MODEL PAX – 1/8 DIN ANALOG INPUT PANEL METERS

GENERAL DESCRIPTION

The PAX® Analog Panel Meters offer many features and performance capabilities to suit a wide range of industrial applications. Available in five different models to handle various analog inputs, including DC Voltage/Current, AC Voltage/Current, Process, Temperature, and Strain Gage Inputs. Refer to pages 4 through 6 for the details on the specific models. The optional plug-in output cards allow the opportunity to configure the meter for present applications, while providing easy upgrades for future needs.

The meters employ a bright 0.56” LED display. The unit is available with a red sunlight readable or a standard green LED. The intensity of display can be adjusted from dark room applications up to sunlight readable, making it ideal for viewing in bright light applications.

The meters provide a MAX and MIN reading memory with programmable capture time. The capture time is used to prevent detection of false max or min readings which may occur during start-up or unusual process events.

The signal totalizer (integrator) can be used to compute a time-input product. This can be used to provide a readout of totalized flow, calculate service intervals of motors or pumps, etc. The totalizer can also accumulate batch weighing operations.

The meters have four setpoint outputs, implemented on Plug-in option cards. The Plug-in cards provide dual FORM-C relays (5A), quad FORM-A (3A), or either quad sinking or quad sourcing open collector logic outputs. The setpoint alarms can be configured to suit a variety of control and alarm requirements.

Communication and Bus Capabilities are also available as option cards. These include RS232, RS485, Modbus, DeviceNet, and Profinet-DP. Readout values and setpoint alarm values can be controlled through the bus. Additionally, the meters have a feature that allows a remote computer to directly control the outputs of the meter. With an RS232 or RS485 card installed, it is possible to configure the meter using a Windows® based program. The configuration data can be saved to a file for later recall.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in this literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use this unit to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the unit.

A linear DC output signal is available as an optional Plug-in card. The card provides either 20 mA or 10 V signals. The output can be scaled independent of the input range and can track either the input, totalizer, max or min readings. Once the meters have been initially configured, the parameter list may be locked out from further modification in its entirety or only the setpoint values can be made accessible.

The meters have been specifically designed for harsh industrial environments. With NEMA 4X/IP65 sealed bezel and extensive testing of noise effects to CE requirements, the meter provides a tough yet reliable application solution.

DIMENSIONS  In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1” (53.4) H x 5.0” (127) W.
TABLE OF CONTENTS
Ordering Information ........................................ 2
General Meter Specifications ............................... 3
Universal DC Input Panel Meter .......................... 4
Process Input Panel Meter .................................. 4
AC True RMS Voltage and Current Meter .............. 5
Strain Gage Input Panel Meter ............................ 5
Thermocouple and RTD Input Meter ...................... 6
Optional Plug-In Cards ..................................... 7
Installing the Meter .......................................... 8
Setting the Jumpers .......................................... 8
Installing Plug-In Cards ................................... 10
Wiring the Meter ............................................. 11
Reviewing the Front Buttons and Display .............. 14
Programming the Meter ..................................... 15
Factory Service Operations ............................... 29
Parameter Value Chart ..................................... 31
Programming Overview ..................................... 33

ORDERING INFORMATION

Meter Part Numbers

<table>
<thead>
<tr>
<th>TYPE</th>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAX</td>
<td></td>
<td>D - DC Volt/Current Input</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>P - Process Input</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>H - AC True RMS Volt/Current Input *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S - Strain Gage/Bridge Input</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T - Thermocouple and RTD Input</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 - Red, Sunlight Readable Display</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 - Green Display</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 - 85 to 250 VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 - 11 to 36 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* PAXH is only available with 85-250 VAC power supply.</td>
<td></td>
</tr>
</tbody>
</table>

Option Card and Accessories Part Numbers

<table>
<thead>
<tr>
<th>TYPE</th>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAXCDS</td>
<td></td>
<td>Dual Setpoint Relay Output Card</td>
<td>PAXCDS10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quad Setpoint Relay Output Card</td>
<td>PAXCDS20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quad Setpoint Sinking Open Collector Output Card</td>
<td>PAXCDS30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quad Setpoint Sourcing Open Collector Output Card</td>
<td>PAXCDS40</td>
</tr>
<tr>
<td>PAXCDC</td>
<td></td>
<td>RS485 Serial Communications Card with Terminal Block</td>
<td>PAXCDC10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extended RS485 Serial Communications Card with Dual RJ11 Connector</td>
<td>PAXCDC1C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS232 Serial Communications Card with Terminal Block</td>
<td>PAXCDC20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extended RS232 Serial Communications Card with 9 Pin D Connector</td>
<td>PAXCDC2C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DeviceNet Communications Card</td>
<td>PAXCDC30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modbus Communications Card</td>
<td>PAXCDC40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extended Modbus Communications Card with Dual RJ11 Connector</td>
<td>PAXCDC4C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Profibus-DP Communications Card</td>
<td>PAXCDC50</td>
</tr>
<tr>
<td>PAXCDL</td>
<td></td>
<td>Analog Output Card</td>
<td>PAXCDL10</td>
</tr>
<tr>
<td>PAXUSB</td>
<td></td>
<td>PAX USB Programming Card (Not included in PAX product UL E179259 file)</td>
<td>PAXUSB800</td>
</tr>
<tr>
<td>CBLUSB</td>
<td></td>
<td>USB Programming Cable Type A-Mini B</td>
<td>CBLUS801</td>
</tr>
<tr>
<td>ICM8</td>
<td></td>
<td>Ethernet Gateway</td>
<td>ICM80000</td>
</tr>
<tr>
<td>PAXLBK</td>
<td></td>
<td>Units Label Kit Accessory (Not required for PAXT)</td>
<td>PAXLBK10</td>
</tr>
<tr>
<td>SFCRD*</td>
<td></td>
<td>Crimson PC Configuration Software for Windows 98, ME, 2000 and XP</td>
<td>SFCRD200</td>
</tr>
</tbody>
</table>

* Crimson® software is available for free download from http://www.redlion.net/
# General Meter Specifications

1. **DISPLAY:** 5 digit, 0.56” (14.2 mm) red sunlight readable or standard green LEDs. (-19999 to 99999)
2. **POWER:**
   - AC Versions:
     - AC Power: 85 to 250 VAC, 50/60 Hz, 15 VA
     - Isolation: 2300 Vrms for 1 min. to all inputs and outputs.
   - DC Versions (Not available on PAXH):
     - DC Power: 11 to 36 VDC, 11 W
     - (derate operating temperature to 40° C if operating <15 VDC and three plug-in option cards are installed)
   - AC Power: 24 VAC, ± 10%, 50/60 Hz, 15 VA
     - Isolation: 500 Vrms for 1 min. to all inputs and outputs (50 V working).
3. **ANNUNCIATORS:**
   - MAX - maximum readout selected
   - MIN - minimum readout selected
   - TOF - totalizer readout selected, flashes when total overflows
   - SP1 - setpoint alarm 1 is active
   - SP2 - setpoint alarm 2 is active
   - SP3 - setpoint alarm 3 is active
   - SP4 - setpoint alarm 4 is active
   - Units Label - optional units label backlight
   - A/D CONVERTER: 16 bit resolution
4. **KEYPAD:** 3 programmable function keys, 5 keys total
5. **A/D CONVERTER:** 16 bit resolution
6. **UPDATE RATES:**
   - A/D conversion rate: 20 readings/sec.
   - Step response: 200 msec. max. to within 99% of final readout value
   - (digital filter and internal zero correction disabled)
   - 700 msec. max. (digital filter disabled, internal zero correction enabled)
   - PAXH Only: 1 sec max. to within 99% of final readout value
   - (digital filter disabled)
   - Display update rate: 1 to 20 updates/sec.
   - Setpoint output on/off delay time: 0 to 3275 sec.
   - Analog output update rate: 0 to 1 sec
   - Max./Min. capture delay time: 0 to 3275 sec.
7. **DISPLAY MESSAGES:**
   - “OLOL” - Appears when measurement exceeds + signal range.
   - “UIUL” - Appears when measurement exceeds - signal range
   - PAXT: “ShH” - Appears when shorted sensor is detected. (RTD only)
   - PAXT: “OPEN” - Appears when open sensor is detected.
   - “. . . .” - Appears when display values exceed + display range.
   - “. . . .” - Appears when display values exceed - display range.
   - “E . . .” - Appears when Totalizer exceeds 9 digits.
   - “h . . .” - Denotes the high order display of the Totalizer.
8. **INPUT CAPABILITIES:** See specific product specifications, pages 4-6
9. **EXCITATION POWER:** See specific product specifications, pages 4-6
10. **LOW FREQUENCY NOISE REJECTION:** (Does not apply to PAXH)
    - Normal Mode: > 60 dB @ 50 or 60 Hz ±1%, digital filter off
    - Common Mode: >100 dB, DC to 120 Hz
11. **USER INPUTS:** Three programmable user inputs
    - Max. Continuous Input: 30 VDC
    - Isolation To Sensor Input Common: Not isolated. (Not PAXH)
12. **MEMORY:**
    - 3 programmable function keys, 5 keys total
    - PAXH: Isolation to Sensor Input Common: 1400 Vrms for 1 min.
    - Working Voltage: 125 V
    - Response Time: 50 msec. max.
    - Logic State: Jumper selectable for sink/source logic

<table>
<thead>
<tr>
<th>INPUT STATE</th>
<th>SOURCING INPUTS</th>
<th>SINKING INPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>$V_{IN} &lt; 0.9$ VDC</td>
<td>$V_{IN} &gt; 3.6$ VDC</td>
</tr>
<tr>
<td>Inactive</td>
<td>$V_{IN} &lt; 0.9$ VDC</td>
<td>$V_{IN} &gt; 3.6$ VDC</td>
</tr>
</tbody>
</table>
13. **TOTALIZER:**
    - Function:
      - Time Base: second, minute, hour, or day
      - Batch: Can accumulate (gate) input display from a user input
      - Time Accuracy: 0.01% typical
      - Decimal Point: 0 to 0.0000
      - Scale Factor: 0.001 to 65,000
      - Low Signal Cut-out: -19,999 to 99,999
      - Total: 9 digits, display alternates between high order and low order readouts
14. **CUSTOM LINEARIZATION:**
    - Data Point Pairs: Selectable from 2 to 16
    - Display Range: -19,999 to 99,999
    - Decimal Point: 0 to 0.0000
    - PAXT: IEC Point Compensation: user value (0.00 to 650.00 μV/°C)
15. **ENVIRONMENTAL CONDITIONS:**
    - Operating Temperature Range: 0 to 50°C (0 to 45°C with all three plug-in cards installed)
    - Vibration According to IEC 68-2-6: Operational 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g.
    - Shock According to IEC 68-2-27: Operational 25 g (10 g relay), 11 msec in 3 directions.
    - Storage Temperature Range: -40 to 60°C
    - Operating and Storage Humidity: 0 to 85% max. RH non-condensing
    - Altitude: Up to 2000 meters
16. **CERTIFICATIONS AND COMPLIANCES:**
    - UL Recognized Component, File #E179259, UL61010A-1, CSA C22.2 No. 61010-1
    - PAXT Only: File # E156876, UL873, CSA C22.2 No. 24
    - Recognized to U.S. and Canadian requirements under the Component Recognition Program of Underwriters Laboratories, Inc.
    - UL Listed, File # E137808, UL508, CSA C22.2 No. 14-965
    - LISTED by Underwriters Laboratories, Inc.
    - IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part I
    - IP65 Enclosure rating (Face only), IEC 529
    - IP20 Enclosure rating (Rear of unit), IEC 529
17. **ELECTROMAGNETIC COMPATIBILITY (EMC):**
    - **Immunity to Industrial Locations:**
      - Electrostatic discharge EN 61000-4-2: Criterion A
      - Electromagnetic RF fields EN 61000-4-3: Criterion A
        - 10 V/m (80 MHz to 1 GHz)
        - 3 V/m (1.4 GHz to 2 GHz)
        - 1 V/m (2 GHz to 2.7 GHz)
      - Fast transients (burst) EN 61000-4-4: Criterion B
        - 2 kV power
        - 1 kV I/O signal
        - 2 kV I/O signal connected to power
      - Surge EN 61000-4-5: Criterion A
        - 1 kV L to L, 2 kV L to G
        - 1 kV
      - RF conducted interference EN 61000-4-6: Criterion A
        - 3 Vrms
      - Power freq magnetic fields EN 61000-4-8: Criterion A
        - 30 A/m
      - AC power EN 61000-4-11: Criterion A
        - 0% during 1 cycle
        - 40% during 10/12 cycle
        - 70% during 25/30 cycle
      - Short interruptions Criterion C
        - 0% during 250/300 cycles
    - **Emissions:**
      - Emissions EN 55011 Class A
      - Notes:
        - Criterion A: Normal operation within specified limits.
        - Criterion B: Temporary loss of performance from which the unit self-recovers.
        - Criterion C: Temporary loss of function where system reset occurs.
        - Self-recoverable loss of performance during EMI disturbance at 10 V/m:
          - Measurement input and/or analog output signal may deviate during EMI disturbance.
          - For operation without loss of performance:
            - Unit is mounted in a metal enclosure (Buckeyem SM7013-0 or equivalent)
            - I/O and power cables are routed in metal conduit connected to earth ground.
            - Refer to EMC Installation Guidelines section of the bulletin for additional information.
18. **CONNECTIONS:**
    - High compression cage-clamp terminal block
    - Wire Strip Length: 0.3” (7.5 mm)
    - Wire Gage: 30-14 AWG copper wire
    - Torque: 4.5 inch-lbs (0.51 N-m) max.
    - Notes:
      - PAXH: Isolation to Sensor Input Common: 1400 Vrms for 1 min.
  - **WEIGHT:**
    - 10.4 oz. (295 g)
**Model PAXD - Universal DC Input**

- **FOUR VOLTAGE RANGES (300 VDC Max)**
- **FIVE CURRENT RANGES (2A DC Max)**
- **THREE RESISTANCE RANGES (10K Ohm Max)**
- **SELECTABLE 24 V, 2 V, 1.75 mA EXCITATION**

**PAXD Specifications**

### Input Ranges:

<table>
<thead>
<tr>
<th>Input Range</th>
<th>Accuracy* (18 to 28°C)</th>
<th>Accuracy* (0 to 50°C)</th>
<th>Impedance/Compliance</th>
<th>Max Continuous Overload</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>±200 μADC</td>
<td>±0.03% of reading +0.03 μA</td>
<td>±0.12% of reading +0.04 μA</td>
<td>1.1 Kohm</td>
<td>15 mA</td>
<td>10 nA</td>
</tr>
<tr>
<td>±2 mADC</td>
<td>±0.03% of reading +0.3 μA</td>
<td>±0.12% of reading +0.4 μA</td>
<td>111 ohm</td>
<td>50 mA</td>
<td>0.1 μA</td>
</tr>
<tr>
<td>±20 mADC</td>
<td>±0.03% of reading +3 μA</td>
<td>±0.12% of reading +4 μA</td>
<td>11.1 ohm</td>
<td>150 mA</td>
<td>1 μA</td>
</tr>
<tr>
<td>±200 mADC</td>
<td>±0.05% of reading +30 μA</td>
<td>±0.15% of reading +40 μA</td>
<td>1.1 ohm</td>
<td>500 mA</td>
<td>10 μA</td>
</tr>
<tr>
<td>±2 ADC</td>
<td>±0.5% of reading +0.3 mA</td>
<td>±0.7% of reading +0.4 mA</td>
<td>0.1 ohm</td>
<td>3 A</td>
<td>0.1 mA</td>
</tr>
<tr>
<td>±200 mVDC</td>
<td>±0.03% of reading +30 μV</td>
<td>±0.12% of reading +40 μV</td>
<td>1.066 Mohm</td>
<td>100 V</td>
<td>10 μV</td>
</tr>
<tr>
<td>±2 VDC</td>
<td>±0.03% of reading +0.3 mV</td>
<td>±0.12% of reading +0.4 mV</td>
<td>1.066 Mohm</td>
<td>300 V</td>
<td>1 mV</td>
</tr>
<tr>
<td>±20 VDC</td>
<td>±0.03% of reading +3 mV</td>
<td>±0.12% of reading +4 mV</td>
<td>1.066 Mohm</td>
<td>300 V</td>
<td>10 mV</td>
</tr>
<tr>
<td>±300 VDC</td>
<td>±0.05% of reading +30 mV</td>
<td>±0.15% of reading +40 mV</td>
<td>1.066 Mohm</td>
<td>300 V</td>
<td>10 mV</td>
</tr>
<tr>
<td>100 ohm</td>
<td>±0.05% of reading +30 Mohm</td>
<td>±0.2% of reading +40 Mohm</td>
<td>0.175 V</td>
<td>30 V</td>
<td>0.01 ohm</td>
</tr>
<tr>
<td>1000 ohm</td>
<td>±0.05% of reading +0.3 ohm</td>
<td>±0.2% of reading +0.4 ohm</td>
<td>1.75 V</td>
<td>30 V</td>
<td>0.1 ohm</td>
</tr>
<tr>
<td>10 Kohm</td>
<td>±0.05% of reading +1 ohm</td>
<td>±0.2% of reading +1.5 ohm</td>
<td>17.5 V</td>
<td>30 V</td>
<td>1 ohm</td>
</tr>
</tbody>
</table>

* After 20 minute warm-up. Accuracy is specified in two ways: Accuracy over an 18 to 28°C and 10 to 75% RH environment; and accuracy over a 0 to 50°C and 0 to 85% RH (non-condensing environment). Accuracy over the 0 to 50°C range includes the temperature coefficient effect of the meter.

