DFM-6301 SERIES Instruction Manual



KEY FEATURES

- NEMA 4X, IP65 Front
- Universal 85-265 VAC Input Power Models
- Large Dual-Line 6-Digit Display, 0.60" & 0.46"
- Isolated 24 VDC Transmitter Power Supply
- Programmable Displays & Function Keys
- Sunlight Readable Display Models
- Rate Displayed as Gallons per minute, Liters per second, Liters per minute
- Total displayed as Gallons, Cubic Meters, Cubic Feet
- Total, Grand Total or Non-Resettable Grand Total
- 9-Digit Totalizer with Total Overflow Feature
- K-Factor Calibration
- Optional Outputs – Models DFM 6301: Two C Form Relays programmable for rate or total + Isolated 4-20 mA Output to transmit rate

ORDERING INFORMATION

DFM-6300-00		Wall Mount flow monitor displays rate and total
DFM-6300-01		Panel mount flow monitor displays rate and total
DFM-6301-00		Wall mount flow monitor with Outputs 4-20mA + 2 relays
DFM-6301-01		Panel mount flow monitor with Outputs 4-20mA + 2 relays

Creative Sensor Technology, Inc.
www.creativesensortechnology.com
Email: info@creativesensortechnology.com

RevDFM 0415

COMPLIANCE INFORMATION

Safety

UL & c-UL LISTED	USA & Canada UL 508 Industrial Control Equipment
UL FILE NUMBER	E160849
FRONT PANEL	UL Type 4X, NEMA 4X, IP65; panel gasket provided
LOW VOLTAGE DIRECTIVE	EN 61010-1:2010 Safety requirements for measurement, control, and laboratory use

Electromagnetic Compatibility

EMISSIONS	EN 55022:2010 Class A ITE emissions requirements
Radiated Emissions	Class A
AC Mains Conducted Emissions	Class A
IMMUNITY	EN 61326-1:2006 Measurement, control, and laboratory equipment EN 61000-6-2:2005 EMC heavy industrial generic immunity standard
RFI - Amplitude Modulated	80 -1000 MHz 10 V/m 80% AM (1 kHz) 1.4 - 2.0 GHz 3 V/m 80% AM (1 kHz) 2.0 - 2.7 GHz 1 V/m 80% AM (1 kHz)
Electrical Fast Transients	±2kV AC mains, ±1kV other
Electrostatic Discharge	±4kV contact, ±8kV air
RFI - Conducted	10V, 0.15-80 MHz, 1kHz 80% AM
AC Surge	±2kV Common, ±1kV Differential
Surge	1KV (CM)
Power-Frequency Magnetic Field	3 A/m 70%V for 0.5 period
Voltage Dips	40%V for 5 & 50 periods 70%V for 25 periods
Voltage Interruptions	<5%V for 250 periods

Note:

Testing was conducted on DFM6300 meters installed through the covers of grounded metal enclosures with cable shields grounded at the point of entry representing installations designed to optimize EMC performance.

Declaration of Conformity available at www.creativesensortechnology.com

SAFETY INFORMATION



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



WARNING: ***Risk of electric shock or personal injury.***



Warning!

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

INSTALLATION

There is no need to remove the meter from its case to complete the installation, wiring, and setup of the meter for most applications.

Unpacking

Remove the meter from box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier.

If any part is missing or the meter malfunctions, please contact your supplier or the factory for assistance.

Panel Mounting Instructions

- Prepare a standard 1/8 DIN panel cutout – 3.622" x 1.772" (92 mm x 45 mm). Refer to Figure 1 for more details.
- Clearance: allow at least 6.0" (152 mm) behind the panel for wiring.
- Panel thickness: 0.04" - 0.25" (1.0 mm - 6.4 mm).
  Recommended minimum panel thickness to maintain Type 4X rating: 0.06" (1.5 mm) steel panel, 0.16" (4.1 mm) plastic panel.
- Remove the two mounting brackets provided with the meter (back-off the two screws so that there is ¼" (6.4 mm) or less through the bracket. Slide the bracket toward the front of the case and remove).
- Insert meter into the panel cutout.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until meter is snug to the panel along its short side. DO NOT OVER TIGHTEN, as the rear of the panel may be damaged.

