

Sealed Reference System for Longer Sensor Life



Model Q45PR

pH/ORP Monitor

Superior Sensor Technology For Advanced Process Measurement



Sensor Mounting Configurations



ORP Monitor

The “Differential” Difference

ATI's versatile Q45P/R pH/ORP system is designed for use in all industrial and municipal applications. The sensors are engineered to function normally in applications where conventional sensors quickly fail.

Conventional pH/ORP sensors have an “open reference system,” which means the reference element and electrolyte are in contact with the process. This allows chemicals to diffuse into the reference chamber and alter the reference system. As the reference junction becomes contaminated, the reference potential shifts. As chemicals attack the silver reference wire, the reference potential shifts and the sensor no longer functions. When any of these problems occur, cleaning and calibration cycles increase and the sensors fail much faster, all of which costs you time and money.

The differential pH/ORP sensors utilize a “sealed reference system,” where the sensors are constructed with a second glass pH electrode as the reference element. The glass reference system protects the sensor from chemical poisons (sulfide, cyanide, chlorine, bisulfite, etc.) that destroy conventional pH sensors.

A large volume, dual junction saltbridge is used to maximize the in-service time of the sensor. The annular junction provides a large surface area to minimize the chance of fouling. Large electrolyte volume and dual junctions minimize contamination of

the reference solution. The replaceable saltbridge allows for easy and inexpensive sensor regeneration.

An integral preamplifier is encapsulated in the body of the sensor. This creates a low impedance signal output which ensures stable readings in harsh environments, and maximizes the distance between sensor and analyzer. Sensor diagnostics are used to alarm the user in the event of electrode breakage, loss of sensor seal integrity, or integral temperature sensor failure.

Sensor electrodes can be user-specified to ensure measurement reliability and maximum sensor lifetime. The type of glass used in the pH electrodes can be selected for optimal performance. The metal electrode used for ORP measurement can be platinum or gold, depending on the chemical makeup of the process solution.

All sensors are available in several mounting configurations. The 1" NPT convertible-style sensor is constructed of PEEK®, a high performance thermoplastic that provides outstanding mechanical strength and chemical resistance. An insertion-style sensor is available in 316SS for hot tap applications. The mounting hardware for the insertion sensor is either CPVC or 316SS, and is mounted using a 1-1/4" NPT full-ported ball valve. The sensors are also available with 1-1/2" or 2" sanitary-style fittings.

Sensor Specifications

Measuring Range:	0 to 14 pH, -1000 to +2000 mV	Sensor Cable:	6 conductor plus 2 shields, HDPE jacket
Sensitivity:	0.002 pH; 0.2 mV	Temperature Range:	-5 to 95°C (23 to 203°C).
Stability:	0.02 pH; 2 mV (per 24 hours, non-cumulative)	Pressure Range:	0 to 100 psig
Wetted Materials:	PEEK®, ceramic, titanium, glass, Viton®, EDPM Platinum or gold (ORP only) 316 Stainless Steel with sanitary or insertion body styles	Max. Flow Rate:	10 feet (3 meters) per second
Temperature Compensation:	Pt1000 RTD	Max. Sensor to Analyzer Distance:	3,000 feet (914 meters)
		Sensor Body Options:	1" NPT Convertible 1-1/4" Insertion 1-1/2" or 2" sanitary-style

Monitor Specifications

Display Parameters:		Display:	Large, high-contrast, super-twist (STN) LCD 4-digit main display with sign, 0.75" (19.1 mm) seven-segment characters; 12-digit alpha-numeric second line display, 0.3" (7.6 mm) 5 x 7 dot matrix characters
Main input:	[pH] 0 to 14 [ORP] -1000 to +2000 mV	Ambient Temperature:	
Sensor voltage:	[pH] ±500 mV	Service:	-20 to 60°C (-4 to 140 °F)
Loop current:	4.00 to 20.00 mA	Storage:	-30 to 70°C (-22 to 158 °F)
Sensor temperature:	-10 to 110°C (14 to 230°F)	Ambient Humidity:	0 to 95%, non-condensing
Main Parameter Range:	0.00 to 14.00 pH, -1000 to +2000 mV	Location:	Designed for hazardous and non-hazardous areas
Input Impedance:	>10 ¹³ Ohms	EMI/RFI Influence:	Designed to EN 61326-1
Repeatability:	0.1% of span or better	Output Isolation:	600 V galvanic isolation
Sensitivity:	0.05% of span	Filter:	Adjustable, 0-9.9 minutes additional damping to 90% step input
Non-linearity:	0.1% of span	Temperature Input:	Selectable Pt1000 or Pt100 RTD with automatic compensation
Stability:	0.05% of span per 24 hours	Power:	16-35 VDC for loop-powered unit; 115/230 VAC, 50/60 Hz., 10 VA Max. 9-volt battery for battery operated portable
Temperature Drift:	Span or zero, 0.02% of span/°C	Control Relays:	Two SPDT relays, 6A @ 250 VAC, 5A @ 24 VDC, resistive
Warm-Up Time:	7 seconds to rated performance	Relay Mode:	Programmable for control, alarm, or timer function
Response Time:	6 seconds to 90% of step input at lowest setting	Analog Outputs:	Isolated 4-20 mA, 550 ohm max. load. Two assignable 4-20 mA outputs, 550 ohm max. (AC only)
Max. Sensor to Analyzer Distance:	3000 feet (914 meters) w/preamp 25 feet (7.6 meters) w/o preamp	Data Logger:	Battery version only, stores 32,000 data points
Sensor Types:	Q-Series pH or ORP with preamp, 5-wire input; combination-style pH or ORP with temperature compensation		
Enclosure:	NEMA 4X, IP66, polycarbonate, weatherproof and corrosion resistant, (HWD): 4.9" (124 mm) x 4.9" (124 mm) x 5.5" (140 mm)		
Mounting Options:	Wall, panel, pipe/handrail		
Conduit Openings:	Three M16 threaded entries, 3 cord-grips and 2 conduit adapters included		
Weight:	2-wire or battery units: 1 lb. (.45 Kg) AC power units: 2 lbs. (.9 Kg) Auto-Clean units: 15 lbs. (6.8 Kg.)		

Auto-Clean Option

The Q45P/R Auto-Clean System is designed to extend sensor cleaning intervals on pH and ORP sensors that are mounted in applications containing high levels of solids contamination. The Auto-Clean System uses high pressure air to remove contaminants from the face of the sensor automatically.

Our Auto-Clean System utilizes a self contained compressor and air cylinder to generate a series of high pressure air blasts. Each cleaning cycle lasts approximately 2 minutes, during which the monitor outputs are placed in a HOLD condition to prevent false readings or alarms.

The concentration of solids in the process will determine the cleaning frequency of the system. The user can vary the cleaning cycle frequency from as often as once every two hours to as little as once a day.

Although the Q45A Auto-Clean System can greatly extend sensor cleaning intervals, the user must still clean and calibrate the sensor at some interval. For a typical pH or ORP measurement in wastewater treatment, the system can extend weekly cleaning intervals to once every three months. Cleaning systems are not suitable for removing hard scale such as that caused by lime.



Auto-Clean Monitor



Auto-Clean Sensor

Standard Sensor Compatibility

The Q45P/R monitors can be easily configured to accept the input from a traditional combination sensor. For applications where a specialty sensor is required, ATI offers a line of standard sensors to meet your needs.

The unique "Lock-N-Load" system is pipe mounted and provides quick and easy isolation of the sensor from a flowing stream. The self-sealing sensor holder allows the sensor to be removed for maintenance without shutting down the process stream.

For high purity water (conductivity below 20 microSiemens), a special sensor is used in conjunction with a stainless steel flow assembly. This system is designed to minimize interference (noise, streaming potentials, CO₂, etc.) and provide a stable pH measurement.

Sensor Features

Differential-Style Sensor: The reference element is a second glass pH electrode immersed in a reference buffer solution. This glass reference system allows the sensor to be used in applications that poison conventional pH sensors.

Peek® Sensor Body Construction: All structural components are made of PEEK®, a high performance thermoplastic that provides outstanding mechanical strength and chemical resistance.

Replaceable Sensor Saltbridge: A large volume, dual junction saltbridge is used to maximize the in-service time of the sensor. The replaceable saltbridge allows for easy and inexpensive sensor regeneration.

Sensor Diagnostics: Sensor diagnostics are used to alarm the user in the event of electrode breakage, loss of sensor seal integrity, or integral temperature sensor failure.

Multiple Sealing Materials: Multiple sealing materials are used to preserve sensor integrity over a wide range of chemical processes and varying temperatures.

Integral Preamplifier: The integral preamplifier is encapsulated in the body of the sensor. This creates a low impedance signal output which ensures stable readings in harsh environments, and maximizes the distance between sensor and analyzer.

Monitor Features

Loop-powered, AC, or Battery Versions: This line of microprocessor based instrumentation allows for easy implementation of loop-powered, line-powered, or battery-powered capability within the same instrument. It can be rapidly converted between any of these versions with no requirement for software change

- Loop-powered (16-35 VDC) transmitter, 4-20 mA output
- Line-powered (115/230 VAC) analyzer, dual relays, dual 4-20 mA outputs
- Battery-powered (9 VDC) monitor/data logger, dual 0-2.5 VDC outputs

Sensor Compatibility: Q45 Monitors can accept standard pH sensor inputs, allowing easy upgrade for existing installations.

Dual Alarm Relays/Analog Outputs: AC operated systems provide two relays that are configurable for control, alarm or timer mode of operation.

Diagnostic Messaging: Diagnostic messages provide a clear description of system condition, which eliminates confusing error codes that are difficult to decipher.

Flexible Calibration: Two-point and sample calibration options include auto-buffer recognition for 13 built-in buffer tables. Manual override of the automatic buffer values allows for user to customize values. All calibration methods include stability monitors to check temperature and main parameter stability before accepting data.

Standard PID Output: A PID control output is standard in every Q45 pH or ORP monitor, with control parameters easily user configurable.

Ordering Information: Model Q25-A-B-C Differential Sensor

Suffix A - Electrode Type

- P1 - pH: industrial glass
- P2 - pH: municipal glass
- P3 - pH: antimony metal (HF applications only)
- R1 - ORP: platinum metal
- R2 - ORP: gold metal

Suffix B - Sensor Style

- 1 - 1" NPT convertible-style, PEEK
- 2 - Insertion-style, 316SS
- 3 - 1-1/2" sanitary-style, 316SS
- 4 - 2" sanitary-style, 316SS
- 5 - Auto-Clean

Suffix C - Sensor Cable Length

- 1 - 15 feet
- 2 - 30 feet
- 9 - Special

OPTIONS:

- 05-0057 P1/P3/ORP sensor regeneration kit
- 05-0067 P2 sensor regeneration kit
- 09-0034 pH 4.00 buffer, 1,000 mL
- 09-0035 pH 7.00 buffer, 1,000 mL
- 09-0036 pH 10.00 buffer, 1,000 mL
- 09-0045 pH 6.87 buffer, 500 mL
- 09-0037 pH 9.18 buffer, 500 mL
- 09-0042 200 mV solution, 500 mL
- 09-0043 600 mV solution, 500 mL
- 05-0056 Quinhydrone powder, 5 grams

Ordering Information: Model Q45-A-B-C pH/ORP Monitor

Suffix A - Measurement Type

- P - pH
- R - ORP

Suffix B - Power

- 1 - 24 VDC, 2-wire (single output only)
- 2 - 115 VAC with 2 relays
- 3 - 230 VAC with 2 relays
- 4 - Battery operated with two 0-2.5 VDC outputs
- 5 - Battery operated with internal data-logger
- 6 - Auto-Clean, 115 VAC
- 7 - Auto-Clean, 230 VAC

Suffix C - Heater (for Auto-Clean only)

- 1 - None
- 2 - Heater/thermostat

Options:

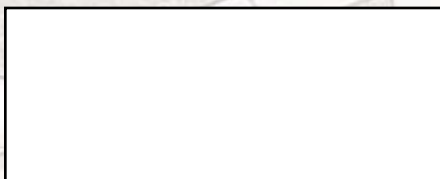
- 07-0100 Junction box
- 31-0057 Sensor interconnect cable
- 07-0202 Submersion mounting hardware
- 47-0005 2" U-bolt, 304SS
- 05-0068 Panel mount bracket kit

Notes

1. All sensor cable lengths greater than 30 feet requires a junction box (07-0100) and sensor interconnect cable (31-0057)
2. PEEK sensor body is only available in convertible style.
3. Pipe mount requires two 2" U-bolts (47-0005).
4. Panel mount requires bracket (05-0068).



