

TUpH™ pH Sensors

For additional information, please visit our website at EmersonProcess.com/LiquidAnalysis.

⚠ 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

Before removing the sensor, be absolutely certain that the process pressure is reduced to 0 psig and the process temperature is lowered to a safe level!

ATEX Directive: 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.

NOTICE

Do not allow lubricant to coat electrode bulb or reference junction. If it does, wipe it clean before installation.

Specifications

397 performance and physical specifications

pH range: AccuGlass: 0-14 pH

Wetted materials: glass, polypropylene, EP

Interconnecting cable: 15 ft. (4.6 m), for use with remote preamplifier

Temperature rating: 32 to 176 °F (0 to 100 °C)

Pressure range: 100 - 790 kPa abs (0 - 100 psig)

Minimum conductivity: 75 μ S/cm, nominal 100 μ S/cm

Weight/shipping weight: 1 lb. / 2 lb. (0.45 kg / 0.9 kg)

Process connections: None; must use Quik-Loc kit which includes a 1 in. MNPT process connection

Quik-Loc kit physical specifications

Process connections: 1 in. MNPT

Wetted materials: 316 SST, EP, PEEK

Weight/shipping weight: 1 lb. / 2 lb. (0.45 kg / 0.9 kg)

Storage

1. It is recommended that electrodes be stored in their original shipping containers until needed.
2. Do not store at temperatures below 23 °F (-5 °C).
3. Electrodes should be stored with a protective cap containing KCL solution.

4. For overnight storage, immerse the sensor in tap water or a pH buffer solution.
5. A pH glass electrode has a limited shelf life of one year.

Electrode preparation

1. Remove electrode from shipping container.
2. Remove the protective boot covering the electrode bulb.
3. Rinse away salt film with clean water, then shake the electrode so that the internal solution fills the bulb, thus removing any air trapped there.

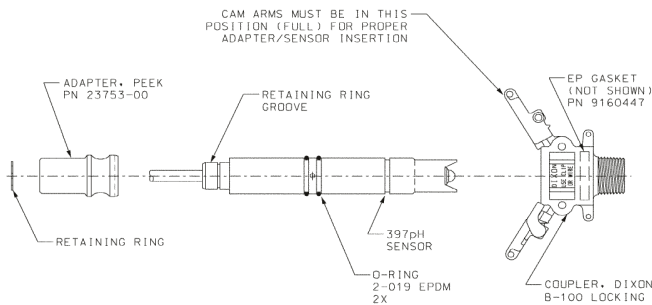
Sensor installation

For sensor dimensions, see Figure 1.

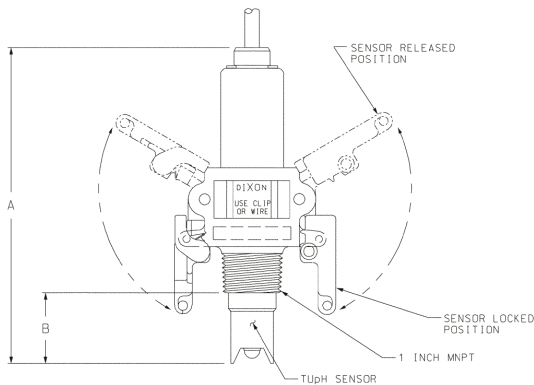
For recommended installation, see Figure 2.

For wiring, see Figures 3-13.

