

User's Guide



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USA**

**PHE/PHETX-600/610/620 ORE/ORETX-600/610/620
Differential pH & ORP Probes**



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

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1. GENERAL INFORMATION

This manual covers all Omega PHE/ORE-600/610/620 5 wire differential measurement pH / ORP probes and PHETX-600/610/620 2 wire (direct 4-20 mA) differential measurement pH / ORP probes. The designation “PHE” refers to pH probes whereas “ORE” refers to ORP probes.

All mounting configurations are described.

All series of probes feature encapsulated preamplifiers. If your probe has five wires it has an encapsulated preamplifier that outputs a voltage. This includes the PHE/ORE 600/610/620 series. If your probe has two wires, or—in the case of an ORP probe—four wires, it has an encapsulated pre-amp and a two-wire transmitter. This includes the PHETX/ORETX 600/610/620 series.

The output from the two-wire transmitter type is non-isolated and un-calibrated. The system must provide 24 Vdc, with “low” isolated from earth ground, and a means of calibrating for offset and span.

Table 1 gives a breakdown of the model designations.

NOTE: Do not discard the protective cap that came with the sensor. If the sensor is removed from the process for an extended period of time, thoroughly clean the sensor, put a piece of cotton ball with few drops of water into the protective cap and replace it on the sensor. This keeps the junction from drying out which causes slow response when put back into operation or causes permanent damage to the sensor. Sensors should not be left in dry lines or empty tanks for extended periods.

Do not store the sensors in a dry or humid location. When storing, check the protective cap(s) regularly to make sure the cotton ball remains moist. Improper storage of sensors voids the warranty.

Table 1 - Guide for Identifying Probe Models

	pH	ORP
5 Wire	PHE - xxx	ORE - xxx
4-20 mA	PHETX - xxx	ORETX - xxx

xxx:

600 = 1.5” fixed insertion

610 — 1” variable insertion

620 — 1” variable insertion extended length for hot tap valve

1.1. Specifications

MEASURING RANGES:

pH: 0 to 14.00 pH

ORP: ORE: ± 1999 mV, ORETX: 0-1000 mV / ± 500 mV field selectable

FLOW RATE:

10 ft./sec max. Flow should be as low as possible in low conductivity water and in solutions with high suspended solids

WETTED MATERIALS:

PHE and PHETX: CPVC, PVDF/ceramic, glass, titanium palladium alloy and EPDM

ORE and ORETX: CPVC, PVDF/ceramic, glass, titanium palladium alloy, EPDM, and platinum

TRANSMISSION DISTANCE:

5-wire Probes: 900 meters (3000 ft.)

2-wire Probes: Limited only by cable resistance and voltage of power supply

SENSITIVITY: pH: Less than 0.005 pH

ORP: Less than 0.5mV

STABILITY: 0.03 pH / 2mV per day, non-cumulative

PRESSURE LIMIT: 100 psig @ 65°C

40 psig @ 95°C

TEMPERATURE LIMITS: -5 to 95°C (23 to 203°F)

POWER SUPPLY LIMIT: 24VDC \pm 4V

PROBE CABLE: 15 ft. (4.6 m)

AUTOMATIC TEMPERATURE COMPENSATION: -5 to 95°C (23 to 203°)

PHETX Series:

OUTPUT SPAN: 1.14mA / pH

OUTPUT OFFSET: 12mA @ 7pH \pm 1.14mA

MAX LOAD: 450 Ohms

ORETX Series:

OUTPUT SPAN:

0-1000mV: 1.6mA / 100mV

\pm 500mV: 1.6mA / 100mV

OUTPUT OFFSET:

0-1000mV: 12mA @ 500mV \pm 1mA

\pm 500mV: 12mA @ 0mV \pm 1mA

MAX LOAD: 450 Ohms

2. INSTALLATION

2.1. General Instructions

Specific instructions for each type of probe are given in the following pages. Common to all probes are the following instructions:

- a) If the distance between the probe and the instrument is such that a direct connection is not possible, the probe cable should be routed to a junction box with a terminal strip (Omega Part No. PHE-600-JB). The box should be well sealed and away from corrosion danger. Be sure that you have sufficient slack cable to allow for probe removal for calibration and servicing.
- b) Route the interconnect cable from the junction box to the instrument, preferably in metal conduit. Do not run the power cable or control cables in the same conduit with the probe interconnect cable.
- c) Remove the protective plastic cap from the end of the probe before placing in service.
- d) For best results probes should always be mounted vertically with electrodes down. If this is not possible, the probe must be at least 15° above horizontal.

2.2. ORP 4-20 mA Probes

- a) ORP 4-20 mA probes have four wires; black, red, green and white. The red wire is to be connected to the +24 Vdc terminal and the back wire to the 24 Vdc common terminal via the load in the loop.
- b) For an instrument with a range of 0 to 1000 mV the green and white wires are to be shorted.
- c) For an instrument with a range of -500 to 500 mV the green and white wires are to be isolated from each other.

2.3. Submersion Mounting Series 600 Differential Probes

Refer to Drawing 5.3

- d) Apply a thread sealant to the thread on the cable end of the probe and screw a 1-1/2" x 1" NPT reducer onto the probe. Route the sensor cable through an appropriate length of 1" pipe and using thread sealant, screw the pipe into the reducer. The cable end of the probe should not be exposed to the process. A cable strain relief fitting should be used on the upper end of the pipe.
- e) An optional protective shroud, Part No. PHE-600-EP should be used on the electrode end of the probe to protect the electrodes from accidental contact with the tank bottom, sides or objects in the process.

2.4. Submersion Mounting Series 610/620- Differential Probes

Refer to Drawing 5.4

- a) Install the optional protective shroud, Part No. PHE-610-EP on the probe by threading the probe cable through it. The shroud will contact the shoulder on the probe.
- b) Install the compression fitting components on the probe in the order shown in the drawing below so that the pipe thread is towards the cable end of the probe. If you are concerned that the shroud may get pushed up and expose the electrodes you can lock it down by the positioning of the fittings.
- c) Snug up the nut of the compression fitting to locate it in the desired position. Hand-tighten as much as possible, then turn 1/2 turn with a wrench.
- d) Apply a thread sealant to the pipe thread portion of the compression fitting and screw a 1-1/4" x 1" NPT reducer to it.
- e) Route the sensor cable through an appropriate length of 1" pipe and using thread sealant, screw the pipe into the reducer on the probe. The cable end of the probe should not be exposed to the process.

2.5. Flow-through tee mounting Series 600 Differential Probes

Refer to Drawing 5.3

- f) Apply pipe sealant to the electrode end of the probe and screw it into a standard 1-1/2" NPT tee.

