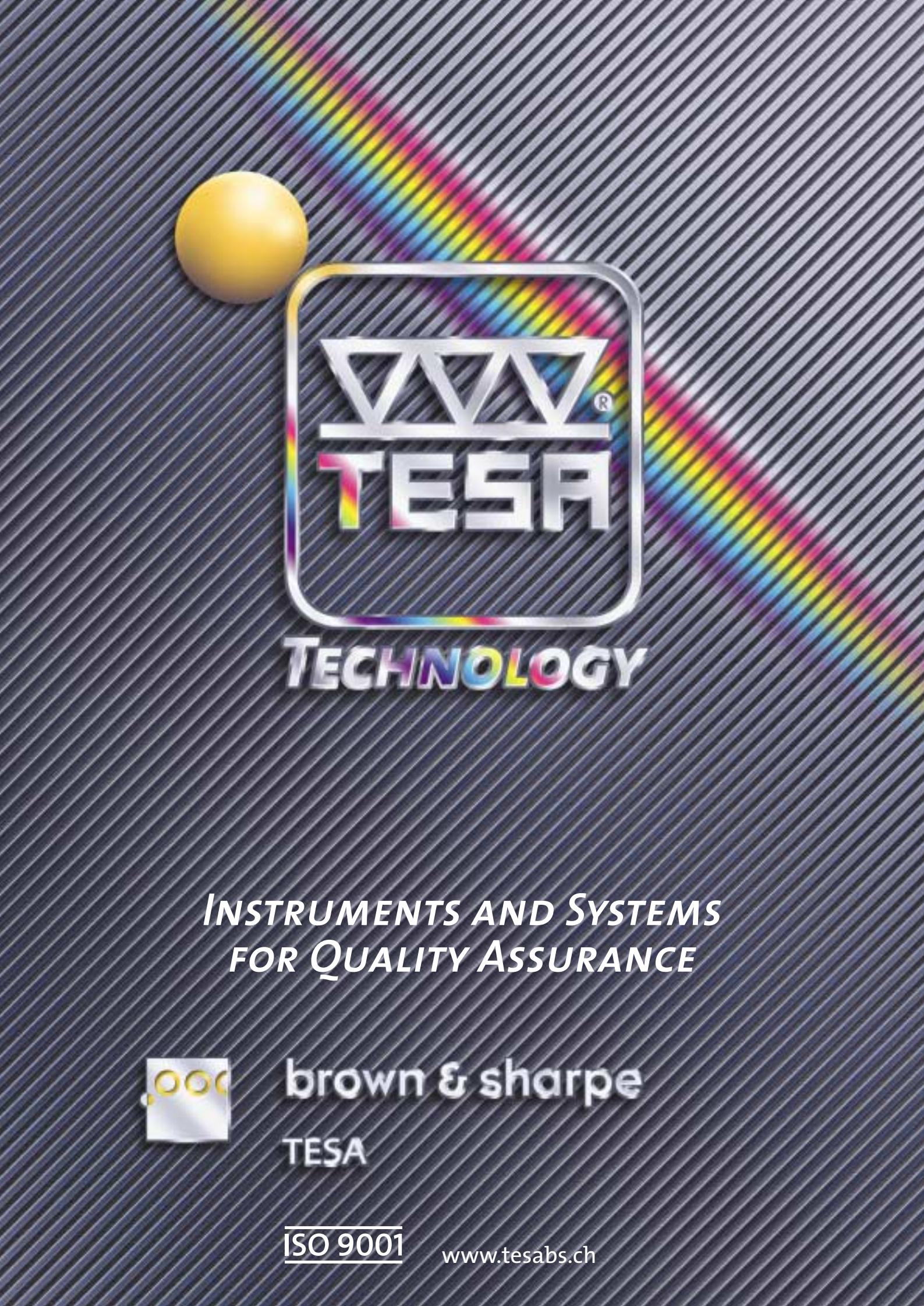


Instruments and Systems for Quality Assurance

brown & sharpe

TESA

ISO 9001

www.tesabs.ch

General Information

Callipers A

External Micrometers and Instrument's Sets B

Internal Measurement C

Measuring Instruments for Large Dimensions D

Electronic Indicators, Dial Gauges and Dial Test Indicators (Lever-Type) E

Comparative Measuring Instruments F

Measuring Supports, Measuring Stands and Auxiliary Fixtures G

Straightness, Angle and Inclination Measurement H

Length and Angle Standards I

Surface Roughness Testing J

Height Gauges K

Electronic Length Measuring Equipments L

Pneumatic Length Measuring Equipments M

Instruments for Optical Measuring N

Calibration Equipments O

Coordinate Measuring Machines P

YESTERDAY TODAY TOMORROW









YESTERDAY:

in 1941 TESA developed and manufactured its first micrometer, which already was a product of the future. The TESA MINMETAL micrometer was the first in a long line of instruments and systems for quality control, that would contribute to the worldwide success of the Swiss company.









TODAY:

the TESA Micromaster is a product of the present – the high-tech electronic micrometer with its patented capa µ system. This instrument shows the long way we have come since our early beginnings. TESA's aim is to strive for innovation and to continually outdo itself.











TOMORROW:

unquestionably, the future will bring higher performance systems, computer-aided inspection, intuitive industrial design – TESA's R & D engineers are already working on these and other challenges.

1941 TESA 2001

Dear Customers,

As a third millennium dawns, TESA will be celebrating sixty years of existence. You can, no doubt, see the progress made since the time when a group of engineers inaugurated a brand name that would, very soon, become a leader in the world of metrology.

What remains from the workshops of those early days in the ultra-modern TESA high-tech manufacturing cells of today? Little, of course, other than the essential! - the pioneering spirit that, over the decades, has resulted in so many innovative achievements and successful products.

In this very complete catalogue, we want to present our range of dimensional measuring instruments and systems that, we are convinced, you will find as indispensable aids in the production of your own quality products.

Antonio Aparicio
General Manager of Brown & Sharpe TESA SA
Vice-President of Brown & Sharpe
success of the Swiss brand.

good brown & sharpe TESA



Sales – Consulting – Services



In 1967, TESA merged with the Brown & Sharpe group in the USA. Since then, the Swiss firm has taken advantage of the synergies within the Group and strengthened its position within Brown & Sharpe.















At present, TESA operates as the headquarter of the PMI (Precision Measuring Instruments division) and has four sales subsidiaries in France, Japan, the UK and the USA. In addition, TESA has more than 60 agents to support its worldwide sales, service and consulting activities.












PMI Headquarter
Subsidiary
Agents

R & D – High Tech – Creativity

The R & D Department, the nerve center of the company, depends on effective use of human and technological resources to meet our future goals. The combination of high technology and industrial design has resulted in unique instruments, that can be easily differentiated from the competitors' products.

Leadtimes for product development and production start-up have been reduced drastically thanks to the widespread usage of computer-aided design as well as the early participation of process engineering specialists in new projects.

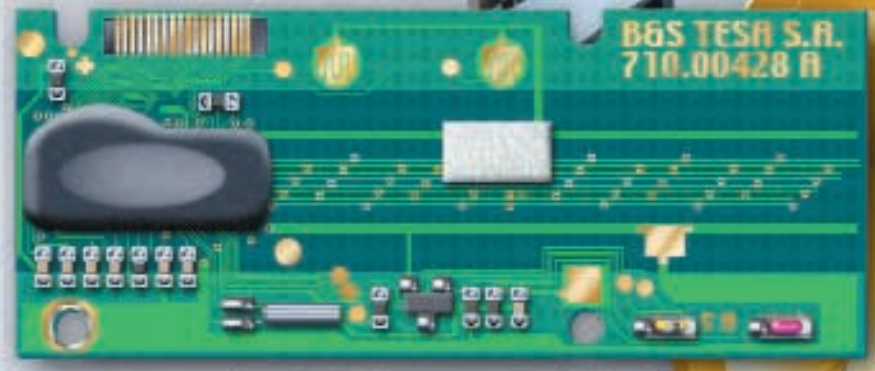



12.000

Label «Swiss Made»

Most of the instruments presented in this catalogue are manufactured in Renens (Lausanne), a competitive advantage as the "Swiss made" label is very highly esteemed by customers all over the world! For this reason, the company's head office has made major investments in ultramodern CNC production facilities. On the world market, TESA products have achieved great success, thanks to new assembly techniques, automation, effective manufacturing engineering processes and know-how acquired over several decades as well as a deeply rooted pioneering spirit.










SSF
SWISS MADE

Quality assurance

Reliability of measuring instruments depend, to a large extend, on quality control during manufacturing. TESA is equipped with inspection equipment to cover all operations of the production process.

The ISO 9001 accreditation on a regular basis is evidence of TESA's commitment to quality. It is also the recognition of a company that is distinguished by the superiority of its products and its pursuit of excellence. Almost all our products are supplied with either a calibration certificate, an inspection report or declaration of conformity.

Customized measuring

Please feel free at any time to get in touch with our Metrology Service, equipped with a wide range of inspection equipment, in case you need an inspection report for a part. The Quality Assurance department of Brown & Sharpe TESA SA will be glad to meet your request.



OFMET
Federal Office of Metrologie

NATIONAL REFERENCE STANDARDS

SAS
Swiss Accreditation service

SCS | STS | SCES | SIS

BVQI





ENAC DKD NCS NKO JTC cofrac ILAC DANAK







New items

Long live innovation! This is be the motto for our Research and Development: we continually develop instruments adapted to the latest inspection processes. We also forecast trends, propose instruments using new measuring systems, participate in technological advances and focus on the future.

Of course, this brief summary does not in any cover the entire spectrum of activities. It is simply intended to introduce you to the basis for our new product development.












micro-hite 900
micro-hite 600
micro-hite 350

Table of Contents by Products

All products are also listed by order numbers on the last pages.

A

Accessories for callipers
- CENTERLINE accessory set A-25
- Depth measuring foot A-25
- Magnetic magnifying glass A-26
- TAIST accessory sets A-26

Accessories for data transfer L-73
Accessories for dial gauges, axial probes etc. E-42
Accessories for dial test indicators (lever-type)
- INTERAPID 312 E-55
- MERCER E-61
- ROCTEST E-57
- TESATAST E-50

Accessories for external micrometers
- Attachments for micrometer ball tips B-16
- Cylindrical setting standards B-24
- Dial gauge element for TESA MICROMASTER and TESA ISOMASTER AB B-8
- ETALON cylindrical step master gauges B-28
- Guide collars for setting standards B-28
- Heat insulating grips B-29
- Interchangeable thread inserts B-26
- Interchangeable anvils for TESA ABY series ISOMASTER B-10
- Micrometer stands B-27
- Plan parallel optical flats B-29
- Setting standards B-28
- Setting standards for screw thread measurement B-26
- XB wires for Screw threads B-27

Accessories for gauge blocks I-11
Accessories for TESA inductive probes L-31
Adjustable parallels, Brown & Sharpe G-18
Air/Electronic Converters, MERCER M-9
Air plug gauges, MERCER M-10
Air ring gauges, MERCER M-14
ALESOMETER «capa µ system», TESA C-10
ALESOMETER mechanical, ROCH C-12
ALESOTEST bore gauges , ROCH F-10
Angle gauge blocks, TESA I-16
Angle gauges, Brown & Sharpe I-18
Angle probe (90 °) for use with dial gauges or the like E-45
Angle protractor combination, Brown & Sharpe H-8
Angle protractor
- with dial, TESA EAC H-7
- with vernier, ETALON H-8

Assembly components, TESANORM L-45
Attachments for micrometer ball tips B-16
Auxiliary fixtures G-14
Axial inductive probes, TESA
Overview of the standard probes L-6
Standard probes
GT 21 / GTL 21 / GTL 211 L-13
GT 22 / GTL 22 L-14
- High-precision probes
GT 21 HP L-13
GT 22 HP L-14
- Probes with long retraction travel
GT 27 / GT 271 / GT 28 L-15
- Probes with extended meas. range
GT 61 / GT 611 / GT 62 L-16

Pressure probes - Overview L-6
Standard probes
GTL 212 / GTL 222, GTL 212-A / GTL 222-A L-17
- Probes with long retraction travel
GT 272 / GT 282, GT 272-A / GT 282-A L-18
- Probes with extended meas. range
GT 612 / GT 622, GT 612-A / GT 622-A L-19

Miniature probes
GT 41 / GT 42 / GT 43 / GT 44 L-20

Axial inductive LVDT probes, TESA
General overview L-10
Standard probes,
GT 21 LVDT L-13
GT 22 LVDT L-14
- Probes with long retraction travel
GT 27 LVDT / GT 28 LVDT L-15
- Probes with extended meas. range
GT 61 LVDT / GT 62 LVDT L-16
- Pressure probes
GT 222 LVDT L-17

Axial inductive probes, TESA
Compatible with ETAMIC, MAHR or MARPOSS electronic equipments L-12
DC probes L-12
Probe accessories
- Measuring inserts L-29
- Measuring force spring sets L-31
- Spare bellows L-31
- Clamping elements L-32
- Manually operated devices for retracting the measuring bolt L-32
- Electropneumatic systems for activating the measuring bolt L-47

Axial inductive probes - MERCER
For MERCER and TESA electronic equipments L-33
- General overview L-34
- 490 / 491 series, standard L-38
- 410 / 411 series with short body L-39
- 510 / 500 / 501 series with long travel L-40
- 460 series without guidance of the measuring bolt L-41
- 492 series, standard with air activation of the measuring bolt L-42
- 160, 430 and 451 series with short body L-43

Axial inductive probes, MERCER
Compatible probes with electronic equipments from other makers L-36
- 490 / 491 series, standard L-36
- 410 / 411 series with short body L-36
- 510 / 500 / 501 series, with long travel L-36
- 460 series with no guidance of the measuring bolt L-36
- 492 series, standard with air activation of the measuring bolt L-36
- 160, 430 and 451 series with short body L-36

B

Backs for precision dial gauges
- ETALON Basic and ROCH E-27
- MERCER Standard and TOP Quality E-46
- TESA YR and YE E-46

Balls (measuring)
- Brown & Sharpe I-19
- TESA I-19

BEVELmeter 1, TESA H-13
BEVELtronic 1, TESA H-13
Bore gauges
ALESOTEST, ROCH F-10

C

Calibration devices for TESA inductive probes and measuring instruments L-65
Calibration equipments for length standards, plug gauges as well as electronic equipments O-2
Callipers A-2
Models with digital indication
- ETALON, 200 to 1000 mm A-6
- INTERAPID «capa µ system», 150 / 200 or 300 mm A-5
- TESA CAL IP 65, 150 mm A-3
- TESA DIGIT-CAL «capa µ system», 150 / 200 or 300 mm A-4

Models with vernier reading
- ETALON, 0 ÷ 150 A-11
- ETALON 117, 0 ÷ 150 / 0 ÷ 300 mm A-10
- ETALON, 0 ÷ 200 / 0 ÷ 2000 mm A-12
- ROCH, 0 ÷ 125 / 0 ÷ 150 A-11
- ROCH, 0 ÷ 125 / 0 ÷ 300 A-10
- ROCH, 0 ÷ 200 / 0 ÷ 2000 A-12
- TESA CC, 0 ÷ 150 mm A-10
- TESA SWISSCAL 2, 0 ÷ 150 mm A-10

Models with dial
- EAGLE, 0 ÷ 200 / 0 ÷ 300 mm A-9
- ETALON 125, 0 ÷ 150 mm A-8
- TESA CCMA-M, 0 ÷ 150 mm / 0 ÷ 300 mm A-7
- TESA CCMA-P, 0 ÷ 150 mm A-9

Models for grooves, ETALON and ROCH A-23
Models for gear tooth, ETALON and ROCH A-23
Models for scribing, ETALON and ROCH, 0 to 300 / 0 to 2000 mm A-24
Models with very long jaws, ROCH A-21
Models with knife-edge measuring faces for internal dimensions, ETALON and ROCH, 0 ÷ 250 mm A-22
Models with hook jaws, ETALON and ROCH, A-21

Calliper gauges for internal / external dimensions, ETALON, 0,01 mm or 0,02 mm F-18
capa µ system for
External micrometers
- TESA MICROMASTER
–in standard versions B-3
–in special versions (from page) B-8

Micrometer heads
- TESA MICROMASTER B-30

Internal micrometers
• TESA ALESOMETER C-10
• TESA IMICRO C-3
Callipers
• TESA DIGIT-CAL A-4
• INTERAPID A-5
Depth callipers
• INTERAPID A-15
Depth micrometers
• TESA MICROMASTER B-32
CAPAX 2000, ETALON and ROCH K-19
CCMA-M, TESA A-7
CCMA-P, TESA A-9
CENTERLINE, Brown & Sharpe A-25
CENTER FINDER, Brown & Sharpe G-14
Centring devices for TESA IMICRO C-9
CLEARLINE 2, MERCER M-7
ClinoBEVEL 1 and 2, TESA H-11
Combination of angle protractors, Brown & Sharpe H-8
Comparative measuring instruments F-1
• ALESOTEST, ROCH F-10
• INOTEST, TESA D-6
• INTERAPID IRA 2 F-16
• QUICK-CONTROL, TESA F-15
• SHE.30 and SHE.35, INTERAPID F-13
• TESADIA F-12
• VERIBOR, TESA F-7
• YA, TESA F-3
Computing counters
• ETALON EG - C 60 L-70
• HEIDENHAIN ND 231 O-7
• HEIDENHAIN ND 281 O-17
• QUADRA-CHEK 120 for ETALON TCM 100 N-6
• QUADRA-CHEK 220 for ETALON TCM 100 and TCM 200 N-6
• QUADRA-CHEK 220, 230 and 231 for ETALON TCM 200 N-15
• SMART DRO I and PM for ETALON PP 300 profile projector N-23
• TESA TG - C 10 and TG - C 11 L-67
Connecting cables for
• Data transfer L-73
• Electronic levels L-75
Control panels «1D» and «POWER PANEL» for TESA MICRO-HITE K-12
Coordinate measuring machine, ETALON DERBY 454 P-2
Crankshaft dial gauges, ROCH F-24

D

Depth callipers
Models with digital indication
• ETALON, 25 / 200 / 250 / 300 / 350 and 500 mm A-16
• INTERAPID «capa µ system», 200 and 300 mm A-15
Models with vernier reading
• ETALON, 0 ÷ 150 / 0 ÷ 500 mm A-18
• ETALON with vee bridge for measuring groove depth A-22
• ROCH, 0 ÷ 80 / 0 ÷ 500 mm A-18
Depth measuring foot for callipers A-25
Depth measuring feet for dial gauges, INTERAPID G-14
Depth micrometers
• MICROMASTER, electronic B-32
• ISOMASTER AQ, TESA B-33
DERBY, ETALON P-2
Dial bevel protractor, TESA H-7
Dial gauge element for micrometers B-8
Dial gauge accessories E-42
Dial gauges / Dial test indicators (lever-type) E-1
Dial gauges, mechanical E-10
ETALON Basic
• Regular models along with models with a long span
ø 40 and ø 58 mm to 0,01 mm E-22
ø 58 mm to 0,01 or 0,001 mm E-21
MERCER precision dial gauges standard series 180
• ø 40 mm to 0.001 in or 0.0005 in 0.01 mm or 0.001 mm E-32
• ø 58 mm 0.001 in or 0.0005 in 0,01 mm, 0,002 mm, 0,001 mm E-33
• ø 58 mm with long span 0.001 in or 0.005 in E-34
0,1 mm or 0,01 mm E-35
Standard series 70
• ø 1 1/8 in / 29 mm 0.001 in or 0.0001 in 0,01 mm or 0,002 mm E-36
Standard series 90 with back plunger
• ø 1 1/12 in / 38 mm 0.001 in or 0,01 mm E-37
TOP Quality series S
• ø 40 mm 0.001 in, 0.0005 in or 0.0001 in 0,01 mm, 0,002 mm, 0,001 mm E-39
TOP Quality series
• 58 mm dia. 0.0005 in or 0.0001 in 0,01 mm, 0,002 mm, 0,001 mm E-40
TOP Quality series L
• ø 80 mm 0.0005 in or 0.0001 in 0,01 mm or 0,002 mm E-41
ROCH Precision dial gauges
• C 40, C 58 and C 80 to 0,1 mm E-29
• C 40 to 0,01 mm E-23
• C 58 and C 60 to 0,01 mm E-24
• C 80 to 0,01 mm E-25
• C 58, C 60 and C 80 with long measuring span to 0,01 mm E-25
• C 40 to 0,001 mm E-27
• C 58 and C 80 to 0,001 mm E-28
0.001 in, 0.0005 in or 0.0001 in 0,01 mm, 0,002 mm, 0,001 mm E-39
ROCH Precision dial gauges with back plunger
C 40 and C 58 to 0,01 mm E-30
TESA precision dial gauges YE
• ø 40 mm to 0,01 mm E-17
• ø 58 mm to 0,01 mm E-17
• ø 82 mm to 0,01 mm E-18
• long-span models to 0,01 mm E-18
• ø 40 and ø 58 mm to 0,001 mm E-20
TESA Precision dial gauges YR E-10
• ø 40 mm to 0,01 mm E-11
• ø 57 or ø 58 mm to 0,01 mm E-12
• ø 82 mm to 0,01 mm E-13
• ø 40 mm to 0,001 mm E-14
• ø 57 or ø 58 mm to 0,001 mm E-15
• ø 82 mm to 0,001 mm E-16
Dial test indicators (lever-type)
• ETALON Basic E-51
• INTERAPID 312 E-52
• MERCER
–Series 300 E-58
–TOP Quality E-60
• ROCTEST E-56
• TESATAST E-47
Dial thickness gauges, INTERAPID
• for film thickness, 0,001 mm F-22
• with deep throat, 0,01 mm F-21
• with increased throat depth, 0,1mm F-21
• with open inserts, 0,1 and 0,01mm F-22
• with roller inserts, 0,01 mm F-19
• small-sized models, 01 and 0,001 mm F-19
• standard models F-20
DIGICO electronic indicators, TESA E-3
Digital length measuring systems
• ETALON EG L-70
• TESA TG L-67
Digital probes
• ETALON EG - 10 and EG - 30 L-71
• TESA TG 30 and TG 60 L-68
Digital scale units, ETALON 150 to 1000 mm A-20
DIGIT-CAL «capa µ system», TESA A-4
DUO-Set, TESA B-35

E

EAGLE, callipers A-9
Edge squares (bevelled)
• ETALON H-5
• ROCH H-6
Electronic indicators
TESA DIGICO 1 and 2 E-5
TESA DIGICO 10, 11 and MIN/MAX E-7
TESA DIGICO 20 E-3
Electronic length measuring instruments
• for inductive probes
• TESAMODUL L-58
• TESATRONIC - Overview L-48
• TESATRONIC TT 10 L-49
• TESATRONIC TT 20 and TT 60 L-50
• TESATRONIC TT 80 L-52
• TESATRONIC TTA 20 L-53
• TESA TT 300 L-54
• MERCER EL 300 L-54
• Calibration devices L-65
Electronic measuring instrument ETALON ET-1 L-63
Electronic length measuring equipments
• analogue L-2
• digital L-66
Electropneumatic devices for the retraction of the measuring bolt L-47
Engineer's parallels
• in pairs, TESA G-16
• in sets, Brown & Sharpe G-17
ETALON EG L-70
ETALON ET-1 L-63
ETALON RA H-10
ETALON POLO O-16
ETALON calliper gauges F-18
ETALON Set Basic B-34
ETALON TCM 50 N-3
ETALON TCM 100 N-5

ETALON TCM 200 N-10
ETALON PP 300 N-21
ETALON RA
for squareness measurement H-10
External micrometers B-1
Standard models
• ETALON Basic, 0,001 mm
0 ÷ 100 mm B-5
• ETALON Basic to 0,01 mm
0 ÷ 100 mm B-7
• ETALON 260, 0 ÷ 300 mm B-5
• ISOMASTER, TESA, 0 ÷ 300 mm B-6
• MICROMASTER, electronic,
0,001 mm, 0 ÷ 300 mm B-3
• Microrapid 226, ETALON
0 ÷ 100 mm B-4
• TESAMASTER, 0 ÷ 300 mm B-4
Models with dial gauge element,
ABY series ISOMASTER
0 ÷ 1500 mm B-10
Models with dial indicator
• MICRO-ETALON 225 B-12
Models with mobile anvil
• ETALON MICROSPEL 280
0 ÷ 50 mm B-11
Models with interchangeable anvils
0 ÷ 1500 mm
• MICROMASTER, electronic B-8
• ISOMASTER AB B-9
Models with 2 interchangeable anvils
• ETALON Basic, 0 ÷ 50 mm B-22
Models with interchangeable inserts
• MICROMASTER, electronic
0 ÷ 55 mm B-19
• ETALON Basic, 0 ÷ 100 mm B-20
Models for gear tooth measurement
• MICROMASTER, electronic
0 ÷ 115 mm B-18
• ISOMASTER AE, 0 ÷ 150 mm B-18
Models with a large anvil
• ISOMASTER AT, 0 ÷ 50 mm B-21
Models with 60 ° and 108 ° prismatic
measuring faces, 1 ÷ 105 mm
• MICROMASTER, electronic B-23
• ISOMASTER AS B-24
Models with small measuring faces
• MICROMASTER, electronic
0 ÷ 120 mm B-13
• MICRORAPID with a 1 mm
thread pitch, 0 ÷ 20 mm B-14
• ISOMASTER AD, 0 ÷ 50 mm B-13
• TESAMASTER AD, 0 ÷ 50 mm B-14
Models for soft materials
• ISOMASTER AF, 0 ÷ 25 mm B-17
• MICROMASTER, electronic
0 ÷ 55 mm B-17
Models with 1 spherical meas. face
• MICROMASTER, electronic
0 ÷ 50 mm B-15
• ETALON, 0 ÷ 25 mm B-15
Models with 2 spherical meas. faces
• MICROMASTER, electronic
0 ÷ 100 mm B-15
• ISOMASTER AAS, 0 ÷ 100 mm B-16
Models for threads, 0 ÷ 150 mm
• ISOMASTER AC B-25
• MICROMASTER, electronic B-25
Model for wall thickness,
ETALON Basic, 0 ÷ 25 mm B-22
Model for wire measurement
ISOMASTER AN, 0 ÷ 10 mm B-21

F

Flat and try squares
• ETALON H-3
• ROCH H-4
Flexible steel rules, ROCH G-18

G

GagePort interfacing modules L-75
Gauge block comparators, TESA
• General overview O-3
• Single and dual template system O-5
• TESA UPC for comparative
measurements
–UPC ordering variations O-9
–UPC system components O-12
• TESA UPD with a 25 mm
measuring span O-4
–UPD ordering variations O-6
–UPD system components O-7
• Software programmes for value
processing
–TESA UP (WINDOWS) O-14
–TESA UPC (MS-DOS) O-10
• Gauge blocks for the comparator
calibration O-14
• TESA UPT temperature devices O-15
Gauge blocks I-2
Gauge blocks sets
ETALON Basic steel sets, metric
• Nominal lengths up to 100 mm I-4
TESA steel, tungsten carbide and
ceramic sets I-5
• Nominal lengths up to 100 mm I-6
• Nominal lengths over 100 mm I-8
• Nominal lengths up to 4 in I-8
• Nominal lengths over 4 in I-10
TESA Mikechex sets for external
micrometers
• Metric sets I-7
• Inch sets I-9
TESA with round section I-13
• Metric sets I-14
• Inch sets I-15
• Accessories I-15
Gauge block accessories, TESA I-11
Toggle clamp for long series I-11
Maintenance kit I-12
Optical flats I-12
Light unit, monochromatic I-13
Guide collars for setting gauges B-28

H

Heat insulating grips for
external micrometers B-29
Height gauges K-2
ETALON and ROCH
• CAPAX 2000 K-19
• Optional accessories K-22
TESA
• MICRO-HITE 100 K-3
• TESA-µHITE K-6
• MICRO-HITE 350 / 600 / 900 K-9
• TESA-HITE plus 350 / 600 K-14
• TESA-HITE 350 / 600 K-14
• Optional accessories for TESA
MICRO-HITE, TESA-HITE plus … K-17
Height and scribing gauges with
• vernier reading, ETALON K-24
• circular scale K-24
• digital indication, ETALON K-24
Horizontal measuring benches
• ETALON, POLO O-16
• INTERAPID SHE.30 for internal
dimensions F-13
• INTERAPID SHE.35 for external
dimensions F-14

I / J / K

IMICRO «capa µ system», TESA C-3
IMICRO, TESA C-6
Inclinometers, TESA
• BEVELtronic 1 H-13
• BEVELmeter 1 H-13
• ClinoBEVEL 1 and 2 H-11
• MICROBEVEL 1 H-12
• NIVELTRONIC, TESA H-14
• Connecting cables L-75
• Service set H-13
Inductive probes
–also see under axial probes
TESA probes
• Overview L-6
• Probes compatible with ETAMIC,
MAHR and MARPOSS L-12
• DC probes L-12
• Calibrating standards L-65
MERCER probes L-33
• General overview
–Probes for both MERCER and
TESA electronic equipments L-34
–Probes compatible with
equipments form other makers L-36
Probes with parallel guiding
TESA FMS standard, inductive
• Overview L-8
• Probes with parallel cable exit
FMS 100 / FMS 130 / FMS 100-P
FMS 130-P L-23
• Probes with angled cable exit
FMS 102 / FMS 132 /
FMS 102-P / FMS 132-P L-24
FMS probes, type LVDT, TESA
• Overview
• Probes with parallel cable exit
FMS 100 LVDT / FMS 100-P
LVDT L-23
• with angled cable exit
FMS 102 LVDT / FMS 102-P
LVDT L-24
DC probes L-12
Use of FMS probes L-25
Accessories for FMS probes L-26
INOTEST, TESA D-6
Instrument sets
• Try square set, Brown & Sharpe H-5
• External micrometers
–ETALON Basic B-7
–TESA ISOMASTER B-6
• TESATAST dial test indicators
with small measuring stand E-49
• INTERAPID 312 dial test indica-
tors, complete with accessories E-54
• ETALON bevelled straight edges
with a flat square H-7
• Callipers and external micrometers B-34
Interface boxes for inductive probes
• BPI Series L-60
• BP 880 Series L-62
• M4P-2 Series L-62
Internal measurement C-1
Internal measuring instruments and
micrometers for threads
• TESA TRIOMATIC, electronic C-14
• TESA TRI-O-BOR, mechanical C-17

Contents

Internal micrometers for large dimensions
- ETALON 532 D-8
- TESA UNIMASTER D-4
- TESA UNITEST D-3

Internal micrometers, electronic «capa µ system»
- TESA ALESOMETER C-10
- TESA IMICRO C-3

Internal micrometers, mechanical
- ETALON INTALOMETER 531 C-21
- ROCH ALESOMETER C-12
- TESA IMICRO C-6
- TESA TRI-O-BOR C-17

INTALOMETER 531 , ETALON C-21
INTERAPID 312 E-52
INTERAPID SHE.30 and SHE.35 F-13
INTERAPID thickness gauges F-19
INTERAPID IRA 2 F-16
ISOMASTER, TESA B-6

L

Large dimension measurement D-1
Length and angle standards I-1
Levels and inclinometers, TESA H-17
- Square model with pivoting vial H-18
- Frame model with turning vial H-18
- Model with micrometer element H-18

Inclinometers, electronic, TESA
- BEVELtronic 1 H-13
- BEVELmeter 1 H-13
- ClinoBEVEL 1 and 2 H-11
- MICROBEVEL 1 H-12
- NIVELTRONIC, TESA H-14
- Connecting cable L-75
- Service set H-13

Lever probes (inductive), TESA L-8
GT 31 inductive probe L-21
Lever probes (inductive), MERCER
- General overview L-34
- Series 420 and 499 for both MERCER and TESA electronic equipments L-44
- Compatible probes with electronic equipments from other makers L-36

Lever probe for MERCER series 90 dial gauges E-38

M

Magnetic supports for dial gauges etc. G-4
Magnetic magnifying glass A-26
Magnifiers, ROCH
- Hand-held magnifier G-20
- Table model with ring light G-20

Maintenance kit for gauge blocks I-12
Measuring balls, TESA and Brown & Sharpe I-19
Measuring benches
–see under horizontal measuring benches
Measuring inserts for dial gauges, axial probes etc.
- with a M2,5 coupling thread E-42, E-29
- with M2 coupling thread E-44, L-30

for dial test indicators (lever-type)
- INTERAPID 312 E-55
- MERCER E-61
- ROCTEST E-56
- TESATAST E-49

for height gauges
- TESA-µHITE K-7
- TESA MICRO-HITE K-17
- TESA-HITE K-17

for external micrometers used for thread measurements B-26
Measuring microscopes
ETALON TCM 50 N-3
ETALON TCM 100 N-5
- Optional accessories N-7

ETALON TCM 200 N-10
- Ordering variations N-11
- Main instruments - overview N-12
- Components - general overview N-13
- Main instruments N-14
- Measuring tables N-15
- Cold light sources N-15
- Systems for value processing N-15
- Accessories for metrology based applications N-16
- Accessories for surface structure examination N-18
- Video systems N-20

Clamping components N-9
Measuring stands, INTERAPID
- UA 1 simple model G-7
- UA 30 for mounting specific workpiece attachments G-8
- Models with granite meas. tables G-9
- Model with small,meas. table in hardened steel G-8
- Model with a 100 x 100 mm meas. table in hardened steel G-9
- UM 20 small-sized model G-10
- UP universal models G-11

Measuring supports, INTERAPID
Magnetic
- Small models
  –UJ 15 and UJ 15G G-3
  –with articulated arm G-3
- Standard models G-4
  –with articulated arm G-5
  –with flexible arm G-5
  –with a flat or vee base G-4
  –with powerful holding force G-4

Model with suction base G-6
Other models
- Small execution G-6
- Standard execution G-6
- UD 12 universal G-7

MEMOPRINT, TESA L-57
MEMOTAST special, TESA K-13
MERCER EL 300 L-54
MERCER probes
–see under inductive probes L-33
MERCER air gauging systems
–see under pneumatic length measuring systems M-1
MERCER MULTI-WAY CLEARLINE M-8
MICROBEVEL 1, TESA H-12
MICRO-ETALON 225 B-12
MICRO-HITE 100, TESA K-3
MICRO-HITE 350 / 600 / 900, TESA K-9
MICROMASTER «capa µ system» B-3
MICRORAPID 226, ETALON B-4
MICROSPEL 280, ETALON B-11
Mikechex, TESA I-7
Micrometers
- External micrometers B-3
- Internal micrometers C-3
- Depth micrometers B-32

Micrometer heads
- MICROMASTER, electronic, 0 ÷ 30 mm, 30 ÷ 0 mm B-30
- ISOMASTER AR, 0 ÷ 25 mm B-30
- TESAMASTER AR, 0 ÷ 25 mm B-31
- ETALON Basic, 0 ÷ 25 mm B-31
- ETALON 266, 0 ÷ 25 mm B-32

MICRO-ETALON 225 B-12
Micrometer stands B-27
Microscopes
–see under Measuring microscopes
Monochromatic light unit, TESA I-13

N

NIVELTRONIC, TESA H-14

O

Optical flats
–TESA I-12
–Plan parallel B-29
Optical measuring N-1

P

Periphery tapes, Roch D-8
Plug gauge, TESADIA F-12
Pneumatic length measuring systems,MERCER M-1
- Introduction M-2
- Operating principle M-3
- Key features M-4
- Possible configurations M-5
- How to order or ask for a quotation M-6

Pneumatic gauge units
- MERCER CLEARLINE 2 M-7
- MERCER MULTI-WAY CLEARLINE M-8
- MERCER Air/Electronic Converter M-9

Pneumatic, contactless sensors, MERCER
- Air plug gauges M-10
- Air ring gauges M-14
- Setting standards M-16
- Additional components M-17

POLO, ETALON O-16
Positioning block set, Brown & Sharpe G-15
POWER PANEL for TESA MICRO-HITE 350 / 600 / 900 K-12
Precision dial gauges, TESA
- YE
  40 and 58 mm dia. to 0,001 mm E-20
- YR
  40 mm dia. to 0,001 E-14
  57 or 58 mm dia. to 0,001 mm E-15
  82 mm dia. to 0,001 mm E-16

Precision dial gauges, ETALON and ROCH to 0,01 and 0,001 mm E-31
Printer units
- TESA PRINTER SPC L-56
- TESA MEMOPRINT L-57

Probe interface boxes for TESA inductive probes
- BPI series L-60
- BP 880 series L-62
- M4P-2 SERIES L-62

Profile projector, ETALON PP 300 N-21
- Main components N-22
- Optional accessories N-24

Protractor spirit inclinometers H-17
- with pivoting or turning vial H-18
- with micrometer element H-18

Q

QUICK-CENTER, TESA K-18
QUICK-CONTROL, TESA F-15

R

Radius gauges, ROCH G-19
Retraction devices for dial gauges or the like E-45
ROCH interface MULTI-4V L-76
ROCTEST dial test indicators E-56
Roughness comparison specimens J-3
RUGOSURF, TESA J-5
RUGOTEST J-3

S

Scales units A-20
Screw pitch gauges G-19
Service set 1 for fitters H-13
Set of bevelled straight edges and flat square, ETALON H-7
Set of external micrometers, 0 ÷ 100 mm
- TESA ISOMASTER B-6
- ETALON Basic B-7

Set of clamping components for measuring microscopes and profile projectors N-9
Sets of measuring instruments –see under instrument sets
Set of try squares, Brown & Sharpe H-5
Set of bevelled straight edges with a flat square, ETALON H-7
Setting plugs for air ring gauges M-17
Setting rings for
- internal micrometers C-24
- air plug gauges M-16

Setting standards
- for external micrometers B-28
- for screw thread micrometers B-26
- cylindrical for diameters 5 ÷ 85 mm B-24
- cylindrical step master gauges B-28

Sine bar, Brown & Sharpe H-5
Spirit levels, TESA
- Model with micrometer element H-17
- Precision models H-16
- Precision frame models H-16
- Precision magnetic square models H-17
- Screw-on models H-15

Spirit inclinometers (protractor type), TESA H-17
- Model with frame and turning vial H-18
- Model with micrometer element H-18
- Square model with pivoting vial H-18

Squares H-3
Steel rules, ROCH G-18
Straightness, angle and inclination measurement H-1
Straight edges (bevelled), ETALON and ROCH H-3
Surface roughness testing J-2
SWISSCAL, TESA A-10
SWISS Set, TESA B-34

T

TAIST accessory set for callipers A-26
Temperature devices for gauge block comparators and other metrology applications. TESA UPT O-15
Template gauges, ROCH
- for thickness G-19
- for radii G-19
- for screw pitches G-19

TESA electronic probes –see under TESA inductive probes L-6
TESA Swiss Set B-34
TESA Duo-Set 1 to 12 B-35
TESA-µHITE K-6
TESADIA F-12
TESA-HITE plus, TESA-HITE K-14
TESAMASTER B-4
TESA MEMOPRINT L-57
TESAMODUL L-58
TESANORM L-45
TESA PRINTER SPC L-56
TESATAST E-47
TESA TG L-67
TESA TRI-O-BOR C-17
TESA TRIOMATIC C-14
TESATRONIC L-48
TESA TT 300 L-54
Try Squares
- ETALON H-3
- ROCH H-4
- Brown & Sharpe H-5

Thickness gauges, ROCH G-19
Thickness gauges with dial INTERAPID
- Small-sized model to 0,1 or 0,01 mm F-19
- with roller inserts to 0,01 mm F-19
- Standard models to 0,1 or 0,01 mm F-20
- with deep throat to 0,01 mm F-21
- with increased throat depth, 0,1 mm F-21
- for thin film measurement to 0,001 mm F-22
- with open measuring inserts to 0,1 or 0,01 mm F-22

Three-wire method for thread measurements B-27
Thread inserts for external micrometers B-26
Thread wires, XB B-27
Toggle clamp for long series gauge blocks I-11
Toolmaker's squares, ETALON H-6

U

UNIMASTER, TESA D-4
UNITEST, TESA D-3
Universal instruments for internal and external dimensions
- TESA QUICK-CONTROL F-11

Universal instruments for large dimensions
- TESA UNIMASTER D-4
- ETALON ZEDURAM D-9

V / W

Vacuum pumps for retracting the measuring bolts, electropneumatic L-47
V-blocks and clamps, Brown & Sharpe G-15
Vernier callipers –see under callipers with vernier
VERIBOR, TESA F-7

X

XB wires for screw threads B-27

Y

YA internal measuring instruments, TESA F-3
YE precision dial gauges, TESA E-17
YR precision dial gauges, TESA E-10

Z

ZEDURAM, ETALON D-9

Quantities and Units

International System of Units (SI)

G: Internationales Einheitensystem (SI)
F: Système international d'unités (SI)

Quantity	SI base unit Name	Symbol
length	metre	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity	candela	cd

Derived unit (of measurement)

G: Abgeleitete Einheiten
F: Unités dérivées

Quantity	Unit Name	Symbol	Relationship to SI base unit
plane angle	radian	rad	1 rad = 1 m / m 1 rad = 57,295 779 51 °
frequency	hertz	Hz	1 Hz = 1 s^{-1}
force	newton	N	1 N = 1 m kg s^{-2}
pressure	pascal	Pa	1 Pa = 1 m^{-1} kg s^{-2}
power	watt	W	1 W = 1 m^2 kg s^{-3}
electr. potential	volt	V	1 V = 1 m^2 kg s^{-3} A^{-1}

Multiple and fractions of units expressed in the SI base unit, the «metre»

Unit	Symbol		m	cm	mm	µm	nm
kilometre	km	1^3 m	1000 m		1 000 000 mm		
metre	**m**	**1 m**	**1 m**	**100 cm**	**1 000 mm**	**1 000 000 µm**	
decimetre	dm	10^{-1} m	0,1 m	10 cm	100 mm	100 000 µm	
centimetre	cm	10^{-2} m	0,01 m	1 cm	10 mm	10 000 µm	
millimetre	**mm**	**10^{-3} m**	**0,001 m**	**0,1 cm**	**1 mm**	**1 000 µm**	**1 000 000 nm**
tenth millimetre		10^{-4} m	0,000 1 m		0,1 mm	100 µm	100 000 nm
hundredth millimetre		10^{-5} m	0,000 01 m		0,01 mm	10 µm	10 000 nm
micrometre	**µm**	**10^{-6} m**	**0,000 001 m**		**0,001 mm**	**1 µm**	**1 000 nm**
tenth micrometre		10^{-7} m	0,000 000 1 m		0,000 1 mm	0,1 µm	100 nm
hundredth micrometre		10^{-8} m	0,000 000 01 m		0,000 01 mm	0,01 µm	10 nm
nanometre	nm	10^{-9} m	0,000 000 001 m		0,000 001 mm	0,001 µm	1 nm

Definition of the metre

G: Meterdefinition – F: Définition du mètre

«The metre is defined as the distance travelled by light in vacuum during a time of 1/299 792 458 of a second».

17th General Conference on Weights and Measures, 1983

Reference temperature

G: Bezugstemperatur – F: Température de référence

For measuring instruments and workpieces, this temperature is fixed at 20 °C by ISO R1.

The temperature of 20 °C is understood to be valid for any size, material measure, measurement result etc., unless otherwise specified.

Operations

Inspecting

G: Prüfen – F: Contrôler

Determining whether a test object complies with the specified requirements (e.g. as regards dimensions and form).

Measuring

G: Messen – F: Mesurer

Obtaining a value (e.g. of a length) measured by comparison against a measurement standard (e.g. material measure).

Calibrating

G: Kalibrieren – F: Etalonner

Establishing the actual deviation from the desired value of a measuring instrument. This is usually done through measurement operations. The result of a calibration is documented in the form of a calibration certificate and can be used later on for adjustment purposes, for instance.

Indications

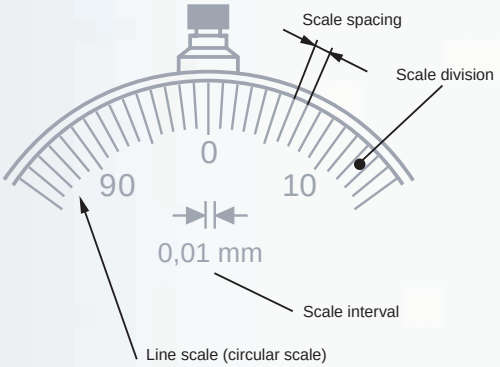
Indication

G: Anzeige – F: Indication

The indication, which provides the information about the measured value, is directly perceptible by human senses. It may be optical, acoustic or based on any other output feature.

Displaying devices may either have a digital or analogue as well as any special indication.

The indication corresponds to the material measures used.



Scale indication

G: Skalenanzeige – F: Indication de l'échelle

The scale indication is the readable position of a scale mark on a line scale.

Line scale

G: Strichskale – F: Echelle à traits

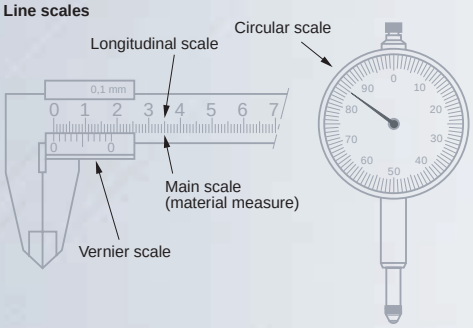
A line scale (graduation) is the successive number of graduation on a scale.

Scale spacing

G: Teilstrichabstand
F: Longueur d'une division (d'échelle)

The scale spacing, expressed in length units, is the distance between two successive scale marks measured along the same line as the scale length (e.g. the end of the pointer).

Line scales



Scale division

G: Skalenteil – F: Division d'échelle (échelon)

Part of a scale between two successive scale marks.

Scale interval

G: Skalenteilungswert
F: Echelon, valeur d'une division (d'échelle)

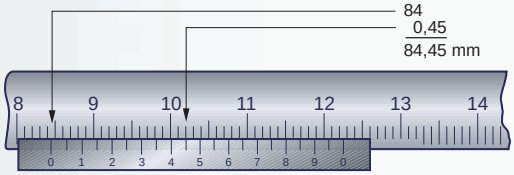
The scale interval is the difference between the values corresponding to two successive scale marks. This characteristic is expressed in the units marked on the scale.

Vernier interval

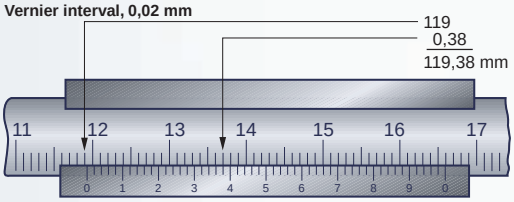
G: Noniuswert – F: Valeur du vernier

The vernier interval is the change in the value of the measurand, which in turn changes the indication by one scale division of the vernier scale.

Vernier interval, 0,05 mm



Vernier interval, 0,02 mm



Numerical (digital) indication

G: Ziffernanzeige – F: Indication numérique

The numerical indication is shown in the form of a digit (succession of digits).

Numerical scale

G: Ziffernskale
F: Echelle numérique

A numerical scale is a succession of digits (usually 0 to 9). On a multi-scale, the single numerical scales are arranged side by side in a decimal fraction.

Numerical division

G: Ziffernschritt – F: Pas (échelon) numérique

The numerical division is the difference between two successive digits from their last position on a numerical scale.

Numerical interval

G: Ziffernschrittwert
F: Valeur du pas (échelon) numérique

The numerical interval is the change by one numerical value of the indication. This characteristic, which corresponds to the scale interval, is expressed in the units of the measurand.

Metrological Definitions

Range of indication

G: Anzeigebereich – F: Etendue d'indication

The range of indication lies between the highest and the smallest indication of a measuring instrument.

Measuring range

G: Messbereich – F: Etendue de mesure

The measuring range of an indicating measuring instrument is the range of the measured values within which the maximum permissible errors cannot be exceeded.

Maximum permissible errors may differ from a measuring range to another where measuring instruments have several measuring ranges.

The measuring range, which is part of the range of indication, may be contained within the whole range of indication.

Measuring span

G: Messspanne – F: Champ de mesure

The measuring span corresponds to the difference between the first and last value of the measuring range as specified.

Displacement range

G: Verstellbereich – F: Etendue de déplacement

The displacement range is the measurand related range within which the measuring range can be displayed.

Application range

G: Anwendungsbereich – F: Etendue d'application

The application range is equal to the sum of both displacement and measuring ranges.

Note: Each range is distinguished by its first and last values.

Measurand

G: Messgröße – F: Mesurande

Physical quantity pertaining to the measurement. In other words, the measurand is the length or the angle as measured or to be measured.

Measured value

G: Messwert – F: Valeur mesurée

This value is the result of a measurement. It is, therefore, associated with the measurand and further allocated to the output feature (e.g. indication) of a measuring instrument or device. A measured value is expressed as the product of both numerical value and unit.

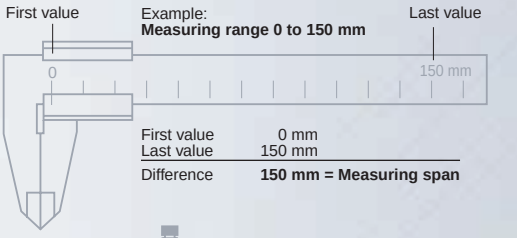
The measured value is made up of the true value as well as the random and systematic errors.

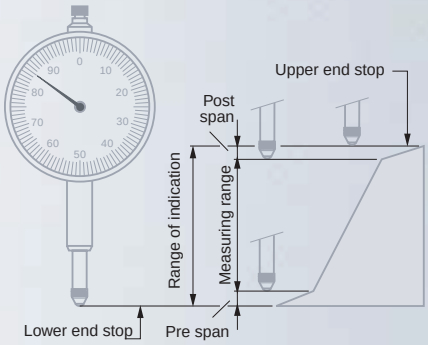
Result of measurement

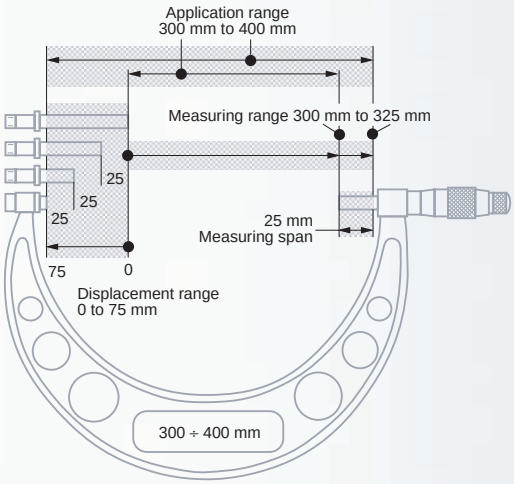
G: Messergebnis – F: Résultat de mesure

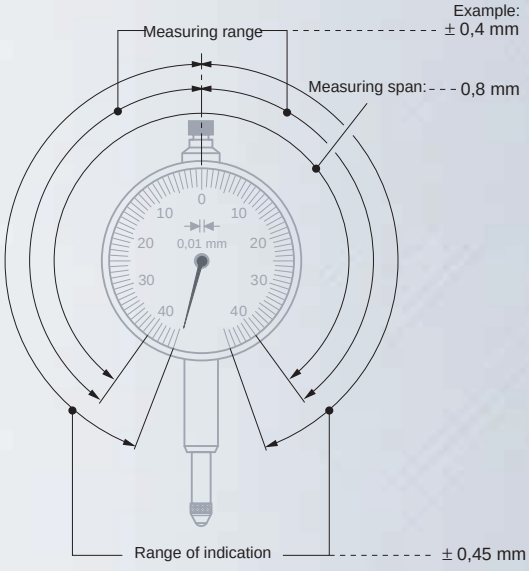
The result of measurement is the product of a measured value corrected on the basis of the known systematic errors.

This result is further increased by the uncertainty of measurement, which includes the random as well as the unknown systematic errors.









Repeatability

G: Wiederholbarkeit – F: Répétabilité (fidélité)

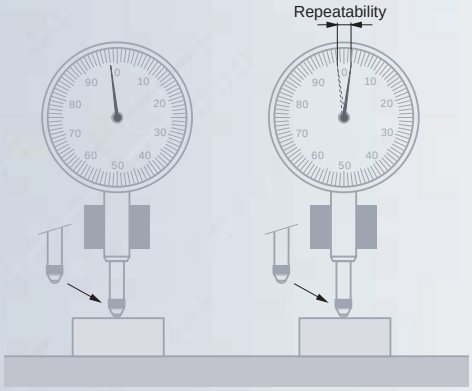
Ability of a measuring instrument to provide closely similar results for repeated measurements of the same measurand carried out in the same measuring direction. Repeatability may be expressed quantitatively in terms of dispersion characteristics.

Repeatability limit

G: Wiederholgrenze – F: Répétabilité limite

Limiting value for repeatability. The repeatability limit states the difference between single values measured under the same measuring conditions. This characteristic applies to a given probability of 95%.

The repeatability limit corresponds quantitatively to the existing definition of the repeatability.



Maximum permissible errors

G: Fehlergrenze G
F: Erreurs maximales tolérées (d'un instrument de mesure)

These errors are extreme values for both upper and lower tolerance limits of a measuring instrument. In practical metrology, these are usually symmetrical errors, which are indicated by a single value without sign.

The conditions for the maximum permissible errors are given or they may need to be specified. For instance, they may be valid for both one or two measuring directions as well as for a local or a whole measuring span, respectively a local or a whole measuring range of a measuring instrument (see page B-2 and E-2).

Hysteresis

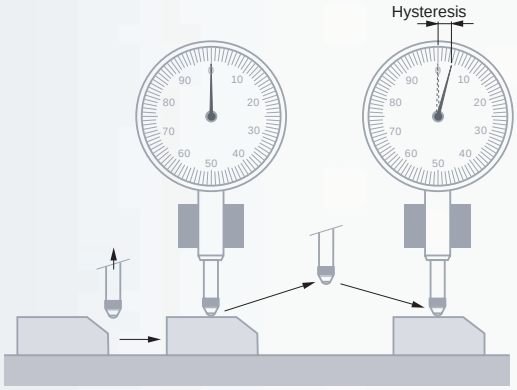
Ability of a measuring instrument to provide closely similar results for repeated measurements of the same measurand carried out in opposite direction and under the same measuring conditions.

Hysteresis

G: Messwertumkehrspanne – F: Hystérésis

The hysteresis value is the difference established between the indications of a measuring instrument while the same value of a measurand is measured under the same conditions based on the increasing or decreasing value order. This characteristic applies to a given confidence probability of 95%.

Hysteresis can either be determined by single measurements carried out at any point within the measuring span or taken from a diagram showing the total deviation.



Deviation span of indication

G: Abweichungsspanne
F: Champ d'erreur d'indication

Deviation span is the distance between the ordinates of the highest and lowest points in the deviation diagram.

***Deviation span**, which is applicable to the whole measuring span or range, is measured in one direction, i.e. when the plunger is being pressed in (without changing the direction of the measuring force).*

***Deviation span within the local measuring span** corresponds to the deviation span. This characteristic, however, applies to a given local measuring span only.*

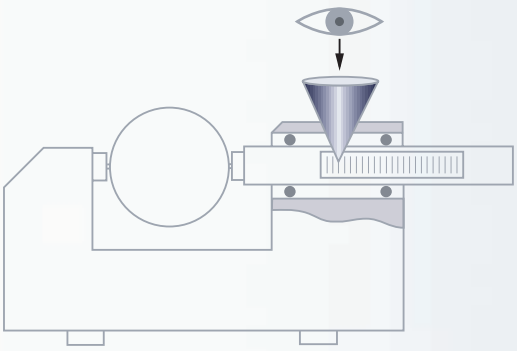
***Total deviation span** is measured in both directions, i.e. using dial gauges with plunger being pressed in or let out (with change of the direction of the measuring force, see page E-2).*

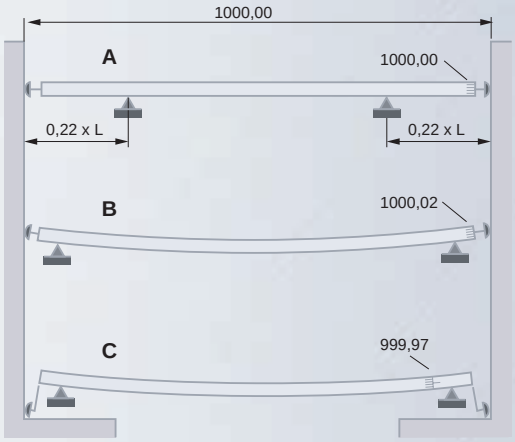
The Abbe principle

Ernst Abbe, one of the founders of the Carl Zeiss company in Jena (Germany) formulated, in 1893, the following principle:

The length to be measured on the workpiece and that of the material measure to be used for comparison must be lying on a same axis.

This principle is also known as the «comparator principle».





Any measured value is affected by the varying resting methods applied to the measuring instrument in use, which may be an internal micrometer with 2-point contact.

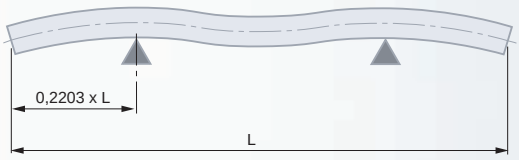
Example: The measuring instrument resting on Bessel points shows the actual value (A) while the one supported on its both ends displays a higher or a lower value (B and C respectively).

Error due to gravity

All workpieces and measuring instruments are subject to distortion because of to their own weight. Choosing the appropriate resting method helps to minimise gravity-induced distortion on long workpieces.

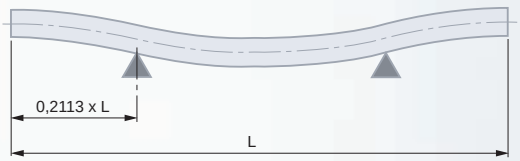
– Bessel points

The minimum deflection of the neutral axis of a profile results in a minimum shortening of the straight line between the two ends of the profile.



– Airy points

These points ensure that the two end faces that are used when measuring gauge blocks with lengths from 100 mm remain parallel to one another.



Working temperature range

The working temperature range provides the limits within which the given maximum permissible errors or deviations spans shall be contained.

Operating temperature range

The operating temperature range provides the limits within which the measuring equipment will operate properly.

Storage temperature range

The storage temperature range provides the limits within which the measuring equipment can be stored or transported securely.

The way to reduce the measurement errors

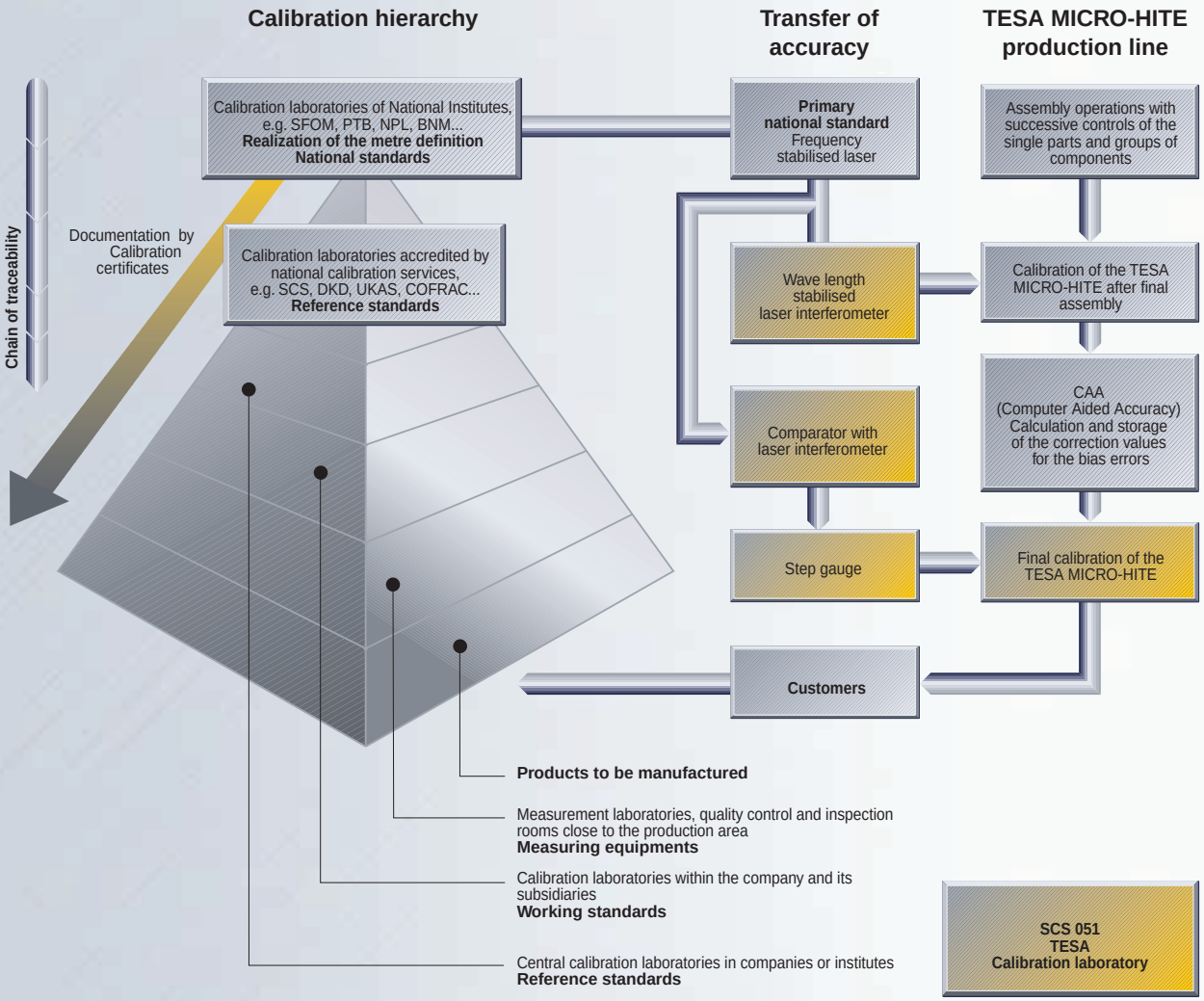
It is advisable to set the display of your measuring instruments under the same conditions that will prevail later on for the workpiece inspection.

Traceability to National Standards

All the measuring equipments consistently used on our production site are traceable to national standards or reference equipements through our quality management system. Brown & Sharpe TESA SA is an ISO 9001 certified company.

Traceability is established by recalibration at regular intervals with documentary evidence as specified by the standards.

The illustration that follows shows the hierarchy of calibrations within the chain of traceability. The example set for the transfer of accuracy to the MICRO-HITE height gauges also shows how they are calibrated. Each feature is supplied with a free SCS calibration certificate issued by our laboratory officially accredited by the Swiss Calibration Service.



Callipers











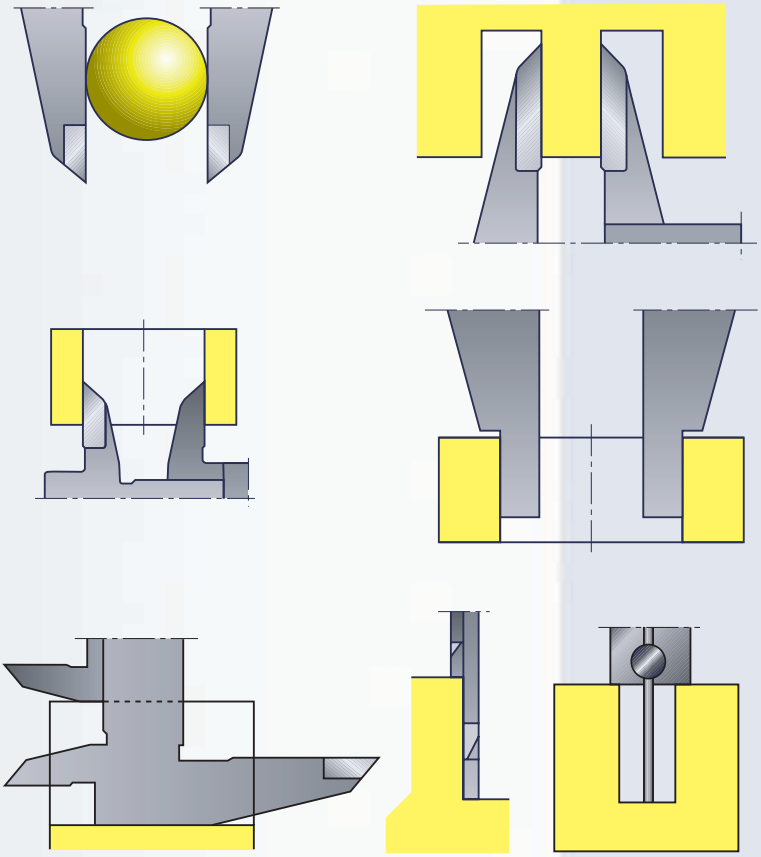
The Favourites

Callipers are the most popular length measuring instruments used worldwide. Owing to their simple construction, ease of handling and quick operation, they are the favourites in precision dimensional measurement. The wide variety of forms and shapes available with exclusive measuring faces make them universal features.

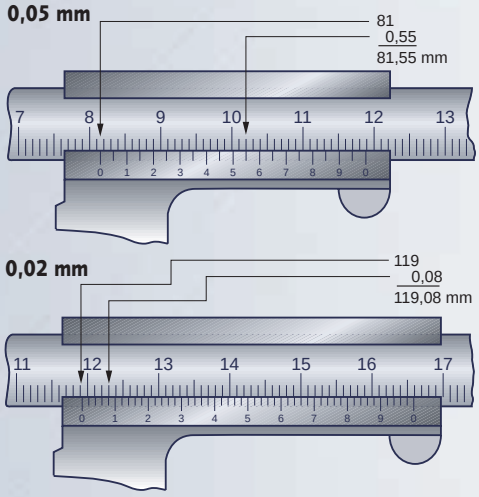
All callipers of the famous TESA, ETALON, INTERAPID and ROCH brand names are recognised for their superior quality - the guarantee for precise measurement. The flawless guide of the slider on the beam assures silky-smooth operation while also preventing the measuring jaws from tilting.

The choice of the material with exactly defined heat treatment as well as a robust design result in further distinctive advantages such as wear and corrosion resistance.

For quick and easy reading of your measured values - an essential condition for the certainty of any measurement - we offer dial callipers for a comfortable reading or more sophisticated digital models for error-free reading besides the regular vernier callipers.



Vernier Callipers



Max. Permissible Errors

The max. permissible errors (G) are expressed by the equations given below, where the values should be rounded down to two decimal fractions (0,01 mm). They apply in measurement taken without inversion of the measuring force. For all other measurements, includ-ing those perform with use of the depth rod, the values obtained must be increased by 20 µm.

Callipers with scale or vernier reading to 0,1 or 0,05 mm:

$$G = (20 + l / 10\ \text{mm})\ \mu\text{m}$$
$$\geq 50\ \mu\text{m}$$

Selected length l mm	0,1 and 0,05 mm µm	0,02 mm µm	0,01 mm µm
50 100	50	20	20
150 300	50		
400	60	30	30
500	70		
600	80		
700	90		
800	100	40	40
900	110		
1000	120		
1200	140	50	
1400	160		
1600	180		–
1800	200	60	
2000	220		

Callipers with scale or vernier reading to 0,02 mm or with numerical indication:

$$G = (22 + l / 50\ \text{mm})\ \mu\text{m}$$

- ✓
- DIN 862 (Style 1AZ)
- See table
- 0,01 mm 0.0005 in
- LCD, 7 mm
- Floating zero
- mm / in conversion
- ≤100 mm: 20 µm >100 mm: 30 µm
- 10 µm
- Steel scale with incremental magnetic divisions
- > 2 m / s
- Hardened stainless steel
- 3 V lithium battery, CR 2032
- ≈ 1,5 a (≈ 2000 h / a)
- Idle mode after 10 min, automatic switch-off after 2 h.
- 10 °C to 40 °C
- -10 °C to 60 °C
- 100 %
- Protection IP65 (IEC 60529)
- EN 50081-1 EN 50082-1
- Suited plastic case
- Identification number
- Inspection report with a declaration of conformity

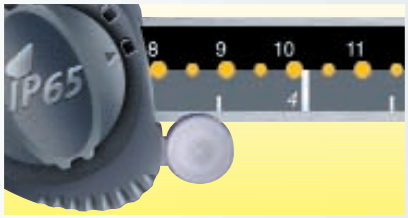
TESA® CAL IP65 Electronic Callipers

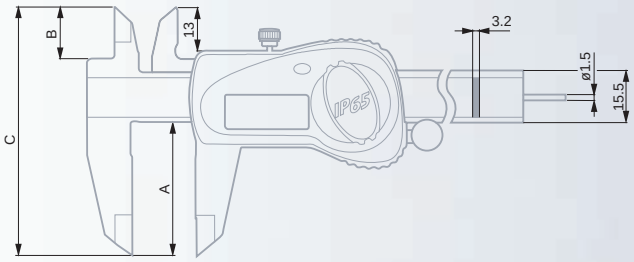
Fully protected against the penetration of liquids or solid contaminants – Highly reliable through a double protection against functional upsetting.

- *IP65 prevent dust, particles of metal, spraying water or oil from entering the calliper through effective encapsulation of the main parts.*
- *New electric measuring system immune against liquids and magnetic fields.*

New TESA patented measuring system with magnetic divisions – Outstanding functional reliability in the thoughest workshop conditions – High quality construction – Accurate, easy to handle.









No	mm / *in*	Wheel drive	A mm	B mm	C mm	g
05.30200	150 / *6*	without	40	16	71,5	140
05.30201	150 / *6*	with	40	16	71,5	140

Optional accessories

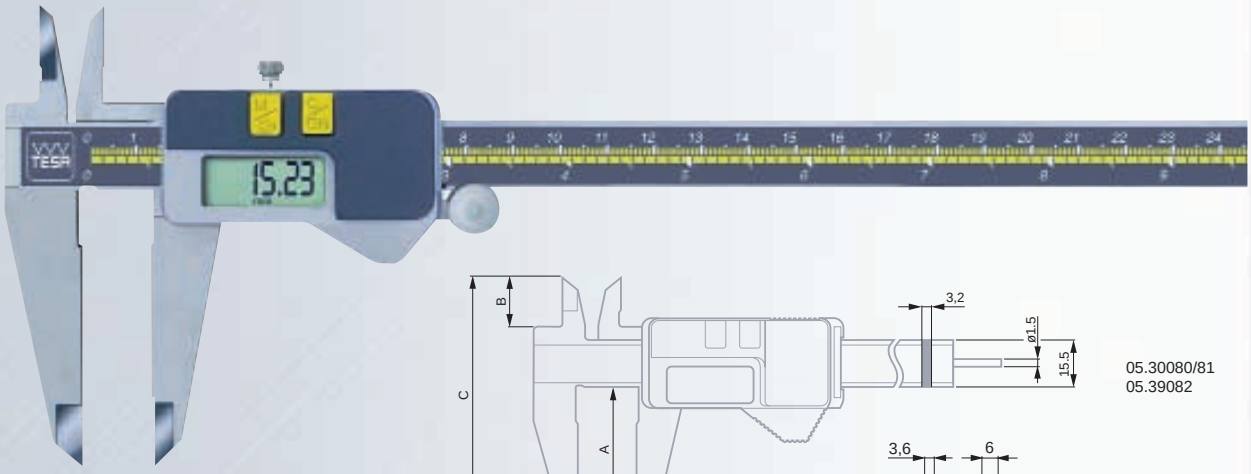
19.61000	3 V lithium battery, 190 mAh, type CR 2032
05.60013	Depth measuring foot (also see page A-25)

TESA® DIGIT-CAL® Electronic Callipers with «capa µ system®»

New «capa µ system» - That's TESA's patented measuring system.

Electronics of the latest generation – High functional reliability – High quality construction – Sure reading of the large digits – Ease of handling – With or without RS 232 data output.

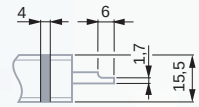




05.30080/81
05.39082

05.30082/83





05.30084

No	mm / *in*	RS 232	Wheel drive	A mm	B mm	C mm	g
05.30080	150 / *6*	without	without	40	16	71,5	140
05.30081	150 / *6*	with	without	40	16	71,5	140
05.39082*	150 / *6*	without	without	40	16	71,5	140
05.30082	200 / *8*	with	without	50	20	89,5	200
05.30083	200 / *8*	with	with	50	20	89,5	200
05.30084	300 / *12*	with	with	64	22	105,5	270

Optional Accessories

19.61000	3 V lithium battery, 190 mAh, type CR 2032.
05.60013	Depth measuring foot for callipers having a 150 mm measuring span (also see on page A-25).
47.61046	RS 232 opto-coupled cable, 2 m long (9-pin).
	For ordering information on cables, see section L.

* ETALON series (not pictured) are equipped with a patented capacitive measuring system («capa µ system» excluded). They have no function «ABS/DIFF» and the max. perm. displacement speed is 1,5 m/s.

- ✓
- DIN 862 (Style 1AZ)
- See table
- 0,01 mm 0.0005 in
- LCD, 7 mm, No. 05.39082: 6 mm
- Floating zero
- Display lock for models with digital output
- «ABS» and «DIFF»
- mm / in conversion
- ≤100 mm: 20 µm >100 mm: 30 µm
- Glass scale with incremental capacitive divisions
- > 2 m / s
- RS 232 optocoupled, bi-directional
- Hardened stainless steel
- 3 V lithium battery, CR 2032
- ≈ 2 a (≈ 2000 h / a)
- Idle mode after 10 min, switch-off after 2 h, automatically.
- 10 °C to 40 °C
- -10 °C to 60 °C
- 80 %, with no condensation
- Protection IP40 (IEC 60529)
- EN 50081-1 EN 50082-1
- Suited plastic case
- Identification number
- Inspection report with a declaration of conformity

INTERAPID® Electronic Callipers with «capa µ system®»

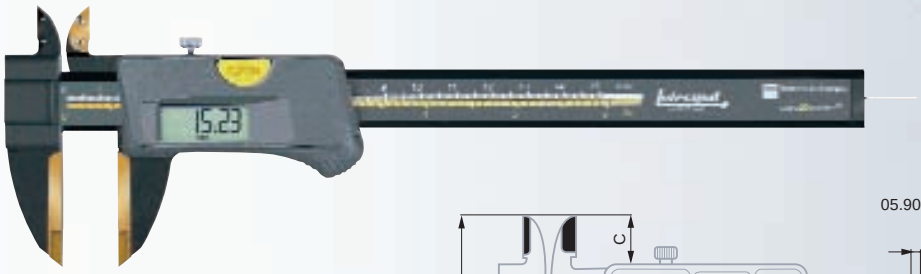
New «capa µ system» - That's TESA's patented measuring system.

Unique design – Ingenious combination of non-ferrous alloy with stainless steel – Measuring jaws for external dimensions with titanium nitride (TiN) coated measuring faces – Light weight for ease of handling – Measuring spans of 150, 200 and 300 mm.

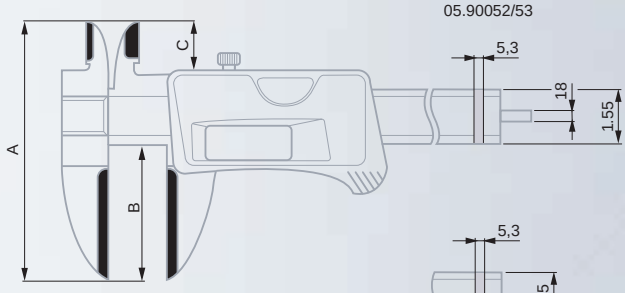
- ✓
- DIN 862 (Style 1AZ)
- 0,01 mm 0.0005 in
- LCD, 7 mm
- Floating zero
- mm / in conversion
- ≤100 mm: 20 µm >100 mm: 30 µm
- Glass scale with incremental capacitive divisions
- (8 ±1) x 10^{-6} K^{-1}
- > 2 m / s
- Slider, beam and depth foot are made from light alloy
- Stainless steel tipped measuring jaws also with titanium nitride (TiN) coated steel part. Hardness: ≈ 2300 HV 0,05
- Steel depth measuring rod, hardened
- 3 V lithium battery, CR 2032
- ≈ 2 a (≈ 2000 h / a)
- Idle mode after 10 min, switch-off after 2 h, automatically.
- 10 °C to 40 °C
- -10 °C to 60 °C
- 80 %, with no condensation
- Protection IP40 (IEC 60529)
- EN 50081-1 EN 50082-1
- Suited plastic case
- Identification number
- Inspection report with a declaration of conformity







05.90052/53



05.90054

No		Amm	Bmm	Cmm	kg
05.90052	150 mm / *6 in*	77	40	15	0,115
05.90053	200 mm / *8 in*	100	60	17	0,135
05.90054	300 mm /*12 in*	100	60	17	0,158

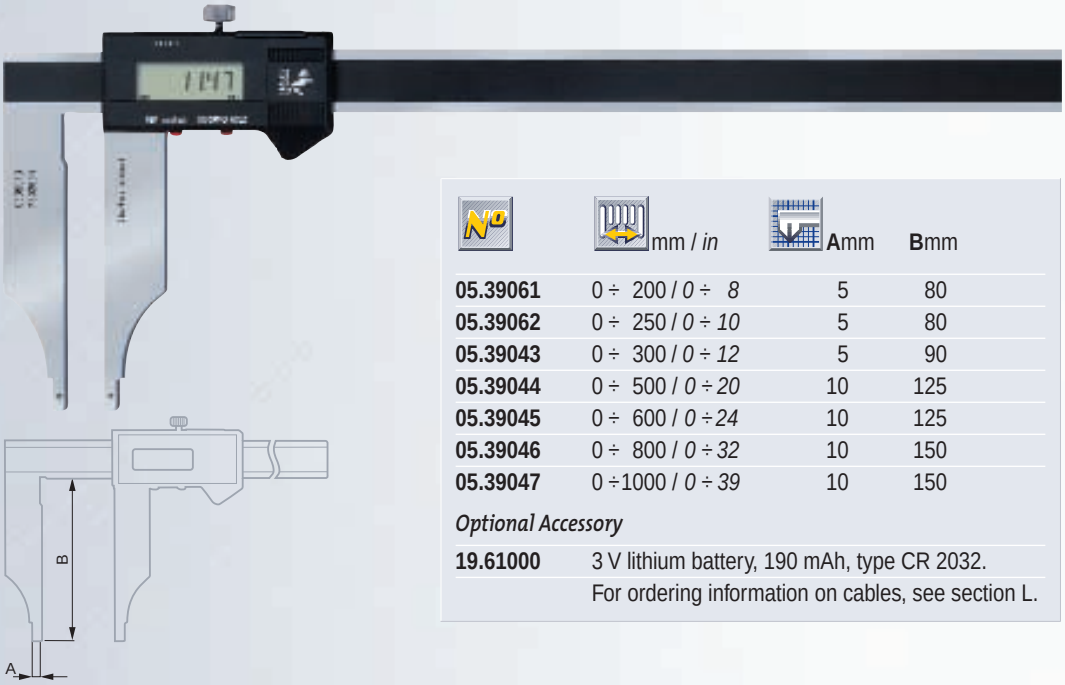
Optional Accessories

19.61000	3 V lithium battery, 190 mAh, type CR 2032.
05.60086	Depth measuring foot, 85 x 7,5 mm measuring face.



ETALON® Electronic Callipers

Models with rounded measuring faces for internal dimensions



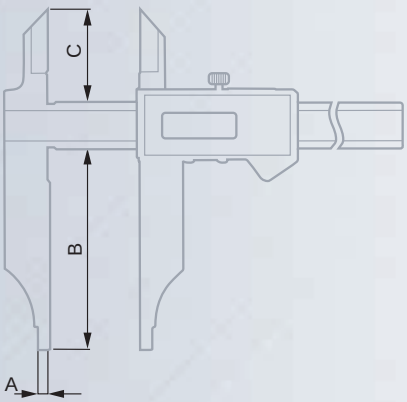
No	mm / *in*	A mm	B mm
05.39061	0 ÷ 200 / *0 ÷ 8*	5	80
05.39062	0 ÷ 250 / *0 ÷ 10*	5	80
05.39043	0 ÷ 300 / *0 ÷ 12*	5	90
05.39044	0 ÷ 500 / *0 ÷ 20*	10	125
05.39045	0 ÷ 600 / *0 ÷ 24*	10	125
05.39046	0 ÷ 800 / *0 ÷ 32*	10	150
05.39047	0 ÷1000 / *0 ÷ 39*	10	150

Optional Accessory

19.61000	3 V lithium battery, 190 mAh, type CR 2032. For ordering information on cables, see section L.

Models with
– knife-edge measuring faces for internal or external dimensions
– rounded measuring faces for internal dimensions





No	mm / *in*	A mm	B mm	C mm
Knife-edge measuring faces for external dimensions				
05.39063	0 ÷ 200 / *0 ÷ 8*	5	80	40
05.39064	0 ÷ 250 / *0 ÷ 10*	5	80	40
05.39036	0 ÷ 300 / *0 ÷ 12*	5	90	40
05.39037	0 ÷ 500 / *0 ÷ 20*	10	125	60
05.39038	0 ÷ 600 / *0 ÷ 24*	10	125	60
05.39039	0 ÷ 800 / *0 ÷ 32*	10	150	65
05.39040	0 ÷1000 / *0 ÷ 39*	10	150	65
Knife-edge measuring faces for internal dimensions				
05.39065	0 ÷ 250 / *0 ÷ 10*	5	80	22

Optional Accessory

19.61000	3 V lithium battery, 190 mAh, type CR 2032. For ordering information on cables, see section L.

- ✓
- DIN 862 (Style BZ)
- 0,01 mm 0.0005 in
- LCD, 6 mm
- Floating zero
- Display lock
- mm / in conversion
- Max. perm. error on page A-2
- Precision scale with incremental capacitive divisions
- ≤ 1,5 m / s
- RS 232 opto-coupled, bi-directional.
- Hardened stainless steel
- 3 V lithium battery, CR 2032
- ≈ 2 a (≈ 2000 h / a)
- 5 °C to 40 °C
- EN 50081-1 EN 50082-1
- Wooden case
- Identification number
- Declaration of conformity

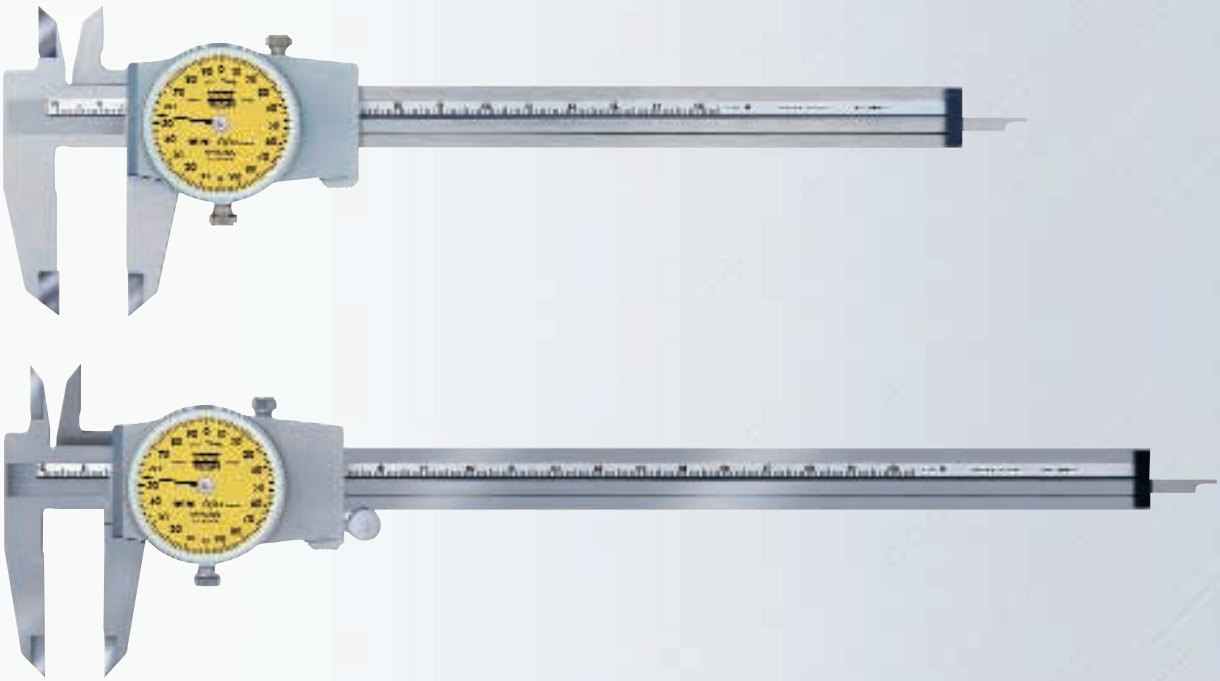
Dial Callipers

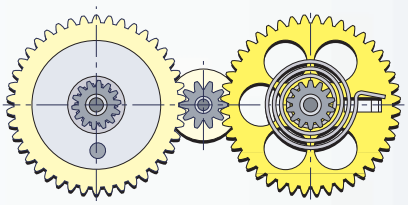
Rugged construction – High accuracy – Patented shockproof design – Ideal for use in the workshop.

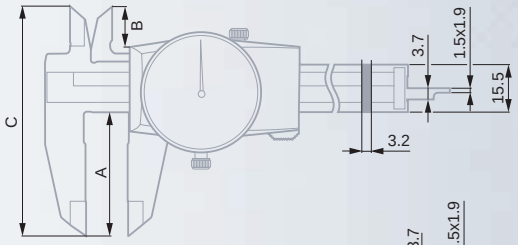
Models TESA® CCMA-M

Easy-to-read dial callipers – Slider with metal dial housing – Models with a 200 or 300 measuring span fitted with a wheel drive.

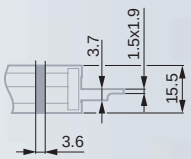
- ✓
- DIN 862 (Style 1AR)
- ≤100 mm: 20 µm >100 mm: 30 µm
- Hardened stainless steel
- 32 mm diameter rotating dial with lock
- Slider with locking screw
- Steel gear mechanism, hardened and ground.
- Patented shockproof design
- Suited plastic case
- Identification number
- Inspection report with a declaration of conformity





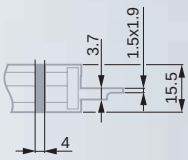


05.10008
05.20002



05.10045





05.10046

No				Wheel drive	A mm	B mm	C mm
05.10008	0 ÷ 150 mm	0,02 mm	2 mm	without	40	13	74
05.20002	*0 ÷ 6 in*	*0.001 in*	*0.1 in*	without	40	13	74
05.10045	0 ÷ 200 mm	0,02 mm	2 mm	with	50	18,6	89,5
05.10046	0 ÷ 300 mm	0,02 mm	2 mm	with	64	20,6	105,5

Optional Accessories

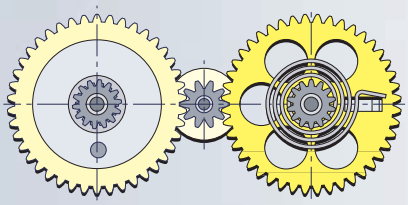
05.60013 Depth measuring foot for models with a 150 mm / 6 in measuring span. Also see page A-25.

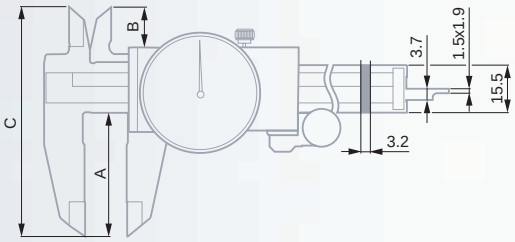
Models ETALON® 125

Slider with metal dial housing – 1 mm per pointer revolution.









75.115821	0 ÷ 150 mm	0,02 mm	1 mm	without wheel drive
75.115811	*0 ÷ 6 in*	*0.001 in*	*0.1 in*	with wheel drive
75.116550	*0 ÷ 6 in*	*0.001 in*	*0.1 in*	with wheel drive, black face and white scale numbering

Optional Accessory

05.60013	Depth measuring foot (also see on page A-25).



- ✓
- DIN 862 (Style 1AR)
- ≤100 mm: 20 µm >100 mm: 30 µm
- Hardened stainless steel
- 32 mm diameter rotating dial with lock
- Slider with locking screw
- Steel gear mechanism, hardened and ground.
- Patented shockproof design
- Suited plastic case
- Identification number
- Inspection report with a declaration of conformity

Models TESA® CCMA-P

Quick and easy reading – Plastic dial housing

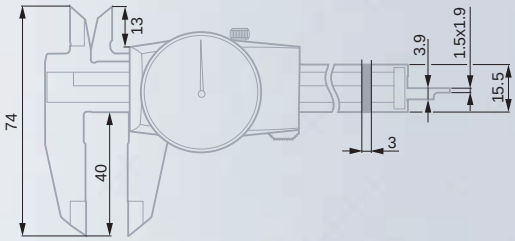
- ✓
- DIN 862 (Style 1AR)
- ≤100 mm: 20 µm >100 mm: 30 µm
- Hardened stainless steel
- 32 mm dia. rotating dial with wheel (zero-setting)
- Slider with locking, screw as well as highly resistant plastic dial housing
- Steel gear mechanism, hardened and ground.
- Patented shockproof design
- Suited plastic case
- Identification number
- Inspection report with a declaration of conformity



05.10004	0 ÷ 150 mm	0,02 mm	2 mm
05.20001	*0 ÷ 6 in*	*0.001 in*	*0.1 in*

Optional Accessory

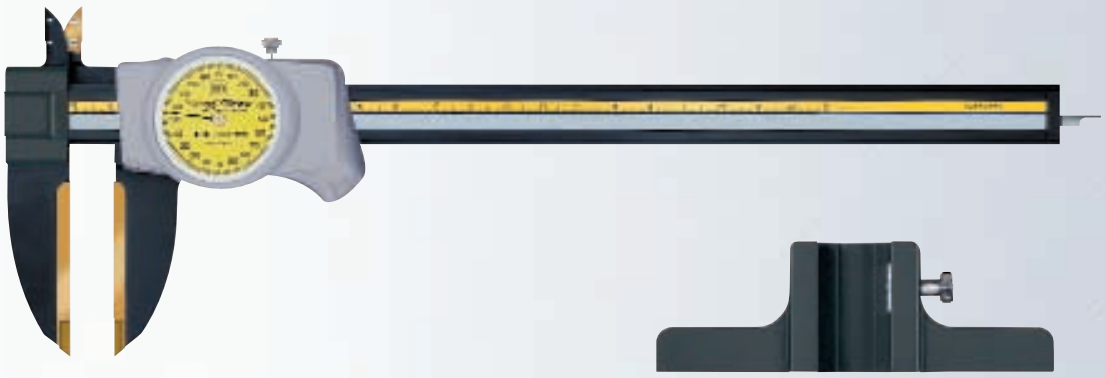
05.60013	Depth measuring foot (also see on page A-25).



Models EAGLE®

Unique design – Combine a light alloy beam with stainless steel slider – Measuring jaws for external dimensions with titanium nitride (TiN) coated measuring faces – Provided with a plastic dial housing on the slider – Feature a 200 or 300 mm measuring span.

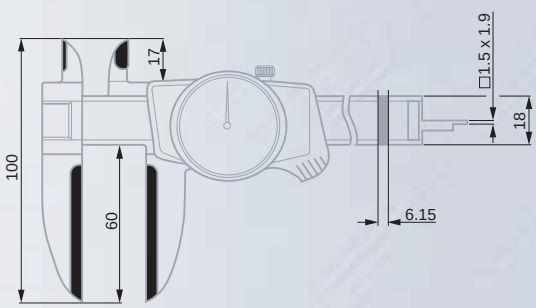
- ✓
- DIN 862 (Style 1AR)
- ≤100 mm: 20 µm >100 mm: 30 µm
- Light alloy. steel jaws with titanium nitride coating (≈ 2300 HV 0,05). Spring steel depth rod.
- 32 mm dia. rotating dial with wheel for zero-setting
- Slider with locking screw
- Steel gear mechanism, hardened and ground
- Patented shockproof design
- Suited plastic case
- Identification number
- Inspection report with a declaration of conformity



	mm	mm	mm
05.10043	0 ÷ 200	0,02	2
05.10044	0 ÷ 300	0,02	2

Optional Accessory

05.60086	Depth foot with a 85 x 7,5 mm measuring face.

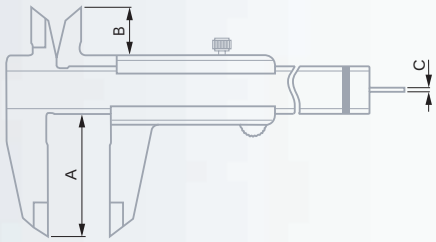


Vernier Callipers

Models TESA SWISSCAL® 2, TESA CC, ETALON® 117 and ROCH

The callipers that offer good value for money.
– Fitted with a locking screw.







Callipers No. 05.1710313, 05.10041, 05.1710320, 05.30101 and 75.111792.

Callipers No. 05.19084, 05.39057, 05.39059, 05.17026, 05.39060 and 05.17027.

DIN 862 (style 1AN-2) NF E 11-091

Satin-chrome scale background; main scale slightly set back for wear protection

Callipers No. 05.39060 and 05.17027 have no depth rod

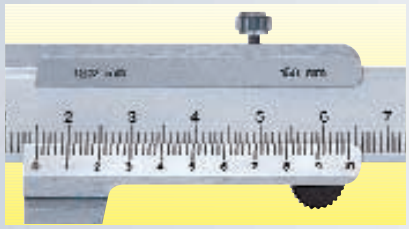
Max. perm. error on page A-2

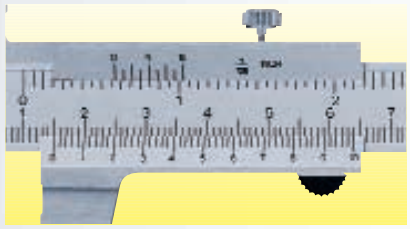
Hardened stainless steel

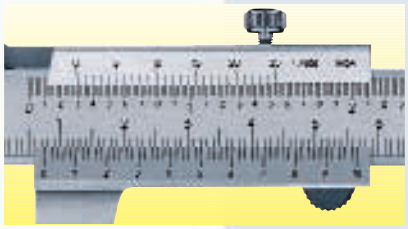
Suited plastic case

Identification number

Inspection report with a declaration of conformity







No		No	mm	mm	in	in	A mm	B mm	C mm
		05.1710313	0 ÷ 125	0,02			40	15,5	1,7 x 1,9
05.10041	TESA SWISSCAL 2*	05.1710320*	0 ÷ 150	0,02	–	–	40	15,5	ø 1,5
05.30101	TESA CC*		0 ÷ 150	0,05	*0 ÷ 6*	1/128	40	15,5	ø 1,5
05.19084	ETALON		0 ÷ 150	0,05	–	–	40	15,5	1,2 x 1,7
05.39057	ETALON		0 ÷ 150	0,05	*0 ÷ 6*	1/128	40	15,5	1,2 x 1,7
75.111792	ETALON 117*		0 ÷ 150	0,02	*0 ÷ 6*	*0.001*	40	15,5	1,9 x 1,4
05.39059	ETALON	05.17026	0 ÷ 200	0,02	*0 ÷ 8*	*0.001*	50	19	1,4 x 1,6
05.39060	ETALON	05.17027	0 ÷ 300	0,02	*0 ÷ 12*	*0.001*	65	22	–

Optional Accessory

05.60013 Depth measuring foot suited for all models marked with «*» (also see on page A-25).

Models ETALON® and ROCH

The callipers with excellent price/performance ratio.
– Provided with clamping device.

Model No. 05.1710303

Models No. 05.19086 and 05.39058

DIN 862 (style 1AN-2) NF E 11-091

Satin-chrome scale background; main scale slightly set back for wear protection

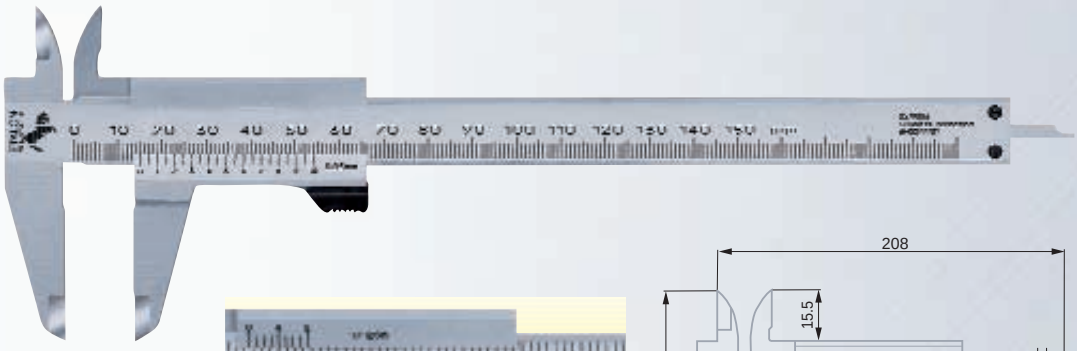
50 µm

Hardened stainless steel

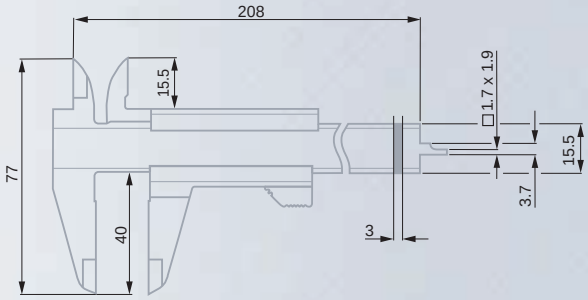
Suited plastic case

Identification number

Inspection report with a declaration of conformity







		mm	mm	in	in
	05.1710303	0 ÷ 125	0,02	–	–
05.19086		0 ÷ 150	0,05	–	–
05.39058		0 ÷ 150	0,05	*0 ÷ 6*	1/128

Models ETALON® and ROCH

– Parallax-free readout.
– Clamping device.

✓

DIN 862 (style 1AP-2) NF E 11-091

Satin-chrome scale background

0,02 mm vernier readout: ≤ 100 mm: 20 µm > 100 mm: 30 µm

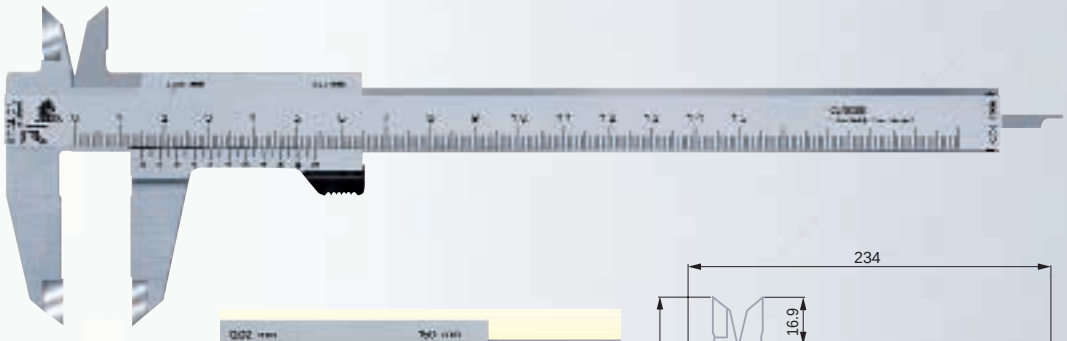
0,05 mm vernier readout: 50 µm

Hardened stainless steel

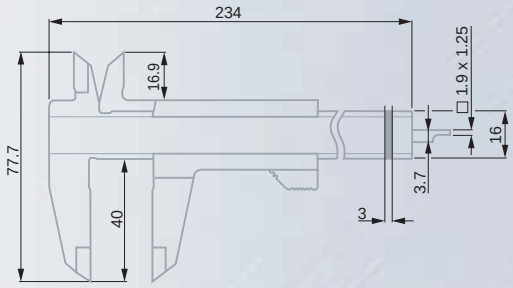
Suited plastic case

Identification number

Inspection report with a declaration of conformity







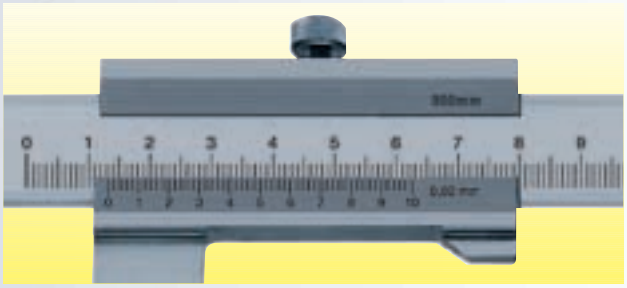
		mm	mm	in	in
05.19087		0 ÷ 150	0,02	–	–
05.19088	**05.1710309**	0 ÷ 150	0,05	–	–

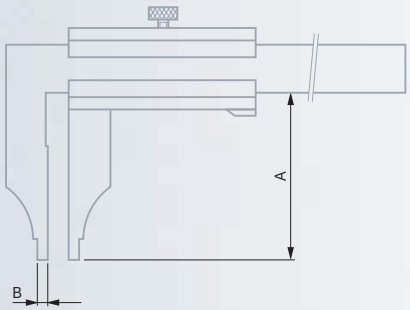
ETALON® and ROCH Vernier Callipers

Models with Rounded Measuring Faces for Internal Dimensions

– *Without fine adjust device.*







		mm	mm	*in*	*in*	A mm	B mm
75.10016	**05.17509***	0 ÷ 200	0,02			80	5
75.30001		0 ÷ 200	0,02	*0 ÷ 8*	*1/128*	80	5
	05.17506	0 ÷ 200	0,05			80	5
	05.17511	0 ÷ 250	0,02			85	5
	05.17512	0 ÷ 250	0,05			85	5
75.10017	**05.17521**	0 ÷ 300	0,02			90	5
	05.17522	0 ÷ 300	0,05			90	5
75.30002		0 ÷ 300	0,02	*0 ÷12*	*1/128*	90	5
75.111990		0 ÷ 400	0,02			125	10
75.109119		0 ÷ 400	0,02	*0 ÷15*	*0.001*	125	10
	05.17541	0 ÷ 500	0,02			150	10
	05.17542	0 ÷ 500	0,05			150	10
	05.17551	0 ÷ 600	0,02			150	10
	05.17552	0 ÷ 600	0,05			150	10

* Provided with stainless steel rule No. 95.1750181, 200 mm long.

✓

DIN 862 (style EN-2) NF E 11-091

Satin-chrome scale background; main scale slightly set back for wear protection

Max. perm. error on page A-2

Hardened stainless steel

Wooden case

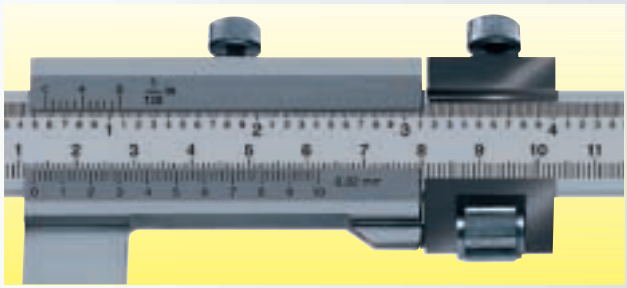
Identification number

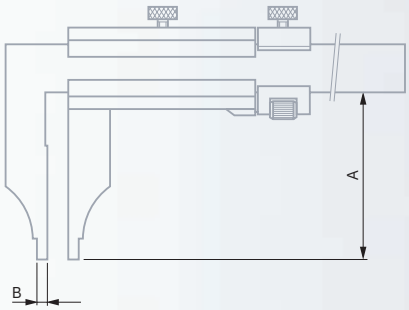
Declaration of conformity

Models with Rounded Measuring Faces for Internal Dimensions

– With fine adjust device.







✓

DIN 862 (style EN-2) NF E 11-091

Satin-chrome scale background; main scale slightly set back for wear protection

Max. perm. error on page A-2

Hardened stainless steel

Wooden case

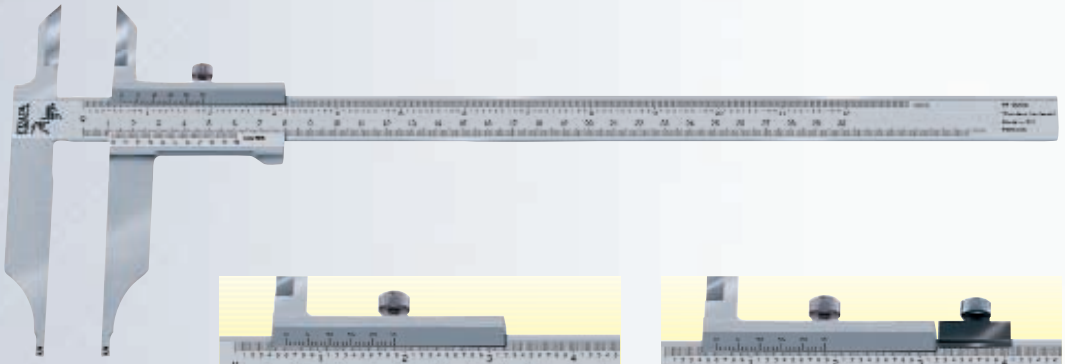
Identification number

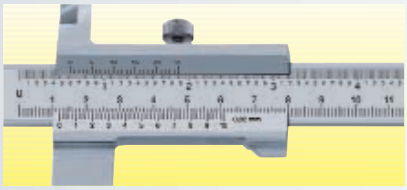
Declaration of conformity

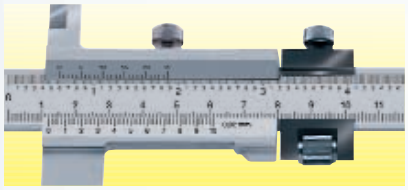
No	No	mm	mm	in	in	A mm	B mm
75.10018	**05.17601**	0 ÷ 190	0,02			80	5
75.30003		0 ÷ 190	0,02	*0 ÷ 8*	$^1/_{128}$	80	5
	05.17602	0 ÷ 190	0,05			80	5
	05.17611	0 ÷ 237	0,02			80	5
	05.17612	0 ÷ 237	0,05			80	5
75.10019	**05.17621**	0 ÷ 287	0,02			90	5
75.30004		0 ÷ 280	0,02	*0 ÷12*	$^1/_{128}$	90	5
75.111991		0 ÷ 400	0,02			125	10
75.109122		0 ÷ 400	0,02	*0 ÷15*	*0.001*	125	10
	05.17641	0 ÷ 500	0,02			150	10
	05.17642	0 ÷ 500	0,05			150	10
75.10020	**05.17651**	0 ÷ 600	0,02			150	10
	05.17652	0 ÷ 600	0,05			150	10
75.10021	**05.17661**	0 ÷ 750	0,02			150	10
	05.17662	0 ÷ 750	0,05			150	10
75.10022	**05.17671**	0 ÷1000	0,02			150	10
	05.17672	0 ÷1000	0,05			150	10
75.109230		0 ÷1250	0,02			180	15
75.116544		0 ÷1500	0,02			200	15
	05.17681	0 ÷1500	0,02			200	15
75.116545		0 ÷2000	0,02			200	15
	05.17691	0 ÷2000	0,02			200	15

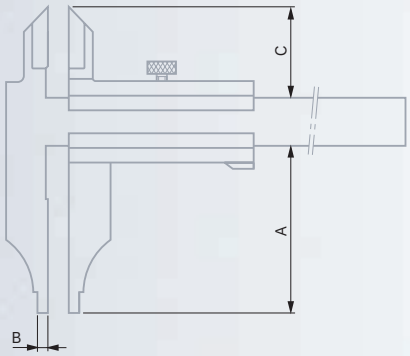
Models with
– knife-edge measuring faces for external dimensions
– rounded measuring faces for internal dimensions

– Provided with or without fine adjust device.









		mm	mm	in	in	A mm	B mm	C mm
Models without Fine Adjust Device								
75.10023	**05.17701**	0 ÷ 200	0,02			80	5	41
75.30005		0 ÷ 200	0,02	*0 ÷8*	$^1/_{128}$	80	5	41
	05.17702	0 ÷ 200	0,05			80	5	41
	05.17711	0 ÷ 250	0,02			80	5	41
75.10024	**05.17721**	0 ÷ 300	0,02			90	5	41
75.30006		0 ÷ 300	0,02	*0 ÷12*	$^1/_{128}$	90	5	41
	05.17722	0 ÷ 300	0,05			90	5	41
75.10025	**05.17741**	0 ÷ 500	0,02			150	10	60
75.30007		0 ÷ 500	0,02	*0 ÷ 20*	*0.001*	150	10	60
	05.17751	0 ÷ 600	0,02			150	10	60
Models with Fine Adjust Device								
75.10026	**05.17801**	0 ÷ 190	0,02			80	5	41
75.30008		0 ÷ 185	0,02	*0 ÷ 7*	$^1/_{128}$	80	5	41
	05.17811	0 ÷ 235	0,02			80	5	41
75.10027	**05.17821**	0 ÷ 285	0,02			90	5	41
75.30009		0 ÷ 280	0,02	*0 ÷11*	$^1/_{128}$	90	5	41
75.10028	**05.17841**	0 ÷ 500	0,02			150	10	60
75.30010		0 ÷ 500	0,02	*0 ÷ 20*	*0.001*	150	10	60
	05.17851	0 ÷ 600	0,02			150	10	60
	05.17861	0 ÷ 750	0,02			150	10	60
	05.17871	0 ÷1000	0,02			150	10	60

✓

DIN 862 (style BN-2) NF E 11-091

Satin-chrome scale background; main scale slightly set back for wear protection

Max. perm. error on page A-2

Hardened stainless steel

Wooden case

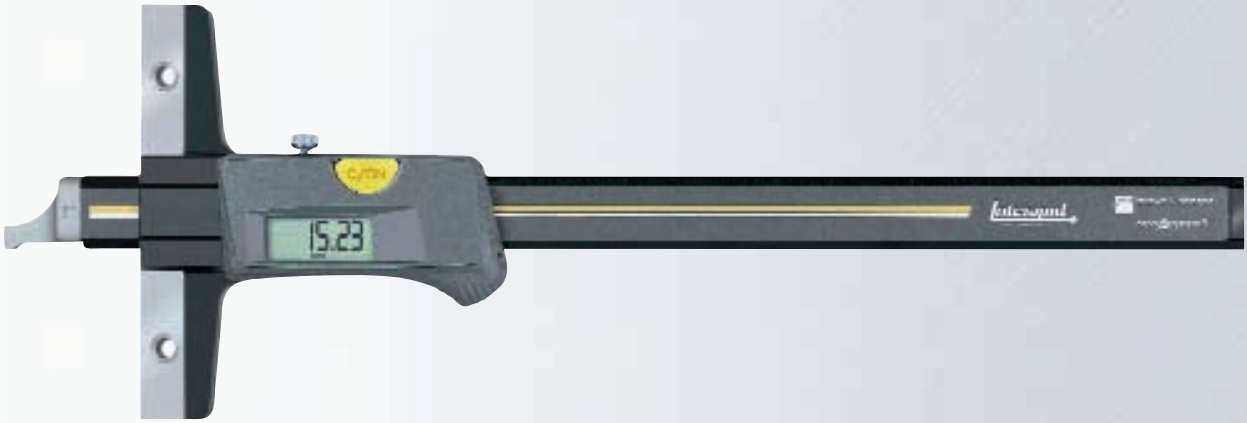
Identification number

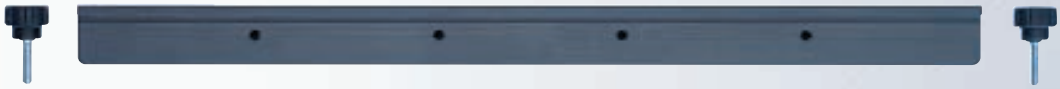
Declaration of conformity

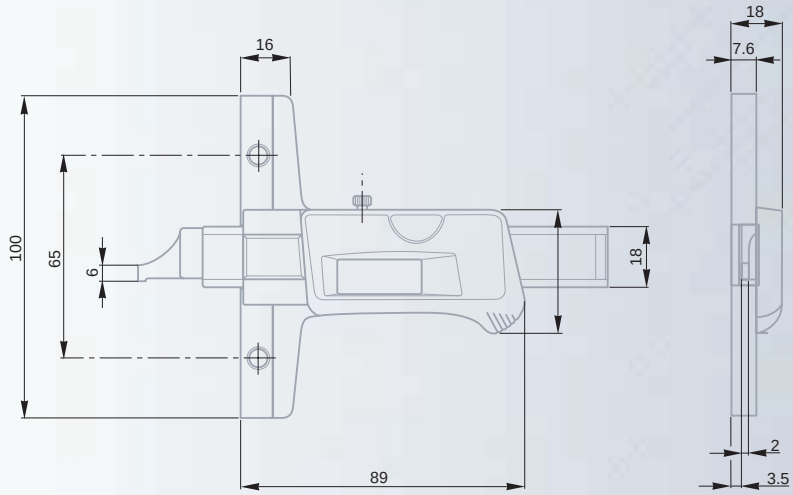
INTERAPID® Electronic Depth Callipers with «capa µ system®»

New «capa µ system» - That's TESA's patented measuring system.
– With removable measuring bridge.

- ✓
- DIN 862 (style CZ)
- 0,01 mm 0.0005 in
- LCD, 7 mm
- Floating zero
- mm / in conversion
- ≤100 mm: 20 µm >100 mm: 30 µm
- Glass scale with incremental capacitive divisions
- (8 ±1) x 10^{-6} K^{-1}
- > 2 m / s
- Beam and slider in hard-coated light alloy combined with hardened stainless steel
- Removable measuring bridge in hardened stainless steel
- 3 V lithium battery, CR 2032
- ≈ 2 a (≈ 2000 h / a)
- Idle mode after 10 min, switch-off after 2 h, automatically
- 10 °C to 40 °C
- -10 °C to 60 °C
- 80 %, with no condensation
- Protection IP40 (IEC 60529)
- EN 50081-1 EN 50082-1
- Suited plastic case
- Identification number
- Inspection report with a declaration of conformity



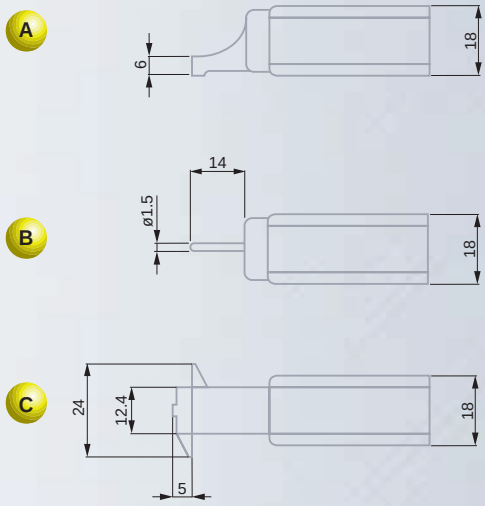




No	mm	in	A
05.90055	0 ÷ 200	*0 ÷ 8*	A
05.90058	0 ÷ 300	*0 ÷12*	A
05.90056	0 ÷ 200	*0 ÷ 8*	B
05.90059	0 ÷ 300	*0 ÷12*	B
05.90057	0 ÷ 200	*0 ÷ 8*	C
05.90060	0 ÷ 300	*0 ÷12*	C

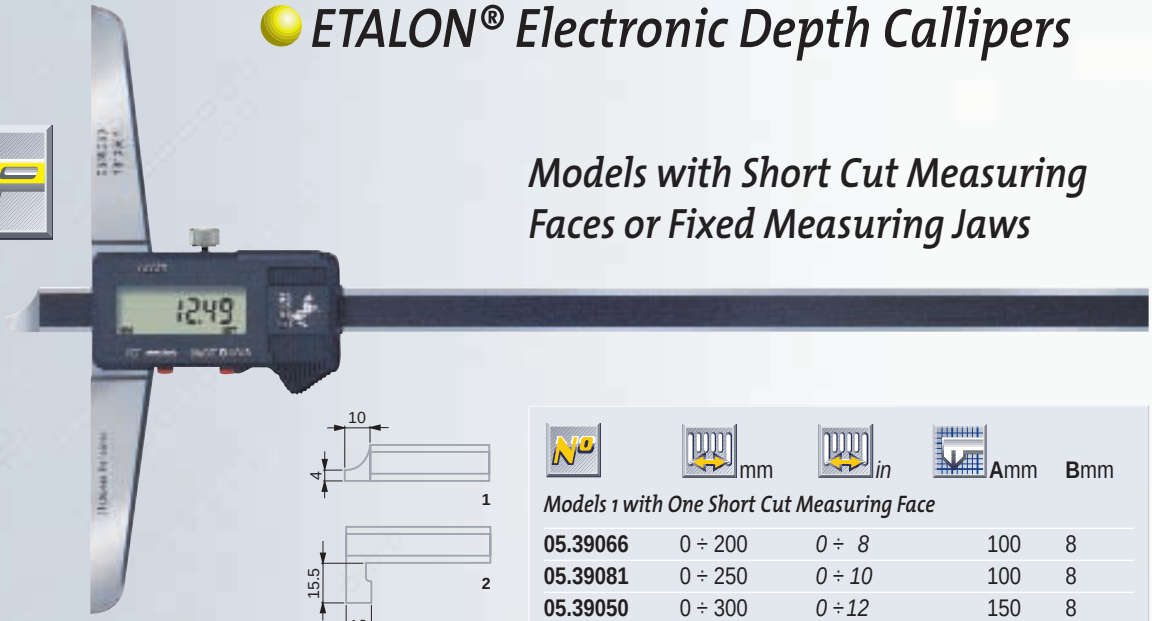
Optional Accessories

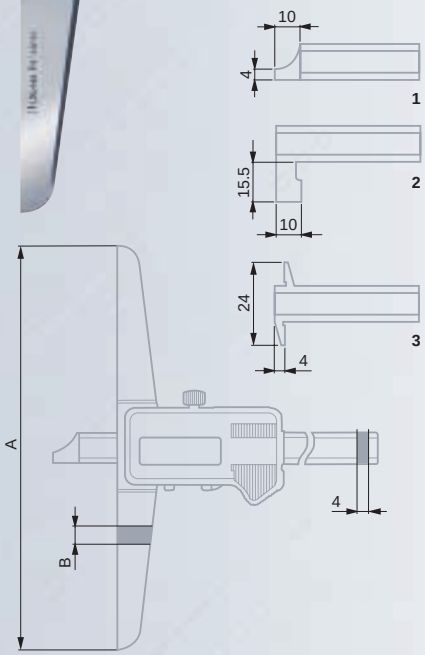
No		mm
05.60087	Removable bridge	180
05.60088	removable bridge	260
05.60089	Removable bridge	320



ETALON® Electronic Depth Callipers

Models with Short Cut Measuring Faces or Fixed Measuring Jaws



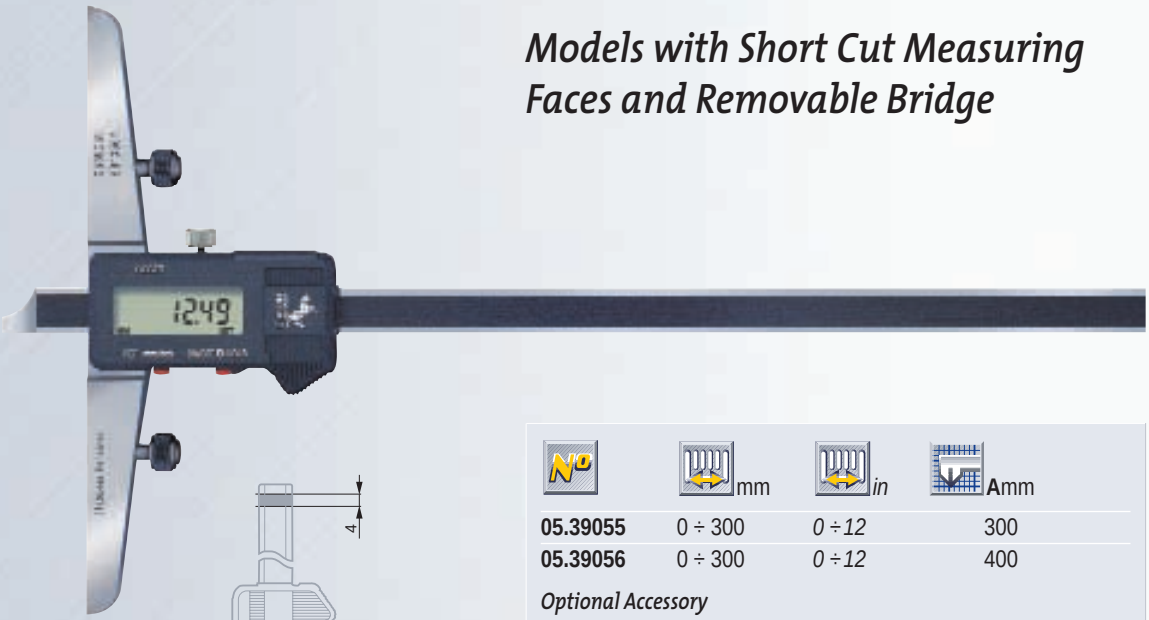


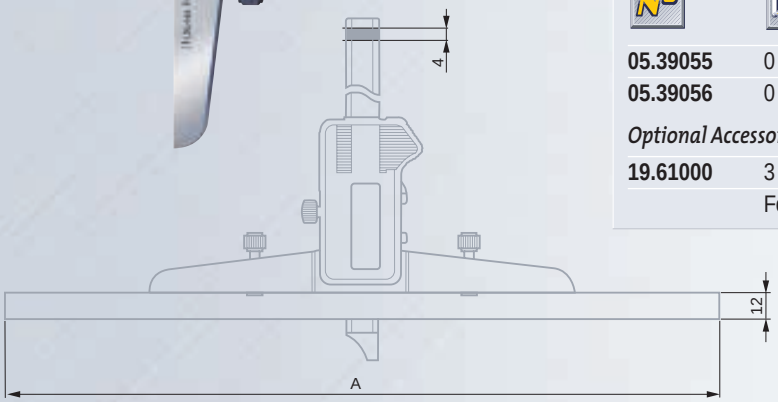
№	mm	in	Amm	Bmm
Models 1 with One Short Cut Measuring Face				
05.39066	0 ÷ 200	*0 ÷ 8*	100	8
05.39081	0 ÷ 250	*0 ÷ 10*	100	8
05.39050	0 ÷ 300	*0 ÷12*	150	8
05.39051	0 ÷ 500	*0 ÷ 20*	150	8
Models 2 with One Fixed Measuring Jaw				
05.39052	0 ÷ 300	*0 ÷ 12*	150	8
05.39053	0 ÷ 500	0 ÷ 20	150	8
Model 3 with Two Fixed Measuring Jaws				
05.39054	0 ÷ 300	*0 ÷12*	150	8

Optional Accessory

19.61000	3V lithium battery, 190 mAh, type CR 2032. For ordering information on cables, see section L.

Models with Short Cut Measuring Faces and Removable Bridge





№	mm	in	Amm
05.39055	0 ÷ 300	*0 ÷12*	300
05.39056	0 ÷ 300	*0 ÷12*	400

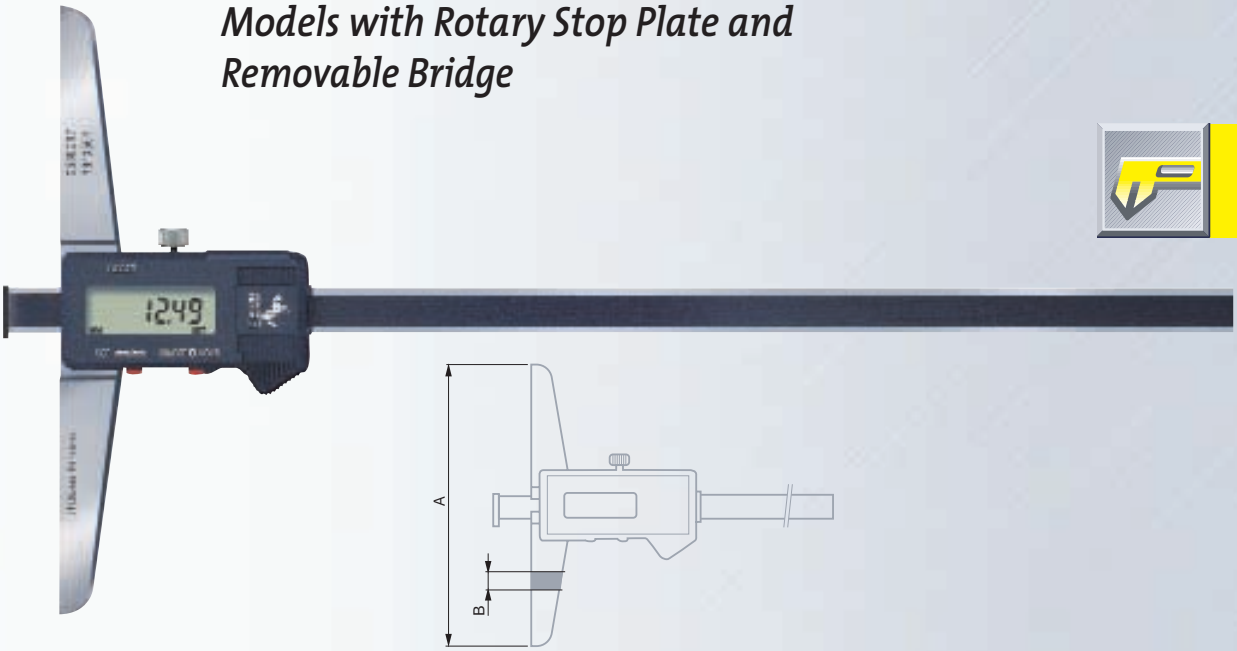
Optional Accessory

19.61000	3 V lithium battery, 190 mAh, type 2032. For ordering information on cables, see section L.

- ✓
- DIN 862 (Style CZ)
- 0,01 mm 0.0005 in
- LCD, 6 mm
- Floating zero
- Display lock
- mm / in conversion
- Max. perm. error on page A-2
- Precision scale with incremental capacitive divisions
- ≤ 1,5 m / s
- RS 232 opto-coupled, bi-directional
- Hardened stainless steel
- 3 V lithium battery, CR 2032
- ≈ 2 a (≈ 2000 h / a)
- 5 °C to 40 °C
- EN 50081-1 EN 50082-1
- Wooden case
- Identification number
- Declaration of conformity

✓
DIN 862 (Style CZ)
0,01 mm 0.0005 in
mm / in conversion
Max. perm. error on page A-2
RS 232 opto-coupled, bi-directional
Hardened stainless steel
3 V lithium battery, CR 2032
≈ 2 a (≈ 2000 h / a)
5 °C to 40 °C
Additional technical data on the previous page
EN 50081-1 EN 50082-1
Wooden case
Identification number
Declaration of conformity

Models with Rotary Stop Plate and Removable Bridge



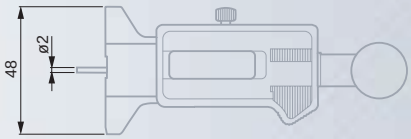
No	mm	in	Amm	Bmm
05.39067	0 ÷ 250	*0 ÷10*	150	8
05.39068	0 ÷ 350	*0 ÷14*	150	8
05.39069	0 ÷ 500	*0 ÷20*	150	8
Optional Accessories				
05.69025	Removable bridge		300	16
05.69026	Removable bridge		400	16
19.61000	3 V lithium battery, 190 mAh, type CR 2032.			
	For ordering information on cables, see section L.			

✓
DIN 862 (Style CZ)
0,01 mm 0.0005 in
Max. perm. error of 20 µm
RS 232 opto-coupled, bi-directional
Hardened stainless steel
Additional technical data on the previous page
Wooden case
Identification number
Declaration of conformity

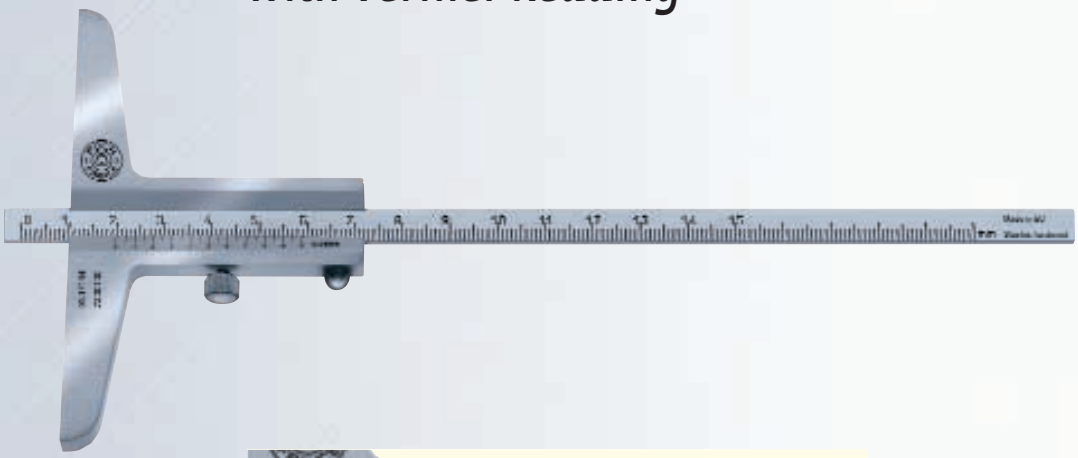
Small-Sized Calliper with Measuring Tip

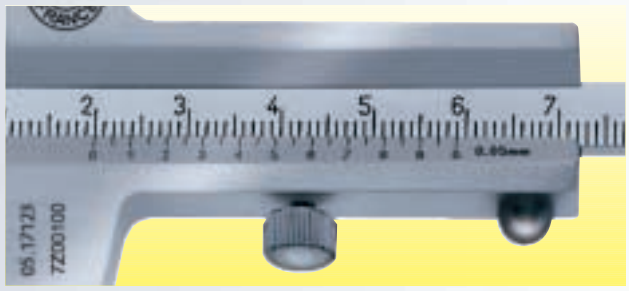


No	mm	in
05.39070	0 ÷ 25	*0 ÷ 1*



ETALON® and ROCH Depth Callipers with Vernier Reading





✓

DIN 862 (Style C)
NF E 11-096

Satin-chrome scale background; main scale slightly set back for wear protection

Max. perm. error on page A-2

Hardened stainless steel

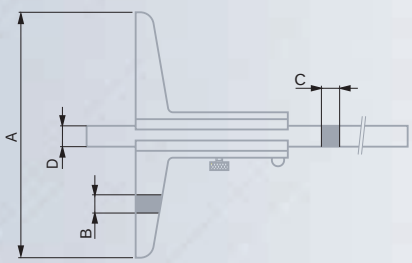
Shipping carton

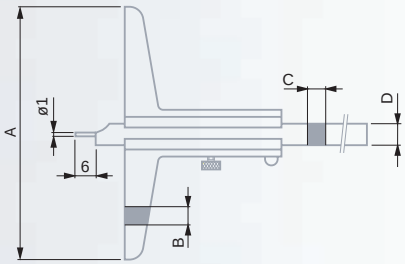
Identification number

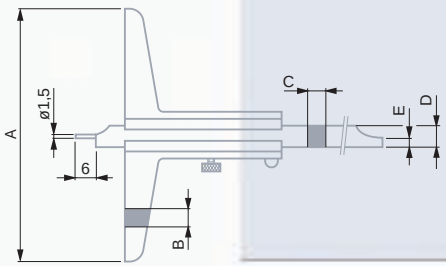
Declaration of conformity

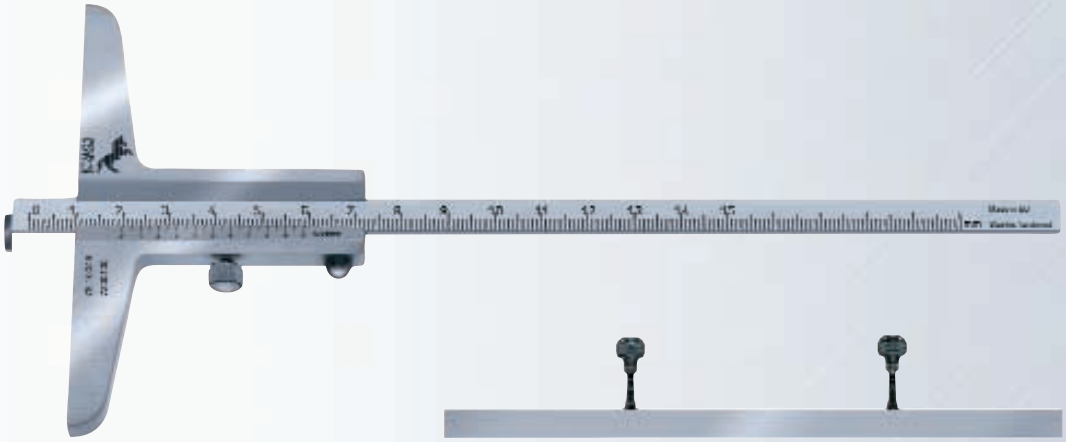
		mm	mm	A mm	B mm	C mm	D mm	E mm
Models with Removable Bridge (Optional)								
75.10051	**05.17133**	0 ÷ 150	0,02	100	7,5	3	8	
	05.17134	0 ÷ 150	0,05	100	7,5	3	8	
75.10052	**05.17143**	0 ÷ 250	0,02	100	7,5	3	8	
	05.17144	0 ÷ 250	0,05	100	7,5	3	8	
75.10053	**05.17163**	0 ÷ 500	0,02	100	8,5	4	12	
	05.17164	0 ÷ 500	0,05	100	8,5	4	12	
75.10056		0 ÷ 600	0,02	150	8,5	4	12	
Convertible Models with Both a Short Cut Measuring Face and Tip as well as Removable Bridge (Optional)								
	05.17111*	0 ÷ 80	0,02	50	7,5	3	8	
	05.17123	0 ÷ 150	0,02	100	7,5	3	8	3,5
75.10054	**05.17124**	0 ÷ 150	0,05	100	7,5	3	8	3,5
75.10055		0 ÷ 250	0,02	100	7,5	3	8	4

* Non-convertible









✓

DIN 862 (style C)
NF E-11-096

Satin-chrome scale background; main scale slightly set back for wear protection

Max. perm. error on page A-2

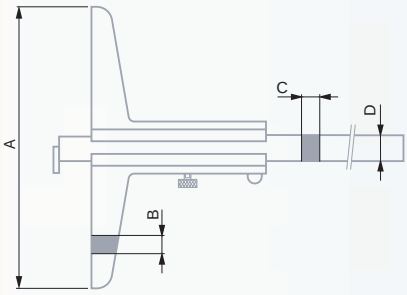
Hardened stainless steel

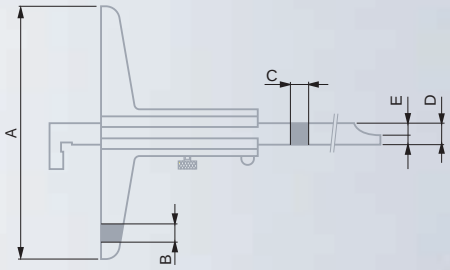
Shipping carton

Identification number

Declaration of conformity

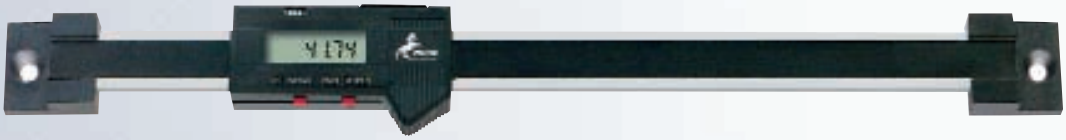
		mm	mm	A mm	B mm	C mm	D mm	E mm
Models with Rotary Stop Plate and Removable Bridge (Optional)								
75.10048	**05.17202**	0 ÷ 150	0,02	130	8,5	4	12	
75.10049	**05.17212**	0 ÷ 250	0,02	130	8,5	4	12	
75.10050	**05.17222**	0 ÷ 500	0,02	130	8,5	4	12	
Convertible Models with a fixed short Jaw along with a Short Cut Measuring Face as well as Removable Bridge (Optional)								
	05.17175	0 ÷ 150	0,02	100	7,5	3	8	3,5
	05.17176	0 ÷ 150	0,05	100	7,5	3	8	3,5
	05.17177	0 ÷ 250	0,02	130	8,5	4	12	4
	05.17183	0 ÷ 300	0,05	150	8,5	4	12	4
	05.17178	0 ÷ 500	0,02	150	8,5	4	12	4
Optional Accessories								
75.60001	**75.60001**	Removable bridge		200	10 ± 0,005			
75.60002	**75.60002**	Removable bridge		400	16 ± 0,005			





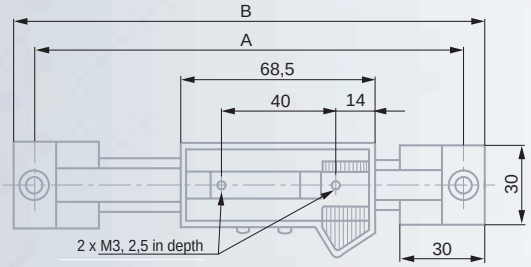
Horizontal and Vertical ETALON® Scale Units with Digital Indication

Let you measure and position any assembly on fixtures, setting devices for toolings, machines and much more. Flexible mounting for use in any position.

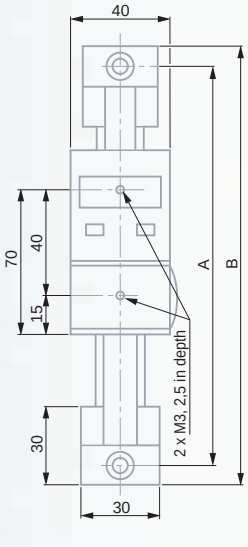


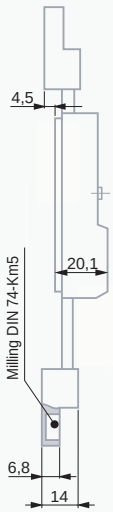


No		mm	mm	in	in	Amm	Bmm
Vertical Execution							
05.39071	150	0,01	6	0.0005		266	281
05.39072	200	0,01	8	0.0005		316	331
05.39073	300	0,01	12	0.0005		416	431
05.39074	500	0,01	20	0.0005		616	631
05.39075	1000	0,01	40	0.0005		1116	1131
Horizontal Execution							
05.39076	150	0,01	6	0.0005		265	280
05.39077	200	0,01	8	0.0005		315	330
05.39078	300	0,01	12	0.0005		415	430
05.39079	500	0,01	20	0.0005		615	630
05.39080	1000	0,01	40	0.0005		1115	1130
Optional Accessory							
19.61000	3 V lithium battery, 190 mAh, type CR 2032.						
	For ordering information on cables, see section L.						





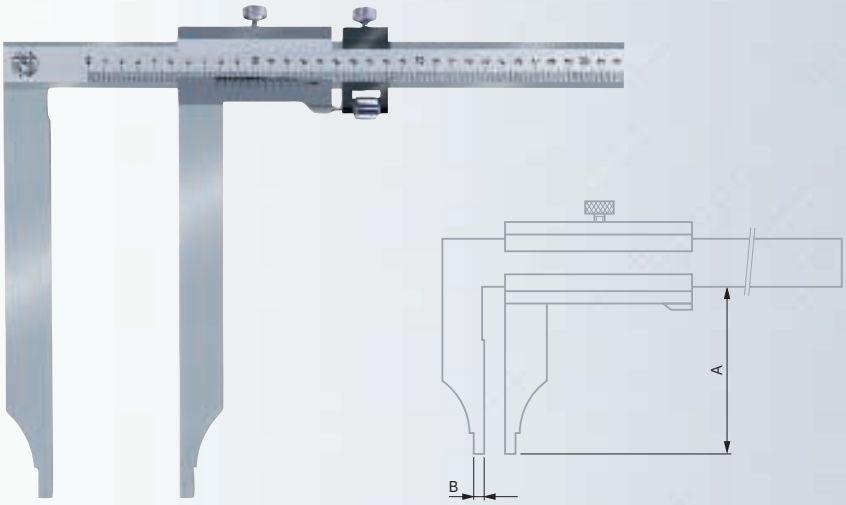




- ✓
- Factory standard
- 0,01 mm 0.0005 in
- LCD, 6 mm
- Floating zero
- PRESET for the values being displayed
- Display lock
- mm / in conversion
- Max. perm. error on page A-2
- Precision scale with incremental capacitive divisions
- ≤ 1,5 m / s
- RS 232 opto-coupled, bi-directional
- Hardened stainless steel
- 3 V lithium battery, CR 2032
- ≈ 2 a (≈ 2000 h / a)
- 5 °C to 40 °C
- EN 50081-1 EN 50082-1
- Transport packing
- Identification number
- Declaration of conformity

ROCH Callipers with Very Long Measuring Jaws

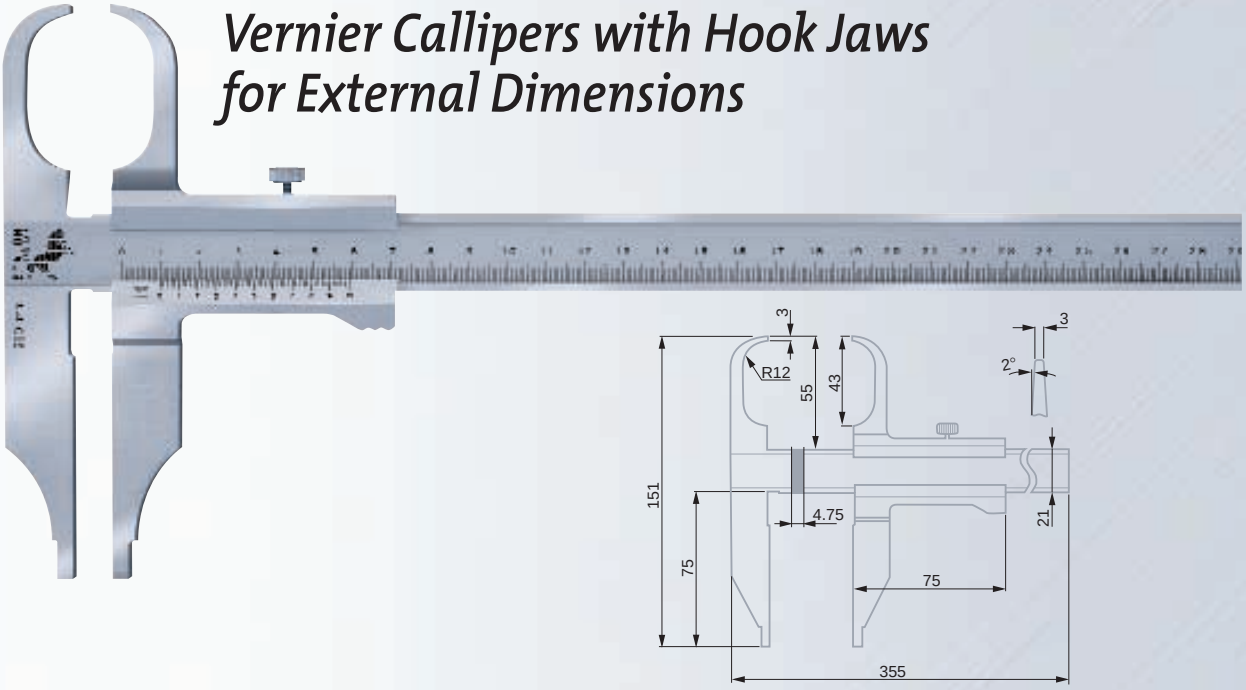
– *Rounded measuring faces for internal dimensions*
– *With fine adjust device*



	mm	mm	A mm	B mm
05.17921	0 ÷ 500	0,02	250	10
05.17931	0 ÷ 800	0,02	300	10
05.17941	0 ÷ 1000	0,02	300	10

✓
Factory standard
Satin-chrome scale baktround; main scale slightly set back for wear protection
Hardened stainless steel
Wooden case
Identification number
Declaration of conformity

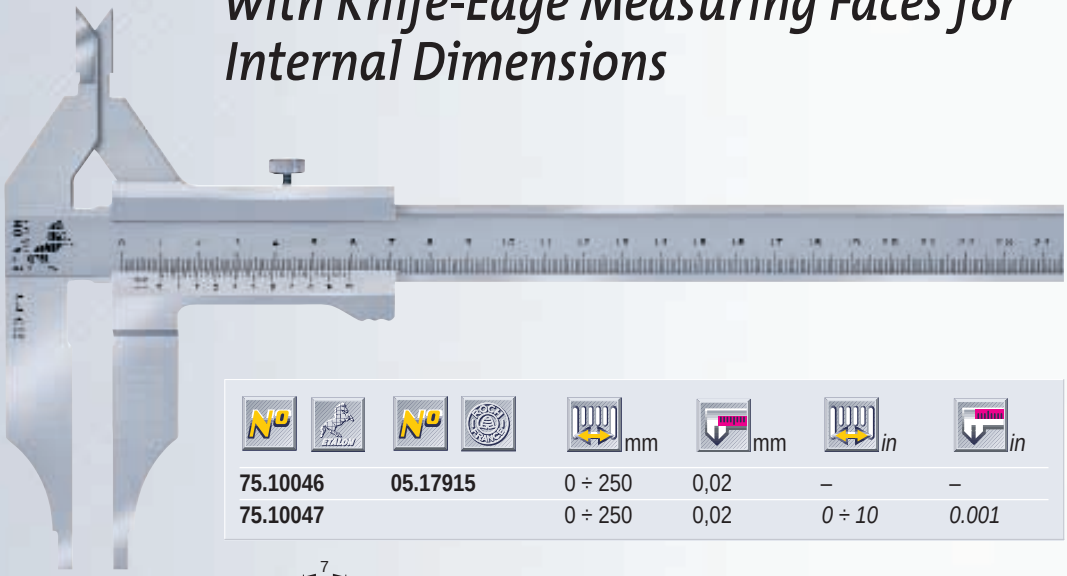
ETALON® and ROCH Vernier Callipers with Hook Jaws for External Dimensions



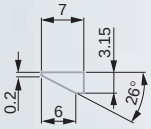
		mm	mm	in	in
85.10911	**05.1710911**	0 ÷ 250	0,02	–	–
85.10912		0 ÷ 250	0,02	*0 ÷ 10*	*0.001*

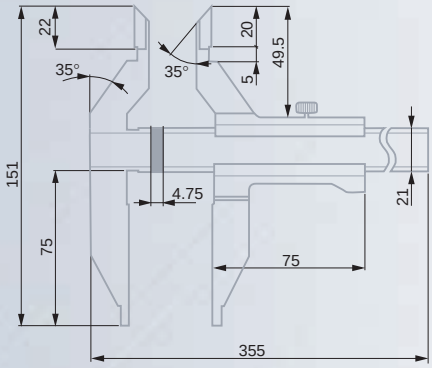
✓
NF E 11-091
Satin-chrome scale baktround; main scale slightly set back for wear protection
Hardened stainless steel
Wooden case
Identification number
Declaration of conformity

ETALON® and ROCH Vernier Callipers with Knife-Edge Measuring Faces for Internal Dimensions



		mm	mm	in	in
75.10046	**05.17915**	0 ÷ 250	0,02	–	–
75.10047		0 ÷ 250	0,02	*0 ÷ 10*	*0.001*

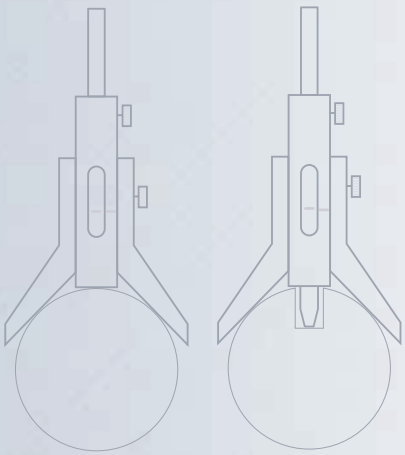


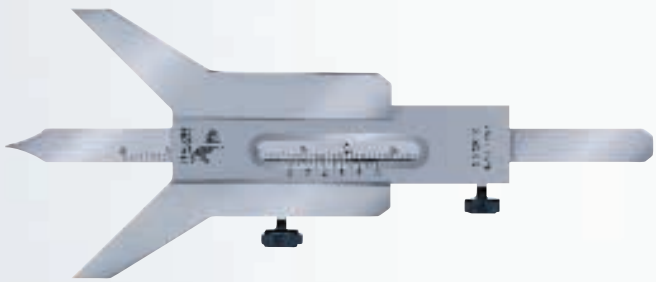


✓
NF E 11-091
Satin-chrome scale background; main scale slightly set back for wear protection
Hardened stainless steel
Wooden case
Identification number
Declaration of conformity

ETALON® and ROCH Depth Callipers with Vee Bridge

Made to measure groove and slot depths on cylindrical shafts.



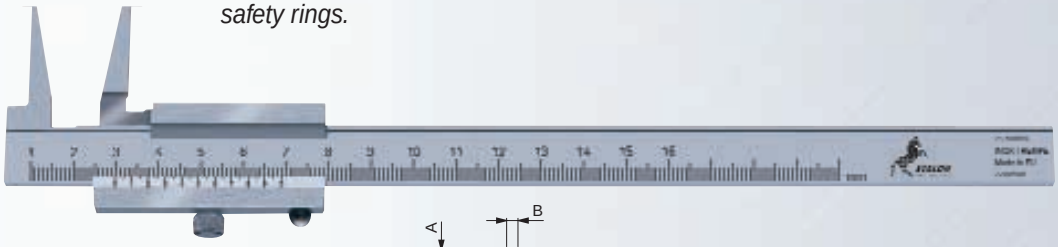


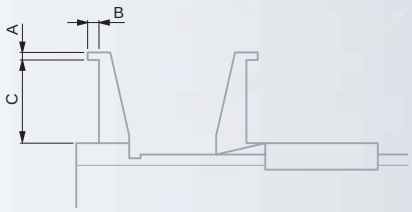
		mm	mm
85.12015	**05.1712015**	0,05	5 ÷ 80
85.12016	**05.1712016**	0,05	6 ÷ 120
85.12017	**05.1712017**	0,05	7 ÷ 160

✓
NF E 11-091
Hardened stainless steel
Wooden case
Identification number
Declaration of conformity

ETALON® and ROCH Vernier Callipers for Grooves.

Specially designed for measuring groove or slot diameters, e.g. on internal safety rings.





75.10029	05.17371	9,5 ÷ 160	0,05	0,9	3	25
75.10030	05.17375	20 ÷ 160	0,05	2	5	40
	05.17383	26 ÷ 200	0,02	2	5	40
75.10031	05.17385	26 ÷ 200	0,05	3	7	60
	05.17387	55 ÷ 250	0,02	4	8,5	80
75.10032	05.17391	55 ÷ 250	0,05	4	8,5	80
	05.17393	35 ÷ 300	0,02	5	10	100
75.10033	05.17395	35 ÷ 300	0,05	5	10	100

✓ Factory standard

Satin-chrome scale background; main scale slightly set back for wear protection

Hardened stainless steel

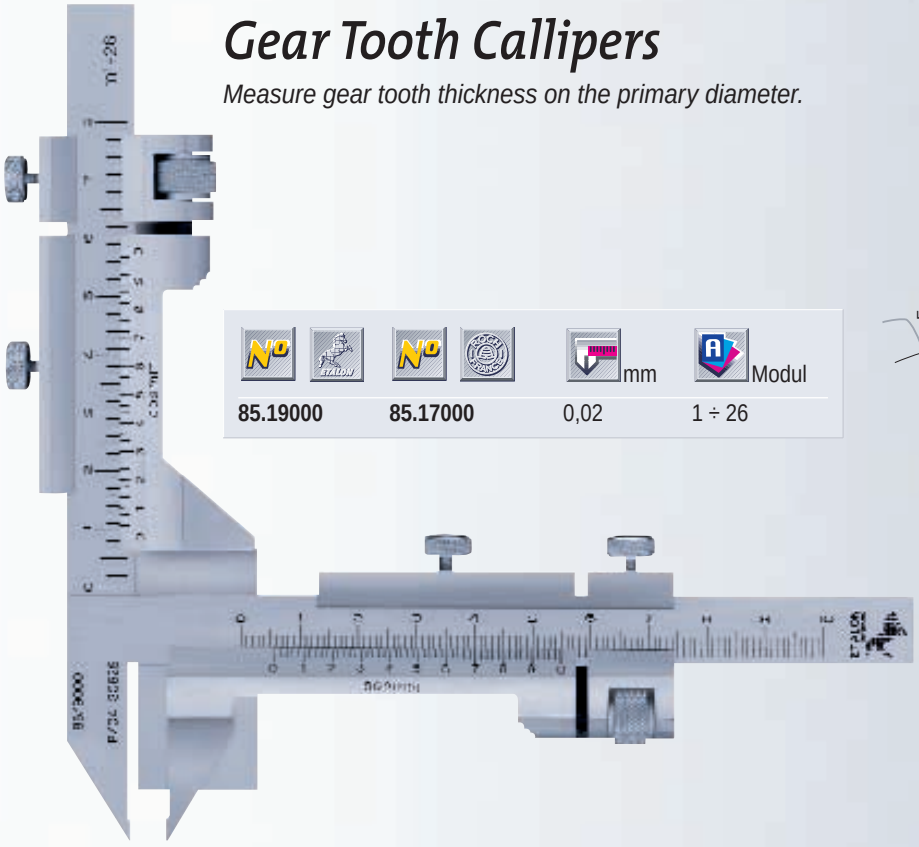
No. 75.10029 and 05.17371 in a plastic case. Other modesl in a wood case.

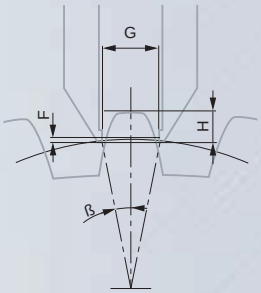
Identification number

Declaration of conformity

ETALON® and ROCH Gear Tooth Callipers

Measure gear tooth thickness on the primary diameter.





85.19000	85.17000	0,02	1 ÷ 26

✓ Factory standard

Both sliders are fitted with a fine adjust device

Hardened stainless steel. Tungsten carbide coated measuring faces.

Wooden case

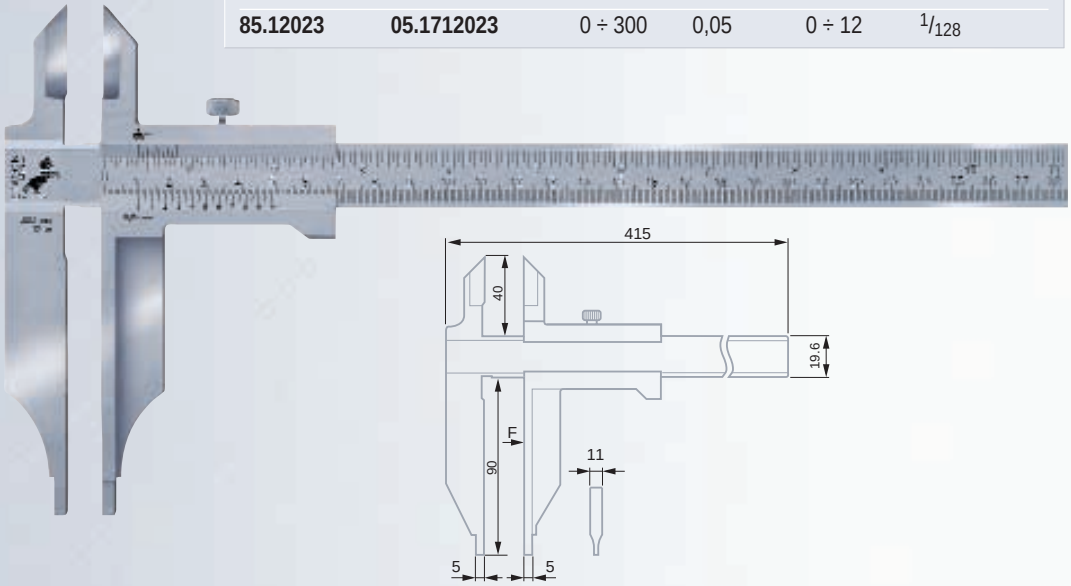
Identification number

Declaration of conformity

ETALON® and ROCH Callipers for Scribing

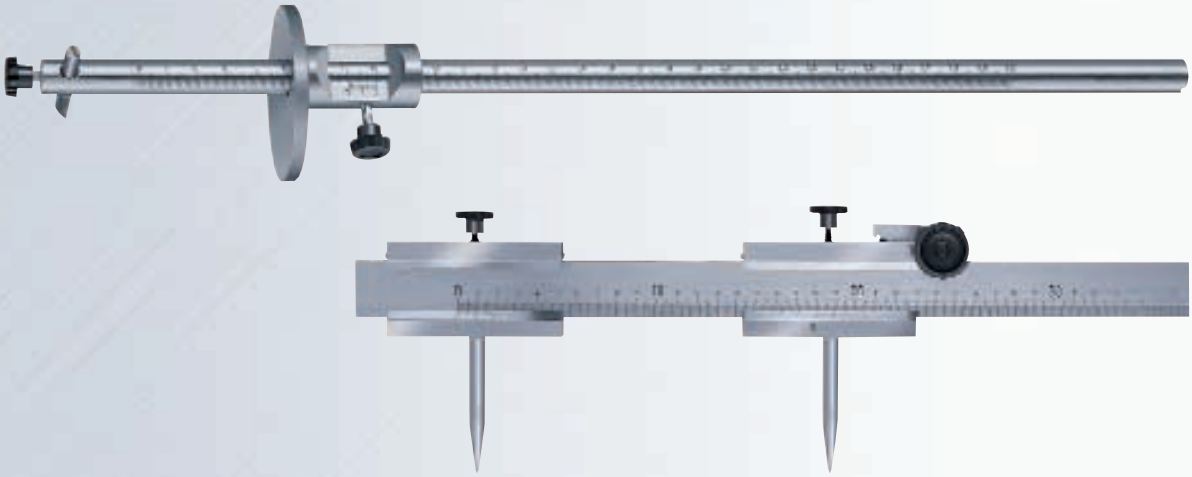
Feature a thick mobile jaw that serves as resting surface for your scribing job – Graduated beam on back for depth measurement without vernier.

		mm	mm	in	in
85.12023	**05.1712023**	0 ÷ 300	0,05	0 ÷ 12	1/128



✓
NF E 11-091
Satin-chrome scale background; main scale slightly set back for wear protection
Hardened stainless steel
Wooden case
Identification number
Declaration of conformity

ROCH Callipers for Scribing



✓
Factory standard
Callipers No. 95.1752291 up to 95.1752294 with wheel drive on the right slider
Steel tip scriber, hardened
Transport packing
Calliper No. 05.1712021 with identification number
Declaration of conformity

	mm	mm	Section mm
Model with a stop plate on the slider as well as a tip scriber			
05.1712021	0 ÷ 300	0,1	round section
Models with 2 discs for use as calliper compasses. Fitted with 2 interchangeable points.			
95.1752291	0 ÷ 500	0,1	25 x 5
95.1752292	0 ÷ 1000	0,1	30 x 6
95.1752293	0 ÷ 1500	0,1	32 x 7
95.1752294	0 ÷ 2000	0,1	40 x 8

Brown & Sharpe® Accessory Set CENTERLINE

Set of practical accessories for measuring undercuts, grooves, slots, centre distances of bores, etc. – Fits all callipers with analogue or digital indication covering the measuring range 0 to 150 mm or 0 to 6 in.

✓
Steel with black oxide plating
Inserts with M2,5 threaded-coupling. Lowest centre distance of the mounted insert holder: 10 mm





No	=	⌀ mm	mm

CENTERLINE Accessory Set

67.69001	Full accessory set provided in a custom wood case (037889).		
67.39000	Full accessory set provided in a custom wood case with the following items: 1 TESA DIGIT-CAL electronic calliper with «capa µ system», No. 05.30080.		
67.69008	Full accessory set provided in a custom wood case. Comes ready for mounting any calliper covering the measuring range 0 to 150 mm or 0 to 6 in (to be ordered separately).		

Full Accessory Sets including:

037883	1 Pair of disc-shaped measuring inserts	6	0,8
037884	1 Pair of disc-shaped measuring inserts	10	0,8
037885	1 Pair of disc-shaped measuring inserts	12,5	0,8
037886	1 Pair of cylindrical measuring inserts	1,5	9,5
037887	1 Pair of cone-shaped measuring inserts	9	60 °
037888	1 Pair of cone-shaped measuring inserts	12,5	60 °
037882	1 Insert holder (link)		
037881	1 Insert holder (right)		
	1 Hexagon key		1,2

Depth Measuring Foot

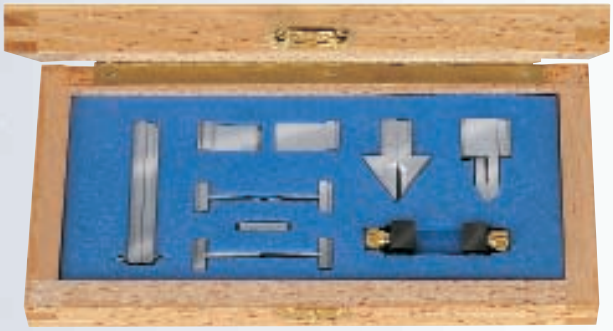
For use with TESA, ETALON or ROCH universal callipers with measuring ranges from 0 to 150 mm/0 to 6 in as listed on pages A-3 and A-4 as well as A-7 to A-10 (not suitable for the models 0 to 150 mm shown on both pages A-5 and A-11 or the exceptions on page A-10).

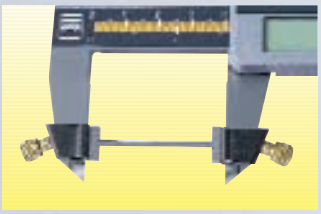
✓
Factory standard
Hardened, stainless steel
Ground measuring face

No	mm
05.60013	75 x 6

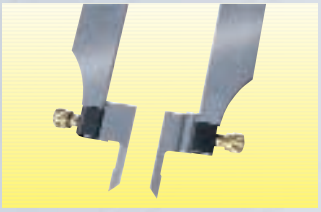


TAIST Accessory Sets











No.		
05.1614508	**TAIST 1 Accessory set, complete** for callipers with bevel measuring jaws for meauring lengths up to 150 mm or 6 in	●
05.1614501	**TAIST 2 Accessory set, complete** for callipers with measuring jaws having 5 mm cylindrical measuring faces for internal dimensions	●
	Consisting of:	
05.1614502	1 Pair of measuring inserts with cylindrical pins, 2,2 mm dia.	● ●
05.1614503	1 Pair of measuring inserts with conical points	● ●
05.1614504	1 Pair of measuring inserts with knife-edge measuring faces for external dimensions	● ●
05.1614505	1 Pair of bevel inserts with knife-edge, cross-over mesauring faces for internal dimensions	●
05.1614506	1 Pair of measuring inserts with small, off-set measuring faces for internal dimensions, 50 mm long	● ●
05.1614507	1 Pair of bevel inserts with knife-edge measuring faces for external dimensions	●
05.1614525	1 Pair of attachments for callipers with bevel measuring jaws	●
05.1614526	1 Pair of attachments for callipers with cylindrical measuring faces for internal dimensions, size A = 4,6 mm, B = 5 mm	●
	1 Wooden case	● ●

Optional Accessories

Callipers with measuring lengths ≥ 750 mm

05.1614512	1 Pair of measuring inserts with cylindrical pins
05.1614515	1 Pair of bevel inserts with knife-edge mesauring faces for external dimensions
05.1614517	1 Pair of inserts with cone-shaped measuring faces for internal dimensions

Attachments for callipers with cylindrical measuring faces for internal dimensions

05.1614522	1 Pair of attachments	**A** = 5 mm	**B** = 10 mm
05.1614523	1 Pair of attachments	7 mm	10 mm
05.1614524	1 Pair of attachments	10 mm	10 mm

A = Thickness of the measuring jaws **B** = Size shown in the drawing (page A-12)

✓

Factory standard

Use of either measuring insert No. 05.1614505 or 05.1614506 increases displayed or read values by 15 mm or 10 mm, respectively.

Stainless steel measuring inserts

Measuring faces hardened to 550 HV 30

Each pair of measuring inserts is supplied without attachments which must be ordered separately

Wooden case

Magnetic Magnifying Glass

Can be mounted on callipers or the like for easier vernier reading.



No.	Magnification
05.1610365	3x

✓

Plastic storage pocket

2 permanent magnets

External Micrometers







Precision Measurement

Precision measurement requires the use of micrometers. The first measuring tool of this type was patented by the French inventor Jean Laurent Palmer in 1848 as «calibre à vis et à vernier circulaire» (screw calliper with a circular vernier). Today, we continue to make external micrometers with these typical features.

The introduction of the micrometer to the mechanical world came about by the visit of the two american engineers Joseph R. Brown and Lucian Sharpe to the Paris Exhibition in 1867. At that time, their attention was called to the Palmer's invention, which greatly interested them. After some improvements of the Palmer design, the product was manufactured on a large scale and marketed sucessfully by the two partners.

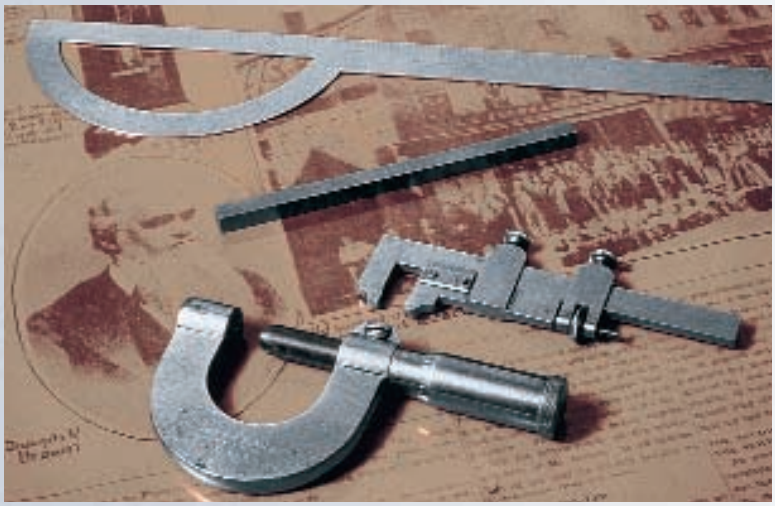
The story repeated in the past as TESA SA decided to manufacture external micrometers making them the first products manufactured by the company.

