Instruction Manual
LIQ-MAN-396R-396RVP
Rev. K
March 2017

Rosemount™ 396R/396RVP

pH/ORP Sensors



EMERSON

Essential Instructions
Read this page before proceeding!

Emerson designs, manufactures and tests its products to meet many national and international standards. Because these sensors are sophisticated technical products, you MUST properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions MUST be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount products. Failure to follow the proper instructions may cause any one of the following situations to occur: loss of life; personal injury; property damage; damage to this sensor; and warranty invalidation.

- Read all instructions prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, contact your Emerson representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Emerson. Unauthorized parts and procedures can affect the product's performance, place the safe operation of your process at risk, and VOID YOUR WARRANTY. Third-party substitutions may result in fire, electrical hazards, or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

The information contained in this document is subject to change without notice.

⚠ DANGER

Hazardous Area Installation

This sensor is not Intrinsically Safe. or Explosion Proof. Installations near flammable liquids or in hazardous area locations must be carefully evaluated by qualified on site safety personnel.

To secure and maintain an intrinsically safe installation, an appropriate transmitter/safety barrier/sensor combi nation must be used. The installation system must be in accordance with the governing approval agency (FM, CSA or BASEEFA/CENELEC) hazardous area classification requirements. Consult your transmitter instruc tion manual for details.

Proper installation, operation and servicing of this sensor in a Hazardous Area Instal lation is entirely the responsibility of the user.

⚠ CAUTION

Sensor/Process Application Compatibility

The wetted sensor materials may not be compatible with process composition and operating conditions. Application compatibility is entirely the responsibility of the user.

⚠ WARNING

Retractable sensors must not be inserted nor retracted when process pressures are in excess of 64 psig (542kPa) for option 21 or 35 psig (343 kPa) for option 25.

⚠ CAUTION

Special Conditions for Safe Use

1. All pH/ORP sensors have a plastic enclosure which must only be cleaned with a damp cloth to avoid the danger due to a build up of an electrostatic charge.

2. All pH/ORP sensor models are intended to be in contact with the process fluid and may not meet the 500V r.m.s. a.c. test to earth.

This must be taken into consideration at installation.

About This Document

This manual contains instructions for installation and operation of the Rosemount 396R and 396RVP pH/ORP Sensors.

The following list provides concerning all revisions of this document.

Rev. Level	Date	Notes
A	01/01	This is the initial release of the product manual. The manual has been reformatted to reflect the Emerson documentation style and updated to reflect any changes in the product offering.
B	07/02	Revised multiple drawings.
C	08/02	Added drawing #40105549, rev. D.
D	04/03	Revised drawing #40396R21/22 on page 18.
E	08/03	Added Silcore information.
F	09/04	Updated ordering info and added/revised wiring drawings.
G	01/05	Delete obsolete options.
H	01/07	Miscellaneous revisions.
I	11/10	Removed mention of patents and updated dnv logo.
J	02/11	Added ATEX directive and updated caution boxes per ANSI standard.
K	03/17	Updated the Ordering Information, Specifications, Product Certifications, and Emerson logo and Address.

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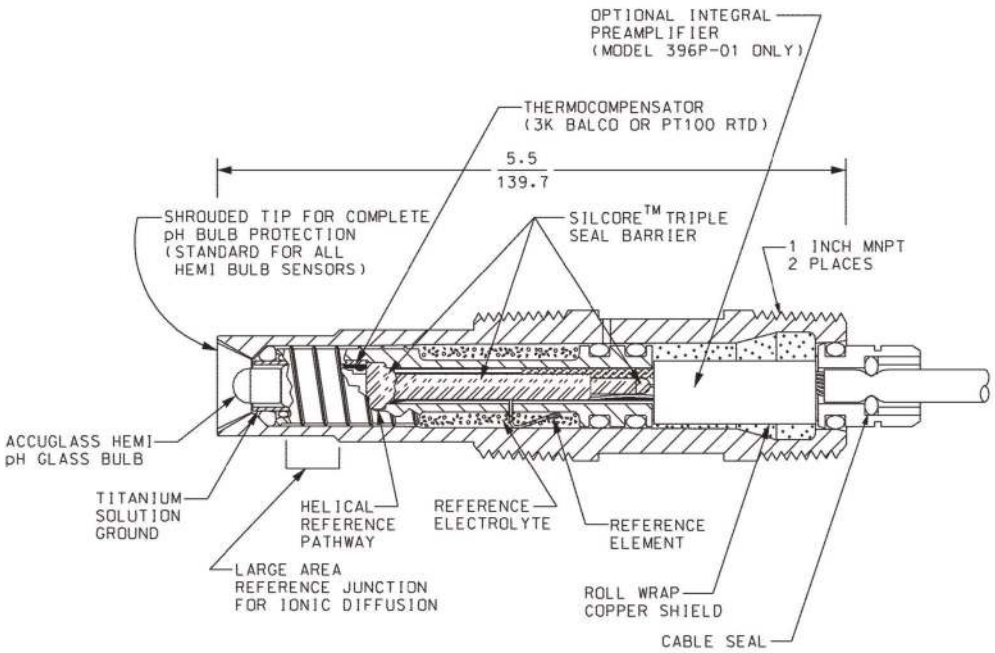
Intrisicallly Safe Sensor Installation Drawing - FM 57

Section 1: Description and Specifications

1.1 Features and Applications

Rosemount 396R and 396RVP Sensors are specifically designed for improved life in harsh, dirty applications where a separate sample stream is difficult to provide and greater insertion depths are required. These sensors are designed for use with a 1-1/4 in. or 1-1/2 in. ball valve for hot tap installation. Sensors are constructed of molded polypropylene housed in a titanium tube with EPDM seals to provide maximum chemical resistance. The sensors feature a shrouded tip for protection from breakage while allowing process to flow by the glass electrode for accurate and reliable pH and ORP measurements.

Figure 1-1: Cross Section Diagram of the TUpH Reference Technology



All TUpH sensors are designed with a large area reference junction, helical reference pathway, and an AccuGlass pH glass bulb. This sensor technology ensures superior performance while only requiring minimal maintenance.

1.2 Specifications

Table 1-1: Percent linearity over pH

pH Range	Hemi Bulb	Flat Bulb
0-2 pH	94%	93%
2-12 pH	99%	98%
12-13 pH	97%	95%
13-14 pH	92%	--

Table 1-2: Rosemount 396R sensor specifications

Measured Range	
pH range	0 to 14 pH
ORP range	-1500 mV to 1500 mV
Maximum Pressure at Retraction or Insertion	
Code 21: 64 psig (542 kPa abs)	
Code 25: 35 psig (343 kPa abs)	
Minimum Conductivity	
100 µS/cm	
Maximum Process Pressure and Temperature	
Hemi bulb: 150 psig (1136 kPa abs) at 212 °F (100 °C)	
Flat bulb: 100 psig (790 kPa abs) at 212 °F (100 °C)	
Wetted Materials	
Polypropylene, EPDM, titanium, glass, (platinum: ORP only)	
Weight/Shipping Weight	
Sensor	Code 21: 2.0 lb/3.0 lb (.9 kg/1.40 kg)
	Code 25: 3.0 lb/4.0 lb (1.40 kg/1.80 kg)
Ball Valve	PN 23240-00; 5 lb/7 lb (2.25 kg /3.20 kg)
	PN 23634-00 8 lb/10 lb (3.65 kg/4.55 kg)
	J-Box: 3 lb/4 lb (1.40 kg/1.80 kg)
Process Connections	
None, must use 1 inch process connector or ball valve kit (1-1/2 or 1-1/4 in.) (sold separately)	
Cable Length	
Integral 15 ft or 9.5 in. 9 conductor cable except option 60 (9.5 in. coaxial cable with BNC)	

Table 1-3: Rosemount 396RVP sensor specifications

Measured Range	
pH range	0 to 14 pH
ORP range	-1500 mV to 1500 mV
Maximum Pressure at Retraction or Insertion	
Code 21: 64 psig (542 kPa abs)	
Code 25: 35 psig (343 kPa abs)	
Minimum Conductivity	
75 µS/cm, nominal	
Pressure Range	
Hemi bulb	100-1136 kPa abs (0-150 psig)
Flat bulb	100-790 kPa abs (0-100 psig)
Wetted Materials	
Polypropylene, EPDM, titanium, glass, (platinum: ORP only)	
Weight/Shipping Weight	
Sensor	Code 21: 2.0 lb/3.0 lb (.9 kg/1.40 kg)
	Code 25: 3.0 lb/4.0 lb (1.40 kg/1.80 kg)
Ball Valve	PN 23240-00; 5 lb/7 lb (2.25 kg /3.20 kg)
Process Connections	
None, must use 1 inch process connector or ball valve kit (1-1/2 in. or 1-1/4 in.)	
Cable Length	
Use cable 24281-XX (where XX = -01 through -08 and designates various cable lengths). See accessories.	

1.3 Product Certifications

Please see online certificates for further details.

IECEx

Sensors without preamp (pH and ORP) – Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +60°C)

Sensors with SMART preamp (pH only) – Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +60°C)

Per standards IEC60079-0 : 2011, IEC 60079-11 : 2011

ATEX

Sensors without preamp (pH and ORP) – II 1 G Ex ia IIC T4 Ga (-20˚C ≤ Ta ≤ +60˚C)

Sensors with SMART preamp (pH only) – II 1 G Ex ia IIC T4 Ga (-20˚C ≤ Ta ≤ +60˚C)

Per standards EN 60079-0: 2012+A11:2013, EN 60079-11:2012

FM

See online FM Certificate of Compliance for applicable sensor options:

Intrinsically Safe for use in Class I, II, and III, Division 1, Groups A, B, C, D, E, F, and G; Temperature Class T6 Ta = -20 °C to +60 °C

Intrinsically Safe for use in Class I, Zone 0, AEx ia IIC T6 Ta = -20 °C to +60 °C

Nonincendive for use in Class I, Division 2, Groups A, B, C, and D; Temperature Class T6 Ta = -20 °C to +60 °C

Suitable for use in Class II and III, Division 2, Groups E, F, and G; Temperature Class T6 Ta = -20 °C to +60 °C Hazardous (Classified) Locations

IS/I,II,III/1/ABCDEFG/T6 Ta = 60°C - 1400332; Entity; I/0/AEx ia IIC/T6 Ta = 60 °C - 1400332; Entity; NI/I/2/ABCD/T6 Ta = 60 °C; S/II,III/2/EFG/T6 Ta = 60 °C

Per standards 3600:1998, 3610:2010, 3611:2004, 3810:2005

CSA

See online CSA Certificate of Compliance for applicable sensor options:

Sensors with preamp – Intrinsically Safe:

Class I, Division 1, Groups ABCD; Class II, Division 1, Groups EFG; Class III; Class I, Division 2, Groups ABCD; Ambient temperature rating -20 °C to +60 °C; Ex ia IIC; T6

Sensors without preamp – Intrinsically Safe and Non-Incendive:

Class I, Division 1, Groups ABCD; Class II, Division 1, Groups EFG; Class III; Class I, Division 2, Groups ABCD; Ex ia IIC; T6; Ambient temperature rating -20 °C to +60 °C: (Simple Apparatus)

Per standards C22.2 No. 0-10, C22.2 No. 0.4-M2004, C22.2 No. 94-M1991, C22.2 No. 142 – M1987, C22.2 No 157 – M1992, CAN/CSA E60079-0:07, CAN/CSA E60079- 11:02, UL50 11th Ed, UL508 17th Ed, UL913 7th Ed, UL 60079-0: 2005, UL 60079-11: 2002

1.4 Ordering Information

Table 1-4: Rosemount 396R ordering information

Model	Sensor type
396R	pH/ORP Sensor
Measuring Electrode Type	
10	pH - GPHT Glass
12	ORP
13	pH - GPLR Flat Glass
Sensor Length	
21	21 Inch Titanium Tube
25	36 Inch Titanium Tube
Transmitter/TC Compatibility	
50	3K TC (1)
54	Pt-100 (2)
Optional Cable Options	
_	No Selection (3)
60	9.5 Inch Cable with BNC (4)
61	9.5 Inch Cable without BNC (5)
Typical Model Number: 396R-10-21-54	

1. *For use with legacy transmitter model 1181.*
2. *For use with Rosemount model 1056, 1057, 1066, 5081, and 56 transmitters.*
3. *The sensor will come with a standard 15 ft. integral cable.*
4. *Used for connection to 1181, 1054 series, and 2081 sensor head junction boxes.*
5. *Used for connection to sensor head junction box PN 23709-00.*

Table 1-5: Rosemount 396RVP ordering information

Model	Sensor type
396RVP	pH/ORP Sensor
Measuring Electrode Type	
10	pH - GPHT Glass
12	ORP
13	pH - GPLR Flat Glass
Sensor Length	
21	21 Inch Titanium Tube
25	36 Inch Titanium Tube
Transmitter/TC Compatibility	
50	3K TC (1)
54	Pt-100 (2)
55	Pt-100 for SMART Preamplifier (3)
Preamplifier Options	
_	No Selection
70	SMART Preamplifier (4)
Typical Model Number: 396RVP-10-21-55-70	

1. *For use with legacy transmitter model 1181.*
2. *For use with Rosemount model 1056, 1057, 1066, 5081, and 56 transmitters.*
3. *Must be selected with option 70. Also suitable for use with Rosemount model 1056, 1057, 1066, 5081, and 56 transmitters.*
4. *Must be selected with option 55.*

Section 2: Installation

2.1 First Time Installation

For first time Rosemount 396R installations, using the following guide is recommended:

1. Retractable Mounting

A. Choose one (required for all first time installations):

PN 23166-00, 1 in. x 1 in. NPT process connector, 316 SST

PN 23166-01, 1 in. x 1 in. NPT process connector, Titanium

B. Choose one:

PN 23240-00, 1-1/2 in. ball valve assembly, 316 SST

PN 23765-00, 1-1/4 in. ball valve assembly, 316 SST

2. Junction Boxes (Optional; Choose either Sensor Head or Remote)

A. Sensor Head Junction Boxes (used with options -60 or -61 sensor) - Choose one:

PN 23709-00; includes preamplifier

B. Remote Junction Boxes (used with standard 15 ft. cable length sensor) - Choose one:

PN 23555-00; includes preamplifier

3. Extension Cables - Choose one:

PN 23646-01, 11 conductor, shielded, prepped

PN 9200273, 11 conductor, shielded, unprepped

For first time Rosemount 396RVP installations, using the following guide is recommended:

1. Variopol Cable (required for all first time installations)

Choose one: PN 24281-00 -- 15 ft. VP8 Cable

PN 24281-01 -- 25 ft. VP8 Cable

2. Retractable Mounting

1A. Choose one (required for all first time installations, except as noted):

PN 23166-00 1 in. x 1 in. NPT process connector, 316 SST

PN 23166-01 1 in. x 1 in. NPT process connector, Titanium

Choose one (optional process connector o-rings):

PN 9550220, Kalrez ® O-ring, 2-214

PN 9550099, Viton ® O-ring, 2-214

1b. Choose one:

PN 23240-00 1-1/2 in. ball valve assembly, 316 SST

PN 23765-00 1-1/4 in. ball valve assembly, 316 SST (process connector not needed)

3. Remote Junction Boxes (Optional)

PN 23555-00 includes preamplifier

4. Extension cables

Choose one: PN 23646-01, 11 conductor, shielded, prepped

PN 9200273, 11 conductor, shielded, unprepped

2.2 Unpacking and Inspection

Inspect the outside of the carton for any damage. If damage is detected, contact the carrier immediately. Inspect the instrument and hardware. Make sure all items in the packing list are present and in good condition. Notify the factory if any part is missing.

Note: If the sensor is to be stored, the protective boot should be filled with either KCl electrolyte solution or pH 4.0 buffer solution and replaced on sensor tip until ready to use.

Note: Save the original packing cartons and materials as most carriers require proof of damage due to mishandling, etc. Also, if it is necessary to return the instrument to the factory, you must pack the instrument in the same manner as it was received. Refer to Section 8.0 for instructions.

⚠ WARNING

Glass electrode must be wetted at all times (in storage and in line) to maximize sensor life.

2.3 Mechanical Installation

The Rosemount 396R Sensor may be installed through a weldalet or in a pipe tee or "Y", as shown in Figure 2-1, when used with a ball valve. Insert the end of the sensor to a depth sufficient to ensure that the glass bulb is continuously wetted by the process fluid. The Rosemount 396R can also be inserted directly into the process without the use of a ball valve for appli cations not requiring continuous operation during sensor maintenance.

⚠ CAUTION

Allow sufficient room for safe retraction and insertion of the sensor. Personnel should have room for stable footing while performing removal or insertion of the sensor.

The sensor must be mounted within 10-90 degrees of the horizontal with the tip pointed downward, thus keeping air bubbles off of the pH sensitive glass bulb. Bubbles settled on the glass bulb disrupt the electrical continuity between the pH sensitive glass and the silver/ silver chloride measuring element.

If the retraction version is to be installed without a ball valve follow the installation procedure for insertion service (Section 2.3.2). Perform the following steps for sensor installation through a ball valve:

2.3.1 Installation Through Ball Valve

1. Carefully remove the liquid filled rubber boot which protects the glass electrode and keeps the liquid junction wet during shipping and storage. Discard the liquid and boot. Make sure the lubricated O-ring is in place in the groove inside the male connector on the sensor body.

⚠ CAUTION

Buffer solution, in the protective boot, may cause skin or eye irritation.

2. With the male connector on the sensor's body, insert the sensor into the ball valve until it gently touches the closed valve. The molded electrode guard will protect the glass bulb from breakage.

3. Thread the male connector body tightly into the ball valve assembly. DO NOT tighten the hex nut on the male connector body; doing so would not allow the sensor to be inserted through the ball valve.

4. Pull back hard on the sensor assembly, as if trying to remove the sensor, to be certain that the sensor cannot come free of the ball valve assembly. The built-in retraction stop will butt against the shoulder of the male connector if properly installed.

⚠ CAUTION

The sensor must be captured by the valve assembly and the male connector so that it cannot be blown free by process pressure if mishandled during insertion or retraction.

5. After confirming that the sensor assembly is properly secured by the valve assembly, the valve may be opened and the sensor positioned into the process at the desired depth and orientation.

6. While holding the sensor in position, tighten the hex nut of the male connector to firmly secure the sensor in place. When the hex nut is tightened, the Teflon ferrule inside the compression fitting clamps the sensor tube.

⚠ CAUTION

Over tightening the hex nut may damage the ferrule.

NOTICE

A stainless steel ferrule is available if the Teflon ferrule does not inadequately grip. When using the metallic ferrule, care must be taken to avoid over tightening and damaging the sensor tube. If the male connector leaks during insertion or retraction, replace the O-ring in the male connector.

2.3.2 Installation Without Ball Valve

The Rosemount 396R Sensor may be installed through a weldalet or pipe tee or "Y" when used with a process connector (PN 23166-00 or 23166-01). The sensor should be installed within 80° of vertical, with the electrode facing down.

