Georg Fischer Signet offers on-line information and assistance

Please visit our website at **www.gfsignet.com** for:

Product information – the “Products” link guides you to the latest product details including data sheets and manuals to assist in product selection, product installation, calibration and operations. Manuals are provided in multiple languages.

The Signet Application Library – a collection of typical industry applications and processes with detailed schematics, common measurement requirements and Signet products to meet those needs.

Technical articles – A library of case studies, technical product write-ups and application solutions, sorted by technology and application

Choosing Products

System Selection Guide

This section provides tips and suggestions on how to choose just the right measurement system for your specific liquid application needs. For specific product information, refer to the individual catalog sheets.

Step 1: Determine Application Requirements

Defining the following variables before building your system will ensure peak performance from your Signet sensors and instruments.

- Measurement range
- Installation requirements
- Pipe size and material
- Chemical compatibility of all wetted parts to process chemicals
- Systems specifications (such as temperature and pressure)
- Performance requirements of sensor
- Fluid particulates
- Viscosity of Fluids
- Hazardous location requirements

Step 2: Select Sensor Technology

Based on the application requirements determined in Step 1, choose a sensor. For pH/ORP and Conductivity/Resistivity electrodes, select your preferred connection style. Keep in mind various connection types such as cable or DryLoc® systems. In addition, users may be required to choose a preamplifier or sensor electronics.

Then, determine your signal output requirement to allow you to match just the right instrument (see Step 3). If you're not purchasing an instrument, select the sensor electronics package that best suits your needs.

Step 3: Choose instrument

Choose an instrument. All units are available in 1/4 DIN panel or field configuration and are available with either digital, analog, or analog/digital display. Various retrofit adapters and mounting accessories are also available (see Accessories section). In cases where the sensor feeds directly to a PLC or PC system, Signet offers a wide range of instruments and sensors with 4 to 20 mA outputs.

Note: Please contact your local Georg Fischer sales and support office if you need assistance in choosing any one of these products.

Step 4: Determine Installation Requirements

Signet offers a wide selection of installation fittings for in-line pH/ORP electrodes. These fittings are specifically designed to ensure the proper placement of the electrode in the system to achieve optimum performance. Other pH electrodes as well as all temperature, pressure and conductivity/resistivity electrodes use standard fittings. All submersion electrodes require conduit piping and fixtures not supplied by Signet.

Features and Benefits

Turbidity

Turbidimeter

- Simple to install with mounting holes pre-drilled on a common pattern.
- Easy and fast to calibrate.
- Programmable analogue output signal.
- Two adjustable alarm relays.
- Easy access for wiring and maintenance.
- Ultrasonic cleaning options ensures long and steady on-line measurement.
- Simple desiccant pouch keeps the measuring chamber dry.
- Easy access for replacing desiccant.
- Standard EPA 180.1 for USA and Asia. ISO 7027 for Europe.
- Quick and easy installation, calibration and maintenance.

4150 Turbidimeter

Multi-Parameter Instruments

9900 SmartPro™ Transmitter

- Multi-Parameter input selection
- Large auto-sensing backlit display with "at a glance" visibility• "Dial-type" digital bar graph
- Intuitive and "user-friendly" interface consistent with legacy Signet ProPoint® and ProcessPro® devices
- Optional field upgradable relays
- Selectable error mode for current outputs, 3.6 mA or 22 mA
- 4 to 20 mA input (with optional 8058 Signal Converter)
- Warning LED indicator
- Custom 13-character label capabilities for the channel type• Factory reset capability
- Optional PC COMM configuration tool
- Optional H COMM module for two-way communication

9900 SmartPro™ Transmitter

Chlorine

Chlorine Analyser System

- Reagent free measuring
- Complete panel system allows for quick and easy installation.
- Built-in flow regulator maintains constant flow and pressure to the sensors.
- Panel includes a 100-240 VAC power supply, two 4 to 20 mA outputs and two mechanical relays.
- Optional automatic pH and temperature compensation.

4630 Chlorine Analyser System

Dissolved Oxygen

Process Optical Dissolved Oxygen Sensor

- Optical DO measurement no flow requirements
- Rugged construction
- Calibration built into the measurement cap 2% of range 0 to 20 mg/l
- One year measurement cap life
- No membranes or filling solutions
- Flexibel communications, 4 to 20 mA or Modbus (RS485)
- Measurement Range: 0 to 20 mg/l

2610 Process Optical Dissolved Oxygen Sensor

Flow Sensors

Insertion Paddlewheel Sensors

- Four-bladed paddle design ensures optimal performance and lower flow rates than five or six-bladed rotors that have a higher weight/bearing inertia.
- The open-cell design and the controlled insertion depth work together to deliver a linear and repeatable output over a wide dynamic range, with virtually no pressure drop in the process pipe.
- Choice of corrosive resistant plastics and rugged metals enable use in many aggressive fluids.
- The widest choice of installation fitting materials, sizes and connections on the market that meet endless application needs.
- Insertion design lowers installation and maintenance costs.
- Self-powered sensors are well suited for remote locations and are FM approved which enable installation in hazardous locations.
- Paddlewheel design has no pressure drop, making it ideal for gravity flows.
- NIST traceable test certification with all plastic sensors provides superior price-to-performance ratio.
- Hot-Tap designs are available to allow service and maintenance without shutting-down the process; saves costly downtime.

2536
Paddlewheel
Flow Sensor

525
Metalex
Flow Sensor

Flow-Through Rotor Sensors

- Operating flow ranges from 110 mL/min to 12110 mL/min (0.03 US gpm to 3.2 US gpm) in clean opaque or clear liquids ideal for precise low flow applications such as dosing.
- Hall-effect devices provide excellent noise immunity output signals.
- Sensor body design allows easy access for cleaning, inspection and rotor replacement without the need for powering down.
- Flexibility with end connections allow flexible tubing or rigid pipe installations.
- Four fully encapsulated magnets provide high resolution signal output.

2507
Mini Flow Sensor

In-line Turbine Sensors

- Small compact design for tightly-spaced installations.
- Superior ceramic bearing provides long life without the need for maintenance.
- Radio Frequency (RF) pick-up provides added advantage without rotor drag or contamination from ferrous particles.
- Detachable electronics means sensor maintenance is possible without the need to cut power to unit.
- Composed of highly chemical resistant materials.
- Mounting at any angle offers total installation flexibility.
- Wide choice of end connections in hose barb, flare or union ends.
- Three flow ranges available for optimum measurement resolution.

2100
Turbine Flow Sensor

Insertion Magnetic Sensors

- No moving parts means no fouling or reduced wear.
- Insertion design provides easier installation and removal than full line magmeters.
- Model 2551 available to fit all pipe sizes ranging from DN15 to DN900 (0.5 to 36 in.).
- Model 2552 Metal Magmeter available for pipe sizes up to DN2550 (102 in.). Hot-Tap versions also available.
- Fluid diagnostics via LED indicators.
- Bi-directional flow and empty pipe detection.
- Rugged design with good chemi-cal resistance suitable for tough applications.
- Analog 4 to 20 mA and frequency outputs provide signals to remote flowmeters and data acquisition. Also available with digital (S^3L) output for compatibility with multi-parameter transmitters and controllers.
- High input impedance provides low sensitivity to coating which makes it ideal for dirty liquids.
- Isolated outputs provide barrier to “ground loops”.

2551
Display Magmeter

2552
Metal Magmeter

Analytical Sensors and Electrodes

Standard pH and ORP Electrodes:

- The amplified output ensures the process signal is resistant to electrical noise and allows up to 120 m (400 ft) before connection to the instrument.
- Longer reference path and larger reference volume means extended service life.
- Flat glass surface sensor design. Resistant to fouling and abrasion in dirty applications, and prevents accidental damage to extend electrode life span.
- Unique DryLoc® design enables pH and ORP connections instantly.
- Designed to mount in standard Signet fittings or connect to 3/4 in. standard fittings.
- Option for blind 4 to 20 mA output or digital (S^3L) output for long cable runs.
- Preamplifier does not need replacing with electrode which significantly reduces service costs.

2724-2726
pH/ORP Electrodes

2774-2777
pH/ORP Electrode

2750
pH/ORP Sensor Electronics

Differential pH/ORP Electrodes:

- pH and reference signals are measured against third electrode, a solution ground, to ensure a stable reading even when the smallest of unknown stray currents are in the process liquids.
- The differential reference is designed to protect the reference element from Br^-, I^-, CN^-, S^- and other harsh compounds that react with Ag^+. Also protects the reference electrolyte from Hg^{++}, Cu^+, Pb^+, ClO_4^-, or other compounds that dilute KCl.
- Unique DryLoc® design is robust and watertight, ensuring rugged installation.
- Designed to mount in 1 in. standard pipe fittings for easy installation.
- The preamplified output ensures the process signal is resistant to electrical noise and allows up to 120 m (400 ft) before connection to the instrument.
- Option for blind 4 to 20 mA or digital (S^3L) signals for long cable runs.
- Flat glass surface sensor design that is resistant to fouling and abrasion in dirty applications.
- Large reference volume and replaceable salt bridge allows the user to rebuild the reference and extend the service life of the electrode.

2764-2767
pH/ORP Electrode

2760
Sensor Electronics

Conductivity/Resistivity Electrodes:

- Flow-through design ensures continuous measurement without air entrapment.
- Reversible threaded connections for in-line integral mount or tank submersion.
- Standard parts offer application flexibility for the user.
- Short length electrodes available to prevent “dead-legs”.
- Blind 4 to 20 mA output or digital output for long cable runs beyond 30 m (100 ft), via 2850 sensor electronics.
- Every sensor uses standard electrical cable. No need to incur additional costs for “patch” type cable connections.
- NIST calibration certificate available upon request.

2800
Series Electrodes

2839-2842 Conductivity Electrodes

2850
Sensor and Electronics

Temperature, Pressure and Level Sensors

Temperature Sensors:

- Unibody PVDF construction for use in either high purity or aggressive fluid conditions.
- 4 to 20 mA or digital (S^3L) signal for long cable runs and choice of output.
- Dual threaded 3/4 in. NPT for easy installation.
- Options for integral mounting of instrument directly onto sensor.
- Cable and thread permits conduit for full tank submersion.

2350
Temperature
Sensor

Pressure/Level Sensors:

- 1/2 in. male union process connection to suit installation needs.
- Three pressure ranges to meet specific requirements and provide optimal resolution.
- 4 to 20 mA or digital (S^3L) signal for long cable runs and choice of output.
- Unibody PVDF construction for aggressive fluid conditions.
- Option for integral mounting of instrument directly onto sensor.
- Configure with 8350 transmitter or multi-parameter transmitters or controllers to provide full level measuring system (hydrostatic pressure).
- Cable end threads permit conduit for full tank submersion.

2450 Pressure Sensor

2250 Level
Sensor

Systems

4630 Chlorine Analyser System

Description

The Signet 4630 Chlorine Analyser System is an integrated all-in-one system designed to measure free chlorine. The 3-4630-21 chlorine panel with the optional pH sensor is used to accurately calculate free chlorine in applications that have varying pH values (±0.20 pH units).

In applications where the pH is stable, the pH sensor is not required and the pH value is manually entered into the transmitter to calculate the chlorine levels. (-20 version).

The unique integrated clear flow cell combines sensors, flow regulator, filter and variable area flow indicator in one compact unit. An integrated flow regulator with removable filter accepts inlet pressures of 1 to 8 bar (15 to 120 psi), while maintaining constant flow and minimal pressure to the sensors.

Water flows vertically into sensor tip eliminates bubble entrapment. The flow cell is designed to maintain a minimum amount of water to ensure sensors stay submerged, even when the system and flow is turned off.

The Signet 4630 Chlorine Analyser System allows quick setup and easy installation and is supplied with a 100-240 VAC power supply, two 4 to 20 mA outputs and two dry contact mechanical relays. The flow cell accommodates two sensors; one chlorine and an optional pH sensor.

Features

- EPA 334.0 compliant
- Reagent free measuring
- Complete panel system allows for quick and easy installation
- Built-in flow regulator maintains contant flow and pressure to the sensors regardless of inlet pressure
- Pre-wired panel includes a 100-240 VAC power supply, two 4 to 20 mA outputs and two mechanical relays.
- Optional automatic pH and temperature compensation

2630 Amperometric Chlorine Electrode

Description

The Signet 2630 Amperometric Chlorine electrode is designed to measure free chlorine in drinking water and wastewater treatment applications. The electrodes are available with a measurement range of 0 to 5 ppm. This electrode requires the Signet 2650 Amperometric Electronics module to communicate with the Signet 8630-3 Chlorine Transmitter.

Utilizing smart-sensor technology, this electrode has a unique embedded memory chip and can communicate a wide variety of information to the Signet 2650 electronics and Signet 8630-3 Transmitter.

Displayed information includes electrode type, factory calibration data, service time, chlorine range, high and low pH (with optional Signet pH electrode), temperature values and more.

Signet's patented DryLoc® connector provides quick assembly and a secure connection. Gold-plated contacts and an O-ring seal ensure a waterproof and reliable interconnect to the Signet 2650 Amperometric Electronics. The Signet 2630 Amperometric Chlorine Electrode has an integrated temperature element for automatic temperature compensation.

Features

- Embedded memory chip accessible via the Signet 8630 transmitter
- Quick assembly with Signet's patented DryLoc® connector
- Integrated temperature element for automatic temperature compensation
- Separate drive electronics (Signet 2650), for easy electrode replacement without running new cable

2650 DryLoc® Amperometric Electronics

Description

The Signet 2650 Amperometric Electronics provide the polarization voltage and signal conditioning required by all Signet Amperometric Sensors. The 2760 Amperometric Electronics also relays important sensor information that is stored on a memory chip inside the sensor and displayed on the 3-8630-3P transmitter. Information includes factory calibration data, service life, calibration information and more.

Signet's patented DryLoc® connector provides a quick and secure connection to the sensor. Gold-plated contacts and an O-ring seal ensure a waterproof and reliable interconnect to the sensor.

Sensor maintenance, replacement and troubleshooting has never been easier. The DryLoc electronics can be separated from the sensor, which allows the user to detect a faulty sensor, electronics or cable assembly.

Features

- Passes the data stored in sensor to the Chlorine transmitter
- Patented DryLoc® connector provides a quick and secure connection to the sensor
- Waterproof and reliable interconnect to the sensor
- Easy sensor replacement without running new cable
- Easy sensor removal for servicing

8630 Chlorine Transmitter

Description

The Signet 3-8630-3P ProcessPro Chlorine Transmitter simultaneously displays free chlorine and pH levels on a bright LCD backlight display.

The 8630 transmitter has two 4 to 20 mA outputs that can be programed to transmit chlorine, pH or temperature information to a data collection device.

Two dry-contact mechanical relays can be used to deliver an alarm signal or activate a chlorine dosing system.

Programming is simple and easy with Signet's standard 4 button keypad. The menu option allows the use ofan optional pH sensor to accurately calculate free chlorine level or select "Manual pH input" and enterthe applications stable pH level to determine free chlorine levels.

Features

- Displays free chlorine 0 to 5 ppm (mg/l)
- Two programmable 4 to 20 mA outputs
- Two mechanical relays
- Temperature and pH Compensation
- Displays diagnostic information from sensor memory
- Simple setup and easy customization
- Backlit LCD display

2750-7 pH Electronics

Description

The Signet 2750-7 pH Electronics amplify the output from the Signet 2724 pH Electrode and output a Digital (S^3L) signal to the Signet 8630 Chlorine Transmitter.

Signet's patented DryLoc® connector provides a quick and secure connection to the sensor. Gold-plated contacts and an O-ring seal ensure a waterproof and reliable interconnect to the sensor.

Sensor maintenance, replacement and troubleshooting has never been easier. The DryLoc electronics can be separated from the sensor, which allows the user to detect a faulty sensor, electronics or cable assembly.

Features

- Amplifies the output from the pH electrode to the Chlorine transmitter
- Patented DryLoc® connector provides a quick and secure connection to the sensor
- Waterproof and reliable interconnect to the sensor
- Easy sensor replacement without running new cable
- Easy sensor removal for servicing

4150 Turbidimeter

Description

The Signet 4150 Turbidimeter system provides accurate and reliable compliant water quality monitoring for municipal and industrial applications.

The 4150 measures turbidity via a 90 degree light which reflects particles as they flow through a small volume, low flow glass cuvette. Air bubbles are eliminated from the cuvette by adjusting the backpressure valve on the outlet tube. The cuvette islocated in a watertight dark chamber for continuously accurate on-line measurement. A replaceable desiccantpack provides a drystable environment to ensure reliable measurements.

Simple and fast calibration can be accomplished in under five minutes by placing the In-line glass cuvettefrom the measuring chamber into the cuvette holder while still in service and the inlet and outlet tubing remains connected. The inexpensive calibrationstandard allows for dry and multiple system calibrations without mixing chemicals. After calibration, the unit isup and running with simple re-insertion of the glass cuvette back into the measuring chamber.

Additional features include a message indicator when the desiccant needs replacing and as an option, auto/ultrasonic cleaning of the glass Inline cuvette for longer runs between maintenance.

The 4150 is available in two measuring ranges. The 0 to 100 NTU/FNU version is for low range applications such as drinking water. The 0 to 1000 NTU/FNU range can be used for various applications including raw water and wastewater reclamation.

Features

- Simple and easy single unit installation with built-in pressure regulator
- Versions compliant with either U.S. EPA 180.1 for North and South America and Asia or ISO 7027 for Europe
- Time saving and efficiencies of cuvette technology simplifies calibration
- Spannable 4 to 20 mA output
- Two adjustable alarm relays Bright backlit display
- Convenient holder for In-line cuvette
- Easy access for wiring and maintenance
- Ultrasonic cleaning option ensures long and steady on-line measurement
- Inexpensive standards allow for multiple system calibrations

Multi Parameter Instruments

9900 SmartPro™ Transmitter

Description

The Signet 9900 Transmitter provides a single channel interface for many different parameters including Flow, pH/ORP, Conductivity/Resistivity, Salinity, Pressure, Temperature, Level and other sensors that output a 4 to 20 mA signal. The extra large (3.90” x 3.90”) auto-sensing backlit display features “at-a-glance” visibility that can be viewed at 4-5 times the distance over traditional transmitters. The highly illuminated display and large characters reduce the risk of misreading or misinterpreting the displayed values. The display shows separate lines for units, main and secondary measurements as well as a "dial-type" digital bar graph.

The 9900 is offered in both panel or field mount versions. Both configurations can run on 12 to 32 VDC power (24 VDC nominal). The 9900 can also be loop powered with compatible sensors.

Designed for complete flexibility, plug-in modulesallow the unit to easily adapt to meet changingcustomer needs. Optional modules include Relay,Direct Conductivity/Resistivity, H COMM and a PCCOMM configuration tool. The unit can be used withdefault values for quick and easy programming or canbe customised with labelling, adjustable minimumand maximum dial settings, and unit and decimalmeasurement choices.

Features

- Multi-Parameter input selection
- Large auto-sensing backlit display with “at a glance” visibility
- “Dial-type” digital bar graph
- Intuitive and “user-friendly” interface consistent with legacy Signet ProPoint® and ProcessPro® devices
- Optional field upgradable relays
- Selectable error mode for current outputs,3.6 mA or 22 mA
- 4 to 20 mA input (with optional 8058 SignalConverter)
- Warning LED indicator
- Custom 13-character label capabilities for the channel type
- Factory reset capability
- Optional PC COMM configuration tool
- Optional H COMM module for two-waycommunication

8900 Multi-Parameter Controller

Description

The Signet 8900 Multi-Parameter Controller takes the concept of modularity to the extreme. Each 8900 is field commissioned with the users specified combination of inputs, outputs, and relays using simple-to-install modular boards into the base unit.

Configure the system selecting either two, four or six input channels which accepts any of the Signet sensors and/or other manufacturer's sensors via a 4 to 20 mA signal converter (Signet Model 8058). To complete your unit, choose a power module with universal AC line voltage or 12 to 24 VDC ±10%, regulated.

If more features are needed, analogue output and relay modules are available and easily installed. Plus, the 8900 will support up to four additional relays via an external relay module.

There are other notable features that the 8900 offers. For instance, digital input to the 8900 enables longer cable runs and simplified wiring with minimal noise interference. Advanced relay logic allows users to select up to 3 measurement sources to trigger 1 relay. Derived measurements include difference, sum, ratio, percent recovery, percent rejection, percent passage and BTU. The menu system can be programmed to display in multi-languages including English, German, French, Spanish, Italian and Portuguese.

Features

- Measures Flow, pH, ORP, Conductivity, Pressure, Level and Temperature
- Multi-language display
- ¼ DIN enclosure
- Up to 4 analogue outputs
- Up to 8 relays
- 12 to 24 VDC or 100 to 240 VAC ±10%, regulated power
- Digital communication allows for extended cable lengths and easy wiring
- Accepts 3rd party 4 to 20 mA output devices when used with 8058 signal converter
- Available with 1 to 6 channels
- Two BTU calculations

Flow

515 Rotor-X Paddlewheel Flow Sensors

Description

Simple to install with time-honored reliable performance, Signet 515 rotor-X Paddlewheel Flow Sensors are highly repeatable, rugged sensors that offer exceptional value with little or no maintenance. The output signal of the Model 515 is a sinusoidal frequency capable of driving a self-powered flowmeter (Model 3-5090). The wide dynamic flow range of 0.3 to 6 m/s (1 to 20 ft/s) allows the sensor to measure liquid flow rates in full pipes and can be used in low pressure systems.

The Model 515 sensors are offered in a variety of materials for a wide range of pipe sizes and insertion configurations. The many material choices including PP and PVDF make this model highly versatile and chemically compatible to many liquid process solutions. Sensors can be installed in up to DN900 (36 in.) pipes using Signet's comprehensive line of custom fittings. These custom fittings, which include tees, saddles, and weldolets, seat the sensor to the proper insertion depth into the process flow. The sensors are also offered in configurations for wet-tap and intrinsically safe installation requirements.

Features

- Operating range 0.3 to 6 m/s (1 to 20 ft/s)
- Wide turndown ratio of 20:1
- Highly repeatable output
- Simple, economical design
- Installs into pipe sizes DN15 to DN900 (½ to 36 in.)
- Self-powered/no external power required
- Test certificate included for -X0, -X1
- Chemically resistant materials

525 Metalex Paddlewheel Flow Sensor

Description

The Signet 525 Metalex Paddlewheel Flow Sensor combines stainless steel construction with insertion paddlewheel technology. The result is a highly reliable sensor suitable for operation at extreme pressures and temperatures. The Tungsten Carbide shaft and rulon B (Fluoroloy B/PTFE) bearing provide excellent wear resistance for extended service.

A comprehensive fitting program allows installation in stell lines with the mini-block for small diameters, and either the mini-tap or saddle for pipes up to DN300 (12 in.). The self-generating output signal allows use with the battery operated flow totaliser 8150.

Features

- For up to 103 bar (1500 psi @ safety factor 1.5) pressure
- For up to 149 °C (300 °F) temperatures
- DN15 to DN300 (½ to 12 in.) pipe range
- Simple installation
- Self-powered/no external power required
- 316 SS body (1.4401)
- Tungsten Carbide or SS shaft
- 7.6 m (25 ft) cable include
- FM approved
- Operating range 0.5 to 6 m/s (1.6 to 20 ft/s)

2536 Rotor-X Paddlewheel Flow Sensors

Description

Simple to install with time-honored reliable performance, Signet 2536 Rotor-X Paddlewheel Flow Sensors are highly repeatable, rugged sensors that offer exceptional value with little or no maintenance. The Model 2536 has a process-ready open collector signal with a wide dynamic flow range of 0.1 to 6 m/s (0.3 to 20 ft/s). The sensor measures liquid flow rates in full pipes and can be used in low pressure systems.

The Signet 2536 sensors are offered in a variety of materials for a wide range of pipe sizes and insertion configurations. The many material choices including PP and PVDF make this model highly versatile and chemically compatible to many liquid process solutions. Sensors can be installed in DN15 to DN900 (½ to 36 in.) pipes using Signet's comprehensive line of custom fittings. These custom fittings, which include tees, saddles, and weldolets, seat the sensor to the proper insertion depth into the process flow. The sensors are also offered in configurations for wet-tap installation requirements.

Features

- Operating range 0.1 to 6 m/s (0.3 to 20 ft/s)
- Wide turndown ratio of 66:1
- Open-collector output
- Simple, economical design
- Highly repeatable output
- Installs into pipe sizes DN15 to DN900 (½ to 36 in.)
- High resolution and noise immunity
- Test certificate included for -X0, -X1
- Chemically resistant materials

2537 Paddlewheel Flowmeter

Description

The Signet 2537 Flowmeter is the next generation in fluid measurement technology from the inventor of the original paddlewheel flowmeter. This sensor is an improvement on what's already an industry standard. It has the added functionality of various output options including flow switch, multi-functional pulse, digital (S^3L) or 4 to 20 mA. Additionally, it offers low flow, low power and high

resolution and can be configured on-site directly through the built-in user interface.

Installation is simple because the Signet 2537 utilizes the same fittings as the popular Signet 515 and 2536 Paddlewheel Sensors and fits into pipe sizes ranging from DN15 to DN200 (½ to 8 inches). Available in Polypropylene and PVDF, it is ideal for a variety of applications including chemical processing, water and wastewater monitoring and scrubber control.

Features

- Digital (S³L), or 4 to 20 mA outputs or Flow Switch or Pulse output (multi-function)
- Allows for up to six sensors to Signet 8900 Multi-Parameter Controller
- Low flow capabilities down to 0.1 m/s (0.3 ft/s)
- Polypropylene or PVDF sensor bodies
- Installs into pipe sizes DN15 to DN200 (½ to 8 in.)
- Test certificate included for -X0, -X1
- Low power and high resolution

2540 Stainless Steel High Performance Paddlewheel Flow Sensor

Description

The Signet 2540 Paddlewheel Flow Sensor offers the strength and corrosion resistance of stainless steel for liquid applications with low velocity measurements. Unique internal circuitry eliminates the need for magnets in the process fluid, enabling flow measurement of 0.1 to 6 m/s (0.3 to 20 ft/s) while maintaining the advantages of insertion sensor design. Rulon® B (Fluoroloy B/PTFE) bearings and Tungsten Carbide pin provide exceptional wear resistance.

The Signet 2540 offers field replaceable electronics and transient voltage suppression (TVS) to providegreater immunity to large voltage disturbances (i.e. lightning) sometimes encountered in field wiring. Sensors can be installed in DN40 to DN600 (1½ to 24inch) pipes using the 1½ inch or ISO 7/1-R 1.5 threaded process connection. The sensors are also offered in a hot-tap configuration with a bleed valve service without process shutdown in pipes up toDN900 (36 in.). Both styles of sensors must be used in full pipes and can be used in low pressure systems.

Features

- Operating range 0.1 to 6 m/s (0.3 to 20 ft/s)
- Field replaceable electronics
- Non-magnetic RF detection
- Standard NPT or ISO process connections
- Hot-tap versions for installation/service without system shutdown
- For pipe sizes up to DN900 (36 in.)
- Adjustable sensor-one size for entire pipe range
- 7.6 m (25 ft) cable

3519 Flow Wet-Tap Valve

Description

The Signet 3519 Flow Wet-Tap Valve serves as a unique interface between the installation fitting and the wet-tap style Signet 515 or 2536 Rotor-X flow sensor. It provides a fast method of removing the sensor from the pipe under specified operating pressures. The PVC and stainless steel design of the Wet-Tap makes it resistant to corrosion and chemical attack by acids, alkalies, salt, and a number of other harsh chemicals.

The Signet 3519 Wet-Tap Valve mounts directly onto standard Signet installation fittings. The 3519 Wet-Tap consists of a flange and support plate that threadsonto the pipe fitting insert, and a PVC ball valve through which an extended length sensor is inserted into the pipe.

Features

- Allows sensor removal without process shutdown
- Pressure release valve for safe sensor removal
- Dual safety lanyards
- Rugged corrosion resistant PVC construction and stainless steel hardware
- Compatible with Signet 515 or 2536 Rotor-X Wet-Tap Flow Sensors
- Eliminates process downtime

2551 Magmeter Flow Sensor

Description

The Signet 2551 Magmeter is an insertion style magnetic flow sensor that features no moving parts. The patented* sensor design is available in corrosion-resistant materials to provide long-term reliabilitywith minimal maintenance costs. Material options include PP with stainless steel, PVDF with stainless steel, PVDF with Hastelloy-C, or PVDF with Titanium.Utilizing the comprehensive line of Signet installation fittings, sensor alignment and insertion depth is automatic. These versatile, simple-to-install sensorsdeliver accurate flow measurement over a wide dynamic range in pipe sizes ranging from DN15 to DN900 (½ to 36 inches), satisfying the requirements of many diverse applications.

Signet 2551 Magmeters offer many output options of frequency/digital (S³L) or 4 to 20 mA which are available on both the blind and display versions. The frequency or digital (S³L) sensor output can be used with Signet's extensive line of flow instruments while the 4 to 20 mA output can be used for a direct input to PLCs, chart recorders, etc. Both the 4 to 20 mA output and digital (S³L) sensor interface is available for long distance signal transmission. An additional benefit is the empty pipe detection which features a zero flow output when the sensors are not completely wetted. Also, the frequency output is bi-directional while the 4 to 20 mA output can be set for uni- or bidirectional flow using the display or the 3-0250 USB to Digital (S³L) Configuration/Diagnostic setup tool which connects to PCs for programming capabilities.

In addition the display version of the 2551 Magmeter is available with relays and features permanent and resettable totalizer values which can be stored andseen on the display. Also, the display contains multi-languages with English, Spanish, German, French, Italian and Portuguese menu options.

Features

- Test certificate included for -X0, -X1, -X2
- Patented Magmeter technology
- No moving parts
- Bi-directional flow
- Empty pipe detection
- Installs into pipe sizes DN15 to DN900 (0.5 to 36 in.)
- Operating range 0.05 to 10 m/s (0.15 to 33 ft/s)
- Accurate measurement even in dirty liquids
- Blind 4 to 20 mA, digital/frequency, relay output
- No pressure drop corrosion resistant materials; PP or PVDF with SS, Hasteloy-C or Titanium
- Multi-language display menu available

2552 Metal Magmeter Flow Sensor

Description

The Signet 2552 Metal Magmeter from Georg Fischer features all-stainless steel construction. The PVDF nosepiece and FPM O-rings are the only other wetted materials. The 2552 installs quickly into standard 1¼ in. or 1½ in. pipe outlets, and is adjustable to fit pipes from DN50 to DN2550 (2 to 102 inches). Two sensor lengths allow maximum flexibility to accommodate a variety of hardware configurations, including ball valves for hot-tap installations.

When equipped with the frequency output, the 2552 is compatible with any externally powered Signet flow instrument, while the digital (S^3L) output enables multi-channel compatibility with the Signet 8900 Multi-Parameter Controller. Select the blind 4 to 20 mA current output to interface directly with dataloggers, PLCs or telemetry systems. Key features include Empty Pipe Detection, LED-assisted troubleshooting, and bi-directional span capability (in 4 to 20 mA models).

The Signet 3-0250 USB to Digital (S^3L)Configuration/Diagnostic Tool is available to customize every performance feature in the 2552 so it can be adapted to the user's application requirements.

Features

- Test certificate included
- Award winning hot-tap magnetic flow sensor up to DN2550 (102 in.)
- Patented Magmeter technology
- Operating range 0.05 to 10 m/s (0.15 to 33 ft/s)
- reliable operation in harsh environments
- Repeatable: ±0.5% of reading @ 25 °C
- Three output options: 4 to 20 mA, Frequency, Digial (S^3L)
- ISO or NPT threads

2100 Turbine Flow Sensor

Description

Engineered specifically for small pipe diameter applications, the Signet 2100 Turbine Flow Sensor provides accurate readings in two flow ranges: 0.3 to 3.8 lpm and 3 to 38 lpm (0.1 to 1 gpm and 0.8 to 10 gpm).

The injection-molded PVDF body and ceramic bearings provide excellent chemical compatibility and long service in dosing and batching applications. Union piping and tubing connections along with removable NEMA 4X electronics allow for easy assembly and field replaceability. The 2100 can be used with DN8 (¼ in.), DN10 (3/8 in.), DN15 (½ in.) tubing, or DN15 (½ in.) piping for simple installation. End connections are available in PVDF for hose barbs, fusion socket or IR/butt fusion, and in PVC for socket or NPT thread.

