Accurate
TECHNOLOGY INC.
Linear Digital Measuring Systems

ProScale®
Compact
LCD Readout

Installation & Operation

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SAFETY WARNING

Before installing this product on any machinery:
Turn off machine and disconnect the power

SAFETY WARNING

Table of Contents

SECTION 1 GENERAL INFORMATION

Introduction

This Digital Readout, (DRO), is one of several available from Accurate Technology for use with ProScale general purpose measuring systems.

The following pages describe the set-up and operation of the Compact Readout when used with ProScale® products.

What This Manual Includes

This manual includes Installation, Set-up, and Operation information for:

ProScale Compact Digital Readout Part Number: 700-1600-700
With firmware version **C 1.000** and higher.
(Press and hold the **DATUM** *key for 7 seconds to display the readout firmware version.)*

This manual DOES NOT apply to the Compact Readout supplied with any DIGI-Family product.

Specifications

Resolution	.1in .1mm .1cm or .01in .01mm .01cm or .001in .01mm .001cm or 1/16, 1/32 or 1/64 inch
Repeatability:	.001in or .01mm or .001cm
Readout Range:	± 999.999 in; ± 9999.99 mm; ± 999.999 cm; ± 399 63/64 in
Operating Temp:	32 to 120°F, 0 to 50°C;
Power:	One CR123 3V Lithium battery.

All ProScale products are MADE IN USA

SECTION 2 INSTALLATION & SET-UP

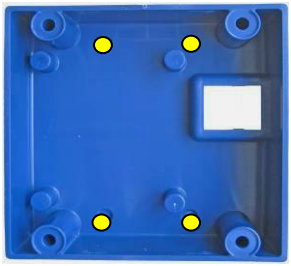
Mounting the Readout

Consult the *Installation* document you received for installation of the SCALE and ENCODER components of your measuring system.

Surface Mount Configuration

The Compact readout may be mounted:

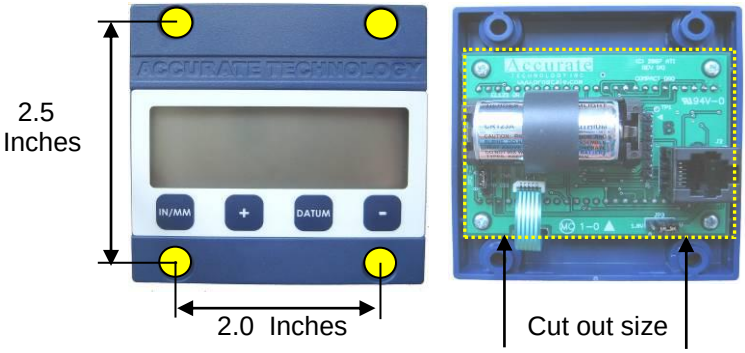
- Using Velcro or Double sided tape.
- Punch out any of the four holes from the inside of the back case.
- Using any of the four holes on the back of the case. **NOTE**: Use a #4 or M3 screw *not longer than 3/8 " (9mm).*



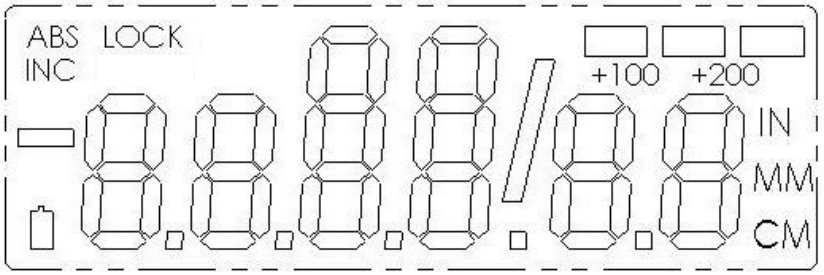
Panel Mount Configuration

A cutout should be made in the panel of at least 2.2 x 1.7 inches, (56 x 43mm) but no larger than 2.6 x 2.0 inches (66 x 50 mm).

