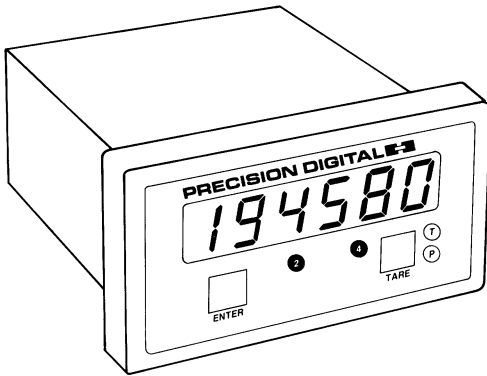


DIGITAL METERS

Universal Strain Gauge Meter

Model PD691 Instruction Manual



- Easy Single Button Scaling
- Lockout Feature
- Peak Hold Feature
- Capture or Programmable Tare Feature
- 4½ Digits + Extra Zero Display
- Steady, Accurate Display to $\pm 199,990$
- Type 4X, NEMA 4X Front Panel
- 11 Point Linearization
- 4 Visual Alarm Points with Front Panel LED Status Indication
- 2 or 4 Relays + 4-20 mA Output Options
- Green Display Available

PRECISION DIGITAL CORPORATION
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Tel (800) 610-5239 • Fax (508) 655-8990



www.predig.com

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ORDERING INFORMATION

115 VAC Model	230 VAC Model	Description	Option Card*
PD691-3-N	PD691-4-N	No Options	
PD691-3-14	PD691-4-14	2 Relays	PD174
PD691-3-15	PD691-4-15	4-20 mA Out	PD175
PD691-3-16	PD691-4-16	2 Relays + 4-20 mA Out	PD176
PD691-3-17	PD691-4-17	4 Relays	PD177
PD691-3-18	PD691-4-18	4 Relays + 4-20 mA Out	PD178

Add (-**G**) to part number to call out meters with green display.

Example: The model PD691-3G-14 refers to a PD691 powered from 115 VAC with green display and 2 relays.

* Part numbers for option cards when purchased separately.

DEFINITIONS

Display	Parameter	Description
19999	Overrange	Indicates overrange condition
- 19999	Underrange	Indicates underrange condition
ALArS	Alarm and relay points	Sets alarm and relay set and reset points.
b or U	Bi-polar or uni-polar	Programs meter for bi-polar or uni-polar operation.
CALIB	Calibrate	To calibrate meter using a calibrated signal source.
dEC Pt	Decimal point	To program decimal point or light up extra "0".
dSPy P	Display peak	Displays the highest rate value captured.
Error	Error	Calibration not successful.
FAULT	Fault	Input signal out of range or open signal connection
no. PtS	Number of points	Programs meter for 2 to 11 calibration points.
outPut	Output	Programs optional 4-20 mA output values.
r or n	Ratiometric or non-ratiometric	Programs meter for ratiometric operation.
tArE	Tare	Programs meter for capture or programmable tare operation.

Safety Notice



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



WARNING: Risk of electric shock.



WARNING

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



AVERTISSEMENT

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

Notice

The information contained in this document is subject to change without notice.

WARRANTY

1 year parts and labor.

EXTENDED WARRANTY

Warranty may be extended an additional 12 months by returning the Product Registration Form within 2 months from date of purchase. See *Web Site*: www.predig.com for online registration.

SPECIFICATIONS

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

Basic Meter

INPUTS: Field selectable: 0-30 mV, 0-200 mV, ± 15 mV, ± 100 mV

RATIOMETRIC: Deviation less than 0.1% of full scale, ± 1 count, with $\pm 10\%$ variation in excitation voltage.

DISPLAY: Bright, large, 0.56" (14.2 mm) high efficiency red or green LED.
4½ digits + extra zero may be switched on to display $\pm 19,999(0)$. Leading zeros blanked.

CALIBRATION RANGE: 0 mV input may be set anywhere in range of the meter.
200 mV may be set anywhere above or below 0 mV input.

ISOLATED POWER SUPPLY: Selectable 5 VDC or 10 VDC $\pm 5\%$ @ 50 mA,
24 VDC $\pm 5\%$ @ 20 mA. Use to power either strain gauge or 4-20 mA output signal,
(maximum load resistance of 1200 Ω).

PEAK HOLD: Captures peak reading and displays it via the front panel ENTER button.

PEAK HOLD INDICATION: Front panel LED

TARE: Captures/sets current display to zero via front panel TARE button.
Programmable tare: automatically sets tare to a preset value.

TARE INDICATION: Front panel LED

ACCURACY: 0.05% of full scale, ± 1 count

ZERO STABILITY: 0.5 $\mu\text{V}/^\circ\text{C}$

SPAN STABILITY: 0.005% of full scale $^\circ\text{C}$

SENSITIVITY: Maximum 0.6 μV

LOCKOUT: Switch 8 at rear of instrument restricts modification of programmed values.

