

# Accurate

TECHNOLOGY INC.

*Linear Digital Measuring Systems*

## **ProScale LCD Readout Quick Start Guide**



This Guide includes basic operation instructions for  
**950, General Purpose, Basic & In-Panel**  
LCD Readouts

For the **Complete** OPERATION Manual  
go to [www.proscale.com/manuals.htm](http://www.proscale.com/manuals.htm)  
Version 3.200 and Above

**LCD Readout Quick Start**

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**PRE-CONFIGURED PARAMETERS FOR THIS READOUT:**

**READOUT SERIAL #** \_\_\_\_\_

**PARAMETER 2 (Reading Direction)** \_\_\_\_\_

**PARAMETER 13 (Linear Multiplier)** \_\_\_\_\_

**PARAMETER 14 (ProScale Technology)** \_\_\_\_\_

If your ProScale looks like this: **Parameter 14 should be set to 1**



If your ProScale looks like these: **Parameter 14 should be set to 0**



If your ProScale looks like this: **THIS READOUT IS NOT COMPATIBLE**



**Readout Specifications**

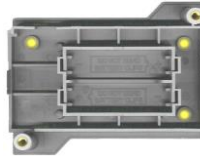
- Display Range:**  $\pm 999.999$  in or  $\pm 9999.99$  mm or  
 $\pm 999.999$  cm or  $\pm 399$  63/64 in
- Resolution:** .1in .1mm .1cm 1/16 or  
.01in .01mm .01cm 1/32 or  
.001in .01mm .001cm 1/64 or  
.0005in .01mm .001cm
- Repeatability:** .001in or .01mm or .001cm
- Operating Power:**  
Basic: 1 CR123\* 3V Lithium battery  
General Purpose: 1 CR123\* 3V Battery or 12-24VDC  
In-Panel: 1 CR123\* 3V Battery or 12-24VDC  
950 Series: 1 CR123\* 3V Lithium battery
- Operating Temperature:** 32 to 120°F, 0 to 50°C

\* Or equivalent

### **Installation: 950, GP, & Basic**

Surface Mount Readouts may be mounted:

- Using Velcro or Double sided tape
- Using 3 holes inside of the case
- Using any six holes on the back which may be tapped for M2 or 4-40 screws.



### **Installation: 1/4 DIN In-Panel**

A cutout should be made in the panel at least 90mm x 90mm (3.6 x 3.6 inches), but no larger than 93mm x 93mm (3.7 x 3.7 inches). The cases of the Readout are designed to "sandwich" panel thicknesses between 3mm (0.125") and 20mm (0.750"). If the panel is thinner than 3mm (0.125 in), shorter screws must be used or damage to the front cover of the Readout will occur.



### **Battery Replacement: 950, GP, & Basic**

Remove the screws in the upper right and lower left corners. Pull the cover off. Remove the Battery Clip and the old battery and install a new CR123 battery noting the proper orientation. Replace Battery Clip, the cover and screws.

### **Battery Replacement: In-Panel Readout**

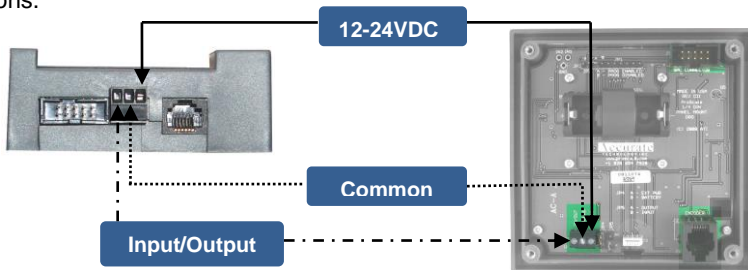
Remove the screws holding the back cover in place. Pull the cover off. Remove the old battery. Reinstall a new CR123 battery, noting the proper orientation. Replace the cover and tighten the screws.



When the battery needs to be replaced, a low battery indicator will appear in the lower left corner of the LCD. **When battery voltage drops below 2.6v, the Readout will turn itself off until the batteries are replaced.**

### **12-24VDC Operation**

The General Purpose and the In-Panel Readouts also operate on 12-24VDC. The General Purpose Readout uses a multi-purpose plug-in connector for power (as well as input and output signals). The In-Panel Readout uses screw terminals for these connections.



