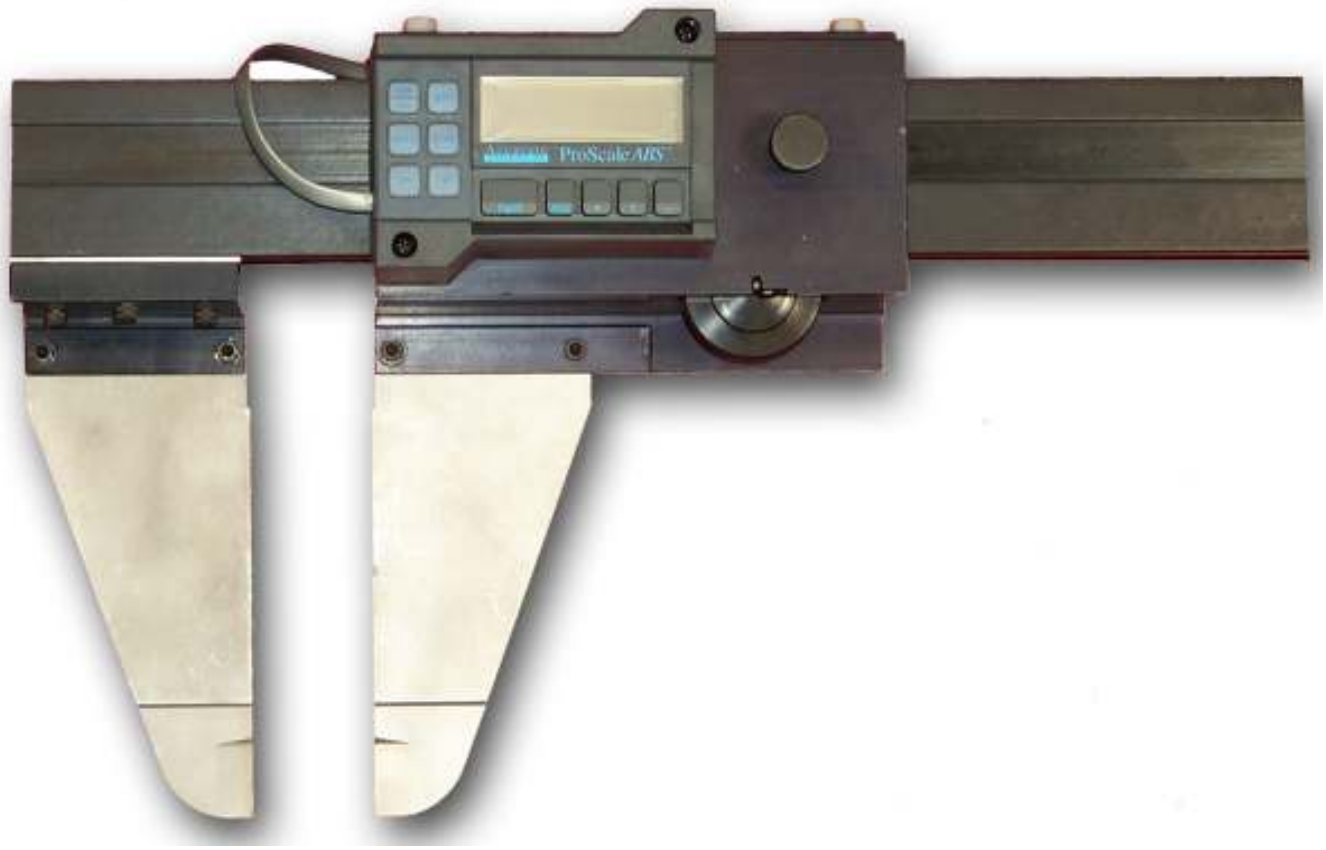
Accurate
TECHNOLOGY INC.
Linear Digital Measuring Systems

ProCaliper



User Manual

ProCaliper

Part Numbers: 901-4008-001 with General Purpose Display V2.0

Warranty

Accurate Technology, Inc., warrants this product against defective parts and workmanship for 2 years 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 or using this product on a machine disconnect the machine from its power source to avoid injury.

SAFETY WARNING

Table of Contents

SECTION 1 GENERAL INFORMATION

Introduction

ProCaliper is a general-purpose bench-top digital caliper. It is ideal for making measurements up to 96 inches (2.4m) It has been designed using high quality extruded and machined parts to provide the best accuracy and repeatability. The core technology of the ProCaliper is a ProScale™ Digital Measuring System.

ProScale digital measuring systems are affordable precision electronic devices for making linear measurements with speed and accuracy.
ProScale is ideal for most measuring requirements up to 20ft. where high accuracy is not needed, but affordable *repeatability*, (better than a tape measure), is desired. Because ProScale shows the exact measurement on its display, it eliminates the guesswork involved in reading and interpreting tape measures. It is compatible for retrofitting, or as original equipment, on most machinery or for any general purpose measurement application where digital accuracy and repeatability is desired.

