MODEL PAXH - 1/8 DIN AC TRUE RMS VOLTAGE AND CURRENT METER

- *FOUR VOLTAGE RANGES (300 VAC Max)*
- *FIVE CURRENT RANGES (5A Max)*
- *ACCEPTS AC OR DC COUPLED INPUTS*
- *THREE WAY ISOLATION: POWER, INPUT AND OUTPUTS*
- *OPTIONAL CUSTOM UNITS OVERLAY W/ BACKLIGHT*
- *MAX/MIN READING MEMORY*
- *PROGRAMMABLE FUNCTION KEYS / USER INPUTS*
- *FOUR SETPOINT ALARM OUTPUTS (W/Plug-in card)*
- *COMMUNICATION AND BUS CAPABILITIES (W/Plug-in card)*
- *ANALOG OUTPUT SIGNAL (W/Plug-in card)*
- *PC SOFTWARE AVAILABLE FOR METER CONFIGURATION*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*
- *9-DIGIT TOTALIZER (INTEGRATOR) WITH BATCHING*
- *EASY STEP BY STEP INSTRUCTIONS*

D

GENERAL DESCRIPTION

The PAXH (PAX AC True RMS Voltage and Current Meter) offers many features and performance capabilities to suit a wide range of industrial applications. The meter employs advanced technology for stable, drift-free readout, while incorporating features that provide flexibility now and in the future with plug-in option cards. The plug-in card options allow the opportunity to configure the meter for present applications, while providing easy upgrades for future needs.

The PAXH meter has four AC voltage input ranges (300 VAC max) and five AC current ranges (5 Amp max). The readout is scalable for applications using external shunts and current transformers. The input signal can be either AC coupled (rejecting the DC component of the signal) or DC coupled (measures both the AC and DC components of the signal).

Unlike many conventional average responding meters, the PAXH is a true RMS meter suited for the readout of both conventional sine waveforms, as well as distorted voltage and current waveforms. Its wide signal bandwidth and high Crest Factor capability allow the PAXH to accurately indicate waveforms such as pulse trains, ripple voltage, and chopped SCR heater waveforms, etc. Competitive average responding meters are frequently calibrated to read out the equivalent RMS value of a sinewave. However, distorted waveforms with Crest Factors greater than 2 or waveforms with DC components may lead to significant errors in these types of readouts.

Plug-in cards also facilitate bus communications. These include RS232, RS485 and DeviceNet™. Readout values and setpoint alarm values can be controlled through the bus. Additionally, the meter has features that allow a remote computer to directly control the outputs of the meter. With a communication card installed, it is possible to configure the meter using a Windows based program. The configuration data can be saved to a file for later recall.

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

- High and low absolute, high and low deviation and band acting
- Balanced or unbalanced hysteresis
- On and off delay timers
- Auto reset or latching modes
- Reverse phase output and/or panel indicator
- Selection of alternate list of setpoint values

A linear DC output signal is available as a Plug-in card. The card provides either 20 mA or 10 V signals. The output can be scaled independent of the input.

The features of the linear output cards are:

- Output tracks either input, totalizer, max or min readings
- Programmable output update times

Once the meter has been initially configured, the parameter list may be locked out from further modification in its entirety or only the setpoint values can be made accessible.

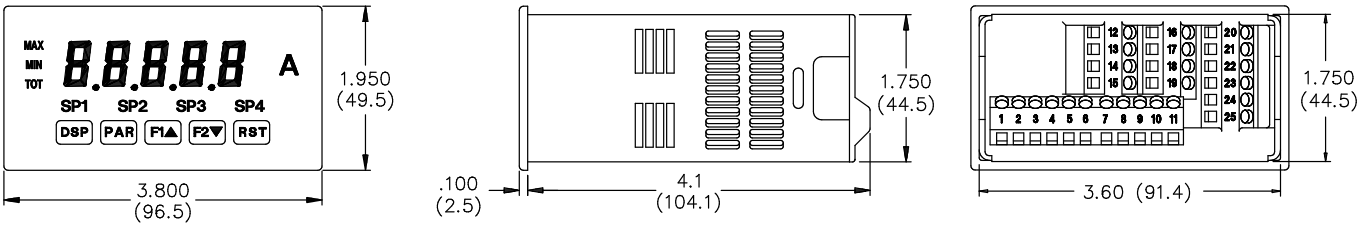
The meter has been specifically designed for harsh industrial environments. With NEMA4 X/IP65 sealed bezel and extensive testing of noise effects to CE requirements, the meter provides a tough yet reliable application solution.

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

CAUTION: Risk of electric shock.

DIMENSIONS "In inches (mm)"

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1" (53.4) H x 5.5" (140) W.



SAFETY SUMMARY

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

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

SPECIFICATIONS

1. **DISPLAY**: 5 digit, 0.56" red LED, (-19999 to 99999)
2. **POWER**:
   AC Power: 85 to 250 VAC, 50/60 Hz, 15 VA
   Isolation: 2300 Vrms for 1 min. to all inputs and outputs.
3. **ANNUNCIATORS**:
   MAX - maximum readout selected
   MIN - minimum readout selected
   TOT - totalizer readout selected, flashes when total overflows
   SP1 - setpoint alarm 1 is active
   SP2 - setpoint alarm 2 is active
   SP3 - setpoint alarm 3 is active
   SP4 - setpoint alarm 4 is active
   Units Label - optional units label backlight
4. **KEYPAD**: 3 programmable function keys, 5 keys total
5. **A/D CONVERTER**: 16 bit resolution ***
6. **UPDATE RATES**:
   A/D conversion rate: 20 readings/sec.
   Step response: 1 sec. max. to within 99% of final readout value (digital filter disabled)
   A step is any change of input value.
   Display update rate: 1 to 20 updates/sec.
   If the update rate is faster than step response, then the same value may be refreshed to the display.
   Setpoint output on/off delay time: 0 to 3275 sec.
   Analog output update rate: 0 to 10 sec
   Max./Min. capture delay time: 0 to 3275 sec.
7. **INPUT RANGES**:
   Isolation To Option Card Commons and User Input Commons: 125 Vrms
   Isolation To AC Power Terminals: 250 Vrms

Input Range	Accuracy*	Impedance (60 Hz)	Max Continuous Overload	Max DC Blocking	Resolution
200 mV	0.1% of reading +0.4 mV	686 Kohm	30 V	±10 V	0.01 mV
2 V	0.1% of reading +2 mV	686 Kohm	30 V	±50 V	0.1 mV
20 V	0.1% of reading +20 mV	686 Kohm	300 V	±300 V	1 mV
300 V	0.2% of reading +0.3 V	686 Kohm	300 V	±300 V***	0.1 V
200 µA	0.1% of reading +0.4 µA	1.11 Kohm	15 mA	±15 mA	0.01 µA
2 mA	0.1% of reading +2 µA	111 ohm	50 mA	±50 mA	0.1 µA
20 mA	0.1% of reading +20 µA	11.1 ohm	150 mA	±150 mA	1 µA
200 mA	0.1% of reading +0.2 mA	1.1 ohm	500 mA	±500 mA	10 µA
5 A	0.5% of reading +5 mA	0.02 ohm	7 A**	±7 A***	1 mA

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

** Non-repetitive surge rating: 15 A for 5 seconds

*** Inputs are direct coupled to the input divider and shunts. Input signals with high DC component levels may reduce the usable range.

8. **RANGE OVERLOAD RESPONSE**:
   Display flashes [OLOL] at approximately 120% above range except for 2 V, 300 V and 5 A which is 110%
9. **MAX CREST FACTOR (Vp/VRMS)**: 5 @ Full Scale Input
10. **INPUT COUPLING:** AC or AC and DC
11. **INPUT CAPACITANCE:** 10 pF
12. **COMMON MODE VOLTAGE:** 125 VAC working
13. **COMMON MODE REJECTION:** (DC to 60 Hz) 100 db
14. **USER INPUTS**: Three programmable user inputs
    Max. Continuous Input: 30 VDC
    Isolation To Sensor Input Common: 1400 Vrms for 1 min.
    Working Voltage: 125 V
    Response Time : 50 msec. max.
    Logic State: Jumper selectable for sink/source logic

INPUT STATE	SINKING INPUTS 22 KΩ pull-up to +5 V	SOURCING INPUTS 22 KΩ pull-down
Active	V_{IN} < 0.7 VDC	V_{IN} > 2.5 VDC
Inactive	V_{IN} > 2.5 VDC	V_{IN} < 0.7 VDC

