

Instruction Sheet

PN 51A-3500/3500VP/rev.A

September 2007

Models 3500 and 3500VP

PERPH-X[®] High Performance pH Sensors

For additional information, please refer to the Instruction Manuals CD shipped with this product, or visit our website at www.emersonprocess.com/raihome/liquid/.

SPECIFICATIONS MODELS 3500 & 3500VP

Measurement range:

pH range: 0 – 14 pH

Temperature range: 0° C to 120° C (32°F to 248°F)

Maximum Process Pressure and Temperature:

100 psig (700 kPa [abs]) at 120°C (248°F)

Wetted Materials:

Ryton[®], Teflon[®], Titanium, glass, (platinum with ORP), and user specified o-rings

Process Connections:

1" MNPT front and rear facing threads

Cable:

With integral Preamplifier (-01 option), 25 ft. or VP8 connector

Without integral Preamplifier (-02 option) 15 ft. or VP8 connector

VP8 connector requires a separate cable:

PN 24281-00, 15 ft.

PN 24281-01, 25 ft.

Storage Temperature:

-10°C to 70°C (14°F to 138°F)

Weight/Shipping Weight:

1 lb/2 lb (0.5 kg/1 kg)

Teflon is a registered trademark of E.I. du Pont de Nemours and Company.
Ryton is a registered trademark of Chevron Phillips Chemical Company

*Percent Linearity Over pH Ranges

pH range	HT series
0-2 pH	94%
2-12 pH	99%
12-13 pH	97%
13-14 pH	92%

NOTICE

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.

STORAGE

1. It is recommended that electrodes be stored in their original shipping containers until needed.
2. Do not store at temperatures below -10°C (14°F).
3. Electrodes should be stored with a protective cap containing KCl solution (PN 9210342).
4. For overnight storage, immerse the sensor in tap water or 4 pH buffer solution.
5. A pH glass electrode does have a limited shelf life of one year.

NOTICE


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

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Process Management

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 gently shake the electrode so that the internal solution fills the bulb, thus removing any air trapped there.

 CAUTION
The buffer in the protective boot may cause skin or eye irritation.

INSTALLATION

For sensor dimensions, see Figures 1.

For sensor orientation and installation, see Figures 2 - 4.

For wiring, see Figures 5 - 18.

pH SENSOR CALIBRATION

TWO POINT pH BUFFER CALIBRATION

Select two stable buffer solutions, preferably pH 4.0 and 10.0 (pH buffers other than pH 4.0 and pH 10.0 can be used as long as the pH values are at least two pH units apart).

NOTE

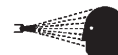
A pH 7 buffer solution reads a mV value of approx. zero, and pH buffers read approximately ± 59.1 mV for each pH unit above or below pH 7. Check the pH buffer manufacturer specifications for millivolt values at various temperatures since it may affect the actual value of the buffer solution mV/pH value.

1. Immerse sensor in buffer solution. **The buffer solution must contact the metal ring on the sensor which acts as the solution ground contact.** Allow the sensor to equilibrate to the buffer temperature and wait for the reading to stabilize. Value of buffer can now be acknowledged by 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 will result in reduced slope values. To ensure accurate readings, it is recommended that the electrode be replaced when the slope value falls below 47 to 49 mV/pH.

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 analyzer's reading to match that of the known process pH.

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!

MAINTENANCE


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

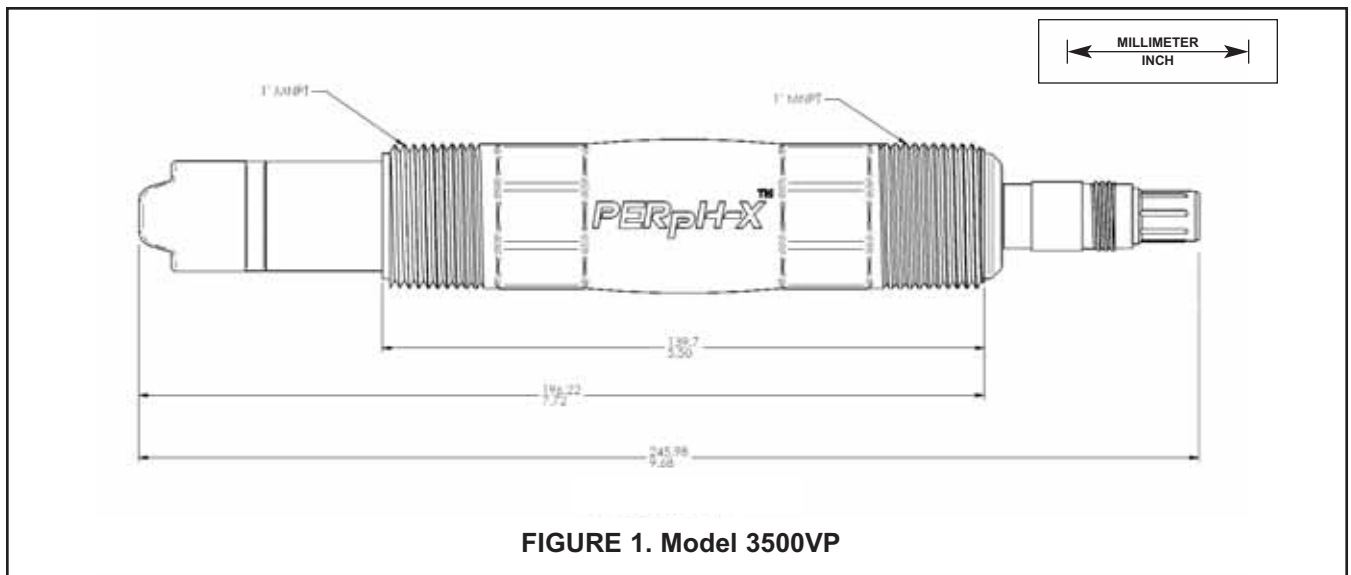
1. To remove oil deposit, clean the electrode with a mild non-abrasive detergent.
2. To remove scale deposits, soak electrodes for 30 to 60 minutes in a 5% hydrochloric acid solution.

REFERENCE JUNCTION REPLACEMENT AND SENSOR ELECTROLYTE RECHARGE

The reference junction and reference fill gelled solution are replaceable to facilitate longer sensor life due to electrolyte depletion and junction plugging and contamination. Use the junction replacement kit and reference fill gel to accomplish this procedure.

1. Remove the junction cap by turning counter clockwise.
2. Remove the liquid junction by pulling the junction straight out.
3. Remove the old reference fill gel by rinsing with water.
4. Fill the reference fill chamber with the reference fill gel using the syringe and remove any air bubbles. Top off the reference fill chamber until it is completely filled.
5. Replace the junction O-ring and liquid junction by sliding over the glass electrode. Excess reference gel should flow out.
6. Replace junction cap by turning clockwise. Hand tighten the junction cap only do not use pliers to tighten the cap.
7. Buffer check and calibrate the sensor as described in the previous section.

 CAUTION
The reference electrolyte may cause skin or eye irritation.