When using Readouts powered with 12-24VDC, the Scale and the Readout common must be connected. Proper connections will eliminate unstable readings.

**Models 150 & 250 system using Readouts powered by 12-24VDC MUST use Scales, & Encoders with part #'s end in 'G'. (ie 701-1500-xxxG & 700-x5xx-xxxG)**

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## **Initial Set-up**

In most instances it will be desirable to set some initial parameters such as a reference point, measurement units and resolution for your application.

**Measurement Units:** The measurement units that are displayed (inch, mm, cm) are selected with the UNITS Key.

**Current Position:** The Readout allows the current position to be easily configured, using the +, -, & (optionally) DATUM Key.

**Reference Point:** The Readout allows a reference point (zero or other value) to be easily recalled using the DATUM Key. The value of this reference point is programmed at Programming Parameter Pr1.

**Reading Direction:** The direction of the reading as the measurement system is moved is programmed using Programming Parameter Pr2.

**Resolution:** The resolution of the displayed units is programmed using Programming Parameter Pr4.

## **Key Timing**

Several keys on the Readouts have multiple functions. The function executed when the key is depressed is dependent on how long the key is depressed. Therefore, how long the key is depressed is important.

This manual uses the term "*Momentarily*" to describe a key depression of less than .8 seconds, and "*Press and Hold*" to describe a key depression of longer than 1 second.

	<b><i>Momentarily</i></b>	<b><i>Press &amp; Hold</i></b>
<b>How long a key is pressed?</b>	Less than .8 seconds	More than 1 second
<b>When is the key function executed?</b>	On key release	While holding

For *Momentary* key operations, the Function is executed when the key is released. For *Press & Hold* operations, the Function is executed after the key has been depressed for the prescribed amount of time.



	<b><i>Momentarily</i></b>	<b><i>Press &amp; Hold</i></b>
<b>On/Off Key</b>	Turns Readout power On or Off	No effect
<b>Units Key</b>	Cycles through measurement units: inches, fractions, mm	No effect
<b>Plus (+) Key</b>	Increments displayed value	Increments faster
<b>Datum Key</b>	Forces displayed reading to programmed Datum value	After 6 seconds displays battery voltage After 9 seconds displays Temperature
<b>Minus (-) Key</b>	Decrements displayed value	Decrements faster

## On/Off Key

*Momentarily* depress the **ON/OFF** key to turn the Readout on or off.  
(The Readout Firmware version displays for two seconds at power-on.)



Momentarily Depress

## Units Key

*Momentarily* depressing the **UNITS** key will display measurement/position information in inches, fractions or millimeters (or centimeters). With each key press, the readout will cycle through decimal inches, fractions (16ths, 32nds, 64ths) and millimeters (or centimeters).



Momentarily Depress

## Plus (+) & Minus (-) Keys

*Momentarily* depressing the **+** or **-** key will increment or decrement the current displayed value by one unit of measurement (in, mm, cm or 1/64).  
*Press & Hold* the **+** or **-** key to continue to increment or decrement the displayed value. The longer the key is depressed, the faster changes occur. **See Pr3 – Key Lockout**



Momentarily Press, or Press & Hold

## Datum Key

*Momentarily* depressing the **DATUM** key forces the Readout to a user programmed value. This can be zero or any other displayable value.

**See Pr1, Pr3– Datum Key, Key Lockout**



Momentarily Press, or Press & Hold

## Key Lock

The Readout provides a function that can “lock-out” the position adjustment keys (**+**, **DATUM** & **-**) to prevent accidental changes of the displayed value.

To activate Key Lock: *Press and Hold* the **ON/OFF** key and, while pressing it, *Momentarily* depress the **UNITS** key, then release both keys. The word **LOCK** will be displayed in the upper left corner of the LCD.

When **LOCK** is displayed, the **+**, **DATUM** and **-** keys become inactive.

To de-activate the Key Lock: *Press and Hold* the **ON/OFF** key and, while pressing it, *Momentarily* depress the **UNITS** key, then release both keys. **See Pr3 – Key Lockout**



Press & Hold

Momentarily Press



## Reading Direction

If the direction of readings, (increasing vs. decreasing) is opposite the desired direction, **See Pr2 – Direction of Travel**

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## Resolution

Four selectable display resolutions are available. Fractional inches mode is not affected by program changes. **See Pr4 – Display Resolution**

## Measurement Units

The measurement units displayed when pressing the **UNITS** key are user configurable. **See Pr11 – Displayed Units**

## Auto on/off

To prolong battery life, the Readout has a built-in function that turns off the Readout after a period of no movement or key activity.