15. **TOTALIZER**:
    Function:
    Time Base: second, minute, hour, or day
    Batch: Can accumulate (gate) input display from a user input
    Time Accuracy: 0.01% typical
    Decimal Point: 0 to 0.0000
    Scale Factor: 0.001 to 65.000
    Low Signal Cut-out: -19,999 to 99,999
    Total: 9 digits, display alternates between high order and low order readouts
16. **CUSTOM LINEARIZATION**:
    Data Point Pairs: Selectable from 2 to 16
    Display Range: -19,999 to 99,999
    Decimal Point: 0 to 0.0000
17. **SERIAL COMMUNICATIONS CARD**:
    Type: RS485 or RS232
    Isolation To Sensor Input Common: 1400 Vrms for 1 min.
    Working Voltage: 125 V
    Isolation To User Input Common: 500 Vrms for 1 min.
    Working Voltage: 50 V
    Data: 7/8 bits
    Baud: 300 to 19,200
    Parity: No, odd or even
    Bus Address: Selectable 0 to 99, Max. 32 meters per line (RS485)
    Transmit Delay: Selectable for 2 to 50 msec or 50 to 100 msec (RS485)
18. **DEVICENET™ CARD**
    Compatibility: Group 2 Server Only, not UCMM capable
    Baud Rates: 125Kbaud, 250 Kbaud, and 500 Kbaud
    Bus Interface: Phillips 82C250 or equivalent with MIS wiring protection per DeviceNet™ Volume I Section 10.2.2.
    Node Isolation: Bus powered, isolated node
    Host Isolation: 500 Vrms for 1 minute (50 V working) between DeviceNet™ and meter input common.
19. **ANALOG OUTPUT CARD**:
    Types: 0 to 20 mA, 4 to 20 mA or 0 to 10 VDC
    Isolation to Sensor Input Common: 1400 Vrms for 1 min.
    Working Voltage: 125 V
    Isolation to User input Common: 500 Vrms for 1 min.
    Working Voltage: 50 V
    Accuracy: 0.17% of FS (18 to 28°C); 0.4% of FS (0 to 50°C)
    Resolution: 1/3500
    Compliance: 10 VDC: 10 KΩ load min., 20 mA: 500 Ω load max.
    Update time: 1 sec. max. to within 99% of final output value (digital filter disabled)
20. **SETPOINT OUTPUT CARD**: Four types of field installable plug-in cards
    Dual Relay Card:
    Type: Two FORM-C relays
    Isolation To Sensor Input Common: 1400 Vrms for 1 min.
    Working Voltage: 125 V
    Isolation To User Input Common: 500 Vrms for 1 min.
    Working Voltage: 50 V
    Contact Rating:
    One Relay Energized: 5 amps @ 120/240 VAC or 28 VDC (resistive load), 1/8 HP @120 VAC, inductive load
    Total current with both relays energized not to exceed 5 amps
    Life Expectancy: 100 K cycles min. at full load rating. External RC snubber extends relay life for operation with inductive loads
    Response Time: 1 sec. max. to within 99% of final readout value (digital filter disabled)

Quad Relay Card:
Type: Four FORM-A relays
Isolation To Sensor Input Common: 1400 Vrms for 1 min.
Working Voltage: 125 V
Isolation To User Input Common: 500 Vrms for 1 min.
Working Voltage: 50 V
Contact Rating:
One Relay Energized: 3 amps @ 250 VAC or 30 VDC (resistive load), 1/10 HP @120 VAC, inductive load
Total current with all four relays energized not to exceed 4 amps
Life Expectancy: 100K cycles min. at full load rating. External RC snubber extends relay life for operation with inductive loads
Response Time: 1 sec. max. to within 99% of final readout value (digital filter disabled)

Quad Sinking Open Collector Card:
Type: Four isolated sinking NPN transistors.
Isolation To Sensor Input Common: 1400 Vrms for 1 min.
Working Voltage: 125 V
Isolation To User Input Common: 500 Vrms for 1 min.
Working Voltage: 50 V
Rating: 100 mA max @ V_{SAT} = 0.7 V max. V_{MAX} = 30 V
Response Time: 1 sec. max. to within 99% of final readout value (digital filter disabled)

Quad Sourcing Open Collector Card:
Type: Four isolated sourcing PNP transistors.
Isolation To Sensor Input Common: 1400 Vrms for 1 min.
Working Voltage: 125 V
Isolation To User Input Common: 500 Vrms for 1 min.
Working Voltage: 50 V
Rating: Internal supply: 24 VDC ± 10% , 30 mA max. total
External supply: 30 VDC max., 100 mA max. each output
Response Time: 1 sec. max. to within 99% of final readout value (digital filter disabled)

21. **MEMORY**: Nonvolatile E^2Prom retains all programmable parameters and display values.

22. **ENVIRONMENTAL CONDITIONS**:
Operating Temperature Range: 0 to 50°C (0 to 45°C with all three plug-in cards installed)
Storage Temperature Range: -40 to 60°C
Operating and Storage Humidity: 0 to 85% max. non-condensing
Altitude: Up to 2000 meters

23. **CERTIFICATIONS AND COMPLIANCES**:
Electromagnetic Compatibility

Immunity to EN 50082-2		
electrostatic discharge	EN 61000-4-2	level 3; 8 Kv air
electromagnetic RF fields	EN 61000-4-3	level 3; 10 V/m [1] 80 MHz - 1 GHz
fast transients (burst)	EN 61000-4-4	level 4; 2 Kv I/O level 3; 2 Kv power
RF conducted interference	EN 61000-4-6	level 3; 10 V/rms 150 KHz - 80 MHz
simulation of cordless telephones	ENV 50204	level 3; 10 V/m 900 MHz ±5 MHz 200 Hz, 50% duty cycle
Emissions to EN 50081-2		
RF interference	EN 55011	enclosure class A power mains class A

Notes:
1. Self-recoverable loss of performance during EMI disturbance at 10 V/m: Measurement error less than 2% of full scale.
For operation without loss of performance:
Mount unit in a metal enclosure (Buckeye SM7013-0 or equivalent)
Route power and I/O cables in metal conduit connected to earth ground.

24. **CONNECTIONS**: High compression cage-clamp terminal block
Wire Strip Length: 0.3" (7.5 mm)
Wire Gauge Capacity: One 14 AWG (2.55 mm) solid, two 18 AWG (1.02 mm), or four 20 AWG (0.61 mm)

25. **CONSTRUCTION**:This unit is rated for NEMA 4X/IP65 indoor 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.

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

ORDERING INFORMATION

TYPE	MODEL NO.	DESCRIPTION	PART NUMBERS
Meter	**PAXH**	AC True RMS Voltage and Current Meter, Upgradeable	PAXH0000
Optional Plug-In Cards	**PAXCDS**	Dual Setpoint Relay Output Card	PAXCDS10
		Quad Setpoint Relay Output Card	PAXCDS20
		Quad Setpoint Sinking Open Collector Output Card	PAXCDS30
		Quad Setpoint Sourcing Open Collector Output Card	PAXCDS40
	PAXCDC	RS485 Serial Communications Card	PAXCDC10
		RS232 Serial Communications Card	PAXCDC20
		DeviceNET Communications Card	PAXCDC30
	PAXCDL	Analog Output Card	PAXCDL10
Accessories	**PAXLBK**	Units Label Kit Accessory	PAXLBK10
	SFPAX	PC Configuration Software for Windows 3.x and 95 (3.5" disk)	SFPAX
	CT	External 50:5 AC Current Transformer	CT005050
	CT	External 200:5 AC Current Transformer	CT020050

OPTIONAL PLUG-IN CARDS AND ACCESSORIES

The PAX series meters can be fitted with up to three optional plug-in cards. However, only one card from each function type can be installed at a time. The function types include Setpoint Alarms (PAXCDS), Communications (PAXCDC), and Analog Output (PAXCDL). The cards can be installed initially or at a later date. Each optional plug-in card is shipped with installation and programming instructions.

SETPOINT ALARMS PLUG-IN CARDS (PAXCDS)

The PAX series has four setpoint alarm output plug-in cards. Only one of these cards can be installed at a time. (Logic state of the outputs can be reversed in the programming.) These plug-in cards include

Dual relay, FORM-C, Normally open & closed
Quad relay, FORM-A, Normally open only
Isolated quad sinking NPN open collector
Isolated quad sourcing PNP open collector

SERIAL RS485 PLUG-IN CARD (PAXCDC)

An RS485 communication port can be installed with the serial RS485 plug-in card. The RS485 option allows the connection of up to 32 meters or other devices (such as a printer, PLC, HMI, or a host computer) on a single pair of wires not longer than 4,000 feet. The address number of each meter on the line can be programmed from 0-99. Data from the meter(s) can be interrogated or changed and alarm outputs can be reset by sending the proper command string. The function keys and user inputs can be programmed to send data to a printer or other device via serial communications.

SERIAL RS232 PLUG-IN CARD (PAXCDC)

An RS232 communication port can be installed with the serial RS232 plug-in card. The RS232 is intended to allow only 2 devices, not more than 50 feet apart, to communicate to each other (such as a printer, PLC, HMI, or host computer). Data from the meter(s) can be interrogated or changed and alarm outputs can be reset by sending the proper command string. The function keys and user inputs can be programmed to send data to a printer or device via serial communication.

DEVICENET PLUG-IN CARD (PAXCDC)

A DeviceNet communication port can be installed with the DeviceNet plug-in card. DeviceNet is a high level bus protocol based upon the CAN specifications. The protocol allows the integration of devices of different types and manufacturers within a common communication framework.

ANALOG OUTPUT PLUG-IN CARD (PAXCDL)

Either a 0(4)-20 mA or 0-10 V retransmitted linear DC output is available from the analog output plug-in card. The programmable output low and high scaling can be based on the input max, min, or total display value. Reverse acting output is possible by reversing the scaling point positions.

UNITS LABEL KIT (PAXLBK)

Each meter has a backlighted units indicator that can be customized using the Units Label Kit. The backlight is controlled in the programming.

PC SOFTWARE (SFPAX)

The SFPAX is a Windows based program that allows configuring of the PAX meter from a PC. Using SFPAX makes it easier to program the PAX meter and allows saving the PAX program in a PC file for future use. On-line help is available within the software. A PAX serial plug-in card is required to program the meter using the software.

EXTERNAL CURRENT TRANSFORMERS (CT)

To measure AC current signals greater than 5 Amp AC, a current transformer must be used. The CT005050 current transformer converts a maximum 50 Amp AC signal to 5 Amp AC. The CT020050 current transformer converts a maximum 200 Amp AC signal to 5 Amp AC. The meter can then be scaled to indicate in the actual primary current amperage.