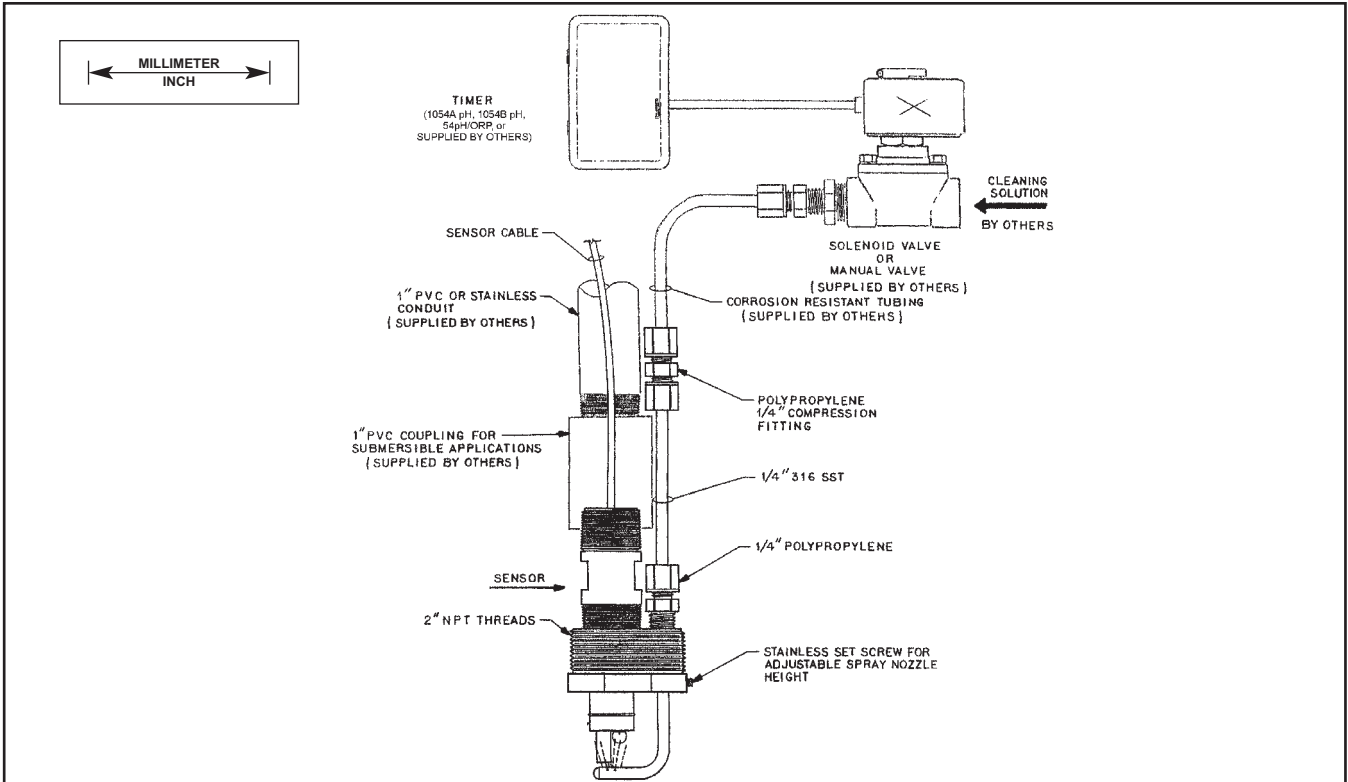


FIGURE 2. 3500 with Jet Spray Cleaner (PN 12707-00) for Submersion Installations

This accessory is especially useful for keeping the sensor clean in