N650A/N1000A

高精度全閉鎖垂直度測量儀使用指南

Instruction of High Precision
Squar-master Measuring Device

目 錄

Contents

一、概述　　Summary

　　新開發高精度全閉鎖垂直度測量儀第四代是　鑫禾興業有限公司,近年開發的最具全球先進水平的垂直度檢測儀器,除改善耗氣量,更具有測量精度極高、速度快、直接讀取、氣浮移動、結構嚴謹、簡單等特點。

　　New development NO.4 high Precision Squarmaster Measuring Device is a newest developing instrument for the advanced squaremaster measuring by Golden-Hope Ent., Co., Ltd. Significant improvement of the air consumption The following features： high accuracy, fast, intuitive readings, moving light, well-structured and easy

功能特點 Function：

☆ 專為垂直度的μ級高精度測量設計改良。

　　Presents μ-class high-precision measurements of the vertical degrees

☆ 可實現單一直角度的 180 度旋轉自我校正操作。

　　（裝置有 TAIWAN PAT. M373482 專利自校支桿座）

　　（可夾持比測表、槓桿表、數顯表、電感測頭等屬選擇性付費附屬量具,需要可洽購。）

　　A squares in　180°rotation of the self-correcting operation ,The equipment Taiwan has a PAT M373482(can be used to hold indicators、digital display meter, inductance probe and so on。

　　(Optional special subsidiary, additional pay for)

☆ 可實現 4 個直角度的原位 90 度翻轉自我校正操作。

　　（裝置 TAIWAN PAT. M373482 專利自校支桿座）

　　(可夾持比測表、槓桿表、數顯表、電感測頭等屬選擇性付費附屬量具,需要可洽購。)

　　Four squares to the 90°situ flip of the self-correcting operation, The equipment Taiwan has a PAT M373482 (can be used to hold indicators、digital display meter, inductance probe and so on。

　　(Optional special subsidiary, additional pay for)

☆ 可實現單一直角度的直接移動量測。

　　（裝置 TAIWAN　PAT. M442498 專利零磨耗豎式全閉自動彈壓定位氣浮量測裝置）

　　Can make a direct measurement of the single straight angle。

　　(This measuring equipment Taiwan has a PAT M442498 fixture is zero abrasion, un-direct touching and automatic elastic press of totally enclosing with pneumatic-floating for high accuracy square-master.)

☆ 可以微調 X.Y 軸軸向偏差作出 Z 軸軸向歸正。

　　（底部裝置 TAIWAN　PAT. M394454 專利可微調自動彈壓定位空氣軸承座,因是採用氣浮結構所以在平台上移動很方便。）

　　The fixture is automatic elastic press locating of plane with hree-point for high accuracy square-master base of Z axis axial adjusting。

　　The base bottom air bearing of the device TAIWAN PAT. M394454,

　　(Is with air slide bearing inside. It can be linear movement on surface plate easily.)

☆ 耐用與環保概念,配裝手搖轉輪,改進去除第 3 代配裝無線遙控電動驅動結構與電池供電。

　　Use new concept of environmental protection. equipped with hand wheel, Do not install battery-driven power structure。

☆ 採用 4 面加工高精度花崗岩主柱為軸身，展現超高精度、與可靠性。

　　Column axis using the main body of granite, four high-precision machining face, and negative pressure air bearing of high precision, good reliability .

☆ 操作簡單。

　　It is an easy measuring by remote control operation.