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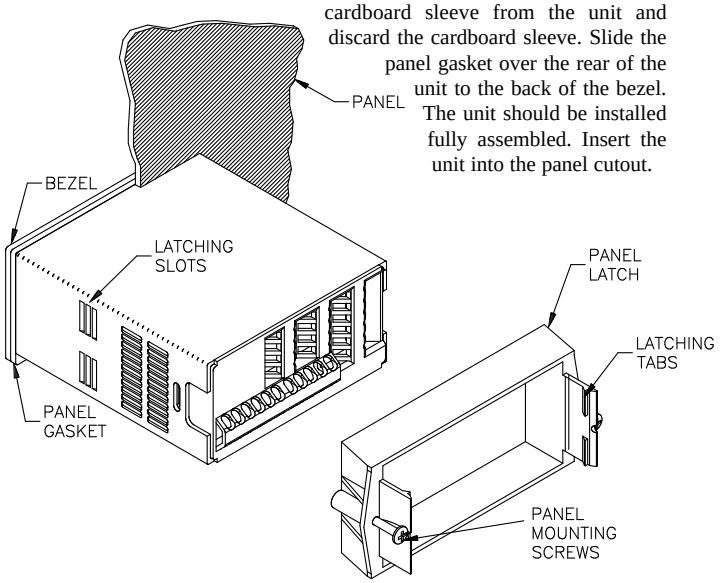
1.0 INSTALLING THE METER

Installation

The PAX meets NEMA 4X/IP65 requirements for indoor use 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 and cardboard sleeve from the unit and discard the cardboard sleeve. 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.

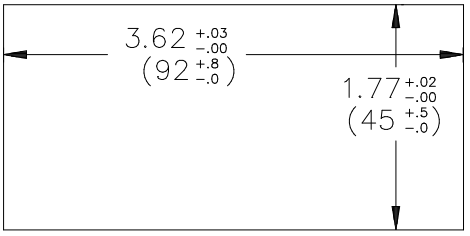
Installation Environment

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



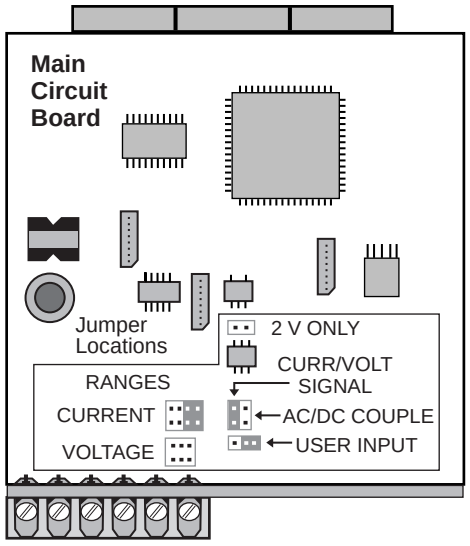
2.0 SETTING THE JUMPERS

The meter has four jumpers that must be set prior to applying power. The four jumpers are Input Range, Signal, Couple, and User Input Logic. In some applications, not all of the jumpers are needed. (From the factory, two jumpers are parked in the current range.) Only those jumpers needed for configuration should be left on the board. Remove unnecessary jumpers from the board and store in a safe place for future use. Needlenose pliers may be needed for moving jumpers. The Jumper Selections Figure is an enlargement of the jumper area shown below.

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

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

FRONT DISPLAY



REAR TERMINALS

Input Range Jumper

For most inputs, one jumper is used to select the input range. However, for the following ranges, set the jumpers as stated:

5A: Remove all jumpers from the input range.

2V: Install one jumper in ".2/2V" position and one jumper in "2V only".

All Other Ranges: One jumper in the selected range only.

Do not have a jumper in both the voltage and current ranges at the same time. Avoid placing a jumper across two ranges.

Signal Jumper

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

Couple Jumper

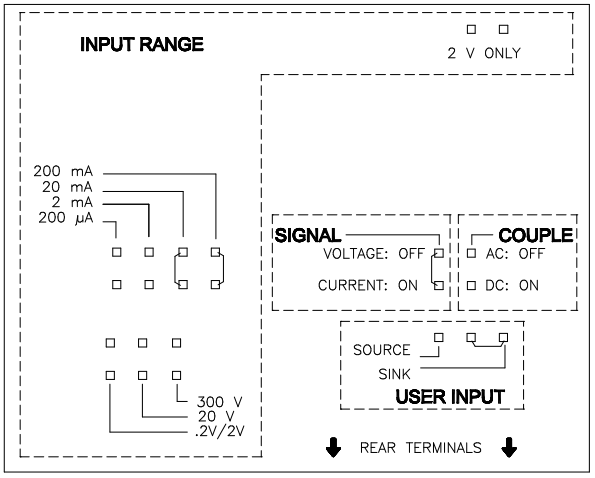
One jumper is used for AC / DC couple. If AC couple is used, then the jumper is removed from the board. If DC couple is used, then the jumper is installed.

User Input Logic Jumper

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

JUMPER SELECTIONS

The ⌒ indicates factory setting.



See PAXH Quick Start for selection examples:

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

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

EMC INSTALLATION GUIDELINES

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

1. The meter should be mounted in a metal enclosure, which is properly connected to protective earth.
2. With use of the lower input ranges or signal sources with high source impedance, the use of shielded cable may be necessary. This helps to guard against stray AC pick-up. Attach the shield to the input common of the meter. Line voltage monitoring and 5A CT applications do not usually require shielding.
3. To minimize potential noise problems, power the meter from the same power branch, or at least the same phase voltage as that of the signal source.
4. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.
5. Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
6. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:

   Ferrite Suppression Cores for signal and control cables:

   Fair-Rite # 0443167251 (RLC #FCOR0000)

TDK # ZCAT3035-1330A
Steward #28B2029-0A0

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

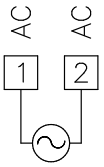
Note: Reference manufacturer's instructions when installing a line filter.

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

AC Power

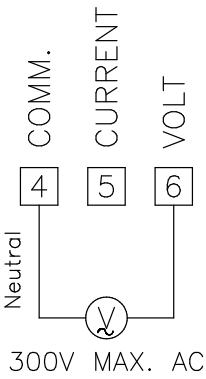
Terminal 1: VAC
Terminal 2: VAC



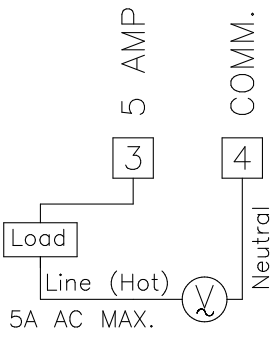
3.2 INPUT SIGNAL WIRING

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

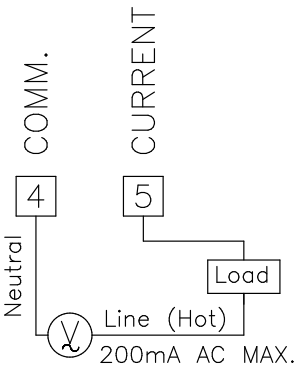
Voltage Signal



Current Signal (Amps)



Current Signal (Milliamps)



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

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

***CAUTION**:*

1. *Where possible, connect the neutral side of the signal (including current shunts) to the input common of the meter. If the input signal is sourced from an active circuit, connect the lower impedance (usually circuit common) to the input signal common of the meter.*
2. *For phase-to-phase line monitoring where a neutral does not exist, or for any other signal input in which the isolation voltage rating is exceeded, an isolating potential transformer must be used to isolate the input voltage from earth. With the transformer, the input common of the meter can then be earth referenced for safety.*
3. *When measuring line currents, the use of a current transformer is recommended. If using external current shunts, insert the shunt in the neutral return line. If the isolation voltage rating is exceeded, the use of an isolating current transformer is necessary.*

D

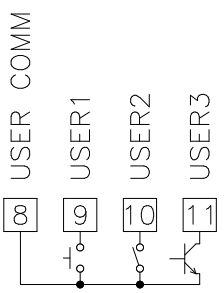
3.3 USER INPUT WIRING

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

Sinking Logic

Terminals 9-11 } Connect external switching device between
Terminal 8 } appropriate User Input terminal and User Comm.

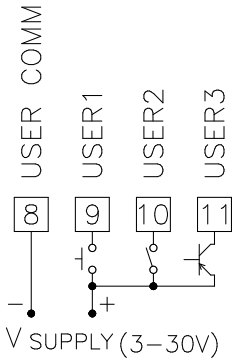
In this logic, the user inputs of the meter are internally pulled up to +5 V with 22 K resistance. The input is active when it is pulled low (<0 .7 V).



Sourcing Logic

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

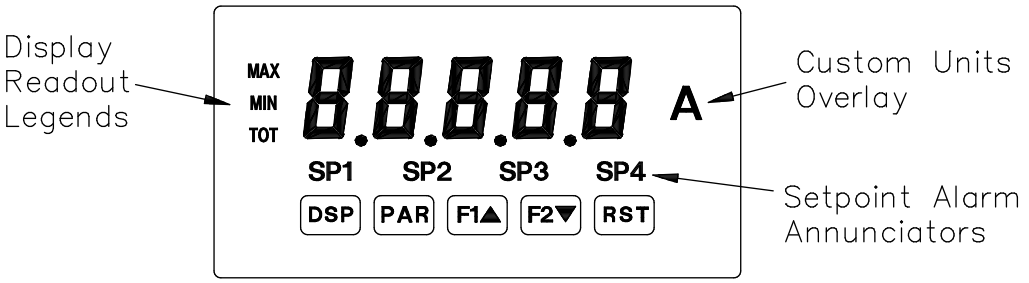
In this logic, the user inputs of the meter are internally pulled down with 22 K resistance. The input is active when a voltage greater than 2.5 VDC is applied.