**Excitation Power:**

Transmitter Power: 24 VDC, ±5%, regulated, 50 mA max.

**Model PAXP - Process Input**

- **DUAL RANGE INPUT (20 mA or 10 VDC)**
- **24 VDC TRANSMITTER POWER**

**PAXP Specifications**

### Sensor Inputs:

<table>
<thead>
<tr>
<th>Input Range</th>
<th>Accuracy* (18 to 28°C)</th>
<th>Accuracy* (0 to 50°C)</th>
<th>Impedance/Compliance</th>
<th>Max Continuous Overload</th>
<th>Display Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>±20 mA</td>
<td>±0.03% of reading +2 μA</td>
<td>±0.12% of reading +3 μA</td>
<td>20 ohm</td>
<td>150 mA</td>
<td>1 μA</td>
</tr>
<tr>
<td>±10 VDC</td>
<td>±0.03% of reading +2 mV</td>
<td>±0.12% of reading +3 mV</td>
<td>500 Kohm</td>
<td>300 V</td>
<td>1 mV</td>
</tr>
</tbody>
</table>

* After 20 minute warm-up. Accuracy is specified in two ways: Accuracy over an 18 to 28°C and 10 to 75% RH environment; and accuracy over a 0 to 50°C and 0 to 85% RH (non-condensing environment). Accuracy over the 0 to 50°C range includes the temperature coefficient effect of the meter.

**Excitation Power:**

Transmitter Power: 24 VDC, ±5%, regulated, 50 mA max.
MODEL PAXH - AC TRUE RMS VOLT AND CURRENT

- FOUR VOLTAGE RANGES (300 VAC Max)
- FIVE CURRENT RANGES (5 A Max)
- ACCEPTS AC OR DC COUPLED INPUTS
- THREE WAY ISOLATION: POWER, INPUT AND OUTPUTS

PAXH SPECIFICATIONS

INPUT RANGE:
- Isolation To Option Card Commons and User Input Commons: 125 Vrms
- Isolation To AC Power Terminals: 250 Vrms

<table>
<thead>
<tr>
<th>INPUT RANGE</th>
<th>ACCURACY*</th>
<th>IMPEDANCE (60 Hz)</th>
<th>MAX CONTINUOUS OVERLOAD</th>
<th>MAX DC BLOCKING</th>
<th>RESOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mV</td>
<td>0.1% of reading +0.4 mV</td>
<td>686 Kohm</td>
<td>30 V</td>
<td>±10 V</td>
<td>0.01 mV</td>
</tr>
<tr>
<td>2 V</td>
<td>0.1% of reading +2 mV</td>
<td>686 Kohm</td>
<td>30 V</td>
<td>±50 V</td>
<td>0.1 mV</td>
</tr>
<tr>
<td>20 V</td>
<td>0.1% of reading +20 mV</td>
<td>686 Kohm</td>
<td>300 V</td>
<td>±300 V</td>
<td>1 mV</td>
</tr>
<tr>
<td>300 V</td>
<td>0.2% of reading +0.3 V</td>
<td>686 Kohm</td>
<td>300 V</td>
<td>±300 V***</td>
<td>0.1 V</td>
</tr>
<tr>
<td>200 μA</td>
<td>0.1% of reading +0.4 μA</td>
<td>1.11 Kohm</td>
<td>15 mA</td>
<td>±15 mA</td>
<td>0.01 μA</td>
</tr>
<tr>
<td>2 mA</td>
<td>0.1% of reading +2 μA</td>
<td>111 ohm</td>
<td>50 mA</td>
<td>±50 mA</td>
<td>0.1 μA</td>
</tr>
<tr>
<td>20 mA</td>
<td>0.1% of reading +20 μA</td>
<td>11.1 ohm</td>
<td>150 mA</td>
<td>±150 mA</td>
<td>1 μA</td>
</tr>
<tr>
<td>200 mA</td>
<td>0.1% of reading +0.2 mA</td>
<td>1.1 ohm</td>
<td>500 mA</td>
<td>±500 mA</td>
<td>10 μA</td>
</tr>
<tr>
<td>5 A</td>
<td>0.5% of reading +5 mA</td>
<td>0.02 ohm</td>
<td>7 A**</td>
<td>±7 A***</td>
<td>1 mA</td>
</tr>
</tbody>
</table>

*Conditions for accuracy specification:
- 20 minutes warmup
- 18-28°C temperature range, 10-75% RH non-condensing
- 50 Hz - 400 Hz sine wave input
- 1% to 100% of range
- Add 0.1% reading + 20 counts error over 0-50°C range
- Add 0.2% reading + 10 counts error for crest factors up to 3, add 1% reading up to 5
- Add 0.5% reading + 10 counts of DC component
- Add 1% reading + 20 counts error over 20 Hz to 10 KHz range

** Non-repetitive surge rating: 15 A for 5 seconds
*** Inputs are direct coupled to the input divider and shunts. Input signals with high DC component levels may reduce the usable range.

MAX CREST FACTOR (Vp/VRMS): 5 @ Full Scale Input
INPUT COUPLING: AC or AC and DC
INPUT CAPACITANCE: 10 pF
COMMON MODE VOLTAGE: 125 VAC working
COMMON MODE REJECTION: (DC to 60 Hz) 100 dB

MODEL PAXS - STRAIN GAGE INPUT

PAXS SPECIFICATIONS

SENSOR INPUTS:

<table>
<thead>
<tr>
<th>INPUT RANGE</th>
<th>ACCURACY*</th>
<th>IMPEDEANCE</th>
<th>MAX CONTINUOUS OVERLOAD</th>
<th>RESOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>±24 mVDC</td>
<td>0.02% of reading +3 μV</td>
<td>100 Mohm</td>
<td>30 V</td>
<td>1 μV</td>
</tr>
<tr>
<td>±240 mVDC</td>
<td>0.02% of reading +30 μV</td>
<td>100 Mohm</td>
<td>30 V</td>
<td>10 μV</td>
</tr>
</tbody>
</table>

* After 20 minute warm-up. Accuracy is specified in two ways: Accuracy over an 18 to 28 °C and 10 to 75% RH environment; and accuracy over a 0 to 50 °C and 0 to 85% RH (non-condensing environment). Accuracy over the 0 to 50 °C range includes the temperature coefficient effect of the meter.

- LOAD CELL, PRESSURE AND TORQUE BRIDGE INPUTS
- DUAL RANGE INPUT: ±24 mV OR ±240 mV
- SELECTABLE 5 VDC OR 10 VDC BRIDGE EXCITATION
- PROGRAMMABLE AUTO-ZERO TRACKING

CONNECTION TYPE: 4-wire bridge (differential)
2-wire (single-ended)

COMMON MODE RANGE (w.r.t. input common): 0 to +5 VDC
Rejection: 80 dB (DC to 120 Hz)

BRIDGE EXCITATION:
- Jumper Selectable: 5 VDC @ 65 mA max., ±2%
- 10 VDC @ 125 mA max., ±2%

Temperature coefficient (ratio metric): 20 ppm/°C max.
**Model PAXT - Thermocouple and RTD Input**

**PAXT Specifications**

**Readout:**
- Resolution: Variable: 0.1, 0.2, 0.5, or 1, 2, or 5 degrees
- Scale: F or C
- Offset Range: -19,999 to 99,999 display units

**Thermocouple Inputs:**
- Input Impedance: 20 MΩ
- Lead Resistance Effect: 0.03 μV/ohm
- Maximum Continuous Overvoltage: 30 V

<table>
<thead>
<tr>
<th>INPUT TYPE</th>
<th>RANGE</th>
<th>ACCURACY* (18 to 28°C)</th>
<th>ACCURACY* (0 to 50°C)</th>
<th>STANDARD</th>
<th>WIRE COLOR</th>
<th>ANSI</th>
<th>BS 1843</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>-200 to 400°C -270 to -200°C</td>
<td>1.2°C **</td>
<td>2.1°C **</td>
<td>ITS-90</td>
<td>(+) blue</td>
<td>(+) white</td>
<td>red (blue)</td>
</tr>
<tr>
<td>E</td>
<td>-200 to 871°C -270 to -200°C</td>
<td>1.0°C **</td>
<td>2.4°C **</td>
<td>ITS-90</td>
<td>(+) purple</td>
<td>(+) white</td>
<td>(+) brown</td>
</tr>
<tr>
<td>J</td>
<td>-200 to 760°C</td>
<td>1.1°C **</td>
<td>2.3°C **</td>
<td>ITS-90</td>
<td>(+) white</td>
<td>(+) yellow</td>
<td>(+) white</td>
</tr>
<tr>
<td>K</td>
<td>-200 to 1372°C -270 to -200°C</td>
<td>1.3°C **</td>
<td>3.4°C **</td>
<td>ITS-90</td>
<td>(+) yellow</td>
<td>(+) white</td>
<td>(+) brown</td>
</tr>
<tr>
<td>R</td>
<td>-50 to 1768°C</td>
<td>1.9°C</td>
<td>4.0°C</td>
<td>ITS-90</td>
<td>no standard</td>
<td>(+) white</td>
<td>(+) blue</td>
</tr>
<tr>
<td>S</td>
<td>-50 to 1768°C</td>
<td>1.9°C</td>
<td>4.0°C</td>
<td>ITS-90</td>
<td>no standard</td>
<td>(+) white</td>
<td>(+) blue</td>
</tr>
<tr>
<td>B</td>
<td>100 to 300°C 300 to 1820°C</td>
<td>3.9°C</td>
<td>5.7°C</td>
<td>ITS-90</td>
<td>no standard</td>
<td>no standard</td>
<td>no standard</td>
</tr>
<tr>
<td>N</td>
<td>-200 to 1300°C -270 to -200°C</td>
<td>1.3°C **</td>
<td>3.1°C **</td>
<td>ITS-90</td>
<td>(+) orange</td>
<td>(+) white</td>
<td>(+) orange</td>
</tr>
<tr>
<td>C</td>
<td>0 to 2315°C</td>
<td>1.9°C</td>
<td>6.1°C</td>
<td>ASTM E988-90***</td>
<td>no standard</td>
<td>no standard</td>
<td>no standard</td>
</tr>
</tbody>
</table>

*After 20 min. warm-up. Accuracy is specified in two ways: Accuracy over 18 to 28°C and 15 to 75% RH environment; and Accuracy over 0 to 50°C and 0 to 85% RH (non-condensing) environment. Accuracy specified over the 0 to 50°C operating range includes meter tempco and ice point tracking effects. The specification includes the A/D conversion errors, linearity conformity, and thermocouple ice point compensation. Total system accuracy is the sum of meter and probe errors. Accuracy may be improved by field calibrating the meter readout at the temperature of interest.

**RTD Inputs:**
- Type: 3 or 4 wire, 2 wire can be compensated for lead wire resistance
- Excitation current: 100 ohm range: 165 μA
  10 ohm range: 2.6 mA
- Lead resistance: 100 ohm range: 10 ohm/lead max.
  10 ohm range: 3 ohms/lead max.

<table>
<thead>
<tr>
<th>INPUT TYPE</th>
<th>RANGE</th>
<th>ACCURACY* (18 to 28°C)</th>
<th>ACCURACY* (0 to 50°C)</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ohm Pt</td>
<td>-200 to 850°C</td>
<td>0.4°C</td>
<td>1.6°C</td>
<td>IEC 751</td>
</tr>
<tr>
<td>alpha = .00385</td>
<td>-200 to 850°C</td>
<td>0.4°C</td>
<td>1.6°C</td>
<td>no official standard</td>
</tr>
<tr>
<td>120 ohm Nickel</td>
<td>-80 to 260°C</td>
<td>0.2°C</td>
<td>0.5°C</td>
<td>no official standard</td>
</tr>
<tr>
<td>alpha = .00672</td>
<td>-100 to 260°C</td>
<td>0.4°C</td>
<td>0.9°C</td>
<td>no official standard</td>
</tr>
<tr>
<td>10 ohm Copper</td>
<td>-100 to 260°C</td>
<td>0.4°C</td>
<td>0.9°C</td>
<td>no official standard</td>
</tr>
<tr>
<td>alpha = .00427</td>
<td>-100 to 260°C</td>
<td>0.4°C</td>
<td>0.9°C</td>
<td>no official standard</td>
</tr>
</tbody>
</table>

**Custom Range:** Up to 16 data point pairs

<table>
<thead>
<tr>
<th>INPUT TYPE</th>
<th>RANGE</th>
<th>ACCURACY* (18 to 28°C)</th>
<th>ACCURACY* (0 to 50°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom mV range</td>
<td>-10 to 65 mV</td>
<td>0.02% of reading</td>
<td>0.12% of reading</td>
</tr>
<tr>
<td></td>
<td>(1 μV res.)</td>
<td>+ 0.04 mV</td>
<td>+ 5 mV</td>
</tr>
<tr>
<td>Custom ohm range</td>
<td>0 to 400 Ω</td>
<td>0.02% of reading</td>
<td>0.12% of reading</td>
</tr>
<tr>
<td></td>
<td>(10 MΩ res.)</td>
<td>+ 0.04 Ω</td>
<td>+ 0.05 Ω</td>
</tr>
<tr>
<td>Custom 10 ohm range</td>
<td>0 to 25 Ω</td>
<td>0.04% of reading</td>
<td>0.20% of reading</td>
</tr>
<tr>
<td></td>
<td>(1 MΩ res.)</td>
<td>+ 0.005 Ω</td>
<td>+ 0.007 Ω</td>
</tr>
</tbody>
</table>

**Accessories**

**Units Label Kit (PAXLGBK) - Not required for PAXT**
- Each meter has a units indicator with backlighting that can be customized using the Units Label Kit. The backlight is controlled in the programming.
- Each PAXT meter is shipped with °F and °C overlay labels which can be installed into the meter’s bezel display assembly.

**External Current Shunts (APSCM)**
- To measure DC current signals greater than 2 ADC, a shunt must be used. The APSCM010 current shunt converts a maximum 10 ADC signal into 100.0 mV. The APSCM100 current shunt converts a maximum 100 ADC signal into 100.0 mV. The continuous current through the shunt is limited to 115% of the rating.

