

## **Information Products/Markets**

### **IS 12 /2017 – BU Industry**

#### **Product Introduction:**

#### **Type 2751 DryLoc<sup>®</sup> pH/ORP Smart Sensor Electronics**

GF Piping Systems has added the Signet 2751 pH/ORP Smart Sensor Electronics to its extensive line of analytical instrumentation product line. The new sensor electronics offers vastly improved diagnostics, performance, and convenience in ensuring accurate pH/ORP monitoring and control.

Key features of the new sensor electronics include an automatic electrode health monitoring function which is beneficial in preventing problems before they happen. Operators typically clean and calibrate pH and ORP electrodes on a regular schedule and manually determine the health of the electrode based on calibration results. If the probe experiences damage or wear before regular maintenance has occurred, the user may have obtained inaccurate pH/ORP readings. The new 2751, combined with the Signet 9900 Transmitter (Gen IV) or 9950 Dual Channel Transmitter\* or Signet 0486 Profibus Concentrator, eliminates this problem by automatically monitoring electrode health and generating an alert to potential problems before they become serious, and possibly costly. The automatic health check also cuts down on time-consuming maintenance and calibration.

In 4 to 20 mA blind mode the 4 to 20 span can be set using the 0252 Configuration Tool to match the desired mV range (for ORP electrodes) and pH range (for pH electrodes). Visit [www.gfsignet.com](http://www.gfsignet.com) to download the latest 0252 software update.

Support for the advanced features (broken glass detection, high glass impedance alarm and reference impedance) in blind mode will be available with the 0252 Configuration Tool, coming within Q4, 2017

***\* Users of 9950 Gen I and 9950 (Gen 2a) should update to 9950 (Gen 2b, available in Q4) to take full advantage of the 2751 features and benefits.  
Visit [www.gfsignet.com](http://www.gfsignet.com) for the latest software update.***

**Key Features**

- Automatic temperature compensated glass impedance monitoring
- High impedance warning on user selectable threshold
- Broken glass detection
- Manufacturing and operational data recorded and stored
- Convenient remote calibration
- Electrode Slope Efficiency
- Compatible with existing 8900, 9900 and 9950 instruments
- 



**2751 Host Compatibility Matrix with a Memory Chip Enabled for pH/ORP Electrodes**

2751 Host Compatibility Matrix with a Memory Chip Enabled for pH/ORP Electrodes											
Host	Inst. Remote Calibration**	Transferable Calibration**	Data Logging**	Glass Impedance Monitoring	Wrong Sensor**	Broken Glass Detection	High Glass Impedance Alarm	Reference Impedance	Remove Sensor Error**	Remove PreAmp**	User Set Point Broken Glass
8900	No	Yes with 8900 set to Cal @ Sensor	Yes But Cannot View	No	CHK SENSOR	No	No	No	CHK SENSOR	CHK SENSOR	No
9900 Gen I, II, III	No	Yes with 9900 set to Cal @ Sensor	Yes But Cannot View	No	WRONG SENSOR	No	No	No	CHK SENSOR	CHK PREAMP	No
9900 Gen IV	Yes	Yes	Yes	Yes	WRONG SENSOR	Yes BROKEN GLASS	Yes HIGH IMPEDANCE	Yes	CHK SENSOR	CHK PREAMP	No
9950 Gen I, 2a	No	Yes	Yes But Cannot View	No	WRONG SENSOR	No	No	No	NO PROBE	CHK PREAMP	No
Profibus Concentrator	No	Yes	Yes	Yes	Yes	Yes	Yes	No	ERROR CODE = 00001000 Program PLC to read No Probe	ERROR CODE= 00000100 Program PLC to read Missing Device	Yes
4 to 20 mA (Blind)	Yes w/EasyCal	Yes	Yes But Cannot View	Yes Factory Default @ 60 min But Cannot View	N/A	No	No	Yes Factory Default @ 60 min But Cannot View	Yes (3.6 mA default)	0 mA	No

\*\*Also applicable to memory chip enabled ORP electrodes

**Target Applications**

Target applications for the DryLoc® pH/ORP Smart Sensor Electronics include:

- Water and Wastewater Treatment
- Neutralization Systems
- Scrubber Control
- Effluent Monitoring
- Pool & Spa Control
- Aquatic Animal Life Support Systems

**Availability**

Accepting orders immediately

**Included in this product release are the following:**

- Data Sheet - 2751 DryLoc® pH/ORP Smart Sensor Electronics
- Product Manual - 2751 pH/ORP Smart Sensor Electronics
- Press Release
- Product Poster
- FAQs
- Signet 2751 pH/ORP Smart Sensor Electronics Promo Video  
<https://www.youtube.com/watch?v=zIZ5S-x5smY>

**Available on request**

- PowerPoint - 2751 Sales Presentation
- Signet 2751 pH/ORP Smart Sensor Electronics Promo Video (37 MB)
- High Resolution photos

In case of any further question, feel free to contact us at:



# Signet 2751 DryLoc<sup>®</sup> pH/ORP Smart Sensor Electronics

with 9900 SmartPro<sup>®</sup> Transmitter (Gen IV)  
or 9950 Dual Channel Transmitter\* or  
Signet 0486 Profibus Concentrator

### Product features

- Electrode health monitoring via automatic glass impedance measurement
- Convenient remote calibration with 9900 (Gen IV) or 9950 Dual-Channel Transmitter and Memory Chip enabled electrodes
- Electrode performance data viewable with 9900 (Gen IV) or 9950 transmitters requires Memory Chip enabled electrodes
- Compatible with existing 8900, 9900 and 9950 instruments
- Available in three styles: In-line (2751-1), In-line with EasyCal (2751-2), Submersible (2751-3, 2751-4)

\* Users of 9950 Gen I and 9950 (Gen 2a) should update to 9950 (Gen 2b), available in Q4) to take full advantage of the 2751 features and benefits. Visit our website for the latest software update.



# Signet 2751 DryLoc® pH/ORP Smart Sensor Electronics



3-2751.090 Rev. B 08/17

## Operating Instructions



2751-1



2751-2



2751-3, 2751-4



- [English](#)
- [Deutsch](#)
- [Français](#)
- [Español](#)



### Description

Signet 3-2751 pH/ORP Smart Sensor Electronics is a blind transmitter that processes analog signals from a pH or ORP electrode and transmits digital data via a three wire cable to a 9900 or 9950 Signet transmitter or a Signet 0486 Profibus Concentrator. The serial bus, Signet Serial Sensor Link (S<sup>3</sup>L) is the latest development in leading-edge technology from Signet.

The Signet 2751 can also output the signal over a 4 to 20 mA current loop with a pre-set scale without the expense of local display. Preamplification is built-in reducing system costs while ensuring absolute signal integrity up to 305 m (1,000 ft).

The Smart Sensor Electronics self-configure for pH or ORP via automatic recognition of electrode type. The DryLoc electrode connector quickly forms a robust assembly with the sensor for submersible and in-line installations. The Smart Sensor Electronics offers broken glass and high impedance detection, remote calibration, storage of environmental extremes, and manufacturing electrode data. (see page 10 for details).

NEMA 4X Junction Boxes are integral parts of the in-line version and are available as accessories for the submersible version.

The optional EasyCal feature allows simple push-button calibration and includes an LED for visual feedback.

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## Warranty Information

Refer to your local Georg Fischer Sales office for the most current warranty statement.

All warranty and non-warranty repairs being returned must include a fully completed Service Form and goods must be returned to your local GF Sales office or distributor. Product returned without a Service Form may not be warranty replaced or repaired.

Signet products with limited shelf-life (e.g. pH, ORP, chlorine electrodes, calibration solutions; e.g. pH buffers, turbidity standards or other solutions) are warranted out of box but not warranted against any damage, due to process or application failures (e.g. high temperature, chemical poisoning, dry-out) or mishandling (e.g. broken glass, damaged membrane, freezing and/or extreme temperatures).

## Product Registration







Thank you for purchasing the Signet line of Georg Fischer measurement products.

If you would like to register your product(s), you can now register online in one of the following ways:

- Visit our website [www.gfsignet.com](http://www.gfsignet.com). Under **Service and Support** click on **Product Registration Form**
- If this is a pdf manual (digital copy), [click here](#)

## Safety Information

1. Depressurize and vent system prior to installation or removal.
2. Confirm chemical compatibility before use.
3. Do not exceed maximum temperature/pressure specifications.
4. Wear safety goggles or faceshield during installation/service.
5. Do not alter product construction.
6. When using chemicals or solvents care should be taken and appropriate eye, face, hand, body, and/or respiratory protection should be used.

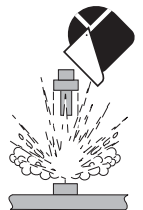
	<b>Caution / Warning / Danger</b> Indicates a potential hazard. Failure to follow all warnings may lead to equipment damage, injury, or death
	<b>Personal Protective Equipment (PPE)</b> Always utilize the most appropriate PPE during installation and service of Signet products.
	<b>Pressurized System Warning</b> Sensor may be under pressure, take caution to vent system prior to installation or removal. Failure to do so may result in equipment damage and/or serious injury.
	<b>Hand Tighten Only</b> Overtightening may permanently damage product threads and lead to failure of the retaining nut.
	<b>Do Not Use Tools</b> Use of tool(s) may damage product beyond repair and potentially void product warranty.
	<b>Note / Technical Notes</b> Highlights additional information or detailed procedure.

## Chemical Compatibility

The retaining nuts of pH and ORP sensors are not designed for prolonged contact with aggressive substances.

Strong acids, caustic substances and solvents or their vapor may lead to failure of the retaining nut, ejection of the sensor and loss of the process fluid with possibly serious consequences, such as damage to equipment and serious personal injury.

Retaining nuts that may have been in contact with such substances e.g. due to leakage or spilling, must be replaced.



## Specifications

### General

Compatible Electrodes	Signet DryLoc Electrodes (PT1000 or 3K Balco temperature sensor versions for pH)
Operational Range	-1.00 to 15.00 pH, -2000 to +2000 mV ORP, 0 °C to 85 °C (32 °F to 185 °F)
Response Time (includes electrode response):	
pH	<6 s for 95% of change
ORP	application dependent
pH Temp T90	200 s (2724 and 2734) 132 s (2726 and 2736) 438 s (2756-WT)

### Materials

2751-1, 2751-2 (in-line)	PBT (thermal plastic polyester), PP (retaining nut)
2751 -3, -4 (submersible)	CPVC
Cable for 2751 -3, -4 submersible versions:	
4.6 m (15 ft) 3-conductor shielded, 22 AWG	
• May be extended up to 305 m (1000 ft) with current output	
• May be extended up to 305 m (1000 ft) with (S <sup>3</sup> L) output	

### Weight:

2751-2 (in-line)	0.75 kg
2751-1 (in-line) & 2751 -3, -4 (submersible)	0.64 kg

### Environmental

Ambient Temp	0 °C to 85 °C (32 °F to 185 °F)
Storage Temp	-20 °C to 85 °C (-4 °F to 185 °F)
Relative Humidity	95% max, non-condensing
Immunity	EN50082-2
Emissions	EN50081-1
Enclosure Rating	
2751 -1, 2751 -2 (in-line)	NEMA 4X/IP65 (with electrode connected)
2751 -3, 2751 -4 (submersible)	NEMA 6P/IP68 (with electrode and watertight extension pipe connected)

### Electrical

Input Impedance	>10 <sup>11</sup> Ω
Input response time	500 ms
Temperature drift	±0.002 pH per °C, ±0.1 mV ORP per °C
Input resolution	0.02 pH, 1 mV ORP, 0.3 °C

### Current output

pH	Fixed 4 to 20 mA, isolated, 0 to 14 pH (custom scaling available)
ORP	Fixed 4 to 20 mA, isolated, -1000 to +2000 mV (custom scaling available, -2000 to +2000 mV)
Power	12-24 VDC ± 10% regulated for 4 to 20 mA output
Max Loop Resistance	100 Ω max. @ 12V 400 Ω max. @ 18V 700 Ω max. @ 24V
Loop Accuracy	±32 µA @ 25 °C
Temperature drift	±1 µA per °C
Output resolution	± 5 µA
Error indication	3.6 mA, 22 mA or none
Update Rate	0.5 seconds

### Digital (S<sup>3</sup>L) output:

Description	Serial ASCII, TTL level 9600 bps
Power	5 to 6.5 VDC ± 5% regulated supply, 2.5 mA max
Update Rate	0.5 seconds
Available Data	Raw mV, pH or ORP, Glass Impedance (pH), Minimum and Maximum pH, Minimum and Maximum mV (ORP), Minimum Temperature (pH), Maximum Temperature (pH), Model Number, Serial Number, Manufacturing Date, Runtime, Slope pH/mV, Measurement Offset, and Temperature Offset (pH)

### System Accuracy:

pH	± 0.02 pH @ 25 °C
ORP	± 1.5 mV @ 25 °C
Temperature	0.4 °C


### Resolution:

pH	≤ 0.01 pH
ORP	1.5 mV
Temperature	0.1 °C

Error indication ..... Temp output "+999.9"

### Standards and Approvals

- CE, RoHS Compliant
- Manufactured under ISO 9001 for Quality, ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety.