Figure 2-1: Exploded View of Ball Valve Kit PN 23240-00 used with process connector PN 23166-00 (or PN 23166-01)

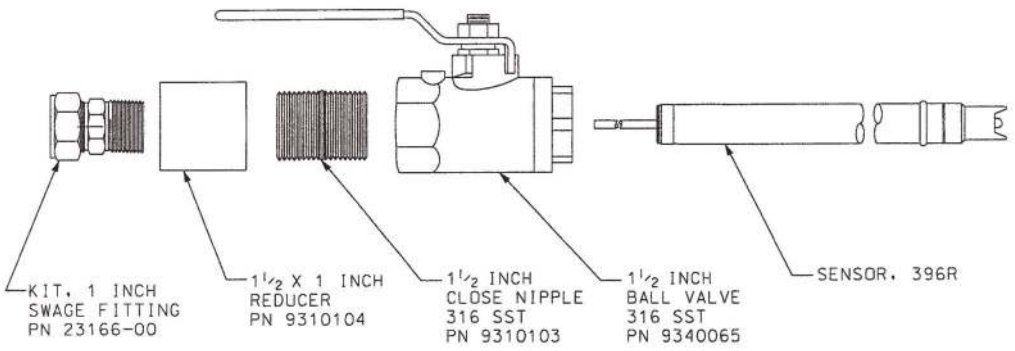


Figure 2-1: Typical Mounting Configurations for Rosemount 396R

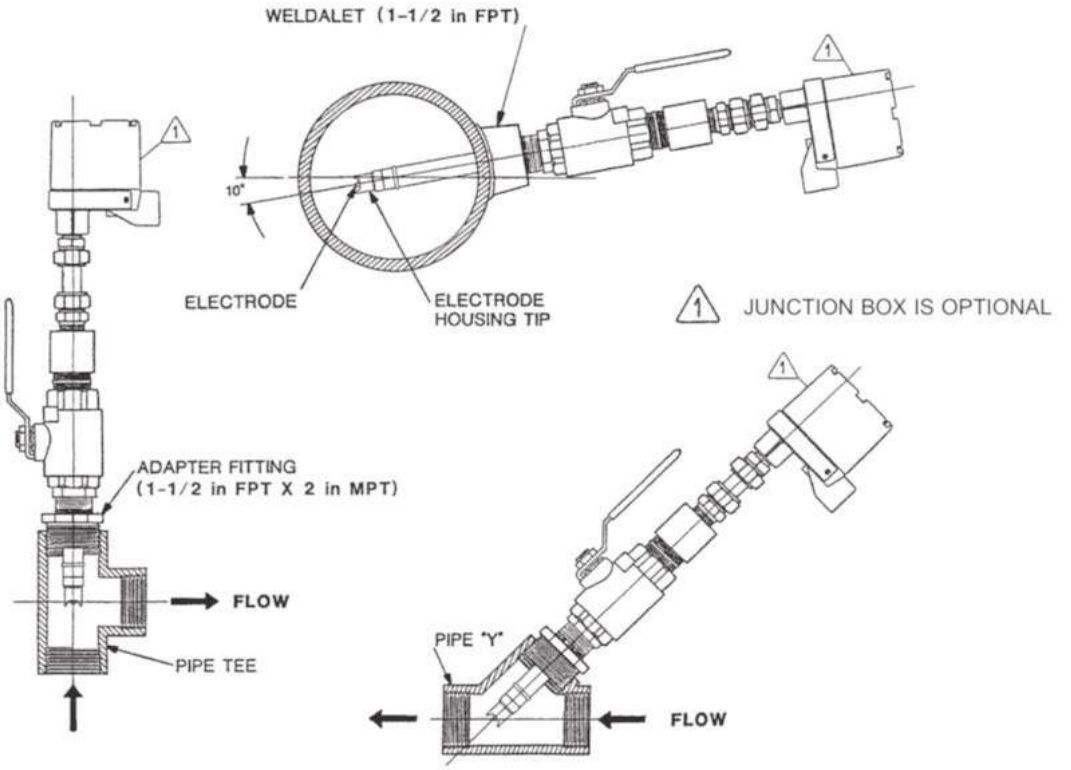


Figure 2-2: Typical Mounting Configurations for Rosemount 396RVP

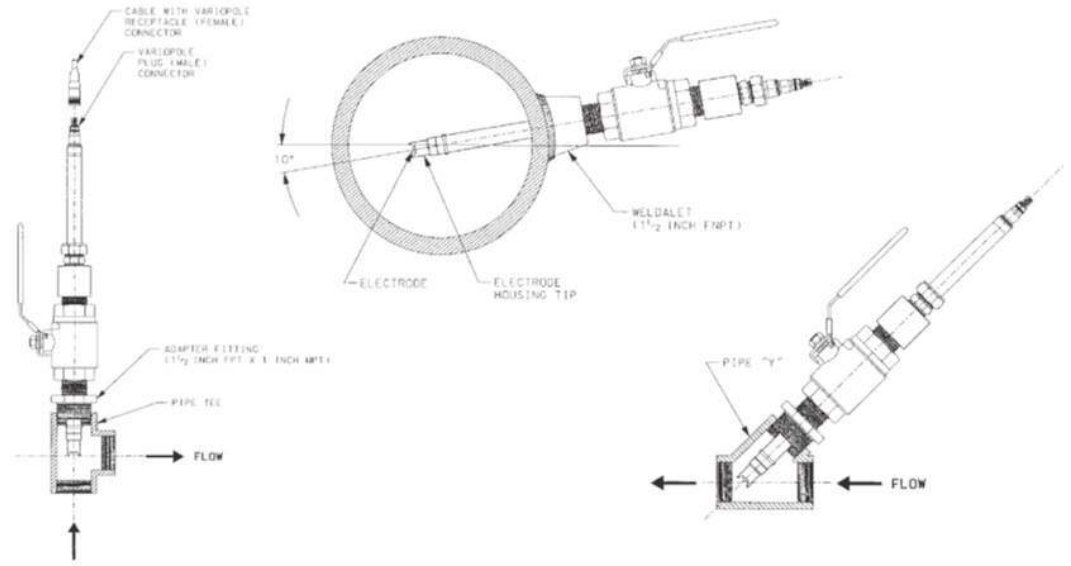
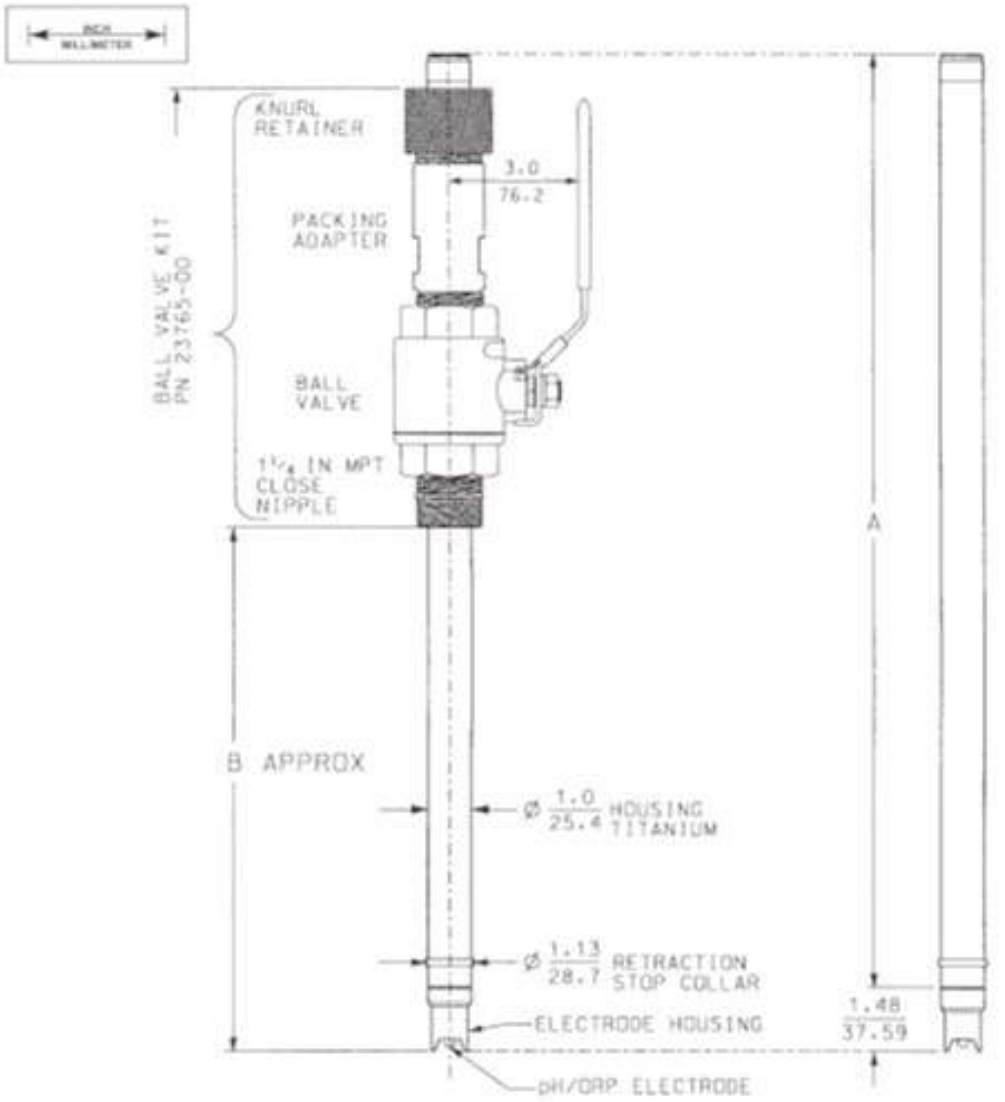


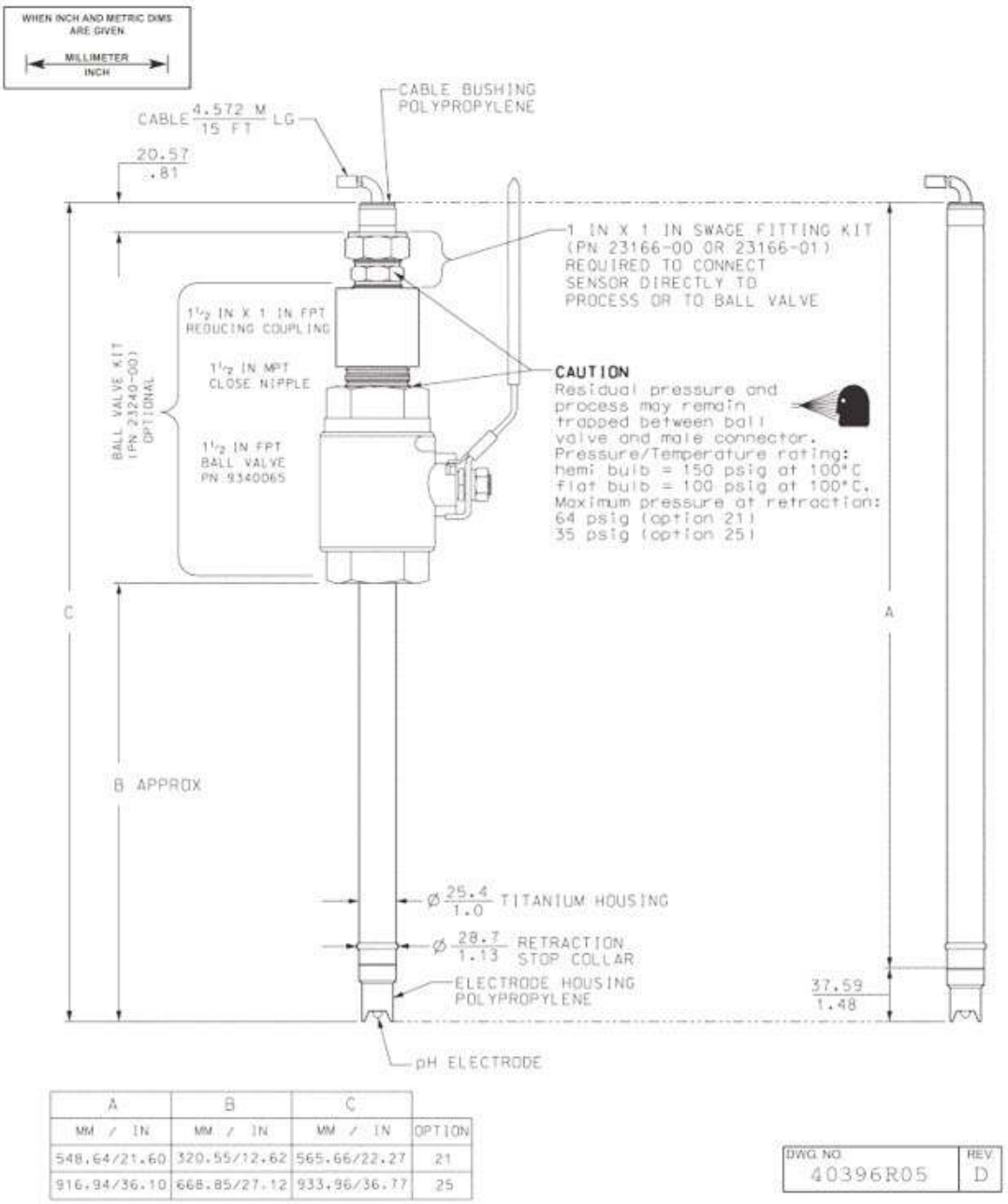
Figure 2-3: Dimensional Drawing — Rosemount 396R with Optional Ball Valve PN 23765-00



A	B	
IN / MM	IN / MM	OPTION
21.60/548.64	12.12/307.85	21
36.10/916.94	26.62/676.15	25

Note: Add five (5) inches to dimension A if mounting a sensor head junction box onto the sensor.

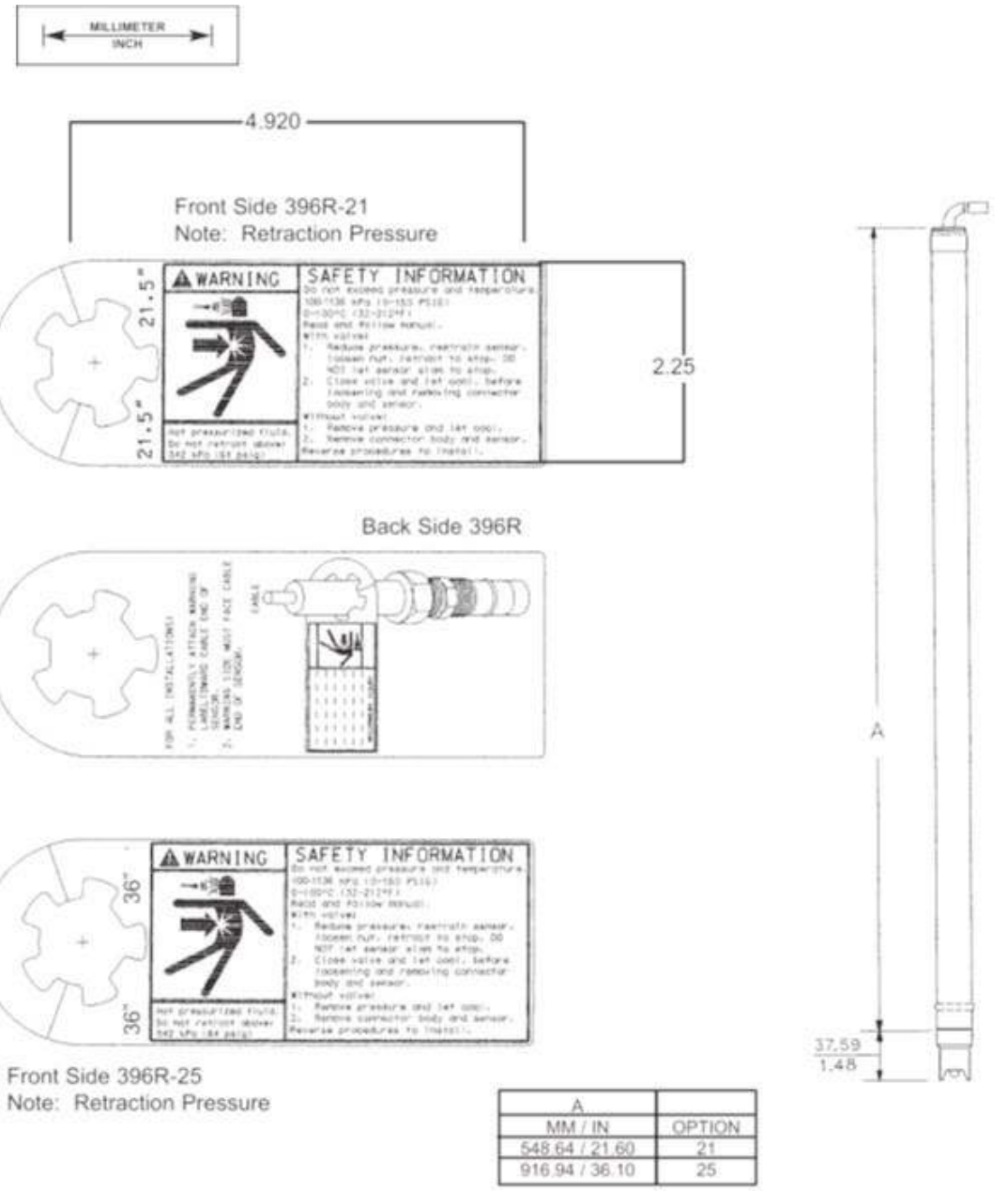
Figure 2-4: Dimensional Drawing — Rosemount 396R with Optional Ball Valve PN 23240-00



A		B		C	
MM	IN	MM	IN	MM	IN	OPTION
548.64	21.60	320.55	12.62	565.66	22.27	21
916.94	36.10	668.85	27.12	933.96	36.77	25

Note: Add five (5) inches to dimension A if mounting a sensor head junction box onto the sensor.

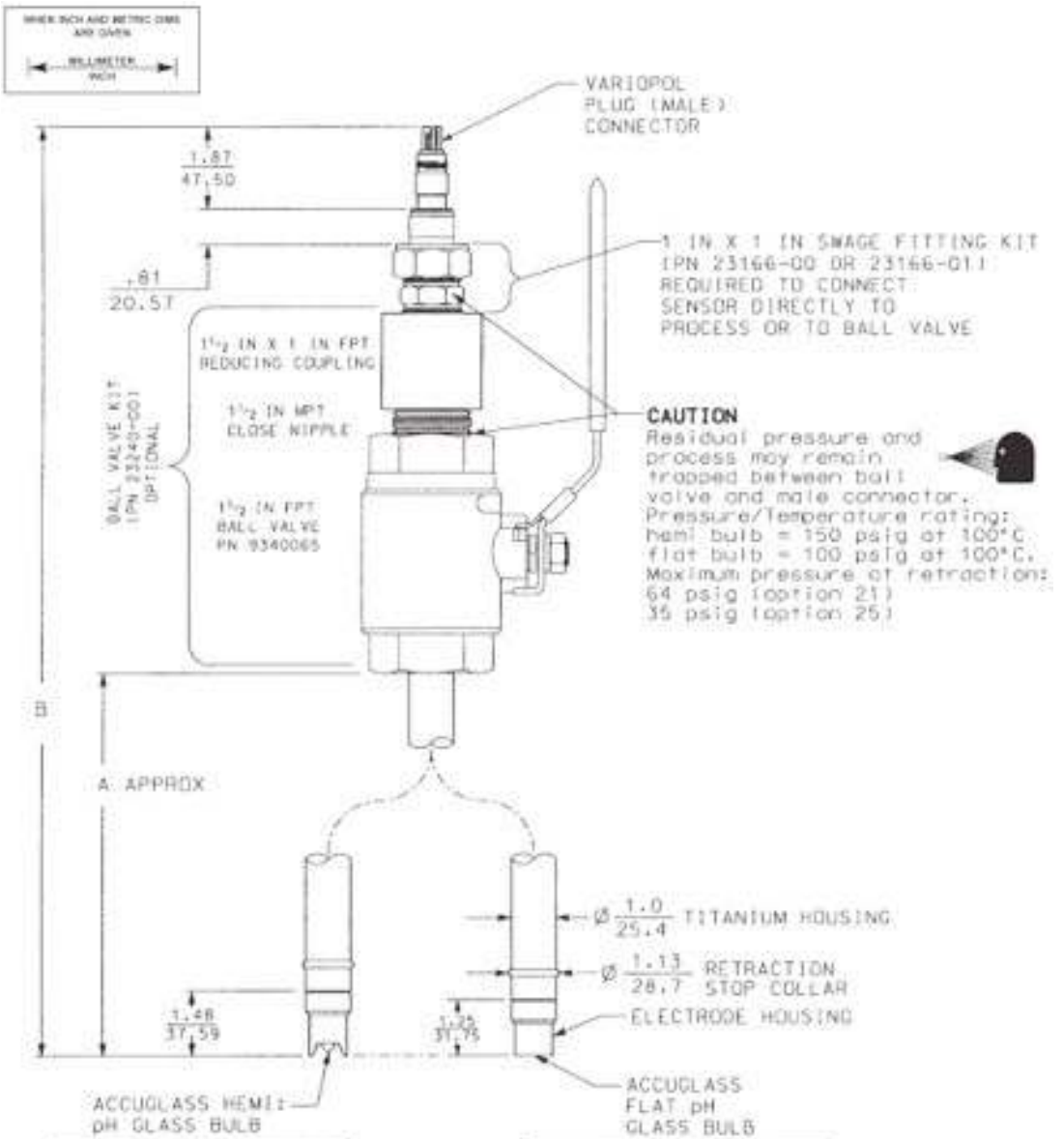
Figure 2-5: Dimensional Warning Label for Rosemount 396R Hemi Bulb Sensors and Sensor



A	
MM / IN	OPTION
548.64 / 21.60	21
916.94 / 36.10	25

Note: Pressure rating for flat glass sensors is 100-790 kPa (0-100 psig).