dirty ponds or tanks. It can be mounted using the Handrail Mounting Assembly or a similar submersion accessory.

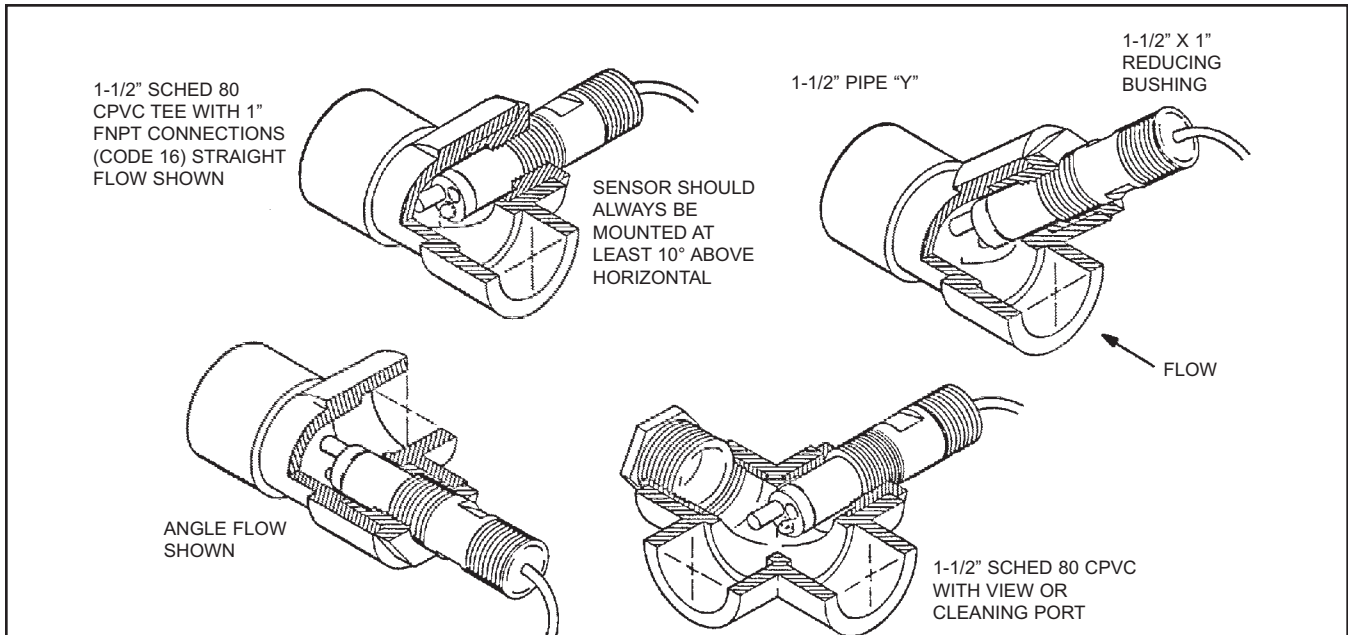
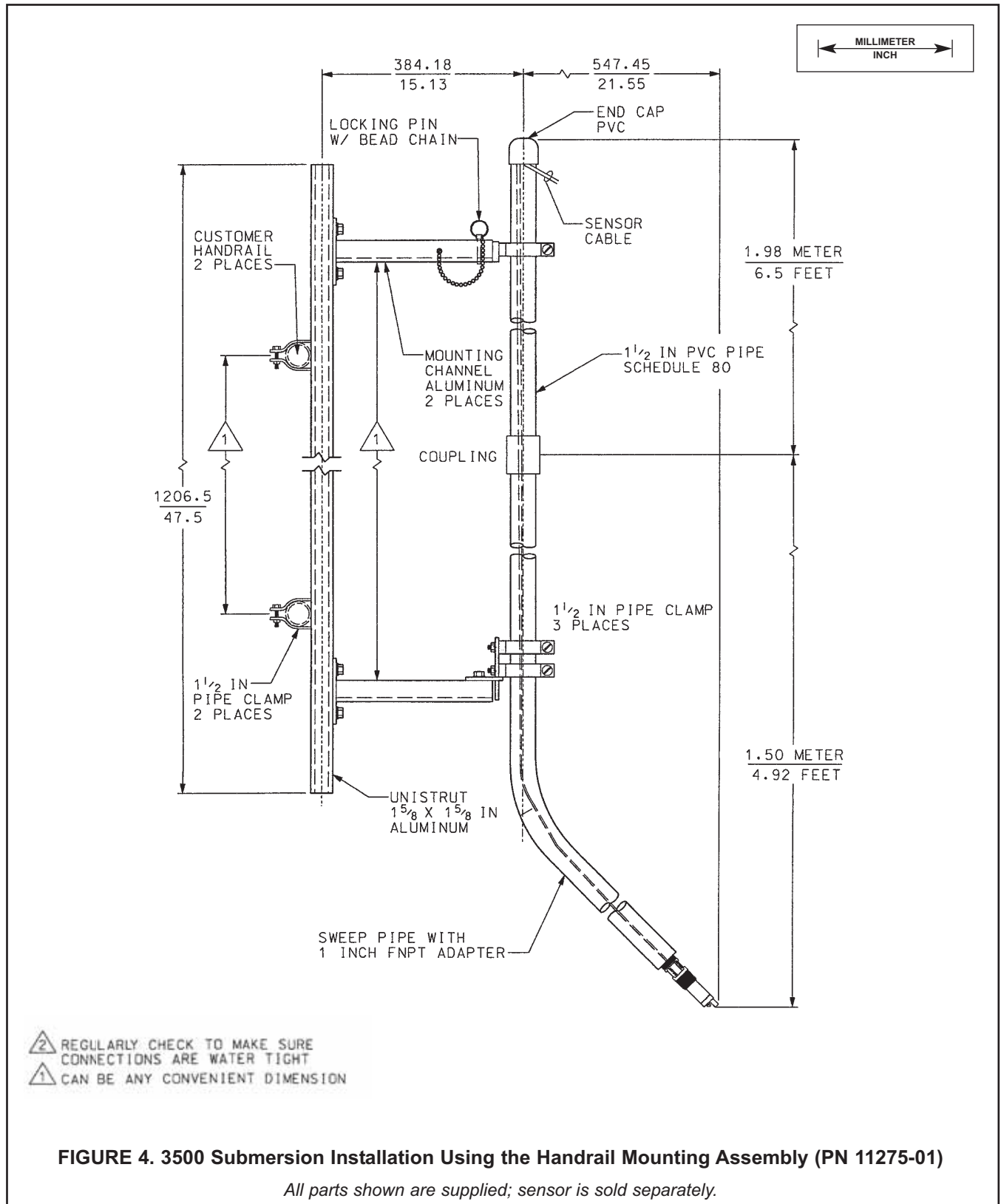