Features

- Operating range of 0.38 to 38 lpm (0.10 to 10 U.S. gpm)
- Non-magnetic turbine
- Union ends for various connector types
- End connector kits for rigid or flexible tubing or DN15 (½ in.) pipe
- PVDF & ceramic wetted parts provide superior chemical compatibility
- For use with both clear and opaque fluids
- Small and compact design
- 4.6 m (15 ft) cable
- Features removable electronics that installs fron either side of the sensor
- Sensor mounts at any angle

2000 Micro Flow Rotor Sensor

Description

The Signet 2000 Micro Flow Rotor Sensor is constructed of Polyphenylene Sulfide (PPS) which provides high material strength. The 2000 offers twoflow ranges starting at 0.11 or 1.13 lpm (0.03 or 0.3 gpm), for clean process liquids, regardless of fluid color or opacity.

This sensor can be connected to flexible tubing or rigid pipe, and uses standard hardware for mounting. Only-one moving part and a low pressure drop across the sensor reduces operating costs and maintenancerequirements.

Features

- Operating range 0.11 to 12.11 lpm (0.03 to 3.2 U.S. gpm)
- Simple mounting
- ¼ in. NPT or ISO threads for simple pipe or tubing connection
- Measures opaque and transparent liquids
- Low pressure drop
- Standard cable 7.6 m (25 ft)

2507 Mini Flow Rotor Sensor

Description

The Signet 2507 Mini Flow Rotor Sensor contains a free-running rotor that is driven by the fluid flow.Within the given measurement range, the rotational speed of the rotor is proportional to the fluid flow rate.

Magnets built into the rotor trigger an electronic switch in the top of the sensor creating a square-wave output. Both opaque and transparent fluids can be measured with kinematic viscosities between 0.2 to 20.0 centistokes.

Features

- Operating range 400 to 12,000 ml/m (0.1 to 3.2 U.S.gpm)
- Detachable signal connector for easy servicing
- Simple installation with a G ¼ in. (¼ in. NPT) threaded connection
- Standard 7.6 m (25 ft) cable
- PVDF construction
- Compact assembly

5075 Totalising Flow Monitor

Description

The Signet 5075 Totalizing Flow Monitor features a traditional analog dial for flow rate at a glance while the backlit LCD provides precision flow rate, total volume- and programming information.

Significant features of this 5075 include user selectable analog dials, permanent and resettable totalizers and pulse outputs at sensor frequency and at totalizer scale, The 5075 is powered by virtually any 12 to 24 VDC or VAC ±10%, regulated power source.

Connect to any of Signet's flow sensors for a classic flow meter system.

Features

- Permanent and resettable totalizers
- Tamper proof security code
- Non-volatile memory
- Simple push-button operation
- Pulse outputs at sensor frequency and at total volume
- 1/4 DIN, NEMA 4X/IP65
- Remote totalizer reset

5090 Sensor-Powered Flow Monitor

Description

The Signet 5090 Sensor Powered Flow Monitor is the simplest and most economical instrument in the Signetoffering. It features a balanced-spring meter movement that is powered by the AC output of the Signet 515 Paddlewheel Flow Sensor. No additional power sourceis required.

This unique system is suitable for a wide range of flow rates, and is Factory Mutual (FM) approved for intrinsic safety without the need for barriers. Packaged in a¼ DIN housing with a NEMA 4X/IP65 front panel, the 5090 is the first choice for simple flow monitoring, even in the most demanding industrial environments.

Features

- High visibility analog display
- Sensor-powered flow rate indication up to 60 m (200 ft) from sensor installation
- Wide flow range: 1 to 20 ft/s in pipe sizes DN15 to D900 (½ to 36 in.)
- Single-point calibration from front panel
- Factory Mutual (FM) approved for intrinsic safety in Classes I, II and III, Division I

5500 Flow Monitor

Description

The Signet 5500 Flow Monitor is an instrument that comes fully equipped with all of the basic tools needed for monitoring and controlling a flow system. The analog dial enables the user to easily read instantaneous flow rate, while the backlit LCD is useful for calibration, setup, and displaying totalized flow volume. The 5500 features a standard ¼ DIN package and removable wiring terminals. Power the instrument with virtually any standard 24-volt power supply (AC or DC).

Connect any one of Signet's wide array of flow sensors, then consider which output features are best for your application.

Two dry-contact relays can be configured for High or Low alarm operation, or they can be set to pulse operation for chemical dosing applications.

Use the internally powered 4 to 20 mA output, programmable from the front keypad, to send the flow information to any PLC or data logger.

If you use all of these output features, you still have two more output pulse terminals, one at sensor frequency, the other triggered by the totalizer. And just for added convenience, the resettable totalizer can be reset by a remote hardwired switch, up to 30 m (100 ft), or fromthe front keypad.

Features

- Permanent and resettable totalizers
- Two programmable relays
- Fully scaleable active (internally powered) 4 to 20 mA output
- Tamper proof security code
- Non-volatile memory
- Intuitive software design
- Programmable pulse outputs

5600 Batch Controller

Description

The Signet 5600 Batch Controller provides control capability and process fine-tuning in a familiar package. The programming interface uses a four-button keypad and an intuitive procedure for adjusting a batching system to the best performance possible.

The standard ¼ DIN package houses an analog display panel that features a batch status indicator with count-up or countdown dials. The backlit LCD displays flowrate and volume information and batch status, as well as calibration and setup instructions. The front of the unit is NEMA 4X/IP65 and is hard-coated, high-impactand UV resistant polycarbonate.

The 5600 operates on 12 to 24 volts ±10%, regulated, either AC or DC. Removable terminal connections make wiring the 5600 easy. Connect any Signet flow sensor with a frequency output, then add connections to two relays for two-stage shutdown or overrun alarm functions, connect a remote start-stop switch anduse the end-of-batch pulse to trigger the next step in the process. A 4 to 20 mA output is also available. Advanced features include a user-set security code,an automatic calibration option, and overrun compensation.

Features

- Permanent and resettable totalizers
- Non-volatile memory
- Easy batch volume entry
- Remote start, stop & resume
- Two-stage shutdown control
- Manual or automatic overrun compensation
- Estimates time to batch completion
- Overrun alarm and missing signal alarm
- Advanced valve control
- End-of-batch trigger
- Count-up or count-down to batch completion

8150 Battery Powered Flow Totaliser

Descripton

The Signet 8150 Battery Operated Flow Totaliser is compatible with the Signet 515 and 525 flow sensors,and will provide years of dependable operation. The large digital display indicates flow rate and totalised flow volume simultaneously. One of the three totalisers is resettable from the front panel or a remote location, while the second resettable totaliser can only be reset by entering a user-selectable security code. The third is a permanent non-resettable totaliser.

Our intuitive software design and four-button keypad provide for simple operation while setting screen displays and programming the system. Calibrationcan be easily performed by entering the Auto-Cal feature and entering a value to match an external reference. Screen displays can be modified to suit theuser's needs; along with the flow rate, any of the three totalisers can be selected as the displayed totaliser. Customers can quickly scroll through the totaliserssimply by pressing any key on the keypad. A display averaging feature is included for applications where the flow in the pipe fluctuates. For applications where flowstops and starts due to production needs, a no-flow indicator will display the hours of non-flow.

Features

- Three totalizers: 2 resettable and 1 permanent, user selectable
- Long-lasting lithium batteries
- Mounting versatility
- No-flow indicator
- Large digital display with averaging
- Simple push-button operation
- User selectable access code prevents unwanted changes
- Auto-calibration

8550 Flow Transmitters

Description

Signet 8550 Flow Transmitters are advanced instruments that convert the signal from frequency and digital (S^3L) flow sensors into a 4 to 20 mA signal for long distance transmission. Configuration flexibility is maximized with single or dual input/output, two optional relays for process control, two packaging options for integral/pipe mount or panel installation, and scalability for virtually any flow range or engineering unit. State-of-the-art electronic design ensures long-term reliability, signal stability, and simple user setup and operation.

Features

- 2 or 4 wire power
- Available with single or dual input/output
- 4 to 20 mA scaleable outputs
- Permanent & resettable totalizers
- Relay options available
- NEMA 4X enclosure with self-healing window
- Output simulation for complete system testing

pH/ORP

2724-2726 DryLoc pH/ORP Electrodes

Description

The Signet 2724-2726 pH and ORP Electrodes features a patented reference electrode design and uses the unique foul-proof patented DryLoc® connector. The large area PE reference junction and pathway is constructed to increase the total reference effectiveness and ensures long service life.

The DryLoc® connector with corrosion resistant gold plated contacts readily connects the sensor to the mating 2760 preamplifier or the 2750 sensor electronics. The robust Ryton® threaded sensor body and choice of flat pH, bulb pH, or flat ORP sensing elements provides broad range of chemical compatibility for a wide variety of applications.

There are two optional pH sensing versions available, HF and LC. The HF version is for applications where traces of hydrofluoric acid (2% or less) will attack standard pH glass in levels of pH 6 and below. The LC version can be used for low conductivity fluids 20 - 100 µS/cm nominal and below 20 µS when mounted under controlled conditions.

The quick temperature response is available in either a PT1000 or 3 KΩ temperature sensor and allows compatibility with all Signet pH/ORP instruments. The 2724-2726 electrodes are general-purpose sensors ideal for a wide range of applications. The sensors incorporate ¾ inch NPT or ISO 7/1-R 3/4 threads for installing into standard pipetees. They can also be mounted directly into Signet standard fittings, DN15 to System Overview DN100 (½ to 4 inch).

Features

- Patented DryLoc® connector with gold plated contacts
- Mounts in Signet standard fittings from DN15 to DN100 (½ to 4 in.)
- ¾" NPT or ISO 7/1-R 3/4 threaded sensors for use with reducing tees DN15 to DN100 (½ to 4 in.)
- Special design allows for installation at any angle, even inverted or horizontal
- Ryton® (PPS) body for broad range of chemical compatibility
- Patented reference design for exceptional performance
- Quick temperature response
- HF resistant glass available for trace HF of <2%
- Optional Low conductivity sensor for liquids down to 20 µS/cm

2774-2777 DryLoc pH/ORP Electrodes

Description

The Signet 2774 - 2777 pH and ORP Electrodes feature a unique foulproof DryLoc® connector with gold-plated contacts designed specifically for use with the Signet 2750 and 2760 preamplifiers, sensor electronics, and connectors. These dependable and highly responsive electrodes feature a PTFE double reference junction with KNO3 in the front chamber to block various poisoning ions such as Copper (CU++), Lead (Pb++), Mercury (Hg++), and a large reference chamber that combine to extend the service-life.

Embedded positioning of the temperature element in the pH sensing tip allows, the temperature response to be quick and accurate. The electrodes are offered witheither flat or bulb style sensing elements. The flat versions allow sediment and particles to sweep past the measurement surface, minimizing risks of abrasion,breakage and coating. The bulb versions can be used for general-purpose applications. Due to the specially designed chambers which keep electrolyte in place,all versions can be installed at any angle, even inverted.

Features

- Durable DryLoc® connector with gold plated contacts
- Special design allows for installation at any angle, even inverted
- Quick temperature response
- Easy sensor replacement using DryLoc® electrode connector
- High temperature versions available
- Mounts into standard ¾ inch threads
- Compatible with all pH/ORP and other suppliers' instruments

2764-2767 Differential DryLoc pH/ORP Electrodes

Description

The Signet 2764-2767 Differential pH & ORP electrodes are built with the DryLoc® connector, a Ryton® body, and PTFE reference junction to handle the most extreme and harshest of chemical applications.

These differential electrodes use a fieldproven 3-electrode differential technique: the pH and reference electrodes are measured against a ground electrode, insuring a steady and stable signal. A key feature is the reference electrode, which is housed in a glass half-cell embedded in the reference chamber and is protected from compounds that may contain sulfides (S_2-) and metals. To ensure long service life, the reference features a refillable electrolyte chamber and a replaceable equitransferant salt bridge, both easily serviced in the field. The patented porous PTFE reference junction resists fouling, clogging and chemical attack.

Other elements of the design are the solution ground, the pH/ORP electrodes, and the temperature element. The solution ground eliminates noisy measurements by draining electrical current away from the reference electrode. The pH/ORP electrodes are designed with a flat or bulb measurement surface, and a temperature device that is positioned at the tip of the measurement surface, making the temperature response of $T_{95\%}$ less than 1 minute. Various temperature devices offered include 3 KΩ, 300 Ω, or PT1000 RTD.

The electrodes are used with the Signet 2750 Sensor Electronics, which provide a blind 4 to 20 mA output or use the digital (S^3L) output to connect the Signet 8900 Multi-Parameter Controller. The electrodes can also be used with the Model 2760 preamplifier to connect to the Signet 5700 or 8750.

Features

- Differential design for stable measurements in the most aggressive applications
- Long service life even in severe or difficult chemical applications
- Water-tight DryLoc® connector with foulproof gold contacts
- Porous PTFE reference junction
- Rebuildable reference electrode
- Solution ground
- Temperature sensor (pH)
- Easy sensor replacement using DryLoc® electrode connector
- Quick temperature response
- Compatible with all Signet instruments and other suppliers' pH/ORP instruments

3719 pH/ORP Wet-Tap Assembly

Description

The Signet 3719 pH/ORP Wet-Tap allows installation and removal of pH or ORP electrodes, even under process pressure, without the need for process shutdown during routine electrode maintenance and calibration. Automatic process isolation is achieved during electrode retraction with a double O-ring seal on a unique and compact retraction assembly; no separate valve is required. A patented cam-activated automatic locking mechanism, SafeLoc™, and the short stroke design help to assure operator safety. The wet-tap unit can be mounted at any angle and can be used with the Signet DryLoc® Wet-Tap electrodes.

Features

- Electrode removal without process shutdown
- Space saving 45 mm (1.75 in.) short-stroke design
- Sealed pneumatic dampening for smooth and safe operation
- SafeLoc™: Cam- activated automatic locking mechanism
- Protects electrode sensing surface from breakage
- Suitable for mounting in any orientation
- Process threaded connection NPT or ISO
- Low profile clampon saddle fittings for convenient installation in ASTM pipe sizes 2½ to 12 in.

2750 DryLoc pH/ORP Sensor Electronics

Description

The Signet 2750 pH/ORP Sensor Electronics featuring the DryLoc® connector, provides a variety of functions to suit various requirements.

The 2750 has a preamplified signal and features two different outputs: a two-wire 4 to 20 mA loop output with EasyCal function or a digital (S^3L) output which allows for longer cable lengths and is compatible with the Signet 8900 Multi-Parameter Controller.

The 2750 self-configures for pH or ORP operation via automatic recognition of the electrode type. The optional EasyCal feature allows simple push-buttoncalibration and includes an LED indicator for visual feedback.

The DryLoc® electrode connector quickly forms a robust assembly for submersible and in-line installations. NEMA 4X junction enclosures are integralparts of the 2750 in-line version and are also available as accessories for the submersible 2750.

The 2750 submersible preamplifier can also be used as an In-line preamplifier when used with the 3/4" or 1" threaded sensors including the 2724, 2774 and 2764 series electrodes. The 2750 In-line preamplifier can be used with Signet fittings up to DN100 (4 in.) and wet-tap assemblies.

Features

- In-line integral mount and submersible installation versions
- Automatic temperature compensation
- Auto configuration for pH or ORP operation
- Optional EasyCal calibration aid with automatic buffer recognition
- Junction boxes for convenient wiring

2760 DryLoc pH/ORP Preamplifiers and Connectors

Description

The Signet 2760 pH/ORP Preamplifiers features the DryLoc® connector, providing a robust connection to Signet DryLoc® electrodes.

The 2760 preamplifier allows any DryLoc® pH/ORP electrode to work with Signet ProcessPro® and ProPoint® pH/ORP instruments. It is also sold as a simple connector for use with other manufacturers' instruments that do not require a preamplified signal.

The DryLoc® electrode connector system quickly forms a robust assembly for submersible and in-line installations. NEMA 4X junction enclosures are to extend the preamplifier cable to long distances.

The 2760 submersible preamplifier can also be used as an In-line preamplifier when used with the ¾ in. or 1 in. threaded sensors including the 2724, 2774 and 2764 series electrodes. The 2760 In-line preamplifier can be used with Signet fittings up to DN100 (4 in.) and wet-tap assemblies.

Features

- In-line integral mount and submersible installation versions
- Automatic temperature compensation
- Auto configuration for pH or ORP operation
- Junction boxes for convenient wiring

5700 pH/ORP Monitor

Description

The Signet 5700 pH/ORP Monitor is a versatile and intelligent instrument that recognizes the type of sensor connected, either pH or ORP, then automatically sets it-

self for the corresponding display and functionality. Also, during EasyCal operation, the monitor automatically recognizes standard buffers/test solutions, thereby shortening and simplifying routine calibration procedures. Two programmable relays and one scaleable 4 to 20 mA output are included, and the four-button keypad arrangement with intuitive software design is very user-friendly. The monitors require 12 to 24 volts ±10%, regulated, AC or DC, and can be used with many Signet pH/ORP electrodes and preamplifiers, or with electrodes from other manufacturers by using the 2721 Preamplifier. Several useful accessories are available, including the optional splashproof rear cover kit.

Features

- Displays pH/temp/mV or ORP/mV
- EasyCal simplifies routine calibration
- Simple push-button operation
- Intuitive software design
- Scaleable 4 to 20 mA output internally powered (active)
- Two programmable relays
- Dual proportional control capability
- Non-volatile memory
- Versatile low voltage power requirement

8750 pH/ORP Transmitters

Description

The Signet 8750 pH/ORP Transmitter is designed for broad application and ease of setup and use. The unit autoconfigures for either pH or ORP use when connected to Signet pH or ORP electrodes. Multiple mounting options allow for installation best suited to your particular application. The EasyCal menu features automatic buffer recognition for mistake-proof pH or ORP electrode calibrations. Intuitive software and the four button keypad arrangement make it easy to access important information such as pH or ORP, mV input, temperature, calibration, relay setup menus and more.

Features

- Automatic temperature compensation
- Temperature display in °C or °F
- Hold and simulate functions
- Relay options available
- Output scaleability
- Optional Dual output
- NEMA 4X/IP65 enclosure with self-healing window
- EasyCal option available

Conductivity/Resistivity

2819-2823 Conductivity/Resistivity Electrodes

Description

Signet 2819-2823 Conductivity/Resistivity Electrodes are designed to provide versatile installation and accurate sensing across a very broad dynamic range. These electrodes are built with a controlled surface finish to ensure accuracy and repeatability. The standard electrode is constructed 316 SS or Titanium, but there are other materials available for maximum chemical compatibility. Reversible threads or sanitary flanges allow for maximum installation versatility. Sanitary flange versions are available with an optional NIST Traceability Certificate to meet USP requirements. Coupled with Signet patented measuring circuitry, a three decade measurement range is achieved without the need for troublesome electrode platinization. A platinum RTD (PT1000) located within the electrodeallows optimal temperature sensing.

Features

- Standard process connections
  - ¾ in. NPT Polypro
  - Tri-clamp 1
  -1½ in., 2”
  - Opt. ½ in. NPT 316 SS
- 316 SS or Titanium standard electrode
- Alternative electrode materials available
  - Hastelloy-C
  - Monel
- In-line or submersible mounting
- NIST traceable certified cells ±1% meet USP requirements

2839-2842 Conductivity Electrodes

Description

The Signet 2839-2842 Conductivity/Resistivity Electrodes are available in four cell constants from 0.01 to 10.0 cm-1, and are suitable for a wide variety of applications from high purity water quality monitoring to weak acids and bases. 316 SS electrode surfacefinishes are controlled in a precision bead blasting operation to ensure measurement accuracy and repeatability. The PEEK™ insulator and processconnections are injection over-molded to minimize variance between electrodes. Double threaded connections in either ¾ in. NPT or ISO 7/1-R 3/4 enable quick and easy installation in submersible or in-line configurations. Transmitter integral mounting kit and junction boxes are available as accessories.

Features

- Dual-threaded
- Compact electrode length for easy in-line installation in small pipe sizes
- Triple orifice flow through design reduces clogging and bubble entrapment
- 316 SS electrodes with injection molded PEEK™ process connections and insulators
- Cell constants may be traceable to NIST and certified to within ±1% of value - meets USP requirements

2850 Conductivity/Resistivity Sensor Electronics and Integral Systems

Description

The Signet 2850 Conductivity/Resistivity Sensor Electronics are available in various configurations for maximum installation flexibility. The universal mount version is for pipe, wall, or tank mounting and enables single or dual (digital versions only) inputs using any standard Signet conductivity/resistivity sensor. The threaded j-box version can be used with these same Signet sensors for submersible sensor mounting. It is also available as a combined integral system configuration for in-line mounting and includes a conductivity electrode in a choice of 0.01, 0.1, 1.0, or 10.0 cm^{-1} cell constants. The 2850 is ideal for applications with a conductivity range of 0.055 to 400,000 µS or a resistivity range of 18.2 MΩ to 10 kΩ.

All 2850 units are available with a choice of two outputs, digital (S^3L) or 4 to 20 mA. The digital (S^3L) output version allows for up to six sensor inputs directly into the Signet 8900 Multi-Parameter Controller. The two-wire 4 to 20 mA output version is available with eight 4 to 20 mA output ranges for each electrode cell constant. Each range can be inverted and are field selectable.

All 2850 units are built with NEMA 4X/IP 65 enclosures which allow output wiring connections with long cable runs of up to 1,000 feet (305 m). EasyCal is a standard feature that automatically recognizes conductivity test solution values for simple field calibration. A certification tool is available for validation of the sensor electronicsaccording to USP requirements.

Features

- Integral mount systems for quick and easy installation
- Compact design for maximum installation flexibility
- Digital (S^3L) interface or two-wire 4 to 20 mA output
- EasyCal with automatic test solution recognition
- Dual channel unit available for low cost installation with Signet 8900 Multi-Parameter Controller
- For use with ALL Signet conductivity electrodes

5800CR Conductivity/Resistivity Monitor

Description

The Signet 5800CR ProPoint® Conductivity/Resistivity Monitor features a unique analog/digital display, making it the preferred measurement instrument for applications requiring routine monitoring.The digital display guides the user through the simple menu system and

provides precision information, while the analog dial serves as a quick, at-a-glanceindicator of the measurement process.

The 5800CR offers two fully programmable dry contact relays and a 4 to 20 mA current. The monitor requires 12 to 24 VAC or VDC ±10%, regulated and is packaged in a convenient ¼ DIN, NEMA 4X/IP65 front panel. The enclosure is hard-coated, high-impact, UV resistant polycarbonate.

In addition to programmable outputs and relays, the unit can also be set up to measure raw conductivity values, meeting USP requirements.

Features

- Display units: µS, mS, kΩ, MΩ, PPM (TDS)
- Temperature compensation
- Two programmable relays
- Dual proportional control capability
- Scaleable 4 to 20 mA output
- Simple push-button operation
- Intuitive software
- Non-volatile memory
- Compatible with ALL Signet conductivity electrodes
- 12 to 24 VAC or VDC power
- NEMA 4X/IP65

5900 Salinity Monitor

Description

The Signet 5900 Salinity Monitor utilizes conductivity sensors to provide direct reading, including calibration, of salinity in parts per thousand (PPT). Equippedwith a scaleable 4 to 20 mA output and two programmable relays, the monitor requires 12 to 24 volts, ±10%, regulated, AC or DC, and is compatible with Signet 10 cm-1 or 20 cm-1 conductivity cells.Temperature is selectable for display in either °C or °F, and compensation is automatic.

Calibration is simplified with single-point salinity and temperature entry via the wet-cal menu sequence. The four-button keypad arrangement with intuitive software design is user-friendly, and is offered with a hard-coated, high impact, and UV resistant polycarbonate front face. The front panel is rated NEMA 4X/IP65 and an optional splashproof cover is available to protect the back of the instrument.

Features

- Direct reading and calibration in PPT
- Dual proportional control capability
- Scaleable 4 to 20 mA output (active) internally powered
- Two programmable relays
- Tamper-proof security code
- Analog and digital display
- Non-volatile memory
- Compatible with ALL Signet conductivity electrodes
- Versatile low voltage power requirement
- NEMA 4X/IP65

8850 Conductivity/Resistivity Transmitters

Description

The Signet 8850 Conductivity/Resistivity Transmitter is designed for multiple installation capabilities, simple set-up and easy operation, thus satisfying a broad range of application requirements.

Full microprocessor based electronics allow for a wide operating range and long term signal stability in three different instrument versions: the 8850-1 for a traditional two-wire current loop, the 8850-2 features current loop plus two dry contact relays, or the 8850-3 with two-wire current loop, one sensor input signal and two current loop outputs. The 8850 is offered with a NEMA 4X/IP65 front panel with a self-healing window in a convenient ¼ DIN package for easy mounting. The 8850 can be configured via a simple menu system.

In addition to programmable outputs and relays, the unit can also be set up to measure raw conductivity values.

Features

- Display choices of µS, mS, KΩ, MΩ, PPM (TDS)
- Simulate function
- Programmable temperature compensation
- Relay and open collector options
- Dual output option allows temperature and process signal transmission
- NEMA 4X/IP65 enclosure with self-healing window
- Compatible with ALL Signet conductivity electrodes

8860 Two-Channel Conductivity/Resistivity Controllers

Description

The Signet 8860 Two-Channel Conductivity/Resistivity Controller is packed with a set of features and capabilities ideal for the real needs of water treatment applications. It accommodates two separate and independent input sources and can be powered with AC/DC voltage. The 8860 programs via a simple and intuitive menu system. The unit can also be programmed to measure a raw conductivity value by turning off the temperature compensation mode.

To control the process, the 8860 is equipped with four dry contact relays and three 4 to 20 mA output loops. Calculated measurement include Difference, Ratio or % Rejection. Two of the relays may be converted into open collector outputs with the flip of a switch. Operating modes for the relays and open collector outputs are high, or low alarm, pulse, or special USP alarm mode. The 8860 is offered with a NEMA 4X/IP65 front panel with a self-healing window in a ¼ DIN package for easy panel installation.

Features

- Meets USP requirements for measuring raw conductivity, USP alarm mode
- Dual sensor input
- AC or DC powered
- Display and/or control: µS, mS, PPM or PPB (TDS), kΩ, MΩ, % rejection, difference, ratio,°C or °F
- Three fully scaleable 4 to 20 mA outputs
- Two open collector outputs
- Four programmable relays
- Time delay relay function
- Proportional pulse control capability
- Compatible with ALL Signet conductivity electrodes
- Programmable temperature compensation
- NEMA 4X/IP65

Temperature/Pressure/Level

2250 Submersible Hydrostatic Pressure Sensor

Description

The Signet 2250 Hydrostatic Level Sensor for level and depth control has a one-piece injection molded PVDF body and ceramic diaphragm for superior compatibility in corrosive liquids. Utilizing hydrostatic pressure, the 2250 disregards false level signals from steam vapors, foam or any other debris on the liquid surface. Two pressure ranges allow for optimal resolution matched to your sensing needs. Solid state circuitry eliminates drift (no internal potentiometers).

Built-in temperature compensation provides outstanding accuracy over wide temperature ranges. These sensors are available with a proprietary digital output (S^3L), or 4 to 20 mA output. The extended cable and capillary tubing with the union connection and a customer supplied conduit, allow submersion in process vessels.

Features

- Level and depth measurement
- 4 to 20 mA or digital (S^3L) output
- Flush ceramic diaphragm
- Easy submersible installation
- Choice of two pressure ranges
- Standard union connection and extended cable and capillary tubing (10 m)

2350 Temperature Sensor

Description

The Signet 2350 Temperature Sensor has a one piece injection molded PVDF body that is ideal for use in high purity applications. It also outlasts metal sensors in aggressive liquids and eliminates the need for costly custom thermowells. These sensors are available with a proprietary digital output (S^3L) or field-scaleable 4 to 20 mA output.

Dual threaded ends (¾ in. NPT) allow submersion in process vessels, or in-line installation with conduit connection. An integral adapter kit (sold separately) may be used to create a compact assembly with field mount versions of the Signet 8350 Temperature Transmitter.

Features

- 4 to 20 mA or digital (S^3L) output
- Standard ¾ in. NPT process connection
- One-piece injection molded PVDF body
- PT1000 platinum RTD in extended tip for quick response
- Easy installation
- Threaded for in-line or submersible installation

2450 Pressure Sensor

Description

The 2450 Pressure Sensor has a one-piece injection molded PVDF body and ceramic diaphragm for superiorcompatibility in corrosive liquids. Three pressure versions allow for optimal resolution matched to your sensing needs. Solid state circuitry eliminates drift (no internal potentiometers). Built-in temperature compensation provides outstanding accuracy over widetemperature ranges.

These sensors are available with a proprietary digital output (S^3L), or fieldscaleable 4 to 20 mA output. Dual-threaded ends allow submersion in process vessels, or in-line installation with conduit connection. Integral adapters (sold separately) may be used to create a compact assembly with a field mount version of the Signet 8250 Level or 8450 Pressure Transmitter.

Features

- Test certificate included
- 4 to 20 mA or digital (S^3L) output
- Standard ¾ in. NPT or ½ in. male union process connection
- One-piece injection molded PVDF body
- Flush ceramic diaphragm
- Easy installation
- Choice of three pressure ranges
- Pressure or level measurement

8250 Level Transmitters

Description

Signet 8250 Level Transmitters are compatible with the Signet 2250 Level sensor and 2450 Pressure Sensor. The instrument is available in field and panel mount configurations, single or dual-channel input and equipped with one 4 to 20 mA output, fully scaleableand reversible for each input channel. The unit also features two relays, plus the ability to support two additional externally mounted relays (for a total offour). Relay operation is selectable for High, Low, Window or Off, and includes fully adjustable hysteresis and trigger time delay. The unit also has the abilityto accept other level sensors with 4 to 20 mA output via the Signet 8058 Signal Converter. Automatic level-to-volume conversion allows display and control of tank volume and/or level in units such as gallons, kilograms, feet or meters. Simply enter the dimensions of yourtank or vessel, and the instrument will calculate volume from the level measurement.

Features

- Level units for: ft, in., m, cm, %
- Volume units for: gal., in^3, lbs., l, m^3, kg, %
- Available with single or dual input
- Advanced relay control supports up to 4 relays
- Output simulation
- Manual (up to 10 pts.) and automatic level to- volume conversion
- Display level, volume or both
- Specific gravity entry for use with pressure sensors and mass unit conversion
- User-selectable averaging for display and output
- Accepts other level sensors with 4 to 20 mA output (via 8058 signal converter)
- NEMA 4X/IP65

8350 Temperature Transmitters

Description

The Signet 8350 Temperature Transmitter offers local or remote display with current and relay outputs. This model offers exceptional repeatability and accuracyover a wide operating temperature range.Configurations include open collector outputs or mechanical relays with status indicators for process control or alarming. The unit also has the ability to accept other temperature sensors which have 4 to 20 mA output via the Signet 8058 Signal Converter. The chemical resistant NEMA 4X/IP65 front face is found on both the highly visible field mount or black panelmount instruments with a self-healing window and a standard 1/4 DIN cutout. Dual input version allows difference calculation (ΔT) and offers cost savingswith independent dual outputs. All models offer an output simulation function for complete system testing.

Features

- Digital (S^3L) input for stable & reliable reading
- Available with single or dual input
- Field scaleable 4 to 20 mA output
- Displays temperature and mA output
- Temperature display in degrees Celsius (°C) or Fahrenheit (°F)
- Choice of relay or open collector output
- NEMA 4X/IP65

8450 Pressure Transmitters

Description

The Signet 8450 Pressure Transmitter is a unique instrument that offers local or remote display with current and relay outputs. This model offersexceptional repeatability and accuracy over a wide operating pressure range. The instrument is available in field and panel mount configurations, single ordual channel input and is equipped with a 4 to 20 mA output, fully scaleable and reversible for each input channel. Configurations include open collectoroutputs or relays with status indicators for process control or alarming.

The unit also has the ability to accept other sensors with 4 to 20 mA output, via the Signet 8058 Signal Converter. The chemical resistant NEMA 4X/IP65 frontface is found in both the highly visible field mount or black panel mount instrument, both featuring a self healing window, a standard ¼ DIN cutout and large push buttons for easy navigation. Programming capabilities are available for single point calibration, setting of relays and outputs, and output simulationfunction for complete system testing. The dual input version allows difference calculation (ΔP) and offers significant cost savings with independent dualoutputs.