Install the readout by screwing the four screws in the each corner of the front case directly into the panel. The rear half of the readout case is not necessary when it is used in a panel mounted configuration with a panel of sufficient thickness to hold the 4 mounting screws. If your panel is too thin to hold screws, you may 'sandwich' the panel between the front and rear halves of the readout case and install 4 screws long enough to extend through the entire assembly and into the rear half case of the readout.



The LCD

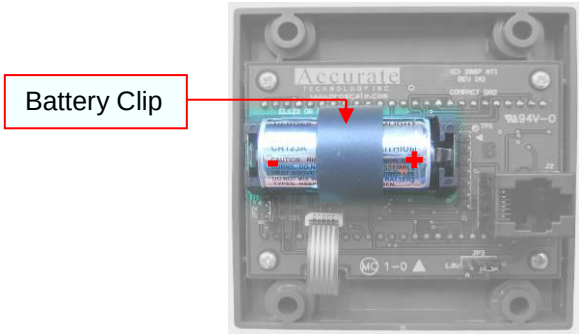


The above figure illustrates all the segments available on the Compact DRO

Changing the Battery

A low battery indicator will appear in the lower left corner of the screen on the DRO when a new battery is needed.

To replace the battery, remove the 4 screws in the corners of the readout case. Separate the two cases, remove the battery clip and the old battery. Install a new CR123 3V, or equivalent, Lithium battery, noting the proper orientation. Replace the battery clip and back case half, and reinstall the 4 screws.



Calibration

Once installed, if the direction of movement (+ and -) on the readout is opposite the desired direction, the programming should be changed.
See Programming Parameter Pr2

The DATUM key can be programmed to represent any known repeatable point. If a convenient zero point is easily set then this key can be used to represent and reset the DRO to 0.00.
However, if some other datum point is desired, the DATUM key can be programmed to force the DRO to that value.
See Programming Parameter Pr1

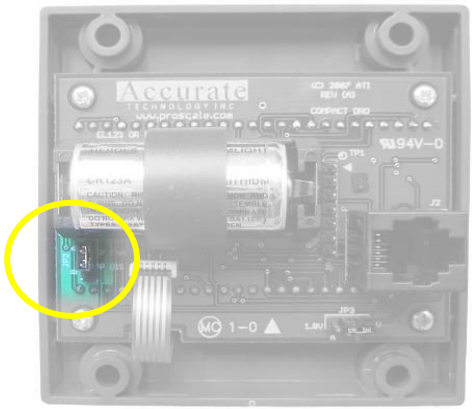
Circuit Board Jumpers

JP1 **FACTORY USE ONLY**

JP2 **Programming Lock-out**

The Front panel programming of the Compact readout can be enabled or disabled. Programming is enabled when the shorting jumper is installed on position A. To disable programming, install it on position B.

When programming is disabled, the user cannot access the programming functions via the front panel as described in the Section 3: PROGRAMMING. This provides a method of configuring the readout with specific parameters then preventing unauthorized or accidental configuration changes.



Jumper on position A:
Programming Enabled

Jumper on position B:
Programming Disabled

JP3 **Encoder Voltage**

The Compact readout is compatible with ProScale Models 150, 180, 250, 280 and 380 systems. JP3 is used to select the proper voltage necessary for these systems to operate correctly.

For ProScale Models 150 or 250 this jumper should be in the **A** position.

For ProScale Models 180, 280 and 380 this jumper should be in the **B** position.

SECTION 3 OPERATION

Readout Keys

The keys on your readout, illustrated below, have multiple functions.

Timing, (how long a key is depressed) is important. This manual uses the terms "*momentarily*" to describe a key press of less than 0.8 seconds and *"press and hold*" to describe a key press of 2 seconds or longer.

