

LevelPRO™

Satellite Display Unit Receiver



Installation Manual

Models:

- 4643-**-*
- 4644-**-9

The information contained in this manual was accurate at the time of release. Specifications are subject to change without notice.

Warranty - All King Engineering products are guaranteed to be free from defects in material and workmanship for one year from the date of purchase. Any product or part found to be defective under normal use within one year of purchase will be repaired or replaced at no charge if returned to the company at Ann Arbor, Michigan within ten days of discovery of the defect. No other warranties, whether expressed, implied or statutory, including the warranties of fitness for a particular purpose or merchantability, are given by this agreement. The exclusive remedy for nonconformity of these goods shall be repair and/or replacement of the nonconforming goods or parts.

Seller will not be liable for consequential damages resulting from breach of this agreement. The term "consequential damages" shall include but shall not be limited to damage to all machines, equipment and goods other than the goods sold hereby, interruption of production, loss of profits, delays of any kind, administrative expense and overhead.

Revisions:

- (A) January, 2000 – Original Release (New Version)
- (B) June, 2000 – Added Model 4643-1-* and 4644-4-9

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KING-GAGE LevelPRO™ Satellite (Remote) Display Units

Satellite Display units are remote receivers capable of displaying tank level data transmitted from a LevelPRO Tank Processor (master). These units are digital receivers that link via a two wire EIA RS-485 serial interface. This interface supports multiple receiver connections (multidrop) over a single twisted pair cable for distances up to 2500 feet/762 meters.

Single Tank Display Unit

This version of the Satellite Display unit is tuned to receive only a single tank channel from the LevelPRO Processor (master) data output stream. Please refer to the part number key to determine the specific channel assignment of the satellite receiver.

Multiple Tank Display Unit

The multiple tank version receives the entire data output stream of up to 8 individual tank channels from the LevelPRO Processor (master). The keypad is used to select the tank channel to be displayed.

Tank Level Status Display

A two line alphanumeric LCD readout provides tank level indication including the unit of measurement (gals, lbs, ltrs, kgs). The second status line identifies the tank by name up to 10 characters/spaces in length. Level can be represented by up to an 8-digit value to allow direct weight indication for even extremely large tanks (see detail below).

Model No. Designation

4643 - 2 - 1 Single Tank Display Unit

Receiver Channel

- 1 - data channel #1
- 2 - data channel #2
- 3 - data channel #3
- 4- data channel #4
- 5 - data channel #5
- 6 - data channel #6
- 7 - data channel #7
- 8 - data channel #8

- 1- flush mount housing
- 2 - thermoplastic (NORYL) enclosure
- 3 - 304 stainless steel enclosure

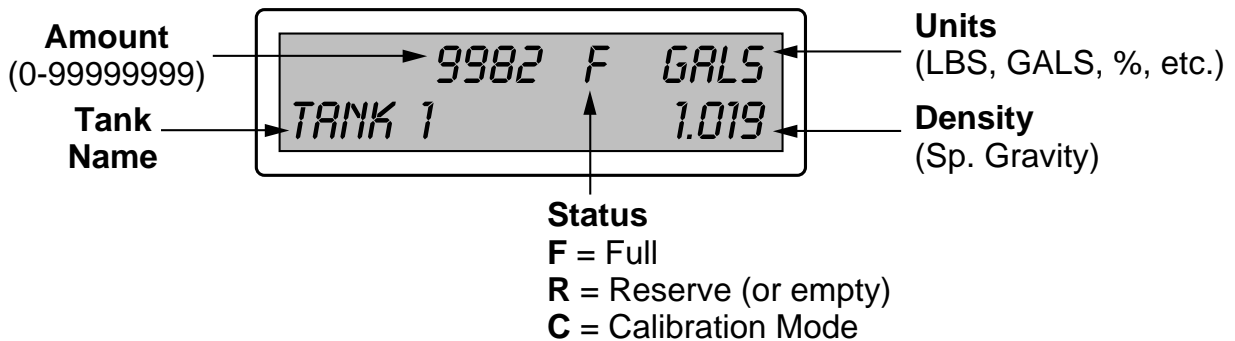
Model No, Designation

4644 - 3 - 9 Multiple Tank Display Unit

Receiver Channel

- 9 - all data channels (#1-#8)