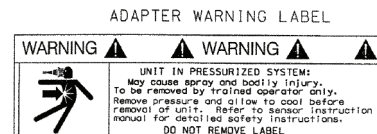
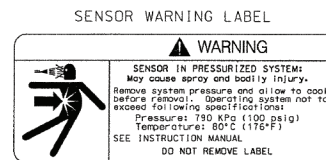
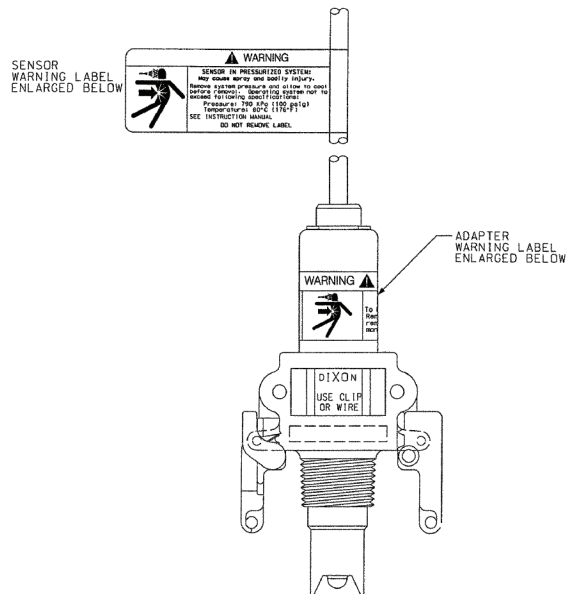
Figure 1. Dimensional drawings for the 397 in the Quik-Loc unit



NOTICE
The EP gasket (see Drawing #40039702) provided with the coupler should be periodically inspected. If the gasket shows signs of corrosion, you must replace it to ensure a proper and secure seal between the coupler and adapter.



Quik-Loc kit	A Sensor length	B Insertion depth
23757-00	6.15 in. / 156 mm	1.4 in. / 35 mm
23757-01		2.0 in. / 50 mm



Quik-Loc mounting

Wrap the pipe threads of the coupler with Teflon tape before placing it into the process pipe. The coupler can be connected to any 1 in. process connection and must be mounted within 80° of vertical, with the electrode facing down. Once the coupler is in place, position the adapter on the back end of the sensor.

Remove the parafilm wrapping from the two O-rings on the sensor, grease the O-rings with the lube provided, and feed the sensor cable through the adapter. Once the adapter is slipped over the sensor's back end, install the retaining ring (which is included with every 397 sensor) on the black, grooved back end of the sensor body. The retaining ring secures the sensor into the adapter. The adapter/sensor assembly is now ready to be inserted into the coupler. With both arms of the coupler in the released position, insert the adapter/sensor assembly into the coupler.

NOTICE

The adapter cannot be inserted completely or properly unless both arms are in the fully released position (see Figure 1).

Once the adapter has been properly placed in the coupler, position both arms in the locked position.

NOTICE

The sensor may obstruct flow through smaller pipes.

WARNING

It is recommended that a thermometer, drain valve to release pressure, and pressure gauge be inserted near the Quik-Loc assembly (see Figure 2).

WARNING

Once the Quik-Loc unit is installed, wait for the process to cool to a safe temperature, use the pressure drain valve to relieve all process pressure, and observe the pressure on the pressure gauge for proper removal of the sensor without spray or bodily injury. The Quik-Loc kit used with the 397 TUpH sensor is not recommended for use with hazardous, corrosive, or strong oxidizing chemicals due to a risk of spray or bodily injury.