Represented By:

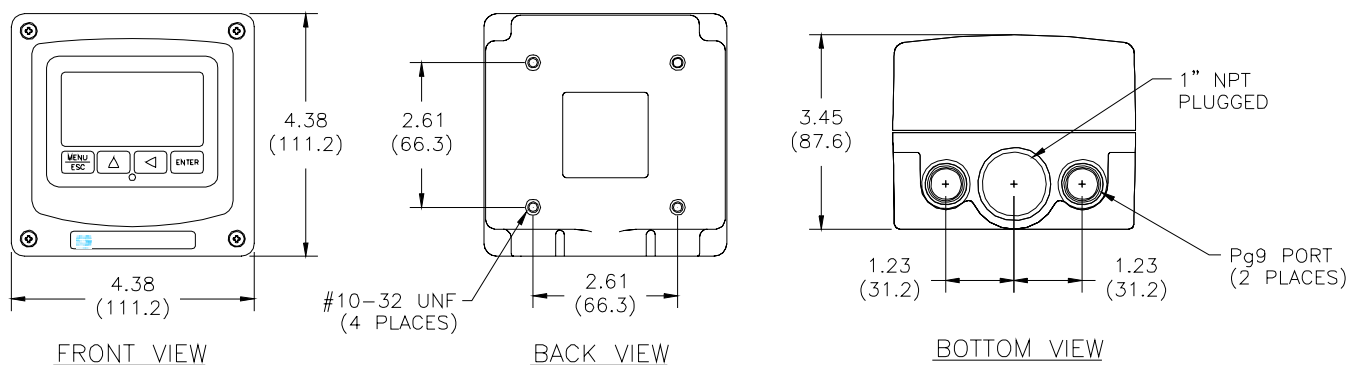


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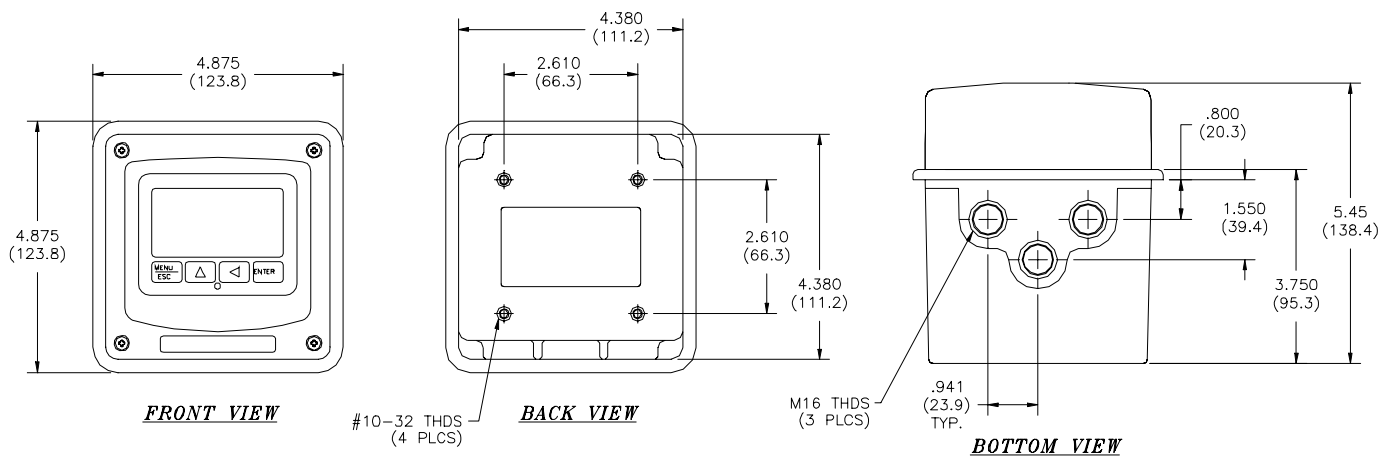
2-WIRE VERSION (or BATTERY POWERED)