**Programming Software**
- The Crimson software is a Windows based program that allows configuration of the PAX meter from a PC. Crimson offers standard drop-down menu commands, that make it easy to program the meter. The meter’s program can then be saved in a PC file for future use. A PAX serial plug-in card or PAX USB programming card is required to program the meter using the software. Crimson can be downloaded at www.redlion.net.
Adding Option Cards
The PAX and MPAX series meters can be fitted with up to three optional plug-in cards. The details for each plug-in card can be reviewed in the specification section below. Only one card from each function type can be installed at one time. The function types include Setpoint Alarms (PAXCDS), Communications (PAXCDC), and Analog Output (PAXCDL). The plug-in cards can be installed initially or at a later date.

PAXH Isolation Specifications For All Option Cards
Isolation To Sensor Commons: 1400 Vrms for 1 min.
Working Voltage: 125 V
Isolation to User Input Commons: 500 Vrms for 1 min.
Working Voltage: 50 V

COMMUNICATION CARDS (PAXCDC)
A variety of communication protocols are available for the PAX and MPAX series. Only one of these cards can be installed at a time. When programming the unit via Crimson, a Windows® based program, the RS232, RS485, or USB cards must be used.
PAXCDC10 - RS485 Serial (Terminal) PAXCDC30 - DeviceNet
PAXCDC1C - RS485 Serial (Connector) PAXCDC40 - Modbus (Terminal)
PAXCDC20 - RS232 Serial (Terminal) PAXCDC4C - Modbus (Connector)
PAXCDC2C - RS232 Serial (Connector) PAXCDC50 - Profibus-DP
PAXUSB00 - USB (Mini B)

SERIAL COMMUNICATIONS CARD
Type: RS485 or RS232
Isolation To Sensor & User Input Commons: 500 Vrms for 1 min.
Working Voltage: 50 V. Not Isolated from all other commons.
Data: 7/8 bits
Baud: 300 to 19,200
Parity: No, Odd or Even
Bus Address: Selectable 0 to 99, Max. 32 meters per line (RS485)
Transmit Delay: Selectable for 2 to 50 msec or 50 to 100 msec (RS485)

DEVICENET™ CARD
Compatibility: Group 2 Server Only, not UCMM capable
Baud Rates: 125 Kbaud, 250 Kbaud, and 500 Kbaud
Bus Interface: Phillips 82C250 or equivalent with MIS wiring protection per DeviceNet™ Volume I Section 10.2.2.
Node Isolation: Bus powered, isolated node
Host Isolation: 500 Vrms for 1 minute (50 V working) between DeviceNet™ and meter input common.

MODBUS CARD
Type: RS485; RTU and ASCII MODBUS modes
Isolation To Sensor & User Input Commons: 500 Vrms for 1 minute.
Working Voltage: 50 V. Not isolated from all other commons.
Baud Rates: 300 to 38400.
Data: 7/8 bits
Parity: No, Odd or Even
Addresses: 1 to 247.
Transmit Delay: Programmable; See Transmit Delay explanation.

PROFIBUS-DP CARD
Fieldbus Type: Profibus-DP as per EN 50170, implemented with Siemens SPC3 ASCII
Conformance: PNO Certified Profibus-DP Slave Device
Baud Rates: Automatic baud rate detection in the range 9.6 Kbaud to 12 Mbaud
Station Address: 0 to 125, set by rotary switches.
Connection: 9-pin female D-Sub connector
Network Isolation: 500 Vrms for 1 minute (50 V working) between Profibus network and sensor and user input commons. Not isolated from all other commons.
PAXUSB PROGRAMMING CARD
Type: USB Virtual Comms Port
Connection: Type mini B
Isolation To Sensor & User Input Commons: 500 Vrms for 1 min.
Working Voltage: 50 V. Not Isolated from all other commons.
Baud Rate: 300 to 19,200
Unit Address: 0 to 99; only 1 meter can be configured at a time

WARNING: Disconnect all power to the unit before installing Plug-in cards.

SETPOINT CARDS (PAXCDS)
The PAX and MPAX series has 4 available setpoint alarm output plug-in cards. Only one of these cards can be installed at a time. (Logic state of the outputs can be reversed in the programming.) These plug-in cards include:
PAXCDS10 - Dual Relay, FORM-C, Normally open & closed
PAXCDS20 - Quad Relay, FORM-A, Normally open only
PAXCDS30 - Isolated quad sinking NPN open collector
PAXCDS40 - Isolated quad sourcing PNP open collector

DUAL RELAY CARD
Type: Two FORM-C relays
Isolation To Sensor & User Input Commons: 2000 Vrms for 1 min.
Working Voltage: 240 Vrms
Contact Rating:
One Relay Energized: 5 amps @ 120/240 VAC or 32 VDC (resistive load), 1/8 HP @120 VAC, inductive load.
Total current with both relays energized not to exceed 5 amps
Life Expectancy: 100 K cycles min. at full load rating. External RC snubber extends relay life for operation with inductive loads

QUAD RELAY CARD
Type: Four FORM-A relays
Isolation To Sensor & User Input Commons: 2300 Vrms for 1 min.
Working Voltage: 250 Vrms
Contact Rating:
One Relay Energized: 3 amps @ 240 VAC or 30 VDC (resistive load), 1/10 HP @120 VAC, inductive load.
Total current with all four relays energized not to exceed 4 amps
Life Expectancy: 100K cycles min. at full load rating. External RC snubber extends relay life for operation with inductive loads

QUAD SINKING OPEN COLLECTOR CARD
Type: Four isolated sinking NPN transistors.
Isolation To Sensor & User Input Commons: 500 Vrms for 1 min.
Working Voltage: 50 V. Not Isolated from all other commons.
Rating: 100 mA max @ Vsat = 0.7 V max. VMAX = 30 V

QUAD SOURCING OPEN COLLECTOR CARD
Type: Four isolated sourcing PNP transistors.
Isolation To Sensor & User Input Commons: 500 Vrms for 1 min.
Working Voltage: 50 V. Not Isolated from all other commons.
Rating: Internal supply: 24 VDC ± 10%, 30 mA max. total
External supply: 30 VDC max., 100 mA max. each output

ALL FOUR SETPOINT CARDS
Response Time: 200msec. max. to within 99% of final readout value (digital filter and internal zero correction disabled) 700 msec. max. (digital filter disabled, internal zero correction enabled)

LINEAR DC OUTPUT (PAXCDL)
Either a 0(4)-20 mA or 0-10 V retransmitted linear DC output is available from the analog output plug-in card. The programmable output low and high scale can be based on various display values. Reverse slope output is possible by reversing the scaling point positions.
PAXCDL10 - Retransmitted Analog Output Card

ANALOG OUTPUT CARD
Types: 0 to 20 mA, 4 to 20 mA or 0 to 10 VDC
Isolation To Sensor & User Input Commons: 500 Vrms for 1 min.
Working Voltage: 50 V. Not Isolated from all other commons.
Accuracy: 0.17% of FS (18 to 28 °C); 0.4% of FS (0 to 50 °C)
Resolution: 1/3500
Compliance: 10 VDC: 10 KΩ load min., 20 mA; 500 Ω load max.
Update time: 200 msec. max. to within 99% of final output value (digital filter and internal zero correction disabled) 700 msec. max. (digital filter disabled, internal zero correction enabled)
1.0 INSTALLING THE METER

Installation

The PAX meets NEMA 4X/IP65 requirements when properly installed. The unit is intended to be mounted into an enclosed panel. Prepare the panel cutout to the dimensions shown. Remove the panel latch from the unit. Slide the panel gasket over the rear of the unit to the back of the bezel. The unit should be installed fully assembled. Insert the unit into the panel cutout.

While holding the unit in place, push the panel latch over the rear of the unit so that the tabs of the panel latch engage in the slots on the case. The panel latch should be engaged in the farthest forward slot possible. To achieve a proper seal, tighten the latch screws evenly until the unit is snug in the panel (Torque to approximately 7 in-lbs [79N-cm]). Do not over-tighten the screws.

Installation Environment

The unit should be installed in a location that does not exceed the maximum operating temperature and provides good air circulation. Placing the unit near devices that generate excessive heat should be avoided.

The bezel should be cleaned only with a soft cloth and neutral soap product. Do NOT use solvents. Continuous exposure to direct sunlight may accelerate the aging process of the bezel.

Do not use tools of any kind (screwdrivers, pens, pencils, etc.) to operate the keypad of the unit.

2.0 SETTING THE JUMPERS

The meter can have up to four jumpers that must be checked and / or changed prior to applying power. The following Jumper Selection Figures show an enlargement of the jumper area.

To access the jumpers, remove the meter base from the case by firmly squeezing and pulling back on the side rear finger tabs. This should lower the latch below the case slot (which is located just in front of the finger tabs). It is recommended to release the latch on one side, then start the other side latch.

Input Range Jumper

This jumper is used to select the proper input range. The input range selected in programming must match the jumper setting. Select a range that is high enough to accommodate the maximum input to avoid overloads. The selection is different for each meter. See the Jumper Selection Figure for appropriate meter.

Excitation Output Jumper

If your meter has excitation, this jumper is used to select the excitation range for the application. If excitation is not being used, it is not necessary to check or move this jumper.

User Input Logic Jumper

This jumper selects the logic state of all the user inputs. If the user inputs are not used, it is not necessary to check or move this jumper.

PAXH:

Signal Jumper

This jumper is used to select the signal type. For current signals, the jumper is installed. For voltage signals, remove the jumper from the board. (For 2 V inputs, this removed jumper can be used in the “2 V only” location.)

Couple Jumper

This jumper is used for AC / DC couple. If AC couple, then the jumper is removed from the board. If DC couple is used, then the jumper is installed.

PAXD Jumper Selection

Input Range Jumper

One jumper is used for voltage/ohms or current input ranges. Select the proper input range high enough to avoid input signal overload. Only one jumper is allowed in this area. Do not have a jumper in both the voltage and current ranges at the same time. Avoid placing the jumper across two ranges.

JUMPER SELECTIONS

The ~ indicates factory setting.

Input Range Jumper

<table>
<thead>
<tr>
<th>Voltage/Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>±300V</td>
</tr>
<tr>
<td>±24V/10KΩ</td>
</tr>
<tr>
<td>±24V/1KΩ</td>
</tr>
<tr>
<td>±200mV/100Ω</td>
</tr>
</tbody>
</table>

Current

| ±2mA |
| ±20mA |
| ±200mA |
| ±200μA |

Excitation Output Jumper

24V @ 5mA A
2V REF. 1.75mA REF.

User Input Logic Jumper

Source Sink

Rear Terminals

Main Circuit Board

Jumper Location

Volt/Ohm

Excitation

User Input
PAXP Jumper Selection

JUMPER SELECTIONS
The □ indicates factory setting.

USER INPUT LOGIC JUMPER
□ SINK □ SOURCE

REAR TERMINALS

PAXH Jumper Selection

CAUTION: To maintain the electrical safety of the meter, remove unneeded jumpers completely from the meter. Do not move the jumpers to positions other than those specified.

Signal Jumper
One jumper is used for the input signal type. For current signals, the jumper is installed. For voltage signals, remove the jumper from the board. (For 2 V inputs, this removed jumper can be used in the “2 V only” location.)

Couple Jumper
One jumper is used for AC/DC couple. If AC couple is used, then the jumper is removed from the board. If DC couple is used, then the jumper is installed.

PAXS Jumper Selection

Bridge Excitation
One jumper is used to select bridge excitation to allow use of the higher sensitivity 24 mV input range. Use the 5 V excitation with high output (3 mV/V) bridges. The 5 V excitation also reduces bridge power compared to 10 V excitation.

A maximum of four 350 ohm load cells can be driven by the internal bridge excitation voltage.
3.0 Installing Plug-In Cards

The plug-in cards are separately purchased optional cards that perform specific functions. These cards plug into the main circuit board of the meter. The plug-in cards have many unique functions when used with the PAX.

CAUTION: The plug-in card and main circuit board contain static sensitive components. Before handling the cards, discharge static charges from your body by touching a grounded bare metal object. Ideally, handle the cards at a static controlled clean workstation. Also, only handle the cards by the edges. Dirt, oil or other contaminants that may contact the cards can adversely affect circuit operation.

To Install:

1. With the meter removed from the case, locate the plug-in card connector for the card type to be installed. The types are keyed by position with different main circuit board connector locations. When installing the card, hold the meter by the rear terminals and not by the front display board. If installing the Quad sourcing Plug-in Card (PAXCD540), set the jumper for internal or external supply operation before continuing.

2. Install the plug-in card by aligning the card terminals with the slot bay in the rear cover. Be sure the connector is fully engaged and the tab on the plug-in card rests in the alignment slot on the display board.

3. Slide the meter base back into the case. Be sure the rear cover latches fully into the case.

4. Apply the plug-in card label to the bottom side of the meter in the designated area. Do Not Cover the vents on the top surface of the meter. The surface of the case must be clean for the label to adhere properly.
## 4.0 Wiring the Meter

### Wiring Overview
Electrical connections are made via screw-clamp terminals located on the back of the meter. All conductors should conform to the meter’s voltage and current ratings. All cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that power supplied to the meter (DC or AC) be protected by a fuse or circuit breaker.

When wiring the meter, compare the numbers embossed on the back of the meter case against those shown in wiring drawings for proper wire position. Strip the wire, leaving approximately 0.3" (7.5 mm) bare lead exposed (stranded wires should be tinned with solder). Insert the lead under the correct screw-clamp terminal and tighten until the wire is secure. (Pull wire to verify tightness.) Each terminal can accept up to one #14 AWG (2.55 mm) wire, two #18 AWG (1.02 mm), or four #20 AWG (0.61 mm).

### EMC Installation Guidelines
Although this meter is designed with a high degree of immunity to Electro-Magnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, its source or the method of coupling into the unit may be different for various installations. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The meter should be mounted in a metal enclosure, which is properly connected to protective earth.
2. With use of the lower input ranges or signal sources with high source impedance, the use of shielded cable may be necessary. This helps to guard against stray AC pick-up. Attach the shield to the input common of the meter. Line voltage monitoring and 5A CT applications do not usually require shielding.
3. To minimize potential noise problems, power the meter from the same power branch, or at least the same phase voltage as that of the signal source.
4. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.
5. Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
6. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:
   - Ferrite Suppression Cores for signal and control cables: Fair-Rite # 0443167251 (RLC #FCOR0000)
   - TDK # ZCAT3035-1330A
   - Steward #28B2029-0A
   - Line Filters for input power cables:
     - Schaffner # FN610-1/07 (RLC #LFIL0000)
     - Schaffner # FN670-1.8/07
     - Corcom #1VR3
   - Note: Reference manufacturer’s instructions when installing a line filter.
7. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
8. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI. Snubber: RLC/SNUB0000.

### 4.1 Power Wiring

<table>
<thead>
<tr>
<th>AC Power</th>
<th>DC Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 1: VAC</td>
<td>Terminal 1: +VDC</td>
</tr>
<tr>
<td>Terminal 2: VAC</td>
<td>Terminal 2: -VDC</td>
</tr>
</tbody>
</table>

### 4.2 Input Signal Wiring

#### PAXD Input Signal Wiring
Before connecting signal wires, the Input Range Jumper and Excitation Jumper should be verified for proper position.

<table>
<thead>
<tr>
<th>Voltage Signal (self powered)</th>
<th>Current Signal (self powered)</th>
<th>Current Signal (2 wire requiring excitation)</th>
<th>Current Signal (3 wire requiring excitation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 3: +VDC</td>
<td>Terminal 4: +ADC</td>
<td>Terminal 4: +ADC</td>
<td>Terminal 4: +ADC (signal)</td>
</tr>
<tr>
<td>Terminal 5: -VDC</td>
<td>Terminal 5: -ADC</td>
<td>Terminal 5: -ADC</td>
<td>Terminal 5: -ADC (common)</td>
</tr>
<tr>
<td>2A DC MAX.</td>
<td>24V EXC.</td>
<td>24V EXC.</td>
<td>24V EXC.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage Signal (3 wire requiring excitation)</th>
<th>3 WIRE TRANSMITTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 3: +VDC (signal)</td>
<td>3 WIRE TRANSMITTER</td>
</tr>
<tr>
<td>Terminal 5: -VDC (common)</td>
<td>+Vs</td>
</tr>
<tr>
<td>Terminal 6: +Volt supply</td>
<td>COMM.</td>
</tr>
<tr>
<td>Excitation Jumper: 24 V</td>
<td>+24V EXC.</td>
</tr>
</tbody>
</table>

| Load | +24V |
| 2A DC MAX. | TRANSMITTER |

<table>
<thead>
<tr>
<th>10 V</th>
<th>20 mA</th>
<th>10 V</th>
<th>20 mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Vout</td>
<td>Iout</td>
<td>Vout</td>
<td>Iout</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>COMM.</td>
<td></td>
<td>COMM.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+Vs</td>
<td></td>
<td>+Vs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Resistance Signal (3 wire requiring excitation)
Terminal 3: Resistance
Terminal 5: Resistance
Terminal 6: Jumper to terminal 3
Excitation Jumper: 1.75 mA REF.