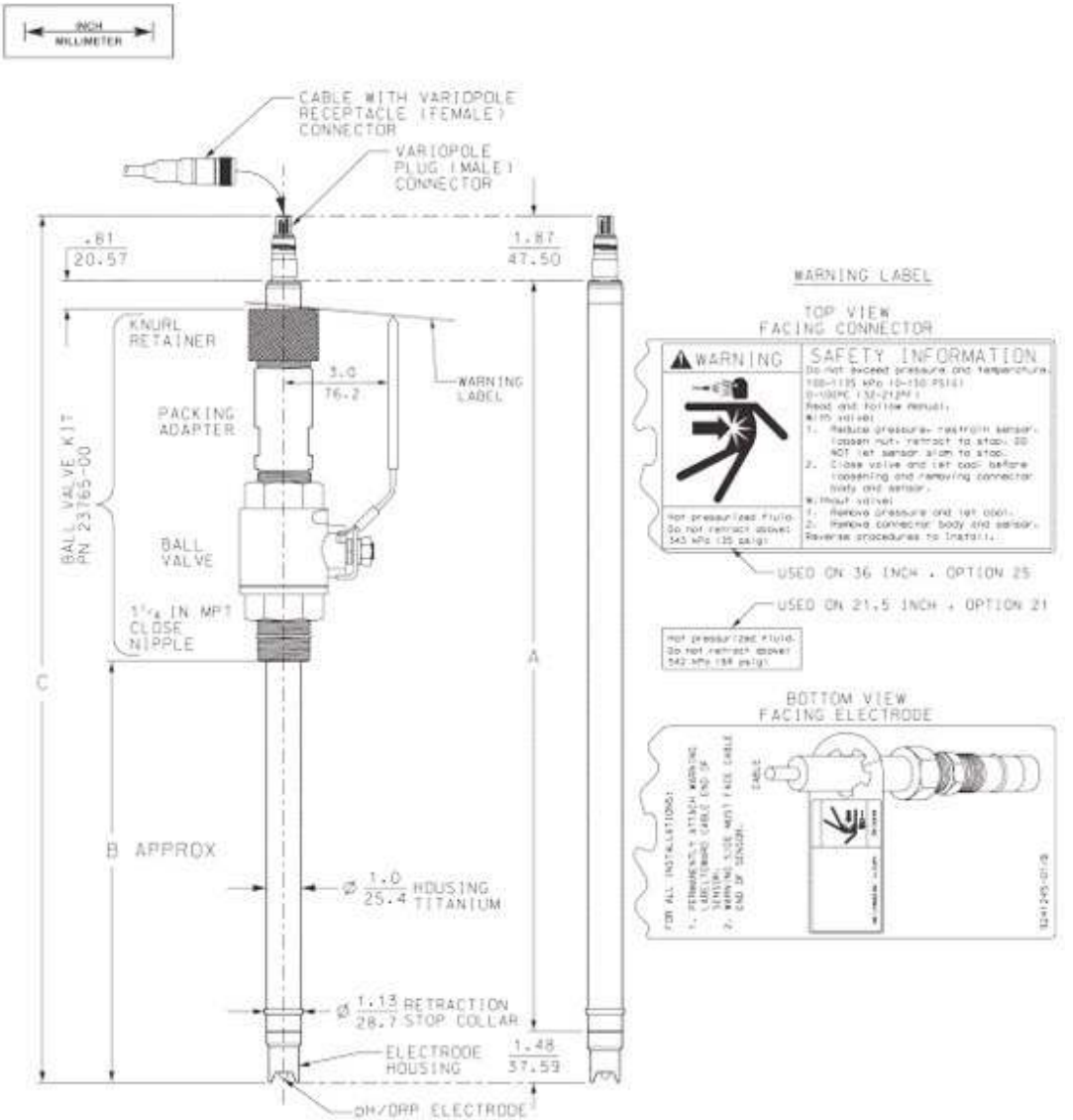
Figure 2-6: Dimensional Drawing — Rosemount 396RVP with Optional 1-1/2 inch Ball Valve PN 23240-00



A		B		
IN	MM	IN	MM	OPTION
12.62	320.55	24.14	613.16	21
27.12	668.85	38.64	981.46	25

A		B		
IN	MM	IN	MM	OPTION
12.65	321.31	23.89	606.81	21
27.15	689.15	38.39	975.11	25

Figure 2-6: Dimensional Drawing — Rosemount 396RVP with Optional 1-1/4 inch Ball Valve PN 23765-00



A	B	C	
IN / MM	IN / MM	IN / MM	OPTION
21.60/548.64	12.12/307.85	24.14/613.16	21
36.10/916.94	26.62/676.15	38.64/981.46	25

Section 3: Wiring Rosemount 396R

3.1 Wiring for Rosemount 396R

Make electrical connections as shown on Figures 3-1 through 3-15 using the following guidelines. For wiring Rosemount 396RVP, see Section 4.

1. Pay particular attention to the analyzer or transmitter model number when following details on the wiring diagrams to ensure that the connections are made to the proper terminals.
2. Use Rosemount custom cable Part Number 9200273 for interconnect.
3. The maximum distance from the sensor to the transmitter is 15 ft without an integral preamplifier.
4. Signal cable should be run in a dedicated conduit and should be kept away from AC power lines.

NOTICE

For maximum EMI/RFI protection when wiring from the sensor to the junction box, the outer braid of the sensor should be connected to the outer braided shield of the extension cable. The outer braid of the extension cable to the instrument must be terminated at earth ground or by using an appropriate metal cable gland fitting, that provides a secure connection to the instrument cable.

Figure 3-1: Cable Preparation Instructions (PN 9200274)

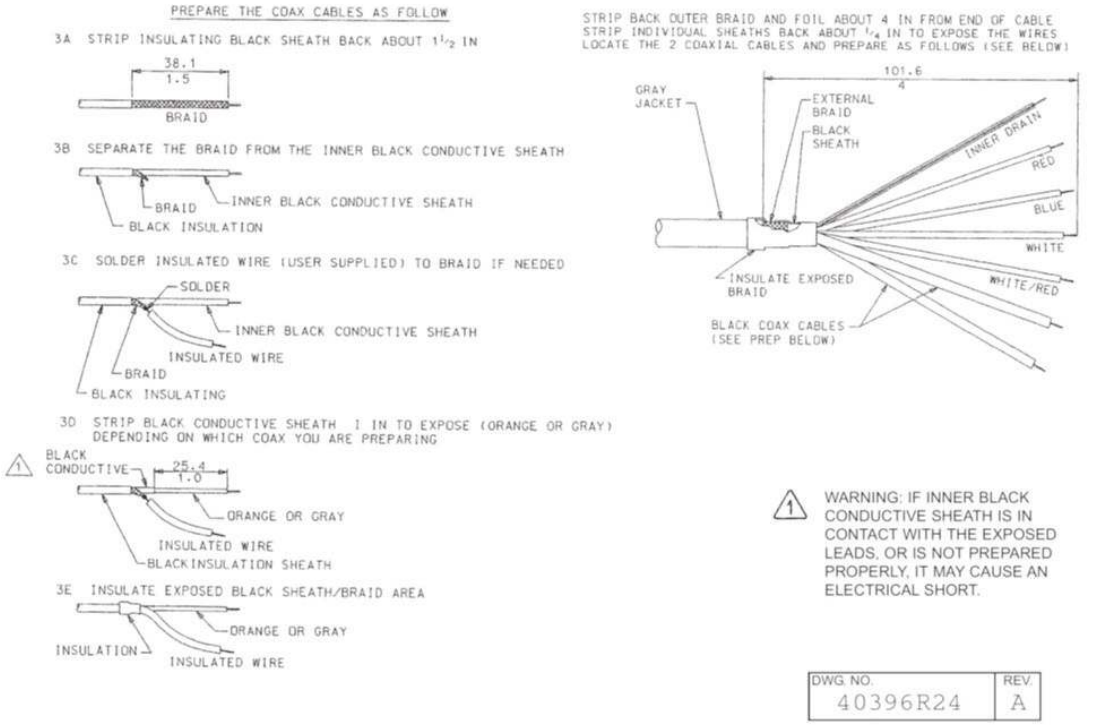


Figure 3-2: Wiring Rosemount 396R-54 to Models 54e, 81, 3081, 4081, and 5081 pH/ORP

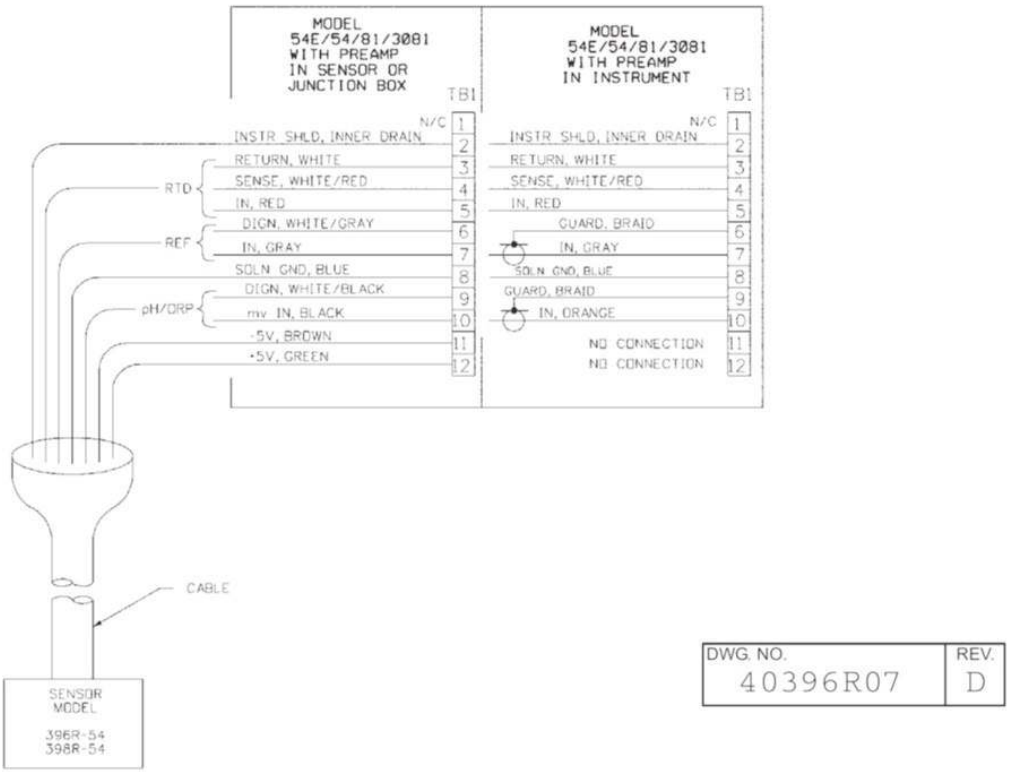


Figure 3-3: Wiring Rosemount 396R-54 with Remote J-Box and Preamp (PN 23555-00)

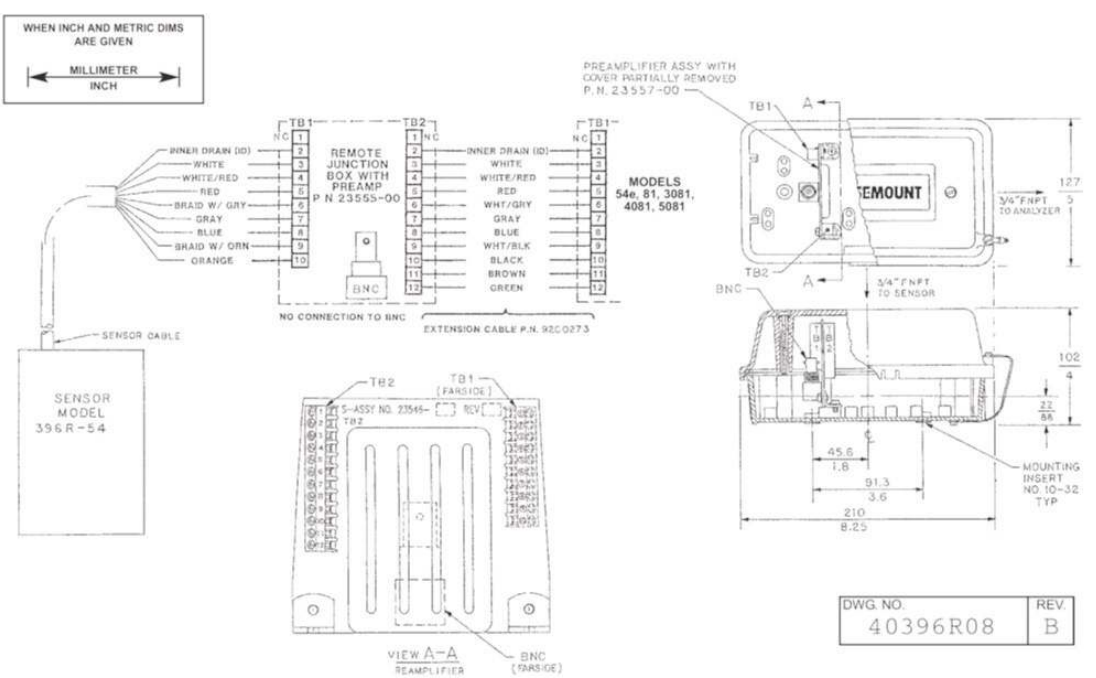


Figure 3-4: Wiring Rosemount 396R-50 for use with Remote Junction Box (PN 23309-03)

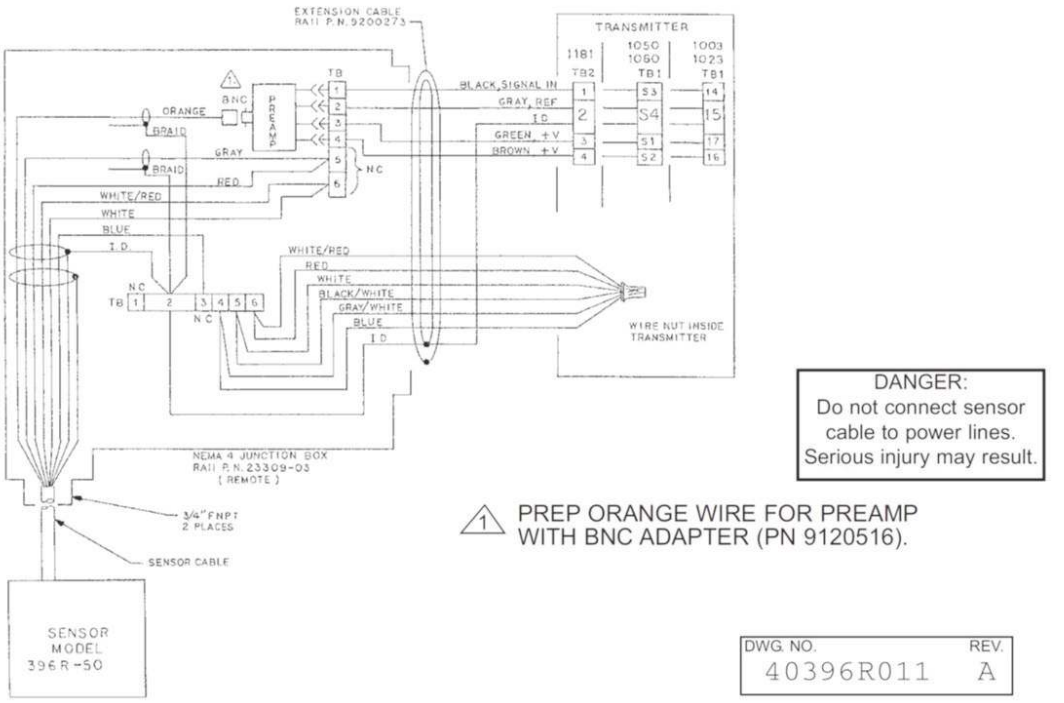


Figure 3-5: Wiring Rosemount 396R-54 for use with Remote Junction Box (PN 23309-04)

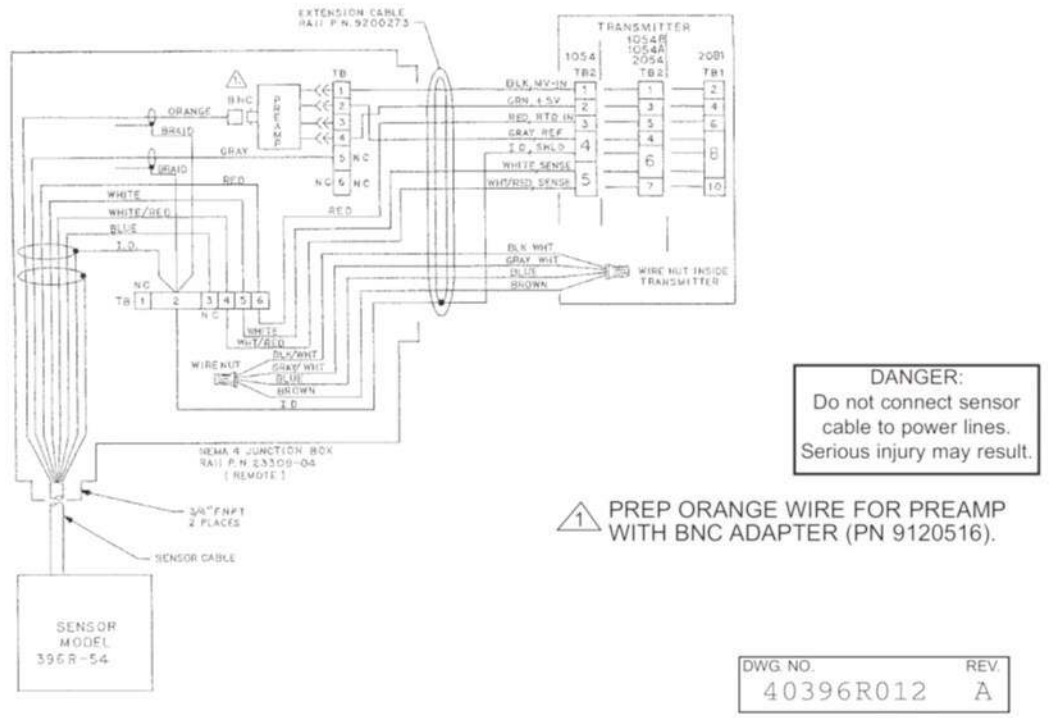


Figure 3-6: Wiring Rosemount 396R-50/54 to Model 1181 pH/ORP

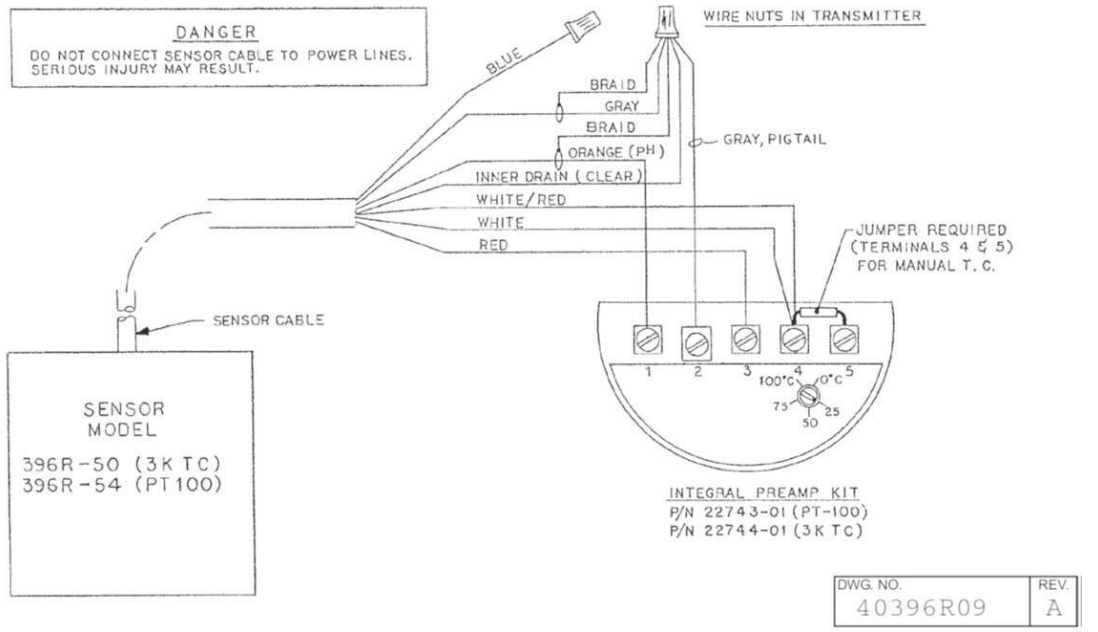


Figure 3-7: Wiring Rosemount 396R-54 to Models 1054A/B pH/ORP, 2054 pH, and 2081 pH/ORP

