

# CONSOLIDATOR® 4 & 8

## MULTI-CHANNEL CONTROLLERS

### ConsoliDator 4 Model PD940



### ConsoliDator 4 Features

- Four 4-20 mA Inputs
- Four 4-20 mA Outputs

### ConsoliDator 8 Features

- Eight 4-20 mA Inputs
- Two 4-20 mA Outputs

### Common Features

- Four Pulse Inputs
- Four Digital Inputs
- Nine 10 A Relays



### ConsoliDator 8 Model PD981

### Advantages

- Easy to read backlit LCD
- Readable in direct sunlight
- Bargraphs & numeric screens
- Easy to set up & program
- Set up with front panel keys
- Intuitive menus in English
- Detailed individual screens
- Input simulation feature
- RS-232 Modbus® RTU
- Power from AC or DC
- Wall or panel mount
- 32-point linearization
- Sum & difference functions
- Free programming & data logging software



## Programming

Main Setup Menu Screen Shown Actual Size

### MAIN SETUP MENU SCREEN

|   |  |
|---|--|
| <p><b>Inputs</b></p> <ul style="list-style-type: none"> <li>Channel # 1</li> <li>Channel # 2</li> <li>Channel # 3</li> <li>Channel # 4</li> <li>Channel # 5</li> <li>Channel # 6</li> <li>Channel # 7</li> <li>Channel # 8</li> <li style="background-color: red;">Flow Meter # 1</li> <li>Flow Meter # 2</li> <li>Flow Meter # 3</li> <li>Flow Meter # 4</li> </ul> <p><b>General Functions</b></p> <p>Buzzer: <input type="checkbox"/> ON      OFF</p> <p>T-Out: <input type="checkbox"/> ON      OFF</p> <p>Change Password</p> <p>Save BL:    YES <input type="checkbox"/>    NO</p> <p>Baud Rate: 19200 bps</p> <p>Parity:      NONE - 8N1</p> <p>Modbus ID:      1</p> <p>Tx Delay:      0 ms</p> | <p><b>Outputs</b></p> <ul style="list-style-type: none"> <li>Alarm Relay # 1</li> <li>Alarm Relay # 2</li> <li>Alarm Relay # 3</li> <li>Alarm Relay # 4</li> <li>Alarm Relay # 5</li> <li>Alarm Relay # 6</li> <li>Alarm Relay # 7</li> <li style="background-color: green;">Alarm Relay # 8</li> <li>Alarm Relay # 9</li> <li>Analog Out # 1</li> <li>Analog Out # 2</li> </ul> |
|---|--|

↓
↑
→
ENTER
EXIT

### Inputs

#### Program Analog Input 1

Analog Input: 1

Input Type: 4-20 mA Transmitter

Function: Linear

Channel ID: TANK 1

Configure Display Parameters

Configure Sensor Input

Sensor: 10.93 mA

Value: 3706.3 gal

↓
↑
→
EXIT

#### Program Flow Meter 1

Flow Meter: 1

Channel ID: Flow: 1      State: OFF

K Factor: 100.00 pls / GAL

Max Value: 50.00 GPM

K-Fac Fmt: 9999.99

Rate Fmt: 9999.99 GPM

Total Fmt: 9999.99 GAL

Units: GAL & GPM

Display: RATE

↓
↑
→
EXIT

### Alarms

#### Alarm 1: HIGH MODE

Alarm Setup: 1

▶ Alarm Mode: HIGH

Channel: [1] TANK: 1

High Value: 3000.0 gal

Low Value: 2000.0 gal

Delay ON: 5.0 sec

Delay OFF: 5.0 sec

↓
↑
→
EDIT
EXIT

#### Alarm 8: LEAD-LAG HIGH MODE

Alarm Setup: 8

▶ Alarm Mode: LEAD\_LAG: HIGH

Channel: [5] WEST TANK

High Value: 18.00 f&i

Low Value: 6.00 f&i

Delay ON: 5.0 sec

Delay OFF: 5.0 sec

Link Relays:

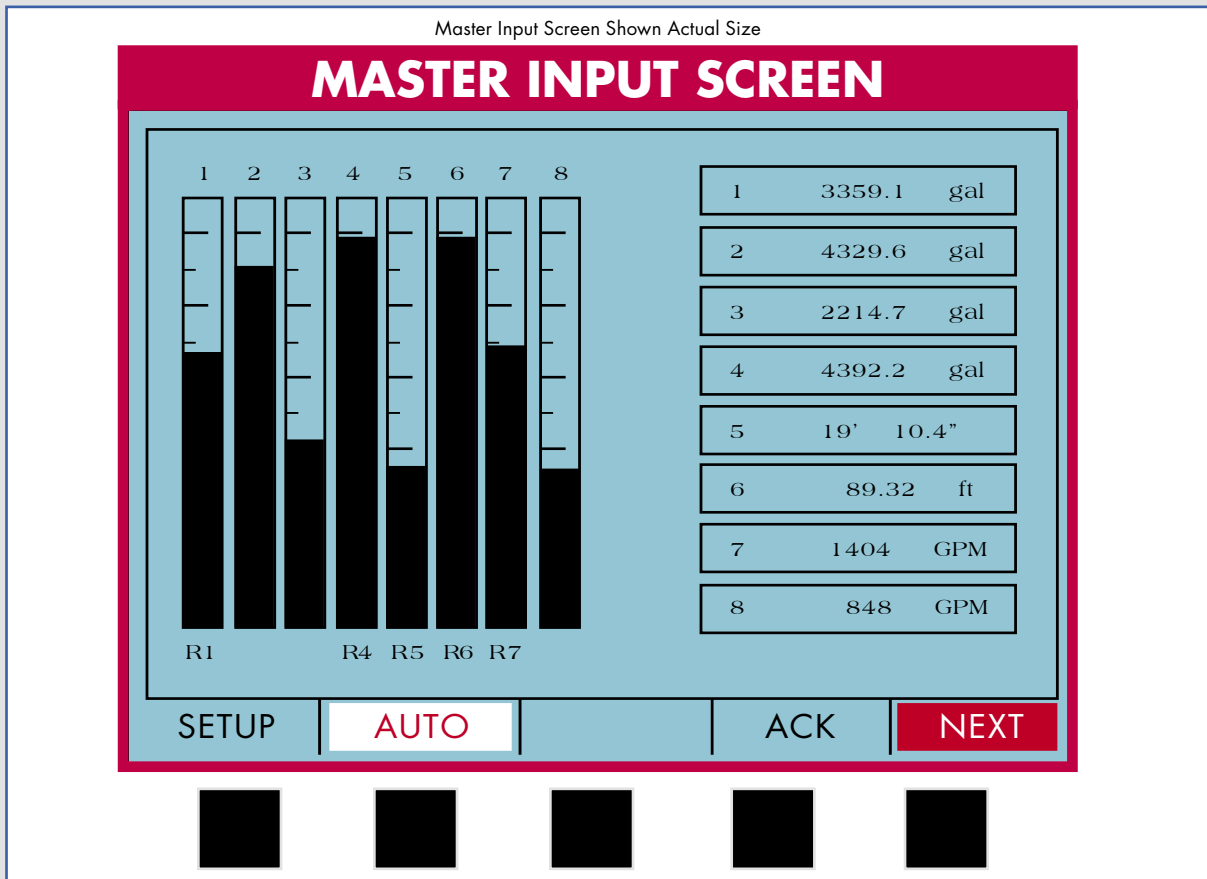
|   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|
| 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| ON: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |   |   |   |   |   |   |   |   |

