Javelin D • Model PD644
Instruction Manual

- Measures DC Voltage up to 300 VDC
- 4 Digit Display, 0.56" (14 mm) High, Red LEDs
- Maximum/Minimum Display
- NEMA 4X, IP65 Front
- 4-20 mA Transmitter
- Universal Power Supply 85-265 VAC
- 12-36 VDC/12-24 VAC Power Option
- Two Relays Option
- RS-485 Serial Communication
- Modbus® RTU Option
- Copy Meter Settings to Other Meters
Disclaimer

The information contained in this document is subject to change without notice. Precision Digital Corporation makes no representations or warranties with respect to the contents hereof, and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.

Registered Trademarks

Modbus® is a registered trademark of Schneider Automation Inc. All other trademarks mentioned in this document are the property of their respective owners.

©2005-2015 Precision Digital Corporation. All rights reserved.

Visit our Web Site

www.predig.com
INTRODUCTION

The Javelin D is an easy to use digital voltmeter with built-in 4-20 mA isolated transmitter and RS-485 serial communication capability. The four front panel buttons provide quick and simple setup and programming. The optional Form C relays can be used for alarm indication or process control applications.

The Modbus® RTU serial communication upgrade enables the Javelin D Digital Voltmeter to operate as a Modbus® slave in RS-485 multi-point data acquisition systems.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>85-265 VAC Model</th>
<th>12-36 VDC Model</th>
<th>Options Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD644-6R3-14</td>
<td></td>
<td>24 VDC Transmitter Supply</td>
</tr>
<tr>
<td>PD644-6R5-14</td>
<td></td>
<td>2 Relays, 24 VDC Supply</td>
</tr>
<tr>
<td>PD644-7R3-04</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>PD644-7R5-04</td>
<td></td>
<td>2 Relays</td>
</tr>
</tbody>
</table>

All models may be powered from AC or DC. See Specifications for details.

Accessories

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDN-MODBUS</td>
<td>Modbus® RTU upgrade</td>
</tr>
<tr>
<td>PDA7485-I</td>
<td>RS-232 to RS-422/485 Isolated Converter</td>
</tr>
<tr>
<td>PDA7485-N</td>
<td>RS-232 to RS-422/485 Non-Isolated Converter</td>
</tr>
<tr>
<td>PDA8485-I</td>
<td>USB to RS-422/485 Isolated Converter</td>
</tr>
<tr>
<td>PDA8485-N</td>
<td>USB to RS-422/485 Non-Isolated Converter</td>
</tr>
<tr>
<td>PDX6901</td>
<td>Suppressor (snubber): 0.01 μF/470 Ω, 250 VAC</td>
</tr>
</tbody>
</table>

Plastic, steel, and stainless steel NEMA 4 and cast aluminum explosion-proof enclosures are available to house up to ten meters.

Visit our web site for details on all accessories.
# Table of Contents

INTRODUCTION .......................................................... 3
ORDERING INFORMATION ........................................... 3
SAFETY INFORMATION ............................................. 6
SPECIFICATIONS ...................................................... 7
  General........................................................................ 7
  Voltage Measurement Input ...................................... 8
  Safety Compliance .................................................. 8
  Relays Option .......................................................... 9
  Isolated 4-20 mA Transmitter Output ......................... 10
  Serial Communications ........................................... 10
INSTALLATION .......................................................... 11
  Unpacking .................................................................. 11
  Panel Mounting ......................................................... 11
  Connections ............................................................ 12
    Connector Labeling ............................................... 12
    Power Connections ............................................... 12
    DC Voltage Measurement Connections .................. 13
    Serial Communication ........................................... 14
    Relay Output Connections ...................................... 14
    Switching Inductive Loads ..................................... 15
    4-20 mA Output Signal Connections ....................... 16
SETUP AND PROGRAMMING ........................................ 17
  Front Panel Buttons and Status LED Indicators .......... 18
  Display Functions and Messages .................................. 19
  Main Menu ................................................................ 21
  Setting Numeric Values .......................................... 22
Setting Up the Meter (SETUP) ........................................ 22
  Setting the Relay Operation (RELAY) .......................... 23
  Relay and Alarm Operation ........................................ 26
  Scaling the 4-20 mA Analog Output (ROUT) ................ 32
  Analog Output when Display is Out of Range .............. 32
Programming the Meter (PROGRAM) ............................... 33
  Scaling the Meter (SCL) ........................................... 34
  Calibrating the Meter (CAL) ..................................... 34
  Recalibrating Process Inputs (ICAL) ......................... 35
<table>
<thead>
<tr>
<th>Setting Up the Password (PR55)</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locking the Meter</td>
<td>35</td>
</tr>
<tr>
<td>Unlocking the Meter</td>
<td>36</td>
</tr>
<tr>
<td><strong>Advanced Features Menu</strong></td>
<td>37</td>
</tr>
<tr>
<td>Advanced Features Menu &amp; Display Messages</td>
<td>38</td>
</tr>
<tr>
<td>Noise Filter (FLr)</td>
<td>39</td>
</tr>
<tr>
<td>Noise Filter Bypass (bYP5)</td>
<td>39</td>
</tr>
<tr>
<td>Serial Communications (SERL)</td>
<td>40</td>
</tr>
<tr>
<td>Select Menu (SELc)</td>
<td>40</td>
</tr>
<tr>
<td>Display Intensity (nty)</td>
<td>41</td>
</tr>
<tr>
<td>Meter Copy Function (COpY)</td>
<td>42</td>
</tr>
<tr>
<td>Internal Calibration (ICal)</td>
<td>44</td>
</tr>
</tbody>
</table>

**OPERATION**

- Front Panel Buttons Operation | 46
- Maximum and Minimum Readings | 47

**MOUNTING DIMENSIONS**

**TROUBLESHOOTING**

- *Diagnostics Menu (dAR)* | 49
  - Determining Software Version | 49
  - Factory Defaults & User Settings | 50
- Reset Meter to Factory Defaults | 52
- Troubleshooting Tips | 53

**USER INTERFACE QUICK REFERENCE GUIDE** | 54
Table of Figures
Figure 1. Panel Cutout and Mounting..................................................11
Figure 2. Power Connections.............................................................12
Figure 3. DC Voltage Signal Connections.........................................13
Figure 4. RS-485 Data Bus Connections .........................................14
Figure 5. Relay Output Connections..................................................14
Figure 6. AC and DC Loads Protection.............................................15
Figure 7. Low Voltage DC Loads Protection....................................15
Figure 8. 4-20 mA Transmitter Powered by Meter............................16
Figure 9. 4-20 mA Transmitter Powered Externally........................16
Figure 10. Meter Copy Connection....................................................42
Figure 11. Meter Dimensions – Side View ......................................48
Figure 12. Case Dimensions - Top View........................................48

SAFETY INFORMATION

CAUTION: Read complete instructions prior to installation and operation of the meter.