Yet no matter what you measure - internal or external dimensions - all TESA and ETALON micrometers are world-class products in design and quality.

With a very few exceptions (e.g. external micrometers for gear teeth measurements), our micrometers respect the Abbe principle, i.e. the comparator's one (also read in the General Information). Their spindle are ground on modern grinding machines and the profile of the screw is accurately restored with negligible pitch deviations. Such manufacturing conditions are the guarantee for very low measurement uncertainties.

The micrometers of both TESA and ETALON premium brands are robust as well as ergonomically and attractively designed.

Besides external micrometers in standard or special versions, we also offer micrometer heads, depth micrometers, full micrometer sets as well as a wide number of accessories plus all what you need for your calibrations. Each model provides either an analogue or a digital indication according to the execution. The models with electrical measuring system also include an RS 232 digital interface.



Max. perm. errors

In future, the max. perm. errors are used instead of «deviation span» as indicated in the previous issues of our general catalogue.
This change is made in order to ! conform with the new specifications of international standards. With respect to this, read also «What is known ...» in General Information.

** The max. perm. errors include the errors of the measuring element as well as the deviations in flatness and parallelism of the measuring faces and the errors due to the flexure of the frame.*

Measuring range / mm	Max. perm. errors* / µm	Number of interference-fringes or rings	µm	10 N
0 ÷ 25	4	6	2	
25 ÷ 50	4	6	2	
50 ÷ 75	5	10	3	
75 ÷ 100	5	10	3	
100 ÷ 125	6		3	
125 ÷ 150	6		3	
150 ÷ 175	7		4	
175 ÷ 200	7		4	
200 ÷ 225	8		4	
225 ÷ 250	8		4	
250 ÷ 275	9		5	
275 ÷ 300	9		5	
300 ÷ 325	10		5	
325 ÷ 350	10		5	
350 ÷ 375	11		6	
375 ÷ 400	11		6	
400 ÷ 425	12		6	
425 ÷ 450	12		6	
450 ÷ 475	13		7	
475 ÷ 500	13		7	

✓

DIN 863 T1

0,001 mm
0.00005 in

mm / in
Conversion

Tungsten
carbide tipped

≤ 100 mm:
6,5 mm dia.
> 100 mm: 8 mm dia.

0,5 mm

Max. 10 N

LCD, digit
height: 7 mm

Floating
zero

Display lock
(except for
model EASY)

Interface:
RS 232
opto-coupled

3 V lithium
battery

1 to 2 a
(≈ 2000 h/a)

Automatic
shut-down after
10 min. Display setting is
maintained as long as
power supply remains
stable.

10°C to 40°C

–10°C to 60°C

80%, with no
condensation

✓

Degree
of protection
(IEC 529, DIN 40 050):
IP 40 (also valid using
the RS output) or IP54

Plastic case

Identification
number

Inspection
report with a
declaration of conformity

TESA® MICROMASTER® Electronic Micrometers with Digital Display

With new TESA measuring system «capa µ system», patented.

- *Measuring span of 30 mm or 25 mm*
- *Large easy-to-read digital display*
- *Models:* – *EASY with a single function key*
  – *IP54 with water spray protection as well as IP54 RS with added RS 232 interface*





No	mm	mm	in	in		
MICROMASTER® EASY						
60.30010	0 ÷ 30	0 ÷ 30	*0 ÷ 1.2*	*0 ÷ 1.2*	IP40	–
MICROMASTER® IP54						
60.30020	0 ÷ 30	0 ÷ 30	*0 ÷ 1.2*	*0 ÷ 1.2*	IP54	–
60.30021	25 ÷ 50	23 ÷ 53	*1 ÷ 2*	*0.9 ÷ 2.1*	IP54	–
60.30022	50 ÷ 75	48 ÷ 78	*2 ÷ 3*	*1.9 ÷ 3.1*	IP54	–
60.30023	75 ÷ 100	74 ÷ 104	*3 ÷ 4*	*2.9 ÷ 4.1*	IP54	–
MICROMASTER® IP54 RS						
60.30030	0 ÷ 30	0 ÷ 30	*0 ÷ 1.2*	*0 ÷ 1.2*	IP54	RS 232
60.30031	25 ÷ 50	23 ÷ 53	*1 ÷ 2*	*0.9 ÷ 2.1*	IP54	RS 232
60.30032	50 ÷ 75	48 ÷ 78	*2 ÷ 3*	*1.9 ÷ 3.1*	IP54	RS 232
60.30033	75 ÷ 100	74 ÷ 104	*3 ÷ 4*	*2.9 ÷ 4.1*	IP54	RS 232
60.30071	100 ÷ 125	98 ÷ 127	*4 ÷ 5*	*3.9 ÷ 5.01*	IP54	RS 232
60.30072	125 ÷ 150	123 ÷ 152	*5 ÷ 6*	*4.9 ÷ 6.01*	IP54	RS 232
60.30073	150 ÷ 175	149 ÷ 178	*6 ÷ 7*	*5.9 ÷ 7.01*	IP54	RS 232
60.30074	175 ÷ 200	174 ÷ 203	*7 ÷ 8*	*6.9 ÷ 8.01*	IP54	RS 232
60.30075	200 ÷ 225	199 ÷ 229	*8 ÷ 9*	*7.9 ÷ 9.01*	IP54	RS 232
60.30076	225 ÷ 250	224 ÷ 254	*9 ÷ 10*	*8.9 ÷ 10.01*	IP54	RS 232
60.30077	250 ÷ 275	250 ÷ 279	*10 ÷ 11*	*9.9 ÷ 11.01*	IP54	RS 232
60.30078	275 ÷ 300	275 ÷ 304	*11 ÷ 12*	*10.9 ÷ 12.01*	IP54	RS 232

Optional Accessories

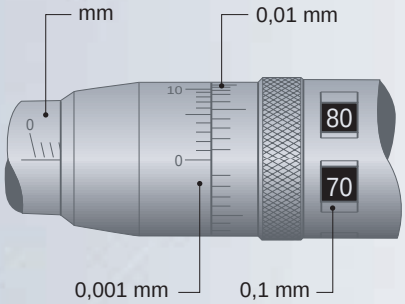
19.61000	1 Lithium battery - 3 V, 190 mAh, type CR 2030 For ordering information on connecting cables etc., see section L.

TESAMASTER® Precision Micrometers with Digital Counter to 0,1 mm

Analogue indication of the full millimetres, hundredths and fractions of hundredths – Accurate, fast reading of the tenths of millimetres – Parallax-free reading of the thousandts of millimetres on vernier



No	mm	µm	µm
03.10001	0 ÷ 25	2	1
03.10002	25 ÷ 50	2	1,5
03.10003	50 ÷ 75	3	1,5
03.10004	75 ÷ 100	3	1,5
03.10005	100 ÷ 125	4	2
03.10006	125 ÷ 150	4	2,5
03.10007	150 ÷ 175	5	3
03.10008	175 ÷ 200	5	3
03.10009	200 ÷ 225	6	3,5
03.10010	225 ÷ 250	6	3,5
03.10011	250 ÷ 275	7	4
03.10012	275 ÷ 300	7	4

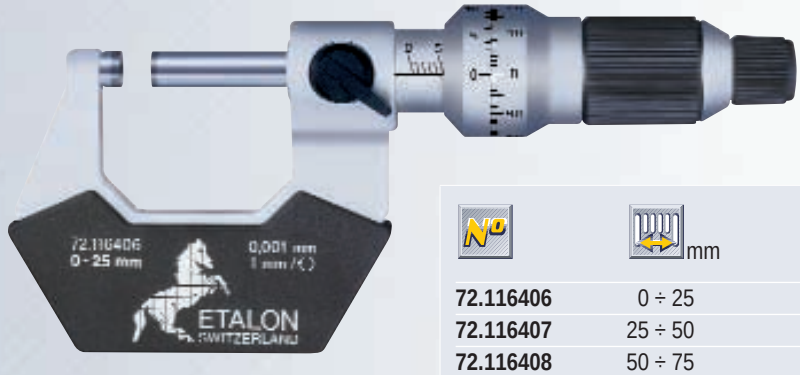


No	in	µm	µm
03.20001	*0 ÷ 1*	2	1
03.20002	*1 ÷ 2*	2	1,5
03.20003	*2 ÷ 3*	3	1,5
03.20004	*3 ÷ 4*	3	1,5

- SWISS MADE ✓
- DIN 863 T1 NF E 11-095
- Vernier reading to 0,001 mm or 0.0001 in
- Digital reading to 0,1 mm or 0.005 in
- Tungsten carbide tipped
- ≤ 100 mm: 6,5 mm dia. > 100 mm: 8 mm dia
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

ETALON® MICRORAPID 226 with 1 mm Revolution

High precision micrometers – Fast, accurate reading – No reading error of the half millimetres - Barrel with 1 mm pitch – Thimble with 100 graduations - Vernier reading to 0,001 mm



No	mm	µm	µm
72.116406	0 ÷ 25	2	1
72.116407	25 ÷ 50	2	1,5
72.116408	50 ÷ 75	3	1,5
72.116409	75 ÷ 100	3	1,5

- SWISS MADE ✓
- DIN 863 T1 NF E 11-095
- 0,001 mm, parallax-free reading on vernier
- Tungsten carbide tipped
- 6,5 mm dia.
- 1 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

ETALON® Basic to 0,001 mm

High accuracy – Parallax-free reading on vernier.

- ✓
- DIN 863 T1 NF E 11-095
- 0,001 mm on vernier, parallax-free
- Tungsten carbide tipped
- 6,5 mm dia.
- 0,5 mm
- Max. 10 N
- Platic case
- Identification number
- Inspection report with a declaration of conformity



N°	mm	µm	µm
01.19051	0 ÷ 25	3	2
01.19052	25 ÷ 50	3	2
01.19053	50 ÷ 75	3	3
01.19054	75 ÷ 100	3	3

ETALON® 260 Standard Models with Analogue Indication

The knurled sleeve needs only be reversed to render the friction drive built into the thimble inactive.

- ✓
- DIN 863 T1 NF E 11-095
- 0 to 100 mm or 0 to 4 in with vernier reading
- Tungsten carbide tipped
- ≤ 100 mm: 6,5 mm dia. > 100 ≤ 300 : 8 mm dia.
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

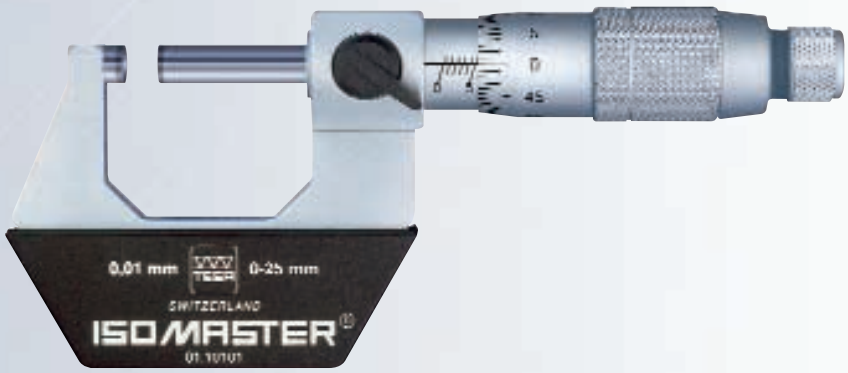


N°	mm	mm	µm	µm
71.115887	0 ÷ 25	0,002	2	1
71.115888	25 ÷ 50	0,002	2	1,5
71.115889	50 ÷ 75	0,002	3	1,5
71.115890	75 ÷ 100	0,002	3	1,5
71.115891	100 ÷ 125	0,01	4	2
71.115892	125 ÷ 150	0,01	4	2,5
71.115893	150 ÷ 175	0,01	5	3
71.115894	175 ÷ 200	0,01	5	3
71.115895	200 ÷ 225	0,01	6	3,5
71.115896	225 ÷ 250	0,01	6	3,5
71.115897	250 ÷ 275	0,01	7	4
71.115898	275 ÷ 300	0,01	7	4
N°	**in**	**in**	**µm**	**µm**
71.115899	*0 ÷ 1*	*0.00001*	2	1
71.115900	*1 ÷ 2*	*0.00001*	2	1,5
71.115901	*2 ÷ 3*	*0.00001*	3	1,5
71.115902	*3 ÷ 4*	*0.00001*	3	1,5

TESA® ISOMASTER® Standard Models with Analogue Indication

Slanted full millimetres on the barrel are set apart from the straight half millimetres to virtually eliminate reading errors.

The knurled sleeve needs only be reversed to render the friction drive built into the thimble inactive.



N°	mm	mm	N°	in	in
01.10101	0 ÷ 25	0,01	***01.20101***	*0 ÷ 1*	*0.0001*
01.10102	25 ÷ 50	0,01	***01.20102***	*1 ÷ 2*	*0.0001*
01.10103	50 ÷ 75	0,01	***01.20103***	*2 ÷ 3*	*0.0001*
01.10104	75 ÷ 100	0,01	***01.20104***	*3 ÷ 4*	*0.0001*
01.10105	100 ÷ 125	0,01			
01.10106	125 ÷ 150	0,01			
01.10107	150 ÷ 175	0,01			
01.10108	175 ÷ 200	0,01			
01.10109	200 ÷ 225	0,01			
01.10110	225 ÷ 250	0,01			
01.10111	250 ÷ 275	0,01			
01.10112	275 ÷ 300	0,01			

- ✓
- DIN 863 T1 NF E 11-095
- Tungsten carbide tipped
- ≤ 100 mm: 6,5 mm dia. > 100 ≤ 300: 8 mm dia.
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

Set of 4 TESA® ISOMASTER®

Same execution as above.

The models covering the application range 0 to 100 mm provide the quality that you need at competitive prices.



N°	mm
01.10113	0 ÷ 100

- ✓
- Plastic case

ETALON® Basic to 0,01 mm



- ✓
- DIN 863 T1
  NF E 11-095
- 0,01 mm
- Tungsten carbide tipped
- 6,5 mm dia.
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

No	mm
01.19046	0 ÷ 25
01.19047	25 ÷ 50
01.19048	50 ÷ 75
01.19049	75 ÷ 100

Set of 4 ETALON® Basic to 0,01 mm

Same execution as above.

The models covering the application range 0 to 100 mm give high value for money.



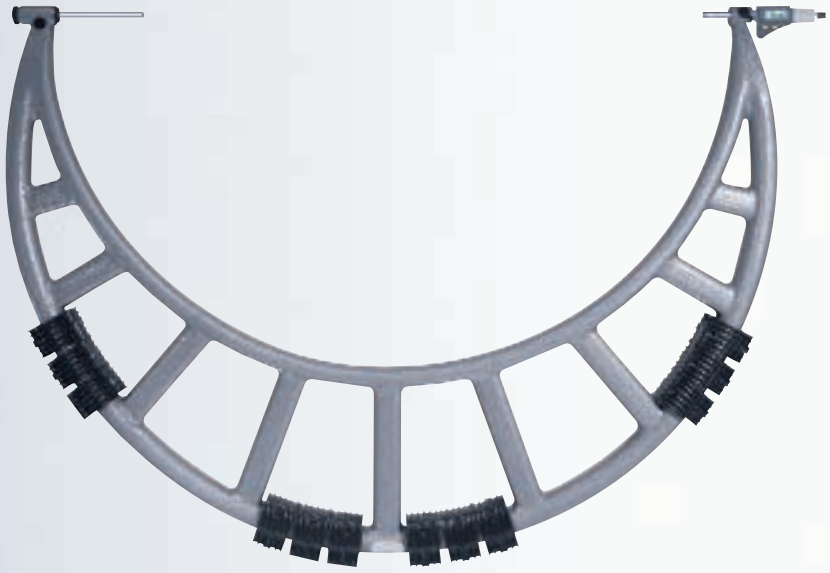
- ✓
- Plastic case

No	mm
01.19050	0 ÷ 100

MICROMASTER® with Interchangeable Anvils

Lightweight, but rugged anvil micrometers.

One set (No. 01.40101) consists of 4 interchangeable anvils in steps of 25 mm. Anvils are adjusted (and numbered) in sets, thus rendering unnecessay the correction of the indication each time an anvil is exchanged.



No	mm	in	µm	µm
60.30047	0 ÷ 100	*0 ÷ 3.94*	6	3
60.30048	100 ÷ 200	*3.94 ÷ 7.87*	7	4,5
60.30049	200 ÷ 300	*7.87 ÷ 11.81*	8	7
60.30050	300 ÷ 400	*11.81 ÷ 15.75*	9	9
60.30051	400 ÷ 500	*15.75 ÷ 19.69*	10	9
60.30052	500 ÷ 600	*19.69 ÷ 23.62*	11	9
60.30053	600 ÷ 700	*23.62 ÷ 27.56*	12	10
60.30054	700 ÷ 800	*27.56 ÷ 31.50*	13	12
60.30055	800 ÷ 900	*31.50 ÷ 35.43*	14	12
60.30056	900 ÷1000	*35.43 ÷ 39.37*	15	16
60.30057	1000 ÷1100	*39.37 ÷ 43.31*	16	16
60.30058	1100 ÷1200	*43.31 ÷ 47.24*	17	17
60.30059	1200 ÷1300	*47.24 ÷ 51.20*	18	17
60.30060	1300 ÷1400	*51.20 ÷ 55.12*	19	17
60.30061	1400 ÷1500	*55.12 ÷ 59.06*	20	18



Dial Gauge Element for MICROMASTER®

Can replace the interchangeable anvils on AB series micrometers. Make finding the culmination point easier. Ensures a constant measuring force.

Supplied as standard accessory with the ABY series micrometers.

No
01.40301

- ✓
- DIN 863 T3 (style D16)
- 0,001 mm 0.00005 in
- mm / in conversion
- 30 mm measuring span
- 0 ≤ 500 mm: malleable cast iron; 500 ≤ 1500 mm: steel tube with insulating grips

Max. flexure of the frame under a measuring force of 10 N: see the table opposite

- Tungsten carbide tipped
- 8 mm dia.
- 0,5 mm
- Max. 10 N
- LCD, digit height: 7 mm
- RS 232
- Other technical data: see page B-3
- Wooden case
- Identification number
- Inspection report with a declaration of conformity

- ✓
- See next page

ISOMASTER® AB with Interchangeable Anvils

Lightweight, but rugged anvil micrometers.

One set (No. 01.40101) consists of 4 interchangeable anvils in steps of 25 mm. Anvils are adjusted (and numbered) in sets, thus rendering unnecessary the correction of the indication each time an anvil is exchanged.

✓

DIN 863 T3 (style D16) NF E 11-090

0,01 mm

0 ≤ 500 mm: malleable cast iron; 500 ≤ 1500 mm: steel tube with insulating grips

Max. flexure of the frame under a measuring force of 10 N: see the table opposite

Tungsten carbide tipped

8 mm dia.

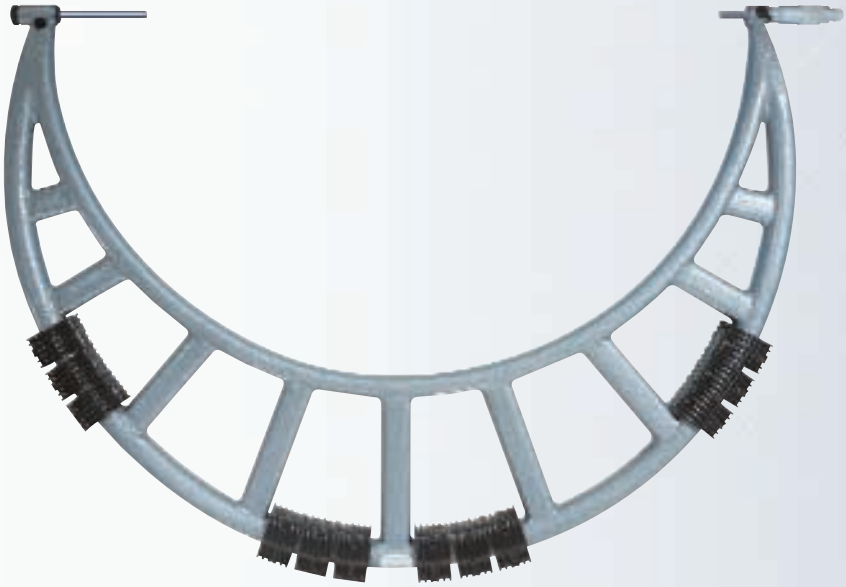
0,5 mm

Max. 10 N

Wooden case

Identification number

Declaration of conformity



No	mm	µm	µm
01.11901	0 ÷ 100	6	3
01.11902	100 ÷ 200	7	4,5
01.11903	200 ÷ 300	8	7
01.11904	300 ÷ 400	9	9
01.11905	400 ÷ 500	10	9
01.11906	500 ÷ 600	11	9
01.11907	600 ÷ 700	12	10
01.11908	700 ÷ 800	13	12
01.11909	800 ÷ 900	14	12
01.11910	900 ÷ 1000	15	16
01.11911	1000 ÷ 1100	16	16
01.11912	1100 ÷ 1200	17	17
01.11913	1200 ÷ 1300	18	17
01.11914	1300 ÷ 1400	19	17
01.11915	1400 ÷ 1500	20	18

Dial Gauge Element for ISOMASTER® AB

Can replace the interchangeable anvils on AB series micrometers. Make finding the culmination point easier. Ensures a constant measuring force.

Supplied as standard accessory with the ABY series micrometers.



✓

± 1,5 mm

0,01 mm

Tungsten carbide tipped

8 mm dia.

Max. 10 N

Meas. element: 11 mm dia., 100 mm long stem

Dial gauge 14.10201: 40 mm dial diameter, two-way dial reading.

Identification number

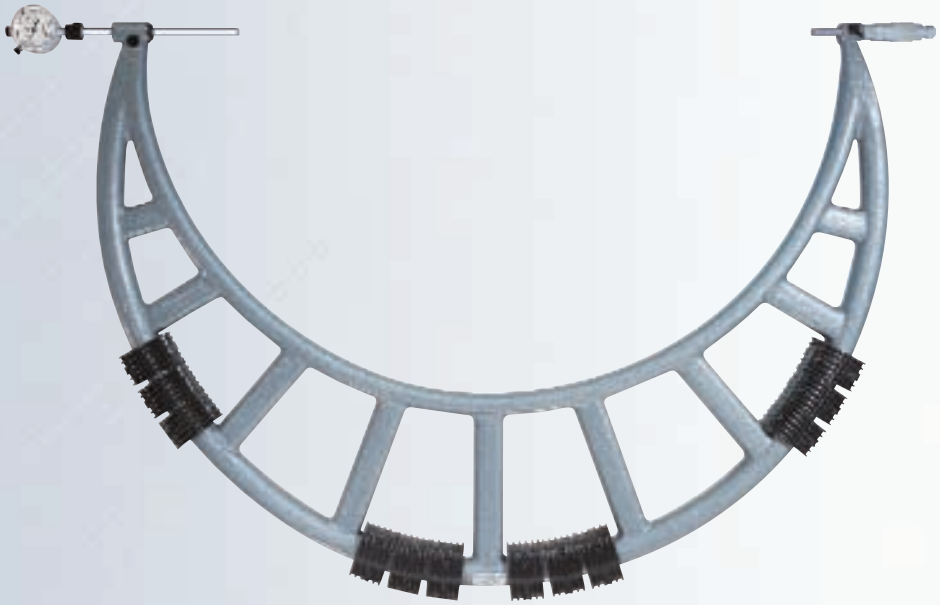
With dial gauge and clamp

Declarartion of conformity

No
01.40301

ABY Series ISOMASTER®
with Adjustable Dial Gauge Element

Similar to the AB series micrometers, but equipped with the adjustable dial gauge element No. 01.40301 that helps you to find the culmination point easier with a constant measuring force.





No	mm	µm	µm
01.12001	0 ÷ 100	6	3
01.12002	100 ÷ 200	7	4,5
01.12003	200 ÷ 300	8	7
01.12004	300 ÷ 400	9	9
01.12005	400 ÷ 500	10	9
01.12006	500 ÷ 600	11	9
01.12007	600 ÷ 700	12	10
01.12008	700 ÷ 800	13	12
01.12009	800 ÷ 900	14	12
01.12010	900 ÷ 1000	15	16
01.12011	1000 ÷ 1100	16	16
01.12012	1100 ÷ 1200	17	17
01.12013	1200 ÷ 1300	18	17
01.12014	1300 ÷ 1400	19	17
01.12015	1400 ÷ 1500	20	18

SWISS MADE ✓

DIN 863 T3 (style D15) NF E 11-090

0,01 mm

0 ≤ 500 mm: malleable cast iron; > 500 ≤ 1500 mm: steel tube with insulating grips

Max. flexure of the frame under a measuring force of 10 N: see the table opposite

Tungsten carbide tipped

8 mm dia.

0,5 mm

Max. 10 N

Dial gauge: see on page B-9

Wooden case

Identification number

Declaration of conformity

Interchangeable Anvils for ABY Series ISOMASTER®

Set (= 4 items) of interchangeable anvils in steps of 25 mm. The anvils are adjusted and numbered in sets, thus eliminating the need for resetting the indication after their exchange.

Supplied as standard accessories with the AB series micrometers.

No
01.40101

SWISS MADE ✓

DIN 863 T3 (style D16) NF E 11-090

Tungsten carbide tipped

8 mm dia.

Sets include 2 covers for the frame as well as 1 clamping nut

Identification number

ETALON® MICROSPEL 280

These micrometers have a mobile anvil and a 8 mm dia. fixing bore for mounting a sensor such as the TESA GT 43/44 electronic probe (also refer to section L).

Specially designed for batch inspection of small precision parts.

- ✓
- DIN 863 T3 (style D14) NF E 11-090
- Vernier reading to 0,002 mm
- Tungsten carbide tipped
- 6,5 mm dia. Models with small measuring faces: 2 mm dia., 5 mm long
- 0,5 mm
- Anvil: 2 up to 8 N, adjustable
- Measuring element: max. perm. error of 2 µm
- Mobile anvil: repeatability limit of 0,5 µm
- Adjustable part support (except model with small measuring faces)
- Plastic case
- Declaration of conformity





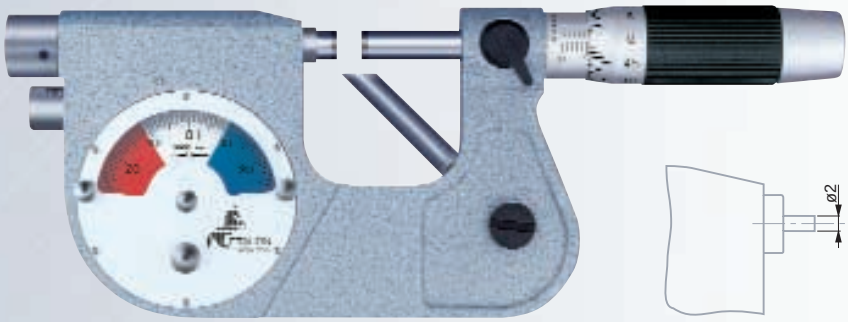
No	mm
72.110816	0 ÷ 25
72.110819	25 ÷ 50
Model with small measuring faces	
72.110853	0 ÷ 20

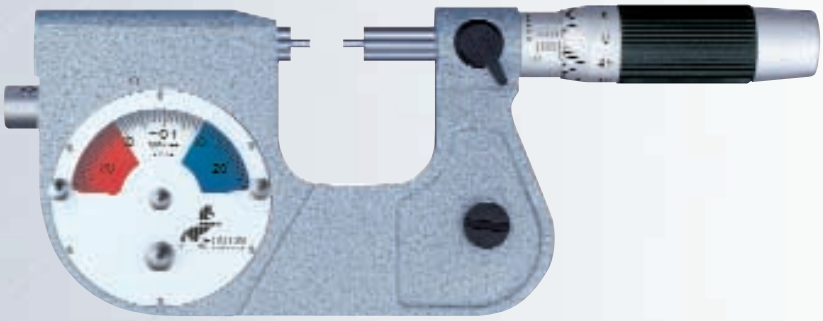
Important

Electronic probe and mirometer stand are not part of the delivery and must be ordered separtely .

MICRO-ETALON 225
Micrometers with a Dial Indicator

Feature a mobile anvil and built-in dial indicator - Ideal for comparative measurements on small part series - Nominal dimension is set on the micrometer and deviations are read on the dial indicator - Retractable anvil by means of a push-button - Rotating Dial for fine adjustment, also with adjustable tolerance markers.





Dial indicator 0,001 mm	mm	*Dial indicator 0.00005 in*	*in*
72.108669	0 ÷ 25	***72.109837***	*0 ÷ 1*
72.108691	25 ÷ 50	***72.109843***	*1 ÷ 2*
Model with small measuring faces			
72.108722	0 ÷ 20	***72.109857***	*0 ÷ 0.8*

Dial indicator 0,002 mm	mm	*Dial indicator 0.0001 in*	*in*
72.108670	0 ÷ 25	***72.109835***	*0 ÷ 1*
72.108716	25 ÷ 50	***72.109841***	*1 ÷ 2*

- ✓ SWISS MADE
- DIN 863 T3 (style D13)
- Tungsten carbide tipped
- 6,5 mm dia. For model with small measuring faces: 2 mm dia., 5 mm long
- 0,5 mm
- Anvil: 4,5 to 5,5 N
- Micrometer with vernier reading to 0,002 mm or 0.0001 in
  Dial indicator: 0,001 or 0,002 mm / 0.00005 or 0.0001 in
- Dial indicator: ± 0,025 or 0,05 mm / ± 0.0005 or ± 0.002 in
- Micrometer: max. perm. error of 2 µm
  Dial indicator: 1 µm
- Dial indicator: repeatability limit of 0,5 µm
- Plastic case
- Declaration of conformity

Protective Cover

Made in transparent plastic – Can be mounted on the bezel – Protects the indicator against dust and liquids – Prevents both tolerance markers from being accidentally displaced.



72.110978

AD Series Micrometers with Small Measuring Faces

For measuring grooves, feather grooves, splines and other difficult to reach measuring points. Particularly suited for measuring small parts in precision work owing to the small measuring faces.

Models MICROMASTER®

- ✓
- DIN 863 T3 (style D3)
- 0,001 mm 0.00005 in
- mm / in conversion
- Tungsten carbide measuring faces, fixed
- Max. 10 N
- RS 232: interface, opto-coupled
- Degree of protection (IEC 529, DIN 40 050): IP 54 or IP 40 with use of digital output
- For additional technical data: see page B-3
- Plastic case
- Identification-number
- Inspection report with a declaration of conformity

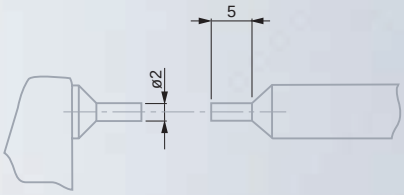


No	mm	in
60.30034	0 ÷ 30	*0 ÷ 1.2*
60.30035	30 ÷ 60	*1.2 ÷ 2.3*
60.30036	60 ÷ 90	*2.3 ÷ 3.5*
60.30037	90 ÷120	*3.5 ÷ 4.7*

Optional Accessory

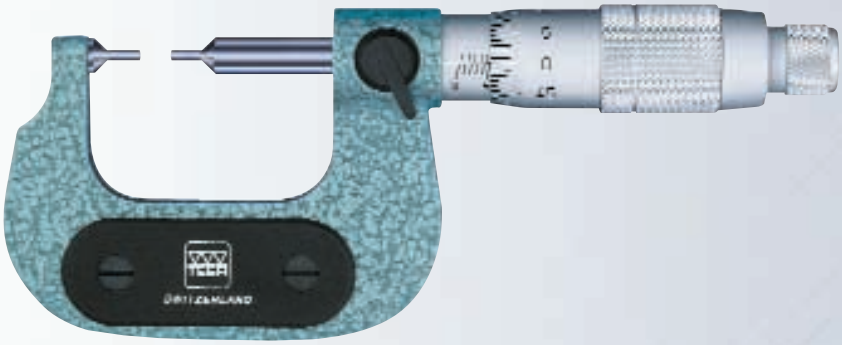
19.61000	1 Lithium byttery - 3 V, 190 mAh, type CR 2032

For information on cables etc., see section L.

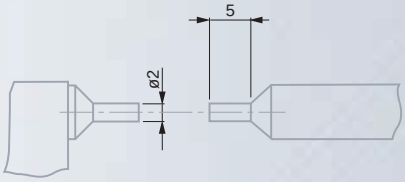


Models ISOMASTER® AD

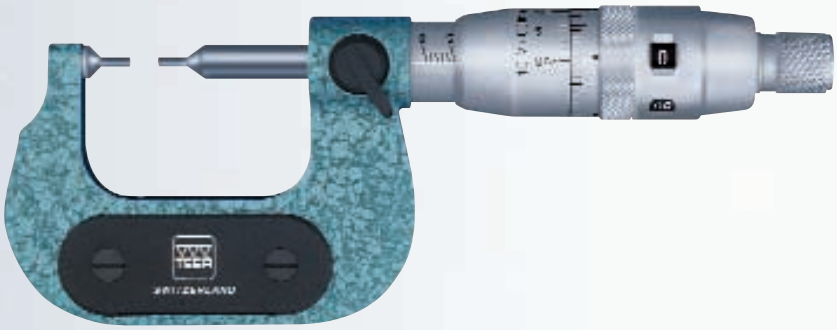
- ✓
- DIN 863 T3 (style D3) NF E 11-090
- 0,01 mm 0.0001 in
- Tungsten carbide measuring faces, fixed
- Max. 10 N
- Plastic case
- Identification-number
- Inspection report with a declaration of conformity

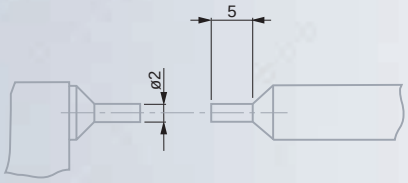


No	mm	No	in
02.10101	0 ÷ 25	***02.20101***	*0 ÷ 1*
02.10102	25 ÷ 50	***02.20102***	*1 ÷ 2*



Models TESAMASTER® AD



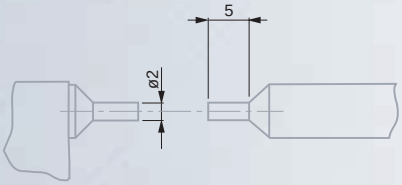


No	mm
03.11301	0 ÷ 25
03.11302	25 ÷ 50

- Swiss made ✓
- DIN 863 T3 (style D3) NF E 11-090
- Vernier reading to 0,001 mm
- Digital reading to 0,1 mm
- Tungsten carbide measuring faces, fixed
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

Model MICRORAPID





No	mm
72.116410	0 ÷ 20

- Swiss made ✓
- DIN 863 T3 (style D3) NF E 11-090
- 0,001 mm. Parallax-free reading on vernier
- 100 divisions
- Tungsten carbide measuring faces, fixed
- 1 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

✓ SWISS MADE

DIN 863 T3 (style D1)

MICROMASTER: 0,001 mm 0.00005 in

ETALON: 0,002 mm

Anvils: tungsten carbide (MICROMASTER) or titanium coated (ETALON)

Tungsten carbide tipped measuring spindle

Anvil with a 3,5 mm (MICROMASTER) or 3,25 mm (ETALON) spherical measuring face

Spindle with a flat measuring face

Max. 10 N

RS 232 on MICROMASTER

Other technical data on MICROMASTER: see page B-3

Plastic case

Identification-number

Inspection report with a declaration of conformity

Micrometers with One Spherical Measuring Face

Measure wall thickness of tubing.

Models MICROMASTER®



No	mm	in
60.30079	0 ÷ 30	*0 ÷ 1.2*
60.30080	25 ÷ 50	*1 ÷ 2*

Model ETALON®



No	mm
71.115940	0 ÷ 25

✓ SWISS MADE

DIN 863 T3 (style D1)

0,001 mm 0.00005 in

Steel, hardened

Spherical, radius 3,5 mm

Max. 10 N

Other technical data: see page B-3

Plastic case

Identification number

Inspection report with a declaration of conformity

Micrometers with Two Spherical Measuring Faces

Rounded Measuring faces on anvil and spindle for measuring concave surfaces of workpieces, e.g. ball-bearing guides or walls of tubing.

Models MICROMASTER®



No	mm	in
60.30081	0 ÷ 25	*0 ÷ 1*
60.30082	20 ÷ 50	*0.8 ÷ 1.9*
60.30083	45 ÷ 75	*1.8 ÷ 2.9*
60.30084	70 ÷ 100	*2.8 ÷ 3.9*

AAS Series ISOMASTER® Micrometers

Rounded measuring faces for measuring concave surfaces such as ball-bearing guides and tubing walls.



No	mm
01.12106	0 ÷ 25 (TiC)
01.90003	25 ÷ 50 (TiC)
01.10901	0 ÷ 25
01.10902	25 ÷ 50
01.10903	50 ÷ 75
01.10904	75 ÷ 100

✓ Swiss made

DIN 863 T3 (style D1)
NF E 11-090

0,01 mm

Measuring faces rounded to 3,25 mm

Titanium carbide coated measuring faces for both models 01.12106 and 01.90003:
Hardened steel for all other models

0,5 mm

Max. 10 N

Plastic case

Identification number

Inspection report with a declaration of conformity

Attachments for Micrometer Ball Tips

Fit on micrometers with measuring faces having a 6,5 mm diameter – Serve to measure tubing wall thickness, workpieces with concave surfaces etc.



No	Ball
72.103522	5 mm
72.103523	*0.200 in*

✓ Swiss made

Rounded measuring faces in hardened and lapped steel

Dull-chrome brass retainer

Micrometers for Soft Materials

With two large, round-edge measuring faces - Measure the thickness of materials such as paper and plastic sheets, felt, cloth and other soft materials.

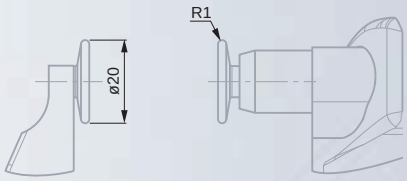
Models MICROMASTER®

Non-rotating measuring spindle - Without spindle lock

- ✓
- DIN 863 T3 (style D6)
- 0,001 mm 0.00005 in
- mm / in Conversion
- Hardened steel measuring faces
- Non-rotating, 20 mm dia.
- Flatness tolerance: 3 µm
- Parallelism tolerance: 6 µm
- Max. perm. error: 4 µm
- Max. 10 N
- RS 232
- Other technical data: see page B-3
- Plastic case
- Identification number
- Inspection report with a declaration of conformity



No	mm	in
60.30085	0 ÷ 30	*0 ÷ 1.2*
60.30086	25 ÷ 55	*1 ÷ 2.1*



Model ISOMASTER® AF

- ✓
- DIN 863 T3 (style D6)
- 0,01 mm
- Hardened steel measuring faces
- ø 15 mm
- Flatness tolerance: 3 µm
- Parallelism tolerance: 6 µm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity



No	mm
02.10301	0 ÷ 25

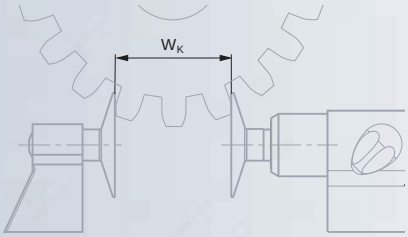
Micrometers for Gear Pitch Measurement

Flanges with ring-shaped measuring faces for root tangent lengths W_k on gear pitches, distance between grooves and slots as well as other hard-to-reach locations.

Models MICROMASTER®

Non-rotating spindle - Without spindle lock





No	mm	in
60.30041	0 ÷ 30	*0 ÷ 1.2*
60.30042	25 ÷ 55	*1 ÷ 2.1*
60.30043	55 ÷ 85	*2.1 ÷ 3.35*
60.30044	85 ÷115	*3.35 ÷ 4.5*

- ✓
- DIN 863 T3 (style D3)
- 0,001 mm 0.00005 in
- mm / in Conversion
- Hardened steel measuring faces
- Non-rotating spindle

  ≤ 90 mm: 25 mm dia.

  > 90 ≤ 120 mm: 30 mm dia.
- Suited from module 0,6
- Max. 10 N
- RS 232
- Other technical data: see page B-3
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

Models ISOMASTER® AE





No	mm
02.10201	0 ÷ 25
02.10202	25 ÷ 50
02.10203	50 ÷ 75
02.10204	75 ÷100
02.10205	100 ÷125
02.10206	125 ÷150

- ✓
- DIN 863 T3 (style D7) NF E 11-090
- 0,01 mm
- Hardened steel measuring faces
- ≤ 100 mm: 25 mm dia.

  > 100 ≤ 150 mm: 32 mm dia.
- Suited from module 0,6
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

✓

0,001 mm
0.00005 in

mm / in
Conversion

Micrometer element with a max. perm.error of 3 µm

7,5 mm dia., non-rotating spindle with fixing bore for a measuring insert

Adjustable attachment on anvil for a measuring insert with lock

Hardened steel measuring faces

Max. 10 N

RS 232

Other technical data on page B-3

Plastic case

Identification number

Inspection report with a declaration of conformity

MICROMASTER® with 7 Pairs of Interchangeable Measuring Inserts

Non-rotating spindle - Without spindle lock



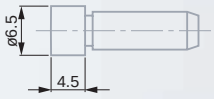
No	mm	in
60.30045	0 ÷ 30	*0 ÷ 1.2*
60.30046	25 ÷ 55	*1.0 ÷ 2.1*

Components of Full Micrometers

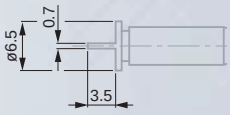
No	mm	in
Single micrometers		
60.30099	0 ÷ 30	*0 ÷ 1.2*
60.30100	25 ÷ 55	*1.0 ÷ 2.1*
Full set of measuring inserts		
02.69027		
Includes one pair of the following inserts:		

No		mm
02.69020	flat	ø 6,5
02.69021	small, flat	ø 2
02.69023	large, flat	ø 12
02.69024	narrow, flat	0,7
02.69026	knife-edged	0,1/60°
02.69022	spherical	R = 5
02.69025	cone-shaped	ø 0,3/60°

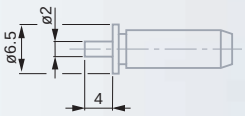
Specially designed measuring faces also available upon request.



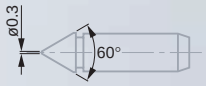
02.69020



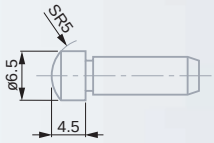
02.69024



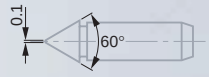
02.69021



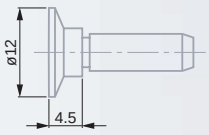
02.69025



02.69022

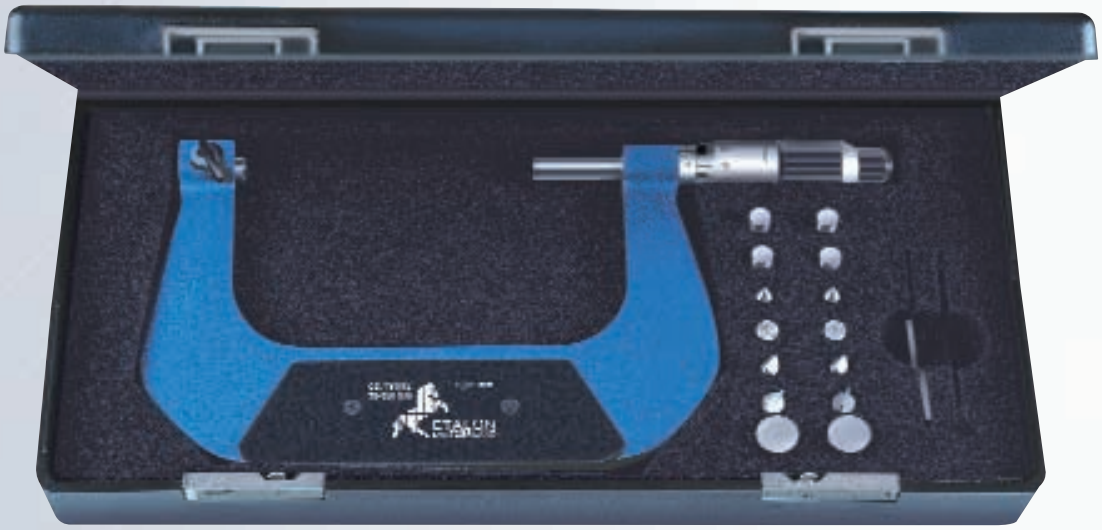


02.69026



02.69023

ETALON® Basic with 7 Pairs of Interchangeable Measuring Inserts



No	mm
02.19056	0 ÷ 25
02.19058	25 ÷ 50
02.19060	50 ÷ 75
02.19062	75 ÷ 100

✓

0,01 mm

0,5 mm

Micrometer element with a max. perm.error of 3 µm

8,0 mm dia., non-rotating spindle with fixing bore for a measuring insert

Adjustable attachment on anvil for a measuring insert with lock

Without spindle lock

Max. 10 N

Plastic case

Identification number

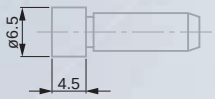
Inspection report with a declaration of conformity

Components of Full Micrometers

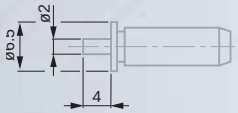
No	mm
Single micrometers	
02.19057	0 ÷ 25
02.19059	25 ÷ 50
02.19061	50 ÷ 75
02.19063	75 ÷ 100
Full set of measuring inserts	
02.69027	

Includes a pair of the following inserts:

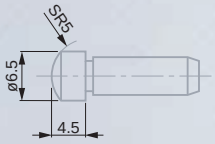
No		mm	µm
02.69020	flat	ø 6,5	0,6
02.69021	small, flat	ø 2	0,6
02.69022	spherical	R = 5	
02.69023	large, flat	ø 12	1,2
02.69024	narrow, flat	0,7	
02.69025	cone-shaped	ø 0,3 / 60°	
02.69026	knife-edged	0,1 / 60°	



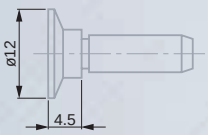
02.69020



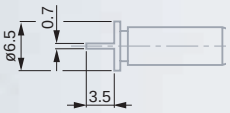
02.69021



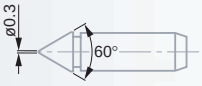
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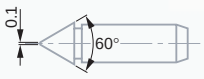
02.69023



02.69024



02.69025



02.69026

AT Series ISOMASTER® Micrometers with Large Measuring Face on Anvil

Micrometers with a flat, rectangular measuring face that serves for inspecting the width of milling cutters with staggered teeth and alike.

- ✓
- DIN 863 T3 (style D11)
- 0,01 mm
- Titanium carbide measuring face on anvil
- Tungsten carbide tipped spindle
- Anvil with a 50 x 9 mm flat face for measuring range 0 to 25 mm or 60 x 10 mm from 25 up to 50 mm
- Spindle with a 6,5 mm dia. measuring face
- Anvil with a flatness tolerance of 2 µm
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

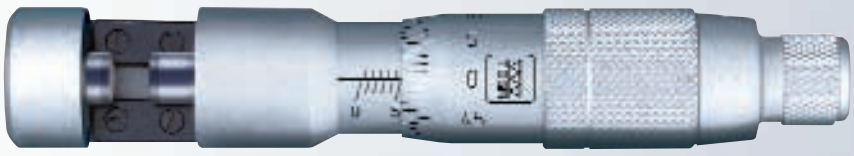


No	mm
02.11301	0 ÷ 25
02.11302	25 ÷ 50

AN Series ISOMASTER® with Small Frame

Measures wire thickness and ball diameters up to 10 mm. Small frame with 2 resting surfaces for wires.

- ✓
- DIN 863 T3 (style D2) NF E 11-090
- 0,01 mm
- Tungten carbide tipped
- 6,5 mm dia.
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

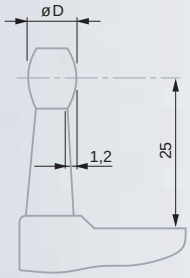


No	mm
02.10901	0 ÷ 10

ETALON® Basic for Tube Wall Thickness Measurement

Barrel-shaped anvil for measuring the tube wall thickness and other curved workpieces.





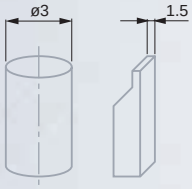
№	mm
02.19066	0 ÷ 25

- ✓
- DIN 863 T3 (style D12) NF E 11-090
- 0,01 mm
- Hardened steel anvil. Tungsten carbide tipped spindle
- 5 mm dia. on anvil. 6,5 mm dia. on spindle.
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

ETALON® Basic with Two Interchangeable Anvils

Universal micrometers – Anvils have either a flat or a cylindrical measuring face.





№	mm
02.19067	0 ÷ 25
02.19068	25 ÷ 50

- ✓
- Vernier reading to 0,002 mm
- Hardened steel anvils. Tungsten carbide tipped spindle.
- Anvils: see drawing. Spindle: 6,5 mm dia.
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

Micrometers with Prismatic Measuring Faces

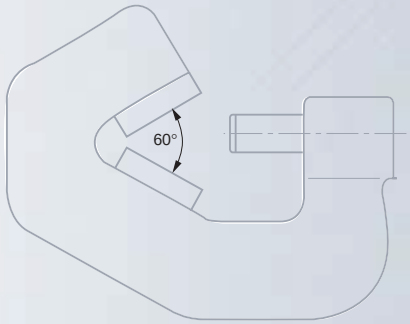
Measure test pieces with an uneven number of grooves such as milling cutters, taps, drills and splined shafts as well as odd polygons. Determine roundness errors on cylindrical surfaces. Angle of the prism aperture is designed for workpieces having a number of 3 or 5 flutes.

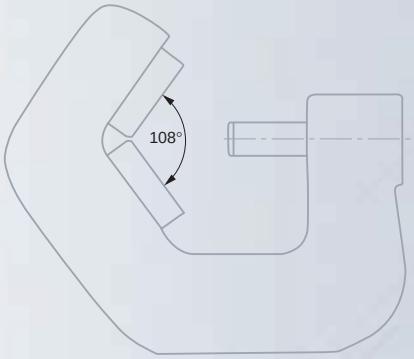
Models MICROMASTER®

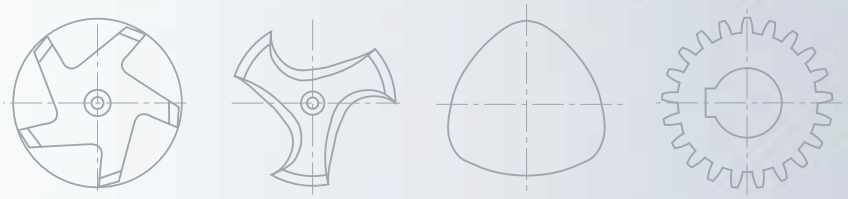
- ✓
- DIN 863 T3 (style D 10)
- 0,001 mm 0.00005 in
- mm / in conversion
- Tungsten carbide tipped
- Angle of the prism aperture: 60° for 3-flute test pieces or 108° for 5-flute test pieces
- 0,75 mm for 3-flute test pieces or 0,559 mm for 5-flute test pieces
- Max. 10 N
- RS 232
- Other technical data on page B-3
- Plastic case
- Identification number
- Inspection report with a declaration of conformity



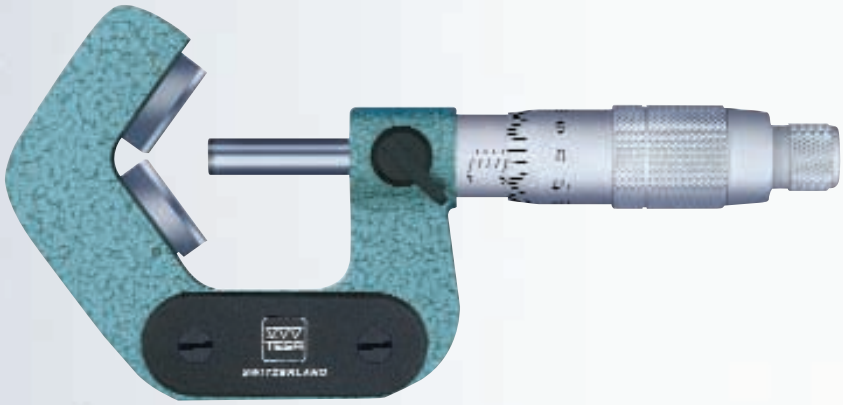
No	mm	in
3-flute test pieces (60°)		
60.30087	1 ÷ 7	*0.04 ÷0.27*
60.30088	5 ÷ 20	*0.20 ÷0.80*
60.30089	20 ÷ 35	*0.80 ÷1.38*
60.30090	35 ÷ 50	*1.38 ÷1.97*
60.30091	50 ÷ 65	*1.97 ÷2.56*
60.30092	65 ÷ 80	*2.56 ÷3.15*
5-flute test pieces (108°)		
60.30093	1 ÷ 7	*0.04 ÷0.27*
60.30094	5 ÷ 25	*0.20 ÷0.98*
60.30095	25 ÷ 45	*0.98 ÷1.77*
60.30096	45 ÷ 65	*1.77 ÷2.56*
60.30097	65 ÷ 85	*2.56 ÷3.35*
60.30098	85 ÷105	*3.35 ÷4.13*







AS Series ISOMASTER® Micrometers





No	mm
3-flute test pieces (60°)	
04.10001	1 ÷ 7
04.10002	5 ÷ 20
04.10003	20 ÷ 35
04.10004	35 ÷ 50
04.10005	50 ÷ 65
04.10006	65 ÷ 80
5-flute test pieces (108°)	
04.10101	1 ÷ 7
04.10102	5 ÷ 25
04.10103	25 ÷ 45
04.10104	45 ÷ 65
04.10105	65 ÷ 85
04.10106	85 ÷ 105

✓ Swiss made

DIN 863 T3 (style D 10) NF E 11-090

0,01 mm

Tungsten carbide tipped

Angle of the prism aperture: 60° for 3-flute test pieces or 108° for 5-flute test pieces

0,75 mm for 3-flute test pieces or 0,559 mm for 5-flute test pieces

Max. 10 N

Plastic case

Identification number

Declaration of conformity

Cylindrical Setting Standards



No	⌀ mm
04.40001	5
04.40002	20
04.40003	25
04.40004	35
04.40005	45
04.40006	50
04.40007	65
04.40008	85

✓ Swiss made

Hardened steel alloy

Fitted with plastic guard plates from nominal dimension of 20 mm. Actual size engraved on the top face.

Identification number

Declaration of conformity

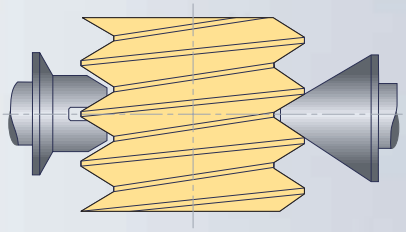
Micrometers for Thread Measurement

Used for pitch diameter inspection – Anvil with adjustable holder for mounting a measuring insert with prismatic faces – Fine screw adjustment and locking device – Spindle has a fixing bore for a cone-shaped measuring insert.

✓
DIN 863 T3 (style D18)
0,001 mm 0.00005 in
mm / in conversion
30 mm measuring span
Max. 10 N
RS 232
Other technical data on page B-3
Plastic case
Identification number
Inspection report with a declaration of conformity

Models MICROMASTER® AC



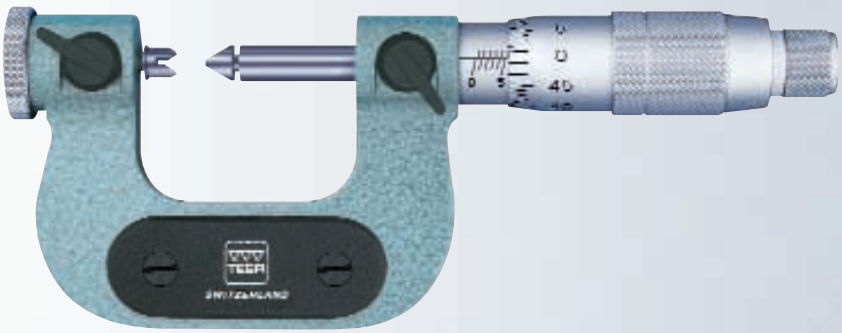


No	mm	in
60.30062	0 ÷ 25	*0 ÷ 1*
60.30063	25 ÷ 50	*1 ÷ 2*
60.30064	50 ÷ 75	*2 ÷ 3*
60.30065	75 ÷100	*3 ÷ 4*
60.30066	100 ÷125	*4 ÷ 5*
60.30067	125 ÷150	*5 ÷ 6*

Important

Measuring inserts and setting standards must be ordered separately.

AC Series ISOMASTER® Micrometers



✓
DIN 863 T3 (style D 18) NF E 11-090
0,01 mm 0.0001 in
0,5 mm
Max. 10 N
Plastic case
Identification number
Declaration of conformity

No	mm	No	in
02.10001	0 ÷ 25	***02.20001***	*0 ÷ 1*
02.10002	25 ÷ 50	***02.20002***	*1 ÷ 2*
02.10003	50 ÷ 75	***02.20003***	*2 ÷ 3*
02.10004	75 ÷ 100	***02.20004***	*3 ÷ 4*
02.10005	100 ÷ 125	***02.20005***	*4 ÷ 5*
02.10006	125 ÷ 150	***02.20006***	*5 ÷ 6*

Important

Measuring inserts and setting standards must be ordered separately.

Interchangeable Thread Inserts for TESA® AC Series Micrometers

Wtih measuring faces specially designed for pitch diameters.





Hardened steel

Shaft with a 3,5 mm dia., 15,5 mm long

Supplied in sets or pairs

No	Pitch in mm	No	Threads per in	No	Threads per in
ISO Metric Threads		*Whitworth Threads*		*Unified Threads UN, UNC, UN...*	
60° flank angle		*55° flank angle*		*60° flank angle*	
02.40000	0,4 ÷ 0,5	***02.50100***	*60 ÷ 48*	***02.50000***	*64 ÷ 42*
02.40001	0,5 ÷ 0,6	***02.50101***	*48 ÷ 40*	***02.50001***	*42 ÷ 25*
02.40002	0,6 ÷ 0,8	***02.50102***	*40 ÷ 32*	***02.50002***	*25 ÷ 17*
02.40003	0,8 ÷ 1,0	***02.50103***	*32 ÷ 24*	***02.50003***	*17 ÷ 10*
02.40004	1,0 ÷ 1,25	***02.50104***	*24 ÷ 18*	***02.50004***	*10 ÷ 6.5*
02.40005	1,25 ÷ 1,5	***02.50105***	*18 ÷ 14*	***02.50005***	*6.5 ÷ 4*
02.40006	1,5 ÷ 2,0	***02.50106***	*14 ÷ 10*	***02.50006***	*4 ÷ 2.5*
02.40007	2,0 ÷ 2,5	***02.50107***	*10 ÷ 7*		
02.40008	2,5 ÷ 3,0	***02.50108***	*7 ÷ 4.5*		
02.40009	3,0 ÷ 4,0	***02.50109***	*4.5 ÷ 3*		
02.40010	4,0 ÷ 5,0				
02.40011	5,0 ÷ 6,0				
Full set (12 pairs)		*Full set (10 pairs)*		*Full set(7 pairs)*	
02.40015	0,4 ÷ 6,0	***02.50115***	*60 ÷ 3*	***02.50015***	*64 ÷ 2.5*

Setting Standards for Screw Thread Micrometers



Hardened steel

Insulating sleeve marked with actual size

Identification number

Declaration of conformity

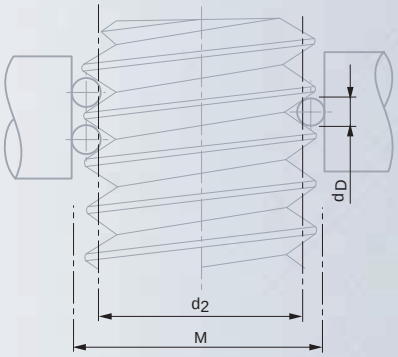
No	mm	No	in
60° flank angle			
02.40501	25	***02.50501***	*1*
02.40502	50	***02.50502***	*2*
02.40503	75	***02.50503***	*3*
02.40504	100	***02.50504***	*4*
02.40505	125	***02.50505***	*5*
55° flank angle			
02.40601	25	***02.50601***	*1*
02.40602	50	***02.50602***	*2*
02.40603	75	***02.50603***	*3*
02.40604	100	***02.50604***	*4*
02.40605	125	***02.50605***	*5*

XB Wires for Screw Threads

For measuring pitch diameter of threads using the three-wire method. The actual flank diameter d_2 can either be determined arithmetically or with the aid of the relevant tables based on the actual size M measured – Suitable for all standard micrometers with a measuring insert having a 6,5 mm diameter.

- ✓ SWISS MADE
- Hardened steel wires
- Steel wires mounted on holders: 2-wire holder rests on anvil and single wire holder on spindle.
- Single pairs are supplied in a plastic bag, full set sets in a wooden case
- Declaration of conformity





No	Wires d_D mm	ISO Metric Threads Pitch in mm	*Whitworth-Threads- Number of threads per in*	*Unified Inch-Threads UN, UNC, UNF... Number of threads per in*
02.40701	0,17	0,25 and 0,3	—	—
02.40702	0,22	0,35	—	*72*
02.40703	0,25	0,4	*60*	*64*
02.40704	0,29	0,45 and 0,5	—	*56*
02.40705	0,335	0,6	*48 and 40*	*48 and 44*
02.40706	0,455	0,7 up to 0,8	—	*32*
02.40707	0,53	0,9	*32 and 28*	*28*
02.40708	0,62	1,0	*26 and 24*	*24*
02.40709	0,725	1,25	*22 up to 19*	*20*
02.40710	0,895	1,5	*18 and 16*	*18 and 16*
02.40711	1,10	1,75	*14*	*14 and 13*
02.40712	1,35	2,0	*12 and 11*	*12 and 11*
02.40713	1,65	2,5	*10 and 9*	*10 and 9*
02.40714	2,05	3,0 and 3,5	*8 and 7*	*8 and 7*
02.40715	2,55	4,0 and 4,5	*6*	*6*
02.40716	3,20	5,0 and 5,5	*5 and 4.5*	*5 and 4.5*
Set including 16 pairs				
02.40700	0,17 ÷ 3,20			

Micrometer Stands

For micrometers up to 300 mm and other measuring instruments.

- ✓ SWISS MADE
- Clamp aperture of 16 m (TESA) or 20 mm (ETALON)
- Lacquered cast iron base
- Tilting locking device

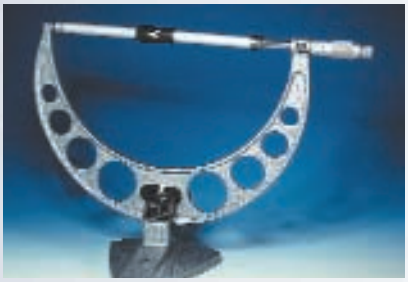
Uses one single bolt only

No	
TESA	
01.60201	
ETALON	
72.110123	





Setting standards





No		mm	No	mm	No	in	No	in
INTERAPID	*ETALON Basic*		*INTERAPID*		*INTERAPID*		*INTERAPID*	
21.40001	**21.19020**	25	**21.40026**	650	***21.50001***	*1*	***21.50026***	*26*
21.40002	**21.19021**	50	**21.40027**	675	***21.50002***	*2*	***21.50027***	*27*
21.40003	**21.19022**	75	**21.40028**	700	***21.50003***	*3*	***21.50028***	*28*
21.40004	**21.19023**	100	**21.40029**	725	***21.50004***	*4*	***21.50029***	*29*
21.40005	**21.19024**	125	**21.40030**	750	***21.50005***	*5*	***21.50030***	*30*
21.40006	**21.19025**	150	**21.40031**	775	***21.50006***	*6*	***21.50031***	*31*
21.40007	**21.19026**	175	**21.40032**	800	***21.50007***	*7*	***21.50032***	*32*
21.40008	**21.19027**	200	**21.40033**	825	***21.50008***	*8*	***21.50033***	*33*
21.40009	**21.19028**	225	**21.40034**	850	***21.50009***	*9*	***21.50034***	*34*
21.40010	**21.19029**	250	**21.40035**	875	***21.50010***	*10*	***21.50035***	*35*
21.40011	**21.19030**	275	**21.40036**	900	***21.50011***	*11*	***21.50036***	*36*
21.40012	**21.19031**	300	**21.40037**	925	***21.50012***	*12*	***21.50037***	*37*
21.40013	**21.19032**	325	**21.40038**	950	***21.50013***	*13*	***21.50038***	*38*
21.40014	**21.19033**	350	**21.40039**	975	***21.50014***	*14*	***21.50039***	*39*
21.40015	**21.19034**	375	**21.40040**	1000	***21.50015***	*15*	***21.50040***	*40*
21.40016	**21.19035**	400	**21.40041**	1025	***21.50016***	*16*	***21.50041***	*41*
21.40017	**21.19036**	425	**21.40043**	1075	***21.50017***	*17*	***21.50043***	*43*
21.40018	**21.19037**	450	**21.40045**	1125	***21.50018***	*18*	***21.50045***	*45*
21.40019	**21.19038**	475	**21.40047**	1175	***21.50019***	*19*	***21.50047***	*47*
21.40020	**21.19039**	500	**21.40049**	1225	***21.50020***	*20*	***21.50049***	*49*
21.40021		525	**21.40051**	1275	***21.50021***	*21*	***21.50051***	*51*
21.40022		550	**21.40053**	1325	***21.50022***	*22*	***21.50053***	*53*
21.40023		575	**21.40055**	1375	***21.50023***	*23*	***21.50055***	*55*
21.40024		600	**21.40057**	1425	***21.50024***	*24*	***21.50057***	*57*
21.40025		625	**21.40059**	1475	***21.50025***	*25*	***21.50059***	*59*

✓ Hardened steel measuring faces

INTERAPID have one flat end face and 1 rounded, lapped

ETALON Basic:
≤ 275 mm: flat parallel face, lapped
≥ 300 mm: 1 flat and 1 rounded face, lapped

Round end-face and plastic insulating grip. INTERAPID with dull-chrome shaft.

INTERAPID with lengths
≤ 175 mm: 10 mm
≥ 200 mm: 13 mm

ETALON Basic:
≤ 75 mm long: 7 mm
≥ 100 mm long: 8 mm

Max. perm. error (ETALON Basic):
≤ 75 mm: 2 µm
100 and 125 mm: 2,5 µm
150 and 175 mm: 3 µm
≥ 200 ≤ 275 mm: 3,5 µm
≥ 300 ≤ 375 mm: 4 µm
≥ 400 ≤ 475 mm: 5 µm
500 mm: 6 µm

Identification number

INTERAPID: Actual length measured shown in the inspection report

Declaration of conformity

Guide Collars

Make the positioning of INTERAPID setting standards fast and simple.

No	mm	mm
21.40103	100 ÷ 175	8
21.40108	200 ÷ 1475	8

✓ Hardened alloy steel

Diameters in step
of 5 mm ≤ 50 mm
10 mm > ø 50 mm

Max. perm. errors for nominal diameters:
≤ 80 mm: 1,5 µm
≥ 90 ≤ 120 mm: 2,0 µm
≥ 130 mm: 2,5 µm

Mounted on a wood base. Supplied with dust cover.

Declaration of conformity

ETALON® Cylindrical Step Master Gauges

For display setting and calibration.

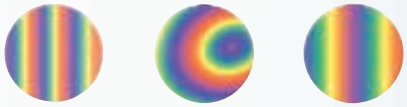


No	mm
72.112020	5 ÷ 100
72.112021	5 ÷ 150

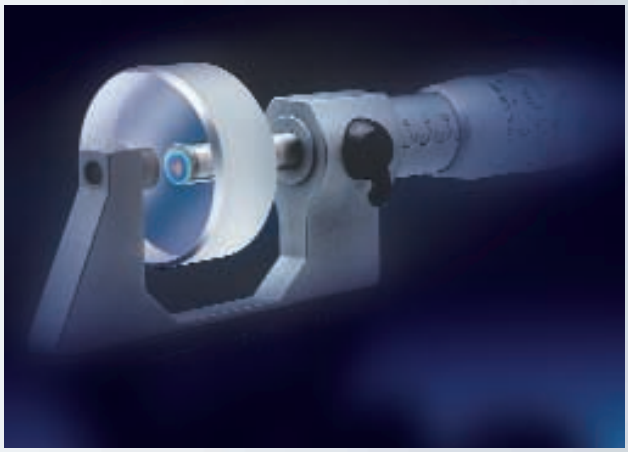
Plan Parallel Optical Flats

Used for examining the flatness and parallelism of the measuring faces on external micrometers as well as other similar measuring instruments. The difference in length of the optical flats within a set corresponds to a quarter or a third of the spindle pitch of 0,5 mm.





No	mm
25.10001	12,00
25.10002	12,125
25.10003	12,25
25.10004	12,375
25.10000	12,00 ÷ 12,375
25.10101	27,00
25.10102	27,165
25.10103	27,335
25.10100	27,00 ÷ 27,335
25.10201	52,00
25.10202	52,165
25.10203	52,335
25.10200	52,00 ÷ 52,335
25.10301	77,00
25.10302	77,165
25.10303	77,335
25.10300	77,00 ÷ 77,335



✓ Swiss made

31 mm

Length tolerance with reference to the nominal dimension: ± 100 µm

Flatness tolerances for optical flats with lengths: ≤ 27,335 mm: 0,15 µm
≥ 52,00 > 77,335 mm: 0,2 µm

Parallelism tolerances for optical flats with lengths: ≤ 27,335 mm: 0,4 µm
≥ 52,00 > 77,335 mm: 0,5 µm

Each set is supplied in a wooden case

Declaration of conformity

Heat Insulating Grips for External Micrometers

Protect the frame from hand warmth.





No	mm
01.40401	up to 200
01.40402	200 ÷ 500
01.60101	500 ÷ 700
01.60102	700 ÷ 1000
01.60103	1000 ÷ 1500

✓ Swiss made

Models No. 01.40401 and 01.40402 in anodised aluminum, black colour

No. 01.60101 up to 01.60103 in moulded plastic, black colour

Micrometer Heads



Components commonly used for checking the various displacements on measuring fixtures, coordinate tables, microscopes, machines as well as other special appliances. Mounted on the cylindrical clamping shaft.

Models MICROMASTER®

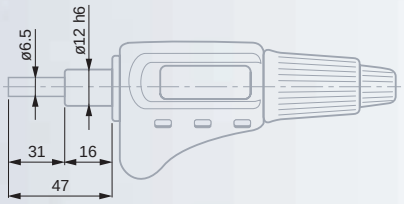
Without spindle lock.



60.30040



60.30038/39

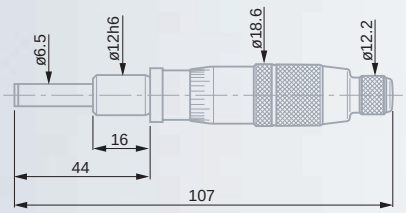


No	mm	mm
60.30038	0 ÷ 30	12h6
60.30039	30 ÷ 0	12h6
60.30040	0 ÷ 30	12h6

Model ISOMASTER® AR

Without spindle lock





No	mm	mm	No	in	mm
02.11201	0 ÷ 25	12h6	***02.21201***	*0 ÷ 1*	12h6

- ✓ SWISS MADE
- DIN 863 T2 (style E)
- 0,001 mm 0.00005 in
- mm / in conversion
- Tungsten carbide tipped
- 6,5 mm dia.
- 0,5 mm
- Max. perm. error of 3 µm
- Max. 10 N
- Other technical data on page B-3
- Optocoupled RS 232 interface
- Identification number
- Inspection report with a declaration of conformity

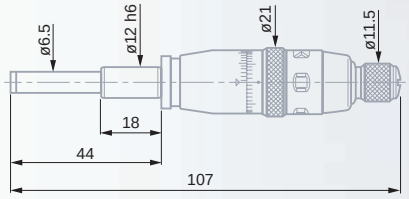
- ✓ SWISS MADE
- DIN 863 T2 (style E) NF E 11-090
- 0,01 mm 0.0001 in
- Tungsten carbide tipped
- 6,5 mm dia.
- 0,5 mm
- Max. perm. error of 3 µm
- Max. 10 N
- Identification number
- Declaration of conformity

- ✓
- DIN 863 T2 (style E)
- Vernier reading to 0,001 mm or 0.0001 in
- Digital reading to 0,1 mm or 0.005 in
- Tungsten carbide tipped
- 6,5 mm dia
- 0,5 mm
- Max. perm. error of 2 µm
- Max. 10 N
- Identification number
- Declaration of conformity

Model TESAMASTER® AR

Without spindle lock.





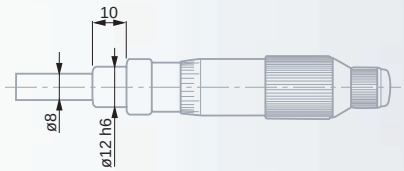
No	mm	mm	No	in	mm
03.12301	0 ÷ 25	12h6	***03.22301***	*0 ÷ 1*	12h6

Models ETALON® Basic

Without spindle lock – Non-rotating spindle.

- ✓
- DIN 863 T2 (style E)
- No. 02.19065 with vernier
- Tungsten carbide tipped
- 6,5 mm dia
- 0,5 mm
- Max. perm. error of 3 µm
- Max. 10 N
- Identification number
- Declaration of conformity



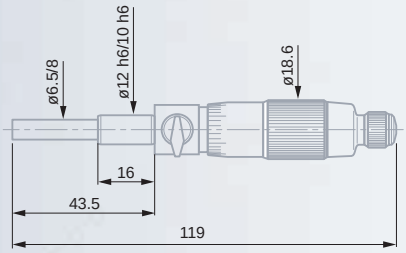


No	mm	mm	mm
02.19064	0 ÷ 25	0,01	12h6
02.19065	0 ÷ 25	0,002	12h6

ETALON® 266 Micrometer Heads

With spindle lock.





No	mm	Dmm	mm	Spindle lock
72.115942	0 ÷ 25	ø 6,5	12h6	without
72.115943	0 ÷ 25	ø 8	12h6	with
72.116258	0 ÷ 25	ø 6,5	10h6	with

- SWISS MADE ✓
- DIN 863 T2 (style E) NF E 11-090
- Vernier reading to 0,002 mm
- Tungsten carbide tipped
- 6,5 mm dia
- Max. perm. error of 3 µm
- Identification number
- Declaration of conformity

Depth Micrometers

With interchangeable measuring rods provided in sets. These depth rods are adjusted in increments of 30 or 25 mm, thus eliminating the need for correcting the display when rods are exchanged.

Models MICROMASTER®

Non-rotating measuring rods. Sets in increments of 30 mm.



No	mm	in	mm
60.30069	0 ÷ 90	0 ÷ 3.5	50 x 15
60.30070	0 ÷180	0 ÷ 7	100 x 15

- SWISS MADE ✓
- DIN 863 T2 (style T)
- 0,001 mm 0.00005 in
- mm / in conversion
- Non-rotating spindle
- Measuring rods with hardened steel ends
- 4 mm dia. depth rods. Base has a 100 x 15 mm measuring face.
- 30 mm
- RS 232 output
- 0,5 mm
- Max. perm. error (meas. element): 3 µm
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

AQ Series ISOMASTER® Micrometers

Measuring rods in increments of 25 mm or 1 in.



- ✓
- DIN 863 T2 (style T) NF E 11-097
- 0,01 mm 0.0001 in
- Measuring rods with hardened steel ends
- 4 mm dia. measuring rods. For the measuring face on the base: see table.
- 0,5 mm
- Max- perm. error of the measuring element: 3 µm
- Plastic case
- Identification number
- Declaration of conformity

N°	mm	mm	N°	in	mm
02.11002	0 ÷ 75	50 x 15	***02.21002***	*0 ÷ 3*	50 x 15
02.11003	0 ÷150	50 x 15	***02.21003***	*0 ÷ 6*	50 x 15
02.11004	0 ÷ 75	100 x 15	***02.21004***	*0 ÷ 3*	100 x 15
02.11005	0 ÷150	100 x 15	***02.21005***	*0 ÷ 6*	100 x 15



Instruments' Sets



ETALON® Basic Set

No		
05.19089	ETALON Basic Set	

Consisting of:

No		mm	mm
05.19084	1 ETALON Basic vernier calliper	0 ÷150	0,05
01.19046	1 ETALON Basic external micrometer	0 ÷ 25	0,01
05.60031	1 Suited plastic case		

✓

Calliper

DIN 862

Hardened stainless steel

Technical data on page A-9

Micrometer

DIN 863 T1 NF E 11-095

Tungsten carbide tipped

Technical data on page B-7

Additional data

Inspection report with a declaration of conformity



TESA® Swiss Set

No		
05.10033	TESA Swiss Set	

Consisting of:

No		mm	mm
05.10041	1 TESA SWISSCAL 2 vernier calliper	0 ÷150	0,02
05.60013	1 Depth measuring foot		
01.10101	1 TESA ISOMASTER external micrometer	0 ÷ 25	0,01
05.60031	1 Suited plastic case		

SWISS MADE ✓

Calliper

DIN 862

Hardened stainless steel

Technical data on page A-9

Depth foot

Hardened stainless steel

75 x 6 mm measuring faces

Micrometer

DIN 863 T1 NF E-11095

Tungsten carbide tipped

Technical data on page B-6

Additional data

Inspection report with a declaration of conformity

SWISS MADE ✓

Calliper

DIN 862

Hardened stainless steel

Technical data on page A-6

Depth foot

Hardened stainless steel

75 x 6 mm measuring face

Micrometer

DIN 863 T1 NF E 11-095

Tungsten carbide tipped

Technical data on page B-6

Additional data

Inspection report with a declaration of conformity



TESA® Duo-Set 1

No	=		mm	mm
05.30020	**TESA Duo-Set 1**			
Consisting of:				
05.10008	1	TESA CCMA-M dial calliper	0 ÷150	0,02
05.60013	1	Depth measuring foot		
01.10101	1	TESA ISOMASTER external micrometer	0 ÷ 25	0,01
05.60031	1	Suited plastic case		

SWISS MADE ✓

Calliper

DIN 862

Hardened stainless steel

Technical data on page A-6

Depth foot

Hardened stainless steel

75 x 6 mm measuring faces

Micrometer

DIN 863 T1 NF E-11095

Tungsten carbide tipped

Technical data on page B-4

Additional data

Inspection report with a declaration of conformity



TESA® Duo-Set 2

No	=		mm	mm
05.30021	**TESA Duo-Set 2**			
Consisting of:				
05.10008	1	TESA CCMA-M dial calliper	0 ÷150	0,02
05.60013	1	Depth measuring foot		
03.10001	1	TESAMASTER external micrometer	0 ÷ 25	0,001
05.60031	1	Suited plastic case		



TESA® Duo-Set 8

05.31101	**TESA Duo-Set 8**		
Consisting of:			
05.30080	1 TESA DIGIT-CAL calliper with capa µ system	0 ÷150 mm	0,01 mm
05.60013	1 Depth measuring foot		
01.10101	1 TESA ISOMASTER external micrometer	0 ÷ 25 mm	0,01 mm
05.60031	1 Suited plastic case		

Swiss Made ✓

Calliper

DIN 862

Hardened stainless steel

Technical data on page A-3

Depth foot

Hardened stainless steel

75 x 6 mm measuring face

Micrometer

DIN 863 T1 NF E 11-095

Tungsten carbide tipped

Technical data on page B-6

Additional data

Inspection report with a declaration of conformity



TESA® Duo-Set 9

05.31102	**TESA Duo-Set 9**		
Consisting of:			
05.30080	1 TESA DIGIT-CAL calliper with Capa µ system	0 ÷150 mm	0,01 mm
05.60013	1 Depth measuring foot		
03.10001	1 TESAMASTER external micrometer	0 ÷ 25 mm	0,001 mm
05.60031	1 Suited plastic case		

Swiss Made ✓

Calliper

DIN 862

Hardened stainless steel

Technical data on page A-3

Depth foot

Hardened stainless steel

75 x 6 mm measuring face

Micrometer

DIN 863 T1 NF E 11-095

Tungsten carbide tipped

Technical data on page B-4

Additional data

Inspection report with a declaration of conformity

SWISS MADE ✓

Calliper

DIN 862

Hardened stainless steel

Technical data on page A-3

Depth foot

Hardened stainless steel

75 x 6 mm measuring face

Micrometer

DIN 863 T1

Tungsten carbide tipped

Technical data on page B-3

Additional data

Inspection report with a declaration of conformity



TESA® Duo-Set 11

05.31002 TESA Duo-Set 11

Consisting of:

		mm	mm
05.30080	1 TESA DIGIT-CAL calliper with capa µ system	0 ÷150	0,01
05.60013	1 Depth measuring foot		
60.30010	1 TESA MICROMASTER EASY external micrometer	0 ÷ 30	0,001
05.60090	1 Suited plastic case		

SWISS MADE ✓

Calliper

DIN 862

Hardened stainless steel

Technical data on page A-3

Depth foot

Hardened stainless steel

75 x 6 mm measuring face

Micrometer

DIN 863 T1

Tungsten carbide tipped

Technical data on page B-3

Additional data

Inspection report with a declaration of conformity



TESA® Duo-Set 12

05.31003 TESA Duo-Set 12

Consisting of:

		mm	mm	
05.30081	1 TESA DIGIT-CAL with capa µ system	0 ÷ 150	0,01	RS 232
05.60013	1 Depth measuring foot			
60.30030	1 TESA MICROMASTER IP54 RS external micrometer	0 ÷ 30	0,001	RS 232
05.60090	1 Suited plastic case			

Internal Measurement





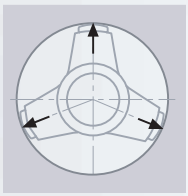


Internal Measuring and Requirements

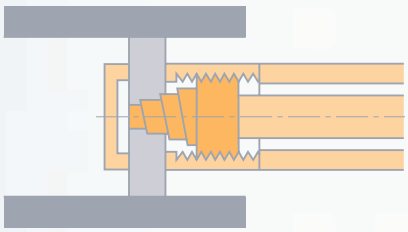
Internal measuring of bores is more demanding than external measurement of workpieces. Not only the tight tolerances given for the measuring job must be respected, but also the measuring components that have a direct influence on the uncertainty of measurement must be designed in such a way that they can enter into the bore to be checked.

Advantage of 3-Line contact

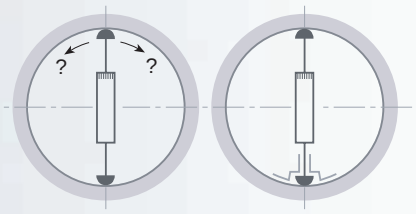
TESA IMICRO, TRIOMATIC, TRI-O-BOR and ETALON INTALOMETER are self-centring and self-aligning internal measuring instruments that make bore measurement reliable independently of the sensitivity of the user.



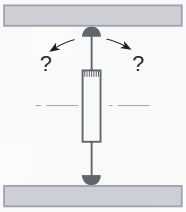
The 3 measuring bolts spaced 120 ° apart provide optimum self-centring.



Line contact of the 3 measuring bolts allows the instrument to align itself parallel to the contact surfaces.



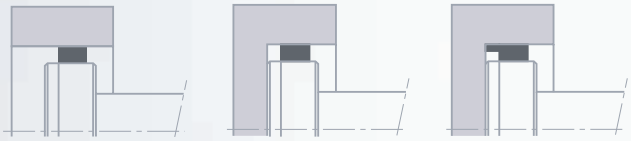
2-point contact measuring instruments are not self-centring. To make bore measurement easier, auxiliary means will additionally be used.



2-point contact does not allow the instrument to align itself in relation to the bore axis.

A single measuring instrument can replace hundreds of plug gauges

Unlike plug gauges that check only one toleranced size, a single instrument can measure many diameters. Depending on the model that is being used, through bores and blind bores as well as short centring shoulders can be measured, reliably.

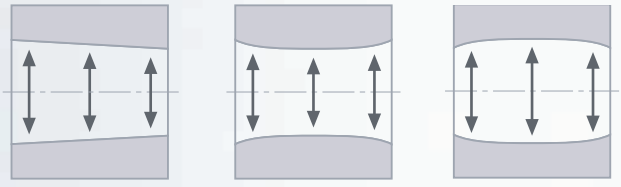


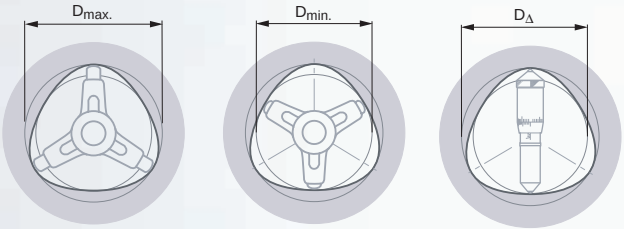
Establishing form errors

Form errors are established by measurements made at several points on the bore.

Measuring instruments with 3-line contact determine run-out errors in a triangular way.

Measuring instruments with 2-point contact measure medium-size diameters only. They do not allow the user to differentiate diameters measured at various points.



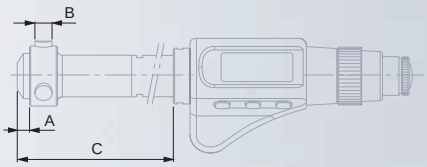


TESA® IMICRO® «capa µ system®» with Digital Display

New TESA capacitive measuring system (patented) associated with the unique cone of the TESA IMICRO internal micrometers.







- ✓
- DIN 863 T4 (style C1)
- 0,001 mm 0.0005 in
- mm / in Conversion
- LCD, 7 mm digit height
- Floating zero
- Display lock
- Measuring faces for application ranges 3,5 to 12 mm: hardened steel (770 HV)
  11 to 100 mm: TIN hard-coating, 0,05 4000 to 6000 HV
  100 to 300 mm: carbide tipped (1300 HV)
- Opto-coupled RS 232 interface, bidirectional
- 3 V lithium battery
- 1 to 2 a (≈ 2000 h/a)
- Automatic shut down after 10 min. Display setting is retained as long as power supply remains stable.
- 10 °C to 40 °C
- –10 °C to 60 °C
- 80 %, with no condensation
- ✓
- Protection of the meas. element IP 54 (IEC 60529) or IP 40 with use of digital output
- Plastic case
- Identification number
- In-house calibration certificate
- Declaration of conformity

No	mm	in	µm	µm	A mm	B mm	C mm
61.30101	3,5 ÷ 4	*0.1377 ÷ 0.1574*	4	4	2	1,5	20
61.30102	4 ÷ 4,5	*0.1574 ÷ 0.1771*	4	4	2	1,5	20
61.30103	4,5 ÷ 5,5	*0.1771 ÷ 0.2165*	4	4	2	1,5	25
61.30104	5,5 ÷ 6,5	*0.2165 ÷ 0.2559*	4	4	2	1,5	25
61.30105	6 ÷ 8	*0.2362 ÷ 0.3150*	4	4	2,5	2,5	55
61.30106	8 ÷ 10	*0.3150 ÷ 0.3970*	4	4	2,5	2,5	55
61.30107	10 ÷ 12	*0.3970 ÷ 0.4724*	4	4	2,5	2,5	55
61.30108	11 ÷ 14	*0.4330 ÷ 0.5512*	4	4	3,5	4	68
61.30109	14 ÷ 17	*0.5512 ÷ 0.6693*	4	4	3,5	4	68
61.30110	17 ÷ 20	*0.6693 ÷ 0.7874*	4	4	3,5	4	83
61.30111	20 ÷ 25	*0.7874 ÷ 0.9843*	4	4	7	7	83
61.30112	25 ÷ 30	*0.9843 ÷ 1.1811*	4	4	7	7	88
61.30113	30 ÷ 35	*1.1811 ÷ 1.3780*	4	4	7	7	88
61.30114	35 ÷ 40	*1.3780 ÷ 1.5748*	4	4	7	7	88
61.30115	40 ÷ 50	*1.5748 ÷ 1.9685*	5	5	11	12	98
61.30116	50 ÷ 60	*1.9685 ÷ 2.3622*	5	5	11	12	98
61.30117	60 ÷ 70	*2.3622 ÷ 2.7560*	5	5	11	12	98
61.30118	70 ÷ 80	*2.7560 ÷ 3.1496*	5	5	11	12	98
61.30119	80 ÷ 90	*3.1496 ÷ 3.5433*	5	5	11	12	98
61.30120	90 ÷ 100	*3.5433 ÷ 3.9370*	5	5	11	12	98
61.30121	100 ÷ 125	*3.9370 ÷ 4.9212*	6	6	26	18	100
61.30122	125 ÷ 150	*4.9212 ÷ 5.9055*	6	6	26	18	100
61.30123	150 ÷ 175	*5.9055 ÷ 6.8897*	7	7	26	18	100
61.30124	175 ÷ 200	*6.8897 ÷ 7.8740*	7	7	26	18	100
61.30125	200 ÷ 225	*7.8740 ÷ 8.8582*	8	8	26	18	100
61.30126	225 ÷ 250	*8.8582 ÷ 9.8425*	8	8	26	18	100
61.30127	250 ÷ 275	*9.8425 ÷ 10.8267*	8	8	26	18	100
61.30128	275 ÷ 300	*10.8267 ÷ 11.8110*	8	8	26	18	100

Special Accessory

19.61000 1 Lithium battery - 3 V, 190 mAh, type CR 2032

For ordering information on cables etc., see section L. Suited cases on page C-9.

TESA® IMICRO® Partial Sets with «capa µ system®» and Digital Display

New TESA capacitive measuring system (patented) associated with the unique cone of the TESA IMICRO internal micrometers.

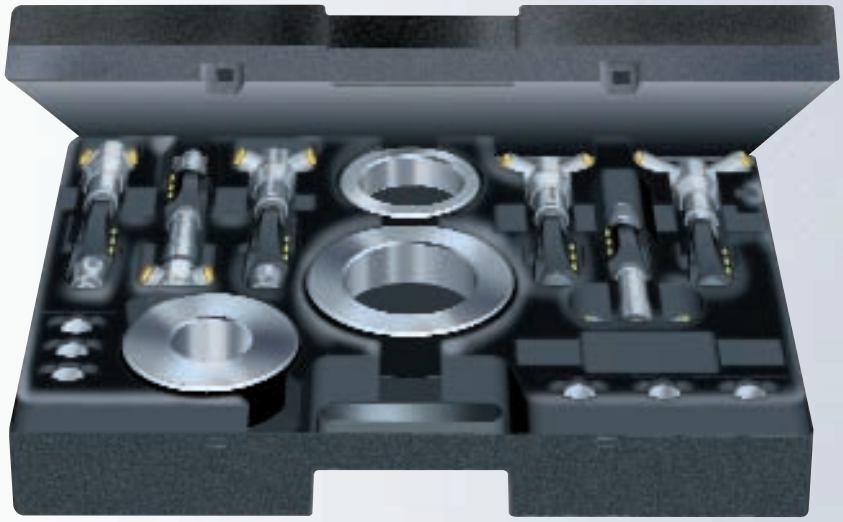


	mm			mm		mm		mm
Partial sets including:		*Meas. element*	*Measuring heads*		*Setting rings*		*Extensions*	
61.30230	3,5 ÷ 6,5	61.30010	61.40020	3,5 ÷ 4	08.43200	4	–	
			61.40021	4 ÷ 4,5	08.43201	5,5		
			61.40022	4,5 ÷ 5,5				
			61.40023	5,5 ÷ 6,5				
61.30231	6 ÷ 12	61.30011	61.40024	6 ÷ 8	08.40101	8	08.40001	100
			61.40025	8 ÷ 10	08.40102	10		
			61.40026	10 ÷ 12				
61.30232	11 ÷ 20	61.30011	61.40027	11 ÷ 14	08.40103	11	08.40301	150
			61.40028	14 ÷ 17	08.40105	17		
			61.40029	17 ÷ 20				
61.30233	20 ÷ 40	61.30011	61.40030	20 ÷ 25	08.40106	25	08.41100	150
			61.40031	25 ÷ 30	08.40107	35		
			61.40032	30 ÷ 35				
			61.40033	35 ÷ 40				
61.30234	40 ÷ 100	61.30011	61.40034	40 ÷ 50	08.40108	50	08.41800	150
			61.40035	50 ÷ 60	08.40109	70		
			61.40036	60 ÷ 70	08.40110	90		
			61.40037	70 ÷ 80				
			61.40038	80 ÷ 90				
			61.40039	90 ÷ 100				
61.30235	100 ÷ 200	61.30012	61.40040	100 ÷ 125	08.40112	125	08.42600	150
			61.40041	125 ÷ 150	08.40113	175		
			61.40042	150 ÷ 175				
			61.40043	175 ÷ 200				

- ✓
- DIN 863 T4 (style C1)
- 0,001 mm 0.00005 in
- mm / in conversion
- LCD, 7 mm digit height
- Floating zero
- Display lock
- Measuring faces for application ranges 3,5 to 12 mm: steel hardened to 770 HV
  11 to 100 mm: TIN hard-coating, hardness to 0,05 2300 HV.
  100 to 300 mm: carbide tipped (1300 HV)
- Opto-coupled RS 232 interface, bidirectional.
- 3 V lithium battery
- 1 to 2 a (≈ 2000 h/a)
- Automatic shut down after 10 min. Display setting is retained as long as power supply remains stable.
- 10 °C to 40 °C
- –10 °C to 60 °C
- 80 %, with no condensation
- ✓
- Protection of the meas. element IP 54 (IEC 60529) or IP 40 with use of digital output
- Plastic case
- Identification number
- In-house calibration certificate
- Declaration of conformity

TESA® IMICRO® Full Sets with «capa μ system®» and Digital Display

New TESA capacitive measuring system (patented) associated with the unique cone of the TESA IMICRO internal micrometers.



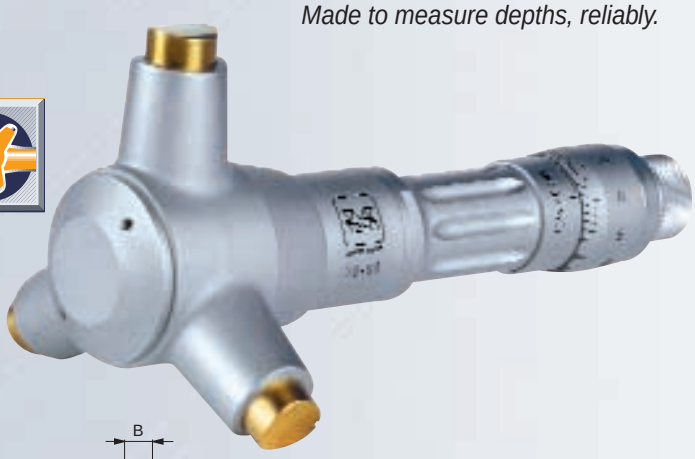
- ✓
- DIN 863 T4 (style C1)
- 0,001 mm 0.00005 in
- mm / in conversion
- LCD, 7 mm digit height
- Floating zero
- Display lock
- Measuring faces for application ranges 6 to 12 mm: hardened steel (770 HV)
  11 to 100 mm: TIN hard-coating, 0,05 4000 to 6000 HV
  100 to 300 mm: carbide tipped (1300 HV)
- Opto-coupled RS 232 interface, bidirectional.
- 3 V lithium battery
- 1 to 2 a (≈ 2000 h/a)
- Automatic shut down after 10 min. Display setting is retained as long as power supply remains stable.
- 10 °C to 40 °C
- –10 °C to 60 °C
- 80 %, with no condensation
- ✓
- Protection of the meas. element IP 54 (IEC 60529) or IP 40 with use of digital output
- Plastic case
- Identification number
- In-house calibration certificate
- Declaration of conformity

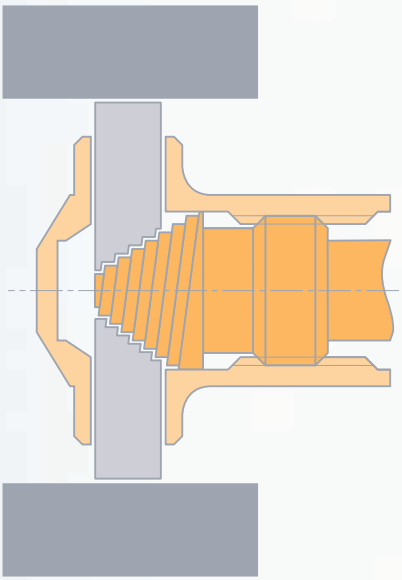
No	mm	No	mm	No	mm	No	mm
Full sets including:		*Single instrument*		*Setting rings*		*Extensions*	
61.30220	3,5 ÷ 6,5	61.30101	3,5 ÷ 4	08.43200	4	–	
		61.30102	4 ÷ 4,5	08.43201	5,5		
		61.30103	4,5 ÷ 5,5				
		61.30104	5,5 ÷ 6,5				
61.30221	6 ÷ 12	61.30105	6 ÷ 8	08.40101	8	08.40001	100
		61.30106	8 ÷ 10	08.40102	10		
		61.30107	10 ÷ 12				
61.30222	11 ÷ 20	61.30108	11 ÷ 14	08.40103	11	08.40301	150
		61.30109	14 ÷ 17	08.40105	17		
		61.30110	17 ÷ 20				
61.30223	20 ÷ 40	61.30111	20 ÷ 25	08.40106	25	08.41100	150
		61.30112	25 ÷ 30	08.40107	35		
		61.30113	30 ÷ 35				
		61.30114	35 ÷ 40				
61.30224	40 ÷ 100	61.30115	40 ÷ 50	08.40108	50	08.41800	150
		61.30116	50 ÷ 60	08.40109	70		
		61.30117	60 ÷ 70	08.40110	90		
		61.30118	70 ÷ 80				
		61.30119	80 ÷ 90				
		61.30120	90 ÷ 100				
61.30225	100 ÷ 200	61.30121	100 ÷ 125	08.40112	125	08.42600	150
		61.30122	125 ÷ 150	08.40113	175		
		61.30123	150 ÷ 175				
		61.30124	175 ÷ 200				

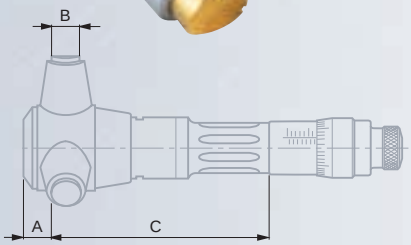
TESA® IMICRO®
with Analogue Indication, Metric

Self-centring and self-aligning internal micrometers. The high-precision thread, machined into the measuring cone, combined with the measuring bolts specially arranged to provide 3 line contact make the Imicros the only micrometers in the world that respect the ABBE principle.

Made to measure depths, reliably.







No	mm	mm	µm	µm	Amm	Bmm	Cmm
08.13410	3,5 ÷ 4	0,001	4	4	2	1,5	20
08.13411	4 ÷ 4,5	0,001	4	4	2	1,5	20
08.13412	4,5 ÷ 5,5	0,001	4	4	2	1,5	25
08.13413	5,5 ÷ 6,5	0,001	4	4	2	1,5	25
08.10001	6 ÷ 8	0,001	4	4	2,5	2,5	52
08.10002	8 ÷ 10	0,001	4	4	2,5	2,5	52
08.10003	10 ÷ 12	0,001	4	4	2,5	2,5	52
08.10801	11 ÷ 14	0,005	4	4	3,5	4	77
08.10802	14 ÷ 17	0,005	4	4	3,5	4	77
08.10803	17 ÷ 20	0,005	4	4	3,5	4	77
08.11501	20 ÷ 25	0,005	4	4	7	7	78
08.11502	25 ÷ 30	0,005	4	4	7	7	78
08.11503	30 ÷ 35	0,005	4	4	7	7	78
08.11504	35 ÷ 40	0,005	4	4	7	7	78
08.12301	40 ÷ 50	0,005	5	5	11	12	84
08.12302	50 ÷ 60	0,005	5	5	11	12	84
08.12303	60 ÷ 70	0,005	5	5	11	12	84
08.12304	70 ÷ 80	0,005	5	5	11	12	84
08.12305	80 ÷ 90	0,005	5	5	11	12	84
08.12306	90 ÷ 100	0,005	5	5	11	12	84
08.12601	100 ÷ 125	0,01	6	6	26	18	81
08.12602	125 ÷ 150	0,01	6	6	26	18	81
08.12603	150 ÷ 175	0,01	7	7	26	18	81
08.12604	175 ÷ 200	0,01	7	7	26	18	81
08.13101	200 ÷ 225	0,01	8	8	26	18	81
08.13102	225 ÷ 250	0,01	8	8	26	18	81
08.13103	250 ÷ 275	0,01	8	8	26	18	81
08.13104	275 ÷ 300	0,01	8	8	26	18	81

SWISS MADE ✓

DIN 863 T4 (style C1)
NF E 11-099

Models from 3,5 to 12 mm with vernier reading

Measuring faces on models from

3,5 to 12 mm: steel hardened to 770 HV

11 to 100 mm: titanium nitride hard-coating (TIN), hardness 0,05 2300 HV.

100 to 300 mm: tungsten carbide tipped, hardness 1300 HV.

Application ranges from

3,5 to 200 mm: shipping box

200 to 300 mm: wooden case with: 1 extension 150 mm (08.42600)

Identification number

Inspection report with a declaration of conformity

TESA® IMICRO® with Analogue Indication in Full Metric Sets

✓

DIN 863 T4 (style C1)
NF E 11-099

Measuring faces on models from

3,5 to 12 mm: hardened steel

11 to 100 mm: titanium nitride hard-coating (TIN), hardness 0,05 2300 HV.

100 to 200 mm: tungsten carbide tipped

Additional technical data: see on previous page C-6

Setting rings on page C-24

Plastic case or suitcase

Identification number

Inspection report with a declaration of conformity



No		mm	No	mm	No	mm	No	mm
Full sets including:			*Single instruments*		*Setting rings*		*Extensions*	
08.13409	BAE	3,5 ÷ 6,5	08.13410	3,5 ÷ 4	08.43200	4	–	
			08.13411	4 ÷ 4,5	08.43201	5,5		
			08.13412	4,5 ÷ 5,5				
			08.13413	5,5 ÷ 6,5				
08.10000	BAF	6 ÷ 12	08.10001	6 ÷ 8	08.40101	8	08.40001	100
			08.10002	8 ÷10	08.40102	10		
			08.10003	10 ÷12				
08.10800	BAG	11 ÷ 20	08.10801	11 ÷ 14	08.40103	11	08.40301	150
			08.10802	14 ÷ 17	08.40105	17		
			08.10803	17 ÷ 20				
08.11500	BAH	20 ÷ 40	08.11501	20 ÷ 25	08.40106	25	08.41100	150
			08.11502	25 ÷ 30	08.40107	35		
			08.11503	30 ÷ 35				
			08.11504	35 ÷ 40				
08.12300	BAJ	40 ÷ 100	08.12301	40 ÷ 50	08.40108	50	08.41800	150
			08.12302	50 ÷ 60	08.40109	70		
			08.12303	60 ÷ 70	08.40110	90		
			08.12304	70 ÷ 80				
			08.12305	80 ÷ 90				
			08.12306	90 ÷ 100				
08.12600	BAK	100 ÷ 200	08.12601	100 ÷ 125	08.40112	125	08.42600	150
			08.12602	125 ÷ 150	08.40113	175		
			08.12603	150 ÷ 175				
			08.12604	175 ÷ 200				

TESA® IMICRO® with Analogue Indication – Inch Models





SWISS MADE ✓

DIN 863 T4 (style C1)
NF E 11-099

Models from 0.275 to 0.500 in with vernier

Measuring faces on models from

0.275 to 0.500 in: hardened steel

0.50 to 4.0 in: hardened steel

4 to 12 in: tungsten carbide tipped

Additional-technical data: see page C-6.
Setting rings on page C-24

Single instruments: shipping box. Full sets: plastic case or suitcase

Identification number

Inspection report with a declaration of conformity

N°	in	in
08.20001	0.275 ÷ 0.350	0.0001
08.20002	0.350 ÷ 0.425	0.0001
08.20003	0.425 ÷ 0.500	0.0001
08.20301	0.500 ÷ 0.600	0.0002
08.20302	0.600 ÷ 0.700	0.0002
08.20303	0.700 ÷ 0.800	0.0002
08.21101	0.800 ÷ 1.0	0.0002
08.21102	1.0 ÷ 1.2	0.0002
08.21103	1.2 ÷ 1.4	0.0002
08.21104	1.4 ÷ 1.6	0.0002
08.21801	1.6 ÷ 2.0	0.0002
08.21802	2.0 ÷ 2.4	0.0002
08.21803	2.4 ÷ 2.8	0.0002
08.21804	2.8 ÷ 3.2	0.0002
08.21805	3.2 ÷ 3.6	0.0002
08.21806	3.6 ÷ 4.0	0.0002
08.22601	4 ÷ 5	0.0005
08.22602	5 ÷ 6	0.0005
08.22603	6 ÷ 7	0.0005
08.22604	7 ÷ 8	0.0005
08.23101	8 ÷ 9	0.0005
08.23102	9 ÷ 10	0.0005
08.23103	10 ÷ 11	0.0005
08.23104	11 ÷ 12	0.0005

N°	A	in	N°	N°	in	N°	in
Full sets including:			*Single instr.*	*Setting rings*		*Extension*	
08.20000	BAFE	0.275 ÷ 0.50	08.20001	08.50101	0.35	08.50001	4
			08.20002	08.50102	0.43		
			08.20003				
08.20300	BAGE	0.50 ÷ 0.80	08.20301	08.50103	0.50	08.50301	6
			08.20302	08.50105	0.70		
			08.20303				
08.21100	BAHE	0.80 ÷ 1.6	08.21101	08.50106	1.0	08.51100	6
			08.21102	08.50107	1.4		
			08.21103				
			08.21104				
08.21800	BAJE	1.6 ÷ 4.0	08.21801	08.50108	2.0	08.51800	6
			08.21802	08.50109	2.8		
			08.21803	08.50110	3.6		
			08.21804				
			08.21805				
			08.21806				
08.22600	BAKE	4.0 ÷ 8.0	08.22601	08.50112	5.0	08.52600	6
			08.22602	08.50113	7.0		
			08.22603				
			08.22604				



Optional Accessories for TESA® IMICRO® and TESA® IMICRO® «capa µ system®»

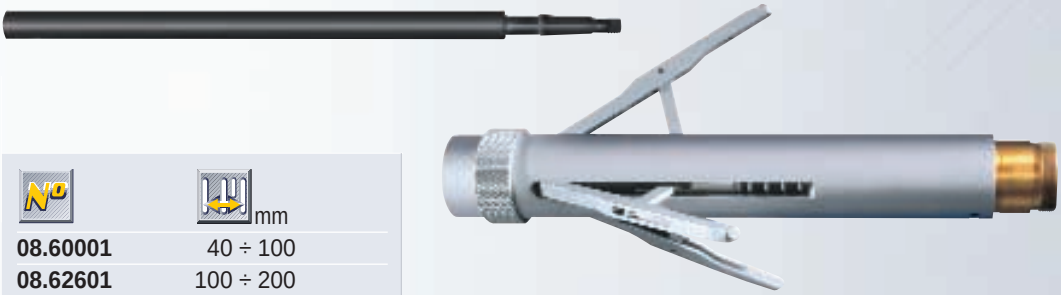
Extensions for Deep Hole Measurement



DIN 863 T4 (Form C1)

No	mm	mm	No	in	in
08.40001	6 ÷ 12	100	***08.50001***	*0.275 ÷ 0.50*	*4*
08.40301	11 ÷ 20	150	***08.50301***	*0.50 ÷ 0.80*	*6*
08.40302		500	***08.50302***		*20*
08.41100	20 ÷ 40	150	***08.51100***	*0.80 ÷ 1.6*	*6*
08.41101		500	***08.51101***		*20*
08.41102		1000	***08.51102***		*40*
08.41800	40 ÷100	150	***08.51800***	*1.6 ÷ 4.0*	*6*
08.41801		500	***08.51801***		*20*
08.41802		1000	***08.51802***		*40*
08.42600	100 ÷ 300	150	***08.52600***	*4.0 ÷ 12.0*	*6*
08.42601		500	***08.52601***		*20*
08.42602		1000	***08.52602***		*40*

Centring Devices for TESA® IMICRO®



No	mm
08.60001	40 ÷ 100
08.62601	100 ÷ 200

Moulded Cases for Single Instruments, Full Sets and Partial Sets

No		000	mm	in
Cases for single instruments				
—	**61.60002**	3,5 ÷ 6,5	*0.1377 ÷ 0.2559*	
–	**61.60002**	6 ÷ 12	*0.275 ÷ 0.50*	
08.60007	**61.60002**	11 ÷ 20	*0.50 ÷ 0.80*	
08.60011	**61.60002**	20 ÷ 40	*0.80 ÷ 1.60*	
08.60015	**61.60003**	40 ÷ 70	*1.60 ÷ 2.80*	
08.60016	**61.60003**	70 ÷ 100	*2.80 ÷ 4.0*	
08.63013	**08.63013**	100 ÷ 150	*4.0 ÷ 6.0*	
08.63014	**08.63014**	150 ÷ 200	*6.0 ÷ 8.0*	
08.63016	**08.63016**	200 ÷ 300	*8.0 ÷ 12.0*	

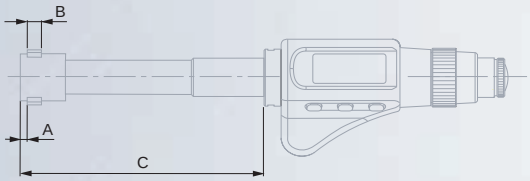
No		000	mm	in
Cases for full sets	*Cases for full or partial sets*			
08.63035	**61.60006**	3,5 ÷ 6,5	*0.1377 ÷ 0.2559*	
08.63005	**61.60005**	6 ÷ 12	*0.275 ÷ 0.500*	
08.60008	**61.60005**	11 ÷ 20	*0.500 ÷ 0.800*	
08.60012	**61.60006**	20 ÷ 40	*0.800 ÷ 1.60*	
08.60017	**61.60007**	40 ÷ 100	*1.60 ÷ 4.0*	
08.63017	**08.63017**	100 ÷ 200	*4.0 ÷ 8.0*	

TESA® ALESOMETER «capa μ system®» with Digital Display

New patented TESA's capacitive measuring system

Internal micrometers with 3-line contact. All TESA ALESOMETER are specially suited for through and blind bores as well as short centring shoulders, except for the models covering the application ranges from 6 to 10 mm.





Single instruments, complete

No	mm	in	μm	μm	A mm*	B mm	C mm
62.30051	6 ÷ 8	*0.2362 ÷ 0.3150*	4	4	1,2	3	55
62.30052	8 ÷ 10	*0.3150 ÷ 0.3970*	4	4	1,2	3	55
62.30023	10 ÷ 12,5	*0.3970 ÷ 0.4921*	4	4	0	6,5	65
62.30024	12,5 ÷ 15	*0.4921 ÷ 0.5905*	4	4	0	6,5	65
62.30025	15 ÷ 17,5	*0.5905 ÷ 0.6890*	4	4	0	6,8	65
62.30026	17,5 ÷ 20	*0.6890 ÷ 0.7874*	4	4	0	6,8	95
62.30027	20 ÷ 25	*0.7874 ÷ 0.9843*	4	4	0	8,5	100
62.30028	25 ÷ 30	*0.9843 ÷ 1.1811*	4	4	0	8,5	100
62.30029	30 ÷ 35	*1.1811 ÷ 1.3780*	4	4	0	8,5	100
62.30030	35 ÷ 40	*1.3780 ÷ 1.5748*	4	4	0	8,5	100
62.30031	40 ÷ 50	*1.5748 ÷ 1.9685*	5	5	0	14,5	140
62.30032	50 ÷ 60	*1.9685 ÷ 2.3622*	5	5	0	14,5	140
62.30033	60 ÷ 70	*2.3622 ÷ 2.7560*	5	5	0	14,5	140
62.30034	70 ÷ 85	*2.7560 ÷ 3.3465*	5	5	0	14,5	140
62.30035	85 ÷ 100	*3.3465 ÷ 3.9370*	5	5	0	14,5	140
62.30036	100 ÷ 125	*3.9370 ÷ 4.9212*	6	6	0	30	175
62.30037	125 ÷ 150	*4.9212 ÷ 5.9055*	6	6	0	30	175
62.30038	150 ÷ 175	*5.9055 ÷ 6.8897*	7	7	0	30	175
62.30039	175 ÷ 200	*6.8897 ÷ 7.8740*	7	7	0	30	175
62.30040	200 ÷ 225	*7.8740 ÷ 8.8582*	8	8	0	30	175
62.30041	225 ÷ 250	*8.8582 ÷ 9.8425*	8	8	0	30	175
62.30042	250 ÷ 275	*9.8425 ÷ 10.8267*	8	8	0	30	175
62.30043	275 ÷ 300	*10.8267 ÷ 11.8110*	8	8	0	30	175

Optional Accessories

19.61000 1 Lithium battery - 3 V, 190 mAh, type CR 2032

* Not applicable to the models from 10 mm since the measuring inserts are close to the instrument's front face.

For ordering information on setting rings, see both pages C-13 and C-24. Fore cases, report to page C-11.

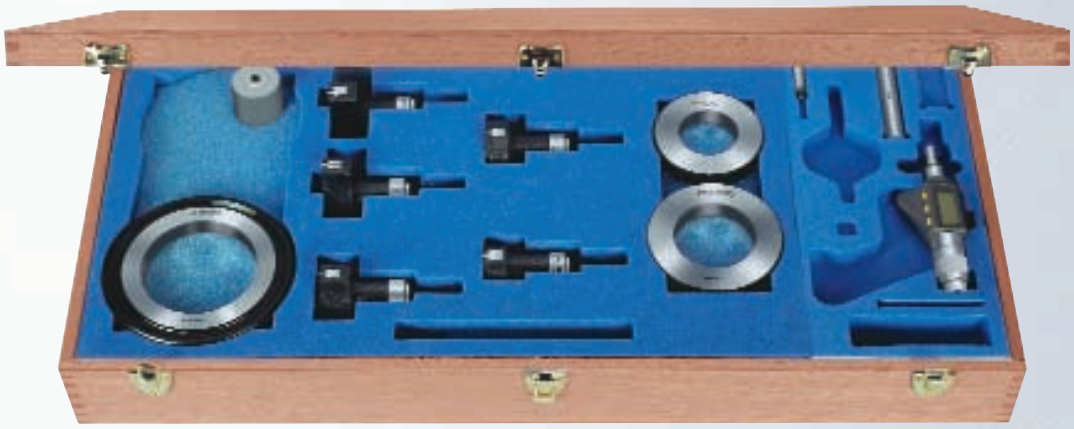
For connecting cables etc., refer to section L.

- ✓
- DIN 863 T4. Style C1 for models 6 to 10 mm or C2 for all other models
- 0,001 mm 0.00005 in
- mm / in conversion
- LCD, height of digits: 7 mm
- Floating zero
- Display lock
- Measuring inserts for application ranges 6 to 10 mm: steel hardened to 30 550 HV
  10 to 300: tungsten carbide tipped ≥ 70 HRC
- Opto-coupled RS 232 interface, bidirectional.
- 3 V lithium battery
- 1 to 2 a (≈ 2000 h/a)
- Automatic shut down after 10 min. Display setting is retained as long as power supply remains stable.
- 10 °C to 40 °C
- –10 °C to 60 °C
- 80 %, with no condensation
- ✓
- For the measuring element: IP54 (IEC 60529) or IP 40 with use of the digital output
- ≤ 100 mm in a plastic case
  > 100 mm in a wood case
- Identification number
- Inspection report with a declaration of conformity

TESA® ALESOMETER «capa µ system®» with Digital Display - Partial Sets

New patented TESA's capacitive measuring system

Models that cover the application ranges from 6 to 10 mm are suited for through bores only – All other Alesometer partial sets also permit blind bores as well as short centring shoulders to be inspected.



✓

DIN 863 T4. Style C1 for models 6 to 10 mm or C2 for all other models

0,001 mm
0.00005 in

Measuring inserts for application ranges
6 to 10 mm: steel hardened to 30 550 HV
10 to 300: tungsten carbide tipped ≥ 70 HRC

For additional technical data, see on page C-10.
For setting rings, see on page C-13.

≤ 100 m in a plastic case,
> 100 mm in a wood case

Identification number

Inspection report with a declaration of conformity

No	mm	No	mm	No	No	No	mm
Partial sets including:		*Measuring heads*		*Connectors*	*Meas. elements*	*Setting rings*	
62.30100	6 ÷ 10	08.1720351	6 ÷ 8	08.1620491	62.30020	21.1625101	8
		08.1720353	8 ÷ 10				
62.30110	10 ÷ 20	08.1720356	10 ÷ 12,5	08.1620492	62.30020	21.1625102	12,5
		08.1720358	12,5 ÷ 15			21.1625103	17,5
		08.1720360	15 ÷ 17,5				
		08.1720362	17,5 ÷ 20				
62.30111	20 ÷ 40	08.1720364	20 ÷ 25	08.1620493	62.30020	21.1625104	25
		08.1720366	25 ÷ 30			21.1625105	35
		08.1720368	30 ÷ 35				
		08.1720370	35 ÷ 40				
62.30112	40 ÷ 100	08.1720372	40 ÷ 50	08.1620494	62.30020	21.1625106	45
		08.1720374	50 ÷ 60			21.1625107	60
		08.1720376	60 ÷ 70			21.1625109	85
		08.1720378	70 ÷ 85				
		08.1720380	85 ÷ 100				

Extensions for Depth Increase

No	mm	mm
08.1625081	6 ÷ 10	100
08.1625082	10 ÷ 20	100
08.1625083	20 ÷ 40	150
08.1625084	40 ÷100	150
08.1625085	100 ÷ 300	200

Cases for Partial Sets

No	mm
08.1629521	6 ÷ 40
08.1629525	40 ÷100

✓

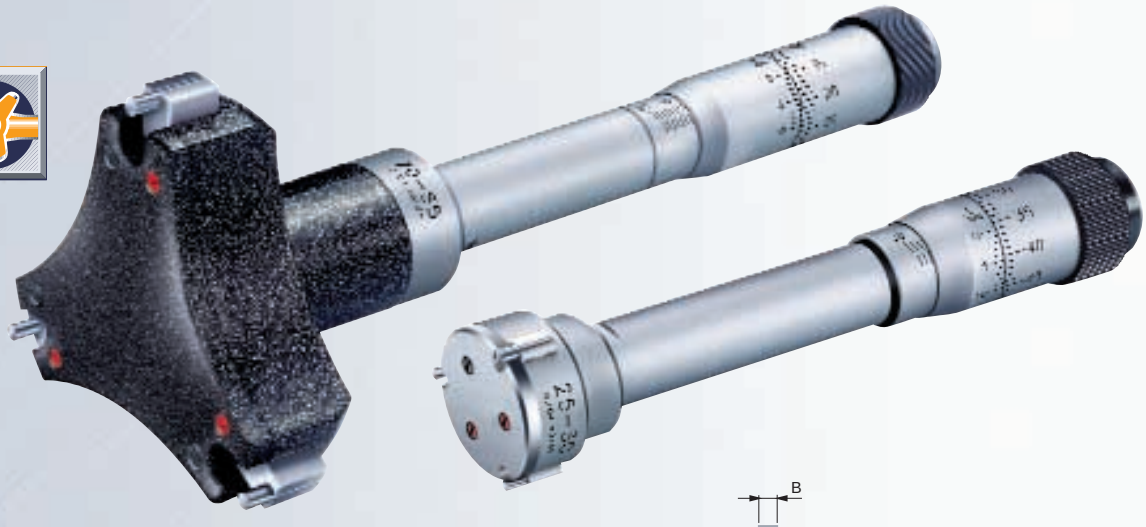
Hardened steel. Insulated body against hand warmth.

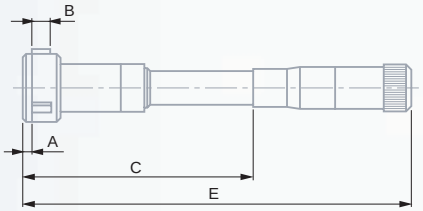
Identification number

Declaration of conformity

ROCH ALESOMETER with Analogue Indication - Metric

Internal micrometers with 3-line contact. All ROCH ALESOMETER let you measure not only through bores but also blind bores as well as centring shoulders, except for the models covering the application ranges from 6 up to 10 mm.





NF E 11-099. Type 1 for models 6 to 10 mm or 2 for all other models

Models 6 to 100 mm with vernier reading

Measuring inserts for application ranges

6 to 10 mm: steel hardened to 30 550 HV

10 to 300 mm: tungsten carbide tipped. Hardness: ≥ 70 HRC.

Wood case

Identification number

Declaration of conformity

Calibration certificate available on request

Single Instruments, complete

No	mm	mm	µm	Amm*	Bmm	Cmm	Emm
08.1725001	6 ÷ 8	0,001	4	1,2	3	54,5	107
08.1725003	8 ÷ 10	0,001	4	1,2	3	54,5	107
08.1725006	10 ÷ 12,5	0,001	4	0	6,5	64,5	117
08.1725008	12,5 ÷ 15	0,001	4	0	6,5	64,5	117
08.1725010	15 ÷ 17,5	0,001	4	0	6,8	64,5	117
08.1725012	17,5 ÷ 20	0,001	4	0	6,8	64,5	117
08.1725014	20 ÷ 25	0,001	4	0	8,5	70	122,5
08.1725016	25 ÷ 30	0,001	4	0	8,5	70	122,5
08.1725018	30 ÷ 35	0,001	4	0	8,5	70	122,5
08.1725020	35 ÷ 40	0,001	4	0	8,5	70	122,5
08.1725022	40 ÷ 50	0,001	4	0	14,5	108,7	188,7
08.1725024	50 ÷ 60	0,001	5	0	14,5	108,7	188,7
08.1725026	60 ÷ 70	0,001	5	0	14,5	108,7	188,7
08.1725028	70 ÷ 85	0,001	5	0	14,5	126,7	206,7
08.1725030	85 ÷ 100	0,001	5	0	14,5	126,7	206,7
08.1725032	100 ÷ 125	0,01	7	0	30	153,7	233,5
08.1725034	125 ÷ 150	0,01	7	0	30	153,7	233,5
08.1725036	150 ÷ 175	0,01	8	0	30	153,7	233,5
08.1725038	175 ÷ 200	0,01	8	0	30	153,7	233,5
08.1725040	200 ÷ 225	0,01	9	0	30	153,7	233,5
08.1725042	225 ÷ 250	0,01	9	0	30	153,7	233,5
08.1725044	250 ÷ 275	0,01	9	0	30	153,7	233,5
08.1725046	275 ÷ 300	0,01	9	0	30	153,7	233,5

* Not applicable to the models from 10 mm since the measuring inserts are close to the instrument's front face.

ROCH ALESOMETER with Analogue Indication - Full Metric Sets



NF E 11-099. Type 1 for models 6 to 10 mm or 2 for all other models

Models 6 to 100 mm with vernier reading

Measuring inserts for application ranges

6 to 10 mm: hardened steel to 30 550 HV

10 to 300 mm: tungsten carbide tipped. Hardness: ≥ 70 HRC

For additional data, see on the previous page

Wood case

Identification number

Declaration of conformity

Calibration certificate available on request

	mm		mm		mm		mm
Full sets including:		*Single instrument*		*Setting rings*	*Extensions*		
08.1725063	6 ÷ 10	08.1725001	6 ÷ 8	21.1625101	8	08.1625081	100
		08.1725003	8 ÷10				
08.1725066	10 ÷ 20	08.1725006	10 ÷ 12,5	21.1625102	12,5	08.1625082	100
		08.1725008	12,5 ÷ 15	21.1625103	17,5		
		08.1725010	15 ÷ 17,5				
		08.1725012	17,5 ÷ 20				
08.1725068	20 ÷ 40	08.1725014	20 ÷ 25	21.1625104	25	08.1625083	150
		08.1725016	25 ÷ 30	21.1625105	35		
		08.1725018	30 ÷ 35				
		08.1725020	35 ÷ 40				
08.1725070	40 ÷ 100	08.1725022	40 ÷ 50	21.1625106	45	08.1625084	150
		08.1725024	50 ÷ 60	21.1625107	60		
		08.1725026	60 ÷ 70	21.1625109	85		
		08.1725028	70 ÷ 85				
		08.1725030	85 ÷ 100				
08.1725072	100 ÷ 150	08.1725032	100 ÷ 125	25.1625111	125	08.1625085	200
		08.1725034	125 ÷ 150				

NF E 11-011 Type A2

Steel hardened to 60 HRC

Bore related tolerance $\pm (3\ \mu m + 10 \cdot 10^{-6}\ D)\ \mu m$

D = Nominal diameter in mm $(1\ \mu m + 5 \cdot 10^{-6}\ D)\ \mu m$

Wood case

Identification number

Calibration certificate available on request

ROCH Setting Rings

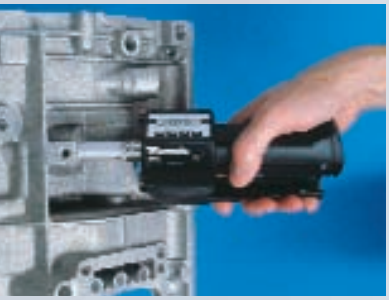
	mm		mm
21.1625101	8	**21.1625110**	90
21.1625102	12,5	**21.1625111**	125
21.1625103	17,5	**21.1625112**	150
21.1625104	25	**21.1625113**	175
21.1625105	35	**21.1625114**	200
21.1625106	45	**21.1625115**	225
21.1625107	60	**21.1625116**	250
21.1625108	75	**21.1625117**	275
21.1625109	85		

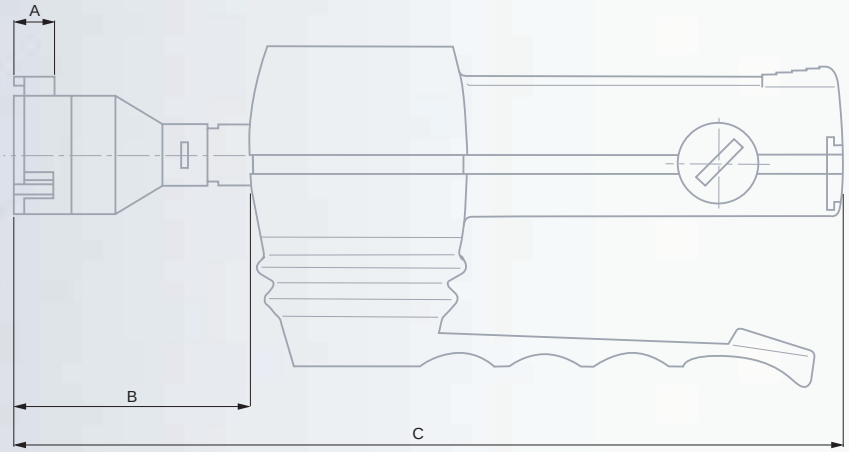
TESA® TRIOMATIC®

For single-handed measurement with a constant measuring force. No ratchet. Self-centring and self-aligning bore gauges owing to the measuring bolts that provide three line contact with the bore to be inspected. Automatic value storage, numerical display and value classification.

Measure through holes and blind bores as well as short centring shoulders. For information on measuring bolts for internal threads and other special profiles, report to TESA Tri-O-Bor.







No	mm	No	in	A mm	B mm	C mm
62.30005	15 ÷ 20	***62.32005***	*0.6 ÷ 0.8*	6	56	206
62.30006	20 ÷ 25	***62.32006***	*0.8 ÷ 1.0*	6	56	206
62.30007	25 ÷ 30	***62.32007***	*1.0 ÷ 1.2*	6	56	206
62.30008	30 ÷ 40	***62.32008***	*1.2 ÷ 1.6*	10	60	210
62.30009	40 ÷ 50	***62.32009***	*1.6 ÷ 2.0*	10	60	210
62.30010	50 ÷ 60	***62.32010***	*2.0 ÷ 2.4*	10	60	210
62.30011	60 ÷ 70	***62.32011***	*2.4 ÷ 2.8*	18	68	218
62.30012	70 ÷ 80	***62.32012***	*2.8 ÷ 3.2*	18	68	218
62.30013	80 ÷ 90	***62.32013***	*3.2 ÷ 3.6*	18	68	218
62.30014	90 ÷ 100	***62.32014***	*3.6 ÷ 4.0*	18	68	218
62.30015	100 ÷ 110	***62.32015***	*4.0 ÷ 4.4*	18	68	218
62.30016	110 ÷ 120	***62.32016***	*4.4 ÷ 4.8*	18	68	218

- ✓
- 0,001 mm 0.00005 in
- LCD, 5,1 mm digit height
- mm / in conversion
- Direct or comparative measurement
- Measuring bolts and cone: tungsten carbide tipped
- Max. perm. error for models covering appl. ranges from:
  15 to 100 mm or 0.6 to 4.0 in: 5 µm
  100 to 120 mm or 4.0 to 4.8 in: 6 µm
- Repeatability-limit: 3 µm
- Interface: RS 232 compatible
- 2 batteries SR 44, 1,55 V, 155 to 190 mAh
- ≈ 4300 h
- Automatic shut down after ≈ 10 min. Display setting is retained as long as power supply remains stable.
- 10 °C to 40 °C
- –10 °C to 60 °C
- 80 %,with no condensation
- Measuring element (IEC 60529): IP 51
- ✓
- Plastic case or suitcase with 2 batteries
- Identification number
- Inspection report with a declaration of conformity

TESA® TRIOMATIC® Metric Partial Sets



Technical data: see on previous page C-10

Setting rings on page C-24

Plastic case or suitcase with 2 batteries

Inspection report with a declaration of conformity

Partial sets including:	mm	*Measuring element*	*Measuring heads, complete*	mm		mm		*Setting rings*	mm
62.30001	15 ÷ 30	62.30000	09.10101	15 ÷ 20				08.40104	15
			09.10102	20 ÷ 25				08.40106	25
			09.10103	25 ÷ 30					
62.30002	30 ÷ 60	62.30000	09.10501	30 ÷ 40				08.40107	35
			09.10502	40 ÷ 50				08.40108	50
			09.10503	50 ÷ 60					
Partial sets including:		*Measuring element*	*Measuring head*		*Measuring bolts*			*Setting rings*	
62.30003	60 ÷ 90	62.30000	09.10801	60 ÷ 90	09.11001	60 ÷ 70		08.40109	70
					09.11002	70 ÷ 80		08.40110	90
					09.11003	80 ÷ 90			
62.30004	90 ÷ 120	62.30000	09.11201	90 ÷ 120	09.11401	90 ÷ 100		08.40110	90
					09.11402	100 ÷ 110		08.40111	110
					09.11403	110 ÷ 120			

TESA® TRIOMATIC® Optional Accessories

05.60030	Set of 2 batteries, type SR 44
09.60009	Extension for depth increase by 100 mm
09.60010	Holder for stationary use of TESA TRIOMATIC
01.60201	Micrometer stand for 09.60010
	For information on cables, see section L.



TESA® TRIOMATIC® Inch Partial Sets



Technical data: see on previous page C-10

Setting rings on page C-24

Plastic case or suitcase with 2 batteries

Inspection report with a declaration of conformity

Partial sets including:	in	Measuring element	Measuring heads, complete	in		in		in
							Setting rings	
62.32001	0.6 ÷ 1.2	62.32000	09.20101	0.6 ÷ 0.8			08.50104	0.6
			09.20102	0.8 ÷ 1.0			08.50106	1.0
			09.20103	1.0 ÷ 1.2				
62.32002	1.2 ÷ 2.4	62.32000	09.20501	1.2 ÷ 1.6			08.50107	1.4
			09.20502	1.6 ÷ 2.0			08.50108	2.0
			09.20503	2.0 ÷ 2.4				
Partial sets including:		**Measuring element**	**Measuring head**		**Measuring bolts**		**Setting rings**	
62.32003	2.4 ÷ 3.6	62.32000	09.20801	2.4 ÷ 3.6	09.31001	2.4 ÷ 2.8	08.50109	2.8
					09.31002	2.8 ÷ 3.2	08.50110	3.6
					09.31003	3.2 ÷ 3.6		
62.32004	3.6 ÷ 4.8	62.32000	09.21201	3.6 ÷ 4.8	09.31401	3.6 ÷ 4.0	08.50110	3.6
					09.31402	4.0 ÷ 4.4	08.50111	4.4
					09.31403	4.4 ÷ 4.8		

Plastic Cases or Suitcases for TESA® TRIOMATIC®

Single instuments	Partial sets	mm	in
09.60011	**09.60017**	15 ÷ 30	0.6 ÷ 1.2
09.60012	**09.60017**	30 ÷ 60	1.2 ÷ 2.4
09.60015	**09.60017**	60 ÷ 90	2.4 ÷ 3.6
09.60016	**09.60018**	90 ÷ 120	3.6 ÷ 4.8

TESA® TRI-O-BOR®

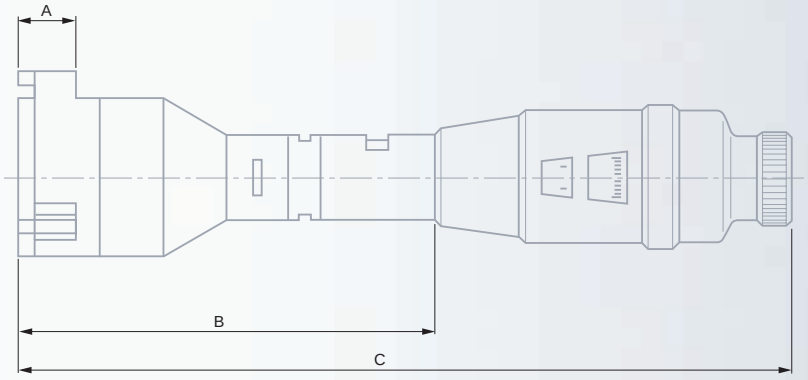
Self-centring and self-aligning internal micrometers with 3-line contact with the part being inspected. These measuring instruments are specially suited for trough holes, but also for blind bores or short centring shoulders.

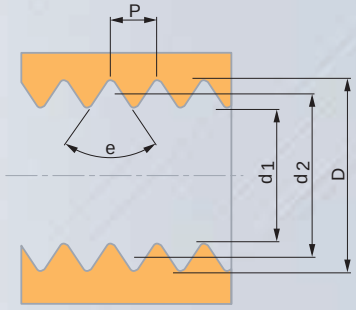


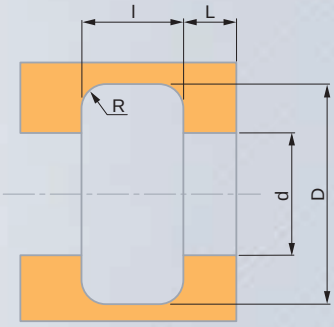
- ✓
- DIN 863 T4 (style C2) NF E 11-099
- 0,002 mm or 0.0002 in
- 0,01 mm or 0.001 in
- Measuring bolts and cone: tungsten carbide tipped
- Max. perm. error for models covering appl. ranges from:
  - 15 to 60 mm or 0.6 to 2.4 in: 3 µm
  - 60 to 90 mm or 2.4 to 3.6 in: 4 µm
  - 90 to 120 mm or 3.6 to 4.8 in: 5 µm
- Repeatability limit for models covering the application ranges from:
  - 15 to 60 mm or 0.6 to 2.4 in: 4 µm
  - 60 to 90 mm or 2.4 to 3.6 in: 5 µm
  - 90 to 120 mm / 3.6 to 4.8 in: 6 µm
- Supplied with 1 heat insulating sleeve No. 09.40020, 2 keys No. 09.40001, 1 screwdriver No. 08.62801
- Shipping box
- Identification number
- Inspection report with a declaration of conformity

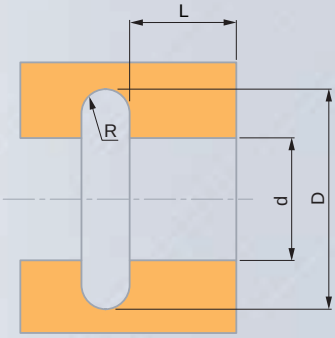
Special Measuring Bolts

Used for Metric ISO threads (M16x0,5 ÷ M150x6), Unified Inch threads UN, UNC or UNF (60°) and Whitworth threads (55°). Measuring bolts with special profiles can also be made available. Both the size and type of the thread or the workpiece to be measured must be specified in your inquiries or purchase orders (see drawings).



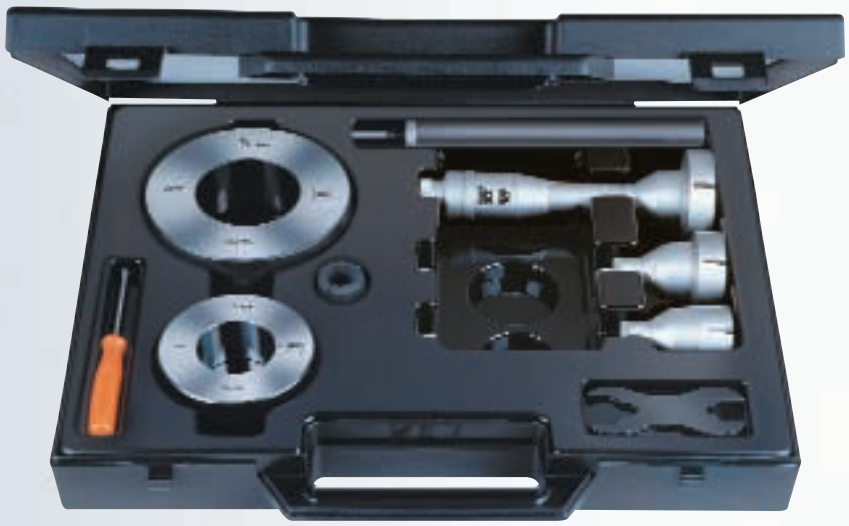






No	mm	No	in	A mm	B mm	C mm
09.10005	15 ÷ 20	***09.20005***	*0.6 ÷ 0.8*	6	≥ 66	≤ 132
09.10006	20 ÷ 25	***09.20006***	*0.8 ÷ 1.0*	6	≥ 66	≤ 132
09.10007	25 ÷ 30	***09.20007***	*1.0 ÷ 1.2*	6	≥ 66	≤ 132
09.10405	30 ÷ 40	***09.20405***	*1.2 ÷ 1.6*	10	≥ 70	≤ 138
09.10406	40 ÷ 50	***09.20406***	*1.6 ÷ 2.0*	10	≥ 70	≤ 138
09.10407	50 ÷ 60	***09.20407***	*2.0 ÷ 2.4*	10	≥ 70	≤ 138
09.10705	60 ÷ 70	***09.20705***	*2.4 ÷ 2.8*	18	≥ 78	≤ 147
09.10706	70 ÷ 80	***09.20706***	*2.8 ÷ 3.2*	18	≥ 78	≤ 147
09.10707	80 ÷ 90	***09.20707***	*3.2 ÷ 3.6*	18	≥ 78	≤ 147
09.11105	90 ÷ 100	***09.21105***	*3.6 ÷ 4.0*	18	≥ 78	≤ 147
09.11106	100 ÷ 110	***09.21106***	*4.0 ÷ 4.4*	18	≥ 78	≤ 147
09.11107	110 ÷ 120	***09.21107***	*4.4 ÷ 4.8*	18	≥ 78	≤ 147

TESA® TRI-O-BOR® Metric Partial Sets



✓ SWISS MADE

Technical data: see on previous page C-13

Setting rings on page C-24

Supplied with 1 extension for depth increase (150 mm) No. 09.40000
1 heat insulating sleeve No. 09.40020,
2 keys No. 09.40001,
1 screwdriver No. 08.62801

Plastic case or suitcase

Inspection report with a declaration of conformity

No	mm	No	No	mm	No	mm	No	mm
Partial sets including:		*Measuring element*	*Measuring heads, complete*				*Setting rings*	
09.10302	15 ÷ 30	09.10201	09.10101	15 ÷ 20			08.40104	15
			09.10102	20 ÷ 25			08.40106	25
			09.10103	25 ÷ 30				
09.10602	30 ÷ 60	09.10201	09.10501	30 ÷ 40			08.40107	35
			09.10502	40 ÷ 50			08.40108	50
			09.10503	50 ÷ 60				
Partial sets including		*Measuring element*	*Measuring head*		*Measuring bolts*		*Setting rings*	
09.10902	60 ÷ 90	09.10802	09.10801	60 ÷ 90	09.11001	60 ÷ 70	08.40109	70
					09.11002	70 ÷ 80	08.40110	90
					09.11003	80 ÷ 90		
09.11302	90 ÷ 120	09.10802	09.11201	90 ÷ 120	09.11401	90 ÷ 100	08.40110	90
					09.11402	100 ÷ 110	08.40111	110
					09.11403	110 ÷ 120		

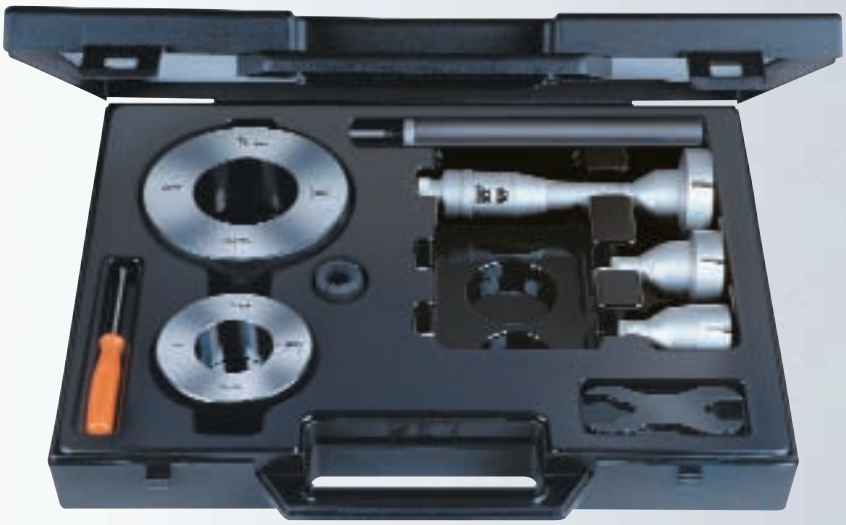
TESA® TRI-O-BOR® Optional Accessory

Extension for Deep Hole Measurement

No	mm
09.40000	150

✓ SWISS MADE

TESA® TRI-O-BOR® Inch Partial Sets



Technical data: see on page C-13

Setting rings on page C-24

Supplied with 1 extension for depth increase (150 mm) No. 09.40000
1 heat insulating sleeve No. 09.40020,
2 keys No. 09.40001,
1 screwdriver No. 08.62801

Plastic case or suitcase

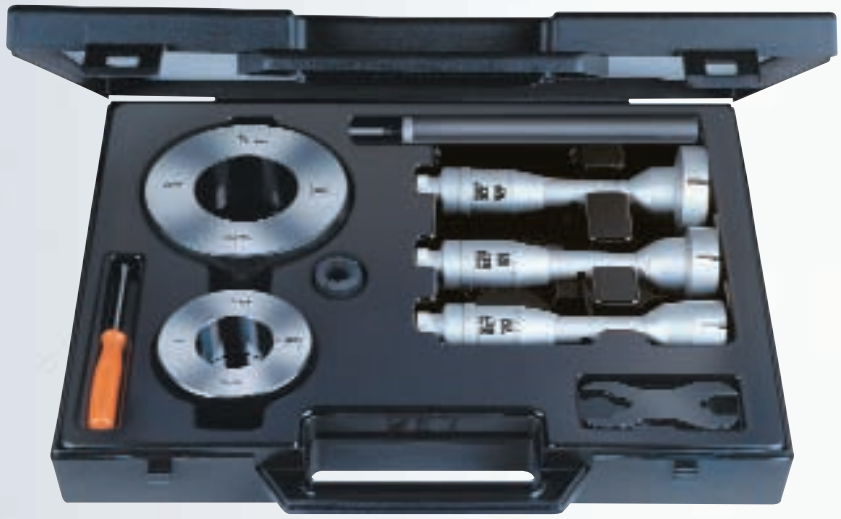
Inspection report with a declaration of conformity

No	in	No	No	in	No	in	No	in
Partial sets including:		*Measuring element*	*Measuring heads, complete*				*Setting rings*	
09.20300	*0.6 ÷ 1.2*	*09.20201*	*09.20101*	*0.6 ÷ 0.8*			*08.50104*	*0.6*
			09.20102	*0.8 ÷ 1.0*			*08.50106*	*1.0*
			09.20103	*1.0 ÷ 1.2*				
09.20600	*1.2 ÷ 2.4*	*09.20201*	*09.20501*	*1.2 ÷ 1.6*			*08.50107*	*1.4*
			09.20502	*1.6 ÷ 2.0*			*08.50108*	*2.0*
			09.20503	*2.0 ÷ 2.4*				
Partial sets including:		*Measuring element*	*Measuring head*		*Measuring bolts*		*Setting rings*	
09.20900	*2.4 ÷ 3.6*	*09.20802*	*09.20801*	*2.4 ÷ 3.6*	*09.31001*	*2.4 ÷ 2.8*	*08.50109*	*2.8*
					09.31002	*2.8 ÷ 3.2*	*08.50110*	*3.6*
					09.31003	*3.2 ÷ 3.6*		
09.21300	*3.6 ÷ 4.8*	*09.20802*	*09.21201*	*3.6 ÷ 4.8*	*09.31401*	*3.6 ÷ 4.0*	*08.50110*	*3.6*
					09.31402	*4.0 ÷ 4.4*	*08.50111*	*4.4*
					09.31403	*4.4 ÷ 4.8*		

Plastic Cases or Suitcases for TESA® TRI-O-BOR®

No	No	No	mm	in
Single instruments	*Partial sets*	*Full sets*		
09.60023	**09.60024**	**09.60024**	15 ÷ 30	*0.6 ÷ 1.2*
09.60025	**09.60026**	**09.60026**	30 ÷ 60	*1.2 ÷ 2.4*
09.60027	**09.60028**	**09.60028**	60 ÷ 90	*2.4 ÷ 3.6*
09.60004	**09.60004**	**09.60008**	90 ÷ 120	*3.6 ÷ 4.8*

TESA® TRI-O-BOR® in Full Sets



SWISS MADE ✓

Technical data: see on page C-13

Setting rings on page C-24

Supplied with 1 extension for depth increase (150 mm) No. 09.40000
1 heat insulating sleeve No. 09.40020,
2 keys No. 09.40001,
1 screwdriver No. 08.62801

Plastic case or suitcase

Inspection report with a declaration of conformity

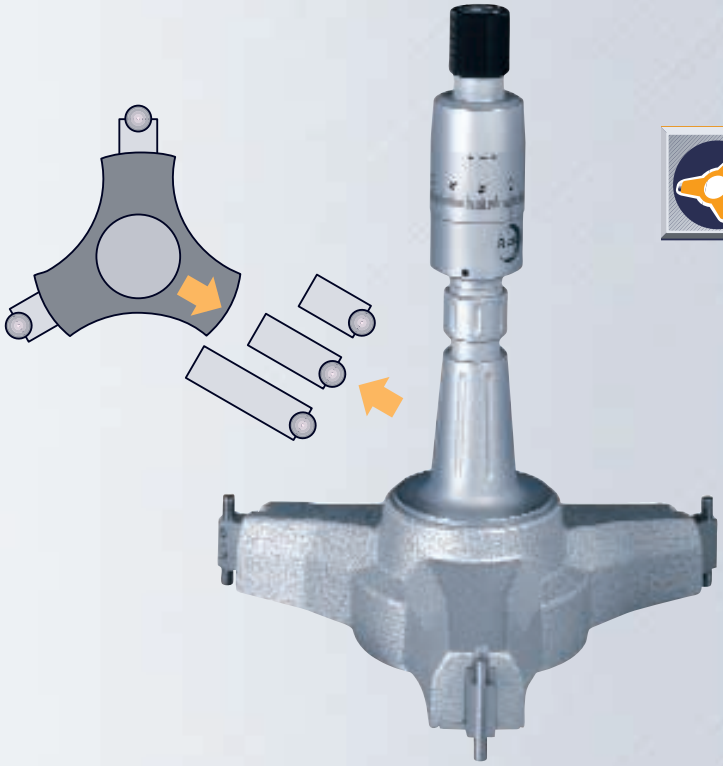
No	A	mm	No	mm	No	mm	No	mm
Full sets including:			*Single instruments*		*Setting rings*		*Extension*	
09.10004	BSC	15 ÷ 30	09.10005	15 ÷ 20	08.40104	15	09.40000	150
			09.10006	20 ÷ 25	08.40105	25		
			09.10007	25 ÷ 30				
09.10404	BSD	30 ÷ 60	09.10405	30 ÷ 40	08.40107	35	09.40000	150
			09.10406	40 ÷ 50	08.40108	50		
			09.10407	50 ÷ 60				
09.10704	BSF	60 ÷ 90	09.10705	60 ÷ 70	08.40109	70	09.40000	150
			09.10706	70 ÷ 80	08.40110	90		
			09.10707	80 ÷ 90				
09.11104	BSG	90 ÷ 120	09.11105	90 ÷ 100	08.40110	90	09.40000	150
			09.11106	100 ÷ 110	08.40111	110		
			09.11107	110 ÷ 120				

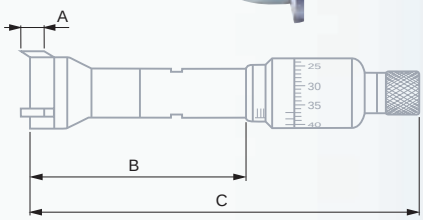
No	A	in	No	in	No	in	No	mm
Full sets including:			*Single instruments*		*Setting rings*		*Extension*	
09.20004	*BSCE*	*0.6 ÷ 1.2*	*09.20005*	*0.6 ÷ 0.8*	*08.50104*	*0.6*	09.40000	150
			09.20006	*0.8 ÷ 1.0*	*08.50105*	*1.0*		
			09.20007	*1.0 ÷ 1.2*				
09.20404	*BSDE*	*1.2 ÷ 2.4*	*09.20405*	*1.2 ÷ 1.6*	*08.50107*	*1.4*	09.40000	150
			09.20406	*1.6 ÷ 2.0*	*08.50108*	*2.0*		
			09.20407	*2.0 ÷ 2.4*				
09.20704	*BSFE*	*2.4 ÷ 3.6*	*09.20705*	*2.4 ÷ 2.8*	*08.50109*	*2.8*	09.40000	150
			09.20706	*2.8 ÷ 3.2*	*08.50110*	*3.6*		
			09.20707	*3.2 ÷ 3.6*				
09.21104	*BSGE*	*3.6 ÷ 4.8*	*09.21105*	*3.6 ÷ 4.0*	*08.50110*	*3.6*	09.40000	150
			09.21106	*4.0 ÷ 4.4*	*08.50111*	*4.4*		
			09.21107	*4.4 ÷ 4.8*				

ETALON® INTALOMETER 531

Measure through holes and blind bores as well as short centring shoulders. All models covering the application ranges up to 100 mm have slanted measuring bolts that extend beyond the front face of the measuring head.







- SWISS MADE ✓
- Models from 10 to 100 mm: DIN 863 T4 (style C2) NF E 11-099
- Models from 5 to 100 mm: 0,002 mm or 0.0001 in, with vernier reading
  100 to 300 mm: 0,01 mm or 0.001 in
- Measuring bolts on models from
  5 to 100 mm: hardened steel
  100 to 300 mm: tungsten carbide tipped
- Max. perm. error for models covering appl. ranges from
  5 to 40 mm or 0.188 to 1.604 in: 2 µm
  40 to 100 mm or 1.394 to 4.005 in: 3 µm
  100 to 300 mm or 4 to 6 in: 5 µm
- Repeatability limit for models covering the application ranges from:
  5 to 40 mm or 0.188 to 1.604 in: 3 µm
  40 to 100 mm or 1.394 to 4.005 in: 4 µm
  100 to 300 mm or 4 to 6 in: 5 µm
- Plastic case or suitcase
- Identification number
- Inspection report with a declaration of conformity

N°	mm	N°	in		A mm	B mm	C mm
78.112356	5 ÷ 6	***78.112374***	*0.188 ÷ 0.238*	2 x 180°	3	≥ 32	≤ 109
78.112357	6 ÷ 7	***78.112375***	*0.233 ÷ 0.278*	2 x 180°	3	≥ 33	≤ 111
78.112358	7 ÷ 8,5	***78.112376***	*0.272 ÷ 0.338*	2 x 180°	4	≥ 60	≤ 130
78.112359	8,5 ÷ 10	***78.112377***	*0.332 ÷ 0.402*	2 x 180°	4	≥ 72	≤ 133
78.112360	10 ÷ 12,5	***78.112378***	*0.396 ÷ 0.502*	3 x 120°	3	≥ 60	≤ 118
78.112361	12,5 ÷ 15	***78.112379***	*0.496 ÷ 0.602*	3 x 120°	3	≥ 63	≤ 120
78.112362	15 ÷ 17,5	***78.112380***	*0.596 ÷ 0.704*	3 x 120°	3	≥ 65	≤ 122
78.112363	17,5 ÷ 20	***78.112381***	*0.696 ÷ 0.804*	3 x 120°	3	≥ 68	≤ 125
78.112364	20 ÷ 25	***78.112382***	*0.794 ÷ 1.004*	90°–135°–135°	7	≥ 75	≤ 132
78.112365	25 ÷ 30	***78.112383***	*0.994 ÷ 1.204*	90°–135°–135°	7	≥ 80	≤ 138
78.112366	30 ÷ 35	***78.112384***	*1.194 ÷ 1.404*	90°–135°–135°	7	≥ 90	≤ 142
78.112367	35 ÷ 40	***78.112385***	*1.394 ÷ 1.604*	90°–135°–135°	7	≥ 90	≤ 148
78.112368	40 ÷ 45	***78.112386***	*1.595 ÷ 1.805*	90°–135°–135°	10,5	≥ 110	≤ 167
78.112369	45 ÷ 50	***78.112387***	*1.795 ÷ 2.005*	90°–135°–135°	10,5	≥ 113	≤ 170
78.112370	50 ÷ 60	***78.112388***	*1.995 ÷ 2.405*	90°–135°–135°	15	≥ 123	≤ 187
78.112371	60 ÷ 70	***78.112389***	*2.395 ÷ 2.805*	90°–135°–135°	15	≥ 130	≤ 193
78.112372	70 ÷ 85	***78.112390***	*2.795 ÷ 3.405*	90°–135°–135°	15	≥ 145	≤ 213
78.112373	85 ÷ 100	***78.112391***	*3.395 ÷ 4.005*	90°–135°–135°	15	≥ 155	≤ 224
78.110733	100 ÷ 125	***78.111174***	*4 ÷ 5*	3 x 120°	27	≥ 105	≤ 194
78.110735	125 ÷ 150	***78.111176***	*5 ÷ 6*	3 x 120°	27	≥ 105	≤ 194
78.110737	150 ÷ 175			3 x 120°	27	≥ 105	≤ 194
78.110739	175 ÷ 200			3 x 120°	27	≥ 105	≤ 194
78.110741	200 ÷ 225			3 x 120°	27	≥ 105	≤ 194
78.110743	225 ÷ 250			3 x 120°	27	≥ 105	≤ 194
78.110745	250 ÷ 275			3 x 120°	27	≥ 105	≤ 194
78.110747	275 ÷ 300			3 x 120°	27	≥ 105	≤ 194

ETALON® INTALOMETER 531 – Metric Sets



SWISS MADE ✓

For technical data, see on page C-17

Setting rings on page C-24

Plastic case or suitcase

Inspection report with a declaration of conformity

No	mm	No	mm	mm	No	mm	No	mm
Full sets		*Including:* *Single instruments*				*Extensions*		*Setting rings*	
78.110592	5 ÷ 10	78.112356	5 ÷ 6			78.103613	100	08.40114	6
		78.112357	6 ÷ 7					08.40115	8,5
		78.112358	7 ÷ 8,5						
		78.112359	8,5 ÷ 10						
78.110594	10 ÷ 20	78.112360	10 ÷ 12,5			78.103621	150	08.40116	12,5
		78.112361	12,5 ÷ 15					08.40117	17,5
		78.112362	15 ÷ 17,5						
		78.112363	17,5 ÷ 20						
78.110596	20 ÷ 40	78.112364	20 ÷ 25			78.103624	150	08.40106	25
		78.112365	25 ÷ 30					08.40107	35
		78.112366	30 ÷ 35						
		78.112367	35 ÷ 40						
78.110598	40 ÷ 100	78.112368	40 ÷ 45			78.104940	150	08.43230	45
		78.112369	45 ÷ 50					08.43239	60
		78.112370	50 ÷ 60					08.40118	85
		78.112371	60 ÷ 70						
		78.112372	70 ÷ 85						
		78.112373	85 ÷ 100						
Full sets including:		*Single instruments*	*Measuring bolts*			*Extensions*			
78.110749	100 ÷ 150	78.110733	78.111003*	100 ÷ 125		78.104940	150		
			78.111004	125 ÷ 150					
78.110751	150 ÷ 300	78.110737	78.111005*	150 ÷ 175		78.104940	150		
			78.111006	175 ÷ 200					
			78.111007	200 ÷ 225					
			78.111008	225 ÷ 250					
			78.111009	250 ÷ 275					
			78.111010	275 ÷ 300					

* One set of measuring bolts is provided with the single instrument No. 78.110733 or 78.110737.

ETALON® INTALOMETER 531 – Inch Sets



For technical data, see on page C-17

Setting rings on page C-24

Plastic case or suitcase

Inspection report with a declaration of conformity

No	in	No	in	in	No	mm	No	in
Full sets		*Including: Single instruments*			*Extension*		*Setting rings*	
78.110600	*0.188 ÷ 0.402*	*78.112374*	*0.188 ÷ 0.238*		78.103613	100	*08.50100*	*0.200*
		78.112375	*0.233 ÷ 0.278*				*08.50114*	*0.250*
		78.112376	*0.272 ÷ 0.388*				*08.50115*	*0.300*
		78.112377	*0.332 ÷ 0.402*				*08.50101*	*0.350*
78.110602	*0.396 ÷ 0.804*	*78.112378*	*0.396 ÷ 0.502*		78.103621	150	*08.50103*	*0.500*
		78.112379	*0.496 ÷ 0.602*				*08.50105*	*0.700*
		78.112380	*0.596 ÷ 0.704*					
		78.112381	*0.696 ÷ 0.804*					
78.110604	*0.794 ÷ 1.604*	*78.112382*	*0.794 ÷ 1.004*		78.103624	150	*08.50106*	*1.000*
		78.112383	*0.994 ÷ 1.204*				*08.50107*	*1.400*
		78.112384	*1.194 ÷ 1.404*					
		78.112385	*1.394 ÷ 1.604*					
78.110606	*1.595 ÷ 4.005*	*78.112386*	*1.595 ÷ 1.805*		78.104940	150	*08.50116*	*1.800*
		78.112387	*1.795 ÷ 2.005*				*08.50118*	*2.400*
		78.112388	*1.995 ÷ 2.405*				*08.50117*	*3.400*
		78.112389	*2.395 ÷ 2.805*					
		78.112390	*2.795 ÷ 3.405*					
		78.112391	*3.395 ÷ 4.005*					
Partial set including:		*Single instr.*	*Measuring bolts*		*Extension*			
78.111179	*4 ÷ 6*	*78.111174*	*78.111011**	*4 ÷ 5*	78.104940	150		
			78.111012	*5 ÷ 6*				

* One set of measuring bolts is provided with the single instrument No. 78.111174.

TESA® Setting Rings and Setting Master





✓ Shipping packing

Identification number

No	⌀ mm	No	⌀ in	μm*	μm**
Setting rings					
08.43200	4			1,5	1,5
08.43201	5,5	***08.50100***	*0.200*	1,5	1,5
08.40114	6	***08.50114***	*0.250*	1,5	1,5
08.40101	8	***08.50115***	*0.300*	1,5	1,5
08.40115	8,5	***08.50101***	*0.350*	1,5	1,5
08.40102	10	***08.50102***	*0.425*	1,5	1,5
08.40103	11			1,5	1,5
08.40116	12,5	***08.50103***	*0.500*	1,5	1,5
08.40104	15	***08.50104***	*0.600*	1,5	1,5
08.40105	17	***08.50105***	*0.700*	1,5	1,5
08.40117	17,5			1,5	1,5
08.40106	25	***08.50106***	*1.000*	1,5	1,5
08.40107	35	***08.50107***	*1.400*	2	2
08.43230	45	***08.50116***	*1.800*	2	2
08.40108	50	***08.50108***	*2.000*	2	2
08.43239	60	***08.50118***	*2.400*	2	2
08.40109	70	***08.50109***	*2.800*	2	2
08.40118	85	***08.50117***	*3.400*	2	2
08.40110	90	***08.50110***	*3.600*	2	2
08.40111	110	***08.50111***	*4.400*	2,5	2,5
08.40112	125	***08.50112***	*5.000*	2,5	2,5
08.40113	175	***08.50113***	*7.000*	2,5	4
Setting master					
08.43101	225 and 275	***08.53101***	*9 and 11*	—	6

* Without taking a rim of 1 mm into account.

** Dimension is determined through a 2-point measurement taken at mid-height of the setting ring. Measuring direction is marked with 2 strokes. Actual dimensions measured are engraved on the setting master.

Measuring Instruments for Large Dimensions



TESA® – The Specialists for Long Lengths

Large sizes in mechanical engineering means dimensions in excess of 500 mm.

Besides various measurement procedures like those that use large internal or external micrometers with two-point contact, tape rules (wrapping round the outside diameter), vee bases, rotating measuring disks (rolling-contact) and optical instruments (triangulation with theodolites), resort is often had to simple testing methods like fixed gauges (inside caliper gauges), gauge blocks combinations or telescopic adjustable gauges.

For large dimensions from 250 mm up to several meters, TESA offer different types of instruments that have long proven their value in practical use.

Here's an example of a proportional relationship. With a bore of 1200 H7, the tolerance zone is 0,1 mm. Reducing both values by a factor of 100 would give a manufacturing tolerance of no more than 1 µm. Of course things are not as simple as this, but the example gives some idea of the proportions.

Whatever the sizes, from a simple distance between two surfaces parallel to one another to large diameters, their measurement is always a challenge to take up. Apart from the usual influences, which are proportional to the size and add to your contributions in the uncertainty budget, those due to gravity play a key role in distortion. With regard to this, also read «What is known …» under General Information.



TESA® UNITEST® Internal Micrometer

Measure in the instrument axis with 2-point contact on the workpiece to be checked – Optional accessories available for inspecting centring shoulders and blind bores as well as auxiliary means for external measuring.

Extensions with built-in gauge rods can be mounted on the measuring element, thus allowing any dimension within the application range to be measured, directly.

Precise, leasy-to-handle micrometer – Horizontal or vertical position of use – Constant measuring force – Integrated dial gauge to show you the culmination point.

✓

DIN 863 T4 (style B)

Measuring element

Micrometer and dial gauge to 0,01 mm

Micrometer: 0,1 mm

Micrometer: 25 mm

0,5 mm

Dial gauge: ± 0,22 mm

0,7 to 1 N

8 µm

Measuring bolts

Spherical end for measuring in the instruments axis. All inserts are interchangeable.