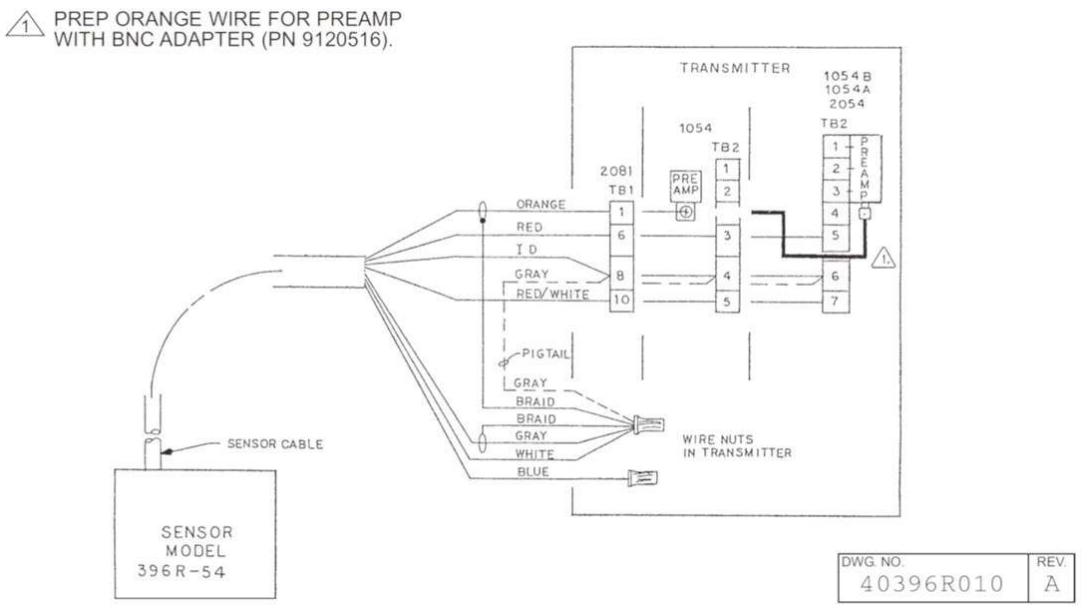


Figure 3-8: Wiring Rosemount 396R-54 to Model SCL-(P/Q)

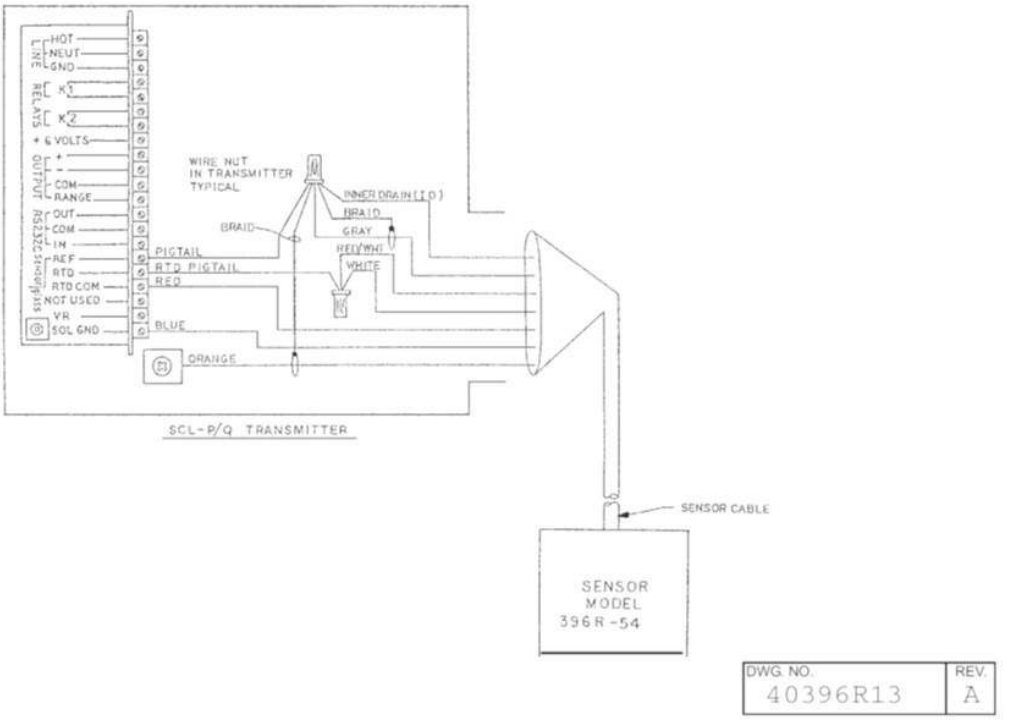


Figure 3-9: Wiring Rosemount 396R-54-61 to Model Xmt-P-XX-10

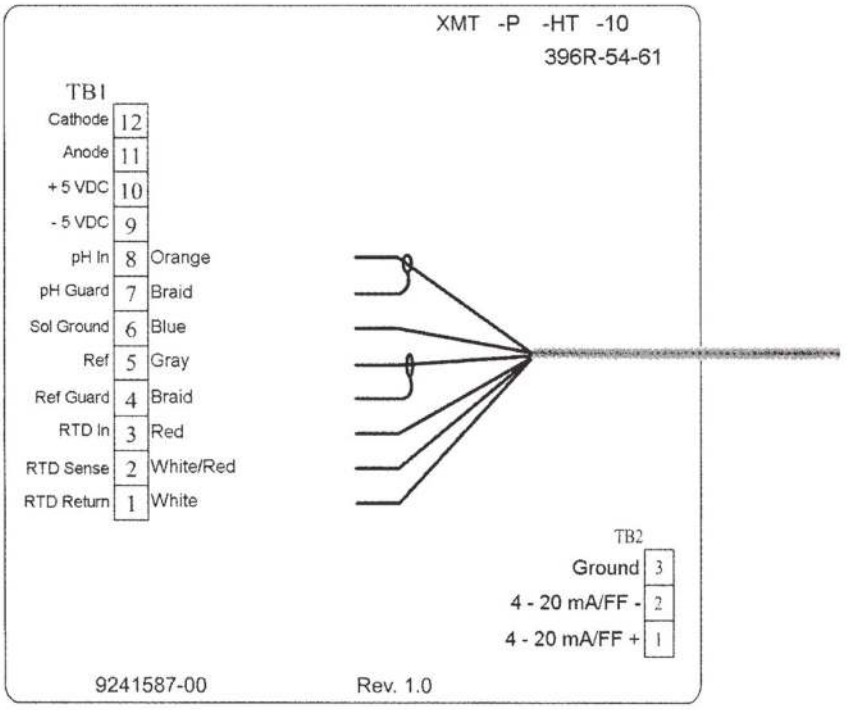


Figure 3-10: Wiring Rosemount 396R-50/54-60 for use with Sensor Head J-Boxes to Models 1181, 1054 Series, 2054, 2081

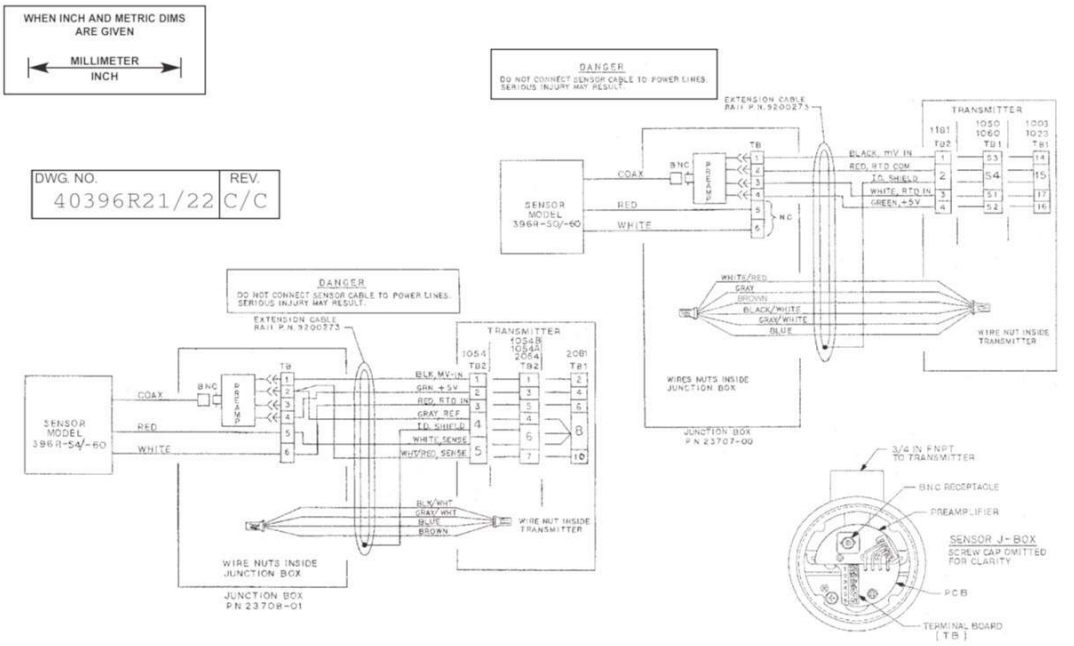


Figure 3-11: Wiring Rosemount 396R-54-61 for use with Sensor Head J-Box to Models 54e, 81, 3081, 4081, and 5081

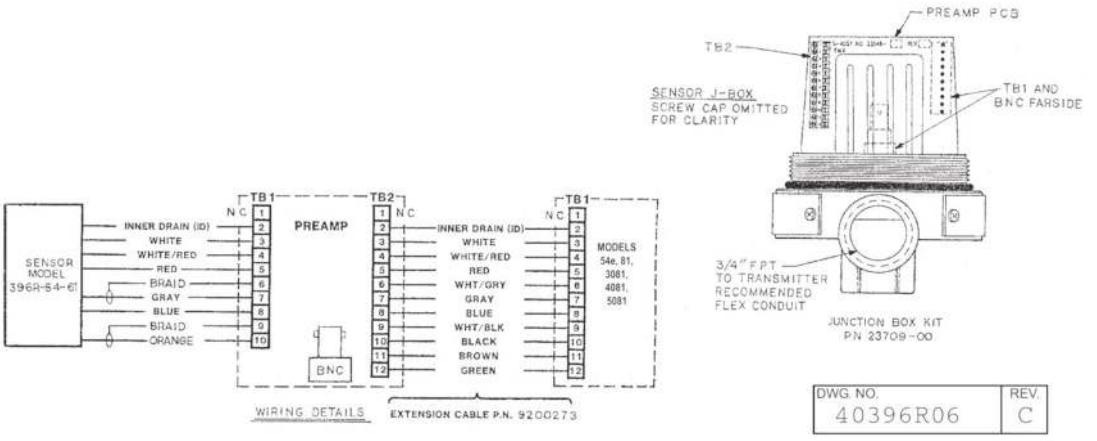


Figure 3-12: Wiring Rosemount 396R-50 for use with J-Box (PN 23707-00) to Models 1181, 1050, 1060, 1030, and 1023 pH Transmitters

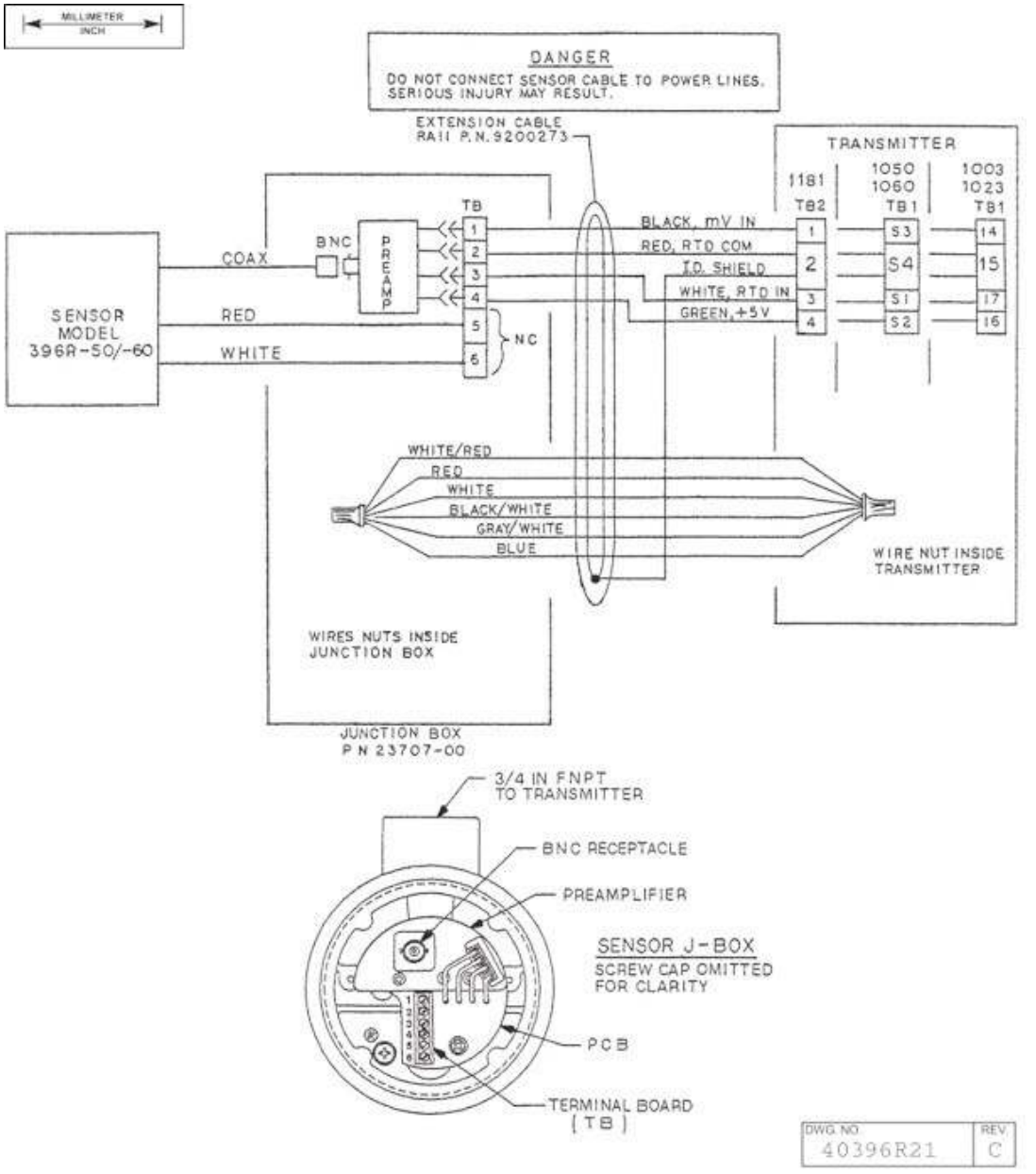


Figure 3-13: Wiring Rosemount 396R-54 for use with J-Box (PN 23708-01) to Models 1054 Series, 2054, and 2081 pH Transmitters

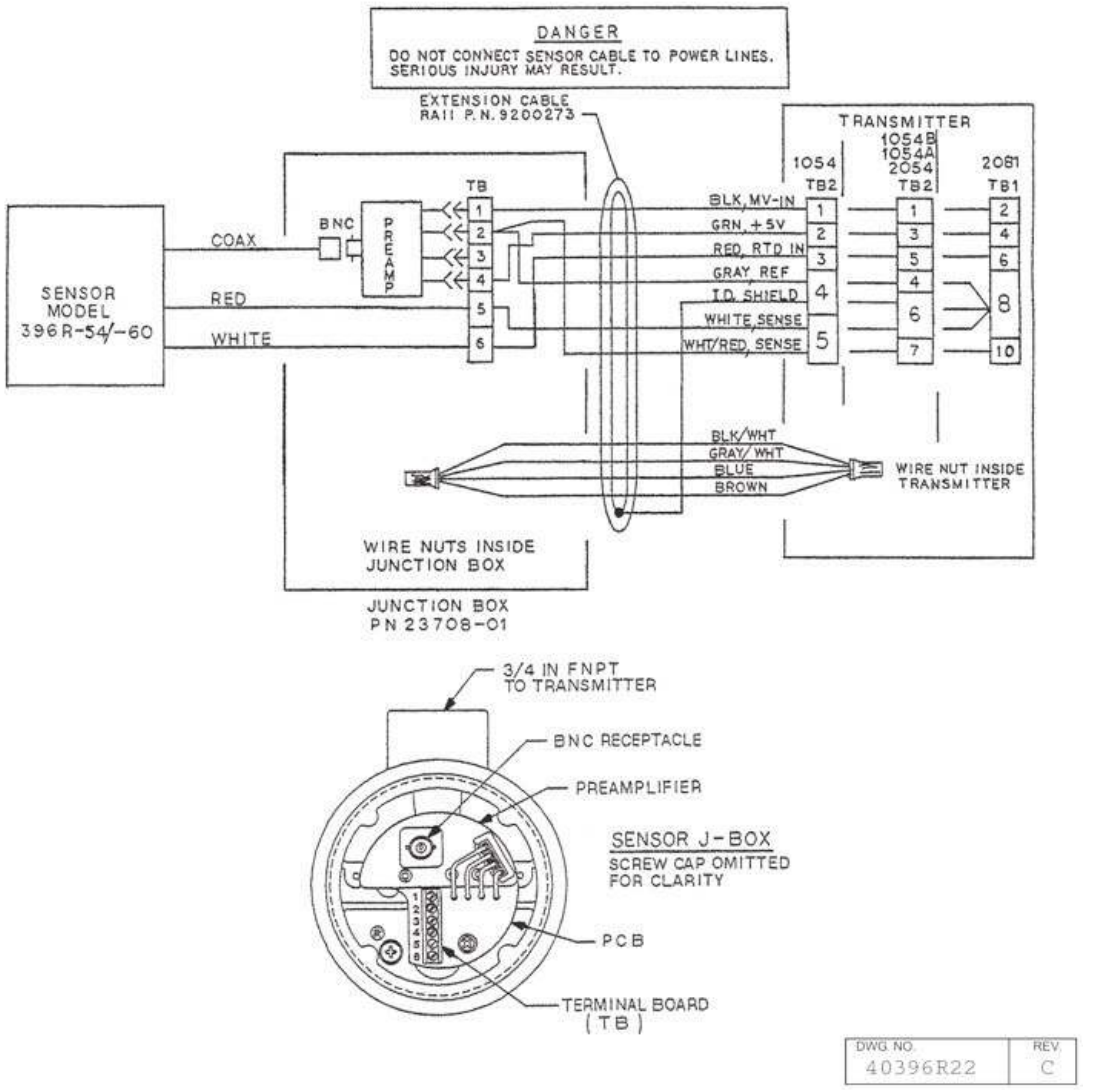


Figure 3-14: Wiring Rosemount 396R-50/54-60 for use with Sensor Head J-Boxes to Models 1181, 1054 Series, 2054, 2081

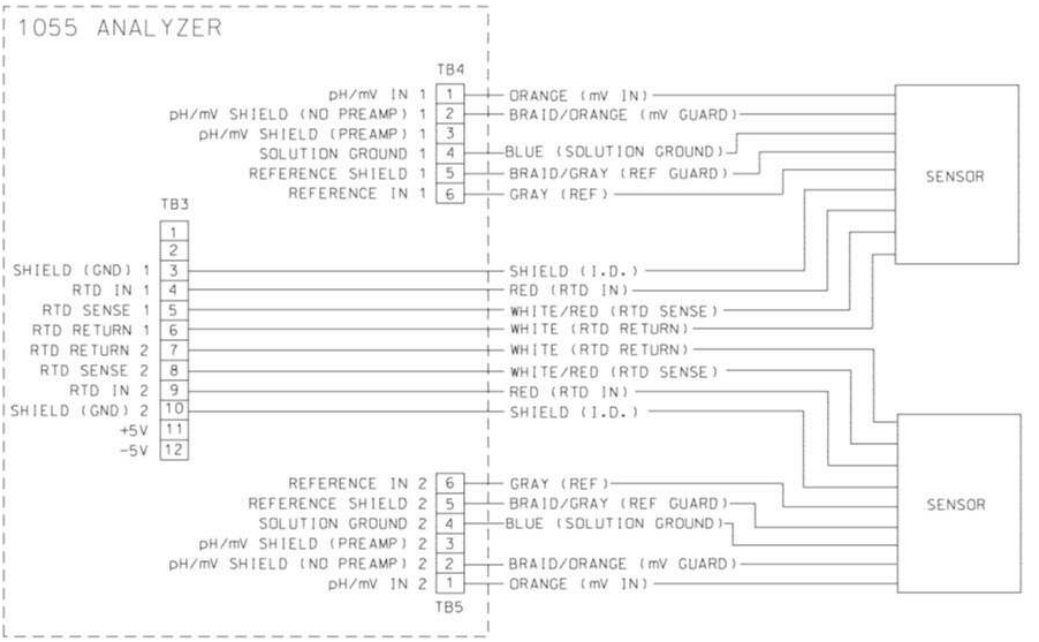
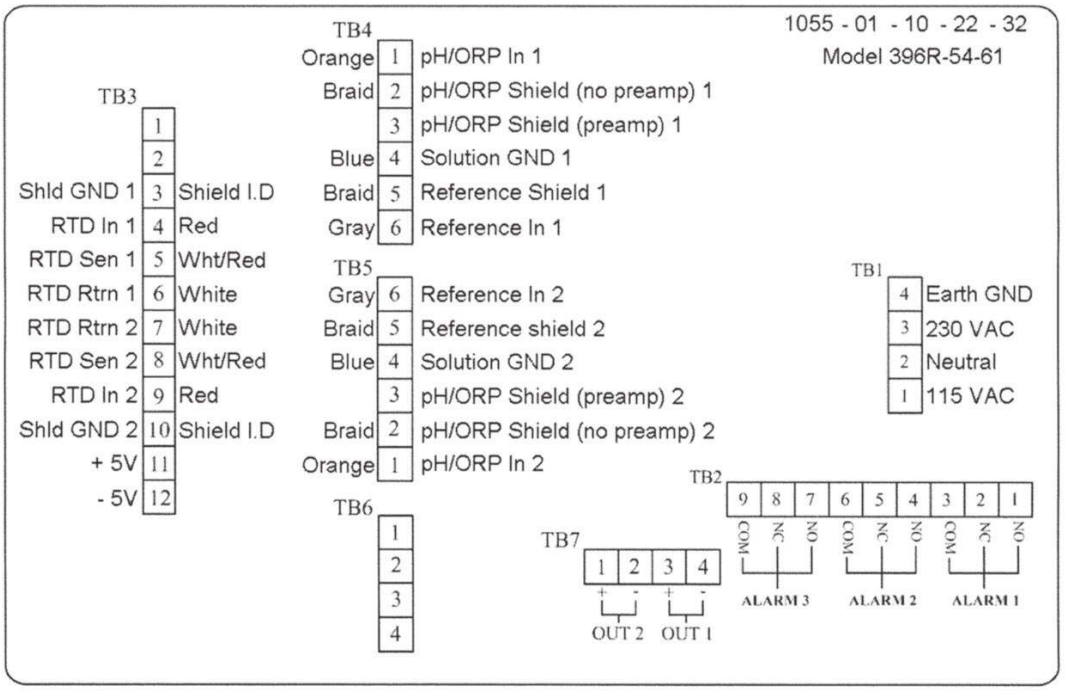


Figure 3-15: Wiring Rosemount 396R-54-61 to Model 1055-10-22-32



Section 3: Wiring Rosemount 396RVP

3.1 Wiring for Rosemount 396RVP

Make electrical connections as shown on Figures 4-1 through 4-20 using the following guidelines. For wiring Rosemount 396R, see Section 3.