NOTE: JUNCTION BOXES HAVE SAME DIMENSIONS AS 2-WIRE TRANSMITTER

ATI-0655

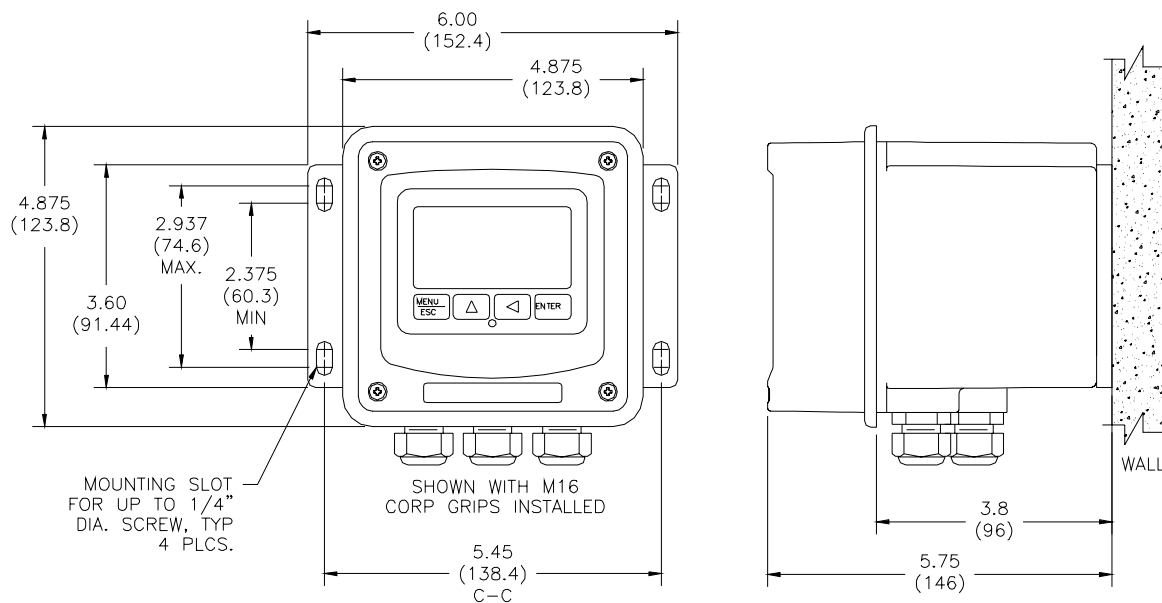
AC POWERED VERSION



Material: Polycarbonate
Ratings: Nema 4X (IP-66)
V-0 Fire Retardant

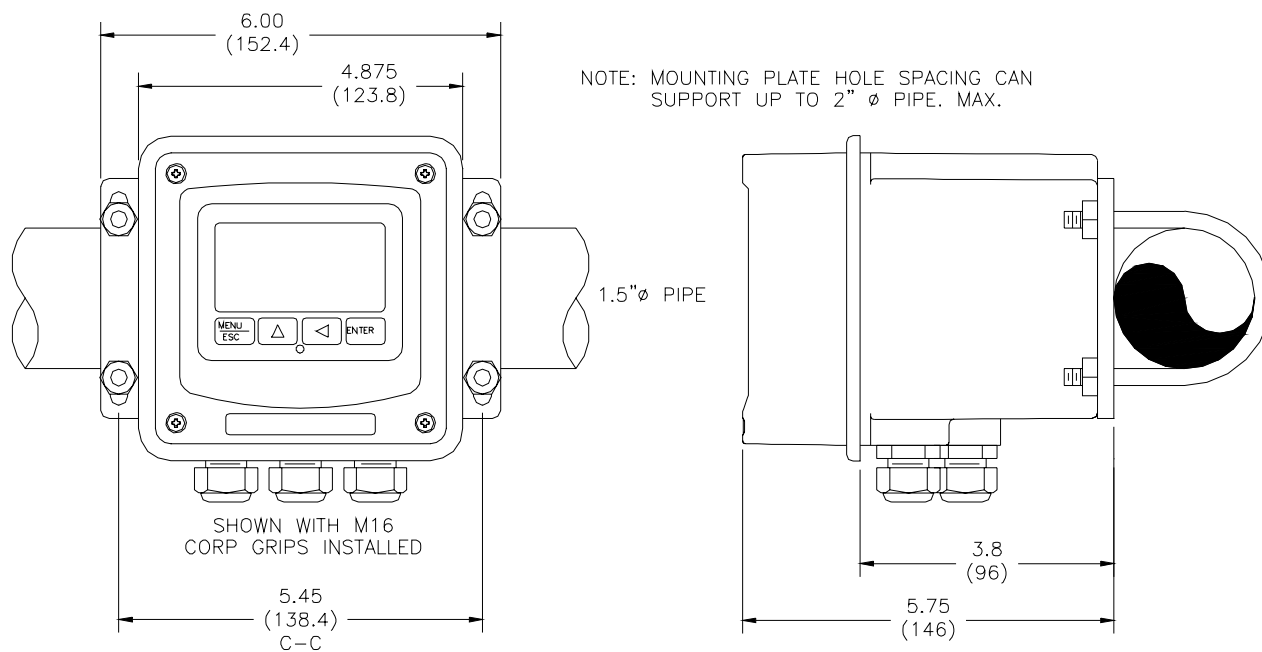
ATI-0706

WALL MOUNTING



ATI-0709

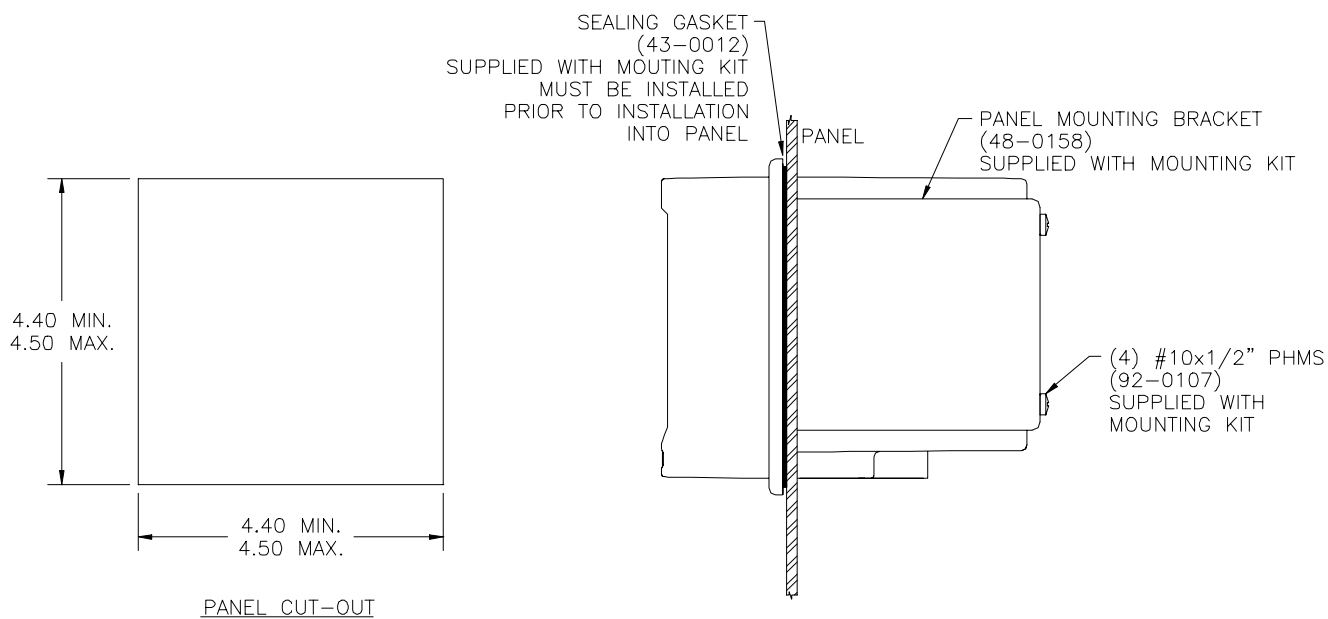
PIPE MOUNTING



NOTE: PLATE MAY BE TURNED 90° FOR VERTICAL PIPE MOUNTING

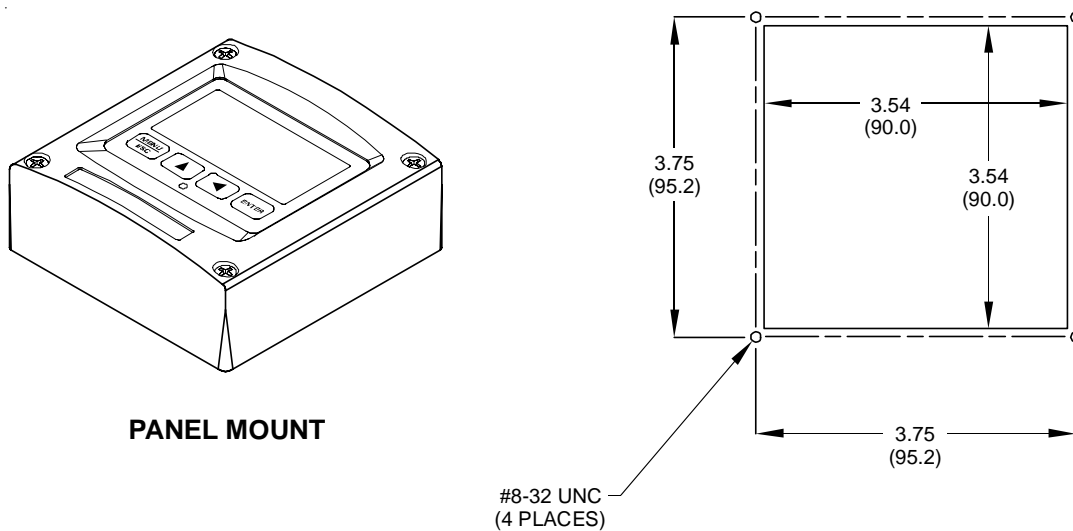
ATI-0710

PANEL MOUNTING - AC UNITS



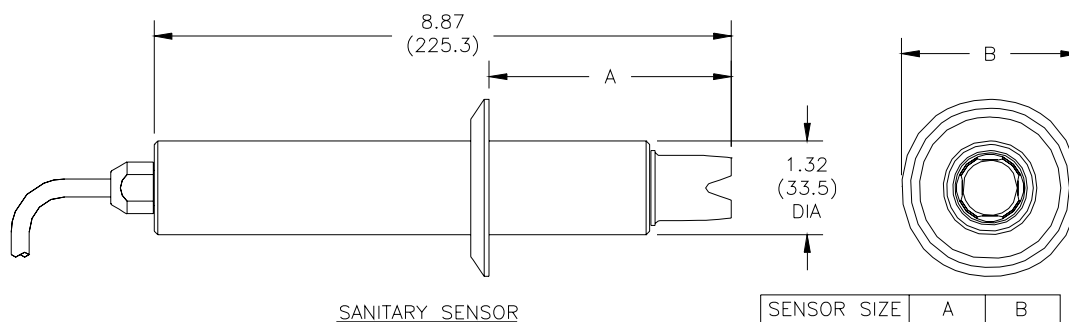
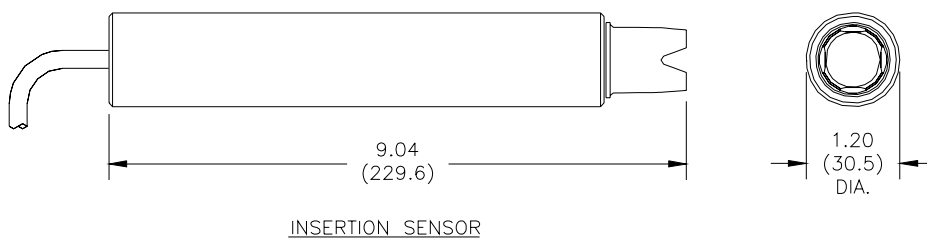
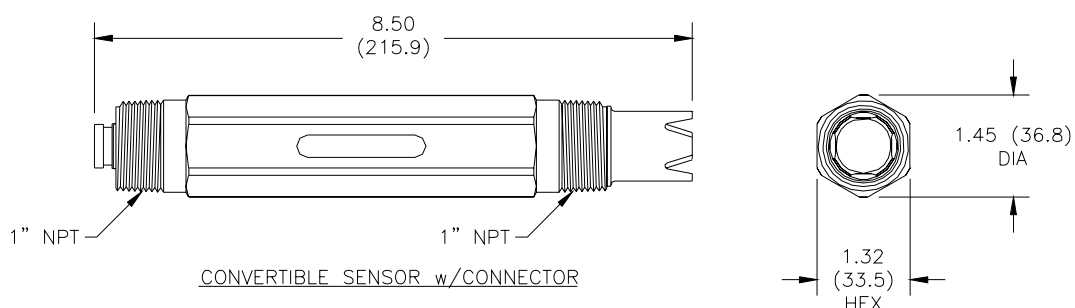
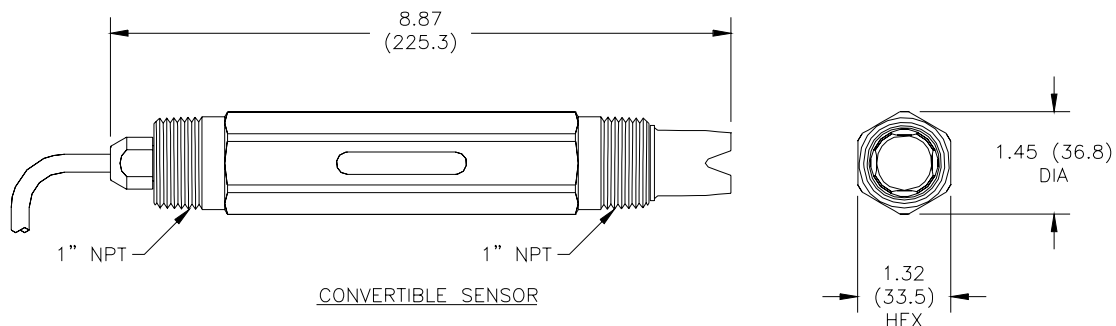
ATI-0711

