TruVu

USER MANUAL

TVL Series

Read the user's manual carefully before starting to use the unit or software.
Producer reserves the right to implement changes without prior notice.

Explanation of symbols used in the manual:

This symbol denotes especially important guidelines concerning the installation and operation of the device. Not complying with the guidelines denoted by this symbol may cause an accident, damage or equipment destruction.

IF THE DEVICE IS NOT USED ACCORDING TO THE MANUAL THE USER IS RESPONSIBLE FOR POSSIBLE DAMAGES.

This symbol denotes especially important characteristics of the unit. Read any information regarding this symbol carefully.

1. BASIC REQUIREMENTS AND USER SAFETY

- Do not use the unit in areas threatened with excessive shocks, vibrations, dust, humidity, corrosive gasses and oils.
- Do not use the unit in areas where there is risk of explosions.
- Do not use the unit in areas with significant temperature variations, exposure to condensation or ice.
- Do not use the unit in areas exposed to direct sunlight.
- Make sure that the ambient temperature (e.g. inside the control box) does not exceed the recommended values. In such cases forced cooling of the unit must be considered (e.g. by using a ventilator).

- **The manufacturer is not responsible for any damages caused by inappropriate installation, not maintaining the proper environmental conditions and using the unit contrary to its assignment.**
- Installation should be conducted by qualified personnel . During installation all available safety requirements should be considered. The fitter is responsible for executing the installation according to this manual, local safety and EMC regulations.
- GND input of device should be connected to PE wire;
- The unit must be properly set-up, according to the application. Incorrect configuration can cause defective operation, which can lead to unit damage or an accident.
- **If in the case of a unit malfunction there is a risk of a serious threat to the safety of people or property additional, independent systems and solutions to prevent such a threat must be used.**
- **The unit uses dangerous voltage that can cause a lethal accident. The unit must be switched off and disconnected from the power supply prior to starting installation of troubleshooting (in the case of malfunction).**
- Neighboring and connected equipment must meet the appropriate standards and regulations concerning safety and be equipped with adequate overvoltage and interference filters.
- **Do not attempt to disassemble, repair or modify the unit yourself. The unit has no user serviceable parts. Defective units must be disconnected and submitted for repairs at an authorized service center.**

The unit is designed for operation in an industrial environment and must not be used in a household environment or similar.

2. GENERAL CHARACTERISTICS

The **TruVu** meter is equipped with one current input 0-20 / 4-20mA and one voltage input 0-5 / 1-5 / 0-10 / 2-10V. Current input has additionally overcurrent protection circuit, which protects standard resistor. The selection of active input is realized by software, and the selected input can be changed at any time. Additionally the **TruVu** allows user to select a conversion characteristic of several kinds: linear, square, square root, user defined (max.20 points length) and volume characteristics of a cylindrical tank in the vertical and horizontal position. Result is showed on 4-digit LED display. Displayed values range can be selected by user, from -999 to 9999, plus decimal point.

The device can be equipped with two relay (or OC type) outputs. Device **TruVu** is equipped with RS-485 / Modbus RTU communication interface and sensor supply output. The meter can be ordered in three power supply versions.

The device has 4 buttons being used for main presets programming. To get high protection level, the keyboard is mounted under a transparent cover. To allow user to change presets without opening the cover, an IR sensor is located on Front. Remote controller keyboard is equivalent to the device keyboard (Note, that remote controller is not a part of the **TruVu** set – it is an additional equipment).

The **TruVu** can be used for controlling and regulation of processes that require proportional and threshold control for example: Temperature, Level, Valve Control.