Note: See Figure 10 on page 30 for 1/8 DIN Panel Cutout Template

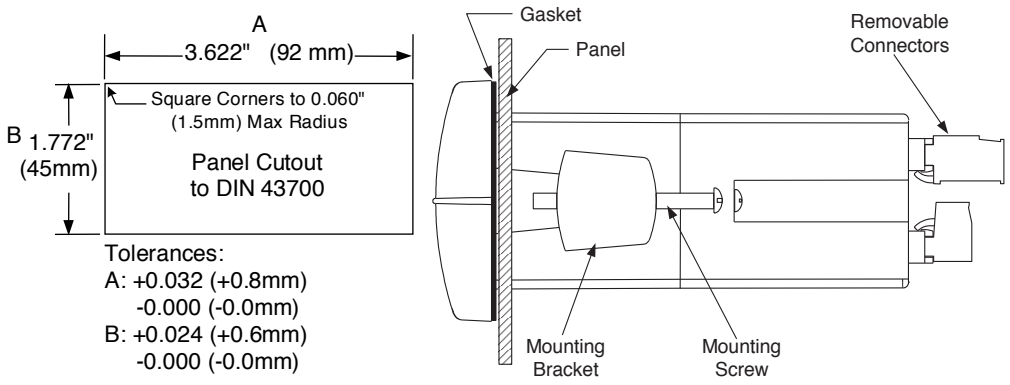


Figure 1: 1/8 DIN Panel Cutout and Mounting

Mounting Dimensions

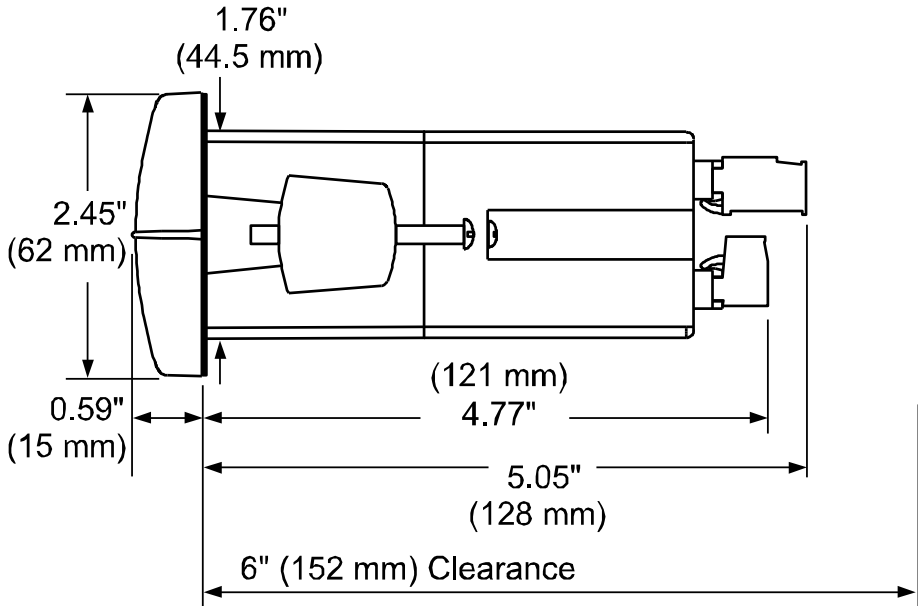


Figure 2: Meter Dimensions - Side View

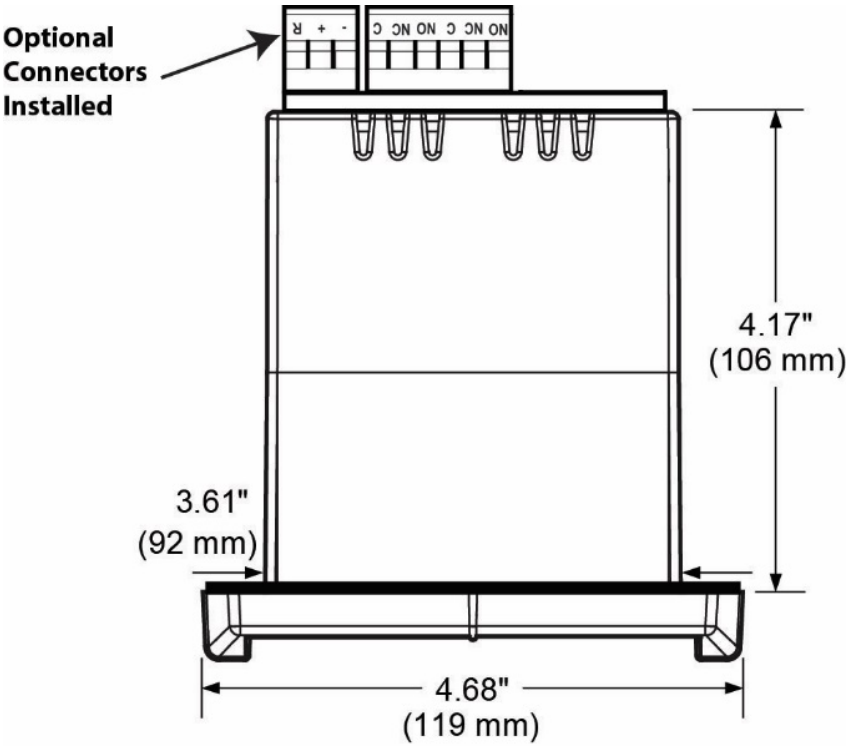


Figure 3: Meter Dimensions - Top View

Connectors Labeling

The connectors' label, affixed to the meter, shows the location of all connectors available with requested configuration.

Warning!

Do not connect any equipment to the RJ45 M-LINK connector. This connector is intended for factory use only. If non-standard equipment is connected to the M-LINK, damage will occur to the equipment and the meter.

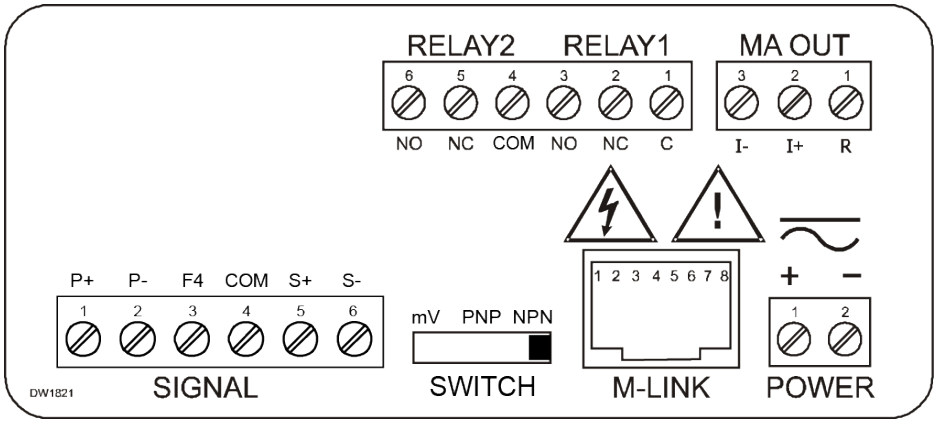


Figure 4: Connector Labeling for Fully Loaded PD6300-CS

Wiring Connections

Power connections are made to a two-terminal connector labeled POWER on Figure 4. The + and - symbols are only a suggested wiring convention.

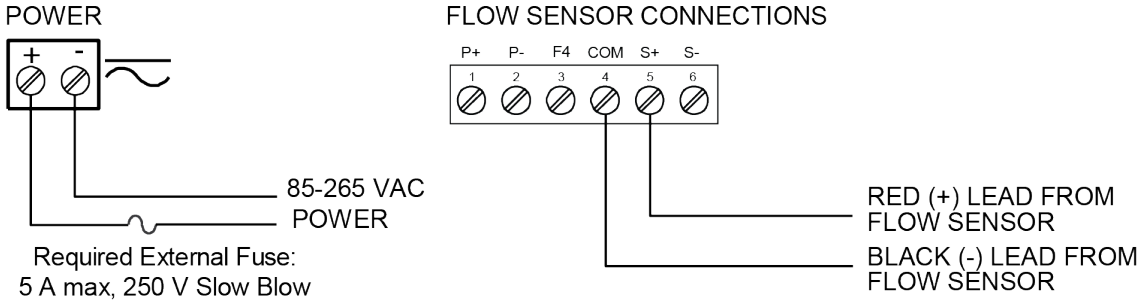


Figure 5: Wiring Connections

Front Panel Buttons and Status LED Indicators



Button Symbol	Description
MENU	**Menu**
F1	**Right arrow/F1**
F2	**Up arrow/F2**
F3	**Enter/F3**

LED	Status
1-8	Alarm 1 – 8 indicator
R	Rate indicator
T	Total indicator
G T	Grand Total indicator
▲	Total overflow indicator
M	Manual control relays &/or analog output

- Press the Menu button to enter or exit the Programming Mode at any time.
- Press the Right arrow button to move to the next digit during digit or decimal point programming.
- Press or hold the Up arrow button to scroll through the menus, decimal point, or press or hold to increment the value of a digit.
- Press the Enter button to access a menu or to accept a setting.

