



Remote Level Display with Explosion Proof Enclosure

Part Number: RD6000-1-EXP (Enclosure)



Features

- Modern, Sleek and Practical Enclosure
- Display Mountable at 0°, 90°, 180°, & 270° Degrees
- Explosion-Proof, IP68, NEMA 4X Enclosure
- SafeTouch® Through-Glass Button Programming
- Password Protection
- Modbus® RS-485 Serial Communications
- Flanges for Wall or Pipe

Specifications

Refer to the data sheets for the meter/controller integral to the PD8.

Enclosure Ratings & Approvals

FM & CSA: FM Approved & CSA Certified. Explosion-proof for use in Class I, Division 1, Groups B, C, and D; Dust-Ignition-proof for Class II, Division 1, Groups E, F, and G, Class III; hazardous (classified) locations, USA: Indoor and outdoor (Type 4X and IP66); Ta = -40 to +185°F FM Certificate: 3037455

Canada: Indoor and outdoor (Type 4X); Ta = -40 to +85°C CSA Certificate: 2341214

ATEX & IECEX: ATEX Certified: Group 2, Category 1 (Zone 1), Gases, Vapors, Mists, or Dusts: II 2 G D, Ex d IIC Gb, Ex tb Db IIIC IP68. Ta = -40 to +85°C. ATEX Certificate: Sira 10ATEX1200U IECEX Certified: Flameproof, Gas Group IIC, Ex d IIC Gb, Ex tb IIIC IP68. Ta = -40 to +85°C. IECEX Certificate: IECEX SIR 10.0102U

Key Features

Through-Glass Safe Touch® Buttons

The RD6000 is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. These buttons can be disabled for security by selecting the LOCK setting on the switch located on the connector board in the base of the enclosure. To actuate a button, press one finger to the glass directly over the marked button area. When the cover is removed, four mechanical buttons located next to the sensors are used.



Modern, Sleek and Practical Enclosure

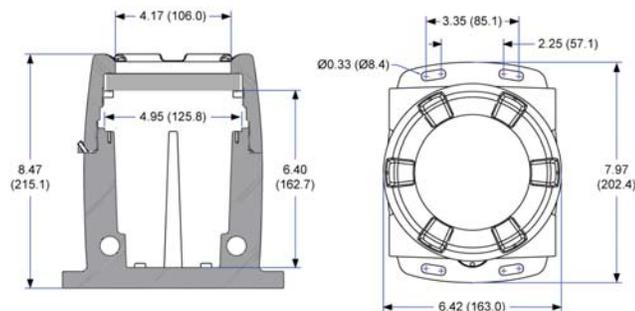
The first thing customers notice about a product is its enclosure and the RD6000-1-EXP really shines here. The copper-free (0.30%), smooth, die-cast aluminum NEMA 4X (IP68) enclosure is finished with a corrosion resistant epoxy coating that literally does make the RD6000-1-EXP shine. The built-in mounting flanges make for convenient wall or pipe mounting and there is even a slot on the back of the enclosure for centering on the pipe. There are four 3/4" NPT conduit holes for wiring (two metal conduit plugs supplied).

Serial Communications

Modbus and RS-485 are standard with all RD6000-1-EXP models. RS-232 may be added to the RD6000-1-EXP for local serial communications.

Dimensions

Units: Inch (mm)



Approvals apply to enclosures only.



