User's Manual

TESA-SCOPE 300V and 300V-PLUS Vertical Profile Projectors

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1 INTRODUCTION

We thank you for having purchased a TESA-SCOPE 300V as profile projector.

Note

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Registered trademarks

TESA-SCOPE is a registered trademark of TESA SA.
Microsoft Windows is a registered trademark of Microsoft Corporation.

Your TESA-SCOPE 300V is a profile projector robustly designed for non-contact measurement of manufactured parts. The projected image on the 330 mm diameter viewing screen can be magnified from 10x up to 100x depending on the objective used.

The measurements can either be carried out

– by comparison on screen (using a chart)

– on screen directly

– by rotating the screen (angular measurement, A-axis)

– by moving the stage in the X or Y coordinate direction

Your TESA-SCOPE 300V may be equipped with either of the two stages available, i.e.:

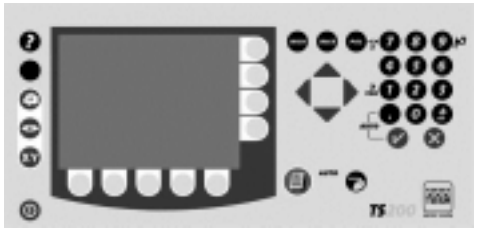
– model 200 x 100 mm (version TESA-SCOPE)

– model 300 x 150 mm (version TESA-SCOPE PLUS)

This manual explains how to use the TESA-SCOPE 300V profile projectors, whatever their type.

TS100 readout unit

TS200 readout unit



Every effort has been made to ensure that every TESA-SCOPE profile projector is used in optimum conditions by the operator. Whenever necessary, contact your TESA-authorized dealer for assistance.

Carefully read this manual to help you to set up and use your projector appropriately. Whenever the profile projector is installed by a TESA-authorized agent or dealer, the chapter **Installation** is for information only.

Précautions

All TESA-SCOPE products have been developped for compliance with the safety precautions. However, inappropriate handling during installation or use is likely to cause damages to your TESA-SCOPE 300V.

For your own safety and that of your equipment, always take the following precautions:

– Installation and use of your TESA-SCOPE 300V requires a comprehensive training provided by a TESA-authorized distributor.

– Your TESA-SCOPE 300V should be installed on a clean, stable surface area. It should not be exposed to hazardous conditions, vibrations, shocks, condensation, excess humidity, corrosive and inflammable surroundings or sudden temperature variations.

– Make sure your TESA-SCOPE 300V is kept away from electrical sources before installation, maintenance, inspection or repair work.

– Do not use your TESA-SCOPE 300V with other voltage levels than those specificied in this manual.

– Do not damage, alter, stretch, bend or stress the power cord. Do not place heavy items on it. If you fail to take any of these precautions, you might damage your projector or cause serious injury by fire or shock hazard.

– Disconnect your TESA-SCOPE 300V by pulling the plug – not the cord – as this might cause electrical damage to the profile projector or expose yourself to an electrical discharge.

– Handle your TESA-SCOPE 300V with special care in order to ensure the reliability of the measurement results delivered by this high-precision measuring equipment.

– Use your TESA-SCOPE 300V in strict accordance with the specifications and instructions of use. Do not attempt to modify or dismantle the projector as this could void the warranty.

– Be sure your TESA-SCOPE 300V has been disconnected from the power source after use.

– If you will not be using your TESA-SCOPE 300V for a long period of time, unplug the power cord from the mains outlet for safety reasons.

2 TECHNICAL FEATURES

2.1 Viewing screen

Your TESA-SCOPE 300V profile projector has a 330 mm diameter viewing screen with rotary chart clips as well as a 60° / 90° graticule. The angular numerical display (when rotating the viewing screen) uses either of both modes **Absolute** or **Incremental**. Readout resolution to 0°.01' (for decimal units, report to chapter 7).

2.2 Telecentric objectives

Each objective as listed below has a bayonet mount.

Objective 10x	No 06860001
Objective 20x	No 06860002
Objective 25x	No 06860003
Objective 31,25x	No 06860004
Objective 50x	No 06860005
Objective 100x	No 06860006

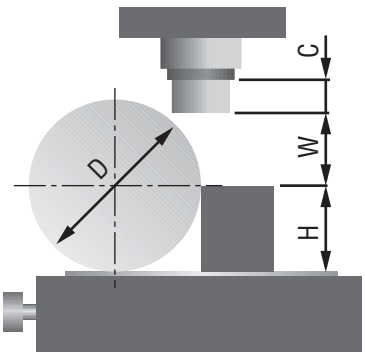
To get the best from your projector, the optics should be regularly maintained. Therefore, it is advisable to observe the following:

– Store the lenses in a clean and dry place, free from dust.

– Clean the lenses regularly with an appropriate solvent.

Optical accuracy: ± 0,05 % for the profile or ± 0,10 % on the surface

Objectives	**10x**	**20x**	**25x**	**31,25x**	**50x**	**100x**
Field of view	30 mm	15 mm	12 mm	9,6 mm	6 mm	3 mm
Working distance (W)	80 mm	82 mm	70 mm	56 mm	53 mm	43 mm
Maximum height (H)	100 mm	100 mm	100 mm	100 mm	100 mm	100 mm
Maximum diameter (D)	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm
Objective length (C)	30 mm	32 mm	44 mm	61 mm	63 mm	71 mm
Maximum length of the part to be measured (X)=Y-(W+C)	172 mm	168 mm	168 mm	165 mm	166 mm	168 mm



X/Y measuring stage

2.3 Measuring stages

Standard model

Surface area	350 x 210 mm (X/Y)
Measuring range	200 mm x 100 mm (X/Y)
Resolution	0,001 mm
Max. load bearing capacity	20 kg

Clutch for fast displacement in the X-axis

Large model

Surface area	440 x 282 mm (X/Y)
Measuring range	300 mm x 150 mm (X/Y)
Resolution	0,001mm
Max. load bearing capacity	20 kg

Clutch for fast displacement in the X-axis

2.4 Illumination

Profile: Lamp 24 Volts – 150 Watts
Fan air cooling, 24 Vdc (No. 06860020)

Surface: adjustable fiber optic
Lamp 24 Volts – 150 Watts
Fan air cooling, 24 Vdc (No. 06860021)

SAVE LAMP: energy saver (for checking purpose, see chapter 7).
Stand-by mode for the lamps if there's no displacement in the A, X or Y axis for 5 minutes.
Stand-by mode for the fans 1 minute after the lamps have been turned off.