1. Pay particular attention to the analyzer or transmitter model number when following details on the wiring diagrams to ensure that the connections are made to the proper terminals.

2. The Rosemount 396RVP uses a mating VP cable. See attached wiring sheet for wire functions of the cables and wiring diagrams to various transmitters.

3. The maximum distance from the sensor to the transmitter is 15 ft without an integral preamplifier.

4. Signal cable should be run in a dedicated conduit and should be kept away from AC power lines.

NOTICE

For maximum EMI/RFI protection when wiring from the sensor to the junction box, the outer braid of the sensor should be connected to the outer braided shield of the extension cable. The outer braid of the extension cable to the instrument must be terminated at earth ground or by using an appropriate metal cable gland fitting, that provides a secure connection to the instrument cable.

Figure 4-1: Model 81 Wiring

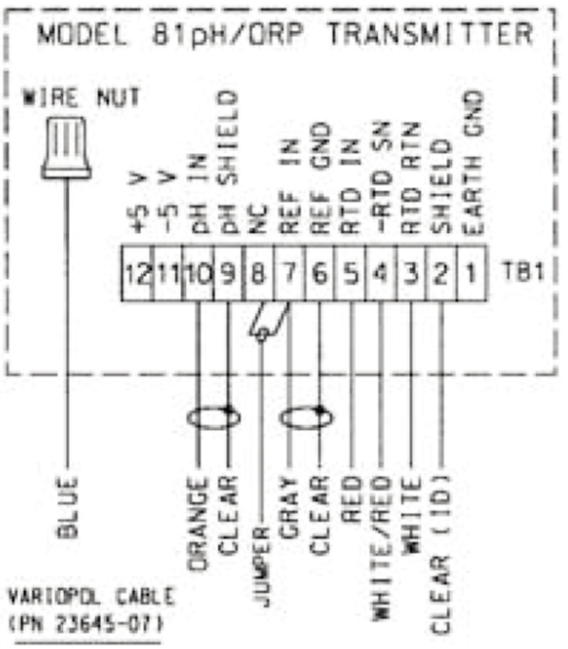


Figure 4-2: Model 1181 Wiring

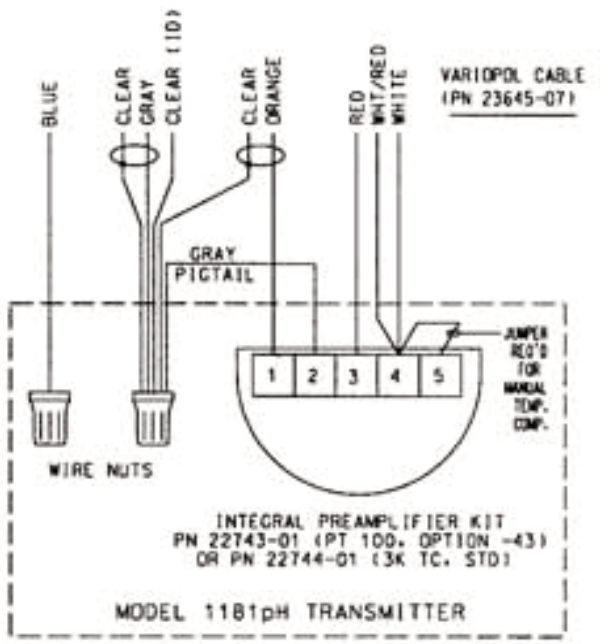


Figure 4-3: Model 81 Wiring through Remote Junction Box

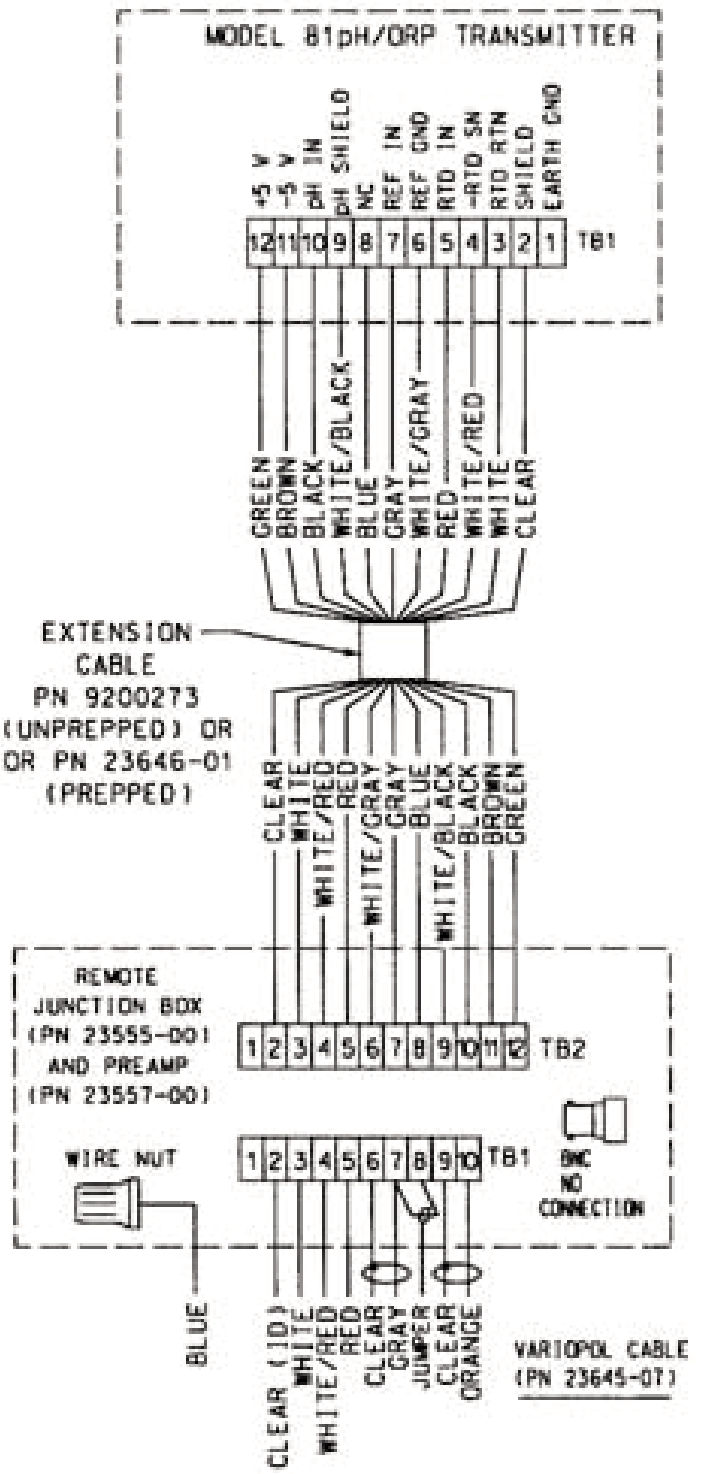


Figure 4-4: Model 1181, 1050/1060, & 1003/1023 Wiring through Remote Junction Box