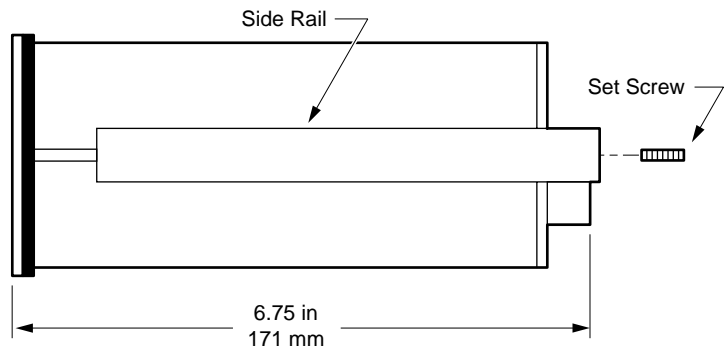
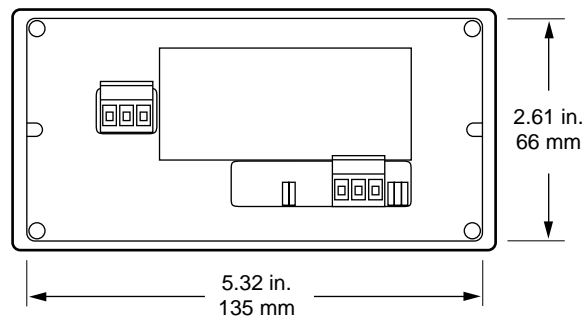
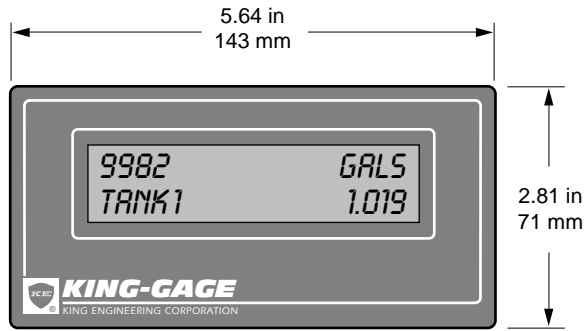
- 2 - thermoplastic (NORYL) enclosure
- 3 - 304 stainless steel enclosure



Detail - Tank Level Status Display

Specifications – 4643-1-*

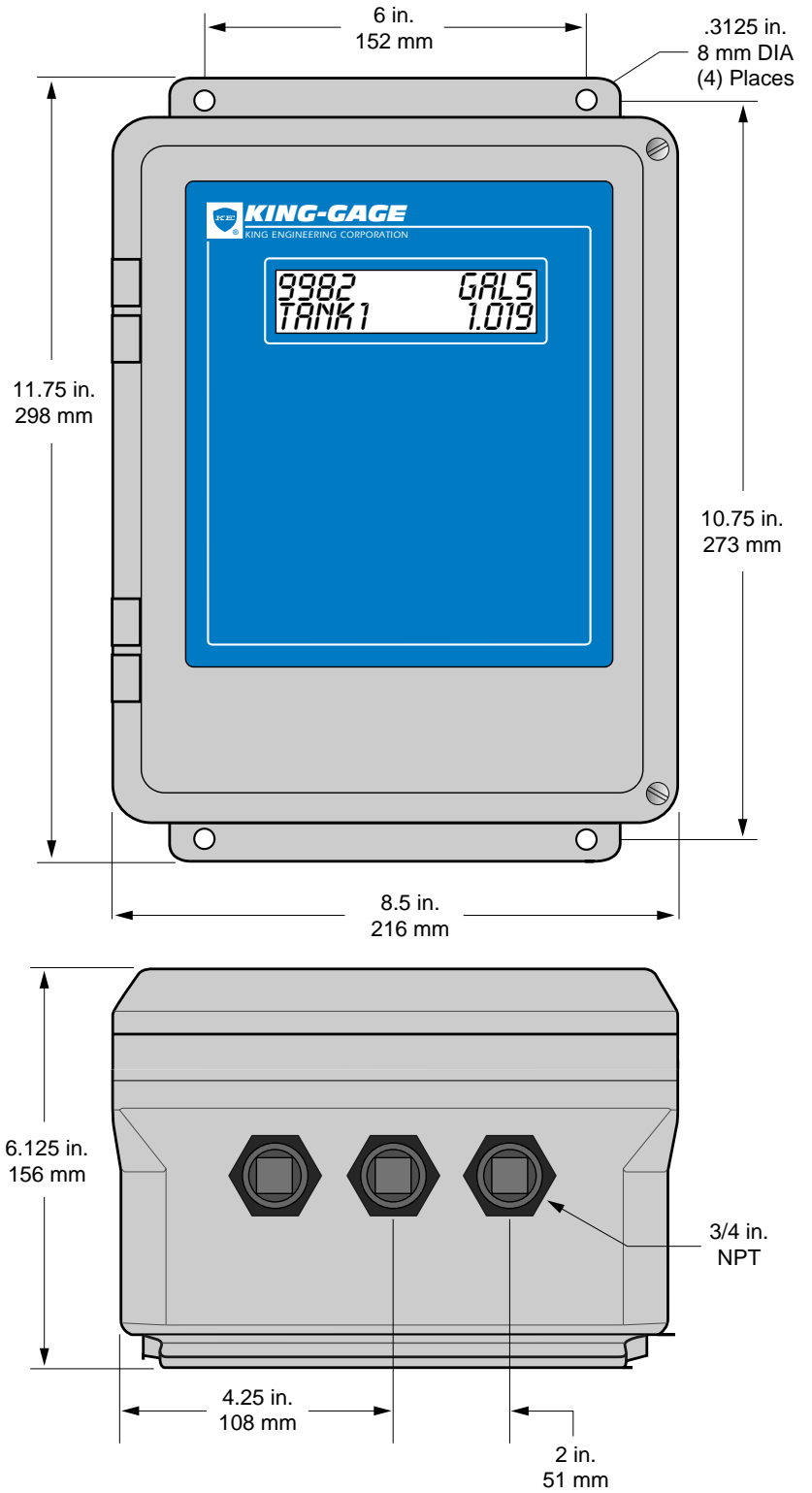
- **Power Requirements**
 100-240 Vac, 50-60 Hz, 25 watts
 (fused internally for 2.5 A 120/250 V)
- **Temperature Range** (Environmental)
 30°F to 120°F (-1°C to 49°C) operating range
- **Signal Input**
 4-20 milliamperes (mA_{dc})
- **Power Output**
 24 Vdc nominal; fused @ 0.5 Amp
- **Input Impedance** (Resistance)
 120 ohm nominal (2.4 Vdc drop @ 20 mA_{dc})
- **Memory**
 Nonvolatile 64kbit memory iButton
- **Digital Readout**
 Alphanumeric 0.3173 in. (8 mm)
 16-character x 2-line LCD; numeric
 8-digit (0-99999999 maximum)
- **Accuracy**
 ±0.048% FS (±0.024% FS, typical)
- **Resolution**
 ±0.024% FS maximum (±0.004 mA)
- **Communications**
 Two (2) serial EIA-485 ports; two wire multidrop
- **Housing**
 Extruded aluminum construction;
 flush mount configuration