WARNING: Risk of electric shock.

WARNING
Hazardous voltages exist within enclosure. Installation and service should be performed only by trained service personnel.
## SPECIFICATIONS

*Except where noted all specifications apply to operation at 77°F (25°C)*.

### General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPLAY</td>
<td>0.56&quot; (14 mm) high, red LED&lt;br&gt;Four digits (-1999 to 9999), automatic lead zero blanking.</td>
</tr>
<tr>
<td>DISPLAY INTENSITY</td>
<td>Eight intensity levels</td>
</tr>
<tr>
<td>DISPLAY UPDATE RATE</td>
<td>Minimum of five times per second</td>
</tr>
<tr>
<td>OVERRANGE</td>
<td>Display flashes 9999</td>
</tr>
<tr>
<td>UNDERRANGE</td>
<td>Display flashes -1999</td>
</tr>
<tr>
<td>PROGRAMMING METHODS</td>
<td>Four front panel buttons, RS-485 interface, or cloning using Copy function</td>
</tr>
<tr>
<td>NOISE FILTER</td>
<td>Programmable from 2 to 199 (0 will disable filter)</td>
</tr>
<tr>
<td>RECALIBRATION</td>
<td>All ranges are calibrated at the factory. Recalibration is recommended at least every 12 months.</td>
</tr>
<tr>
<td>MAX/MIN DISPLAY</td>
<td>Maximum and minimum measured voltages stored until reset by the user or until power to the meter is turned off.</td>
</tr>
<tr>
<td>PASSWORD</td>
<td>Programmable password restricts modification of programmed settings.</td>
</tr>
<tr>
<td>NON-VOLATILE MEMORY</td>
<td>All programmed settings are stored in non-volatile memory for a minimum of ten years without power.</td>
</tr>
<tr>
<td>POWER OPTIONS</td>
<td>AC: 85-265 VAC, 50/60 Hz&lt;br&gt;DC: 90-265 VDC&lt;br&gt;Optional: 12-36 VDC, 12-24 VAC&lt;br&gt;See table for power consumption (*X: number depends on option)</td>
</tr>
<tr>
<td>Model</td>
<td>PD644-6RX-14* 20&lt;br&gt;PD644-7RX-04 6</td>
</tr>
<tr>
<td>FUSE</td>
<td>Required fuse: UL Recognized, 5 A maximum, slow blow&lt;br&gt;Up to 6 meters can share one 5 A fuse</td>
</tr>
<tr>
<td>ISOLATED POWER SUPPLY OPTION</td>
<td>24 VDC ± 10% @ 200 mA</td>
</tr>
<tr>
<td>NORMAL MODE REJECTION</td>
<td>64 dB at 50/60 Hz</td>
</tr>
<tr>
<td>ISOLATION</td>
<td>4 kV from mains&lt;br&gt;500 V from transmitter to other secondary circuits&lt;br&gt;500 V from 24 VDC supply to other secondary circuits</td>
</tr>
</tbody>
</table>
## Javelin D • Model PD644 Voltmeter Instruction Manual

### ENVIRONMENTAL
- Operating temperature range: 32 to 150°F (0 to 65°C)
- Storage temperature range: -40 to 185°F (-40 to 85°C)
- Relative humidity: 0 to 90%, non-condensing

### CONNECTIONS
- Removable screw terminal blocks accept 12 to 26 AWG wire

### ENCLOSURE
- 1/8 DIN, high impact plastic,
- UL 94V-0, color: gray

### MOUNTING
- 1/8 DIN panel cutout required. Two panel mounting bracket assemblies provided.

### TIGHTENING TORQUE
- Screw terminal connectors: 5 lb-in (0.56 Nm)

### OVERALL DIMENSIONS
- 2.45" x 4.68" x 4.19" (62 mm x 119 mm x 106 mm)
- (H x W x D)

### WEIGHT
- 9 oz (255 g) (Including options)

### WARRANTY
- 3 years parts and labor

### EXTENDED WARRANTY
- 1 or 2 years, refer to Price List for details

### Voltage Measurement Input

<table>
<thead>
<tr>
<th>INPUT</th>
<th>0 to 300 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCURACY</td>
<td>±0.05% of full scale ±1 count</td>
</tr>
<tr>
<td>TEMPERATURE DRIFT</td>
<td>50 PPM/°C from 0 to 65°C ambient</td>
</tr>
<tr>
<td>DECIMAL POINT</td>
<td>Up to three decimal places: (d.ddd), (dd.dd), (ddd.d), or (dddd)</td>
</tr>
<tr>
<td>INPUT IMPEDANCE</td>
<td>Greater than 1 MΩ</td>
</tr>
</tbody>
</table>

### CALIBRATION RANGE
- An Error message will appear if input 1 and input 2 signals are too close together.
- Minimum Span: 10 VDC

### Safety Compliance

<table>
<thead>
<tr>
<th>UL LISTED</th>
<th>USA and Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UL 508 Industrial Control Equipment</td>
</tr>
<tr>
<td>UL FILE NUMBER</td>
<td>E160849</td>
</tr>
<tr>
<td>FRONT PANEL</td>
<td>UL Type 4X, NEMA 4X, IP65; panel gasket provided</td>
</tr>
</tbody>
</table>
## Relays Option

<table>
<thead>
<tr>
<th><strong>RATING</strong></th>
<th>2 SPDT (form C); rated 3 A @ 30 VDC or 3 A @ 250 VAC resistive load; 1/14 HP @ 125/250 VAC for inductive loads</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELECTRICAL NOISE SUPPRESSION</strong></td>
<td>A suppressor (snubber) should be connected to each relay contact switching inductive loads, to prevent disruption to the microprocessor’s operation. Recommended suppressor value: 0.01 μF/470 Ω, 250 VAC (Order PDC model number PDX6901).</td>
</tr>
<tr>
<td><strong>DEADBAND</strong></td>
<td>0-100% of full scale, user selectable</td>
</tr>
<tr>
<td><strong>HIGH OR LOW ALARM</strong></td>
<td>User may program any alarm for high or low trip point.</td>
</tr>
</tbody>
</table>
| **RELAY OPERATION** | Automatic (non-latching)  
Latching  
Alternation control  
Modbus® control |
| **RELAY RESET** | User selectable via front panel buttons or serial communication  
Automatic reset only (non-latching)  
Automatic plus manual reset at any time (non-latching)  
Manual reset only at any time (latching)  
Manual reset only after alarm condition has cleared (latching)  
Automatic reset: Relays will automatically reset when the input passes the reset point.  
| **TIME DELAY** | 0 to 199 seconds, on and off delays  
Programmable and independent for each relay |
| **FAIL-SAFE OPERATION** | Programmable  
Independent for each relay |
| **AUTO INITIALIZATION** | When power is applied to the meter, relays will reflect the state of the input to the meter. |