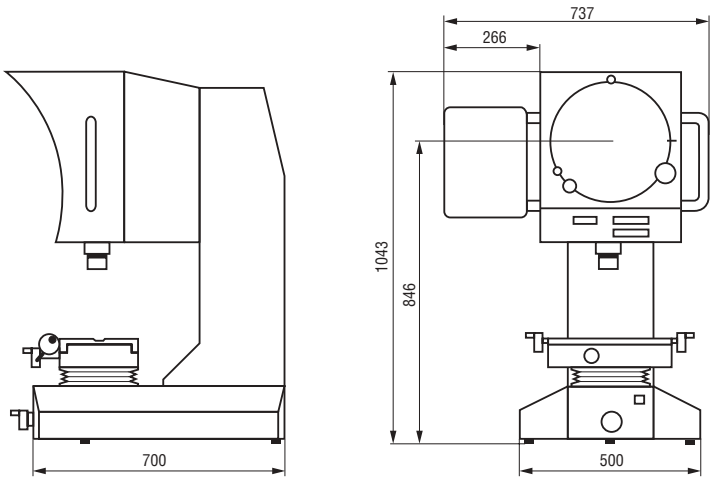
2.5 Power supply

115 Volts - 60 Hz
230 Volts - 50 Hz

Make sure your TESA-SCOPE 300V is disconnected before installation, maintenance, inspection or repair work.

To prevent bad connections or accidental damage, also take all the satety precautions listed under **Installation**.

2.6 Overall dimensions



Weight : 110 kg

2.7 Options

Description	TESA No
Rotating table, ø 150 mm	06860022
Remote foot switch	06860023
V-blocks and centres	06860024
Vise stage	06860025
TESA practice piece	06860027
Objective 10x	06860001
Objective 20x	06860002
Objective 25x	06860003
Objective 31,25x	06860004
Objective 50x	06860005
Objective 100x	06860006

3 INSTALLATION

3.1 Installation on site

Your TESA-SCOPE 300V is a profile projector that complies with the installation rules II. Therefore, this appliance must be installed in a place where

– temperature variations are low (5 °C to 40 °C)

– humidity is controlled (below 80%)

– supply voltage remains stable, free from interference

This place should also be free from

– vibrations

– corrosive fumes

– oil splashes (to prevent optics and mirrors from being contaminated)

It is also advisable to have TESA-SCOPE 300V installed on a support that is

– rigid and stable

– horizontally aligned to the floor

– with resting surface lying approximately 740 mm above the floor

– with connected grounding plug

3.2 Mounting the TS200 unit

3.2.1 Attachment

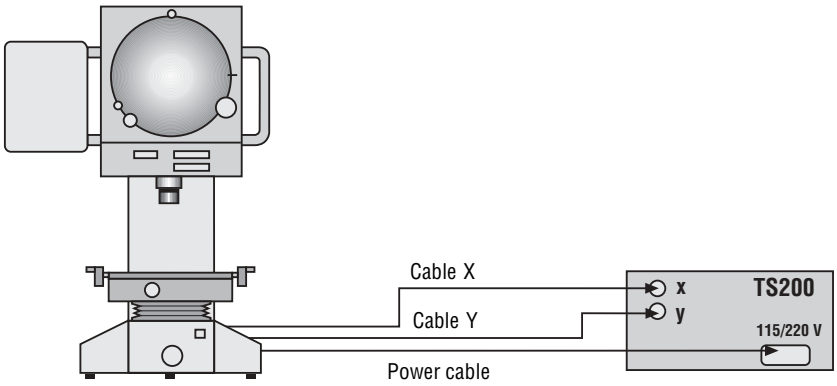
Once the readout unit has been mounted on the right handle of the projector, tighten clamps and screws that came with the projector, i.e.:

– 4 CHC type screws, M6 x 35 mm

– 4 semicircular clamps

Do not overtighten these items so that the unit can be pivoted round the vertical axis of the handle.

3.2.2 Connecting the TS200 unit



Each connection below is adequately marked

Plug the X-cable of the optoelectronic glass scale into the X-socket (DB-9) on the readout unit.

Plug the Y-cable of the optoelectronic glass scale into the Y-socket (DB-9) on the readout unit.

Plug the power cable at the rear of the projector to the readout unit.

3.3 Connecting the projector

Before connecting TESA-SCOPE 300V to the mains, check that the voltage regulator is in correct position (220V or 115V).

Do not alter any default connection!

Use the three-wire power cable that came with the profile projector. Being identical to a PC cable, it is fitted with an IEC connector and has the following characteristics:

– UL approuved cable

– 3 m in length

– complies with international standards on safety features

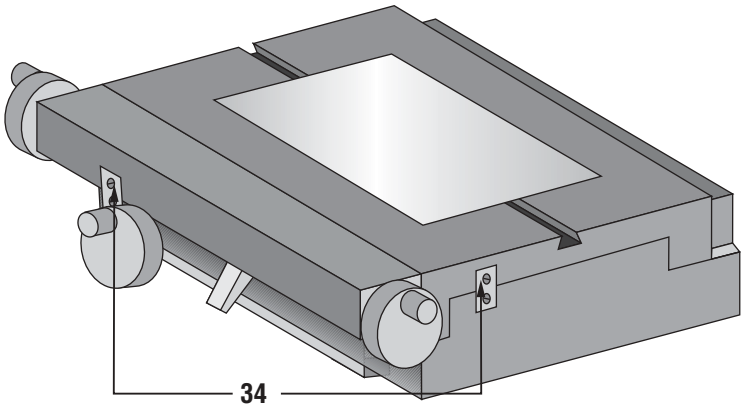
– includes a grounded outlet

– supports at least 400 VA

Check that the main switch is set to OFF. Plug the power cable of the projector into the grounded outlet, then set the switch to ON again. Your TESA-SCOPE 300V is ready for use.

3.4 Unlocking the stage

Remove the two safety brackets shown below (X and Y axes). Leaving them into place could damage the stage whenever either of both axes is moved.



