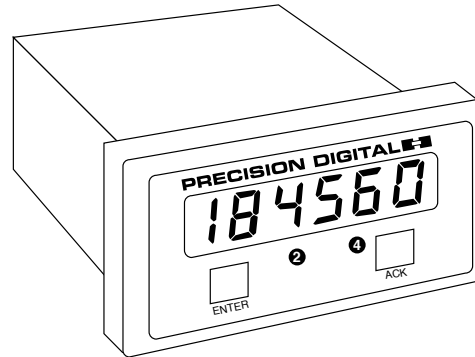# DIGITAL PANEL METERS

Model PD695 True RMS AC Input Voltmeter
Instruction Manual

- Easy **S**ingle **B**utton **S**caling **(SBS)**
- True RMS Indication for Greater Accuracy
- 50 mV, 200 mV, 2 V, 20 V, or 250 V
  Field Selectable Inputs
- Field Selectable Noise Filter
- 24 V Transmitter Power Supply Standard
- Stand Alone Scaling
- Steady, Accurate Display to 299,990
- 4$\frac{1}{2}$ Digit + Extra Zero
- 2 or 4 Relays + 4-20 mA Output Options
- Lockout Feature
- Non-volatile Memory, No Battery Needed.

INTRODUCTION

The PD695 is a True RMS AC Volt Meter. It can handle low mV inputs such as 50 mV or high voltage inputs up to 250 VAC. The True RMS feature allows non-sinusoidal waveforms to be measured with high accuracy. The unit displays this signal in engineering units on a $4\frac{1}{2}$ digit display that also includes an extra zero which may be used to handle numbers up to 299,990.

Ordering Information

115 VAC Model	230 VAC Model	Description	Option Card*
PD695-3-N	PD695-4-N	No Options	
PD695-3-14	PD695-4-14	2 Relays	PD174
PD695-3-15	PD695-4-15	4-20mA Out	PD175
PD695-3-16	PD695-4-16	2 Relays + 4-20 mA Out	PD176
PD695-3-17	PD695-4-17	4 Relays	PD177
PD695-3-18	PD695-4-18	4 Relays + 4-20 mA Out	PD178

*Part numbers for Option Cards when purchased separately

Safety Notice

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

WARNING: Risk of electric shock.

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

Do not use this meter to directly drive heavy equipment such as pumps, motors, valves, etc.

It is recommended to use this meter in a fail-safe system that accommodates the possibility of meter failure or power failure.

WARNING

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

AVERTISSMENT

Les pièces à l'intérieur du boîtier portent des tensions dangereuses. Seules des personnes qualifiées et bien entraînées devraient entreprondre l'ótalonnage et la maintenance.

DISCLAIMER

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SPECIFICATIONS

Except where noted all specifications apply to operation at +25°C

Basic Meter

INPUTS	Field selectable: 50 mV, 200 mV, 2 V, 20 V, 250 V.
DISPLAY	Bright, large, 0.56" (14.2mm) high efficiency red LEDs. $4^{1}/_{2}$ digits + extra zero may be switched on to display 29,999(0). Leading zeros blanked.
INPUT FREQUENCY	10 Hz to 30 KHz
DISPLAY UPDATE	2 per Second.
CREST FACTOR	Up to 5:1
DECIMAL POINT	Decimal point may be placed in any of the following positions. 2.9999, 29.999,299.99, 2999.9, 29999 or 299990 with extra zero.
CALIBRATION RANGE	Minimum span is 5% of full scale input range.
INPUT IMPEDANCE	Greater than 1 Mohm.
LOOP POWER	Isolated 24 VDC ± 5% @ 20 mA regulated. Maximum loop resistance is 1200 ohms.
HOLD READING	Connect ACK/HLD and COM terminals and place jumper over HLD pins on JP5 at rear of instrument.
EXTERNAL ACKNOWLEDGE	Connect ACK/HLD and COM terminals and place jumper over ACK pins on JP5 at rear of instrument.
ACCURACY	±0.1% of full scale @ 60 Hz.
RESOLUTION	0.025% of full scale.
ALARM POINTS	Four, any combination of high or low alarms.
ALARM POINT DEADBAND	0-100% of full scale, user selectable.
ALARM STATUS INDICATION	Front panel LED.

LOCKOUT	Jumper JP6 restricts modification of calibration values.
NON-VOLATILE MEMORY	All programming values are stored in non-volatile memory for a minimum of ten years if power is lost. No battery needed.
ISOLATION	1500 VAC
POWER	115 or 230 VAC ±10%, 50/60 Hz, 10 VA.
ENCLOSURE	1/8 DIN, High Impact plastic, UL 94V-0
FRONT PANEL	NEMA 4X, Panel Gasket provided
ENVIRONMENTAL	Operational ambient temperature range: 0 to +60°C. Storage temperature range: -40 to +85°C. Relative humidity: 0 to 90% non-condensing.
CONNECTIONS	Removable screw terminal blocks (provided) accept 22 to 12 AWG wire.
WARRANTY EXTENDED WARRANTY	1 year parts & labor. Warranty may be extended an additional 12 months by returning the Product Registration Form within 2 months from date of purchase. *Go to **www.predig.com** for online registration.*

Options

Relays

RATING	2 or 4 SPDT (form C); rated 2 Amp @ 30 VDC or 2 Amp @ 250 VAC resistive load; $^{1}/_{14}$ HP @ 125 / 250 VAC for inductive loads.
RESET	User Select: 1. Automatically when input passes reset point. 2. Automatically + Manually (via user supplied switch or front panel ACK button). Manual reset resets all manually resetable relays.
DEADBAND	0-100% of full scale, user selectable.
HIGH OR LOW ALARM	User may program any alarm for a high or low trip point.

