WEC SENSOR INSTRUCTIONS

1.0 Introduction

The electrodeless conductivity sensors measure an induced current in a loop submerged in solution. Two coils are enclosed within the sensor, which is immersed in the chemical whose conductivity is of interest. An AC signal applied to one of the coils induces a current in the other coil, which is directly proportional to the conductivity of the solution.

2.0 Specifications

2.1 Measurement Performance

Conductivity Ranges:	0–1000 µS/cm, 0–10,000 µS/cm, 0–100 mS/cm, 0–1000 mS/cm
Conductivity Resolution:	1 µS/cm, 1 µS/cm, 0.1 mS/cm, 1 mS/cm
Conductivity Accuracy:	± 1% of Span
Temperature Range:	-5 to 80 °C, 20 to 180 °F (CPVC) -5 to 120 °C, 20 to 250 °F (PEEK)
Temperature Resolution:	1 ° (C or F)
Temperature Accuracy:	± 1% of Reading

2.2 Mechanical

Part Number:	102730	190954	191145
Sensor Material:	PEEK	CPVC	PEEK
O-Ring Material:	EPR	FKM (in-line only)	N/A
Mounting Adapter Material:	316SS	CPVC (in-line only)	316 SS (in-line only)
Dimensions:	7" long x 1" diameter	7” long x 1.75” diameter	7” long x 1.75” diameter
Sensing Coil:	0.5" (1.3cm) aperture	0.5 (1.3cm) aperture	0.5 (1.3cm) aperture
Temperature Limitations:	+20 to 250°F (-5 to 120°C)	+20 to 180°F (-5 to 80°C)	+20 to 250°F (-5 to 120°C)
Pressure Rating:	-15 to +250 psi (-0.1 to 1.75 MPa)	-15 to +140 psi (-0.1 to 0.98 MPa)	-15 to +250 psi (-0.1 to 1.75 MPa)
Mounting:			
Submersion	3/4" NPTF thread	1” NPTM thread	1” NPTM thread
In-Line	2" NPTM adapter	2” NPTM adapter	2” NPTM adapter

3.0 Unpacking and Installation

3.1 Unpacking the unit

Inspect the contents of the carton. Please notify the carrier if there are any signs of damage to the sensor or its parts. Contact your distributor if any of the parts are missing. The carton should contain a 102730 PEEK, 191145 PEEK or 190954 CPVC sensor assembly and instruction manual. Any options or accessories will be incorporated as ordered.

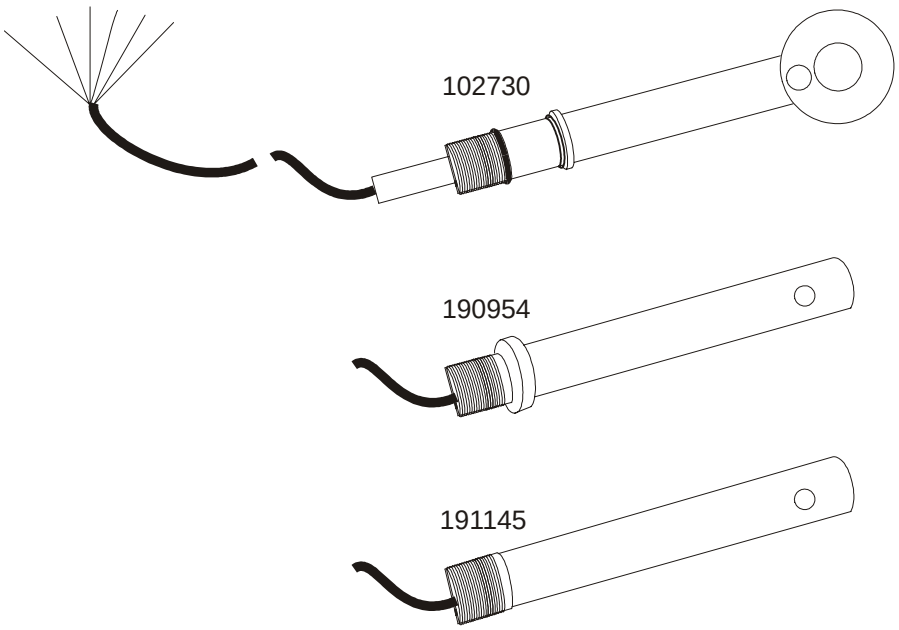


Figure 1 Sensor Identification

3.2 Mechanical Installation

General Guidelines

- Mount the sensor as close as possible to the controller.
- Use only Walchem extension cable if 20 feet of cable is not sufficient.
- Take care to shield the cable properly.
- Maximum cable length is 120 feet.
- Position the sensor such that a fresh, representative sample of the solution is available.
- Position the sensor such that air bubbles will not be trapped within the sensing area.
- Position the sensor where sediment or oil will not accumulate within the sensing area.
- If cable is installed in metal conduit (recommended), either flexible conduit should be used or some other provision made for removal of sensor from the process for maintenance.

Notes:

1. There are two grooves near the cable end of the 102730 sensor. The groove closest to the cable is ***NOT*** an O-ring groove and should remain unoccupied. The next groove, as shown in Figure 2, ***IS*** for the O-ring.

2. Ensure that the sensor received has the O-ring in the proper position.

Note: There are two notches at the cable cap (shown in Figure 2) that line up with the flat surfaces of the sensor "doughnut". These notches are an aid in positioning the sensor in a pipe or vessel. The user should direct the flow <u>through</u> the sensor bore.