2-WIRE FLUSH MOUNT



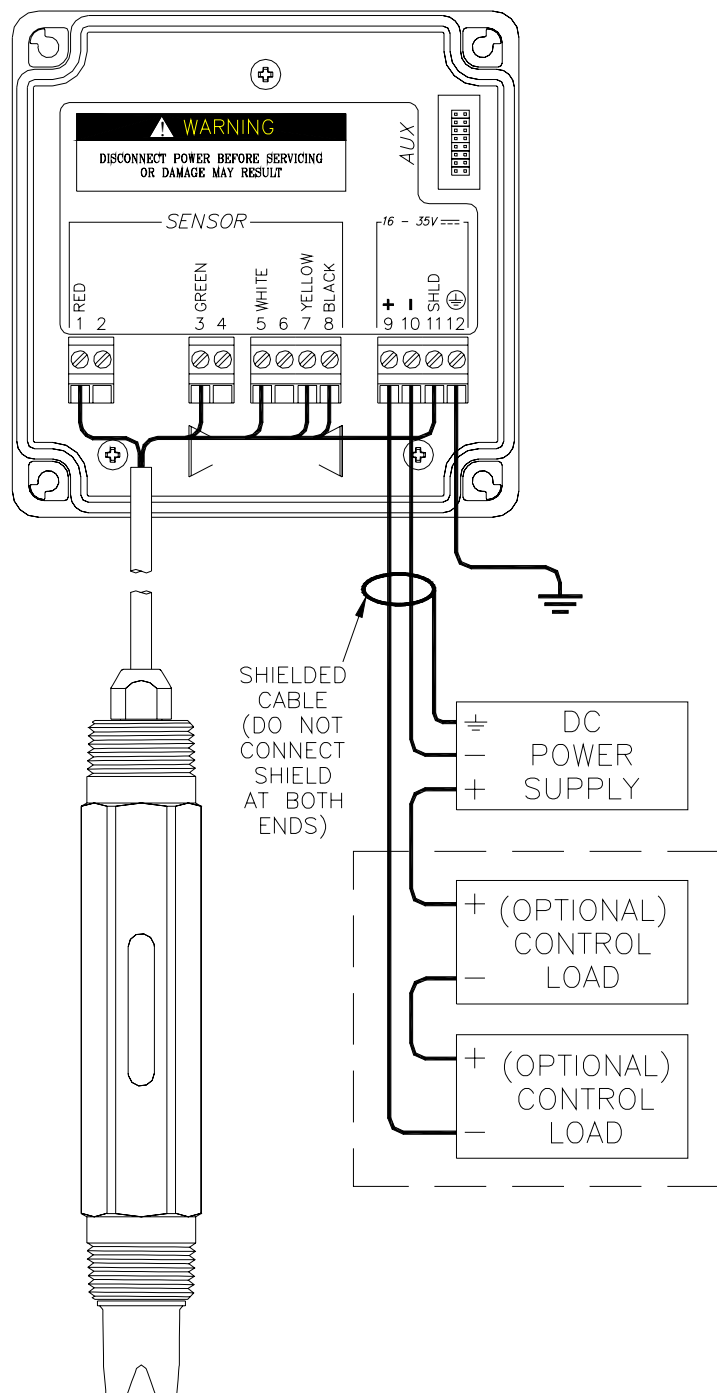
ATI-0611

Q25 pH/ORP SENSOR DIMENSIONS



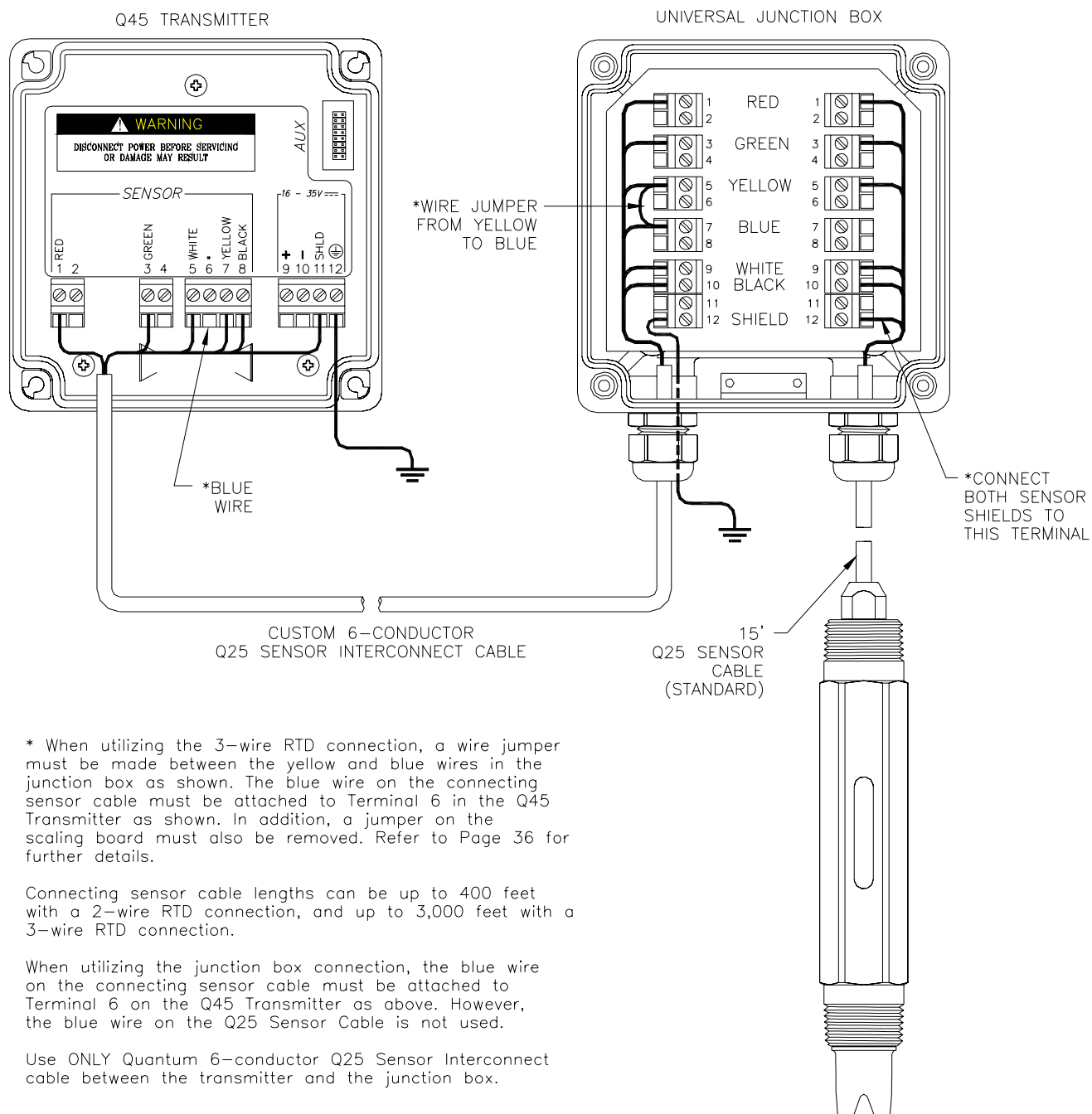
SENSOR SIZE	A	B
1-1/2"	2.75 (70.0)	1.98 (50.4)
2"	3.50 (88.9)	2.50 (63.5)

ELECTRICAL CONNECTIONS - 2-WIRE TRANSMITTER



- NOTES:** 1. Voltage between Terminals 9 & 10 **MUST** be between 16 & 35 VDC.
 2. Earth ground into Terminal 12 is **HIGHLY** recommended. This connection can greatly improve stability in electrically noisy environments.

ELECTRICAL CONNECTIONS - 2-WIRE WITH JUNCTION BOX



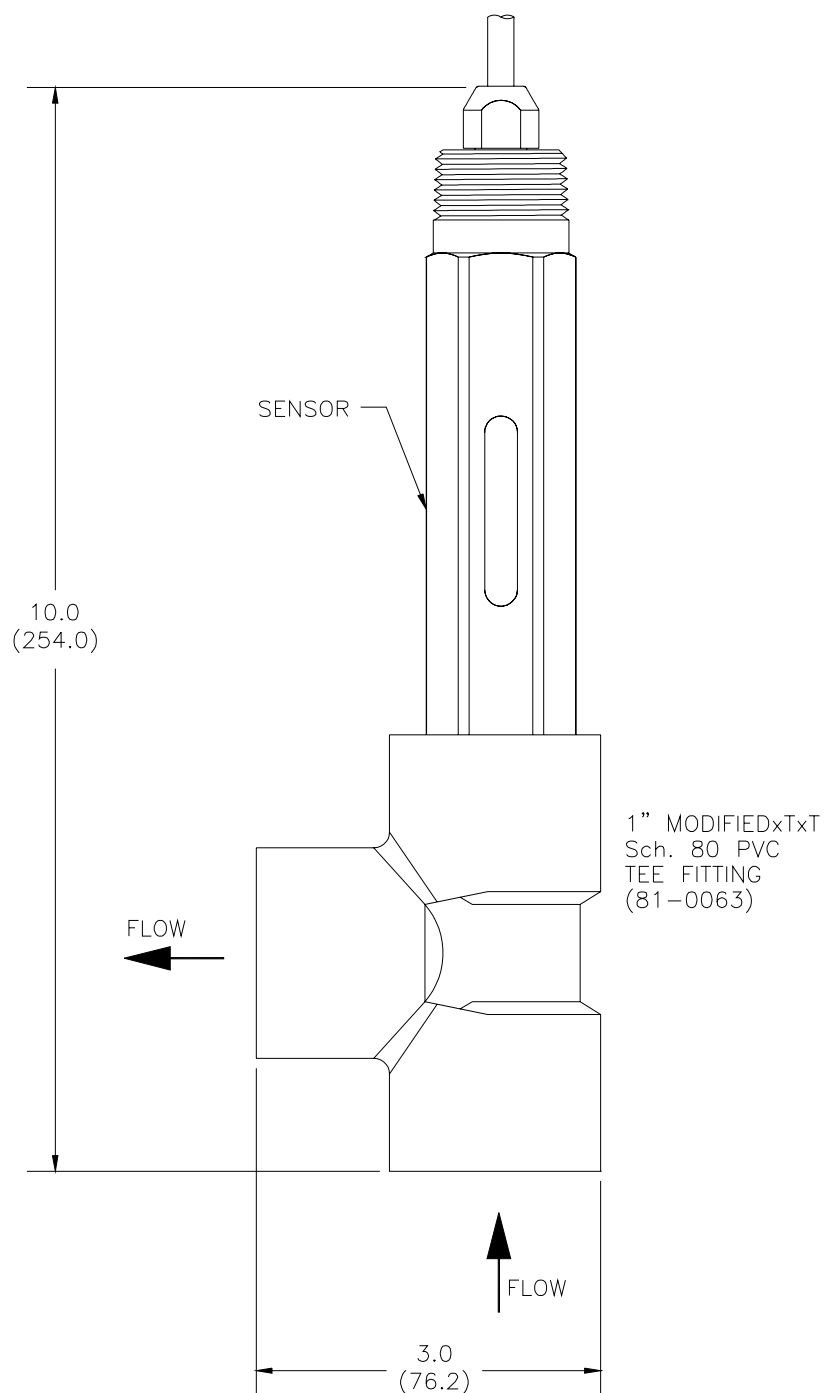
* When utilizing the 3-wire RTD connection, a wire jumper must be made between the yellow and blue wires in the junction box as shown. The blue wire on the connecting sensor cable must be attached to Terminal 6 in the Q45 Transmitter as shown. In addition, a jumper on the scaling board must also be removed. Refer to Page 36 for further details.

Connecting sensor cable lengths can be up to 400 feet with a 2-wire RTD connection, and up to 3,000 feet with a 3-wire RTD connection.

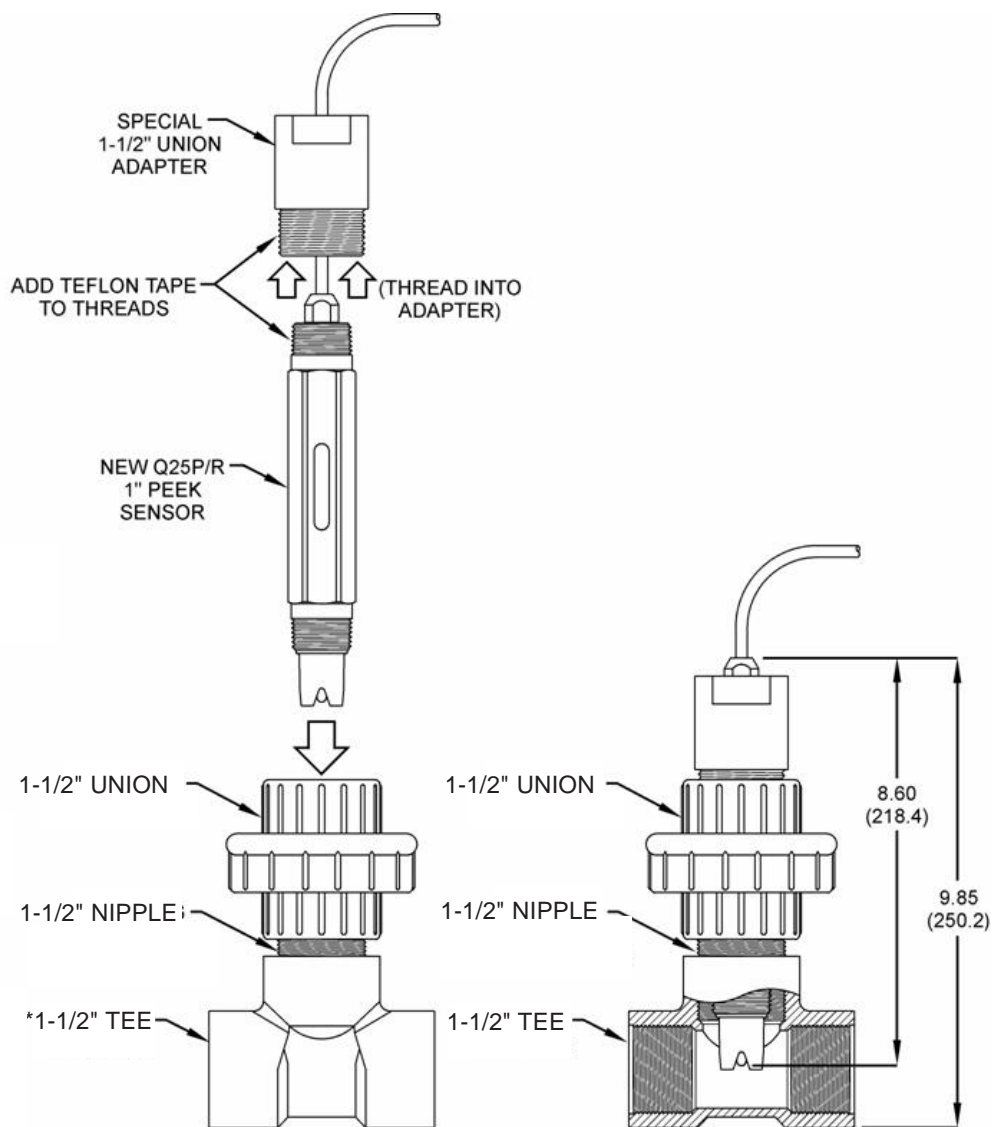
When utilizing the junction box connection, the blue wire on the connecting sensor cable must be attached to Terminal 6 on the Q45 Transmitter as above. However, the blue wire on the Q25 Sensor Cable is not used.