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

 Declaration of Conformity according to FCC Part 15.

This device complies with Part 15 of the FCC rules.

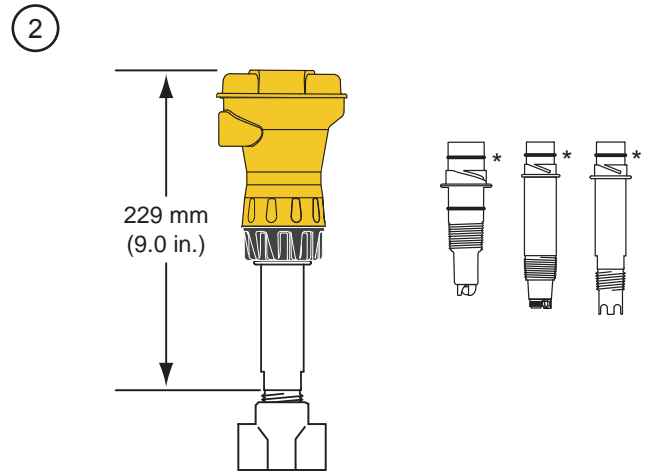
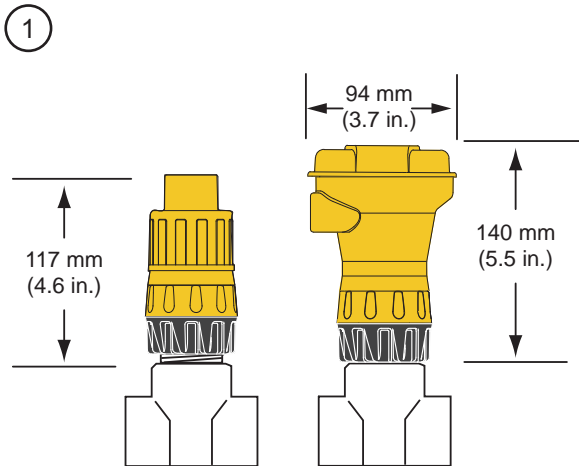
Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and,
- (2) This device must accept any interference received, including interference that may cause undesired operation.

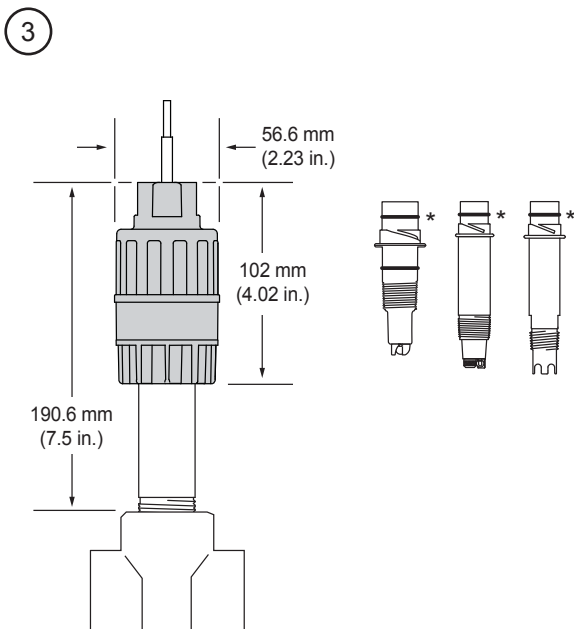


## In-Line Dimensions

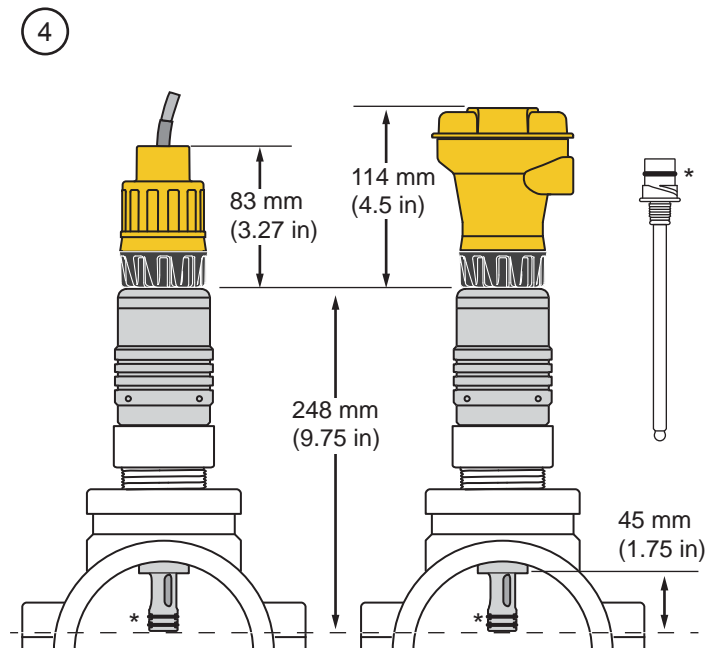
- 2751-1 In-Line sensor (without EasyCal) is designed for applications where electrode calibration is facilitated by remote equipment.
  - A Signet installation fitting (12.7 mm to 101.6 mm [ $\frac{1}{2}$  in. to 4 in.]), Wet-Tap assembly or a threaded tee is required to secure the electrode in the pipe.
- 2751-2 In-Line sensor includes EasyCal.
  - 272X, 273X, 276X and 277X series of sensors thread directly into standard 1 in or  $\frac{3}{4}$  in NPT fittings.
  - The Signet Measurement and Instrumentation catalog offers a complete selection of fittings.
  - 272x and 273x series of pH and ORP electrodes are compatible with Signet Installation Fittings.
- The 2751-3 and 2751-4 submersible sensor electronics are recommended for in-line applications using the 272X, 273X, 276X and the 277x series threaded DryLoc sensors.
- 2756 and 2757 Wet-Tap sensors require the 3719 Wet-Tap assembly and can use the 2751-1 or 2751-2 versions.



2751-1 and 2751-2 with 272X, 273X, 276X OR 277X sensors



2751-3 and 2751-4 with 272X, 273X, 2764 or 2774 sensors



2751-1 and 2751-2 with  
3719 Wet Tap and 2756 or 2757 Sensors

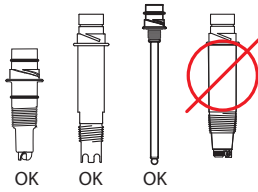
**\*NOTE:**

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



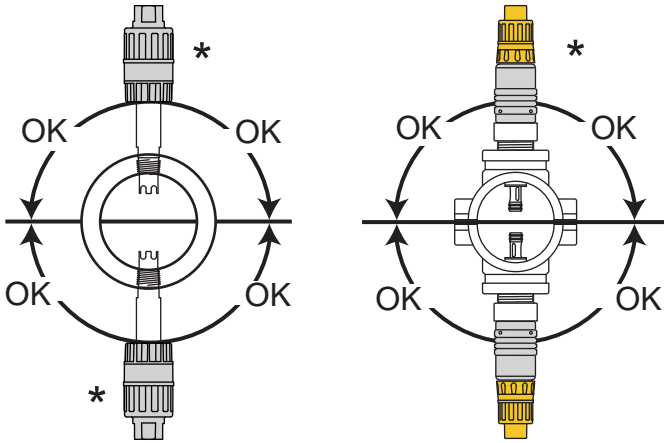
## Mounting Position

### Wet-Tap electrodes, 2724, 2734, and 2774 series electrodes

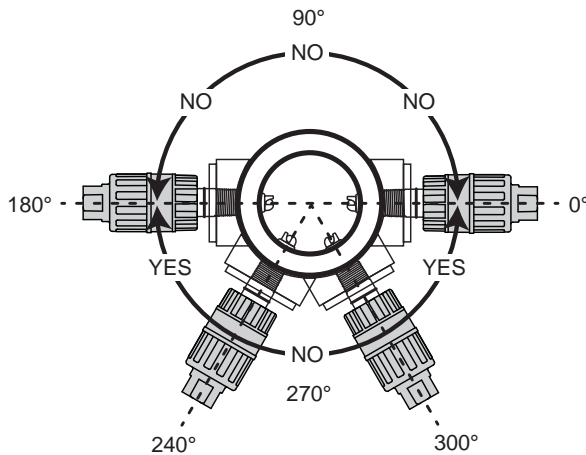


Mounting Angle using GF Signet Fittings.

\*Avoid locations with air pockets and/or sediment (90° and 270°).



When mounting in a standard threaded fitting, the electrode must be mounted horizontal to 60 degrees below horizontal position only:

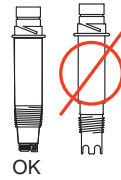


## 2751 In-Line pH Sensor Assembly

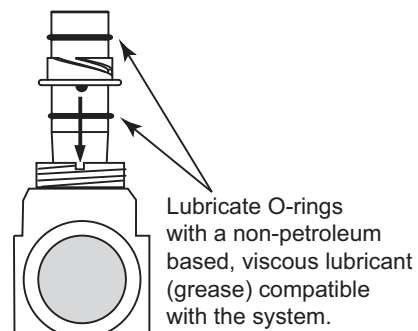
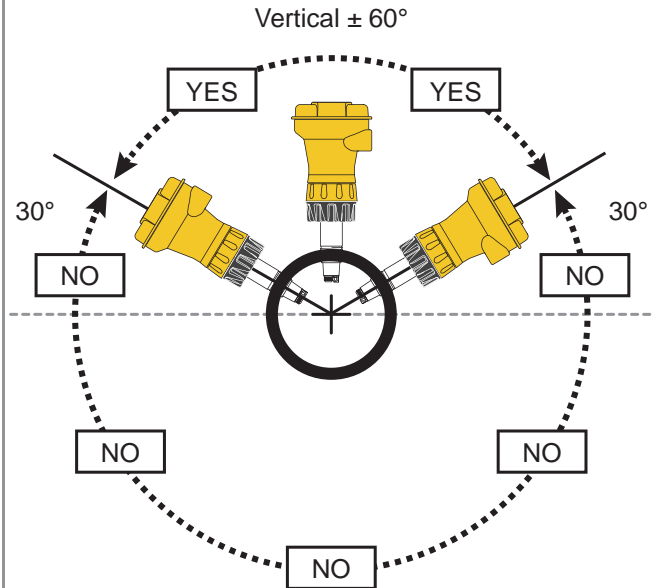
**NOTE:** This procedure applies to systems using 2724-2726 and 2734-2736 electrodes. If the 3719 pH/ORP Wet-Tap is used, refer to the 3719 manual for instructions.

