

# 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; color: white;">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; color: white;">Alarm Relay # 8</li> <li>Alarm Relay # 9</li> <li>Analog Out # 1</li> <li>Analog Out # 2</li> </ul>
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↓
↑
→
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:

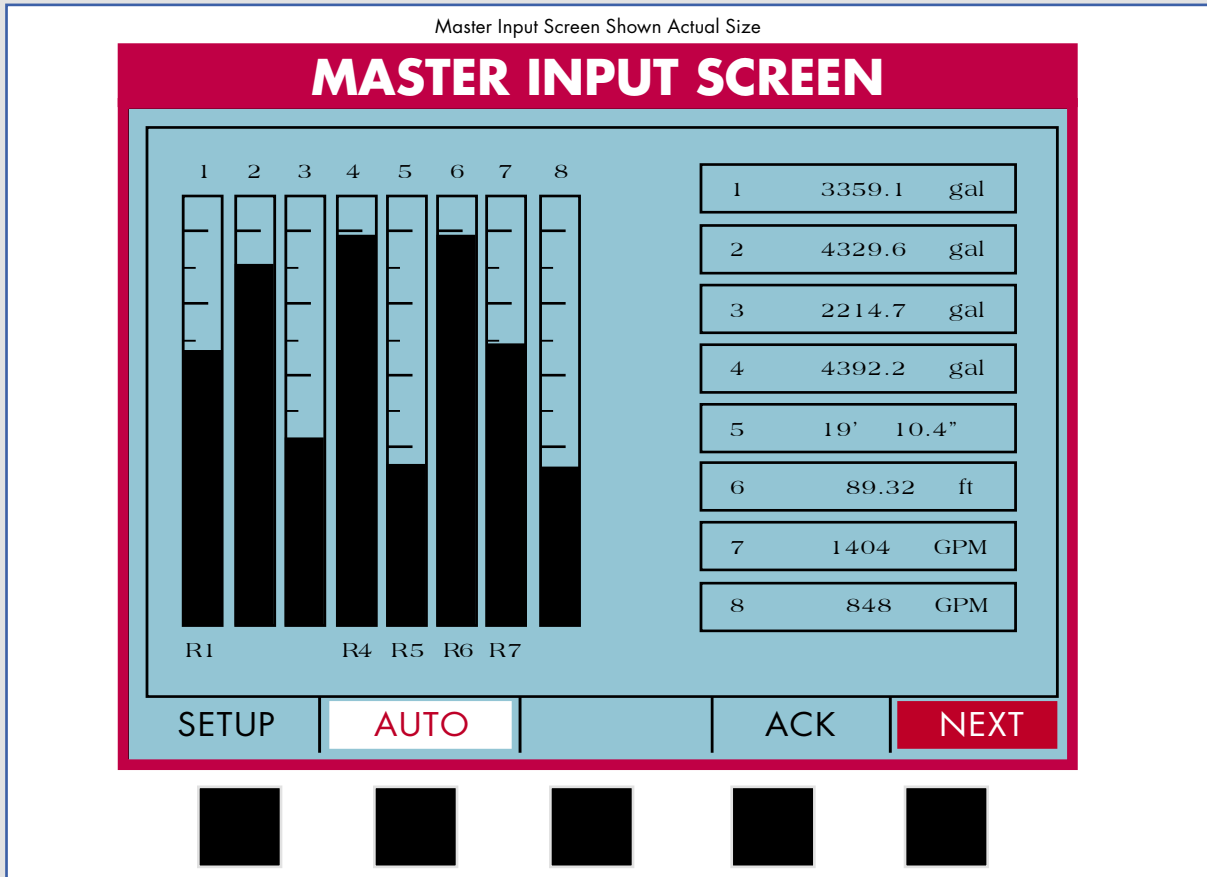
1	2	3	4	5	6	7	8	9
ON: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>								