二、主要技術指標
Technology Specification

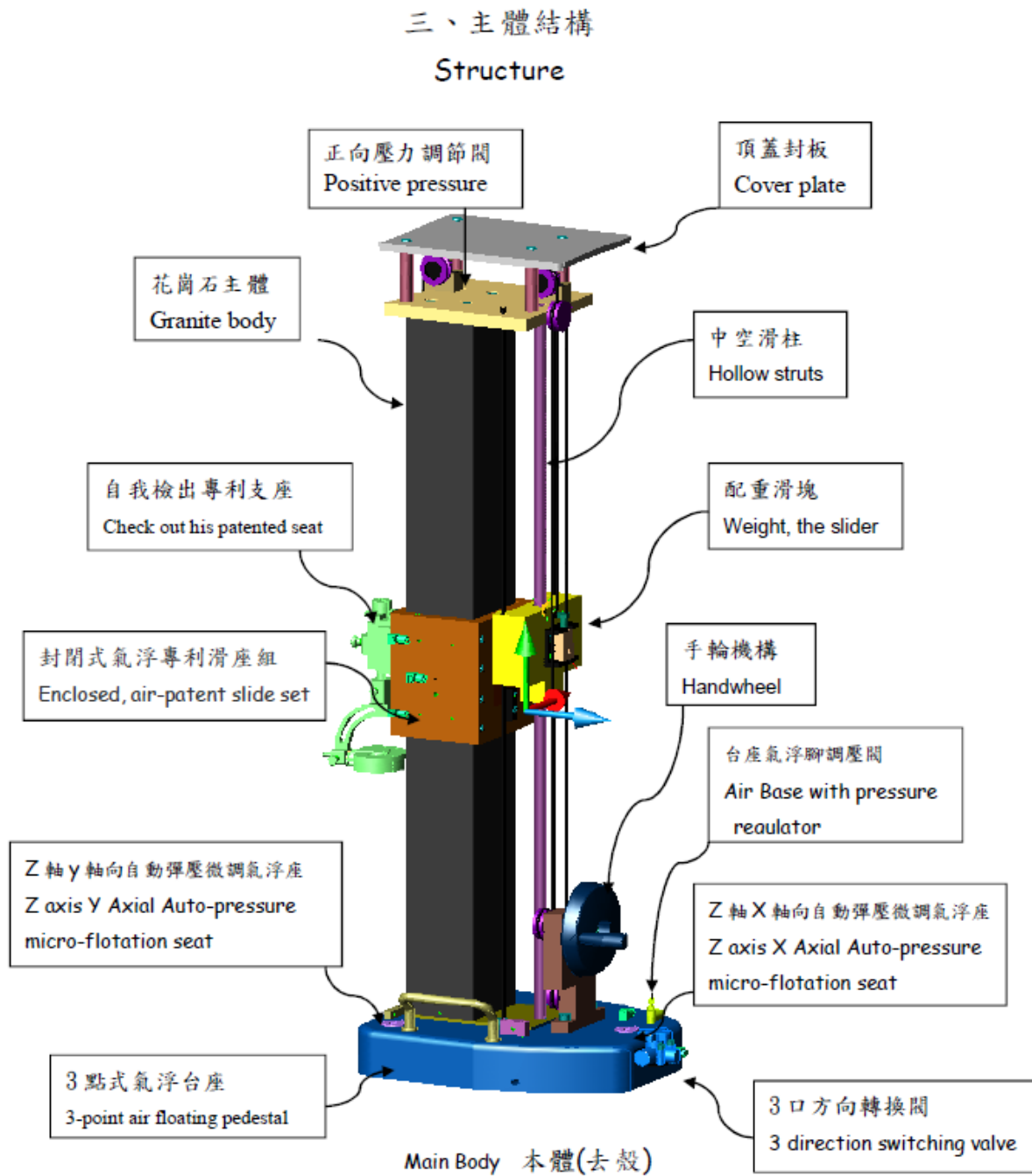| 型號 Type	N650A	N1000A
測量範圍 Measuring Range	600mm	1000mm
測量基準面直線度 Straightness in measuring plane	‹1.5 μ m	‹2.0 μ m
自我檢出測量側面直線度 Check the calibration measurement side straightness	‹1.5 μ m	‹2.0 μ m
測量基準面與台座底面垂直度 Squareness between measuring plane and base datum plane	可微調歸正 Can be Reformed	可微調歸正 Can be Reformed
側面基準面與台座底面垂直度 Squareness between side surface and base datum plane	可微調歸正 Can be Reformed	可微調歸正 Can be Reformed
本體高度 Body Height	890mm	1190mm
重量 Weight	72kg	kgs

註：上述標稱精度要求環境

Remark： The required environment

1. 濕度 Humidity：50%
2. 溫度 Temperature：20±1℃
3. 使用空氣壓力 using air pressure： 2kg/cm^2
4. 基準平板：建議尺寸不小於 1600×1000×200mm
　　　　　　　平面度 3-5μm 以內

　　Surface Plate：The suggested dimension should be 1600×1000×200mm at least. And the flatness is under 3-5μm.

三、主體結構

三、主體結構
Structure

正向壓力調節閥
Positive pressure

頂蓋封板
Cover plate

花崗石主體
Granite body

中空滑柱
Hollow struts

自我檢出專利支座
Check out his patented seat

配重滑塊
Weight, the slider

封閉式氣浮專利滑座組
Enclosed, air-patent slide set

手輪機構
Handwheel

台座氣浮腳調壓閥
Air Base with pressure reaulator

Z軸y軸向自動彈壓微調氣浮座
Z axis Y Axial Auto-pressure micro-flotation seat

Z軸X軸向自動彈壓微調氣浮座
Z axis X Axial Auto-pressure micro-flotation seat

3點式氣浮台座
3-point air floating pedestal

3口方向轉換閥
3 direction switching valve

Main Body 本體(去殼)

四、使用準備　　　Preparing for use

4-1. 拆箱準備(如果運送方式是長途運輸包裝)