1. Insert electrode into Signet installation fitting. Seat the electrode tabs into the alignment notches in the fitting.

### 2764 series electrodes **MUST** be mounted upright.



- Vertical (0°) position optimum.
- DO NOT install within 30° of horizontal (Contact factory for horizontal or inverted installation requirements).

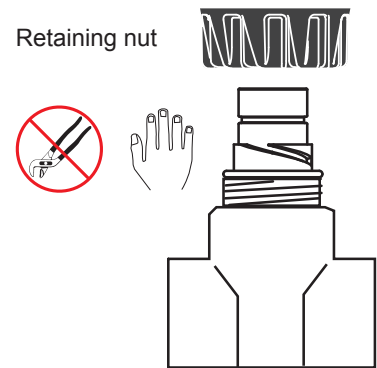


## 2751 In-Line pH Sensor Assembly - continued

- Thread the in-line retaining nut onto fitting to secure the electrode into place.



**HAND-TIGHTEN THE THREADED NUT ONTO THE INSTALLATION FITTING. DO NOT USE TOOLS! DO NOT USE THREAD SEALANT OR LUBRICANTS ON THE FITTING THREADS OR THE SENSOR CAP.**



### Chemical Compatibility Warning

- The retaining nuts of pH and ORP sensors are not designed for prolonged contact with aggressive substances.
- Strong acids, caustic substances and solvents or their vapor may lead to failure of the retaining nut, ejection of the sensor and loss of the process fluid with possibly serious consequences, such as damage to equipment and serious personal injury.
- Retaining nuts that may have been in contact with such substances e.g. due to leakage or spilling, must be replaced.

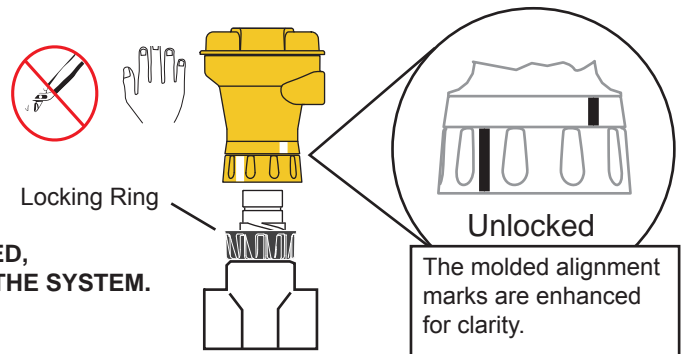
### Note:

Keep the electrical interconnection between electrode and sensor electronics dry and clean at all times.

- Unlock the ring on base of 2751 (the ring is unlocked when the lines on the ring and body of the 2751 are not aligned.)

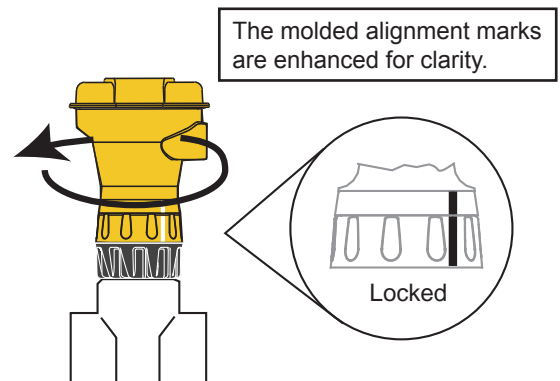


**LUBRICATE O-RINGS WITH A NON-PETROLEUM BASED, VISCOUS LUBRICANT (GREASE) COMPATIBLE WITH THE SYSTEM.**



- Place 2751 onto top of electrode and turn until the assembly drops into position.

- Turn locking ring  $\frac{1}{4}$  turn to secure the 2751 assembly. (The ring is locked when the line on the ring and the line on the body of the 2751 are aligned.)



### In-Line Sensor and Electrode Removal

- To remove electronics assembly only:** Turn locking ring  $\frac{1}{4}$  turn; lift assembly straight up.
- To remove electrode from the pipe:** Remove electronics assembly, then unthread retaining nut; pull electrode straight up.
- To remove the complete 2751 system:** Hold locking ring in place. Unthread retaining nut and pull electrode straight up.

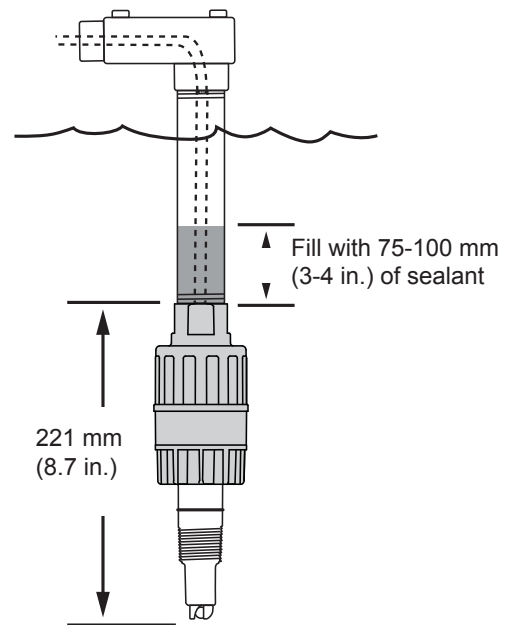
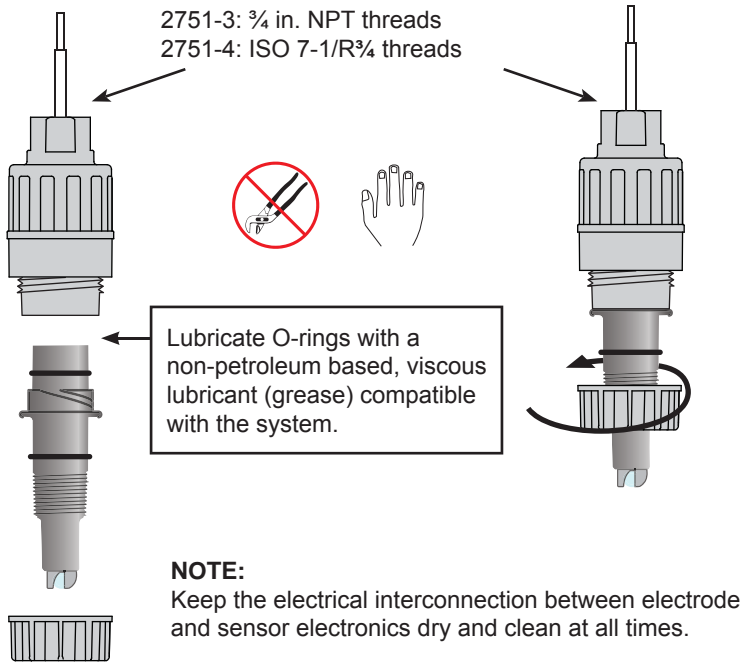


### CAUTION!

- Do not remove the electrode from a pressurized pipe.
- Wear appropriate protective clothing when working with chemicals in pressurized pipe.

## 2751 -3, -4 Submersible Sensor Assembly and Installation

1. Insert electrode into base of the 2751-3 or 2751-4 and turn until keyed contacts are seated.  
**NOTE:** Lubricate O-ring if installing sensor is difficult.
2. Thread retaining nut over electrode and hand-tighten onto 2751.
3. Attach 3/4 in. watertight pipe to the top of the 2751. Secure the threaded connection to prevent any leakage.
  - For additional defense against possible accumulation of condensation at the back seal area of the sensor, fill the lower 75 mm to 100 mm (3 in. to 4 in.) of conduit or extension pipe with a flexible sealant such as silicone.



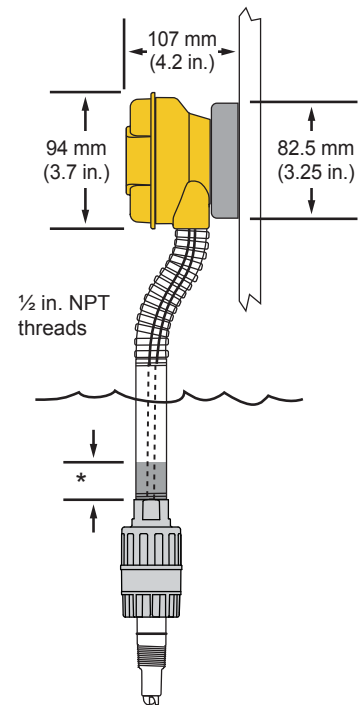
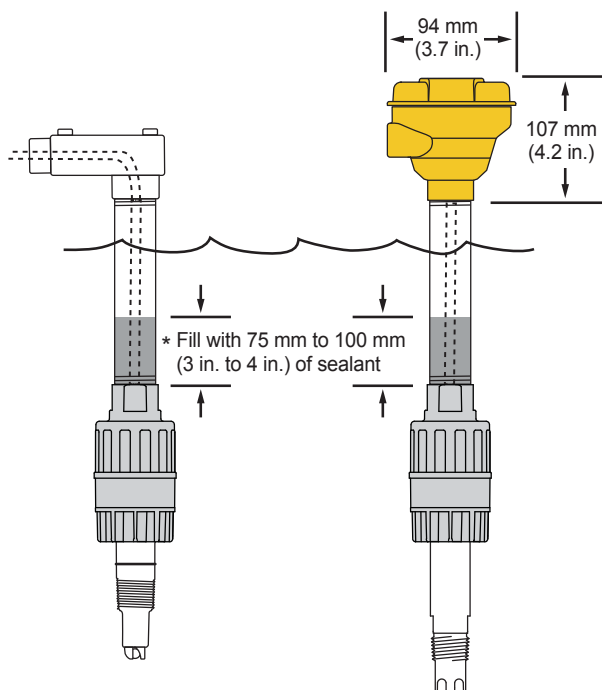
Use standard installation hardware to connect the submersible 2751 -3 or -4 directly to external equipment.

OR

The 8052-1 NPT Mount Junction box (or 8052-2 with EasyCal) connects to 3/4 in. pipe or conduit and provides convenient wiring termination.

OR

The 8050-1 Universal Mount junction box (or 8050-2 with EasyCal) mounts flat onto a wall or can be strapped to a post or pipe.



### Cable supplied:

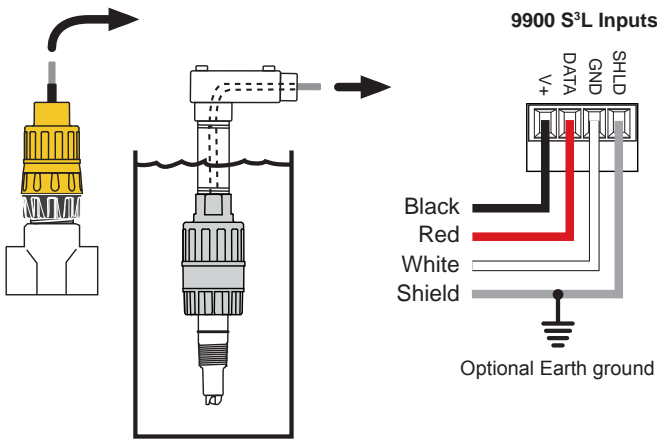
5 m (15 ft) 3-conductor + shield, 22 AWG.

- May be extended up to 305 m (1000 ft) with current output.
- May be extended up to 305 m (1000 ft) with Digital (S<sup>3</sup>L) output.