Use ONLY Quantum 6-conductor Q25 Sensor Interconnect cable between the transmitter and the junction box.

FLOW TEE DETAIL

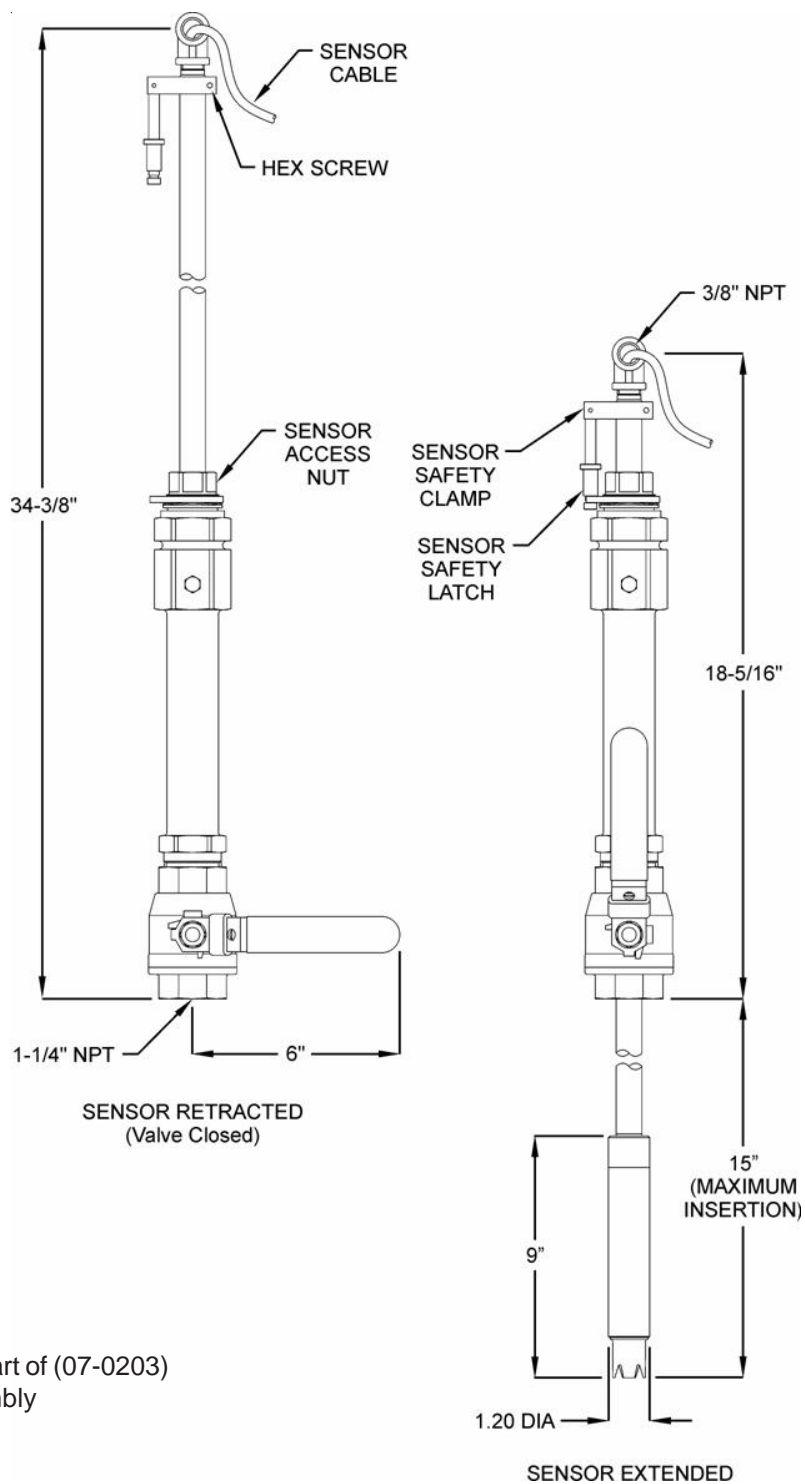


1-1/2" UNION DETAIL - (07-0221)



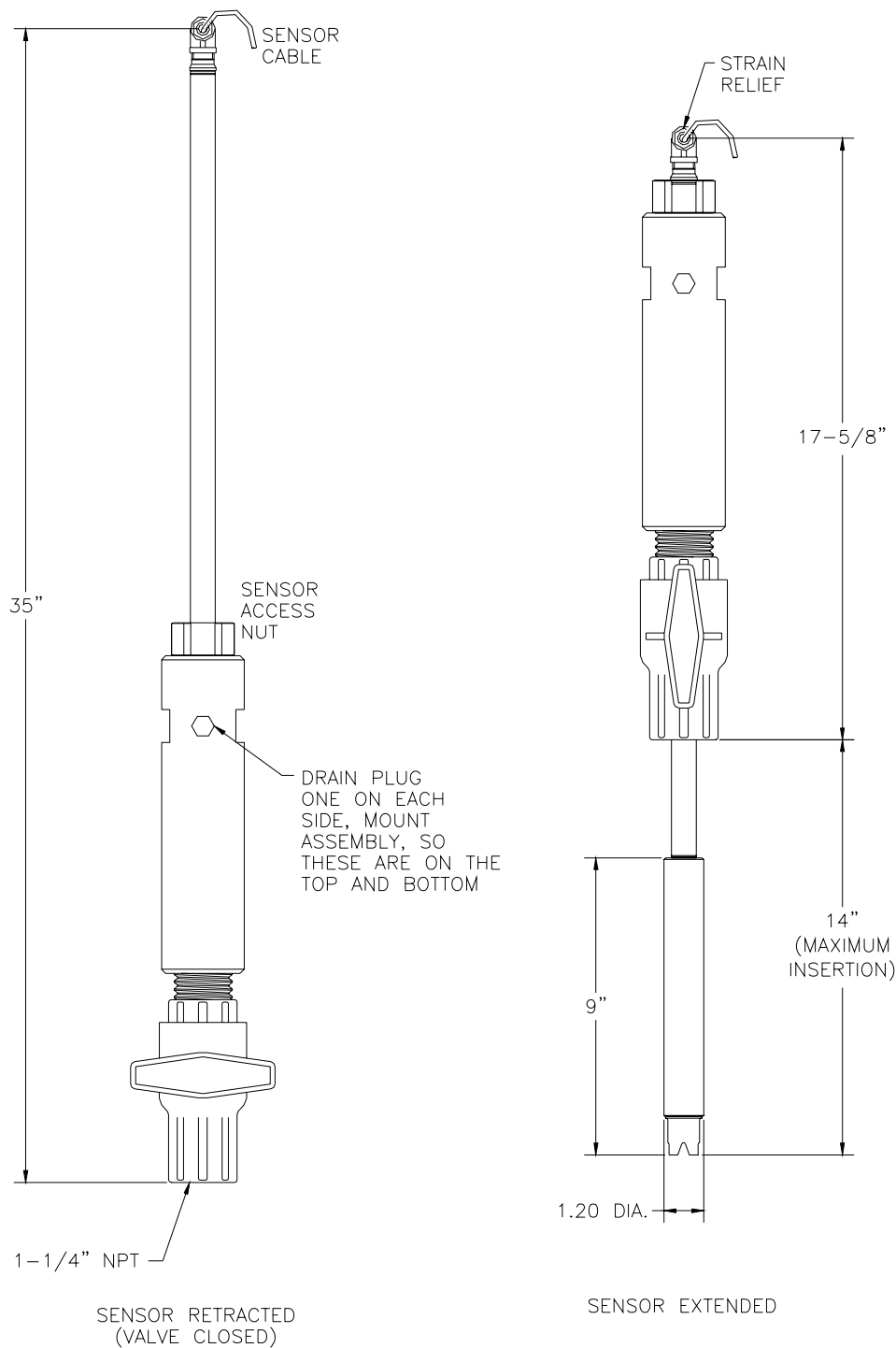
* 1-1/2" TEE Fitting not supplied with P/N (07-0221). Tee Fitting must be ordered Separately

INSERTION ASSEMBLY DETAIL (07-0203) - (SS VERSION)



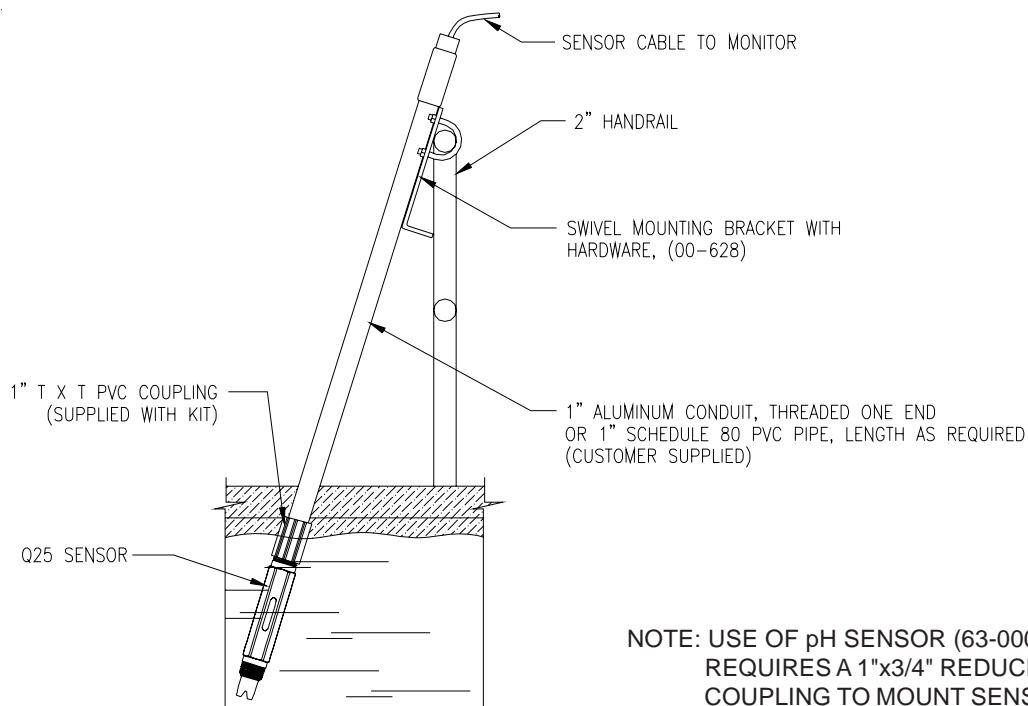
NOTE: Sensor is not part of (07-0203) insertion assembly

INSERTION ASSEMBLY DETAIL (07-0223) - (CPVC VERSION)



