SECTION A

Foreword

Scope

This section contains the Installation instructions for the American Level Instruments Phoenix Model 32E Two-Wire HART® Smart Continuous Level Transmitter. Since it is impossible to cover all sensor/systems configurations, only the most common are discussed in this document. The user is encouraged to contact an authorized American Level Instrument Representative for specific situations.

Section Contents

Foreword discusses safety precautions and safety notations as well as other generic information used throughout this manual

Introduction explains the functions and characteristics of the instrument, describes the model number configurations for the instrument and the probe, and documents the performance specifications, as well as, an explanation of the operating principle.

Installation describes the procedure for properly unpacking and installing the transmitter into your vessel.

Safety Precautions

Conventions

The conventions used in this manual follow ANSI Z535.4-2002 for “Product Safety Signs and Labels”. The safety markings in this manual are as follows:

⚠ WARNING — WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION — CAUTION indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. This category also includes potential equipment damage.

Cryogen Safety

Cryogenic liquefied gases are potentially extreme suffocation hazards since a small amount of liquid will vaporize and yield a very large volume of oxygen-displacing gas. Always ensure the location where the cryogen used is well ventilated.

Cryogenic liquids, due to their extremely low temperatures, will burn the skin in a similar manner to hot liquids. Never permit cryogenic liquids to come into contact with the skin or allow them to soak clothing. Serious burns may result from careless handling. Never touch non-insulated pipes or vessels containing cryogenic liquids. Flesh will stick to extremely cold materials. Even nonmetallic materials are dangerous to touch at low temperatures. The vapors expelled during the venting process are sufficiently cold to burn flesh or freeze optic tissues.

Containers of cryogenic liquids are self-pressurizing (as the liquid boils off, vapor pressure increases). Hoses or lines used to transfer these liquids should never be sealed at both ends (i.e. by closing valves at both ends).

The properties of many materials at extremely low temperatures may be quite different from the properties that these same materials exhibit at room temperatures. Exercise extreme care when handling materials cooled to cryogenic temperatures until the properties of these materials under these conditions are known.

Cryogenic storage systems are complex systems with the potential to injure personnel or equipment seriously if not operated according to procedures. Proper use of safety mechanisms (pressure relief valves, rupture disks, etc.) included in the cryostat and top plate assembly are necessary.

Warranty

All products manufactured by American Level Instruments are warranted to be free of defects in materials and workmanship and to perform as specified for a period of one year from date of shipment. In the event of failure occurring during normal use, American Level Instruments, at its option, will repair or replace all products or components that fail under warranty, and such repair or replacement shall constitute a fulfillment of all American Level Instruments liabilities with respect to its products. Since, however, American Level Instruments does not have control over the installation conditions or the use to which its products are put, no warranty can be made of fitness for a particular purpose, and American Level Instruments cannot be liable for special or consequential damages. All warranty repairs are F.O.B. Oak Ridge, Tennessee, USA.

Return Authorization

Items to be returned to American Level Instruments for repair (warranty or otherwise) require a return authorization number to ensure your order will receive proper attention. Please call American Level Instruments for a return authorization number before shipping any items back to the factory.

Introduction

The instructions in this manual pertain to the American Level Instruments Phoenix Model 32E Two-Wire HART® Smart Continuous Level Transmitter. The Phoenix is designed to measure the level of virtually any liquid, slurry, granular material, liquid-liquid interface, and cryogenic fluids.

The Phoenix is available in two different mounting configurations. The first is integral-mounted with the probe (see Photo #1). The second is remote-mounted from the probe, a maximum of 10 feet (Photo #2).

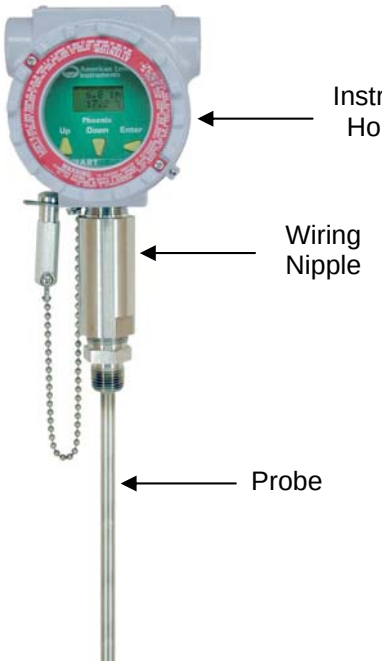


Photo #1

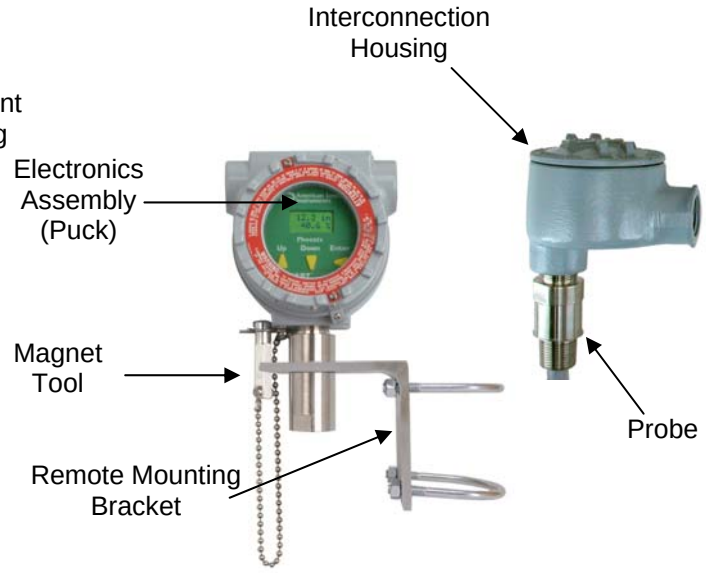


Photo #2

System Description

The Phoenix consists of two distinct parts:

I**nstrument**: This consists of the electronics assembly (puck), a NEMA 4X / 7 explosion-proof enclosure, and an interconnection nipple. The enclosure provides (2) ¾" NPT conduit openings for wiring. The "window" cover allows for viewing of process variables. The included magnet tool provides a way to set-up and calibrate the instrument without removing the cover. Built-in HART Communication is included for remote communication with the Phoenix (See Photo #3).

