1066
Liquid Analytical Transmitter

- **WIDE RANGE OF SENSOR INPUTS** – measures pH, ORP, Contacting and Toroidal Conductivity, % Concentration, Total Chlorine, Free Chlorine, Monochloramine, Oxygen, Ozone and Temperature
- **LARGE DISPLAY** – large easy-to-read process measurements, user-definable display of measurement diagnostic parameters
- **DIGITAL COMMUNICATIONS –** HART® version 7 and FOUNDATION® fieldbus communication protocols available for host monitoring and configuration
- **INTUITIVE MENU SCREENS** with advanced diagnostics and help screens
- **SMART Enabled** – automatic calibration with SMART pH sensors
- **TWO 4-20mA CURRENT OUTPUTS** are standard on the 1066 HART

Features and Applications

This loop-powered analytical unit serves industrial, commercial and municipal applications with the widest range of liquid measurement inputs available for a two-wire liquid transmitter.

The 1066 SMART transmitter supports continuous measurement of one liquid analytical input. The design supports easy internal access and wiring connections. The large display gives excellent visibility for live measurements and displayed parameters. Conveniently, live process values are always displayed during programming and calibration routines.

ANALYTICAL MEASUREMENTS: Ordering options for pH/ORP, Resistivity/Conductivity, % Concentration, Total Chlorine, Free Chlorine, Monochloramine, Dissolved Oxygen, and Ozone.

LARGE DISPLAY: The high-contrast LCD provides live measurement readouts in large digits and shows up to four additional variables or diagnostic parameters. The display parameters can be customized to meet user requirements.

DIGITAL COMMUNICATIONS: HART version 7 digital communications are standard on the 1066. 1066 HART units communicate with the 475 hand-held communicator and HART monitoring applications such as AMS™ Intelligent Device Manager.

MENUS: Menu screens for calibrating and programming are simple and intuitive. Plain language prompts and help screens guide the user through the procedures. All menu screens are available in eight languages. Live process values are displayed during programming and calibration.

ROSEMOUNT® Analytical

EMERSON™ Process Management

Features and Applications, cont.

QUICK START PROGRAMMING: Popular Quick Start screens appear the first time the unit is powered. The instrument prompts the user to configure the sensor loop in a few quick steps for immediate commissioning.

USER HELP SCREENS: Fault and warning messages include help screens similar to Plant Web alerts that provide useful troubleshooting tips to the user. These on-screen instructions are intuitive and easy to use. They allow many installation and operational problems to be solved directly by the user without the need for a manual or a call to technical support.

DIAGNOSTICS: The transmitter continuously monitors itself and the sensor for problems. A display banner on the screen alerts Technicians to Fault and/or Warning conditions. The dedicated Diagnostic key is available for immediate access to specific fault and warning messages and troubleshooting help screens. Extensive diagnostic data is available for pH including Glass Impedance, Reference Impedance, Slope and Offset.

LANGUAGES: Rosemount Analytical extends its worldwide reach by offering eight languages – English, French, German, Italian, Spanish, Portuguese, Chinese and Russian. Every unit includes user programming menus: calibration routines, faults and warnings and user help screens in all eight languages.

CURRENT OUTPUTS: HART® units include two 4-20 mA electrically isolated current outputs giving the ability to transmit the live measurement value and the process temperature reported from the sensor. Users can assign the live measurement value or temperature to Output 2. Output dampening can be enabled with time constants from 0 to 999 seconds. HART digital communications on current output 1 is standard on all HART-compatible units (option code –HT).

INPUT DAMPENING: is automatically enabled to suppress noisy process readings. Default input filtering averages readings for settings between one and four seconds. For very noisy or highly variable process conditions, entering a filter setting of four seconds or higher will allow continuous filtering.

SMART-enabled pH: Rosemount Analytical's SMART pH capability eliminates field calibration of pH probes through automatic upload of calibration data and history. pH probe changes are literally plug and play using SMART pH sensors with VP cables.

AUTOMATIC TEMPERATURE COMPENSATION: Most measurements require temperature compensation. The 1066 will automatically recognize Pt100, Pt1000 or 22k NTC RTDs built into the sensor. Temperature compensation algorithms are available and selectable as needed to ensure accurate live measurements.

SMART WIRELESS THUM™ ADAPTER COMPATIBLE: Enable wireless transmissions of process variables and diagnostics from hard-to-reach locations. A 250 Ohm load resistor is integrated in-circuit on the main circuit board and a dedicated THUM terminal block is provided for easy wiring connection. When commissioned with the THUM Adapter, 1066 HART units will communicate with all other wireless devices on the Emerson wireless network.

Specifications - General

Case: Polycarbonate. IP66 (CSA, FM), NEMA 4X (CSA)

Dimensions: Overall 155 x 155 x 131mm (6.10 x 6.10 x 5.15 in.). Cutout: 1/2 DIN 139mm x 139mm (5.45 x 5.45 in.)

Conduit openings: Six. Accepts PG13.5 or 1/2 in. conduit fittings

Display: Monochromatic graphic liquid crystal display. No backlight. 128 x 96 pixel display resolution. Active display area: 58 x 78mm (2.3 x 3.0 in.). All fields of the main instrument display can be customized to meet user requirements.