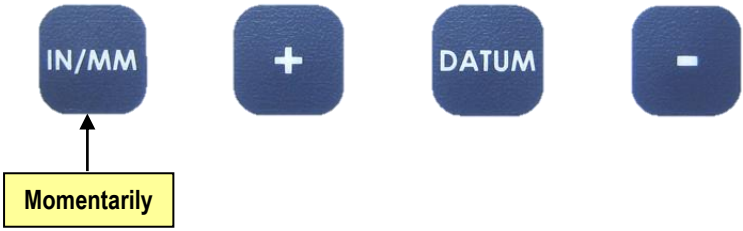
The execution of a key's function is performed on "key release" for momentary key presses and after the allotted time has elapsed for "press & hold" operations. **See Below.**

	Momentarily	Press & Hold
How long a key is pressed?	Less than .8 seconds	More than 2 seconds
When key function is executed?	On key release	While holding

Key Press and Function Summary

	Momentarily Press	Press & Hold
IN/MM	Cycles measurement units displayed: inches, fractions, mm	After 3 seconds toggles between ABS/INC
(in programming mode)	Increments program parameter list	no effect
+ (plus key)	increments displayed value	increments faster
(in programming mode)	increments parameter value	increments faster
DATUM	forces reading to programmed value	After 7 seconds displays FW version After 9 seconds enters Programming After 3 seconds exits programming
(in programming mode)	forces parameter to factory default	no effect
- (minus key)	decrements displayed value	Decrements faster
(in programming mode)	decrements parameter value	Decrements faster

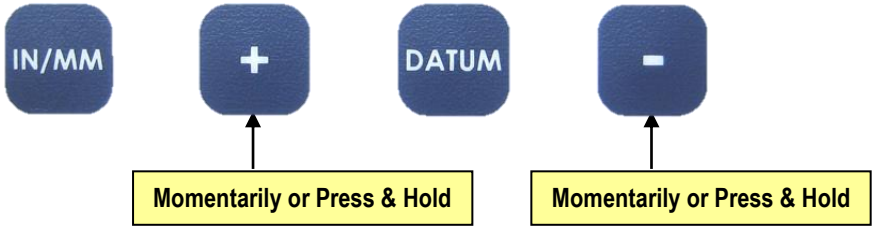
IN/MM key



The Compact readout can display measurement/position information in inches, fractions or millimeters. To change the display mode, momentarily press the **IN/MM** key. With each key press, the DRO cycles through decimal inches, fractions (16ths, 32nds, 64ths) and millimeters.

When the readout is in 1/16 or 1/32 inch fraction mode, a series of "bars" in the upper right corner of the LCD, each representing 1/64th of an inch, may appear. (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 would then indicate an additional 1/64 of an inch additional measurement.) For better resolution, switch to 1/32 or 1/64 mode, for better precision switch to a decimal mode.
When the measurement is greater than ± 99 63/64 inches, a **+100** and/or **+200** will illuminate in the upper right portion of the display 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 illuminated on the display. If the measurement is -307 23/64 inches, - 7 23/64 , **+100** and **+200** will be illuminated on the display.
See Programming Parameter Pr11

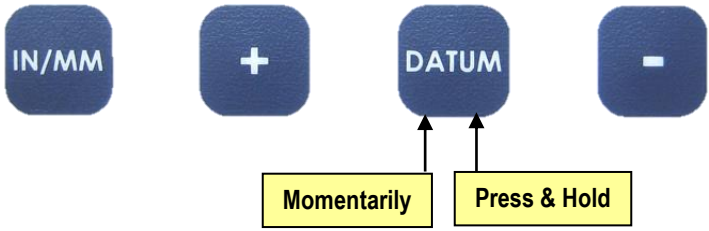
+ & - Keys



Momentarily pressing the **+** or **-** key increments or decrements the currently displayed value by one unit of measurement.