Model 4643-1-*

Specifications – 4643-2-*

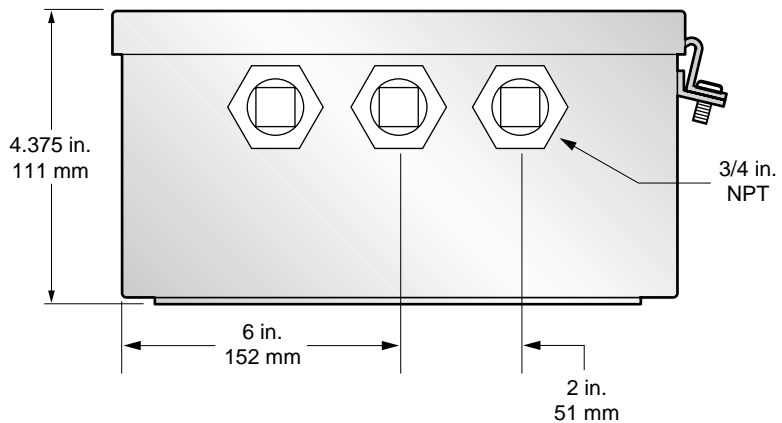
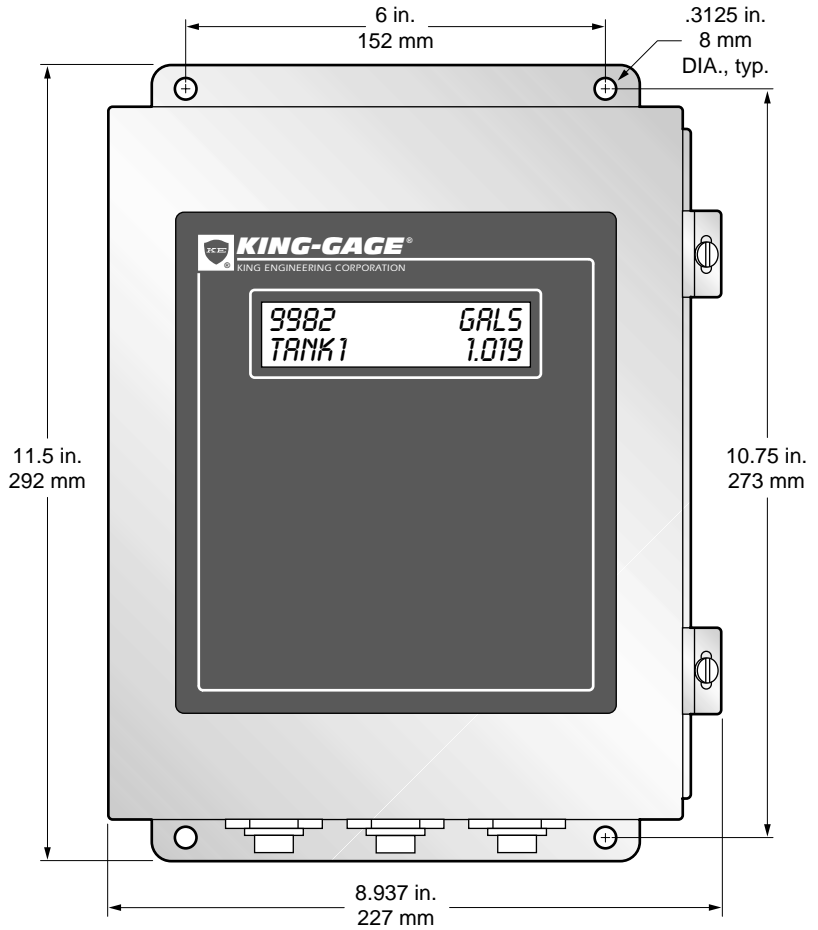
- **Power Requirements**
 100-240 Vac, 50-60 Hz, 25 watts
 (fused internally for 2.5 A 120/250 V)
- **Temperature Range** (Environmental)
 30°F to 120°F (-1°C to 49°C) operating
 range
- **Digital Readout**
 Alphanumeric 0.3173 in. (8 mm)
 16-character x 2-line LCD; numeric
 8-digit (0-99999999 maximum)
- **Communications**
 Serial EIA RS-485 port; two wire multidrop
- **Enclosure**
 Engineered thermoplastic (NORYL)
 enclosure; UL 50, NEMA type 3, 3S, 4,
 4X, 12; hinged cover with dual latching
 screws.



