



- Do not exceed maximum temperature/pressure specifications.
- Wear safety goggles or face shield during installation/service.
- Do not attempt to disassemble the retraction housing and the electrode piston.
- Do not alter product construction.
- Failure to follow safety instructions may result in severe personal injury.
- Retract electrode before any pipe cleaning operation.



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## 1. Description

The Signet 3719 pH/ORP Wet-Tap allows installation and removal of pH or ORP electrodes without the need for process shutdown during routine electrode maintenance and calibration. Process isolation is achieved with a double O-ring seal on a unique and compact retraction assembly; no separate valve is required. A cam-activated automatic locking mechanism, SafeLoc™, and the short stroke design help to assure operator safety.

## 2. Specifications

### General

- Compatible sensors:
  - 2716-WT Twist-Lock pH Electrode
  - 2717-WT Twist-Lock ORP Electrode
  - 2756-WT DryLoc® pH Electrode
  - 2756-WT-1 DryLoc® pH Electrode
  - 2756 -WTP DryLoc® plastic pH electrode
  - 2756-WTP-1 DryLoc® plastic pH electrode
  - 2757-WT DryLoc® ORP Electrode
  - 2757-WTP DryLoc® plastic ORP electrode
- Shipping Weight:
 

Wet-tap assembly:	1.2 kg (2.7 lbs.)
Electrode:	0.13 kg (0.3 lb)
- Process Connection:
 

3-3719-11:	1½ in. NPT
3-3719-21:	2 in. NPT
3-3719-12:	ISO 7/1-R1½
3-3719-22:	ISO 7/1-R2

### Wetted materials

- Retraction Housing: CPVC
- O-rings: FPM
- Electrode Body: Glass OR Plastic
- Electrode junctions: Porous PTFE
- Electrode sensing surface:
 

Glass Membrane (pH)
Platinum (ORP)
- Electrode O-rings: FPM

### Other Materials

- Locking Shroud: PVC
- Hardware: 316 stainless steel

**WARNING!**

If used in conditions that exceed recommended pressure ratings, this product can pose a serious hazard.

We urge customers to read the specifications carefully before installing and operating this product. Improper use can cause components and process liquids to be expelled at high speeds and cause serious personal injury.

### Performance

- Maximum Flow Velocity: 3 m/s (10 ft/s)
- Efficiency: > 97% @ 25 °C (77 °F)
- Response Time:
 

pH:	<5s for 95% of signal change
ORP:	Application dependent
- Drift: < 2 mV per week
- Operating Range:
 

pH:	0 to 14 pH
ORP:	-2000 to +2000 mV
- Reference Junctions: Porous PTFE
- Electrolyte: 3.5M KCl
- Elements: Ag/AgCl
- Temp. Sensor (pH):
 

3K Balco (3-2716-WT,
3-2756-WT-1, WTP-1)
PT1000 (3-2756-WT, -WTP)
- Temp. response time (τ): 438 s
- Sodium Ion Error:
 