Open the box ready(If the shipping method is the long-distance transport packaging)
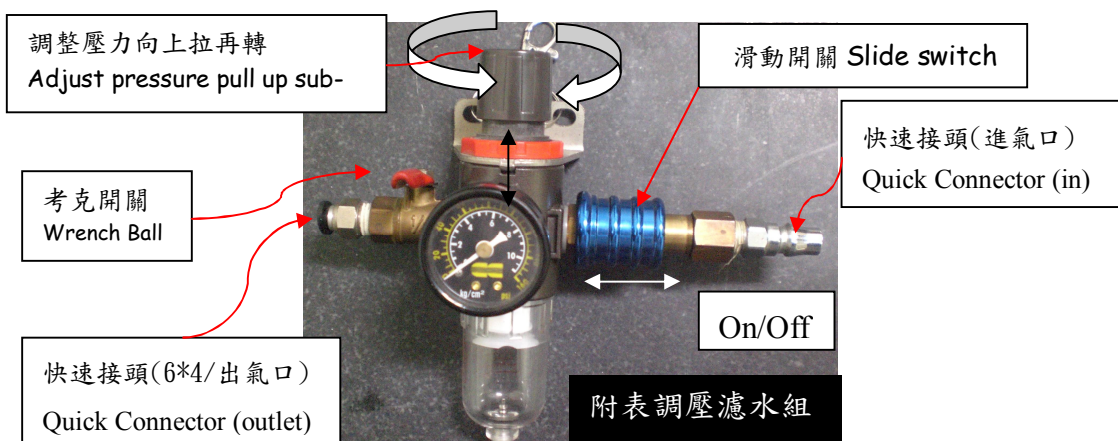

請先卸除*2顆螺絲
Removable screw *2EA

（固定螺絲拆除後友善提醒不可側臥倒置）

After the demolition of fixing screws, Can not be on its side

新品拆箱，取出本體豎立放置平台後，再卸除*2顆滑動配重塊運輸保護固定螺絲。

New unpacking, remove the body, placed on the platform, two sliding weight, shipping protection screw dismount

4-2. 連接空壓機氣源與垂直儀，取出隨貨標準配件-附表調壓濾水組。

Remove the standard accessories, Schedule regulator treatment group connected with the

SQUAREMASTER instrument and air compressor

調整壓力向上拉再轉
Adjust pressure pull up sub-

滑動開關 Slide switch

快速接頭（進氣口）
Quick Connector (in)

考克開關
Wrench Ball

快速接頭(6*4/出氣口)
Quick Connector (outlet)

On/Off

附表調壓濾水組

4-3. 調整壓力先往上拉再旋至定壓 $2kg/cm^2$ 壓力需求。

Adjust pressure to spin around before pulling up demand 2kg/cm2。
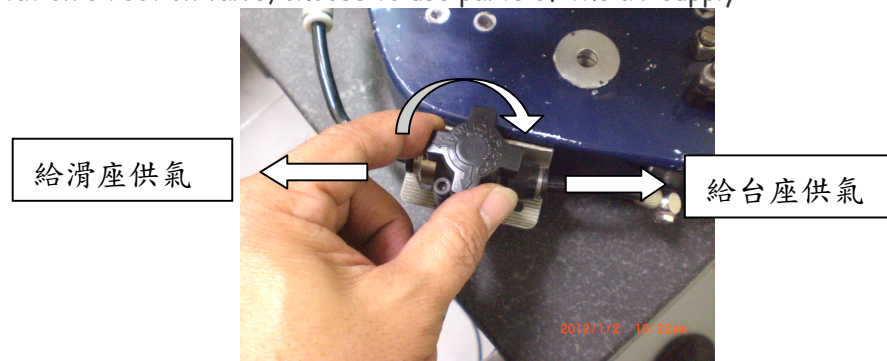
4-4. 開啟氣源，將調壓閥壓力調至 $2kg/cm^2$，連接進氣將 6mm 氣管插入 3 口方向閥進氣口，扳動球閥開關，開啟供氣。

Open air, the pressure regulator adjusted to 2kg/cm2, Connecting the inlet, the 6mm tube inserted in the outlet valveswitch on the rear

4-5. 旋轉３口方向閥，選擇使用供氣給那各部位。

Rotation direction valve, choose to use parts of the air supply
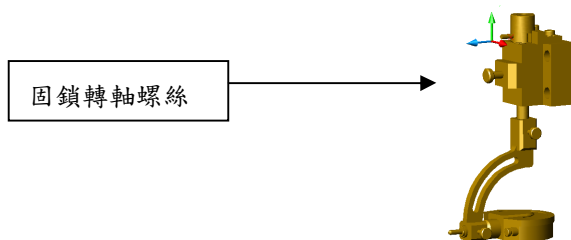

給滑座供氣 ← → 給台座供氣

4-6. 先逆時鐘旋轉到位，開啟台座供氣，可移動垂直儀安置就位，如欲量測再轉換為測量滑座供氣使用。

To turn on the switch of air cushion. And set up the position of this instrument.

