PAX Lite Panel Meters

Go To Market Kit

August 2009

MARKET INTRODUCTION – PAX LITE SERIES

Red Lion is pleased to announce three new versatile 1/8 DIN panel meters that offer maximum flexibility while lowering inventory costs. These new PAX Lite meters feature universal signal inputs, dual relay outputs, and a universal power supply capable of accepting 50 to 250 VAC or 21.6 to 250 VDC input and providing a 24 VDC excitation output.

The PAXLA DC Volt/Current/Process Meter accepts universal DC and process signal inputs, and can scale them to a desired readout for a wide range of applications. The PAXLCR Dual Counter and Rate Meter accepts two separate digital signal inputs, and offers a choice of eight different count modes, with rate indication available from all count modes. The PAXLT Temperature Meter is programmable for 14 different thermocouple and RTD inputs and provides a temperature display in Celsius or Fahrenheit, along with a maximum and minimum reading memory and programmable capture time.

All meters feature a bright 0.56 in. high red LED display along with fully programmable features such as scaling, decimal points and many other parameters to suit a variety of control requirements. Plus, once front panel programming is complete, the front panel buttons can be disabled through a user input setting.

HOW TO USE THE PAX LITE GO TO MARKET KIT:

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FOR IMMEDIATE RELEASE:

NEW PAX LITE PANEL METERS

[Location]—[Date]— [Company] announces three new versatile 1/8 DIN panel meters from Red Lion that offer maximum flexibility while lowering inventory costs. These new PAX Lite meters feature universal signal inputs, dual relay outputs, and a universal power supply capable of accepting 50 to 250 VAC or 21.6 to 250 VDC input and providing a 24 VDC excitation output.

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“The PAX Lite series provides a rugged, reliable solution for basic machines, simple process control, count or other applications that require a display-only meter,” said Jeff Thornton, Red Lion product manager. “These new units add to this line by providing control capability via the built-in dual relay outputs, and optimizing the panel’s capabilities while maintaining a low cost—value that clients have come to expect from this line.”

The PAX Lite Series meets CE requirements and features a NEMA 4X/IP65 sealed front bezel, providing excellent reliability in harsh industrial environments.

For additional information on the PAX Lite or other panel meter solutions, please contact [contact name] at [phone] or by e-mail at [email].

[company description]

PAX Lite E-mail Template

Your Company Name or Header Here

New PAX Lite Meters from Red Lion

Three new versatile 1/8 DIN panel meters from Red Lion offer maximum flexibility while lowering inventory costs. These new PAX Lite meters feature universal signal inputs, dual relay outputs, and a universal power supply capable of accepting 50 to 250 VAC or 21.6 to 250 VDC input and providing a 24 VDC excitation output.

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PAX Lite Panel Meters

- PAXLA - DC Current, Voltage & Process Signals
- PAXLCR - Dual Counter & Rate Meter
- PAXLT - Thermocouple & RTD Meter
- Dual 5 Amp Form C Relays
- Universally Powered, AC or DC
- Min and Max Display Capture
- Programmable User Input
- PAX Style Programming

Download PAXLA Data Sheet
Download PAXLCR Data Sheet
Download PAXLT Data Sheet

The new PAX Lite is just one of the many industrial display and control solutions offered by Red Lion and <Your Company Name Here>.

Do you have questions or need to discuss a particular application for the PAX Lite? Please contact <Your Email Address Here>.

We look forward to working with you.

<Your Company Name Here>
<Address>
<City, State Zip>
<Phone>
<Fax>
<Email>

Be sure to visit our web site at:
<www.YourWebSiteHere.com>

<Your Company Name Here> is an Authorized Red Lion Distributor:
www.redlion.net

The New
PAX Lite Meters

PAX Panel Meters

PAX Lite Meters

- ✓ 16 Dedicated Meters
- ✓ Indication Only
- ✓ AC Powered
- ✓ Low Price

PAX Meters

- ✓ Dedicated Input
- ✓ Field Upgradeable Outputs
- ✓ 4 Setpoint Cards
- ✓ 5 Communication Cards
- ✓ Retransmitted Analog Card
- ✓ AC/DC Powered
- ✓ Programmable User Inputs

What is a New PAX Lite?

A new meter that fills a product position between the CUB5 Meters and the PAX Meters. It offers a improved feature set over the existing PAX Lite Meters allowing it to satisfy the basic applications, while leaving the more advanced applications for the PAX Meters. This position allows it to be priced accordingly.

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Old versus New!

Existing PAX Lite

- ✓ Indication
- ✓ AC Powered
- ✓ Dedicated Signal Input

New PAX Lite

- ✓ Indication
- ✓ AC/DC Powered
- ✓ Universal Signal Input
- ✓ Dual Relay Control
- ✓ Min/Max Capture
- ✓ Programmable User Input
- ✓ PAX Style Programming

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Three More Models Available

PAXLA - DC Current, DC Voltage, and Process Signals

PAXLCR - Dual Counter and Rate Meter

PAXLT - Thermocouple and RTD Meter

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Major Advantage!

With their Universal Input and Universal Power Supply, these new meters can be programmed to handle many applications. This capability allows users the utmost in flexibility, while lowering their inventory costs.

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6 Meters Replaced By One

Omron Part Numbers		Red Lion Part Number
K3MA-J 100-240VAC	=	PAXLA000
K3MA-J-A2 100-240VAC		
K3TL-TA11-C		
K3TL-TB11-C		
K3MA-J 24VAC/VDC		
K3MA-J-A2 24VAC/VDC		

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21 Meters Replaced by One

Kübler Part Numbers		Red Lion Part Number
6.540.012.300	=	PAXLCR00
6.540.012.3A0		
6.541.011.000		
6.541.011.0A0		
6.541.011.300		
6.541.011.3A0		
6.541.012.000		
6.541.012.0A0		
6.541.012.300		
6.541.012.3A0		
6.542.011.000		
6.542.011.0A0		
6.542.011.300		
6.542.011.3A0		
6.542.012.000		
6.542.012.0A0		
6.542.012.300		
6.542.012.3A0		
CODIX 540		
CODIX 541		
CODIX 542		

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Let's Compare Part Numbers!

Their Solutions		Our Solution
33 - Autonics Meters	=	1 - PAXLA000
16 - Yokogawa Meters	=	1 - PAXLA000
500+ - Carlo Gavazzi Meters	=	1 - PAXLCR00
127 - KEP Meters	=	1 - PAXLCR00
21 - Kübler Meters	=	1 - PAXLCR00
51 - Omron Meters	=	1 - PAXLT000
125 - Yokogawa Meters	=	1 - PAXLT000

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PAXLA – Universal DC Meter

- Universal DC Input
  - Current; 200µA, 2 mA, 20 mA, 200 mA
  - Voltage; 200mv, 2 V, 10 V, 20 V, 200 V
  - Process; 4 to 20 mA, 1 to 5 VDC, 1 to 10 VDC
- 24 Volt Excitation

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PAXLCR – Count/Rate Meter

- Dual Counter
- Batch Counter
- Rate Meter
- Separate Scaling for Count and Rate

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PAXLT – Temperature Meter

- Universal Temperature Input
  - Accepts T, E, J, K, R, S, B, N, and C Thermocouples
  - Accepts 100 ohm Pt, 120 ohm Nickel, and 10 ohm Copper RTDs
  - Accepts mV Signals
- 24 Volt Excitation

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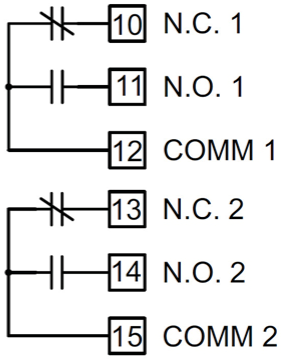
Common Features

- Dual 5 Amp Form C Relays
- Universally Powered, AC or DC
- Min and Max Display Capture
- Programmable User Input
- PAX Style Programming

Dual Relay Control

Dual 5 Amp From C Relays

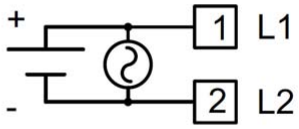
Terminal 10: NC 1
Terminal 11: NO 1
Terminal 12: Relay 1 Common
Terminal 13: NC 2
Terminal 14: NO 2
Terminal 15: Relay 2 Common



Universal Power Supply

Power Specification - 50 to 250 VAC
or 21.6 to 250 VDC

Power
Terminal 1: VAC/DC +
Terminal 2: VAC/DC -



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Programmable User Input

Provide functions like; Program Lock-out, Rest, Rest Setpoints, Display Hold, Change Display, Change Intensity and more.

Terminal 8: User Input
Terminal 9: User Comm

Sinking Logic

Sourcing Logic

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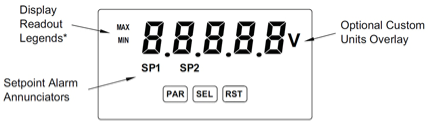
PAX-Like Look and Feel



BUTTON	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
PAR	Access Programming Mode	Store selected parameter and index to next parameter
SEL	Index display through selected displays	Advance through selection list/select digit position in parameter value
RST	Resets display	Increment selected digit of parameter value

OPERATING MODE DISPLAY DESIGNATORS

MAX - Maximum display capture value
MIN - Minimum display capture value
"SP1" - Below the display indicates setpoint 1 output activated.
"SP2" - Below the display indicates setpoint 2 output activated.

Pressing the **SEL** button toggles the meter through the selected displays. If display scroll is enabled, the display will toggle automatically every four seconds between the enabled display values.

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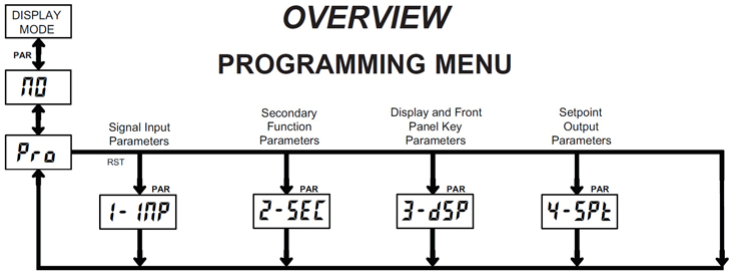
PAX-Like Programming



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Your best choice…

PAX Lite and PAX Meters

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Bulletin No. PAXLA-C
Drawing No. LP0722
Released 07/09

MODEL PAXLA - PAX LITE DC VOLT/CURRENT/PROCESS METER

- *5 DIGIT, 0.56" HIGH RED LED DISPLAY*
- *PROGRAMMABLE SCALING AND DECIMAL POINTS*
- *PROGRAMMABLE USER INPUT*
- *DUAL 5 AMP FORM C RELAY*
- *UNIVERSALLY POWERED*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*
- *OPTIONAL CUSTOM UNIT OVERLAY W/ BACKLIGHT*
- *MINIMUM AND MAXIMUM DISPLAY CAPTURE*

c UL US LISTED IND. CONT. EQ. 51EB

CE

For Model No. PAXLA0U0 Only

GENERAL DESCRIPTION

The PAXLA is a versatile meter available as a DC volt, current, or process meter with scaling and dual Form C relay outputs. The meter is programmed through the front panel buttons and the use of jumpers. The RST Key will also function as a front panel display reset.

Once the front panel programming is complete, the buttons can be disabled by a user input setting. The meter has been specifically designed for harsh industrial environments. With a NEMA 4X/IP65 sealed bezel and extensive testing to meet CE requirements, the meter provides a tough yet reliable application solution.

SAFETY SUMMARY

All safety regulations, local codes and instructions that appear in this and corresponding 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.

CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

CAUTION: Risk of electric shock.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
PAXLA	Volt/Current/Process Meter with Dual Relay Output	PAXLA000
	UL Listed Volt/Current/Process Meter with Dual Relay Output	PAXLA0U0
PAXLBK	Unit Label Kit Accessory	PAXLBK10

SPECIFICATIONS

1. **DISPLAY**: 5 digit, 0.56" (14.2 mm) intensity adjustable Red LED (-19999 to 99999)
2. **POWER REQUIREMENTS**:
   AC POWER: 50 to 250 VAC 50/60 Hz, 12 VA
   Isolation: 2300 Vrms for 1 min. to all inputs and outputs
   DC POWER: 21.6 to 250 VDC, 6 W
   DC Out: +24 VDC @ 100 mA if input voltage is greater than 50 VAC/VDC
   +24 VDC @ 50 mA if input voltage is less than 50 VDC
3. **INPUT RANGES**: Jumper Selectable
   D.C. Voltages: 200 mV, 2 V, 20 V, 200 V, 10 V

INPUT RANGE	ACCURACY @ 23 °C LESS THAN 85% RH	INPUT IMPEDANCE	MAX INPUT SIGNAL	RESOLUTION	TEMP. COEFFICIENT
200 mV	0.1% of span	1.033 MΩ	75 VDC	10 µV	70 ppm /°C
2 V	0.1% of span	1.033 MΩ	75 VDC	0.1 mV	70 ppm /°C
20 V	0.1% of span	1.033 MΩ	250 VDC	1 mV	70 ppm /°C
200 V	0.1% of span	1.033 MΩ	250 VDC	10 mV	70 ppm /°C
10 V	0.1% of span	538 KΩ	75 V	1 mV	70 ppm /°C

D.C. Currents: 200 µA, 2 mA, 20 mA, 200 mA

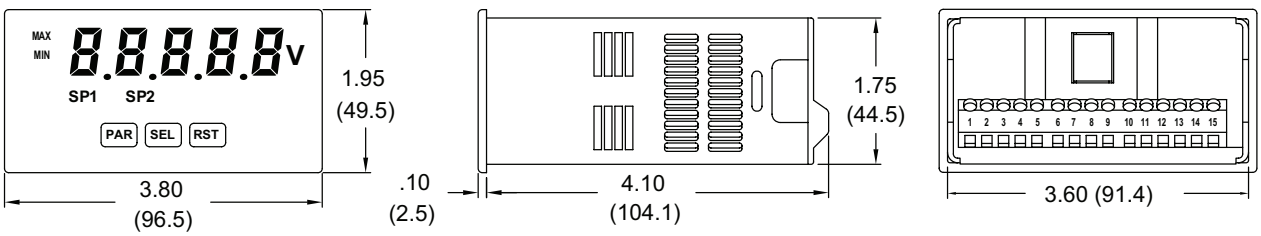
INPUT RANGE	ACCURACY @ 23 °C LESS THAN 85% RH	INPUT IMPEDANCE	MAX INPUT SIGNAL	RESOLUTION	TEMP. COEFFICIENT
200 µA	0.1% of span	1.111 KΩ	15 mA	10 nA	70 ppm /°C
2 mA	0.1% of span	111 Ω	50 mA	0.1 µA	70 ppm /°C
20 mA	0.1% of span	11 Ω	150 mA	1 µA	70 ppm /°C
200 mA	0.1% of span	1 Ω	500 mA	10 µA	70 ppm /°C

D.C. Process: 4 to 20 mA, 1 to 5 VDC, 0/1 to 10 VDC

INPUT RANGE	SELECT RANGE
4 - 20 mA	Use the 20 mA range
1 - 5 VDC	Use the 10V range
1 - 10 VDC	Use the 10V range

4. **OVERRANGE/UNDERRANGE INDICATION:**
   Input Overrange Indication: "OLOL".
   Input Underrange Indication: "ULUL".
   Display Overrange/Underrange Indication: "....."/"-....."
5. **A/D CONVERTER:** 16 bit resolution
6. **UPDATE RATES**:
   A/D conversion rate: 20 readings/sec.
   Display update: 500 msec min.

DIMENSIONS In inches (mm)



7. **USER INPUT**:
   User Input: Software selectable pull-up (24.7 KΩ) or pull-down resistor (20 KΩ) that determines active high or active low input logic.
   Trigger levels: V_{IL} = 1.0 V max; V_{IH} = 2.4 V min; V_{MAX} = 28 VDC
   Response Time: 5 msec typ.; 100 msec debounce (activation and release)
8. **MEMORY**: Nonvolatile E^2PROM retains all programming parameters when power is removed.
9. **OUTPUT**:
   Type: Dual FORM-C relay
   Isolation To Sensor & User Input Commons: 1400 Vrms for 1 min.
   Working Voltage: 150 Vrms
   Contact Rating: 5 amps @ 120/240 VAC or 28 VDC (resistive load), 1/8 H.P. @ 120 VAC (inductive load)
   Life Expectancy: 100,000 minimum operations
   Response Time:
   Turn On Time: 4 msec max.
   Turn Off Time: 4 msec max.
10. **ENVIRONMENTAL CONDITIONS**:
   Operating temperature: 0 to 50 °C
   Storage temperature: -40 to 70 °C
   Operating and storage humidity: 0 to 85% max. RH (non-condensing)
   Vibration According to IEC 68-2-6: Operational 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2g's.
   Shock According to IEC 68-2-27: Operational 30 g (10g relay), 11 msec in 3 directions.
   Altitude: Up to 2,000 meters
11. **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.
12. **CONSTRUCTION**: This unit is rated for NEMA 4X/IP65 outdoor use. IP20 Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.
13. **CERTIFICATIONS AND COMPLIANCES**:
   SAFETY
   Type 4X Enclosure rating (Face only), UL50
   IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
   IP65 Enclosure rating (Face only), IEC 529
   IP20 Enclosure rating (Rear of unit), IEC 529
   For Model No. PAXLA0U0 Only: UL Listed, File # E137808, UL508, CSA C22.2 No. 14-M95
   LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion B 2 kV power 1 kV signal
Surge	EN 61000-4-5	Criterion A 1 kV L-L, 2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms
Voltage dip/interruptions	EN 61000-4-11	Criterion A 0.5 cycle

Emissions:

Emissions	EN 55011	Class A

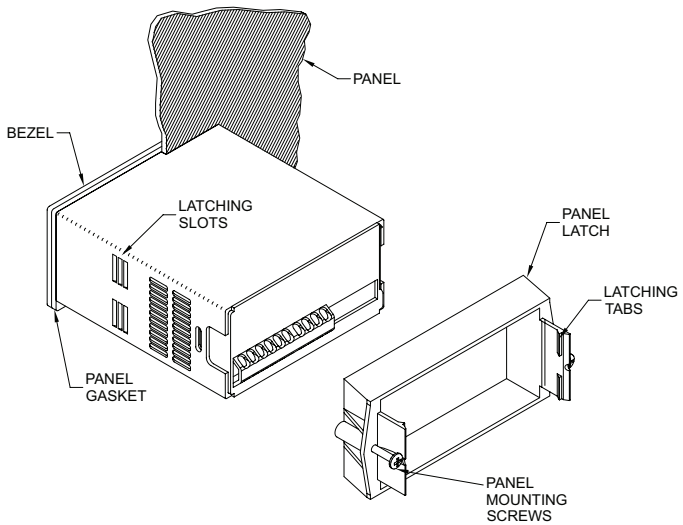
Notes:
1. Criterion A: Normal operation within specified limits.
2. Criterion B: Temporary loss of performance from which the unit self-recovers.

14. **WEIGHT**: 10.4 oz. (295 g)

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.

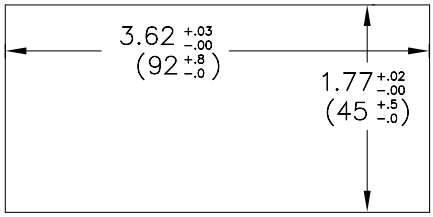
Installation Environment

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.