FIGURE 3. 3500 FLOW THROUGH INSTALLATIONS



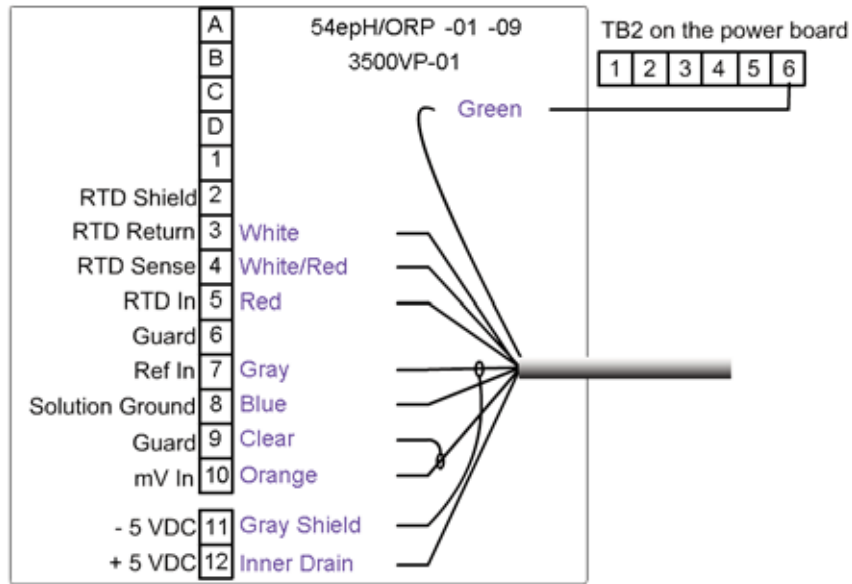


FIGURE 5. 3500 -01 or 3500VP -01 to Model 54epH/ORP

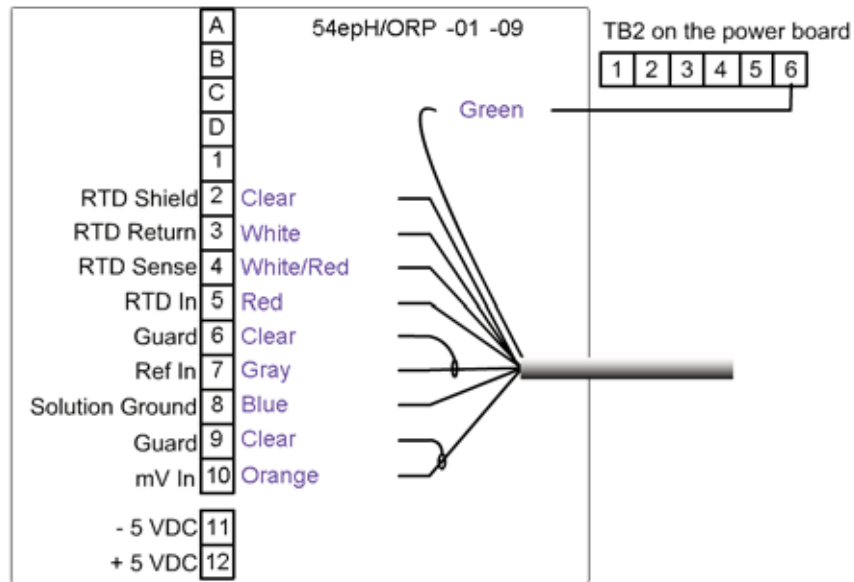
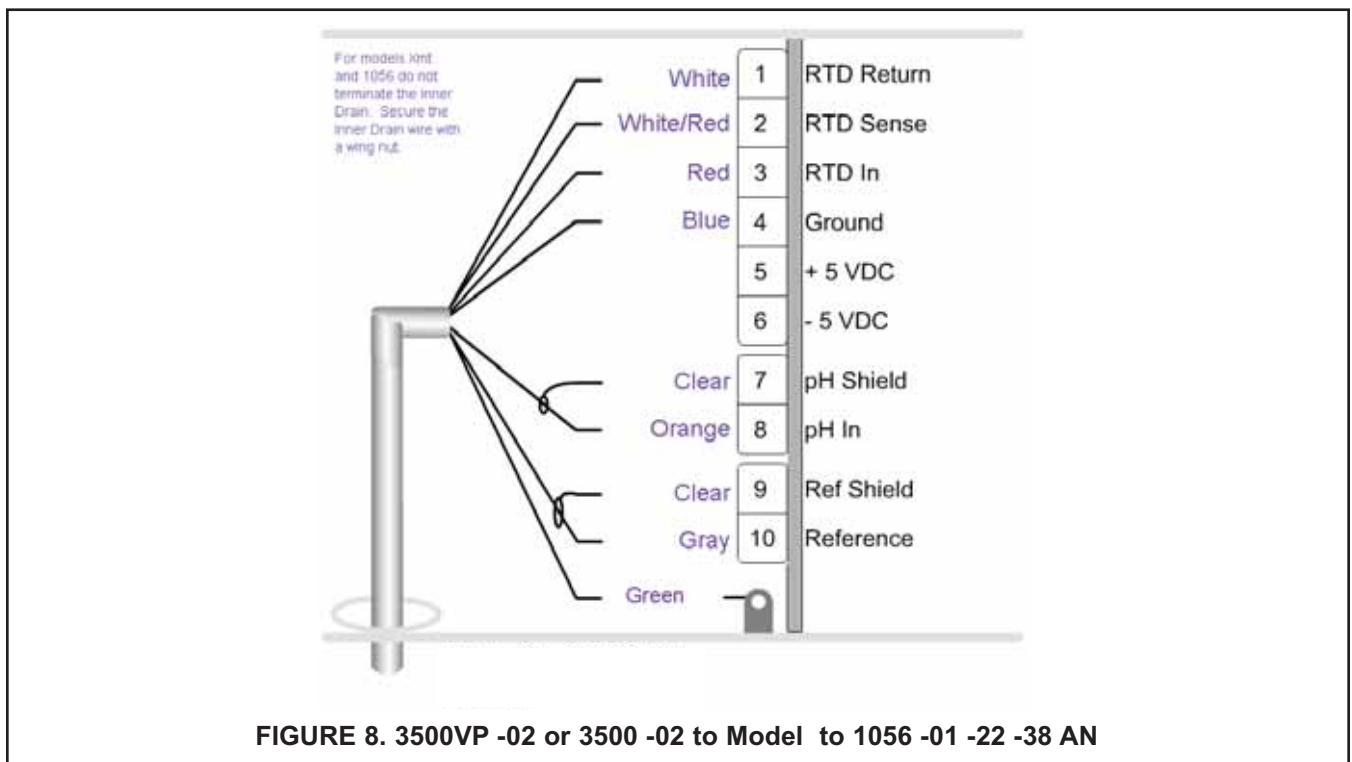
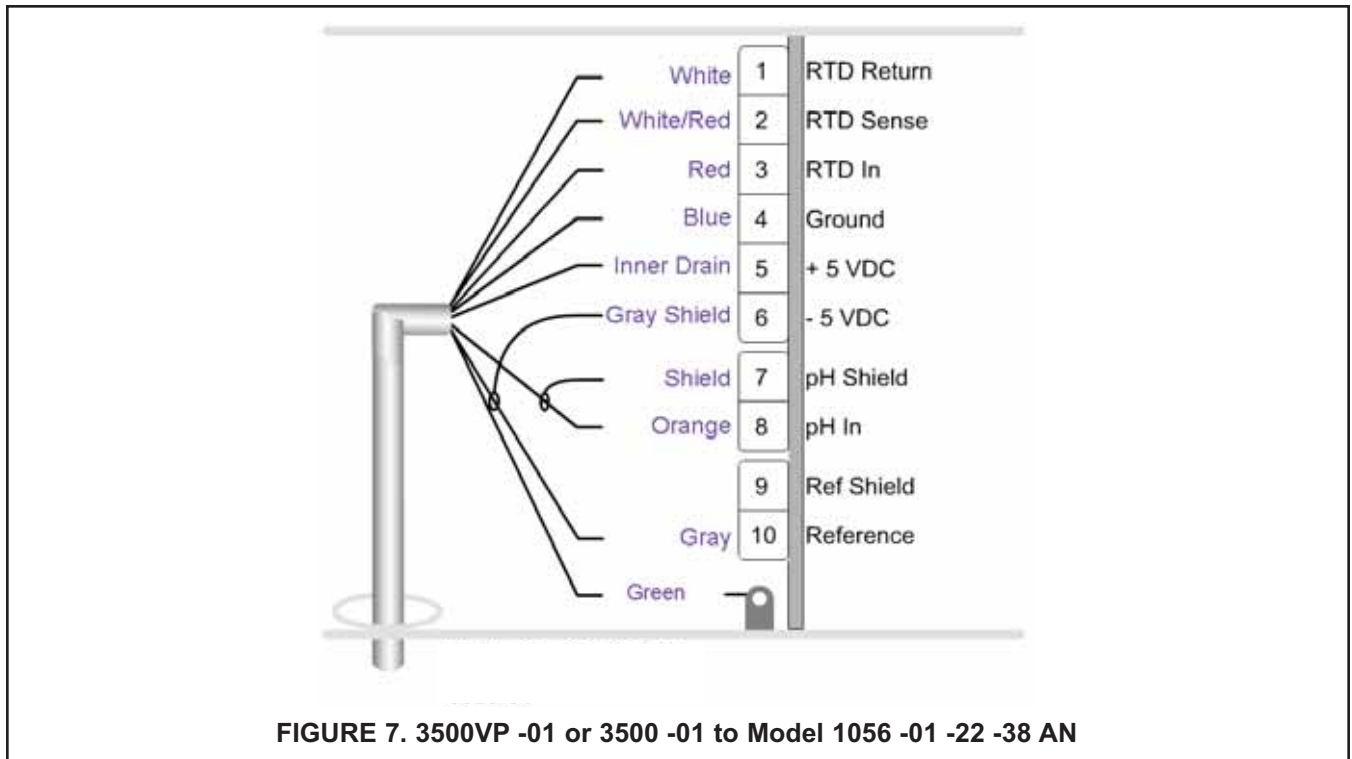