**Fail-safe operation:** relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.
Isolated 4-20 mA Transmitter Output

**OUTPUT RANGE**
1.00 to 23.00 mA typical

**CALIBRATION**
Factory calibrated for 4-20 mA

**SCALING RANGE**
0.00 to 23.99 mA for any display range, see output range above

**ACCURACY**
± 0.1% F.S. ± 0.004 mA

**TEMPERATURE DRIFT**
50 PPM/°C from 0 to 65°C ambient
Note: Analog output drift is separate from input drift.

**ISOLATED TRANSMITTER POWER SUPPLY**
24 VDC ± 10% @ 20 mA

**EXTERNAL LOOP POWER SUPPLY**
35 VDC maximum

**OUTPUT LOOP RESISTANCE**

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC</td>
<td>10 Ω</td>
<td>700 Ω</td>
</tr>
<tr>
<td>35 VDC (external)</td>
<td>100 Ω</td>
<td>1200 Ω</td>
</tr>
</tbody>
</table>

Serial Communications

**METER ADDRESS**
PDC protocol: 0 - 99
Modbus® protocol: 1 - 247

**BAUD RATE**
300 – 19,200 bps

**TRANSMIT TIME DELAY**
Programmable between 0 and 199 ms

**DATA**
8 bit (1 start bit, 1 stop bit)

**PARITY**
None, even, or odd (Modbus® only; PDC protocol does not use parity)

**BYTE-TO-BYTE TIMEOUT**
0.01 – 2.54 sec (Modbus® only)

**TURN AROUND DELAY**
Less than 2 ms (fixed)

Request or download copies of the Precision Digital Serial Communication Protocol and Modbus® Register Tables specifications for details about serial data communications with Precision Digital products.
INSTALLATION

There is no need to remove the meter from its case to complete the installation, wiring, and setup of the meter.

Unpacking

Remove the meter from box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier.

If any part is missing or the meter malfunctions, please contact your supplier or the factory for assistance.

Panel Mounting

- Prepare a standard 1/8 DIN panel cutout – 3.622" x 1.772" (92 mm x 45 mm). Refer to Mounting Dimensions, page 48 for more details.
- Clearance: allow at least 4" (102 mm) behind the panel for wiring.
- Panel thickness: 0.04" - 0.25" (1.0 mm - 6.4 mm). Recommended minimum panel thickness to maintain Type 4X rating: 0.06" (1.5 mm) steel panel, 0.16" (4.1 mm) plastic panel.
- Remove the two mounting brackets provided with the meter (back-off the two screws so that there is ¼" (6.4 mm) or less through the bracket. Slide the bracket toward the front of the case and remove).
- Insert meter into the panel cutout.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until meter is snug to the panel along its short side. DO NOT OVER TIGHTEN, as the rear of the panel may be damaged.

Figure 1. Panel Cutout and Mounting
Connections

All connections are made to removable screw terminal connectors located at the rear of the meter. You must use copper wire with 60°C or 60/75°C insulation.

⚠️ Observe all safety regulations. Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.

Connector Labeling

The label on each meter shows the location of all connectors for the particular model. As an example Figure 2 illustrates the connector layout for meters equipped with relays and 4-20 mA transmitter. Other models have different connector arrangements.

![Figure 2. Connector Labeling](image)

Power Connections

Power connections are made to a two position screw terminal connector labeled POWER. The meter will operate regardless of DC polarity connection. The + and - symbols are only a suggested wiring convention. The screw terminal power connector is specially keyed to prevent insertion into the wrong receptacle on the meter. The installer must not remove nor alter the positions of any of the keying inserts.

![Figure 3. Power Connections](image)
DC Voltage Measurement Connections

Figure 4 shows how to connect the DC voltage to be measured. The voltage on terminal V- must be at ground potential. Be sure to observe the correct polarity.

The reversal of polarity can result in damage to the meter and associated data communications equipment and can expose personnel to electrical shock hazards.

Figure 4. DC Voltage Signal Connections
Serial Communication

The PD644 can be connected directly to an RS-485 data bus of up to 32 nodes. For systems consisting of more than 32 nodes RS-485 repeaters are necessary. Serial communication wiring connections to the PD644 are made via the three position screw terminal connector labeled RS-485. Please refer to standard EIA-485 for complete specifications for balanced digital multi-point communications. The use of shielded twisted pair cable is recommended to protect the data signals from electrical interference. For long wire runs it is good practice to terminate the bus at both ends with a resistor connected between D+ and D- that matches the characteristic impedance of the cable. A typical value for termination resistors is 120Ω.

![RS-485 Data Bus Connections](image)

For non-multiplexed serial communications with RS-232 data communications equipment such as a personal computer, an RS-232 to RS-485 converter such as the Precision Digital PDA7485 is required. If using a PDA7485, connect the PD644 according to the PDA7485 wiring diagram for a two wire RS-485 application.

Relay Output Connections

Relay connections are made to a six-terminal connector labeled RELAY1 RELAY2.

![Relay Output Connections](image)
Switching Inductive Loads

The use of suppressors (snubbers) is strongly recommended when switching inductive loads to prevent disrupting the microprocessor's operation. The suppressors also prolong the life of the relay contacts. Suppression can be obtained with resistor-capacitor (RC) networks assembled by the user or purchased as complete assemblies. Refer to the following circuits for RC network assembly and installation:

Choose R and C as follows:

R: 0.5 to 1 \( \Omega \) for each volt across the contacts

C: 0.5 to 1 µF for each amp through closed contacts

Notes:
1. Inductive relay rating is 1/14 HP (50 W) at 115/230 VAC
2. Use capacitors rated for 250 VAC.
3. RC networks may affect load release time of solenoid loads. Check to confirm proper operation.
4. Install the RC network at the meter's relay screw terminals. An RC network may also be installed across the load. Experiment for best results.

RC Networks Available from Precision Digital

RC networks are available from Precision Digital and should be applied to each relay contact switching an inductive load. Part number: PDX6901.

Note: Relays are de-rated to 1/14th HP (50 watts) with an inductive load.
4-20 mA Output Signal Connections

Connections for the 4-20 mA transmitter are made to the screw terminal connector labeled mA OUT. The 4-20 mA transmitter may be powered from an internal power supply (optional) available at the screw terminal connector labeled 24V OUT or from an external power supply.

Figure 9. 4-20 mA Transmitter Powered by Meter

Figure 10. 4-20 mA Transmitter Powered Externally
There is no need to recalibrate the meter when first received from the factory.

The meter is factory calibrated prior to shipment. The calibration equipment used at the factory is certified to NIST standards.