OMNTEC Mfg., Inc.
1993 Pond Road
Ronkonkoma, NY 11779
Phone: (631) 981-2001
Fax: (631) 981-2007
E-mail: omntec@omntec.com
Website: www.omntec.com
Document No. 900187 rev 1-0 exp enc.doc
Revision No. 1.0 Revision Date: 6-24-11





Remote Level Display with Explosion Proof Enclosure

Part Number: RD6000-1-EXP (Display)



Features

- 4-20 mA, 0-5 V, 1-5 V, and ± 10 V Inputs
- NEMA 4X, IP65 Front
- Universal 85-265 VAC Input Power
- Large Dual-Line 6-Digit Display, 0.60" & 0.46"
- Dual-Scale for Level Applications – Single Input
- Sunlight Readable Display Models
- Isolated 24 VDC @ 200 mA Transmitter Power Supply
- Math Functions for Flow & Round Horizontal Tanks
- Programmable Displays & Function Keys
- 32-Point, Square Root, or Exponential Linearization
- Multi-Pump Alternation Control
- 4 Relays + Isolated 4-20 mA Output Options
- External 4-Relay & Digital I/O Expansion Modules Available
- Modbus[®] RTU Communication Protocol Standard

Feature Rich and Flexible

The RD6000-1-EXP meter boasts specifications and functionality that clearly make it one of the most advanced process meters available. Its dual-line 6-digit display (999,999), advanced math functions, function keys, Modbus RTU serial communications, and optional expansion modules are only a few of the features found on the RD6000-1-EXP.

Front Panel Display

Precise, Accurate, and More Informative

RD6000-1-EXP's large 0.6" upper display provides a highly accurate and precise 6-digit view of the process measurement. Its 24-bit A/D is accurate to $\pm 0.03\%$ of calibrated span ± 1 count.



Flow in CFH



Gallons & Setpoint



Level in Feet



Pressure Indication

Configurable

The upper display can be programmed to indicate PV, maximum (peak), minimum (valley), alternating maximum/minimum, one of eight alarm set points, or Modbus input. The lower display can also be configured to display engineering units, set points, user defined legends, or simply turned off.

SunBright Display Models

RD6000-1-EXP's SunBright display models have an extraordinarily bright LED display. They are perfect for applications where the meter is in direct sunlight or in applications where visibility may be impaired by smoke, fog, dust, or distance. Option is available on all RD6000-1-EXP models.

Function Keys

There are three function keys available to the user. These keys can be programmed to trigger certain events (i.e. acknowledge alarms, reset max and/or min, disable/enable output relays, or hold current relay states), provide direct menu access points, and more.



Remote Level Display with Explosion Proof Enclosure

Part No. RD6000-1-EXP (Display)



Easy to Use

The user friendly dual-line display makes the RD6000-1-EXP easy to set up & program. No jumpers to set for input selection. All setup & programming are done via the front panel. Three levels of password protection help maintain the reliability of the programming.



Input Setup



Display Setup

Dual-Scale Display Feature

The RD6000-1-EXP has a rather unique, and very flexible dual-scale capability; a second scaled display can represent the measured input in a different form (i.e. gallons & height). This is of particular value in level applications. Please see the examples shown below. Both displays are independently scaled and are based on the 4-20 mA input signal. Beyond level, this function has been used for pressure & force, current & power, feet & meters, GPM & CFM, and more.



Gallons & mA



Gallons & Height



Gallons & Percent



Gallons & Head PSI

Three Tier Password Protection

The RD6000-1-EXP offers 3 levels of password protection:

- Level 1 protection allows the operator use of only the 3 pre-configured function keys on the front panel without a password.
- Level 2 protection allows the operator use of only the function keys and the ability to change set points without a password.
- Level 3 protection restricts the operator from using the function keys and all meter configuration menus without a password.

Advanced Linearization Capability

The RD6000-1-EXP includes a 32-point linearizer. In non-linear level applications (i.e. some pumping or lift stations), it can easily compensate for submerged equipment or plumbing that displace usable volume. A second independent 8-point linearizer is available for a second scaled display (PV2) when "Level" function is enabled.

Simplified & Dynamic Menu System

The RD6000-1-EXP minimizes the menu selections by auto-detecting the installed options to determine what menu navigation is required. For example, extra menu items for the relay expansion module, I/O expansion, etc. are not present unless those options have been installed. This is an example of keeping the product *simply sophisticated*.

