ProCaliper

2.4 m Benchtop
Digital Caliper

ProPanel

1.2 m Portable
Measuring System

Measurement Table Kits

1.2 m – 5.9 m
Measuring Kits

Accurate
TECHNOLOGY INC.
Linear Digital Measuring Systems

Warranty

Accurate Technology, Inc., warrants this product against defective parts and workmanship commencing from the date of original purchase. Upon notification of a defect, Accurate Technology, Inc., shall have the option to repair or replace any defective part. Such services shall be the customer's sole and exclusive remedy. Expenses incidental to repair, maintenance, or replacement under warranty, including those for labor and material, shall be borne by Accurate Technology, Inc. Freight or transportation charges to Accurate Technology, Inc., shall be paid by the customer.

Except as expressly provided in this warranty, Accurate Technology, Inc., does not make any warranties in respect to the product, either expressed or implied, including implied warranties of merchantability or fitness for a particular purpose, except as expressly provided in this agreement.

Accurate Technology, Inc., shall not be liable for any special, incidental, or consequential damages or for loss, damage or expense directly or indirectly arising from the customer's use of or inability to use the equipment either separately or in combination with other equipment, or for personal injury or loss or destruction of other property, or from any other cause.

To request repair work (either warranty qualified parts or not), contact Accurate Technology, Inc. directly by phone, fax, or e-mail. A Returned Merchandise Authorization (RMA) number is required before returning a product for repair.

SAFETY WARNING

Before installing ProScale products, turn off the machine and disconnect it from its power source to avoid injury.

SAFETY WARNING

Table of Contents

SECTION 1 GENERAL INFORMATION

Introduction

ProScale™ digital measuring systems are affordable precision electronic devices for making linear measurements with speed and accuracy. ProScale consists of a scale, a readhead (or encoder) mechanism and a digital display. It uses capacitive encoder technology, the same technology used in digital calipers.

ProScale is ideal for most measuring requirements where high (1 µm) accuracy is not needed. Because ProScale shows the exact measurement on its display, it eliminates the guesswork involved in reading and interpreting tape, pointer, or shaft encoder scales. It is compatible for retrofitting or as original equipment on most machinery and as a result, machine setup time can be reduced considerably, maximizing throughput on a machine.

ProScale's measurement mode can be changed to display in sixteenths, thirty-seconds, sixty-fourths, or thousandths of an inch. If accustomed to working with metric measurements, in millimeters or centimeters. In any mode, ProScale is designed to provide and maintain its accuracy for years.

ProScale is extremely rugged and durable. Unlike optical measurement systems, the accuracy of capacitive systems is not affected by sawdust or other non-conductive contaminants. Additionally, power consumption is much less than magnetic or optical measurement systems.

Because ProScale is a solid-state electronic device there's very little to wear out. The readhead and scale are designed to withstand shop dirt, dust, and other airborne contaminants, and the controls are sealed with a protective cover for long life. With normal care, ProScale will last for years.

ProScale Terminology

All ProScale systems consist of a SCALE, a READHEAD, and a digital DISPLAY.

The SCALE consists of a series of conductive patterns bonded to an aluminum extrusion. The READHEAD contains a computer chip, which transmits and receives signals to the scale using capacitive coupling. The received signal is used by the readhead to calculate it's position to within 0.005mm. This position data is then sent to the digital DISPLAY, where it can be displayed in millimeters, centimeters, inches, or sent to an external data acquisition device.

Other Accurate Technology Products

ProScale Model 150

General Purpose *ABS* systems with standard measuring ranges of 250mm and 450mm.

ProScale Model 250

General Purpose *ABS* systems with seven standard measuring ranges from 1.2m to 6m.

ProMUX Family

Data acquisition and multiplexing systems. 3, 4 or 8 inputs; RS232, RS422 or 2-way wireless communication output protocols.

ProTable

Turnkey 1,2 or 3 axis measuring systems. Available in standard and custom designs.

ProStand
Optical measuring, cataloging and set-up system for moulder and tenoner cutterheads.

ProStop
Digital Stop and Fence System.

ProTOOL
Cataloging software database for cutterheads.

ProSet
A ProScale designed specifically for moulders. Measuring ranges of 250mm and 450mm.

ProKits
Pre-engineered custom kits for popular woodworking machinery such as Panel Saws, Table Saws and Wide Belt Sanders.

ProCase
Set-up Reduction System for use on multi-axis machinery.

ProLine
Digitally positioned laser projection system for CNC routers.

(See individual product manuals for detailed descriptions & operation for these products)

General Product Specifications

Accuracy:

ProCaliper
± .18mm/m to ± .20mm @ 2.4m
± .003in/ft to ± .008in @ 96 inches
See individual Calibration Chart supplied with instrument

ProPanel
± .20mm/m to ± .25mm @ 1.2m
± .003in/ft to ± .010in @ 48 inches

Measurement Table Kits
± .20mm/m to ± .40mm @ 2-6m
± .003in/ft to ± .018in @ 20 feet
(Depending on construction: See *Abbe Error* Section 7)

Repeatability: .01mm or .001in

Display Range: ± 9999.99 mm; ± 999.999 cm; ± 394.000 in; ± 99 63/64 in.