Ambient temperature and humidity: -20 to 65°C (-4 to 149°F), RH 5 to 95% (non-condensing).

Storage Temperature: -20 to 70°C (-4 to 158°F)

HART® Communications: PV, SV, TV, and 4V assignable to measurement, temperature and all live HART diagnostics.

RFI/EMI: EN-61326

Complies with the following Standards:

CSA: C22.2 No 0 – 10; C22.2 No 0.4 – 04; C22.2 No. 25-M1966: , C22.2 No. 94-M1991: , C22.2 No.142-M1987: , C22.2 No. 157-M1992: , C22.2 No. 213-M1987: , C22.2 No. 60529:05

ATEX: IEC 60079-0:2011, 60079-11:2011

IECEx: IEC 60079-0: 2011 Edition: 6.0, I EC 60079-11 : 2011-06 Edition: 6.0

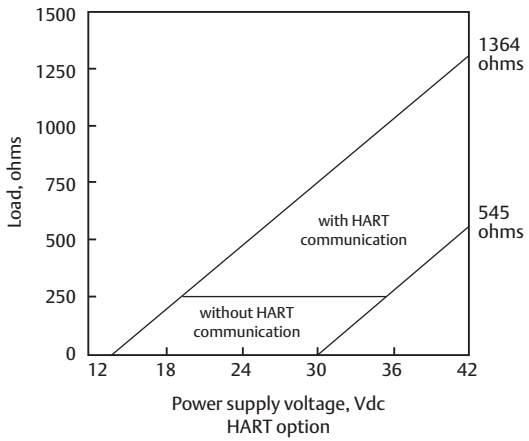


FIGURE 1. Load/Power Supply Requirements

FM: 3600: 1998, 3610: 2010, 3611: 2004, 3810: 2005, IEC 60529:2004, ANSI/IEC 60529

Input: One isolated sensor input. Measurement choices of pH/ORP, resistivity/conductivity/TDS, % concentration, total and free chlorine, monochloramine, dissolved oxygen, dissolved ozone, and temperature. For contacting conductivity measurements, temperature element can be a PT1000 RTD or a PT100 RTD. Other measurements (except ORP) and use PT100 or PT1000 RTDs or a 22k NTC (D.O. only).

Hazardous Location Approvals

Intrinsic Safety (with appropriate safety barrier):

Class I, II, III, Div. 1
Groups A-G
T4 Tamb = -20°C to 65°C

ATEX
CE 1180 II 1 G
Baseefa04ATEX0195X
EEx ia IIC
T4 Tamb = -20°C to 65°C

IECEx BAS 11.90098X
EEx ia IIC
T4 Tamb = -20°C to 65°C

Class I, II & III, Division 1, Groups A-G T4
Tamb = -20°C to 40°C for -FI option
Tamb = -20°C to 65°C for -HT and -FF options

Class I, Zone 0, AEx ia IIC T4
Tamb = -20°C to 40°C for -FI option
Tamb = -20°C to 65°C for -HT and -FF options

Non-Incendive:

Class I, Div. 2, Groups A-D
Dust Ignition Proof
Class II & III, Div. 1, Groups E-G
NEMA 4/4X Enclosure
T4 Tamb = -20°C to 65°C

Class I, Division 2 Groups A-D
Dust Ignition proof

Class II & III, Division 1, Groups E-G
IP66 enclosure

Power & Load Requirements: Supply voltage at the transmitter terminals should be at least 12.7Vdc. Power supply voltage should cover the voltage drop on the cable plus the external load resistor required for HART communications (250 Ω minimum). Minimum power supply voltage is 12.7Vdc. Maximum power supply voltage is 42.4 Vdc (30 Vdc for intrinsically safe operation). The graph shows the supply voltage required to maintain 12 Vdc (upper line) and 30 Vdc (lower line) at the transmitter terminals when the current is 22 mA.

Analog Outputs: Two-wire loop powered (Output 1 only). Two 4-20 mA electrically isolated current outputs (Output 2 must be externally powered). Superimposed HART digital signal on Output 1. Fully scalable over the operating range of the sensor.

Weight/Shipping Weight: 2 lbs/3 lbs (1 kg/1.5 kg)

Foundation fieldbus: Figure 3 shows a 1066-P-FF being used to measure and control pH and chlorine levels in drinking water. The figure also shows three ways in which Fieldbus communication can be used to read process variables and configure the transmitter.