Features

- Digital (S^3L) input for stable and reliable reading
- Available with single or dual sensor input
- Pressure can be displayed in psi, bar or kPa
- Field scaleable 4 to 20 mA output
- Choice of relay or open collector output
- NEMA 4X/IP65
- Chemical resistant enclosure and self-healing window

Other Products

0250 USB to Digital (S3L) Configuration/Diagnostic Tool

Description

The new 3-0250 USB to (S^{3}L) configuration/diagnostic tool interfaces with Signet's various digital sensors to allow users to select all parameters available for modification, monitor the sensor's data on the PC/Laptop, or log the sensor's data to a file. Multilanguage Software in English, German, French, Italian, Portuguese and Spanish.

Features

- User-friendly interface
- Configure blind sensors
- Configure all modifiable parameters in the sensor
- Monitor sensor data or log sensors data to a file
- Monitor mV and Temperature reading in pH/ORP sensors
- Graph sensor data
- Red and Blue LED indicators for power and data transmission
- 6 ft USB extension cable

6400 Intrinsic Safety Barriers

Description

Georg Fischer Signet offers singlechannel intrinsic safety barriers foruse with the 515 and 525 paddlewheelflow sensors.

Both versions use a ½ inch wide housing which snaps directly to a 35 mm DIN rail. Once mounted, an electrical connection is formed between the barrier and the rail. The rail serves as the intrinsic safety ground bus when connected to the designated grounding point. Two additional ground lugs are provided andmay be used as a redundant grounding method or for terminating shields.

Each barrier also contains a replaceable 160 mA fuse cartridge for each channel. Safety barriers are polarity sensitive devices and are available in +DC and AC-voltage ratings.

Features

- One step, snap-on 35 mm DIN rail mounting and grounding
- Replaceable 160 mA fuse
- Lowest internal resistance
- Common ½ in. wide housing for single channel versions
- Short-circuit proof connections
- FM, UL, CSA approved
- Compatible with Signet 515 and 525 flow sensors

7300 Switching Power Supplies

Description

Signet 7300 Switching Power Supplies provide regulated output voltage in compact and lightweight plastic housings that can be DIN Rail or surface mounted. The series includes five different outputcapacities from 300 mA to 4.2 A (7.5W to 100W), all of which accept universal AC line voltage input and meet worldwide standards for performance and safety. These units meet the power requirements for a single system, multiple Signet instruments or other devices requiring 24 VDC operation.

Features

- Regulated 24 VDC output voltage
- Five output capacities: 300 mA, 600 mA, 1.3 A, 2.1 A and 4.2 A
- DIN rail or surface mount
- Universal AC input (85 to 264 VAC)
- DC compatible input (105 to 370 VDC)
- Fused input
- Auto resetting output overcurrent protection
- Unique spring-up, finger-safe terminals
- Short-circuit protection
- Output voltage adjust (+/- 10%)
- Light-weight plastic housing

i-Go 8058 Signal Converter

Description

The Signet i-Go™ 8058 Signal Converter accepts any 4 to 20 mA signal and converts it into the Signet digital (S^{3}L) format, the serial data format used by the Signet 8250, 8350, 8450 and 8900 instruments. When used with the 8900 Multi-Parameter Controller, the measurement type and operating range are defined in the 8900 setup menu. When used with level, temperature and pressure transmitters, the 8058 is configured at the factory to the user's specifications.

The wire-mount single-channel version is easily mounted anywhere in the interconnecting wiring between the sensor and the instrument. The DIN rail mounted dual-channel version can convert one or two separate 4 to 20 mA inputs into a digital (S^{3}L)output.

Features

- Connects with level, temperature, pressure and multi-parameter Signet instruments and other manufacturers transmitters
- Up to two 4 to 20 mA sensor inputs
- Connects additional measurement parameters to Signet 8900 Multi-Parameter instrument
- Wire or DIN rail mountable

8059 External Relay Modules

Description

Signet 8059 External Relay Modules supplement the output capabilities of certain host instruments such as the Signet 8900 Multi-Parameter Controller. AC-powered versions accept universal line voltage, and also provide 24 VDC output that can be used to power the host instrument or other device(s).

The host instrument controls relay operation by way of a single digital (S^3L) connection. The compact plastic housing is DIN rail mountable and includes LED annunciators for each relay, plus one each for power-on and data transfer or test mode.

Features

- External relays controlled by host instrument
- AC and DC powered versions
- DC power output (AC versions)
- DC power passthrough (DC versions) to simplify wiring
- Digital (S^3L) passthrough to simplify sensor wiring
- Red LED annunciators for each relay
- Green LED indicators for power and digital (S^3L) data transfer
- Relays may be tested locally, and also via the host instrument

Calibration Accessories

pH/ORP Buffer Solutions

Description

The Signet pH buffers are ideal for many calibration requirements. The liquid solutions are conveniently packaged in one pint bottles; the powder pillows are packaged in low weight, single-use containers which can be mixed with water. All pH buffers are color coded for easy identification; 4.01 pH is red, 7.00 pH isyellow, and 10.00 pH is blue.

The pH buffers are traceable to NIST standards and certificates are available upon request. They are accurate to within ± 0.01 pH units @ 25 °C and have long term stability.

These solutions are temperature sensitive and are provided with temperature correction values for the most accurate calibration. For applications that requireORP calibration, the pH 4 and pH 7 buffers can be mixed with quinhydrone powder for the correct measurement values of +87 mV and +264 mV respectively.

Features

- NIST Traceable
- Easily identifiable color coded buffer solutions
- Liquid or powder versions
- Temperature compensated values
- Kits for easy use

Calibration Kits for 4150 Turbidimeter

Description

The Calibration Standard kits contain fluids in special cuvette bottles that are used to compare the clarity of the process water against the standard to calibrate theturbidity instrument. The standard kits come in two premixed, calibrated ranges.

The 0-100 version is generally used for measuring the turbidity of clean, potable water applications. The 0-1,000 version is used to measure water that has aturbidity which may exceed 100, such as water in a reclamation plant.

Features

- Stable pre-mixed standards that are certified accurate
- Sealed calibration cuvettes
- Shelf life - 1 year
- Easy to follow instructions
- Kits for easy use

Formazin Stock Kit for 4150 Turbidimeter

Description

The Formazin Stock kit contains all chemicals and instructions to dilute/ mix calibration standards between1.0 and 1980 NTU/FNU. The Formazin Stock kit can be used to calibrate third party turbidity instruments as well as the Signet 4150 Turbidimeter.

Features

- Turbidity standard for most any value
- Three different graduated pipettes included
- Four glass cuvettes with light shield caps
- Easy to follow instructions

2759 pH/ORP System Tester

Description

The Signet 2759 pH/ORP Simulator is a battery-powered millivolt generator that simulates pH values of 4, 7 and 10, plus ORP values of ±700 mV. This device is useful as a troubleshooting aid and for general verification of system operation. It is not a substitute for periodic system calibration with pH buffers or testsolutions.

Accessory adapter cables (sold separately) enable the 2759 to connect directly to Signet 2760 preamplifiers,or 2750 pH/ORP Sensor Electronics. The adapters include a selector switch for pH (3K or PT1000 Temperature Compensation) or ORP simulation. The switch triggers automatic sensorrecognition software in Signet pH/ORP instrumentation.

Features

- Battery powered millivolt generator
- Simulates pH and ORP values
- High impedance input simulates preamplified signal
- Verifies system functionality
- Compatible with 2750 and 2760 preamplifiers
- Connects to any Signet pH/ORP instrument
- Verifies preamplifier or instrument electronics

Conductivity/Resistivity Tools

Description

The Signet conductivity/resistivity tools are available for certification or validation of electronics that are independent of the electrode. Because there are no available liquid standards for calibration in lowconductivity and resistivity applications, these tools are ideal for various installations. All tools are built to conform to the ASTM D 1125-95 Standard (StandardTest Methods for Electrical Conductivity and Resistivity of Water), which is also commonly used for USP 24 applications.

Signet tools simulate, within ±0.1% precision (accuracy), various values: 1.0 µS, 2.5 µS, 10.0 µS, 10.0 MΩ, 18.2 MΩ. These tools also temperature compensated to 25 °C and enable the user to accurately validate or certify the electronics.

Model 2830 can be used with Signet Models 5800CR, 8850, and 8860 instruments. The 2850-101-X simulators are used with the Model 2850 electronicsand simply plugs into the same terminals as the sensor cables.

Features

- Simulates five different values
- Compatible with all Signet Conductivity/ Resistivity instruments
- Verifies electronics independent of electrode
- NIST traceable units
- Temperature compensated to 25 °C
- All units ship with NIST traceable certificates

Installation

Installation of Turbidity

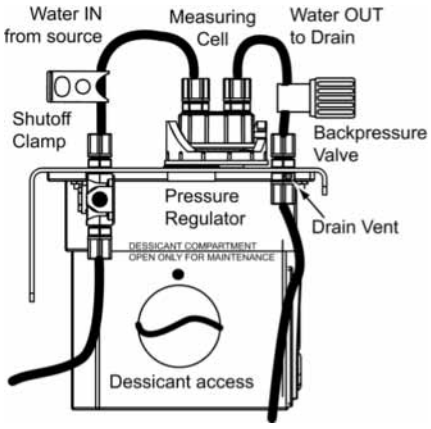
4150 Turbidimeter

Turbidity Installation

An owner's manual is included with every instrument that ships. Please refer to this manual for detailed instructions regarding installation and operation. The instrument includes a mounting braket designed for the instrument to mount on a vertical surface.
This was made simpler by having pre-drilled mounting holes on a pattern common with instruments used for this measurement. A pattern hole template is also included with the instrument when new mounting holes are required.

Plumbing

- Use 8 mm (5/16 in.) OD, 5 mm (3/16 in.) ID flexible tubing for the water supply connections.
- Opaque tubing (not supplied) should be used to prevent algae growth if the tubing will be exposed to sunlight.
- The 4150 requires only 1 psi head pressure to operate.
- The flow through cuvette is rated for a flow of 100 mL/m to 1 L/m (0.026 - 0.26 GPM).
- The integral pressure regulator is rated for a maximum pressure of 200 psi. It is factory adjusted. Do not tamper with the regulator.
- Inlet water pressure should not exceed 50 psi to avoid damage to the tubing connection to the regulator.
- Fluid temperature must not exceed 50 ºC (122 ºF).
- The shutoff clamp is used to interrupt the flow during cuvette maintenance.
- route the sensor drain tubing to a suitable drain. Do not reintroduce the drain sample to the process stream.



Power

The power required is 100 - 240 volts AC at 47 - 63 Hz. The output is a single programmable 4 to 20 mA DC instrument signal that is in direct proportion to the turbidity. Also provided are two programmable alarm relay outputs, one for high process alarm and the other for low process alarm sense. Note, both alarms are used in common to indicate an instrument malfunction, i.e. High Humidity.

Calibration and Operation

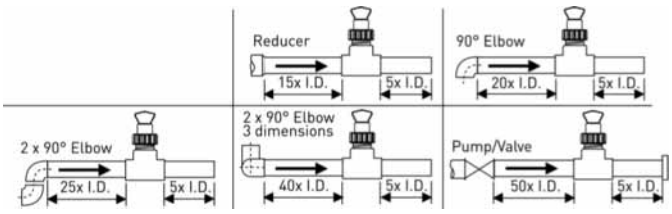
Please refer to the owner's manual for details.

Installation of Flow Sensors

Paddlewheel

I. Piping Location

- The correct location of the sensor in the piping system helps to ensure a proper flow profile in the pipe. It is important to have sufficient straight pipe immediately upstream of the sensor to create “fully developed turbulent flow.” Such a flow profile provides the stability required for the paddlewheel to measure accurately.
- The diagrams below illustrate the minimum distances that are recommended to mount plastic and metal paddlewheel sensors.
- In all scenarios, it is recommended to choose a location with as much straight, uninterrupted pipe length upstream of the sensor as possible



Flow Installation Tips:

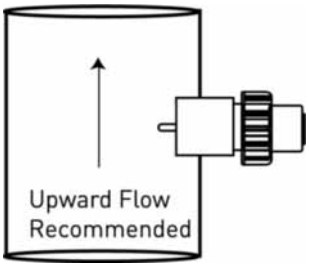
- Use Signet fittings for proper insertion into the process flow.
- Recommended up-stream distances are stated as a multiplier of the I.D. (inner diameter) dimension of the pipe. Note that these multipliers are different for each example and depend upon the upstream obstruction.
- Paddlewheel sensors can be used for all water-like fluids with little or no particulates (100 micron in diameter/length), and non-ferrous, non-fouling in nature.
- Always use these sensors in full pipes.
- Always maximize the distance between sensors and pump sources.

II. Mounting Angle

Paddlewheel sensors are affected by the mounting angle due to the effect of gravity increasing the friction between rotor and bearing surfaces. Air entrapment and sediment within the pipe may also adversely affect sensing accuracy and/or impede operation.

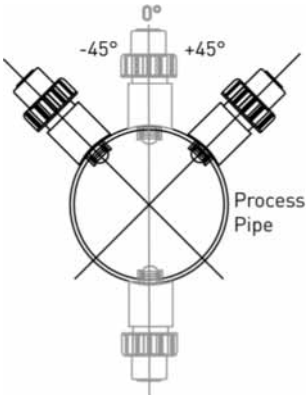
Paddlewheels in Vertical pipes:

- Mount the sensor in a pipe with an upward flow. This position is recommended for all scenarios, as it ensures a full pipe.
- Vertical installations with down-ward flow are generally not recommended.



Paddlewheels in Horizontal pipes:

- ±45° from vertical is the recommended sensor mounting angle to avoid air bubbles (pipe must be full). With the sensor at greater angles, the drag created by the rotor resting against the sensor body may compromise performance at the lower end of the operating range.
- Straight up installations may experience interference from entrained air at the top of the pipe.
- Inverted installations are often subject to blockage due to sediments in the pipe. Mounting sensors in the bottom of the pipe is NOT recommended if sediments are likely to be in the pipe.



K-Factors

K-Factors are calibration values (pulses per unit of volume) used to convert flow sensor output frequencies to flow rates. Signet publishes K-Factors for water only in gallons (pulses per gallon) and liters (pulses per liter) for all sensors, in all applicable pipe sizes and materials, and/or all applicable installation fitting sizes and materials. K-Factors for fluids other than water must be determined empirically, typically on-site using a secondary standard.

Note that K-Factors are published for pipe sizes od DN15 to DN300 (0.5 in. to 12 in.). For other pipe sizes, statistical K-Factors may be available. Contact Technical Support for more information.

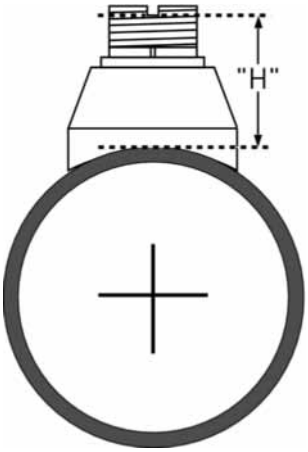
Flow Installation Tips:

- Ensure that all wetted materials are chemically compatible with the process liquid.
- Pressure and temperature ratings are reduced when plastic flow sensors are mounted in metal piping systems.
- The flow sensor is designed to fit tightly into the fittings. Lightly lubricate o-rings with a non-petroleum based lubricant to ease the installation.
- Cut the cable to the desired length if too long. Do not coil extra cable.

III. Installation Fittings

Fixed Depth

The insertion depth of a paddlewheel in a flow stream is critical and must be achieved and maintained to ensure accurate flow measurements. Signet installation fittings for Rotor-X and Metalex paddlewheel flow sensors set this depth automatically and facilitate the use of convenient K-Factors (calibration values) published in the sensor instruction manuals.



The H-dimension controls the insertion depth and they are critical for proper seating of the flow sensor into the pipe. These dimensions can be found listed in the flow sensor instruction manuals.

515, 2536 and 2537 Rotor-X

- This section outlines the installation fittings available from Signet for the 515, 2536 and 2537 Rotor-X family of flow sensors. The fitting controls the location of the paddlewheel inside the pipe, which in turn determines the calibration constant (K-Factor).
- Refer to the Fittings section of this catalog for a complete listing of part numbers.

Type	Description
Plastic tees	• PVC: 0.5 to 4 inch versions • CPVC: 0.5 to 2 inch versions
PVC Glue-on Saddles	• Available in 10 and 12 inch sizes only • Cut 2-1/2 inch hole in pipe • Weld in place using solvent cement
Clamp-on Saddles	• 2 to 4 inch, cut 1-7/16 inch hole in pipe • 6 to 8 inch, cut 2-1/8 inch hole in pipe
Iron Strap-on saddles	• 2 to 4 inch, cut 1-7/16 inch hole in pipe • Over 4 inch, cut 2-1/8 inch hole in pipe • Special order 12 in. to 36 in.

Type	Description
Iron, Carbon Steel, 316 SS Threaded tees	• 0.5 to 2 in. versions • Mounts on threaded pipe ends
Carbon steel & stainless steel Weld-on Weldolets	• 2 to 4 inch, cut 1-7/16 inch hole in pipe • Over 4 inch, cut 2-1/8 inch hole in pipe
Fiberglass tees FPT	• 1.5 in. to 2 in. PVDF insert
Metric Union Fitting	• For pipes from DN 15 to 50 mm • PP or PVDF

525 Metalex

- This section outlines the installation fittings available from Signet for the 525 Metalex family of flow sensors. The fitting controls the location of the paddlewheel inside the pipe, which in turn determines the calibration constant (K-Factor).
- Refer to the Fittings section of this catalog for a complete listing of part numbers.

525-1 Metalex Flow Sensor

The smallest Metalex Flow Sensor (525-1) must be installed into a specially constructed tee fitting with socket-weld piping connections.

525-2 Metalex Flow Sensor

Use the 525-2 and one of these weld-on fittings for stainless steel pipes from DN32 (1.25 inches) up to DN300 (12 inches) in diameter.

525-3 Metalex Flow Sensor

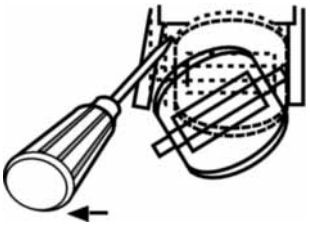
The 525-3 is the longest metalex flow sensor. It requires one of the strap-on saddles for pipes from DN50 (2 inches) up to DN300 (12 inches) in diameter.

Consult a qualified welder to install metalex fittings. Use of saddle fittings reduces the pressure rating for the 525 sensor.

IV. Rotor placement

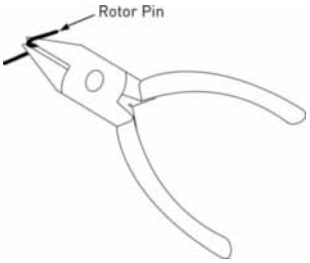
Procedure for plastic paddlewheel sensors:

1. Hold the sensor upside down and hold the rotor still.
2. Place the tip of a medium blade screwdriver between the rotor and the sensor body.
3. Turn the screwdriver blade 90° to flex the “ear” back just enough to angle the rotor pin out of one side.

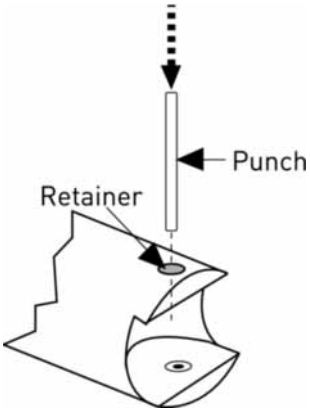


Procedure for metal paddlewheel sensors:

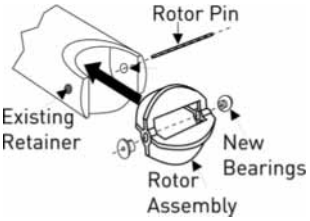
1. With a small pair of needle-nose pliers, firmly grip the center of the rotor pin (shaft) and with a twisting motion, bend the rotor pin into an “S” shape. This should pull the ends of the pin out of the retainers and free the rotor assembly.



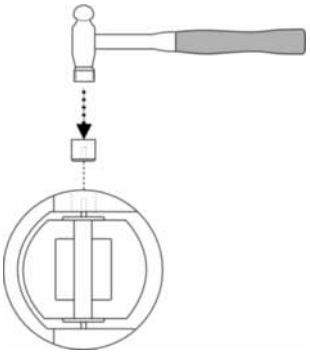
2. Remove retainer from each side by gently tapping it inwards using a punch. Install a new retainer with its rotor pin clearance hole inward. Only install one retainer at this time.



3. Insert the new rotor assembly and bearings into the rotor housing of the sensor and place the new rotor pin (shaft) through the open end of the rotor housing, through the rotor and bearings, and into the previously installed retainer.



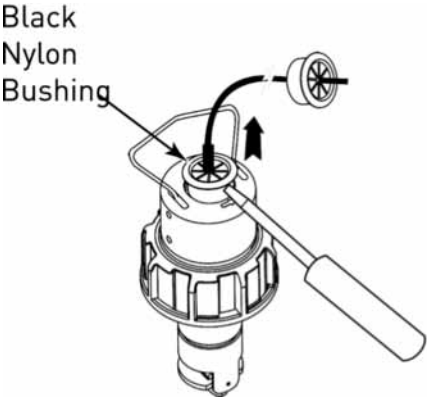
4. Tap the second retainer (rotor pin clearance hole inwards) into the hole while lining up the rotor pin with the center of the retainer hole. This completes the rotor replacement procedure.

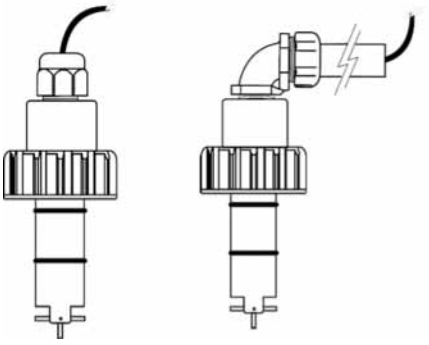


V. Cable glands and conduit adapter kits

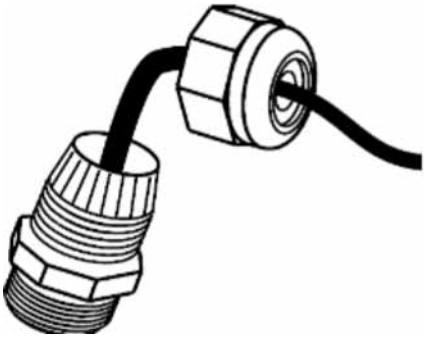
Cable Glands and Conduit adapter kits are available to install on Models 515, 2536, 525 when used in wet environments. These items protect against moisture entering the back end of the sensor. Follow these simple instructions to prolong the life of the sensor. Conduit adapters are included with the 2540 sensors.

1. Remove the black Nylon® bushing to expose the female threads at the back end of the flow sensor. Use a standard medium size screwdriver to pry the bushing up and out of the port. Slide it up and off the entire length of the cable, or cut it away carefully so as not to knick the cable jacket.
2. Thread the gland or conduit adapter over the cable and screw the 1/2 in. NPT male threads into the top of the sensor in place of the bushing.
3. For liquid-tight glands, tighten the compression fitting onto the fitting sufficiently to achieve a seal around the cable.
4. For conduit adapters, thread the cable through the adapter and tighten the adapter into the sensor fitting.

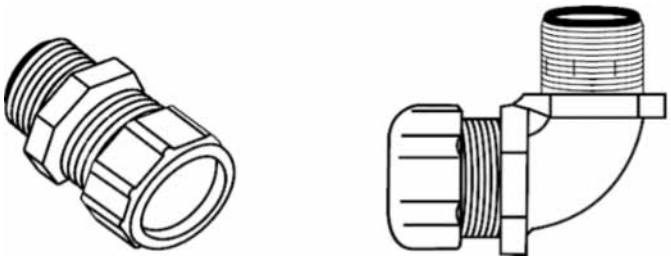




Cable Gland (Liquid Tight Connector):



Conduit Adapters (suitable for all plastic and metal paddlewheel sensors):

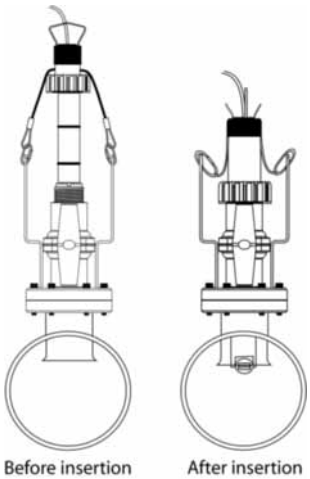


Wet-Tap and Hot-Tap

VI. Wet-Tap and Hot-Tap installation

3519 Wet-Tap Valve

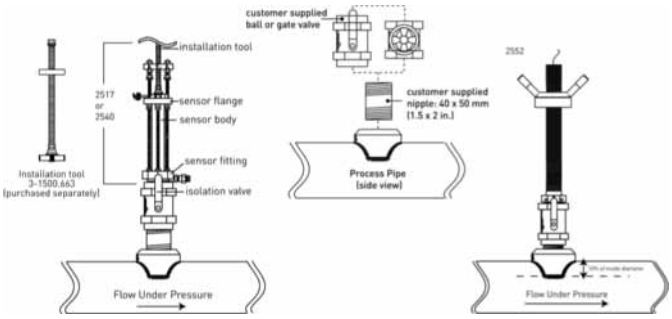
- The 3519 Wet-Tap consists of a flange and support plate that threads onto the pipe fitting insert, and a PVC ball valve through which an extended length, wet-tap style sensor is inserted into the pipe.
- No special tools are required to install the 3519.
- The Signet 3519 Wet-Tap Valve mounts directly onto standard Signet installation fittings for the 515 and 2536 flow sensors. The wet-tap sensors are identified in their part number as -P3, -P4 and -P5, depending on the pipe size.
- The 3519 Wet-Tap valve can only be installed in an empty pipe. Once installed, the sensor can be removed and re-inserted while the process is active.
- Pressure must be reduced prior to insertion and removal of sensor (please see individual product page for more information).



3719 Wet-Tap valve with a 515 Paddlewheel Sensor

2540 and 2552 Hot-Tap

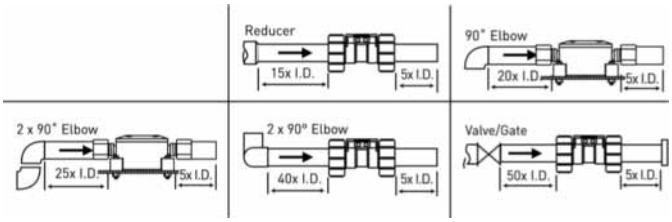
- The valve for Hot-Tap sensors can be installed while the pipe is full if a hot-tap drill is used. Consult with your piping supplier for information regarding drills.
- To install a Hot-tap sensor, you will need a hot-tap drilling machine, a ball valve, a metal pipe nipple. Signet Hot-Tap installation tool available (2540 only).
- Hot-Tap sensors can be installed and removed without process shutdown. Care must be taken while removing sensor under process conditions. The installation tool serves to hold the sensor against the line pressure as it is retracted or inserted into the pipe (2540 only).
- The Hot-Tap installation fitting has a bleed valve to relieve the pressure when retracting the sensor (2540 only).



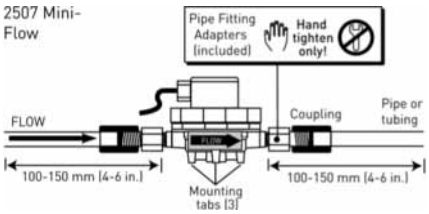
In-Line Rotors and Turbines

I. Piping Location

- The location of the sensor in the piping system determines the flow profile that the sensor is monitoring. The ideal location is to have sufficient straight pipe immediately upstream of the sensor to create “fully developed turbulent flow.” Such a flow profile provides the stability required for the paddlewheel to measure accurately.
- The diagrams below illustrate the minimum distances recommended from various obstructions.
- In all scenarios, it is recommended to choose a location with the maximum length of straight, uninterrupted pipe.
- Six common installation configurations are shown below as guidelines to help you select the best location in your piping system for the flow sensor. Always maximize distance between sensors and pump sources.
- Never install immediately down-stream of valves, fittings, etc.
- Observe minimum Reynolds Number (see Technical Reference section).
- The flow sensors are not for bi-di-rectional operation.



- For optimal performance of the 2507, a straight flow run of at least 100 to 150 mm (4 to 6 in.) should be allowed before and after the sensor.



II. Mounting Angle

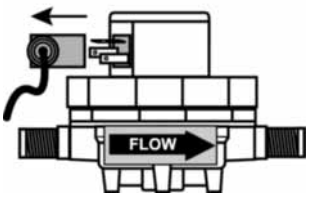
The mounting angle of the sensor may affect the performance of the system.
In-line Rotors:

- Signet Models 2507 and 2000 flow sensors are designed to be mounted on a flat surface, although the sensors may be tilted up to ±30° if necessary.
- Installation in excess of 30° will affect the accuracy of the sensor.
- For Model 2507, two pipe fitting adapters (included) convert the straight threads G-1/4 in. to 1/4 in. NPT.
- These sensors should be installed securely to their supporting surface to prevent vibrations from affecting the performance.

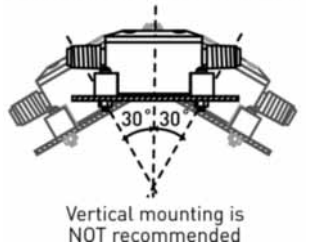
Turbine Flow Sensors:

- All mounting angles are accept-able for these sensors if the basic parameters are met: the pipe must be full with no entrapped air.
- Install the sensor with the arrow pointing in the direction of the flow of liquid.

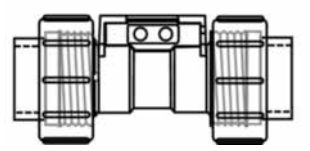
2507 In-Line Rotor



2000 Micro Flow Sensor



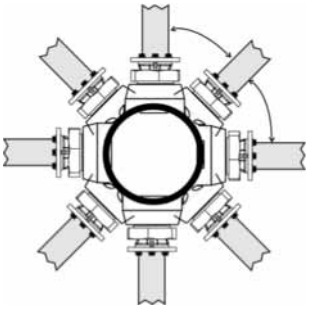
2100 Turbine Flow Sensor

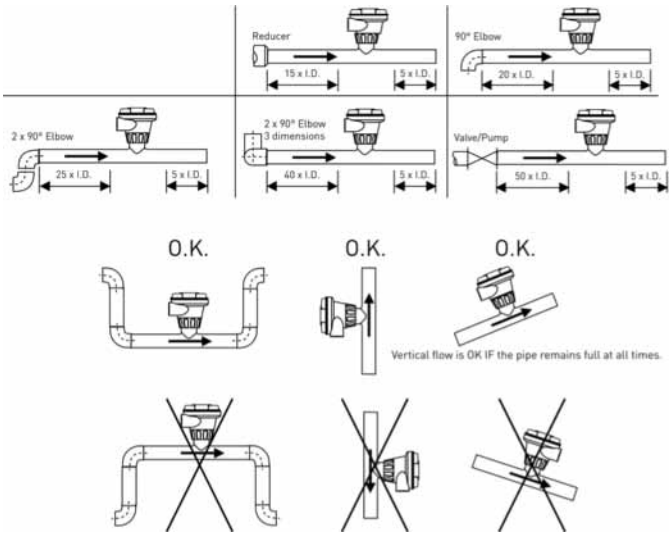


Magnetic

Magnetic Flow Sensors

- All mounting angles are acceptable for these sensors if the basic parameters are met: the pipe must be full with no entrained air.
- On horizontal pipe runs sensor may be mounted in any position around the pipe. If air bubbles or sediments are expected; mount at a slight angle.
- On vertical pipe runs sensor may be mounted in any orientation with UPWARD flow preferred to ensure a full pipe.

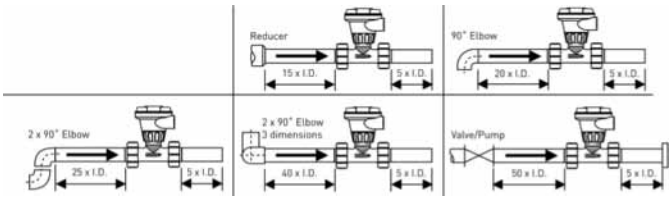




Vortex

I. Piping Location

- Install the sensor with the arrow pointing in the direction of the flow. These flow sensors are not for bi-directional operation.
- Recommended upstream distanc-es are stated as a multiplier of the I.D. (inner diameter) of the pipe. Note that these multipliers vary and depend upon the type of obstruction.
- Follow these recommended distances to ensure a good flow indication.