Pressing and holding the **+** or **-** key will cause the displayed value to change continuously. Continue pressing the key to cause the amount of change to speed up. This allows for quick adjustments over a large range of values. These keys may be locked out to prevent accidental offset entries.
See Programming Parameter Pr3

Datum Key



Momentarily pressing the **DATUM** key forces the readout to a user programmed value. This can value can be zero or any other displayable value.
See Programming Parameter Pr1

Pressing & Holding the **DATUM** key:

- For 7 seconds will display the firmware version.
- For 9 seconds will enter programming mode.
- For 3 seconds will exit programming mode.

The **DATUM** key can also be locked out to prevent accidental entries.
See Programming Parameter Pr3

Readout Functions

Absolute vs Incremental Measurements

The Compact readout provides the ability to make relative, or incremental, measurements and still retain the measurements system's absolute position in memory. To enter the Incremental (or return to Absolute) measurement mode, press and hold the **IN/MM** key for 3 seconds. The **ABS** or **INC** indicator will illuminate on the display.

While in Incremental mode, the **+** and **–** keys are used to set offsets and the **DATUM** key is used to zero the display.

Example of an Incremental Measurement (with no offsets):

1) Enter the incremental mode (press and hold the **IN/MM** key 3 seconds.)
2) Make a measurement.
3) Momentarily depress **IN/MM** or **DATUM** key to re-zero the readout.
4) Make another measurement.
5) Repeat as necessary.

Example of an Incremental Measurement (with offsets):

1) Enter the incremental mode (press and hold the **IN/MM** key 3 seconds.)
2) Set the desired offset by depressing the **+** or **–** key.
3) Make a measurement.
4) Momentarily depress **IN/MM** key to reset the readout and apply the offset entered previously, or momentarily depress the **DATUM** key to re-zero the display before the next measurement.

NOTES:

1. Offsets are stored when leaving the Incremental mode. Any offsets will be recalled the next time you switch from Absolute to Incremental mode.

2. While in Incremental mode, the Units of Measurement cannot be changed. If the display is reading **mm** when you enter the INC mode you cannot change to **inches** without first returning to the ABS mode.

Lock

The user can lock-out the operation of the **+, DATUM** and **–** key functions to prevent accidental changes of the currently displayed value.
To lock these keys set
See Programming Parameter Pr3.

Auto Off

The compact readout turns itself off to conserve battery power. When Auto off is enabled, pressing any key or movement of the encoder will wake up the readout with no loss of data.
See Programming Parameter Pr12.

Restore to factory settings

Remove the battery. Press and hold **IN/MM** key while reinstalling the battery.

Error Codes

What does no Enc mean?

If the Encoder is off the Scale, or the Encoder cable is unplugged from the readout, **no Enc** will appear on the display. To clear the error:

1. Be sure the encoder is on the scale.
2. Connect the encoder to the readout.
3. Unplug the encoder from the readout for 5 seconds and then reconnect.

What does b FAIL mean?

When the readout displays this message it means the battery voltage has dropped to a level where reliable operation is no longer possible. Install new batteries to clear this message.

What does P FAIL mean?

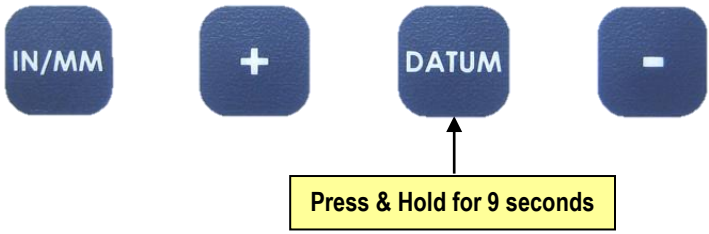
When the readout displays this message it means the battery voltage has dropped to a level where reliable programming is not possible. Install new batteries to clear this message.

Programming

Several functions of this readout are user programmable. The following describes what features and functions are available and how to change the factory defaults to customize the system to suit your application needs.

Enter Programming

Press and hold the **DATUM** key for 7 seconds. After approximately 7 seconds the readout firmware version (**C 1.xxx**) will be displayed for 2-3 seconds and then the readout will enter programming mode. **PR 1** is displayed, immediately followed by the programmed value for Pr1. Release the **DATUM** key. You are now in programming mode.