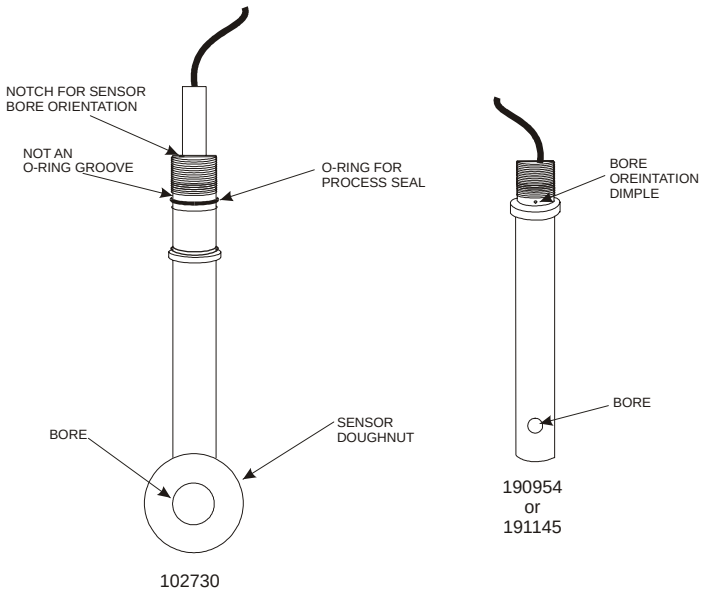


Figure 2 Sensor Mounting

Submersion Installations

P/N 102730

The submersion sensor will be supplied from Walchem with a ¾ NPTF coupling, Walchem p/n 190999. This coupling is designed to seal the cable from the process liquid by compressing an O-ring on the sensor body. The ¾ NPTM thread on the sensor body is to hold the coupling in place only; it will not seal. The adapter will slide over the cable and over the threaded end of the sensor body, smooth bore first. A light coating of appropriate grease on the O-ring will make it slide on a little easier. As the O-ring is compressed the thread will engage. Now turn the adapter until the smooth bore end butts firmly against the lip on the sensor.

Attach an appropriate length of user-supplied pipe to the ¾ NPTF coupling, using several layers of PTFE tape on any threads. The sensor should be immersed away from the walls or floor of the tank by a minimum of 2 inches. The support pipe must be long enough to be above solution level. It should be sealed at the top, with a user supplied cable clamp, to prevent moisture from filling the pipe. See figure 3B. This pipe will usually be suspended from a bracket attached to the lip of the tank.

If the cable will be exposed to moisture (rain, hosing, etc.) it must be protected with flexible conduit (preferably metal).

P/N 190954 or 191145
The submersion sensor requires a standard 1" NPTF coupling (user supplied) for connection to standard compatible pipe. The sensor should be immersed away from the walls and floor of the tank by a minimum of 2 inches. The support pipe must be long enough to be above solution level. It should be sealed at the top, with a user supplied cable clamp, to prevent moisture from filling the pipe. See Figure 3A. This pipe will usually be suspended from a bracket attached to the lip of the tank.

If the cable run will be exposed to moisture (rain, hosing, etc.), it must be protected with flexible conduit (preferably metal).

In-Line Installations

P/N 102730
Insert the sensor cable up through the custom bushing and lock nut as shown in figure 4B. Lubricate the O-ring and press the sensor into the bushing. Secure the sensor in place using the lock nut.

Thread the custom bushing into a 2" or larger diameter tee as shown in figure 4B. Note that top of the sensor is notched to indicate the flat sides of the sensor. Use these notches to align the bore of the sensor with the flow.

If the sensor will be exposed to moisture (rain, hosing, etc.) the cable end of the sensor needs to be further protected. See the top section of Figure 4B for sealing the cable end.

P/N 190954
Thread the custom bushing into the end port of a 2" or larger diameter tee as shown in Figure 4A. Note that the top of the sensor has a dimple drilled in the side to indicate the direction of the flow channel. Align this dimple with the tee exit. 2" to ¾ " adapters are usually used on the entry and exit ports to allow the use of ¾" pipe.

Caution: *It is important that the flow direction is in the end port and out the side port (as shown in Figure 4A) to provide maximum cleaning of the sensor.*

Insert the sensor cable up through the custom lock nut as shown in Figure 4A. Lubricate the o-ring and insert the sensor into the custom bushing. The flange on the sensor provides a sealing surface against the o-ring.

If the sensor will be exposed to moisture (rain, hosing, etc.) the cable end must be protected.