↓
↑
OVER
EDIT
EXIT

Color shown for illustration only

Input & alarm screens shown 1/2 scale

## Operation



**Manual Mode Screen**

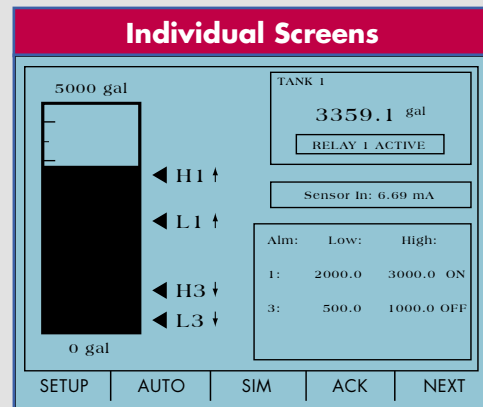
Manual Mode

| Relay #   | Status                                 | Hours | Cycles |
|-----------|--|-------|--------|
| Relay #1: | ON                                     | 5.7   | 14     |
| Relay #2: | OFF                                    | 2.9   | 15     |
| Relay #3: | OFF                                    | 2.4   | 5      |
| Relay #4: | ON                                     | 3.9   | 16     |
| Relay #5: | ON                                     | 3.3   | 24     |
| Relay #6: | ON                                     | 3.5   | 7      |
| Relay #7: | ON                                     | 3.3   | 9      |
| Relay #8: | OFF                                    | 0.7   | 1      |
| Relay #9: | <input checked="" type="checkbox"/> ON | 0.0   | 2      |

Buttons: ↓, ↑, ON, RESET, NEXT

### Key Points Shown

- **View relay status**
  - On & off status
  - Hours of operation
  - Operation cycles
- **Control relay operation**
  - Reset hours & cycles
  - Toggle status on & off



Color shown for illustration only

### Key Points Shown

- **Bargraph with set points**
- **Input identification**
- **Engineering units label (gal, ft, GPM)**
- **Alarm status**
  - Assigned alarms 1 & 3
  - Low & high set points
  - On & off status
- **Input simulation**
  - Test setup without applying an input

Manual mode & individual screens shown 1/2 scale

## Field Enclosure



- NEMA 4X
- Hinged clear cover
- Stainless steel quick-release latches
- Easy access to front panel buttons
- Power switch & fuse

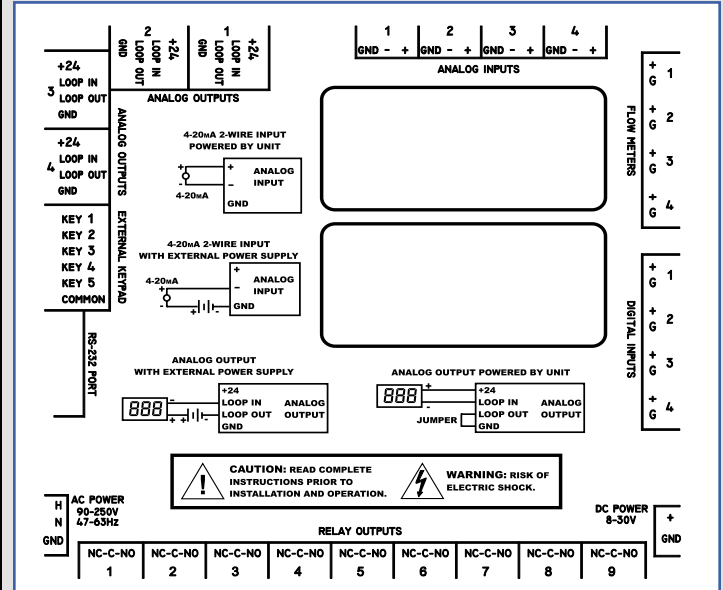


*Shown with  
Optional Sub-Panel*

- Hinged front mounting panel
- Extra space for additional components
- PDP2901 panel with terminal strips
- Captive screws

*See PDA2901 data sheet for additional details*

## Connectors Diagram



The connectors diagram is silk-screened on the back of all panel mount ConsoliDators (PD941 shown here).

## ORDERING INFORMATION

| ConsoliDator Controllers |       |                |              |                 |        |
|--------------------------|-------|----------------|--------------|-----------------|--------|
| Model                    | Mount | 4-20 mA Inputs | Pulse Inputs | 4-20 mA Outputs | Relays |
| PD940-8K9-15             | Wall  | 4              | 4            | 4               | 9      |
| PD941-8K9-15             | Panel | 4              | 4            | 4               | 9      |
| PD980-8K9-15             | Wall  | 8              | 4            | 2               | 9      |
| PD981-8K9-15             | Panel | 8              | 4            | 2               | 9      |

ConsoliDator Software for programming and data logging is included free of charge with your purchase of any ConsoliDator Controller.