Overview
All setup and programming functions are done with the front panel buttons. There are no jumpers involved in the setup process of the meter. After power and signal connections have been completed and verified, apply power to the meter.

For User Interface Quick Reference Guide go to page 54
Front Panel Buttons and Status LED Indicators

<table>
<thead>
<tr>
<th>Button Symbol</th>
<th>Description</th>
<th>LED</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Menu</td>
<td>1</td>
<td>Alarm 1</td>
</tr>
<tr>
<td></td>
<td>Right arrow/Reset</td>
<td>2</td>
<td>Alarm 2</td>
</tr>
<tr>
<td></td>
<td>Up arrow/Max</td>
<td>S</td>
<td>Set point indicator</td>
</tr>
<tr>
<td></td>
<td>Enter/Ack</td>
<td>R</td>
<td>Reset point indicator</td>
</tr>
</tbody>
</table>

- Press the **Menu** button to enter or exit the Programming Mode at any time.
- Press the **Right** arrow button to move to the next digit during digit programming.
- Press the **Up** arrow button to scroll through the menus, decimal point, or to increment the value of a digit.
- Press the **Enter/Ack** button to access a menu or to accept a setting.
- Press and hold the **Right** arrow and the **Menu** buttons, for three seconds, to access the Advanced features of the meter (Tip: press and hold **Right** arrow first then press **Menu**).
Display Functions and Messages

The meter displays various functions and messages during setup/programming and operation. The following table shows the displayed functions and messages with their action or setting description.

<table>
<thead>
<tr>
<th>Display Parameter</th>
<th>Action/Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Setup</strong></td>
<td>Enter Setup menu</td>
</tr>
<tr>
<td><strong>Decimal point</strong></td>
<td>Set decimal point for process inputs</td>
</tr>
<tr>
<td><strong>Relay</strong></td>
<td>Enter the Relay menu</td>
</tr>
<tr>
<td><strong>Relay1</strong></td>
<td>Relay 1 setup</td>
</tr>
<tr>
<td><strong>Action1</strong></td>
<td>Set relay 1 action (automatic, latching, etc.)</td>
</tr>
<tr>
<td><strong>Automatic</strong></td>
<td>Set relay for automatic reset</td>
</tr>
<tr>
<td><strong>Auto-manual</strong></td>
<td>Set relay for automatic + manual reset any time</td>
</tr>
<tr>
<td><strong>Latching</strong></td>
<td>Set relay for latching operation</td>
</tr>
<tr>
<td><strong>Latching-cleared</strong></td>
<td>Set relay for latching operation with manual reset only after alarm condition has cleared</td>
</tr>
<tr>
<td><strong>Alternate</strong></td>
<td>Set relays for alternation control</td>
</tr>
<tr>
<td><strong>Off</strong></td>
<td>Disable relay and front panel status LEDs Disable relay's fail-safe operation</td>
</tr>
<tr>
<td><strong>Set1</strong></td>
<td>Program set point 1</td>
</tr>
<tr>
<td><strong>Reset1</strong></td>
<td>Program reset point 1</td>
</tr>
<tr>
<td><strong>Relay2</strong></td>
<td>Setup relay 2</td>
</tr>
<tr>
<td><strong>Action2</strong></td>
<td>Set relay 2 action (automatic, latching, etc.)</td>
</tr>
<tr>
<td><strong>Set2</strong></td>
<td>Program set point 2</td>
</tr>
<tr>
<td><strong>Reset2</strong></td>
<td>Program reset point 2</td>
</tr>
<tr>
<td><strong>Fail-safe</strong></td>
<td>Enter Fail-safe menu</td>
</tr>
<tr>
<td><strong>Fail-safe1</strong></td>
<td>Set relay 1 fail-safe operation</td>
</tr>
<tr>
<td><strong>On</strong></td>
<td>Enable fail-safe operation</td>
</tr>
<tr>
<td><strong>Fail-safe2</strong></td>
<td>Set relay 2 fail-safe operation</td>
</tr>
<tr>
<td><strong>Delay</strong></td>
<td>Enter Time Delay menu</td>
</tr>
<tr>
<td><strong>Delay1</strong></td>
<td>Enter relay 1 time delay setup</td>
</tr>
<tr>
<td>Display</td>
<td>Parameter</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>On1</td>
<td>On1</td>
</tr>
<tr>
<td>Off1</td>
<td>Off1</td>
</tr>
<tr>
<td>Delay2</td>
<td>Delay2</td>
</tr>
<tr>
<td>On2</td>
<td>On2</td>
</tr>
<tr>
<td>Off2</td>
<td>Off2</td>
</tr>
<tr>
<td>Analog output</td>
<td></td>
</tr>
<tr>
<td>Output 1</td>
<td></td>
</tr>
<tr>
<td>Output 2</td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td></td>
</tr>
<tr>
<td>Calibrate</td>
<td></td>
</tr>
<tr>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Input 1</td>
<td>Input 1</td>
</tr>
<tr>
<td>Display 1</td>
<td></td>
</tr>
<tr>
<td>Input 2</td>
<td>Input 2</td>
</tr>
<tr>
<td>Display 2</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>Error</td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
<tr>
<td>Unlocked</td>
<td></td>
</tr>
<tr>
<td>Locked</td>
<td></td>
</tr>
<tr>
<td>Flashing display</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Main Menu

The main menu consists of the most commonly used functions: Setup, Program, and Password.

- Press Menu button to enter Programming Mode then press Up arrow button to scroll main menu.

- Press Menu, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing Enter/Ack are not saved.
- Changes to the settings are saved to memory only after pressing Enter/Ack.
- The display moves to the next menu every time a setting is accepted by pressing Enter/Ack.
Setting Numeric Values

The numeric values are set using the Right and Up arrow buttons. Press Right arrow to select next digit and Up arrow to increment digit value.

The digit being changed is displayed brighter than the rest. Press the Enter/Ack button, at any time, to accept a setting or Menu button to exit without saving changes.

Setting Up the Meter (Setup)

The Setup menu is used to select:

1. Relay operation
2. 4-20 mA analog output setup

Press the Enter/Ack button to access any menu or press Up arrow button to scroll through choices. Press the Menu button to exit at any time.