**See Pr12 – Display Off Time**

## Linear Scaling

This function is useful when the actual measurement or position must be multiplied or divided before being displayed on the Readout. This function has a range of 0.0001 to 9.9999 allowing the actual measured value to be multiplied or divided in very small or very large increments. **Use care when enabling this function. It will force the readout to display a value different from the actual measurement or position.**

**See Pr13 – Linear Compensation**

## Segment Offset

This function applies **ONLY** to Models 150, 250 & 950 systems and all ProScale systems measuring more than 17 inches (430mm) **AND** employing Absolute technology.

If the scale on your system looks like this →



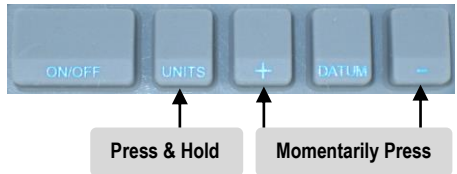
In certain situations, if the Encoder is disconnected from the Readout and then moved along the Scale or, if the Encoder is moved too quickly along the Scale, the measurement may be incorrect. To correct this situation use the

### **SEGMENT OFFSET ADJUSTMENT.**

To add one segment to the displayed value,

*Press and Hold* the **UNITS** key and then *Momentarily* press the **+** key. The display will increase by 430.07mm (16.932 inches). To subtract one segment from the displayed value, *Press and Hold* the **UNITS** key and then *Momentarily* press the **-** key.

This function operates only when Pr14 is set to 1. **See Pr14 – ProScale Compatibility**



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**These following functions are available on General Purpose and 950 Readouts with the Auxiliary keypad pictured here: → → →**

## Absolute / Incremental

These Readouts have two measurement indexes. One is called ABS (absolute) and the other INC (incremental). The ABS measurement setting is designed to allow a user to set an origin point referenced to a fixed or known position. The INC measurement setting is designed to take relative or incremental measurements from one point to another. The settings operate independently allowing separate position offsets to be programmed for ABS and INC. The origin, or known



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position of the measuring system is not lost when using the INC measurement mode and is recalled and displayed when the Readout is returned to ABS mode.

### **Absolute (ABS)**

The Readout automatically enters ABS mode when power is first applied. This is indicated by **ABS** in the upper left corner of the LCD. While in ABS mode, all position measurements are related to the current system reference point.

To enter INC (Incremental) mode, *Press and Hold* the **ABS/INC** key for 3 seconds.



### **Incremental (INC)**

While in the INC mode, **INC** is shown in the upper left corner of the LCD. When INC mode is initially entered, the displayed position will change to reflect a new reference point at the current position of the Encoder. This is typically a position of zero (**0.00**) but may be changed by using the **+** or **-** Key to enter an offset. Moving the Encoder 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 Readout will again change to zero (or the previously programmed offset). To return to the ABS mode, *Press and Hold* the **ABS/INC** key for 3 seconds. **See Pr22 – ABS/INC Key Operation**

### **Send**

The General Purpose and 950 Readouts have an output port that may be used to send data to another device via a wireless or wired data converter.

To initiate a data transmission, momentarily press the **SEND** key. This will cause **Snd** to be displayed on the Readout.

**NOTE: When using a Wired Data Converter with Model 150 or 250 systems, Scales and Encoders with part numbers ending in 'G' MUST be used.**



**The following functions require additional user programming. For detailed programming instructions download the complete OPERATION Manual at [www.proscale.com/manuals.htm](http://www.proscale.com/manuals.htm)**

### **Offset Addition**

Offset addition allows values to be pre-programmed that are then added to the measurement, and the sum is displayed on the LCD.

**See Pr30, 31, 32, 33 & 34 – Offset Addition**

### **Monitor**

The Readout can monitor a position to detect drift or measurement variance.