2.6. Flow-through tee mounting Series 610/620 Differential Probes

Refer to Drawing 5.4.

- a) Take the compression fitting apart. Apply pipe sealant to the 1-1/4" NPT thread and screw this part into a 1-1/4" tee. A larger tee with an appropriate reducer may be used.
- b) Put the compression fitting components on the probe in the order shown in the drawing. They should be in such a position that the electrodes will be in the pipe stream but not touching the opposite side of the tee.
- c) Remove the protective cap from the probe and place the probe in the tee. Now tighten the nut by hand as much as possible, then turn 1/2 turn with a wrench.

2.7. Hot/Wet tap insertion mounting PHETX / ORETX 600/610/620 Series Differential Probes

Refer to Drawing 5.5.

- a) A ball valve assembly, PHE-620-BVA, is available from Omega, which includes the assembly and a safety shroud.
- b) Mount the ball valve assembly in a desirable location. The assembly comes with a field selectable, 1-1/4 NPTF or socket adaptor. Make sure valve is in the close position before mounting.
- c) Remove the union body by turning the union nut counter clockwise. Take the compression fitting apart as shown on the drawing. Insert the back end of the series 620 probe through the union body until safety notch on the probe aligns with the safety stop on the union body.
- d) Place the union body, with the probe attached, back into the ball valve assembly and tighten union nut. Open ball valve & slide the probe into the process.
- e) Put the compression fitting components on the probe in the order shown in the drawing and tighten the nut by hand as much as possible, then turn 1/2 turn with a wrench to keep probe in place.
- f) Insert the protective shroud as shown.

3. SERVICE AND MAINTENANCE

3.1. Probe Cleaning

The probe should be kept reasonably clean to avoid measurement errors. Frequency of cleaning can only be determined by experience. To clean proceed as follows:

- a) Rinse with clean warm water.
- b) Soak the end of the probe in warm water and dish detergent for 3 or 4 minutes.
- c) Brush the end of the probe, particularly the three electrodes with a soft bristle brush such as a tooth brush. Take care not to scratch the glass electrode.
- d) If the probe is still not clean, it may have to be cleaned with acid. **CAUTION: Do not acid clean probes used in processes containing cyanide solutions.** Some experimentation may be required to determine the most suitable acid for your process. Use the most dilute acid which is effective. Normally 10 parts of water to one part muriatic acid is sufficient. **Do not use hydrofluoric acid.**
- e) Soak the probe for not more than 5 minutes in the chosen acid; then rinse thoroughly with clean warm water and soak in water for 3-5 minutes.
- f) Calibrate the system in accordance with the instrument instruction manual.

3.2. Replacement of Salt Bridge for Series 610 and 620 Differential Probes

If the system cannot be calibrated after cleaning the probe, it may be necessary to replace the standard cell solution. A kit is available from Omega Engineering for this purpose (PHE-612-SB). Proceed as follows:

- a) Hold the probe vertically with the sensor face up. Insert long nose pliers in the blind holes in the salt bridge and turn counter-clockwise taking care not to damage the glass electrode. Discard the used salt bridge.
- b) Up-end the probe and pour out the contents of the standard electrode chamber. Flush the chamber with a small amount of pH 7 buffer or clean water.
- c) Refill the chamber with 7pH buffer solution up to the tip of the electrode inside the chamber. DO NOT OVERFILL. It is important to leave space for the salt bridge thread and a small amount of air.
- d) Screw the new salt bridge into the cavity until finger tight. Now turn 1/4 turn with long nose pliers. The front face of the salt bridge should be flush with the probe face.

3.3. Replacement of Salt Bridge for Series 600 Differential Probes

If the system can't be calibrated after cleaning the probe, it may be necessary to replace the standard cell solution. A kit is available from Omega Engineering for this purpose (PHE-600-SB). Proceed as follows:

- a) Hold the probe vertically electrodes up. Remove the used salt bridge using a 9/16" socket wrench, turning counter-clockwise. Discard the used salt bridge.
- b) Dispose of the used solution inside the bridge chamber and flush with pH 7 solution or distilled water.
- c) Refill the chamber with 7 pH buffer solution, up to the tip of the electrode, inside the chamber. DO NOT OVERFILL. It is important to leave space for the salt bridge thread and a small amount of air.
- d) Screw the new salt bridge into the cavity until finger tight. Now perform a 1/4 turn with a 9/16" socket wrench. The salt bridge edges should be flush with the front of the probe face.

3.4. Storage

- a) Do not discard the protective cap(s) that came with the sensor. If the sensor is removed from the process for an extended period of time, thoroughly clean the sensor, put a piece of cotton ball with few drops of water into the protective cap and replace it on the sensor. This keeps the junction from drying out which causes slow response when put back into operation or causes permanent damage to the sensor. **Sensors should not be left in dry lines or empty tanks for extended periods.**

- b) Do not store the sensors in a dry or humid location. When storing, check the protective cap(s) regularly to make sure the cotton ball remains moist. Improper storage of sensors voids the warranty.

4. TROUBLESHOOTING AND SERVICE

4.1. Checking 5-wire Differential Probes PHE-600/610/620 and ORE-600/610/620

The probe can be checked by a few simple measurements. Two pH buffer solutions, 7 pH and either 4 pH or 10 pH, and a multimeter are required. For ORP probes two calibration solutions, 200 and 600 mV, are required. Millivolt solutions may be $\pm 20\%$ of nominal value. Actual value is noted on the bottle.

4.1.1. PHE-600/610/620 pH probes

Clean the probe as described in Section 4.1. If the system cannot be calibrated, replace the salt bridge and 7pH buffer solution. If the system still can't be calibrated check the probe as follows:

- a) Disconnect red, green, yellow and black wires at the junction box. If you are not using a junction box, disconnect at the instrument after shutting off the power.
- b) Place the probe in 7 pH buffer. Allow enough time for the temperature of the probe and buffer to stabilize at room temperature.
- c) Measure the resistance between the yellow and black wires to check the probe's temperature compensator. The resistance should be between 250 and 350 ohms at 25°C. If the resistance is within specifications the probes thermistor is functioning correctly.
- d) Reconnect the yellow and black wires and restore power to the instrument.
- e) Measure the voltage between the red and green wires. If it is not within -50 to $+50$ millivolts with the probe in 7 pH buffer, the probe is defective. If the voltage is OK proceed to the next step.
- f) Rinse the probe and place it in 4 pH or 10 pH buffer. Allow it to stabilize then check the voltage again between the red and green wires. If the voltage is between 100 and 230 millivolts (negative in 10 pH buffer, positive in 4 pH buffer) the probe is within specifications.

