



IDE40 Series

Multivariable Controller



UL & C-UL Listed for Div 2 Hazardous
(nonincendive) and Ordinary Location Installations.
Select models; see Ordering Information for complete details.

- **NEMA 4X Panel Mount Multivariable Controller**
- **Convenient Display, Control, & Alarm of Multiple 4-20 mA, Temperature, Pulse, & Modbus Inputs**
- **Numeric & Bargraph Color Display (320 x 240 pixels) 5.7" (145 mm)**
- **Sunlight Readable Display, White Backlight; UL/C-UL Listed Sun Hood Option Available**
- **Isolated 24 VDC Transmitter Supplies 200 mA / Analog Input: 1,600 mA Max**
- **99 Channels, 32 Totalizers, 30 Timers, & 199 Modbus Inputs**
- **64 High & Low Alarms, Combine Multiple Alarms Into Logic AND & OR Alarms**
- **Simulation & Manual Control Modes for Testing and Setup**
- **Modular Design for Inputs & Outputs Flexibility**
- **Up to (28) Inputs; Isolated 4-20 mA, Pulse, or Temperature (Thermocouple or RTD)**
- **Up to (25) 10 Amp Form C Relays (With Eight Analog or Pulse Inputs)**
- **Up to (25) Isolated 4-20 mA Outputs (With Eight Analog or Pulse Inputs)**
- **Operating Temperature Range: -25°C to 55°C (-13 to 131°F)**
- **Print Critical Data from ConsoliDator+ with Printer Card**
- **Pulse, Analog, & Modbus Input Flow Rate / Total / Grand Total Capability**
- **50-Point Linearization, Square Root, and Exponent for Open Channel Flow**
- **Round Horizontal Tank Volume Calculation; Just Enter Diameter & Length**
- **Open Channel Flow Math Formulas for Weirs & Flumes**
- **Multi-Pump Alternation with On-Off Multi-Setpoint Control and Lead-Lag Control**
- **HOA Switch Functions for Controlling Pumps by Setting Relay Actions for Automatic, Manual, or On/Off Modes**
- **Advanced Batch Control Features with Ticket Printing Capabilities**
- **Programmable Displays, Function Keys & Digital Inputs (Five Standard) and Optional 15-Digital Inputs Card Available**
- **Math Functions: Sum, Diff, Average, Multiply, Divide, % Efficiency, & More**
- **Modbus Client (Master) & Snooper / Server with 99 Programmable Outputs**
- **Direct Modbus PV Inputs – Snooper / Server Mode**
- **RS-485 Serial Communication with Modbus RTU / ASCII & Ethernet TCP/IP**
- **USB Data Logger Feature: Up to 8 Log Files with up to 12 Parameters Each**
- **Input Power Options: 90-264 VAC or 24 VDC**
- **(20) Screens with up to Eight PVs Each**
- **ConsoliDator+ Configuration Software**
- **Type 4X, IP66 Front – Field Enclosures Available**
- **Auto-Tune PID Control for Multiple Control Loops with Analog, Digital, or Relay Outputs**
- **3-Year Warranty**

Overview & Screens

The ConsoliDator+ is a multivariable controller that is both easy to use and satisfies a wide variety of process display, alarm, and control applications. It accepts 4-20 mA inputs, flow meter pulse inputs, temperature inputs, digital inputs, and Modbus inputs and displays them in both numeric and bargraph format on a large, 5.7" color display.

It can be equipped with multiple relays with user-definable actions, 4-20 mA outputs, digital outputs, Modbus RTU & ASCII, Modbus Enron, and Ethernet Modbus TCP/ IP protocol communication. Additionally, the controller is equipped with up to 30 timers that can be used to control many processes or events.

New features that have been added to the ConsoliDator+ include:

- (4) Temperature Inputs Card
- (15) Digital Inputs Card
- Auto-Tune PID Control
- Digital Switches (HOA)
- Advanced Batch Control Features
- Print batch tickets, process variables, and other critical data
- Pump Alternation with On-Off Multi-Setpoint and Lead-Lag Control

The ConsoliDator+ takes full advantage of its color display by allowing the user to customize screen colors for bargraphs, alarm conditions, and input channels.

All this functionality is easily programmed using the free software or via the front panel pushbuttons. Choose the model that best suits your application, from monitoring only to fully loaded controllers with an extensive combination of inputs, outputs, and communication protocols.

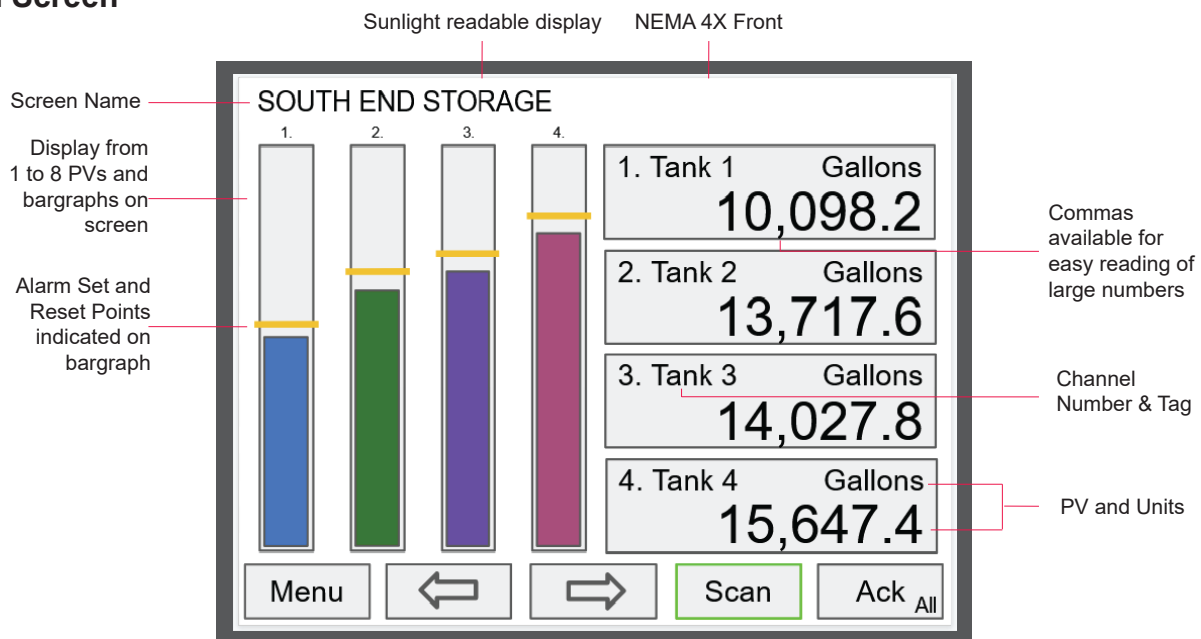
The standard product offering is listed in the ordering guide and other models are available for special order. The AddOn features expand the functionality of the ConsoliDator+, see ordering information for details.

Most ConsoliDator+ models have been Certified by Underwriters Laboratory (UL & C-UL) for use in ordinary locations (electrical safety) and in Div 2 hazardous area locations (nonincendive). See Ordering Information for complete details.

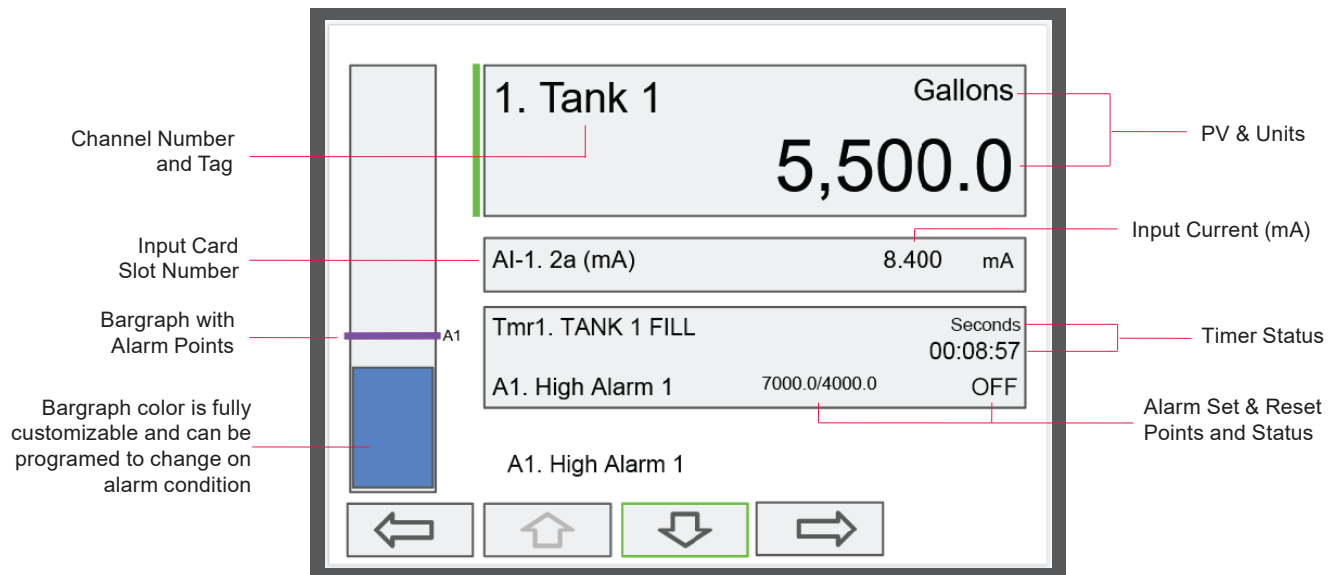
SCREENS

The ConsoliDator+ can be programmed to display the data on up to 20 different screens in a variety of formats and colors, with and without bargraphs. The following screens show a typical main screen and channel details screen:

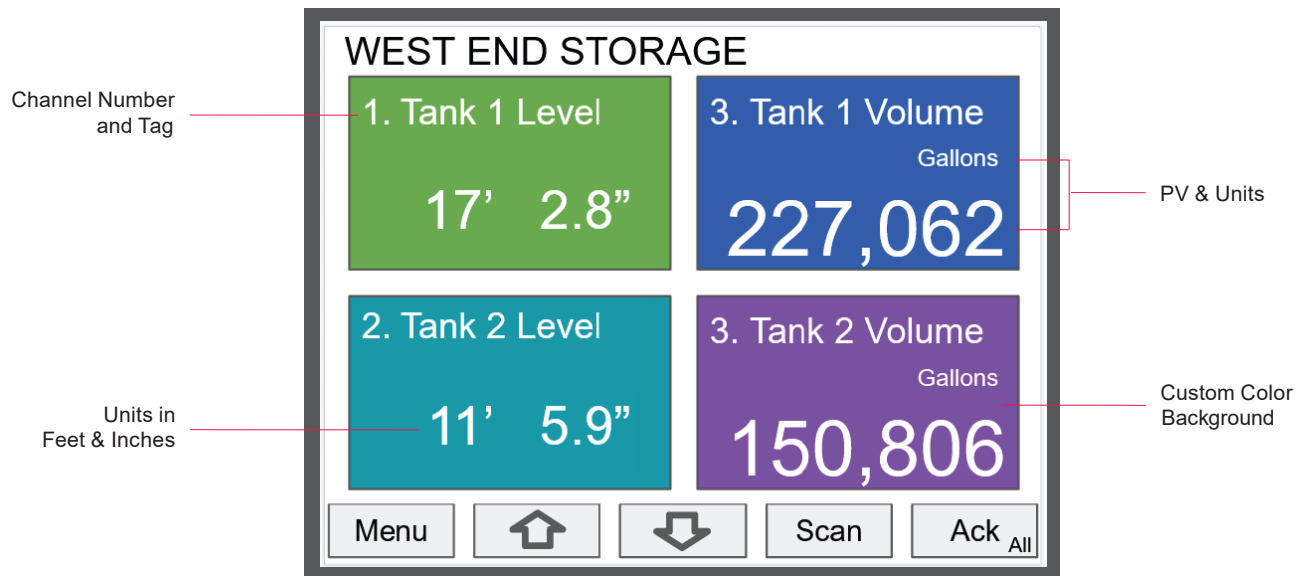
Main Screen



Channel Details Screen



Screen with Feet & Inches Units



Inputs & Outputs

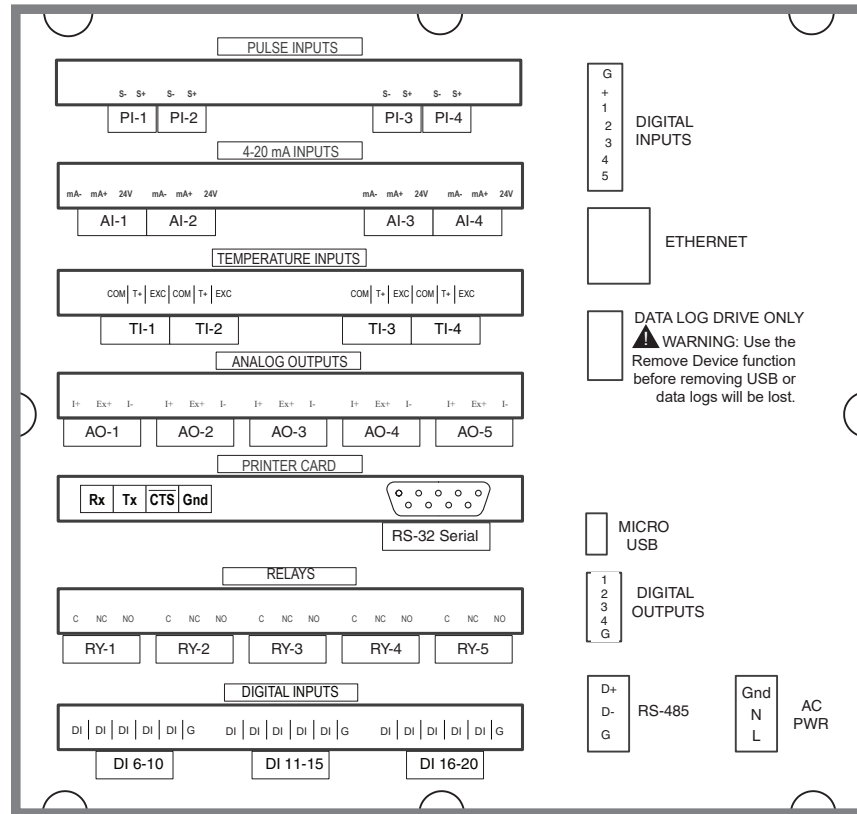
The back panel is labeled with the I/O boards that were installed at the factory. The removable connectors are labeled with the connection signal for each terminal. The following diagram shows what the back of the model PD9000-6N-4PI-4AI-4TI-5AO-5RY-15DI-E-P looks like.

This model is powered from 90-264 VAC, it accepts (4) pulse and (8) analog inputs and has (10) 4-20 mA outputs and (10) relays. (5) digital inputs, (4) digital outputs, RS-485 serial capability and USB connections are standard on all ConsoliDator+ models. Ethernet is an option.

If all Input/Output slots are used exclusively for one function, the ConsoliDator+ can accept up to (28) isolated 4-20 mA inputs, (28) pulse inputs, (25) isolated 4-20 mA outputs, or (25) relays.

If used as a Modbus Client, Snooper, or Server only: It can have (35) 4-20 mA outputs, 30 relays, or (20) 4-20 mA outputs and (15) relays.

Units are powered from AC or DC according to the power option ordered (AC: -6 or DC: -7).



Connection Terminals for a PD9000-6N-4PI-4AI-4TI-5AO-5RY-15DI-E-P

Notes:

1. Each 4-20 mA input has its own isolated 24 VDC power supply to power the transmitter.
2. Each 4-20 mA output has its own isolated 24 VDC power supply to power the output loop.
3. Each relay is Form C and rated at 10 A.
4. Input / output connections are made to removable screw connectors.
5. Every ConsoliDator+ has five digital inputs standard (additional digital inputs can be obtained by using the 15-Digital Inputs card).
6. Temperature Inputs Card has (4) thermocouple/RTD inputs.
7. Every ConsoliDator+ has four digital outputs.
8. Every ConsoliDator+ has RS-485 with Modbus.
9. Powered from AC or DC, depending on the ordered power option.
10. The Data Log Drive is used for the *Data Logger Add-On feature*.
11. Ethernet with Modbus TCP is an option.
12. Micro USB is used for programming the ConsoliDator+ with Free Software.

Setting Channel Parameters

What makes the ConsoliDator+ easy to program is its intuitive setup screens. As shown in the first image below, the setup screen allows you to see all the relevant information you need when creating or editing a channel - all on one screen! When creating a new channel, the channel number is auto-generated for you. All you have to do is populate the appropriate fields such as the channel tag name, function, input, and units. Scaling the inputs and outputs, selecting number of decimals, and turning the bargraph on/off and inputting its values are also programmed from this screen. Multiple colors can also be selected for the text, background and bargraphs to customize the look of the display screens. During programming, the soft keys will change based on the screen in place. For instance, pressing the edit key will bring up the letters/numbers keypad and appropriate navigation keys will appear (Shown in the bottom image). See the [PD9000 manual](#) for details on setup and programming.