Model 4643-2-*

Specifications – 4643-3-*

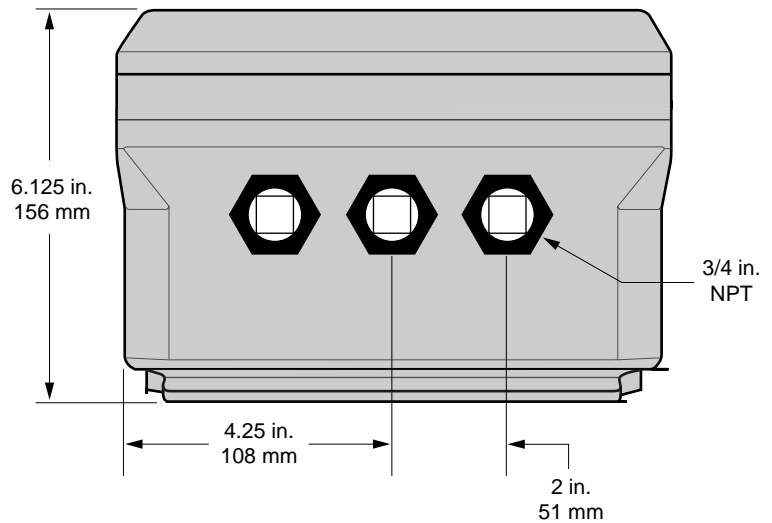
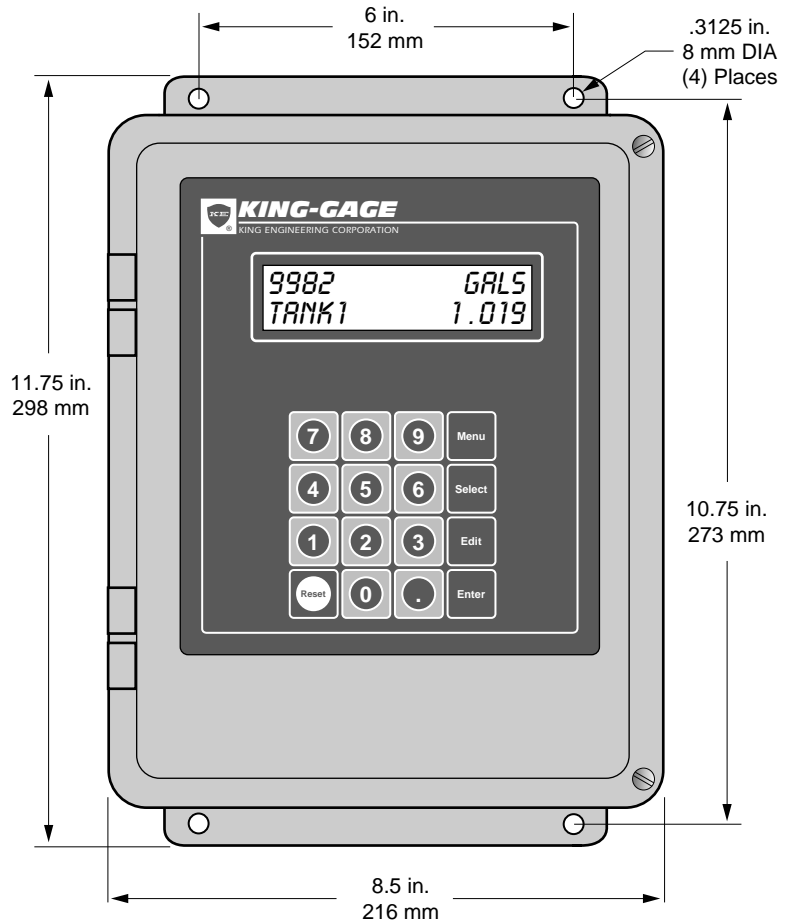
- **Power Requirements**
100-240 Vac, 50-60 Hz, 25 watts
(fused internally for 2.5 A 120/250 V)
- **Temperature Range** (Environmental)
30°F to 120°F (-1°C to 49°C) operating range
- **Digital Readout**
Alphanumeric 0.3173 in. (8 mm)
16-character x 2-line LCD; numeric
8-digit (0-99999999 maximum)
- **Communications**
Serial EIA RS-485 port; two wire multidrop
- **Enclosure**
14 gauge stainless steel enclosure; UL
50 types 4, 4X, 12, 13; hinged cover with
dual latching screw lugs.