3. TECHNICAL DATA

Power supply voltage (depending on version)	230V AC ± 10%, 50 ÷ 60 Hz (separated) or 110V AC ± 5%, 50 ÷ 60 Hz (Standard) or 24V AC ± 5%, 50 ÷ 60 Hz (separated) or 24V DC ± 15%, (not separated)
External fuse (required)	T - type, max. 2 A
Power consumption	2max. 2.6 VA @ 230V AC and @ 110V A max. 4.5 W @ 24V DC
Current input	0÷20 mA, 4÷20 mA overload protected, maximum input current about 40 mA
Current measurement accuracy	± 0,1% @ 25°C; ± one digit (for 0÷20 mA range)
Current input resistance	< 65 W (typical 55 W)
Voltage input	0÷5 V, 1÷5 V, 0÷10 V, 2÷10 V
Voltage measurement accuracy	± 0,1% @ 25°C; ± one digit (for 0÷10 V range)
Voltage input resistance	> 50 kΩ
Temperature stability	50 ppm / °C
Display range	-999 ÷ 9999, plus decimal point
Accepted prolonged input overload	20%

Outputs relay	0 or 2 NO, 5A/250V AC (cosϕ = 1) or 4 NO
Sensor power supply U_o	not stabilized, not separated from measuring inputs, in 230V AC and 110V AC and 24V AC version: U_o = 24V DC ± 3V / max. 25 mA; in 24V DC version: U_o = Us / max. 100 mA, R_o = 30 Ω (where Us - device power supply, R_o - internal resistance for sensor power supply output)
Communication interface	RS 485, 8N1 and 8N2, Modbus RTU, not separated
Baud rate	1200 bit/s ÷ 115200 bit/s
Display(depending on version)	LED, 4 digit, 20mm height, red or LED, 6 digit, 13mm height, red
Data memory	Non-Volatile Memory, EEPROM type
Protection level	IP 65 NEMA 4X
Housing type **Housing material** **without glands:** **with glands:**	IP 65 NEMA 4X Poly Carbonate 110 x 80 x 67 mm 110 x 105 x 67 mm
Operating temperature (depending on version)	-40°C to +60°C
Storage temperature (depending on version)	-40°C to +70°C or -40°C to +70°C
Humidity	5 to 90% no condensation
Altitude	up to 2000 meters above sea level
Screws tightening max. torque	0,5 Nm
Max. connection leads diameter	2,5 mm²
Safety requirements	According to: PN-EN 61010-1 installation category: II pollution degree: 2 voltage in relation to ground: 300V AC insulation resistance: >20MΩ insulation strength between power supply and input/output terminal: 1min. @ 2300V insulation strength between relays terminal: 1min. @ 1350V
EMC	according to: PN-EN 61326-1

This is a class A unit. In a residential or a similar area it can cause radio frequency interference. In such cases the user can be requested to use appropriate preventive measures.

4. DEVICE INSTALLATION

The unit has been designed and manufactured in a way assuring a high level of user safety and resistance to interference occurring in a typical industrial environment. In order to take full advantage of these characteristics installation of the unit must be conducted correctly and according to the local regulations.

- Read the basic safety requirements on page 3 prior to starting the installation.
- Ensure that the power supply network voltage corresponds to the nominal voltage stated on the unit's identification label.
- The load must correspond to the requirements listed in the technical data.
- All installation works must be conducted with a disconnected power supply.
- Protecting the power supply connections against unauthorized persons must be taken into consideration.

4.1. UNPACKING

After removing the unit from the protective packaging, check for transportation damage. Any transportation damage must be immediately reported to the carrier. Also, write down the unit serial number located on the housing and report the damage to the manufacturer.

Attached with the unit please find:

- User's Manual,
- Warranty,

4.2. ASSEMBLY

- Disconnect the power supply prior to starting assembly.
- Check the connections are wired correctly prior to switching the unit on.

To install device on the wall, a pinholes should be made. Figure 4.1 presents dimensions of the device and distances between holes. The back side of the device has four mounting holes. This part of the case should be mounted to a wall by screws.