INPUT IMPEDANCE: 20 K Ω

POWER: 115 VAC or 230 VAC $\pm 10\%$, 50/60 Hz, 10 VA

ISOLATION: AC power: 1500 VAC; DC power: 500 VDC

NORMAL MODE REJECTION: 60 dB @ 50/60 Hz

OVERLOAD PROTECTION: 230 VDC or VAC across inputs or input to ground

ENVIRONMENTAL:

Operational Ambient Temperature Range: 0 to 60°C

Storage temperature range: -40 to 85°C

Relative humidity: 0 to 90% non-condensing

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

FRONT PANEL: Type 4X, NEMA 4X, panel gasket provided

CONNECTIONS: Removable screw terminal block, accepts 22 to 12 AWG.

ALARM POINTS: 4, any combination of high or low alarms

ALARM STATUS INDICATION: Front panel LED

ALARM DEADBAND: 0-100% of full scale, user selectable

UL FILE NUMBER: E160849; 508 Industrial Control Equipment

Options

Relays

RATING: 2 or 4 relays; SPDT (form C); rated 2 Amp @ 30 VDC or 2 Amp @ 250 VAC resistive load; 1/14 HP @ 125/250 VAC for NC contacts and 1/10 HP @ 125/250 VAC for NO contacts, inductive load.

RESET: User selectable

1. Automatically when the input passes the reset point.
2. Automatically + manually (via user supplied switch). Manual reset resets all manually resettable relays, (that have been tripped).

FAIL-SAFE OPERATION: The relay coils are energized in the non-alarm condition. In the case of a power failure, the relays will go to the alarm state.

AUTO INITIALIZATION: When power is applied to the meter, the relays will always reflect the state of the input to the meter.

DEADBAND: 0-100%, user selectable

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 on the meter. The 20 mA output may correspond to any number displayed on the meter that is at least 501 counts greater or smaller than the 4 mA output display. (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.

OUTPUT LOOP RESISTANCE: 1000 Ω max. using a 35V external power supply. 600 Ω max. using the built-in power supply. Built-in power supply available for either 4-20 mA output @ 24 VDC or signal input, 5 or 10 VDC @ 50 mA, but not both.

ACCURACY: $\pm 0.1\%$ FS, $\pm .004$ mA

ISOLATION: 500 VDC or peak AC, input-to-output or input/output-to-power line

EXTERNAL LOOP POWER SUPPLY: 35 V maximum

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

DESCRIPTION

All meters, regardless of configuration, have the same front panel. The front panel consists of a single button for programming and calibrating labeled **ENTER** and another button for setting Tare, labeled **TARE**.

In addition, the meter front panel includes LEDs that illuminate to assist in 4-20 mA output and alarm programming. LEDs are also provided to indicate Alarm, Peak Hold and Tare status.

SETUP AND PROGRAMMING

Set the Configuration Switch (SW1) for desired input and excitation per chart below. The Configuration Switch is located at the rear of the instrument next to the screw terminal block. Set switch 8 to the off position to disable Lockout feature.

FUNCTION	CONFIGURATION SWITCH (SW1)							
	8	7	6	5	4	3	2	1
Switch Number								
Ratiometric with Internal excitation		On	On					
Ratiometric with External excitation		Off	Off					
0-30 mV input				On	Off			
0-200 mV input				Off	Off			
± 15 mV input				On	On			
± 100 mV input				Off	On			
24 VDC Excitation						Off	Off	On
10 VDC Excitation						On	Off	Off
5 VDC Excitation						Off	On	Off
Lockout Feature	On							