4.1.2. ORE-600/610/620 ORP probes

Clean the probe as described in Section 4.1. If the system cannot be calibrated, replace the salt bridge and 7pH buffer solution. If the system still can't be calibrated check the probe as follows:

- a) Disconnect red, green, yellow and black wires at the junction box. If you are not using a junction box, disconnect at the instrument after shutting off the power.
- b) Place the probe in 200 mV solution. Allow enough time for the temperature of the probe and solution to stabilize at room temperature.
- c) Measure the resistance between the yellow and black wires to check the probe's temperature compensator. The resistance should be between 250 and 350 ohms at 25°C. If the resistance is within specifications the probes thermistor is functioning correctly.
- d) Reconnect the yellow and black wires and restore power to the instrument.
- e) Measure the voltage between the red and green wires. The reading should be between 160 and 240 mV; otherwise, the probe is defective. If the voltage is OK proceed to the next step.
- f) Rinse the probe and place it in 600 mV solution. Allow it to stabilize then check the voltage again between the red and green wires. If the voltage is between 560 and 640 mV, the probe is within specifications.

4.2. Checking Probes PHETX/ORETX Series Probes (4-20 mA output)

The operation of the 2-wire, 4-20 mA, probe can be checked by a few simple measurements. Two pH buffer solutions, 7 pH and either 4 pH or 10 pH, and a dc voltmeter are required.

4.2.1. PHETX Series pH Probe

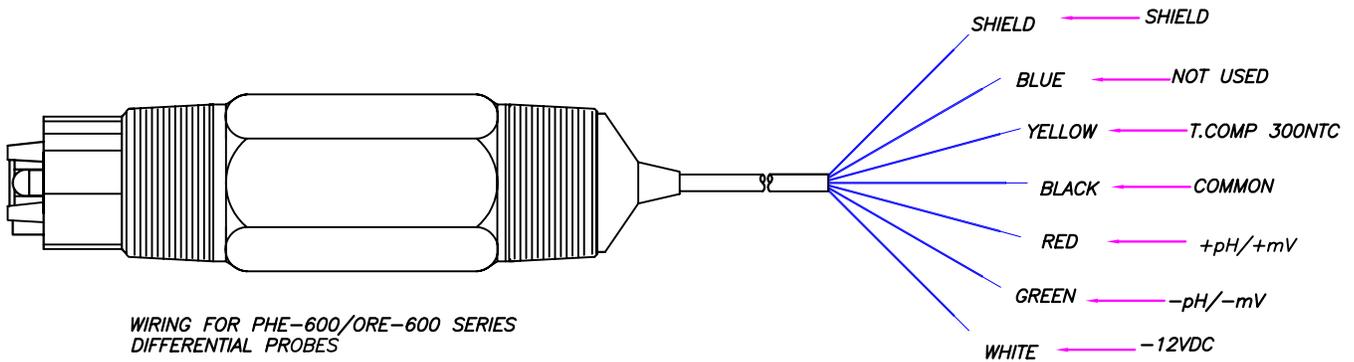
- a) Disconnect the red wire at the instrument or power supply and connect it to the voltmeter (-) black.
- b) Connect the voltmeter (+) red to the instrument or power supply red wire output terminal.
- c) Rinse the probe and place it in 7 pH buffer. Allow the temperature of the buffer and probe to stabilize at room temperature.
- d) Check the offset of the probe by reading the voltmeter. The reading should be between 11 and 13 mA. If not the probe is defective. If the offset is OK, note the exact reading and proceed to the next step.
- e) Rinse the probe and place it in 4 pH or 10 pH buffer. Allow the temperature of the probe and buffer to stabilize at room temperature. Now check the span of the probe by reading the voltmeter. If the probe is in 4 pH buffer, the reading should be between 2.85 and 3.99 lower than the reading obtained in (d).

- f) If the probe is in 10 pH buffer, the reading should be between 2.85 and 3.99 higher than the reading obtained in (d).
- g) If this test is not satisfied the probe is defective.
- h) If you wish to check the temperature compensator proceed to step (j).
- i) If the span of the probe drops below 2.85mA than the probe still can be used adjustments will have to be made to the receiving device to compensate for the low span.
- j) To check the operation of the temperature sensor in the probe, heat the buffer used in step (e) with the probe in it to about 50°C. The voltmeter reading should be within ± 0.15 mA of the reading observed in step (e).