Tungsten carbide tipped

Extensions

26 mm dia. steel tube with snap-ring system

Built-in gauge rods

Tungsten carbide tipped

One spherical and one flat measuring faces

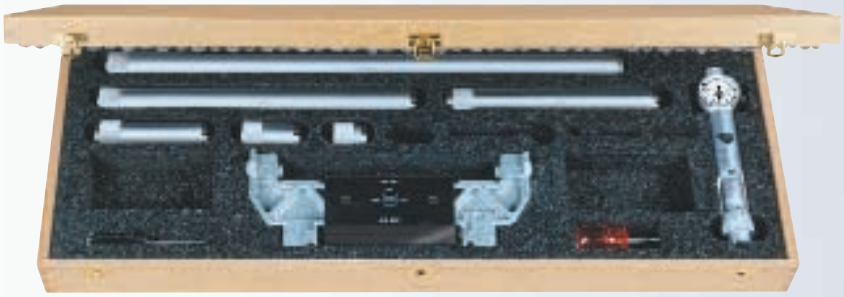
Additional data

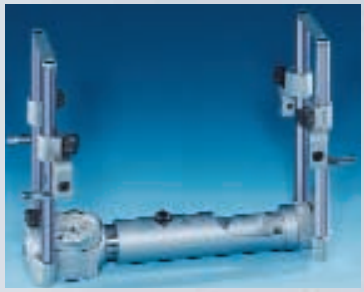
Wooden case

Setting gauge with identification number

Declaration of conformity







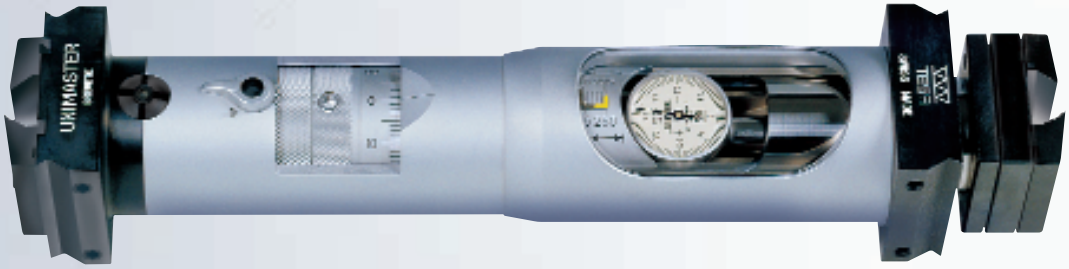
No		mm			No	in
TESA UNITEST complete set						
11.10700		Int. dim.: 200 ÷ 1400			***11.20700***	*8 ÷ 56*
consisting of:						
11.10901	Meas. element	Int. dim.: 200 ÷ 225			***11.20901***	*8 ÷ 9*
11.41001	Setting gauge	Internal/external dimensions:	200		***11.51001***	*8*
11.10801	Extension		25	0,7	***11.20801***	*1*
11.10802	Extension		50	1	***11.20802***	*2*
11.10804	Extension		100	1,5	***11.20804***	*4*
11.10808	Extension		200	2,5	***11.20808***	*8*
11.10812	Extension		300	3,5	***11.20812***	*12*
11.10820	Extension		500	5,5	***11.20820***	*20*
11.60901	Special screwdriver				**11.60901**	
11.62302	Wooden case for complete set				**11.62302**	
Optional accessories						
11.41101	Extension		1000	10	***11.51101***	*40*
11.60701	Pair of measuring bolts for blind bores, tungsten carbide tipped faces				**11.60701**	
11.62301	Additional components for external measuring	Meas. depth: ≤ 10			**11.62301**	
11.40801	Suspension device, complete	Meas. depth: ≤ 100			***11.50801***	

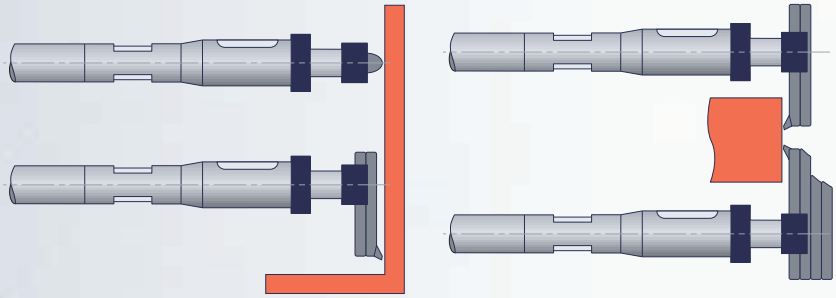
TESA® UNIMASTER® Universal Measuring Instrument

Provides the features necessary for direct measurement of specially large internal and external dimensions.

TESA UNIMASTER is similar in concept to internal micrometers with two-point contact with the workpiece. Made to measure any dimension within the application range directly by simply adding the needed extensions with built-in gauge rods.

Accurate, robust and easy-to-handle – Can be used either vertically or horizontally with a constant measuring force – Incorporates a lever-type dial indicator that clearly shows the culmination point – Ensures stable measuring owing to the negligible deflection and thermal protection of the extensions.







✓ SWISS MADE

DIN 863 T4 (style B)

Measuring element

Micrometer and lever-type dial indicator : 0,01 mm

Micrometer : 25 mm

1 mm

Lever-type dial indicator:± 0,4 mm

Mobile ball-bearing anvil under spring pressure

15 to 20 N
Reversible probing direction to allow both internal and external measuring

5 µm

Measuring bolts

With tungsten carbide tipped measuring inserts

Measuring bolts in pairs:
- No. 11.10203 for internal measuring in the instrument axis.
- No. 11.10205 for internal/ external measuring, meas. depth up to 60 mm from the lower edge of the instrument.
- No. 11.10208 , extra-rigid for external measuring, meas. depth up to 75 mm from the lower edge of the instrument.

Extensions

38 mm dia. steel tube with snap-ring system

Built-in gauge rods

Tungsten carbide tipped

One spherical and one flat measuring faces



Additional data

Wooden case

Measuring element and setting standard with identification number

Declaration of conformity

mm | in

TESA UNIMASTER set, complete

No		mm				No	in
11.10000		Int. dim.:	250 ÷ 1475*			***11.20000***	*10 ÷ 59**
		Ext. dim.:	225 ÷ 1450*				*9 ÷ 58**

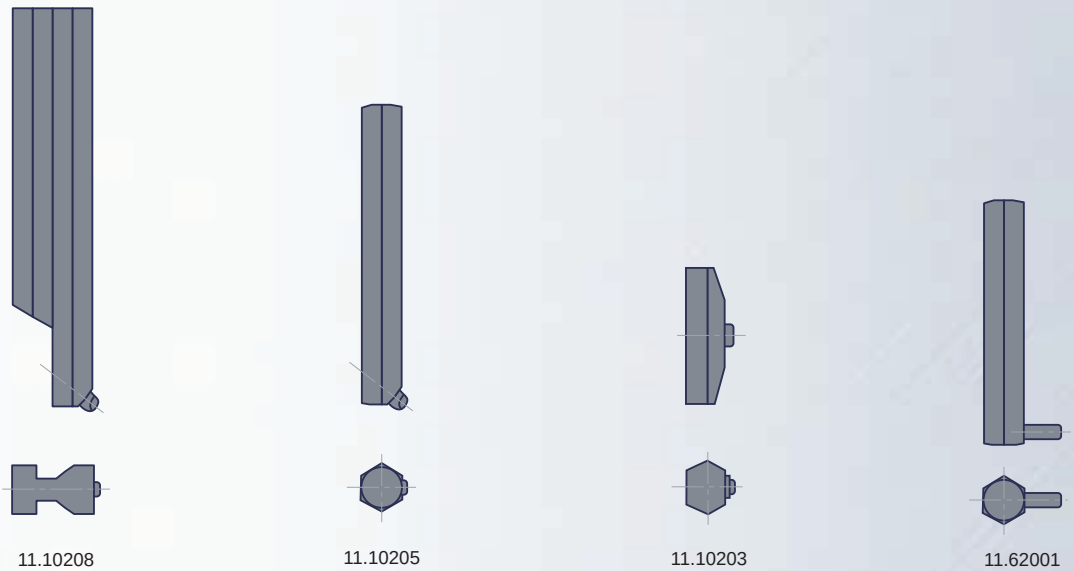
consisting of:

No		mm		mm	µm	No	in
11.10300	Meas. element	Int. dim.:	250 ÷ 275			***11.20300***	*10 ÷ 11*
		Ext. dim.:	225 ÷ 250				*9 ÷ 10*
11.10203	Pair of measuring bolts for internal measurements					***11.20203***	
11.10205	Pair of measuring bolts for internal and external measurements, length			75		***11.20205***	
11.10208	Pair of bolts for external measurements., length:			100		***11.20208***	
11.10501	Setting gauge	Internal dimension:		250		***11.20501***	*10*
		External dimension:		225			*9*
11.10101	Extension			25	0,7	***11.20101***	*1*
11.10102	Extension			50	1	***11.20102***	*2*
11.10103	Extension			75	1,2	***11.20103***	*3*
11.10104	Extension			100	1,5	***11.20104***	*4*
11.10105	Extension			125	1,5	***11.20105***	*5*
11.10106	Extension			150	2	***11.20106***	*6*
11.10112	Extension			300	3,5	***11.20112***	*12*
11.10118	Extension			450	4,5	***11.20118***	*18*
11.10124	Extension			600	6,5	***11.20124***	*24*
11.30001	Special screwdriver for extensions					**11.30001**	
11.10401	Set of suspension accessories (4 brackets and 4 clamps)					**11.10401**	
11.12401	Wooden storage case for the complete set					**11.12401**	

Optional accessories

11.10140	Extension			1000	10	***11.20140***	*40*
11.62001	Pair of bolts for internal/external dimensions and turned grooves	Measuring depth:		≤ 20		**11.62001**	
		Tungsten carbide measuring inserts:		ø 4 x 7			
11.60001	Support roller available as single item (2 are needed)					**11.60001**	

* Using a maximum number of 3 extensions



11.10208 | 11.10205 | 11.10203 | 11.62001

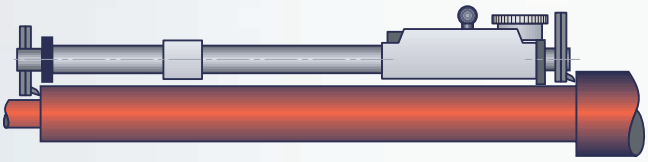
TESA® INOTEST® Comparative Measuring Instrument

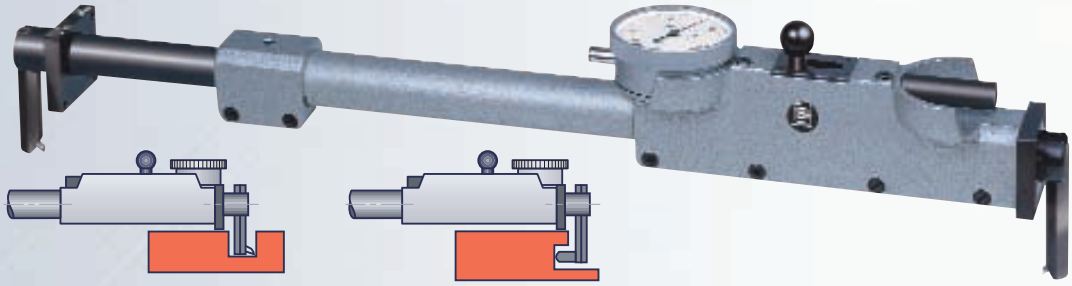
Allows large internal and external dimensions to be measured by comparison.

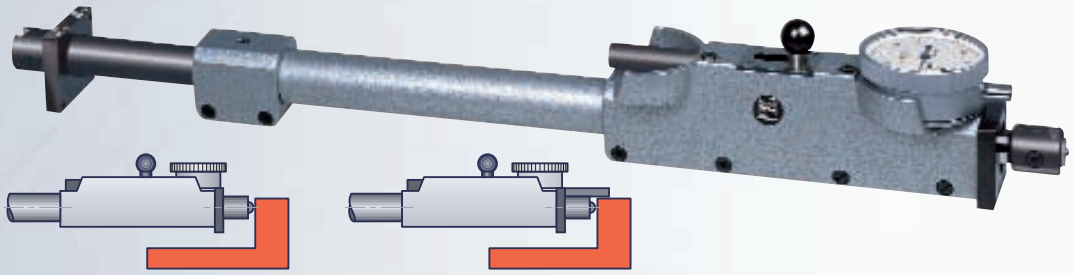
Consists of a measuring element with interchangeable inserts as well as a set of extensions with no material measure. The indication is set using a separate reference standard that can either be a gauge block, setting ring or horizontal measuring bench.

Measuring inserts for inspection in the instrument axis or offset inserts – Vertical or horizontal position of use – Integrated dial gauge to show you the culmination point – Constant measuring force – Heat insulating grips for extensions.











SWISS MADE ✓

Measuring element

Mobile ball-bearing anvil,10 mm measuring travel

Waterproof dial gauge No. 14.70104 or No. 14.80101

0,01 mm or 0.0005 in

10 mm or 0.40 in

Additional technical data, see section E

4 to 7 N Reversible probing direction to allow both internal and external measuring

Measuring bolts

With a tungsten carbide tipped measuring face

Measuring bolts in pairs:
- No. 11.31901 for internal measuring in the instrument axis
- No. 11.31902 for internal/ external measuring, meas. depth up to 30 mm from the lower edge of the instrument

Extensions

25 mm dia. steel tube. 19 mm dia. telescopic tube that can be clamped

Additional data

Plastic case

Dial gauge with serial number

Inspection report (dial gauge)

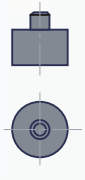
Declaration of conformity



mm				in	
TESA INOTEST complete set					
No		mm		No	in
11.11900		Int. dim.:	275 ÷ 1025	***11.21900***	*11 ÷ 41*
		Ext. dim.:	250 ÷ 1010		*10 ÷ 40*
consisting of:					
No	=	mm	mm	No	in
11.12301	Measuring element with dial gauge			***11.22301***	
11.31901	Pair of bolts for internal measurements			**11.31901**	
11.31902	Pair of bolts for internal and external measurements, length:		60	**11.31902**	
11.32001	4 resting bolts		ø 7 x 40	**11.32001**	
01.60101	3 insulating grips (order number for 1 item)			**01.60101**	
11.12001	Extension	Internal dimensions:	275 ÷ 335	***11.22001***	*11 ÷ 13*
		External dimensions:	250 ÷ 310		*10 ÷ 12*
11.12002	Extension	Internal dimensions:	325 ÷ 435	***11.22002***	*13 ÷ 17*
		External dimensions:	300 ÷ 410		*12 ÷ 16*
11.12003	Extension	Internal dimensions:	425 ÷ 635	***11.22003***	*17 ÷ 25*
		External dimensions:	400 ÷ 610		*16 ÷ 24*
11.12004	Extension	Internal dimensions:	625 ÷ 1035	***11.22004***	*25 ÷ 41*
		External dimensions:	600 ÷ 1010		*24 ÷ 40*
11.62303	Plastic storage case for complete set			**11.62303**	
Optional accessories					
11.41901	Extensions for increasing the application range by:		500	***11.51901***	*20*
11.41902	Extension for increasing the application range by:		1000	***11.51902***	*40*
11.62001	Pair of bolts with tungsten carbide measuring inserts for internal/external measuring		ø 4 x 7	**11.62001**	
11.62002	Pair of bolts with tungsten carbide measuring inserts for turned grooves		ø 4 x 7	**11.62002**	
11.61900	Measuring device for small dimensions			**11.61900**	
		Internal dimensions:	35 ÷ 280		*1.4 ÷ 11*
		External dimensions:	15 ÷ 255		*0.6 ÷ 10*

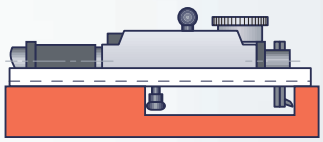


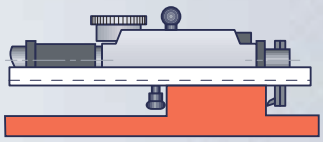
11.62001



11.31901







ETALON® 532 Internal Micrometers

These internal micrometers are designed for 2-point contact measurements.
Extensions with incorporated gauge rods to increase the measuring range – Stiff screw coupling.





Full sets			72.109101	72.109107	72.109108	72.109117	72.109128
		mm	50 ÷ 170	50 ÷ 290	50 ÷ 530	50 ÷ 1010	50 ÷ 1510
consisting of:							
		mm	mm				
72.103576	Micrometer element	50 ÷ 65		●	●	●	●	●
72.103585	Extension		15	●	●	●	●	●
72.105462	Extension		30	●	●	●	●	●
72.109030	Extension		60	●	●	●	●	●
72.103586	Extension		120		●	●	●	●
72.109055	Extension		240			●	●	●
72.109066	Extension		480				●	●
72.109089	Extension		500					●

SWISS MADE ✓

DIN 863 T4 (style A)
NF E 11-098

Micrometer element

0,01 mm

15 mm

0,5 mm

Spherical for int. measuring in the instrument axis

Tungsten carbide tipped

Extensions

Built-in gauge rods

Tungsten carbide tipped

Additional data

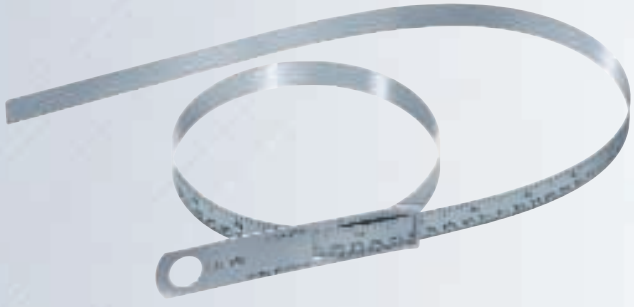
Wooden or plastic case

Declaration of conformity

ROCH Periphery Tapes

Steel tapes with a dual graduation for measuring external circumferences and diameters of cylindrical parts on machine and other fittings – Suitable for malleable parts such as plastic tubings – Used for inspecting tanks or boilers – Also designed for checking steel or concrete pipes, rims, tyres etc.

	Diameter mm	Circumference mm	mm
95.1750222	20 ÷ 300	60 ÷ 950	0,15
95.1750223	300 ÷ 700	940 ÷ 2200	0,20
95.1750224	700 ÷ 1100	2190 ÷ 3460	0,20
95.1750225	1100 ÷ 1500	3450 ÷ 4720	0,25
95.1750226	1500 ÷ 1900	4710 ÷ 5980	0,30
95.1750227	1900 ÷ 2300	5960 ÷ 7230	0,35



✓

Factory standard

0,1 mm

See table

16 x 0,2 mm tape section

Steel band

Transport packing

Declaration of conformity

ETALON ZEDURAM

✓

LC display

1 mm, 0,1 mm and 0,01 mm, 0,01 °

10 x 6,5 mm (H x W)

mm / in conversion

Internal/external diameters from 350 up to 20 000 mm or 14 to 800 in

Radii of concave and convex surfaces from 175 up to 10 000 mm or 7 up to 400 in

heights (drawing):
- 120 to + 250 mm
- 4,75 to + 9,8 in

Angles (drawing):
- 50 ° to + 95 °

Diameter sizes from
350 to 2000 mm: 0,05 %
2000 to 5000 mm: 0,1 %
5000 to 10 000 mm: 0,3 %
10 000 to 20 000 mm: 0,6 %

Heights: 0,04 mm

Angles: 0,03 °

Infrared data transfer (ZEDURAM 2020 only)

2 batteries 1,5 V, AA, LRC 6

10 °C to 40 °C

- 10 °C to 50 °C

80 %,with no condensation

EN 50081-2
EN 50082-2

Housing in anodised aluminium; resting cylinders in hardened steel.

420 x 160 x 90 mm
(max. L x H x D)

Net weight of the main part: 2,4 kg; gross weight of ZEDURAM complete: 4,6 kg (No. 11.39001) 5,1 kg (No. 11.39002)

ETALON® ZEDURAM®
Universal Measuring Instrument - Electronic

Another way to measure – Brings quality control into practice.

- *Easy, reliable measuring - event in the thoughest surrounding conditions.*
- *Perfect for inspecting large internal or external diameters as well as radii, circumferences, heights and angles.*
- *Capable to compute the mean value of n single values.*
- *Error-free reading of the numerical display*
- *Cableless, permanently ready-to-measure with battery power.*
- *Infrared data transfer to the printer.*



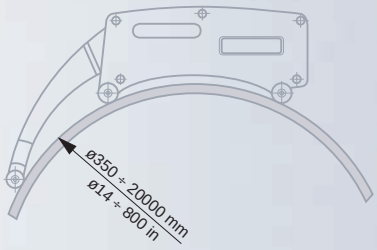
Polyvalent

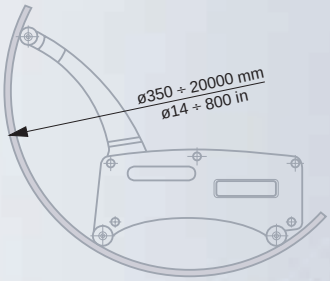
- *Measures metal, plastic or wood pieces of work.*
- *Checks forming processes, e.g. on metal sheets and tubes.*
- *Inspects the distortion during bending and continuous rounding operations of metal sheets into cylinders or boiler bottoms an alike.*
- *Measures manufactured and machined pattern parts (profiles) made from metal, plastic or wood.*

Cylindrical Surface Measurement

- *Measures internal and external diameters from 350 up to 20 000 mm.*
- *Measures radii of concave and convex surfaces from 175 up to 10 000 mm.*
- *Displays all related circumferences.*







Height Measurement

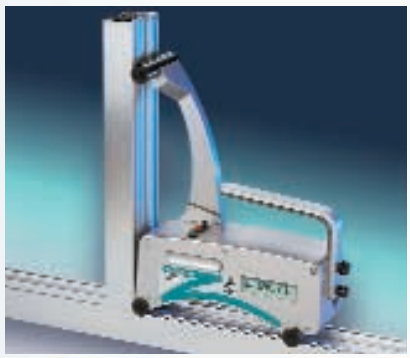
- *Measures heights in the form of step and thickness dimensions up to 250 mm.*
- *Establishes internal dimensions such as the distance between two parallel surfaces if the probe constant is taken into account.*

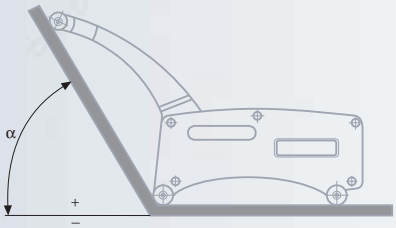


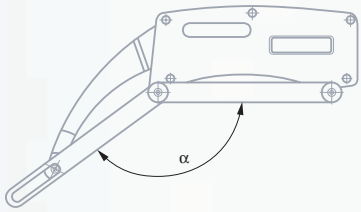
Angle Measurement

- *Allows workpiece positioning with or without use of the rules.*









11.39001 **ETALON ZEDURAM 2010**
Universal electronic measuring instrument for large diameters, heights and angles; numerical display with 1 to 0,01 mm resolutions; battery-powered.

furnished with:

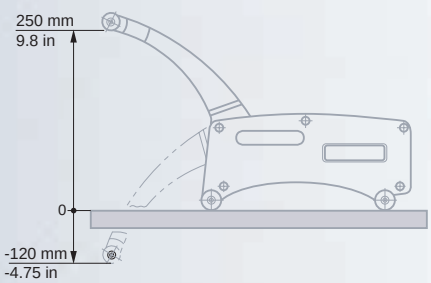
47.68002
1 Set of 4 batteries, 1,5 V, AA, type LRC 6
3 Resting discs
2 Rules for angle measurement

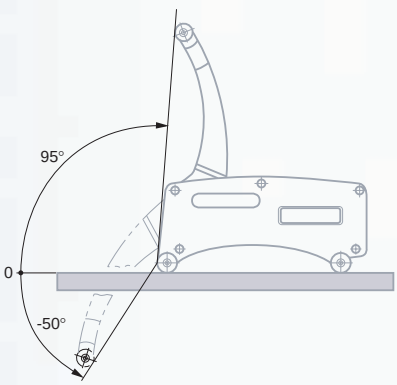
11.39002 **ETALON ZEDURAM 2020**
Identical to No. 11.39001, but with added infrared data transfer capability.

Also included:

1 Matrix printer with infrared data transfer, type HP 82240B
1 Thermal paper roll, 57 mm wide, type HP 821175







Plastic case

Identification number

Declaration of conformity

HP 82240 B printer

✓

Matrix printer for use with the 57 mm wide thermal paper roll HP 821175

Cableless, infrared data transfer (ZEDURAM 2020)
Transfer distance:
≤ 450 mm / ≤18 in
Max. reception angle:
± 60 ° (horizontal)
- 10 ° to + 20 ° (vertical)

4 batteries 1,5 V, AA, type LRC 6

0 °C to 50 °C

- 40 °C to 60 °C

5 % to 95 % at 40 °C, with no condensation

Security: EN 60950:1992 +A1, A2

EN 50082-1
EN 55022: 1994 Cl. B
EN 61000-3-2: 1995
EN 61000-3-3: 1995

91 x 61 x 186 mm

0,4 kg

Electronic Indicators / Dial Gauges / Dial Test Indicators (Lever-Type)



Easy-to-use, versatile

As manufacturer of a full range of precision dial gauges for more than 50 years, we are able to provide you with a wide variety of models.

- *Electronic indicators featuring a combined analogue/digital indication with the most up-to-date technology.*
- *Mechanical dial gauges with high-precision movement and smooth pointer revolution, double-action shockproof mechanisms as well as measuring spans up to 100 mm.*
- *Dial test indicators (lever-type). With these most practical measuring instruments we are worth millionaire since long.*

Which Style Do you Need?

- *Digital indication provides error-free readout of the measured values as the fractions of the scale divisions need not be estimated, visually.*
- *Analogue indication has the advantage to change smoothly according to the size of the workpiece feature to be measured. This type of indication is best suited for dynamic measurements, e.g. when determining axial and radial runout errors.*
- *Electronic indicators provide many additional functions compared to the mechanical models. For more information, also read the pages E-3 to E-8.*
- *Electronic indicators, precision dial gauges as well as dial test indicators have the capability to measure with the lowest possible hysteresis. Therefore, they are ideally suited for runout inspection where this capability is required.*
- *In order to significantly reduce the effects of the systematic errors, we recommend to carry out a number of comparative measurements since only the actual size of each related nominal length will be read out.*

The measuring instruments that are best suited for this purpose are electronic indicators, dial gauges with limited range of indication and precision indicators.

- *These indicators also permit to avoid rough reading errors of the metric range.*
- *Dial test indicators (lever-type) are specially designed for:*

– checking malleable parts due to low measuring force;
– inspecting hard-to-reach measuring points with auckward edges.

Standards and Definitions

Definitions in force today have resulted in the review of existing standards dealing with measuring instruments.

For this section, standard drafts, whether voted or not, give rise to the use of the definitions below. For further details, also read in chapter Information.

Measuring instruments:

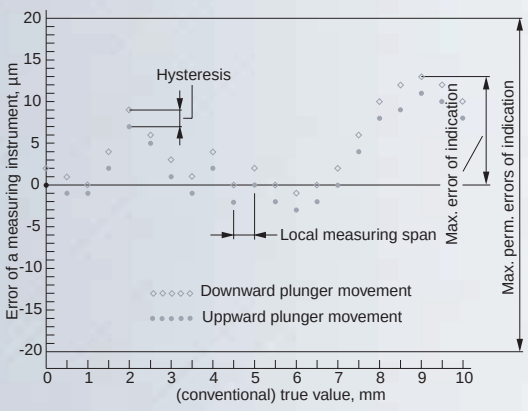
Electronic indicators

Definitions used in this section:

Max. perm. errors in one measuring direction
over the whole measuring range
within the local measuring range
in both measuring directions

Repeatability limit

Max. hysteresis



Measuring instruments:

Mechanical dial gauges
Dial test indicators (lever-type)

Definitions used in this section:

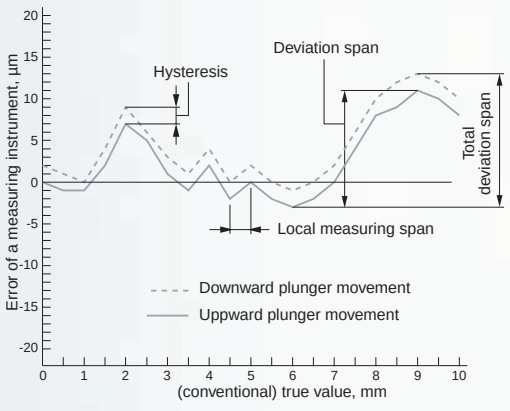
Deviation span

Deviation span within the local measuring span

Total deviation span

Repeatability limit

Max. hysteresis



TESA® DIGICO® 20
Electronic Indicators

Equipped with the new TESA opto-electronic measuring system based on encoded graduation lines – Display setting is maintained even if battery is removed – Outstanding functional reliability combining ease of handling.

- *Choice between 2 versions: models «EASY» or with «rotating display».*
- *Measuring span to 12,5 mm / 0.5 in.*
- *Case diameter: 57 mm.*
- *Combined analogue/digital display.*
- *Numerical interval to 0,001 and 0,01 mm or 0.00005 and 0.0005 in.*
- *Height of digits: 10 mm.*
- *Floating zero within the measuring span.*
- *Digit displaying in reverse order.*
- *Direct conversion mm / in.*
- *Warning if analogue display range is overrun.*
- *Tolerance markers mechanically adjustable.*
- *RS 232 digital output.*





TESA® DIGICO® 20 - Models EASY

Main features as listed above.

	mm / *in*	mm	*in*	
TESA DIGICO 20 – Models EASY				
19.30200	12,5 / *0.5*	0,01	*0.0005*	IP51
19.30201	12,5 / *0.5*	0,001 and 0,01	*0.00005 and 0.0005*	IP51

Digital and Analogue Display

mm	mm		mm	*in*	*in*	*in*
0,01	± 0,25	50	0,01	*0.0005*	± *0.0125*	*0.0005*
0,001	± 0,025	50	0,001	*0.00005*	± *0.00125*	*0.00005*

✓ Swiss made

LC display

6 decades plus minus sign

10 x 5 mm digit height (HxW)

see table opposite

31,5 mm scale length

See table opposite

See table opposite

Lockable function keys. Reset of programmed functions to initial settings.

Glass scale with encoded graduation lines, circular.

Any

Ball-bearing guiding of the plunger

M2,5 thread for the measuring insert

DIGICO 20 : 10 µm (EASY) or 5 µm (other models).

2 µm

0,6 to 0,9 N. Models with another measuring force available on request.

Opto-coupled RS 232 interface

3V lithium battery, CR 2032

1 to 2 a (≈ 2000 h/a)

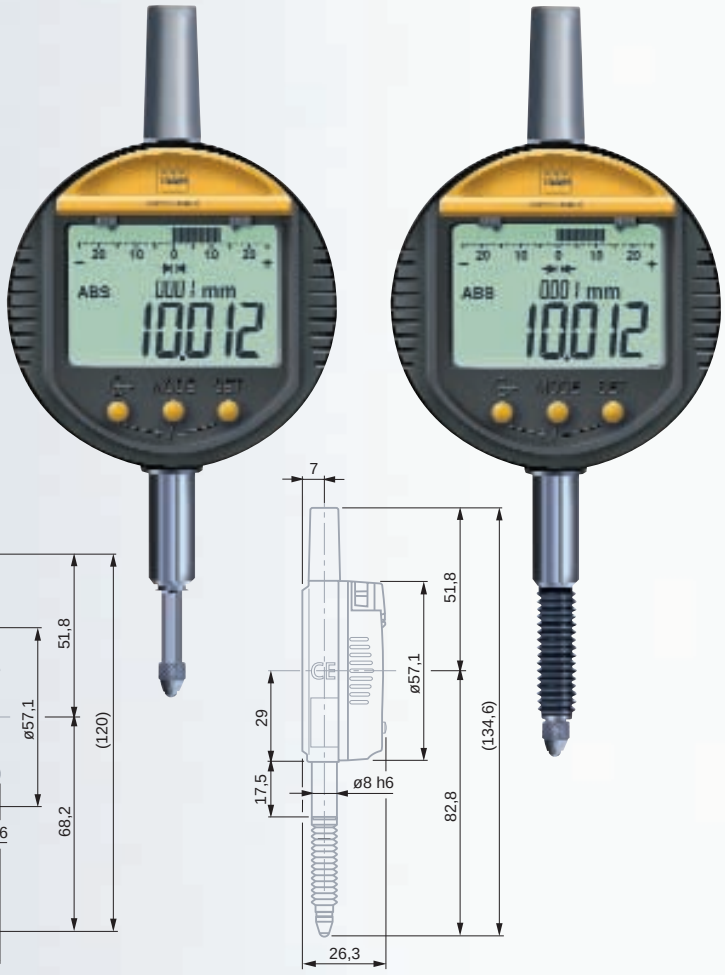
Continued on the following page

TESA® DIGICO® 20 - Models with Rotating Display

Main features are as listed on the previous page, but with added functions that follow.

- *Keypad and display rotating through 270°.*
- *Choice between direct measurement «ABS» and comparative measurement «DIFF».*
- *Display setting to zero or any other desired value anywhere within the measuring span in mode «ABS».*
- *Zero-setting of display anywhere within the measuring span in mode «DIFF».*
- *Value storage by means of the functions «Highest value», «Lowest value» or «Highest value minus lowest value».*
- *Memory reset to current value.*
- *Presetting on a desired value for comparative measurement.*
- *Memory function for «Highest value» or «Lowest value».*
- *Rubber bellows to protect the plunger of the model IP 54.*

No	mm / *in*	000 mm	000 *in*	
TESA DIGICO 20 – Model with rotating display				
19.30210	12,5 / *0.5*	0,001 or 0,01	*0.00005 or 0.0005*	IP51
TESA DIGICO 20 – Model with rotating display – IP54				
19.30211	12,5 / *0.5*	0,001 or 0,01	*0.00005 or 0.0005*	IP54
Optional Accessory				
19.61000	1 Lithium battery - 3 V, 190 mAh, type CR 2032 For ordering information on connecting cable etc., see section L.			



Automatic switch down after 2 hours while keeping display setting.

10°C to 40°C

–10°C to 60°C

80%, with no condensation

✓

Degree of protection (IEC 60529): IP51 or IP54 (see in the table)

Supplied in a suited carrying case with:
1 lithium battery
No. 19.61000

Identification number

Inspection report with a declaration of conformity

TESA® DIGICO® 1 And 2 Electronic Indicators

Both models are remarkable for their versatile functions, large measuring span and high accuracy.

- *Analogue and digital display; the latter can be displaced for easy reading in any position.*
- *Zero setting at any point within the measuring span.*
- *Data input through the keyboard.*
- *Counting sense reversal.*
- *Entry of limiting values for classification through displayed symbols. Additional green, red or amber coloured background in case the instrument is connected to the mains.*
- *Value storage by means of the functions «Highest value», «Lowest value» or «Highest value minus lowest value».*

✓

LC display with coloured background

6 decades plus minus sign

9 x 4,5 mm digit height (HxW)

See the table opposite

mm / in Conversion

40 mm scale length

25 scale divisions

According to selected tolerances

30,4 mm (DIGICO 1) or 60,4 mm (DIGICO 2)

Incremental glass scale

Max. 1 m/s (DIGICO 1) or max. 2 m/s (DIGICO 2)

Plunger guiding on a plain bearing

M2,5 thread for the measuring insert

DIGICO 1: 2 µm
DIGICO 2: 3 µm

1 µm

1 µm

See table on page E-6

RS 232

3,6 V lithium battery or mains adapter



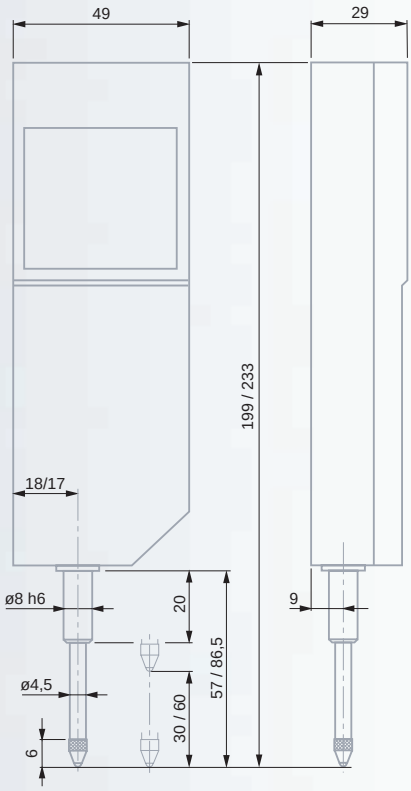


No		mm	mm	in	in
19.30000	DIGICO 1	30	0,001 or 0,01	*1.18*	*0.00005 or 0.0005*
19.30001	DIGICO 2	60	0,001 or 0,01	*3.36*	*0.00005 or 0.0005*
Model IP54 with rubber bellow					
S19060524	DIGICO 1	30	0,001 or 0,01	*1.18*	*0.00005 or 0.0005*

Measuring Force

	DIGICO 1	DIGICO 2
Measuring force* close to the plunger stop		
– bottom:	0,85 N ± 0,15 N	0,90 N ± 0,20 N
– top:	1,10 N ± 0,20 N	1,45 N ± 0,25 N
Force hysteresis*:	0,10 N	0,15 N

* Valid with the indicator used vertically, with downward oriented plunger, or for static measurement.



≈ 1000 h with lithium battery

0,002 % / °C

10 °C to 40 °C

–10 °C to 50 °C

CE ✓

Degree of protection (IEC 60529): IP 54 (standard model housing)

290 g (DIGICO 1)
310 g (DIGICO 2)
Moved mass (plunger):
DIGICO 1: 28 g
DIGICO 2: 27 g

Supplied in a suited carrying case with:
1 lithium battery No. 19.60007
1 lever No. 19.60005

Identification number

Inspection report with a declaration of conformity

Accessories for TESA® DIGICO® 1 and 2

47.61037	230 V mains adapter, 50 Hz, 9 V, 200 mA, 1,8 VA
47.61057	110 V mains adapter
19.60007	3,6 V lithium battery, LR6, AA
19.60005	Lever for the plunger retraction
19.60009	Connector for vacuum plunger lift, for DIGICO 1
19.60008	Same as above, but for DIGICO 2
19.60010	Connector for pneumatic plunger retraction , suitable for DIGICO 1 only.
19.60011	Adaptor for use of the mains adapter together with the switch for triggering data transfer
47.68000	Hand switch for triggering data transfer

For ordering information on connecting cable etc., see section L.

SWISS MADE ✓

TESA® DIGICO® 10 and 11 as well as MIN/MAX Electronic Indicators

These three versions are made for optimum adaptation to your metrology based applications

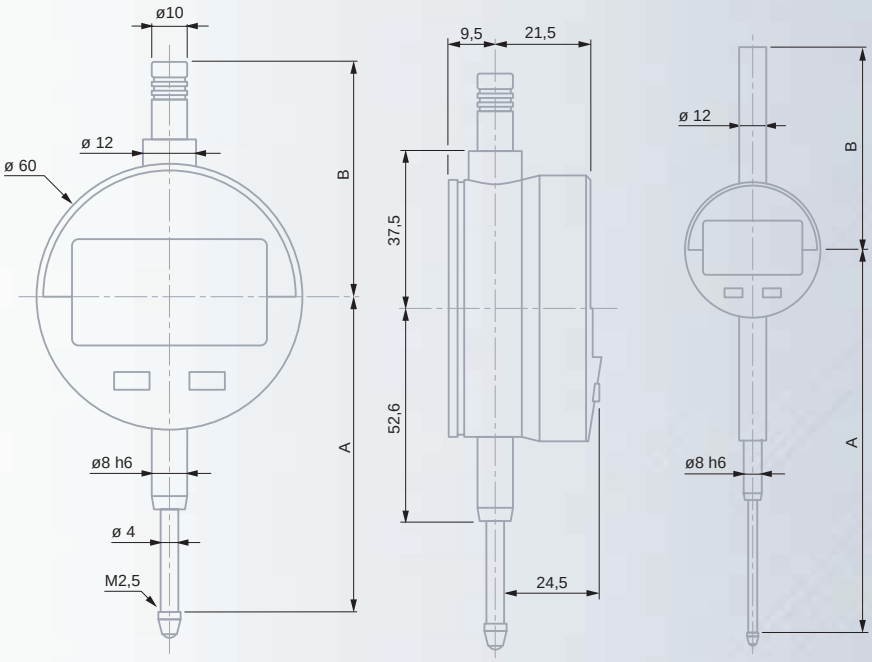
- *Zero-setting of display anywhere within the measuring span.*
- *Display and keyboard rotating through 270°.*
- *Ability to hold the measured values.*
- *Digit entry (PRESET function).*
- *Two reference points.*
- *Digital output.*

Models TESA® DIGICO® 10

Provided with all the features listed above.







✓

LC display. 6 decades plus minus sign

8,5 mm digit height

See tables

mm / in Conversion

Glass scale with capacitive, incremental divisions.

Max. perm.: 1,5 m / s

Case in light alloy. Front face in polyamide.

Stainless steel plunger guided on a plain bearing

M2,5 thread for the measuring insert.

See tables

2 µm

2 µm

See table on page E-8

RS 232, opto-coupled

3V lithium battery, type CR 2032.

DIGICO 10: ≈ 4000 h
DIGICO 11 / MIN/MAX: ≈ 2000 h

5 °C to 40 °C

– 20 °C to 60 °C

EN 50081-1: 1993
EN 50082-1: 1993

No	mm	mm	µm	g	Amm	Bmm	in	in
19.30110	12,5	0,01	10	120	65,9	53,4	*0.5*	*0.0005*
19.30111	25	0,01	10	130	78,4	53,4	*1*	*0.0005*
19.30112	50	0,01	20	210	150,5	90,5	*2*	*0.0005*
19.30113	100	0,01	20	250	250,5	140,5	*4*	*0.0005*
19.30101	12,5	0,001	5	120	65,9	53,4	*0.5*	*0.00005*
19.30100	25	0,001	5	130	78,4	53,4	*1*	*0.00005*
19.30102	50	0,001	12	210	150,5	90,5	*2*	*0.00005*
19.30103	100	0,001	15	250	250,5	140,5	*4*	*0.00005*

IEC 60529: IP 51

See tables

Supplied in a suited carrying case with:
1 lithium battery, type CR 2032, No. 19.61000

Identification number

Inspection report with a declaration of conformity





Models TESA® DIGICO® 11

With same basic features as set forth plus the following functions:

- *Possible entry of limiting values for classification through colour LEDs: green for «Good», red for «Scrap», amber for «Rework».*
- *Value storage using the functions «Highest value», «Lowest value» and «Highest value minus lowest value».*
- *Counting sense reversal.*

No	mm	mm	µm	g	Amm	Bmm	in	in
19.30104	12,5	0,001	5	120	65,9	53,4	*0.5*	*0.00005*
19.30105	25	0,001	5	130	78,4	53,4	*1*	*0.00005*

Models TESA® DIGICO® MIN/MAX

With same basic features as TESA DIGICO 11 except that PRESET function is not available.

- *Mainly used for value classification through the function «Highest value minus lowest value».*

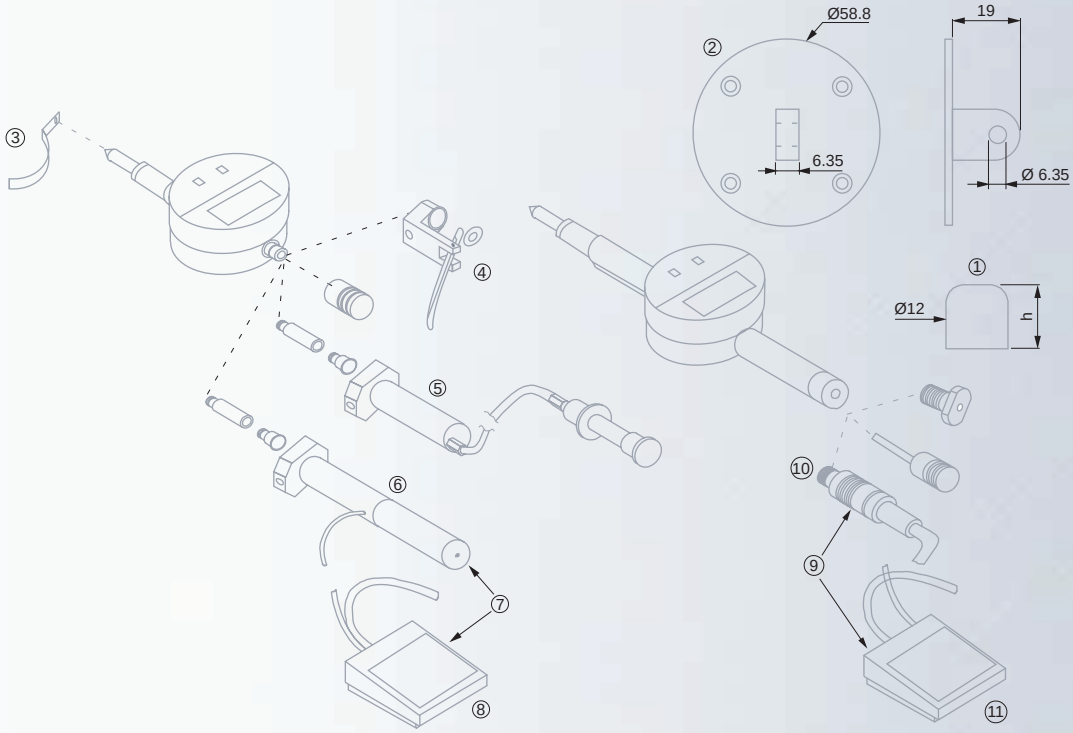
No	mm	mm	µm	g	Amm	Bmm	in	in
19.30120	12,5	0,001	5	120	65,9	53,4	*0.5*	*0.00005*
19.30121	25	0,001	5	130	78,4	53,4	*1*	*0.00005*

Measuring Force

mm	Lower limit value	Upper limit value
12,5	0,7 N	0,95 N
25	0,6 N	1,1 N
50	2,5 N	4,0 N
100	2,5 N	4,0 N

* Valid with the indicator used vertically, with downward oriented plunger, or in static measurement.

Accessories for TESA® DIGICO® 10 and 11 as well as MIN/MAX



No			Suited for
19.61000		Lithium battery, type CR 2032, 3 V, 190 mAh	all models
19.61009	①	Top mounted dust cap L = 23 mm	12,5 mm
19.61010		L = 36 mm	25 mm
19.61003	②	Back with lug	all models
19.60005	③	Plunger retracting lever, at the bottom	all models
19.61005	④	Plunger retracting lever, at the top	12,5 mm / 25 mm
19.61011	⑤	Plunger retracting cable, at the top	12,5 mm / 25 mm
19.61006	⑥	Pneumatic device for plunger retraction, alone without foot switch	12,5 mm / 25 mm
19.61008	⑧	Foot switch with pressure regulator for No. 19.61006	12,5 mm / 25 mm
19.61007	⑦	Pneumatic device for plunger retraction, complete with foot switch and pressure regulator	12,5 mm / 25 mm
S19001431	⑨	Vacuum lifting device	50 mm / 100 mm
S19001448	⑩	Pressure regulator for No. S19001431	
S19001447	⑪	Foot switch for No. S19001431	

For ordering information on connecting cable etc., see section L.

TESA® YR Precision Dial Gauges

TESA Precision dial gauge series combine excellent metrological properties with very long life – Smooth pointer run – Conform to national standards as well as ISO standard on dial gauges.

The movement along with the full-metal housing and precision plain bearing are the best possible choice for sturdiness even under the thoughest workshop conditions. Shockproof mechanism effective in both directions.

- *Available with a 0,01 mm or 0,001 mm scale division.*
- *Dial diameters of 40 mm, 57 or 58 mm and 82 mm.*
- *White face, non-dazzling dial with straight, high-contrast graduations.*
- *Choice of regular models and models IP54 protected against the penetra tion of liquids.*
- *Models with central lug back.*
- *All precision dial gauges come with an inspection report and a declaration of conformity.*



A



B

Dial numbering

A	=	Continuous clockwise numbering, e.g.:	0 ÷ 50 ÷ 100
B	=	Balanced numbering	0 ÷ 50 ÷ 0

Technical Data

			0,01 mm	0,01 mm	0,001 mm	0,001 mm
			40 mm	57 / 58 mm 82 mm	40 mm	57 / 58 mm 82 mm
	Deviation span		12 µm	15 µm	4 µm	4 µm
	Deviation span within the local measuring span	0,10 mm	5 µm	5 µm	2 µm	2 µm
	Total deviation span		14 µm	17 µm	5 µm	5 µm
	Repeatability		3 µm	3 µm	1 µm	1 µm
	Max. hysteresis		3 µm	3 µm	1 µm	1 µm
	Measuring force	Regular models	≤ 1,4 N	≤ 1,4 N	≤ 1,7 N	≤ 1,7 N
		Models IP54	≤ 2 N	≤ 2,2 N	≤ 2 N	≤ 2 N

TESA® YR Precision Dial Gauges 40 mm Dial Diameter, 0,01 mm Reading

Precision mechanism with both a ground toothed rack made from hardened stainless steel and sturdy gear drive.

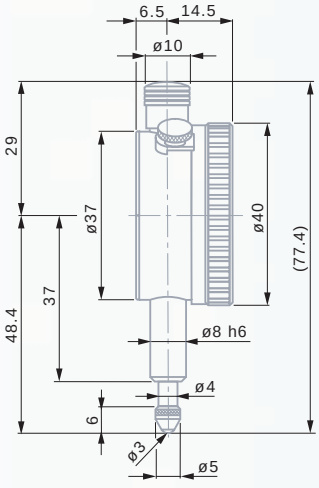
- *Regular models and models IP 54 protected against the penetration of liquids, with or without central lug back.*

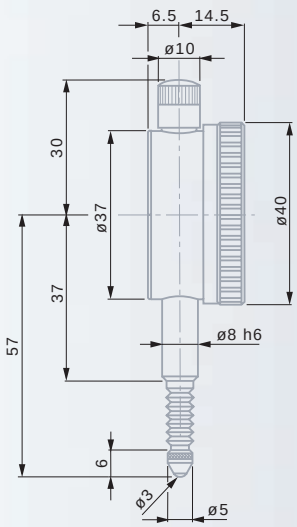


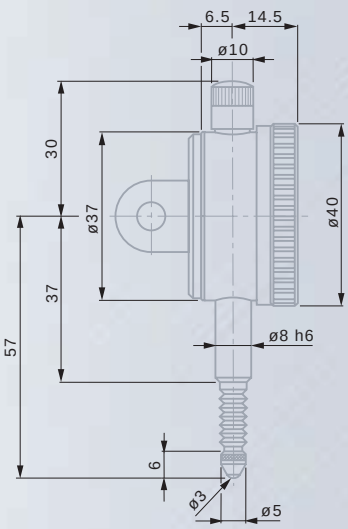


- ✓
- DIN 878
  NF E 11-050
  ISO/R 463
- 0,01 mm
- 2,2 mm
- Rotating dial.
  Regular models with dial lock.
- Full-metal case housing
  Fixing shank and plunger in hardened stainless steel
- High performance shockproof system in both directions
- Adjustable tolerance markers
  M2,5 thread for the measuring insert
- Accuracy: see table on page E-10
- See table on page E-10
- 3 mm dia. ball tip already mounted
- Cardboard box
- Identification number
- Inspection report with a declaration of conformity

№	mm	mm	mm		mm		
Regular models							
14.10210	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 50	can be locked
14.10211	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 0	can be locked
14.10212	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 50	
Models IP54 protected against the penetration of liquids							
14.10320	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 50	
14.10321	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 0	
Models IP54 protected against the penetration of liquids, with central lug back							
14.10322	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 50	
14.10323	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 0	







TESA® YR Precision Dial Gauges 57 or 58 mm Dial Diameter, 0,01 mm Reading

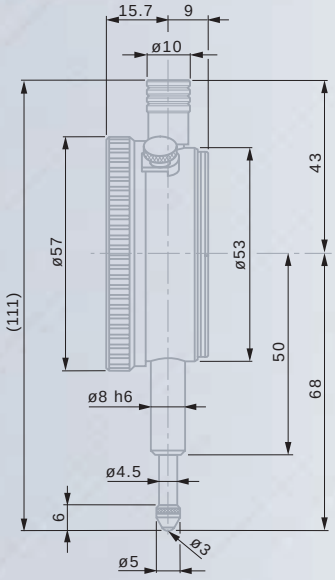
Precision mechanism with both a ground toothed rack made from hardened stainless steel and sturdy gear drive.

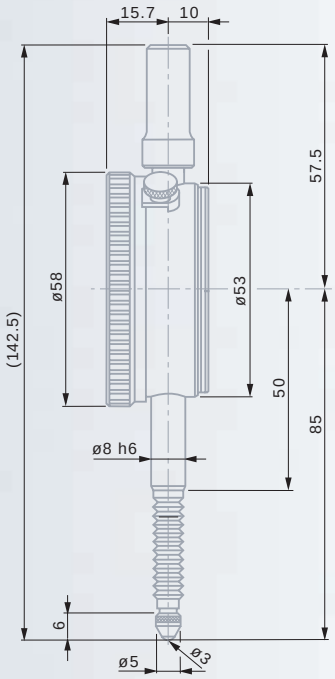
- *Regular models and models IP 54 protected against the penetration of liquids, with or without central lug back.*

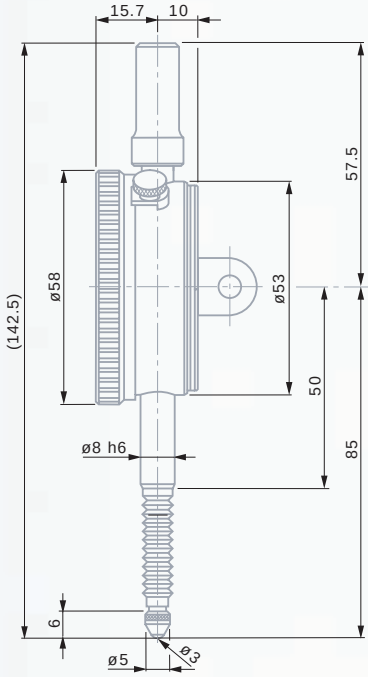




	mm	mm	mm	mm		mm		
Regular models								
14.10610	0,01	10	10,5	57	with	1	0 ÷ 50 ÷ 100	can be locked
14.10611	0,01	10	10,5	57	with	1	0 ÷ 50 ÷ 0	can be locked
14.10612	0,01	10	10,5	57	with	1	0 ÷ 50 ÷ 100	
Models IP54 protected against the penetration of liquids								
14.10720	0,01	10	10,5	58	with	1	0 ÷ 50 ÷ 100	
14.10721	0,01	10	10,5	58	with	1	0 ÷ 50 ÷ 0	
Models IP54 protected against the penetration of liquids, with central lug back								
14.10722	0,01	10	10,5	58	with	1	0 ÷ 50 ÷ 100	
14.10723	0,01	10	10,5	58	with	1	0 ÷ 50 ÷ 0	







SWISS MADE ✓

DIN 878
NF E 11-050
ISO/R 463

0,01 mm

1,5 mm

Rotating dial.
Regular models with dial lock.

Full-metal case housing
Fixing shank and plunger in hardened stainless steel

High performance shockproof system in both directions

Adjustable tolerance markers
M2,5 thread for the measuring insert

Accuracy: see table on page E-10

See table on page E-10

3 mm dia. ball tip already mounted

Cardboard box

Identification number

Inspection report with a declaration of conformity

TESA® YR Precision Dial Gauges
82 mm Dial Diameter, 0,01 mm Reading

Precision mechanism with both a ground toothed rack made from hardened stainless steel and sturdy gear drive.

✓ SWISS MADE

DIN 878
NF E 11-050
ISO/R 463

0,01 mm

2,3 mm

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

High performance shockproof system in both directions

M2,5 thread for the measuring insert

Accuracy: see table on page E-10

See table on page E-10

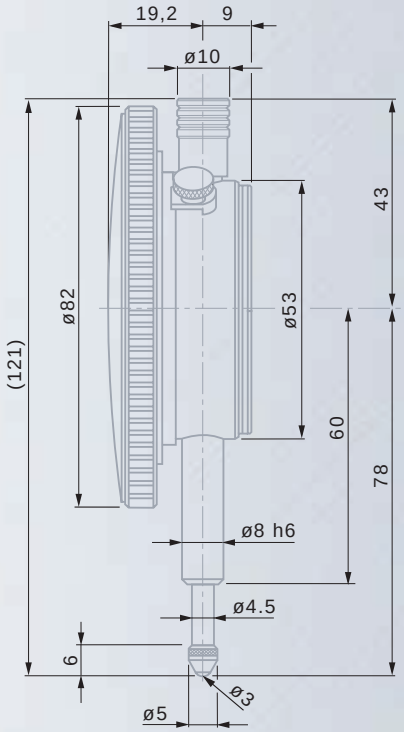
3 mm dia. ball tip already mounted

Cardboard box

Identification number

Inspection report with a declaration of conformity





	mm	mm	mm		mm		
Regular models							
14.10910	0,01	10	10,5	with	1	0 ÷ 50 ÷ 100	can be locked
14.10911	0,01	10	10,5	with	1	0 ÷ 50 ÷ 0	can be locked

TESA® YR Precision Dial Gauges 40 mm Dial Diameter, 0,001 mm Reading

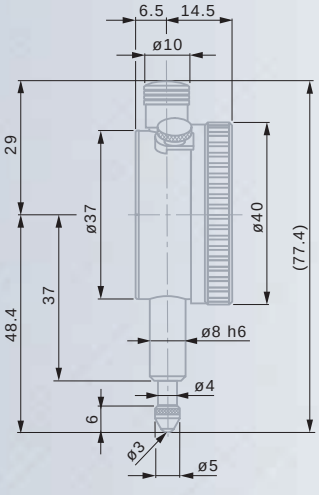
Feature a precision movement based on a combined gear and level transmission – This combination similar to that of precision indicators offers full shock protection as well as very low hysteresis errors.

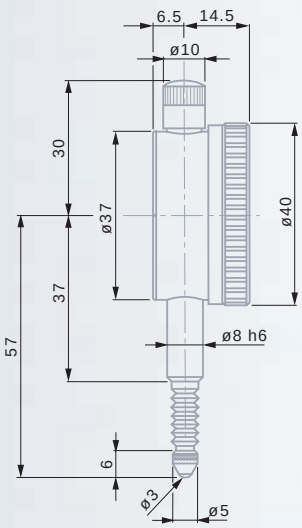
- *Regular models and models IP54 protected against the penetration of liquids, with or without central lug back.*

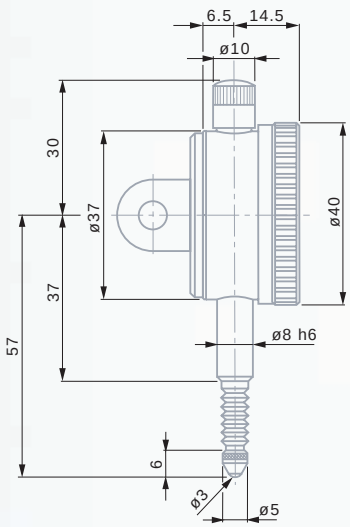




No	mm	mm	mm		mm		
Regular models							
14.10010	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 100	can be locked
14.10011	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 0	can be locked
Models IP 54 protected against the penetration of liquid							
14.10120	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 100	
14.10121	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 0	
Models IP54 protected against the penetration of liquids, with central lug back							
14.10122	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 100	
14.10123	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 0	







✓ SWISS MADE

DIN 878
NF E 11-050
ISO/R 463

0,001 mm

1,1 mm

Rotating dial.
Regular models with dial lock.

Full-metal case housing
Fixing shank and plunger in hardened stainless steel

High performance shockproof system in both directions

Adjustable tolerance markers
M2,5 thread for the measuring insert

Accuracy: see table on page E-10

See table on page E-10

3 mm dia. ball tip already mounted

Cardboard box

Identification number

Inspection report with a declaration of conformity

TESA® YR Precision Dial Gauges 57 or 58 mm Dial Diameter, 0,001 mm Reading

Feature a precision movement based on a combined gear and level transmission – This combination similar to that of precision indicators offers full shock protection as well as very low hysteresis errors.

- *Regular models and models IP54 protected against the penetration of liquids, with or without central lug back.*

✓

DIN 878
NF E 11-050
ISO/R 463

0,001 mm

1,5 mm

Rotating dial.
Regular models with dial lock.

Full-metal case housing
Fixing shank and plunger in hardened stainless steel

High performance shockproof system in both directions

Adjustable tolerance markers
M2,5 thread for the measuring insert

Accuracy: see table on page E-10

See table on page E-10

3 mm dia. ball tip already mounted

Cardboard box

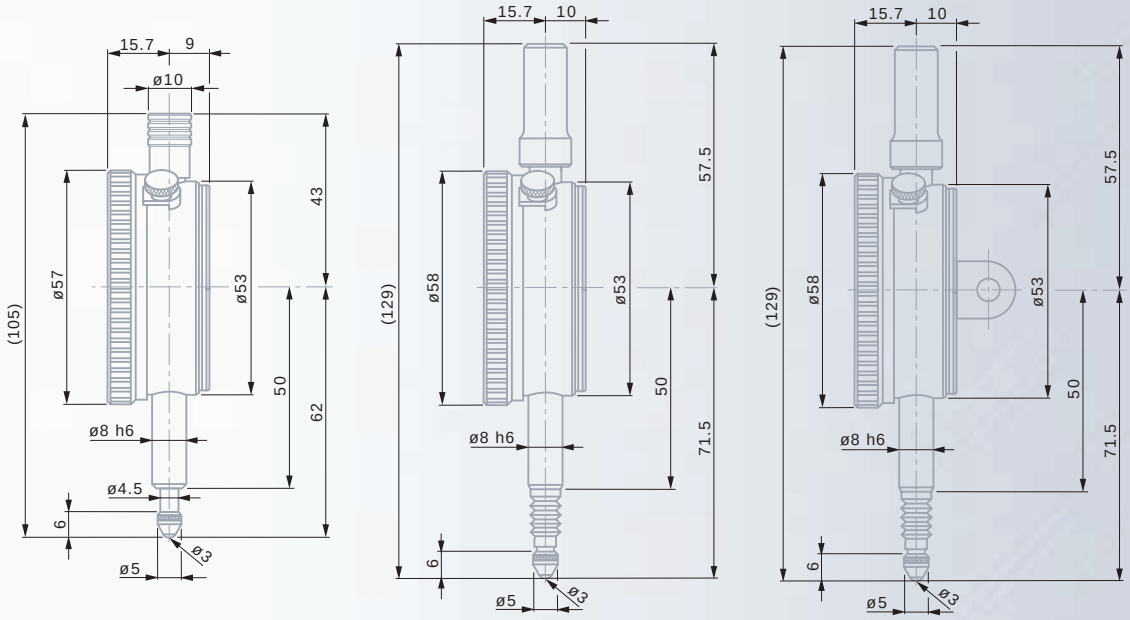
Identification number

Inspection report with a declaration of conformity



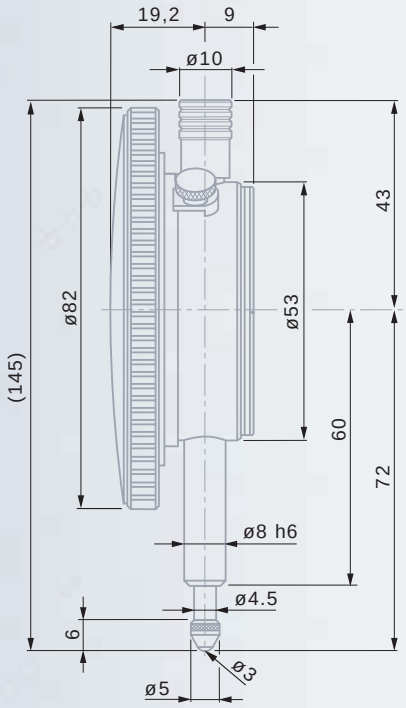


No	mm	mm	mm	mm		mm		
Regular models								
14.10410	0,001	1	3,3	57	with	0,1	0 ÷ 50 ÷100	can be locked
14.10411	0,001	1	3,3	57	with	0,1	0 ÷ 50 ÷ 0	can be locked
Models IP 54 protected against the penetration of liquids								
14.10520	0,001	1	3,3	58	with	0,1	0 ÷ 50 ÷100	
14.10521	0,001	1	3,3	58	with	0,1	0 ÷ 50 ÷ 0	
Models IP54 protected against the penetration of liquids, with central lug back								
14.10522	0,001	1	3,3	58	with	0,1	0 ÷ 50 ÷100	
14.10523	0,001	1	3,3	58	with	0,1	0 ÷ 50 ÷ 0	



TESA® YR Precision Dial Gauges
82 mm Dial Diameter, 0,001 mm Reading

Feature a precision movement based on a combined gear and level transmission – This combination similar to that of precision indicators offers full shock protection as well as very low hysteresis errors.





	mm	mm	mm		mm		
Regular models							
14.10810	0,001	1	3,3	with	0,1	0 ÷ 50 ÷ 100	can be locked
14.10811	0,001	1	3,3	with	0,1	0 ÷ 50 ÷ 0	can be locked

✓ SWISS MADE

DIN 878
NF E 11-050
ISO/R 463

0,001 mm

2,3 mm

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

High performance shockproof system in both directions

M2,5 thread for the measuring insert

Accuracy: see table on page E-10

See table on page E-10

3 mm dia. ball tip already mounted

Cardboard box

Identification number

Inspection report with a declaration of conformity

TESA® YE Precision Dial Gauges to 0,01 mm

Models with a 40 mm Dial Diameter



No	mm	mm	mm		mm		N
Regular model							
14.12010	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 50	≤ 1,4
Model with restricted reading range							
14.12210	0,01	0,4	5,4	with		20 ÷ 0 ÷ 20	≤ 1,4
Model IP 54 protected against the penetration of liquids							
14.12410	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 50	≤ 2

Models with a 58 mm Dial Diameter



No	mm	mm	mm		mm		N
Regular models							
14.12011	0,01	10	10,5	with	1	0÷ 50 ÷ 100	≤ 1,4
14.12310	0,01	10	10,5	without	1	0 ÷ 50 ÷ 100	≤ 1,4
Model with restricted reading range							
14.12211	0,01	0,8	4,0	with		40 ÷ 0 ÷ 40	≤ 1,4
Model IP 54 protected against the penetration of liquids							
14.12411	0,01	10	10,5	without	1	0 ÷ 50 ÷ 100	≤ 2

✓

DIN 878
NF E 11-050
ISO/R 463

0,01 mm

ø 40 mm: 2,2 mm
ø 58 mm: 1,5 mm

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

High performance shockproof system in both directions

Adjustable tolerance markers M2,5 thread for the measuring insert

Size for a 40 mm dia. dial on page E-11 or E-12 for a 58 mm dia. dial

Accuracy for models having a 5 or 10 mm measuring span: see table on page E-10.

Accuracy for models having a 0,4 or 0,8 mm measuring span:

Deviation span: 7 µm.
Total deviation span: 9 µm.

3 µm

3 µm

See table opposite

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

Inspection report with a declaration of conformity

Model with a 82 mm Dial Diameter



Regular model

N°	mm	mm	mm
14.12311	0,01	10	10,5
mm	mm		N
without	1	0 ÷ 50 ÷ 100	≤ 1,4

- ✓
- DIN 878 NF E 11-050 ISO/R 463
- 0,01 mm
- 2,3 mm
- Accuracy: see table on page E-10
- See table opposite
- For sizes, see page E-13
- Additional technical data on previous page
- Cardboard box
- Identification number
- Inspection report with a declaration of conformity

TESA® YE Precision Dial Gauges with Long Span - 0,01 mm Reading





- ✓
- Factory standard
- 0,01 mm
- 1,5 mm for 58 mm dial dia. or 2,3 mm for 82 mm dia.
- Rotating dial
- Full-metal case housing

Fixing shank and plunger in hardened stainless steel

- High performance shockproof system in both directions
- M2,5 thread for the measuring inserts

	mm	mm	mm		mm		N
Regular models							
14.12012	0,01	30	58	with	1	0 ÷ 50 ÷ 100	≤ 2,2
14.12013	0,01	50	58	with	1	0 ÷ 50 ÷ 100	≤ 2,5
14.12014	0,01	100	82	with	1	0 ÷ 50 ÷ 100	≤ 3,2

See table opposite

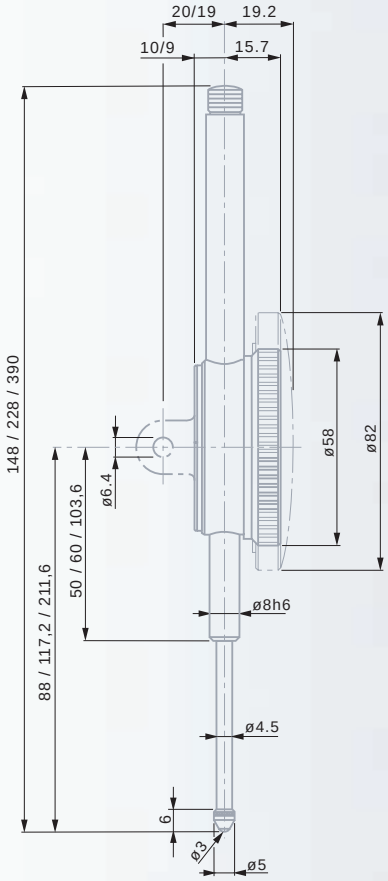
See table opposite

3 mm dia. ball tip already mounted

Cardboard box

Identification number

Inspection report with a declaration of conformity





Accuracy

		mm	30	50	100
	Deviation span	µm	20	25	30
	Total deviation span	µm	25	30	35
	Repeatability limit	µm	3	3	3
	Max. hysteresis	µm	5	5	8

TESA® YE Precision Dial Gauges Reading to 0,001 mm

Feature a precision movement based on a combined gear and level transmission – This combination, which is similar to that of precision indicators, offers full shock protection as well as very low hysteresis.

Models with a 40 mm Dial Diameter





	mm	mm	mm		mm		N
Regular model							
14.12510	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 100	≤ 1,7
Model IP54 protected against the penetration of liquids							
14.12710	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 100	≤ 2

Models with a 58 mm Dial Diameter







	mm	mm	mm		mm		N
Regular models							
14.12511	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 100	≤ 1,7
14.12611	0,001	5	5,3	with	0,2	0 ÷ 100 ÷ 200	≤ 1,7
Model IP54 protected against the penetration of liquids							
14.12711	0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 100	≤ 2

- ✓
- Factory standard
- 0,001 mm
- 40 mm dial dia.: 1,1 mm, 58 mm dial dia.: 2,2 mm.
- Rotating dial
- Full-metal case housing

Fixing shank and plunger in hardened stainless steel

- High performance shockproof system in both directions
- Adjustable tolerance markers

M2,5 thread for the measuring insert

- Size for a 40 mm dia. dial on page E-11 or E-12 for a 58 mm dia. dial
- Dial gauges with a 1 mm measuring span:

deviation span of 4 µm. Total deviation span of 5 µm.

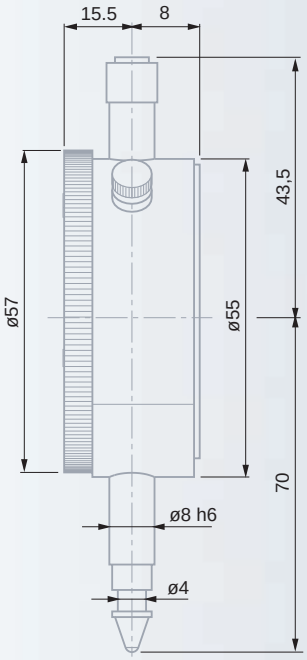
Models with a 5 mm measuring span: deviation span of 12 µm. Total deviation span of 14 µm.

- Dial gauges with a measuring span of 1 mm: 1 µm or 5 mm: 2 µm.
- Dial gauges with a measuring span of 1 mm:1 µm or 5 mm: 2 µm.
- See table opposite
- Mounted insert with a 3 mm dia. steel ball tip
- Cardboard box
- Identification number
- Inspection report with a declaration of conformity

ETALON® Basic Dial Gauges - 0,01 or 0,001 mm Reading - 58 mm Dial Diameter

Solid dial gauges providing good value for money.



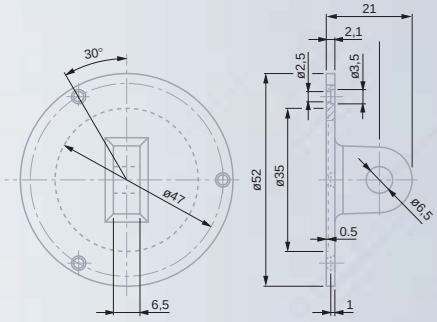




- ✓
- DIN 878
  NF E 11-050
  ISO/R 463
- 0,01 mm
  0,001 mm
- 1,5 mm
- Rotating dial that can be locked
- Full-metal case housing
  Fixing shank and plunger in hardened stainless steel
- With or without shockproof system
- Adjustable tolerance markers
  M2,5 thread for the measuring inserts
- Accuracy: see table opposite
- See table opposite
- Mounted insert with a 3 mm diameter steel ball tip
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

N°	mm	mm		mm		
14.19045	0,01	5	with	1	0 ÷ 50 ÷ 100	can be locked
14.19046	0,01	10	with	1	0 ÷ 50 ÷ 100	can be locked
14.19044	0,001	1	with	0,1	0 ÷ 50 ÷ 100	can be locked
Accessory						
14.69004	Central luck back					

		0,01 mm	0,001 mm
Deviation span		15 µm	5 µm
Deviation span within the local measuring span of 0,10 mm		5 µm	3 µm
Total deviation span		17 µm	6 µm
Repeatability limit		3 µm	1,5 µm
Max. hysteresis		3 µm	2,5 µm
Measuring force	lower limit	0,3 N	0,3 N
	upper limit	1,5 N	1,5 N
Force hysteresis		0,5 N	0,5 N



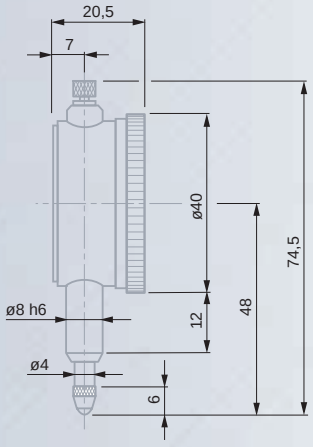
ETALON® Basic Dial Gauges - 0,01 mm

Regular Models and Models with Long Span

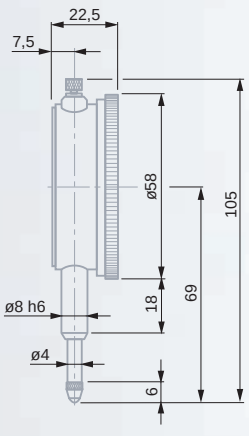


No	mm	mm	mm		mm		N
14.19047	0,01	5	40	with	0,5	0 ÷ 25 ÷ 50	≈ 1
14.19048	0,01	10	58	without	1	0 ÷ 50 ÷100	≈ 1
14.19049	0,01	30	58	with	1	0 ÷ 50 ÷100	1,5 ÷ 2
14.19050	0,01	50	58	with	1	0 ÷ 50 ÷100	1,5 ÷ 2

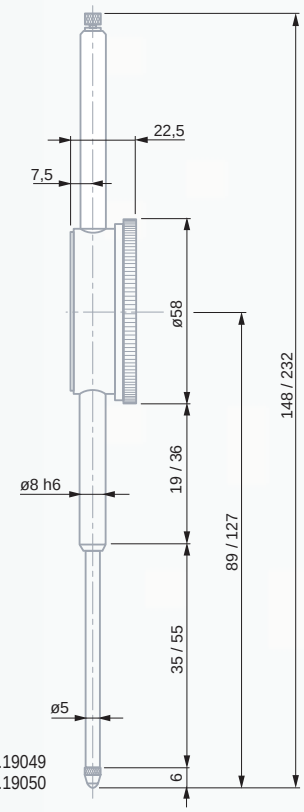
		mm	30	50
	Deviation span	µm	20	25
	Deviation span within the local measuring span of 0,1 mm	µm	5	5
	Repeatability limit	µm	3	3



14.19047



14.19048



14.19049
14.19050

✓

DIN 878
NF E 11-050

0,01 mm

40 mm dial dia.: 2,2 mm
58 mm dial dia.: 1,5 mm

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

With or without shockproof system

Adjustable tolerance markers

M2,5 thread for the measuring inserts

Accuracy for models having a 5 or 10 mm measuring span: see the table on page E-10.

For dial gauges having a 30 or 50 mm measuring span, see beneath.

See in the table opposite

Mounted insert with a 3,175 mm diameter steel ball tip

Plastic case or cardboard box

Identification number

Declaration of conformity

ROCH Precision Dial Gauges - 0,01 mm

Models C 40

Dial gauge No. 14.1760560 is the perfect low-cost model.







- ✓
- DIN 878 NF E 11-050
- 0,01 mm
- 2,2 mm
- Rotating dial
- Full-metal case housing

Fixing shank and plunger in hardened stainless steel

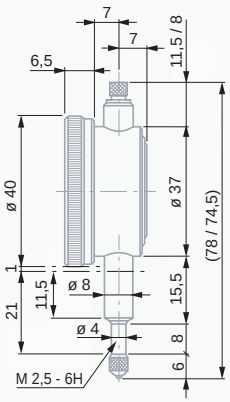
- With or without shockproof system
- Adjustable tolerance markers

M2,5 thread for the measuring inserts

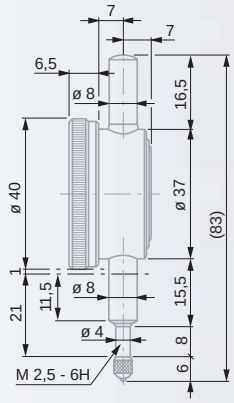
- See table opposite
- Mounted insert with a 3,175 mm diameter steel ball tip
- Plastic case or cardboard box
- Identification number
- Declaration of conformity

№	mm	mm	mm		mm		N
Regular models							
14.1760560	0,01	3	3,4	without	0,5	0 ÷ 25 ÷50*	≤ 1,4
14.1760561	0,01	3	3,4	without	0,5	0 ÷ 25 ÷50*	≤ 1,4
14.1760582	0,01	5	5,4	with	0,5	0 ÷ 25 ÷50*	≤ 1,4
Model with restricted reading range							
14.1760551	0,01	0,4	4,5	with		20 ÷ 0 ÷ 20	≤ 1,4
Model IP54 protected against the penetration of liquids							
14.1760570	0,01	3	3,4	with	0,5	0 ÷ 25 ÷50*	≤ 2

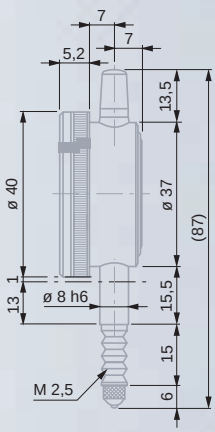
* With extra red tinted reverse numbering.



14.1760561
14.1760582



14.1760551
14.1760560



14.1760570

Accuracy

		≤ 0,8 mm	3 mm	5 mm	10 mm
0,01 mm					
Deviation span		7 µm	10 µm	12 µm	15 µm
Deviation span within the local measuring span	0,1 mm	5 µm	5 µm	5 µm	5 µm
Total deviation span		9 µm	12 µm	14 µm	17 µm
Repeatability limit		3 µm	3 µm	3 µm	3 µm
Max. hysteresis		3 µm	3 µm	3 µm	3 µm

ROCH Precision Dial Gauges - 0,01 mm

Models C 58 and C 60

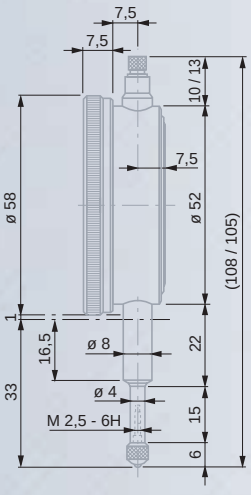
Both models No. 14.1760635 and 14.1760636 are very attractively priced.



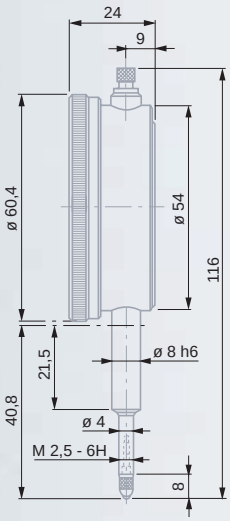
№	⌀ mm	mm	mm	mm		mm		N
Regular models								
14.1760631	58	0,01	10	10,5	without	1	0 ÷ 50 ÷100*	≤ 1,4
14.1760632	58	0,01	10	10,5	without	1	0 ÷ 50 ÷100*	≤ 1,4
14.1760635	58	0,01	10	10,5	without	1	0 ÷ 50 ÷100*	≤ 1,4
14.1760636**	58	0,01	10	10,5	without	1	0 ÷ 50 ÷100*	≤ 1,4
14.1760640	58	0,01	10	10,5	with	1	0 ÷ 50 ÷100*	≤ 1,4
14.1761210	60,4	0,01	10	10,5	with	1	0 ÷ 50 ÷100*	≤ 1,4
14.1761211**	60,4	0,01	10	10,5	with	1	0 ÷ 50 ÷100*	≤ 1,4
Model with restricted reading range								
14.1760601	58	0,01	0,8	9,0	with		40÷ 0 ÷ 40	≤ 1,4
Model IP54 protected against the penetration of liquids								
14.1760624	58	0,01	10	10,5	with	1	0 ÷ 50 ÷100*	≤ 2

* With extra red tinted reverse numbering.

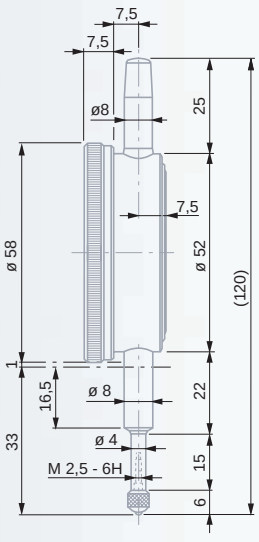
** With mounted central luck back No. 35.1669012 (also refer to page E-27).



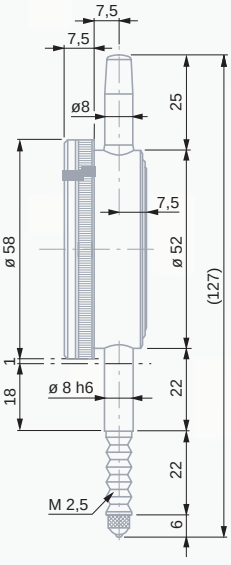
14.1760631 – 14.1760635
14.1760632 – 14.1760636



14.1761210
14.1761211



14.1760601
14.1760640



14.1760624

✓

DIN 878
NF E 11-050

0,01 mm

1,5 mm

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

With or without shockproof system

Adjustable tolerance markers

Model No. 14.1760640 with fine adjust mounted under the protective cap for dial reading

M2,5 thread for the measuring insert

For accuracy, see in the table on page E-23.

See in the table opposite

Mounted insert with a 3,175 mm diameter steel ball tip

Exceptions:
Models No. 14.1760631, 14.1761210, 14.1761211 have a ruby ball tip.

Plastic case or cardboard box

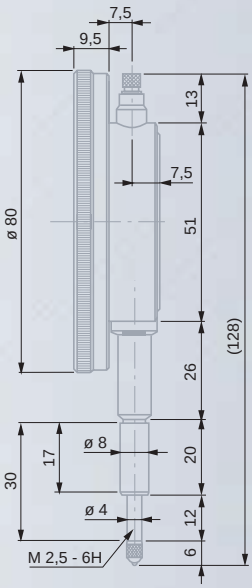
Identification number

Declaration of conformity

ROCH Precision Dial Gauges - 0,01 mm

Model C 80





✓

Factory standard

0,01 mm

2,2 mm

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

With or without shockproof system

Adjustable tolerance markers

M2,5 thread for the measuring insert

Deviation span: 15 µm

Deviation span within the local measuring span of 0,1 mm: 5 µm
Total deviation span: 19 µm

3 µm

3 µm

See in the table opposite

Mounted insert with a 3,175 mm diameter steel ball tip

Cardboard box

Identification number

Declaration of conformity

	mm	mm	mm		mm		N
Regular model							
14.1761221	0,01	10	10,4	without	1	0 ÷ 50 ÷100*	≤ 1,4

* With extra red tinted reverse numbering.

ROCH Precision Dial Gauges with Long Measuring Span - 0,01 mm

Models C 58, C 60 and C 80

	mm	mm	mm	mm		mm		N
Regular models								
14.1761213	60,4	0,01	15	15,5	with	1	0 ÷ 50 ÷100*	≤ 1,6
14.1761214**	60,4	0,01	15	15,5	with	1	0 ÷ 50 ÷100*	≤ 1,6
14.1760651	58	0,01	30	30,5	without	1	0 ÷ 50 ÷100	≤ 1,6
14.1760652***	58	0,01	30	30,5	without	1	0 ÷ 50 ÷100	≤ 1,6
14.1760653	58	0,01	30	30,5	with	1	0 ÷ 50 ÷100	≤ 1,6
14.1760661	58	0,01	50	51	without	1	0 ÷ 50 ÷100	≤ 2,2
14.1760662***	58	0,01	50	51	without	1	0 ÷ 50 ÷100	≤ 2,2
14.1760663	58	0,01	50	51	with	1	0 ÷ 50 ÷100	≤ 2,2
14.1760671	58	0,01	80	81	without	1	0 ÷ 50 ÷100	≤ 3,0
14.1761224	80	0,01	100	100,5	without	1	0 ÷ 50 ÷100	≤ 3,5

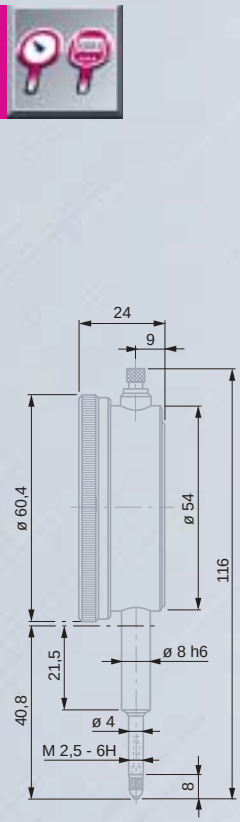
* With extra red tinted reverse numbering.
** With mounted central lug back No. 35.1669012 (also report to page E-27).
*** With counterclockwise numbering.



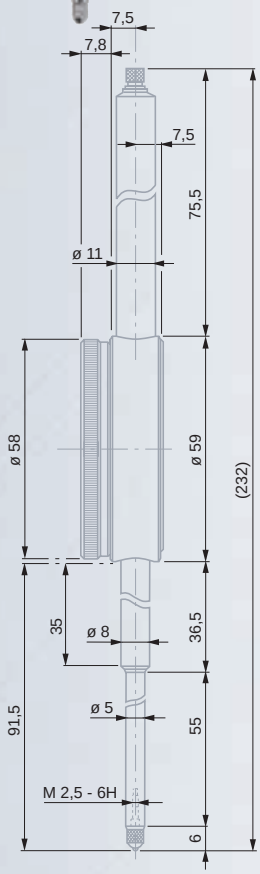




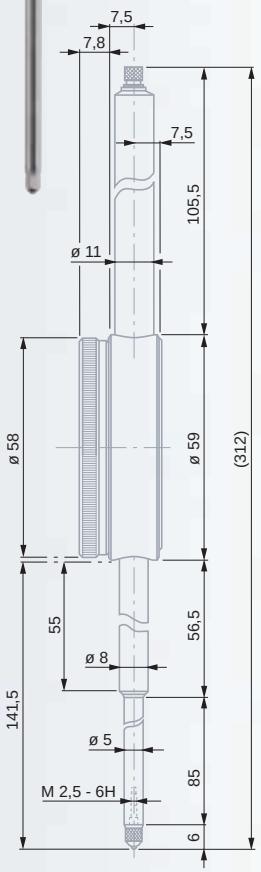




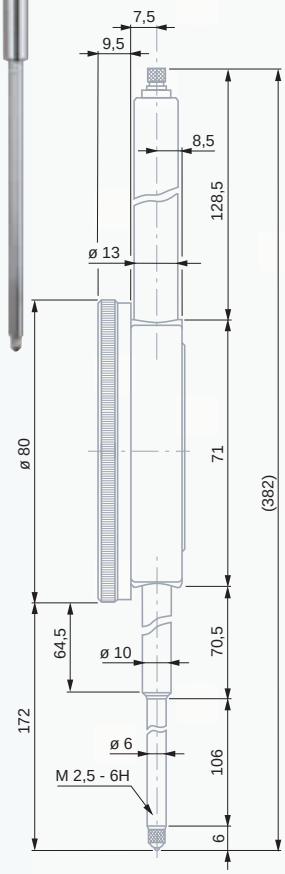
14.1761213
14.1761214



14.1760651 – 14.1760652
14.1760653



14.1760661 – 14.1760663
14.1760662 – 14.1760671



14.1761224

Accuracy

0,01 mm		≤ 30 mm	50 mm	80 mm	100 mm
Deviation span		20 µm	25 µm	30 µm	35 µm
Deviation span within the local measuring span	0,1 mm	5 µm	5 µm	5 µm	8 µm
Repeatability limit		3 µm	3 µm	3 µm	8 µm

✓

NF E 11-050 for models No. 14.1760651,14.1760653, 14.1761213, 14.1761214. Factory standard for all other models

0,01 mm

1,5 mm for both models C 58 and C 60. 2,2 mm for C 80.

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

With or without shockproof system

Adjustable tolerance markers

M2,5 thread for the measuring insert

In order to eliminate the hysteresis when measuring with the plunger moving downward, the use of a mechanical mean for approaching the measuring point is required.

See in the table on the previous page E-25

Mounted insert with a 3,175 mm diameter steel ball tip

Exceptions:
Models No. 14.1761213 and 14.1761214 fitted with a ruby ball tip.

Cardboard box

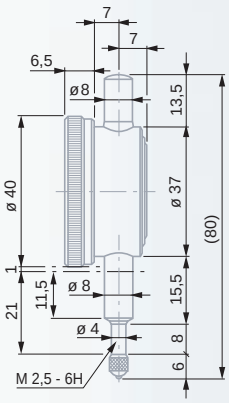
Identification number

Declaration of conformity

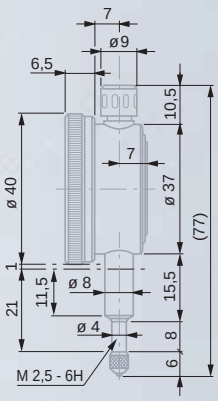
ROCH Precision Dial Gauges - 0,001 mm

Models C 40









- ✓
- Factory standard (14.1761261) or NF E 11-050 (14.1761262)
- 0,001 mm
- 1,1 mm (14.1761261) 2,2 mm (14.1761262)
- Rotating dial
- Full-metal case housing

Fixing shank and plunger in hardened stainless steel

- With shockproof system
- Adjustable tolerance markers

M2,5 thread for the measuring insert

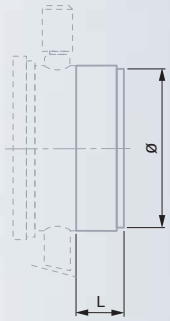
- See in the table opposite
- Mounted insert with a 3,175 mm diameter steel ball tip
- Suited plastic case
- Identification number
- Declaration of conformity

		mm	mm	mm		mm		N
Regular models								
14.1761261	0,001	1	1,1	with	0,2	0÷ 100/0 ÷ 100*	≤ 1,5
14.1761262	0,001	1	1,1	with	0,1	0 ÷ 50 ÷100*	≤ 1,2

* With extra red tinted reverse numbering.

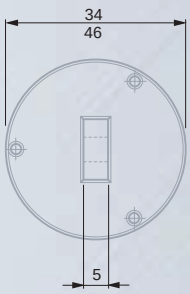
Accuracy

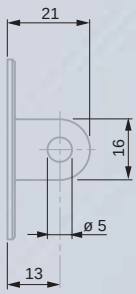
0,001 mm			1 mm
Deviation span			5 µm
Deviation span within the local measuring span		0,01 mm	3 µm
Total deviation span			7 µm
Repeatability limit			3 µm
Max. hysteresis			3 µm



Backs for ROCH or ETALON® Basic (page E-22) Precision Dial Gauges

	Bezel diameter	Back diameter	Magnetic back diameter	Lmm
Central lug backs				
14.62004	40 mm	34 mm		
14.62005	58, 60 and 80 mm	46 mm		
Magnetic backs with 2 permanent magnets				
14.62000	40 mm	34 mm	34 mm	14,5 mm
14.62001	58, 60 and 80 mm	46 mm	46 mm	17 mm





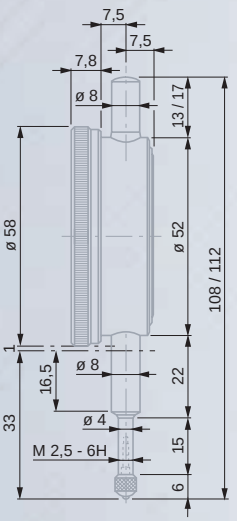
ROCH Precision Dial Gauges - 0,001 mm

Models C 58 and C 80

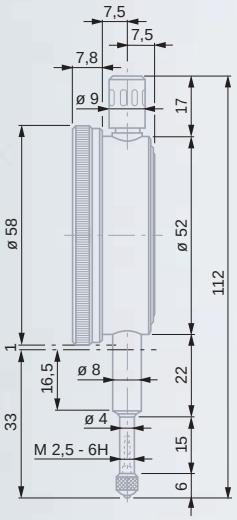


	mm	mm	mm	mm		mm		N
Regular models								
14.1761282	58	0,001	1	1,1	without	0,2	0÷ 100/0 ÷ 100*	≤ 1,5
14.1761283	58	0,001	1	1,1	with	0,2	0÷ 100/0 ÷ 100*	≤ 1,5
14.1761284	58	0,001	1	1,1	with	0,1	0 ÷ 50 ÷100*	≤ 1,5
14.1761291	80	0,001	1	1,1	without	0,2	0÷ 100/0 ÷ 100*	≤ 2,5
Models IP 54 protected against the penetration of liquids								
14.1761281	58	0,001	1	1,1	with	0,2	0÷ 100/0 ÷ 100*	≤ 2,0

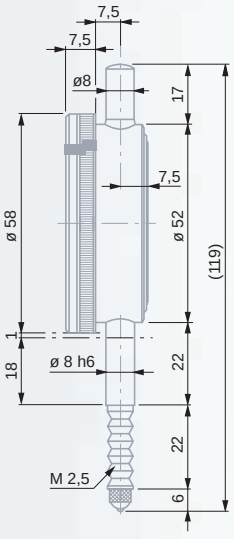
* With extra red tinted reverse numbering.



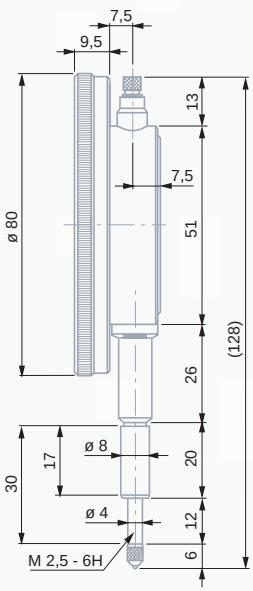
14.1761282
14.1761283



14.1761284



14.1761281



14.1761291

✓

NF E 11-050 (14.1761284). Factory standard (others)

0,001 mm

0,8 mm (14.1761281, 14.1761282, 14.15612839) or 1,5 mm (14.1761284, 14.1761291)

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

With or without shockproof system

Adjustable tolerance markers

M2,5 thread for the measuring insert

For accuracy, see in the table on previous page E-27

See in the table opposite

Mounted insert with a 3,175 mm diameter steel ball tip

Suited plastic case

Identification number

Declaration of conformity

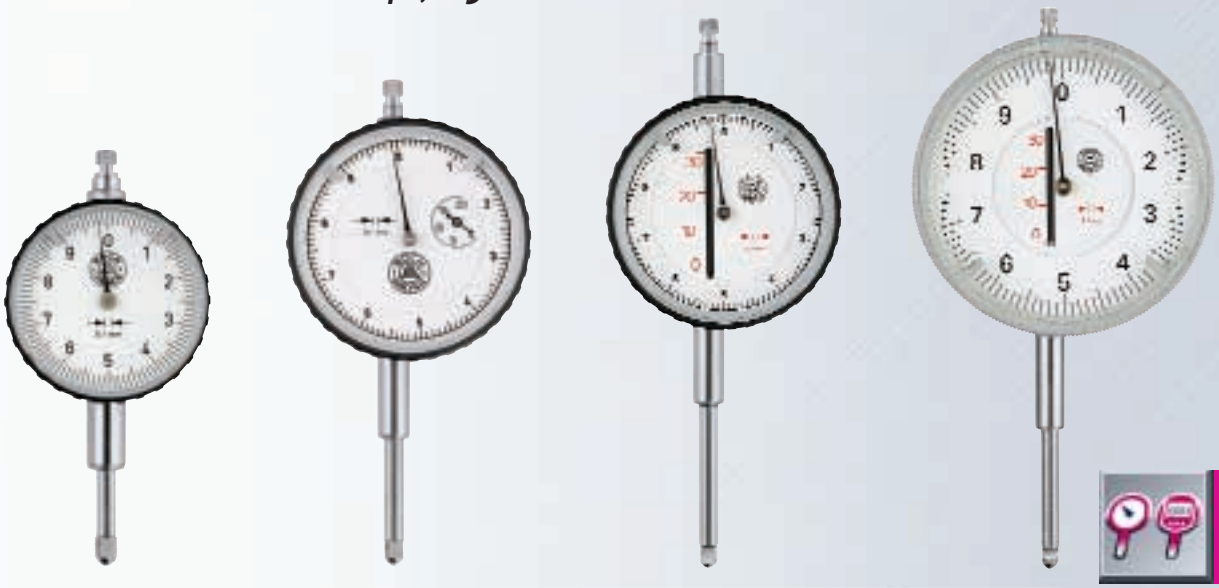
ROCH Precision Dial Gauges - 0,1 mm

Models C 40, C 58 and C 80

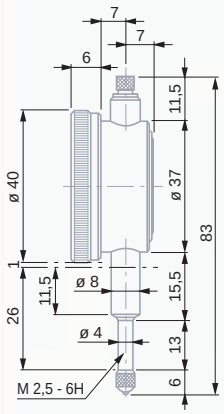
- ✓
- NF E 11-050 Factory standard
- 0,1 mm
- 1,1 mm (C 40), 1,5 mm (C 58) and 2,2 mm (C 80)
- Rotating dial
- Full-metal case housing

Fixing shank and plunger in hardened stainless steel

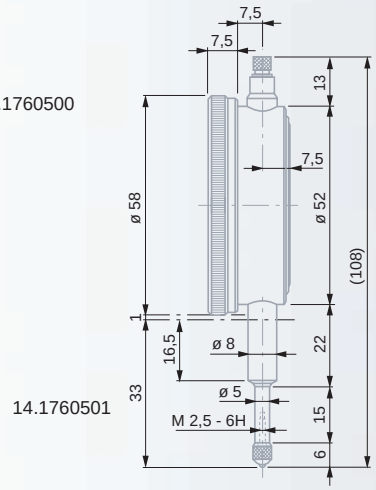
- Without shockproof system
- M2,5 thread for the measuring insert
- See in the table opposite
- Mounted insert with a 3,175 mm diameter steel ball tip
- Suited plastic case
- Identification number
- Declaration of conformity



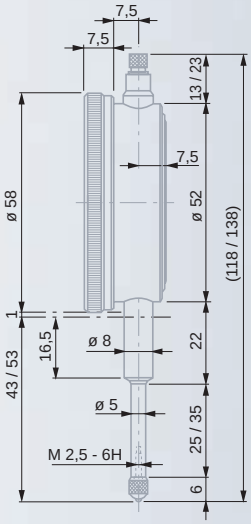
№	⌀ mm	mm	mm	mm		mm		N
Regular models								
14.1760500	40	0,1	10	10,5	without	10	0 ÷ 5 ÷ 10	≤ 1,0
14.1760501	58	0,1	10	10,5	without	10	0 ÷ 5 ÷ 10	≤ 1,0
14.1760502	58	0,1	20	20,5	without	10	0 ÷ 5 ÷ 10	≤ 1,0
14.1760503	58	0,1	30	30,5	without	10	0 ÷ 5 ÷ 10	≤ 1,5
14.1760513	80	0,1	30	30,5	without	10	0 ÷ 5 ÷ 10	≤ 2,0



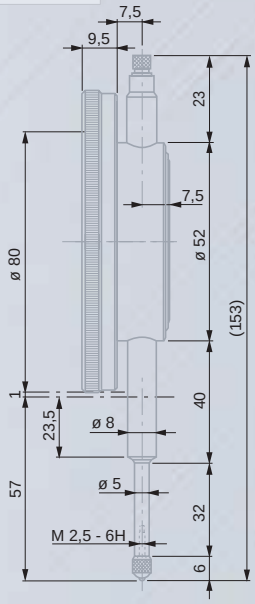
14.1760500



14.1760501



14.1760503
Similar to the model 14.1760502



14.1760513

Accuracy

0,1 mm		10 mm
Deviation span		40 µm
Deviation span within the local measuring span	1 mm	25 µm
Total deviation span		55 µm
Repeatability limit		15 µm
Max. hysteresis		15 µm

ROCH Precision Dial Gauges with Back Plunger - 0,01 mm

Models C 40 and C 58

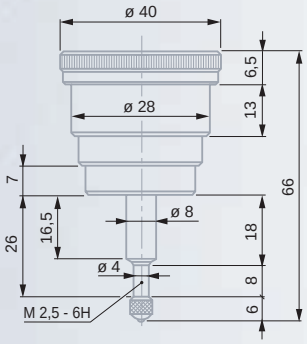


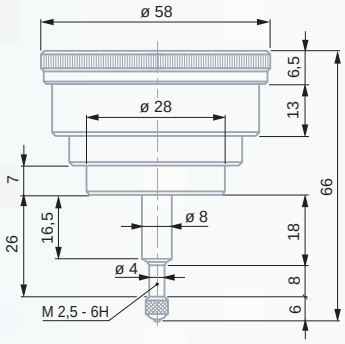


	mm	mm	mm	mm		mm		N
Regular models								
14.1760566	40	0,01	3	3,5	without	0,5	0 ÷ 25 ÷50*	≤ 1,2
14.1760611	58	0,01	5	5,5	without	1	0 ÷ 50 ÷100*	≤ 1,5

* With extra red tinted reverse numbering.

14.1760566





14.1760611

Accuracy

0,01 mm		3 mm	5 mm
Deviation span		12 µm	17 µm
Deviation span with the local measuring span	0,1 mm	5 µm	5 µm
Total deviation span		15 µm	20 µm
Repeatability limit		5 µm	5 µm
Max. hysteresis		15 µm	8 µm

✓
Factory standard
0,01 mm
2,2 mm (C 40)
1,5 mm (C 58)
Rotating dial
Full-metal case housing
Fixing shank and plunger in hardened stainless steel
Without shockproof system
Adjustable tolerance markers
M2,5 thread for the measuring insert
See in the table opposite
Mounted insert with a 3,175 mm diameter steel ball tip
Cardboard box
Identification number
Declaration of conformity

ETALON® Basic and ROCH Precision Dial Gauges - 0,01 mm or 0,001 mm

Remarkably reliable, also when constantly used during series inspection – Made for comparative measurements demanding a very low uncertainty – Measure axial and radial runouts with minimum hysteresis.

- *Shockproof movement with gear-level transmission and long dead travel.*
- *Large, non-dazzling dial for easy readout.*
- *No coarse reading errors as the measuring travel is limited to less than one revolution.*
- *Fine adjustment and protective knob to prevent unintentional pointer displacement.*

✓

DIN 879-1
Sizes as per DIN 878

Ball-bearing plunger, except.for the metric model to 0,01 mm mounted on a plain bearing

Metal case housing

Plunger made from hardened stainless steel

Adjustable tolerance markers

Coupling thread for the lifting cable

M2,5 thread for the measuring insert

≈ 1 N

1 insert with a 3,175 mm. dia. steel ball tip (mounted). 1 lifting cable.

Suited plastic case

Declaration of conformity

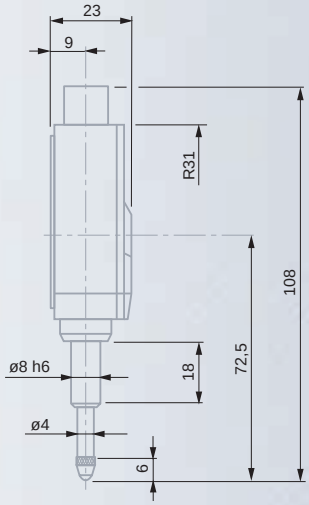




		mm	mm	Travel mm	mm		
Regular models							
	14.1761371	0,01	0,5	2,5	62	with	25 ÷ 0 ÷ 25
14.19051	**14.1761373**	0,001	0,1	3,0	62	with	50 ÷ 0 ÷ 50
Model IP54 protected against the penetration of liquids							
14.19052		0,001	0,1	3,0	62	with	50 ÷ 0 ÷ 50

Accuracy

	0,01 mm	0,001 mm
Max. perm. errors in one measuring direction throughout the measuring range	10 µm	1 µm
over a local measuring range of 10 scale divisions whatsoever	7 µm	0,7 µm
in both meauring directions throughout the measuring range	12 µm	1,2 µm
Repeatability limit	5 µm	0,5 µm
Max. hysteresis	5 µm	0,5 µm



MERCER Precision Dial Gauges ø 40 mm – Standard Series 180

Movement with stainless steel rack teeth, hardened and ground, as well as hard-wearing gear.

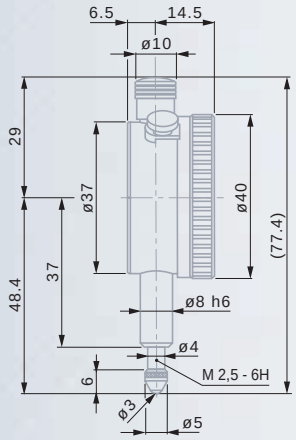


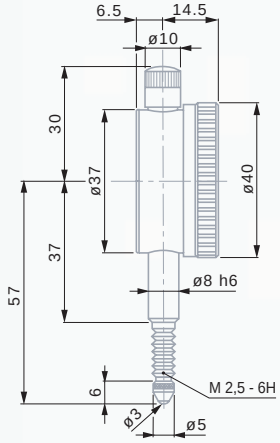
Inch Versions - 0.001 in or 0.0005 in Reading

		in	in	in		in		N
Regular models								
14.26010	***181-1***	*0.001*	*0.200*	*0.212*	without	*0.1*	*0 ÷ 25 ÷ 0*	≤ 1,4
14.26011	***182-1***	*0.001*	*0.200*	*0.212*	without	*0.1*	*0 ÷ 25 ÷ 50*	≤ 1,4
14.26012	***183-1***	*0.0005*	*0.200*	*0.212*	with	*0.05*	*0 ÷ 10 ÷ 0*	≤ 1,4
14.26013	***184-1***	*0.0005*	*0.200*	*0.212*	with	*0.05*	*0 ÷ 10 ÷ 20*	≤ 1,4

Metric Versions - 0,01 mm or 0,001 mm Reading

		mm	mm	mm		mm		N
Regular models								
14.16013	**185-1**	0,01	5	5,4	without	0,5	0 ÷ 25 ÷ 0	≤ 1,4
14.16014	**186-1**	0,01	5	5,4	without	0,5	0 ÷ 25 ÷ 50	≤ 1,4
Models with restricted reading range								
14.16031	**SRc**	0,01	0,4	3,3	with		20 ÷ 0 ÷ 20	≤ 1,4
Models IP54 protected against the penetration of liquids								
14.16015		0,01	5	5,4	without	0,5	0 ÷ 25 ÷ 50	≤ 2
14.16036		0,001	1	1,5	without	0,1	0 ÷ 50 ÷ 100	≤ 2





SWISS MADE ✓

DIN 878 and factory standard

See in the table opposite

2,2 mm

Rotating dial. Can be locked.

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

With or without shockproof system

Adjustable tolerance markers

M2,5 thread for the measuring insert

See in the table opposite

For accuracy, see in the table on page E-35

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

Declaration of conformity

MERCER Precision Dial Gauges ø 58 mm – Standard Series S

Movement with stainless steel rack teeth, hardened and groud, as well as hard-wearing gear.



- ✓
- DIN 878 and factory standard
- See in the table opposite
- 1,5 mm
- Rotating dial. Can be locked.
- Full-metal case housing

Fixing shank and plunger in hardened stainless steel

- With or without shockproof system
- Adjustable tolerance markers

M2,5 thread for the measuring insert

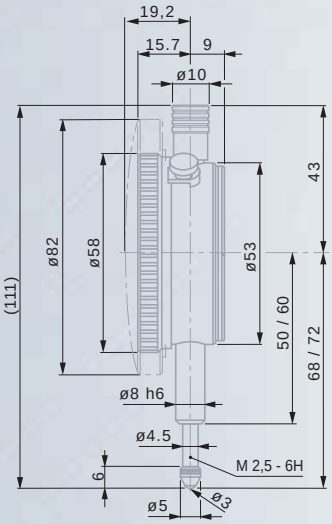
- For sizes, see on page E-34
- See in the table opposite
- For accuracy, see in the table on page E-35
- Mounted insert with a 3 mm dia. steel ball tip
- Cardboard box
- Identification number
- Declaration of conformity

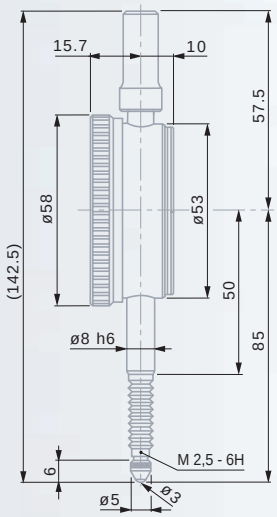
Inch Versions - 0.001 in or 0.0005 in Reading

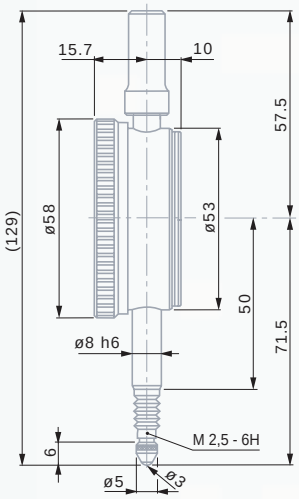
		in	in	in		in		N
Regular models								
14.26026	**210-1**	*0.001*	*0.400*	*0.420*	without	*0.1*	*0 ÷ 50 ÷ 0*	≤ 1,4
14.26027	**211-1**	*0.001*	*0.400*	*0.420*	without	*0.1*	*0 ÷ 50 ÷ 100*	≤ 1,4
14.26020	**212-1**	*0.0005*	*0.400*	*0.420*	without	*0.05*	*0 ÷ 25 ÷ 0*	≤ 1,4
14.26021	**213-1**	*0.0005*	*0.400*	*0.420*	without	*0.05*	*0 ÷ 25 ÷ 50*	≤ 1,4
14.26028	**240-1**	*0.0001*	*0.200*	*0.210*	without	*0.01*	*0 ÷ 50 ÷ 0*	≤ 1,7
14.26029	**241-1**	*0.0001*	*0.200*	*0.210*	without	*0.01*	*0 ÷ 50 ÷ 100*	≤ 1,7

Metric Versions - 0,01 mm, 0,002 mm or 0,001 mm Reading

		mm	mm	mm		mm		N
Regular models								
14.16020	**250-1**	0,01	10	10,5	without	1	0 ÷ 50 ÷ 0	≤ 1,4
14.16021	**251-1**	0,01	10	10,5	without	1	0 ÷ 50 ÷ 100	≤ 1,4
14.16034	**253-1**	0,002	5	5,3	without	0,2	0 ÷ 10 ÷ 0	≤ 1,7
14.16035	**254-1**	0,002	5	5,3	without	0,2	0 ÷ 10 ÷ 20	≤ 1,7
Model with restricted reading range								
14.16032		0,01	0,8	4,0	with		40 ÷ 0 ÷ 40	≤ 1,4
Models IP54 protected against the penetration of liquids								
14.16016		0,01	10	10,5	without	1	0 ÷ 50 ÷100	≤ 2,2
14.16037		0,001	1	3,3	with	0,1	0 ÷ 50 ÷ 100	≤ 2







For dial gauges with a 80 mm dial diameter, see page E-41.

MERCER Precision Dial Gauges with Long Measuring Span ø 58 mm – Standard Series Gauges





Inch Versions - 0.001 in or 0.0005 in Reading

N°		in	in	in		in		N
Regular models								
14.26031	***216-1***	*0.001*	*1*	*1.02*	with	*0.1*	*0 ÷ 50 ÷100*	≤ 2,2
14.26032	***217-1***	*0.0005*	*1*	*1.02*	with	*0.05*	*0 ÷ 25 ÷ 50*	≤ 2,2

- ✓
- DIN 878 and factory standard
- See in the table opposite
- 1,5 mm
- Rotating dial. Can be locked.
- Full-metal case housing

Fixing shank and plunger in hardened stainless steel

- With or without shockproof system
- Adjustable tolerance markers

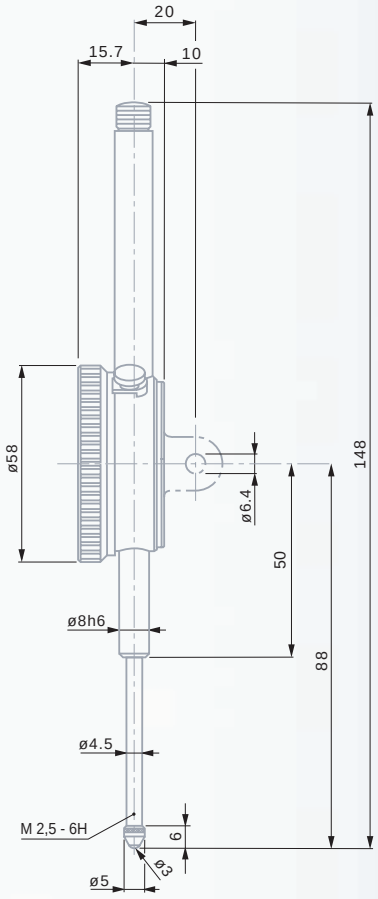
M2,5 thread for the measuring insert

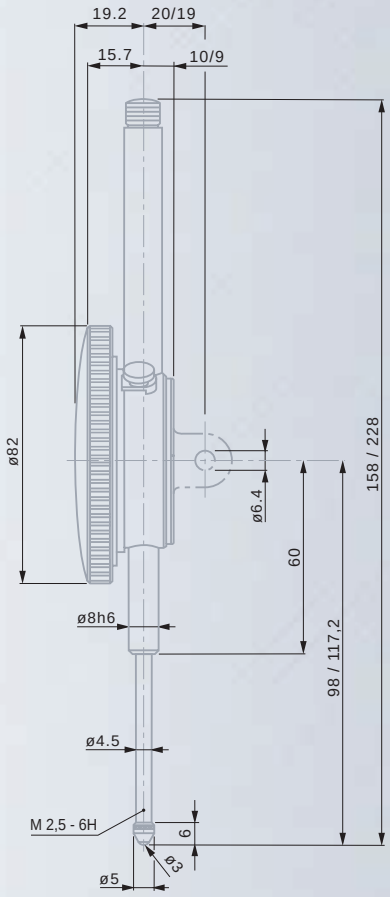
- See in the table opposite
- Mounted insert with a 3 mm dia. steel ball tip
- Cardboard box
- Identification number
- Declaration of conformity

Metric Versions - 0,1 mm or 0,01 mm Reading

		mm	mm	mm		mm		N
Regular models								
14.16038	**249-1**	0,1	30	30,5	with	5	0 ÷ 5	≤ 2,2
14.16039	**252-1**	0,01	30	30,5	with	1	0 ÷ 50 ÷100	≤ 2,2

For dial gauges with a 80 mm dial diameter, report to page E-41.



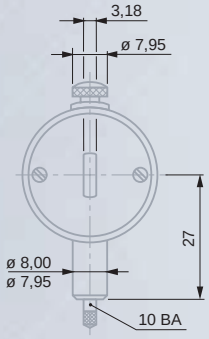


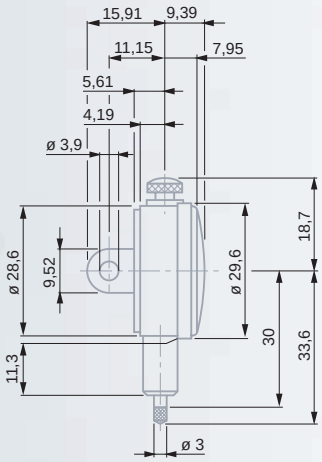
Accuracy

For MERCER standard dial gauges, except series 70 and 90.

	0.001 in 0.0005 in	0.001 in 0.0005 in	0.001 in 0.0005 in	0.0001 in	0,01 mm	0,01 mm	0,01 mm	0,1 mm 0,01 mm	0,002 mm	0,001 mm
	0.200 in	0.400 in	1 in	0.200 in	≤ 0,8 mm	5 mm	10 mm	30 mm	5 mm	1 mm
Deviation span	0.0005 in	0.0006 in	20 µm	0.0005 in	7 µm	12 µm	15 µm	20 µm	12 µm	2 µm
Total deviation span	0.0006 in	0.0007 in	25 µm	0.0006 in	9 µm	14 µm	17 µm	25 µm	14 µm	5 µm
Repeatability limit	0.0002 in	0.0002 in	3 µm	0.0001 in	3 µm	3 µm	3 µm	3 µm	2 µm	1 µm
Max. hysteresis	0.0002 in	0.0002 in	3 µm	0.0001 in	3 µm	3 µm	3 µm	3 µm	2 µm	1 µm

MERCER Precision Dial Gauges
ø 1 1/8 in/29 mm – Standard Series 70







✓ SWISS MADE

Factory standard

See in the table opposite

2,25 mm or 0,9 mm

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

Without shockproof system

Back with central lug

10BA thread for the measuring insert

See in the table opposite

Mounted insert with a 1,6 mm dia. steel ball tip

Cardboard box

Identification number

Declaration of conformity

Inch Versions - 0.001 in or 0.0001 in Reading

№		in	in	in		in		N
Regular models								
14.26050	***71***	*0.001*	*0.04*	*0.05*	without	*0.04*	*0 ÷ 20 ÷ 0*	≤ 1,5
14.26051	***73***	*0.0001*	*0.01*	*0.05*	without	*0.01*	*0 ÷ 5 ÷ 0*	≤ 1,5

Metric Versions - 0,01 mm or 0,002 mm Reading

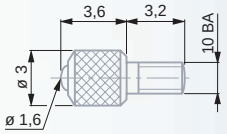
№		mm	mm	mm		mm		N
Regular models								
14.16050	**72**	0,01	1	1,2	without	1	0 ÷ 50 ÷ 0	≤ 1,5
14.16051	**74**	0,002	0,2	1,2	without	0,2	0 ÷ 10 ÷ 0	≤ 1,5

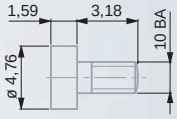
Accuracy

	0.001 in	0.0001 in	0,01 mm	0,002 mm
Deviation span	0.0005 in	0.0005 in	10 µm	6 µm
Total deviation span	0.0008 in	0.0007 in	13 µm	9 µm
Repeatability limit	0.0003 in	0.0002 in	3 µm	2 µm
Max. hysteresis	0.0003 in	0.0002 in	3 µm	3 µm

Accessories for MERCER Series 70 Dial Gauges

10BA coupling threads.



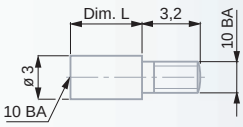


Standard spherical measuring inserts.

N°		∅ mm
35.60072	Steel	1,6
35.60073	Carbide	1,6

Insert with a flat measuring face.

N°		∅ mm
35.60074	Steel	4,76



Extensions for the measuring inserts.

N°	L mm
35.60075	12,7
35.60076	19,05
35.60077	25,4

MERCER Precision Dial Gauges with Back Plunger
ø 1 1/2 in/38 mm – Standard Series 90



✓ SWISS MADE

✓

✓ SWISS MADE

Factory standard

0.001 in and 0,01 mm

2,4 mm or 1,2 mm

Rotating dial

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

Without shockproof system

M2,5 thread for the measuring insert

6,35 mm dia. holding rod that can be unscrewed

See in the table opposite

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

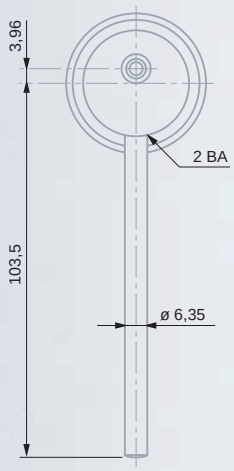
Declaration of conformity

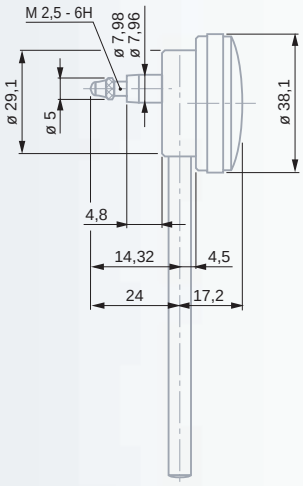
Inch Versions - 0.001 in Reading

		in	in	in		in		N
Regular models								
14.26060	**91**	0.001	0.05	0.14	without	0.05	0 ÷ 25 ÷ 0	≤ 1,5
14.26061	**92**	0.001	0.05	0.14	without	0.05	0 ÷ 25 ÷ 50	≤ 1,5

Metric Versions - 0,01 mm Reading

		mm	mm	mm		mm		N
Regular models								
14.16060	**93**	0,01	1	3,5	without	1	0 ÷ 50 ÷ 0	≤ 1,5
14.16061	**94**	0,01	1	3,5	without	1	0 ÷ 50 ÷ 100	≤ 1,5





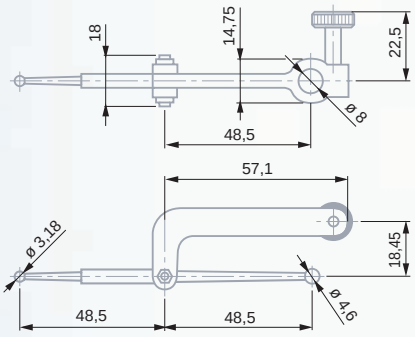
Accuracy

		0.001 in	0,01 mm
	Deviation span	0.0010 in	25 µm
	Total deviation span	0.0015 in	40 µm
	Repeatability limit	0.0005 in	12 µm
	Max. hysteresis	0.0005 in	12 µm

Accessories for MERCER Series 90 Dial Gauges

Lever Probe

	Amplification
35.60078	1 : 1



MERCER Precision Dial Gauges
ø 40 mm – TOP Quality Series 180



DIN 878 and factory standard

See in the-table opposite

Scale divisions
0.001 in and 0,01 mm: 2,2 mm
0.0005 in: 3,1 mm
0.0001 in, 0,002 mm and 0,001 mm: 1,1 mm

Rotating dial. Can be locked.

Full-metal case housing
Fixing shank and plunger in hardened stainless steel

With shockproof system

Adjustable tolerance markers
M2,5 Thread for the measuring insert

For sizes, see page E-32

See in the tables opposite

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

Declaration of conformity

Inch Versions - 0.001 in, 0.0005 in or 0.0001 in Reading

N°		in	in	in		in		N
Regular models								
14.26001	**181-1TQ**	0.001	0.200	0.212	with	0.05	0 ÷ 25 ÷ 0	≤ 1,4
14.26002	**182-1TQ**	0.001	0.200	0.212	with	0.05	0 ÷ 25 ÷ 50	≤ 1,4
14.26003	**183-1TQ**	0.0005	0.200	0.212	with	0.02	0 ÷ 10 ÷ 0	≤ 1,4
14.26004	**184-1TQ**	0.0005	0.200	0.212	with	0.02	0 ÷ 10 ÷ 20	≤ 1,4
14.26005	**193-1TQ**	0.0001	0.120	0.130	with	0.01	0 ÷ 50 ÷ 0	≤ 1,7
14.26006	**194-1TQ**	0.0001	0.120	0.130	with	0.01	0 ÷ 50 ÷ 100	≤ 1,7

Metric Versions - 0,01 mm, 0,002 mm or 0,001 mm Reading

N°		mm	mm	mm		mm		N
Regular models								
14.16005	**185-1TQ**	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 0	≤ 1,4
14.16006	**186-1TQ**	0,01	5	5,4	with	0,5	0 ÷ 25 ÷ 50	≤ 1,4
14.16007	**195-1TQ**	0,002	3	3,3	with	0,2	0 ÷ 10 ÷ 0	≤ 1,4
14.16008	**196-1TQ**	0,002	3	3,3	with	0,2	0 ÷ 10 ÷ 20	≤ 1,4
14.16009		0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 0	≤ 1,7
14.16010		0,001	1	1,5	with	0,1	0 ÷ 50 ÷ 100	≤ 1,7

Accuracy

	0.0005 in 0,01 mm	≥ 0.0005 in 0,01 mm	0.0005 in 0,01 mm	0.0005 in 0,01 mm	0,002 mm	0.0001 in 0,002 mm	0.0001 in 0,002 mm	0,001 mm	0,001 mm
	0.040 in 1 mm	0.200 in 5 mm	0.400 in 10 mm	1 ÷ 2 in 30÷50 mm	0,16 mm	0.120 in 3 mm	0.200 in 5 mm	0,08 mm	1 mm
Deviation span	7 µm	12 µm	15 µm	20 µm	2 µm	10 µm	12 µm	1,5 µm	4,5 µm
Total deviation span	9 µm	14 µm	17 µm	25 µm	3 µm	12 µm	14 µm	2 µm	5 µm
Repeatability limit	3 µm	3 µm	3 µm	3 µm	1 µm	1,5 µm	1,5 µm	0,5 µm	0,5 µm
Max. hysteresis	3 µm	3 µm	3 µm	3 µm	1 µm	1,5 µm	1,5 µm	0,5 µm	0,5 µm

MERCER Precision Dial Gauges ø 58 mm – TOP Quality Series S

Movement with stainless steel rack teeth, hardened and groud, as well as hard-wearing gear.



Inch Versions - 0.0005 in and 0.0001 in Reading

		in	in	in		in		N
Regular models								
14.26024	***212HD-1TQ***	*0.0005*	*0.400*	*0.42*	with	*0.05*	*0 ÷ 25 ÷ 0*	≤ 1,5
14.26022	***240-1TQ***	*0.0001*	*0.200*	*0.21*	with	*0.1*	*0 ÷ 50 ÷ 0*	≤ 1,5
14.26023	***241-1TQ***	*0.0001*	*0.200*	*0.21*	with	*0.1*	*0 ÷ 50 ÷ 100*	≤ 1,5
Model with restricted reading range								
14.26025	***212SRc-1TQ***	*0.0005*	*0.040*	*0.15*	with		*20 ÷ 0 ÷ 20*	≤ 1,4

Metric Versions - 0,01 mm, 0,002 mm or 0,001 mm Reading

		mm	mm	mm		mm		N
Regular models								
14.16022	**250HD-1TQ**	0,01	10	10,5	with	1	0 ÷ 50 ÷ 0	≤ 1,4
14.16023	**251HD-1TQ**	0,01	10	10,5	with	1	0 ÷ 50 ÷ 100	≤ 1,4
14.16024	**253HD-1TQ**	0,002	5	5,3	with	0,2	0 ÷ 10 ÷ 0	≤ 1,5
14.16025	**254HD-1TQ**	0,002	5	5,3	with	0,2	0 ÷ 10 ÷ 20	≤ 1,5
14.16026	**HD**	0,001	1	3,3	with	0,1	0 ÷ 50 ÷ 0	≤ 1,7
14.16027	**HD**	0,001	1	3,3	with	0,1	0 ÷ 50 ÷ 100	≤ 1,7
Models with restricted reading range								
14.16029	**250SRc-1TQ**	0,01	1	4	with	1	50 ÷ 0 ÷ 50	≤ 1,4
14.16030	**253SRc-1TQ**	0,002	0,16	3	with	0,16	8 ÷ 0 ÷ 8	≤ 1,5
14.16028	**SRc**	0,001	0,08	3	with	0,08	40 ÷ 0 ÷ 40	≤ 1,7

✓ SWISS MADE

DIN 878 and factory standard

See in the table opposite

1,5 mm

Rotating dial. Can be locked.

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

With shockproof system

Adjustable tolerance markers

M2,5 thread for the measuring insert

For sizes, see on page E-34

See in the table opposite

For accuracy, see in the table on page E-39

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

Declaration of conformity

MERCER Precision Dial Gauges ø 80 mm – TOP Quality Series L

Movement with stainless steel rack teeth, hardened and groud, as well as hard-wearing gear.



✓ Swiss made

Factory standard

See in the table opposite

2,3 mm

Rotating dial. Can be locked.

Full-metal case housing

Fixing shank and plunger in hardened stainless steel

With shockproof system

Adjustable tolerance markers

M2,5 thread for the measuring insert

For sizes, see on page E-34 or E-35 for models with long measuring span

See in the table opposite

For accuracy, see in the table on page E-39

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

Declaration of conformity

Inch Versions - 0.0005 in or 0.0001 in Reading

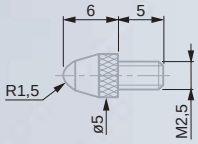
No		in	in	in		in		N
Regular models								
14.26042	**244-1TQ**	0.0001	0.200	0.21	with	0.01	0 ÷ 50 ÷ 0	≤ 1,7
14.26043	**245-1TQ**	0.0001	0.200	0.21	with	0.01	0 ÷ 50 ÷100	≤ 1,7
Models with long measuring span								
14.26040	**222-1TQ**	0.0005	1	1.02	with	0.05	0 ÷ 25 ÷ 50	≤ 2,2
14.26041	**222A-1TQ**	0.0005	2	2.02	with	0.05	0 ÷ 25 ÷ 50	≤ 2,5

Metric Versions - 0,01 mm and 0,002 mm Reading

No		mm	mm	mm		mm		N
Regular models								
14.16042	**260-1TQ**	0,002	5	5,3	with	0,2	0 ÷ 10 ÷ 0	≤ 1,5
14.16043	**261-1TQ**	0,002	5	5,3	with	0,2	0 ÷ 10 ÷ 20	≤ 1,5
Models with long measuring span								
14.16040	**259-1TQ**	0,01	30	30,5	with	1	0 ÷ 50 ÷100	≤ 2,2
14.16041	**259A-1TQ**	0,01	50	50,5	with	1	0 ÷ 50 ÷100	≤ 2,5

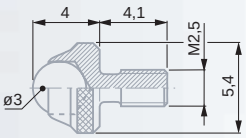
Measuring Inserts for Dial Gauges, Axial Probes and the like

Executions with M2,5 Coupling Threads



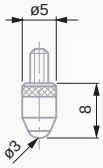
Standard spehrical measuring inserts.

No		Lmm
35.10001	Steel	6
35.10002	Carbide	6
35.60001	Sapphire	6



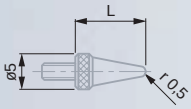
Short spherical measuring insert.

No		Lmm
35.60007	Carbide	4



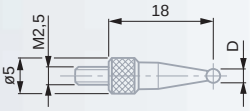
Long spherical measuring inserts.

No		Lmm
35.60019	Steel	8
35.60020	Carbide	8
35.60021	Ruby	8



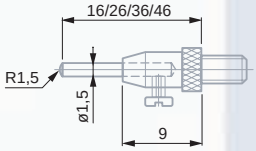
Spherical measuring inserts. R 0,5 mm,

No		Lmm
35.60035	Steel	5
35.60036	Steel	10
35.60037	Steel	15
35.60038	Steel	20
35.60039	Steel	30
35.60040	Steel	40



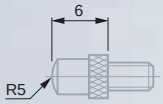
Spherical measuring inserts.

No		mm
35.60051	Carbide	1
35.60052	Carbide	2
35.60053	Carbide	3
35.60054	Carbide	4
35.60055	Carbide	5
35.60056	Carbide	6
35.60057	Carbide	7
35.60058	Carbide	8
35.60059	Carbide	9
35.60060	Steel	10
35.60061	Steel	11
35.60062	Steel	12



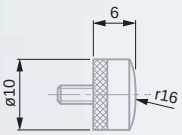
Spherical measuring inserts with 4 interchangeable pins, R = 1,5 mm.

No		Lmm
35.10201	Steel	16, 26, 36, 46



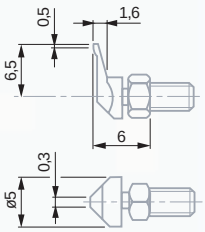
Spherical measuring inserts.

No		Rmm
35.10101	Steel	5
35.10102	Carbide	5



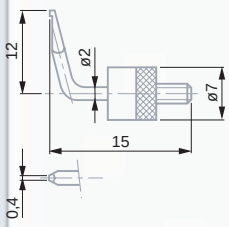
Spherical measuring inserts.

No		Rmm
35.60017	Steel	16
35.60018	Carbide	16



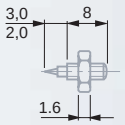
Measuring insert with offset (A) contact point and lock nut for radial alignment.

No		Amm
35.10401	Steel	6,5



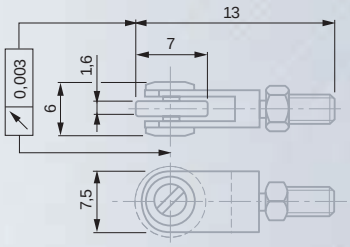
Measuring insert with offset (A) contact point. Lock nut for radial alignment.

No		Amm
35.60063	Steel	12



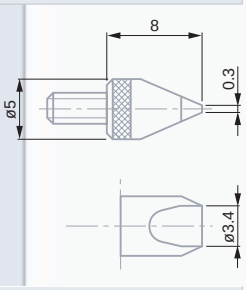
Measuring insert with needle contact point.

No	
35.60030	Steel



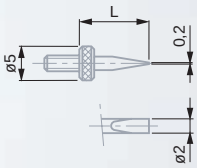
Measuring inserts with ball-bearing rollers. Lock nut for radial alignment.

No		Shape
35.60010	Steel	cylindrical
35.60011	Steel	ball-shaped



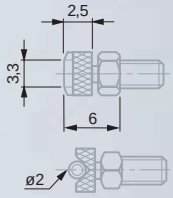
Measuring inserts with blade-shaped measuring faces. Lock nut for radial alignment.

No		Bmm
35.60024	Steel	0,3
35.60025	Carbide	0,3



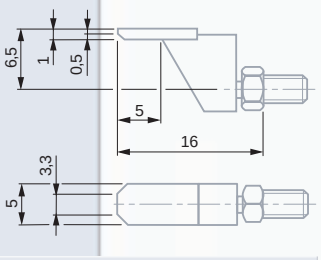
Measuring inserts with blade-shaped measuring faces, in steel. Lock nut for radial alignment.

No	Lmm	Bmm
35.60031	5	0,2
35.60032	10	0,2
35.60033	15	0,2
35.60034	20	0,2



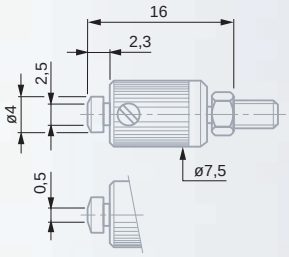
Measuring insert with a cylindrical measuring face. Lock nut for radial alignment.

No	
35.10502	Carbide



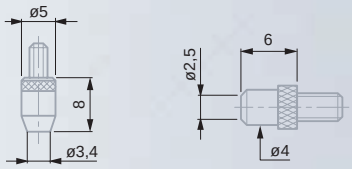
Measuring insert with off-centre, narrow measuring face. Lock nut for radial alignment.

No		Bmm
35.10602	Carbide	0,5



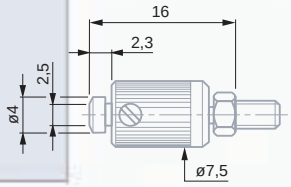
Measuring insert with adjustable narrow measuring face (parallelism). Lock nut for radial alignment.

No		Bmm
35.10702	Carbide	0,5



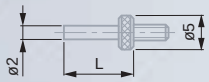
Measuring inserts with a flat measuring face.

No		mm
35.10801	Steel	2,5
35.10802	Carbide	2,5
35.60022	Steel	3,4
35.60023	Carbide	3,4



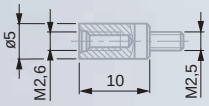
Measuring insert with a flat, adjustable measuring face (parallelism). Lock nut for radial alignment.

No		mm
35.10902	Carbide	2,5



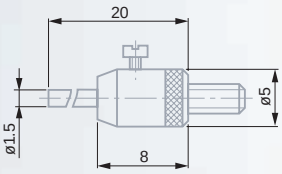
Steel measuring inserts with a flat measuring face.

No	L mm	ø mm
35.60026	5	2
35.60027	10	2
35.60028	15	2
35.60029	20	2



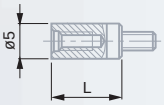
Connectors for the measuring inserts.

No	Outer	Inner
35.60066	M2,5	M2,6
35.60067	M2,5	M3
35.60064	M2,6	M2,5
35.60065	M3	M2,5
35.60068	M2,5	6BA
35.60069	M2,5	8BA
35.60070	6BA	M2,5
35.60071	8BA	M2,5



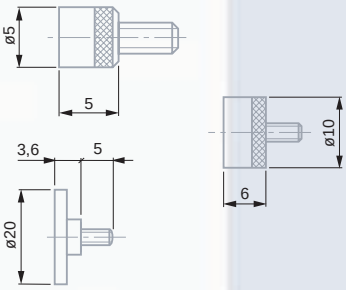
Measuring inserts with a flat measuring face as well as interchangeable pin.

No		ø mm
35.60008	Steel	1,5
35.60009	Carbide	1,5



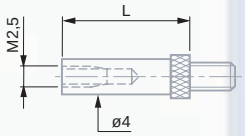
Extensions for the measuring inserts.

No	L mm
35.60042	10
35.60043	15
35.60044	20
35.60045	25
35.60046	30
35.60047	35
35.60048	40
35.60049	45
35.60050	50



Measuring inserts with a flat measuring face.

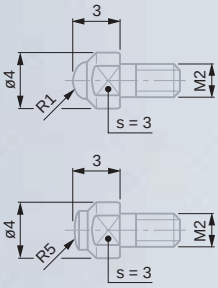
No		ø mm
35.60012	Steel	5
35.60013	Carbide	5
35.60014	Steel	10
35.60015	Carbide	10
35.60016	Steel	20



Extensions for the measuring inserts.

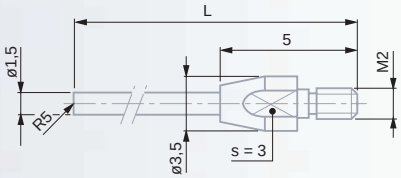
No	L mm
35.40501	10
35.40502	15
35.40503	20
35.40504	40

Executions with M2 Coupling Threads



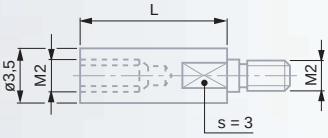
Spherical measuring inserts. M2 thread.

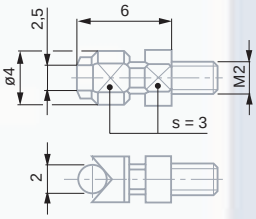
No		ø mm
35.10204	Carbide	R 1
35.10103	Carbide	R 5



Spherical measuring inserts, R 5. M2 thread.

No		L mm
35.10202	Carbide	16
35.10203	Carbide	26





Measuring insert with cylindrical measuring face. Lock nut for radial alignment. M2 thread.

No	
35.10503	Carbide

Extensions for measuring inserts, M2.

No	L mm
35.40505	10
35.40506	15

Devices for Plunger Retraction

Top mounted retraction devices.

No		mm
35.60004	Retraction device	ø 40
35.60005	Retraction device	ø 58

Each consisting of:

14.62003	Lift lever
	Head screw

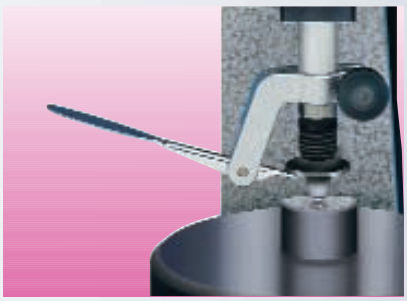


Bottom mounted retraction device.

No	
35.40104	Retraction device

Consisting of:

35.40101	Lever
35.40102	Wascher



Bottom mounted retraction device.

No
19.60005



90° Angle Probe

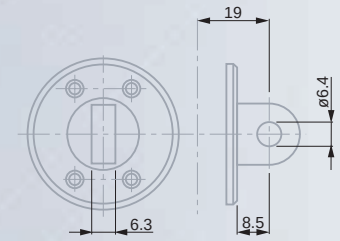
No	
35.60006	90 ° angle probe used for the transmission of the plunger movements up to 10 mm. Suited for dial gauges with a 0,01 mm scale division.

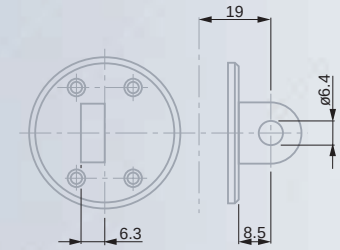
Furnished with:

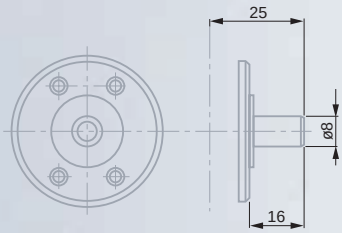
35.60012	Measuring insert with a 5 mm dia. flat face



Backs for TESA YR and YE as well as MERCER Standard and TOP Quality Precision Dial Gauges

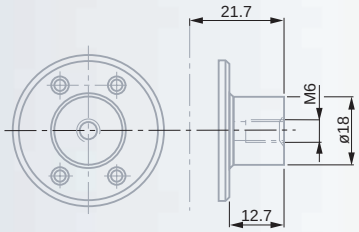


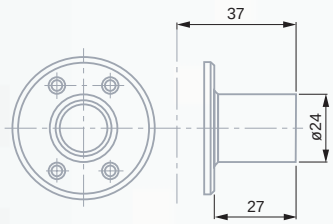




Executions for 40 mm Dial Diameter

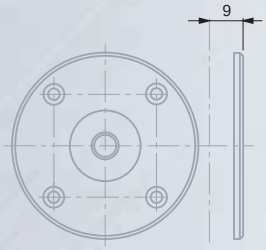
No	=
14.60008	Back with central lug
14.60009	Back with offset lug
14.60010	Back with 8 mm dia. fixing shank
14.60011	Back with M6 inner thread
14.60012	Back with permanent magnet

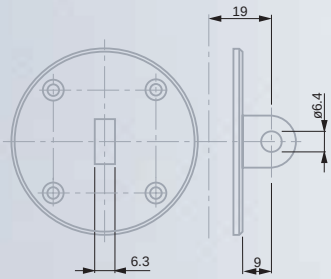


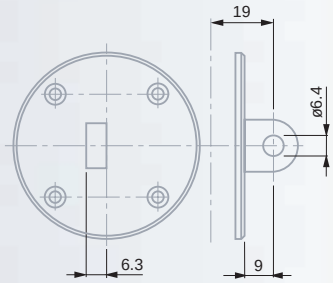


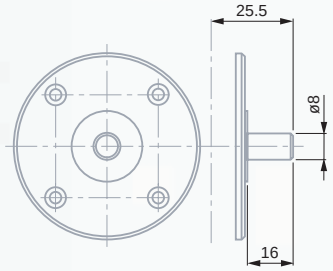
Executions for 58 or 82 mm Dial Diameters

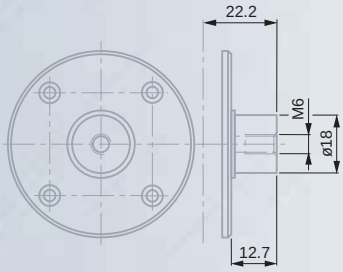
No	=
14.60013	Flat back
14.60014	Back with central lug
14.60015	Back with offset lug
14.60016	Back with 8 mm dia. fixing shank
14.60017	Back with M6 internal thread
14.60018	Back with 4 clamping bores as per CNOMO French standard
14.60019	Back with permanent magnet

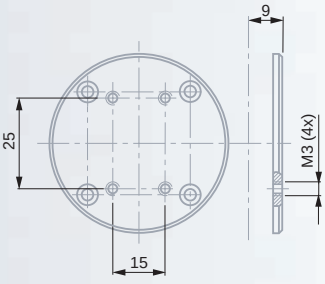


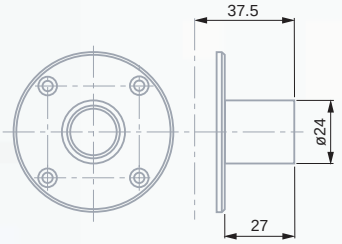












SWISS MADE ✓

Dull-chrome plated, except for models No. 14.60010, 14.60011,14. 60016 and 14.60017

Backs with permanent magnet

TESATAST® Dial Test Indicators (Lever-Type)

These lever-type dial test indicators are especially intended for use on the shop floor or in the inspection room – Ideally suited for comparative measurements on a surface plate, for instance – Determine form, shape and positional deviations as well as axial and runout errors.

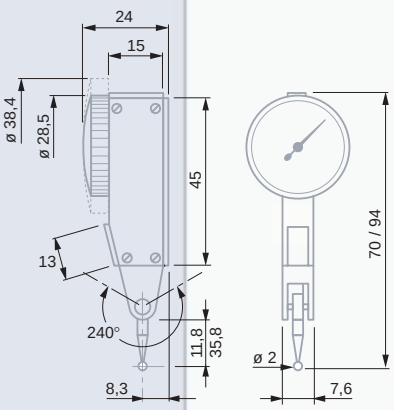
- *Bidirectional measuring with automatic reversal inside the movement.*
- *Continuous clockwise pointer rotation providing error-free reading.*
- *Insensitive to magnetic fields.*
- *Jeweled movement with 7 rubies.*
- *Ball-bearing lever system with measuring insert swivelling through to 240°.*
- *Very low measuring force.*
- *Full-metal construction giving exceptional robustness.*
- *Monobloc housing with 3 countersunk dovetail attachments.*

✓

DIN 2270
NF E 11-053

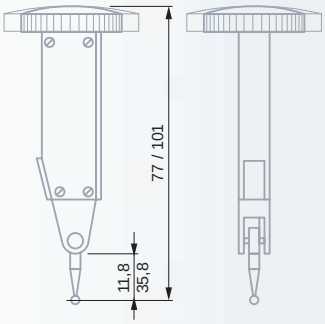
Standard Models

Well-proven lever-type dial test indicators with dial face mounted parallel to the insert's axis.



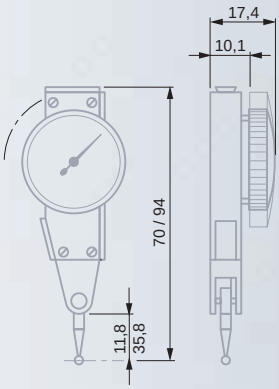
Perpendicular Models

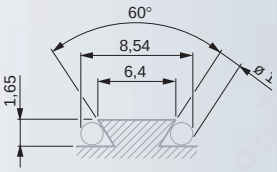
Lever-type dial test indicators with dial face mounted at right angle to the insert's axis.



Lateral Models

Lever-type dial test indicators with dial face mounted parallel to the insert's axis, but on the flat side of the dial housing.





Technical Data

			0,02 mm	0,01 mm	0,002 mm
	Deviation span		27 µm	10 µm	2 µm
	Deviation span within the local measuring span	0,20 mm	12 µm		
		0,10 mm		5 µm	
		0,02 mm			1 µm
	Total deviation span		31 µm	13 µm	3,5 µm
	Repeatability limit		4 µm	3 µm	1 µm
	Max. hysteresis		4 µm	3 µm	1,5 µm
	Measuring force with the following measuring inserts				
		12,53 mm long		0,15 N	0,15 N
		36,53 mm long	0,06 N	0,06 N	

TESATAST® Standard Models



No			Bezel dia.		Insert
mm					
18.10005	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
18.10006	0,01	0,8	38	0 ÷ 0,4 ÷ 0	12,53
18.10007	0,01	0,5	28	0 ÷ 0,25 ÷ 0	36,53
18.10008	0,01	0,5	38	0 ÷ 0,25 ÷ 0	36,53
18.10009	0,002	0,2	28	0 ÷ 100 ÷ 0	12,53
18.10010	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53
in					
18.20006	*0.0005*	*0.030*	*1.1*	*0 ÷ 15 ÷ 0*	*1/2*
18.20007	*0.0005*	*0.030*	*1.5*	*0 ÷ 15 ÷ 0*	*1/2*
18.20008	*0.0005*	*0.020*	*1.1*	*0 ÷ 10 ÷ 0*	*1 7/16*
18.20009	*0.0005*	*0.020*	*1.5*	*0 ÷ 10 ÷ 0*	*1 7/16*
18.20010	*0.001*	*0.030*	*1.1*	*0 ÷ 15 ÷ 0*	*1/2*
18.20011	*0.0001*	*0.008*	*1.1*	*0 ÷ 4 ÷ 0*	*1/2*
18.20012	*0.0001*	*0.008*	*1.5*	*0 ÷ 4 ÷ 0*	*1/2*
18.20013	*0.00005*	*0.008*	*1.5*	*0 ÷ 4 ÷ 0*	*1/2*

SWISSTAST® Standard Models



No			Bezel dia.		Insert
mm					
18.11000	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
18.11001	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53

* Technical data as for the standard models, but equipped with a 2 mm dia. ruby ball tip No. 18.60302.

TESATAST® Perpendicular Models



No			Bezel dia.		Insert
mm					
18.10204	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
18.10205	0,01	0,5	28	0 ÷ 0,25 ÷ 0	36,53
18.10304	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53
in					
18.20204	*0.0005*	*0.030*	*1.1*	*0 ÷ 15 ÷ 0*	*1/2*
18.20304	*0.0001*	*0.008*	*1.5*	*0 ÷ 4 ÷ 0*	*1/2*

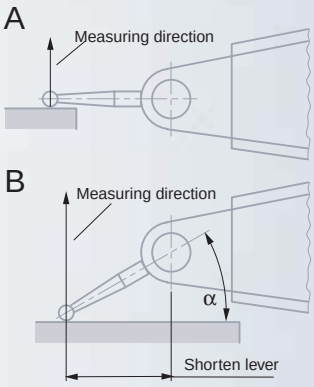
- ✓
- DIN 2270 NF E 11-053
- Rotating dial
- Very low measuring force as shown in table opposite
- Movement with patented shock absorber items
- Lever system with friction drive preventing from overload
- Accuracy: see table on page E-29
- Supplied in a plastic case with:
  1 2 mm dia. meas. insert
  1 Key No. 18.60307
  1 8 mm dia. fixing shank No. 18.40105
- Identification number
- Declaration of conformity

TESATAST® Lateral Models

No			Bezel dia.		Insert
mm					
18.10011	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
18.10012	0,02	2	38	0 ÷ 1,0 ÷ 0	36,53
18.10013	0,002	0,2	28	0 ÷ 100 ÷ 0	12,53
in					
18.20014	*0.0005*	*0.030*	*1.1*	*0 ÷ 15 ÷ 0*	*½*

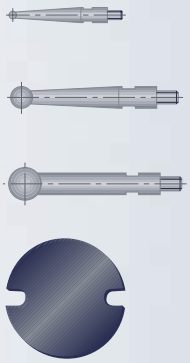


Note for use of the TESATAST lever-type dial test indicators
When the measuring insert is parallel to the workpiece surface (Fig. A), these dial test indicators give true reading as the amplification factor is 1:1.
In other measuring positions (angle α in Fig. B), the effective lever length changes so that the read value need be corrected. With respect to this, also refer to the instruction manual.



Measuring inserts

No	Carbide ball tip	Ruby ball tip		mm
18.60201		**18.60301**	1	12,53
18.60202		**18.60302**	2	12,53
18.60203		**18.60303**	3	12,53
18.60211		**18.60304**	1	36,53
18.60212		**18.60305**	2	36,53
18.60213		**18.60309**	3	36,53
18.60307	Key for measuring inserts			



Note
The original measuring insert mounted on every TESATAST and other inserts with same nominal length but having different tip diameters are completely interchangeable.

✓ Swiss made
Tungsten carbide or ruby ball tip
M1,4 coupling thread

Indicator Sets with Small Support

No	
16.30003	Indicator sets with small support
consisting of:	
18.10005	Dial test indicator (lever-type)
18.10010	Dial test indicator (lever-type)
18.60203	Measuring insert
18.40104	Fixing shank
18.40105	Fixing shank
18.60307	Key for measuring inserts
16.39007	INTERAPID small support UJ 15



✓ Swiss made
DIN 2270
NF E 11-053
Technical data are listed under each single product
Plastic case
Identification number
Declaration of conformity

Accessories for TESATAST®



No		mm	No	in
18.40104	① Fixing shank with dovetail clamp	ø 4	***18.50104***	ø 7/32
18.40105	② Fixing shank with dovetail clamp	ø 8	***18.50105***	ø 1/4
18.40202	③ Cylindrical fixing shank with clamp	ø 8 x 80 ø 5,6	***18.50202***	ø 3/8 x 3.5 ø 7/32
18.40203	④ Rectangular fixing shank with clamp	13 x 6 x 50 ø 5,6	***18.50203***	1/2 x 1/4 x 2 ø 7/32
18.40404	⑤ Short swivel holder with cylindrical shank and dovetail clamp	ø 8 x 25	***18.50404***	ø 3/8 x 1
18.40405	⑥ Long swivel holder with cylindrical shank and dovetail clamp	ø 8 x 90	***18.50405***	ø 3/8 x 3.5
18.40406	⑦ Angle holder with cylindrical shank Clamping bore	ø 8 x 25 ø 8	***18.50406***	ø 3/8 x 1 ø 3/8
18.40501	⑧ Centring shoulder for TESATAST perpendicular Cylindrical shank Clamping point for fixing shank and dovetail clamp	ø 8 x 25 ø 4	**18.40501**	
18.60401	⑨ Double fixing clamp with dovetail clamp	ø 5,6	**18.60401**	
18.40407	⑩ Long swivel holder with cylindrical shank and dovetail clamp as well as fine adjustment	ø 8 x 125		

Accessory sets
Consisting of the following components:

No mm		18.40104	18.40105	18.40202	18.40203	18.40404	18.40405	18.40406	18.40501	18.60401
18.40001*	No. 1	●	●							
18.40100**	No. 2			●	●	●	●	●		●
18.40703***	No. 3			●	●	●	●	●	●	●

No in		*18.50104*	*18.50105*	*18.50202*	*18.50203*	*18.50404*	*18.50405*	*18.50406*	18.40501	18.60401
18.50001*	*No. 1*	●	●							
18.50100**	*No. 2*			●	●	●	●	●		●
18.50703***	*No. 3*			●	●	●	●	●	●	●

* Supplied with one measuring insert No. 18.60201, 18.60202 or 18.60203, one key No. 18.60307 as well as a suited case No. 18.60308.

** Supplied in a suited case No. 18.60608.

*** Supplied in a suited case No.18.60702.

ETALON® Basic Dial Test Indicator (Lever-Type)

Excellent price/performance relationship – Extremely valuable in tough workshop environment – Perform measurements on the surface plate or close to the machine – Determine form, shape and positional errors and measure axial or radial runouts.

- *Bi-directional measuring with automatic reversal inside the movement.*
- *Continuous clockwise pointer rotation providing clear unambiguous reading.*
- *Jeweled movement with rubies.*
- *One-piece housing in stainless steel with 3 dovetail attachments.*

✓

DIN 2270

Rotating dial

See table opposite

Lever system with friction clutch acting as load inhibitor

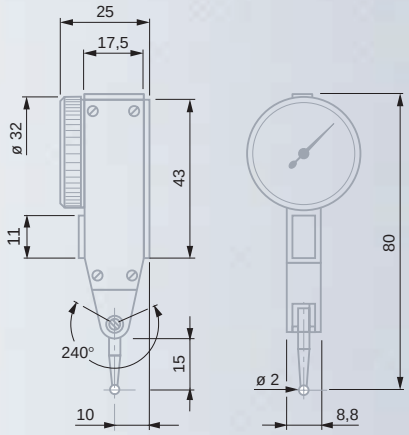
Accuracy as shown on the table opposite

Supplied in a plastic case with:
1 insert with a 2 mm dia.
1 key
1 shank with a 6 mm dia.
1 shank with a 8 mm dia.

Identification number

Declaration of conformity

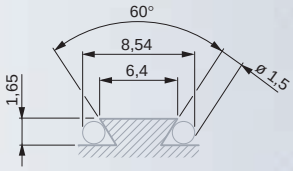




			Bezel dia.		Insert
18.19024	0,01 mm	0,8 mm	32 mm	0 ÷ 0,4 ÷ 0	14 mm

Technical data

Deviation span		10 µm
Deviation span within the local measuring span	0,10 mm	5 µm
Total deviation span		13 µm
Repeatability limit		3 µm
Max. hysteresis		3 µm



INTERAPID® 312 Dial Test Indicators (Lever-Type)

Very large measuring span – Ideal for inspecting all significant size variations, e.g. on the surface plate - Measure positional, form and shape errors.

- *Additional revolution counter for sure reading.*
- *Bidirectional measuring with automatic reversal inside the movement.*
- *Pointer rotation is thereby constant.*
- *Jeweled movement with rubies.*
- *Ball-bearing lever system with measuring insert swivelling through 210°.*
- *Full-metal construction giving outstanding robustness.*
- *Monobloc housing with mounted dovetail attachments as well as a 4 mm swivelling shank.*

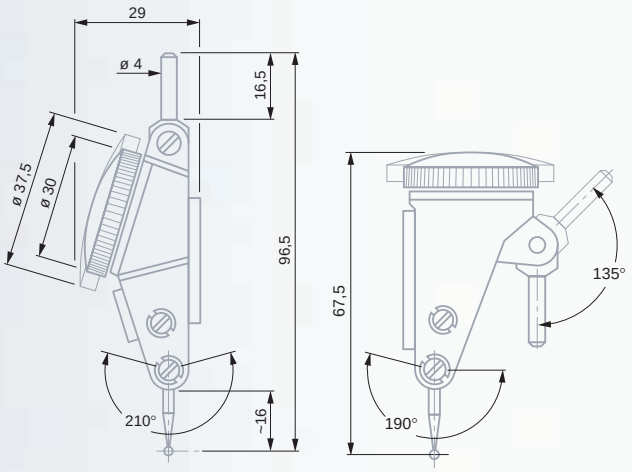


Regular Model

Time-tested dial test indicator (lever-type) with dial face mounted parallel to the insert axis.

Perpendicular Model

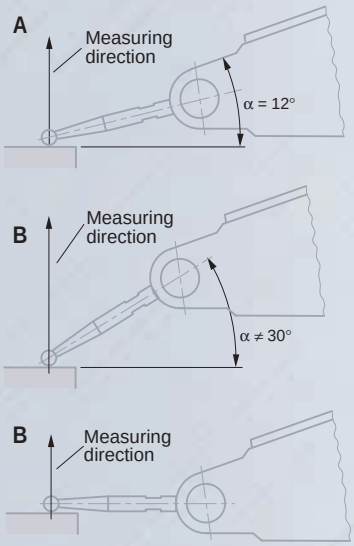
Dial test indicator (lever-type) with dial face mounted at right angle to the insert axis.



Angular position of 12 ° for stylus insert

The models INTERAPID 312 are designed to give a true reading when the angle α between the stylus and the workpiece surface is 12 ° (Fig. A).

In other measuring positions, including the parallel position of the stylus against the workpiece surface, the values read have to be corrected (Fig. B). With regard to this, also read in the instruction manual.



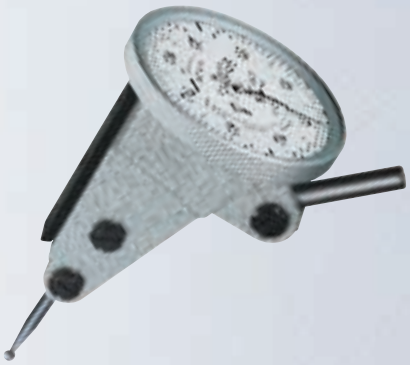
Technical Data

		0,01 mm		0,002 mm	
		Pointer revolution 1	2	1	2
	Deviation range	10 µm	20 µm	4 µm	8 µm
	Total deviation range	13 µm	23 µm	6 µm	10 µm
	Repeatability limit	3 µm		1 µm	
	Max. hysteresis	3 µm		2 µm	
	Measuring force	0,12 N		0,25 N	

INTERAPID® 312 Regular Models

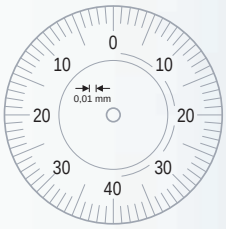
No			Bezel dia.		Inserts
mm					
74.111366	0,01	1,6	37,5	0 ÷ 40 ÷ 0	16,5
74.111367	0,01	1,6	30	0 ÷ 40 ÷ 0	16,5
74.111368	0,002	0,4	37,5	0 ÷ 10 ÷ 0	15,2
74.111369	0,002	0,4	30	0 ÷ 10 ÷ 0	15,2
in					
74.111370	*0.0005*	*0.060*	*1.5*	*0 ÷ 15 ÷ 0*	*0.65*
74.111371	*0.0005*	*0.060*	*1.2*	*0 ÷ 15 ÷ 0*	*0.65*
74.111965	*0.0005*	*0.060*	*1.5*	*0 ÷ 15 ÷ 0*	*2.675*
74.111374	*0.001*	*0.060*	*1.2*	*0 ÷ 15 ÷ 0*	*0.65*
74.111372	*0.0001*	*0.016*	*1.5*	*0 ÷ 4 ÷ 0*	*0.65*
74.111373	*0.0001*	*0.016*	*1.2*	*0 ÷ 4 ÷ 0*	*0.65*





INTERAPID® 312 Perpendicular Models

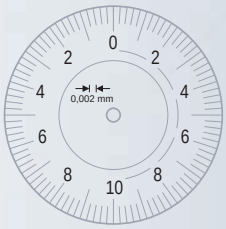
No			Bezel dia.		Insert
mm					
74.111375	0,01	1,6	37,5	0 ÷ 40 ÷ 0	16,5
74.111376	0,01	1,6	30	0 ÷ 40 ÷ 0	16,5
in					
74.1113774.11	*0.0005*	*0.060*	*1.5*	*0 ÷ 15 ÷ 0*	*0.65*
74.111378	*0.0005*	*0.060*	*1.2*	*0 ÷ 15 ÷ 0*	*0.65*
74.111958	*0.0005*	*0.060*	*1.5*	*0 ÷ 15 ÷ 0*	*2.675*
74.111379	*0.001*	*0.060*	*1.2*	*0 ÷ 15 ÷ 0*	*0.65*
74.111957	*0.0001*	*0.016*	*1.5*	*0 ÷ 4 ÷ 0*	*0.65*



74.111366



74.111367



74.111368



74.111369

SWISS MADE ✓

Rotating dial

Very low measuring force as in the table on page E-34

Lever system with friction drive preventing from overload

Accuracy: see table on page E-34

Supplied in a plastic case with:
1 insert with a 2 mm. dia. in hardened steel
1 key No. 18.60307

Identification number

Declaration of conformity

Full Indicator Sets with Accessories



Full sets consist of:

	INTERAPID 312 dial test indicators as shown in the tables hereafter
74.106331	Rectangular clamp attachment
74.108942	Reducing sleeve, metric
	or
74.108943	Reducing sleeve, inch
74.106026	Swivel holder, metric
	or
74.106931	Swivel holder, inch
74.111474	Case for measuring insert
18.60307	Key for the measuring insert

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Technical data as listed under each single product

Plastic case

Identification number

Declaration of conformity

INTERAPID® 312 Regular Models

No. mm	74.111366	74.111367	74.111368	74.111369	74.106331	74.108942	74.106026	74.111474	18.60307
74.111502	●				●	●	●	●	●
74.111503		●			●	●	●	●	●
74.111504			●		●	●	●	●	●
74.111505				●	●	●	●	●	●

No. *in*	*74.111370*	*74.111371*	*74.111372*	*74.111373*	74.106331	*74.108943*	*74.106931*	74.111474	18.60307
74.111508	●				●	●	●	●	●
74.111509		●			●	●	●	●	●
74.111510			●		●	●	●	●	●
74.111511				●	●	●	●	●	●

INTERAPID® 312 Perpendicular Models

No. mm	74.111375	74.111376	74.106331	74.108942	74.106026	74.111474	18.60307
74.111506	●		●	●	●	●	●
74.111507		●	●	●	●	●	●

No. *in*	*74.111377*	*74.111378*	74.106331	*74.108943*	*74.106931*	74.111474	18.60307
74.111513	●		●	●	●	●	●
74.111514		●	●	●	●	●	●

Measuring Inserts for INTERAPID® 312

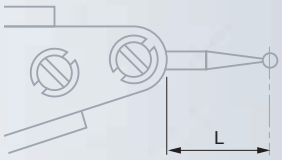
Ball tips in hardened steel or tungsten carbide

M1,7 coupling thread

Steel ball tips	Carbide ball tips			L
mm				
74.107893	**74.105993**	0,01	2	16,5
74.107895	**74.105994**	0,01	1,5	16,5
74.107897	**74.105995**	0,01	0,8	16,5
	74.106358	0,01	2	36,6*
	74.106360	0,01	0,8	36,6*
74.110481	**74.110482**	0,002	2	15,2
74.110492	**74.110491**	0,002	1,5	15,2
74.110493	**74.110507**	0,002	0,8	15,2
	74.110494	0,002	2	34*
	74.110508	0,002	0,8	34*
in				
74.107899	***74.105996***	*all***	*0.080*	*0.650*
74.107901	***74.105997***	*all***	*0.060*	*0.650*
74.107903	***74.105998***	*all***	*0.031*	*0.650*
	74.106361	*all***	*0.080*	*1.375**
	74.106363	*all***	*0.031*	*1.375**
	74.111913*		*0.080*	*2.675*
	74.111912**		*0.100*	*2.675*

mm / *in*	
18.60307	Key for measuring inserts
74.111474	Case for measuring inserts

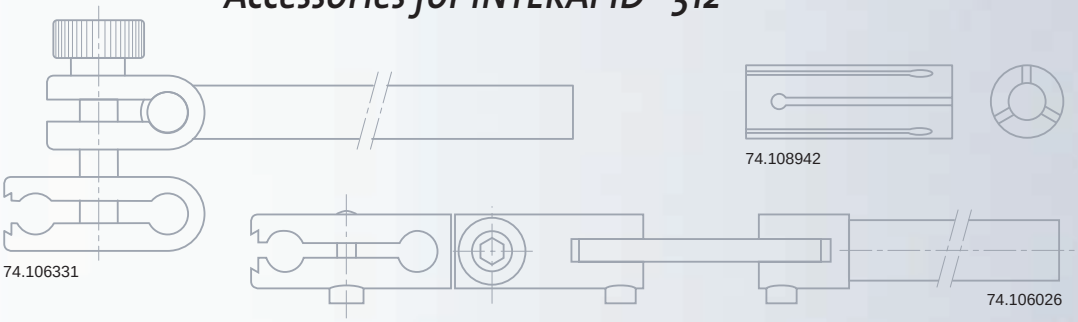
Length L of the measuring inserts



* *The length of the used insert changes the amplification factor of the lever system. Therefore, each read value must be doubled.*
** *Except for models No. 74.111965 and No. 74.111958*
*** *Only for model No. 74.111965*
**** *Only for model No. 74.111958*

Note
The original measuring insert mounted on every INTERAPID 312 and other inserts with same nominal length but having different tip diameters are completely interchangeable.