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. With normal care, ProScale will last for years.

All ProScale systems consist of a SCALE, a READHEAD, and a DIGITAL DISPLAY. The SCALE is a series of conductive patterns bonded to an aluminum extrusion. The READHEAD contains a computer chip, which transmits and receives signals to/from the scale. The received signal is used by the readhead to calculate its position. This position data is sent to the DIGITAL DISPLAY, where it can be displayed in millimeters, centimeters, inches, or sent to an external data acquisition device.

What This Manual Includes

This manual includes information for:

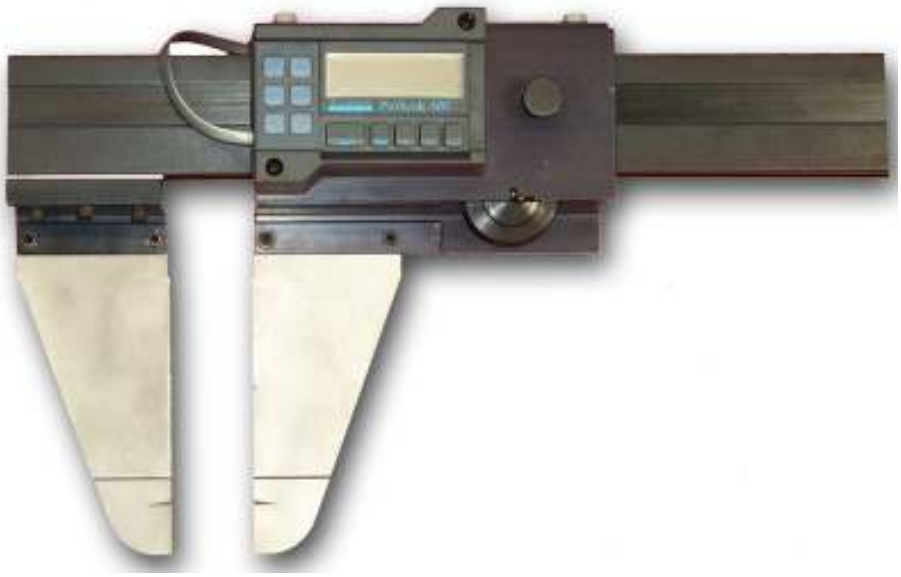
- **ProCaliper supplied with a General Purpose LCD Digital Display with Firmware V2.0 and higher.**

ProCaliper Specifications

Measuring Range:	96 Inches
Accuracy:	± .003in/ft to ± .008in @ 96 inches
Resolution:	.1mm/.01cm/.01in; .01mm/.001cm/.001in; .01mm/.001cm/.0004in
Repeatability:	.01mm or .001cm or .001in
Display Range:	± 9999.99 mm; ± 999.999 cm; ± 999.999 in; ± 399 63/64 in.
Operating Temp:	0 to 51°C, 32 to 120°F
Temp Coef:	25ppm/°C; 13ppm/ °F
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

SECTION 2 PROCALIPER

ProCaliper is a *Bench-Top* measuring system capable of measurements up to 96 inches (2.4m)



Assembly:

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.

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/℃, it is suggested the ProCaliper be used in a temperature stable environment.

SECTION 3 DIGITAL DISPLAY OPERATION

This section covers programming and operation of the General Purpose LCD Digital Display Supplied on the ProCaliper.

Programmable Battery Operation Display

This display operates on 2AA batteries. It has an auxiliary keypad with 6 keys for: switching between ABSolute readings and INCremental measurements, MONitoring position drift, SENDing data out the SPC connector, HOLDing the reading, and F1 & F2 special function keys.

NOTE: *Programming Parameters from Pr0 through Pr23 (except Pr15 & Pr22) are applicable to ProCaliper Digital Displays.*