PANEL CUT-OUT



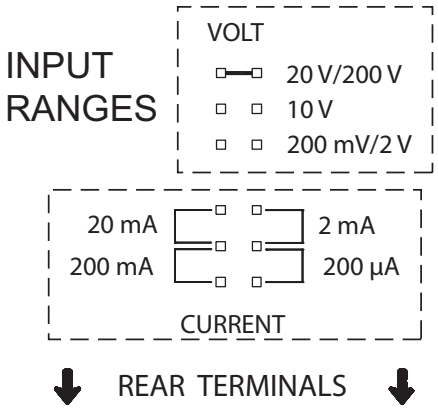
2.0 Setting the Jumpers

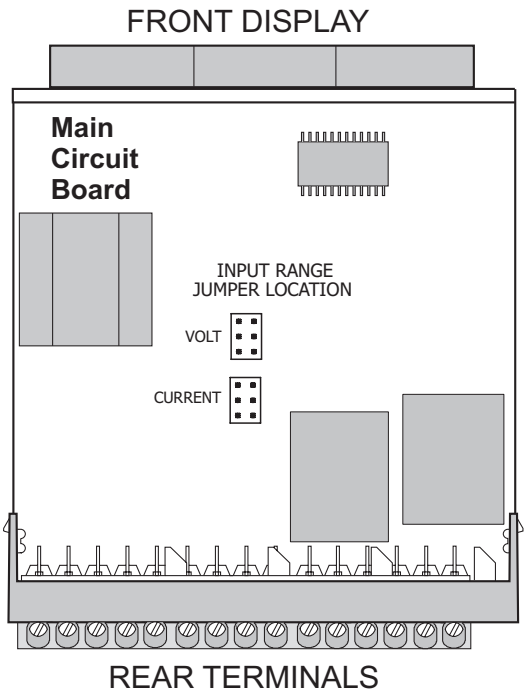
INPUT RANGE JUMPER

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 signal input to avoid overloads.

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 on the other side latch.

Warning: Exposed line voltage exists on the circuit boards. Remove all power to the meter and load circuits before accessing inside of the meter.





3.0 Wiring the Meter

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, source or coupling method into the meter may be different for various installations. The meter becomes more immune to EMI with fewer I/O connections. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The meter should be properly connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the meter and leave the other end of the shield unconnected and insulated from earth ground.
3. 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 ran 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.
4. Signal or Control cables within an enclosure should be routed as far as possible from contactors, control relays, transformers, and other noisy components.
5. 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 # 28B2029-0A0

   Line Filters for input power cables:
   Schaffner # FN610-1/07 (RLC# LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom # 1 VR3

   Note: Reference manufacturer's instructions when installing a line filter.
6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
7. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI.
   Snubber: RLC# SNUB0000.

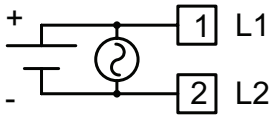
WIRING OVERVIEW

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 the power supplied to the meter (DC or AC) be protected by a fuse or circuit breaker.

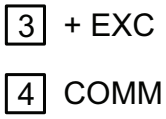
When wiring the meter, compare the numbers embossed on the back of the meter case against those shown in wiring drawings for proper wire position. Strip the wire, leaving approximately 0.3" (7.5 mm) bare lead exposed (stranded wires should be tinned with solder.) Insert the lead under the correct screw-clamp terminal and tighten until the wire is secure. (Pull wire to verify tightness.)

3.1 POWER WIRING

Power
Terminal 1: VAC/DC +
Terminal 2: VAC/DC -



DC Out Power
Terminal 3: + 24 VDC OUT
Terminal 4: Common

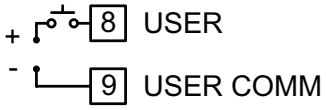


3.2 USER INPUT WIRING

Terminal 8: User Input
Terminal 9: User Comm

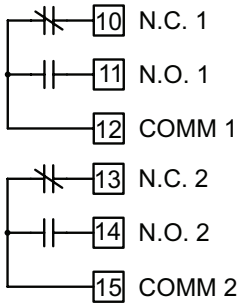
Sinking Logic

Sourcing Logic



3.3 SETPOINT (OUTPUT) WIRING

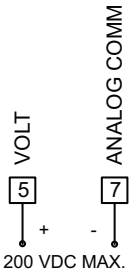
Terminal 10: NC 1
Terminal 11: NO 1
Terminal 12: Relay 1 Common
Terminal 13: NC 2
Terminal 14: NO 2
Terminal 15: Relay 2 Common



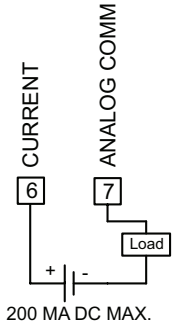
3.4 INPUT SIGNAL WIRING

CAUTION: Analog common is NOT isolated from user input common. In order to preserve the safety of the meter application, the Analog and DC power common must be suitably isolated from hazardous live earth referenced voltage; or input common must be at protective earth ground potential. If not, hazardous voltage may be present at the User Input and Input Common terminals. Appropriate considerations must then be given to the potential of the input common with respect to earth ground. Always connect the analog signal common to terminal 7.

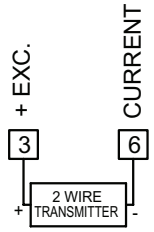
Voltage Signal (self powered)
Terminal 5: +VDC
Terminal 7: -VDC



Current Signal (self powered)
Terminal 6: +ADC
Terminal 7: -ADC

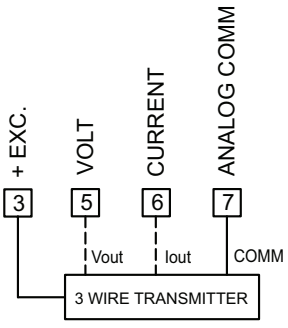


Current Signal (2 wire requiring excitation)
Terminal 3: +EXC
Terminal 6: +ADC

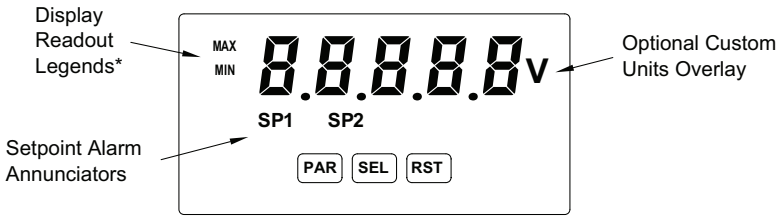


Current Signal (3 wire requiring excitation)
Terminal 6: +ADC (signal)
Terminal 7: -ADC (common)
Terminal 3: +EXC

Voltage Signal (3 wire requiring excitation)
Terminal 5: +VDC (signal)
Terminal 7: -VDC (common)
Terminal 3: +EXC



4.0 Reviewing the Front Buttons and Display



BUTTON	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
PAR	Access Programming Mode	Store selected parameter and index to next parameter
SEL	Index display through selected displays	Advance through selection list/select digit position in parameter value
RST	Resets display	Increment selected digit of parameter value

OPERATING MODE DISPLAY DESIGNATORS

MAX - Maximum display capture value
MIN - Minimum display capture value

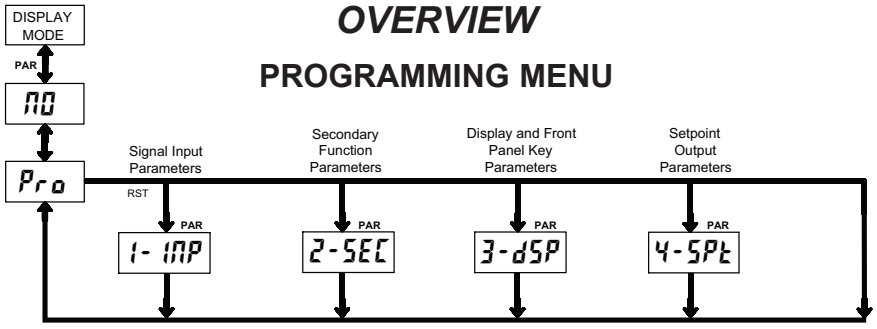
"SP1" - Below the display indicates setpoint 1 output activated.
"SP2" - Below the display indicates setpoint 2 output activated.

Pressing the **SEL** button toggles the meter through the selected displays. If display scroll is enabled, the display will toggle automatically every four seconds between the enabled display values.

5.0 Programming the Meter

OVERVIEW

PROGRAMMING MENU



PROGRAMMING MODE ENTRY (PAR BUTTON)

It is recommended all programming changes be made off line, or before installation. The meter normally operates in the Display Mode. No parameters can be programmed in this mode. The Programming Mode is entered by pressing the **PAR** button. If it is not accessible, then it is locked by either a security code or a hardware lock.

MODULE ENTRY (SEL & PAR BUTTONS)

The Programming Menu is organized into four modules. These modules group together parameters that are related in function. The display will alternate between Pro and the present module. The **SEL** button is used to select the desired module. The displayed module is entered by pressing the **PAR** button.

MODULE MENU (PAR BUTTON)

Each module has a separate module menu (which is shown at the start of each module discussion). The **PAR** button 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 Pro nO. Programming may continue by accessing additional modules.

SELECTION / VALUE ENTRY

For each parameter, the display alternates between the present parameter and the selections/value for that parameter. The **SEL** and **RST** buttons are used to move through the selections/values for that parameter. Pressing the **PAR** button, stores and activates the displayed selection/value. This also advances the meter to the next parameter.

For numeric values, the value is displayed with one digit flashing (initially the right most digit). Pressing the **RST** button increments the digit by one or the user can hold the **RST** button and the digit will automatically scroll. The **SEL** button will select the next digit to the left. Pressing the **PAR** button will enter the value and move to the next parameter.

PROGRAMMING MODE EXIT (PAR BUTTON)

The Programming Mode is exited by pressing the **PAR** button with Pro nO displayed. This will commit any stored parameter changes to memory and return the meter to the Display Mode. (If power loss occurs before returning to the Display Mode, verify recent parameter changes.)

PROGRAMMING TIPS

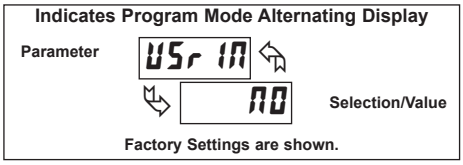
It is recommended to start with Module 1 and proceed through each module in sequence. When programming is complete, it is recommended to record the parameter programming and lock out parameter programming with the user input or programming security code.

FACTORY SETTINGS

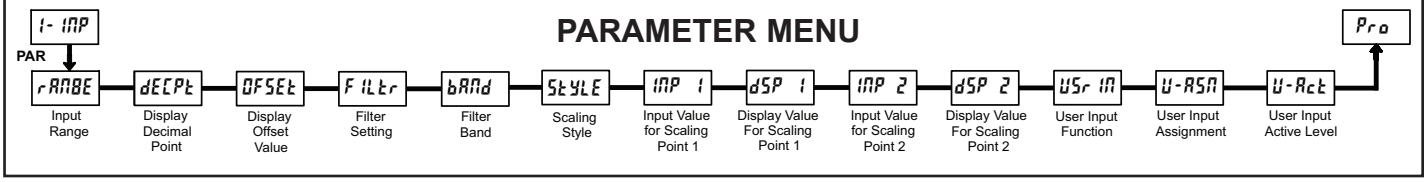
Factory Settings may be completely restored in Module 2. This is useful when encountering programming problems.

ALTERNATING SELECTION DISPLAY

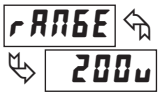
In the explanation of the modules, the following dual display with arrows will appear. This is used to illustrate the display alternating between the parameter on top and the parameter's Factory Setting on the bottom. In most cases, selections and values for the parameter will be listed on the right.



5.1 MODULE 1 - SIGNAL INPUT PARAMETERS (1- INP)



INPUT RANGE



SELECTION	RANGE RESOLUTION	SELECTION	RANGE RESOLUTION
200uA	200.00 µA	0.02A	20.000 mA
0.002A	2.0000 mA	0.2A	200.00 mA
0.2u	200.00 mV	20u	20.000 V
2u	2.0000 V	200u	200.00 V
10u	10.000 V		

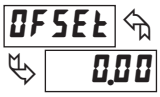
Select the input range that corresponds to the external signal. This selection should be high enough to avoid input signal overload but low enough for the desired input resolution. This selection and the position of the Input Range Jumper must match.

DISPLAY DECIMAL POINT

0 0.0 0.00 0.000 0.0000

Select the decimal point location for the Input, MIN and MAX displays. This selection also affects the dSP1 and dSP2 parameters and setpoint values and offset value..

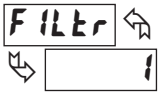
DISPLAY OFFSET VALUE



-19999 to 19999

The display can be corrected with an offset value. This can be used to compensate for signal variations or sensor errors. 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. The decimal point follows the dECPt selection.

FILTER SETTING

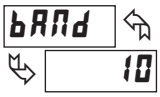


0 1 2 3

If the displayed value is difficult to read due to small process variations or noise, increased levels of filtering will help to stabilize the display. Software filtering effectively combines a fraction of the current input reading with a fraction of the previous displayed reading to generate the new display.

Filter values represent no filtering (0), up to heavy filtering (3). A value of 1 for the filter uses 1/4 of the new input and 3/4 of the previous display to generate the new display. A filter value of 2 uses 1/8 new and 7/8 previous. A filter value of 3 uses 1/16 new and 15/16 previous.

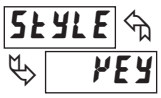
FILTER BAND



0 to 199 display units

The filter will adapt to variations in the input signal. When the variation exceeds the input filter band value, the 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, independent of the Display Decimal Point position. A band setting of '0' keeps the filter permanently engaged at the filter level selected above.

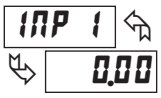
SCALING STYLE



KEY APLY

If Input Values and corresponding Display Values are known, the Key-in (KEY) scaling style can be used. This allows scaling without the presence or changing of the input signal. If Input Values have to be derived from the actual input signal source or simulator, the Apply (APLY) scaling style must be used.

INPUT VALUE FOR SCALING POINT 1



0 to 29999

For Key-in (KEY) style, enter the first Input Value using the front panel buttons. (The Input Range selection sets the decimal location for the Input Value).

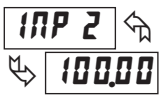
For Apply (APLY) style, the meter shows the previously stored Input Value. To retain this value, press the **SEL** button to advance to the next parameter. To change the Input Value, press the **RST** button and apply the input signal to the meter. Adjust the signal source externally until the desired Input Value appears. Press the **SEL** button to enter the value being displayed.

DISPLAY VALUE FOR SCALING POINT 1

-19999 to 99999

Enter the first Display Value by using the front panel buttons. This is the same for KEY and APLY scaling styles. The decimal point follows the dECPt selection.

INPUT VALUE FOR SCALING POINT 2

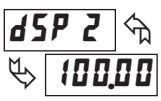


0 to 29999

For Key-in (KEY) style, enter the known second Input Value using the front panel buttons.

For Apply (APLY) style, the meter shows the previously stored Input Value for Scaling Point 2. To retain this value, press the **SEL** button to advance to the next parameter. To change the Input Value, press the **RST** button and apply the input signal to the meter. Adjust the signal source externally until the desired Input Value appears. Press the **SEL** button to enter the value being displayed.

DISPLAY VALUE FOR SCALING POINT 2



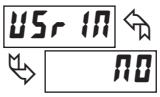
-19999 to 99999

Enter the second Display Value by using the front panel buttons. This is the same for KEY and APLY scaling styles. The decimal point follows the dECPt selection.

General Notes on Scaling

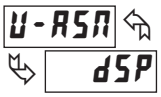
1. When using the Apply (APLY) scaling style, input values for scaling points must be confined to the range limits shown.
2. The same Input Value should not correspond to more than one Display Value. (Example: 20 mA can not equal 0 and 20.)
3. For input levels beyond the programmed Input Values, the meter extends the Display Value by calculating the slope from the two coordinate pairs (InP1 / dSP1 & InP2 / dSP2).

USER INPUT FUNCTION



DISPLAY	MODE	DESCRIPTION
no	No Function	User Input disabled.
P-Loc	Program Mode Lock-out	See Programming Mode Access chart (Module 3).
2Er0	Zero Input (Edge triggered)	Zero the Input Display value causing Display Reading to be Offset.
rESEt	Reset (Edge triggered)	Resets the assigned value(s) to the current input value.
d-Hld	Display Hold	Holds the assigned display, but all other meter functions continue as long as activated (maintained action).
d-SEL	Display Select (Edge Triggered)	Advance once for each activation.
d-LEU	Display Intensity Level (Edge Triggered)	Increase intensity one level for each activation.
rSt-1	Setpoint 1 Reset	Resets setpoint 1 output.
rSt-2	Setpoint 2 Reset	Resets setpoint 2 output.
rSt 12	Setpoint 1 and 2 Reset	Reset both setpoint 1 and 2 outputs.

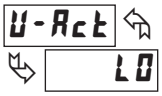
USER INPUT ASSIGNMENT



H1 H1-LO
LO dSP

Select the value(s) to which the User Input Function is assigned. The User Input Assignment only applies if a selection of reset, or display hold is selected in the User Input Function menu.

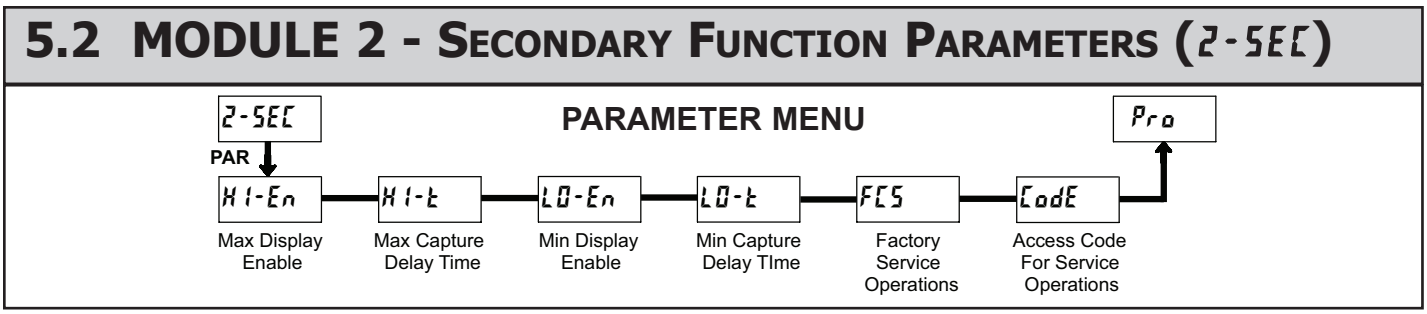
USER INPUT ACTIVE LEVEL



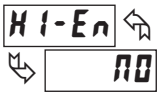
H1 LO

Select whether the user input is configured as active low or active high.

5.2 MODULE 2 - SECONDARY FUNCTION PARAMETERS (2-SEC)



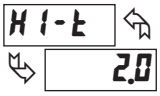
MAX DISPLAY ENABLE



no YES

Enables the Maximum Display Capture capability.

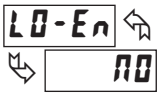
MAX CAPTURE DELAY TIME



0.0 to 999.9 sec.

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.

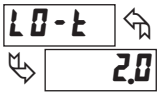
MIN DISPLAY ENABLE



no YES

Enables the Minimum Display Capture capability.

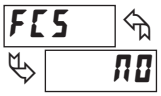
MIN CAPTURE DELAY TIME



0.0 to 999.9 sec.

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.

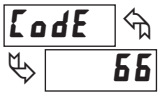
FACTORY SERVICE OPERATIONS



no YES

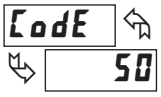
Select YES to perform any of the Factory Service Operations shown below.