Power and Signal Connections

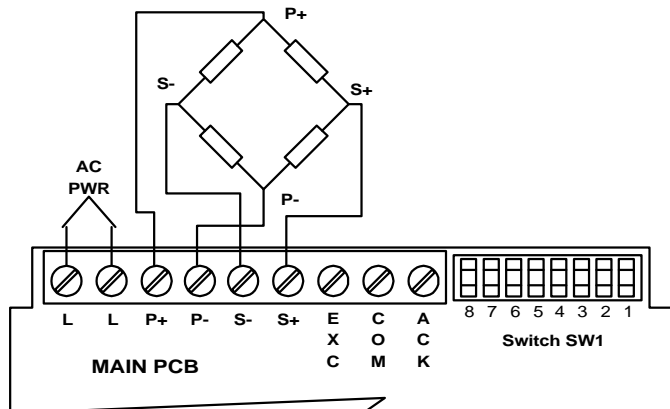


Figure 1. Strain gauge powered from internal power supply

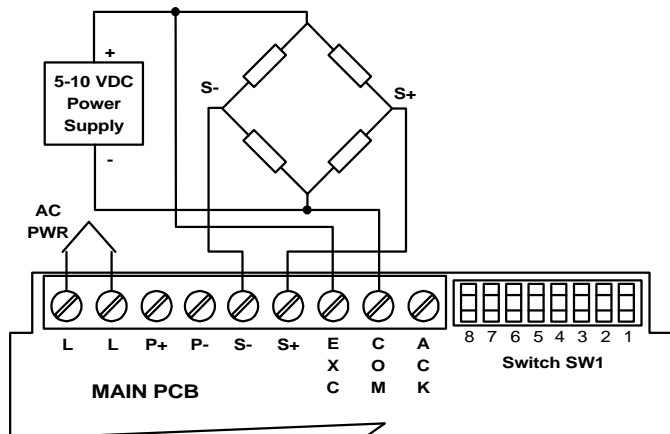


Figure 2. Strain gauge powered from external power supply

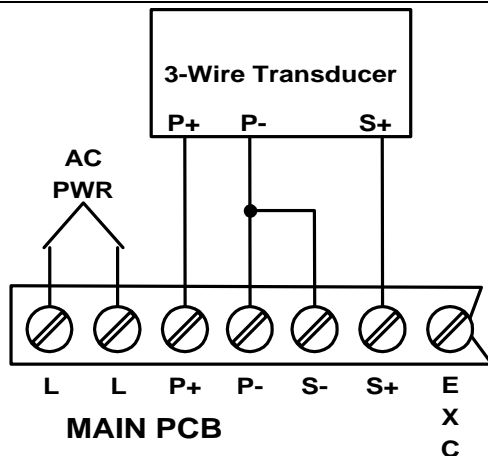


Figure 3. Three-wire transducer powered from internal power supply

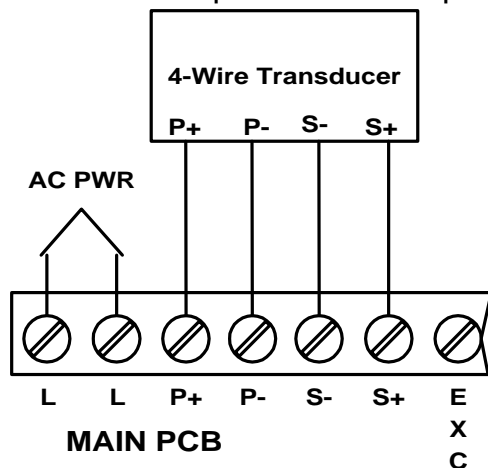


Figure 4. Four-wire transducer powered from internal power supply
Note: For two-wire mV signals connect positive lead to S+ and negative to S-.

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 = ¼ in (7 mm). **DO NOT** pre-treat wire with solder.
2. Terminals L and L: Use AWG #12-18 wire, 600 volt, 60°C. Only one wire to each terminal.
3. Terminals P+, P-, S-, S+, EXC, COM, and ACK: 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 1 wire may be connected to each terminal.

Programming the Meter

The meter's **Single Button Scaling** allows it to be programmed using only the **ENTER** button. The general procedure is to push the **ENTER** button to accept a flashing display or to wait for the display to scroll and push **ENTER** when the desired display appears.

For instance the first time the **ENTER** button is pushed, the meter scrolls through the standard programming routine titles as shown in the following table. It will also scroll the **outPut** programming routine if the meter contains an isolated 4-20 mA output option. To enter a programming routine, push **ENTER** when the meter displays the desired programming routine title.

Display	Parameter	Description
dSPy P	Display peak	Displays the highest rate value captured.
tArE	Tare	Programs meter for capture or programmable tare operation.
CALiB	Calibrate	Calibrates meter using a calibrated signal source.
dECPt	Decimal point	To program decimal point or light up extra "0".
no. PtS	Number of points	Programs meter for 2 to 11 calibration points.
r or n	Ratiometric or non-ratiometric	Programs meter for ratiometric operation.
b or U	Bi-polar or uni-polar	Programs meter for bi-polar or uni-polar operation if ratiometric operation is selected.
ALArS	Alarm and relay points	Sets alarm and relay set and reset points.
outPut	Output	Programs optional 4-20 mA output values. Function is displayed only when 4-20 mA output option is installed.

Calibration of the Meter

Calibration is performed from the front panel using the **ENTER** button. It does not require any tools or disassembly of the meter. The only equipment needed is a calibrated signal source.

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

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

An **Error** message will appear if input 1 signal and input 2 signal are too close together:

Input Range	Minimum Difference Between Input 1 and Input 2:
0-30 mV	1 mV / (# of points-1)
0-200 mV	5 mV / (# of points-1)
± 15 mV	1 mV / (# of points-1)
± 100 mV	5 mV / (# of points-1)
Example:	Minimum span for a 11 point 0-30 mV range is .1 mV between points.