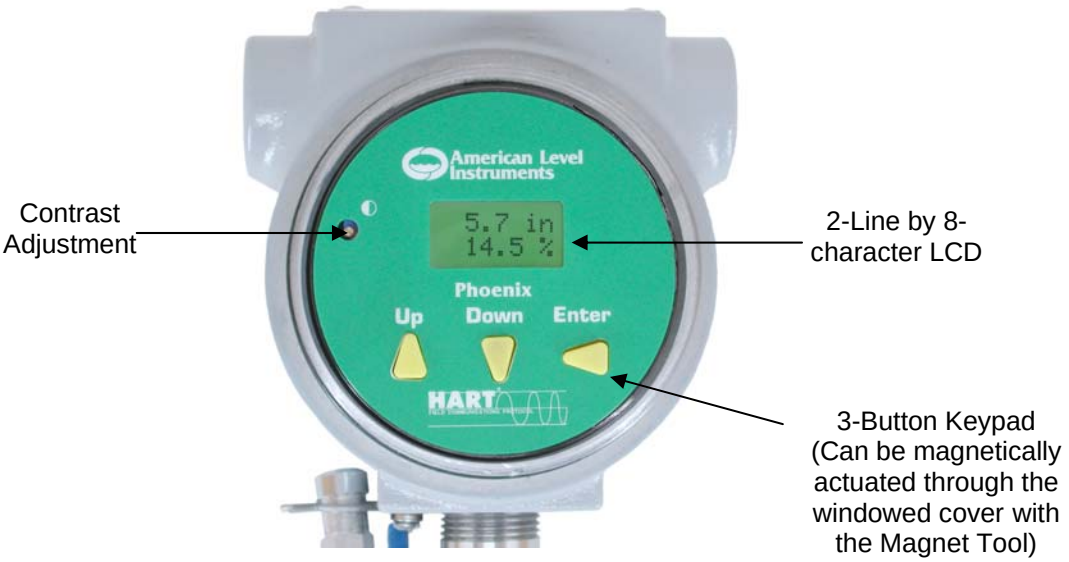


Photo #3

Probe: There is a myriad of probe configurations available for virtually any process level measurement application. A wide variety of threaded and flanged connections is available. In addition, we offer a complete family of construction materials to perform in acidic, caustic, and corrosive media.

Instrument Model Configuration

32E – 3□ □C – 1 B□A – □

User Interface

Agency Approval

Mounting

Options

User Interface

Description	Code
Onboard display & keypad w/ HART Communication	B
HART® Communication Only	D

Choose Code "D" for Burst-mode

Mounting

Description	Code
Integral	0
Remote	1

Agency Approval (Selected Approval must match Probe)

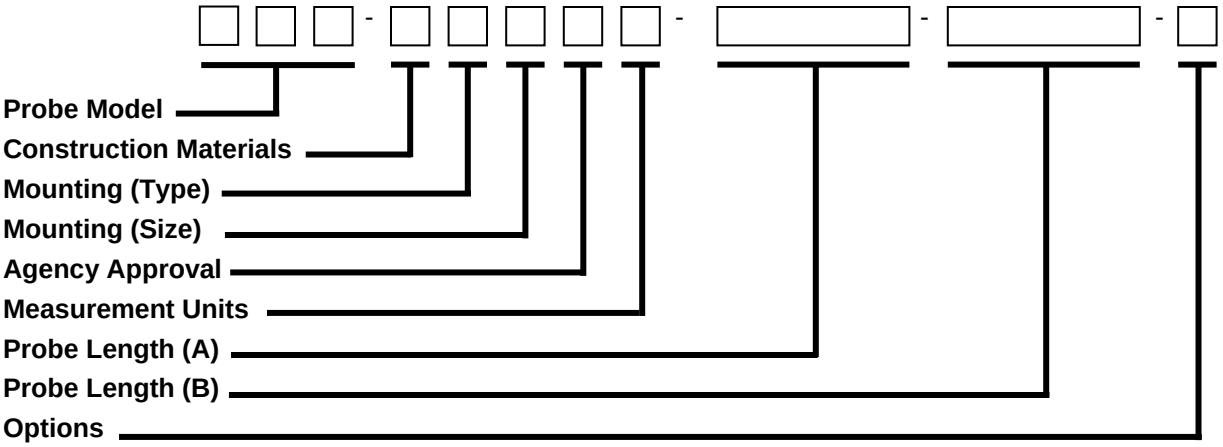
Description	Code
No Approval	0
*FM Explosion-proof (XP) & Non-Incendive (N.I.)	1
FM Intrinsically Safe (I.S.) & N.I.	2
*FM XP, I.S. & N.I.	3

* Maximum Ambient Temperature of 140ºF (60ºC) for XP Installations

Options

Description	Code
HART® Lock	0
ProxCal™	1

Probe Model Configuration (Industrial Grade)



Probe Model

Description	Code
Bare Rod	C1A
Bare Stillwell	C1D
Bare Reference Rod	C1E
Bare Bent Rod	C1F
Insulated Rod	C2A
Insulated Inactive Sheath	C2B
Insulated Reference Wire	C2C
Insulated Stillwell	C2D
Insulated Reference Rod	C2E
Insulated Bent Rod	C2F
Flexible Cable	C3A
Cryogenic Liquid	C4A
Liquid Hydrogen (Cryogenic)	C4H
Liquid Oxygen (Cryogenic)	C4J