3.4 SETPOINT (ALARMS) WIRING
3.5 SERIAL COMMUNICATION WIRING
3.6 ANALOG OUTPUT WIRING

See appropriate plug-in card bulletin for details.

4.0 REVIEWING THE FRONT BUTTONS AND DISPLAY

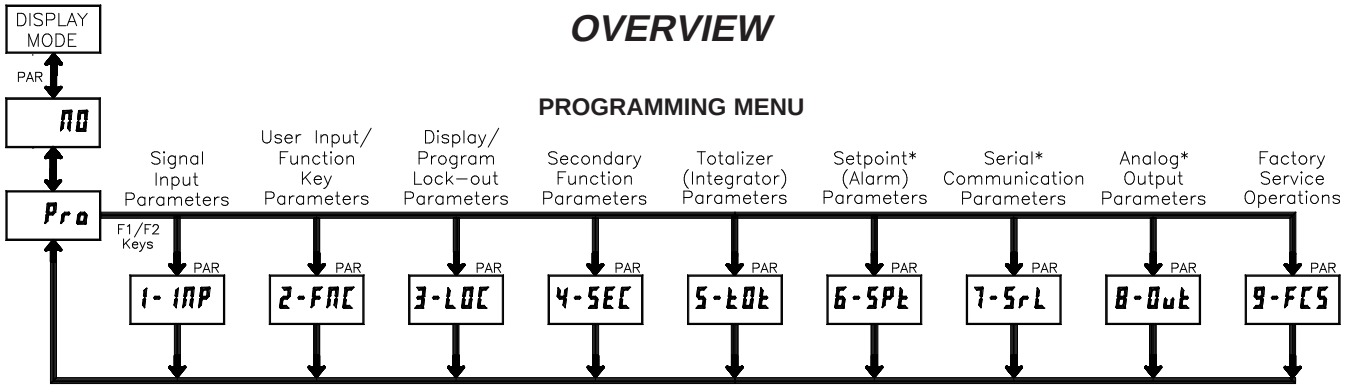


KEY	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
DSP	Index display through max/min/total/input readouts	Quit programming and return to display mode
PAR	Access parameter list	Store selected parameter and index to next parameter
F1▲	Function key 1; hold for 3 seconds for Second Function 1	Increment selected parameter value
F2▼	Function key 2; hold for 3 seconds for Second Function 2	Decrement selected parameter value
RST	Reset (Function key)*	Hold with F1▲, F2▼ to scroll value by x1000

* Factory setting for the F1, F2, and RST keys is NO mode.

5.0 PROGRAMMING THE METER

OVERVIEW



* Only accessible with appropriate plug–in card.

PROGRAMMING MODE ENTRY (PAR KEY)

The Display Mode is the normal operating mode of the meter. The Programming Mode is entered by pressing the **PAR** key. If it is not accessible, then it is locked by either a security code or hardware lock.

PARAMETER MODULE ENTRY (ARROW & PAR KEYS)

The Programming Menu is organized into modules. These modules group together parameters which are related in function. The display alternates between **PRO** and the current parameter module. The arrow keys (**F1** and **F2**) are used to select the desired parameter module. The displayed module is entered by pressing the **PAR** key.

PARAMETER MENU MOVEMENT (PAR KEY)

Each parameter module has a separate module menu (which is shown at the start of each parameter module discussion). The **PAR** key is pressed to advance to a particular parameter without changing the programming of preceding parameters. After completing a module, the display will return to **Pro no**. Programming may continue by accessing additional parameter modules.

SELECTION/VALUE ENTRY (ARROW & PAR KEYS)

In the parameter module, the display will alternate between the current parameter and the selections/values for that parameter. The arrow keys (**F1** and **F2**) are used to move through the selections/values for that parameter. By pressing the **PAR** key, the displayed selection is stored and activated. This will also advance the meter to the next parameter.

PROGRAMMING MODE EXIT (DSP KEY or at Pro no PAR KEY)

The Programming Mode is exited by pressing the **DSP** key (from anywhere in the Programming Mode) or the **PAR** key (with **Pro no** displayed). This will commit any stored parameter changes to memory and return the meter to the Display Mode. If a parameter was just changed, the **PAR** key should be pressed to store the change before pressing the **DSP** key.

PROGRAMMING TIPS

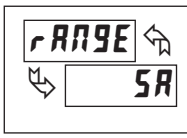
It is recommended to start with Parameter Module 1. If lost or confused while programming, press the **DSP** key and start over. When programming is complete, it is recommended to record the parameter programming on the Parameter User Chart and lock-out parameter programming with a user input or lock-out code.

FACTORY SETTINGS

Factory Settings may be completely restored in Parameter Module 9. This is a good starting point when experiencing programming problems. Some parameters can be left at their factory settings without affecting basic start-up. These parameters are identified throughout the Module explanations. Try the Factory Settings for these parameters unless a specific selection or value is known. Factory settings may have a different decimal point location than what is listed if Input Range is changed from 5A.

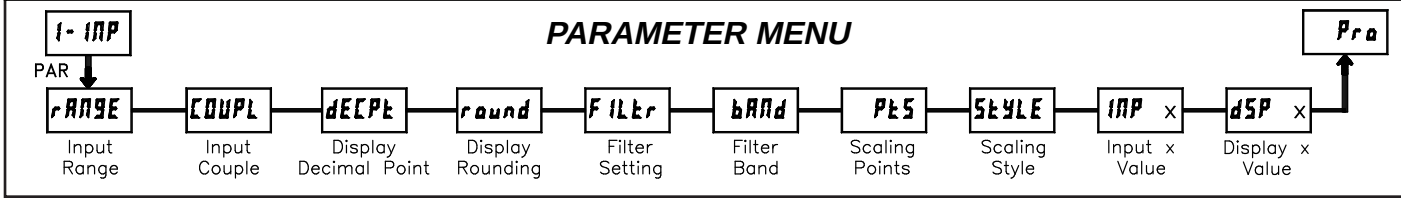
ALTERNATING SELECTION DISPLAY

In the explanation of the parameter modules, the following dual display with arrows will appear. It is 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.



Indicates Program Mode Alternating Display

5.1 MODULE 1 - Signal Input Parameters (1- INP)



INPUT RANGE

rANGE ↔ 5A

SELECTION	RANGE RESOLUTION	SELECTION	RANGE RESOLUTION
0.2u	200.00 mV	0.002A	2.0000 mA
2u	2.0000 V	0.02A	20.000 mA
20u	20.000 V	0.2A	200.00 mA
300u	300.0 V	5A	5.000 A
200uA	200.00 µA		

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.

INPUT COUPLE

COUPL ↔ AC AC or dC

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

DISPLAY DECIMAL POINT

dECPt ↔ 0.000 0 0.0 0.00 0.000 0.0000

Select the decimal point location for the Input, **MAX** and **MIN** displays. (The **TOT** display decimal point is a separate parameter.) This selection also affects round and dSPx parameters and setpoint values.

DISPLAY ROUNDING*

round ↔ 0.001 1 2 5 10 20 50 100

Rounding selections other than one cause the Input Display to 'round' to the nearest rounding increment selected (ie. rounding of '5' causes 122 to round to 120 and 123 to round to 125). Position of the decimal point should be ignored when programming this selection. Remaining parameter entries (scaling point values, setpoint values, etc.) are not automatically adjusted to this display rounding selection.

FILTER SETTING*

F ILtr ↔ 0.5 0.0 to 25.0 seconds

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

FILTER BAND*

bAnd ↔ 0.020 0.0 to 25.0 display units

The digital filter adapts to variations in the input signal. When the variation exceeds the input filter band value, the digital filter disengages. When the variation becomes less than the band value, the filter engages again. This allows for a stable readout, but permits the display to settle rapidly after a large process change. The value of the band is in display units, independent of the Display Decimal Point position. A band setting of '0' keeps the digital filter permanently engaged.

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

SCALING POINTS*

Pt5 ↔ 2 2 to 16

Linear - Scaling Points (2)

For linear processes, only 2 scaling points are necessary. It is recommended that the 2 scaling points be at opposite ends of the input signal being applied. The points do not have to be the signal limits. Display scaling will be linear between and continue past the entered points up to the limits of the Input Signal Jumper position. Each scaling point has a coordinate-pair of Input Value (INP) and an associated desired Display Value (dSP).

Nonlinear - Scaling Points (Greater than 2)

For non-linear processes, up to 16 scaling point may be used to provide a piece-wise linear approximation. (The greater the number of scaling points used, the greater the conformity accuracy.) The Input Display will be linear between scaling points which are sequential in program order. Each scaling point has a coordinate-pair of Input Value (INP) and an associated desired Display Value (dSP). Data from tables or equations, or empirical data could be used to derive the required number of segments and data values for the coordinate pairs. In the SFPAX software, several linearization equations are available.

SCALING STYLE

StYLE ↔ KEY KEY key-in data
APLY apply signal

If Input Values and corresponding Display Values are known, the Key-in (KEY) scaling style can be used. This allows scaling without the presence of a live 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

INP 1 ↔ 0.000 -19999 to 19999

For Key-in (KEY), enter the known first Input Value by using the arrow keys. (The Input Range selection sets up the decimal location for the Input Value). For Apply (APLY), apply the input signal to the meter, adjust the signal source externally until the desired Input Value appears. In either method, press the **PAR** key to enter the value being displayed. The **DSP** key can be pressed without changing the previously stored INP 1 value in the APLY style.