Accessories for INTERAPID® 312



		mm		*in*
74.106331	Rectangular clamping attachment, complete		**74.106331**	
18.40203	Rectangular attachment with clamp	13 x 6 x 50 *ø 5,6*	***18.50203***	*1/2 x 1/4 x 2* *ø 7/32*
74.108603	Double attachment with clamping point and dovetail	ø 4	**74.108603**	
74.106026	Swivel holder with clamping points and dovetail	ø 8 x 133 *ø 4*	***74.106931***	*ø 3/8 x 5.25*
74.108942	Reducing sleeve	*ø 8 / ø 4*	***74.108943***	*ø 3/8 / ø 5/32*
	Rectangular fixing shank		***74.111481***	*3/16 x 5/16*

ROCH ROCTEST Dial Test Indicators

- *Bidirectional measuring through automatic reversal inside the movement.*
- *Continuous clockwise pointer rotation providing clear unambiguous reading.*
- *Insensitive to magnetic fields.*
- *Jeweled movement with rubies.*
- *Ball-bearing lever mechanism with measuring insert swivelling through 240°.*
- *Very low measuring force.*
- *Full-metal construction giving exceptional robustness.*
- *One-piece housing with 3 dovetail mounting attachments.*







ROCTEST Regular Models

No			Bezel ø		Meas. insert
35.1761301	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
35.1761302	0,01	0,8	38	0 ÷ 0,4 ÷ 0	12,53
35.1761303*	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
35.1761305	0,01	0,5	38	0 ÷ 0,25 ÷ 0	36,53
35.1761311	0,002	0,2	28	0 ÷ 100 ÷ 0	12,53
35.1761312	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53

* Low-cost model (for information on the scope of delivery, see beneath).

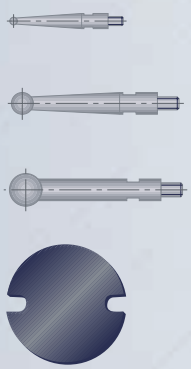
ROCTEST Perpendicular Models

No			Bezel ø		Measuring insert
35.1761321	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
35.1761322	0,01	0,8	38	0 ÷ 0,4 ÷ 0	12,53
35.1761331	0,002	0,2	28	0 ÷ 100 ÷ 0	12,53
35.1761332	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53

ROCTEST Lateral Models

No			Bezel ø		Measuring insert
35.1761341	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
35.1761342	0,01	0,8	38	0 ÷ 0,4 ÷ 0	12,53
35.1761351	0,002	0,2	28	0 ÷ 100 ÷ 0	12,53
35.1761352	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53

Measuring inserts



No Carbide ball tip	Ruby ball tip		mm
18.60201	**18.60301**	1	12,53
18.60202	**18.60302**	2	12,53
18.60203	**18.60303**	3	12,53
18.60211	**18.60304**	1	36,53
18.60212	**18.60305**	2	36,53
18.60213	**18.60309**	3	36,53
18.60307	Insert key wrench		

Hinweis
Note
The original measuring insert mounted on every ROCTEST and other inserts with same nominal length but having different tip diameters are completely interchangeable.

✓ SWISS MADE

DIN 2270
NF E 11-053

Rotating dial

Very low measuring force (see table on page E-47)

Movement with shock absorber

Lever system with friction clutch acting as load inhibitor

For accuracy, see in the table on page E-47.

Provided in a suited plastic case including:
3 measuring inserts
ø 1 mm No. 18.60201
ø 2 mm No. 18.60202
ø 3 mm No. 18.60203
1 key No. 18.60307
2 fixing shanks
ø 4 mm No. 18.40104
ø 8 mm No. 18.40105

Exceptions:

ROCTEST 35.1761303
in a plastic case incl.:
1 measuring insert
ø 2 mm No. 18.60202
1 key No. 18.60307
1 fixing shank
ø 8 mm No. 18.40105

ROCTEST 35.1761305
in a plastic case incl.:
1 36,53 mm meas. insert
ø 2 mm No. 18.60212
1 key No. 18.60307
1 fixing shank
ø 8 mm No. 18.40105

Identification number

Declaration of conformity

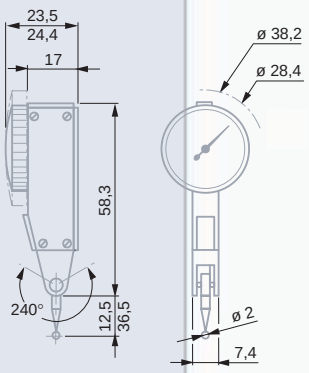
✓ SWISS MADE

Tungsten carbide ball tip or ruby

M1,4 coupling thread

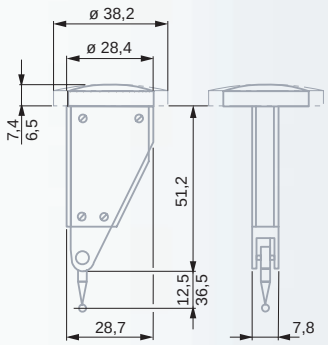
Regular Models

Models with dial mounted parallel to the insert axis .



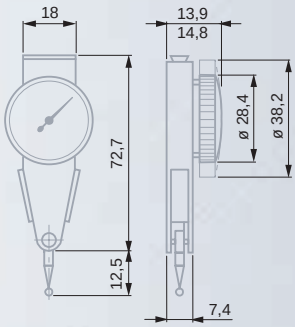
Perpendicular Models

Models with dial mounted at right angle to the insert axis.



Lateral Models

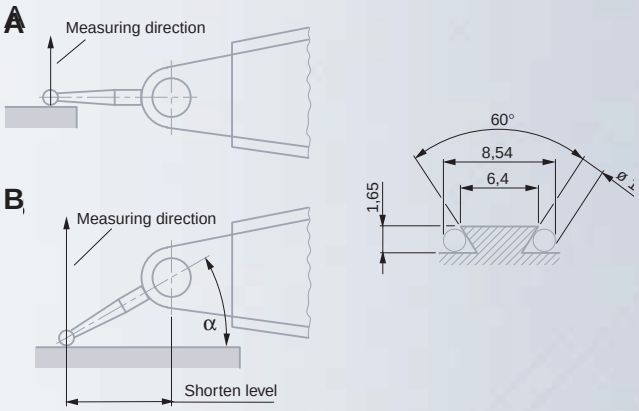
Models with dial mounted parallel to the insert axis, but on the lateral face of the housing.



Note for use of the MERCER lever-type dial test indicators

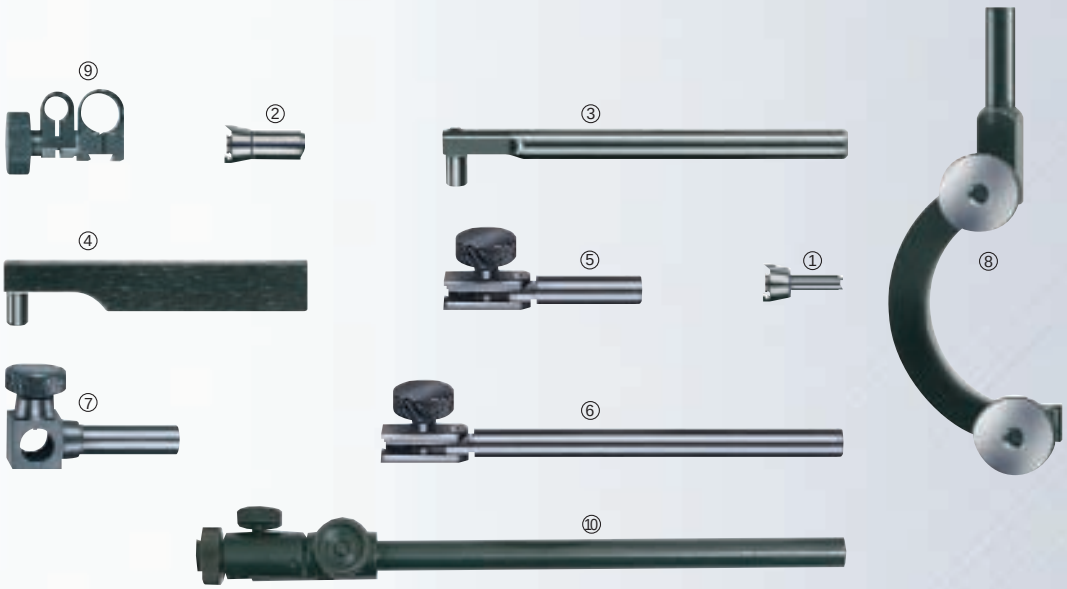
When the measuring insert is parallel to the workpiece surface (Fig. A), these dial test indicators give true reading as the amplification factor is 1:1.

In other measuring positions (angle α in Fig. B), the effective lever length changes so that the read value need be corrected. With respect to this, also refer to the instruction manual.



ROCTEST Accessories

For a detailed description of the components shown in this catalogue as well as the complete accessory sets and order numbers, see on page E-50.



MERCER Series 300
Dial Test Indicators (Lever-Type)

- *Bidirectional measuring through automatic reversal inside the movement.*
- *Continuous clockwise pointer rotation providing clear unambiguous reading.*
- *Insensitive to magnetic fields.*
- *Jeweled Movement with rubies.*
- *Ball-bearing lever system with measuring insert swivelling through 220 °.*
- *Full-metal construction giving exceptional robustness.*
- *One-piece housing with 3 dovetail mounting attachments.*







SWISS MADE ✓

DIN 2270 and factory standard

Rotating Dial

See in the table opposite

Lever system with friction clutch acting as load inhibitor

Tungsten carbide ball tips

Supplied in a suite plastic case including:
1 2 mm dia. insert
1 1/4 in dia. rigid fixing shank No. 18.50107

A 8 mm dia. fixing shank (part No. 18.40107 or a mounting lug (part No. 32.38013 can also be used instead of the 1/4 in dia. rigid shank. Both are provided at no extra cost if specified on order.

Identification number

Declaration of conformity

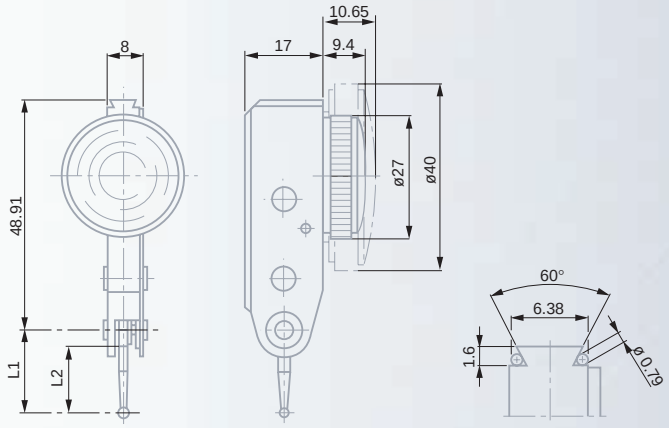
Inch Versions

N°		in	in	Bezel dia. mm		Measuring insert* L_1 in	L_2 in	N
18.26001	**301-1**	0.0005	0.030	27	0 ÷ 15 ÷ 0	0.6754	0.5278	≤ 0,25
18.26002	**303-1**	0.0001	0.008	27	0 ÷ 4 ÷ 0	0.7200	0.5724	≤ 0,25
18.26003	**305-1**	0.001	0.030	27	0 ÷ 15 ÷ 0	0.6754	0.5278	≤ 0,25
18.26004	**306-1**	0.0005	0.030	40	0 ÷ 15 ÷ 0	0.6754	0.5278	≤ 0,25
18.26005	**310-1**	0.001	0.080	27	0 ÷ 40 ÷ 0	1.800	1.6527	≤ 0,25
18.26006	**312-1**	0.0005	0.060	40	0 ÷ 30 ÷ 0	1.440	1.2035	≤ 0,25

Metric Versions

N°		mm	mm	Bezel dia. mm		Measuring insert* L_1 mm	L_2 mm	N
18.16001	**302-1**	0,01	0,8	27	0 ÷ 40 ÷ 0	18	14,26	≤ 0,25
18.16002	**304-1**	0,002	0,2	27	0 ÷ 10 ÷ 0	18	14,26	≤ 0,25
18.16003	**307-1**	0,01	0,8	40	0 ÷ 40 ÷ 0	18	14,26	≤ 0,25
18.16004	**311-1**	0,025	2,0	27	0 ÷ 10 ÷ 0	45	41,26	≤ 0,25
18.16005	**313-1**	0,01	1,6	40	0 ÷ 8 ÷ 0	36	32,26	≤ 0,25

* For both sizes L_1 and L_2, see drawing on page E-61.



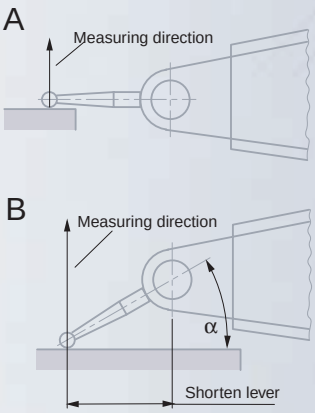
Accuracy

		0.001 in 0.0005 in	0.0001 in	0,025 mm 0,01 mm	0,002 mm
	Deviation range	0.0004 in	0.00012 in	10 µm	3 µm
	Total deviation range	0.0005 in	0.00015 in	13 µm	4 µm
	Repeatability limit	0.00015 in	0.00006 in	3 µm	1 µm
	Max. hysteresis	0.00015 in	0.00008 in	3 µm	1 µm

Note for use of the MERCER lever dial test indicators

When the measuring insert is parallel to the workpiece surface (Fig. A), these dial test indicators give true reading as the amplification factor is 1:1.

In other measuring positions (angle α in Fig. B), the effective lever length changes so that the read value need be corrected. With respect to this, also refer to the instruction manual.



MERCER TOP Quality
Dial Test Indicators (Lever-Type)

Models with extra long measuring span.

- *Bidirectional measuring through automatic reversal inside the movement.*
- *Continuous clockwise pointer rotation providing clear unambiguous reading.*
- *Insensitive to magnetic fields.*
- *Jeweld movement with rubies.*
- *Bell-bearing lever system with measuring insert swivelling through 180 °.*
- *Full-metal construction giving exceptional robustness.*
- *One-piece housing with 3 dovetail mounting attachments.*



SWISS MADE ✓

DIN 2270 and factory standard

Rotating Dial

See in the table opposite

Lever system with friction clutch acting as load inhibitor

Tungsten carbide ball tips

For sizes, see on the previous page E-59

Supplied in a suite plastic case including:
1 2 mm dia. insert
1 1/4 in dia. rigid fixing shank No. 18.50107

A 8 mm dia. fixing shank (part No. 18.40107 or a mounting lug (part No. 32.38013 can also be used instead of the 1/4 in dia. rigid shank. Both are provided at no extra cost if specified on order.

Identification number

Declaration of conformity

Inch Models

No	in	in	in	Bezel dia. in		Measuring insert* L_1 in	L_2 in	N
18.26011	0.0005	0.06	0.02	1.063	0 ÷ 10 ÷ 20	0.72	0.5724	≤ 0,35
18.26012	0.0005	0.06	0.02	1.575	0 ÷ 10 ÷ 20	0.72	0.5724	≤ 0,35
18.26013	0.0005	0.12	0.04	1.063	0 ÷ 20 ÷ 40	1.44	1.2924	≤ 0,20
18.26014	0.0005	0.12	0.04	1.575	0 ÷ 20 ÷ 40	1.44	1.2924	≤ 0,20
18.26015	0.0001	0.024	0.004	1.063	0 ÷ 20 ÷ 40	0.72	0.5724	≤ 0,30
18.26016	0.0001	0.024	0.004	1.575	0 ÷ 20 ÷ 40	0.72	0.5724	≤ 0,30

Metric Models

No	mm	mm	mm	Bezel dia. mm		Measuring insert* L_1 mm	L_2 mm	N
18.16011	0,01	1,5	0,5	27	0 ÷ 25 ÷ 50	18	14,26	≤ 0,35
18.16012	0,01	1,5	0,5	40	0 ÷ 25 ÷ 50	18	14,26	≤ 0,35
18.16013	0,01	3,0	1,0	27	0 ÷ 50 ÷ 100	36	32,26	≤ 0,20
18.16014	0,01	3,0	1,0	40	0 ÷ 50 ÷ 100	36	32,26	≤ 0,20
18.16015	0,002	0,6	0,1	27	0 ÷ 50 ÷ 100	18	14,26	≤ 0,30
18.16016	0,002	0,6	0,1	40	0 ÷ 50 ÷ 100	18	14,26	≤ 0,30

* For both sizes L_1 and L_2, see on page E-61.

Accuracy

	0.06 in	*0.12 in*	*0.024 in*	1,5 mm	3,0 mm	0,6 mm
	0.0005 in	*0.0005 in*	*0.0001 in*	0,025 mm 0,01 mm	0,01 mm	0,002 mm
Deviation span	*0.0007 in*	*0.0009 in*	*0.0005 in*	17 µm	24 µm	13 µm
Total deviation span	*0.0008 in*	*0.0012 in*	*0.0006 in*	20 µm	30 µm	15 µm
Repeatability limit	*0.00015 in*	*0.00025 in*	*0.0001 in*	3 µm	6 µm	1,5 µm
Max. hysteresis	*0.00015 in*	*0.00025 in*	*0.0001 in*	3 µm	6 µm	1,5 µm

Accessories for MERCER Series 300 and TOP Quality Lever Dial Test Indicators

Measuring Inserts



✓ SWISS MADE

Tungsten carbide ball tips

M1,6 coupling thread

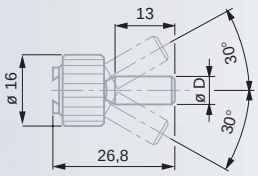
The original measuring insert mounted on every ROCTEST and other inserts with same nominal length but having different tip diameters are completely interchangeable.

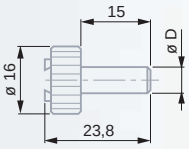
0,8 mm	2 mm	3 mm	Insert length L_2	Suitable for 300 series	TOP Quality
Inch Models					
18.66010	***18.66007***	***18.66017***	*0.5278 in*	*18.26001* *18.26003* *18.26004*	
18.66011	***18.66005***	***18.66018***	*0.5724 in*	*18.26002*	*18.26011* *18.26012* *18.26015* *18.26016*
18.66013	***18.66001***	***18.66020***	*1.2035 in*	*18.26006*	
18.66012	***18.66008***	***18.66019***	*1.6527 in*	*18.26005*	
18.66024	***18.66009***	***18.66025***	*1.2924 in*		*18.26013* *18.26014*
Metric Models					
18.66014	**18.66003**	**18.66021**	14,26 mm	18.16001 18.16002 18.16003	18.16011 18.16012 18.16016
18.66016	**18.66004**	**18.66023**	32,26 mm	18.16005	18.16013 18.16014
18.66015	**18.66006**	**18.66022**	41,26 mm	18.16004	

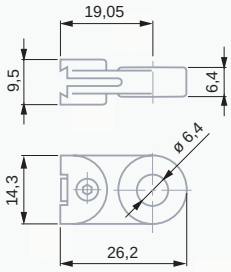
Attachments for MERCER Series 300 and TOP Quality Lever-Type Dial Test Indicators

For a detailed description of the components shown in this catalogue as well as the complete accessory sets and order numbers, see on page E-50.

		D
Dovetail fixing shanks and mounting lug		
18.50106	Fixing shank swivelling through ± 30 °	ø 1/4 in
18.50107	Rigid fixing shank	ø 1/4 in
18.40106	Fixing shank swivelling through ± 30 °	ø 8 mm
18.40107	Rigid fixing shank	ø 8 mm
18.40108	Fixing shank swivelling through ± 30 °	ø 4 mm
18.40109	Rigid fixing shank	ø 4 mm
32.38013	Mounting lug	

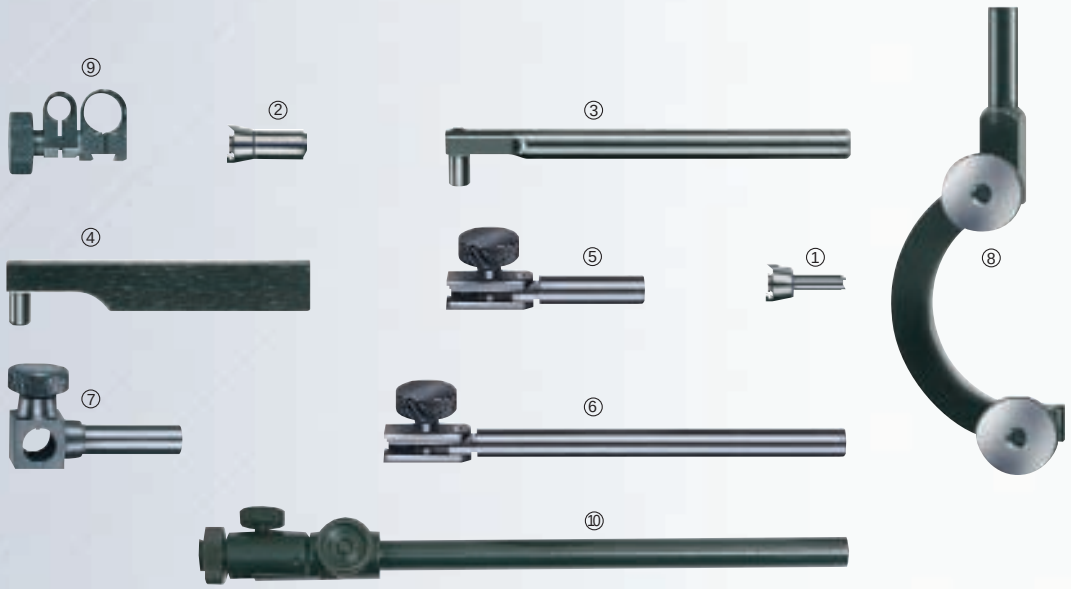






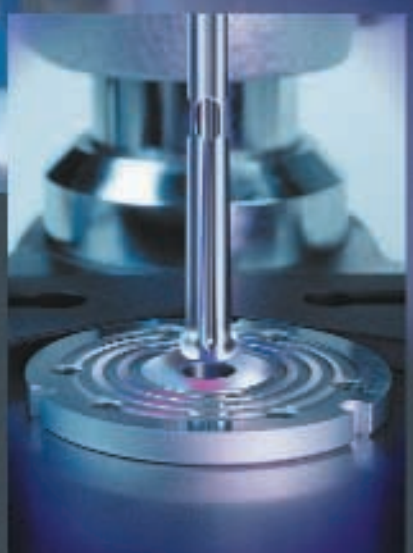
Additional Clamping Accessories

For a detailed description of the components shown in this catalogue as well as the complete accessory sets and order numbers, see on page E-50.



Comparative Measuring Instruments





TESA® YA
Internal Measuring Instruments

Specially designed for small bores from 0,47 up to 12,20 mm – Determine dimensions as well as form and shape deviations through 2-point measurements – Excellent repeatability.

These measuring instruments have an interchangeable measuring head housing a needle as well as a clamping shank with a 8 mm diameter fixing bore for a dial gauge or any other sensor.

- *Measuring heads with spherical faces for through holes.*
- *Measuring heads with faces forming a rounded edge on the front face of the measuring head for blind bores and short centring shoulder*
- *Measuring heads for deep bores.*

✓

Holder

With mount for instrument with 8h6 dia. clamping shank

Measuring heads

See tables

See tables

Hardened, dull-chrome plated steel, ≈ 1000 HV 25

Measuring needles

See tables

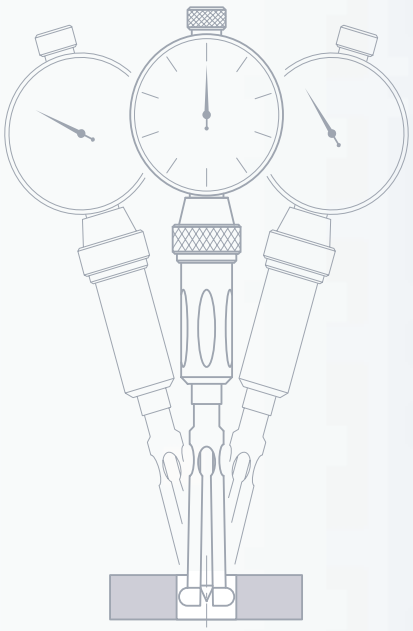
Steel hardened to ≈ 800 HV 25

Setting rings

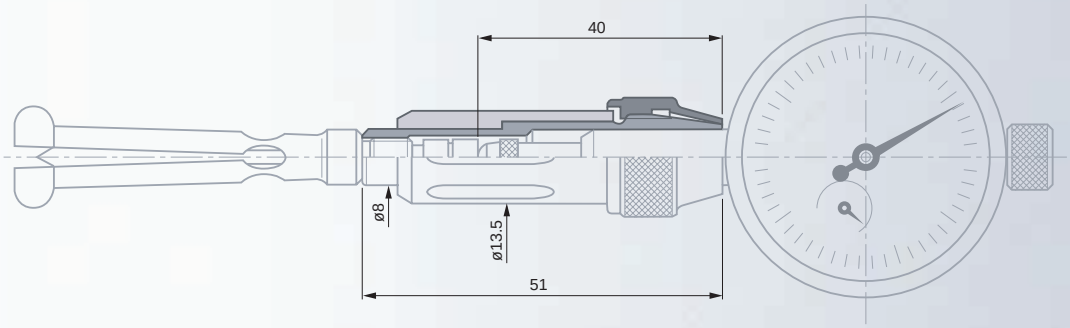
Nominal diameter
≤ 1,5 mm: insert with synthetic sapphire
> 1,5 mm: steel hardened to ≈ 780 HV 25

Reliability of engraved size: ± 2s = 1 µm

1 µm







Complete Sets for Through Holes Measurement



N°	mm
15.10000	0,47 ÷ 0,97
15.10100	0,95 ÷ 2,45
15.10200	2,30 ÷ 6,20
15.10300	6,00 ÷ 12,20

✓

Technical data: see page F-3

Complete set includes:
1 holder No. 15.40201
Measuring heads, needles and setting rings as shown on table opposite.
1 TESA YR dial gauge No. 14.10212 (reading to 0,01 mm, 40 mm dial diameter)
1 Extension for a 10 mm measuring insert No. 35.40501

Plastic case

Declaration of conformity

Single Components for Through Holes Measurement

N°	mm	Depth / mm max.	min.	N°	N°	mm
Measuring heads				*Needles*	*Setting Rings*	
15.40401	0,47 ÷ 0,53	1,5	0,25	**15.40001**	**15.40601**	0,50
15.40402	0,52 ÷ 0,58	1,8	0,27	**15.40001**	**15.40602**	0,55
15.40403	0,57 ÷ 0,67	2,0	0,29	**15.40002**	**15.40603**	0,60
15.40404	0,65 ÷ 0,77	2,5	0,31	**15.40002**	**15.40604**	0,70
15.40405	0,75 ÷ 0,87	2,8	0,33	**15.40002**	**15.40605**	0,80
15.40406	0,85 ÷ 0,97	3,0	0,35	**15.40002**	**15.40606**	0,90
15.40407	0,95 ÷ 1,15	11	0,6	**15.40003**	**15.40607**	1,00
15.40408	1,07 ÷ 1,25	11	0,6	**15.40003**	**15.40608**	1,10
15.40409	1,17 ÷ 1,35	11	0,6	**15.40003**	**15.40609**	1,20
15.40410	1,27 ÷ 1,45	11	0,6	**15.40003**	**15.40610**	1,30
15.40411	1,37 ÷ 1,55	11	0,6	**15.40003**	**15.40611**	1,40
					15.40612	1,50
15.40412	1,50 ÷ 1,90	17	0,9	**15.40004**	**15.40613**	1,75
15.40413	1,70 ÷ 2,15	17	0,9	**15.40004**	**15.40614**	2,00
15.40414	2,05 ÷ 2,45	17	0,9	**15.40004**	**15.40615**	2,25
15.40415	2,30 ÷ 2,75	22	1,2	**15.40005**	**15.40616**	2,50
15.40416	2,65 ÷ 3,20	22	1,2	**15.40005**	**15.40617**	3,00
15.40417	3,05 ÷ 3,50	22	1,2	**15.40005**	**15.40618**	3,25
15.40418	3,35 ÷ 3,85	22	1,2	**15.40005**	**15.40619**	3,50
15.40419	3,80 ÷ 4,30	22	1,2	**15.40005**	**15.40620**	4,00
15.40420	4,20 ÷ 5,00	40	2,0	**15.40006**	**15.40621**	4,50
15.40421	4,70 ÷ 5,50	40	2,0	**15.40006**	**15.40622**	5,00
15.40422	5,30 ÷ 6,20	40	2,0	**15.40006**	**15.40623**	5,75
15.40423	6,00 ÷ 6,80	40	2,0	**15.40006**	**15.40624**	6,50
15.40424	6,60 ÷ 7,50	40	2,0	**15.40006**	**15.40625**	7,00
15.40425	7,30 ÷ 8,15	40	2,0	**15.40006**	**15.40626**	7,75
15.40426	8,00 ÷ 8,80	40	2,0	**15.40006**	**15.40627**	8,50
15.40427	8,50 ÷ 9,40	50	2,0	**15.40006**	**15.40628**	9,00
15.40428	9,15 ÷ 10,00	50	2,0	**15.40006**	**15.40629**	9,50
15.40429	9,60 ÷ 10,80	50	3,3	**15.40007**	**15.40630**	10,00
15.40430	10,65 ÷ 12,20	50	3,3	**15.40007**	**15.40631**	11,50

Complete Sets for Measuring Blind Bores and Short Centring Shoulders



No.	mm
15.10400	1,50 ÷ 2,45
15.10500	2,30 ÷ 6,20
15.10600	6,00 ÷ 12,20

✓

Technical data: see page F-3

Complete set includes:
1 holder No. 15.40201

Measuring heads, needles and setting rings as shown on table opposite

1 TESA YR dial gauge No. 14.10212 (reading to 0,01 mm, 40 mm dial diameter)
1 Extension for a 10 mm measuring insert No. 35.40501

Plastic case

Declaration of conformity

Single Components for Measuring Blind Bores and Short Centring Shoulders

No.	mm	Depth / mm max.	Depth / mm min.	No.	No.	mm
Measuring heads				*Needles*	*Setting rings*	
15.40501	1,50 ÷ 1,90	17	0,3	**15.40009**	**15.40613**	1,75
15.40502	1,70 ÷ 2,15	17	0,3	**15.40009**	**15.40614**	2,00
15.40503	2,05 ÷ 2,45	17	0,3	**15.40009**	**15.40615**	2,25
15.40504	2,30 ÷ 2,75	22	0,3	**15.40010**	**15.40616**	2,50
15.40505	2,65 ÷ 3,20	22	0,3	**15.40010**	**15.40617**	3,00
15.40506	3,05 ÷ 3,50	22	0,3	**15.40010**	**15.40618**	3,25
15.40507	3,35 ÷ 3,85	22	0,2	**15.40010**	**15.40619**	3,50
15.40508	3,80 ÷ 4,30	22	0,2	**15.40010**	**15.40620**	4,00
15.40509	4,20 ÷ 5,00	40	0,5	**15.40011**	**15.40621**	4,50
15.40510	4,70 ÷ 5,50	40	0,5	**15.40011**	**15.40622**	5,00
15.40511	5,30 ÷ 6,20	40	0,5	**15.40011**	**15.40623**	5,75
15.40512	6,00 ÷ 6,80	40	0,5	**15.40011**	**15.40624**	6,50
15.40513	6,60 ÷ 7,50	40	0,5	**15.40011**	**15.40625**	7,00
15.40514	7,30 ÷ 8,15	40	0,5	**15.40011**	**15.40626**	7,75
15.40515	8,00 ÷ 8,80	40	0,5	**15.40011**	**15.40627**	8,50
15.40516	8,50 ÷ 9,40	50	0,5	**15.40011**	**15.40628**	9,00
15.40517	9,15 ÷ 10,00	50	0,5	**15.40011**	**15.40629**	9,50
15.40518	9,60 ÷ 10,80	50	1,0	**15.40012**	**15.40630**	10,00
15.40519	10,65 ÷ 12,20	50	1,0	**15.40012**	**15.40631**	11,50

Complete Set for Measuring Deep Bores

No.	mm
15.10700	4,25 ÷ 8,50

✓

Technical data: see page F-3

Complete set includes:
1 holder No. 15.40201

Measuring heads, needles and setting rings as shown on table page F-6

1 64 mm depth extension No. 15.40101
1 TESA YR dial gauge No. 14.10212 (reading to 0,01 mm, 40 mm dial diameter)
1 Extension for a 10 mm diameter measuring insert No. 35.40501

Plastic case

Declaration of conformity

Single Components For Measuring Deep Bores

	mm	Depth / mm max.	min.			mm
Measuring heads				*Needles*	*Setting rings*	
15.40431	4,22 ÷ 4,75	95*	1,7	**15.40008**	**15.40621**	4,50
15.40432	4,73 ÷ 5,38	95*	1,7	**15.40008**	**15.40622**	5,00
15.40433	5,36 ÷ 6,02	95*	1,7	**15.40008**	**15.40623**	5,75
15.40434	6,00 ÷ 6,65	95*	1,7	**15.40008**	**15.40701**	6,50
15.40435	6,63 ÷ 7,29	95*	1,7	**15.40008**	**15.40702**	7,00
15.40436	7,27 ÷ 7,92	95*	1,7	**15.40008**	**15.40703**	7,75
15.40437	7,90 ÷ 8,56	95*	1,7	**15.40008**	**15.40704**	8,50

* Require the use of the 64 mm depth extension No. 15.40101

Special executions

Available upon request:

- *Tungsten carbide tipped measuring heads.*
- *Measuring heads for special inspection jobs.*
- *Measuring heads for through holes and deep bores covering other application ranges*
- *Tungsten carbide measuring needles.*
- *Depth extensions 125, 250, 500, 750 and 1000 mm.*

✓

Technical data: see on page F-3

Complete set includes:
1 holder No. 15.40201

Measuring heads, needles and setting rings as shown on table opposite

1 TESA YR dial gauge No. 14.10212 (reading to 0,01 mm, 40 mm dial diameter)
1 Extension for a 10 mm measuring insert No. 35.40501

Plastic case

Declaration of conformity

Optional Accessory For TESA® YA Internal Measuring Instruments

Measuring stand for stationary use.

16.39009	NTERAPID UA 30 measuring stand
to be equipped with:	
16.10201	UK 25 sliding measuring arm
16.40000	UAZ 10 depth strop



✓

Technical data: see on page G-8

Declaration of conformity

TESA® VERIBOR® Bore Gauges

The proven construction of these bore gauges has established their reputation for high reliability over decades – Perform 2-point measurements on bores from 4,5 up to 550 mm – Detect form and shape deviations – Feature a clamping shaft with a 8 mm diameter fixing bore for mounting a dial gauge, an indicator or any other sensor.

- *Bore gauges with virtually clearance free circular articulation ensuring high repeatability.*
- *Shaft made of invar steel to prevent the measurement results from being affected by hand warmth transfer.*
- *Centring shoe to ensure a correct alignment of the gauge into the bore to be inspected.*
- *Tungsten carbide for high resistance to wear.*

✓

See tables

Measuring bolts and anvils fitted with tungsten carbide ball tips

Mount for indicating feature having a 8h6 dia. shaft

VERIBOR alone with no additional feature: 2 µm

VERIBOR alone with no additional feature: ± 2s = 0,5 µm



Models TESA® VERIBOR® without Dial Gauge

✓

Complete set includes:
1 single TESA VERIBOR
1 set of fixed measuring anvils covering the application range, interchangeable

Wooden case

Declaration of conformity

N°	mm
57.10012	4,5 ÷ 6
57.10013	6 ÷ 12,5
57.10014	12 ÷ 25
57.10015	25 ÷ 50
57.10016	50 ÷ 150
57.10018	50 ÷ 300
57.10017	240 ÷ 550

Models TESA® VERIBOR® with Dial Gauge

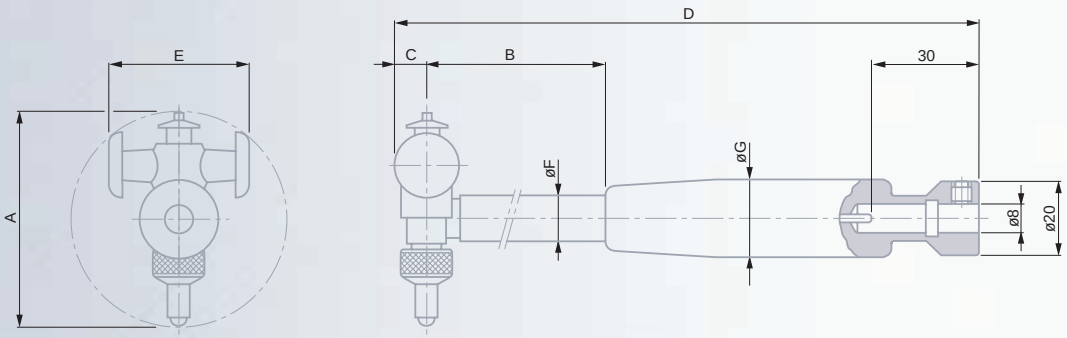
					mm
	57.10054	**57.10061**			4,5 ÷ 6
	57.10055	**57.10062**			6 ÷ 12,5
	57.10056	**57.10063**			12 ÷ 25
			57.10057	**57.10064**	25 ÷ 50
			57.10058	**57.10065**	50 ÷ 150
			57.10059	**57.10066**	50 ÷ 300
			57.10060	**57.10067**	240 ÷ 550
Supplied with a TESA's dial gauge					
	14.12010	**14.12510**	**14.12310**	**14.12511**	
mm	40	40	58	58	
mm	0,01	0,001	0,01	0,001	

✓

Complete set includes:
1 single TESA VERIBOR
1 set of fixed measuring anvils covering the full application range, interchangeable
1 dial gauge as shown on the table opposite
1 dial gauge guard

Wooden case

Declaration of conformity



Amm	mm	Bmm	Cmm	Dmm	Emm	Fmm	Gmm
4,5 ÷ 6	0,35	74	2	138	3,3	3,8	16
6 ÷ 12,5	0,5	93	2,6	156	4,3	4,9	16
12 ÷ 25	0,9	106	4,5	194	7,8	7,9	19
25 ÷ 50	1,3	140	6	228	16	8	19
50 ÷ 150	1,4	173	10	279	36	12	23
50 ÷ 300	1,4	173	10	279	66	12	23
240 ÷ 550	1,6	227	14	347	112	18	28

Special Models

Available on request:

- *TESA VERIBOR for blind bores and centring shoulders.*
- *TESA VERIBOR for hard-to-reach bores - elbow-shaped model.*
- *Internal measuring instruments for checking the distance between two plan parallel surfaces.*
- *Instruments for measuring gear pitch diameters.*

Optional Accessories for TESA® VERIBOR® Bore Gauges

Extensions in a set

For expanded application range up to 300 mm dia. To be used with VERIBOR No. 57.10016, 57.10058 or 57.10065

No	mm
57.40001	
Consisting of:	
1 centring shoe	
3 extensions	50 mm



Depth extensions (not pictured)

To be mounted on VERIBOR shafts from 25 to 550 mm dia. for depth increase (Size B – Drawing, see on page F-8)

No	mm
57.60026	250
57.60027	500
57.60028	750
57.60029	1000

Dial gauge guard

Protects the dial gauge from direct knocks. Also prevents dial from being unintentionally rotated.

No	mm
57.60012	ø 40
57.60013	ø 58



Cable holder

For electronic probe. To be mounted at the shaft end of your VERIBOR.

No
57.60014



Clear/Memory Switch

For cancelling a value stored in the electronic length measuring instrument such as TESATRONIC. Easily and quickly.

No
57.60025



Setting device for TESA VERIBOR

Used with gauge blocks that serve as material measures (not included). Supplied in a wooden case.

No	mm
57.40004	4,5 ÷ 300
57.40005	160 ÷ 550



ROCH ALESOTEST Bore Gauges

Self-aligning and self-centring bore gauges with 3-line contact – All ROCH ALESOTEST are designed for measuring not only blind bores but also through bores as well as short centering shoulders, except for the models covering the application ranges from 6 up to 10 mm.

- *Robustly built, these bore gauges are ideally suited for part series inspection on the production floor.*
- *ROCH ALESOTEST are used in conjunction with a value sensor (must be ordered separately). Use of a mechanical or electronic dial gauge or axial probe is recommended.*



✓ Factory standard

Bolts spaced 120 ° apart

The three measuring bolts are retracted for easy entry into the bore to be checked

Measuring bolts for application ranges

6 to 10 mm in hardened steel, 550 HV 30

10 to 100 mm with tungsten carbide coating, hardness 1300 HV 5

Aluminium coated main part

Application range 6 to 50 mm : 4 µm
50 to 100 mm : 5 µm

Both given values are valid for the bore gauges alone, without value sensor.

For additional setting rings, refer to page C-24.

Models 40 mm up to 100 mm are provided with an extension rod for the measuring insert L = 10 mm

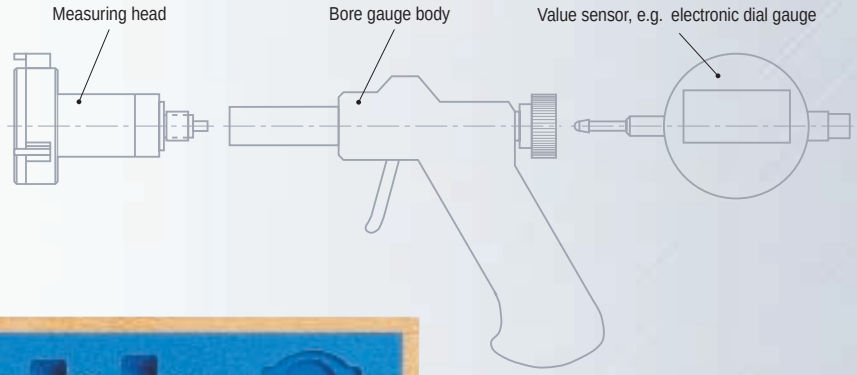
Wooden case with free room for a 60 mm dia. dial gauge

Identification number

Declaration of conformity

Full Partial Sets

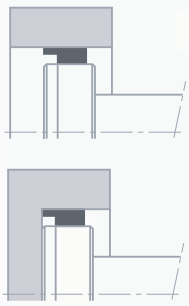
	mm		mm			mm		mm
Full partial sets including:		*Measuring heads*		*Main part*	*Setting rings*		*Extensions*	
08.1764703	6 ÷ 10	08.1720351	6 ÷ 8	08.1764653	21.1625101	8	08.1625081	100
		08.1720353	8 ÷10					
08.1764706	10 ÷ 20	08.1720356	10 ÷ 12,5	08.1764655	21.1625102	12,5	08.1625082	100
		08.1720358	12,5 ÷ 15		21.1625103	17,5		
		08.1720360	15 ÷ 17,5					
		08.1720362	17,5 ÷ 20					
08.1764708	20 ÷ 40	08.1720364	20 ÷ 25	08.1764657	21.1625104	25	08.1625083	150
		08.1720366	25 ÷ 30		21.1625105	35		
		08.1720368	30 ÷ 35					
		08.1720370	35 ÷ 40					
08.1764710	40 ÷ 70	08.1720372	40 ÷ 50	08.1764659	21.1625106	45	08.1625084	150
		08.1720374	50 ÷ 60		21.1625107	60		
		08.1720376	60 ÷ 70					
08.1764712	70 ÷ 100	08.1720378	70 ÷ 85	08.1764661	21.1625108	75	08.1625084	150
		08.1720380	85 ÷ 100		21.1625110	90		

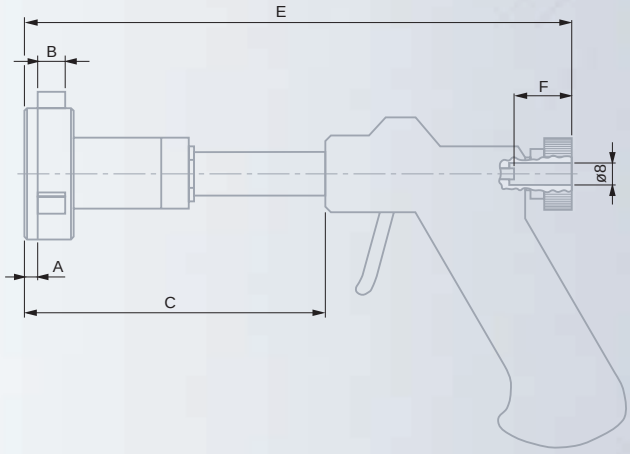




Cases for Partial Sets

No	mm
08.1669521	6 ÷ 10
08.1669522	10 ÷ 20
08.1669523	20 ÷ 40
08.1669524	40 ÷ 70
08.1669525	70 ÷ 100





mm	Amm*	Bmm	Cmm	Emm	Fmm
6 ÷ 10	1,2	3	54,5	144,4	18,4
10 ÷ 15	0	6,5	64,5	154,5	18,4
15 ÷ 20	0	6,8	64,5	154,5	18,4
20 ÷ 40	0	8,5	70	160	28,4
40 ÷ 70	0	14,5	103,7	198,7	29,4
70 ÷ 100	0	14,5	134,7	216,7	28,3

* Non-applicable for the models from 10 mm since the measring bolts are close to the instrument's front face.

TESADIA® Plug Gauge

Easy-to-handle plug gauge for 2-point or 3-point measurement of cylindrical bores – Ideal for blind bores and short centring shoulders with diameters ranging from 2,98 up to 250 mm.

- *Features a built-in probe that can be connected to a TESA's electronic measuring instrument, e.g. TESATRONIC or TESA Interface Box BP 880.*
- *Specially suited for recurrent measuring on the production floor as well as for receiving and final inspection of medium and large-sized batches of parts.*
- *Equipped with a guiding cylinder that renders swinging the plug gauge to find the culmination point unnecessary. Self-centering and self-aligning plug gauge.*



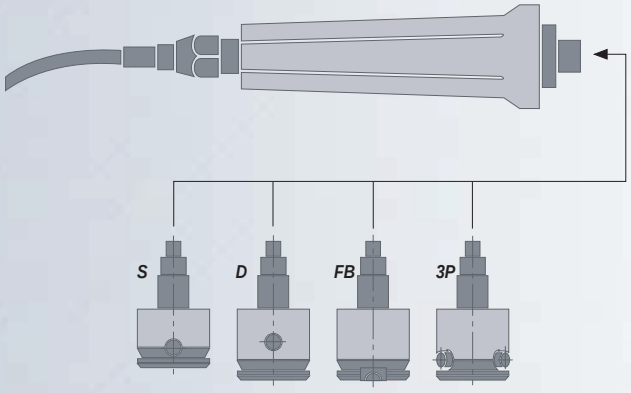
TESADIA® Handle Unit

- *With built-in TESA GT 21 axial probe.*
- *Mechanical device for fine adjustment, stress-relieved probe cable.*
- *Possible connexion of a probe from another source that is compatible with TESA GT 21.*

Plug Gauge

- *Equipped with both a measuring head and guiding cylinder.*
- *Uses the measuring needle with reversal wedge at one end to transfer the sweeping movement of the measuring inserts to the electronic probe.*
- *Houses a guiding cylinder having a special profile for unrestrainedly introduction of the plug gauge into the bore to be measured. No locking, no tilting.*
- *Choice of gauging contacts offering optimum adaptation to the parts to be checked:*

– *tungsten carbide tipped (not suited for non-ferrous metal alloy);*
– *hard-chrome plated (partially suited for non-ferrous metal alloy);*
– *ruby contacts (suited for non-ferrous metal alloy);*
– *diamond contacts (suited for soft light alloy).*
– *synthetic contacts (suited for polished surfaces)*



S 2-point plug gauge in standard execution for through holes
D 2-point plug gauge with longer guiding cylinder for through holes
FB Plug gauge for blind bores
3P 3-point plug gauge for through holes

Ask for a quotation for plug gauges with own setting rings as well as electronic length measuring instruments .

Specify nominal dimension, both upper and lower limits of size as well as bore material.

✓

Measuring faces: see opposite

Plug gauges with built-in probe
- 2-point models: 1 %
- 3-point models: 3 %

These percentages refer to the measuring span of each plug gauge

Plug gauges with built-in probe
- 2-point model: ≤ 1 µm
- 3-point model: ≤ 2 µm

Plug gauges with built-in probe: ≤ 0,4 µm

0,3 to 1,2 N according to the relevant model

10 °C to 35 °C

- 25 °C to 55 °C

Declaration of conformity

✓

0 to 30 mm

Mobile measuring bolt mounted on a plain bearing and fitted with a semi-circular releasing disc plate.

Measuring inserts supplied in pairs. One is tighten on the measuring bolt, the other on the fixed measuring stop using one indexing pin with a 1 mm dia. and two M1,4 clamping screws.

Resting table with vertical and longitudinal adjustment facility
Surface area:
24 x 9,5 mm
Adjustment range
vertical: 15 mm
longitudinal: 14 mm
Tightening screws.

Sensor (must be ordered separately), e.g. electronic, mechanical or precision dial gauge, analogue or digital axial probe with a 8 mm dia.

Main body in cast iron. Other parts in hardened steel and ground.

Produced by the sensor used. The bench SH.30 has no spring for the measuring force.

Accuracy is usually influenced by the measuring instrument as well as both the flatness and parallelism of the measuring faces of the inserts used.

Precision of the insert attachment
Tolerance in flatness for both clamping faces: 0,05 mm
Tolerance in axial positioning of both indexing pins against the measuring bolt axis: 0,05 mm

Tolerance in parallelism of the table surface against the measuring bolt axis: 0,05 mm

Also see drawing.

2,1 kg

Transport packing

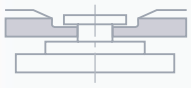
Declaration of conformity

INTERAPID® SHE.30 and SHE.35 Small Measuring Benches

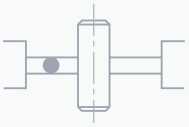
The ideal solution for precise inspection of small part series dedicated to watch-making and precision mechanics – Fast in measuring and changing from one type of part to another – Wide choice of specially designed measuring inserts for the broadest variety of measuring applications.

INTERAPID® SHE.30 for External Dimensions

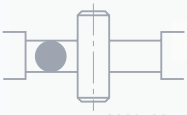




33.60300



S33010070



S33010071



S33010072

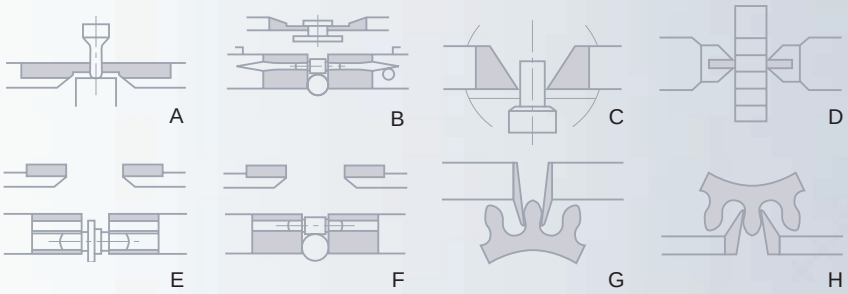
33.30004	**INTERAPID SHE.30 small horizontal measuring bench for external dimensions**, without measuring inserts.

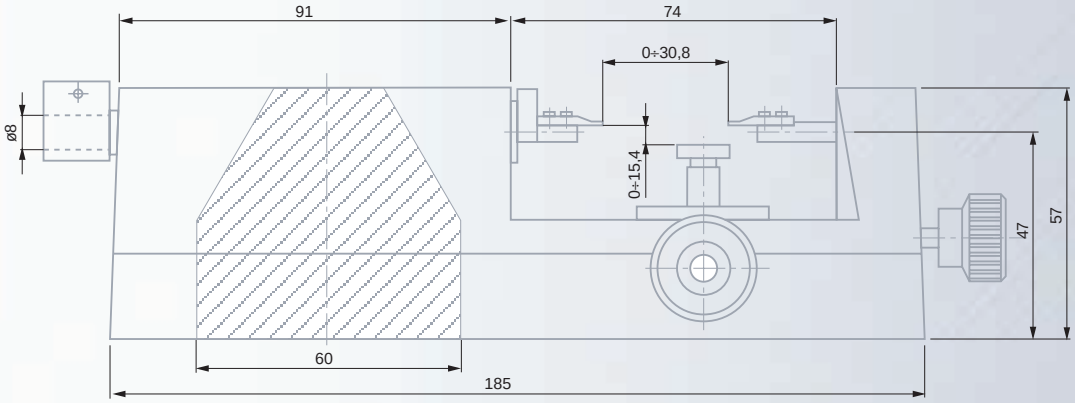
Tungsten carbide tipped measuring inserts in pairs

33.60300	Flat measuring face, 3,5 mm long, 0,4 mm high.
S33010070	Cylindrical pin with a flat measuring face, 1,2 mm dia.
S33010071	Cylindrical pin with a flat measuring face, 2 mm dia.
S33010072	Knife-edge measuring face, 3,5 mm long, 0,05 mm high, 40 °.

* 0,1 mm and 1,5 mm thick measuring inserts also available on request.

Special Measuring Inserts Available on Request (examples only)





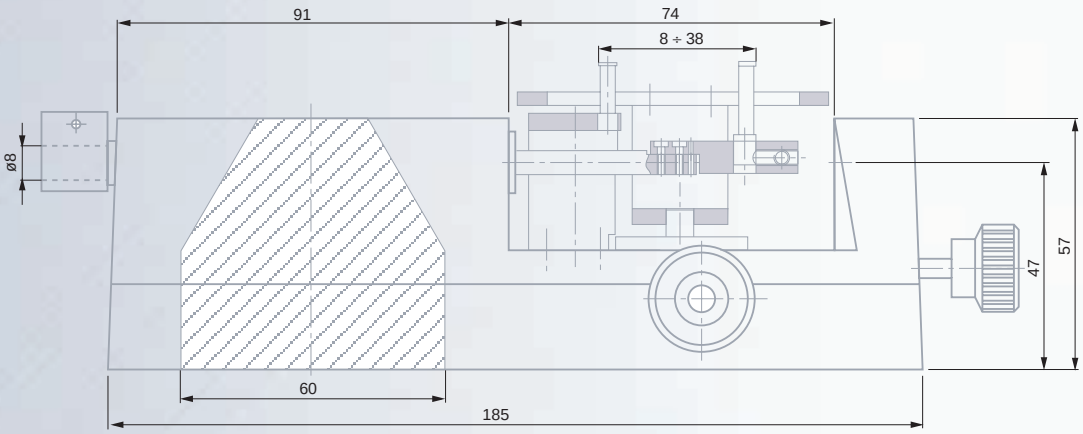
INTERAPID® SHE.35 for Internal Dimensions



33.30006	**INTERAPID SHE.35 small horizontal measuring bench for internal dimensions**, with measuring inserts	**8 up to 38 mm**

Special measuring inserts available on request.





✓

30 mm

8 up to 38 mm (std accessory)

Mobile measuring bolt mounted on a plain bearing and fitted with a retracting ball handle

Measuring inserts supplied in pairs. Can be exchanged. Provided with a 4 mm dia. fixing shaft.

Height adjustable resting table
Surface area:
40 x 70 mm
Adjustment range: 8 mm
1 tightening screw.

Sensor (must be ordered separately), e.g. electronic or mechanical dial indicator, precision dial gauge, analogue or digital axial probe with a 8 mm clamping diameter.

Main body in cast iron. Other parts in hardened steel and ground.

Measuring inserts with tungsten carbide measuring faces

Produced by the sensor used. The bench has no spring for the measuring force.

Accuracy is usually influenced by the measuring instrument as well as the type of the inserts used.

2,3 kg

Transport packing

Declaration of conformity

TESA® QUICK-CONTROL Measuring Instrument for Stationary Use

Versatile instrument for comparative measurement of internal and external dimensions – Ideal for part series inspection – Accommodates a clamping fixture for mounting either a mechanical dial gauge, electronic indicator or axial probe having a 8 mm diameter fixing shank.

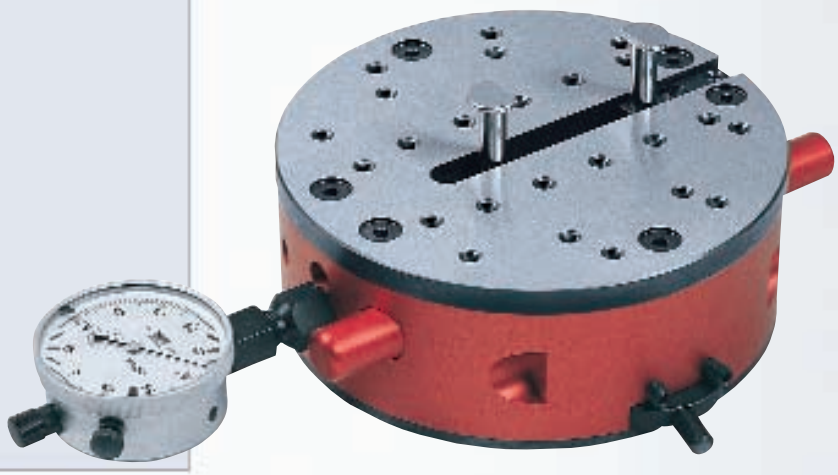
- *Solidly built, easily mounted, simple to use.*
- *Wide application range from the smallest internal dimension of 2 mm up to the highest external dimension of 425 mm.*
- *Measures workpieces with plan parallel surfaces as well as cylindrical or conical surfaces, e.g. shafts, through holes, blind bores, short centring shoulders grooves and wall thickness – Checks gear diameters – Determines form and position errors such as roundness, concentricity, coaxiality errors etc.*

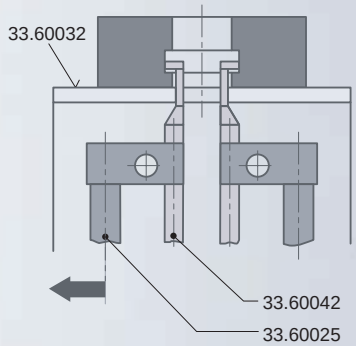
✓
Hardened steel inserts
Finish lapped measuring faces
QUICK-CONTROL alone: 2 µm
0 to 10 N, adjustable. Can be reversed from «neutral» to internal or external measuring
Plastic case
Identification number
Declaration of conformity

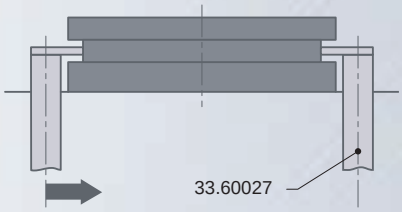
		mm	in	mm	in
		Internal dimensions		External dimensions	
33.30000	**QUICK-CONTROL 1**	8,5 ÷ 195	*0.33 ÷ 7.68*	0 ÷ 170	*0 ÷ 6.70*
Supplied with the standard accessories listed below (sensor such as dial gauge not included)					
33.60022	1 Insert holder 8 mm dia. fixing bore	2 ÷ 143	*0.08 ÷ 5.63*	≤ 115	*≤ 4.52*
33.60023	1 Insert holder 8 mm dia. fixing bore	115 ÷ 208	*4.52 ÷ 8.18*	97 ÷ 170	*3.81 ÷ 6.69*
33.60025	1 Pair of insert adapters Shaft diameter from 8 mm to 5 mm				
33.60027	1 Pair of measuring inserts	≥ 30	*≥ 1.18*	> 0	*> 0*
33.60029	1 Pair of measuring inserts	≥ 25	*≥ 0.98*	> 0	*> 0*
33.60031	1 Pair of measuring inserts	≥ 8,5	*≥ 0.33*	> 0	*> 0*
33.60032	1 Pair of raising supports, 20 mm high				
33.60033	1 Extension 20 mm, for dial gauge plunger				
33.60034	1 Locking segment, for insert holder				
33.30001	**QUICK-CONTROL 2** Identical to QUICK-CONTROL 1	47 ÷ 430	*1.85 ÷ 16.93*	0 ÷ 425	*0 ÷ 16.73*

Optional Accessories

A wide variety of optional accessories is available upon request for typical measuring applications.



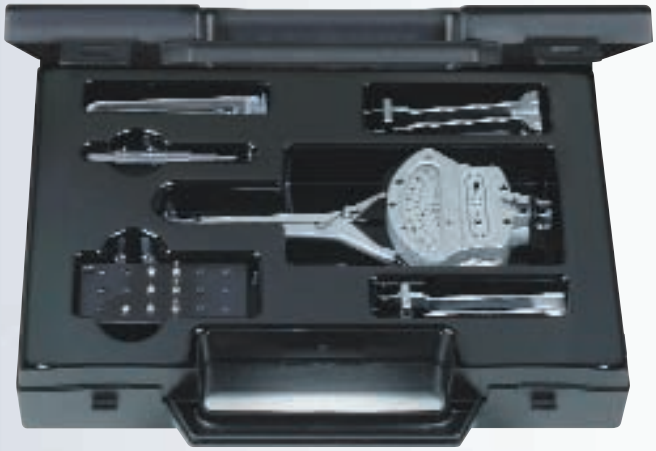




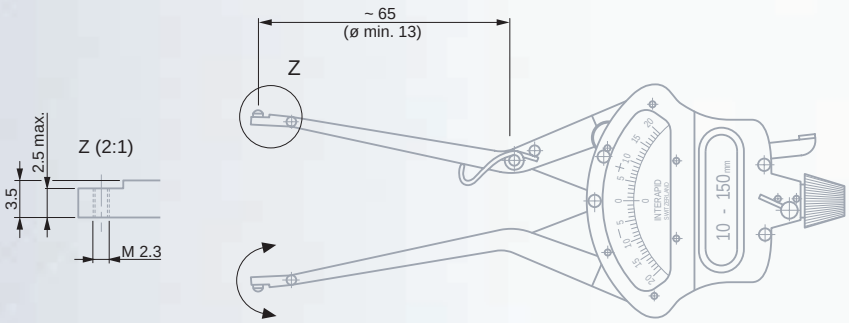
INTERAPID® IRA 2 Comparator Gauges

The finest instrument for measuring by comparison – Performs two or three-point measurements depending on the accessory used – Suitable for through holes, blind bores, grooves and undercuts as well as for internal measuring of slots with plan parallel surfaces, for instance.

- *Wide application range from 10 up to 150 mm.*
- *Ideal in design, light in weight for easy and safe handling.*
- *Built-in indicator to 0,01 mm and fine indication setting.*
- *Centring fixture for 2-point measurements.*



No mm	=	No in
79.105704	**INTERAPID IRA 2**	***79.108640***
Supplied with the following standard accessories:		
79.105667	3 Measuring inserts in hardened steel (No. for 1 item)	***79.105697***
79.105668	3 Short measuring inserts in hardened steel (No. for 1 item)	***79.105698***
79.105669	3 Long measuring inserts in hardened steel (No. for 1 item)	***79.105699***
79.112126	2 Adjustable contact arms for bores ≥ 6 mm	**79.112126**
79.110111	1 Small insert holder for 3-point contact	***79.110113***
79.110110	1 Large insert holder for 3-point contact	***79.110112***
79.108502	1 Centring arm for bores 15 ÷ 30 mm	***79.108504***
79.108503	1 Centring arm for bores 30 ÷ 150 mm	***79.108505***
79.105694	1 Special screwdriver	**79.105694**
79.111401	**INTERAPID IRA 2 md** Same as INTERAPID IRA 2, but furnished with the measuring inserts mentioned below instead of those in steel No. 79.10566 or 79.105697.	***79.111402***
79.105756	3 Tungsten carbide tipped measuring inserts (No. for 1 item)	***79.105759***



✓ SWISS MADE

0,01 mm
or 0.0005 in

10 to 150 mm
0.375 to 6 in

± 0,20 mm
to ± 0.008 in

Arm
clearance:
10 mm

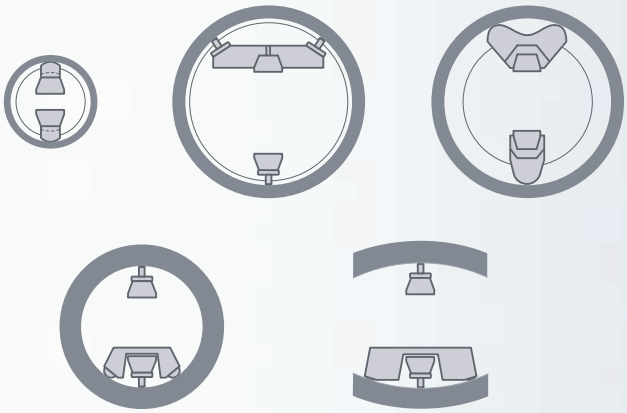
Hardened
steel
or tungsten carbide
tipped measuring faces:
see opposite

3,5 N

Plastic case

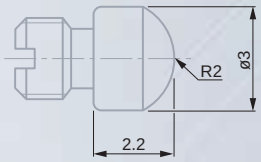
Identification
number

Declaration
of conformity

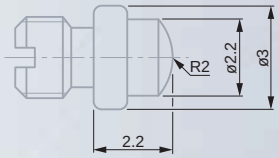




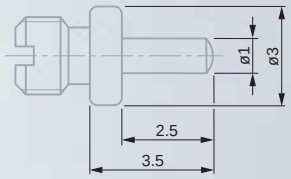
79.105667



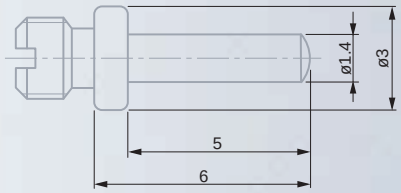
79.105756



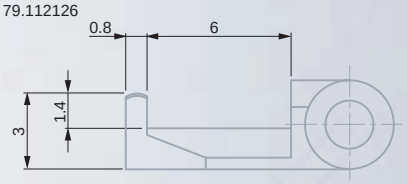
79.105668



79.105669



79.112126

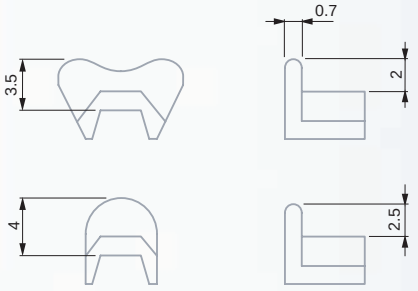


Optional Accessories

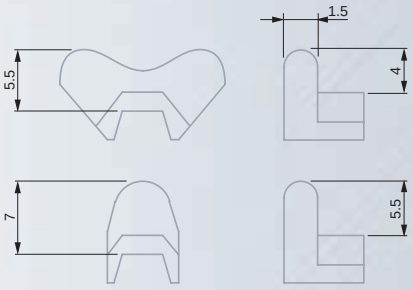
79.112051	1 set = 2 small measuring inserts (1-point contact) 1 small measuring insert (2-point contact)
79.112052	1 set = 2 large measuring inserts (1-point contact) 1 large measuring insert (2-point contact)
79.108830	Holder

✓

Steel, hardened and chrome plated



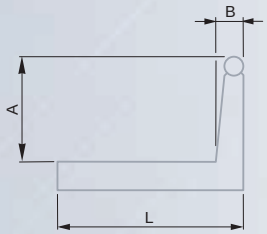
79.112051



79.112052

ETALON® Calliper Gauges for Internal and External Dimensions, 0,01 or 0,02 mm Reading

Long-lasting movement – No gear transmission – Tungsten carbide measuring faces for high wear resistance – Concentric pointer for sure reading of the millimetres – Lifting lever for the legs.





Short Leg External Calliper Gauges

	mm	mm	A mm	B mm	L mm
79.19000	0 ÷ 10	0,01	9,3	3,0	39,7
79.19002	10 ÷ 20	0,01	9,3	3,0	39,7
79.19004	20 ÷ 30	0,01	9,3	3,0	39,7
79.19006	30 ÷ 40	0,01	9,3	3,0	39,7
79.19008	40 ÷ 50	0,01	9,3	3,0	39,7



Long Leg External Calliper Gauges

	mm	mm	A mm	B mm	L mm
79.19009	0 ÷ 20	0,02	9,3	3,0	87
79.19011	20 ÷ 40	0,02	9,3	3,0	87
79.19013	40 ÷ 60	0,02	9,3	3,0	87



Short Leg Internal Calliper Gauges

	mm	mm	A mm	B mm	L mm
79.19015	5 ÷ 15	0,01	1,1	1,5	39,7
79.19016	10 ÷ 20	0,01	3,3	1,5	39,7
79.19017	15 ÷ 25	0,01	4,0	1,8	39,7
79.19018	20 ÷ 30	0,01	7,0	2,5	39,7
79.19019	25 ÷ 35	0,01	9,0	2,8	39,7
79.19020	30 ÷ 40	0,01	9,75	2,8	39,7
79.19021	35 ÷ 45	0,01	9,75	2,8	39,7
79.19022	40 ÷ 50	0,01	9,75	2,8	39,7



Long Leg Internal Calliper Gauges

	mm	mm	A mm	B mm	L mm
79.19023	10 ÷ 30	0,02	3,3	1,8	87
79.19024	20 ÷ 40	0,02	7,0	2,5	87
79.19025	30 ÷ 50	0,02	9,75	2,8	87
79.19026	40 ÷ 60	0,02	9,75	2,8	87

✓

0,01 mm or. 0,02 mm

Tungsten carbide faces

Models with reading to
0,01 mm: 30 µm
0,02 mm: 60 µm

Models with reading to
0,01 mm: 20 µm
0,02 mm: 40 µm

Plastic case

Identification number

Inspection report with a declaration of conformity

INTERAPID® Dial Thickness Gauges

These dial gauges with a frame are made to measure plastic parts as well as hard and soft materials such as glass, wood, paper, rubber, metal sheets etc. – All models have a dial that can be rotated for zero setting.

Small-sized models with 0,1 mm scale division

With open measuring inserts when not in use.

✓
Throat depth: 15 mm
37 mm in diameter
10 mm
Non-interchangeable inserts
40 µm
Plastic case
Declaration of conformity

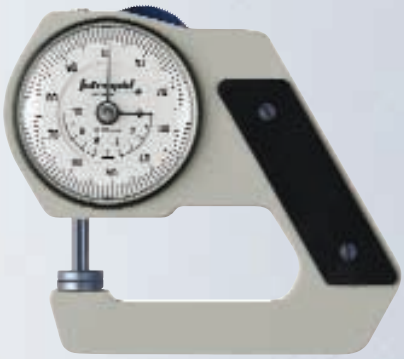
N°	mm	mm		mm
74.115586	0 ÷ 10	0,1	flat	ø 6,35
74.115587	0 ÷ 10	0,1	flat	ø 10
74.115665	0 ÷ 10	0,1	rounded	ø 10
74.115588	0 ÷ 10	0,1	spherical	ø 10



Small-sized models with 0,01 mm scale division

✓
40 mm in diameter
1 mm
Non-interchangeable inserts
With retraction device for measuring inserts
0,7 N
15 µm
Plastic case
Declaration of conformity

N°	mm	N°	mm	mm	mm		mm
74.115629	18	**74.115633**	45	0 ÷ 10	0,01	flat	ø 6,35
74.115630	18	**74.115634**	45	0 ÷ 10	0,01	flat	ø 10
74.115631	18	**74.115635**	45	0 ÷ 10	0,01	round.	ø 10
74.115632	18	**74.115636**	45	0 ÷ 10	0,01	spher.	ø 10



Models with roller inserts, 0,01 mm scale division

✓
Throat depth: 50 mm
57 mm in diameter
1 mm
Non-interchangeable inserts
With retraction device for measuring inserts
≈ 1,2 N
Dial gauge: 15 µm
Cardboard box
Declaration of conformity



N°	mm	mm	Diam. mm	Length mm	Side discs
			Cylindrical rollers		
74.115647	0 ÷ 5	0,01	8,4	8,7	with
74.115648	0 ÷ 5	0,01	8,4	8,7	without

Standard models with 0,1 mm scale division



✓
57 mm in diameter
10 mm
Interchangeable meas. inserts
With retraction device for measuring inserts
≈ 1 N
Dial gauge: 40 µm
Cardboard box
Declaration of conformity

N°	mm	mm	mm		mm	N° Inserts in pair
74.115594	0 ÷ 10	0,1	50	flat	ø 30	**74.115686**
74.115595	0 ÷ 10	0,1	50	flat	ø 20	**74.115687**
74.115596	0 ÷ 10	0,1	50	flat	ø 10	**74.115726**
74.115597	0 ÷ 10	0,1	50	rounded	ø 10	**74.115727**
74.115598	0 ÷ 10	0,1	50	spheri.	ø 5	**74.115728**

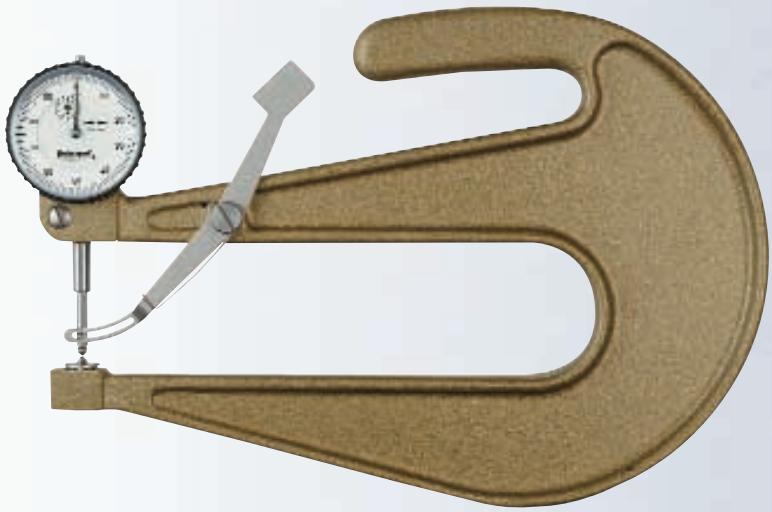
Standard models with 0,01 mm scale division



✓
57 mm in diameter
1 mm
Interchangeable meas. inserts
With retraction device for measuring inserts
≈ 1 N
Dial gauge: 15 µm
Cardboard box
Declaration of conformity

mm 50	mm 100					mm 50	mm 100
N°	N°	mm	mm		mm	N° Inserts in pair	N° Inserts in pair
74.115642	**74.115649**	0 ÷ 10	0,01	flat	ø 30	**74.115686**	**74.115729**
74.115643	**74.115650**	0 ÷ 10	0,01	flat	ø 20	**74.115687**	**74.115730**
74.115644	**74.115651**	0 ÷ 10	0,01	flat	ø 10	**74.115726**	**74.115688**
74.115645	**74.115652**	0 ÷ 10	0,01	rounded	ø 10	**74.115727**	**74.115689**
74.115646	**74.115653**	0 ÷ 10	0,01	spheri.	ø 5	**74.115728**	**74.115690**

Models with deep throat and 0,01 mm scale division



✓
57 mm in diameter
1 mm
Interchangeable meas. inserts
With retraction device for measuring inserts
≈ 2 N
Dial gauge: 15 µm
Cardboard box
Declaration of conformity

mm 0 ÷ 10	mm 0 ÷ 30	mm	mm		mm	Inserts in pair
74.115654	**74.115659**	0,01	200	flat	ø 30	**74.115734**
74.115655	**74.115660**	0,01	200	flat	ø 20	**74.115735**
74.115656	**74.115661**	0,01	200	flat	ø 10	**74.115731**
74.115657	**74.115662**	0,01	200	rounded	ø 10	**74.115732**
74.115658	**74.115663**	0,01	200	spherical	ø 5	**74.115733**

Models with increased throat depth and 0,1 mm scale division



✓
57 mm in diameter
10 mm
With one base for stationary use
Interchangeable meas. inserts
With retraction device for measuring inserts
≈ 2 N
Dial gauge: 40 µm
Cardboard box
Declaration of conformity

mm 200	mm 300	mm 400	mm	mm		mm	Inserts in pairs
74.115614	**74.115619**	**74.115624**	0 ÷ 30	0,1	flat	ø 30	**74.115734**
74.115615	**74.115620**	**74.115625**	0 ÷ 30	0,1	flat	ø 20	**74.115735**
74.115616	**74.115621**	**74.115626**	0 ÷ 30	0,1	flat	ø 10	**74.115731**
74.115617	**74.115622**	**74.115627**	0 ÷ 30	0,1	rounded	ø 10	**74.115732**
74.115618	**74.115623**	**74.115628**	0 ÷ 30	0,1	spherical	ø 5	**74.115733**

Models for film thickness measurement, 0,001 mm scale division



	mm	mm		mm
74.115664	0 ÷ 1	0,001	flat	ø 6,35

✓
Throat depth: 30 mm
Highly stable frame with heat insulating handle
57 mm in diameter
0,2 mm
Non-interchangeable inserts
With retraction device for measuring inserts
≈ 2 N
Dial gauge: 5 µm
Cardboard box
Declaration of conformity

Models with 0,1 mm scale division

With open measuring inserts when not in use.



mm 0 ÷ 10	mm 0 ÷ 20	mm 0 ÷ 30	mm	mm		mm	Inserts in pair
74.115589	**74.115599**	**74.115604**	0,1	50	flat	ø 30	**74.115686**
74.115590	**74.115600**	**74.115605**	0,1	50	flat	ø 20	**74.115687**
74.115591	**74.115601**	**74.115606**	0,1	50	flat	ø 10	**74.115726**
74.115592	**74.115602**	**74.115607**	0,1	50	rounded	ø 10	**74.115727**
74.115593	**74.115603**	**74.115608**	0,1	50	spherical	ø 5	**74.115728**

✓
57 mm in diameter
1 mm
Interchangeable inserts
Dial gauge: 40 µm
Cardboard box
Declaration of conformity

Models with 0,1 mm scale division

With open measuring inserts when not in use.

✓
57 mm in diameter
10 mm
Interchangeable meas. inserts
Dial gauge: 40 µm
Cardboard box
Declaration of conformity



N°	mm	mm	mm		mm	Inserts in pair
74.115609	0 ÷ 30	0,1	100	flat	ø 30	**74.115729**
74.115610	0 ÷ 30	0,1	100	flat	ø 20	**74.115730**
74.115611	0 ÷ 30	0,1	100	flat	ø 10	**74.115688**
74.115612	0 ÷ 30	0,1	100	rounded	ø 10	**74.115689**
74.115613	0 ÷ 30	0,1	100	spherical	ø 5	**74.115690**

Models with 0,1 mm scale division

With open measuring inserts when not in use.

✓
57 mm in diameter
1 mm
Interchangeable meas. inserts
Dial gauge: 15 µm
Cardboard box
Declaration of conformity

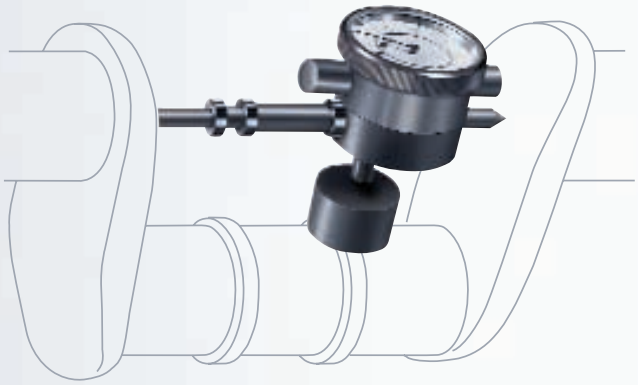


N°	mm	mm	mm		mm	Inserts in pair
74.115637	0 ÷ 10	0,01	50	flat	ø 30	**74.115686**
74.115638	0 ÷ 10	0,01	50	flat	ø 20	**74.115687**
74.115639	0 ÷ 10	0,01	50	flat	ø 10	**74.115726**
74.115640	0 ÷ 10	0,01	50	rounded	ø 10	**74.115727**
74.115641	0 ÷ 10	0,01	50	spherical	ø 5	**74.115728**

ROCH Crankshaft Dial Gauges

For detecting radial runout errors on crankshafts caused by bearings misalignment – Suitable for assembly, servicing, failure detection of motors and compressors, for instance – Available in two versions.

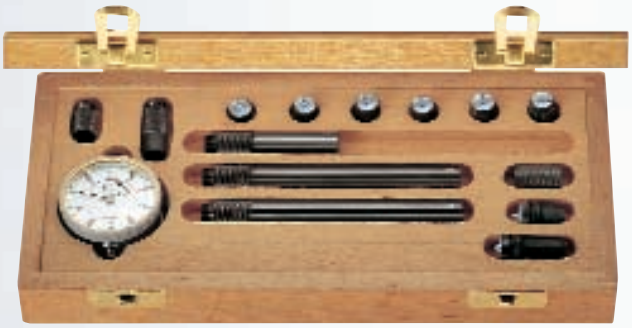
- *With a pendulum that keeps the dial gauge into horizontal position with dial face permanently up.*
- *Without pendulum, but with a dual face dial gauge.*



	mm
Version with one single dial and pendulum	
14.1764093	45 to 150
14.1764094	60 to 300
14.1764095	60 to 500
Versions with a dual face dial, without pendulum	
14.1764091	49 to 363







✓

Factory standard

0,01 mm

3,5 mm

40 mm diameter rotating dial for zero-setting

See table

The instrument is inserted between two crank webs. The crankshaft is then rotated while looking at the dial gauge. Bearings misalignment results in an elastic deformation of the crankshafts during their rotation. As the distance from the crank webs changes, the dial gauge gives a varying indication representing the elastic deformation.

Extension rods made from steel. Measuring faces in hardened steel.

Every extension rod is specially made to suit the relevant application range

Wooden case

Declaration of conformity

Measuring Supports, Measuring Stands and Auxiliary Fixtures







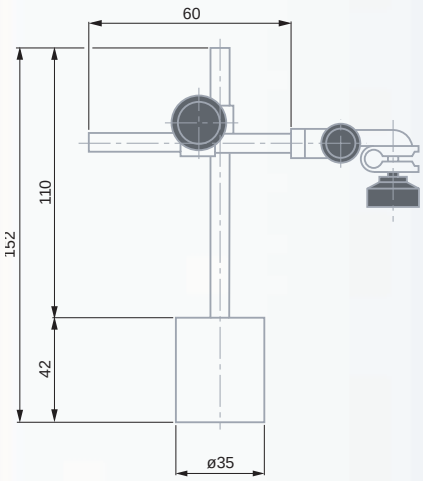


INTERAPID® Small Magnetic Supports

Ideal for dial test indicators (lever-type) or dial gauges having a 40 mm dial diameter – Versatile due to 2 rigid articulation points and fine adjustment.

Model UJ 15





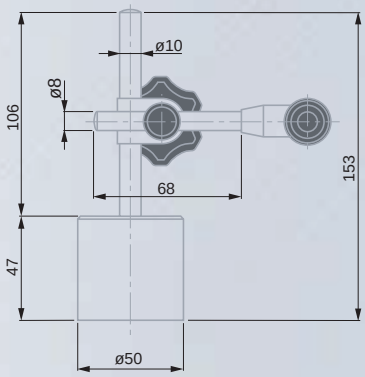
- ✓
- Rounded base with permanent magnet
- Holding force on a flat surface
  UJ 15 : ≈ 220 N
  UJ 15G : ≥ 350 N
- Dovetail clamp with a 8 mm diameter fixing bore
- UJ 15 : 0,47 kg
  UJ 15G : 0,93 kg
- Supplied without sensor
- Suited carrying case
- Declaration of conformity

Steel base plate

- 50 x 80 x 20 mm
- 0,60 kg

Model UJ 15G

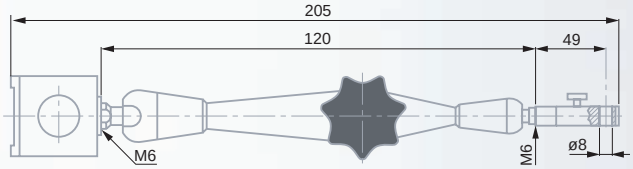




No		
16.39007	INTERAPID small magnetic support UJ 15	
16.39016	INTERAPID small magnetic support UJ 15G	
Accessory		
16.40501	Steel base plate to use UJ 15 as mobile support	

Model with Articulated Arm

No		mm
16.39025	INTERAPID small magnetic support with articulated arm	Full length 205
consisting of:		
16.69013	1 Articulated arm	Length 120
16.69012	1 Dovetail clamp with fine adjustment	
16.69014	1 Magnetic base	L x B x H 30 x 30 x 30



- ✓
- Base has a vee recess and one magnetic flat face with disengageable magnet. Articulations made from duralumin.
- Holding force on a flat surface : ≈ 170 N
- Dovetail clamp with a 8 mm diameter fixing bore
- 0,4 kg
- Supplied without sensor
- Suited carrying case
- Declaration of conformity



Magnetic Supports with Flat or Vee Base





16.39011	INTERAPID magnetic support with flat base
16.39012	INTERAPID magnetic support with vee base

✓

Model with a flat base has 2 rounded permanent magnets

Model with a flat base: 72 x 38 x 11 mm. Model with a V-base: 72 x 38 x 26 mm.

Holding force: ≈ 180 N for the flat base or ≈ 260 N for the V-base

Clamp with a 8 mm diameter fixing bore

Supplied without sensor

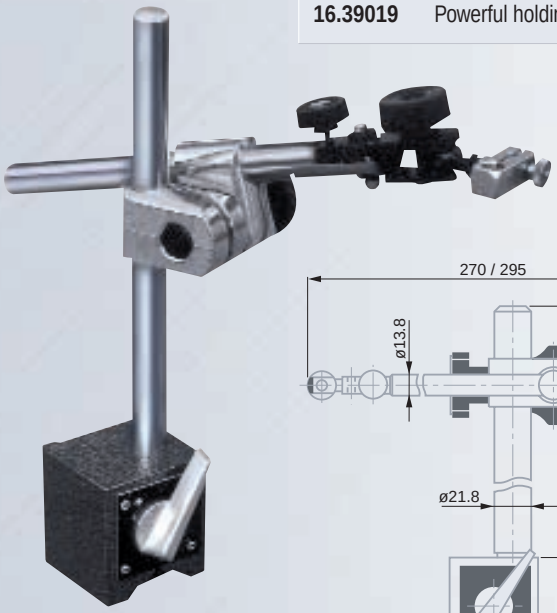
Suited carrying case

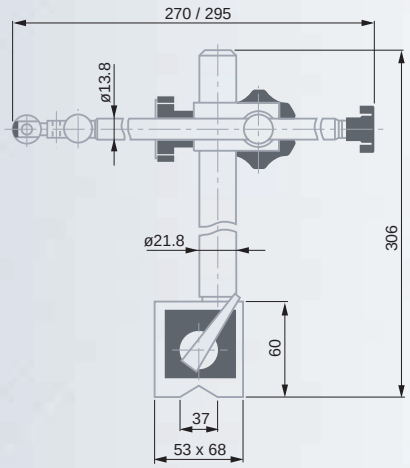
Declaration of conformity

INTERAPID® Magnetic Supports

Standard Model and Models with Powerful Holding Force

		N	Fine adjustment	V-base for:
16.39017	Standard model	≈ 600	yes	70 ÷ 220
16.39018	Powerful holding force	≈ 1000	no	70 ÷ 220
16.39019	Powerful holding force	≈ 1000	yes	70 ÷ 220







✓

Disengageable magnet

Clamp with a 8 mm dia. fixing bore

Supplied without sensor

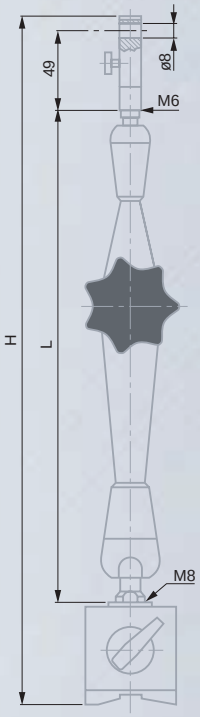
Suited carrying case

Declaration of conformity

Models with Articulated Arm

Attach simply and securely using a single locking star knob – Solid arm with highly rigid articulations.





✓ SWISS MADE

Magnetic base has 2 flat and 1 V-faces

Articulations made from duralumin

Disengageable permanent magnet

Dovetail clamp with a 8 mm diameter fixing bore

Magnetic base (L x W x H): 60 x 50 x 55 mm

1,45 kg or 1,85 kg

Supplied without sensor

Suited carrying case

Declaration of conformity

No		H mm	L mm	N	Fine adjustment	V-base for:
16.39022	Magnetic support	310		≈ 700	yes	30 ÷ 150
16.39023	Magnetic support	390		≈ 700	yes	30 ÷ 150
consisting of:						
16.69009	Articulated arm (Nr. 16.39022)		200			
16.69010	Articulated arm (Nr. 16.39023)		280			
16.69012	Clamp				yes	
16.69011	Magnetic base			≈ 700		30 ÷ 150

Model with Flexible Arm

For hard-to-reach locations – Holds securely on any surface using the clamping lever.



✓

Magnetic base has 2 flat and 1 vee faces

Disengageable permanent magnet

Full length: 350 mm

Dovetail clamp with a 8 mm diameter fixing bore

Holding force on a flat surface: ≈ 450 N

Supplied without sensor

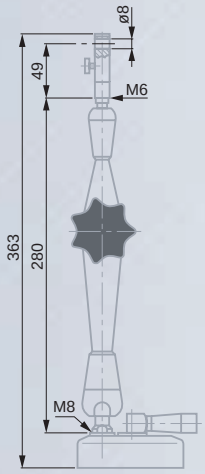
Suited carrying case

Declaration of conformity

No		
16.39020	INTERAPID magnetic support with flexbar arm	

INTERAPID® Measuring Support with Suction Base

Holds firmly on any plain, flat surface – Clamps easily and reliably using a single locking star knob – Free from magnetic fields.

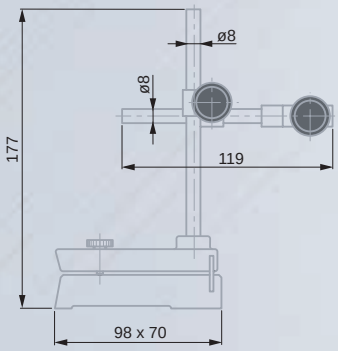


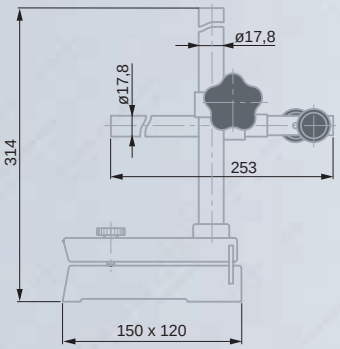


No		H mm	L mm	N	Fine adjustment
16.39024	Support with suction base	363	280	≈ 400	yes
consisting of:					
16.69010	Articulated arm		280		
16.69012	Clamp				yes
16.69015	Round suction base			≈ 400	

- Swiss Made ✓
- Round suction base in duralumin (88 mm in diameter, 28 mm in height) with a flat face
- Articulations in duralumin
- Disengageable suction effect using the lever
- Dovetail clamp with a 8 mm diameter fixing bore
- 1,1 kg
- Supplied without sensor
- Suited carrying case
- Declaration of conformity

INTERAPID® Measuring Supports









No		Used in conjunction with
16.39003	INTERAPID small meas. support	Dial test indicators, small dial gauges
16.39004	INTERAPID measuring support	Dial test indicators, dial gauges, precision indicators, electronic probes etc.

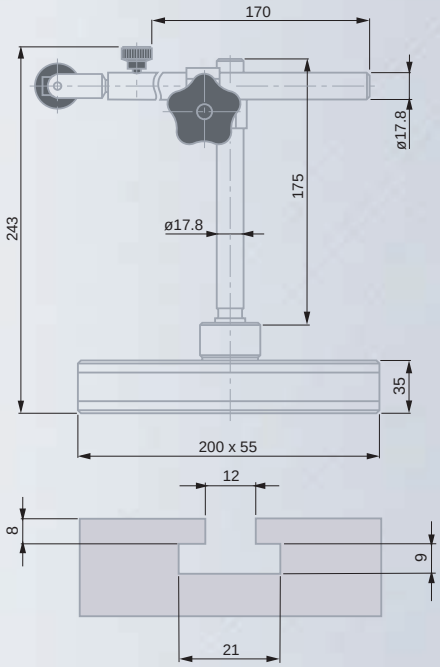
- Swiss Made ✓
- Base with resting front face
- Clamp for a 8 mm dia. measuring stem or dial gauges with lugs
- Stand No. 16.39003 with additional dovetail clamp
- Cast iron base
- 1,3 kg or 4,35 kg
- Supplied without sensor
- Suited carrying case
- Declaration of conformity

INTERAPID® UD 12
Universal Measuring Support

Medium-sized sliding support for dial test indicators (lever-type), dial gauges, electronic probes etc. – With fine adjustment.

- ✓
- Stand with guiding faces sideways
- Vertical column movable along the T-slot
- 2 rigid articulation points
- Cast iron base
- 3,3 kg
- Supplied without sensor
- Suited carrying case
- Declaration of conformity





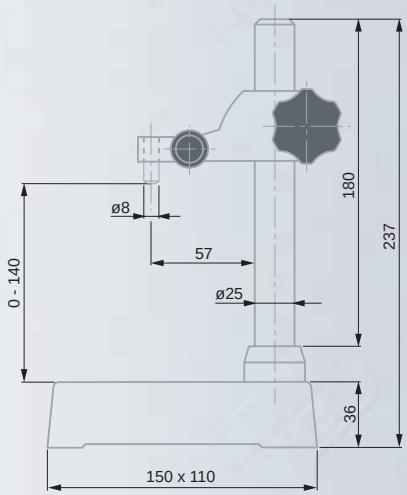
No		
16.39000	INTERAPID UD 12 universal measuring support	
furnished with:		
16.40100	Clamp with a 8 mm dia. fixing bore	
18.40105	Fixing shank with a 8 mm dia. and dovetail recess	

INTERAPID® UA 1 Measuring Stand

Model without fine adjustment – Suited as basic component for mounting specific workpiece attachments for series inspection.

- ✓
- Measuring table with ground measuring face
- Dismountable column
- Measuring arm with a 8 mm dia. clamping bore
- Cast iron table. Chrome-plated steel column. Spherical graphite cast iron arm.
- 3 kg
- Supplied without sensor
- Suited carrying case
- Declaration of conformity

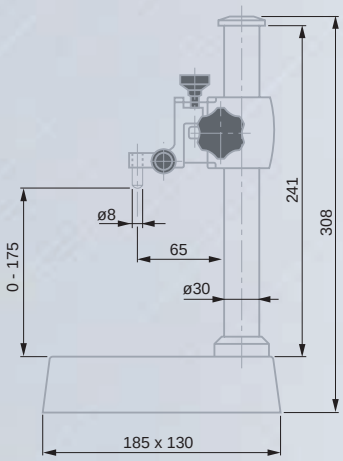




No		mm	mm
16.39008	INTERAPID UA 1 measuring stand	0 ÷ 140	100 x 100

INTERAPID® UA 30 Measuring Stand

Basic component for mounting specific workpiece attachments for series inspection.







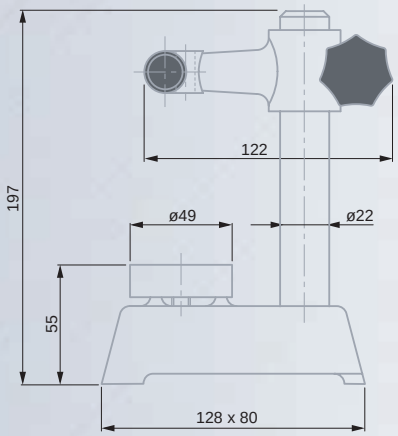




No		mm	mm
16.39009	INTERAPID UA 30 basic measuring stand (without measuring arm)	0 ÷ 175	125 x 115
Accessories			
16.10200	UK 20 measuring arm with fine adjustment		
16.10201	UK 25 sliding arm used in conjunction with TESA YA internal measuring instruments for stationary bore measurement (see page F-6)		
16.40000	UAZ 10 depth stop plate		

INTERAPID® Small Measuring Stand

With round steel measuring table





No		mm	mm
16.39006	INTERAPID small measuring stand	0 ÷ 100	ø 49

SWISS MADE ✓

Basic stand

Ground measuring face. 2 T-slots. Dismountable column.

Cast iron table. Chrome-plated steel column.

Measuring arm

Fine adjustment within a range of 1 mm

8 mm dia. clamping bore

Sliding arm

Floating holder for TESA YA. Adjustable swivelling movement. 13 mm dia. clamping bore. 35, 57 or 80 mm vertical travel ranges. Overall span: 60 mm.

Stop plate

Dimensions: 115x35x3,5 mm. 120° vee recess for diameters ≤ 120 mm. Two fixing screws.

Additional data

4,85 kg (basic stand). 0,85 kg (measuring arm). 1,75 kg (sliding arm).

Suited carrying case

Declaration of conformity

✓

Measuring arm with a 8 mm dia. clamping bore, without fine adjustment. Overall span: 48 mm.

Measuring table and column in hardened steel

2,7 kg

Supplied without sensor

Suited carrying case

Declaration of conformity

INTERAPID® Measuring Stands

✓

Meas. stand No. 16.39035:
black burnished steel column with a 8 mm dia. clamping bore

No. 16.39029:
chrome-plated column with thread and setting ring for height adjustable measuring arm. 8 mm dia. clamping bore. Measuring face with dust grooves.

No. 16.39030:
chrome-plated steel column. Tilting measuring arm with articulation. 4 or 8 mm. dia. bore for dovetail clamp or lugs.

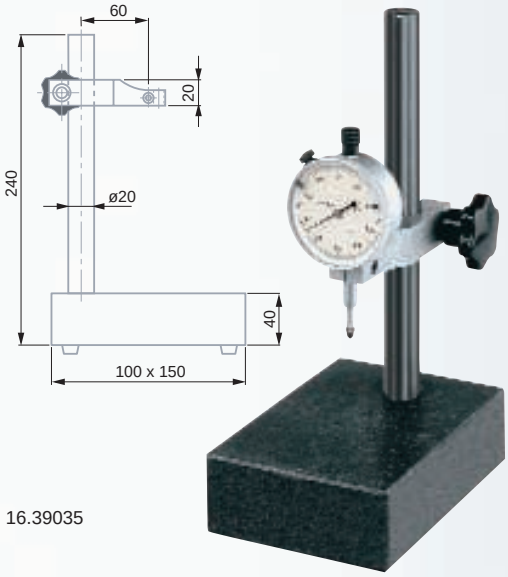
No. 16.39033:
chrome-plated steel column. Sliding measuring arm, horizontally. 4 or 8 mm dia. bore for dovetail clamp or lugs.

DIN 876 T1, grade 00: 3 µm

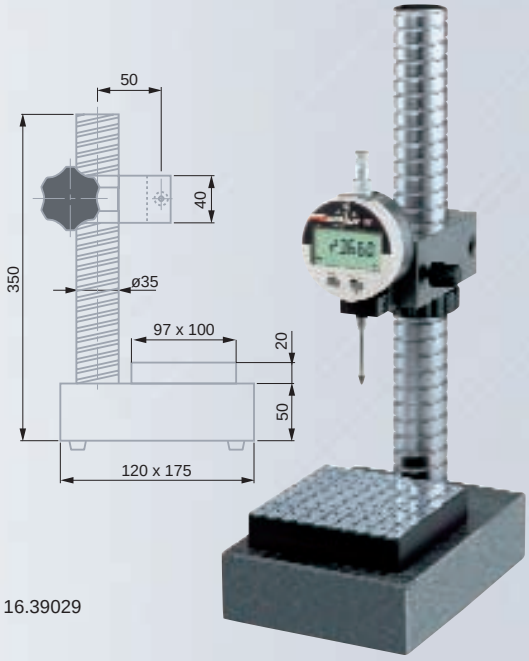
Supplied without sensor

Suited carrying case

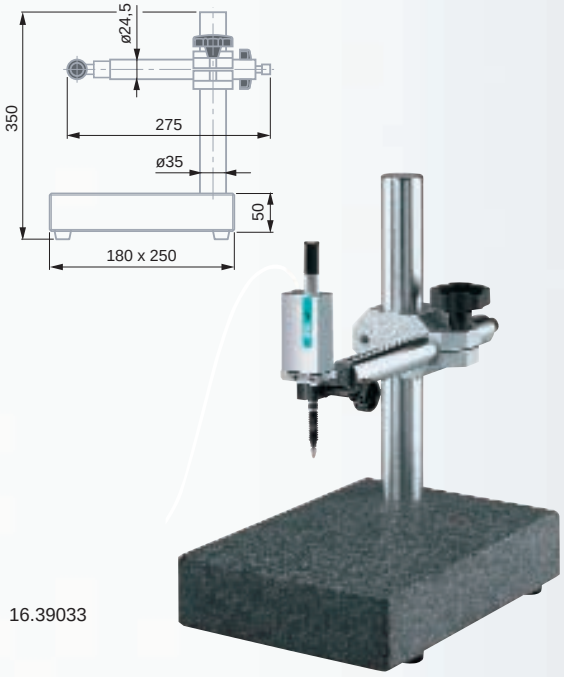
Declaration of conformity



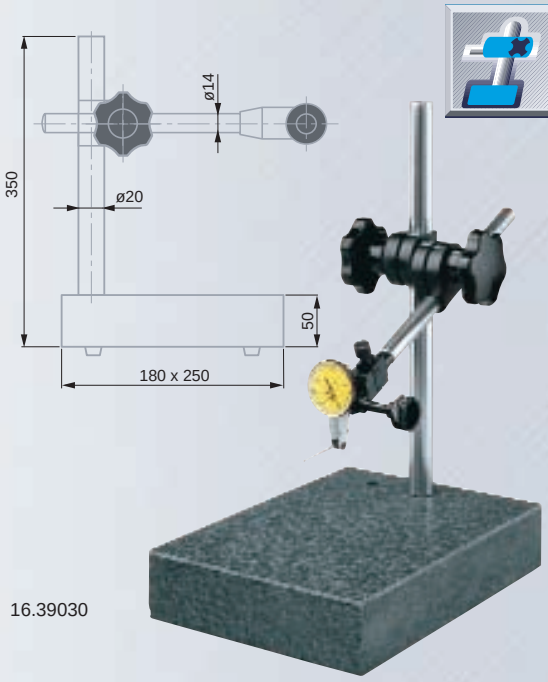
16.39035



16.39029



16.39033



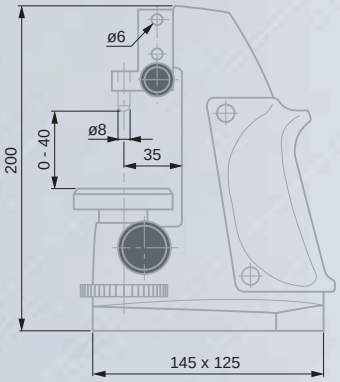
16.39030

No	Measuring face	Measuring face in mm	mm	Fine adjustment	Overall span mm
16.39035	Granite	100 x 115	0 ÷ 170	no	50
16.39029	Steel, hardened	100 x 100	0 ÷ 225	yes	68,5
16.39030	Granite	180 x 205	0 ÷ 240	yes	adjustable
16.39033	Granite	180 x 200	0 ÷ 260	yes	adjustable

	Meas. table	Meas. table mm	Column mm	Column mm	kg
16.39035	Granite	100 x 150 x 40	20	200	2,6
16.39029	Granite	120 x 175 x 50	35	300	8,1
16.39030	Granite	180 x 250 x 50	20	300	8,4
16.39033	Granite	180 x 250 x 50	35	300	10,5

INTERAPID® UM 20 Measuring Stand

Stable measuring stand for precision measuring of small parts





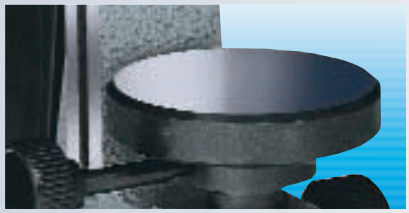
INTERAPID UM 20 measuring stand (without measuring table)
Height adjustable table mount with thread and fine adjustment. Clamping groove for UMZ 12 depth stop (No. 16.40300)

No.	mm	Fine adjustment mm
16.39002	0 ÷ 40	15



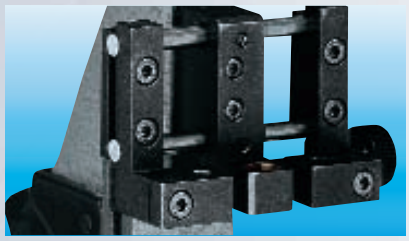
UMZ 40 meas. table with dust grooves
Hardened steel, lapped measuring face

No.	mm
16.40302	ø 66 x 12



UMZ 41 meas. table without dust grooves
Hardened steel, finish ground measuring face

No.	mm
16.40303	ø 66 x 12



UPZ 6 double probe-holder
8 mm dia. mounting bore for 2 probes. Clamped on the measuring stand with 2 shafts having a 6 mm dia.

No.	Laterally mm
16.40401	13 ÷ 80

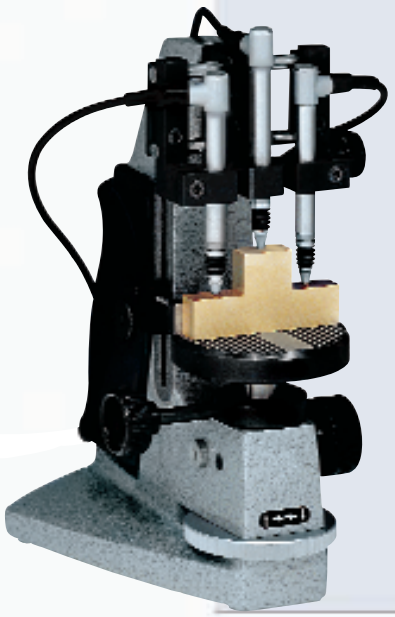


UMZ 12 depth stop
Clamp for mount purpose in the stand groove. Hardened and ground stop base.

No.	Stop face mm
16.40300	55 x 11

UMZ 13 side stop
Hardened and ground.
For use with UMZ 12 depth stop.

No.	Side stop mm
16.40301	31,5 x 10 x 3



✓

Stand has a 8 mm dia. bore. Also with two clamping bores with a 6 mm dia. for UPZ6. Usable overall span: 35 mm.

Measuring stand (without measuring table): 3 kg

Supplied without sensor

Suited carrying case

Declaration of conformity

INTERAPID® Universal Stands UP

These two measuring stands provide different heights as well as a wide range of accessories that serve for setting up a variety of measuring configurations – High-precision components remarkably stable and wear-resistant – Guarantee a very low measurement uncertainty for state-of-the-art factory shop floors.

Besides dial gauges, precision indicators or dial test indicators (lever-type), both stands enable electronic probes to be mounted, especially for direct, sum or comparative measurements (see section L).

- ✓
- Heavy cast iron base with mounted steel column, ground (50 mm dia.)
- Measuring arm with a 8 mm dia. clamping bore and 2 mounting bores for UPZ6
- Fine adjustment using the protected knob with 1 mm travel
- Base and measuring arm in cast iron. Dull-chrome plated steel column.
- Supplied without sensor
- Suited carrying case
- Declaration of conformity



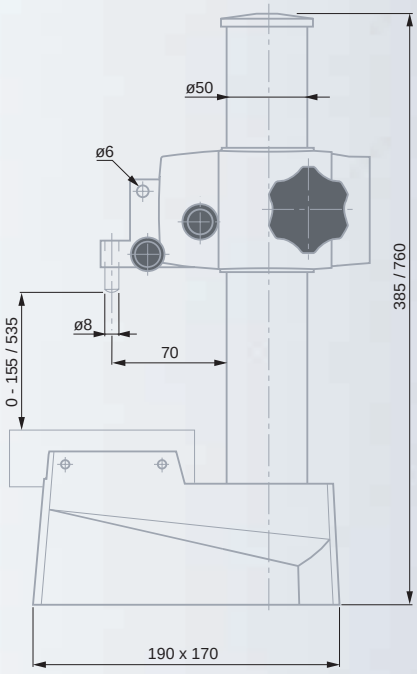


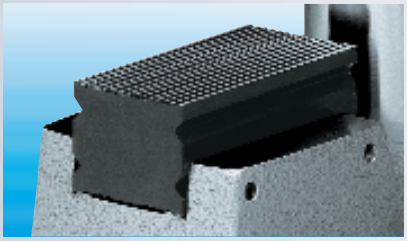
INTERAPID Universal stands UP (without measuring table)

Heavy cast iron models. Measuring arm with locking feature and brake stop. For additional technical data, see opposite.

		mm	kg
16.39041	UP 160 measuring stand	0 ÷ 155	13,5
16.39042	UP 200 measuring stand	0 ÷ 535	19





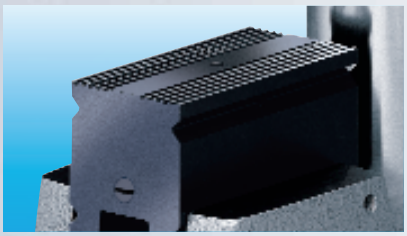


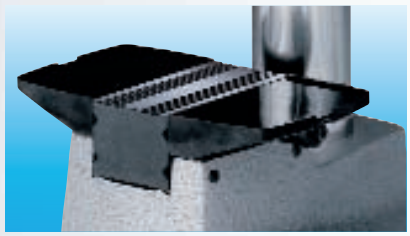
UPZ 40 standard measuring table

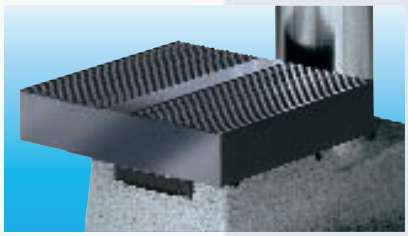
Hardened steel. Two measuring faces with dust grooves, lapped. One face has a 13 mm wide strip along the centre.

No	mm	µm
16.40405	45 x 95	1

SWISS MADE ✓







UPZ 46 A measuring table with probe holder

Feature a 8 mm dia. mounting bore for axial probe. Hardened and lapped measuring face with dust grooves as well as a 13 mm wide strip along the centre.

No	mm	µm
16.40410	45 x 95	1

UPZ 20 side table

To be mounted sideways on both UPZ 40 and UPZ 46 A measuring tables. Made of black plastic, supplied in pairs.

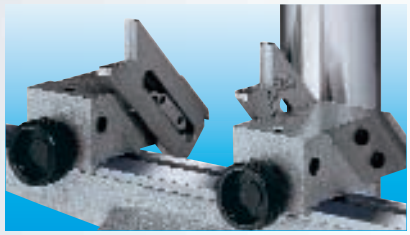
No	Resting face mm
16.40404	55 x 95

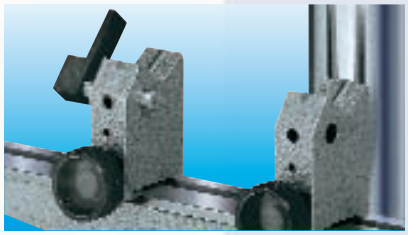
UPZ 47 large measuring table with probe holder

Feature a 8 mm dia. mounting bore for axial probe. Hardened and lapped measuring face with dust grooves as well as a 16 mm wide strip along the centre.

No	mm	µm
16.40411	120 x 120	1,5







UPZ 53 cross beam

For centre and vee supports. Made from cast iron and ground.

No	Length mm
16.40416	300

UPZ 52 resting stand

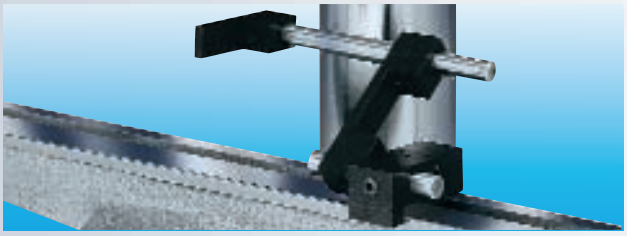
For cylindrical or conical part elements. Resting plates with tungsten carbide pins for adaptation to the part diameter. Distance between plates: ≤ 300 mm. For use with cross beam UPZ 53. Supplied in pairs.

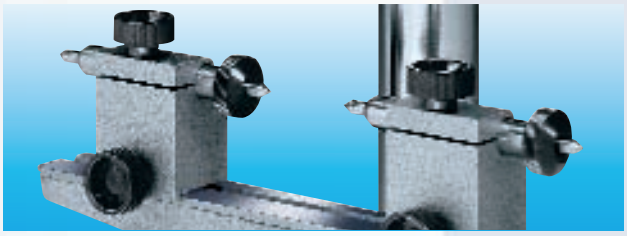
No	∅ mm
16.40415	≤ 30

UPZ 55 vee blocks

Support parts on tungsten carbide pins. Distance between blocks: ≤ 280 mm. With length stop. For use with cross beam UPZ 53. Supplied in pairs.

No	∅ mm	A
16.40418	≤ 40	108 °





UPZ 54 length stop

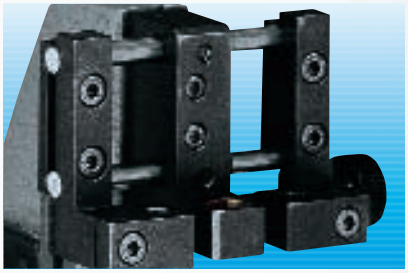
For use with cross beam UPZ 53 associated with centre or vee supports.
A probe can be mounted instead of the stop pin.

No
16.40417

UPZ 51 centre supports

For axial and radial run-out inspection. Max. width of points: 155 mm. Feature solid and hollow points movable longitudinally. Fitted with spring but lockable. For use with cross beam UPZ 53. Supplied in pairs.

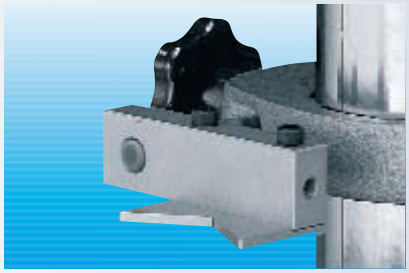
No	Height of points mm
16.40414	50



UPZ 6 double probe holder

8 mm dia. clamping bore for 2 electronic probes. Mounted on the measuring stand with 2 shafts having a 6 mm dia.

No	Laterally mm
16.40401	13 ÷ 80



UPZ 15 limit stop

Mounted with clamp on the column. Hardened, dull-chrome plated.

No	Resting face mm
16.40403	68 x 20

UPZ 14 stop plate

Fo use with limit stop UPZ 15. Hardened, dull-chrome plated.

No	Vee recess
16.40402	120 °

UPZ 60 rack and pinion slide

For vertical adjustment of the measuring arm.

No	Travel mm
16.40419	185

UPZ 43 / One insert with flat measuring face

To be mounted on the spindle of the micrometer element of the measuring arm UPZ 42. Hardened steel measuring face, lapped.

No	mm
16.40407	ø 30









UPZ 42 measuring arm

Robust construction with built-in ISOMASTER micrometer head and spindle lock. Conform to DIN 863, part 2. Tungsten carbide measuring face.

No	mm	mm	mm	µm
16.40406	0 ÷ 25	0,01	ø 8	3

UPZ 43 / Two inserts with ball tips

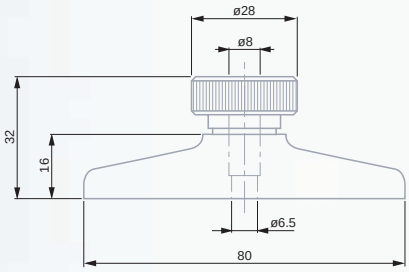
To be mounted on the spindle of the micrometer element of the measuring arm UPZ 42. Tungsten carbide ball tip.

No	Ball tip mm
16.40408	8

INTERAPID® Depth Measuring Feet

Execution with Flat Measuring Face



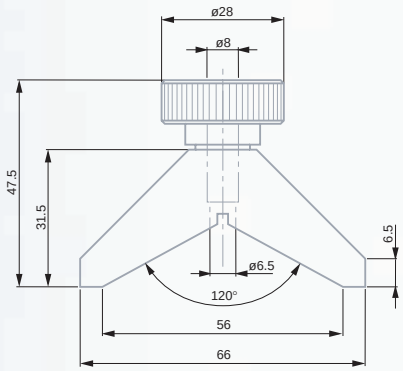


	mm	Clamp mm
16.39046	80 x 16	ø 8

Executin with Prismatic Measuring Face

For measuring groove depth on cylindrical shafts. Also for establisching circularity errors etc.





	mm	Width mm	Clamp mm
16.39047	10 ÷ 100	120 ° 16	ø 8

- ✓
- Hardened steel
- Finish lapped measuring faces
- Clamp with lock for mounting a dial gauge or an electronic probe
- Supplied without sensor
- Suited carrying case
- Declaration of conformity

Brown & Sharpe® CENTER FINDER

Practical auxiliary support that helps you to quickly align the centre of the bores against the spindle axis on a machine tool – The support without fixing shaft can also serve as small magnetic support – Designed for clamping a standard or perpendicular dial test indicator (lever-type).





67.69006	Brown & Sharpe CENTER FINDER

- ✓
- Center Finder includes the following 3 components:
- Cylindrical shank that can be clamped on the chuck of a machine tool
- Powerful permanent magnets
- Swivel joint and a dovetail collar for clamping a dial test indicator (lever-type)
- Wooden case

Brown & Sharpe® V-Blocks and Clamps

V-blocks have a frame for clamping cylindrical parts with diameters ranging from 0,7 to 40 mm – Used for workpiece inspection or machining.





- ✓
- Hardened steel
- Ground resting and vee faces
- Not available as single components
- Suited plastic case

No		Clamping range mm
67.69007	Brown & Sharpe V-blocks and clamps	0,7 ÷ 40
Supplied in a set consisting of:		
	1 Pair of V-blocks	5 ÷ 40
	1 Extra V-block	3 ÷ 8
	1 Extra V-block	1,5 ÷ 5
	5 Extra V-blocks	0,7 ÷ 3,5
	2 In-between bridges	
	2 Large frames	
	1 Small frame	

Brown & Sharpe® Positioning Block Set

Pair of matched blocks convenient for positioning and holding workpieces or for use as stops on surface plates, metrology set-ups, machines tools or the like – Blocks are precision ground.





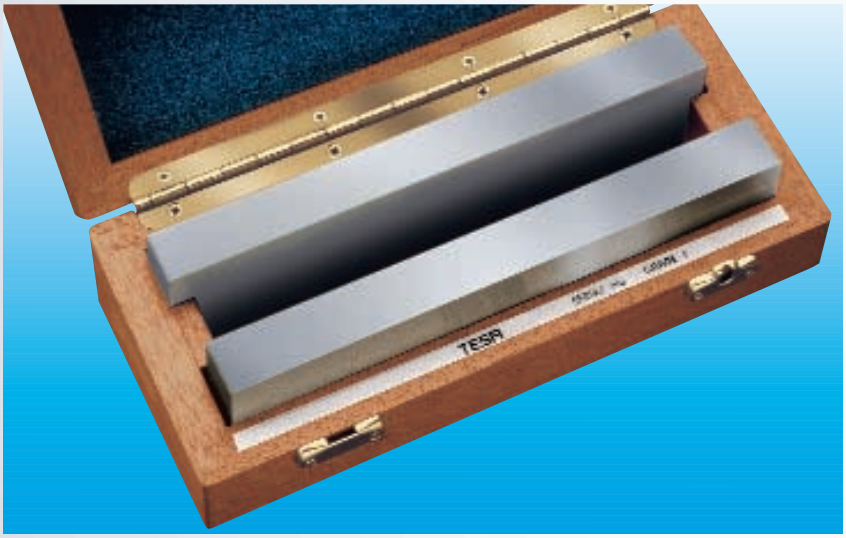
- ✓
- Each block has18 through bores of 9,53 mm as well as 5 threaded bores (M10)
- Steel hardened to 55 to 60 HRC
- 7 µm for each pair
- 2,5 µm for all surfaces
- Supplied with 5 M10 hexagon socket screws as well as one 8 mm hexagon socket key.
- Suited plastic case

No		mm
67.69004	Brown & Sharpe positioning block set	75 x 50 x 25

Engineers' Parallels

Precision Pairs From TESA®

Each pair of Engineers' parallels is produced in metric and inch units. Available in both tolerance classes A and B.



✓ BS 906, Part 1 and Part 2

High quality steel, stress relieved and stabilised. Hardened to 800 HV.

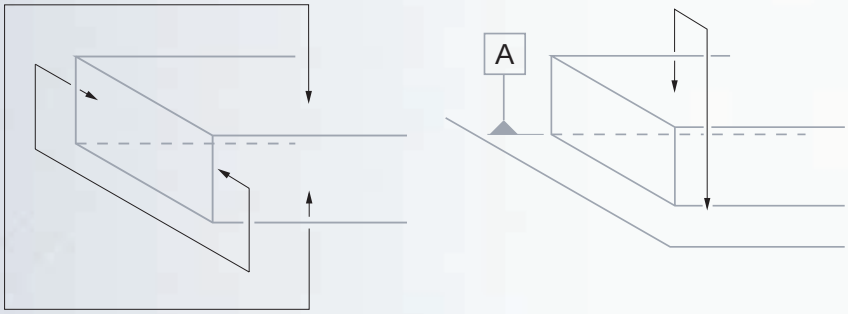
Faces in tolerance class A: lapped, B: ground.

Wooden case

UKAS calibration certificate

Metric Units

No.	H mm	B mm	L mm	H and B µm	H and B µm	Single parallel µm (H and W)	In pairs µm (H and W)
				2-point measurement (Fig. 1)		Step measurement against datum plane R (Fig. 2)	
A							
65.1570040	5	10	100	5	2	4	6
65.1570041	10	20	125	5	2	4	6
65.1570042	15	30	150	5	2	4	6
65.1570043	20	40	200	5	2	4	6
65.1570044	25	50	250	10	3	6	10
65.1570045	30	60	300	10	3	6	10
B							
65.1570048	5	10	100	10	4	8	12
65.1570049	10	20	125	10	4	8	12
65.1570050	15	30	150	10	4	8	12
65.1570051	20	40	200	10	4	8	12
65.1570052	25	50	250	20	6	12	20
65.1570053	30	60	300	20	6	12	20
65.1570054	40	80	350	25	7	14	20
65.1570055	50	100	400	30	8	16	25



Inch Units

No. in	H in	B in	L in	H and B µin	Single parallel µin (H and W)	In pairs µin (H and W)	Single parallel µin (H and W)
A							
65.2570040	1/4	1/2	4	100	50	50	50
65.2570041	3/8	3/4	6	100	100	100	100
65.2570042	1/2	1	6	100	100	100	100
65.2570043	3/4	1 1/2	8	150	150	150	150
65.2570044	1	2	10	150	150	150	150
65.2570045	1 1/4	2 1/2	10	200	150	150	150
65.2570046	1 1/2	3	12	200	200	200	200
B							
65.2570049	1/4	1/2	4	250	100	100	100
65.2570050	3/8	3/4	6	250	150	150	150
65.2570051	1/2	1	6	250	150	150	150
65.2570052	3/4	1 1/2	8	400	200	200	200
65.2570053	1	2	10	400	250	250	250
65.2570054	1 1/4	2 1/2	10	500	250	250	250
65.2570055	1 1/2	3	12	500	300	300	300
65.2570056	1 1/4	3 1/2	14	600	350	350	350
65.2570057	2	4	16	600	400	400	400

Set Compositions from Brown & Sharpe®

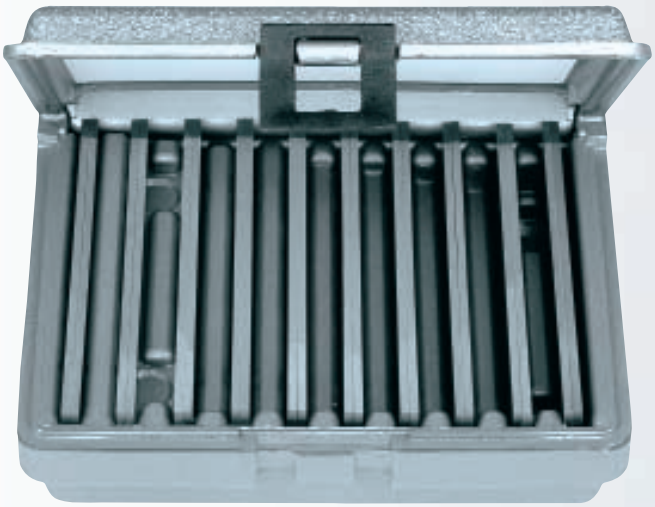
These set compositions include 9 or 10 pairs of Engineers' parallels.

✓

Hardened steel

Height H in pairs and ground.

Plastic case



No.		Set compositions H mm					B mm	L mm	Height H µm	Pairs (H) µm
67.69003	Set = 9 pairs	19	22	25	28	31	6,4	150	4	5
	Engineers' parallels	34	38	41	44					
67.69000	Set = 10 pairs	12	16	19	22	25	3	150	5	5
	Engineers' parallels	28	32	34	38	41				

Brown & Sharpe® Adjustable Parallels

Available in a set including 6 adjustable parallels – Frequently used as parallel pads, setting standards for measuring instruments or plug gauges for checking internal dimensions on plane parallel surfaces.

Each parallel consists of two tapered parts, dovetailed together – Two clamp screws lock parallels to size.

✓
Hardened steel
Supplied with a screwdriver PH 1
Plastic bag



		Height mm	Length mm	Width mm
67.69010	Brown & Sharpe Adjustable Parallel Set			
Consisiting of the following single parallels:				
	1 Piece	10 ÷ 13	44	7
	1 Piece	13 ÷ 17	54	7
	1 Piece	17 ÷ 24	68	7
	1 Piece	24 ÷ 33	90	7
	1 Piece	33 ÷ 44	106	7
	1 Piece	44 ÷ 57	129	7

ROCH Flexible Steel Rules

Made from stainless steel – 1 mm and 0,5 mm scale divisions.



✓
EG class II
Stainless spring steel
Suited carrying case
Declaration of conformity

	mm	Width mm	Thickness mm
95.1750181	200	13	0,5
95.1750182	300	13	0,5
95.1750184	500	18	0,5
95.1750187	1000	18	0,5
95.1750188	1500	18	0,5
95.1750189	2000	18	0,5

ROCH Thickness Gauges

No	Number of blades	Thickness mm	Step mm
95.1753013	6	0,05 ÷ 0,3	0,05
	7	0,4 ÷ 1,0	0,1
95.1753014	20	0,05 ÷ 1,0	0,05
95.1753015	20	0,1 ÷ 2,0	0,1



CE ✓
Alloyed Steel
100 mm long blades, 13 mm wide (max.)
Blades are not available individually
Plastic bag
Declaration of conformity

ROCH Radius Gauges

Radius gauges with both concave and convex blades – Designed for visual assessment of radii.

No	Number of blades	Radius mm	Step mm
95.1753001	2 x 17	1,0 ÷ 2,75	0,25
		3,0 ÷ 7,0	0,5
95.1753002	2 x 16	7,5 ÷ 15,0	0,5
95.1753003	2 x 15	15,5 ÷ 19,5	0,5
		20,0 ÷ 25,0	1,0



CE ✓
Stainless steel
Blades are not available individually
Plastic bag
Declaration of conformity

ROCH Screw Pitch Gauges

60° or 55° flank angles for ISO metric threads or Whitworth threads.

No		mm					
95.1753045	ISO 60 °	0,25	0,3	0,35	0,4	0,45	0,5
		0,6	0,7	0,75	0,8	0,9	1,0
		1,25	1,5	1,75	2,0	2,5	3,0
		3,5	4,0	4,5	5,0	5,5	6,0

No		Threads per in					
95.1753046	Whitworth 55 °	62	60	48	40	36	32	30
		28	26	25	24	22	20	19
		18	16	14	13	12	11	10
		8	7	6	5	4,5	4	



CE ✓
Alloyed steel
Blades are not available individually
Plastic bag
Declaration of conformity

ROCH Hand-Held Magnifier

Folding handle with added small magnifier – Retractable support.



		Large size	Small size	
N°	mm		mm	
95.1754511	80 x 45	3x	13	10x

✓

Solid plastic

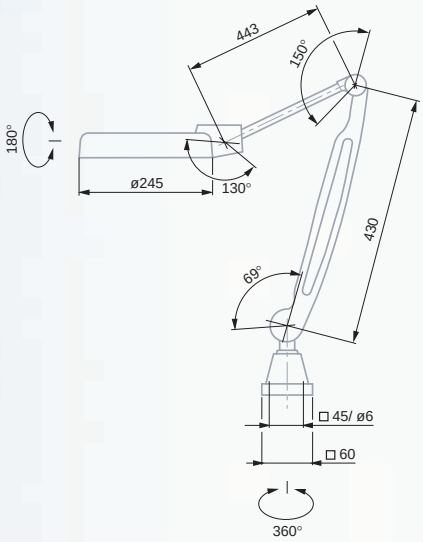
Cardboard box

Declaration of conformity

ROCH Magnifier with Ring Light

Table model ideal for sampling inspection, small part assembly etc. – Main plus added magnifier with no distorsion – Homogeneous, clear, antiglare illumination – Ajustable magnifier head to any positions – Easy and safe positioning through spring-loaded articulations.





N°		Large size	Small size
95.1754531	Magnifier with ring light	4x	12x
Accessory			
95.1654531	Spare lamp, 22 W		

✓

120 mm dia. magnifying glass

Materials: glass with unbreakable plastic for the magnifier head

Sturdy cast iron base

230 Vac, 50 Hz

Supplied with ring light (22 W)

Suited carrying case

Declaration of conformity

Straightness, Angle and Inclination Measurement



Levels with Natural Measuring Base

Mechanical instruments with vial or electronic inclinometers with gravity pendulum are based on longtime stabilisation, on reliability and moreover, on a free of charge measuring base, the centre of the earth. Due to the gravitation, liquids (vials) respectively gravity pendulum depend on the natural reference of the centre of the earth. The position of the pendulum facing the housing of the level is measured by using the measuring faces.

Based on these perfect conditions, levels and inclination gauges offer a great number of applications with high precision measurements.

The horizontal and vertical positions of the measuring faces on the housing allow form errors of the geometrical elements to be measured on the workpiece. For instance, straightness or flatness errors as well as position errors, such as deviations from parallelism or squareness.

Depending on the type of level, readings may differ. Typical measurement outputs are:

- *inclination in mm / m, respectively in / 10 in*
- *radians in mrad*
- *angle in decimal output, e.g. 12.37 °*
- *sexagesimal angle in degrees (°), minutes (') and seconds ("), e.g. 15 ° 30 ' 45 "*



Calibrating a try square using the ETALON RA squareness measuring instrument

Application of two electronic clinometers in differential mode for the capture of the squareness errors on a machine tool (example).



ETALON® Bevelled Straight Edges

Provided with 1 or 3 bevelled edges – Heat insulating handle.

✓
DIN 874 P2
NF E 11-104
Hardened steel
≥ 650 HV 10
Wooden case
Declaration
of conformity

1 bevelled edge	3 bevelled edges	mm	µm
81.115795		30	2
81.115796	**81.115802**	50	2
81.115797	**81.115803**	75	2
81.115798	**81.115804**	100	2
81.115799	**81.115805**	150	3
81.115800	**81.115806**	200	3
81.115801	**81.115807**	300	3



ROCH Bevelled Straight Edges

Provided with 1 bevelled edge – Heat insulating handle.

✓
DIN 874 T2
NF E 11-104
Hardened steel
≥ 650 HV 10
Models up to 200 mm long in plastic bag. Models from 300 mm in a wood case.
Declaration
of conformity

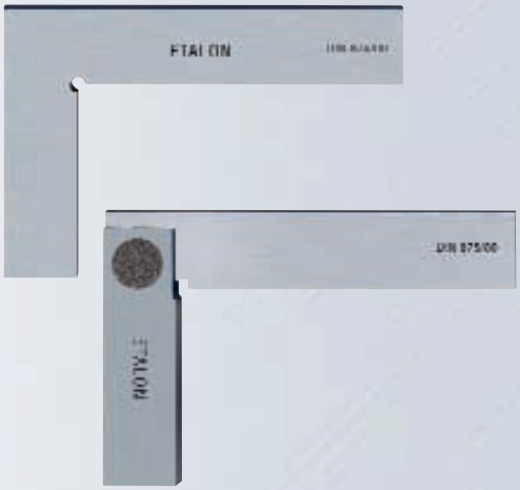
	mm	µm
95.1750002	75	2
95.1750003	100	2
95.1750004	125	3
95.1750005	150	3
95.1750006	200	3
95.1750007	300	3
95.1750008	400	4
95.1750009	500	4
95.1750010	600	5
95.1750011	750	5



ETALON® Flat and Try Squares

✓
DIN 874 T2
NF E 11-104
Hardened steel
≥ 700 HV 5
Try square with a large and short reinforced beam
Accuracy
class 00
Accuracy
class 00
Wooden case
Declaration
of conformity

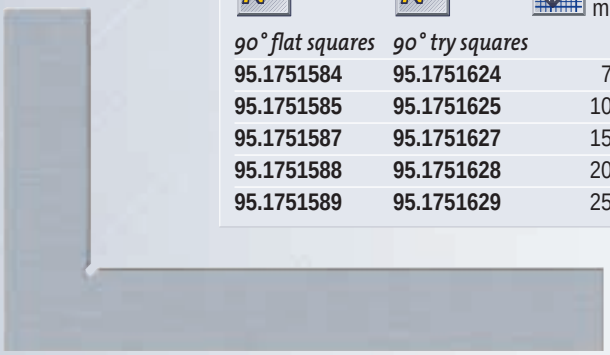
90 ° flat squares	*90 ° try squares*	mm	µm
81.115771	**81.115777**	40 x 30	3
81.115772	**81.115778**	50 x 40	3
81.115773	**81.115779**	75 x 50	3
81.115774	**81.115780**	100 x 70	3
81.115775	**81.115781**	150 x 100	4
81.115776	**81.115782**	200 x 130	4



ROCH Flat and Try Squares

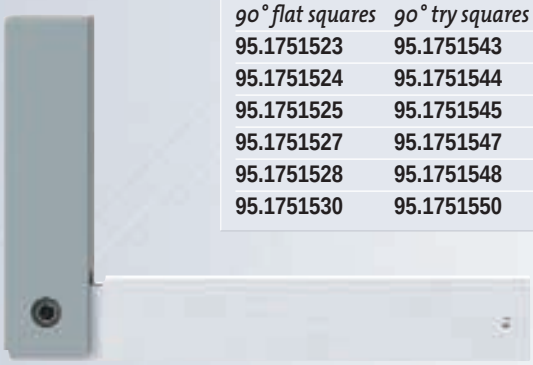
Made from stainless steel

Accuracy class 0, not tempered



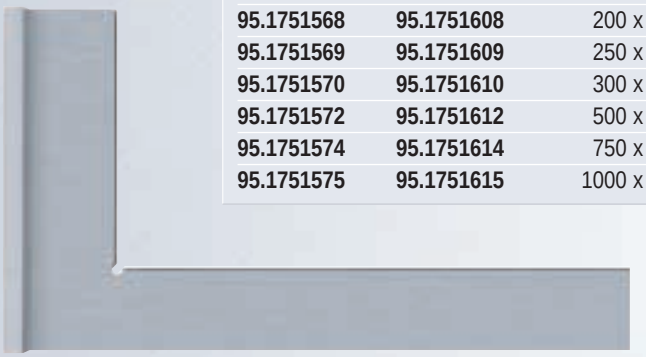
No	No	Length of the beams mm	Section mm	⊥ µm
90° flat squares	*90° try squares*			
95.1751584	**95.1751624**	75 x 50	15 x 5	7
95.1751585	**95.1751625**	100 x 70	20 x 5	7
95.1751587	**95.1751627**	150 x 100	28 x 6	8
95.1751588	**95.1751628**	200 x 130	32 x 7	9
95.1751589	**95.1751629**	250 x 165	35 x 8	10

Accuracy class 0, tempered



No	No	Length of the beams mm	Section of the flat square blade beams mm	Section of the try square blade beams long mm	Section of the try square blade beams short mm	⊥ µm
90° flat squares	*90° try squares*					
95.1751523	**95.1751543**	50 x 40	15 x 4	16 x 2	14 x 10	7
95.1751524	**95.1751544**	75 x 50	15 x 4	18 x 2	14 x 10	7
95.1751525	**95.1751545**	100 x 70	20 x 5	18 x 2	16 x 10	7
95.1751527	**95.1751547**	150 x 100	30 x 6	22 x 2	20 x 12	8
95.1751528	**95.1751548**	200 x 130	30 x 7	26 x 3	24 x 14	9
95.1751530	**95.1751550**	300 x 200	40 x 8	32 x 3	30 x 18	11

Accuracy class 1, not tempered



No	No	Length of the beams mm	Section mm	⊥ µm
90° flat squares	*90° try squares*			
95.1751564	**95.1751604**	75 x 50	15 x 5	14
95.1751565	**95.1751605**	100 x 70	20 x 5	15
95.1751567	**95.1751607**	150 x 100	28 x 6	18
95.1751568	**95.1751608**	200 x 130	32 x 7	20
95.1751569	**95.1751609**	250 x 165	35 x 8	23
95.1751570	**95.1751610**	300 x 200	40 x 8	25
95.1751572	**95.1751612**	500 x 330	50 x 10	35
95.1751574	**95.1751614**	750 x 500	60 x 12	43
95.1751575	**95.1751615**	1000 x 660	70 x 14	60

✓

DIN 875
NF E 11-103

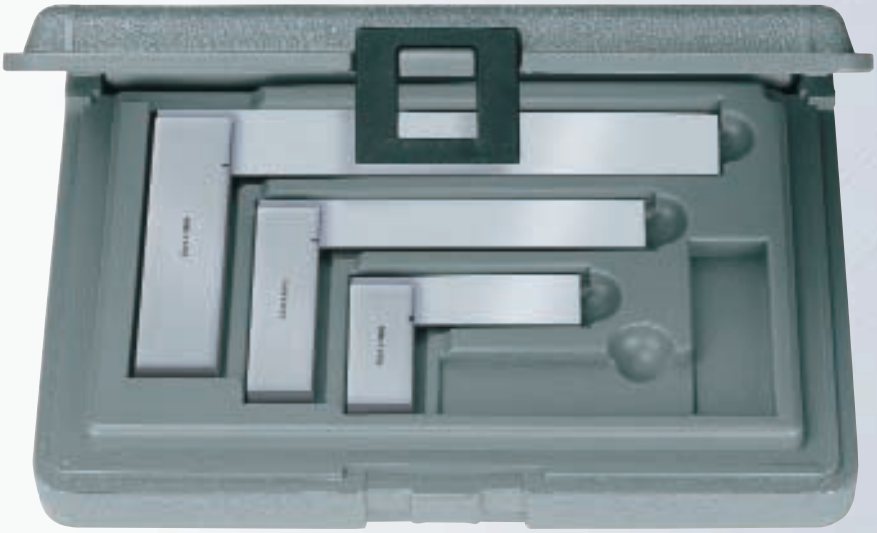
Stainless steel to
200 HRB (not tempered)
≥ 550 HV 30 (tempered)

Accuracy class 0 or 1

Transport packing

Declaration of conformity

Brown & Sharpe® Try Square Set



✓ Factory standard
Hardened steel
Suited plastic case

No	=		mm	µm
67.39001	**Brown & Sharpe Try Square Set**			
Consisting of:				
	1	Try square	68 x 45	16
	1	Try square	120 x 70	16
	1	Try squarel	175 x 95	16

ETALON® Bevelled Edge Squares

No	No	mm	µm
90° flat squares	*90° try squares*		
81.115783	**81.115789**	40 x 30	3
81.115784	**81.115790**	50 x 40	3
81.115785	**81.115791**	75 x 50	3
81.115786	**81.115792**	100 x 70	3
81.115787	**81.115793**	150 x 100	4
81.115788	**81.115794**	200 x 130	4



✓ Hardened steel
Try square with a large short reinforced beam
Accuracy class 00: DIN 875
Wooden case
Declaration of conformity

ROCH Bevelled Edge Squares

Made from hardened stainless steel



✓
DIN 875
NF E 11-103
Hardened stainless steel, ≥ 550 HV 30.
Accuracy class 00
Transport packing
Declaration of conformity

No 90 ° flat squares	No 90 ° try squares	Length of the beams mm	Section of the flat square blade beams mm	Section of the try square blade beams long beam mm	short beam mm	µm
95.1751533	**95.1751553**	50 x 40	14 x 4,5	16 x 2	14 x 10	3
95.1751534	**95.1751554**	75 x 50	16 x 4	18 x 2	14 x 10	3
95.1751535	**95.1751555**	100 x 70	20 x 5	18 x 2	16 x 10	3
95.1751537	**95.1751557**	150 x 100	28 x 6	22 x 2	20 x 12	4
95.1751538	**95.1751558**	200 x 130	30 x 7	26 x 3	24 x 14	4
	95.1751560	300 x 200	40 x 8	32 x 3	30 x 18	5

ETALON® Toolmaker's Squares

Long adjustable beam with lock and 2 bevelled edges.



✓
Special hardened steel
Precision ground with lapped inspection edges
Accuracy class 0: DIN 875
Suited wooden case
Declaration of conformity

No	mm	µm
81.115808	75 x 50	7
81.116278	100 x 70	7

ETALON® Set of Bevelled Straight Edges with a Flat Square

- ✓
- Hardened steel
- Technical data: page H-3
- Wooden case
- Declaration of conformity

No		
81.115809	**ETALON Set of bevelled straight edges with a flat square**	
containing:		
81.115795	1 knife edge with 1 straight edge	30
81.115796	1 knife edge with 1 straight edge	50
81.115802	1 knife edge with 3 straight edges	50
81.115772	1 flat square	50 x 40



TESA® EAC Angle Protractors with Dial

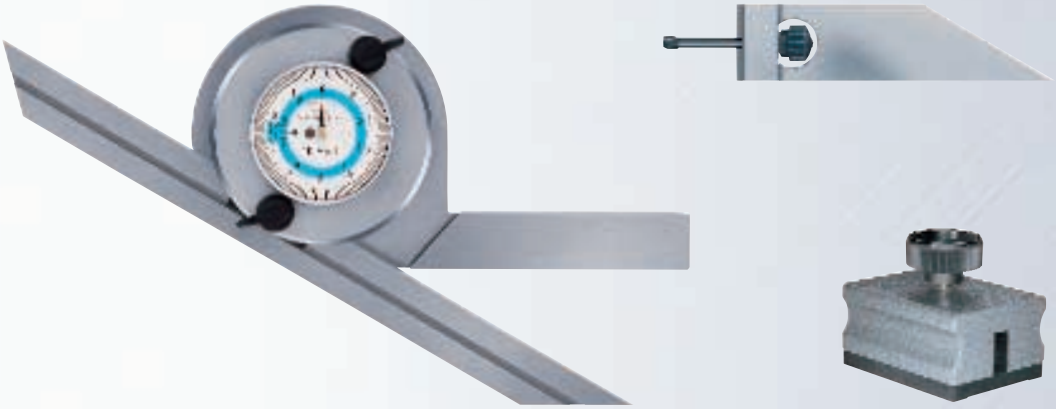
Circular scale with pointer – Easy, reliable readout of the main and auxiliary graduated scales – Very low hysteresis – Precision movement mechanism with compensation of play.

- ✓
- 2 circular scales
- 5' on main scale. Clockwise or counter-clockwise reading
- 10 ° on the auxiliary scale
- Stainless steel, hardened.
- Max. perm. error: 5' (without accessory)
- Plastic case
- Declaration of conformity

No		Blade mm
06.30001	4 x 90 °	200
06.30002	4 x 90 °	300

Optional accessories

No		mm
06.60002	Blade	200
06.60003	Blade	300
06.10101	Auxiliary blade for acute angles up to 15 °	
06.10102	Cast iron base with hardened steel bottom surface	



ETALON® 436 Angle Protractor with Vernier



No		Blade mm	Auxiliary blade*
76.115566	4 x 90 °	200	without
76.115567	4 x 90 °	300	without
76.116009	4 x 90 °	200	with
76.116010	4 x 90 °	300	with

Optional accessories (pictured on previous page)

No		mm
06.60002	Blade	200
06.60003	Blade	300
06.10101	Auxiliary blade for acute angles up to 15°	
06.10102	Cast iron base with hardened steel bottom surface	
06.10103	Magnifying glass	

✓ SWISS MADE

5 '

Hardened stainless steel

Suited plastic case

Declaration of conformity

Brown & Sharpe® Angle Protractor Combination

Commonly used as bevelled protractor, ruler, graduated scale, try square, depth and centre gauge as well as spirit level.







No		
67.19000	**Brown & Sharpe Angle Protractor Combination**	

Consisting of:

- 1 Ruler graduated in millimetres, 300 mm long
- 1 Protractor head graduated 2 x 90 °
- 1 Centre head
- 1 Square head with hardened steel scriber



✓

Hardened steel with specially coated faces for extreme scratch resistance

Suited plastic case

Brown & Sharpe® Sine Bar

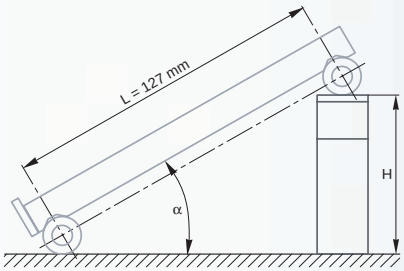
Suited for setting ranges from 0 to 60 ° – Sine function for establishing the setting angle on the basis of the length dimensions obtained from gauge blocks.

✓
Hardened steel
With frontal thick beam, dismountable
Cardboard box
Declaration of conformity



	Centre distance mm	mm
67.69005	127 ± 0,004	123 x 25





Example for the calculation of a 45° setting angle

Gauge block combination H:

$H = l \cdot \sin \alpha$

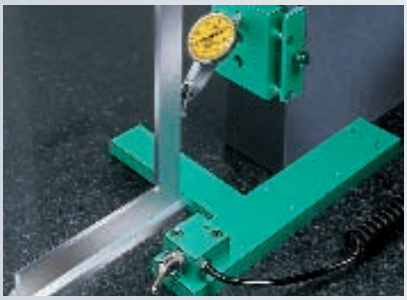
$H = 127 \cdot 0{,}70711$

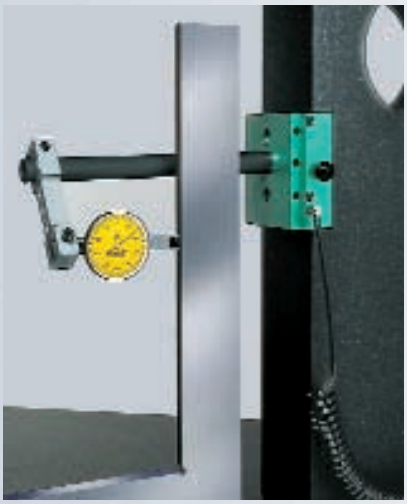
$H = 89{,}803$ mm

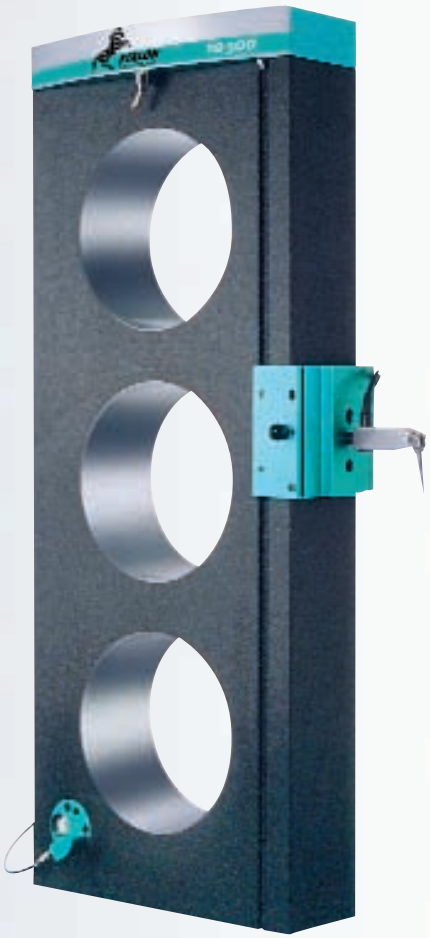
ETALON® RA for Squareness Measurement

High precision measuring instruments for the capture of squareness, straightness and parallelism errors – Perfect for the calibration or measurement labo-laboratory as well as in the workshop.

- *Angle and straightness standards are made of natural granite with fine lapped measuring faces.*
- *Patented, hand moved carriage that attaches by vacuum on the guiding face of the angular standard. The grid potential obtained enables the carriage to be guided free of play.*
- *Base face on air bearing for easy displacement, almost without wear and tear, of the reference angle on the surface plate.*
- *Practical optional accessories to make measuring easy.*







✓

Angle standard made of fine-grained natural granite

Max. perm. errors for squareness and straightness apply to the total measuring range (path of the measuring carriage)

This is valid for a theoretical line drawn symmetrically to the the lateral guiding faces as well as ≈ 60 mm away from the front faces of the angle standard

ETALON RA only (without value sensor): 0,2 µm

Temperature stabilisation: < 0,1 °C

Needed pressure: > 5 bar

Air consumption: < 20 l / min

Dimensions (L x W x H):
ETALON RA 300
200 x 80 x 484 mm

ETALON RA 500
250 x 80 x 634 mm

ETALON RA 700
250 x 80 x 884 mm

Transport packing

SCS calibration certificate

		mm	frontal µm	lateral µm	µm	kg
53.19200	**ETALON RA 300**	300	1	3	1	17
53.19201	**ETALON RA 500**	500	1,2	5	1,2	26
53.19202	**ETALON RA 700**	700	1,5	7	1,5	37

Optional Accessories

53.60007	Auxiliary vacuum square for mounting either a flat or a try square at right angle on the ETALON RA front part.	
53.60008	Support with a 8 mm dia. fixing hole for mounting a value sensor. Used for inspecting inner angles of flat or try squares, etc.	
53.60009	Air filter unit (oil and water collector)	
53.60010	Wooden case for storing	ETALON RA 300
53.60011		ETALON RA 500
53.60012		ETALON RA 700

✓

DIN 2276 Part 2 (form D)

LC display **Angle**: decimal or sexagesimal

Inclination: mm / m, in / 10 in or in / 12 in, mm or in / base length, radians (mrad) and others

Capacitive measuring system with gravity pendulum

Rugged aluminium eloxide

Flat measuring faces, 4 x 90 °

2 ' + 1 numerical interval

21 correction values can be stored for higher accuracy

Response time: ≈ 1 s

Locking of display

RS 485, asynchronous, 7 bits, 2 stop bits, no parity, 9600 bauds

1 LRC 6 battery 1,5 V, AA

≈ 150 h

Automatic shut down after 8 min

0 to 40 °C

- 20 to 70 °C

Protection: IP 65 (IEC 60529)

EN 50081-1 / -2 EN 50082-1 / -2

100 x 75 x 35 mm

0,52 kg

Plastic case

Identification number

Inspection report with a declaration of conformity

TESA® ClinoBEVEL 1
Electronic Inclinometer

Userfriendly and versatile inclinometer for the measurement of inclinations in direct or comparative mode – Measuring range ± 45 ° with angle or inclination display – Reinforced aluminium housing and new electronics – Large display for error free read-out.

53.30201	**TESA ClinoBEVEL 1**	± 45 °	
	mm / m	Base length mm	
	≥ 0,02	100 or 75	

Optional Accessories

53.60004	RS 485 connection cable, 2,5 m long
53.60005	RS 485 adaptor to RS 232, 9-pole
53.60006	Cable with key for HOLD function
47.68002	4 batteries, type LRC 6 - 1,5 V, AA



TESA® ClinoBEVEL 2
Electronic Inclinometer

The top model among inclinometers – Measuring range ± 45 ° with angle or inclination display – Integrated temperature compensation – Microprocessor controlled auxiliaries for display setting and inclonometer adjusting – Instrument output split for comparative measurements etc.



53.30202	**TESA ClinoBEVEL 2**	± 45 °	≤ 5 "		150

Base length mm

Optional Accessories

47.68002	4 batteries, type LRC 6 - 1,5 V, AA

Technical data are identical to the one on the left side with exceptions below

Anti-rust iron housing

2 flat and 2 prismatic measuring faces for diameters ranging from 17 to 94 mm

5 " + 0,07 % from measured value

Response time: < 5 s

RS 232

2 LRC 6 batteries 1,5 V, AA

40 to 60 h

150 x 150 x 35 mm

3 kg

Declaration of conformity

TESA® MICROBEVEL 1
Electronic Inclinometers

Especially intended for precision measurements of small inclinations, e.g for flatness measurements on surface plates as well as measurements of geometrical features on machines – To be used in rough environments.

		Base length mm	Width mm	mm / m	kg
53.30003	**Horizontal model**	110	45	0,01 and 0,001	1,8
53.30004	**Horizontal model**	150	45	0,01 and 0,001	2,1
53.30005	**Square model**	150	45	0,01 and 0,001	3,1

Instruments with numerical intervals to 0,05 and 0,005 mm/m also available upon request.

Optional Accessories

47.68002 4 batteries, type LRC 6 - 1,5 V, AA



Range	mm / m	mm / m	mm	G = mm / m
1	± 20	± 5	0,01	G = 1 %*
2	± 2	± 2	0,001	G = 0,01 (2 [measured value] - 0,5 [last value of the meas. range); within the local range of ± 1 mm / m: 1 %*.

* relative to the measured value. Valid within the measuring range.

- ✓
- DIN 2276 Part 2 (form D)
- LC display, see table
- See table
- Fully encapsulated measuring system with gravity pendulum
- Cast iron base, chromium-plated side faces, varnished aluminium case
- Flat and prismatic measuring faces, 20 to 120 mm dia.
- See table
- Response time: < 3 s
- RS 485, asynchronous, 7 bits, 2 stop bits, no parity, 9600 bauds
- 1 mV pro unit (100 kΩ)
- 1 LRC 6 battery 1,5 V, AA
- 100 to 140 h
- Aut. shut down after 55 min
- 0 to 40 °C
- - 20 to 70 °C
- ≤ 0,1 % / °C relative to the measuring range at 20 ± 5 °C
- Come in a case as per table
- EN 50081-1 / -2 EN 50082-1 / -2
- Plastic case
- Identification number
- Declaration of conformity

✓

DIN 2276 Part 2 (form E)

BEVELtronic 1

Flat and prismatic measuring faces, 20 to 120 mm dia.

1 mV / 0,001 or 0,005 mm / m

Other technical data listed under TESA MICROBEVEL 1

BEVELmeter 1

LC display as per table

Response time: < 3 s

RS 232, asynchronous, 7 bits, 2 stop bits, no parity, 9600 bauds

4 LRC 6 batteries 1,5 V, AA

33 to 40 h

Automatic shut down after 8 min

TESA SERVICE-SET 1

0 to 40 °C

- 20 to 70 °C

≤ 0,1 % / °C relative to the measuring range, at 20 ± 5 °C

≤ 95 %

EN 50081-1 / -2
EN 50082-1 / -2

Plastic case

Identification number

Declaration of conformity

TESA® SERVICE-SET 1 for Fitters
Electronic Inclinometers

Same features as TESA MICROBEVEL 1 – Set includes 2 TESA BEVELtronics 1 that serve as value sensors without display – A separate BEVELmeter 1 reading unit can be connected to both BEVELtronics 1 for difference measurements (example is shown on page H-2).

No		000 mm / m	mm / m	Base length mm	Width mm	kg
53.30302	**TESA Service-Set 1-**	**0,001**	± 2			6,4*
53.30303	**TESA Service-Set 1-**	**0,005**	±10			6,4*
containing:						
	1 BEVELtronic 1 - horizontal model			150	45	1,3
	1 BEVELtronic 1 - square model			150	45	2,2
	1 BEVELmeter 1, numerical interval to 0,001 or 0,005 mm / m					0,4
	2 cables for connecting BEVELtronic 1 to BEVELmeter 1					

* supplied in a plastic case

Optional Accessories

47.68002 4 batteries, type LRC 6 - 1,5 V, AA.





Local measuring range mm / m	Measuring range mm / m
± 1 and ± 5	± 2 and ± 10
G = mm / m	G = mm / m
G = 1%*	G = 0,01 (2 [measured value] - 0,5 [last value of the meas. range])

* relative to the measured value.

TESA® NIVELTRONIC Electronic Levels

Most popular measuring instruments with solid cast iron body for the inspection and alignment of horizontal and vertical surfaces – Also suitable for precision measurement of small inclinations, for instance for flatness inspection on surface plates.



N°		Base lenght mm	Width mm	mm / m	kg
31.30063	**Horizontal model**	150	45	0,05 and 0,01	6,0**
31.30060	**Square model**	200	45	0,05 and 0,01	6,5**
Optional Accessories					
31.60007	Granite sole plate*	200	50		1,0
31.60008	Granite sol plate*	250	50		1,5
31.60009	Granite sol plate*	500	50		6,0
31.60048	Holder with built-in voltage regulator (4,65 V) as well as 1 battery set as below.				
47.61059	1 Set = 4 spare batteries, type LR 03, AAA - 1,5 V				

***** For horizontal model ** along with wooden case



Range	mm / m	"	mm / m	"
1	± 0,75	± 150 "	0,05	10 "
2	± 0,15	± 30 "	0,01	2 "

✓ SWISS MADE

DIN 2276 Part 2 (form D)

See table

See table

Inductive measuring system with gravity pendulum

Cast iron body. Horizontal model with mountable granite sole plate.

Horizontal model with a flat measuring face. Square model with 2 flat and 2 prismatic measuring faces, 20 to 120 mm diameters.

0,005 mm / m + 1 % from measured value

0,001 mm / m

≈ ± 0,2 V. Impedance 4,5 kΩ.

10 to 30 °C

- 20 to 60 °C

EN 50081-1 / -2
EN 50082-1 / -2

Wooden case

Identification number

Declaration of conformity

TESA® Spirit Levels

No	mm / m	mm	For shafts mm	mm
Tubular spirit levels with a prismatic measuring face, Ω-shaped				
53.31650	1,0	100 x 30	17 ÷ 80	32
53.31651	0,3	100 x 30	17 ÷ 80	32
53.31652	0,3	150 x 30	17 ÷ 80	32
53.31653	0,3	200 x 30	17 ÷ 80	32
Tubular spirit levels with a flat measuring face				
53.31250	0,1	80 x 9		ø 16
53.31251	0,3	80 x 9		ø 16
53.31252	0,1	100 x 10		ø 20
53.31253	0,3	100 x 10		ø 20
53.31254	0,05	150 x 11		ø 22
53.31255	0,1	150 x 11		ø 22
53.31256	0,3	150 x 11		ø 22
53.31257	0,05	200 x 12		ø 22
53.31258	0,1	200 x 12		ø 22
53.31259	0,3	200 x 12		ø 22
Transmission shaft spirit levels with side viewing slots				
53.31350	0,05	100 x 30	17 ÷ 80	
53.31351	0,3	100 x 30	17 ÷ 80	
53.31352	0,1	200 x 30	17 ÷ 80	



SWISS MADE ✓

DIN 877

See table

DIN 2276 part 1

Nr. 53.31350 to 53.31352 in a wooden case, others in cardboard boxes

Declaration of conformity

TESA® Screw-on Spirit Levels

No	mm / m	L x B mm	mm	H mm
Prismatic levels with longitudinal vial				
53.31400	2 ÷ 5	30 x 10		10
53.31401	2 ÷ 5	40 x 10		11
53.31402	1,0	50 x 10		12
53.31403	2 ÷ 5	50 x 10		12
53.31406	0,3	60 x 12		14
53.31404	1,0	60 x 12		14
53.31405	2 ÷ 5	60 x 12		14
53.31408	0,1	80 x 15		18
53.31409	0,3	80 x 15		18
53.31407	2 ÷ 5	80 x 15		18
53.31411	0,1	100 x 18		22
53.31412	0,3	100 x 18		22
53.31410	1,0	100 x 18		22
53.31413	0,1	120 x 18		22
53.31414	0,3	120 x 18		22
53.31415	0,1	150 x 18		22
53.31416	0,3	150 x 18		22
Circular levels with longitudinal and lateral vials				
53.31500	2 ÷ 5		40	11
53.31501	2 ÷ 5		60	13
53.31502	0,3		60	13
53.31503	0,3		80	18
T-shaped, screw-on levels with longitudinal and lateral vials				
53.31550	0,1	80 x 65		17
53.31551	0,3	80 x 65		17
53.31552	0,02	150 x 147		30
53.31553	0,05	150 x 147		30







SWISS MADE ✓

DIN 877

See table

DIN 2276 part 1

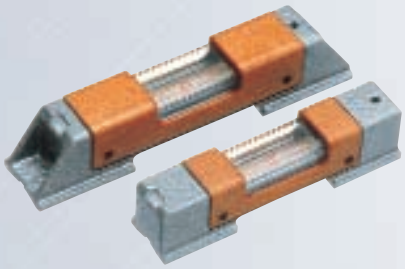
2 or 3 screw mounting

Cardboard box

Declaration of conformity

TESA® Precision Spirit Levels

For the inspection and alignment of flat and cylindrical surfaces in horizontal positions.





No	mm / m	mm	For shafts mm
Precision spirit level with insulating grip			
53.31600	0,05	100 x 45	19 ÷120
Precision spirit levels with insulting grip and vial protection, side viewing slot			
53.31050	0,02	100 x 32	17 ÷ 80
53.31051	0,1	100 x 32	17 ÷ 80
53.31052	0,3	100 x 32	17 ÷ 80
53.31054	0,02	150 x 35	17 ÷ 94
53.31055	0,04	150 x 35	17 ÷ 94
53.31056	0,05	150 x 35	17 ÷ 94
53.31057	0,1	150 x 35	17 ÷ 94
53.31058	0,02	200 x 40	19 ÷108
53.31059	0,04	200 x 40	19 ÷108
53.31060	0,05	200 x 40	19 ÷108
53.31061	0,1	200 x 40	19 ÷108
53.31062	0,3	200 x 40	19 ÷108
53.31063	0,02	250 x 45	19 ÷120
53.31064	0,04	300 x 50	22 ÷135
53.31065	0,05	300 x 50	22 ÷135
Crank pin spirit levels with 2 prismatic longitudinal/lateral measuring faces			
53.31100	0,05	60 x 40	19 ÷108
53.31101	0,05	90 x 40	19 ÷108
53.31102	0,3	90 x 40	19 ÷108

SWISS MADE ✓

DIN 877

Longitudinal and lateral vials

Flat and prismatic measuring faces

See table

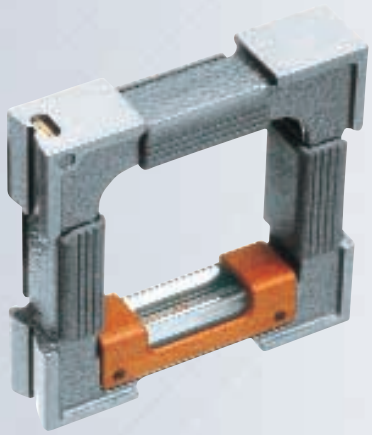
DIN 2276 part 1

Wooden case

Declaration of conformity

TESA-® Precision Frame Spirit Levels

For the inspection and alignment of flat and cylindrical surfaces in horizontal and vertical positions – Insulating handles and vial protection – side viewing slot.



No	mm / m	mm	For shafts mm
53.31200	0,04	100 x 32	17 ÷ 80
53.31201	0,05	100 x 32	17 ÷ 80
53.31202	0,1	100 x 32	17 ÷ 80
53.31203	0,04	150 x 35	17 ÷ 94
53.31204	0,05	150 x 35	17 ÷ 94
53.31205	0,1	150 x 35	17 ÷ 94
53.31206	0,02	200 x 40	19 ÷108
53.31207	0,04	200 x 40	19 ÷108
53.31208	0,05	200 x 40	19 ÷108
53.31209	0,1	200 x 40	19 ÷108
53.31210	0,05	250 x 45	19 ÷120

SWISS MADE ✓

DIN 877

Longitudinal and lateral vials

4 x 90 ° flat measuring faces machined to one another. Two of them have a vee-shape.

See table

DIN 2276 part 1

Wooden case

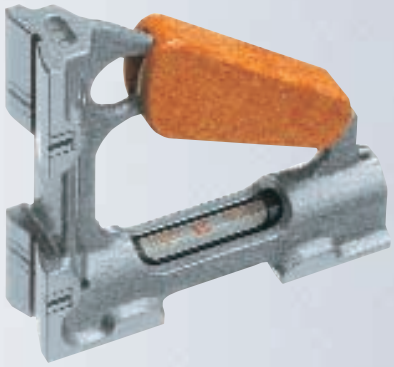
Declaration of conformity

- ✓
- DIN 877
- Longitudinal and lateral vials
- 90 ° flat measuring faces machined to one another with added prismatic faces
- See table
- DIN 2276 Part 1
- Wooden case
- Declaration of conformity

TESA® Precision Spirit Levels Magnetic Square Models

For inspecting and aligning flat and cylindrical surfaces in horizontal or vertical position – Attaches magnetically on flat and cylindrical surfaces – Fitted with insulating handle.

No	mm / m	mm	For shafts mm
53.31000	0,02	150 x 40	19 ÷ 108
53.31001	0,04	150 x 40	19 ÷ 108
53.31002	0,05	150 x 40	19 ÷ 108

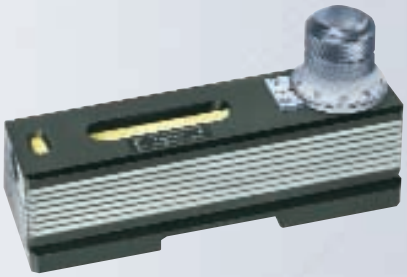


- ✓
- DIN 877
- Longitudinal and lateral vials
- Hardened and ground base
- Flat as well as prismatic measuring faces
- DIN 2276 Part 1
- Wooden case
- Declaration of conformity

TESA® Precision Spirit Level with Micrometer Element

For checking surface flatness and inclinations – With insulating grip.