Model 4643-3-*

Specifications – 4644-2-9

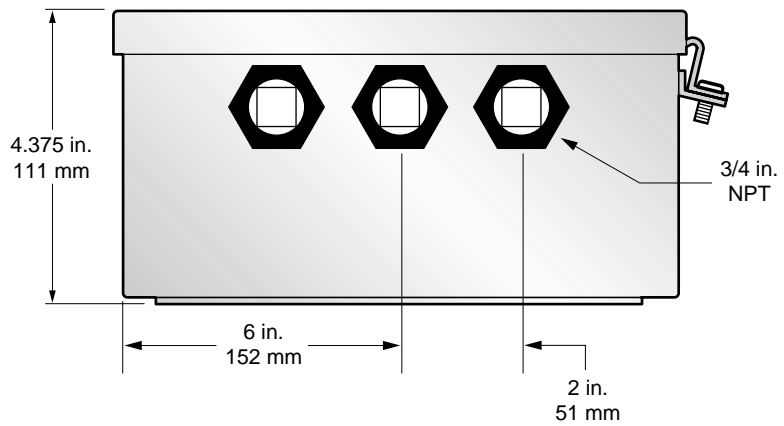
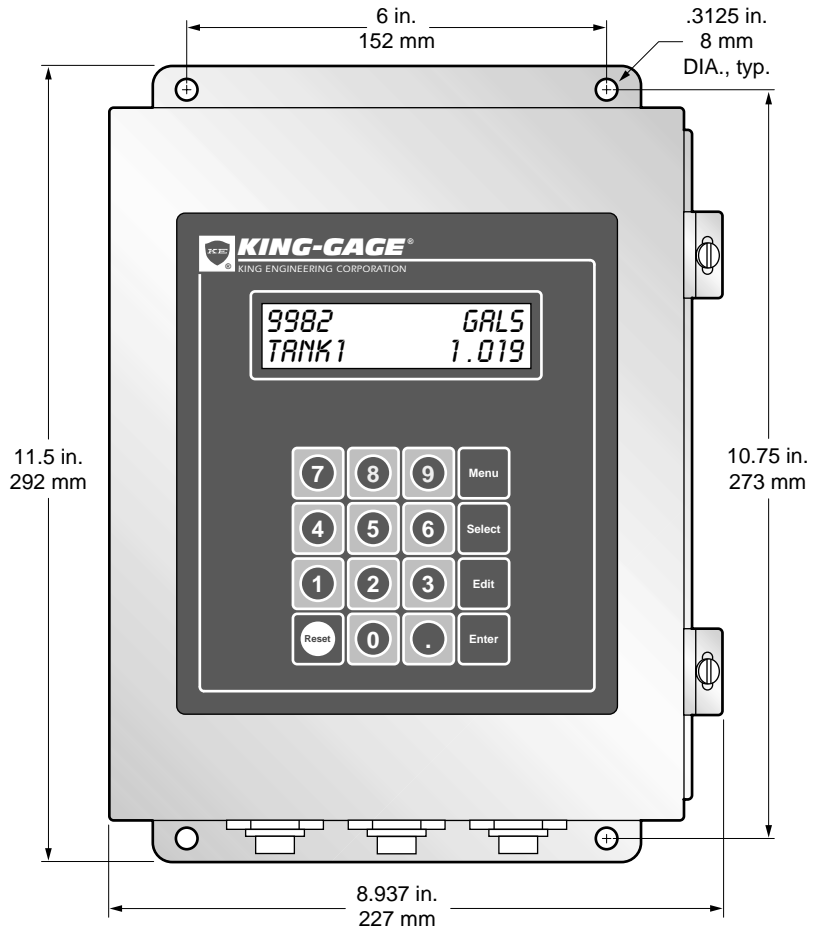
- **Power Requirements**
 100-240 Vac, 50-60 Hz, 25 watts
 (fused internally for 2.5 A 120/250 V)
- **Temperature Range** (Environmental)
 30°F to 120°F (-1°C to 49°C) operating range
- **Digital Readout**
 Alphanumeric 0.3173 in. (8 mm)
 16-character x 2-line LCD; numeric
 8-digit (0-99999999 maximum)
- **Communications**
 Serial EIA RS-485 port; two wire multidrop
- **Enclosure**
 Engineered thermoplastic (NORYL)
 enclosure; UL 50, NEMA type 3, 3S, 4,
 4X, 12; hinged cover with dual latching
 screws.