Potentiometer Signal (3 wire requiring excitation)
Terminal 3: Wiper
Terminal 5: Low end of pot.
Terminal 6: High end of pot.
Excitation Jumper: 2 V REF.
Input Range Jumper: 2 Volt
Module 1 Input Range: 2 Volt
Note: The Apply signal scaling style should be used because the signal will be in volts.

CAUTION: Sensor input common is NOT isolated from user input common. In order to preserve the safety of the meter application, the sensor input common must be suitably isolated from hazardous live earth referenced voltages; or input common must be at protective earth ground potential. If not, hazardous live voltage may be present at the User Inputs and User Input Common terminals. Appropriate considerations must then be given to the potential of the user input common with respect to earth common; and the common of the isolated plug-in cards with respect to input common.

PAXP INPUT SIGNAL WIRING

Voltage Signal (self powered)
Terminal 3: +VDC
Terminal 5: -VDC
10 V 20 mA COMM.

Current Signal (self powered)
Terminal 4: +ADC
Terminal 5: -ADC
20 mA COMM.

Current Signal (2 wire requiring excitation)
Terminal 4: -ADC
Terminal 6: +ADC
20 mA DC MAX.

Current Signal (3 wire requiring excitation)
Terminal 4: +ADC (signal)
Terminal 5: -ADC (common)
Terminal 6: +Volt supply

Voltage Signal (3 wire requiring excitation)
Terminal 3: +VDC (signal)
Terminal 5: -VDC (common)
Terminal 6: +Volt supply

CAUTION: Sensor input common is NOT isolated from user input common. In order to preserve the safety of the meter application, the sensor input common must be suitably isolated from hazardous live earth referenced voltages; or input common must be at protective earth ground potential. If not, hazardous live voltage may be present at the User Inputs and User Input Common terminals. Appropriate considerations must then be given to the potential of the user input common with respect to earth common; and the common of the isolated plug-in cards with respect to input common.

PAXH INPUT SIGNAL WIRING

Before connecting signal wires, the Signal, Input Range and Couple Jumpers should be verified for proper position.

Voltage Signal
Neutral
Line (Hot)
300V MAX. AC

Current Signal (Amps)
Neutral
Load
Line (Hot)
5A AC MAX.

Current Signal (Milliamps)
Neutral
Load
Line (Hot)
200mA AC MAX.

CAUTION: Connect only one input signal range to the meter. Hazardous signal levels may be present on unused inputs.

CAUTION: The isolation rating of the input common of the meter with respect to the option card commons and the user input common Terminal 8 (If used) is 125 Vrms; and 250 Vrms with respect to AC Power (meter Terminals 1 & 2). To be certain that the ratings are not exceeded, these voltages should be verified by a high-voltage meter before wiring the meter.

CAUTION:
1. Where possible, connect the neutral side of the signal (including current shunts) to the input common of the meter. If the input signal is sourced from an active circuit, connect the lower impedance (usually circuit common) to the signal common of the meter.

2. For phase-to-phase line monitoring where a neutral does not exist, or for any other signal input in which the isolation voltage rating is exceeded, an isolating potential transformer must be used to isolate the input voltage from earth. With the transformer, the input common of the meter can then be earth referenced for safety.

3. When measuring line currents, the use of a current transformer is recommended. If using external current shunts, insert the shunt in the neutral return line. If the isolation voltage rating is exceeded, the use of an isolating current transformer is necessary.

12
PAXS INPUT SIGNAL WIRING

Before connecting signal wires, the Input Range Jumper should be verified for proper position.

2-Wire Single Ended Input

4-Wire Bridge Input

6-Wire Bridge Input

DEADLOAD COMPENSATION
In some cases, the combined deadload and liveload output may exceed the range of the 24 mV input. To use this range, the output of the bridge can be offset a small amount by applying a fixed resistor across one arm of the bridge. This shifts the electrical output of the bridge downward to within the operating range of the meter. A 100 K ohm fixed resistor shifts the bridge output approximately -10 mV (350 ohm bridge, 10 V excitation).

Connect the resistor between +SIG and -SIG. Use a metal film resistor with a low temperature coefficient of resistance.

BRIDGE COMPLETION RESISTORS
For single strain gage applications, bridge completion resistors must be employed externally to the meter. Only use metal film resistors with a low temperature coefficient of resistance.

Load cells and pressure transducers are normally implemented as full resistance bridges and do not require bridge completion resistors.

PAXT INPUT SIGNAL WIRING

Thermocouple

3-Wire RTD

2-Wire RTD

CAUTION: Sensor input common is NOT isolated from user input common. In order to preserve the safety of the meter application, the sensor input common must be suitably isolated from hazardous live earth referenced voltages; or input common must be at protective earth ground potential. If not, hazardous live voltage may be present at the User Inputs and User Input Common terminals. Appropriate considerations must then be given to the potential of the user input common with respect to earth common; and the common of the isolated plug-in cards with respect to input common.

4.3 USER INPUT WIRING
Before connecting the wires, the User Input Logic Jumper should be verified for proper position. If not using User Inputs, then skip this section. Only the appropriate User Input terminal has to be wired.

Sinking Logic
Terminal 8-10: + VDC thru external switching device
Terminal 7: -VDC thru external switching device

In this logic, the user inputs of the meter are internally pulled up to +5 V with 22 K resistance. The input is active when it is pulled low (<0.9 V).

Sourcing Logic
Terminal 7: + VDC thru external switching device
Terminal 8-10: -VDC thru external switching device

In this logic, the user inputs of the meter are internally pulled down to 0 V with 22 K resistance. The input is active when a voltage greater than 3.6 VDC is applied.
PAXH ONLY

Sinking Logic
Terminals 9-11
Terminal 8

In this logic, the user inputs of the meter are internally pulled down with 22 K resistance. The input is active when it is pulled low (<0.9 V).

Sourcing Logic
Terminals 9-11:
+ VDC through external switching device
Terminal 8:
-VDC through external switching device

In this logic, the user inputs of the meter are internally pulled down with 22 K resistance. The input is active when a voltage greater than 3.6 VDC is applied.

4.4 SETPOINT (ALARMS) WIRING
4.5 SERIAL COMMUNICATION WIRING
4.6 ANALOG OUTPUT WIRING

See appropriate plug-in card bulletin for details.

5.0 REVIEWING THE FRONT BUTTONS AND DISPLAY

Display Readout Legends*

Setpoint Alarm Annunciators

Optional Custom Units Overlay

KEY DISPLAY MODE OPERATION
DSP Index display through max/min/total/input readouts
PAR Access parameter list
F1▲ Function key 1; hold for 3 seconds for Second Function 1**
F2▼ Function key 2; hold for 3 seconds for Second Function 2**
RST Reset (Function key)**

PROGRAMMING MODE OPERATION
Quit programming and return to display mode
Store selected parameter and index to next parameter
Increment selected parameter value
Decrement selected parameter value
Hold with F1▲, F2▼ to scroll value by x1000

* Display Readout Legends may be locked out in Factory Settings.
** Factory setting for the F1, F2, and RST keys is NO mode.
6.0 PROGRAMMING THE METER

OVERVIEW

PROGRAMMING MENU

DISPLAY MODE

The meter normally operates in the Display Mode. In this mode, the meter displays can be viewed consecutively by pressing the DSP key. The annunciators to the left of the display indicate which display is currently shown; Max Value (MAX), Min Value (MIN), or Totalizer Value (TOT). Each of these displays can be locked from view through programming. (See Module 3) The Input Display Value is shown with no annunciator.

PROGRAMMING MODE

Two programming modes are available. Full Programming Mode permits all parameters to be viewed and modified. Upon entering this mode, the front panel keys change to Programming Mode operations. This mode should not be entered while a process is running, since the meter functions and User Input response may not operate properly while in Full Programming Mode.

Quick Programming Mode permits only certain parameters to be viewed and/or modified. When entering this mode, the front panel keys change to Programming Mode operations, and all meter functions continue to operate properly. Quick Programming Mode is configured in Module 3. The Display Intensity Level “<LFE>” parameter is available in the Quick Programming Mode only when the security code is non-zero. For a description, see Module 9—Factory Service Operations. Throughout this document, Programming Mode (without Quick in front) always refers to “Full” Programming Mode.

PROGRAMMING TIPS

The Programming Menu is organized into nine modules (See above). These modules group together parameters that are related in function. It is recommended to begin programming with Module 1 and proceed through each module in sequence. Note that Modules 6 through 8 are only accessible when Modules 6 through 8 are only accessible when Modules 6 through 8 are only accessible when Modules 6 through 8 are only accessible when Modules 6 through 8 are only accessible when Modules 6 through 8 are only accessible when Modules 6 through 8 are only accessible. (See Modules 2 and 3 for programming lock-out details.)

FACTORY SETTINGS

Factory Settings may be completely restored in Module 9. This is a good starting point if encountering programming problems. Throughout the module description sections which follow, the factory setting for each parameter is shown below the parameter display. In addition, all factory settings are listed on the Parameter Value Chart following the programming section.

ALTERNATING SELECTION DISPLAY

In the module description sections which follow, the dual display with arrows appears for each programming parameter. This is used to illustrate the display alternating between the parameter (top display) and the parameter’s Factory Setting (bottom display). In most cases, selections or value ranges for the parameter will be listed on the right.

PROGRAMMING MODE ENTRY (PAR KEY)

The Programming Mode is entered by pressing the PAR key. If this mode is not accessible, then meter programming is locked by either a security code or a hardware lock. (See Modules 2 and 3 for programming lock-out details.)

MODULE ENTRY (ARROW & PAR KEYS)

Upon entering the Programming Mode, the display alternates between the present module (initially Pr) and the present module (initially Pr). The arrow keys (F1< and F2>) are used to select the desired module, which is then entered by pressing the PAR key.

PARAMETER (MODULE) MENU (PAR KEY)

Each module has a separate parameter menu. These menus are shown at the start of each module description section which follows. The PAR key is pressed to advance to a particular parameter to be changed, without changing the programming of preceding parameters. After completing a module, the display will return to Pr. From this point, programming may continue by selecting and entering additional modules. (See MODULE ENTRY above.)

PARAMETER SELECTION ENTRY (ARROW & PAR KEYS)

For each parameter, the display alternates between the parameter and the present selection or value for that parameter. For parameters which have a list of selections, the arrow keys (F1< and F2>) are used to sequence through the list until the desired selection is displayed. Pressing the PAR key stores and activates the displayed selection, and also advances the meter to the next parameter.

NUMERICAL VALUE ENTRY (ARROW, RST & PAR KEYS)

For parameters which require a numerical value entry, the arrow keys can be used to increment or decrement the display to the desired value. When an arrow key is pressed and held, the display automatically scrolls up or scrolls down. The longer the key is held, the faster the display scrolls.

The RST key can be used in combination with the arrow keys to enter large numerical values. When the RST key is pressed along with an arrow key, the display scrolls by 1000’s. Pressing the PAR key stores and activates the displayed value, and also advances the meter to the next parameter.

PROGRAMMING MODE EXIT (DSP KEY or PAR KEY at Pr)

The Programming Mode is exited by pressing the DSP key (from anywhere in the Programming Mode) or the PAR key (with Pr displayed). This will commit any stored parameter changes to memory and return the meter to the Display Mode. If a parameter was just changed, the PAR key should be pressed to store the change before pressing the DSP key. (If power loss occurs before returning to the Display Mode, verify recent parameter changes.)
Refer to the appropriate Input Range for the selected meter. Use only one Input Range, then proceed to Display Decimal Point.

### PAXD Input Range

<table>
<thead>
<tr>
<th>Selection</th>
<th>Range Resolution</th>
<th>Selection</th>
<th>Range Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>300.0 mV</td>
<td>±200.00 μA</td>
<td>2 μA</td>
<td>±2.0000 V</td>
</tr>
<tr>
<td>0.002 mA</td>
<td>±20.000 mA</td>
<td>20 μA</td>
<td>±20.000 V</td>
</tr>
<tr>
<td>0.2 mA</td>
<td>±200.00 mA</td>
<td>300 μA</td>
<td>±300.000 V</td>
</tr>
<tr>
<td>2 mA</td>
<td>±2.0000 A</td>
<td>1000 μA</td>
<td>±200.00 mA</td>
</tr>
<tr>
<td>20 μA</td>
<td>±200.00 mA</td>
<td>10000 μA</td>
<td>±100.000 μA</td>
</tr>
</tbody>
</table>

Select the input range that corresponds to the external signal. This selection should be high enough to avoid input signal overload but low enough for the desired input resolution. This selection and the position of the Input Range Jumper must match.

### PAXP Input Range

<table>
<thead>
<tr>
<th>Selection</th>
<th>Range Resolution</th>
<th>Selection</th>
<th>Range Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.002 A</td>
<td>±20.000 mA</td>
<td>10 μA</td>
<td>±200.000 mA</td>
</tr>
<tr>
<td>100.00 V</td>
<td>±200.000 mA</td>
<td>10000 μA</td>
<td>±2000.000 mA</td>
</tr>
</tbody>
</table>

Select the input range that corresponds to the external signal.

### PAXH Input Range

<table>
<thead>
<tr>
<th>Selection</th>
<th>Range Resolution</th>
<th>Selection</th>
<th>Range Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 μA</td>
<td>±200.00 mV</td>
<td>2 μA</td>
<td>±2.0000 mV</td>
</tr>
<tr>
<td>2 μA</td>
<td>±20.000 mA</td>
<td>20 μA</td>
<td>±20.000 mA</td>
</tr>
<tr>
<td>20 μA</td>
<td>±2.0000 V</td>
<td>0.002 A</td>
<td>±200.00 mA</td>
</tr>
<tr>
<td>300.0 V</td>
<td>±300.000 V</td>
<td>5 μA</td>
<td>±5.0000 mA</td>
</tr>
<tr>
<td>200 μA</td>
<td>±200.00 μA</td>
<td>5 μA</td>
<td>±5.0000 mA</td>
</tr>
</tbody>
</table>

Select the input range that corresponds to the external signal. This selection should be high enough to avoid input signal overload but low enough for the desired input resolution. This selection and the position of the Input Range Jumper must match.

### PAXH Input Couple

The input signal can be either AC coupled (rejecting the DC components of the signal) or DC coupled (measures both the AC and DC components of the signal). The coupling jumper and the setting of this parameter must match.

### PAXT Input Range

Select the input range that corresponds to the external signal. This selection should be high enough to avoid input signal overload but low enough for the desired input resolution. This selection and the position of the Input Range Jumper must match.

### PAXT Input Type

Select the input type that corresponds to the input sensor. For RTD types, check the RTD Input Jumper for matching selection. For custom types, the Temperature Scale parameter is not available, the Display Decimal Point is expanded, and Custom Sensor Scaling must be completed.

### PAXT Temperature Scale

Select the temperature scale. This selection applies for Input, MAX, MIN, and TOT displays. This does not change the user installed Custom Units Overlay display. If changed, those parameters that relate to the temperature scale should be checked. This selection is not available for custom sensor types.

### Display Decimal Point

Select the decimal point location for the Input, MAX and MIN displays. (The TOT display decimal point is a separate parameter.) This selection also affects round, disp1 and disp2 parameters and setpoint values.
Rounding selections other than one, cause the Input Display to ‘round’ to the nearest rounding increment selected (ie. rounding of ‘5’ causes 122 to round to 120 and 123 to round to 125). Rounding starts at the least significant digit of the Input Display. Remaining parameter entries (scaling point values, setpoint values, etc.) are not automatically adjusted to this display rounding selection.