## Digital (S<sup>3</sup>L) Wiring

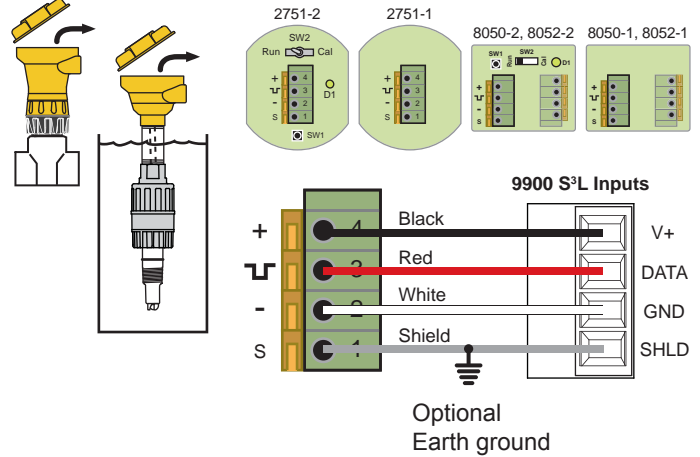
- When the 2751 is powered with 5 VDC, the digital (S<sup>3</sup>L) serial data output is automatically selected.
- (S<sup>3</sup>L) data is used exclusively by Signet instruments.
- Remove approximately 10 mm (0.4 in.) of insulation and tin each conductor before inserting into connectors
- To add the EasyCal function the 2751-1, 2751-3 and 2751-4 use the 8050-2 or 8052-2 junction box

### (S<sup>3</sup>L) with no junction box



- Connect the 2751 cable directly to (S<sup>3</sup>L) I/O terminals.
- **8900 and 9900 users:**  
 If this direct wiring is used, set the CALIBRATE menu to perform Calibration at "INSTRUMENT"

### (S<sup>3</sup>L) with junction box

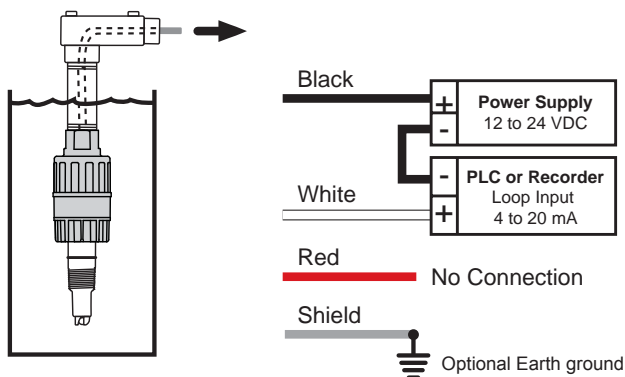


- Connect the 2751 terminals as shown to any digital (S<sup>3</sup>L) terminals.
- **8900 and 9900 users:**  
 If using EasyCal, set the CALIBRATE menu to either perform Calibration at "SENSOR" or "INSTRUMENT"
  - If SENSOR, use standard buffer values (pH 4, 7, or Light's Solution; ORP 264, 87, or 469 mV) to perform periodic calibration.
  - If INSTRUMENT, any pH/ORP value can be used.

## 4 to 20 mA Loop Wiring

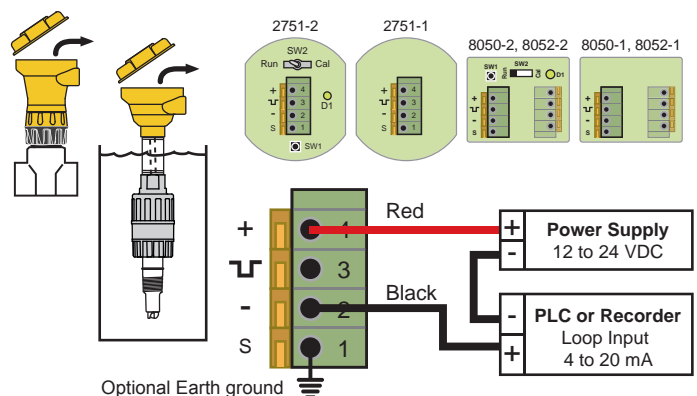
- When the 2751 is powered with 12 to 24 VDC, the 4 to 20 mA loop output is automatically selected.
- Remove approximately 10 mm (0.4 in.) of insulation and tin each conductor before inserting into connectors.
- To add the EasyCal function the 2751-1, 2751-3 and 2751-4 use the 8050-2 or 8052-2 junction box

### Current loop with no junction box



- Connect the 2751 cable directly to a Loop device as shown.
- This configuration does not provide any calibration capability within the 2751 system. Periodic calibration must be performed at the external equipment.

### Current loop with junction box



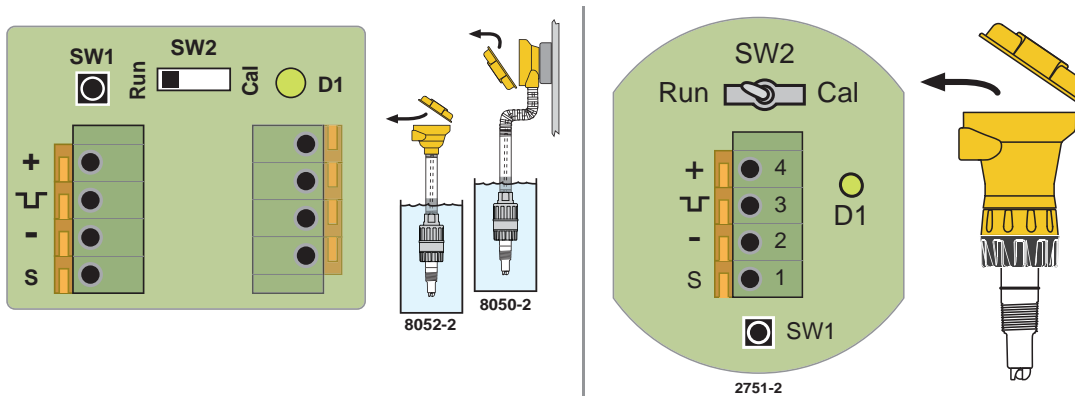
- When the 2751 includes a terminal block, connect the 2751 terminals to the Loop device as shown.
- If the 2751 includes the EasyCal accessory, use standard pH buffer values (pH 4, 7, or 10) for pH or quinhydrone saturated pH 4 or 7 or Light's solution for ORP to perform periodic calibration.

## Calibration

All 2751 pH/ORP Smart Sensor Electronics are factory-calibrated for maximum out-of-the-box accuracy. Periodic recalibration is required to compensate for electrode aging.

The optional EasyCal feature allows calibration to be performed local at the sensor.

- SW1 EasyCal button
- SW2 RUN/CALIBRATE switch for (S<sup>3</sup>L) system
- D1 EasyCal Indicator (green LED)



### Required Equipment:

- 2751-2 with built-in EasyCal or Any 2751 with 8050-2 or 8052-2 junction box with EasyCal
- Standard pH buffers (pH 4, 7 or 10)
- Quinhydrone saturated standard pH buffers (pH 4, or pH 7) or Light's Solution, 469 mV

### EasyCal Procedure:

The first step (Reset) is recommended each time an electrode is replaced, but is NOT necessary upon initial installation or periodic calibration.

In fact, for periodic calibration it is best for the electrode/sensor assembly to remain intact to minimize the possibility of moisture or other contamination entering the electrical interconnection area. The electrode/sensor connection must remain dry and clean at all times.

1. Reset the 2751 pH/ORP Smart Sensor Electronics to factory calibration: With no electrode connected to the Sensor, press and hold SW1 until the LED (D1) comes on steady then goes off again (approx. 10 seconds). When the LED goes off, one blink will occur. This indicates the reset was successful. Release SW1; reset is complete.
2. Connect an electrode to the 2751 pH/ORP Smart Sensor Electronics.
3. **If (S<sup>3</sup>L) output is being used, place SW2 in the "Cal" position. If 4 to 20 mA output is being used, SW2 position is of no consequence.**
4. Place the electrode/sensor assembly into a calibration solution as follows: (If the electrode is "healthy", then the 2751 will automatically recognize the solution. The order in which the solutions are used during the calibration procedure is of no consequence). The 2751 ORP EasyCal is a single point calibration.
  - For pH calibration, use any two of these international standards: pH 4.0, 7.0 or 10.0 buffer solutions. (Signet part number 3-0700.390 contains one capsule of each value)
  - To produce standards for ORP calibration, mix the chemical Quinhydrone into pH 7.0 and 4.0 buffers to saturation (1/8g per 50 ml). The 2751 can also use Light's Solution (469 mV), a commercial ORP calibration solution, for ORP calibration. The 2751 offers a one point ORP calibration, for this reason only a single buffer near your operating point is required for EasyCal.
  - Regardless of the size of the container used for calibration, one inch of solution is adequate to completely submerge the tip of the electrode.
  - **Allow at least 30 seconds for the electrode response to stabilize before calibration.**
5. Press and hold SW1 for approximately 8 to 10 seconds. During this time, the LED (D1) will come on steady then go back off. Release SW1 (If the LED blinks several times rapidly, the calibration was not successful. See the troubleshooting section.)
6. Remove the electrode/sensor assembly from the first calibration solution, rinse the electrode with clean water, and place it in the second solution.  
**NOTE:** If using the 2751 Smart Sensor Electronics, only a single point is used to calibrate the 2751 and ORP electrode.
  - **Allow at least 30 seconds for the electrode response to stabilize before calibration.**
7. Press and hold SW1 for approximately 8 to 10 seconds. During this time, the LED will come on steady then go back off. Release SW1. (If the LED blinks several times rapidly, the calibration was not successful. See the troubleshooting section.)
8. **For (S<sup>3</sup>L) systems ONLY: Return SW2 to the RUN position.**

Calibration is complete. Return the system to service.

## 2751 Advanced Features

The Signet 2751 Smart Sensor Electronics brings new features to Signet's line of pH and ORP products.

A complete system consists of:

1. 9900 Transmitter Generation IV (or later) or 9950\* Dual Channel Transmitter or 0486 Profibus Concentrator
2. 2751 Smart Sensor Electronics
3. Memory chip enabled electrode

### Remote calibration of the sensors

- Calibrate the electrode in a laboratory environment and install it in the field to minimize system downtime.
- Remote calibration can be performed via one set of 2751 and 9900 Gen IV (or later) and used with another set.
- Select "Sensor Data" screen in 9900 Transmitter to complete initialization of probe at the 9900 Transmitter

### On-line sensor diagnostics

- 2751 is capable of automatic measurement of the temperature compensated glass impedance (for pH only).
- In 9900 Transmitter (Gen IV or later), pH **INPUT** menu, the user can select the interval of the glass impedance measurement. Factory default is at 60 minutes.
- The glass impedance measurement takes on average 10 seconds to complete. During this time the pH monitoring is not active. The output pH is held at the pH value just prior to performing the impedance measurement. Users should perform glass impedance measurements at times when process pH is not likely to change.
- For process solutions of low conductivity, impedance measurement is not recommended. This is because the sample solution itself has high resistance which adds up to the measured impedance. Below 100  $\mu$ S, glass impedance can reach 3 times the factory glass impedance. The automatic impedance measurement function and the **HI GLASS IMPEDANCE WARNING** in this application should be set to **OFF** in the 9900 Transmitter.

### Monitor pH sensor for broken pH glass

- When used with a 9900 Transmitter (Gen IV or later), 9950 Dual Channel Transmitter\* or 0486 Profibus Concentrator, a **BROKEN GLASS** alarm will be displayed when pH glass impedance falls below 3 M $\Omega$ .
- Earlier versions of the 9900 (Gen I-III) and all 8900 transmitters will display a **CHECK SENSOR** warning when broken glass is detected.
- **Note:** to take full advantage of the Broken Glass alarm feature, a pH probe built after 07/2017 is needed.