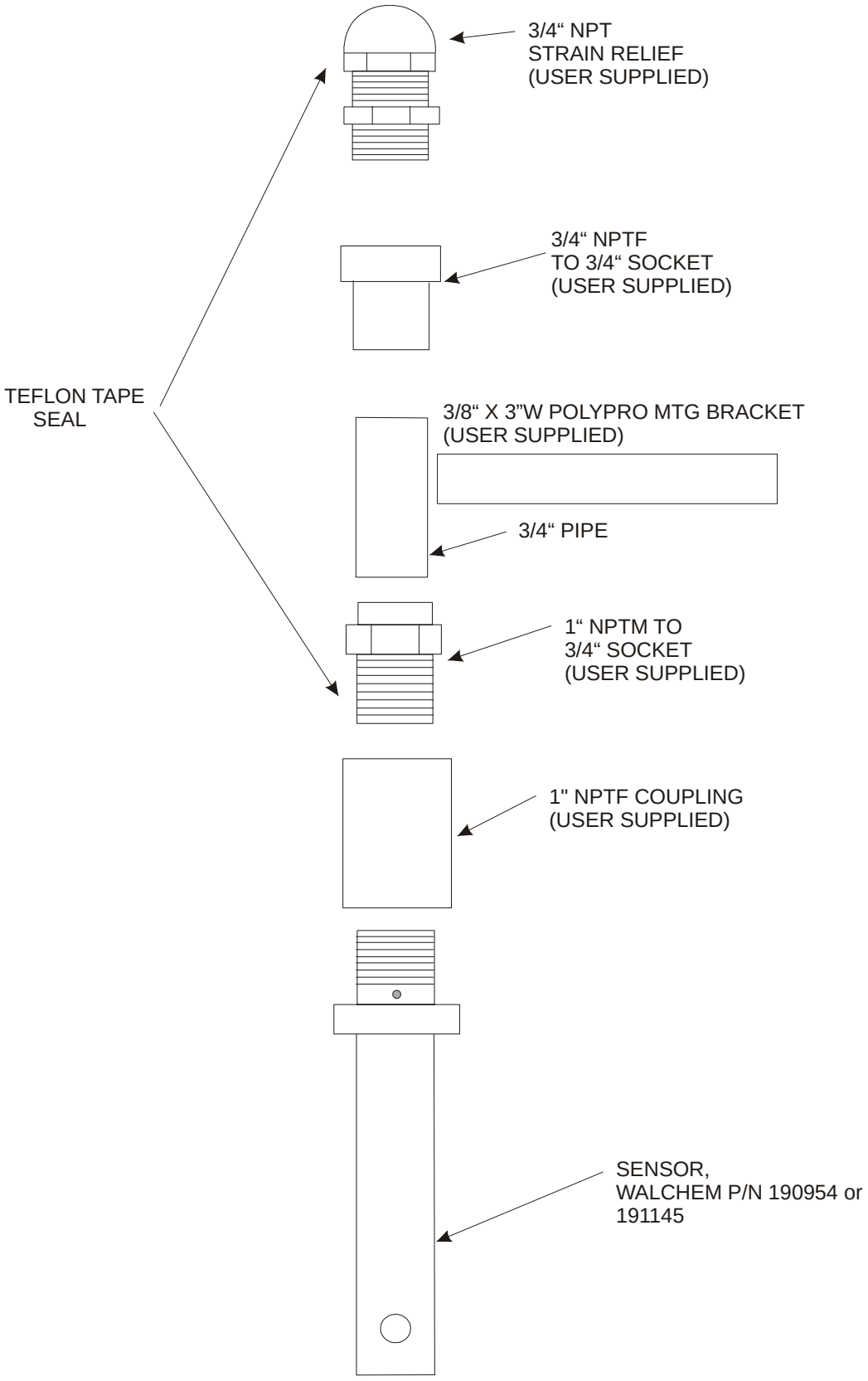


Figure 3A – Submersion Installation – P/N 190954 or 191145

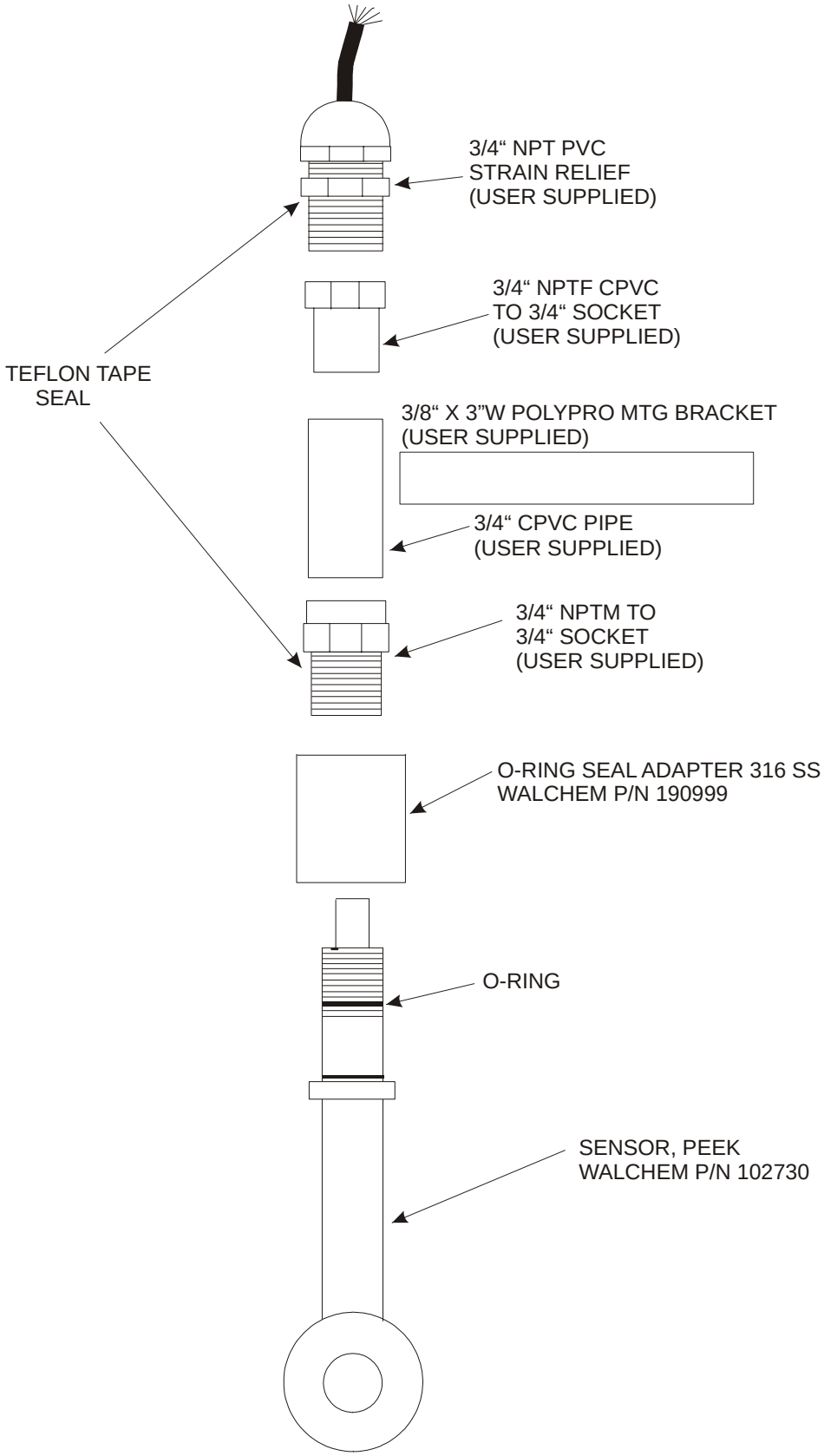


Figure 3B – Submersion Installation – P/N 102730

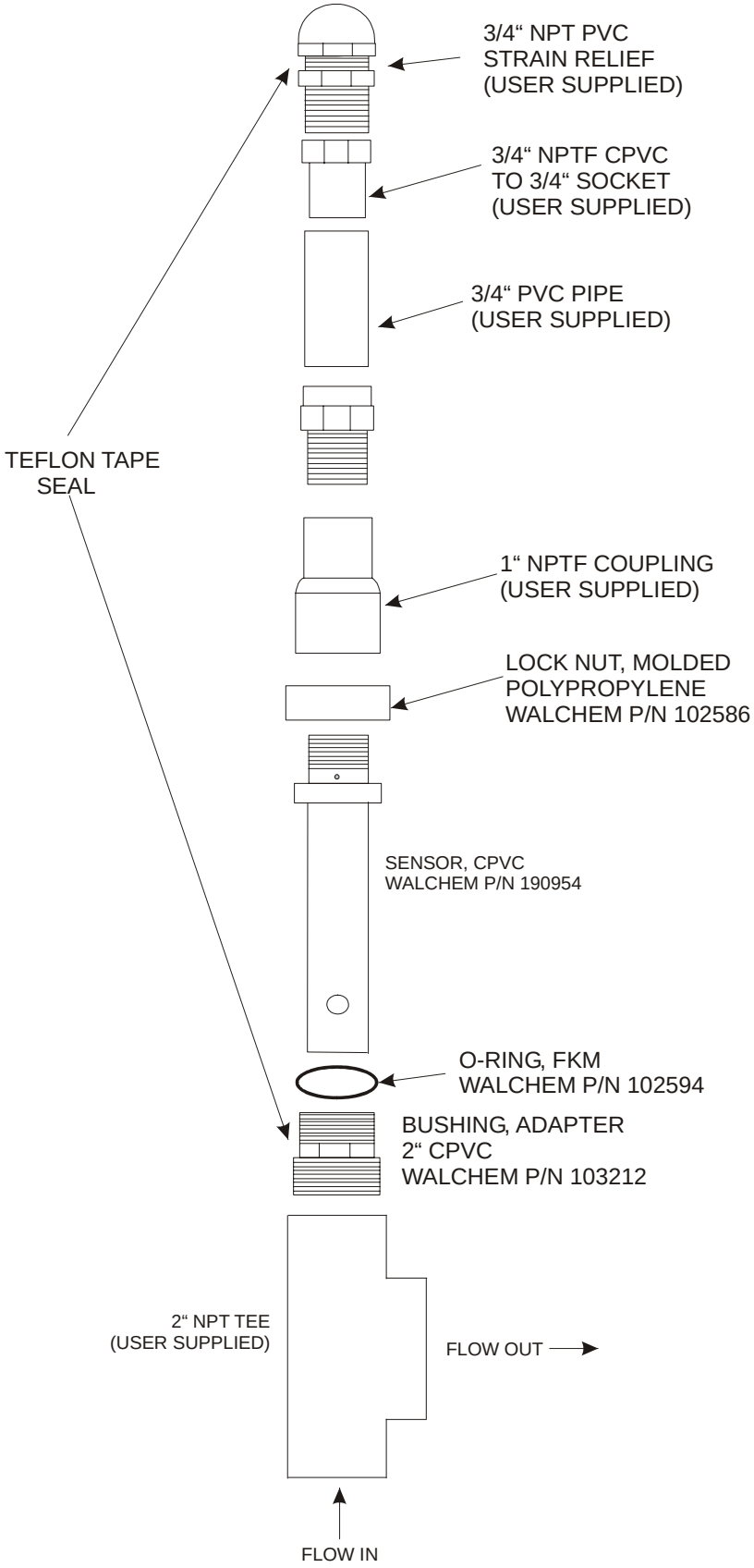


Figure 4A In-Line Installation – P/N 190954

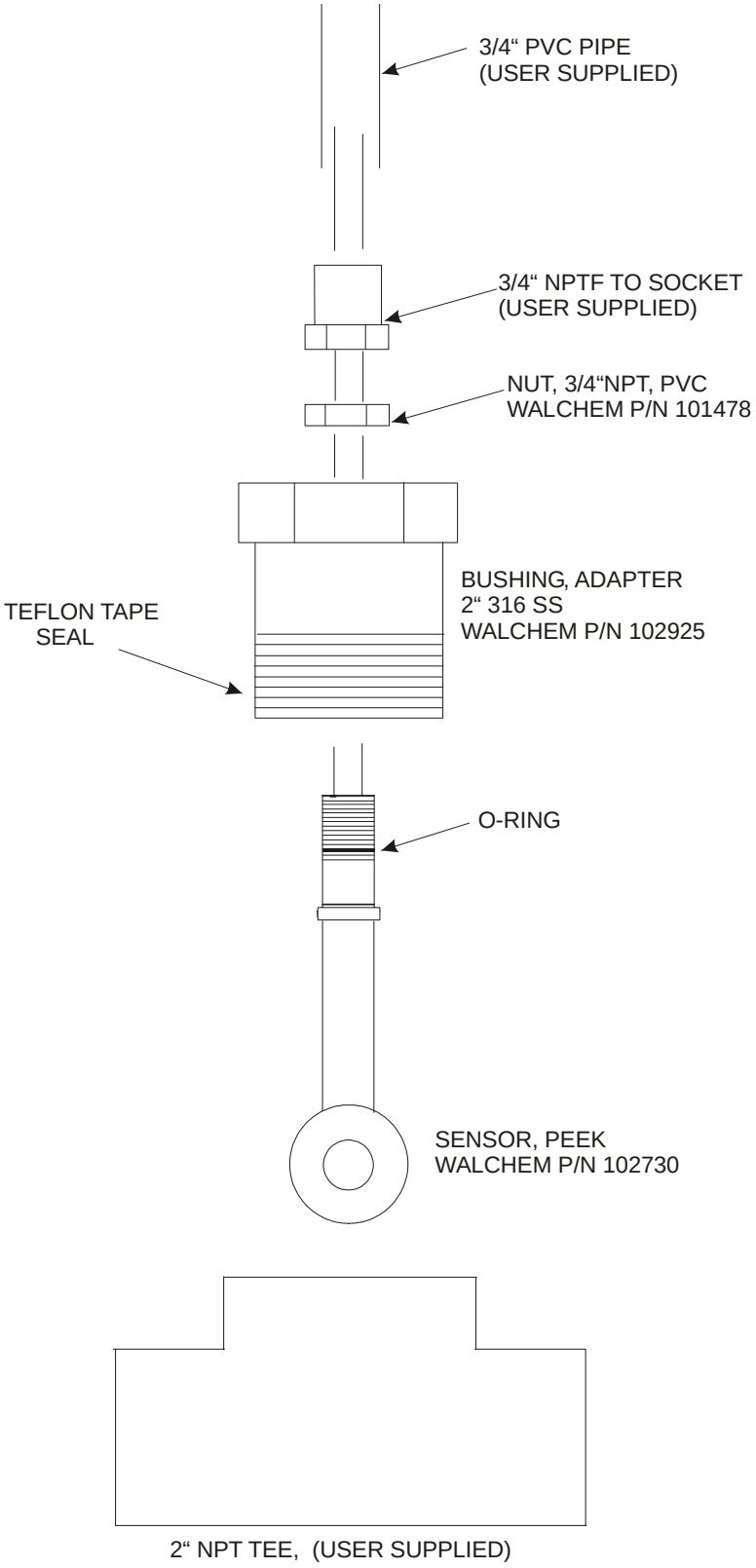