Display Functions and Messages

The meter displays various functions and messages during setup, programming, and operation. The following table shows the main menu functions and messages in the order they appear in the menu.

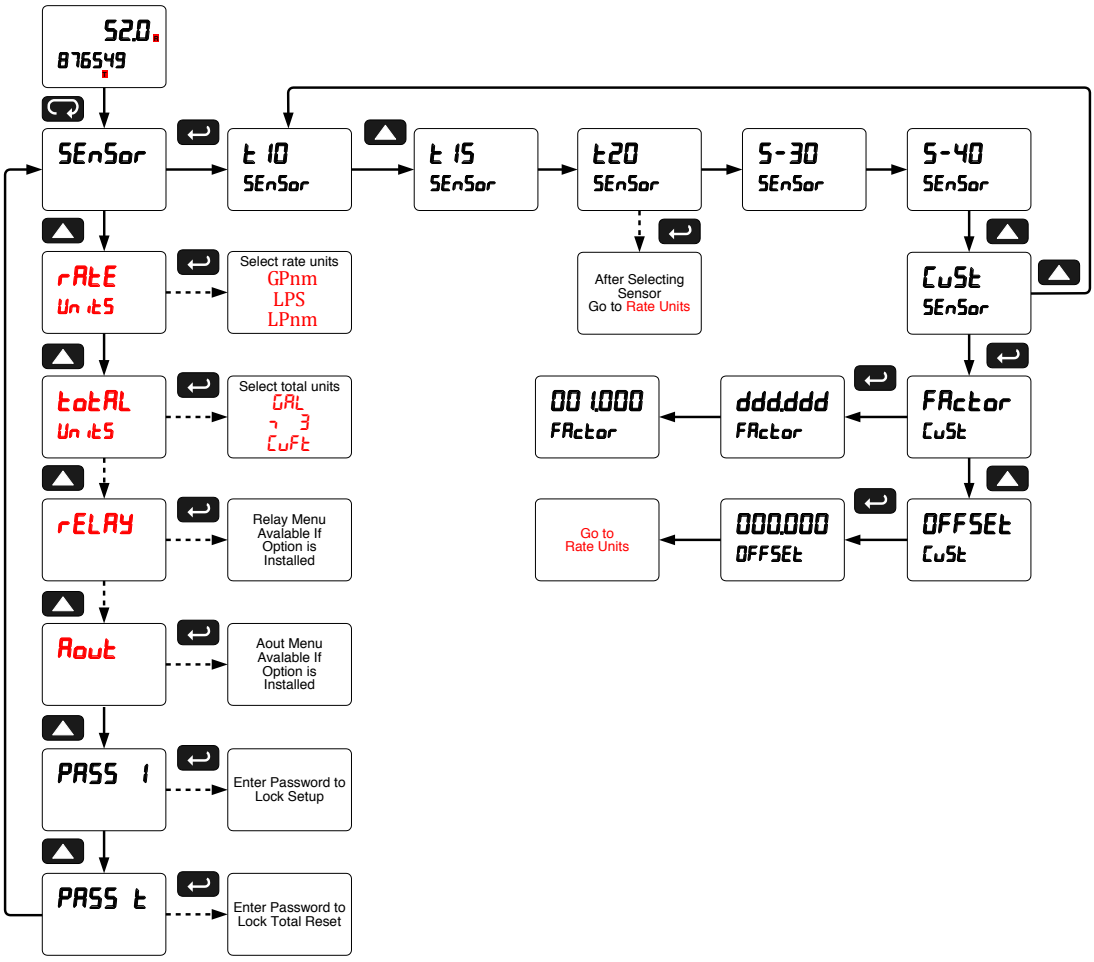
Display	Parameter	Action/Setting Description
DFM-6300 SERIES		
SEnSor	*Sensor*	Select the appropriate sensor
t 10	*T10*	Type T10 Sensor
t 15	*T15*	Type T15 Sensor
t20	*T20*	Type T20 Sensor
S-30	*S-30*	Type S-30 Sensor
S-40	*S-40*	Type S-40 Sensor
CuSt	*Custom*	Custom Sensor
FACtor	*K-Factor*	Custom Sensor K-Factor
OFFSEt	*Offset*	Custom Sensor Offset
rAtE Un itS	*Rate Units*	Select the display units for rate
totAL Un itS	*Total Units*	Select the display units for total
OPTIONAL OUTPUT: DFM-6301 MODELS		
rELAY	*Relay*	Enter the *Relay* menu
ASS iGn	*Assignment*	Assign relays to rate, total, grand total, or Modbus
AS iGn 1	*Assign 1*	Relay 1 assignment
rAtE	*Rate*	Assign relay to rate
totAL	*Total*	Assign relay to total
G totAL	*Grand total*	Assign relay to grand total
rLY 1	*Relay 1*	Relay 1 setup
Act 1	*Action 1*	Set relay 1 action
Auto	*Automatic*	Set relay for automatic reset
A-mn An	*Auto-manual*	Set relay for automatic & manual reset any time
LAtCH	*Latching*	Set relay for latching operation (relays assigned to rate)

Display	Parameter	Action/Setting Description
Lt-CLr	*Latching-cleared*	Set relay for latching operation with manual reset only after alarm condition has cleared (relays assigned to rate)
ALtErn	*Alternate*	Set relay for alternation control (relays assigned to rate)
SAmPL	*Sampling*	Set relay for sampling operation
OFF	*Off*	Disable relay and front panel status LED (Select Off to enable Interlock feature)
SEt 1	*Set 1*	Program set point 1
rSt 1	*Reset 1*	Program reset point 1
rLY 2	*Relay 2*	Relay 2 setup
FAILSF	*Fail-safe*	Enter *Fail-safe* menu
FLS 1	*Fail-safe 1*	Set relay 1 fail-safe operation
on	*On*	Enable fail-safe operation
oFF	*Fail-safe off*	Disable fail-safe operation
dELAY	*Delay*	Enter relay *Time Delay* menu
dLY 1	*Delay 1*	Enter relay 1 time delay setup
On 1	*On*	Set relay 1 On time delay
OFF 1	*Off*	Set relay 1 Off time delay
Aout	*Analog output*	Enter the *Analog output* scaling menu
dIS 1	*Display 1*	Program display 1 value
Out 1	*Output 1*	Program output 1 value (e.g. 4.000 mA)
dIS 2	*Display 2*	Program display 2 value
Out 2	*Output 2*	Program output 2 value (e.g. 20.000 mA)
ALL DFM-6300 SERIES		
PASS 1	*Password*	Password protect the meter
PASS t	*Total Password*	Password protect the resetting of the total

Main Menu

The main menu consists of the most commonly used functions: *Sensor, Rate Units, Total Units*, *Relay*, *Analog Out*, *Password* and *Total Password*.