Vortex Installation Tips:

- Sensors must be used in full pipes.
- Sensors may be mounted at any angle.
- Observe minimum Reynolds Number and Back Pressure requirements.
- Never install immediately downstream of valves, fittings, etc.
- For optimal performance, choose a piping location with the maximum length of straight un-interrupted pipe lengths upstream of the sensor.

II. Mounting Angle

Signet Vortex Flow Sensors may be mounted at any angle, and either horizontal or vertical pipe runs, with upward flow prefered in the case of vertical runs.

Backpressure Calculation

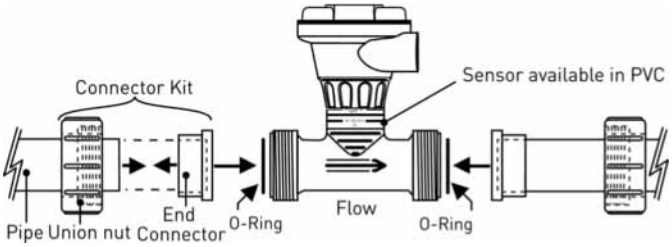
Minimum downstream pipe backpressure levels are required to prevent cavitation within the sensor. The minimum back pressure is calculated by the following formula:
(2.7 x ΔP) + (1.3 x Pv)

ΔP: Pressure drop across sensor
Pv: Liquid vapor pressure at operating temperature.

III. End Connector Options

Solvent socket version:

Available in PVC. Follow the PVC cement manufacturer's recommendations for preparation and installation.

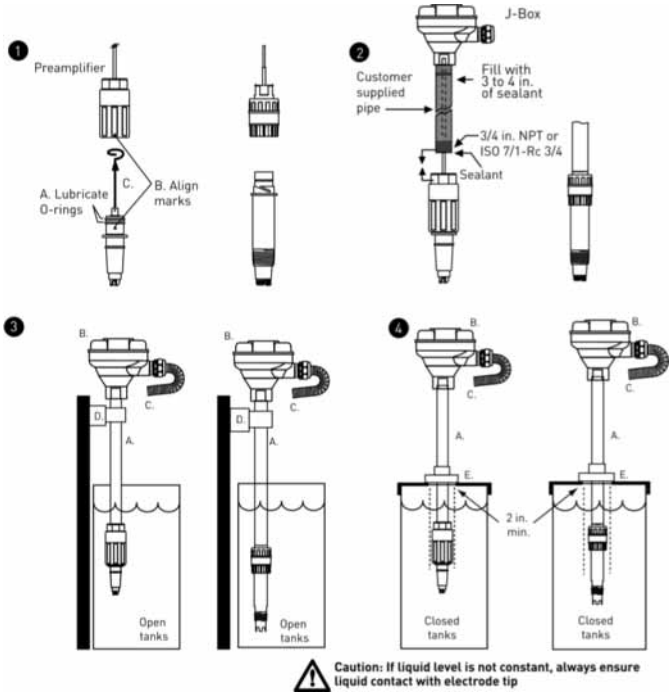


Installation of pH/ORP Electrodes

I. Submersible Installation

2724-2726
/ 2764-2767 / 2774-2777 with 27750/2760 preamplifier

1. The O-ring at the top of the electrode fits very tightly into the preamplifier. Use a small amount of lubricant (non-petroleum based) to assist the assembly.
2. To prevent moisture from migrating into the preamplifier, backfill the conduit with 3 to 4 inches of sealant.
3. Mount electrodes in a location with ample clearance to remove them for periodic cleaning and recalibration.
4. Choose a location that keeps the electrode glass completely submerged at all times.



Customer supplied:

A) 3/4 in. NPT threaded pipe

B) Signet threaded J-box

C) Flex conduit

D) Quick release pipe clamp

E) Tank flange

Installation Tips:

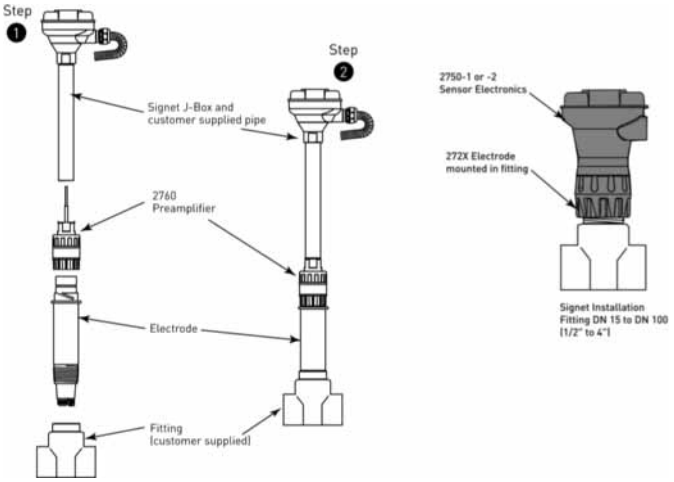
- Mount the electrode near tank outlet away from reagent addition areas.
- Place the electrode tip in pH 4 buffer during system maintenance or storage to avoid dehydration.

II. In-Line Installation

2724-2726

/ 2764-2767 / 2774-2777 pH/ORP Electrodes with 2750 or 2760 Preamplifier

- Models 2724-2726, 2764-2767 and 2774-2777 feature a thread close to the sensor end which allows the sensor to thread directly into a standard NPT pipe tee.
- Electrodes must be immersed in liquid. Keep pipe full at all times to avoid dehydration.
- Observe mounting angle requirements for models 2764-2767.
- Any mounting angle is acceptable for Models 2724-2726, 2774-2777.
- Models 2724-2726 are compatible with Signet installation fittings for pipes from DN15 to DN100 (1/2 in. to 4 in.).



III. Installation Fittings compatible with Models 2724-2726 pH/ORP Electrodes

See Fittings section for more information

Type	Description
Plastic tees	• Available in 1/2 in. to 4 in. sizes • PVC, CPVC w/solvent cement socket • PVDF and PP w/union end fittings
PVC saddles	• Available in 2 in. to 4 in. sizes • Requires 1-7/16 in. hole in pipe
Iron strap-on saddles	• Available in 2 in. to 4 in. sizes • Requires 1-7/16 in. hole in pipe

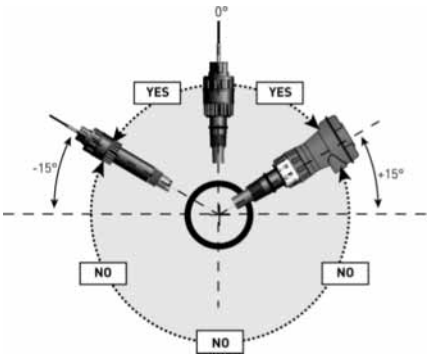
Type	Description
Carbon steel weldolets	• Available in 2 in. to 4 in. sizes • Requires 1-7/16 in. hole in pipe • Install by certified welder only
Carbon steel threaded tees	• Available in 1/2 in. to 2 in. sizes • Female NPT ends
Universal pipe adapters	• Use for installation in pipes > 4 in. (1-1/4 in. NPT) • PVC, CPVC, or PVDF versions • Specify socket or 1-1/4 inch NPT male threads (socket version shown here)

Installation Tips

- Use pipe adapters to install electrodes into pipe sizes larger than DN100 (4 inches)
- Adapters are designed to either glue into a plain socket tee (specify socket) or thread into a 1.25 inch threaded tee (specify threaded).

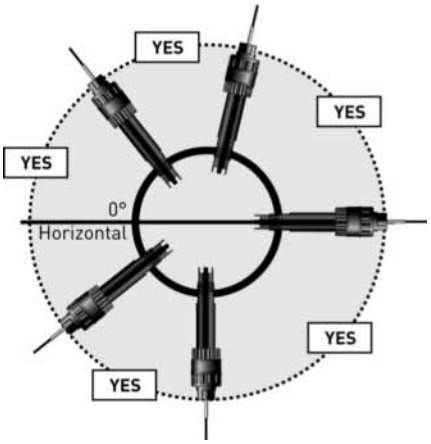
IV. Mounting Angle

Sensor Mounting - Models 2764-2767



- pH electrodes must be mounted at least 15° from the horizontal to ensure proper sensing. Sensors mounted at less than 15° will impede performance.
- ORP electrodes may be mounted at any angle without affecting the performance.

Sensor Mounting - Models 2724-2726, 2774-2777



- Models 2724-2726 and 2774-2777 may be mounted at any angle without affecting the performance.
- Avoid the 12 o'clock position.
- In the presence of sediment, avoid the 6 o'clock position.

3719 Wet-tap Overview

All of these components are sold separately:

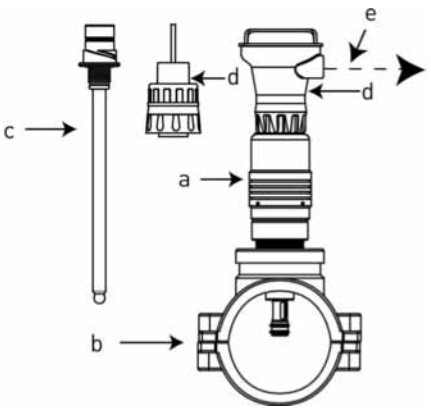
a) 3719 pH/ORP Wet-Tap

b) Low Profile PP Clamp-on Saddle Fitting (ASTM sizes 2.5 to12 in.)

c) 275X-WT and 275X-WTP DryLoc® pH or ORP Electrode ("DryLoc" refers to the electrode connector style)

d) 2750/2760 DryLoc® pH/ORP Sensor with J-Box

e) Output signal options: digital (S³L) and 4 to 20 mA

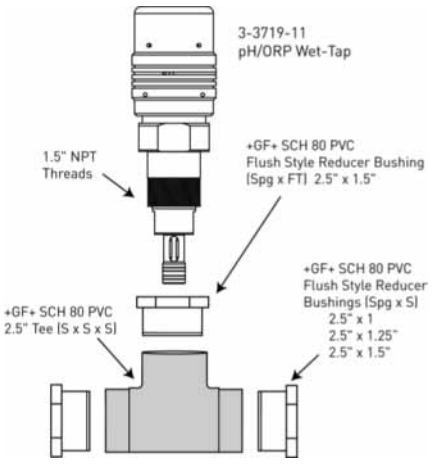


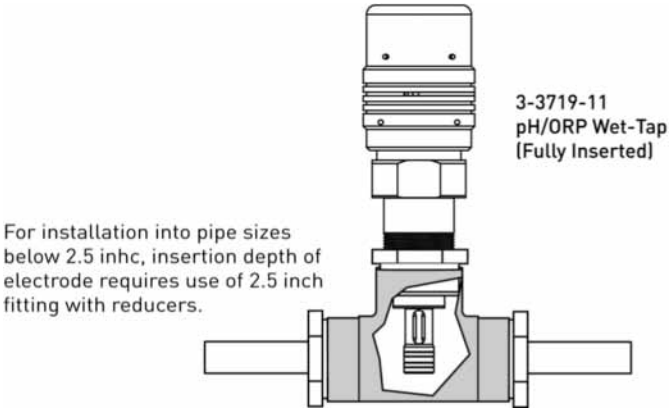
Installation Tips:

- Provide 0.6 m (20 in.) minimum clearance from the top of the pipe for electrode removal.
- The 3719 can be mounted in any orientation, including horizontal and inverted.
- Use caution when removing inverted sensors. Residual fluid may be present in the retraction housing.
- Keep electrode connector clean and dry at all times.
- 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 assure proper positioning in pipe sizes DN65 to DN300 (2.5 to 12 inches).
- It is strongly recommended to use the low profile PP clamp-on saddle fittings.

3719 pH/ORP Wet-tap Installation

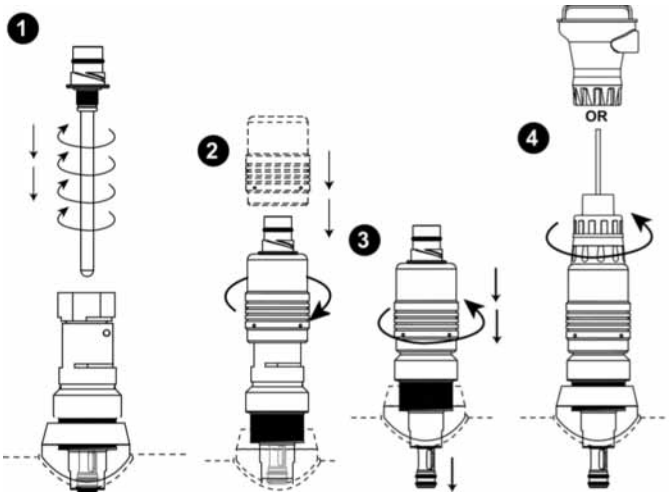
- Initial installation must be performed under non-pressurized conditions.
- The 3719-11 has a 1.5 in. NPT process connection for use with accessory saddle fittings from 2.5 to 4 inch.
- The 3719-21 has a 2 in. NPT process connection for use with accessory saddle fittings from 6 to 12 inch.
- It is possible 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 GF SCH 80 PVC tee and reducer bushings, is illustrated below.
- Avoid the entrapment of air inside the flow cell.
- Model 3719-12 has an ISO 7/1-R1.5 process connection to fit pipe sizes DN65 to DN100. Installation fittings are customer supplied.
- Model 3719-22 has an ISO 7/1-R2 process connection to fit pipe sizes DN150 to DN300. Installation fittings are customer supplied.





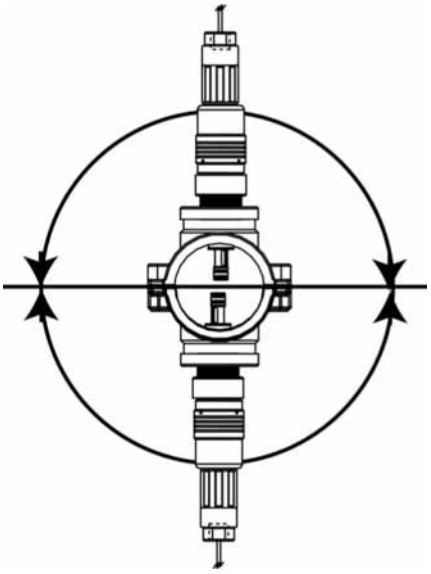
VI. 3719 pH Wet-tap Electrode Installation

The 3719 can be mounted in any orientation, including horizontal and inverted (shown here with both 2720 preamplifier and 2750 Sensor).



1. Slide electrode (DryLoc®) straight down into electrode piston. Thread electrode into place until connector shoulder is flush with top of electrode piston. Hand tighten only.
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 Locking Shroud 1/4-turn counterclockwise to lock the piston.
4. Install the 2750 DryLoc® pH/ORP Sensor onto the electrode connector (see individual operation manuals for more detail).

VII. 3719 Wet-tap mounting angle



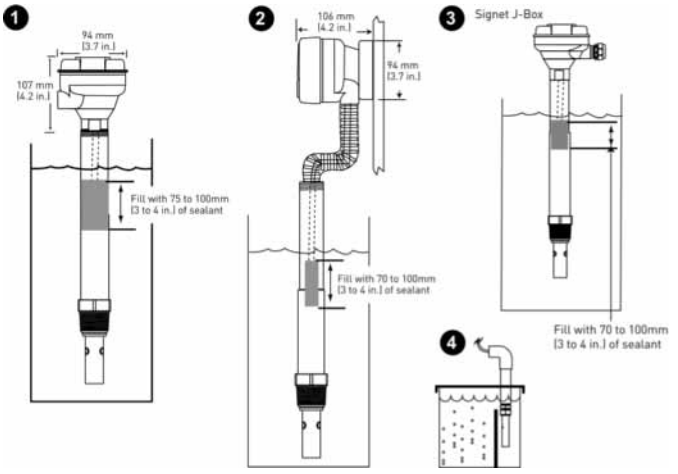
- The 3719 can be mounted in any orientation, including horizontal and inverted.
- Avoid the 12 o'clock position.
- In the presence of sediment, avoid the 6 o'clock position.

Installation of Conductivity/Resistivity Electrodes

I. Submersible Installation

2819 to 2823/2839-1 to 2842-1 with 2850 Sensor Electronics

- Electrode with 2850 Sensor Electronics shown below.
- All mounting brackets, electrical conduits, and pipe extensions are customer supplied.
- Sensor Models 2819-2823 are mounted similarly, except use a 3/4" MNPT Thread to mount to a 3/4" FNPT pipe thread (customer supplied).

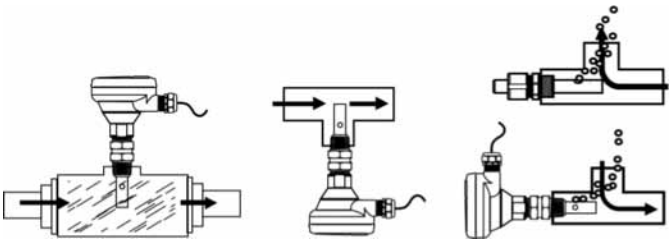


Installation Tips:

- Use standard installation hardware to connect the submersible 2850-3 or -4 directly to external equipment.
- In aerated vessels install the electrode in a stilling well to prevent air from being trapped inside the electrode.

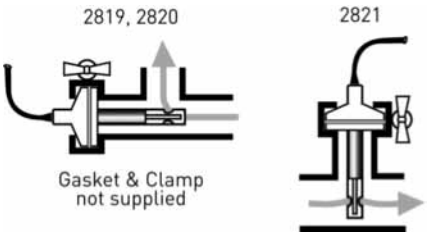
II. In-Line Installation

- Conductivity/Resistivity electrodes can be installed into standard 3/4 inch NPT fittings or ISO 7-R3/4 threaded fittings.
- The preferred installation for in-line applications directs flow straight into the electrode. This configuration reduces the probability of entrapped air bubbles, and provides the best continuous sampling of the fluid content.
- If the electrode is mounted vertically in a tee, do not recess the orifices inside the tee. Mounting upside down may help prevent air entrapment.
- An oversized tee or flow cell may be helpful for inline installations.
- At least 4 threads (ANSI B1.20.1) must be engaged to meet pressure rating per published specifications.



Tri-clamp Connections

- Models 2819-2821 are offered with 1 to 1.5 inch and 2 inch sanitary fittings.

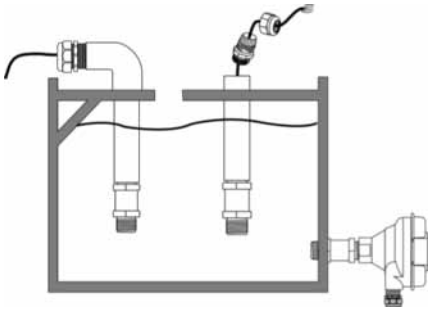


Installation of Pressure/Level Sensors

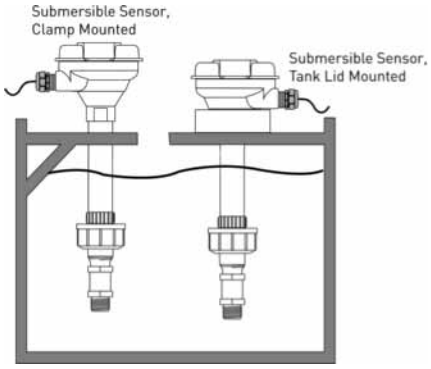
I. Submersible Installation

- Use the 2450 and 2250 sensors with 4.6 m (15 ft) cable and 10 m (32.8 ft), respectively.
- Mount the sensor to an extension pipe or watertight conduit using thread sealant.
- Use a cable gland at the top of the extension to prevent moisture intrusion/accumulation inside the pipe.
- DO NOT hermetically seal (i.e. applying silicone sealant or epoxy) the back of the sensor. To do so may introduce measurement errors resulting from changes in atmospheric pressure and/or temperature.

Signet 2450 Pressure Sensor



Signet 2250 Hydrostatic Level Sensor



Installation Tips:

- 8050-1 and 8050-2 junction boxes can be useful for this instal-lation option.

II. In-Line Installation

- The 2450 can be mounted in a pipe-tee using the threads closest to the sensing end.
- The sensor can be mounted with or without an integral mount kit. This kit mounts a junction box or an instrument.
- See below for more information on instrument integral mount and junction box/remote mount examples.

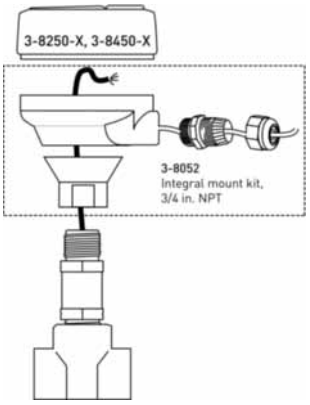
Installation Tips:

- Sensors can be mounted into any DN20 (3/4 in) FNPT pipe tee (customer supplied)

Integral Assembly

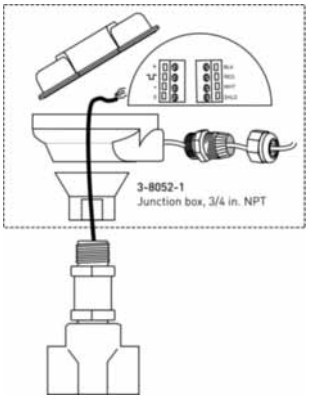
The 3-8052 Integral Kit connects the 8450 Pressure Transmitter and 8250 Level Transmitter directly onto the 2450 sensors.

- Use the 2450 sensor with 15.2 cm (6 in.) cable and digital (S^3L) output.
- Apply sealant or PTFE tape to the process connection threads, after inspecting threads to ensure integrity. Do not install a sensor with damaged threads.
- Tighten the sensor 1.5 turns past finger tight into the process connection.



Remote Assembly

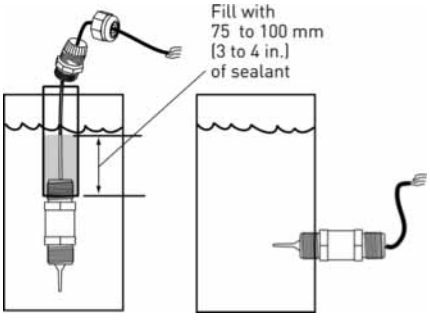
- 3/4 in. NPT sensor connection
- Conduit base and cap with junction terminals
- 3-9000.392-1 liquid tight connector, 0.5 in. NPT



Installation of Temperature Sensors

I. Submersible Installation

- Use the 2350 sensor with 4.6 m (15 ft) cable.
- Mount the sensor to an extension pipe or watertight conduit using thread sealant.
- Use a cable gland at the top of the extension to prevent moisture intrusion/accumulation inside the pipe.
- For additional defense against possible accumulation of condensation at the back seal area of the sensor, fill the lower 75-100 mm (3-4 inches) of conduit or extension pipe with a flexible sealant such as silicone.



Installation Tips

- 8050-1 and 8052-1 junction boxes can be useful for this installation option.

II. In-Line Installation

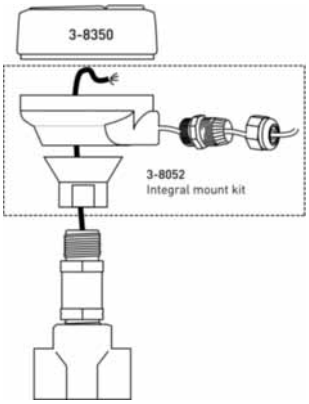
- The 2350 can be mounted in a pipe-tee using the threads closest to the sensing end.
- The sensor can be mounted with or without an integral kit. This kit mounts a junction box to an instrument.
- See below for more information on instrument integral mount and junction box/remote mount examples.

Installation Tips

- Sensors can be mounted into any DN20 (3/4 in.) FNPT pipe tee (customer supplied).

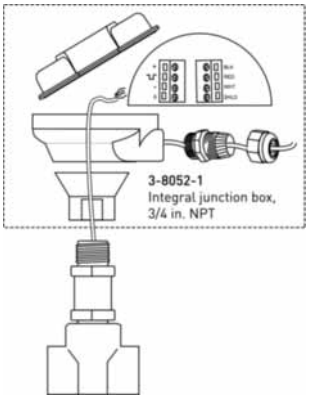
Integral Assembly

- The 3-8052 Integral Kit connects the 8350 Temperature Transmitter directly onto the 2350 sensor.
- Apply sealant or PTFE tape to the process connection threads, after inspecting threads to ensure integrity. Do not install a sensor with damaged threads.
- Tighten the sensor 1.5 turns past finger tight into the process connection.



Remote Assembly

- The optional 3-8052-1 Integral Junction box with 3/4 in. process connection offers a convenient ter-minal point to extend the 2350 cable over a distance. The kit includes:
- 3/4 in. NPT process connection.
- Conduit base and cap with junction terminals.
- 3-9000.392-1 liquid tight connector, 0.5 in. NPT.
- Apply sealant or PTFE tape to the process connection threads, after inspecting threads to ensure integrity. Do not install a sensor with damaged threads.
- Tighten the sensor 1.5 turns past finger tight into the process connection.



Wiring

Wiring Information: Turbidity

I. 4150 Turbidimeter

Power

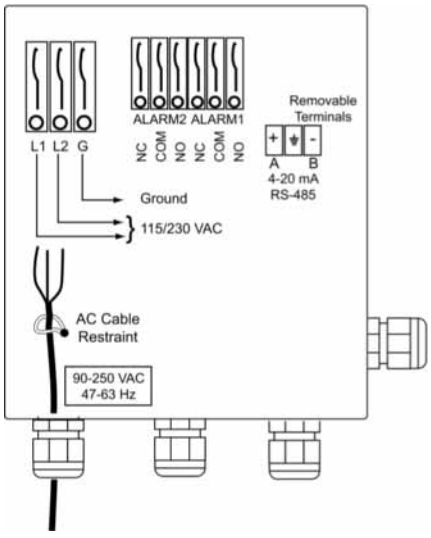
- Install a circuit breaker in the AC line before the 4150 power connection to allow for service.
- The 4150 is not supplied with a power cord.
- The power cable bulkhead will accept cable diameters from 5.8 mm (0.230 in.) up to 10 mm (0.395 in.)
- All terminals are designed to accept wires in the range of 14-28 AWG.
- All wires should be stripped to a length of 6 mm (1¼ in.).
- A strain relief strap is provided to reduce tension on the AC power terminal.

RS485

- The RS485 half-duplex (2 wire) digital interface operates with differential levels that are not susceptible to electrical interferences.
- The last device on each bus may require terminating with a 120-ohm resistor to eliminate signal reflection on the line.
- Do not run RS485 cables in the same conduit as power.

4 to 20 mA

- The active 4 to 20 mA outut is driven by a 15 VDC power source and can drive external loads up to 600 ohms.
- Do not run 4 to 20 mA cables in the same conduit as power.



Wiring Information: Sensors & Electrodes

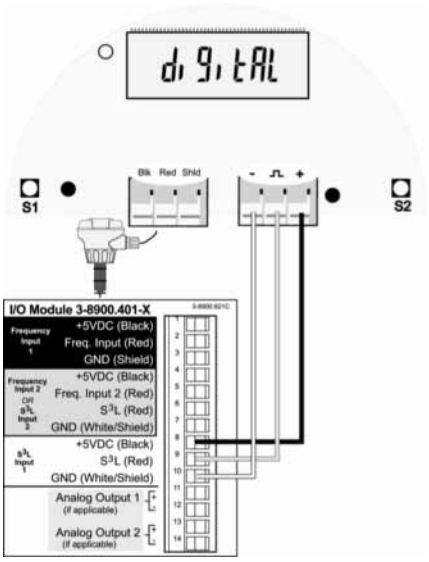
I. Flow sensor cable details and connection to instrumentation

- Most Signet Flow sensors are supplied with a standard 7.6 m (25 ft) length of cable except the 2100 Turbine, which has 4.6 m (15 ft)
- 2551 Magmeters are not supplied with cable.
- 2552 Magmeters supplied with 7.6 m (25 ft) or submersible version with optional 3.9 m (13 ft) or 5.9 m (19.5 ft).
- Sensors with AC sine wave outputs (515, 525) may extend cable to a maximum 60 m (200 ft)
- Sensors with open collector outputs (2000, 2100, 2507, 2536, 2537, 2540, 2551, 2552) may extend cable to a maximum 300 m (1000 ft)
- Maintain all cable shielding through splices or terminal connections.
- Cable should be 2 conductor twisted pair with shield, 18 to 22 AWG.
- Signet Flow sensors use cable with Black, Red and Shield conductors. To facilitate wiring, most Signet instruments have wiring terminals that are labeled with these same colours.

Instrument Marking	Sine Wave Output	Sensor Wire Color	Open Collector Output	Instrument Marking
Freq. In Black	Frequency	Black	DC Power +	Sensor Pwr Sensor V+
Freq. In Red	Frequency	Red	Signal Out	Freq. In Sensor In
Iso. Gnd Shld	Ground	Shield (White)	DC Power -	Iso. Gnd Sensor Gnd
	515 525	Sensor models	2000 2100 2507 2536 2537 2540 2551 2552	

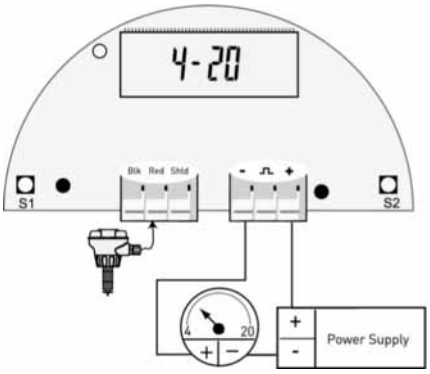
I. Flow sensor wiring details for 2537 Flowmeter Digital (S³L) Wiring:

The digital (S³L) output is compatible with Signet Multi-Parameter Transmitters and Controllers.



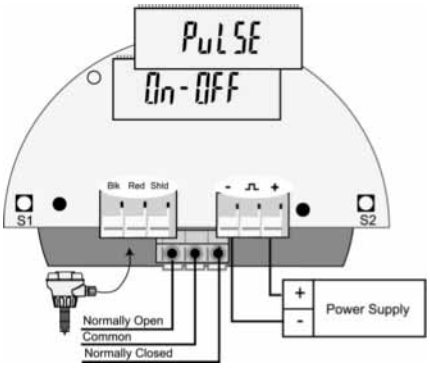
Loop Wiring:

The 4 to 20 mA output can be connected to Chart Recorders, PLCs or any device that requires a 4 to 20 mA signal.



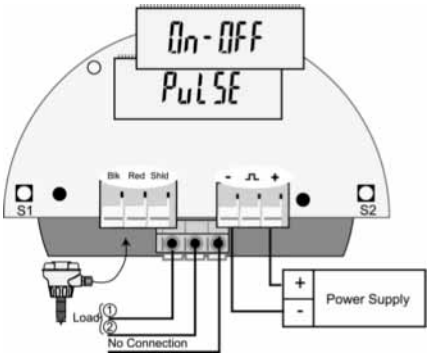
On-Off/Pulse:

Provide a single dry-contact relay output that can be programmed as a HIGH alarm or a LOW alarm.



Pulse/On-Off:

Provide a single solid-state relay output that represents a volumetric pulse or pulse divided output.



I. Flow sensor wiring details for the 2552 Magmeter

Frequency Wiring:
The 2552 offers an open collector frequency signal that can be connected to any powered Signet flow instrument. If connecting to a non-Signet instrument, 5 to 24 VDC power must be provided to the 2552.

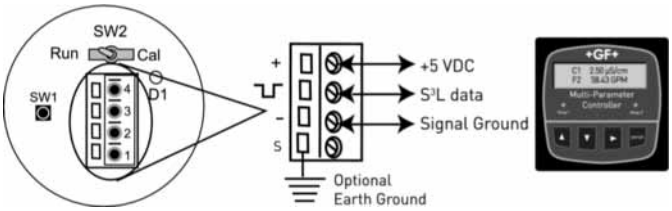
Digital (S³L) Wiring:
The 2552 receives 5 VDC power from the 8900. No additional power is required.

Loop Wiring:
The 2552 is a traditional 2-wire passive 4 to 20mA loop transmitter. Eternal loop power (24 VDC ± 10%) is required. Please refer to the Model 7300 Power Supplies.