Single Button Scaling

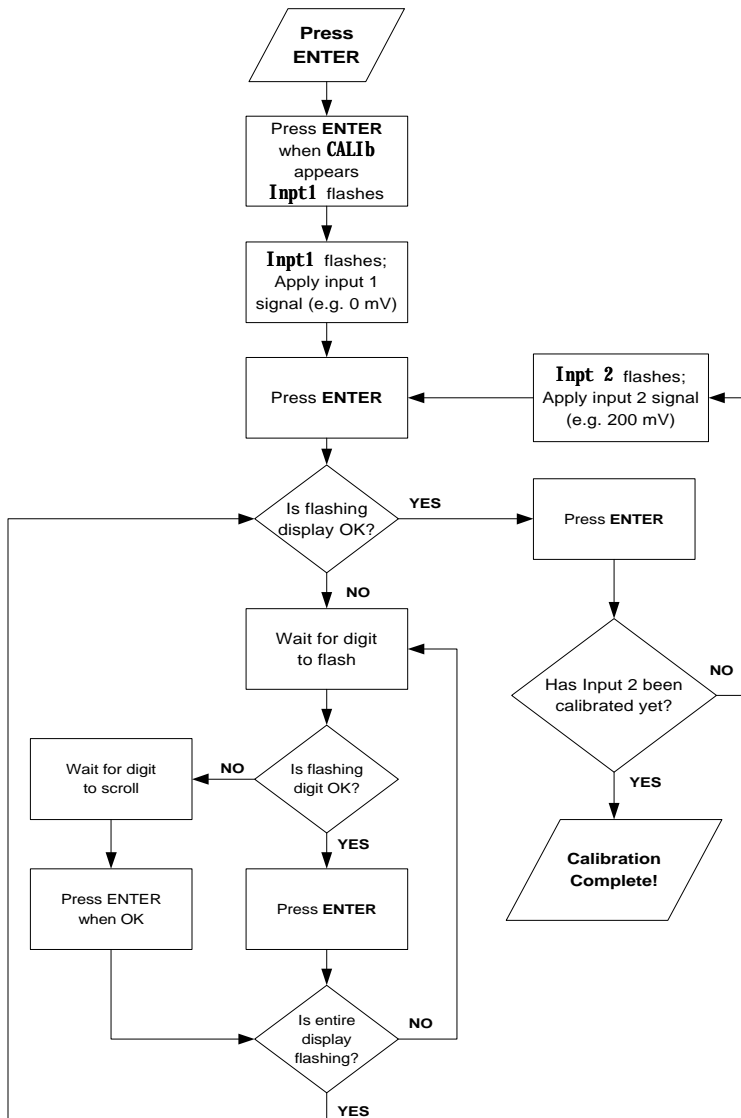
The **Single Button Scaling** technique is used to program many of the meter's functions which include; Calibration, Tare, Alarm Set and Reset points and the 4 mA and 20 mA output values.

Five basic calibration instructions

1. If the flashing display is OK, push **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 the 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.

The following flowchart illustrates a 2 point calibration using **Single Button Scaling**. The same general procedure is used for 11 point user calibrations, alarm set and reset point programming, and 4-20 mA output programming.

Calibration Flowchart



Decimal Point (Dec Pt)

To program the decimal point or light up the extra "0", push **ENTER**. Push **ENTER** again when **dEC Pt** appears. The meter then reads 199990 with the decimal point changing locations and the extra "0" illuminating. Push **ENTER** when the decimal point is in the desired position; or if the extra "0" is desired; when the extra "0" is displayed.

Number of Calibration Points (No. Pts)

The user may input up to 11 calibration points and corresponding displays.

To program the number of calibration points:

1. Push **ENTER**, when **no. PtS** appears, push **ENTER** again. The meter displays a number from 2 to 11 that represents the number of calibration points.
2. Push **ENTER** when the number equals the desired number of calibration points.

As soon as the number of points is programmed, the meter flashes **InPt 1**. Refer to **Calibration Procedure (CALIb)** on page 16, to calibrate each point.

Calibration Procedure (CALiB)

1. Push **ENTER**, when **CALiB** appears push **ENTER** again.
2. Meter flashes **InPt 1**. Apply input 1 signal THEN push **ENTER**, (e.g. 0 mV, -15 mV, etc.)
3. All digits flash for 3 seconds
If this is the desired display for input 1, push **ENTER** before entire display stops flashing (meter will then flash **InPt 2**). Go to step 9 below.

If this is not the desired display, (or if **ENTER** was not pushed in time to accept the display) wait for the first digit to flash.

First digit flashes for 3 seconds before it scrolls.

4. When digit is OK, push **ENTER**, next digit will flash for 3 seconds before it scrolls.
5. When flashing digit is OK, push **ENTER**, next digit will flash for 3 seconds before it scrolls.
6. Repeat step 4 for each remaining digits.
7. When last digit is OK, press **ENTER**.
8. Entire display will flash for 3 seconds. Press **ENTER** within the 3 seconds if OK to complete input 1 calibration. If not OK, wait for first digit to flash and go to step 3 above.
9. Meter flashes **InPt 2**. Apply input 2 signal THEN push **ENTER**, (e.g. 30 mV, 200 mV, etc.)
10. GO TO STEP 3 ABOVE.

Calibration Error

A meter display of **Error** during calibration indicates that the calibration process was not successful. The meter should be recalibrated.