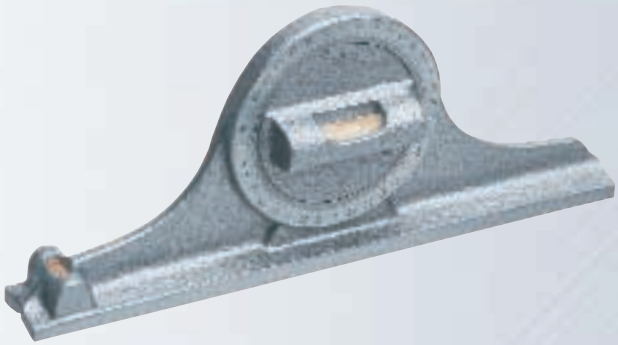
No	mm / m	mm	For shafts mm
53.31450	0,02	150 x 45	19 ÷ 120



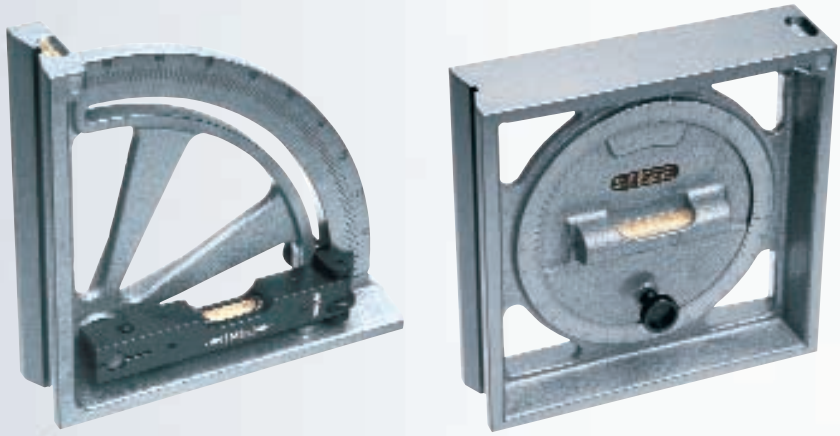
- ✓
- Factory standard
- Longitudinal and lateral vials
- Flat and prismatic measuring faces
- Wooden case
- Declaration of conformity

TESA® Protractor Spirit Inclinometer

No			Vial	mm	For shafts mm
53.31300	4 x 90 °	1 °	7 ÷ 17 '	180 x 22	15 ÷ 55



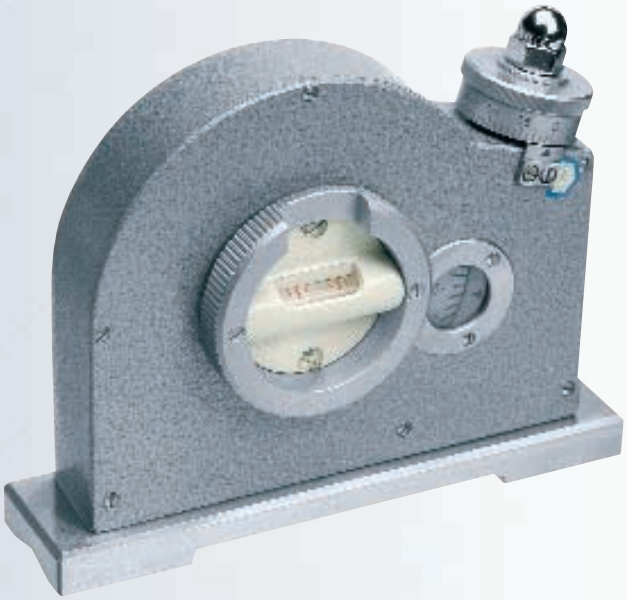
TESA® Protractor Spirit Inclinometers



- SWISS MADE ✓
- Factory standard
- Longitudinal and lateral vials
- **Square model**: 90 ° flat measuring faces machined to one another with additional prismatic measuring faces.
- **Model with frame**: 4 x 90 ° flat measuring faces machined to one another. Two of them have prismatic measuring faces.
- Wooden case
- Declaration of conformity

		Vernier	Vial	mm	For shafts mm
Square model with fine adjust device for the pivoting vial					
53.31150	90 °	10 '	1 '	150 x 40	19 ÷ 108
Model with frame and fine adjust device for the turning vial					
53.31700	2 x 180 °	3 '	1 '	150 x 40	19 ÷ 108

TESA® Spirit Inclinometer with Micrometer Element



- SWISS MADE ✓
- DIN 877
- Longitudinal and lateral vials
- Hardened and ground base
- Flat and prismatic measuring faces
- DIN 2276 part 1
- Wooden case
- Declaration of conformity

		Micrometer element	Vial	mm	For shafts mm
53.31750	2 x 180 °	1 '	1 '	150 x 35	17 ÷ 80

Length And Angle Standards



Purchasing Gauge Blocks Calls For Confidence

The high quality of the TESA's gauge blocks is the result of years of experience in producing and making use of these products.

- *Use of the highest quality materials and appropriate heat treatment of the gauge blocks, guaranteeing a durable form and dimensional stability of the gauge blocks over the years.*
- *Very low deviations in flatness and parallelism of the measuring faces, resulting in excellent accuracy.*
- *Unique flat lapping polish as well as edge rounding techniques, leading to superior wringability.*
- *Proper serial number marked on each gauge block.*

ISO 3650

Gauge blocks with metric nominal lengths conform to ISO 3650:1998. This international standard is based on standards published either in a region, e.g. the European standard EN ISO 3650:1998 or in a country, e.g. the Swiss standard SN EN ISO 3650, German standard DIN EN ISO 3650 or French standard NF EN ISO 3650. Consequently, national standards such as DIN 861 or NF E 11-010 are non longer applicable.

Gauge blocks with inch nominal lengths comply with the British standard BS 4311 - Part 1.

The new standard ISO 3650:1998 includes the following main changes:

- *Withdrawal of accuracy grade 00 (see the table on tolerance classes below)*
- *Introduction of specifications dealing with t he uncertainty of measurement in relation with the declaration of the conformance of the product as per ISO 14253-1:1998.*
- *Review of some definitions and abbreviations according to the normative references currently applicable (see picture).*

Limit deviations t_e and *tolerances t_v: see table on page I-5*

Flatness tolerance ft_f

Nominal - length mm	Calibration grade and other grades K	0	1	2
	Flatness tolerance t_f			
	µm	µm	µm	µm
$0,5 \le l_n \le 150$	0,05	0,1	0,15	0,25
$150 < l_n \le 500$	0,1	0,15	0,18	0,25
$500 < l_n \le 1000$	0,15	0,18	0,2	0,25

Which Material Do You Need?

Steel

Steel gauge blocks have proven their reliability for more than hundred years. This material remains the most commonly accepted for length standards.

Steel gauge blocks provide high resistance to wear associated with a good property to adhere to other gauge blocks. However, steel must be protected against corrosion. Provided gauge blocks made from this material are properly handled, they will remain reliable for many years. TESA steel gauge blocks have the following main features:

- *Highly alloyed steel*
- *Hardness guaranteed to 800 HV*
- *Artificially aged for optimum form and dimensional stability*
- *Coefficient of thermal expansion: $(11,5 \pm 1,0) \times 10^{-6}\ K^{-1}$*

Tungsten Carbide

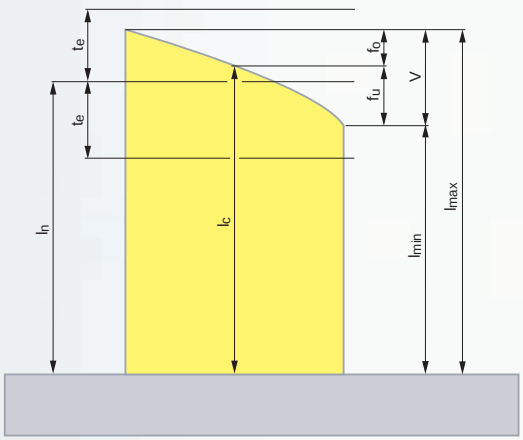
Gauge blocks in tungsten carbide are 10 times as much resistant as steel gauges. They are intended for frequent use, also where superior wringing quality is required. TESA tungsten carbide gauge blocks provide:

- *Hardness guaranteed to 1400 HV*
- *Coefficient of thermal expansion: $(4,23 \pm 0,1) \times 10^{-6}\ K^{-1}$*

Ceramic

Ceramic gauge blocks are extremely resistant to wear and scratches. Due to the properties of this material, any minor damage is unlikely to affect the wringability of their measuring faces. Being corrosion resistant, these gauge blocks are insensitive to sweaty hands, among others. Manufactured from stabilised zirconia, TESA ceramic gauge blocks have the following key features:

- *Non-magnetizable*
- *Hardness guaranteed to 1400 HV*
- *Coefficient of thermal expansion: $(9,7 \pm 0,8) \times 10^{-6}\ K^{-1}$*



Nominal length l_n.
Central length l_c.
Variation v with f_o and f_u.
Limit deviations t_e at any point , proceeding from the nominal length.

Which Grade Do You Need?

Grade 2

*These gauge blocks are commonly used as **«Working Standards»** in inspection rooms within the production to set and calibrate measuring instruments and others equipments as well as to inspect tools, fixtures and machines.*

Grade 1

*Gauge blocks of this class are mainly used as **«Working Standards»** to set and calibrate plug gauges and measuring instruments in measuring rooms or inspection areas within the production.*

Grade 0

*These gauge blocks are designated for use as **«Company Standards»** in calibration laboratories or environmentally controlled inspection room to set and calibrate plug gauges as well as measuring equipments.*

Calibration grade K

*Gauge blocks of this tolerance class are intended for use as **«Reference Standards»** in metrology oriented laboratories of National Institutes, precision measuring rooms and other laboratories of National Calibration Services, whether officially accredited or not. They should be used as masters to calibrate gauge blocks, length standards of same accuracy and measuring instruments as well.*

Grade 00

The new standard ISO 3650 does no longer take this accuracy grade into consideration as the uncertainties of measurement achieved with the procedure applied for calibration usually lead to a disparity against specified tolerances.

The rules to the expression of uncertainty of measurement for proving the conformance or non conformance of the product with the specification, as stated in the standard ISO 14253-1:1998, have dictated the decision to withdraw the accuracy grade 00.

A wide experience in practical use of gauge blocks has proven that gauges of the calibration class K could easily replace those of accuracy grade 00 used until now.

Gauge blocks of grade 00 remain, however, available upon request.

Certificate of Calibration and Traceability

All gauge blocks from TESA are supplied with a certificate of calibration issued by the accredited calibration laboratory of a national calibration service. Depending on their execution, this service can either be the Swiss calibration service (SCS), British calibration service (UKAS) or Comité Français d'Accréditation (COFRAC).

Accreditation is the authentic assurance of the skills of the calibration laboratories as well as of the full traceability to national standards that conform with the International System of Units (SI). And this for any reference standard or measuring equipment used.

Owing to a multilateral agreement (MLA), all certificates of calibration issued by the members of the European Cooperation for Accreditation of Laboratories (EA) as listed below are internationally accepted.

Belgium	–	*BKO / OBE*
Denmark	–	*DANAK*
Germany	–	*DKD / DAR*
Finland	–	*FINAS*
France	–	*COFRAC*
United Kingdom	–	*UKAS*
Ireland	–	*NAB*
Italy	–	*SIT*
Netherlands	–	*RvA*
Norway	–	*NA*
Austria	–	*MBwA*
Portugal	–	*IPQ*
Sweden	–	*SWEDAC*
Switzerland	–	*SCS / SAS*
Spain	–	*ENAC*

Other related countries:

Australia	–	*NATA*
New Zealand	–	*IANZ*
South Africa	–	*SANAS*
Czechia	–	*CAI*

Deliveries

TESA gauge blocks are available in full sets or individually with nominal lengths or within set compositions as listed on the following pages. Other gauge sets and lengths can also be made available upon request.

Since individual gauge blocks could no be listed in their whole here, any inquiry or purchase order should specify:

- *desired nominal length*
- *material*
- *calibration grade or any other grade*

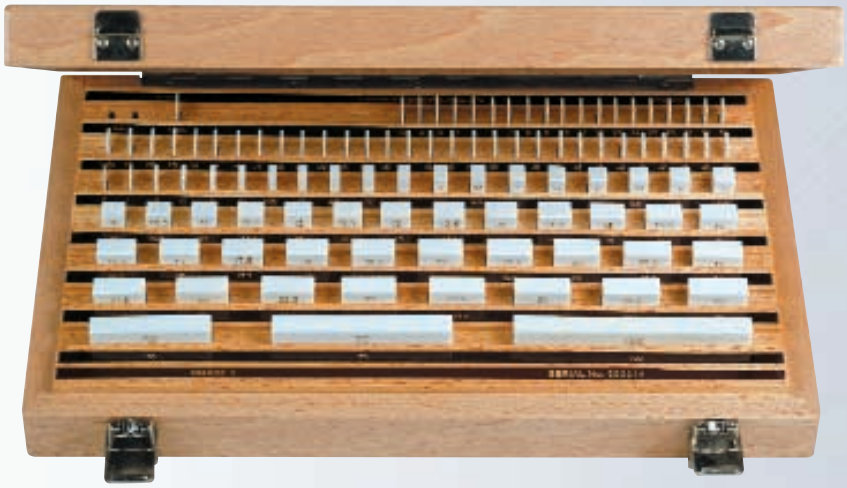
ETALON® Basic
Set Compositions in Steel, Metric



✓
ISO 3650
Stable, highly alloyed steel, resistant to wear
(11,5 ± 1,0) x 10^{-6} K^{-1}
Limit deviations t_e on page I-5
Tolerances t_V on page I-5
See page I-2
Wooden case
Identification number
SCS or COFRAC calibration certificate

SCS calibration certificate	COFRAC calibration certificate		Set compositions		
No	No		mm	Steps mm	Pieces
32 Piece Sets					
65.19000	**65.19010**	1	1,005		1
65.19001	**65.19011**	2	1,01 ÷ 1,09	0,01	9
			1,1 ÷ 1,9	0,1	9
			1 ÷ 9,0	1,0	9
			10, 20, 30 and 50		4
47 Piece Sets					
65.19002	**65.19012**	1	1,005		1
65.19003	**65.19013**	2	1,01 ÷ 1,09	0,01	9
			1,1 ÷ 1,9	0,1	9
			1,0 ÷ 24,0	1,0	24
			25 ÷ 100	25	4
88 Piece Sets					
65.19004	**65.19014**	1	1,0005		1
65.19005	**65.19015**	2	1,001 ÷ 1,009	0,001	9
			1,01 ÷ 1,49	0,01	49
			0,5 ÷ 9,5	0,5	19
			10 ÷ 100	10	10

TESA® Gauge Blocks in Steel, Tungsten Carbide and Ceramic



Limit Deviations and Tolerances as per ISO 3650

Nominal length	Calibration grade K		Grade 0		Grade 1		Grade 2	
	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length
mm	$\pm t_e$ µm	t_v µm	$\pm t_e$ µm	t_v µm	$\pm t_e$ µm	t_v µm	$\pm t_e$ µm	t_v µm
$0,5 \geq l_n \leq 10$	0,2	0,05	0,12	0,1	0,2	0,16	0,45	0,3
$10 < l_n \leq 25$	0,3	0,05	0,14	0,1	0,3	0,16	0,6	0,3
$25 < l_n \leq 50$	0,4	0,06	0,2	0,1	0,4	0,18	0,8	0,3
$50 < l_n \leq 75$	0,5	0,06	0,25	0,12	0,5	0,18	1	0,35
$75 < l_n \leq 100$	0,6	0,07	0,3	0,12	0,6	0,2	1,2	0,35
$100 < l_n \leq 150$	0,8	0,08	0,4	0,14	0,8	0,2	1,6	0,4
$150 < l_n \leq 200$	1	0,09	0,5	0,16	1	0,25	2	0,4
$200 < l_n \leq 250$	1,2	0,1	0,6	0,16	1,2	0,25	2,4	0,45
$250 < l_n \leq 300$	1,4	0,1	0,7	0,18	1,4	0,25	2,8	0,5
$300 < l_n \leq 400$	1,8	0,12	0,9	0,2	1,8	0,3	3,6	0,5
$400 < l_n \leq 500$	2,2	0,14	1,1	0,25	2,2	0,35	4,4	0,6
$500 < l_n \leq 600$	2,6	0,16	1,3	0,25	2,6	0,4	5,0	0,7
$600 < l_n \leq 700$	3	0,18	1,5	0,3	3	0,45	6,0	0,7
$700 < l_n \leq 800$	3,4	0,2	1,7	0,3	3,4	0,5	6,5	0,8
$800 < l_n \leq 900$	3,8	0,2	1,9	0,35	3,8	0,5	7,5	0,9
$900 < l_n \leq 1000$	4,2	0,25	2,0	0,4	4,2	0,6	8	1

Sets of TESA® Gauge Blocks with Nominal Lengths up to 100 mm

Steel	Carbide	Céramic		Set compositions mm	Steps mm	Pieces
32 Piece Sets M32						
65.1516027	**65.1526027**	**65.1536027**	K	1,005		1
65.1515027	**65.1525027**	**65.1535027**	0	1,01 ÷ 1,09	0,01	9
65.1511027	**65.1521027**	**65.1531027**	1	1,1 ÷ 1,9	0,1	9
65.1512028	**65.1522027**	**65.1532027**	2	1,0 ÷ 9,0	1,0	9
				10, 20, 30 and 60		4
46 Piece Sets - M46						
65.1516024	**65.1526024**	**65.1536024**	K	1,001 ÷ 1,009		9
65.1515024	**65.1525024**	**65.1535024**	0	1,01 ÷ 1,09	0,01	9
65.1511024	**65.1521024**	**65.1531024**	1	1,1 ÷ 1,9	0,1	9
65.1512024	**65.1522024**	**65.1532024**	2	1,0 ÷ 9,0	1,0	9
				10 ÷ 100	10	10
47 Piece Sets - M4						
65.1516021	**65.1526021**	**65.1536021**	K	1,005		1
65.1515021	**65.1525021**	**65.1535021**	0	1,01 ÷ 1,09	0,01	9
65.1511021	**65.1521021**	**65.1531021**	1	1,1 ÷ 1,9	0,1	9
65.1512021	**65.1522021**	**65.1532021**	2	1,0 ÷ 24,0	1,0	24
				25 ÷ 100	25	4
88 Piece Sets - M88						
65.1516014	**65.1526014**	**65.1536014**	K	1,0005		1
65.1515014	**65.1525014**	**65.1535014**	0	1,001 ÷ 1,009	0,001	9
65.1511014	**65.1521014**	**65.1531014**	1	1,01 ÷ 1,49	0,01	49
65.1512014	**65.1522014**	**65.1532014**	2	0,5 ÷ 9,5	0,5	19
				10 ÷ 100	10	10
103 Piece Sets - M103						
65.1516013	**65.1526013**	**65.1536013**	K	1,005		1
65.1515013	**65.1525013**	**65.1535013**	0	1,01 ÷ 1,49	0,01	49
65.1511013	**65.1521013**	**65.1531013**	1	0,5 ÷ 24,5	0,5	49
65.1512013	**65.1522013**	**65.1532013**	2	25 ÷ 100	25	4
112 Piece Sets - M112						
65.1516012	**65.1526012**	**65.1536012**	K	1,0005		1
65.1515012	**65.1525012**	**65.1535012**	0	1,001 ÷ 1,009	0,001	9
65.1511012	**65.1521012**	**65.1531012**	1	1,01 ÷ 1,49	0,01	49
65.1512012	**65.1522012**	**65.1532012**	2	0,5 ÷ 24,5	0,5	49
				25 ÷ 100	25	4
122 Piece Sets - M122						
65.1516011	**65.1526011**	**65.1536011**	K	1,0005		1
65.1515011	**65.1525011**	**65.1535011**	0	1,001 ÷ 1,009	0,001	9
65.1511011	**65.1521011**	**65.1531011**	1	1,01 ÷ 1,49	0,01	49
65.1512011	**65.1522011**	**65.1532011**	2	1,6 ÷ 1,9	0,1	4
				0,5 ÷ 24,5	0,5	49
				30 ÷ 100	10	8
				25 and 75		2

Steel gauge blocks

Tungsten carbide and ceramic gauge blocks

ISO 3650

Steel: stable, highly alloyed steel, resistant to wear.

Tungsten carbide: stable, resistant to wear.

Ceramic: stabilised zirconia, extremely resistant to wear and scratches.

Seel: $(11,5 \pm 1,0) \times 10^{-6}\ K^{-1}$

Tungsten carbide: $(4,23 \pm 0,1) \times 10^{-6}\ K^{-1}$

Ceramic: $(9,7 \pm 0,8) \times 10^{-6}\ K^{-1}$

Limit deviations t_e on page I-5

Tolerances t_V on page I-5

See page I-2

Supplied in sets or individually

Wooden case

Identification number

Steel gauge blocks to calibration grade K with SCS certificate

Steel gauge blocks to tolerances classes 0, 1 and 2 with TESA certificate

Tungsten carbide and ceramic gauge blocks to all classes with UKAS certificate

Sets of TESA® Mikechex Metric Gauge Blocks

Designated to calibrate and set the indication of external micrometers.

Steel Gauge blocks

Tungsten carbide and ceramic gauge blocks

ISO 3650

Set compositions: Mikechex M10 to DIN 863 T1 Mikechex M8, M10 and M11 to BS 870

Steel: stable, highly alloyed steel, resistant to wear.

Tungsten carbide: stable, resistant to wear.

Ceramic: Made from stabilised zirconia, extremely resistant to wear and scratches.

Steel: $(11,5 \pm 1,0) \times 10^{-6}\ K^{-1}$

Tungsten carbide: $(4,23 \pm 0,1) \times 10^{-6}\ K^{-1}$

Ceramic: $(9,7 \pm 0,8) \times 10^{-6}\ K^{-1}$

Limit deviations t_e on page I-5

Tolerances t_V on page I-5

See page I-2

Optical flats on page I-12

Supplied in sets or individually

Wooden case

Identification number

Steel gauge blocks to calibration grade K with SCS certificate

Steel gauge blocks to tolerances classes 0,1 and 2 with TESA certificate

Tungsten carbide and ceramic gauge blocks to all classes with UKAS certificate





Steel	Carbide	Ceramic		Set compositions mm
8 Piece Sets - Mikechex M8				
65.1516038	**65.1526036**	**65.1536037**	K	3,1 6,5 9,7 12,5 15,8 19,0 21,9 25,0
65.1515038	**65.1525038**	**65.1535038**	0	
65.1511038	**65.1521038**	**65.1531038**	1	
65.1512039	**65.1522038**	**65.1532038**	2	
8 Piece Sets - Mikechex M8 with Optical Flat				
	65.1525042		0	3,1 6,5 9,7 12,5 15,8 19,0 21,9 25,0
	65.1521042		1	50 mm dia.optical flat*
	65.1522042		2	
10 Piece Sets - Mikechex M10				
65.1516037	**65.1526035**	**65.1536036**	K	2,5 5,1 7,7 10,3 12,9 15,0 17,6 20,2
65.1515037	**65.1525037**	**65.1535037**	0	22,8 25,0
65.1511037	**65.1521037**	**65.1531037**	1	
65.1512038	**65.1522037**	**65.1532037**	2	
10 Piece Sets - Mikechex M10 with Optical Flat				
	65.1525041		0	2,5 5,1 7,7 10,3 12,9 15,0 17,6 20,2
	65.1521041		1	22,8 25,0
	65.1522041		2	50 mm dia.optical flat*
11 Piece Sets - Mikechex M11				
65.1515036	**65.1525036**	**65.1535036**	0	3,1 6,5 9,7 12,5 15,8 19,0 21,9 25,0
65.1511036	**65.1521036**	**65.1531036**	1	50 75 100
65.1512037	**65.1522036**	**65.1532036**	2	
11 Piece Sets - Mikechex M11 with Optical Flat				
	65.1525040		0	3,1 6,5 9,7 12,5 15,8 19,0 21,9 25,0
	65.1521040		1	50 75 100
	65.1522040		2	50 mm dia.optical flat*

* Max. flatness error: 0,125 µm

Sets of TESA® Gauge Blocks with Nominal Lengths over 100 mm



✓

ISO 3650

Stable, highly alloyed steel, resistant to wear.

Ceramic tipped gauge blocks in special steel with zirconia tipped ends

(11,5 ± 1,0) x 10^{-6} K^{-1}

2 coupling holes

Airy point with bear marks

Other technical data on page I-6

Wooden case

Identification number

UKAS calibration certificate

Steel	Ceramic tipped		Set compositions mm						
8 Piece Sets - ML8									
65.1516500	**65.1536500**	K	125	150	175	200	250	300
65.1515500	**65.1535500**	0	400	500				
65.1511500	**65.1531500**	1						
65.1512500	**65.1532500**	2						

Sets of TESA® Gauge Blocks with Nominal Lengths up to 4 in



✓

BS 4311 Part 1

Additional technical data on page I-6

See BS 4311 Part 1

Supplied as single gauge blocks or in sets

Moulded wooden case

Identification number

UKAS calibration certificate

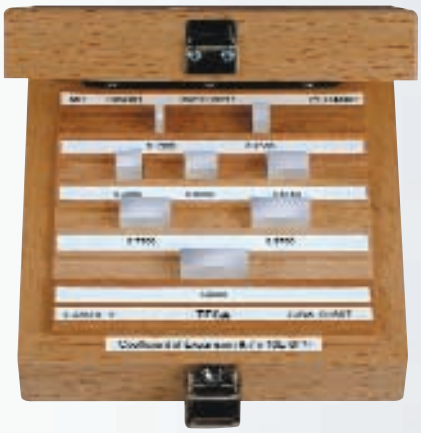
Tungsten carbide	Ceramic		Set compositions in	Steps in	Pieces
81 Piece Sets - E81 with 2 Protector Gauge Blocks					
65.2526012	***65.2536012***	*K*	*0.1001 ÷ 0.1009*	*0.0001*	9
65.2525012	***65.2535012***	*0*	*0.101 ÷ 0.149*	*0.001*	49
65.2521012	***65.2531012***	*1*	*0.05 ÷ 0.95*	*0.05*	19
65.2522012	***65.2532012***	*2*	*1.0 ÷ 4.0*	*1.0*	4
			0.10		2

Limit Deviations and Tolerances According to BS 4311 : Part 1 : 1993

Nominal length	Calibration grade K		Grade 0		Grade 1		Grade 2	
	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length
in	$\pm t_e$ µin	t_v µin	$\pm t_e$ µin	t_v µin	$\pm t_e$ µin	t_v µin	$\pm t_e$ µin	t_v µin
$l_n \leq 0,4$	5	2	5	4	10	6	20	12
$0,4 < l_n \leq 1$	6	2	6	4	12	6	25	12
$1 < l_n \leq 2$	8	3	8	4	15	7	30	12
$2 < l_n \leq 3$	10	3	10	5	20	7	40	14
$3 < l_n \leq 4$	12	3	12	5	25	8	50	14

Sets of TESA® Mikechex Inch Gauge Blocks

Designated to calibrate and set the indication of external micrometers.



✓

BS 4311 Part 1

BS 870 for the set compositions.

Steel type: tungsten carbide providing stability as well as high resistance to wear

Ceramic type: extremely resistant zirconia

Tugnsten carbide: $(4,23 \pm 0,1) \times 10^{-6}\ K^{-1}$

Ceramic: $(9,7 \pm 0,8) \times 10^{-6}\ K^{-1}$

See BS 4311 Part 1

Supplied as single gauge blocks or in sets

Wooden case

Identification number

UKAS calibration certificate

Tungsten carbide	Ceramic		Set compositions in						
8 Piece Sets - Mikechex E8									
65.2526023	**65.2536014**	K	0.130	0.250	0.385	0.500	0.615	0.750	
65.2525023	**65.2535014**	0	0.870	1.000					
65.2521023	**65.2531015**	1							
65.2522023	**65.2532015**	2							
10 Piece Sets - Mikechex E10									
65.2526022	**65.2536013**	K	0.105	0.210	0.315	0.420	0.500	0.605	
65.2525022	**65.2535013**	0	0.710	0.815	0.920	1.000			
65.2521022	**65.2531014**	1							
65.2522022	**65.2532014**	2							
n Piece Sets - Mikechex En									
65.2521021	**65.2531013**	1	0.130	0.250	0.385	0.500	0.615	0.750	
65.2522021	**65.2532013**	2	0.870	1.000	2.000	3.000	4.000		

Sets of TESA® Gauge Blocks with Nominal Lengths over 4 in



✓ Factory standard

Stable, highly alloyed steel, resistant to wear

Ceramic tipped gauge blocks in special steel with zirconia tipped ends

(11,5 ± 1,0) x 10^{-6} K^{-1}

2 coupling holes

Airy point with bear marks

Other technical data on page I-6

Wooden case

Identification number

UKAS calibration certificate

Steel	Ceramic tipped		Set compositions in
8 Piece Sets - EL8			
65.2516500	**65.2536500**	K	5 6 7 8 10 12 16 20
65.2515500	**65.2535500**	0	
65.2511500	**65.2531500**	1	
65.2512500	**65.2532500**	2	

Limit Deviations and Tolerances According to Factory Standard for Gauge Blocks over 4 in

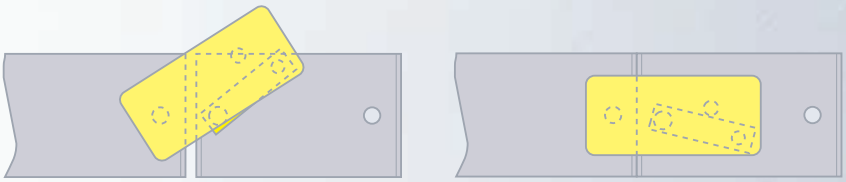
Nominal length	Calibration grade K		Grade 0		Grade 1		Grade 2	
	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length
in	± t_e µin	t_v µin	± t_e µin	t_v µin	± t_e µin	t_v µin	± t_e µin	t_v µin
$4 < l_n \leq 6$	31	3	15	5	31	8	63	16
$6 < l_n \leq 8$	40	3	20	6	40	10	79	16
$8 < l_n \leq 10$	47	4	23	6	47	10	95	18
$10 < l_n \leq 12$	55	4	28	7	55	10	110	20
$12 < l_n \leq 16$	70	5	35	8	70	12	140	20
$16 < l_n \leq 20$	87	5	43	10	87	14	174	24

TESA® Toggle Clamp for Long Series Gauge Blocks over 100 mm / 4 in

✓

Constant force. Compression at each locking point is within 0,3 to 0,4 µm.





No		
65.1500492	Toggle clamp for long series gauge blocks	

TESA® Accessories for Gauge Blocks

✓

Measuring jaws, straight edge, scriber and centre point in hardened steel

Available in sets or individually

Full sets in a wooden case

Declaration of conformity

No		
65.1570401	TESA accessory set M10	
65.1570403	TESA accessory set M20	

Furnished with the following items:

No					mm	Lengths mm	M10	M20
65.1570420	Pair	Measuring jaws with 1 cylindrical and 1 flat measuring faces	Radius	2		40	●	●
65.1570421	Pair	Measuring jaws with 1 cylindrical and 1 flat measuring faces	Radius	5		50	●	●
65.1570422	Pair	Measuring jaws with 1 cylindrical and 1 flat measuring faces	Radius	8		60	–	●
65.1570423	Pair	Measuring jaws with 1 cylindrical and 1 flat measuring faces	Radius	12		75	●	●
65.1570424	Pair	Measuring jaws with 2 plan parallel measuring faces	Height	20		100	–	–
65.1570436	Pair	Measuring jaws with 2 plan parallel measuring faces	Height	20		160	–	●
65.1570432	Piece	Straight edge				50	–	●
65.1570433	Piece	Scriber				50	–	●
65.1570434	Paire	Centre point				50	●	●
65.1570425	Piece	Gauge Holder	Max. length			60	–	●
65.1570426	Piece	Gauge Holder	Max. length			100	●	●
65.1570427	Piece	Gauge Holder	Max. length			160	–	●
65.1570428	Piece	Gauge Holder	Max. length			250	●	●
65.1570429	Piece	Gauge Holder	Max. length			450	–	–
65.1570431	Piece	Cast iron base for gauge holders	Height	35			●	●

TESA® Maintenance Kit for Gauge Blocks



65.2500450	TESA maintenance kit for gauge blocks

Supplied with the following items :

65.2500452	1 Arkansas stone
65.2500453	1 Soft tipped tweezers
65.2500454	1 Pneumatic vacuum pen
65.2500455	1 Nanofibre cleaning cloth
65.2500456	1 Pair of cotton gloves
65.2500457	1 Acid-free solvent
65.2500458	1 Box with protective grease
25.30050	1 50 mm dia. optical flat
65.2500460	1 Solvent container
65.2500461	1 Dust remover
65.2500462	1 Dust-brush
65.2500463	1 Bottle of super-fine, acid-free oil
65.2500451	1 Wooden case

✓

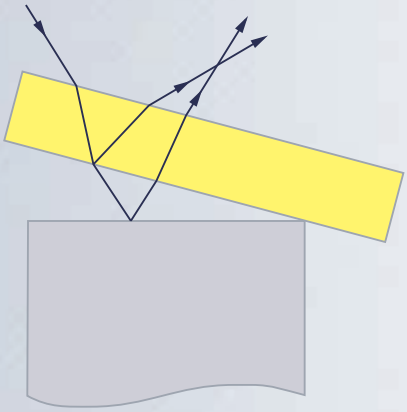
Full set in a wooden case

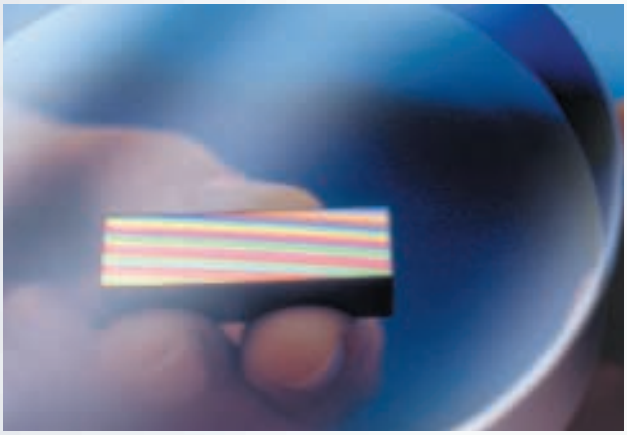
TESA® Optical flats

Used for examining flatness and wringability of the gauge blocks or any other test pieces having flat faces with same high grade of accuracy.



	mm	mm	µm
25.30050	50	15	0,125
25.30075	75	20	0,125





✓

✓

Diameter and thickness as shown on the table

Optical flats with 2 flat measuring faces. Parallelism cannot be guaranteed.

Wooden case

Declaration of conformity

TESA® Monochromatic Light Unit

For use with optical flats or optical parallels to measure both the flatness and parallelism of the measuring faces by interferometry.

Monochromatic light source providing high-contrast interference fringes. This light unit uses a single wavelength so that bright/light fringes only are visible.

The light source at the rear of the case also permits visual examination, e.g. with the aid of a knife-edge or bevelled straight edge.

✓

Case in lacquered wood

406 x 406 x 355 mm (W x D x H)

Light source: 35 W sodium lamp, 89 % monochromatic, colour yellow, wavelength 0,575 µm

See table

Surface plate in hardened steel

Surface plate: 0,5 µm

Surface plate: 2,5 µm

Suited carrying case

	V
65.2500420	110
65.2500422	210 ÷ 230
Accessory	
65.1570269	200 mm dia. surface plate. Lapped and polished measuring face
65.2500424	Spare lamp (sodium)



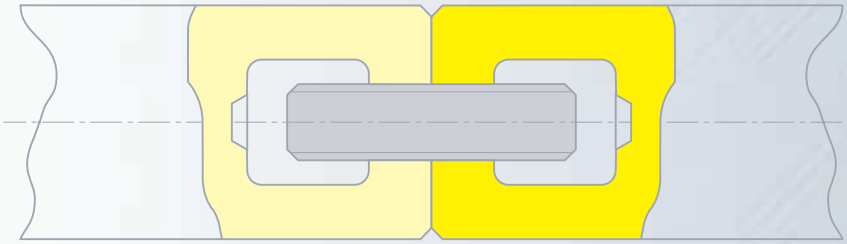
TESA® Combination Length Bars with Round Section

A coaxially mounted threaded connection allows length bars of either grade 1 or I and 2 or W as well as accessory components to be securely joined together to form the desired combination.

✓

R = «Reference»
C = «Calibration»
I = «Inspection»
W = «Workshop»





Metric Gauge blocks

		Thread	Set compositions mm
8 Piece Sets - MB8			
65.1517750	R	with	10 20 40 60 80 100
65.1516750	C	without	200 300
65.1511750	1	with	
65.1512750	2	with	
9 Piece Sets - MB9			
65.1517751	R	without	10 20 40 60 80 100
65.1516751	C	without	200 300 400
65.1511751	1	with	
65.1512751	2	with	
10 Piece Sets - MB10			
65.1517752	R	without	10 20 40 60 80 100
65.1516752	C	without	200 300 400 600
65.1511752	1	with	
65.1512752	2	with	
11 Piece Sets - MB11			
65.1517753	R	without	25 50 75 100 125 150
65.1516753	C	without	175 200 375 575 775
65.1511753	1	with	
65.1512753	2	with	
14 Piece Sets - MB14			
65.1517754	R	without	25^{3x} 50 75 100 125 150
65.1516754	C	ohne	175 200^{2x} 375 575 775
65.1511754	1	with	
65.1512754	2	with	

^{2x} = 2 pieces ^{3x} = 3 pieces

✓

BS 5317

22 mm

Gauges of both grades 1 and 2 with coupling thread M10x1,5

Stable, highly alloyed steel , resistant to wear. Hardness to ≥ 800 HV

$(11{,}5 \pm 1{,}0) \times 10^{-6}\ K^{-1}$

See table

See BS 5317

See BS 5317

Available in sets or individually

Wooden case

Identification number

UKAS calibration certificate

Limit Deviations of Length at any Point from Nominal Length

Grades	R	C	1	2
Nominal length mm	µm	µm	µm	µm
$l_n \le 25$	± 0,08	± 0,15	$^{+0,4}/_{-0,2}$	$^{+0,75}/_{-0,35}$
$25 < l_n \le 50$	± 0,12	± 0,20	$^{+0,6}/_{-0,2}$	$^{+0,95}/_{-0,45}$
$50 < l_n \le 75$	± 0,15	± 0,30	$^{+0,7}/_{-0,3}$	$^{+1,2}/_{-0,5}$
$75 < l_n \le 100$	± 0,2	± 0,35	$^{+0,85}/_{-0,35}$	$^{+1,4}/_{-0,6}$
$100 < l_n \le 125$	± 0,25	± 0,45	$^{+1,0}/_{-0,4}$	$^{+1,6}/_{-0,7}$
$125 < l_n \le 150$	± 0,3	± 0,50	$^{+1,1}/_{-0,5}$	$^{+1,8}/_{-0,8}$
$150 < l_n \le 175$	± 0,3	± 0,60	$^{+1,25}/_{-0,55}$	$^{+2,0}/_{-0,9}$
$175 < l_n \le 200$	± 0,35	± 0,65	$^{+1,4}/_{-0,6}$	$^{+2,2}/_{-1,0}$
$275 < l_n \le 300$	± 0,5	± 0,95	$^{+1,4}/_{-0,6}$	$^{+2,2}/_{-1,0}$
$300 < l_n \le 375$	± 0,5	± 0,95	$^{+2,4}/_{-1,0}$	$^{+3,7}/_{-1,6}$
$375 < l_n \le 400$	± 0,65	± 1,3	$^{+2,5}/_{-1,1}$	$^{+3,9}/_{-1,7}$
$500 < l_n \le 575$	± 0,8	± 1,6	$^{+3,5}/_{-1,5}$	$^{+5,4}/_{-2,3}$
$575 < l_n \le 600$	± 0,95	± 1,9	$^{+3,65}/_{-1,55}$	$^{+5,6}/_{-2,4}$
$700 < l_n \le 775$	± 1,1	± 2,2	$^{+4,6}/_{-2,0}$	$^{+7,1}/_{-3,0}$

Grades	*R*	*C*	*I*	*W*
Nominal length in	*µin*	*µin*	*µin*	*µin*
$l_n \le 1$	*± 3*	*± 5*	$^{+7}/_{-7}$	$^{+10}/_{-10}$
$1 < l_n \le 2$	*± 4*	*± 10*	$^{+14}/_{-7}$	$^{+20}/_{-10}$
$2 < l_n \le 3$	*± 6*	*± 15*	$^{+20}/_{-10}$	$^{+30}/_{-20}$
$3 < l_n \le 4$	*± 8*	*± 20*	$^{+30}/_{-10}$	$^{+40}/_{-20}$
$4 < l_n \le 5$	*± 10*	*± 25*	$^{+35}/_{-15}$	$^{+50}/_{-30}$
$5 < l_n \le 6$	*± 12*	*± 30*	$^{+40}/_{-20}$	$^{+60}/_{-30}$
$6 < l_n \le 7$	*± 14*	*± 35*	$^{+50}/_{-20}$	$^{+70}/_{-40}$
$7 < l_n \le 8$	*± 16*	*± 40*	$^{+55}/_{-25}$	$^{+80}/_{-40}$
$8 < l_n \le 9$	*± 18*	*± 45*	$^{+55}/_{-25}$	$^{+80}/_{-40}$
$9 < l_n \le 10$	*± 20*	*± 50*	$^{+55}/_{-25}$	$^{+80}/_{-40}$
$11 < l_n \le 12$	*± 25*	*± 60*	$^{+55}/_{-25}$	$^{+80}/_{-40}$
$12 < l_n \le 15$	*± 30*	*± 75*	$^{+105}/_{-45}$	$^{+150}/_{-80}$
$15 < l_n \le 18$	*± 35*	*± 90*	$^{+105}/_{-45}$	$^{+150}/_{-80}$
$18 < l_n \le 23$	*± 45*	*± 120*	$^{+160}/_{-70}$	$^{+230}/_{-120}$
$24 < l_n \le 30$	*± 60*	*± 150*	$^{+160}/_{-70}$	$^{+230}/_{-120}$
$30 < l_n \le 31$	*± 60*	*± 160*	$^{+220}/_{-90}$	$^{+310}/_{-160}$
$31 < l_n \le 40$	*± 80*	*± 200*	$^{+280}/_{-120}$	$^{+400}/_{-200}$
$40 < l_n \le 50$	*± 100*	*± 250*	$^{+350}/_{-150}$	$^{+500}/_{-250}$

✓

BS 1790

7/8 in

Gauges of both grades I and W with coupling thread BSW 3/8 in

Stable, highly alloyed steel, resistant to wear. Hardness to ≥ 800 HV

(11,5 ± 1,0) x 10^{-6} K^{-1}

See table

See BS 1790

See BS 1790

Available in sets or individually

Wooden case

Identification number

UKAS calibration certificate

Inch Gauge Blocks

No		Thread	Set compositions in							
8 Piece Sets - EB8										
65.2517750	R	without	0.5	1	2	3	4	5	6	12
65.2515750	C	without								
65.2511750	I	with								
65.2512750	W	with								
9 Piece Sets - EB9										
65.2517751	R	without	0.5	1	2	3	4	5	6	12
65.2515751	C	without	18							
65.2511751	I	with								
65.2512751	W	with								
10 Piece Sets - EB10										
65.2517752	R	without	0.5	1	2	3	4	5	6	12
65.2515752	C	without	18	30						
65.2511752	I	with								
65.2512752	W	with								
11 Piece Sets - EB11										
65.2517753	R	without	1	2	3	4	5	6	7	8
65.2515753	C	without	15	23	31					
65.2511753	I	with								
65.2512753	W	with								
14 Piece Sets - EB14										
65.2517754	R	without	1 3x	2	3	4	5	6	7	8 2x
65.2515754	C	without	15	23	31					
65.2511754	I	with								
65.2512754	W	with								
15 Piece Sets - EB15										
65.2517755	R	without	0.5	1	2	3	4	5	6	7
65.2515755	C	without	8	9	10	20	30	40	50	
65.2511755	I	with								
65.2512755	W	with								

2x = 2 pieces 3x = 3 pieces

✓

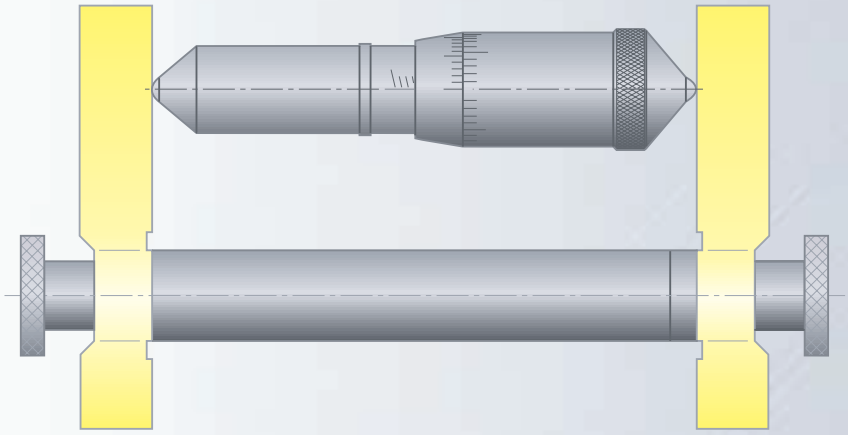
Metric units: BS 5317. Inch units: BS 1790

Gauge blocks: metric 22 mm, inch 7/8 in.

Coupling thread: metric M10x1,5, inch BSW 3/8 in.

Accessories for TESA® Length Bars with Round Section

Suited for the assembly of a combination of length bars of either grades1 or I and 2 or W equipped with a coaxially mounted coupling thread.



65.1570800	TESA accessory set	Metric units
65.2570800	*TESA accessory set*	*Inch units*

consting of:

				mm	µm		in	µin
65.1570805	1 Pair	AA style jaws with 2 plan parallel measuring faces		10	± 0,5	***65.2570805***	*0.4*	*± 20*
65.1570806	1 Pair	BB style jaws. each with 1 cylindrical and 1 flat measuring faces		25	± 1	***65.2570806***	*1*	*± 30*
65.1570807	1 Pair	End pieces with spherical measurig faces		25	$^{+1}/_{-0}$	***65.2570807***	*1*	$^{+30}/_{-0}$
65.1570808	1 Piece	Round base		25	± 1	***65.2570808***	*1*	*± 30*
65.1570809	1 Pair	Knurled nut		M10x1,5		***65.2570809***	*BSW 3/8*	
65.1570810		Threaded rod		M10x1,5		***65.2570810***	*BSW 3/8*	
	4 Pieces		Length	28			1 1/8	
	4 Pieces			35			*1 3/8*	
	2 Pieces			57			*2 1/4*	

✓
Stable, light alloyed steel, resistant to wear. Hardness to ≥ 800 HV
(11,5 ± 1,0) x 10^{-6} K^{-1}
See table opposite
See BS 5317 or BS 1790
See BS 5317 or BS 1790
Available in sets or individually
Wooden case
Identification number
Declaration of conformity

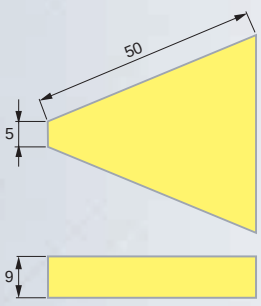
TESA® Angle Gauge Blocks

These angle gauge blocks are used to set and calibrate angles, tapers, clinometers, rotary scales, dividing heads, rotary tables etc.

Angle Gauge Blocks with a 9 x 50 mm Measuring Face

Sets containing 15, 16 or 27 angle gauge blocks allow a number of up to 32400 angle combinations to be built up, ranging from 0° to 90° in steps of 10 ".





65.1570102	TESA angle gauge block set A27, 27 piece set
65.1570103	TESA angle gauge block set A16, 16 piece set
65.1570104	TESA angle gauge block set A15, 15 piece set
65.1570105	TESA angle gauge block set A13, 13 piece set
65.1570106	TESA angle gauge block set A06, 6 piece set

For set compositions, see on the following pages.

✓
Stable, light alloyed steel, resistant to wear. Hardness to ≥ 800 HV
(11,5 ± 1,0) x 10^{-6} K^{-1}
± 2 "
Grade 2 : ISO 3650
Available in sets or individually
Wooden case
Identification number
UKAS calibration certificate

Each set of TESA angle gauge blocks contains :

			A27	A16	A15	A13	A06
65.1570145	Angle gauge block	10 ”	●	●	●		
65.1570146	Angle gauge block	30 ”	●	●	●		
65.1570147	Angle gauge block	1 ’	●		●		
65.1570148	Angle gauge block	2 ’	●	●	●		
65.1570149	Angle gauge block	3 ’	●	●	●		
65.1570150	Angle gauge block	4 ’	●				
65.1570151	Angle gauge block	5 ’	●	●			
65.1570152	Angle gauge block	10 ’	●	●	●		
65.1570153	Angle gauge block	20 ’	●	●			
65.1570154	Angle gauge block	30 ’	●	●	●		
65.1570155	Angle gauge block	40 ’	●				
65.1570156	Angle gauge block	50 ’	●				
65.1570157	Angle gauge block	1 °	●	●	●	●	●
65.1570158	Angle gauge block	2 °	●		●	●	
65.1570159	Angle gauge block	3 °	●	●	●	●	●
65.1570160	Angle gauge block	4 °	●			●	
65.1570161	Angle gauge block	5 °	●	●		●	●
65.1570162	Angle gauge block	10 °	●		●	●	
65.1570163	Angle gauge block	15 °		●			●
65.1570164	Angle gauge block	20 °	●			●	
65.1570165	Angle gauge block	30 °	●	●	●	●	●
65.1570166	Angle gauge block	40 °	●			●	
65.1570167	Angle gauge block	45 °		●			●
65.1570168	Angle gauge block	50 °	●			●	
65.1570169	Angle gauge block	60 °	●		●	●	
65.1570170	Angle gauge block	70 °	●			●	
65.1570171	Angle gauge block	80 °	●			●	
65.1570172	Measuring jaws with 2 plan parallel measuring faces						
	Gauge section in mm	9 x 20	●	●	●		
	Gauge length in mm	125					
65.1570173	Angle standard	4 x 90 °	●	●	●		

✓

Stable, highly alloyed steel, resistant to wear. Hardness to ≥ 800 HV.

(11,5 ± 1,0) x 10^{-6} K^{-1}

± 2 ”

0,2 µm

Lateral measuring face : 2 µm

Available in sets or individually

Wooden case

Identification number

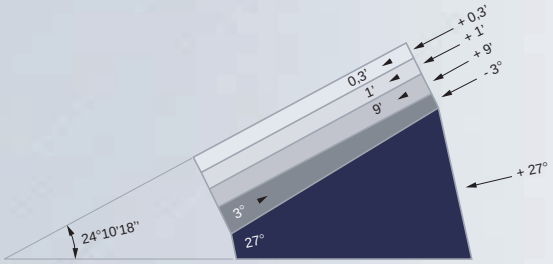
UKAS calibration certificate

Angle Gauge Blocks as per NPL MOY/SMI/18

Used for combinations from 0° to 81° in steps of 3 ” (Set A) or 6 ” (Set B).

To obtain combinations from 81° to 90°, the use of an additional 9° angle gauge block (No. 65.1570140) is required. For angles through to 90°, the precision square No. 65.1570143 is normally used.





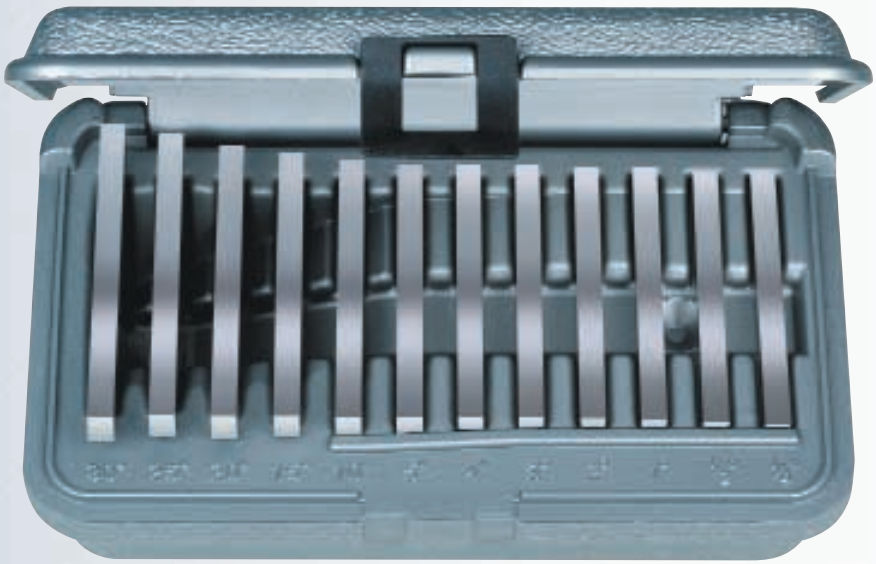
No					
65.1570100	TESA angle gauge block set A, 15 piece set				
65.1570101	TESA angle gauge block set B, 14 piece set				

Each set of TESA angle gauges contains:

No			A	B
65.1570130	Angle gauge block	0,05 '	●	
65.1570131	Angle gauge block	0,1 '	●	●
65.1570132	Angle gauge block	0,3 '	●	●
65.1570133	Angle gauge block	0,5 '	●	●
65.1570134	Angle gauge block	1 '	●	●
65.1570135	Angle gauge block	3 '	●	●
65.1570136	Angle gauge block	9'	●	●
65.1570137	Angle gauge block	27 '	●	●
65.1570138	Angle gauge block	1 °	●	●
65.1570139	Angle gauge block	3 °	●	●
65.1570140	Angle gauge block	9 °	●	●
65.1570141	Angle gauge block	27 °	●	●
65.1570142	Angle gauge block	41 °	●	●
65.1570143	Angle gauge block	4 x 90 °	●	●
65.1570144	Straight edge		●	●

Brown & Sharpe® Angle Gauges

For setting and calibration purposes – Smallest step to 15 ' (1/4 °).



✓

Hardened steel

30 "

Width: 6,35 mm (1/4 in)
Length: ≥ 76,2 mm (3 in)

Plastic case

No		Set composition					
67.69002	Set = 12 precision squares	15 '	30 '	1 °	2 °	3 °	4 °
		5 °	10 °	15 °	20 °	25 °	30 °

Measuring Balls

These standards serve, for example, to measure internal tapers.

TESA® Measuring Balls

✓

Special steel, hardened

(11,5 ± 1,0) x 10^{-6} K^{-1}

Max. perm. error of 20 µm or 0.0008 in
Uniformity of size within a set of three balls with same nominal size:
1 µm or 0.00004 in

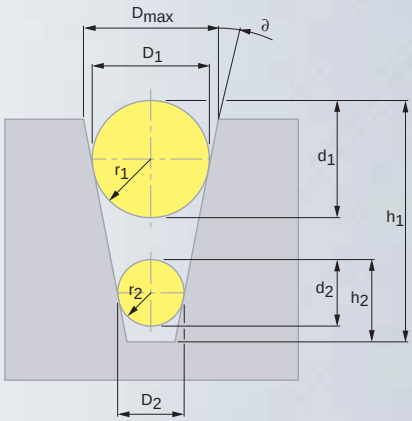
± 0,5 µm or ± 0.00002 in

Full set or set containing three balls with same nominal size

Wooden case

UKAS calibration certificate





No mm		mm	Steps mm	Piece/ Nominal size	Total pieces
65.1500950	Steel ball set	1 ÷ 25	1	3	75
65.1500951	Steel ball set	1,5 ÷ 12,5	1	3	36
No in		*in*	*Steps in*	*Piece/ Nominal size*	*Total pieces*
65.2500950	*Steel ball set*	$^1/_{16}$ ÷ $^1/_2$	$^1/_{32}$	*3*	*45*
65.2500951	*Steel ball set*	$^9/_{16}$ ÷ *1*	$^1/_{16}$	*3*	*24*

Brown & Sharpe® Measuring Balls

✓

Special steel, hardened

3 µm

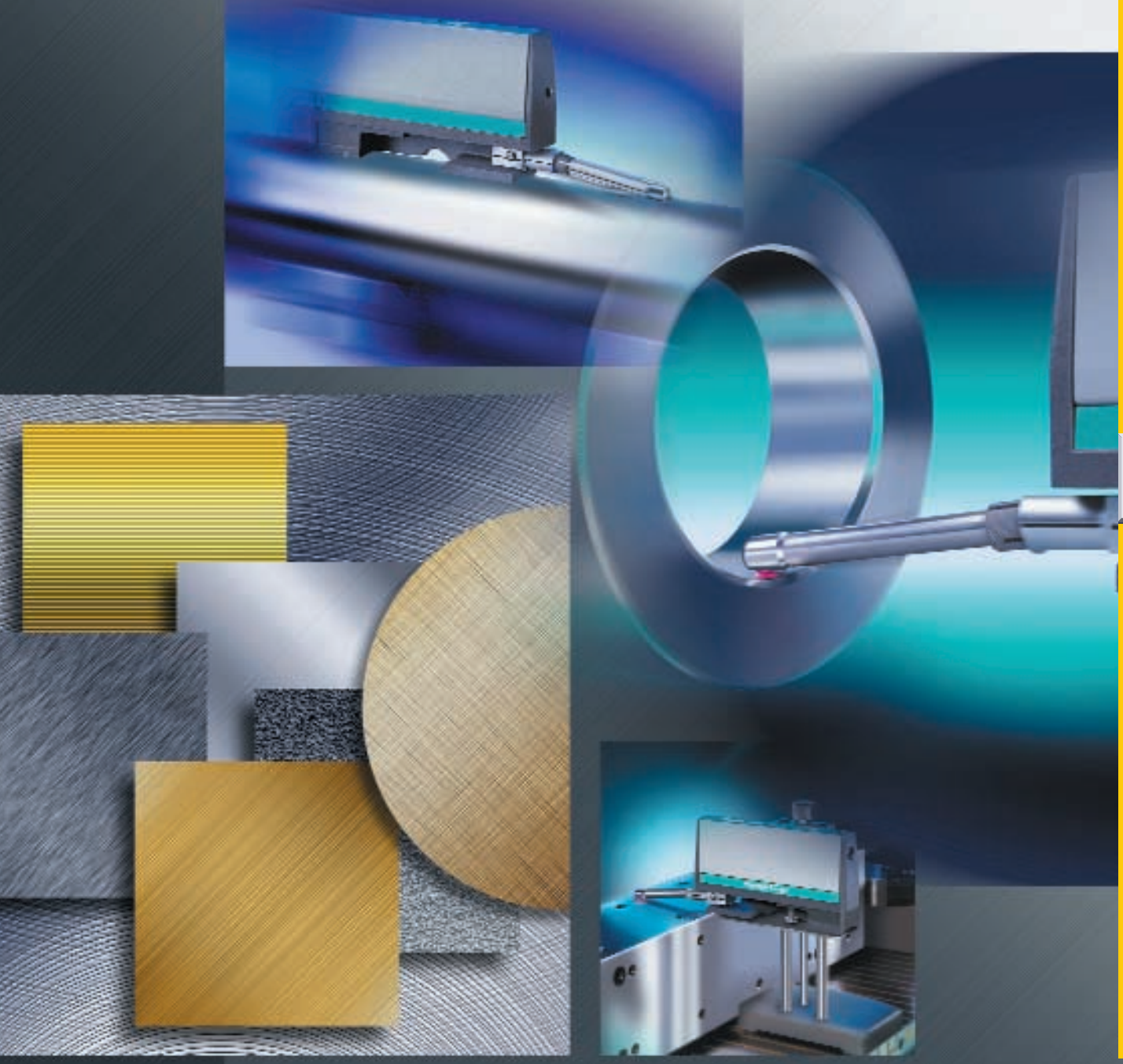
Not available individually

Plastic case



No mm		mm	Steps mm	Piece/ Nominal size	Total pieces
67.69009	Steel ball set	1 ÷ 25	1	2	50

Surface Roughness Testing



Summary of Roughness Parameters Commonly Used

Arithmetical mean deviation of the profile R_a
(ISO 4287, DIN 4768)

The arithmetical mean deviation of the profile R_a is the mean value of the absolute value of the profile departure y within the reference length l.

Max. profile valley depth R_{max}
(DIN 4768)

The max. profile valley depth R_{max} is the largest of the existing single roughness depths Z_i in the total measuring length l_m.

According to ISO 4288 and DIN 4287 - Part 1, this parameter is also called $R_{y\,max}$.

Mean roughness depth $R_{z\,DIN}$
(DIN 4768)

The mean roughness depth R_z is the arithmetical mean of the single roughness depths of successive sampling lengths l_e.

According to ISO 4287 and DIN 4762, the parameter $R_{z\,DIN}$ is also called R_{y5}.

Because R_z is named differently in DIN 4768 and ISO 4287, this paramater is also called $R_{z\,DIN}$ and $R_{z\,ISO}$.

When the parameter R_z is measured according to DIN, it is generally admitted that the extrem value ISO is also matched providing that $R_{z\,DIN}$ is not exceeding $R_{z\,ISO}$.

Application of Roughness Comparison Specimens

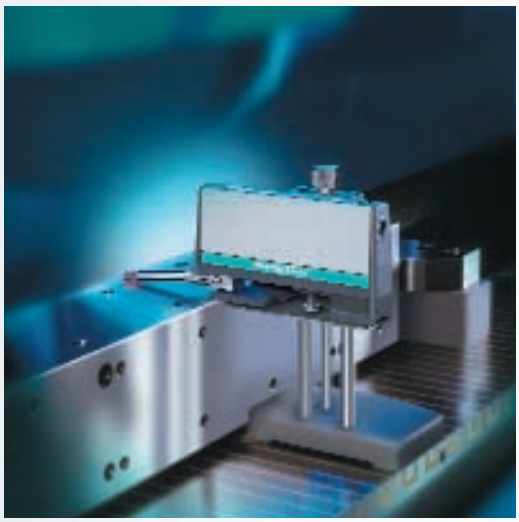
For a long time, these specimens for testing the surface finish quality have proven their value in practical use.

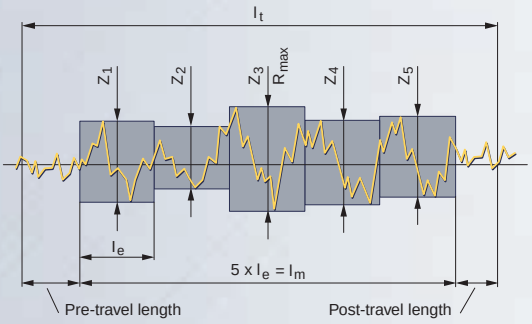
They serve for touch and/or sight comparisons with the surface of the workpieces that are manufactured using the same method. Condition is that materials have to be comparable.

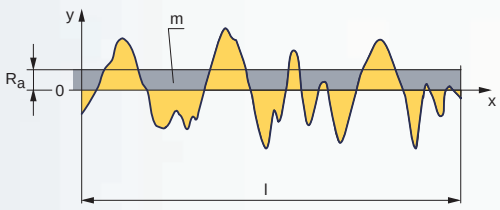
The comparison of the roughness of the workpiece surface is not quantitatively expressed. The extent to which the surfaces of both the specimen and the workpiece are matched is appreciated subjectively only.

Sight comparison requires optimum light source angle. For small surfaces, the use of a magnifying glass with up to 8x magnification is recommended.

Touch comparison is made using the finger nail or a small cooper piece like a coin, for instance.







RUGOTEST Roughness Comparison Specimens

For touch and/or sight comparisons with the surface of workpieces

– Sets of roughness comparison specimens for individual machining methods according to ISO roughness parameters

✓ DIN 4769 part 1 and part 2

Rust-resistant, Nickel

Specimens for roughness comparison are no reference specimens. They are not suitable for calibrating surface roughness testers.

Leather case

No		RUGO-TEST No.	Number of single specimens	ISO roughness parameters
81.112346	**RUGOTEST**	**A4**		
consisting of the following single specimens:				
81.112053	Metal working	1	27	N2 to N10
81.112054	Hand grinding	2	6	N6 to N11
81.112055	Shot blasting	3	18	N6 to N11
81.112056	Hand filing	4	6	N6 to N8
81.112345	**RUGOTEST**	**A6**		
consisting of the following single specimens:				
81.112058	Planing	101	6	N6 to N11
81.112059	Turning	102	6	N5 to N10
81.112060	Face milling	103	6	N5 to N10
81.112061	Surface grinding	104	8	N1 to N8
81.112062	Cylindrical grinding	105	8	N1 to N8
81.112063	Spark erosion	107	6	N5 to N10








No	RUGOTEST No.	mm	g
81.112053	1	135 x 105	160
81.112054	2	120 x 90	160
81.112055	3	120 x 90	190
81.112056	4	120 x 90	160
81.112057	5	120 x 90	200
81.112058	101	110 x 50	110
81.112059	102	110 x 50	105
81.112060	103	110 x 50	110
81.112061	104	130 x 50	125
81.112062	105	130 x 50	130
81.112063	107	110 x 50	110
81.112344	12	127 x 27	60
81.112346	A4	330 x 250	710
81.112345	A6	330 x 250	780






– Executions for individual machining methods according to ISO roughness parameters

	ISO roughness parameters			N0	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11
	Arithmetical mean deviation of profile R_a		µm	0,0125	0,025	0,05	0,1	0,2	0,4	0,8	1,6	3,2	6,3	12,5	25
			µin	*0.5*	*1*	*2*	*4*	*8*	*16*	*32*	*63*	*125*	*250*	*500*	*1000*
	Ten point height of irregularities $R_{z\ ISO}$		µm / *µin*	Characteristic related data may differ depending on the machining method applied											
№	=		RUGO-TEST No.	Number of single specimens											
81.112053	**Metal working**		1	27											
	Side milling			3								●	●	●	
	Face milling			5						●	●	●	●	●	
	Turning/Planing			5						●	●	●	●	●	
	Grinding			6		●	●	●	●	●	●				
	Lapping			4		●	●	●	●						
	Finish grinding/Honing			4		●	●	●	●						
81.112054	**Hand grinding**		2	6						●	●	●	●	●	●
81.112055	**Shot blasting**		3	18											
	Shot-blasting mean														
	– spherical	coarse		3									●	●	●
		fine		6						●	●	●	●	●	●
	– angular	coarse		3									●	●	●
		fine		6						●	●	●	●	●	●
81.112056	**Hand filing**		4	6											
	– straight			3						●	●	●			
	– crossed			3						●	●	●			
81.112057	**Hand polishing**		5	10											
	Surface form														
	– cylindrical			5	●	●	●	●	●						
	– plane			5	●	●	●	●	●						
81.112058	**Planing**		101	6						●	●	●	●	●	●
81.112059	**Turning**		102	6					●	●	●	●	●	●	
81.112060	**Face milling**		103	6					●	●	●	●	●	●	
81.112061	**Plane grinding**		104	8		●	●	●	●	●	●	●			
81.112062	**Circular grinding**		105	8		●	●	●	●	●	●	●			
81.112063	**Spark erosion**		107	6					●	●	●	●	●	●	

– Execution according to Charmille roughness parameters (VDI 3400)

	Charmille roughness parameters		12	15	18	21	24	27	30	33	36	39	42	45
	Arithmetical mean deviation of profile R_a	µm	0,40	0,56	0,80	1,12	1,60	2,24	3,15	4,5	6,3	9,0	12,5	18,0
№	=	Number of single specimens												
81.112344	**Spark erosion**	12	●	●	●	●	●	●	●	●	●	●	●	●

TESA® RUGOSURF Surface Roughness Gauge

Mobile and versatile roughness gauge that can be used in manufacturing cells, receiving inspection and measurement laboratory – Solidly built and easily handle – The selected accessories allow to inspect a wide variety of forms and shapes of workpiece surfaces – Measurements can be performed in virtually any position – Measure small bores as well as grooves.

- *The following roughness parameters can be measured:*

Arithmetical mean deviation of the profile	R_a	*ISO 4287, DIN 4762, DIN 4768*
Max. height of the profile	R_y	*ISO 4287, DIN 4762*
Max. profile valley depth	R_{max}	*ISO 4287, DIN 4768*
Mean roughness depth	$R_{z\ DIN}$	*DIN 4768 also called*
corresponds to	R_{y5}	*ISO 4287*

- *Integrated drive unit.*
- *Interchangeable probes with either a transverse or parallel chisel stylus.*
- *Easy-to-use parameter selection switch.*
- *Comfortable, reliable reading of the results on the digital display.*
- *Digital output for a direct value transmission to TESA PRINTER SPC or to a computer unit.*

✓

Measuring principle of the contact system, piezoelectric

3-digit LC display

0,01 µm
1 µin

See adjoining table

Classe 2 (± 10 %) according to DIN 4772

Cut-off: 0.8 mm / 0.03 in (ANSI 2RC filter)

The total measuring lenght l_m may be set for 1, 3 or 5 cut-off-lenghts

Feed rate V_t: 5 mm / s

15 mN

RS 232

9 V alkaline battery, IEC 6F22

≈ 3000 h

Durable cast aluminium housing

10 °C to 45 °C

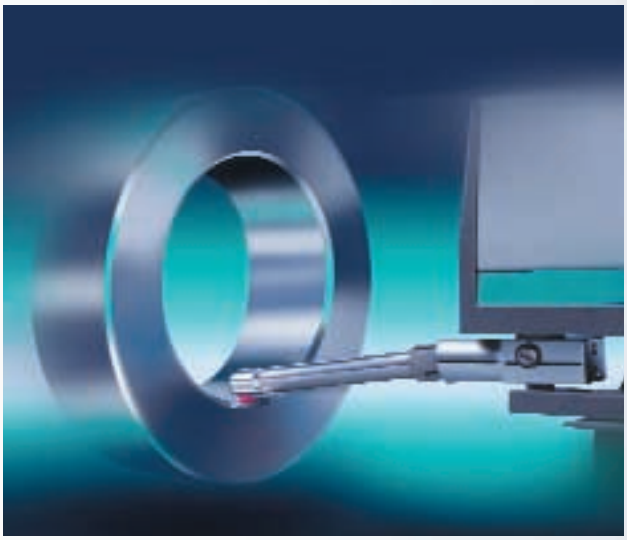
- 20 °C to 65 °C

Basic instrument without probe: 140 x 76 x 25 mm

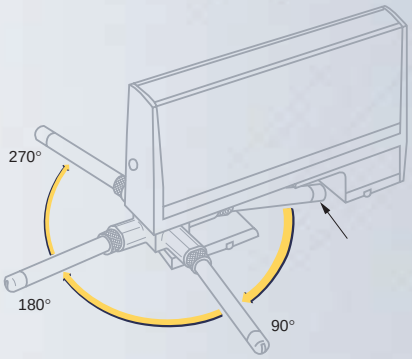
basic instr. without probe: ≈435 g

Plastic case

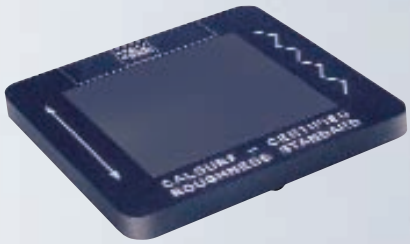
Declaration of conformity. Available upon request: reference standard No. 81.60000 with calibration certificate



4 possible measuring positions of the stylus



81.30000	**TESA RUGOSURF Surface Roughness Gauge**
delivered with the following standard accessories:	
81.60002	1 standard probe with a 90° conical diamond stylus, 5 µm in tip radius
81.60000	1 roughness standard, nominal value Ra = 3,1 µm respectively 122 µin
	1 bottom plate, associated with the reference standard
81.60012	1 9 V alkaline battery, IEC 6F22

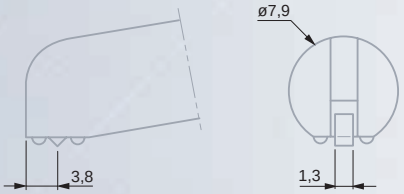




	µm	µin	Evaluation lenght l / l_m mm	*in*	Total displacement length l_t mm	*in*	Cut-off mm
R_a	0,03 ÷ 6,35	*1 ÷ 250*	0,8	*0.030*	2,0	*0.075*	1 x 0,8
R_y	0,2 ÷ 25,3	*8 ÷ 999*	2,4	*0.090*	3,5	*0.135*	3 x 0,8
R_a / $R_{z\ DIN}$ / R_{max}	0,2 ÷ 25,3	*8 ÷ 999*	4,0	*0.150*	5,0	*0.195*	5 x 0,8

Special Accessories for TESA RUGOSURF Surface Roughness Gauge

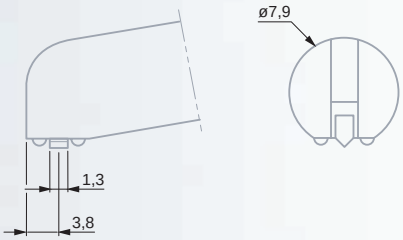
✓ Transport packing



Transverse chisel probe

Sapphire chisel stylus for measuring small shafts, sharp edges etc.
90° chisel stylus,10 µm in radius.

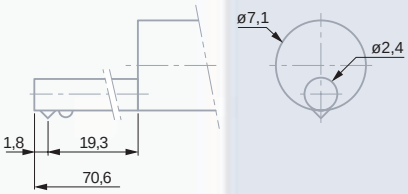
81.60005



Parallel chisel probe

Diamond chisel stylus for lateral measurement on small shafts, sharp edges etc. 90° chisel stylus, 10 µm in radius.

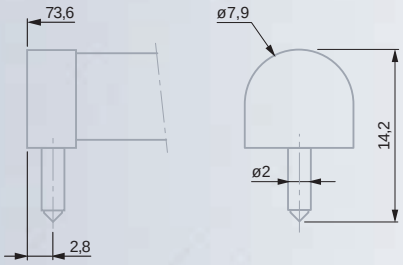
81.60006



Small bore probe

For measuring diameters ranging from 3,2 mm respectively $^1/_8$ in, 90° conical diamond stylus, 10 µm in tip radius

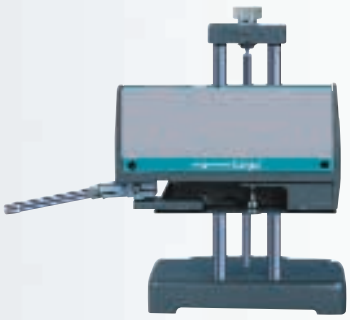
81.60003



Groove bottom probe

For measuring hard-to-reach recesses, 90 ° conical diamond stylus, 10 µm in tip radius

81.60004



Measuring stand

Clamp for vertical and horizontal positioning of the instrument. Adjustable device for height position.

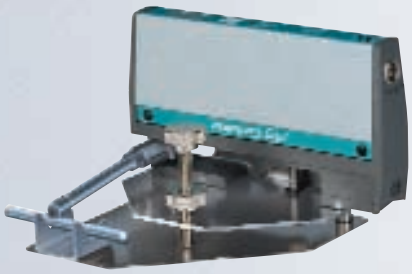
81.60007



Universal stand

250 x 270 mm cast iron bottom plate, with ground measuring face. Vertical column, 31,7 mm in diameter, 213 mm high. Adjustable swivel clamp.

81.60008



Vee fixture

Bottom plate with a Vee for holding shafts up to 25 mm or 1 in dia.
Clamp for height adjustment. All parts are nickel-plated.

81.60010



Vee adaptor kit for checking hard-to-reach surfaces on shafts

3 interchangeable Vees for diameters from 5 to 125 mm respectively from 0.19 to 5 in.

81.60011



Bottom plate with Vees

For measuring small parts (min. surface 19 x 19 mm) and short shafts with diameters from 6,35 mm respectively 0.25 in, and length of 38 mm or 1.5 in.

81.60009

Height Gauges







Made To Measure in the Course of the Manufacturing Process

Height gauges perform one-dimensional measurements on a surface plate, preferably in granite. TESA-µHITE we offer to you in this section clearly shows that the combination of surface plates and height gauges can be an integral part of a full measuring system.

These versatile height gauge's dedicated instruments are used for the measurements taken directly on a machine or a group of machines. These measurements are usually carried out during the various setting and sampling operations throughout the manufacturing process. They are specially made for checking parts that are difficult to machine due to their critical sizes.

- *No need to be an expert. Practically everyone working in the workshop can use any TESA height gauge.*
- *TESA MICRO-HITE 100 and TESA-µHITE are recommended for inspecting workpieces up to the fist size.*
- *TESA MICRO-HITE 350, 600 and 900 are mainly dedicated to measure workpieces up to 1 m in size.*
- *Low measurement uncertainties. With a resolution of 0,0001 mm, the measurement errors are below 2 µm or 4 µm for a measured length of 100 or 500 mm, respectively.*

A World of Measuring Capabilities

Each model from TESA offers much more than a simple height gauge. With their one-dimensional measuring capability, these height gauges can measure lengths in the form of internal, external, height, depth, step and distance dimensions. The measurement programme integrated into the control panel calculates all feature relationships, automatically.



This programme can also provide additional key functions for processing the values measured in both coordinate directions to establish bore positions. The coordinates of the two directions are captured successively while the workpiece is rotated trough 90 ° or any other known angle.

The highly accurate upright guidance allows form and positional errors such as deviations from straightness, perpendicularity or parallelism including runout errors to be measured as well.

For all measuring capabilities, refer to each single height gauge listed in this section.



Comfortable, Easy-to-Handle

- *Fully stand-alone design with cordless flexibility.*
- *Air cushion for easy, effortless displacement on the surface plate.*
- *Fast and reliable probing of the workpiece surface with a constant measuring force.*
- *High reliability through microprocessor controlled value capture.*
- *High accuracy through automatic self-correction of the bias errors of the height gauge ensured by CAA (Computer Aided Accuracy).*
- *Efficient operator guidance through the measurement operations.*

TESA® MICRO-HITE® 100 Height Gauge



✓

Factory standard

General

100 mm / 4 in

0,001 mm and 0,0001 mm or 0.0001 in and 0.00001 in

Max. perm. error G*: 2,0 µm / 0.0001 in

Repeatability limit r*: 1,0 µm / 0.00004 in

* With use of the standard accessory

TESA MICRO-HITE 100 main instrument

Rust-inhibitor cast iron base with ground resting surface

Guiding on the surface plate through mechan. contact

Incremental glass scale with opto-electronic value capture, dividing period 20 µm.

11,5 x 10^{-6} K^{-1}

Electromotorised head displacement also allowed manually.

10 mm/s for both numerical intervals 0,001 mm and 0.0001 in or 5 mm/s for 0,0001 mm and 0.00001 in. Fast move: 30 mm/s

Insert attachment: 4 mm dia. x 10 mm long

0,63 ± 0,1 N or 1 ± 0,1 N, switchable Electromotorised actuator

Through the control panel

Handy and fine – Measures lengths in the form of internal, external, height, depth, step and distance dimensions of geometric elements having either a plane, parallel or cylindrical surface.

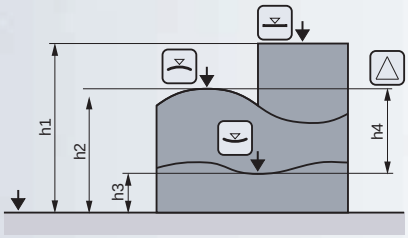
Automatic recording of the culmination point of bores and shafts – Memory functions «max», «min» and «max - min» in dynamic probing to establish straigthness, flatness and runout errors, for instance.

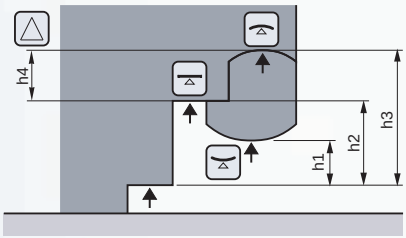
- *Ideal for workpiece inspection close to the production area.*
- *100 mm measuring span.*
- *0,001 mm and 0,0001 mm or 0.0001 in and 0.00001 digital display.*
- *Max. perm. error of only 2 µm due to the self-correction of the bias errors through CAA (Computer Aided Accuracy).*
- *Built-in temperature sensor so that the coefficient of linear expansion of both the height gauge and steel are matched (11,5 x 10^{-6} K^{-1}).*
- *Motorised measuring head for fast probing at each measuring points.*
- *Automatic value capture controlled over the stability of the measuring force and the measured values.*
- *Constant measuring force using the motor-driven actuator. Switchable.*
- *No manual calculation.*
- *RS 232 data output with direct linkage to TESA PRINTER SPC.*
- *Memory for the storage of up to 99 single values.*

TESA MICRO-HITE® 100 – Measuring Capabilities

Without change of the probe direction

Probe constant excluded

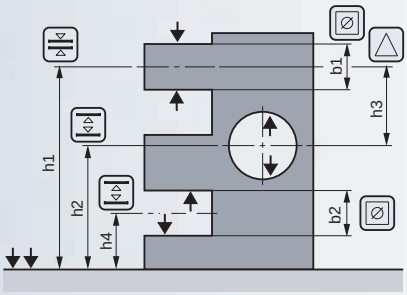




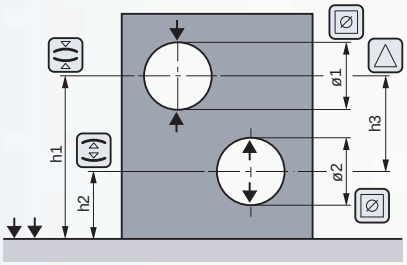
With change of the probe direction

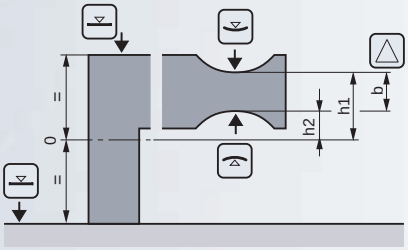
Probe constant included

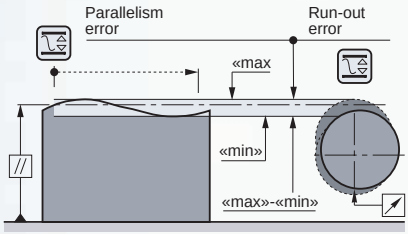
– without storage of the culmination point

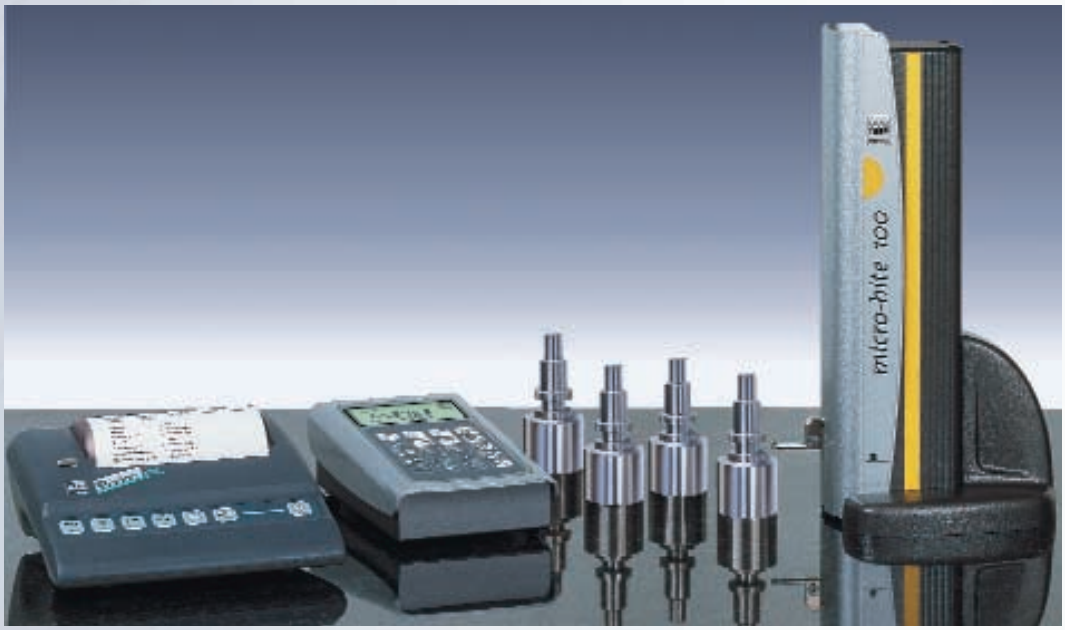


– with storage of the culmination point









Control panel

LCD. Display field: 67 x 33 mm. Display type: 3-line display (alphanumeric, 7-segment / sign) plus graphical symbols. Value display: 7-decade plus minus sign. First and secondary display have 7 or 4 signs.

Value display: 10 x 4,9 mm, auxiliary displays 1 and 2: 7,5 x 3,7 mm or 5 x 2,5 mm.

Keyboard with 20 function keys

PRESET function to enter a known value

Acoustic signal

7 languages available for the report headings

RS 232, opto-electronic and bi-directional

Mains adapter No. 47.61054: 110 to 240 Vac / 50 to 60 Hz / 6,6 Vdc / 750 mA

Additional data

5 °C to 40 °C

- 10 °C to 60 °C

80 %,with no condensation

See drawings

Net weight: 4,8 kg (main instrument No. 07.30053). 1,45 kg (control panel No. 07.60204 with cable No. 07.60191).

Protection IP 50 (IEC 60529)

EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2

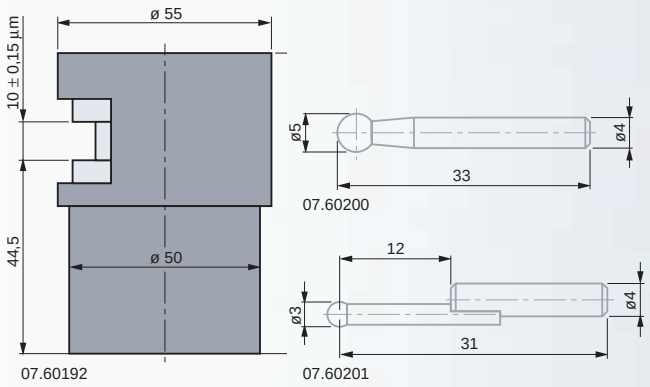
Transport packing

Identification number

Inspection report

Declaration of conformity

No.	=		mm	mm	in	in
07.30048		**TESA MICRO-HITE 100 Height Gauge**				
		consisting of the following components:				
07.30053	1	TESA MICRO-HITE 100 main instrument	100		*4*	
07.60204	1	Control panel to be connected to TESA MICRO-HITE 100		0,001 0,0001		*0.0001* *0.00001*
07.60191	1	Connecting cable TESA-µHITE 100 to panel				
07.60200	1	Insert with a 5 mm dia. tungsten carbide ball tip				
07.60192	1	Master piece for determining the probe constant, 10 mm / 0.39370 in				
47.61054	1	Mains adapter, 110 to 240 Vac / 50 to 60 Hz				
47.61055	1	Cable EU for mains adapter				

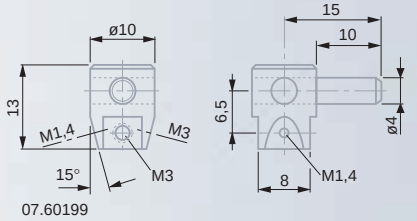


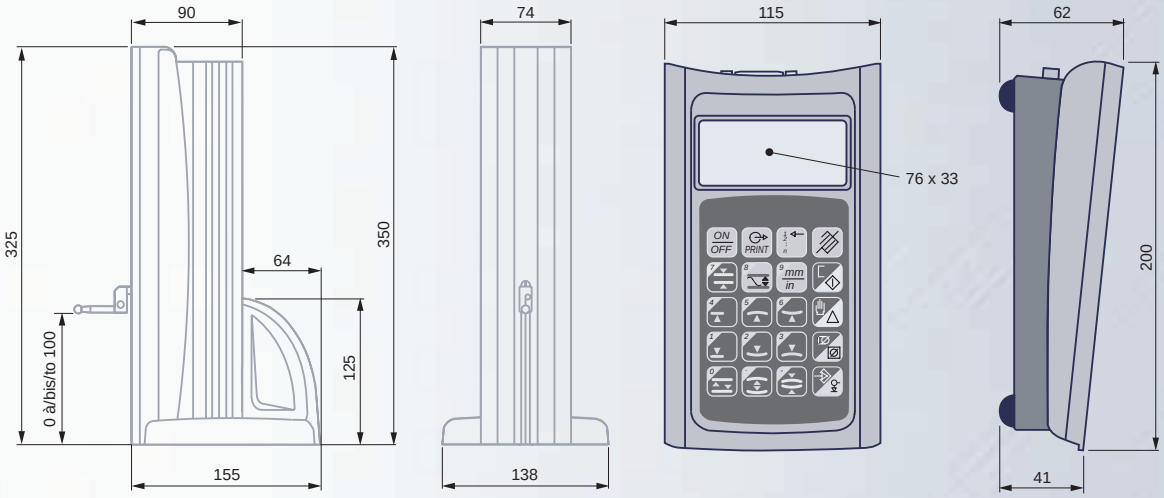


Optional Accessories

No.	=	
07.60201		Insert with a 3 mm dia. ball tip
07.60199		Universal Fixing shank with M1,4 and M2,5 threads (2 x 2) for the measuring inserts
07.60207		Swivel support for positioning the control panel
07.60202		Replacement batteries for panel No. 07.60204, 6 Vdc / 1,2 Ah

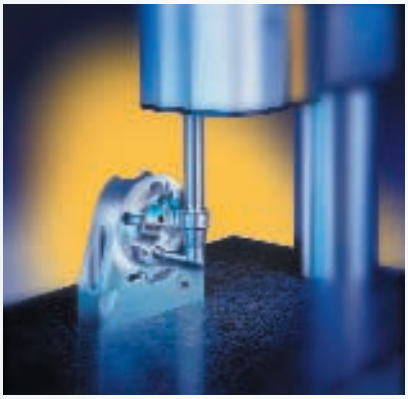
For TESA PRINTER SPC, cables and others: see section L.





TESA-µHITE® Height Gauge





Compact design with measuring stand included – Sensor equipped with a system for coaxial measuring according to the comparator principle (Abbe) or with use of the offset probe relative to the gauge axis.

Length measurements in the form of internal, external, height, depth, step and distance dimensions of geometric elements having either a flat, parallel or cylindrical surface – Memory functions «max», «min» and «max - min» in dynamic measurement.

Programme functions and control panel similar to TESA MICRO-HITE 100 – Examples as shown on page K-4.

- *Ideal for workpiece inspection close to the production area.*
- *100 mm measuring span*
- *0,001 mm and 0,0001 mm or 0.0001 in and 0.00001 in digital display*
- *Max. perm. error of only 2 µm due to the automatic correction of the bias errors through CAA (Computer Aided Accuracy)*
- *Integrated temperature sensor giving the height gauge the same coefficient of linear expansion as steel (11,5 x 10^{-6} K^{-1}).*
- *Motorised measuring head for fast probing at each measuring point.*
- *Automatic value capture controlled over the stability of the measuring force and the measured values.*
- *Constant measuring force using the motor-driven actuator. Swtichable.*
- *No manual calculation.*
- *RS 232 data output with direct linkage to TESA PRINTER SPC.*
- *Memory capacity for 99 single values.*

✓

Factory standard

100 mm / 4 in

0 to 160 mm
0 to 6.3 in

0,001 mm and 0,0001 mm or
0.0001 in and 0.00001 in

Max. perm. error G: see table

Repeatability limit r: see table

Measuring stand

Measuring table in granite. Hardened steel column, dull-chrome plated and ground.

Measuring table (W x D x H):
200 x 300 x 50 mm
Column: ø 50 x 300 mm

Finish lapped

Accuracy grade 00 according to DIN 876, Part 1

TESA-µHITE value sensor

See page K-3

11,5 x 10^{-6} K^{-1}

Electromotorised head displacement,
5 and 10 mm / s.
Fast move 30 mm / s,
also allowed manually.

Fixing shank for meas. inserts:
6 mm dia. x 10 mm long

0,63 ± 0,1 N
or 1 ± 0,1 N, switchable.
Electromotorised actuator.

Through the control panel

Control panel

LCD. Display field: 67 x 33 mm. Display type: 3-line display (alphanumeric, 7-segment / sign) plus graphical symbols. Value display: 7-decade plus minus sign. First and secondary displays have 7 or 4 signs.

Value display: 10 x 4,9 mm, auxiliary displays 1and 2: 7,5 x 3,7 mm or 5 x 2,5 mm.

Keyboard with 20 function keys

PRESET function to enter a known value

Acoustic signal

Report headings available in 7 languages

RS 232, opto-electronic and bi-directional

Mains adapter No. 47.61054: 110 to 240 Vac / 50 to 60 Hz / 6,6 Vdc / 750 mA

Additional data

5 °C to 40 °C

- 10 °C to 60 °C

80 %,with no condensation

See page K-5

Net weights: 16,2 kg (stand No. 07.60203). 2,6 kg (TESA-*µ*HITE No. 07.30050). 1,45 kg (control panel No. 07.60204 with cable No. 07.60191).

Protection IP 50 (IEC 60529)

EN 50081-1, EN 50081-2, EN 50082-2

Transport packing

Identification number

Inspection report

Declaration of conformity

No		mm	in
07.30049	**TESA -µHITE Height Gauge**	0 to 160	*0 to 6.3*
	consisting of the following components:		
07.60203	**1 TESA measuring stand** with granite measuring table, 200 x 300 x 50 mm		
07.30054	**1 TESA-µHITE electronic device**		
	including		

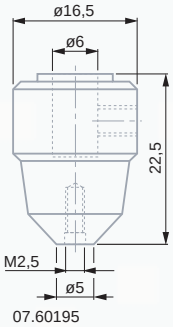
No		mm	000 mm	in	000 in
07.30050	1 TESA-µHITE value sensor	100		*4*	
07.60204	1 Control panel connected to TESA-µHITE		0,001 0,0001		*0.0001* *0.00001*
07.60191	1 Connecting cable TESA-µHITE 100 / Panel				
07.60195	1 Axial insert holder with M2,5 thread				
35.10002	1 Insert with a 3 mm dia. tungsten carbide ball tip				
07.60197	1 Insert with a 5 mm dia. tungsten carbide ball tip and offset point				
07.60192	1 Master piece for determining the probe constant, 10 mm / 0.39370 in				
47.61054	1 Mains adapter, 110 to 240 Vac / 50 to 60 Hz				
47.61055	1 Mains cable EU for mains adapter				
07.60208	1 Plastic case				

Accuracy

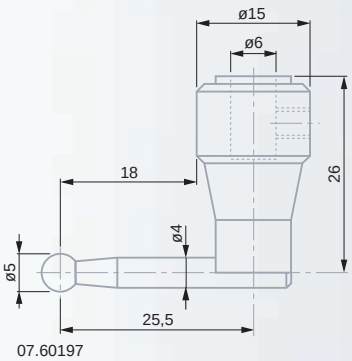
	µm	*in*	µm	*in*
Position of the measuring insert relative to the measuring bolt axis				
coaxial	1,0	*0.00005*	0,5	*0.00002*
offset	2,0	*0.0001*	1,0	*0.00004*

With use of the standard accessory

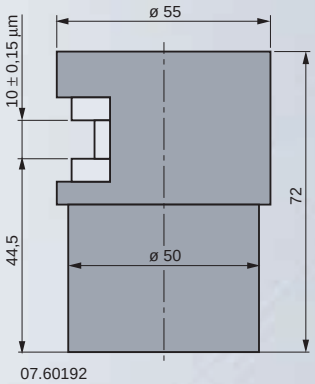




07.60195



07.60197



07.60192



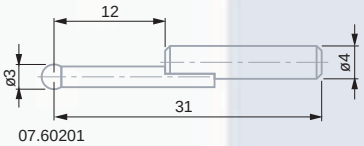
SWISS MADE ✓

Factory standard

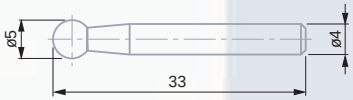
Transport packing

Optional Accessories

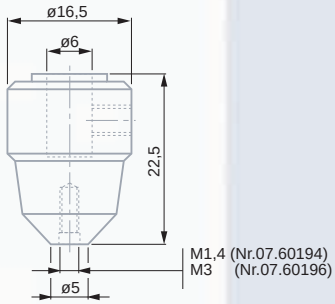
07.60194	Axial insert holder with a M1,4 thread
07.60196	Axial insert holder with a M3 thread
07.60198	Radial insert holder with a 4 mm dia. fixing bore
07.60199	Universal insert holder with a 4 mm dia. fixing shank (to be used in conjunction with the radial insert holder No. 07.60198); with M1,4 and M2,5 threads (2x2) for the measuring inserts
07.60200	Insert with a 5 mm dia. tungsten carbide ball tip and a 4 mm dia. fixing shank for use with the radial insert holder No. 07.60198
07.60201	Insert with a 3 mm dia. tungsten carbide ball tip and a 4 mm dia. fixing shank for use with the radial insert holder No. 07.60198
07.60207	Swivel support for positioning the control panel
07.60202	Spare batteries for panel No. 07.60204, 6 Vdc / 1,2 Ah
	TESA PRINTER SPC, cables and others: see section L.



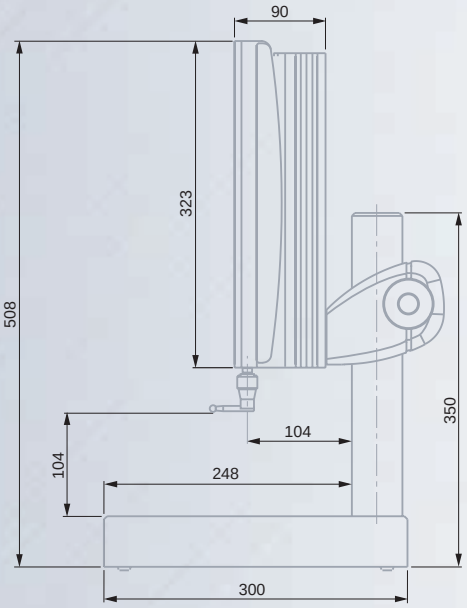
07.60201

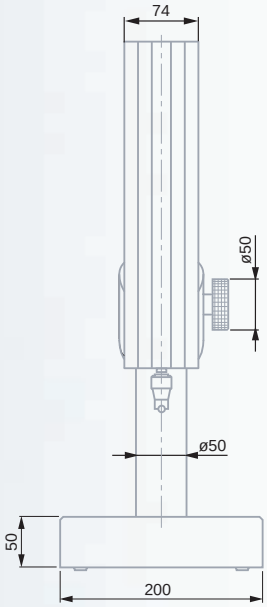


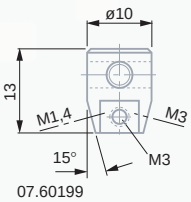
07.60200



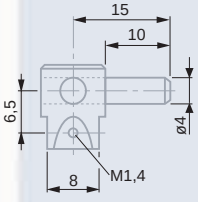
07.60194 - 07.60196

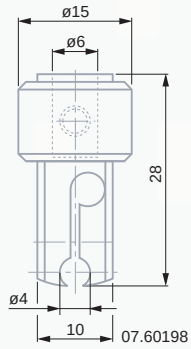






07.60199





07.60198

TESA® MICRO-HITE® 350 / 600 / 900 Height Gauges

TESA MICRO-HITE main instruments 350 / 600 / 900

✓ SWISS MADE

Factory standard

Measuring span, application range and accuracy as shown on page K-11

Rust-inhibitor cast iron base with 3 ground circular faces in hardened stainless steel

Air cushion usable for easy move of the height gauge accross the surface plate

Incremental glass scale with reference point, dividing period of 20 µm. Opto-electronic value capture (TESA patent).

11,5 x 10^{-6} K^{-1}

Measuring head mounted on a ball-bearing and displaced by means of both the knurled wheel and crank. Drive system can be locked or tighten. Fine adjust can also be additionally mounted. Available as an option.

Automatic value capture with a constant measuring force. Visual and acoustic signal for acknowledgment.

300 mm / s
12 in / s

1,6 ± 0,25 N (at switch point)

RS 232, opto-electronic

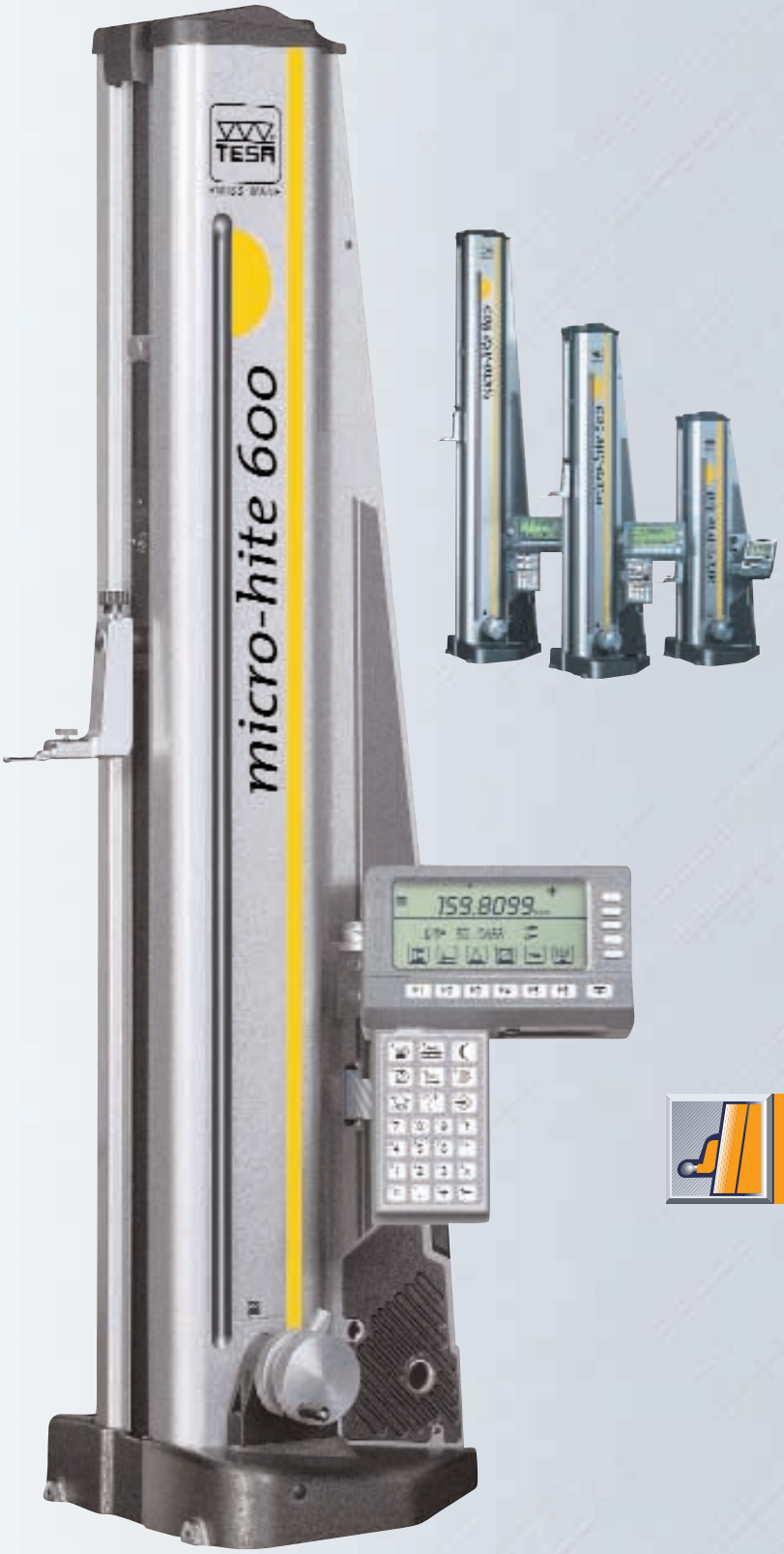
Continued next page

Self-contained design made to measure in 1 or 2 coordinate directions – For length measurements in the form of internal, external, height, depth, step and distance dimensions of geometric elements with flat, parallel or cylindrical surfaces.

Automatic capture of the culminating point on bores and shafts – Memory functions «max», «min» and «max - min» in dynamic probing.

TESA IG-13 digital probe lets you also measure any deviation from perpendicularity, straightness and parallelism as well as runout errors with result output in conformance with ISO 1101.

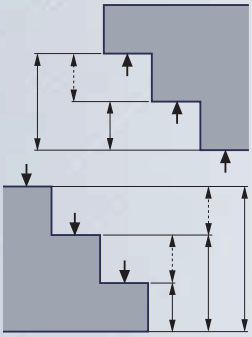
- *State-of-the-art concept associated with a high-quality design is the fruit of 20 years of experience in the manufacture of electronic height gauges.*
- *Ideal for inspection job close to the production. No cumbersome cables to clutter up the working area.*
- *Fast, simple and reliable probing of the workpiece and the bores, especially.*
- *3 main instruments available with either a 365, 615 or 920 mm measuring span.*
- *Numerical display to 0,0005, 0,001, 0,01 and 0,1 mm or equivalent in inch units.*
- *Extremely accurate measuring of deviations from length, straightness and perpendicularity due to the automatic correction of the bias errors through CAA (Computer Aided Accuracy).*
- *Coefficient of linear expansion identical to steel (11,5 x 10^{-6} K^{-1}).*
- *Control panels «1D» and «POWER PANEL» for value processing and output with interactive display to guide the operator.*
- *No manual calculation.*
- *99 workpiece oriented measurement cycles, programmable. Each cycle includes a number of 64 features with related limits of size.*
- *Built-in printer for result output or possible use of an external unit to get a hardcopy in A4 format.*

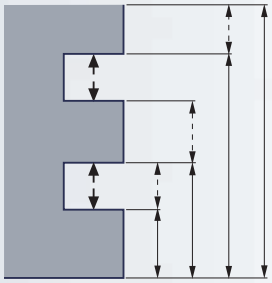


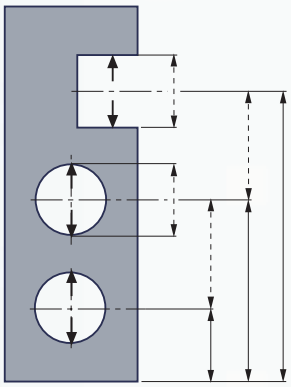
- *RS 232 data output.*
- *Every height gauge comes with a SCS calibration certificate.*

TESA MICRO-HITE® – For the Most Challenging Measuring Applications

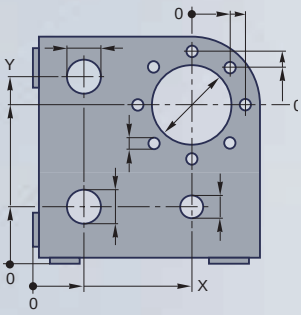
Measurements in one coordinate direction

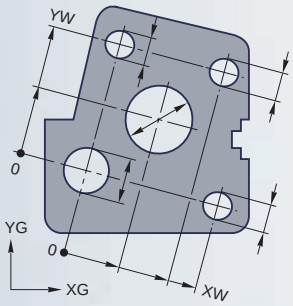


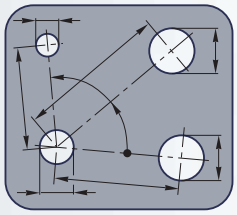


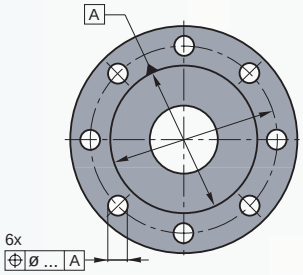


Measurements in two coordinate directions



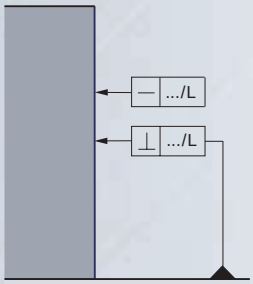


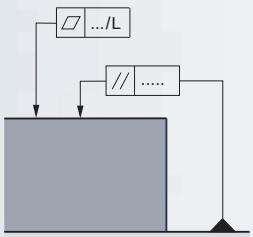


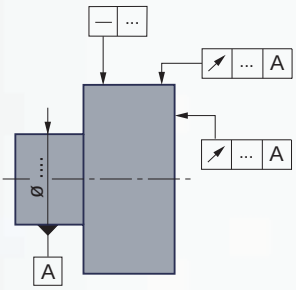


Dedicated programme functions for form and shape as well as positional errors

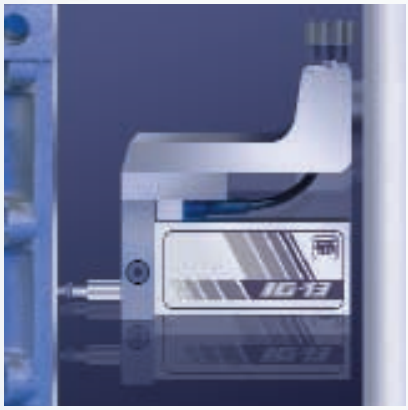
Measurements using TESA IG-13 digital probe











Rechargeable battery pack, 6 V, 3,0 Ah or mains adapter

≈ 24 h with use of the battery pack and ≈ 2 h for the pump in use for creating the air-cushion

10 °C to 40 °C

- 10 °C to 60 °C

80 %, with no condensation

Protection IP 40 (IEC 60529)

EN 50081-1
EN 50081-2
EN 50082-1, EN 50082-2
(as long as the mains adapter is not used)

Net weights (without panel and battery pack)

Main instrum.	350 : 33 kg
	600 : 38 kg
	900 : 45 kg

Transport packing

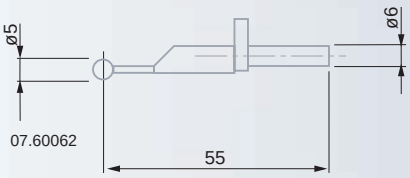
Identification number

SCS calibration certificate

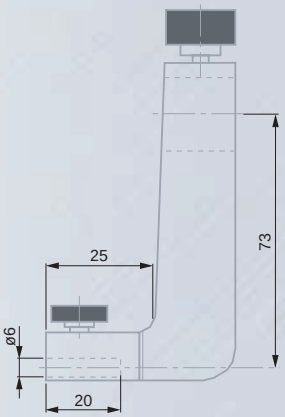
TESA MICRO-HITE® 350 / 600 / 900 Height Gauge Sets



		350	600	900
07.30033	**TESA MICRO-HITE Height Gauge Set**			
07.30034	**TESA MICRO-HITE Height Gauge Set**			
07.30035	**TESA MICRO-HITE Height Gauge Set**			
	consisting of the following components, but without control panel:			
07.30021	1 TESA MICRO-HITE 350 main instrument	●		
07.30022	1 TESA MICRO-HITE 600 main instrument		●	
07.30023	1 TESA MICRO-HITE 900 main instrument			●
07.60143	1 Standard insert holder	●	●	●
07.60062	1 Standard insert with a 5 mm dia. carbide ball tip	●	●	●
07.60150	1 Master piece for determining the probe constant, 20,0000 mm / 0.78740 in	●	●	●
07.60142	1 Electric pump already mounted for creating the air-cushion beneath the gauge base	●	●	●
07.60141	2 Battery packs (order number for one item only)	●	●	●
47.61054	1 Mains adapter, 110 to 240 Vac / 50 to 60 Hz	●	●	●
47.61055	1 Cable EU for mains adapter	●	●	●
07.60151	1 Dust cover for TESA MICRO-HITE 350	●		
07.60152	1 Dust cover for TESA MICRO-HITE 600		●	
07.60153	1 Dust cover for TESA MICRO-HITE 900			●
	Optional accessories for TESA MICRO-HITE main instruments 350 / 600 and 900			
07.60144	Add-on fine adjustment device for extra fine movement of the measuring head, complete			
07.60157	Spare battery pack No. 07.60141			
47.61056	Cable US for mains adapter			



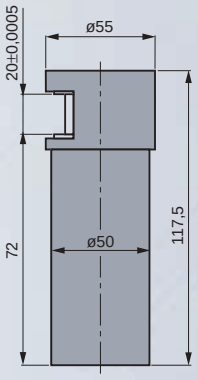
07.60062



07.60143

Technical Data

	Models		350	600	900
		mm	365	615	920
		in	*14*	*24*	*36*
		mm	0 ÷ 520	0 ÷ 770	0 ÷1075
	with standard accessory	*in*	*0 ÷ 20*	*0 ÷ 30*	*0 ÷ 42*
	with insert holder	mm	0 ÷ 575	0 ÷ 825	0 ÷1130
	No. 07.60057	*in*	*0 ÷ 22*	*0 ÷ 32*	*0 ÷ 44*
	with standard accessory		(2 + 3 · L) µm *(0.0001 + 0.000003 . L) in*		(L in m) *(L in in)*
	with standard accessory	µm	2	2	2
		in	*0.0001*	*0.0001*	*0.0001*
	Frontal and sideways using TESA IG-13 digital probe	µm	6	8	12



07.60150

Control Panels for TESA MICRO-HITE® 350 / 600 / 900





07.60145	**TESA Control Panel «1D»** With dedicated programme for measuring in one coordinate direction as well as for perpendicularity and straightness measurements. 0,0005 / 0,001 / 0,01 and 0,1 mm 0.00002 / 0.0001 / 0.001 / 0.01 and 0.1 in	
07.60163	**TESA Control Panel «POWER PANEL»** With dedicated programme for measuring in 1 and 2 coordinate directions with geometric combination of the measured values. Lets you also measure perpendicularity, straightness and squareness. Provides 99 workpiece oriented measurement cycles including 64 features with related limits of size, programmable. Memory capacity for 2500 measured values. Statistical value processing (SPC). Result output via the built-in matrix printer or in A4 format using an external unit. PCMCIA memory card reader enabling measurement cycles and results to be stored. Operator-controlled on-screen display. 0,0005 / 0,001 / 0,01 and 0,1 mm 0.00002 / 0.0001 / 0.001 / 0.01 and 0.1 in	

Accessories for TESA «POWER PANEL»:

47.66010	Formatable memory card, type JEIDA SRAM, 128 k
47.64009	Memory card reader for PC
47.65008	Thermal paper roll, 57 mm wide

Control Panel «1D»

✓

Dual LC display 128 x 63 mm in size.
- Upper display field for length values measured (7-segment / sign) and symbols for the functions.
- Lower full dot display field for perpendicularity and straightness measurements as well as symbols for the operator-controlled function keys.

Measured values (7-decade) plus minus sign

Main display 8 x 4 mm, auxiliary display 6,3 x 4,2 mm.

✓

✓

PRESET function for entering any known value

Input of size limits for toleranced features

Continuous display

Manual or automatic triggering of data transfer

Output of inspection reports with headings in 5 languages. A4 format also available using an external printer unit.

Via TESA MICRO-HITE

Protection IP40 (IEC 60529)

✓

Optional Accessories

Factory standard

Control Panel «POWER PANEL»

Dual LC display 128 x 63 mm in size.
- Upper display field for length values measured (7-segment / sign) and symbols for the functions.
- Lower full dot display field for perpendicularity and straightness measurements as well as symbols for the operator-controlled function keys.

Measured values (7-decade) plus minus sign.

Main display 12,7 x 6,4 mm, auxiliary display 6,3 x 4,2 mm.

See opposite

PRESET function for entering a known value

Input of size limits for toleranced features

Continuous display

Manual or automatic triggering of data transfer

Output of inspection reports with headings in 5 languages. A4 format also available using an external printer unit.

Via TESA MICRO-HITE

Protection IP 40 (IEC 60529)

Optional Accessories for TESA MICRO-HITE® 350, 600 and 900

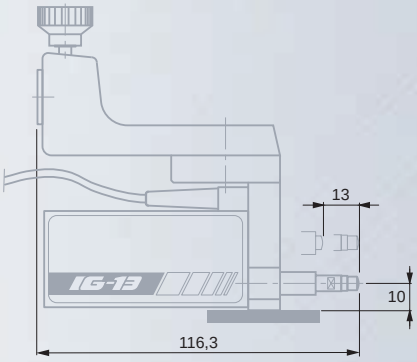
Additional accessories are listed on page K-18.

07.60140 **TESA IG-13 Probe Set**

consisting of:

07.60139 1 TESA IG-13 digital probe with measuring span of 13 mm or 0.5 in

07.60138 1 Attachment for TESA IG-13 digital probe



Other Accessories

19.60005 Lift lever for the measuring bolt

35.40501 Extension 10 mm for the measuring insert

07.60161 **TESA IGI interface**

For use as stand-alone measuring device with 1 or 2 TESA IG-13 probes No. 07.60139 associated with control panel TESA MICRO-HITE «1D» No. 07.6014 (see the example opposite). Supplied with connecting cable No. 47.61047 (1 m long).



Accessories

47.61054 Mains adapter - 110 to 220 Vac, 50 to 60 Hz

47.61055 Mains cable EU for adapter No. 47.61054

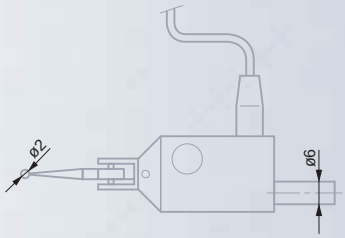
47.68000 Hand switch for data transfer

47.68001 Foot switch for data transfer

S07.072076 **TESA MEMOTAST-special**

Switchable probe. Technical data are valid for use of this probe in conjunction with TESA MICRO-HITE, model 10 or 11.

N		µm
0,5	(3 + 3 · L) µm L in m	≤ 3



64.60000 **TESA MEMOPRINT Matrix Printer**

Allows you to store up to 1999 values in the memory that can be subdivided to accommodate 99 distinct data files. Thermal printer type. Printing speed 100signs / s. RS 232 interface, bi-directional. Comes with rechargeable batteries and mains adapter.



Accessories

07.60149 Support for TESA MICRO-HITE

47.65008 Thermal paper roll, 57 mm wide

47.65008 Connecting cable to TESA MICRO-HITE

TESA-HITE® plus and TESA-HITE® Height Gauges





Futuristic design, excellent price/ performance relationship – Rugged construction for use on the shop floor or close to the manufacturing – Ideal for your measuring and scribing jobs.

Full autonomy with battery power – Measure height and step dimensions as well as groove widths, centre distances between slots, bores and others – Make bore measurements simple and highly reliable using QUICK CENTER.

- *Available in two sizes with measuring spans of 365 and 615 mm or 14 and 24 in.*
- *Numerical display to 0,005 and 0,001 mm or 0.0002 and 0.0001 in.*
- *Choice of two models: TESA-HITE and TESA-HITE plus.*
- *TESA-HITE plus allows you to also establish perpendicularity and straightness errors based on the high-precision vertical guiding.*
- ***TESA-HITE plus is more accurate than ever before through CAA (Computer Aided Accuracy).***
- ***Fast dynamic probing of the workpieces with a constant measuring force.***
- *No need for manual calculation as the on-board microprocessor delivers the measured values in less than one second.*
- *Acoustic signal to acknowledge the value capture, programmable.*
- *High accuracy permanently ensured by the glass scale providing optimum stability over a long time.*
- *Large numerical display with symbols for dedicated functions*
- *Zero-setting of display anywhere within the measuring range.*
- *PRESET function for entering a known value.*
- *Metric / inch conversion.*
- *Opto-electronic RS 232 data transfer for safety operating conditions.*

✓

Factory standard

LC display. Display size 83 x 49 mm. 7-decade plus minus sign and graphical symbols for the functions.

0,001 mm and 0,0005 mm or 0.0001 in and 0.0002 in

12 mm

Measuring span, application range and accuracy as listed in the table on page K-16.

Rust-inhibitor cast iron base

Opto-electronic (for TESA-HITE plus) or capacitive (for TESA-HITE) glass scale

(12 ± 1,5) x 10^{-6} K^{-1}

Measuring head mounted on a ball-bearing, handwheel for fast head movement.

500 mm / s 20 in / s

TESA-HITE plus 1,6 ± 0,25 N, TESA-HITE 1,6 ± 0,5 N (at switch point)

RS 232, opto-electronic

4 batteries, non-rechargeable 1,5 V, type IEC LRC6. TESA-HITE plus can also be used with rechargeable batteries or mains adapter (optional accessories).

TESA-HITE plus ≈ 200 h, TESA-HITE ≈ 1 a

10 °C to 40 °C

- 10 °C to 60 °C

80 %, with no condensation

Protection IP 40 (IEC 60529)

See table on page K-16

EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2 (with use of mains adapter excluded)

Transport packing

Identification number

Declaration of conformity

TESA-HITE® plus 350 / 600



07.30051	**TESA-HITE plus Height Gauge, Model 350** Measuring span 365 mm / 14 in Application range 0 to 520 mm / 0 to 20 in
07.30052	**TESA-HITE plus Height Gauge, Model 600** Measuring span 615 mm / 24 in Application range 0 to 770 mm / 0 to 30 in

Each model is supplied with the following standard accessories:

07.60168	1 Standard insert holder
07.60164	1 Standard insert, tungsten carbide ball tip, 5 mm dia.
07.60133	1 TESA QUICK CENTER*. Measuring device for quick bore inspection to be used with the roller-bearing measuring inserts
07.60134	1 Roller-bearing insert, 10 mm dia. For measuring bores from 18 up to 80 mm*
07.60150	1 Master piece for determining the probe constant, 20,0000 mm / 0.78740 in
47.68002	1 Set of 4 batteries, 1,5 V, type IEC LRC 6

* For further details, see page K-18.

TESA-HITE® 350 / 600

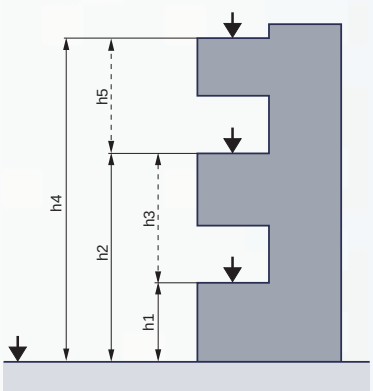


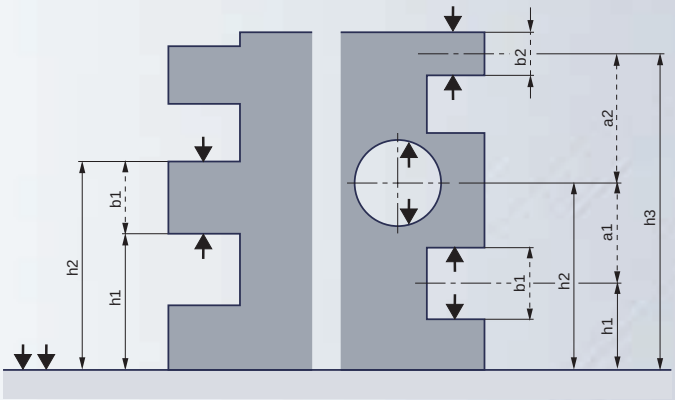
07.30041	**TESA-HITE Height Gauge, Model 350** Measuring span 365 mm / 14 in Application range 0 to 520 mm / 0 to 20 in
07.30042	**TESA-HITE Height Gauge, Model 600** Measuring span 615 mm / 24 in Application range 0 to 770 mm / 0 to 30 in

Each model is supplied with the following standard accessories:

07.60168	1 Standard insert holderr
07.60164	1 Standard insert ø 5 mm dia. tungsten carbide ball tip
07.60169	1 Master piece for determining the probe constant
47.68002	1 Set of 4 batteries, 1,5 V, type IEC LRC 6

The standard accessory is pictured on the next page.

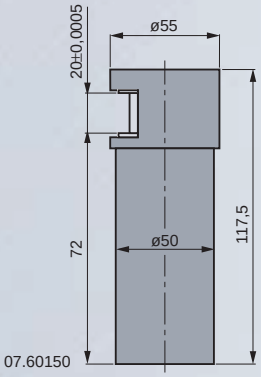




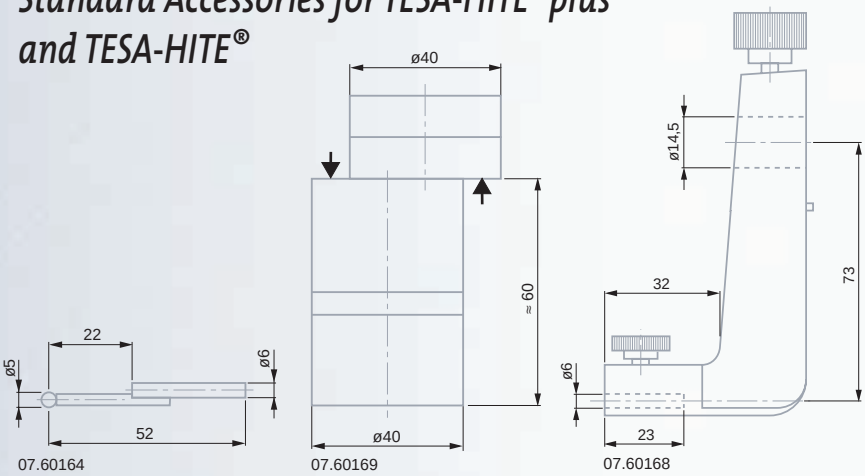
Technical Data

Models		TESA-HITE plus 350	TESA-HITE plus 600	TESA-HITE 350	TESA-HITE 600
	mm	365	615	365	615
	in	*14*	*24*	*14*	*24*
with std accessory	mm	0 ÷ 520	0 ÷ 770	0 ÷ 520	0 ÷ 770
	in	*0 ÷ 20*	*0 ÷ 30*	*0 ÷ 20*	*0 ÷ 30*
with insert holder No. 07.60057	mm	0 ÷ 575	0 ÷ 825	0 ÷ 575	0 ÷ 825
	in	*0 ÷ 22*	*0 ÷ 32*	*0 ÷ 22*	*0 ÷ 32*
	µm	7	10	15	20
with std accessory	*in*	*0.0003*	*0.0004*	*0.0006*	*0.0008*
	µm	3	3	5	5
with std accessory	*in*	*0.0001*	*0.0001*	*0.0002*	*0.0002*
	µm	15	20	–	–
	in	*0.0006*	*0.0008*	–	–
	kg	14	16,1	14	16,1

The limiting values assigned to the perpendicularity error (frontal) are valid for the max. distance of 120 mm from the front face of the height gauge.



Standard Accessories for TESA-HITE®plus and TESA-HITE®



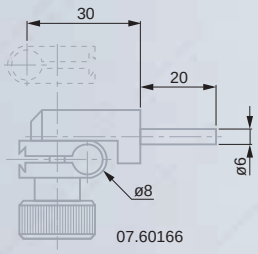
Optional Accessories for TESA-HITE®plus and TESA-HITE®

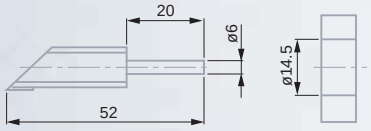
07.60165	Tungsten carbide tipped scriber with centring ring for safety operating
07.60166	Fixing shank for dial test indicators, dial gauges, etc.
07.60151	Dust cover for model 350
07.60152	Dust cover for model 600

For use of TESA-HITE plus with rechargeable batteries
(not suited for TESA-HITE standard version)

47.68035	6 V battery pack
47.61054	Mains adapter, 100 to 240 Vac / 50 to 60 Hz, 6,6 Vdc / 750 mA
47.61055	Mains cable EU
47.61056	Mains cable US

For ordering information on TESA PRINTER SPC, cables and others, see section L.





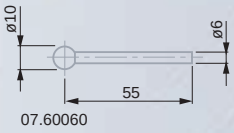
Special Accessories for TESA MICRO-HITE® 350, 600 and 900 TESA-HITE®plus 350 and 600 TESA-HITE® 350 and 600

SWISS MADE ✓

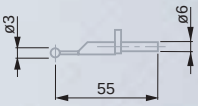
Transport packing

Declaration of conformity

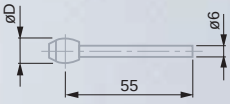
No			
07.60173	**Partial set of accessories**	●	
07.60148	**Full set of accessories**		●
	Supplied in a suited plastic case with the following components:		
07.60061	1 Measuring insert with a 3 mm dia. tungsten carbide ball tip	●	●
07.60060	1 Measuring insert with a 10 mm dia. tungsten carbide ball tip	●	●
	Measuring inserts with tungsten carbide, barrel-shaped measuring faces for cylindrical bores as well as for determining the position of metric (or similar) inside threads		
07.60066	1 Insert with a 2,2 mm dia. (for M3 ÷ M16)		●
07.60067	1 Insert with a 4,5 mm dia. (for M6 ÷ M48)		●
07.60068	1 Insert with a 9,7 mm dia. (for M12 ÷ M150)		●
	Measuring inserts with tungsten carbide disc tip for grooves, slots, centring shoulders etc.		
07.60074	1 Insert, E = 1 mm / 4,5 mm dia.		●
07.60075	1 Insert, E = 1 mm / 4,5 mm dia.	●	●
07.60076	1 Insert, E = 3 mm / 19 mm dia.		●
07.60082	1 Insert with a 2 mm dia. cylindrical carbide measuring face		●
07.60096	1 Holder for TESATAST probe inserts having either a M1,4 or M2,5 thread	●	●
	TESATAST probe inserts with a carbide ball tip, M1,4 thread		
18.60201	1 Insert with a 1 mm dia.	●	●
18.60202	1 Insert with a 2 mm dia.	●	●
18.60203	1 Insert with a 3 mm dia.	●	●
18.60307	1 Setting key	●	●
07.60093	1 Measuring insert with cylindrical measuring face (10 mm dia., 12 mm long). Stainless steel body, hardened. Tungsten carbide measuring face.	●	●
	Insert holder for increasing the measurement depth		
07.60086	1 Holder for measurement depths up to 110 mm (L = 75 mm)		●
07.60087	1 Holder for measurement depths up to 185 mm (L = 150 mm)		●
07.60057	1 Insert holder for extending the application range		●
07.60094	1 Measuring insert with a stainless steel pin, hardened with one flat and one spherical carbide measuring face. Interchangeable pin.	●	●



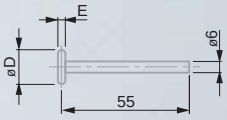
07.60060



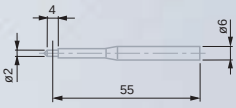
07.60061



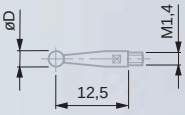
07.60066 - 07.60068



07.60074 - 07.60076

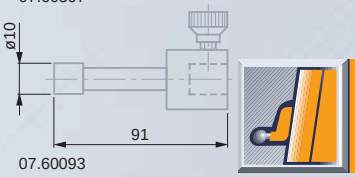


07.60082

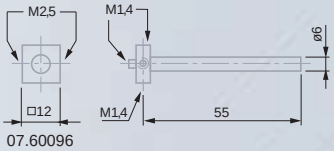


18.60201 - 18.60203


07.60307

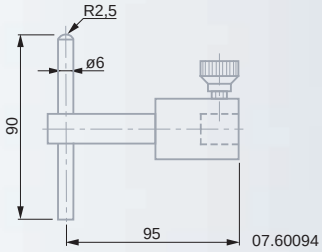


07.60093

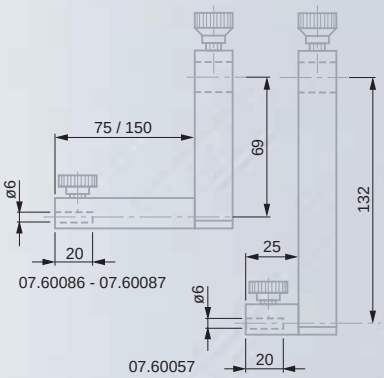


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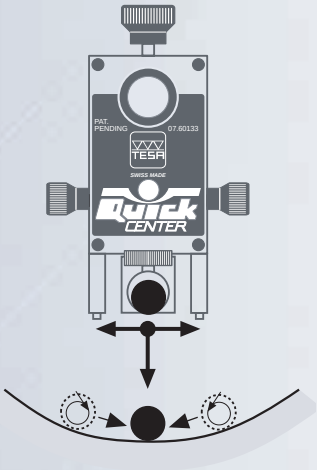




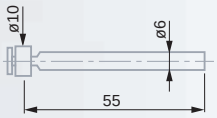
07.60094



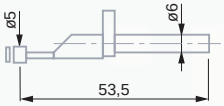
07.60086 - 07.60087
07.60057



07.60133	**TESA QUICK CENTER** Measuring device (TESA's patent) for quick bore measurement by automatically establishing the culmination point. To be used with the measuring inserts listed below, exclusively.
07.60135	Roller-bearing insert, 5 mm dia. Application range for bores from 7 up to 25 mm dia.
07.60134	Roller-bearing insert, 10 mm dia. Application range for bores from 18 up to 80 mm dia.



07.60134

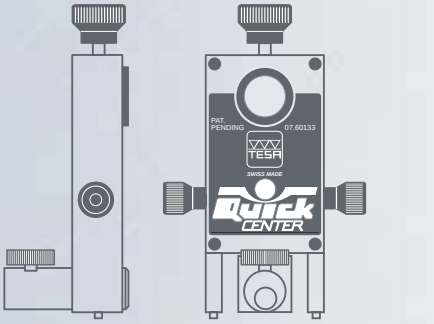


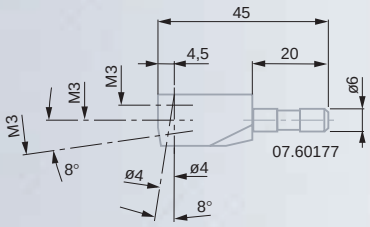
07.60135

SWISS MADE ✓

Transport packing

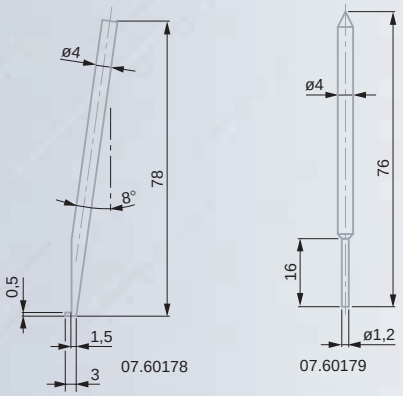
Declaration of conformity



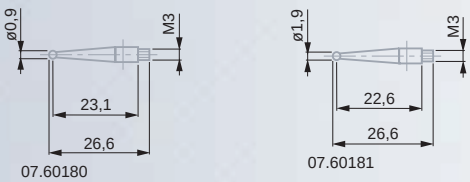


07.60177

07.60175	**Set of optional measuring inserts**
	Provided in a fitted plastic case with:
07.60177	1 Insert holder
07.60178	1 Hardened steel pin for grooves, centring shoulders, blind bores etc., tilted through 8 °
07.60179	1 Hardened steel pin, cylindrical for depth measurement.
	Measuring inserts with hardened steel ball tip
07.60180	1 Insert with a 0,9 mm dia.
07.60181	1 Insert with a 1,9 mm dia.
07.60182	1 Insert with a 2,9 mm dia.
07.60183	1 Measuring insert with a cone-shaped steel measuring face, hardened, 8 mm dia.
	Extensions, 20 mm long
07.60184	1 Threaded extension M3 to M3
07.60185	1 Threaded extension M3 to M2,5

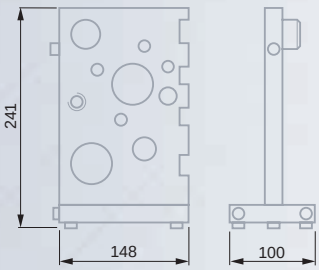


07.60178 07.60179



07.60180 07.60181 07.60182 07.60183

07.60124	**Practice piece** Allows 1D and 2D as well as straightness, perpendicularity and parallelism measurements. For information on the programmed measurement cycles, see the instruction manual on TESA «POWER PANEL»



ETALON® and ROCH CAPAX 2000 Height Gauges

✓

Factory standard

600 mm / 24 in measuring span

0 to 800 mm
0 to 31 in

0,0001 / 0,0005 / 0,001 and 0,005 mm or 0.00001 / 0.00005 / 0.0001 and 0.0005 in

(2 µm + L / 350) µm (L in mm)

0,5 µm with the standard insert No. 07.1684825 or 0,2 µm with the insert No. 07.1684829.

Frontal: ≤ 10 µm

Main instrument

Base with built-in stainless steel plate, hardened.

Air-cushion for easy move of the height gauge over the surface plate

Ball-bearing measuring head

Incremental glass scale with reference point. Opto-electronic probing.

Displacement of the measuring head:
• electro-motorised displacement providing 10 programmable speeds from 12 up to 40 mm / s.
• manual displacement: ≤ 600 mm / s.

Automatic value capture with a constant measring force

0,9 ÷ 1,2 N. Electro-motorised actuation with coupler

Continued next page

The ultimate in design – State of the art concept – Versatile and profitable in measuring.

Specially designed for length measurements in the form of internal, external, height, depth and distance dimensions on geometrical elements having either a flat, plane-parallel or cylindrical surfaces – Also able to capture the position of bores in two directions of coordinates with further output in either cartesian or polar system – Their measuring capabilities can be increased with use of an inductive probe that can be connected for the detection of perpendicularity errors.

- *Main instrument with tilting control panel are combined in a single unit, which makes probing comfortable and reliable.*
- *Self-contained, cableless operating through rechargeable batteries.*
- *Air-cushion for easy displacement of the height gauge over the surface plate.*
- *Electro-motorised measuring head for fast, accurate probing at each measuring points with a constant measuring force.*
- *High accuracy through CAA (Computer Aided Accuracy) plus enhanced mechanical precision through correction values that are registered.*
- *Control panel fully programmable for 50 workpiece oriented measurement cycles, each including 100 features with related limits of size.*
- *Additionally, automatic measurement cycles through programming or sampling routines in «Teach-in Mode» for recurent workpieces.*



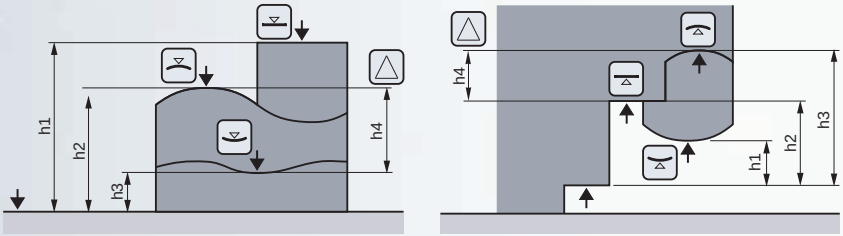


- *Memory capacity for 22 600 measured values.*
- *Statistical process control (SPC) with possible output of either the average, range, standard deviation, histrogram, given/actual value comparison, number of values beyond tolerances, control limits or control chart.*
- *Inspection reports printable in A4 format with related charts an graphic presentations. Custom designed report headings.*
- *SCS calibration certificate delivered with each single height gauge.*

Measuring Capabilities

Measuring without change of the probe direction

Probe constant not included

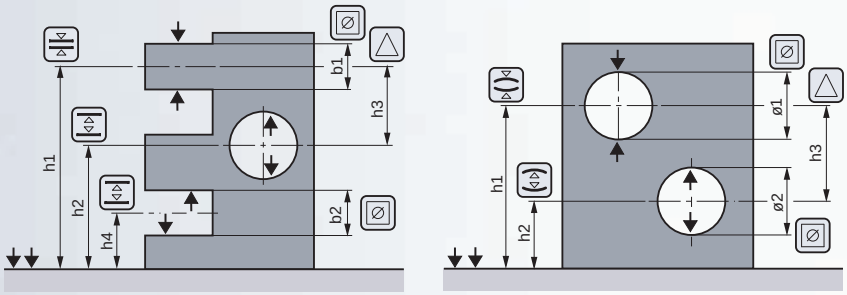


Measuring with change of the probe direction

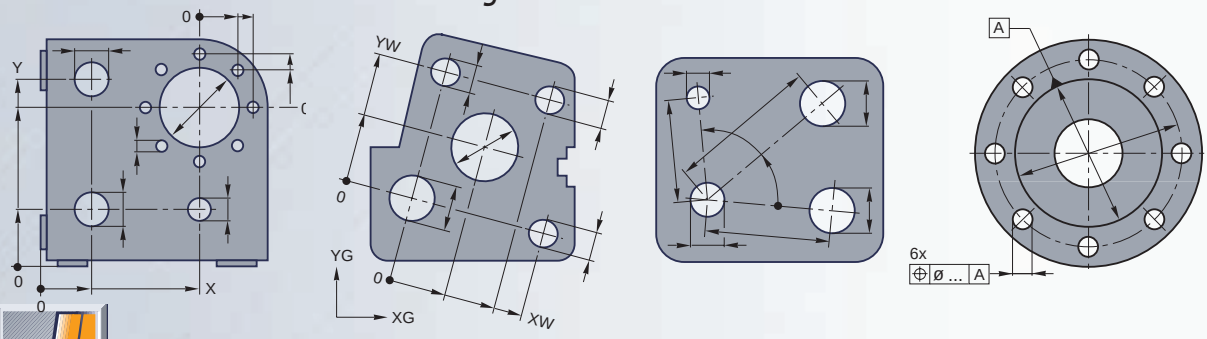
With probe constant included

– without storage of the culmination point

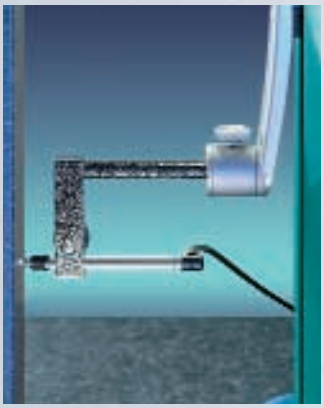
– with storage of the culmination point

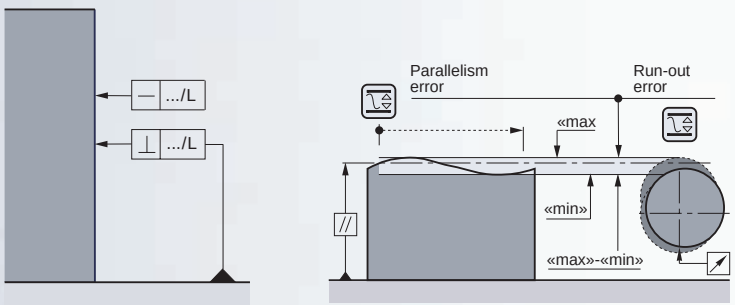


Measuring in two coordinate directions



Establishing form and position errors





Rechargeable battery packs (6 V, 3,0 Ah) and mains adapter 110 to 240 Vac / 50 to 60 Hz

≈ 6 h after 6 h charging

Control Panel

LC display field, 130 x 36 mm in size.

Full dot matrix
- 64 x 240 for graphs
- 8 lines of 40 signs for texts

See above

✓

✓

✓

Watertight tactile keypad

RS 232 and Centronics,. Possible connection of a measuring instrument, e.g. electronic depth calliper

Via the main instrument

General

10 °C to 40 °C

- 10 °C to 60 °C

80 %, with no condensation

Protection: IP 40 (IEC 60529)

EN 50081-1
EN 50082-1

29 kg net (main instrum.).
1,7 kg net (control panel)

Transport packing

Identification number

SCS calibration certificate

CAPAX 2000 Delivery Programme

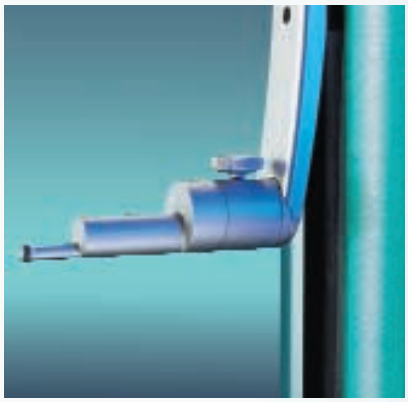


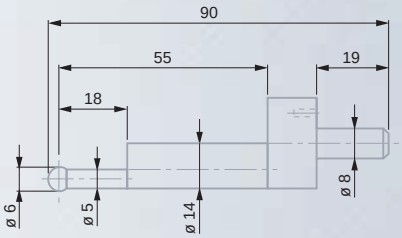
No			Languages
	CAPAX 2000 Height Gauges		
	Measuring span: 600 mm / 24 in		
	Application range: 0 to 800 mm / 0 to 31 in		
07.39010		**ETALON**	**German**
07.39011		**ETALON**	**English**
07.39012		**ETALON**	**French**
07.37043		**ROCH**	**French**

Each unit is supplied with the following standard accessories:

	1 Control panel with dialogue capabilities in either of the above languages
07.60189	1 Connecting cable for the control panel to the height gauge
07.1684825	1 Standard insert with a 6 mm dia. tungsten carbide ball tip
07.1684824	1 Master piece for establishing the probe constant
07.60190	2 Rechargeable battery packs (order number for 1 item only)
47.61054	1 Mains adapter - 110 to 240 Vac / 50 to 60 Hz
47.61055	1 Mains cable EU for mains adapter
07.60152	1 Dust cover

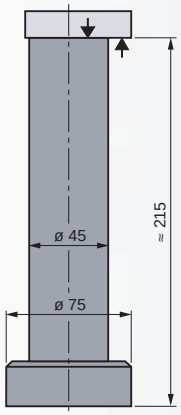
Standard Accessories for CAPAX 2000





Standard measuring insert with a ball tip.

No		mm
07.1684825	Carbide	6



Master piece for establishing the probe constant.

No	
07.1684824	Steel, hardened



Mains adapter.

No	
47.61054	110 to 240 Vac, 50 to 60 Hz

Rechargeable battery pack.

No	
037738	Order number for 1 item

Optional Accessories for CAPAX 2000

For ordering information on connecting cables, report to both pages L-73 and L-74.



07.1684849

07.1684849 Accessory Set

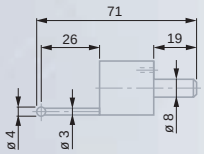
Consisting of:

07.1684848	1 Plug-ins panel in plexiglass
07.1684815	1 Insert with a 4 mm dia. tungsten carbide ball tip
07.1684816	1 Insert with a 6 mm dia. tungsten carbide ball tip
07.1684832	1 Insert with a 8 mm dia. tungsten carbide ball tip
07.1684829	1 Insert with a 10 mm dia. tungsten carbide ball tip
07.1684817	1 Long insert with a 10 mm dia. tungsten carbide ball tip
07.1684826	1 Attachment for interchangeable inserts, fitted with a M1,4 thread. Supplied with one insert No. 18.60201 with a 1 mm dia. carbide ball tip.
07.1684835	1 Insert with short cylindrical measuring face in hardened steel, 12 mm in diameter, 2 mm long.
07.1684820	1 Insert with cylindrical measuring face in hardened steel, 10 mm in diameter, 12 mm long.
07.1684827	1 Insert with disc-shaped measuring face in hardened steel for blind bores or short centring shoulders, 12 mm in diameter, 3 mm wide.
07.1684822	1 Insert with cone-shaped measuring face in hardened steel, for diameters from 0,5 up to 5,5 mm.
07.1684819	1 Insert with cone-shaped measuring face in hardened steel, for diameters from 5 up to 20 mm.
07.1684828	1 Attachment for interchangeable inserts, fitted with a M1,4 thread. Supplied with two inserts No. 18.60202 with a 2 mm dia. carbide ball tip.
07.1684852	1 Attachment for interchangeable inserts, fitted with M1,4, M2,5 and M3 threads. Supplied with connectors M3 to M1,4 and M3 to M2,5. The measuring insert can be aligned radially.
07.1684818	1 Insert with a 1 mm dia. steel pin, hardened. Adjustable for depth measurement.

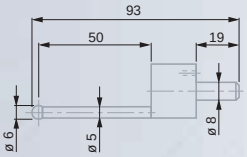
SWISS MADE ✓

Factory standard

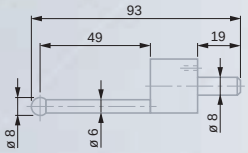
Transport packing



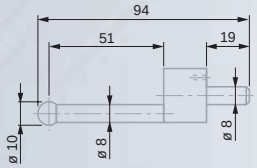
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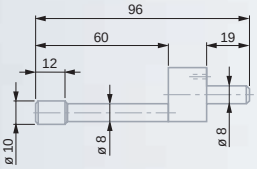
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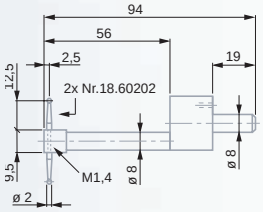
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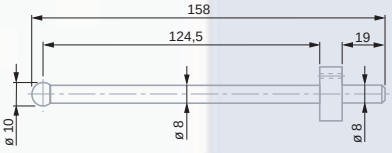
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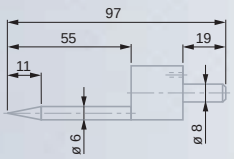
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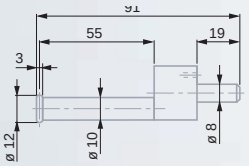
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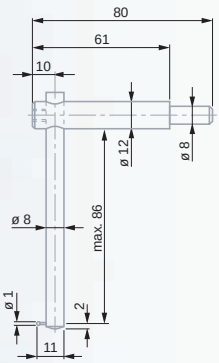
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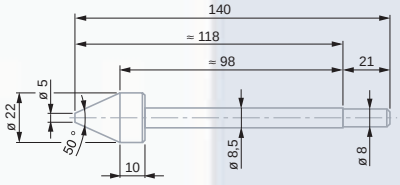
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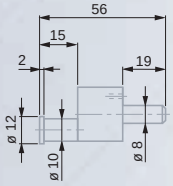
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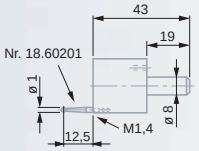
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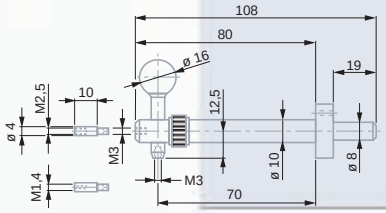
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07.1684835

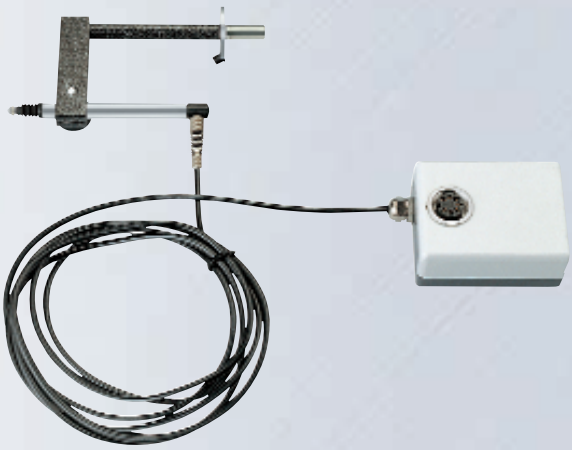


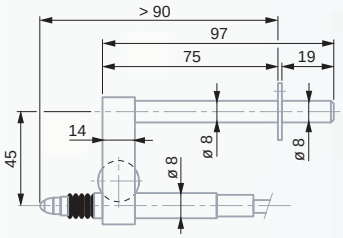
07.1684826



07.1684852

07.60215 **Inductive Probe**
For perpendicularity measurement etc. Measuring travel ± 1,5 mm. Complete with holder No. 84854.

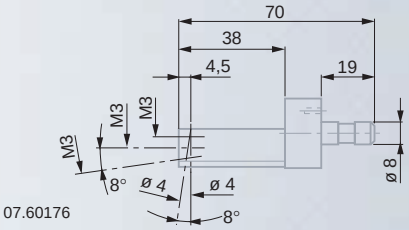




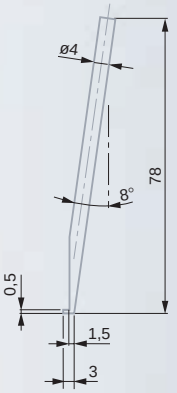
07.60174 **Set of optional measuring inserts**

Provided in a suited plastic case including:

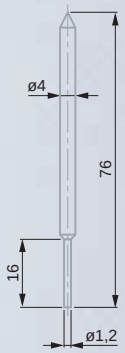
07.60176	1	Probe holder
07.60178	1	Hardened steel pin for turned grooves, centring shoulders, blind bores etc. Angled through 8 °.
07.60179	1	Cylindrical steel pin for depth measurement, hardened.
		Measuring inserts with hardened steel ball tips
07.60180	1	Insert with a 0,9 mm dia.
07.60181	1	Insert with a 1,9 mm dia.
07.60182	1	Insert with a 2,9 mm dia.
07.60183	1	Hardened steel insert with a cone-shaped measuring face having a 8 mm. dia.
		Extensions, 20 mm long
07.60184	1	Item with a M3 to M3 thread
07.60185	1	Item with a M3 to M2,5 thread



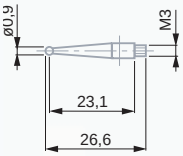
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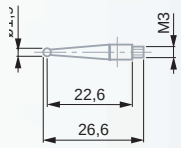
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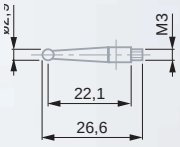
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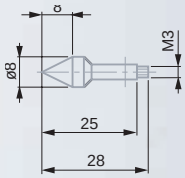
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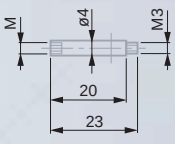
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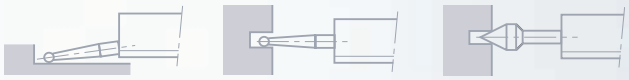
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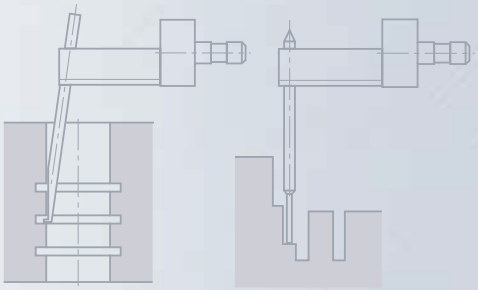


07.60183

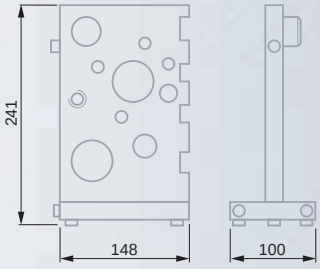


07.60184
07.60185





07.60124 **Practice Piece**
For the measurements in 1 and 2 coordinate directions as well as for the capture of perpendicularity errors and others.





ETALON® Height and Scribing Gauges with Digital Display or Vernier Readout

Electronic Height and Scribing Gauges
- *Resolution to 0,01 mm / 0.005 in*
- *RS 232 interface*

Mechanical Height and Scribing Gauges
- *Vernier to 0,02 mm*
- *Parallax-free readout – Dull-chrome plated scale background*

No	Sizes	mm	in	Columns mm	Base (WxHxL) mm
ETALON Height and Scribing Gauges with Digital Display					
77.39001	300	0 to 300	*0 to 12*	25 x 6	60 x 40 x 100
77.39002	600	0 to 600	*0 to 24*	30 x 12	110 x 50 x 160
77.39003	1000	0 to 1000	*0 to 40*	30 x 12	110 x 50 x 160
ETALON Height and Scribing Gauges with Vernier Readout					
77.19011	300	0 to 300		25 x 6	60 x 40 x 100
77.19012	600	0 to 600		30 x 12	110 x 50 x 160
77.19013	1000	0 to 1000		30 x 12	110 x 50 x 160



Optional Accessories

No		Convenient for sizes	Length mm
77.69001	Scriber	300	65
77.69002*	Scriber	300	120
77.69003	Scriber	600 and 1000	75
77.69004*	Scriber	600 and 1000	150
	Holder for dial gauges, electronic probes, dial test indicators (lever-type etc. 8 mm dia. fixing bore.		
77.69005	Can be mounted instead of the scriber.		
77.69006	Rotating and tilting version fitted with a 8 mm shaft.		
	For connecting cables, see both pages L-73 and L-74.		

***** Not suitable for electronic height gauges with digital display.







Height and Scribing Gauges

Robustly constructed, simple to use – Measuring head with twin guide system – Handwheel drive for easy head displacement – Two mechanical digital counters with clockwise and counterclockwise readout for the full millimetres – Circular scale with a 0,01 mm scale division – Zero-setting of display anywhere within the measuring range – Rotating dial.

No		mm
77.19000	**Height and Scribing Gauges 300 with dial**	0 ÷ 300
77.19001	**Height and Scribing Gauges 600 with dial**	0 ÷ 600
Supplied with the following standard accessories:		
07.60172	1 Tungsten carbide scriber	
77.60000	1 Attachment for the scriber as well as the measuring inserts	
Optional Accessories		
07.60059	Measuring insert with a 5 mm dia. tungsten carbide ball tip	
18.10005	TESATAST dial test indicator (lever-type) to 0,01 mm with a 28 mm dial dia.	
18.60008	Clamping shaft with dovetail, 6 mm dia. clamp	

✓
Factory standard

Slider with interchangeable scriber. Also equipped with a back mounted clamping holder having a 8 mm dia.

Slider with a locking screw and fine adjustment device

Base has a ground face with dust grooves. Top face also ground.

Steel base, hardened.

DIN 862 Measuring lengths up to 600 mm: 30 µm, 1000 mm: 40 µm.

Models with digital display

Floating zero

PRESET and Hold functions

General

Wooden case

Identification number

Declaration-of conformity

✓
Factory standard

Twin guide system with 1 toothed rack for moving the head up and down while the other serves as material measure

50 mm rotating dial

1 mm

For lengths up to 200 mm: 30 µm, 400 mm: 40 µm and 600 mm: 50 µm

Transport packing

Identification number

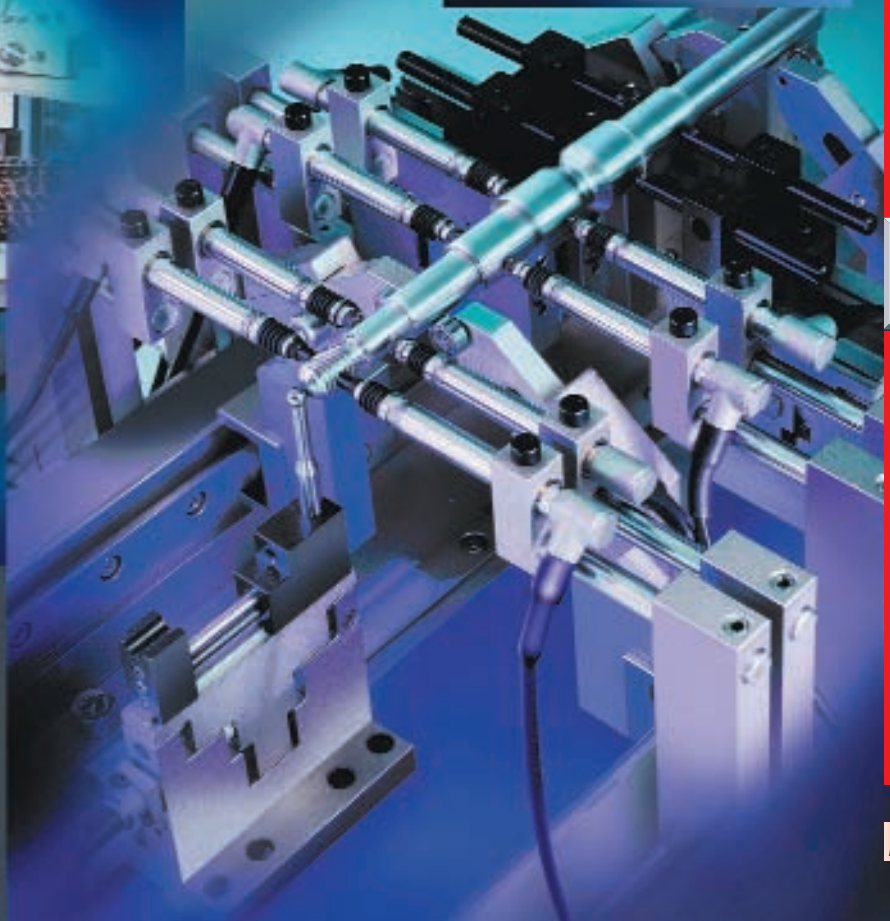
Declaration of conformity

Electronic Length Measuring Equipments









TESA® Length Measuring Equipments with Inductive Probes

*TESA offers a complete family of value sensors (electronic probes) as well as dedicated measuring instruments for the most demanding applications. Our **standard probes -** also called **half-bridge probes** - operate on the electrical principle. They do not need be specifically adjusted.*

*Electronic probes that are used with the measuring instruments from other manufacturers operate partially on the basis of a differential transformer. These are **LVDT** type probes (Linear Variable Differential Transformer). TESA also offer a full range of this kind of probes which, however, need to be fitted with an appropriate socket and further adapted accordingly.*

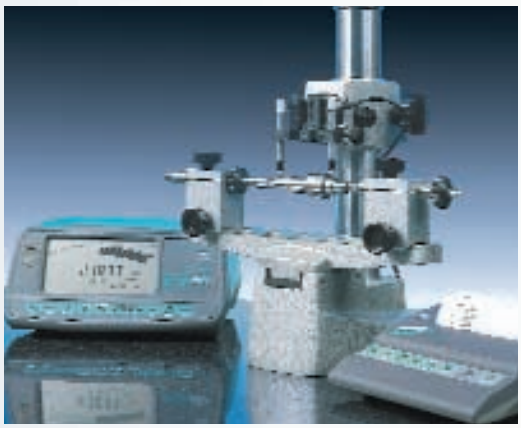
For more details on TESA half-bridge and LVDT inductive probes, read the information that follows.

Countless Measuring Capabilities

All TESA electronic probes can either be used with hand-held internal and external measuring instruments or in conjunction with measuring stands and other typical measuring devices. TESA can supply such executions as axial probes with linear displacement of the measuring bolt, angled probes with inclinable lever or probes with parallel guiding that are specially designed for multigauging devices and other equipment for in-process inspection - thus allowing to spare a great deal of assembly components.

With a very few exceptions, these probes perform «comparative measurements», essentially. Based on a master standard, which can either be a gauge block, a setting ring or any other workpiece accepted as such, a number of sizes are compared on the test piece.

- *All measurements are taken with high accuracy. The bias errors usually count for very little in the uncertainty budget since the comparison is made between two values of a measurand that are close to one another.*
- *Random errors are also significantly reduced as display setting and all subsequent measurements are usually made in the same conditions.*
- *TESA measuring instruments are provided with an analogue and/or digital display depending on their type.*



Instrument based Processing

Processing the measurement signals is performed differently according to the measuring application.

Mathematical Signal Processing

Signal processing can equally be made with «positive» or «negative» polarity signs. The use of one single probe enable «single measurement» of internal or external dimensions while the combination of the signals of two probes produces either a «sum measurement» or a «difference measurement».

Value Storage

Provides security for your dynamic measurement cycles. The smallest or highest value as well as the difference between both values are some of the part features that are questioned when capturing form and position errors.

Value Classification

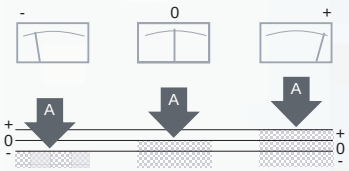
Uses limit deviations to classify the measured values while producing additional control signals usable through a remote unit.



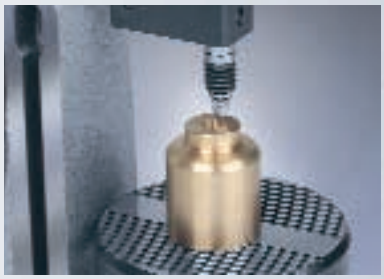
General Overview of the Measuring Functions

Single measurements with positive polarity sign (+A)

Measuring external dimensions with use of a measuring stand, snap gauge etc.

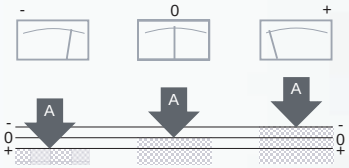


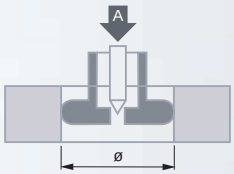




Single measurements with negative polarity sign (-A)

Inspecting with change of the polarity sign. Display will show a low value for a small bore or a high value for a large diameter.

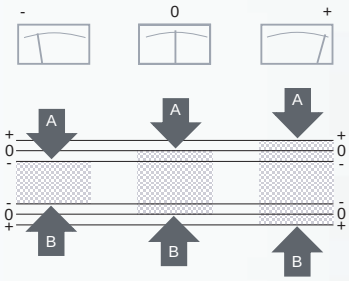


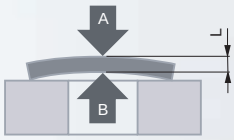




Sum measurements with positive polarity signs (+A +B)

Measuring external dimensions regardless of the form and position errors.

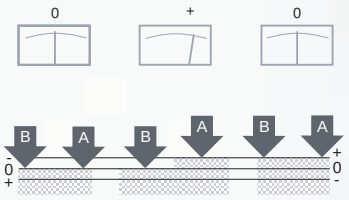


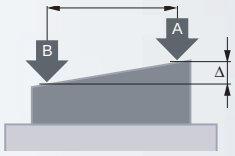




Difference measurements with opposite polarity signs (+A -B)

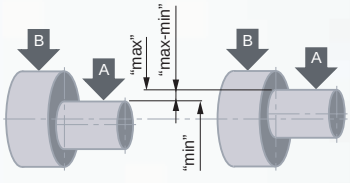
Performing step, cone and inclination measurements.