II. Wiring Connections for pH/ORP and Conductivity/Resistivity

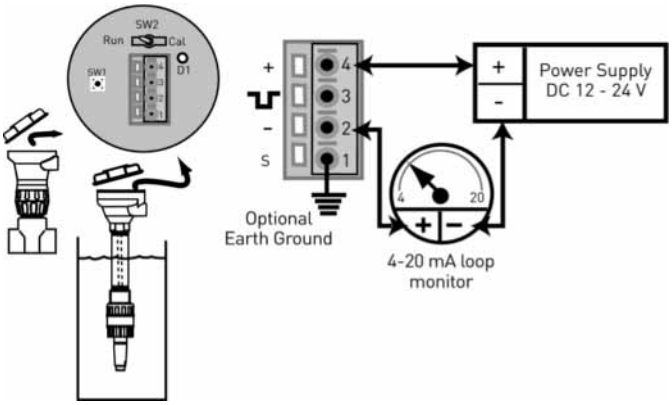
(S³L) pH/ORP Wiring continued

2750 In-Line version with J-Box

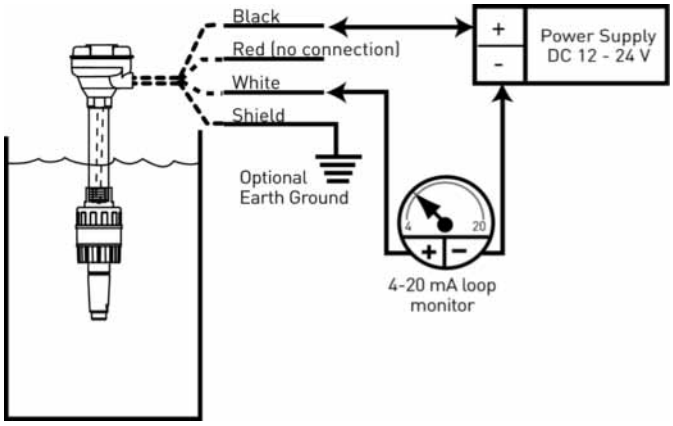


4 to 20mA Loop pH/ORP Wiring

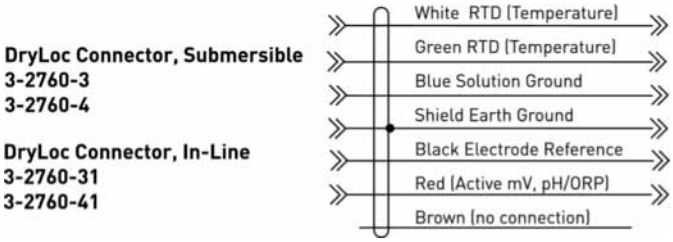
2750 with J-Box



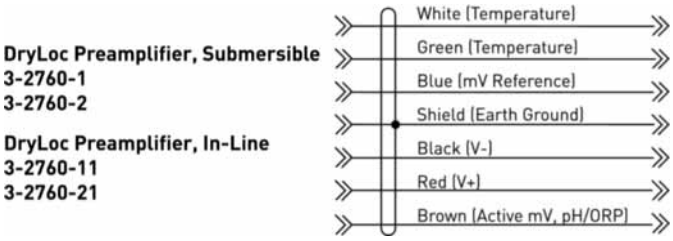
2750 without J-Box



2760 Preamplifier to Other Manufacturer's Equipment

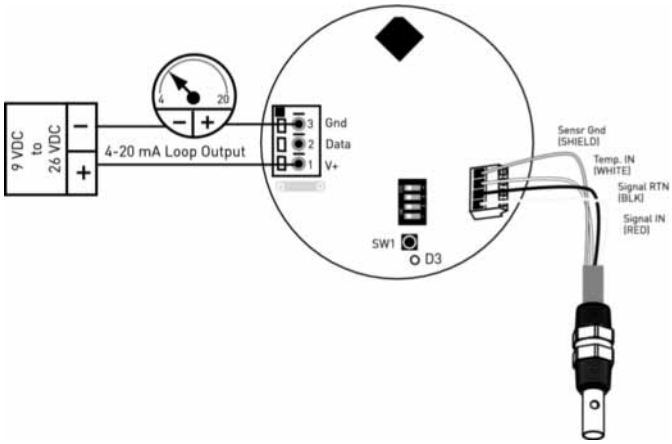


2760 Connector to Other Manufacturer's Equipment

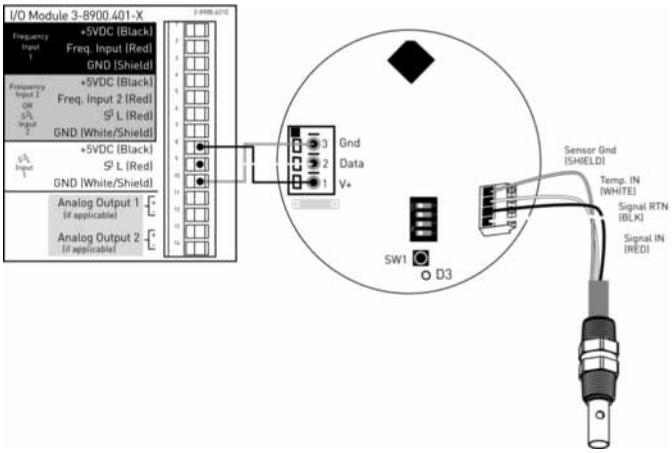


2850 Conductivity/Resistivity Sensor Electronics

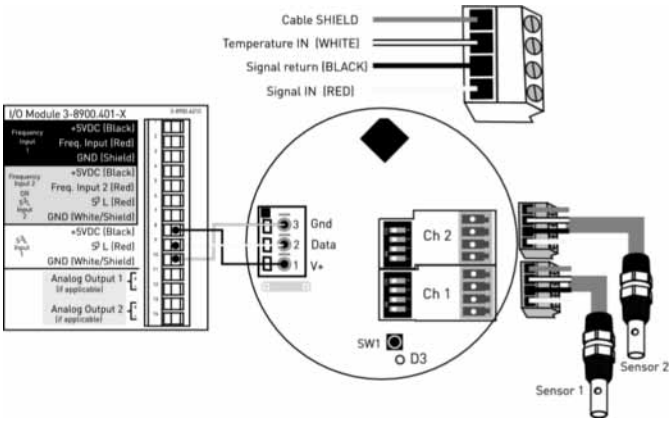
4 to 20 mA Conductivity/Resistivity Wiring



Digital (S³L) Output Conductivity/Resistivity Wiring



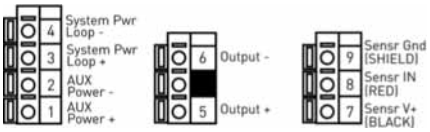
Dual Digital (S³L) Output Conductivity/Resistivity Wiring



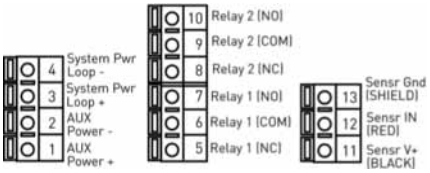
Wiring Information: Instruments

III. Rear Terminal Views Signet Flow Instruments

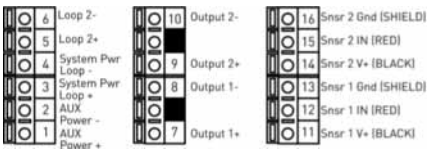
Terminal 8550-1



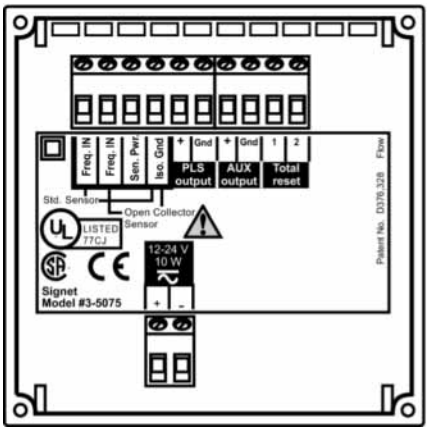
Terminal 8550-2



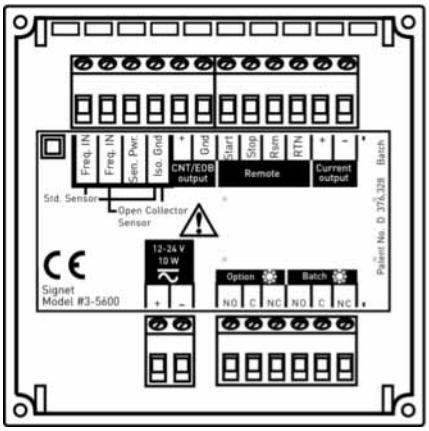
Terminal 8550-3



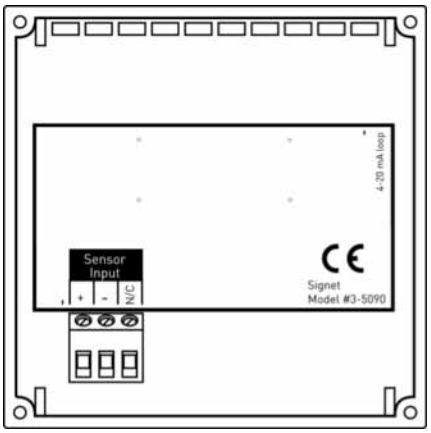
5075



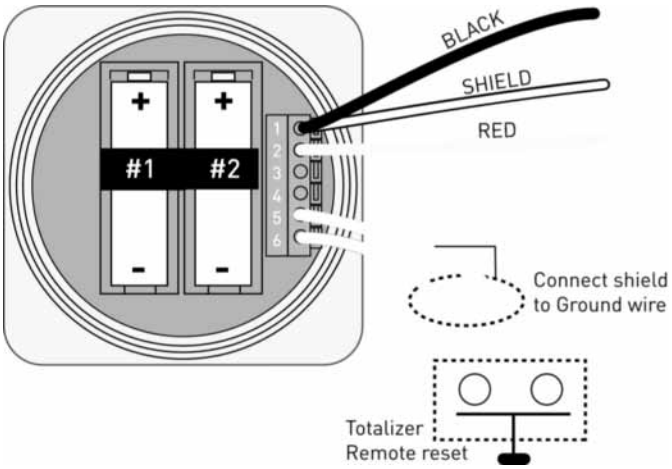
5090

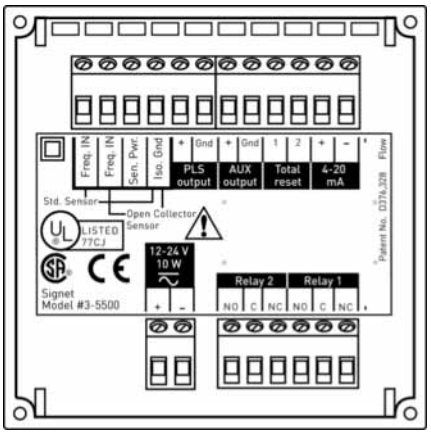


8150 Battery Powered Flow Totalizer



5500





5600

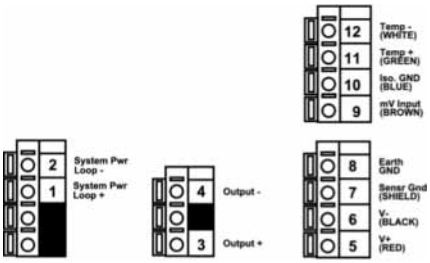
Wiring Information

- The terminal blocks for the 8550 are not labeled on the back of the unit. An adhesive label is supplied with the instruments with terminal descriptions to serve as a remote terminal display to aid electrical installations.
- The 8150 Battery Powered Flow Totalizer is compatible only with the AC output sensors, 515, 525. The wiring is shown here. See Operation Manual for more information.

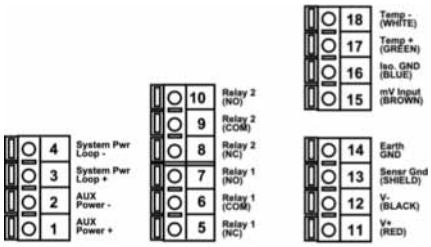
III. Rear Terminal Views Signet pH/ORP, Conductivity/Resistivity Instruments

pH/ORP

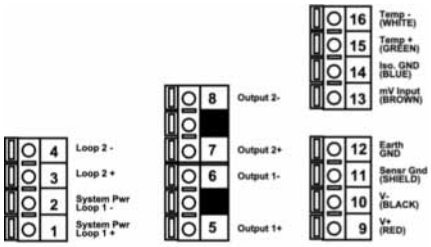
Terminal 8750-1



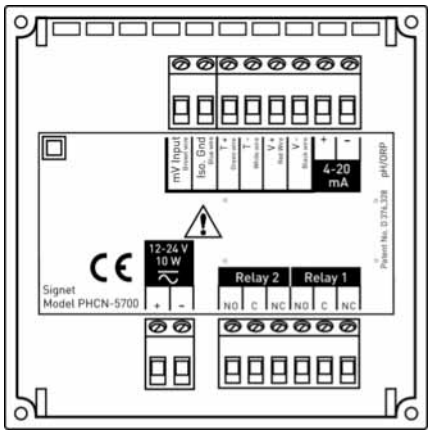
Terminal 8750-2



Terminal 8750-3

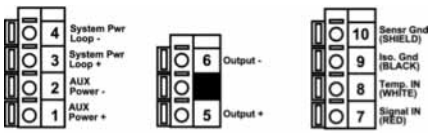


5700

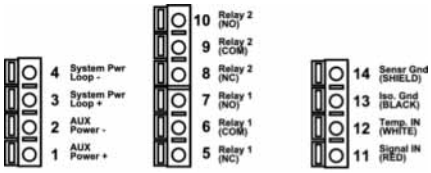


Conductivity

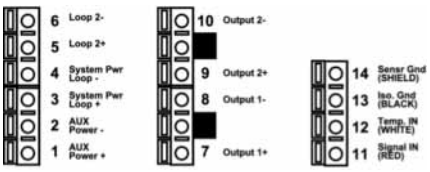
Terminal 8850-1



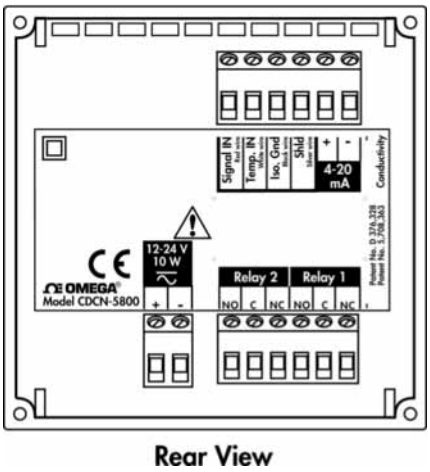
Terminal 8850-2



Terminal 8850-3

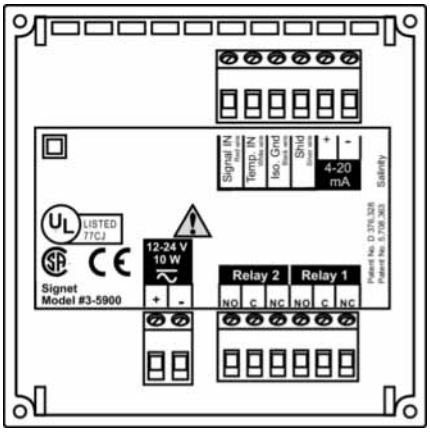


5800CR

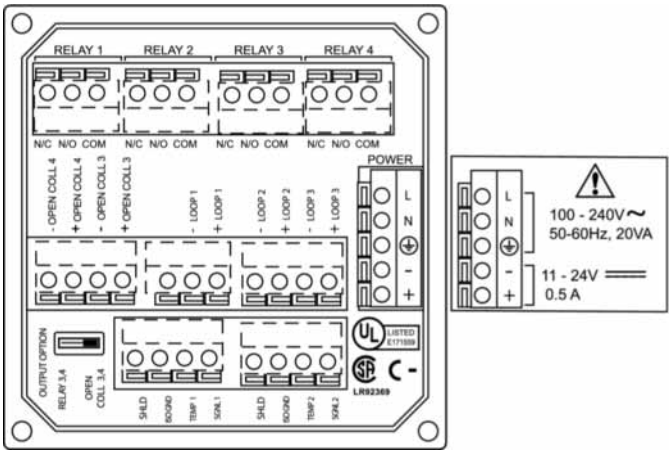


Rear View

5900



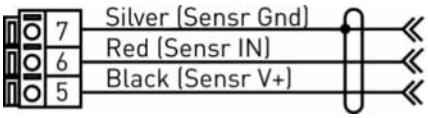
8860



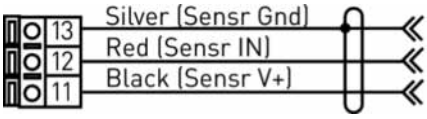
III. Rear Terminal Views Signet Temperature, Level and Pressure Instruments

Temperature

Terminal 8350-1



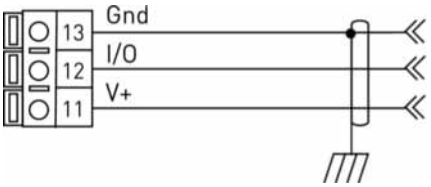
Terminal 8350-2



Terminal 8350-3

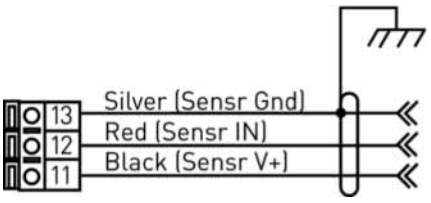
Level

Terminal 8250-2

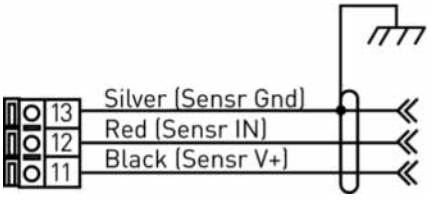


Pressure

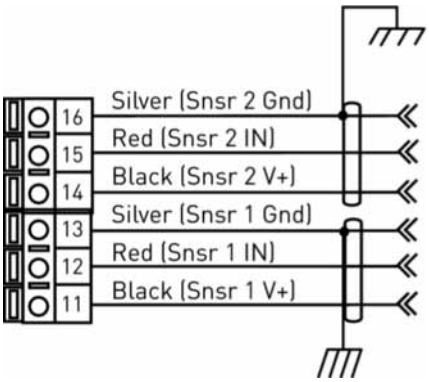
Terminal 8450-1



Terminal 8450-2

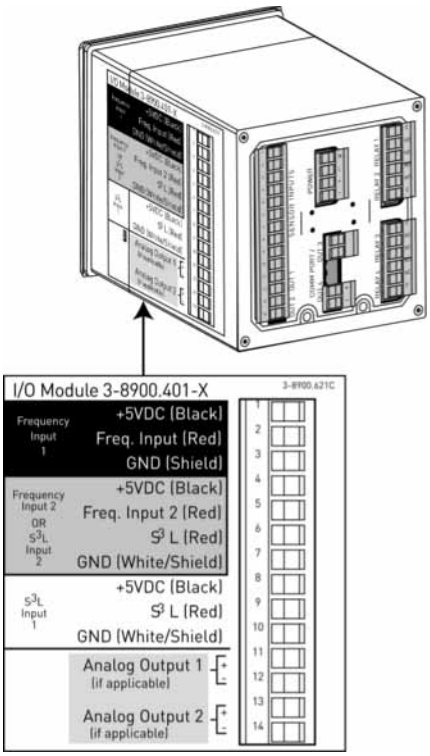


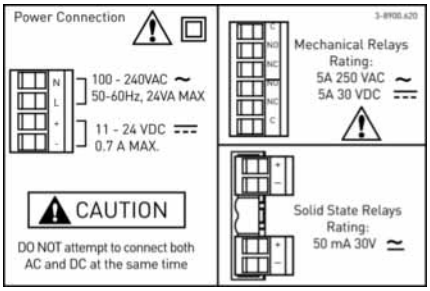
Terminal 8450-3



III. Rear Terminal Views Signet Instruments

8900 Multi-Parameter





Maximum Cable Lengths for all sensors used with the 8900

The I/O Module (3-8900.401-x) supports frequency and (S³L) signal types. These signal types are fundamentally different from one another, and the rules governing

maximum cable lengths also differ, so the two types must be treated separately. Refer to the following two sections as necessary to determine the cable length limitations of any system.

Signal Type: Frequency

The maximum allowable cable length for flow sensors with frequency output is dependent upon the output signal strength of the sensors themselves, and the degree to which the signals are susceptible to EMI or “noise”. This is largely a function of whether the sensors are self-powered, or powered by an external source.

All of the sensors in the table below are compatible with the 8900. The three models limited to 60 m (200 ft) are self-powered sensors. The 8900 automatically provides power to the others via the I/O Module (normal sensor wiring).

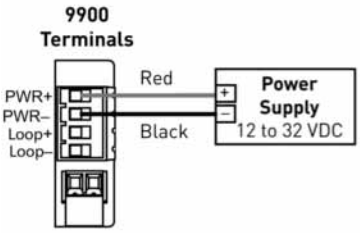
These maximum recommended cable lengths apply to individual sensors and are completely independent of one another. Additionally, these cable lengths have no relevance to any digital (S³L) devices that may also be connected to the I/O Module.

Flow sensor models with Frequency output		
Max. Cable Length	60 m (200 ft)	305 m (1000ft)
515	x	
525	x	
2000		x
2100		x
2507		x
2536		x
2537		x
2540		x
2551		x
2552		x

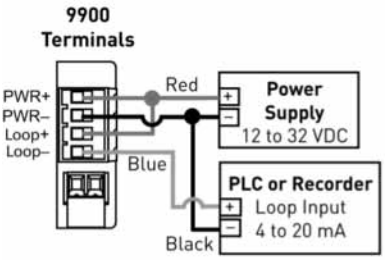
V. Rear Terminal Views Signet Instruments

9900 Transmitter

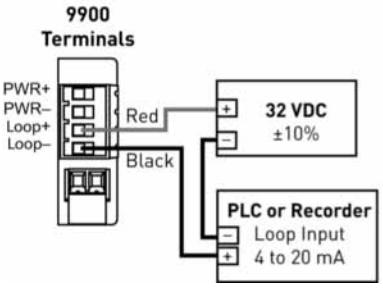
Stand Alone Application, no current loop used



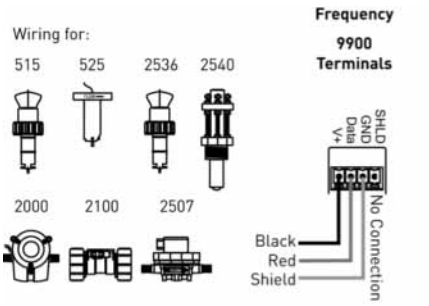
Connection to a PLC/Recorder, separate supply

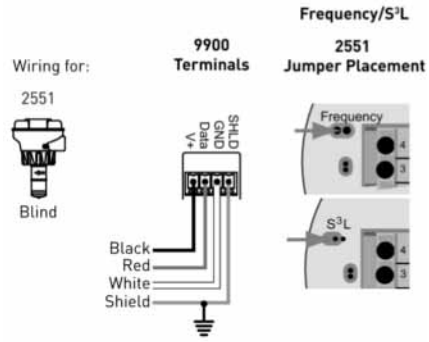


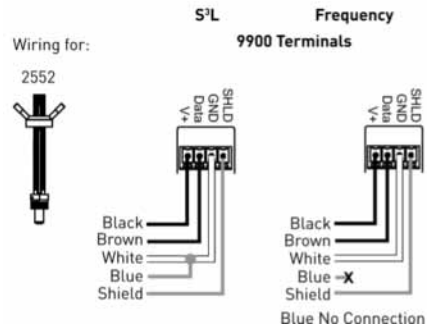
Loop Powered

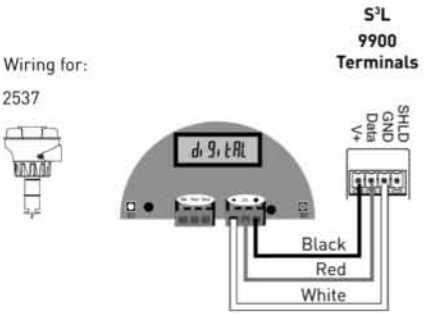


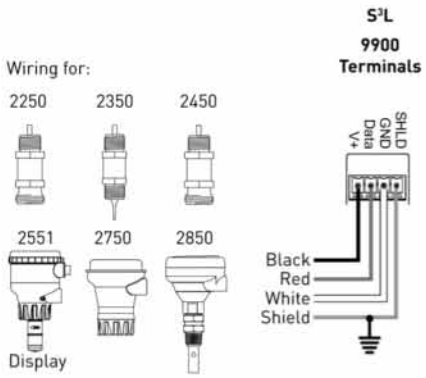
Note: Loop Power can be used to power Signet models 515, 525, 2250, 2350, 2450, 2536 and 2540 sensors

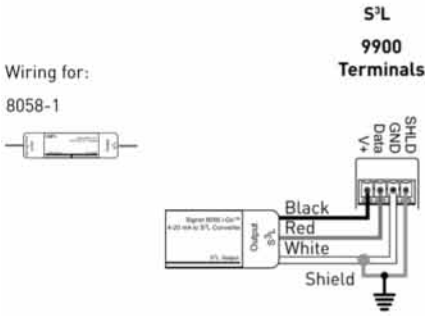


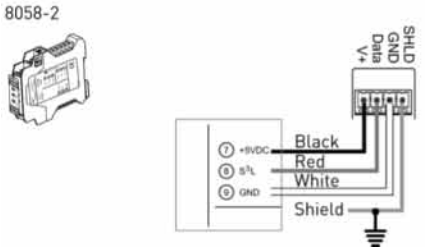








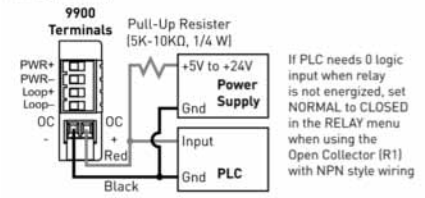




V. Rear Terminal Views Signet Instruments

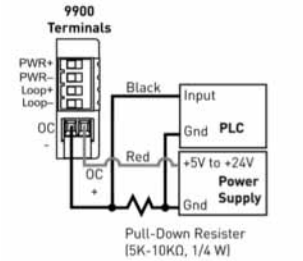
9900 Transmitter

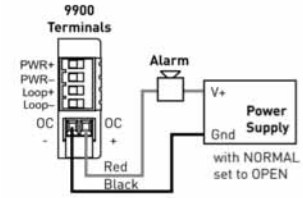
NPN Style Wiring



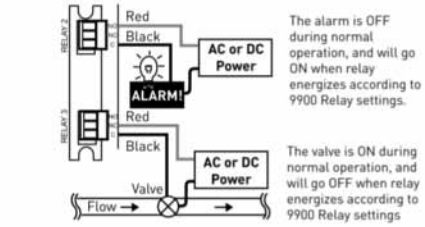
If PLC needs 0 logic input when relay is not energized, set NORMAL to CLOSED in the RELAY menu when using the Open Collector (R1) with NPN style wiring

PNP Style Wiring





Relay Module Wiring



The alarm is OFF during normal operation, and will go ON when relay energizes according to 9900 Relay settings.

The valve is ON during normal operation, and will go OFF when relay energizes according to 9900 Relay settings

NO = Normally Open (closes when energized)
NC = Normally Closed (opens when energized)

Technical Reference

Section: Flow

Velocity-based Flow Measurement Technologies

All of the flow sensors featured in the Signet catalogue belong to the broad category of velocity-based flow measurement devices. This vast offering includes paddlewheel, electromagnetic, in-line rotor, and turbine flow sensors. Principles of operation vary considerably for each type, but some very important installation considerations are common throughout. The following discussion plus the general selection guidelines at the front of the catalogue should help the user choose the appropriate sensor type and obtain optimal flow measurement results. All manuals, data sheets, and additional helpful information are available at www.gfsignet.com.

Fully Developed Turbulent Flow

Velocity-based flow sensors depend on fully developed turbulent flow for accurate and repeatable measurements. Fully developed turbulent flow occurs in Newtonian fluids with a Reynolds Number (Re) greater than 4,500. Low flow rates, viscous liquids, and large pipe sizes make fully developed turbulent flow more difficult to achieve. The opposite is also true. That is, for a given set of conditions, simply reducing the pipe size to increase the local flow velocity will produce a higher Reynolds Number.

Re : Reynolds Number

Re = 3,162.76 x Q x Sg/(μ x ID)

where:

Q = Flow rate in US GPM

Sg = Specific gravity

μ = Dynamic viscosity in Centipoise (cP)

ID = Pipe inside diameter in inches

OR

Re = DN x V/v

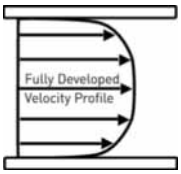
where:

DN = Pipe inside diameter (m)

V = Flow velocity (m/s)

v = Kinematic viscosity (m²/s)

(v of water = 1 x 10 - 6 m²/s)



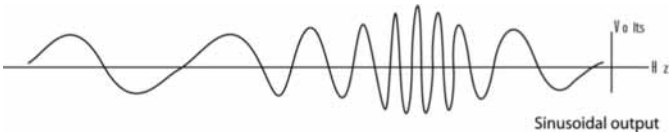
Principles of Operation

Electromagnetic

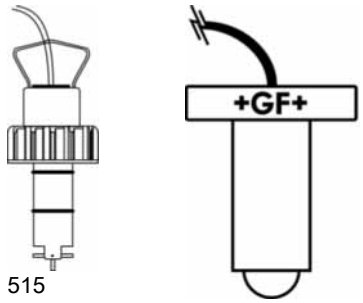
flow sensors, like Signet models 2551 and 2552 operate on Faraday's principle of electromagnetic induction, and have no moving parts. As fluid (must be conductive >20 μS) moves through the magnetic field produced at the sensor tip, a voltage occurs that is directly proportional to the fluid velocity. Internal electronics then convert this voltage into a frequency and/or a 4 to 20 mA output. Signet electromagnetic flow sensors are insertion-style, suitable for use in a wide range of pipe sizes.

2551

Paddlewheel flow sensors are insertion devices, mounted perpendicular to the piping system, and rely upon the energy in the flow stream to spin a rotor (paddlewheel) around a stationary shaft. Most paddlewheel flow sensors utilise rotors with magnets embedded in each blade. The magnets are typically used either in conjunction with a coil internal to the sensor housing to produce a sinusoidal output (self-generating, non-powered sensors), or to trigger an internal electronic switch to produce a square-wave output (transistor-type, powered sensors). Either way, the resulting frequency is directly proportional to the fluid velocity.



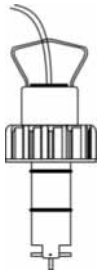
1) Sinusoidal sensors output a signal typical of self-generating, nonpowered paddlewheel sensors such as the model 515, 525. The frequency and amplitude (voltage) both vary directly with flow rate.



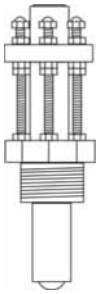
515

525

2) Transistor-type sensors output a signal typical of powered sensors such as the model 2536, 2540, and all other Signet powered flow sensors with frequency output.

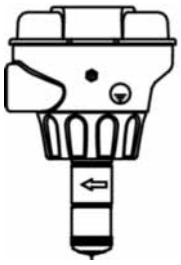


2536



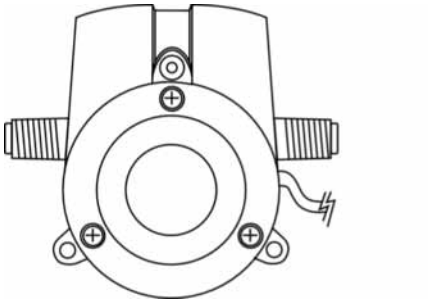
2540

2537

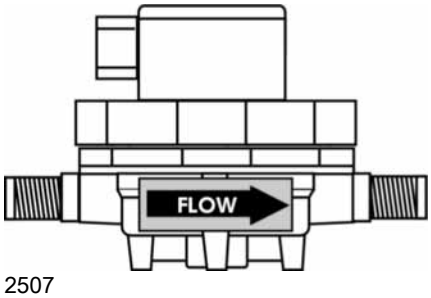


2551

In-Line rotor flow sensors like the Signet models 2000 and 2507 are similar to paddlewheel sensors, except the rotor is positioned in a flow cell. These types of sensors have a transistor-type output signal and are able to measure lower flow rates.