FAIL-SAFE OPERATION	Relay coils are energized in non-alarm condition. In case of power failure, relays will go to alarm state. Fail-safe operation may be disabled, by removing jumper J2 located on the Options PCB.
AUTO INITIALIZATION	When power is applied to the meter, relays will always reflect the state of the input to the meter.

Isolated 4-20 mA Transmitter Output

CALIBRATION RANGE	The transmitter output can be calibrated so that a 4 mA output is produced for any number displayed by the meter. The 20 mA output may correspond to any number that is at least 501 counts greater or smaller than the number corresponding to 4 mA. (Ex. 4 mA = 0, 20 mA = 501) If the span between 4 and 20 mA is less than 501 counts, an error message will appear.
EQUIPMENT NEEDED	The 4-20 mA output is calibrated without the use of a calibrator. No equipment needed.
OUTPUT LOOP-POWER	Isolated 24 VDC ± 5% @ 20mA regulated. Maximum loop resistance is 1200 ohms.
ACCURACY	± 0.1% F.S., ± 0.004 mA.
ISOLATION	1500 VAC
EXTERNAL LOOP-POWER SUPPLY	35 VDC max.

OUTPUT LOOP RESISTANCE	Power supply	Min. loop resistance	Max loop resistance
	24 VDC	10 ohms	600 ohms
	35 VDC (external)	600 ohms	1000 ohms

Display Messages and Functions

The following table describes the various messages displayed by the meter during programming and operation:

Display	Parameter	Description/Comments
E-CAL	Select External Calibration	Set meter for calibration using an external calibration source.
I-CAL	Select Internal Calibration	Set meter for calibration (scaling) using Internal calibration source.
CAL Ib	Perform External Calibration	Calibrate meter using an external calibration source.
SCALE	Perform Internal Calibration (scaling)	Calibrate meter (scale) using internal calibration source. (Signal source not required).
FILtEr	Filter	Set filter level for input noise rejection.
bYPASS	Bypass	Set by-pass value so short input spikes are not reflected on display.
InPt 1	Input 1	Set Input 1 calibration value.
dSPY 1	Display 1	Set Display 1 calibration value.
InPt 2	Input 2	Set Input 2 calibration value.
dSPY 2	Display 2	Set Display 2 calibration value.
ALArS	Alarms	Program alarm/relay set and reset points.
outPut	Output	Set 4-20 mA output values.
29999	Overrange	Indicates input signal exceeds full-scale range of meter.
Error	Error	Indicates calibration was not successful.

SETUP AND PROGRAMMING

Power, Signal, External Functions & Options Connections

⚠

Disconnect power to the meter before making any connections.

⚠

Do not connect power or earth ground to any unused or CM terminals.

⚡

Connecting 230 VAC to a meter specified to accept 115 VAC will result in damage to the instrument as well as endanger personnel. Keep primary wires separated from signal cables.

Notice:
• Primary voltages must not be accessible to the user.
• Primary wires must be installed in accordance to the applicable standards.

Overview
The following field wiring connections are made to removable screw terminal blocks supplied with the meter:

Power, Signal Input, Acknowledge, Hold

Options: Relays & 4-20 mA Output
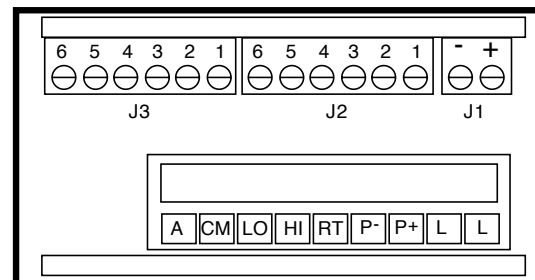
Figure 1: Rear View of Meter (Connectors)

Label	Main PCB (Lower)	Wire Size
None	Power	12-18
None	Signal, Acknowledge, Hold	12-22
	Options PCB (Upper)	
J1	4-20 mA Output	12-22
J2	Relays 1 & 2; NC, NO, Common	12-22
J3	Relays 3 & 4; NC, NO, Common	12-22

Wiring Instructions

1. All field connections to be made with insulated copper wire, either solid or stranded. Tighten all screw terminals to 7 in-lb (0.8 Nm). Strip length = $1/4$ in (7mm). **DO NOT** pre-treat wire with solder.
2. **Terminals L & L**: Use AWG #12-18 wire, 600 volt, 60°C. Connect only one wire to each terminal on the 9-pin connector.
3. **Terminals A, CM, LO, HI, RT, P-, P+:** Use AWG #12-22 wire, 150 volt, 60°C. If using AWG #20 or smaller wire, up to 2 wires may be connected to each terminal. If using AWG #18 or larger wire, only one wire may be connected to each terminal.

Power, Signal and External Functions

up to 200 mV

AC

L L P+ P- R H L C A
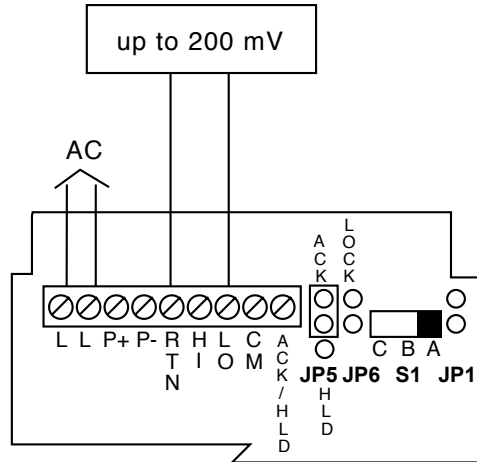   T H I O C
        N   L M K
            D   /
                H
                L
                D