RESTORE FACTORY DEFAULT SETTINGS



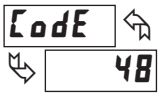
Entering Code 66 will overwrite all user settings with the factory settings. The meter will display rESEt and then return to CodE 00. Press the **PAR** button to exit the module.

VIEW MODEL AND VERSION DISPLAY



Entering Code 50 will display the version (x.x) of the meter. The display then returns to CodE 00. Press the **PAR** button to exit the module.

CALIBRATION



The PAXLA uses stored calibration values to provide accurate measurements. Over time, the electrical characteristics of the components inside the PAXLA will slowly change with the result that the stored calibration values no longer accurately define the input circuit. For most applications, recalibration every 1 to 2 years should be sufficient.

Calibration of the PAXLA involves a calibration which should only be performed by individuals experienced in calibrating electronic equipment. Allow 30 minute warm up before performing any calibration related procedure. The following procedures should be performed at an ambient temperature of 15 to 35 °C (59 to 95 °F).

CAUTION: The accuracy of the calibration equipment will directly affect the accuracy of the PAXLA.

Current Calibration

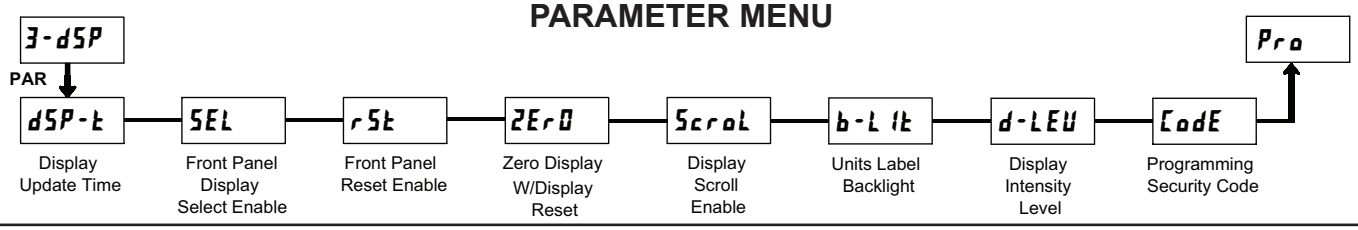
1. Connect the negative lead of a precision DC current source with an accuracy of 0.01% or better to the COMM terminal. Leave the positive lead of the DC current source unconnected.
2. With the display at CodE 48, press the **PAR** button. Unit will display CAL no
3. Press the **RST** button to select the range to be calibrated.
4. Press the **PAR** button. Display reads 0.0A
5. With the positive lead of the DC current source unconnected, press **PAR**. Display reads CALC for about 8 seconds.
6. When the display reads the selected range, connect the positive lead of the DC
   current source to the current input and apply full-scale input signal for the range. (Note: For 200 mA range, apply 100 mA as indicated on the display.) Press **PAR**. Display reads CALC for about 8 seconds.
7. Repeat steps 3 through 6 for each input range to be calibrated. When display reads CAL no, press the **PAR** button to exit calibration.

Voltage Calibration

1. Connect a precision DC voltage source with an accuracy of 0.01% or better to the volt input and COMM terminals of the PAXLA. Set the output of the voltage source to zero.
2. With the display at CodE 48, press the **PAR** button. Unit will display CAL no.
3. Press the **RST** button to select the range to be calibrated.
4. Press the **PAR** button. Display reads 0.0u.
5. With the voltage source set to zero (or a dead short applied to the input), press **PAR**. Display reads CALC for about 8 seconds.
6. When the display reads the selected range, apply full-scale input signal for the range. (Note: For 200V range, apply 100V as indicated on the display.) Press **PAR**. Display reads CALC for about 8 seconds.
7. Repeat steps 3 through 6 for each input range to be calibrated. When display reads CAL no, press the **PAR** button to exit calibration

5.3 MODULE 3 - DISPLAY AND FRONT PANEL BUTTON PARAMETERS (3-dSP)

PARAMETER MENU



DISPLAY UPDATE TIME

dSP-t → 1

0.5 1 2 seconds

This parameter sets the display update time in seconds.

FRONT PANEL DISPLAY SELECT ENABLE (SEL)

SEL → YES

YES NO

The YES selection allows the **SEL** button to toggle through the enabled displays.

FRONT PANEL RESET ENABLE (RST)

rSt → dSP

no LO dSP
HI HI-LO

This selection allows the **RST** button to reset the selected value(s).

ZERO DISPLAY WITH DISPLAY RESET

2Er0 → no

YES NO

This parameter enables the **RST** button or user input to zero the input display value, causing the display reading to be offset.

Note: For this parameter to operate, the **RST** button or User Input being used must be set to dSP and the Input value must be displayed. If these conditions are not met, the display will not zero.

DISPLAY SCROLL ENABLE

Scrol → no

YES NO

The YES selection allows the display to automatically scroll through the enabled displays. The scroll rate is every 4 seconds. This parameter only appears when the MAX or MIN displays are enabled.

UNITS LABEL BACKLIGHT*

b-Lit → OFF

ON OFF

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

DISPLAY INTENSITY LEVEL

d-LEV → 3

1 to 3

Enter the desired Display Intensity Level (1-3). The display will actively dim or brighten as levels are changed.

PROGRAMMING SECURITY CODE

CodE
000

000 to 999

The Security Code determines the programming mode and the accessibility of programming parameters. This code can be used along with the Program Mode Lock-out (P-Loc) in the User Input Function parameter (Module 1).

Two programming modes are available. Full Programming mode allows all parameters to be viewed and modified. Quick Programming mode permits only the Setpoint values to be modified, but allows direct access to these values without having to enter Full Programming mode.

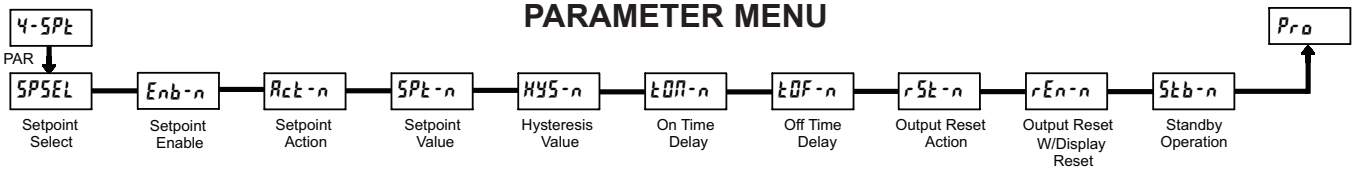
Programming a Security Code other than 0, requires this code to be entered at the CodE prompt in order to access Full Programming mode. Depending on the code value, Quick Programming may be accessible before the CodE prompt appears (see chart).

USER INPUT FUNCTION	USER INPUT STATE	SECURITY CODE	MODE WHEN "PAR" BUTTON IS PRESSED	FULL PROGRAMMING MODE ACCESS
not P-Loc	_____	0	Full Programming	Immediate Access
		1-99	Quick Programming	After Quick Programming with correct code entry at CodE prompt *
		100-999	CodE prompt	With correct code entry at CodE prompt *
P-Loc	Active	0	Programming Lock	No Access
		1-99	Quick Programming	No Access
		100-999	CodE prompt	With correct code entry at CodE prompt *
	Not Active	0-999	Full Programming	Immediate Access

** Entering Code 222 allows access regardless of security code.*

5.4 MODULE 4 - SETPOINT OUTPUT PARAMETERS (4-SPt)

PARAMETER MENU

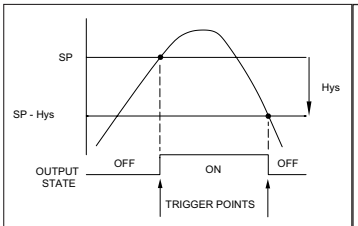


SETPOINT SELECT

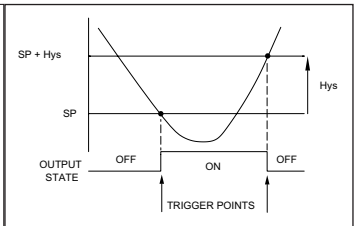
SPSEL
no

no SP-1 SP-2

Enter the setpoint (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 SPSEL. Repeat steps for each setpoint to be programmed. Select no to exit the module.



High Acting (Unbalanced Hys) = H1-Ub



Low Acting (Unbalanced Hys) = LO-Ub

SETPOINT ENABLE

Enb-n
no
YES no

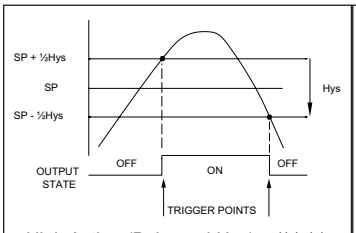
Select YES to enable Setpoint n and access the setup parameters. If no is selected, the unit returns to SPSEL and Setpoint n is disabled.

SETPOINT ACTION

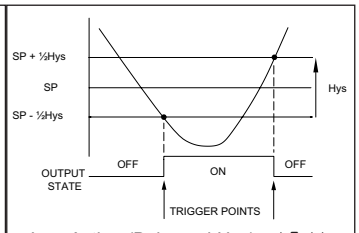
Act-n
H1-Ub
H1-bL LO-bL H1-Ub LO-Ub

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

- H1-bL = High Acting, with balanced hysteresis
- LO-bL = Low Acting, with balanced hysteresis
- H1-Ub = High Acting, with unbalanced hysteresis
- LO-Ub = Low Acting, with unbalanced hysteresis



High Acting (Balanced Hys) = H1-bL



Low Acting (Balanced Hys) = LO-bL

SETPOINT VALUE

SPt-n
001.00

-19999 to 99999

Enter the desired setpoint value. The decimal point position for the setpoint and hysteresis values follow the selection set in Module 1.

HYSTERESIS VALUE

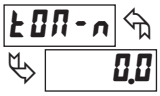
HYS-n
2

1 to 59999

Enter desired hysteresis value. See Setpoint Output Figures for visual explanation of how setpoint output actions (balanced and unbalanced) 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.

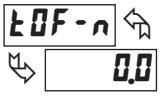
ON TIME DELAY



0.0 to 599.9 Sec

Enter the time value in seconds that the output is delayed from turning on after the trigger point is reached. A value of 0.0 allows the meter to update the output status per the response time listed in the Specifications.

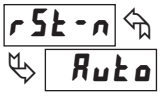
OFF TIME DELAY



0.0 to 599.9 Sec

Enter the time value in seconds that the output is delayed from turning off after the trigger point is reached. A value of 0.0 allows the meter to update the output status per the response time listed in the Specifications.

OUTPUT RESET ACTION



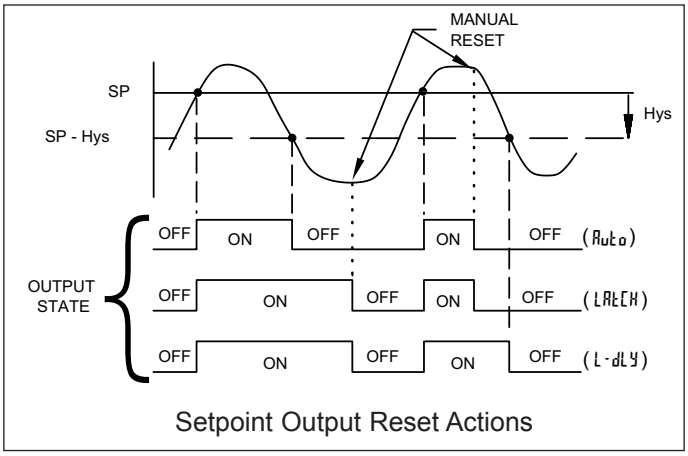
Auto LATCH L-dLY

Enter the reset action of the output. See figure for details.

Auto = Automatic action; This action allows the output to automatically reset off at the trigger points per the Setpoint Action shown in Setpoint Output Figures. The "on" output may be manually reset (off) immediately by the front panel **RST** button or user input.The output remains off until the trigger point is crossed again.

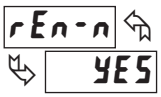
LATCH = Latch with immediate reset action; This action latches the output on at the trigger point per the Setpoint Action shown in Setpoint Output Figures. Latch means that the output can only be turned off by the front panel **RST** button or user input manual reset, or meter power cycle. When the user input or **RST** button is activated (momentary action), the corresponding "on" 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.)

L-dLY = Latch with delay reset action; This action latches the output on at the trigger point per the Setpoint Action shown in Setpoint Output Figures. Latch means that the output can only be turned off by the front panel **RST** button or user input manual reset, or meter power cycle. When the user input or **RST** button is activated (momentary action), the meter delays the event until the corresponding "on" output crosses the trigger off point. (Previously latched outputs are off if power up Display Value is lower than setpoint value. During a power cycle, the meter erases a previous L-dLY reset if it is not activated at power up.)



Setpoint Output Reset Actions

OUTPUT RESET WITH DISPLAY RESET

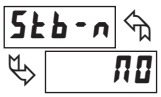


NO YES

This parameter enables the **RST** button or user input to reset the output when the display is reset.

Note: For this parameter to operate, the **RST** button or User Input being used must be set to dSP and the Input value must be displayed. If these conditions are not met, the output will not reset.

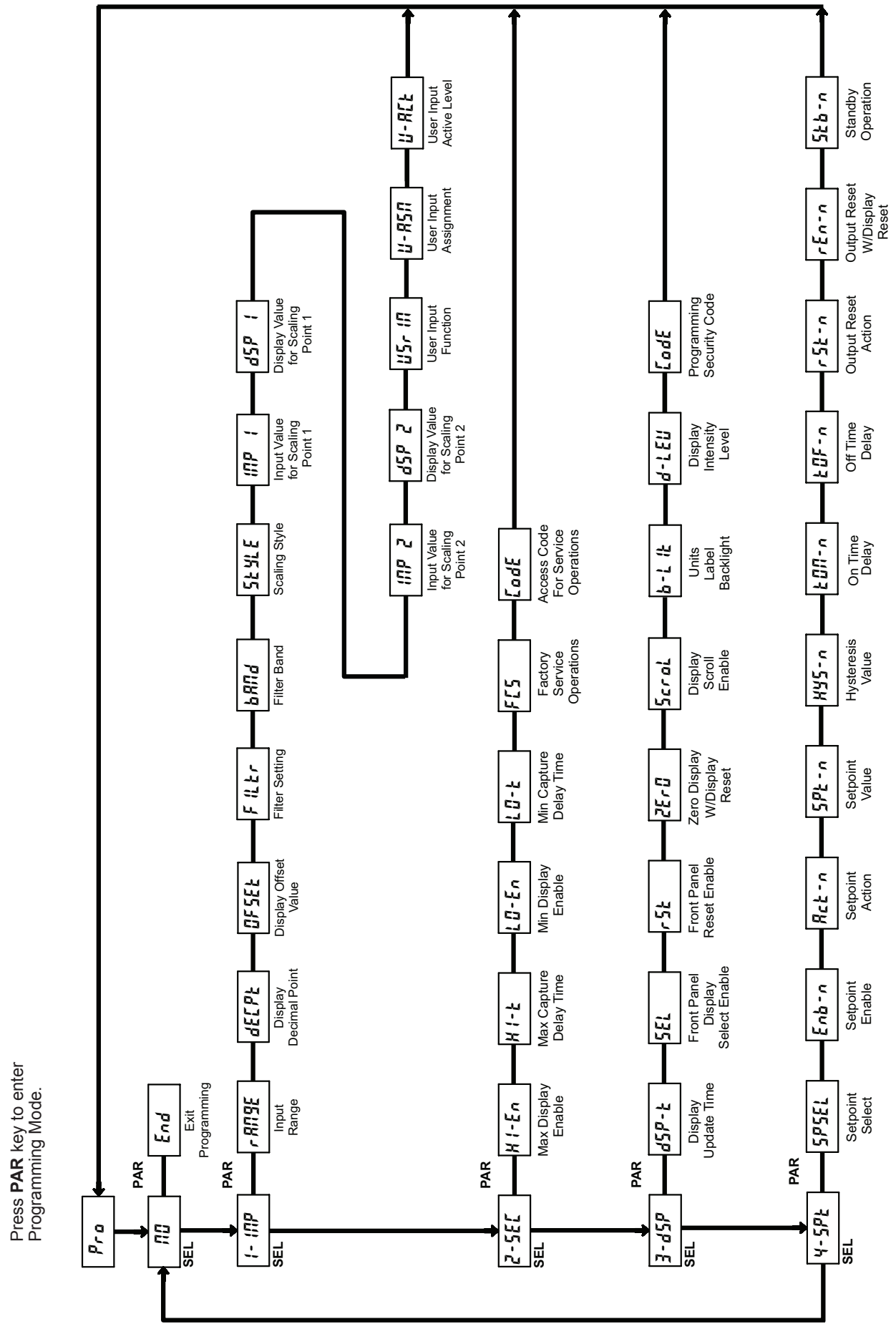
STANDBY OPERATION



NO YES

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

PAXLA PROGRAMMING QUICK OVERVIEW



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.

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Bulletin No. PAXLCR- B
Drawing No. LP0749
Released 04/09

MODEL PAXLCR - PAX LITE DUAL COUNTER AND RATE METER

- *6 DIGIT, 0.56" HIGH RED LED DISPLAY*
- *PROGRAMMABLE SCALING FOR COUNT AND RATE*
- *BI-DIRECTIONAL COUNTING, UP/DOWN CONTROL*
- *QUADRATURE SENSING (UP TO 4 TIMES RESOLUTION)*
- *BUILT-IN BATCH COUNTING CAPABILITY*
- *PROGRAMMABLE USER INPUT*
- *DUAL 5 AMP FORM C RELAYS*
- *UNIVERSALLY POWERED*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*

c UL US LISTED IND. CONT. EQ. 51EB

For Model No. PAXLCRU0 Only

GENERAL DESCRIPTION

The PAXLCR is a versatile meter that provides a single or dual counter with rate indication, scaling and dual relay outputs. The 6-digit display has 0.56" high digits with adjustable display intensity. The display can be toggled manually or automatically between the selected counter and rate values.

The meter has two signal inputs and a choice of eight different count modes. These include bi-directional, quadrature and anti-coincidence counting, as well as a dual counter mode. When programmed as a Dual Counter, each counter has separate scaling and decimal point selection.

Rate indication is available in all count modes. The Rate Indicator has separate scaling and decimal point selection, along with programmable display update times. In addition to the signal inputs, the User Input can be programmed to perform a variety of meter control functions.

Two setpoint outputs are provided, each with a Form C relay. The outputs can activate based on either counter or rate setpoint values. An internal batch counter can be used to count setpoint output activations.

The PAXLCR can be powered from a wide range of AC or DC voltages. The meter has been specifically designed for harsh industrial environments. With a NEMA 4X/IP65 sealed bezel and extensive testing to meet CE requirements, the meter provides a tough yet reliable application solution.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
PAXLCR	Dual Counter & Rate Meter with Dual Relay Output	PAXLCR00
PAXLCRU	UL Listed Dual Counter & Rate Meter with Dual Relay Output	PAXLCRU0

SAFETY SUMMARY

All safety regulations, local codes and instructions that appear in this and corresponding 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 meter 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 meter

CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

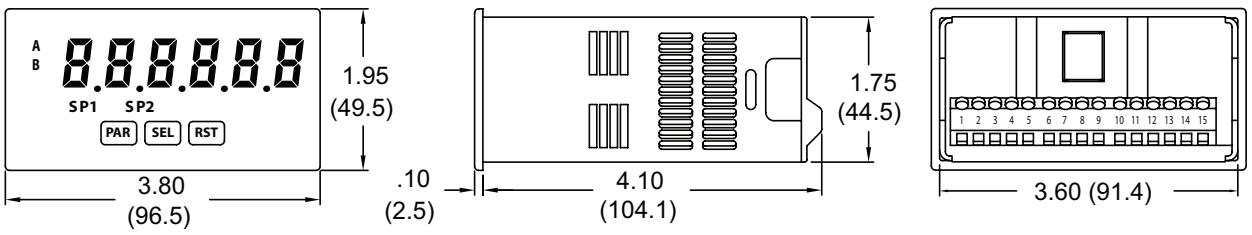
CAUTION: Risk of electric shock.