* Relay menu is always available even if relays option is not installed. Visual alarm indication is available through front panel LEDs and MeterView software.
Setting the Relay Operation (rELY)

This menu allows you to set up the operation of the relays:

1. Relay action
   a. Automatic reset only (non-latching)
   b. Automatic plus manual reset at any time (non-latching)
   c. Latching (manual reset only)
   d. Latching with Clear (manual reset only after alarm condition has cleared)
   e. Alternation control (automatic reset only)
   f. Off (relay and status LED disabled)

2. Set point

3. Reset point

4. Fail-safe operation
   a. On (enabled)
   b. Off (disabled)

5. Time delay
   a. On delay (0-199 seconds)
   b. Off delay (0-199 seconds)

From Setup Menu

Press Enter/Ack button to access any menu
Press Menu button to exit at any time
Setting the Relay Action

The relay *Action* menu allows the user to set up the operation of the relays. The relays may be set up for any of the following modes of operation:

1. Automatic reset (non-latching)
2. Automatic plus manual reset at any time (non-latching)
3. Latching (manual reset only, at any time)
4. Latching with Clear (manual reset only after alarm condition has cleared)
5. Alternation control (automatic reset only)
6. Off (relay and status LED disabled)

The following illustration shows relay 1 action setup; relay 2 is set up in a similar fashion.

Programming Set and Reset Points

High alarm indication: program set point above reset point.

Low alarm indication: program set point below reset point.

The deadband is determined by the difference between set and reset points. Minimum deadband is one display count. If set and reset points are programmed the same, relay will reset one count below set point.

Quick Set Points

Press **Up arrow** and **Menu** at the same time to access set/reset points quickly.
Setting Fail-Safe Operation

The fail-safe operation is set independently for each relay. Select **on** to enable or select **off** to disable fail-safe operation.

Press **Enter/Ack** button to accept setting
Press **Menu** button to exit at any time

Programming Time Delay

The **On** and **Off** time delays may be programmed for each relay between 0 and 199 seconds. The relays will transfer only after the condition has been maintained for the corresponding time delay. The **On** time delay is associated with the set point. The **Off** time delay is associated with the reset point.
Relay and Alarm Operation

The following graphs illustrate the operation of the relays, status LEDs, and ACK button.

**High Alarm Operation (Set > Reset)**

For Manual reset mode, ACK can be pressed anytime to turn "off" relay. For relay to turn back "on", signal must go below set point, and then go above it.
Low Alarm Operation (Set < Reset)

Relay LED ACK pressed
energized on pressed
de-energized off

Automatic (non-latching)

Relay LED ACK pressed
energized on pressed
de-energized off

Manual (latching)

Relay LED ACK pressed
energized on pressed
de-energized off

Manual only after passing above Reset (latching with clear)

For Manual reset mode, ACK can be pressed anytime to turn "off" relay.
For relay to turn back "on", signal must go above set point, and then go below it.
**Fail-safe operation:** relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.
Low Alarm with Fail-Safe Operation (Set < Reset)

Fail-safe operation: relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.
Time Delay Operation

The following graphs show the operation of the time delay function.

If the signal crosses the set point, the *On* time delay timer starts and the relay trips when the time delay has elapsed. If the signal drops below the set point (high alarm) before the time delay has elapsed, the *On* time delay timer resets and the relay does not change state. The same principle applies to the *Off* time delay.

*The LED is not affected by Time Delay when “Automatic or Manual” reset mode is selected. Rather the LED follows the set and reset points.*
Alternation Control Operation

LEDs indicate the relay status
Scaling the 4-20 mA Analog Output ($R_{out}$)

The 4-20 mA analog output can be scaled to provide a 4-20 mA signal for any display range selected.

No equipment is needed to scale the analog output, simply program the display values to the corresponding mA output signal.

The Analog Output menu is used to program:

1. 4-20 mA output based on display values
2. Sensor break value in mA

Analog Output when Display is Out of Range

The analog output reflects the display out of range conditions as follows:

<table>
<thead>
<tr>
<th>Input Condition</th>
<th>Display</th>
<th>Analog Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underrange</td>
<td>Flashing - 9999</td>
<td>3.00 mA</td>
</tr>
<tr>
<td>Overrange</td>
<td>Flashing 9999</td>
<td>21.00 mA</td>
</tr>
</tbody>
</table>
### Programming the Meter (*Prog*)

It is **very important** to read the following information, before proceeding to program the meter:

- **There is no need to recalibrate** the meter when first received from the factory.
- The meter is **factory calibrated** prior to shipment. The calibration equipment used at the factory is certified to NIST standards.
- Simply connect the power and signal to the proper terminals, and turn the power on. **No calibration needed!** (when the meter is first received from the factory).

The *Program* menu contains the *Calibrate* and the *Scale* menus.

The input may be calibrated or scaled to any display within the range of the meter.

---

Additional parameters, not needed for most applications, are programmed with the *Advanced* features menu, see *Advanced Features Menu*, page 37.
Scaling the Meter (ScRL)
The 0 to 300 VDC input can be scaled to display convenient engineering units.
A signal source is not needed to scale the meter; simply program the inputs and corresponding display values.

Calibrating the Meter (Cal)
The meter can be calibrated to display in convenient engineering units by applying the appropriate input signal and following the calibration procedure.
The use of a calibrated signal source is strongly recommended to calibrate the meter.

See Scaling the Meter for Button Functions Description
Error Message (Err)

An error message indicates that the calibration or scaling process was not successful.

After the error message is displayed, the meter reverts to input 1, allowing acceptable input voltages to be applied or valid data to be entered. The error message might be caused by any of the following conditions:

1. Input signal is not connected to the proper terminals or it is connected backwards.
2. Input span was less than 10 VDC.
3. Same input signal used for both calibration points.

Recalibrating Process Inputs (ICal)

The Internal Calibration (ICal) menu, located in the Advanced features menu, is used to recalibrate the voltage input so that the Scaling feature has accurate reference points. Recalibration is recommended at least every twelve months if using the scaling feature.

Refer to Internal Calibration (ICal), page 44 for instructions.

Setting Up the Password (PASS)

The Password menu is used to program a four-digit password to prevent unauthorized changes to the programmed parameter settings.

Locking the Meter

Enter the Password menu and program a four-digit password.

For instructions on how to program numeric values see Setting Numeric Values, page 22.
Unlocking the Meter

If the meter is password protected, the correct password must be entered in order to make changes to the parameter settings.

Entering the correct four-digit number sets the password to 0000, disabling the protection.

Changes to the programmed parameter settings are allowed only with the password set to 0000.

If the password entered is incorrect, the meter displays LoCd (Locked) for three seconds, then allows you to try again.

Forgot the Password?

The password may be disabled by the following procedure:

1. Note display reading prior to pressing the Menu button. Ignore decimal point and sign.
2. Access the Password menu, add 2 to the noted reading and enter that number as the password (e.g. display reading = -1.23, password = 0125).
Advanced Features Menu

To simplify the setup process, functions not needed for most applications are located in the Advanced features menu.

Press and hold the Right arrow and the Menu buttons, for three seconds, to access the Advanced features of the meter (Tip: press and hold Right arrow first then press Menu).