Construction Materials

Description	Code
316 SS (C1x)	0
Hastelloy-C® (C1x)	1
Monel® (C1x)	2
Alloy-20 (C1x)	3
Hastelloy-B® (C1x)	4
Titanium (C1x)	5
Tantalum (C1x)	6
304 SS (C4x)	7
316 SS w/ Teflon® (C2x, C3A)	A
Hastelloy-C® w/ Teflon® (C2x)	B
Monel® w/ Teflon® (C2x)	C
Alloy-20 w/ Teflon® (C2x)	D
Hastelloy-B® w/ Teflon® (C2x)	E
Titanium w/ Teflon® (C2x)	F
Tantalum w/ Teflon® (C2x)	H

Mounting Type

Description	Code
NPT (Not C1E, C2E)	A
150# ANSI Flange	B
300# ANSI Flange	C
600# ANSI Flange	D
Sanitary Fitting (C2A)	E
Conflat (C4x)	1

Mounting Size

Description	Code
½" (ANSI Flange), (NPT – C4A & C4J)	A
¾" (ANSI Flange & NPT)	0
1" (ANSI Flange, NPT, & Sanitary)	1
1-½" (ANSI Flange, NPT, & Sanitary)	5
2" (ANSI Flange, NPT, & Sanitary)	2
3" (ANSI Flange & NPT)	3
4" (ANSI Flange & NPT)	4
6" (ANSI Flange & NPT)	6
8" (ANSI Flange & NPT)	8
1.33" (Conflat)	B
2-1/8" (Conflat)	C
2-3/4" (Conflat)	D

Agency Approval

Description	Code
No Approval (All Probes)	0
FM Explosion-proof (XP) & Non-Incendive (N.I.) (C2x)	1
FM Intrinsically Safe (I.S.) & N.I. (All Probes)	2
FM XP, I.S., & N.I. (C2x)	3

Measurement Units

Description	Code
Inches	0
Feet	1
Millimeters	2
Meters	3

Options

Description	Code
None	0
Seal Welding (ANSI Flanges)	1

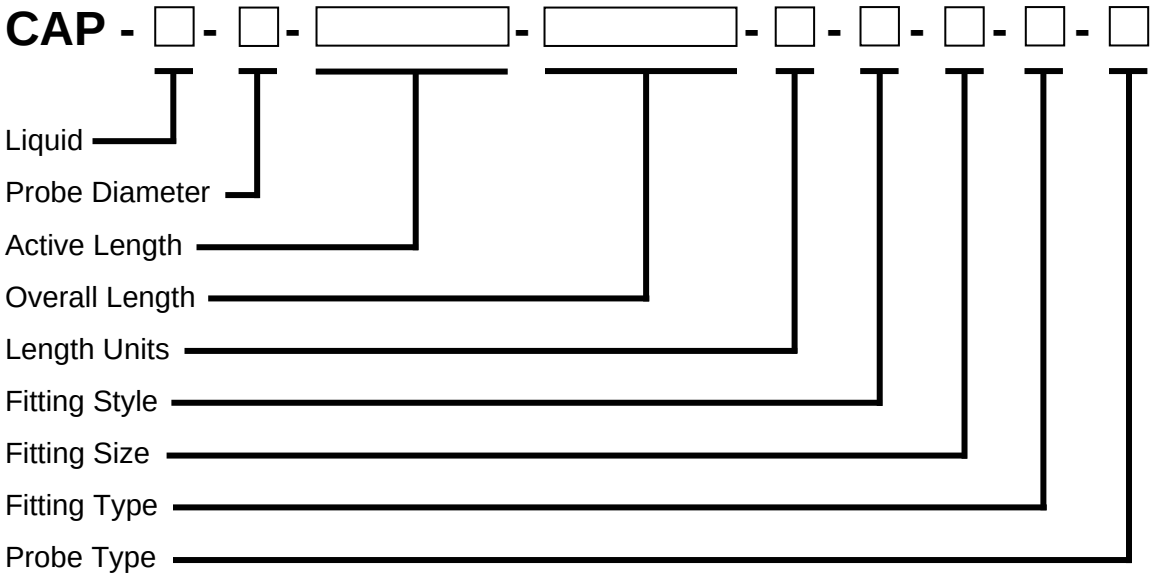
Probe Length (A)

This field represents the insertion length of the probe, which is defined as the length of the probe, measured from the bottom probe tip to the bottom of the mounting connection. C1x, C2x, and C4x probes are available in lengths up to 234". The C3A probe is available in lengths up to 150'. For C4x probes, the minimum insertion length is Probe Length (B) + 2.375". For CxF probes this is the 'A' dimension. Probe length fields are fixed as follows: xxx.x inches, xxx.x feet, xx.xx meters, and xxxxx millimeters. Use leading zeros if necessary to supply all five characters (the decimal point counts as a character).

Probe Length (B)

This dimension is used for C2B, CxF, and C4x probes only. For C2B probes this is the length of the inactive sheath. For the CxF probes, this is the 'B' dimension. The maximum length is limited by the formula: 'A' dim. + 'B' dim. + 3" ≤ 234". For C4x probes, this field represents the Active Length, which is defined as the measurement range of the probe. It starts 0.375" above the bottom tip of the probe, and ends 1" below the upper-most vent hole on the probe. Probe length fields are fixed as follows: xxx.x inches, xxx.x feet, xx.xx meters, and xxxxx millimeters. Use leading zeros if necessary to supply all five zeros if necessary to supply all five characters (the decimal point counts as a character). For probes not using this field, fill this space with zeros, using the format from Probe Length (A).

Probe Model Configuration (Scientific Grade – No Agency Approvals)



Liquid

Description	Code
Liquid Nitrogen	N2
Liquid Oxygen	O2
Liquid Hydrogen	H2
Liquid Carbon Dioxide	CO2

NOTE: Use commonly recognized chemical name for other fluids.

Probe Diameter

Description	Code
1/4" Outer Diameter	1/4
3/8" Outer Diameter	3/8

NOTE: For 1/2" and 3/4" diameter probes, use "Industrial Grade" probes

Active Length

This is defined as the measurement range of the probe. It starts 0.375" above the bottom tip of the probe, and ends 1" below the upper-most vent hole on the probe. Contact the factory for active lengths exceeding 140".