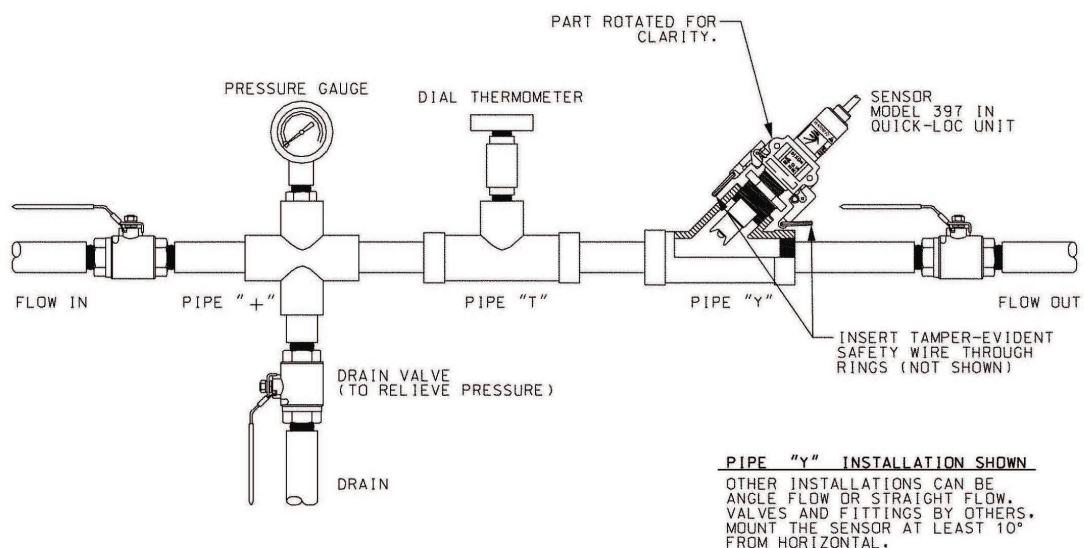
WARNING

It is the responsibility of each company using the Quik-Loc kit/397 TUpH sensor to train personnel about the injury risks associated with using a quick-release coupler that is placed in a hot or pressurized process.

Once the arms of the coupler have been locked in position, use tamper-evident safety wire on the metal rings of the coupler arms to prevent unauthorized and/or untrained personnel from using the Quik-Loc unit.

Only use the Quik-Loc unit within the pressure and temperature limits stated for the 397 sensor.

Figure 2. Recommended flow-through and insertion installation for the 397



NOTICE

For additional wiring information on this product, including sensor combinations not shown here, please refer to either our online wiring programs or the manual DVD enclosed with each product.

1056, 1057, XMT, 6081, 5081, 54e, and 56: <http://www3.emersonprocess.com/raihome/sp/liquid/wiring/XMT/>

1066 and sensors with SMART preamps: <http://www2.emersonprocess.com/en-US/brands/rosemountanalytical/Liquid/Wiring-Diagrams/Pages/analyzer-wiring-diagrams.aspx>

1055: <http://www3.emersonprocess.com/raihome/sp/liquid/wiring/1055/>

Figure 3. 397 standard wiring option used with 1054A, 1054B, 2054, and preamplifiers P/N 22698-02 and 22698-03

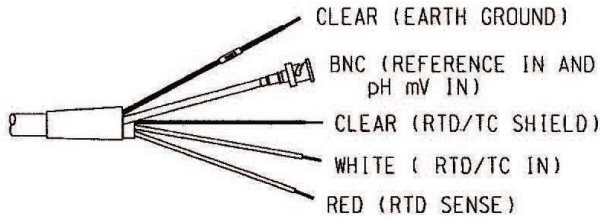


Figure 4. The 397 option -62 for wiring to 1054, 1055, 1181, 2081, 54, 54e, 81, 3081, 4081, 5081-P, Xmt-P, SoluComp, and 2700 pre-amplifier (P/N 23504-03). Also for use with remote junction box P/N 23555-00.