DISPLAY VALUE FOR SCALING POINT 1

dSP 1 ↔ 0.000 -19999 to 19999

Enter the first coordinating Display Value by using the arrow keys. This is the same for KEY and APLY scaling styles. The decimal point follows the dECPt selection.

INPUT VALUE FOR SCALING POINT 2

INP 2 ↔ 5.000 -19999 to 19999

For Key-in (KEY), enter the known second Input Value by using the arrow keys. For Apply (APLY), adjust the signal source externally until the next desired Input Value appears. (Follow the same procedure, if using more than 2 scaling points.)

D

DISPLAY VALUE FOR SCALING POINT 2

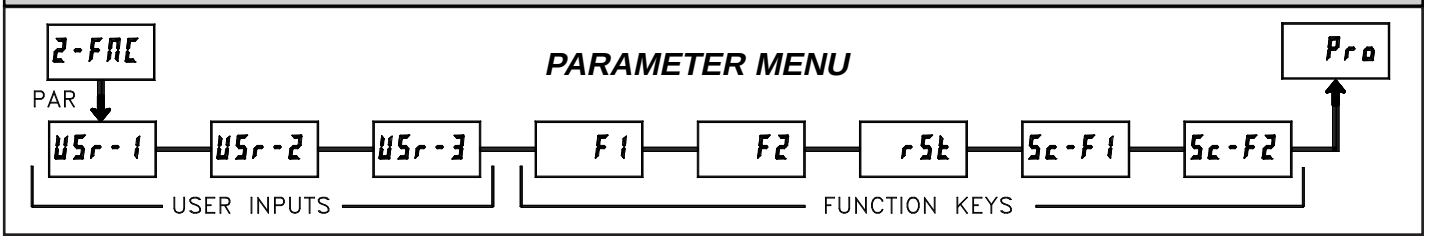
-19999 to 19999

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

General Notes on Scaling

1. Input Values for scaling points should be confined to the limits of the Input Range Jumper position.
2. The same Input Value can not correspond to more than one Display Value. (Example: 20 mA can not equal a display of 0 and 10.)
   This is referred to as readout jumps (vertical scaled segments).
3. The same Display Value can not correspond to more than one Input Value. (Example: 0 mA and 20 mA can not equal a display of 10.)
   This is referred to as readout dead zones (horizontal scaled segments).
4. For input levels beyond the first programmed Input Value, the meter extends the Display Value by calculating the slope from the first two coordinate pairs (INP 1 / dSP 1 & INP2 / dSP2). If INP 1 = 4 mA and dSP 1 = 0, then 0 mA would be some negative Display Value. This could be prevented by making INP 1 = 0 mA / dSP 1 = 0, INP2 = 4 mA / dSP2 = 0, with INP3 = 20 mA / dSP3 = the desired high Display Value. The calculations stop at the limits of the Input Range Jumper position.
5. For input levels beyond the last programmed Input Value, the meter extends the Display Value by calculating the slope from the last two sequential coordinate pairs. If three coordinate pair scaling points were entered, then the Display Value calculation would be between INP2 / dSP2 & INP3 / dSP3. The calculations stop at the limits of the Input Range Jumper position.

5.2 MODULE 2 - User Input and Front Panel Function Key Parameters (2-FNC)



D

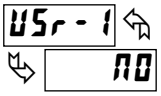
The three user inputs are individually programmable to perform specific meter control functions. While in the Display Mode or Program Mode, the function is executed the instant the user input transitions to the active state.

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

In most cases, if more than one user input and/or function key is programmed for the same function, the maintained (level trigger) actions will be performed while at least one of those user inputs or function keys are activated. The momentary (edge trigger) actions will be performed every time any of those user inputs or function keys transition to the active state.

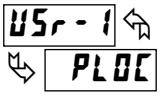
***Note**: In the following explanations, not all selections are available for both user inputs and front panel function keys. Alternating displays are shown with each selection. Those selections showing both displays are available for both. If a display is not shown, it is not available for that selection.*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

NO FUNCTION



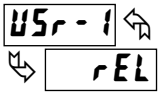
No function is performed if activated. This is the factory setting for all user inputs and function keys.

PROGRAMMING MODE LOCK-OUT



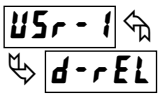
Programming Mode is locked-out, as long as activated (maintained action). A security code can be configured to allow programming access during lock-out.

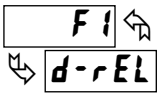
ZERO (TARE) DISPLAY



The Zero Display provides a way to zero the Input Display value at various input levels, causing future Display readings to be offset. When activated (momentary action), rESEt flashes and the Display is set to zero. At the same time, the Display value (that was on the display before the Zero Display) is subtracted from the Display Offset Value and is automatically stored as the new Display Offset Value (oFFSt). If another Zero (tare) Display is performed, the display will again change to zero and the Display reading will shift accordingly.

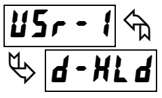
RELATIVE/ABSOLUTE DISPLAY





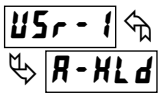
This function switches the Input Display between Relative and Absolute. The Relative is a net value that includes the Display Offset Value. The Input Display will normally show the Relative unless switched by this function. Regardless of the display selected, all meter functions continue to operate based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

HOLD DISPLAY



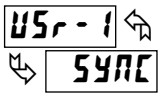
The display is held but all other meter functions continue as long as activated (maintained action).

HOLD ALL FUNCTIONS



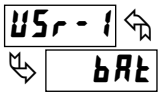
The meter disables processing the input, holds the display, and locks the state of all outputs as long as activated (maintained action). The serial port continues data transfer.

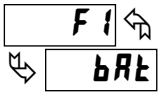
SYNCHRONIZE METER READING



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

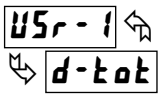
STORE BATCH READING IN TOTALIZER





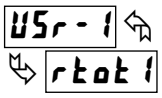
The Input Display value is one time added (batched) to the Totalizer at transition to activate (momentary action). The Totalizer retains a running sum of each batch operation until the Totalizer is reset. When this function is selected, the normal time based operation of the Totalizer is overridden.

SELECT TOTALIZER DISPLAY



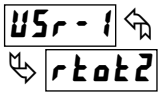
The Totalizer display is selected as long as activated (maintained action). When the user input is released, the Input Display is returned. The **DSP** key overrides the active user input. The Totalizer continues to function including associated outputs independent of being displayed.

RESET TOTALIZER



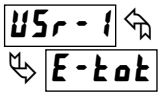
When activated (momentary action), rESEt flashes and the Totalizer resets to zero. The Totalizer then continues to operate as it is configured. This selection functions independent of the selected display.

RESET AND ENABLE TOTALIZER



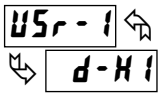
When activated (momentary action), rESEt flashes and the Totalizer resets to zero. The Totalizer continues to operate while active (maintained action). When the user input is inactive, the Totalizer stops and holds its value. This selection functions independent of the selected display.

ENABLE TOTALIZER



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

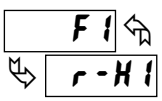
SELECT MAXIMUM DISPLAY



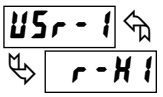
The Maximum display is selected as long as activated (maintained action). When the user input is inactive, the Input Display is selected. The **DSP** key overrrides the active user input. The Maximum continues to function independent of being displayed.

RESET MAXIMUM

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

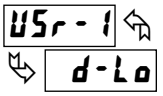


RESET, SELECT, ENABLE MAXIMUM DISPLAY



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

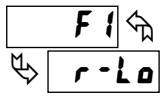
SELECT MINIMUM DISPLAY



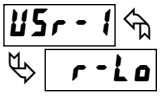
The Minimum display is selected as long as activated (maintained action). When the user input is released, the Input Display is returned. The **DSP** key overrides the active user input. The Minimum continues to function independent of being displayed.

RESET MINIMUM

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

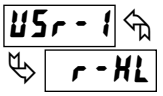


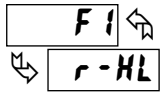
RESET, SELECT, ENABLE MINIMUM DISPLAY



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

RESET MAXIMUM AND MINIMUM





When activated (momentary action), rESEt flashes and the Maximum and Minimum readings are set to the present Input Display value. The Maximum and Minimum function then continues. This functions independent of the selected display.

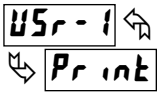
SETPOINT SELECTIONS

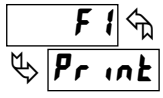
The following selections are accessible only with the Setpoint plug-in card installed. Refer to the Setpoint Card Bulletin shipped with the Setpoint card, for explanation of their operation.

Setpoint Card Only

- **LISt - Select main or alternate setpoints**
- **r-1 - Reset Setpoint 1 (Alarm 1)**
- **r-2 - Reset Setpoint 2 (Alarm 2)**
- **r-3 - Reset Setpoint 3 (Alarm 3)**
- **r-4 - Reset Setpoint 4 (Alarm 4)**
- **r-34 - Reset Setpoint 3 & 4 (Alarm 3 & 4)**
- **r-234 - Reset Setpoint 2, 3 & 4 (Alarm 2, 3 & 4)**
- **r-ALL - Reset Setpoint All (Alarm All)**

PRINT REQUEST

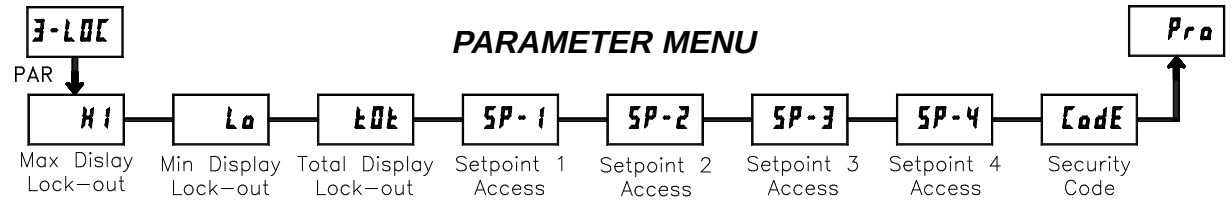




The meter issues a block print through the serial port when activated. The data transmitted during a print request is programmed in Parameter Module 7. If the user input is still active after the transmission is complete (about 100 msec), an additional transmission occurs. As long as the user input is held active, continuous transmissions occur.