Max/Min Display

Max/Min (or Peak/Valley) is standard on the RD6000-1-EXP. Either display can be configured to show either maximum or minimum excursion since last reset. The displays can also be configured to toggle between Max and Min values. Both values can be simply reset from the front panel.

Environmentally Protected

The RD6000-1-EXP has standard UV protection, a NEMA 4X front panel, extremely durable face plate, performs in wide ambient operating temperatures, and is CE Certified (high noise and RF immunity).

Digital Communications

Modbus RTU Serial Communications

With the purchase of a serial communication adapter, RD6000-1-EXP meters can communicate with any Modbus Master device using the ever-popular Modbus communications protocol that is included in every RD6000-1-EXP. This greatly increases the flexibility of the meter. Modbus provides much more capability than read PV and write set points. Below are some examples of other things that can be done with RD6000-1-EXP's Modbus communications.

- Send a 6-character message to the lower display upon an event
- Convert a digital value to a 4-20 mA signal
- Remote user control (i.e. change set points, acknowledge alarms)
- Input a Modbus digital PV (in place of analog input)
- Remote override of any, or all, relays and analog outputs

Remote Level Display with Explosion Proof Enclosure

Part No. RD6000-1-EXP (Display)



Modbus PV Input



Remote Message

Meter Copy

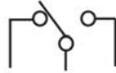
The Copy feature is used to copy (or clone) all the settings from one RD6000-1-EXP to other RD6000-1-EXP meters in about 20 seconds! The Copy function is a standard feature on all meters. It does not require a communications adapter, only an optional cable assembly. Consult factory for details.



Outputs

Relay Outputs

The RD6000-1-EXP has up to four 3 A Form C relays (SPDT) with multiple power loss fail-safe options. Relays can be configured for proper protective action upon input loop break. Relay ON and OFF delay times are user adjustable. Up to eight front panel indicators show alarm and/or relay state. All relays can be configured for 0-100% deadband.



Relay Operation/Configuration

There are powerful relay functions that can be configured in the RD6000-1-EXP meter, including:

- Automatic reset only (non-latching)
- Automatic + manual reset at any time (non-latching)
- Latching (manual reset only)
- Latching with clear (manual reset only after alarm condition has cleared)
- Pump alternation control (automatic reset only)
- Sampling (activated for a user-specified time)
- User selectable fail-safe operation
- Relay action for loss (break) of 4-20 mA input signal
- Time delay (on and off), independent for each relay
- Manual control mode
- Interlock relay mode

Analog Output

The isolated analog retransmission signal can be configured to represent the process variable (PV), maximum (peak) value, minimum (valley) value, the value for any of the eight relay set points, or Modbus input. While the output is nominally 4-20 mA, the signal will accurately accommodate under- and over-ranges from 1 to 23 mA.

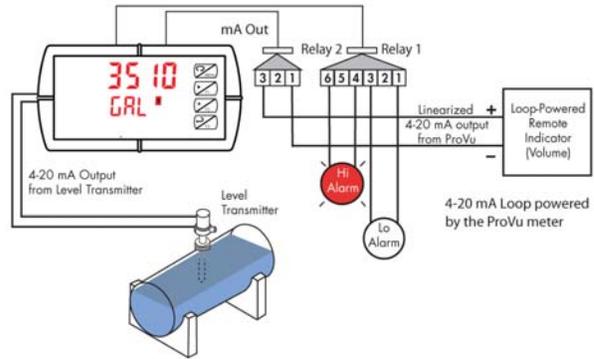
Manual Output Control

Take control of any output with this feature. All relays can be forced ON or OFF, and the 4-20 mA output signal can be set to any value within its range. When the relays and 4-20 mA output are controlled manually, an LED labeled "M" is turned on and the associated Alarm LEDs (1-8) flash every 10 seconds indicating that the meter is in manual control mode.