Overall Length

This is defined as the total length of the probe, measured from the bottom tip to the top of the BNC Connector. The minimum overall length is the Active Length + 3.25".

Length Units

Description	Code
Inches	IN
Feet	FT
Millimeters	MM
Centimeters	CM
Meters	M

Fitting Style

Description	Code
SS Swagelock (Remote-mount transmitter Only)	SS
Welded (NPT)	W
Flange	F

NOTE: All NPT Threaded connections are "Welded" Style

Fitting Size

Description	Code
1/4" (NPT & M175 Fitting Type Only)	1/4
3/8" (NPT & M175 Fitting Type Only)	3/8
1/2" (NPT & M175 Fitting Type Only)	1/2
3/4" (M175 Fitting Type Only)	3/4
1.33" (Conflat Fitting Type Only)	1.33
2.125" (Conflat Fitting Type Only)	2.125
2.75" (Conflat Fitting Type Only)	2.75

NOTE: For other sizes contact the factory

Fitting Type

Description	Code
NPT (Swagelock Fitting Style Only)	NPT
M175 (Welded Fitting Style Only)	M175
Conflat (Flange Fitting Style Only	Conflat
Flange (Flange Fitting Style Only)	Flange

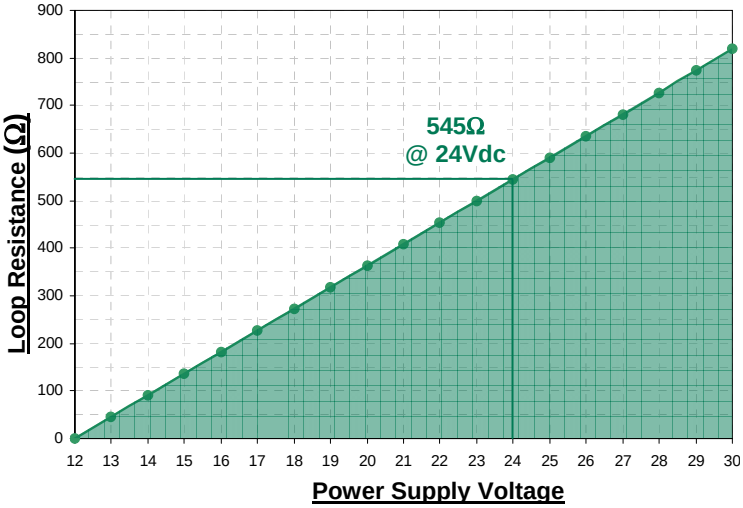
NOTE: If a fitting size other than 1/2" is selected for the M174 Fitting Type, select "Custom" Probe Type.

Probe Type

Description	Code
Standard	S
Custom	C

Specifications

Loop Resistance Chart



$$\text{Maximum Loop Resistance} = \frac{V_{PS} - 12}{0.022}$$

V_{PS} = Power Supply Voltage

= Acceptable Loop Resistance Range

Instrument

Description		Specification
Power Supply		12 – 30Vdc ±10%; 24Vdc nominal
Supply Voltage Effect		Less than 0.01% of span/volt change
*Ambient Temperature Range		-40°F to 176°F (-40°C to 80°C)
Humidity		100% condensing
Accuracy		±0.1% of span
Repeatability		±0.05% of span
**Linearity		±0.1% of span
Resolution		0.01mA
Response Time		300 msec.
Temperature Effect		±0.01% of span/°F (0.018% of span/°C)
Operator Interface	Data Entry	3-button keypad; Magtouch™
	Display	2 Line by 8 Character LCD
Output	Analog	4-20mA; 3.8 – 20.5mA overtravel; reversible
	Digital	HART® communications protocol
Error Indication		3.6mA, 22mA, or Hold last value; field selectable
Range		15 – 100,000pF
Damping		0 – 60 seconds; field adjustable in 1 sec. increments
Maximum Remote Cable Length		10 feet between the transmitter and the probe.

* Maximum Ambient Temperature of 140ºF (60ºC) for XP Installations

**Linearity is ±0.25% when used with a Flexible probe.

Probe

Description		Specification
Process Temperature Range @ 1 psig (1 Bar)	C1x	-100°F – 400°F (-73°C – 204°C)
	C2x	-100°F – 400°F (-73°C – 204°C)
	C3A	- 50°F – 285°F (-45°C – 140°C)
	C4A	-430°F – 180°F (-257°C – 82°C)
	C4H	-430°F – 250°F (-257°C – 121°C)
	C4J	-430°F – 400°F (-257°C – 204°C)
Process Pressure Range @ 100°F (37°C)	C1x	Vacuum to 2,000 psig
	C2x	Vacuum to 2,000 psig
	C3A	Atm. to 100 psig
	C4x	Vacuum to 1,000 psig

Approvals

Instrument

Agency	Models	Protection Method	Approval
FM	32E-3x1C-1BxA-x 32E-3x3C-1BxA-x	*Explosion-proof	Division 1 Class I – Groups B, C, D; Class II – Groups E, F, G; Class III
	32E-3x2C-1BxA-x 32E-3x3C-1BxA-x	Intrinsically Safe	Division 1 Class I – Groups A, B, C, D; Class II – Groups E, F, G; Class III
	32E-3x1C-1BxA-x 32E-3x2C-1BxA-x 32E-3x3C-1BxA-x	Non-Incendive	Division 2 Class I – Groups A, B, C, D; Class II – Groups F, G; Class III

NOTE: Maximum ambient temperature of 140ºF (60ºC) for Explosion-proof installations.