A C K
L O C K
JP5 JP6 S1 JP1
C B A

Figure 2: 0-200 mV Input Range

up to 250 Volts

AC

L L P+ P- R H L C A
        T H I O C
        N   L M K
            D   /
                H
                L
                D

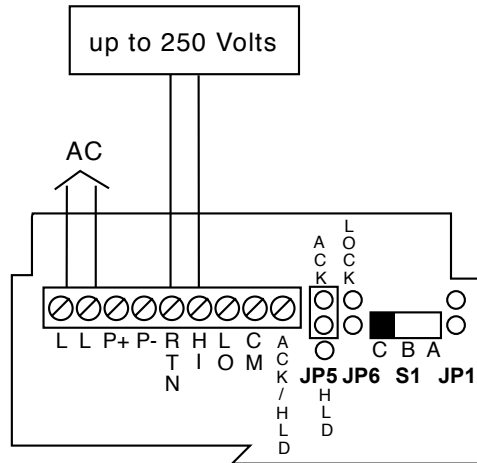A C K
L O C K
JP5 JP6 S1 JP1
C B A

Figure 3: 0-250 Volt Input Range

Relays & 4-20 mA Output

Depending on the model number, the Options PCB may contain two or four relays and an Isolated 4-20 mA Transmitter Output. Relay connections are made to removable screw terminal connectors located at J2 and J3 on the Options PCB. Connections for the Isolated 4-20 mA Transmitter Output are made to J1 on the Options PCB.

Pin:	Function:	
J1 1	Transmitter +	PD175
2	Transmitter -	
J2 1	Relay #1 Common	PD176
2	Relay #1 NC	
3	Relay #1 NO	PD174
4	Relay #2 Common	
5	Relay #2 NC	PD178
6	Relay #2 NO	
J3 1	Relay #3 Common	PD177
2	Relay #3 NC	
3	Relay #3 NO	
4	Relay #4 Common	
5	Relay #4 NC	
6	Relay #4 NO	

Figure 4: Option Card Pinouts

Notes:
1. Alarm acknowledgement terminals (ACK and COM) are located on the meter main board.
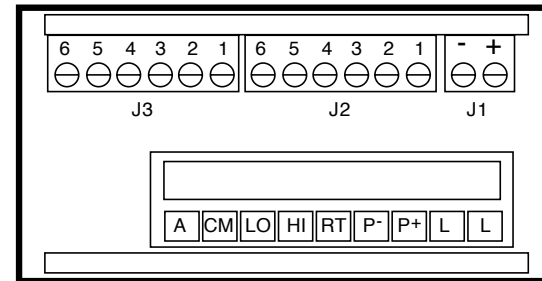2. In the alarm condition, the NC contact is connected to common in the fail-safe mode.

6 5 4 3 2 1   6 5 4 3 2 1   - +
        J3   J2   J1

A CM LO HI RT P- P+ L L

Figure 5: Rear View of Meter (Connectors)

4-20 mA Output

The 4-20 mA output from the meter can either be powered from the meter's internal transmitter power supply, or by an external power supply as the following diagrams illustrate:
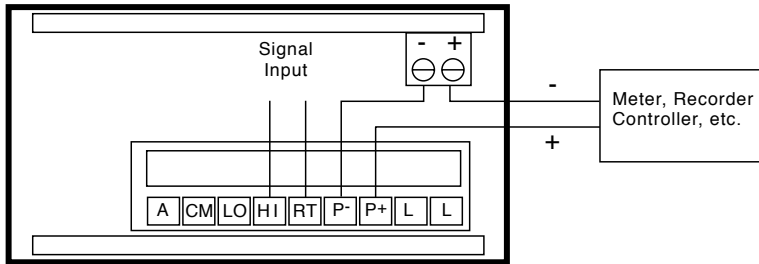

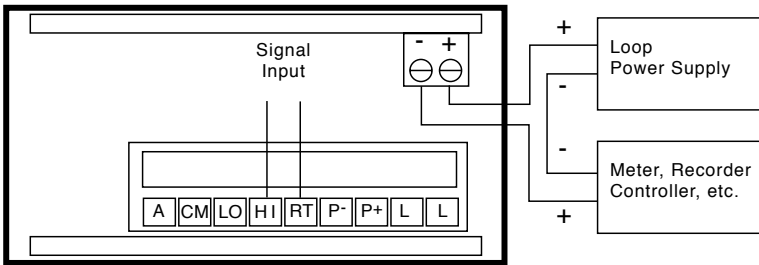**Figure 6: Meter Powering 4-20 mA Output Loop**

Figure 7: External Power Supply Powering 4-20 mA Output Loop

⚠ If the output loop is powered by an external supply, the loop power supply must be turned on before the meter is turned on. Otherwise, the output loop signal may be incorrect.

Programming

Overview

The meter is programmed using the **ENTER** button, several jumper arrays and a signal input selection switch. The **ENTER** button controls the meter's *S*ingle *B*utton *S*caling *(SBS)* feature that allows the meter to be completely programmed using just one button. The jumper arrays and switch are used for programming the input signal, lockout, relays acknowledge enable and relays fail-safe operation.

Single Button Scaling (SBS)

*S*ingle *B*utton *S*caling is a technique that allows the meter to be completely programmed using just the **ENTER** button. The general method behind *(SBS)* is to push **ENTER** when the meter reads the desired value. This value may be a menu title, the entire display or just a single digit. If the meter is not reading the desired value wait and the value will change. When the meter finally reads the desired display push **ENTER** to accept it.