Isolated Transmitter Power Supplies

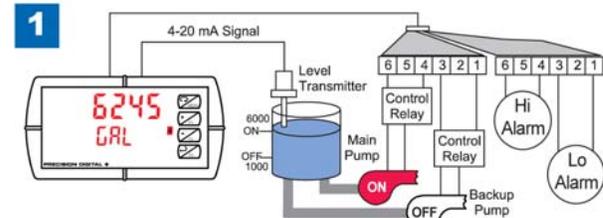
A powerful 24 V @ 200 mA power supply is a standard feature on the RD6000-1-EXP meter. It can be configured for 5, 10, or 24 V (default) by means of a simple internal jumper (see manual). An additional power supply (24 V @ 40 mA) is standard with the 4-20 mA output option.



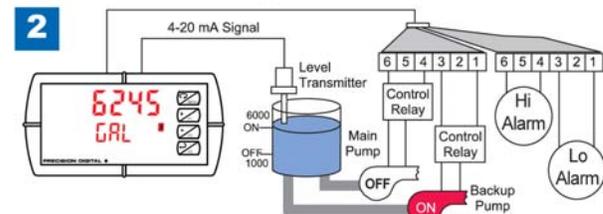
Round Horizontal Tank Math Function

Multi-Pump Alternation

Up to 8 pumps can be alternated/sequenced.



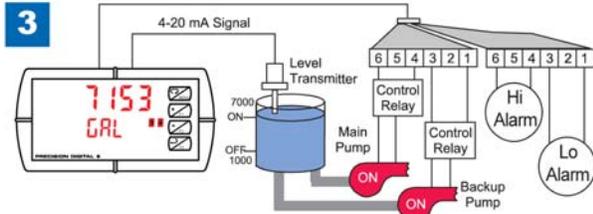
Relay #4 turns the main pump on at 6000 gallons and turns it off at 1000 gallons.



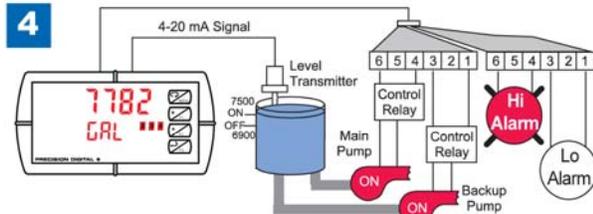
With the Pump Alternation feature activated, the next time the level reaches 6000 gallons, relay #3 transfers and starts the backup pump.

Remote Level Display with Explosion Proof Enclosure

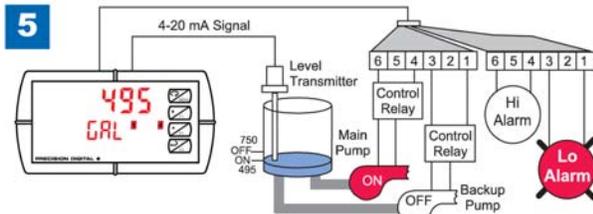
Part No. RD6000-1-EXP (Display)



If the backup pump is not able to keep up, and the level reaches 7000 gallons, relay #4 transfers and starts the main pump as well.



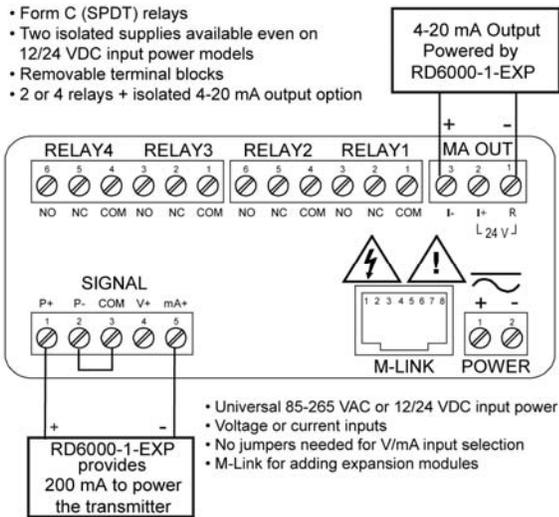
Relay #2 trips the High Level Alarm at 7500 gallons and resets at 6900 gallons.