Press for Three Seconds

Press Enter/Ack to Access Menu or to Accept Setting

Press Up to Scroll Menu and to Increment Digit Value

Press Right to Select Next Digit

Press Menu to Exit at any Time
### Advanced Features Menu & Display Messages

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter</th>
<th>Action/Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>fltr</td>
<td>Filter</td>
<td>Set noise filter value</td>
</tr>
<tr>
<td>byPS</td>
<td>Bypass</td>
<td>Set filter bypass value</td>
</tr>
<tr>
<td>SErl</td>
<td>Serial</td>
<td>Set serial communication parameters</td>
</tr>
<tr>
<td>Prot</td>
<td>Protocol</td>
<td>Enter the Protocol menu</td>
</tr>
<tr>
<td>PDC</td>
<td>PDC</td>
<td>Select PDC protocol</td>
</tr>
<tr>
<td>Modbus®</td>
<td>Address</td>
<td>Set meter address</td>
</tr>
<tr>
<td>Addr</td>
<td>Baud rate</td>
<td>Select baud rate</td>
</tr>
<tr>
<td>trdE</td>
<td>Transmit delay</td>
<td>Set transmit delay for serial communication</td>
</tr>
<tr>
<td>ParLY</td>
<td>Parity</td>
<td>Select none, even, or odd (Modbus® only)</td>
</tr>
<tr>
<td>byBYt</td>
<td>Byte-to-byte</td>
<td>Program byte-to-byte timeout (silent time – Modbus® only)</td>
</tr>
<tr>
<td>CoPY</td>
<td>Copy</td>
<td>Enter copy function</td>
</tr>
<tr>
<td>Send</td>
<td>Send</td>
<td>Send meter settings to another meter</td>
</tr>
<tr>
<td>Done</td>
<td>Done</td>
<td>Copy function completed</td>
</tr>
<tr>
<td>Select</td>
<td>Select</td>
<td>Enter the Select menu (output, intensity)</td>
</tr>
<tr>
<td>Output</td>
<td>Output</td>
<td>Set meter for either relay or analog output</td>
</tr>
<tr>
<td>Inty</td>
<td>Intensity</td>
<td>Select display intensity</td>
</tr>
<tr>
<td>Analog output</td>
<td></td>
<td>Set meter for analog output option</td>
</tr>
<tr>
<td>Relay</td>
<td>Relay</td>
<td>Set meter for relay option</td>
</tr>
<tr>
<td>Diagnostics</td>
<td></td>
<td>Display parameter settings</td>
</tr>
<tr>
<td>LED</td>
<td>LED</td>
<td>Test display</td>
</tr>
<tr>
<td>CFG</td>
<td>CFG</td>
<td>Display meter configuration</td>
</tr>
<tr>
<td>Initial calibration</td>
<td></td>
<td>Enter initial calibration</td>
</tr>
<tr>
<td>Relays</td>
<td>Relays</td>
<td>Display relay settings</td>
</tr>
<tr>
<td>Gain/offset</td>
<td></td>
<td>Display gain and offset</td>
</tr>
<tr>
<td>Analog output</td>
<td></td>
<td>Display analog output settings</td>
</tr>
</tbody>
</table>
Display Parameter Action/Setting

<table>
<thead>
<tr>
<th>SErL</th>
<th>Serial</th>
<th>Display serial communication settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>InFo</td>
<td>Information</td>
<td>Display software version and serial number information</td>
</tr>
</tbody>
</table>

**Noise Filter (Fltr)**

Most applications do not require changing this parameter. It is intended to help attain a steady display with an unsteady (noisy) input signal. The field selectable noise filter averages any minor or quick changes in the input signal and displays the reading with greater stability. Increasing the filter value will help stabilize the display, however this will slow down the display response to changes in the input signal.

The filter level may be set anywhere from 2 to 199. Setting filter value to zero disables filter function, and bypass setting becomes irrelevant.

**Noise Filter Bypass (bypS)**

The meter can be programmed to filter small input changes, but allow larger input changes to be displayed immediately, by setting the bypass value accordingly.

If the input signal goes beyond the bypass value, it will be displayed immediately with no averaging done on it.

The noise filter bypass value may be set anywhere from 0.2 to 99.9. It corresponds to percentage of full scale.

Increasing the bypass value may slow down the display response to changes in the input signal.
Serial Communications (SERL)

The meter is equipped with serial communications capability as a standard feature using PDC Serial Communication Protocol. The Modbus® RTU Protocol is optional and may be purchased at any time.

To communicate with a computer or other data communications equipment which lacks an RS-485 interface, an RS-232 to RS-485 adapter such as the Precision Digital PDA7485 is required. Please refer to Ordering Information on page 3 for details.

When using more than one meter in a multi-drop mode, each meter must be provided with its own unique address. The address may be programmed from 00 to 99 for PDC protocol and from 1 to 247 for Modbus® protocol. The transmit delay may be set between 0 and 199 ms.

Select Menu (SELc)

The Select menu is used to select the display intensity. Selection of analog output is a factory setting depending on the option installed.

- Output options are installed and set up at the factory.
- Changing the output selection will cause erroneous operation.

The Output selection menu is for factory use only. Do not change the selection!
Display Intensity (inTY)
The Display Intensity function provides a selection from eight brightness levels to accommodate a wide variety of ambient lighting conditions.

Advanced Features

Press Enter to Accept Setting
Press Up to Select Value
Press Menu to Exit at any Time

Select Display Intensity Level

Next
Meter Copy Function (COPY)

The Copy function is used to copy (or clone) all the settings from one meter to other meters requiring exactly the same setup and programming (alarms, filter, bypass, etc.). The copy function must not be engaged while more than two meters are connected together.

**Copy Function Requirements**

To copy settings from one meter to another, both meters must have:

1. Same software version
2. Same baud rate setting
3. PDC protocol selected

See Determining Software Version, page 49 for instructions.

![Figure 11. Meter Copy Connection](image_url)
**Meter Copying Instructions**

1. Connect the RS-485 terminals of the two meters according to this table.

<table>
<thead>
<tr>
<th>Master</th>
<th>Clone</th>
</tr>
</thead>
<tbody>
<tr>
<td>D+</td>
<td>D+</td>
</tr>
<tr>
<td>D-</td>
<td>D-</td>
</tr>
<tr>
<td>G</td>
<td>G</td>
</tr>
</tbody>
</table>

2. Power up both meters. Leave the Clone meter in Run Mode.

3. Enter the Advanced features menu of the Master meter, see Advanced Features Menu, page 37.

4. Scroll to Copy function using Up arrow button then press Enter/Ack.

5. The meter displays the message 5End. Press Enter/Ack, the display flashes while sending data. The message done is displayed when copying is completed.

6. The Clone meter displays the memory block numbers in hexadecimal sequence then the message done when copying is completed. The Clone meter then initializes and returns to Run Mode using the same settings as the Master.