< 0.05 pH in 0.1 molar
Na+ ion at 12.8 pH
- Impedance (pH): <150 MΩ @ 25 °C

### Storage Temperature:

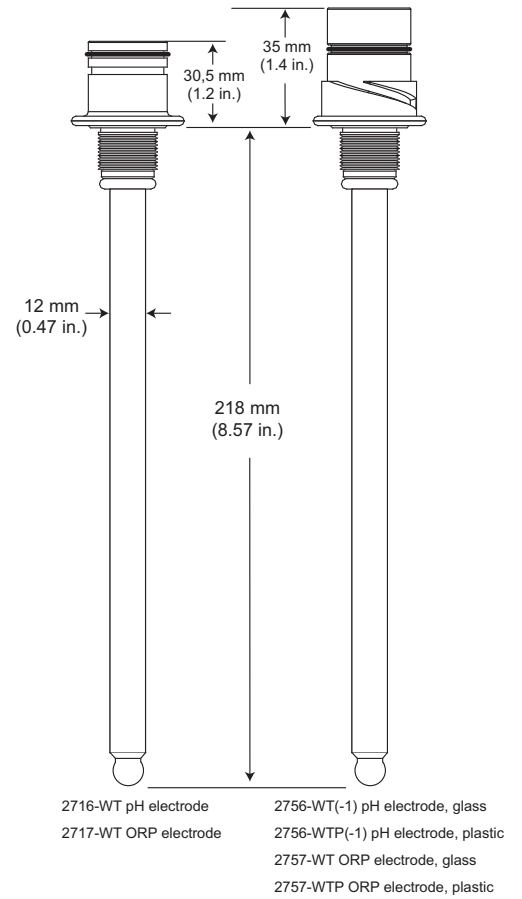
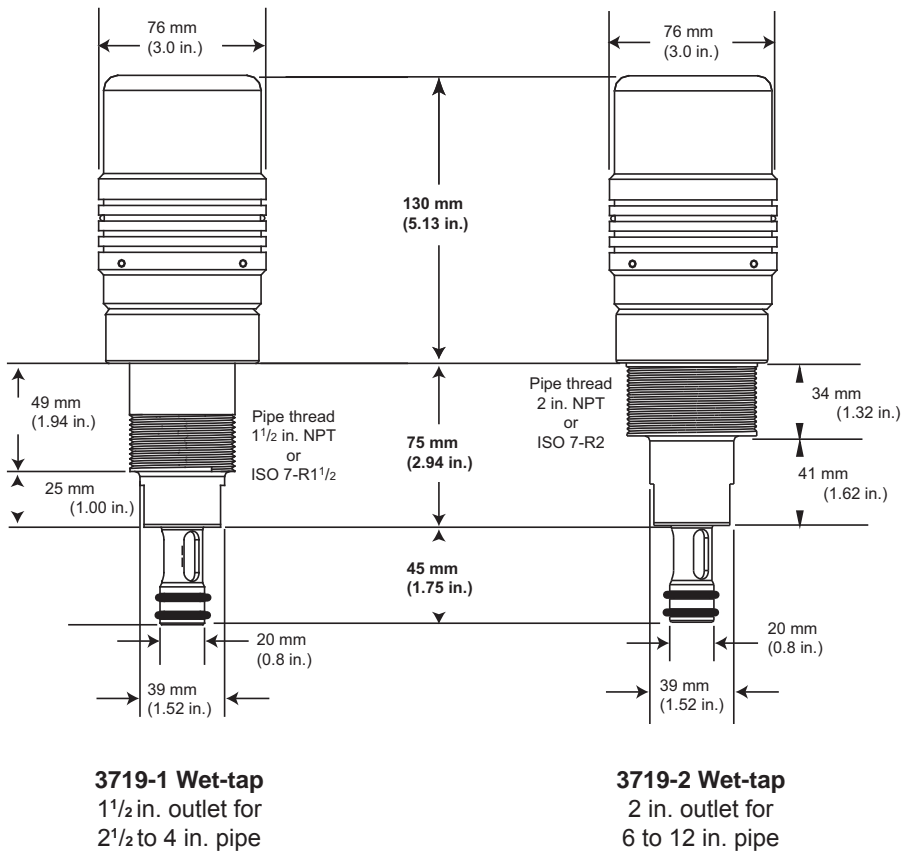
- Wet-tap assembly: -15 to 120 °C (5 to 248 °F)
- Electrode: 0 to 50 °C (32 to 122 °F)

### Standards and Approvals

- Manufactured under ISO 9001 and 14001

China RoHS (Go to [www.gfsignet.com](http://www.gfsignet.com) for details)

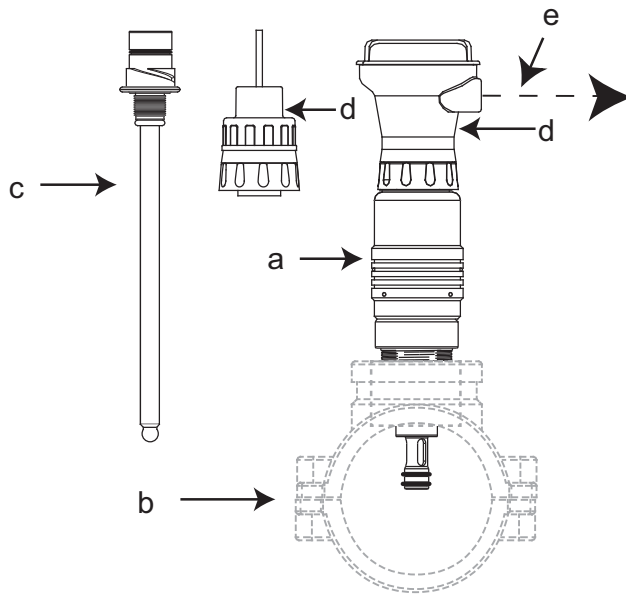
### 3. Dimensions



#### CAUTION!

When using clamp-on saddle fittings (customer-supplied), the system temperature and pressure is limited by the saddle specifications.  
 The process temperature is limited to 40 °C (104 °F) maximum when using saddles.