Probes

Agency	Models	Protection Method	Approval
FM	C2x-xxx1x-xxxxx-xxxxx-x C2x-xxx3x-xxxxx-xxxxx-x	Explosion-proof	Division 1 Class I – Groups B, C, D; Class II – Groups E, F, G; Class III
	Cxx-xxx2x-xxxxx-xxxxx-x C2x-xxx3x-xxxxx-xxxxx-x	Intrinsically Safe	Division 1 Class I – Groups A, B, C, D; Class II – Groups E, F, G; Class III
	C2x-xxx1x-xxxxx-xxxxx-x Cxx-xxx2x-xxxxx-xxxxx-x C2x-xxx3x-xxxxx-xxxxx-x	Non-Incendive	Division 2 Class I – Groups A, B, C, D; Class II – Groups F, G; Class III

Operating Principle

For non-conductive media applications in metallic vessels, the probe in conjunction with the vessel wall and the process media form a capacitor. The probe and the vessel walls are the plates of the capacitor and the media is the dielectric. As the level of the media changes, a corresponding change in capacitance occurs. The Phoenix transmitter measures this change, compares it to the calibrated values and calculates the level of the media.

For conductive media applications in metallic vessels, the probe and the process media are the capacitive plates and the insulation (Teflon®) on the probe is the dielectric.

When measuring any media in non-metallic vessels (ex. concrete sumps, plastic tanks, etc.) the second plate of the capacitor must be supplied. American Level Instruments offers a variety of options for this situation.

Installation

Unpacking

Upon receiving the Phoenix transmitter, check all components carefully for damage incurred in shipping. If damage is evident, or suspected, do not attempt installation. Notify the carrier immediately and request a damage inspection. Check each item against the packing list.

Mounting Location

Phoenix transmitters should be mounted in a location that is as free as possible from mechanical shock, vibration, and corrosive atmospheres. The area should have an ambient temperature in the range of –40°F to 176°F (-40°C to 80°C). NOTE: 140ºF (60º) is the maximum ambient temperature for XP installations.

In most applications, the metallic vessel wall is the second plate of the capacitor (typically referred to as the ground reference). For the transmitter to function properly the probe's mounting connection must make good electrical connection with the vessel. This usually occurs by metal-to-metal contact between the mounting and the vessel connection threads, or via the metallic bolts used with mounting flanges. However, rust, Teflon tape, gaskets, and paint can interfere with obtaining a solid electrical contact. If you are unsure, about the quality of this connection, a grounding strap between the probe's mounting nut and the vessel is recommended.

Metallic Vessels / Non-conductive Media: Mounting the probe as close as possible to the vessel wall will enhance resolution and linearity. If the distance is greater than 10", the vessel is a horizontal cylinder, or a sphere, a stilling well is recommended. If a stilling well cannot be installed, contact an ALI Sales Representative for applications assistance.

Metallic Vessels / Conductive Media: These are usually the simplest of all applications. Since the media itself is the ground reference, distances to the vessel wall and vessel shape are not factors. Insure that you are using an insulated probe.

Non-metallic vessels / Any Media: Either you must use a metal stilling well or an American Level Instruments supplied ground-referenced probe.

If you have any questions concerning the probe selection for a given application, contact an American Level Instruments Representative for assistance.

Rigid Probe Installation

⚠ CAUTION **The gland used on all rigid probes is factory adjusted and sealed. Any attempt at disassembly will permanently damage the probe.**

Verify that the process conditions do not exceed the probe's specification (see page 9 for specifications).

1.) Carefully insert the probe through the mounting connection into the vessel (see Photo #4). When using the NPT fitting, sealing tape or pipe joint compound can be used around the threads of the probe-mounting nut to obtain a good seal without excessive tightening.

2.) Screw the probe into the vessel using the wrench flats provided on the mounting nut. Insure that there is a good electrical connection (1Ω or less) between the mounting nut and the vessel.

3.) Attach the supplied probe wire to the screw terminal at the top of the probe. In the case of a cryogenic probe (C4A, C4H, or C4J) the connection is a BNC instead of a screw terminal.

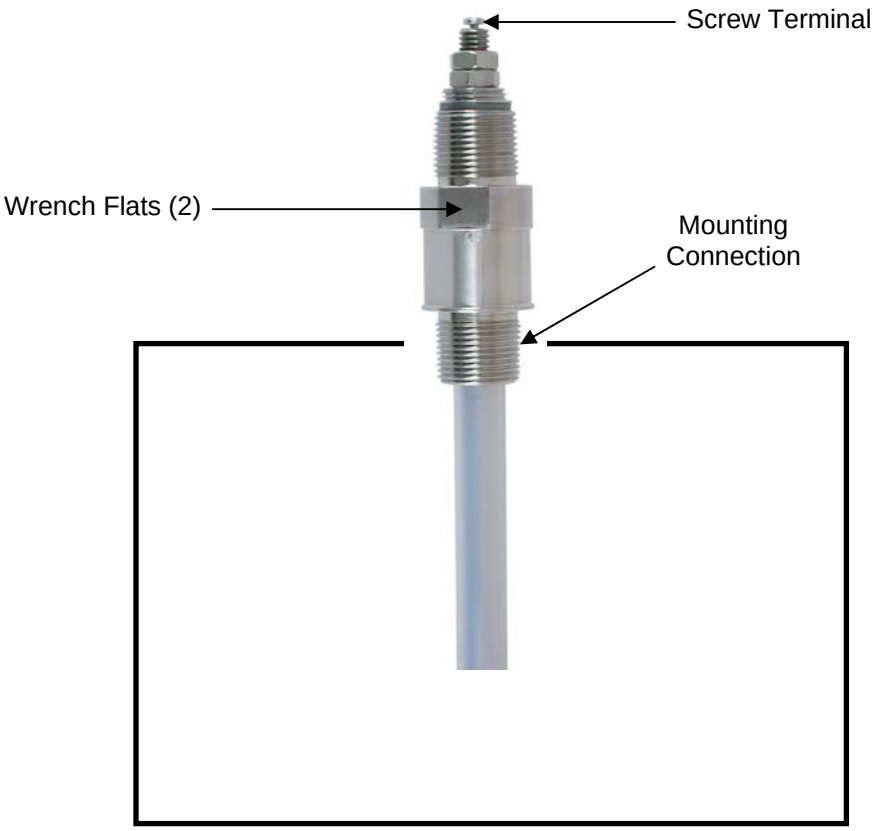


Photo #4

Flexible Probe Installation

⚠ CAUTION **Flexible probes are shipped with packing gland and cable clamp hand tight. Be careful not to lose the cable in the vessel**

Verify that the process conditions do not exceed the probe's specification (see page 7 for specifications).