When the meter is first powered up, it will read a random number. Pushing **ENTER** will cause the meter to scroll through the following menu titles (if the Lockout Jumper is not installed):
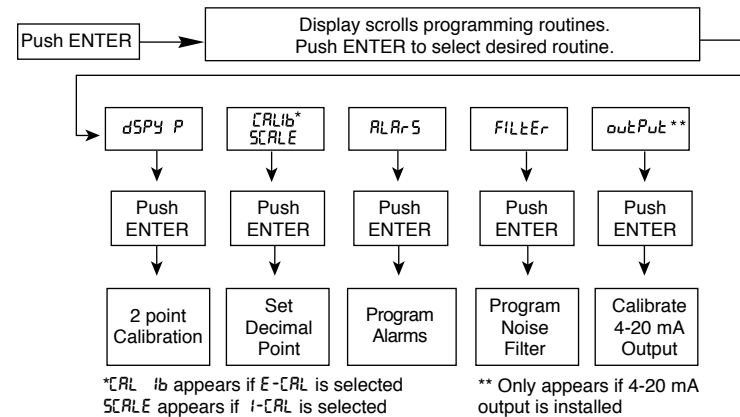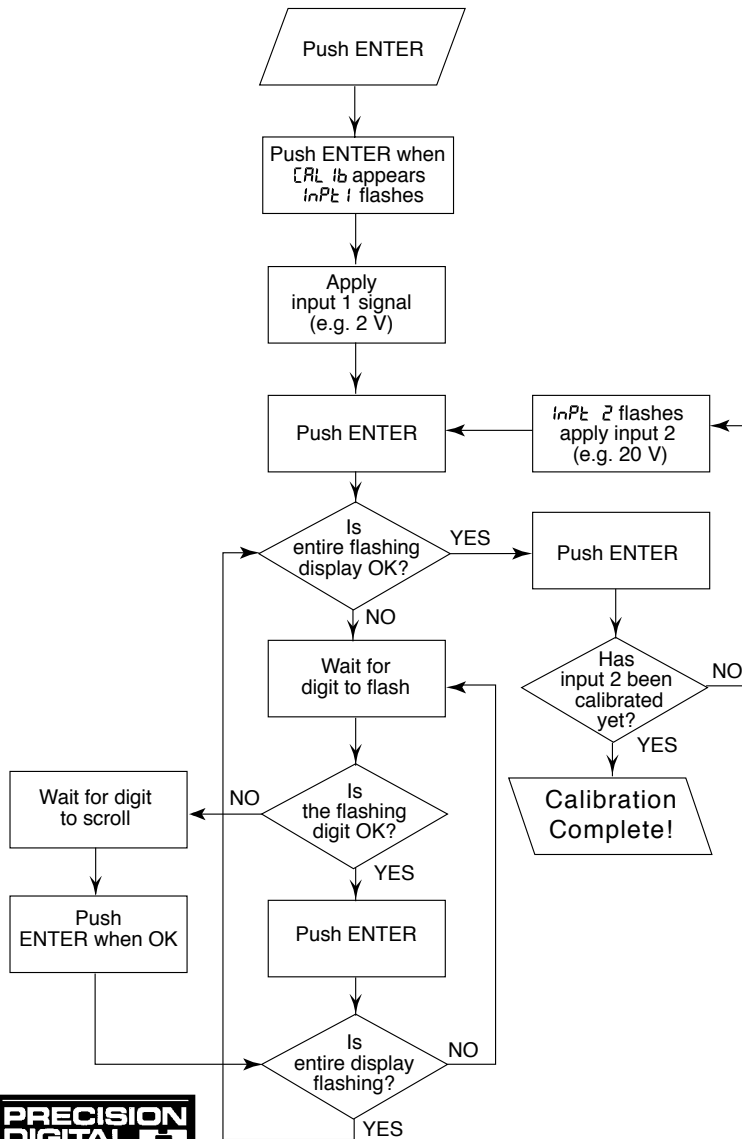

*CAL ib appears if E-CAL is selected
SCALE appears if i-CAL is selected

** Only appears if 4-20 mA output is installed

Figure 8: Menu Scroll (with Lockout Jumper Removed)

Figure 9: Two-point External Calibration Flow Chart

Five Basic Digit/Display-setting Instructions

Rather than repeat the *S*ingle *B*utton *S*caling *(SBS)* technique for every function it is used in, it will be detailed here and the user can refer to it when necessary.

The *S*ingle *B*utton *S*caling technique is used to program all the meter's functions that require numbers to be entered. For instance, calibration and scaling values, values, alarm set and reset points, 4 and 20 mA output values are set using *(SBS).*

1. If the flashing display is OK, push **ENTER** before it stops flashing to accept it. (Whenever a new value is to be programmed or last digit has been accepted the entire display flashes, if this is the desired value, press **ENTER** before it stops flashing to accept it.)
2. If the flashing display is not OK, (or if **ENTER** was not pushed in time to accept it), wait for first digit to flash.
3. If a flashing digit is OK, push **ENTER** before it starts to scroll to accept it.
4. If a flashing digit is not OK, (or if **ENTER** was not pushed in time to accept it), wait for the digit to scroll and push **ENTER** when OK.
5. Digits will scroll until **ENTER** is pushed. When a digit is accepted by pushing **ENTER**, the next digit flashes.

Basic Meter Programming

Overview

There are four steps for programming the basic meter functions:
1. Select Input
2. Perform Initial Calibration if Needed
3. Select Calibration Method
4. Calibrate or Scale the Meter

Programmed Parameter Values
To simplify programming, write down the desired programming values prior to attempting to program the meter. The form located at the back of this manual provides a convenient method to record the user settings.

Select Input Signal

Program jumper JP1 and switch S1 for desired input per chart below. JP1 and S1 are located at the rear of the instrument, next to the screw terminal block. Remove jumper JP6 (if installed) to disable lockout feature.