Once you are in the Programming mode, momentarily pressing the **IN/MM** key will advance through the Programming Parameter list, first displaying the Programming Parameter number, Pr x, then the currently programmed value for that parameter.

Momentarily press the **+** key to increase the parameter value setting.

Momentarily press the **-** key to decrease the parameter value setting.

Momentarily press **DATUM** to reset the parameter to the factory default value.

Exit Programming

Press and hold the **DATUM** key for 3 seconds.

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

Programming Parameters

Programming Parameters are listed below. Values in **[ ]** are the available range of values that can be programmed for that parameter.
Factory defaults are shown in **Bold Red.**

NOTE: Programming parameters may not be sequentially numbered due to firmware differences between systems and provision for future enhancements and features.

Pr 1 – DATUM Key Value **[0** to ± 999.999in**]** or **[0** to ±9999.99mm**]**
The programmed value that will be recalled whenever the DATUM key is pressed during normal operation.
Default = 0

Pr 2 – Reading Direction **[0** or 1**]**
This parameter controls the sign of travel (positive vs negative) when the measuring system is moved.
Default = 0

Pr 3 – Key Lockout **[0** or 1**]**
This parameter controls the operation of the +, -, and DATUM keys. If enabled, (set to 1), these keys will not function and the **LOCK** symbol will appear on the display. This prevents accidental changes when depressing these keys during normal operation.
Default = 0

Pr 4 – Resolution **[**1, 2 or **3]**
This parameter sets the number of places to the right of the decimal point on the display. When the Compact DRO is in a decimal mode (in, mm or cm) it will auto-range to the next resolution if the value is too large to be displayed in the current resolution but is displayable in an alternate resolution.
A value of **1** will display x.x.
A value of **2** will display x.xx
A value of **3** will display x.xxx
Default = 3
NOTES:
Decimal inch mode has a maximum of 3 places.
Millimeter mode has a maximum of 2 places (even if parameter is set to 3.)
Fractions mode is not affected by this setting.

Pr 5 – Movement Required for Readout Auto-On **[**0.3 to 10mm**]**
This parameter sets the amount of encoder, or system, movement required to automatically wake up the digital readout when it is turned off.
Default = 0.1mm

Pr 11 – Displayed Measurement Units **[0 to 6]**

This parameter controls the type of measuring units that will be displayed on the readout.

The table below illustrates the possible combinations of measuring units that may be configured for the Compact readout by changing the value of this programming parameter.

Default = 0

Pr 11 Parameter Setting	Displayable Units
0	All inch units, metric in millimeters
1	Millimeters only
2	Decimal inches and millimeters
3	Decimal inches and centimeters
4	All inch units, metric in centimeters
5	Centimeters only
6	Decimal inches only

Table 3 Display Units

Pr 12 – Auto-Off Time **[0 to 240, 15]**

This parameter allows changing of the amount of time before the readout turns off to conserve battery power. The value of this parameter represents the number of minutes of idle operation (no movement or key presses) before the display turns off.

When Auto off is enabled, pressing any key or movement of the encoder will wake up the readout with no loss of data.

A value of '**0**' disables the auto off feature (Readout is always ON).

Default = 15

Pr 13 – Linear Scaling Multiplier **[0.0001 to 99.9999]**

This parameter sets a linear multiplier correction factor in the readout that is applied to the actual measurement and then the adjusted value is displayed on the readout. This is useful for instance if you would like to display half, double or any other value that can be achieved by multiplying the amount of actual movement by the value of the parameter setting.

Default: 1.0000

Pr 14 – ProScale Model Compatibility **[0 or 1]**

This enables or disables compatibility among ProScale systems.

Set to **0** for ProScale Model 150-10 and all ProScale Models 180 and 280.

Set to **1** for ProScale Model 150-18 and all ProScale Model 250 systems.

Default = 0

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