1.) If used, connect the probe weight to the probe anchor assembly. DO NOT adjust the fitting connection the anchor assembly to the probe cable

2.) Carefully insert the probe through the mounting connection into the vessel (see Photo #5). When using the NPT fitting, sealing tape or pipe joint compound can be used around the threads of the probe-mounting nut to obtain a good seal without excessive tightening.

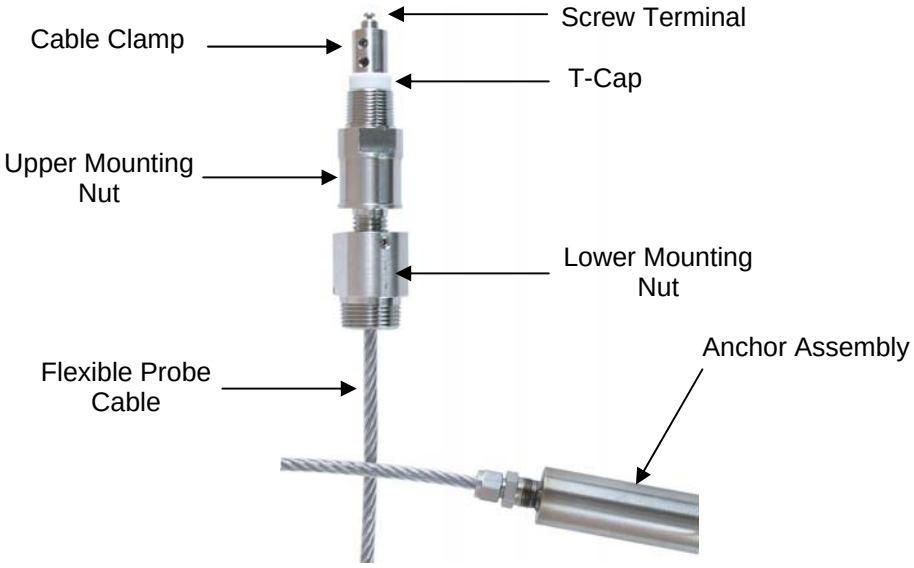


Photo #5

3.) Screw the lower mounting nut into the vessel using the wrench flats provided on the mounting nut. Insure that there is a good electrical connection (1Ω or less) between the mounting nut and the vessel.

4.) If used, attach the probe anchor to a welded stud (3/4"-10) at the bottom of the vessel. If supplied, screw the probe weight into the probe anchor.

5.) Loosen both socket head set screws in the cable clamp. Remove the cable clamp and the T-Cap from the probe and put aside.

6.) While holding the top of the probe cable, loosen the upper mounting nut from the lower mounting nut. **DO NOT** allow the cable to fall into the vessel.

7.) Pull the cable upward until it is taut. Tighten the upper & lower mounting nuts using the flats provided. Tighten the socket head cap screw located in the side of the lower mounting nut.

8.) Cut the cable 1.1" above the upper mounting nut. Strip off 0.875" of insulation.

9.) Reinstall the T-Cap, and cable clamp onto the probe cable. The cable clamp should seat tightly against the T-Cap.

10.) Tighten both socket head set screws to approximately 3 – 5 ft./lbs. of torque.

11.) Wrap electrically insulating tape around the sides of the cable clamp to prevent it from shorting against the housing.

12.) Attach the supplied probe wire to the screw terminal at the top of the probe.

Integral-mounted Transmitter Installation

⚠ WARNING

Before starting installation procedures in hazardous areas, insure that all power sources have been turned off and locked out. "Live" electrical circuits can ignite flammable gasses and dusts.

Follow the wiring practices set forth in the National Electric Code, as well as local electrical codes. These Codes supercede any information in this manual.

⚠ CAUTION

Do not apply more than 33Vdc to the transmitter, as this may damage the instrument.

1.) Remove the cover from the instrument enclosure.

2.) Remove the electronics assembly (puck) from the instrument enclosure. Hold the puck firmly around the diameter and pull it out of the enclosure. No tools are necessary.

3.) The wiring nipple is attached to the instrument enclosure at the factory (see Photo #1). Thread the probe wire up inside the wiring nipple. Screw the wiring nipple onto the top of the probe. Use the wrench flats provided on the probe and the wiring nipple to tighten. **DO NOT** use the instrument enclosure for tightening.

NOTE: *For the C2E (Insulated Reference Rod Probe), mount the wiring nipple onto the probe rod containing the probe nameplate.*