Mounting the Display

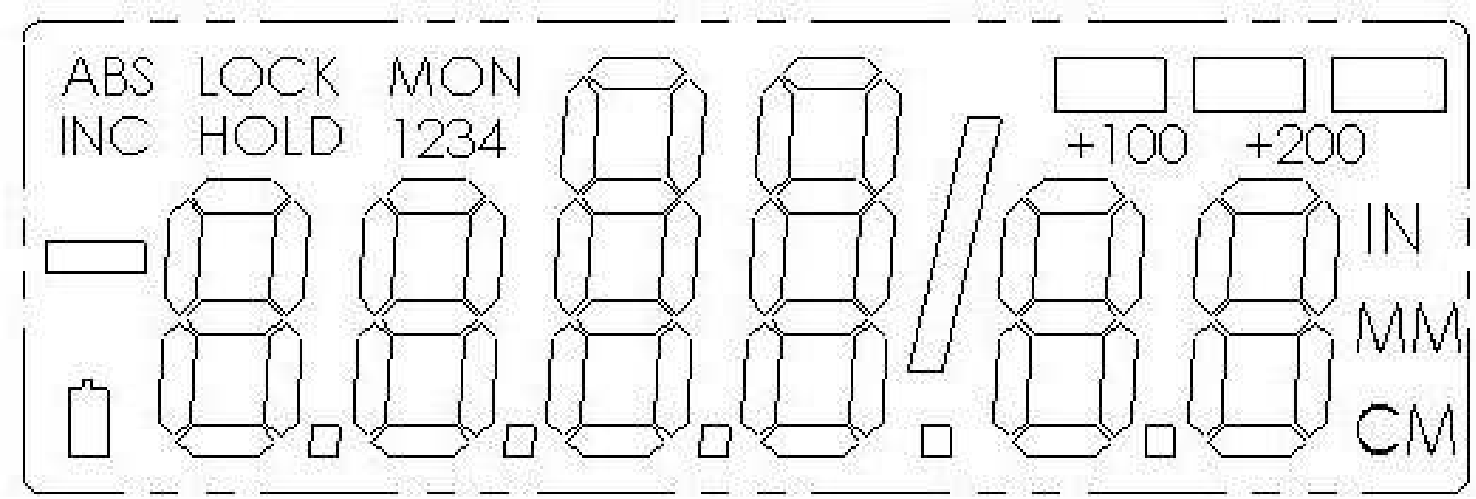
If you choose to relocate Digital Display, It can be mounted:

- Using Velcro or Double sided tape
- Drilling out any of the four holes from the inside of the case
- Using the holes on the back of the case which may tapped for M2 or 4-40 screws.

NOTE: Care must be taken when using the inside holes. If using the lower left hole as shown above, be sure to use a screw that will not rise above the extruded countersink as this may short the input connector.

If the readhead requires a longer cable, Please contact Accurate Technology.

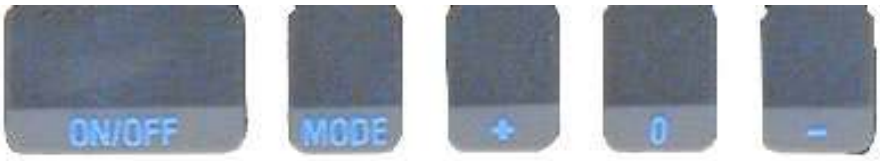
The LCD



The above figure illustrates all the segments available on the Digital Display.

CAUTION: Pressing and holding the ON/OFF and MODE key for 10 seconds *while the display is turned off* will perform a full segment LCD test AND re-set all programming parameters to factory defaults.

Display Keys



Key Press Timing

The keys pictured above, found on all General Purpose LCD Digital Displays, have multiple functions. Timing, that is how long a key is depressed, and the combination of the keys pressed is important. This manual uses the term "*momentarily*" to describe a key press of typically less than 1 second. Whereas *"press and hold*" is used imply a key press of typically longer than 1.5 seconds. As an example; when using a PC keyboard to type a capital letter you would "*press and hold*" the SHIFT key and "*momentarily* depress the LETTER key.

In addition the key(s) "*function*" is executed on the key RELEASE, not the key DEPRESS. This is important since some keys execute different functions based on how long they are depressed. These key operations, once tried, quickly become intuitive.

ON/OFF

Momentarily pressing the **ON/OFF** key will cause the display to turn on or off. The Firmware Version is displayed on power-up or when **ON/OFF** key is pressed. While on, if no key presses or positional changes occur within 15 minutes, the Digital Display will automatically turn itself off to conserve battery life. While off, if a position change is detected (.05mm or .002in) or the **ON/OFF** button is pressed, the display will automatically turn itself on with no loss of measurement information.
(Programming Parameter Pr8. Factory default set to 15 minutes.)

Battery voltage can be displayed by pressing and holding the **ON/OFF** key for 5 seconds while display is turned on.

CAUTION: Pressing and holding the ON/OFF and MODE key for 10 seconds *while the display is turned off* will perform a full segment LCD test AND re-set all programming parameters to factory defaults.

MODE

The digital display can show measurement information in Imperial or Metric. To change the current display mode, momentarily press the **MODE** key. With each key press the display will cycle through decimal inches, fractional inches (1/16), (1/32), (1/64) (If enabled by **Programming Parameter Pr6**) and metric (mm or cm based on setting of **Programming Parameter Pr5**).