### Monitor sensor glass for High Impedance conditions

- High glass Impedance can be caused by chemical attack on the glass, fouling of the sensor or built up material on the glass, or if the sensor dries out.
- In the pH **INPUT** menu users can set up the **HI GLASS IMPEDANCE WARNING** to **OFF**, 3X, 4X or 5X of the factory measured glass impedance. All users should set up this condition. A setting of 3X may be appropriate. Please note that factory default is **OFF**.
- The 9900 Transmitter (Gen IV or later) will display a **HIGH IMPEDANCE** warning when the sensor impedance exceeds the value set in the pH **INPUT** menu.

### Monitor Reference Impedance

- Only available for electrodes with a solution ground (Differential electrodes, 276X only).
- Values below 3 M $\Omega$  indicate a broken reference glass.
- Values above 200 M $\Omega$  indicate a severely coated or dried reference glass.

### Record and display minimum and maximum process variables, and total runtime hours of sensor

- pH electrode: the memory chip will store the minimum and maximum recorded temperatures, the minimum and maximum recorded pH values and the total runtime hours of the sensor.
- ORP electrode: the memory chip will store the minimum and maximum recorded mV values and the total run time hours of the sensor.
- These values are accessible via the 9900 Transmitter (Gen IV or later), or 9950 Dual Channel Transmitters\* to aid in the evaluation of environmental factors versus sensor longevity

### Record and display calibration information data

- Includes: Factory calibration pH/ORP, factory calibration temperature for pH, user pH/ORP offset, user pH/ORP slope efficiency and temperature offset for pH.
- pH slope (the potential difference developed by the electrode per pH unit,  $\Delta U/\Delta pH$ ) is displayed in percent units where 100 represents a slope of  $\pm 59.16$  mV/pH at 25° C. In practice a new electrode reaches at best 99.8% of the theoretical value.
- A new electrode should have a slope between 93.2% to 103%. As electrode ages, the slope decreases gradually.  
**Note:** Older 9900 Gen IV instruments, units built before 11/18/15, S/N 6151118xxxx, will display slope efficiency as a decimal number instead of percent, e.g. 0.98 = 98%

### Display manufacture data via the 9900 (Gen IV or later) or 9950\* Transmitters

- Includes: sensor model number, serial number, and measured factory glass impedance.

### 2751 Blind Mode Advanced Features

2751 pH/ORP Smart Sensor Electronics can be used in blind mode (outputs the signal in 4-20 mA current loop with a pre-set scale) without the need of a local display.

Using Signet 3-0252 Configuration tool\*\*, users can set alarm conditions using the loop output to produce optional error outputs of 3.6 mA, 22 mA or none.

- Error output conditions can be individually set, only one condition can occur at a time.
- The alarm conditions in the priority order are: 1) Missing Probe, 2) Out of Operational Range (i.e. pH range is 0 to 14 pH, ORP range: -1000 to +2000 mV), 3) Low Glass Impedance, 4) High Glass Impedance, 5) Low Reference Impedance, 5) High Reference Impedance and 6) OFF
- When more than one alarm condition exists, the state of the current loop is set by the higher priority condition. Missing probe has the highest priority (1)
- During normal operation, there is no access to the measured glass impedance, reference impedance or Sensor Data (blind).
- During operation, 2751 reads and write information in the sensor memory chip. Blind users do not have access to that information unless the 2751 is connected to a display: 9900, 9950 or Profibus Concentrator.

\* Users of 9950 Gen I and 9950 (Gen 2a) should update to 9950 (Gen 2b, available in Q4) to take full advantage of the 2751 features and benefits. Visit [www.gfsignet.com](http://www.gfsignet.com) for the latest software update.

\*\* Support for the advanced alarm conditions in blind mode with the 0252 Configuration Tool will be available in Q4, 2017



## Troubleshooting

LED and Output Condition	Possible Causes	Suggested Solutions
<b>Current Output:</b> LED off, current output is 3.6 mA or 22 mA (S <sup>3</sup> L): Transmitter displays "Check Sensor" or "Broken Glass"	<ul style="list-style-type: none"> <li>No electrode or damaged electrode installed.</li> <li>Bad/dirty contacts between electrode and 2751.</li> </ul>	<ul style="list-style-type: none"> <li>Install/replace electrode.</li> <li>Check interconnection between electrode and 2751, clean contacts, and/or lubricate sensor o-ring.</li> </ul>
<b>During EasyCal, the LED blinks rapidly for 4 seconds and the current output is frozen at a fixed value.</b>	<ul style="list-style-type: none"> <li>The buffer solution is outside of the accepted tolerance for the 2751.</li> <li>The electrode is depleted (&gt; 1.1 pH or 65 mV offset).</li> </ul>	<ul style="list-style-type: none"> <li>pH system: Use fresh 4 pH, 7 pH, or 10 pH buffer and restart the calibration.</li> <li>ORP system: Use fresh 4 pH and 7 pH buffer solution saturated with Quinhydrone, or Light's Solution.</li> <li>Clean or replace the electrode.</li> </ul>
<b>After completing calibration procedure, the output values are inaccurate.</b>	<ul style="list-style-type: none"> <li>Insufficient time allowed for electrode stabilization during calibration.</li> </ul>	<p>Recalibrate:</p> <ul style="list-style-type: none"> <li>Verify that test solutions are at room temperature</li> <li>Wait at least 30 seconds after placing electrode in solution before pressing S1 EasyCal button.</li> </ul>
<b>Sensor Data screen for a probe with memory chip is not available in the 9900 Gen IV</b>	<ul style="list-style-type: none"> <li>Error during electrode connection to the 2751</li> </ul>	<ul style="list-style-type: none"> <li>Disconnect the sensor from 2751 and re-connect again</li> </ul>
<b>Transmitter displays the wrong Sensor Data information</b>	<ul style="list-style-type: none"> <li>Probe connected before 2751 acknowledged removal of the previous probe.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnect the probe, wait to see "CHECK SENSOR" alarm (roughly 3 seconds) prior to inserting new sensor</li> </ul>
<b>Transmitter displays the incorrect glass impedance after disconnecting a probe with memory chip and connecting a probe without memory chip.</b>  <b>When removing a broken glass probe and alarm triggered, the alarm continues after new, non-memory chip electrode was installed.</b>	<ul style="list-style-type: none"> <li>9900 and 2751 communication</li> </ul>	<ul style="list-style-type: none"> <li>After connecting the new probe, allow 30 seconds before performing a manual glass impedance measurement. If the broken glass alarm is on, performing a manual glass impedance measurement will clear the error. Remember to allow at least 30 seconds wait time from the time the new electrode was connected.</li> </ul>

## Parts and Accessories

Mfr. Part No.	Code	Description
3-0700.390	198 864 403	pH Buffer Kit
3-2700.395	159 001 605	Calibration kit: included 3 PP cups, cup stand, 1 pint pH 4.01, 1 pint pH 7.00
3-2759	159 000 762	pH/ORP Simulator/System tester
3-2759.391	159 000 764	Adapter cable to connect 2759 and 2751
3-8050-1	159 000 753	Universal Mount Junction Box
3-8050-2	159 000 754	Universal Mount Junction Box with EasyCal
3-9900.392-1	159 000 839	Liquid tight connector kit, NPT (1 connector)
3-9900.392-2	159 000 840	Liquid tight connector kit, PG 13.5 (1 connector)
3822-7004	159 001 581	pH 4.01 buffer solution, 1 pint (473 ml) bottle
3822-7007	159 001 582	pH 7.00 buffer solution, 1 pint (473 ml) bottle
3822-7010	159 001 583	pH 10.00 buffer solution, 1 pint (473 ml) bottle
3822-7115	159 001 606	20 gram bottle Quinhydrone for ORP calibration
5523-0322	159 000 761	Cable, 3-conductor + shield (blk/red/wht/shld) 22 AWG (per ft)
P31515-0P200	159 000 630	Universal Pipe Adapter PVC
P31515-0C200	159 000 631	Universal Pipe Adapter CPVC
P31515-0V200	159 000 459	Universal Pipe Adapter PVDF
7310-1024	159 873 004	24 VDC power supply, 10W, 0.42 A
7310-2024	159 873 005	24 VDC power supply, 24W, 1.0 A
7310-4024	159 873 006	24 VDC power supply, 40W, 1.7 A
7310-6024	159 873 007	24 VDC power supply, 60W, 2.5 A
7310-7024	159 873 008	24 VDC power supply, 96W, 4.0 A
3-8050.390-1	159 001 702	Retaining Nut Replacement Kit, NPT, Valox <sup>®</sup>
3-8050.390-3	159 310 116	Retaining Nut Replacement Kit, NPT, PP
3-0252	159 001 808	Configuration tool
-	159 399 007	9900 pH Calibrator



## Ordering Information

### 2751 DryLoc pH/ORP Smart Sensor Electronics

Mfr. Part No.	Code	Description
3-2751-1	159 001 804	In-line Smart Sensor Electronics with 4.6 m (15 ft) cable (recommended for use with 9900 or 9950)
3-2751-2	159 001 805	In-line Smart Sensor Electronics with Junction Box and EasyCal (recommended for current loop and 0486)
3-2751-3	159 001 806	Submersible Smart Sensor Electronics with 4.6 m (15 ft) cable, ¾ in. NPT threads
3-2751-4	159 001 807	Submersible Smart Sensor Electronics with 4.6 m (15 ft) cable, ISO 7/1-R¾ threads

### DryLoc pH Electrodes

3-2724-00	159 001 547	Flat pH Electrode, DryLoc, PT1000, ¾ in. NPT or Signet fittings
3-2724-01	159 001 548	Flat pH Electrode, DryLoc, PT1000, ISO 7/1-R¾ or Signet fittings
3-2724-HF-10	159 001 771	HF Resistant, Flat pH Electrode, DryLoc, 3K Balco, ¾ in. NPT or Signet fittings
3-2724-HF-11	159 001 772	HF Resistant, Flat pH Electrode, DryLoc, 3K Balco, ISO 7/1-R¾ or Signet fittings
3-2726-00	159 001 555	Bulb pH Electrode, DryLoc, PT1000, ¾ in. NPT or Signet fittings
3-2726-01	159 001 556	Bulb pH Electrode, DryLoc, PT1000, ISO 7/1-R¾ or Signet fittings
3-2726-HF-00	159 001 551	HF Resistant, Bulb pH Electrode, DryLoc, PT1000, ¾ in. NPT or Signet fittings
3-2726-HF-01	159 001 552	HF Resistant, Bulb pH Electrode, DryLoc, PT1000, ISO 7/1-R¾ or Signet fittings
3-2726-LC-00	159 001 559	Low Conductivity, Bulb pH Electrode, DryLoc, PT1000, ¾ in. NPT or Signet fittings
3-2726-LC-01	159 001 560	Low Conductivity, Bulb pH Electrode, DryLoc, PT1000, ISO 7/1-R¾ or Signet fittings
3-2734-00	159 001 774	Flat pH Electrode + Memory Chip, DryLoc, PT1000, ¾ in. NPT or Signet fittings
3-2734-01	159 001 775	Flat pH Electrode + Memory Chip, DryLoc, PT1000, ISO 7/1-R¾ or Signet fittings
3-2734-HF-00	159 001 776	HF Resistant, Flat pH Electrode + Memory Chip, DryLoc, PT1000, ¾ in. NPT or Signet fittings
3-2734-HF-01	159 001 777	HF Resistant, Flat pH Electrode + Memory Chip, DryLoc, PT1000, ISO 7/1-R¾ or Signet fittings
3-2736-00	159 001 778	Bulb pH Electrode + Memory Chip, DryLoc, PT1000, ¾ in. NPT or Signet fittings
3-2736-01	159 001 779	Bulb pH Electrode + Memory Chip, DryLoc, PT1000, ISO 7/1-R¾ or Signet fittings
3-2736-HF-00	159 001 780	HF Resistant, Bulb pH Electrode + Memory Chip, DryLoc, PT1000, ¾ in. NPT or Signet fittings
3-2736-HF-01	159 001 781	HF Resistant, Bulb pH Electrode + Memory Chip, DryLoc, PT1000, ISO 7/1-R¾ or Signet fittings
3-2756-WT	159 000 834	Electrode, pH (glass body), DryLoc, bulb, PT1000, wet-tap
3-2756-WTP	159 001 390	Electrode, pH (plastic body), DryLoc, bulb, PT1000, wet-tap
3-2764-2	159 000 944	Differential electrode, pH, DryLoc, flat, PT1000, 1 in. NPT process connection
3-2766-2	159 000 950	Differential electrode, pH, DryLoc, bulb, PT1000, 1 in. NPT process connection
3-2774-1	159 000 956	Electrode, pH, DryLoc, flat, PT1000, ¾ in. NPT process connection
3-2776-1	159 000 960	Electrode, pH, DryLoc, bulb, PT1000, ¾ in. NPT process connection