SPECIFICATIONS

1. **DISPLAY**: 6 digit, 0.56" (14.2 mm) intensity adjustable Red LED
2. **POWER REQUIREMENTS**:
   AC POWER: 50 to 250 VAC 50/60 Hz, 12 VA
   Isolation: 2300 Vrms for 1 min. to all inputs and outputs
   DC POWER: 21.6 to 250 VDC, 6 W
   DC Out: +24 VDC @ 100 mA if input voltage is greater than 50 VAC/VDC
   +24 VDC @ 50 mA if input voltage is less than 50 VDC
3. **COUNTER DISPLAYS**:
   Counter A: 6-digits, enabled in all count modes
   Display Designator: "A" to the left side of the display
   Display Range: -99999 to 999999
   Counter B: 6-digits, enabled in Dual Count mode or Batch Counter
   Display Designator: "B" to the left side of the display
   Display Range: 0 to 999999 (positive count only)
   Overflow Indication: Display "OLOL" alternates with overflowed count value
   Maximum Count Rates: 50% duty cycle, count mode dependent.
   With setpoints disabled: 25 KHz, all modes except Quadrature x4 (23 KHz).
   With setpoint(s) enabled: 20 KHz, all modes except Dual Counter (14 KHz), Quadrature x2 (13 KHz) and Quadrature x4 (12 KHz).

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.



4. **RATE DISPLAY**: 6-digits, may be enabled or disabled in any count mode
   Display Range: 0 to 999999
   Over Range Display: "OLOL"
   Maximum Frequency: 25 KHz
   Minimum Frequency: 0.01 Hz
   Accuracy: ±0.01%
5. **COUNT/RATE SIGNAL INPUTS (INPUT A and INPUT B)**:
   See Section 2.0 Setting the DIP Switches for complete Input specifications. DIP switch selectable inputs accept pulses from a variety of sources. Both inputs allow selectable active low or active high logic, and selectable input filtering for low frequency signals or switch contact debounce.
   Input A: Logic level or magnetic pickup signals.
   Trigger levels: V_{IL} = 1.25 V max; V_{IH} = 2.75 V min; V_{MAX} = 28 VDC
   Mag. pickup sensitivity: 200 mV peak, 100 mV hysteresis, 40 V peak max.
   Input B: Logic level signals only
   Trigger levels: V_{IL} = 1.0 V max; V_{IH} = 2.4 V min; V_{MAX} = 28 VDC
6. **USER INPUT**: Programmable
   Software selectable for active logic state: active low, pull-up (24.7 KΩ to +5 VDC) or active high, pull-down resistor (20 KΩ).
   Trigger levels: V_{IL} = 1.0 V max; V_{IH} = 2.4 V min; V_{MAX} = 28 VDC
   Response Time: 10 msec typ.; 50 msec debounce (activation and release)
7. **MEMORY**: Nonvolatile E^2PROM retains all programming parameters and count values when power is removed.
8. **OUTPUTS**:
   Type: Dual Form C contacts
   Isolation to Input & User/Exc Commons: 1400 Vrms for 1 min. Working Voltage: 150 Vrms
   Contact Rating: 5 amps @ 120/240 VAC or 28 VDC (resistive load), 1/8 H.P. @ 120 VAC (inductive load)
   Life Expectancy: 100 K cycles min. at full load rating. External RC snubber extends relay life for operation with inductive loads.
   Response Time: Turn On or Off: 4 msec max.
9. **ENVIRONMENTAL CONDITIONS**:
   Operating temperature: 0 to 50 °C
   Storage temperature: -40 to 70 °C
   Operating and storage humidity: 0 to 85% max. RH (non-condensing)
   Vibration According to IEC 68-2-6: Operational 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2g's.
   Shock According to IEC 68-2-27: Operational 30 g (10g relay), 11 msec in 3 directions.
   Altitude: Up to 2,000 meters
10. **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.
11. **CONSTRUCTION**: This unit is rated for NEMA 4X/IP65 outdoor use. IP20 Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.
12. **CERTIFICATIONS AND COMPLIANCES**:
    SAFETY
    Type 4X Enclosure rating (Face only), UL50
    IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
    IP65 Enclosure rating (Face only), IEC 529
    IP20 Enclosure rating (Rear of unit), IEC 529
    For Model No. PAXLCRU0 Only: UL Listed, File # E137808, UL508, CSA C22.2 No. 14-M95
    LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
    ELECTROMAGNETIC COMPATIBILITY
    Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A 2 kV power 1 kV signal
Surge	EN 61000-4-5	Criterion C 1 kV L-L, 2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms
Voltage dip/interruptions	EN 61000-4-11	Criterion A 0.5 cycle

Emissions:

Emissions	EN 55011	Class A

Notes:
1. Criterion A: Normal operation within specified limits.
2. Criterion C: Temporary loss of function which requires operator intervention.

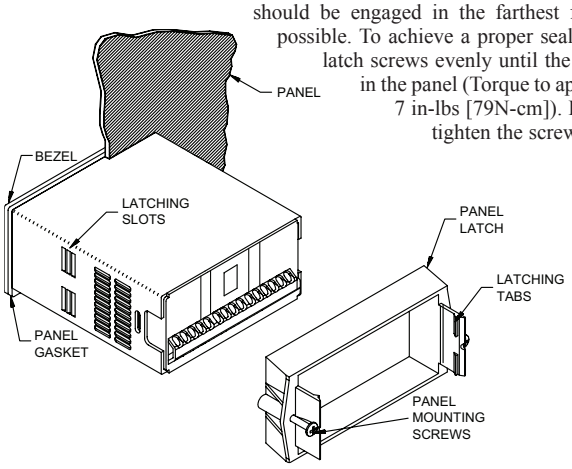
13. **WEIGHT**: 10.4 oz. (295 g)

1.0 Installing the Meter

Installation

The PAX Lite 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.



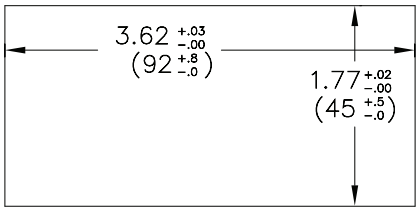
Installation Environment

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.

PANEL CUT-OUT



2.0 Setting the DIP Switches

To access the switches, 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 on the other side latch.

Warning: Exposed line voltage exists on the circuit boards. Remove all power to the meter and load circuits before accessing inside of the meter.

SWITCH 1 (Input A)

LOGIC: Input A trigger levels V_{IL} = 1.25 V max.; V_{IH} = 2.75 V min.; V_{MAX} = 28 VDC

MAG: 200 mV peak input sensitivity; 100 mV hysteresis; maximum voltage: 40 V peak (28 Vrms); Must also have Input A SRC switch ON. (Not recommended with counting applications.)

SWITCH 2 (Input A) {See Note 1}

SNK.: Adds internal 7.8 KΩ pull-up resistor to +5 VDC, I_{MAX} = 0.7 mA.

SRC.: Adds internal 3.9 KΩ pull-down resistor, 7.2 mA max. @ 28 VDC max.

SWITCH 3 (Input A)

HI Frequency: Removes damping capacitor and allows max. frequency.

LO Frequency: Adds a damping capacitor for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec.

SWITCH 4 (Input B) {See Note 1}

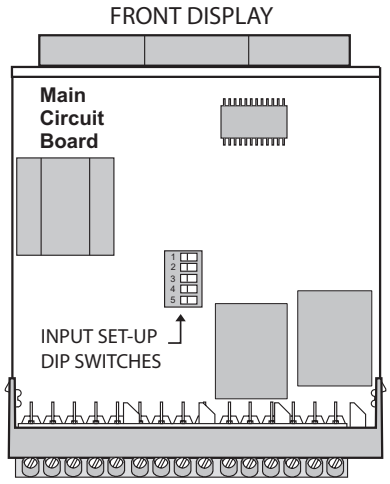
SNK.: Adds internal 7.8 KΩ pull-up resistor to +5 VDC, I_{MAX} = 0.7 mA.

SRC.: Adds internal 3.9 KΩ pull-down resistor, 7.2 mA max. @ 28 VDC max.

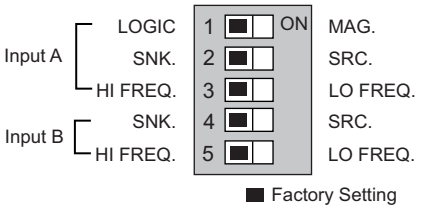
SWITCH 5 (Input B)

HI Frequency: Removes damping capacitor and allows max. frequency.

LO Frequency: Adds a damping capacitor for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec.



Note 1: When the DIP switch is in the SNK position (OFF), the signal input is configured as active low. When the switch is in the SRC position (ON), the signal input is configured as active high.



3.0 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 the 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.)

EMC INSTALLATION GUIDELINES

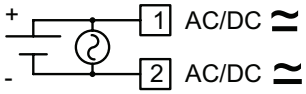
Although this meter is designed with a high degree of immunity to Electro-Magnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the meter may be different for various installations. The meter becomes more immune to EMI with fewer I/O connections. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The meter should be properly connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the meter and leave the other end of the shield unconnected and insulated from earth ground.
3. 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 ran 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.
4. Signal or Control cables within an enclosure should be routed as far as possible from contactors, control relays, transformers, and other noisy components.
5. 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 # 28B2029-0A0
   Line Filters for input power cables:
   Schaffner # FN610-1/07 (RLC# LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom # 1 VR3
   Note: Reference manufacturer's instructions when installing a line filter.
6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
7. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI.
   Snubber: RLC# SNUB0000.

3.1 POWER WIRING

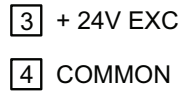
Power

Terminal 1: VAC/DC +
Terminal 2: VAC/DC -



DC Out Power

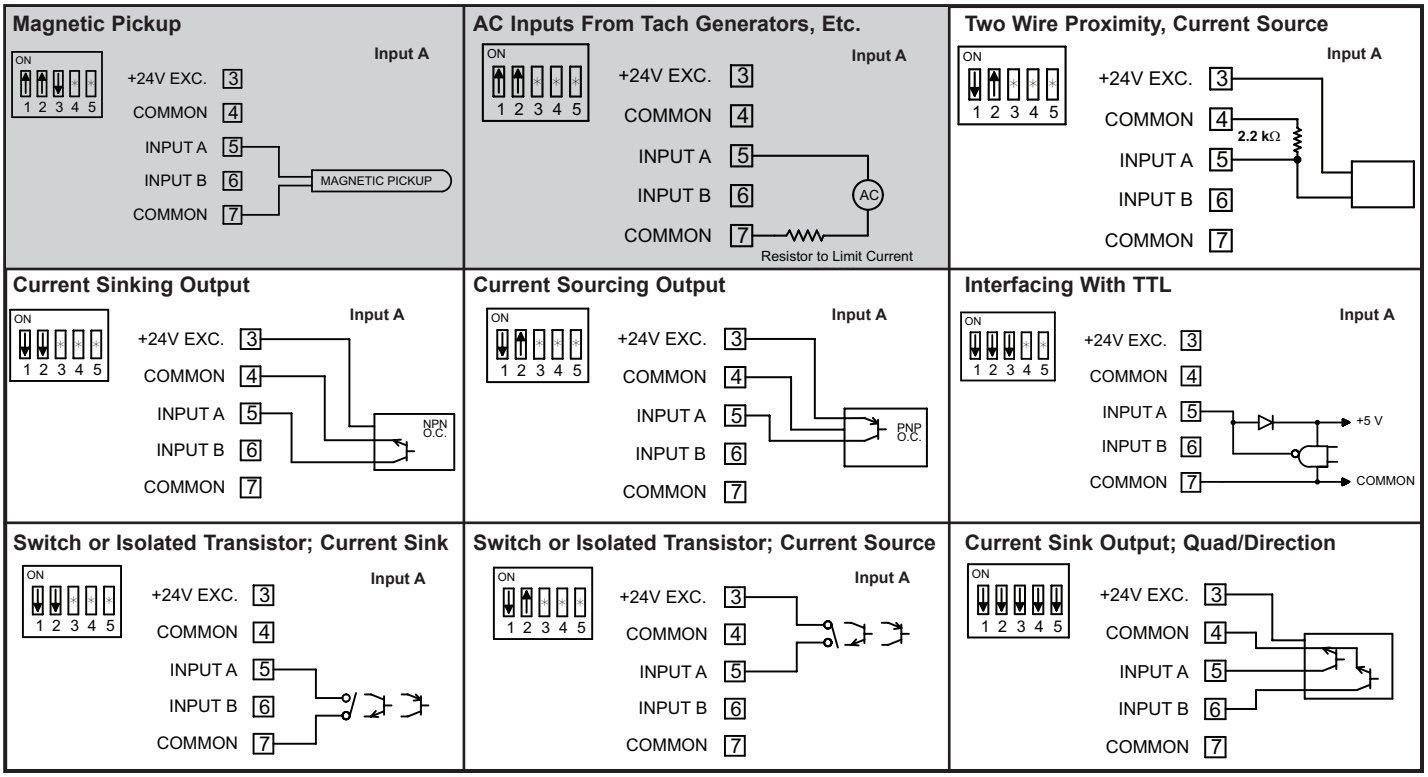
Terminal 3: + 24 VDC OUT
Terminal 4: Common



3.2 INPUT SIGNAL WIRING

The meter provides a choice of eight different count modes using two signal inputs, A and B. The Count Mode selected determines the action of Inputs A and B. Section 5.1, Input Setup Parameters, provides details on count mode selection and input action.

CAUTION: DC common (Terminal 4) is NOT isolated from Input common (Terminal 7) or User common (Terminal 9). In order to preserve the safety of the meter application, DC common must be suitably isolated from hazardous live earth referenced voltage; or Input common and User common must be at protective earth ground potential. If not, hazardous voltage may be present at the Signal or User Inputs, and Input or User common terminals. Appropriate considerations must then be given to the potential of the Input or User common with respect to earth ground.



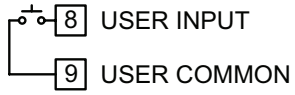
∗ *Switch position is application dependent.*

Shaded areas not recommended for counting applications.

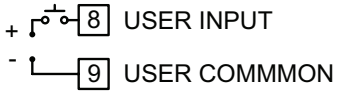
3.3 USER INPUT WIRING

Terminal 8: User Input
Terminal 9: User Common

Current Sinking (Active Low Logic)

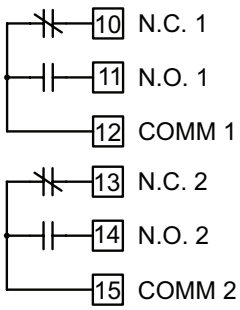


Current Sourcing (Active High Logic)



3.4 SETPOINT (OUTPUT) WIRING

Terminal 10: NC 1
Terminal 11: NO 1
Terminal 12: Relay 1 Common
Terminal 13: NC 2
Terminal 14: NO 2
Terminal 15: Relay 2 Common



4.0 Reviewing the Front Buttons and Display

BUTTON	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
PAR	Access Programming Mode	Store selected parameter and index to next parameter
SEL	Index display through enabled values	Advance through selection list/select digit position in parameter value
RST	Resets count display(s) and/or outputs	Increment selected digit of parameter value

OPERATING MODE DISPLAY DESIGNATORS

"A" - Counter A value

"B" - Counter B value (dual count or batch)

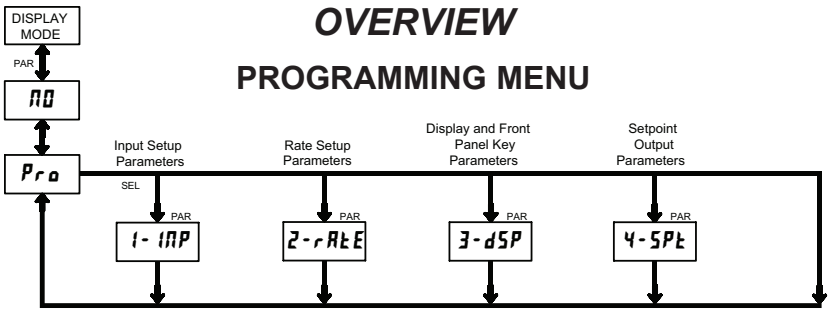
- Rate value is displayed with no designator

"SP1" - Indicates setpoint 1 output status.

"SP2" - Indicates setpoint 2 output status.

Pressing the **SEL** button toggles the meter through the selected displays. If display scroll is enabled, the display will toggle automatically every four seconds between the enabled display values.

5.0 Programming the Meter



OVERVIEW

PROGRAMMING MENU

PROGRAMMING MODE ENTRY (PAR BUTTON)

It is recommended all programming changes be made off line, or before installation. The meter normally operates in the Display Mode. No parameters can be programmed in this mode. The Programming Mode is entered by pressing the **PAR** button. If it is not accessible, then it is locked by either a security code or a hardware lock.

MODULE ENTRY (SEL & PAR BUTTONS)

The Programming Menu is organized into four modules. These modules group together parameters that are related in function. The display will alternate between **Pro** and the present module. The **SEL** button is used to select the desired module. The displayed module is entered by pressing the **PAR** button.

MODULE MENU (PAR BUTTON)

Each module has a separate module menu (which is shown at the start of each module discussion). The **PAR** button 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 **Pro no**. Programming may continue by accessing additional modules.

SELECTION / VALUE ENTRY

For each parameter, the display alternates between the present parameter and the selections/value for that parameter. The **SEL** and **RST** buttons are used to move through the selections/values for that parameter. Pressing the **PAR** button, stores and activates the displayed selection/value. This also advances the meter to the next parameter.

For numeric values, the value is displayed with one digit flashing (initially the right most digit). Pressing the **RST** button increments the digit by one or the user can hold the **RST** button and the digit will automatically scroll. The **SEL** button will select the next digit to the left. Pressing the **PAR** button will enter the value and move to the next parameter.

PROGRAMMING MODE EXIT (PAR BUTTON)

The Programming Mode is exited by pressing the **PAR** button with **Pro no** displayed. This will commit any stored parameter changes to memory and return the meter to the Display Mode. (If power loss occurs before returning to the Display Mode, verify recent parameter changes.)

PROGRAMMING TIPS

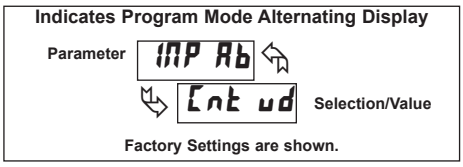
It is recommended to start with Module 1 and proceed through each module in sequence. When programming is complete, it is recommended to record the parameter programming and lock out parameter programming with the user input or programming security code.

FACTORY SETTINGS

Factory Settings may be completely restored in Module 3. This is useful when encountering programming problems.