When the display is in a decimal mode (mm, cm or in) it will auto-range to the next resolution if the value is displayable in the next range**.**

When the display is in 1/16 or 1/32 inch fraction mode, a series of "bars" in the upper right corner of the LCD each represent an additional 1/64th of an inch measurement. ie. When in 1/16 inch mode and three bars are showing, the measurement displayed is rounded *down* to closest 1/16 inch and each illuminated bar indicates an additional 1/64 of an inch ("heavy") measurement. For better resolution switch to 1/32 or 1/64 fraction mode. For the best resolution switch to a decimal mode.
When the measurement is greater than ± 99 63/64 inches, a +100 or +200 will show in the upper right portion of the LCD to indicate this amount must be added to the displayed reading. ie: if the measurement is 154 5/8 inches, 54 5/8 and +100 will be displayed on the LCD. If the measurement is -307 23/64 inches - 7 23/64 , +100 and +200 will be displayed on the LCD.

The **Resolution** of the display can be set for *Normal;* (.01mm or .001in), *Reduced*; (.1mm or .01in) or *Increased*; (.01mm or .0005in) **(Programming Parameter Pr4.)**

+, 0, and – Keys

The **+** (plus), **0** (zero) and **–** (minus) keys are used to change the currently displayed position to a different value. The **0** key forces the unit to display 0. Momentarily

depressing the **+** key increments the current position by one unit of measurement. 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. Holding down the key will cause the amount of change to speed up. This allows for quick adjustments over a range of large values. These keys can be "locked out" to prevent accidental offset or zero entries. **(See Programming Parameter Pr3.)**

Digital Display Functions

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 word LOCK on the LCD display will turn on or off with each lock/unlock 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.
(See Programming Parameter Pr3. Factory default is Enabled.)

Segment Offset Adjustment

This function is not applicable to ProCaliper systems.
(Programming Parameter Pr1 should be always be set to "0" for ProCaliper)

Offset Addition

Offset addition allows the user to preset up to 3 different distances that are then added to the Digital Display reading when selected. This allows the user to quickly switch measurement modes from one reference point to another.
To utilize the offset addition feature, programming parameter Pr10 must be set to 1. The display will then flash one of "offset" numerals 1, 2, 3 or 4 located in the upper left corner of the LCD. Offset 1 is the ABS position with no offset addition. Offset 2 is the ABS position with parameter Pr11 (Offset Addition 1) added to it. Offsets 3 and 4 have similar functions with parameters Pr12 and Pr13 added to the ABS position respectively.
To move from "Offset" 1 to 2, momentarily press the F1 key. Each depression of the F1 key advances to the next offset. After offset 4, the display will move back to offset 1.
(See Programming Parameters 9, 10, 11, 12 and 13. Factory default is *Disabled.*)

Limit Mode

The digital display will show either " **LL "** for Low Limit or " **UL"** for Upper Limit if a pre-programmed upper or lower reading is encountered. Upper and Lower limits are set with programming parameters **Pr16** and **Pr17** but are only active if **Pr14** is set to 1. Display toggles between current position display and "LL" or "UL". The position is shown for 2 seconds and the "**LL**" or "**UL**" is shown for 2 seconds. This continues as long as a limit has been exceeded. Limit monitoring is always active, even in programming mode.

Numerous Programming parameters, including Offset Addition *and* Limit mode *indicate a* ***'factory default set in inches'****. The equivalent offset/limit value in mm or cm is applied if you switch the* MODE *of display to mm or cm. ie These parameter values take on the unit of measurement* MODE *(mm, cm or inches) active when programming is entered.*

Scaling

All General Purpose Digital Displays have the ability to "scale" the actual measurement. This function is useful when the actual measurement must be multiplied or divided before being displayed. Care should be taken when using this function since invoking it will cause the unit to display a reading different than the actual measured or traversed value. This function is set using **Programming Parameter Pr7. The Factory Default is set to 1.000 - No Scaling**

Changing the Batteries

A low battery indicator will appear in the lower left corner of the LCD display when new batteries are needed.

Remove the screws in the upper right and lower left corners. Pull the cover off. Remove the old batteries. Reinstall new AA Alkaline batteries, noting the proper orientation. Replace the cover and tighten the screws.

CAUTION: DO NOT BEND BATTERY CLIPS!

THESE CLIPS ARE DESIGNED TO BE LOOSE WHEN THE CASE IS OPEN AND WILL COMPRESS AND SECURE THE BATTERIES IN PLACE WHEN THE CASES ARE SCREWED TOGETHER.

Auxiliary Keypad

ABS - INC

The Digital Display has two measurement "indexes". One is referred to as **ABS** and the other is **INC**. The **ABS** measurement setting is designed to allow the user to set a current position on the display referenced from a fixed or known position such as a saw blade, or stop. The **INC** measurement setting is designed to take relative distance measurements from one arbitrary point to another. The systems operate independently allowing separate position offsets to be programmed. The **ABS** position of the measuring system is not lost when using the **INC** settings.

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 point (i.e. sawblade, stop, origin etc.) To enter the INC mode, momentarily press the **ABS/INC** button.