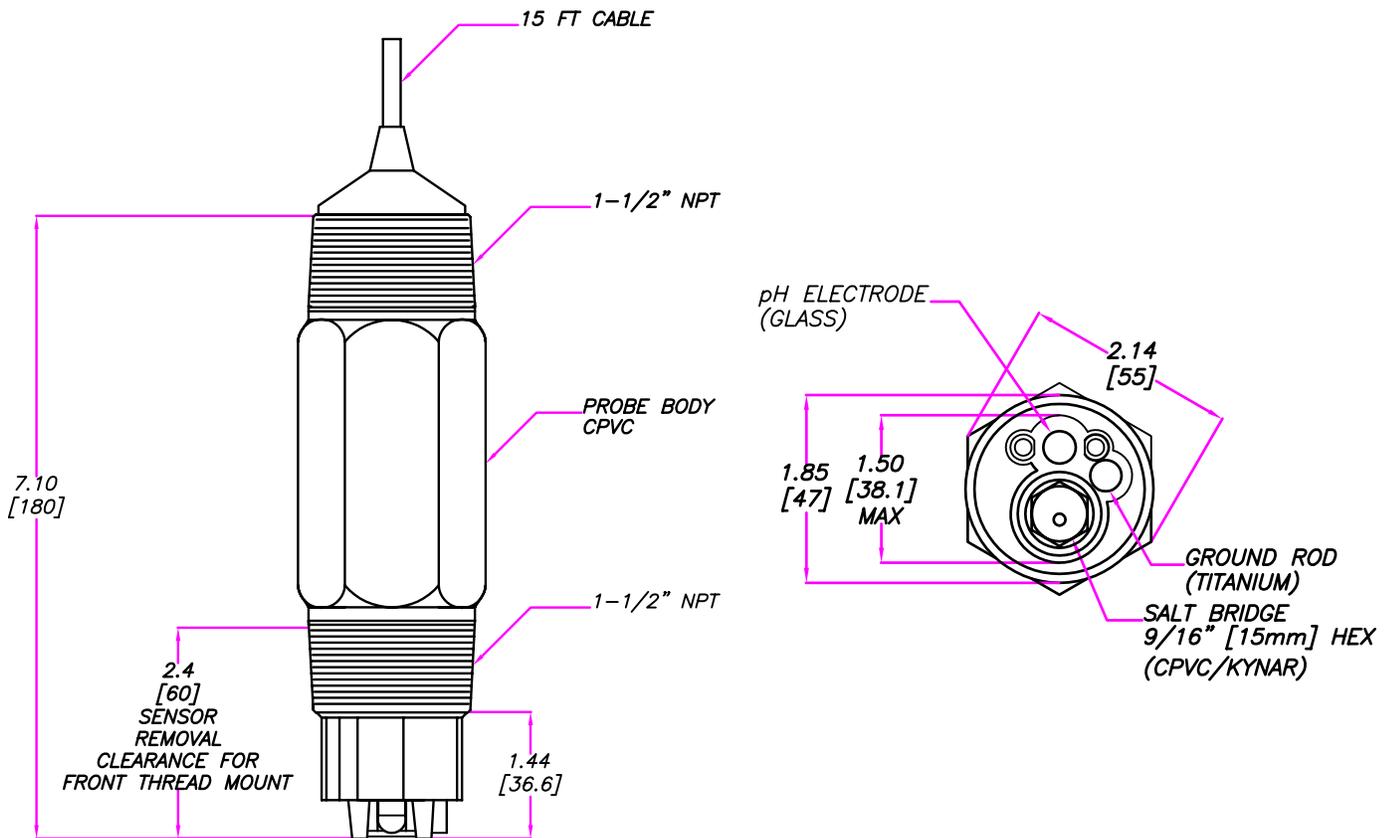
4.2.2. ORETX Series ORP Probe

- a) Disconnect the red wire at the instrument or power supply and connect it to the voltmeter (-) black. Connect the voltmeter (+) red to the instrument or power supply red wire output terminal.
- b) For a probe with range of -500 to 500 mV: (white and green wire open). Rinse the probe and place it in the 200 mV solution. The voltmeter should read between 14.4 and 16.0 mA.
- c) Rinse the probe and place it in the 600 mV solution. The meter should read between 19.55 and 20.45 mA.
- d) For a probe with range of 0 to 1000 mV: (white and green wire joined). Rinse the probe and place it in the 200 mV solution. The voltmeter should read between 6.4 and 8.0 mA.
- e) Rinse the probe and place it in the 600 mV solution. The meter should read between 12.8 and 14.4mA.

5.1 PHE/ORE-600 Differential Probes



WIRING FOR PHE-600/ORE-600 SERIES DIFFERENTIAL PROBES



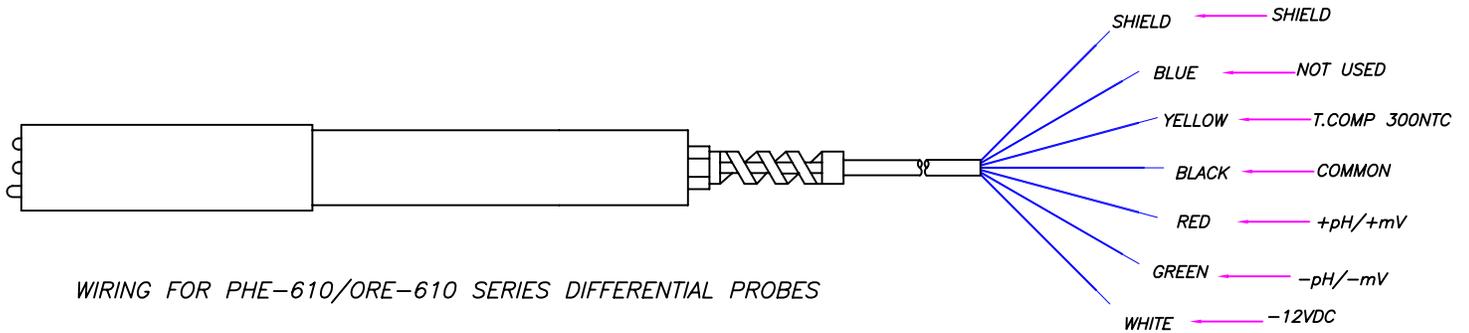
SPECIFICATIONS:

MEASURING RANGE: 0.00 TO 14.00 pH OR -2000 TO +2000 mV (ORP)
 FLOW RATE: 10FT/SEC MAX. IF POSSIBLE FLOW RATE SHOULD BE MINIMAL FOR SOLUTIONS WITH LOW CONDUCTIVITY OR HIGH IN SUSPENDED SOLIDS
 WETTED MATERIAL STANDARD PROBES: CPVC (BODY), GLASS (ELECTRODE), TITANIUM (GROUND ROD), EPDM (ORINGS), KYNAR (JUNCTION), PLATINUM (FOR ORP PROBES)
 TRANSMISSION DISTANCE: 3000FT MAX
 SENSITIVITY: LESS THAN 0.005pH OR 0.5 mV (ORP)
 STABILITY: 0.03PH OR 2 mV (ORP) PER 24 HOURS NON CUMULATIVE
 TEMPERATURE COMPENSATION: -5°C TO 95°C
 PRESSURE LIMIT: 100PSIG 65°C, 40PSIG 95°C
 TEMPERATURE LIMIT: -5°C TO 95°C
 CABLE: 15FT, 6 WIRE PLUS SHIELD
 PROCESS CONNECTION: 1-1/2" NPTM
 MOUNTING RESTRICTIONS: SENSORS SHOULD BE MOUNTED VERTICALLY WITH ELECTRODES POINTING DOWN, WHEREVER POSSIBLE. IF SENSOR MUST BE INSTALLED ON AN ANGLE, IT SHOULD BE AT LEAST 15° ABOVE HORIZONTAL.
 BACK END OF SENSOR AND CABLE IS NOT SUBMERSIBLE

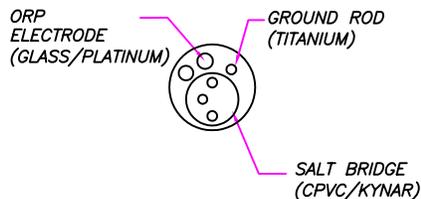
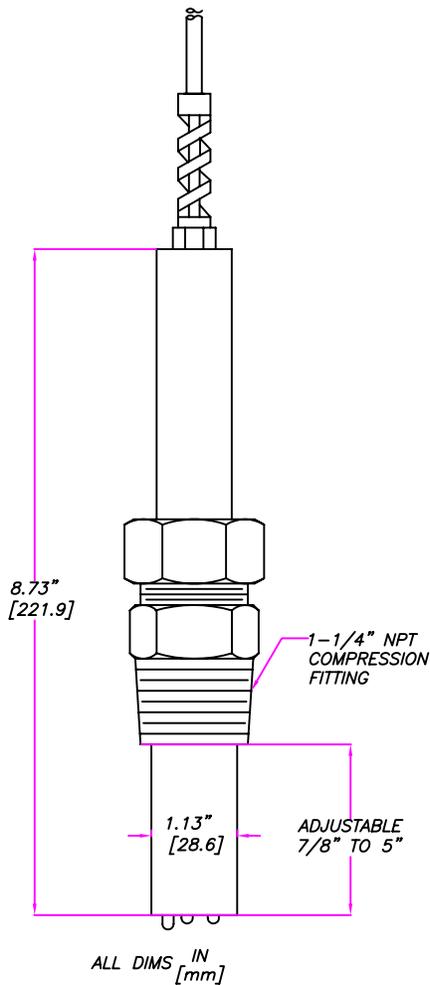
OMEGA ENGINEERING, INC.			
PHE-600/ORE-600 DIFFERENTIAL PROBES			
CODE IDENT NO.	SIZE		REV.
	A		1
SCALE: NTS		SHEET 01 OF 01	