Model 4644-2-9

Specifications – 4644-3-9

- **Power Requirements**
 100-240 Vac, 50-60 Hz, 25 watts
 (fused internally for 2.5 A 120/250 V)
- **Temperature Range** (Environmental)
 30°F to 120°F (-1°C to 49°C) operating range
- **Digital Readout**
 Alphanumeric 0.3173 in. (8 mm)
 16-character x 2-line LCD; numeric
 8-digit (0-99999999 maximum)
- **Communications**
 Serial EIA RS-485 port; two wire multidrop
- **Enclosure**
 14 gauge stainless steel enclosure; UL
 50 types 4, 4X, 12, 13; hinged cover with
 dual latching screw lugs.



Model 4644-3-9

Specifications – Model 4644-4-9

■ Power Requirements

100-240 Vac, 50-60 Hz, 25 watts
(fused internally for 2.5 A 120/250 V)

- **Temperature Range** (Environmental)
30°F to 120°F (-1°C to 49°C) operating range

- **Signal Input**
4-20 milliampere (mA)

- **Input Channels**
8 input channels; two wire 4-20 mA analog signal

- **Keypad**
Membrane numeric keypad, five (5) function keys, positive tactile response

- **Power Output**
24 Vdc nominal; fused @ 0.5 Amp

- **Input Impedance** (Resistance)
120 ohm nominal (2.4 Vdc drop @ 20 mA)

- **Memory**
Nonvolatile 64kbit memory iButton

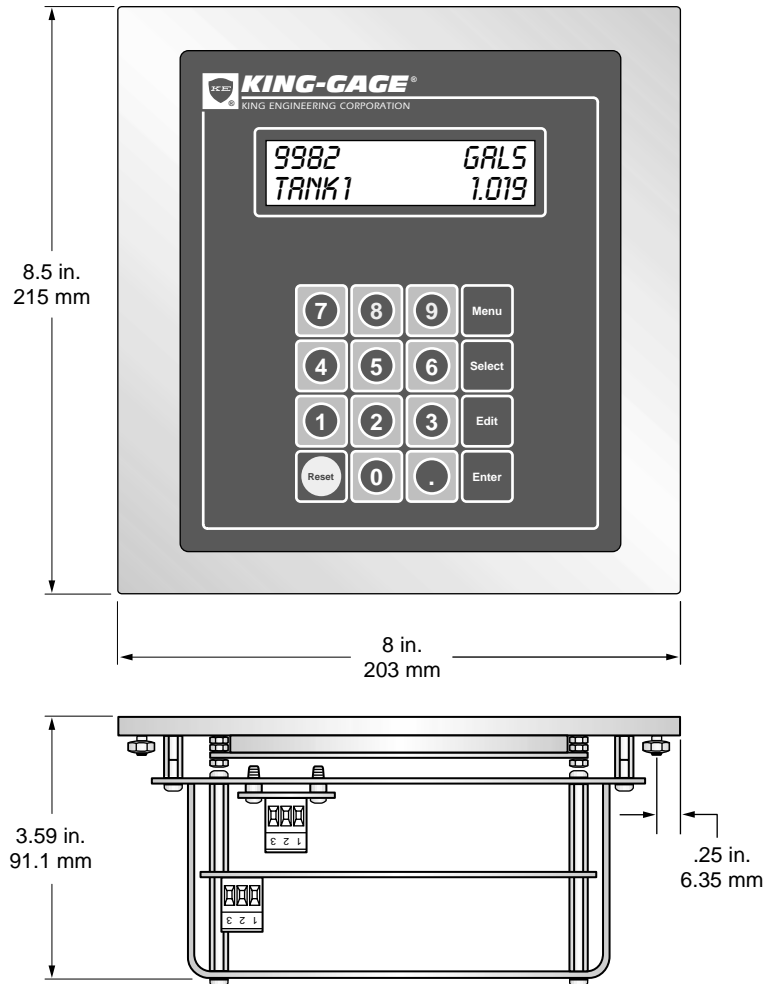
- **Digital Readout**
Alphanumeric 0.3173 in. (8 mm)
16-character x 2-line LCD; numeric
8-digit (0-99999999 maximum)