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 at the current position of the readhead. This is typically a position of zero (0) but may be changed by using the + or - keys to provide an offset. Moving the readhead in either direction will display the distance moved from the initial INC starting point (plus any offset). To complete another incremental measurement from the new 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 3-4 seconds.

HOLD

The Digital Display provides a feature that allows the displayed position to be "frozen" in time while the readhead is moved from its measuring 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 and selected key presses will be frozen at this point. To release the HOLD feature, momentarily press the **HOLD** key again.

MONitor

The Digital Display has the ability to monitor a position to detect position drift or measurement variance. To activate the monitoring mode, position the readhead to the desired location and momentarily press the **MON** key. The MON symbol will flash on the display to indicate that the position monitor mode is active.

If the readhead moves outside the programmed tolerance the displayed reading flashes, indicating a drift condition. When the readhead is moved back within the programmed tolerance, the displayed reading will stop flashing.

To exit the monitor mode, momentarily press the **MON** key. The MON symbol will stop flashing and 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.

The display can be programmed to automatically enter or exit the MONitor mode based on elapsed time or movement of the encoder.

If the programmable auto monitor is enabled (Programming parameter Pr19 set to 1), the Digital Display will automatically enter monitor mode after either 30 or 60 seconds of no encoder motion. If the programmable auto monitor is disabled, the ProScale will automatically exit monitor mode if the encoder is moved beyond a programmable distance from the monitored position. This option, in conjunction with auto monitor activation, allows the ProCaliper to be kept in monitor mode without manually pressing the monitor key.

(See Programming Parameters 19,20, 21. Factory default is OFF.)

SEND

The Digital Display provides an output port that can be used to send measurement information to a compatible SPC device such as a printer or data acquisition unit. After connecting the SPC device to the 10 pin connector on the 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 digital display.

Pressing the SEND key displays " **Snd** " on the display for 1 second to show activation of the send function (even if no SPC device is attached to the ProCaliper).

The data format and connector style of the ProCaliper 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 ProCaliper is sent to the SPC connector in either millimeters or decimal inches, whichever is currently displayed on the LCD.

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

F1 / F2

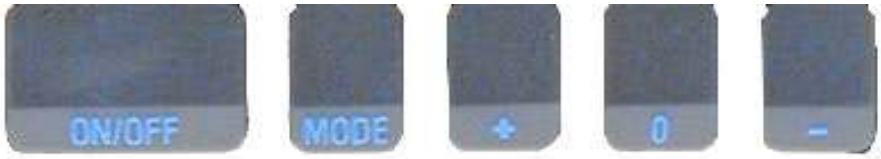
These keys are used for special features and/or Custom programming functions.

Programming

Several functions of the digital display are user programmable. The following instructions describe what features are available and how to change the system's factory defaults to customize the display for your application.

The keys pictured have multiple functions. Timing, which is how long a key is depressed, and the combination of the keys pressed is important. This manual uses the term '"*momentarily*" to describe a key press of typically less than 1 second. Whereas *"press and hold*" is used imply a key press of typically longer than 1.5 seconds. As an example; when using a PC keyboard to type a CAPITAL letter you would "*press and hold*" the SHIFT key and "*momentarily* depress the appropriate letter key.

The "*function*" associated with the key(s) pressed is executed on the key *RELEASE*, not the key *DEPRESS*. This is important since some keys execute different functions based on how long they are depressed. These key operations, once tried, quickly become intuitive.



To enter programming mode, *press and hold* the **MODE** key and then *momentarily* press the **0** (zero) key. The **MODE** key must be held for approximately 1 second before the depression of the **0** (zero) key.

Once you are in the Programming Mode, *momentarily* pressing the **MODE** key will advance through the Programming Parameter list.

To step backwards in the Programming Parameter list *press and hold* the **ON/OFF** key and *momentarily* press the **MODE** key.

Momentarily pressing the **+** (plus) key while displaying a Programming Parameter will increase the parameter setting.

Momentarily pressing the **-** (minus) key while displaying a Programming Parameter will decrease the parameter setting.

Momentarily pressing the **0** (zero) key while displaying a Programming Parameter will revert the parameter to its factory default setting.

To exit programming mode, *press and hold* the **MODE** key and then *momentarily* press the **0** (zero) key.

NOTE: The display will automatically exit programming mode after 60 seconds of no key activity.

Programming Parameters are listed below. Values in [ ] are the available range of values that can be programmed for that entry. **ProCaliper** settings are shown in **bold.**
(Factory defaults are shown on pg 21: Programming Summary)

Pr0 – Encoder Direction [**0**,1]
Change value to reverse the direction of measurement readings.

Pr1 – Enable/Disable Segment Offset [**0**, 1]
0 = For ProScale M150 and **ProCaliper**
1 = For ProScale Model 250.