| Accessories |  |
|-------------|--|
| Model       | Description  |
| PDA2901     | NEMA 4X Enclosure for PD941 or PD981                 |
| PDA6901     | 2" Pipe Mounting Kit for PDA2901 Enclosure           |
| PDA7485-I   | RS-232 to RS-422/485 Isolated Converter              |
| PDA7485-N   | RS-232 to RS-422/485 Non-Isolated Converter          |
| PDP2901     | Sub-Panel with Terminal Strips for PDA2901 Enclosure |
| PDP2902     | Sub-Panel w/o Terminal Strips for PDA2901 Enclosure  |
| PDLXXXX     | Engraved Plastic Label                               |
| PDX6901     | Suppressor (snubber): 0.01 µF/470 Ω, 250 VAC         |

| Setup & Programming Services |                                      |
|------------------------------|--------------------------------------|
| Part Number                  | Description                          |
| PDN-CSETUP2                  | Custom Setup & Programming           |
| PDN-CERTCAL                  | Certificate of Calibration           |
| PDN-CERTCAL2                 | Certificate of Calibration with Data |

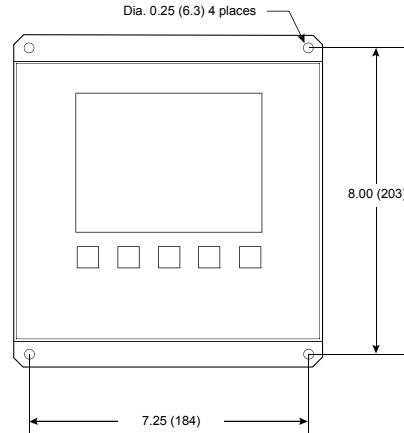
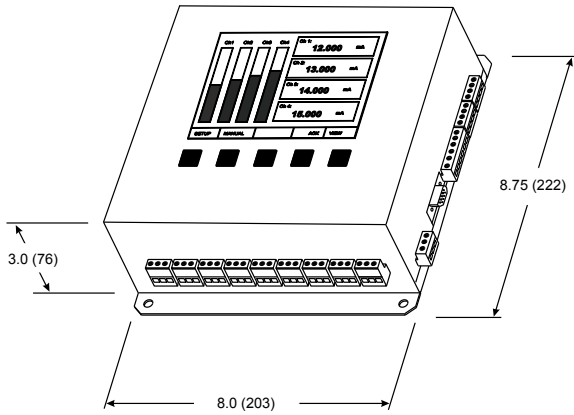
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## Wall Mount

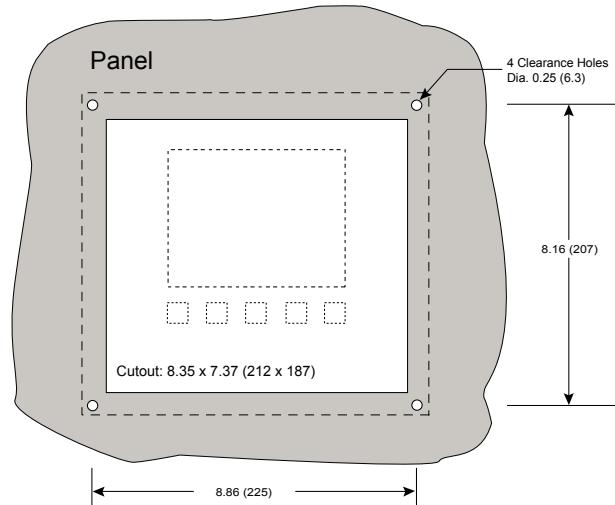
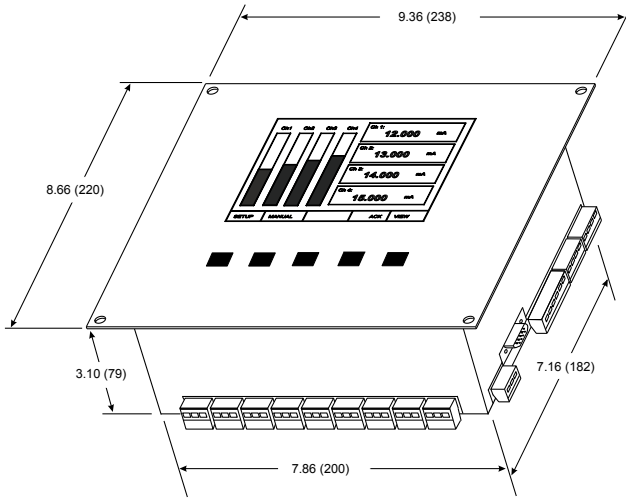
Overall Dimensions