Operating Temp: 0 to 51°C, 32 to 120°F

Temp Coef: 25ppm/1°C (i.e. Δ .06mm / over 2.5m / 10° C)

Max. Slew Rate: 600 mm/sec. (24 inches/sec.)

Power: Two AA Alkaline Batteries

Battery Life: 8-12 months

Warranty: Two years from date of purchase

Output Format: Mitutoyo SPC format.

Readhead: Six-conductor cable terminated by RJ12 modular connector. To increase or decrease cable length, contact Accurate Technology.

Dimensions: All product dimensions available upon request or at www.proscale.com.

US Patents: 4420754, 4879508, 4878013, 4959615

ProCaliper is easy to install and use. By following the installation instructions in this section, reliable, error-free operation is assured, with only an occasional need for adjustments or realignment of the jaws.

Assembly:

1. The jaws can be attached to the caliper in either of two positions. They may be mounted on the upper or lower side of the lip on each of the fixed or moving heads.
2. Loosely attach the left (fixed head) jaw to the caliper using the supplied socket screws. Square the jaw to the caliper rail with a machinist's square. Carefully tighten the screws, taking care to keep the jaw square to the rail.
3. Loosely attach the right jaw (moving head) to the caliper using the supplied socket screws. Slide the moving head up to the fixed head until the measuring surfaces of the two jaws touch.
4. While holding the jaws together, carefully tighten the screws on the moving jaw.
5. Using a feeler gauge, check for misalignment between the jaws near the tip and the heel of the jaws. If a gap of more than 0.05mm (0.002 inches) exists between the jaws at either point, loosen the screws and repeat steps 2 through 4.

Installation:

1. Determine an appropriate mounting surface for the ProCaliper. Ideally, it should be mounted on an open, flat surface which does not interfere with the moving head.
2. Notice the three 1/4-20 mounting holes in the bottom of ProCaliper. Determine the depth of the mounting surface. Mount the rail to the surface using bolts of the appropriate length, making certain it is mounted without any bending stress to the rail, which will cause measuring inaccuracies.
3. Check that the bolts extending through the rail will not interfere with the operation of the moving head. To provide the best accuracy, provide large clearance holes in the mounting surface, and shim all gaps precisely.

Operation:

1. Insert the object to be measured between the caliper jaws. While holding the object against the measurement face of the fixed jaw, slide the right jaw to the other end of the object until it stops.
2. Press in and rotate the fine adjustment thumb-wheel until the moving jaw is tight against the object. If the position of the moving jaw needs to be held in place, use the lock knob on the top of the moving head.
3. If not using the ProCaliper with SPC data collection devices, press the HOLD button on the display to HOLD the displayed value. All of the display's operations will be stopped until the HOLD button is pressed again.
4. Read the measurement data from the ProCaliper's display. The displayed data can now be sent to an SPC data collector/processor (if attached) by pressing the SEND button.

Making Relative Measurements:
Measure the first part. Change to Incremental mode by pressing the ABS/INC button on the display. Press the zero key. Measure the second part. The difference in length will be shown on the display. When finished taking relative measurements, press and hold the ABS/INC on the display for three seconds to return to Absolute mode.

Tips for Measuring Long Parts:
1. When measuring long parts, keep them parallel to the caliper rail (and as close as possible).
2. Support the object being measured so it is as straight as possible.

Maintenance:

ProCaliper must be kept clean to measure accurately. The measuring edges of the jaws and the bearing ways must be kept free of dust, dirt, and other residue. Clean often using a nonabrasive cleaner. Inconsistent measurements often indicate ProCaliper's jaws or bearings need realignment or adjustment. The Digital Display should be cleaned periodically with compressed air to remove any dust on the lens and keys. All fasteners should be checked occasionally for tightness.
Periodically check the jaw alignment, particularly after rough or prolonged use.

Checking Bearing Adjustment:
ProCaliper's moving head has four white, cylindrical bearings which help it to slide easily along the caliper rail. These bearings, made of UHMW plastic, slide in grooves located on the front and rear of the caliper rail. The two bearings on the rear side have small spring plungers which keep the moving head at a constant distance from the caliper rail. The spring load on the bearings may have to be adjusted after prolonged use. To adjust the load, loosen the lock nuts on the spring plungers several turns. Tighten each spring plunger until the spring bottoms out. Loosen each screw 1/2 turn, then tighten the lock nuts. Check for smooth sliding operation and adjust again if necessary.

Notes about Accuracy:

ProCaliper has been thoroughly tested for accuracy against national standards. This test data has been supplied. However, the following situations can affect ProCaliper's overall accuracy. The specified accuracy is achieved at the heel (rail side) of the jaws. In some cases, this specified level of accuracy may be exceeded at the tip of the jaws. This difference results from the large distance between the center of the measuring scale inside the caliper rail and the tips of the caliper jaws. Small changes in temperature can cause slight differences in a given measurement. Because ProCaliper's major components are made from aluminum, which has a temperature coefficient of 23ppm/°C, it is strongly suggested to use ProCaliper in a temperature stable environment (over the 2400mm [96 inch] measuring range, this coefficient can alter measurements by 0.05mm [0.002 inches] per °C).