## 4. 3719 System Overview



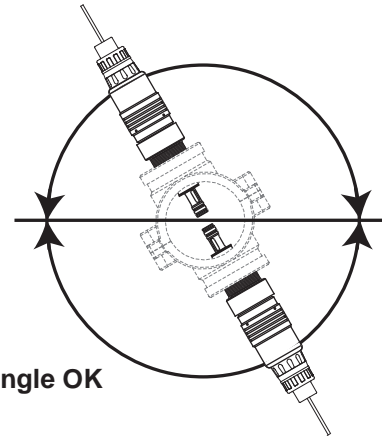
- a) 3719 pH/ORP Wet-Tap
- b) Customer-supplied Low-Profile Clamp-on Saddle Fitting (ASTM sizes 2½ to 12 in.)
- c) DryLoc® pH or ORP Electrode (6 versions available; see ordering information on page 8.) ("DryLoc®" refers to the electrode connector style)
- d) 2750 or 2760 DryLoc® pH/ORP Preamplifier/Sensor electronics
- e) Output signal options:
  - 2750:
    - Digital (S³L)
    - 4 to 20 mA
  - 2760:
    - Analog mV Output- Digital (S³L)

All components (items a–d) are sold separately.

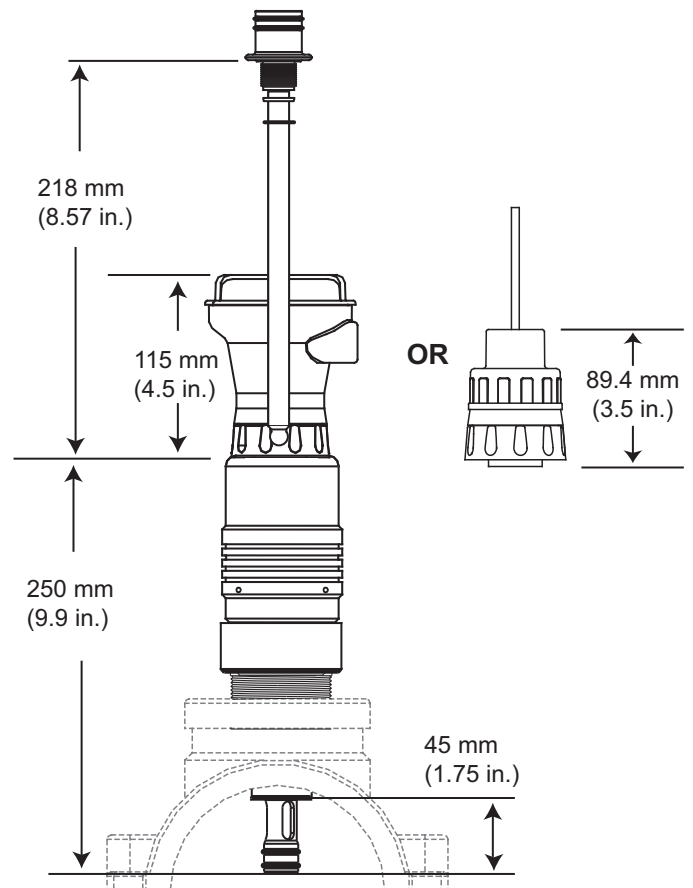
## 5. Installation

### 5.1 Notes on Location, Orientation and Required Clearance

- The 3719-1 is designed for use in pipes up to 4 in.
- The 3719-2 is designed for use in pipes from 6 to 12 in.
- Select a location that will provide sufficient clearance to remove and insert the electrode.
- The 3719 can be mounted in any orientation, including horizontal and inverted. Avoid the 12 o'clock position. In the presence of sediment, avoid the 6 o'clock position.
- If inverted, use caution when removing the sensor. Residual fluid may be present in the retraction housing. Keep electrode connector clean and dry at all times.

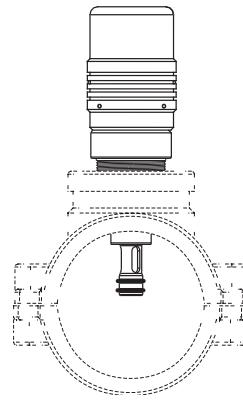


- Provide 20 inches (minimum) clearance from the top of the pipe for electrode removal..



