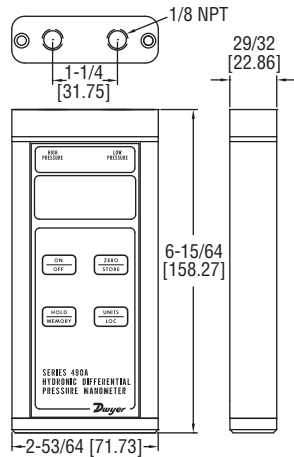




Series 490A Hydronic Differential Pressure Manometer
Specifications - Installation & Operating Instructions



Series 490A Hydronic Differential Pressure Manometer are versatile, hand-held, battery operated manometers available in several basic ranges for positive or positive differential pressure measurement and can tolerate most liquid media compatible with 316LSS. A memory function allows storage of up to 40 readings for later recall and a backlight provides auxiliary lighting for hard-to-see locations. Standard are a hold feature and both visual and audible overpressure alarms. A new feature added to the Series 490A is a field adjustable damping, independent viewable high/low pressure readings, and low range increased resolution. This allows the user to choose the level of display averaging rate corresponding to the fluctuation level common in many applications. A 9 V alkaline battery is included that provides up to 100 hours of operation.

SPECIFICATIONS

- Service:** Compatible gases & liquids.
- Wetted Materials:** 316 SS; -3V option: 316LSS, Buna-N, silicone, grease, PTFE, brass 360, copper, reinforced acetal copolymer; -HKIT option: 316LSS, PTFE, brass, copper.
- Accuracy:** ±0.5% FS from 60 to 78°F (15.6 to 25.6°C); ±1.5% FS from 32 to 60°F and 78 to 104°F (0 to 15.6°C and 25.6 to 40°C).
- Pressure Hysteresis:** ±0.1% FS.
- Pressure Limits:** See chart
- Temperature Limits:** Operating: 0 to 140°F (-17.8 to 60°C); Process with -HKIT option: -20 to 180°F (-29 to 82°C); Storage: -4 to 176°F (-20 to 80°C).
- Display:** 4-digit LCD (.425" H x .234" W digits).
- Resolution:** See chart.
- Process Connections:** Two 1/8" (3.18 mm) female NPT; -HKIT option: Two 1/4" male 45° flare fittings.
- Power Requirements:** 9 V alkaline battery, installed non-functional, user replaceable.
- Weight:** 14.1 oz (400 g); -HKIT option: 3.6 lb (1.63 kg).
- Agency Approvals:** CE.

Model	English Range	Metric Range	Maximum Pressure	Available Engineering Units
490A-1	0 to 15 psi	0 to 103.4 kPa	30 psi (2.7 bar)	psi, in w.c., in Hg, cm w.c., mm Hg, kPa, hPa, mbar, bar, oz/in ²
490A-2	0 to 30 psi	0 to 206.9 kPa	60 psi (4.13 bar)	psi, in w.c., in Hg, cm w.c., mm Hg, kPa, hPa, mbar, bar, oz/in ²
490A-3	0 to 50 psi	0 to 344.8 kPa	100 psi (6.89 bar)	psi, in w.c., in Hg, cm w.c., mm Hg, kPa, hPa, mbar, bar, oz/in ²
490A-4	0 to 100 psi	0 to 689.5 kPa	200 psi (13.78 bar)	psi, in w.c., in Hg, cm w.c., mm Hg, kPa, hPa, mbar, bar, oz/in ²
490A-5	0 to 500 psi	0 to 3448 kPa	1000 psi (68.9 bar)	psi, in w.c., in Hg, cm w.c., mm Hg, kPa, hPa, mbar, bar, oz/in ²
490A-6	0 to 200 psi	0 to 1379 kPa	400 psi (27.57 bar)	psi, in w.c., in Hg, cm w.c., mm Hg, kPa, hPa, mbar, bar, oz/in ²

BATTERY INSTALLATION

The unit is shipped with a separate 9 volt alkaline battery which must be installed before operation. Remove the two screws holding the bottom endcap in place and remove the endcap. Connect the battery to the enclosed battery clip, making sure to observe correct polarity. Be careful not to trap wires between the battery, case, or foam pads which retain the battery. This could make it difficult to install the battery or remove it later for replacement. Be sure that the rubber gasket is properly seated in the gasket channel of the endcap and replace endcap. Note that the endcap will only fit one way because the holes are slightly off-center. Place the Z shaped wrist strap clip in one of the screw recesses and replace the screws. Do not over tighten the screws. Attach the wrist strap to the clip. **Note:** On –HKIT option 490A, the rubber boot will have to be pulled back to have access to the battery compartment.