- Press Menu button to enter *Programming Mode* then press the *Up Arrow* button to scroll through the main menu.



- Press Menu, at any time, to exit and return to *Run Mode*. Changes made to settings prior to pressing *Enter* are not saved.
- Changes to the settings are saved to memory only after pressing *Enter*.
- The display moves to the next menu every time a setting is accepted by pressing *Enter*.

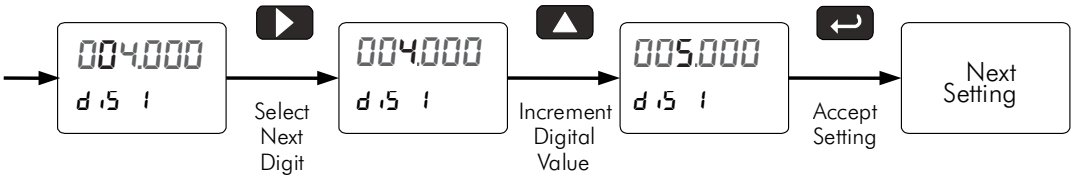
Setting Numeric Values

The numeric values are set using the Right and Up arrow buttons. Press Right arrow to select next digit and Up arrow to increment digit value.

The digit being changed is displayed brighter than the rest.

Press and hold up arrow to auto-increment the display value.

Press the Enter button, at any time, to accept a setting or Menu button to exit without saving changes.

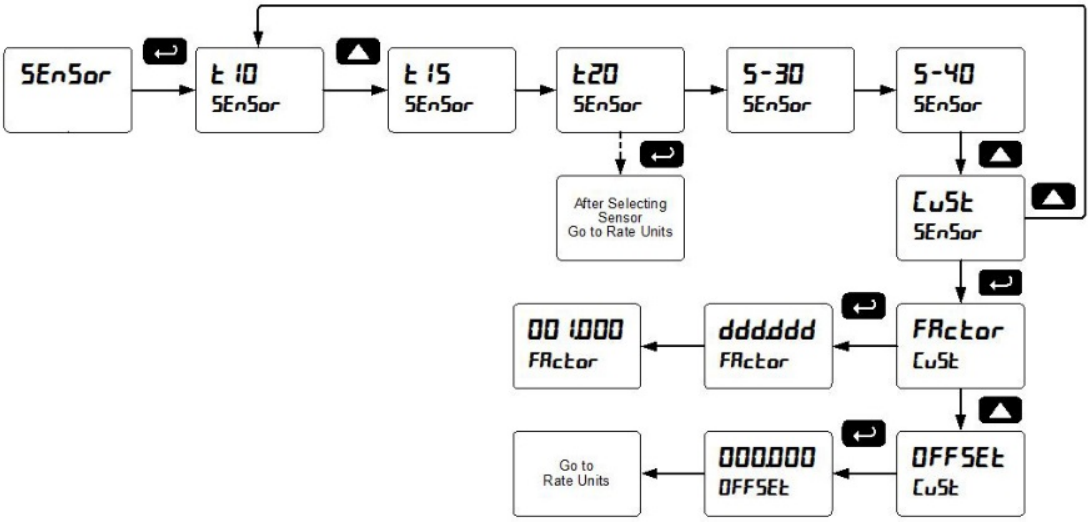


Selecting a Sensor Type (SEnSor)

The *Sensor* menu is used to select the sensor type from the following options:

1. T10
2. T15
3. T20
4. S-30
5. S-40
6. Custom

Press the *Enter* button to access any menu or press the *Up Arrow* button to scroll through choices. Press the *Menu* button to exit at any time.



Use the Custom menu to enter the K-Factor and Offset for a custom sensor not included in this meter.

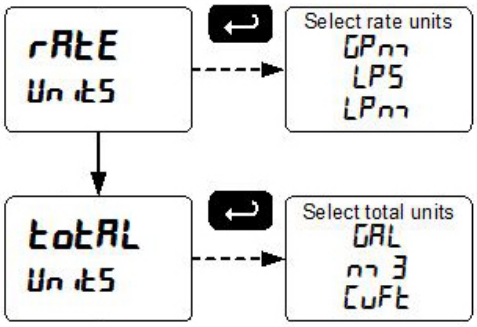
K-Factor Calibration (FActor)

The meter may be calibrated using the *K-Factor* function. Most flowmeter manufacturers provide this information with the device. Enter the *K-Factor* (FActor) menu and select the decimal point with highest resolution possible and program the k-factor value (*from sensor manual*). The meter will automatically calculate the flow rate using the k-factor and the time base selected.



Select Rate and Total Units (rAtE unitS/totAL unitS)

Use the rate units and total units menus to select the appropriate rate and total units for your application.



The units available for rate are:

1. Gallons per minute (GPm)
2. Liters per second (LPS)
3. Liters per minute (LPm)

The units available for total are:

1. Gallons (GAL)
2. Cubic meters (m3)
3. Cubic feet (CuFt)

Setting up the Password (PASS)

The *Password* menu is used for programming two levels of security to prevent unauthorized changes to the programmed parameter settings.

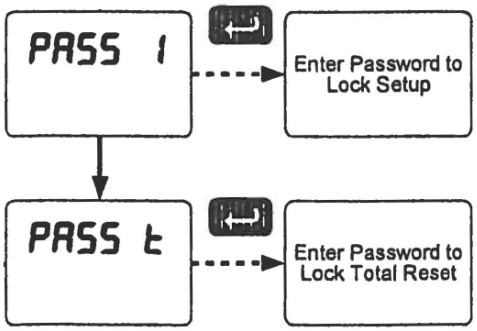
Pass 1: Restricts all programming and function keys Pass T: Prevents resetting the total manually.

Protecting or Locking the Meter

Enter the *Password* menu and program a six-digit password.

For instructions on how to program numeric values see

Setting Numeric Values, page 11.



Record the password for future reference. If appropriate, it may be recorded in the space provided.

Model:	
Serial Number:	
Password 1:	__ __ __ __ __ __
Total Password	__ __ __ __ __ __

Making Changes to a Password Protected Meter

If the meter is password protected, the meter will display the message Locd (*Locked*) when the Menu button is pressed. Press the Enter button while the message is being displayed and enter the correct password to gain access the menu. After exiting the programming mode, the meter returns to its password protected condition.

Disabling Password Protection

To disable the password protection, access the setup menu by following the instructions under **Making Changes to a Password Protected Meter** on page 13. Navigate to the applicable password menu, press *Enter* and then enter the correct password.

If the correct six-digit password is entered, the meter displays the message unLoc (unlocked) and the protection is disabled until a new password is programmed.

