

INSTRUCTIONS

Series 1502,1516,1518,1533,1831,1833,1835

DIFFERENTIAL PRESSURE INSTRUMENTS

Diaphragm Sensor

Your new Orange Research Differential Pressure Instrument is a rugged instrument featuring simplicity of design to provide dependable and efficient service. Because it is an instrument it should be handled with care. Read all instructions carefully before attempting to install the instrument.

CAUTION: Do not exceed maximum operating pressure listed on instrument label. Use only fluids compatible with wetted parts.

HOW IT WORKS

The instrument operates on the difference between two pressures (delta-P). The sensing element is a spring biased diaphragm which moves linearly in proportion to the difference between two basic pressures. A magnet on the HI pressure side of the piston assembly moves with the diaphragm and rotates a follower magnet located adjacent to the pressure cavity. The gauge pointer is located at the end of the rotary magnet shaft and rotates with the magnet to provide gauge readings proportional to differential pressure variations. This is accomplished by the coupling forces between two adjacent magnets through a solid wall.

Switch Units: On switch and indicating switch models, reed switches are located adjacent to the pressure chamber and are actuated when the diaphragm magnet field interacts at a present point with the reed switch armature. Reed switch set points are adjustable.

Transmitter Units: On transmitter models the transmitter module is located adjacent to the pressure chamber. A Hall Effect sensor interacts with the movement of the sensor magnet.

Note: This instrument will provide $\pm 2\%$ accuracy full scale.

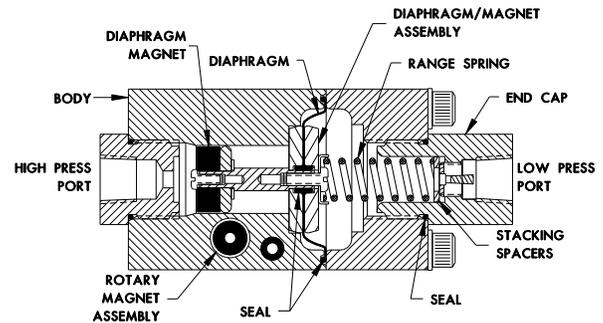
Caution: For models 1502 & 1533, always apply pressure to the high side first. Reverse pressure may damage the diaphragm.

INSTALLATION

Check instrument & identify **HI** and **LO** markings. HI identifies the high pressure port; **LO** the low pressure port. If instrument is installed backwards, it will neither operate nor be damaged. The instrument can be line mounted, bracket mounted or panel mounted depending upon the model purchased.

Orange Research

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1516 Series shown – images vary by model

*Mounting Options:

1. Piping support: sometimes the piping supports our instruments with no additional mounting required
2. Mounting holes: each unit has mounting holes to support our instrument
3. Flanged "F-style" mounting case: contains holes around the outside edge for panel mounting, order as an option
4. C-clamp: C-shaped clamp for mating "B-style" dial cases to panel, order as an option
5. Mounting kit: multiple configurations for mating instrument to flat surfaces or to pipes, order as an option

* See our website for complete details on mounting our instruments.

Installation Notes:

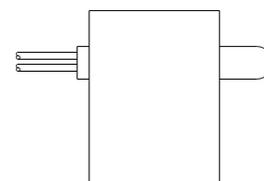
- Do not mount directly to steel surfaces...this could affect the magnetic sensors...mounting 1 inch from ferrous metals is recommended
- If there is particulate in the line, insert a screen (approx. 100 micron) to block the particulate from becoming lodged in the instrument
- Do not install on systems for highly viscous fluids or where fluid may become hardened over time
- Do not install on system with iron in the fluid...the iron can become attached to the magnetic sensors
- Install the unit above the process line to prevent particulate settling in the instrument
- We recommend isolating the instrument from the system pressure using valves...3 or 5 way manifold valves are common
- Open valves connected to our instrument slowly, to protect the diaphragm sensor from damage
- Before installation, refer to our Specification Sheets (on our website) to identify instrument component materials & double check for chemical compatibility

SWITCH ADJUSTMENT – No Enclosure

Reed switch set points are field adjustable. On Indicating Switches, the reed switches can be adjusted over the top 80% of the gauge range. On Switch models the reed switches can be adjusted over the range shown on the nameplates.

To change the reed switch setting, a source of pressure will be needed with the instrument. Loosen the screw holding the reed switch. To increase the set point, slide the switch tube toward the **LO** port. To decrease the set point, slide the switch tube toward the **HI** port. Repeat as required until new setting is reached. Tighten the screw holding the switch tube in place and recheck the new actuation point.

CAUTION: Do not over tighten the switch holding screw-this is a cone point set screw and digs into the tube with light pressure. (in some cases, it might be necessary to reverse the switch tube end for end to locate the new actuation point-this is normal procedure.



HI PORT **LO PORT**

SWITCH WIRE COLOR

- A SPST white and white
- B SPST green(N/C); blue(common)
- C SPDT green(N/C); red(N/O); blue(common)



INC. SETTING

DEC. SETTING

SWITCH ADJUSTMENT – With Enclosure

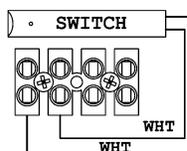
Reed switch set points are field adjustable. On Indicating Switches, the reed switches can be adjusted over the top 80% of the gauge range. On Switch models the reed switches can be adjusted over the range shown on the nameplates.

To change the reed switch setting, a source of pressure will be needed with the instrument. Remove the switch enclosure and loosen the set screw on the switch bracket. To increase the set point, slide the switch tube toward the **LO** port. To decrease the set point, slide the switch tube toward the **HI** port. Repeat as required until the new setting is reached. Recheck the new actuation point. Re-tighten set screw.