Auto-Generated Channel #: User-editable to re-order channels

Function: Applied to input source

Input: Source for channel

Units: Engineering / time or none

Decimals: Number of decimals for PV

Scale: Enter input and output values

Cutoff: PV goes to zero below the cutoff value

Channel Tag: User editable

Color Pattern Select: Select color for text, background, and bargraph

13. Flow #30

Function: Scale Linear 2-Pt

Input: AI-1. 2a (mA)

Units: Gallons/min

Decimals: 0

Scale:

	Input (mA)	Output (Gallons/min)
1.	4.000	0
2.	20.000	30000

☒ Cutoff: 0 Gallons

Colors 1

☒ Bargraph

0% : 0

100% : 30000

Cancel
⬆
⬇
Colors
Ok

Soft Keys: Change based on the screen in place

1. Rate #1

Source: 2b (mA)

Function: Scale

Units: GAL/h

Decimals: 2

Scale:

	Input	Output
1.		0.00
2.		10000.0

☒ Cutoff

Rate #1

... A B C D E

F G H I J K L

M N O P Q R S

T U V W X Y Z

Enter x

Colors 1

☒ Bargraph

0.0

10000.0

⬇
⬅
➡
X ➡
Enter

Soft Keys: Change based on the screen in place

Numbers Keypad Button: pressing this will bring up the numbers keypad

Text / Numbers Input Field

Letter and Numbers Keypad: Used to input text and numbers in text fields

Text Field Editing Buttons

Ordering Information

ORDERING INFORMATION						
SERIES	IDE40					
APPROVALS*	N	No approvals	G	CE, cULus	H	CE, cULus, Non-incendive
POWER	1	90 - 264 Vac	2	24 Vdc		
OPTIONAL EXPANSION CARDS**	A	4 Analog Inputs	D	15 Digital Inputs	P	4 Pulse Inputs
	T	4 Temperature Inputs	O	5 Analog Outputs	R	5 Relays
	PR	Printer Card				
OPTIONS***	ETH	TCP/IP Network	DL	Data Logging	BC	Batch Controller
	MM	Modbus Master				

Notes:

* PR (printer), T (temperature inputs), and D (digital inputs) require N (no approvals)

** 7 total Expansion Cards Maximum, 6 Relay Expansion Cards Maximum, 1 Printer Expansion Card only, include number of required card as a prefix

*** ETH, DL, BC, and MM can all coexist together and with any other options and cards

EXAMPLE

		IDE40	-	G	-	1	-	3A	-	ETH
Series	IDE40 Series									
Approvals	CE, cULus									
Power	90 - 264 Vac									
Optional Expansion Cards	4 Analog Inputs									
Options	TCP/IP Network									

OPTIONAL EXPANSION CARD EXAMPLE

CARD TYPE	CODE	POINTS PER CARD	MODEL CODE FORMAT
Analog inputs	A	 4	X A → 3 A = 3 cards × 4 points = 12 inputs
Temperature inputs	T	 4	XT → 1T = 1 card × 4 points = 4 inputs
Printer	PR	Fixed, 1 only	PR → no prefix, max 1 card
Digital inputs	D	 15	XD → 2D = 2 cards × 15 points = 30 inputs
Analog outputs	O	 5	XO → 2O = 2 cards × 5 points = 10 outputs
Pulse inputs	P	 4	XP → 1P = 1 card × 4 points = 4 inputs
Relays	R	 5	XR → 4R = 4 cards × 5 points = 20 relays (max 6 cards)

Notes:

- There is 7 total expansion cards maximum.
- Expansion cards should be indicated in the order shown above.
- Omit expansion cards that are not required.

Specifications

Specifications

Except where noted all specifications apply to operation at 25°C (77°F)

General

Display	Color: QVGA (320 x 240 pixels), 5.7" (145 mm) diagonally, white backlight Bargraph: Twenty divisions Numerical: Up to 15 digits (±999,999,999,999,999) Feet & Inches Format: 99,999' 11.9"
Screen Bargraph	Enable/disable: Channels, totals, timers Bargraph scale: 0 – 100%, independent of channel scale. Twenty divisions: 5% each. Screen: Select to show bargraph or not.
Color Selection	65 colors selection Customize bargraph, panel background, and text for normal and alarm conditions.
Decimal Point	0 to 15 decimal places, user selectable
Engineering Units	User selectable units or custom units Time, Distance, Volume, Pressure, Weight, Temperature, Current, Voltage, Percent, Amps, Volts, Counts, Logic, and Custom, Any unit/unit of time or other units. See page 21 for list of units.
Feet & Inches Units	Data entry format: Decimal (e.g. 50.58 feet) Display format: 50' 6.96"
Units Conversion	Units' conversion is supported for channels, totals, timers, and any function using those parameters. Channel scaling must be in the intended base units (e.g. Gallons/min)
Boot-Up Time	Less than 10 seconds All inputs and outputs
Display Update Rate	User selectable: 0.1 to 0.5 sec (10 updates/sec to 2 updates/sec)
Programming Method	Front panel buttons, external buttons, or IDE40 Software
Number of Alarms	Up to 64 high or low, Logic AND & OR Automatic (non-latching) or latching On & Off time delays Can be assigned to one or more relays. Note: Alarms are independent from relays.
Alarm Types	Single Source: One input Multi-Source: Two or more inputs Interval: Enter time interval and On Time Day & Time: Select day of the week & time Alarm OR: Any active input alarm triggers the OR alarm Alarm AND: All alarms must be active to trigger the AND alarm
Alarm Ack & Reset	Automatic only (Non-latching) Automatic and manual Manual only (Latching) Manual with Ack only after alarm is cleared (Latching with Clear)
Alarm Indication	1. Bargraph, panel, and text can be set up to change color on alarm 2. Enable internal buzzer 3. Assign external relay to drive a horn
Internal Buzzer	60 dBA @ 24 inches (61 cm) Enable/disable in System – General menu Associated with alarm Horn setting

External Horn (Sold Separately)	Assign any relay to the Horn function to activate an external horn when alarm condition is detected.
Live Channel Calibration	Live calibration of channels is independent of the input calibration used for scaling.
Input & Output Cards	Max Number of I/O Cards: 7 Analog Inputs: 4/card Pulse Inputs: 4/card Temperature Inputs: 4/card ⁽¹⁾ Digital Inputs: 15/card ⁽¹⁾ Analog Outputs: 5/card Relays: 5/card ⁽³⁾ Printer: 1/card. ^{(1) (2)} 1. Models equipped with these cards are not UL Listed. 2. Printer card occupies one I/O slot. 3. Max number of relay cards is 6.
Number of Screens	Up to 20 screens with 1 to 8 PVs or items per screen Enable or disable screen title, channel #, and bargraph Automatic or manual scanning Scan time: 1 to >1000 sec, independent for each screen F1-F4 keys are assigned per screen
Function Keys	User programmable (See defaults below) F1 = Previous ← F2 = Next → F3 = Scan/Stop F4 = Ack
Number of Channels	Up to 99 channels Input Source: 4-20 mA, Pulse, Digital, Modbus, another Channel, Total, Timer, Alarm, Date & Time, mA Output, Relay Output, Digital Output, or Modbus Output
Channel Functions	There is an extensive number of functions that can be applied to the inputs, see Channel & Math Functions on page 19.
Number of PID Control Channels	Up to (8) PID control loops can be set up with (8) analog inputs and (8) analog outputs. Note: (2) analog input cards and (2) analog output cards are used. The (3) remaining slots can be used for relays. Contact Tech Support if more than (8) PID loops are needed.
Programmable Switches	Up to (32) programmable digital switches can be used to route any input, output, or process variable.
Password	Programmable password restricts modification of programmed settings. View and Setup menus are password protected, function keys and digital inputs are not protected.
Simulation Mode	Inputs, channels, totals, timers, and alarms can be simulated from the View menu or from a function key. Simulation mode is not saved on power down. Alert! message is provided for simulated items.

Specifications

Manual Control	Analog outputs and relays can be controlled manually from the View menu or from a function key. Manual control mode is not saved on power down. Alert! message is provided for outputs in manual control. Note: If it is necessary to turn relays off and maintain the condition through power cycle, configure the relays to Always Off.
Non-Volatile Memory	Settings stored for a minimum of 10 years.
AC Powered Models (6)	Three-terminal connector (L, N, GND) 90264 VAC, 47 to 63 Hz, 60 W max
DC Powered Models (7)	Two-terminal connector (G, 24V) 24 VDC $\pm 10\%$, 60 W max Means of Protection: Class 2 (Reinforced) Overvoltage Category: Class II
Fuse	Units are protected internally with auto-resettable fuse AC: 1.25 A max DC: 3.7 A max
External Fuse	Recommended external fuse slow-blow 120 VAC: 2.0 A 240 VAC: 1.0 A 24 VDC: 4 A
Isolation & Grounding	1500 V Analog inputs/outputs-to-power line
	500 V Analog input-to-input, input-to-output, analog output-to-output
	All analog inputs and analog outputs are isolated from each other.
Environmental	Operating temperature range: -25 to 55°C (-13 to 131°F)* Storage temperature range: -40 to 60°C (-40 to 140°F) Relative humidity: 0 to 90% non-condensing
Front Sealing	Type 4X, IP66
Pollution Degree	2
Maximum Altitude	2000 m (6,562 feet)
Internal Fan	Automatic temperature-controlled fan turns on if the inside temperature reaches 50°C and increases the speed as the temperature rises to 60°C.
Internal Heater	Automatic temperature-controlled heater located behind the LCD turns on at 0°C, delivering the minimum power. If the temperature drops below -10°C, the heater delivers its maximum power.
Connections	Removable screw terminal blocks Inputs/Outputs: 12 to 24 AWG wire Digital I/O: 16 to 30 AWG RS-485: 12 to 24 AWG wire RJ45 Ethernet connection USB ports: Micro-USB used for programming; cable included. Data Log Drive: Type A, used with Data Logger Add-On feature.
Tightening Torque	Screw terminal connectors: Analog I/O & Relays: 0.5 Nm (4.5 lb-in) Digital I/O terminals: 0.23 Nm (2 lb-in)

Enclosure	Enclosure Body: Thermoplastic Polyester Color: Gray Display Window: Clear Polycarbonate, GE LEXAN HP12W Front Panel Keys: Silicone rubber
Mounting	Panel-mounting frame and twelve screws (provided) Cutout: 10.0" x 10.0" ± 0.05 " (254 mm x 254 mm ± 1.3 mm) (H x W) Panel thickness: 0.07" – 0.35" (1.8 mm – 8.9 mm) Clearance behind panel: 6" (152 mm)
Overall Dimensions	10.85" x 10.85" x 4.87" (276 mm x 276 mm x 124 mm) (H x W x D)
Weight	Ex: PD9000-XY-4PI-8AI-10AO-10RY 7.4 lb (3.4 kg) approx.
Field Enclosure	This device is an open-type controller and is required to be installed in a suitable enclosure that can only be accessed with the use of a tool or key. Panel mounting fasteners shall be tightened to a torque value of 0.8 Nm (7 lb-in).
Warranty	3 years parts and labor. See Warranty Information and Terms & Conditions on www.noshok.com for complete details.