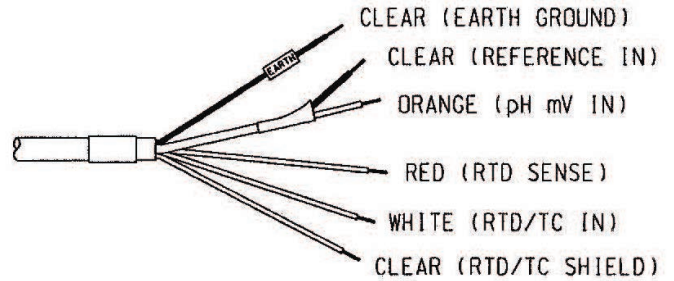
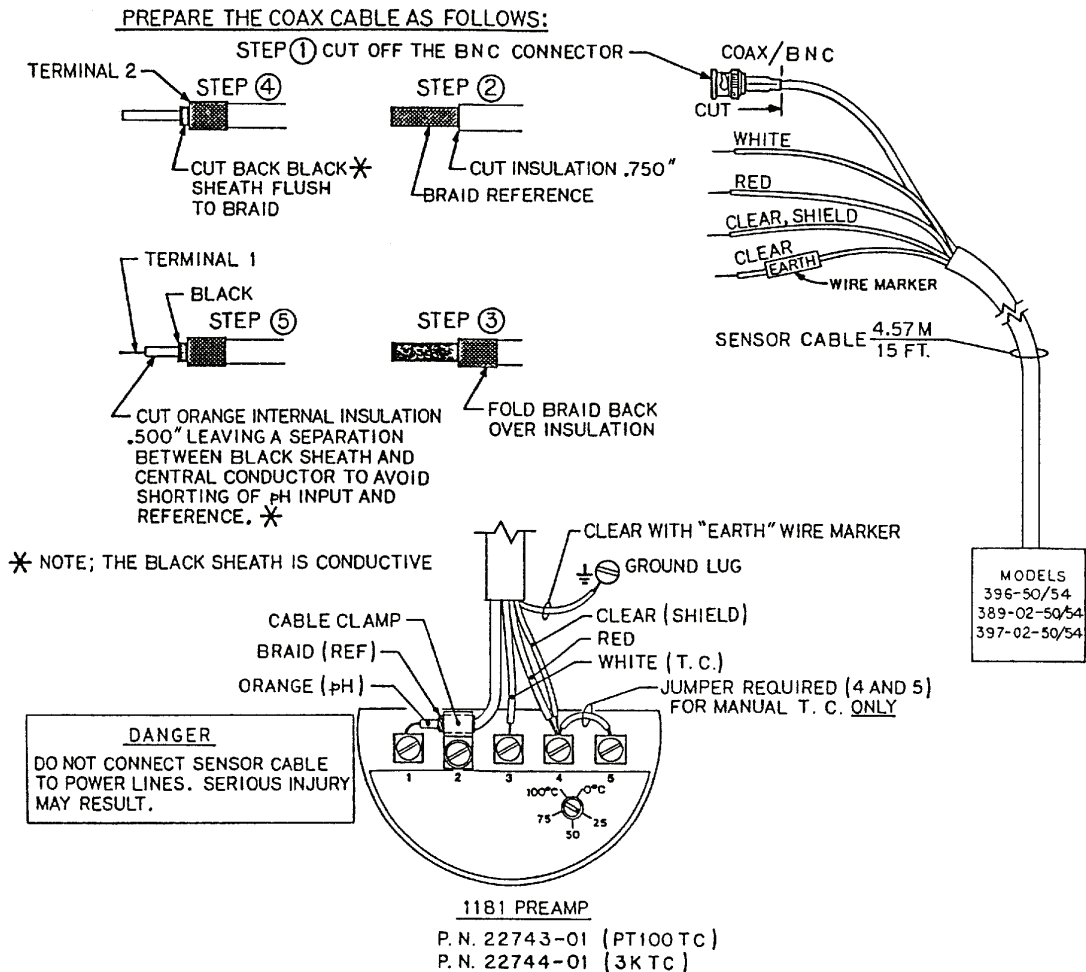


Figure 5. Wiring to 1181 pH analyzer



NOTES: UNLESS OTHERWISE SPECIFIED

Figure 6. Preparing coax cable for wiring to 54e, 1055, 81, 2081, 3081, 4081, 5081, and Xmt