SECTION 3 PROPANEL

ProPanel is a *portable* measuring system capable of edge-to-edge, edge-to-hole, hole-to-hole, and corner-to-corner measurements up to 1.2m (48in.).

Assembly:

ProPanel is assembled at the factory. If using the ProPanel to measure hole-to-edge or hole-to-hole distances, install the provided cones using the enclosed hex wrench.

Operation:

Edge-To-Edge Measuring:
Use ProPanel like a T-square. Close the jaws, and take the measurement.
Note:Do not use the extreme outer edges of the jaws for measurements. If possible, use the full width of the jaw for reliable measurements.

Corner-To-Corner Measuring:
Place the ProPanel jaws over the panel corners. Gently "wiggle" the ProPanel while applying light closing pressure to seat the corners. Change to Incremental mode. (Press the zero key to zero the display if necessary.) Measure the second diagonal. The difference in diagonal lengths will be shown on the display. If the diagonal

measurements are equal and any two adjacent edges are equal, then the part is square. Return to Absolute mode.

Hole-To-Hole Measuring:
Install the two full cone attachments. Close the ProPanel. Use the plus or minus keys to adjust the display to exactly 38.1mm (1.500 inches). Place the cones into the holes to be measured. Be sure the cones are fully seated in the holes. Do not press down on the rail of the ProPanel, as this may affect accuracy.

Edge-To-Hole Measuring:
Install one full cone attachment and one half cone attachment. Close the ProPanel. Use the plus or minus keys to adjust the display to exactly 19.05mm (.750 inches). Place the full cone in the hole and the half cone against the edge of the panel. Keeping the ProPanel rail equidistant from the part (by adjusting the half cone's position up or down) will assure the highest accuracy measurement.

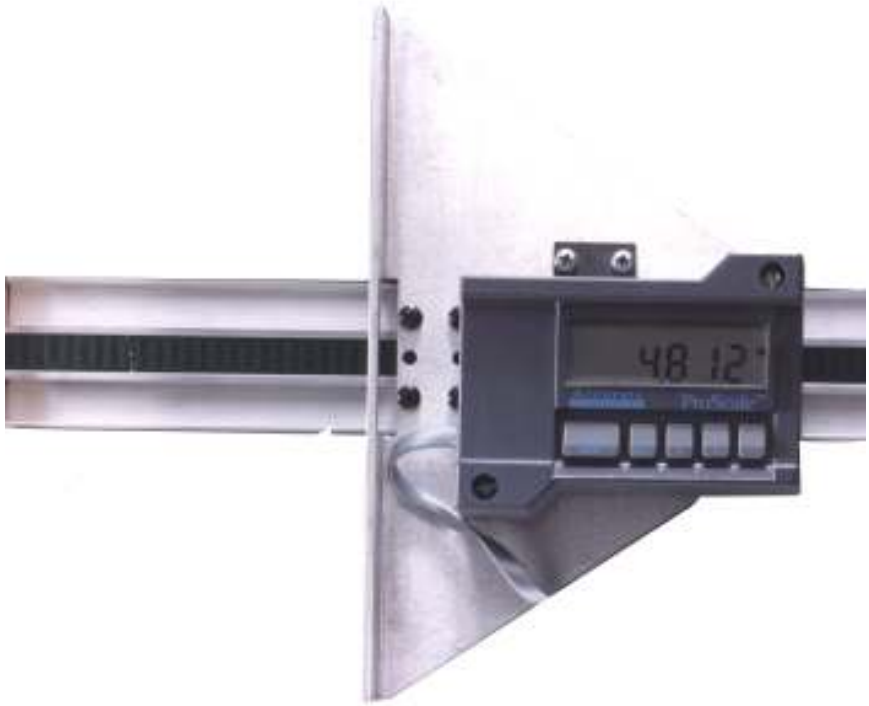
Maintenance*:*

Occasionally check parallelism of the jaws by measuring a thick piece of paper on the upper side of the jaws, then on the lower side of the jaws. A variation of 0.05mm (0.002 inches) is acceptable. Use a precision square to adjust if necessary. The digital scale should be cleaned of all debris often. This will prevent premature damage to the scale or readhead. Should the assembly become difficult to move, check that the scale is cleaned. Find and remove any burrs which may have developed on the aluminum scale. Do not use any liquid lubricants on the scale assembly, as this may:

1. Impede the readhead's ability to operate properly.
2. Attract other contaminants to the scale.
3. Swell the black bearings on the moving assembly, thus making the assembly tighter on the scale.

The Digital Display should be cleaned periodically with compressed air to remove any dust on the lens and keys. All fasteners should be checked occasionally for tightness. If there is any wear on the green laminate of the scale, the guide clip pressure on the readhead should be lessened (if wear continues, the readhead bearing should be replaced.)