Mounting Dimensions

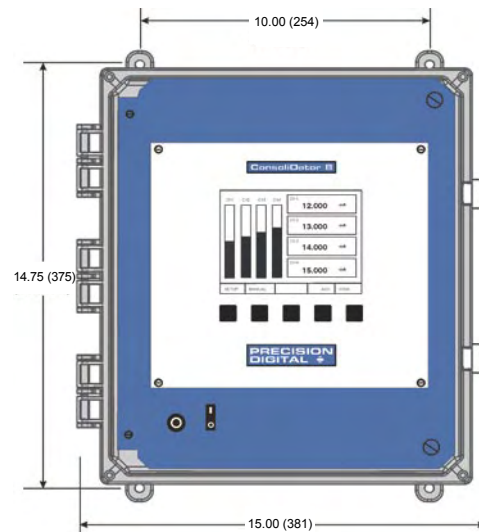
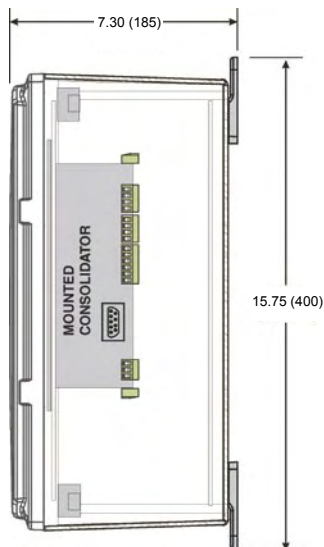
Units: Inch (mm)



## Panel Mount



## Optional Enclosure



## SPECIFICATIONS

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

### General

**Display:** Backlit LCD; 4.75" x 3.50" (121 mm x 89 mm)  
**Display Update Rate:** 1 every 2 seconds  
**Programming Method:** Front panel buttons, external buttons, PC with ConsoliDator software, or Modbus registers.  
**Password:** Programmable, restricts modification of settings.  
**Non-Volatile Memory:** Settings stored for a minimum of 10 years.  
**Power:** 90-264 VAC, 47-63 Hz, 20 VA or 8-30 VDC, 15 W (field)  
**Isolation:** AC: 1500 V; signal and output power grounds are connected to earth ground (chassis); DC: not isolated.  
**Surge Protection:** Analog inputs have chokes & TVS  
**Operating Temperature:** 0 to 50°C  
**Relative Humidity:** 0 to 90% non-condensing  
**Storage Temperature:** -40 to 60°C  
**Connections:** Removable screw terminals and DB9 male  
**Enclosure:** NEMA 1, powder-coated steel; color: warm gray  
**Mounting:** Panel or wall mount models  
**Weight:** 5.5 lb (2.5 kg)  
**UL File Number:** E160849; 508 Industrial Control Equipment  
**Warranty:** 1 year parts & labor  
**Extended Warranty:** 1 or 2 years, refer to Price List for details.

### Screen Displays

**Numeric Display:** Six digits, ±999999 or 99' 11.9" (feet & inches)  
**Bargraph:** Twenty divisions  
**Engineering Units:** User selectable or definable units (e.g. ppm, gal, m, lb, g/h, psi, ozs, ft, mA, °C, °F, f&i, %)  
**Master Input Screen:**  
**Numeric Displays:** Eight; process value & engineering units  
**Bargraphs:** Eight; process & channel number  
**Individual Input Screen:**  
**Numeric Displays:** Process and mA input value  
**Bargraphs:** High and low set point markings  
**Simulation Mode:** Test setup without applying an input