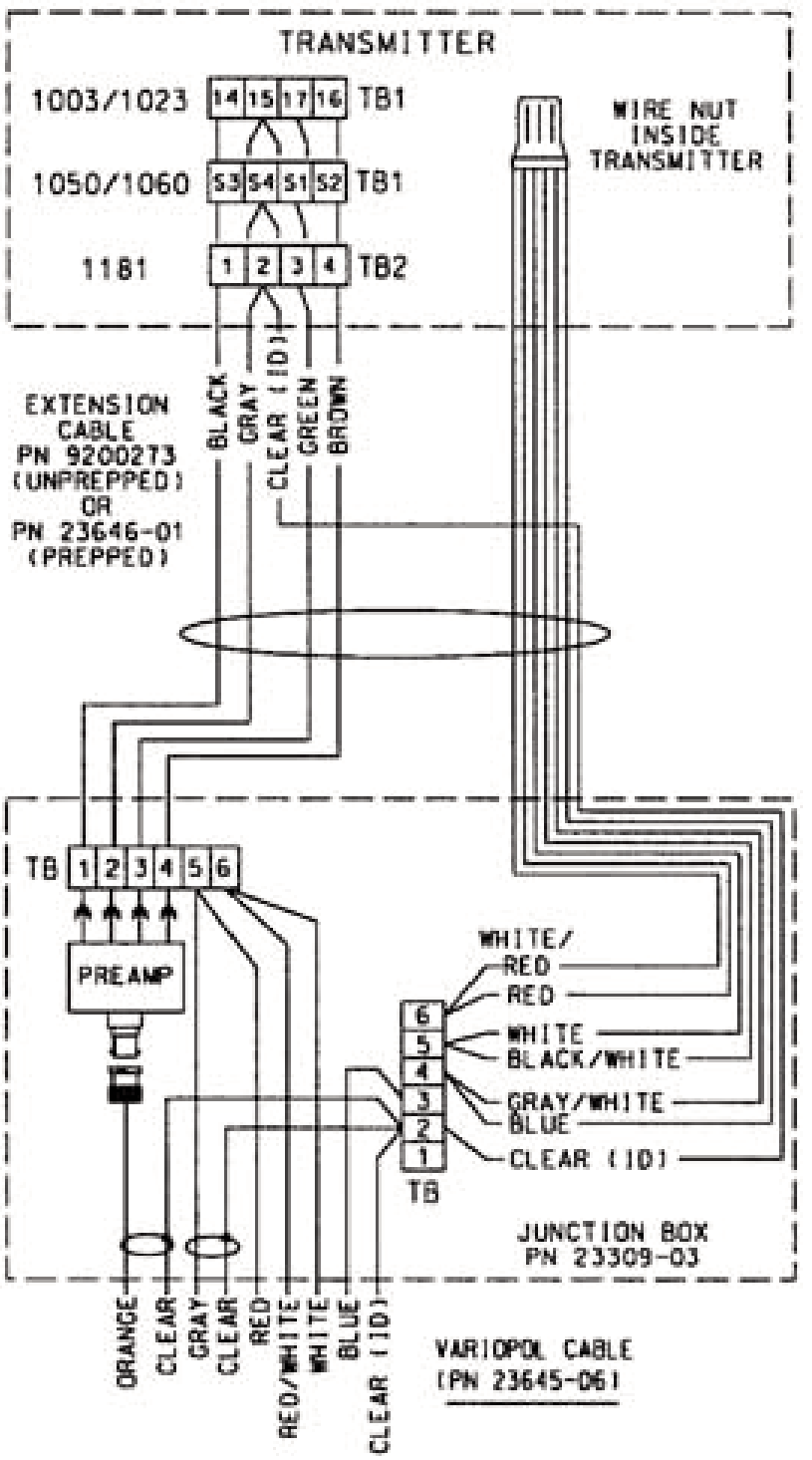


Figure 4-5: Model 2081 Wiring

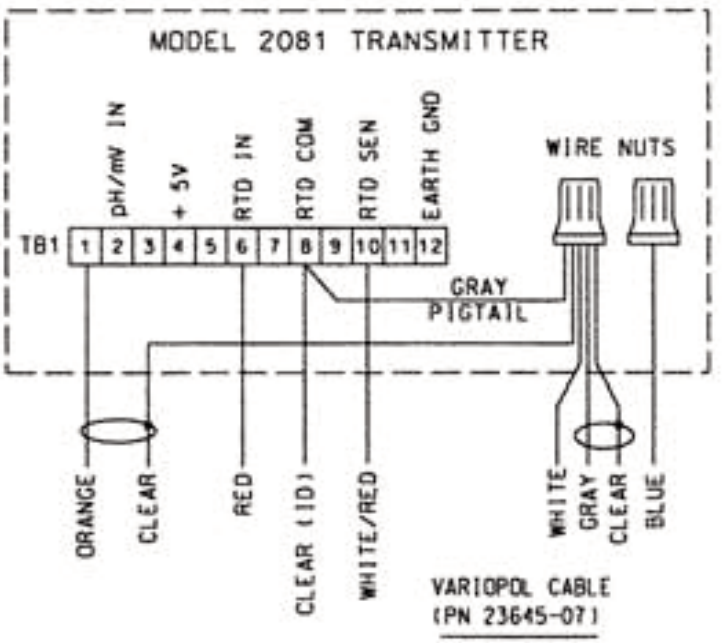


Figure 4-6: Model 3081, 4081, and 5081 Wiring

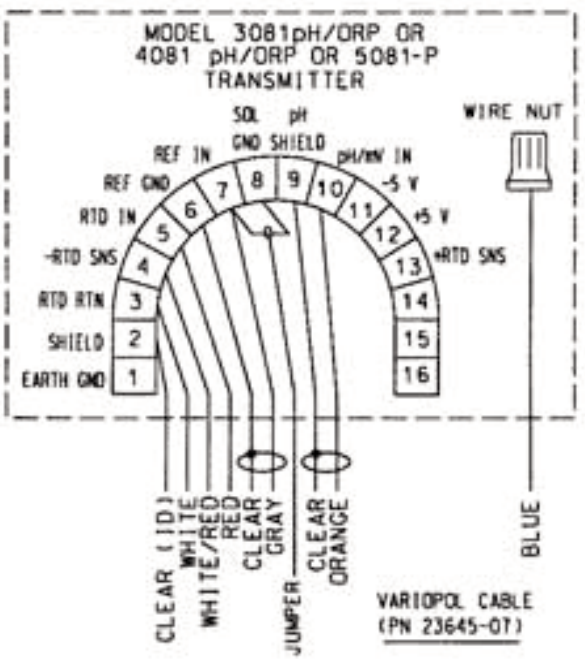


Figure 4-7: Model 2081 Wiring through Remote Junction Box

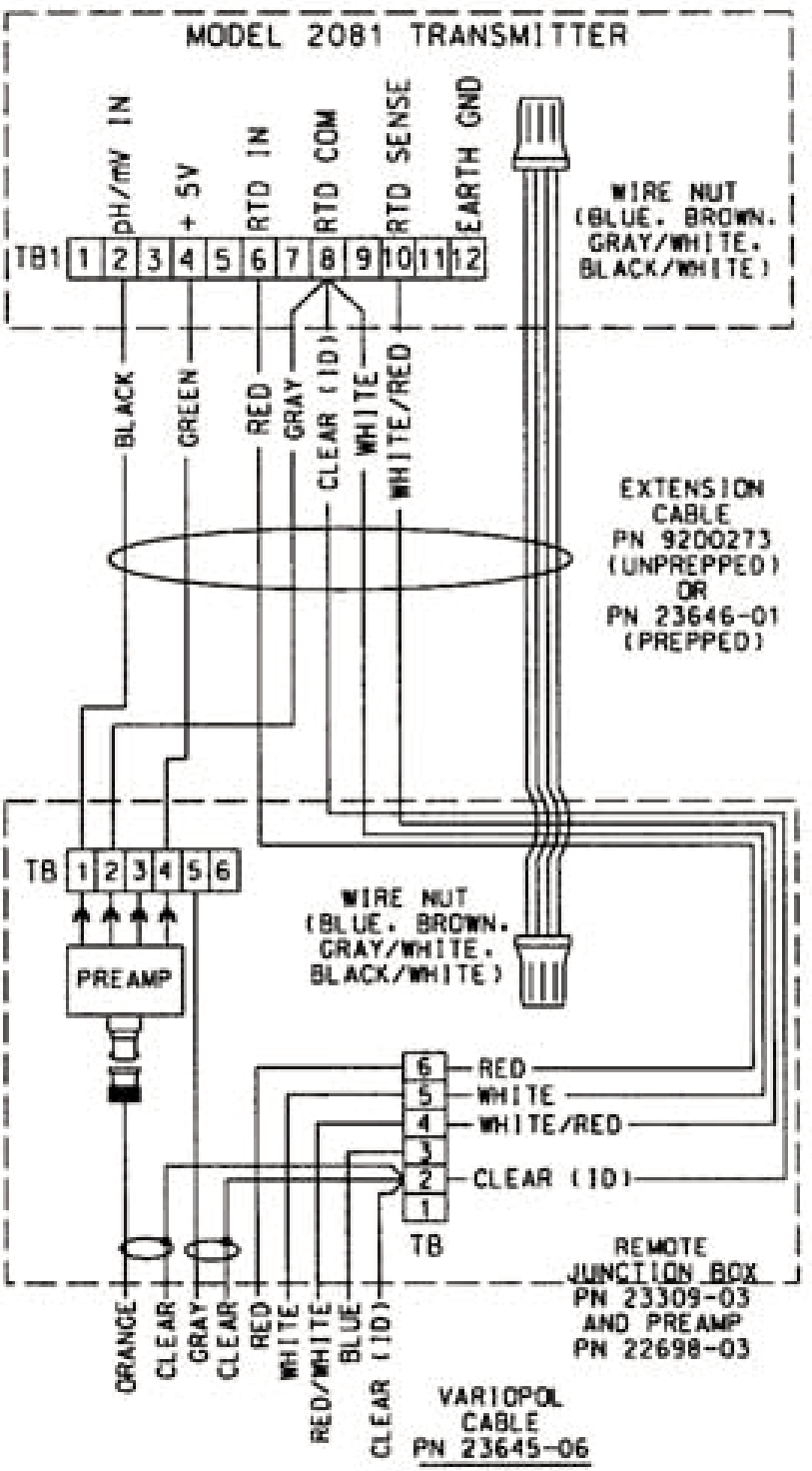


Figure 4-8: Model 3081, 4081, and 5081 Wiring through Remote Junction Box

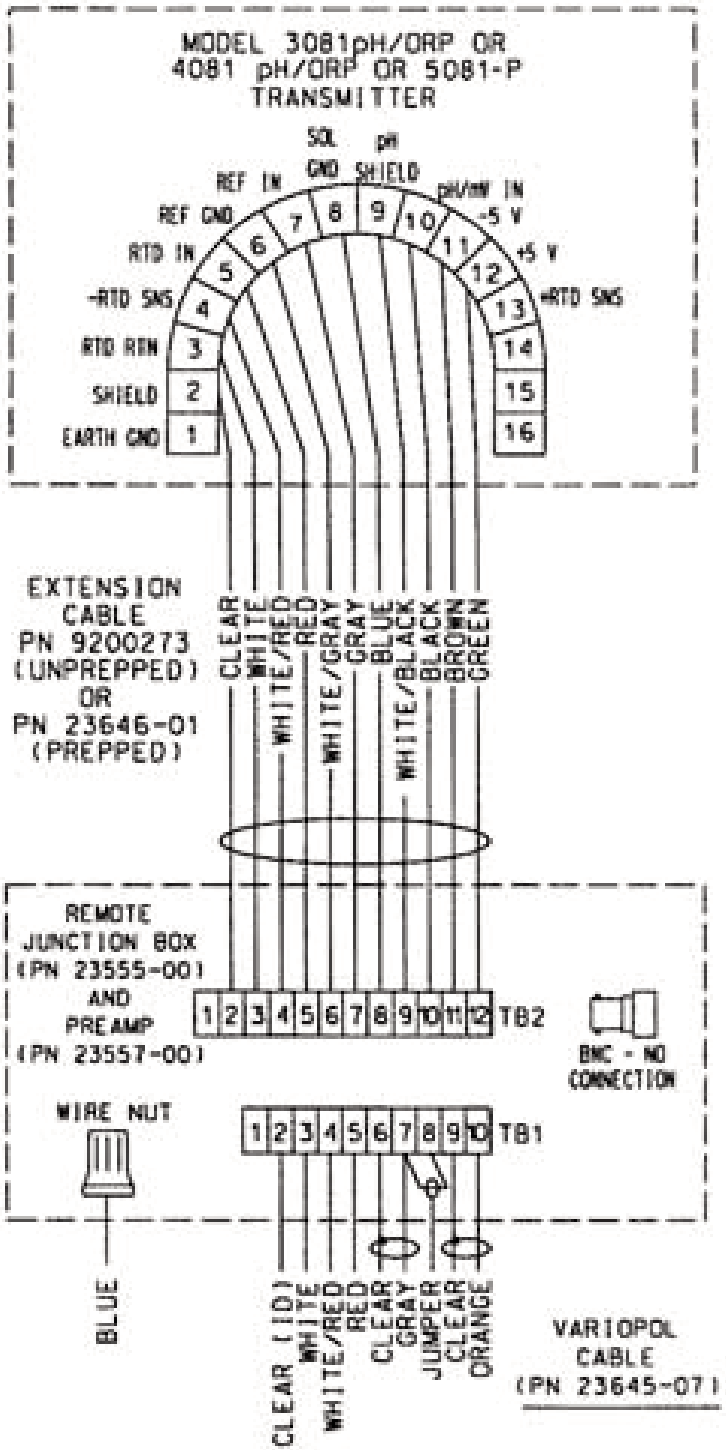


Figure 4-9: Model 1054 Wiring

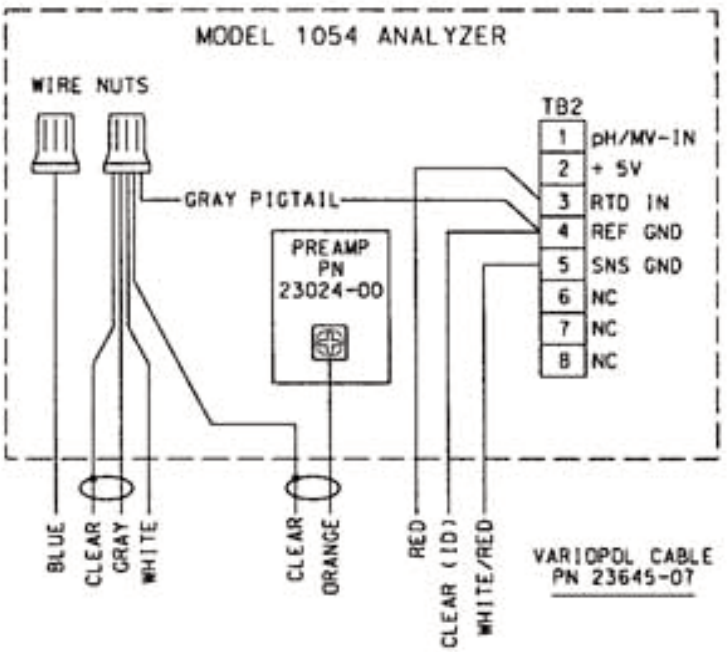


Figure 4-10: Model 1054A/B & 2054 Wiring

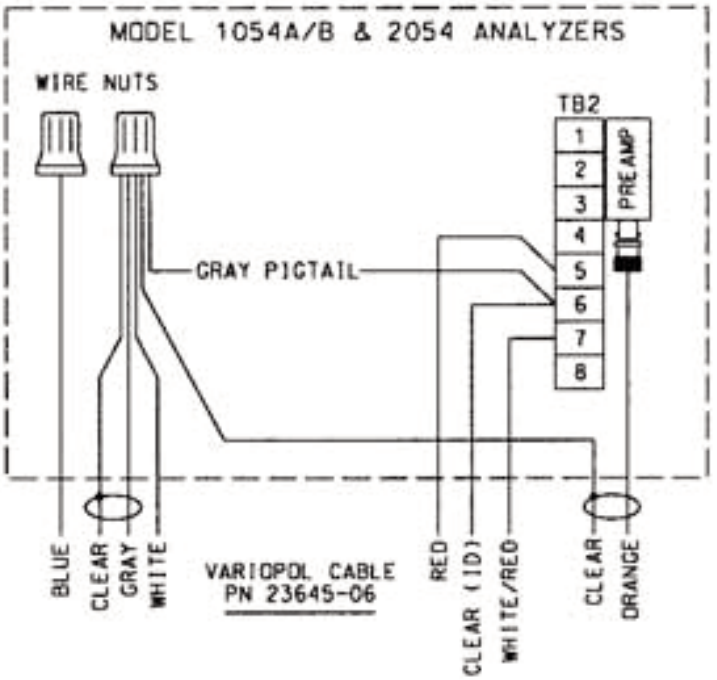


Figure 4-11: Model 1054 Wiring through a Remote Junction Box

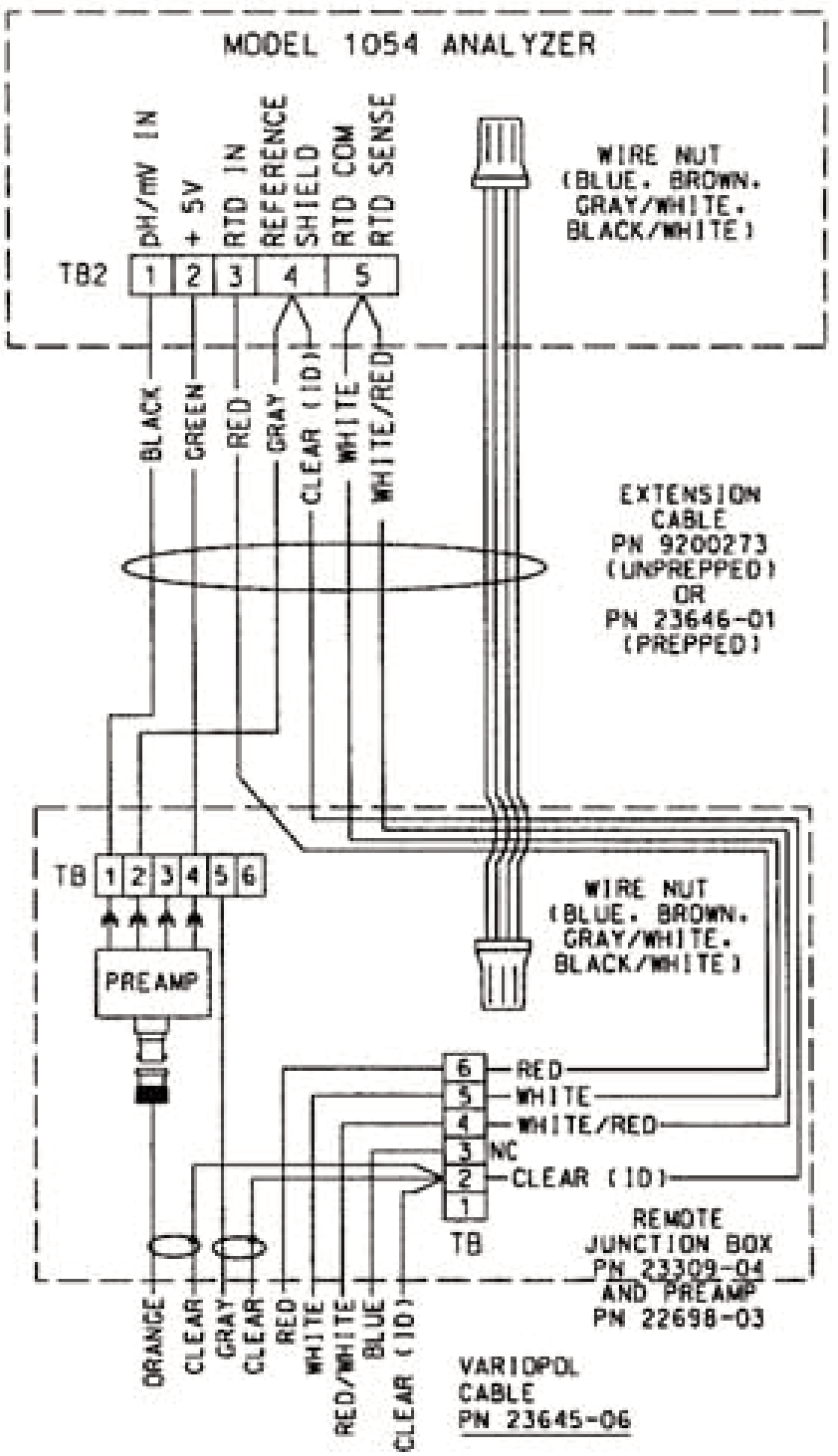


Figure 4-12: Model 1054A/B & 2054 Wiring through a Remote Junction Box

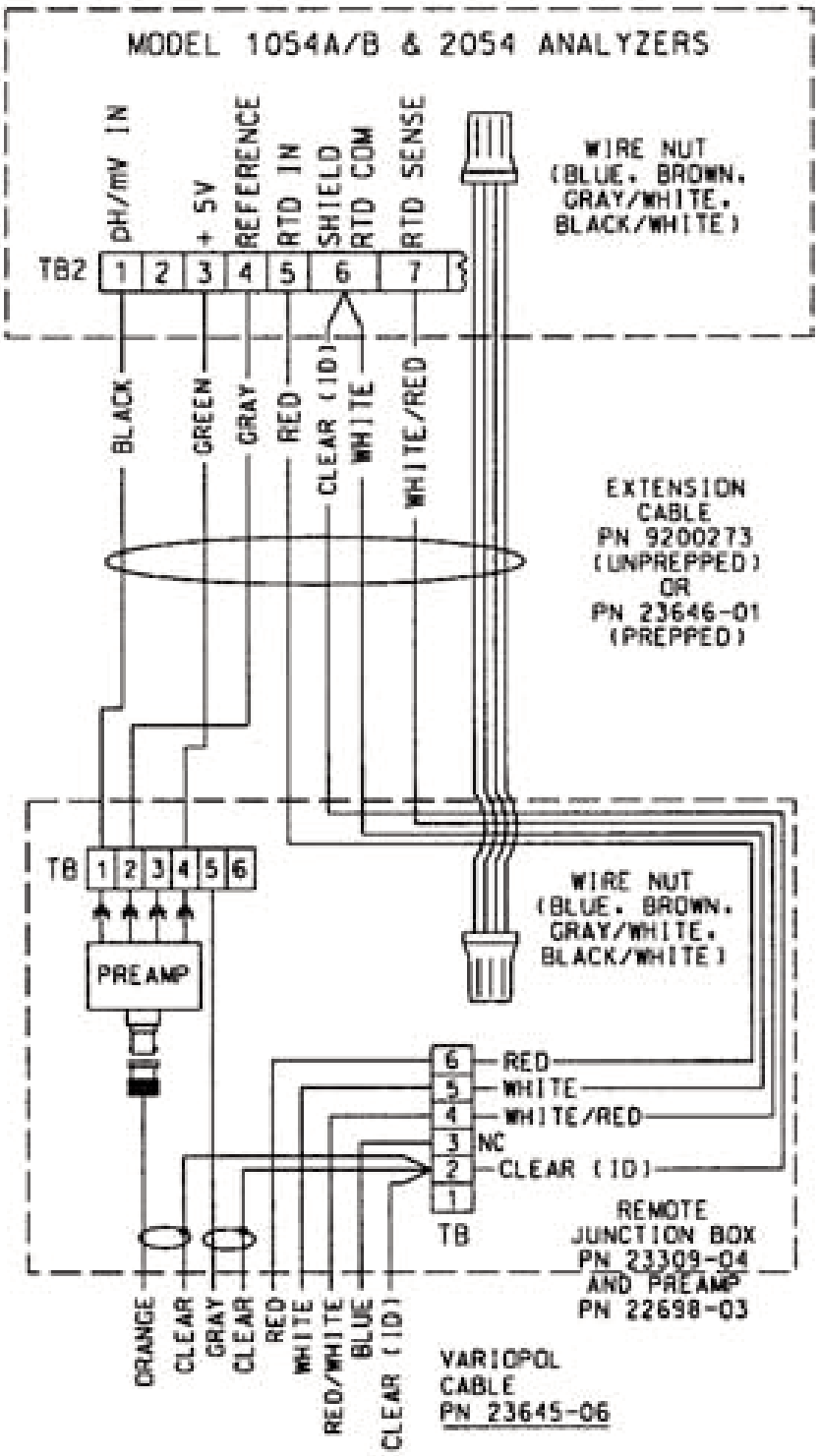


Figure 4-13: Model 54/54e Wiring

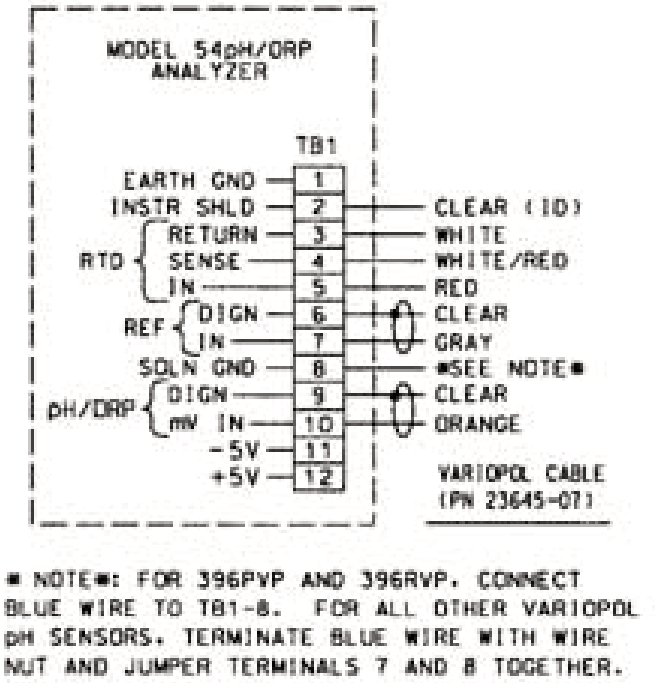


Figure 4-14: Model 54 Wiring through Remote Junction Box

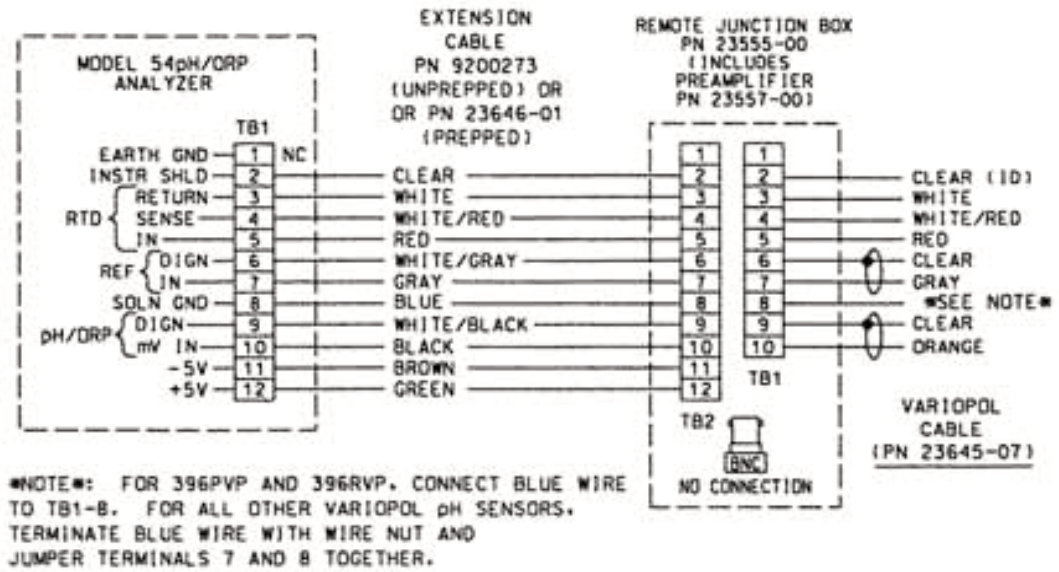


Figure 4-15: Model 2700 Wiring

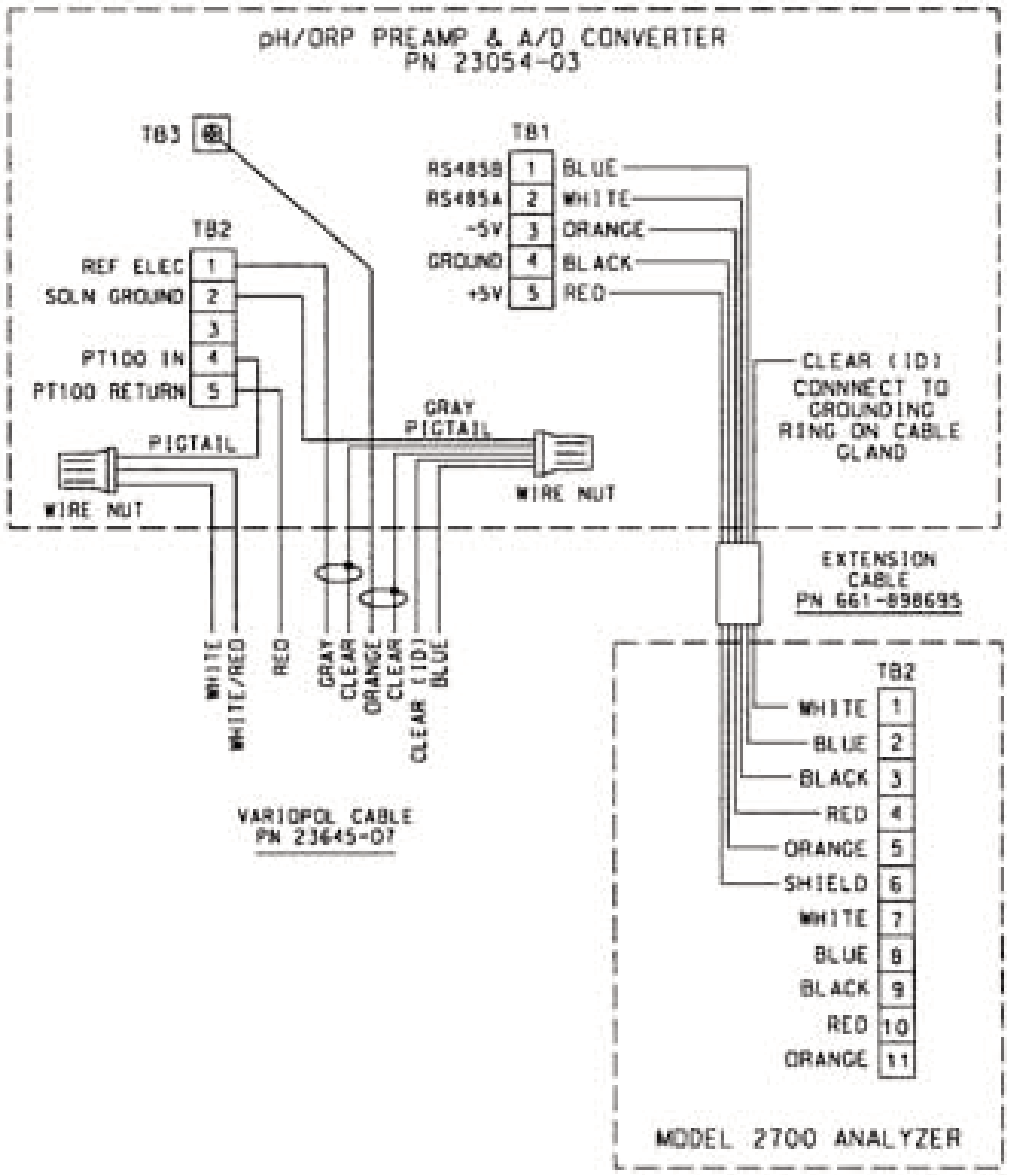


Figure 4-16: Model SCL-(P/Q) Wiring

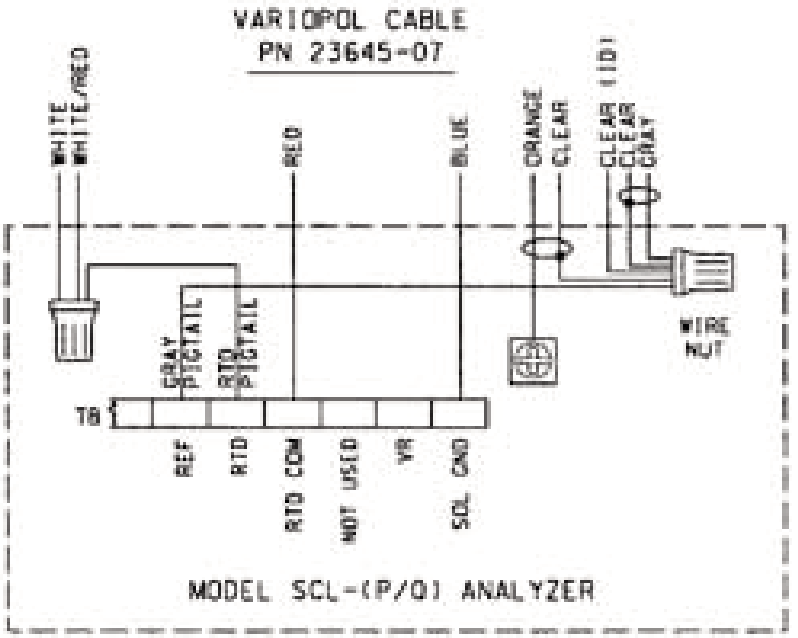


Figure 4-17: Model Xmt-P-XX-10 Wiring

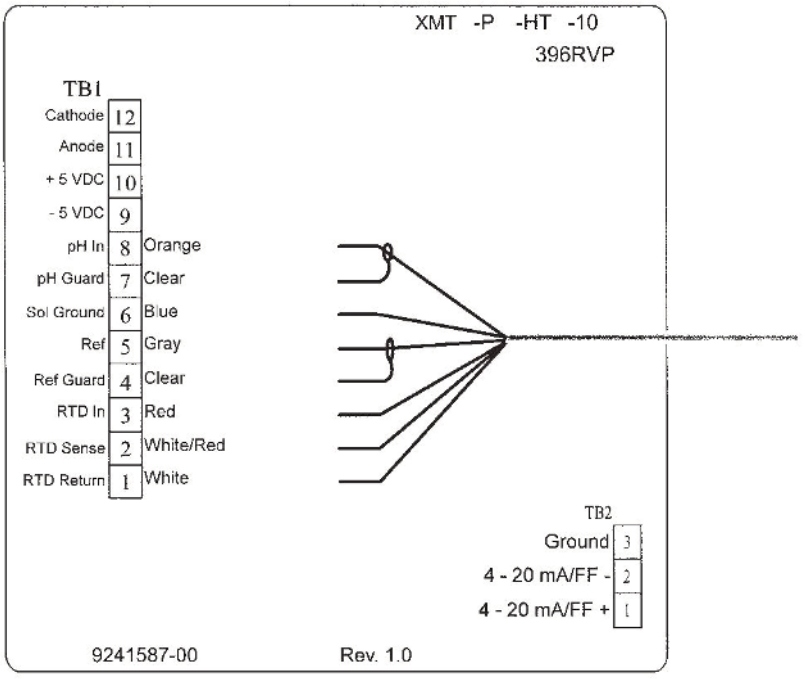


Figure 4-18: Model 1055pH/pH Wiring

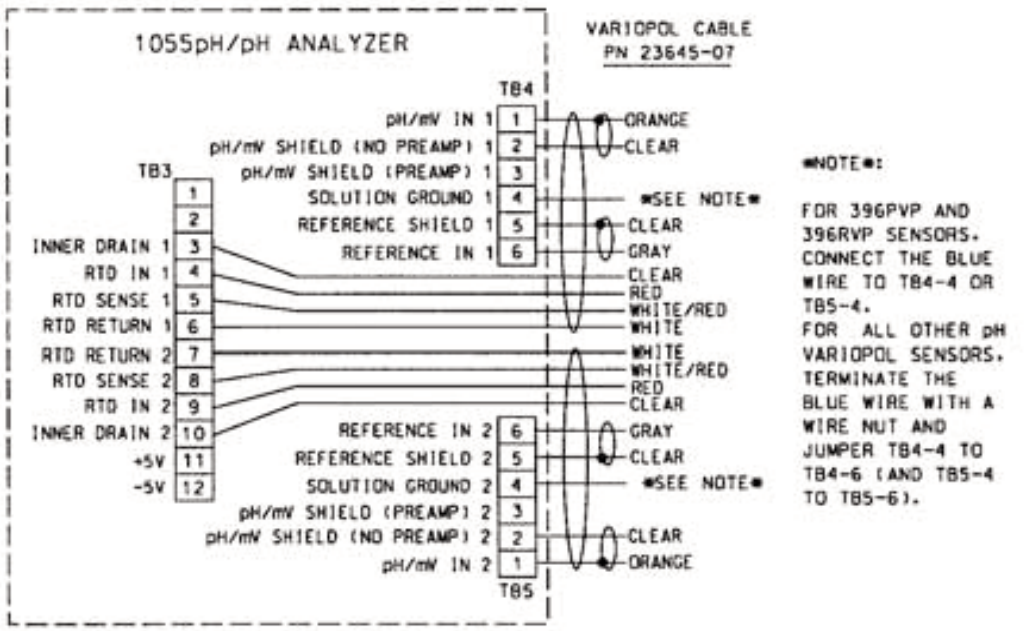


Figure 4-19: Model 1055pH/pH Wiring through Remote Junction Boxes

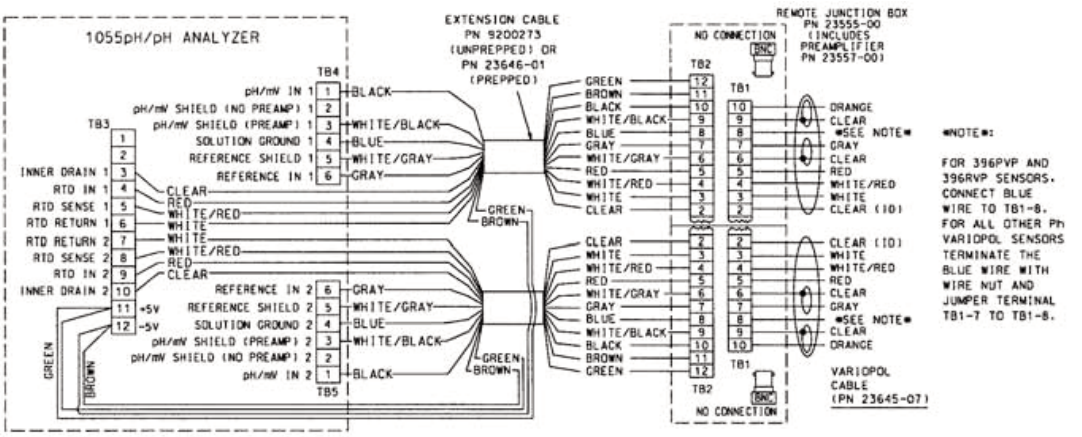
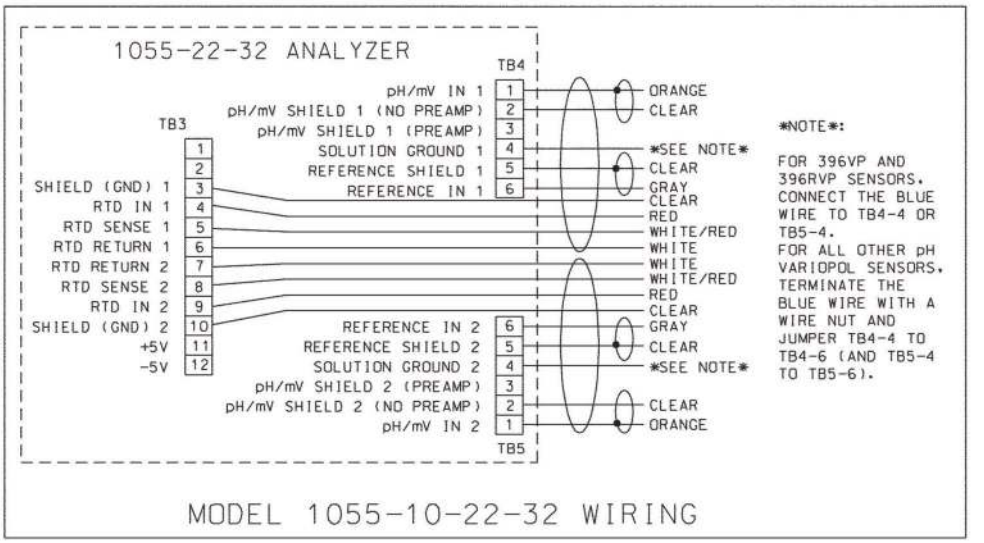
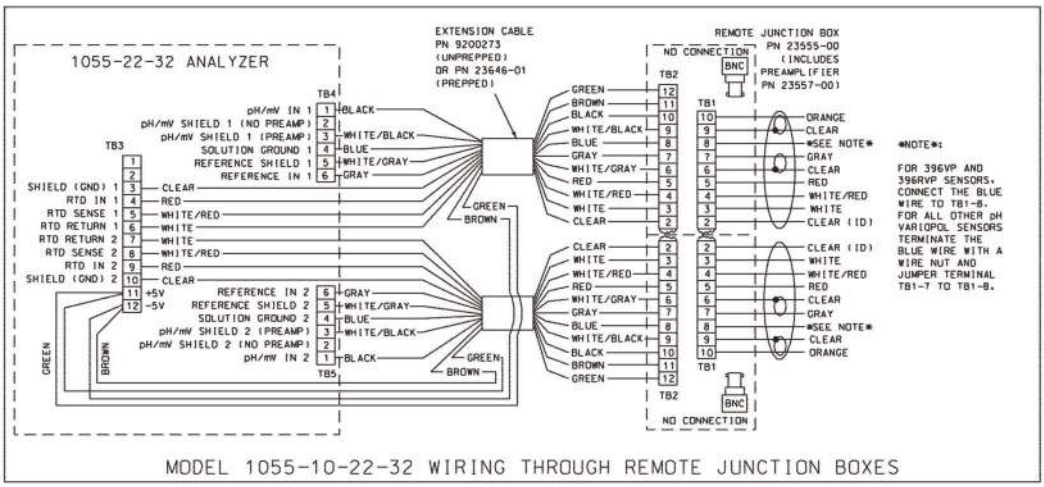


Figure 4-20: Model 1055-10-22-32 Wiring





Section 5: Startup and Calibration

5.1 Sartup

To obtain best accuracy, the sensor must be calibrated as a loop with the transmitter. Please refer to the respective transmitter instruction manual for proper calibration procedures.

5.2 pH Calibration

1. After a temporary connection is established between the sensor and the instrument, a buffer calibration may be performed.

2. Consult appropriate pH/ORP transmitter instruction manual for specific calibration and standardization procedures or see below for recommended two point buffer calibration procedure.

5.2.1 Recommended two point buffer calibration procedure

Select two stable buffer solutions, preferably pH 4.0 and 7.0 (pH buffers other than pH 4.0 and pH 7.0 can be used as long as the pH values are at least two pH units apart).

NOTICE

A pH 7 buffer solution reads a mV value of approx. zero, and pH buffers read approx. +/- 59.1 mV for each pH unit above or below pH 7. Check the pH buffer manufacturer specifications for millivolt values at various temperatures since it may affect the actual value of the buffer solution mV/pH value.

1. Immerse sensor in the first buffer solution. Allow sensor to adjust to the buffer temperature (to avoid errors due to temperature differences between the buffer solution and sensor temperature) and wait for reading to stabilize. Value of buffer can now be acknowledged by transmitter.

2. Once the first buffer has been acknowledged by the transmitter, rinse the buffer solution off of the sensor with distilled or deionized water.

3. Repeat steps 1 and 2 using the second buffer solution.

4. Once the transmitter has acknowledged both buffer solutions, a sensor slope (mV/pH) is established (the slope value can be found within the transmitter).

5. The slope value should read about 59.1 mV/pH for a new sensor and will decrease over time to approximately 47 - 49 mV/pH. Once the slope reads below the 47-49 mV/pH range, a new sensor should be installed to maintain accurate readings.

5.2.2 Recommended pH Sensor Standardization

For maximum accuracy, the sensor can be standardized on-line or with a process grab sample after a buffer calibration has been performed and the sensor has been conditioned to the process. Standardization accounts for the sensor junction potential and other interferences. Standardization will not change the sensor's slope but will simply adjust the transmitters reading to match that of the known process pH.

1. While obtaining a process solution sample (it is recommended that the sample is taken close to the sensor), record the pH value that is shown on the transmitter display.

2. Measure and record the pH of the process solution sample with a another temperature compensated, calibrated pH instrument. For best results, standardization should be performed at the process temperature.

3. Adjust the transmitter value to the standardized value.

5.3 ORP Calibration

An ORP loop is best calibrated using an ORP standard solution. Most industrial applications have a number of ORP reactions occurring in sequence or simultaneously. There can be several components that are oxidized or reduced by the reagents that are used. Theoretically, the ORP potential is absolute because it is the result of the oxidation- reduction equilibrium. However, the actual measured potential is dependent on many factors, including the condition of the surface of the ORP platinum electrode. Therefore, the sensor should be allowed 1-2 hours to become "conditioned" to the stream when first set-up or after being cleaned.

5.3.1 ORP Calibration Procedure

1. Make a temporary electrical connection between the sensor and the instrument.

2. Obtain a ORP standard solution (PN R508-8oz) or one can be made quite simply by adding a few crystals of quinhydrone to either pH 4 or pH 7 buffer. Quinhydrone is only slightly soluble; therefore, only a few crystals will be required.

3. Immerse the sensor in the standard solution. Allow 1-2 minutes for the ORP sensor to stabilize.

4. Adjust the standardize control of the instrument to the solution value shown in Table 5-1. The resulting potentials, measured with a clean platinum electrode and saturated KCl/AgCl reference electrode, should be within ±20 millivolts of the value shown in Table 5-1. Solution temperature must be noted to insure accurate interpretation of results. The ORP value of saturated quinhydrone solution is not stable over long periods of time. Therefore, these standards should be made up fresh each time they are used.

5. Remove the sensor from the buffer, rinse and install in the process.

Table 5-1: ORP of Saturated Quinhydrone Solution

	pH 4			pH 7		
Temperature °C	20	25	30	20	25	30
Millivolt Potential	268	264	260	94	87	80

Section 6: Maintenance

6.1 Maintenance

Rosemount 396R and 396RVP sensors are disposable type sensors and require minimum maintenance. These sensors should be removed from the process periodically and checked in buffer solutions. If the sensor will not calibrate, refer to your transmitter instruction manual for proper test procedures. If the sensor has failed, it should be discarded and replaced.

6.2 Sensor Removal

Please refer to the appropriate paragraph for instructions regarding removal of the sensor for periodic maintenance.

6.2.1 Retractable Version

⚠ WARNING

System pressure may cause the sensor to blow out with great force unless care is taken during removal. Make sure the following steps are adhered to.

A. Rosemount 396R-21 (21 in. tube)

1. Be certain system pressure at the sensor is below 64 psig (542 kPa) before proceeding with the retraction. It is also recommended that the personnel wear a face shield and have a stable footing. Refer to Figure 6-1. Push in on the sensor end or the top of the J-box and slowly loosen the hex nut (B) of the process end male connector (A).