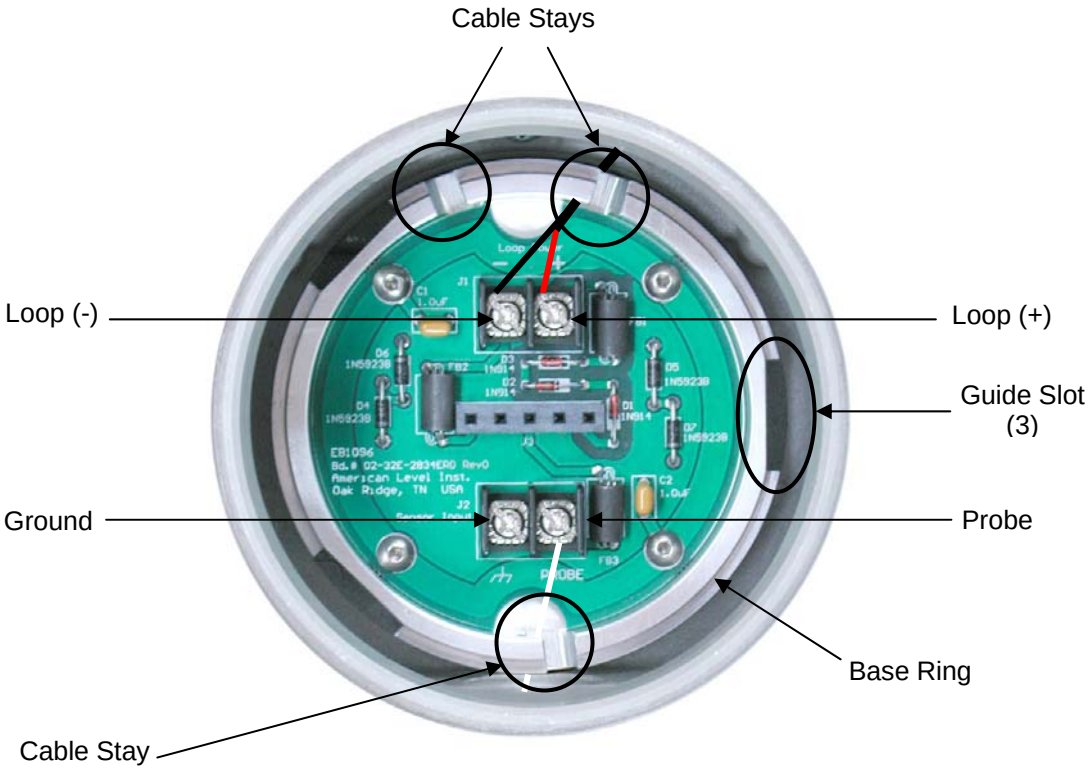


Photo #6

4.) Use an ohmmeter to check the resistance between the probe wire and the wiring nipple. The reading should be infinite. If it is not, wrap electrical tape around the hex nuts and washers above the ¾" NPT threads on the probe (used for the housing connection. Check the measurement again to insure that the resistance is infinite.

5.) Connect the probe wire to the PROBE terminal in the base of the instrument enclosure (see Photo #6). If you are using a cryogenic probe, the probe wire is an RG-188 coax cable with a female BNC Connector on one end. The center wire goes to the PROBE terminal, and the shield connects to the ground terminal. Make sure the probe wire is under the cable stay.

6.) Install a conduit fitting to one of the conduit openings at the top of the instrument enclosure. Use the supplied conduit plug for the other conduit opening. Follow all applicable electrical codes when installing this conduit. It is strongly recommended that you use a drip-loop to prevent water from entering the instrument enclosure from the conduit.

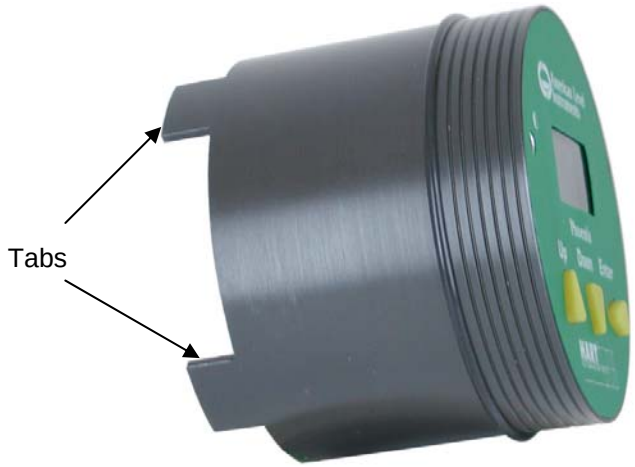


Photo #7

7.) Using a twisted shielded pair cable, connect the positive wire to the Loop (+) terminal and the negative wire to the Loop (-) terminal. At the power supply end, also connect the shield and/or drain wire to ground. **DO NOT** connect the shield and/or drain wire to the transmitter, as this could cause an unwanted "ground loop" situation. Connect an earth ground wire to the green screw inside the Instrument Enclosure

8.) Reinsert the puck into the instrument enclosure by visually aligning the tabs (3) on the puck (see Photo #7) with the guide slots (3) in the base ring, using firm pressure to seat the puck. It can only fit in one orientation, **DO NOT FORCE**.

9.) If this is an Intrinsically Safe installation, make sure that the I.S. Barrier is properly installed in the "Safe" area before applying power to the Phoenix Transmitter. Follow Plant, Local, and National Electric Codes to insure safe operation.

10.) Refer to Section B. for calibration and programming instructions.

Remote-mounted Transmitter Installation

⚠ WARNING

Before starting installation procedures in hazardous areas, insure that all power sources have been turned off and locked out. "Live" electrical circuits can ignite flammable gasses and dusts.

Follow the wiring practices set forth in the National Electric Code, as well as local electrical codes. These Codes supercede any information in this manual.

⚠ CAUTION

Do not apply more than 33Vdc to the transmitter, as this may damage the instrument.

1.) Remove the cover of the interconnection housing.