The **Error** message will appear if input 1 signal and input 2 signal are too close together, see chart on page 13.

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.

Selecting Ratiometric or Normal Operation

Selecting Ratiometric (**r**) allows the meter to compensate for small fluctuations in the excitation power supply. A voltage drift of $\pm 10\%$ will not affect the display value of the meter when in Ratiometric mode.

Selecting normal (**n**) results in the meter not compensating for voltage fluctuations. The display value will shift as voltage change.

1. Push **ENTER**. When **r or n** appears, push **ENTER** again.
2. The meter will alternately flash **r or n**. Press **ENTER** when desired character is flashing. Meter will then revert back to indication mode.

Selecting Bi-Polar or Uni-Polar Operation

When using Ratiometric (**r**) operation the meter must be programmed according to the input switch selections. If a uni-polar input is selected (0-30 mV or 0-200 mV), then uni-polar operation **U** must be selected. If a bi-polar input is selected (± 15 mV or ± 100 mV), then bi-polar operation (**b**) must be selected. If Normal operation (**n**) is selected meter is able to read bi-polar signals.

This feature can only be accessed if Ratiometric Operation has been selected, see above.

1. Push **ENTER**. When **b or U** appears, push **ENTER** again.
2. The meter will alternately flash **b or U**. Press **ENTER** when desired character is flashing. Meter will then revert back to indication mode.

Selecting Tare Function

The meter can be set for either Capture or Programmable Tare. Capture Tare sets a currently displayed reading to zero via front panel TARE button. The operator may reset Capture Tare at any time in the field. Programmable Tare will automatically subtract a set tare value from the actual reading.

Example of Capture Tare: a current display of some random number, say 13.0, is set to 0 when the TARE button is pressed.

Example of Programmable Tare: if tare is set to 10.0, then a reading of 100.0 will always be displayed as 90.0 in the Programmable Tare mode.

1. Push **ENTER**. When **tArE** appears, push **ENTER** again.
2. The meter displays **tArE** and starts to scroll through the choices, (0-2). Press **ENTER** when desired digit appears (see chart below).

Tare	Choice Number
Off	0
Capture Tare	1
Programmable Tare	2

Capture Tare

When Capture Tare (1) is selected meter will revert back to indication mode displaying current reading. Pressing the TARE button resets the display to Zero and a green LED labeled "T" illuminates indicating the display is showing a tare value. A new tare value may be set at any time by pressing the TARE button.

To clear the tare value simply push **ENTER**, when **tArE** appears push **ENTER** again. When the meter displays **tArE 1**, Press **ENTER** again.

Programmable Tare

When Programmable Tare (2) is selected, the desired tare value must be set. The display will flash for 3 seconds. If this is the desired display for the tare value, push **ENTER** before the entire display stops flashing. If this is not the desired value then the Programmable Tare value needs to be programmed using the **Single Button Scaling** technique (see **Five basic calibration instructions**, page 13).

Displaying Peak Value

The meter captures the highest displayed value and stores it in memory for later viewing. The peak value is stored in memory until reset by the user or until power to the meter is turned off.

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

4 ALARM POINTS

The meter is equipped with 4 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 2 and 4 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 deadband of 100. Alarm 2 set point is set at 1500 and its reset point at 1400.

Alarm Set and Reset Point Programming (ALArS)

Alarm set and reset point programming is performed in the **ALArS** routine.

1. To enter the **ALArS** routine, push **ENTER** and when **ALArS** appears, push **ENTER** again. This starts a scan of the 4 alarm set and reset points. The scan sequence begins with a flashing display of alarm #1 set point. The "1" LED and "S" LED are illuminated to indicate the meter is flashing alarm #1 set point value.
2. All digits flash for 3 seconds.
If this is the desired display for this alarm point, push **ENTER**. Pushing **ENTER** completes this alarm point programming. Proceed to step 8 for next alarm point programming.

If this is not the desired display, wait for the first digit to flash. It will flash for 3 seconds before it starts to scroll.

3. If the first flashing digit is OK, push **ENTER** before it starts to scroll to accept it, the second digit flashes- go to step 6. If not OK, wait for first digit to scroll.
4. When the first digit is OK, push **ENTER**, the next digit flashes for 3 seconds before it starts to scroll.
5. If the flashing digit is OK, push **ENTER** before it scrolls. If not OK, wait for digit to scroll.
6. When digit is OK, push **ENTER**. Program remaining digits in the same fashion.

7. When the last digit is OK, push **ENTER**. The entire display flashes for 3 seconds. Push **ENTER** if OK to complete alarm point programming and proceed to step 8. If not OK, wait, first digit flashes. Repeat steps 3-7.
8. When an alarm set and reset point have been programmed the scan moves to the next alarm set and reset point. To program the remaining alarm set and reset points, repeat steps 2-7.

Determine which alarm set or reset point is being programmed by noting which LEDs are illuminated. For instance, if the "3" LED and the "R" LED are illuminated, the meter is displaying alarm #3 reset point. 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 follow steps 3-8 above.