### Analog Inputs

**Number of Inputs:** Four (ConsoliDator 4); Eight (ConsoliDator 8)  
**Input:** 4-20 mA; minimum span of 1 mA  
**Accuracy:** ±0.03% FS ±1 count  
**Input Function:** Linear, square root, programmable exponent, or fixed value  
**Programmable Exponent:** From 0.50001 to 2.99999  
**Multi-Point Linearization:** 2 to 32 points, accessible through ConsoliDator software or Modbus registers.  
**Math Function:** Sum or difference of 2 or more channels  
**Totalizer:** Calculates total based on rate and time base of seconds, minutes, hours, or days; stored in non-volatile memory every 5 minutes; supports linear inputs only.  
**Totalizer Reset:** Via front panel buttons (password restricted)  
**Input Impedance:** 130 Ω  
**Transmitter Supply:** 24 VDC @ 20 mA per input; short circuit protection: current limited to 40 mA max per input

### Pulse Inputs

**Number of Inputs:** Four  
**Input:** 100 mVp-p to 15 Vp-p; 1 Hz to 10 kHz  
**Accuracy:** ±1 count for K-Factor >1  
**K-Factor:** 0.00001 to 999999 pulses/unit  
**Totalizer:** Calculates total based on rate, stored in non-volatile memory every 5 minutes.  
**Totalizer Reset:** Via front panel buttons (password restricted)

### Digital Inputs

**Number:** Four  
**Type:** Switch closure, open collector transistor, or logic level  
**Input Impedance:** 240 Ω

### Relays

**Number of Relays:** Nine  
**Relay Type:** Form C (SPDT) with built in MOVs  
**Rating:** 10 A @ 120/240 VAC resistive load; 1/3 HP @ 120/240 VAC inductive loads; 5 A @ 28 VDC  
**Minimum Load:** 50 mA for AC, 10 mA @ 5 VDC  
**Assignment:** Any relay may be assigned to any channel. Multiple relays may be assigned to one channel. All relays are programmed independently.  
**Cycle Monitoring:** Controller tracks time relay has been active and number of times relay has cycled on/off.  
**Time Delay:** Programmable on/off delays, 0 to 999.9 seconds  
**Operation:** (see instruction manual for complete list)  
**High or Low Alarm:** Assign to analog or pulse channel for on/off relay control; 100% adjustable deadband.  
**Multi-Channel Alarm:** Assign two or more analog channels to indicate common high or low condition.  
**Summary Alarm:** Indicates when any relay enters alarm state.  
**Supervisory Alarm:** Indicates CPU failure or analog input loss.  
**Lead-Lag Alternation (Sequence):** Link multiple relays for sequential operation. Programmable override set points to turn on additional relays.  
**Manual Override:** Override any relay (password restricted). Relays do not respond to input while in this mode.

### 4-20 mA Analog Output

**Number:** Four (ConsoliDator 4); Two (ConsoliDator 8)  
 Assign to any process or pulse input  
**Accuracy:** ±0.05% FS ±0.01 mA  
**Mode:** Linear or manual tuning PID  
**Loop Resistance:** 10 to 600 Ω, powered by controller  
**External Loop Power Supply:** 12 VDC min (300 Ω max); 32 VDC max (900 Ω max)  
**Isolation:** 1500 V output-to-power line; 500 V output-to-input when powered by external supply.

### Modbus® Communications

**Compatibility:** EIA-232  
**Protocol:** Modbus RTU  
**Address:** Programmable between 1 and 247  
**Baud Rate:** 1,200 to 38,400 bps  
**Transmit Delay:** Programmable between 0 and 300 ms  
**Data:** 8 bits (1 start bit, 1 stop bit)  
**Parity:** Even, None with 1 stop bit, or None with 2 stop bits

### ConsoliDator® Software

**System Requirements:** Windows® 95/98/ME/NT4/2000/XP  
**Communications:** RS-232 using null-modem serial cable  
**Compatibility:** ConsoliDator 4 & ConsoliDator 8, two versions  
**Configuration:** Configure inputs and outputs. Save settings to file for programming other controllers or restoring settings.  
**Logging Interval:** 1 second to 10 minutes  
**Data Logging Report:** Log to comma separated value (.csv) file compatible with spreadsheet applications.