FIGURE 6. 3500 -02 or 3500VP -02 to Model 54epH/ORP



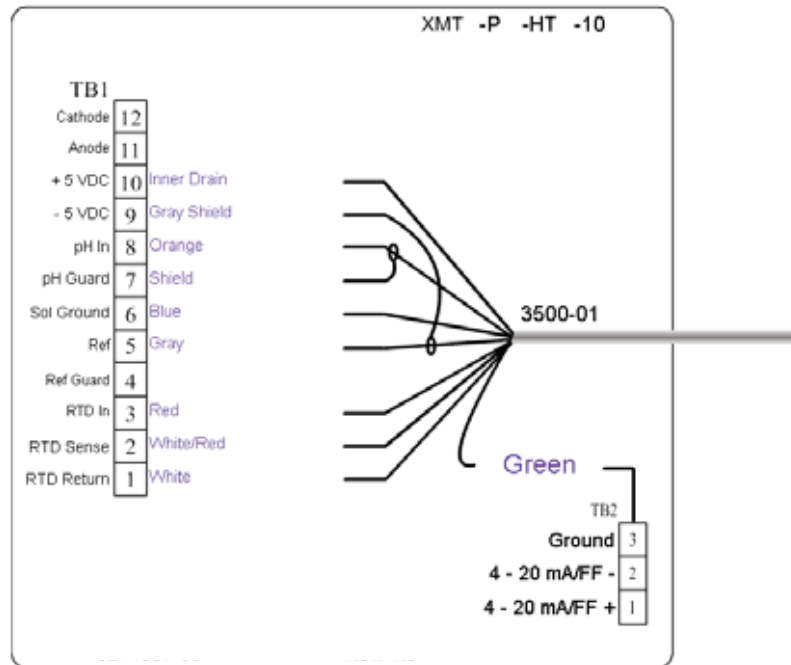


FIGURE 9. 3500VP -01 & 3500 -01 to Model Xmt

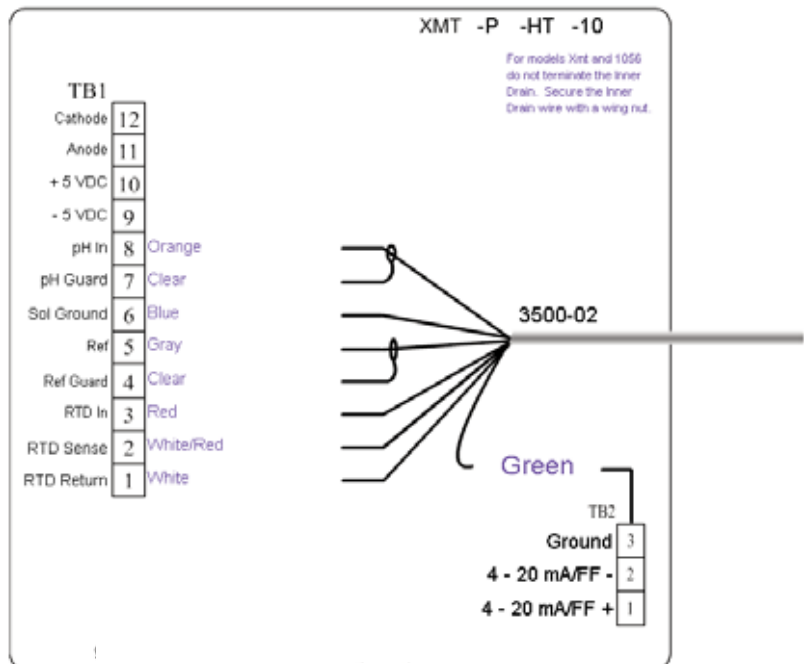


FIGURE 10. 3500VP -02 & 3500 -02 to Model Xmt

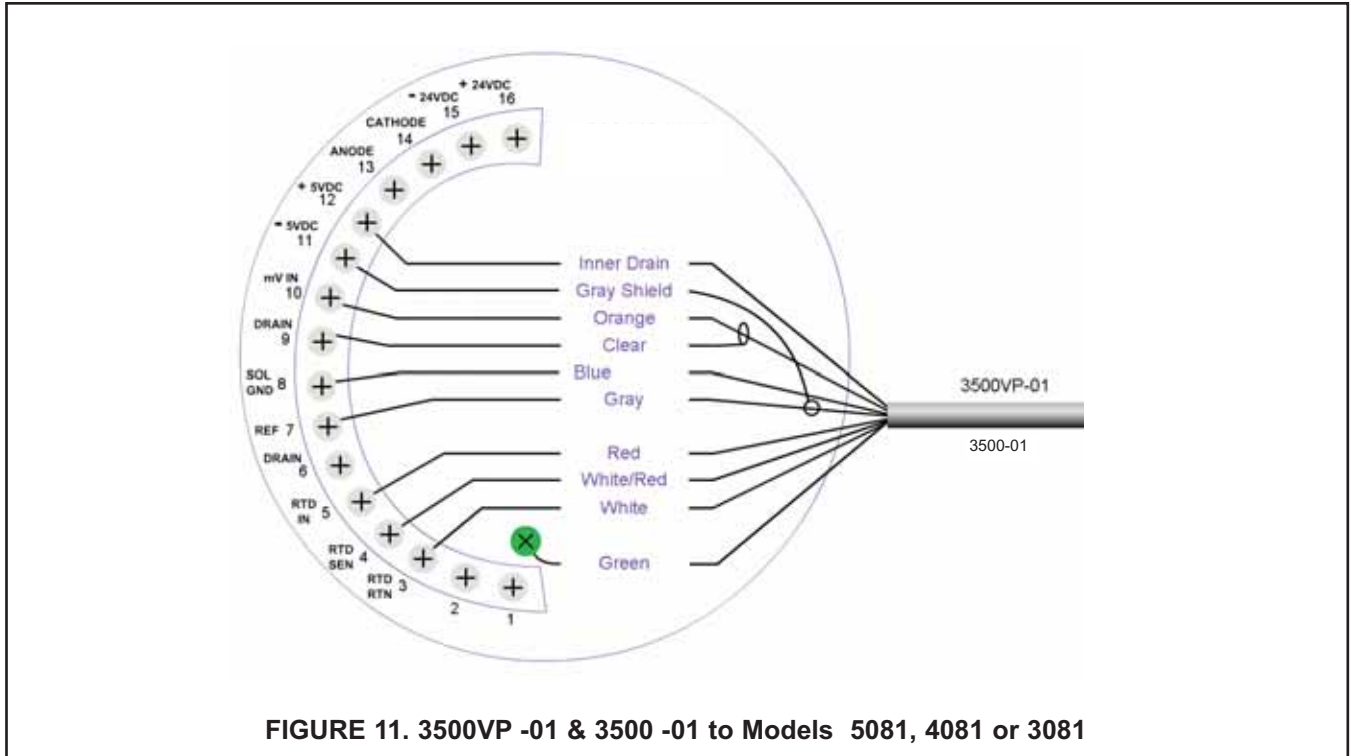


FIGURE 11. 3500VP -01 & 3500 -01 to Models 5081, 4081 or 3081