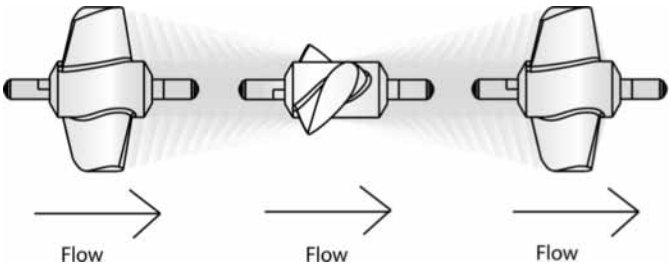


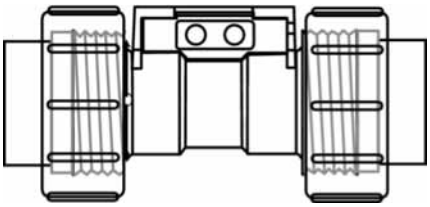
2000



2507

Turbine flow sensors are full-bore devices designed for low-flow measurements. Signet model 2100 is offered in 6.4 mm and 12.7 mm (1/4 in. and 1/2 in.) line sizes. Many self-aligning end connector options are available for installation simplicity and application versatility. Similar to paddlewheels, they rely upon the energy in the flow stream to spin a rotor (turbine). The difference is that the shaft is in the centre of, and parallel to, the flow stream. The velocity of the fluid spins the turbine for detection by external electronic circuitry, producing a transistor-type square wave output with a frequency directly proportional to the flow rate.





2100

Flow Range Charts (GPM)

Paddlewheel and Electromagnetic Sensors

Signet models 515, 525, 2536, 2537, 2540, 2551, 2552 GPM flow rates for DN15 to DN450 (1/2 in. to 18 in.) pipe sizes

Nominal Pipe Size		2551/2552		2536/8512/2537/2540		515 and 8510		525	
Inch	Metric DN (mm)	Min	Max	Min	Max	Min	Max	Min	Max
		0.15 ft/s	33 ft/s	0.3 ft/s	20 ft/s	1 ft/s	20 ft/s	1.6 ft/s	20 ft/s
0.5	15	0.14	31.25	0.28	18.94	0.95	18.94	1.52	18.94
0.75	20	0.25	54.85	0.50	33.24	1.66	33.24	2.66	33.24
1	25	0.40	88.89	0.81	53.88	2.69	53.88	4.31	53.88
1.25	32	0.70	153.84	1.40	93.24	4.66	93.24	7.46	93.24
1.5	40	0.95	209.40	1.90	126.91	6.35	126.91	10.15	126.91
2	50	1.57	345.15	3.14	209.18	10.46	209.18	16.73	209.18
2.5	65	2.24	492.45	4.48	298.46	14.92	298.46	23.88	298.46
3	80	3.46	760.39	6.91	460.84	23.04	460.84	36.87	460.84
4	100	5.95	1309.40	11.90	793.57	39.68	793.57	63.49	793.57
5	125	9.35	2057.74	18.71	1247.12	62.36	1247.12	99.77	1247.12
6	150	13.51	2971.57	27.01	1800.95	90.05	1800.95	144.08	1800.95
8	200	23.39	5145.63	46.78	3118.57	155.93	3118.57	249.49	3118.57
10	250	36.87	8110.73	73.73	4915.59	245.78	4915.59	393.25	4915.59
12	300	52.33	11512.97	104.66	6977.56	348.88	6977.56	558.20	6977.56
14	350	-	-	126.49	8432.82	421.64	8432.82	-	-
16	400	-	-	165.24	11015.97	550.80	11015.97	-	-
18	450	-	-	209.16	13943.74	697.19	13943.74	-	-

Flow Range Charts (LPM)

Paddlewheel and electromagnetic sensors

Signet models 515, 525, 2536, 2537, 2540, 2551, 2552
LPM flow rates for DN15 to DN450 (1/2 in. to 18 in.)
pipe sizes

Nominal Pipe Size		2551/2552		2536/8512/2537/2540		515 and 8510		525	
Inch	Metric DN (mm)	Min	Max	Min	Max	Min	Max	Min	Max
		0.05 ft/s	33 ft/s	0.1 ft/s	6 ft/s	1 ft/s	20 ft/s	1.6 ft/s	20 ft/s
0.5	15	0.6	117.6	1.2	70.6	3.5	70.6	5.9	70.6
0.75	20	1.0	206.4	2.1	123.9	6.2	123.6	10.3	123.9
1	25	1.7	334.5	3.3	200.7	10.0	200.7	16.7	200.7
1.25	32	2.9	579.0	5.8	347.4	17.4	347.4	28.9	347.4
1.5	40	3.9	788.1	7.9	472.8	23.6	472.8	39.4	472.8
2	50	6.5	1298.9	13.0	779.4	39.0	779.4	64.9	779.4
2.5	65	9.3	1853.3	18.5	1112.0	55.6	1112.0	92.7	1112.0
3	80	14.3	2861.7	28.6	1717.0	85.9	1717.0	143.1	1717.0
4	100	24.6	4927.8	49.3	2956.7	147.8	2956.7	246.4	2956.7
5	125	38.7	7744.2	77.4	4646.5	232.3	4646.5	387.2	4646.5
6	150	55.9	11183.3	111.8	6710.0	335.5	6710.0	559.2	6710.0
8	200	96.8	19365.3	193.7	11619.2	581.0	11619.2	968.3	11619.2
10	250	152.6	30524.2	305.2	18314.5	915.7	18314.5	1526.2	18314.5
12	300	216.6	43328.4	433.3	25997.0	1299.9	25997.0	2166.4	25997.0
14	350	-	-	523.7	31419.1	1571.0	31419.1	-	-
16	400	-	-	684.1	41043.4	2052.2	41043.4	-	-
18	450	-	-	865.9	51951.7	2597.6	51951.7	-	-

Flow Range Charts (GPM and LPM)

In-line rotor and turbine sensors

Signet models 2000, 2100, and 2507 GPM and LPM
Flow Rates

		GPM		LPM	
Model and Size	Description	Min	Max	Min	Max
3-2000-1X	Micro flow - low	0.030	0.700	0.110	2.600
3-2000-2X	Micro flow - high	0.300	3.200	1.130	12.110
3-2100-XL and -31 kits	Turbine low - 1/2" tubing	0.100	1.000	0.380	3.800
3-2100-XL and -32 kits	Turbine low - 3/8" tubing	0.100	1.000	0.380	3.800
3-2100-XL and -33 kits	Turbine low - 1/4" tubing	0.100	1.000	0.380	3.800
3-2100-XL and -34 thru -38 kits	Turbine low - 1/2" pipe	0.100	1.000	0.380	3.800
3-2100-XL and -40 kits	Turbine low - 1/2" flare	0.100	1.000	0.380	3.800
3-2100-XL and -41 kits	Turbine low - 3/8" flare	0.100	1.000	0.380	3.800
3-2100-XL and -42 kits	Turbine low - 1/4" flare	0.100	1.000	0.380	3.800
3-2100-XH and -31 kits	Turbine high - 1/2" tubing	0.800	10.000	3.000	38.000
3-2100-XH and -34 thru -38 kits	Turbine high - 1/2" pipe	0.800	10.000	3.000	38.000
3-2100-X and -40 kit	Turbine high - 1/2" flare	0.800	7.000	3.000	27.000
3-2507-100-2V	Mini-flow - 2mm insert	0.106	0.740	0.500	2.800
3-2507-100-3V	Mini-flow - 3mm insert	0.198	1.123	0.750	4.250
3-2507-100-4V	Mini-flow - 4mm insert	0.330	1.585	1.250	6.000
3-2507-100-6V	Mini-flow - 6mm insert	0.792	3.170	3.000	12.000

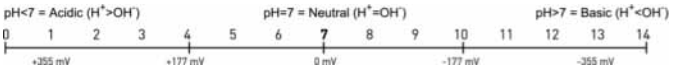
Section: pH/ORP

Information in this section addresses frequently asked questions regarding pH & ORP and is provided as REFERENCE ONLY to supplement procedures and recommendations specifically outlined in individual product instruction manuals. All manuals, data sheets, and additional helpful information are available at www.gfsignet.com

Definition of pH

pH is defined as the negative logarithm of the hydrogen ion concentration in aqueous solutions. The common pH scale ranges from 0 to 14, with 7 being neutral water (H_2O). At pH 7, hydrogen ions (H^+) exist in equal concentration to hydroxyl ions (OH^-). A solution is considered to be acidic if the concentration of H^+ exceeds that of OH^-, and is indicated by pH values below 7. Conversely, a solution is considered to be basic if the concentration of H^+ is less than that of OH^-, and is indicated by pH values above 7.

pH Scale



(Theoretical: 59.16 mV/pH @ 25°C)

Common Acids
1M HCl: 0.0 pH
Sulfuric acid: 0.3 pH
Lemon juice: 2.0 pH
Vinegar: 3.0 pH
Wine: 3.5 pH
Beer: 4.5 pH
Milk: 6.0 pH

Common Bases
Egg whites: 7.5 pH
Seawater: 8.0 pH
Sodium bicarbonate: 8.4 pH
Ammonia: 11 .6 pH
Photo developer: 12.0 pH
0.1M NaOH: 13.0 pH
Lye: 14.0 pH

Definition of ORP

ORP is an abbreviation for **O**xidation-**R**eduction Potential. Oxidation is a term used to denote the occurrence of a molecule losing an electron. Reduction occurs as a molecule gains an electron. The “potential” is simply an indication of a solution’s propensity to contribute or accept electrons. ORP reactions (sometimes referred to as REDOX) always take place simultaneously. There is never oxidation without reduction, and ORP electrodes are used to detect electrons exchanged by molecules as these reactions occur.

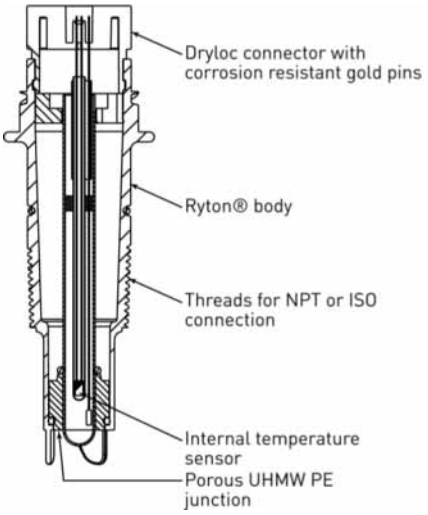
Both pH and ORP electrodes produce voltages that depend on the solutions in contact with their sensing ends. Most pH electrodes, including the GF Signet brand, are designed to produce 0 mV at pH 7, positive mV below pH 7 (associated with the charge of the hydrogen ion, H^+) and negative mV above pH 7 (associated with the charge of the hydroxyl ion, OH^-). According to the Nernst equation, the interval between each pH unit is approximately 59.16 mV at 25 °C. This “raw” output is converted to a pH value by the display instrument. The ORP scale is typically - 1000 mV to +1000 mV, and the electrodes produce these values directly.

Whereas pH is a specific measure of the hydrogen ion concentration in solution, ORP only provides relative measures of chemicals and cannot discriminate one from another. Although non-specific, it is a very useful and inexpensive method of monitoring and controlling the activity of such compounds as chlorine, ozone, bromine, cyanide, chromate, and many other chemical reactions.

It is worth noting that temperature compensation, very important for accurate pH measurement, is NOT used in ORP measurements. Temperature does indeed affect the reactionary potential of all chemicals, some to a greater extent than others. But even if the affects of temperature could be precisely known in all of the many different REDOX reactions, it would not be desirable to remove them from the measurement. True ORP is the direct measurement of electrons in transit during oxidation-reduction reactions, regardless of temperature.

Principle of Operation

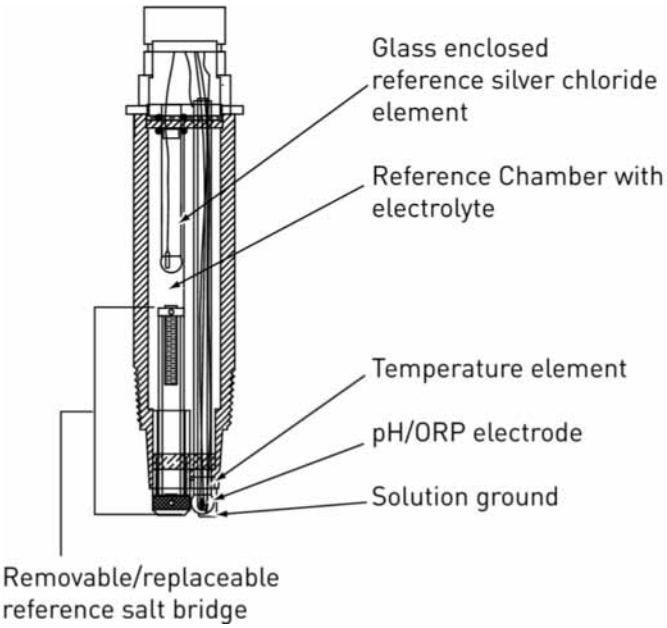
Standard pH/ORP electrodes are also commonly called combination electrodes; a pH/ORP measuring electrode and a reference measuring electrode are combined in a single body. The pH/ORP sensor measures the amount of hydrogen ions in the liquid. The pH signal is measured against the steady reference signal. Various chemical elements leaching through the porous reference junction can react with the reference electrolyte, dilute the electrolyte solution, or attack the silver chloride element; in either case, it will disturb the steady reference signal. Stray electrical currents will also affect the steady reference signal. A temperature element is also built into the pH/ORP combination electrode. Instruments interpret and temperature compensate the pH/ORP and reference signals into pH/ORP readings at 25 °C (77 °F).



Standard pH/ORP electrode: GF Signet offers three different groups of standard pH/ORP electrode models, 2724 - 2726, and 2774 - 2777

Differential pH/ORP electrodes function similar to the standard (combination) electrodes, but the reference design is modified and there is a third electrode, the solution ground. The pH and reference electrodes are measured against the solution ground. The solution ground drains stray currents away from the reference element, hence maintaining a steady signal at all times. The reference salt bridge slows or stops various chemical elements from leaching into the reference chamber. Chemicals that leach in may dilute the electrolyte but

will not react with the glass-encased reference silver chloride element. The reference electrolyte can be refreshed if it is diluted or depleted. The temperature element is embedded in the pH/ORP electrode for an extremely quick response.



Differential pH/ORP electrode: Signet offers one group of differential pH/ ORP electrodes, models 2764 - 2767

Standard versus Differential pH/ORP Electrodes

GF Signet offers what is called combination pH/ORP electrodes; that is, there is a combination of three or four electrodes built into one common body that measures the pH or ORP of the solutions. These electrodes are the pH/ORP sensing element, temperature sensing element (pH only), the reference, and sometimes a solution ground. An electrical path between the process solution, reference electrode, and the pH/ORP sensing electrode must always be present to complete the measuring circuit. When the circuit is broken or interrupted, the result is a faulty reading. There are only a few things in a chemical process that would affect the glass-sensing element. These include concentrations of HF, constant high temperatures, and particles that can break the glass.

On the other hand, there are many problems that can occur with the reference electrode. The reference silver chloride sensing element (wire) is exposed to the process liquid via the primary porous reference junction, which is in constant contact with the process and allows liquid to pass through to the reference electrolyte. Because of the direct contact with the process liquid, the reference electrolyte and reference silver chloride sensing element can react with chemicals in the process. Many application liquids do not chemically react with the reference and therefore a standard electrode will perform well in this scenario. However, there are other process chemicals that will easily attack the reference and therefore, a differential style electrode should be used. There are three advantages of the differential electrode:

1. If the process chemicals attack the KCl electrolyte, the reference electrolyte chamber is refillable.
2. If the reference junction becomes clogged by chemical reactions between the KCl and the process chemicals, the reference salt bridge is replaceable.
3. If there are stray currents or if there are process chemicals that attack the silver chloride wire in the standard electrodes, it will not attack it in the differential electrode because the wire is encased in a glass electrode.

A general rule of thumb is to use a differential electrode if you have mercury, copper, lead, chlorate, bromine, iodine, cyanide, or sulfide compounds in the process liquid. Differential electrodes may also be useful in processes that have oil, grease, or dirt that builds up on the reference junction because it is easily replaced.

See Model 2764-2767 Differential pH/ORP catalog pages for more information on standard versus differential electrodes.

Important Application Tips

- It is important that the sensing end of pH and ORP electrodes remain wet, for they may be permanently damaged if allowed to dehydrate. This is true for both in-line and submersible installation configurations. However, be careful to keep the electrical interconnection between electrode and preamplifier dry and clean at all times. Moisture in this area can also cause permanent damage.
- Some pH and ORP electrode models should be installed greater than ±30 ° above the horizontal plane, so the internal solutions remain in contact with the sensing ends. Other electrodes allow horizontal or inverted installation. See individual sensor models for more information.
- pH control is best when performed in a tank. This is especially true in neutralisation applications since it is very important for reagents to mix thoroughly with waste fluids, and to be allowed adequate time for the reactions to occur. Limiting adjustments to fewer than 3 pH units per stage, and sizing tanks to provide at least 10 minutes retention time, will increase the probability of producing safe effluents.
- For bulb-style pH and ORP electrodes, significant natural self-cleaning by turbulent eddies is achieved at velocities of 1.5 m/s or more (5 ft/s). Flat surface electrodes get adequate self-cleaning at velocities of 0.3 to 0.6 m/s (1 to 2 ft/s). In all cases, exposure to velocities greater than 3 m/s (10 ft/s) can cause excessive measurement noise and electrode wear and should be avoided.
- Simply stated, the aging of pH and ORP electrodes (i.e., reference depletion and decreased glass sensitivity) results from a series of chemical reactions. And as a general rule, the rates of chemical reactions double with every increase of 10 °C (50 °F). This means shorter life expectancy for all pH and ORP electrodes as application temperatures increase.
- HF acid and strong caustics etch pH glass. High concentrations, especially at high temperatures, destroy electrodes quickly. For applications containing trace quantities of HF (<2 %), use the Signet 3-2726-HF electrode. This electrode has a polymeric constituent in the pH glass that resists attack by HF and extends the service life considerably over “normal” electrodes.
- In applications where process temperatures will drop below 10 °C (50 °F), use the bulb-style electrodes in place of the flat-style electrode. This is a function of the electrical impedance of the glass that increases dramatically as temperature decreases.
- Proper electrode placement within a tank is also very important. Electrodes should be mounted in well-mixed areas, away from reagent and waste introduction. It is usually advisable to position the electrode near the discharge outlet of the tank.
- In-line pH control is not recommended because it is very difficult to determine the amounts of reagent necessary to achieve a desired reaction if both pH and flow are variables. However, in-line pH monitoring is very common and useful.

Maintenance Tips

- Cleaning pH and ORP electrodes and calibrating the systems should be done regularly. The required frequency is application-dependent, but once/week for cleaning, and twice/month for calibration is recommended.
- Isopropyl alcohol may be used for removing mild grease and oils from the pH sensitive glass or from the metallic tips of ORP electrodes. Use 5 % HCl on porous reference junctions clogged with hard water deposits, or other solvents/detergents as necessary. Always consider the electrode’s materials of construction when selecting a cleanser.
- The purpose of calibration is to compensate the system for the continual changes occurring within the electrodes. Like batteries, all pH and ORP electrodes eventually deplete and must be replaced. A good time to determine the condition of an electrode is after cleaning and during calibration. Note the mV readings in pH buffers and replace the electrode if its actual mV output differs more than 50 mV from these theoretical values: pH 7 = 0 mV, pH 4 = +177 mV, pH 10 = -177 mV. Replace an ORP electrode if its actual mV output differs more than 50 mV from the theoretical values in the table below:

ORP values of standard pH buffers saturated with quinhydrone

	pH4			pH7		
Temperature (°C)	20	**25**	30	20	**25**	30
ORP value (mV)	268	**264**	258	92	**87**	79

- The typical shelf-life recommendation for GF Signet pH and ORP electrodes is 12 months at 25 °C (77 °F).
- Refrigeration will extend this period, but do not allow them to freeze! Expansion of internal solutions during freezing can cause permanent damage to the electrodes.
- The risk of putting older electrodes into service is the possible disappointment of shorter than expected service life. All Signet pH and ORP electrodes are marked with date codes to identify the date of manufacture.

Section: Conductivity/Resistivity

Information in this section addresses frequently asked questions regarding conductivity (resistivity) and is provided as REFERENCE ONLY to supplement procedures and recommendations specifically outlined in individual product instruction manuals. All manuals, data sheets, and additional helpful information are available at www.gfsignet.com.

Definition of Conductivity and Resistivity

Conductivity is a measure of the ability of a material to convey an electric current. The proper term for this ability of a solution is electrolytic conductivity since only ions conduct electric current in solution. When dissolved in solution, many substances such as salts, acids and bases dissociate into ions. Electrolytic conductivity (or simply conductivity) is therefore an indirect measure

of the ionic concentration of a solution. Generally, conductivity increases and decreases with the concentration of ions.

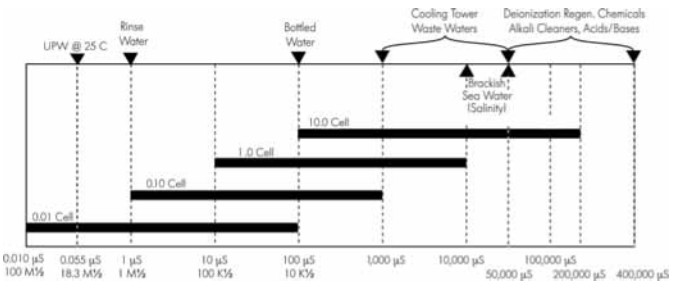
Unlike pH, which is a specific measure of hydrogen ion concentration, conductivity is a non-selective measurement of all the dissolved ionic species in a solution. As such, it is a highly utilised parameter in water, waste water and industrial process analyses. For example, conductivity is used to monitor the salt load of waters entering treatment facilities, to monitor and control the quality of drinking water and ultra pure water, and to otherwise detect contaminants in industrial processes.

According to the International Standards Organization (ISO) the unit of conductance is the Siemens (S), after Werner von Siemens (1816-1892). However, the following three separate units of measure are commonly used to express conductivity: Siemens/cm (S/cm), mhos/ cm, and µS/cm. For any given measurement Siemens/cm and mhos/cm are exactly equal; they are merely different labels for the same value. The denominator in these units (cm) is sometimes truncated but is always assumed to be present.

Ohm·cm is a unit of resistivity (the inverse of conductivity) and is frequently replaced by "Ω" the symbol for electrical resistance. Units of resistivity are most commonly associated with ultra pure water measurements in the millions of ohm·cm, or MΩ (megohms).

Some users will also find it desirable to express conductivity in terms of parts per million (PPM) or parts per billion (PPB) of total dissolved solids (TDS). GF Signet instruments accommodate this by allowing the entry of a TDS factor to convert from standard units of conductivity. (See the instruction manual of any current GF Signet conductivity instrument for details.)

Conductivity is a measurement parameter with a very wide range. For example, ultra pure water has a theoretical maximum resistivity of approximately 18.3 MΩ, approximately 0.055 µS (microsiemens), whereas concentrated acids and bases can exceed 400,000 µS. Despite the wide-ranging possibilities most applications for conductivity measurement are much narrower. Tap water, for instance, typically measures between 50 and 1,000 µS.

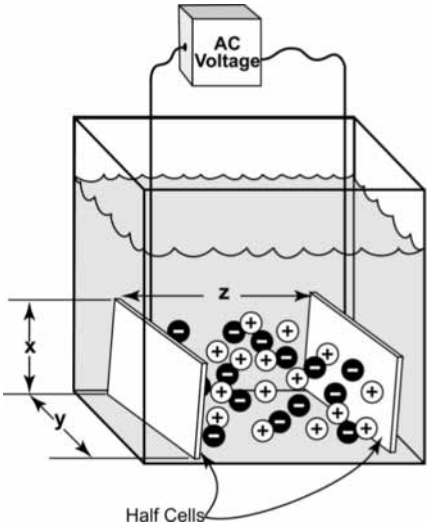


Principle of Operation

Most conductivity electrodes consist of two measuring half-cells. The geometry of the half-cells can be tailored to provide highly accurate measurements over a specific conductivity range. Cell constants help to describe electrode geometry for the purpose of selecting the appropriate electrode for a given application. A cell constant is defined as the length between the two half-cells divided by the area of the cells.

Conductivity cell constant = Length/CSA = z/xy
As an example, When x = y = z = 1cm the cell constant becomes 1cm/1cm² = 1cm-1

*CSA is cross-sectional area.



Solutions of very low conductivity (high resistivity) such as ultra pure water are best measured with half-cells that are very close together (i. e., cell constant = 0.01 cm^{-1}). Highly conductive solutions should be measured with half-cells that are farther apart and that have relatively little cross-sectional area between them (i. e., cell constant = 20.0 cm^{-1}).

Temperature Compensation

The conductivity of a solution is highly dependent upon temperature. Therefore, conductivity measurements are almost always converted to an equivalent conductivity at the common reference temperature of 25 °C (77 °F). This is accomplished by means of temperature compensation algorithms in the instruments, which require temperature as well as conductivity measurement input. To simplify and facilitate this requirement all GF Signet conductivity electrodes contain high-quality temperature sensing elements intelligently positioned for quick and accurate response.

Temperature effects on conductivity are more or less linear for normal water-based solutions, hovering around 2 % per °C. However, the actual linear relationship varies considerably with the ionic composition of the solution and can range from less than 1 % to more than 3 % per °C. This is true of regional ground water sources as well as for other solutions such as brackish water, acids and bases. Signet instruments allow the entry of custom linear compensation coefficients for these applications. See the instruction manual of any GF Signet conductivity instrument for details. The conductivity or resistivity of pure water is not a linear function with respect to temperature. In fact, the latest GF Signet conductivity instruments utilise a sophisticated polynomial to compensate for the peculiar effects. For seamless measurement accuracy all current GF Signet conductivity instruments switch automatically between linear and pure water compensation as certain measurement thresholds are crossed.

Temperature Compensation Exception

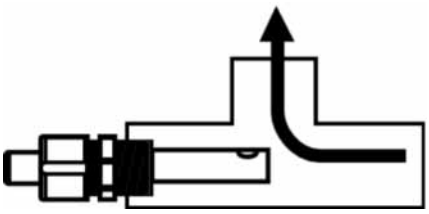
One exception to the requirement for temperature compensation has been established by USP (United States Pharmacopeia), which prescribes limits of acceptability for ultrapure water quality based upon non-com-

pensated measurements. This methodology is used to eliminate measurement variances that may result from differences in the pure water temperature compensation algorithms used by different manufacturers of conductivity measurement equipment. A more thorough treatment of the USP standard and instrument functionality can be found in the instruction manuals of the following GF Signet conductivity instruments: Model 8900 Multi-Parameter Controller, Model 8860 Dual Channel Conductivity/Resistivity Controller.

Important Application Tips

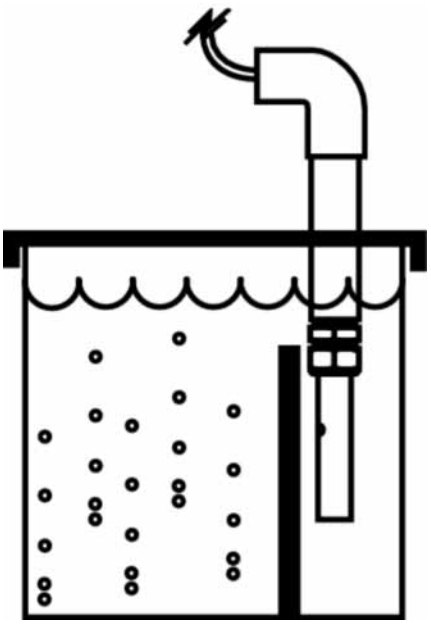
The two basic installation configurations for conductivity electrodes are in-line and submersible. In-line configuration refers to installation into a piping system as opposed to submersion in a tank. In either case the primary considerations are to minimise the propensity for air entrapment inside and/or around the electrode and to position the electrode for representative exposure to the process.

In-Line Installation
For in-line configurations it is best to install the electrode in the “dead leg” of a tee fitting. That is, use a tee fitting in place of an elbow and install the electrode in the horizontal plane. Best results will be obtained if fluid flows into and around, then up and away from the electrode. Be sure that at least one of the holes in a flow-through electrode is facing upward to allow air bubbles to escape.



Upward flow is the preferred installation when mounting the sensor in a tee.

For submersible installation when conductivity electrodes are submerged in tanks beware of mechanical mixers, sparges and inlets as potential sources of air bubbles. Baffles may be used to create more favourable conditions for reliable continuous conductivity measurements. If the application is such that sediment is likely to accumulate on the bottom of the tank, then position the electrode to avoid it being smothered by debris.



Mounting a submersed sensor on the side of the baffle that is free of air bubbles is preferred.

Most GF Signet conductivity electrodes are supplied with a standard 4.6 m (15 ft) of cable. Generally, this can be extended up to a maximum of 30 m (100 ft). If splicing in the field, then use good quality 3-conductor shielded 22 AWG cable and be sure to maintain the shield through the splice. Electrode cable should be routed separately from power wiring. The maximum allowable cable length for resistivity measurements above 10 MΩ (below 0.1 µS) is 7.6 m (25 ft), except for the model 2850 conductivity sensor which allows cable lengths of almost 915 m (3,000 ft) for all measurements.

The primary purpose of calibration is to compensate the system for possible changes occurring to the electrode’s cell constant. Since the cell constant accuracy of all GF Signet conductivity electrodes is tightly controlled, and since brand new electrodes should be allowed to “soak” overnight prior to calibration, “out-of-the-box” calibration of conductivity systems is not recommended.

Maintenance Tips

Conductivity electrodes are not inherently perishable as pH and ORP electrodes. This means system calibrations and electrode replacements are typically not required as frequently. However, depending upon the application, conductivity electrodes may require periodic cleaning to remove coatings, algae growth, scale build-up, etc. Use isopropyl alcohol for removing mild grease and oils, and/or other cleansing agents as necessary. Always consider the electrode’s materials of construction when selecting a cleanser.

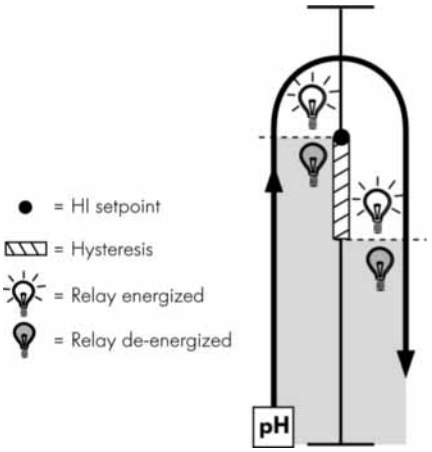
The shelf-life of GF Signet conductivity electrodes is limitless. However, oxidation can cause cell constants to drift over time. If there is any doubt about an electrode’s condition, then clean it thoroughly before placing it into service.

When installing new electrodes, it is recommended to “soak” the electrode into the process solution for several days before the first use. This will condition the surfaces of the electrode.