When battery replacement becomes necessary, use only a 9 volt alkaline type such as a Duracell® MN 1604, Eveready® 522, or equivalent. Zinc-carbon types, often labeled heavy-duty are not recommended because of the increased potential for leakage. Alkaline batteries are also a better value because they last up to three times longer in this device.

Low Battery Indicator

A weak battery can cause improper operation or inaccurate measurements. A low battery indicator is provided on the display to show when the battery needs replacement.

NOTICE

Although the unit might appear to function and indicate properly, the accuracy of readings cannot be guaranteed when the LOW BAT indicator is illuminated. Replace the battery with a new one. Do not leave an exhausted battery in the unit due to potential leakage.

ON-OFF OPERATION

Press the ON/OFF button once to turn the unit on. Once on, press the ON/OFF button for more than 5 seconds to turn the unit off. If the manometer is left on with no activity for approximately 20 minutes, the unit will turn itself off to conserve the battery.

ZEROING PRESSURE READING

Potential inaccuracy due to temperature effects can be minimized by re-zeroing immediately before use. To zero the display, vent both ports to the atmosphere so no pressure is applied to either port. Press the ZERO/STORE button and ---- will be momentarily displayed as zeroing occurs. Zeroing is not possible when the memory mode is in use. It must be done before selecting that function.

If the unit is accidentally zeroed with pressure applied to one of the ports, the pressure reading might display incorrectly. To correct, vent the pressure ports to atmosphere and press the ZERO/STORE button to zero the unit.

BACKLIGHT

The Model 490A includes a display backlight to allow use in the dark or in poor lighting conditions. Pressing the ON/OFF button toggles the backlight on or off. With the 490A on, press the ON/OFF button to toggle the backlight on or off. The backlight will remain lit for approximately 2 minutes after which it will turn itself off to conserve battery life.

PRESSURE CONNECTION

Measuring Single Pressure

To measure single positive pressure, connect the tubing to the port marked "High Pressure" and vent the opposite port to the atmosphere.

Measuring Differential Pressure

To measure differential pressure, connect the higher positive pressure to the port marked "High Pressure" and the lower positive pressure to the port marked "Low Pressure". The manometer will indicate the difference between the two.

Overpressure Alarm

A visual indicator and audible alarm are provided to alert the user that pressure has exceeded the operating range of the unit. Exceeding the range will not damage it or affect calibration as long as the maximum rated pressure is not exceeded. The maximum pressure for all units is shown on the rear label and on page 1 of these instructions.

CAUTION

Do not exceed the maximum rated pressure of the manometer. Doing so will cause permanent damage to the sensor, may rupture the housing, and/or cause personal injury.

AUTOMATIC RESOLUTION ADJUSTMENT

For all ranges, the series 490A will automatically move the decimal place one point to the left when reading in the bottom 10% of its calibrated range. This allows the user to gain a higher resolution reading for lower static or differential pressure readings.

SELECTING PRESSURE UNITS

Up to seven pressure units are available. The display will indicate the current selection. To change to different units, use the UNITS/LOC button. Each press of the button will cause an advance to the next choice. The selected units will remain in the memory even when the power is shut off. This way, the user preferences will always be displayed after the initial selection.

DISPLAY HOLD

In situations where a reading needs to be temporarily retained, the Model 490A includes a display hold feature which freezes the current reading and holds it on the display until it is cleared. To activate this operation, press the HOLD/MEMORY button when the desired pressure is displayed. A HOLD indicator will appear on the display to indicate that the reading shown is frozen. To return to normal operation, press the HOLD/MEMORY button again. The HOLD indicator will disappear and the current pressure will be shown.

MEMORY FUNCTION

A memory function is included in the Model 490A that allows users to store up to 40 pressure readings for later review or recording. The readings are stored in non-volatile memory so they will be retained even if the unit is shut off or the battery is removed.

Storing Pressure Readings

To store a reading, press and hold the HOLD/MEMORY button until ST01 displayed. Next, press the ZERO/STORE button to save the current reading to the ST01 memory location. A beep will sound indicating that the reading has been saved. As each reading is saved, the memory location display will advance to the next number. To resume pressure measurement, press the HOLD/MEMORY button again. Note that in the memory mode, the display zero function is not available. To zero the display, exit the memory mode and then press the ZERO/STORE button.