If the Encoder moves outside the programmed tolerance the LCD reading flashes, indicating a drift condition. **See Pr24 – Special Functions**

### **Hold**

The Readout provides a feature that allows the displayed measurement or position to be “held”. This allows information to be captured on the Readout and held for later viewing regardless of the current Encoder position. **See Pr24 – Special Functions**

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## Delete

When a ProRF SPC Transmitter is used, a “delete” message can be sent to remove the last measurement from a list. **See Pr24 – Special Functions**

## Go/NoGo

In certain applications, it may be desirable to program upper and lower measurement tolerances to measure parts. If the measurement falls within the programmed tolerance, a “Go” condition occurs. If the measurement is not within the upper or lower tolerance, a “No Go” condition occurs. **See Pr24 – Special Functions**

## Measurement Accumulator

This Function allows multiple measurements to be made, and the sum displayed on the Readout. **See Pr24 – Special Functions**

## Statistics

This Function can perform some basic statistical analysis without the use of SPC data collection on a PC or other device. i.e.: Measurement Count, Minimum Measurement, Maximum Measurement, and Average Measurement in standard or trimmed mode.

**See Pr24 – Special Functions**

## Upper/Lower Limits

All LCD Readouts can display either **LL**, for Lower Limit, or **UL**, for Upper Limit, if a user programmed upper or lower reading is exceeded.

**See Pr27, Pr28 and Pr29 – Upper/Lower Limits**

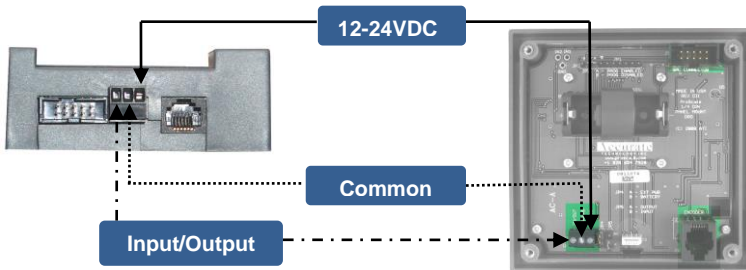
## Input/Output Signals

An external connector and internal circuit board pads on the General Purpose Readout, and the on-board connector and circuit board pads on the In-Panel Readout provide connection points for external DC power, Output Signal connection and Auxiliary Key Pad Input connections.

**See Pr35 and 36 – External Key Input**

**See Pr37 and 38 – Programmable Output**

**Input/Output** functions are mutually exclusive and cannot be enabled concurrently.



**CAUTION: DO NOT APPLY VOLTAGE to Input/Output connections. These should only be switched from OPEN to GROUND.**



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## **Compensation**

Temperature and Non-Linear Compensation Functions are ONLY available on General Purpose Part # 700-1600-236 and 950 Series Readouts with firmware ending in "C". The firmware version is displayed on power-up, i.e. **P3.xxxC**.

### **Temperature Compensation**

This Function provides automatic compensation of measurement variations caused by changes in the ambient temperature where the measurement system is used. Additionally, coefficients of expansion other than aluminum may be programmed and the resulting measurement compensated for the different expansion rates based on a temperature sensor inside the Readout.

**See Pr41, 42, 43 and 44 – Temperature Compensation**

**Note:** Parameters **Pr41, 42, 43 & 44** are preset at the factory for any products ordered with **Enhanced Accuracy**.

### **Non-linear Compensation**

The Non-Linear Compensation Function is used to enhance the accuracy of the Total Measurement System by creating a table of correction values in the Readout, based on known measurement points along the length of the Measurement System.

**See Pr39 and 40 – Non-Linear Compensation**

ProPanel HD-E and ProTable systems purchased with the *Enhanced Accuracy* option are pre-configured at the factory.

ProKit Model 580 & 590 users **must perform** the initial error compensation procedure on the 'total measuring environment' in order for this function to be meaningful.

**NOTE:** When operating the Readout in Compensated mode, if the encoder is positioned outside the calibrated (corrected) range of operation, the LCD will display **No Co** alternately with the current position. This is normal and indicates that the system is operating outside the calibrated measuring range and has a reduced measuring accuracy.