7. If meter to be cloned does not respond to the data being sent, refer to Copy Function Requirements above.

8. If desired, move the connector to the next Clone meter and press Enter/Ack to repeat the process.
Internal Calibration (ICRL)

- There is no need to recalibrate the meter when first received from the factory.
- The meter is factory calibrated prior to shipment. The calibration equipment used at the factory is certified to NIST standards.
- Allow the meter to warm up for at least 15 minutes before performing the internal calibration procedure.

The internal calibration allows the user to scale the meter without applying a signal.
The use of calibrated signal sources is necessary to perform the internal calibration of the meter.
Check calibration of the meter at least every 12 months.

The Internal calibration menu is part of the Advanced features menu.
1. Press and hold the Right arrow and the Menu buttons, for three seconds, to access the Advanced features of the meter (Tip: press and hold Right arrow first then press Menu).
2. Press the Up arrow button to scroll to the Internal calibration menu and press Enter/Ack.
3. The meter displays voltage (VLoL). Press Enter/Ack to start the calibration process.
4. The meter displays VLow (VLoL) prompt. Apply the lower voltage input signal and press Enter/Ack. The display flashes for a moment while meter is sampling the input.
5. After the display stops flashing, a number is displayed with the leftmost digit brighter than the rest. The bright digit is the active digit that can be changed by pressing the Up arrow button. Press the Right arrow button to move to the next digit.
6. Set the display value to correspond to the input voltage being applied.
7. The display moves to the high input calibration (VHiH). Apply the higher voltage input signal and press Enter/Ack.
8. Set the display for the high input calibration in the same way as it was set for the low input calibration.
Notes:

- Low and high input signals can be anywhere between 0 and 300 VDC.
- Observe minimum input span requirement of 10 VDC between input 1 and input 2.
- The inputs must not be negative, even slightly.

**Error Message (Err)**

An error message indicates that the calibration process was not successful.

After the error message is displayed, the meter reverts to input 1, allowing acceptable input voltages to be applied.

The error message might be caused by any of the following conditions:

1. Input signal is not connected to the proper terminals or it is connected backwards.
2. Input span was less than 10 VDC.
3. Same input signal used for both calibration points.
OPERATION

The meter is capable of accepting positive DC voltage signals and displaying these signals in engineering units from -1999 to 9999.

Front Panel Buttons Operation

<table>
<thead>
<tr>
<th>Button Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press to enter or exit Programming Mode, view settings, or exit Max/Min display</td>
<td></td>
</tr>
<tr>
<td>If displaying Max or Min reading, press to reset Max or Min reading</td>
<td></td>
</tr>
<tr>
<td>Press to display Max reading</td>
<td></td>
</tr>
<tr>
<td>If displaying Max reading, press to display Min reading</td>
<td></td>
</tr>
<tr>
<td>Press to acknowledge relays</td>
<td></td>
</tr>
<tr>
<td>If displaying Max or Min reading, press to override Max/Min display timeout</td>
<td></td>
</tr>
</tbody>
</table>
Maximum and Minimum Readings

The main function of the front panel buttons during operation is to display the maximum and minimum readings.

1. Press Up arrow/Max button to display maximum reading since the last reset/power-up.
2. Press Up arrow/Max again to display the minimum reading since the last reset/power-up.
3. Press Enter/Ack to hold Max/Min display reading, the meter will continue to track new Max/Min readings.
4. If Enter/Ack is not pressed, the Max/Min display reading will time out after ten seconds and the meter will return to displaying the actual reading.
5. Press Right arrow/Reset button to reset Max/Min while reading is being displayed. Max/Min display readings are reset to actual reading.
MOUNTING DIMENSIONS

Figure 12. Meter Dimensions – Side View

Figure 13. Case Dimensions - Top View
TROUBLESHOOTING

The rugged design and the user-friendly interface of the meter make it unusual for the installer or operator to need to refer to this section. If the meter is not working as expected, refer to the Diagnostics menu and the recommendations below.

Diagnostics Menu (d ｢RG)

The Diagnostics menu is located in the Advanced features menu, to access Diagnostics menu see Advanced Features Menu, page 37. It provides an easy way to view the programmed parameter settings for troubleshooting purposes. Press the Enter/Ack button to view the settings and the Menu button to exit at any time. For a description of the diagnostics messages see Advanced Features Menu & Display Messages, page 38.

Determining Software Version

To determine the software version of a meter:

1. Go to the Diagnostics menu (d ｢RG) and press Enter/Ack button.
2. Press Up arrow/Max button and scroll to Information menu (lnFo).
3. Press Enter/Ack to access the software number (SFt), version (UEr), and serial number (Sn) information. Write down the information as it is displayed. Continue pressing Enter/Ack until all the information is displayed.
## Factory Defaults & User Settings

The following table shows the factory setting for most of the programmable parameters on the meter. Next to the factory setting, the user should record the setting for the particular application.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Display</th>
<th>Default Setting</th>
<th>User Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming</td>
<td>ProG</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Input 1</td>
<td>InP1</td>
<td>000.0 VDC</td>
<td></td>
</tr>
<tr>
<td>Display 1</td>
<td>Dis1</td>
<td>000.0</td>
<td></td>
</tr>
<tr>
<td>Input 2</td>
<td>InP2</td>
<td>200.0 VDC</td>
<td></td>
</tr>
<tr>
<td>Display 2</td>
<td>Dis2</td>
<td>200.0</td>
<td></td>
</tr>
<tr>
<td>Decimal point</td>
<td>ddd.d</td>
<td>1 decimal place</td>
<td></td>
</tr>
<tr>
<td>Relay 1</td>
<td>RLY1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action 1</td>
<td>Act1</td>
<td>Automatic</td>
<td></td>
</tr>
<tr>
<td>Set 1</td>
<td>Set1</td>
<td>70.0</td>
<td></td>
</tr>
<tr>
<td>Reset 1</td>
<td>RSt1</td>
<td>60.0</td>
<td></td>
</tr>
<tr>
<td>Relay 2</td>
<td>RLY2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action 2</td>
<td>Act2</td>
<td>Automatic</td>
<td></td>
</tr>
<tr>
<td>Set 2</td>
<td>Set2</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Reset 2</td>
<td>RSt2</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>Fail-safe</td>
<td>Flsf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fail-safe 1</td>
<td>Fls1</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td>Fail-safe 2</td>
<td>Fls2</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td>Time delay</td>
<td>dlay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On delay 1</td>
<td>On1</td>
<td>0 sec</td>
<td></td>
</tr>
<tr>
<td>Off delay 1</td>
<td>OFF1</td>
<td>0 sec</td>
<td></td>
</tr>
<tr>
<td>On delay 2</td>
<td>On2</td>
<td>0 sec</td>
<td></td>
</tr>
<tr>
<td>Off delay 2</td>
<td>OFF2</td>
<td>0 sec</td>
<td></td>
</tr>
</tbody>
</table>
### Javelin D ● Model PD644 Voltmeter Instruction Manual