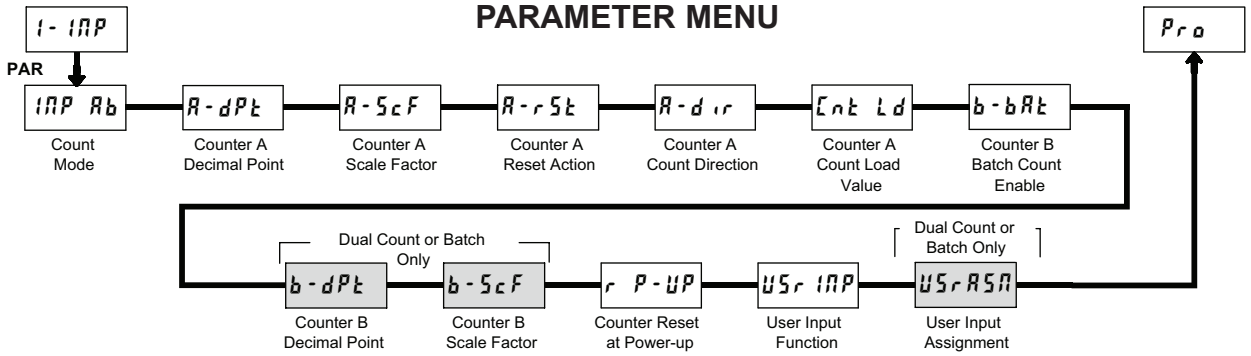
ALTERNATING SELECTION DISPLAY

In the explanation of the modules, the following dual display with arrows will appear. This is used to illustrate the display alternating between the parameter on top and the parameter's Factory Setting on the bottom. In most cases, selections and values for the parameter will be listed on the right.



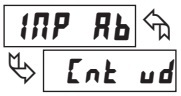
5.1 MODULE 1 - INPUT SETUP PARAMETERS (1- INP)

PARAMETER MENU



Shaded area selections only apply when Counter B is enabled (Dual Count mode or batch counter).

COUNT MODE



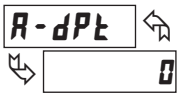
Cnt ud QUAd 1 AddAdd
rt-Cnt QUAd 2 AddSub
dUAL QUAd 4

Select the count mode that corresponds with your application. The input actions are shown in the boxes below. For simple counting applications, it is recommended to use Count with Direction for the count mode. Simply leave the direction input unconnected.

DISPLAY	MODE	INPUT A ACTION	INPUT B ACTION
Cnt ud	Count with Direction	Counter A	Counter A Direction
rt-Cnt	Rate/Counter	Rate only	Counter A Add
dUAL	Dual Counter	Counter A Add	Counter B Add
QUAd 1	Quadrature x1	Count A	Quad A
QUAd 2	Quadrature x2	Count A	Quad A
QUAd 4	Quadrature x4	Count A	Quad A
AddAdd	2 Input Add/Add	Counter A Add	Counter A Add
AddSub	2 Input Add/Subtract	Counter A Add	Counter A Subtract

Note: The Rate indicator signal is derived from Input A in all count modes.

COUNTER A DECIMAL POSITION



0 0.00 0.0000
0.0 0.000 0.00000

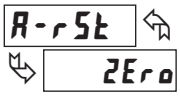
This selects the decimal point position for Counter A. The selection will also affect Counter A scale factor calculations.

COUNTER A SCALE FACTOR

00.0001 to 99.9999

The number of input counts is multiplied by the scale factor to obtain the desired process value. A scale factor of 1.0000 will result in the display of the actual number of input counts. (Details on scaling calculations are explained at the end of this section.)*

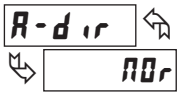
COUNTER A RESET ACTION



2Ero Cnt Ld

When Counter A is reset, it returns to Zero or Counter A Count Load value. This reset action applies to all Counter A resets, except a Setpoint generated Counter Auto Reset programmed in Module 4.

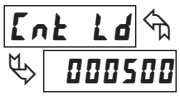
COUNTER A COUNT DIRECTION



nor rEU

Reverse (rEU) switches the normal Counter A count direction shown in the Count Mode parameter chart.

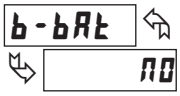
COUNTER A COUNT LOAD VALUE



-99999 to 999999

Counter A resets to this value if Reset to Count Load action is selected. To enter a negative Count Load value, increment digit 6 to display a "-" sign.*

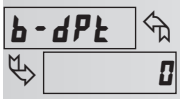
COUNTER B BATCH COUNT ENABLE



no SP-2
SP-1 SP1-2

The Counter B Batch Count function internally counts the number of output activations of the selected setpoint(s). The count source for the batch counter can be SP1, SP2 or both. Batch counting is available in all count modes except Dual Counter, which uses an external input signal for Counter B.

COUNTER B DECIMAL POSITION

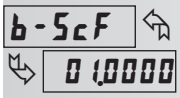


0 0.00 0.0000
0.0 0.000 0.00000

This selects the decimal point position for Counter B. The selection will also affect Counter B scale factor calculations.

*For value entry instructions, refer to selection/value entry in the Programming The Meter section.

COUNTER B SCALE FACTOR



00.0001 to 99.9999

The number of input or batch counts is multiplied by the scale factor to obtain the desired process value. A scale factor of 1.0000 will result in the display of the actual number of input or batch counts. (Details on scaling calculations are explained at the end of this section.)*

COUNTER RESET AT POWER-UP

no	no	Cnt b
YES	Cnt A	both

The selected counter(s) will reset at each meter power-up.

SCALING FOR COUNT INDICATION

The counter's scale factor is factory set to 1, to provide one count on the display for each pulse that is input to the unit. In many applications, there will not be a one-to-one correspondence between input pulses and display units. Therefore, it is necessary for the meter to scale or multiply the input pulses by a scale factor to achieve the desired display units (feet, meters, gallons, etc.)

The Count Scale Factor Value can range from 00.0001 to 99.9999. It is important to note that the precision of a counter application cannot be improved by using a scale factor greater than one. To accomplish greater precision, more pulse information must be generated per measuring unit. The following formula is used to calculate the scale factor.

$$\text{Scale Factor} = \frac{\text{Desired Display Units}}{\text{Number of Pulses}} \times \text{Decimal Point Position}$$

WHERE:

Desired Display Units: Count display units acquired after pulses that occurred.

Number of Pulses: Number of pulses required to achieve the desired display units.

Decimal Point Position:

0	=	1
0.0	=	10
0.00	=	100
0.000	=	1000
0.0000	=	10000
0.00000	=	100000

EXAMPLE 1: The counter display is used to indicate the total number of feet used in a process. It is necessary to know the number of pulses for the desired units to be displayed. The decimal point is selected to show the resolution in hundredths.

$$\text{Scale Factor} = \frac{\text{Desired Display Units}}{\text{Number of Pulses}} \times \text{Decimal Point Position}$$

Given that 128 pulses are equal to 1 foot, display total feet with a one-hundredth resolution.

$$\text{Scale Factor} = \frac{1.00}{128} \times 100$$

$$\text{Scale Factor} = 0.007812 \times 100$$

$$\text{Scale Factor} = 0.7812$$

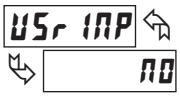
EXAMPLE 2: A manufacturer wants to count the total number of bricks molded in a process yielding 12 bricks per mold. The counter receives 1 pulse per mold and should increase by 12 for each pulse received. Since single brick accuracy is not required, a Scale Factor greater than 1 can be used in this case.

$$\text{Scale Factor} = \frac{\text{Desired Display Units}}{\text{Number of Pulses}} \times \text{Decimal Point Position}$$

$$\text{Scale Factor} = \frac{12}{1} \times 1$$

$$\text{Scale Factor} = 12.0000$$

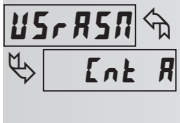
USER INPUT FUNCTION



DISPLAY	MODE	DESCRIPTION
no	No Function	User Input disabled.
ProLoc	Program Mode Lock-out	See Programming Mode Access chart (Module 3).
Inhibt	Inhibit	Inhibit counting for the selected counter(s).
rESEt	Maintained Reset	Level active reset of the selected counter(s).
StorE	Store	Freeze display for the selected counter(s) while allowing counts to accumulate internally.
St-rSt	Store and Reset	Edge triggered reset of the selected counter(s) after storing the count.
d-SEL	Display Select *	Advance once for each activation.
d-LEU	Display Intensity Level *	Increase intensity one level for each activation.
rSt-1	Setpoint 1 Reset *	Reset setpoint 1 output.
rSt-2	Setpoint 2 Reset *	Reset setpoint 2 output.
rSt-12	Setpoint 1 and 2 Reset *	Reset both setpoint 1 and 2 outputs.

** Indicates Edge Triggered function. All others are Level Active functions.*

USER INPUT ASSIGNMENT



Cnt A
Cnt b
both

The User Input Assignment is only active when Counter B is enabled and the user input selection performs a Reset, Inhibit or Store function on one or both of the counters.

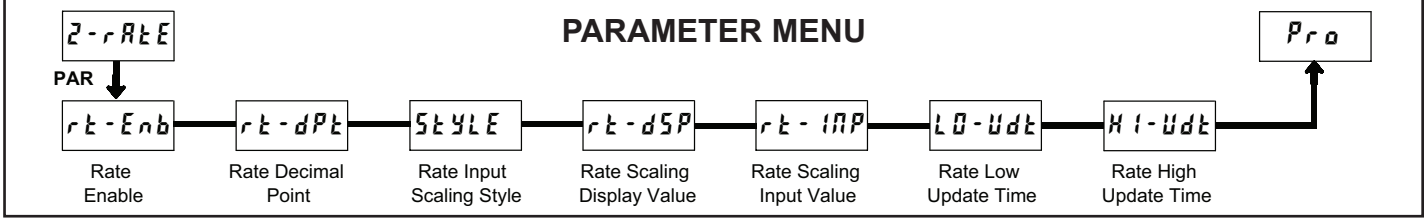
USER INPUT ACTIVE LEVEL

Lo Hi

Select whether the user input is configured as active low or active high.

*For value entry instructions, refer to selection/value entry in the Programming The Meter section.

5.2 MODULE 2 - RATE SETUP PARAMETERS (2-rAtE)



RATE ENABLE

rt-Enb / YES — NO YES

This parameter enables the Rate display. For maximum input frequency, Rate Enable should be set to NO when not in use. When set to NO, the remaining rate parameters are not accessible.

RATE DECIMAL POINT

rt-dPt / 0 — 0 0.00 0.0000 / 0.0 0.000 0.00000

This selects the decimal point position for the rate display. This parameter does not affect rate scaling calculations.

RATE INPUT SCALING STYLE

StyLE / KEY — KEY APLY

If a Rate Input value (in Hz) and the corresponding Rate Display value are known, the Key-in (KEY) Scaling Style can be used. This allows rate scaling without the presence of a rate input signal.

If the Rate Input value has to be derived from the actual rate input signal, the Apply (APLY) Scaling Style should be used.

RATE SCALING DISPLAY VALUE

rt-dSP / 001000 — 0 to 999999

Enter the desired Rate Display value. This value is entered using the front panel buttons for either Scaling Style.*

RATE SCALING INPUT VALUE

rt-InP / 01000.0 — 0.1 to 99999.9

Enter the corresponding Rate Input value using the Scaling Style selected.

Key-in Style:

Enter the Rate Input value using the front panel buttons. This value is always in pulses per second (Hz).*

Apply Style:

The meter initially shows the stored Rate Input value. To retain this value, press **PAR** to advance to the next parameter. To enter a new value, apply the rate input signal to Input A. Press **RST** and the applied input frequency (in Hz) will appear on the display. To insure the correct reading, wait several rate sample periods (see Rate Low Update Time) or until a consistent reading is displayed. Press **PAR** to store the displayed value as the new Rate Input value.

*For value entry instructions, refer to selection/value entry in the Programming The Meter section.

RATE LOW UPDATE TIME (DISPLAY UPDATE)

LO-Udt / 01.0 — 0.1 to 99.9 seconds

The Low Update Time is the minimum amount of time between display updates for the Rate display. Values of 0.1 and 0.2 seconds will update the display correctly but may cause the display to appear unsteady.

RATE HIGH UPDATE TIME (DISPLAY ZERO)

HI-Udt / 02.0 — 0.2 to 99.9 seconds

The High Update Time is the maximum amount of time before the Rate display is forced to zero. (For more explanation, refer to Input Frequency Calculation.) The High Update Time **must** be higher than the Low Update Time and higher than the desired slowest readable speed (one divided by pulses per second). The factory setting of 2.0, will force the display to zero for speeds below 0.5 Hz or a pulse every 2 seconds.

SCALING FOR RATE INDICATION

To scale the Rate, enter a Scaling Display value with a corresponding Scaling Input value. These values are internally plotted to a Display value of 0 and Input value of 0.0 Hz. A linear relationship is formed between these points to yield a rate display value that corresponds to the incoming input signal rate. The meter is capable of showing a rate display value for any positive slope linear process.

SCALING CALCULATION FOR KEY-IN STYLE

If a display value versus input signal (in pulses per second) is known, then those values can be entered into Scaling Display (rt-dSP) and Scaling Input (rt-InP). No further calculations are needed.

If only the number of pulses per 'single' unit (i.e. # of pulses per foot) is known, then it can be entered as the Scaling Input value and the Scaling Display value will be entered as the following:

RATE PER	DISPLAY (rt-dSP)	INPUT (rt-InP)
Second	1	# of pulses per unit
Minute	60	# of pulses per unit
Hour	3600	# of pulses per unit

NOTES:

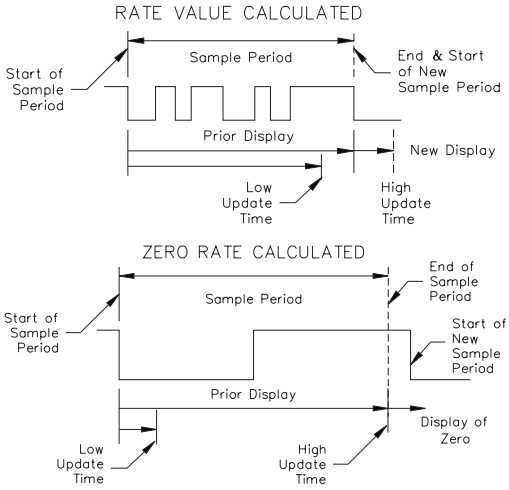
1. If # of pulses per unit is less than 1, multiply both Input and Display values by 10 or 100 as needed to obtain greater accuracy.
2. If the Display value is raised or lowered, then Input value must be raised or lowered by the same proportion (i.e. Display value for per hour is entered by a third less (1200) then Input value is a third less of # of pulses per unit). The same is true if the Input value is raised or lowered, then Display value must be raised or lowered by the same proportion.
3. Both values must be greater than 0.

EXAMPLE:

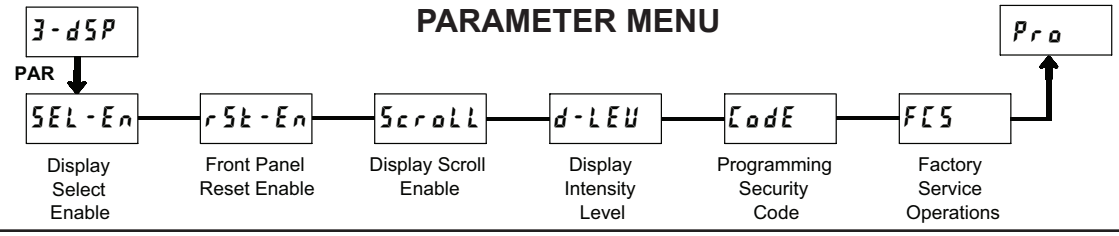
1. With 15.1 pulses per foot, show feet per minute in tenths. Scaling Display = 60.0 Scaling Input = 15.1.
2. With 0.25 pulses per gallon, show whole gallons per hour. (To have greater accuracy, multiply both Input and Display values by 10.) Scaling Display = 36000 Scaling Input = 2.5.

INPUT FREQUENCY CALCULATION

The meter determines the input frequency by summing the number of falling edges received during a sample period of time. The sample period begins on the first falling edge. At this falling edge, the meter starts accumulating time towards Low Update and High Update values. Also, the meter starts accumulating the number of falling edges. When the time reaches the Low Update Time value, the meter looks for one more falling edge to end the sample period. If a falling edge occurs (before the High Update Time value is reached), the Rate display will update to the new value and the next sample period will start on the same edge. If the High Update Time value is reached (without receiving a falling edge after reaching Low Update Time), then the sample period will end but the Rate display will be forced to zero. The High Update Time value must be greater than the Low Update Time value. Both values must be greater than 0.0. The input frequency calculated during the sample period, is then shown as a Rate value determined by the scaling calculation.



5.3 MODULE 3 - DISPLAY AND FRONT PANEL KEY PARAMETERS (3-dSP)



FRONT PANEL DISPLAY SELECT ENABLE (SEL)

SEL-En / YES — nO YES

The **YES** selection allows the **SEL** key to toggle through the enabled displays.

FRONT PANEL COUNTER RESET ENABLE (RST)

rSt-En / YES — nO YES

nO		both
YES	Cnt A	dSPLAY
	Cnt b	

The **YES** selection allows the **RST** key to reset the selected counter(s). The shaded selections are only active when Counter B is enabled (Dual Count Mode or batch counter).

DISPLAY SCROLL ENABLE

ScroLL / nO — nO YES

The **YES** selection allows the display to automatically scroll through the enabled displays. Each display is shown for 4 seconds.

DISPLAY INTENSITY LEVEL

d-LEU / 3 — 1 to 5

Enter the desired Display Intensity Level (1-5). The display will actively dim or brighten as levels are changed.

PROGRAMMING SECURITY CODE

CodE / 000 — 0 to 999

The Security Code determines the programming mode and the accessibility of programming parameters. This code can be used along with the Program Mode Lock-out (ProLoc) in the User Input Function parameter (Module 1).

Two programming modes are available. Full Programming mode allows all unit parameters to be viewed and modified. Quick Programming mode permits only user selected values to be modified, but allows direct access to these values without having to enter Full Programming mode.

Entering a Security Code from 1-99 enables Quick Programming mode, and displays a sublist to select which values appear in the Quick Programming menu. All of the values set to **YES** in the sublist are accessible in Quick Programming. The values include Setpoints (SP-1, SP-2), Output Time-outs (tOUt-1, tOUt-2), Count Load value (Cnt Ld) and Display Intensity (d-LEU).

Programming any Security Code other than 0, requires this code to be entered at the CodE prompt in order to access Full Programming mode. Quick Programming mode, if enabled, is accessed before the CodE prompt appears.

USER INPUT FUNCTION	USER INPUT STATE	SECURITY CODE	MODE WHEN "PAR" KEY IS PRESSED	FULL PROGRAMMING MODE ACCESS
not ProLoc	———	0	Full Programming	Immediate Access
		1-99	Quick Programming	After Quick Programming with correct code entry at CodE prompt *
		100-999	CodE prompt	With correct code entry at CodE prompt *
ProLoc	Active	0	Programming Lock	No Access
		1-99	Quick Programming	No Access
		100-999	CodE prompt	With correct code entry at CodE prompt *
	Not Active	0-999	Full Programming	Immediate Access

** Entering Code 222 allows access regardless of security code.*

FACTORY SERVICE OPERATIONS

FCS → no / YES

Select **YES** to perform either of the Factory Service Operations shown below.

VIEW MODEL AND VERSION DISPLAY

CodE → 50

Entering Code 50 will display the model and version (x.x) of the meter. The display then returns to **CodE 00**. Press the **PAR** button to exit the module.