Specifications

Totalizer

Number of Totalizers	Up to 32 totalizers 15 digits with comma separator
Totalizer Inputs	Calculates total based on selected rate channel, pulse input, digital input, or triggered event for non-rate channels. Total is stored in non-volatile memory if power is lost.
Maximum Total	18 digits 999,999,999,999,999,999
Rate Channel Input	4-20 mA input, Pulse input, Modbus input
Rate & Total Decimal Point	Independent and user selectable from 0 to 15 places
Totalizer Reset	Via front panel keys or digital inputs
Non-Resetable Total	Total can be set up to be non-resettable to prevent unintentional reset. This can be changed in the Setup Totals menu.
Total Units Conversion	Input: Rate channel Total units can be different than rate units. Use the custom units to convert to any unit (e.g. Gallons to Billion gallons BGAL: Factor = 0.000000001)
Pulse Input K-Factor	K-Factor = pulses/units of measure Calculates total directly from pulse input, Modbus input, channel, total, or Modbus output. Create rate channel by entering K-Factor, units and time base in sec, min, hr, or day. Decimals: 0 to 15
Count Down	Total can set up to count down from a predetermined value entered by the user.
Preset Value	Enter the preset value to count up or down. Reset total sets total to the preset value; to reset to zero un-check the Preset box.
Roll-Over	Enter the value for total to rollover to 0 Example: Roll-Over = 1,000,000 Total goes to 0 after 1 million
Negative Total	Allow total value to count below 0 for bidirectional flow based on rate channel
Total Bargraph	Bargraph can be scaled to represent the expected maximum total
Function Keys	Screen Setup: Assign F1F4 to Reset Total, Enter Total, Add To, or Remove From Total
Previous Total	This is the total prior to the last reset. Multiple previous totals can be set up by selecting a previous total as the input to a new total. The date & time is captured with the previous total.
Daily Total	This is the total for the day, starting at midnight. Daily total can be the input for previous totals to keep a record of a few days. The date is captured with the previous total.
Grand Total	Uses another total as the input and it is set up as non-resettable
Non-Rate Total	This total takes the input from a non-rate channel, a trigger causes the total to increment, or decrement based on the settings selected (e.g. Input from weight scale added when digital input is triggered).

Batch Controller

Availability	Order Add-On Feature model PDK9000B1 at any time. (IDE40 firmware version 2.4 or greater) See <i>How to Enable Add-On Features</i> on page 139.
Methods	Automatic or Manual, count up or count down
Auto Correct	Select auto correct to automatically correct minor deviations of the delivered batch from the preset value. Test batches must be run until the correct batch is obtained.
Manual Batch Start	Assign a function key to start the batch
Manual Batch Pause/Stop	Assign a function key to pause or stop the batch. A paused batch can be resumed or stopped.
Batch Start Delay	The start delay applies to manual or automatic batch modes.
Automatic Batching	The batch can be run automatically, where the batches run continuously without operator input, after started.
Automatic Batch Restart Delay	The batch will automatically restart after completion of the last batch and the automatic delay. This time is in addition to the start delay, if selected.
Batching Relay Operation	Single or dual-relay batching with optional pre-close for dual-stage operation.
Batch Preset	Assign a function key to change the preset quickly without navigating the menu.
Batch Preclose	For two-stage batch application, a pre-close value can be set to close the main flow line before the preset is reached.
Pre-Start Action	Select what happens before the batch starts running (e.g. Turn on a horn/light to alert the operator).
Start Action	Select action when batch starts.
Pre-Close Action	Select action when pre-close is reached.
Finish Action	Select action when the batch is completed.
Batch View Screen	The batch view screen provides information about the batch setup (inputs & outputs) and the batch control functions (e.g. Start/Stop, Print, Partial, Force On).
Batch Control	The control functions can be accessed from the View menu or a function key.
Partial Batch	A partial batch can be entered to test the system before running a full batch.
Force On/Off	Batch relay(s) can be forced on or off from the View menu or a function key.

Real Time Clock

Date Format	Month, day, year (e.g. July 16, 2024)
Time Format	24 hour; 00: Midnight hh:mm:ss
Battery	3V, P/N: CR2032 included Battery replacement only with a Panasonic CR2032 Lithium Metal 3V coin cell battery.
Display Date & Time	Displayed on the top line of Setup and View menus, including day of the week.
Screens	Date & Time can be added to any screen.
Channels	Date & Time can be the input to a channel. Display Format: yyyy/mm/dd hh:mm:ss

Specifications

Channel & Math Functions

Scale Functions	K-Factor	Converts number of pulses to volume or other units
	Scale Factor	Apply multiplier to a channel
	Scale Linear 2Pt	Scale a channel
	Scale Multi-Point*	Multi-point scaling of a channel
	Scale Square Root	Apply square root to a channel – Differential Pressure from two channels
	Scale Exponent	Apply exponent for weirs and flumes open channel flow calculation
	Round Horizontal Tank	Calculate volume in round horizontal tank with flat ends
	Units Conversion	Convert base units to any units
	Percent (Bargraph)	% bargraph of any: 420 mA input, channel, total, timer, or mA output
	Text (Percent)	Text displayed based on the % input value
Math Functions	Constant	Assign fixed value
	Summation	Add two or more channels
	Difference	Subtract any two channels
	Abs Difference	Difference always positive
	Absolute Value	Convert channel value to positive
	Average	Find the average of channels
	Weighted Average	Assign % weight to two or more channels
	Multiply	Multiply two channels
	Divide	Divide two channels
	Exponent	Set the base and the exponent; both can be constants or variables
	Logarithm	Set the base and the value; both can be constants or variables
	Polynomial	Calculate single variable 5th degree polynomial
	Modulo	Set constants or variables for A mod B
	Trigonometry	Sine, cosine, tangent, arc sine, arc cosine, arc tangent. Select the input and angle
	% Efficiency	Calculate input to output efficiency ((A-B)/A)*100%

Open Channel Flow Functions	Parshall Flumes	$Q = K H^n$ Enter constant, head variable, exponent, and units
	V-Notch Weirs	$Q = K H^{2.5}$ Enter constant, head variable, and units
	Cipolletti Weirs	$Q = K L H^{1.5}$ Enter constant, crest length, head variable, and units
	Rectangular Weirs w/o Contractions	$Q = K L H^{1.5}$ Enter constant, crest length, head variable, and units
	Rectangular Weirs with Contractions	$Q = K (L - 0.2H) H^{1.5}$ Enter constant, crest length, head variable, and units
	Note: Enter K value for $Q = \text{cuFt/sec}$; select any flow rate units to be displayed or used as input to a totalizer.	



IMPORTANT

***Scale MultiPoint:** There is no minimum input span requirement; it is up to the user to make sure the input values are correct.

Specifications

Additional Functions	Compare	
	Greatest	Greatest value in a group of channels
	Least	Smallest value in a group of channels
	Middle of 3	Outputs the middle value of three inputs
	Less Than	Calculate True/False if A is less than B
	Measure	
	Tare	Calculate net value when Tare function is applied via function key
	Maximum	Maximum value reached by the process
	Minimum	Minimum value reached by the process
	Duration	Keep track of time a condition has been present (e.g. high alarm active)
	Rate of Change	Calculates how fast a process is changing / sec, /min, /hr, /day
	Filter	
	Window Average	Enter time to calculate the average
	IIR (First Order)	Infinite Impulse Response (slow)
	Cutoff	PV = 0 below cutoff Flip Side: 0 above (-)
	Limits	Sets PV upper & lower limits.
	Round	Round (to nearest) Floor (always down) Ceiling (always up) Less (toward zero) More (away from zero)
	Hysteresis	Resists a directional change using a time delay, filters change in the trending direction
	Delay	Enter the number of seconds to delay the output
	Pulse Filter	Use to filter discrete inputs, set minimum and maximum on/off time in seconds