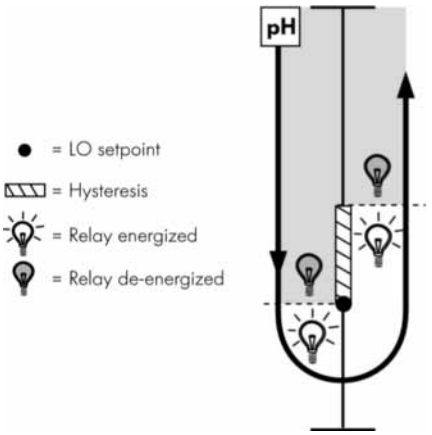
Relay Information

The two most common methods of controlling a process are “on/off” and “proportional” control. In on/off control, relay setpoints are defined as either high or low limits on the process variable. When the measurement value reaches a limit the relay is energized, typically for the purpose of opening a valve or starting a pump to introduce a chemical reagent to the process. This should cause the measurement value to change in the direction of the setpoint as shown in these on/off control diagrams:

High limit on/off relay control



Low limit on/off control

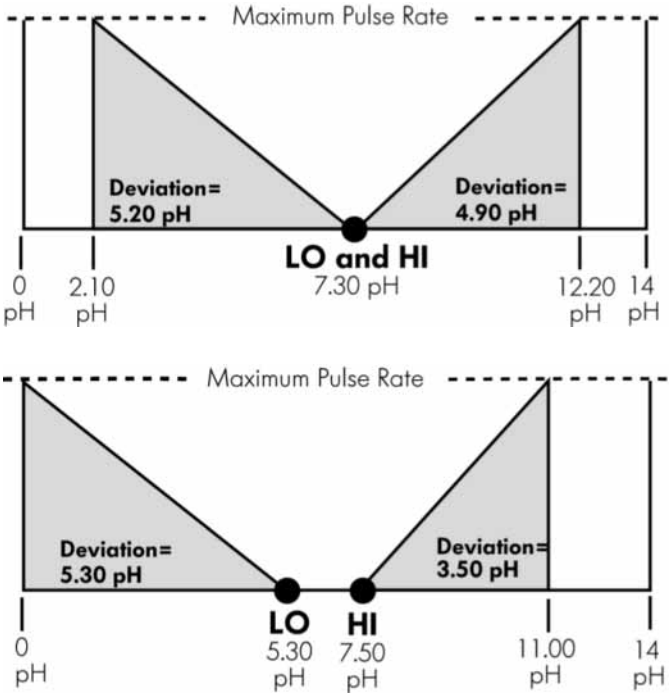


Notice the relay will not de-energize until the setpoint is exceeded by the hysteresis value. This is a programmable value and is primarily used to prevent ”relay chatter”, which occurs if a relay is set to energize and de-energize at the same value. Because of hysteresis, and because reagent delivery is fairly constant while the relay is energized, a condition known as “overshoot” is inherent to the on/off control method. Overshoot refers to the introduction of more chemical reagent than is absolutely necessary for achieving a desired adjustment to the process value, and can be expensive over time.

Proportional control is a popular alternative to the on/off control method. This method typically makes use of variable rate metering pumps to reduce overshoot and improve precision. Establishing a proportional control scenario requires the selection of setpoint(s), deviation range(s) and maximum pulse rates. The example shown here illustrates how two relays in ”pulse mode” can be used to proportionally control pH within a desired range, or to a single setpoint. This is called “Dual Proportional Control”. Of course, a single relay in proportional pulse mode can be used to establish a high or low limit and will also reduce overshoot.

Metering pumps are idle at and between setpoints. When a setpoint is exceeded, the pump begins delivering reagent at a rate proportional to the difference between the measurement value and the setpoint. The larger the difference, the faster the delivery. The programmed deviation value defines how quickly the maximum pulse rate is reached. Depending on the input requirements of the metering pump, proportional control can also be accomplished with scaleable 4 to 20 mA outputs instead of pulsing relays or open collectors.

Dual proportional pulse relay control



Open collector output

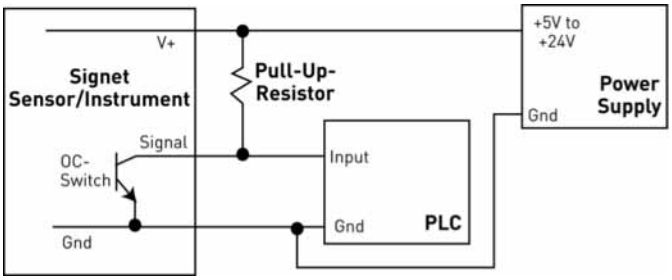
Many GF Signet instruments and sensors feature “Open Collector Outputs” for purposes of signal transmission, alarming, control signal output, etc. Although such outputs allow for a lot of wiring flexibility, care must be taken not to destroy the circuits via incorrect polarity, over-voltage, transients or current overload. Below is an explanation of proper wiring and dimensioning of related circuit components. Please note that the following recommendations may or may not apply to other manufacturer’s equipment.

1. Function

Open Collector (“OC”) outputs are low-powered, solid state switches. Although the term “Open Collector” stipulates the use of bipolar transistors (NPN-type or PNP-type) as a switch, nowadays Field Effect Transistors (FET or MOSFET) are used. Unlike electromechanical switches (e. g. pushbuttons or dry contact relays) these OC switches are very fast, use little power, are inexpensive, do not bounce and do not wear. However, OC’s are also more limited in terms of voltage and current rating as well as being polarized (i. e. they have a “plus” and “minus” terminal and thus DC only switching capability). They are less tolerant to overload abuse than electromechanical devices. Usually these switches have higher resistance and voltage drop.

2. Sensor Wiring

A typical example of the need for high speed switching capability is the OC frequency output of GF Signet flow sensors like 3-2536 or 3-2540. Signal frequencies can reach several hundred pulses per second while voltage and current requirements are small enough, allowing the use of a transistor switch. For each output pulse this switch connects the signal output to the negative supply or ground terminal of the sensor and is therefore an "NPN" style output. GF Signet does not produce sensors with PNP style outputs (which connect the signal output internally to the positive supply terminal). Most indicating instruments or control system inputs require a signal voltage of 0 to 5 V (TTL or CMOS logic levels) or 0 to 24 V. Therefore, Open Collector output circuits must be complemented with a "Pull-Up-Resistor" to function properly. Please see the following example diagram for wiring with a PLC input:



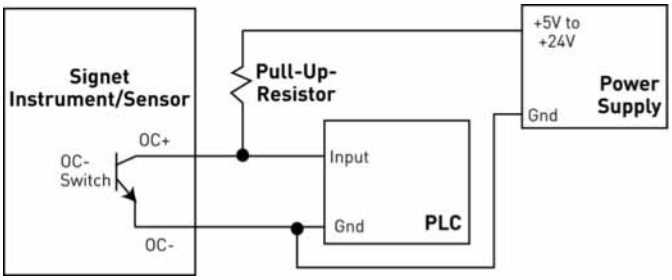
Do not exceed the absolute maximum voltage rating of the OC output as listed in the sensor specifications, normally 27 or 30 Volt, DC only. This includes changes to power line fluctuations, transients or power supply instability, otherwise damage to the OC will occur.

Please note that the voltage connected to the positive sensor supply (V+) must correspond to the required high-level PLC input voltage (i.e. if the high-input voltage of the PLC is 24 V, then the pull-up must be supplied with 24 V). If the input is "TTL-Level" or "CMOS-Level", that means 5V for high level, then the pull-up should not be connected with a supply higher than 5 V.

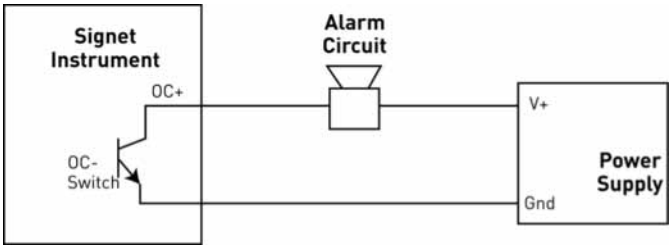
3. Instrument Output Wiring

Open collector control and alarm outputs on Signet instruments (i. e. ProcessPro or ProPoint series) are electrically isolated from the instrument's power supply. That means these can be used in the above mentioned NPN configuration as well as in PNP configuration, if required. Below are a few sample circuits:

PLC wiring "NPN" style

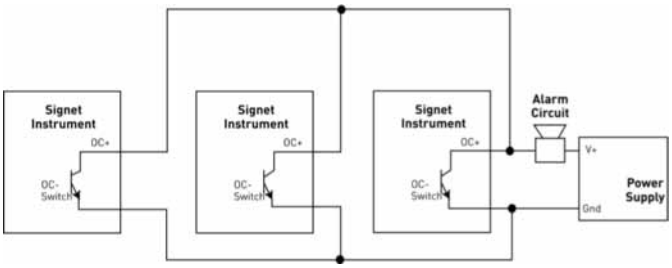


Alarm circuit or alarm lamp wiring to a single Signet instrument



Alarm circuit or alarm lamp wiring to serve multiple Signet instruments

(Triggers the alarm if any one of the instruments open collector outputs are on)



4. Voltage and Current Limitation

As mentioned before, the supply voltage in the OC output circuit MUST be limited to the specified maximum OC voltage (see operating manual for specific instrument). The use of a quality regulated 5 V, 12 V or 24 V (depending on the application) power supply is recommended.

Depending on the stability of the main power line and the location, it may be necessary to use additional overvoltage protection components or lightning arrestors. Similarly, the current through the open collector switch must be limited. Typical OC outputs allow only for 10 to 50 mA switch current (please consult manual). Exceeding this current limit can burn out the OC output components immediately. Please see the following section on how to dimension the loads.

5. Load and Pull-Up/Down Resistor Considerations

By utilising basic arithmetic and Ohm's law, one can determine the safe limits of load resistance. When the OC switch is closed, almost the entire supply voltage is applied to the load, (i. e. the pull-up or pull-down resistor, the alarm horn input, a potential power relay coil or annunciator lamp). The resulting current through the load and through the OC switch, as well, can be calculated as:
(Current) = (Supply Voltage)/(Load Resistance)

- **Example 1:**
  The supply voltage is 24 V and a pull-up resistor of 10kΩ is used. Current is 24/10,000 = 2.4 mA (If the OC current rating is 10 mA, then in this example, it would be considered safe).
- **Example 2:**
  The supply voltage is 12 V and a horn with a resistance of 100Ω is used. Current is 12/100 = 120 mA (Even if the OC current rating is 50 mA, this load will damage the instrument).

6. Transient Protection

There are several “difficult” load cases that must be considered:

- **Inductive loads:** These can be power relay or other solenoids, motors, alarm horn coils, etc. Such loads generate very high voltage spikes when the OC switch is turned off. If such a load is unavoidable, the use of transient suppression components or RC filters (or snubbers) wired parallel to the load is required. This is critical, as a single transient pulse may destroy the output.
- **Capacitive loads:** This type of load should be rare but can occur if the load contains an internal power supply/regulator that is fed from the OC output circuit. In such a case, it must be assured that the in-rush current does not exceed the OC current rating.
- **Incandescent lamps:** Such lamps have a very high start-up current until the filament glows and the current settles to the specified value. The use of incandescent lamps on an OC output is not recommended. An LED type annunciator should be used instead.

7. "Active High" and "Active Low" Setting

Depending on the desired function of the circuit attached to the OC output, it may be necessary to have the OC output switch turned “on” or “off” when the criteria for the activation of this output are met.

By default, GF Signet instruments are set to operate in “active low” mode. This means when the user-defined condition for the activation is met (e. g. exceeding of an alarm limit) the OC switch is turned “on”. If wired as standard “NPN-style” output (see previous page) the logic level of the attached control system or PLC input consequently becomes “low” logic level.

If a high input logic level is required for activation, it can be accomplished in two ways:

- wire the OC output “PNP” style as described on the previous page
- change the OC output function to “active high” in the menu system of the instrument. Most Signet instruments allow for this option.

8. Fail-Safe Behaviour

No matter what the setting, all OC outputs of GF Signet instruments turn off when the instrument loses power. This must be taken into account when evaluating system failure consequences. If the system layout requires a “closed” or “on” condition for the output in case of power loss, a mechanical dry contact relay (NC contacts) must be used instead of the OC output.

Control Output Comparisons

Control Outputs

Many Signet products offer control outputs that can be categorized into three categories: Mechanical Relay, Solid-State Relay and Open Collector. Each control output offers benefits and limitations based on the application requirements. See below for comparisons.

Open Collector

Benefits:

- Longer life than a Mechanical Relay
- No moving parts
- Can switch DC voltage only (typically $\leq$ 30VDC)
- Faster ON/OFF switching capabilities than Mechanical Relays

Considerations:

- Can only be used with DC voltage
- Polarity very important when wiring
- Not recommended for use with inductive loads
- Lower voltage and current ratings than Mechanical Relays
- Typically should not apply current **>**25mA

Solid-State Relays

Benefits:

- Has isolated outputs (optically)
- Can switch DC voltage (typically $\geq$ 40VDC)
- Can switch AC voltage (typically $\geq$ 33VAC)
- Longer life than a Mechanical Relay
- No moving parts
- Faster ON/OFF switching capabilities (Equal rise/fall times)

Considerations:

- Not recommended for use with:
  Inductive loads (ex. Solenoid, Pumps)
  If using inductive loads, snubbers (RC Filter) can prevent IC damage
- Lower voltage and current ratings than Mechanical Relays

Mechanical Relays

Benefits:

- Can switch line voltage (typically $\geq$ 120 to 240 VAC)
- Can switch DC voltage (typically $\geq$ 30VDC @ 5A)
- Has a large current rating (typically 5A to 10A)
- Larger voltage and current ratings than Solid-State Relay and Open Collector Outputs

Considerations:

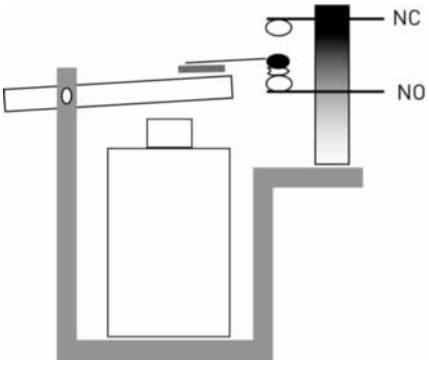
- Slower ON/OFF switching capabilities than Solid-State Relay and Open Collector Outputs
- Mechanical contacts can burn/wear over time
- Snubbers (RC Filter), Signet 3-8050.396, can prolong contact life

RC Filter

RC Filter kits are recommended when using a Signet transmitter or controller with mechanical relays, and/or the external relay module 3-8059 to switch on and off inductive loads. Signet RC filter kits provide protection and extend the life of the relay by preventing premature

wearing of of the relay contacts, usually caused by voltage/current arching and line noises generated by the activation and deactivation of mechanical relays.

RC filter kit (3-8050.396) comes with two RC filter assemblies.



During the activation and deactivation of a relay, a spark can be generated on the surface of the relay contacts. This spark, over a period of time, melts the surface of the contacts which will prevent the contacts from making a physical connection.

Figure A is suitable for AC and DC applications

Fig. A

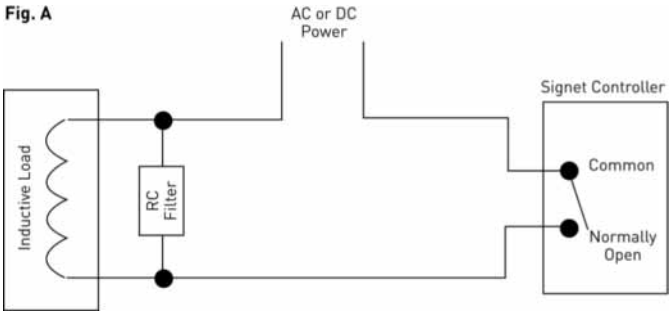
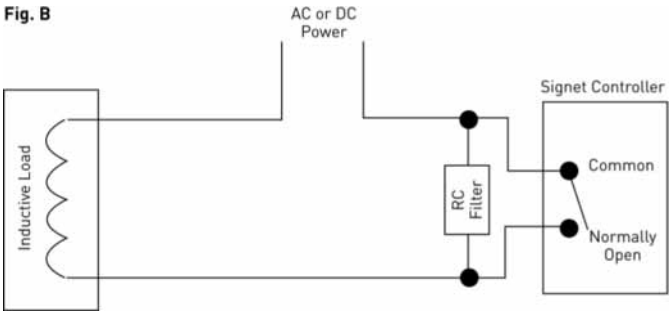


Figure B is also suitable for AC and DC applications. However, if this configuration is used with an AC power source, verify that the impedance of the load is less than the impedance of the RC filter; current leak through the filter may occur and cause the device to be constantly on.

- R = 47 Ω
- C = 0.01 µF

Fig. B



Conversion Factors

Volume		
To Convert	**Into**	**Multiply by**
Gallons (U.S.)	fl. oz. (U.S.)	128
Gallons (U.S.)	cubic in. (in3)	231
Gallons (U.S.)	cubic ft. (ft3)	0.1336
Gallons (U.S.)	liters	3.785
Gallons (U.S.)	cubic meters (m3)	0.00379
Gallons (U.S.)	pounds	8.33
Gallons (U.S.)	cubic centimeter (cm3 or cc)	3785.41
Gallons (U.S.)	Gallon (UK)	0.833
Gallons (U.S.)	milliliter (mL)	3785.41
Cubic ft. (ft3)	liters	28.32
Cubic ft. (ft3)	cubic meter (m3)	0.028317
Liters	ft. oz. (U.S.)	33.81
Liters	cubic in. (in3)	61.02
Liters	cubic ft. (ft3)	0.0353
Liters	Gallons (U.S.)	3785.41
Cubic meter (m3)	cubic ft. (ft3)	35.31
Cubic meter (m3)	Gallon (UK)	219.97
Cubic meter (m3)	Gallons (U.S.)	264.17
1 Acre foot	Gallons (U.S.)	325.853
Cubic ft. (ft3)	Gallons (UK)	6.23
Cubic ft. (ft3)	Gallons (U.S.)	7.48

Pressure		
To Convert	**Into**	**Multiply by**
psi	bar	0.069
psi	kPa	6.89
psi	atmosphere	0.068
psi	mm of Hg	51.71
atmosphere	bar	1.013
atmosphere	psi	14.696
atmosphere	kPa	101.325
atmosphere	mm of Hg	760
bar	psi	14.5
bar	kPa	100
bar	atmosphere	0.987
bar	mm of Hg	750.06
kPa	bar	0.01
kPa	psi	0.145
kPa	atmosphere	0.00987
kPa	mm of Hg	7.5

Temperature		
To Convert	**Into**	**Multiply by**
Deg F	Deg C	(F-32)*0.5555
Deg C	Deg F	C*1.8+32

Length		
To Convert	**Into**	**Multiply by**
inch	meter (m)	0.0254
inch	millimeter (mm)	25.4
inch	centimeter (cm)	2.54
foot	meter (m)	0.3048
foot	millimeter (mm)	304.8
foot	centimeter (cm)	30.48
cm	foot (ft.)	0.0328
cm	inch (in.)	0.3938
m	foot (ft.)	3.28
m	inch (in.)	39.37

Flow rate		
To Convert	**Into**	**Multiply by**
gallon (US)/min	m3/h	0.227
gallon (US)/min	l/s	0.063
gallon (US)/min	ft3/min	0.134
ft3/min	m3/h	1.699
ft3/min	l/s	0.472
ft3/min	gallon (US)/min	7.48
m3/h	l/s	0.2278
m3/h	ft3/min	0.589
m3/h	gallon (US)/min	4.4
l/s	m3/h	3.6
l/s	ft3/min	2.12
l/s	gallon (US)/min	15.85

Weight		
To Convert	**Into**	**Multiply by**
ounce (Av.)	grams (g)	28.35
pound (Av.)	grams (g)	453.59
pound (Av.)	ounce (Av.)	16
grams (g)	ounce (Av.)	0.035274
grams (g)	pound (Av.)	0.0022046

Area		
To Convert	**Into**	**Multiply by**
Acre	Hectare	0.4047
Acre	square ft. (ft2)	43559.66
Acre	square meter (m2)	4046.82
Acre	square kilometer (km2)	0.004047
square meter (m2)	Hectare	0.0001
square meter (m2)	square ft. (ft2)	10.764
square centi-meter (cm2)	square ft. (ft2)	0.00108
square inch (in2)	square centimeter (cm2)	0.155

Equations:

Flow:

- To convert fluid velocity into a volumetric flow rate.
  GPM = (ID2 x Feet/sec)/0.4084967
  LPM = 0.0471189 x ID2 x m/s
- To conver volumetric flow rate into fluid velocity.
  Feet/sec = (GPM x 0.4084967)/ID2
  m/s = (LPM x 21.22291)/ID2

Conductivity

Conductivity	=	1/Resistivity
1/Ohm	=	1 Siemen = 1 mho
Measured conductivity	=	((solution conductivity) x (electrode sectional area)) / electrode separation
Measured conductivity	=	Siemen/cm

Nominal Pipe Sizes

Below are the NPS (Nominal Pipe Sizes) inch names and their metric equivalents called DN or diamtre nominel. The metric designations conform to International Standards Organization (ISO).

Metric DN (mm)	NPS (inch)
6	1/8
8	¼
10	⅜
15	½
20	¾
25	1
32	1.25
40	1.5
50	2
65	2.5
80	3
100	4
125	5
150	6
200	8
250	10
300	12
350	14
400	16

Metric DN (mm)	NPS (inch)
450	18
500	20
550	22
600	24
650	26
700	28
750	30
800	32
900	36
1000	40
1100	42
1200	48
1400	54
1500	60
1600	64
1800	72
2000	80
2200	88

Application Assistance Form

Please provide as much detail as possible for prompt assistance. Fax the completed form to Technical Support at your local FG sales office.

Date: _____

Company: _____

Contact: _____

Address: _____

City: _____ State/Province: _____ Zip/Postal Code: _____

Country: _____

Phone: _____ Ext: _____ Fax: _____

Name of project: _____

GF Distributor: _____ Contact: _____ Tel: _____

Description of application(use seperate sheet if necessary): _____

Piping system: (if flow sensor, on separate sheet sketch piping system - see Installation section for upstream and downstream requirements)

Piping material: _____ Size: _____ Sched-ule: _____ Angle: _____ Vertical or Horizontal

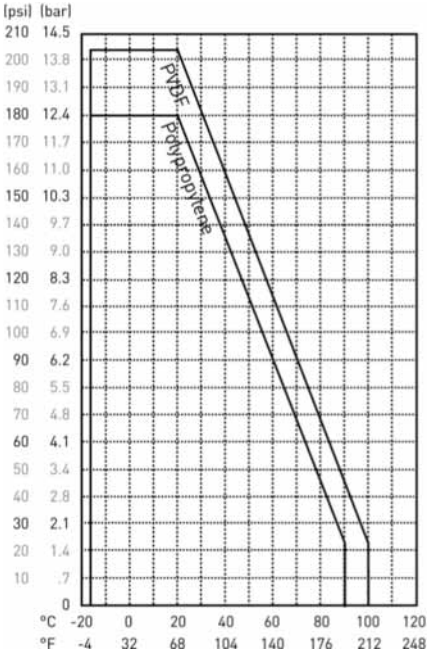
Fluid temp. range:	min:		max:		nominal:		Control range:
Line press. range:	min:		max:		nominal:		Control range:
Process pH range:	min:		max:		nominal:		Control range:
Cond/Resist range:	min:		max:		nominal:		Control range:
Turbidity range:	min:		max:		nominal:		Control range:

Sensor mounted:	Indoor or Outdoor	Indicator mounted:	Indoor or Outdoor
Sensor mounted:	In-line or Submersible		
If submersible, tank size and shape:			
Fluid to be measured:		Chemistry:	
Fluid viscosity:		Specific gravity:	
Percent solids:		Description:	Size of solids:
Flow rate:	min:	max:	nominal:
Back pressure after sensor:	psig/bar		
Required accuracy:		Unit of measurement:	
Cable run from sensor to indicator:	ft./m		
Available power:		Amperage:	
Required outputs & Qty:			

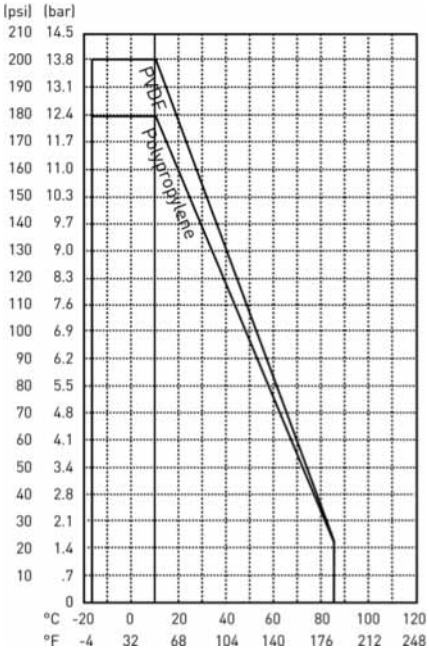
Operating Temperature & Pressure Graphs

Operating Temperature & Pressure Graphs: Flow Sensors

Model 515



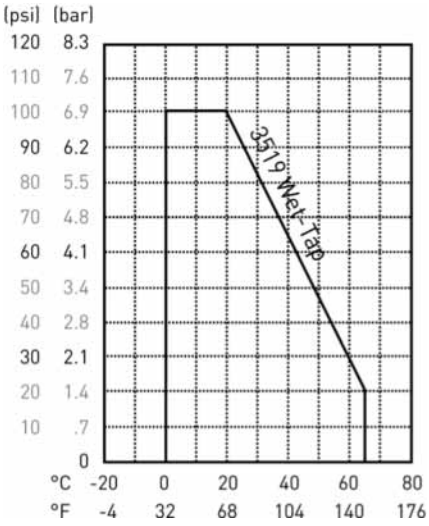
Model 2536 and 2537*



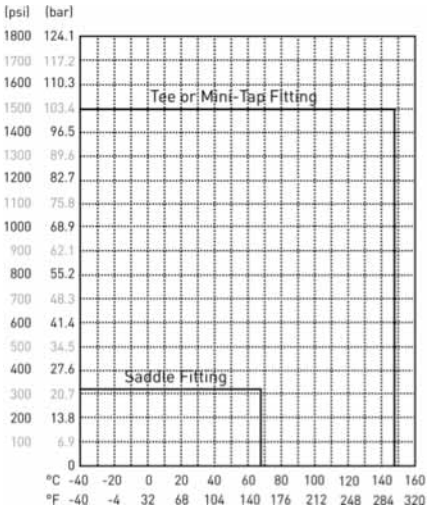
***2537 only:**

Graph applies to wetted materials (sensor) only. Maximum ambient temperature is 65ºC.