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Display</th>
<th>Default Setting</th>
<th>User Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>$R_{out}$ $S_{CAL}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display 1</td>
<td>$d \ i \ s\ l$</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Output 1</td>
<td>$o_{ut\ l}$</td>
<td>4.00 mA</td>
<td></td>
</tr>
<tr>
<td>Display 2</td>
<td>$d \ i\ s\ 2$</td>
<td>200.0</td>
<td></td>
</tr>
<tr>
<td>Output 2</td>
<td>$o_{ut\ 2}$</td>
<td>20.00 mA</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td>$P\ A S\ S$</td>
<td>0000 (unlocked)</td>
<td></td>
</tr>
<tr>
<td>Advanced Features</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filter</td>
<td>$F_{L\ T\ r}$</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Bypass</td>
<td>$b_{Y\ P\ S}$</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Serial settings</td>
<td>$S_{E\ r\ L}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protocol</td>
<td>$P_{d\ C}$</td>
<td>PDC protocol</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td>$R_{a\ d\ d}$</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td>Baud rate</td>
<td>$b_{A\ u\ d}$</td>
<td>2400</td>
<td></td>
</tr>
<tr>
<td>Trans delay</td>
<td>$t_{r\ d\ E}$</td>
<td>10 ms</td>
<td></td>
</tr>
<tr>
<td>Output option</td>
<td>$o_{n}$</td>
<td>Factory set only</td>
<td></td>
</tr>
<tr>
<td>Display intensity</td>
<td>$i_{n\ T\ y}$</td>
<td>Level 2</td>
<td></td>
</tr>
<tr>
<td>Modbus®</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td>$R_{a\ d\ d}$</td>
<td>247</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td>$P_{r\ T\ y}$</td>
<td>Even</td>
<td></td>
</tr>
<tr>
<td>Byte-to-byte timeout*</td>
<td>$t_{b\ y\ t}$</td>
<td>0.01 sec</td>
<td></td>
</tr>
</tbody>
</table>

* The byte-to-byte timeout setting might be updated automatically depending on the baud rate selected and the previous timeout setting. The minimum timeout allowed is saved to memory if a lower value is entered (e.g. If user enters 0.00 with a baud rate of 300, 0.06 is saved).
Reset Meter to Factory Defaults

When the parameters have been changed in a way that is difficult to determine what’s happening, it might be better to start the setup process from the factory defaults.

Instructions to load factory defaults:

1. Enter the Advanced features menu. See Advanced Features Menu, page 37.
2. Press Up arrow to go to Diagnostics menu
3. Press and hold Right arrow/Reset for five seconds, press Enter/Ack when display flashes rSET.
   Note: If Enter/Ack is not pressed within three seconds, display returns to Diagnostics menu.
4. The meter goes through an initialization sequence (same as on power-up), and loads the factory default settings.
## Troubleshooting Tips

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Check/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No display at all</td>
<td>Check power at power connector.</td>
</tr>
<tr>
<td>Not able to change setup or programming, (\text{LoCd}) is displayed</td>
<td>Meter is locked, enter correct four-digit password to unlock.</td>
</tr>
</tbody>
</table>
| Meter displays error message during calibration (\(\text{Err}\))      | Check:  
1. Signal connections  
2. Input selected in Setup menu  
3. Minimum input span requirements                                                                 |
| Meter displays \(\text{9999}\)                                        | Voltage at Signal connector out of range.                                                                                                   |
| Meter displays \(\text{-1999}\)                                       |                                                                                                                                              |
| Display alternates between  
1. \(\text{Hi}\) and a number  
2. \(\text{Lo}\) and a number                                      | Press Menu to exit Max/Min display readings.                                                                                                 |
| Display response is too slow                                           | Check filter and bypass values.                                                                                                             |
| If the display locks up or the meter does not respond at all           | Cycle the power to restart the microprocessor.                                                                                               |
| Relay operation is reversed                                            | Check:  
1. Fail-safe in Setup menu  
2. Wiring of relay contacts                                                                                                                         |
| Relay and status LED do not respond to signal                          | Check:  
1. Relay action in Setup menu  
2. Set and reset points                                                                                                                               |
| Meter not communicating with other devices                             | Check:  
1. Serial converter and wiring  
2. Serial protocol selected  
3. Meter address and baud rate                                                                                                                     |
| Meter flashes \(\text{Err2}\) at power on.                            | Hardware failure. Contact Technical Support to arrange for repair.                                                                             |
| Other symptoms not described above                                     | Call Contact Technical Support for assistance.                                                                                            |


**Pushbutton Function**
- **Menu**: Go to Programming Mode or leave Programming, Advanced Features, and Max/Min Modes.
- **Right Arrow**: Move to next digit.
- **Up Arrow**: Move to next selection or increment digit.
- **Enter/Ack**: Accept selection/value and move to next selection.

**Right Arrow & Menu** held for 3 seconds enters Advanced Features

**Max/Min Mode**
While in Run Mode, pressing **Up Arrow** will initiate Max/Min Mode. **Up Arrow** toggles between Max & Min displays, and **Right Arrow** resets the Max/Min to the current value. Press **Menu** or wait 10 seconds to return to Run Mode. Pressing **Enter/Ack** will disable the 10 second timeout and continuously display Max or Min.

Press & hold **Right** arrow and **Menu** for 3 seconds to access Advanced Features Menu

When the meter is locked programmable settings can only be displayed and the Copy function is unavailable.

**Operational Modes**

```
Advanced Features
  ↓
  Filter
  ↓
  Bypass
  ↓
  Serial
  ↓
  Copy
  ↓
  Send
  ↓
  Select
  ↓
  Output
  ↓
  Intensity
  ↓
  Initial Calibrate
  ↓
  Diagnostics

Run
  ↓
  Menu
  ↓
  Max & Min
  ↓
  Menu

Program
  ↓
  Menu
  ↓
  Menu

Advanced Features
  ↓
  Right Arrow & Menu for 3 seconds

Max & Min
  ↓
  Up Arrow

Operational Modes
  ↓
  Protocol
  ↓
  Modbus®
  ↓
  PDC

  ↓
  Address
  ↓
  Baud
  ↓
  TX Delay
  ↓
  Modbus®?
  No Yes
  ↓
  Parity
  ↓
  Byte-To-Byte Timeout
```
How to Contact Precision Digital

- For Technical Support please
  Call: (800) 610-5239 or (508) 655-7300
  Fax: (508) 655-8990
  Email: support@predig.com

- For Sales Support or to place an order please
  Call: (800) 343-1001 or (508) 655-7300
  Fax: (508) 655-8990
  Email: sales@predig.com

- For the latest version of this manual please visit
  www.predig.com