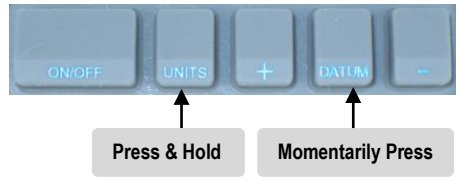
**For detailed instructions, please download the complete **OPERATION Manual** at [www.proscale.com/manuals.htm](http://www.proscale.com/manuals.htm)**



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## Entering Programming Mode

*Press and Hold* the **UNITS** key while *Momentarily* pressing the **DATUM** key. The LCD will briefly display: **PG on** (Programming On). Release both keys. The LCD will then display **Pr 1**, (indicating Programming Parameter #1) for about 1 second, then display the value stored for **Pr1**.



## Navigate Programming Mode

*To move up the Programming Parameter list:*

*Momentarily* press the **UNITS** key to advance up through the Programming Parameter list. The Readout will display the Parameter number, then the current programmed value.



*To move down the Programming Parameter list:*

*Press and Hold* the **ON/OFF** key and *Momentarily* press the **UNITS** key to move backward through the Parameter list.



*To Increase a Parameter value:*

*Momentarily* press the **plus (+)** key while the Parameter value is displayed.



*To Decrease Parameter value:*

*Momentarily* press the **minus (-)** key while the Parameter value is displayed.



*To Reset a Parameter value to the Factory Default setting:*

*Momentarily* press the **DATUM** key while the Parameter value is displayed.



## Exit Programming Mode

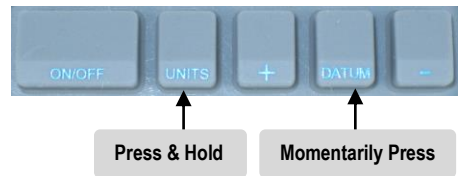
*Press and Hold* the **UNITS** key until the Readout displays **Pr x** (where *x* is the current parameter number)

*Momentarily* press the **DATUM** key.

The LCD will display **PG off**

Release both keys.

The Readout will return to normal operation.



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

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## **Programming Parameters**

Values in brackets [ ] represent the range of values available for that Parameter.

**Default Values for each Parameter are shown in RED**

**NOTE: Not all Parameters are available on all Readouts.**

**Pr1 – Datum Key** [0 to ± 999.999in or mm] **Default = 0.00**

**Pr2 – Direction of Travel** [0 or 1] **Default = 0**

**Pr3 – Key Lockout** [0 or 1] **Default = 0**

Pr3 Setting	Key Action
0	+, - and Datum keys respond normally
1	+, - and Datum keys are locked

**Pr4 – Display Resolution** [1, 2, 3 or 4] **Default = 3**

Pr4 Setting	Display Resolution
1	x.X
2	x.XX
3	x.XXX
4	x.XXXX

**Pr5 – Movement to Wake Readout** [0.3 to 10mm] **Default = 0.1mm**

**Pr6 – Fractional Rounding** [0 or 1] **Default = 0**

Pr6 Setting	Fractional Rounding
0	Fractions round down to least 64th
1	Fractions round to nearest 64th

**Pr11 – Displayed Units** [0 to 6] **Default = 0**

Pr11 Setting	Displayable Units
0	All inch units and millimeters
1	Millimeters only
2	Decimal inches and millimeters
3	Decimal inches and centimeters
4	All inch units and centimeters
5	Centimeters only
6	Decimal inches only

**Pr12 – Display Off Time (in minutes)** [0 to 240] **Default = 15**

**Pr13 – Linear Compensation** [0.00001 to 9.99999] **Default = 1.00000**

**Pr14 – ProScale Compatibility** [0 or 1] **Default = 1**

Pr14 Setting	Technology Supported
0	Model 180/190, 280/290, 380/390 and 580/590
1	Model 150, 250 and 950 Systems

**Pr21 – NOT USED**

**Pr22 – ABS/INC Key Operation** [0 or 1] **Default = 0**

Pr22 Setting	Key press to enter INCRemental mode
0	Press and Hold ABS/INC key (1.2 sec)
1	Momentarily depress ABS/INC key (< 1 sec)

**Pr23 – Auxiliary Keypad Enable** [0 to 3] **Default = 3**

Pr23 Setting	ABS/INC and SEND keys
0	Disable Both Keys
1	Enable abs/inc Key only
2	Enable send Key only
3	Enable Both Keys

**Pr24 – Special Functions** [0 to 4] **Default = 0**

Pr24 Setting	Advanced Readout Function
0	None
1	F3 = MON, F4 = HOLD, F2 = Delete
2	Go/NoGo
3	Measurement Accumulation
4	Statistics