D

5.3 MODULE 3 - Display and Program Lock-out Parameters (3-LOC)



MAXIMUM DISPLAY LOCK-OUT*
MINIMUM DISPLAY LOCK-OUT*
TOTALIZER DISPLAY LOCK-OUT*

HI ↔ LOC Lo ↔ LOC tOt ↔ LOC

These displays can be programmed for LOC or rEd. When programmed for LOC, the display will not be shown when selected by the **DSP** key. It is suggested to lock-out the display if it is not needed. The associated function will continue to operate even if its display is locked-out.

SP-1 SP-2 SP-3 SP-4 SETPOINT ACCESS*

SP-1 ↔ LOC SP-2 ↔ LOC SP-3 ↔ LOC SP-4 ↔ LOC

The setpoint displays can be programmed for LOC, rEd or Ent (See following table). Accessible only with the Setpoint plug-in card installed.

SELECTION	DESCRIPTION
LOC	Not selectable in Display Mode.
rEd	Selectable, but not changeable in Display Mode during Program Lock-out.
Ent	Selectable and changeable in Display Mode during Program Lock-out.

PROGRAM MODE SECURITY CODE*

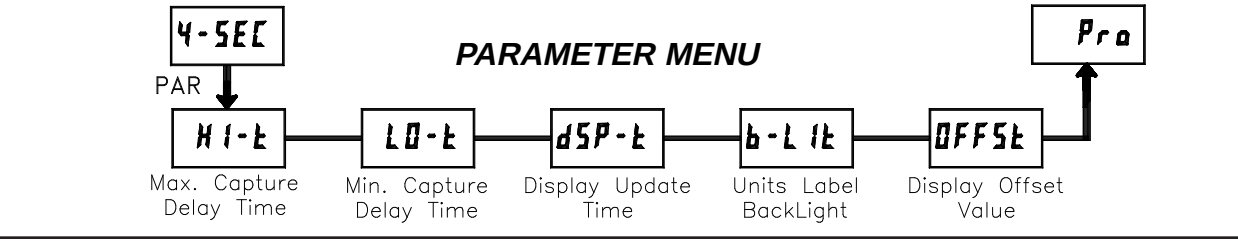
CodE ↔ 0 0 to 250

By entering any non-zero value, the prompt CodE 0 appears when trying to access the Program Mode. Access will only be allowed after entering a matching security code or universal code of 222. With this lock-out, a user input would not have to be configured for Program Lock-out. However, this lock-out is overridden by an inactive user input configured for Program Lock-out.

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

D

5.4 MODULE 4 - Secondary Function Parameters (4-SEC)



MAX CAPTURE DELAY TIME*

HI-t ↔ 0.0 0.0 to 3275.0 sec.

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

MIN CAPTURE DELAY TIME*

LO-t ↔ 0.0 0.0 to 3275.0 sec.

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

DISPLAY UPDATE RATE*

dSP-t ↔ 2 1 2 5 10 20 updates/sec.

This parameter determines the rate of display update. It does not affect the update rate of other meter functions.

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.

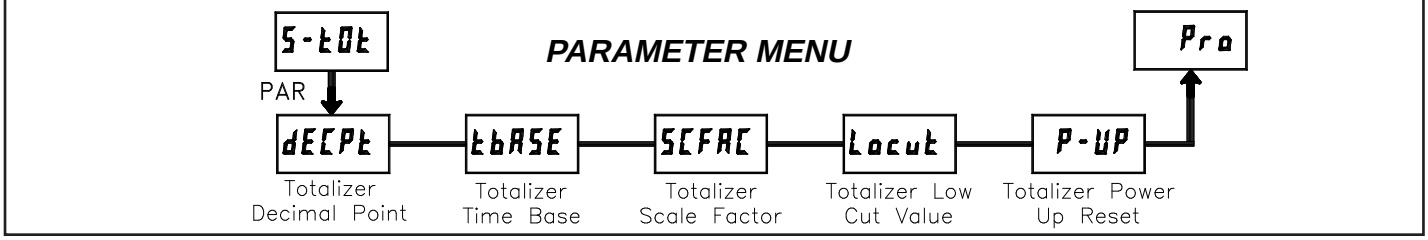
DISPLAY OFFSET VALUE*

OFFSt ↔ 0.000 -19999 to 19999

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

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

5.5 MODULE 5 - Totalizer (Integrator) Parameters (5-tot)



The Totalizer accumulates (integrates) the Input Display value using one of two modes. The first is using a time base. This can be used to provide an indication of total flow, usage or consumption over time. The second is through a user input or function key programmed for Batch (one time add on demand); where accumulation is based on a completed event. If the Totalizer is not needed, its display can be locked-out and this module can be skipped during programming.

TOTALIZER DECIMAL POINT*

dECPt ↺ 0 0.0 0.00 0.000 0.0000
↻ 0

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

TOTALIZER TIME BASE

tbASE ↺ SEC - seconds (÷ 1) hour - hours (÷ 3600)
↻ hour _in - minutes (÷ 60) dAY - days (÷ 86400)

For most applications, this normally matches the Input Display rate. If the Totalizer is being accumulated through a user input programmed for Batch, then this parameter does not apply.

TOTALIZER SCALE FACTOR*

SCFAC ↺ 0.000 to 65.000
↻ 1.000

For most applications, the Totalizer reflects the same decimal point location and engineering units as the Input Display. In these cases, the Totalizer Scale Factor is 1.000. The Totalizer Scale Factor can be used to scale the Totalizer to a different value than the Input Display. Common possibilities are:

1. Changing decimal point location (example tenths to whole)
2. Changing engineering units (example inches to meters)
3. Changing both decimal point location and engineering units.

Details on calculating the scale factor are shown later.

TOTALIZER LOW CUT VALUE*

Locut ↺ - 19999 to 99999
↻ -19999

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

TOTALIZER POWER UP RESET*

P-uP ↺ no Do not reset buffer
↻ no rSt Reset buffer

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

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

TOTALIZER HIGH ORDER DISPLAY

When the total exceeds 5 digits, the front panel annunciator **TOT** flashes. In this case, the meter continues to totalize up to a 9-digit value. The high order 4 digits and the low order 5 digits of the total are displayed alternately. The letter "h" denotes the high order display.

TOTALIZER BATCHING

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

TOTALIZER USING TIME BASE

Totalizer accumulates as defined by:

$$\frac{\text{Input Display} \times \text{Totalizer Scale Factor}}{\text{Totalizer Time Base}}$$

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

Example: The input is at a constant reading of 100.0 Amperes. It is desired to totalize amp-hours of a motor. Select hour for time base, 0.100 for Scale Factor, and no Decimal Point position for the totalizer.

$\frac{100.0 \times 0.100}{3600}$ = 0.00277 Amperes accumulate each second
This results in:
0.1667 Amperes accumulate each minute
10 Amperes accumulate each hour

TOTALIZER SCALE FACTOR CALCULATION EXAMPLES

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

Example: Input (dECPt)=0.0 Input (dECPt)= 0.00

Totalizer dECPt	Scale Factor
0.00	10
0.0	1
0	.1
x10	.01
x100	.001

Totalizer dECPt	Scale Factor
0.000	10
0.00	1
0.0	.1
0	.01
x10	.001

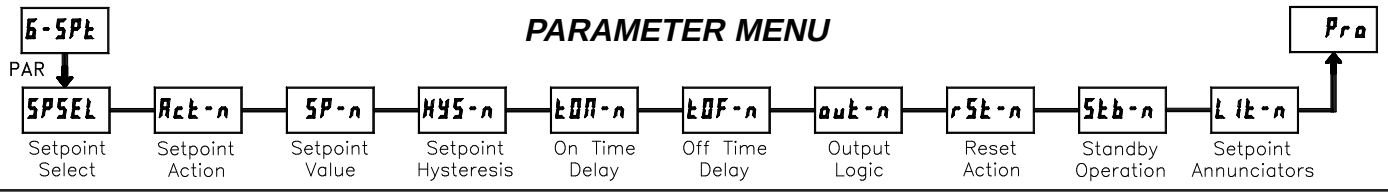
(x = Totalizer display is round by tens or hundreds)

2. When changing the Totalizer engineering units, the Totalizer Scale Factor is the known conversion multiplier from Input Display units to Totalizer units. Example: If Input Display is feet and the Totalizer needs to be in yards, the conversion multiplier from feet to yards is 0.333. Enter 0.333 as the Totalizer scale factor.
3. When changing both the Totalizer engineering units and Totalizer Decimal Point, the two calculations are multiplied together. Example: Input Display = feet in tenths (0.0) with Totalizer = whole yards (0), the scale factor would be 0.033.

D

Modules 6, 7, and 8 are accessible only with the appropriate plug-in cards installed. A quick overview of each Module is listed below. Refer to the corresponding plug-in card bulletin for a more detailed explanation of each parameter selection.