- **Accuracy**
 $\pm 0.048\%$ FS ($\pm 0.024\%$ FS, typical)

- **Resolution**
 $\pm 0.024\%$ FS maximum (± 0.004 mA)

- **Communications**
Two (2) serial EIA-485 ports; two wire multidrop

- **Mounting Flange/Housing**
11 gauge stainless steel plate, 2B finish;
closed cell neoprene gasket; aluminum
rear cover housing.



Model 4644-4-9

Power & Communications Connections

Certain problems experienced during initial system installation and start-up may result from incomplete connections. Optimum performance will occur when power and cabling recommendations are followed.

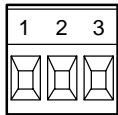
Power

Make certain that Satellite Display unit is connected to 115 VAC power source.

Communications (RS485-B Connector)

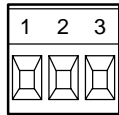
The RS-485 network cable must be connected to the port labelled RS485-B on the circuit board. Refer to the instructions on page 9.

RS 485-B Connector



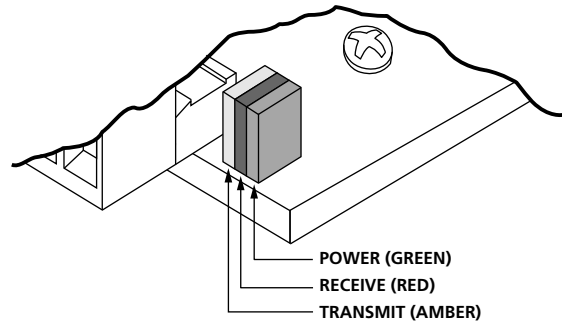
- 1 – GND
- 2 – B } Data
- 3 – A }

AC Input Connector



- 1 – GND
- 2 – Hot (Line)
- 3 – Neutral

Communications Troubleshooting



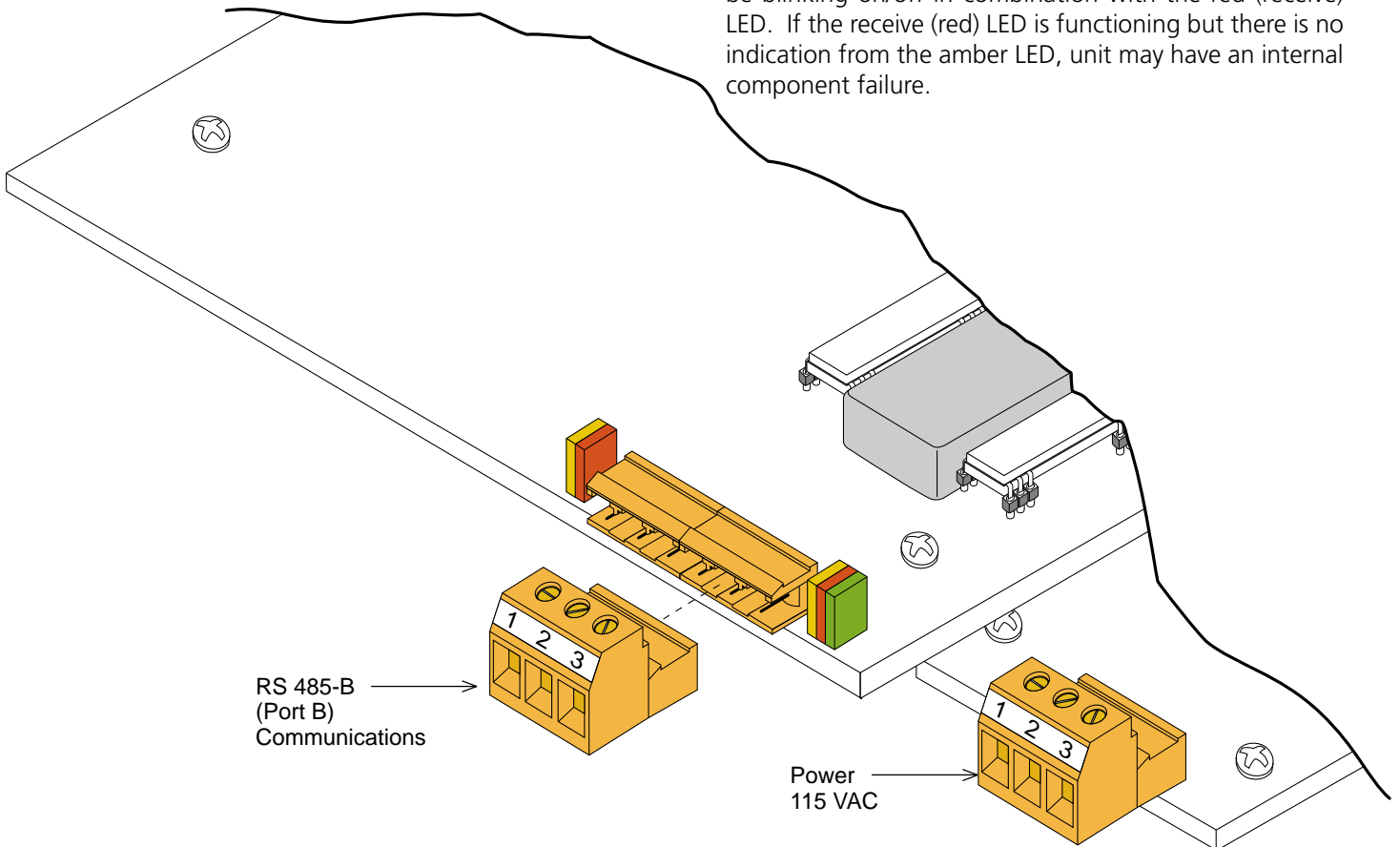
Using LED Status Indicators

- GREEN On = Power is On**
- GREEN Off = Power is Off**

The green LED is illuminated when power is supplied to the unit. If the green LED is not lit, check that the external power supply is connected to unit. (Internal fuse may also be blown.)

- AMBER On (Blinking) = Data Transmit**
- AMBER Off = Not Transmitting**

The amber LED is illuminated during each data pulse transmission. During normal operation, the LED will be blinking on/off in combination with the red (receive) LED. If the receive (red) LED is functioning but there is no indication from the amber LED, unit may have an internal component failure.



RED On (Blinking) = Data Received

RED Off = No Data Received

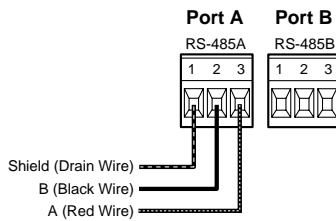