**PAXT: TEMPERATURE DISPLAY OFFSET**

The temperature display can be corrected with an offset value. This can be used to compensate for probe errors, errors due to variances in probe placement or adjusting the readout to a reference thermometer. This value is automatically updated after a Zero Display to show how far the display is offset. A value of zero will remove the effects of offset.

**FILTER SETTING**

The input filter setting is a time constant expressed in tenths of a second. The filter settles to 99% of the final display value within approximately 3 time constants. This is an Adaptive Digital Filter which is designed to steady the Input Display reading. A value of ‘0’ disables filtering.

**FILTER BAND**

The digital filter will adapt to variations in the input signal. When the variation becomes less than the band value, the digital filter disengages. When the variation becomes less than the band value, the filter engages again. This allows for a stable readout, but permits the display to settle rapidly after a large process change. The value of the band is in display units. A band setting of ‘0’ keeps the digital filter permanently engaged.

For the PAXT, the following parameters only apply to Custom Sensor Scaling.

**PAXT: ICE POINT SLOPE**

This parameter sets the slope value for ice point compensation for the Custom TC range (mV/°C only). The fixed thermocouple ranges are automatically compensated by the meter and do not require this setting. To calculate this slope, use μV data obtained from thermocouple manufacturers’ tables for two points between 0°C and 50°C. Place this corresponding μV and °C information into the equation:

\[ \text{slope} = \frac{\text{μV}_2 - \text{μV}_1}{(\text{°C}_2 - \text{°C}_1)} \]

Due to the nonlinear output of thermocouples, the compensation may show a small offset error at room temperatures. This can be compensated by the offset parameter. A value of 0 disables internal compensation when the thermocouple is externally compensated.

*Factory Setting can be used without affecting basic start-up.*
### DISPLAY VALUE FOR SCALING POINT 2

<table>
<thead>
<tr>
<th>DSP 2</th>
<th>-19999 to 99999</th>
</tr>
</thead>
</table>

Enter the second coordinating Display Value by using the arrow keys. This is the same for PRE and RPLY scaling styles. (Follow the same procedure if using more than 2 scaling points.)

### General Notes on Scaling

1. Input Values for scaling points should be confined to the limits of the Input Range Jumper position.
2. The same Input Value should not correspond to more than one Display Value. (Example: 20 mA can not equal 0 and 10.) This is referred to as read out jumps (vertical scaled segments).
3. The same Display Value can correspond to more than one Input Value. (Example: 0 mA and 20 mA can equal 10.) This is referred to as readout dead zones (horizontal scaled segments).

### 6.2 MODULE 2 - USER INPUT AND FRONT PANEL FUNCTION KEY PARAMETERS (2-FNC)

<table>
<thead>
<tr>
<th>2-FNC</th>
<th>PARAMETER MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>USr-1</td>
<td>USr-2</td>
</tr>
</tbody>
</table>

The three user inputs are individually programmable to perform specific meter control functions. While in the Display Mode or Program Mode, the function is executed the instant the user input transitions to the active state.

The front panel function keys are also individually programmable to perform specific meter control functions. While in the Display Mode, the primary function is executed the instant the key is pressed. Holding the function key for three seconds executes a secondary function. It is possible to program a secondary function without a primary function.

In most cases, if more than one user input and/or function key is programmed the instant the user input transitions to the active state. These selections showing both displays are available for both. If a display is not shown, it is not available for that selection. USr-1 will represent all three user inputs. F1 will represent all five function keys.

### Note:
In the following explanations, not all selections are available for both user inputs and front panel function keys. Alternating displays are shown with each selection. Those selections showing both displays are available for both. If a display is not shown, it is not available for that selection. USr-1 will represent all three user inputs. F1 will represent all five function keys.

### NO FUNCTION

No function is performed if activated. This is the factory setting for all user inputs and function keys. No function can be selected without affecting basic start-up.

### PROGRAMMING MODE LOCK-OUT

Programming Mode is locked-out, as long as activated (maintained action). A security code can be configured to allow programming access during lock-out.

### ZERO (TARE) DISPLAY

The Zero (Tare) Display provides a way to zero the Input Display value at various input levels, causing future Display readings to be offset. This function is useful in weighing applications where the container or material on the scale should not be included in the next measurement value. When activated (momentary action), rEEE flashes and the Display is set to zero. At the same time, the Display value (that was on the display before the Zero Display) is subtracted from the Display Offset Value and is automatically stored as the new Display Offset Value (OFF). If another Zero (tare) Display is performed, the display will again change to zero and the Display reading will shift accordingly.

### RELATIVE/ABSOLUTE DISPLAY

This function will switch the Input Display between Relative and Absolute. The Relative is a net value that includes the Display Offset Value. The Input Display will normally show the Relative unless switched by this function. Regardless of the display selected, all meter functions continue to operate based on relative values. The Absolute is a gross value (based on Module 1 DSP and INP entries) without the Display Offset Value. The Absolute display is selected as long as the user input is activated (maintained action) or at the transition of the function key (momentary action). When the user input is released, or the function key is pressed again, the input display switches back to Relative display. Rs$ (absolute) or rE (relative) is momentarily displayed at transition to indicate which display is active.
HOLD DISPLAY
The shown display is held but all other meter functions continue as long as activated (maintained action).

HOLD ALL FUNCTIONS
The meter disables processing the input, holds all display contents, and locks the state of all outputs as long as activated (maintained action). The serial port continues data transfer.

SYNCHRONIZE METER READING
The meter suspends all functions as long as activated (maintained action). When the user input is released, the meter synchronizes the restart of the A/D with other processes or timing events.

STORE BATCH READING IN TOTALIZER
The Input Display value is one time added (batched) to the Totalizer at transition to activate (momentary action). The Totalizer retains a running sum of batched input.

SELECT TOTALIZER DISPLAY
The Totalizer display is selected as long as activated (maintained action). When the user input is released, the Input Display is returned. The Totalizer continues to function including associated outputs independent of being displayed.

RESET TOTALIZER
When activated (momentary action), DSP flashes and the Totalizer resets to zero. The Totalizer then continues to operate as it is configured. This selection functions independent of the selected display.

RESET AND ENABLE TOTALIZER
When activated (momentary action), DSP flashes and the Totalizer resets to zero. The Totalizer continues to operate while active (maintained action). When the user input is released, the Totalizer stops and holds its value. This selection functions independent of the selected display.

ENABLE TOTALIZER
The Totalizer continues to operate as long as activated (maintained action). When the user input is released, the Totalizer stops and holds its value. This selection functions independent of the selected display.

SELECT MAXIMUM DISPLAY
The Maximum display is selected as long as activated (maintained action). When the user input is released, the Input Display returns. The DSP key overrides the active user input. The Maximum continues to function independent of being displayed.

RESET MAXIMUM
When activated (momentary action), DSP flashes and the Maximum resets to the present Input Display value. The Maximum function then continues from that value. This selection functions independent of the selected display.

RESET, SELECT, ENABLE MAXIMUM DISPLAY
When activated (momentary action), the Maximum value is set to the present Input Display value. Maximum continues from that value while active (maintained action). When the user input is released, Maximum detection stops and holds its value. This selection functions independent of the selected display. The DSP key overrides the active user input display but not the Maximum function.

SELECT MINIMUM DISPLAY
The Minimum display is selected as long as activated (maintained action). When the user input is released, the Input Display is returned. The DSP key overrides the active user input. The Minimum continues to function independent of being displayed.

RESET MINIMUM
When activated (momentary action), DSP flashes and the Minimum reading is set to the present Input Display value. The Minimum function then continues from that value. This selection functions independent of the selected display.

RESET, SELECT, ENABLE MINIMUM DISPLAY
When activated (momentary action), the Minimum value is set to the present Input Display value. Minimum continues from that value while active (maintained action). When the user input is released, Minimum detection stops and holds its value. This selection functions independent of the selected display. The DSP key overrides the active user input display but not the Minimum function.

RESET MAXIMUM AND MINIMUM
When activated (momentary action), DSP flashes and the Maximum and Minimum readings are set to the present Input Display value. The Maximum and Minimum function then continues from that value. This selection functions independent of the selected display.

CHANGE DISPLAY INTENSITY LEVEL
When activated (momentary action), the display intensity changes to the next intensity level (of 4). The four levels correspond to Display Intensity Level (d-LEU) settings of 0, 3, 8, and 15. The intensity level, when changed via the User Input/ Function Key, is not retained at power-down, unless Quick Programming or Full Programming mode is entered and exited. The meter will power-up at the last saved intensity level.
Throughout this document, Programming Mode (without Quick in front) always refers to “Full” Programming (all meter parameters are accessible).
6.4 MODULE 4 - SECONDARY FUNCTION PARAMETERS (4-SEC)

**PARAMETER MENU**

- **Max. Capture Delay Time**
- **Min. Capture Delay Time**
- **Display Update Time**
- **Auto-Zero Tracking Delay Time**
- **Auto-Zero Tracking Band**
- **Units Label BackLight**
- **Display Offset Value**
- **Ice Point Compensation**

**MAX CAPTURE DELAY TIME**

When the Input Display is above the present MAX value for the entered delay time, the meter will capture that display value as the new MAX reading. A delay time helps to avoid false captures of sudden short spikes.

**MIN CAPTURE DELAY TIME**

When the Input Display is below the present MIN value for the entered delay time, the meter will capture that display value as the new MIN reading. A delay time helps to avoid false captures of sudden short spikes.

**DISPLAY UPDATE RATE**

This parameter determines the rate of display update. When set to 20 updates/second, the internal re-zero compensation is disabled, allowing for the fastest possible output response.

**PAXS: AUTO-ZERO TRACKING**

The meter can be programmed to automatically compensate for zero drift. Drift may be caused by changes in the transducers or electronics, or accumulation of material on weight systems.

Auto-zero tracking operates when the readout remains within the tracking band for a period of time equal to the tracking delay time. When these conditions are met, the meter re-zeroes the readout. After the re-zero operation, the meter resets and continues to auto-zero track.

**PAXS: AUTO-ZERO BAND**

The auto-zero tracking band should be set large enough to track normal zero drift, but small enough to not interfere with small process inputs.

For filling operations, the fill rate must exceed the auto-zero tracking rate. This avoids false tracking at the start of the filling operation.

**DISPLAY OFFSET VALUE**

Unless a Zero Display was performed or an offset from Module 1 scaling is desired, this parameter can be skipped. The Display Offset Value is the difference from the Absolute (gross) Display value to the Relative (net) Display value for the same input level. The meter will automatically update this Display Offset Value after each Zero Display. The Display Offset Value can be directly keyed-in to intentionally add or remove display offset. See Relative / Absolute Display and Zero Display explanations in Module 2.

**PAXS: AUTO-ZERO TRACKING**

When setting the auto-zero tracking parameter, ensure that the auto-zero tracking rate is set high enough to track normal zero drift, but low enough to not interfere with small process inputs.

**PAXS: AUTO-ZERO TRACKING**

The auto-zero tracking band should be set large enough to track normal zero drift, but small enough to not interfere with small process inputs.

For filling operations, the fill rate must exceed the auto-zero tracking rate. This avoids false tracking at the start of the filling operation.

**PAXS: AUTO-ZERO TRACKING**

The auto-zero tracking band should be set large enough to track normal zero drift, but small enough to not interfere with small process inputs.

For filling operations, the fill rate must exceed the auto-zero tracking rate. This avoids false tracking at the start of the filling operation.

**PAXS: AUTO-ZERO TRACKING**

The auto-zero tracking band should be set large enough to track normal zero drift, but small enough to not interfere with small process inputs.

For filling operations, the fill rate must exceed the auto-zero tracking rate. This avoids false tracking at the start of the filling operation.

**UNIT LABEL BACKLIGHT**

The Units Label Kit Accessory contains a sheet of custom unit overlays which can be installed into the meter’s bezel display assembly. The backlight for these custom units is activated by this parameter.

**DISPLAY OFFSET VALUE**

This parameter does not apply for the PAXT.

**PAXS: ICE POINT COMPENSATION**

This parameter turns the internal ice point compensation on or off. Normally, the ice point compensation is on. If using external compensation, set this parameter to off. In this case, use copper leads from the external compensation point to the meter. If using Custom TC range, the ice point compensation can be adjusted by a value in Module 1 when this is yes.

* Factory Setting can be used without affecting basic start-up.*
6.5 MODULE 5 - TOTALIZER (INTEGRATOR) PARAMETERS (S-TOTAL)

The totalizer accumulates (integrates) the Input Display value using one of two modes. The first is using a time base. This can be used to compute a temperature-temperature product. The second is through a user input or function key programmed for Batch (one time add on demand). This can be used to provide a readout of temperature integration, useful in curing and sterilization applications. If the Totalizer is not needed, its display can be locked-out and this module can be skipped during programming.

**TOTALIZER DECIMAL POINT**

![Decimal Point](image)

For most applications, this matches the Input Display Decimal Point \(dECPk\). If a different location is desired, refer to Totalizer Scale Factor.

**TOTALIZER TIME BASE**

\[ \text{base} \quad \text{SEC} = \text{seconds} \quad (+1) \quad \text{hour} = \text{hours} \quad (+3600) \]

\[ \text{IN} = \text{minutes} \quad (+60) \quad \text{DAY} = \text{days} \quad (+86400) \]

This is the time base used in Totalizer accumulations. If the Totalizer is being accumulated through a user input programmed for Batch, then this parameter does not apply.

**TOTALIZER SCALE FACTOR**

![Scale Factor](image)

For most applications, the Totalizer reflects the same decimal point location and engineering units as the Input Display. In these cases, the Totalizer Scale Factor is 1.000. The Totalizer Scale Factor can be used to scale the Totalizer to a different value than the Input Display. Common possibilities are:
1. Changing decimal point location (example tenths to whole)
2. Average over a controlled time frame.

Details on calculating the scale factor are shown later.

If the Totalizer is being accumulated through a user input programmed for Batch, then this parameter does not apply.

**TOTALIZER LOW CUT VALUE**

![Low Cut Value](image)

A low cut value disables Totalizer when the Input Display value falls below the value programmed.

**TOTALIZER POWER UP RESET**

![Power Up Reset](image)

The Totalizer can be reset to zero on each meter power-up by setting this parameter to reset.

* Factory Setting can be used without affecting basic start-up.

**TOTALIZER HIGH ORDER DISPLAY**

When the total exceeds 5 digits, the front panel annunciator TOT flashes. In this case, the meter continues to totalize up to a 9 digit value. The high order 4 digits and the low order 5 digits of the total are displayed alternately. The letter “h” denotes the high order display. When the total exceeds a 9 digit value, the Totalizer will show “E...” and will stop.

**TOTALIZER BATCHING**

The Totalizer Time Base and scale factor are overridden when a user input or function key is programmed for store batch \(dECPk\). In this mode, when the user input or function key is activated, the Input Display reading is one time added to the Totalizer (batch). The Totalizer retains a running sum of each batch operation until the Totalizer is reset. This is useful in weighing operations, when the value to be added is not based on time but after a filling event.

**TOTALIZER USING TIME BASE**

Totalizer accumulates as defined by:

\[
\text{Input Display} \times \text{Totalizer Scale Factor} = \text{Totalizer Time Base}
\]

Where:
- Input Display - the present input reading
- Totalizer Scale Factor - 0.001 to 65.000
- Totalizer Time Base - (the division factor of \(dBASE\))

Example: The input reading is at a constant rate of 10.0 gallons per minute. The Totalizer is used to determine how many gallons in tenths has flowed. Because the Input Display and Totalizer are both in tenths of gallons, the Totalizer Scale Factor is 1. With gallons per minute, the Totalizer Time Base is minutes (60). By placing these values in the equation, the Totalizer will accumulate every second as follows:

\[
10.0 \times 1.000 = 0.1667 \text{ gallon accumulates each second}
\]

This results in:
- 10.0 gallons accumulates each minute
- 600.0 gallons accumulates each hour

**TOTALIZER SCALE FACTOR CALCULATION EXAMPLES**

1. When changing the Totalizer Decimal Point \(dECPk\) location from the Input Display Decimal Point \(dECPk\), the required Totalizer Scale Factor is multiplied by a power of ten.

