

Accurate

TECHNOLOGY INC.

Linear Digital Measuring Systems

ProScale™

Model 150

Model 250



**User's Manual for:
ProScale Model 150 & 250 Systems
& All ProScale Products using the**

General Purpose LCD Digital Display

Firmware V2.0 and Higher

Warranty

Accurate Technology, Inc., warrants the Model 150 and Model 250 ProScale against defective parts and workmanship for 3 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. (Including freight or transportation charges during the first 30 days).

Except as expressly provided in this warranty, Accurate Technology, Inc., does not make any warranties with 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.

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SAFETY WARNING

**Before installing ProScale on any machinery:
Turn off the machine and disconnect the power.**

SAFETY WARNING

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FCC Statement

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Operation with non-approved equipment is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment.

FCC ID: SMIGPDS

**This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:**

- (1) This device may not cause harmful interference and**
- (2) This device must accept any interference received including interference that may cause undesired operation.**

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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) and a digital display. It uses capacitive encoder technology, the same technology used in digital calipers.

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.

ProScale is ideal for most measuring requirements up to 6m (20ft.) where high accuracy, 10 µm, (approximately .0005") is not needed, but affordable repeatability, (better than a tape measure), or accuracy to 50 µm (.002") is desired. Because ProScale shows the exact measurement on its display, it eliminates the guesswork involved in reading and interpreting tape measures, scales & pointer, or shaft encoders. It is compatible for retrofitting, or as original equipment, on most machinery or for any general purpose measurement application where data is collected (SPC, RS232, RS485) and/or digital accuracy and repeatability is desired.

What This Manual Includes

This manual includes information for:

- **ProScale Model 150 and Model 250 measurement systems with General Purpose LCD Digital Displays.**
- **General Purpose LCD Digital Display operation instructions for other ProScale products (covered in separate manuals).**
- **General Purpose LCD Digital Displays with Firmware V2.0 and higher.**

The General Purpose LCD Digital Display comes in the following configurations:

Surface Mount



Basic Programming
2AA Batteries

OLD P/N 701-1600-120
NEW P/N 700-1600-220



Fully Programmable
2AA Batteries
SPC output

P/N 701-1600-100
P/N 700-1600-200



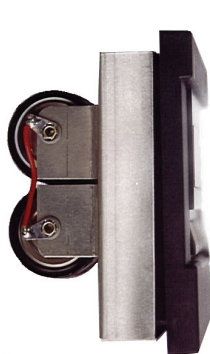
Fully Programmable
24VDC
Limit Signal Output
LCD Backlighting
P/N 701-1605-100
P/N 700-1600-205

1/4 DIN Panel Mount



Fully Programmable
2D Batteries
SPC output

OLD P/N 701-1570-100
NEW P/N 700-1600-400



Fully Programmable
24VDC
Limit/Monitor Signal Output
LCD Backlighting
P/N 701-1560-100
P/N 700-1600-300

The above displays are direct replacements for the following Digital Displays:

General Purpose	701-1600-001	Panel Mount, Battery	701-1570-001
General Purpose Basic	701-1600-020	Panel Mount, 24VDC	701-1560-001
Standard	701-1505-00x	Panel Mount, Battery	701-1525-00x
Basic	701-1500-00x	Panel Mount, 24VDC	701-1550-00x
SPC	701-1115-00x		
Programmable	701-1115-00x		
Incremental	701-2000-002		
Incremental	701-1495-00x		

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**, or encoder, contains a computer chip which transmits and receives signals to and from the scale using capacitive coupling. The received signal is used by the readhead to calculate its position to within 10 microns (10 μ m / .0004in). This position data is then sent to the digital **DISPLAY**, where it can be displayed in millimeters, centimeters, inches, or fractions and sent to an external data acquisition device.

Each **SCALE** and **READHEAD** uses either *Incremental* or *Absolute* encoder technology. Absolute, (often referred to as *ABS*) systems use a more robust and sophisticated method to measure position, resulting in a high immunity to electrical interference and one that does not forget its position when power is removed. The type of system you have (absolute or incremental) may be determined by the pictures and descriptions on the following pages of this manual, by reviewing our web site, by the label on the packaging, or by contacting your supplier.

Model 150	<i>Absolute Technology Measuring System Usually measures 250mm (10") or 450mm (18")</i>
Model 250	<i>Absolute Technology Measuring System Standard Sizes from 1.2m (4') to 6m (20')</i>

A close-up photograph of a green scale surface showing a repeating pattern of V-shaped conductive tracks.

Absolute (ABS) Style Pattern

Model 100	<i>Incremental Technology Measuring System (Discontinued 1999) Usually measures 250mm (10") or 450mm (18")</i>
Model 200	<i>Incremental Technology Measuring System (Discontinued 1999) Standard Sizes from 1.2m (4') to 6m (20')</i>
Select ProScale Products ie. ProPanel, ProStop, ProKits etc.	

A close-up photograph of a green scale surface showing a repeating pattern of vertical rectangular conductive tracks.

Incremental Style Pattern

Scales

Absolute

An (ABS) Absolute measuring technology system measures its actual position by reading a pattern which is unique at any given location over a segment length. The maximum length of a ProScale absolute segment is 430mm (16.932 in.). The segment must then repeat.



Consider the illustration above to represent a ProScale approximately 50 inches long. There are three absolute segments joined together. Within each segment the system is absolute. However, crossing over a segment joint now presents the readhead with information identical to what it read in the previous segment. At this point the system must be able to recognize that it has crossed a joint and therefore must add or subtract the value of 1 segment: 430mm. In fact, each time the readhead passes over a joint it must keep track of how many segments it has passed, and in which direction. This action is accomplished by the digital display and is transparent to the operator.

What does all this mean? If the readhead remains on the same absolute segment, it can have power removed, its position changed and power restored without loss of position information. However, if power is removed (readhead unplugged from Digital Display or batteries removed from Digital Display) *and* the readhead passes over a segment joint, the *transition* will not be recognized. When power is restored the system knows its absolute position on the new segment, but does not know how many segments it has passed, or in which direction. (Simply turning the digital display off does NOT constitute removing power. A small amount of power is still supplied to the readhead; only the LCD is turned off.)

General purpose digital displays provide the operator with a method to adjust the segment offset so the system displays the correct reading at all times without loss of accuracy.

See Section 4 for additional information on *Segment Offset Adjustment*.

All Absolute (ABS) scales have a “zigzag” pattern on a green laminate. Take care to not damage the green coating. There should also be a pattern “SPlice” approximately every 430mm (17in.). **To shorten (ABS) scales. Call Accurate Technology for assistance,** or visit: <http://www.proscale.com/other/absscalecut.htm>



Incremental

Simply stated, an Incremental system measures the distance it has traveled relative to a starting point. Incremental style scales have a repeating “bar” pattern on a green laminate. There should be a “SPLICE” approximately every 570mm (22in.). Incremental scales may be shortened if needed.

Incremental Style Pattern

Scales used on Absolute and Incremental systems should never be mixed.

Avoid drilling through the green portion of any scale. Any portion of the green that is drilled will not operate.

Shortening Scales

<http://www.proscale.com/support/faq.htm>

To shorten incremental scales follow these steps:

The scale has stainless-steel wires pressed into the side that could be damaged if not cut properly.

1. Clamp the wires so they do not pull away from the extrusion.
2. Using a hacksaw, cut through the aluminum extrusion.
3. Use a file or sanding tool to chamfer the cut end to the specifications shown in the illustration.
4. Remove all burrs.
5. Test the shortened scale by sliding a readhead on. There should not be any binding.