SECTION 4 MEASUREMENT TABLE KITS



Measuring Table Kits are easy to install. By following the basics of good installation in this section, reliable, error-free operation is assured. Because Measuring Table Kits can be installed in so many different configurations, all installations will be slightly different. Therefore, it's the responsibility of the installer to choose the bolts, screws, or other mounting hardware that guarantee proper installation for optimum operation.

Assembly:

Each Measuring Table Kit shipped from Accurate Technology will have at least two packages. The first contains the linear scale. The second contains the sliding assembly, and some mounting hardware. These parts should be assembled prior to mounting the Measuring Table Kit:

1. Remove the readhead from the scale.
2. Remove the front cover from the ProScale display.
3. Carefully drill the threads out of the brass inserts in the bottom cover, with a 3/16" (or equivalent) drill.
4. Remove the guide clip attached to the sliding assembly.

5. Note the readhead's sensitive internal ground fingers. Place the readhead into the sliding assembly cutout and carefully slide the unit onto the aluminum scale.
6. Reattach the guide clip to the sliding assembly.
7. Mount the display (top and bottom re-assembled) onto the sliding assembly using the supplied #8-32 x 1 3/4" screws, #8 washers, and spacers. (The spacers are inserted between the washers – under the display - and the moving assembly.)
8. Plug the readhead into the display. Move the assembly from left to right and note if the display's readings increase or decrease. Depending upon the installation, it may be necessary to re-program the digital display to reverse the reading direction. (See section 5; *Jumper Settings*.)
9. After the Measurement Table Kit has been assembled, it is very important to check that the scale will be mounted in the **exact direction** of the desired measurement, as measuring errors will result if the scale is not properly aligned. See "Abbe error" in Section 7 for more information.
10. Mount the scale using M4 (or #6) Flathead screws. Check that the backstop is solid and will not move under pressure. The scale may be recessed if desired; the cutout for the scale should be at least 2.02 inches wide for the full length of the aluminum scale.

Maintenance:

The digital scale should be cleaned of all debris often. This will prevent premature damage to the scale or readhead. Should the assembly become difficult to move, check that the scale is thoroughly cleaned. Find, and remove any burrs which may have developed on the aluminum scale. Do not use any liquid lubricants on the scale assembly, as this may:

1. Impede the readhead's ability to operate properly.
2. Attract other contaminants to the scale.
3. Swell the black bearings on the moving assembly, thus making the assembly tighter on the scale.

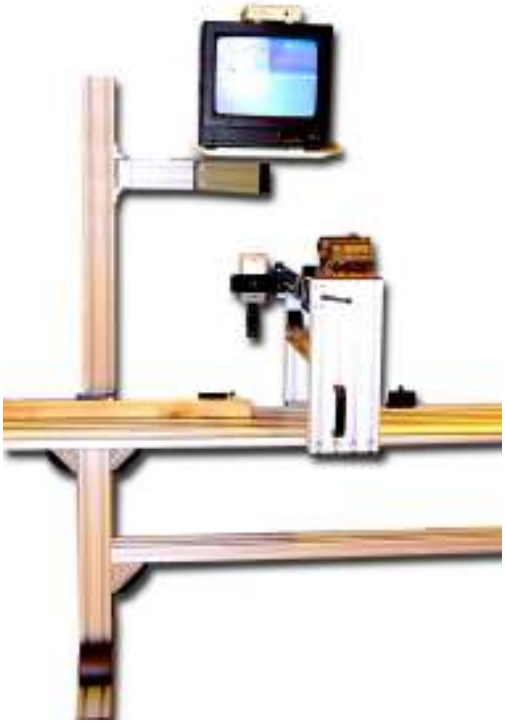
The Digital Display should be cleaned periodically with compressed air to remove any dust on the lens and keys. All fasteners should be checked occasionally for tightness. If there is any wear on the green laminate of the scale, the guide clip pressure on the readhead should be lessened. If wear continues, the readhead bearing should be replaced.

NOTE: When any mechanical devices are built on, or attached to, a measuring device; the accuracy of the "*total system*" will not be equal to the accuracy of the measurement device due to mechanical inaccuracies, and/or physical measurement errors (orthogonality, Abbé or cosine errors etc.) (See *Abbe Error* Section 7)

Additional standard and custom measurement systems are also available from Accurate Technology

ProTable I Single Axis Measurements
ProTable II Two Axis Measurements

Standard ProTable I



Custom Designed ProTable II

SECTION 5 GENERAL PURPOSE DISPLAY

Display Power

Momentarily pressing the **On**/**Off** key will cause the unit to turn the display on or off. While on, if no key presses or positional changes occur for more than 30 minutes, the ProScale will automatically turn itself off to conserve battery life. While off, if a position change is detected or the **On**/**Off** button is pressed, the display will automatically turn itself on.

Programming The Display

To customize the General Purpose Digital Display, several functions of the display are user programmable. The following instructions describe how to change the system's factory defaults.

To enter programming mode, press and hold the MODE key and momentarily press the 0 key. Release the MODE key.

The display shows the current parameter ID in the format: **Prx** (where x represents the parameter ID). After approximately 1 second, the display will change to show the current value of the parameter. Use the + or – keys to change the value.