Control	
Sampler	Trigger relay sample and select sampling time (e.g. Turn relay on for 30 sec every time total increases by 1,000 Gallons)
On Off Control	Set on & off control based on PV
On Off Control with Random Varying On/Off Points	Select Randomizer, enter on/off points +/- random variation
On Off Multi Set	Calculate On/Off for multiple positions based on a single input and multiple set-points
Lead Lag Control	Calculate On/Off for multiple positions based on multiple logic inputs. Inputs are True if not zero, otherwise false.
Pump Alternation	Calculate On/Off for multiple positions based on multiple logic inputs. Inputs are True if not zero, otherwise false.
Logic OR, AND, NOT	Calculate logic combinations of multiple inputs. Inputs are True if not zero, otherwise false.
Select A or B	Switch between 2 inputs
Select 1,2,3...	Select 1 from 3 or more inputs, it works as a selector switch
Schedule	Daily or weekly event The available actions depend on the configuration of the inputs and outputs.
Capture	Set a trigger event to capture a value in real time
PID Control	Set up channel for PID control
PWM Control	Set up channel for pulse width modulation control to be used with PID control loop
Switch Position	Set up channel to read the digital switch position (0, 1, 2, 3)
Relays	
Cycle Count	Number of relay cycles since reset
Runtime	Relay runtime (ON) hh:mm:ss
Modbus	
Time Since Read	Time since a Modbus client device read a register
Time Since Write	Time since a Modbus client wrote to a register

Specifications

Additional Functions	Bitwise	
	Bitwise Constant	Configure numeric constant in Hexadecimal format.
	Bitwise Hex	Convert input to Hexadecimal format.
	Bit Test	Calculate True/False if a specific bit of the input is set to 1.
	Bitwise OR, AND, NOT	Calculate bitwise logical combinations of multiple inputs. Resulting output is a 32-bit Hexadecimal format.
	Bitwise RSH, LSH	Convert input to Hexadecimal format, then perform bit shift operation.
	Bitwise Map	Convert input to Hexadecimal format, then perform a bit rearrangement based on bit to bit mapping.
	Bitwise Count	Convert input to Hexadecimal format, then count the number of bits that are set to 1.
	Bitwise First, Last	Convert input to Hexadecimal format. The result is with only the First (Last) bit set, clearing all other bits to zero. Optionally, the result is the position of the First (Last) bit set.

List of Engineering Units

Time	seconds, minutes, hours, days & /sec, /min, /hr, /day
Distance (Height)	cm, m, Inch, Feet, Ft-In, Yard, km, miles, custom
Volume	Gallons, GAL, L, IGAL, M3, BBL, BUSH, cuYD, cuFt, cuIn, LiBBL, BBBL, HECtL, quarts, pints, fl oz, mL, DT, M/T, MGAL, custom
Pressure	psi, Pa, bar, hPa, kPa, MPa, GPa, inH2O, cmH2O, inHg, mmHg, atm, kg/cm2, kg/m2, mbar, Mbar, Torr, mTorr, custom
Weight	grams, Oz, Lb, lb, g, kg, ounces, tons, tonnes, custom
Temperature	C, F, K, Ra
Percent	%, PCT, Percent, custom
Amps	mA, Amps, custom
Volts	V, mV, Volts, custom
Counts	Pulses, Cycles, Counts, custom
Logic	ON, OFF, OPEN, CLOSED, YES, NO, START, RUNNING, STOP, STOPPED, PUMP ON, PUMP OFF, OK, OKAY, ERROR, WARNING, custom
Custom	Enter unit's name, type, base unit, and factor.

Pump Controller

Control Modes	Channels > Control 1. On-Off control 2. Multi-Setpoint control 3. Alternation control 4. LeadLag control
Inputs	1. On-Off control channels 2. Digital inputs 3. Modbus inputs
Relays	Any relay can be set up for pump control. It is critical to select the corresponding position for the relay to operate correctly.
Number of Alternation Pumps	Limited only by the number of available relays
On & Off Delays	Delays can be added either in the control channels or the individual relays. The delays help to prevent turning on/off multiple pumps at the same time.
Pump Controller Panel	Use channels to monitor the state of the relays and use the screens to create a pump controller annunciator panel.

Refer to *Pump Controller Setup* on page 110 for setup of the pump controller functions.

Safety Information

4-20 mA Analog Inputs

Number of Inputs	(4) Analog inputs/card (28) Analog inputs max, no other I/O
Typical Input	4-20 mA
Input Range	0-24 mA
Accuracy	±0.03% of full scale ±1 count
420 mA Display Value	Up to six recommended ±999,999 More digits can be used, but the stability will be affected. Increase the filter value and lower the display update rate or use rounding to get a more stable reading.
Number of PID Control Loops	(8) PID control loops can be set up with (8) analog outputs connected to SCRs. Note: (4) digital outputs can be used to control SSR (Solid State Relays). Mechanical relays can be used for slow-process PID control. Contact Tech Support if more than (8) PID loops are needed.
Transmitter Power Supply	Isolated 24 VDC @ 200 mA/input Max current: 1,600 mA (All inputs) (8) Analog Input @ 200 mA max (28) Analog Input @ 20 mA max Available on AC or DC powered units
Temperature Drift	Better than 20 ppm/°C from -40 to 60°C ambient
Filter	Window average: None, 0.5, 1, 2, 4, 8 sec IIR (Infinite Impulse Response): 16, 32 sec Glitch Filter: Discards a single sample caused by high frequency noise
Filter Bypass	0 to 100 % of full scale Filter is ignored, if the signal change is greater than bypass value
Channel Input Scale Function	Scale Linear 2-Point, Scale Multi-Point (2 to 50 points)* Scale Square Root Scale Exponent (Open Channel Flow) Scale Factor Round Horizontal Tank (Volume) Units Conversion (mA Input Reading) Percent Bargraph Text (Percent)
Channel Input Live Calibration	Each channel can be calibrated using a live calibration signal from a sensor or a calibrator.
Input Protection	Each 4-20 mA input is protected by an auto-resettable fuse, 30 VDC max. The fuse resets automatically after the fault condition is removed.
Input Impedance	125 Ω typical, including auto-resettable fuse
Hart Transparency	The controller does not interfere with existing HART communications; it displays the 4-20 mA primary variable, and it allows the HART communications to pass through without interruption. The controller is not affected if a HART communicator is connected to the loop. The controller does not display secondary HART variables.
Isolation	1500 V: Input-to-power line 500 V: Input-to-input, input-to-output All analog inputs and analog outputs are isolated from each other.
Normal Mode Rejection	100 dB at 50/60 Hz
Common Mode Rejection	90 dB at 50/60 Hz

Pulse Inputs

Number Of Inputs	(4) Pulse inputs/card (28) Pulse inputs max, no other I/O
Input Type	Active Square Wave, NPN, PNP, Reed Switch, Coil (Magnetic Pickup) Normal threshold: 1.2 V (0.8 to 3.0 V) High threshold: 2.5 V (2.0 V to 6.0 V) Coil threshold: 20 mV (Low) or 100 mV (High)
Signal Level	Active Square Wave: 0 to 30 V max Typical: 0 to 5 V Coil: 20 mVp-p to 30 Vp-p (Magnetic Pickup)
Input Impedance	Active, NPN, Reed: 10 kΩ pull-up to 5 V PNP: 10 kΩ pull-down to (S) Coil: >2 kΩ (20 mV sensitivity), >10 kΩ (100 mV sensitivity)
Isolation	Pulse inputs are not isolated, (S) terminal is connected to system GND
Input Protection	±36 V, non-isolated
Frequency Response & Signal Level	Active Square Wave 5 V: 0 to 100 kHz Coil (Magnetic Pickup): 0 to 50 kHz <u>Frequency – Signal level (Coil: 20 mV)</u> 20 mVp-p – 100 Hz 100 mVp-p – 10 kHz <u>Frequency – Signal level (Coil: 100 mV)</u> 100 mVp-p – 90 Hz 500 mVp-p – 5 kHz 20 Vp-p – 50 kHz
Minimum Frequency	250 μHz with High Gate = 4,000 sec
Low Gate	1 to 99 sec
High Gate	2 to 4,000 sec (Must be higher than low gate)
Low Speed	100 Hz maximum Used for contact de-bouncing
Pulse Counter	8,388,607 maximum, used for troubleshooting purposes only
Accuracy	±1 count for K-Factor > 1 or 30 ppm
K-Factor	Programmable pulses/unit of measure with up to 14 decimal resolution
Scale Pulse Input	Scale Linear 2-Point Scale Multi-Point Scaling*: 2 to 50 points Scale Factor Units Conversion
Live Calibration	Pulse input channel can be calibrated using live calibration signal from a sensor.



IMPORTANT

***Scale MultiPoint:** There is no minimum input span requirement; it is up to the user to make sure the input values are correct.

Safety Information

Modbus Inputs - Server

Availability	Standard feature
Number of Inputs	199 Modbus RTU or ASCII
Scale Modbus Input	Modbus input can be used as the input for creating channels and totals, the same way the 4-20 mA inputs are used.
Data Type	BitLogic Signed/Unsigned: 16 (Short), 32 (Long), 64 (Long-Long) Float 32, Float 64 (Double)
Decimal Point	User selectable
Comm Break & Timeout	Specify what value to hold when a communication break occurs and how long to wait for new data before reporting a break condition.
Input Action	Specify what should happen when new data is written to the input register (e.g. Add to Total 1, Log Entry – All Logs).