34
Locked stage for safe transportation

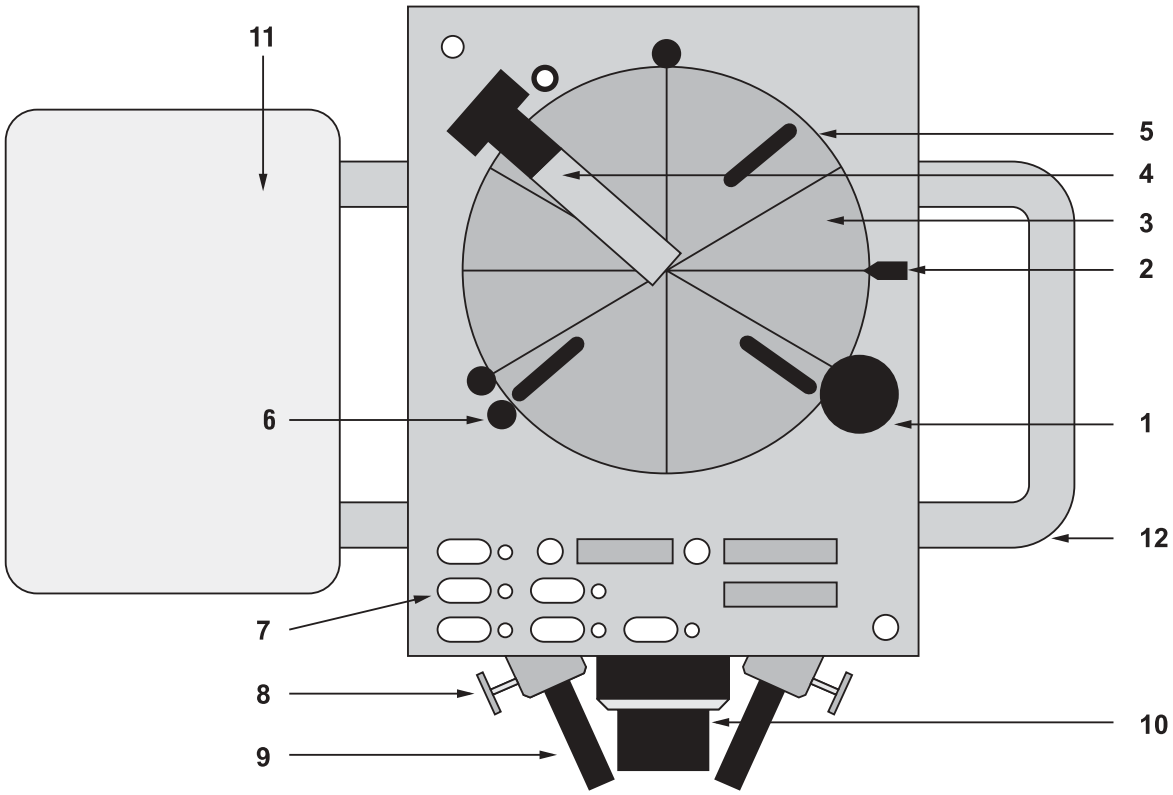
3.5 Safety, cleaning and maintenance

If you need to approach hazardous areas (e.g. for changing bulbs or anything else), check with your finger that there's no risk of burn before any action. Proceed from the most far-off point and come close to the bulb.

To clean your profile projector and its accessories, use only a soft damp cloth or a special cleaning cloth for optics.

4 OVERVIEW

4.1 Commands



1 Screen rotation button

2 Screen zeroing pointer

3 Frosted glass screen with crossline graticule

4 Edge detector (TESA-SCOPE 300V-TS200-E only)

5 Rotary clip

6 Screen lock button

7 Digital display

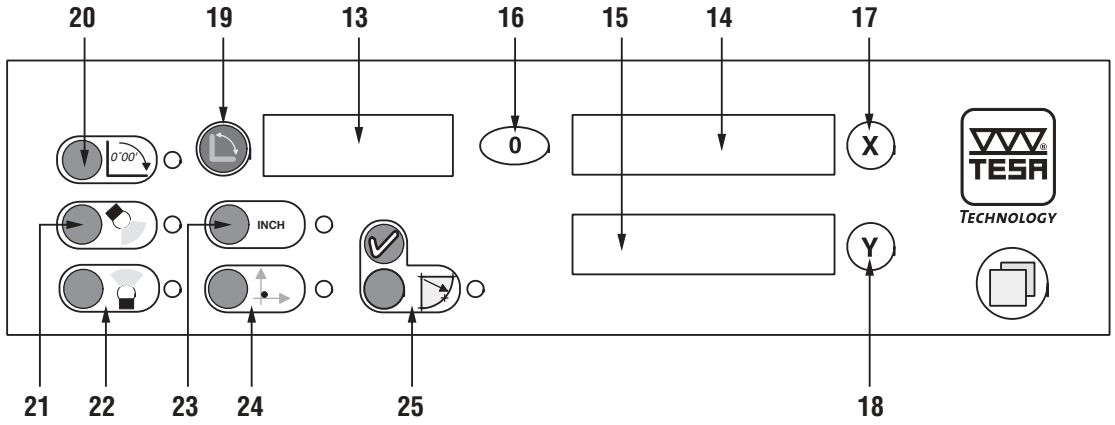
8 Fiber optic surface illumination lock button

9 Fiber optic surface illumination

10 Interchangeable objective

11 Papersheet holder

12 Mounting handle for TS200 or TS200-E



13 A-axis display

14 X-axis display

15 Y-axis display

16 A/X/Y zeroing key

17 X-axis zeroing key

18 Y-axis zeroing key

19 A-axis zeroing key

20 Decimal/Minute degrees conversion button

21 ON/OFF switch for the surface lamp

22 ON/OFF switch for the profile lamp

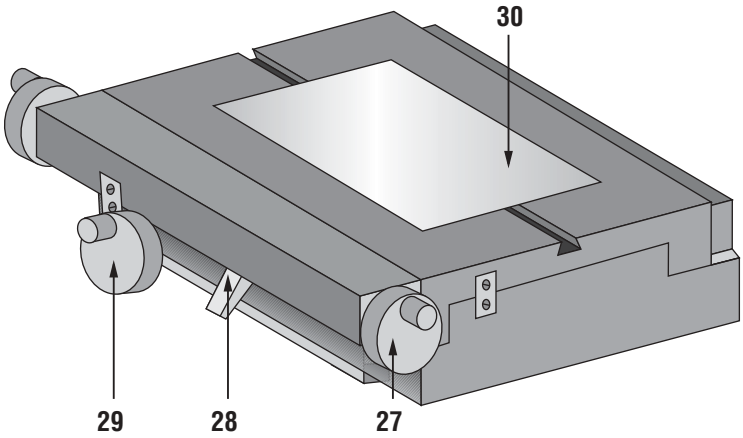
23 Button for displaying metric/inch axes

24 Button for selecting Absolute/Incremental mode

25 Key for activating the **Circle** function along with **Enter** key

26 Print button

4.2 Stage commands

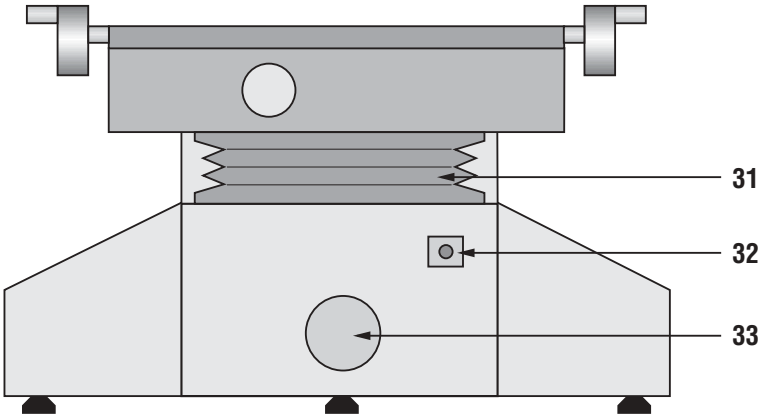


27 Control handle for stage displacement in X-axis

28 Clutch system for fast stage displacement in X-axis

29 Control handle for fast stage displacement in Y-axis

30 Glass stage



31 Protective rubber bellow for the focus axis

32 Main switch

0 = OFF
1 = ON (with red indicator lighting up)

33 Control handle for stage displacement in the focus axis

4.3 About TS200

To know more about this readout unit, read in the manual that came with this redout unit.