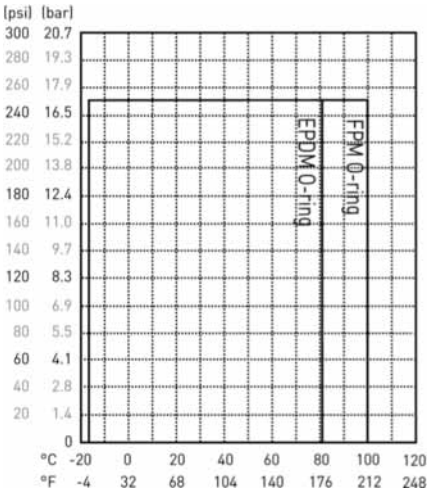
Model 3519 WetTap



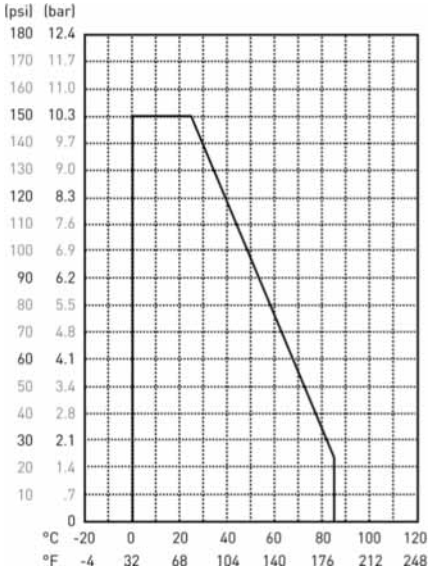
Model 525



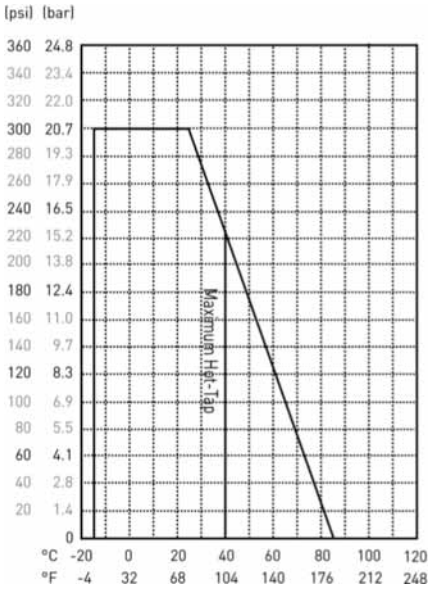
Model 2540



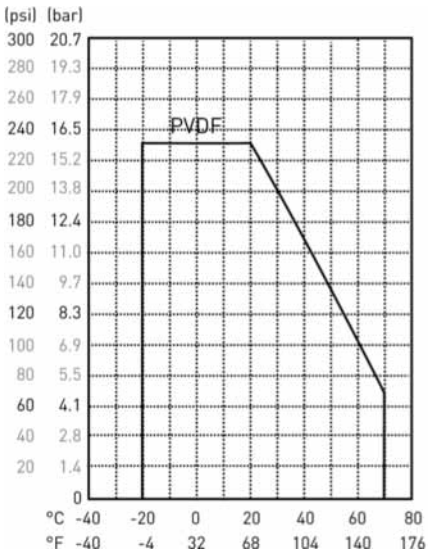
Model 2551



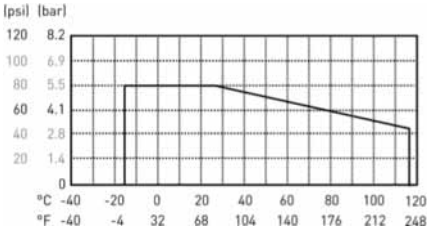
Model 2552



Model 2100

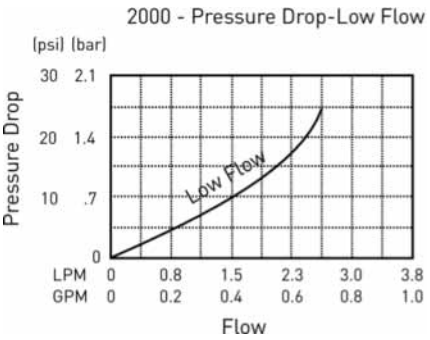


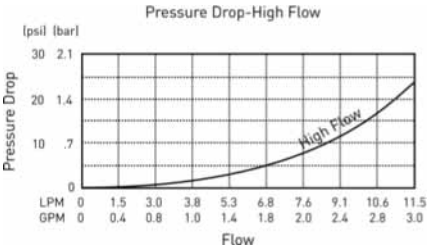
Model 2507



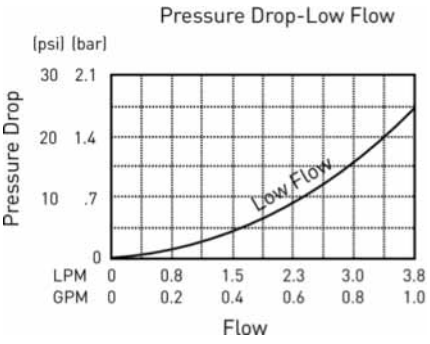
Pressure Drop Graphs: Flow Sensors

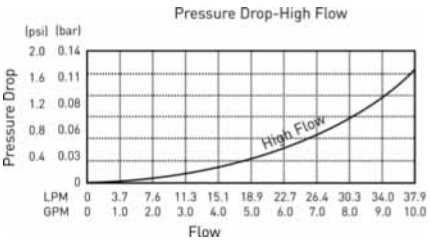
Model 2000



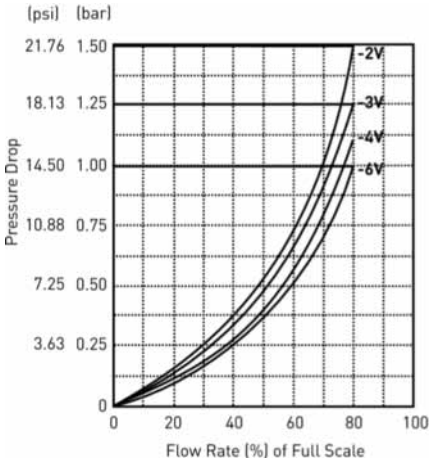


Model 2100



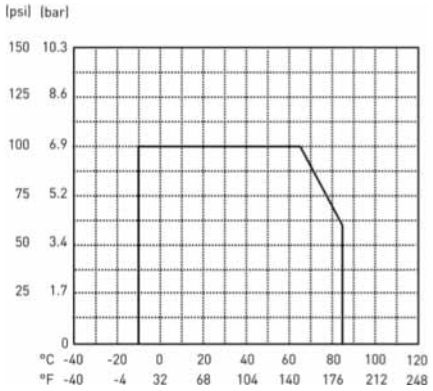


Model 2507

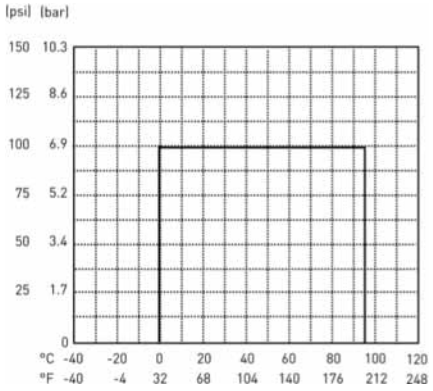


Operating Temperature & Pressure Graphs: pH/ORP Electrodes

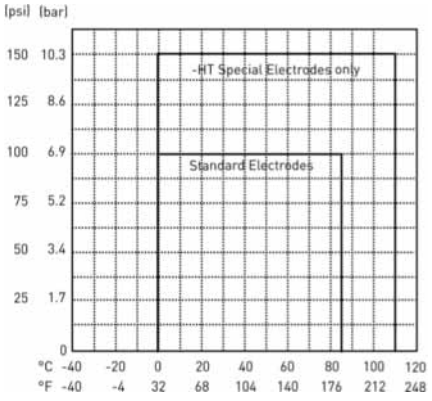
Models 2724-2726



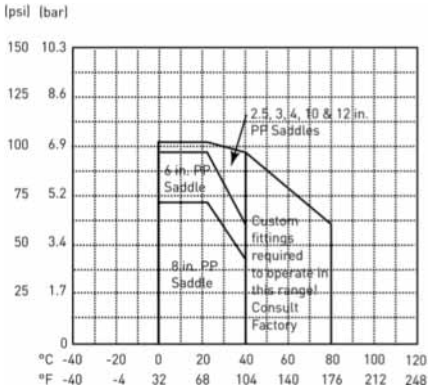
Models 2764-2767



Models 2774-2777

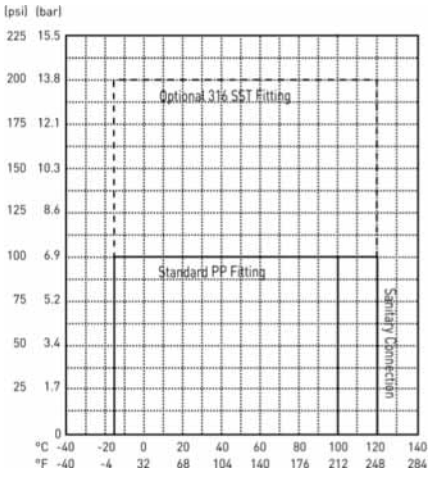


Model 3719

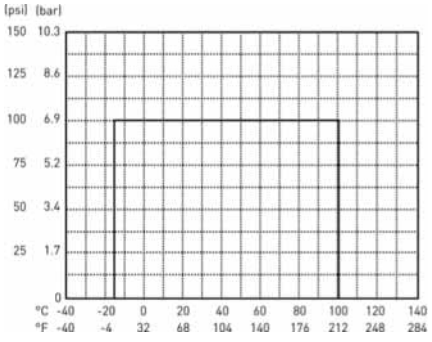


Operating Temperature & Pressure Graphs: Conductivity Electrodes

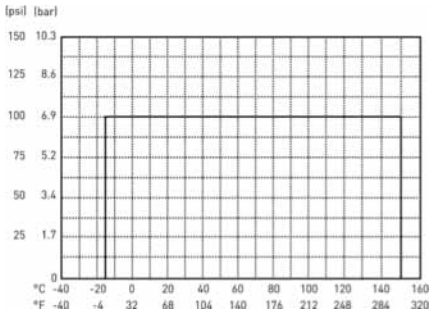
Model 2819, 2820, 2821



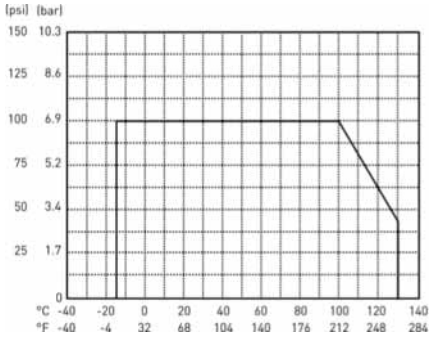
Model 2822



Model 2823

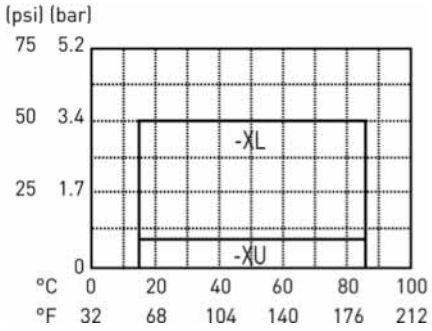


Models 2839-2842

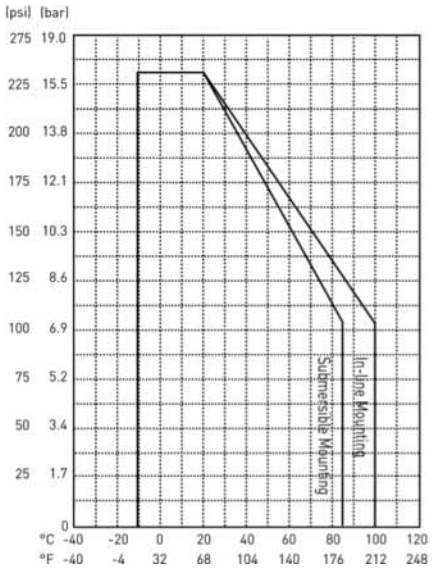


Operating Temperature & Pressure Graphs: Temperature/Pressure Graphs

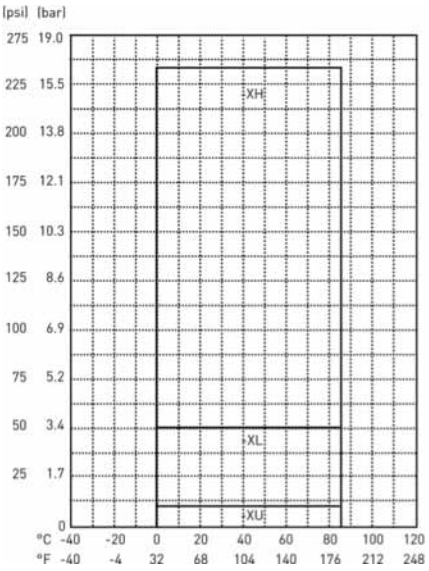
Model 2250



Model 2350



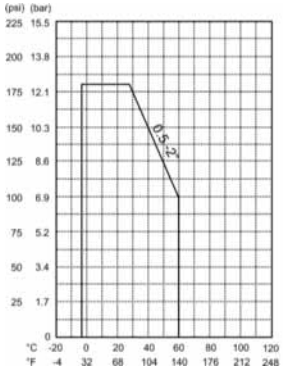
Model 2450

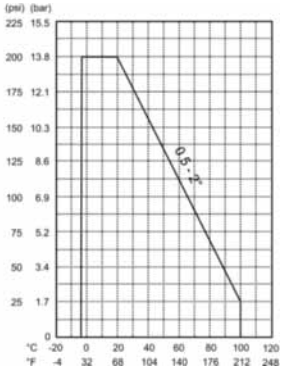


Operating Temperature & Pressure Graphs: Fittings

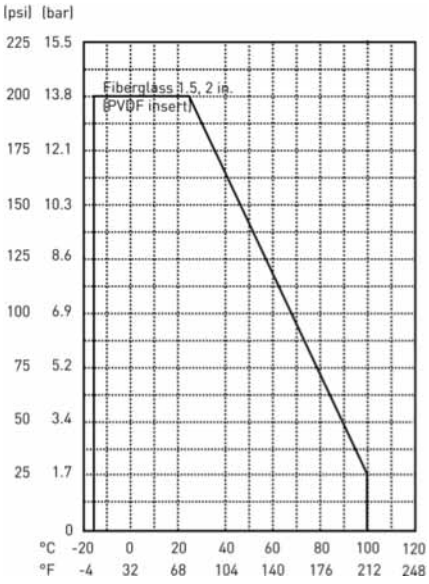
Note: The pressure/temperature graphs are specifically for the Signet sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification. When using a PVDF sensor in a PVC piping system, the fitting will reduce the system specification.

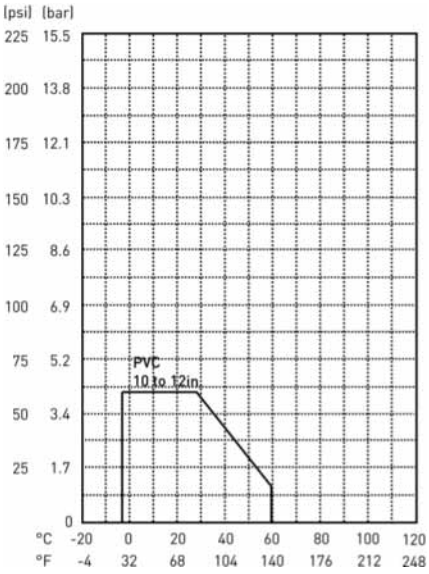
PVC-U and PVC-C Tees



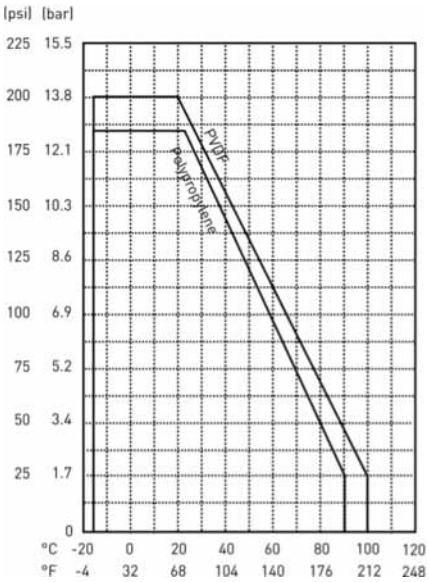


Fiberglass Tees

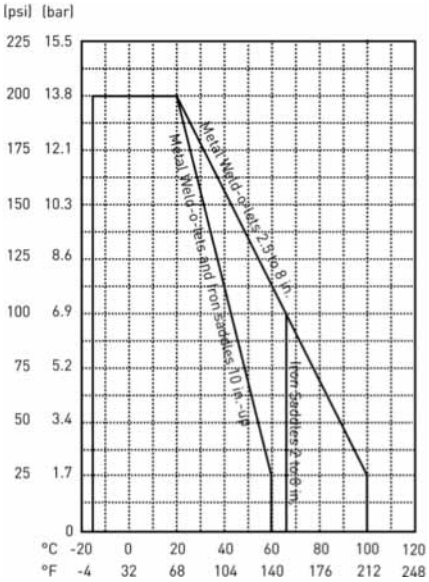




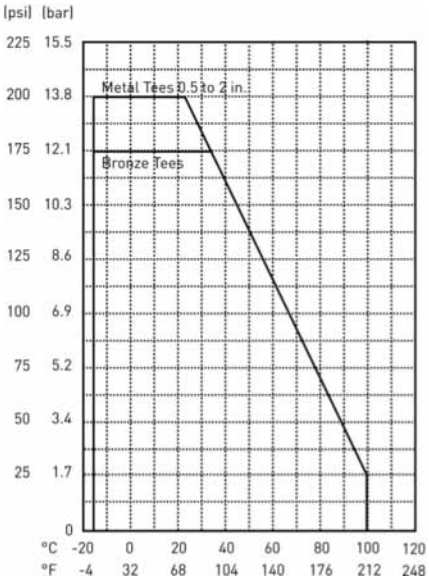
PP and PDVF Tees



Metal Weldolets and Saddle Fittings



Metal Tees



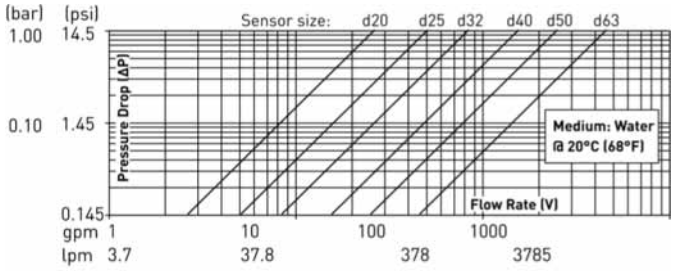
Backpressure Drop Graphs: Flow Sensors

Backpressure Calculation:
Minimum downstream pipe backpressure levels (full pipes) are required to prevent cavitation within the sensor. The minimum back pressure is calculated by the following formula:

$2.7 \times \Delta P + 1.3 \times Pv$

ΔP = Pressure drop across sensor
Pv = Liquid vapor pressure at operating temperature

Model 7000-7001



Liquid Vapor Pressures at Operation Temperatures

°C	-20	-10	0	10	20	25	30	40	50	65
°F	-4	14	32	50	68	77	86	104	122	149
Pv (bar)	0.001	0.003	0.006	0.012	0.023	0.32	0.042	0.074	0.123	0.25
Pv (psig)	0.014	0.038	0.088	0.178	0.338	0.458	0.614	1.067	1.784	3.626

Glossary

4 to 20 mA: A standard analogue (also analog) signal used for the proportional representation of a measurement variable or process condition.

Absorb: To take up or receive by chemical or molecular action.

AC(Alternating Current): An electric current in which the flow reverses periodically. Compare direct current (DC).

Accumulator: See Totalizer

Accuracy: The ability of a measurement to match the actual value of the quantity being measured.

Acid: A corrosive liquid (usually in a solution) that dissolves metals and other materials. Technically, acidic material produces positive ions in solution. An acid is the opposite of a base and has a pH between 0 to 7. A given amount of an acid added to the same amount of a base neutralises the base, producing water and a salt. Common vinegar, for example, is a weak solution of acetic acid.

Active Outputs: These outputs throttle current in loops powered by the 8900; no external power source is required.

Adsorption: The clinging of molecules to the surface of particles; the process by which activated carbon removes contaminants from water.

Alkali: A bitter, caustic mineral often found in large beds in the desert. Alkalis are bases; two common examples are lye and ammonia.

Analogue (also analog):A type of signal in which data is represented by continuously variable, measurable, physical quantities, such as current or voltage. 4 to 20 mA is a common analogue signal. As opposed to Digital.

Base: A bitter, caustic liquid. Technically, a basic material produces negative ions in solution. A base is the opposite of an acid and has a pH of 7 to 14. A given amount of a base added to the same amount of an acid neutralises the acid; water and a salt are produced. Alkalis are bases; ammonia is a common base.

Batch Control: The process of dispensing a precise volume of fluid repetitively or in conjunction with another process.

BCF: Bead and Crevice Free; a welding technique for plastic pipes that yields a weld surface suitable for high purity application requirements.

Bi-Directional Flow: (1) All Signet flow sensors with a frequency output are bi-directional; the sensor will allways have an output of "positive" flow no matter which direction the fluid is flowing in the pipe. (2) Flow sensors with 4 to 20 mA output can be set for uni- or bi-directional flow. Uni-directional flow indicates one direction of flow only, typically set as 4 mA equal to zero flow and 20 mA equal to the maximum flow rate required. Bi-directional flow can be set-up by making the 20 mA output equal to a positive number (for instance, +5 m/s).

Blind Transmitter: Any device having 4 to 20 mA output without also having a local/permanent display.

Boolean: A logic system treating variables through the operators AND, OR, NOT, and XOR, where each operator can have one of two values, true or false.

Buffer: Typically a solution used as a calibration standard due to its ability to maintain a stable pH value.

Calibration: Systematic adjustment of the display and/or output of a measuring instrument for the purpose of conforming to a standard or actual value.

Caustic: Any strongly corrosive chemical substance, especially one that attacks organic matter. A caustic alkali is a metal hydroxide, especially that of an alkali metal; caustic soda is sodium hydroxide, and caustic potash is potassium hydroxide. Most inorganic acids, e. g., sulphuric acid, are caustic, especially when concentrated.

Cavitation: The formation and collapse of a gas pocket or bubble due to mechanical shearing of a fluid.

CE: Conformité Européene. A mark that is affixed to a product to designate that it is in full compliance with all applicable European Union legal requirements.

Cell Constant: 1) The distance between the two electrodes of a conductivity cell divided by their cross-sectional area. 2) A value associated with an effective measurement range used in the proper selection of conductivity cells for specific applications.

Chlorine: A halogen element, a heavy, greenish-yellow, incombustible, water-soluble, poisonous gas, obtained chiefly by electrolysis of sodium chloride brine: used for water purification in the making of bleaching powder, and in the manufacture both of chemicals that do no contain chlorine and those that do.

Condensation: The transformation of water vapour to liquid. Also, a chemical reaction in which two or more molecules combine, usually with the expulsion of water or some other substance.

Conductivity: The measure of the ability of a fluid to conduct an electrical current. In water, this ability is due to the presence of ionized substances in solution. Conductivity measurements usually include temperature compensation.

Corrosion: Material deterioration due to chemical attack.

Current (loop) Output: See 4 to 20 mA

DC (Direct Current): Electric current in which electrons flow in one direction only. Compare alternating current (AC).

Dead Band: The limits between which the input to an instrument can vary without causing a change to the instrument output.
In relay operation: the difference between the increasing and decreasing readings when the switch is operated between setpoint and reset point.
See also Hysteresis.

DIN: Deutsches Institut für Normung e.V. DIN is a non-governmental organisation established to promote the development of standardisation and related activities in Germany and related markets with the goal of facilitating the international exchange of goods and services, and to developing co-operation in the spheres of intellectual, scientific, technological and economic activity. Through the European standards organisations CEN and CENELEC, DIN also presents the German view in the development of the European standards that are critical to completion of the single European market.

DN: Diametre Nominal; Term used by DIN standards for the inside diameter of pipes.

Deionization: A purification process by which ionized particles are removed from water.

Desalination: Processes that remove salt from water, such as reverse osmosis, ion exchange, distillation and evaporation.

Desiccant: A granular, porous, silica based material that has the ability to absorb moisture. Desiccant is used to control humidity in a closed environment.

Desiccant Silica Gel: Is a granular, porous form of silica made synthetically from sodium silicate. Despite the name, silica gel is a solid. Silica gel is most commonly encountered in everyday life as beads packed in a semi-permeable. In this form, it is used as a desiccant to control local hunidity and is used in industry for many purposes.

Diffusion: An intermingling of the molecules of liquids or gases.

Digital: A type of signal in which data is represented in numerical form. Opposite of analog.

Dry Contact Closure: Relay. The contacts of a mechanical switch.

Dry Contact Relay: (DCR): An electromechanical device used to switch external power.

DryLoc: Georg Fischer Signet LLC trade name and patented design for a versatile and robust connector scheme between sensor electronics and electrodes.

Dual Proportional Control: See relay control discussion on page ___ (also applies to transistor-type outputs).

EasyCal: The calibration routine in Signet pH and ORP systems in which standard buffers or test solutions are automatically recognised by the instrument.

Efficiency: For pH and ORP electrodes, the percent of theoretical slope.

Effluent: Liquid flowing out of a system, such as a discharge of liquid waste from a factory or water leaving a sewage treatment plant.

Electrode: 1) Primary detection device, typically analytical, requiring or benefiting from some secondary conditioning circuitry (e.g., pH and ORP electrodes). 2) Sensor.

Emissions: The potentially disruptive electromagnetic frequencies generated by an electronic device. Various standards defining allowable limits have been established.

Empty Pipe Detection: The empty pipe detection in Signet products features a zero flow output when the sensors are not compltetely wetted. This does not indicate an empty pipe, but rather a pipe that is not completely full.

EP, EPDM, EPM, EPR: Copolymer of Ethylene and Propolene or terpolymer with butadiene. Typically features good weather and chemical resistance Typically used with diluted acids and alkalis, detergents, alcohols, steam and silicone oils.

FFPM: Also know as FFKM, trade names include or Kalrez (trademark) or Chemraz (registered trademark). Typical applications for this material include highly aggressive chemical processing, semiconductor wafer processing, pharmaceutical, oil and gas recovery, aeorspace and petroleum.

FM: Factory Mutual; An organisation that sets various product standards, especially related to intrinsic safety and explosion proof. Insurance companies look to see if items such as cooling towers have earned Factory Mutual Approval and typically offer reduced rates for equipment that has been demonstrated as unlikely to burn in a fire.

Formazin: A very stable suspended solid that remain suspended in solution with water indefinitely. The supended solid in Formazin can be hydrazine sulphate, (NH2)2(H2SO4) or hexa-methylene-tetramine in wateror

FPM: FPM is an elastomer, better known as Viton. See Viton entry.

Frequency: The number of repetitions that occur in one second. Frequency can be used to describe electrical quantities, sound waves, mechanical vibrations, etc. Frequency is measured in units of Hertz (Hz). In GF Signet flow sensors, the output is defined in terms of frequency and used to calculate flow rate.

Formazin Nephelometric Unit (FNU): A unit of turbidity based upon a comparison of scattered light intensity by a sample under defined conditions with the intensity of light scattered by a standard reference Formazin suspension. The higher the intensity of scattered light, the greater is the turbidity. The design of the nephelometer is specified in the method. A standard suspension of Formazin is used for calibration.

Hot-Tap: A mechanical assembly that allows the insertion and removal of a sensor or electrode without the need for system shutdown, and initial installation may be performed under pressurised conditions. Similar to Wet-Tap.

Hysteresis: In relay Setpoint programming, the difference between the activation point and the release point. See also Deadband.

Impedance: A measure of the apparent resistance posed by an electrical circuit to an alternating current (AC).

Immunity: Ability of a device to function without disruption in the presence of electromagnetic interference.

Insertion Flow Sensor: A type of flow sensor that installs through a hole in the wall of a pipe and converts a local velocity measurement into a calculation of the flow rate in the pipe. Usually used in comparison to “full bore” or “full line” flow sensor.

Intrinsically Safe: Term used to identify any device, instrument or component that will not produce any spark or thermal effects under any conditions that are normal or abnormal that will ignite a specified gas mixture. Electrical and thermal energy limits are at levels incapable of causing ignition. It is common practice to use external barriers with intrinsically safe installations.

Ion: An electrically charged atom or group of atoms.

IP65: A European standard for the degree of protection provided by enclosures for splash proof and dust-proof rating.

IP68: The European standard for degree of protection provided by enclosures for submersible and dust-proof rating.

IR: Infrared, refers to a welding technique offered within the range of SYGEF® HP products.

IR - Infrared Light: Light whose wave length is just below the light sensitivity of the human eye.

ISO: International Organisation for Standardisation: A voluntary organisation that creates international standards, including the standards for computers and communications. The American National Standards Institute, ANSI is a member of ISO.

ISO 14001: International Organisation for Standardisation environmental standard.

ISO 9001: International Organisation for Standardisation quality standard.

Isolated/Isolation: Electrical separation between two or more circuits used to prevent measuring errors, ground loops, or a shock hazard.

K-Factor: In Signet Flow sensors, the number of pulses generated by the sensor for each unit of volume that passes by the sensor. Usually published in pulses per gallon and pulses per litre.

Linearity: The extent to which an output (response) is strictly proportional to an input (stimulus).

Loop: In electricity, a complete circuit. Usually used in reference to a 4 to 20 mA loop, an output signal used to control valves, actuators etc.

Loop Impedance: The maximum allowable total electrical resistance of all devices, including wiring, connected to any electrical loop; expressed in ohms at a specified voltage level, i. e.; 600Ω at 12 VDC.

Loop Output: An analog output signal, usually 4 to 20 mA.

Loop Powered: In Signet products, any instrument that derives operating power from a 4 to 20 mA loop.

Magmeter: Electromagnetic flow meter.

Metalex: Product name of fixed insertion metal paddlewheel flow sensors manufactured by Georg Fischer Signet LLC

Mho: The unit of conductance such that a constant voltage of one volt between its ends produces a current of one ampere in the conductor.

Mini-Tap: Stainless steel installation fittings for use with Metalex flow sensors.

NEMA 4: A standard for enclosures maintained by the National Electrical Manufacturers Association; NEMA 4 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose-directed water.

NEMA 4X: Same as NEMA 4, with added protection from corrosion.

NEMA 6: A standard for enclosures maintained by the National Electrical Manufacturers Association; NEMA 6 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection in submersible applications.

NIST: National Institute of Standards and Technology.

Non-isolated: Two or more electrical circuits sharing a common ground. When separated by distance or connected to additional circuitry there is increased probability for measurement errors due to ground loops.

Nephelometric Turbidity Unit (NTU): A unit of meaure used when comparing the light scattered by a liquid media to the light scattered by a known concentration Formazin Polymer. This unit of measure is recognised as a measure of the optical clarity of an aqueous sample. NTU is the accepted unit of measurement of turbidity.

Ohm: The unit of measure for electrical resistance. A resistance of 1 ohm will pass 1 ampere of current when a voltage of 1 volt is applied.

OHSAS 18001: Occupational Health and Safety Assessment Series - Published by BSI, the National Standards Body of the UK, this is an international group of standards and guidelines dedicated to occupational health and safety.

Open Collector Output: An NPN transistor or FET output generally used to pull a signal from high to low. Device used for frequency, pulse, and alarm outputs.

Operating Pressure: Maximum vapor pressure from process.

Operating Temperature: The temperature at which a product is capable of operating; usually a minimum and maximum value.

ORP (Oxidation Reduction Potential): A method of measuring the degree of completion of a chemical reaction by detecting the ratio of ions in the reduced form to those in the oxidised form as a variation in electrical potential measured by an ORP electrode.

Paddlewheel: A type of insertion flow sensor (pioneered by Georg Fischer Signet LLC) that utilises a bladed rotor to engage the fluid flowing in a pipe. The spinning rotor produces a frequency output directly proportional to the fluid velocity.

Passive Outputs: These outputs throttle current in loops powered by a supply external to the 8900.

PBT: PolyButylene Terephthalate: A semi-crystalline polymer, combining good strength and stiffness with low moisture absorption, exceptional thermal stability, excellent electrical insulation properties, outstanding dimensional stability and resistance to the effects of a wide range of chemicals, solvents, and oils.

PEEK: PolyEtherEtherKetone; an engineering thermoplastic with excellent chemical and water resistance. In Signet products, the yellow housing in ProcessPro® field-mount instruments.

Percent Rejection: An indicator of RO system efficiency and membrane condition. Defined as one minus the ratio of the conductivity of RO product water to feed water, expressed as a percentage, and representing the extent to which incoming contaminants were rejected by the system.

pH: A measure of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity. The pH scale commonly in use ranges from 0 to 14.

Polypropylene (PP): PP is a polymer of ethylene with an isotactic arrangement of methyl groups.

Preamplifier: A device used typically to protect the relatively weak output signals of pH and ORP electrodes from the wide variety of electromagnetic interference common in most industrial environments.

ProcessPro: Signet product name for a group of instruments characterised by a basic 4 to 20 mA loop output, for the measurement of Flow, pH/ORP, Conductivity, Pressure and Temperature.

Proof Pressure: Maximum water or hydraulic pressure.

ProPoint: Signet product name for a group of panel mount instruments for the measurement of Flow, Batch, pH/ORP, Conductivity/Resistivity, Salinity and others. Characterised by a unique analogue and digital display.

Proportional Pulse: In Signet products, an operating mode for relays and open-collector outputs that varies the frequency of the pulse in direct proportion to input variations.

PTFE: Polytetrafluoroethylene, also known as TFE. Trade names include Halon®, Floun® (all registered trademarks).

Pull-up resistor: A resistor needed to obtain the high-level voltage signal in a transistor- type output circuit.

PWM: Pulse Width Modulation; In Signet products, an operating mode for relays and open-collector outputs characterised by varying the time that a pulse is “on” versus the time it is “off”. Also, a method of digitally encoding analogue signal levels.

Quinhydrone: A crystalline powder typically added to pH 4 and 7 buffers for the purpose of producing standard solutions used in the calibration of ORP measuring systems.

RC Filter: A resistive-capacitive device, often referred to as a “snubber”, designed to protect instrumentation and relay contacts by capturing the voltage spikes resulting from the switching of large inductive loads such as solenoids and motor starters, etc.

REDOX: Reduction/Oxidation; Same as ORP.

Relative Humidity: The amount of moisture in the air as compared with the maximum amount that the air could contain at the same temperature, expressed as a percentage.

Relay: An electromechanical switch.

Repeatability: The extent to which an output (response) repeatedly corresponds to identical input (stimulus) during dynamic conditions.

Resistivity: The inverse of conductivity (1/conductivity).

Reverse Osmosis: a process that allows the removal of particles as small as ions from a solution. The most common use for reverse osmosis is in purifying water. It is used to produce water that meets the most demanding specifications that are currently in place.

Reynolds number: A dimensionless quantity associated with the smoothness of flow of a fluid. At low velocities fluid flow is smooth, or laminar, and the fluid can be pictured as a series of parallel layers, or lamina, moving at different velocities. The fluid friction between these layers gives rise to viscosity. As the fluid flows more rapidly, it reaches a velocity, known as the critical velocity, at which the motion changes from laminar to turbulent, with the formation of eddy currents and vortices that disturb the flow. The formula can be stated as: $R = dv/\mu$ where d is inside diameter, v is velocity and μ is viscosity. In general

- R « 2000 = Laminar flow
- R » 2000 « 4500 = Transitional (indeterminate)
- R » 4500 = Fully developed and turbulent (most flow sensors operate best in turbulent flow)

Rotor-X: Family trade name of the original Signet plastic paddlewheel flow sensors.

Ryton : Trade name for Polyphenylene Sulfide or PPS. Other trade names include Forton®, Tedar®, Supec®, and Tedur® (all registered trademarks).

S³L: Acronym for Signet Sensor Serial Link; a digital communication method between Signet sensors and host instruments.

SafeLoc: Name coined by Georg Fischer Signet LLC to define the unique locking mechanism used in the Signet 3719 pH Wet-Tap assembly.

Salinity: A measurement of dissolved salt concentration, as in seawater, typically expressed in parts per thousand (ppt).

Sensor: 1) A primary detection device typically providing direct input to a measurement instrument (i.e., paddlewheel flow sensor). 2) The combination of an electrode and some secondary conditioning circuitry (i.e., pH electrode and preamplifier). 3) Electrode.

Signet: Model name of fluid measurement sensors and instruments marketed under the Georg Fischer Piping Systems brand.

Sleeved Rotor: An accessory rotor featuring a self-lubricating mechanical sleeve that replaces the standard liquid bearing of Rotor-X paddlewheel flow sensors. Sleeved rotors will extend the maintenance interval in applications known to produce premature rotor wear, such as those involving abrasive liquids.

Specific gravity: Ratio of the mass of a body to the mass of an equal body of volume of water at 4 °C, or some other specified temperature.

Suspended Solids: Particulate suspended (as opposed to being dissolved) and typically creating turbid, cloudy conditions in liquid.

SSR: Solid-state relay

TDS: Total dissolved solids.

Totalizer: In flow instrumentation, a permanent or resettable counter for volume such as gallons or tens of gallons, etc.

Transmitter (two-wire): A device that converts an electrode or sensor input to a 4 to 20 mA output using the same two wires for signal transmission as for system power.

Turbidity: The reduction of transparency of a liquid caused by the presence of undissolved matter (ISO 7027 Definition of Turbidity)

Turndown Ratio: Dynamic response characteristic. The ratio of a sensor’s maximum measurement range to its minimum measurement range.

UHMW Polyethylene: Ultra High Molecular Weight polyehtylene. Very good chemical resistance of corrosives; very good stress cracking resistance (with the exeption of strong oxidizing acids at elevated temperatures).

Viscosity: The internal friction of a fluid, caused by molecular interaction, which makes it resist a tendency to flow.

Viton: Viton® fluoroelastomer is well known for its excellent heat resistance. It offers excellent resistance to aggressive chemicals.

Voltage (output): A standard analogue signal (0 to 5 or 0 to 10 VDC for Signet products) used for the proportional representation of a measurement variable or process condition.

Weldolet: A weld-on branch connection for metal pipe typically used as an installation fitting for insertion-style sensors or electrodes.

Wet-Tap: A mechanical assembly that, after initial installation into a non-pressurised system, allows the insertion and removal of a sensor or electrode without the need for system shutdown. Similar to Hot-Tap.

White Light: The combined light whose wave lengths are all within the range of sensitivity of the human eye.

Window (Relay Module): An out-of-range alarm scenario that allows a single relay to be triggered by either a high or a low process condition. For example, a relay in window mode can be programmed to trigger if a pH value in a final effluent tank drops below 6.0 or rises above 8.5.