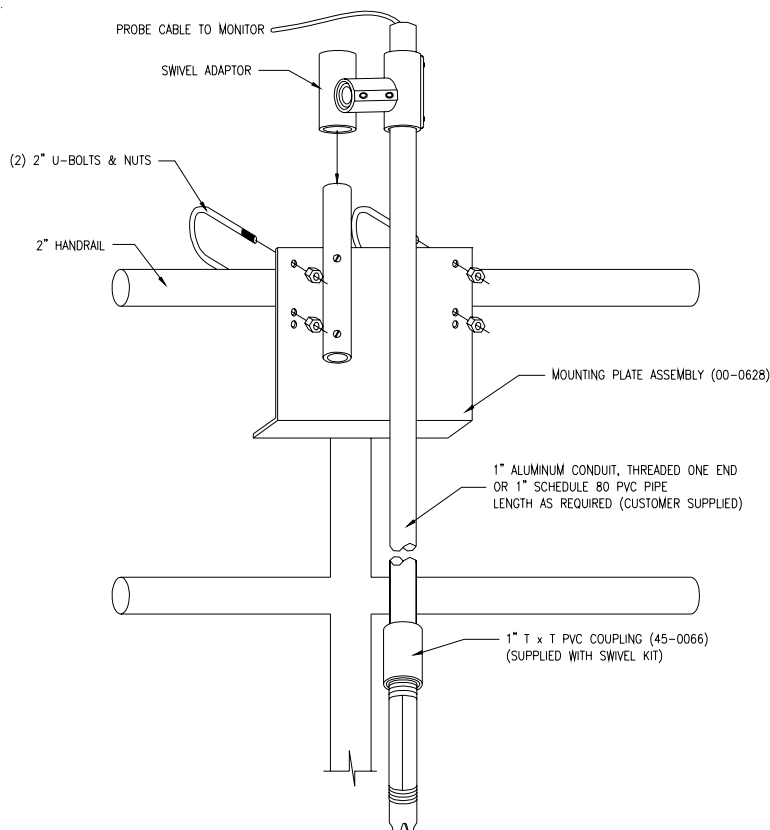
NOTE: Sensor is not part of (07-0223) insertion assembly

SUBMERSION SENSOR DETAIL



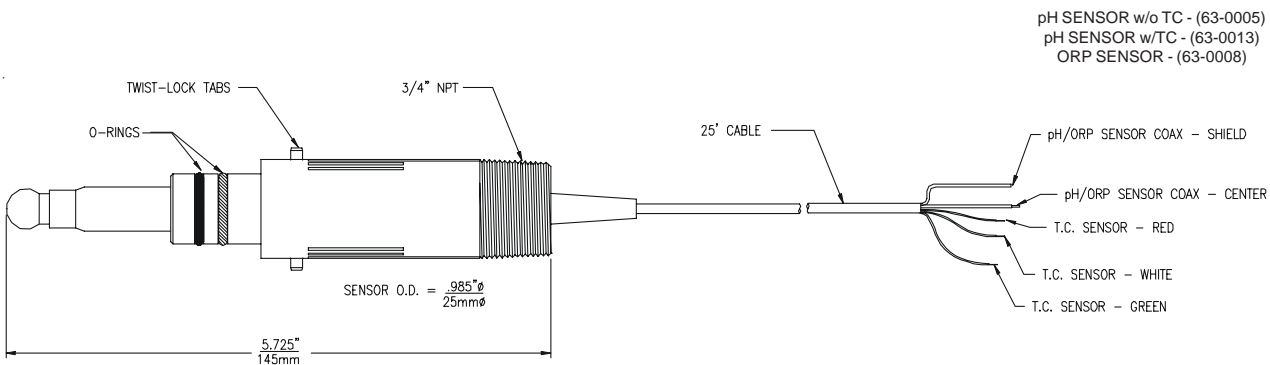
NOTE: USE OF pH SENSOR (63-0009) REQUIRES A 1"x3/4" REDUCING COUPLING TO MOUNT SENSOR TO CONDUIT (CUSTOMER SUPPLIED)

ATI-0728



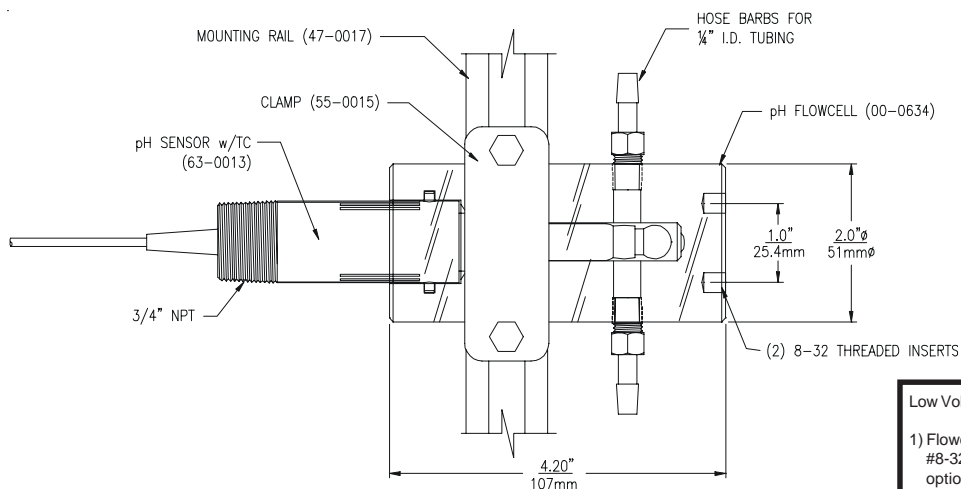
ATI-0729

FLOW SENSOR DIMENSIONS



ATI-0313

LOW VOLUME FLOWCELL INSTALLATION

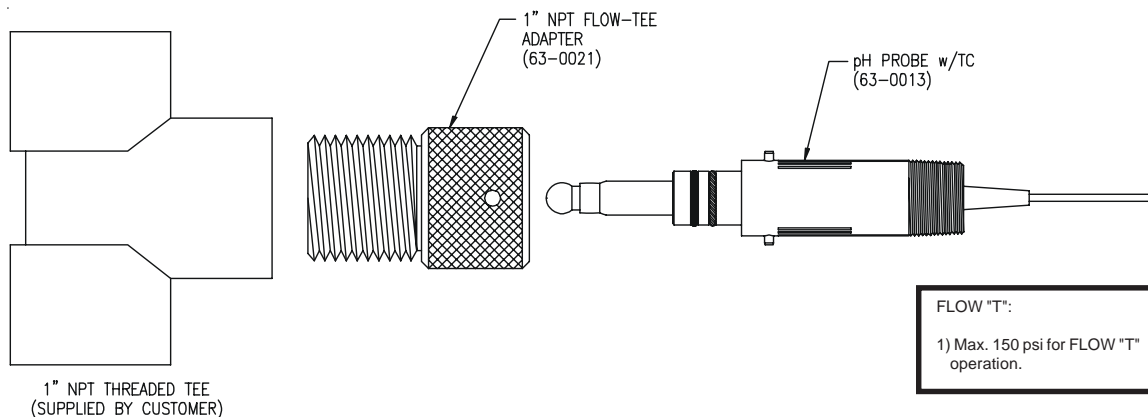


ATI-0306

Low Volume Flowcell:

- 1) Flowcell may be mounted using #8-32 inserts on bottom or with optional rail and clamp.
- 2) Material: Clear Acrylic

FLOW "T" INSTALLATION

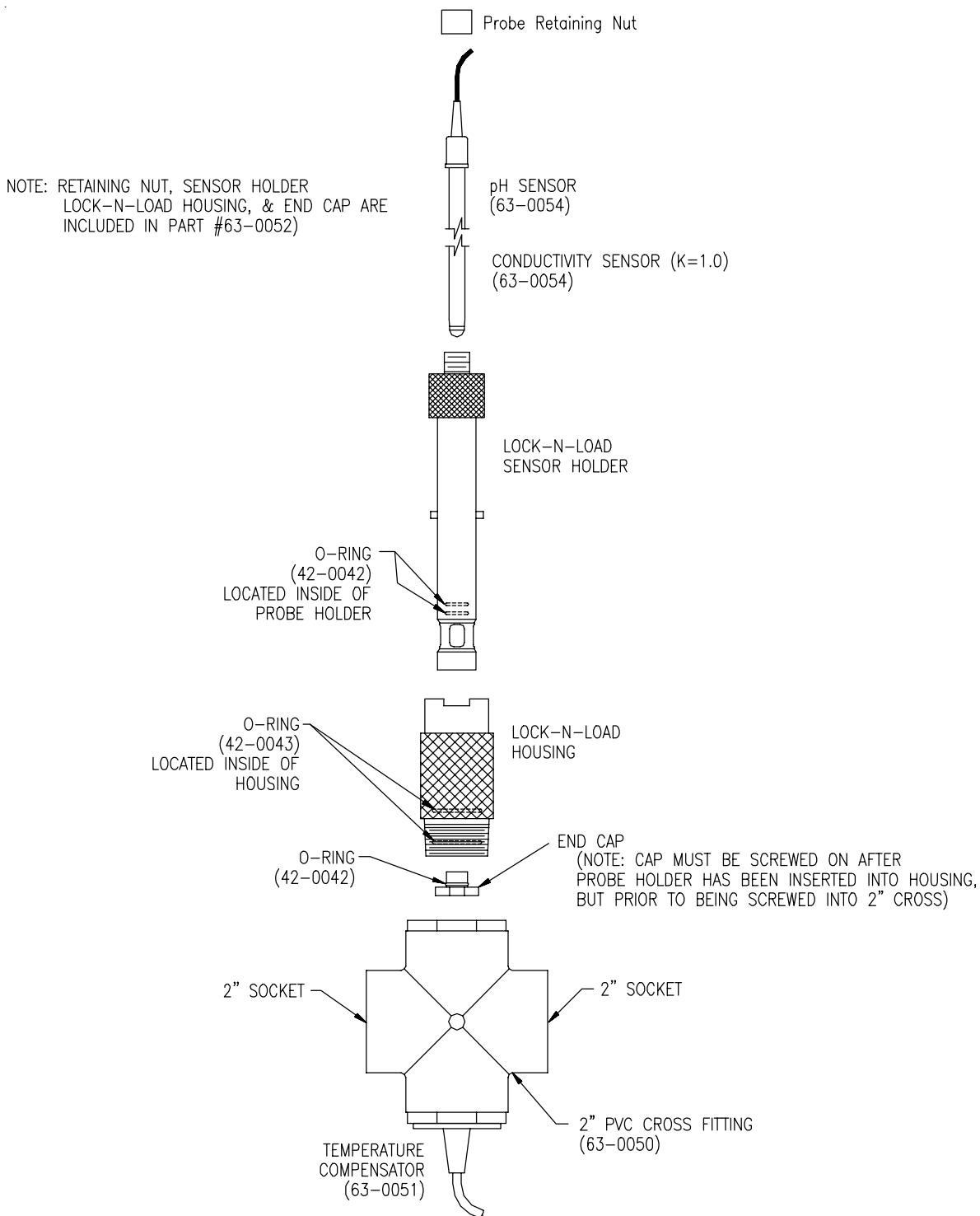


FLOW "T":

- 1) Max. 150 psi for FLOW "T" operation.