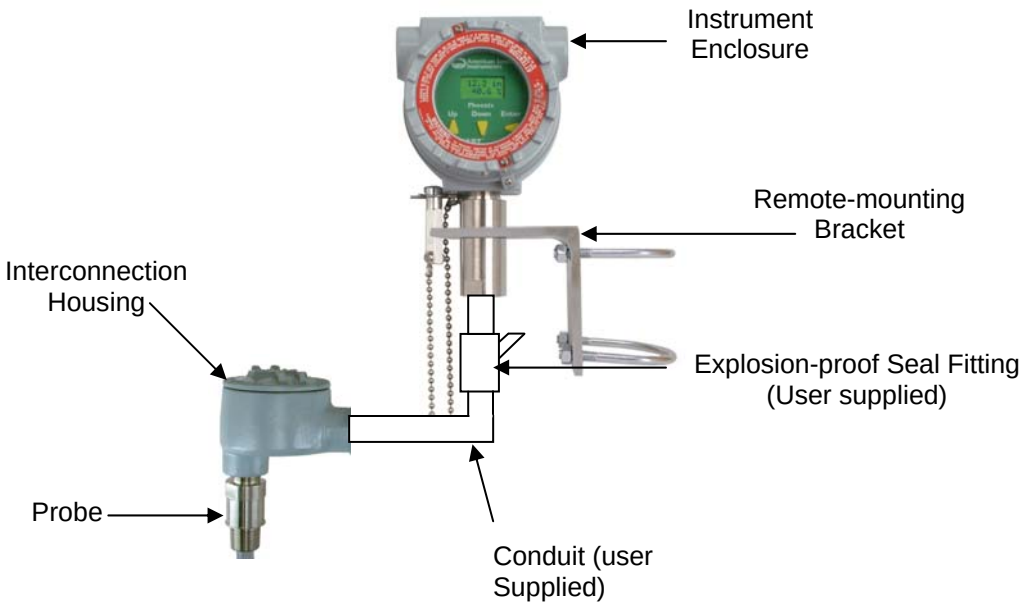


Photo #8

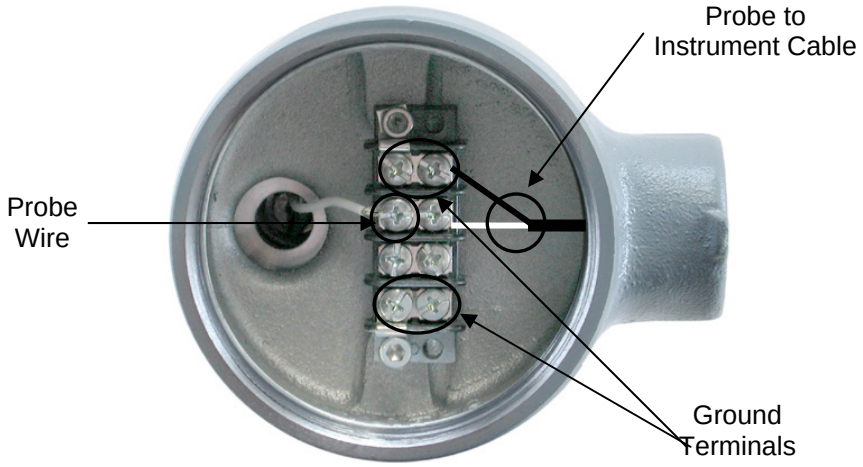


Photo #9

2.) Look at the wire at the top of the probe. Cryogenic probes have a RG-188 coaxial cable with a BNC connector at the probe, and two wires (center & shield) at the other end.

All other probes have a single wire from the screw at the top of the probe. This single wire (the center wire on Cryogenic probes) is considered the "probe" wire for the remainder of these instructions.

3.) Unscrew the nipple from the bottom of the instrument enclosure. If the process temperature exceeds 176º F (80ºC), or if the probe is a Model C2E, screw the nipple onto the top of the probe, being careful to thread the probe wire through the nipple. Use an ohmmeter to check the resistance between the probe wire and the nipple. The reading should be infinite. If it is not, wrap electrical tape around the hex nuts and washers above the ¾" NPT threads on the probe (used for the housing connection). Check the measurement again to insure that the resistance is infinite.

If the process temperature is less than 176ºF (80ºC), you may discard the nipple. Thread the probe wire into the bottom of the interconnection housing. Screw the interconnection housing onto the top of the probe.

NOTE: *For the C2E (Insulated Reference Rod Probe), mount the nipple and the Interconnection Housing onto the probe rod containing the probe nameplate.*

4.) Connect the probe wire to the terminal block inside the Interconnection housing (see Photo #9). If this is a cryogenic probe, connect the shield wire to one of the two ground terminals.

5.) Remove the cover from the instrument enclosure.

6.) Remove the electronics assembly (puck) from the instrument enclosure. Hold the puck firmly around the diameter and pull it out of the enclosure. No tools are necessary.

7.) Using the U-Bolts provided, attach the remote-mounting bracket to a pipe stand or railing. The U-Bolts are sized for a 2" diameter pipe.

8.) Connect conduit between the interconnection housing and the remote-mounting bracket (see Photo #8). See the control drawing in Appendix A. as a reference in determining the correct location of the XP seal fitting (needed for an Explosion-proof installation; not needed for an Intrinsically Safe installation). It is strongly recommended that you use a drip-loop to prevent water from entering the instrument enclosure or interconnection housing from the conduit.

9.) In the interconnection housing, using a twisted shielded pair cable, connect one wire (designated "probe" wire) to the screw terminal opposite the probe wire, and the other wire to either of the outer (ground) terminals (see Photo #9 for reference – the black wire is shown connected to the ground terminal). Clip the shield/drain wire short (**DO NOT** connect it to anything).

10.) In the instrument enclosure, connect the probe wire to the "PROBE" terminal in the base of the instrument enclosure (see Photo #6). Connect the ground wire to the ground terminal (not the green screw). Connect the shield/drain wire to the green screw at the bottom of the enclosure.

11.) Connect conduit to one of the two conduit openings at the top of the instrument enclosure. Use the supplied conduit plug for the other conduit opening. Follow all applicable electrical codes when installing this conduit. It is strongly recommended that you use a drip-loop to prevent water from entering the instrument enclosure from the conduit.

12.) In the instrument enclosure, using a twisted shielded pair cable, connect the positive wire to the Loop (+) terminal and the negative wire to the Loop (-) terminal. Place the wires under one of the two cable stays in the bottom of the enclosure (see Photo #6). At the power supply end, also connect the shield and/or drain wire to ground. **DO NOT** connect the shield and/or drain wire to the transmitter, as this could cause an unwanted “ground loop” situation (see Photo #6). Connect an earth ground wire to the green screw inside the Instrument Enclosure.

13.) Reinsert the puck into the instrument enclosure by visually aligning the tabs (3) on the puck (see Photo #7) with the guide slots in the base ring and using firm pressure to seat the puck. It can only fit in one orientation, **DO NOT FORCE**.

14.) If this is an Intrinsically Safe installation, make sure that the I.S. Barrier is properly installed in the “Safe” area before applying power to the Phoenix Transmitter. Follow Plant, Local, and National Electric Codes to insure safe operation.

15.) Refer to Section B. for calibration and programming instructions.