Connect the input signal to screw terminals per chart below.

Input Range	Screw Terminals	Switch Position	Jumper JP1
50 mV	LO, RTN	A	ON
200 mV	LO, RTN	A	OFF
2 V	HI, RTN	A	OFF
20 V	HI, RTN	B	OFF
250 V	HI, RTN	C	OFF

Table 1: Signal Input Selection Array

Initial Calibration with External Source (If Needed)

Initial calibration is required when the i-CAL feature is used for the first time with the selected input range. For best accuracy do not apply 0 volts for input 1 calibration. Instead, apply a signal equal to approximately 10% of full scale range. Example for 20 V range, input 1 signal should be 2 Volts.

1. Program jumper JP1 and switch S1 for desired input and connect input per Signal Input Selection Array chart above.
2. Apply power with **ENTER** and **ACK** buttons pushed. Release when display stops flashing.
3. The meter scrolls through the choices *.050, .200, 2.00, 20, and 250* which correspond to input range of 50 mV, 200 mV, 2 V, 20 V and 250 V. Push **ENTER** when desired value appears.
4. The meter flashes $inPut$ 1. Apply low end signal equal to 10% of full scale range. (for 20 V range, input 1 signal should be 2 V), push **ENTER.**
5. The meter flashes $inPt$ 2. Apply high end signal, (for 20 V range, input 2 should be 20 V) push **ENTER.**
6. This completes the Initial Calibration and initializes the Input 1 and Input 2 scaling points to 50 mV, 200 mV, 2 V, 20 V, or 250 V.
7. Refer to i-CAL scaling below for further instructions.

Select Calibration Method

The meter may be calibrated using an external signal source such as a calibrator (E-CAL), or scaled using the internal source (i-CAL). To select a Calibration Method, apply power with **ACK** button pressed.

1. When display stops flashing, release **ACK** button. Display alternates between E-CAL and i-CAL.
2. To calibrate meter with an external source, such as a calibrator, press **ENTER** when E-CAL appears.
3. To scale meter with internal source, press **ENTER** when i-CAL appears.

General Calibration/Scaling Instructions

Calibration is performed from the front panel using the **ENTER** button. It does not require any tools or disassembly of the meter. A calibrated signal source is required if external calibration (E-CAL) is selected.

For best results, allow meter to warm up for at least 30 minutes.

The calibration input signals must be within the range of the meter and input 2 must be greater than input 1. (However, display for input 2 does not have to be greater than desired display for input 1.)

An Error message will appear if input 1 signal and input 2 signal are within 5% of full scale of each other.

Scale Using Internal Calibration (I-CAL)

If I-CAL (Internal Calibration) was selected above in *Select Calibration Method*, the meter can be scaled without applying an input. Desired values can be programmed using the *Five Basic Digit/Display-setting Instructions* described on page 17. See Figure 9: *Two-point External Calibration Flow Chart* on page 16.

1. Push **ENTER**, when SCALE appears push **ENTER** again.
2. 19999 will be displayed and a decimal point will travel from left to right and the extra "0" will illuminate. Push **ENTER** when the decimal point in the desired position.
3. InPt 1 flashes. Push **ENTER** and program desired value for input 1.
4. dSPY 1 flashes. Push **ENTER** and program desired value for display 1.
5. InPt 2 flashes. Push **ENTER** and program desired value for input 2.
6. dSPY 2 flashes. Push **ENTER** and program desired value for display 2.

Calibrate Using an External Calibrator (E-CAL)

If E-CAL (External Calibration) was selected above in *Select Calibration Method,* the meter must be calibrated with an external calibrator. Desired values can be programmed using the *Five Basic Digit/Display-setting Instructions* described on page 17. *See Figure 9: Two-point External Calibration Flow Chart* on page 16.

1. Push **ENTER**, when CAL 1b appears push **ENTER** again.
2. 19999 will be displayed and a decimal point will travel from left to right and the extra "0" will illuminate. Push Enter when the decimal point in the desired position.
3. InPt 1 flashes. Apply input 1 signal (10% of full scale input) then push **ENTER** and program desired display for input 1.
4. InPut 2 flashes. Apply input 2 signal (e.g. 50 mV, 250 V etc) then push **ENTER** and program desired display for input 2.

Calibration Error (Error)

A meter display of Error during calibration indicates that the calibration process was not successful and the meter needs to be recalibrated.
1. An Error message will appear if input 1 signal and input 2 signal are within 5% of full scale of each other.
2. The Error message will appear if input 1 signal is inadvertently also applied for input 2 calibration, or **ENTER** is pushed before applying input 2.

Programming Confirmation

The values that have been programmed can be quickly checked to make sure they are the desired values. To do this, apply the desired signal for each point and check the display.

Noise Filter

The field selectable noise filter allows the meter to be programmed so that an unsteady (noisy) input can be displayed with greater stability.

Increasing the filter value will help stabilize the display, however this will reduce the display response rate. The filter level may be set anywhere between 2 and 999. Factory default is 100.

Noise Filter By-pass

The Noise Filter averages any minor changes in the input signal and displays the reading with greater stability. Quick, small input spikes will not be immediately reflected on the display. However, the meter can be programmed to filter only small changes. Larger input changes can be displayed immediately by setting a **Noise Filter By-pass value**. If the input signal spikes beyond the Noise Filter by-pass value the signal will **NOT** be averaged but rather immediately reflected on the display. The noise filter by-pass value may be set anywhere between 0.2% and 99.9% of full scale.

Increasing the noise filter by-pass value will slow down the display response rate.