Pr2 – High Speed Readhead [**0**, 1]
0 = Normal Readhead
1 = High Speed Readhead
Use this setting *only* if instructed by special instructions included with High Speed Readheads. A setting of 1 will impact battery life.

Pr3 – Enable/Disable the +, - and ZERO keys [0**,1**]
0 = Disables operation of Zero, + and – keys (Display will be in Lock Mode).
1 = Enables operation of Zero, + and – keys.

Pr4 – Display Resolution [0, **1**, or 2]
Sets the displayed resolution in *decimal* mode. (No change in fractions mode.)
0 = Reduced resolution Inch = xxx.xx MM = xx.x
1 = Normal resolution Inch = xxx.xxx MM = xx.xx
2 = Increased resolution Inch = xx.xxxx MM = xx.xx (Inch mode only)
Auto scaling will allow measurements of over 100 inches when in high resolution. Measurements over 100 inches will automatically be reduced to 3 decimal places.

Pr5 – Metric Display Units [**0**, 1]
Controls whether the measured value is displayed in millimeters or centimeters when in metric mode.
0 = millimeters
1 = centimeters

Pr6 – Disable Fractions/Inches [**0**, 1, 2]
0 = All measurement modes (millimeters or centimeters, inches and fractions)
1 = No Fractions. Only decimal inches and metric units* will be displayed.
2 = Only Metric. No Imperial (decimal inches or fractions) will be displayed.
** Pr5 will determine if mm or cm are displayed for metric units.*

Pr7 – Scaling Factor [.001 .. 99.999] **Default = 1.000** (No Scaling.)
The multiplier applied to the measurement. Scaling factors less than 1.000 will make the displayed measurement less that the actual measurement. Scaling factors greater than 1.000 will make the displayed measurement greater than the actual measurement.

Pr8 – Automatic Power Off [0 to 60] **Default = 15**.

Sets the amount of time in 'minutes without activity' before the display automatically turns off.
0 = Disables Auto Off.
Encoder motion or ON/OFF key "wake-ups" the display and resets the timer.

Pr9 – Auxiliary Keys Enable/Disable [0..**7**]

0 = ABS/INC, MON and HOLD Disabled
1 = ABS/INC Key Enabled
2 = MON Key Enabled
4 = HOLD Key Enabled
7 = All Keys Enabled
To enable keys, add up combination of key values. A value of 2 enables only the MON key. A value of 7 enables all 3 Keys.

Pr10 – Offset Addition Enable [**0**, 1]

0 = Offset Addition Disabled
1 = Offset Addition Enabled.
SEE ALSO Pr11, Pr12, Pr13

Pr11 – Offset Addition 1 [-999.999 to 999.999in] or [-9999.99 to 9999.99mm]

When offset 1 is selected (see section 4 -*Offset Addition*), this value is added to the current ABS position. **Default = 1.000IN**
Only active if Pr10 is set to 1. ***Note: Default is set in Inches***

Pr12 – Offset Addition 2 [-999.999 to 999.999in] or [-9999.99 to 9999.99mm]

When offset 2 is selected (see section 4 -*Offset Addition*), this value is added to the current ABS position. **Default: 1.500IN**
Only active if Pr10 is set to 1. ***Note****: Default is set in Inches*

Pr13 – Offset Addition 3 [-999.999 to 999.999in] or [-9999.99 to 9999.99mm]

When offset 3 is selected (see section 4 -*Offset Addition*), this value is added to the current ABS position and displayed. **Default: 2.000IN**
Only active if Pr10 is set to 1. ***Note****: Default is set in Inches*

Pr14 – Output Signal Mode [**0**, 1]

Set to 1 to enable *LIMIT MODE* function on ProCaliper

Pr15 – Output Polarity [**0,** 1]**.**

This function is not available on ProCaliper

Pr16 – Lower Limit [-999.999 to 999.999in] or [-9999.99 to 9999.99mm]
Sets the lower limit alarm value. **Default = 0.000IN**.
Active only when parameter Pr14 = 1. ***Note: Default is set in Inches***

Pr17 – Upper Limit [-999.999 to 999.999in] or [-9999.99 to 9999.99mm]
Sets the upper limit alarm value. **Default = 5.000IN**.
Active only when parameter Pr14 = 1. ***Note: Default is set in Inches***

Pr18 – Drift Tolerance [.01 to 9999.99mm] or [.001 to 999.999in].
Range of motion allowed (+ or -) while in MONitor mode. **Default =. 01IN.**
Note: Default is set in Inches

Pr19 – Automatic Monitor ON Time [**0**, 1 or 2]
Configures display to automatically activate MONitor mode after 30 or 60 seconds of encoder inactivity.
0 = disabled. 1 = 30 seconds. 2 = 60 seconds.