Viewing Stored Readings – Selecting a Location

To view the contents of the memory, press and hold the HOLD/MEMORY button until RD01 is displayed. Next, press UNITS/LOC to view other memory locations. To resume pressure measurement, press the HOLD/MEMORY button again.

Clearing Memory

To clear the contents of the memory, press and hold the HOLD/MEMORY button until CLR is displayed. Next, press the ZERO/STORE button to clear all previously stored readings. During this operation --- will be displayed. Once the memory is cleared, the current pressure will be displayed.

Exiting Memory Mode

To exit the memory mode, press the HOLD/MEMORY button again and the unit will return to normal operation.

DAMPENING FUNCTION

The dampening feature allows users to enter a dampening number from 1 to 16 (default value = 2). Entering a larger number increases the amount of readings that are averaged for each display update.

In order to access the dampening feature:

1. Press and hold the HOLD/MEMORY button for 7 seconds until DAMP is displayed.
2. Once DAMP is selected, a number is shown in the upper right portion of the LCD, along with the current pressure reading. This number is the dampening number. Adjust the number up by pressing the ZERO/STORE button or down by pressing the UNITS/LOC button. The LCD update rate slows as the number increases from 1 to 16. Therefore, for best results, choose the smallest number that provides a stable pressure reading.
3. Once the pressure reading is stable, press the HOLD/MEMORY button to store the dampening value.

INDEPENDENT HIGH OR LOW STATIC PRESSURE READINGS

This feature allows the user to select the pressure source to be shown on the LCD. The selections are LOW (-), HIGH (+), or DIFF (HIGH – LOW) without disconnecting any process connections.

1. Press and hold the HOLD/MEMORY button for 9 seconds until SRCE is displayed, then release.
2. Next, press the UNITS/LOC button to change the source to the one desired.
3. Press the ZERO/STORE, or ON/OFF or HOLD/MEMORY button to store the source and resume pressure measurement. To return to any other pressure source reading, please return to step 1. Note: The unit will default to DIFF when powered on, to return to a differential pressure reading DIFF (HIGH-LOW) simply turn the unit off and then back on.

OPTIONAL 3-WAY VALVE

For certain hydronic applications, it is beneficial to measure the differential pressure with the assistance of the optional attached 3-way valve. (See Fig. A)

Begin with valve V1 open and valves V2 and V3 closed. (See Fig. B) Slowly open V2 and V3. Once the pressure has stabilized and is equal on the high and low side, V1 can be closed and normal operation can proceed. To ensure proper pressures will be detected by the 490A, use the bleed fitting provided with this valve package. (See Fig. A) Before applying pressure to the process connections, turn V1 to the open position and back off the bleed screw. Next apply pressure. After the flowing liquid is free of bubbles, retighten the bleed screw. Before taking the 490A offline from the process, open V1 then close V2 and V3.

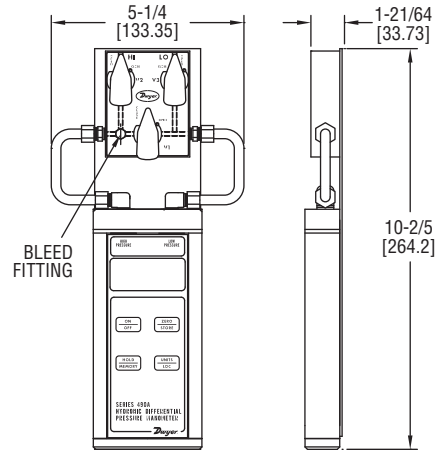


Figure A

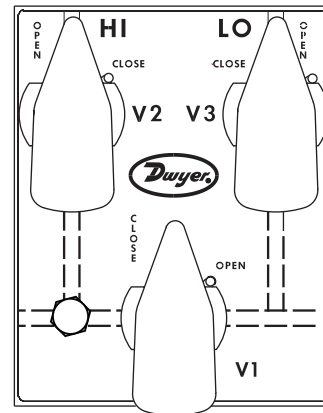


Figure B

OPTIONAL HYDRONIC KIT (-HKIT Option)

For hydronic valve balancing, Dwyer offers a full comprehensive kit of components to be able read pressure across valves by tapping the pressure test ports on either side of the valve or pump. The kit is comprised of two sets of 60" hoses with integral ball valves, 3 pairs of various size gage piercing adapters, adapters for various installations and a 3 way valve. The 3 way valve allows for isolation of pressure, equalization between high /low and bleeding of lines to evacuate air or particulate.

(See Fig. C). Please use following procedure as a guide when reading differential pressure across a hydronic valve or pump.