Pressing and **holding** the MODE key will show the currently selected parameter ID without moving to the next parameter. Releasing the MODE key will again display the parameter value.

Quickly pressing the MODE key will move to the next parameter, displaying the parameter ID for 1 second and then the parameter value. Successive momentary presses of the MODE key will quickly migrate down the parameter list without displaying each parameter value. When the desired parameter is reached and the MODE key is no longer depressed, the parameter value will then be displayed. When the end of the parameter list is reached, the display will loop back to parameter 0.

To exit programming mode, press and hold the MODE key then momentarily press the 0 key. Release the MODE key.

The following parameters are available for programming. Values within { } reflect the available range of values that can be programmed for an entry.

Factory defaults are shown in **bold**

Pr0 – Encoder Direction {**0**,1}

Changes the Display readings from Positive to Negative or visa-versa.

Pr1 – Enable/Disable Long Scales {**0**, 1}

0= Model 150 only
1=Segment offsets enabled for scales longer than 430mm

Pr2 – Enable/Disable Offset Change {**0**,1}

0= Allows Zero, + and – keys to zero, increment & decrement readings
1=Disallows Zero, + and – keys to zero, increment & decrement readings

Pr3 – Aux Keypad Key Enable {0..**7**}

ABS/INC Button = 1
Monitor Button = 2
Hold Button = 4

To enable buttons, add up combination of button values. Store sum in Pr3. A value of 0 disables all three buttons. A value of 7 enables all 3 buttons.

Pr4 – Future Enhancement DO NOT CHANGE {**0**..63}

Pr5 – **Future Enhancement DO NOT CHANGE** {**0**..31}

Pr6 – Future Enhancement DO NOT CHANGE {**0**, 1}

Pr7 – Display Resolution {0, **1**, or 2}

Sets the displayed resolution in decimal mode.
0 = Reduced resolution. Inch = xxx.xx MM = xx.x
1 = Normal resolution. Inch = xxx.xxx MM = xx.xx
2 = Increased resolution (Inch only). Inch = xx.xxxx MM = xx.xx

Pr8 – Metric Display Mode {**0**, 1}

Controls whether the position is displayed in millimeters or centimeters when the metric display mode is selected.
0 = millimeters
1 = centimeters

Pr9 – Scaling Factor {.001 .. 99.999}

Applies a scaling factor to the encoder position with the result being displayed as the current position. Scaling factor values less than 1.000 result in displayed positions less than the actual position. Values greater than 1.000 result in displayed position greater than the actual position. Pressing the 0 key restores the **default value of 1.000** (No Scaling).

PrA – Drift Tolerance {.03 .. } mm, {.001 ..} inch

Defines a tolerance of motion allowed (+/-) while the ProScale is in Monitor mode. This tolerance value is automatically converted to the appropriate units based on the currently selected display units.
Default = .01in.

Position Display Units

The ProScale measurement system can display position information in decimal inches, fractional inches or millimeters/centimeters. To change the current display mode, momentarily press the Mode key. With each key activation, the unit will cycle from decimal inches to fractional inches (1/16), (1/32), (1/64) and then to millimeters/centimeters. Pressing the Mode key again returns the unit to decimal inches. When the display is in a “fraction” mode, each bar in the display's upper right corner represents an additional 1/64th of an inch.

Measuring Modes

The ProScale display has two measurement modes. One is referred to as Absolute (ABS) and the other is Incremental (INC). The Absolute measurement system is designed to allow the user to set a current position on the display referenced from a fixed position such as a saw blade, fence or stop. The Incremental measurement system is designed to take distance measurements from one arbitrary point to another. Both systems operate independently allowing separate position offsets to be programmed.

Absolute (ABS) Mode – The ProScale automatically enters ABS mode when power is first applied. This is indicated by the ABS symbol in the upper left corner of the display. While in the ABS mode, all position measurements are related to the current system reference (i.e. saw, fence, etc.) To enter the INC mode, momentarily press the ABS/INC button.

Incremental (INC) Mode – While in the INC mode, the INC symbol is shown in the upper left corner of the display. When the INC mode is initially entered, the displayed position will change to reflect a new reference point from the current position of the readhead. This is typically a position of 0 but may be changed by using the + or - keys to provide a distance offset. This offset may be used to compensate for the kerf of a saw or other requirements. Moving the readhead in either direction will display the distance moved from the initial starting point plus offset value. To complete another incremental measurement from the new current position, momentarily press the ABS/INC key. The display will again change to “0” or the previously programmed offset. To return to the ABS mode, press and hold the ABS/INC key for approximately 3 seconds.

Offset Adjustment

Use the +, - and 0 keys to change the currently displayed position to a different value. The zero key forces the unit to display 0. Momentarily depressing the + key increments the current position by one unit (.001" or .01mm). Momentarily depressing the – key decrements the current position by one unit. Pressing and holding the + or – keys will cause the displayed position to change continuously. Continued holding of the key will cause the amount of change to increase from 1 unit to 10 units, then 100 units, etc. This allows for quick adjustments over a range of large values.