Pr20 – Automatic Monitor OFF Enable[**0**, 1]
Configures display to automatically exit MONitor mode after a programmed distance **(Pr21)** has been exceeded from the drift tolerance position **(Pr18).**
0 = disabled 1 = enabled.

***Pr21* – Automatic Monitor OFF Distance** [0.001 to 999.999in] or [0.01 to 9999.99mm].
The distance that must be exceeded from the drift tolerance position **(Pr18)** to activate auto monitor off**. Default = 0.500in**
This parameter is relevant only when **Pr20=1**. ***Note: Default set in Inches***

Pr22 – Backlight ON time [0, **1**, 2, 3 or 4]
This function is not available on ProCaliper

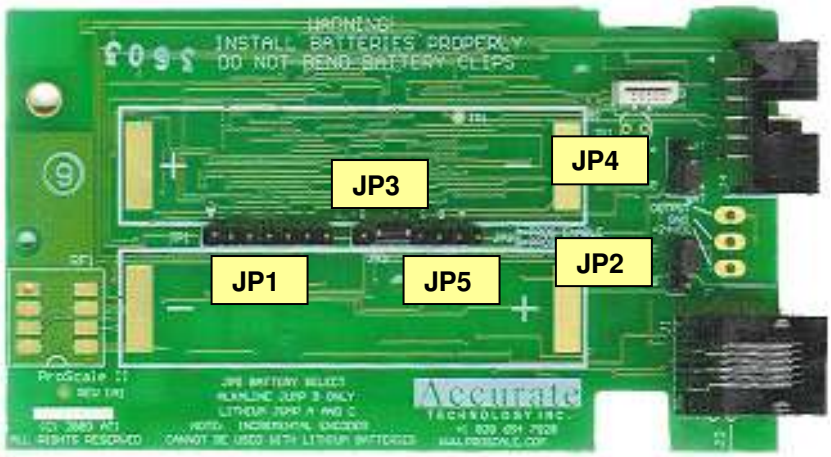
Pr23 – Future Enhancement DO NOT CHANGE [0,**1**,2] **Default =1**
Pr24 – Future Enhancement DO NOT CHANGE [**0**..63] **Default =0**
Pr25 – Future Enhancement DO NOT CHANGE [**0**..31] **Default =0**

CAUTION: Pressing and holding the ON/OFF and MODE key for 10 seconds *while the display is turned off* will perform a full segment LCD test AND re-set all programming parameters to factory defaults.

Jumpers

Although the ProCaliper display uses a keyboard-programming mode to enable and configure features in the unit, several selection jumpers are located on the circuit board for additional system configuration.
User configurable jumpers consist of three pins and a ‘shorting block’.
The center of these pins is ‘Common’. One end pin is labeled ‘A’ and the other end pin is labeled ‘B’.

Digital Display Circuit Board



JP1 FOR FACTORY USE ONLY

JP2 Encoder Selection
ProCaliper Digital Displays should have the shorting jumper in position B.
Position A is reserved for ProScale ABS Systems

JP3 Programming Enable/Disable
Entry to the programming mode of the 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 Section 3: *Programming*. This provides the user with a method of configuring the display with specific parameters and prevents unauthorized configuration changes.

JP4 Display Power
This jumper will be set at the factory based on the type of display you have ordered.
ProCaliper Digital Displays should have the shorting jumper in position B.

JP5 FOR FACTORY USE ONLY

Programming Summary for ProCaliper

Programming Parameter	Function	Factory Default	ProCaliper Setting
Pr0	Encoder Direction	0	0
Pr1	Segment Offset	1 - On	0
Pr2	High Speed ReadHead	0 - Off	0
Pr3	Zero, Offset Entry	1 - Enable	1
Pr4	Display Resolution	1 - Normal	1
Pr5	mm or cm	0 - mm	0
Pr6	Fractions, mm, in	0 - all	0
Pr7	Scaling	1.000 (none)	1.000
Pr8	Auto off	15 - 15 min.	15
Pr9	Auxiliary Keypad	7 - all keys	7
Pr10	Offset Addition	0 - disabled	0
Pr11	Offset Addition 1	1.000 Inch	1.000
Pr12	Offset Addition 2	1.500 Inch	1.500
Pr13	Offset Addition 3	2.000 Inch	2.000
Pr14	Output Mode	0	0
Pr15	Output Polarity	0	N/A
Pr16	Lower Limit	0.000	0.000
Pr17	Upper Limit	5.000 Inch	5.000
Pr18	Drift Tolerance	.01 Inch	.01
Pr19	Auto Monitor ON	0 - disabled	0
Pr20	Auto Monitor OFF	0 - disabled	0
Pr21	Auto Monitor Distance	.500 Inch	.500
Pr22	Backlight On	1	N/A
Pr23	FUTURE FEATURE	1	1
Pr24	FUTURE FEATURE	0	0
Pr25	FUTURE FEATURE	0	0