If the password entered is incorrect, the meter displays the message Locd (Locked) for about two seconds, and then it returns to Run Mode. To try again, press Enter while the *Locked* message is displayed.

Did you forget the password?

The password may be disabled by entering a master password once. If you are authorized to make changes, enter the master password 508655 to unlock the meter.

Relays

RATING	2 SPDT (Form C) internal; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP (≈ 50 W) @ 125/250 VAC for inductive loads
NOISE SUPPRESSION	Noise suppression is recommended for each relay contact switching inductive loads; see page 18 for details.
RELAY ASSIGNMENT	Relays may be assigned to rate, total, or grand total.
DEADBAND	0-100% of span, user programmable
HIGH OR LOW ALARM	User may program any alarm for high or low trip point. Unused alarm LEDs and relays may be disabled (turn off).
RELAY OPERATION	Automatic (non-latching) Latching (requires manual acknowledge) Sampling (based on time) Alternation control (2 to 8 relays) Off (disable unused relays and enable Interlock feature) Manual on/off control mode
RELAY RESET	User selectable via front panel buttons, digital inputs 1. Automatic reset only (non-latching), when the input passes the reset point or total is reset to zero. 2. Automatic + manual reset at any time (non-latching) 3. Manual reset only, at any time (latching) 4. Manual reset only after alarm condition has cleared (Latching with clear) *Note: Front panel button may be assigned to acknowledge relays programmed for manual reset.*
TIME DELAY	0 to 999.9 seconds, on & off relay time delays Programmable and independent for each relay.
FAIL-SAFE OPERATION	Programmable and independent for each relay. *Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.*
AUTO INITIALIZATION	When power is applied to the meter, relays will reflect the state of the input to the meter.

Isolated 4-20 mA Transmitter Output

OUTPUT SOURCE	Rate/process, total, grand total, max, min, set points 1-2, Modbus input or manual control mode		
SCALING RANGE	1.000 to 23.000 mA for any display range.		
CALIBRATION	Factory calibrated: 0.0 to 1000.0 = 4-20 mA output		
ANALOG OUT PROGRAMMING	23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break		
ACCURACY	± 0.1% FS ± 0.004 mA		
TEMPERATURE DRIFT	0.4 µA/°C max from 0 to 65°C ambient, 0.8 µA/°C max from -40 to 0°C ambient *Note: Analog output drift is separate from input drift.*		
ISOLATED TRANSMITTER POWER SUPPLY	Terminals I+ & R: 24 VDC ± 10%. May be used to power the 4-20 mA output or other devices. Refer to Figure 6 on page 6 and Figure 15 on page 19. All models rated @ 40 mA max.		
EXTERNAL LOOP POWER SUPPLY	35 VDC maximum		
OUTPUT LOOP RESISTANCE	Power supply	Minimum	Maximum
	24 VDC	10 Ω	700 Ω
	35 VDC (external)	100 Ω	1200 Ω

Relay Connections

Relay connections are made to a six-terminal connectors labeled RELAY1 – RELAY2 on Figure 4. Each relay's C terminal is common only to the normally open (NO) and normally closed (NC) contacts of the corresponding relay. The relays' C terminals should not be confused with the COM (common) terminal of the INPUT SIGNAL connector.

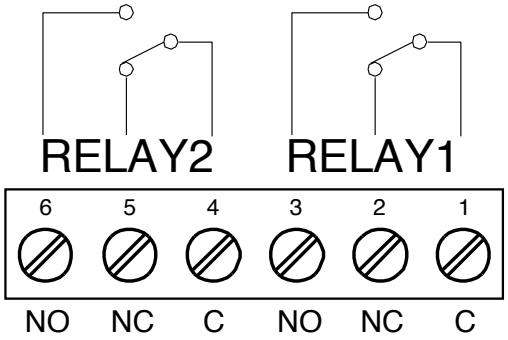


Figure 6: Relay Connections

Switching Inductive Loads

The use of suppressors (snubbers) is strongly recommended when switching inductive loads to prevent disrupting the microprocessor's operation. The suppressors also prolong the life of the relay contacts. Suppression can be obtained with resistor-capacitor (RC) networks assembled by the user or purchased as complete assemblies. Refer to the following circuits for RC network assembly and installation:

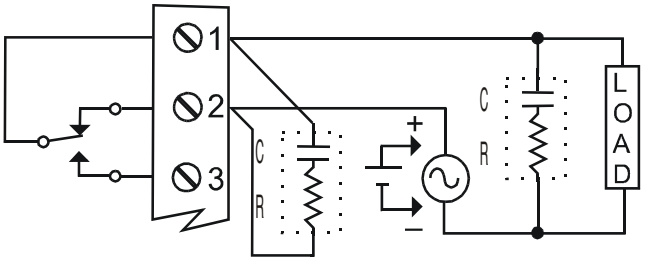
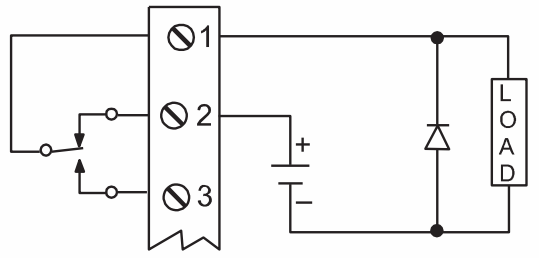


Figure 7: AC and DC Loads Protection

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 250 VAC.
2. RC networks may affect load release time of solenoid loads. Check to confirm proper operation.
3. Install the RC network at the meter's relay screw terminals. An RC network may also be installed across the load. Experiment for best results.



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.

Figure 8: Low Voltage DC Loads Protection

4-20 mA Output Connections

Connections for the 4-20 mA transmitter output are made to the connector terminals labeled MA OUT. The 4-20 mA output may be powered internally or from an external power supply.

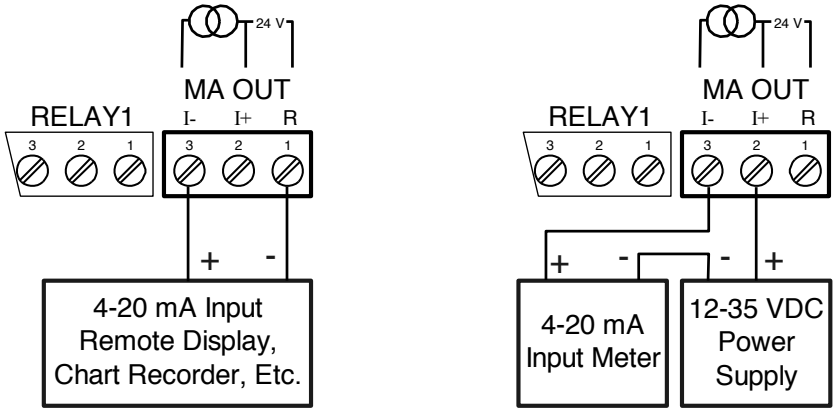


Figure 9: 4-20 mA Output Connections

Analog Output Transmitter Power Supply

The internal 24 VDC power supply powering the analog output may be used to power other devices, if the analog output is not used. The I+ terminal is the +24 V and the R terminal is the return.