Alarm Operation

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

Relay Acknowledgment

Connect a N.O. contact push-button switch to the ACK and COM terminals. Closing the switch contacts will reset the optional relays only and has no effect on the alarm status LEDs.

Optional Relays and 4-20 mA Output Terminals

Options may contain 2 or 4 relays and an isolated 4-20 mA output transmitter. Connections are made to removable screw terminal connectors located on the Options PCB.

Function	Connector	Pin Number
Transmitter +	J1	1
Transmitter -	J1	2
Relay 1 Common	J2	1
Relay 1 NC	J2	2
Relay 1 NO	J2	3
Relay 2 Common	J2	4
Relay 2 NC	J2	5
Relay 2 NO	J2	6
Relay 3 Common	J3	1
Relay 3 NC	J3	2
Relay 3 NO	J3	3
Relay 4 Common	J3	4
Relay 4 NC	J3	5
Relay 4 NO	J3	6

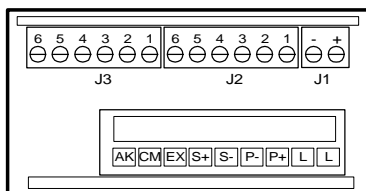


Figure 5. Rear View of Meter, Connectors Location

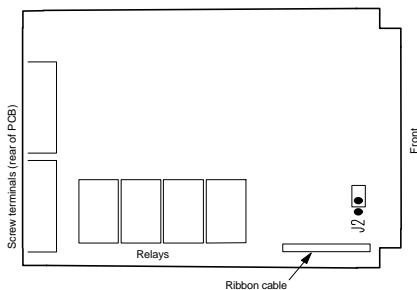


Figure 6. Fail-Safe Jumper Location

The failsafe operation can be disabled by removing jumper J2 located at the front of the relay option card (see figure to left). Refer to page 27 for option card removal

RELAYS (Optional)

The meter is available with 2 and 4 relays. The SPDT relays can be programmed for automatic or automatic + manual reset. The relays can also be programmed for 0-100% deadband.

Set and Reset Point Programming

Refer to page 19 to program the alarm (relay) set and reset points.

Automatic and Manual Reset

There are two ways to reset the relays:

1. Automatically when the signal passes through the reset point.
2. Automatically + manually, via a user supplied momentary N.O. push-button connected across terminals ACK and COM 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.

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 27 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.

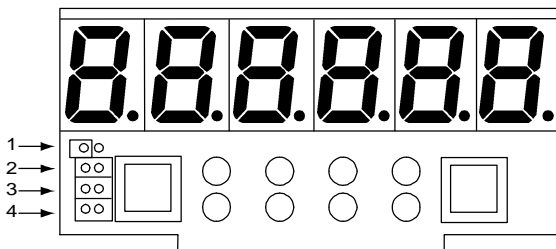


Figure 7. Relay Acknowledge Enable Jumpers

Relay 1 is programmed for automatic reset;
Relays 2, 3, and 4 are programmed for automatic + manual reset.

Switching Inductive Loads

The meter has the ability to suppress electrical noise generated by switching inductive loads. However, installing suppressors improves this performance even more 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 and DC Loads

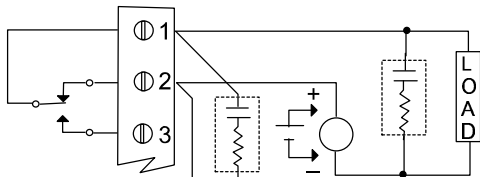


Figure 8. AC and DC Loads Protection

Choose R and C as follows:

R: 0.5 to 1 Ω for each volt across the contacts

C: 0.5 to 1 μF for each amp 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

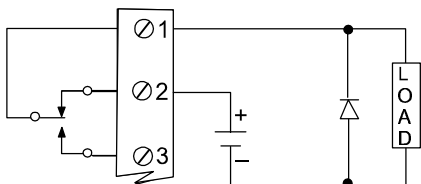


Figure 9. Low Voltage DC Loads Protection

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

Suppressors are available from Precision Digital and should be applied to each relay that switches an inductive load. Part number PDX-6901.

ISOLATED 4-20 MA OUTPUT OPTION

The meter can be equipped with an isolated 4-20 mA output option that can be programmed to produce a 4-20 mA output for virtually any input.

Connections

The following drawings illustrate the 4-20 mA output signal being powered from the meter's internal 24 V power supply and by an external power supply.