5 USING THE PROFILE PROJECTOR

5.1 Managing the illumination

5.1.1 Profile lamp key

Lamp off  Lamp on 

5.1.2 Surface lamp key

Lamp off  Lamp on 

5.1.3 Switching off a profile lamp, manually

Whenever one of the profile lamps is switched off, the active ventilation systems continue cooling the relevant lamp for 5 minutes.

5.1.4 Stand-by mode for the lamps

– This mode is automatically activated if there's no displacement in the axes A/X/Y for 5 minutes. At that time, each lamp goes off.

– 5 minutes later, the active fans stop operating in turn.

– To have each of them reactivated, just move one of the three axes.

5.2 Direct measurement

Since only the viewing screen is used for direct measurement, the stage needs not be moved. So, the desired dimension will be captured by the superimposed glass scale, then divided by the magnification factor of the chosen objective.

Example

Magnification	20x
Read value	220,00 mm
True value	11,00 mm

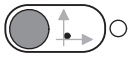
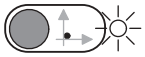
5.3 Comparative measurement

Use a chart to the chosen magnification to measure part features such as small radius, threads, aukward shapes etc. by comparison.
Various standard or special charts are available on request.

5.4 Angle measurement

Use the rotation button (**1** in chapter 4.1) for rotating the reference lines appearing on the screen. The angular display then shows the measured value (**13** in chapter 4.1).

5.4.1 Counting mode selection

Absolute  Incremental 

Your TESA-SCOPE 300V is able to manage two measuring modes simultaneously.

Absolute mode

This mode allows the relevant angular origin to be retained for a measurement series. To change this value, press the zeroing key (**19** in chapter 4.1) as the absolute mode is activated.

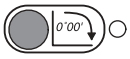
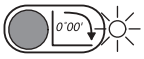
Incremental mode

This mode permits intermediate origins to be created without altering the absolute one. To change the incremental origin, press the zeroing key (**19** in chapter 4.1) as the incremental mode is activated.

5.4.2 Setting the angular display to zero in the active mode

Depress the key 

5.4.3 Changing the measurement unit (00°59'' or 00°99)

Decimal degrees  Minutes degrees 

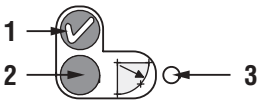
As you are getting started, you may change the selected unit according to chapter 7.

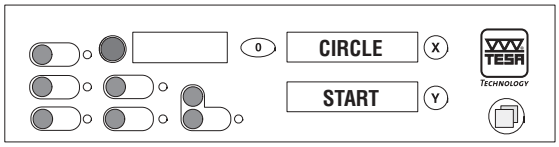
5.5 Circle measurement

This function is not available unless your profile projector is equipped with the TS200 readout unit. If so, please refer to the manual that came with this unit.

5.5.1 Measuring method

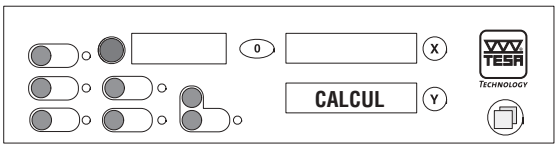
Use this function to have a circle be calculated from the points you have previously selected. Radius, diameter, centre position in both cartesian and polar coordinates as well as distance X/Y from the last incremental zero will also be reported.





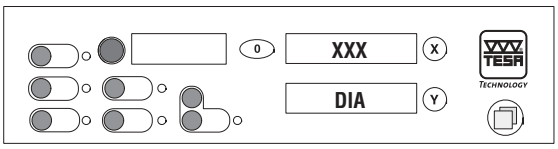
Press the **CIRCLE** key (2). As the led is on (**3**), the system emits 3 beep sounds before the above display appears on your screen for 2 seconds.

Position the graticule on the edge of the circle to be measured, then press the ENTER key (**1**) shortly to validate the measuring point you've selected. You'll then hear a double beep sound that confirms the value acquisition.
Repeat this operation Nth times (N minimum = 3 points, N maximum = 10 points). The system emits a double beep sound for each captured point.
Keep depressing the ENTER key for more than 2s to validate the last point and get the following displayed on your screen:

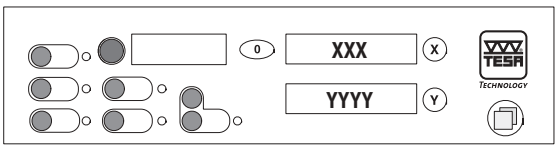


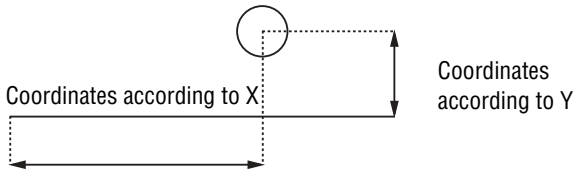
5.5.2 Displaying the measurement results

Once the circle has been calculated, both the radius and diameter are displayed along with the origin in cartesian and polar coordinates.
The value first displayed in the active unit system relates to the radius.
Press the ENTER key shortly to have the value related to the diameter be displayed in the active unit system.



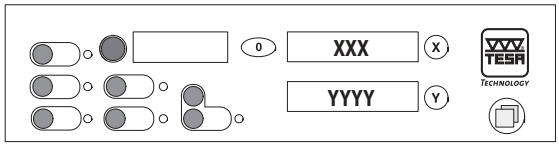
Depress the ENTER key to have both X and Y coordinates of the centre of the circle compared to the incremental zero be displayed in the active unit system.