Setting the Relay Operation (rELAY)

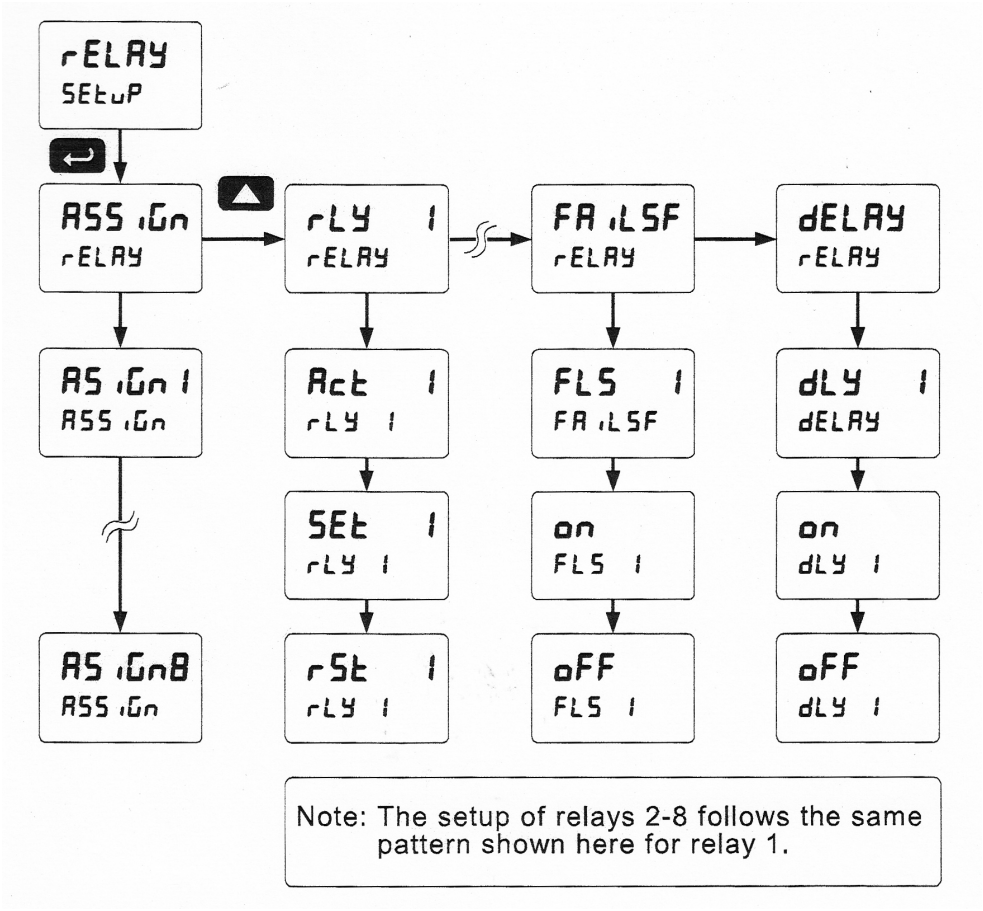
This menu is used to set up the operation of the relays. This menu is only available in PD6300-xx5-CS models.



Caution!

During setup, the relays do not follow the input and they will remain in the state found prior to entering the Relay menu.

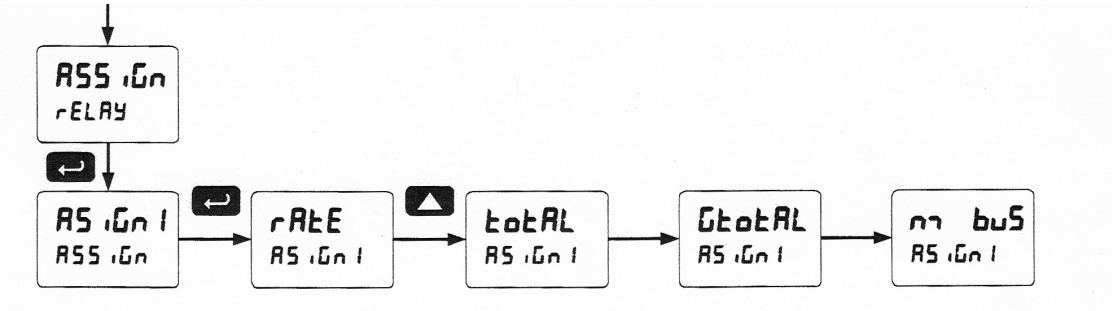
1. Relay assignment
    a. Rate for low and high alarm
    b. Total
    c. Grand total
    d. Modbus input
2. Relay action
    a. Automatic reset only (non-latching)
    b. Automatic + manual reset at any time (non-latching)
    c. Latching (manual reset only)
    d. Latching with Clear (manual reset only after alarm condition has cleared)
    e. Alternation control (automatic reset only)
    f. Sampling (the relay is activated for a user-specified time)
    g. Off (relay state controlled by Interlock feature)
3. Set and reset points
4. Fail-safe operation
    a. On (enabled)
    b. Off (disabled)
5. Time delay
    a. On delay (0-999.9 seconds)
    b. Off delay (0-999.9 seconds)



Relay Assignment (ASS iGn)

The relays can be assigned to any of the following parameters:

1. Rate for low or high alarm indication
2. Total for alarm indication
3. Grand total for alarm indication
4. Modbus input