Relay #1 trips the Low Level Alarm at 495 gallons and resets at 750 gallons.

Connections

- Form C (SPDT) relays
- Two isolated supplies available even on 12/24 VDC input power models
- Removable terminal blocks
- 2 or 4 relays + isolated 4-20 mA output option



Specifications

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

General

Display: Upper display: 0.60" (15 mm) high. Lower display: 0.46" (12 mm) high. Both displays are 6 digits (-99999 to 999999), red LEDs with leading zero blanking.

Display Intensity: Eight intensity levels

Display Update Rate: 5/second (200 ms)

Overrange: Display flashes 999999

Underrange: Display flashes -99999

Display: Upper display: 0.60" (15 mm) high. Lower display: 0.46" (12 mm) high. Both displays are 6 digits (-99999 to 999999), red LEDs with leading zero blanking.

Display Intensity: Eight intensity levels

Display Update Rate: 5/second (200 ms)

Overrange: Display flashes 999999

Underrange: Display flashes -99999

Display Assignment: The upper and lower displays may be assigned to PV1, PV2, PCT (percent), max/min, alternate max & min, set points, units (lower display only), or Modbus input.

Front Panel: NEMA 4X, IP65

Programming Methods: Four front panel buttons, digital inputs, Modbus registers, or cloning using Copy function.

Noise filter: Programmable from 2 to 199 (0 will disable filter)

Filter Bypass: Programmable from 0.1 to 99.9% of calibrated span

Recalibration: Calibrated at the factory. Recalibration is recommended at least every 12 months.

Max/Min Display: Max (Peak) / min (Valley) readings reached by the process are stored until reset by the user or until power to the meter is cycled.

Password: Three programmable passwords restrict modification of programmed settings. Pass 1: Allows use of function keys and digital inputs. Pass 2: Allows use of function keys, digital inputs and editing set/reset points. Pass 3: Restricts all programming, function keys, and digital inputs.

Non-Volatile Memory: All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

Power Options: 85-265 VAC 50/60 Hz, 90-265 VDC, 20 W max, or jumper selectable 12/24 VDC $\pm 10\%$, 15 W max.

Fuse: Required external fuse: UL Recognized, 5 A max, slow blow; up to 6 meters may share one 5 A fuse.

Isolated Transmitter Power Supply: Terminals P+ & P-: 24 VDC $\pm 5\%$ @ 200 mA max (standard), (12/24 VDC powered models rated @ 100 mA max). 5 or 10 VDC @ 50 mA max, selectable with internal jumper J4.

Normal Mode Rejection: Greater than 60 dB at 50/60 Hz

Isolation: 4 kV input/output-to-power line. 500 V input-to-output or output-to-P+ supply.

Overvoltage Category: Installation Overvoltage Category II: Local level with smaller transient overvoltages than Installation Overvoltage Category III.

Operating Temperature Range: -40 to 65°C

Storage Temperature Range: -40 to 85°C

Relative Humidity: 0 to 90% non-condensing.

Connections: Removable screw terminal blocks accept 12 to 22 AWG wire, RJ45 for external relays, digital I/O, and serial communication adapters.

Enclosure: 1/8 DIN, high impact plastic, UL 94V-0, color: black

Mounting: 1/8 DIN panel cutout required: 3.622" x 1.772"

(92 mm x 45 mm). Two panel mounting bracket assemblies are provided.

Tightening Torque: Screw terminal connectors: 5 lb-in (0.56 Nm)

Overall Dimensions: 4.68" x 2.45" x 5.64" (119 mm x 62 mm x 143 mm) (W x H x D)

Weight: 9.5 oz (269 g)

UL File Number: UL & c-UL Listed. E160849; 508 Industrial Control Equipment.