### DryLoc ORP (Redox) Electrodes

3-2725-60	159 001 561	Flat ORP Electrode, DryLoc, 10KΩ ID, ¾ in. NPT or Signet fittings
3-2725-61	159 001 562	Flat ORP Electrode, DryLoc, 10KΩ ID, ISO 7/1-R¾ or Signet fittings
3-2735-60	159 001 782	Flat ORP Electrode, DryLoc, 10KΩ ID, ¾ in. NPT or Signet fittings
3-2735-61	159 001 783	Flat ORP Electrode, DryLoc, 10KΩ ID, ISO 7/1-R¾ or Signet fittings
3-2757-WT	159 000 835	Electrode, ORP (glass body), DryLoc, bulb, 10KΩ ID, Wet-Tap
3-2757-WTP	159 001 391	Electrode, ORP (plastic body), DryLoc, bulb, 10KΩ ID, Wet-Tap
3-2765-1	159 000 946	Differential electrode, ORP, DryLoc, flat, 10KΩ ID, 1 in. NPT process connection
3-2767-1	159 000 952	Differential electrode, ORP, DryLoc, bulb, 10KΩ ID, 1 in. NPT process connection
3-2775	159 000 957	Electrode, ORP, DryLoc, flat, 10KΩ ID, ¾ in. NPT process connection
3-2777	159 000 961	Electrode, ORP, DryLoc, bulb, 10 KΩ ID, ¾ in. NPT process connection



## FAQ's 2751 pH/ORP Smart Sensor Electronics

### 1. What are the similarities between the 2750 pH/ORP Sensor Electronics and the 2751 pH/ORP Smart Sensor Electronics?

- Both the 2750 and the 2751 Sensor Electronics are compatible with all Signet DryLoc® pH/ORP electrodes with either the PT1000 or 3KΩ Balco Temperature Sensors. Both models support insertion installation with threaded fittings and GF Signet fittings along with styles optimized for submersion applications.

### 2. What are the differences between the 2750 pH/ORP Sensor Electronics and the 2751 pH/ORP Smart Sensor Electronics?

- The 2751 pH/ORP Smart Sensor Electronics supports electrode diagnostics. The 2751 is capable of automatic measurement of the temperature compensated glass impedance of pH electrodes. If the pH sensitive glass is broken an error will be generated and the user will be alerted by an alarm. A high impedance alarm warning is available on user selectable threshold with 9900 (Gen IV or later) and 9950 Transmitter\*. If the electrode has an integral solution ground the 2751 can also monitor reference junction impedance, 276X series of electrodes.
- The 2751 pH/ORP Smart Sensor Electronics, when paired with a memory chip enabled electrode, will allow for transferable calibration. The calibration information is stored in the electrode. Calibrate on one 2751 sensor electronics and move the probe to a second 2751 sensor electronics transferring the calibration.  
*Note: To take advantage of this feature the calibration system is required to consist of any of the 2751 style with a 9900 (Gen IV or later) or 9950 transmitter. The final measuring system will require a 2751 Smart Sensor Electronics in S<sup>3</sup>L or blind (4 to 20 mA) mode and any version of the Signet 8900, 9900 or 9950 instruments.*
- The 2751 pH/ORP Smart Sensor Electronics coupled to a memory chip enabled electrode will store manufacturing and operational information within the electrode's internal memory chip. The data stored can be displayed in a 9900 (Gen IV or later) or 9950 and includes: electrode model number, serial number, minimum and maximum pH or mV, minimum and maximum temperature (pH electrodes only), and operational hours. This information is useful in evaluating the environmental and operational characteristics of the system versus sensor longevity.
- The In-line (insertion) 2751 pH/ORP Smart Sensor Electronics comes equipped with a black polypropylene nut to easily identify the Sensor Electronics.

### 3. Will the 2751 pH/ORP Smart Sensor Electronics work with my existing GF Signet transmitter?

- The 2751 pH/ORP Smart Sensor Electronics is compatible with all (S<sup>3</sup>L) capable Signet 8900, 9900, 9950 transmitters and Signet 0486 Profibus Concentrator. Access to advanced features such as memory chip data and transferable calibration will require a 9900 (Gen IV or later) or 9950.

**4. Will the 2751 pH/ORP Smart Sensor Electronics work with my present pH/ORP electrode?**

- The 2751 pH/ORP Smart Sensor Electronics is compatible with all Signet DryLoc pH/ORP Electrodes that utilize either a PT1000 or 3K Balco temperature element for pH temperature measurement or a 10 K $\Omega$  ID Resistor for ORP electrodes.
- Pairing the 2751 with the 2722 DryLoc to BNC adapter allows the use of special pH/ORP Electrodes or third party electrodes that utilize the BNC style connector.

***Note:** pH applications require a PT1000 or 3K $\Omega$  Balco temperature element for proper operation. If temperature compensation is not required a fixed 1K $\Omega$  or 3K $\Omega$  resistor must be connected to the temperature sensor terminals on the 2722.*

- *ORP applications do not support temperature compensation; a 10K $\Omega$  fixed resistor must be connected to the temperature sensor terminals on the 2722 for proper operation.*

**5. Are any plumbing or wiring changes required to upgrade an existing 2750 system to the new 2751 pH/ORP Smart Sensor Electronics?**

- No changes are required for either the wiring or the plumbing for upgrading to a 2751 in systems using the 3-2750-2, 3-2750-3, or 3-2750-4. The terminal blocks, 3-2750-2, and wiring, 3-2750-3 and 3-2750-4, are identical to the 3-2751-2, 3-2751-3 or 3-2751-4 Smart Sensor Electronics.
- Applications using the 3-2750-1 should use either the 3-2751-2, with no changes to wiring or plumbing.
  - i. The 3-2751-1 uses the same housing and wiring as the 3-2750-7. Upgrading an existing 3-2750-1 to the 3-2751-1 will require changes to the wiring. The 3-2750-1 uses a four position terminal block for wiring. The 3-2751-1 has an integral 4.6 meter (15 ft) cable.

**6. Is the 2751 pH/ORP Smart Sensor Electronics compatible with my PLC, SCADA System or other controller that uses a 4 to 20 mA current loop interface?**

- The 4 to 20 mA current loop interface of the 2751 Smart Sensor Electronics is compatible with any current loop input that works with the 2750 Sensor Electronics. The 2751 has additional options, available through a future version of the USB Diagnostic Software, to allow for setting 3.6 mA and 22 mA alarm indications. The alarm indication can be triggered by one of the following conditions: missing electrode or pH or mV value out of range.

**7. What is the 2751 pH/ORP Smart Sensor Electronic memory chip interface?**

- The 2751 pH/ORP Smart Sensor Electronics can read and write memory chips embedded in specific Signet pH/ORP electrodes. The 2751 stores calibration information in the electrode to allow for a transferable calibration, calibrate on one system and move the calibration to a second. The electrode will also contain information from the manufacturing of the electrode such as model number, serial number, and factory calibration. The 2751 will store operation parameters in the electrodes memory chip such as, minimum and maximum pH or ORP mV reading, minimum and maximum temperature (pH electrodes only), and electrode runtime in hours.

**8. Which pH/ORP Electrodes have the memory chip?**

- All Signet standard pH and ORP electrodes are memory chip enabled. 272x-273x series of electrodes are manufactured with a memory chip since July 2014 while the 275x, 276x and 277x series of electrodes since April 2017.

## 9. How do I use the probe diagnostics?

- The 2751 Smart pH/ORP Sensor Electronics combined with the Signet 9900 (Gen IV or later) transmitter gives you access to probe diagnostic information. The three most important pieces of information are:
  - i. Glass impedance
  - ii. Calibration offset (temperature, pH and mV for ORP)
  - iii. Electrode slope efficiency
- Glass impedance is available on all pH electrodes.
- Calibration offset and electrode slope efficiency are available on both pH and ORP electrodes with memory chips.
- The 2751, when combined with a memory chip enabled electrode and 9900 (Gen IV or later) or 0486 Profibus Concentrator, will display the factory impedance of the pH glass stem for comparison to the measured impedance. This will give you valuable insights into the health of the probe, and if the probe is nearing the end of its life.
- Glass pH is in the range of 100's of megOhms and is strongly temperature dependent. The glass can be chemically attacked by certain chemicals such as HF, NaOH or dehydrated by high concentrations of acids. The glass can also be physically damaged through mechanical shock, impact of abrasive particles in the liquid, mishandling of the electrode, or freezing temperatures.
  - i. Etching of the glass by either chemical, HF, NaOH, or mechanical means, abrasive particles will cause the impedance of the glass to lower.
  - ii. Mechanical shock, impact, mishandling, or freezing temperatures can cause the glass to fracture creating a short which results in the impedance dropping to a very low value, 1 megOhm or less.
  - iii. Dehydration of the glass, or in some instances, excessive hard coatings can cause the glass impedance to greatly increase.
- Low values of impedance are an indication to replace the pH electrode. Broken glass, or values below 1 megOhm, indicates a need to immediately replace the electrode.
- High impedance values normally indicate that the probe requires cleaning or that the probe is exposed to high concentrations of chemicals that are dehydrating the glass. If the high impedance is caused by chemical dehydration, soaking the probe in a 4 pH buffer with 3M KCl solution for several hours may restore the electrode.
- As the electrodes age, either pH or ORP, the internal reference solution's chemical make-up changes. This change causes an offset of the mV reading between a healthy electrode and a depleted electrode. Once the offset reaches approximately 50 mV, about 1 pH unit, the electrode is considered depleted. By monitoring the offset of the electrode one can predict when the life of the electrode has been reached, and order a replacement electrode minimizing downtime in the system.
- In specific applications regulatory agencies may require the monitoring of the slope, or efficiency, of the electrode. The 2751 Smart Sensor Electronics connected to a memory chip enabled electrode and a 9900 Transmitter (Gen IV or later) will display the electrode slope efficiency.

**For example:** In certain applications the United States Environmental Protection Agency requires efficiency between 95% to 105%. By using the 9900 (Gen IV), and the 2751 Smart Sensor Electronics, the operator can read the efficiency, for example 97%. If the electrode falls outside the range, while still usable in other applications, it will need to be replaced.