4-7. 安裝量表在弓型支架，調整量表位置並鎖緊。

To fit the direction meter. And adjust the holding with a best position and locking

固鎖轉軸螺絲 →

4-8. 最佳精度出廠已做標準調整(正負壓在控制滑座氣浮移動時緊鬆與背隙的精度器差值)，如有必要可掀開頂蓋依個人需求做合適正負壓調整。

adjust the best accuracy Factory has been set. Positive and negative pressure in the control accuracy of air-moving device difference, If necessary, open the top cover to make the appropriate adjustment according to individual

4-9. 滑座正負壓調整方法

Positive pressure and negative pressure to balance the sliding seat adjustment method：

4-10. 轉動手輪先檢查封閉式氣浮滑座是否在閉鎖不動狀態?

Handwheel check enclosed space Slide is in the air will not move off the state?

4-11. 不供氣狀態轉不動(為閉鎖狀態)：表示移動器差控制是零。

State does not supply air pressure not turn that lock state：

Location of the action that the controller is zero difference

4-12. 供氣狀態：(可依下列工作需求情況調整它)

A supply air pressure state

(Adjusted according to the following conditions)

*轉動時手感很緊狀態：表示移動滑座器差控制接近零。

*Turn the hand wheel, it can move, Slide must feel very tight.
   Turning movements on behalf of poor control device close to zero

*轉動時手感微緊狀態：表示移動滑座器差控制在最佳狀態。

*Turn the hand wheel, it can moving, never feel tight.
   Turning movements on behalf of poor control device in the best
   condition

*轉動時手感鬆鬆狀態：表示移動器差控制在不佳狀態。

* Turn the hand wheel, it can move very easily feel absolutely.
   Turning movements on behalf of poor control device at the maximum
   state

負向壓力吸氣越大移動阻力越大但器差越小，正向壓力供氣越大
移動阻力越小但器差越大，可依使用需求調整之。

   The greater the resistance the greater the vacuum suction to
   move the smaller error，
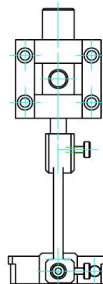   Supply the greater the air pressure to move the resistance of the
   smaller but the greater the difference，Adjusted according to user
   needs.

4-13. 從自校支桿座量表認識檢出方位 Understanding of the direction:
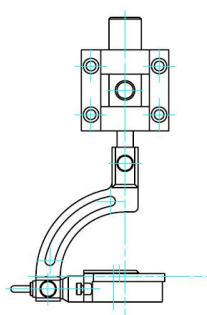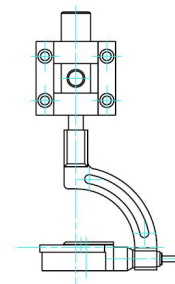

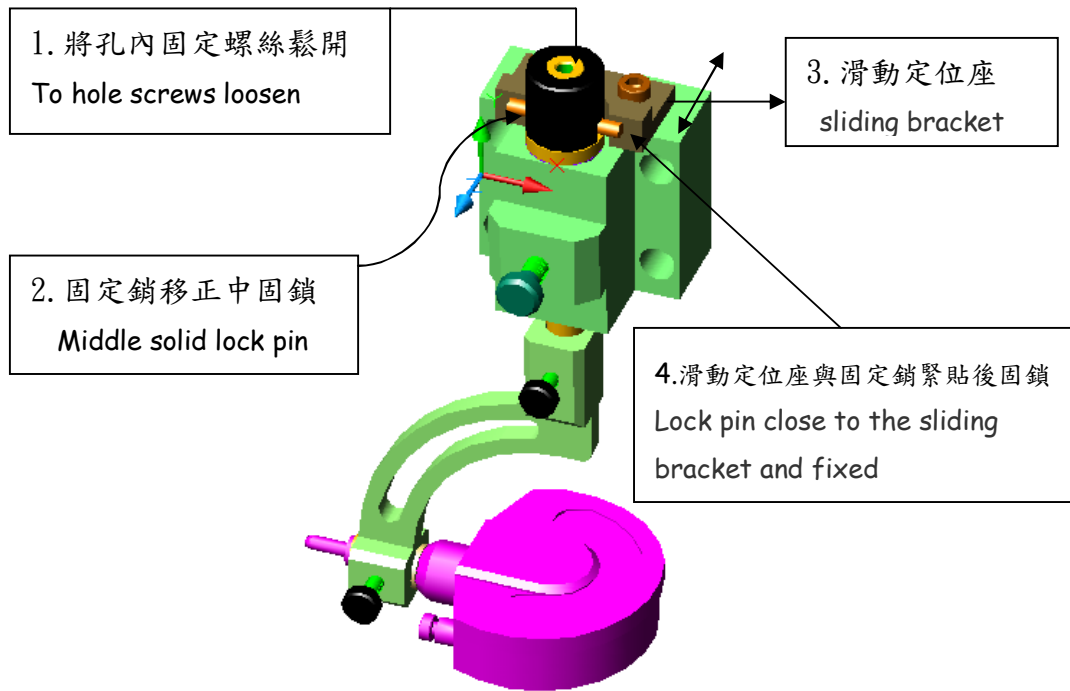| 左側檢出	前方檢出	右側檢出
Left measuring test	Front measuring test	Right measuring test