B. Rosemount 396R-25 (36 in. tube)

2. Be certain that pressure at the sensor is below 35 psig (343 KPa) before proceeding with the retraction. It is also recommended that the personnel wear a face shield and have a stable footing. Refer to Figure 6-1. Push in on the sensor end or the top of the J-box and slowly loosen the hex nut (B) of the process end male connector (A).

⚠ CAUTION

Do not remove nut at this time.

3. When the hex nut is loose enough, slowly ease the sensor back completely until the retraction stop collar is reached.

⚠ CAUTION

Failure to withdraw the sensor completely may result in damage to the sensor when the valve is closed.

4. Close the ball valve slowly. If there is resistance, the valve may be hitting the sensor. Double check that the sensor has been retracted to the retraction stop collar.

⚠ WARNING

Before removing the sensor from the ball valve, be absolutely certain that the ball valve is fully closed. Leakage from the male connector threads may indicate that the male connector is still under pressure. Leakage through a partially open valve could be hazardous, however with the ball valve closed, some residual process fluid may leak from the connector's pipe threads.

5. The Male Connector Body (A) may now be completely unthreaded from the reducing coupling and the sensor removed for servicing.

⚠ CAUTION

If the male connector leaks during insertion or retraction, replace the O-ring (PN 9550099) in the male connector A.

6.3 pH Electrode Cleaning

If the electrode is coated or dirty, it may be cleaned as follows:

1. Remove the sensor from process as instructed in Section 6.2.
2. Wipe the glass bulb with a soft, clean, lint free cloth or tissue. If this does not remove the dirt or coating, proceed to step 3. If the sensor appears to be clean, go to step 5.
3. Wash the glass bulb in a strong detergent solution and thoroughly rinse with tap water. If the bulb still appears to have a coating, proceed to step 4.

⚠ CAUTION

The solution used in the following step is an acid and should be handled with care. Follow the directions of the acid manufacturer. Wear the proper protective equipment. Do not let the solution come in contact with skin or clothing. If contact with the skin is made, immediately rinse with clean water.

4. Following the caution above, wash the glass bulb in dilute 5% hydrochloric acid solution and then rinse it thoroughly in tap water. Replace the sensor if it cannot be cleaned. If the glass bulb appears clean, proceed to step 5.
5. Buffer calibrate the sensor (Refer to Section 5). If the sensor appears to respond sluggishly to pH change, soaking it overnight in a weak acid solution (5% hydrochloric acid) may improve its response. Be sure to follow the CAUTION above and to rinse the sensor's tip thoroughly with tap water. If the sensor will not calibrate, it must be replaced.

6.4 Cleaning Platinum Electrode

The electrode is never exposed to these undesirable compounds. In the event poisoning is suspected, the electrode can be restored to normal operation by simply cleaning the platinum electrode with baking soda. Polish it by rubbing it with a damp paper towel and baking soda until a bright, shiny appearance is attained.

6.5 Automatic Temperature Compensator

The temperature compensator element is temperature sensitive and can be checked with an ohmmeter. Resistance increases with temperature.

The 3K element will read 3000 ohms ±1% at 25°C (77°F) and a Pt-100 will read 110 ohms. Resistance varies with temperature for a 3K and Pt-100 element and can be determined according to Table 6-2 or the following formula:

$$R_T=R_0 [l+R_1 (T-20)]$$

Where R_T = Resistance

T = Temperature in °C

Refer to Table 4-1 for R_0 and R_1 values

Table 6-1: R_0 and R_1 Values for Temperature Compensation Elements

Temperature Element	R_0	R_1
3K	2934	0.0045
PT-100	107.7	0.00385

Table 6-2: Temperature vs Resistance of Automatic Temperature Compensator Elements

Temperature °C	Resistance (Ohms) ±1%	
	3K	PT-100
0	2670	100.0
10	2802	103.8
20	2934	107.7
25	3000	109.6
30	3066	111.5
40	3198	115.4
50	3330	119.2
60	3462	123.1
70	3594	126.9
80	3726	130.8
90	3858	134.6
100	3990	138.5

6.6 Sensor Tube Replacement When Used With A Sensor Head Junction Box

Replace ment of the retraction versions sensor tube assembly involves the removal and installation of two sets of male connectors: One at the process end of the sensor, and the other at the junction box end (See Figures 6-1, 6-2). Refer to Section 6.2 for proper removal of the sensor from process.

1. Remove sensor from process before proceeding. The junction box with attached male connector must be recovered from the old sensor for reuse. Unscrew the junction box cover and set aside. Disconnect electrical connections from printed circuit board inside junction box. Disconnect BNC connector to preamp. Unscrew hex nut (D) from male connector body (C). Separate junction box from used sensor. Set aside.

2. Pry off split ferrule from sensor and set aside for reuse. Remove hex nut (D) and set aside for reuse. Check that the internal O-ring is in place in the male connector body (C) attached to the junction box.

3. Remove hex nut (B) from male connector body (A) at process end of sensor and set aside. Slide the Teflon ferrule and the male connector off sensor in the direction of junction box and set.

NOTICE

If stainless steel ferrule was used, male connector body (A) will have to be discarded with the sensor tube.

4. Discard used O-ring from male connector body (A). Coat new O-ring with a thin film of the O-ring lubricant provided. Position it in the machined Oring groove in place of the discarded O-ring.

⚠ CAUTION

Make sure lubricant does not contact any part of the sensor tip particularly the glass bulb.

5. Cover the 1" MNPT pipe threads of the male connector body (A) with Teflon tape (not provided) to protect them from galling during reinstallation.

6. Pass the wires from the new sensor through the process end male connector (A). Make sure that the beveled edge of the ferrule faces the process end of the sensor. Snug the hex nut (B) to keep it in place. Do not tighten down fully on the hex nut at this time.

7. Pass the wires from the new sensor through the hex nut (D), the split ferrule (from the old sensor), male connector body (C), O-ring, and through the junction box from the “neck” opening and out to the printed circuit board in the junction box. Butt the ferrule’s beveled edge and the sensor tube against the junction male connector (C). Screw the hex nut (D) by hand until the tube is “locked” into the male connector body. Make sure that the male connector body (C) is sufficiently tightened. The sensor will “click” into place by pulling the sensor tube away from the junction box, but will not move from side to side or pull clear of the male connector. If the sensor tube is correctly attached to the junction box, wrench tighten hex nut (D) on male connector body (C) (see Figure 6-1). Do not put the sensor tube in a vise or use a pipe wrench to tighten the hardware as these will damage the sensor. If sensor tube is not correctly attached to the junction box, loosen hex nut (D) and repeat.