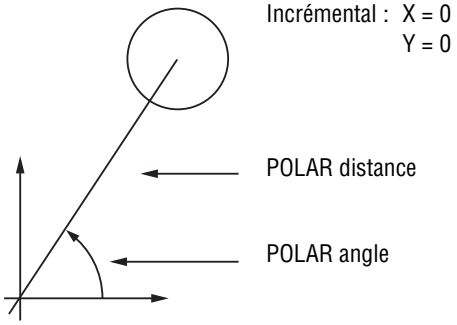




Depress the ENTER key shortly to have the cartesian and polar coordinates of the centre of the circle compared to the incremental zero be displayed in the active unit system.

X display indicates the distance of the centre of the circle from the incremental zero while Y display shows its angular position





Keeping depressing the ENTER key shortly causes the radius to be displayed again and so on.

Displayed results can be sent to the serial port for further printing by pressing the PRINT key shortly or using the foot switch.

The **CIRCLE** mode may be exited any time by simply activating the relevant key (**2**), except when the circle is being calculated. If so, the led goes off and the system emits 3 beep sounds before positioning the incremental zero at the centre of the measured circle.

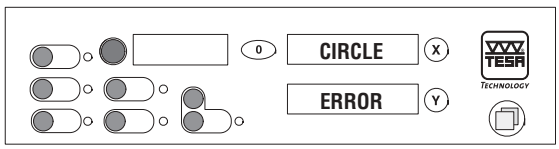
5.5.3 Auto Enter Mode

The way this function can be activated is described in chapter 7 – Configuring parameters.

Once enabled, this mode allows each single point to be validated without the need to release the control handles. The operating mode is as described earlier in this manual, except for the validation of the points as this occurs automatically providing both X and Y coordinates were not changed during the given waiting time. This time can be set according to chapter 7.

5.5.4 Computing error

If the number of the captured points is less than 3 points or if the circle could not be found, the system will display the following:



Depress the **CIRCLE** key to exit the calculation mode. You'll hear 3 beep sounds before the relevant led goes off.

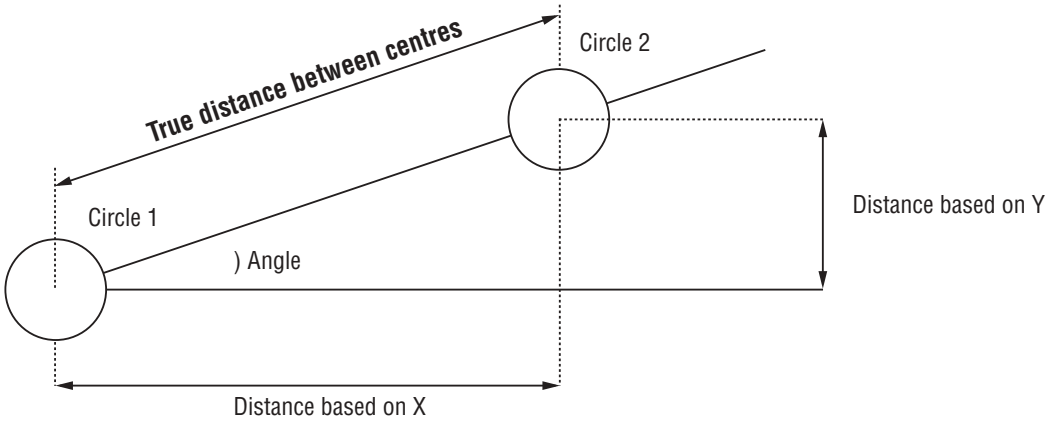
5.6 Distance measurement

5.6.1 Measuring a distance between 2 points

– Align the part to be measured against the table
– Position the graticule on the first point to be measured
– Set both X and Y values to zero by pressing the keys (X) and (Y)
– Position the graticule on the second point to be measured
– Display shows the distance between both points as measured in the X and Y axes

5.6.2 Measuring a distance between 2 circles

– Measure the first circle (see chapter 5.5.1)
– Measure the second circle



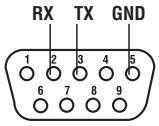
Once the radius and diameter of the second circle have been displayed, the following appears subsequently on your screen:

– measured distance X between the centre of both circles (X-display)
– measured distance Y between the centre of both circles (Y-display)
– absolute distance value between the centre of both circles (X-display)
– angle created by the straight line passing through the centre of both circles (Y-display)

5.7 Exporting the measured values (version TS100 only)

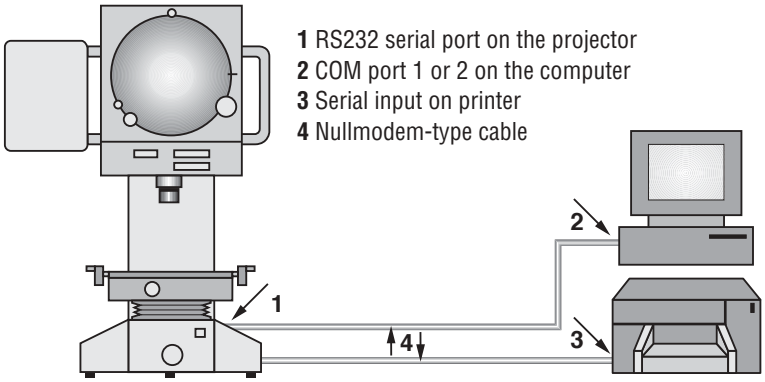
The procedure for proper use of the TS200 readout unit is detailed in its own manual.
Using a NULLMODEM type cable, connect the RS 232 digital output available on the profile projector to either port COM1 or COM2 on the PC.

Sub-D9 connector (male) on the projector's back panel



Pin 2
Data input (Rx)
Pin 3
Data output (Tx)
Pin 5
GND (masse)

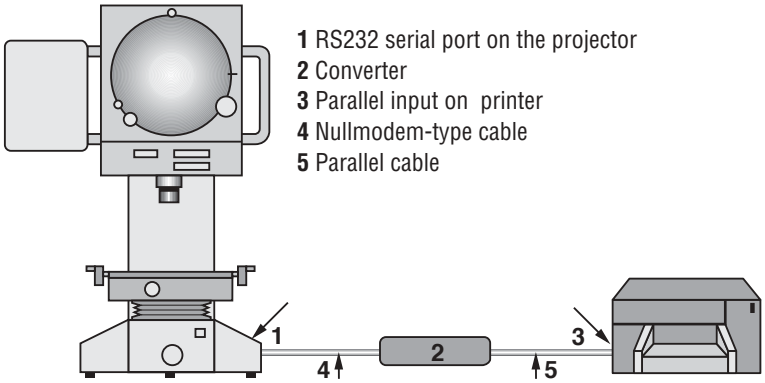
Port related paramaters
Bits per second: 19200
Data bits: 8
Parity: none
Stop bit: 1
Flow control: none



1 RS232 serial port on the projector
2 COM port 1 or 2 on the computer
3 Serial input on printer
4 Nullmodem-type cable

Note

The serial output can either be connected directly on a printer equipped with a serial input or using a serial/parallel converter.