- 1. Begin with valve V1 open and valves V2 and V3 closed. (See Fig. D) Verify the integral ball valves on the red and blue hoses are in the open position. Then slowly open valves V2 and V3.
- 2. Once the pressure has stabilized and is equal on the high and low side, valve V1 can be closed and normal operation can proceed.
- 3. To ensure proper pressures will be detected by the 490A, use the bleed fittings for the high & low pressure sources on either side of the 3-valve manifold assembly. (See Figure D) These can be adjusted with the use of the adjustable wrench in the kit. PVC tubing has also been provided for connection to the bleed fitting giving the ability to control the bleeding into a container or reservoir. Once the lines are clear of pockets of air, close each bleed fitting with the wrench provided.
- 4. With valve V1 closed, bleed fittings tightened, valves V2 and V3 open, take the necessary readings.
- 5. Once the readings are completed, it is best practice to close off the integral ball valves in the red and blue hoses and leave valves V2 and V3 open. Then using the bleed fittings once more, loosen and bleed out the pressurized fluid or gases. The PVC tubing can be used once more to control the bleeding of the fluid into a container or reservoir.
- 6. Maintaining the integral hose ball valves in the closed position, disconnect from the pressure test ports.

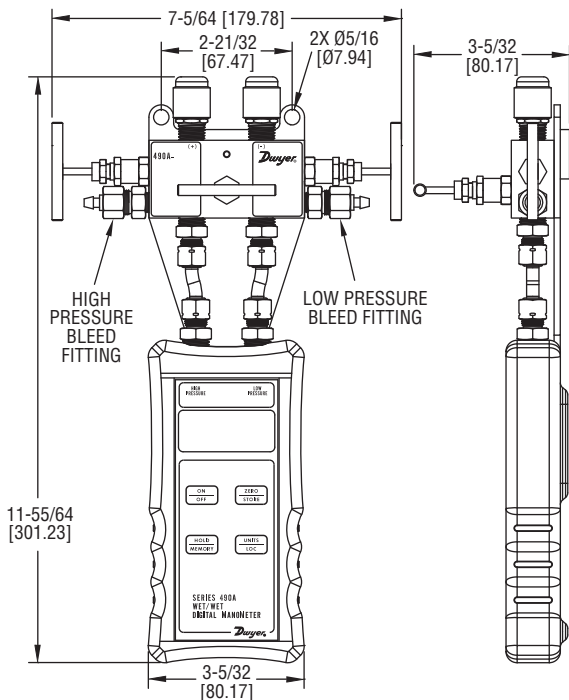


Figure C

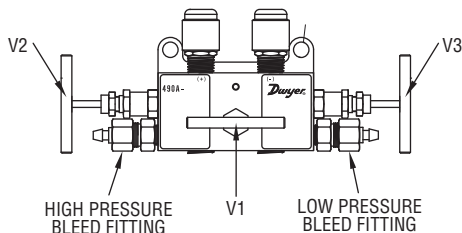


Figure D

490-X-HKIT Field Replacement Parts	
Model	Description
A-HKIT-AFIT	Adapter fitting replacement kit including: Straight adapter, 1/4" Male NPT X 1/4" - 45° flare (2 per kit) 1/4" SAE 45° flare seal cap and gasket (2 per kit) 90° union elbow, 1/4" - 45° flare X 1/4" - 45° flare (2 per kit) 90° male elbow, 1/4" male NPT X 1/4" - 45° flare (2 per kit)
A-HKIT-BFIT	Bleed fitting assembly (2 per kit)
A-HKIT-HOSES	60" blue charging hose with valve 60" red charging hose with valve
A-HKIT-500	Piercing gauge adapter 1/8" DIA x 1-1/2" Length (2 per kit)
A-HKIT-500XL	Piercing gauge adapter 1/8" DIA x 3" Length (2 per kit)
A-HKIT-510	Piercing gauge adapter 1/16" x 1-1/2" Length (2 per kit)
UHH-STRAP	Pipe or carry strap
A-47X-BOOT	Rubber boot
A-203	PVC tubing 1/4" OD x 1/8" ID. Ordered per foot
Please call our customer service for pricing and availability at 219-879-8000 or email: quotes@dwyer-inst.com	



MAINTENANCE/REPAIR

Upon final installation of the Series 490A, no routine maintenance is required. The Series 490A is not field serviceable and should be returned if repair is needed. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN

Refer to "Terms and Conditions of Sale" in our catalog and on our website. Contact customer service to receive a Return Goods Authorization Number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

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