Example: Input \(dECPk = 0\)

<table>
<thead>
<tr>
<th>Totalizer CECP</th>
<th>Scale Factor</th>
<th>Totalizer CECP</th>
<th>Scale Factor</th>
<th>Totalizer CECP</th>
<th>Scale Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>10</td>
<td>0.00</td>
<td>10</td>
<td>0.000</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>0.0</td>
<td>1</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>x10</td>
<td>0.1</td>
<td>0</td>
<td>0.1</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>x100</td>
<td>0.01</td>
<td>x10</td>
<td>0.01</td>
<td>x100</td>
<td>0.001</td>
</tr>
<tr>
<td>x1000</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(x = \text{Totalizer display is round by tens or hundreds}\)

2. To obtain an average reading within a controlled time frame, the selected Totalizer Time Base is divided by the given time period expressed in the same timing units.

Example: Average temperature per hour in a 4 hour period, the scale factor would be 0.250. To achieve a controlled time frame, connect an external timer to a user input programmed for \(rSET\). The timer will control the start (reset) and the stopping (hold) of the totalizer.
**6.6 MODULE 6 - SETPOINT (ALARM) PARAMETERS (6-SP ט) ▼**

**PARAMETER MENU**

<table>
<thead>
<tr>
<th>PAR</th>
<th>SPSEL</th>
<th>RAct-n</th>
<th>SP-n</th>
<th>HYS-n</th>
<th>tON-n</th>
<th>tOFF-n</th>
<th>out-n</th>
<th>rSt-n</th>
<th>Stb-n</th>
<th>LIt-n</th>
<th>brn-n</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SETPOINT SELECT**

Enter the setpoint (alarm output) to be programmed. The \( n \) in the following parameters will reflect the chosen setpoint number. After the chosen setpoint is completely programmed, the display will return to \( \text{SPSEL NO} \). Repeat step for each setpoint to be programmed. The \( \text{NO} \) chosen at \( \text{SPSEL} \) will return to \( \text{OFF} \). The number of setpoints available is setpoint output card dependent.

**SETPOINT ACTION**

Enter the action for the selected setpoint (alarm output). See Setpoint Alarm Figures for a visual detail of each action.

- **OFF** = Setpoint always off, (returns to SPSEL NO)
- **Ab-H I** = Absolute high, with balanced hysteresis
- **Ab-L O** = Absolute low, with balanced hysteresis
- **Ru-H I** = Absolute high, with unbalanced hysteresis
- **Ru-L O** = Absolute low, with unbalanced hysteresis
- **dE-H I** = Deviation high, with unbalanced hysteresis *
- **dE-L O** = Deviation low, with unbalanced hysteresis *
- **brNd** = Outside band, with unbalanced hysteresis *
- **talo** = Lower Totalizer absolute high, unbalance hysteresis**
- **tahI** = Upper Totalizer absolute high, unbalance hysteresis**

* Deviation and band action setpoints are relative to the value of setpoint 1. It is not possible to configure setpoint 1 as deviation or band actions. It is possible to use setpoint 1 for an absolute action, while its value is being used for deviation or band.

**The lower Totalizer action talo allows setpoints to function off of the lower 5 digits of the Totalizer. The upper Totalizer action tahI allows setpoints to function off of the upper 4 digits of the Totalizer. To obtain absolute low alarms for the Totalizer, program the talo or tahI output logic as reverse.**

**Setpoint Alarm Figures**

With reverse output logic \( rE_u \), the below alarm states are opposite.

- Absolute High Acting (Balanced Hys) = \( Ab-H I \)
- Absolute Low Acting (Unbalanced Hys) = \( Ru-L O \)
- Band Outside Acting = \( brNd \)
- Deviation High Acting (SP > 0) = \( dE-H I \)
- Deviation Low Acting (SP < 0) = \( dE-L O \)
- Deviation Low Acting (SP > 0) = \( dE-L O \)
- Deviation Low Acting (SP < 0) = \( dE-L O \)

Depending on the card installed, there will be two or four setpoint outputs available. For maximum input frequency, unused Setpoints should be configured for \( \text{OFF} \) action.

The setpoint assignment and the setpoint action determine certain setpoint feature availability.

\( \text{V} \) - A setpoint card must be installed in order to access this module.
Enter desired setpoint alarm value. These setpoint values can also be entered in the Display Mode during Program Lock-out when the setpoint is programmed as SP1 in Parameter Module 3. When a setpoint is programmed as deviation or band acting, the associated output tracks SP1 as it is changed. The value entered is the offset, or difference from SP1.

**HYSTERESIS VALUE**

Enter desired hysteresis value. See Setpoint Alarm Figures for visual explanation of how setpoint alarm actions (balance and unbalance) are affected by the hysteresis. When the setpoint is a control output, usually balanced hysteresis is used. For alarm applications, usually unbalanced hysteresis is used. For unbalanced hysteresis modes, the hysteresis functions on the low side for high acting setpoints and functions on the high side for low acting setpoints.

Note: Hysteresis eliminates output chatter at the switch point, while time delay can be used to prevent false triggering during process transient events.

**ON TIME DELAY**

Enter the time value in seconds that the alarm is delayed from turning on after the trigger point is reached. A value of 0.0 allows the meter to update the alarm status per the response time listed in the Specifications. When the output logic is SP, this becomes off time delay. Any time accumulated at power-off resets during power-up.

**OFF TIME DELAY**

Enter the time value in seconds that the alarm is delayed from turning off after the trigger point is reached. A value of 0.0 allows the meter to update the alarm status per the response time listed in the Specifications. When the output logic is SP, this becomes on time delay. Any time accumulated at power-off resets during power-up.

**OUTPUT LOGIC**

Enter the output logic of the alarm output. The nar logic leaves the output operation as normal. The rEw logic reverses the output logic. In rEw, the alarm states in the Setpoint Alarm Figures are reversed.

**RESET ACTION**

Enter the reset action of the alarm output. rAuto = Automatic action; This action allows the alarm output to automatically reset off at the trigger point per the Setpoint Action shown in Setpoint Alarm Figures. The “on” alarm may be manually reset (off) immediately by a front panel function key or user input manual reset, serial reset command or meter power cycle. When the user input or function key is activated (momentary or maintained), the corresponding “on” alarm output is reset immediately and remains off until the trigger point is crossed again. (Previously latched alarms will be off if power up Display Value is lower than setpoint value.) LRec2 = Latch with delay reset action; This action latches the alarm output on at the trigger point per the Setpoint Action shown in Setpoint Alarm Figures. Latch means that the alarm output can only be turned off by front panel function key or user input manual reset, serial reset command or meter power cycle. When the user input or function key is activated (momentary or maintained), the meter delays the event until the corresponding “on” alarm output crosses the trigger off point. (Previously latched alarms are off if power up Display Value is lower than setpoint value. During a power cycle, the meter erases a previous Latch 2 reset if it is not activated at power up.)

**STANDBY OPERATION**

When YES, the alarm is disabled (after a power up) until the trigger point is crossed. Once the alarm is on, the alarm operates normally per the Setpoint Action and Reset Mode.

**SETPOINT ANNUNCIATORS**

The OFF mode disables display setpoint annunciators. The nar mode displays the corresponding setpoint annunciators of “on” alarm outputs. The rEw mode displays the corresponding setpoint annunciators of “off” alarm outputs. The FLASH mode flashes the corresponding setpoint annunciators of “on” alarm outputs.

An Alternate list of setpoint values can be stored and recalled as needed. The Alternate list allows an additional set of setpoint values. (The setpoint numbers or rear terminal numbers will change in the Alternate list.) The Alternate list can only be activated through a function key or user input programmed for L15t in Module 2. When the Alternate list is selected, the Main list is stored and becomes inactive. When changing between Main and Alternate, the alarm state of Auto Reset Action alarms will always follow their new value. Latched “on” alarms will always stay latched during the transition and can only be reset with a user input or function key. Only during the function key or user input transition does the display indicate which list is being used.

![Setpoint Alarm Reset Actions](image-url)
### 6.7 MODULE 7 - SERIAL COMMUNICATIONS PARAMETERS (7-5rL)

#### PARAMETER MENU

<table>
<thead>
<tr>
<th>7-5rL</th>
<th>PAR</th>
<th>bAud</th>
<th>dRtR</th>
<th>PR</th>
<th>Raddr</th>
<th>Abru</th>
<th>OPt</th>
<th>PAXS ONLY</th>
<th>PAXS ONLY</th>
<th>PAXS ONLY</th>
<th>tOk</th>
<th>HILD</th>
<th>SPnk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gross</td>
<td>Tare</td>
<td>Total Value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>Value</td>
<td>Value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Min Values</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **BAUD RATE**

  
  ![baud_rate_image](image)

  Set the baud rate to match that of other serial communications equipment. Normally, the baud rate is set to the highest value that all of the serial communications equipment is capable of transmitting.

- **DATA BIT**

  
  ![data_bit_image](image)

  Select either 7 or 8 bit data word lengths. Set the word length to match that of other serial communication equipment. Since the meter receives and transmits 7-bit ASCII encoded data, 7-bit word length is sufficient to request and receive data from the meter.

- **PARITY BIT**

  
  ![parity_bit_image](image)

  Set the parity bit to match that of other serial communications equipment used. The meter ignores the parity when receiving data, and sets the parity bit for outgoing data. If no parity is selected with 7-bit word length the meter transmits and receives data with 2 stop bits. (For example: 10 bit frame with mark parity)

- **METER ADDRESS**

  ![meter_address_image](image)

  Enter the serial node address. With a single unit on a bus, an address is not needed and a value of zero can be used (RS232 applications). Otherwise, with multiple bussed units, a unique address number must be assigned to each meter. The node address applies specifically to RS485 applications.

- **ABBREVIATED PRINTING**

  ![abbreviated_printing_image](image)

  Select abbreviated transmissions (numeric only) or full field transmission. When the data from the meter is sent directly to a terminal for display, the extra characters that are sent identify the nature of the meter parameter displayed. In this case, select **NO**. When the data from the meter goes to a computer, it may be desirable to suppress the node address and mnemonic when transmitting. In this case, set this parameter to **YES**.

- **PRINT OPTIONS**

  ![print_options_image](image)

  **YES** - Enters the sub-menu to select those meter parameters to appear in the block print. For each parameter in the sub-menu select **YES** for the parameter to appear with the block print, and **NO** to disable the parameter.

  *Setpoints 1–4 are setpoint plug-in card dependent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Gross Value (PAXS Only)</th>
<th>Tare Value (PAXS Only)</th>
<th>Input Value</th>
<th>Max and Min Values</th>
<th>Total Value</th>
<th>Setpoint values*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
</tr>
<tr>
<td><strong>Gross Value (PAXS Only)</strong></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tare Value (PAXS Only)</strong></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Input Value</strong></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max and Min Values</strong></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Value</strong></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Setpoint values</strong></td>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sending Commands and Data

When sending commands to the meter, a string containing at least one command character must be constructed. A command string consists of a command character, a value identifier, numerical data (if writing data to the meter) followed by a the command terminator character * or $.

Command Chart

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Node Address Specifier</td>
<td>Address a specific meter. Must be followed by one or two digit node address. Not required when node address = 0.</td>
</tr>
<tr>
<td>T</td>
<td>Transmit Value (read)</td>
<td>Read a register from the meter. Must be followed by register ID character.</td>
</tr>
<tr>
<td>V</td>
<td>Value change (write)</td>
<td>Write to register of the meter. Must be followed by register ID character and numeric data.</td>
</tr>
<tr>
<td>R</td>
<td>Reset</td>
<td>Reset a register or output. Must be followed by register ID character.</td>
</tr>
<tr>
<td>P</td>
<td>Block Print Request (read)</td>
<td>Initiates a block print output. Registers are defined in programming.</td>
</tr>
</tbody>
</table>

Command String Construction

The command string must be constructed in a specific sequence. The meter does not respond with an error message to illegal commands. The following procedure details construction of a command string:

1. The first 2 or 3 characters consist of the Node Address Specifier (N) followed by a 1 or 2 character node address number. The node address number of the meter is programmable. If the node address is 0, this command and the node address itself may be omitted. This is the only command that may be used in conjunction with other commands.
2. After the optional address specifier, the next character is the command character.
3. The next character is the register ID. This identifies the register that the command affects. The P command does not require a register ID character. It prints according to the selections made in print options.
4. If constructing a value change command (writing data), the numeric data is sent next.
5. All command strings must be terminated with the string terminator character * or $. The meter does not begin processing the command string in conjunction with other commands.

Receiving Data

Data is transmitted by the meter in response to either a transmit command (T), a print block command (P) or User Function print request. The response from the meter is either a full field transmission or an abbreviated transmission. In this case, the response contains only the numeric field. The meter response mode is established in programming.

Full Field Transmission

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>2 byte Node Address field [00-99]</td>
</tr>
<tr>
<td>3</td>
<td>&lt;SF&gt; (Space)</td>
</tr>
<tr>
<td>4-6</td>
<td>3 byte Register Mnemonic field</td>
</tr>
<tr>
<td>7-18</td>
<td>12 byte data field; 10 bytes for number, one byte for sign, one byte for decimal point (The T command may be a different byte length)</td>
</tr>
<tr>
<td>19</td>
<td>&lt;CR&gt; carriage return</td>
</tr>
<tr>
<td>20</td>
<td>&lt;LF&gt; line feed</td>
</tr>
<tr>
<td>21</td>
<td>&lt;SP&gt; (Space)</td>
</tr>
<tr>
<td>22</td>
<td>&lt;CR&gt; carriage return</td>
</tr>
<tr>
<td>23</td>
<td>&lt;LF&gt; line feed</td>
</tr>
</tbody>
</table>

* These characters only appear in the last line of a block print.

The first two characters transmitted are the node address, unless the node address assigned =0, in which case spaces are substituted. A space follows the node address field. The next three characters are the register ID (Serial Mnemonic).

The numeric data is transmitted next. The numeric field is 12 characters long (to accommodate the 10 digit totalizer), with the decimal point position floating within the data field. Negative value have a leading minus sign. The data field is right justified with leading spaces.

Register Identification Chart

<table>
<thead>
<tr>
<th>ID</th>
<th>Value Description</th>
<th>Register ID</th>
<th>Applicable Commands/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Input</td>
<td>INP T, P, R</td>
<td>(Reset command [Ver2.5+] zeros the input [&quot;REL&quot; or Tare])</td>
</tr>
<tr>
<td>B</td>
<td>Total</td>
<td>TOT T, P, R</td>
<td>(Reset command resets total to zero)</td>
</tr>
<tr>
<td>C</td>
<td>Max Input</td>
<td>MAX T, P, R</td>
<td>(Reset command resets MAX to current reading)</td>
</tr>
<tr>
<td>D</td>
<td>Min Input</td>
<td>MIN T, P, R</td>
<td>(Reset command resets MIN to current reading)</td>
</tr>
<tr>
<td>E</td>
<td>Setpoint 1</td>
<td>SP1 T, P, V, R</td>
<td>(Reset command resets the setpoint output)</td>
</tr>
<tr>
<td>F</td>
<td>Setpoint 2</td>
<td>SP2 T, P, V, R</td>
<td>(Reset command resets the setpoint output)</td>
</tr>
<tr>
<td>G</td>
<td>Setpoint 3</td>
<td>SP3 T, P, V, R</td>
<td>(Reset command resets the setpoint output)</td>
</tr>
<tr>
<td>H</td>
<td>Setpoint 4</td>
<td>SP4 T, P, V, R</td>
<td>(Reset command resets the setpoint output)</td>
</tr>
<tr>
<td>I</td>
<td>Analog Output</td>
<td>AOR T, V</td>
<td>(Applies to manual mode)</td>
</tr>
<tr>
<td>J</td>
<td>Control Status</td>
<td>CSR T, V</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Absolute (gross)</td>
<td>ABS GRS † T, P</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Offset/Tare (PAXS)</td>
<td>GFS TAR † T, P, V</td>
<td>(Ver 2.5+)</td>
</tr>
</tbody>
</table>

† Register ID for the PAXS.