ALL DIMENSION IS INCH [mm]

5.2. PHE/ORE-610 Differential pH/ORP Probes



WIRING FOR PHE-610/ORE-610 SERIES DIFFERENTIAL PROBES

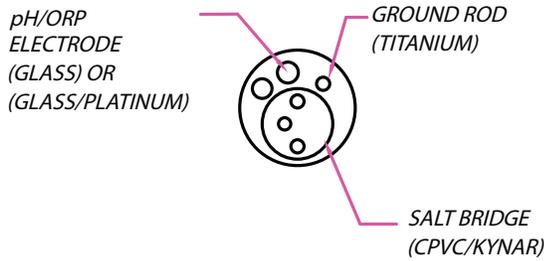
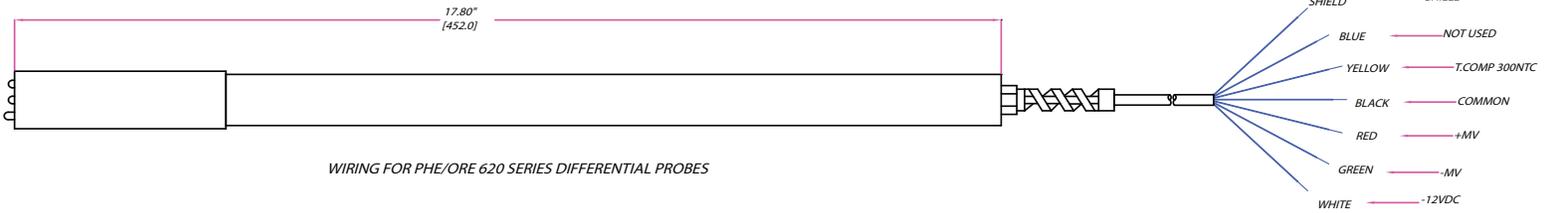
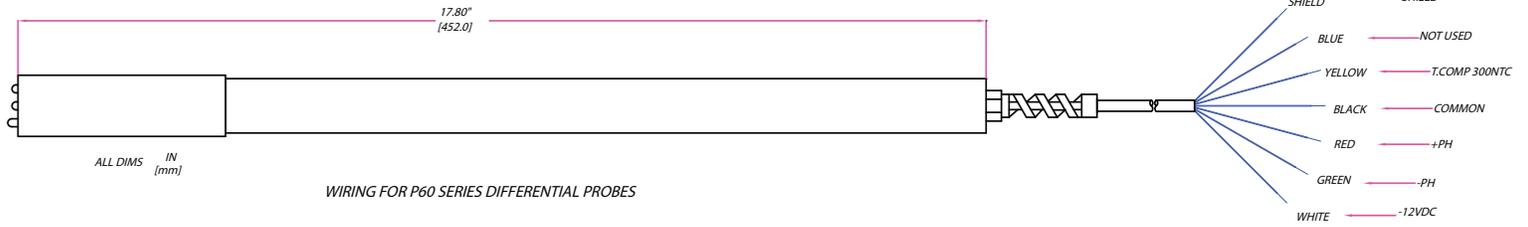


SPECIFICATIONS:

MEASURING RANGE: 0.00 TO 14.00 pH OR -2000 TO +2000 mV (ORP)
 FLOW RATE: 10FT/SEC MAX. IF POSSIBLE FLOW RATE SHOULD BE MINIMAL FOR SOLUTIONS WITH LOW CONDUCTIVITY OR HIGH IN SUSPENDED SOLIDS
 WETTED MATERIAL STANDARD PROBES: CPVC (BODY), GLASS (ELECTRODE), TITANIUM (GROUND ROD), EPDM (ORINGS), KYNAR (JUNCTION), PLATINUM (FOR ORP PROBES)
 TRANSMISSION DISTANCE: 3000FT MAX
 SENSITIVITY: LESS THAN 0.005pH OR 0.5 mV (ORP)
 STABILITY: 0.03pH OR 2 mV (ORP) PER 24 HOURS NON CUMULATIVE
 TEMPERATURE COMPENSATION: -5°C TO 95°C
 PRESSURE LIMIT: 100PSIG 65°C, 40PSIG 95°C
 TEMPERATURE LIMIT: -5°C TO 95°C
 CABLE: 15FT, 6 WIRE PLUS SHIELD
 PROCESS CONNECTION: 1-1/4" NPTM
 MOUNTING RESTRICTIONS: SENSORS SHOULD BE MOUNTED VERTICALLY WITH ELECTRODES POINTING DOWN, WHEREVER POSSIBLE. IF SENSOR MUST BE INSTALLED ON AN ANGLE, IT SHOULD BE AT LEAST 15° ABOVE HORIZONTAL.
 BACK END OF SENSOR AND CABLE IS NOT SUBMERSIBLE

OMEGA ENGINEERING, INC.			
PHE-610/ORE-610 DIFFERENTIAL PROBES			
CODE IDENT NO.	SIZE		REV.
	A		1
SCALE: NTS		SHEET 01 OF 01	