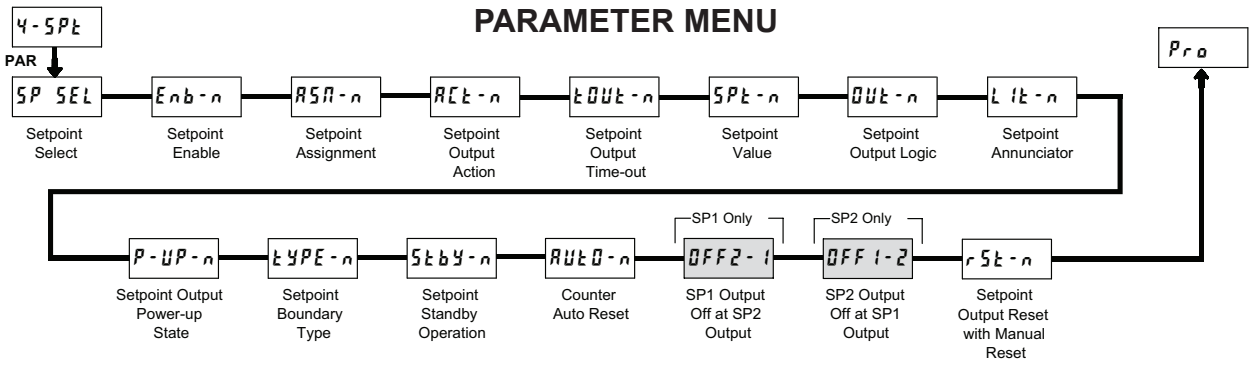
RESTORE FACTORY DEFAULT SETTINGS

CodE → 66

Entering Code 66 will overwrite all user settings with the factory default settings. The meter will display **rESEt** and then return to **CodE 00**. Press the **PAR** button to exit the module.

5.4 MODULE 4 - SETPOINT OUTPUT PARAMETERS (4-SPt)

PARAMETER MENU



Some Setpoint parameters will not appear depending on the Setpoint Assignment and Setpoint Output Action selected. The Setpoint Parameter Availability chart below illustrates this.

PARAMETER	DESCRIPTION	COUNTER ASSIGNMENT (A or B)*			RATE ASSIGNMENT		
		TIMED OUT t-Out	BOUNDARY bOUnd	LATCH LAtCH	TIMED OUT t-Out	BOUNDARY bOUnd	LATCH LAtCH
tOUt-n	Setpoint Output Time-out Value	Yes	No	No	Yes	No	No
SPt-n	Setpoint Value	Yes	Yes	Yes	Yes	Yes	Yes
Out-n	Setpoint Output Logic	Yes	Yes	Yes	Yes	Yes	Yes
Lit-n	Setpoint Annunciator	Yes	Yes	Yes	Yes	Yes	Yes
P-UP-n	Setpoint Output Power-up State	No	No	Yes	No	No	Yes
tYPE-n	Setpoint Boundary Type	No	Yes	No	Yes	Yes	Yes
StbY-n	Standby Operation (Low ActingOnly)	No	Yes	No	Yes	Yes	Yes
AUtO-n	Counter Auto Reset	Yes	No	Yes	No	No	No
OFF2-1	SP1 Output Off at SP2 (SP1 only)	Yes	No	Yes	No	No	No
OFF1-2	SP2 Output Off at SP1 (SP2 only)	Yes	No	Yes	No	No	No
rSt-n	Output Reset with Manual Reset	Yes	No	Yes	Yes	No	Yes

* BOUNDARY Setpoint Action not applicable for Counter B assignment.

SETPOINT SELECT

SP SEL → no

SP-1
SP-2

Select the Setpoint Output to be programmed, starting with Setpoint 1. The "n" in the following parameters reflects the chosen Setpoint number. After the selected setpoint is completely programmed, the display returns to **SP SEL**. Repeat steps for Setpoint 2 if both Setpoints are being used. Select **no** to exit the Setpoint programming module.

SETPOINT ENABLE

Enb-n → no

no / YES

Select **YES** to enable the chosen setpoint and access the setup parameters. If **no** is selected, the unit returns to **SP SEL** and the setpoint is disabled.

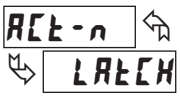
SETPOINT ASSIGNMENT

ASn-n → Cnt A

Cnt b
rAtE

Select the display to which the Setpoint is assigned.

SETPOINT OUTPUT ACTION



LAtCH
t-OUt
bOUnd

This parameter selects the action of the Setpoint output as described in the chart below. Boundary mode is not applicable for Counter B assignment.

SPT ACTION	DESCRIPTION	OUTPUT ACTIVATES	OUTPUT DEACTIVATES
LAtCH	Latched Output Mode	When Count = Setpoint	At Manual Reset (if rSt-n=YES)
t-OUt	Timed Output Mode	When Count = Setpoint	After Setpoint Output Time-Out
bOUnd	Boundary Mode (High Acting)	When Count ≥ Setpoint	When Count < Setpoint
	Boundary Mode (Low Acting)	When Count ≤ Setpoint	When Count > Setpoint

SETPOINT OUTPUT TIME-OUT

0.0 1 to 599.99 seconds

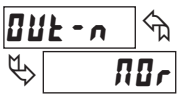
This parameter is only active if the Setpoint Action is set to timed output mode (t-OUt). Enter the value in seconds that the output will be active, once the Setpoint Value is reached.

SETPOINT VALUE

Count A: -99999 to 999999
Count B: 0 to 999999
Rate: 0 to 999999

Enter the desired Setpoint value. To enter a negative setpoint value, increment digit 6 to display a "-" sign (Counter A only).

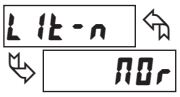
SETPOINT OUTPUT LOGIC



nOr rEU

Normal (nOr) turns the output "on" when activated and "off" when deactivated. Reverse (rEU) turns the output "off" when activated and "on" when deactivated.

SETPOINT ANNUNCIATOR



nOr rEU

Normal (nOr) displays the setpoint annunciator when the corresponding output is "on". Reverse (rEU) displays the setpoint annunciator when the output is "off".

SETPOINT OUTPUT POWER-UP STATE

OFF
On
SAVE

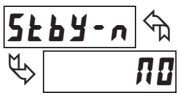
SAVE will restore the output to the same state it was at before the meter was powered down. On will activate the output at power up. OFF will deactivate the output at power up.

SETPOINT BOUNDARY TYPE

HI-ACt LO-ACt

High Acting Boundary Type activates the output when the assigned display value (ASn-n) equals or exceeds the Setpoint value. Low Acting activates the output when the assigned display value is less than or equal to the Setpoint.

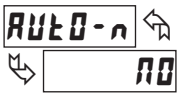
SETPOINT STANDBY OPERATION



no YES

This parameter only applies to Low Acting Boundary Type setpoints. Select YES to disable a Low Acting Setpoint at power-up, until the assigned display value crosses into the output "off" area. Once in the output "off" area, the Setpoint will then function per the description for Low Acting Boundary Type.

COUNTER AUTO RESET

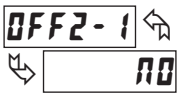


no 2Er-St CLd-St
2Er-En CLd-En

This parameter automatically resets the Setpoint Assigned Counter (A or B) each time the Setpoint value is reached. The automatic reset can occur at output start, or output end if the Setpoint Output Action is programmed for timed output mode. The Reset-to-Count Load selections ("CLd-") only apply to Counter A assignment. This reset may be different from the Counter A Reset Action selected in Module 1.

SELECTION	ACTION
no	No Auto Reset
2Er-St	Reset to Zero at the Start of output activation
CLd-St	Reset to Count Load value at the Start of output activation
2Er-En	Reset to Zero at the End of output activation (timed out only)
CLd-En	Reset to Count Load at the End of output activation (timed out only)

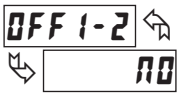
SETPOINT 1 OUTPUT OFF AT SETPOINT 2 (SP1 Only)



no
O2-Str
O2-End

This parameter will deactivate Setpoint 1 output at the Start or End of Setpoint 2 output (O1 off at O2). The "-End" setting only applies if Setpoint 2 Output Action is programmed for timed output.

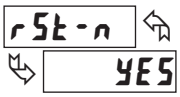
SETPOINT 2 OUTPUT OFF AT SETPOINT 1 (SP2 Only)



no
O1-Str
O1-End

This parameter will deactivate Setpoint 2 output at the Start or End of Setpoint 1 output (O2 off at O1). The "-End" setting only applies if Setpoint 1 Output Action is programmed for timed output.

SETPOINT OUTPUT RESET WITH MANUAL RESET

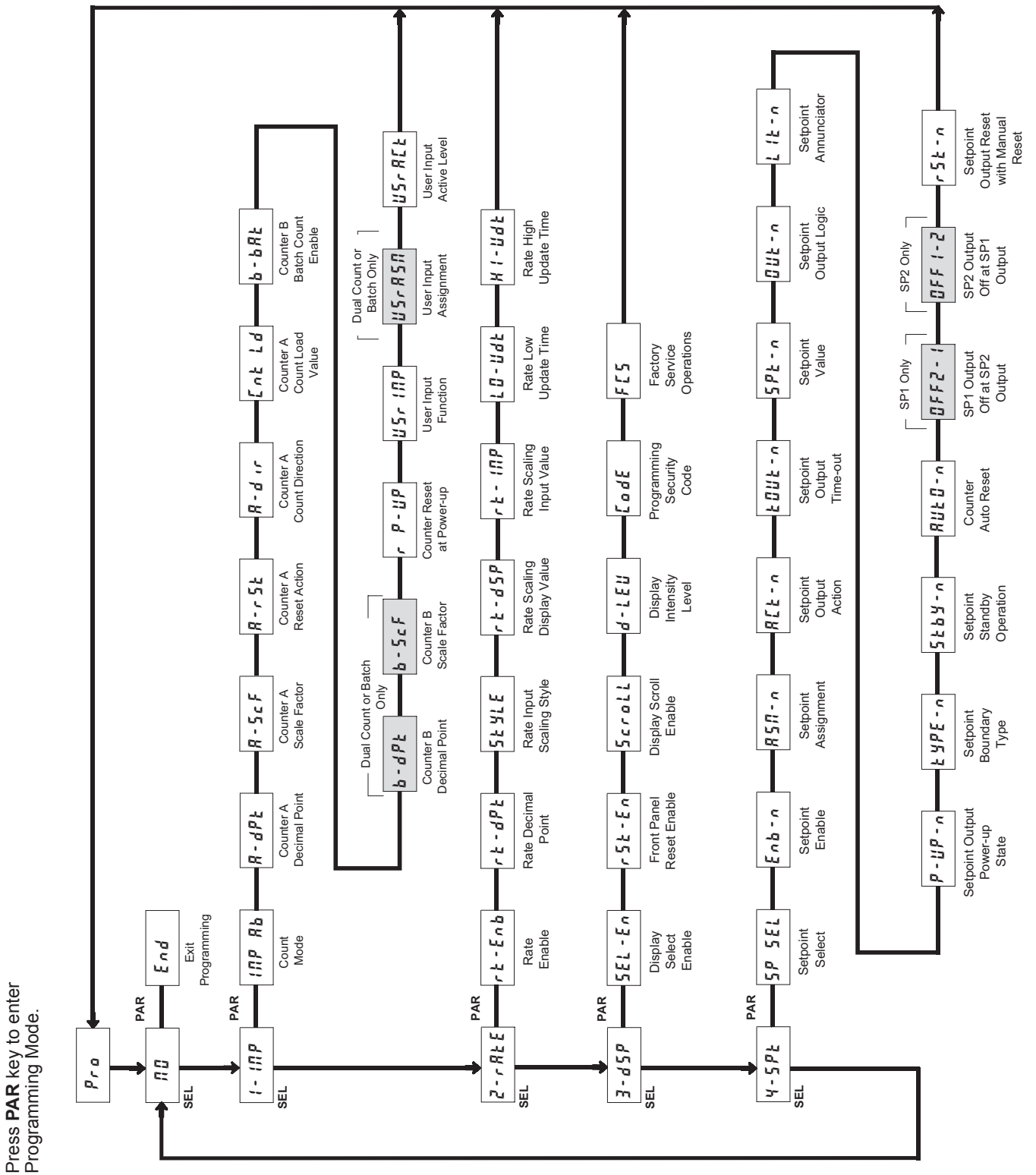


no YES

Selecting YES causes the Setpoint output to deactivate (reset) when the Setpoint Assigned Counter is reset. The counter reset can occur by the **RST** button, User Input or Counter Reset at Power-up.

This output reset will not occur when the Assigned Counter is reset by a Setpoint generated Counter Auto Reset.

PAXLCR PROGRAMMING QUICK OVERVIEW



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Bulletin No. PAXLT-X
Drawing No. LP0750
Effective 03/09

MODEL PAXLT - PAX LITE TEMPERATURE METER

- *5 DIGIT, 0.56" HIGH RED LED DISPLAY*
- *DISPLAYS °C OR °F WITH 1° OR 0.1° RESOLUTION*
- *BACKLIGHT OVERLAYS INCLUDED (°C AND °F)*
- *MAX AND MIN READING MEMORY*
- *TC COLD JUNCTION COMPENSATION (ON/OFF)*
- *PROGRAMMABLE TEMPERATURE OFFSET*
- *PROGRAMMABLE USER INPUT*
- *DUAL 5 AMP FORM C RELAYS*
- *UNIVERSALLY POWERED*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*
- *THERMOCOUPLE AND RTD INPUTS*
- *CONFORMS TO ITS-90 STANDARDS*

c UL US LISTED IND. CONT. EQ. 51EB

For Model No. PAXLT0U0 Only

GENERAL DESCRIPTION

The PAXLT is a versatile meter that accepts a variety of thermocouple and RTD inputs and provides a temperature display in Celsius or Fahrenheit. The readout conforms to ITS-90 standards, with 1° or 0.1° resolution. The 5-digit display has 0.56" high digits with adjustable intensity. Backlight overlay labels for °F and °C are included.

The meter features a Maximum and Minimum 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. Either value can be displayed if desired. The display can be toggled manually or automatically between the selected values.

Other features include thermocouple cold junction compensation, display offset and a programmable user input to perform a variety of meter control functions. Two setpoint outputs are provided, each with a Form C relay. Output modes and setup options are fully programmable to suit a variety of control requirements.

The PAXLT can be universally powered from a wide range of AC or DC voltage. The meter has been specifically designed for harsh industrial environments. With a NEMA 4X/IP65 sealed bezel and extensive testing to meet CE requirements, the meter provides a tough yet reliable application solution.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
PAXLT	TC/RTD Temperature Meter with Dual Relay Output	PAXLT000
	UL Listed TC/RTD Temperature Meter with Dual Relay Output	PAXLT0U0

SAFETY SUMMARY

All safety regulations, local codes and instructions that appear in this and corresponding 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 meter 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 meter

CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

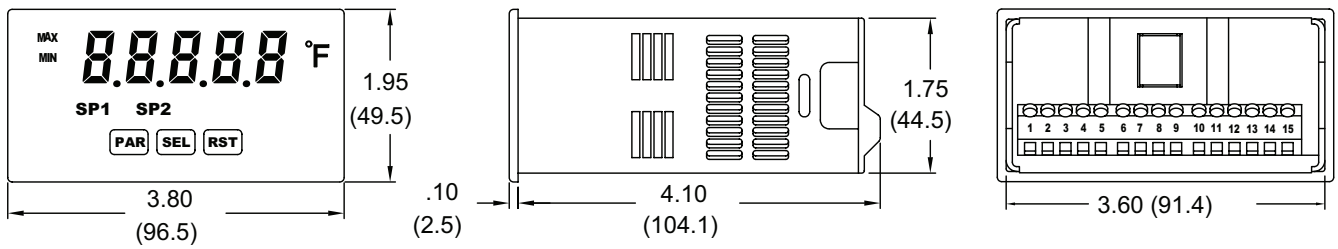
CAUTION: Risk of electric shock.

SPECIFICATIONS

1. **DISPLAY**: 5 digit, 0.56" (14.2 mm) intensity adjustable Red LED
2. **POWER REQUIREMENTS**:
   AC POWER: 50 to 250 VAC 50/60 Hz, 12 VA
   Isolation: 2300 Vrms for 1 min. to all inputs and outputs
   DC POWER: 21.6 to 250 VDC, 6 W
   DC Out: +24 VDC @ 100 mA if input voltage is greater than 50 VAC/VDC
   +24 VDC @ 50 mA if input voltage is less than 50 VDC
3. **READOUT:**
   Display Range: -19999 to 99999
   Scale: °F or °C
   Resolution: 1° or 0.1°
   Response Time: 500 msec min.
   Display Overrange/Underrange Indication: "....." / "-...."
   Input Overrange/Underrange Indication: OLOL / ULUL

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.



4. **THERMOCOUPLE INPUTS:**
Input Impedance: 20 MΩ
Max. Continuous Overvoltage: 30 VDC
Failed Sensor Indication: OPEN

TC TYPE	RANGE	ACCURACY @ 23°C ±°C *	ACCURACY @ 0 to 50°C ±°C *	WIRE COLOR	
				ANSI	BS 1843
T	-200 to 400°C -328 to 752°F	2.3	5.8	(+) blue (-) red	(+) white (-) blue
E	-200 to 871°C -328 to 1600°F	2.7	4.9	(+) purple (-) red	(+) brown (-) blue
J	-200 to 760°C -328 to 1400°F	1.9	4.3	(+) white (-) red	(+) yellow (-) blue
K	-200 to 1372°C -328 to 2502°F	2.3	5.8	(+) yellow (-) red	(+) brown (-) blue
R	-50 to 1768°C -58 to 3214°F	4.5	15.0	no standard	(+) white (-) blue
S	-50 to 1768°C -58 to 3214°F	4.5	15.0	no standard	(+) white (-) blue
B	200 to 1820°C 392 to 3308°F	9.1<540°C 4.5>540°C	42.6<540°C 15.0>540°C	no standard	no standard
N	-200 to 1300°C -328 to 2372°F	2.8	8.1	(+) orange (-) red	(+) orange (-) blue
C (W5/W26)	0 to 2315°C 32 to 4199°F	1.9	6.1	no standard	no standard
mV	-10.00 to 65.00	0.02 mV	0.08 mV	no standard	no standard

*After 20 min. warm-up. Accuracy is specified in two ways: Accuracy at 23°C and 15 to 75% RH environment; and Accuracy over a 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 cold junction tracking effects.

The specification includes the A/D conversion errors, linearization conformity, and thermocouple cold junction 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.

5. **RTD INPUTS**:
Type: 2, 3 or 4 wire
Excitation Current:
100 ohm range: 165 µA; 10 ohm range: 2.5 mA
Lead Resistance:
100 ohm range: 10 Ω/lead max.; 10 ohm range: 3 Ω/lead max.
Balanced Lead Resistance: Automatically compensated up to max per lead
Unbalanced Lead Resistance: Uncompensated
Max. Continuous Overvoltage: 30 VDC
Failed Sensor Indication: OPEN or Short

RTD TYPE	RANGE	ACCURACY* @ 23°C	ACCURACY* @0 to 50°C	STANDARD
100 ohm Pt alpha = .00385	-200 to 850°C	0.4°C	1.6°C	IEC 751
100 ohm Pt alpha = .00392	-200 to 850°C	0.4°C	1.6°C	no official standard
120 ohm Nickel alpha = .00672	-80 to 260°C	0.2°C	0.5°C	no official standard
10 ohm Copper alpha = .00427	-100 to 260°C	0.4°C	0.9°C	no official standard

*After 20 min. warm-up. Accuracy is specified in two ways: Accuracy at 23°C and 15 to 75% RH environment; and Accuracy over a 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 effects.