Figure 4B In-Line Installation – P/N 102730

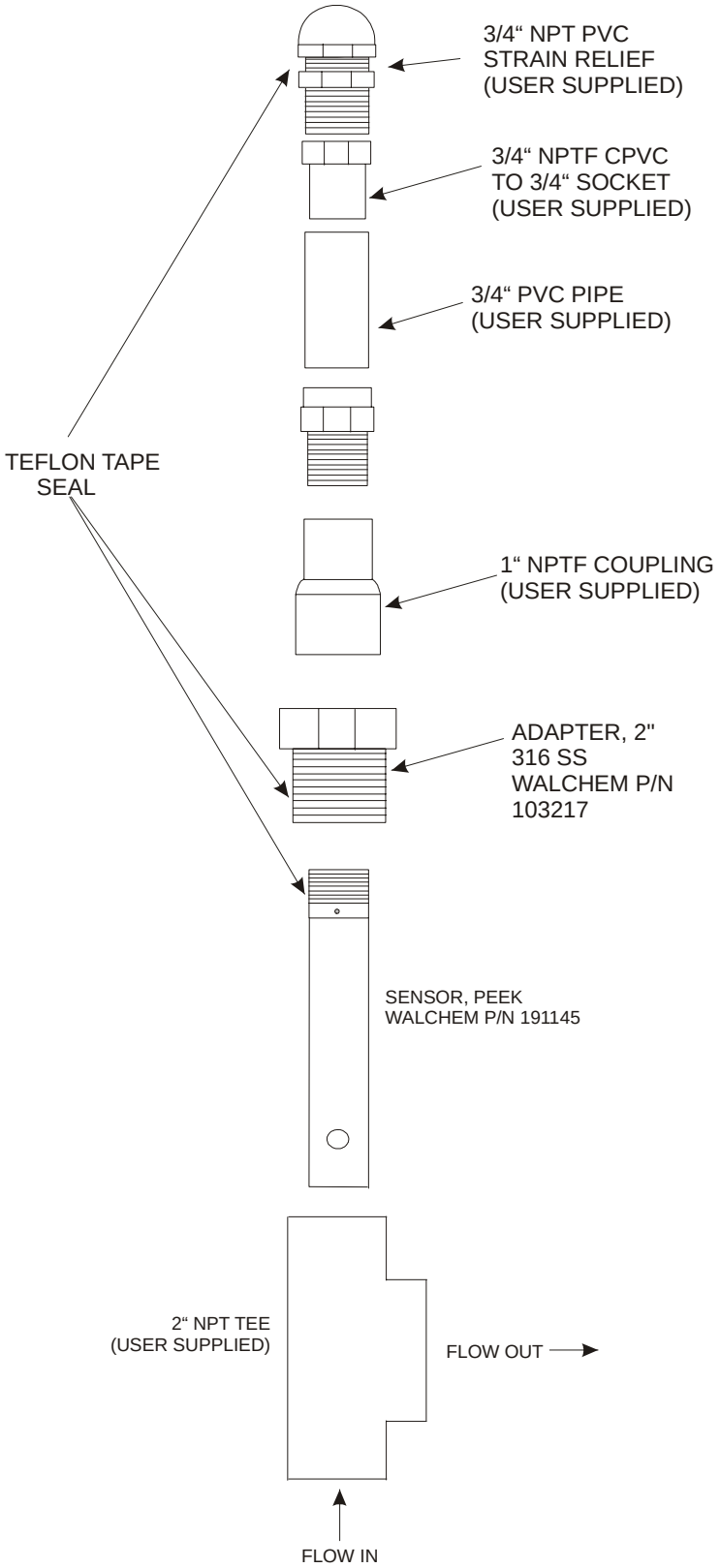


Figure 4C In-Line Installation – 191145

3.3 Electrical Installation

Route the cable through one of the water tight cable glands on the WEC310 series controller, and connect the wires according to the color code shown in figure 