5.3 PHE/ORE-620 Differential Probes



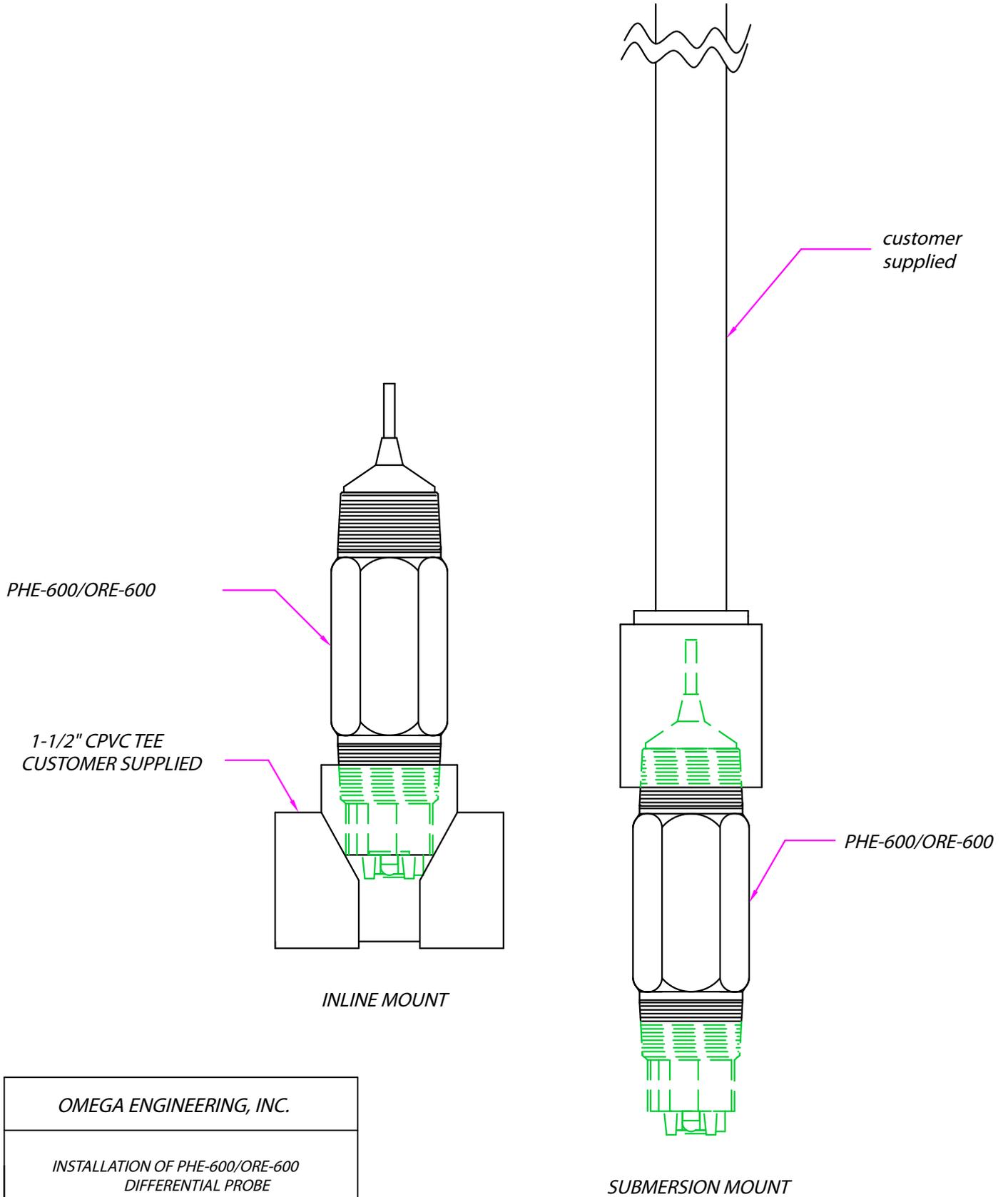
NOTE:
1. MODEL SHOWN IS STANDARD P/R60C7,
FOR R60C7G ORP ELECTRODE MATERIAL IS
GLASS AND GOLD

SPECIFICATIONS:

MEASURING RANGE: 0.00pH TO 14.00pH; ORP IS 1999mV TO +1999mV
 FLOW RATE: 10FT/SEC. MAX. IF POSSIBLE FLOW RATE SHOULD BE MINIMAL FOR SOLUTIONS
 WITH LOW CONDUCTIVITY OR HIGH IN SUSPENDED SOLIDS
 WETTED MATERIAL STANDARD PROBES: CPVC (BODY), TITANIUM (GROUND ROD), EPDM
 (ORINGS), KYNAR (JUNCTION), GLASS (pH ELECTRODE) OR GLASS/PLATINUM (ORP
 ELECTRODE)
 TRANSMISSION DISTANCE: 3000FT MAX
 SENSITIVITY: LESS THAN 0.005pH OR 0.3mV
 STABILITY: 0.03pH OR 2mV PER 24 HOURS NON CUMULATIVE
 TEMPERATURE COMPENSATION: -5°C TO 95°C
 PRESSURE LIMIT: 100PSIG 65°C, 40PSIG 95°C
 TEMPERATURE LIMIT: -5°C TO 95°C
 CABLE: 15FT, 6 WIRE PLUS SHIELD (BLUE WIRE NOT USED ON 60 SERIES)
 PROCESS CONNECTION: P60-HTC HOT TAP VALVE
 MOUNTING RESTRICTIONS: SENSORS SHOULD BE MOUNTED VERTICALLY WITH ELECTRODES
 POINTING DOWN, WHEREVER POSSIBLE. IF SENSOR MUST BE INSTALLED ON AN ANGLE, IT
 SHOULD BE AT LEAST 15° ABOVE HORIZONTAL.
 BACK END OF SENSOR AND CABLE IS NOT SUBMERSIBLE