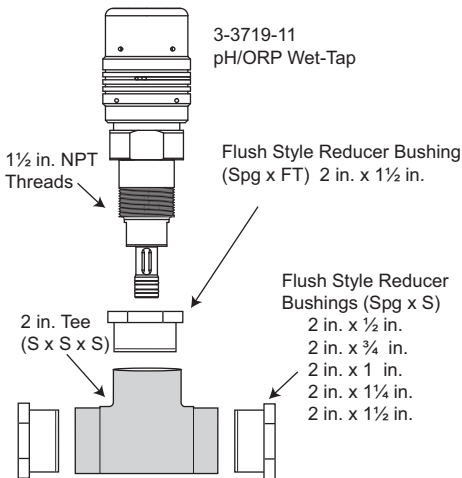
## 5.2 Installation in Pipe Sizes 2.5 to 12 Inches

- For reliable in-line measurements of pH and ORP, it is imperative to position the electrode tip into the process stream.
- Because of its compact “short stroke” design, the 3719 requires low-profile fittings to ensure proper positioning in pipe sizes DN65 to DN300 (2.5 to 12 inches).
- **It is strongly recommended to use low-profile PP clamp-on saddle fittings (customer-supplied).**
- Choose the 3719 version (-11 or -21) appropriate to the size of the branch connection of the required fitting:  
Use -11 for sizes DN65 to DN100 (2.5 to 4 in), and -21 for sizes DN150 to DN300 (6 to 12 in.)

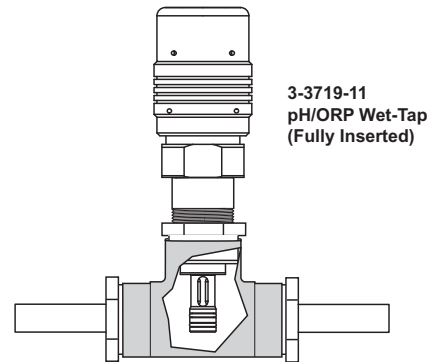


## 5.3 Installation in Pipe Sizes less than 2.5 Inches

- It is possible to install the 3719 into pipe sizes below 2.5 inches by creating a “flow cell” with standard piping components.
- One simple solution, using a tee fitting and reducer bushings, is shown in the example below.



- Many similar configurations are conceivable in a wide variety of materials, but be very careful to verify dimensional compatibility.
- Select an appropriate installation orientation to avoid the entrapment of air inside the flow cell.
- Contact your local Georg Fischer Sales and Support office for assistance.



## 5.4 Installation (Wet-Tap Into Fitting)

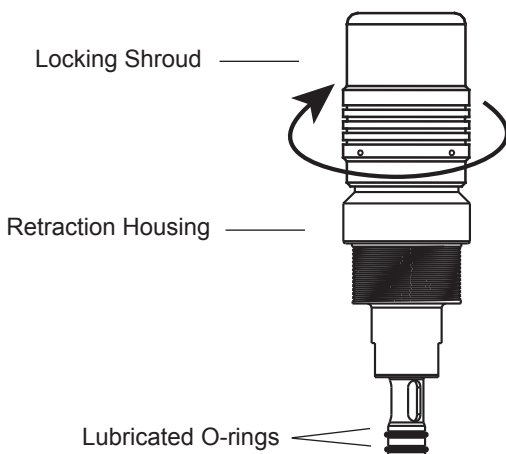


The 3719 is packaged with no electrode installed, and with the electrode piston in the fully inserted position.

- Examine the female threads at the top of the electrode piston. Do not install electrode if threads are damaged.
- Examine the two O-rings at the lower end of the assembly. Do not install if O-rings are missing or there are any signs of damage.
- **Lubricate O-rings with a non-petroleum based, viscous lubricant (grease) compatible with the system.**
- The pipe can be pressurized after completion of step 4.
- **DO NOT ATTEMPT TO REMOVE THE RETRACTION HOUSING FROM A PRESSURIZED PIPING SYSTEM!**

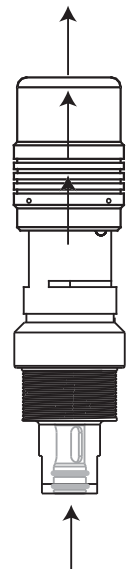
1

Grasp the retraction housing below the locking shroud; turn the locking shroud 1/4-turn clockwise.



2

Pull the locking shroud straight up until both O-rings are fully seated inside the retraction housing.