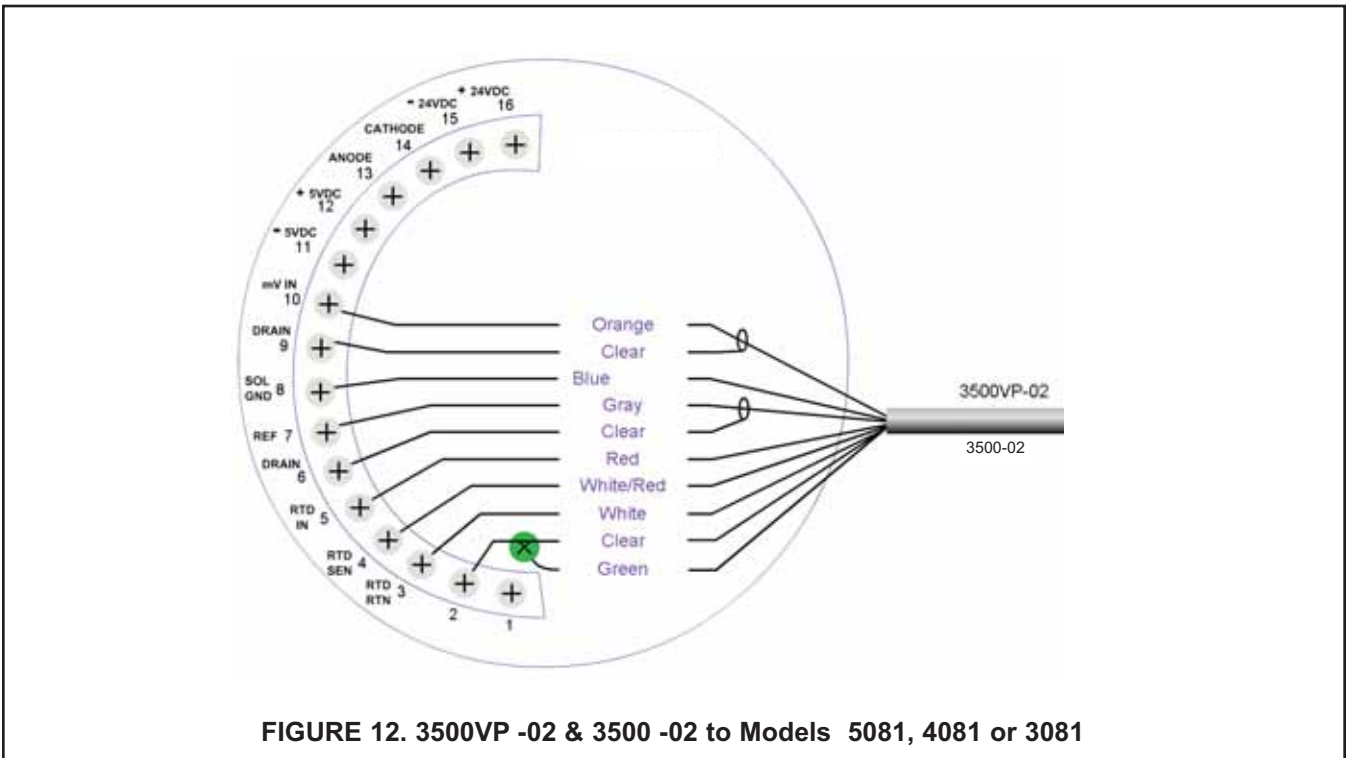


FIGURE 12. 3500VP -02 & 3500 -02 to Models 5081, 4081 or 3081

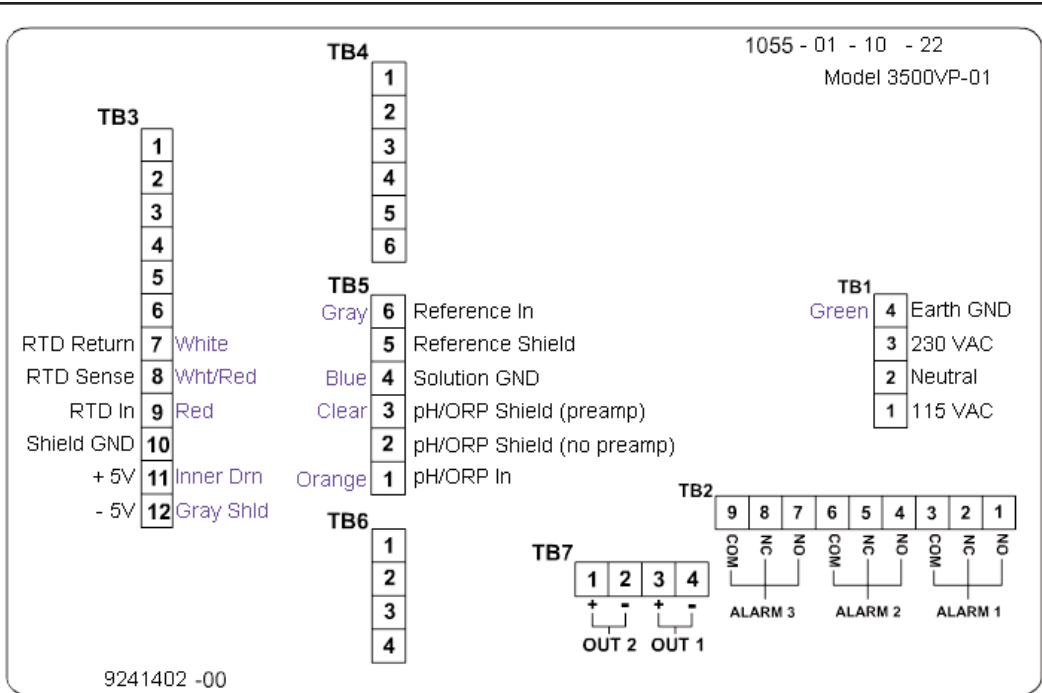


FIGURE 13. 3500 -01 or 3500VP -01 to Model 1055

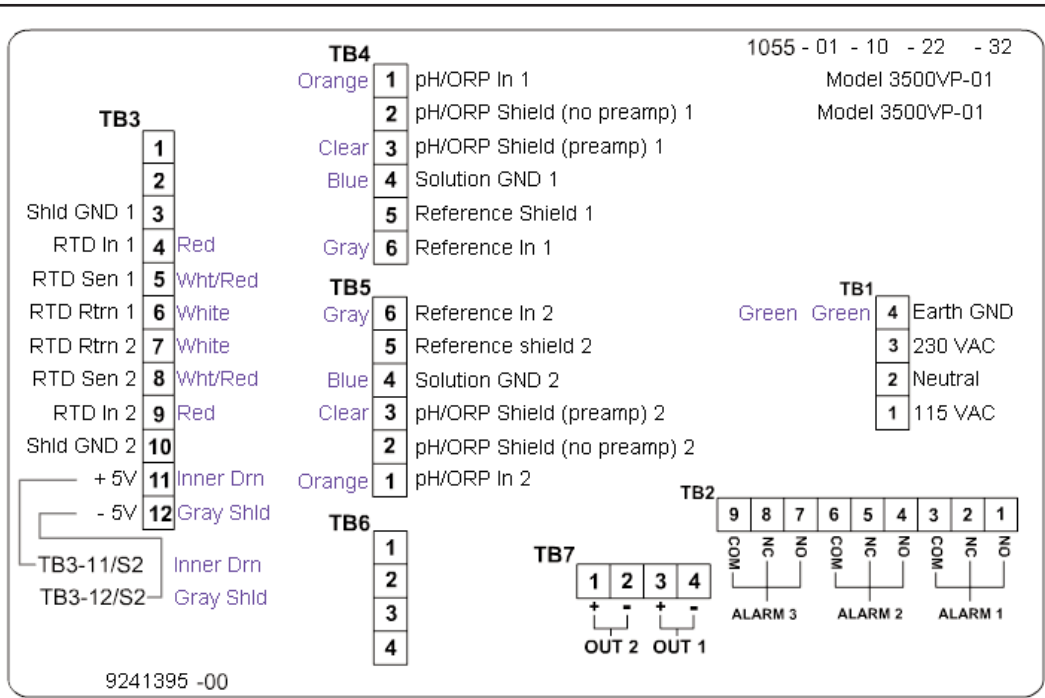


FIGURE 14. Two Model 3500 -01 or 3500VP -01 to Model 1055