**Pr25 – Special Function Variable** [0 to 16] **Default = 0**

**Pr26 – Drift Monitor Tolerance** [.001 in to 120 in] **Default = .01in**

**Pr27 – Upper/Lower Limits** [0 or 1] **Default = 0**

Pr27 Setting	Upper/Lower Limits Function
0	Function DISABLED
1	Function ACTIVE

**Pr28 – Lower Limit** [0 to ± 999.999in or mm] **Default = 0.000in.**

**Pr29 – Upper Limit** [0 to ± 999.999in or mm] **Default = 5.000in.**

**Pr30 – Offset Addition** [0 to 4] **Default = 0**

Pr30 Setting	Offsets Enabled
0	None
1	Offset 1 Enabled
2	Offsets 1 & 2 Enabled
3	Offsets 1, 2 & 3 Enabled
4	Offsets 1, 2, 3 & 4 Enabled

**Pr31 – Offset 1** [0 to ± 999.999in or mm] **Default = .500in.**

**Pr32 – Offset 2** [0 to ± 999.999in or mm] **Default = 2.000in.**

**Pr33 – Offset 3** [0 to ± 999.999in or mm] **Default = 3.000in.**

**Pr34 – Offset 4** [0 to ± 999.999in or mm] **Default = 3.000in.**

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**Pr35 – External Key Input 1** [0 to 11] **Default = 0**

**Pr36 – External Key Input 2** [0 to 11] **Default = 0**

Value of Pr35 & 36	Key
0	None
1	On/Off
2	Units
3	Plus
4	Datum
5	Minus
6	ABS/INC
7	Send
8	F1
9	F2
10	F3
11	F4

**Pr37 – Programmable Output Polarity** [0 or 1] **Default = 0**

Pr37 Setting	Output Polarity
0	Normally Open (NO)
1	Normally Closed (NC)

**Pr38 – Programmable Output Function** [0 to 3] **Default = 0**

Value of Pr38	Function
0	No Operation
1	Monitor (Drift) Operation
2	Upper/Lower Limits
3	Go/No Go

**Pr39 – Non-Linear Compensation** [0 or 1] **Default = 0**

Pr39 Setting	Non-Linear Compensation
0	Off
1	On

**Pr40 – Non-Linear Interval** [0.5 to 10.0 in.] **Default = 5.000in.**

**Pr41 – Temperature Compensation** [0 or 1] **Default = 0**

Pr41 Setting	Temperature Compensation
0	Off
1	On

**Pr42 & Pr43 NO LONGER USED**

**Pr44 – Temp. Comp. Coefficient** [10 to 999] **Default = 150**

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## Resetting All Parameters

To reset all programming parameters to their Factory Default settings:

1. Turn the Readout power off.
2. Insure Jumper JP3 is in position A
3. *Press and Hold* the **ON/OFF** and **UNITS** keys for 10 seconds.



The Readout will:

1. Perform a full segment LCD test
2. Display the current firmware version
3. **Reset all programming parameters to factory default values. NOT recommended unless instructed by factory technician.**

**NOTE:** Resetting the Readout to factory default settings does not erase the Non-Linear compensation table.

## Frequently Asked Questions

### **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 LCD. To clear the error:

1. Be sure the Encoder is on the Scale and properly oriented (M150/250/950)
2. Unplug the Encoder from Readout for one second and then reconnect
3. Connect the Encoder to the Readout.

### **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 a new battery 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 a new battery to clear this message.

### **The Readout numbers appear to be random. (Model 150, 250 & 950)**

Be sure the Encoder is oriented correctly on the Scale. One end of the Scale is marked black. Be sure that the arrow on the Encoder is pointed in this direction.

### **The Readout does not change, or changes very little, as it moves.**

1. The Readout is in the HOLD mode.
2. The Encoder is on the Scale backwards. (Model 150, 250 & 950)
3. The Scaling factor is set very low.

### **The Readout alternately shows “no Co”.**

The Readout has non-linear compensation enabled and either:

1. The position of the encoder is outside the calibrated range  
*Move the encoder to a position within the calibrated range.*
2. The system datum has changed  
*Make sure the system datum is set properly.*
3. The Readout is in INC mode  
*Return to ABS mode and check Datum.*

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**Thank you for choosing a ProScale Product,**

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