5.6 MODULE 6 - Setpoint (Alarm) Parameters (6-SPt)

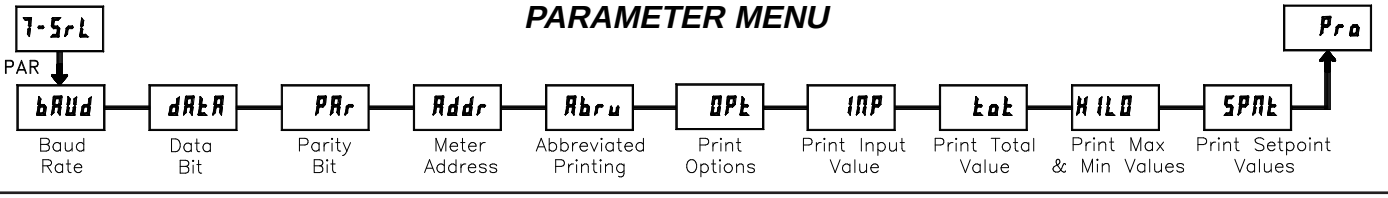


SPSEL - SELECT SETPOINT TO CONFIGURE	no SP-1	SP-3
	SP-2	SP-4
Act-n - SETPOINT ACTION	OFF	dE-HI
	Ab-HI	dE-LO
	Ab-LO	bAnd
	AU-HI	toLo
	AU-LO	toHI
SP-n - SETPOINT VALUE	-19999 to	99999
HYS-n - SETPOINT HYSTERESIS	1 to	65000

tON-n - ON TIME DELAY	0.0 to	3275.0 sec
tOF-n - OFF TIME DELAY	0.0 to	3275.0 sec
out-n - OUTPUT LOGIC	nor	rEu
rSt-n - RESET ACTION	AUto	LAtC2
	LAtC1	
Stb-n - STANDBY OPERATION	no	YES
LIt-n - SETPOINT ANNUNCIATORS	OFF	rEu
	nor	FLASH

D

5.7 MODULE 7 - Serial Communications Parameters (7-SrL)

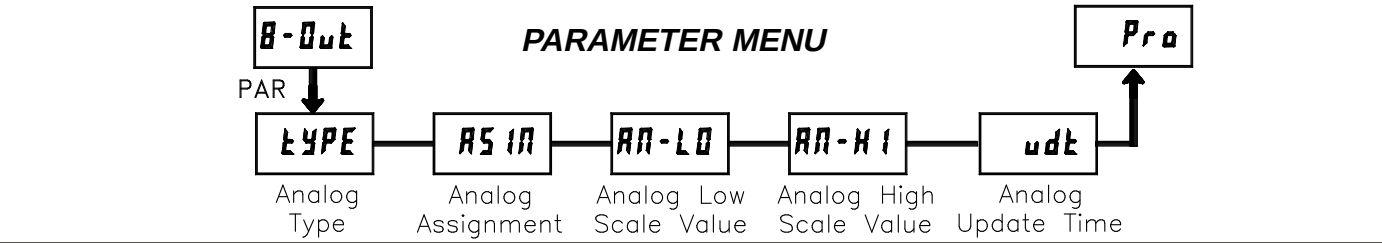


This module is for RS232 and RS485.

bAUd - BAUD RATE	300	4800
	600	9600
	1200	19200
	2400	
dAtA - DATA BITS	7	8

PAr - PARITY BIT	Odd	no
	EVEN	
Addr - METER ADDRESS	0 to	99
Abru - ABBREVIATED PRINTING	no	YES
OPt - PRINT OPTIONS	INP	HILO
	tot	SPNt

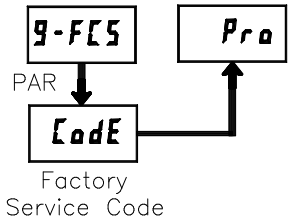
5.8 MODULE 8 - Analog Output Parameters (8-Out)



tYPE - ANALOG TYPE	0-20	0-10
	4-20	
AS IN - ANALOG ASSIGNMENT	INP	LO
	HI	tot

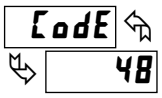
AN-LO - ANALOG LOW SCALE VALUE	-19999 to 99999
AN-HI - ANALOG HIGH SCALE VALUE	-19999 to 99999
udt - ANALOG UPDATE TIME	0.0 to 10.0 sec.

5.9 MODULE 9 - Factory Service Operations (9-FCS)



PARAMETER MENU

CALIBRATION



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

When recalibration is required (generally every 2 years), it should only be performed by qualified technicians using appropriate equipment. Signal source accuracies of 0.01% or better are required. Calibration does not change any user programmed parameters. However, it may affect the accuracy of the input signal values previously stored using the Apply (APLY) Scaling Style.

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

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

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

Input Calibration

1. Set the Signal Jumper for the range to be calibrated. Set the Couple Jumper for DC.
2. Connect the DC signal source to the appropriate terminals.
3. Use the arrow keys to display CodE 48 and press **PAR**.
4. The meter displays CAL. Use the arrow keys to select the range that matches the Signal Jumper setting. Press **PAR**.
5. Apply the signal matching the meter prompt and press **PAR**.
6. Repeat for the remaining three prompts.
8. When NO appears, press **PAR** twice and remove power.
9. Repeat Input Calibration for each range to be calibrated.
10. When all desired calibration is complete, remove the external signal source and restore original configuration and jumper settings.

AC Couple Offset Calibration

It is recommended that Input Calibration be performed first.

1. With meter power removed, set the Signal Jumper for 20 V range and the Couple Jumper for DC.
2. Connect a wire (short) between Volt (rear terminal 6) and COMM (rear terminal 4)
3. Apply meter power.
4. In Module 1-INP program as follows: Range: 20u; Couple: dC; Decimal Point: 0; Round: 1; Filter: 0.5; Band: 20; Points: 2; Style: KEY; INP1: 0.000; DSP1: 0; INP2: 20.000; DSP2: 20000
5. In Module 4-SEC program as follows: Hi-t: 0.0; Lo-t: 32767
6. Press **DSP** to exit programming and view the Input Display.
7. The readout displays the DC coupled zero input, record the value.
8. Remove the meter power and set the Couple Jumper to AC.
9. Maintaining the short between terminals 4 and 6, reapply the meter power.
10. Keeping all programming the same, view the Input Display.
11. The readout now displays the AC coupled zero input, record the value.
12. In Module 9-FAC, Use the arrow keys to display CodE 48 and press **PAR**.
13. Press the down arrow key twice to AC-OF and press **PAR**.
14. Calculate the offset OFFSt using the following formula:
    OFFSt = AC coupled reading (step 11) - DC coupled reading (step 7)
15. Use the arrow keys to enter the calculated OFFSt.
16. Press **PAR** three times, to exit programming.
17. Remove the meter power and remove the short from terminals 4 and 6.
18. Restore the original jumper and configuration settings.

Analog Output Card Calibration

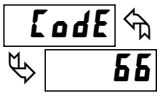
Before starting, verify that the precision voltmeter (voltage output) or current meter (current output) is connected and ready. Then perform the following procedure:

1. Use the arrow keys to display CodE 48 and press **PAR**.
2. Use the arrow keys to choose OUt and press **PAR**.
3. Using the chart below, step through the five selections to be calibrated. At each prompt, use the PAXH arrow keys to adjust the external meter display to match the selection being calibrated. When the external reading matches, or if this range is not being calibrated, press **PAR**.

SELECTION	EXTERNAL METER	ACTION
0.0A	0.00	Adjust if necessary, press **PAR**
4.0A	4.00	Adjust if necessary, press **PAR**
20.0A	20.00	Adjust if necessary, press **PAR**
0.0u	0.00	Adjust if necessary, press **PAR**
10.0u	10.00	Adjust if necessary, press **PAR**

4. When nO appears remove the external meters and press **PAR** twice.

RESTORE FACTORY DEFAULTS



Use the arrow keys to display CodE 66 and press **PAR**. The meter will display rESEt and then return to CodE 50. Press **DSP** key to return to Display Mode. This will overwrite all user settings with the factory settings.

TROUBLESHOOTING

PROBLEM	REMEDIES
NO DISPLAY	CHECK: Power level, power connections
PROGRAM LOCKED-OUT	CHECK: Active (lock-out) user input ENTER: Security code requested
MAX, MIN, TOT LOCKED-OUT	CHECK: Module 3 programming
INCORRECT INPUT DISPLAY VALUE	CHECK: Module 1 programming, Input Range Jumper position, input connections, input signal level, Module 4 Display Offset is zero, DSP is on Input Display PERFORM: Calibration (If the above does not correct the problem.)
"OLOL" in DISPLAY (SIGNAL LOW)	CHECK: Module 1 programming, Input Range Jumper position, input connections, input signal level
"ULUL" in DISPLAY (SIGNAL HIGH)	CHECK: Module 1 programming, Input Range Jumper position, input connections, input signal level
JITTERY DISPLAY	INCREASE: Module 1 filtering, rounding, input range CHECK: Wiring is per EMC installation guidelines
MODULES or PARAMETERS NOT ACCESSIBLE	CHECK: Corresponding plug-in card installation
ERROR CODE (Err 1-4)	PRESS: Reset KEY (If cannot clear contact factory.)