Program Noise Filter and Noise Filter By-pass value:

1. Push **ENTER,** when *F ILtEr* appears push **ENTER** again
2. Current value for filter flashes, program for desired value and press **ENTER**
3. *bYPASS* appears, then the display shows the current setting for Noise Filter By-pass value.
4. Program desired value for Noise Filter By-pass

Peak Value

The meter captures the highest displayed value and stores it in memory for later viewing.

Displaying Peak Value

1 Push **ENTER** when *d5PY P* appears, push **ENTER** again. A green LED labeled "P" illuminates indicating the display is showing the peak value.

Resetting Peak Value

2. Push **ENTER**, when *r5Et P* appears, push **ENTER** again. Last stored peak value is erased from memory and a new peak value will be captured. The meter will return to normal indication mode and the green LED will turn off.

Isolated 4-20 mA Transmitter Output Programming (*outPut*)

The Isolated 4-20 mA Transmitter Output option can be programmed without a calibrator. This option can be calibrated so that a 4 mA output is produced for any number displayed by the meter. The 20 mA output may be programmed to correspond to any number that is at least 501 counts greater or smaller than the number corresponding to 4 mA. (Ex. 4 mA = 0, 20 mA = 501 or -501) If the span between 4 and 20 mA is less than 501 counts, an *Error* message will appear and the previously programmed values will be retained in memory until a new set of values is accepted.

Setting 4 mA Output Value

1. Push **ENTER**, when *outPut* appears push **ENTER** again.
2. All digits flash for 3 seconds, a green LED labeled "4" illuminates indicating the flashing display is the value at which the meter will produce a 4 mA output. Program desired value per *Five Basic Digit/Display-setting Instructions* on page 17.

Setting 20 mA Output Value

1. When **ENTER** is pushed to complete the programming for 4 mA output, the green LED labeled "20" illuminates indicating the flashing display is the value at which the meter will produce a 20 mA output.
2. Program desired value per *Five Basic Digit/Display-setting Instructions* on page 17.
3. An Error message will be displayed if the 4-20 mA output span is smaller than 501 counts.

Programming Confirmation

The values that have been programmed to produce the 4 & 20 mA outputs can be quickly checked to make sure they are the desired values. To do this, enter the *outPut* routine by pushing **ENTER** and then pushing **ENTER** again when *outPut* appears.

The green "4" LED illuminates indicating the meter is displaying the value at which it will produce a 4 mA output. Confirm that this is the desired value. Push **ENTER** (within 3 seconds) before the entire display stops flashing and the green "20" LED illuminates indicating the meter is displaying the value at which it will produce a 20 mA output. Confirm that this is the desired value. Push **ENTER** (within 3 seconds) before the entire display stops flashing and the meter returns to indication mode.

Alarm Programming

Overview

The meter is equipped with four alarm points as a standard feature. Each alarm may be programmed for either a high or low alarm and for 0-100% deadband. Front panel LEDs indicate alarm status.

Options for two or four relays are available.

To program a high alarm, program the set point above the reset point. To program a low alarm, program the set point below the reset point. To program the alarm deadband, set the reset point above or below the set point by an amount equal to the desired deadband value.

Example: Alarm 2 is a high alarm that trips at 1500 and has a dead-band of 100. Alarm 2 set point is set at 1500 and its reset point at 1400.

Setting Alarm Set & Reset Points (ALArS)

Alarm Set and Reset points are programmed using the *Five Basic Digit/Display-setting Instructions* described on page 17.

1. Push **ENTER** and when ALArS appears, push **ENTER** again. This starts a scan of the four alarm set & reset points. The scan sequence begins with a flashing display of alarm #1 set point. The "1" LED and "S" LED below the display are illuminated to indicate the meter is flashing alarm #1 set point value. Program the desired value for alarm #1 set point using the *Five Basic Digit/Display-setting Instructions* described on page 17.

2. After Alarm #1 set point has been programmed, the meter displays Alarm #1 reset point, as indicated by the "1" LED and "R" LED below the display. Program the desired value for alarm #1 reset point using the *Five Basic Digit/Display-setting Instructions* described on page 17.

3. Program the remaining alarm set and reset points in a similar fashion.

4. When alarm programming is complete the meter will display the process input signal and the front panel LEDs will indicate alarm status.

Programming Confirmation

To verify that the alarm set and reset points have been programmed as desired, push **ENTER**, and push **ENTER** again when ALArS appears. Before the display stops flashing #1 set point value, push **ENTER** again to advance the display to #1 reset point. Continue skipping through the remaining alarm set and reset points. To alter an alarm point value, wait for the first digit to flash and program the desired value using the *Five Basic Digit/Display-setting Instructions* on page 17.

Alarm Operation

When the meter detects an alarm, a front panel LED illuminates to indicate which alarm point has tripped. This LED will stay illuminated until the meter display passes through the reset point.

Set Relays for Fail-safe Operation

In the fail-safe mode, the relay coils are energized and the Normally Open (NO) contacts are connected to the Common (C) contacts under normal operation. During an alarm condition, the relay coils are *de-energized,* the Normally Closed (NC) contacts are connected to the Common (C) contacts. During a power failure the relay contacts reflect an alarm condition.
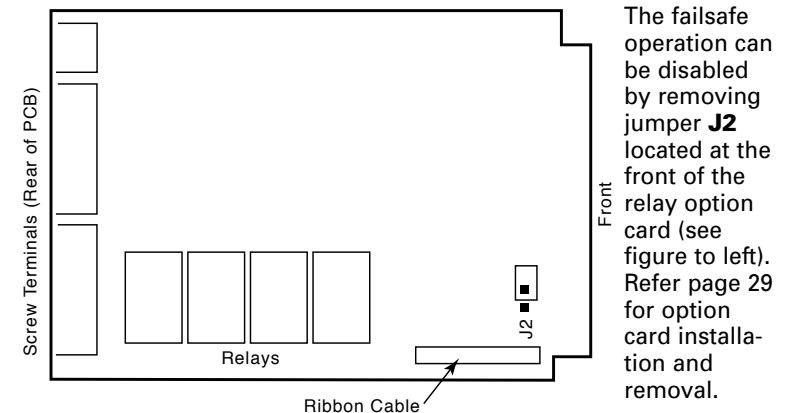

The failsafe operation can be disabled by removing jumper **J2** located at the front of the relay option card (see figure to left). Refer page 29 for option card installation and removal.