Digital Inputs

Digital Inputs	5 Inputs, non-isolated, 30 VDC max Standard feature on all IDE40 models 15-Digital Inputs Card (Optional) Low: 0 to 1.2 V High: 2.8 to 30.0 V Internal pull-up: 5 k Ω to 5 V Max pulse frequency: 1 kHz @ 5 Vpp +5 V terminal: Internal pull-up 100 Ω Note: Pulse inputs can be used as digital inputs
Digital Input Types	Normally open switch: External excitation not required (Current: 1 mA) Open collector: 4.1 V open circuit voltage Logic level: 0 to 30 V
Assignment & Operation	Active Low or Active High Functions: Remote front panel button, total functions, timer control, alarm functions, screen navigation, horn functions, reset relay information. Digital inputs can be used as input source for channels, totals, and alarms.
Input Protection	± 36 V, non-isolated

Temperature Inputs

Inputs	Thermocouple: J, K, T, E, R, S, B, N, C RTD: 100 Ω platinum (0.00385 & 0.00392 coefficients), 10 Ω copper, 120 Ω nickel, 1000 Ω platinum (0.00385 & 0.00392 coefficients)
Cold Junction Reference	Automatic, fixed, no user calibration needed
Temperature Drift	$\pm 2^{\circ}\text{C}$ maximum from 0 to 55°C ambient temperature $\pm 4^{\circ}\text{C}$ maximum from 25 to 0°C ambient temperature
Input Impedance	Greater than 100 k Ω
Sensor Break Detection	Open TC or RTD sensor indicated by display break, relays can be programmed to go "On", "Off", or to "Ignore" (<i>Note: Ignore is detected as an upscale condition</i>). Analog output goes to the programmed sensor break value.

Accuracy & Ranges

Type	Range ($^{\circ}\text{F}$)	Accuracy	Range ($^{\circ}\text{C}$)	Accuracy
J	-200 to 2000	$\pm 1.8^{\circ}\text{F}$	-129 to 1093	$\pm 1^{\circ}\text{C}$
K	-200 to 2400	$\pm 1.8^{\circ}\text{F}$	-129 to 1316	$\pm 1^{\circ}\text{C}$
T	-200 to 752	$\pm 1.8^{\circ}\text{F}$	-129 to 400	$\pm 1^{\circ}\text{C}$
E	-200 to 1800	$\pm 1.8^{\circ}\text{F}$	-129 to 982	$\pm 1^{\circ}\text{C}$
R	-50 to 3000	$\pm 3.6^{\circ}\text{F}$	-46 to 1649	$\pm 2^{\circ}\text{C}$
S	-50 to 3000	$\pm 3.6^{\circ}\text{F}$	-46 to 1649	$\pm 2^{\circ}\text{C}$
B	752 to 3300	$\pm 3.6^{\circ}\text{F}$	400 to 1816	$\pm 2^{\circ}\text{C}$
N	-100 to 2300	$\pm 3.6^{\circ}\text{F}$	-73 to 1260	$\pm 2^{\circ}\text{C}$
C	32 to 4100	$\pm 3.6^{\circ}\text{F}$	0 to 2260	$\pm 2^{\circ}\text{C}$
10 Ω	-328 to 500	$\pm 0.2^{\circ}\text{F}$	-200 to 260	$\pm 0.1^{\circ}\text{C}$
100 Ω	-328 to 1562	$\pm 0.7^{\circ}\text{F}$	-200 to 850	$\pm 0.4^{\circ}\text{C}$
120 Ω	-110 to 500	$\pm 0.2^{\circ}\text{F}$	-79 to 260	$\pm 0.1^{\circ}\text{C}$
1000 Ω	-328 to 900	$\pm 0.7^{\circ}\text{F}$	-200 to 482	$\pm 0.4^{\circ}\text{C}$

Digital Outputs

Digital Outputs	4 Outputs Standard feature on all IDE40 models Low: 0 V (no load), 1.5 V max @ 10 mA sink (External pull-up) High: 5.0 V (no load), 3.5 V @ 10 mA load Maximum current: 30 mA Output impedance: 100 Ω Output protection: 150 mA auto-resettable fuse Max frequency: 5 Hz
Digital Output Assignment	Digital outputs require logic units as the input. Input sources: Digital input, Modbus input, channel, alarm, horn, always on, or always off
Output Protection	± 36 V, non-isolated

Safety Information

Relays

Number of Relays	(5) Relays/card (30) Relays max with (4) analog or (4) pulse inputs, no other I/O
Rating	SPDT (Form C) Resistive load: Rated 10A @ 120/240 VAC or 8A @ 30 VDC Inductive load: NO contacts: 5A, 1/3 HP, 120 VAC; 30,000 cycles NC contacts: 1/8 HP, 120 VAC; 50,000 cycles Minimum load: 100 mA @ 5 VDC
Maximum Current per Relay & Number of Relays	11 relays or more: 5A @ 120/240 VAC or 30 VDC. Limited due to heat dissipation inside the enclosure.
Isolation	1500 VAC, 50/60 Hz for 1 min between coil and contacts
Deadband	0- 100% of full scale, user selectable
Electrical Noise Suppression	TVS diodes & snubbers on all contacts. Recommended additional external snubber: 0.01 μ F/470 Ω , 250 VAC (Order: PDX6901)
Assignment & Operation	Any relay can be assigned to any alarm, channel, total, timer, digital input, Modbus input, pump control, batch control, horn, always on, or always off. Multiple relays can be assigned to the same alarm or channel. All relays are programmed independently. High & Low Alarm: Defined by set and reset points in the Alarm menu High or Low Alarm: Assign relay to any alarm or channel for on/off relay control Note: Automatic reset only for channel Multi-Source High or Low Alarm: Assign relay to multi-source alarm to indicate common high or low condition. Pulse Action: Set any relay for pulsing on/off timed relay control. Programmable pulse width (on/off time) and on/off delay. Sampling: Relay must be assigned to channel setup for Sampler function with user-defined total increment and sampling time. Pump Alternation: Any relay can set up to alternate with any relay in the group. Multiple alternation groups can set up.
Acknowledge	Front panel Ack key or digital input acknowledges individual or all alarms; relays associated with acknowledged alarm are turned off.
Alarm Relay	Assign any relay to be driven by any alarm; acknowledging the alarm turns off the relay (non-fail-safe mode).
Time Delay	Programmable on/off delays, 0.0 to 999.9 sec Independent for each relay.
Auto Initialization	When power is applied to the controller, relays will reflect the state of the input to the controller.
Fail-Safe 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.

4-20 mA Transmitter Outputs

Number of Analog Outputs	(5) Analog outputs/card (35) Analog outputs max with no other I/O cards (Seven I/O slots)
Output Range	4.00 to 20.00 mA, nominal
Calibration	Factory calibrated for 4-20 mA
Scaling Range	Any process range Reverse scaling allowed
Assignment & Operation	Assign to any analog or pulse input, digital input, Modbus input, channel, total, timer, alarm, or fixed value (none). Note: Multiple 4-20 mA outputs can be assigned to the same input.
Accuracy	$\pm 0.03\%$ F.S. ± 0.005 mA
Temperature Drift	20 ppm/ $^{\circ}$ C from -40 to 60° C ambient. (Output & Input drifts are separate)
Output Loop Power	Powered by controller: 24 VDC @ 24 mA max or powered externally by 12 to 32 VDC
Output Loop Resistance	Powered by controller: 10 to 600 Ω External 12 VDC: 10 to 200 Ω External 24 VDC: 10 to 600 Ω External 32 VDC: 10 to 1000 Ω
Isolation	1500 V: Output-to-power line 500 V: Output-to-output, output-to-input All analog inputs and analog outputs are isolated from each other.

Timers

Number of Timers	Up to 30
Time Format	hh:mm:ss with 0 decimals selected Seconds with 1 or more decimals
Automatic Actions	Power Up: Timer action on power up Error: Action when an error is detected Reset: Event causes the timer to reset Start: Event triggers the timer to start Stop: Event causes the timer to stop
Start / Stop Reset	The function keys and digital inputs can be used to start, stop, and reset the timers, regardless of the automatic actions selected.
Assignment & Operation	Timers can be triggered, stop, and reset, by rising or falling signals from 4-20 mA input, pulse, digital, Modbus input, channel, total, other timers, alarm, mA output, relay, or Modbus output.
Count Down Timer	Select count down and enter starting time
Timer Alarm	Timer can be used to trigger alarms
Bargraph	Select bargraph during setup and scale the bargraph for 0 – 100% target time
Timer Control	Access timer control via the <i>View Timer</i> menu or assign a function key to timer control in the <i>Screens</i> menu
Timer & Relay	Timer can be assigned to drive relays based on selected set and reset points.