The specification includes the A/D conversion errors and linearization conformity. 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.

6. **USER INPUT**: Programmable input
Software selectable for active logic state: active low, pull-up (24.7 KΩ to +5 VDC) or active high, pull-down resistor (20 KΩ).
Trigger levels: V_{IL} = 1.0 V max; V_{IH} = 2.4 V min; V_{MAX} = 28 VDC
Response Time: 10 msec typ.; 50 msec debounce (activation and release)

7. **MEMORY**: Nonvolatile E^2PROM retains all programming parameters and max/min values when power is removed.

8. **OUTPUTS**:
Type: Dual Form C contacts
Isolation to Sensor & User Input Commons: 1400 Vrms for 1 min. Working Voltage: 150 Vrms
Contact Rating: 5 amps @ 120/240 VAC or 28 VDC (resistive load), 1/8 H.P. @ 120 VAC (inductive load)
Life Expectancy: 100 K cycles min. at full load rating. External RC snubber extends relay life for operation with inductive loads.
Response Time: Turn On or Off: 4 msec max.

9. **ENVIRONMENTAL CONDITIONS**:
Operating temperature: 0 to 50 °C
Storage temperature: -40 to 70 °C
Operating and storage humidity: 0 to 85% max. RH (non-condensing)
Vibration According to IEC 68-2-6: Operational 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g's.
Shock According to IEC 68-2-27: Operational 30 g's (10 g's relay), 11 msec in 3 directions.
Altitude: Up to 2,000 meters

10. **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.

11. **CONSTRUCTION**: This unit is rated for NEMA 4X/IP65 outdoor use. IP20 Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.

12. **CERTIFICATIONS AND COMPLIANCES**:
SAFETY
Type 4X Enclosure rating (Face only), UL50
IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
IP65 Enclosure rating (Face only), IEC 529
IP20 Enclosure rating (Rear of unit), IEC 529
For Model No. PAXLT0U0 Only: UL Listed, File # E137808, UL508, CSA C22.2 No. 14-M95
LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
ELECTROMAGNETIC COMPATIBILITY
Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion B 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion B 2 kV power 1 kV signal
Surge	EN 61000-4-5	Criterion A 1 kV L-L, 2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion B 3 V/rms

Emissions:

Emissions	EN 55011	Class A

Notes:
1. Criterion A: Normal operation within specified limits.
2. Criterion B: Temporary loss of performance from which the unit self-recovers.

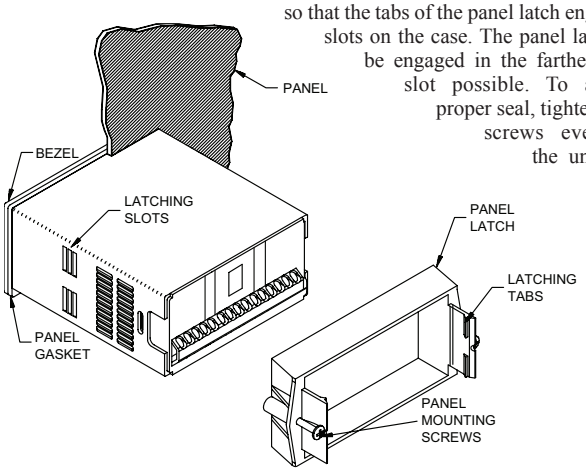
13. **WEIGHT**: 10.4 oz. (295 g)

1.0 Installing the Meter

Installation

The PAX Lite 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.



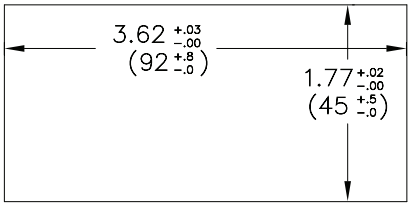
Installation Environment

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.

PANEL CUT-OUT

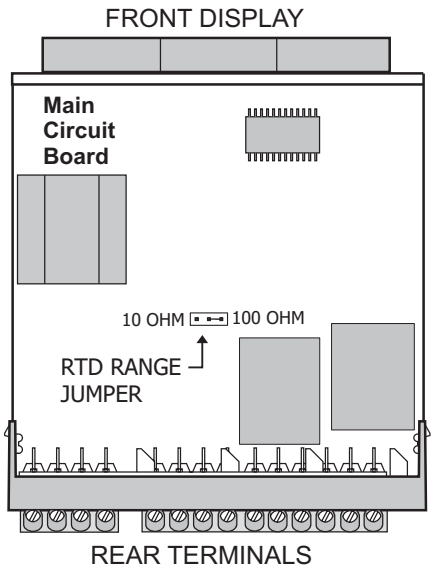


2.0 Setting the Jumper

INPUT RANGE JUMPER (RTD ONLY)

This jumper is used to select the proper input range for the RTD probe being used (10 ohm or 100 ohm). For thermocouple inputs, this jumper has no effect and can be left in either position.

To access the jumper, 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 on the other side latch.



3.0 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 the 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.)

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, source or coupling method into the meter may be different for various installations. The meter becomes more immune to EMI with fewer I/O connections. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The meter should be properly connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application.

Listed below are the recommended methods of connecting the shield, in order of their effectiveness.

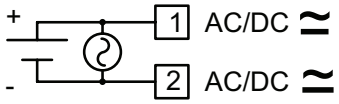
a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
c. Connect the shield to common of the meter and leave the other end of the shield unconnected and insulated from earth ground.

3. 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 ran 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.
4. Signal or Control cables within an enclosure should be routed as far as possible from contactors, control relays, transformers, and other noisy components.
5. 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 # 28B2029-0A0
   Line Filters for input power cables:
   Schaffner # FN610-1/07 (RLC# LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom # 1 VR3
   Note: Reference manufacturer's instructions when installing a line filter.
6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
7. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI.
   Snubber: RLC# SNUB0000.

3.1 POWER WIRING

Power

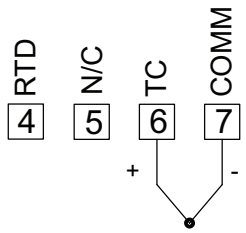
Terminal 1: VAC/DC +
Terminal 2: VAC/DC -



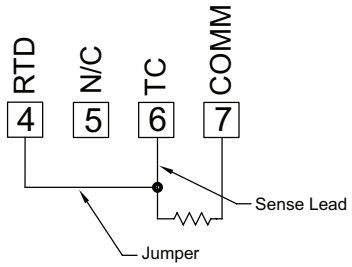
3.2 INPUT SIGNAL WIRING

CAUTION: Sensor input common (Terminal 7) is NOT isolated from user common (Terminal 9). 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 and user common must be at protective earth ground potential. If not, hazardous live voltage may be present at the user input and user common terminals. Appropriate considerations must then be given to the potential of the sensor input common and the user common with respect to earth ground.

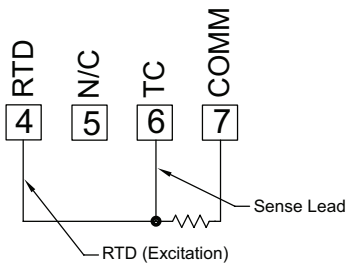
THERMOCOUPLE



2-WIRE RTD



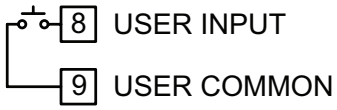
3-WIRE RTD



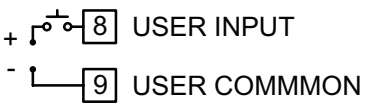
3.3 USER INPUT WIRING

Terminal 8: User Input
Terminal 9: User Common

Current Sinking (Active Low Logic)

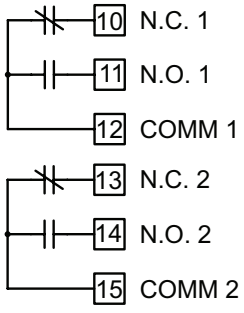


Current Sourcing (Active High Logic)



3.4 SETPOINT (OUTPUT) WIRING

Terminal 10: NC 1
Terminal 11: NO 1
Terminal 12: Relay 1 Common
Terminal 13: NC 2
Terminal 14: NO 2
Terminal 15: Relay 2 Common



4.0 Reviewing the Front Buttons and Display

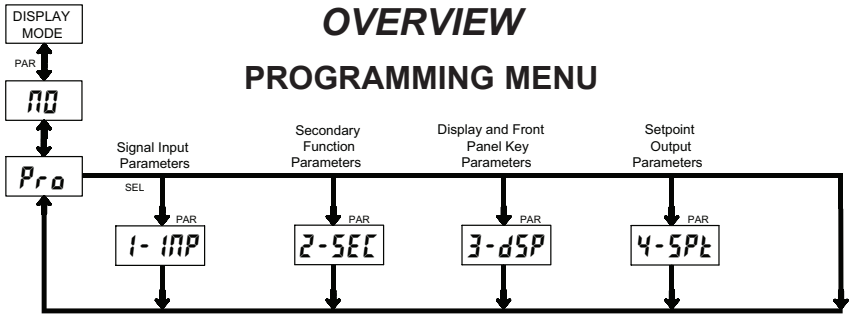
BUTTON	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
PAR	Access Programming Mode	Store selected parameter and index to next parameter
SEL	Index display through enabled values	Advance through selection list/select digit position in parameter value
RST	Resets values (min/max) or outputs	Increment selected digit of parameter value

OPERATING MODE DISPLAY DESIGNATORS

MAX - Maximum display capture value
MIN - Minimum display capture value
"SP1" - Indicates setpoint 1 output activated.
"SP2" - Indicates setpoint 2 output activated.

Pressing the **SEL** button toggles the meter through the selected displays. If display scroll is enabled, the display will toggle automatically every four seconds between the enabled display values.

5.0 Programming the Meter



OVERVIEW

PROGRAMMING MENU

PROGRAMMING MODE ENTRY (PAR BUTTON)

It is recommended all programming changes be made off line, or before installation. The meter normally operates in the Display Mode. No parameters can be programmed in this mode. The Programming Mode is entered by pressing the **PAR** button. If it is not accessible, then it is locked by either a security code or a hardware lock.

MODULE ENTRY (SEL & PAR BUTTONS)

The Programming Menu is organized into four modules. These modules group together parameters that are related in function. The display will alternate between **Pro** and the present module. The **SEL** button is used to select the desired module. The displayed module is entered by pressing the **PAR** button.

MODULE MENU (PAR BUTTON)

Each module has a separate module menu (which is shown at the start of each module discussion). The **PAR** button 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 **Pro nO**. Programming may continue by accessing additional modules.

SELECTION / VALUE ENTRY

For each parameter, the display alternates between the present parameter and the selections/value for that parameter. The **SEL** and **RST** buttons are used to move through the selections/values for that parameter. Pressing the **PAR** button, stores and activates the displayed selection/value. This also advances the meter to the next parameter.

For numeric values, the value is displayed with one digit flashing (initially the right most digit). Pressing the **RST** button increments the digit by one or the user can hold the **RST** button and the digit will automatically scroll. The **SEL** button will select the next digit to the left. Pressing the **PAR** button will enter the value and move to the next parameter.

PROGRAMMING MODE EXIT (PAR BUTTON)

The Programming Mode is exited by pressing the **PAR** button with **Pro nO** displayed. This will commit any stored parameter changes to memory and return the meter to the Display Mode. (If power loss occurs before returning to the Display Mode, verify recent parameter changes.)

PROGRAMMING TIPS

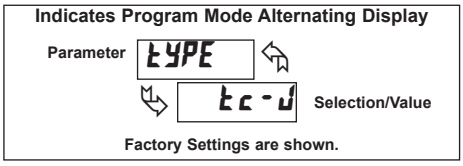
It is recommended to start with Module 1 and proceed through each module in sequence. When programming is complete, it is recommended to record the parameter programming and lock out parameter programming with the user input or programming security code.

FACTORY SETTINGS

Factory Settings may be completely restored in Module 2. This is useful when encountering programming problems.

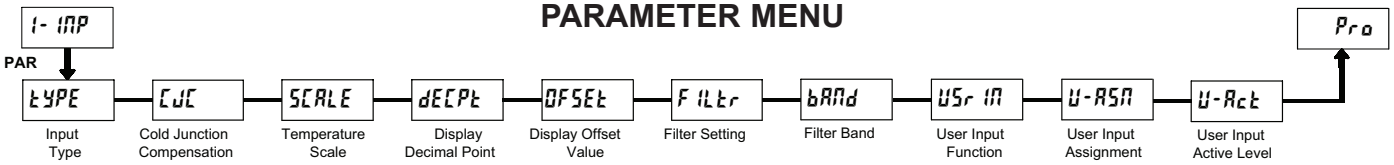
ALTERNATING SELECTION DISPLAY

In the explanation of the modules, the following dual display with arrows will appear. This is used to illustrate the display alternating between the parameter on top and the parameter's Factory Setting on the bottom. In most cases, selections and values for the parameter will be listed on the right.

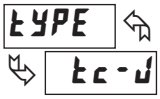


5.1 MODULE 1 - INPUT SETUP PARAMETERS (1- INP)

PARAMETER MENU



INPUT TYPE

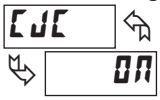


SELECTION	INPUT TYPE	SELECTION	INPUT TYPE
tC-t	T	tC-n	N
tC-E	E	tC-C	C
tC-J	J	uOLt	mV
tC-K	K	Pt385	Platinum 385 100 Ω
tC-r	R	Pt392	Platinum 392 100 Ω
tC-S	S	n.672	Nickel 672 100 Ω
tC-b	B	Cu427	Copper 427 10 Ω

Select the thermocouple or RTD type used for the application. For RTDs, position the Input Range Jumper to match the RTD type (10Ω or 100Ω).

Selecting uOLt displays a millivolt signal readout with 10 µV resolution.

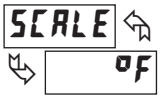
COLD JUNCTION COMPENSATION



On OFF

This parameter enables or disables internal cold junction compensation for thermocouples. For most applications, cold junction compensation should be enabled (On). This parameter only appears for thermocouple input selections.

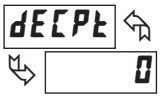
TEMPERATURE SCALE



°F °C

Select the desired temperature scale. This selection applies for the Input, MAX and MIN displays. This parameter does not appear when mV or RTD resistance display is enabled.

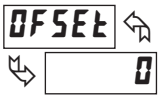
DISPLAY DECIMAL POINT



0 0.0

Set the decimal point for the desired display resolution. This selection applies for the Input, MAX and MIN displays, and also affects the Setpoint and Display Offset values. For mV or RTD resistance displays, the decimal point location is fixed and this parameter does not appear.

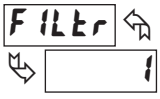
DISPLAY OFFSET VALUE



-19999 to 99999

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.

FILTER SETTING

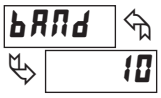


0 1 2 3

If the displayed temperature is difficult to read due to small process variations or noise, increased levels of filtering will help to stabilize the display. Software filtering effectively combines a fraction of the current input reading with a fraction of the previous displayed reading to generate the new display.

Filter values represent no filtering (0), up to heavy filtering (3). A value of 1 for the filter uses 1/4 of the new input and 3/4 of the previous display to generate the new display. A filter value of 2 uses 1/8 new and 7/8 previous. A filter value of 3 uses 1/16 new and 15/16 previous.

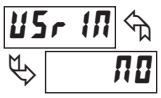
FILTER BAND



0 to 199 display units

The filter will adapt to variations in the input signal. When the variation exceeds the input filter band value, the 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, independent of the Display Decimal Point position. A band setting of '0' keeps the filter permanently engaged at the filter level selected above.

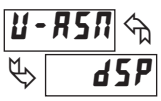
USER INPUT FUNCTION



DISPLAY	MODE	DESCRIPTION
no	No Function	User Input disabled.
P-Loc	Program Mode Lock-out	See Programming Mode Access chart (Module 3).
rESEt	Reset *	Reset the assigned value(s) to the current input value.
d-HLd	Display Hold	Holds the assigned display, but all other meter functions continue as long as activated (maintained action).
d-SEL	Display Select *	Advance once for each activation.
d-LEU	Display Intensity Level *	Increase intensity one level for each activation.
rSt-1	Setpoint 1 Reset *	Reset setpoint 1 output.
rSt-2	Setpoint 2 Reset *	Reset setpoint 2 output.
rSt 12	Setpoint 1 and 2 Reset *	Reset both setpoint 1 and 2 outputs.

** Indicates Edge Triggered function. All others are Level Active functions.*

USER INPUT ASSIGNMENT

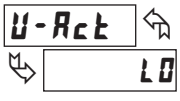


H1 H1-LO

LO dSP

Select the value(s) to which the User Input Function is assigned. The User Input Assignment only applies if a selection of reset or display hold is selected in the User Input Function menu.

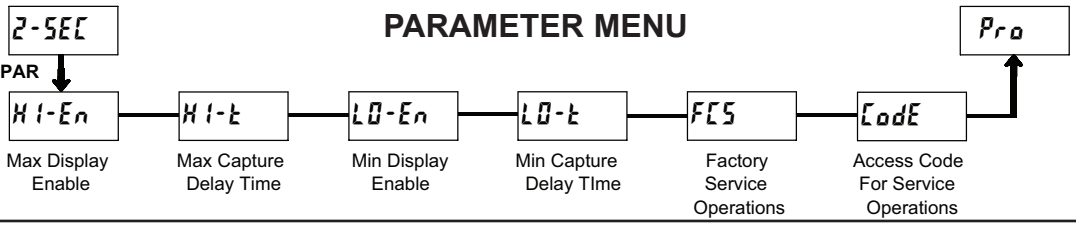
USER INPUT ACTIVE LEVEL



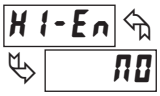
H1 LO

Select whether the user input is configured as active low or active high.

5.2 MODULE 2 - SECONDARY FUNCTION PARAMETERS (2-SEC)



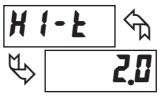
MAX DISPLAY ENABLE



no yes

Enables the Maximum Display Capture capability.

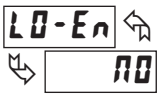
MAX CAPTURE DELAY TIME



0.0 to 999.9 sec.

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.

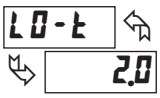
MIN DISPLAY ENABLE



no yes

Enables the Minimum Display Capture capability.

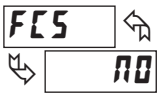
MIN CAPTURE DELAY TIME



0.0 to 999.9 sec.

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.

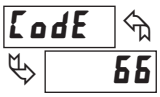
FACTORY SERVICE OPERATIONS



no yes

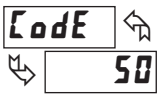
Select yes to perform any of the Factory Service Operations shown below.

RESTORE FACTORY DEFAULT SETTINGS



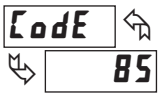
Entering Code 66 will overwrite all user settings with the factory settings. The meter will display rESEt and then return to CodE 00. Press the **PAR** button to exit the module

VIEW MODEL AND VERSION DISPLAY



Entering Code 50 will display the version (x.x) of the meter. The display then returns to CodE 00. Press the **PAR** button to exit the module.

TOGGLE RTD INPUT DISPLAY MODE

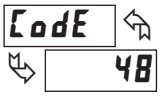


Entering Code 85 toggles the selected RTD input display mode between a temperature or resistance readout. The resistance readout is useful for diagnostic purposes before and after calibration, or to display the measured resistance of a connected RTD probe.