Lock Mode

The user can "lock-out" the position offset adjustment functions (+, -, 0 keys) to prevent accidental changes of the current displayed position. To activate the lock mode, press and hold the On/Off key and then momentarily press the Mode key. The LOCK symbol on the LCD display will turn on and off with each key operation. When the LOCK symbol is displayed, the +, - and 0 keys will not change the displayed position. ABS and INC modes have independent lock operations. That is to say that the ABS mode can be locked and the INC mode can be unlocked.

Display Hold Mode

The ProScale unit provides a feature that allows the displayed position to be "frozen" in time while the readhead is moved from its initial position. This allows measurements to be captured on the display and held for later viewing regardless of the current readhead position. To activate the Hold mode, momentarily press the Hold key. The HOLD symbol will be shown in the upper left corner of the display. The currently displayed position will be frozen from this point. To release the hold feature, momentarily press the Hold key again.

Position Monitor Mode

The ProScale display has the ability to monitor a preset position to detect position drift caused by machine vibration or other factors. To activate the monitoring mode, position the readhead to the desired location and momentarily press the MON key. The ABS symbol will flash on the display to indicate that the position monitor mode is active.

If the readhead is moved outside the programmed tolerance (programming parameter A), the displayed position will also flash indicating a drift condition. When the readhead is moved back within the programmed tolerance, the displayed position will stop flashing.

To exit the position monitor mode, momentarily press the MON key. This can be done regardless of whether the display is indicating a drift condition. The ABS symbol will stop flashing and if the position was previously drifted, the currently displayed position will also stop flashing.

NOTE: Position monitor mode can only be activated while in the ABS measuring mode. If the ABS/INC key is depressed while monitoring, the position monitoring mode is automatically exited.

Segment Offset Adjustment

ProScale encoder scales that are shorter than 17 inches are designed with an absolute measurement encoder pattern such that the readhead can calculate its position directly from this pattern. For encoder scales that are longer than 17 inches, multiple encoder pattern segments are installed end-to-end on the aluminum scale extrusion. This provides a pseudo-absolute measurement capability in which the readhead can calculate its position on any individual encoder scale segment but cannot determine which encoder segment it is on. To solve this problem, the ProScale display tracks which encoder scale segment the readhead is on by detecting the readhead crossing from one encoder segment to another encoder segment.

In certain situations, the crossing from one segment to another may not be detected by the display. This may occur if the readhead is disconnected from the display and then moved along the scale to another encoder segment. It may also occur if the readhead is moved too quickly between two encoder segments.

If the encoder segment tracking count is incorrect because of one of the above situations, the user can re-adjust the display to correct the error. This modification is referred to as the Segment Offset Adjustment.

To add the distance of one encoder segment to the display, press and hold the Mode key and then momentarily press the + key. The displayed position will increase by 16.932 inches.

To subtract the distance of one encoder segment to the display, press and hold the Mode key and then momentarily press the - key. The displayed position will decrease by 16.932 inches.

Sending position to SPC device

The ProScale display provides an output port that can be used to send position information to a compatible SPC device such as a printer or data acquisition device. After connecting the SPC device to the ProScale display, the user may initiate the data transmission by momentarily pressing the SEND key. This signals the SPC device to acquire the data from the ProScale display.

The data format and connector style of the ProScale SPC output is the same as Mitutoyo SPC. This is an industry standard that can be interfaced with most available SPC products including multiplexers, RS232 converters and PC plug-in boards. Data from the ProScale is sent to the SPC connector in either millimeters or decimal inches. (No fractions.)

If no SPC device is attached to the display, the SEND key has no other function.

See *Section 6 Accessories* for additional interface/data acquisition product descriptions and specifications.

ProMUX 3
1-3 inputs

ProMUX 4 or 8
4 or 8 inputs

Pro RF
2 way wireless data transmission

Jumpers

Although the ProScale display uses a keyboard-programming mode to set features in the unit, several selection jumpers are located on the circuit board for special functions.

JP1 Absolute/Incremental Encoder Selection
The ProScale General Purpose Display supports both the Accurate Technology incremental and absolute style systems. To configure the display for use with absolute type encoders (default), install the shorting jumper in position A. For incremental type encoders, install the shorting jumper in position B.

(ProScale Model 150 & 250 are Absolute systems. Other Accurate Technology products such as **ProCaliper, ProPanel, Measurement Kits, and ProStop are Incremental systems**).

NOTE: This functionality is not related to the Absolute and Incremental measurement modes described earlier.

JP2 FUTURE FEATURE DO NOT CHANGE

JP4 Programming Mode Control

Entry to the programming mode of the ProScale display can be enabled or disabled based on this jumper setting. To enable keyboard programming (default), install the shorting jumper in position A. To disable keyboard programming, install the shorting jumper in position B.

When programming mode is disabled, the user cannot access the programming functions via the **Mode/0** keys as described in the programming section. This provides the user with a method of configuring the display with specific parameters and prevents unauthorized configuration changes.