Safety Information

Modbus Outputs - Server

Availability	Standard feature
Data Type	Bit-Logic Signed/Unsigned: 16 (Short), 32 (Long), 64 (Long-Long) Float 32, Float 64 (Double)
Register Numbers	The register numbers are automatically generated based on the Modbus output number and the output's data type. Bit – Logic: 04101 – 04199 Signed/Unsigned 16: 44101 – 44199 Signed/Unsigned 32: 44201 – 44398 Signed/Unsigned 64: 45001 – 45396 Float 32: 44401 – 44598 Float 64: 44601 – 44996
Engineering Units	Select the engineering units for the process variable assigned to the output
Decimal Point	User selectable. For short and long integers this is a multiplier applied to the input value, but it is not displayed on the server's screen. The Modbus client uses this setting to read the correct value from the server. Example: Ch 1 value = 4,379.26 MB Output Data Type: Signed 32 Decimals = 0 → Output = 4,379 Decimals = 3 ← Output = 4,379,260
Output Action	Specify what should happen when the output register is read by the client (e.g. Start timer 1, Log Entry – All Logs).

Printer Card

Part Number	PDA9000-CP
Cable Connection	DB9M - 10 ft DB9F to DB25M Null Modem Cable (Included with printer card)
Screw Terminal Connection	5.0 mm pitch (Rx, Tx, /CTS, GND) Note: Use only one of the connection methods.
Test Printing	Prints system information, including details on installed I/O cards and firmware versions.
Data Printing	Includes batch ticket printing, event logs (such as alarms and time), and other critical data.
Text Formatting	Allows up to 24 text entries with four tab settings for aligning different items on the same line.
Printer Functions	Allows for printing of a custom ticket using data pulled from various sources (such as channels, inputs, outputs, etc). Tickets can be printed manually using function keys or digital inputs, as well as automatically via programmed trigger events.

Notes:

1. Printer card output uses an RS-232 serial connection.
2. IDE40 models equipped with a printer card are not UL Listed.
3. Printer card occupies one I/O slot.

Modbus Serial Communications

Compatibility	RS-485 (EIA-485)
Protocols	Modbus RTU or Modbus ASCII Modbus Enron is supported by the Client and the Spoofer modes.
Device Address	1 to 247 (Server)
Transmit Delay	0 to 999 ms
Receive Timeout	1 to 9 seconds
Baud Rate	1,200 to 115,200 bps
Data	8 bit (1 start bit, 1 stop bit)
Parity	Even, Odd, None with 1 stop bit, or None with 2 stop bits
Modbus Inputs	199 for all modes
Modbus Outputs	99 for all modes. The outputs can be grouped together to be sent as blocks of registers. These Modbus outputs are in addition to the outputs listed in the <i>Modbus Register Tables</i> , see page 163.
Communication Break	Reports a break condition after the response timeout has elapsed. The break condition can be: Zero, a default value, or the text Break. The Client goes into break condition after the server device fails to respond and the timeout has elapsed. The Snooper and Server modes go into break condition after no new data is received within the response timeout window. Alarms can be programmed to go on, off, or stay as is when a break condition is detected. The analog outputs can set up to generate a fixed mA current when a break condition is detected.

Modbus Client, Snooper & Spoofer

AddOn Feature PDK9000M1	The Modbus Client, Snooper & Spoofer Add-On Feature is an option in the IDE40. It can be purchased at the time the order is placed, or it can be purchased and enabled at any time. (IDE40 firmware version 2.1 or greater) See <i>How to Enable Add-On Features</i> on page 139.
Modes	Client: Requests data from servers and writes data to servers. Snooper: Listens to the RS-485 network communications and reads the selected registers. Spoofer: A channel is configured to pretend being a device that has been removed from the network. The device ID and register number is used.

Safety Information

Client & Snooper Settings

Availability	Order AddOn Feature model PDK9000M1 at any time. (IDE40 firmware version 2.1 or greater) See <i>How to Enable AddOn Features</i> on page 139.
Number of Output PVs	99 process variables can be written by the Client mode to Modbus servers. Modbus server inputs and outputs are available over the Ethernet port, in Client mode also.
Server ID	Enter the server ID or address containing the process variables to be read or written by the Client or read by the Snooper.
Function Code	Select which Modbus function code to use for reading the server device or for writing to a server by the IDE40 Client.
Register Address	065,533 (Base 0) Reg. No. 30001-39999, 40001-49999 Reg. No. 300001-365534 or 400001-465534 Specifies which register(s) to read from the server device.
Data Type	Select the data format used by the server device. Bit – Logic (Coil) Signed/Unsigned: 16 (Short, 2 byte) 32 (Long, 4 byte) 64 (Long Long, 8 byte) Float 32 (4 byte), Float 64 (Double, 8 byte)
Byte Order	ABCD, CDAB, BADC, or DCBA (big-endian, swapped, or little-endian)
Client Poll Time	1.0 to 999.9 sec. Time between read commands.
Server Response Timeout	99:59:59 hrs.: Time allowed for the server to respond before the Modbus client generates a communication break condition. The timeout should be greater than the poll time. Server/Snooper mode: Time the Modbus input will wait for new data before going into a break condition. If the timeout is disabled, the last value will remain until a new value is received.

Spoofers Settings

Availability	Order Add-On Feature model PDK9000-M1 at any time. (IDE40 firmware version 2.1 or greater) See <i>How to Enable AddOn Features</i> on page 139.
Number of Output PVs	99 process variables can be replaced by the IDE40 Spoofers feature.
Number of Input PVs	199 process variables can be written by a client to the Spoofers inputs replacing other Modbus servers.
Server ID	Enter the server ID or address being replaced by the IDE40 Spoofers.
Function Code	Select the Modbus function code used by the server device.
Register Address	Enter the address 0-65,533 (Base 0) for the process variable of the replaced server.
Data Type	Select the data format used by the server.
Byte Order	Select the byte order ABCD, CDAB, BADC, or DCBA (bigendian, swapped, or littleendian)
Engineering Units	Select the engineering units for the process variable.
Decimals	Enter the number of decimals required.
Output Action	Select an action to be performed by the controller, when the Spoofers output is read by a Modbus client or leave as None.

Data Logger – USB Drive

USB Data Logger AddOn Feature PDK9000D1	The Data Logger AddOn Feature is an option in the IDE40. It can be purchased at the time the order is placed, or it can be purchased and enabled at any time. (IDE40 firmware version 2.2 or greater) See <i>How to Enable AddOn Features</i> on page 139.
Storage Device	External USB flash drive Format: FAT32 (32 GB maximum) Recommended drive: SanDisk 32GB maximum.
Number of Data Logs	8, maximum
Number of Variables / Log	12, maximum
Number of Log Variables	96 variables, maximum (8 logs x 12 variables / log)
Number of Log Records	The number of records depends on the flash drive size. Examples for 32 GB: 1) 4 logs with 8 variables each 1 min rate: ~160,000,000 records Log time: 60 years 2) 8 logs with 12 variables each 1 min rate: ~70,000,000 records Log time: 16 years
Log File Type	csv (comma separated value)
Maximum Log File Size	100 MB A new file is automatically created when the log file exceeds 100 MB.
Stop when Full	This should be selected if the oldest logged data is more important than logging new data. If <i>Stop when Full</i> is not selected, the oldest block of data will be deleted to make room for new data.
Remove Device	Use the <i>Remove Device</i> button, in the <i>System – USB Drive</i> , to safely remove the USB drive and prevent data corruption.
Alert! Message	An Alert! message is displayed in place of the Menu key if the USB drive is removed.
Start / Stop	Selecting this feature enables the <i>Start / Stop</i> function key in the <i>View – Data Logs</i> menu. The <i>Start / Stop</i> function can be activated using the digital inputs, F1F4 function keys in the <i>Setup – Screens</i> menu, Channel control schedule, Modbus inputs, and Modbus outputs.
Log Enable Switch	The <i>Enable Switch</i> setting can be used to control the log process using digital inputs, Modbus inputs, Channel control, alarms, or relay outputs. Logs are recorded only if the <i>Enable Switch</i> input is in the active (on) condition.
Log Trigger	The <i>Log Trigger</i> setting is used to log data on a specific event; a log can be triggered using digital inputs, Modbus inputs, Channel control, alarms, relays.
Manual Log	The user can record a log entry at any time by using the F4 key in the <i>View – Logs</i> menu or by assigning a function key in the <i>Setup – Screens</i> menu.
Log Interval	00:00:01 to 23:59:59 hrs:min:sec

Compliance Information

Hazardous Area Location*

UL & CUL Listed	For Hazardous Location Installations (US and Canada) Class I Division 2 Groups A, B, C, and D Class II Division 2 Groups F and G Class III Temperature Code: T4A
UL File Number	E516990
Front Panel	UL Type 4X, NEMA 4X, IP66; Panel gasket provided
Low Voltage Directive	CSA-C22.2 No. 61010-1 and CSA-C22.2 No. 61010-2-201 UL 61010-1 and UL 61010-2-201 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use



WARNINGS

Risk of electric shock or personal injury. Hazardous voltages exist within enclosure. Installation and service should be performed only by trained service personnel.

*Hazardous Area Location approvals apply to all IDE40 (H) models. See ordering information.

Note: Models with -TI (Temperature Inputs Card), -DI (Digital Inputs Card), and -P (Printer Card) installed are not UL & C-UL Listed.

Ordinary Location*

UL & C-UL Listed	USA and Canada UL 508 Industrial Control Equipment
UL File Number	E160849
Front Panel	UL Type 4X, NEMA 4X, IP66; Panel gasket provided
Low Voltage Directive	CSA-C22.2 No. 61010-1 and CSA-C22.2 No. 61010-2-201 UL 61010-1 and UL 61010-2-201 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

*Ordinary Location approvals apply to all IDE40 (G) models. See ordering information.