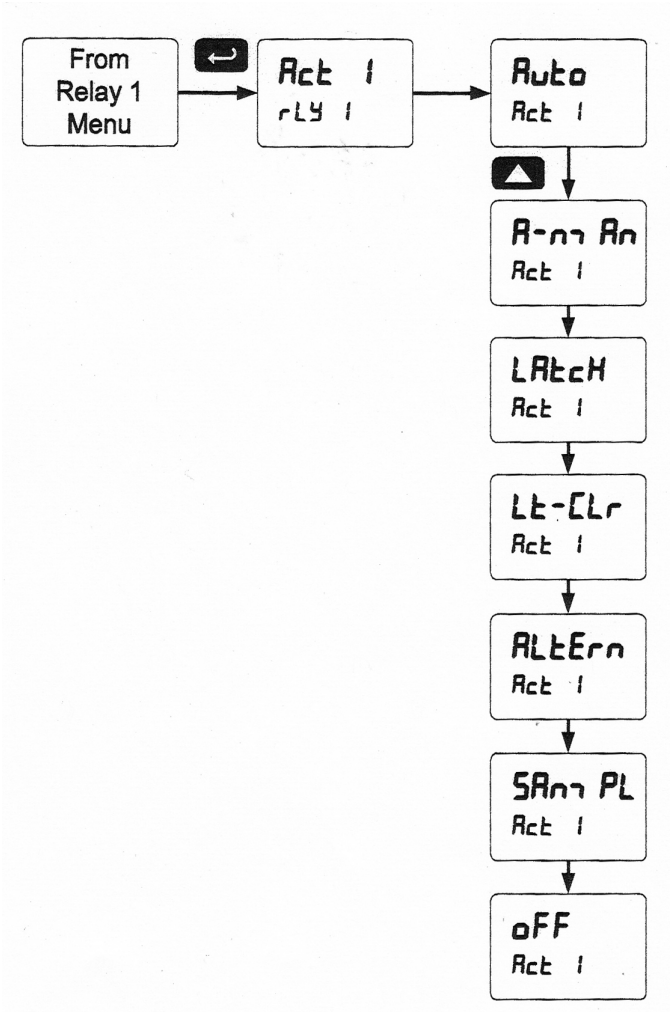


Setting the Relay Action

Operation of the relays is programmed in the *Action* menu. The relays may be set up for any of the following modes of operation:

1. Automatic reset (non-latching)
2. Automatic + manual reset at any time (non-latching)
3. Latching (manual reset only, at any time)
4. Latching with Clear (manual reset only after alarm condition has cleared)
5. Alteration control (automatic reset only)
6. Sampling (the relay is activated for a user-specified time)
7. Off (relay state controlled by Interlock feature)

The following graphic shows relay 1 action setup; relay 2-8 are set up in a similar fashion.



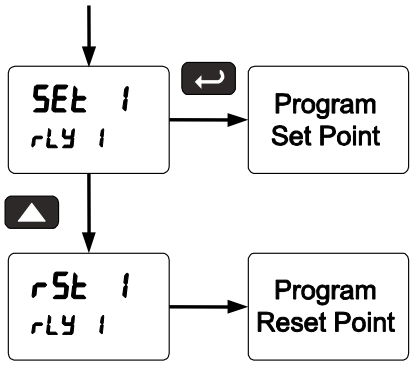
Programming Set and Reset Points

High alarm indication: program set point above reset point.

Low alarm indication: program set point below reset point.

The deadband is determined by the difference between set and reset points. Minimum deadband is one display count. If the set and reset points are programmed with the same value, the relay will reset one count below the set point.

Note: Changes are not saved until the reset point has been accepted.



Setting Fail-Safe Operation

In fail-safe mode of operation, the relay coil is energized when the process variable is within safe limits and the relay coil is de-energized when the alarm condition exists. The fail-safe operation is set independently for each relay. Select **on** to enable or select **oFF** to disable fail-safe operation.

Programming Time Delay

The *On* and *Off* time delays may be programmed for each relay between 0 and 999.9 seconds. The relays will transfer only after the condition has been maintained for the corresponding time delay.

The *On* time delay is associated with the set point.

The *Off* time delay is associated with the reset point.

Relay Operation Details

Overview

The relay capabilities of the meter expand its usefulness beyond simple indication to provide users with alarm and control functions. These capabilities include front panel alarm status LEDs as well as 2 optional internal relays. Typical applications include high or low flow alarms and basic batch control. There are four basic ways the relays can be used:

1. High or Low Alarms with Latching or Non-Latching Relays
2. Simple On/Off Control with 100% Adjustable Deadband
3. Sampling (Based on Time)
4. Alternation Control for up to 8 relays

Relays Auto Initialization

When power is applied to the meter, the front panel LEDs and alarm relays will reflect the state of the input to the meter. The following table indicates how the alarm LEDs and relays will react on power-up based on the set and reset points:

Alarm #	HI or LO Alarm	Set Point	Reset Point	Power-Up Reading	Relay & LED
1	HI	1000	500	499	Off
2	LO	700	900	499	On
3	LO	250	400	499	Off
4	HI	450	200	499	On

Fail-Safe Operation

The following table indicates how the relays behave based on the fail-safe selection for each relay:

Fail-Safe Selection	Non-Alarm State		Alarm State		Power Failure
	NO	NC	NO	NC	
Off	Open	Closed	Closed	Open	Relays go to non-alarm state
On	Closed	Open	Open	Closed	Relays go to alarm state

Note: NO = Normally Open, NC = Normally Closed. This refers to the condition of the relay contacts when the power to the meter is off.

Front Panel LEDs

The LEDs on the front panel provide status indication for the following:

LED	Status
1	Alarm 1
2	Alarm 2
3	Alarm 3
4	Alarm 4

LED	Status
5	Alarm 5
6	Alarm 6
7	Alarm 7
8	Alarm 8

The meter is supplied with four alarm points that include front panel LEDs to indicate alarm conditions. This standard feature is particularly useful for alarm applications that require visual-only indication. The LEDs are controlled by the set and reset points programmed by the user. When the display reaches a set point for a high or low alarm, the corresponding alarm LED will turn on. When the display returns to the reset point the LED will go off. The front panel LEDs respond differently for latching and non-latching relays.

For non-latching relays, the LED is always off during normal condition and always on during alarm condition, regardless of the state of the relay (e.g. Relay acknowledged after alarm condition).

For latching relays, the alarm LEDs reflects the status of the relays, regardless of the alarm condition. The following tables illustrate how the alarm LEDs function in relation to the relays and the acknowledge button. (Default: F3 key assigned to ACK):

Latching and Non-Latching Relay Operation

The relays can be set up for latching (manual reset) or non-latching (automatic reset) operation.

Relay terminology for following tables

Terminology	Relay Condition
On	Alarm (Tripped)
Off	Normal (Reset)
Ack	Acknowledged

The On and Off terminology does not refer to the status of the relay's coil, which depends on the fail-safe mode selected.



Warning!

In latching relay mode, latched relays will reset (unlatch) when power is cycled.

Non-Latching Relay (AUto)

Automatic reset only

Condition	LED	Relay
Normal	Off	Off
Alarm	On	On
Ack (No effect)	On	On
Normal	Off	Off

In this application, the meter is set up for automatic reset (non-latching relay). Acknowledging the alarm while it is still present has no effect on either the LED or the relay. When the alarm finally goes away, the relay automatically resets and the LED also goes off.

Non-Latching Relay (A-mAn)

Automatic + manual reset at any time

Condition	LED	Relay
Normal	Off	Off
Alarm	On	On
Normal	Off	Off
Next Alarm	On	On
Ack	On	Off
Normal	Off	Off

In this application, the meter is set up for automatic and manual reset at any time (non-latching relay). The LED and the relay automatically reset when the meter returns to the normal condition.