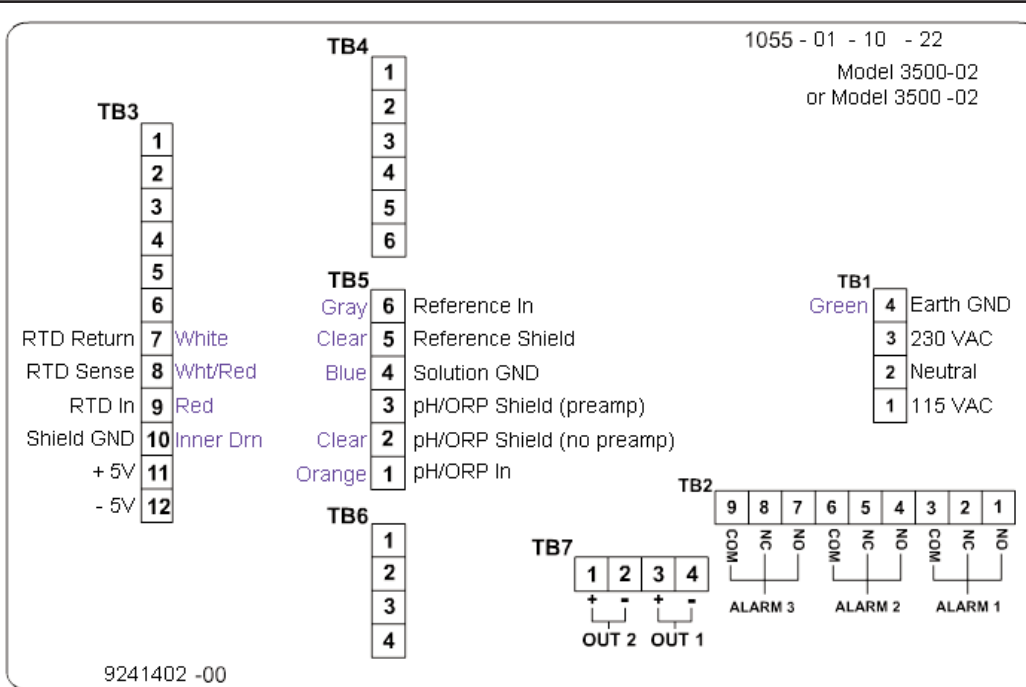


FIGURE 15. Model 3500 -02 or 3500VP -02 to Model 1055

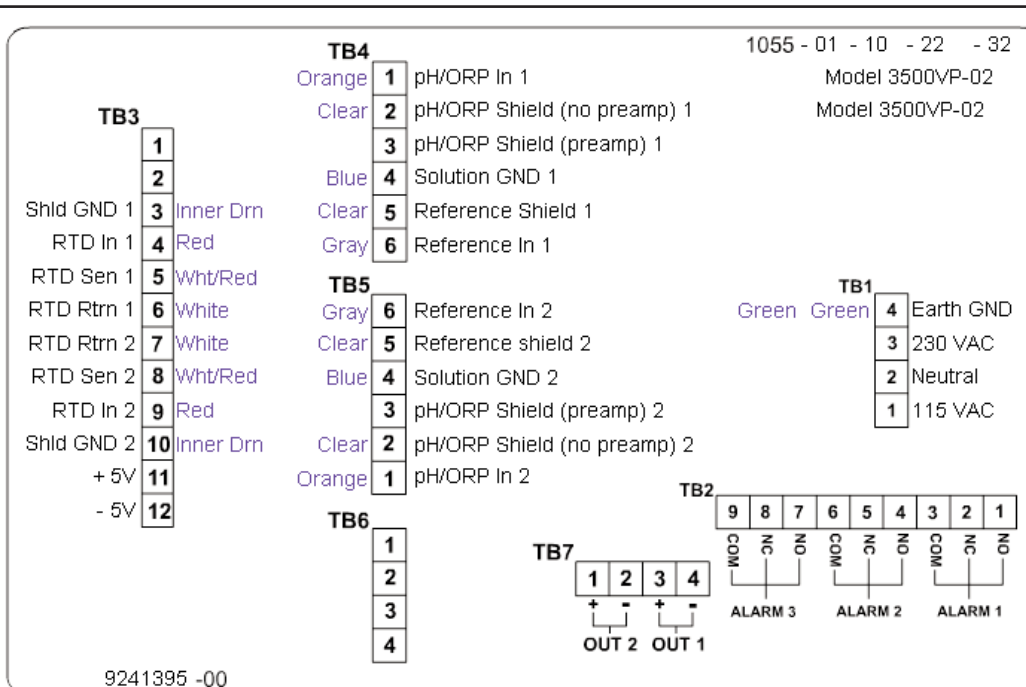


FIGURE 16. Two Model 3500 -02 or 3500VP -02 to Model 1055

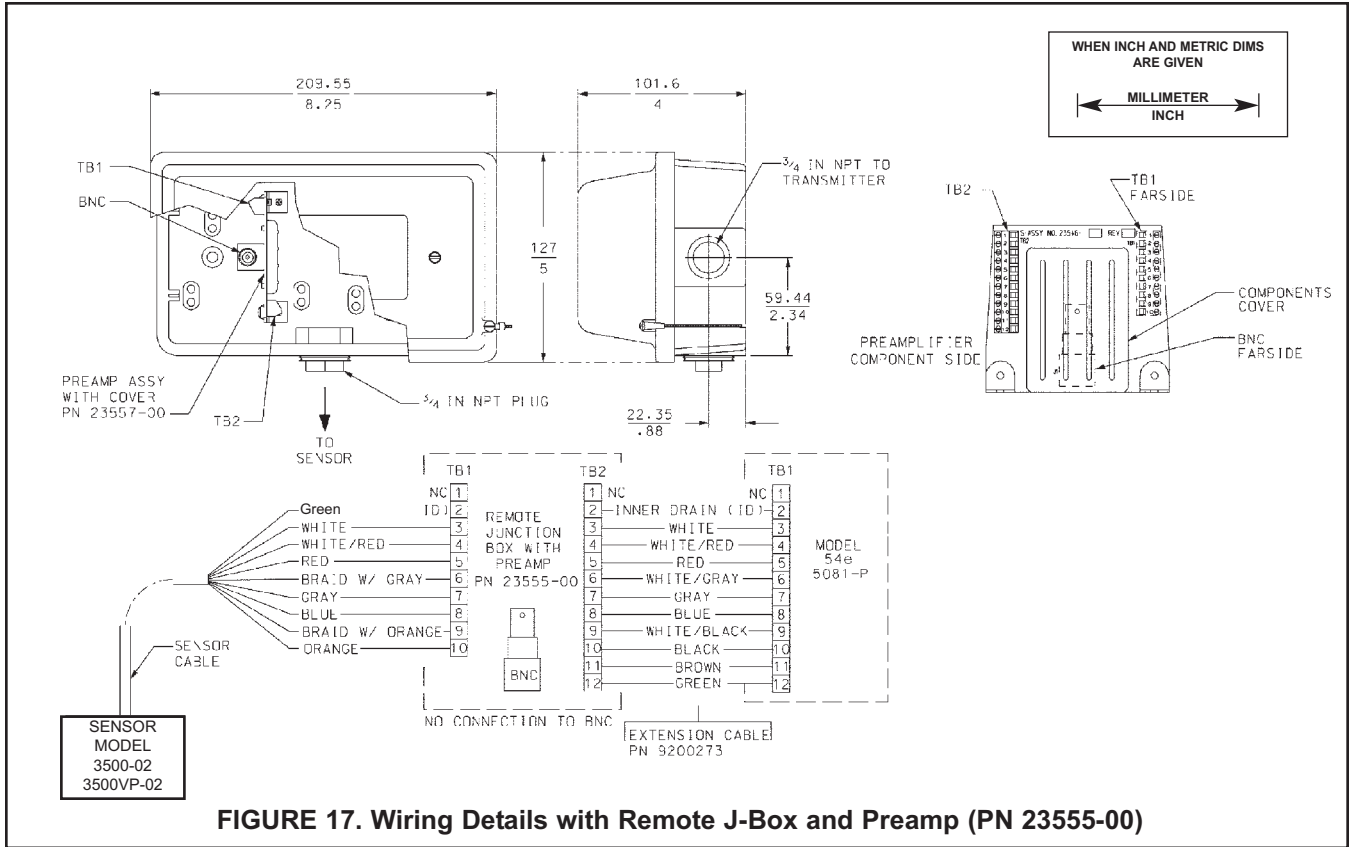


FIGURE 17. Wiring Details with Remote J-Box and Preamp (PN 23555-00)