3

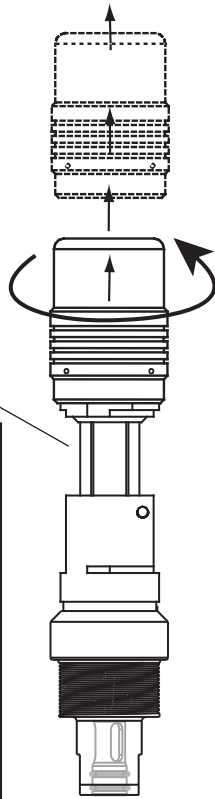
Turn the shroud 1/4-turn counterclockwise and lift it completely away from the electrode piston.

Electrode Piston



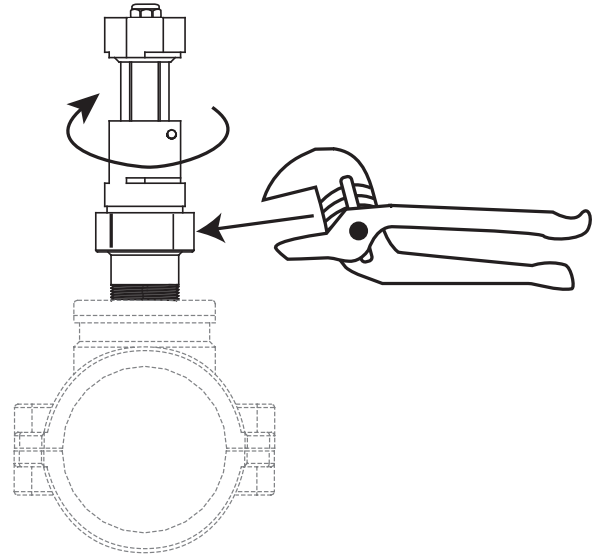
The electrode piston is locked in position by SS locking pins.

DO NOT tamper with the locking pins! If the piston is depressed with no electrode installed, the pipe contents are exposed.



4

- Thread the Wet-Tap into the pipe fitting.
- Smaller pipes may require bracing to support the Wet-Tap weight and the longitudinal forces required for operation.
- Use an appropriate thread sealant to prevent leaks.
- The piping system can now be safely pressurized.
- Inspect the installation for leaks.



### 5.5 Electrode Installation

Before installation, lubricate O-rings with a non-petroleum based, viscous lubricant (grease) compatible with the system.

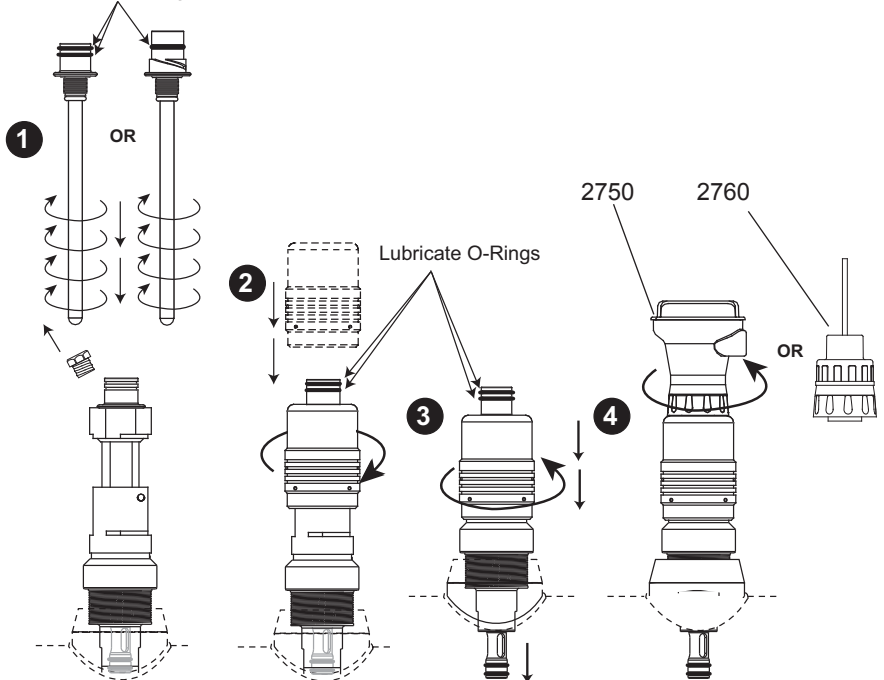
1. Remove the safety plug from top of electrode piston. Slide electrode straight down into electrode piston. Thread electrode into place until connector shoulder is flush with top of electrode piston. Hand tighten only.

**WARNING:**

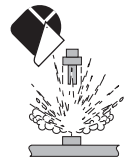
Do not flex the electrode when inserting into the Wet-Tap assembly. The electrode can be permanently damaged if it is flexed during installation.