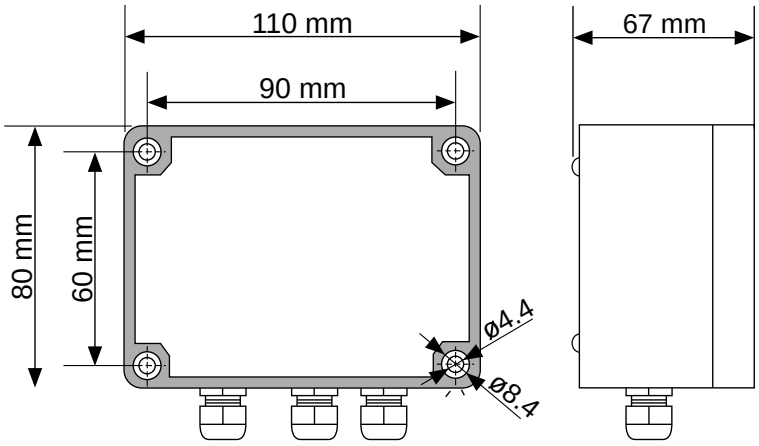


Figure 4.1. Device and assembly dimensions

4.3. CONNECTION METHOD

Due to possible significant interference in industrial installations appropriate measures assuring correct operation of the unit must be applied. To avoid the unit of

- Installation should be conducted by qualified personnel . During installation all available safety requirements should be considered. The fitter is responsible for executing the installation according to this manual, local safety and Federal regulations.

- The unit is not equipped with an internal fuse or power supply circuit breaker.
  Because of this an external time-delay cut-out fuse with a small nominal current value must be used (recommended bipolar, max. 2A) and a power supply circuitbreaker located near the unit. In the case of using a monopolar fuse it must be mounted on the phase cable (L).

- The power supply network cable diameter must be selected in such a way that in the case of a short circuit of the cable from the side of the unit the cable shall be protected against destruction with an electrical installation fuse.

- Wiring must meet appropriate standards and local regulations and laws.

- In order to secure against accidental short circuit the connection cables must be terminated with appropriate insulated cable tips.

- Tighten the clamping screws. The recommended tightening torque is 0.5 Nm.Loose screws can cause fire or defective operation. Over tightening can lead to damaging the connections inside the units and breaking the thread.

- In the case of the unit being fitted with separable clamps they should be inserted into appropriate connectors in the unit, even if they are not used for any connections.

- **Unused terminals (marked as n.c.) must not be used for connecting any connecting cables (e.g. as bridges), because this can cause damage to the equipment or electric shock.**

- If the unit is equipped with housing, covers and sealing to, protecting against water intrusion, pay special attention to their correct tightening or clamping. In the case of any doubt consider using additional preventive measures (covers, roofing, seals, etc.). Carelessly executed assembly can increase the risk of electric shock

- After the installation is completed do not touch the unit's connections when it is switched on, because it carries the risk of electrical shock.

Due to possible significant interference in industrial installations appropriate measures assuring correct operation of the unit must be applied. To avoid the unit of improper indications keep recommendations listed below.

- Avoid running signal cables and transmission cables together with power supply cables and cables controlling inductive loads (e.g. contactors). Such cables should cross at a right angle.
- Contactor coils and inductive loads should be equipped with interference protection systems, e.g. RC-type.
- Use of screened signal cables is recommended. Signal cable screens should be connected to the earth or ground only at one of the ends of the screened cable.
- In the case of magnetically induced interference the use of twisted pair of signal cables is recommended. Twisted pair (best if shielded) must be used with RS-485 serial transmission connections.
- In the case of measurement or control signals are longer than 100 Feet or go outside of the building then additional safety circuits are required.
- In the case of interference from the power supply side the use of appropriate interference filters is recommended. Bear in mind that the connection between the filter and the unit should be as short as possible and the metal housing of the filter must be connected to the earth with the largest possible surface. The cables connected to the filter output must not be run with cables with interference (e.g. circuits controlling relays or contactors).

Connection of the power supply, and the measurement and controlling signals should be made by screw connectors mounted inside the housing.