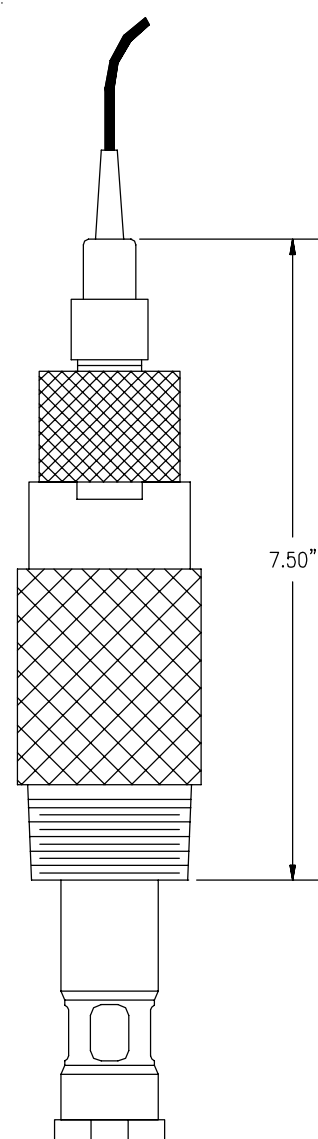
ATI-0333

LOCK-N-LOAD SENSOR (EXPLODED VIEW)

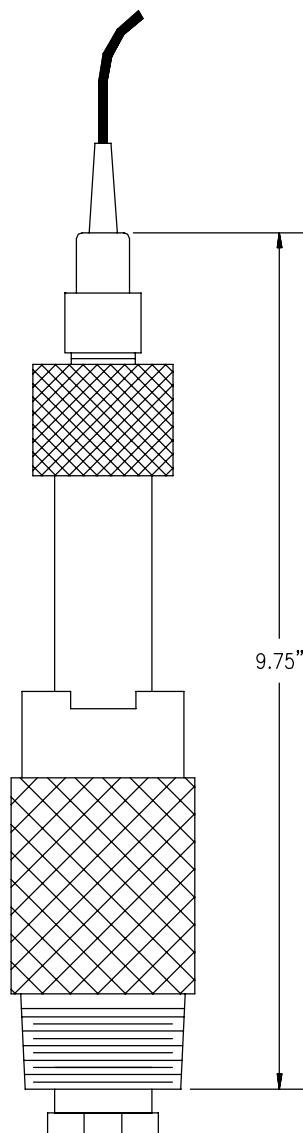


ATI-0622

LOCK-N-LOAD SENSOR (OPERATIONAL DIAGRAMS)



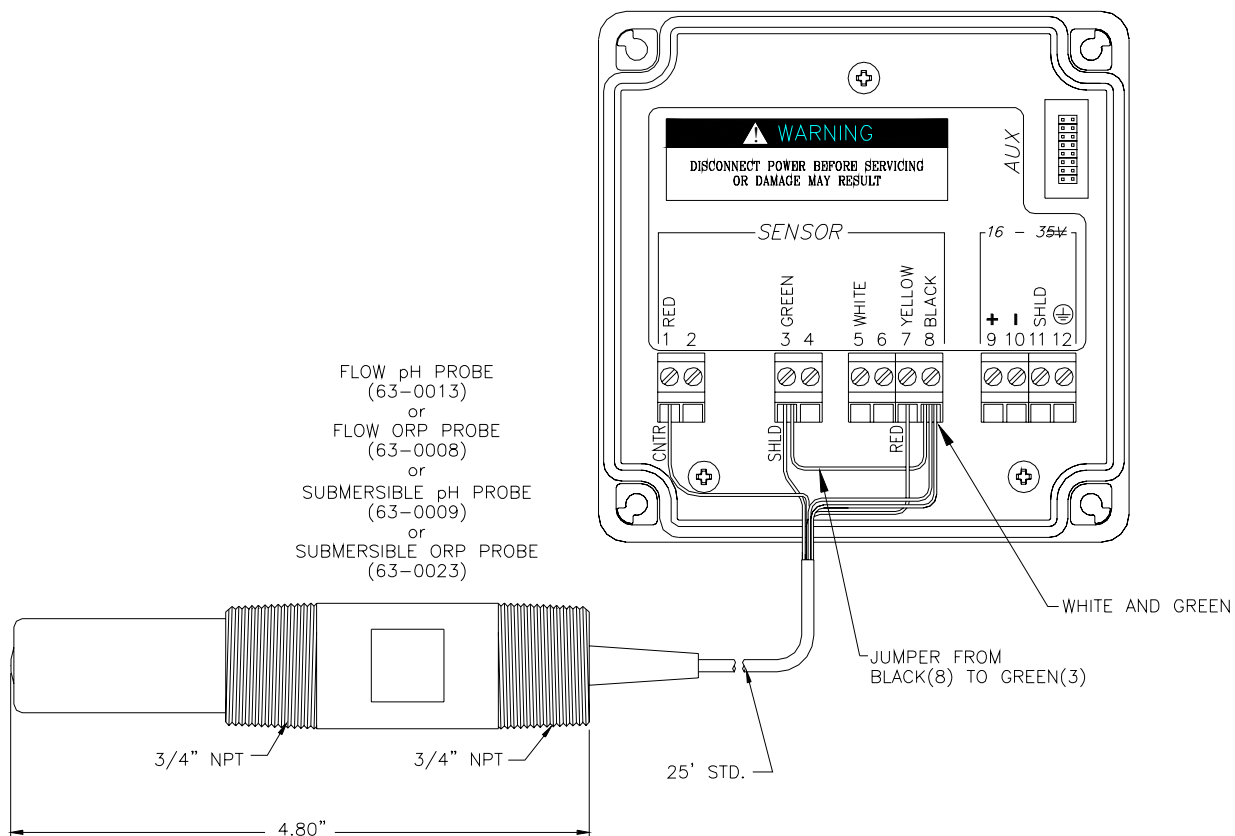
OPERATIONAL POSITION



MAINTENANCE POSITION

ATI-0626

SENSOR CONNECTION (COMBINATION ELECTRODE)

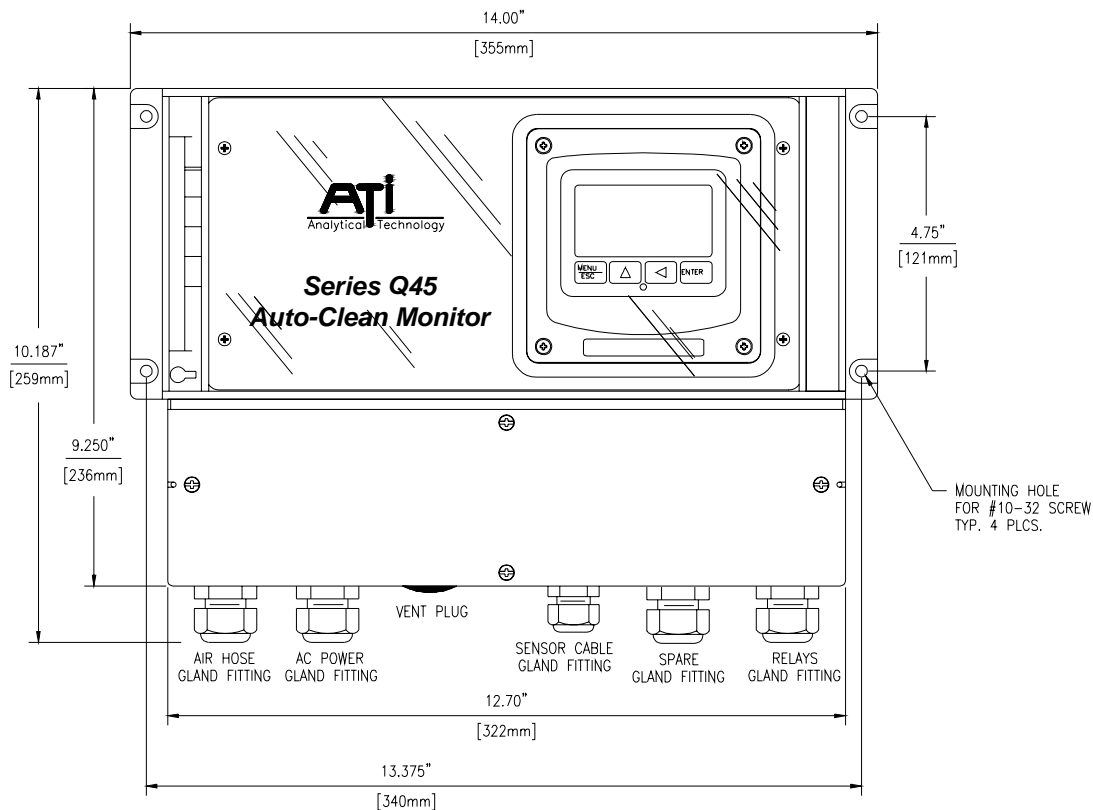


FOR OTHER COMBINATION ELECTRODES, CONNECT AS FOLLOWS:

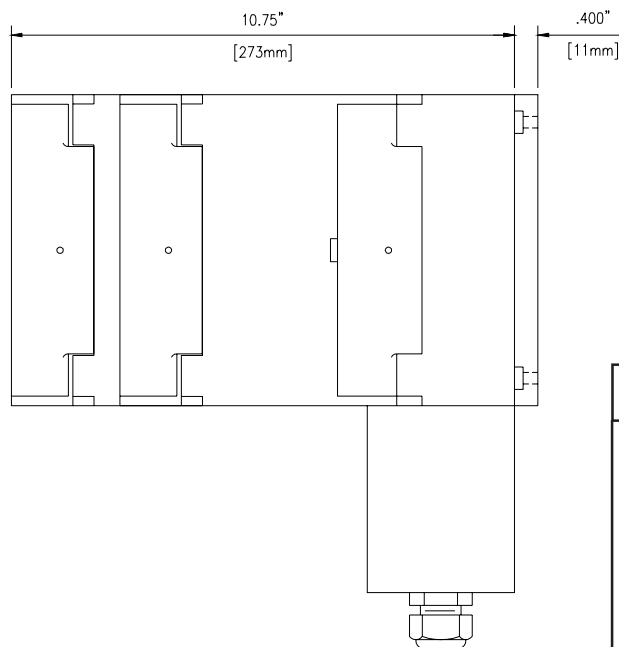
- Terminal 1 - Glass Electrode
- 3 - Reference Electrode
- 7 - PT100 or PT1000 Temp. Element
- 8 - PT100 or PT1000 Temp Element

NOTES: 1. Terminals 3 and 8 **MUST** be connected with jumper wire.
2. ORP sensors **DO NOT HAVE** T/C connections.