2. Place the Locking Shroud over electrode; turn 1/4-turn clockwise to unlock the piston, then press down firmly on the locking shroud to lower the electrode piston into the pipe.
3. Turn the shroud 1/4-turn counterclockwise to lock the piston.
4. Install the matching electronics assembly or preamplifier onto the electrode connector.

Lubricate O-Rings



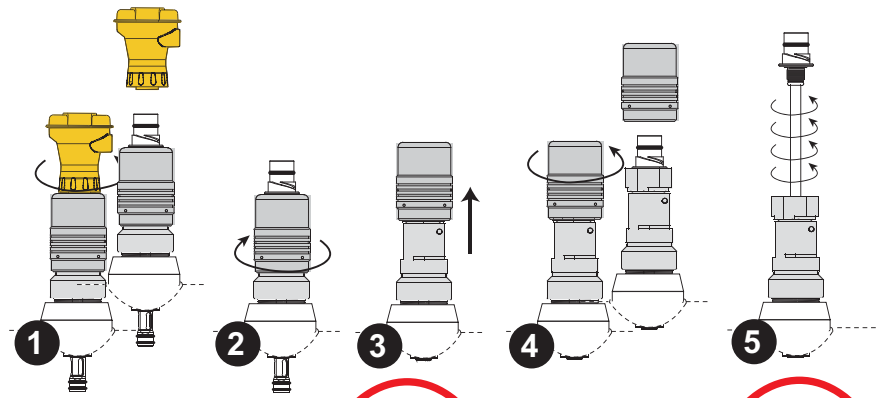
DO NOT ATTEMPT TO REMOVE THE RETRACTION HOUSING FROM A PRESSURIZED PIPING SYSTEM!



## 5.6 Electrode Removal

The electrode in any pH or ORP system requires periodic service, calibration or replacement. When removing the electrode from the wet-tap assembly, it is very important to exercise caution and follow the instructions carefully.

1. Remove the preamplifier from the top of the wet-tap assembly.
2. Turn the locking shroud 1/4-turn clockwise to unlock the piston.
3. Pull up on the locking shroud to retract the electrode piston into the pipe.



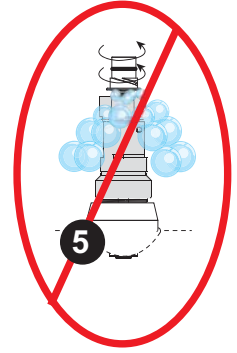
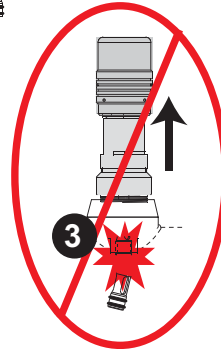
### DANGER!

The piston should retract easily from a pressurized pipe. If the piston offers resistance, there is a danger that the piston is coated with deposits from the process.

### STOP! DO NOT FORCE THE PISTON UP!

It may damage the O-rings or break off the piston tip.

Return the locking shroud to the LOCKED position and follow the steps in the box below.



4. Turn the locking shroud 1/4-turn counterclockwise and lift up to remove it from the wet-tap assembly.
5. Remove the electrode by turning it counterclockwise.  
For safety, keep your body clear of the top of the wet-tap assembly while removing the electrode.



### DANGER!

If any fluid is observed leaking from the electrode threads, STOP! DO NOT REMOVE THE ELECTRODE. There is a danger that the piston tip has been damaged.

**Tighten the electrode back down to reseal the assembly and follow the steps in the box below.**

**If the piston does not retract easily, or if any fluid is observed leaking from the electrode threads, the pipe must be drained before the 3719 can be safely removed.**

- Stop the flow and depressurize the pipe.
- Remove the entire 3719 assembly from the pipe.
- Remove the electrode from the assembly
- Clean any scaling and debris found on or in the piston tip and surrounding area.

## 6. Electrode Maintenance and Cleaning

### Cleaning

Cleaning techniques vary depending on the type of coating present on the glass electrode surface or reference junction.