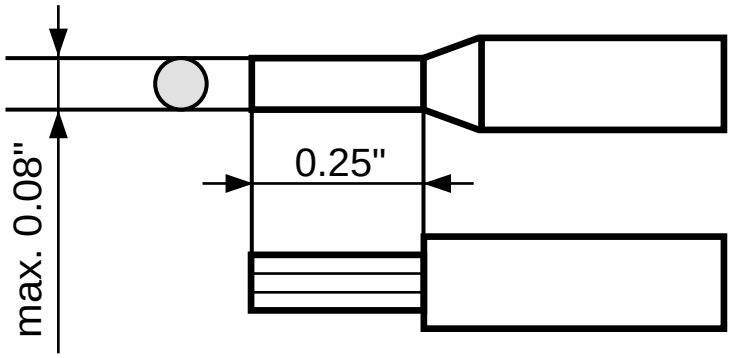


Figure 4.2. Method of cable insulation replacing and cable terminals

Use Screw Driver Provided

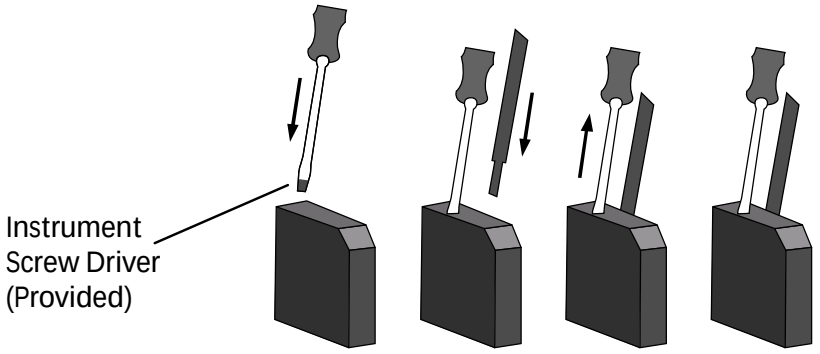
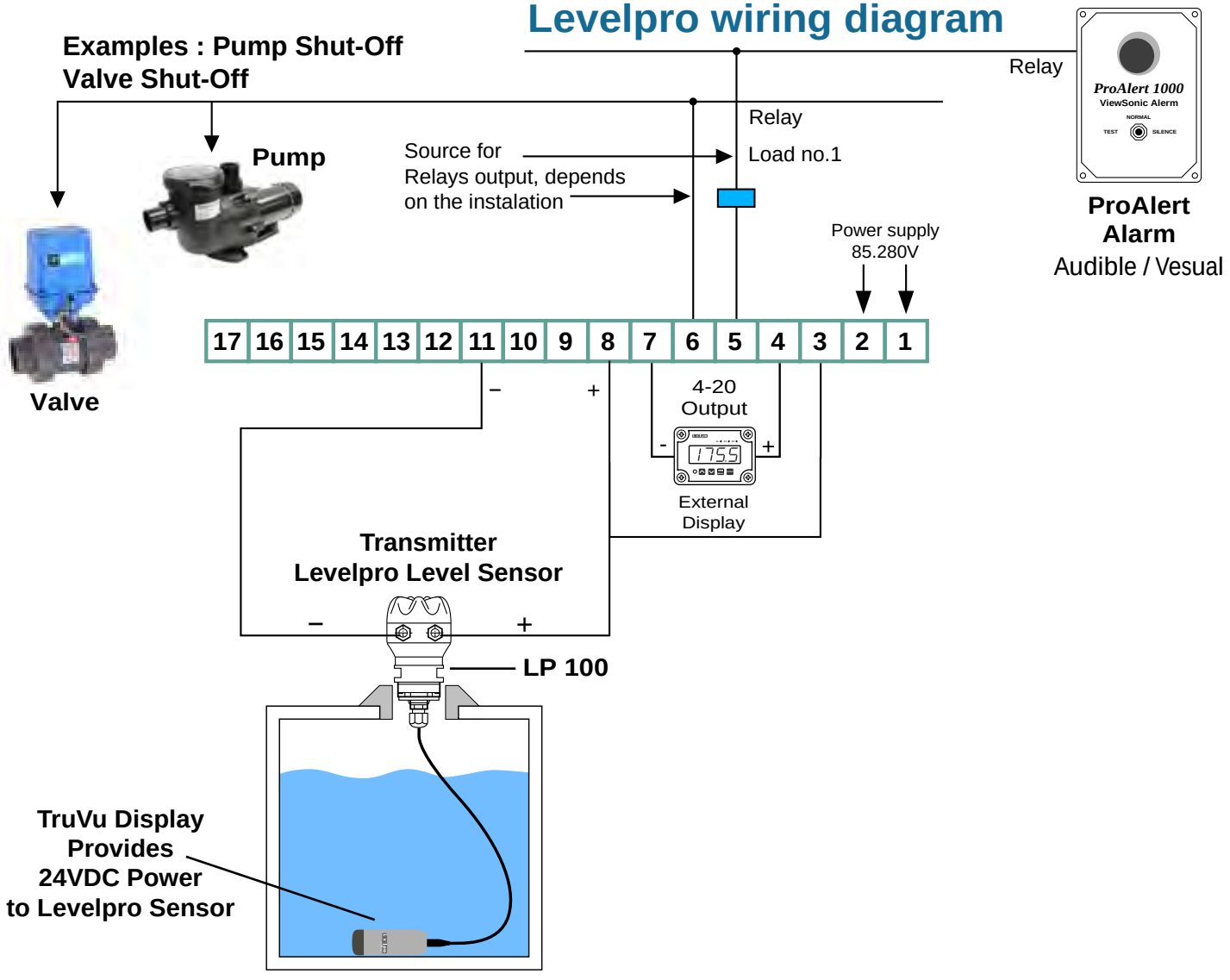
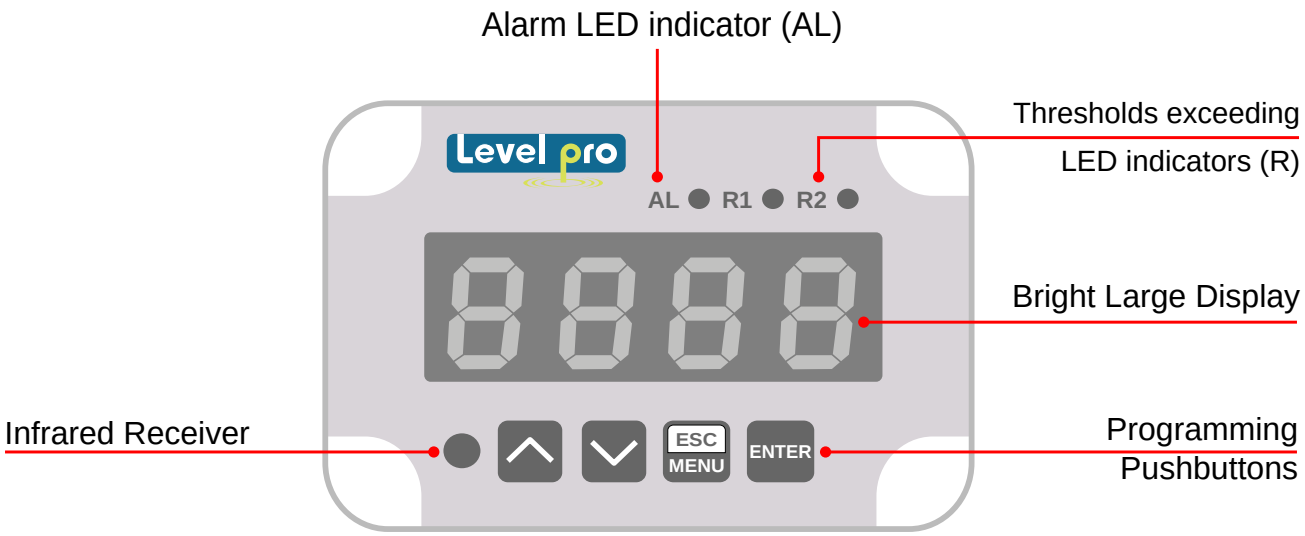