4-14. 自我檢出自校支桿座定位使用

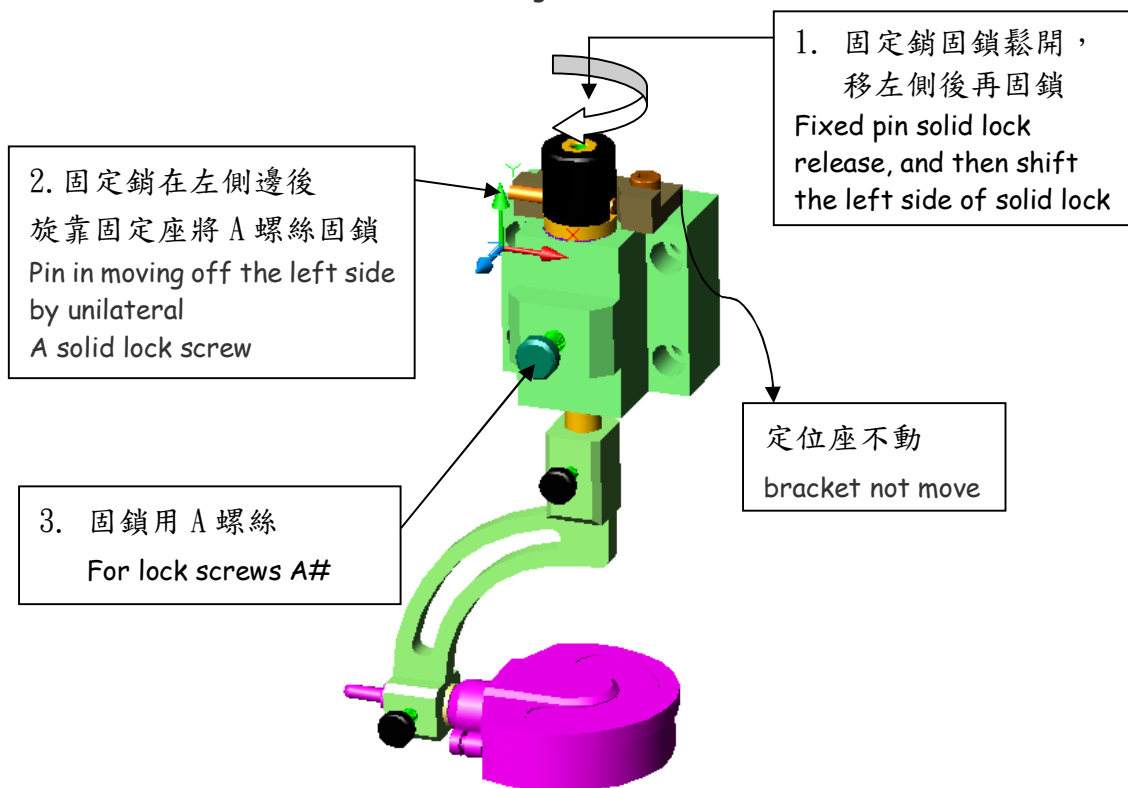Own test method to find Stent positioning method ：Program 1.

4-14-1. 定位方法程序 1 ：Positioning methods 1..

先在左側檢出位置作定位 Left measuring test Locate

1. 將孔內固定螺絲鬆開
To hole screws loosen

3. 滑動定位座
sliding bracket

2. 固定銷移正中固鎖
Middle solid lock pin

4. 滑動定位座與固定銷緊貼後固鎖
Lock pin close to the sliding bracket and fixed

4-14-2. 檢出方法程序 2 ：The detection method 2..
左側定位檢出 Left measuring test Locate

1. 固定銷固鎖鬆開，
移左側後再固鎖
Fixed pin solid lock release, and then shift the left side of solid lock

2. 固定銷在左側邊後
旋靠固定座將 A 螺絲固鎖
Pin in moving off the left side by unilateral
A solid lock screw

3. 固鎖用 A 螺絲
For lock screws A#

定位座不動
bracket not move

4-14-3. 檢出方法程序 3 ：The detection method 3..