7. For cable lengths beyond the standard 20 feet, a junction box (p/n 190851) and extension cable (p/n 190916-XX) must be used. The extension cable must be supplied by Walchem to ensure reliability.

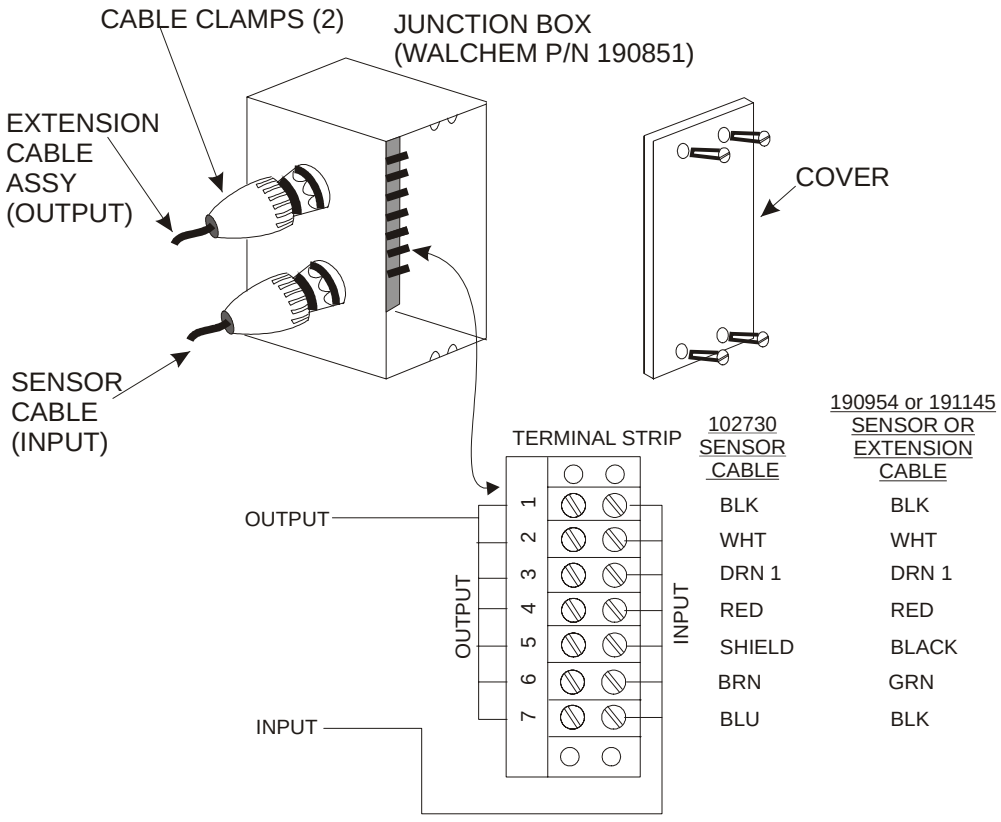


Figure 5 Junction Box Wiring

Mechanical mounting of the Junction Box

Open the junction box enclosure and use the two holes to screw the enclosure in place (mounting screws are user supplied). See Figure 6 for dimensions. Place the junction box within 20 feet of the sensor, in an area that is protected from excessive fumes or moisture. Locate the cable entry on the bottom to minimize leakage problems.