Note: Models with -TI (Temperature Inputs Card), -DI (Digital Inputs Card), and -P (Printer Card) installed are not UL & C-UL Listed.

Safety Information



CAUTION

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



WARNINGS

Risk of electric shock or personal injury. Hazardous voltages exist within enclosure. Installation and service should be performed only by trained service personnel.

Installation

Unpacking

Remove the instrument from its box. Inspect the packaging and contents for damage. Report any damages to the carrier. If any part is missing or the controller malfunctions, please contact your supplier or the factory for assistance.

Panel Mounting

- Prepare panel cutout per the dimensions provided
- Locate the panel mounting bracket and screws
- Inspect the controller to assure the gasket is securely in place
- Insert controller in the panel cutout, the latches on the top and bottom should hold it in place
- Insert the panel mounting bracket from the back of the panel, observe the orientation of the piece marked TOP
- Install the 12 screws provided to a torque value of 0.8 Nm (7 lb-in)

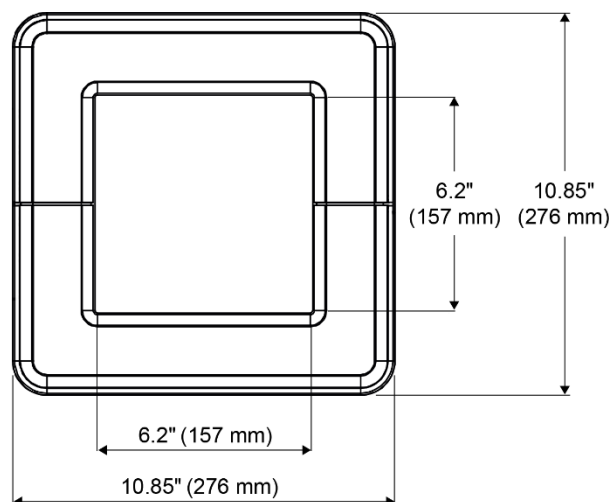


Figure 1. Front Panel Mount Dimensions

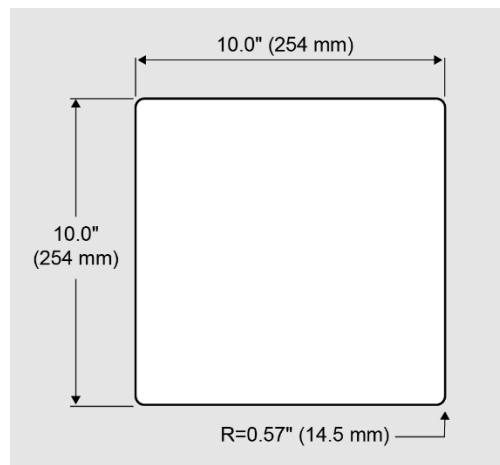
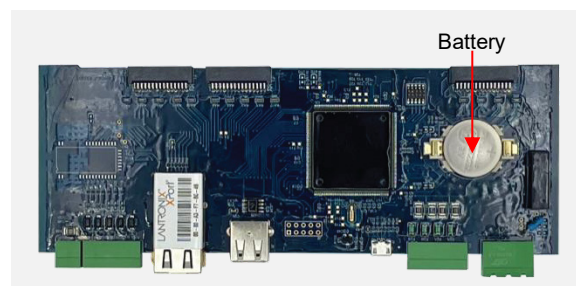


Figure 2. Panel Cutout Dimensions

Replacement Battery for Real Time Clock



Main MCU Board Showing Battery Location

WARNINGS



Explosion Hazard - Batteries must only be changed in an area known to be nonhazardous.

- Step 1:** Remove power to the IDE40, as well as all terminal plugs that are installed.
- Step 2:** Remove 8 screws from the back of the IDE40 housing using a Phillips head screwdriver. Remove the backplate and set aside.
- Step 3:** Grabbing both ends of the board, remove Main MCU board by pulling upwards.
- Step 4:** Remove CR2032 battery and replace only with a Panasonic CR2032 Lithium Metal 3V coin cell battery.
- Step 5:** Reinsert Main MCU board, making sure to note the orientation of the three pin headers. The board should fit snugly in place and be the same height as the other installed boards.
- Step 6:** Place the backplate back onto the rear of the IDE40 and replace the 8 screws, taking care not to overtighten.
- Step 7:** Replace terminal plugs and power on unit.

Installation

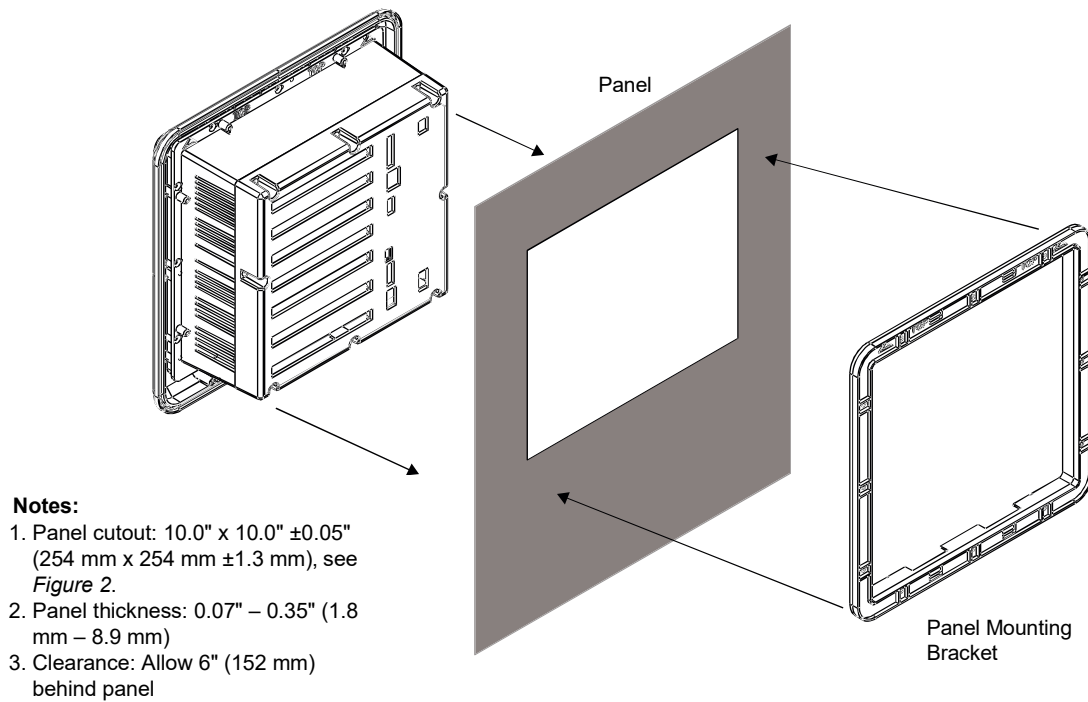


Figure 3. Panel Mount Installation

Mounting Dimensions

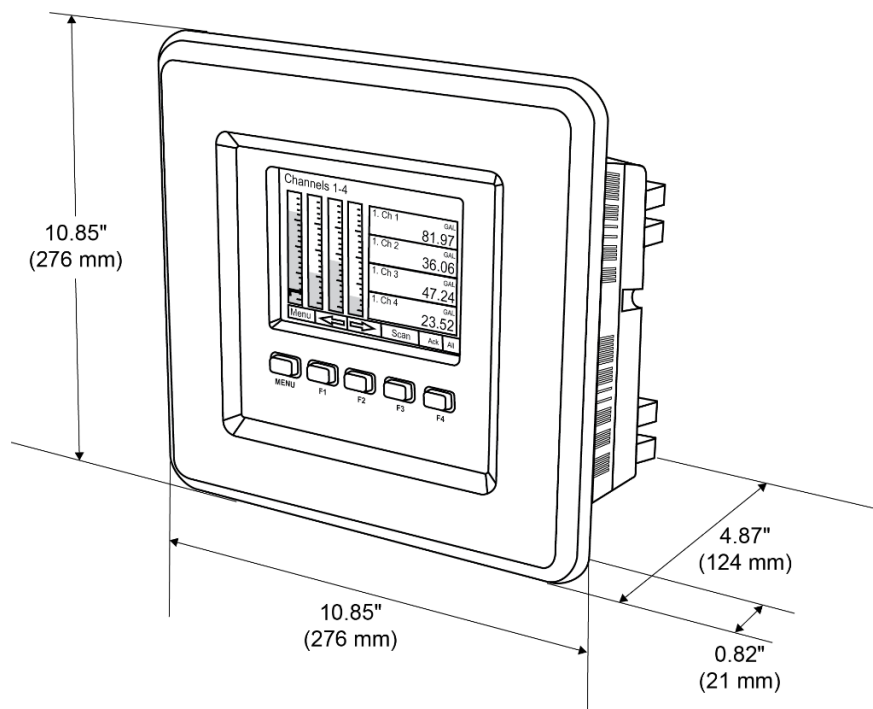


Figure 4. Panel Mount Overall Dimension