Changing the Batteries

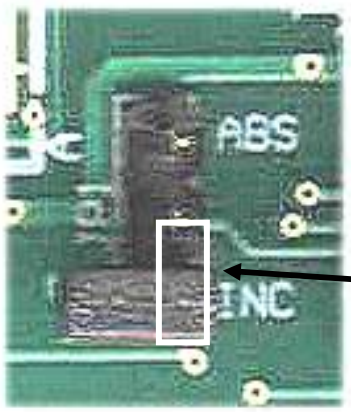
To change the batteries, remove the two screws holding the cover to the base of the display housing. Carefully pull off the cover. Remove the batteries. Reinstall new ones, noting the proper orientation shown in the battery compartment. Replace the cover and tighten the screws.
Note: **DO NOT BEND BATTERY CLIPS**!

Mounting the Display

There are four small mounting holes in the back of the display which may tapped for M2 or 4-40 screws. The display may also be mounted using double sided tape or Velcro.

Display Jumpers

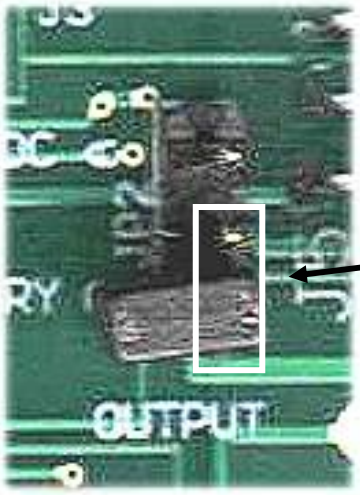
Actual Jumpers are shown in "storage" position for best visibility



JP 1
Selects the appropriate ProScale system technology:

Center Pin & "A" connected = Absolute
Center Pin & "B" connected = Incremental

Default Position = B (Incremental)

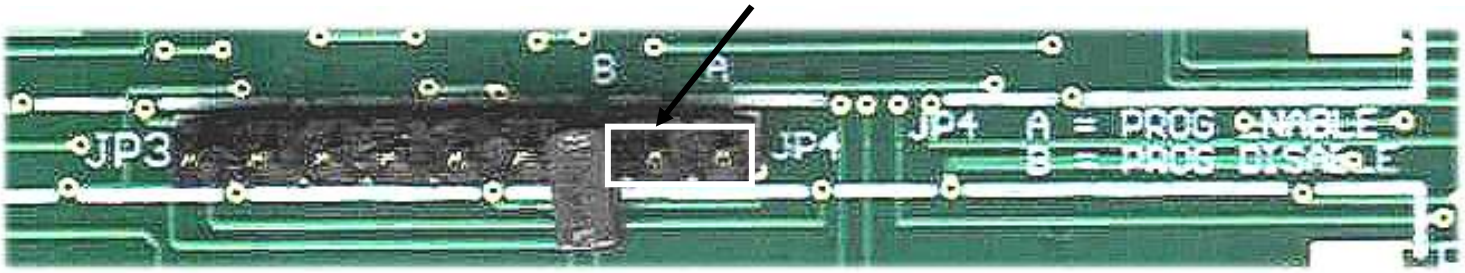


JP 2

Selects a future option – **Do Not Change**

Default Position = B

JP 4 Default Position = A



JP 3 NOT USED

JP 4
Front Panel Programming Enabled = A
Front Panel Programming Disabled = B
Default Position = A

Actual Jumpers are shown in "storage" position for best visibility

SECTION 6 ACCESSORIES

ProMUX-3

The ProMux 3™ is an easy to use hardware interface device providing communication and control of one to three ProScale ABS linear encoders from a user provided PC or PLC.

Supplied are two separate components. First is the ProMux 3 interface unit and second is a low voltage plug-in power supply. The user must provide the host PC or PLC and a standard DB-9 serial cable (male to female).

Uses for the ProMux 3 include axis position measurement on XY or XYZ quality control measurement tables, machinery position control (**NON-CNC**), tooling measurement devices and the like.

Specifications:

Encoder Inputs: 3 ProScale ABS readheads or SPC displays. ProMux 3 can provide power to readheads directly.

Serial Interface: RS-232 DB-9 connector.
8 bit word, no parity, 1 stop bit
No flow control.

Pro RF

The Pro-RF™ system consists of a base module and a remote module that communicate over a bi-directional RF interface.

The Remote module provides the data acquisition functions.
It accepts 1 ProScale or Mitutoyo SPC output as input and relays the information via RF link to the Base module.

The Base module communicates to a host PC via RS-232 operating at 57,600 Baud.

The system can support up to 32 remote modules up to 100 meters away for each base module.

SECTION 7 MISCELLANEOUS

Frequently Asked Questions

Why is there an "Err 2" message on the display?

If the read head is off the scale, or the readhead cable is unplugged from the digital display, an "Err 2" will appear on the display. To clear error:

1. Be sure the readhead is on the scale.
2. Unplug the connector from the display for one second.
3. Reconnect the readhead cable to the digital display.

Pressing ZERO, PLUS, or MINUS keys has no effect

The keypad is locked. To unlock the keypad, momentarily press and release the MODE key while holding down the ON/OFF key.

The battery clips seem to be very loose. Is this normal?