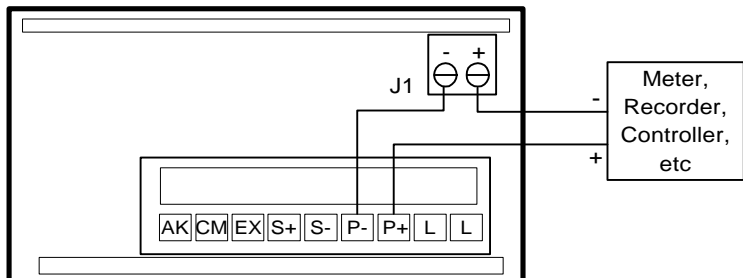


Figure 10. Output Loop Powered by Meter

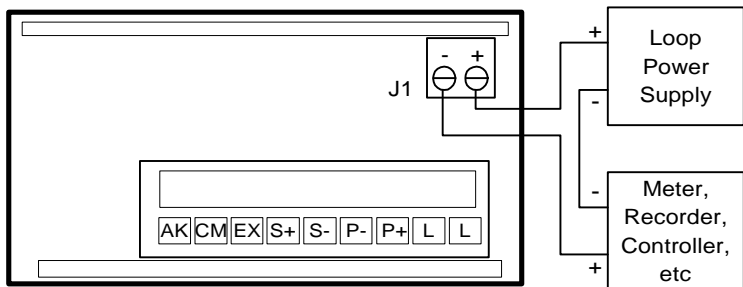


Figure 11. Output Loop Powered from External Supply



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.

Isolated 4-20 mA Output Calibration

The isolated 4-20 mA output signal is calibrated using the front panel **ENTER** button and uses the same **Single Button Scaling** technique that is used to calibrate the signal input and the alarm set and reset points. A current meter may be connected to the output terminals to verify calibration, but it is not required as part of the calibration process.

4 mA Output Calibration

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.

If this is the desired display at which the meter will produce a 4 mA output, push **ENTER** before entire display stops flashing. The meter indicates that the 4 mA Output Calibration is now complete by illuminating the green "20" LED. Go to 20 mA Output Calibration below.

If this is not the desired display, (or if **ENTER** was not pushed in time to accept the display) wait for the first digit to flash.

3. First digit flashes for 3 seconds before it scrolls.
4. When first digit is OK, push **ENTER**, next digit will flash for 3 seconds before it scrolls.
5. When flashing digit is OK, push **ENTER**, next digit will flash for 3 seconds before it scrolls.
6. Repeat step 5 for each remaining digits.
7. When last digit is OK, press **ENTER**.
8. Entire display will flash for 3 seconds. Press **ENTER** within the 3 seconds if OK to complete 4 mA Output Calibration. If NOT OK, wait for first digit to flash and go to step 5 above.

20 mA Output Calibration

Note: The 20 mA output calibrates in the same fashion as 4 mA output so the 4 mA Calibration Instructions will be referenced for most of the 20 mA Calibration Instructions.

1. When **ENTER** is pushed to complete the calibration 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. Repeat steps 2-8 in 4 mA Output Calibration above.
3. Upon acceptance of the display corresponding to the 20 mA output, the meter exits the **outPut** routine and returns to indication mode.

Note: 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 and 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.

LOCKOUT

Set switch 8 to the **ON** position to restrict modification of programmed values. When **ENTER** is pushed with switch 8 **ON**, only **dSPy P**, **tArE**, **ALArS**, and **outPut** routines are displayed. **dSPy P** can still be entered to activate the Peak Hold feature. **ALArS** and **outPut** routines may be entered to view their settings, but the settings may not be altered. If Capture Tare is in operation, the captured value can be cleared.

MOUNTING DIMENSIONS

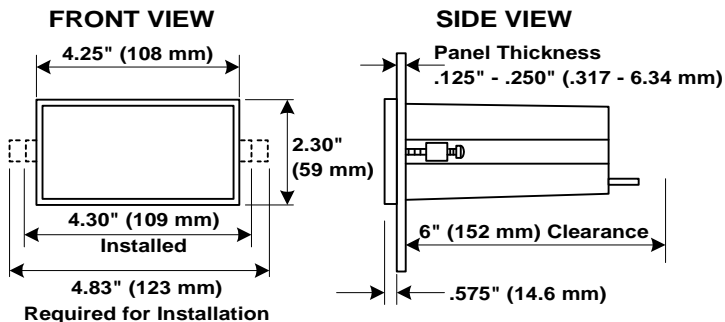


Figure 12. Mounting Dimensions

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. Approximate weight: 16 oz (454g)

OPTIONS CARD INSTALLATION

Options may be ordered completely installed at the factory. If an Options Card is ordered separately, refer to following instructions and illustrations.



Disconnect power prior to performing the following operations.

The meter's snap-off cover is held in place by 6 latches that snap into notches on the snap-off cover. To remove the snap-off cover from the meter, grasp it firmly on its top and bottom edges and pull it forward. The latch plate remains around the meter's case.

To remove the Main PCB from the case, unscrew the two front panel retaining screws and remove the screw terminal block at the rear of the meter. Push the meter through its case by applying pressure to the Main PCB at the rear of the meter. Do not apply pressure to the vertical display PCB.