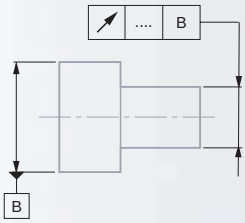


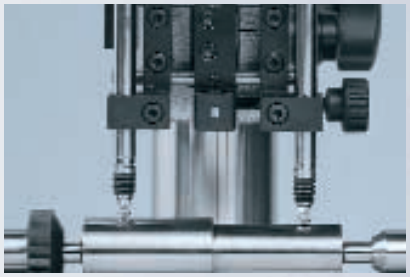


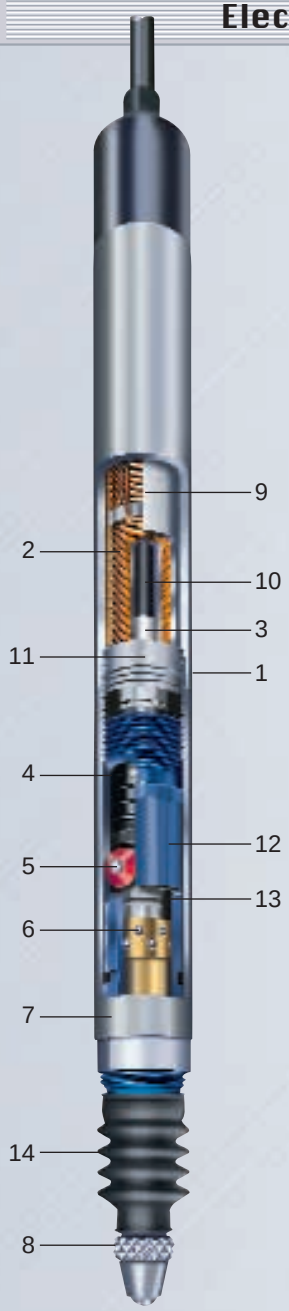


Establishing form and position errors such as runout errors with use of the memory function «max»-«min» as shown in the example.







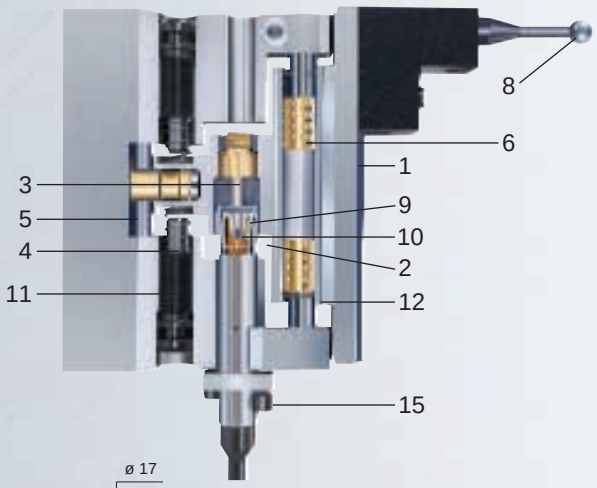


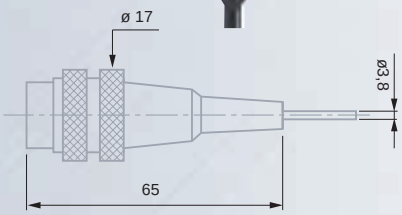
TESA Electronic Probes at the Forefront in Precision Measurement

TESA is a leading designer, manufacturer and user of inductive probes for more than 40 years. TESA high precision electronic probes are made to withstand the stresses sustained in the production environment where they can be constantly used for series inspection. But, these probes are also designed for high accuracy measurements such as those performed in gauge block calibration, for instance.

- *All electronic probes are mounted on ball bearings, except for miniature axial probes.*
- *Ball-bearing measuring bolts are virtually insensitive to radial forces.*
- *Probe guide system is efficiently protected against the penetration of solid and liquid contaminants by sealing rubber bellows. In normal conditions of use, nitrile elastomer rubber bellows are sufficient. For applications where the probes remain permanently in contact with cooling and lubricating agents, we would recommend the use of Viton rubber bellows.*
- *Sealing bellows ensure full airtightness so that the measuring bolt is retracted by throwing off the air contained in the probe. This provides optimum protection of the guiding system as no mechanical means is used.*
- *Electronic signal amplification with no use of any other mechanical component produces excellent repeatability and low hysteresis.*
- *Maximum resolution: 0,01 µm*

1 Mounting stem or probe housing
2 Coil system
3 Item mounted between both the ferro-magnetic core and measuring bolt for the correction of the varying coefficients of thermal expansion
4 Force compression spring
5 Anti-rotation guidance
6 Ball cage
7 Setting element for limiting the bolt travel
8 Measuring insert
9 In-between tube being part of the coil system
10 Ferromagnetic core
11 Force spring stop
12 Ball-bearing guide tube
13 Measuring bolt
14 Sealing rubber bellow
15 Mechanical device for zero-setting





Dimensions of the connector fitted to all TESA probes (minimum cable curve radius R = 15 mm).

Probe sensitivity

All stated values are valid for the following reference conditions:

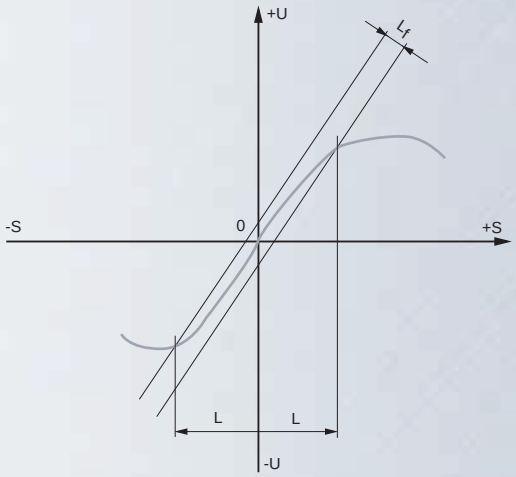
- Drive voltage 3 V
- Drive frequency 13 kHz
- Adjustment load 2 kΩ

	mV / V / mm
All types	73,75
Except for the probe series	
• GT 61 / 62	29,5
• FMS 130 / 132	49,17
LVDT probes	see both pages L-10 and L-11

Functioning Principle

All TESA electronic probes (value sensors) work on the inductive principle with mechanical contact of the workpiece. They are fitted with a coil system inducing an alternating output voltage that depends on the the position of the ferromagnetic core. With a symmetric position, i.e. at electrical zero, no voltage is impressed. A move of the core, which may be attached to the measuring bolt while the measurand is being taken, leads to a change in the inductance. This change generates a signal that is amplified and rectified before being displayed and further output. Depending on the instrument type, the analogue signal will be shown on a voltmeter or a numerical display after its digital transformation.

Unambiguous assessment of the measurand (at bolt position) to the signal (displayed value) is the main characteristic of the analogue value acquisition. One of its distinct advantages is that the value primarily displayed will be reproduced in the event of a power cut (switch-off or power failure).



Inductive probe related main parameters

s travel
U output current
0 electrical zero
L linearity range
L_f linearity error

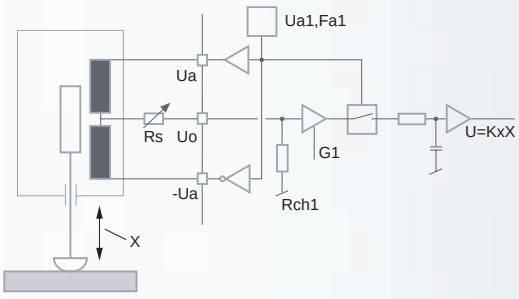
The linearity range L , which is the range within which the max. perm. errors are contained, is equal to the measuring range. All max. perm. errors are limiting values given for linearity errors.

Standard TESA Half-Bridge Probes for use with TESA Measuring Instruments

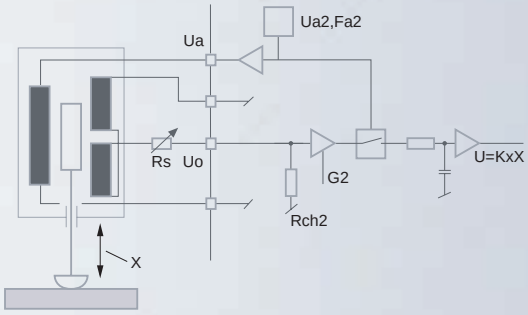
These probes have two serial coils with middle output mounted side by side and energised by a sinusoidal alternation at 3 kHz. Both are linked together to a Wheatstone bridge over an additional half-bridge.

TESA LVDT Probes

These probes are based on a Linear Variable Differential Transformer (LVDT). They have three coils: one primary coil, which is is energised by a sinusoidal alternation at 5 kHz, and two secondary coils, connected in opposite phase, which generate the output current proportional to the measuring travel.



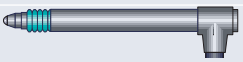
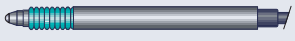
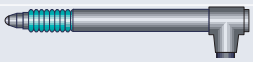
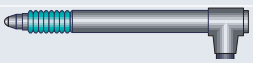
Wiring plan of half-bridge probes



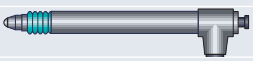
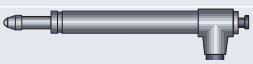
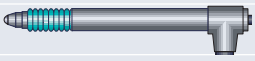
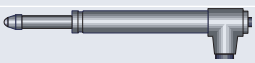
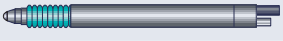
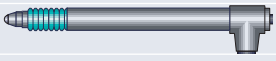
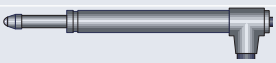
Wiring plan of LVDT probes

Standard TESA® Electronic Probes - Overview

8 mm Diameter Axial Probes with Ball-Bearing Measuring Bolt

	N°		Measuring range mm	mm	Cable exit	Bolt retraction	Sealing bellows
Standard probes							
	32.10904	GT 21	± 2	4,3	axial	mechanical	Nitrile
	32.10924	GT 22	± 2	4,3	radial	by vacuum	Nitrile
	32.30057	GTL 21	± 2	4,3	axial	mechanical	Viton
	32.30072	GTL 211	± 2	4,3	axial	by vacuum	Viton
	32.30056	GTL 22	± 2	4,3	radial	by vacuum	Viton
Standard high-precision probes							
	32.30036	GT 21HP	± 0,2	4,3	axial	mechanical	Nitrile
	32.30021	GT 22HP	± 0,2	4,3	radial	by vacuum	Nitrile
Standard long-travel probes							
	32.30027	GT 27	± 2	10,3	axial	mechanical	Viton
	32.30073	GT 271	± 2	10,3	axial	by vacuum	Viton
	32.30026	GT 28	± 2	10,3	radial	by vacuum	Viton
Probes with extended measuring ranges							
	32.30041	GT 61	± 5	10,3	axial	mechanical	Viton
	32.30074	GT 611	± 5	10,3	axial	by vacuum	Viton
	32.30042	GT 62	± 5	10,3	radial	by vacuum	Viton

... with Activation of the Measuring Bolt by Pneumatic Pressure

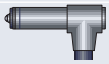
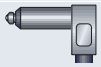
	N°		Measuring range mm	mm	Cable exit	Pressure (bar) Nomi-nal	Maxi-mum	Sealing bellows
Standard probes								
	32.30060	GTL 212	± 1,5	3,2	axial	0,7	1,0	Viton
	32.30054	GTL 222	± 1,5	3,2	radial	0,7	1,0	Viton
	32.30067	GTL 212-A	± 1,5	3,2	axial	0,25	6,0	none
	32.30063	GTL 222-A	± 1,5	3,2	radial	0,25	6,0	none
Long-travel probes								
	32.30061	GT 272	± 2	10,3	axial	1,1	1,5	Viton
	32.30053	GT 282	± 2	10,3	radial	1,1	1,5	Viton
	32.30068	GT 272-A	± 2	10,3	axial	1,0	6,0	none
	32.30069	GT 282-A	± 2	10,3	radial	1,0	6,0	none
Probes with extended measuring ranges								
	32.30062	GT 612	± 5	10,3	axial	1,1	1,5	Viton
	32.30055	GT 622	± 5	10,3	radial	1,1	1,5	Viton
	32.30070	GT 612-A	± 5	10,3	axial	1,0	6,0	none
	32.30071	GT 622-A	± 5	10,3	radial	1,0	6,0	none

** Nominal value of the measuring force at electrical zero, max. deviation ± 25 %.
*** Mechanical frequency limit valid for the final value of the measuring range with an amplitude of 10 %.
**** Max. perm. errors applicable to the linearity errors

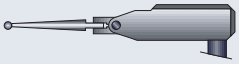
N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
0,63	6	60	yes	0,01	0,02	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,63	6	60	yes	0,01	0,02	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,63	6	60	yes	0,01	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
0,63	6	60	yes	0,01	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
0,63	6	60	yes	0,01	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
0,63	6	60	no	0,01	0,01	$0,07 + 0,4 \cdot L$	10 to 40	IP64
0,63	6	60	no	0,01	0,01	$0,07 + 0,4 \cdot L$	10 to 40	IP64
0,63	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,63	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,63	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,9	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65
0,9	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65
0,9	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65

N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
1,2	6	60	yes	0,015	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
1,2	6	60	yes	0,015	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
0,2	6	60	yes	0,015	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP50
0,2	6	60	yes	0,015	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP50
1,0	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
1,0	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,85	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
0,85	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2,0	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65
2,0	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65
1,0	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP50
1,0	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP50

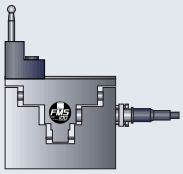
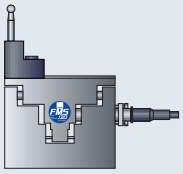
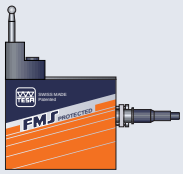
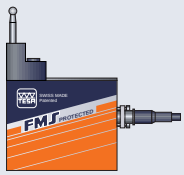
8 mm Diameter Miniature Probes

			Measuring range mm	mm	Cable exit	Bolt retraction	Sealing bellows
Measuring bolt hanging from diaphragm springs							
	32.30001	GT 41	± 0,3	0,7	axial	none	Nitrile
	32.30002	GT 42	± 0,3	0,7	radial	by vacuum	Nitrile
Measuring bolt guided on plain bearings							
	32.30035	GT 43	± 1	2,1	axial	mechanical	Viton
	32.30017	GT 44	± 1	2,1	radial	by vacuum	Viton

Lever Type Probes

			Measuring range mm	mm	Cable exit
	32.10802	GT 31	± 0,3	0,7	angled

Probes with Parallel Guiding

			Measuring range mm	mm	Cable exit *	Insert retraction (accessory)
Standard probes						
	32.30019	FMS 100	± 2	5,8	parallel	by air pressure
	32.30028	FMS 102	± 2	5,8	angled	by air pressure
	32.30049	FMS 130	± 2,9	5,8	parallel	by air pressure
	32.30050	FMS 132	± 2,9	5,8	angled	by air pressure
Probes «FMS protected»						
	32.30037	FMS 100-P	± 2	5,8	parallel	by air pressure
	32.30038	FMS 102-P	± 2	5,8	angled	by air pressure
	32.30051	FMS 130-P	± 2,9	5,8	parallel	by air pressure
	32.30052	FMS 132-P	± 2,9	5,8	angled	by air pressure

* Position in relation to the measuring movement

N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
0,63	2	60	no	0,01	0,01	$0,2 + 5 \cdot L^2$	- 10 to 65	IP65
0,63	2	60	no	0,01	0,01	$0,2 + 5 \cdot L^2$	- 10 to 65	IP65
0,4	2	60	no	0,1	0,15	$0,2 + 5 \cdot L^2$	5 to 65	IP65
0,4	2	60	no	0,1	0,15	$0,2 + 5 \cdot L^2$	5 to 65	IP65

N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
0,1	12	25	no	0,1	0,25	$0,2 + 50 \cdot L^2$	- 10 to 50	IP40

N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP54
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP54
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP54
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP54

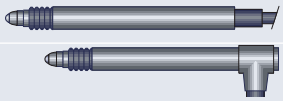
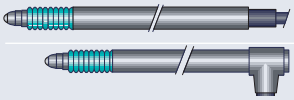
** Nominal value of the measuring force at electrical zero, max. deviation ± 25 %.

*** Mechanical frequency limit valid for the final value of the measuring range with an amplitude of 10 %.

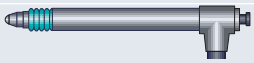
**** Max. perm. errors applicable to the linearity errors.

TESA® LVDT Probes - General Overview

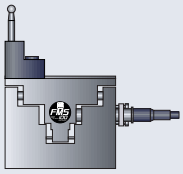
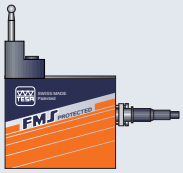
LVDT Axial Probes with a 8 mm Diameter and Ball-Bearing Measuring Bolt

	No		Measuring range mm	mm	Cable exit	Bolt retraction	Sealing bellows
Standard probes							
	32.30029	GT 21 LVDT	± 1,5	4,3	axial	mechanical	Nitrile
	32.30030	GT 22 LVDT	± 1,5	4,3	radial	by vacuum	Nitrile
Standard long-travel probes							
	32.30031	GT 27 LVDT	± 1,5	10,3	axial	mechanical	Viton
	32.30032	GT 28 LVDT	± 1,5	10,3	radial	by vacuum	Viton
Probes with extended measuring range							
	32.30046	GT 61 LVDT	± 5	10,3	axial	mechanical	Viton
	32.30048	GT 62 LVDT	± 5	10,3	radial	by vacuum	Viton

... with activation of the Measuring Bolt by Pneumatic Pressure

	No		Measuring range mm	mm	Cable exit	Pressure (bar) Nominal	Pressure (bar) Maximum	Sealing bellows
	S32020269	GT 222 LVDT	± 1,5	3,2	radial	0,7	1,0	Viton

LVDT probes with Parallel Guiding

	No		Measuring range mm	mm	Cable exit *	Insert retraction (accessory)
Standard probes						
	32.30033	FMS 100 LVDT	± 1,5	5,8	parallel	by air pressure
	32.30034	FMS 102 LVDT	± 1,5	5,8	angled	by air pressure
Probes «FMS protected»						
	32.30039	FMS 100-P LVDT	± 1,5	5,8	parallel	by air pressure
	32.30040	FMS 102-P LVDT	± 1,5	5,8	angled	by air pressure

* Position in relation to the measuring movement

N **	Drive voltage Drive frequency Adjustment load	Sensitivity mV / V / mm	µm	µm	% ***	°C	IEC 60529
0,63	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	- 10 to 65	IP65
0,63	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	- 10 to 65	IP65
0,63	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	10 to 65	IP65
0,63	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	10 to 65	IP65
0,9	3 V / 5 kHz / 100 kΩ	98	0,2	0,2	0,3	- 10 to 65	IP65
0,9	3 V / 5 kHz / 100 kΩ	98	0,2	0,2	0,3	- 10 to 65	IP65

N **	Drive voltage Drive frequency Adjustment load	Sensitivity mV / V / mm	µm	µm	% ***	°C	IEC 60529
1,2	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	- 10 to 65	IP65

N **	Drive voltage Drive frequency Adjustment load	Sensivity mV / V / mm	µm	µm	% ***	°C	IEC 60529
2	3 V / 5 kHz / 100 kΩ	150	0,5	0,5	0,25	- 10 to 65	IP50
2	3 V / 5 kHz / 100 kΩ	150	0,5	0,5	0,25	- 10 to 65	IP50
2	3 V / 5 kHz / 100 kΩ	150	0,5	0,5	0,25	- 10 to 65	IP54
2	3 V / 5 kHz / 100 kΩ	150	0,5	0,5	0,25	- 10 to 65	IP54

** Nominal value of the measuring force at electrical zero, max. deviation ± 25 %.

*** Max. perm. errors given as % for linearity errors refer to each relevant measuring span (= difference between both first and last values of the measuring range). For max. perm. errors expressed in µm, see the information provided with each LVDT probe on the following pages.

Note : For technical data, report to TESA standard probes.

Compatibility of TESA® Probes with Electronic Equipments from Other Makers

	N°	32.90119	32.90120	32.90121	32.90122	32.90123	32.90124
ETAMIC (ZCB)	=	GT 21	GT 22	GT 27	GT 28	FMS 100	FMS 102
	N°	32.90143	32.90144	32.90145	32.90146		
MAHR	=	GT 21	GT 22	GT 212	GT 222		
	N°	32.90149	32.90150				
MARPOSS	=	GT 21	GT 22				

TESA® DC Axial Probes

Provided with a direct current output for connection to a computer or any other unit fitted with an analogue input.



N°	=	Measuring range / mm	N *	Cable exit
32.30059	GT 21 DC	± 2	0,63	axial
32.30058	GT 22 DC	± 2	0,63	radial

* Nominal value at electrical zero; max. deviation ± 25 %. Valid for upright assembly position, with downward oriented measuring bolt, as well as for static measuring.

Also available upon request:

N°	32.80358	32.80315	32.80302	32.80692	32.80721
=	GT 27 DC ± 10 V	GT 28 DC	GT 31 DC	GT 41 DC	GT 43 DC
N°	32.80569	32.20402	32.80729	32.80661	32.20214
=	GT 44 DC ± 5 V	GT 61 DC	GTL 222 DC ± 10 V	GT 272 DC	GT 622 DC
N°	32.01487	32.80524	32.30497	32.80361	
=	FMS 100 DC	FMS 102 DC	FMS 132 DC ±10 V	FMS 100 DC-IP54	

Other existing versions: 2 V / mm, 5 V / mm and 10 V / mm; max. output voltage 10 V.

GT 21 DC and GT 22 DC electronic probes

✓

DIN 32676 Part 1

See in the table

Axial probes usable in any position

8 mm dia. fixing shank

Drive voltage: ± 10 to ± 15 V
Consumption: 15 mA
Adjustment load: > 1 kΩ
Sensitivity: 1 V / mm

0,1 µm

0,15 µm

Max. perm. error of 15 µm relative to a 4 mm measuring span (measuring range ± 2 mm)

Other technical data listed on pages L-13 and L-14

Technical data sheets
GT 21 DC: 32.00396
GT 22 DC: 32.00397

✓

DIN 32876 Part 1

See in the table

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Distance from electrical zero of both stops is either adjustable (lower stop) or depending on the position of the latter (upper stop).

Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread

Cable length : 2 m

5-pin plug DIN 45322, LVDT without plug.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Sealing bellows: resistant Nitrile or high-resistance Viton (elastomer)

Moving mass: 6 g

Drive frequency 13 kHz (± 5 %). For LVDT, see on pages L-10 and L-11.

Mechanical frequency limit: 60 Hz

0,15 µm / °C, GTL 21 and GTL 211: 0,2 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C GT 21 HP: 10 °C to 40 °C

80 %

Protection IP65 (IEC 60529), GT 21 HP: IP64

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Axial Probes

Standard and LVDT Probes

Universal probes for common but constraining applications.

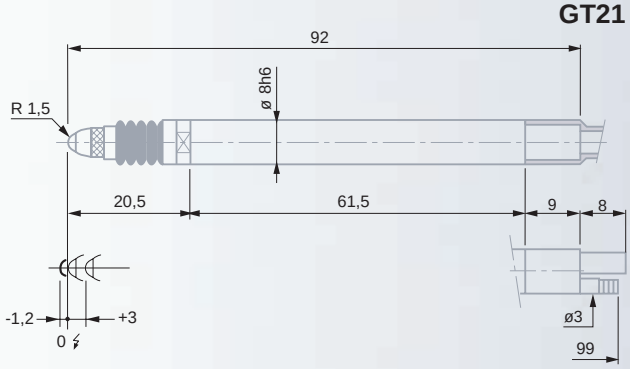
- *8 mm dia. probe housing. Can be clamped over its entire length.*
- *Measuring bolt mounted on ball bearings.*
- *Both the probe housing and ball-bearing guide are separate from one another so that the measuring bolt moves easily even if the probe is not clamped appropriately.*
- *Degree of protection IP65 according to IEC 60529.*
- *Wide range of accessories including measuring inserts, spring sets, etc.*

GT 21 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.10904	**GT 21**	± 2	0,63	mechanical	Nitrile
32.10905	**GT 21**	± 2	1,0	mechanical	Nitrile
32.10906	**GT 21**	± 2	1,6	mechanical	Nitrile
32.10907	**GT 21**	± 2	2,5	mechanical	Nitrile
32.10908	**GT 21**	± 2	4,0	mechanical	Nitrile
32.30057	**GTL 21**	± 2	0,63	mechanical	Nitrile
32.30072	**GTL 211**	± 2	0,63	by vacuum	Viton
High-Precision probes					
32.30036	**GT 21 HP**	± 0,2	0,63	mechanical	Nitrile
LVDT probes					
32.30029	**GT 21 LVDT**	± 1,5	0,63	mechanical	Nitrile

* Nominal value at electrical zero, max. ± 25 %. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

GT21





GTL211

		Lower stop of the measuring bolt **, adjustable from… mm	to mm	ex-factory mm	mm	µm	µm	µm ***	Technical data sheets
GT 21		- 2,2	0,1	- 1,2	4,3	0,01	0,02	$0,2 + 3 \cdot L^3$	32.00249
GTL 21		- 2,2	0,1	- 1,2	4,3	0,01	0,02	$0,2 + 2,4 \cdot L^2$	32.00391
GTL 211		- 2,2	0,1	- 1,2	4,3	0,01	0,02	$0,2 + 2,4 \cdot L^2$	32.00435
GT 21 HP		- 2,2	0,1	- 1,2	4,3	0,01	0,01	$0,07 + 0,4 \cdot L$	32.00264
GT 21 LVDT		- 2,2	0,1	- 1,7	4,3	0,15	0,15	4,5 ****	32.00228

** Distance from electrical zero

*** Max perm. errors applicable to the linearity errors (L in mm).

**** With reference to the 3 mm measuring span (measuring range ± 1,5 mm).

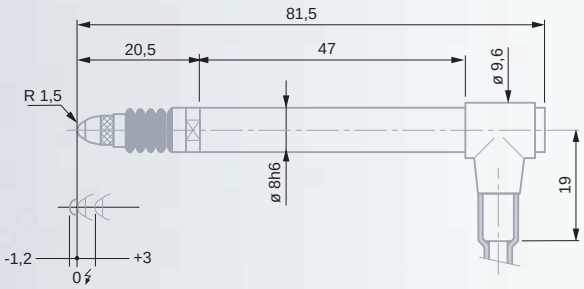
GT 22 Probes with Radial Cable Exit

		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.10924	**GT 22**	± 2	0,63	by vacuum	Nitrile
32.10921	**GT 22**	± 2	0,16	by vacuum	Nitrile
32.10922	**GT 22**	± 2	0,25	by vacuum	Nitrile
32.10923	**GT 22**	± 2	0,4	by vacuum	Nitrile
32.10925	**GT 22**	± 2	1,0	mechanical	Nitrile
32.10926	**GT 22**	± 2	1,6	mechanical	Nitrile
32.10927	**GT 22**	± 2	2,5	mechanical	Nitrile
32.10928	**GT 22**	± 2	4,0	mechanical	Nitrile
32.30056	**GTL 22**	± 2	0,63	by vacuum	Nitrile
High-Precision probes					
32.30021	**GT 22 HP**	± 0,2	0,63	by vacuum	Nitrile
LVDT probes					
32.30030	**GT 22 LVDT**	± 1,5	0,63	mechanical	Nitrile

* Nominal value at electrical zero, max. ± 25 %. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.



GT22



	Lower stop of the measuring bolt **, adjustable from… mm	to mm	ex-factory mm	mm	µm	µm	µm ***	Technical data sheets
GT 22	- 2,2	0,1	- 1,2	4,3	0,01	0,02	0,2 + 3 · L^3	32.00250
GTL 22	- 2,2	0,1	- 1,2	4,3	0,01	0,02	0,2 + 2,4 · L^2	32.00392
GT 22 HP	- 2,2	0,1	- 1,2	4,3	0,01	0,01	0,07 + 0,4 · L	32.00265
GT 22 LVDT	- 2,2	0,1	- 1,7	4,3	0,15	0,15	4,5 ****	32.00229

** Distance from electrical zero

*** Max perm. errors applicable to the linearity errors (L in mm).

**** With reference to the 3 mm measuring span (measuring range ± 1,5 mm).

✓

DIN 32876 Part 1

See in the table

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Distance from electrical zero of both stops is either adjustable (lower stop) or depending on the position of the latter (upper stop).

Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread

Cable length: 2 m

5-pin plug DIN 45322, LVDT without plug.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Sealing bellows: resistant Nitrile or high-resistance Viton (elastomer)

Moving mass: 6 g

Drive frequency 13 kHz (± 5 %). For LVDT, see on pages L-10 and L-11.

Mechanical frequency limit: 60 Hz

0,15 µm / °C or 0,2 µm / °C for GTL 22

20 ± 0,5 °C

-10 °C to 65 °C. 10 °C to 40 °C for GT 21 HP.

80 %

Protection IP65 (IEC 60529), GT 21 HP: IP64

Transport packing

Identification number

Inspection report with a declaration of conformity

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Distance from electrical zero of both stops is either adjustable (lower stop) or depending on the position of the latter (upper stop).

Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread

Cable length : 2 m

Standard probes with a 5-pin plug DIN 45322, LVDT without plug.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Viton rubber bellows: high-resistance elastomer

Moving mass: 6 g

Drive frequency 13 kHz (± 5 %). For LVDT probes, see on pages L-10 and L-11.

Mechanical frequency limit: 60 Hz

0,15 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP65 (IEC 60529)

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Axial Probes with Long Retraction Travel

Standard and LVDT Probes

Universal inductive probes for common applications, especially with multigauging devices.

- *Long retraction travel to prevent the probe from being damaged.*

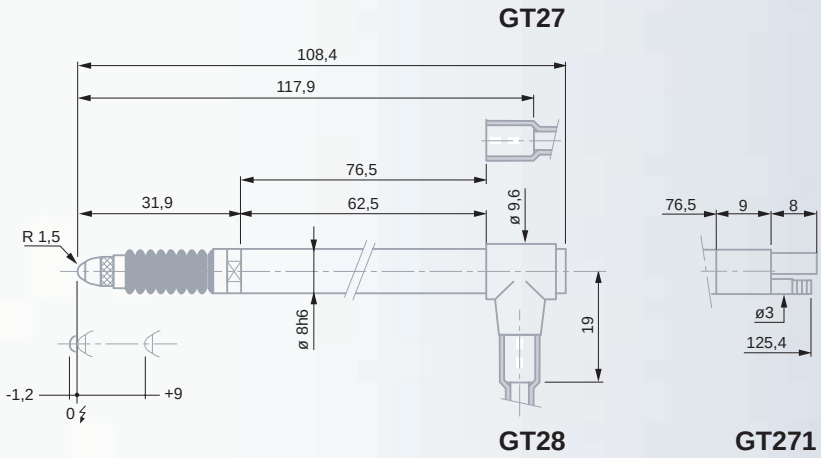
GT 27 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.30027	**GT 27**	± 2	0,63	mechanical	Viton
32.30073	**GT 271**	± 2	0,63	by vacuum	Viton
LVDT probes					
32.30031	**GT 27 LVDT**	± 1,5	0,63	mechanical	Viton

GT 28 Probes with Radial Cable Exit

No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.30026	**GT 28**	± 2	0,63	Vakuum	Viton
LVDT probes					
32.30032	**GT 28 LVDT**	± 1,5	0,63	Vakuum	Viton

* Nominal value at electrical zero; max. deviation ± 25 %.
Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.





	Lower stop of the measuring bolt **, adjustable from… mm	to mm	ex-factory mm	mm	µm	µm	µm ***	Technical data sheets
GT 27	- 2,2	0,1	- 1,2	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00251
GT 271	- 2,2	0,1	- 1,2	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00436
GT 28	- 2,2	0,1	- 1,2	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00252
GT 27 LVDT	- 2,2	0,1	- 1,7	10,3	0,15	0,15	4,5 ****	32.00245
GT 28 LVDT	- 2,2	0,1	- 1,7	10,3	0,15	0,15	4,5 ****	32.00246

** Distance from electrical zero

*** Max perm. errors applicable to the linearity errors (L in mm).

**** With reference to the 3 mm measuring span (measuring range ± 1,5 mm).

TESA® Axial Probes with Long Measuring Range

Standard and LVDT Probes

Probes designed for long measuring travels and low resolutions – Specially suited for multigauging systems.

- *Correction factor 2,5 times to obtain the true values.*



GT 61 Probes with Axial Cable Exit

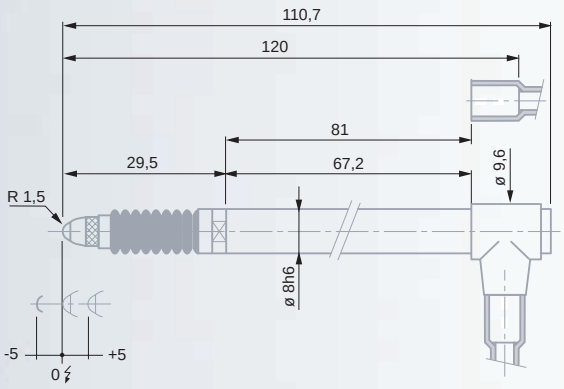
No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.30041	**GT 61**	± 5	0,9	mechanical	Viton
32.30074	**GT 611**	± 5	0,9	by vacuum	Viton
LVDT probes					
32.30046	**GT 61 LVDT**	± 5	0,9	mechanical	Viton

GT 62 Probes with Radial Cable Exit

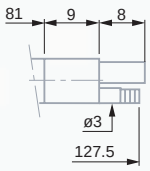
No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.30042	**GT 62**	± 5	0,9	Vakuum	Viton
LVDT probes					
32.30048	**GT 62 LVDT**	± 5	0,9	Vakuum	Viton

* Nominal value at electrical zero; max. deviation ± 25 %.
Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

GT61



GT62



GT611

	Bolt endstops ** upper stop mm	lower stop mm	mm	µm	µm	µm ***	Technical data sheets
GT 61	- 5,1	5,2	10,3	0,05	0,05	1 + 4 · L	32.00294
GT 611	- 5,1	5,2	10,3	0,05	0,05	1 + 4 · L	32.00437
GT 62	- 5,1	5,2	10,3	0,05	0,05	1 + 4 · L	32.00295
GT 61 LVDT	- 5,1	5,2	10,3	0,2	0,2	20 ****	32.00337
GT 62 LVDT	- 5,1	5,2	10,3	0,2	0,2	20 ****	32.00339

** Distance from electrical zero
*** Max perm. errors applicable to the linearity errors (L in mm).
**** With reference to the 10 mm measuring span (measuring range ± 5 mm).

✓
DIN 32876 Part 1
See in the tables
Axial probes usable in any position
Signal combinations with probes having a standard resolution may require your attention to needed correction
8 mm dia. fixing shank
Ball-bearing measuring bolt
Both lower and upper bolt endstops are fixed
Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread.
Cable length: 2 m
5-pin plug DIN 45322. LVDT without plug.
Nickel-plated housing
Stainless steel measuring bolt, hardened.
Viton rubber bellows: high-resistance elastomer
Moving mass: 8 g
Drive frequency 13 kHz (± 5 %). For LVDT probes, see on pages L-10 and L-11.
Mechanical frequency limit: 60 Hz
0,09 µm / °C, GT 61 LVDT and GT 62 LVDT: 0,16 µm / °C
20 ± 0,5 °C
-10 °C to 65 °C
80 %
Protection IP65 (IEC 60529)
Transport packing
Identification number
Inspection report with a declaration of conformity

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Both lower and upper bolt endstops are fixed

Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread.

Cable length : 2 m

Standard probes with a 5-pin plug DIN 45322. LVDT probes without plug.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Viton rubber bellows: high-resistance elastomer

Moving mass: 6 g

Drive frequency 13 kHz (± 5 %). For LVDT probes, see on pages L-10 and L-11.

Mechanical frequency limit: 60 Hz

0,2 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP65 (IEC 60529), GTL 212-A and GTL 222-A: IP50

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Axial Probes with Measuring Bolt Activation by Pneumatic Pressure

Standard and LVDT Probes

Probes intended for use with measuring devices providing fully or half-assisted inspection routines.

GTL 212 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Meas. bolt activation		Sealing bellows
Standard probes						
32.30060	**GTL 212**	± 1,5	1,2	▼	▲	Viton
32.30067	**GTL 212-A**	± 1,5	0,2	▼	▲	none

GTL 222 Probes with Radial Cable Exit

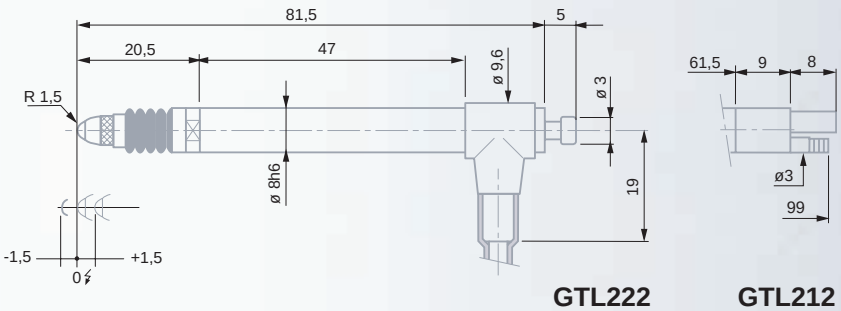
No		Measuring range / mm	N *	Measuring bolt activation		Sealing bellows
Standard probes						
32.30054	**GTL 222**	± 1,5	1,2	▼	▲	Viton
32.30063	**GTL 222-A**	± 1,5	0,2	▼	▲	none
LVDT probes						
S32020269	**GT 222 LVDT**	± 1,5	1,2	▼	▲	Viton

* Nominal value at electrical zero; max. deviation ± 25 %. Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

▼ Downward movement of the measuring bolt activated by pneumatic pressure.

▲ Upward movement of the measuring bolt activated under the spring force alone.





GTL222

GTL212

	Pressure (bar) Nominal	Maximum	mm	µm	µm	µm ***	Technical data sheets
GTL 212	0,7	1,0	3,2	0,015	0,02	$0,2 + 2,4 \cdot L^2$	32.00413
GTL 212-A	0,25	6,0	3,2	0,015	0,02	$0,2 + 2,4 \cdot L^2$	32.00430
GTL 222	0,7	1,0	3,2	0,015	0,02	$0,2 + 2,4 \cdot L^2$	32.00393
GTL 222-A	0,25	6,0	3,2	0,015	0,02	$0,2 + 2,4 \cdot L^2$	32.00422
GT 222 LVDT	0,7	1,0	3,2	0,15	0,15	4,5 ****	

*** Max. perm. errors applicable to the linearity errors (L in mm).

**** With reference to the 3 mm measuring span (measuring range ± 1,5 mm).

TESA® Long-Travel Probes with Measuring Bolt Activation by Pneumatic Pressure

Standard Probes

Probes intended for use with measuring devices providing fully or half-assisted inspection routines.



GT 272 Probes with Axial Cable Exit

		Meas. range mm	Upper travel mm *	N **	Measuring bolt activation		Sealing bellows
Standard probes							
32.30061	**GT 272**	± 2	8,1	1,0	▼	▲	Viton
32.30068	**GT 272-A**	± 2	8,1	0,85	▼	▲	none

GT 282 Probes with Radial Cable Exit

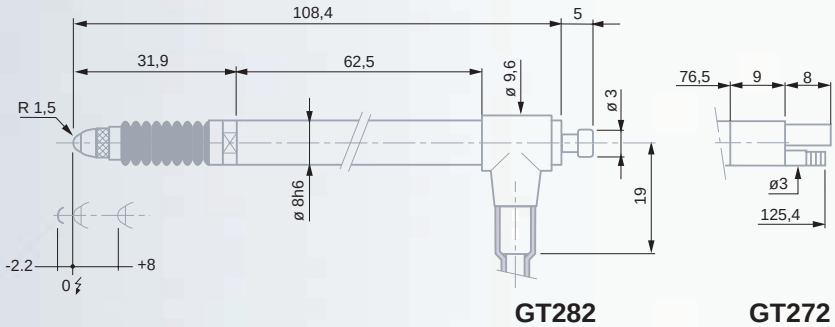
		Meas. range mm	Upper travel mm *	N **	Measuring bolt activation		Sealing bellows
Standard probes							
32.30053	**GT 282**	± 2	8,1	1,0	▼	▲	Viton
32.30069	**GT 282-A**	± 2	8,1	0,85	▼	▲	none

* Travel from the electrical zero up to the upper stop.

* Nominal value at electrical zero; max. deviation ± 25 %.
Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

▼ Downward movement of the measuring bolt activated by pneumatic pressure.

▲ Upward movement of the measuring bolt activated under the spring force alone.



	Pressure (bar) Nominal	Maximum	mm	µm	µm	µm ***	Technical data sheets
GT 272	1,1	1,5	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00414
GT 272-A	1,0	6,0	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00431
GT 282	1,1	1,5	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00390
GT 282-A	1,0	6,0	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00432

*** Max perm. errors applicable to the linearity errors (L in mm).

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Both lower and upper bolt endstops are fixed

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread.

Cable length: 2 m

5-pin plug DIN 45322.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Viton rubber bellows: high-resistance elastomer

Moving mass: 8 g

Drive frequency 13 kHz (± 5 %)

Mechanical frequency limit: 60 Hz

0,15 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP65 (IEC 60529), GTL 272-A and GT 282-A: IP50

Transport packing

Identification number

Inspection report with a declaration of conformity

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Both lower and upper bolt endstops are fixed

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread.

Cable length: 2 m

5-pin plug DIN 45322.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Viton rubber bellows: high-resistance elastomer

Moving mass: 8 g

Drive frequency 13 kHz (± 5 %)

Mechanical frequency limit: 60 Hz

0,09 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP65 (IEC 60529), GTL 612-A and GT 622-A: IP50

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Probes with Extended Measuring Range and Bolt Activation by Pneumatic Pressure

Standard Probes

Probes intended for use with measuring devices providing fully or half-assisted inspection routines.

GT 612 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Measuring bolt activation		Sealing bellows
Standard probes						
32.30062	**GT 612**	± 5	2,0	▼	▲	Viton
32.30070	**GT 612-A**	± 5	1,0	▼	▲	none

GT 622 Probes with Radial Cable Exit

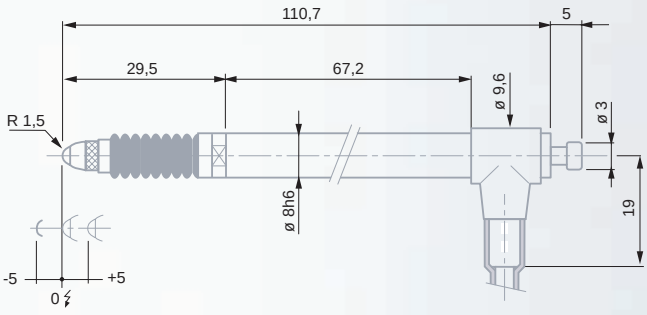
No		Measuring range / mm	N *	Measuring bolt activation		Sealing bellows
Standard probes						
32.30055	**GT 622**	± 5	2,0	▼	▲	Viton
32.30071	**GT 622-A**	± 5	1,0	▼	▲	none

** Nominal value at electrical zero; max. deviation ± 25 %. Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

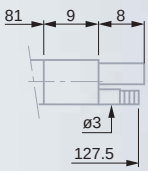
▼ Downward movement of the measuring bolt activated by pneumatic pressure.

▲ Upward movement of the measuring bolt activated under the spring force alone.





GT622



GT612

	Pressure (bar) Nominal	Maximum	mm	µm	µm	µm ***	Technical data sheets
GT 612	1,1	1,5	10,3	0,05	0,05	1 + 4 · L	32.00415
GT 612-A	1,0	6,0	10,3	0,05	0,05	1 + 4 · L	32.00433
GT 622	1,1	1,5	10,3	0,05	0,05	1 + 4 · L	32.00394
GT 622-A	1,0	6,0	10,3	0,05	0,05	1 + 4 · L	32.00434

*** Max perm. errors applicable to the linearity errors (L in mm).

TESA® Axial Miniature Probes



Standard Probes

Compact probes specially designed for use where there's no room for longer probes – Possible assembly of measuring heads, etc.

GT 41 and GT 43 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Meas. bolt retraction	Sealing bellows
Measuring bolt hanging from diaphragms					
32.30001	**GT 41**	± 0,3	0,63	none	Nitrile
Measuring bolt guided on a plain bearing					
32.30035	**GT 43**	± 1	0,4	mechanical	Viton

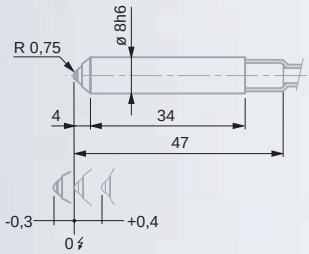
GT 42 and GT 44 Probes with Radial Cable Exit



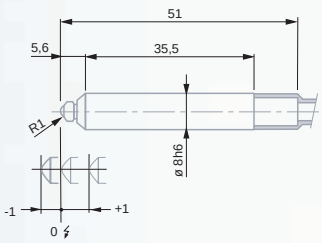


No		Measuring range / mm	N *	Meas. bolt retraction	Sealing bellows
Measuring bolt hanging from diaphragms					
32.30002	**GT 42**	± 0,3	0,63	Vakuum	Nitrile
Measuring bolt guided on a plain bearing					
32.30017	**GT 44**	± 1	0,4	by vacuum	Viton

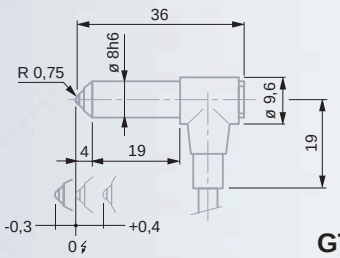
* Nominal value at electrical zero; max. deviation ± 25 %.
Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring.



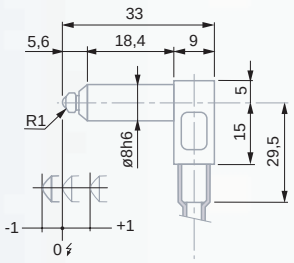
GT41



GT43



GT42



GT44

	Meas. bolt endstops: ** lower stop mm	upper stop mm	mm	µm	µm	µm ***	Technical data sheets
GT 41	- 0,3	0,4	0,7	0,01	0,01	0,2 + 5 · L²	32.00258
GT 43	- 1,05	1,05	2,1	0,1	0,15	0,2 + 5 · L²	32.00260
GT 42	- 0,3	0,4	0,7	0,01	0,01	0,2 + 5 · L²	32.00259
GT 44	- 1,05	1,05	2,1	0,1	0,15	0,2 + 5 · L²	32.00261

** Distance from electrical zero

*** Max perm. errors applicable to the linearity errors (L in mm).

SWISS MADE ✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shaft

Measuring bolt guided on a plain bearing or hanging from diaphragms

Both lower and upper bolt endstops are fixed

GT 41 or GT 42 with a fixed measuring insert; spherical carbide measuring face, R 0,75 mm. GT 43 or GT 44 with a selectable measuring insert; spherical carbide measuring face, R 1 mm. M2 thread.

Cable length: 2 m

5-pin plug DIN 45322

Nickel-plated fixing shank

Resistant nitrile rubber bellow or Viton rubber bellow with high-resistance elastomer

Moving mass: 2 g

Drive frequency 13 kHz (± 5 %)

Mechanical frequency limit: 60 Hz

0,1 µm / °C

20 ± 0,5 °C

GT 41 and GT 42: -10 °C to 65 °C, GT 43 and GT 44: 5 °C to 65 °C

80 %

Protection IP65 (IEC 60529)

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® GT 31 Lever Type Probes

Probes with inclinable insert for measuring in two directions – Ideally suited for use where probes with axial displacement of the measuring bolt are found awkward to use.

- *Ball-bearing balanced lever.*
- *Interchangeable measuring insert fitted with a tungsten carbide ball tip and inclinable through 180 °.*
- *Automatic reversal of the probing direction while the direction of the indication remains unchanged.*
- *Protected against shocks by 2 safety clutches.*
- *One-piece housing provided with 2 dovetails.*

✓

DIN 32876 Part 1

± 0,3 mm

Lever probe usable in any position

2 dovetail attachments

Both lower and upper bolt endstops are fixed

Selectable measuring inserts, stainless steel shank fitted with a 2 mm carbide ball tip.
For all other inserts, see under optional accessories on the next pages.

Cable length: 2 m

5-pin plug DIN 45322

All-metal housing with matt-chromium finish

Moving mass: 12 g

Drive frequency 13 kHz (± 5 %)

Mechanical frequency limit: 25 Hz

20 ± 0,5 °C

5 °C to 60 °C

80 %

Protection IP40 (IEC 60529)

Equipped with one 2 mm dia. insert No. 32.60410, . and one 8 mm dia. fixing shank No. 18.40105

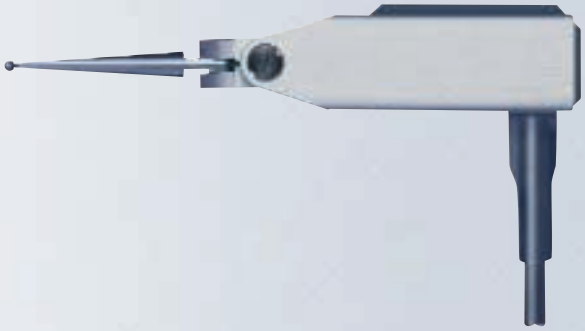
Transport packing

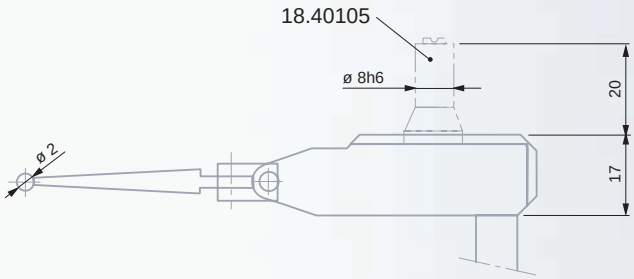
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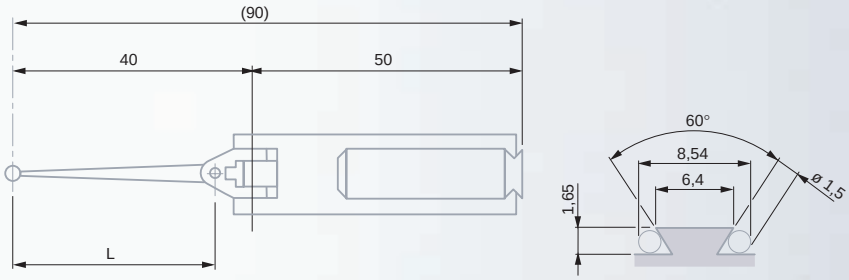
Inspection report with a declaration of conformity

No		Measuring range / mm	N *
32.10802	**GT 31**	± 0,3	**0,1** (Standard)
32.10801	**GT 31**	± 0,3	**0,02**
32.10803	**GT 31**	± 0,3	**0,2**

* Nominal value at electrical zero; max. deviation ± 25 %. Valid with both probe housing and lever lying horizontally as well as in static measuring.

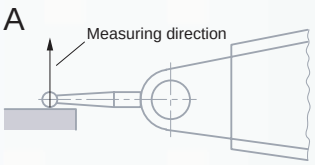


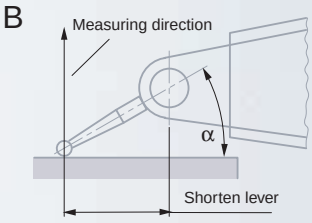




	mm	µm	µm	µm **	Technical data sheets
GT 31	0,7	0,1	0,25	0,2 + 50 · L^2	32.00266

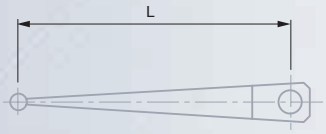
** Max perm. errors applicable to the linearity errors (L in mm).



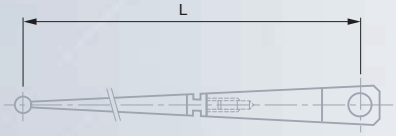


Note:
If the measuring insert is lying parallel to the workpiece surface (Fig. A), the leverage is 1:1 so that the values as measured need not be corrected.
Any other position (angle α in Fig. B) will change the effective length of the lever. Therefore, all read values must be corrected. With regard to this, also report to the instructions for use that came with your electronic probes.

Accessories for TESA® GT 31 Probe Series



32.60410



35.90003



32.60410





35.90003





35.90007





35.90001





35.90014

Measuring Inserts

		Ball tip mm	Lever amplification	Length L mm
Standard one-piece probe shank				
32.60402		1	1 : 1	32
32.60410		2	1 : 1	32
32.60403		3	1 : 1	32
Special two-piece probe shank				
35.90002		1	1 : 1	32
35.90003		2	1 : 1	32
35.90004		3	1 : 1	32
35.90005		4	1 : 1	32
35.90006		1	1 : 2	72
35.90007		2	1 : 2	72
35.90008		3	1 : 2	72
35.90009		4	1 : 2	72
35.90010		1	1 : 3	112
35.90001		2	1 : 3	112
35.90011		3	1 : 3	112
35.90012		4	1 : 3	112
35.90013		1	1 : $\sqrt{10}$	118,49
35.90014		2	1 : $\sqrt{10}$	118,49
35.90015		3	1 : $\sqrt{10}$	118,49
35.90016		4	1 : $\sqrt{10}$	118,49

Swiss Made ✓

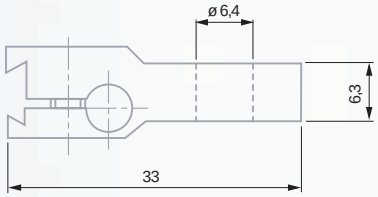
Stainless steel insert holder with a tungsten carbide ball tip

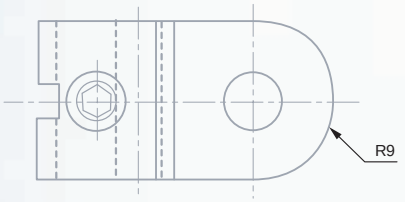
Transport packing

32.40100	**Fixing brackets** With dovetail and cylindrical bore
32.60414	**Correction cable for the probe constant** Used for the electrical correction to zero of the probe constant using the measuring insert fitted with a 1 mm dia. ball tip

Swiss Made ✓

Transport packing







32.40100

✓

DIN 32876 Part 1

See in the tables

Probes with linear action usable in any position

4 fixing threads M6

Linear ball-bearing guiding with fixed stops

Insert holder attachment with dovetail

Cable length: 2 m

Standard and protected probes with a 5-pin plug DIN 45322 integrating a setting element for the signals. LVDT probes have no plug and no adjust item.

Hardened steel probe body, nickel-plated

Moving mass: 110 g

Drive frequency 13 kHz (± 5 %). Not for LVDT probes.

LVDT probes: Drive voltage: 3V Drive frequency: 5 kHz Adjustment load: 100 kΩ Sensitivity: 150 mV / V / mm

Mechanical frequency limit: 25 Hz

- 0,14 µm / °C. LVDT probes: 0,15 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP50. Protected probes: IP54 (IEC 60529)

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Probes with Parallel Guiding

Standard, Protected and LVDT Probes

Universal probes for multigauging devices. Let you capture the values measured on machines and other fixtures for in-process inspection.

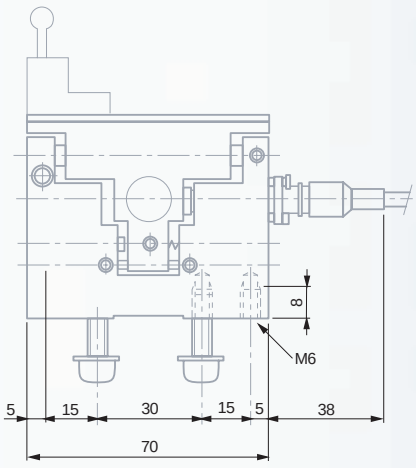
- *Long-life probes featuring a rugged compact design.*
- *Modular construction to eliminate the need for many assembly components.*
- *Ball-bearing probing movements.*
- *Sense of the measuring force as well as probe retraction according to the accessory used.*
- *Wide choice of measuring inserts and supports for optimum adaptation to your measuring work.*

FMS Probes with Parallel Cable Exit

		Measuring range mm	N *	Insert retraction (accessory)
Standard probes				
32.30019	**FMS 100**	± 2	2	by air pressure
32.30049	**FMS 130**	± 2,9	2	by air pressure
Probes «FMS protected»				
32.30037	**FMS 100-P**	± 2	2	by air pressure
32.30051	**FMS 130-P**	± 2,9	2	by air pressure
LVDT probes				
32.30033	**FMS 100 LVDT**	± 1,5	2	by air pressure
32.30039	**FMS 100 P-LVDT**	± 1,5	2	by air pressure

* Nominal value at electrical zero; max. deviation ± 25 %. Valid with probing movement exerted horizontally as well as in static measuring.







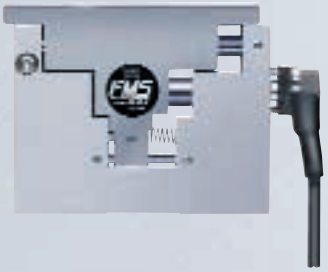
	Mech. stop: ** lower mm	upper mm	mm	µm	µm	µm***	Technical data sheets
FMS 100	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00253
FMS 100-P	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00283
FMS 130	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00342
FMS 130-P	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00344
FMS 100 LVDT	- 2,9	2,9	5,8	0,5	0,5	4,5 ****	32.00247
FMS 100-P LVDT	- 2,9	2,9	5,8	0,5	0,5	4,5 ****	32.00290

** Distance from electrical zero

*** Max. perm. errors applicable for linearity errors (L in mm)

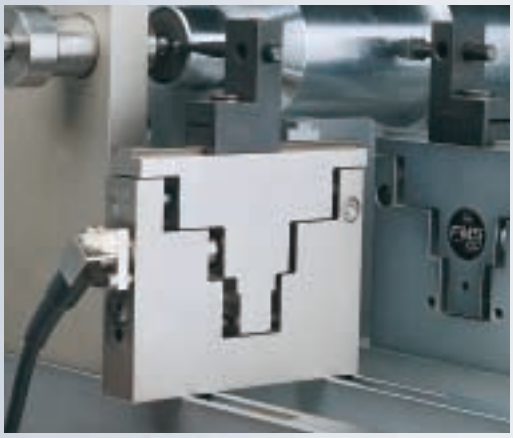
**** With reference to the 4 mm measuring span (measuring range ± 2 mm) or 5,8 mm (± 2,9 mm).

FMS Probes with Angled Cable Exit

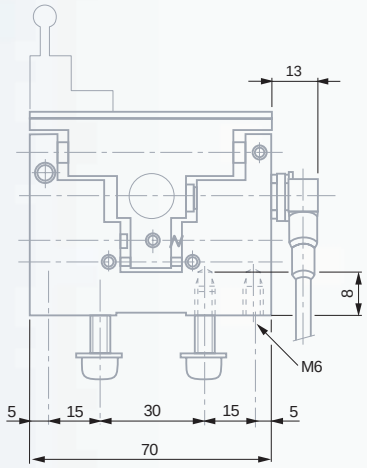


		Measuring range mm	N *	Insert retraction (accessory)
Standard probes				
32.30028	**FMS 102**	± 2	2	air pressure
32.30050	**FMS 132**	± 2,9	2	air pressure
Probes «FMS protected»				
32.30038	**FMS 102-P**	± 2	2	air pressure
32.30052	**FMS 132-P**	± 2,9	2	air pressure
LVDT probes				
32.30034	**FMS 102 LVDT**	± 1,5	2	air pressure
32.30040	**FMS 102 P-LVDT**	± 1,5	2	air pressure

* Nominal value at electrical zero; max. deviation ± 25 %. Valid with probing movement exerted horizontally as well as in static measuring.







	Mechanical stops ** lower mm	upper mm	mm	µm	µm	µm***	Technical data sheets
FMS 102	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00254
FMS 102-P	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00289
FMS 132	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00343
FMS 132-P	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00345
FMS 102 LVDT	- 2,9	2,9	5,8	0,5	0,5	4,5 ****	32.00248
FMS 102-P LVDT	- 2,9	2,9	5,8	0,5	0,5	4,5 ****	32.00291

** Distance from electrical zero. *** Max. perm. errors applicable for linearity errors (L in mm)

**** With reference to the 4 mm measuring span (measuring range ± 2 mm) or 5,8 mm (± 2,9 mm).

✓

DIN 32876 Part 1

See in the tables

Probes with linear action usable in any position

4 coupling threads M6

Linear ball-bearing guiding with fixed stops

Insert holder attachment with dovetail

Cable length: 2 m

Standard and FMS protected probes with a 5-pin plug DIN 45322 integrating a calibration element for the signals. LVDT probes have no plug and no adjust item.

Hardened steel probe body, nickel-plated

Moving mass: 110 g

Carrier frequency 13 kHz (± 5 %). Not for LVDT probes.

LVDT probes:
Drive voltage: 3V
Drive frequency: 5 kHz
Adjustment load: 100 kΩ
Sensitivity:
150 mV / V / mm

Mechanical frequency limit:
25 Hz

- 0,15 µm / °C.

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP50. Probes «FMS protected»: IP54 (IEC 60529)

Transport packing

Identification number

Inspection report with a declaration of conformity

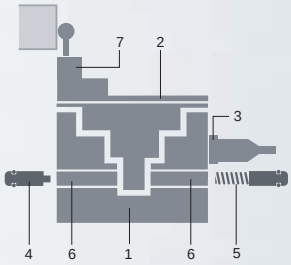
Configuration and Use of the TESA® FMS Probes

The following examples provide you with a number of possibilities to activate and retract the measuring insert during your measurement cycles.

Example A

- *Activating the measuring Insert towards the part to be inspected using the measuring force produce by the compression spring.*
- *No insert's retraction.*

Result:
The measuring insert remains into position. Exchange of the part is made with mechanical contact with the probe under the measuring force.

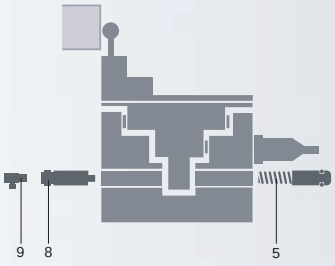


1 Fixed probe body
2 Moving probe body
3 Measuring element with fine adjustment
4 Adjustable stop
5 Spring set for the measuring force
6 Fixing bores
7 Holder for the measuring insert

Example B

- *Activating the measuring insert towards the part to be inspected using the measuring force produced by the compression spring.*
- *Insert's retraction by pneumatic pressure.*

Result:
Exchange of the part is made with no mechanical contact with the probe.



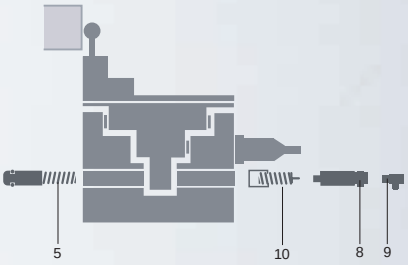
5 Spring set for the measuring force
8 Pneumatic jack No. 32.6400
9 Pressure connector (024388 on page L-33)

Example C

- *Activating the measuring insert towards the part to be inspected by air pressure using the measuring force produced by the compression spring.*
- *Insert's retraction by disabling the pneumatic pressure.*

Result:
Exchange of the part is made with no mechanical contact with the probe providing absolute security through the automatic retraction of the measuring insert a pressureless condition.

This configuration is also applied when there is no room on the left side for the pneumatic jack as shown in the example B.

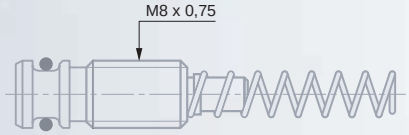


5 Spring set for the measuring force
8 Pneumatic jack No. 32.60440
9 Pressure connector (024388 on page L-33)
10 Auxiliary spring-loaded element No. 32.60445

The force of the spring set (5) must be equivalent to the force of the auxiliary spring-loaded element (10).

Accessories for TESA® FMS Pobes

Spring sets for the measuring force



Spring sets
Item 5 in the examples A to C

No	N	
*	2,0	Nickel-plated
32.60448	0,4	Red
32.60449	0,63	Yellow
32.60450	1,0	Green
32.60451	1,6	Blue
32.60452	2,5	Brown
32.60453	4,0	Black

* Supplied with FMS probes

Swiss Made ✓

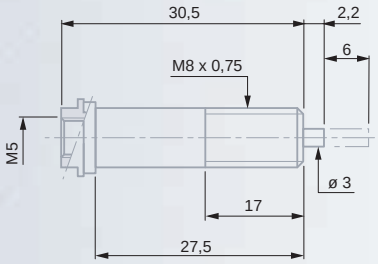
All values given in the table for the measuring force are nominal values at the electrical zero; max. deviation ± 25 %. Valid for the probing movements exerted horizontally as well as in static measuring.

Transport packing

Accessories for Pneumatic Activation of the Moving Probe Body

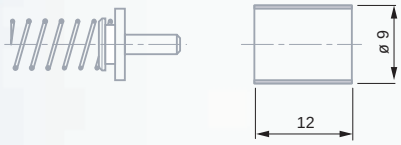
No	
32.60440	**Pneumatic jack** Activates the moving probe body. Force under a pressure of 4 bars: 11 N.

Item 8 in both examples B and C.



Auxiliary spring-loaded element
Item 10 in the example C

No	N	
32.60441	0,4	Red
32.60442	0,63	Yellow
32.60443	1,0	Green
32.60444	1,6	Blue
32.60445	2,0	Nickel-plated
32.60446	2,5	Brown
32.60447	4,0	Black



Insert Holder with Fine Adjustment

Helps you to set the probe – Setting and locking screws remain accessible even with several probes mounted side by side.

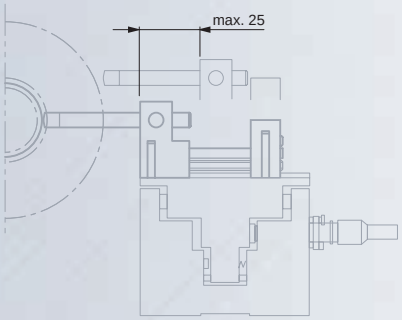
Swiss Made ✓

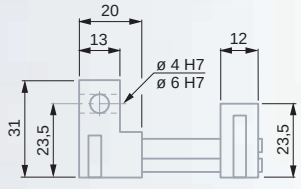
Width of the insert holder: 12 mm

Transport packing

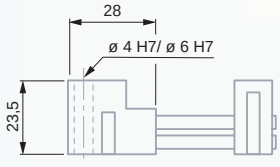
Mounting bores for the measuring insert

No	ø mm	Number	Position	mm
26.30053	4	2	Horizontal	25
26.30055	4	1	Vertical	25
26.30052	6	2	Horizontal	25
26.30054	6	1	Vertical	25





26.30052/53



26.30054/55

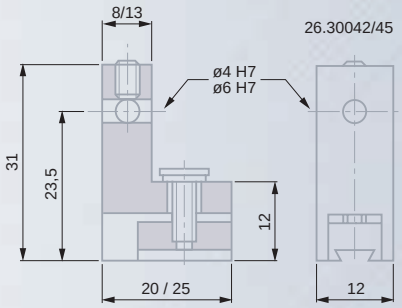
SWISS MADE

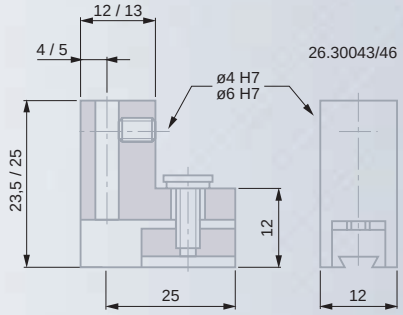
Transport packing

Fixed insert holders

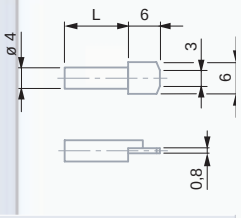
With mounting bores for the inserts

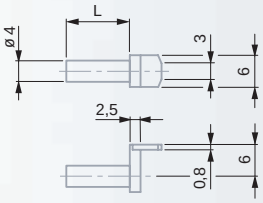
No	mm	Number	Position
26.30042	4	2	Horizontal
26.30043	4	1	Vertical
26.30045	6	2	Horizontal
26.30046	6	1	Vertical

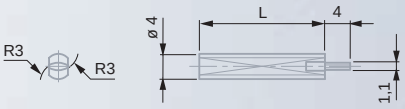




Inserts with a 4 mm diameter fixing shaft







Centred insert with a narrow flat measuring face.

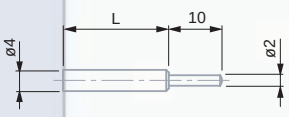
No		Lmm
26.60066	Carbide	12
26.60068	Carbide	25

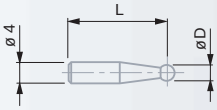
Off-centre inserts with a narrow flat measuring face.

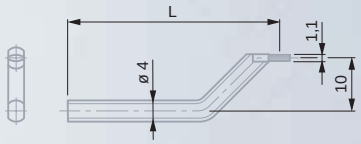
No		Lmm
26.60067	Carbide	12
26.60069	Carbide	25

Centred inserts with 2 cylindrical meas uring faces.

No		Lmm
26.60070	Carbide	20
26.60071	Carbide	40
26.60072	Carbide	60







Inserts with a 2 mm dia. contact pin with spherical measuring face.

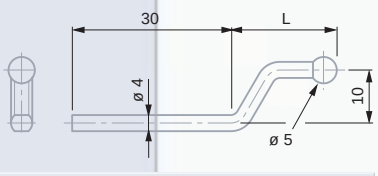
No		Lmm
26.60073	Carbide	20
26.60074	Carbide	40
26.60075	Carbide	60

Inserts with a tungsten carbide ball tip.

No	mm	Lmm
26.60076	3	20
26.60077	3	40
26.60078	3	60
26.60079	5	20
26.60080	5	40
26.60081	5	60

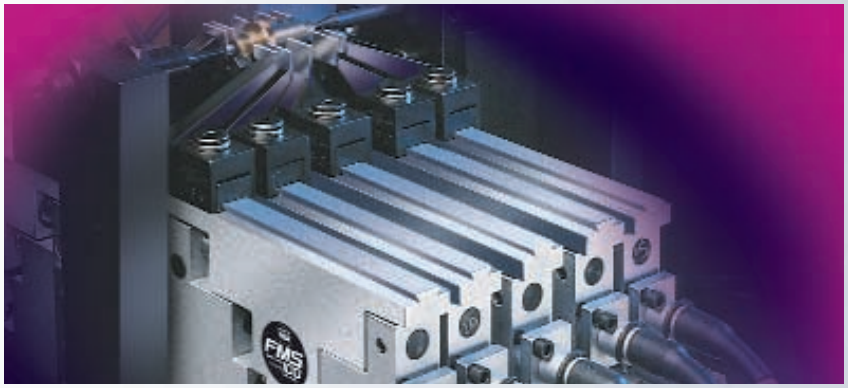
Off-centre inserts with 2 cylindrical measuring faces.

No		Lmm
26.60082	Carbide	40
26.60083	Carbide	60



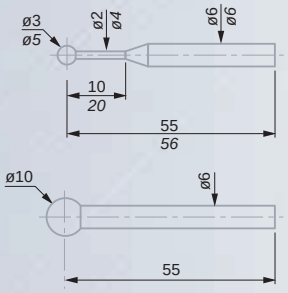
Off-centre inserts with a tungsten carbide ball tip.

No	mm	Lmm
26.60084	5	20
26.60085	5	33
26.60086	5	48



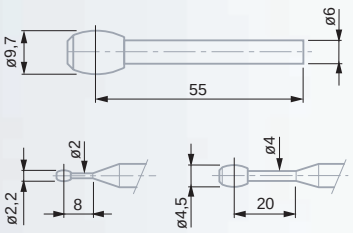
Inserts with a 6 mm diameter fixing shaft

Transport packing



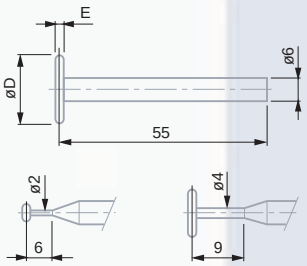
Inserts with a tungsten carbide ball tip.

No	mm
07.60058	3
07.60059	5
07.60060	10



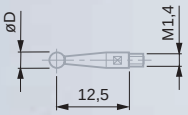
Inserts with a barrel-shaped measuring face for cylindrical bores. Also serve for determining the position of internal threads.

No	mm	For threads
07.60066	2,2	M3 ÷ M16
07.60067	4,5	M6 ÷ M48
07.60068	9,7	M12 ÷ M150



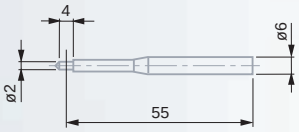
Inserts with a tungsten carbide disc for grooves, nuts, centering shoulders etc.

No	mm	Emm
07.60074	4,5	1
07.60075	14	2
07.60076	19	3



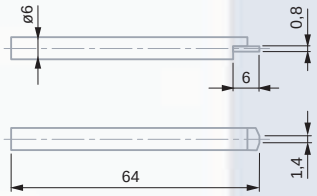
TESATAST inserts with a tungsten carbide ball tip. M1,4 mounting thread.

No	Dmm	Lmm
18.60201	1	12,53
18.60202	2	12,53
18.60203	3	12,53
18.60307	Key	



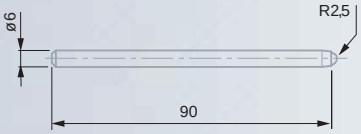
Insert with a small cylindrical measuring face.

No		mm
07.60082	Carbide	2



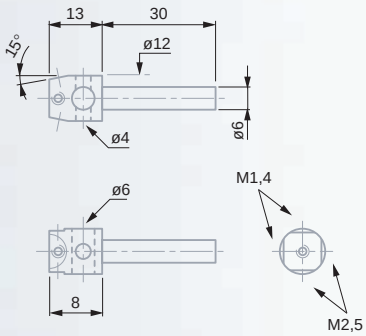
Centred insert with a small flat measuring face.

No		Lmm
S26074380	Carbide	64



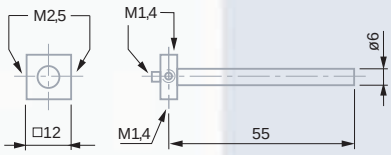
Insert with one flat and one spherical measuring faces.

No		Lmm
025589	Carbide	64



Universal insert holder provided with the following mounting facilities:

No	
S26074372	1 x 4 mm dia. 1 x 6 mm dia. 2 x M1,4 threads 2 x M2,5 threads



Universal insert holder with 2 mounting threads.

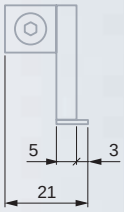
No	
07.60096	M1,4 and M2,5

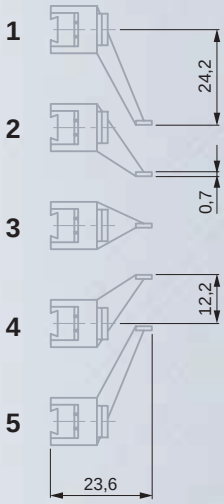
Inserts with offset measuring faces

Transport packing

Inserts with offset small and flat measuring faces.

No	As shown in the drawing
26.30047	1
26.30048	2
26.30049	3
26.30050	4
26.30051	5

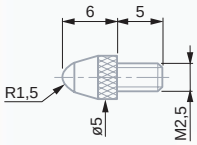




Transport packing

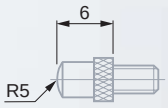
Measuring Inserts for TESA® Axial Probes, Dial Gauges and others

Inserts fitted with a M2,5 Coupling Thread



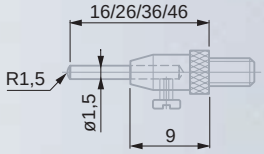
Standard inserts with a spherical measuring face.

No		Lmm
35.10001	Steel	6
35.10002	Carbide	6



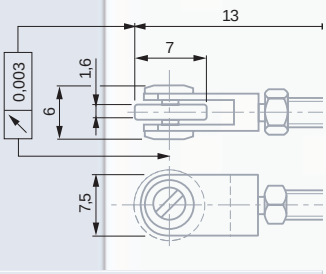
Insert with a with spherical measuring face.

No		Rmm
35.10101	Steel	5
35.10102	Carbide	5



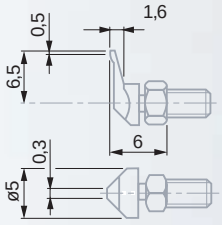
Inserts with 4 interchangeable steel pins, spherical measuring face R = 1,5 mm

No		Lmm
35.10201	Steel	16, 26, 36, 46



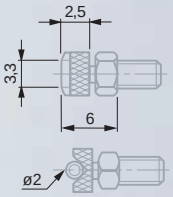
Inserts a with ball-bearing steel roller. Counternut for radial alignment.

No		Shape
35.60010	Steel	Cylindrical
35.60011	Steel	Domed



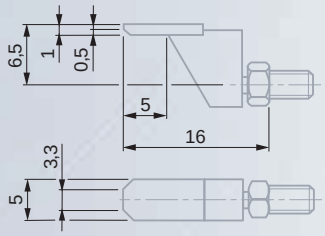
Insert with offset contact point (A). Counternut for radial alignment.

No		Amm
35.10401	Steel	6,5



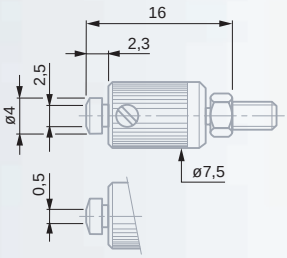
Insert with cylindrical measuring face. Counternut for radial alignment.

No	
35.10502	Carbide



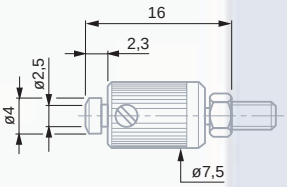
Off-centre insert with narrow measuring face.
Counternut for radial alignment.

No		B mm
35.10602	Carbide	0,5



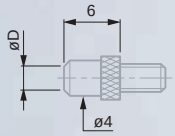
Insert with narrow measuring face.
Adjustable parallelism. Counternut for radial alignment.

No		B mm
35.10702	Carbide	0,5



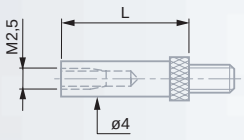
Insert with flat measuring face.
Adjust-able parallelism. Counternut for radial alignment.

No		⌀ mm
35.10902	Carbide	2,5



Inserts with a flat measuring face.

No		⌀ D mm
35.10801	Steel	2,5
35.10802	Carbide	2,5
35.60022	Steel	3,4
35.60023	Carbide	3,4

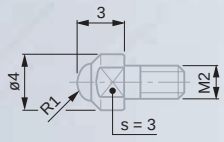


Extensions for the measuring inserts

No	L mm
35.40501	10
35.40502	15
35.40503	20
35.40504	40

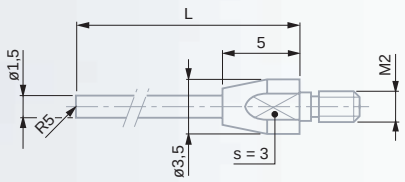
Additional measuring inserts and extensions with M2,5 coupling thread are listed on pages E-42 to E-44.

Measuring Inserts with a M2 Coupling Thread for GT 43 and GT 44 Axial Miniature Probes



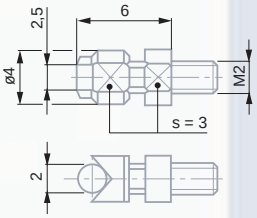
Inserts with a spherical measuring face.
M2 thread.

No		mm
35.10204	Carbide	R 1
35.10103	Carbide	R 5



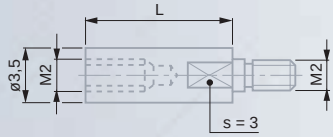
Inserts with a spherical measuring face, R 5. M2 thread.

No		L mm
35.10202	Carbide	16
35.10203	Carbide	26



Insert with a cylindrical measuring face.
Counternut for radial alignment.
M2 thread.

No	
35.10503	Carbide



Extensions for measuring inserts with M2 thread.

No	L mm
35.40505	10
35.40506	15

Variety of Accessories for TESA® Electronic Probes

Measuring Force Spring Sets for Axial Probes

All values given in the table for the measuring force are nominal values at electrical zero; max. deviation ± 25 %. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

Force related information marked on the plastic sleeve

Transport packing

No	N
GT 22 probe series	
32.60419	0,16
32.60420	0,25
32.60421	0,40
GT 21 and GT 22 probe series	
32.60422	1,0
32.60423	1,6
32.60424	2,5
32.60425	4,0

No	N
GT 27 and GT 28 probe series	
32.60458	0,63
32.60459	1,0
32.60460	1,6
32.60461	2,5
GT 61 and GT 62 probe series	
32.60483	0,8
32.60463	1,0
32.60464	1,6
32.60465	2,5



Spare Bellows for Axial Probes

Nitrile: resistant synthetic rubber for normal use

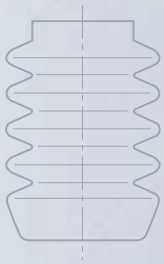
Viton: high-resistance synthetic rubber used where probes are constantly in contact with cooling and lubricating agents.

Safety rings and washer

Transport packing

No	
GT 21 and GT 22 probe series	
32.60468	Nitrile
32.60470	Viton
GTL 212 and GTL 222 probe series	
32.60489	Viton
GT 43 and GT 44 probe series	
028845	Nitrile
037608	Viton

No	
GT 27, GT 28, GT 61 and GT 62 probe series	
32.60491	Viton
GT 272, GT 282, GT 612 and GT 622 probe series	
32.60490	Viton



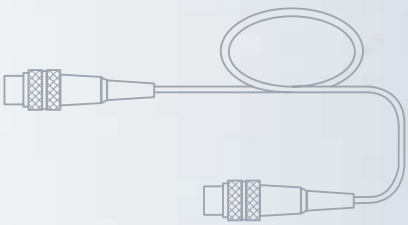
Extension Cables

For high accuracy requirements, we recommend to adjust all parts of your measuring equipment together.

Transport packing

No	m
32.40201	1
32.40202	2
32.40203	3

Other cable lengths available on request

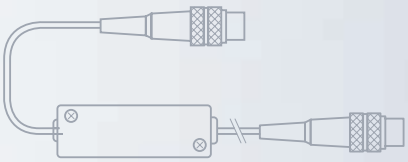


Attenuator Cables

Mounted between the probe and the electronic device

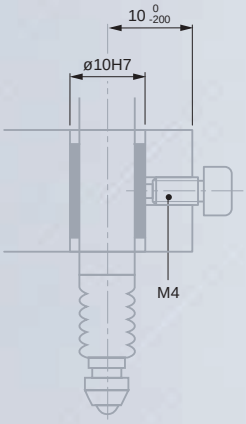
Transport packing

No	Factor	m
32.60415	1 : 2	0,3
32.60416	1 : 3	0,3
32.60417	$1 : \sqrt{10}$	0,3
32.60418	1 : 10	0,3



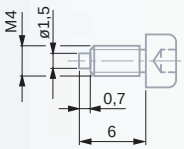
Clamping Elements for Axial Probes

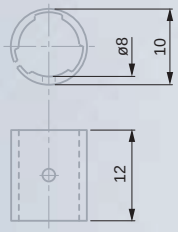
Provided with 3 clamping faces – To make sure all the metrology properties of the guiding system will not be disturbed by the clamps.



VKD clamp screw

26.11013	M4



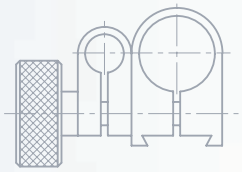


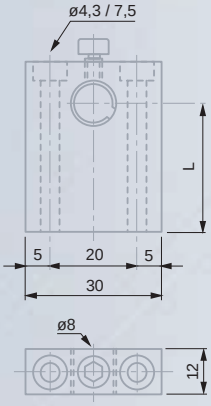
VKE clamp

26.11014	8

Clamp Collar

18.60401	5,6 or 9,5 diam. and dovetail





VDE clamps with fastening sleeve and screw

26.60048	8	28
26.60049	8	37

SWISS MADE ✓

All dimensions shown in the drawing must be respected

Transport packing

Manually Operated Devices for Retracting the Measuring Bolt





35.40104	**Mechanical retraction device**
consisting of:	
35.40101	1 Lift lever
35.40102	1 Washer

32.60401	**Pneumatic retraction device** Suited for the probe series GT 22 / 28 / 42 / 44 and 62
consisting of:	
	1 Manual vacuum pump
35.40405	1 4 mm dia. air tube, 1 m.

SWISS MADE ✓

Transport packing

MERCER Inductive Probes

For Mercer and TESA® Electronic Equipments or Those from Other Manufacturers

All electronic probes of the MERCER range are solidly built. Their enhanced longevity make them most suitable for constraining applications in the production area.

- *Ball-bearing guidance provides each axial probe with the capability to perform thousands of cycles without any sign of wear.*
- *Rubber bellows protect the guiding system against the penetration of liquids and solid contaminants.*

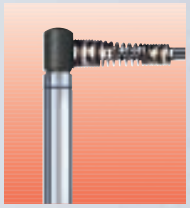


Principle

*The **MERCER probes** (transducers) work like any **TESA standard probe** fitted with two induction coils, also called **half-bridge** probes. For more details, report to the information on page L-5.*

The use of the right angle adaptor supplied with each probe with axial cable exit allows full deflection of the cable sideways.



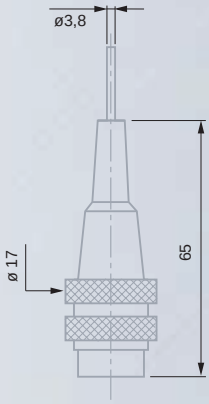


Probe sensitivity

Reference conditions:				
• Drive voltage:	< 5 V rms		< 5 V rms	
• Drive frequency	5 kHz		13 kHz	
• Adjustment load:	10 kΩ		2 kΩ	
	mV/V/mm	mA_{rms}*	mV/V/mm	mA_{rms}**
410	50 ± 0,5	4,5	73,75 ± 0,5	3,5
411	50 ± 0,5	8,2	73,75 ± 0,5	3,5
490 / 491	50 ± 0,5	4,3	73,75 ± 0,5	2
510	50 ± 0,5	5,0	49,17 ± 0,5	2,2
500 / 501	5 ± 0,5	10,0	7,375 ± 0,5	4,3
460	50 ± 0,5	4,5	73,75 ± 0,5	2,9
492	50 ± 0,5	4,3	73,75 ± 0,5	2
160	50 ± 0,5	7,8	73,75 ± 0,5	3,3
430	50 ± 0,5	6,0	73,75 ± 0,5	2,5
451	50 ± 0,5	7,2	73,75 ± 0,5	3,0
420	50 ± 0,5	8,2	73,73 ± 0,5	8,0
499	50 ± 0,5	6,0	73,75 ± 0,5	4,5

* Power consumption at 5 kHz / 2,7 V_{rms}

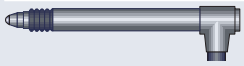
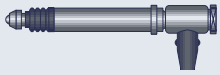
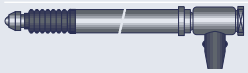
** at 13 kHz / 5 V_{rms}



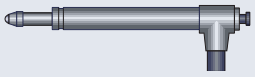
Dimensions of the DIN 45322 / 5x240 °/ M18x0,75 connector fitted to all MERCER/TESA probes.
Unless otherwise specified, the cable curve radius must be at least R = 40 mm.

MERCER Probes for MERCER and TESA® Electronic Equipments - General Overview

8 mm Diameter Axial Probes with Ball-Bearing Measuring Bolt

	MERCER TESA*		Measuring range mm	mm	Cable exit	Measuring bolt retraction
Standard probes						
	32.36490 32.30490*	490	± 1,5	4,3	axial / radial	mechanical
	32.36491 32.30491*	491	± 1,5	4,3	radial	by vacuum
Standard probes with short body						
	96410010 96410012*	410	± 1	2,5	axial / radial	mechanical
	96411011 96411014*	411	± 1	2,5	adial	by vacuum
Standard long-travel probes						
	96510017 96510013*	510	± 2,5	5,3	axial / radial	mechanical
	96500010 96500015*	500	± 5	11,5	axial / radial	mechanical
	96500013 96500025*	501	± 5	11,5	radial	by vacuum
Axial probes without guidance of the measuring bolt						
	96460011 96460014*	460	± 1,5		axial / radial	

... with Measuring Bolt Activated by Pneumatic Pressure

	MERCER TESA*		Measuring range mm	mm	Cable exit	Measuring bolt retraction
Standard Probes						
	32.36492 32.30492*	492	± 1,5	4,3	radial	0,25 6

Axial Probes with Short Body and Ball-Bearing Measuring Bolt

	MERCER TESA*		Measuring range mm	mm	Cable exit	Measuring bolt retraction
Standard probes with a 6 mm body diameter						
	96160011 96160013*	160	± 1	3,3	axial	mechanisch
Miniature probes with a 8 mm body diameter						
	96430028 96430029*	430	± 0,5	1,25	axial	mechanical
	96441015 96441041*	451	± 0,5	2,1	radial	mechanical

Lever probes

	MERCER TESA*		Measuring range mm	mm	Cable exit	Measuring bolt retraction
	96420001 96420004*	420	± 0,2	0,525	parallel	without
	96499004 96499007*	499	± 0,5	1,2	parallel	without

* Nominal value of the measuring force at electrical zero.
** Nominal value of the measuring force at electrical zero with pressure at 0,25 bar.
*** Mechanical frequency limit valid for the final value of the measuring range amplified by 10 %.
**** Max. perm. errors applicable to the linearity errors contained within each relevant measuring span.

Sealing bellows	N *	Moving mass g	Frequency limit Hz ***	µm	% ****	°C	IEC 60529
Viton	0,63	4	60	0,02	0,15 (MERCER) 0,2 (TESA)	- 10 to 65	IP65
Viton	0,63	4	60	0,02	0,15 (MERCER) 0,2 (TESA)	- 10 to 65	IP65
nitrile	0,6	3,1	58	0,1	0,2	0 to 60	IP62
Viton	0,6	3,1	58	0,1	0,2	0 to 60	IP65
Viton	1,3	4	60	0,1	0,2	0 to 60	IP62
Viton	1,5	6,8	45	0,1	0,2	0 to 60	IP62
Viton	0,23	6,8	45	0,1	0,2	0 to 60	IP65
none	–	3,4	–	–	0,15	0 to 60	IP40

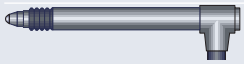
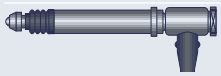
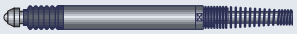
Sealing bellows	N **	Moving mass g	Frequency limit Hz ***	µm	% ****	°C	IEC 60529
none	0,2	4	60	0,02	0,15 (MERCER) 0,2 (TESA)	- 10 to 65	IP50

Sealing bellows	N *	Moving mass g	Frequency limit Hz ***	µm	% ****	°C	IEC 60529
Viton	0,6	2,5	60	0,1	0,2	0 to 60	IP62
nitrile	0,75	1,9	60	0,1	0,2	0 to 60	IP62
nitrile	0,6	3	60	0,1	0,2	0 to 60	IP62

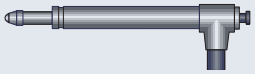
Sealing bellows	N *	Moving mass g	Frequency limit Hz ***	µm	% ****	°C	IEC 60529
none	1,8	2,5	10	0,5	0,3	0 to 60	IP40
none	0,02 ÷ 0,2	10,6	10	0,25	0,6	0 to 60	IP40

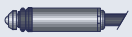
MERCER Probe Series Compatible with Electronic Equipments from Other Manufacturers

8 mm Diameter Axial Probes with Ball-Bearing Measuring Bolt

		Measuring range mm	ETAMIC (ZDB) LVDT	MACHSIZE Half-bridge	MAHR Half-bridge	MARPOSS LVDT	MARPOSS Half-bridge
Standard probes							
	490	± 1,5	96490101	96490041	96498003	96490034	96490136
	491	± 1,5	96491101	96491121	96491111	96491131	96491136
Standard probes with short body							
	410	± 1	96410101	96410018	96410111	96410033	96410136
	411	± 1	96411101	96411121	96411111	96411131	96411136
Standard long-travel probes							
	510	± 2,5	96510101	96510121	96510111	96510131	96510136
	500	± 5	96500101	96500121	96500111	96500131	96500040 S / 10
	501	± 5	96501101	96501121	96501111	96501131	96501136
Axial probes without guidance of the measuring bolt							
	460	± 1,5	96460101	96460121	96460111	96460131	96460136
Standard probes with pneumatic retraction of the measuring bolt							
	492	± 1,5	96400101	96400121	96400111	96400131	96400136

Probes with Short Body and Ball-Bearing Measuring Bolt



	Measuring range mm	ETAMIC (ZDB) LVDT	MACHSIZE Half-bridge	MAHR Half-bridge	MARPOSS LVDT	MARPOSS Half-bridge
Standard probes with a 6 mm body diameter						
 160	± 1	96160101	96160121	96160111	96160169	96160136
Miniature probes with a 8 mm body diameter						
 430	± 0,5	96430101	96430024	96430111	96430131	96430136
 451	± 0,5	96441101	96441070	96441054	96441131	96441136

Lever Probes

		Measuring range	ETAMIC (ZDB) LVDT	MACHSIZE Half-bridge	MAHR Half-bridge	MARPOSS LVDT	MARPOSS Half-bridge
	420	± 0,2	96420101	96420121	96420003	96420131	96420136
	499	± 0,5	96499101	96499121	96499111	96499020	96499136

For technical features on each probe series, report to the following pages.

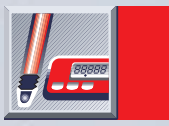
METEM Half-bridge	MOORE LVDT	NOVIBRA Half-bridge **	PMS METRO Half-bridge	PRETEC Half-bridge	RMP Systems	SIGMA Half-bridge	SOLARTRON Half-bridge	SOLARTRON LVDT
96499006	96490053* 80 DIN5x180°	96498005	96498025	96498007	96498028	96490045	96490031	96490211
96491016	96491151	96491021	96491036	96491020	96491032	96491041	96491047	96491211
96410031	96410074		96410037	96410171		96410093	96410044	96410211
96411141	96411151		96411161	96411171		96411181	96411201	96411211
96510141	96510151		96510161	96510171		96510181	96510018	96510211
96500045 S / 10	96500151		96500161	96500171		96500181	96500201	96500211
96500046 S / 10	96501151		96501161	96501171		96501181	96501201	96500053
96460141	96460151		96460161	96460171		96460181	96460201	96460211
96400044	96400067 DIN5x180°	96400039	96400042	96400040	96400036	96400056	96400201	96400211

METEM Half-bridge	MOORE LVDT	NOVIBRA Half-bridge **	PMS METRO Half-bridge	PRETEC Half-bridge	RMP Systems	SIGMA Half-bridge	SOLARTRON Half-bridge	SOLARTRON LVDT
96160141	96160151		96160161	96160171		96160015	96160021	96160211
96430030	96430027 DIN5x180°		96430161	96430171		96430181	96430033	96430211
96441032	96441073* 80	96441055	96441056	96441058	96441045	96441093	96441077	96441211

METEM Half-bridge	MOORE LVDT	NOVIBRA Half-bridge **	PMS METRO Half-bridge	PRETEC Half-bridge	RMP Systems	SIGMA Half-bridge	SOLARTRON Half-bridge	SOLARTRON LVDT
96420006	96420016	96420005	96420013	96420007		96420011	96420012	96420211
96499141	96499151		96499161	96499018		96499010	96499201	96499211

* Half-bridge

** Half-bridge in special version



MERCER Axial Probes - 490 and 491 Series

For MERCER and TESA® Electronic Equipments

Universal probes to suit common but constraining applications.

- *8 mm body diameter that may be clamped over its entire length.*
- *Measuring bolt mounted on a ball-bearing.*
- *Probe body made in steel and nickel plated.*
- *Degree of protection IP65 as per IEC 60529.*
- *490 series provided with a flexible axial cable exit with steel spring to prevent the cable from breaking.*
- *Probes compatible with those from other makers (page L-36).*



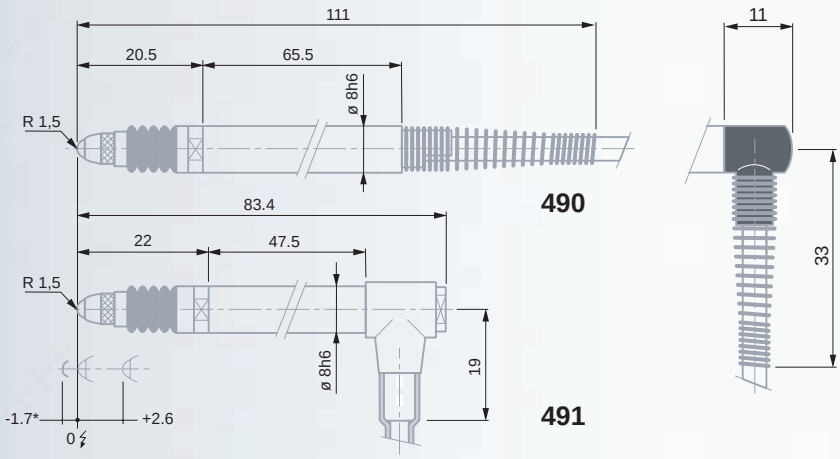
		Measring range mm	N *	Measuring bolt retraction	Sealing bellows
*490 Series with axial/radial cable exit***					
32.36490	**32.30490**	± 1,5	0,63	mechanical	Viton
491 Series with radial cable exit					
32.36491	**32.30491**	± 1,5	0,63	by vacuum	Viton

Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 and L-30
Retraction devices	
– hand operated	L-32
– electro-pneumatically operated	L-47

* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring. Also available on request: probes with measuring force of 0,4, 1,0, 1,6, 2,5 or 4 N.

** With use of the right angle adaptor that came with the probe.



		Lower stop of the measuring bolt***: adjustable from… mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
490	**MERCER**	- 2	0	- 1,7	4,3	0,02	0,15	32.00450
490	**TESA**	- 2	0	- 1,7	4,3	0,02	0,2	32.00456
491	**MERCER**	- 2	0	- 1,7	4,3	0,02	0,15	32.00454
491	**TESA**	- 2	0	- 1,7	4,3	0,02	0,2	32.00457

*** Distance from electrical zero.

**** Max. perm. errors for linearity errors contained within the measuring span of 3 mm (measuring range ±1,5 mm).

SWISS MADE ✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

Measuring bolt mounted on a ball-bearing

Adjustable distance between both the lower stop and electrical zero.

Interchangeable measuring insert with M2,5 thread. 3 mm dia. carbide ball tip.

Cable length: 2 m

Plug type: DIN 45322

Nickel plated body

Steel measuring bolt, hardened.

Viton rubber bellow with high-resistance elastomer

Moving mass: 4 g

Force increase: 0,2 N/mm

Mechanical frequency limit: 60 Hz

0,2 µm / °C

- 10 °C to 65 °C

-20 °C to 65 °C

IP65 (IEC 60529)

Transport packing

Identification number

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

Measuring bolt mounted on a ball-bearing

Adjustable distance between both the lower stop and electrical zero.

Interchangeable measuring insert with a M2,5 thread. 3 mm dia. tungsten carbide ball tip.

Cable length: 2 m

Plug type: DIN 45322

Steel body, hardened and hard chrome plated.

Stainless steel measuring bolt, hardened.

Rubber bellows: resistant nitrile or Viton with high-resistance elastomer

Moving mass: 3,1 g (410 series) or 3,2 g (411 series)

Force increase: 0,15 N/mm

Mechanical frequency limit: 60 Hz

0,025 µm / °C

0 °C to 65 °C

-40 °C to 65 °C

IP62 (410 series) IP 65 (411 series) as per IEC 60529

Transport packing

Identification number

MERCER Axial Probes with Short Body Length - 410 and 411 Series

For MERCER and TESA® Electronic Equipments

Universal probes for common but constraining applications.

- *8 mm body diameter that may be clamped over its entire length.*
- *Measuring bolt mounted in a ball-bearing.*
- *Hardened steel body, hard chrome plated.*
- *Degree of protection IP62 (410 series) or IP65 (411 series) as per IEC 60529.*
- *490 series provided with a flexible axial cable exit with steel spring to prevent the cable from breaking.*
- *Probes compatible with those from other makers (page L-36).*



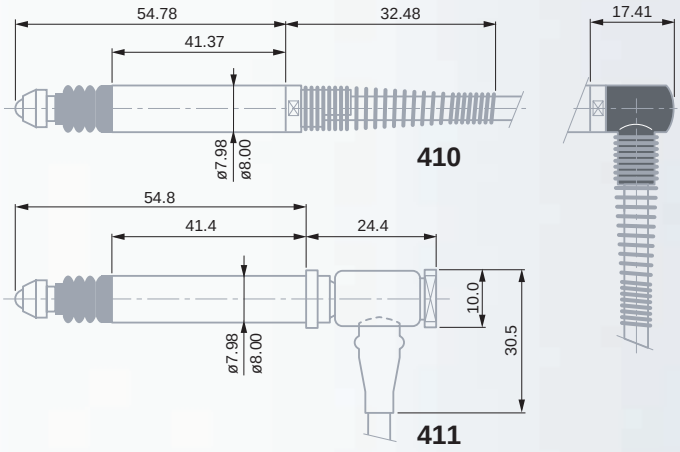
		Measuring range mm	N *	Measuring bolt retraction	Sealing bellow
*410 Series with axial/radial cable exit***					
96410010	**96410012**	± 1	0,6	mechanical	nitrile
411 Series with radial cable exit					
96411011	**96411014**	± 1	0,6	by vacuum	Viton

Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 and L-30
Retraction devices	
– hand operated	L-32
– electro-pneumatically operated	L-47

* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring. Also available on request: 410 probe series with measuring force of 0,1 or 1,6 N.

** With use of the right angle adaptor that came with the probe.



		Lower stop of the measuring bolt***: adjustable from... mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
410	**MERCER**	- 1,2	0	- 1,08	2,5	0,1	0,2	F96410010
410	**TESA**	- 1,2	0	- 1,08	2,5	0,1	0,2	F96410012
411	**MERCER**	- 1,2	0	- 1,08	2,5	0,1	0,2	F96411011
411	**TESA**	- 1,2	0	- 1,08	2,5	0,1	0,2	F96411014

*** Distance from electrical zero.

**** Max. perm. errors for linearity errors within a 2 mm measuring span (measuring range ± 1 mm).

MERCER Axial Probes with Long Travel - 510, 500 and 501 Series

For MERCER and TESA® Electronic Equipments

Universal probes for multigauging dedicated devices used in standard applications.

- *Long travel to ensure optimum protection of the probe.*
- *Probes compatible with those from other makers (page L-36).*



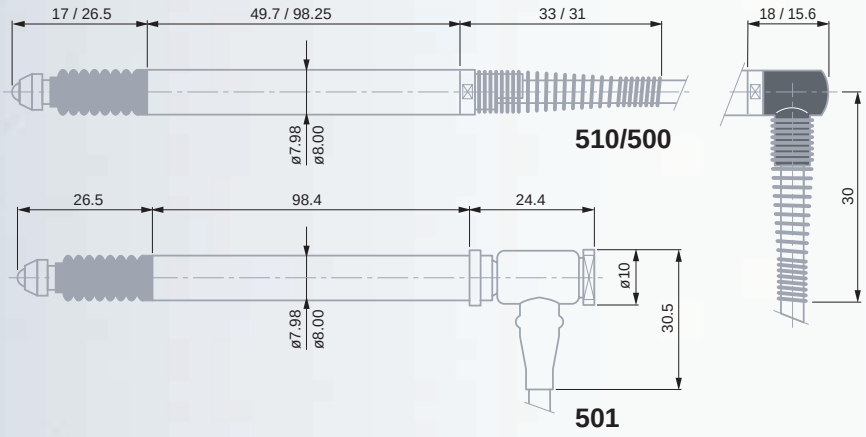
		Measuring range mm	N *	Measuring bolt retraction	Sealing bellows
*510 Series with axial/radial cable exit***					
96510017	**96510013**	± 2,5	1,3 ± 0,3	mechanical	Viton
*500 Series with axial/radial cable exit***					
96500010	**96500015**	± 5	1,5 ± 0,3	mechanical	Viton
501 Series with radial cable exit					
96500013	**96500025**	± 5	0,23 ± 0,06	by vacuum	Viton

Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 and L-30
Retraction devices	
– hand operated	L-32
– electro-pneumatically operated	L-47

* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

** With use of the right angle adaptor that came with the probe.



		Lower stop of the measuring bolt***: adjustable from… mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
510	**MERCER**	- 2,8	0	- 2,6	5,3	0,1	0,2	F96510017
510	**TESA**	- 2,8	0	- 2,6	5,3	0,1	0,2	F96510013
500	**MERCER**	–	–	- 5,25	11,5	0,1	0,2	F96500010
500	**TESA**	–	–	- 5,25	11,5	0,1	0,2	F96500015
501	**MERCER**	–	–	- 5,25	11,5	0,1	0,2	F96500013
501	**TESA**	–	–	- 5,25	11,5	0,1	0,2	F96500025

*** Distance from electrical zero.

**** Max. perm. errors for linearity errors contained within the 5 mm or 10 mm measuring span (measuring range ± 2,5 mm or ± 5 mm, respectively).

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

Ball-bearing meas. bolt

Distance between both stops and electrical zero: adjustable for 510 series (lower stop only) or fixed for 500 and 501 series.

Interchangeable measuring insert with a M2,5 thread. 3 mm dia. tungsten carbide ball tip.

Cable length: 2 m

Plug type: DIN 45322

Steel body, hardened and hard chrome plated.

Hardened steel measuring bolt

Viton rubber bellows with high-resistance elastomer

Moving mass:
3,8 g (MERCER 510)
4,2 g (TESA 510)
6,8 g (500 and 501)

Force increase:
0,4 N/mm (510 series)
0,15 N/mm (500 series)
0,03 N/mm (501 series)

Mechanical frequency limit:
60 Hz (510 series)
45 Hz (500/501 series)

0,025 µm / °C

0 °C to 60 °C

-40 °C to 60 °C

IP62 (510/500 series) or IP 65 (501 series) as per IEC 60529

Transport packing

Identification number

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

8 mm diameter cylindrical body $^{0}/_{-20}$ µm, 8 mm long. for coupling the measuring bolt.

Cable length: 2 m

Plug type: DIN 45322

Steel body, hardened and hard chrome plated

Moving mass: 3,4 g

0 °C to 60 °C

-40 °C to 60 °C

IP40 (IEC 60529)

Transport packing

Identification number

MERCER Axial Probes without guidance of the measuring bolt - 460 Series

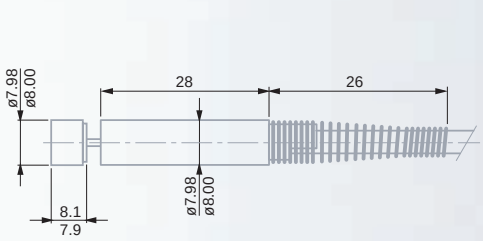
For MERCER and TESA® Electronic Equipments

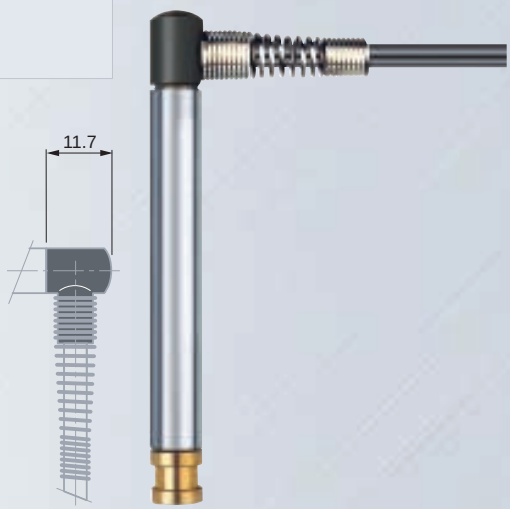
Specially designed for assembly on measuring instruments and other gauging devices – Suitable for capturing any displacement on machines or fixtures used for in-process inspection.

- *Open type transducers with measuring bolt mechanically coupled.*
- *8 mm body diameter that may be clamped over its entire length. Made in hardened steel and hard chrome plated.*
- *Flexible axial cable exit with steel spring to prevent the cable from breaking.*
- *Probes compatible with those from other makers (page L-36).*

		Measuring range / mm	Sealing bellows
*460 Series with axial/radial cable exit**			
96460011	**96460014**	± 1,5	none

* With use of the right angle adaptor that came with the probe.





460

		% *	Technical data sheets
460	**MERCER**	0,15	F96460011
460	**TESA**	0,15	F96460014

* Max. perm. errors for linearity errors contained within the measuring span of 3 mm (measuring range ± 1,5 mm).

MERCER Axial Probes with Air Activation of the Measuring Bolt - 492 Series

For MERCER and TESA® Electronic Equipments

Designed for use in measuring devices providing fully or half-assisted inspection routines.

- *8 mm body diameter that may be clamped over its entire length. Made in steel and nickel plated.*
- *Probes compatible with those from other makers (page L-36).*



		Measuring bolt mm	N *	Meauring bolt activation	Sealing bellows
492 Series with radial cable exit					
32.36492	**32.30492**	± 1,5	0,2	▼ ▲	none

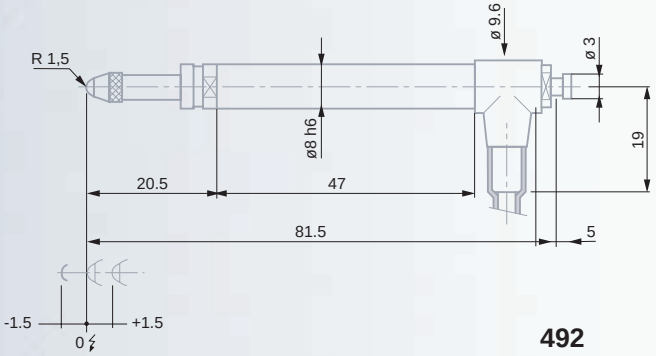
Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 to L-30
Retraction devices	
electro-pneumatically operated	L-47

* Nominal value at electrical zero; max. deviation ± 25 %. Valid at a pressure of 0,25 bar with use of the probe in upright assembly position, with downward oriented measuring insert, as well as in static measuring.

▼ Downward movement of the measuring bolt activated by air pressure.

▲ Upward movement of the measuring bolt activated under the spring force only.



492

		Lower stop of the measuring bolt ** mm	mm	µm	% ***	Technical data sheets
492	**MERCER**	- 1,7 ± 0,1	4,3	0,02	0,15	32.00455
492	**TESA**	- 1,7 ± 0,1	4,3	0,02	0,2	32.00458

** Fixed distance from electrical zero.

*** Max. perm. errors for linearity errors contained within the 3 mm measuring span (measuring range ± 1,5 mm).

✓ SWISS MADE

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

Measuring bolt mounted on a ball-bearing

Distance between both stops and the electrical zero is fixed

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread.

Cable length: 2 m

Plug type: DIN 45322

Steel body, nickel plated.

Measuring bolt in hardened steel

Moving mass: 4 g

Force increase: 0,045 N/mm

Mechanical frequency limit: 60 Hz

Air pressure: 0,25 bar (nominal) 6 bar (maximum) Air filter capacity: <5 µm

Air pressure: 60 %

0,2 µm / °C

-10 °C to 65 °C

-20 °C to 65 °C

IP50 (IEC 60529)

Transport packing

Identification number

MERCER Probes with Short Body - 160, 430 and 451 Series

For MERCER and TESA® Electronic Equipments

Their compact size and robust construction make them perfect for a frequent use.

- *8 mm body diameter that may be clamped over its entire length.*
- *Hardened steel, nickel plated body. Ball-bearing measuring insert.*
- *Probes compatible with those from other makers (page L-36).*

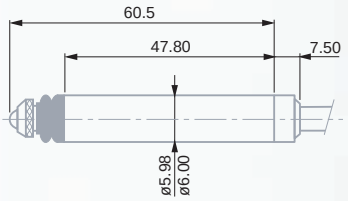


		Measuring range mm	N *	Measuring bolt retraction	Sealing bellows
160 Series - Probes with short body length and axial cable exit					
96160011	**96160013**	± 1	0,6 ± 0,15	mechanical	Viton
430 Series - Miniature probes with axial cable exit					
96430028	**96430029**	± 0,5	0,75 ± 0,2	mechanical	nitrile
451 Series - Miniature probes with radial cable exit					
96441015	**96441041**	± 0,5	0,6 ± 0,15	mechanical	nitrile

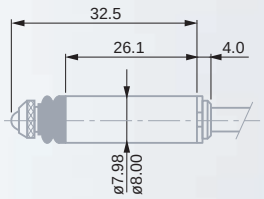
Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 and L-30
Hand operated retraction devices	L-32

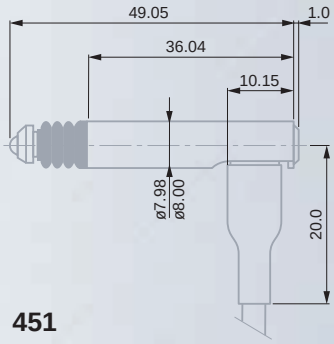
* Nominal value at electrical zero. Valid for upright assembly position, with downward oriented measuring insert, as well as in static measuring.



160



430



451

		Lower stop of the measuring bolt ***: adjustable from... mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
160	**MERCER**	- 1,2	0	- 1,08	3,3	0,1	0,2	F96160011
160	**TESA**	- 1,2	0	- 1,08	3,3	0,1	0,2	F96160013
430	**MERCER**	- 0,7	0	- 0,58	1,25	0,2	0,2	F96430028
430	**TESA**	- 0,7	0	- 0,58	1,25	0,2	0,2	F96430029
451	**MERCER**	–	–	- 0,58	2,1	0,1	0,2	F96441015
451	**TESA**	–	–	- 0,58	2,1	0,1	0,2	F96441041

*** Distance from electrical zero.

**** Max. perm. errors for linearity errors contained within the 2 mm or 1 mm measuring span (measuring range ± 1 mm or ± 0,5 mm, respectively).

- ✓
- DIN 32876 Part 1
- See in the tables
- Axial probes usable in any position
- 8 mm body diameter

Ball-bearing measuring bolt

Distance between both stops and electrical zero is either adjustable (lower stop only, 160 series) or fixed (451series).

Interchangeable insert

M2 thread (160 series) M2,5 thread (430 and 451 series)

3 mm dia. tungsten carbide ball tip.

Cable length: 2 m

Plug type: DIN 45322

- Steel body, hardened and chrome plated.

Measuring bolt in stainless steel, hardened.

Rubber bellows: resistant nitrile or Viton with high-resistance elastomer

- Mobile mass: 2,5 g (160 series) 1,9 g (430 series) 3,0 g (451series)
- Force increase: 0,3 N/mm (160 series) 0,25 N/mm (430 series) 0,15 N/mm (451 series)
- Mechanical frequency limit: 60 Hz
- 0,025 µm / °C
- 0 °C to 60 °C
- -40 °C to 60 °C
- IP62 (IEC 60529)
- Transport packing
- Identification number



MERCER Lever Probes - 420 and 499 Series

For MERCER and TESA® Electronic Equipments

420 Series

- *Very small body that can be recessed into a fixture or a plug gauge.*
- *Measuring insert mounted on leaf springs.*

499 Series

- *Parallel guiding of the measuring bolt that can be moved in both probing directions.*
- *Interchangeable measuring insert that may be replaced by other inserts having varying lengths with no influence on the leverage.*
- *Ideal where parallel motion of the measuring bolt is needed.*
- *Without switch-over feature for the probing direction.*

Probes compatible with those from other makers (page L-36).



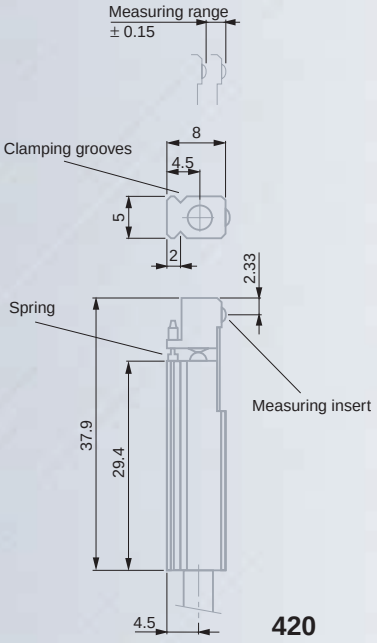
		Measuring range / mm	N *
420 Series - Miniature lever probes			
96420001	**96420004**	± 0,15	1,8 ± 0,4
499 Series - Lever probes with parallel guidance			
96499004	**96499007**	± 0,5	0,02 ÷ 0,2 **

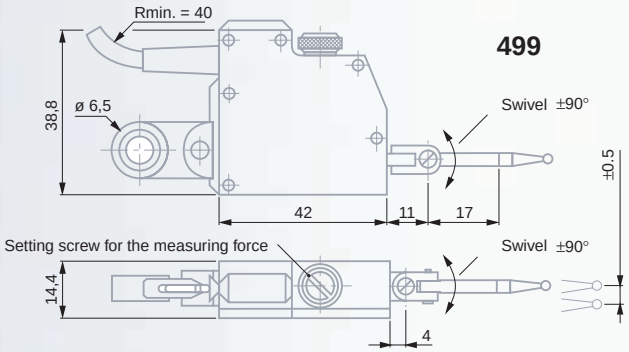
Accessories for MERCER 499 Series

		mm		mm
32.38401	Insert	0,8	Hard. steel	12,3
32.38402	Insert	1,6	Hard. steel	12,3
32.38403	Insert	3,2	Hard. steel	12,3
32.38411	Insert	0,8	Hard. steel	37,7
32.38412	Insert	1,6	Hard. steel	37,7
32.38413	Insert	3,2	Hard. steel	37,7
18.40105	Cylindr. clamp	8		

For other clamping items, report to page E-32.

* Nominal values at electrical zero. Valid in static measuring.
** Adjustable with both the probe housing and lever lying horizontally.





		(Lower) stop of the measuring bolt ***: adjustable from… mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
420	**MERCER**	–	–	- 0,225	0,525	0,5	0,3	F96420001
420	**TESA**	–	–	- 0,225	0,525	0,5	0,3	F96420004
499	**MERCER**	0,6	0	0,6	1,2	0,25	0,6	F96499004
499	**TESA**	0,6	0	0,6	1,2	0,25	0,6	F96499007

*** Distance from electrical zero.
**** Max. perm. errors for llinearity errors contained within the 0,3 mm or 1 mm measuring span (measuring range ± 0,15 mm or ± 0,5 mm, respectively.).

SWISS MADE ✓

DIN 32876 Part 1

See in the tables

Lever probes usable in any position

420 series with a clamping groove. Articulation mounted on leaf-springs.

499 series 2 dovetails with fixing lug or clamping rod. Parallel motion leaf-springs. Smooth motion of the insert through 2 x 90 ° friction clutches.

Triple protection against damage in both probing directions.

499 series Interchangeable insert fitted with a M2 thread

Cable length: 2 m

Plug type: DIN 45322

Stainless steel body, hardened (420 series)

Dull-chrome plated housing (499 series)

Tungsten carbide ball tip

Moving mass: 2,5g (420 series) 10,6 g (499 series)

Force increase: 0,2 N/mm (420) 0,25 N/mm (499)

Mech. frequency limit: 10 Hz

420 series: 0,025 µm / °C, 499 series: 0,25 µm / °C

0 °C to 60 °C

-40 °C to 60 °C

IP40 (IEC 60529)

499 series: with a 3,2 mm dia. insert (No 32.38403) and lug (No 32.38013).

Transport packing

Identification number

TESANORM® Assembly Components

Small coordinate tables with accessories used for measuring centre distances of bores or for similar applications – Mounted on roller-bearings for free move in one or two axes – Available in two sizes – Provided with probe holders, etc.

- *Model 42 x 42 mm with a 3 mm travel, for bore diameters from 0,2 to 26 mm.*
- *Model 62 x 62 mm with a 6 mm travel, for bore diameters from 26 to 100 mm.*

Swiss made ✓

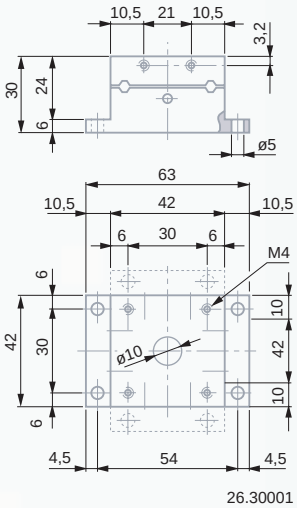
Hardened and ground steel

Transport packing

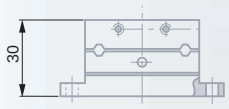
42 x 42 mm coordinate tables

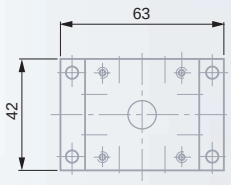
26.30001	**VMA**	Coordinate table for 1 axis - 3 mm travel
26.30005	**VOA**	Coordinate for 2 axes - 3 mm travel
26.30003	**VLA**	Holder for centring heads
26.60004	**VQA**	Centring head
26.60005	**VQB**	Centring head
26.60041	**VUA**	Holder for measuring heads



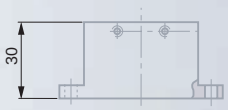


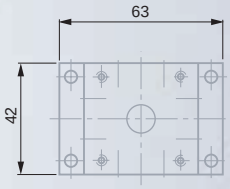
26.30001



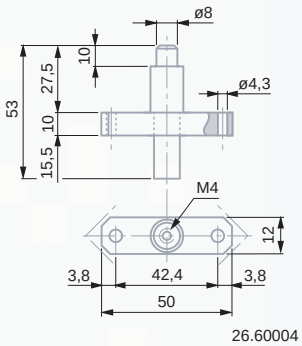


26.30005

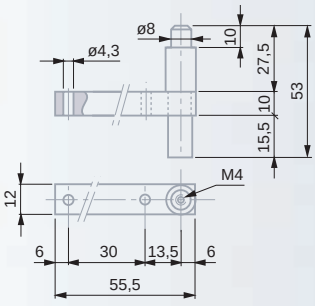




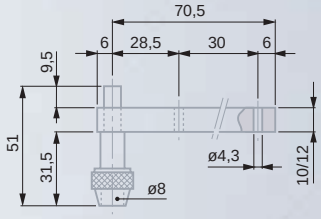
26.30003



26.60004



26.60005



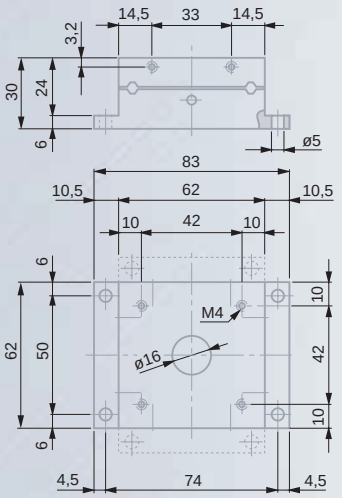
26.60041

62 x 62 mm coordinate tables

26.30002	**VNA**	Coordinate table for 1 axis - 6 mm travel
26.30006	**VPA**	Coordinate table for 2 axes - 6 mm travel
26.30004	**VLB**	Holder for centring heads
26.60006	**VRA**	Centring head
26.60007	**VRB**	Centring head
26.60042	**VUB**	Holder for measuring head



26.30002

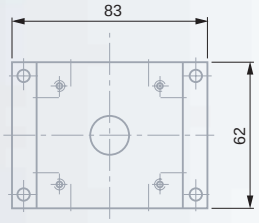


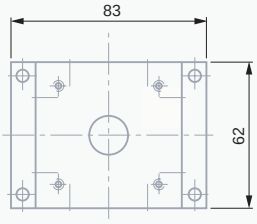
26.30006



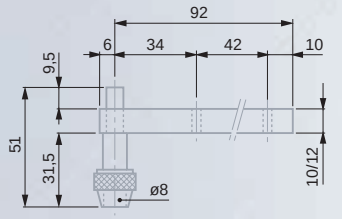
26.30004



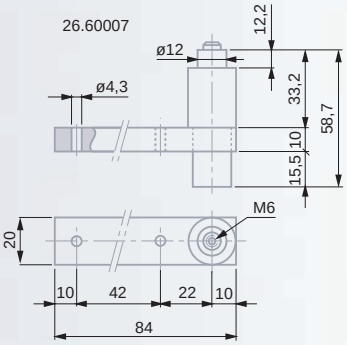




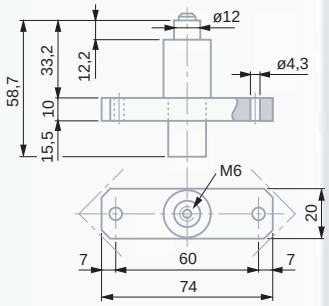
26.60042



26.60007



26.60006



SWISS MADE ✓

Hardened and ground steel

Transport packing

Centring cones for VQA / VQB centring heads

N°	A	∅ mm
26.60008	VSA	0,2 ÷ 0,7
26.60009	VSB	0,7 ÷ 1,2
26.60010	VSC	1,2 ÷ 1,7
26.60011	VSD	1,7 ÷ 2,2
26.60012	VSE	2,2 ÷ 2,7
26.60013	VSF	2,7 ÷ 3,2
26.60014	VSG	3,2 ÷ 3,7
26.60015	VSH	3,7 ÷ 4,2
26.60016	VSJ	4,2 ÷ 4,7
26.60017	VSK	4,7 ÷ 5,2
26.60018	VSL	5,2 ÷ 5,7
26.60019	VSM	5,7 ÷ 6,2
26.60020	VSN	6,2 ÷ 6,7
26.60021	VSO	6,7 ÷ 7,2
26.60022	VSP	7,2 ÷ 7,7
26.60023	VSQ	7,7 ÷ 8,2
26.60024	VSR	8,2 ÷ 8,7
26.60025	VSS	8,7 ÷ 9,2
26.60026	VST	9,2 ÷ 9,7
26.60027	VSU	9,7 ÷ 10,2

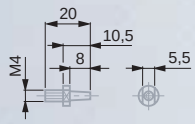
Centring cones for VRA / VRB centring heads

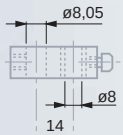
N°	A	∅ mm
26.60028	VTA	10,2 ÷ 11,8
26.60029	VTB	11,8 ÷ 14,2
26.60030	VTC	14,2 ÷ 16,2
26.60031	VTD	16,2 ÷ 18,2
26.60032	VTE	18,2 ÷ 20,2
26.60033	VTF	20,2 ÷ 22,2
26.60034	VTG	22,2 ÷ 24,2
26.60035	VTH	24,2 ÷ 26,2
26.60036	VTJ	26,2 ÷ 28,2
26.60037	VTK	28,2 ÷ 30,2
26.60038	VTL	30,2 ÷ 32,2
26.60039	VTM	32,2 ÷ 34,2
26.60040	VTN	34,2 ÷ 36,2
26.60050	VTO	36,2 ÷ 38,2
26.60051	VTP	38,2 ÷ 40,2
26.60052	VTQ	40,2 ÷ 42,2
26.60053	VTR	42,2 ÷ 44,2
26.60054	VTS	44,2 ÷ 46,2
26.60055	VTT	46,2 ÷ 48,2
26.60056	VTU	48,2 ÷ 50,2

Probe holders and accessories

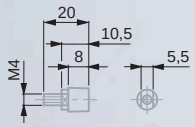
N°	A	=	= L mm
26.30016	VDA	Probe holder	
26.30017	VDB	Probe holder	
26.30018	VDC	Probe holder	
26.60047	VDD	Probe holder	
26.60048	VDE	Probe holder	28
26.60049			37
26.60044	VFB	Spring support	
26.11010	VKF	Spring	29
26.11011			45
26.11001	VKA	Axes	50
26.11002			75
26.11003			100
26.11004			125
26.11005			150
26.11006			175
26.11007			200
26.30020	VEB	Meas. stops	35
26.30021			60
26.30022			110
26.30023			160

26.60008/17



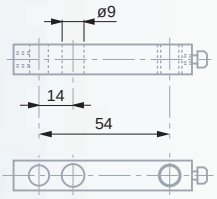


26.60018/27

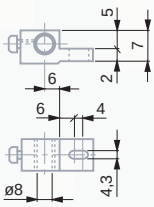


26.30016

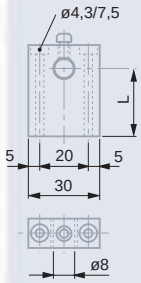
26.30017



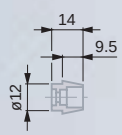
26.30018

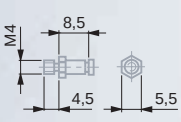


26.60047

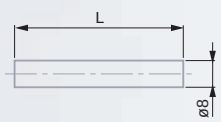


26.60028/56

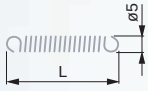




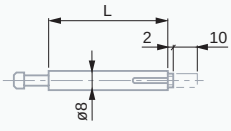
26.60044



26.11001/7



26.11010/11



26.30020/23

26.60048/49

Electropneumatic Systems for Activating the Measuring Bolt

✓

Suited for 20 probes from the GT 22 / 42 / 44 and 52 probe series

GT 28 and 62 probe series: max. 10 probes

230 V, 50 Hz

✓

Transport packing

Electropneumatic vacuum pump

For lifting up to 20 measuring bolts simultaneously with a measuring force of up to 0,63 N



No	
32.60431	Operated via the built-in push-button or 24 V relay
32.60432	Operated via the mains powered foot switch

✓

230 ± 10 % V switchable to 115 ± 10 % V

Needed pressure: 1 to 7 bars

190 x 170 x 310 mm

3,5 kg

✓

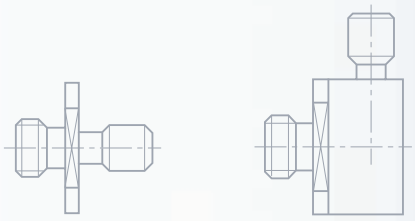
Transport packing

FMS C electropneumatic vacuum pump

Uses vacuum or air pressure; simultaneous connection of up to 30 TESA probes; ideal for use with FMS probes.



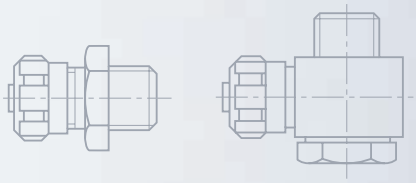
No	
32.60486	Controlled electrically via the TESA's electronic instrument or manually



Air tube connectors for TESA GT 22 / 28 / 42 / 44 and 62 probe series

M4 coupling thread; suited for a 4 / 2 mm dia. air pipe (No. 35.40405).

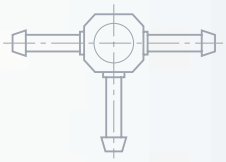
No	Connector type
35.60000	straight
35.60002	angled



Air tube connectors for TESA FMS probes

M5 coupling thread; suited for a 4 / 2 mm dia. air pipe (No. 35.40405).

No	Connector type
026522	straight
024388	angled



Connecting T-piece

No	For air pipe
35.40403	4 / 2 mm dia. (No. 35.40405)



Vacuum release delay valve

For controlling the lowering speed of axial probes.

No	For air pipe
35.40404	4 / 2 mm dia. (No. 35.40405)

TESATRONIC® Length Measuring Instruments - General Overview

Dedicated compact units having either an analogue or a numerical display – Used in association with hand-held measuring instruments or on stationary devices for shop floor inspection and maintenance as well as in the measuring room.



TESATRONIC		TT 10	TT 20	TT 60	TT 80	TTA 20
		44.30008	44.30009	44.30010	44.30011	44.30003
Probe input	number	1	2	2	2	2
	automatic recognition	no	yes	yes	yes	no
Measuring range	number	3	7	7	9	6
	minimum	± 5 µm	± 5 µm	± 5 µm	± 0,5 µm	± 3 µm
	maximum	± 500 µm	± 5000 µm	± 5000 µm	± 5000 µm	± 1000 µm
	Zoom function (5x)	yes	no	no	no	no
	automatic switching	yes	yes	yes	yes	no
Numerical display		yes	yes	yes	yes	no
Numerical interval	minimum	0,1 µm	0,1 µm	0,1 µm	0,01 µm	
	maximum	10 µm	0,1 µm	0,1 µm	0,01 µm	
Analogue display		yes	yes	yes	yes	yes
Scale interval	minimum	0,1 µm	0,2 µm	0,2 µm	0,02 µm	0,1 µm
	maximum	10 µm	200 µm	200 µm	200 µm	50 µm
Metric / inch units		yes	yes	yes	yes	yes
Value classification		no	yes	yes	yes	yes
	number of classes		3	up to 42	up to 42	3
	signal outputs		yes	yes	yes	yes
Memory		no	no	yes	yes	no
Digital output		RS 232	RS 232	RS 232	RS 232	no
Analogue output		no	no	yes	yes	yes
Power supply		Batteries	Mains adapter	Mains adapter	Mains adapter	Mains power

✓

DIN 32876 Part 1

66 x 57 mm LC display field

9 x 4,5 mm

Response time of display ≤ 100 ms.
Hold time ≥ 100 ms.

Zero drift* ≤ ± 0,005 % / °C

Frequency limit of display with reference to signal input: 10 Hz

Max. display error *: 2 %

± 1 numerical interval

Opto-coupled RS 232 compatible output

3,5 V to 4,5 V, 3 batteries type LRC 6, 1,5 V, AA.

Power consumption: ≈ 7 mW / 3,5 V

Self-controlled voltage fluctuation

Drive voltage of the probe: 0,7 V

Drive frequency: 13 ± 0,65 kHz

0 °C to 60 °C

- 10 °C to 70 °C

80 %, with no condensation

Protection IP42 (IEC 60529)

EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2

95 x 170 x 68 mm (W x D x H)

490 g (with batteries)

Transport packing

Identification number

Declaration of conformity

* with reference to 20 °C as well as a relative humidity of ≤ 50 %.

TESATRONIC® TT 10
Electronic Length Measuring Instrument

Pocket-sized, battery-operated electronic instrument for use on the move – Ideally suited for your measurement tasks on the surface plate, in the inspection room right next to the production floor or directly on the machine – Provides full portability where there's no room for cumbersome power cable.

- *Simple-to-use function keys used in conjunction with the combined analogue/numerical indication providing easy reading.*
- *LCD, pointerless display field for high repeatability and negligible hysteresis.*
- *3 measuring ranges, switchable manually or automatically depending on the size of the measured value.*
- *Metric and inch conversion.*
- *Additional signal amplification (5x) for easy display setting.*
- *Quick zero-setting thanks to digital technology.*
- *Signal input for one probe.*
- *RS 232 compatible digital output, opto-coupled.*



No	=
44.30008	**TESATRONIC TT 10** Electronic measuring instrument with analogue and numerical display; 3 measuring ranges switchable from metric to inch; 1 probe input; RS 232 output.

Provided with the following accessories:

47.68002	3 Batteries, 1,5 V, type LRC 6, AA.
44.60007	1 Visual template for value classification.



Measuring ranges and numerical interval

	Zoom function	Used for	µm	µm	in	in
1	without	measuring	± 500	10	± 0.025	0.0005
	5x	setting	± 100	2	± 0.005	0.0001
2	without	measuring	± 50	1	± 0.0025	0.00005
	5x	setting	± 10	0,2	± 0.0005	0.00001
3	without	measuring	± 5	0,1	± 0.00025	0.000005

TESATRONIC® TT 20, TT 60 and TT 80 Electronic Length Measuring Instruments

Feature the most advanced technology – Provide functional reliability – Simple to use – Essential for shop floor inspection or in the measurement laboratory.

TESATRONIC® TT 20

Includes a combined analogue/numerical display – 2 probe inputs for single, sum or difference measurements.

- *Large LC display for error-free reading.*
- *Better repeatability and negligible hysteresis as the analogue display has no mechanical pointer.*
- *Choice between pointer or bar graph.*
- *All measuring functions readable on the LC display.*
- *7 measuring ranges selectable manually or automatically according to the size of the measured value.*
- *Direct conversion from metric to inch units.*
- *Zeroing with just one touch button for each measuring channel.*
- *Setting of tolerances through the keyboard.*
- *3 quality classes displayed through LEDs with control signal outputs.*
- *Lockable display for step by step measurement routines.*
- *Automatic recognition of the connected TESA's probe with direct adaptation of the measurement signals to the right output (only for TESA probes made in 1997 or later).*
- *Opto-coupled RS 232 output, bi-directional.*
- *Power supply through mains adapter.*



TESATRONIC® TT 60

Same features as model TESATRONIC TT 20, but with added functions that include:

- *Memory for retaining extreme values «max», «min», «max - min» as well as the mean value of «max» minus «min».*
- *Dynamic measurement with acquisition of more than 100 single values/s.*
- *Value classification with output signals through contact relay for 5, 10, 20 and 40 good classes.*
- *Remote signal processing using the analogue output.*

TESATRONIC TT 20, TT 60 and TT 80

✓

DIN 32876 Part 1

126 x 62 mm LC display

110 mm scale length

50 scale divisions

2,2 mm

6-decade display plus minus sign

12,5 x 6,6 mm

Zero drift and drift of the signal amplification*: ≤ ± 0,005 % / °C

No drift for the registered values

± 1 numerical interval

RS 232 opto-coupled output

6,5 Vdc up to 7,3 Vdc

Consumption: 2 W

Self-controlled voltage fluctuation

Drive voltage of the probe: 3 V

0 °C to 60 °C

-10 °C to 70 °C

80 %, with no condensation

Resistant plastic

Protection: IP 54 (IEC 60529) for the front face only.

EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2

255 x 235 x 120 mm (BxTxH)

1,1 kg

* with reference to 20 °C as well as a relative humidity of ≤ 50 %.

Transport packing

Identification number

Declaration of conformity

Additional data on TESATRONIC TT 20

Response time* of analogue display with pointer and digital display: ≤ 80 ms

Holding time of digital display: ≤ 10 ms

Frequency limit for all displays with reference to the signal input: 12,5 Hz

Limiting value for analogue display as well as digital display and output*: 0,3 %

Dirve frequency 13 ± 0,65 kHz

Additional data on TESATRONIC TT 60

Response time* of analogue display with pointer and digital display: ≤ 80 ms

Holding time of digital display: 80 ms

Response time of analogue display with bar graphs, classification LEDs as well as analogue output: ≤ 30 ms

Response time** of the memory: ≤ 10 ms

Frequency limit for all displays with reference to the signal input: 12,5 Hz

Frequency limit with reference to the signal input: 20 Hz for the analogue output
100 Hz for the memory

Limiting value for analogue display as well as digital display and output*: 0,3 %

Voltage range: ± 2 V up to ± 10 V

* with reference to 20 °C as well as a relative humidity of ≤ 50 %

** with reference to the analogue output signal





44.30009	**TESATRONIC TT 20** Electronic length measuring instrument with analogue and numerical display; 7 measuring ranges switchable from metric to inch; value classification with 1 good class and signal output through contact relay; 2 probe inputs; RS 232 output.
44.30010	**TESATRONIC TT 60** Same features as model TT 20, but with added memory; dynamic measuring and signal output through contact relay for 5, 10, 20 or 40 good classes; analogue output.

Delivery includes the following items:

47.61054	1 Mains adapter, 110 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA.
47.61055	1 Mains cable EU

Optional Accessory:

Adapter for 5, 10, 20 or 40 classes available on request.



Measuring ranges with scale divisions or numerical intervals (TESATRONIC TT 20 and TT60)

µm	µm	µm	*in*	*in*	*in*
± 5000	0,1	200	*± 0.200*	*0.000005*	*0.01*
± 2000	0,1	100	*± 0.100*	*0.000005*	*0.005*
± 500	0,1	20	*± 0.02*	*0.000005*	*0.001*
± 200	0,1	10	*± 0.01*	*0.000005*	*0.0005*
± 50	0,1	2	*± 0.002*	*0.000005*	*0.0001*
± 20	0,1	1	*± 0.001*	*0.000005*	*0.00005*
± 5	0,1	0,2	*± 0.0002*	*0.000005*	*0.00001*

TESATRONIC® TT 80

High-resolution measuring instrument – Fitted with a combined analogue/ digital display – Provided with 2 probe inputs for single, sum and difference measurements.

Same features as TESATRONIC TT 20 but with the following added functions:

- *9 measuring ranges with numerical interval to 0,01 µm or 0.000001 in.*
- *Memory for extreme values «max», «min» and «max» - «min» as well as mean of «max» and «min».*
- *Dynamic measurement with acquisition of more than 10 single values / s.*
- *Value classification with output signals through contact relay for 5, 10, 20 and 40 good classes.*
- *Remote signal processing using the analogue output.*





44.30011 **TESATRONIC TT 80**
High-resolution electronic length measuring instrument provided with a combined analogue/digital display, 9 measuring ranges switchable from metric to inch, value classification with 1 good class and signals output through contact relay for 5, 10, 20 or 40 good classes, memory, dynamic measuring capability, 2 probe inputs, RS 232 interface as well as analogue output.

Delivered with the following accessories:

47.61054 1 Mains adapter - 110 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

47.61055 1 Mains cable EU

Optional Accessories

Adapter for 5, 10, 20 or 40 classes available on request.

Measuring ranges with scale divisions or numerical intervals (TESATRONIC TT 80)

µm	µm	µm	*in*	*in*	*in*
± 5000	0,01	200	*± 0.200*	*0.000001*	*0.01*
± 2000	0,01	100	*± 0.100*	*0.000001*	*0.005*
± 500	0,01	20	*± 0.02*	*0.000001*	*0.001*
± 200	0,01	10	*± 0.01*	*0.000001*	*0.0005*
± 50	0,01	2	*± 0.002*	*0.000001*	*0.0001*
± 20	0,01	1	*± 0.001*	*0.000001*	*0.00005*
± 5	0,01	0,2	*± 0.0002*	*0.000001*	*0.00001*
± 2	0,01	0,1	*± 0.0001*	*0.000001*	*0.000005*
± 0,5	0,01	0,02	*± 0.00002*	*0.000001*	*0.000001*

Output current: ≤ 2 mA.
Permissible adjustment load: ≥ 5 kΩ.
Residual ripple(with probe at zero point): ≤ 1 mV
Reference voltage level: analogue earth 0 V

Drive frequency: 13 ± 0,65 kHz

Additional data on TESATRONIC TT 80

Response time of the analogue/ digital display, classification LEDs as well as both digital and analogue outputs: ≤ 100 ms

Holding time of digital display: 100 ms

Response time ** of the memory: ≤ 100 ms

Frequency limit for all types of display as well as the memory with reference to the signal input: 10 Hz

Limiting values * :
2 % for analogue display
0,15 for digital display
0,3 % for analogue output
0,15 % for digital output

Voltage range: ± 2 V to ± 10 V
Output current: ≤ 2 mA
Permissible adjustment load: ≥ 5 kΩ
Residual ripple (with probe at zero point): ≤ 1 mV
Reference voltage level: analogue earth 0 V

Drive frequency: 13 kHz ± 0,5 %

* with reference to 20 °C as well as a relative humidity of ≤ 50 %.

** with reference to the analogue output signal

✓

DIN 32876 Part 1

≈ 100 mm scale length

Response time: ≤ 1 s (display), 20 ms (analogue output), 10 ms (output signal of the classification).

Zero drift* ≤ ± 0,005 % / °C

Frequency limit * display: 1 Hz analogue output 50 Hz classification: 30 Hz

Limiting value*: 1,5 % (display), 0,3 % (analogue output).

Negligible (display) or 5 % (classification signals).

Voltage ± 1V, output current ≤ 3 mA, perm. adjustment load ≥ 2 kΩ, residual ripple (at zero) ≤ 1 mV. Reference voltage level: analogue earth (0 V).

230 or 115 V - 10 % to 20 %, 50 to 60 Hz.

Power consumption: ≤ 20 VA

Drive voltage of the probe: 1,5 V_{eff} -10 % to 5 %

Drive frequency: 13 ± 0,65 kHz

0 °C to 50 °C

- 10 °C to 70 °C

Protection IP40 (IEC 60529)

EN 50081-1, EN 50081-2, EN 50082-2

258 x 190 x 158 mm (W x D x H)

3,4 kg

Transport packing

Identification number

Declaration of conformity

* with reference to 20 °C as well as a relative humidity of ≤ 50 %.

TESATRONIC® TTA 20 Electronic Length Measuring Instrument

Compact design with analogue indication and value classification facility – Aluminium housing for harsh shop floor environment – Easy to handle.

- *Easy-to-read analogue display with mirror strip to avoid parallax error.*
- *6 measuring ranges.*
- *Metric / Inch conversion.*
- *Easy display setting through electrical zero.*
- *2 probe inputs for single, sum or difference measurements.*
- *1 auxiliary signal input, e.g. for the correction values.*
- *LEDs for signalling the relevant quality class with green for «Good», yellow for «Rework» and red for «Scrap».*
- *Potentiometer for setting the limit deviations.*
- *Polarity selector switch for the classification signals (internal and external dimensions).*
- *Switch for locking or unlocking a displayed value.*
- *Analogue output for the connection of a remote displaying or scribing unit.*



44.30003	**TESATRONIC TTA 20** Electronic length measuring instrument with analogue display; 6 measuring ranges; switchable from metric to inch; value classification with 1 good class and signal output through contact relay; 2 probe inputs.

Supplied with one of the following cables depending on the country where goods are to be delivered (must be specified when ordering):

31.60015	Mains cable fitted with SEV connector, 3-wire cable type, 2 m long.
31.60016	Mains cable fitted with VDE connector, 3-wire cable type, 2 m long.
31.60017	Mains cable without connector, 3-wire cable type, 2 m long.

Optional Accessory

44.60004	15-pin connector for both analogue output and classification signal output.

Measuring ranges and scale intervals

µm	µm	*in*	*in*
± 1000	50	*± 0.1*	*0.005*
± 300	10	*± 0.03*	*0.001*
± 100	5	*± 0.01*	*0.0005*
± 30	1	*± 0.003*	*0.0001*
± 10	0,5	*± 0.001*	*0.00005*
± 3	0,1	*± 0.0003*	*0.00001*



TESA® TT 300 and MERCER EL 300 Electronic Length Measuring Instruments

The best choice for series inspection – Instantaneous measuring and displaying through tricolour signals – Value classification with green, amber and red – High contrast diode chain offering fast and sure reading even at a great distance – Alpha numeric display providing detailed measurement results – Vast range of programmable functions – Digital and analogue interfaces – Signal outputs for the control functions.

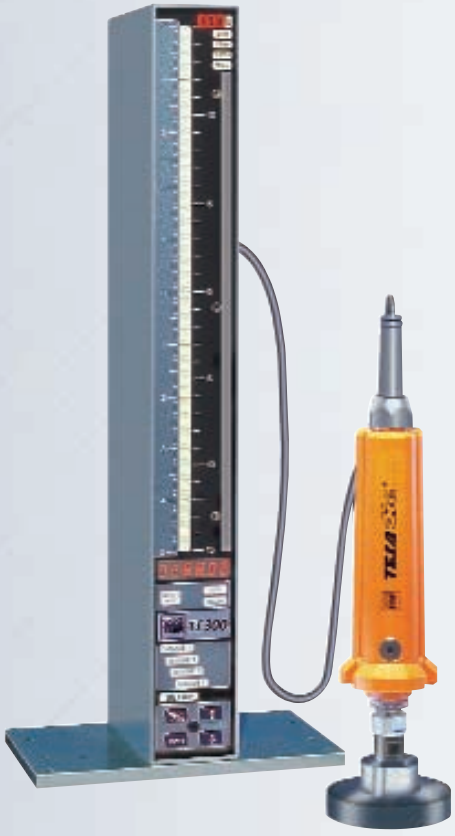
- *Possible use of 2 or 4 electronic probes or measuring units with built-in probe such as TESADIA plug gauges.*
- *Choice of 6 measuring ranges either self set or selected by the user.*
- *PRESET facility enabling values such as the nominal or actual size of setting standards to be entered.*
- *Signal combinations in sum or difference measurements, programmable.*
- *Added features such as selectable digital filters used for the displayed values, programmable as well.*

Executions with memory for one single inspection characteristic

- *Used for both static and dynamic measuring.*
- *Computing functions «max», «min», «max» minus «min» as well as mean of «max» and «min» for value storage.*
- *Value classification with one good class and possible entry of tolerances and control limits.*

Executions for multi-gauging with four inspection characteristics

- *Automatic switch-over and recognition or manual switching from one measuring point to another (4 points maximum).*
- *Value classification with 1 good class and possible entry of tolerances and control limits for each single characteristic.*



Executions with possible classification of up to 30 good classes for one inspection characteristic

- *Input of a desired number of good classes along with both LSL and USL specification limits that relate to the entire tolerance range.*

✓

DIN 32876 Part 1

Analogue and digital display as shown in the table

✓

Automatic or selectable display range based on the size of the tolerance field with enabled classification.

254 mm long

100 bar LEDs, each being 1,75 mm wide, 5 mm long.

Alpha numeric, red-colour LED display with 6 signs (7 segments per sign)

7 x 3,2 mm (H x W)

Classification through the colour LEDs of the analogue display based on the four size limits previously entered.

2 or 4 probe inputs according to the column type along with 2 DC signal inputs.

Signal polarity: positive (+) and negative (-)

Besides single measurement, the combination of the signals in sum or difference measurement is also possible.

Amplification factors of the signal inputs: 0,01 ... 99,99

Response time of the analogue and digital display and outputs with classification included: ≤ 100 ms with a max. error of < 0,1 % for any other measuring deviations.

Max. perm. error of digital display with reference to 20 °C with a relative humidity of ≤ 50 %: 0,5 %

Zero drift: < 0,004 % / °C
Drift of the signal amplification: < 0,008 % / °C

RS 232

Sensitivity of analogue input and output: 1,525 V / mm, Voltage: ≤ ± 5 V, Output current: ≤ 3 mA, Adjustment load: ≥ 2 kΩ

100 to 250 Vac, 47 to 60 Hz

Power consumption: 5,5 VA

0 °C to 50 °C

- 10 °C to 70 °C

80 %,with no condensation

Painted aluminium housing with acrylic front plate. Integrated keypad with touch buttons.

Protection IP 50 (IEC 60529)

EN 50081-2, EN 50082-2

45 mm in width, 370 mm in height, 102,5 mm in depth, column base and rear-mounted connectors not included.

0,65 kg

Provided with base and two M3 x 6 tightening screws for safe positioning of the instrument

Transport packing

Identification number

Declaration of conformity

TESA TT 300 and MERCER EL 300 Electronic Measuring Instruments
With analogue and digital display, 6 measuring ranges, metric/inch selection, classification with tolerances and control limits, analogue as well as RS 232 digital ouputs.

		Number of signal inputs Probe	DC
Executions with memory for one single inspection characteristic			
40.30002	**40.36002**	2	2
40.30004	**40.36004**	4	–
Executions for multi-gauging with four inspection characteristics			
40.30012	**40.36012**	2	2
40.30014	**40.36014**	4	–
Executions with possible classification of up to 30 good classes for one inspection characteristic			
40.30022	**40.36022**	2	2
40.30024	**40.36024**	4	–

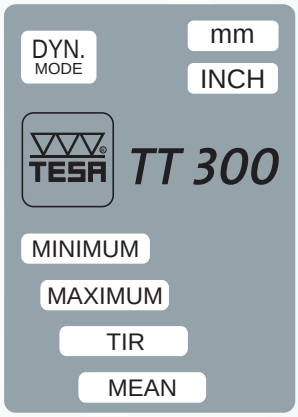
Supplied with either of the following cables depending on the country where goods are to be delivered (must be specified when ordering):

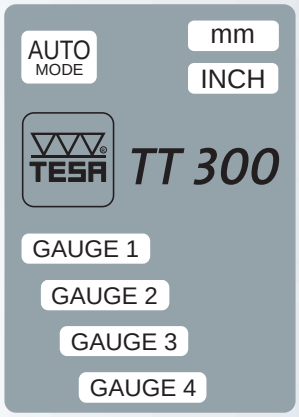
31.60015	Mains cable fitted with SEV connector, 3-wire cable type, 2 m long.
31.60016	Mains cable fitted with VDE connector, 3-wire cable type, 2 m long.
31.60017	Mains cable without connector, 3-wire cable type, 2 m long.

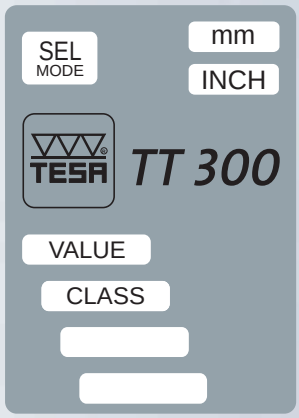
Optional Accessories

S40040021	Open Collector Adapter, low level. Consists of a plug-in module with open collector output and built-in suppression diodes for inductive load.
S40040022	Open Emitter Adapter, high level. Consists of a plug-in module with open collector outputs for positive output voltages.
S40040023	Hand switch
S40040024	Foot switch, degree of protection IP 32 (IEC 60529)
S40040025	Foot switch, degree of protection IP 65 (IEC 60529)









Displaying and measuring ranges with scale divisions or numerical intervals.

µm	µm	µm	*in*	*in*	*in*	*in*
± 1500	30	1 and 0,1	*± 0.1500*	*± 0.0590*	*0.0030*	*0.0001 and 0.00001*
± 500	10	1 and 0,1	*± 0.0500*	*± 0.0500*	*0.0010*	*0.0001 and 0.00001*
± 150	3	1 and 0,1	*± 0.0150*	*± 0.0150*	*0.0003*	*0.0001 and 0.00001*
± 50	1	1 and 0,1	*± 0.0050*	*± 0.0050*	*0.0001*	*0.0001 and 0.00001*
± 15	0,3	1 and 0,1	*± 0.0015*	*± 0.0015*	*0.00003*	*0.0001 and 0.00001*
± 5	0,1	1 and 0,1	*± 0.0005*	*± 0.0005*	*0.00001*	*0.0001 and 0.00001*

TESA® Portable Data Printer

Intelligent printer designed for the inspection of finished parts or incoming goods – Provides SPC statistics and prints the results with graphical representations.



TESA® PRINTER SPC

Can be connected to TESA measuring instruments as well as those provided with a DIGIMATIC output – TESA PRINTER SPC is able to recognise the connected instrument and will execute an automatic configuration.

	«Normal»	«Tolerance»
Statistical Features		
Lower limit of size (LSL)	–	●
Upper limit of size (USL)	–	●
Tolerance	–	●
Number of captured values		
– sampling extent	●	●
– < lowest size	–	●
– > highest size	–	●
– Part out of tolerance given as % –	●	
Lowest list value	●	●
Highest list value	●	●
Value dispersion R	●	●
Arithmetical mean $\bar{x}$	●	●
Standard deviation σ_n, σ_{n-1}	●	●
Process capability Cp, Cpk	–	●
Graphical Representations		
Position of each single value within the tolerance range (10 classes)	–	●
Histogramme	–	●
LEDs Display		
Sorting of each single value with green for *Good*, yellow for *Rework* and red for *Reject*	–	●

- *Memory capacity: 9999 single values for one feature per sample.*
- *Two function modes «Normal» and «Tolerance».*
- *Limits of size quickly set on the display of the connected instrument with subsequent transfer to TESA PRINTER SPC.*
- *Output of statistical values that are further printed with graphical representations.*
- *Printing of report headings that will be completed by the operator.*
- *Hard copies printed in a preferred language (English, German, French, Italian or Spanish).*
- *Self-contained, battery-powered printer unit for use on the fly (optional).*

✓

Matrix printer for printing on a thermal paper roll

Paper width: 110 mm
Print mode: 40 signs / line

RS 232
Data inputs (9-pin male trapezoid input)
DIGIMATIC (10-pin Ansley input)
Connector with mini-jack for the remote trigger of data transfer

Mains adaptor 230 Vac, 7,3 Vdc
Optional accessory: 6 V battery pack, rechargeable

10 °C to 40 °C

- 10 °C to 60 °C

Protection IP40 (IEC 60529)

EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2

180 x 180 x 84 mm (W x D x H)

0,55 kg

Transport packing

Identification number

Declaration of conformity

64.30000	**TESA PRINTER SPC** Printer with memory, SPC statistics and value classification; prints the results with graphical representations using the matrix printer provided with a 110 mm wide thermal paper roll; RS 232 interface.

Delivery includes:

47.65013	1 Thermal paper roll, 110 mm wide.
47.61054	1 Mains adapter, 100 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA.
47.61055	1 Mains cable EU

Optional Accessories

47.68035	6 V battery pack, rechargeable.
47.61056	Mains cable US

For cable ordering information etc., see section L.



TESA® MEMOPRINT Printer

Stand-alone, cableless printer unit for value storage and output – With data transfer capability.

- *Up to 2000 measured values can be retained in the memory that can be sub-divided into 99 distinct files.*
- *Supplied with a matrix printer that uses a thermal paper roll (57 mm wide).*
- *Made to print report headings that will be completed by the operator.*



✓

Matrix printer for printing on thermal paper

57 mm wide paper roll

100 signs / s

RS 232, bidirectional

Connector with mini-jack for the remote trigger of data transfer

Battery pack rechargeable via the mains adapter, 230 Vac, 4,8 Vdc, 0,5 Ah.

95 x 175 x 75 mm (W x D x H)

0,53 kg

Transport packing

Identification number

Declaration of conformity

64.60000	**TESA MEMOPRINT** Matrix printer with memory for printing on thermal paper. Fitted with an RS 232 interface, bi-directional.

supplied with:

47.65008	1 Thermal paper roll, 57 mm in width.
47.61035	1 Mains adapter, 230 Vac, 4,8 Vdc.

For ordering information on connecting cable and others, refer to section L.

TESAMODUL Electronic Modular System

System made up of self-contained units allowing any number of task oriented configurations – Specifically designed for multi-gauging applications as well as for use on process control devices – Housings are made of synthetic material that allows their combination or assembly in standard 19 in racks.

- *Stackable units provided with a number of functions that include powering capability, signal amplification and combination, value displaying, value storage and classification, channel switcher, among others.*
- *Dedicated system for high measuring speeds.*
- *Possible modification or extension of the overall assembly.*
- *Plastic housings reinforced with glass fibre to stand up workshop conditions.*

✓

Technical data along with a full description on each module and their possible combination available on request

Transport packing

Identification number

Declaration of conformity



TESAMODUL Assembly Units

Each unit comes preassembled into a synthetic housing with one rack included.

No			Module width in mm
41.30095	122	500 mA power supply module	80
41.30103	321	250 mA power supply module with analogue display	160
41.30094	372	500 mA power supply module with numerical display	160
41.30002	403	Measuring module with 2 probe inputs	80
41.30097	425	Measuring module with 3 probe inputs	40
41.30102	521	Klassiereinheit für 3 Klassen	40
41.30104	525	Programmable classification and display module	40
41.30107	526	Integral classification module - 3 classes 40	
41.30108	527	Interface module for automatic operating	40
41.30098	621	Measuring module with 2 probe inputs	40
41.30099	671	Measuring module with analogue memory and 2 probe inputs	40
S41074159	872	Decoder for unit 525	80
41.60025		Do-it 1 module	40
41.60027		Do-it 2 module	80
41.60029		Do-it 4 module	160



✓ Technical data along with a full description on each module and their possible combination available on request

Transport packing

Identification number

Declaration of conformity

TESAMODUL Lenth Measuring Instrument, complete

Supplied already mounted, ready-for-use.

41.30100		**TESAMODUL** **Electronic length measuring instrument**
consisting of:		
41.30094	372	Power supply module with numerical display
41.30002	403	Measuring module with 2 probe inputs
41.90190		**TESAMODUL** **Electronic length measuring instrument**
consisting of:		
41.30094	372	Power supply unit with numerical display
S41077235	404	Measuring module with 2 probe inputs





Interfacing Plug-in Boards

41.60076	RS 232 plug-in board RS 232 compatible digital output, opto-coupled.
41.60067	Plug-in board with BCD output
41.60071	Socket for BCD plug-in board

For ordering information on cables and others, see section L.

Assembly components

		Number of sockets	Housing width in mm
	Preassembled plastic housings for rack assembly		
41.60002	Housing for 1 module	0	45
41.60003	Housing for 2 modules	0	85
41.60004	Housing for 4 modules	0	165
41.60034	Housing for 1 module	1	45
41.60035	Housing for 2 modules	1	85
41.60036	Housing for 4 modules	1	165
41.60037	Housing for 4 modules	2	165
41.60005	2 Side plates with additional accessories		
41.60042	4 Joiners for 2 housing rows		
41.60011	Special screwdriver		
41.60020	3 Prop feet for tilting the instrument		
41.60001	19 in metal pull-rack		
41.60018	Cover plate for 1 module		
41.60019	Cover plate for 2 modules		
41.60038	Single 2-plug cable - 34-wire cable type		
41.60039	Double 2-plug cable - 34-wire cable type each		
41.60008	Control cable fitted with 1 molex socket - 15-wire cable type		
41.40001	Contact key for racks supplied earlier		
41.60068	Contact key for new rack assembly		

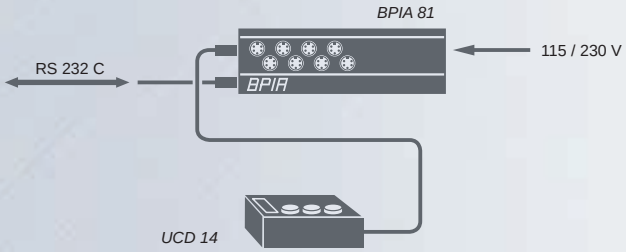
TESA® Probe Interface Boxes

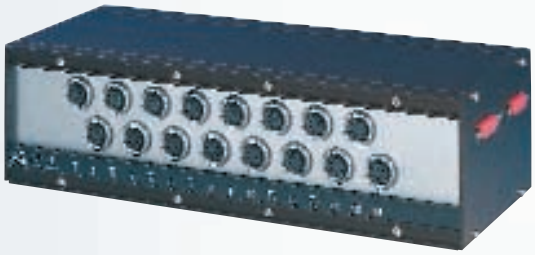
Modular system that consists of three basic models acting as probe interfaces for the preparation and further transmission of the measurement signals to a computer, whether in their digital or analogue form – Models are all key components for multigauging fixtures applied in centralised process control.

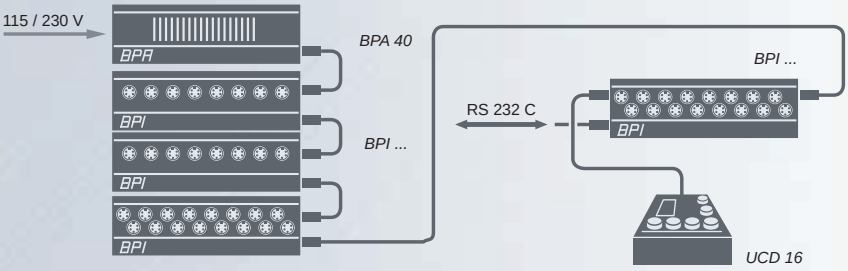
BPI Series

Signal inputs: Standard TESA probes (half-bridge)
Signal outputs: RS 232, digital

- Direct connection to the computer's serial port.
- Programmable functions owing to integrated microprocessor.
- Possible connection of up to 64 probes for optimum adaptation to your measuring applications.
- High functional reliability and precision.
- Total immunity to negative environmental effects, e.g. electrical interferences, liquid and solid contaminants.







✓
RS 232
2 mm and 0,2 mm
1 µm and 0,1 µm
± 0,3 % with reference to each measuring span
7 ms / probe or 0,2 ms / probe for BPI 88
Housings in anodized aluminium except for stackable BPIA 81
0 °C to 40 °C
- 10 °C to 70 °C
95 %, with no condensation
Protection IP51 (IEC 60529)
EN 50081-1 EN 50082-2
Transport packing
Identification number
Declaration of conformity

No		Number of probe inputs	Number of inputs/ outputs	Integrated power supply
50.30004	**BPIA 81** Probe interface box	8	6 / 8	●
50.30007	**BPIA 81-N** Probe interface box	8	1 / –	●
50.30001	**BPI 81** Probe interface box	8	6 / 8	–
50.30002	**BPI 161** Probe interface box	16	6 / 8	–
50.30003	**BPI 88** Probe interface box with quick signal processing in dynamic and static measuring	8 *	6 / 8	–
50.31000	**BPA 40** Power supply unit for 1 up to 4 probe boxes BPI 81, BPI 161 and BPI 88			

* Each measurement signal uses a separate demodulator.