右側定位檢出　Right measuring test Locate

1.鬆開 A 螺絲將支架旋轉
180°旋靠固定座將 A 螺絲
固鎖。
Loosen the screw A, the
bracket to be rotated 180.,
Rotating by the holder, the A
screw solid lockPin in moving
off the right side by

定位座不動
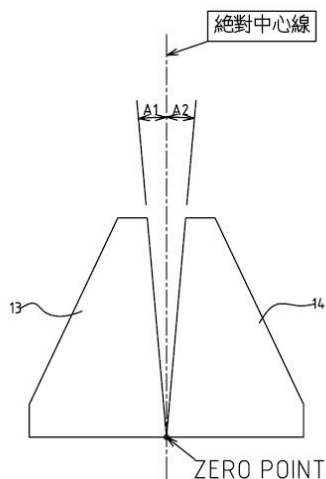bracket not move

固鎖用 A 螺絲
For lock screws A#
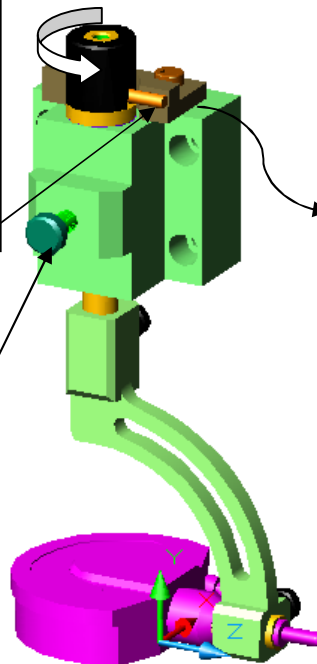
五、方法應用
Using Method

5.　　直角度量測方法應用：Measure the Square angle applications

5-1. 方法第一種：單一直角度的 180 度旋轉自我校正操作
　　　The one method ：Own test method to find the absolute angles

絕對中心線

A1 A2

13

14

ZERO POINT

左側檢出= A1
Left to check out A1

右側檢出= A2
Right to check out A2

絕對直角= (A1+A2)/2
Absolute angle= (A1+A2)/2

檢出定理圖示
Test structure shown
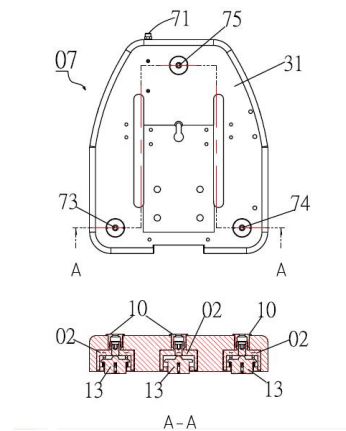
5-1-1. 用 180 度旋轉絕對直角檢出法確認直角器差值後，可依此做出直角度歸正。

With Rotated 180 degrees the angle deviation method for zero.
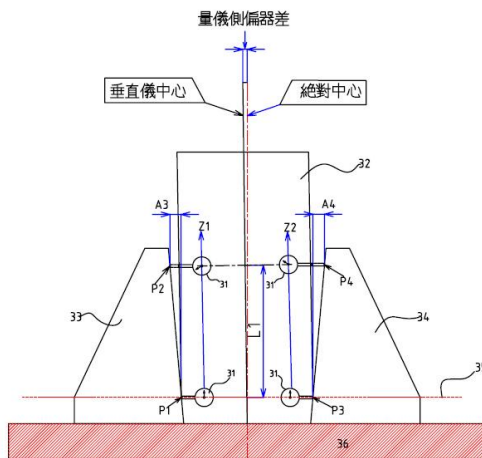
<u>檢出示意</u>

Testing shown

<u>台座調整示意</u>

Base adjustment shown

5-1-2. 依架構定理左、右檢出值平均，參考該直角規的偏差值，去調整台座 Y 軸向，歸正垂直儀，將校正直角規放置左側檢出，以板手插入上右圖 74 中可作 Y 軸向調整，將垂直儀 Z 軸側偏差歸正至絕對中心。

Use Left and right check structure of theorem .use gauge angle deviation of the Y-axis axial adjustment of the base. Check squaremaster .Use six-wrench into the hole 74 will be adjusted.

Reformed the squaremaster Z-axis deviation to the absolute center.
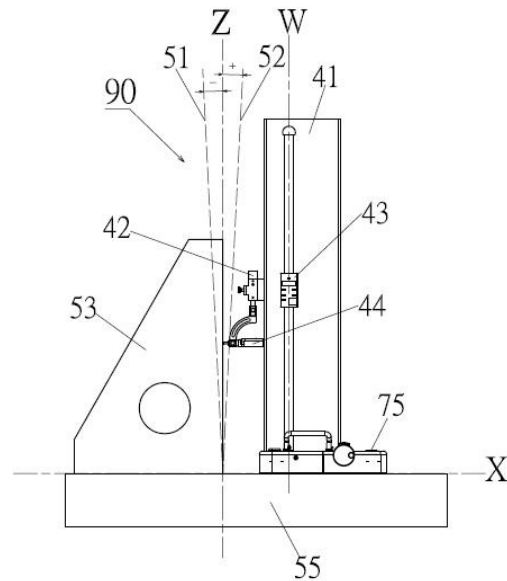
5-1-3. 依架構定理左、右檢出值平均，參考該直角規的偏差值，去調整台座 X 軸向，歸正垂直儀，將校正直角規轉到前方檢出(如下圖示)，以板手插入 75 可作 X 軸向調整，將垂直儀 Z 軸前後偏差歸正至絕對中心。

Use gauge angle deviation of the X-axis axial adjustment of the base. Check squaremaster .Use six-wrench into the hole 75 will be adjusted.Reformed the squaremaster Z-axis deviation to the absolute center.