8. Connect the sensor wires to the terminals on the printed circuit board in the junction box in the manner recommended on the junction box cover,and reattach the BNC connector to the preamp. Screw on the cover of the junction box aside. Discard sensor tube.

9. Insert the sensor in the process fitting. Stop it against the closed ball valve. Slide the processend male connector down the sensor tube to mate with the process fitting. Tighten the male connector into the process fitting.

10. Pull back hard on the sensor assembly, as if trying to remove the sensor, to be certain that the sensor cannot come free from the valve assembly and male connector. The built-in retraction stop collar at the end of the sensor will butt against the shoulder of the male connector.

11. Open ball valve and position the sensor at the desired insertion depth and orientation. Using a crescent or open end wrench, tighten the hex nut (B) to secure the sensor in place. See Figure 6-2.

NOTICE

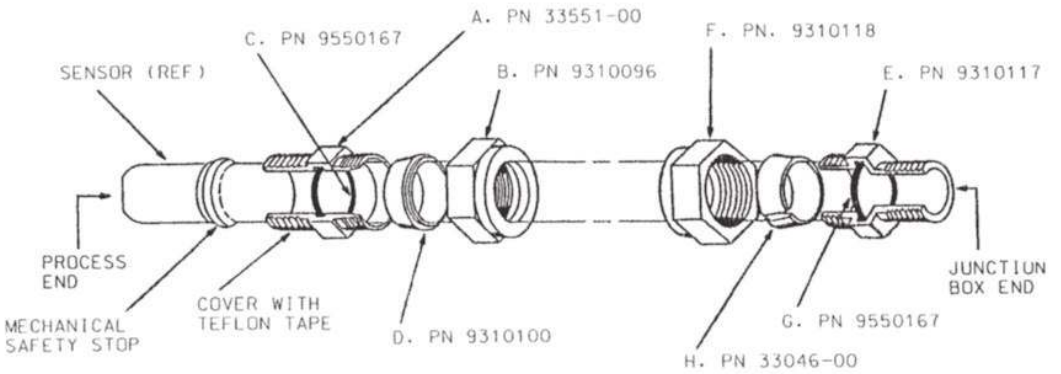
A stainless steel ferrule is available if the Teflon ferrule does not adequately grip, be careful and avoid over tightening. This can damage the sensor tube.

⚠ CAUTION

If the male connector leaks during insertion or retraction, replace the O-Ring (PN 9550099) in the male connector body (A).

If the sensor is to be stored, the rubber boot should be filled with 7pH buffer solution and replaced on sensor tip until ready to use.

Figure 6-1: Example of Sensor Tube Replacement



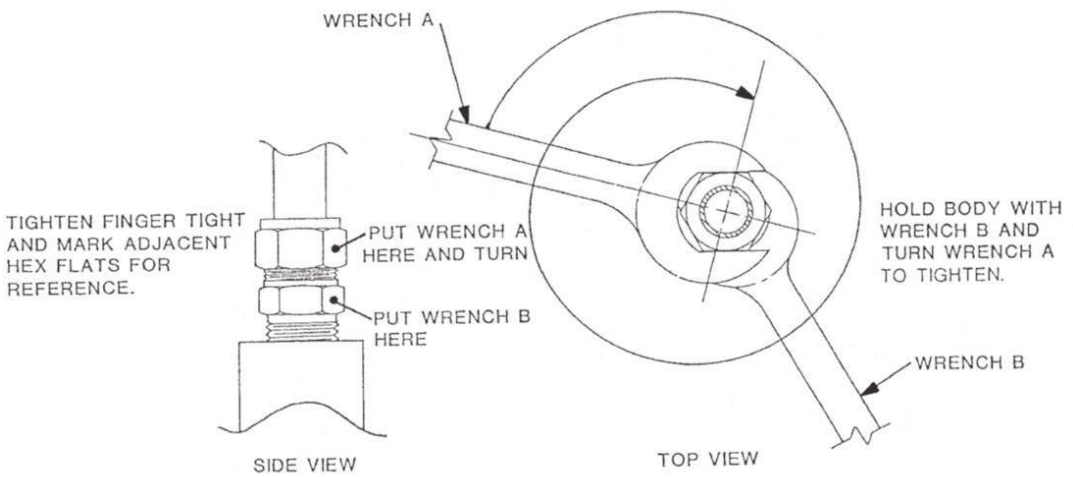
PROCESS END (A.B.C. & D SOLD TOGETHER AS
SST. PROCESS CONNECTOR KIT PN 23166-00 OR
TITANIUM PROCESS CONNECTOR KIT PN23166-01)

A. MALE CONNECTOR BODY
B. HEX NUT
C. O-RING
D. TEFLON FERRULE (SST. FERRULE AVAILABLE AS PN 9310094)

JUNCTION BOX END (E, F, G, & H SOLD TOGETHER AS
SENSOR HEAD JUNCTION BOX FITTING KIT PN 23472-00)

E. MALE CONNECTOR BODY
F. HEX NUT
G. O-RING
H. SST. SPLIT FERRULE

Figure 6-2: Male Connector Tightening Diagram



Section 7: Diagnostics and Troubleshooting

7.1 Diagnostics and Troubleshooting with Model 54/81/3081 pH/ORP

The Model 54 and 54e transmitters and Models 81 and 3081 pH Transmitters automatically search for fault conditions that would cause an error in the measured pH value, as does the Model 1054A/B pH/ORP transmitter to a lesser degree. Refer to the respective manual for a complete description of the transmitter's fault conditions.

Table 7-1 lists the transmitters diagnostic messages that indicate a possible sensor problem. A more complete description of the problem and a suggested remedy corresponding to each message is also listed.

Table 7-1: Troubleshooting with Diagnostics

DIAGNOSTIC MESSAGE 54 and 54e 81/3081	DESCRIPTION OF PROBLEM	REMEDY
"Calibration Warning" CALibrAtE	1. Aged glass. 2. Sensor not immersed.	1. Perform buffer calibration. 2. Be sure electrode measuring tip is in process.
"Cracked glass failure" bLASS FAIL	Broken or cracked glass.	Replace Sensor.
"High reference imped" rEF FAIL or rEF WArn	1. Liquid junction coated. 2. Reference Cell gel depleted. 3. Sensor not immersed.	1. Clean sensor; replace if necessary. 2. Replace sensor. 3. Be sure electrode measuring tip is in process.
"Input voltage high" "Input voltage low"	pH input shorted or sensor. miswired.	Check wiring. Replace sensor if necessary.
"Old glass warning" bLoSS WArn	1. Glass electrode worn out. 2. Sensor not immersed.	1. Replace sensor. 2. Be sure electrode measuring tip is in process.
"Reference offset err" (offline only) Std Err	Reference electrode poisoned.	Replace sensor.
"Ref voltage high" "Ref voltage low"	1. Reference shorted or sensor miswired. 2. Sensor not immersed.	Check wiring. Replace sensor if necessary.
"Sensor line open" LinE FAIL	1. Open wire between sensor and analyzer. 2. Interconnecting cable greater than 1000 ft.	1. Check sensor wiring. 2. Relocate analyzer.
"Sensor miswired"	1. Open wire between sensor and analyzer. 2. Bad preamplifier.	1. Check wiring. 2. Replace preamplifier.
"Temp error high" "Temp error low" tEMP HI tEMP LO	1. Open or shorted RTD. 2. Temperature out of range.	1. Replace sensor. 2. Check process temperature.

Table 7-2: Troubleshooting without Diagnostics

Trouble	Probable Cause	Remedy
Meter reads off scale. (Display reads overrange.)	Defective preamplifier.	Replace preamplifier (for code 02 sensors). For code 01, replace sensor.
	T.C. element shorted.	Check T.C. element as instructed in Section 6.5 and replace sensor if defective.
	Sensor not in process or sample stream is low.	Make sure sensor is in process with sufficient sample stream (refer to Section 2.0 for installation details).
	Open glass electrode.	Replace sensor.
	Reference element open - no contact.	Replace sensor.
Display reads between 3 and 6 pH regardless of actual pH of solution or sample.	Electrode cracked.	Replace sensor.
Meter or display indication swings or jumps widely in AUTO T.C. Mode.	T.C. element shorted.	Check T.C. element as instructed in Section 6.5 and replace sensor if defective.
Span between buffers extremely short in AUTO T.C. Mode.	T.C. element open.	Check T.C. element as instructed in Section 6.5 and replace sensor if defective.
Sluggish or slow meter indication for real changes in pH level.	Electrode coated.	Clean sensor as instructed in Sections 6.3 or 6.4. Replace sensor if cracked.
	Electrode at end of life.	Replace sensor.
Transmitter cannot be standardized.	Electrode coated or cracked.	Clean sensor as instructed in Sections 6.3 or 6.4. Replace sensor if cracked.
Transmitter short spans between two different buffer values.	Electrode at end of life, due to old glass or high temperature exposure.	Replace sensor.
	Coated glass.	Clean sensor as instructed in Sections 6.3 or 6.4. Replace sensor if cracked.

Note: For any repair or warranty inquiries please contact our Customer Care group.

Section 8: Accessories

8.1 Accessories

Table 8-1: Accessories for Rosemount 396R

Part Number	Description
23550-00	Remote Junction box with extension board
9210012	Buffer solution, 4.01 pH, 16 oz
9210013	Buffer solution, 6.86 pH, 16 oz
9210014	Buffer solution, 9.18 pH, 16 oz
23557-00	Preamplifier for junction box for Models 1055, 54e, 81, 3081, 4081, 5081, Xmt

Table 8-2: Accessories for Rosemount 396RVP

Part Number	Description
23557-00	Preamplifier for junction box for Models 54e, 81, 3081, 4081, 5081, Xmt, 1055
33046-00	Ferrule, 1 in., split 316SS
9310096	Nut, swage, 1 in. 316SST
9210012	Buffer solution, 4.01 pH, 16 oz
9210013	Buffer solution, 6.86 pH, 16 oz
9210014	Buffer solution, 9.18 pH, 16oz
R508-80Z	ORP solution, 460 mv ± 10 at 20°C

EC Declaration of Conformity

Note: Please see website for most recent Declaration.

EMERSON

EU Declaration of Conformity

(No. 1700911)

CE

pH/ORP Sensors

This declaration is issued under the sole responsibility of the manufacturer:
Rosemount Inc., 8200 Market Blvd., Chanhassen, MN 55317 USA
The sensor models:

328A, 385, 385+ -04, 385+ -02/03, 385+-03-12, 389-01, 389-01-10/11-50, 389-01-10/11-54, 389-01-12-50, 389-01-12-54, 389-01-12-55, 389-02, 389VP, 389VP-70, 396, 396P-01-10/13-50, 396P-01-10/13-54, 396P-01-12-50, 396P-01-12-54, 396P-01-12-55, 396P-01-55, 396VP, 396VP-70, 396R, 396RVP, 396RVP-70, 396P-02, 396PVP, 396PVP-70, 397, 398, 398VP, 398R, 398RVP, 398RVP-70, 3200HP, 3300HT, 3300HT VP, 3300HTVP-70, 3400HT, 3400HT VP, 3400HTVP-70, 3500P-01, 3500P-01-12, 3500P-02, 3500VP-01, 3500VP-01-12, 3500VP-02, 3800, 3800VP, 3900-01, 3900-02, 3900VP-01, 3900VP-02

to which this declaration relates, are in conformity with relevant Union harmonization legislation:
(2014/34/EU) ATEX Directive
Intrinsically Safe, Examination Certificate: Baseefa10ATEX0156X
Provisions of the directive fulfilled by the equipment:
Equipment Group II, Category 1 G Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +60°C) exceptions noted below

Model 328A Steam sterilizable pH sensor with integral cable
Model 385 Retractable pH/ORP sensor with integral cable
Model 385+ -04 pH/ORP sensor with integral cable
Model 385+ -02/03 pH/ORP sensor with integral cable & Smart preamplifier
Model 385+ -03-12 ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C), T5 (-20°C ≤ Ta ≤ +40°C)
Model 389-01 pH sensor with integral cable & Smart preamplifier
Model 389-01-10/11-50 pH sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C) or T5 (-20°C ≤ Ta ≤ +40°C)
Model 389-01-10/11-54 pH sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C) or T5 (-20°C ≤ Ta ≤ +40°C)
Model 389-01-12-50 ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 389-01-12-54 ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 389-01-12-55 ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 389-02 pH/ORP sensor with integral cable
Model 389VP-70 pH sensor with Variopol connector & Smart preamplifier
Model 389VP pH/ORP sensor with Variopol connector
Model 396 TUpH sensor with integral cable
Model 396P-01-10/13-50 polypropylene pH sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ 80°C) or T5 (-20°C ≤ Ta ≤ 40°C)
Model 396P-01-10/13-54 polypropylene pH sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ 80°C) or T5 (-20°C ≤ Ta ≤ 40°C)
Model 396P-01-12-50 ORP sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ +80°C)
Model 396P-01-12-54 ORP sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ +80°C)
Model 396P-01-12-55 ORP sensor with integral cable & preamp: T4 (-20°C ≤ Ta ≤ +80°C)
Model 396P-01-55 pH sensor with integral cable & Smart preamp
Model 396VP TUpH sensor with Variopol connector
Model 396VP-70 TUpH sensor with Variopol connector & Smart preamplifier
Model 396R TUpH Retractable pH/ORPsensor with integral cable
Model 396RVP TUpH Retractable pH/ORP sensor with Variopole connector
Model 396RVP-70 TUpH Retractable pH sensor with Variopole connector & Smart preamplifier
Model 396P-02 TUpH Polypropylene pH/ORP sensor with integral cable
Model 396PVP TUpH Polypropylene pH/ORP sensor with Variopole connector
Model 396PVP-70 TUpH Polypropylene pH sensor with Variopole connector & Smart preamplifier
Model 397 TUpH sensor with integral cable
Model 398 TUpH pH/ORP sensor with integral cable
Model 398VP TUpH pH/ORP sensor with Variopole connector
Model 398R TUpH Retractable pH/ORP sensor with integral cable
Model 398RVP TUpH Retractable pH/ORP sensor with Variopole connector
Model 398RVP-70 TUpH Retractable pH sensor with Variopole connector & Smart preamplifier
Model 3200HP Flowing junction pH sensor with Variopole connector
Model 3300HT Insertion/submersion pH sensor with integral cable
Model 3300HTVP Insertion/submersion pH sensor with Variopole connector
Model 3300HTVP-70 Insertion/submersion pH sensor with Variopole connector & Smart preamplifier
Model 3400HT Retractable pH sensor with integral cable
Model 3400HTVP Retractable pH sensor with Variopole connector
Model 3400HTVP-70 Retractable pH sensor with Variopole connector & Smart preamplifier
Model 3500P-01 High performance pH sensor with integral cable & Smart preamplifier
Model 3500P-01-12 PerpH-X ORP sensor with integral cable & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 3500P-02 High performance pH sensor with integral cable
Model 3500VP-01 High performance pH sensor with Variopole connector & Smart preamplifier
Model 3500VP-01-12 PerpH-X ORP sensor with Variopole connector & preamplifier: T4 (-20°C ≤ Ta ≤ +80°C)
Model 3500VP-02 High performance pH sensor with Variopole connector
Model 3800 Steam sterilizable pH sensor with single pole Eurocap connector

Model 3800VP Steam sterilizable pH sensor with Variopole connector
Model 3900-01 pH/ORP sensor with integral cable & Smart preamplifier
Model 3900-02 pH/ORP sensor with integral cable
Model 3900VP-01 pH sensor with Variopole connector & Smart preamplifier
Model 3900VP-02 pH/ORP sensor with Variopole connector

Special conditions for safe use:

1) All pH/ORP sensor models with a plastic enclosure or exposed plastic parts may provide an electrostatic ignition hazard and must only be cleaned with a damp cloth to avoid the danger of ignition due to a build up of electrostatic charge.
2) All pH/ORP sensor models with a metallic enclosure may provide a risk of ignition by impact or friction. Care should be taken during installation to protect the sensor from this risk.
3) External connections to the sensor must be suitably terminated and provide a degree of protection of at least IP20.

All pH/ORP sensor models are intended to be in contact with the process fluid and may not meet the 500V r.m.s test to earth. This must be taken into consideration at installation.

ATEX Notified Body for EC Type Examination Certificate & Quality Assurance:
SGS Baseefa[Notified Body Number:1180], Rockhead Business Park, Staden Lane, Buxton SK17 9RZ UNITED KINGDOM

Assumption of conformity is based on the application of the harmonized standards:
EN 60079-0:2012+A11:2013 Explosive atmospheres. Equipment. General requirements
EN 60079-11:2012 Explosive atmospheres. Equipment protection by intrinsic safety "i"

K Freeman

(Signature)

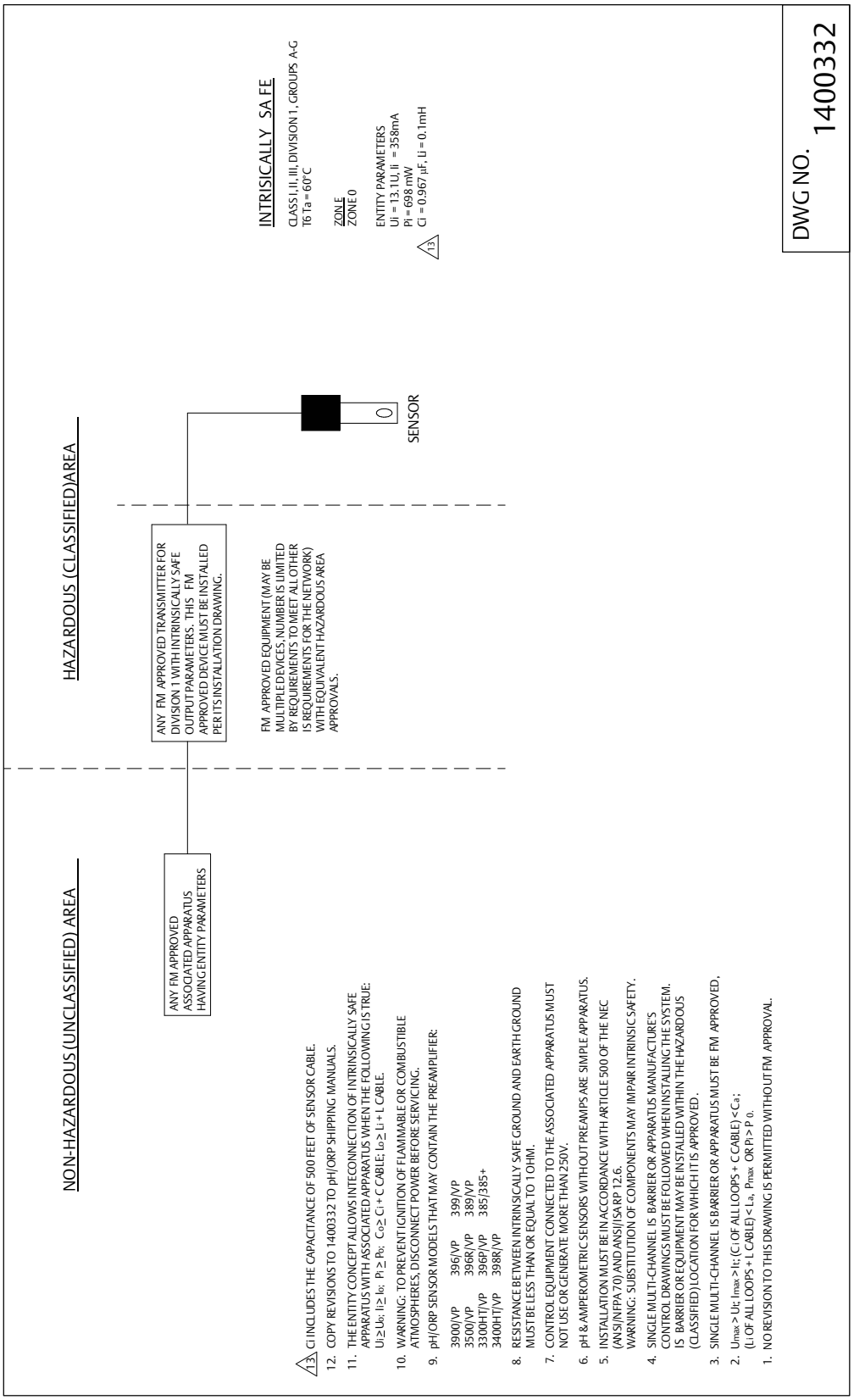
Kim Freeman
(Name printed)

Director of Global Quality
(Function name)

March 23, 2017
(Date of issue)

CE marking was first affixed to this product in 2011

Intrisicallly Safe Sensor Installation Drawing - FM



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Rev. K
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