	Number of inputs/ outputs	Power supply	mm	kg
BPIA 81	6 / 8	220 ÷ 240 Vac, 100 ÷ 120 Vac, 50 ÷ 60 Hz, 25 VA	94 x 322 x 134	2,5
BPIA 81-N	1 / –	230 Vac $^{+10}/_{-15}$ %, 115 Vac $^{+15}/_{-25}$ %, 50 ÷ 60 Hz	97 x 320 x 155	3
BPI 81	6 / 8	via BPA 40	94 x 322 x 134	2,1
BPI 161	6 / 8	via BPA 40	94 x 322 x 134	2,1
BPI 88	6 / 8	via BPA 40	94 x 322 x 134	2,1
BPA 40		115 ÷ 230 Vac ± 20 %, 50 ÷ 60 Hz, 140 VA	94 x 322 x 134	2,4

Accessories for BPI Series

50.33000	**BAP 10**	Extension for digital outputs with positive logic
48.66009	**BSF 10**	Stacking set for BPI 81, BPI 88 and BPI 161
50.61001	**BSF 20**	Stacking set for BPA 40 and BPIA 81

		m	Number of pins
	Connecting cables		
50.60007	BPI – BPI	0,3	
50.60008		2	
50.60003	BPI – PC	2	25 / 9
50.60002		5	25 / 9
50.60004		10	25 / 9
50.60005	BPI – PC	2	25 / 25
50.60001		5	25 / 25
50.60006		10	25 / 25





✓

Highly resistant synthetic housings

Cable length: 3 m

UCD 16: 125 x 160 x 205 mm
UCD 14: 75 x 200 x 120 mm

UCD 16: 1,3 kg
UCD 14: 1,1 kg

UCD 14: Protection IP65 (IEC 60529)

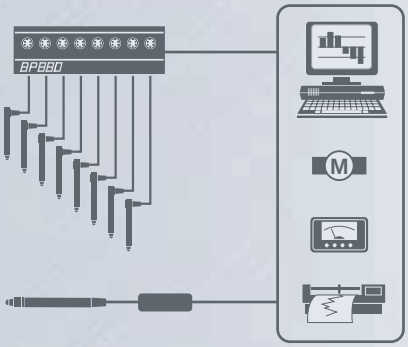
S50078033	**UCD 16**	Remote control unit for 4 electronic equipments; functions: Start 1 to 4, cancellation and plausibility test; 3 lamps for the value classification.
50.62000	**UCD 14**	Remote control unit for 1 electronic equipment; functions: Start / Stop plus cancellation; 5 lamps for value classification.

BP 880 Series

Signal inputs: *Standard TESA probes (half-bridge)*
Signal outputs: *Analogue signals*

- *Allow the connection of up to 8 probes.*



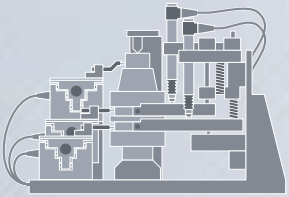


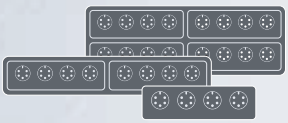
No		Number of probe inputs
48.90001	**BP 880** Probe interface with multiplex output	8
48.90002	**BP 880-Z** Probe interface with multiplex output and zeroing card	8
48.90000	**BP 880-SP** Probe interface for enhanced accuracy also with zeroing board	8
Accessory		
48.66009	**BSF 10** Stacking set for interfacing units	

Series M4P-2

Signal inputs: *TESA standard half-bridge probes*
Signal outputs: *Analogue signals*

- *System for the connection of 32 TESA standard probes*
- *Possible link to a PC through an A / D transducer*









No		mm	kg
S48001721	**M4P-2** Probe interface • 4 probe inputs with separate demodulation • Sensitivity: 73,75 mV / V / mm • Analogue outputs: ± 1 V / mm, ± 2,5 V / mm, ± 5 V / mm and ± 10 V / mm	36 x 100 x 120	0,6
S48001722	**R2M-1** Rack housings for 2 M4P-2 • 2 x 4 = 8 probe inputs	55 x 212 x 144	0,9
S48001723	**R4M-1** Rack housings for 4 M4P-2 • 4 x 4 = 16 probe inputs	160 x 212 x 144	1,2
S48001724	**MA4-1** Power supply unit • 230 ± 10 % Vac, 50 Hz • Output current: ± 15 V with up to 32 probes	55 x 212 x 144	1,1
Accessories			
S48001725	**CB37-1** Cable for connecting a PC 2 m long, two 37-pin male/female trapezoid sockets.		
S48001728	**A-SPC-1** Set for data capture consisting of: 1 A / D transducer for PC-AT, 12 bits, 16 single pin inputs or 8 differential inputs, 40 kHz reader frequency. 1 TESA BLA-11 / AD software 1 Connecting cable CB37-1 (No. S48.1725)		

✓
± 10 V with reference to the measuring range
± 0,3 % or ± 0,025 % for BP 880-SP (each refers to the measuring span)
≤ ± 250 ppm / °C
BP 880-SP: ≤ ± 100 ppm / °C
± 15 Vdc ± 5 %, ≤ ± 250 mA
15 °C to 40 °C
- 10 °C to 70 °C
30 % to 80 % (no condensation)
Protection IP50 (IEC 60529)
EN 50081-1
EN 50082-2
322 x 134 x 93,5 mm
≈ 2 kg
Transport packing
Identification number
Declaration of conformity

✓
M4P-2
± 0,5 % with reference to the measuring span
≤ ± 100 ppm / °C, stability at zero: ≤ ± 0,2 µm / °C
± 10 to ± 15 Vdc, 60 mA
15 °C to 40 °C
- 10 °C to 70 °C
30 % to 80 % (no condensation)
Protection IP50 (IEC 60529)
Transport packing

ETALON® ET-1 Electronic Length Measuring Instrument

Features integrated axial probes – Ergonomically designed – With value acquisition and displaying all in one.

- *Superslim units with just 12 mm in width – Well suited for use onto hard-to-get-at places, e.g. on multi-gauging devices.*
- *Equipped with a combined numerical and analogue display.*
- *Display unit swivelling through 100 °.*
- *Resolution to 0,001 mm.*
- *Analogue display comprising 21 LED bars.*
- *Three-coloured display for value classification.*
- *Measuring range to ± 1 mm.*
- *RS 232 output.*





✓

DIN 32876 Part 1

Analogue and numerical display

± 1,000 mm or ± 0.040 in

0,001 mm or 0.00005 in

± 0,01 / ± 0,02 / ± 0,05 / ± 0,1 / ± 0,25 / ± 0,5 and ± 1,0 mm
± 0.0005 / ± 0.001 / ± 0.0025 / ± 0.005 / ± 0.01 / ± 0.025 and ± 0.04 in

7 x 5, 8-sign dot matrix rotating through 180 °, coloured green.

3,7 x 2,1 mm (H x W)

52 mm long with programmable display orientation

21 bar LED display, each 1,75 x 5 mm (W x L)

Self-adjust resolution according to the size of the tolerance field used with active value classification or the selected measuring range

Value classification based on 2 tolerance limits with use of the bar LED analogue display (green, red and amber)

Signal polarity signs: positive (+) or negative (-). Multiplication factor: + 0,01 ... + 1,00 ... + 2,00 - 0,01 ... - 1,0 ... - 2,00

Max. perm. error 5 µm + 1 % from the measured value

1 µm or 0.00005 in

No			
46.39001	**ETALON ET-1 electronic length measuring instrument** Consists of an axial inductive probe and integrated numerical/analogue display, 0,001 mm or. 0.00005 in numerical interval; able to perform value classification; RS 232 output, without mains adapter.		
	Mains adapter For powering up to 3 ETALON ET-1		
46.39002	**A3 - EU**	230 Vac, 50 Hz, 19,1 VA	7,5 Vdc, 870 mA, 6,5 VA
46.39003	**A3 - UK**	230 Vac, 50 Hz, 19,1 VA	7,5 Vdc, 870 mA
46.39004	**A3 - USA**	120 Vac, 60 Hz, 18,3 VA	7,5 Vdc, 900 mA
	Cables For powering one ETALON ET-1 to the other		
46.39005	**AC - 15**	150 mm long	
46.39006	**AC - 30**	300 mm long	
46.39007	**AC - 60**	600 mm long	
46.39008	**ET-PC2 connecting cable** RS 232 cable for ETALON ET-1 to TESA PRINTER SPC (No. 64.30000) or a PC / AT computer (9-pin female connector)		
46.39009	**Hook wrench** For setting the measuring bolt travel.		



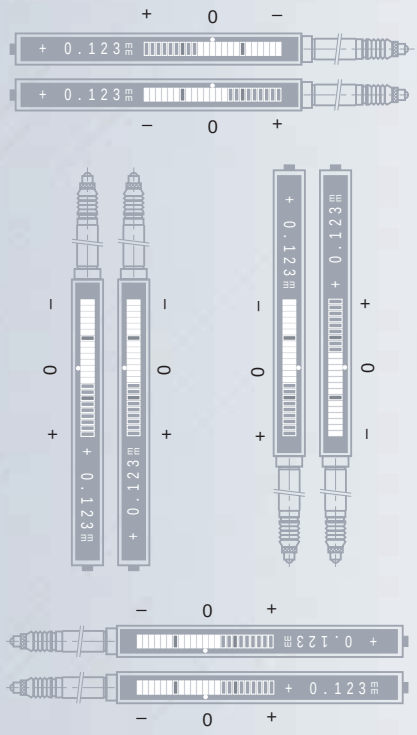


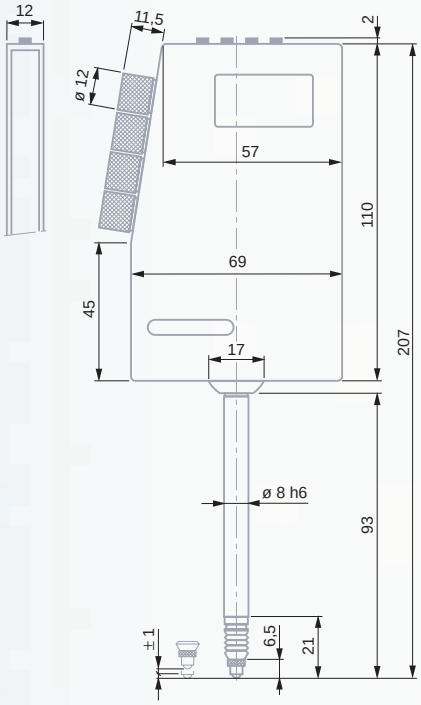
- *Superslim form*
  Value capture and displaying provided in a measuring unit that is just 12 mm wide also permits complex multigauging fixtures to be mounted in compact assembly.



- *Display unit and axial probe can be titled through ± 50 ° to each other to allow display reading in the most favourable position.*

- *Possible orientation of the combined numerical/analogue display*





Axial probe

With mechanical contact, swivelling through ± 50 ° relative to the instrument axis

Measuring bolt guided on a plain bearing and protected by a rubber below

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread.

Measuring travel of 3 mm with upper and adjustable lower stops at a distance of 1,5 mm max. from electrical zero.

Hardened steel measuring bolt

Fixing shank with a 8 h6 dia.

0,8 N *
Force increase*: 0,8 N / mm

Mechanical frequency limit: 30 Hz ± 30 %

0,25 µm / °C

General

RS 232

7 to 9 Vdc, 220 mA

5 °C to 40 °C

- 40 °C to 50 °C

Operating and storage: 95 %

Protection IP50 (IEC 60529)

89/336/EWG of 3.5.1989, 91/31/EWG of 28.4.92, 93/68/EWG of 22.7.93

235 g

Transport packing

Identification number

In-house calibration certificate

* Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

Precision TESAMODUL

✓

Technical data and other details available on request

Calibrating Standards

✓

Simulate half-bridge probes with 73,75 mV / V / mm

Suited for
Frequency: 13 ± 0,65 kHz
Voltage: 3 ± 0,015 V_{eff}
(2 symmetrical voltages of 1,5 V_{eff})
Impedance:
≤ 0,2 Ω (output)
or
2000 Ω,(input)

Input impedance at 13 kHz:
970 ± 50 Ω; normal:
0 µm: 2150 ± 50 Ω
Phase of input impedance at 13 kHz:
71 ± 2 °
Input resistance:
100 ± 5 Ω
Output impedance at 13 kHz: 1000 ± 2 Ω
Phase of output impedance at 13 kHz:
0,2 °

± 3 ppm / °C ageing:
± 30 ppm / a

20 ± 0,5 °C, stabilisation time: 8 h

10 °C to 35 °C

- 10 °C to 70 °C

Calibration:
40 % to 60 %.
Operating: 20 % to 80 %.
Storage: 5 % to 95 %.
With no condensation.

18 mm dia., 118 mm long

≈ 45 g

Protection IP40 (IEC 60529)

Inspection report

Calibration devices

Designed for calibrating and adjusting TESA length measuring equipments fitted with standard TESA inductive probes (half-bridge probes).

Calibration of TESA Inductive Probes

The regular system consists of the following components:

- *1 Precision TESAMODUL No. S41077248.*
- *1 Set of calibrating standards No. S41077249 with nominal values of ± 0 µm, ± 100 µm and ± 1000 µm.*
- *1 Measuring support such as the INTERAPID UP 160 (No. 16.39041) equipped with the UPZ 40 measuring table (No. 16.40405).*
- *1 Set of gauge blocks accurate to the calibration grade K (see section I).*
- *1 Precision digital voltmeter, min. 5 1/2 digits.*

No	
S41077248	**Precision TESAMODUL**
consisting of:	
	1 Measuring unit 429
41.30095	1 Power supply unit 122 - 500 mA



Calibration of Measuring Instruments

Calibrating standards available as single item or in sets.

No	µm	*in*	Marked with
S41078077	± 0		32.70700
S41078078		*± 0*	32.70708
S41078079	± 3		32.70704
S41078231	± 5		32.70714
S41078080	(± 7,62)	*± 0.0003*	32.70709
S41078081	± 10		32.70705
S41078229	± 19		32.70720
S41078082	(± 25,4)	*± 0.001*	32.70710
S41078083	± 30		32.70706
S41078331	± 50		32.70715
S41078084	(± 76,2)	*± 0.003*	32.70711
S41078228	± 100		32.70701
S41078230	± 190		32.70717
S41078086	(± 254)	*± 0.01*	32.70712
S41078087	± 300		32.70707
S41078332	± 500		32.70716
S41078088	(± 762)	*± 0.03*	32.70713
S41078751	± 1000		32.70702
S41078752	± 1900		32.70719

Calibrating Standards

Also called «Dummy Probes», they serve as resistance dividers. Each standard produces a given length dimension simulated electrically with high accuracy. The system provides both positive and negative values. Those given in the table are all nominal values.

These products are calibrated and come with proper inspection report that shows the values as measured (actual values) with their related uncertainty of measurement.

The calibrating standard will be connected to the instrument instead of the regular probe. Calibration and adjustment of the measuring instrument - if needed - are subject to a number of criteria that must be respected. For a further information with regard to this, refer to your instruction manual or ask our specialists.

No	µm	µm	µm
Set of 3 calibrating standards			
S41078227	± 3	± 30	± 300
S41077249	± 0	± 100	± 1000
S41000429	± 30	± 300	± 1000
Set for calibrating TESATRONIC			
S41078654	± 190	± 1900	
S41078612	Cable for analogue output		

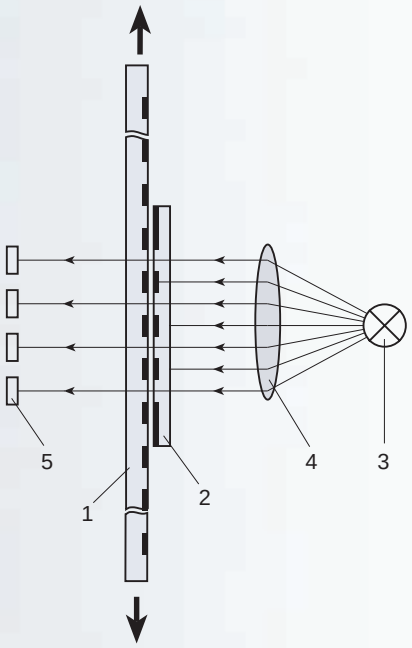


The way they work

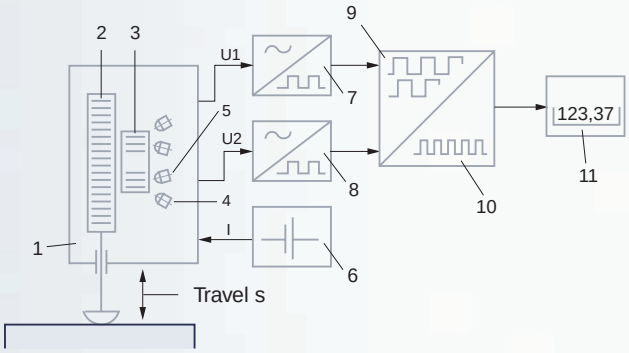
All electronic length measuring systems shown in this part of our catalogue work on the basis of value sensors in the form of digital probes with axial displacement. These probes generate the digital capture of the measurands (measured sizes), which are changing as the incremental linear scale lying in front of the scanning unit fitted with a reticle is moved. Divisions on both features are identical. The opto-electronic detection of these changes uses the transmitted light.

Optical material measures are made up of quality glass gratings with a number of divisions distributed over the entire length. These divisions consist alternately of lines and blanks, which represent the individual increments. The distance from line to line or blank to blank is the dividing period, e.g. 20 µm or 40 µm.

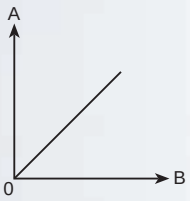
As the gratings of both the scale and reticule are moved in relation to one another, the opaque divisions on the scanning reticle are covered alternately by the lines and blanks on the linear scale (i.e material meassure). This provides a bright/dark information, which is then converted into electrical signals. After their analogue/ digital conversion, these signals are shown on the up/down computing counter as the sum of counting impulses equal to the amount of the measurand changes. So as to increase the resolution that results from the dividing periods, the probe signals are split by electronic means (interpolation).



1 Incremental linear scale (material measure) associated with the measuring bolt
2 Divided scanning unit
3 Light source
4 Condensor
5 Photo diode



1 Probe housing
2 Linear scale divided into increments
3 Divided reticle
4 Light source
5 Photodiodes
6 Power supply
7 Conversion of signal U_1
8 Conversion of signal U_2
9 Signal scanning
10 Multiplied evaluation of the signal (interpolation) and direction discrimator
11 Numerical display



Typical linearity where digital capture of the measurands is based on incremental linear scales.
A Counting impulses
B Travel







TESA® TG Digital Measuring System

Ideal for long measuring travels – Incremental probes with either a 30 mm or 60 mm measuring span – Numerical display to 0,001 mm or 0,0005 mm – Analogue display with illuminated colour background for value classification – Value storage ability – PRESET function - To name just a few.

TG Computing Counter

✓

DIN 32876 Part 2

Up/down counter with one probe input

LC display with illuminated colour background for value classification with green, amber and red. 37 x 37 mm display size.

6 decades plus minus sign.

0,001 mm and 0,0005 mm or 0.00001 in

For probes from another brand : 0,0002 instead of 0,0005 mm if dividing periods are 10 µm or 0,0001 instead of 0,0005 mm if they are 2 µm.

9 x 4,5 mm

According to the selected tolerance range

Scale length: 40 mm

25

20 keys available for entering values and selecting functions

Power supply: 5 Vdc (measuring system).

Output: ± 5 ± 1 % Vdc according to the selected tolerance range

Max. excess voltage: 25 % in relation to ± 5 Vdc

Output impedance: < 100 Ω

Resolution: 12 bits

RS 232, bidirectional

Power supply: 7 Vdc. Power consumption: 0,3 A.

Continued on next page



TESA® Computing Counters TG - C 10 and TG - C 11



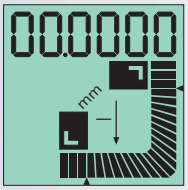


46.30004	**TESA TG - C 10 Computing Counter**	Up/down computing counter with numerical display*, 0,001 and 0,0005 mm or 0.00001 in numerical intervals. Features 1 probe input, value classification and value storage capabilities, RS 232 interface.
46.30008	**TESA TG - C 11 Assembly Unit**	Same execution as above, but to be mounted*. 138 x 52 mm cross section.

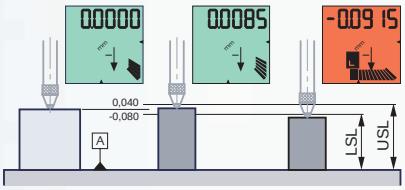
Each unit is supplied with the following item:

47.61054	1 Mains adapter, 110 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

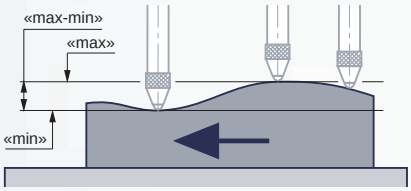
* Compatible with the probes from HEIDENHAIN or from any other brand providing the shape of both the signal and connector is alike.

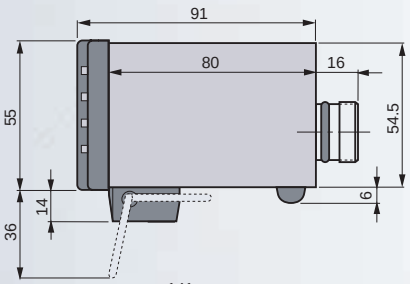


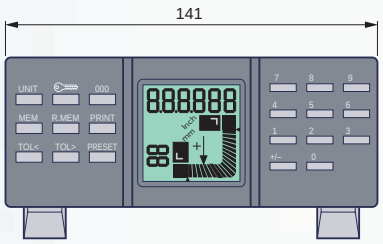
Input of both lower and upper specification limits (LSL and USL)

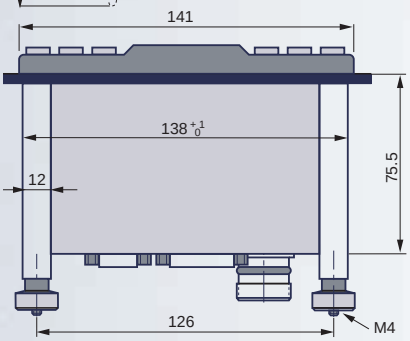


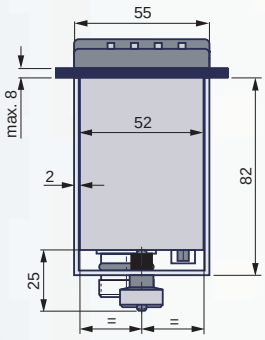
Digital capture of both extrem values «max» and «min» as well as difference «max - min» in dynamic measurement











10 °C to 40 °C

- 10 °C to 50 °C

80 %

Protection (IEC 60529):
TG - C 10: IP40
TG - C 11: IP54*
* valid for the front face

EN 50081-1, EN 50081-2, EN 50082-2

TG - C 10: ≈ 650 g
TG - C 11: ≈ 500 g

Transport packing

Identification number

Declaration of conformity



TESA® Digital Probes TG 30 and TG 60

	Digital Probes*
	Axial probes with incremental glass scale
46.30006	**TESA TG 30** with a 30 mm measuring span
S46060525	**TESA TG 30** with a 30 mm measuring span as well as rubber bellow
46.30007	**TESA TG 60** with a 60 mm measuring span
Each probe is supplied with:	
19.60005	1 Retract lever for the measuring bolt

* Compatible with the probes from HEIDENHAIN or from any other brand whose signal and connector shape is alike.

TG probe

SWISS MADE ✓

DIN 32876 Part 2

Axial probe used in any position

Measuring bolt guided on a plain bearing

M2,5 thread for the measuring insert

Bolt displacement:
- mechanical retraction device: see under standard accessories
- pneumatic retraction: see table

Cable: 4,3 mm dia. x 3 m.
Max. cable extension: 10 m.

Incremental glass scale

0,002 % / °C

10 °C to 40 °C

- 10 °C to 50 °C

80 %, with no condensation

Protection: IP54* (IEC 60529)
* probe housing only

Power supply:
5 ± 10 % Vdc

Output signal
± 11 μA_{pp}
Sinusoidal signal form

Transport packing

Identification number

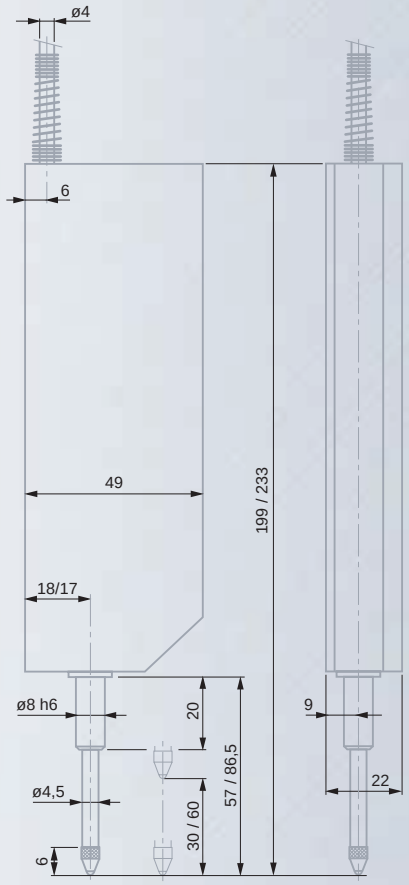
Inspection report

Declaration of conformity

TESA electronic probes		TG 30	TG 60
	mm	30	60
	mm	30,4	60,4
Dividing and signal periods	µm	20	40
	µm	1,0	2,0
	µm	1,0	1,0
	µm	1,0	1,0
Close to			
– lower bolt endstop*	N	0,85	0,90
	N	± 0,15	± 0,20
– upper bolt endstop*	N	1,10	1,45
	N	± 0,20	± 0,25
Force hysteresis*	N	0,1	0,15
Force hysteresis*	N	2,0	2,0
Pneumatic bolt retraction by vacuum or air pressure.			
Position of use:			**
– vertical	bar	0,55 - 0,70	0,60 - 0,75
– horizontal	bar	0,42 - 0,57	0,52 - 0,67
– vertical (in suspension)	bar	0,30 - 0,45	0,45 - 0,60
	m / s	1,4	2,0
	g	350	365
Moved mass	g	28	27

* Applicable with the probe used in vertical position, with downwards oriented measuring bolt, as well as in static measuring.

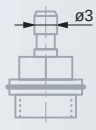
** TG 60 cannot be used with air pressure.



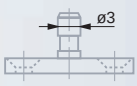


Optional Accessories

No		
	Connectors for vacuum lift of the measuring bolt	
19.60009	Suitable for TESA TG 30 (order No. 46.30006)	
19.60008	Suitable for TESA TG 60 (order No. 46.30007)	
	Air pressure actuator	
19.60010	Suitable for TESA TG 30 (order No. 46.30006)	



19.60009



19.60008



19.60010

ETALON® EG Digital Measuring System

Uses incremental probes having either a 13 mm or 30 mm measuring span – Numerical display to 0,001 mm or 0.00004 – Measures using one or two probes – Performs sum and differential measurements – Includes PRESET function – Allows value classification and value storage – Usable as built-in unit.



ETALON® Computing Counter EG - C 60



46.39000	**ETALON Computing Counter EG - C 60** Up/down computing counter with numerical display, 0,001 or 0.00004 in numerical intervals. Features 2 probe inputs. Value classification and value storage capabilities. RS 232 digital output. Usable as built-in unit.

Supplied with:

47.61054	1 Mains adaptor, 110 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

EG - C 60
Computing counter

✓

DIN 32876 Part 2

Up/down computing counter with 2 probe inputs for EG - 10 and EG - 30

Luminous diodes (LEDs)

7-segment per sign, red colour.

6 decades plus minus sign.

0,001 mm or 0.00004 in

14 mm high
9 mm wide

Waterproof keypad

Single, sum and differential measurements as illustrated in the examples

Value classification based on both upper and lower specification limits previously entered (LSL and USL) as well as result displaying through luminous colour diodes

Value storage and HOLD function as illustrated

RS 232, opto-electronic

Relay controlled output signal for value classification. Max. perm. load: 30 Vdc, 1 A. Duration of the switching signal: ≤ 30 ms

Switching input signal for the functions HOLD, START and ZERO-SET

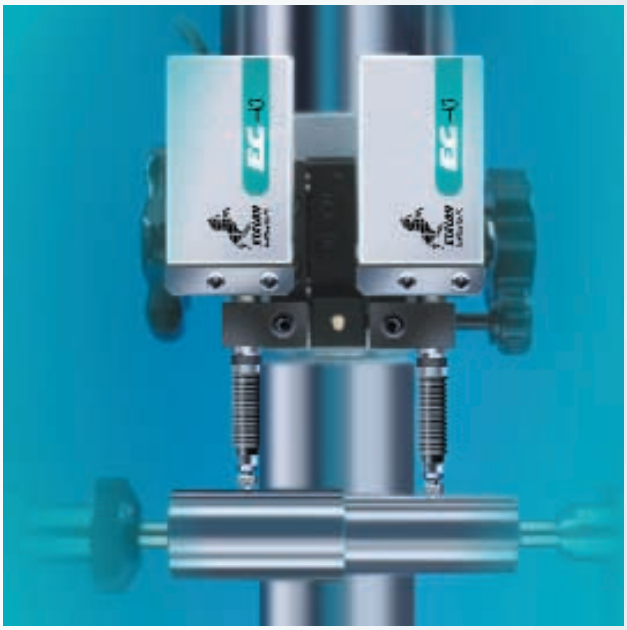
SUB-D connector, 15-pole female

Power supply: 6 Vdc. Power consumption: ≤ 0,7 A

0 °C to 55 °C

ETALON® EG - 10 and EG - 30 Digital Probes

	Digital probes Axial probes with incremental glass scale protected against the penetration of liquids
46.19000	**ETALON EG - 10** with a 13 mm measuring span
46.19001	**ETALON EG - 30** with a 30 mm measuring span





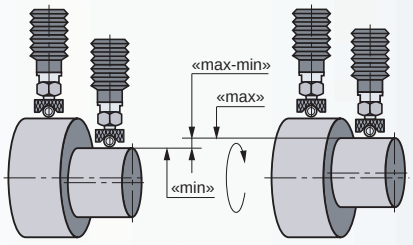
- 10 °C to 70 °C
- Operating and storage: 80 %
- Protection (IEC 60529): IP40. Front face: IP 54
- EN 50011:1991, group 1, class A, EN 50082-2:1995, 89/336/EWG of 3.5.89
- Opening for mounting EG - C 60: 161 $_0$ / $^{+0,5}$ mm wide 81 $_0$ / $^{+0,5}$ mm high
- ≈ 1,5 kg
- Transport packing
- Identification number
- Declaration of conformity

EG - 10 and EG - 30 axial probes

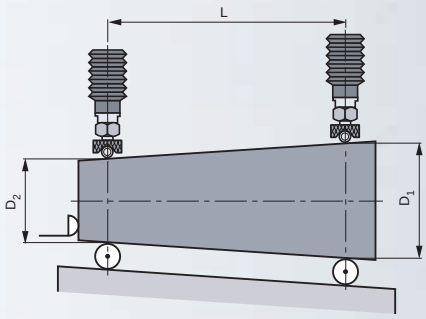
- ✓
- DIN 32876 Part 2
- Use of probes in any position
- Measuring bolt guided on a plain bearing. Rubber bellow for protection.
- M2,5 thread for the measuring insert
- For the mechanical or pneumatic retraction of the measuring bolt, see under optional accessories.
- 4 mm dia. x 1,9 m cable. Max. extension: 30 m.
- Incremental glass scale. Signal periods: 1 µm. 1 reference point.
- 0,6 m / s

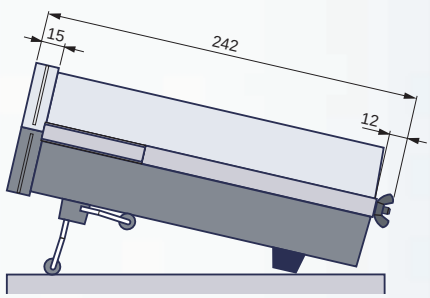
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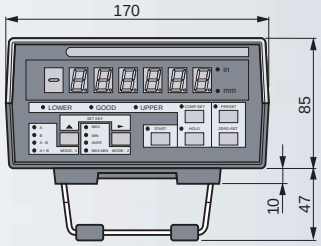
Differential measurements for detecting run-out errors (extrem values «max - min»)

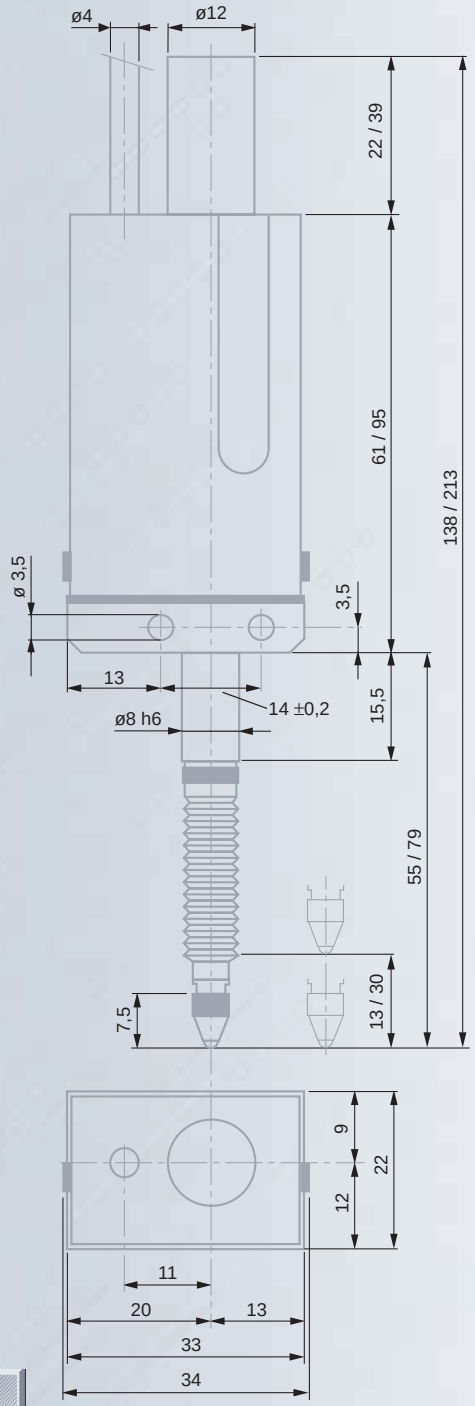


Differential measurements using 2 probes for inspecting cones and inclinations.









ETALON axial probes		EG - 10	EG - 30
	mm	13	30
	µm*	1,0	1,5
	µm*	0,6	0,6
	µm*	1,0	1,5
	N*	≤ 1,5	≤ 2,0
Force increase	N / mm*	0,0284	0,0188
Force hysteresis	N*	0,1	0,2
Max. transverse force	N	1,0	1,0
	g	230	260
Moved mass	g	20	30

* Applicable with the probe used in vertical position, with downwards oriented, measuring bolt as well as in static measuring.

Optional Accessories

19.60005	**Lift lever for bolt retraction**
	Pneumatic retraction device To be connected to air pressure. For technical data, see on the right side
46.19002	**AA - 6100** convenient for EG - 10
46.19003	**AA - 6101** convenient for EG - 30

Each consisting of:

1 Connector (M8) – 1 Pneumatic jack – 1 Pressure reducing valve – 1 Setting screw

8,5 µm / °C

10 °C to 40 °C

- 10 °C to 55 °C

75 %, with no condensation

Shock resistance to ≤ 980 m / s^2. Vibration resistance to 98 m / s^2

Protection: IP64 (IEC 60529)

Power supply 4,5 to 6,0 Vdc. Power consumption ≤ 100 mA

Transport packing

Identification number

In-house calibration certificate

Declaration of conformity

Pneumatic bolt retraction

✓

Operating pressure range: 2,5 to 7 bar. Max. perm. pressure: 9 bar.

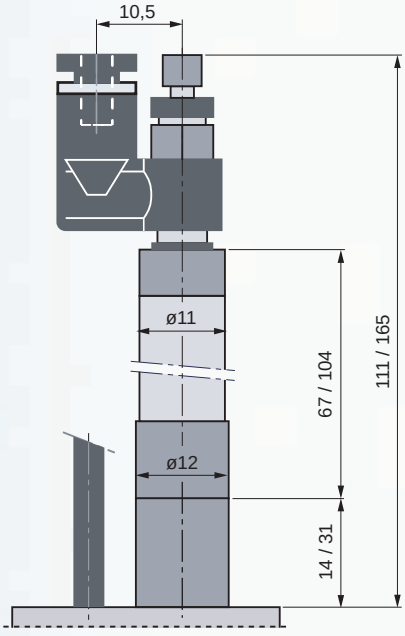
Retraction range:
0 to 13 mm
AA - 6100 (EG - 10)
0 to 30 mm
AA - 6101 (EG - 30)
Probe life:
5 millions travels

40 g (AA - 6100)
50 g (AA - 6101)

Transport packing









Connecting Cables and Accessories for Data Transfer

Plug-in Chart

Instrument Type \ Peripherals	Personal Computer 9-pin	Personal Computer 25-pin	TESA PRINTER SPC	RS 232 Printer	TESA MEMOPRINT	Gage Port NT 2 and NT 4	ROCH Interface MULTI - 4V	Cable w/o connector
TESA DIGIT-CAL «capa µ system» TESA MICROMASTER «capa µ system» TESA IMICRO «capa µ system» TESA ALESOMETER «capa µ system» TESA DIGICO 20	1 7		1 7			31	1 7	5
TESA DIGIT-CAL ETALON callipers ETALON depth callipers ETALON digital scale units TESA DIGICO 10 / 11 / MIN/MAX ETALON height and scribing gauges	1		1			31	1	5
TESA-DIGIT TESA IMICRO SM TESA TRIOMATIC			12			12		
TESA DIGICO 1 / 2	6+19	6	13			13	6+19*	
TESA RUGOSURF	8		8				8 *	
TESA MICRO-HITE 100 TESA-µHITE	9		9				9	
TESA MICRO-HITE, models 10 / 11	3		3	4	10	32	3	
TESA-HITE plus	1		1			31	1	5
TESA-HITE	7		7				7	
ETALON and ROCH CAPAX 2000	15	16					15 *	
TESATRONIC TT 10	3		3	4		32	3	
TESATRONIC TT 20 / TT 60 / TT 80	1 7		1 7			31	1 7	5
TESATRONIC TTD 20 / TTD 60 TESAMODUL	3		3	4		32	3	
ETALON ET-1	2		2					
TESA TG	9		9				9	
ETALON EG	3		3				3	

* Requires also the use of the cable No. 981680274 (see page L-76).

			Number of pins	Type		Number of pins	Type	m	
Connecting cables									
1	**47.61046**	Special, opto			Sub-D	9	f	2	
2	**46.39008**	Special			Sub-D	9	f	2	Type ET-1-PC
3	**47.61023**	MiniDIN	8	m	Sub-D	9	f	2	
4	**47.61024**	MiniDIN	8	m	Sub-D	25	m	2	
5	**47.61027**	Special, opto			without			2	
6	**47.61038**	Special			Sub-D	25	f	2	With socket
7	**47.61049**	Special, opto			Sub-D	9	f	2	Bi-directional
8	**47.61051**	Special			Sub-D	9	f	1	
9	**47.61052**	Sub-D	9	m	Sub-D	9	f	2	
10	**47.65008**								
11	**53.60004**	Special	8	m	Special	8	m	2,5	RS 485
12	**60.60002**	Special			Ansley	10	f	2	
13	**S47078588**	Special			Ansley	10	f	2	
14	**S53001564**	Special			Sub-D	25	f	2	
15	**981680037**	Special			Sub-D	9	f	2	
16	**981680035**	Special			Sub-D	25	f	2	
17	**981680089**	Special			Special,opto			2	*
18	**981686113**	Special			Sub-D			2	Centronics **
Adapter for cables									
19	**47.61017**	Sub-D	25	m	Sub-D	9	f		
20	**47.61019**	Sub-D	25	m	Sub-D	25	m		
21	**53.60005**	Special	8	f	Sub-D	9	f	for No. 53.60004 RS 485 to RS 232	

Additional Accessories			
22	**47.61037**	Mains adapter, 230 Vac, 9 V, 200 mA, 1,8 VA	TESA DIGICO 1 / 2
23	**47.61054**	Mains adapter, 110 to 240 Vac, 50to 60 Hz, 6,6 Vdc, 750 mA	Universal
24	**47.61055**	Mains cable EU for adapter No. 47.61054	
25	**47.61056**	Mains cable USA for adapter No. 47.61054	
26	**47.61057**	Mains adapter, 110 Vac	TESA DIGICO 1 / 2
27	**47.68000**	Hand switch for triggering data transfer	
28	**47.68001**	Foot switch for triggering data transfer	
29	**47.61058**	9-pin / 9-pin adapter for connecting either of the hand or foot switch	
30	**981680040**	Foot switch for triggering data transfer to the control panel used in conjunction with the ETALON or ROCH CAPAX 2000 height gauge	

* For the connection of instruments with opto-coupled RS 232 interface to the control panel used with ETALON or ROCH CAPAX 2000 height gauge

** Connecting cable for parallel data transfer from CAPAX 2000 control panel to printer with Centronics interface

Other connecting cables and accessories available on request.

Connecting Cables for Electronic Inclinometers

Transport packing

No	Cables for connecting:		Number of pins	Type	Number of pins	Type
53.60004	TESA ClinoBEVEL 1	RS 485	Special 8	m	Special 8	m
53.60004 **53.60005**	TESA ClinoBEVEL 1	RS 232 (RS 485) Adapter	Special 8 Special 8	m f	Special 8 Sub-D 9	m f
On request	TESA ClinoBEVEL 2	RS 232	Special 8	m	Sub-D 9	f
On request	TESA MICROBEVEL 1	RS 485	Special 6	m	Special 8	m
On request **53.60005**	TESA MICROBEVEL 1	RS 232 (RS 485) Adapter	Special 6 Special 8	m f	Special 8 Sub-D 9	m f
On request	TESA BEVELmeter 1	RS 232	Special 8	m	Sub-D 9	f

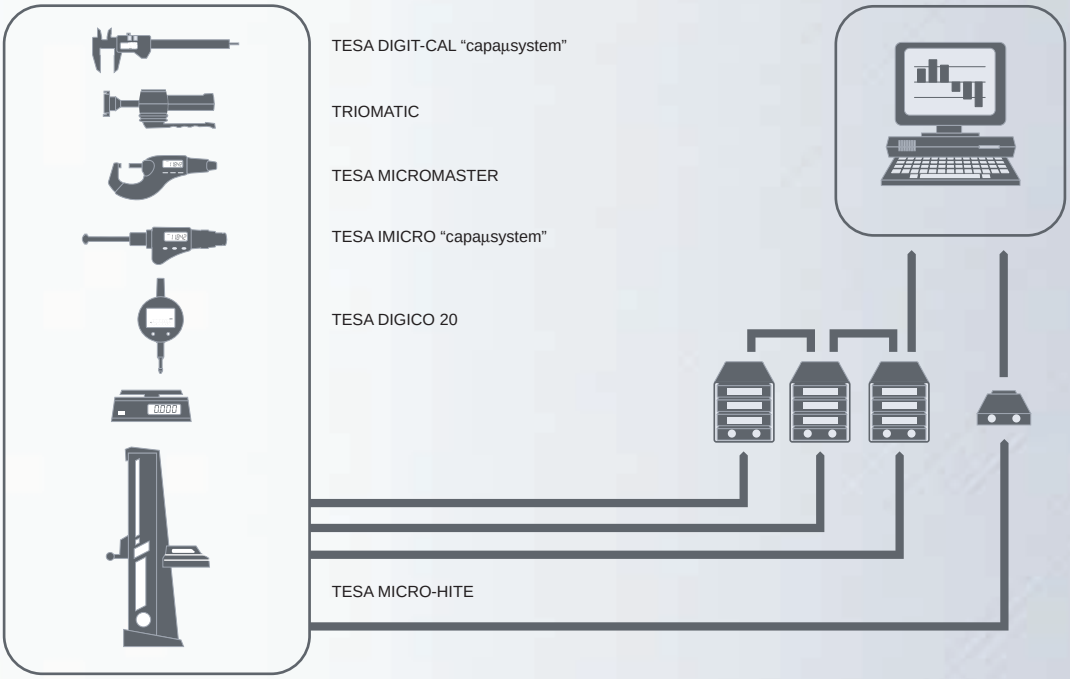
GagePort Interfacing Modules

Used to link 2 or 4 measuring instruments fitted with an RS 232 output to the interface of a PC, for example.

Transport packing

	No		Number of measuring instruments
Interfacing Modules			
	S49078420	**NT 2**	2
	S49078488	**NT 4**	4

	No		Number of pins	Type		Number of pins	Type	m
Connecting Cables								
31	**47.61029**	Special, opto			Ansley	10	f	2
32	**47.61022**	MiniDIN 8		m	Ansley	10	f	2



ROCH Interface MULTI - 4V

Allows a direct connection of up to 4 measuring instruments fitted with a RS 232 digital output such as length measuring instruments, pressure gauges, dynamometers, scales and the like – Up to 10 MULTI - 4V can be linked together, thus enabling up to 40 measuring instruments to be connected to the RS 232 output of a computer unit such as a PC for data processing.

- *Serial port for both mono and bidirectional data transfer – RS 232 standard or opto-coupled.*
- *Automatic recognition of the connected instrument.*
- *Data transfer triggered to the connected instrument directly or using either the hand or the foot switch.*

✓

Robust sheet steel case

Mains adapter: 220 Vac, 12 Vdc, 200 mA

Transport packing





983780020	**ROCH Interface MULTI - 4V** 4 Ports RS 232 on input side (Sub-D, 9-pin / f) 1 Port RS 232 on output side (Sub-D, 9-pin / m) Provided with mains adapter.
Accessories	
981680037	Cable for connecting ETALON and ROCH CAPAX 2000 to the ROCH Interface MULTI - 4V. Requires the use of the cable No. 981680274 (see hereafter).
S470785088F	Cable for connecting TESA DIGICO 1 to a number of 2 ROCH Interface MULTI - 4V
981680275	Cable for linking 2 Interfaces MULTI - 4V. Connector for 4 hand or foot switches for triggering data transfer
981680279	Adapter cable for MITUTOYO devices. Connectors: Ansley, 10-pin.
981680274	Adapter cable for pressure gauges, dynamometers, scales por instruments of another type provided with an RS 232 digital output. Connector: Sub-D 9-pin.
	Cables with a Sub-D connector (9-pin / f) for connecting one ROCH Interface MULTI - 4V to a PC.
981680276	2 m in length
981680277	5 m in length
981680278	10 m in length

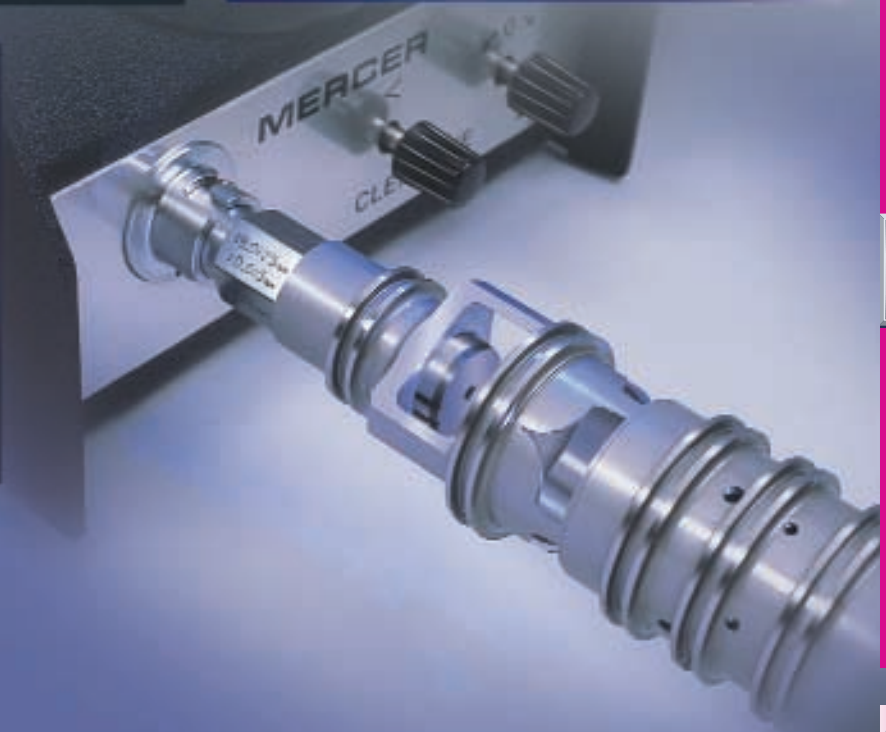
Hand or foot switches for data transfer as well as other connecting cables are listed on both pages L-73 and L-74.

Pneumatic Length Measuring Systems









Non-Contact Measuring with MERCER

The MERCER air units and systems are mostly used for measuring cylindrical workpiece features such as bores and shafts. Non-contact air gauging offers many advantages, namely:

- *All the measurements are taken with high reliability and repeatability is excellent since the sensors in the form of air plugs or air rings resort to no mechanical parts for the signal transmission.*
- *Non-contact measurement eliminates the risk of damaging the workpiece surface.*
- *Air pressure acts as a powerful cleaner at the measuring points, thus enabling the user to inspect even dirty, oiled and greased surfaces or those exposed to solid contaminants securely.*
- *Linear displaying of a number of signals is highly accurate with up to 10'000x magnification.*

Air measures precisely

Air flowing through the plug from the gauge unit escapes through two or more jets (1) directly on the surface to be measured (2). Any dimensional variation of the workpiece causes the clearance (3) between each jet and the workpiece to change. This leads to a difference in pressure, which is converted by the MERCER gauge units prior to be measured.

Air gauging general principles and applications are described hereafter along with all relevant product features.

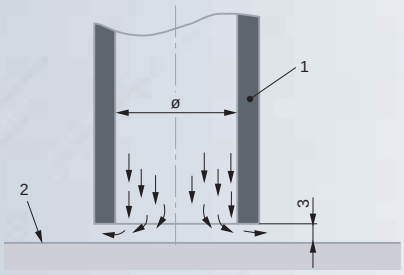
Safety with speed

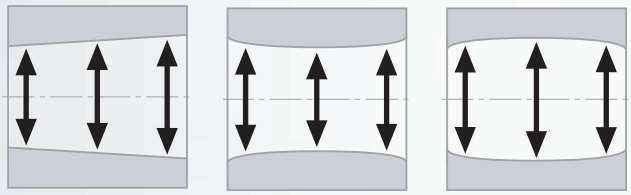
***Jet plug gauges** are used for bore measurement while **jet ring gauges** serve for shaft inspection. They are equipped with a guiding cylinder which makes them self-centring into the part feature to be checked. Inexperienced users and qualified staff will both be convinced of the safety use and speedy action of air gauging systems.*

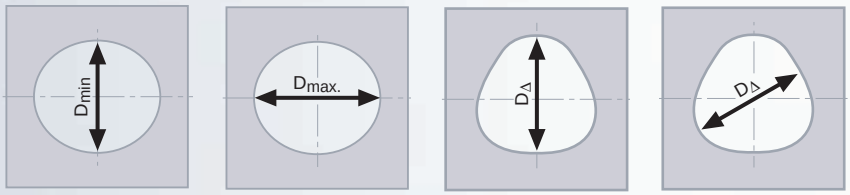
Air plugs and rings are fitted with two jets lying 180° apart from one another. As they work in sum measurement, bore and shaft diameters can be established through 2-point measurements.

With the measurements taken at several points, any variation in diameter can be detected and, therefore, form and shape errors as well.

1 Air jets
2 Part surface
3 Clearance



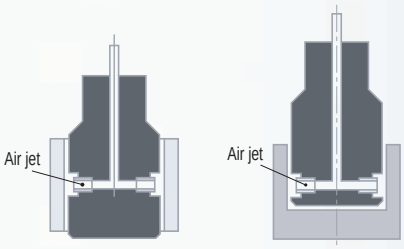




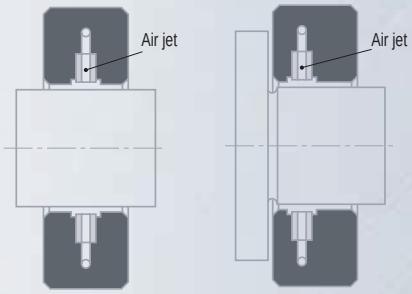
When measuring ovality, the capture of the two diameters d_{max} and d_{min} also delivers the circularity error, which corresponds to the half of the difference between both diameters.

When measuring at several points, the mean diameter is captured at each point so that the circularity error cannot be detected through a 2-point measurement.

Depending on their jet combination, plug gauges may be used for measuring blind bores and through bores.



According to their type, ring gauges permit to measure close to the shoulder or to check short centring shoulders.



Operating Principle

Air gauging systems are based on pressure changes. They determine the volume of the air escaping from the smallest hole of the pipe it passes through.

To ensure proper functioning of air gauging systems, the clearance between the measuring head and the workpiece, which is a quarter of the jet bore diameter, shall be contained within the bore cross-section.

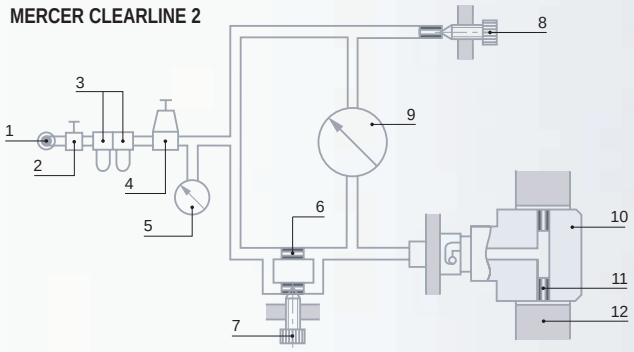
The MERCER products use compressed air to convert any change in the air flow induced by the dimensional variations of the workpiece into variations in pressure. They all work according to the pressure measuring method.

CLEARLINE 2 and MULTI-WAY CLEARLINE gauge units feature a top mounted pressure gauge that records and displays any variation. Pressure is also used for the signal amplification.

The MERCER Air/Electronic Converters in turn change the variations in pressure into variations in length resulting from the movement of a membrane, which is detected by an electronic length measuring instrument fitted with an inductive axial probe. The signals are electrically amplified and further displayed using a MERCER or TESA electronic gauge unit.

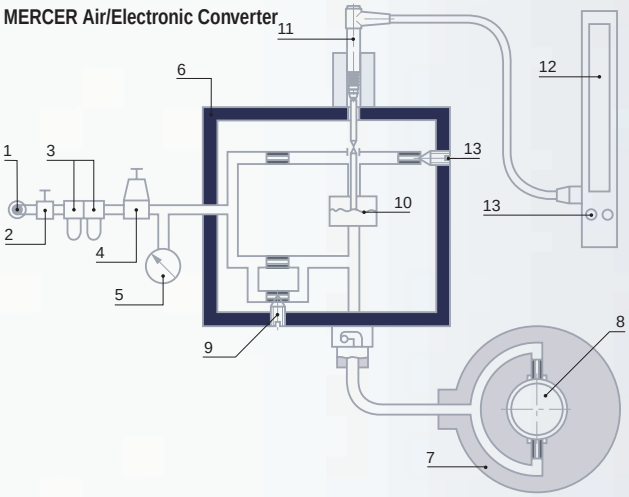
Two setting standards (setting plugs or rings) of known size are used to adjust the unit for magnification and datum zero.

MERCER CLEARLINE 2



1 Air supply
2 Check valve
3 Double filter dealing with liquids, vapour and solid contaminants
4 Pressure regulator
5 Pressure gauge
6 Pneumatic sleeve
7 Magnification regulator
8 Zero regulator
9 Dial
10 Value sensor (air plug gauge)
11 Air jets
12 Bore to be checked

MERCER Air/Electronic Converter



1 Air supply
2 Check valve
3 Double filter dealing with liquids, vapour and solid contaminants
4 Pressure regulator
5 Pressure gauge
6 MERCER Air/Electronic Converter
7 Value sensor (air ring gauge)
8 Workpiece (shaft)
9 Magnification regulator
10 Membrane
11 Inductive axial probe
12 Electronic length measuring instrument
13 Zero regulator

Key Features

- *Easy connection to universal air mains - No need for power supply.*
- *Insensitive to magnetic, electro-magnetic or radioactive fields.*
- *Every component is robustly housed to withstand harsh workshop conditions.*
- *Clear open scale with scale numbering and graduations giving comfortable reading even at a great distance.*
- *Oil filled pressure gauge to ensure stable readings and fast response.*
- *Adjustable tolerance pointers.*
- *Precise high magnification with the use of two settings standards that reproduce the upper and lower size limits of the workpiece.*
- *Regulators for both the magnification and reading.*
- *Double filtration for liquids, vapour and solid contaminants along with check valve.*
- *Low air consumption.*
- *Rapid gauge connection trough the bayonet mount.*
- *90° adaptor useful for measuring in recesses. Also provides optimum convenience in use of the gauge unit.*
- *Depth collars to be mounted on the body of the 'S', 'L' and 'M' type plugs - thus permitting quick measuring at defined measuring points.*
- *Extensions for air plugs from 14 mm / 0.32 in in diameter.*



Also available upon request:

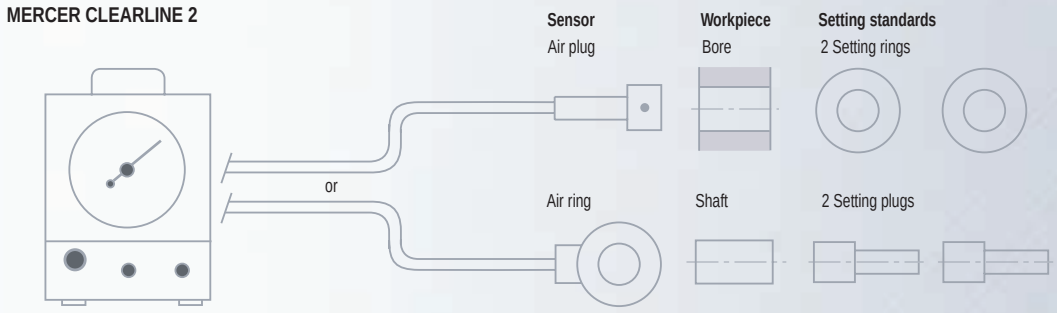
- *3-jet plug gauges in nominal diameters exceeding 11 mm / 0.44 in.*
- *Plug gauges for deeper bores.*
- *Plug gauges in nominal diameters exceeding 150 mm / 5.9 in.*
- *Other materials or coatings for the sensors.*

Air Gauging Systems - Possible Configurations

MERCER CLEARLINE 2 (with a single measuring channel)

Single measurement of trough bores, blind bores and shafts (with those made close to the shoulder also included).

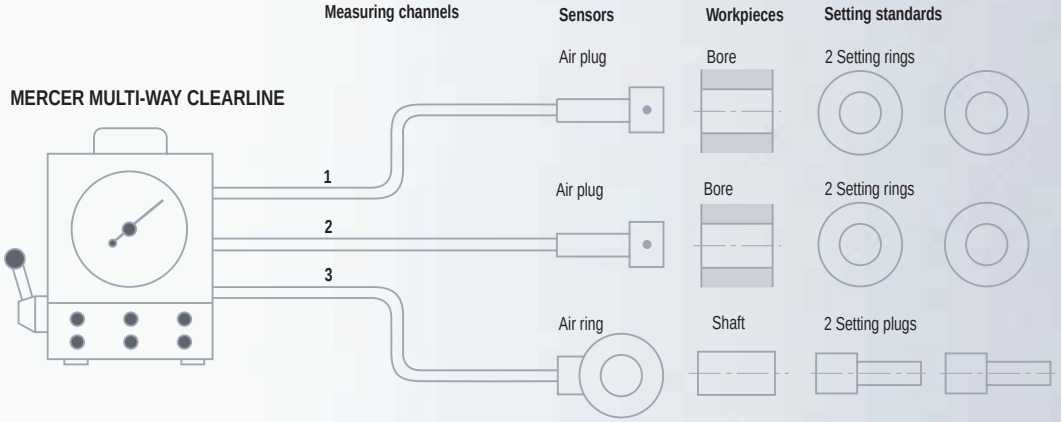
Analogue reading on the pressure gauge.



MERCER MULTI-WAY CLEARLINE (with 3 measuring channels)

Single measurement of three workpiece features whilst switching from a channel to another.

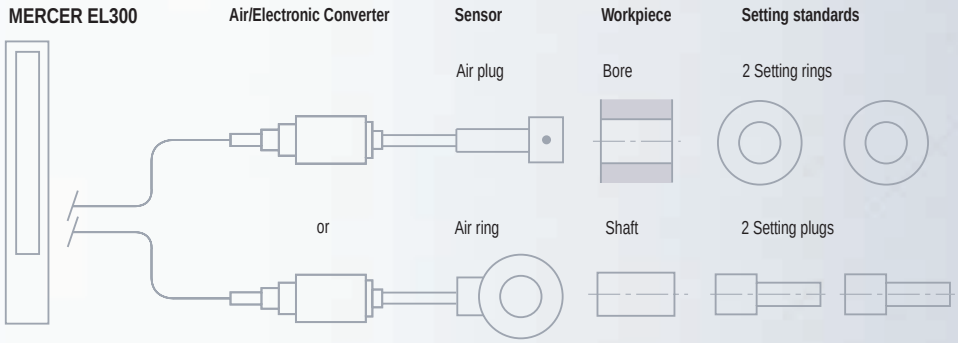
Analogue reading on the pressure gauge.



MERCER EL300 Column Gauge (for single measurement)

Single measurement of cylindrical bores or shafts.

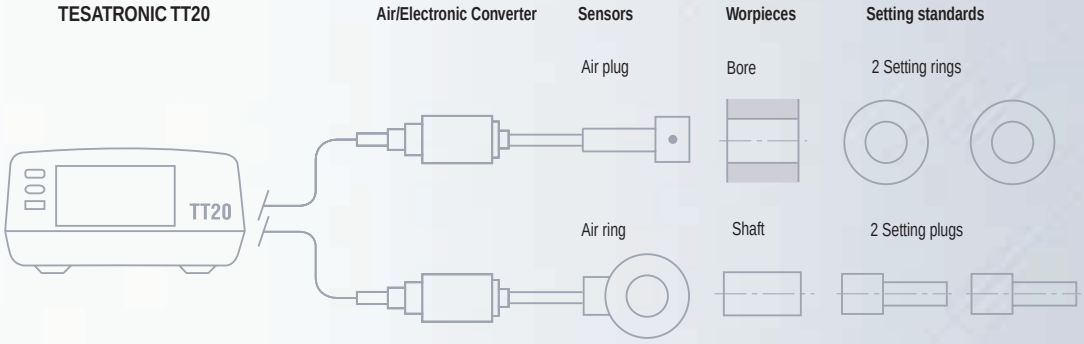
Electronic data processing and displaying.



TESATRONIC TT20 Electronic Unit (for difference measurement)

Bore mating on shafts through difference measurement.

Electronic data processing and displaying.

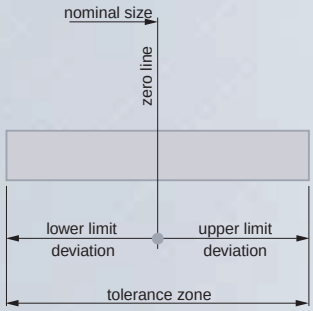


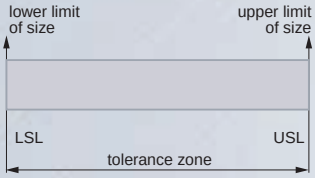
How To Ask For a Quotation or To Order Air Plug or Ring Gauges

To make sure that you get the right air gauge unit, your requirements must be exactly stated based on the information given below.

Value sensors

- *Air plugs and air rings are designed and supplied according to your air gauging application.*
- *So, please submit a drawing or provide a comprehensive description of the workpiece to be measured.*





Questions on your measuring application

- *What is the form element to be checked? Bore or shaft.*
- *What are the size and tolerances? State either of the options below.*
  - *Nominal size with limits of size (Fig. 1) or*
  - *Lower specification limit LSL or upper specification limit USL (Fig. 2)*
- *What is the length of the bore or the shaft?*
- *What is the type of the bore? (Blind bore, through bore or short centring shoulder).*
- *Is a measurement close to the shoulder required?*

Which accessory do you need?

See pages 17 and 18

- *Depth extension for air plug gauge*
- *Depth stop ring for air plug gauge*
- *90° adaptor*
- *Universal Handle*
- *Base for stationary use of air plug or air ring*

Questions on the indicating unit

- *What is the unit to be used as indicating unit? MERCER CLEARLINE 2 or MULTI-WAY CLEARLINE or an electronic unit in case either of the MERCER Air/Electronic Converters is used.*
- *Which way the dial is to be used? (see page M-8)*

Setting standards, i.e plug or ring gauges

- *The MERCER air gauges require the use of (at least) 2 setting standards.*
- *For exact size of each standard, we usually recommend to state the following:*
  - *First and last value of the full scale range while making allowances for the nominal size of the workpiece*
  - *lower and upper limits of size of the workpiece*
    Also refer to «Scale Options» (Fig. C and D on page M-8).
- *Supplied with a calibration certificate upon request.*



CLEARLINE - Units

Subsequent ordering

Each subsequent order must specify the type of the used gauge unit, Converter or sensor along with all relevant product related data for identification purpose.



Air/Electronic Converter

All sensors such as plugs and rings intended for use with the CLEARLINE gauges or Air/Electronic Converters are marked with a symbol as shown

Prerequisite conditions dealing with the workpieces to be measured

Surface condition

• Roughness of the surface to be checked usually affects the measured values. If, however, the roughness value Rz is contained within 5 µm, the effect counts for very little with use of air gauging systems unlike other sensors with mechanical contact.

• Surface must be free from porosity.

• Surface can be exposed to liquids, vapour or solid contaminants.

Measuring force

• Although the measurements are made with no mechanical contact with the part feature, the air escaping from the jets produces low sensing forces which may lead to the distortion of very thin-walld or malleable workpieces. In such a case, we recommend optical measuring.

Smallest surface

• The smallest surface to be gauged must be at least as large as the jet diameter.

MERCER® CLEARLINE 2
Air Gauge Units

Feature both a clear circular scale and large pointer.

- *Single measuring channel and bayonnet connector for mounting an air plug or air ring.*
- *Magnification and zero regulators.*
- *Dial with a 240 mm scale length.*
- *Double filtration dealing with liquids and solid contaminants along with a check valve.*
- *Integrated pressure regulator and pressure gauge.*



Important

When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

✓

DIN 2271

Air gauge units with bayonet connector for one sensor

Circular scale with large pointer. Response time: ≈ 3 s or ≈ 7 s for miniature air plugs or air rings

≈ 4,8 mm (metric scale) or ≈ 12 mm (inch scale)

All accuracy related data given hereafter refer to the complete measuring system, i.e. with air plug or air ring included.

Max. perm. error: 1 scale division. (provided magnification was previously set)

0,5 scale division

0,5 scale division

Air mains connection: pipe thread G $^1/_4$ as per ISO 228-1

Air supply (before pressure setting): ≥ 4,1 bar

Air supply (after pressure setting): 3 bar

Air consumption when escaping from the gauge head: ≤ 1,0 m^3 / h

200 x 280 x 300 mm (W x H x D with filters)

6,7 kg (filter included)

5 °C to 45 °C

Transport packing

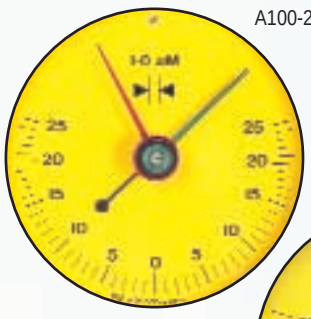
Identification number

MERCER CLEARLINE 2

		µm	µm		in	in	
Executions with metric scale							
S95010000	**A100-23**	± 25	1	25 - 0 - 25			
S95010001	**A100-24**	± 50	2	50 - 0 - 50			
Executions with metric/inch scale							
S95010010	**A100-62**	± 25	1	25 - 0 - 25	*± 0.001*	*0.0001*	*10 - 0 - 10*
S95010011	**A100-63**	± 50	2	50 - 0 - 50	*± 0.002*	*0.0002*	*20 - 0 - 20*

Dial Options

A100-23 - 3/A100-23



A100-62 - 3/A100-62





A100-24 - 3/A100-24



A100-63 - 3/A100-63

MERCER® MULTI-WAY CLEARLINE Air Gauge Units

These units are identical to MERCER CLEARLINE 2, but with the following added features:

- *3 single channels and bayonet connectors for up to three sensors (air plugs or air rings).*
- *Magnification and zero regulators for each channel.*
- *Lever switch to make the three channels operate.*



Important

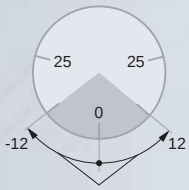
When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

MERCER MULTI-WAY CLEARLINE

		µm	µm		in	in	
Executions with metric scale							
S95010002	**3/A100-23**	± 25	1	25 - 0 - 25			
S95010003	**3/A100-24**	± 50	2	50 - 0 - 50			
Executions with metric/inch scale							
S95010012	**3/A100-62**	± 25	1	25 - 0 - 25	*± 0.001*	*0.0001*	*10 - 0 - 10*
S95010013	**3/A100-63**	± 50	2	50 - 0 - 50	*± 0.002*	*0.0002*	*20 - 0 - 20*

How to use the scales

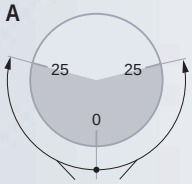
CLEARLINE 2 and MULTI-WAY CLEARLINE provide different ways of use of the scales which make allowances for the workpiece as well as the machining process. The sensors are normally made to allow the workpiece related tolerance zone to be equally displayed on half the scale on both plus and minus sides starting from zero (see below). Four other ways of use are also illustrated hereafter (A to D).



Measuring range

Workpiece related tolerance zone (24 µm) = Measuring range (± 12 µm).

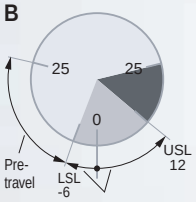
A



Full scale = Measuring range

Use of the full scale as measuring range.

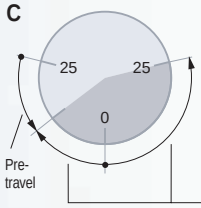
B



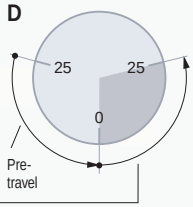
Measuring range

Use of the measuring range defined within the full scale range based on the workpiece tolerances (LSL and USL).

C



D



Usable zones from the measuring range

Use of the half range (Fig. C) or the entire scale (Fig. D) on the minus side for pretravel in order to allow the smaller diameters to be captured during the machining process.

✓

DIN 2271

Air gauge units with connectors for three sensors

Circular scales with large pointer. Response time ≈ 3 s or ≈ 7 s for miniature air plugs or air rings.

≈ 4,8 mm (metric scale) or ≈ 12 mm (inch scale)

All accuracy related data given hereafter refer to the complete measuring system, i.e. with air plug or air ring included.

Max. perm. error: 1 scale division. (provided magnification was previously set)

0,5 scale division

0,5 scale division

Air mains connection: pipe thread G $^{1}/_{4}$ as per ISO 228-1

Air supply (before pressure setting): ≥ 4,1 bar

Air supply (after pressure setting): 3 bar

Air consumption when escaping from the gauge head: ≤ 1,0 m^3 / h

250 x 280 x 400 mm (W x H x D with filters)

9,4 kg (filters included)

5 °C to 45 °C

Transport packing

Identification number

MERCER® Air/Electronic Converters

Air flow converter with mounted inductive axial probe from MERCER.

- *One measuring channel and bayonet connector for one sensor (air plug or air ring).*
- *Two versions available for use with TESA or MERCER electronic equipments.*
- *Electronic signal processing combined with value classification, value storage and statistical computing through their possible connection to a measuring instrument.*
- *Possible mating of shafts with bores through difference measurements.*

✓

DIN 2271

Air flow converters with connector for one sensor

Air mains connection: pipe thread G $^{1}/_{4}$ as per ISO 228-1.

Air supply (before pressure setting): ≥ 4,1 bar

Air supply (after pressure setting): 3 bar

Air consumption when escaping from the gauge head: ≤ 1,0 m^3 / h

55 x 55 x 165 mm (without electronic probe)

5 °C to 45 °C

Air unit and connecting T-piece must be ordered separately since they are not included in the MERCER Air/Electronic Converters scope of supply (see tables)

Transport packing

Identification number





MERCER Air/Electronic Converters with mounted MERCER axial probe

			µm	in
Compatible axial probes for use with the MERCER electronic gauge units				
S95010020	**AE6/493-3**	standard	≤ ± 15	≤ ± *0.0005*
S95010021	**AE6/495-3**	special	≤ ± 50	≤ ± *0.0020*
Compatible axial probes for use with the TESA length measuring instruments				
S95010030	**AE6/493-4**	standard	≤ ± 15	≤ ± *0.0005*
S95010031	**AE6/495-4**	special	≤ ± 50	≤ ± *0.0020*

Accessories

S95010022	**Air dressing unit** consisting of: 1 check valve, 2 air filters dealing with liquids and solid contaminants, 1 pressure regulator
S95010023	**Air connecting unit** To be mounted once the pneumatic unit is assembled. Allows the connection of up to 4 MERCER Air/Electronic Converters.

Important

When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

MERCER® Air Plug Gauges

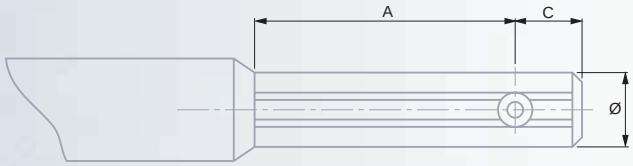
Made to measure diameters and detect form deviations on cylindrical bores.

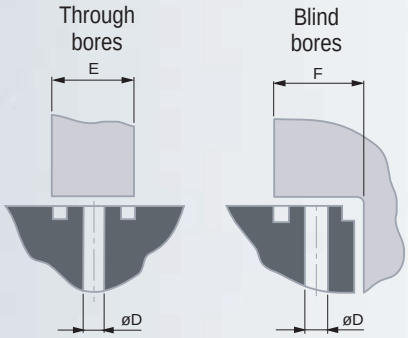
- *Application ranges from 1,30 up to 150 mm / 0.051 up to 5.9 in.*
- *Bayonet connector for rapid gauge assembly.*
- *Air plugs with 2 jets spaced 180 ° apart from one another.*

MERCER® Miniature Air Plug Gauges 1,30 to 3,00 mm/0.051 to 0.118 in in diameter

- *Hand-held plug gauges for through and blind bores.*
- *Air plugs up to 2,29 mm / 0.090 in are designed for blind bores only.*







When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

✓

DIN 2271

Air plug gauges

2 jets spaced 180 ° apart

Plugs up to 2,29 mm/ 0.090 in are made from solid tungsten carbide. Larger sizes are in tool steel.

Transport packing

Identification number

mm	µm	A mm	C mm	C1 mm*	D mm	E mm	F mm
Metric							
1,30 ÷ 2,29	≤ 10	9,6		1,5	≤ 0,25	≥ 1,02	≥ 2,3
2,29 ÷ 2,64	≤ 20	15,9	6,4	1,5	≤ 0,46	≥ 1,32	≥ 2,4
2,64 ÷ 3,00	≤ 30	15,9	6,4	1,5	≤ 0,64	≥ 1,63	≥ 2,5

in	*in*	A *in*	C *in*	C1 *in**	D *in*	E *in*	F *in*
Inch							
0.051 ÷ 0.090	*≤ 0.0004*	*0.377*		*0.06*	*≤ 0.010*	*≥ 0.040*	*≥ 0.090*
0.090 ÷ 0.104	*≤ 0.0008*	*0.625*	*0.25*	*0.06*	*≤ 0.018*	*≥ 0.052*	*≥ 0.095*
0.104 ÷ 0.118	*≤ 0.0012*	*0.625*	*0.25*	*0.06*	*≤ 0.025*	*≥ 0.064*	*≥ 0.100*

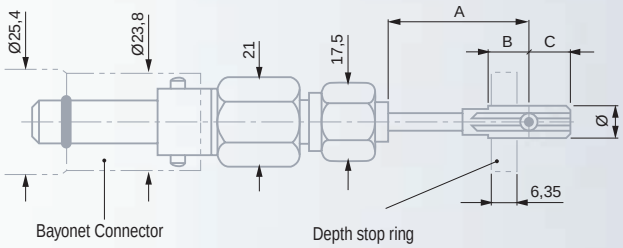
* Air plugs for blind bores only.

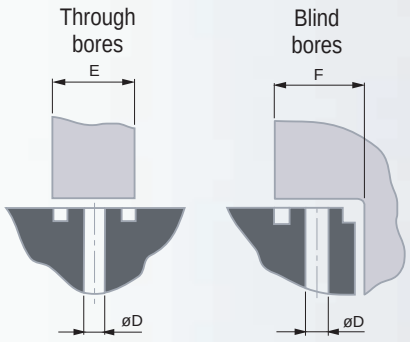
MERCER® Air Plug Gauges - Standard Type 'S' 3,10 to 6,30 mm / 0.12 to 0.25 in in diameter

- *Available in both through bore and blind bore versions.*
- *Can be directly connected to CLEARLINE 2, MULTI-WAY CLEARLINE and Air/Electronic Converters or used in conjunction with the Universal Handle.*

✓
DIN 2271
Air plug gauges
2 jets spaced 180 ° apart
Made from Nitralloy or too steel
Transport packing
Identification number







Important

When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

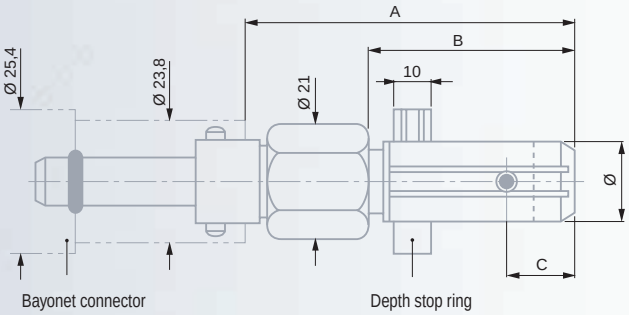
mm	µm	**A**mm*	**B**mm	**C**mm	**C1**mm**	**D**mm	**E**mm	**F**mm
Metric								
3,10 ÷ 4,10	≤ 30	33,3	12,8	6,5	3,0	≤ 0,64	≥ 1,63	≥ 4,0
4,20 ÷ 6,30	≤ 50	33,3	10,0	9,5	3,0	≤ 1,00	≥ 2,49	≥ 4,2
in	*in*	**A***in**	**B***in*	**C***in*	**C1***in***	**D***in*	**E***in*	**F***in*
Inch								
0.12 ÷ 0.16	*≤ 0.0012*	*1.311*	*0.51*	*0.26*	*0.12*	*≤ 0.025*	*≥ 0.06*	*≥ 0.16*
0.16 ÷ 0.25	*≤ 0.0020*	*1.311*	*0.39*	*0.37*	*0.12*	*≤ 0.04*	*≥ 0.10*	*≥ 0.17*

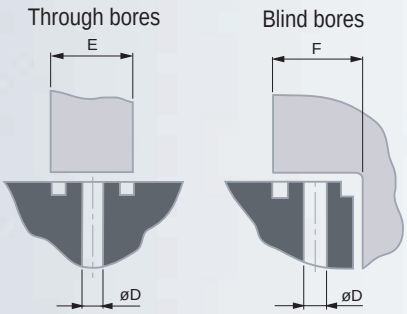
* For deep hole measurement, special designs also available to increase the dimension A by 25, 50 or 75 mm / 1, 2 or 3 in.
** Air plug gauges for blind bores only.

MERCER® Air Plug Gauges - Standard Type 'M' 6,3 to 62, 0 mm/0.25 to 2.5 in in diameter

- *Available in both through bore and blind bore versions.*
- *Can be directly connected to CLEARLINE 2, MULTI-WAY CLEARLINE and Air/Electronic Conversters or used in conjunction with the Universal Handle.*







Important

When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

mm	µm	Amm*	Bmm	Cmm	C1mm**	Dmm	Emm	Fmm
Metric								
6,3 ÷ 8,0	≤ 100	61,1	38	13,0	3,0	≤ 1,5	≥ 3,0	≥ 4,5
8,0 ÷ 14,0	≤ 100	61,1	38	13,0	3,0	≤ 1,5	≥ 3,0	≥ 4,5
14,0 ÷ 62,0	≤ 100	61,1	40	13,0	3,0	≤ 1,5	≥ 3,0	≥ 4,5
in	***in***	***Ain****	***Bin***	***Cin***	***C1in*****	***Din***	***Ein***	***Fin***
Inch								
0.25 ÷ 0.32	*≤ 0.004*	*2.41*	*1.50*	*0.51*	*0.12*	*≤ 0.06*	*≥ 0.12*	*≥ 0.18*
0.32 ÷ 0.55	*≤ 0.004*	*2.41*	*1.50*	*0.51*	*0.12*	*≤ 0.06*	*≥ 0.12*	*≥ 0.18*
0.55 ÷ 2.5	*≤ 0.004*	*2.52*	*1.57*	*0.51*	*0.12*	*≤ 0.06*	*≥ 0.12*	*≥ 0.18*

* For deep hole measurement, special designs with nominal diameters from 6,3 to 14,0 mm/0.25 to 0.55 in can also be made available to increase the dimension A by 25, 50, 75, 100 or 200 mm/1, 2, 3, 4 or 8 in. For plug gauges above 14 mm, extensions may be mounted (see page M-17).

** Air plug gauges for blind bores only.

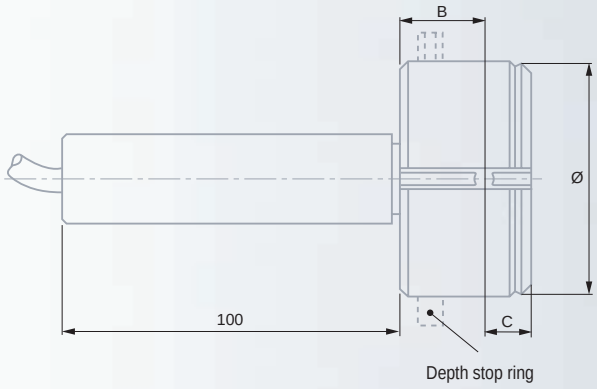
✓
DIN 2271
Air plug gauges
2 jets spaced 180 ° apart
Nitralloy or hard chrome plating. Other coatings on request.
Transport packing
Identification number

MERCER® Air Plug Gauges - Standard Type 'L'
62 to 150 mm / 2.44 to 5.9 in in diameter

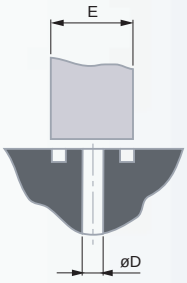
- *Available in both through bore and blind bore versions.*
- *Provided with hand grip and flexible hose.*
- *200 or 300 mm / 8 or 12 in long hand grip available in addition to the standard length of 100 mm / 4 in.*

✓
DIN 2271
Air plug gauges
2 jets spaced 180 ° apart
Made from Nitralloy or hard chrome plated
Transport packing
Identification number

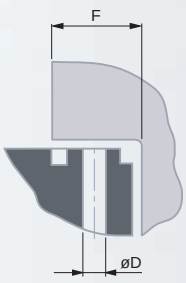




Through bores



Blind bores



Important

When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

mm	µm	B mm	B mm*	C mm	C1 mm*	D mm	E mm	F mm
Metric								
62,0 ÷ 150	≤ 100	24,0	34,0	13,0	3,0	≤ 1,5	≥ 3,0	≥ 4,5
in	*in*	B *in*	B *in**	C *in*	C1 *in**	D *in*	E *in*	F *in*
Inch								
2.44 ÷ 5.9	*≤ 0.004*	*0.95*	*1.34*	*0.51*	*0.12*	*≤ 0.06*	*≥ 0.12*	*≥ 0.18*

* Air plug gauges for blind bores only.

MERCER® Air Ring Gauges

Measure diameters and detect form deviations on cylindrical shafts.

- *Application ranges from 1,50 up to 50,80 mm / 0.059 up to 2.000 in.*
- *Bayonet connector for quick gauge assembly.*
- *Two jets spaced 180 ° apart from one another.*

MERCER® Miniature Air Ring Gauges 1,50 to 6,00 mm / 0.059 to 0.236 in in diameter

- *Standard rings with central jets fitted on the guiding cylinder.*
- *Other rings with off-set jets for measuring close to the shoulder.*

✓ DIN 2271

Air plug gauges

2 jets spaced 180 ° apart

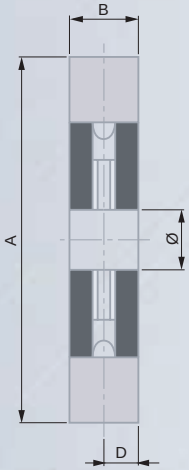
Hardened tool steel

Transport packing

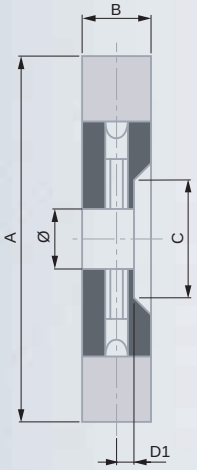
Identification number



Standard central jet version



Off-set jet version





mm	µm	Amm	Bmm	Cmm	Dmm	D1mm*
Metric						
1,50 ÷ 2,30	≤ 10	34,9	6,4	12,7	3,17	1,00
2,30 ÷ 3,05	≤ 15	34,9	6,4	12,7	3,17	1,27
3,05 ÷ 3,56	≤ 20	34,9	6,4	12,7	3,17	1,50
3,56 ÷ 4,32	≤ 30	34,9	6,4	12,7	3,17	1,50
4,32 ÷ 6,00	≤ 40	34,9	6,4	12,7	3,17	1,78

in	*in*	A*in*	B*in*	C*in*	D*in*	D1*in**
Inch						
0.059 ÷ 0.090	*≤ 0.0004*	*1.375*	*0.25*	*0.50*	*0.125*	*0.04*
0.090 ÷ 0.120	*≤ 0.0006*	*1.375*	*0.25*	*0.50*	*0.125*	*0.05*
0.120 ÷ 0.140	*≤ 0.0008*	*1.375*	*0.25*	*0.50*	*0.125*	*0.06*
0.140 ÷ 0.170	*≤ 0.0012*	*1.375*	*0.25*	*0.50*	*0.125*	*0.06*
0.170 ÷ 0.236	*≤ 0.0016*	*1.375*	*0.25*	*0.50*	*0.125*	*0.07*

* Air ring gauges with off-set jets

Important

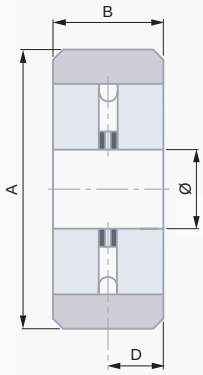
When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

MERCER® Standard Air Ring Gauges
6,00 to 50,80 mm / 0.236 to 2.000 in

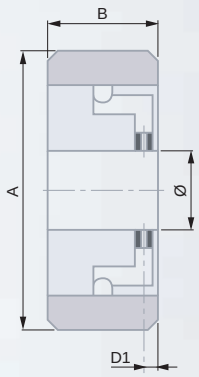
- *Standard rings with central jets fitted on the guiding cylinder.*
- *Other rings with off-set jets for measuring close to the shoulder.*

✓
DIN 2271
Air plug gauges
2 jets spaced 180 ° apart
Hardened tool steel
Transport packing
Identification number





Standard central jet version



Off-set jet version

mm	µm	A mm	B mm	D mm	D1 mm*
Metric					
6,00 ÷ 9,65	≤ 50	75,4	28,6	14,3	3,2
9,65 ÷ 25,52	≤ 100	75,4	28,6	14,3	3,2
25,52 ÷ 38,22	≤ 100	88,1	28,6	14,3	3,2
38,22 ÷ 50,80	≤ 100	113,5	28,6	14,3	3,2

in	*in*	A *in*	A1 *in**	B *in*	D *in*	D1 *in**
Inch						
0.236 ÷ 0.380	*≤ 0.002*	*2.968*	*2.968*	*1.125*	*0.562*	*0.125*
0.380 ÷ 0.505	*≤ 0.004*	*2.968*	*2.968*	*1.125*	*0.562*	*0.125*
0.505 ÷ 1.005	*≤ 0.004*	*2.968*	*3.468*	*1.125*	*0.562*	*0.125*
1.005 ÷ 1.505	*≤ 0.004*	*3.468*	*4.468*	*1.125*	*0.562*	*0.125*
1.505 ÷ 2.000	*≤ 0.004*	*4.468*	*4.468*	*1.125*	*0.562*	*0.125*

* Air ring gauges with off-set jets

Important

When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

MERCER® Setting Standards

Air gauge applications with the MERCER products require the use of (at least) two setting standards.

- *Supplied with a calibration certificate upon request.*

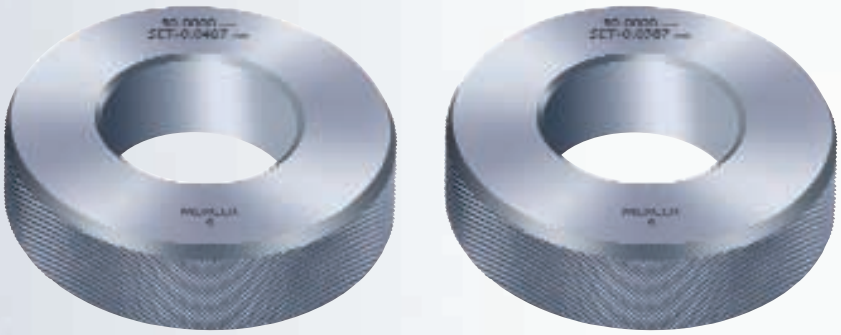
MERCER® Setting Rings for Air Plug Gauges

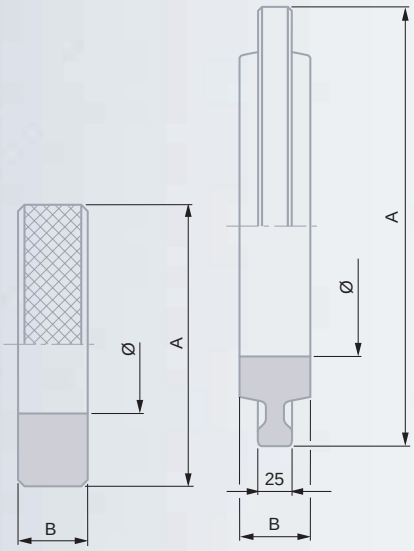
- *Application ranges from 1,30 to 150,00 mm / 0.051 to 5.90 in.*

Steel hardened to ≥ 59 HRC

Transport packing

UKAS calibration certificate on request





Style 1 Style 2

mm	A mm	B mm
$d_n \leq$ 6	ø 24	8
6 ≤ $d_n \leq$ 12	ø 28	10
12 ≤ $d_n \leq$ 18	ø 42	15
18 ≤ $d_n \leq$ 24	ø 56	20
24 ≤ $d_n \leq$ 32	ø 72	25
32 ≤ $d_n \leq$ 42	ø 90	30
42 ≤ $d_n \leq$ 52	ø 100	30
52 ≤ $d_n \leq$ 62	ø 110	30
62 ≤ $d_n \leq$ 74	ø 130	35
74 ≤ $d_n \leq$ 86	ø 142	35
86 ≤ $d_n \leq$ 100	ø 154	35
100 ≤ $d_n \leq$ 120	ø 184	38*
120 ≤ $d_n \leq$ 140	ø 210	38*

* Style 2

Important

When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

A mm	1 2 3 1 µm*	4 µm*	µm**	µm	µm
1,50 ≤ $d_n \leq$ 2,97	1,0	2,5	0,5	0,5	0,5
2,97 ≤ $d_n \leq$ 25,00	1,0	2,5	0,5	0,5	0,5
25,00 ≤ $d_n \leq$ 61,95	1,0	2,5	0,75	1,0	0,75
61,95 ≤ $d_n \leq$ 101,85	2,0	5,0	1,0	1,5	1,0
101,85 ≤ $d_n \leq$ 150,00	2,0	5,0	1,5	2,0	1,25

* Max. perm. deviation of the mean value measured from the nominal size.

** Uncertainty against the actual size or actual deviation marked on the air ring.

MERCER® Setting Plugs for Air Ring Gauges

- *Single or double ended plug gauges fitted with a hand grip according to their size.*
- *Max. perm. error with respect to the nominal size or nominal deviation : 1 µm.*

✓
Hardened steel
Transport packing
UKAS calibration certificate on request



Important

When asking for a quotation or writting down your order, it is important to specify your requirements according to the information provided on page M-6 .

Additional Components

Extensions for deep holes

- *Available for 'M' type plugs with nominal diameters ranging from 14 to 62 mm / 0.55 to 2.5 in.*
- *Increase the measuring depth by 25, 50, 75, 100 or 200 mm / 1, 2, 3, 4 or 8 in.*
- *Screw mount.*
- *Special designs for smaller sizes up to 14 mm / 0.55 in also available for deeper holes.*

✓
Steel
Transport packing



Depth Stop Rings for Air Plug Gauges

- *Can be supplied with any air plug except for the miniature versions.*
- *Other versions specially made to suit your gauging applications are also available.*

✓
Hardened steel
Transport packing



90° Adaptors

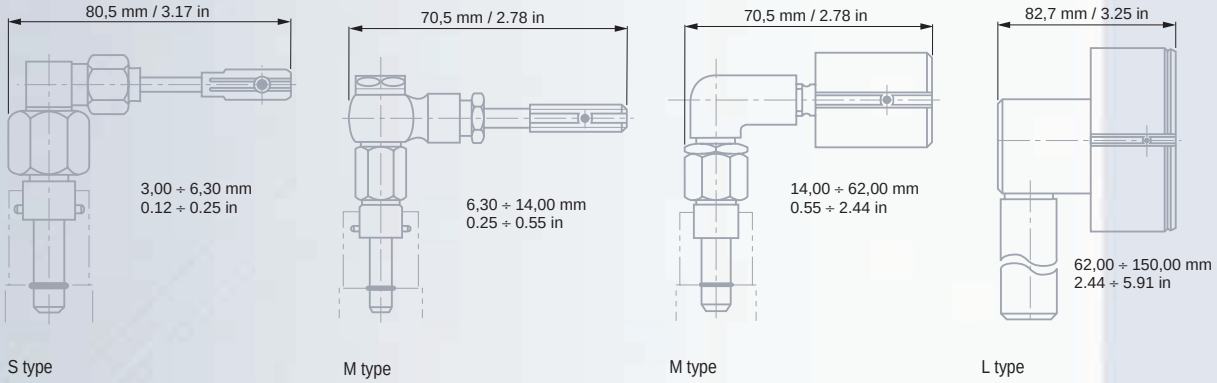
These are designed to assist you reaching the measuring points, especially those on workpieces that are clamped in machines.

- *Convenient for 'S', 'M' and 'L' type air plugs as well as air rings.*
- *'S' and 'M' type plugs and adaptors are used with a Universal Handle as shown below while the 200 mm long hand grip is screw coupled on 'L' type adaptors.*

✓
Chrome plated steel
Transport packing



S95011021



S type | M type | M type | L type

Universal Handle

- *Equally suited for air plugs and air rings with bayonet connectors.*
- *Supplied with 1,3 m long flexible hose for connection to the gauging unit.*

Base for stationary use

- *Equally suited for air plugs and air rings.*
- *Hose, air plugs and air rings are screw connected.*

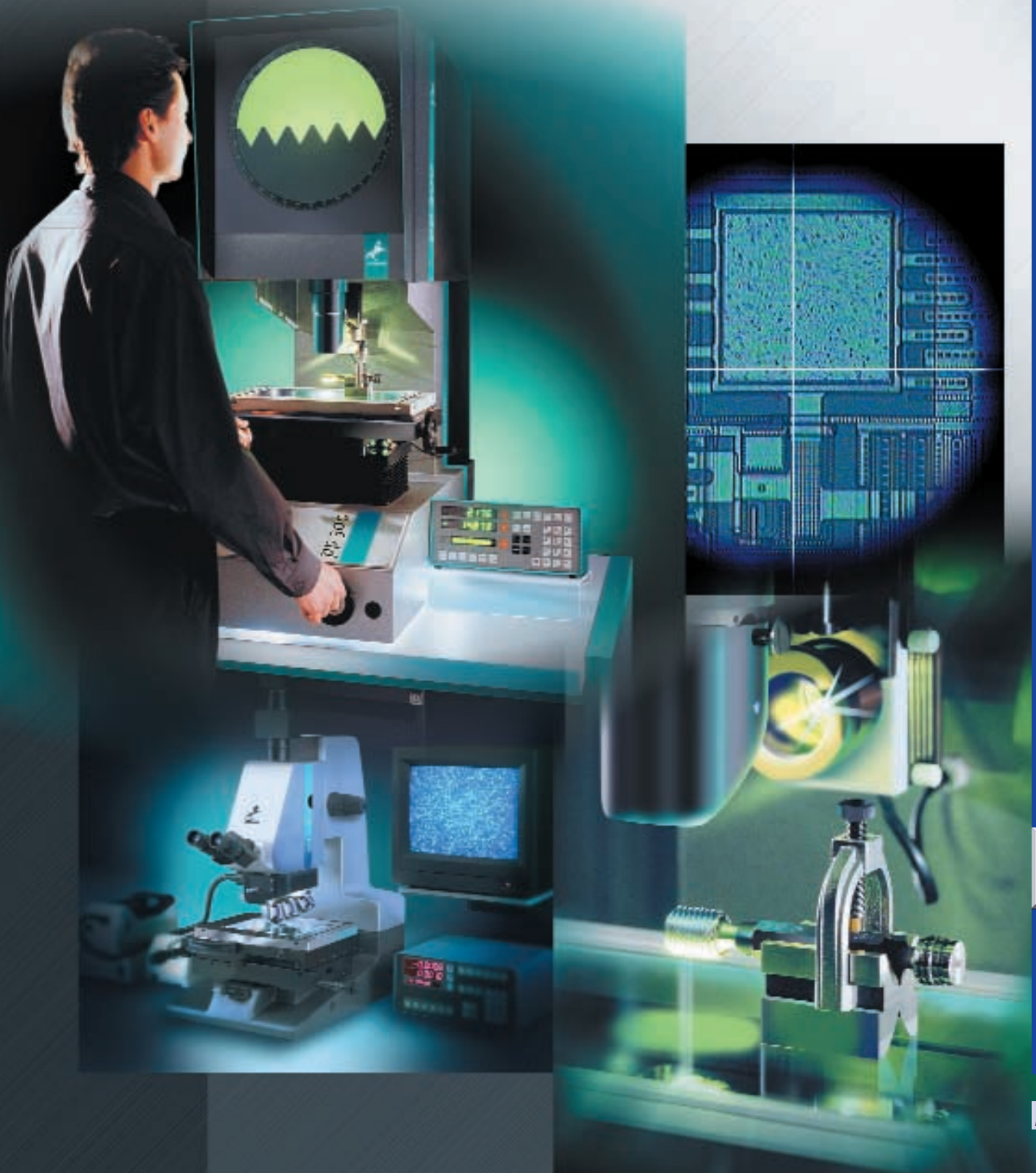
✓
Transport packing

S95011024





Instruments for Optical Measuring



ETALON® Measuring Microscopes and Profile Projectors – Leading Edge Products for Design and Quality

These dedicated optical products serve for non-contact measurement of lengths and angles as well as for inspecting the contours of workpieces manufactured with cutting or non-cutting machining. Bent and moulded parts, stampings, springs of all types, components of motors and gear boxes, cutting tools, plug gauges, templates, electrodes for electro-erosion as well as gear, thread and other part profiles are some examples of those workpieces optically checked.

Measuring microscopes and profile projectors are used for checking samples and batches in tool and mould makings as well as for receiving inspection. They are also intended for use in both vocational and ongoing training, R+D department, professional schools, technical universities and other testing, calibration and criminal laboratories.

Powerful Optics

PLAN FLUOR selectable micro-objectives with up to 1000x magnifications produce bright images for metallographic inspection and surface structure examination as well. They are mainly used with the ETALON TCM 100 or TCM 200 measuring microscopes.

Optical Length Measurements

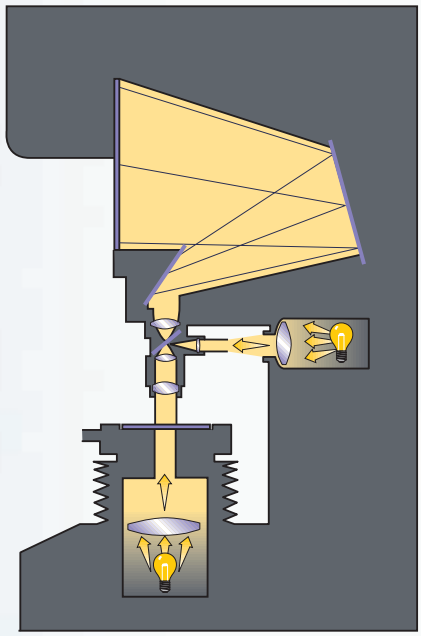
- *Non-contact measurements regardless of the measuring force permitting deformable parts made from any materials whatsoever (metal, plastic or rubber) to be reliably inspected.*
- *Measurements in 1, 2 or 3 directions of coordinates depending on the instrument's type.*
- *Applied measurements adapted to the capabilities of each single ETALON product provided with a variety of illuminations such as transmitted light, reflected light, coaxial reflected light, oblique incident light and ring light. Images can also be viewed with brightfield/darkfield, polarised light (optional) and interference contrast (DIC).*
- *Top quality measuring objectives providing a perfect erect image with a very low distortion and high contrast.*
- *Optics with telecentric ray path to render the full size of the part being measured even under changing focus conditions – A must for high-precision measurements.*
- *Eyepieces with dioptric compensation producing a high-resolution, laterally correct upright image - thus offering a comfortable image viewing.*
- *Photometric sensors for automatic edge detection with high repeatability when moving from brightfield to darkfield and conversely.*
- *Very long free working distances and high table load capacity unlike the other products from the competition. This makes it possible for the user to measure big and heavy workpieces reliably.*

Solid Mechanical Base

Each ETALON microscope and profile projector is built on a solid, highly steady main body made from cast iron or steel. This construction assures that the optical components such as the deflection mirror or the objective attachment remain adequately aligned over a long time.

Digital Measuring Systems

- *Ball-bearing steel measuring tables equipped with opto-electronic systems and incremental steel scales for high-precision measuring with tight limits of permissible errors.*
- *Easy-to-read numerical display with resolutions from 0,001 mm up to 0,0001 mm.*
- *Computer-based value processing, geometric combination of the measurement signals, statistical computing of part features, programmable measurement cycles, value storage as well as interfaces for data transfer are distinct attributes that make the ETALON measuring microscopes and profile projectors different from the others.*



ETALON® TCM 50 Measuring Microscope

Provides simplicity and user comfort – 100 x 50 mm measuring span – 0,001 mm or 0.0001 in numerical interval – High-precision – Built-in transmitted and oblique incident light – Eyepiece with angle device – RS-232 digital output – In-house calibration certificate.



Main instrument with measuring table

100 x 50 mm

Ball-bearing measuring table. Moves freely or over the threaded spindle with quick action drive.

Workpiece attachment with two M8 threads. Max. perm. load: 5 kg.

Optics holder with adjustable height by means of the wide knurled collars mounted on each side.

Opto-electronic measuring system with incremental steel scale

0,001 mm

Valid for one coordinate direction plus working temperature range: 10 µm + 0,04 · L µm (L in mm)

Optics

Upright, laterally correct image

30 x

Monocular eyepiece with dioptric compensation. Rotating graticule.

Built-in device for angle measurement: angle scale value 1 °, readout 12 ' (assessment)

Objective 2 : 1
Object-field diameter 6,5 mm
Numerical aperture 0,05
Free working distance 100 mm (see drawing)

Integrated transmitted light and oblique incident light with continuous brightness setting, 5 W each

Continued next page

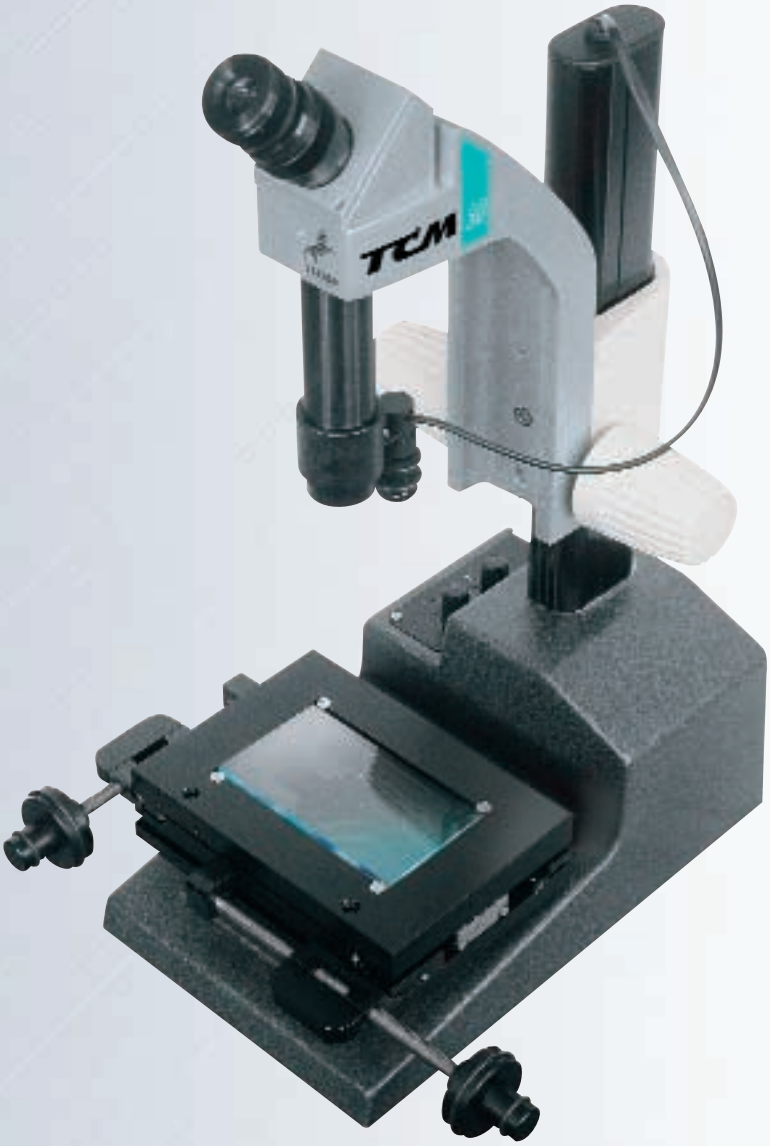
68.39000	**ETALON TCM 50 measuring microscope**
Consisting of the following components:	
68.19000	1 TCM 50 measuring microscope, complete Measuring table (100 x 50 mm measuring span) with opto-electronic system and cable for the transmission of the measurement signal. Height adjustable optics holder. Monocular viewing tube. Objective for 30x magnification. Eyepiece with angle device. Built-in transmitted light and oblique incident light with continuous brightness setting.
68.39001	1 A 50 Computing counter Up/down counter with a two-line numerical display (X and Y, 7-decade display). Numerical interval 0,001 or 0.0001 in. RS-232 digital output.
Supplied with:	
68.69025	1 Mains adapter, 100 to 240 Vac, 47 to 63 Hz, 11 to 13 Vdc, 30 W
68.69000	1 Dust cover
Optional Accessories	
68.69027	Set of clamping components (listed individually on page N-9).

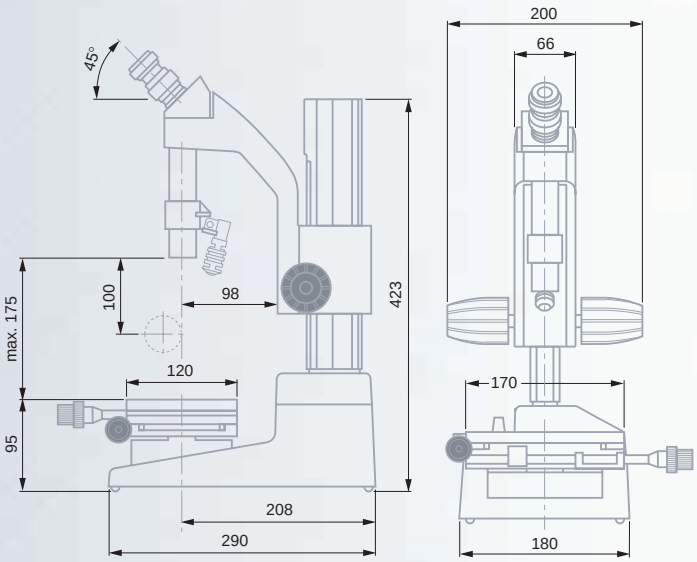




ETALON® TCM 50 Measuring Microscope

Full microscope with good value for money.





A 50 counter

Two-line LC display (coordinates X/Y)

7 decades and 7 segments per sign

0,001 mm or 0.0001 in

9 mm

Keyboard protected against the penetration of liquids

RS 232

General

Main instrument with counter: mains adapter 100 to 240 V, 47 to 63 Hz, 11 to 13 Vdc, max. 30 W

0 °C to 50 °C

20 ± 0,5 °C

- 20 °C to 70 °C

Counter protection: IP52 (IEC 60529)

EN 50081-1, EN 50082-2, EN 61000-3-2, EN 61000-3-3

8,2 kg (microscope) 0,5 kg (counter)

Transport packing

Identification number

In-house calibration certificate

Declaration of conformity

ETALON® TCM 100 Measuring Microscope

Most accurate and versatile – Ball-bearing measuring table with 100 x 50 mm measuring span – 0,0005 mm or 0.00002 in interval – High-precision with measurement errors contained within 6 µm over a 100 mm measured length – Superb optics with telecentric beam path providing excellent image quality with magnifications up to 1000x – Transmitted and coaxial reflected light – Video adapter – RS-232 digital output – In-house calibration certificate.



Main instrument with measuring table

100 x 50 mm

Ball-bearing measuring table. Free move or fine displacement over the threaded spindle.

2 T-slots for tightening the workpiece. Max. perm. load: 10 kg.

Height adjustable optics holder by means of both fast and fine feed knobs

Opto-electronic measuring system with incremental steel scale

0,0005 mm

Valid for one coordinate direction as well as working temperature range: 2 µm + 0,02 · L µm (L in mm)

Optics

Upright, laterally correct image

Total magnification: 20x. Also refer to optional accessories (objectives).

Ocular: monocular tube, with a 10x magnification, dioptric compensation and built-in graticule.

Objective with bayonet mount

Interchangeable telecentric objectives 2 : 1 Object field diameter 10 mm
Numerical aperture 0,06
Free working distance 85 mm (see drawing)

Built-in transmitted and coaxial reflected light with continuous brightness setting, 20 W each

Continued next page

ETALON® TCM 100 Measuring Microscope

68.19001		**ETALON TCM 100 measuring microscope, without computing counter**
		Consisting of the following components:
68.19002	1	Main instrument Vertical column with height adjustable optics holder. Built-in transmitted and coaxial reflected light illumination with continuous brightness setting. 120 to 230 Vac, 50 to 60 Hz
68.19003	1	Measuring table Measuring span 100 x 50 mm. With opto-electronic measuring system and cable for the signal transmission as well as fast and fine displacement.
68.69023	1	Ocular Eyepiece with cup, 10x magnification. Monocular viewing tube with built-in graticule.
68.69022	1	Measuring objective 2 : 1 Free working distance a = 85 mm
		Supplied with:
	1	Dust cover for ETALON TCM 100





QUADRA-CHEK 120 Computing Counter

Up/down computing counter with numerical display for both coordinate directions X and Y.

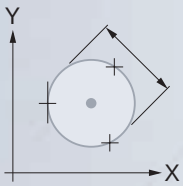
- *Numerical interval to 0,0005 mm or 0.00002 in.*
- *Metric and inch units.*
- *Selectable languages: English, German, French, Italian and Spanish.*
- *Measurements performed with either a fixed or freely assignable origin point of coordinates.*
- *Reverse counting sense. Switchable.*
- *RS-232 digital output.*



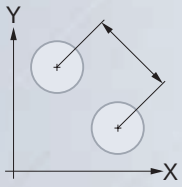
QUADRA-CHEK 220 Computing Counter

Up/down computing counter having a microprocessor on board. Also with digital display for both coordinate directions X and Y as well as auxiliary display for the functions.

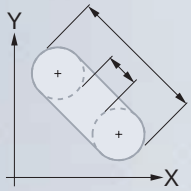
- *No manual calculation.*
- *Metric and inch units.*
- *Selectable languages: English, German, French, Italian and Spanish.*
- *No mechanical workpiece alignment owing to the numerical translation of coordinates.*
- *Assignable number of points as large as 3 to 50 for inspecting diameters on pitch circles.*
- *Cartesian and polar coordinate systems.*
- *Possible combination of up to 50 measured values per geometric element.*
- *Location of origin points at the user's choice.*
- *PRESET function.*
- *Programmable measurement cycles (max. 250 steps).*
- *RS-232 digital output, bidirectional.*
- *Serial port for result output structured in any format up to A4 format.*



Bore diameters



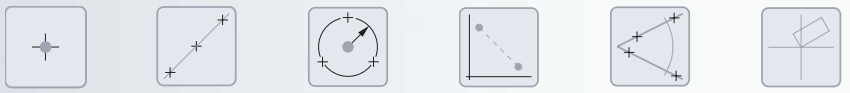
Centre-to-centre distances



Circle distances

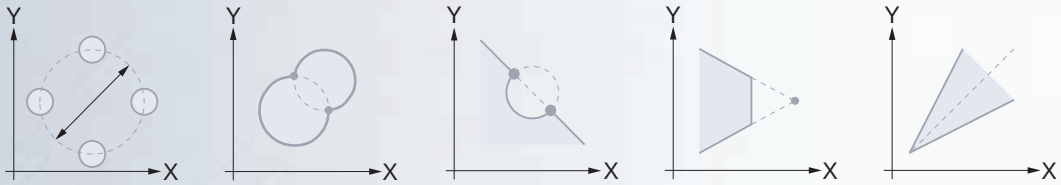
68.39012	**QUADRA-CHEK 120 computing counter** Up/down counter with 2 numerical displays
68.39013	**QUADRA-CHEK 220 computing counter** Up/down counter with 2 numerical and 1 alphanumeric display for the functions

Programmed Measuring Functions



Point | Straight line | Circle | Distance | Angle | Alignment

Geometric Combination of the Measured Values (Examples)



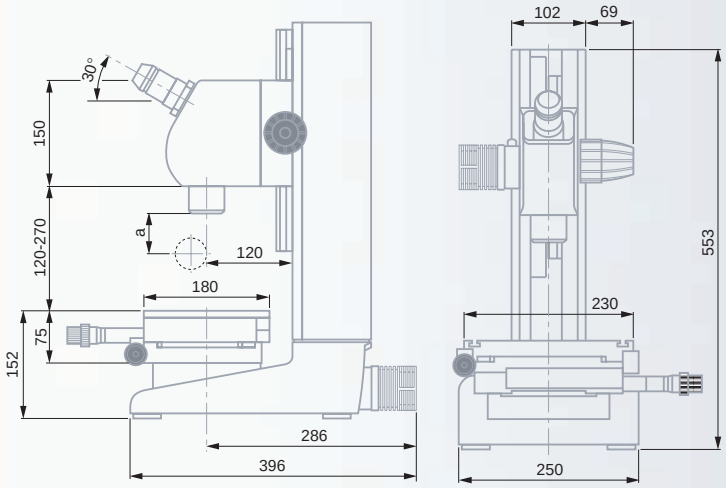
Diameters on pitch circles | Insertion point of two straight lines | Insertion points of straight line/circle | Insertion point of two straight lines | Angle median of two straight lines

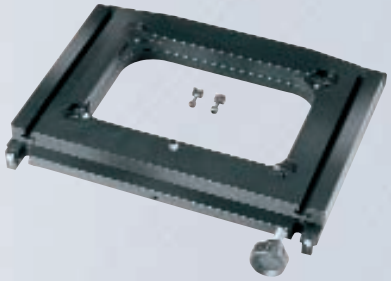
General – Microscopes

- 120 to 240 Vac, 50 to 60 Hz
- 10 °C to 40 °C
- 20 ± 0,5 °C
- - 10 °C to 60 °C
- Protection IP40 (IEC 60529)
- EN 50081-1, EN 50082-2, EN 61000-4, EN 61010-1
- 26 kg (No 68.19001)
- Transport packing
- Identification number
- In-house calibration certificate

QUADRA-CHEK 120 and 220 Computing Counters

- ✓
- Black/white LC display field (115 x 86 mm). With colour background
- 0,0005 mm or 0.00002 in
- 12,5 mm
- Metal housing, lacquered
- Parallel and RS 232
- 85 to 264 Vac, 43 to 63 Hz
- EN 61326:1998 EN 61010
- 0 °C to 45 °C
- 90 %, with no condensation
- 292 x 190 x 250 mm (W x D x H)
- 4,8 kg without cable





Optional Accessories

✓ Transport packing

Declaration of conformity

No.		
68.69007	**Rotary table**	
	Table surface 230 x 160 mm with 2 T-slots, rotation range ± 7,5 °	
68.69001	**Oblique incident light for 230 V**	
Consisting of:		
68.69002	1	Light unit Suitable for all measuring objectives. Dual-arm fibre optic cable. Support rotating through ± 45 ° in the viewing axis.
68.69003	1	CLS 100 cold light source 230 Vac, 50 to 60 Hz, 14,5 V, 90 W
68.69004	1	Reflective halogen lamp for CLS 100, 14,5 V, 90 W
68.69005	**Oblique incident light for 120 V**	
Same as above, but with the following feature also included:		
68.69006	1	CLS 100 light source 120 Vac, 50 to 60 Hz, 90 W







Continuation – Computing Counters

Transport packing

Identification number

Declaration of conformity

LEICA Plan Achromat measuring objectives (for further details, see page N-16)

No.	Objectives	Total magnification	Object-field dia.	Numerical aperture	Free working distance a
68.69008	1 : 1	10 x	20 mm	0,03	88 mm
68.69009	5 : 1	50 x	4 mm	0,13	62 mm
68.69010	10 : 1	100 x	2 mm	0,20	52 mm
68.69011	20 : 1	200 x	1 mm	0,35	30 mm



LEICA Plan Fluor micro-objectives for metallographic inspection

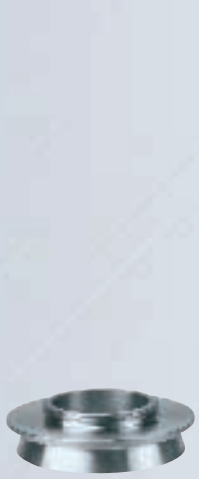
Convenient for both transmitted light and coaxial reflected light.To be used with the single bayonet mount No 68.69019

No	Objectives	Total magnification	Object-field diameter	Numerical aperture	Free working distance a
68.69012	2,5 : 1	25 x	8 mm	0,075	5,5 mm
68.69013	5 : 1	50 x	4 mm	0,10	10,5 mm
68.69014	10 : 1	100 x	2 mm	0,20	10,5 mm
68.69015	20 : 1	200 x	1 mm	0,40	10,5 mm
68.69016	40 : 1	400 x	0,5 mm	0,50	10,5 mm
68.69017	50 : 1	500 x	0,4 mm	0,60	3,6 mm
68.69018	100 : 1	1000 x	0,2 mm	0,70	3,6 mm

✓ Transport packing

Declaration of conformity

No	
68.69019	**Single bayonet mount for micro-objectives** Threads for micro-objectives from 2,5 : 1 to 100 : 1
68.69021	**C-mount adapter** Allows the use of a video camera instead of the ocular
68.69020	**KAPPA FK1/F electronic crossline graticule** For use in association with a video camera





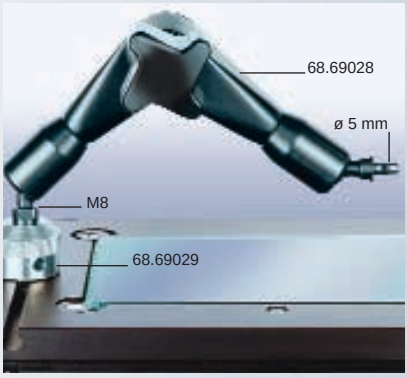


Wooden case

Declaration of conformity



68.69027



68.69027 **Set of clamping components**
Suitable for ETALON microscopes TCM 50, TCM 100 and TCM 200 as well as ETALON profile projector PP 300.

Consisting of:

68.69028 1 **SU articulated support**
Dual-arm support with central clamp through the star grip. Total length 195 mm. With 1 socket joint and 2 ball joints. M8 fixing thread on the table side and 5 mm dia. fixing hole on the workpiece side. Max. perm. load: 400 g.

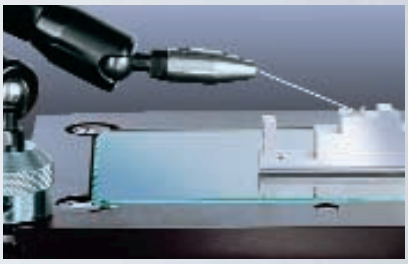
Clamp for attaching the SU support on the measuring table
T-slot blocks, type ETALON / LEICA.

T-slot blocks with M8 fixing thread for articulation

68.69029 1 Item, type V for vertical position.
68.69030 1 Item, type H for horizontal position.

Workpiece oriented clamps for use with the SU support
With a 5 mm dia. fixing hole.
Spring clamp to hold workpieces down.

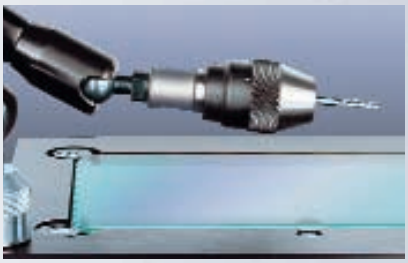
68.69031 1 Item, 34 mm long.
68.69032 1 Item, 50 mm long.
68.69033 1 **P clamp for small parts**, max. clamp capacity. ≤ 1,8 mm, resting width 3 mm, depth stop at 1,5 mm.
68.69034 1 **M clamp for small parts**, max. clamp capacity ≤ 5,0 mm, resting width 4,8 mm, depth stop at 1,5 mm
68.69035 1 **Clamping chuck,** ≤ 3 mm in dia.
68.69036 1 **Toggle clamp**, clamping capacity ≤ 25 mm.
68.69037 1 **V-block with spring clamp** covering a range from 2 to 25 mm. Vee angle 120 °. Vee length 25 mm.
68.69038 1 **Try-square**, beam length 120 x 80 mm. Accommodates 2 T-grooves for both columns No 68.69039.
68.69039 2 **Columns** used with the try-square for attaching the spring clamps listed below.
Spring clamp to hold the workpieces down.
68.69040 1 Item, 34 mm long.
68.69041 1 Item, 50 mm long.
Leaf spring clamp to press the workpiece against the try-square.
68.69042 1 Item, 34 mm long.
68.69043 1 Item, 50 mm long.
68.69044 1 **Adapter** rotating through 4 x 90 ° with lock-in positions.
1 Socket head key (2, 2,5 and 3 mm).
1 Clamping bolt for holes with a 5 mm dia.



68.69031



68.69033



68.69035



68.69037



68.69038 – 68.69039 – 68.69040 – 68.69042

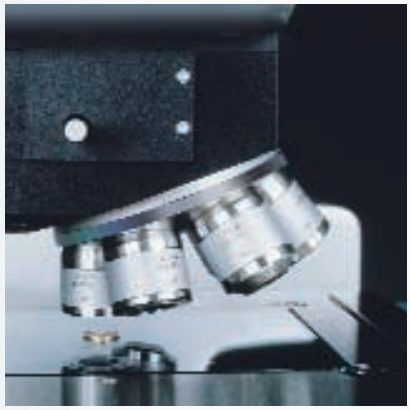
ETALON® TCM 200 Measuring Microscope

Modular concept – Custom built configurations for optical applications from length measurement through metallographic examination – Selectable telecentric objectives of superior quality – Optimum object illumination – Ball-bearing measuring tables having a 150 x 100 mm or 250 x 150 mm measuring span – Opto-electronic measuring systems with incremental steel scales – Computer based data processing – RS-232 digital output – In-house calibration certificate.

- *Non-contact measurement in 1, 2 or 3 coordinate directions. No measuring force.*
- *Numerical interval to 0,0005 mm or 0.00002 in.*
- *High accuracy guaranteed by a very low maximum permissible error - 2,6 µm only over a 150 mm measured length, for instance.*
- *High load capacity and long free working distances for the inspection of tall test pieces.*
- *Bright images for surface structure examination with magnifications up to 1000x.*
- *Video camera for further image analysis.*







Main instrument with measuring table

150 x 100 mm
250 x 150 mm

Main part in cast iron

Optics holder guided on a ball-bearing,height adjustable using the feed knobs for fast and fine focusing, max. travel 150 mm.

Steel ball-bearing measuring tables equipped with opto-electronic systems having incremental steel scales.
Other components are listed on page N-9

Valid for one coordinate direction as well as the working temperature range:
1,8 µm + 0,005 · L µm
for the table 150 x 100
2,5 µm + 0,01 · L µm
(L in mm)
for the table 250 x 150

Illumination system

Coaxial reflected light and transmitted light with knurled wheel used for setting the diaphragm aperture

Light units with remote continuous brightness setting.

Fibre optic illumination

Optical system

Binocular viewing tube with dioptric compensation for each eyepiece

Eyepiece cups
10x magnification
20 mm dia. free opening
25 ° viewing angle

Upright, laterally correct image

For interchangeable objectives and micro-objectives with bayonet mount, see on pages N-16 to N-19.

ETALON TCM 200 made ready-for-use - Ordering Variations

Equipped with binocular viewing tube for metrology oriented applications (for 230 V). Additional technical data and ordering information as listed below.

No	Variations	Main instrument with binocular viewing tube	Cold light unit transmitted light 35 W	Cold light unit reflected light 90 W	Meas. table Meas. span 150x100 mm	Meas. table Meas. span 250x150 mm	Coordinate direction Z	QUADRA-CHEK 220	QUADRA-CHEK 230*	QUADRA-CHEK 4000
68.39006	1	●	●	●	●		●		●	
68.39007	2	●	●	●		●	●		●	
68.39008	3	●	●	●	●			●		
68.39009	4	●	●	●		●		●		
68.19006	5	●	●	●	●		●			❍
68.19007	6	●	●	●		●	●			❍
68.19008	7	●	●	●	●					❍
68.19009	8	●	●	●		●				❍

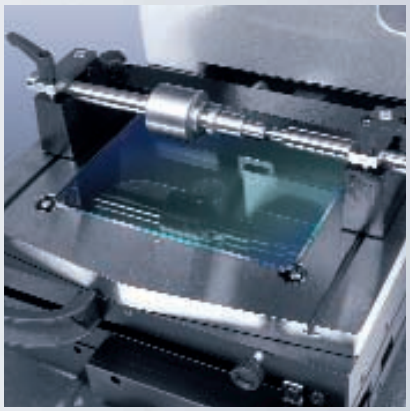
* Execution for X, Y and Z coordinate directions: ETALON No. 68.39014.

❍ Not part of the sales programme. Must be ordered on the spot.

Highly significant features

- *Table freely moved by hand or fine displacement over the threaded spindle allowing quick positionning in each direction.*
- *Objectives with bayonet mount for easy exchange with just one hand.*
- *Inserts with crossline graticules and concentric circles.*
- *Patented angle device with digital measuring system (as pictured opposite)*
- *Centre support for use in conjunction with the insert fitted with both aperture diaphragm and interference slit used to check diameters on cylinders (as pictured opposite).*
- *Fibre optic illumination to eliminate all heat lighting.*
- *Image viewing in transmitted light, coaxial reflected light, oblique incident light and ring light as well as brightfield/darkfield. Also with or without polarised l ight or interference contrast (DIC).*
- *Dedicated compact counter for 2 and 3 coordinate directions (see pages N-6 and N-15).*
- *Software for value processing using a computer unit (page N-15).*





General

10 °C to 40 °C

20 ± 0,5 °C

- 10 °C to 60 °C

120 to 230 Vac 50 to 60 Hz

Protection IP40 (IEC 60529)

EN 50081-1, EN 50082-1, EN 61000-4, EN 61010-1

70 kg net (main instrument No 68.19010)

45 kg (table 150 x 100)
70 kg (table 250 x 150)

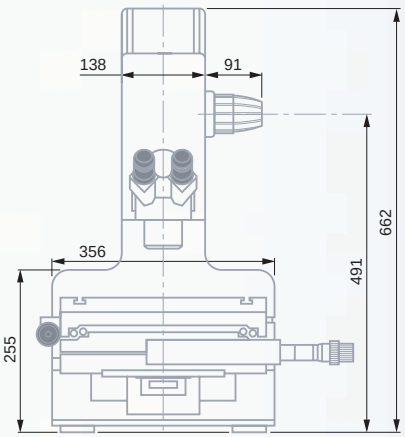
Setting key and dust cover

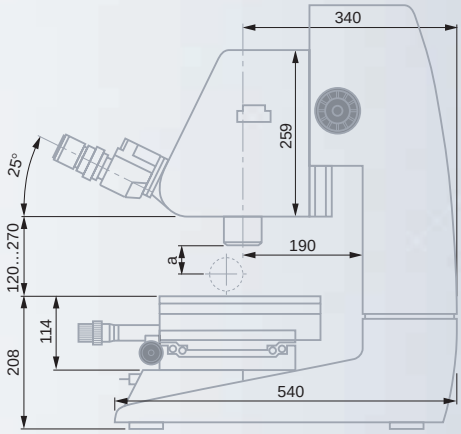
Transport packing

Identification number

In-house calibration certificate

Declaration of conformity





ETALON® TCM 200 Key Components

TCM 200 Main Instruments - General Overview

Important: In order to let you work with your microscope efficiently, at least the following components must be added to all main instruments listed on page N-14:

- *Measuring table (see page N-15)*
- *Cold light source for transmitted and reflected illumination (see page N-15)*
- *Computing counter for value processing (see page N-15)*

68.19010	**Main instrument with binocular viewing tube**				●
68.19011	**binocular viewing tube and measuring system (Z)**			●	
68.19012	**video viewing tube**		●		
68.19013	**video viewing tube and measuring system (Z)**	●			
Consisting of:					
68.69085	1 TCM 200 main body	●	●	●	●
68.69086	1 Optics holder with both mechanically operated fast and fine displacement	●	●	●	●
68.69090	1 Digital measuring system in the Z direction	●		●	
68.69087	1 Binocular viewing tube			●	●
68.69091	1 Video viewing tube	●	●		
68.69088	2 Eyepieces with a 10x magnification (order number for 1 item)			●	●
68.69022	1 Measuring objective 2 : 1	●	●	●	●
68.69089	1 Insert with aperture diaphragm	●	●	●	●



Components and Use of Accessories - General Overview

To be used with	**binocular viewing tube**											●
	video viewing tube										●	
	measuring system in the Z direction									●		
for	**length measurements**								●			
	surface examination	**in polarised light**						●				
		with interference contrast DIC					●					
No	=											
68.69061	150 x 100 measuring table						●	●	●	●	●	●
68.69062	250 x 150 measuring table						●	●	●	●	●	●
68.69063	CLS 50 cold light source for transmitted light	12 V	35 W	for 230 Vac			●	●	●	●	●	●
68.69064				120 Vac			●	●	●	●	●	●
68.69003	CLS 100 for reflected light and oblique incident light	14,5 V	90 W	for 230 Vac			●		●	●	●	●
68.69006				120 Vac			●		●	●	●	●
68.69065	CLS 150 for reflected light and oblique incident light	15 V	150 W	for 230 Vac			●	●				
68.69066				120 Vac			●	●				
68.69069	Insert with crosslines graticule								●	●		●
68.69070	Insert with crosslines graticule and concentric circles								●	●		●
68.69071	Angle device with measuring system (Q)								●	●		●
	LEICA Plan Achromat telecentric measuring objectives											
68.69008	Objective	1 : 1	Total magnification	10 x					●	●	●	●
68.69009		5 : 1		50 x					●	●	●	●
68.69010		10 : 1		100 x					●	●	●	●
68.69011		20 : 1		200 x					●	●	●	●
68.69072	Centre support (for use with the 150 x 100 measuring table only)								●	●	●	●
68.69073	Insert with aperture diaphragm and interference slit								●	●	●	●
68.69002	Illumination unit with oblique incident light (objectives 1 : 1 to 10 : 1)								●	●	●	●
68.69074	Illumination unit with ring light								●	●	●	●
68.69075	Micro-optical head for 6 micro-objectives						●	●	◗	◗	◗	◗
68.69076	Micro-optical head for 6 micro-objectives and polarised light						●	●	◗	◗	◗	◗
68.69019	Single bayonet mount						●	●	◗	◗	◗	◗
	LEICA Plan Fluor micro-objectives for image viewing in polarised light (optional)											
68.69012	Objective	2,5 : 1	Total magnification	25 x			●	●	◗	◗	◗	◗
68.69013		5 : 1		50 x			●	●	◗	◗	◗	◗
68.69014		10 : 1		100 x			●	●	◗	◗	◗	◗
68.69015		20 : 1		200 x			●	●	◗	●	◗	◗
68.69016		40 : 1		400 x			●	●	◗	●	◗	◗
68.69017		50 : 1		500 x			●	●	◗	●	◗	◗
68.69018		100 : 1		1000 x			●	●	◗	●	◗	◗
68.69077	Micro-optical head for 6 micro-objectives and image viewing in polarised light with interference contrast DIC						●	●	◗	◗	◗	◗
	LEICA Plan Fluor micro-objectives for image viewing in polarised light or not but with interference contrast DIC											
68.69078	Objective	10 : 1	Total magnification	100 x			●	●	◗	◗	◗	◗
68.69079		20 : 1		200 x			●	●		●		
68.69080		40 : 1		400 x			●	●		●		
68.69081		50 : 1		500 x			●	●		●		
68.69082		100 : 1		1000 x			●	●		●		
68.39013	QUADRA-CHEK 220 for 2 coordinate directions (X and Y)								●		●	●
68.39014	QUADRA-CHEK 230 for 3 coordinate directions (X, Y and Z)								●	●	●	●
68.39015	QUADRA-CHEK 231 for 3 coordinate directions (X, Y and Z) plus angle (Q)								●		●	●
	QUADRA-CHEK 4000 software (available on request)								●	●	●	●
	Video system (available on request)						●	●	●	●	●	●
68.69083	C-mount adapter with 1,2x magnification						●	●	●	●		●
68.69084	C-mount adapter with built-in magnification changer (0,4x and 1,2x)						●	●	●	●		●
68.69020	KAPPA FK1/F electronic graticule								●		●	●
68.69027	Set of clamping components as detailed on page N-9						●	●	●	●	●	●

Main Instruments



68.19010 **Main instrument with binocular viewing tube for ETALON TCM 200**
(measuring table and computing counter excluded)

Consisting of the following components:

68.69085	1 TCM 200 main body, cast iron, varnished. Vertical columm with guide adjusted to the optics holder No. 68.69086 (max. displacement 150 mm). Fibre optic transmitted light illumination.
68.69086	1 Optics holder, with mechanically operated knurted collars for fast and fine focusing. Accommodates an attachement for the viewing tube.
68.69087	1 Binocular viewing tube Provided with dioptric compensation for each eyepiece, single bayonet mount for LEICA Plan Achromat and Plan Fluor objectives or the micro-optical head, ocular accommodated attachment, vieo camera adapter (C-mount) and angle device. Coaxial reflected illumination via fibre optic.
68.69088	2 Eyepieces With a 10x magnification and cups (order number for 1 item only)
68.69022	1 Measuring objective 2 : 1 Free working distance a = 85 mm
68.69089	1 Insert with aperture diaphragm For use in transmitted light. With setting knurled wheel.

68.19012 **Main instrument with video viewing tube for ETALON TCM 200**
(measuring table and computing counter excluded)

Consisting of the following components:

68.69085	1 TCM 200 main body Cast iron body, varnished. Vertical column with guide adjusted to optics holder No. 68.69086 (max. displa cement 150 mm). Fibre optic transmitted illumination.
68.69086	1 Optics holder With mechanical fast and fine focusing.Accommodates the attachment for the viewing tube.
68.69091	1 Video viewing tube Provided with single bayonet mount for LEICA Plan Achromat and Plan Fluor objectives or the micro-optical head. Also with C-mount adapter for the video camera. Coaxial reflected illumination via fibre optic.
68.69022	1 Measuring objective 2 : 1 Free working distance a = 85 mm
68.69089	1 Insert with aperture diaphragm For use in transmitted light. With setting knurled wheel.

68.19011 **Main instrument with binocular viewing tube and digital measuring system in the Z direction**
(measuring table and computing counter excluded)

Identical to the model No. 68.19010 described above, but with the following added option:

68.69090	1 Opto-electronic measuring system Mounted in the coordinate direction Z with incremental steel scales, 0,0001 mm resolution.

68.19013 **Main instrument with video viewing tube and digital measuring system in the Z direction**
(measuring table and computing counter excluded)

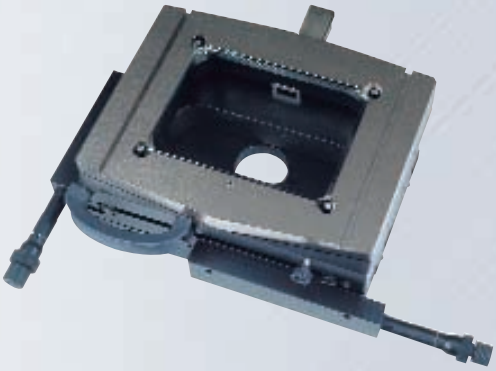
Identical to the model No. 68.19012 described above, but with the following added option:

68.69090	1 Opto-electronic measuring system Mounted in the coordinate direction Z with incremental steel scales, 0,0001 mm resolution.

Measuring Tables

No		
68.69061	**150 x 100 measuring table** 150 x 100 mm measuring span (X/Y directions). Rotary stage (320 x 240 mm surface area) through ± 5 ° for manual workpiece alignment. With cable for transmission of the masurement signal.
68.69062	**250 x 150 measuring table** 150 x 100 mm measuring span (X/Y directions). Surface area 420 x 256 mm. With cable fors transmission of the masurement signal.

Note:
Executions with motorised displacement in the two coordinate directions X and Y also available upon request.



Cold light sources

No		
	Cold light sources for transmitted illumination 35 W Includes both a 12 V reflective halogen lamp (No. 68.69067) and continuous brightness setting.
68.69063	**CLS 50 for 230 Vac**, 50 to 60 Hz
68.69064	**CLS 50 for 120 Vac**, 50 to 60 Hz
	Cold light sources for reflected illumination 90 W Includes a 14,5 V reflective halogen lamp (No. 68.69004) and continuous brightness setting.
68.69003	**CLS 100 for 230 Vac**, 50 to 60 Hz
68.69006	**CLS 100 for 120 Vac**, 50 to 60 Hz



Systems for Value Processing

No		
	QUADRA-CHEK 200 Computing Counter Up/down computing counter with alphanumeric LC display and colour background. Languages available: English, French, German, Italian and Spanish.Computerised workpiece alignment. Also with functions to calculate for geometric combinations, programmable measurement cycles, memory as well as parallel, digital RS 232 and infra-red outputs.
68.39013	**QUADRA-CHEK 220** For **2 coordinate directions** (X and Y)
68.39014	**QUADRA-CHEK 230** For **3 coordinate directions** (X, Y and Z)
68.39015	**QUADRA-CHEK 231** For **3 coordinate directions** (X, Y and Z) **and Q** (Angle device No. 68.69071)



✓
Ball-bearing guiding.
Free move or fine displacement over the threaded spindle.
With 2 T-slots for tightening the workpiece.
Max. load capacity
30 kg (table 150 x 100)
20 kg (table 250 x 150)
Opto-electronic system with incremental steel scale.
TTL signal form.
0,0001 mm

✓
Transport packing
Declaration of conformity

QUADRA-CHEK 200 Computing Counter

✓
Black/white LC display
0,0005 mm or 0.00002 in
Parallel and RS 232
85 to 264 Vac, 43 to 63 Hz
EN 61326:1998 EN 61010
0 °C to 45 °C
292 x 190 x 250 mm (W x D x H)
4,8 kg without cable
Transport packing
Declaration of conformity

For further details, refer to pages N-6 and N-7

QUADRA-CHEK 4000 – Software programme for value processing

For value processing and output using a PC.
Permits the user to observe the image through the binocular viewing tube or using a video camera linked to an additional viewing screen.

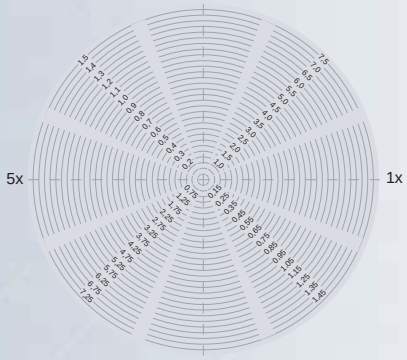
For QUADRA-CHEK 4000 running under WINDOWS, the option enabling automatic edge detection can also be provided for further image analysis.

The computing cards necessary for connecting the microscope to the computer can be quoted as follows:

- **Dual-input computing card for both X and Y coordinate directions**
- **Dual-input computing card for the three coordinate directions X, Y and Z**
- **2 Dual-input computing cards for both X and Y coordinate directions as well as angle device (Q)**
- **2 Dual-input computing cards for the three X, Y and Z coordinate directions as well as angle device (Q)**

For a quotation, we recommend to get in touch with your local ACU-RITE dealer, directly.

Accessories for Metrology based Applications using TCM 200







68.69069 **Insert with crosslines graticule**
90 ° crosslines graticule with 2 additional index lines to ± 60 °. To be used in conjunction with the binocular viewing tube No. 68.69087.

68.69070 **Insert with crosslines graticule and concentric circles**
90 ° crosslines graticule with 2 additional index lines to ± 60 ° as well as 2 sets of 30 concentric lines each.

Magnification	Diameter	Stepping
10 x	0,25 to 7,5 mm	0,25 mm
20 x	0,25 to 3,75 mm	0,125 mm
50 x	0,05 to 1,5 mm	0,05 mm
100 x	0,05 to 0,75 mm	0,025 mm

Usable with the binocular viewing tube No.68.69087

68.69071 **Insert with protractor and digital measuring system**
Crosslines graticule combined with opto-electronic measuring system, which is based on incremental scale divisions. Both features can be rotated. Sinusoidal output signal ± 11 μA_{pp}. To be used with the binocular viewing tube No. 68.69087

LEICA Plan Achromat measuring objectives
High-quality telecentric measuring objectives producing a perfect erect image, thus allowing a definite

Long working distances, e.g. for the inspection of test pieces having auckward edges or for bore measurements.

Easily and quickly exchanged. Safely attached through the bayonet mount.

Transport packing

Declaration of conformity

✓ Transport packing
Declaration of conformity

LEICA Plan Achromat measuring objectives

No	Objectives	Total magnification	Object-field dia.	Numerical aperture	Free working distance a
68.69008	1 : 1	10 x	20 mm	0,03	88 mm
68.69022*	2 : 1	20 x	10 mm	0,06	85 mm
68.69009	5 : 1	50 x	4 mm	0,13	62 mm
68.69010	10 : 1	100 x	2 mm	0,20	52 mm
68.69011	20 : 1	200 x	1 mm	0,35	30 mm

***** The measuring objective 2:1 is a full part of the ETALON TCM 200 main equipment

✓ Transport packing
Declaration of conformity

68.69072 **Centre support**
Serves to measure parts with symmetrical rotation. Max. width of points 190 mm. Max. diameter 50 mm. Usable **solely with the 150 x 100 measuring table** (No. 68.69061).

Supplied with a setting piece designed for inspecting diameters on cylinders according to the method that uses interference fringes. This support requires the use of the insert No. 68.69073.

68.69073 **Insert with aperture diaphragm and interference slit**
For diameter inspection on cylinders in trasnmitted light on the basis of the interference method. Used with the centre support No. 68.69072.Includes a knurled wheel to set both the aperture diaphragm and interference contrast.

68.69002 **Oblique incident light unit**
Suitable for the measuring objectives 1 : 1 to 10 : 1. Dual-arm fibre optic cable with holder rotating through ± 45 ° in the optical axis.

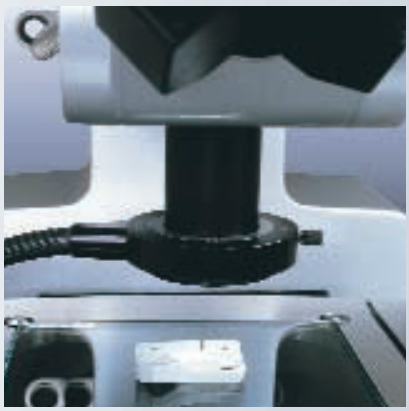
For use in conjunction with the cold light unit CLS 100 (90 W, No. 68.69003 or 68.69006) or CLS 150 (150 W, No. 68.69065 or. 68.69066).

68.69074 **Ring light unit**
Suitable for all measuring objectives. Includes one fibre optic cable.

For use with the CLS 100 cold light unit (90 W, No. 68.69003 or 68.69006).



Note:
Mounting the measuring device for diameter inspection according to the interference method requires a specific knowledge. Therefore, allowances should be made for this feature at the date of purchase of your microscope. The measuring device includes both the centre support No. 68.69072 and insert No. 68.6073.







Accessories for Surface Structure Examination

68.69019 **Single bayonet mount for micro-objectives**
With threads for micro-objectives 2,5 : 1 to 100 : 1.
For transmitted and coaxial reflected illumination.



68.69075 **Micro-optical head suited for 6 micro-objectives**

Consisting of:

1 Main body
With changer for 6 LEICA Plan Fluor micro-objectives 2,5 : 1 to 100 : 1 and 1 fibre optic cable (light unit No. 68.69003 or 68.69006 not included).

1 Triple-module illumination
Mounted in the main body with coaxial reflected light (darkfield/brightfield).

68.69076 **Micro-optical head suited for 6 micro-objectives as well as image viewing in polarised light**

Includes the same components as No. 68.69075 above plus the following additional option:

1 Polariser
Mounted in the main body.

✓
Micro-optical heads furnished in a carrier packing with aerated foam that can be inserted into a drawer for further use.
Declaration of conformity





LEICA Plan Fluor micro-objectives for image viewing with or without polarised light
Convenient for illumination in transmitted and coaxial reflected light.
To be used with the single bayonet mount No. 68.69019 or the micro-optical head No. 68.69075 or 68.69076, without interference contrast DIC.

	Objectives	Total magnification	Object-field dia.	Numerical aperture	Free working distance a
68.69012	2,5 : 1	25 x	8 mm	0,075	5,5 mm
68.69013	5 : 1	50 x	4 mm	0,10	10,5 mm
68.69014	10 : 1	100 x	2 mm	0,20	10,5 mm
68.69015	20 : 1	200 x	1 mm	0,40	10,5 mm
68.69016	40 : 1	400 x	0,5 mm	0,50	10,5 mm
68.69017	50 : 1	500 x	0,4 mm	0,60	3,6 mm
68.69018	100 : 1	1000 x	0,2 mm	0,70	3,6 mm

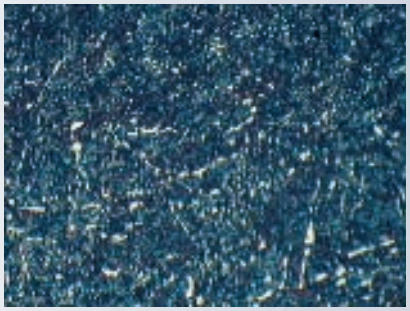
✓
Transport packing
Declaration of conformity

No.	
68.69077	**Micro-optical head suited for 6 micro-objectives and image viewing in polarised light with interference contrast (DIC)**

Consisting of the same components as No. 68.69075, but provided with the following added options:

1 Polariser
Mounted in the main body.

1 DIC drawer
With adjustable Wollaston prism.



✓ Micro-optical heads in a carrier packing with aerated foam that can be inserted in a drawer for further use.

Declaration of conformity





✓ Transport packing

Declaration of conformity

LEICA Plan Fluor micro-objectives for image viewing with or without polarised light, with interference contrast DIC

Convenient for illumination in transmitted and coaxial reflected light. To be used with the single bayonet mount No. 68.69019 or the micro-optical head No. 68.69076 or 68.69077. These objectives are marked with «IK» for «Interference contrast».

No.	Objectives	Total magnification	Object-field dia.	Numerical aperture	Free working distance a
68.69078	10 : 1	100 x	2 mm	0,20	10,5 mm
68.69079	20 : 1	200 x	1 mm	0,40	10,5 mm
68.69080	40 : 1	400 x	0,5 mm	0,50	10,5 mm
68.69081	50 : 1	500 x	0,4 mm	0,60	3,6 mm
68.69082	100 : 1	1000 x	0,2 mm	0,70	3,6 mm

✓ Transport packing

Declaration of conformity

No.	
	Cold light sources with reflected light used for image viewing with interference contrast and polarisation,150 W
	With a 15 V reflective halogen lamp (No. 68.69068) as well as continuous brightness setting.
68.69065	**CLS 150 for 230 Vac**, 50 to 60 Hz
68.69066	**CLS 150 for 120 Vac**, 50 to 60 Hz



Video Systems for ETALON TCM 200

Measuring microscope with binocular viewing tube

All adapters listed hereafter allow the microscope to accommodate a video camera with a C-mount.



68.69083 **C-mount adapter with a 1,2 x magnification**

consisting of:

1 Adapter with a 1,2 x magnification factor
1 C-mount attachment for the camera

68.69084 **C-mount adapter with integrated magnification changer**

consisting of:

1 Adapter with integrated magnification changer, magnification factors of 0,4 x / 1,2 x. Convenient only for a 0.5 in camera.
1 C-mount attachment for the camera.

✓
Transport packing
Declaration of conformity

Measuring microscope with a video viewing tube

The electronic graticule shown below is intended for use with any QUADRA-CHEK 200 computing counter. However, this feature is unnecessary with QUADRA-CHEK 4000.





68.69020 **KAPPA FK1/F electronic crosslines graticule**
To be connected to the video screen. The graticule (white or black) overlaps the camera's image.

✓
100 to 240 Vac 50 to 60 Hz
Connecting cable
Transport packing
Declaration of conformity

Workpiece Attachments



68.69027 **Set of campling components**
For a safe positioning of the workpieces to be measured ot parts to be observed. Equally suited for ETALON measuring microscopes and ETALON profil projector PP 300.
Single components as listed on page N-9.

✓
Wooden case
Declaration of conformity

ETALON® PP 300 Profile Projector

Table model featuring a functional, modern design – 300 mm diameter viewing screen – High-definition image quality, high-contrast silhouette contours – Telecentric objectives from 1 : 10 up to 1 : 100 – Photometric measuring unit for automatic edge detection.

Ball-bearing measuring table with a 200 x 100 mm span– 0,001 mm or 0.00005 in numerical interval – Max perm. error as low as 10 µm over a 200 mm measuring travel – Very long free working distances for tall workpieces – Workload capacity up to 20 kg without loss of accuracy – Reflected and transmitted light illumination (halogen, 150 W) – RS-232 digital output – In-house calibration certificate.

✓

Main instrument

200 x 100 mm

Highly stable welded construction in steel sheet

Steel table guided on a ball-bearing in the three axes. Table surface with chemical nickel-plating. 4 clamping T-slots. Moved by 3 cranks. Max. perm. table load 20 kg

Table surface area 400 x 240 mm, vertical displacement over 100 mm. Max. workpiece diameter 200 mm.

Opto-electronic measuring systems with incremental steel scales providing a 0,001 mm resolution

Valid for one coordinate direction as well as the working temperature range: 5 µm + $^{L}/_{40}$ µm (L in mm)

Optics

300 mm / 11.8 in screen diameter. Rotating graticule. 4 spring clamps to hold thin films and templates.

360 ° angle device, vernier reading to 1 '.

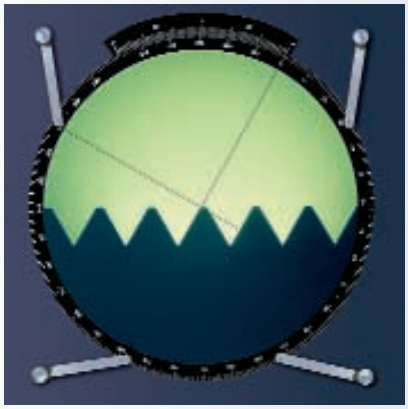
High-contrast erect image with sharp contours. Reversed image, laterally.

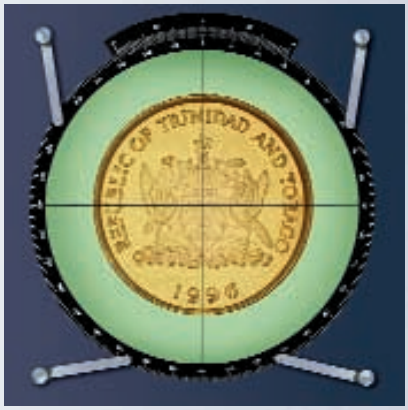
Telecentric ray path.

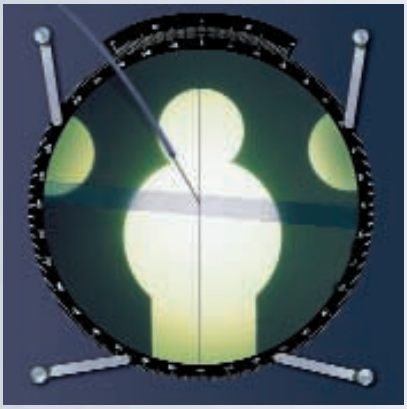
Selectable measuring objectives with single threaded attachment.

Continued next page











World Class Image Projection

- *Projection screen mounted vertically for a comfortable observation at operator's eye level.*
- *Optics with telecentric ray path guaranteeing:*
  – direct access to the measuring table;
  – full projection of the silhouette of prismatic parts that need just be put on the table;
  – perfect illumination without cumbersome light unit;
  – use of transmitted light with no blindness effect.
- *Ball-bearing, upright guidance to avoid the measuring table tilting over.*
- *High image accuracy with low distortion.*
- *Curtain for examination in bright ambient light or for measuring with a high magnification.*

PM Computing Counter

Up/down computing counter with 2 numerical displays.

- *0,001 mm or 0.00005 in numerical interval.*
- *Metric / Inch conversion.*
- *Measurements with a fixed or freely assignable origin point of coordinates.*
- *Reverse counting sense.*
- *Display setting on any numerical value (PRESET function).*
- *RS 232 and Centronics digital outputs.*

SMART DRO I Computing Counter

- ***Photometric sensor for automatic edge detection.***
- *Programmed geometric functions.*
- *Programmable computing functions for the combination of the measured values according to the workpiece geometry.*
- *Measuring capability eliminating the need for manual calculation.*
- *Computerised transformation of coordinates making mechanical workpiece alignment unnecessary.*
- *Diameter measurement including a number of measuring points from 3 up to 15 probing points.*
- *Cartesian and polar coordinate systems.*
- *Ability to combine up to 99 measured values per geometric element.*
- *Coordinate origin points located at user's choice.*
- *Value classification based on preset limits of size.*
- *20 programmable measurement cycles, each including up to 99 geometric elements.*

Image accuracy: Max. distortion 0,1 ‰. Max. error in both transmitted and reflected light: 0,1 % and 0,15 %, resp.

General

Transmitted and reflected light illumination, switchable. 24 V, 150 W each (halogen). Cold light with filter.

10 °C to 40 °C

19 °C to 21 °C

230 Vac (±15 %) 50 Hz
Power consumption: max. 0,40 kW

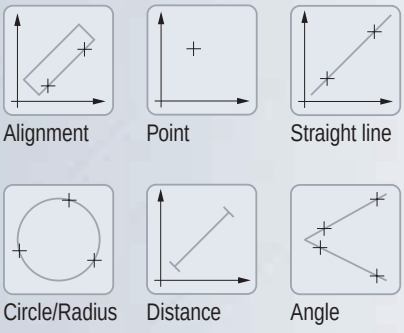
Surface need: 1500 x 1500 mm (W x D)

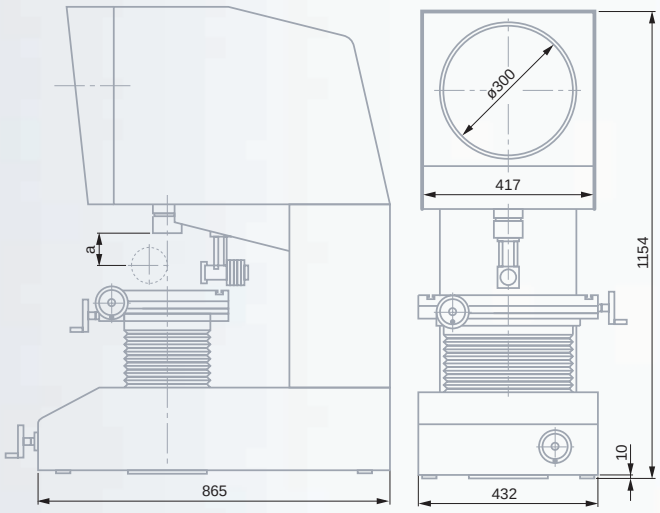
250 kg net (No. 68.19005)

Safety EN 292-1:1991, EN 292-2:1991, EN 60 204-1 (VDE 0113)

Identification number

Programmed functions





Components of the Main Equipment

68.19005 **ETALON Profile Projector PP 300**
(objectives, computing counter and packaging not included)

Consisting of:

- PP 300 main part
- Projection screen with a 300 mm dia. / 11.8 in
- 360 ° Angle device vernier reading to 1 '
- Transmitted and reflected light illumination 24 V, 150 W, halogen
- Measuring table (X and Y directions) Ball-bearing guide. 200x100 mm measuring.span. Equipped with 4 T-slots, opto-electronic measuring system and cable for the signal transmission.



✓
2 carrying rods
Packaging according to shipping conditions and relevant country
In-house calibration certificate
Declaration of conformity

Objectives, interchangeable
Top quality telecentric objectives that render images with minimum distortion and optimum contrast. Long free working distances that permit measurements to be taken on tall test pieces with auckward edges but also on offset bores.
Safe threaded attachment.

	Objectives	Object-field dia.	Free working distance a
68.69045	10 : 1	30 mm	115 mm
68.69046	20 : 1	15 mm	97 mm
68.69047	50 : 1	6 mm	53 mm
68.69048	100 : 1	3 mm	45 mm

✓
Transport packing
Declaration of conformity



✓
000 LEDs display (X and Y coordinates plus functions). 7-decade display
14 mm (meas. values) 6 mm (alphanumerical display)
RS 232 and Centronics
120 Vac or 220 to 240 Vac, 50 to 60 Hz
Safety IEC 1010-1
EN 55011 EN 50082-1
SMART DRO I: 1 photometric contour sensor
Transport packing
Declaration of conformity

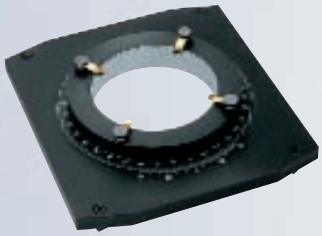
68.39005 **SMART DRO I computing counter with photometric unit for automatic edge detection**
Up/down computing counter with 2 numerical and 1 alphanumerical displays for the functions. Numerical interval: 0,001 mm or 0.00005 in

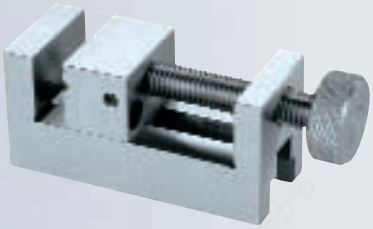
Available languages: English, German, French, Italian and Spanish. Computerised workpiece alignment. Computing functions for the geometric combination of the measured values. Value classification. Programmable measurement cycles. Value storage. Digital output.

68.39004 **PM computing counter**
Up-down computing counter with 2 numerical displays, numerical interval 0,001 mm or 0.00005 in.



Optional Accessories

















No		
68.69049	**Rotary table**	Table surface 250 x 125 mm. Rotation range ± 6 °. Without scale (not pictured).
68.69050	**Rotary table**	Rotation range ± 360 °. With graduated scale, scale value 0,5 °.
68.69051	**Precision clamp**	Serves for clamping plan parallel test pieces. Made from hardened steel, finish ground. 40 mm clamp capacity, 32 mm resting width, 38 mm total height, 78 mm total length. Max. deviations in perpendicularity and parallelism of the clamping faces: 5 µm / 100 mm and 1 µm / 30 mm, resp.
68.69052	**Centre support**	Height of points: 55 mm, width of points: 300 mm. Swivelling through ± 10 °. Swivel device with quick action clamp. Hardened solid points, precisely ground.
68.69053	**Headstock**	Equipped with a SK40 quick-release taper, mounted horizontally and tilting through 360 °. Axis height 55 mm. Graduated scale, vernier reading to 10 '.
68.69054	**Inspection prism**	Made from hardened stainless steel, precisely ground. Accuracy grade 1 / DIN 2274. With a 90 ° vee recess for shaft diameters ranging from 5 to 30 mm. 50 mm vee length. Also with clamp bracket.
	Measuring films	Durable plastic foils having a 300 mm dia.
68.69055	**Radii**	
68.69056	**Radii and angles**	
68.69057	**Thread profiles**	
68.69058	**Curtain**	Advisable for optimum contrast in bright ambient light or for workpiece examination with high magnification (pictured on page N-21).
68.69059	**Base table**	Highly stable welded construction in steel. Dimensions (H x W x D): 750 x 900 x 800 mm, without hanging cabinet.
68.69060	**Hanging cabinet**	Convenient for the table No. 68.69059. Fitted with 4 drawers: 3 are 100 mm high and one is 300 mm high.

✓ Transport packing

Declaration of conformity

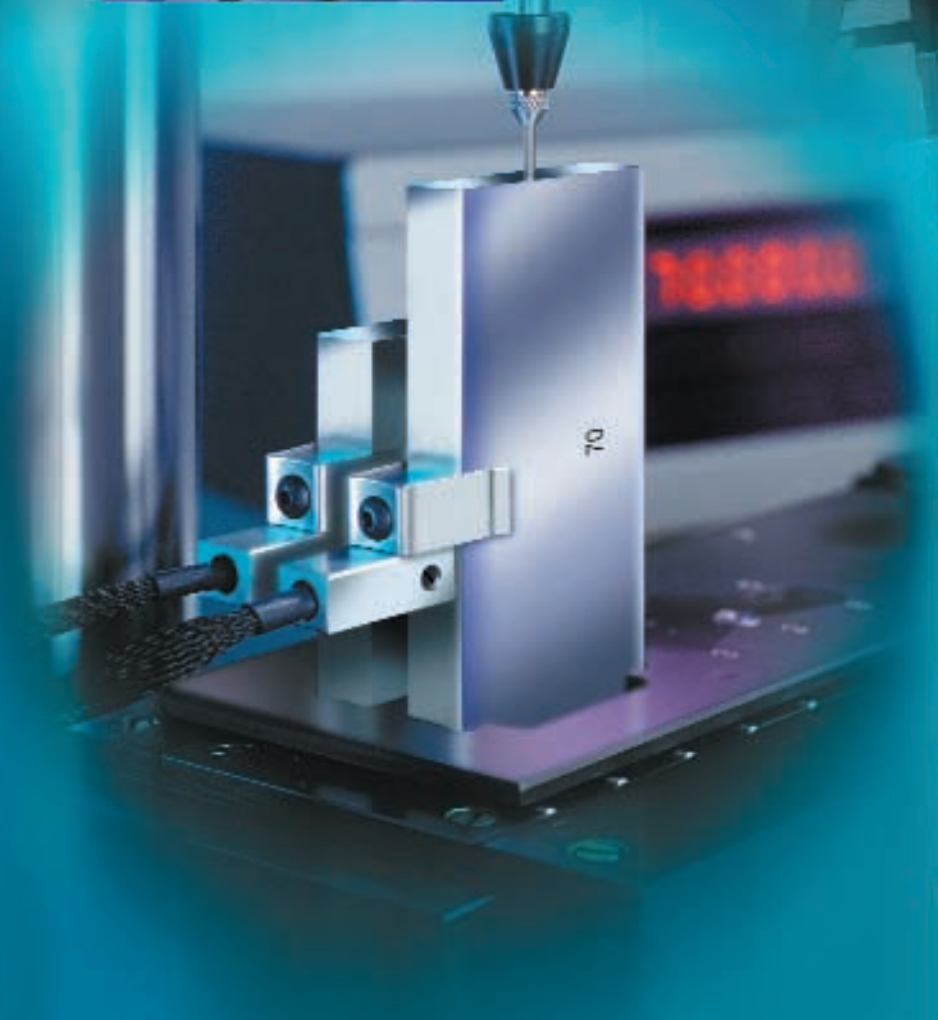
No		
68.69027	**Set of clamping components**	Used for safety positioning of test pieces. Suited for ETALON profile projector PP 300 as well as ETALON measuring microscopes. Listed as single components on page N-9.

✓ Wooden case

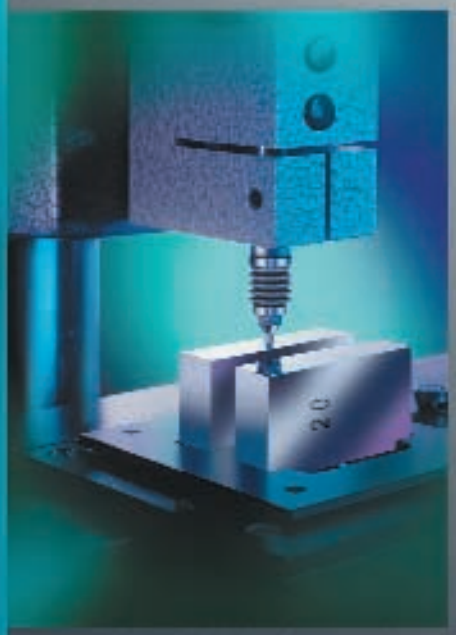
Declaration of conformity

Calibration Equipments









Confidence is not enough...

Control of inspection and measuring equipments is an element of the quality management that is increasingly more important than ever before. The introduction of the ISO 9000 family of international standards has led to major changes in this field as well. So, ISO 9001 specifies, among others, that:

«all inspection and measuring equipment than can affect product quality must be identified, calibrated and adjusted at prescribed intervals, or prior to use, against certified equipment having a known valid relationship to internationally or nationally recognised standards.»