Z 軸側偏差歸正

5-2. 方法第二種：四個直角度的原位 90 度翻轉自我校正操作：
The two method ：4 each square angle test method to find the absolute angles.

5-2-1. 取用配件定位檢出 L 支架在台座前端裝上(可配裝 Mahr 比測表)(如下圖示)，它用三點成一個平面定理用千分比測表讀取參考原點，能提高每位不同操作者取得同樣可靠度。

Take positioning measurements with L bracket Accessories, In front of the pedestal fitted, (Installed Mahr measuring precision indicators) (Look at the following picture) , The three-spot forming a plane Theorem Use the precision indicators read with reference to the origin, Can improve each operator to obtain the same reliability


操作時啟動氣浮移動台座，先碰觸前端單一鋼珠，再旋靠第二顆鋼珠，取得連線，再將做為第三點的指示表歸零，完成平面取點標準動作，重複此動作應都是 0 讀出值，表示定位動作正確。

Operation start air bearing baseto move pedestal, First touch front single steel ball, Second hard steel ball and then touch, Obtain endpoint connection, Table and then to zero as the third point, Completed plane standard take point, Repeat this action should be are read out zero value, Positioning action indicates the correct.
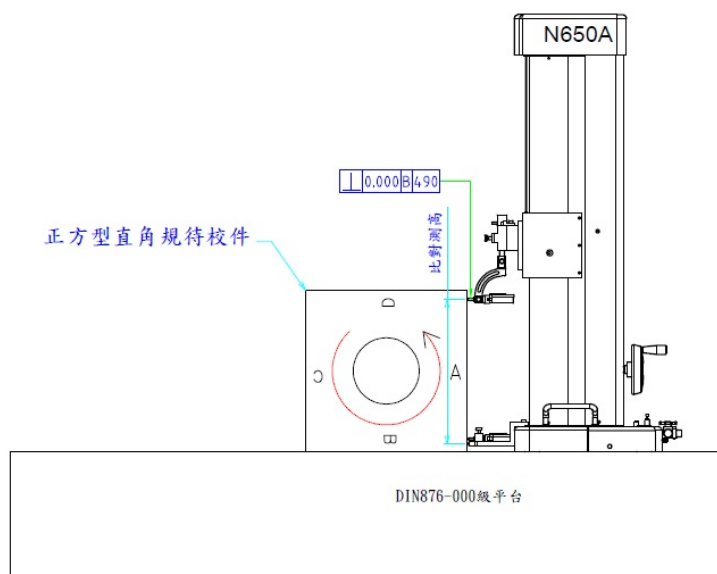
操作圖示　　Operation icon

5-2-2. 參看上圖，採用 4 個 90° 原位 5 次旋轉自我校正法，
See on figure, 4 each square angle test method to find the absolute angles.
請注意： Note
1. 頂端指示表的測頭應在被測方形角尺距邊緣 10mm 內。
The top of the indicators head should be measured squaremaster within 10mm from the edge.
2. 移動滑動座至量測高度後關閉氣源，使滑座封閉固鎖在合適位置。
The move sliding seat to the measurement height,turn off air, Sliding seat be closed solid lock in suitable position.

依標示順序旋轉進行各面比對測量，啟動台座氣浮，移動垂直儀取得校正起點(底部千分比測表取歸 0 讀值為校正起點原點參用值)，關閉氣浮氣源，再讀取量測值(第一個角度量測值可用 0 為起始值)。

By marked sequence rotation surface than measurement, Start pedestal floatation, Moving squaremaster obtain calibration points, The bottom of the indicators to take zero readings, The origin reference value as a calibration starting point, Close air floatation compressed air, Read the measurement value again , (The first edge measurement value can be set 0 is the starting value).

　　　首先對 A 面進行比對量測，將 A 面比對高度的偏差讀數 a1 調為 0，(第一個角度量測值可用 0 為起始值)，然後依序 90° 逆時針旋轉，將待校件再置放回原位(所謂原位即第一次量測時定位處，應作記號或置放定位板)，再移動 N650A 垂直儀去比對，依序

對 B.C.D 面進行比對去測得與基準面之各角 b2、c3、d4 誤差，並記錄下差值，第 5 次是回到對 A 面進行起點比對原點，觀察取值可靠否?