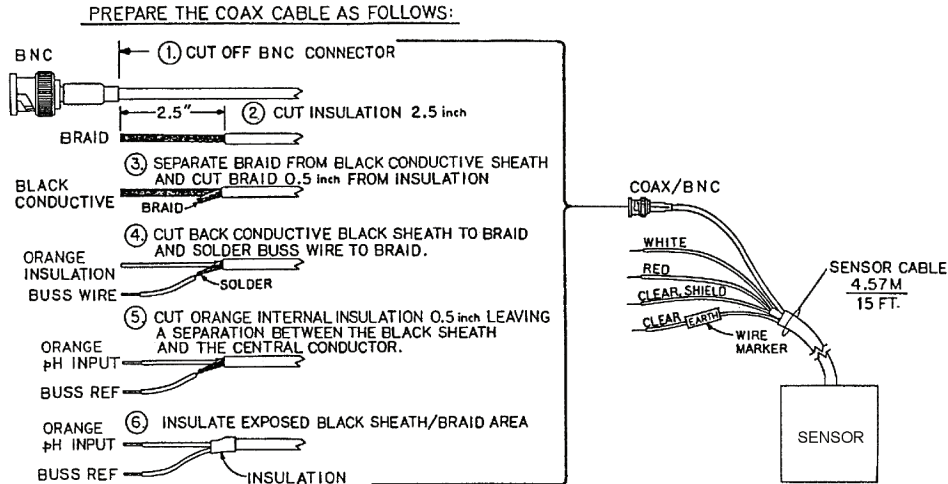


Figure 7. Wiring to 2081

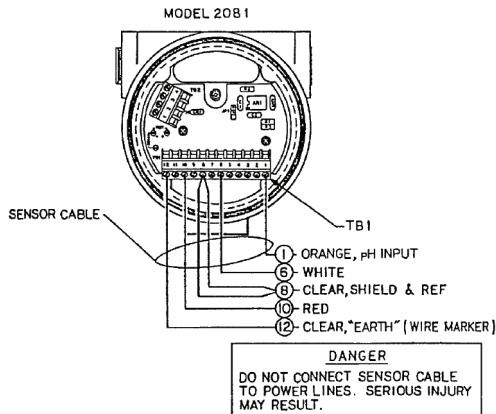


Figure 8. Wiring to 54e, 81, 3081, 4081, and 5081

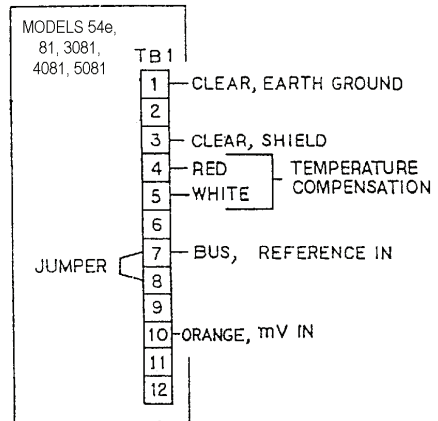


Figure 9. Wiring to Xmt-P-XX-10

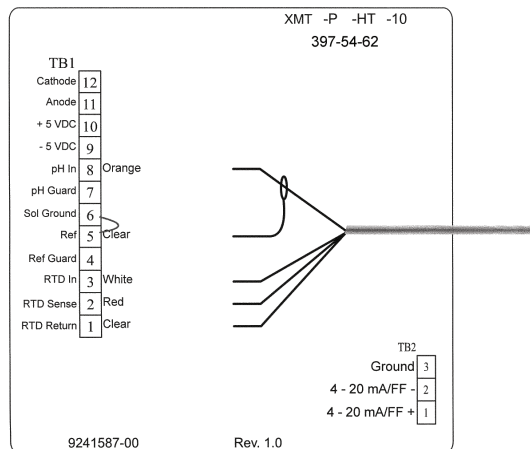


Figure 10. Wiring to 1054A, 1054B, and 2054

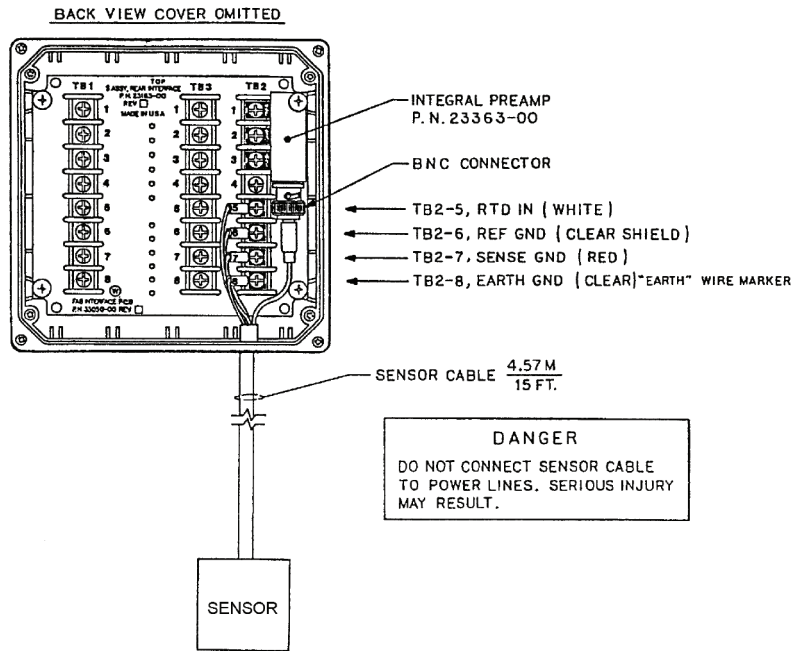


Figure 11. Wiring through junction box P/N 23309-04(03) and remote preamplifier

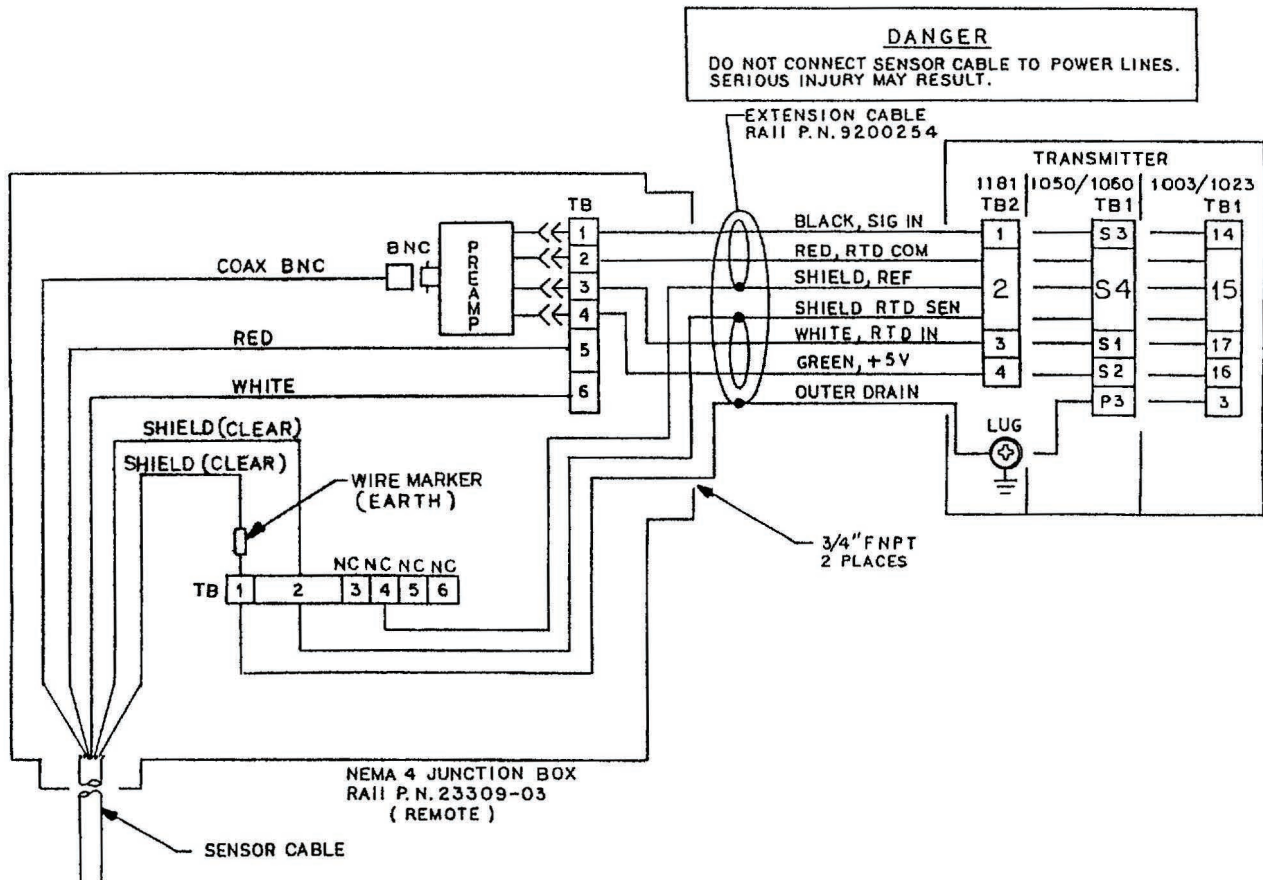


Figure 12. Wiring to 1055-01-10-22-32

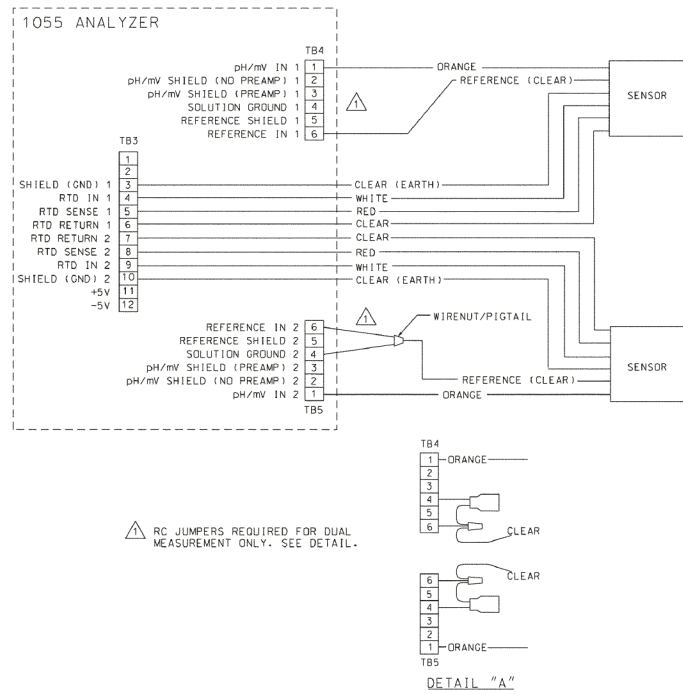
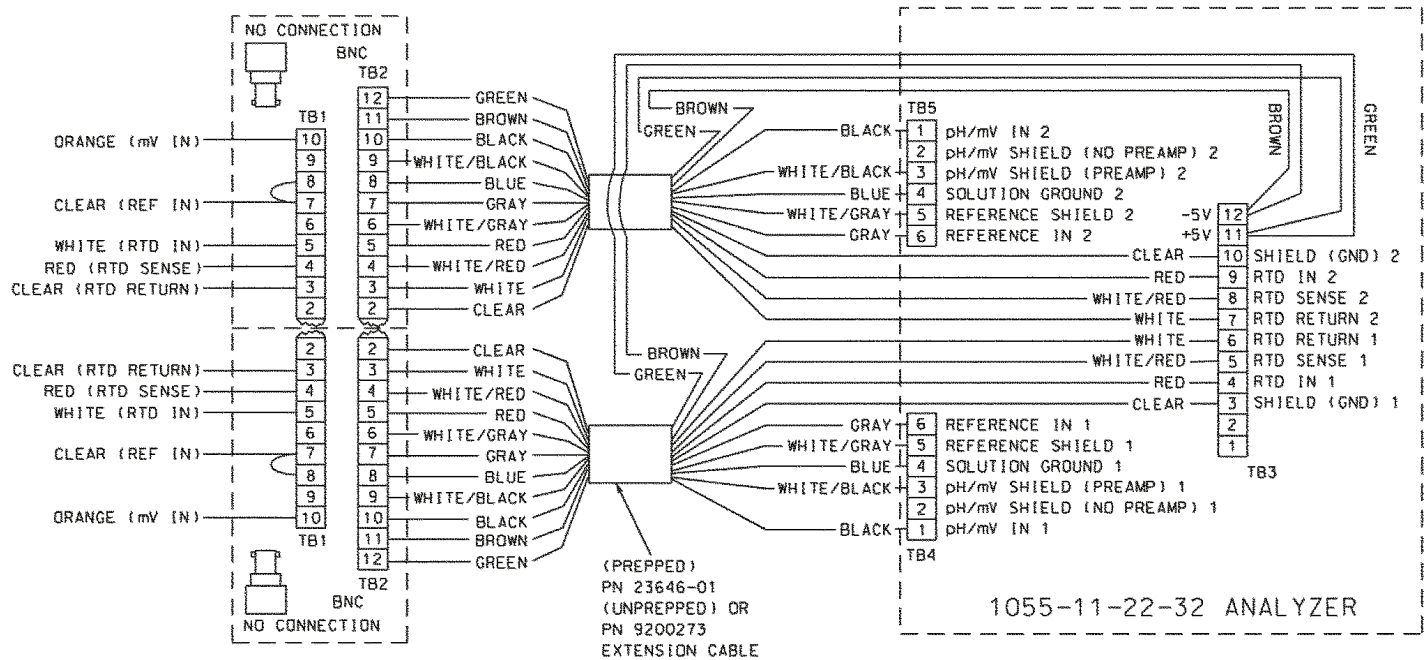