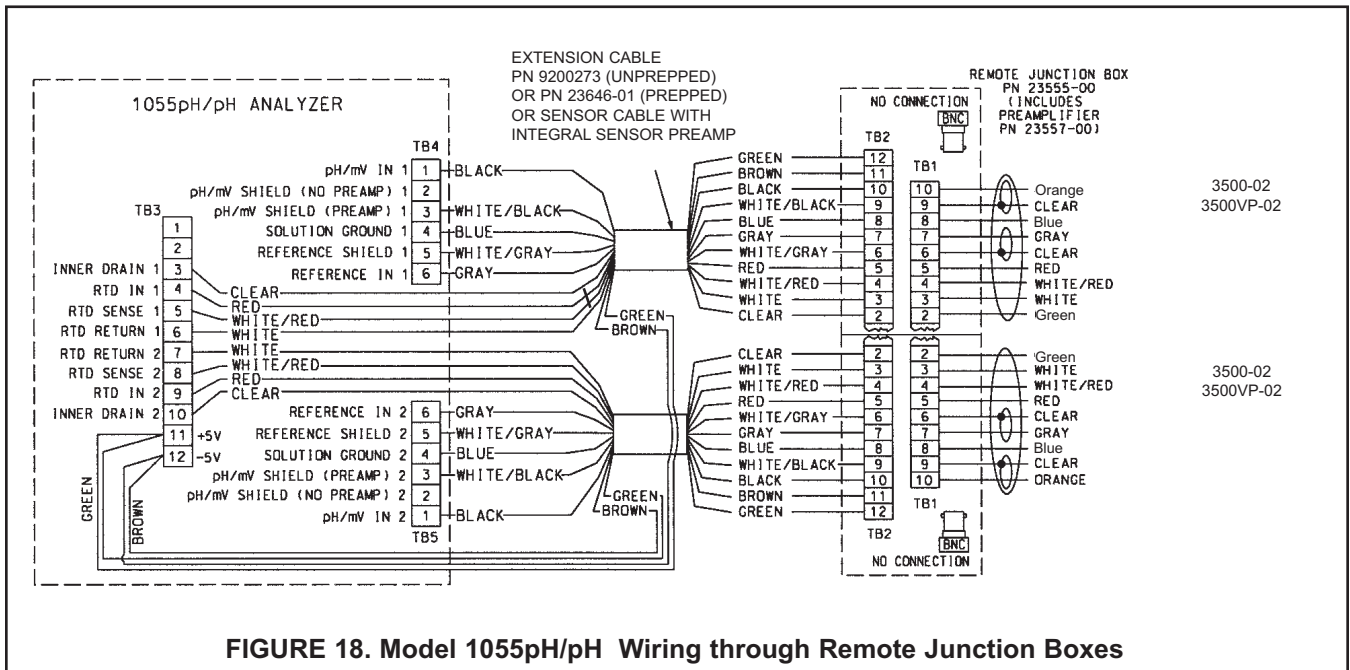


FIGURE 18. Model 1055pH/pH Wiring through Remote Junction Boxes

ORDERING INFORMATION - Model 3500

The **Model 3500** Sensor is a versatile sensor platform for measuring pH or ORP. A platinum PT100 RTD is used for temperature compensation. The rugged Ryton body and rebuildable reference electrode construction with front and rear facing 1" MNPT threads allows use in either insertion or submersion applications. The 3500 uses an integral cable, 25 ft., with preamplifier (-01) and 15 ft. without (-02).

MODEL 3500		High Performance pH sensor
CODE	Electrolyte Selection	
HT	High Temperature default choice	
BF	Bio-film Resistant	
PR	Poisoning Resistant	
OR	Oil Resistant	
SR	Scaling Resistant	
MR	Metal Resistant	
CODE	Preamplifier/Cable (Required Selection)	
01	With integral Preamplifier, 25 ft. Cable (0°C to 85°C)	
02	Without integral Preamplifier, 15 ft. Cable	
CODE	Measuring Electrode Type (Required Selection)	
10	GPHT hemi glass bulb	
CODE	Reference Type (Required Selection)	
21	Double Junction	
CODE	O-Ring Material (Required Selection)	
30	EPDM	
31	Viton®	
32	Kalrez®	
3500-HT -02 -12 -21 -32 EXAMPLE		



ORDERING INFORMATION - Model 3500VP

The **Model 3500VP** Sensor is a versatile sensor platform for measuring pH or ORP. A platinum PT100 RTD is used for temperature compensation. The rebuildable reference electrode and rugged Ryton body construction with front and rear facing 1" MNPT threads allow use in either insertion or submersion applications. The 3500VP uses the VP8 connector and it requires a cable assembly purchased separately.

MODEL 3500VP		High Performance pH sensor
CODE	Electrolyte Selection	
HT	High Temperature default choice	
BF	Bio-film Resistant	
PR	Poisoning Resistant	
OR	Oil Resistant	
SR	Scaling Resistant	
MR	Metal Resistant	
CODE	Preamplifier/Cable (Required Selection)	
01	With integral Preamplifier, 25 ft. Cable (0°C to 85°C)	
02	Without integral Preamplifier, 15 ft. Cable	
CODE	Measuring Electrode Type (Required Selection)	
10	GPHT hemi bulb	
CODE	Reference Type (Required Selection)	
21	Double Junction	
CODE	O-Ring Material (Required Selection)	
30	EPDM	
31	Viton®	
32	Kalrez®	
3500VP-HT -01 -10 -21 -31 EXAMPLE		



OTHER ACCESSORIES

Part Number	Description
23555-00	Junction Box with Preamplifier for Models 54e, 3081, 4081, 5081, XMT, 1055, 1056
915240-03	PVC flow through Tee, ¾ in. NPT process connection
915240-04	PVC flow through Tee, 1 in. NPT process connection
915240-05	PVC flow through Tee, 1-1/2 in. NPT process connection
2002011	CPVC flow through Tee, 1-1/2 in. NPT process connection
11275-01	Sensor handrail assembly
24091-00	Acrylic low flow cell
12707-00	Jet Spray Cleaner
24281-00	15 ft. cable with mating VP8
24281-01	25 ft. cable with mating VP8
9210012	Buffer solution, 4.01 pH, 16oz
9210013	Buffer solution, 6.86 pH, 16oz
9210014	Buffer solution, 9.18 pH, 16oz



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