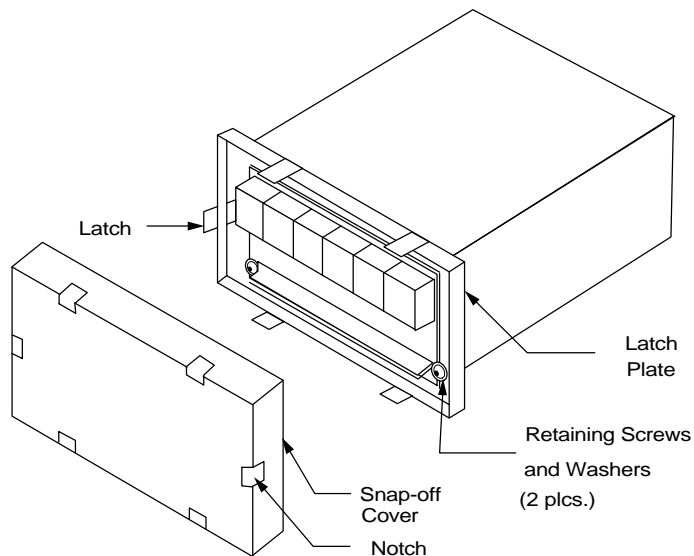


Figure 13. Removing Front Bezel

The Options PCB is connected to the meter by a flexible cable, which is permanently attached to the Options PCB. Place the Main PCB and the Options PCB side by side, with the Main PCB (display facing you) on the left, and with the Options PCB (with its flexible cable next to the Main PCB) on the right. Plug the flexible cable from the Options PCB into the socket on the Main PCB.

To avoid electric shock, re-install the PCBs in the case prior to applying power. All programming and calibrating can be performed with the PCBs installed in the case.

To re-install the meter in its case, fold the option PCB over the Main PCB, grasp both PCBs so the Main PCB is on the bottom and the two PCB's are separated by about an inch. Insert the two PCBs together into the case. Be sure both the top and bottom PCBs engage the rails, which hold them in place. Do not press on the Display PCB when seating the assembly in the case.

Install washers and retaining screws in 4 corners of meter and install front cover.

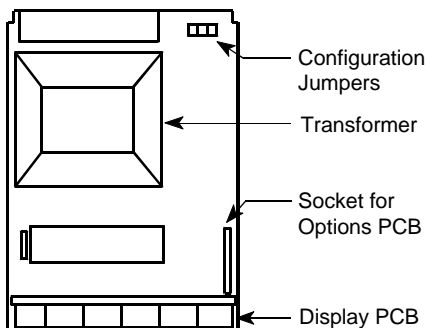


Figure 14. Internal View of Meter (Options PCB Socket)

User Programmed Parameters

Number of calibration points _____

Calibration Point Values

input 1	_____	display 1	_____
input 2	_____	display 2	_____
input 3	_____	display 3	_____
input 4	_____	display 4	_____
input 5	_____	display 5	_____
input 6	_____	display 6	_____
input 7	_____	display 7	_____
input 8	_____	display 8	_____
input 9	_____	display 9	_____
input 10	_____	display 10	_____
input 11	_____	display 11	_____

Ratiometric operation or
Bi-polar operation or

Normal operation
Uni-polar operation

Alarms

relay 1 set point	_____	reset point	_____
relay 2 set point	_____	reset point	_____
relay 3 set point	_____	reset point	_____
relay 4 set point	_____	reset point	_____

4-20 mA Output Option

4 mA display value _____
20 mA display value _____

Model Number: PD691 - _____ - _____

Serial Number: _____

OTHER PRECISION DIGITAL PRODUCTS

Model	Description
PD118	MINIMUX [®] 8 Point Scanner
PD128	PLC Annunciator
PD128-NI	PLC Annunciator (FM & CSA Approved)
PD141AFO	VIGILANTE [®] four Point Annunciator with First-Out
PD148	AC/DC Input Annunciator (UL Listed)
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 (UL Listed)
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	4½ Digit Loop Powered 1/8 DIN Meter
PD675/676	4½ Digit Loop Powered NEMA 4X Meter (FM & CSA)
PD677/678	4½ Digit Loop Powered Exp-Proof Meter
PD680	3½ Digit Loop Powered 1/8 DIN Meter
PD682	3½ Digit Loop Powered 1/8 DIN Meter (FM Approved)
PD686	3½ Digit Loop Powered NEMA 4X Meter (FM & CSA)
PD687	3½ Digit Loop Powered Exp-Proof Meter
PD690	1/8 DIN Universal Process Meter (UL Listed)
PD692	1/8 DIN Universal Process Meter (UL Listed)
PD693	1/8 DIN Freq/Pulse Input Flow Totalizer (UL Listed)
PD694	1/8 DIN 0-200 DC Volt Meter (UL Listed)
PD695	1/8 DIN True RMS AC Volt Meter
PD696	1/8 DIN Loop Powered Flow Rate/Totalizer
PD697	NEMA 4X Loop Powered Flow Rate/Totalizer
PD698	Exp-Proof Loop Powered Flow Rate/Totalizer

NOTES

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 please visit

www.predig.com



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