Figure 13. Wiring to 1055-11-22-32 through a remote junction box



Two point buffer calibration

Select two stable buffer solutions (at least two pH units apart), preferably pH 4.0 and 10.0.

NOTICE

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

1. Immerse the sensor in the first buffer solution. Allow the sensor to equilibrate to the buffer temperature (to avoid errors due to temperature differences between the buffer solution and sensor temperature) and wait for reading to stabilize. The value of the buffer can now be acknowledged by the analyzer/transmitter.
2. Once the first buffer has been acknowledged by the analyzer/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. The theoretical slope value, according to the Nernst equation for calculating pH, is approximately 59.17 mV/pH. Over time, the sensor will age, both in the process and in storage, and this will result in reduced slope values. To ensure accurate readings, we recommend that the electrode be replaced when the slope value falls below 47 to 49 mV/pH.

Recommended pH standardization

For maximum accuracy, the sensor can be standardized online 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 sensor's reading to match that of the known process pH.

Maintenance

Electrodes should respond rapidly. Sluggishness, offsets, and erratic readings are indicators that the electrodes may need cleaning or replacement.

1. To remove oil deposits, clean the electrode with a mild non-abrasive detergent.
2. To remove scale deposits, soak electrodes for 30 to 60 minutes in a 5% hydrochloric acid solution.
3. Temperature effect on life expectancy: If the glass electrode life expectancy is 100% at 77 °F (25 °C), then it will be approximately 25% at 176 °F (80 °C) and approximately 5% at 248 °F (120 °C).

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