↓
↑
OVER
EDIT
EXIT

Color shown for illustration only

Input & alarm screens shown 1/2 scale

## Operation



**Manual Mode Screen**

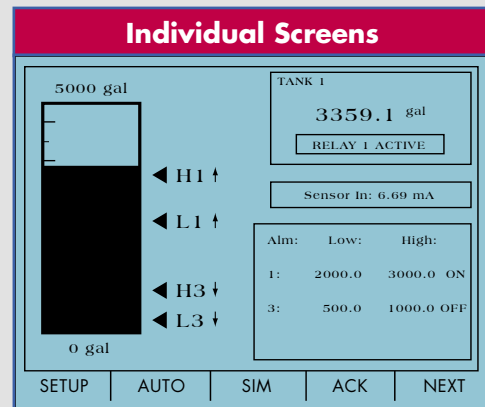
Manual Mode

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

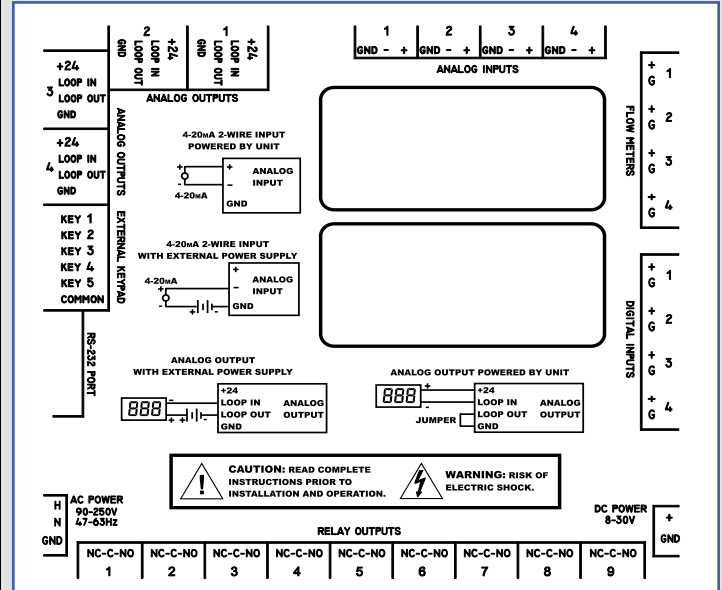


*Shown with  
Optional Sub-Panel*

- 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

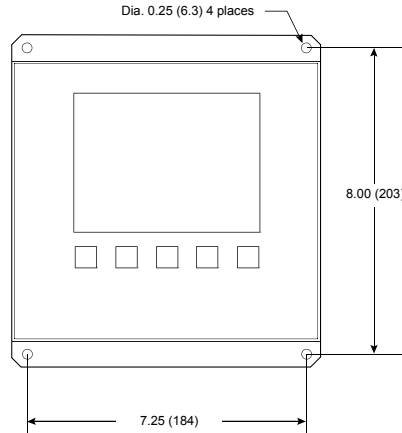
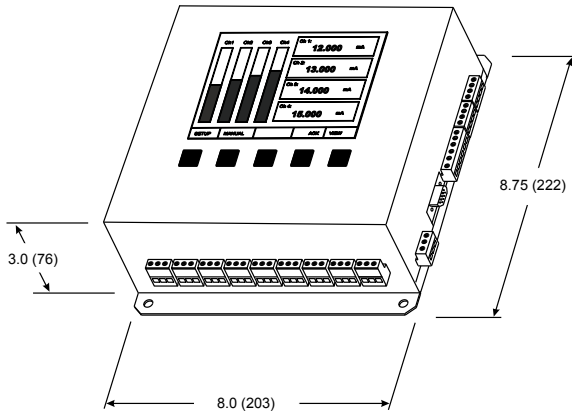
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## Wall Mount

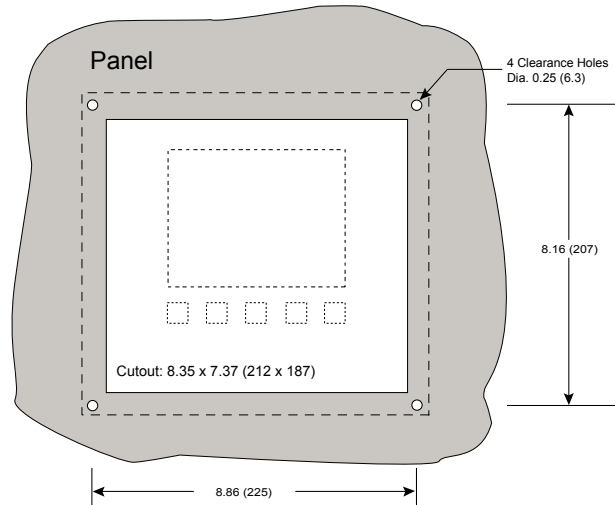
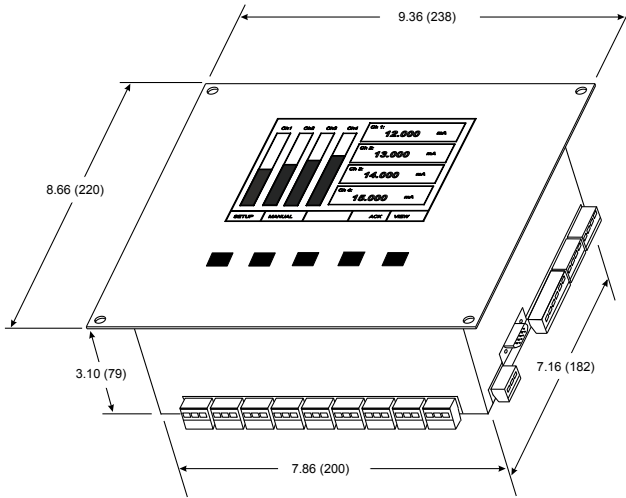
Overall Dimensions

Mounting Dimensions

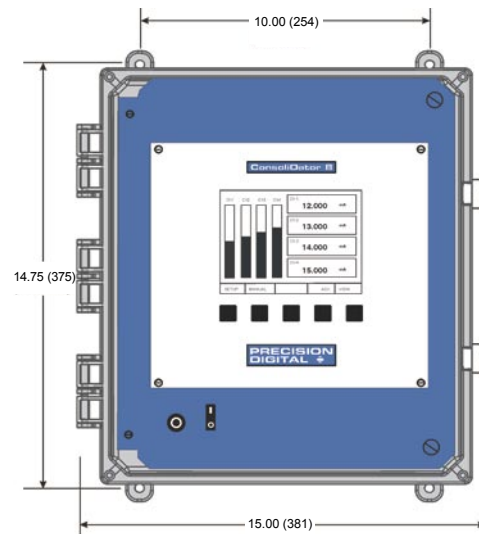
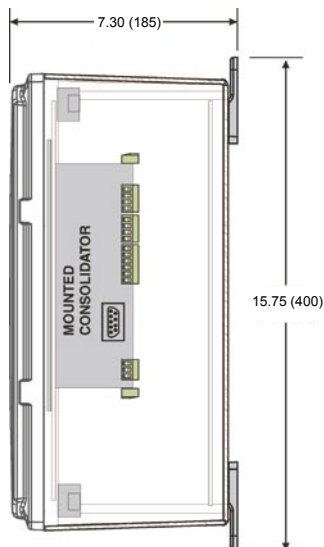
Units: Inch (mm)



## 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.