First on the A side, Compare measurement, A surface height deviation readings a1 is adjusted to 0, (The first edge measurement value can be set 0 is the starting value), Then sequentially 90 ° anti-clockwise rotation, Move master and then placed back into place,
(Original position should be marked or placed the detent plate),
Move N650A squaremaster to comparison,
Accordance with the order
To B.C.D face measurement, Get b2, c3, d4 error value,
5th is back on the A face starting point than the origin.
Whether these values reliable?

如果千分比測表讀出沒有變，表示動作方法正確，
If the measurement indicators read-out has not changed, and that the correct action method,
如果千分比測表讀出有變，表示動作方法不正確，需重新再做一至直到正確。
If the measurement indicators read-out has changed, and that the correct action method incorrect, Need to re-do,Until correct.

再依下列自我校正公式求得：
Obtained in accordance with the following correction formula is as:

$$\triangle A = a1-1/4 \times (a1+b2+c3+d4)$$
$$\triangle B = b2-1/4 \times (a1+b2+c3+d4)$$
$$\triangle C = c3-1/4 \times (a1+b2+c3+d4)$$
$$\triangle D = d4-1/4 \times (a1+b2+c3+d4)$$

依此計算出之四個直角度絕對值數據總和應接近 0，才是可靠參用檢出值，總和沒接近 0 為不可靠參用檢出值，算錯為主因，請重新正確計算。
And so calculate the absolute value of the number of four squares.
Total of addition and subtraction and should be close to 0.
If not must recalculated.

5-2-3. 依架構定理檢出直角規的各角偏差值，可以用來調整台座 X、Y 軸向，歸正垂直儀，將 Z 軸歸正後可做直接量測應用。

Use gauge angle deviation of the X-Y axis axial adjustment of the base.

Check squaremaster .Use Z-axis deviation to the absolute center. Can direct measurement application

5-3. 方法第三種：歸正後單一直角度的直接移動校正量測操作：

The third method ：Can make a direct measurement of the single straight angle。

藉由已檢出直角母規去微調 X.Y 軸軸向偏差作出 Z 軸軸向歸正，可實現歸正後單一直角度的直接移動校正量測。

By detected at right angles master , to adjusttable, Adjustment X.Y axis axial deviation, Zeroing Z axis Measurement of direct movement do an angle square.
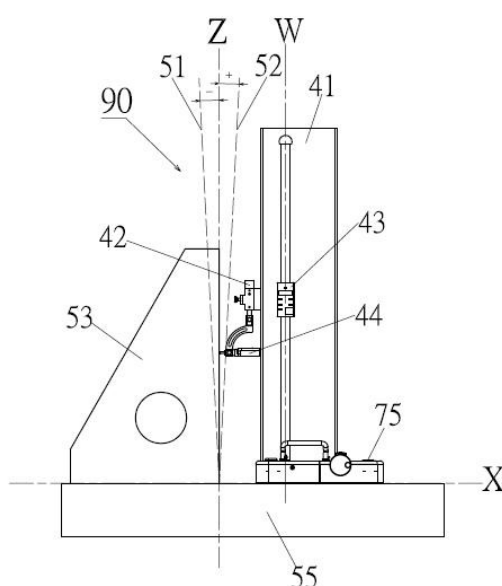
母規校正後的直接移動量測

六、使用. 保管注意事項　　Notice

6-1. 本儀器建議在恆溫恆濕環境條件下使用。

This instrument recommended under the conditions of standard temperature, regulate the wet environment.

6-2. 基準平板不小於 1600×1000×200㎜，平面度不大於 3μ㎜。

Surface Plate：　The suggested dimension should be 1600×1000×200mm at least. and the flatness is under 3um

6-3. 它有潔癖請經常保持基準平台精度面的絕對乾淨。

To make sure a clean surface plate.

6-3-1. 本儀器使用之最佳標準環境

The instrument used in the best standard environment

温度 20±1℃　　Temperature： 20±1℃

濕度：50%±10%　　Humidity： 50%±10%

6-3-2.過濾器應在積水未達 1/3 時排水。

To exclude the moisture from this filter with a schedule time.

6-4. 出現故障即時聯繫本公司，因使用不當或擅目拆卸造成損壞不在保修範圍之列。

Please contact us once the user met any breakdown.　No any guarantee for incorrect operation or dismantling by user.

七. 裝 箱 單
Packing List

1. 主機

   Main Body

2. 定位檢出 L 支架 ＊1 SET

3. Positioning L bracket ＊1 SET

4. 附表調壓濾水組＊1set

   Schedule adjustment pressure water filters*1set

5. 六角扳手 ＊1EA

   Six-wrench ＊1EA

6. 使用指南光盤 x 1 份

   Instruction using the operating CD *1 set

7. 出廠檢定報告*1 份

   Inspection Report*1set