This standard also states that the supplier shall:

«ensure that the inspection and measuring equipment is capable of the necessary accuracy and precision».

A Big Choice

TESA can provide you with the most varied means specifically suited for the inspection and calibration of standards, measuring instruments and other plug gauges. Some of them are already described in the previous sections of this catalogue, namely:

- *Gauge blocks and angle gauges – Section I*
- *Setting rings – Page C-24*
- *Steel balls – Page I-19*
- *Cylindrical setting standards with outside diameters– Page B-24*
- *Optical flats – Page I-12*
- *Plan parallel optical flats – Page B-29*
- *Electronic levels for straightness and flatness measurement – Section H*
- *Instruments for squareness and perpendicularity measurement – Page H-10*
- *Calibration equipment for length measuring devices fitted with inductive probes – Page L-65*

This section is devoted to the measuring equipments that serve to calibrate other such inspection means. But, they can also be used for high-accuracy measurement of precision parts.



The instrument first developed for calibrating gauge block was an improved external micrometer, which was manufactured early in the 19th century by Brown& Sharpe for the inventor of the gauge set compositions, C.E. Johansson.

Gauge Block Calibration

In the hierarchical chain of dimensional transfers which can be traced to the metre length unit, the gauge blocks hold a key position. And this make them the most important material measures in metrology.

The transference of the length unit, based on specific wavelengths of light, to gauge blocks is achieved in the first instance by a fundamental interferential measurement. From the gauge blocks measured in this way, the lengths are transferred to other gauge blocks by hierarchical measurements.

TESA® Gauge Block Comparators – General Overview

TESA offer two models which operate according to 2 different measuring procedures.

- *The new TESA UPD used to measure gauges blocks directly over a measuring span of 25 mm / 1 in.*
- *The traditional well-proven TESA UPC used for comparative measurement gauge blocks having a same nominal length.*

TESA Gauge Block Comparators			UPD	UPC
Measuring procedures				
Direct measurement			●	
• Length comparison with a variation in nominal length of 25 mm				
• Number of reference gauge blocks required for calibrating a 122-piece set: 9 pieces			●	
• Number of gauges blocks required for the set-up calibration: 9 pieces + 6 pairs			●	
Comparative measurement			●	●
• Comparison of gauge blocks of same nominal length				
• Number of reference gauges required for calibrating a 122-piece set: 122 pieces			●	●
• Number of gauge blocks required for the set-up calibration: 6 pairs			●	●
Errors of measurement				
For details about the information provided hereafter, refer to both pages O-8 and O-10.				
Repeatability limit	0,015 µm			●
	0,025 µm			●
	0,04 µm		●	
Uncertainty of measurement	U = ± (0,05 + 0,5 · L) µm			●
	U = ± (0,07 + 0,5 · L) µm	L in m	●	
	U = ± (0,10 + 1,0 · L) µm			●
Application ranges				
Nominal lengths	0,5 up to 100 mm / 0.02 up to 4.0 in		●	●
	100 up to 500 mm / 4,0 up to 16,0 in		▲	
Measuring span			●	
25 mm / 1 in				
Sensors for length dimensions				
• Two axial probes in sum measurement			●	●
• Digital system, opto-electronic with incremental divisions			●	
• Inductive analogue system, electrical				●
• Measuring force activation				
– electro-motorised			●	
– by force spring				●
• Measuring bolt retraction				
– electro-motorised			●	
– by vacuum				●
Template system (see page O-5)				
• Single template system			●	●
• Dual template system			●	❍
Handling of gauge blocks with nominal lengths up to 10 mm, approx.				
Suction loader used in conjunction with the electrical vacuum pump			❍	❍
TESA UPT temperature device			●	❍
Incorporates 4 temperature sensors (4-wire type) for measuring electrical resistance				
TESA software programme for value processing				
• **TESA UP**, WINDOWS 95 ..., WINDOWS NT			●	❍
• **TESA UPC**, MS-DOS - Version 3.0 or later				❍

▲ Available upon request ❍ Recommended option

TESA® UPD Gauge Block Comparator with a 25 mm Measuring Span

- *Direct measurement of gauge blocks with a variation in nominal length of up to 25 mm or 1 in.*
  – To reduce the number of required reference gauge blocks by nearly 80 %.
- *Typical comparative measurement of gauge blocks having a same nominal length.*
  – To achieve lower measurement uncertainties due to weaker influences of the systematic errors.
- *Equipped with HEIDENHAIN high-precision incremental probes.*
- *Templates with new concept for positioning the gauge blocks (patent pending).*
  – Single or dual template system to provide optimum ease of handling of the gauge blocks.
- *Integrated device for temperature acquisition with high precision.*
- *On-line transfer of the measured length and temperature values.*
- *Computer aided data processing with all needed corrections included.*

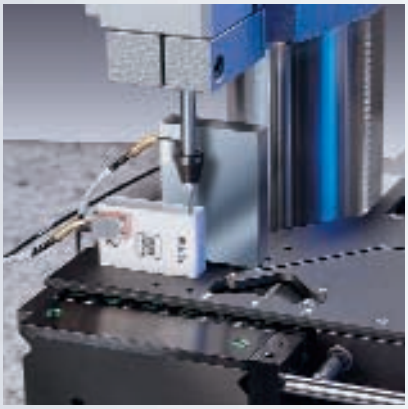


New Technical Concept through Direct Measurement

Two mutually opposed, aligned probes connected in sum measurement (+A+B as shown on page L-3) also measure thin gauge blocks reliably as the upper sensor A is able to capture lengths up to 25 mm. Displacement of the measuring bolt and activation of the measuring force are both electro-motorised.

PT 100 platinum resistances let you capture the temperature of the two gauge blocks, the measuring table and support.

The TESA UP software programme processes length and temperature values as measured while executing and controlling your measurement cycles simultaneously.



General

✓ SWISS MADE

✓

ISO 3650

For gauge blocks with nominal lengths from 0,5 mm to 100 mm / 0.02 in to 4 in

Measuring procedure
direct and comparative measurements through the transference of the length of a reference gauge block to the gauge block to be measured.

In **direct measurement,** the nominal length of the two gauge blocks to be compared may vary up to the size of the measuring span, i.e. 25 mm.

In **comparative measurement**, comparison is always made between two gauge blocks of same nominal length.

Measuring configuration: Two probes with mechanical contact with the measuring face to be probed are connected in sum measurement (function +A+B).

Measuring points
On the reference gauge block: at the centre of the measuring face (point R). On the gauge block to be measured: at the centre (point 1) as well as the four corners of the measuring face, each lying 2 mm away from the adjacent faces (points 2 to 5).

The central length l_C is determined by probing both points R and 1. For establishing lengths at any point, the measurements shall be carried out at points R plus 1 to 5.

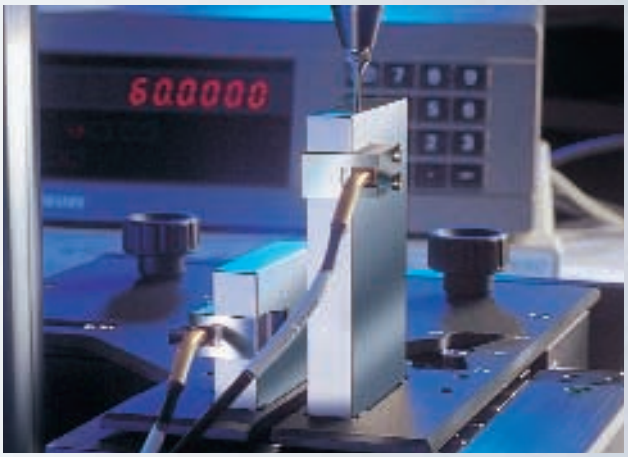
The variation in length v is obtained from the measurements taken at measuring points 1 to 5

Transport packing

Identification number

Calibration certificates from the supplier (comparator) or the Swiss Calibr. Service (temperature device).

TESA UPD
– The flexible concept that provides distinctive metrological features with substantial savings at the end of it all



Direct Measurement

- *Permits over 90 % of a 122-piece set to be checked using the same reference gauge block. All nominal lengths of the full gauge set being contained within 0,5 and 25 mm, the measuring span is therefore not exceeded.*
- *Allows the reference gauge set to be reduced by nearly 80 % against the ones needed until now.*
- *Provides substantial savings in the gauge block supply and re-calibration through reduced set compositions.*
- *Enables direct measurement of gauge blocks that can not be compared with other existing gauge blocks due to their unusual nominal lengths.*

Comparative Measurement



- *Allows gauge blocks of same nominal lengths to be measured by comparison as usual.*
- *Enhances the measuring conditions, thus permitting all measurements to be taken with lower uncertainty.*
- *Reduces the number of systematic errors through limited length based influences of both the upper probe A and gauge block to be compared.*

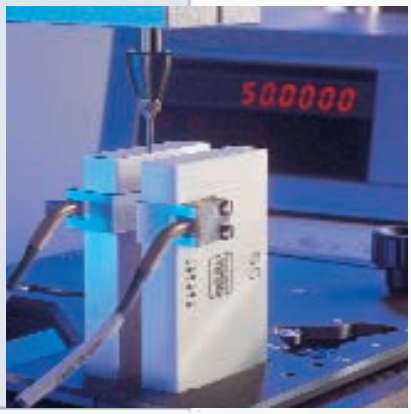
Dual Template System To Protect Your Expensive Reference Gauges (Patent Pending)

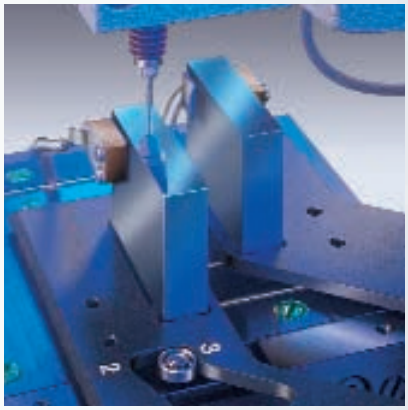


- *Simultaneous use of two templates allows you to release your reference gauges until their handling becomes necessary.*
- *This system makes it possible for you to save much time and money.*
- *During the measurement cycles on a routine basis, the travel of the reference gauges moved onto the measuring table is reduced by nearly 70 %. This contributes to significantly lower the risks of damaging and wearing the measuring faces.*
- *The double protection of your reference gauges leads to significant cost savings by reducing the need for :*
  - *recalibration*
  - *restoring measuring faces*
  - *replacing worn or damaged reference gauges*
  - *long downtime while prolonging the life of your full reference sets.*

Single Template System

- *With this system, your reference gauges along with the gauge blocks to be calibrated are moved together during the measurement cycles.*



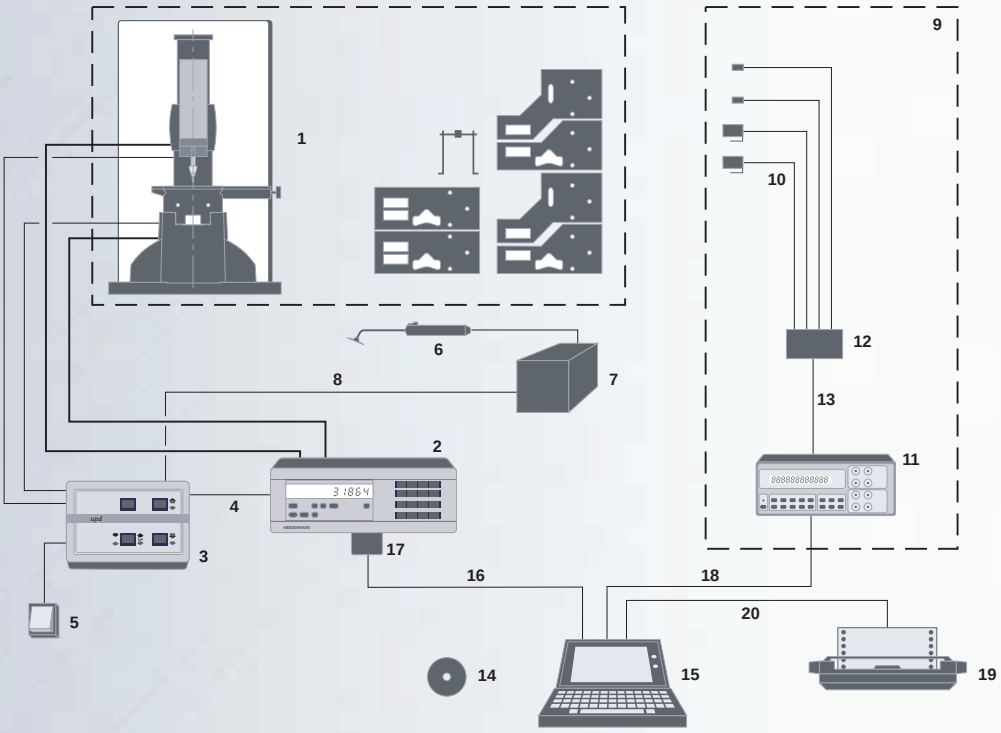




TESA UPD Delivery Programme – Three Ordering Variations

	No	=			
	59.30005	**TESA UPD gauge block comparator with temperature device***			●
	59.30004	**TESA UPD gauge block comparator without temperature device**		●	
	S59300102	**TESA UPD gauge block comparator, complete * with temperature device, TESA UP software programme, computer (Notebook) and printer**	●		
		Consisting of:			
1	59.30008	1 TESA UPD mechanical part	●	●	●
2	59.60016	1 HEIDENHAIN ND 231 computing counter	●	●	●
3	59.60013	1 Control panel	●	●	●
4	59.60014	1 Connecting cable for control panel to ND 231	●	●	●
5	47.68001	1 Foot switch	●	●	●
6	16.60011	1 Pneumatic suction loader	●		●
7	32.60433	1 Electrical vacuum pump with external control - 230 Vac, 50 Hz	●		●
8	59.60028	1 Cable for connecting the electrical vacuum pump to control panel	●		●
9	59.30011	1 TESA UPT temperature device, complete	●		●
14	59.60025	1 TESA UP software programme for value processing	●		
15		1 Personal Computer Portable (Notebook)	●		
16	59.60027	1 Cable for connecting ND 231 computing cunter to adapter No. 47.60017	●		
17	47.61017	1 Adapter for connecting cable No. 59.60027 to computer	●		
18	59.60026	1 Cable for connecting PREMA 3040 to computer	●		
19		1 Matrix Ink Jet printer	●		
20	S16071229	1 Cable for connecting computer to printer	●		

* Special execution for 110 Vac, 60 Hz also available on request.



Measuring stand

Heavy construction with toothed rack guide plus handwheel for setting the measuring arm. Fixing bores (16 and 3 mm dia, resp.) for upper probe A plus one temperature sensor No. 59.60010.

Main body in cast iron. Hardened steel column, dull-chrome plated and ground.

Special table

Solid measuring table fitted with 6 cylindrical pins to ensure and protect the gauge blocks during handling.

3 mm dia.clamping bore for one temperature sensor No. 59.60010 as well as retaining plate mounted laterally on the table for both sensors 59.60008 and 59.60009 fitted with clip.

Hardened steel. Tungsten carbide cylindrical pins.

Positioning device for gauge blocks

Single and dual template systems to shift the gauge blocks to the selected measuring points

For more details on both systems, report to the previous page

Sensors for length measurements

Two HEIDENHAIN axial probes, opto-electronic with electro-motorised bolt activation

ZERODUR® glass ceramic with incremental divisions

Dividing periods: 4 µm

25 mm / 1 in for upper probe A or 1 mm for lower probe B

Measuring bolt on plain bearing

1,0 N for upper probe A or 0,63 N for lower probe B.

Measuring bolt in invar steel

Tungten carbide insert with spherical measuring face, R = 20 mm

Computing counter

HEINDENHAIN ND 231 up and down computing counter provided with two probe inputs

7-segment LED display, alphanumeric. 9-decade digits plus sign. Also with auxiliary LED display for activated functions.

Signal divdiing: ≤ 400x

0,01 µm and 0,005 µm or 0.000 001 in

10 mm

16 keys for digit entry as well as the functions

Sum measurement with probe function +A+B

Linear correction of the systematic errors

PRESET function for digit entry

2 programmable reference points

RS 232 and V.24

100 to 240 Vac (-15 % to 10 %), 48 to 62 Hz

0 °C to 45 °C

- 30 °C to 70 °C

75 %, with no condensation

Die-cast aluminium housing

Protection IP 40 (IEC 60529)

EN 55022, Class B

(W x H x D) 239 x 85 x 224 mm

TESA UPD System Components

	No		
1	**59.30008**	**TESA UPD Mechanical Part**	
		Consisting of:	
	59.30009	1	Measuring stand with toothed rack guide. Manually operated for setting the measuring arm. Attachment has a 16 mm dia. fixing bore for the upper probe.
	59.60015	1	Solid measuring table in special version. Made from hardened steel and fitted with 6 tungsten carbide cylindrical pins for safe positioning of the gauges blocks. Provide high protection and wear resistance to the gauge blocks over a long time. Threaded bores for clamping the lower probe. Prepared for the integration of the temperature sensor (see below).
	59.60029	1	Positioning device provided with a single or dual template system. Interchangeable templates to shift the gauge blocks from a given measuring point to another: 1 Pair for gauge blocks having a 9 x 30 mm cross-section. Consists of 1 template No. 59.60019 for the reference gauges plus 1 template No. 59.60020 for the gauge blocks to be calibrated. 1 Pair for gauge blocks having a 9 x 35 mm cross-section. Consists of 1 template No. 59.60021 for the reference gauges plus 1 template No. 59.60022 for the gauge blocks to be calibrated. Also with added support to prevent the system from tilting. 1 Template No. 59.60023 for the reference gauges and those to be calibrated (9 x 30mm). 1 Template No. 59.60024 for the reference gauges and those to be calibrated having a 9 x 35 mm cross-section. Also with added support to prevent the gauges from tilting.
	59.30010	1	Sensor based measuring system with electro-motorised bolt activation. Consists of: 1 upper probe A, type HEIDENHAIN CT 25 No. 59.30006. 25 mm / 1 in measuring travel. Measuring force to 1,0 N. Fitted with the measuring insert No. 35.10003. 1 Lower probe B, type HEIDENHAIN special No. 59.30007. 1 mm measuring travel. Measuring force to 0,63 N. Fitted with the measuring insert No. 35.10003.
	16.60031	1	Setting piece for the probe alignment.
	16.40420	1	Heat protection shield, 250 x 380 mm in size.
	16.60001	1	Pair of grip pliers for safe handling of the gauge blocks.
	16.60030	1	Dust cover
2	**59.60016**		**HEIDENHAIN Computing Counter ND 231** Up and down electronic counter with alpha-numeric LED display, numerical interval to 0,01 or 0,005 µm. Includes 2 probe inputs as well as an RS 232 digital nterface. 100 to 240 Vac, 48 to 62 Hz
3	**59.60013**		**Control Panel** With keys for electro-motorised activation of the measuring bolt as well as for triggering data transfer.
4	**59.60014**		**Connecting Cable** For control panel No. 59.60013 to HEIDENHAIN computing counter ND 231 No. 59.60016
5	**47.68001**		**Foot Switch** For fine setting of the measuring bolt as well as data transfer.
6	**16.60011**		**Pneumatic Suction Loader** For safe and easy handling of the gauge blocks with nominal length up to 10 mm. To be connected to the vacuum pump.
7			**Electrical Vacuum Pump with External Control** For the connection of the suction loader No. 16.60011.
	32.60433		Execution 230 Vac, 50 Hz
	S32070030		Execution 110 Vac, 60 Hz
8	**59.60028**		**Connecting Cable** For electrical vacuum pump to control panel No. 59.60013.

Continued next page

9	**59.30011**	**TESA UPT temperature device for TESA Gauge Block Comparators** Fully calibrated for the measuring ranges from 19 °C up to 24 °C with a numerical interval to 0,001 °C; supplied with SCS calibration certificate issued by the Swiss Calibration Service. Uncertainty of measurement achieved during calibration: U = ± 0,03 °C. *Consists of:*
10	59.60018	1 Set of 4 temperature sensors PT 100 platinum resistances giving exceptional long-term stability while drifts are kept to a minimum over years of use. This set includes the following single sensors: 1 Temperature sensor with clamp R for the reference gauges of nominal lengths from about 14 mm, No. 59.60009. 1 Temperature sensor with clamp P for the gauge blocks to be calibrated having nominal lengths from about 14 mm, No. 59.60008. 2 Temperature sensors to be mounted on the measuring stand or the table. Size of the PT 100 temperature sensors: 3 g8 mm in diameter, 10 mm long. Order number for 1 item: 59.60010.
11	59.60017	1 PREMA 3040 temperature device Precision temperature device including a switch for the measuring points. With use of the PT 100 platinum resistances, this device provides 18 measuring channels with 0,001 °C numerical interval. RS 232 or IEEE 488 interfaces. 115 or 230 Vac for 50 or 60 Hz.
12	59.60012	1 Adapter For the connection of a number of up to 4 temperature sensors.
13	59.60011	1 Connecting cable For adapter No. 59.60012 to temperature device No. 59.60017.
14	**59.60025**	**TESA UP Software Programme** Can be run on WINDOWS 95 (or later) and WINDOWS NT. This programme package consists of one CD-ROM along with one protective hard-key; 10 languages available (English, Czech, Danish, Dutch, French, German, Italian, Polish, Spanish as well as Swedish). • For more details, see page O-14. Also ask for the relevant Product information.
15		**Portable Personal Computer** (Notebook) available upon request.
16	**59.60027**	**Connecting Cable** For serial data transfer from HEIDENHAIN computing counter ND 231 to host computer, 25-pin / m and 25-pin / f. Additional needed adapter: No. 47.60017.
17	**47.61017**	**Adapter** For connecting cable No. 59.60027 to computer, 25-pin / m and 9-pin / f.
18	**59.60026**	**Connecting Cable** For serial data transfer from PREMA 3040 temperature device to computer, 9-pin / m and 9-pin / f.
19		**Matrix Ink Jet Printer** For A4 format (upright). With graphical capability and Centronics interface. On request.
20	**S16071229**	**Connecting Cable** For parallel data transfers from computer to printer, 25-pin / m to 36-pin / m.

Errors of Measurement

Provided all the metrological conditions are met, the reliability of the comparator used for direct measurement of steel gauge blocks is expressed as follows:

Repeatability limit (with no influence of external temperature): 0,04 µm

Uncertainty of measurement
$U = \pm (0{,}07 + 0{,}5 \cdot L)$ *µm (L in m)*

Condition implies the use of reference standards whose measurement uncertainty is:

$U \leq \pm 0{,}015$ *µm*
for the comparator calibration
$U \leq \pm (0{,}02 + 0{,}2 \cdot L)$ *µm* *L in m*
for the gauge block calibration

Uncertainties are subject to amendment as the limiting values were not definitely approved at the time this catalogue was printed out.

Temperature Sensors

PT 100 platinum resistances, 4-wire type.

Temperature Device

PREMA 3040 multiple-channel precision thermometer for max. 18 platinum resistances.With facility to switch from a measuring point to another.

Measuring procedure: 4-wire resistance measurement with continuous value acquisition by the connected sensors. PT 100 linearisation according to EN 60751.

LCD alphanumeric, 16-decade display. Full dot matrix with green colour background.

0,001 °C

°C, °F or K

8 mm

17 keys for both digit entry and the functions

RS 232 and IEEE 488

115 ±10 % Vac or 230 ±10 % Vac, for 50 and 60 pHz

10 °C to 45 °C

- 25 °C to 60 °C

75 % (with no condensation)

Die-cast aluminium housing

EN 61010, EN 50081, EN 50082 and EN 55011

225x94x375 mm (W x H x D)

General

✓

ISO 3650

For gauge blocks ranging from 0,5 mm to 100 mm or 0.02 in to 4 in

Comparative measuring procedure with transference of the length of a reference gauge to the gauge block being measured

Measuring configuration two probes connected in sum measurement (function +A+B) with mechanical contact with the measuring face.

Measuring points On the reference gauge block: at the centre of the measuring face (point R). On the gauge block to be measured: at the centre (point 1) as well as the four corners of the measuring face, each lying 2 mm away from the adjacent faces (points 2 to 5).

The central length l_C is determined by probing both points R and 1. For establishing lengths at any point, measurements shall be carried out at points R plus 1 to 5.

The viariation in length v is obtained from the measurements taken at the measuring points 1 to 5.

TESA® UPC Gauge Block Comparator for Comparative Measurement

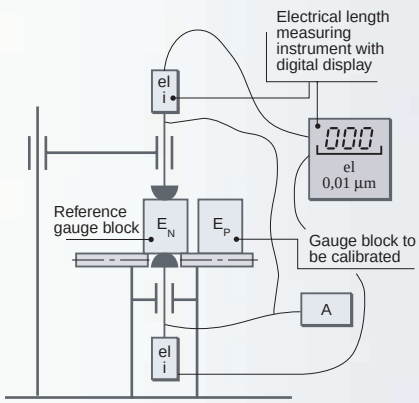
- *Measures gauge blocks of same nominal length by comparison.*
- *Comes with new template system for positioning the gauge blocks (patent pending),*
  - *Single or dual template system for optimum ease of gauge handling (also refer to page O-5).*
- *Features TESA high-precision inductive probes.*
- *Integrates a facility for highly accurate temperature measurement.*
- *Allows on-line transfer of length and temperature values.*
- *Executes computer aided data processing incl. all needed correction values.*
- *Performs calibrations that meet the requirements of both ISO standards and EA guidelines (European cooperation for Accreditation of Laboratories EAL).*
- *Includes an execution for greater accuracy along with a calibration certificate (optional).*





The TESA UPC system is devoted to the calibration - or dimensional inspection - of the gauge blocks with nominal lengths ranging from 0,5 to100 mm. The measuring configuration consisting of two probes aligned opposite one another combined with the concept and quality of the measuring system is the guarantee for an extra low measurement uncertainty.

TESA UPC is targeted at manufacturers and users of gauge blocks, but the system is also used in laboratories accredited by the national calibration services.

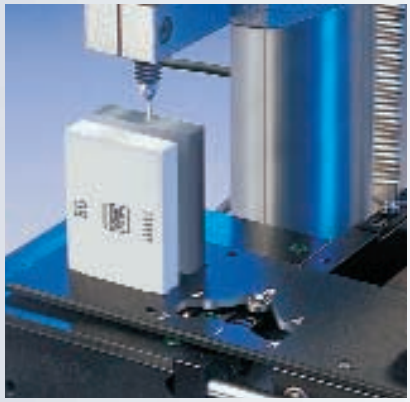


If specified, the built-in temperature device we offer as an option can also be supplied. This device has 4 PT 100 platinum resistances which capture the temperature of the two gauge blocks as well as the measuring table and stand.

To carry out your calibrations in a reliable and rational way, computer aided data processing is virtually unavoidable.

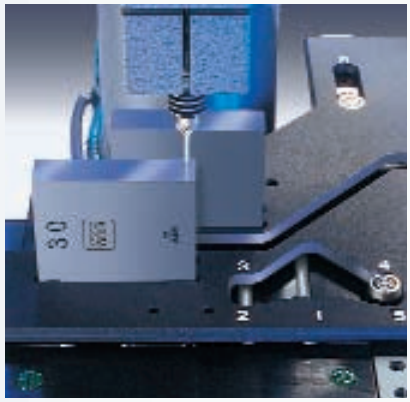
Single Template System

• *With this system, your reference gauges along with the gauge blocks to be calibrated are moved together during the measurement cycles.*



Dual Template System *(Patent Pending)*

• *Simultaneous use of two templates allows you to release your reference gauge blocks until their handling is necessary. For further details, report to page O-5.*



Errors of Measurement

Provided all the metrological conditions are met, the reliability of both standard executions No. 59.30000 and No. 59.30002 is expressed as follows:

Repeatability limit (with no influence of external temperature): 0,025 µm

Measurement uncertainty U = ± (0,10 + 1,0 · L) µm (L in m)*

Condition implies the use of reference standards whose uncertainty is as follows (also see both pages O-14 and O-15):

U ≤ ± 0,030 µm for the comparator calibration

U ≤ ± (0,05 + 0,5 · L) µm L in m for gauge block calibration

** Applicable to steel gauge blocks*

Provided all the metrological conditions are met, the reliability of both executions No. 59.30001 and No. 59.30003 with option for increased certainty (No. 16.90021) is expressed as follows:

Repeatability limit (with no influence of external temperature): 0,015 µm

Measurement uncertainty U = ± (0,05 + 0,5 · L) µm (L in m)*

Condition implies the use of reference standards whose uncertainty is as follows (also see both pages O-14 and O-15):

U ≤ ± 0,015 µm for the comparator calibration

U ≤ ± (0,02 + 0,2 · L) µm L in m for gauge block calibration

** Applicable to steel gauge blocks*

TESA® UPC Software for Value Processing

The TESA UPC software programme is modular and provides menu-driven functions that are easily accessible. No need to be an expert to quickly use it securely. Released from the tiresome learning job, you can focus on the measurement cycles.

- *Very user-friendly programme software with comprehensive user's guide.*
- *Flexible programme architecture for optimum adaptation to individual user's needs.*
- *Storage of your reference sets.*
- *Control of the value drift or value dispersion.*
- *Automatic correction where required.*
- *Metric or inch data processing.*
- *User customised certificates exactly reproduced.*

Note: The TESA UPC programme allows you to enter all temperature values via the computer's keyboard. But, this programme is not designed for transferring data on-line. For this purpose, we recommend the use of the TESA UP programme software.

Measuring stand

Heavy construction with toothed rack guide plus hand-wheel for coarse setting of the measuring arm. Encapsulated attachment and device for extra-fine setting of upper probe A.

3 mm dia. fixing bore for one temparature sensor No. 59.60010.

Main body in cast iron. Hardened steel column, dull-chrome plated and ground.

Special table

Solid measuring table fitted with 6 cylindrical pins to ensure and protect the gauge blocks as they are being handle.

3 mm dia.clamping bore for one temperature sensor 59.60010 as well as retaining plate mounted laterally on the table for both sensors 59.60008 and 59.60009 with clip.

Hardened steel. Tungsten carbide cylindrical pins.

Positioning device for gauge blocks

Single and dual template system to shift the gauges to the selected measuring point.
For details on single and dual template system, see both pages O-5 and O-12 (system components).

Sensors for length dimensions

2 TESA GT 22-spec. inductive probes with pneumatic retraction of the measuring bolt

Electrical adjustment through resistances fitted on each probe

± 150 µm measuring bolt travel

Measuring force to ≈ 1 N (upper probe A) or ≈ 0,63 N (lower probe B)

Tungsten carbide insert with spherical measuring face, R = 20 mm.

TESA UPC Delivery Programme – Eight Ordering Variations

TESA UPC gauge block comparator with single template system								
	59.30000	**Standard execution, without computer application**						●
	59.30001	**Execution for greater accuracy, without computer application**					●	
	59.30002	**Standard execution, with computer application**				●		
	59.30003	**Execution for greater accuracy, with computer application**				●		
TESA UPC gauge block comparator with single and dual template system								
	59.30012	**Standard execution, without computer application**			●			
	59.30013	**Execution for greater accuracy, without computer application**		●				
	59.30014	**Standard execution, with computer application**	●					
	59.30015	**Execution for greater accuracy, with computer application**	●					
Each version consists of:								
1	**16.10401**	1 TESA UPC mechanical part with single template system				●	●	● ●
1a	**59.60030**	1 TESA UPC mechanical part with single and dual template system	●	●	●	●		
2	**32.60401**	1 Pneumatic retraction of the measuring bolt, manually operated			●			●
3	**32.60432**	1 Electric vacuum pump with foot switch			●			●
4	**32.60433**	1 Electric vacuum pump with external control	●	●		●	●	
5	**16.60011**	1 Pneumatic suction loader	●	●	●	●	●	●
6	**41.90190**	1 TESAMODUL electronic measuring instrument, units 372 - 404			●	●		● ●
7	**41.30105**	1 TESAMODUL electronic measuring instrument, units 372 - 404 - 708	●	●		●	●	
8	**41.60079**	1 Plug-in card with RS 232 output	●	●		●	●	
9	**47.61050**	1 Connecting cable for plug-in card to interface unit 708	●	●		●	●	
10	**47.61005**	1 Connecting cable for interface unit 708 to vacuum pump	●	●		●	●	
11	**47.68000**	1 Hand switch	●	●		●	●	
12	**16.90021**	1 Option for greater accuracy with calibration certificate	●		●	●		●

TESAMODUL

000 7-segment LED display, 3 1/2 decades for digits

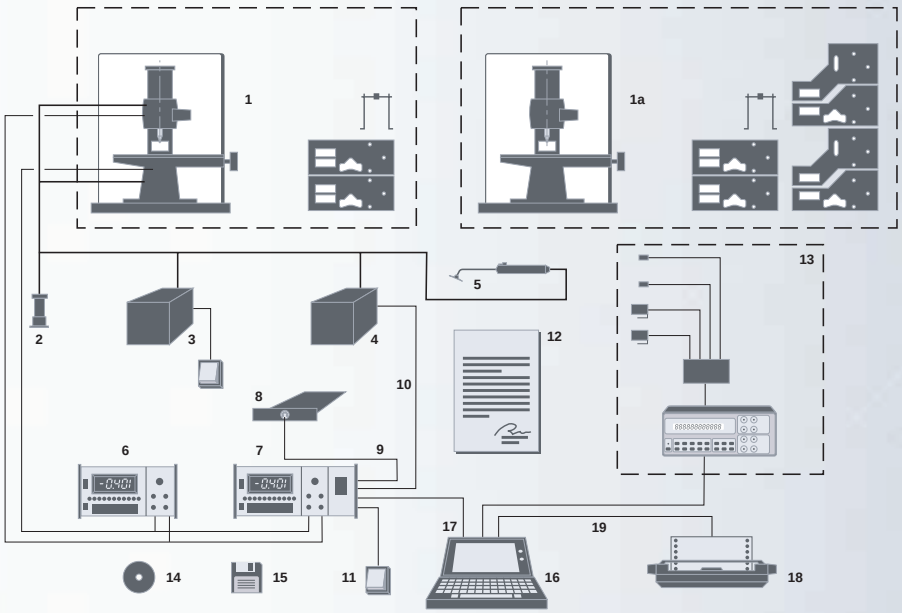
Measuring range used: ± 20 µm

000 0,01 µm 0.000 001 in

12,5 mm

Auxiliary display consisting of 20 red colour diodes for quick zero-setting

Plug-in card with RS 232 output



TESA UPC System Components

	No.	
1	**16.10401**	**TESA UPC mechanical part provided with single template system** Prepared for mounting the TESA UPT temperature device *Consists of:*
	16.30004	1 Measuring stand with toothed rack guide Manually operated for coarse setting of the measuring arm. Encapsulated attachment and device allowing extra-fine setting of the upper probe.
	59.60031	1 Solid special measuring table Made from hardened steel and fitted with 6 tungsten carbide cylindrical pins for safe positioning. Provide high protection and wear resistance to the gauge blocks over a long time. Adjustable attachment for the lower probe. Prepared for the temperature sensor.
	59.60032	1 Positioning device provided with single template system Used to shift the gauge blocks from a given point to another. With 2 adjustable templa-plates No. 16.60045 (for gauge blocks 9 x 30 mm) and No. 16.60046 (for gauge blocks 9 x 35 mm). Also with added support to prevent the gauges from tilting.
	32.30045	1 Sensor system consisting of: – upper probe A, GT 22-spec. No. 32.90075. Measuring force to 1 N. Fitted with the measuring insert No. 35.10003. – lower probe B, GT 22-spec. No. 3290076. Measuring force to 0,63 N Fitted with the measuring insert No. 35.10003. – air pipe system
	16.60031	1 Setting piece for the probe alignment
	16.40420	1 Heat protection shield, 250 x 380 mm in size.
	16.60001	1 Pair of grip pliers for safe handling of the gauge blocks
	16.60030	1 Dust cover
1a	**59.60030**	**TESA UPC mechanical part provided with single and dual template system** Prepared for mounting the TESA UPT temperature device *Includes the same components as described under the first item, except for:*
	59.60029	1 Positioning device provided with a single and dual template system including: 1 Pair of templates for gauge blocks with a 9 x 30 mm cross-section. The pair includes 1 item No. 59.60019 for the reference gauges as well as 1 item No. 59.60020 for the gauge blocks to be calibrated. 1 Pair of templates for gauge blocks with a 9 x 35 mm cross-section. The pair includes 1 item No. 59.60021 for the reference gauges as well as 1 item No. 59.60022 for the gauge blocks to be calibrated. Also with added support to prevent tilting. 1 Template No. 59.60023 for the reference gauges and those to be calibrated (9 x 30mm). 1 Template No. 59.60024 for the reference gauges and those to be calibrated having a 9 x 35 mm cross-section. Also with added support to prevent the gauges tilting.
2	**32.60401**	**Pneumatic retraction of the measuring bolt** Hand-operated
3	**32.60432**	**Electric vacuum pump with foot switch** For retracting the measuring bolt of each probe. Also used to plug in the hand-operated pneumatic suction loader No. 16.60011, 230 V.
4	**32.60433**	**Electrical vacuum pump with external control** To be connected to the interface unit 708 No. 41.30106. Used for the retraction of the measuring bolt of each probe. Also used to plug in the pneumatic suction loader No. 16.60011, 230 V.
5	**16.60011**	**Pneumatic suction loader** For safe, easy handling of the gauge blocks with nominal lengths up to 10 mm. To be connected to the electrical vacuum pump No. 32.60432 or 32.60433.
6	**41.90190**	**TESAMODUL electronic length measuring instrument** *consisting of:* 1 Power and display unit 372, No 41.30094. 1 Measuring unit 404, No. 41.95420.

0 °C to 40 °C

- 10 °C to 70 °C

80 % (with no condensation)

230 and 110 Vac, 50 to 60 Hz

Electrical vacuum pumps

230 Vac, 50 Hz (No. 32.60432 and 32.604339)

Temperature device

See page O-8

Further data

≈ 23 kg (comparator, complete without computer).

≈ 4 kg (temperature device).

Transport packing

Identification number for the TESA comparators provided with the option for greater accuracy

Gauge block comparator with in-house calibration certificate for the version with greater accuracy or a declaration of conformity for the standard version.

Temperature device with SCS calibration certificate

Electrical vaccuum pump in a special version

With external control as for No. 32.60433, but:

For 110 Vac, 60 Hz

S32070030

7	41.30105	**TESAMODUL electronic length measuring instrument** *consisting of:* 1 Power and display unit 372, No. 41.30094. 1 Measuring unit 404, No. 41.95420. 1 Interface unit 708 No. 41.30106 that serves as control unit for the electrical vacuum pump No. 32.60433. To be linked with the computer unit.
8	41.60079	**Plug-in card with RS 232 digital output** For serial data transfer, opto-coupled.
9	47.61050	**Connecting cable** For plug-in card RS 232 (No. 41.60079) to interface unit 708 (No. 41.30106).
10	47.61005	**Connecting cable** For interface unit 708 (No. 41.30106) to electrical vacuum pump (No. 32.60433).
11	47.68000	**Hand switch** For triggering the movements of the measuring bolt as well as data transfer from TESAMODUL No. 41.30105 to computer. To be connected to the interface unit 708 (No. 41.30106).
12	16.90021	**Option for greater accuracy and calibration certificate** Consists of the TESA UPC (mechanical part No. 16.10401 along with the electronic measuring instrument TESAMODUL No. 41.90190 or 41.30105) specially adjusted and calibrated. All key components are marked with a serial number.
13	59.30011	**TESA UPT temperature device for TESA gauge block comparators** Fully calibrated for the measuring ranges from 19 °C up to 24 °C with a numerical interval to 0,001 °C; supplied with SCS calibration certificate issued by the Swiss Calibration Service. Uncertainty of measurement achieved during calibration: U = ± 0,03 °C. Used in association with TESA UP software programme for value processing. *Consists of:*
	59.60018	1 Set of 4 temperature sensors
	59.60017	1 PREMA 3040 temperature device
	59.60012	1 Cable adapter
	59.60011	1 Connecting cable
		For details, see under items 7 to 11 on page O-8.
14	59.60025	**TESA UP software programme for value processing** Compatible with **WINDOWS 95 or later and WINDOWS NT** • For detailed programme related features, report to page O-14 or ask for the relevant product information on TESA UP.
15	59.60006	**TESA UPC software programme for value processing** Used with conventional PC equipped with **MS-DOS**. For profile requirements, see opposite. 3 languages available (English, German and French). The programme package includes 1 programme diskette 3 $^1/_2$ in plus 1 protective hard-key along with 1 application handbook «TESA UPC - Part 2» available in 3 languages (English, German or French). • For detailed programme related features, ask for the relevant product information on TESA UPC.
16		**Portable Personal Computer** (Notebook) available on request. Minimum hardware profile requirements: see opposite.
17	S16071225	**Connecting cable** For serial data transfer from interface unit 708 (No. 41.30106) to AT computer, 25-pin / f and 9-pin / m, intersected.
18		**Matrix Ink Jet printer** For A4 format (upright). With graphical capability and Centronics interface. On request.
19	S16071229	**Connecting cable** For parallel data transfer from computer to printer, 25-pin / m to 36-pin / m.

Minimum profile requirements for running the TESA UPC software programme for value processing

Personal Computer

- To avoid disturbing the ambient temperature at the measurement point, the use of a computer configuration without heat source (e.g. Notebook with LC display screen) is recommended.
- Operating system: MS-DOS 3.0 or later
- Memory capacity: 512 kB RAM
- One hard disc plus one disc drive (720 kB)
- RS 232 output for serial data transfer (input) as well as 8-bit parallel transfer (Centronics standard)
- Graphic card not required

Hardware

All hardware components listed opposite (items 16 to 19) can be obtained locally. Should you wish to, we may also provide you with a quotation on request.

TESA cannot assure the UPC system will operate properly when run on a network. Therefore, we recommend to inquire about a technical information before purchasing your own equipment.

TESA® UP Software Programme for Value Processing

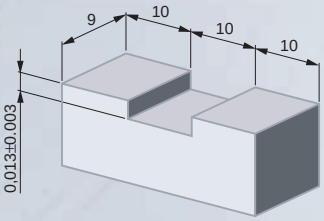
Suitable for both TESA gauge block comparators UPD and UPC as well as for comparators from other manufacturers – Compatible with WINDOWS 95 or later and WINDOWS NT.

- *10 languages available (English, Czech, Danish, Dutch, French, German, Italian, Polish, Spanish and Swedish).*
- *On-line processing of the length and temperature values transferred.*
- *Measurement cycles and result outputs according to ISO 3650.*
- *Flexible architecture for optimum adaptation to specific user's needs.*
- *Possible set-up of limiting values and grades peculiar to users.*
- *Surveillance of the value dispersion or drift throughout the length and temperature measurements.*
- *Automatic execution of all relevant corrections. Hence, the programme makes allowances for actual sizes of the reference standards, flattening due to differing materials used (steel, tungsten carbide, ceramic), compensation of the variations in temperature with reference to 20 °C according to the varying coefficients of linear expansion - as typical examples.*
- *Assignment of the gauge blocks to their relevant accuracy grade.*

No.		
59.60025	**TESA UP software programme for the gauge block calibration** Compatible with WINDOWS 95 or later and WINDOWS NT ***Programme package consisting of:*** 1 CD-ROM along with 1 protective hard-key	

Gauge Blocks for the Calibration of Comparators

To calibrate the two TESA gauge block comparators UPD and UPC, we recommend the use of the pairs of gauge blocks detailed hereafter. The 9 piece set listed on page O-15 is additionally required for calibrating TESA UPD.



Set Including 6 Pairs of Gauge Blocks

These pairs of gauge blocks meet the requirements of:

- *EAL-G21 – Calibration of Gauge Block Comparators European cooperation for Accreditation of Laboratories*
- *DKD-R 4-1 – Guidelines of the German Calibration Service (DKD) for the calibration of gauge block comparators.*

No.		µm
	Set of 6 pairs of gauge blocks for calibrating comparators ***As listed in the chart opposite. Provided with:***	
S59110152	Calibration certificate of Physikalisch Technische Bundesanstalt (PTB)	± 0,015
S59110489	Calibration certificate of a calibration laboratory accredited by the German Calibration Service (DKD)	± 0,030

Full set in tungsten carbide also available upon request.

Pair No.	Nominal lengths A mm	B mm
1	0,5	0,5
2	1,0	1,005
3		1,01
4	4,0	4,0
5	100,0	100,0
6	6,0	6,0 *

* Special bridge-shaped gauges (see drawing) used for establishing the measuring deviations of the lower probe B.

✓ ISO 3650

Metric and inch units

✓ ISO 3650

Special high-alloy steel, wear resistant and stable. Exception: 6 mm special carbide gauges.

Class K (see page I-5)

The given expanded uncertainty k = 3 refers to the difference of central length of both gauge blocks A and B forming the pairs 1 to 5 as well as to the deviations f_o and f_u from the central length of gauge blocks forming both pairs 2 and 3. The gauge-blocks of pair No. 6 need not be calibrated.

Wooden case

Identification number

PTB or DKD calibration certificate

✓

✓

ISO 3650

Special high-alloy steel, wear resistant and stable.

Class K (see page I-5)

Expanded uncertainty k = 2 is valid for the given one.

Wooden case

Identification number

For calibration certificates, see beneath.

✓

Temperature Sensors

PT 100 platinum resistances, 4-wire type.

Temperature Device

PREMA 3040 multiple-channel precision thermometer for max. 18 platinum resistances. With facility to switch from a measuring point to another.

Measuring procedure: 4-wire resistance measurement with continuous value acquisition by the connected sensors. PT 100 linearisation according to EN 60751.

0,001 °C

RS 232 and IEEE 488

115 ±10 % Vac or 230 ±10 % Vac. For 50 and 60 Hz.

EN 61010, EN 50081, EN 50082 and EN 55011

Additional technical data listed on page O-8

*Additional Set of Gauge Blocks for the TESA UPD Calibration**

To achieve the best measuring capability when calibrating TESA UPD, we recommend to use reference standards of grade K, which are measured directly by interferometry and come along with a calibration certificate. And this, irrespective of any other requirement such as the ambient conditions.

		µm
	9-piece set for the TESA UPD gauge block comparator calibration* *As detailed in the chart opposite. Supplied with:*	
S59300103	Calibration certificate issued by the calibration laboratory of a national institute, e.g. EAM (Switzerland) or PTB (Germany)	± (0,02 + 0,2 · L) µm L in m Measuring procedure: by direct interferometry
S59300104	Calibration certificate issued by an accredited calibration laboratory, e.g. TESA	± (0,05 + 0,5 · L) µm L in m Measuring procedure: by comparison

Set composition mm

1 5 10 15 20 25 50 75 100

Steel

Calibration grade K

Other set compositions or tungsten carbide material also available on request.

* To set the display of the comparator used for the gauge block calibration, we recommend to use the same gauge set as reference standards.

TESA® UPT Temperature Devices

These devices are not only used on gauge block comparators, but also on measuring equipments such as horizontal measuring benches or height gauges.

59.300011	**TESA UPT temperature device for TESA gauge block comparators UPD and UPC** For a detailed description, see under items 9 to 13 (page O-8)
S59300105	**TESA UPT temperature devices for other length measuring equipments** Fully calibrated for the measuring ranges from 19 °C up to 24 °C with a numerical interval to 0,001 °C; supplied with SCS calibration certificate issued by the Swiss Calibration Service. Uncertainty of measurement achieved during calibration: U = ± 0,03 °C. *Consist of:*
59.60010	1 up to 4 temperature sensors depending on user's needs. PT 100 platinum resistances offering exceptional stability over a long period of time and minimum drift over years of use. Order number given for 1 item.
59.60017	1 PREMA 3040 temperature measuring unit Precision unit including a facility to switch from a measuring to another. If used with the PT 100 platinum resistances: 18 measuring channels with a 0,001 °C numerical interval. Fitted with an RS 232 digital interface, 115 and 230 Vac for 50 and 60 Hz.
59.60012	1 Adapter For the connection of up to 4 temperature sensors.
59.60011	1 Connecting cable For cable adapter No. 59.60012 to temperature unit No. 59.60017.
59.60026	1 Connecting cable For serial data transfer from PREMA 3040 to host computer, 9-pin / m and 9-pin / f

ETALON® POLO Horizontal Measuring Bench

A giant for small sizes – Specially designed for the control of measuring and test equipments in accordance with ISO 9000.

- *Application range from 0 up to 100 mm for external dimensions or 2,5 up to 110 mm for internal dimensions – 50 mm measuring span.*
- *Resolutions to 0,001 and 0,0001 mm – Conversion mm / in.*
- *Maximum permissible error of 0,5 µm.*
- *Measuring force from 0 to 4 N.*
- *Comes with in-house calibration certificate.*

SWISS MADE ✓

✓

Transport packing

Identification number

In-house calibration certificate

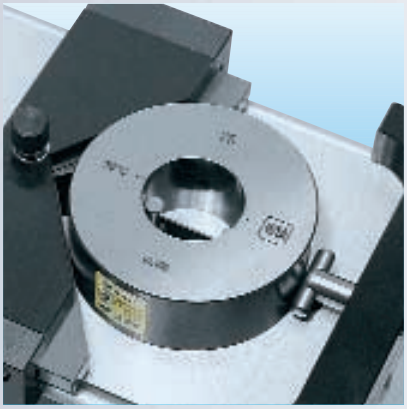


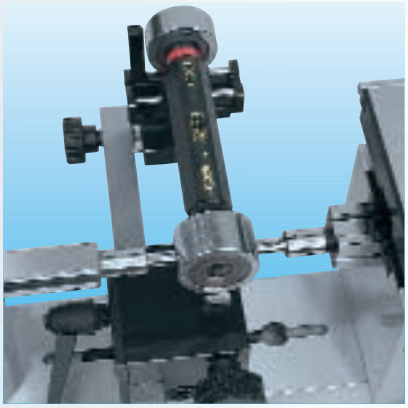
Calibration of Standards

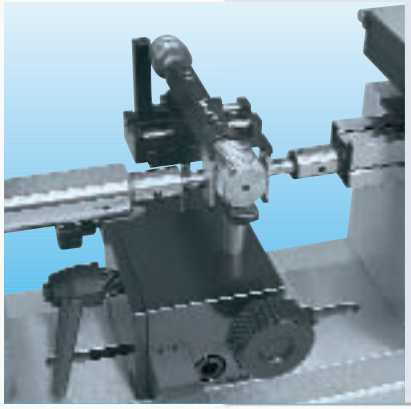
- *Cylindrical test pins*
- *Setting standards with cylindrical, plane-parallel measuring faces*
- *Threaded reference gauges (measured using the 3-wire method)*
- *Setting masters*
- *Setting rings*

Calibration of Gauges

- *Limit plug gauges*
- *Plug gauges «GO»*
- *Plug gauges «NOT GO»*
- *Plain plug Gauges*
- *Ring gauges «GO»*
- *Ring gauges «NOT GO»*
- *Threaded plug gauges*

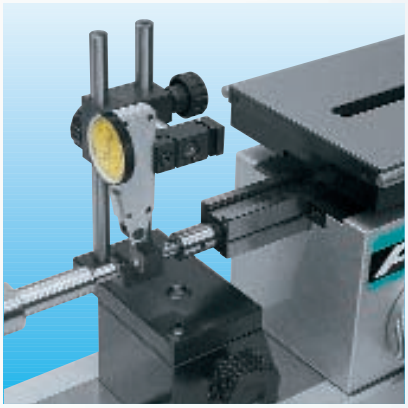






Calibration of Measuring Instruments

- *Dial gauges*
- *Precision indicators*
- *Dial test indicators (lever-type)*
- *Electronic probes*





ETALON POLO Measuring Bench

SWISS MADE ✓

0 to100 mm for external dimensions
- 10 to 110 mm with std accessories
- 2,5 to 110 mm with optional accessories

50 mm measuring span

Max. perm. error within the measuring span, with std accessories: 0,5 µm

0,1 µm

0 to 4 N

Opto-electronic measuring system with incremental glass scale, type LIF – HEIDENHAIN

8,0 · 10^{-6} / °C

Tilting range of the floating table: ± 0,5 °

See in the drawing
- shortest distance A: 0 mm
- longest distance A: 11,5 mm

19,0 kg net (main part alone without table)

2,8 kg net (floating table)

2,1 kg net (fixed table)

10 °C to 40 °C

- 10 °C to 40 °C

EN 50081-1, EN 50082-2, EN 61000-4-2, EN 61000-4-4

ETALON POLO with Floating Resting Table

59.39001 **ETALON POLO measuring bench with floating resting table and HEIDENHAIN computing counter ND 281 included**

Consists of the following main components:

59.19002 **1 Main part**

Application range 0 to 100 mm for external dimensions or 10 to 110 mm for internal dimensions (with standard accessories); 50 mm measuring span.

Base plate with measuring unit and mounting block for the fixed measuring stops fitted with a stop pin; measuring unit with measuring spindle as well as opto-electronic system featuring an incremental glass scale; both the stop pin and measuring spindle have a mounting bore for a 6,5 mm dia. measuring insert; attachment for the measuring stops and device allowing the table to be moved vertically and further tilted for inside measurements; also with adjust system for the measuring force.

59.69024 **1 Pair of standard measuring inserts for external dimensions**

With a 6,5 mm dia. tungsten carbide flat face, already mounted.

59.69015 **1 Floating resting table**

Already mounted, intercherchangeable. Used for positioning parts in the measuring direction when inspecting internal dimensions; includes a stainless steel plate, hardened and ground, mounted on ball bearings; table surface area 200 x 100 mm; also with mount for the stops.

59.69029 **1 HEIDENHAIN computing counter ND 281 ***

Up/down computing counter with alphanumeric LED display; resolution to 0,001 or 0,0001 mm; switchable from metric to inch; performs the capture of the two extreme values and outputs the difference between both; with value classification capability and RS 232 output.

Supplied with the following standard accessories:

59.69020 **1 Pair of standard inserts for internal dimensions from 10 mm**

Stainless steel measuring face, hardened and ground; ball tip section R = 2,5 mm; M4 locking screw.

59.69030 **1 Dust cover**

* Also available upon request: HEIDENHAIN card IK 220 (PC-I-BUS) instead of the ND 281 computing counter.

ETALON POLO with Fixed Resting Table

59.39000 **ETALON POLO measuring bench with fixed resting table and HEIDENHAIN computing counter ND 281 included**

Consists of the following components:

59.19002 **1 Main part**
As described on the previous page.

59.69024 **1 Pair of standard measuring inserts for external dimensions**
With a 6,5 mm dia. tungsten carbide flat measuring face, already mounted.

59.69014 **1 Fixed resting table**
Already mounted, interchangeable. Used for internal measurements; includes a stainless steel base plate, hardened and ground; table surface 200 x 100 mm; also with a stop clamp for positioning the workpiece.

59.69029 **1 HEIDENHAIN computing counter ND 281 ***
Up/down computing counter with alphanumeric LED display; resolution to 0,001 or 0,0001 mm; switchable from metric to inch; performs the to 0,001 or 0,0001 mm; switchable from metric to inch; performs the both; with value classification capability and RS 232 output.

Supplied with the following standard accessories:

59.69016 **1 Pair of standard inserts for internal dimensions from 10 mm**

59.69030 **1 Dust cover**

* Also available upon request: HEIDENHAIN card IK 220 (PC-I-BUS) instead of the ND 281 computing counter.

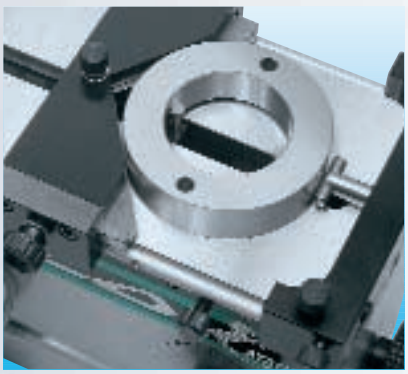
Workpiece Inspection

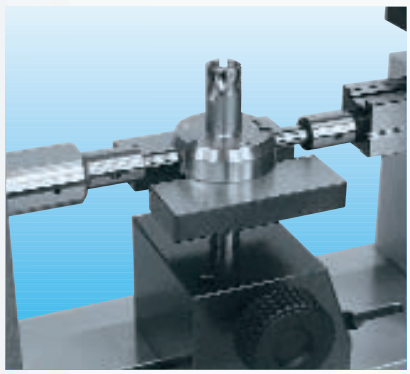
Examples for external dimensions

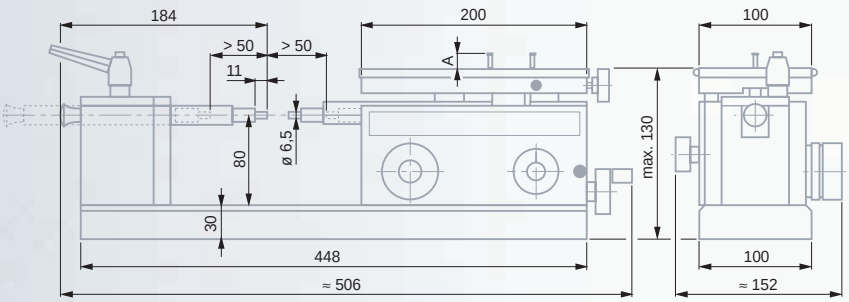
- *Stepped shafts*
- *Cutting tools*
- *Cylindrical pins*
- *Ball tips*
- *Grooves*
- *Short centering shoulders*
- *Threads (measured using the 3-wire method)*

Examples for internal dimensions

- *Through holes*
- *Blind bores*
- *Centering grooves*
- *Slots*
- *Sliding guides*







HEIDENHAIN ND 281 computing counter

✓

Up/down counter with inside data processing and output

LED display

Alphanumeric, 9-decade display plus signs

Auxiliary display for 14 measuring functions

0,001 mm or 0,0001 mm
0.0001 in or 0.00001 in

10 mm

RS 232

0 °C to 45 °C

- 30 °C to 70 °C

75 %

100 to 240 Vac (-15 % to +10 %), 48 to 62 Hz

(W x H x D)
239 x 85 x 224 mm

≈ 1,5 kg

Protection IP40 (IEC 60529)

Noise acuteness to grade 4 (VDE 0843 Parts 2 and 4)

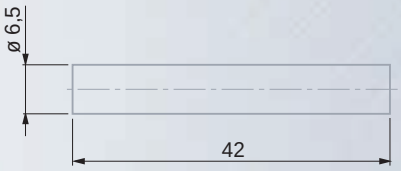
EN 55022, class B

Transport packing

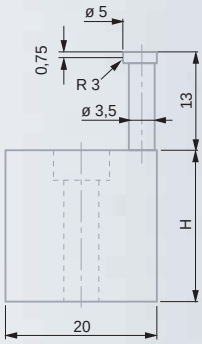
Standard Accessories

Available according to the model supplied.

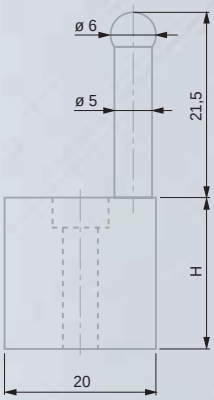
No		
59.69024	**1 Pair of standard inserts for external dimensions** 6,5 mm dia. carbide inserts with flat measuring face	
	Standard inserts for internal dimensions from 10 mm 5 mm dia. inserts with a stainless steel measuring face, hardened; .M4 locking screw	
59.69020	1 Pair of inserts for use with the floating table No. 59.60015, H = 20 mm	
59.69016	1 Pair of inserts for use with the fixed table No. 59.69014, H = 12,5 mm	



59.69024



59.69016-20

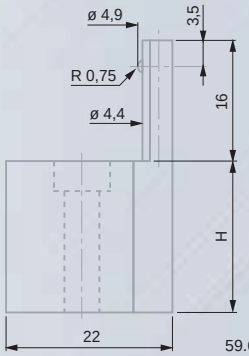


59.69018-22

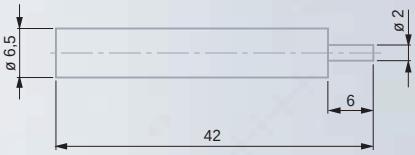
Optional Accessories

No		
	Measuring inserts for internal measurements using the floating resting table Height H = 20 mm; also with a M4 locking screw.	
59.69021	**1 Pair for external dimensions from 2,5 mm** Barrel-shaped with a 1,2 mm dia.carbide ball tip.	
59.69023	**1 Pair for internal dimensions from 5 mm** Fitted with a 1,5 mm dia. carbide ball tip.	
59.69022	**1 Pair for internal dimensions from 13 mm** Fitted with a 6 mm dia. carbide ball tip.	
	Measuring inserts for internal measurements using the fixed resting table Height H = 12,5 mm; also with M4 locking screw.	
59.69017	**1 Pair for internal dimensions from 2,5 mm** Barrel-shaped with a 1,2 mm dia. carbide ball tip.	
59.69019	**1 Pair for internal dimensions from 5 mm** Fitted with a 1,5 mm dia. carbide ball tip.	
59.69018	**1 Pair for internal dimensions from 13 mm** Fitted with a 6 mm dia. carbide ball tip.	
59.69028	**1 Pair for external dimensions** Tungsten carbide flat measuring face, D = 2 mm.	
59.69027	**1 Pair for external dimensions** Tungsten carbide flat measuring face, D = 8 mm.	
	Insert attachments	
59.69025	With mounting thread G = M2,5	
59.69026	G = $^4/_{48}$ in	
	Optional measuring inserts available on request. **Inserts with a M2,5 mounting thread** See on pages E-42 to E-44. **Wires** for thread measurement listed on page B-27.	

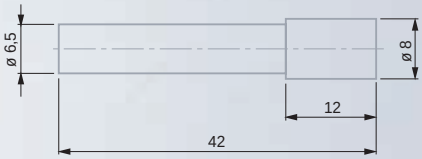
59.69017-21



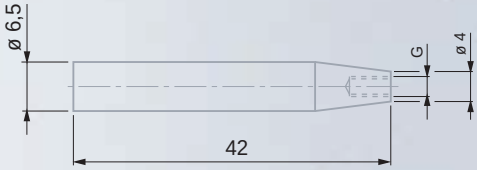
59.69019-23



59.69028



59.69027



59.69025/26

No		
59.69000	**Bench stand with swivelling plate** For raising the measuring bench from the horizontal to the vertical position. Accommodates a clamp lever. Horizontal length: 295 mm, mass ≈ 20 kg.	





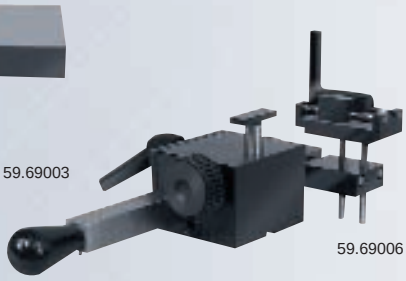
59.69002



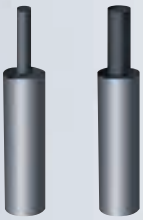
59.69001



59.69003



59.69006



59.69007/8



59.69013



59.69005



59.69012



59.69010



59.69004



59.69009

59.69001	**Counter base** For heightening the HEIDENHAIN computing counter ND 281, 380 mm high, mass 5,2 kg.
59.69002	**Intermediate resting block** Includes a 10 mm dia.mounting bore for: • Resting table No. 59.69003 • Holder No. 59.69004 for a dial test indicator (lever type)
59.69003	**Supporting plate** Supports test pieces having internal dimensions; surface area 60 x 60 mm with recesses; in hardened, ground steel; with a 10 mm dia. fixing pin.
59.69006	**Resting device** Allows external measurement of long test pieces with diameters up to 60 mm; mounting block with height adjustable resting table, 11 mm wide; 10 mm dia. fixing bore for the resting pins No. 59.69007 and 59.69008; mobile device for the support of workpieces having varying lengths; 2 resting angles movable crosswise or vertically.
	Resting pins Used with the resting device No. 59.69006; in hardened and ground steel; mounted 10 mm dia. shaft.
59.69007	Resting face D = 3 mm dia.
59.69008	D = 6 mm dia.
59.69013	**Floating mount device** For prismatic parts with diameters up to 30 mm and max. length of 100 mm; basic plate includes 2 adjustable centre supports, both are mounted on a ball bearing; 60 ° support points. Also with height adjustable vees, removable; 120 ° V-angle.
59.69005	**Intermediate resting block** For use with the floating mount device No 59.69013.
59.69012	**Centring device** Allows the culmination point to be searched for transversally; for use with either of both fixed or floating table No. 59.69014 or 59.69015; prismatic stop movable transversally, max. diameter = 110 mm; counterpressure piece finished with cylindrical stop pins
	Fixing shafts For clamping the instruments to be calibrated such as dial gauges or precision indicators.
59.69010	For shafts with 8 mm dia.
59.69011	$^3/_8$ in dia.
59.69004	**Holder for dial test indicators (lever type)** Provided with 2 dovetail clamps, type TESATAST or conform to BS 2795: 1981.
59.69009	**Spindle for calibrating dial gauges, dial test indicators, etc.** 50 mm travel, 1 spindle rotation = 0,5 mm

SWISS MADE ✓

Transport packing

Coordinate Measuring Machines







ETALON® DERBY® 454 Coordinate Measuring Machine

Three-dimensional measuring was never so simple – This CMM is the ideal solution to check machine settings on the production floor or inspect part batches and samples as well as to take any measurement on jigs and dedicated fixtures or in tool and die workshops, among others – No matter how you use it, the measuring system that will make you an expert.

Exclusive rights for sales in Europe

ETALON® DERBY® – The speedy and efficient CMM

- *Simple programming architecture that is easy to learn and to use.*
- *Graphic representation of geometrical elements, software prompts, measurement functions and instant result outputs.*
- *Direct measurement - No need for programming or for time-consuming alignment operations of workpieces.*
- *Auto-detection of geometrical form and shape features.*
- *Excellence in design with the patented ZMouse ® integrated into the ram.*
- *High accuracy – Low measurement uncertainties.*
- *Workpiece geometry digitizing for CAD applications.*
- *Installation and training in hours not days.*



ETALON® DERBY®
– The universal CMM for your workpieces

- *Workpiece alignment quickly and easily.*
- *Point-to-point measurement or manual scanning.*
- *ZMouse for speedy operation.*
- *Inspection reports in A4 format.*

General

✓

Small-sized, leightweight construction with moving bridge

Measuring systems and air bearing guides in all three axes

457, 508 and 406 mm measuring spans (X / Y / Z)

0,001 mm
0.00001 in

Manual probing movements that can be locked in either of the three axes. Also with fine adjust devices.

Light alloy base fitted with a granite measuring table

Opto-electronic measuring systems based on incremental glass scales<

0,0001 mm (meas. system)

760 mm / s

Control panel

89 x 118 mm display field with background lighting

7-decade display plus sign for the measured values

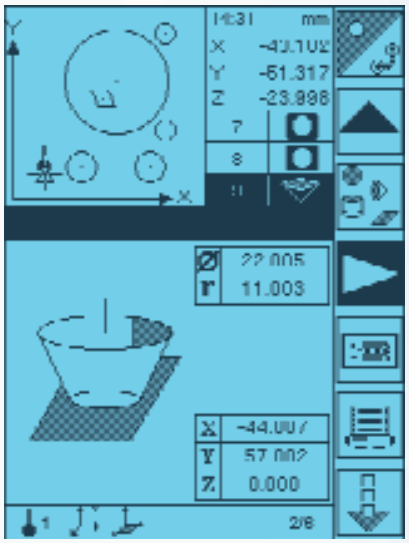
Icon-based user's guide

RS 232

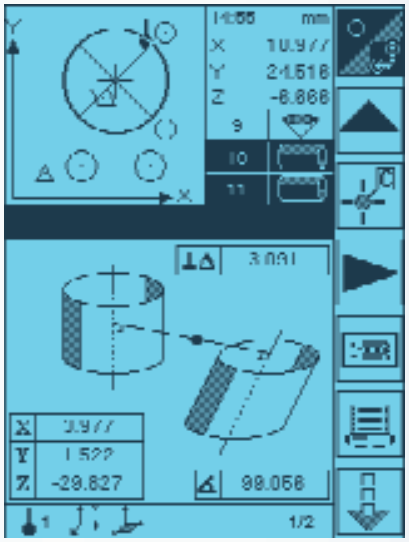
Precision

Repeatability limit: 4 µm

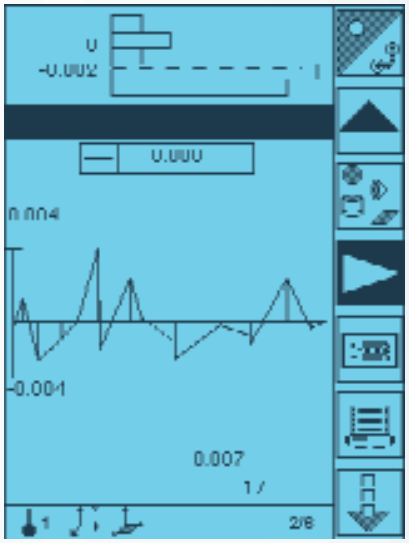
Uncertainties as per VDI / VDE:
U1 = (0,004 + 0,004 · L/1000) mm
U3 = (0,004 + 0,005 · L/1000) mm
L in mm













39.39000	**ETALON DERBY 454 Coordinate Measuring Machine**
	Consisting of the following main components:
	Machine Base Moving bridge CMM base; also with measuring systems and air bearing guiding in all three axes; measuring spans of 457 x 508 x 406 mm (X,Y and Z). Manual probing movements that can be locked or regulated by means of the fine adjust devices; light alloy construction; granite measuring table with 11 kinematic mountings (M10 threads) for clamping workpieces. Material measures: incremental glass scales.
	RENISHAW Touch Trigger Probe Kit 11 *Provided with:* 11 TP-ES measuring head. 1 PS1-10R probe, 21 mm long stylus, 2 mm dia. ball tip. 1 PS1-11R probe, 21 mm long stylus, 3 mm dia. ball tip. 1 Adjustable probe holder 1 Connecting cable.
	TTP 103 Probe Stylus Kit
	Fixed Stylus Probe for scanning operations.
	Control Panel VGA backlight monochrome screen as well as 9-key sealed keypad; also with swivelling support included.
	Software Programme (2 MB PCMCIA cards).
39.69006	**Memory Card** For workpiece oriented programming (2 MB PCMCIA Smart Card).
	ZMouse™ Integrated in the ram.
39.69011	**Reference Sphere**
39.69010	**Clamp Kit** for workpieces.
39.69008	**Air Filter and Regulator**
	Operation and Installation Manuals
	Practice Piece

Optional Accessories

39.69000	**RENISHAW Touch Trigger Probe Kit MIP** 168 hand adjustable angles; repeatability limit 1,5 µm.
39.69009	**ReflexScan operating software for WINDOWS**™ **95/98** For digitizing the workpiece geometry with conversion of the probe center points into standard CAD formats such as DXF and IGES for reverse engineering applications.
39.69007	**Cable** For connecting ETALON DERBY to a PC, serial data transfer.
39.69031	**Matrix Printer**
39.69005	**Cable** For connecting ETALON DERBY to the matrix printer.
39.69001	**Cabinet with table top for the ETALON DERBY measuring machine** Overall dimensions 865 x 740 x 865 mm (W x H x D), with 2 lock-up drawers.
39.69002	**Air refinement system**
39.69003	**Dust cover**

Workpiece features

Max. workpiece size for X-axis = 559 mm, Y-axis = 750 mm, Z-axis = 483 mm

Max. workpiece weight: 227 kg

Additional CMM specifications

Overall dimensions 885 x 1575 x 895 mm (W x H x D, w/o cabinet)

Net weight: 218 kg (w/o cabinet) or 300 kg gross weight (shipping)

Air supply pressure: 4,8 to 8,3 bars (70 to 120 psi)

Air absorption: 21 l per min at 3,75 bars (55 psi)

115 to 220 Vac ± 10 %, 50 to 60 Hz, power consumption 0,3 to 0,7 A

20 ± 1 °C

13 °C to 35 °C

✓

Transport packing

Inspection report

Product List by Order Numbers

No	Page

01

01.10101	B-6
	B-34
01.10102	B-6
01.10103	B-6
01.10104	B-6
01.10105	B-6
01.10106	B-6
01.10107	B-6
01.10108	B-6
01.10109	B-6
01.10110	B-6
01.10111	B-6
01.10112	B-6
01.10113	B-6
01.10901	B-16
01.10902	B-16
01.10903	B-16
01.10904	B-16
01.11901	B-9
01.11902	B-9
01.11903	B-9
01.11904	B-9
01.11905	B-9
01.11906	B-9
01.11907	B-9
01.11908	B-9
01.11909	B-9
01.11910	B-9
01.11911	B-9
01.11912	B-9
01.11913	B-9
01.11914	B-9
01.11915	B-9
01.12001	B-10
01.12002	B-10
01.12003	B-10
01.12004	B-10
01.12005	B-10
01.12006	B-10
01.12007	B-10
01.12008	B-10
01.12009	B-10
01.12010	B-10
01.12011	B-10
01.12012	B-10
01.12013	B-10
01.12014	B-10
01.12015	B-10
01.12106	B-16
01.19046	B-7
	B-34
01.19047	B-7
01.19048	B-7
01.19049	B-7
01.19050	B-7
01.19051	B-5
01.19052	B-5
01.19053	B-5
01.19054	B-5
01.20101	B-6
01.20102	B-6
01.20103	B-6
01.20104	B-6
01.40101	B-10
01.40301	B-8
	B-9
01.40401	B-29
01.40402	B-29
01.60101	B-29
	D-7
01.60102	B-29
01.60103	B-29
01.60201	B-27
01.90003	B-16

02

02.10001	B-25
02.10002	B-25
02.10003	B-25
02.10004	B-25
02.10005	B-25
02.10006	B-25
02.10101	B-13
02.10102	B-13
02.10201	B-18
02.10202	B-18
02.10203	B-18
02.10204	B-18
02.10205	B-18
02.10206	B-18
02.10301	B-17
02.10901	B-21
02.11002	B-33
02.11003	B-33
02.11004	B-33
02.11005	B-33
02.11201	B-30
02.11301	B-21
02.11302	B-21
02.19056	B-20
02.19057	B-20
02.19058	B-20
02.19059	B-20
02.19060	B-20
02.19061	B-20
02.19062	B-20
02.19063	B-20
02.19064	B-31
02.19065	B-31
02.19066	B-22
02.19067	B-22
02.19068	B-22
02.20001	B-25
02.20002	B-25
02.20003	B-25
02.20004	B-25
02.20005	B-25
02.20006	B-25
02.20101	B-13
02.20102	B-13
02.21002	B-33
02.21003	B-33
02.21004	B-33
02.21005	B-33
02.21201	B-30
02.40000	B-26
02.40001	B-26
02.40002	B-26
02.40003	B-26
02.40004	B-26
02.40005	B-26
02.40006	B-26
02.40007	B-26
02.40008	B-26
02.40009	B-26
02.40010	B-26
02.40011	B-26
02.40015	B-26
02.40501	B-26
02.40502	B-26
02.40503	B-26
02.40504	B-26
02.40505	B-26
02.40601	B-26
02.40602	B-26
02.40603	B-26
02.40604	B-26
02.40605	B-26
02.40700	B-27
02.40701	B-27
02.40702	B-27
02.40703	B-27
02.40704	B-27
02.40705	B-27
02.40706	B-27
02.40707	B-27
02.40708	B-27
02.40709	B-27
02.40710	B-27
02.40711	B-27
02.40712	B-27
02.40713	B-27
02.40714	B-27
02.40715	B-27
02.40716	B-27
02.50000	B-26
02.50001	B-26
02.50002	B-26
02.50003	B-26
02.50004	B-26
02.50005	B-26
02.50006	B-26
02.50015	B-26
02.50100	B-26
02.50101	B-26
02.50102	B-26
02.50103	B-26
02.50104	B-26
02.50105	B-26
02.50106	B-26
02.50107	B-26
02.50108	B-26
02.50109	B-26
02.50115	B-26
02.50501	B-26
02.50502	B-26
02.50503	B-26
02.50504	B-26
02.50505	B-26
02.50601	B-26
02.50602	B-26
02.50603	B-26
02.50604	B-26
02.50605	B-26
02.69020	B-19
	B-20
02.69021	B-19
	B-20
02.69022	B-19
	B-20
02.69023	B-19
	B-20
02.69024	B-19
	B-20
02.69025	B-19
	B-20
02.69026	B-19
	B-20
02.69027	B-19
	B-20

03

03.10001	B-4
	B-35
03.10002	B-4
03.10003	B-4
03.10004	B-4
03.10005	B-4
03.10006	B-4
03.10007	B-4
03.10008	B-4
03.10009	B-4
03.10010	B-4
03.10011	B-4
03.10012	B-4
03.11301	B-14
03.11302	B-14
03.12301	B-31
03.20001	B-4
03.20002	B-4
03.20003	B-4
03.20004	B-4
03.22301	B-31

04

04.10001	B-24
04.10002	B-24
04.10003	B-24
04.10004	B-24
04.10005	B-24
04.10006	B-24
04.10101	B-24
04.10102	B-24
04.10103	B-24
04.10104	B-24
04.10105	B-24
04.10106	B-24
04.40001	B-24
04.40002	B-24
04.40003	B-24
04.40004	B-24
04.40005	B-24
04.40006	B-24
04.40007	B-24
04.40008	B-24

05

05.10004	A-9
05.10008	A-7
	B-35
05.10033	B-34
05.10041	A-10
	B-34
05.10043	A-9
05.10044	A-9
05.10045	A-7
05.10046	A-7
05.1610365	A-26
05.1614501	A-26
05.1614502	A-26
05.1614503	A-26
05.1614504	A-26
05.1614505	A-26
05.1614506	A-26
05.1614507	A-26
05.1614508	A-26
05.1614512	A-26
05.1614515	A-26
05.1614517	A-26
05.1614522	A-26
05.1614523	A-26
05.1614524	A-26
05.1614525	A-26
05.1614526	A-26
05.16921	A-21
05.16931	A-21
05.16941	A-21
05.17026	A-10
05.17027	A-10
05.1710303	A-11
05.1710309	A-11
05.1710313	A-10
05.1710320	A-10
05.1710911	A-21
05.17111	A-18
05.1712015	A-22
05.1712016	A-22
05.1712017	A-22
05.1712021	A-24
05.1712023	A-24
05.17123	A-18
05.17124	A-18
05.17133	A-18
05.17134	A-18
05.17143	A-18
05.17144	A-18
05.17163	A-18
05.17164	A-18
05.17175	A-19
05.17176	A-19
05.17177	A-19
05.17178	A-19
05.17183	A-19
05.17202	A-19
05.17212	A-19
05.17222	A-19
05.17371	A-23
05.17375	A-23
05.17383	A-23
05.17385	A-23
05.17387	A-23
05.17391	A-23
05.17393	A-23
05.17395	A-23
05.17506	A-12
05.17509	A-12
05.17511	A-12
05.17512	A-12
05.17521	A-12
05.17522	A-12
05.17541	A-12
05.17542	A-12
05.17551	A-12
05.17552	A-12
05.17601	A-13
05.17602	A-13
05.17611	A-13
05.17612	A-13
05.17621	A-13
05.17641	A-13
05.17642	A-13
05.17651	A-13
05.17652	A-13
05.17661	A-13
05.17662	A-13
05.17671	A-13
05.17672	A-13
05.17681	A-13
05.17691	A-13
05.17701	A-14
05.17702	A-14
05.17711	A-14
05.17721	A-14
05.17722	A-14
05.17741	A-14
05.17751	A-14
05.17801	A-14
05.17811	A-14
05.17821	A-14
05.17841	A-14
05.17851	A-14
05.17861	A-14
05.17871	A-14
05.17915	A-22
05.19084	A-10
	B-34
05.19086	A-11
05.19087	A-11
05.19088	A-11
05.19089	B-34
05.20001	A-9
05.20002	A-7
05.30020	B-35
05.30021	B-35
05.30080	A-4
	B-36
05.30081	A-4
	B-37
05.30082	A-4
05.30083	A-4
05.30084	A-4
05.30101	A-10
05.30200	A-3
05.30201	A-3
05.31002	B-37
05.31003	B-37
05.31101	B-36
05.31102	B-36
05.39036	A-6
05.39037	A-6
05.39038	A-6
05.39039	A-6
05.39040	A-6
05.39043	A-6
05.39044	A-6
05.39045	A-6
05.39046	A-6
05.39047	A-6
05.39050	A-16
05.39051	A-16
05.39052	A-16
05.39053	A-16
05.39054	A-16
05.39055	A-16
05.39056	A-16
05.39057	A-10
05.39058	A-11
05.39059	A-10
05.39060	A-10
05.39061	A-6
05.39062	A-6
05.39063	A-6
05.39064	A-6
05.39065	A-6
05.39066	A-16
05.39067	A-17
05.39068	A-17
05.39069	A-17
05.39070	A-17
05.39071	A-20
05.39072	A-20
05.39073	A-20
05.39074	A-20
05.39075	A-20
05.39076	A-20
05.39077	A-20
05.39078	A-20
05.39079	A-20

No	Page
05.39080	A-20
05.39081	A-16
05.39082	A-4
05.60013	A-25
05.60030	C-15
05.60031	B-34
05.60086	A-5
	A-9
05.60087	A-15
05.60088	A-15
05.60089	A-15
05.69025	A-17
05.69026	A-17
05.90052	A-5
05.90053	A-5
05.90054	A-5
05.90055	A-15
05.90056	A-15
05.90057	A-15
05.90058	A-15
05.90059	A-15
05.90060	A-15
06	
06.10101	H-7
	H-8
06.10102	H-7
	H-8
06.10103	H-8
06.30001	H-7
06.30002	H-7
06.60002	H-7
	H-8
06.60003	H-7
	H-8
07	
07.1684815	K-22
07.1684816	K-22
07.1684817	K-22
07.1684818	K-22
07.1684819	K-22
07.1684820	K-22
07.1684822	K-22
07.1684824	K-21
07.1684825	K-21
07.1684826	K-22
07.1684827	K-22
07.1684828	K-22
07.1684829	K-22
07.1684832	K-22
07.1684835	K-22
07.1684848	K-22
07.1684849	K-22
07.1684852	K-22
07.30021	K-11
07.30022	K-11
07.30023	K-11
07.30033	K-11
07.30034	K-11
07.30035	K-11
07.30041	K-15
07.30042	K-15
07.30048	K-5
07.30049	K-7
07.30050	K-7
07.30051	K-15
07.30052	K-15
07.30053	K-5
07.30054	K-7
07.37043	K-21
07.39010	K-21
07.39011	K-21
07.39012	K-21
07.60057	K-17
07.60058	L-28
07.60059	K-24
	L-28
07.60060	K-17
	L-28
07.60061	K-17
07.60062	K-11
07.60066	K-17
	L-28
07.60067	K-17
	L-28
07.60068	K-17
	L-28
07.60074	K-17
	L-28
07.60075	K-17
	L-28
07.60076	K-17
	L-28
07.60082	K-17
	L-28
07.60086	K-17
07.60087	K-17
07.60093	K-17
07.60094	K-17
07.60096	K-17
	L-28
07.60124	K-18
	K-23
07.60133	K-15
	K-18
07.60134	K-15
	K-18
07.60135	K-18
07.60138	K-13
07.60139	K-13
07.60140	K-13
07.60141	K-11
07.60142	K-11
07.60143	K-11
07.60144	K-11
07.60145	K-12
07.60147	K-13
07.60148	K-17
07.60149	K-13
07.60150	K-11
	K-15
07.60151	K-11
	K-16
07.60152	K-11
	K-16
	K-21
07.60153	K-11
07.60157	K-11
07.60161	K-13
07.60163	K-12
07.60164	K-15
07.60165	K-16
07.60166	K-16
07.60168	K-15
07.60169	K-15
07.60172	K-24
07.60173	K-17
07.60174	K-23
07.60175	K-18
07.60176	K-23
07.60177	K-18
07.60178	K-18
	K-23
07.60179	K-18
	K-23
07.60180	K-18
	K-23
07.60181	K-18
	K-23
07.60182	K-18
	K-23
07.60183	K-18
	K-23
07.60184	K-18
	K-23
07.60185	K-18
	K-23
07.60189	K-21
07.60190	K-21
07.60191	K-5
	K-7
07.60192	K-5
	K-7
07.60194	K-8
07.60195	K-7
07.60196	K-8
07.60197	K-7
07.60198	K-8
07.60199	K-5
	K-8
07.60200	K-5
	K-8
07.60201	K-5
	K-8
07.60202	K-5
	K-8
07.60203	K-7
07.60204	K-5
	K-7
07.60207	K-5
	K-8
07.60208	K-7
07.60215	K-23
08	
08.10000	C-7
08.10001	C-6
08.10002	C-6
08.10003	C-6
08.10800	C-7
08.10801	C-6
08.10802	C-6
08.10803	C-6
08.11500	C-7
08.11501	C-6
08.11502	C-6
08.11503	C-6
08.11504	C-6
08.12300	C-7
08.12301	C-6
08.12302	C-6
08.12303	C-6
08.12304	C-6
08.12305	C-6
08.12306	C-6
08.12600	C-7
08.12601	C-6
08.12602	C-6
08.12603	C-6
08.12604	C-6
08.13101	C-6
08.13102	C-6
08.13103	C-6
08.13104	C-6
08.13409	C-7
08.13410	C-6
08.13411	C-6
08.13412	C-6
08.13413	C-6
08.1620491	C-11
08.1620492	C-11
08.1620493	C-11
08.1620494	C-11
08.1625081	C-11
	C-13
	F-10
08.1625082	C-11
	C-13
	F-10
08.1625083	C-11
	C-13
	F-10
08.1625084	C-11
	C-13
	F-10
08.1625085	C-11
08.1629521	C-11
08.1629525	C-11
08.1669521	F-11
08.1669522	F-11
08.1669523	F-11
08.1669524	F-11
08.1669525	F-11
08.1720351	C-11
	F-10
08.1720353	C-11
	F-10
08.1720356	C-11
	F-10
08.1720358	C-11
	F-10
08.1720360	C-11
	F-10
08.1720362	C-11
	F-10
08.1720364	C-11
	F-10
08.1720366	C-11
	F-10
08.1720368	C-11
	F-10
08.1720370	C-11
	F-10
08.1720372	C-11
	F-10
08.1720374	C-11
	F-10
08.1720376	C-11
	F-10
08.1720378	C-11
	F-10
08.1720380	C-11
	F-10
08.1725001	C-12
08.1725003	C-12
08.1725006	C-12
08.1725008	C-12
08.1725010	C-12
08.1725012	C-12
08.1725014	C-12
08.1725016	C-12
08.1725018	C-12
08.1725020	C-12
08.1725022	C-12
08.1725024	C-12
08.1725026	C-12
08.1725028	C-12
08.1725030	C-12
08.1725032	C-12
08.1725034	C-12
08.1725036	C-12
08.1725038	C-12
08.1725040	C-12
08.1725042	C-12
08.1725044	C-12
08.1725046	C-12
08.1725063	C-13
08.1725066	C-13
08.1725068	C-13
08.1725070	C-13
08.1725072	C-13
08.1764653	F-10
08.1764655	F-10
08.1764657	F-10
08.1764659	F-10
08.1764661	F-10
08.1764703	F-10
08.1764706	F-10
08.1764708	F-10
08.1764710	F-10
08.1764712	F-10
08.20000	C-8
08.20001	C-8
08.20002	C-8
08.20003	C-8
08.20300	C-8
08.20301	C-8
08.20302	C-8
08.20303	C-8
08.21100	C-8
08.21101	C-8
08.21102	C-8
08.21103	C-8
08.21104	C-8
08.21800	C-8
08.21801	C-8
08.21802	C-8
08.21803	C-8
08.21804	C-8
08.21805	C-8
08.21806	C-8
08.22600	C-8
08.22601	C-8
08.22602	C-8
08.22603	C-8
08.22604	C-8
08.23101	C-8
08.23102	C-8
08.23103	C-8
08.23104	C-8
08.40001	C-9
08.40101	C-24
08.40102	C-24
08.40103	C-24
08.40104	C-24
08.40105	C-24
08.40106	C-24
08.40107	C-24
08.40108	C-24
08.40109	C-24
08.40110	C-24
08.40111	C-24
08.40112	C-24
08.40113	C-24
08.40114	C-24
08.40115	C-24
08.40116	C-24
08.40117	C-24
08.40118	C-24
08.40301	C-9
08.40302	C-9
08.41100	C-9
08.41101	C-9
08.41102	C-9
08.41800	C-9
08.41801	C-9
08.41802	C-9
08.42600	C-9
08.42601	C-9
08.42602	C-9
08.43101	C-24
08.43200	C-24
08.43201	C-24
08.43230	C-24
08.43239	C-24
08.50001	C-9
08.50100	C-24
08.50101	C-24
08.50102	C-24
08.50103	C-24
08.50104	C-24
08.50105	C-24
08.50106	C-24
08.50107	C-24
08.50108	C-24
08.50109	C-24
08.50110	C-24
08.50111	C-24
08.50112	C-24
08.50113	C-24
08.50114	C-24
08.50115	C-24
08.50116	C-24
08.50117	C-24
08.50118	C-24
08.50301	C-9
08.50302	C-9
08.51100	C-9
08.51101	C-9
08.51102	C-9
08.51800	C-9
08.51801	C-9
08.51802	C-9
08.52600	C-9
08.52601	C-9
08.52602	C-9
08.53101	C-24
08.60001	C-9
08.60007	C-9
08.60008	C-9
08.60011	C-9
08.60012	C-9
08.60015	C-9
08.60016	C-9
08.60017	C-9
08.62601	C-9
08.62801	C-17
08.63005	C-9
08.63013	C-9
08.63014	C-9
08.63016	C-9
08.63017	C-9
08.63035	C-9
09	
09.10004	C-20
09.10005	C-17
	C-20
09.10006	C-17
	C-20
09.10007	C-17
	C-20
09.10101	C-15
	C-18
09.10102	C-15
	C-18
09.10103	C-15
	C-18
09.10201	C-18
09.10302	C-18
09.10404	C-20
09.10405	C-17
	C-20
09.10406	C-17
	C-20
09.10407	C-17
	C-20
09.10501	C-15
	C-18
09.10502	C-15
	C-18
09.10503	C-15
	C-18
09.10602	C-18
09.10704	C-20
09.10705	C-17
	C-20
09.10706	C-17
	C-20
09.10707	C-17
	C-20
09.10801	C-15
	C-18

No	Page
09.10802	C-18
09.10902	C-18
09.11001	C-15
	C-18
09.11002	C-15
	C-18
09.11003	C-15
	C-18
09.11104	C-20
09.11105	C-17
	C-20
09.11106	C-17
	C-20
09.11107	C-17
	C-20
09.11201	C-15
	C-18
09.11302	C-18
09.11401	C-15
	C-18
09.11402	C-15
	C-18
09.11403	C-15
	C-18
09.20004	C-20
09.20005	C-17
	C-20
09.20006	C-17
	C-20
09.20007	C-17
	C-20
09.20101	C-16
	C-19
09.20102	C-16
	C-19
09.20103	C-16
	C-19
09.20201	C-19
09.20300	C-19
09.20404	C-20
09.20405	C-17
	C-20
09.20406	C-17
	C-20
09.20407	C-17
	C-20
09.20501	C-16
	C-19
09.20502	C-16
	C-19
09.20503	C-16
	C-19
09.20600	C-19
09.20704	C-20
09.20705	C-17
	C-20
09.20706	C-17
	C-20
09.20707	C-17
	C-20
09.20801	C-16
	C-19
09.20802	C-19
09.20900	C-19
09.21104	C-20
09.21105	C-17
	C-20
09.21106	C-17
	C-20
09.21107	C-17
	C-20
09.21201	C-16
	C-19
09.21300	C-19
09.31001	C-16
	C-19
09.31002	C-16
	C-19
09.31003	C-16
	C-19
09.31401	C-16
	C-19
09.31402	C-16
	C-19
09.31403	C-16
	C-19
09.40000	C-18
	C-19
09.40001	C-17
09.40020	C-17
09.60004	C-19
09.60008	C-19
09.60009	C-15
09.60010	C-15
09.60011	C-16
09.60012	C-16
09.60015	C-16
09.60016	C-16
09.60017	C-16
09.60018	C-16
09.60023	C-19
09.60024	C-19
09.60025	C-19
09.60026	C-19
09.60027	C-19
09.60028	C-19

11

No	Page
11.10000	D-5
11.10101	D-5
11.10102	D-5
11.10103	D-5
11.10104	D-5
11.10105	D-5
11.10106	D-5
11.10112	D-5
11.10118	D-5
11.10124	D-5
11.10140	D-5
11.10203	D-5
11.10205	D-5
11.10208	D-5
11.10300	D-5
11.10401	D-5
11.10501	D-5
11.10700	D-3
11.10801	D-3
11.10802	D-3
11.10804	D-3
11.10808	D-3
11.10812	D-3
11.10820	D-3
11.10901	D-3
11.11900	D-7
11.12001	D-7
11.12002	D-7
11.12003	D-7
11.12004	D-7
11.12301	D-7
11.12401	D-5
11.20000	D-5
11.20101	D-5
11.20102	D-5
11.20103	D-5
11.20104	D-5
11.20105	D-5
11.20106	D-5
11.20112	D-5
11.20118	D-5
11.20124	D-5
11.20140	D-5
11.20203	D-5
11.20205	D-5
11.20208	D-5
11.20300	D-5
11.20501	D-5
11.20700	D-3
11.20801	D-3
11.20802	D-3
11.20804	D-3
11.20808	D-3
11.20812	D-3
11.20820	D-3
11.20901	D-3
11.21900	D-7
11.22001	D-7
11.22002	D-7
11.22003	D-7
11.22004	D-7
11.22301	D-7
11.30001	D-5
11.31901	D-7
11.31902	D-7
11.32001	D-7
11.39001	D-10
11.39002	D-10
11.40801	D-3
11.41001	D-3
11.41101	D-3
11.41901	D-7
11.41902	D-7
11.50801	D-3
11.51001	D-3
11.51101	D-3
11.51901	D-7
11.51902	D-7
11.60001	D-5
11.60701	D-3
11.60901	D-3
11.61900	D-7
11.62001	D-5
	D-7
11.62002	D-7
11.62301	D-3
11.62302	D-3
11.62303	D-7

14

No	Page
14.10010	E-14
14.10011	E-14
14.10120	E-14
14.10121	E-14
14.10122	E-14
14.10123	E-14
14.10210	E-11
14.10211	E-11
14.10212	E-11
14.10320	E-11
14.10321	E-11
14.10322	E-11
14.10323	E-11
14.10410	E-15
14.10411	E-15
14.10520	E-15
14.10521	E-15
14.10522	E-15
14.10523	E-15
14.10610	E-12
14.10611	E-12
14.10612	E-12
14.10720	E-12
14.10721	E-12
14.10722	E-12
14.10723	E-12
14.10810	E-16
14.10811	E-16
14.10910	E-13
14.10911	E-13
14.12010	E-17
	F-8
14.12011	E-17
14.12012	E-19
14.12013	E-19
14.12014	E-19
14.12210	E-17
14.12211	E-17
14.12310	E-17
	F-8
14.12311	E-18
14.12410	E-17
14.12411	E-17
14.12510	E-20
	F-8
14.12511	E-20
	F-8
14.12611	E-20
14.12710	E-20
14.12711	E-20
14.16005	E-39
14.16006	E-39
14.16007	E-39
14.16008	E-39
14.16009	E-39
14.16010	E-39
14.16013	E-32
14.16014	E-32
14.16015	E-32
14.16016	E-33
14.16020	E-33
14.16021	E-33
14.16022	E-40
14.16023	E-40
14.16024	E-40
14.16025	E-40
14.16026	E-40
14.16027	E-40
14.16028	E-40
14.16029	E-40
14.16030	E-40
14.16031	E-32
14.16032	E-33
14.16034	E-33
14.16035	E-33
14.16036	E-32
14.16037	E-33
14.16038	E-35
14.16039	E-35
14.16040	E-41
14.16041	E-41
14.16042	E-41
14.16043	E-41
14.16050	E-36
14.16051	E-36
14.16060	E-38
14.16061	E-38
14.1760500	E-29
14.1760501	E-29
14.1760502	E-29
14.1760503	E-29
14.1760513	E-29
14.1760551	E-23
14.1760560	E-23
14.1760561	E-23
14.1760566	E-30
14.1760570	E-23
14.1760582	E-23
14.1760601	E-24
14.1760611	E-30
14.1760624	E-24
14.1760631	E-24
14.1760632	E-24
14.1760635	E-24
14.1760636	E-24
14.1760640	E-24
14.1760651	E-25
14.1760652	E-25
14.1760653	E-25
14.1760661	E-25
14.1760662	E-25
14.1760663	E-25
14.1760671	E-25
14.1761210	E-24
14.1761211	E-24
14.1761213	E-25
14.1761214	E-25
14.1761221	E-25
14.1761224	E-25
14.1761261	E-27
14.1761262	E-27
14.1761281	E-28
14.1761282	E-28
14.1761283	E-28
14.1761284	E-28
14.1761291	E-28
14.1761371	E-31
14.1761373	E-31
14.1764091	F-24
14.1764093	F-24
14.1764094	F-24
14.1764095	F-24
14.19044	E-21
14.19045	E-21
14.19046	E-21
14.19047	E-22
14.19048	E-22
14.19049	E-22
14.19050	E-22
14.19051	E-31
14.19052	E-31
14.26001	E-39
14.26002	E-39
14.26003	E-39
14.26004	E-39
14.26005	E-39
14.26006	E-39
14.26010	E-32
14.26011	E-32
14.26012	E-32
14.26013	E-32
14.26020	E-33
14.26021	E-33
14.26022	E-40
14.26023	E-40
14.26024	E-40
14.26025	E-40
14.26026	E-33
14.26027	E-33
14.26028	E-33
14.26029	E-33
14.26031	E-34
14.26032	E-34
14.26040	E-40
14.26041	E-41
14.26042	E-42
14.26043	E-43
14.26050	E-36
14.26051	E-36
14.26060	E-38
14.26061	E-38
14.60008	E-46
14.60009	E-46
14.60010	E-46
14.60011	E-46
14.60012	E-46
14.60013	E-46
14.60014	E-46
14.60015	E-46
14.60016	E-46
14.60017	E-46
14.60018	E-46
14.60019	E-46
14.62000	E-27
14.62001	E-27
14.62003	E-45
14.62004	E-27
14.62005	E-27
14.69004	E-21

15

No	Page
15.10000	F-4
15.10100	F-4
15.10200	F-4
15.10300	F-4
15.10400	F-5
15.10500	F-5
15.10600	F-5
15.10700	F-5
15.40001	F-4
15.40002	F-4
15.40003	F-4
15.40004	F-4
15.40005	F-4
15.40006	F-4
15.40007	F-4
15.40008	F-6
15.40009	F-5
15.40010	F-5
15.40011	F-5
15.40012	F-5
15.40201	F-4
15.40401	F-4
15.40402	F-4
15.40403	F-4
15.40404	F-4
15.40405	F-4
15.40406	F-4
15.40407	F-4
15.40408	F-4
15.40409	F-4
15.40410	F-4
15.40411	F-4
15.40412	F-4
15.40413	F-4
15.40414	F-4
15.40415	F-4
15.40416	F-4
15.40417	F-4
15.40418	F-4
15.40419	F-4
15.40420	F-4
15.40421	F-4
15.40422	F-4
15.40423	F-4
15.40424	F-4
15.40425	F-4
15.40426	F-4
15.40427	F-4
15.40428	F-4
15.40429	F-4
15.40430	F-4
15.40431	F-6
15.40432	F-6
15.40433	F-6
15.40434	F-6
15.40435	F-6
15.40436	F-6
15.40437	F-6
15.40501	F-5
15.40502	F-5
15.40503	F-5
15.40504	F-5
15.40505	F-5
15.40506	F-5
15.40507	F-5
15.40508	F-5
15.40509	F-5
15.40510	F-5
15.40511	F-5
15.40512	F-5
15.40513	F-5
15.40514	F-5
15.40515	F-5
15.40516	F-5
15.40517	F-5
15.40518	F-5

No	Page
15.40519	F-5
15.40601	F-4
15.40602	F-4
15.40603	F-4
15.40604	F-4
15.40605	F-4
15.40606	F-4
15.40607	F-4
15.40608	F-4
15.40609	F-4
15.40610	F-4
15.40611	F-4
15.40612	F-4
15.40613	F-4
	F-5
15.40614	F-4
	F-5
15.40615	F-4
	F-5
15.40616	F-4
	F-5
15.40617	F-4
	F-5
15.40618	F-4
	F-5
15.40619	F-4
	F-5
15.40620	F-4
	F-5
15.40621	F-4
	F-5
	F-6
15.40622	F-4
	F-5
	F-6
15.40623	F-4
	F-5
	F-6
15.40624	F-4
	F-5
15.40625	F-4
	F-5
15.40626	F-4
	F-5
15.40627	F-4
	F-5
15.40628	F-4
	F-5
15.40629	F-4
	F-5
15.40630	F-4
	F-5
15.40631	F-4
	F-5
15.40701	F-6
15.40702	F-6
15.40703	F-6
15.40704	F-6

16

No	Page
16.10200	G-8
16.10201	F-6
	G-8
16.10401	O-11
	O-12
16.30003	E-49
16.30004	O-12
16.39000	G-7
16.39002	G-10
16.39003	G-6
16.39004	G-6
16.39006	G-8
16.39007	G-3
16.39008	G-7
16.39009	F-6
	G-8
16.39011	G-4
16.39012	G-4
16.39016	G-3
16.39017	G-4
16.39018	G-4
16.39019	G-4
16.39020	G-5
16.39022	G-5
16.39023	G-5
16.39024	G-6
16.39025	G-3
16.39029	G-9
16.39030	G-9
16.39033	G-9
16.39035	G-9
16.39041	G-11
16.39042	G-11
16.39046	G-14
16.39047	G-14
16.40000	F-6
	G-8
16.40100	G-7
16.40300	G-10
16.40301	G-10
16.40302	G-10
16.40303	G-10
16.40401	G-10
	G-13
16.40402	G-13
16.40403	G-13
16.40404	G-12
16.40405	G-12
16.40406	G-13
16.40407	G-13
16.40408	G-13
16.40410	G-12
16.40411	G-12
16.40414	G-12
16.40415	G-12
16.40416	G-12
16.40417	G-12
16.40418	G-12
16.40419	G-13
16.40420	O-7
	O-12
16.40501	G-3
16.60001	O-7
	O-12
16.60011	O-7
	O-12
16.60030	O-7
	O-12
16.60031	O-7
	O-12
16.69009	G-5
16.69010	G-5
	G-6
16.69011	G-5
16.69012	G-3
	G-5
	G-6
16.69013	G-3
16.69014	G-3
16.69015	G-6
16.90021	O-13

18

No	Page
18.10005	E-48
18.10006	E-48
18.10007	E-48
18.10008	E-48
18.10009	E-48
18.10010	E-48
18.10011	E-49
18.10012	E-49
18.10013	E-49
18.10204	E-48
18.10205	E-48
18.10304	E-48
18.11000	E-48
18.11001	E-48
18.16001	E-58
18.16002	E-58
18.16003	E-58
18.16004	E-58
18.16005	E-58
18.16011	E-60
18.16012	E-60
18.16013	E-60
18.16014	E-60
18.16015	E-60
18.16016	E-60
18.19024	E-51
18.20006	E-48
18.20007	E-48
18.20008	E-48
18.20009	E-48
18.20010	E-48
18.20011	E-48
18.20012	E-48
18.20013	E-48
18.20014	E-49
18.20204	E-48
18.20304	E-48
18.26001	E-58
18.26002	E-58
18.26003	E-58
18.26004	E-58
18.26005	E-58
18.26006	E-58
18.26011	E-60
18.26012	E-60
18.26013	E-60
18.26014	E-60
18.26015	E-60
18.26016	E-60
18.40001	E-50
18.40100	E-50
18.40104	E-50
18.40105	E-50
	G7
18.40106	E-62
18.40107	E-62
18.40108	E-62
18.40109	E-62
18.40202	E-50
18.40203	E-50
	E-55
18.40404	E-50
18.40405	E-50
18.40406	E-50
18.40407	E-50
18.40501	E-50
18.40703	E-50
18.50001	E-50
18.50100	E-50
18.50104	E-50
18.50105	E-50
18.50106	E-62
18.50107	E-62
18.50202	E-50
18.50203	E-50
	E-55
18.50404	E-50
18.50405	E-50
18.50406	E-50
18.50703	E-50
18.60201	E-49
	E-56
	L-28
18.60202	E-49
	E-56
	L-28
18.60203	E-49
	E-56
	L-28
18.60211	E-49
	E-56
18.60212	E-49
	E-56
18.60213	E-49
	E-56
18.60301	E-49
	E-56
18.60302	E-49
	E-56
18.60303	E-49
	E-56
18.60304	E-49
	E-56
18.60305	E-49
	E-56
18.60307	E-49
	E-56
	L-28
18.60308	E-50
18.60309	E-49
	E-56
18.60401	E-50
	L-32
18.60608	E-50
18.60702	E-50
18.66001	E-61
18.66003	E-61
18.66004	E-61
18.66005	E-61
18.66006	E-61
18.66007	E-61
18.66008	E-61
18.66009	E-61
18.66010	E-61
18.66011	E-61
18.66012	E-61
18.66013	E-61
18.66014	E-61
18.66015	E-61
18.66016	E-61
18.66017	E-61
18.66018	E-61
18.66019	E-61
18.66020	E-61
18.66021	E-61
18.66022	E-61
18.66023	E-61
18.66024	E-61
18.66025	E-61

19

No	Page
19.30000	E-5
19.30001	E-5
19.30100	E-8
19.30101	E-8
19.30102	E-8
19.30103	E-8
19.30104	E-8
19.30105	E-8
19.30110	E-8
19.30111	E-8
19.30112	E-8
19.30113	E-8
19.30120	E-8
19.30121	E-8
19.30200	E-3
19.30201	E-3
19.30210	E-4
19.30211	E-4
19.60005	E-45
19.60007	E-6
19.60008	E-6
19.60009	E-6
19.60010	E-6
19.60011	E-6
19.61000	A-3
19.61003	E-9
19.61005	E-9
19.61006	E-9
19.61007	E-9
19.61008	E-9
19.61009	E-9
19.61010	E-9
19.61011	E-9

21

No	Page
21.1625101	C-13
	F-10
21.1625102	C-13
	F-10
21.1625103	C-13
	F-10
21.1625104	C-13
	F-10
21.1625105	C-13
	F-10
21.1625106	C-13
	F-10
21.1625107	C-13
	F-10
21.1625108	C-13
	F-10
21.1625109	C-13
	F-10
21.1625110	C-13
	F-10
21.1625111	C-13
21.1625112	C-13
21.1625113	C-13
21.1625114	C-13
21.1625115	C-13
21.1625116	C-13
21.1625117	C-13
21.19020	B-28
21.19021	B-28
21.19022	B-28
21.19023	B-28
21.19024	B-28
21.19025	B-28
21.19026	B-28
21.19027	B-28
21.19028	B-28
21.19029	B-28
21.19030	B-28
21.19031	B-28
21.19032	B-28
21.19033	B-28
21.19034	B-28
21.19035	B-28
21.19036	B-28
21.19037	B-28
21.19038	B-28
21.19039	B-28
21.40001	B-28
21.40002	B-28
21.40003	B-28
21.40004	B-28
21.40005	B-28
21.40006	B-28
21.40007	B-28
21.40008	B-28
21.40009	B-28
21.40010	B-28
21.40011	B-28
21.40012	B-28
21.40013	B-28
21.40014	B-28
21.40015	B-28
21.40016	B-28
21.40017	B-28
21.40018	B-28
21.40019	B-28
21.40020	B-28
21.40021	B-28
21.40022	B-28
21.40023	B-28
21.40024	B-28
21.40025	B-28
21.40026	B-28
21.40027	B-28
21.40028	B-28
21.40029	B-28
21.40030	B-28
21.40031	B-28
21.40032	B-28
21.40033	B-28
21.40034	B-28
21.40035	B-28
21.40036	B-28
21.40037	B-28
21.40038	B-28
21.40039	B-28
21.40040	B-28
21.40041	B-28
21.40043	B-28
21.40045	B-28
21.40047	B-28
21.40049	B-28
21.40051	B-28
21.40053	B-28
21.40055	B-28
21.40057	B-28
21.40059	B-28
21.40103	B-28
21.40108	B-28
21.50001	B-28
21.50002	B-28
21.50003	B-28
21.50004	B-28
21.50005	B-28
21.50006	B-28
21.50007	B-28
21.50008	B-28
21.50009	B-28
21.50010	B-28
21.50011	B-28
21.50012	B-28
21.50013	B-28
21.50014	B-28
21.50015	B-28
21.50016	B-28
21.50017	B-28
21.50018	B-28
21.50019	B-28
21.50020	B-28
21.50021	B-28
21.50022	B-28
21.50023	B-28
21.50024	B-28
21.50025	B-28
21.50026	B-28
21.50027	B-28
21.50028	B-28
21.50029	B-28
21.50030	B-28
21.50031	B-28
21.50032	B-28
21.50033	B-28
21.50034	B-28
21.50035	B-28
21.50036	B-28
21.50037	B-28
21.50038	B-28
21.50039	B-28
21.50040	B-28
21.50041	B-28
21.50043	B-28
21.50045	B-28
21.50047	B-28
21.50049	B-28
21.50051	B-28
21.50053	B-28

Nº	Page
21.50055	B-28
21.50057	B-28
21.50059	B-28
25	
25.10000	B-29
25.10001	B-29
25.10002	B-29
25.10003	B-29
25.10004	B-29
25.10100	B-29
25.10101	B-29
25.10102	B-29
25.10103	B-29
25.10200	B-29
25.10201	B-29
25.10202	B-29
25.10203	B-29
25.10300	B-29
25.10301	B-29
25.10302	B-29
25.10303	B-29
25.30050	I-12
25.30075	I-12
26	
26.11001	L-46
26.11002	L-46
26.11003	L-46
26.11004	L-46
26.11005	L-46
26.11006	L-46
26.11007	L-46
26.11010	L-46
26.11011	L-46
26.11013	L-32
26.11014	L-32
26.30001	L-45
26.30002	L-45
26.30003	L-45
26.30004	L-45
26.30005	L-45
26.30006	L-45
26.30016	L-46
26.30017	L-46
26.30018	L-46
26.30020	L-46
26.30021	L-46
26.30022	L-46
26.30023	L-46
26.30042	L-27
26.30043	L-27
26.30045	L-27
26.30046	L-27
26.30047	L-29
26.30048	L-29
26.30049	L-29
26.30050	L-29
26.30051	L-29
26.30052	L-26
26.30053	L-26
26.30054	L-26
26.30055	L-26
26.60004	L-45
26.60005	L-45
26.60006	L-45
26.60007	L-45
26.60008	L-46
26.60009	L-46
26.60010	L-46
26.60011	L-46
26.60012	L-46
26.60013	L-46
26.60014	L-46
26.60015	L-46
26.60016	L-46
26.60017	L-46
26.60018	L-46
26.60019	L-46
26.60020	L-46
26.60021	L-46
26.60022	L-46
26.60023	L-46
26.60024	L-46
26.60025	L-46
26.60026	L-46
26.60027	L-46
26.60028	L-46
26.60029	L-46
26.60030	L-46
26.60031	L-46
26.60032	L-46
26.60033	L-46
26.60034	L-46
26.60035	L-46
26.60036	L-46
26.60037	L-46
26.60038	L-46
26.60039	L-46
26.60040	L-46
26.60041	L-45
26.60042	L-45
26.60044	L-46
26.60047	L-46
26.60048	L-32
	L-46
26.60049	L-32
	L-46
26.60050	L-46
26.60051	L-46
26.60052	L-46
26.60053	L-46
26.60054	L-46
26.60055	L-46
26.60056	L-46
26.60066	L-27
26.60067	L-27
26.60068	L-27
26.60069	L-27
26.60070	L-27
26.60071	L-27
26.60072	L-27
26.60073	L-27
26.60074	L-27
26.60075	L-27
26.60076	L-27
26.60077	L-27
26.60078	L-27
26.60079	L-27
26.60080	L-27
26.60081	L-27
26.60082	L-27
26.60083	L-27
26.60084	L-27
26.60085	L-27
26.60086	L-27
31	
31.30060	H-14
31.30063	H-14
31.60007	H-14
31.60008	H-14
31.60009	H-14
31.60015	L-53
	L-55
31.60016	L-53
	L-55
31.60017	L-53
	L-55
31.60048	H-14
32	
32.10801	L-21
32.10802	L-8
	L-21
32.10803	L-21
32.10904	L-6
	L-13
32.10905	L-13
32.10906	L-13
32.10907	L-13
32.10908	L-13
32.10921	L-14
32.10922	L-14
32.10923	L-14
32.10924	L-6
	L-14
32.10925	L-14
32.10926	L-14
32.10927	L-14
32.10928	L-14
32.30001	L-8
	L-20
32.30002	L-8
	L-20
32.30017	L-8
	L-20
32.30019	L-8
	L-23
32.30021	L-6
	L-14
32.30026	L-6
	L-15
32.30027	L-6
	L-15
32.30028	L-8
	L-24
32.30029	L-10
	L-13
32.30030	L-10
	L-14
32.30031	L-10
	L-15
32.30032	L-10
	L-15
32.30033	L-10
	L-23
32.30034	L-10
	L-24
32.30035	L-8
	L-20
32.30036	L-6
	L-13
32.30037	L-8
	L-23
32.30038	L-8
	L-24
32.30039	L-10
	L-23
32.30040	L-10
	L-24
32.30041	L-6
	L-16
32.30042	L-6
	L-16
32.30045	O-12
32.30046	L-10
	L-16
32.30048	L-10
	L-16
32.30049	L-8
	L-23
32.30050	L-8
	L-24
32.30051	L-8
	L-23
32.30052	L-8
	L-24
32.30053	L-6
	L-18
32.30054	L-6
	L-17
32.30055	L-6
	L-19
32.30056	L-6
	L-14
32.30057	L-6
	L-13
32.30058	L-12
32.30059	L-12
32.30060	L-6
	L-17
32.30061	L-6
	L-18
32.30062	L-6
	L-19
32.30063	L-6
	L-17
32.30067	L-6
	L-17
32.30068	L-6
	L-18
32.30069	L-6
	L-18
32.30070	L-6
	L-19
32.30071	L-6
	L-19
32.30072	L-6
	L-13
32.30073	L-6
	L-15
32.30074	L-6
	L-16
32.30490	L-34
	L-38
32.30491	L-34
	L-38
32.30492	L-34
	L-42
32.36490	L-34
	L-38
32.36491	L-34
	L-38
32.36492	L-34
	L-42
32.38013	E-62
32.38401	L-44
32.38402	L-44
32.38403	L-44
32.38411	L-44
32.38412	L-44
32.38413	L-44
32.40100	L-22
32.40201	L-31
32.40202	L-31
32.40203	L-31
32.60401	L-32
	O-12
32.60402	L-22
32.60403	L-22
32.60410	L-22
32.60414	L-22
32.60415	L-31
32.60416	L-31
32.60417	L-31
32.60418	L-31
32.60419	L-31
32.60420	L-31
32.60421	L-31
32.60422	L-31
32.60423	L-31
32.60424	L-31
32.60425	L-31
32.60431	L-47
32.60432	L-47
32.60432	O-12
32.60433	O-7
	O-12
32.60440	L-26
32.60441	L-26
32.60442	L-26
32.60443	L-26
32.60444	L-26
32.60445	L-26
32.60446	L-26
32.60447	L-26
32.60448	L-26
32.60449	L-26
32.60450	L-26
32.60451	L-26
32.60452	L-26
32.60453	L-26
32.60458	L-31
32.60459	L-31
32.60460	L-31
32.60461	L-31
32.60463	L-31
32.60464	L-31
32.60465	L-31
32.60468	L-31
32.60470	L-31
32.60483	L-31
32.60486	L-47
32.60489	L-31
32.60490	L-31
32.60491	L-31
32.90119	L-12
32.90120	L-12
32.90121	L-12
32.90122	L-12
32.90123	L-12
32.90124	L-12
32.90143	L-12
32.90144	L-12
32.90145	L-12
32.90146	L-12
32.90149	L-12
32.90150	L-12
33	
33.30000	F-15
33.30001	F-15
33.30004	F-13
33.30006	F-14
33.60022	F-15
33.60023	F-15
33.60025	F-15
33.60027	F-15
33.60029	F-15
33.60031	F-15
33.60032	F-15
33.60033	F-15
33.60034	F-15
33.60300	F-13
35	
35.10001	E-42
	L-29
35.10002..	E-42
	L-29
35.10101	E-42
	L-29
35.10102	E-42
	L-29
35.10103	E-44
	L-30
35.10201	E-42
	L-29
35.10202	E-44
	L-30
35.10203	E-44
	L-30
35.10204	E-44
	L-30
35.10401	E-42
	L-29
35.10502	E-43
	L-29
35.10503	E-44
	L-30
35.10602	E-43
	L-30
35.10702	E-43
	L-30
35.10801	E-43
	L-30
35.10802	E-43
	L-30
35.10902	E-43
	L-30
35.1761301	E-56
35.1761302	E-56
35.1761303	E-56
35.1761305	E-56
35.1761311	E-56
35.1761312	E-56
35.1761321	E-56
35.1761322	E-56
35.1761331	E-56
35.1761332	E-56
35.1761341	E-56
35.1761342	E-56
35.1761351	E-56
35.1761352	E-56
35.40101	E-45
	L-32
35.40102	E-45
	L-32
35.40104	E-45
	L-32
35.40403	L-47
35.40404	L-47
35.40405	L-32
35.40501	E-44
	L-30
35.40502	E-44
	L-30
35.40503	E-44
	L-30
35.40504	E-44
	L-30
35.40505	E-44
	L-30
35.40506	E-44
	L-30
35.60000	L-47
35.60001	E-42
35.60002	L-47
35.60004	E-45
35.60005	E-45
35.60006	E-45
35.60007	E-42
35.60008	E-44
35.60009	E-44
35.60010	E-43
	L-29
35.60011	E-43
	L-29
35.60012	E-44
35.60013	E-44
35.60014	E-44
35.60015	E-44
35.60016	E-44
35.60017	E-42
35.60018	E-42
35.60019	E-42
35.60020	E-42
35.60021	E-42
35.60022	E-43
	L-30
35.60023	E-43
	L-30
35.60024	E-43
35.60025	E-43

No	Page
35.60026	E-44
35.60027	E-44
35.60028	E-44
35.60029	E-44
35.60030	E-43
35.60031	E-43
35.60032	E-43
35.60033	E-43
35.60034	E-43
35.60035	E-42
35.60036	E-42
35.60037	E-42
35.60038	E-42
35.60039	E-42
35.60040	E-42
35.60042	E-44
35.60043	E-44
35.60044	E-44
35.60045	E-44
35.60046	E-44
35.60047	E-44
35.60048	E-44
35.60049	E-44
35.60050	E-44
35.60051	E-42
35.60052	E-42
35.60053	E-42
35.60054	E-42
35.60055	E-42
35.60056	E-42
35.60057	E-42
35.60058	E-42
35.60059	E-42
35.60060	E-42
35.60061	E-42
35.60062	E-42
35.60063	E-43
35.60064	E-44
35.60065	E-44
35.60066	E-44
35.60067	E-44
35.60068	E-44
35.60069	E-44
35.60070	E-44
35.60071	E-44
35.60072	E-37
35.60073	E-37
35.60074	E-37
35.60075	E-37
35.60076	E-37
35.60077	E-37
35.60078	E-38
35.90001	L-22
35.90002	L-22
35.90003	L-22
35.90004	L-22
35.90005	L-22
35.90006	L-22
35.90007	L-22
35.90008	L-22
35.90009	L-22
35.90010	L-22
35.90011	L-22
35.90012	L-22
35.90013	L-22
35.90014	L-22
35.90015	L-22
35.90016	L-22

39

39.39000	P-4
39.69000	P-4
39.69001	P-4
39.69002	P-4
39.69003	P-4
39.69005	P-4
39.69006	P-4
39.69007	P-4
39.69008	P-4
39.69009	P-4
39.69010	P-4
39.69011	P-4
39.69031	P-4

40

40.30002	L-55
40.30004	L-55
40.30012	L-55
40.30014	L-55
40.30022	L-55
40.30024	L-55
40.36002	L-55
40.36004	L-55
40.36012	L-55
40.36014	L-55
40.36022	L-55
40.36024	L-55

41

41.30002	L-58
	L-59
41.30094	L-58
	L-59
41.30095	L-58
	L-65
41.30097	L-58
41.30098	L-58
41.30099	L-58
41.30100	L-59
41.30102	L-58
41.30103	L-58
41.30104	L-58
41.30105	O-13
41.30107	L-58
41.30108	L-58
41.40001	L-59
41.60001	L-59
41.60002	L-59
41.60003	L-59
41.60004	L-59
41.60005	L-59
41.60008	L-59
41.60011	L-59
41.60018	L-59
41.60019	L-59
41.60020	L-59
41.60025	L-58
41.60027	L-58
41.60029	L-58
41.60034	L-59
41.60035	L-59
41.60036	L-59
41.60037	L-59
41.60038	L-59
41.60039	L-59
41.60042	L-59
41.60067	L-59
41.60068	L-59
41.60071	L-59
41.60076	L-59
41.60079	O-13
41.90190	L-59
	O-12

44

44.30003	L-48
	L-53
44.30008	L-48
	L-49
44.30009	L-48
	L-51
44.30010	L-48
	L-51
44.30011	L-48
	L-52
44.60004	L-53
44.60007	L-49

46

46.19000	L-71
46.19001	L-71
46.19002	L-72
46.19003	L-72
46.30004	L-67
46.30006	L-68
46.30007	L-68
46.30008	L-67
46.39000	L-70
46.39001	L-62
46.39002	L-62
46.39003	L-62
46.39004	L-62
46.39005	L-62
46.39006	L-62
46.39007	L-62
46.39008	L-62
	L-74
46.39009	L-62

47

47.60157	K11
47.61005	O-13
47.61017	L-74
	O-8
47.61019	L-74
47.61022	L-75
47.61023	L-74
47.61024	L-74
47.61027	L-74
47.61029	L-75
47.61035	L-57
47.61036	K-13
47.61037	L-74
47.61038	L-74
47.61046	L-74
47.61049	L-74
47.61050	O-13
47.61051	L-74
47.61052	L-74
47.61054	L-74
47.61055	K-5
47.61056	K-11
47.61057	L-74
47.61058	L-74
47.61059	H-14
47.64009	K-12
47.65008	L-74
47.65013	L-47
47.66010	K-12
47.68000	L-74
47.68001	L-74
47.68002	K-15
47.68035	K-16
	L-57

48

48.66009	L-61
	L-62
48.90000	L-62
48.90001	L-62
48.90002	L-62

50

50.30001	L-60
50.30002	L-60
50.30003	L-60
50.30004	L-60
50.30007	L-60
50.31000	L-60
50.33000	L-61
50.60001	L-61
50.60002	L-61
50.60003	L-61
50.60004	L-61
50.60005	L-61
50.60006	L-61
50.60007	L-61
50.60008	L-61
50.61001	L-61
50.62000	L-61

53

53.19200	H-10
53.19201	H-10
53.19202	H-10
53.30003	H-12
53.30004	H-12
53.30005	H-12
53.30201	H-11
53.30202	H-11
53.30302	H-13
53.30303	H-13
53.31000	H-17
53.31001	H-17
53.31002	H-17
53.31050	H-16
53.31051	H-16
53.31052	H-16
53.31054	H-16
53.31055	H-16
53.31056	H-16
53.31057	H-16
53.31058	H-16
53.31059	H-16
53.31060	H-16
53.31061	H-16
53.31062	H-16
53.31063	H-16
53.31064	H-16
53.31065	H-16
53.31100	H-16
53.31101	H-16
53.31102	H-16
53.31150	H-18
53.31200	H-16
53.31201	H-16
53.31202	H-16
53.31203	H-16
53.31204	H-16
53.31205	H-16
53.31206	H-16
53.31207	H-16
53.31208	H-16
53.31209	H-16
53.31210	H-16
53.31250	H-15
53.31251	H-15
53.31252	H-15
53.31253	H-15
53.31254	H-15
53.31255	H-15
53.31256	H-15
53.31257	H-15
53.31258	H-15
53.31259	H-15
53.31300	H-17
53.31350	H-15
53.31351	H-15
53.31352	H-15
53.31400	H-15
53.31401	H-15
53.31402	H-15
53.31403	H-15
53.31404	H-15
53.31405	H-15
53.31406	H-15
53.31407	H-15
53.31408	H-15
53.31409	H-15
53.31410	H-15
53.31411	H-15
53.31412	H-15
53.31413	H-15
53.31414	H-15
53.31415	H-15
53.31416	H-15
53.31450	H-17
53.31500	H-15
53.31501	H-15
53.31502	H-15
53.31503	H-15
53.31550	H-15
53.31551	H-15
53.31552	H-15
53.31553	H-15
53.31600	H-16
53.31650	H-15
53.31651	H-15
53.31652	H-15
53.31653	H-15
53.31700	H-18
53.31750	H-18
53.60004	H-11
	L-74
	L-75
53.60005	H-11
	L-74
	L-75
53.60006	H-11
53.60007	H-10
53.60008	H-10
53.60009	H-10
53.60010	H-10
53.60011	H-10
53.60012	H-10

57

57.10012	F-7
57.10013	F-7
57.10014	F-7
57.10015	F-7
57.10016	F-7
57.10017	F-7
57.10018	F-7
57.10054	F-8
57.10055	F-8
57.10056	F-8
57.10057	F-8
57.10058	F-8
57.10059	F-8
57.10060	F-8
57.10061	F-8
57.10062	F-8
57.10063	F-8
57.10064	F-8
57.10065	F-8
57.10066	F-8
57.10067	F-8
57.40001	F-9
57.40004	F-9
57.40005	F-9
57.60012	F-9
57.60013	F-9
57.60014	F-9
57.60025	F-9
57.60026	F-9
57.60027	F-9
57.60028	F-9
57.60029	F-9

59

59.19002	O-17
	O-18
59.30000	O-11
59.30001	O-11
59.30002	O-11
59.30003	O-11
59.30004	O-6
59.30005	O-6
59.30008	O-7
59.30009	O-7
59.30010	O-7
59.30011	O-8
	O-13
	O-15
59.30012	O-11
59.30013	O-11
59.30014	O-11
59.30015	O-11
59.39000	O-18
59.39001	O-17
59.60006	O-13
59.60010	O-15
59.60011	O-8
	O-13
	O-15
59.60012	O-8
	O-13
	O-15
59.60013	O-7
59.60014	O-7
59.60015	O-7
59.60016	O-7
59.60017	O-8
	O-13
	O-15
59.60018	O-8
	O-13
59.60025	O-8
	O-13
	O-14
59.60026	O-8
	O-15
59.60027	O-8
59.60028	O-7
59.60029	O-7
	O-12
59.60030	O-12
59.60031	O-12
59.60032	O-12
59.69000	O-19
59.69001	O-20
59.69002	O-20
59.69003	O-20
59.69004	O-20
59.69005	O-20
59.69006	O-20
59.69007	O-20
59.69008	O-20
59.69009	O-20
59.69010	O-20
59.69011	O-20
59.69012	O-20
59.69013	O-20
59.69014	O-18
59.69015	O-17
59.69016	O-18
	O-19
59.69017	O-19
59.69018	O-19
59.69019	O-19
59.69020	O-17
	O-19
59.69021	O-19
59.69022	O-19
59.69023	O-19
59.69024	O-17
	O-18
	O-19
59.69025	O-19
59.69026	O-19
59.69027	O-19
59.69028	O-19
59.69029	O-17
	O-18

No	Page
59.69030	O-17
	O-18

60

No	Page
60.30010	B-3
	B-37
60.30020	B-3
60.30021	B-3
60.30022	B-3
60.30023	B-3
60.30030	B-3
	B-37
60.30031	B-3
60.30032	B-3
60.30033	B-3
60.30034	B-13
60.30035	B-13
60.30036	B-13
60.30037	B-13
60.30038	B-30
60.30039	B-30
60.30040	B-30
60.30041	B-18
60.30042	B-18
60.30043	B-18
60.30044	B-18
60.30045	B-19
60.30046	B-19
60.30047	B-8
60.30048	B-8
60.30049	B-8
60.30050	B-8
60.30051	B-8
60.30052	B-8
60.30053	B-8
60.30054	B-8
60.30055	B-8
60.30056	B-8
60.30057	B-8
60.30058	B-8
60.30059	B-8
60.30060	B-8
60.30061	B-8
60.30062	B-25
60.30063	B-25
60.30064	B-25
60.30065	B-25
60.30066	B-25
60.30067	B-25
60.30069	B-32
60.30070	B-32
60.30071	B-3
60.30072	B-3
60.30073	B-3
60.30074	B-3
60.30075	B-3
60.30076	B-3
60.30077	B-3
60.30078	B-3
60.30079	B-15
60.30080	B-15
60.30081	B-15
60.30082	B-15
60.30083	B-15
60.30084	B-15
60.30085	B-17
60.30086	B-17
60.30087	B-23
60.30088	B-23
60.30089	B-23
60.30090	B-23
60.30091	B-23
60.30092	B-23
60.30093	B-23
60.30094	B-23
60.30095	B-23
60.30096	B-23
60.30097	B-23
60.30098	B-23
60.30099	B-19
60.30100	B-19
60.60002	L-74

61

No	Page
61.30010	C-4
61.30011	C-4
61.30012	C-4
61.30101	C-3
61.30102	C-3
61.30103	C-3
61.30104	C-3
61.30105	C-3
61.30106	C-3
61.30107	C-3
61.30108	C-3
61.30109	C-3
61.30110	C-3
61.30111	C-3
61.30112	C-3
61.30113	C-3
61.30114	C-3
61.30115	C-3
61.30116	C-3
61.30117	C-3
61.30118	C-3
61.30119	C-3
61.30120	C-3
61.30121	C-3
61.30122	C-3
61.30123	C-3
61.30124	C-3
61.30125	C-3
61.30126	C-3
61.30127	C-3
61.30128	C-3
61.30220	C-5
61.30221	C-5
61.30222	C-5
61.30223	C-5
61.30224	C-5
61.30225	C-5
61.30230	C-4
61.30231	C-4
61.30232	C-4
61.30233	C-4
61.30234	C-4
61.30235	C-4
61.40020	C-4
61.40021	C-4
61.40022	C-4
61.40023	C-4
61.40024	C-4
61.40025	C-4
61.40026	C-4
61.40027	C-4
61.40028	C-4
61.40029	C-4
61.40030	C-4
61.40031	C-4
61.40032	C-4
61.40033	C-4
61.40034	C-4
61.40035	C-4
61.40036	C-4
61.40037	C-4
61.40038	C-4
61.40039	C-4
61.40040	C-4
61.40041	C-4
61.40042	C-4
61.40043	C-4
61.60002	C-9
61.60003	C-9
61.60005	C-9
61.60006	C-9
61.60007	C-9
61.60011	C-9

62

No	Page
62.30000	C-15
62.30001	C-15
62.30002	C-15
62.30003	C-15
62.30004	C-15
62.30005	C-14
62.30006	C-14
62.30007	C-14
62.30008	C-14
62.30009	C-14
62.30010	C-14
62.30011	C-14
62.30012	C-14
62.30013	C-14
62.30014	C-14
62.30015	C-14
62.30016	C-14
62.30020	C-11
62.30023	C-10
62.30024	C-10
62.30025	C-10
62.30026	C-10
62.30027	C-10
62.30028	C-10
62.30029	C-10
62.30030	C-10
62.30031	C-10
62.30032	C-10
62.30033	C-10
62.30034	C-10
62.30035	C-10
62.30036	C-10
62.30037	C-10
62.30038	C-10
62.30039	C-10
62.30040	C-10
62.30041	C-10
62.30042	C-10
62.30043	C-10
62.30051	C-10
62.30052	C-10
62.30100	C-11
62.30110	C-11
62.30111	C-11
62.30112	C-11
62.32000	C-16
62.32001	C-16
62.32002	C-16
62.32003	C-16
62.32004	C-16
62.32005	C-14
62.32006	C-14
62.32007	C-14
62.32008	C-14
62.32009	C-14
62.32010	C-14
62.32011	C-14
62.32012	C-14
62.32013	C-14
62.32014	C-14
62.32015	C-14
62.32016	C-14

64

No	Page
64.30000	L-57
64.60000	K-13
	L-57

65

No	Page
65.1500492	I-11
65.1500950	I-19
65.1500951	I-19
65.1511011	I-6
65.1511012	I-6
65.1511013	I-6
65.1511014	I-6
65.1511021	I-6
65.1511024	I-6
65.1511027	I-6
65.1511036	I-7
65.1511037	I-7
65.1511038	I-7
65.1511500	I-8
65.1511750	I-14
65.1511751	I-14
65.1511752	I-14
65.1511753	I-14
65.1511754	I-14
65.1512011	I-6
65.1512012	I-6
65.1512013	I-6
65.1512014	I-6
65.1512021	I-6
65.1512024	I-6
65.1512028	I-6
65.1512037	I-7
65.1512038	I-7
65.1512039	I-7
65.1512500	I-8
65.1512750	I-14
65.1512751	I-14
65.1512752	I-14
65.1512753	I-14
65.1512754	I-14
65.1515011	I-6
65.1515012	I-6
65.1515013	I-6
65.1515014	I-6
65.1515021	I-6
65.1515024	I-6
65.1515027	I-6
65.1515036	I-7
65.1515037	I-7
65.1515038	I-7
65.1515500	I-8
65.1516011	I-6
65.1516012	I-6
65.1516013	I-6
65.1516014	I-6
65.1516021	I-6
65.1516024	I-6
65.1516027	I-6
65.1516037	I-7
65.1516038	I-7
65.1516500	I-8
65.1516750	I-14
65.1516751	I-14
65.1516752	I-14
65.1516753	I-14
65.1516754	I-14
65.1517750	I-14
65.1517751	I-14
65.1517752	I-14
65.1517753	I-14
65.1517754	I-14
65.1521011	I-6
65.1521012	I-6
65.1521013	I-6
65.1521014	I-6
65.1521021	I-6
65.1521024	I-6
65.1521027	I-6
65.1521036	I-7
65.1521037	I-7
65.1521038	I-7
65.1521040	I-7
65.1521041	I-7
65.1521042	I-7
65.1522011	I-6
65.1522012	I-6
65.1522013	I-6
65.1522014	I-6
65.1522021	I-6
65.1522024	I-6
65.1522027	I-6
65.1522036	I-7
65.1522037	I-7
65.1522038	I-7
65.1522040	I-7
65.1522041	I-7
65.1522042	I-7
65.1525011	I-6
65.1525012	I-6
65.1525013	I-6
65.1525014	I-6
65.1525021	I-6
65.1525024	I-6
65.1525027	I-6
65.1525036	I-7
65.1525037	I-7
65.1525038	I-7
65.1525040	I-7
65.1525041	I-7
65.1525042	I-7
65.1526011	I-6
65.1526012	I-6
65.1526013	I-6
65.1526014	I-6
65.1526021	I-6
65.1526024	I-6
65.1526027	I-6
65.1526035	I-7
65.1526036	I-7
65.1531011	I-6
65.1531012	I-6
65.1531013	I-6
65.1531014	I-6
65.1531021	I-6
65.1531024	I-6
65.1531027	I-6
65.1531036	I-7
65.1531037	I-7
65.1531038	I-7
65.1531500	I-8
65.1532011	I-6
65.1532012	I-6
65.1532013	I-6
65.1532014	I-6
65.1532021	I-6
65.1532024	I-6
65.1532027	I-6
65.1532036	I-7
65.1532037	I-7
65.1532038	I-7
65.1532500	I-8
65.1535011	I-6
65.1535012	I-6
65.1535013	I-6
65.1535014	I-6
65.1535021	I-6
65.1535024	I-6
65.1535027	I-6
65.1535036	I-7
65.1535037	I-7
65.1535038	I-7
65.1535500	I-8
65.1536011	I-6
65.1536012	I-6
65.1536013	I-6
65.1536014	I-6
65.1536021	I-6
65.1536024	I-6
65.1536027	I-6
65.1536036	I-7
65.1536037	I-7
65.1536500	I-8
65.1570040	G-16
65.1570041	G-16
65.1570042	G-16
65.1570043	G-16
65.1570044	G-16
65.1570045	G-16
65.1570048	G-16
65.1570049	G-16
65.1570050	G-16
65.1570051	G-16
65.1570052	G-16
65.1570053	G-16
65.1570054	G-16
65.1570055	G-16
65.1570100	I-18
65.1570101	I-18
65.1570102	I-16
65.1570103	I-16
65.1570104	I-16
65.1570105	I-16
65.1570106	I-16
65.1570130	I-18
65.1570131	I-18
65.1570132	I-18
65.1570133	I-18
65.1570134	I-18
65.1570135	I-18
65.1570136	I-18
65.1570137	I-18
65.1570138	I-18
65.1570139	I-18
65.1570140	I-18
65.1570141	I-18
65.1570142	I-18
65.1570143	I-18
65.1570144	I-18
65.1570145	I-17
65.1570146	I-17
65.1570147	I-17
65.1570148	I-17
65.1570149	I-17
65.1570150	I-17
65.1570151	I-17
65.1570152	I-17
65.1570153	I-17
65.1570154	I-17
65.1570155	I-17
65.1570156	I-17
65.1570157	I-17
65.1570158	I-17
65.1570159	I-17
65.1570160	I-17
65.1570161	I-17
65.1570162	I-17
65.1570163	I-17
65.1570164	I-17
65.1570165	I-17
65.1570166	I-17
65.1570167	I-17
65.1570168	I-17
65.1570169	I-17
65.1570170	I-17
65.1570171	I-17
65.1570172	I-17
65.1570173	I-17
65.1570269	I-13
65.1570401	I-11
65.1570403	I-11
65.1570420	I-11
65.1570421	I-11
65.1570422	I-11
65.1570423	I-11
65.1570424	I-11
65.1570425	I-11
65.1570426	I-11
65.1570427	I-11
65.1570428	I-11
65.1570429	I-11
65.1570431	I-11
65.1570432	I-11

No	Page
65.1570433	I-11
65.1570434	I-11
65.1570436	I-11
65.1570800	I-16
65.1570805	I-16
65.1570806	I-16
65.1570807	I-16
65.1570808	I-16
65.1570809	I-16
65.1570810	I-16
65.19000	I-4
65.19001	I-4
65.19002	I-4
65.19003	I-4
65.19004	I-4
65.19005	I-4
65.19010	I-4
65.19011	I-4
65.19012	I-4
65.19013	I-4
65.19014	I-4
65.19015	I-4
65.2500420	I-13
65.2500422	I-13
65.2500424	I-13
65.2500450	I-12
65.2500451	I-12
65.2500452	I-12
65.2500453	I-12
65.2500454	I-12
65.2500455	I-12
65.2500456	I-12
65.2500457	I-12
65.2500458	I-12
65.2500460	I-12
65.2500461	I-12
65.2500462	I-12
65.2500463	I-12
65.2500950	I-19
65.2500951	I-19
65.2511500	I-10
65.2511750	I-15
65.2511751	I-15
65.2511752	I-15
65.2511753	I-15
65.2511754	I-15
65.2511755	I-15
65.2512500	I-10
65.2512750	I-15
65.2512751	I-15
65.2512752	I-15
65.2512753	I-15
65.2512754	I-15
65.2512755	I-15
65.2515500	I-10
65.2515751	I-15
65.2515752	I-15
65.2515753	I-15
65.2515754	I-15
65.2515755	I-15
65.2516500	I-10
65.2517750	I-15
65.2517751	I-15
65.2517752	I-15
65.2517753	I-15
65.2517754	I-15
65.2517755	I-15
65.2521012	I-8
65.2521021	I-9
65.2521022	I-9
65.2521023	I-9
65.2522012	I-8
65.2522021	I-9
65.2522022	I-9
65.2522023	I-9
65.2525012	I-8
65.2525022	I-9
65.2525023	I-9
65.2526012	I-8
65.2526022	I-9
65.2526023	I-9
65.2531012	I-8
65.2531013	I-9
65.2531014	I-9
65.2531015	I-9
65.2531500	I-10
65.2532012	I-8
65.2532013	I-9
65.2532014	I-9
65.2532015	I-9
65.2532500	I-10
65.2535012	I-8
65.2535013	I-9
65.2535014	I-9
65.2535500	I-10
65.2536012	I-8
65.2536013	I-9
65.2536014	I-9
65.2536500	I-10
65.2570040	G-17
65.2570041	G-17
65.2570042	G-17
65.2570043	G-17
65.2570044	G-17
65.2570045	G-17
65.2570046	G-17
65.2570049	G-17
65.2570050	G-17
65.2570051	G-17
65.2570052	G-17
65.2570053	G-17
65.2570054	G-17
65.2570055	G-17
65.2570056	G-17
65.2570057	G-17
65.2570800	I-16
65.2570805	I-16
65.2570806	I-16
65.2570807	I-16
65.2570808	I-16
65.2570809	I-16
65.2570810	I-16

67

No	Page
67.19000	H-8
67.39000	A-25
67.39001	H-5
67.69000	G-17
67.69001	A-25
67.69002	I-18
67.69003	G-17
67.69004	G-15
67.69005	H-9
67.69006	G-14
67.69007	G-15
67.69008	A-25
67.69009	I-19
67.69010	G-18

68

No	Page
68.19000	N-3
68.19001	N-5
68.19002	N-5
68.19003	N-5
68.19005	N-23
68.19006	N-11
68.19007	N-11
68.19008	N-11
68.19009	N-11
68.19010	N-12
	N-14
68.19011	N-12
	N-14
68.19012	N-12
	N-14
68.19013	N-12
	N-14
68.39000	N-3
68.39001	N-3
68.39004	N-23
68.39005	N-23
68.39006	N-11
68.39007	N-11
68.39008	N-11
68.39009	N-11
68.39012	N-6
68.39013	N-6
	N-13
	N-15
68.39014	N-13
	N-15
68.39015	N-13
	N-15
68.69000	N-3
68.69001	N-7
68.69002	N-7
	N-13
	N-17
68.69003	N-7
	N-13
	N-15
68.69004	N-7
68.69005	N-7
68.69006	N-7
	N-13
	N-15
68.69007	N-7
68.69008	N-7
	N-13
	N-17
68.69009	N-7
	N-13
	N-17
69.69011	N-7
	N-13
	N-17
68.69012	N-8
	N-13
	N-18
68.69013	N-8
	N-13
	N-18
68.69014	N-8
	N-13
	N-18
68.69015	N-8
	N-13
	N-18
68.69016	N-8
	N-13
	N-18
68.69017	N-8
	N-13
	N-18
68.69018	N-8
	N-13
	N-18
68.69019	N-8
	N-13
	N-18
68.69020	N-8
	N-13
	N-20
68.69021	N-8
68.69022	N-5
	N-12
	N-14
	N-17
68.69023	N-5
68.69025	N-3
68.69027	N-3
	N-9
	N-13
	N-20
	N-24
68.69028	N-9
68.69029	N-9
68.69030	N-9
68.69031	N-9
68.69032	N-9
68.69033	N-9
68.69034	N-9
68.69035	N-9
68.69036	N-9
68.69037	N-9
68.69038	N-9
68.69039	N-9
68.69040	N-9
68.69041	N-9
68.69042	N-9
68.69043	N-9
68.69044	N-9
68.69045	N-23
68.69046	N-23
68.69047	N-23
68.69048	N-23
68.69049	N-24
68.69050	N-24
68.69051	N-24
68.69052	N-24
68.69053	N-24
68.69054	N-24
68.69055	N-24
68.69056	N-24
68.69057	N-24
68.69058	N-24
68.69059	N-24
68.69060	N-24
68.69061	N-13
	N-15
68.69062	N-13
	N-15
68.69063	N-13
	N-15
68.69064	N-13
	N-15
68.69065	N-13
	N-19
68.69066	N-13
	N-19
68.69069	N-13
	N-16
68.69070	N-13
	N-16
68.69071	N-13
	N-16
68.69072	N-13
	N-17
68.69073	N-13
	N-17
68.69074	N-13
	N-17
68.69075	N-13
	N-18
68.69076	N-13
	N-18
68.69077	N-13
	N-19
68.69078	N-13
	N-19
68.69079	N-13
	N-19
68.69080	N-13
	N-19
68.69081	N-13
	N-19
68.69082	N-13
	N-19
68.69083	N-13
	N-20
68.69084	N-13
	N-20
68.69085	N-12
	N-14
68.69086	N-12
	N-14
68.69087	N-12
	N-14
68.69088	N-12
	N-14
68.69089	N-12
	N-14
68.69090	N-12
	N-14
68.69091	N-12
	N-14

71

No	Page
71.115887	B-5
71.115888	B-5
71.115889	B-5
71.115890	B-5
71.115891	B-5
71.115892	B-5
71.115893	B-5
71.115894	B-5
71.115895	B-5
71.115896	B-5
71.115897	B-5
71.115898	B-5
71.115899	B-5
71.115900	B-5
71.115901	B-5
71.115902	B-5
71.115940	B-15

72

No	Page
72.103522	B-16
72.103523	B-16
72.103576	D-8
72.103585	D-8
72.103586	D-8
72.105462	D-8
72.108669	B-12
72.108670	B-12
72.108691	B-12
72.108716	B-12
72.108722	B-12
72.109030	D-8
72.109055	D-8
72.109066	D-8
72.109089	D-8
72.109101	D-8
72.109107	D-8
72.109108	D-8
72.109117	D-8
72.109128	D-8
72.109835	B-12
72.109837	B-12
72.109841	B-12
72.109843	B-12
72.109857	B-12
72.110123	B-27
72.110816	B-11
72.110819	B-11
72.110853	B-11
72.110978	B-12
72.112020	B-28
72.112021	B-28
72.115942	B-32
72.115943	B-32
72.116258	B-32
72.116406	B-4
72.116407	B-4
72.116408	B-4
72.116409	B-4
72.116410	B-14

74

No	Page
74.105993	E-55
74.105994	E-55
74.105995	E-55
74.105996	E-55
74.105997	E-55
74.105998	E-55
74.106026	E-54
	E-55
74.106331	E-54
	E-55
74.106358	E-55
74.106360	E-55
74.106361	E-55
74.106363	E-55
74.106931	E-54
	E-55
74.107893	E-55
74.107895	E-55
74.107897	E-55
74.107899	E-55
74.107901	E-55
74.107903	E-55
74.108603	E-55
74.108942	E-54
	E-55
74.108943	E-54
	E-55
74.110481	E-55
74.110482	E-55
74.110491	E-55
74.110492	E-55
74.110493	E-55
74.110494	E-55
74.110507	E-55
74.110508	E-55
74.111366	E-53
74.111367	E-53
74.111368	E-53
74.111369	E-53
74.111370	E-53
74.111371	E-53
74.111372	E-53
74.111373	E-53
74.111374	E-53
74.111375	E-53
74.111376	E-53
74.111377	E-53
74.111378	E-53
74.111379	E-53
74.111474	E-54
74.111481	E-55
74.111502	E-54
74.111503	E-54
74.111504	E-54
74.111505	E-54
74.111506	E-54
74.111507	E-54
74.111508	E-54
74.111509	E-54
74.111510	E-54
74.111511	E-54
74.111513	E-54
74.111514	E-54
74.111912	E-55
74.111913	E-55
74.111957	E-53
74.111958	E-53
74.111965	E-53
74.115586	F-19
74.115587	F-19
74.115588	F-19
74.115589	F-22
74.115590	F-22

	Page
74.115591	F-22
74.115592	F-22
74.115593	F-22
74.115594	F-20
74.115595	F-20
74.115596	F-20
74.115597	F-20
74.115598	F-20
74.115599	F-22
74.115600	F-22
74.115601	F-22
74.115602	F-22
74.115603	F-22
74.115604	F-22
74.115605	F-22
74.115606	F-22
74.115607	F-22
74.115608	F-22
74.115609	F-23
74.115610	F-23
74.115611	F-23
74.115612	F-23
74.115613	F-23
74.115614	F-21
74.115615	F-21
74.115616	F-21
74.115617	F-21
74.115618	F-21
74.115619	F-21
74.115620	F-21
74.115621	F-21
74.115622	F-21
74.115623	F-21
74.115624	F-21
74.115625	F-21
74.115626	F-21
74.115627	F-21
74.115628	F-21
74.115629	F-19
74.115630	F-19
74.115631	F-19
74.115632	F-19
74.115633	F-19
74.115634	F-19
74.115635	F-19
74.115636	F-19
74.115637	F-23
74.115638	F-23
74.115639	F-23
74.115640	F-23
74.115641	F-23
74.115642	F-20
74.115643	F-20
74.115644	F-20
74.115645	F-20
74.115646	F-20
74.115647	F-19
74.115648	F-19
74.115649	F-20
74.115650	F-20
74.115651	F-20
74.115652	F-20
74.115653	F-20
74.115654	F-21
74.115655	F-21
74.115656	F-21
74.115657	F-21
74.115658	F-21
74.115659	F-21
74.115660	F-21
74.115661	F-21
74.115662	F-21
74.115663	F-21
74.115664	F-22
74.115665	F-19
74.115686	F-20
	F-22
	F-23
74.115687	F-20
	F-22
	F19
74.115688	F-20
	F-23
74.115689	F-20
	F-23
74.115690	F-20
	F-23
74.115726	F-20
	F-22
	F-23
74.115727	F-20
	F-22
	F-23
74.115728	F-20
	F-22
	F-23
74.115729	F-20
	F-23
74.115730	F-20
	F-23
74.115731	F-21
74.115732	F-21
74.115733	F-21
74.115734	F-21
74.115735	F-21

75

75.10016	A-12
75.10017	A-12
75.10018	A-13
75.10019	A-13
75.10020	A-13
75.10021	A-13
75.10022	A-13
75.10023	A-14
75.10024	A-14
75.10025	A-14
75.10026	A-14
75.10027	A-14
75.10028	A-14
75.10029	A-23
75.10030	A-23
75.10031	A-23
75.10032	A-23
75.10033	A-23
75.10046	A-22
75.10047	A-22
75.10048	A-19
75.10049	A-19
75.10050	A-19
75.10051	A-18
75.10052	A-18
75.10053	A-18
75.10054	A-18
75.10055	A-18
75.10056	A-18
75.109119	A-12
75.109122	A-13
75.109230	A-13
75.111792	A-10
75.111990	A-12
75.111991	A-13
75.115811	A-8
75.115821	A-8
75.116544	A-13
75.116545	A-13
75.116550	A-8
75.30001	A-12
75.30002	A-12
75.30003	A-13
75.30004	A-13
75.30005	A-14
75.30006	A-14
75.30007	A-14
75.30008	A-14
75.30009	A-14
75.30010	A-14
75.60001	A-19
75.60002	A-19

76

76.115566	H-8
76.115567	H-8
76.116009	H-8
76.116010	H-8

77

77.19000	K-24
77.19001	K-24
77.19011	K-24
77.19012	K-24
77.19013	K-24
77.39001	K-24
77.39002	K-24
77.39003	K-24
77.60000	K-24
77.69001	K-24
77.69002	K-24
77.69003	K-24
77.69004	K-24
77.69005	K-24
77.69006	K-24

78

78.103613	C-22
	C-22
78.103621	C-22
	C-22
78.103624	C-22
	C-22
78.104940	C-22
	C-22
78.110592	C-22
78.110594	C-22
78.110596	C-22
78.110598	C-22
78.110600	C-23
78.110602	C-23
78.110604	C-23
78.110606	C-23
78.110733	C-21
	C-22
78.110735	C-21
78.110737	C-21
	C-22
78.110739	C-21
78.110741	C-21
78.110743	C-21
78.110745	C-21
78.110747	C-21
78.110749	C-22
78.110751	C-22
78.111003	C-22
78.111004	C-22
78.111005	C-22
78.111006	C-22
78.111007	C-22
78.111008	C-22
78.111009	C-22
78.111010	C-22
78.111011	C-23
78.111012	C-23
78.111174	C-21
	C-23
78.111176	C-21
78.111179	C-23
78.112356	C-21
	C-22
78.112357	C-21
	C-22
78.112358	C-21
	C-22
78.112359	C-21
	C-22
78.112360	C-21
	C-22
78.112361	C-21
	C-22
78.112362	C-21
	C-22
78.112363	C-21
	C-22
78.112364	C-21
	C-22
78.112365	C-21
	C-22
78.112366	C-21
	C-22
78.112367	C-21
	C-22
78.112368	C-21
	C-22
78.112369	C-21
	C-22
78.112370	C-21
	C-22
78.112371	C-21
	C-22
78.112372	C-21
	C-22
78.112373	C-21
	C-22
78.112374	C-21
	C-23
78.112375	C-21
	C-23
78.112376	C-21
	C-23
78.112377	C-21
	C-23
78.112378	C-21
	C-23
78.112379	C-21
	C-23
78.112380	C-21
	C-23
78.112381	C-21
	C-23
78.112382	C-21
	C-23
78.112383	C-21
	C-23
78.112384	C-21
	C-23
78.112385	C-21
	C-23
78.112386	C-21
	C-23
78.112387	C-21
	C-23
78.112388	C-21
	C-23
78.112389	C-21
	C-23
78.112390	C-21
	C-23
78.112391	C-21
	C-23

79

79.105667	F-16
79.105668	F-16
79.105669	F-16
79.105694	F-16
79.105697	F-16
79.105698	F-16
79.105699	F-16
79.105704	F-16
79.105756	F-16
79.105759	F-16
79.108502	F-16
79.108503	F-16
79.108504	F-16
79.108505	F-16
79.108640	F-16
79.108830	F-17
79.110110	F-16
79.110111	F-16
79.110112	F-16
79.110113	F-16
79.111401	F-16
79.111402	F-16
79.112051	F-17
79.112052	F-17
79.112126	F-16
79.19000	F-18
79.19002	F-18
79.19004	F-18
79.19006	F-18
79.19008	F-18
79.19009	F-18
79.19011	F-18
79.19013	F-18
79.19015	F-18
79.19016	F-18
79.19017	F-18
79.19018	F-18
79.19019	F-18
79.19020	F-18
79.19021	F-18
79.19022	F-18
79.19023	F-18
79.19024	F-18
79.19025	F-18
79.19026	F-18

81

81.112053	J-3
	J-4
81.112054	J-3
	J-4
81.112055	J-3
	J-4
81.112056	J-3
	J-4
81.112057	J-3
	J-4
81.112058	J-3
	J-4
81.112059	J-3
	J-4
81.112060	J-3
	J-4
81.112061	J-3
	J-4
81.112062	J-3
	J-4
81.112063	J-3
	J-4
81.112344	J-4
81.112345	J-3
81.112346	J-3
81.115771	H-3
81.115772	H-3
	H-7
81.115773	H-3
81.115774	H-3
81.115775	H-3
81.115776	H-3
81.115777	H-3
81.115778	H-3
81.115779	H-3
81.115780	H-3
81.115781	H-3
81.115782	H-3
81.115783	H-5
81.115784	H-5
81.115785	H-5
81.115786	H-5
81.115787	H-5
81.115788	H-5
81.115789	H-5
81.115790	H-5
81.115791	H-5
81.115792	H-5
81.115793	H-5
81.115794	H-5
81.115795	H-3
	H-7
81.115796	H-3
	H-7
81.115797	H-3
81.115798	H-3
81.115799	H-3
81.115800	H-3
81.115801	H-3
81.115802	H-3
	H-7
81.115803	H-3
81.115804	H-3
81.115805	H-3
81.115806	H-3
81.115807	H-3
81.115808	H-6
81.115809	H-7
81.116278	H-6
81.30000	J-5
81.60000	J-5
81.60002	J-5
81.60003	J-6
81.60004	J-6
81.60005	J-6
81.60006	J-6
81.60007	J-6
81.60008	J-6
81.60009	J-6
81.60010	J-6
81.60011	J-6
81.60012	J-5

85

85.10911	A-21
85.10912	A-21
85.12015	A-22
85.12016	A-22
85.12017	A-22
85.12023	A-24
85.17000	A-23
85.19000	A-23

95

95.1654531	G-20
95.1750002	H-3
95.1750003	H-3
95.1750004	H-3
95.1750005	H-3
95.1750006	H-3
95.1750007	H-3
95.1750008	H-3
95.1750009	H-3
95.1750010	H-3
95.1750011	H-3
95.1750181	A-12
	G-18
95.1750182	G-18
95.1750184	G-18
95.1750187	G-18
95.1750188	G-18
95.1750189	G-18
95.1750222	D-8
95.1750223	D-8
95.1750224	D-8
95.1750225	D-8
95.1750226	D-8
95.1750227	D-8

No	Page
95.1751523	H-4
95.1751524	H-4
95.1751525	H-4
95.1751527	H-4
95.1751528	H-4
95.1751530	H-4
95.1751533	H-6
95.1751534	H-6
95.1751535	H-6
95.1751537	H-6
95.1751538	H-6
95.1751543	H-4
95.1751544	H-4
95.1751545	H-4
95.1751547	H-4
95.1751548	H-4
95.1751550	H-4
95.1751553	H-6
95.1751554	H-6
95.1751555	H-6
95.1751557	H-6
95.1751558	H-6
95.1751560	H-6
95.1751564	H-4
95.1751565	H-4
95.1751567	H-4
95.1751568	H-4
95.1751569	H-4
95.1751570	H-4
95.1751572	H-4
95.1751574	H-4
95.1751575	H-4
95.1751584	H-4
95.1751585	H-4
95.1751587	H-4
95.1751588	H-4
95.1751589	H-4
95.1751604	H-4
95.1751605	H-4
95.1751607	H-4
95.1751608	H-4
95.1751609	H-4
95.1751610	H-4
95.1751612	H-4
95.1751614	H-4
95.1751615	H-4
95.1751624	H-4
95.1751625	H-4
95.1751627	H-4
95.1751628	H-4
95.1751629	H-4
95.1752291	A-24
95.1752292	A-24
95.1752293	A-24
95.1752294	A-24
95.1753001	G-19
95.1753002	G-19
95.1753003	G-19
95.1753013	G-19
95.1753014	G-19
95.1753015	G-19
95.1753045	G-19
95.1753046	G-19
95.1754511	G-20
95.1754531	G-20

96

No	Page
96160011	L-34
	L-43
96160013	L-34
	L-43
96160015	L-37
96160021	L-37
96160101	L-36
96160111	L-36
96160121	L-36
96160136	L-36
96160141	L-37
96160151	L-37
96160161	L-37
96160169	L-36
96160171	L-37
96160211	L-37
96400036	L-37
96400039	L-37
96400040	L-37
96400042	L-37
96400044	L-37
96400056	L-37
96400067 DIN5x180°	L-37
96400101	L-36
96400111	L-36
96400121	L-36
96400131	L-36
96400136	L-36
96400201	L-37
96400211	L-37
96410010	L-34
	L-39
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	L-39
96410012	L-34
	L-39
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	L-39
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96410093	L-37
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96411201	L-37
96411212	L-37
96420001	L-34
	L-44
96420003	L-36
96420004	L-34
	L-44
96420005	L-37
96420006	L-37
96420007	L-37
96420011	L-37
96420012	L-37
96420013	L-37
96420016	L-37
96420101	L-36
96420121	L-36
96420131	L-36
96420136	L-36
96420211	L-37
96430024	L-36
96430027 DIN5x180°	L-37
96430028	L-34
	L-43
96430029	L-34
	L-43
96430030	L-37
96430033	L-37
96430101	L-36
96430111	L-36
96430131	L-36
96430136	L-36
96430161	L-37
96430171	L-37
96430181	L-37
96430211	L-37
96441015	L-34
	L-43
96441032	L-37
96441041	L-34
	L-43
96441045	L-37
96441054	L-36
96441055	L-37
96441056	L-37
96441058	L-37
96441070	L-36
96441073 80	L-37
96441077	L-37
96441093	L-37
96441101	L-36
96441131	L-36
96441136	L-36
96441211	L-37
96460011	L-34
	L-41
96460014	L-34
	L-41
96460101	L-36
96460111	L-36
96460121	L-36
96460131	L-36
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96460141	L-37
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96460171	L-37
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96460201	L-37
96460211	L-37
96490031	L-37
96490034	L-36
96490041	L-36
96490045	L-37
96490053 80 DIN5x180°	L-37
96490101	L-36
96490136	L-36
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96491016	L-37
96491020	L-37
96491021	L-37
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96491036	L-37
96491041	L-37
96491047	L-37
96491101	L-36
96491111	L-36
96491121	L-36
96491131	L-36
96491136	L-36
96491151	L-37
96491211	L-37
96498003	L-36
96498005	L-37
96498007	L-37
96498025	L-37
96498028	L-37
96499004	L-34
	L-44
96499006	L-37
96499007	L-34
	L-44
96499010	L-37
96499018	L-37
96499020	L-36
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96499121	L-36
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96499151	L-37
96499161	L-37
96499201	L-37
96499211	L-37
96500010	L-34
	L-40
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96500015	L-34
	L-40
96500025	L-34
	L-40
96500040 S/10	L-36
96500045 S/10	L-37
96500046 S/10	L-37
96500053	L-37
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96500111	L-36
96500121	L-36
96500131	L-36
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96500171	L-37
96500181	L-37
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96500211	L-37
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96510121	L-36
96510131	L-36
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96510141	L-37
96510151	L-37
96510161	L-37
96510171	L-37
96510181	L-37
96510211	L-37

98

No	Page
981680035	L-74
981680037	L-74
	L-76
981680040	L-74
981680089	L-74
	L-76
981680275	L-76
981680276	L-76
981680277	L-76
981680278	L-76
981680279	L-76
981686113	L-74
983780020	L-76

S

No	Page
024388	L-47
025589	L-28
026522	L-47
028845	L-31
037608	L-31
037881	A-25
037882	A-25
037883	A-25
037884	A-25
037885	A-25
037886	A-25
037887	A-25
037888	A-25
037889	A-25
S07.072076	K-13
S16071225	O-13
S16071229	O-6
	O-8
	O-13
S19001431	E-9
S19001447	E-9
S19001448	E-9
S19060524	E-5
S26074372	L-28
S26074380	L-28
S32001487	L-12
S32020214	L-12
S32020269	L-10
	L-17
S32020402	L-12
S32070030	O-7
S32080302	L-12
S32080361	L-12
S32080524	L-12
S32080569	L-12
S32080661	L-12
S32080692	L-12
S32080721	L-12
S32080729	L-12
S32180315	L-12
S32180358	L-12
S32730497	L-12
S33010070	F-13
S33010071	F-13
S33010072	F-13
S40040021	L-55
S40040022	L-55
S40040023	L-55
S40040024	L-55
S40040025	L-55
S41000429	L-65
S41074159	L-58
S41077235	L-59
S41077248	L-65
S41077249	L-65
S41078077	L-65
S41078078	L-65
S41078079	L-65
S41078080	L-65
S41078081	L-65
S41078082	L-65
S41078083	L-65
S41078084	L-65
S41078086	L-65
S41078087	L-65
S41078088	L-65
S41078227	L-65
S41078228	L-65
S41078229	L-65
S41078230	L-65
S41078231	L-65
S41078331	L-65
S41078332	L-65
S41078612	L-65
S41078654	L-65
S41078751	L-65
S41078752	L-65
S46060525	L-68
S47078588	L-74
S48001721	L-62
S48001722	L-62
S48001723	L-62
S48001724	L-62
S48001725	L-62
S48001728	L-62
S49078420	L-75
S49078488	L-75
S50078033	L-61
S53001564	L-74
S59110152	O-14
S59110489	O-14
S59300102	O-6
S59300103	O-15
S59300104	O-15
S59300105	O-15
S95010000	M-7
S95010001	M-7
S95010002	M-8
S95010003	M-8
S95010010	M-7
S95010011	M-7
S95010012	M-8
S95010013	M-8
S95010020	M-9
S95010021	M-9
S95010022	M-9
S95010023	M-9
S95010030	M-9
S95010031	M-9
S95011021	M-18
S95011024	M-18

Lexicon of pictograms

Technical and trading features

TESA Design SWISS MADE

TESA Design – Product from the European Community

TESA Design – Product produced outside Europe

Product from the European Community

Product produced outside Europe

Order number

Standard

Measuring range
Measuring span

Range of indication
Max. plunger travel

Displacement range

Application range

Analogue indication
Longitudinal scale

Lower vernier

Upper vernier

Circular scale

Dial

mm or in / Revolution

Number of scale divisions

Scale spacing

Scale interval

Resolution
Magnification

Numerical scale

Numerical interval

Height of signs
Digit height

Analogue / Numerical indication

Material measure
Measuring system

«capa µ system» Capacitive measuring system, patented

Units of measurement

Metric / inch conversion

Maximum permissible errors
Limit deviations

Deviation span of indication

Repeatability limit

Hysteresis limit

Maximum permissible straightness error

Maximum permissible flatness error

Maximum permissible roundness error

Maximum permissible parallelism error

Maximum permissible cylindricity error

Maximum permissible perpendicularity error

Maximum permissible runout error

Grade

Uncertainty of measurement
Accuracy

Measuring frame

Measuring face or faces

Dimensions

Diameter

Thread pitch

Material
Hardness

Measuring force

Shockproof design

Maximum displacement speed

Product designation

Execution

Key features

Notes

Function mode

Floating zero

Blocking of display

Locking of display

Digital interface

Analogue interface

Control functions

Power supply

Battery operating life

Coefficient of linear expansion

Working temperature range

Operating temperature range

Storage temperature range

Maximum relative humidity

Degree of protection

Electromagnetic compatibility

Mass

Included in scope of supply

Packaging

Identification number

Declaration of conformity

Inspection report

Inspection report with a declaration of conformity

SCS
Calibration certificate

Certificate of another type