Figure 4.3. Method of connecting cables to the clamping connectors

Levelpro wiring diagram



5. FRONT PANEL DESCRIPTION



Symbols and functions of Push Buttons:

ESC MENU

Symbol used in the manual : **[ESC/MENU]**

Functions:

- Enter to main menu (press and hold for at least 2 sec.)
- Exit the current Screen and Enter to previous menu (or measure mode)
- Cancel the changes made in parameter being edited

ENTER

Symbol used in the manual : **[ENTER]**

Functions :

- Start to edit the parameter
- Enter into the sub-menu,
- Confirmation of changes made in parameter being edited

Symbol used in the manual : **[^] [v]**

Functions :

- Change of the present menu,
- Modification of the parameter value,
- Change of the display mode.

TruVu TVL Series Quick Start Manual (Step by Step)

PROGAMMING RELAYS

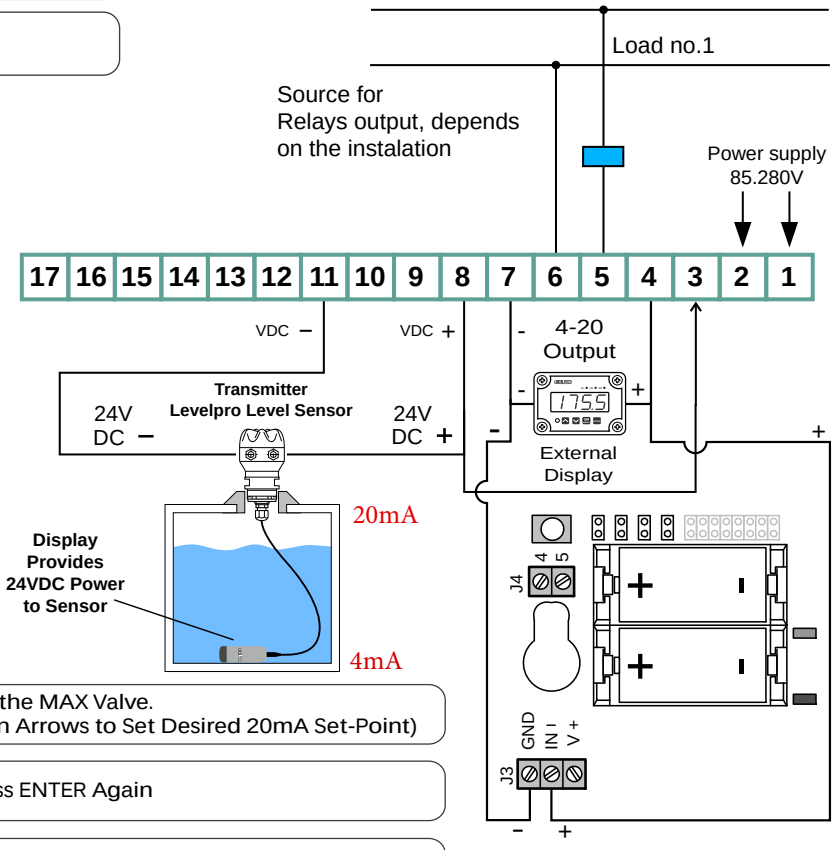
- Press **ESC/MENU** Button for **3 Seconds** (Enter Security Code if Required)
- Press **DOWN** Arrow (**Relay 1** Appears on Display)
- Press **ENTER** Button (**SETP** Appears on Display
- Press **ENTER** Button (Relay Set-Point Number Appears on Display)
- Press **UP** Or **DOWN** Arrow To Increase Or Decrease Number To Desired Setpoint
- (When Desired Number Appears Press & Hold **ENTER** (2 Sec)
- Press **DOWN** Arrow To Select Relay Parameters (ON-OFF, HYSTERISIS, Mode, Time, Unit, Alarm)
- Press **Enter** & Hold
- (**SETP** Appears on Display) Repeat Steps to Set-UP 2nd Relay if Required

PROGRAMING 4-20mA INPUT

- Press **ESC/MENU** Button for 3 Seconds (Enter Security Code if Required)
- Press **DOWN** Arrow (**inPT** Appears on Display)
- Press **ENTER** Button (**tyPE** Appears on Display)
- Press **DOWN** Arrow (4X) (**Lo C** Appears on Display)
- Press **ENTER** Button –(4Ma) (ALL ZERO's (**0000**)-This is Standard = 4mA Set-Point)
- Press **ESC/MENU** Button
- Press **DOWN** Arrow (**Hi C** Will Appear on Display)
- Press **ENTER** Button—(20Ma) ---> This Will be the MAX Valve. (Numbers will Appear-Change Using Up/Down Arrows to Set Desired 20mA Set-Point)
- Press **ENTER**—**(Hold 3 Sec)** SET? Appears Press ENTER Again
- Press **ESC/MENU** to Return to Main Menu

Remember 4mA = 0, 20mA = MAX Level

Levelpro Wiring Diagram



SENTINEL 247 (Option)