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

PARAMETER VALUE CHART
PAXH AC Input meter

Programmer _____ **Date** _____

Meter# _____ **Security Code** _____

1-INP Signal Input Parameters

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
rANGE	INPUT RANGE	5A	
COUPL	INPUT COUPLE	AC	
dECPt	DISPLAY DECIMAL POINT	0.000	
round	DISPLAY ROUNDING	0.001	
FILtr	FILTER SETTING	0.5	
bAnd	FILTER BAND	0.020	
PtS	SCALING POINTS	2	
StyLE	SCALING STYLE	KEY	
INP 1	INPUT VALUE 1	0.000	
dSP 1	DISPLAY VALUE 1	0.000	
INP 2	INPUT VALUE 2	5.000	
dSP 2	DISPLAY VALUE 2	5.000	
INP 3	INPUT VALUE 3	0.000	
dSP 3	DISPLAY VALUE 3	0.000	
INP 4	INPUT VALUE 4	0.000	
dSP 4	DISPLAY VALUE 4	0.000	
INP 5	INPUT VALUE 5	0.000	
dSP 5	DISPLAY VALUE 5	0.000	
INP 6	INPUT VALUE 6	0.000	
dSP 6	DISPLAY VALUE 6	0.000	
INP 7	INPUT VALUE 7	0.000	
dSP 7	DISPLAY VALUE 7	0.000	
INP 8	INPUT VALUE 8	0.000	
dSP 8	DISPLAY VALUE 8	0.000	
INP 9	INPUT VALUE 9	0.000	
dSP 9	DISPLAY VALUE 9	0.000	
INP 10	INPUT VALUE 10	0.000	
dSP 10	DISPLAY VALUE 10	0.000	
INP 11	INPUT VALUE 11	0.000	
dSP 11	DISPLAY VALUE 11	0.000	
INP 12	INPUT VALUE 12	0.000	
dSP 12	DISPLAY VALUE 12	0.000	
INP 13	INPUT VALUE 13	0.000	
dSP 13	DISPLAY VALUE 13	0.000	
INP 14	INPUT VALUE 14	0.000	
dSP 14	DISPLAY VALUE 14	0.000	
INP 15	INPUT VALUE 15	0.000	
dSP 15	DISPLAY VALUE 15	0.000	
INP 16	INPUT VALUE 16	0.000	
dSP 16	DISPLAY VALUE 16	0.000	

2-FNC User Input and Function Key Parameters

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
USr-1	USER INPUT 1	NO	
USr-2	USER INPUT 2	NO	
USr-3	USER INPUT 3	NO	
F1	FUNCTION KEY 1	NO	
F2	FUNCTION KEY 2	NO	
rSt	RESET KEY	NO	
Sc-F1	2nd FUNCTION KEY 1	NO	
Sc-F2	2nd FUNCTION KEY 2	NO	

3-LOC Display and Program Lockout Parameters

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
HI	MAX DISPLAY LOCK-OUT	LOC	
LO	MIN DISPLAY LOCK-OUT	LOC	
tOt	TOTAL DISPLAY LOCK-OUT	LOC	
SP-1	SETPOINT 1 ACCESS	LOC	
SP-2	SETPOINT 2 ACCESS	LOC	
SP-3	SETPOINT 3 ACCESS	LOC	
SP-4	SETPOINT 4 ACCESS	LOC	
CodE	SECURITY CODE	0	

4-SEC Secondary Function Parameters

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
HI-t	MAX CAPTURE DELAY TIME	0.0	
LO-t	MIN CAPTURE DELAY TIME	0.0	
dSP-t	DISPLAY UPDATE TIME	2	
b-LIt	UNITS LABEL BACKLIGHT	OFF	
OFFSt	DISPLAY OFFSET VALUE	0.000	

5-tOt Totalizer (Integrator) Parameters

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
dECPt	TOTALIZER DECIMAL POINT	0	
tbASE	TOTALIZER TIME BASE	hour	
SCFAC	TOTALIZER SCALE FACTOR	1.000	
Locut	TOTALIZER LOW CUT VALUE	-19.999	
P-UP	TOTALIZER POWER UP RESET	NO	

7-SrL Serial Communication Parameters

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
bAUd	BAUD RATE	9600	
dAtA	DATA BIT	7	
PAr	PARITY BIT	Odd	
Addr	METER ADDRESS	0	
Abru	ABBREVIATED PRINTING	YES	
INP	PRINT INPUT VALUE	YES	
tot	PRINT TOTAL VALUE	YES	
HILO	PRINT MAX & MIN VALUES	YES	
SPNt	PRINT SETPOINT VALUES	NO	

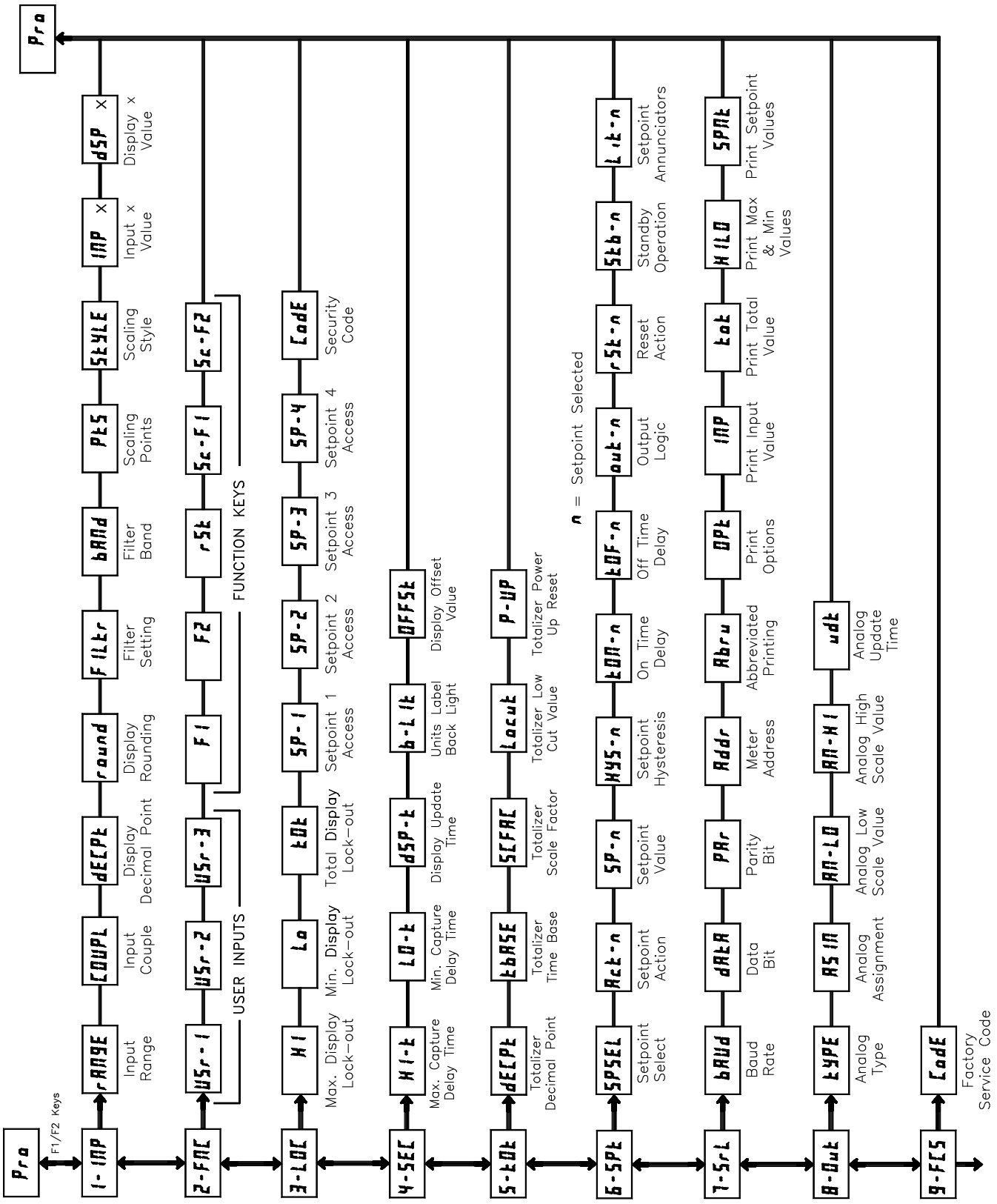
8-Out Analog Output Parameters

DISPLAY	PARAMETER	FACTORY SETTING	USER SETTING
tYPE	ANALOG TYPE	4-20	
AS IN	ANALOG ASSIGNMENT	INP	
AN-LO	ANALOG LOW SCALE VALUE	0.000	
AN-HI	ANALOG HIGH SCALE VALUE	10.000	
udt	ANALOG UPDATE TIME	0.0	

6-SPt Setpoint (Alarm) Parameters

DISPLAY	PARAMETER	SP-1 FACTORY SETTING	SP-1 USER SETTING	SP-2 FACTORY SETTING	SP-2 USER SETTING	SP-3 FACTORY SETTING	SP-3 USER SETTING	SP-4 FACTORY SETTING	SP-4 USER SETTING
ACt-n	SETPOINT ACTION	OFF		OFF		OFF		OFF	
SP-n	SETPOINT VALUE (main)	1.000		2.000		3.000		4.000	
	SETPOINT VALUE (alternate)*	1.000		2.000		3.000		4.000	
HYS-n	SETPOINT HYSTERESIS	0.002		0.002		0.002		0.002	
tON-n	ON TIME DELAY	0.0		0.0		0.0		0.0	
tOF-n	OFF TIME DELAY	0.0		0.0		0.0		0.0	
out-n	OUTPUT LOGIC	nor		nor		nor		nor	
rSt-n	RESET ACTION	AUto		AUto		AUto		AUto	
Stb-n	STANDBY OPERATION	NO		NO		NO		NO	
LIt-n	SETPOINT ANNUNCIATORS	nor		nor		nor		nor	

PAXH PROGRAMMING QUICK OVERVIEW



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