Q45P/R AUTO-CLEAN pH/ORP MONITOR



FRONT VIEW

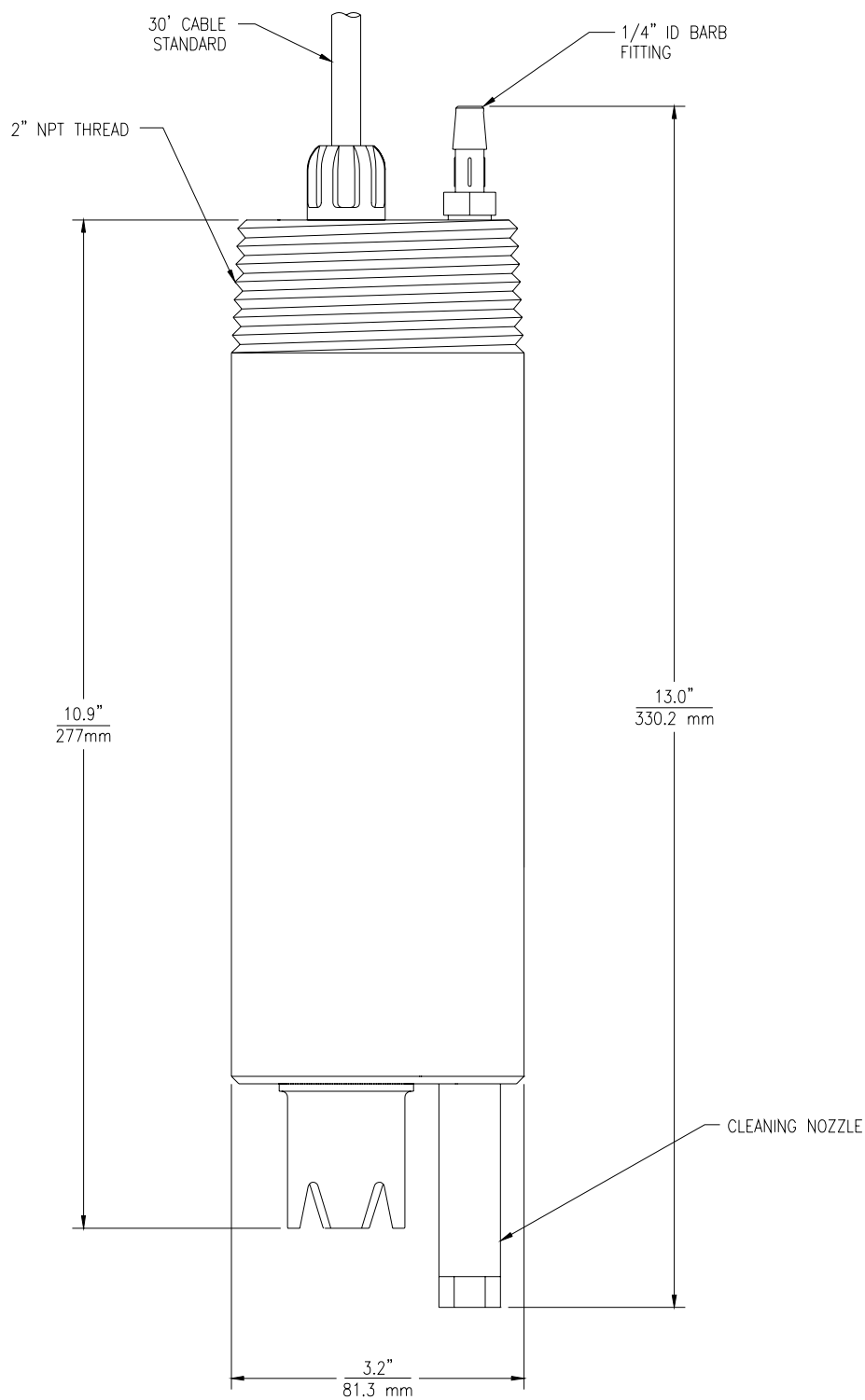


SIDE VIEW

NOTES

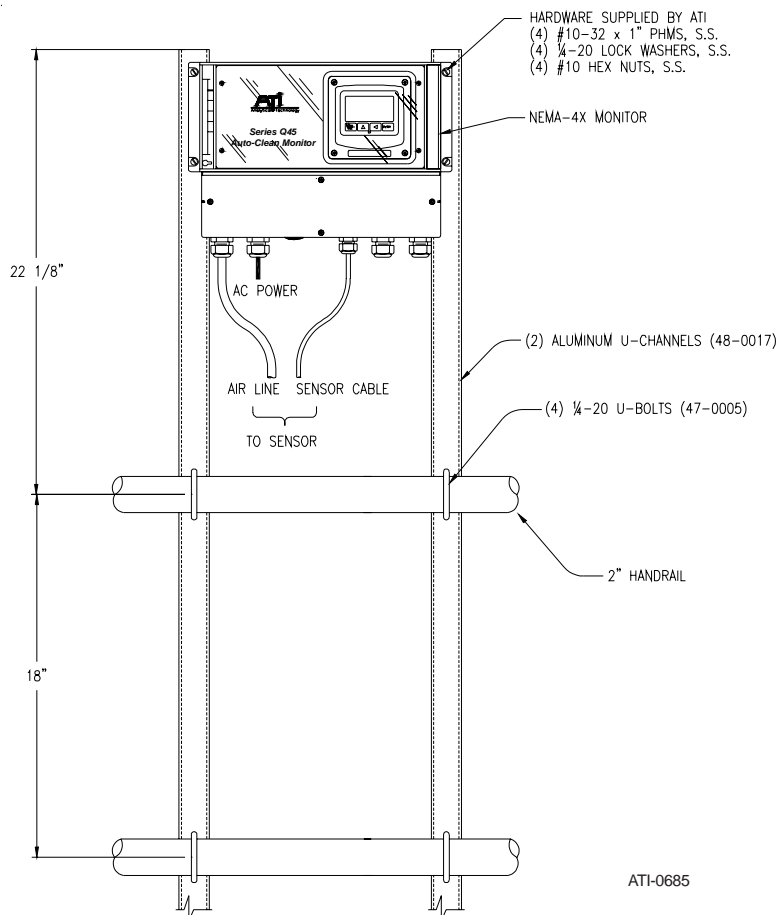
- 1) Nema-4X Enclosure Material:
Base: Molded ABS, Tan in Color
Cover: Clear Lexan w/Dual Hinge
- 2) Nema-4X Rating:
Nema rated types 4, 4X
IEC 529 rated IP66
- 3) Sensor Material:
Noryl EN265 & Stainless Steel

30' AUTO-CLEAN pH SENSOR (07-0127), 30' ORP (07-0129)



ATI-0734

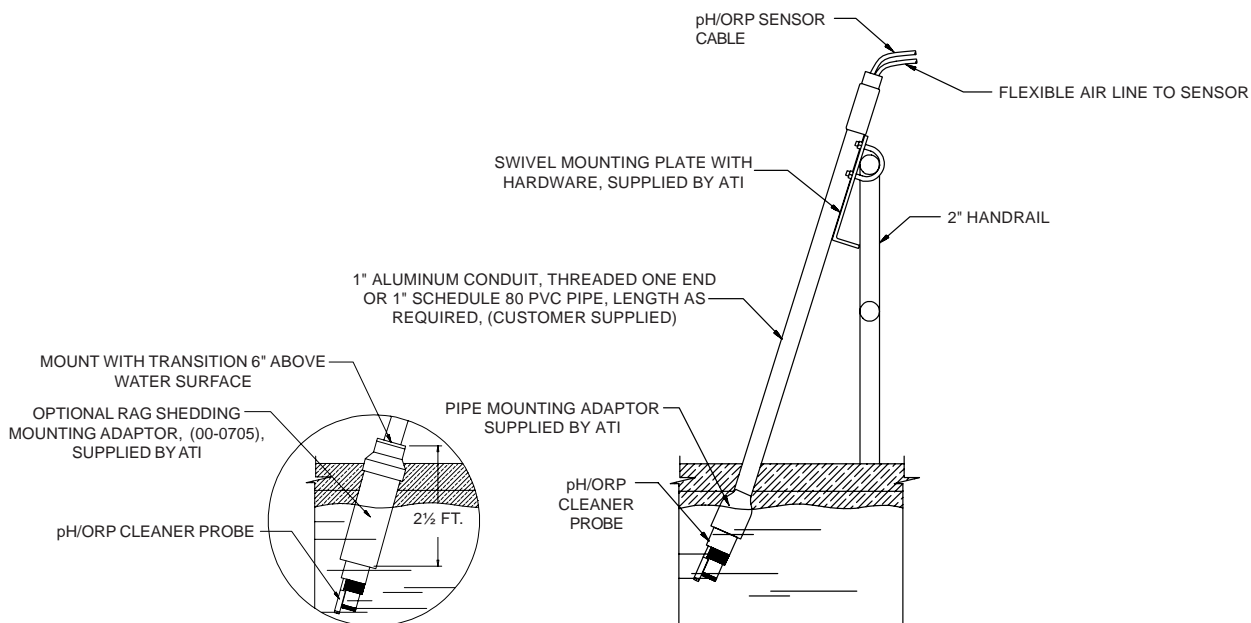
MONITOR HANDRAIL INSTALLATION



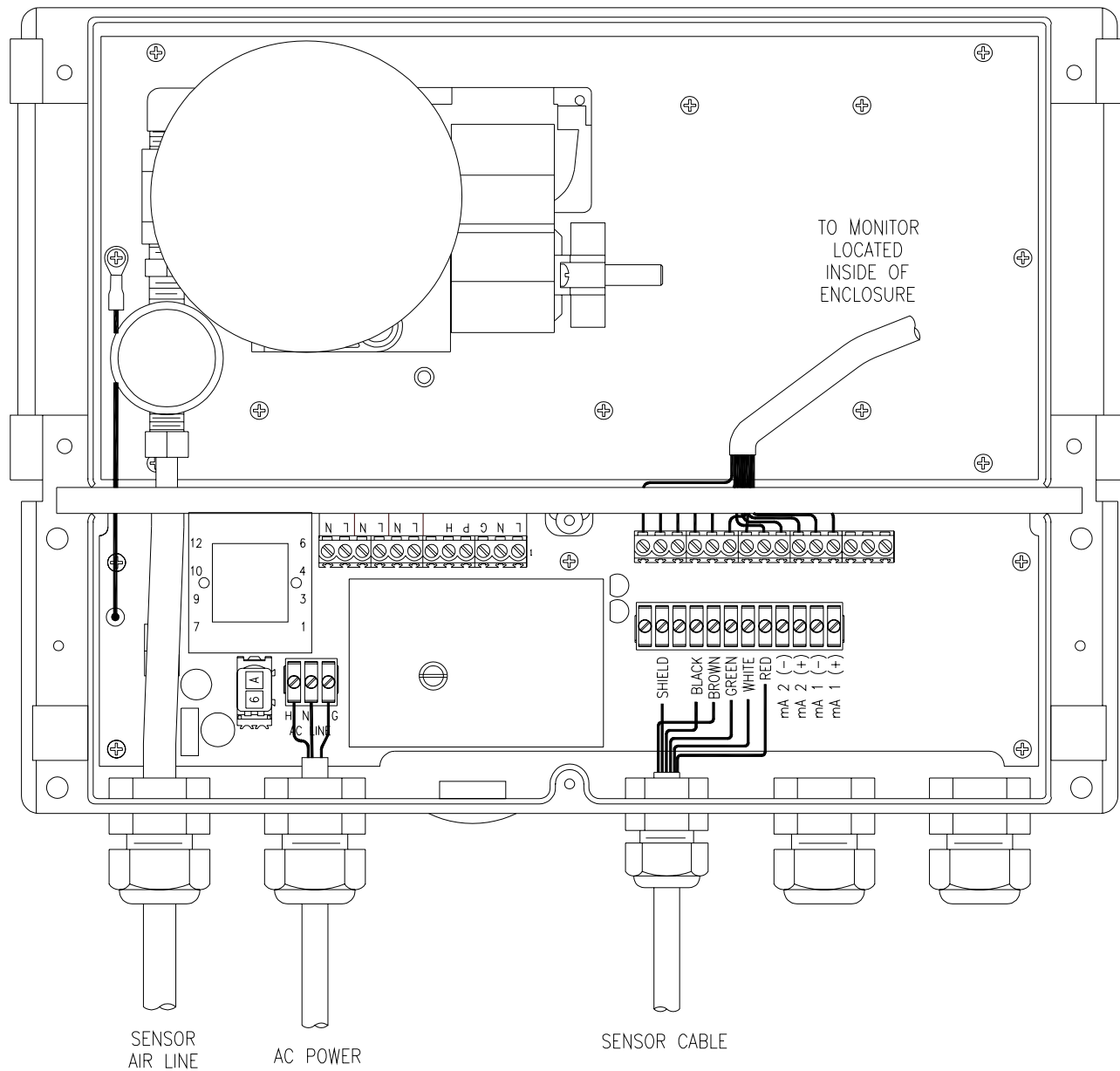
NOTES

- 1) Always mount sensor cleaner within 25 ft. of sensor if possible. Maximum air line distance is 50 ft.
- 2) Sun shade over monitor is recommended in hot climates.
- 3) Monitor Handrail Mounting Kit # 00-0930 supplies all hardware listed for mounting monitor.
- 4) Wall mounting requires customer supplied screws or bolts.
- 5) Sensor Pipe Mounting Kit # 00-0624 supplies mounting plate with hardware and PVC pipe mounting adaptor.
- 6) Sensor Pipe Mounting Kit with Rag Shedder # 00-0629 supplies mounting plate with hardware and PVC rag shedder.

SENSOR HANDRAIL INSTALLATION



STANDARD SYSTEM WIRING DIAGRAM



ATI-0733