For RTD type Cu427 (Input Range Jumper in 10Ω position), resistance is displayed in 0.000 ohms resolution. For all other RTD types (100Ω position), resistance is displayed in 0.00 ohms resolution.

Upon entering Code 85, the meter displays either dSP-t or dSP-r to indicate temperature or resistance readout selected. The display then returns to CodE 00. Press the **PAR** button to exit the module.

CALIBRATION



The PAXLT uses stored calibration values to provide accurate temperature measurements. Over time, the electrical characteristics of the components inside the meter could slowly change, with the result being that the stored calibration values may no longer accurately define the input circuit. For most applications, recalibration every 1 to 2 years should be sufficient.

Calibration for thermocouple inputs involves a voltage calibration and a cold junction calibration. It is recommended that both calibrations be performed. The voltage calibration must precede cold junction calibration.

Calibration of the meter should only be performed by persons experienced in calibrating electronic equipment. Allow a minimum 30 minute warm up before performing any calibration procedures. The following procedures should be performed at an ambient temperature of 15 to 35°C (59 to 95°F).

CAUTION: The accuracy of the calibration equipment will directly affect the accuracy of the meter.

10 OHM RTD Range Calibration

1. Set the Input Range Jumper to 10 ohm position.
2. With the display at CodE 48, press the **PAR** key. Unit displays CAL no.
3. Press **SEL** to select 10 ohm range. Display reads CAL r10.
4. Press **PAR**. Display reads 0.0r.
5. Apply a direct short to terminals RTD (4), TC (6) and COMM (7) using a three wire link. Press **PAR**. Display reads CALC for about 10 seconds.
6. When the display reads 15.0r, apply a precision resistance of 15 ohms (with an accuracy of 0.01% or better) to terminals RTD, TC and COMM using a three wire link. Press **PAR**. Display reads CALC for about 10 seconds.
7. When display reads CAL no, press **PAR** twice to exit calibration and return to the normal display mode.

100 OHM RTD Range Calibration

1. Set the Input Range Jumper to 100 ohm position.
2. With the display at CodE 48, press the **PAR** key. Unit displays CAL no.
3. Press **SEL** twice to select 100 ohm range. Display reads CAL r100.
4. Press **PAR**. Display reads 0.0r.
5. Apply a direct short to terminals RTD (4), TC (6) and COMM (7) using a three wire link. Press **PAR**. Display reads CALC for about 10 seconds.
6. When the display reads 300.0r, apply a precision resistance of 300 ohms (with an accuracy of 0.01% or better) to terminals RTD, TC and COMM using a three wire link. Press **PAR**. Display reads CALC for about 10 seconds.
7. When display reads CAL no, press **PAR** twice to exit calibration and return to the normal display mode.

THERMOCOUPLE Voltage Calibration

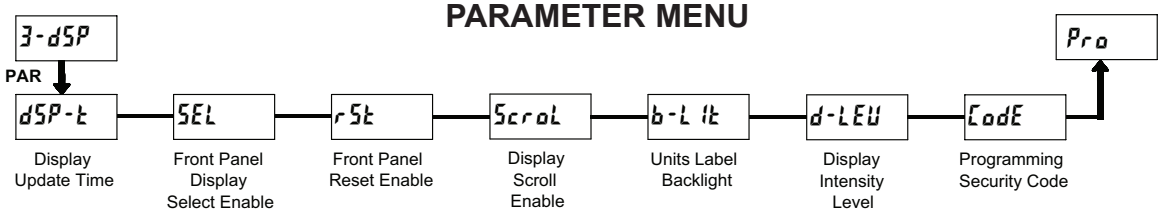
1. Connect a precision DC voltage source with an accuracy of 0.01% or better to the TC and COMM terminals. Set the voltage source to zero.
2. With the display at CodE 48, press the **PAR** key. Unit displays CAL no.
3. Press **SEL** until the display reads CAL tc to select thermocouple input.
4. Press **PAR**. Display reads 0.0u.
5. With the voltage source set to zero, press **PAR**. Display reads CALC for about 6 seconds.
6. When the display reads 60.0u, set the voltage source output to 60.000 mV. Press **PAR**. Display reads CALC for about 6 seconds.
7. When display reads CAL no, press **PAR** twice to exit calibration and return to the normal display mode. Proceed to Cold Junction Calibration.

THERMOCOUPLE Cold Junction Calibration

1. The ambient temperature must be between 20°C and 30°C.
2. Connect a thermocouple (types T, E, J, K or N only) with an accuracy of 1°C or better to the meter.
3. Enter programming mode and verify the following settings in Module 1:
   tYPE = thermocouple type connected to the meter
   CJC = on; SCALE = °C; dECPt = 0.0; OFSEt = 0.0
4. 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 of known temperature could be used in place of the thermometer.)
5. Compare the unit display with the reference temperature indicator (or calibration bath). If a difference of more than +/- 1.0°C exists, note the difference (CJ Error) and continue with cold junction calibration.
   CJ Error = Reference Temperature - Unit Display
6. Enter programming mode and proceed through Module 2 to the Service Access Code. Select CodE 48 and press **PAR**. Unit displays CAL no. Press **RST** to select CJC.
7. Press **PAR**. Display reads CJC followed by the current cold junction value. Calculate a new cold junction value as follows:
   New cold junction = Current cold junction + CJ Error (noted above)
8. Press **PAR** and set the display to the new cold junction value. Press **PAR** to enter the new value. Display reads CALC for 6 seconds and returns to CAL no.
9. Press **PAR** twice to exit calibration and return to the normal display mode. Verify the input reading is correct. If not, repeat steps 5 through 9.

5.3 MODULE 3 - DISPLAY AND FRONT PANEL KEY PARAMETERS (3-dSP)

PARAMETER MENU



DISPLAY UPDATE TIME

dSP-t / 1 — 0.5 1 2 seconds

This parameter sets the display update time in seconds.

FRONT PANEL DISPLAY SELECT ENABLE (SEL)

SEL / YES — no YES

The YES selection allows the **SEL** key to toggle through the enabled displays.

FRONT PANEL RESET ENABLE (RST)

rSt / dSP — no LO dSP HI HI-LO

This selection allows the **RST** button to reset the selected value(s).

DISPLAY SCROLL ENABLE

ScroL / no — no YES

The YES selection allows the display to automatically scroll through the enabled displays. The scroll rate is every 4 seconds. This parameter only appears when the MAX or MIN displays are enabled.

UNITS LABEL BACKLIGHT

b-L it / OFF — on OFF

The PAXLT includes two units overlay labels (°C and °F) which can be installed into the meter's bezel display assembly. The backlight for the units label is activated by this parameter.

DISPLAY INTENSITY LEVEL

d-LEV / 3 — 1 to 5

Enter the desired Display Intensity Level (1-5). The display will actively dim or brighten as levels are changed.

PROGRAMMING SECURITY CODE

CodE / 000 — 0 to 999

The Security Code determines the programming mode and the accessibility of programming parameters. This code can be used along with the Program Mode Lock-out (P-Loc) in the User Input Function parameter (Module 1).

Two programming modes are available. Full Programming mode allows all parameters to be viewed and modified. Quick Programming mode permits only user selected values to be modified, but allows direct access to these values without having to enter Full Programming mode.

Entering a Security Code from 1-99 enables Quick Programming mode, and displays a sublist to select which values appear in the Quick Programming menu. Values set to YES in the sublist are accessible in Quick Programming. These values include the Setpoints (SP-1, SP-2) and Display Intensity (d-LEV).

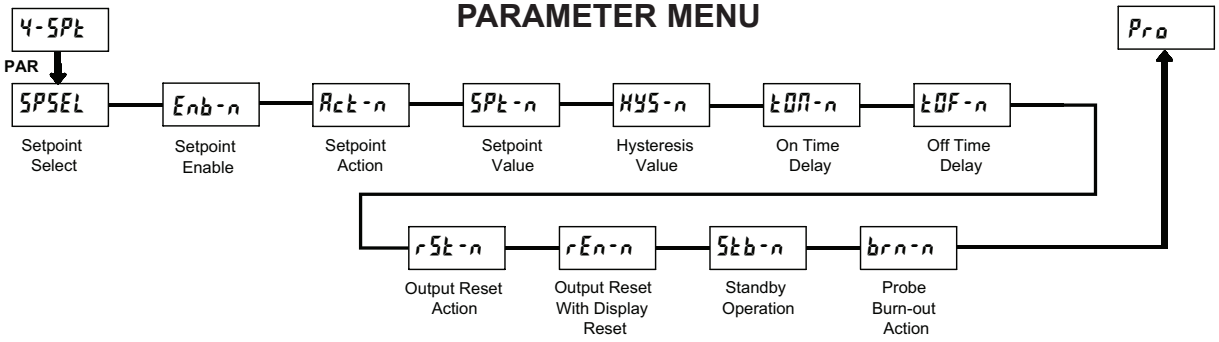
Programming any Security Code other than 0, requires this code to be entered at the CodE prompt in order to access Full Programming mode. Quick Programming mode, if enabled, is accessed before the CodE prompt appears.

USER INPUT FUNCTION	USER INPUT STATE	SECURITY CODE	MODE WHEN "PAR" BUTTON IS PRESSED	FULL PROGRAMMING MODE ACCESS
not P-Loc	———	0	Full Programming	Immediate Access
		1-99	Quick Programming	After Quick Programming with correct code entry at CodE prompt *
		100-999	CodE prompt	With correct code entry at CodE prompt *
P-Loc	Active	0	Programming Lock	No Access
		1-99	Quick Programming	No Access
		100-999	CodE prompt	With correct code entry at CodE prompt *
	Not Active	0-999	Full Programming	Immediate Access

** Entering Code 222 allows access regardless of security code.*

5.4 MODULE 4 - SETPOINT OUTPUT PARAMETERS (4-SPt)

PARAMETER MENU



SETPOINT SELECT

SPSEL → nO
SP-1
SP-2

Select the Setpoint Output to be programmed, starting with Setpoint 1. The "n" in the following parameters reflects the chosen Setpoint number. After the selected setpoint is completely programmed, the display returns to SPSEL. Repeat steps for Setpoint 2 if both Setpoints are being used. Select nO to exit the Setpoint programming module.

SETPOINT ENABLE

Enb-n → nO YES

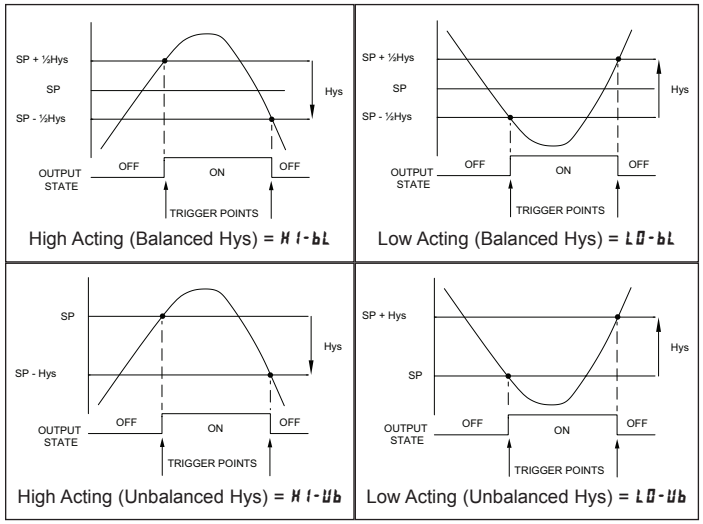
Select YES to enable Setpoint n and access the setup parameters. If nO is selected, the unit returns to SPSEL and Setpoint n is disabled.

SETPOINT ACTION

Act-n → HI-bL LO-bL HI-Ub LO-Ub

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

- HI-bL = High Acting, with balanced hysteresis
- LO-bL = Low Acting, with balanced hysteresis
- HI-Ub = High Acting, with unbalanced hysteresis
- LO-Ub = Low Acting, with unbalanced hysteresis



SETPOINT VALUE

SPt-n → 00100

-19999 to 99999

Enter the desired setpoint value. The decimal point position for the setpoint and hysteresis values follow the selection set in Module 1.

HYSTERESIS VALUE

HYS-n → 2

1 to 59999

Enter desired hysteresis value. See Setpoint Output Figures for visual explanation of how setpoint output actions (balanced and unbalanced) 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

tON-n → 0.0

0.0 to 599.9 Sec

Enter the time value in seconds that the output is delayed from turning on after the trigger point is reached. A value of 0.0 allows the meter to update the output status per the response time listed in the Specifications.

OFF TIME DELAY

tOF-n → 0.0

0.0 to 599.9 Sec

Enter the time value in seconds that the output is delayed from turning off after the trigger point is reached. A value of 0.0 allows the meter to update the output status per the response time listed in the Specifications.

OUTPUT RESET ACTION

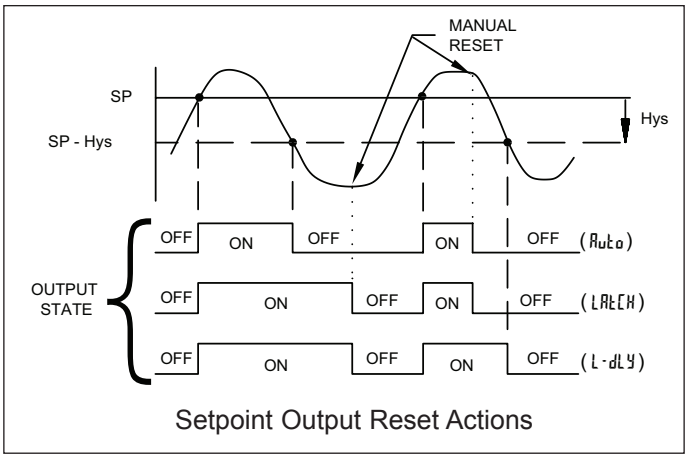
rSt-n → Auto LAtCH L-dLY

Enter the reset action of the output. See figure for details.

Auto = Automatic action; This action allows the output to automatically reset off at the trigger points per the Setpoint Action shown in Setpoint Output Figures. The "on" output may be manually reset (off) immediately by the front panel **RST** button or user input.The output remains off until the trigger point is crossed again.

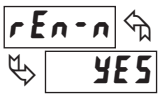
LAtCH = Latch with immediate reset action; This action latches the output on at the trigger point per the Setpoint Action shown in Setpoint Output Figures. Latch means that the output can only be turned off by the front panel **RST** button or user input manual reset, or meter power cycle. When the user input or **RST** button is activated (momentary action), the corresponding "on" 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.)

L-dLY = Latch with delay reset action; This action latches the output on at the trigger point per the Setpoint Action shown in Setpoint Output Figures. Latch means that the output can only be turned off by the front panel **RST** button or user input manual reset, or meter power cycle. When the user input or **RST** button is activated (momentary action), the meter delays the event until the corresponding "on" output crosses the trigger off point. (Previously latched outputs are off if power up Display Value is lower than setpoint value. During a power cycle, the meter erases a previous **L-dLY** reset if it is not activated at power up.)



Setpoint Output Reset Actions

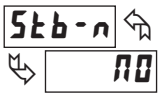
OUTPUT RESET WITH DISPLAY RESET



This parameter enables the **RST** button or user input to reset the output when the display is reset.

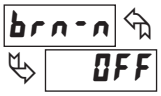
Note: For this parameter to operate, the **RST** button or User Input being used must be set to **dSP** and the Input value must be displayed. If these conditions are not met, the output will not reset.

STANDBY OPERATION



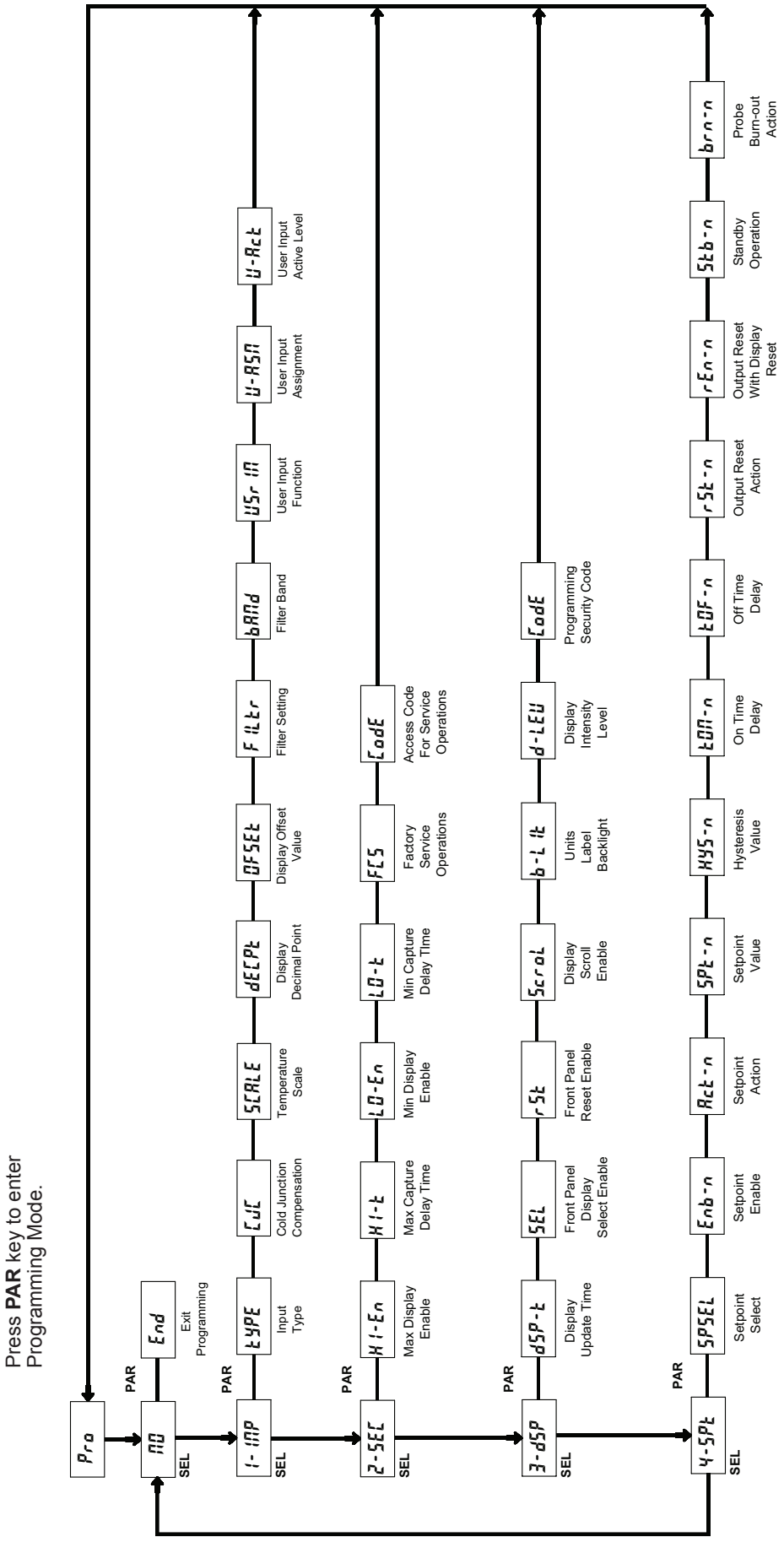
When **YES**, the output is disabled (after a power up) until the trigger point is crossed. Once the output is on, the output operates normally per the Setpoint Action and Output Reset Action.

PROBE BURN-OUT ACTION



Enter the probe burn-out action. In the event of a temperature probe failure (TC open; RTD open or short), the output can be programmed to be on or off.

PAXLT PROGRAMMING QUICK OVERVIEW



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