Command String Examples:

1. Node address = 17, Write 350 to Setpoint 1, response delay of 2 msec
   String: N17VE350S
2. Node address = 5, Read Input value, response delay of 50 msec
   String: N5TA*
3. Node address = 0, Reset Setpoint 4 output, response delay of 50 msec
   String: RH*

Sending Numeric Data

Numeric data sent to the meter must be limited to 5 digits (-19,999 to 99,999). If more than 5 digits are sent, the meter accepts the last 5. Leading zeros are ignored. Negative numbers must have a minus sign. The meter ignores any decimal point and conforms the number to the scaled resolution. (For example: the meter’s scaled decimal point position = 0.0 and 25 is written to a register. The value of the register is now 2.5 In this case, write a value = 25.0).

Note: Since the meter does not issue a reply to value change commands, follow with a transmit value command for readback verification.

Receiving Data

The end of the response string is terminated with a carriage return <CR> and <LF>. When block print is finished, an extra <SF><CR><LF> is used to provide separation between the blocks.

Abbreviated Transmission

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-12</td>
<td>12 byte data field, 10 bytes for number, one byte for sign, one byte for decimal point</td>
</tr>
<tr>
<td>13</td>
<td>&lt;CR&gt; carriage return</td>
</tr>
<tr>
<td>14</td>
<td>&lt;LF&gt; line feed</td>
</tr>
<tr>
<td>15</td>
<td>&lt;SP&gt; (Space)</td>
</tr>
<tr>
<td>16</td>
<td>&lt;CR&gt; carriage return</td>
</tr>
<tr>
<td>17</td>
<td>&lt;LF&gt; line feed</td>
</tr>
</tbody>
</table>

* These characters only appear in the last line of a block print.

The abbreviated response supresses the node address and register ID, leaving only the numeric part of the response.

Meter Response Examples:

1. Node address = 17, full field response, Input = 875
   17 INP 875<CR><LF>
2. Node address = 0, full field response, Setpoint 2 = -250.5
   SP2 -250.5<CR><LF>
3. Node address = 0, abbreviated response, Setpoint 2 = 250, last line of block print
   250<CR><LF><SP><CR><LF>
SERIAL COMMANDS FOR PAX SOFTWARE

(CSR) Control Status Register

The Control Status Register is used to both directly control the meter’s outputs (setpoints and analog output), and interrogate the state of the setpoint outputs. The register is bit mapped with each bit position within the register assigned to a particular control function. The control function are invoked by writing to each bit position. The bit position definitions are:

- 0: Setpoint 1 Output Status
- 1: Setpoint 2 Output Status
- 2: Setpoint 3 Output Status
- 3: Setpoint 4 Output Status
- 4: Manual Mode
- 5: Sensor Status
- 6: Sensor Fail
- 7: Sensor Normal

Although the register is bit mapped starting with bit 7, HEX < > characters are sent in the command string. Bits 7 and 5 always stay a zero, even if a “1” is sent. This allows ASCII characters to be used with terminals that may not have extended character capabilities.

Writing a “1” to bit 4 of CSR selects manual mode. In this mode, the setpoint outputs are defined by the values written to the bits b0, b1, b2, b3; and the analog output is defined by the value written to the AOR. Internal control of these outputs is then overridden.

In automatic mode, the setpoint outputs can only be reset off. Writing to the setpoint output bits of the CSR has the same effect as a Reset command (R). The contents of the CSR may be read to interrogate the state of the setpoint outputs and to check the status of the temperature sensor (PAXT only).

Examples:
1. Set manual mode, turn all setpoints off:
   \[ VJ<30>* \text{ or } VJ0* \]
   \[ \text{ASCII } 0 = 0 0 0 1 1 0 0 0 \text{ or } <30> \]
   V is command write, J is CSR and * is terminator.
2. Turn SP1, SP3 outputs on and SP2, SP4 outputs off:
   \[ VJ<35>* \text{ or } VJ5* \]
   \[ \text{ASCII } 5 = 0 0 1 1 0 0 1 0 \text{ or } <35> \]
3. Select Automatic mode:
   \[ VJ<40>* \text{ or } VJ@* \]
   \[ \text{ASCII } @ = 0 1 0 0 0 0 0 0 \text{ or } <40> \]

Note: Avoid writing values <AB> (LF), <DO> (CR), <24> (S) and <2E> (*) to the CSR. These values are interpreted by the meter as end of command control codes and will prematurely end the write operation.

(AOR) Analog Output Register

The Analog Output Register controls the analog output of the meter. The manual mode must first be engaged by setting bit 4 of the Control Status Register. The range of values of this register is 0 to 4095, which corresponds to 0 mA, 0 V and 20 mA, 10 V; respectively. The table lists correspondence of the output signal with the register value.

<table>
<thead>
<tr>
<th>Register Value</th>
<th>Output Signal*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000 0.005</td>
</tr>
<tr>
<td>2047</td>
<td>10.000 5.000</td>
</tr>
<tr>
<td>4094</td>
<td>19.995 9.9975</td>
</tr>
<tr>
<td>4095</td>
<td>20.000 10.000</td>
</tr>
</tbody>
</table>

*Due to the absolute accuracy rating and resolution of the output card, the actual output signal may differ 0.15% FS from the table values. The output signal corresponds to the range selected (20 mA or 10 V).

Writing to this register while the meter is in the manual mode causes the output signal to update immediately. While in the automatic mode, this register may be written to, but the output will not update until the meter is placed in manual mode.

Examples:
1. Set output to full scale:
   \[ VI4095* \]
2. Set output to zero scale:
   \[ VJ0* \]

Command Response Time

The meter can only receive data or transmit data at any one time (half-duplex operation). The meter ignores commands while transmitting data, but instead uses RXD as a busy signal. When sending commands and data to the meter, a delay must be imposed before sending another command. This allows enough time for the meter to process the command and prepare for the next command.

No reply from meter:

- Command String Transmission
- Meter Response Time
- Ready

Response from meter:

- Command Terminator Received
- First Character of Reply
- Reply Transmission Time
- Ready

Timing Diagram Figure

At the start of the time interval \( t_1 \), the computer program prints or writes the string to the com port, thus initiating a transmission. During \( t_1 \), the command characters are under transmission and at the end of this period, the command terminating character (*) is received by the meter. The time duration of \( t_1 \) is dependent on the number of characters and baud rate of the channel.

\[ t_1 = (10 \times \# \text{ of characters}) / \text{baud rate} \]

At the start of time interval \( t_2 \), the meter starts the interpretation of the command and when complete, performs the command function. This time interval \( t_2 \) varies from 2 msec to 50 msec. If no response from the meter is expected, the meter is ready to accept another command.

If the meter is to reply with data, the time interval \( t_2 \) is controlled by the use of the command terminating character. The standard command line terminating character is "*". This terminating character results in a response time window of 50 msec minimum and 100 msec maximum. This allows sufficient time for the release of the sending driver on the RS485 bus. Terminating the command line with "$" results in a response time window \( t_1 \) of 2 msec minimum and 50 msec maximum. The faster response time of this terminating character requires that sending drivers release within 2 msec after the terminating character is received.

At the beginning of time interval \( t_1 \), the meter responds with the first character of the reply. As with \( t_1 \), the time duration of \( t_2 \) is dependent on the number of characters and baud rate of the channel. \( t_2 = (10 \times \# \text{ of characters}) / \text{baud rate} \). At the end of \( t_2 \), the meter is ready to receive the next command.

The maximum serial throughput of the meter is limited to the sum of the times \( t_1 \), \( t_2 \) and \( t_3 \).
Communication Format
Data is transferred from the meter through a serial communication channel. In serial communications, the voltage is switched between a high and low level at a predetermined rate (baud rate) using ASCII encoding. The receiving device reads the voltage levels at the same intervals and then translates the switched levels back to a character.

The voltage level conventions depend on the interface standard. The table lists the voltage levels for each standard.

<table>
<thead>
<tr>
<th>START</th>
<th>STOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 b01 b. b2 b3 b4 b5 b6 1</td>
<td>0 b0 b1 b2 b3 b4 b5 b6 1</td>
</tr>
<tr>
<td>0 b0 b1 b2 b3 b4 b5 b6 1</td>
<td>0 b0 b1 b2 b3 b4 b5 b6 1</td>
</tr>
<tr>
<td>0 b0 b1 b2 b3 b4 b5 b6 1</td>
<td>0 b0 b1 b2 b3 b4 b5 b6 1</td>
</tr>
</tbody>
</table>

Parity bit
After the data bits, the parity bit is sent. The transmitter sets the parity bit to a zero or a one, so that the total number of ones contained in the transmission (including the parity bit) is either even or odd. This bit is used by the receiver to detect errors that may occur to an odd number of bits in the transmission. However, a single parity bit cannot detect errors that may occur to an even number of bits. Given this limitation, the parity bit is often ignored by the receiving device. The PAX meter ignores the parity bit of incoming data and sets the parity bit to odd, even or none (mark parity) for outgoing data.

Start bit and Data bits
Data transmission always begins with the start bit. The start bit signals the receiving device to prepare for reception of data. One bit period later, the least significant bit of the ASCII encoded character is transmitted, followed by the remaining data bits. The receiving device then reads each bit position as they are transmitted. Since the sending and receiving devices operate at the same transmission speed (baud rate), the data is read without timing errors.

Parity bit
After the data bits, the parity bit is sent. The transmitter sets the parity bit to a zero or a one, so that the total number of ones contained in the transmission (including the parity bit) is either even or odd. This bit is used by the receiver to detect errors that may occur to an odd number of bits in the transmission. However, a single parity bit cannot detect errors that may occur to an even number of bits. Given this limitation, the parity bit is often ignored by the receiving device. The PAX meter ignores the parity bit of incoming data and sets the parity bit to odd, even or none (mark parity) for outgoing data.

Stop bit
The last character transmitted is the stop bit. The stop bit provides a single bit period pause to allow the receiver to prepare to re-synchronize to the start of a new transmission (start bit of next byte). The receiver then continuously looks for the occurrence of the start bit.

6.8 MODULE 8 - ANALOG OUTPUT PARAMETERS (B-Out)

- An analog output card must be installed in order to access this module.

ANALOG TYPE

<table>
<thead>
<tr>
<th>SELECTION</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 20</td>
<td>0 to 20 mA</td>
</tr>
<tr>
<td>4 - 20</td>
<td>4 to 20 mA</td>
</tr>
<tr>
<td>0 - 10</td>
<td>0 to 10 V</td>
</tr>
</tbody>
</table>

Enter the analog output type. For 0-20 mA or 4-20 mA use terminals 18 and 19. For 0-10 V use terminals 16 and 17. Only one range can be used at a time.

ANALOG ASSIGNMENT

Enter the source for the analog output to retransmit:

- **inP** = Display Input Value
- **Hi** = Maximum Display Input Value
- **Lo** = Minimum Display Input Value
- **tot** = Totalize Display Value

ANALOG LOW SCALE VALUE

- 19999 to 99999

Enter the Display Value that corresponds to 0 mA (0-20 mA), 4 mA (4-20 mA) or 0 VDC (0-10 VDC).

ANALOG HIGH SCALE VALUE

- 19999 to 99999

Enter the Display Value that corresponds to 20 mA (0-20 mA), 20 mA (4-20 mA) or 10 VDC (0-10 VDC).

ANALOG UPDATE TIME

0.00 to 10.0

Enter the analog output update rate in seconds. A value of 0.0 allows the meter to update the analog output at a rate of 20/sec.

PROBE BURN-OUT ACTION (PAXT ONLY)

Enter the probe burn-out action. In the event of a temperature probe failure, the analog output can be programmed for low or high scale.
DISPLAY INTENSITY LEVEL
Enter the desired Display Intensity Level (0-15) by using the arrow keys. The display will actively dim or brighten as the levels are changed. This parameter also appears in Quick Programming Mode when enabled.

RESTORE FACTORY DEFAULTS
Use the arrow keys to display Code 48 and press PAR. The meter will display rES ET and then return to Code 50. Press DSP key to return to Display Mode. This will overwrite all user settings with the factory settings.

CALIBRATION
The meter has been fully calibrated at the factory. Scaling to convert the input signal to a desired display value is performed in Module 1. If the meter appears to be indicating incorrectly or inaccurately, refer to Troubleshooting before attempting to calibrate the meter.

When recalibration is required (generally every 2 years), it should only be performed by qualified technicians using appropriate equipment. Calibration does not change any user programmed parameters. However, it may affect the accuracy of the input signal values previously stored using the Apply (RPLY) Scaling Style.

Calibration may be aborted by disconnecting power to the meter before exiting Module 9. In this case, the existing calibration settings remain in effect.

PAXP - Input Calibration

WARNING: Calibration of this meter requires a signal source with an accuracy of 0.01% or better and an external meter with an accuracy of 0.005% or better.

Before starting, verify that the precision signal source is connected to the correct terminals and ready. Allow a 30 minute warm-up period before calibrating the meter. na and PAR can be chosen to exit the calibration mode without any changes taking place.

Then perform the following procedure:
1. Use the arrow keys to display Code 48 and press PAR.
2. Choose the range to be calibrated by using the arrow keys and press PAR. (na and PAR can be chosen to exit the calibration mode without any changes taking place.)
3. When the zero range limit appears on the display, apply the appropriate:
   - Voltage range: dead short applied
   - Current range: open circuit
4. Press PAR and 48 will appear on the display for about 10 seconds.
5. When the top range limit appears on the display, apply the appropriate:
   - Voltage range: 10 VDC
   - Current range: 20 mADC
6. Press PAR and 48 will appear on the display for about 10 seconds.
7. When na appears, press PAR twice.
8. If the meter is not field scaled, then the input display should match the value of the input signal.
9. Repeat the above procedure for each input range to be calibrated.

PAXH - Input Calibration

WARNING: In the PAXH, DC signals are used to calibrate the AC ranges. Calibration of the PAXH requires a DC voltmeter with an accuracy of 0.025% and a precision DC signal source capable of:

1. +1% of full scale, DC
2. -1% of full scale, DC
3. +100% of full scale, DC; (300 V range = +100 V calibration)
4. -100% of full scale, DC; (300 V range = -100 V calibration)

Before starting, verify the Input Range and Signal Jumpers are set for the range to be calibrated. Also verify that the precision signal source is connected and ready. Allow a 30 minute warm-up period before calibrating the meter. na and PAR can be chosen to exit the calibration mode without any changes taking place.

Then perform the following procedure:
1. Press the arrow keys to display Code 48 and press PAR.
2. The meter displays 48. Use the arrow keys to select the range that matches the Signal Jumper setting. Press PAR.
3. Apply the signal matching the meter prompt.
4. Press PAR and 48 will appear on the display, wait for next prompt.
5. Repeat steps 3 and 4 for the remaining three prompts.
6. When na appears, press PAR twice.
7. If the meter is scaled to show input signal, the Input Display should match the value of the input signal in the Display Mode.
8. Repeat the above procedure for each range to be calibrated or to recalibrate the same range. It is only necessary to calibrate the input ranges being used.
9. When all desired calibrations are completed, remove the external signal source and restore original configuration and jumper settings. If AC is being measured, continue with AC Couple Offset Calibration.
AC Couple Offset Calibration - PAXH

It is recommended that Input Calibration be performed first.
1. With power meter removed, set the Input Range Jumper for 20 V, the Couple Jumper for DC, and set the Signal Jumper for voltage by removing the jumper.
2. Connect a wire (short) between Volt (terminal 6) and COMM (terminal 4).
3. Apply meter power.
4. In Module 1, program as follows: Range: 20.00 V, Couple: AC; Decimal Point: 0, Round: f; Filter: DB; Bandwidth: 20 Hz; Points: 2; Style: YES, INP1: 0.000, DSP1: 0, INP2: 2000.00, DSP2: 2000.00.
5. In Module 4, program as follows: Hi-t: 0.00, Lo-t: 20.00, 0.00.
6. Press PAR twice to exit programming and view the Input Display.
7. The readout displays the DC coupled zero input, record the value.
8. Remove the meter power and set the Couple Jumper to AC by removing the jumper.
9. Maintaining the short between terminals 4 and 6, reapply the meter power.
10. Keeping all programming the same, view the Input Display.
11. The readout now displays the AC coupled zero input, record the value.