1 RS232 serial port on the projector
2 Converter
3 Parallel input on printer
4 Nullmodem-type cable
5 Parallel cable

5.8 Using the foot switch for zero resetting and data transfer (optional)

– JACK-type connector at the rear of the projector, monofemale, 6,35 mm in diameter

– A short depression (for less than 2 seconds) on the foot switch causes the three axes A/XY to be reset to zero.

– A long depression (for more than 2 seconds) on the foot switch causes the measured value to be sent to the RS232 output.

6 CALIBRATING THE PROFILE PROJECTOR

The procedure described below refers to a calibration performed with mounted TS100 readout unit.

6.1 A-axis calibration

OPERATION	DISPLAY		
	Projector	TS100	
		X	Y
Depress key for 6 seconds	360	CAL	CAL
Depress key to validate selected value	CAL 1	CAL	CAL
Align 1 line of the graticule with the zero resetting index of the screen, then confirm by	CAL 2	CAL	CAL
Fully rotate screen once, then validate via	Good	CAL	CAL
Depress key to validate and have the calibration be completed			

Notes

To exit this procedure at any time, press
If ERROR still appears, repeat the whole procedure.

6.2 X-axis calibration

The nominal length of the gauge block required for this operation can equally be 10, 25, 50, 75,_100, 150 or 200 mm. Prior to being perfectly aligned on the stage, the used gauge block shall be cleaned very carefully.

OPERATION	DISPLAY		
	Projector	TS100	
		X	Y
Depress key (X) for 6 seconds	CAL	10	CAL
Possible scrolling of values by activating	CAL	Scrolling value	CAL
Depress key (X) to validate selected value	CAL	CAL 1	CAL
Position the graticule on either edge of the gauge block	CAL	CAL 1	CAL
Depress key (X) to validate	CAL	0000	CAL
Position the gratricule on the opposite side	CAL	Value at end position	CAL
Depress key (X) to validate	CAL	GOOD	CAL
Depress key (X) to confirm and have the calibration be completed			

Notes

To exit this procedure at any time, press
If ERROR still appears, repeat the whole procedure.

6.3 Y-axis calibration

The nominal length of the gauge block required for this operation can equally be 10, 25, 50, 75,_100, 150 or 200 mm. Prior to being perfectly aligned on the stage, the used gauge block shall be cleaned very carefully.

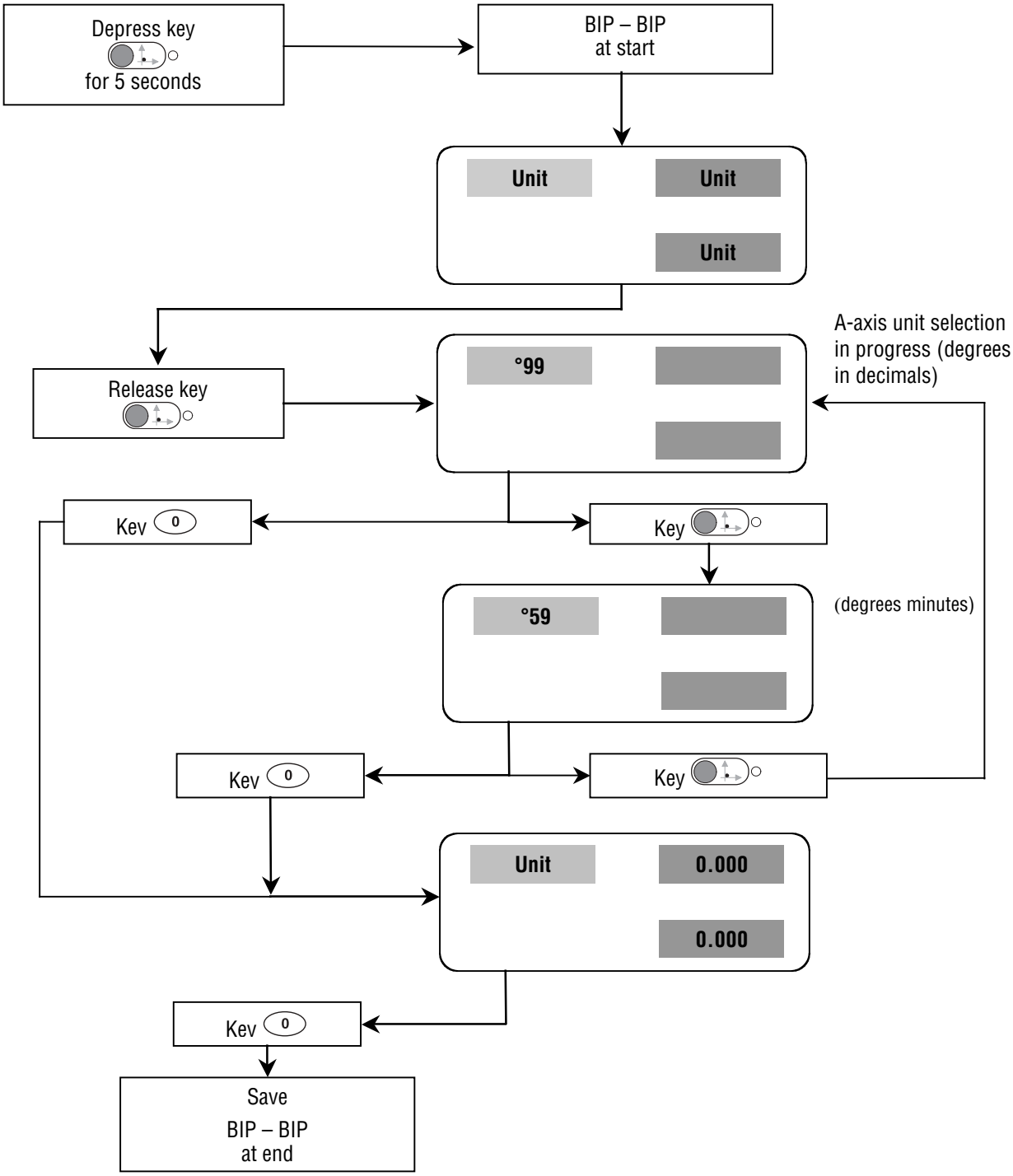
OPERATION	DISPLAY		
	Projector	TS100	
		X	Y
Depress key (Y) for 6 seconds	CAL	CAL	10
Possible scrolling of values by activating 	CAL	CAL	Scrolling value
Depress key (Y) to validate selected value	CAL	CAL	CAL 1
Position the graticule on either edge of the gauge block	CAL	CAL	CAL 1
Depress key (Y) to validate	CAL	CAL	0000
Position the graticule on the opposite side	CAL	CAL	Value at end position
Depress key (Y) to validate	CAL	CAL	GOOD
Depress key (Y) to validate and have the calibration be completed			