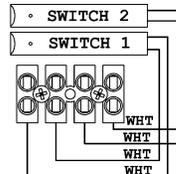
SWITCH WIRE COLOR

- A SPST white and white
- B SPST green(N/C); blue(common)
- C SPDT green(N/C); red(N/O); blue(common)

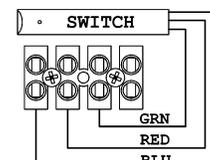
**1 SWITCH
-A OR -B**



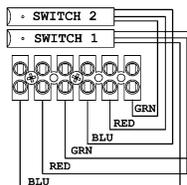
**2 SWITCHES
-A OR -B**



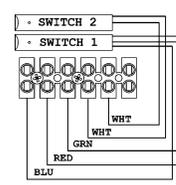
**1 SWITCH
-C**



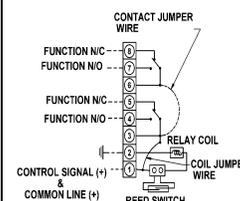
**2 SWITCHES
-C & -C**



**1 -C SW. & 1
-A OR -B SW.**



**RELAY DPDT
-R2**



MAINTENANCE

Other than replacing broken lens, there is only one area where this instrument may need attention. Erratic pointer or switch action may indicate that cleaning is required.

LENS REPLACEMENT:

1. Insert pressure body into vise, protecting the body from damage, with dial facing upwards.
2. Remove bezel or ring:
 - Bezel: twist off SS bezel with strap wrench or similar device
 - Snap-ring or threaded ring: use small screwdriver to loosen ring and remove by hand
3. Remove lens and gasket.
4. Remove gauge from vise and turn upside down to remove any debris that may be present.
5. Re-install in vise and reassemble with new lens, make sure gasket is located under the lens.

POINTER REPLACEMENT:

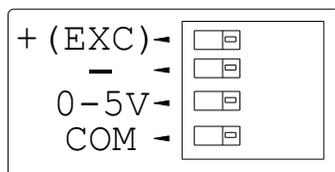
1. Remove lens and gasket, using above instructions – with pressure body in vise & gauge pointed upward.
2. Note exact position of pointer with small pencil mark.
3. Remove old pointer with pointer puller or screwdriver, take care not to bend the pointer or the pointer pin as they are sensitive components.
4. Install new pointer by hand, to line up with the pencil mark.
5. Rap the center of the pointer hub sharply, to set the pointer into the pin.
6. Erase small pencil mark & remove any debris.
7. Re-install lens, gasket and bezel.

Transmitters

HOW IT WORKS: Orange Research Differential Pressure Transmitters provide a proportional electronic output from a magnetically activated Hall Effect sensor. Pressure moves a magnetic piston inducing a polar bias in the sensor which causes a voltage change. Microprocessor amplifies, conditions and buffers the input analog signal.

Remove Transmitter cover and refer to wiring connections diagrams. These instruments are reverse polarity protected to protect the board.

ELECTRICAL CONNECTIONS:

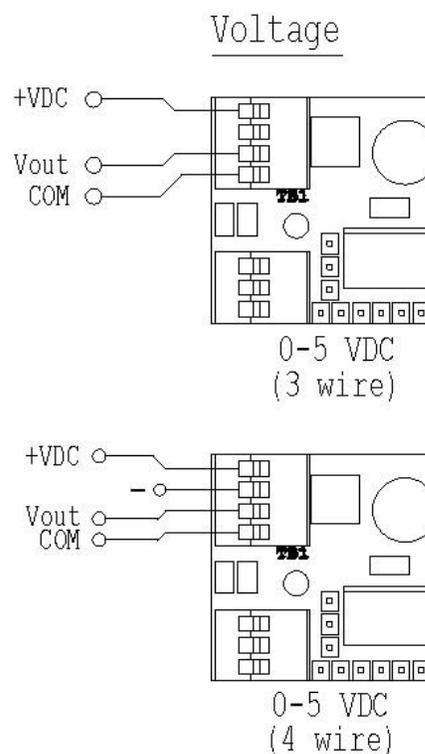
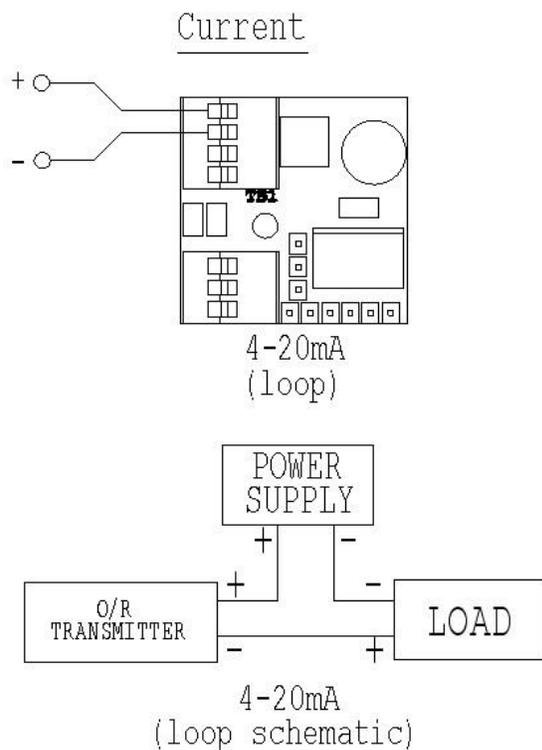


Supply Voltage: 9-35 VDC (reverse polarity protected)

Wire size: 20-26 AWG

Conduit connection: ½" trade size

Wiring Options:



WARNING: This product contains Nickel, a chemical known to the State of California to cause cancer. For more information go to: www.p65warnings.ca.gov