#### 10. How do I use the remote calibration feature?

- Remote calibration requires all sensor electronics be 2751 pH/ORP Smart Sensor Electronics. The calibration instrument must be either a 9900 (Gen IV or later) or 2751-2 (with the EasyCal option). **All electrodes must have a memory chip.**  
The system units (units that the electrode will be installed in after calibration) can be any style of 2751 sensor electronics, any version of the 8900 or 9900 or 9950 instruments or blind, 4 to 20 mA current loop. System units, 8900 or 9900 or 9950 instruments must be configured for calibration at sensor “Cal At Sensor”.
- All calibrations should be performed at the calibration unit. Once an electrode is calibrated, it can be installed immediately in any system unit. *If the calibrated probe is not intended to be installed in the system right away, this will maintain its calibration with proper storage, please refer to the Electrode Care section of the sensor’s manual for correct storage.* The system 2751 connected to the calibrated electrode will read the new calibration information out of the electrode, and use this information to send a calibrated value to the transmitter, or to internally process the electrode readings for blind applications.

\* Users of 9950 Gen I and 9950 (Gen 2a) should update to 9950 (Gen 2b, available in Q4) to take full advantage of the 2751 features and benefits. Visit [www.gfsignet.com](http://www.gfsignet.com) for the latest software update.

# Signet 2751 DryLoc® pH/ORP Smart Sensor Electronics



In-line  
2751-1

In-line EasyCal  
2751-2

Submersible  
2751-3 or 2751-4

DryLoc® Electrodes sold separately

The Signet 2751 pH/ORP Smart Sensor Electronics featuring the DryLoc® connector, is the solution for field-free calibration, out of range glass impedance and broken glass detection, alerting the operator to probe failure or maintenance needs.

The 2751 features two different outputs: a two-wire 4 to 20 mA loop output with optional EasyCal function or a digital (S<sup>3</sup>L) output which allows for longer cable lengths and is compatible with all Signet 8900, 9900 and 9950\* instruments or in blind, 4 to 20 mA.

The Smart Sensor Electronics will allow for calibration of electrodes in a laboratory setting and installation of pre-calibrated probes in the field, reducing system downtime. Memory chip enabled electrodes will store operational data such as minimum and maximum pH/mV readings, runtime, minimum and maximum temperature (pH only), for troubleshooting and operational evaluation. To take full advantage of all features and benefits of the 2751, use with Signet 9900 (Generation IV or later), 9950 Transmitter or 0486 Profibus Concentrator.

The 2751 self-configures for pH or ORP operation via automatic recognition of the electrode type. The optional EasyCal feature allows simple push-button calibration and includes an LED indicator for visual feedback.

The 2751 submersible Smart Sensor Electronic can also be used in-line when used with the 3/4" or 1" threaded sensors including the 272X, 273X, 275X, 276X and 277X series of electrodes. The 2751 in-line sensor electronics can be used with Signet fittings up to DN100 (4 in.) and Wet-Tap assemblies.

## Features

- Probe health monitoring, glass impedance and broken glass detection
- Memory chip interface that allows for transferable calibration, runtime data, and manufacturing information
- In-line integral mount and submersible installation versions
- Automatic temperature compensation
- Auto configuration for pH or ORP operation
- Optional EasyCal calibration aid with automatic pH buffer recognition for 4, 7 and 10 pH and ORP solutions: quinhydrone saturated pH 4 or 7 buffers and Light's Solution +469 mV
- Junction boxes for convenient wiring
- Patented DryLoc® connector provides a quick and secure connection to the sensor\*\*



## Applications

- Water and Wastewater Treatment
- Neutralization Systems
- Scrubber Control
- Effluent Monitoring
- Surface Finishing
- Flocculent Coagulation
- Heavy Metal Removal and Recovery
- Toxics Destruction
- Sanitization Systems
- Pool & Spa Control
- Aquatic Animal Life Support Systems

\*Users of 9950 Gen I and 9950 (Gen 2a) should update to 9950 (Gen 2b, available in Q4) to take full advantage of the 2751 features and benefits. Visit [www.gfsignet.com](http://www.gfsignet.com) for the latest software update.

\*\*U.S. Patent No.: 6,666,701



# Specifications

## General

### Compatible Electrodes

Signet DryLoc® pH and ORP Electrodes, Models 2724-2726, 2734-2736, 2756-2757 Wet-Tap, 2764-2767, 2774-2777

Operating Range	pH	-1 to 15 pH
	ORP	±2000 mV
Response Time	pH	< 6 sec. for 95% of change
	ORP	Application dependent
Materials	In-line	PBT (thermal plastic polyester) and polypropylene (retaining nut)
	Submersible	CPVC

## Electrical

Cable	4.6 m	15 ft	3-conductor shielded (3-2751-1 in-line and the 3-2751-3 or -4 submersible sensor electronics only)	
	22 AWG		For 9900, 9950 and 4 to 20 mA max. cable length is 300 m (1000 ft.). For 8900, please refer to the Cable Calculation Table of the Signet catalog for max. cable length.	
Power	12 to 24 VDC	±10%, regulated for 4 to 20 mA output		
	5 to 6.5 VDC	±5% regulated recommended, 3 mA max., for digital (S <sup>3</sup> L) output		
Current Output	pH	Fixed 4 to 20 mA, isolated, = 0 to 14 pH (custom scaling available with 0252 tool)		
	ORP	Fixed 4 to 20 mA, isolated, = -1000 to +2000 mV (custom scaling available from ± 2000 mV with 0252 tool)		
Max Loop Resistance	100 Ω max. @ 12 V	325 Ω max. @ 18 V	600 Ω max. @ 24 V	
Accuracy	±32 µA			
Resolution	±5 µA			
Update Rate	0.5 seconds			
Error Indication	3.6 mA, 22 mA, or none			
Digital (S <sup>3</sup> L) Output	Serial ASCII, TTL level 9600 bps			
Accuracy	pH	± 0.02 pH @ 25 °C	± 0.02 pH @ 77 °F	
	ORP	± 1.5 mV @ 25 °C	± 1.5 mV @ 77 °F	
	Temperature	≤ 0.4 °C	0.72 °F	
Resolution	pH	≤ 0.01 pH		
	ORP	1.5 mV		
Update Rate	0.5 seconds			
Available Data	Raw mV, pH or ORP, Temperature (pH), Glass Impedance (pH), Minimum mV (pH), Maximum mV (pH), Minimum Temperature (pH), Maximum Temperature (pH), Model Number, Serial Number, Manufacturing Date, Runtime, Slope pH/mV, Measurement Offset, and Temperature			
Error Indication	Open input diagnostic, broken glass detection (pH), High Impedance			
Input Impedance, Z	>10 <sup>11</sup> Ω			

## Environmental

Enclosure	3-2751-1 & -2	NEMA 4X/IP65 with electrode connected
	3-2751-3 & -4	NEMA 6P/IP68 with electrode and watertight conduit and/or extension pipe connected

## Max. Temperature/Pressure Rating

### Operating Temperature

Submersible	0 °C to 85 °C	32 °F to 185 °F
	0 °C to 85 °C	32 °F to 185 °F
In-line	0 °C to 85 °C	32 °F to 185 °F
Storage Temperature	-20 °C to 85 °C	-4 °F to 185 °F
Relative Humidity	0 to 95%, non-condensing (without electrode connected)	

## Shipping Weight

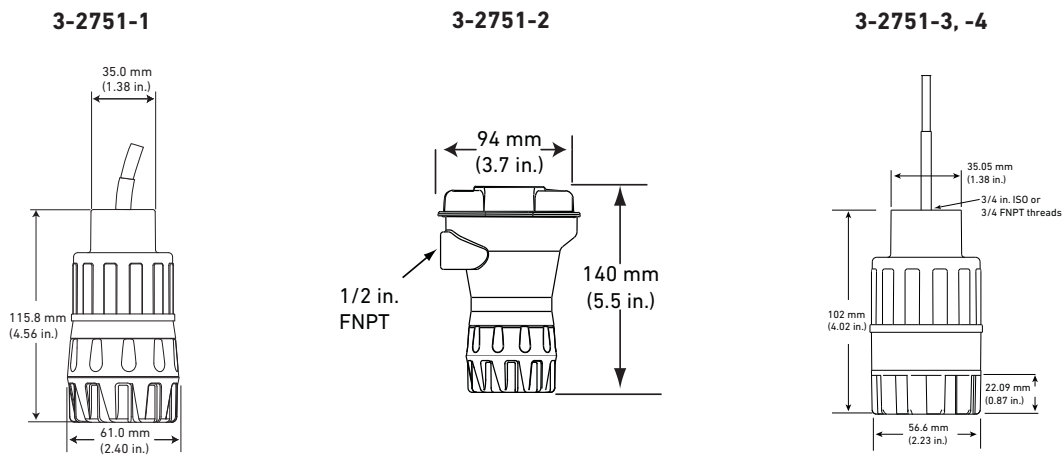
2751-2	0.75 kg	1.65 lb
2751-1, -3 & -4	0.64 kg	1.41 lb

## Standards and Approvals


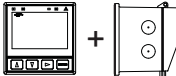

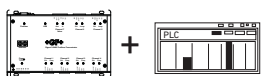

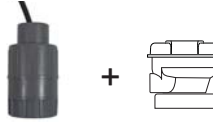

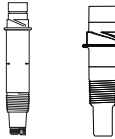
CE, FCC
RoHS compliant, China RoHS
Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety



# Dimensions






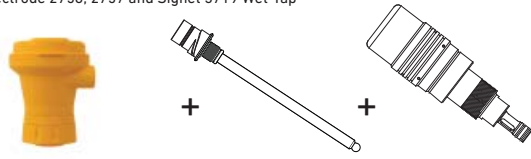
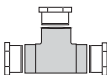


## In-Line Installation

System Overview	Panel Mount	Pipe, Tank, Wall	4 to 20 mA Input	Automation System
	Signet Instruments 9900 9950	Signet Instrument 9900 and Rear Enclosure	3-2751 Smart Sensor Electronics and Customer Supplied Chart Recorder, Programmable Logic Controller, or Programmable Automation Controller	3-0486 Profibus Concentrator and Customer Supplied Programmable Logic Controller or Programmable Automation Controller
				
	<b>Signet 2751 Smart Sensor Electronics</b>	<b>Signet 2751 Smart Sensor Electronics</b> with Signet 3-8050-2 Universal Junction Box (EasyCal)		<b>Signet 2751 Smart Sensor Electronics</b>
				
Signet Electrodes 2724-2726 2734-2736 2764-2767 2774-2777				
2724-2726 and 2734-2736 DryLoc Electrodes: Use GF fittings* or customer supplied 3/4 in. NPT fittings 2764-2767 and 2774-2777 DryLoc Electrodes: Use customer supplied 3/4 in. or 1 in. NPT fittings			All sold separately	

## Submersible Installation




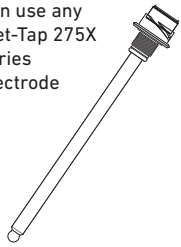
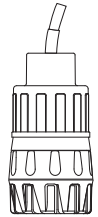
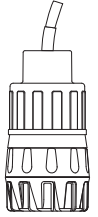

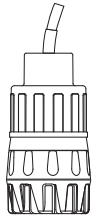

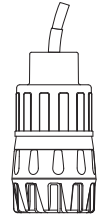

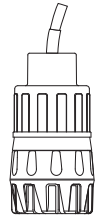
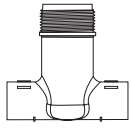
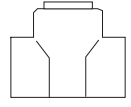
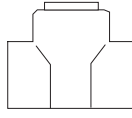
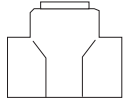
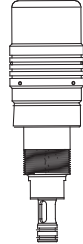




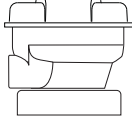

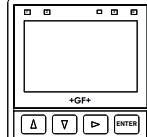
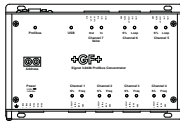
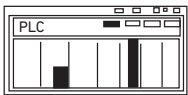

## Wet-Tap Installation

Panel Mount	Pipe, Tank, Wall	4 to 20 mA Input	Automation System
Signet Instruments 9900 9950	Signet Instrument 9900 and Rear Enclosure	2751 Smart Sensor Electronics and Customer Supplied Chart Recorder, Programmable Logic Controller, or Programmable Automation Controller	0486 Profibus Concentrator and Customer Supplied Programmable Logic Controller or Programmable Automation Controller
			
<b>Signet 2751 Smart Sensor Electronics</b> with customer supplied pipe extension or conduit, 3/4 in. NPT or ISO 7/1-R 3/4 threads**	<b>Signet 2751 Smart Sensor Electronics</b> with Signet Wet-Tap Electrode 2756, 2757 and Signet 3719 Wet-Tap		
			
Signet Electrodes 2724-2726 2734-2736 2764-2767 2774-2777	GF Tees and Fittings see model 3719 for more info		All sold separately

\* See fittings section for more information.