Figure 10: Option Card Installation

Alarm Acknowledgment

The ACK button on the front panel resets the optional relays only and has no effect on the alarm status LEDs.

Automatic & Manual Reset Programming

There are two ways to reset the relays:
1. Automatically when the signal passes through the reset point.
2. Automatically + manually via the front panel ACK button, or a user supplied momentary Normally Open push-button across terminals AK and CM at the rear of the instrument. That is, a relay may be manually reset prior to the signal passing through the reset point or it will automatically reset when the signal passes through the reset point.

A manual reset will reset all relays that are programmed for automatic + manual reset.
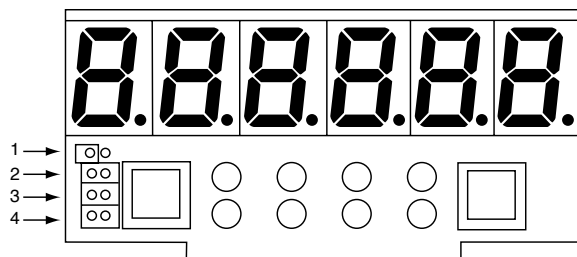

Figure 11: Relay Reset Jumpers

An array of jumpers located behind the front panel on the Display PCB is used to program each relay for either automatic or automatic + manual reset. Refer to page 29 for front panel removal instructions. The top jumper is used for relay 1, the next for relay 2, etc. A relay will automatically reset if no jumper is installed. A relay will automatically reset, plus can be manually reset, if a jumper is installed over its respective pins.

Example Above: Relay 1 is programmed for automatic reset; Relays 2, 3, & 4 are programmed for automatic + manual reset.

Lockout Jumper

Once the meter has been completely programmed, a lockout jumper can be installed to restrict further modification to the meter. This jumper is located at the rear of the instrument and is labeled JP6. When **ENTER** is pushed with the lockout jumper in place, only ᴿᴸᴬᵣ5 and ou𝘵Pu𝘵 routines are displayed. These routines may be entered to view their settings, but the settings may not be altered.

SWITCHING INDUCTIVE LOADS

The meter has the ability to suppress electrical noise generated by switching inductive loads. However, installing Resistor Capacitor (RC) Networks improves this performance and prolongs the life of the meter's relay contacts. This suppression can be obtained with RC networks assembled by the user or purchased as a complete assembly. Refer to the following circuits for RC network assembly and installation:
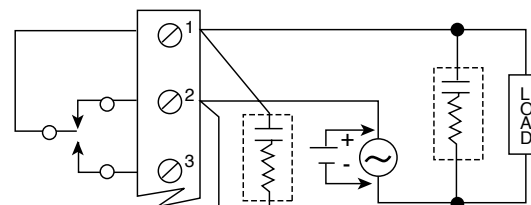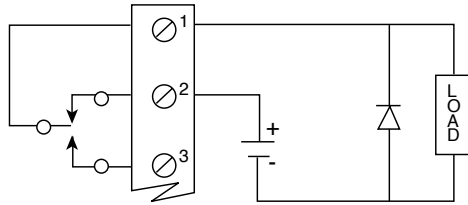
AC & DC Loads

Figure 12: AC & DC Loads

Choose R and C as follows:
R: 0.5 to 1 ohm for each volt across the contacts
C: 0.5 to 1 microfarad for each 1 A through closed contacts

Notes:
1. Use capacitors rated for 240 VAC.
2. Snubbers may affect load release time of solenoid loads, check to confirm proper operation.
3. Install the RC network right at the meter's relay screw terminals. An RC network may also be installed across the load.

Low Voltage DC Loads

Figure 13: Low Voltage DC Loads

Use a diode with a reverse breakdown voltage two to three times the circuit voltage and forward current at least as large as the load current.

RC Networks Available from Precision Digital
RC Networks are available from Precision Digital and should be applied to each relay contact that switches an inductive load. Part number PDX6901.

OPTION CARD INSTALLATION

Options may be ordered installed at the factory or as separate items.

To disable the relays' fail-safe operation, it is necessary to remove the PCBs from the case. Refer to the following instructions.