10 OHM RTD Range Calibration
1. Set the Input Range Jumper to 10 ohm.
2. Use the arrow keys to display Choosing 48 and press PAR. Then choose r to 10 and press PAR.
3. At 0 r, apply a direct short to input terminals 3, 4 and 5 using a three wire link. Wait 10 seconds, then press PAR.
4. At 150 r, apply a precision resistance of 150 ohms (with an accuracy of 0.01% or better) using a three wire link, to input terminals 3, 4 and 5. Wait 10 seconds, then press PAR.
5. Connect the RTD, return to the Display Mode and verify the input reading (with 0 Display Offset) is correct. If not correct repeat calibration.

ICE POINT Calibration
1. Remove all option cards or invalid results will occur.
2. The ambient temperature must be within 20°C to 30°C.
3. Connect a thermocouple (types T, E, J, K, or N only) with an accuracy of 1°C or better to the meter.
4. Verify the readout Display Offset is 0, Temperature Scale is °C, Display Resolution is 0.0, and the Input Range is set for the connected thermocouple.
5. Place the thermocouple in close thermal contact to a reference thermometer probe. (Use a reference thermometer with an accuracy of 0.25°C or better.)
   The two probes should be shielded from air movement and allowed sufficient time to equalize in temperature. (A calibration bath could be used in place of them.)
6. In the Normal Display mode, compare the readouts.
7. If a difference exists then continue with the calibration.
8. Enter Module 9, use the arrow keys to display Choosing 48 and press PAR. Then choose ICE and press PAR.
9. Calculate a new ICE Point value using: existing ICE Point value+(reference temperature - Display Mode reading). All values are based on °C.
10. Enter the new ICE Point value.
11. Return to the Display Mode and verify the input reading (with 0 Display Offset) is correct. If not correct repeat steps 8 through 10.

ANALOG OUTPUT CARD CALIBRATION
Before starting, verify that the precision voltmeter (voltage output) or current meter (current output) is connected and ready. Perform the following procedure:
1. Use the arrow keys to display Choosing 48 and press PAR.
2. Use the arrow keys to choose DD and press PAR.
3. Using the chart below, step through the five selections to be calibrated. At each prompt, use the PAX arrow keys to adjust the external meter display to match the selection being calibrated. When the external reading matches, or match the selection being calibrated. When the external reading matches, or
4. When DD appears remove the external meters and press PAR twice.
## Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Display</td>
<td>Check: Power level, power connections</td>
</tr>
<tr>
<td>Program Locked-out</td>
<td>Check: Active (lock-out) user input Enter: Security code requested</td>
</tr>
<tr>
<td>Max, Min, Tot Locked-out</td>
<td>Check: Module 3 programming</td>
</tr>
<tr>
<td>Incorrect Input Display Value</td>
<td>Check: Module 4 programming, Input Range Jumper position, input connections, input signal level, Module 4 Display Offset is zero, press DSP for Input Display Perform: Module 9 Calibration (If the above does not correct the problem.)</td>
</tr>
<tr>
<td>&quot;OLUL&quot; in Display (Signal High)</td>
<td>Check: Module 1 programming, Input Range Jumper position, input connections, input signal level</td>
</tr>
<tr>
<td>&quot;ULUL&quot; in Display (Signal Low)</td>
<td>Check: Module 1 programming, Input Range Jumper position, input connections, input signal level</td>
</tr>
<tr>
<td>Jittery Display</td>
<td>Increase: Module 1 filtering, rounding, input range Check: Wiring is per EMC installation guidelines</td>
</tr>
<tr>
<td>Modules or Parameters Not Accessible</td>
<td>Check: Corresponding plug-in card installation</td>
</tr>
<tr>
<td>Error Code (Err 1-4)</td>
<td>Press: Reset Key (If cannot clear contact factory.)</td>
</tr>
<tr>
<td>Display Zero’s at Levels Below 1% of Range</td>
<td>Program: Module 4 as Hi-t: 0.0 Lo-t: 3271.1 (to disable zero chop feature)</td>
</tr>
</tbody>
</table>

For further assistance, contact technical support at the appropriate company numbers listed.

## Parameter Value Chart

### Signal Input Parameters

<table>
<thead>
<tr>
<th>Display Parameter</th>
<th>Factory Setting</th>
<th>User Setting</th>
<th>Display Parameter</th>
<th>Factory Setting</th>
<th>User Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>Model Dependent</td>
<td></td>
<td>Inp 6</td>
<td>* Input Value 6</td>
<td>0.000</td>
</tr>
<tr>
<td>Type</td>
<td>PAX: Input Type</td>
<td>kC</td>
<td>Dsp 6</td>
<td>* Display Value 6</td>
<td>0</td>
</tr>
<tr>
<td>Scale</td>
<td>PAX: Temperature Scale</td>
<td>0F</td>
<td>Inp 7</td>
<td>* Input Value 7</td>
<td>0.000</td>
</tr>
<tr>
<td>Coupl</td>
<td>PAX: Input Couple</td>
<td>RC</td>
<td>Dsp 7</td>
<td>* Display Value 7</td>
<td>0</td>
</tr>
<tr>
<td>DcPct</td>
<td>* Display Resolution</td>
<td>0</td>
<td>Inp 8</td>
<td>* Input Value 8</td>
<td>0.000</td>
</tr>
<tr>
<td>Round</td>
<td>Display Rounding Increment</td>
<td>1</td>
<td>Dsp 8</td>
<td>* Display Value 8</td>
<td>0</td>
</tr>
<tr>
<td>Offset</td>
<td>PAX: Display Offset</td>
<td>0</td>
<td>Inp 9</td>
<td>* Input Value 9</td>
<td>0.000</td>
</tr>
<tr>
<td>Filter</td>
<td>Filter Setting - PAXH</td>
<td>05</td>
<td>Dsp 9</td>
<td>* Display Value 9</td>
<td>0</td>
</tr>
<tr>
<td>Band</td>
<td>Filter Enable Band - PAXH</td>
<td>0020</td>
<td>Inp 10</td>
<td>* Input Value 10</td>
<td>0.000</td>
</tr>
<tr>
<td>Ice</td>
<td>PAX: Ice Point Slope</td>
<td>0,000</td>
<td>Dsp 10</td>
<td>* Display Value 10</td>
<td>0</td>
</tr>
<tr>
<td>Ps5</td>
<td>Scaling Points</td>
<td>2</td>
<td>Inp 11</td>
<td>* Input Value 11</td>
<td>0.000</td>
</tr>
<tr>
<td>Style</td>
<td>Scaling Style - Not PAXT</td>
<td>KEY</td>
<td>Dsp 11</td>
<td>* Display Value 11</td>
<td>0</td>
</tr>
<tr>
<td>Inp 1</td>
<td>* Input Value 1</td>
<td>0,000</td>
<td>Inp 12</td>
<td>* Input Value 12</td>
<td>0.000</td>
</tr>
<tr>
<td>Dsp 1</td>
<td>* Display Value 1</td>
<td>0</td>
<td>Dsp 12</td>
<td>* Display Value 12</td>
<td>0</td>
</tr>
<tr>
<td>Inp 2</td>
<td>* Input Value 2</td>
<td>0,000</td>
<td>Inp 13</td>
<td>* Input Value 13</td>
<td>0.000</td>
</tr>
<tr>
<td>Dsp 2</td>
<td>* Display Value 2</td>
<td>10,000</td>
<td>Inp 13</td>
<td>* Display Value 13</td>
<td>0</td>
</tr>
<tr>
<td>Inp 3</td>
<td>* Input Value 3</td>
<td>0</td>
<td>Inp 14</td>
<td>* Input Value 14</td>
<td>0.000</td>
</tr>
<tr>
<td>Dsp 3</td>
<td>* Display Value 3</td>
<td>0</td>
<td>Inp 14</td>
<td>* Display Value 14</td>
<td>0</td>
</tr>
<tr>
<td>Inp 4</td>
<td>* Input Value 4</td>
<td>0,000</td>
<td>Inp 15</td>
<td>* Input Value 15</td>
<td>0.000</td>
</tr>
<tr>
<td>Dsp 4</td>
<td>* Display Value 4</td>
<td>0</td>
<td>Inp 15</td>
<td>* Display Value 15</td>
<td>0</td>
</tr>
<tr>
<td>Inp 5</td>
<td>* Input Value 5</td>
<td>0,000</td>
<td>Inp 16</td>
<td>* Display Value 16</td>
<td>0.000</td>
</tr>
<tr>
<td>Dsp 5</td>
<td>* Display Value 5</td>
<td>0</td>
<td>Inp 16</td>
<td>* Display Value 16</td>
<td>0</td>
</tr>
</tbody>
</table>

* Decimal point location is model and programming dependent.
### 2-FAE User Input and Function Key Parameters

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>PARAMETER</th>
<th>FACTORY SETTING</th>
<th>USER SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>USr - 1</td>
<td>USER INPUT 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USr - 2</td>
<td>USER INPUT 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USr - 3</td>
<td>USER INPUT 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>FUNCTION KEY 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>FUNCTION KEY 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rSk</td>
<td>RESET KEY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sc - F1</td>
<td>2nd FUNCTION 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sc - F2</td>
<td>2nd FUNCTION 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3-LOC Display and Program Lockout Parameters

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>PARAMETER</th>
<th>FACTORY SETTING</th>
<th>USER SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H I</td>
<td>MAX DISPLAY LOCKOUT</td>
<td>LOC</td>
<td></td>
</tr>
<tr>
<td>L0</td>
<td>MIN DISPLAY LOCKOUT</td>
<td>LOC</td>
<td></td>
</tr>
<tr>
<td>L0C</td>
<td>TOTAL DISPLAY LOCKOUT</td>
<td>LOC</td>
<td></td>
</tr>
<tr>
<td>SP - 1</td>
<td>SETPOINT 1 ACCESS</td>
<td>LOC</td>
<td></td>
</tr>
<tr>
<td>SP - 2</td>
<td>SETPOINT 2 ACCESS</td>
<td>LOC</td>
<td></td>
</tr>
<tr>
<td>SP - 3</td>
<td>SETPOINT 3 ACCESS</td>
<td>LOC</td>
<td></td>
</tr>
<tr>
<td>SP - 4</td>
<td>SETPOINT 4 ACCESS</td>
<td>LOC</td>
<td></td>
</tr>
<tr>
<td>CadE</td>
<td>SECURITY CODE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4-SEC Secondary Function Parameters

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>PARAMETER</th>
<th>FACTORY SETTING</th>
<th>USER SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>H I - k</td>
<td>MAX CAPTURE DELAY</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>L0 - k</td>
<td>MIN CAPTURE DELAY</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>dSP - k</td>
<td>DISPLAY UPDATE</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>A4 - k</td>
<td>PAXS: AUTO-ZERO</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>A6 - k</td>
<td>PAXS: AUTO-ZERO</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>b - L k</td>
<td>UNITS LABEL BACKLIGHT - PAXT</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>OFFStk</td>
<td>DISPLAY OFFSET</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>ICE</td>
<td>PAXT: ICE POINT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5-LE Setpoint (Alarm) Parameters

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>PARAMETER</th>
<th>SP - 1 FACTORY SETTING</th>
<th>SP - 1 USER SETTING</th>
<th>SP - 2 FACTORY SETTING</th>
<th>SP - 2 USER SETTING</th>
<th>SP - 3 FACTORY SETTING</th>
<th>SP - 3 USER SETTING</th>
<th>SP - 4 FACTORY SETTING</th>
<th>SP - 4 USER SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCl - n</td>
<td>SETPOINT ACTION</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>SPr - n</td>
<td>SETPOINT VALUE (main)</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>1000</td>
<td>400</td>
<td>1000</td>
<td>400</td>
</tr>
<tr>
<td>HSPr - n</td>
<td>SETPOINT VALUE (alternate)</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>1000</td>
<td>400</td>
<td>1000</td>
<td>400</td>
</tr>
<tr>
<td>L0N - n</td>
<td>ON TIME DELAY</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>L0F - n</td>
<td>OFF TIME DELAY</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>OUt - n</td>
<td>OUTPUT LOGIC</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
</tr>
<tr>
<td>rSk - n</td>
<td>RESET ACTION</td>
<td>Ruto</td>
<td>Ruto</td>
<td>Ruto</td>
<td>Ruto</td>
<td>Ruto</td>
<td>Ruto</td>
<td>Ruto</td>
<td>Ruto</td>
</tr>
<tr>
<td>Stb - n</td>
<td>STANDBY OPERATION</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
</tr>
<tr>
<td>LIt - n</td>
<td>SETPOINT ANNUNCIATORS</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
<td>nor</td>
</tr>
<tr>
<td>bmn - n</td>
<td>PAXT: PROBE BURN-OUT ACTION</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

† Select alternate list to program these values.

* Decimal point location is model and programming dependent.

### 6-FAE Totalizer (Integrator) Parameters

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>PARAMETER</th>
<th>FACTORY SETTING</th>
<th>USER SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>dECPt</td>
<td>TOTALIZER DECIMAL POINT</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>tBASE</td>
<td>TOTALIZER TIME BASE</td>
<td>. IN</td>
<td></td>
</tr>
<tr>
<td>SCFAC</td>
<td>TOTALIZER SCALE FACTOR</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>Loclu</td>
<td>TOTALIZER LOW CUT VALUE</td>
<td>-19999</td>
<td></td>
</tr>
<tr>
<td>P - UP</td>
<td>TOTALIZER POWER-UP RESET</td>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

### 7-5rL Serial Communication Parameters

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>PARAMETER</th>
<th>FACTORY SETTING</th>
<th>USER SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>bRud</td>
<td>BAUD RATE</td>
<td>9600</td>
<td></td>
</tr>
<tr>
<td>dRfA</td>
<td>DATA BIT</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>PRr</td>
<td>PARITY BIT</td>
<td>Odd</td>
<td></td>
</tr>
<tr>
<td>Addr</td>
<td>METER ADDRESS</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abru</td>
<td>ABBREVIATED PRINTING</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>DPf</td>
<td>ENTER PRINT OPTIONS</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>GROs</td>
<td>PAXS: PRINT GROSS OFFSET</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>tARs</td>
<td>PAXS: PRINT TARE OFFSET</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>INP</td>
<td>PRINT INPUT VALUE</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>tAt</td>
<td>PRINT TOTAL VALUE</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>H ILO</td>
<td>PRINT MAX &amp; MIN VALUES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>sPRA</td>
<td>PRINT SETPOINT VALUES</td>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

### 8-Out Analog Output Parameters

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>PARAMETER</th>
<th>FACTORY SETTING</th>
<th>USER SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>tYPE</td>
<td>ANALOG TYPE</td>
<td>4-20</td>
<td></td>
</tr>
<tr>
<td>AN1</td>
<td>ANALOG ASSIGNMENT</td>
<td>INP</td>
<td></td>
</tr>
<tr>
<td>AN - Lo</td>
<td>ANALOG LOW SCALE VALUE</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>AN - Hi</td>
<td>ANALOG HIGH SCALE VALUE</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>udt</td>
<td>ANALOG UPDATE TIME</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td>burn</td>
<td>PAXT: PROBE BURN-OUT ACTION</td>
<td>LD</td>
<td></td>
</tr>
</tbody>
</table>

### 9-FE5 Factory Setting Parameters

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>PARAMETER</th>
<th>FACTORY SETTING</th>
<th>USER SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>d - LEu</td>
<td>DISPLAY INTENSITY LEVEL</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### 32
LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company’s liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company’s option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company’s products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.