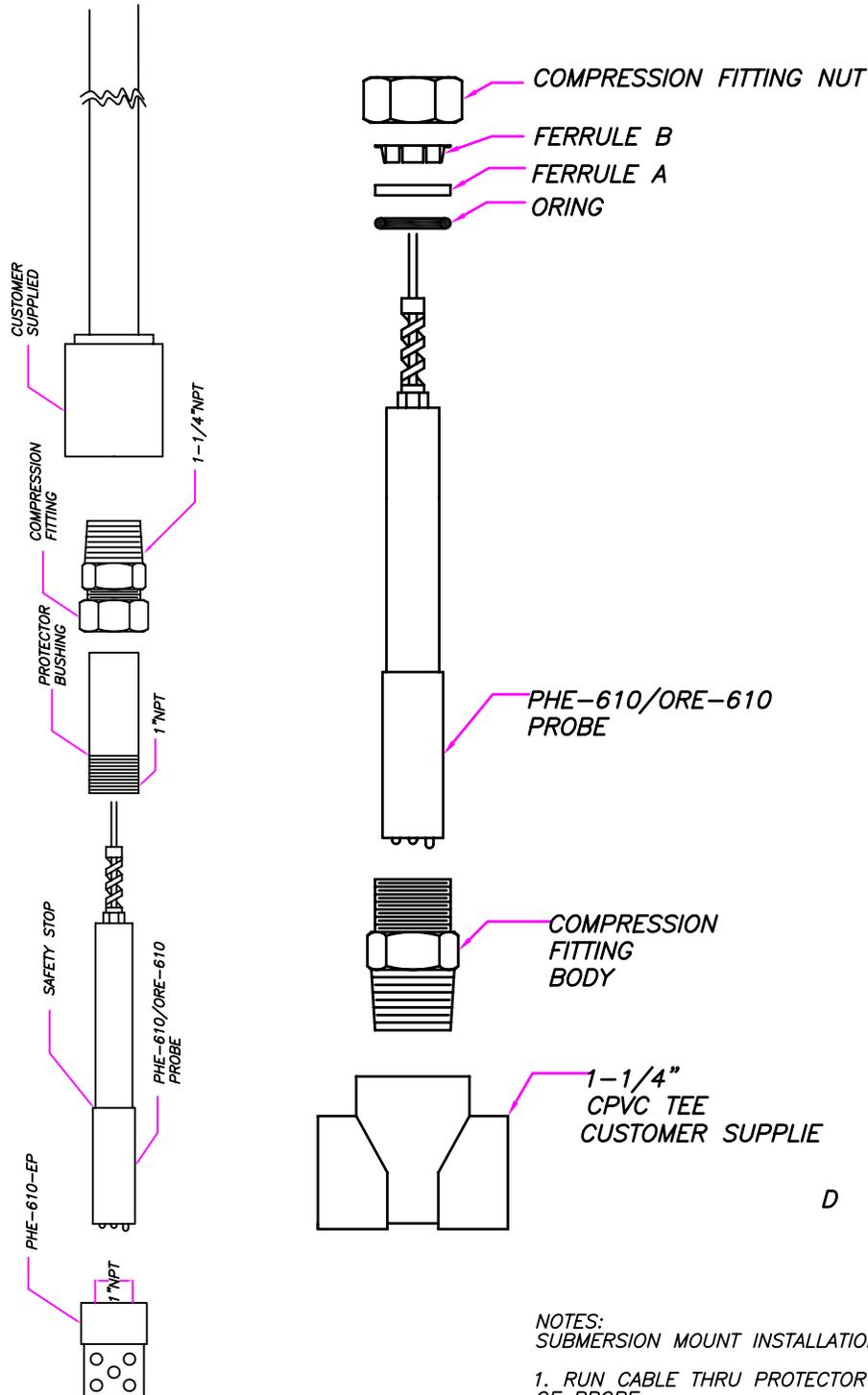
TOLERANCES: (UNLESS OTHERWISE SPECIFIED) DIMENSIONS: (IN INCHES) 1 PLACE DECIMALS ± 0.1 FRACTIONAL ± 1/64 2 PLACE DECIMALS ± 0.01 ANGLES: DECIMAL DEGREES ± 0.5 3 PLACE DECIMALS ± 0.005 THREADS: - MALE CLASS 2A, FEMALE CLASS 2B REMOVE BURRS AND SHARP EDGES 0.020 MAX	MATERIAL: N/A	OMEGA ENGINEERING, INC.	
	FINISH: N/A	TITLE SERIES 620 DIFFERENTIAL PH/ORP PROBES	
PROPRIETARY NOTICE: THE INFORMATION ON THIS DRAWING IS PRIVATE AND CONFIDENTIAL AND IS THE PROPERTY OF THE COMPANY AND MUST NOT BE PUBLISHED DIRECTLY OR INDIRECTLY WITHOUT THE WRITTEN PERMISSION OF THE COMPANY AND MUST NOT BE USED IN ANYWAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.		SIZE A	DWG. NO. REV R1
SCALE NTS		SHEET 01 OF 01	

5.4 Installation of Series 600 Differential Probes



<i>OMEGA ENGINEERING, INC.</i>			
<i>INSTALLATION OF PHE-600/ORE-600 DIFFERENTIAL PROBE</i>			
CODE IDENT NO.	SIZE		REV.
	<i>A</i>	<i>N105-122</i>	<i>1</i>
SCALE: NTS	SHEET 01 OF 01		

5.5 Installation of Series 610 Differential Probes



NOTES:
SUBMERSION MOUNT INSTALLATION

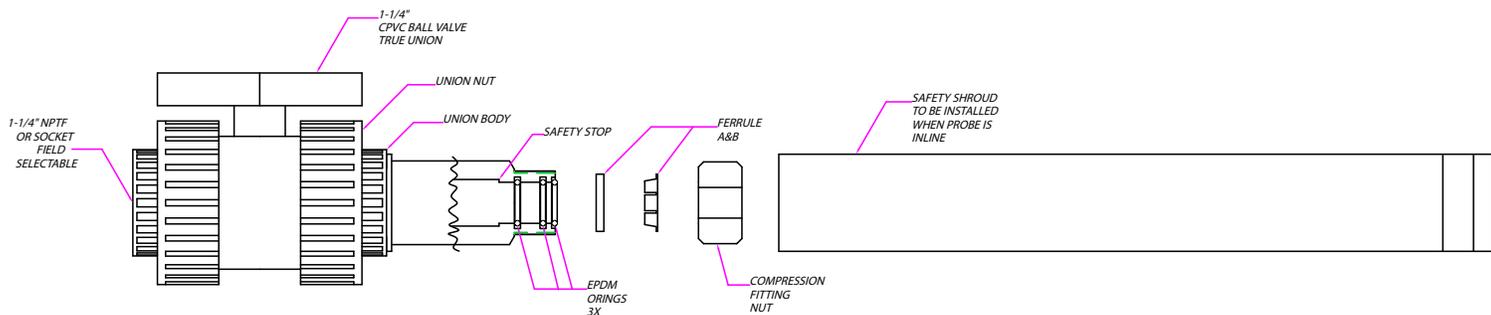
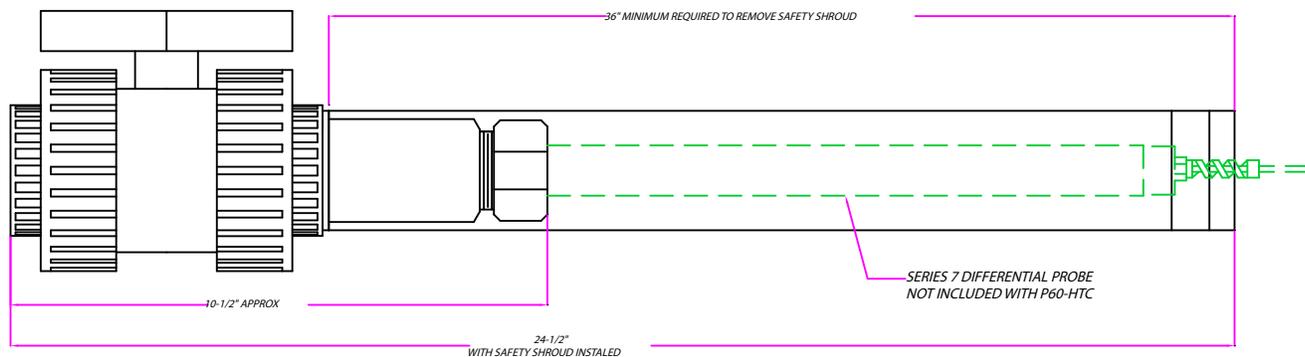
1. RUN CABLE THRU PROTECTOR BUSHING AND SLIDE ONTO BODY OF PROBE.
2. SCREW END PROTECTOR ONTO 1" THREAD ON PROTECTOR BUSHING.
3. INSTALL COMPRESSION FITTING ONTO PROBE
4. WRAP COMPRESSION FITTING THREAD WITH SEALING TAPE AND THREAD INTO FITTING.