Notes

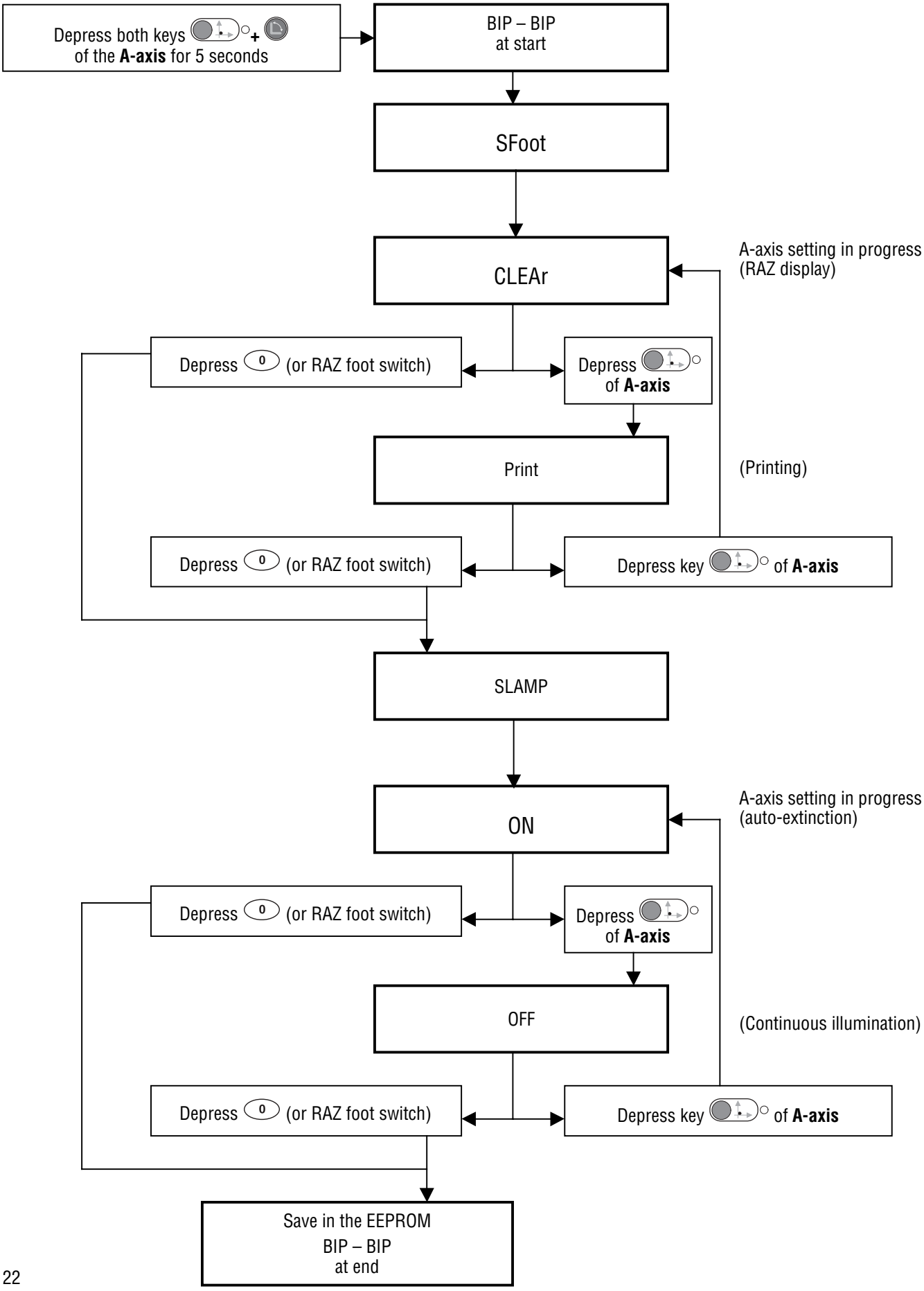
To exit this procedure at any time, press 
If ERROR still appears, repeat the whole procedure.