Jumpers and Key Press Summary

Printed Circuit Board Jumper Information:

JP1 Internal Use Only
JP2 Position **B** for ProCaliper
JP3 Programming Enable/Disable
JP2 Position **B** for ProCaliper
JP5 Internal Use Only

Key Press Functions:

ON/OFF (*Press & Hold)* + MODE (*Momentarily)*
Enable/Disable LOCK mode ('**0', '+**' & '**-**' keys).
MODE (*Press & Hold)* + '**0**'(*Momentarily)*
Enter or Exit Programming Mode
While in Programming mode:
MODE (*Momentarily)*
Advances through the Programming Parameter list.
ON/OFF (*Press & Hold)* + MODE (*Momentarily)*
Steps backwards in Programming Parameter list
+ (*Momentarily)* while displaying a Programming Parameter
Increases the Parameter setting.
- (*Momentarily)* while displaying a Programming Parameter
Decreases the parameter setting.
0 (*Momentarily)* while displaying a Programming Parameter
Reverts the parameter to its Factory Default setting.

MODE (*Press & Hold* + '**+**' or '**-**'(*Momentarily)*
Apply Segment Offset Adjustment
ON/OFF (*Momentarily)*
Turn Display power on or off
ON/OFF (*Press & Hold*) for 5 seconds
Display Battery Voltage
ON/OFF (*Press & Hold*) + MODE (*Press & Hold*) both for 10 seconds
LCD Segment Test & sets ALL Programming parameters to factory defaults

How long a key is depressed, and the combination of the keys pressed is important. The term (*Momentarily)* describes a key press of typically less than 1 second. Whereas (*Press & Hold*) is used imply a key press of typically longer than 1.5 seconds.
For example: When using a PC keyboard to type a CAPITAL letter you would "*press and hold*" the SHIFT key and "*momentarily"* depress the LETTER key.
In addition, a key(s) "*function*" is executed on the key RELEASE, not the key DEPRESS of that key(s). This is important since some keys execute different functions based on how long they are depressed. These key operations, once tried, quickly become intuitive.

ProMUX-3™, ProMUX-4™ & ProMUX-8™

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.

The ProMUX-4 and ProMux-8 series of linear encoder multiplexers are designed for OEM and system integrators for use in acquiring setup positional information (non-CNC) on industrial production machinery.
The multiplexers interface directly with ProScale absolute linear measurement encoders. These systems provide linear measurement ranges from 100mm to 6 meters depending on the model.
ProMUX 4/8 multiplexers communicate with a host PC or PLC via RS-232 or RS-422 serial interface. Various baud rates are supported from 9600 to 115200. Up to 15 multiplexers can be connected to the same communications bus when utilizing the RS-422 serial interface.

Pro RF & Analog Interface Unit

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 (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.

The Analog Interface Unit (AIU) is designed to provide an analog signal output that is proportional to the current position being displayed on a ProScale linear measurement system. The interface provides a DC signal range from 0 to 5 volts or 0 to 10 volts depending on configuration. This offers a simple integration between a ProScale™ linear measurement system and a PLC or other process control system.
The interface incorporates a 12-bit Digital-to-Analog converter to generate the analog output. This provides 4096 discrete steps of resolution over the configured measuring range. This can offer a measurement displacement resolution of .001" over a 4-inch range of motion.

Other Accurate Technology Products

ProScale Model 150
General Purpose *ABS* systems with standard measuring ranges of 10 and 18 inches.

ProScale Model 250
General Purpose *ABS* systems with nine standard measuring ranges from 1-20 feet.

ProPanel
A portable measuring system for Edge-Edge, Hole-Hole and Hole-Edge measurements up to 48 inches.

Measurement Table Kits
These kits include the necessary components to assemble your own custom built measuring table. Seven sizes to 20 feet.

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

ProStop II
A complete digital stop and fence system for chop saws, radial arm saws, miter saws or any application where a moving stop with a fixed back fence is needed.

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

Visit www.proscale.com for more information

Frequently Asked Questions

What does “no Enc” mean?

If the readhead is off the scale, or the readhead cable is unplugged from the digital display, an “no Enc” 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.

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.

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

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

PRODUCT REGISTRATION

Fill out for your records and
FAX to Accurate Technology @ +1.828.654.8824 or
Register on line at http://www.proscale.com/registration.htm

Name _____

E-Mail _____

Company _____

Address _____

Address _____

City _____

State/Region _____

Zip/Postal Code _____

Country _____

Purchased From: _____

Purchased When: _____

ProCaliper Serial Number:

Thank you for choosing an Accurate Technology Product

MADE IN USA

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This manual is available at www.proscale.com

Please return your Product Registration Card or register your system at:
http://www.proscale.com/registration.htm