RED Always On = RS-485 A + B Line Reversed

The red LED is illuminated in response to each data pulse received. During normal operation, the LED will be blinking on/off in combination with the amber (transmit) LED. If there is no indication from the red LED, there may be a problem with the data format from the host. If the red LED is continuously illuminated, this indicates a crossed connection between the A + B sides of the RS-485 two wire interface (try reversing the A + B connections at the LevelPRO).

Communications Interface - Network Systems

Network Communications (RS-485)

LevelPRO tank processors can provide direct ASCII communications via a two wire multi-drop network interface. Recommended communications cable is Belden 9501 (24 AWG twisted pair stranded conductors, copper drain wire, overall shielding).



Connections are provided on the plug in terminal for A, B and SH (shield). Refer to the RS-485 diagram for proper cabling connections. Up to 32 individual LevelPRO devices can be installed on a multi-drop network.

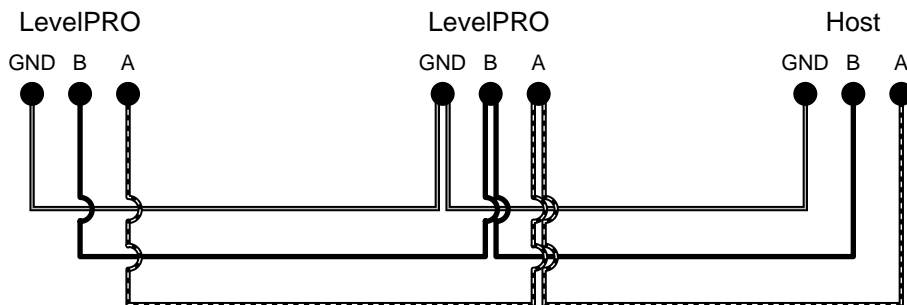
No Communications

Loss of communications to all devices in the network.

- Check connections at RS-485 terminals at each device. If one processor has been disconnected from the network, make certain that cabling has continuity.
- Check that power is being supplied to the LevelPRO processors. There will be no communications if individual devices suffer loss of power.

No Communications Response (Individual)

- Check that power is supplied to the LevelPRO processor. Additionally, check internal power supply fuse, replace if necessary.
- Check communications connections at RS-485 terminals. If cable conductors have been reversed, unit will not be able to communicate. Make certain that A, B, SHD (shield) continuity has been maintained.



Detail - RS-485 diagram



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