7 CONFIGURING PARAMETERS

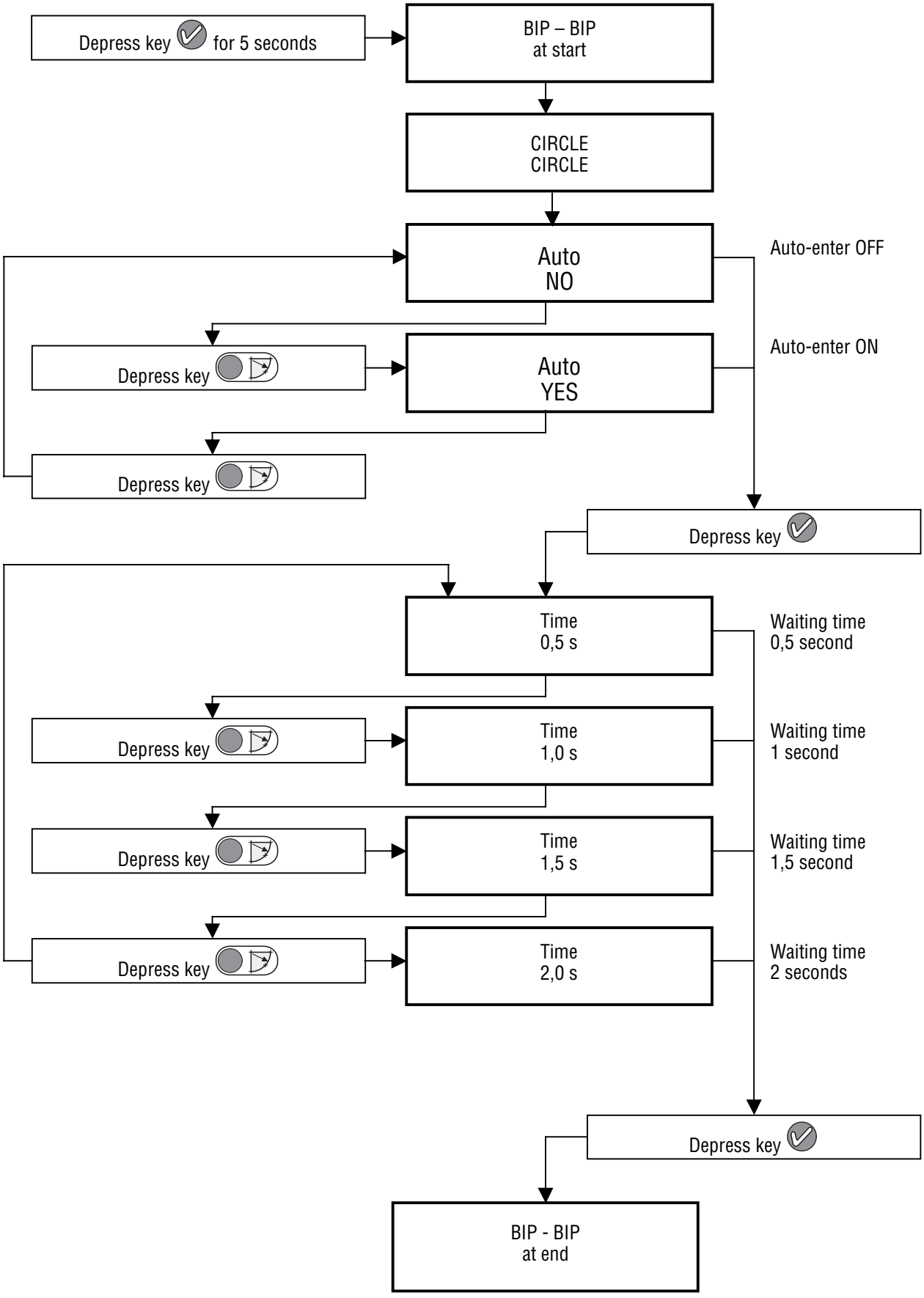
7.1 Angular display measurement unit



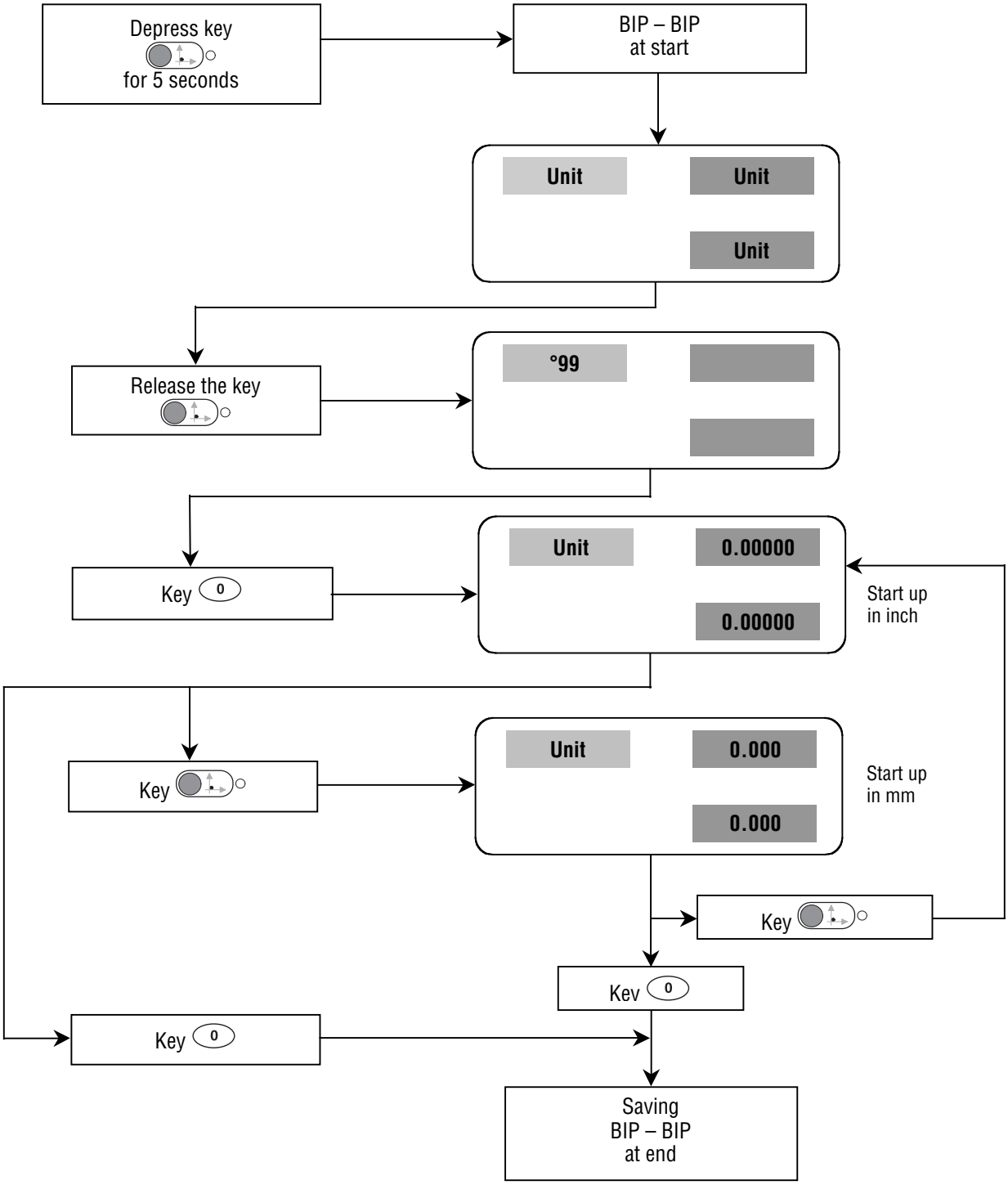
7.2 Lamp saving mode



7.3 Enabling AUTO ENTER and waiting times



7.4 Changing the measurement unit when starting up (mm/in)



8 WARRANTY

We guarantee this instrument against any fault of design, manufacture or material for a period of 12 months from the date of purchase. Any repair work carried out under the guarantee conditions is free of charge. Our responsibility is limited to the repair of the instrument or, if we consider it necessary, to its free replacement.

The following are not covered by the warranty: batteries and damage due to incorrect handling, failure to observe the instruction manual, or attempts by any non-qualified party to repair the instrument; any consequences whatever which may be connected either directly or indirectly with the instrument supplied or its use.

(Extract from our General Terms of Delivery, December 1st, 1981)

9 DECLARATION OF CONFORMITY AND CONFIRMATION OF TRACEABILITY OF THE VALUES

Thank you very much for your confidence in purchasing this product. We herewith certify that it was inspected in our works.

We declare under our sole responsibility that this product is in conformity with standards and technical data as specified in our sales literature (instruction manual, leaflet, catalogue).

In addition, we certify that the measuring equipment used to check this product refers to national master standards. The traceability of the measured values is guaranteed by our Quality Assurance.

J.-D. Richard
Quality Assurance Manager

Bedienungsanleitung

Vertikale Profilprojektoren TESA-SCOPE 300V und 300V-PLUS

INHALT