Yes. DO NOT attempt to bend these clips or wedge anything between them and the case. These clips are designed to expand when the two case halves are screwed together.

Can I mount the scale/readhead without the flex link/guide clip?

The flex link and guide clip serve to provide an accurate method of transferring the movement of the moving part to the read head, while also absorbing any stresses that may occur. If they are not used, the warranty is voided.

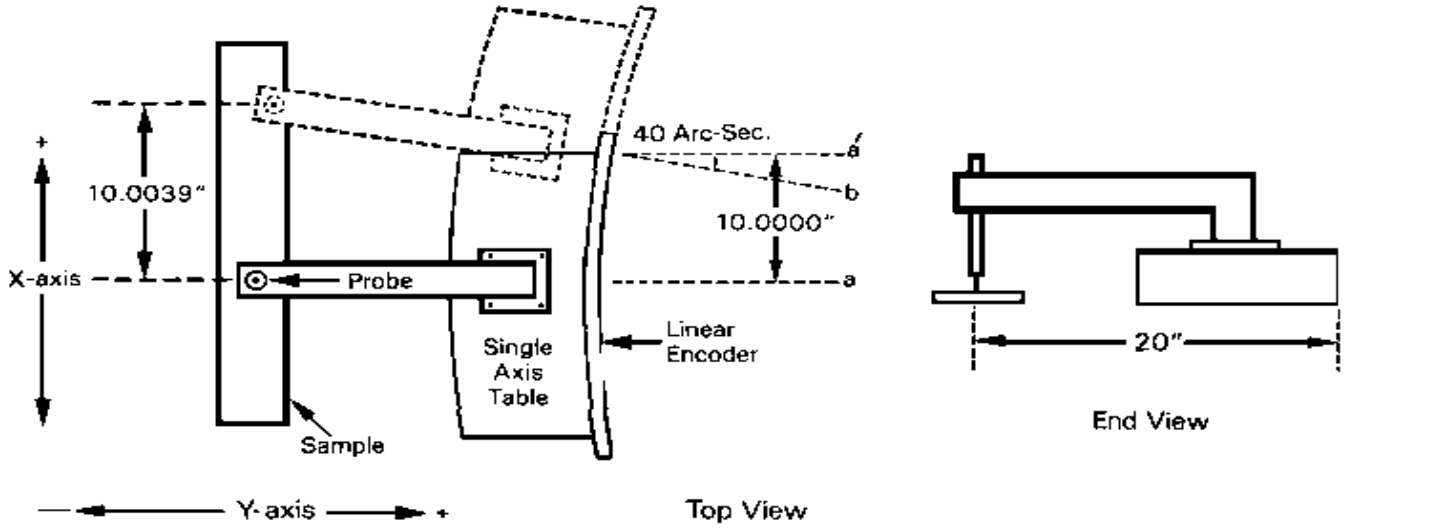
The display does not change as the scale/readhead moves.

The display is in the HOLD mode. Press & release the Hold button.

Abbe Error

Abbe error is a condition which may not be visible to the human eye, but will affect linear measurements. Be sure to take precautions when installing ProScale in order to eliminate the possibility for Abbe error.

Abbe error refers to a linear error caused by the combination of an angular



error and a dimensional offset between the sample and the measuring system. It is important to understand that the information the encoder is providing is **only the position of the readhead on the scale**. To illustrate this, see the figure, which shows a linear measuring device. (The apparent distortion in the measuring device is intentional - for this example - to show the measuring device with a curvature in its mounting.)
Suppose the curvature in the figure is sufficient to produce an angle of 40 arc-seconds. If the measuring device moves 10 inches, the probe will be found to have moved 10.0039 inches, resulting in an error of +0.0039 inches. Abbe error could be lessened by moving the measuring system closer to the sample. This effectively solves one half of the Abbe error problem (offset) and leaves only the angular mounting problem to be solved. Angular error can best be countered through proper design and placement of the linear scale. Sources of angular error include:
1. Mounting the linear scale to an imperfectly flat surface.
2. Mounting the linear scale to an imperfectly straight surface.
3. Curvature of ways (or linear bearings) used to measure the sample.
4. Contaminants between the probe and item being measured.
Friction in any part(s) of the measuring device.

Error Codes & Factory Service

ProScale warns if an error occurs by displaying "Err" plus a number on the display. If error code 0, 1, 2, 3, 5, 6, 7, or 8 is displayed:

1. Check to be sure the readhead is on the scale.
2. Check all connections and cable for damage.
3. If the readhead is on the scale and all connections are good, unplug the readhead from the display , wait 3 seconds, and reinstall it.

If error code 4 is displayed, the display is trying to display fractions over 99 63/64". Switch to a decimal readout or press ZERO (and recalibrate) if this value is incorrect.

For further assistance, contact your supplier, or Accurate Technology.
When calling for factory service, please have as much information about your product on-hand. If possible, please have the following information:

1. Product name.
2. Any modification to the product.
3. The date of product purchase.
4. Detailed information about the problem, such as when, where, and how the problem occurs, and the machinery being used nearby.

This manual is available at www.proscale.com

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