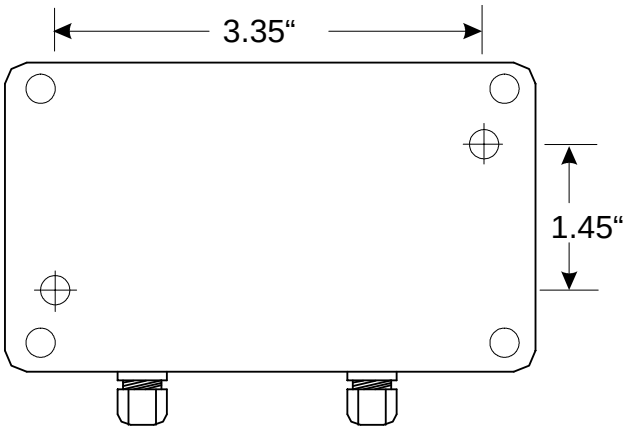


Figure 6 Junction Box Mounting Dimensions

Electrical installation of the Junction Box

Route the sensor cable through the water tight cable gland and attach the wires to the terminal strip inside the junction box according to the color codes shown in figure 5. Attach the extension cable to the WEC controller terminal strip according to the color codes shown in figure 7.

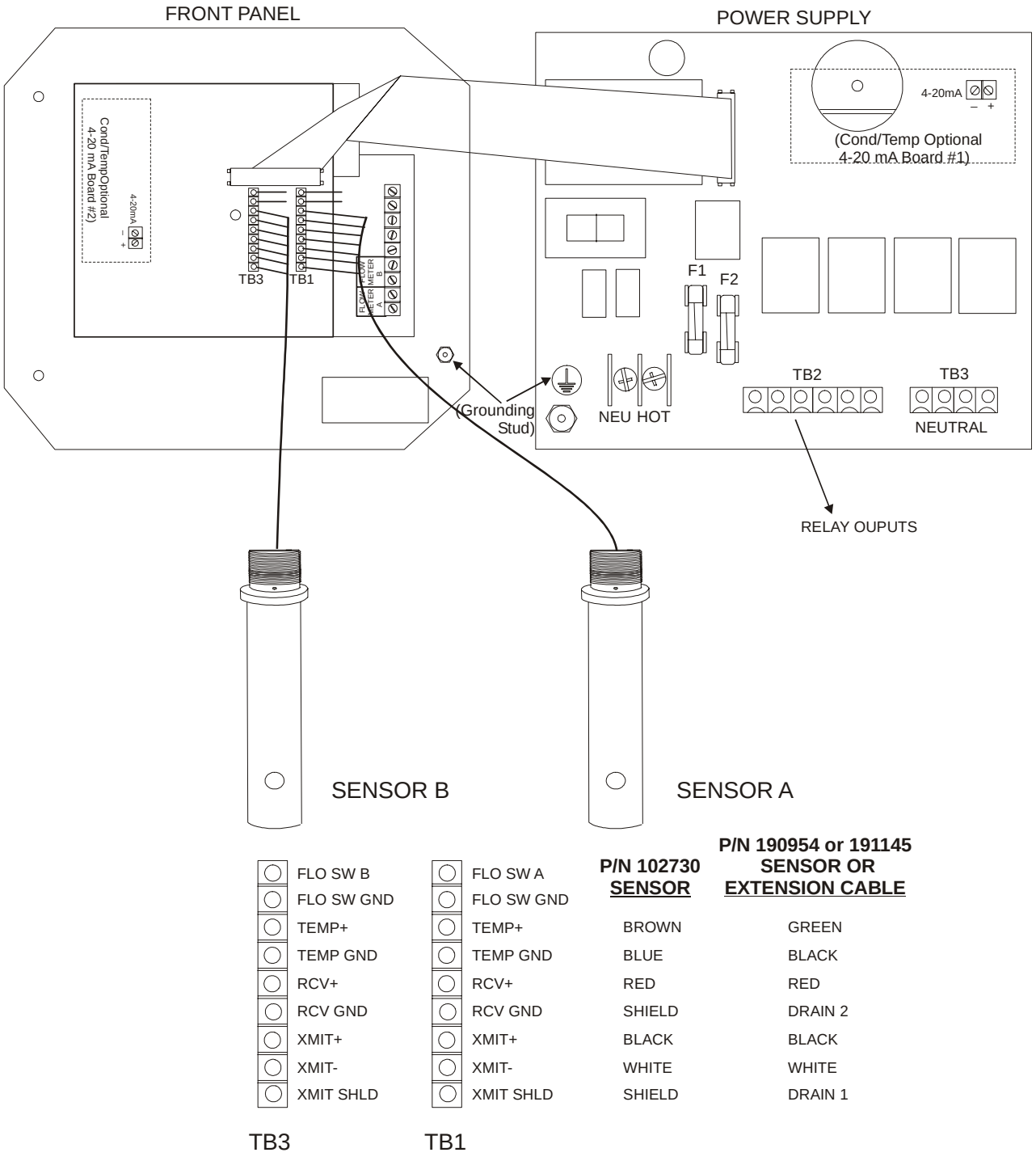
4.0 Maintenance

4.1 Cleaning the sensor

Note: the controller must be recalibrated after cleaning the probe.

- The probe should be cleaned periodically. The frequency required will vary by installation. In a new installation, it is recommended that the probe be cleaned after two weeks of service. To determine how often the probe must be cleaned, follow the procedure below:
    1. Read and record the conductivity.
    2. Remove, clean and replace the conductivity probe.
    3. Read conductivity and compare with the reading in step 1 above.

- If the variance in readings is greater than 5%, increase the frequency of probe cleaning. If there is less than 1% change in the reading, the probe was not dirty and can be cleaned less often.