Instructions
1. Disconnect power to the meter.
2. Remove all connectors from the back of the meter.
3. Remove the Front Cover, simply pry the top and pull it back.
4. Remove the two screws that retain the PCB.
5. Slide the Main PCB out of case (set it down with display facing forward).
6. Lay the Option PCB to the right of the Main PCB.
7. Connect flexible cable connector CT1 to J5 connector on Main PCB.
8. Check that all the pins are properly seated in the connector.
9. Fold the option board over onto the Main PCB.
10. Slide the two PCBs into the case and secure with four screws and washers.
11. Reassemble front covers and install connectors.
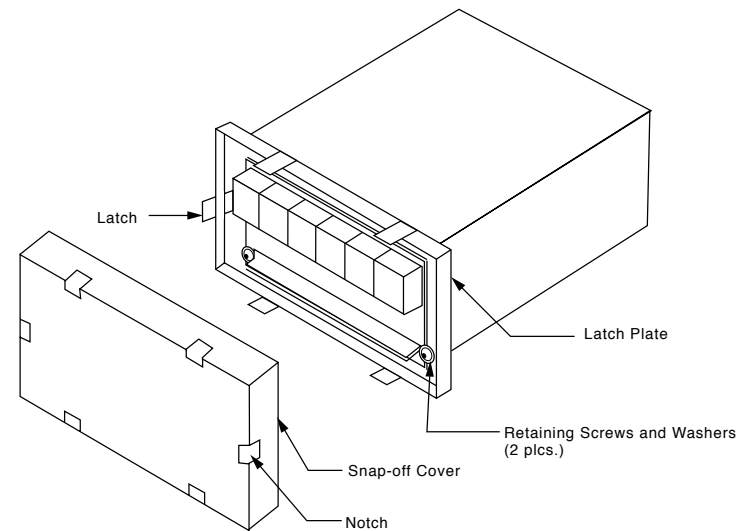
Figure 14: Removing Front Bezel
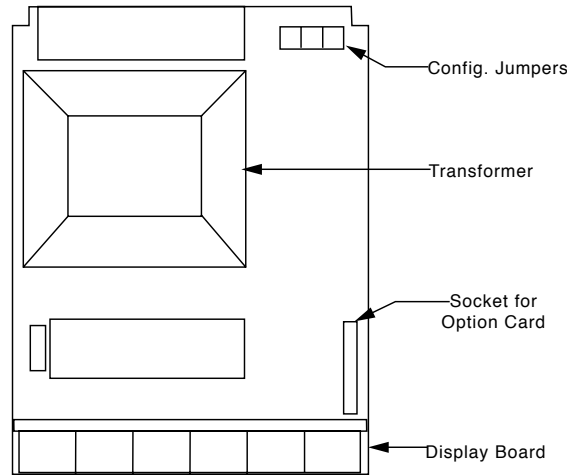
Internal View of Meter for
Locating Option Connector

Figure 15: Internal View of Meter (Option Card Socket)
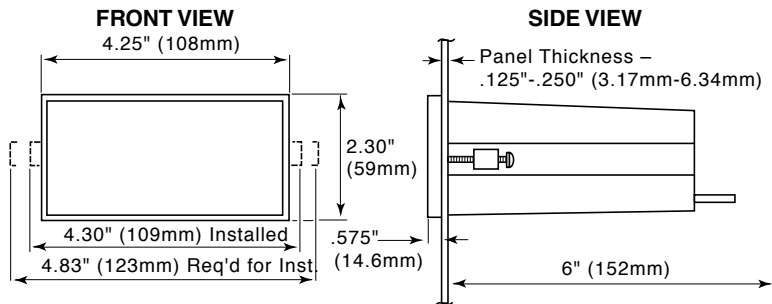
MOUNTING DIMENSIONS

Figure 16: Mounting Dimensions

Notes:
1. Panel cutout required: 1.772" X 3.622" (45 mm x 92 mm) 1/8 DIN
2. Panel thickness: 0.125" - 0.250" (3.17 mm - 6.34 mm)
3. Allow 6 inches (152 mm) behind the panel
4. Weight 16 oz. (454 g)

OTHER PRECISION DIGITAL PRODUCTS

Model	Description
PD118	MINIMUX® 8 Point Scanner
PD128	PLC Annunciator
PD141AFO	VIGILANTE® four Point Annunciator with First-out
PD148	AC/DC Annunciator
PD650	2.3" LED NEMA 4X Large Display Process Meter
PD655	1.0" LED NEMA 4X Large Display Process Meter
PD656	0.8" LED Exp-Proof Large Display Process Meter
PD750	1/8 DIN Universal Temperature Meter
PD755	1.0" LED NEMA 4X Large Display Temperature Meter
PD756	0.8" LED Exp-Proof Large Display Temperature Meter
PD757	2.3" LED NEMA 4X Large Display Temperature Meter
PD660	Low-cost NEMA 4X Loop-powered Meter
PD661	Low-cost Exp-proof Loop-powered Meter
PD673/674	$4\frac{1}{2}$ Digit Loop-powered 1/8 DIN Meter
PD675/676	$4\frac{1}{2}$ Digit Loop-powered NEMA 4X Meter (FM Approved)
PD677/678	$4\frac{1}{2}$ Digit Loop-powered Exp-proof Meter
PD680	$3\frac{1}{2}$ Digit Loop-powered 1/8 DIN Meter
PD682	$3\frac{1}{2}$ Digit Loop-powered 1/8 DIN Meter (FM Approved)
PD686	$3\frac{1}{2}$ Digit Loop-powered NEMA 4X Meter (FM Approved)
PD687	$3\frac{1}{2}$ Digit Loop-powered Explosion-proof Meter
PD690	1/8 DIN Universal Process Meter
PD691	1/8 DIN Universal mV Strain Gauge & Load Cell Meter
PD692	1/8 DIN Analog Input Flow Rate/totalizer
PD693	1/8 DIN Frequency/Pulse Input Flow Rate/totalizer
PD694	1/8 DIN 0-200 DC Volt Meter
PD696	1/8 DIN Loop-powered Flow Rate/totalizer
PD697	NEMA 4X Loop-powered Flow Rate/totalizer
PD698	Explosion-proof Loop-powered Flow Rate/totalizer

How to Contact Precision Digital

• For Technical Support please
  call: (800) 610-5239
  fax: (508) 655-8990
  e-mail: support@predig.com

• For Sales Support or to place an order please
  call: (800) 343-1001
  fax: (317) 216-1277
  e-mail: mrootes@predig.com

• For Warranty Registration and to Double Your
  Warranty on-line please visit
  www.predig.com

• For an online version of this instruction manual
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  www.predig.com

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