The next time an alarm occurs, the operator acknowledges the alarm manually while the alarm condition still exists. This causes the relay to reset, but the LED stays on until the meter returns to the normal condition.

Latching Relay (LAtcH)

Manual reset any time

Condition	LED	Relay
Normal	Off	Off
Alarm	On	On
Ack	Off	Off

In this application, the meter is set up for manual reset at any time. Acknowledging the alarm even if the alarm condition is still present resets the relay and turns off the LED.

Latching Relay (LE-CLr)

Manual reset only after alarm condition has cleared

Condition	LED	Relay
Normal	Off	Off
Alarm	On	On
Ack (no effect)	On	Off
Normal	Off	Off
Ack	Off	Off

In this application, the meter is set up for manual reset only after the signal passes the reset point (alarm condition has cleared). Acknowledging the alarm while it is acknowledged after it returns to the normal state, the LED and the relay go off. Notice that the LED remains on, even after the meter returns to the normal condition. This is because, for latching relays, the alarm LED reflects the status of the relay, regardless of the alarm condition.

Acknowledging Relays

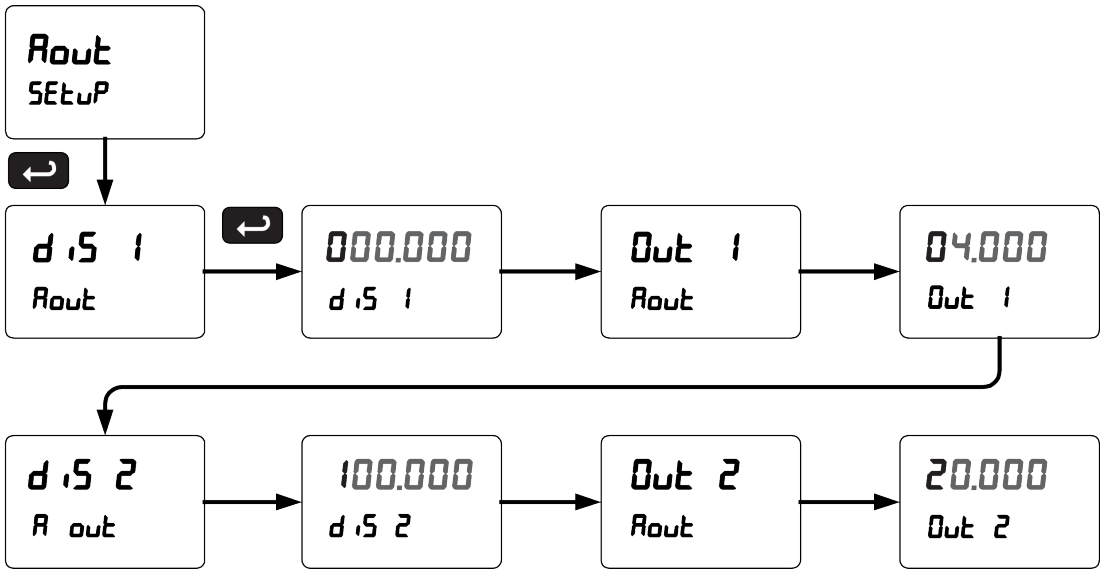
Acknowledge relays programmed for manual reset via the programmable front panel function keys F1-F3 (Default: F3 assigned to ACK).

Scaling the 4-20 mA Analog Output (Aout)

The 4-20 mA analog output can be scaled to provide a 4-20 mA signal for any display range selected.

No equipment is needed to scale the analog output; simply program the display values to the corresponding mA output signal.

The *Analog Output* menu is used to program the 4-20 mA output based on display values. This menu is only available in PD6300-xx5-CS models.



For instructions on how to program numeric values see

Setting Numeric Values, page 11.

TROUBLESHOOTING

Symptom	Check/Action
No display at all	Check power at power connector
Not able to change setup or programming, Locd is displayed	Meter is password-protected, enter correct six-digit password to unlock
Meter displays error message during calibration (Error)	Check: 1. Signal connections 2. Minimum input span requirements
Meter displays 999999 -99999	Check: 1. Input selected in *Setup* menu 2. Corresponding signal at Signal connector
Display is unstable	Check: 1. Input signal stability and value 2. Display scaling vs. input signal
Display reading is not accurate	Check: Scaling or calibration
Display does not respond to input changes, reading a fixed number	Check: Display assignment, it might be displaying max, min, or set point.
Display alternates between 1. Hi and a number 2. Lo and a number	Press Menu to exit max/min display readings.
Relay operation is reversed	Check: 1. Fail-safe in *Setup* menu 2. Wiring of relay contacts
Relay and status LED do not respond to signal	Check: 1. Relay action in Setup menu 2. Set and reset points
If the display locks up or the meter does not respond at all	Cycle the power to reboot the microprocessor.
Other symptoms not described above	Call Technical Support for assistance. Contact information is located on the last page of this manual.

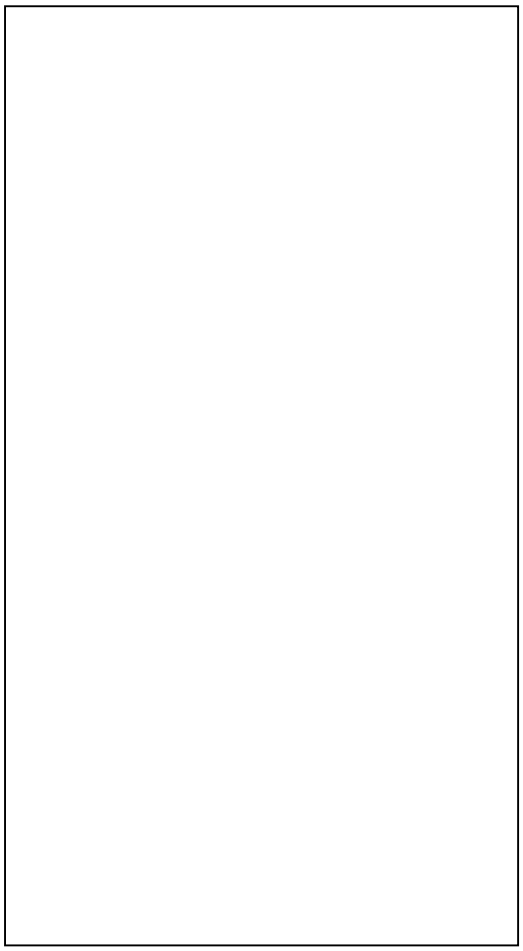


Figure 10: 1/8 DIN Panel Cutout Template