	P/N 102730 SENSOR	P/N 190954 or 191145 SENSOR OR EXTENSION CABLE
TEMP+	BROWN	GREEN
TEMP GND	BLUE	BLACK
RCV+	RED	RED
RCV GND	SHIELD	DRAIN 2
XMIT+	BLACK	BLACK
XMIT-	WHITE	WHITE
XMIT SHLD	SHIELD	DRAIN 1

Figure 7 Input Wiring

Cleaning Procedure

An accumulation of dirt or debris on the sensor can effect the accuracy and the thermal time constant. This accumulation should be removed periodically. This can be accomplished by scrubbing with a toothbrush or stiff bottle brush. Soap or hand cleaner may help. Harsh abrasives should be avoided. Rinse the sensor thoroughly before returning to service.

Degaussing the sensor

Occasionally, when operating at low conductance (100-500 µS), a sensor may become magnetized. This might happen during maintenance or calibration, if the sensor is placed near a large transformer or high magnetic field of a motor. Magnetization of the sensor may result in erratic behavior or unexplained positive or negative offsets.

To degauss a sensor, use a degaussing tool such as that used for erasing magnetic tape heads. With degaussing tool power on, bring the tool close to the sensor and move the tool slowly around the sensor in close proximity. Then slowly move the tool away from the sensor. Turn tool power off. This should be done with WEC310 power off.

5.0 Troubleshooting

To find out if the probe or the controller is faulty, select the Self-Test menu, as described in the controller manual. If the problem is internal, an error message will appear on the lower line of the display. Call Walchem customer service.

If the Self-Test passes proceed as described below.

- To check the probe, check the probe electrical connections to the terminal strip (refer to Figure 6). Make sure that the correct colors go to the correct terminals and the connections are tight. Restore power and see if the conductivity is back to normal.

- Test Resistor
  Included with your controller is a resistor (4.32KΩ) with flexible leads. This can be used to test the controller and sensor. Select 1000µS scale. With the probe in open air, loop the wire through the sensor aperture and connect to the opposite end of the resistor. For a P/N 102730 sensor, the controller should stabilize at a reading of 500µS on the 1000µS scale. However, this value may range from 250-1000µS (the calibration has a range of 1/2X to 2X). For a P/N 190954 or 191145 sensor, the reading should be 800µS, but may range from 400-1600µS.

  The previous calibration will effect this reading. This is a quick operability test. It is not a substitute for insitu calibration with a known liquid.

- The last calibration performed will effect this reading. This is a quick operability test. It is not a substitute for insitu calibration with a known liquid.

- If the test resistor indicates that the sensor and controller are functional, your problem may be caused by an accumulation of dirt. Try cleaning the probe (refer to section 4.2).

■ Interference

The principle of operation involves a drive coil inducing a current in a receive coil. The liquid being tested is the coupling media. Calibration factors are determined when the coils are completely surrounded by this liquid. Should anything interfere with this coupling (i.e. buildup on the sensor, bubbles on the sensor, close proximity to the tank wall, any submerged object like a tumbling barrel), the reading will be distorted.

If the interference is a conductive object, it will increase the reading. If the interference is a non-conductive object, (which displaces the liquid from the sensor). The reading will be reduced. Keep these principles in mind when placing the sensor as well as when troubleshooting.

■ Sensor Resistance Check

If the problem is suspected to be in the sensor, a high impedance meter can be used to verify the readings shown in figure 8. Using a low impedance meter can cause the sensor to become magnetized.

CONNECTION	RESISTANCE Ω
1 TO 2	0 (SHORT)
1 OR 2 TO 3	INFINITE
1 OR 2 TO 4 OR 5	INFINITE
4 TO 5	0 (SHORT)
4 OR 5 TO 6 OR 7	INFINITE
6 TO 7	100KΩ ±1% @25°C (77 °F)

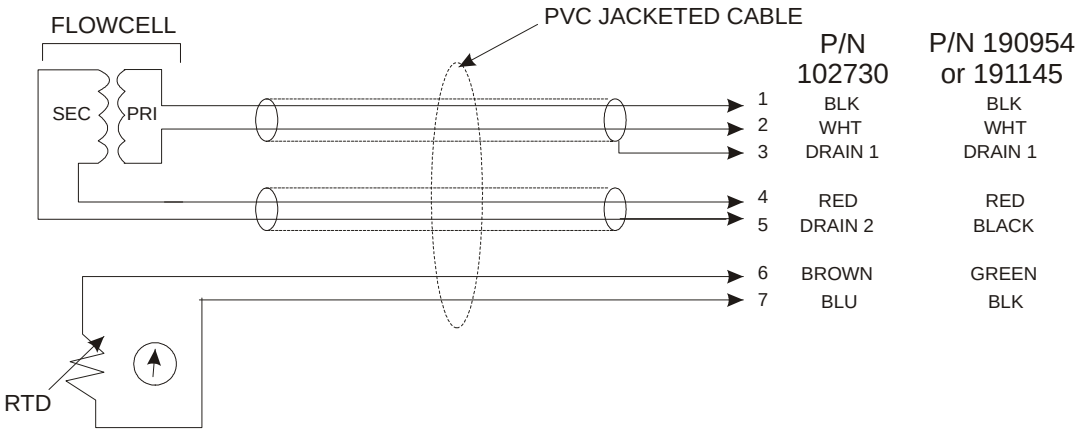


Figure 8 Sensor Resistance Check