INLINE MOUNT:

1. WRAP COMPRESSION FITTING THREADS WITH SEALING TAPE AND SCREW INTO 1-1/4" TEE
2. SLIDE O-RING, FERRULES A&B AND NUT OVER PROBE AS SHOWN
3. INSERT PROBE INTO THE COMPRESSION FITTING BODY AND TIGHTEN NUT TO SECURE PROBE

OMEGA ENGINEERING INC.			
INSTALLATION OF PHE-610/ORE-610 DIFFERENTIAL PROBES			
CODE IDENT NO.	SIZE		REV.
	A		1
SCALE: NTS		SHEET 01 OF 01	

5.5 Installation of Series 620 Differential Probes

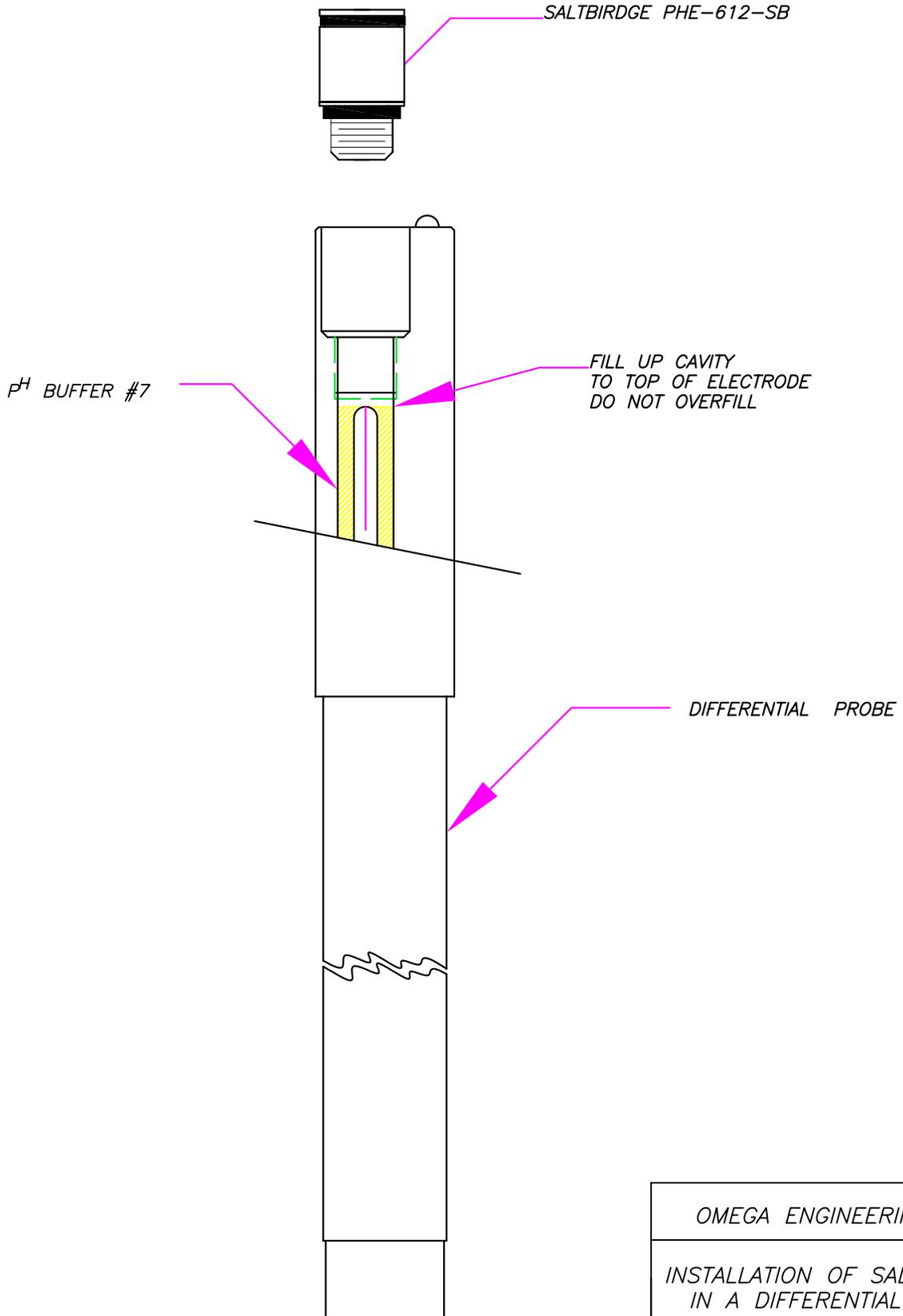


SPECIFICATIONS P60-HTC
WETTED MATERIALS: CPVC, EPDM
MAXIMUM RATINGS: 200PSI @ 25°C / 30PSI @ 100°C

- TO REMOVE PROBE FROM BALL VALVE**
1. PULL BACK SAFETY SHROUD
 2. LOOSEN SECURING NUT AND WITHDRAW PROBE TO SAFETY STOP
 3. CLOSE BALL VALVE
 4. UNSCREW UNION CCW
- TO REMOVE PROBE FROM UNION BODY**
5. PULL PROBE FORWARD THROUGH PROBE FITTING

OMEGA ENGINEERING, INC.			
PHE-620 BVA HOT TAP VALVE ASSEMBLY FOR SERIES 620 DIFFERENTIAL PROBES			
CODE IDENT NO.	SIZE	AQUAMETRIX DRAWING NO.	REV.
	A		1
SCALE: NTS		SHEET 01 OF 01	

5.7. Installation of Salt Bridge in a Differential Probe



OMEGA ENGINEERING, INC

INSTALLATION OF SALT BRIDGE
IN A DIFFERENTIAL PROBE

CODE IDENT NO.	SIZE	REV.
	A	1
SCALE: NTS		SHEET 01 OF 01



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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