- Remove soft coatings by vigorous stirring, or with directed spray of a suitable detergent or solvent onto the glass electrode surface.
- Use chlorine bleach or mild detergent to remove soft coatings. Rinse electrode tip in clean water after cleaning.
- Use the least harsh chemical available to remove hard coatings without attacking the materials of construction. (For example, remove calcium carbonate with a 5% HCL (muriatic acid) solution.
- Remove oily or organic coatings with detergents or an appropriate solvent that does not attack the materials of construction.
- ORP electrode surface (platinum) can be gently sanded with 600 grit wet and dry silicone or carbide sandpaper, jewelers rouge, crocus cloth, or very fine steel wool.
- Never scrape or sand the glass electrode surface.
- Treat glass electrode surfaces with appropriate care to avoid breakage.
- Lubricate O-rings with a non-petroleum based, viscous lubricant (grease) compatible with the system.

### Wet-Tap Maintenance

- The Wet-Tap assembly should be operated (retracted) on a monthly basis
- The O-rings on the piston tip should be inspected and lubricated annually, and whenever the system is off line for maintenance.
- Lubricate O-rings with a non-petroleum based, viscous, lubricant (grease) compatible with the system.

## 7. Troubleshooting

### Offset in pH Electrodes

Electrode offsets occur due to:

- Clogged reference junction
- Aged or contaminated reference solution/wire
- A constant output near 0 mV in all buffer solutions indicates a shorted electrode that must be replaced.

Check offsets in a pH 7 buffer @ 25 °C. The theoretical output is 0 mV. Any deviation from 0 mV is the pH electrode offset. The mV offset will track across the entire pH range. The slope is usually not affected by offset changes. (i.e., pH 7= +10 mV, pH 4= +187 mV); slope = 59 mV.

pH Electrode Offset pH 7 buffer @ 25 °C

Theoretical:	pH 7.0 (0.0 mV)
New electrode:	pH 7 ± 0.25 pH (±15 mV)
Reliable:	pH 7 ± 0.85 pH (± 50 mV)

Electrode offsets greater than 0.85 pH (50 mV) indicate the electrode requires cleaning or replacement. See Maintenance and Cleaning section.

pH	mV
2	+296 mV
3	+237 mV
4	+177 mV
5	+118 mV
6	+59 mV
7	0 mV
8	-59 mV
9	-118 mV
10	-177 mV
11	-237 mV
12	-296 mV

### Offset in ORP Electrodes

- ORP electrode offsets are usually caused by clogged reference junctions or by an aged or contaminated reference solution/wire.
- Offsets should be checked in pH 7 buffer saturated with quinhydrone @ 25 °C. The theoretical output is +86 mV. Any deviation from +86 mV is the ORP electrode offset (e.g., +90 mV).
- Quinhydrone is the oxidizer measured by the ORP electrode and is required for calibration. To measure ORP electrode offset, saturate 50 mL of pH 4 and pH 7 buffers with 1/8 g quinhydrone. A new ORP electrode measures these values ±15 mV. The electrode continues to be functional until the offset from these values exceeds 50 mV. Electrodes with offset greater than 50 mV should be cleaned and replaced if necessary.

	4 pH w/Quinhydrone			7 pH w/Quinhydrone		
Temp:	20 °C	25 °C	30 °C	20 °C	25 °C	30 °C
ORP:	268 mV	263 mV	258 mV	92 mV	86 mV	79 mV

### Slope in pH electrodes

Electrode slope is the mV output per pH unit. At 25 °C the theoretical slope is 59.16 mV per pH. The graph below illustrates potential pH error when a temperature-compensated instrument is not used.

- Coatings on the glass may affect sensor slopes. See Maintenance and Cleaning section.
- Temperature affects electrode slope. Calibrate temperature before calibrating the standard and slope.

°C	pH										
	2	3	4	5	6	7	8	9	10	11	12
15	0.15	0.12	0.09	0.06	0.03	0	0.03	0.06	0.09	0.12	0.15
25	0	0	0	0	0	0	0	0	0	0	0
35	0.15	0.12	0.09	0.06	0.03	0	0.03	0.06	0.09	0.12	0.15
45	0.3	0.24	0.18	0.12	0.06	0	0.06	0.12	0.18	0.24	0.3
55	0.45	0.36	0.27	0.18	0.09	0	0.09	0.18	0.27	0.36	0.45

### Slope in ORP electrodes

ORP slope errors are caused by contamination of the platinum electrode surface. Cleaning the electrode surface will usually restore proper values, response time, and stability. Many systems require both pH and ORP calibration. To conserve calibration reference solutions, use pH 7 and 4 buffers for pH calibration first. ORP calibration can be performed with the same buffers after adding quinhydrone.

### Response Time/Stability

Response time and stability are affected by the condition of the glass surface (ORP electrode - Platinum surface), reference junction, and reference solution. Restoration to acceptable levels can often be accomplished by cleaning the electrode's glass surface (ORP electrode - platinum surface) and reference junction.