\*\*Refer to the Signet Submersion Kit brochure (3-0000.707) located on our website for installation suggestions and options.

# 2751 Product Selection Guide

<p><b>1. Choose the Electrode</b></p>	<p>2724-2726, 2734-2736</p> <p>Can use Any 3-272X or 273X series Electrode</p> 	<p>2764-2767 Differential</p> <p>3-2764-1 3-2764-2 3-2766-1 3-2766-2</p> 	<p>2774-2777</p> <p>ORP electrodes must have 10K ID resistor use: 3-2775, 3-2777</p> <p>pH Electrodes can be either the 1K or 3K use: 3-2774, 3-2774-1, 3-2776, 3-2776-1</p> 	<p>2756 and 2757 Wet-Tap</p> <p>Can use any Wet-Tap 275X series electrode</p> 	
<p><b>2. Determine the mounting style:</b></p>	<p>In-line</p>  <p>2751-1 or -2</p>	<p>In-line</p>  <p>2751-1 or -2</p>  <p>2751-3 or -4</p>	<p>In-line</p>  <p>2751-1 or -2</p>  <p>2751-3 or -4</p>	<p>In-line</p>  <p>2751-1 or -2</p>  <p>2751-3 or -4</p>	<p>In-line</p>  <p>2751-1 or -2</p>
<p>And</p>	<p>-In-line fitting</p>  <p>Signet fitting</p>	<p>-In-line fitting</p>  <p>3/4" reducing tee</p>	<p>-In-line fitting</p>  <p>1" threaded tee</p>	<p>-In-line fitting</p>  <p>3/4" reducing tee</p>	<p>-In-line fitting</p>  <p>3719 Wet-Tap Assembly</p>
<p>Or</p>	<p>Submersible</p> <p>2751-3 or -4 and cable conduit (customer supplied) connected to 3/4" sensor electronics</p> 	<p>Submersible</p> 	<p>Submersible</p> 	<p>Submersible</p> 	<p>Submersible</p> <p>3719 Wet-Tap Assembly</p> <p>(Submersible not applicable with Wet-Tap assembly)</p>
<p><b>3. Junction Boxes</b></p>	<p>3-8050-1: Use when extending the submersible cable over long distance. 3-8050-2: Use with the submersible 2751-3 or -4 and the in-line 2751-1 for best calibration results with the EasyCal function when using the blind 4 to 20 mA output.</p>				
<p><b>4. Choose the output instrument</b></p>	<p>Digital (S<sup>L</sup>)</p>    <p>9900 or 9950 Instruments, Profibus Concentrator</p> <p>OR</p>   <p>PLCs or Chart Recorders</p> <p>4 to 20 mA</p>				<p>PLCs or Chart Recorders</p>

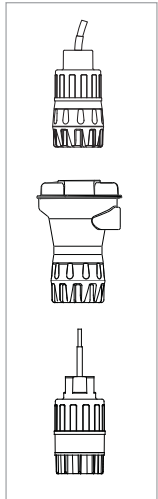
## Model 2751 Ordering Information

- 1) Model 2751 requires 12 to 24 VDC to function as a blind 4 to 20 mA output transmitter.
- 2) Order a 3-2751-2 or any other 2751 with a junction box 3-8050-2 if the EasyCal feature is desired.
- 3) Conduit and mounting brackets for submersion installation must always be used (customer supplied).
- 4) The 3-2759 System Tester must be ordered with the adapter cable 3-2759.391 for exclusive use with the 2751.
- 5) All sensor electronics, preamplifiers and connectors require a DryLoc electrode for full system installation.
- 6) The 2751 Smart Sensor Electronics is compatible with all Signet 8900, 9900 and 9950 instruments. To take full advantage of the advanced features use the 9900 SmartPro Transmitters (Generation IV or greater), 9950 and 0486 Profibus Concentrator.

## Application Tips

- The EasyCal feature automatically recognizes standard 4.0, 7.0, and 10.0 pH buffer or ORP quinhydrone solutions of +87 and +264 mV or Light's Solution, +469 mV, and simplifies calibration. For EasyCal ORP only single point calibration is used.
- Frequency of calibration of electrodes is dependent upon the application.

## Ordering Information



Mfr. Part No.	Code	Description
<b>In-line Smart Sensor Electronics (Yellow body)</b>		
3-2751-1	<b>159 001 804</b>	with 4.6 m (15 ft) cable, recommended for 9900 or 9950 instruments
3-2751-2	<b>159 001 805</b>	with junction box and EasyCal, recommended for 4 to 20 mA use
<b>Submersible Smart Sensor Electronics (Gray body)</b>		
3-2751-3	<b>159 001 806</b>	with 4.6 m (15 ft) cable and 3/4 in. NPT threads - when 4 to 20 mA is required use the 3-8050-2 junction box with EasyCal
3-2751-4	<b>159 001 807</b>	with 4.6 m (15 ft) cable and ISO 7/1-R 3/4 threads - when 4 to 20 mA is required use the 3-8050-2 junction box with EasyCal

Sensor Electronics with preamplified signal and Digital (S<sup>3</sup>L) output (for use with the SmartPro Instruments) or 4 to 20 mA output - power supplied to unit dictates output type.

**Note:**

The 2751 Smart Sensor Electronics is compatible with 8900, 9900 and 9950 SmartPro Transmitters, and Signet 0486 Profibus Concentrator. To take full advantage of the 2751 features, use 9900 (Generation IV or later), 9950 or 0486 Profibus Concentrator.

## Accessories and Replacement Parts

Mfr. Part No.	Code	Description
<b>Calibration</b>		
3-2700.395	<b>159 001 605</b>	Calibration kit: includes 3 polypropylene cups, box used as cup stand, 1 pint pH 4.01, 1 pint pH 7.00
3822-7115	<b>159 001 606</b>	20 gm bottle quinhydrone for ORP calibration (must use pH 4.01 and/or pH 7.00 buffer solutions)
3-2759	<b>159 000 762</b>	pH/ORP system tester (adapter cable sold separately)
3-2759.391	<b>159 000 764</b>	2759 adapter cable for use with 2751 DryLoc sensor electronics
3-0700.390	<b>198 864 403</b>	pH buffer kit (1 each 4, 7, 10 pH buffer in powder form, makes 50 ml of each)
3822-7004	<b>159 001 581</b>	pH 4 buffer solution, 1 pint (473 ml) bottle
3822-7007	<b>159 001 582</b>	pH 7 buffer solution, 1 pint (473 ml) bottle
3822-7010	<b>159 001 583</b>	pH 10 buffer solution, 1 pint (473 ml) bottle
<b>Mounting</b>		
3-8050.390-3	<b>159 310 116</b>	Retaining nut replacement kit, Black Polypropylene
3-8050-1	<b>159 000 753</b>	Universal mount junction box
3-8050-2	<b>159 000 754</b>	Universal mount junction box w/EasyCal (for submersible applications, use with 3-2751-3 and -4 where 4 to 20 mA is required)
3-9000.392-1	<b>159 000 839</b>	Liquid tight connector kit, NPT (1 connector)
3-9000.392-2	<b>159 000 841</b>	Liquid tight connector kit, PG 13.5 (1 connector)
<b>Other</b>		
5523-0322	<b>159 000 761</b>	Sensor cable (per ft), 3-cond. plus shield, 22 AWG, black/red/white (for use with 2751)
P31515-0P200	<b>159 000 630</b>	Universal Pipe Adapter PVC
P31515-0C200	<b>159 000 631</b>	Universal Pipe Adapter CPVC
P31515-0V200	<b>159 000 459</b>	Universal Pipe Adapter PVDF
7310-1024	<b>159 873 004</b>	24 VDC power supply, 10W, 0.42 A
7310-2024	<b>159 873 005</b>	24 VDC power supply, 24W, 1.0 A
7310-4024	<b>159 873 006</b>	24 VDC power supply, 40W, 1.7 A
7310-6024	<b>159 873 007</b>	24 VDC power supply, 60W, 2.5 A
7310-7024	<b>159 873 008</b>	24 VDC power supply, 96W, 4.0 A

3-2751.099 Rev A (07/17)  
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Reg. No. GF Piping Systems Africa (Pty) Ltd 2015/163211/07

## **New pH/ORP Measurement Solution Alerts User to Probe Health**

*EI MONTE, Calif.* - GF Piping Systems has announced introduction of the Signet 2751 pH/ORP Smart Sensor Electronics. The new measurement system solution offers vastly improved diagnostics, performance, and convenience in ensuring accurate pH/ORP monitoring and control.

Operators typically clean and calibrate pH and ORP electrodes on a regular schedule and manually determine the health of the electrode based on calibration results. If the probe experiences damage or wear before regular maintenance has occurred, the user may have obtained inaccurate pH/ORP readings. The new 2751, combined with the 9900 Transmitter (Gen IV or later), 9950 Dual Channel Transmitter\* or 0486 Profibus Concentrator, eliminates this problem by automatically monitoring electrode health and generating an alert to potential problems before they become serious, and possibly costly. The automatic health check also cuts down on time-consuming maintenance and calibration.

In addition to its powerful automatic electrode health monitoring function, the 2751 incorporates extended pH measurement ranges of -1 to 15 and extended ORP ranges of -2000 to +2000 millivolts. The current loop is scalable with alarm indication over the entire measurement range and is compatible with existing 8900/9900/9950 and current loop systems. Convenient remote calibration in the laboratory (with the probe in remote location) is now possible when used with the Signet memory chip enabled electrodes.

\* Users of 9950 Gen I and 9950 (Gen 2a) should update to 9950 (Gen 2b, available in Q4) to take full advantage of the 2751 features and benefits. Visit [www.gfsignet.com](http://www.gfsignet.com) for the latest software update.

Combining the 2751 Smart Sensor Electronics with the 9900 Transmitter (Gen IV or later) is now enabling convenient visibility to the sensor condition at the 9900 Transmitter. Previously, the sensor status could only be determined by physically removing the sensor from the installation for visual inspection.

Other high-performance functions provided by the new system include the ability to set automatic glass impedance measurements and review application data – such as minimum and maximum readings – and obtain electrode runtime and manufacturing information. The 9900 Transmitter (Gen IV or later) and 9950 Dual Channel Transmitter incorporate all the inherent advantages of previous generations with their ability to work with multiple sensor types, modular design, and large backlit displays.

The new pH/ORP measurement system is suitable for applications in water and wastewater treatment, neutralization systems, air scrubber, effluent monitoring, surface finishing and plating, heavy metal removal/recovery, pool and spa control, and aquatic life support systems. The system meets CE, FCC, RoHS and China RoHS approvals.

GF Piping Systems supplies a full range of plastic pipe, fittings, valves, actuators, variable area flowmeters, fusion machines, secondary containment, heat exchangers, custom products, and sensors and instrumentation for industrial process control. The Georg Fischer Signet LLC facility, located in El Monte, California, is the development, manufacturing, and logistics organization for Signet flow and analytical measurement systems. For further information, please contact