Remote Level Display with Explosion Proof Enclosure

Part No. RD6000-1-EXP (Display)

Process Input

Inputs: Field selectable: 0-20, 4-20 mA, ± 10 VDC (0-5, 1-5, 0-10 V), Modbus PV (Slave)

Accuracy: $\pm 0.03\%$ of calibrated span ± 1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span

Temperature Drift: 0.005% of calibrated span/ $^{\circ}$ C max from 0 to 65 $^{\circ}$ C ambient, 0.01% of calibrated span/ $^{\circ}$ C max from -40 to 0 $^{\circ}$ C ambient

Math Function: Linear, square root, programmable exponent, or round horizontal tank volume calculation.

Multi-Point Linearization: 2 to 32 points for PV or PV1. 2 to 8 points for PV2 (Dual-Scale Level feature)

Programmable Exponent: 1.0001 to 2.9999

Low-Flow Cutoff: 0-999999 (0 disables cutoff function)

Decimal Point: Up to five decimal places or none: d.ddddd, dd.dddd, ddd.d, dddd.dd, dddd.d, or dddd.

Calibration Range: 4-20 mA: minimum span input 1 & input 2: 0.15 mA. ± 10 V: minimum span input 1 & 2: 0.10 V. An Error message will appear if input 1 and input 2 signals are too close together.

Input Impedance: Voltage ranges: greater than 1 M Ω . Current ranges: 50 - 100 Ω (depending on resettable fuse impedance).

Input Overload: Current input protected by resettable fuse, 30 VDC max. Fuse resets automatically after fault is removed.

Relays

Rating: 2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external;

rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP (≈ 50 watts)

@ 125/250 VAC for inductive loads such as contactors, solenoids, etc.

Noise Suppression: Noise suppression is recommended for each relay contact switching inductive loads.

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 (turned off).

Relay Operation: automatic (non-latching), latching (requires manual acknowledge), sampling (based on time), pump 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 or digital inputs.

1. Automatic reset only (non-latching), when input passes the reset point.
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).

Note: Front panel button or digital input 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.

Serial Communications

Protocol: Modbus[®] RTU

Meter Address/Slave ID: 1 - 247

Baud Rate: 300 - 19,200 bps

Transmit Time Delay: Programmable between 0 and 199 ms or transmitter always on for RS-422 communication

Data: 8 bit (1 start bit, 1 or 2 stop bits)

Parity: Even, odd, or none with 1 or 2 stop bits

Byte-to-Byte Timeout: 0.01 - 2.54 seconds

Turn Around Delay: Less than 2 ms (fixed)

Isolated 4-20 mA Transmitter Output

Output Source: Process variable (PV), max, min, set points 1-8, manual control setting, or Modbus input

Scaling Range: 1.000 to 23.000 mA for any display range

Calibration: Factory calibrated: 4.000 to 20.000 = 4-20 mA output

Analog Output Programming: 23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break

Accuracy: $\pm 0.1\%$ of span ± 0.004 mA

Temperature Drift: 0.4 μ A/ $^{\circ}$ C max from 0 to 65 $^{\circ}$ C ambient, 0.8 μ A/ $^{\circ}$ C max from -40 to 0 $^{\circ}$ C ambient *Note: Analog output drift is separate from input drift.*

Isolated Transmitter Power Supply: Terminals I+ & R: 24 VDC $\pm 5\%$ @ 40 mA maximum, may be used to power the 4-20 mA output or other devices.

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

Important: Specifications subject to change without notice, verify with manufacturer.



OMNTEC Mfg., Inc.
1993 Pond Road
Ronkonkoma, NY 11779
Phone: (631) 981-2001
Fax: (631) 981-2007
E-mail: omntec@omntec.com
Website: www.omntec.com
Document No. 900187 rev1-0 display.doc
Revision No. 1.0 Revision Date: 6-24-11