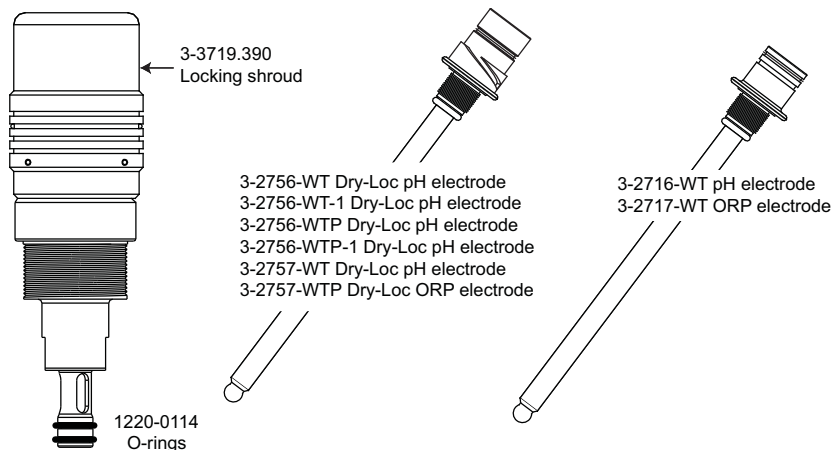
pH and ORP electrodes are similar to batteries; they age with time and usage.

The following information will help maximize electrode life:

- High temperatures or concentrated acids/caustics will accelerate electrode aging.
- Never store the electrode tip in deionized (DI) water.
- Never expose electrode to temperatures below -12 °C (10 °F) or allow it to dehydrate. These conditions will damage the electrode.

## 8. Ordering Information

Mfr. Part No.	Code	Description
3-3719-11	159 000 804	pH/ORP Wet-Tap, 1½ in. NPT
3-3719-21	159 000 805	pH/ORP Wet-Tap, 2 in. NPT
3-3719-12	159 000 806	pH/ORP Wet-Tap, ISO 7/1-R 1.5
3-3719-22	159 000 807	Wet-Tap Assembly, ISO 7/1-R 2
<b>Parts and accessories</b>		
3-2716-WT	159 000 809	Electrode, pH, twist-lock, bulb, 3 KΩ, wet-tap
3-2717-WT	159 000 811	Electrode, ORP, twist-lock, bulb, 10 KΩ ID, wet-tap
3-2756-WT	159 000 834	Electrode, pH, DryLoc®, bulb, PT1000, wet-tap
3-2756-WT-1	159 001 383	Electrode, pH, DryLoc®, bulb, 3 KΩ, wet-tap
3-2756-WTP	159 001 390	Electrode, pH, DryLoc®, plastic bulb, PT1000, wet-tap
3-2756-WTP-1	159 001 384	Electrode, pH, DryLoc®, plastic bulb, 3 KΩ, wet-tap
3-2757-WT	159 000 835	Electrode, ORP, DryLoc®, bulb, 10 KΩ ID, wet-tap
3-2757-WTP	159 001 391	Electrode, ORP, DryLoc®, plastic bulb, 10 KΩ ID, wet-tap
3-2750-1	159 000 744	In-line DryLoc® pH/ORP Sensor with J-Box
3-2750-2	159 000 745	In-line DryLoc® pH/ORP Sensor with J-Box and EasyCal
3-2760-11	159 001 367	In-line Pre-amplifier with ¾ in. NPT threads and 4.6 m (15 ft) cable
3-2760-21	159 001 368	In-line Pre-amplifier with ¾ in. ISO threads and 4.6 m (15 ft) cable
3-2760-31	159 001 369	In-line Connector with 4.6 m (15 ft) cable and ¾ in. NPT threads
3-2760-41	159 001 370	In-line Connector with 4.6 m (15 ft) cable and ISO 7/1R ¾ threads
3-3719.390	159 000 855	3719 Locking Shroud
1220-0114	159 000 854	3719 O-ring, FPM, Piston Tip
3-2700.395	159 001 605	pH Calibration Kit: includes 3 Polypropylene cups, box used as stand, 1 pint pH 4.01, 1 pint pH 7.00
3-0700.390	198 864 403	pH buffer kit (1 each 4,7,10 pH buffer in powder form, makes 50 ml of each)
3822-7115	157 001 606	20 gm bottle Quinhydrone for ORP calibration (must use ph 4.01 and/or pH 7.00 buffer solutions)



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