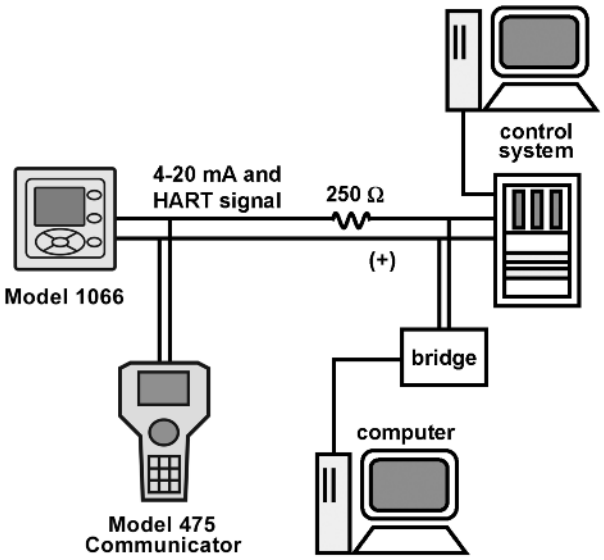


FIGURE 2. Power Supply-Current Loop Wiring

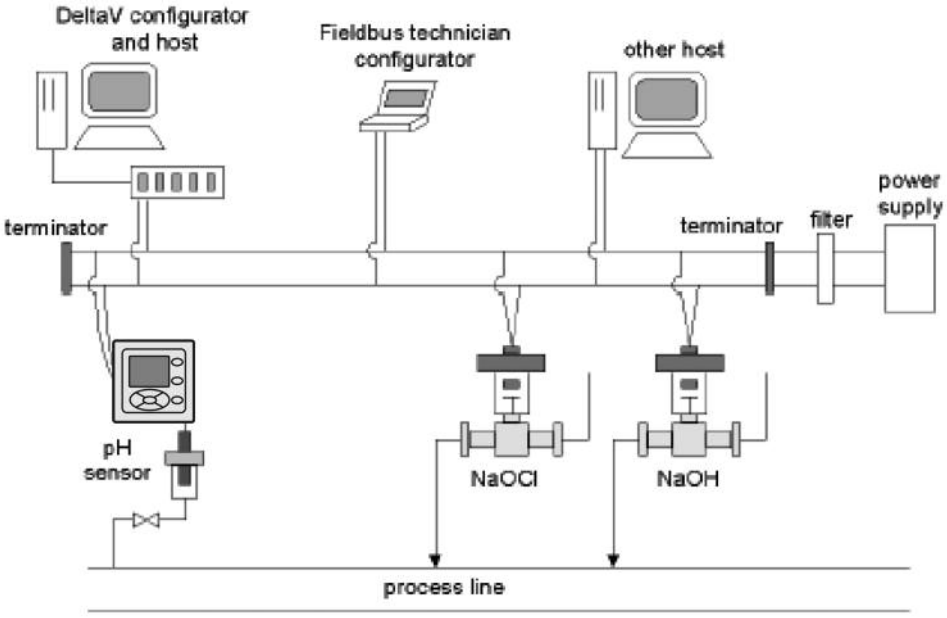


FIGURE 3. Configuring 1066-P Transmitter with FOUNDATION fieldbus

pH/ORP (Ordering Code – P)

For use with any standard pH or ORP sensor. SMART pH sensor with SMART pre-amplifiers from Rosemount Analytical. Measurement choices are pH, ORP, or Redox. The automatic buffer recognition feature uses stored buffer values and their temperature curves for the most common buffer standards available worldwide. The transmitter will recognize the value of the buffer being measured and perform a self stabilization check on the sensor before completing the calibration. Manual or automatic temperature compensation is menu selectable. Change in pH due to process temperature can be compensated using a programmable temperature coefficient.

General purpose and high performance pH sensors 3900VP, 396PVP and 3300HT

Performance Specifications - Transmitter (pH input)

Measurement Range [pH]: 0 to 14 pH

Accuracy: ±0.01 pH

Buffer recognition: NIST, DIN 19266, JIS 8802, and BSI.

Input filter: Time constant 1 - 999 sec, default 4 sec.

Response time: 5 seconds to 90% of final reading

Performance Specifications - Transmitter (ORP input)

Measurement Range [ORP]: -1400 to +1400 mV

Accuracy: ± 1 mV

Input filter: Time constant 1 - 999 sec, default 4 sec.

Response time: 5 seconds to 90% of final reading

Recommended Sensors

ORP: All standard ORP sensors.

pH: All standard pH sensors. Supports SMART Rosemount Analytical pH sensors.

Contacting Conductivity
(Ordering Code –C)

Measures conductivity in the range 0 to 600,000 µS/cm (600mS/cm). Measurement choices are conductivity, resistivity, total dissolved solids, salinity, and % concentration. In addition, the "Custom Curve" feature allows users to define a three to five point curve to measure ppm, %, or a no unit variable. The % concentration selection includes the choice of five common solutions (0-12% NaOH, 0-15% HCl, 0-20% NaCl, and 0-25% or 96-99.7% H_2SO_4). The conductivity concentration algorithms for these solutions are fully temperature compensated. Three temperature compensation options are available: manual slope (X%/°C), high purity water (dilute sodium chloride), and cation conductivity (dilute hydrochloric acid). Temperature compensation can be disabled, allowing the transmitter to display raw conductivity. For more information concerning the use of the contacting conductivity sensors, refer to the product data sheets.

NOTE: The 410VP 4-electrode high-range conductivity sensor is compatible with the 1066.

Performance Specifications

Measurement Range: see table below

Input filter: time constant 1 - 999 sec, default 2 sec.

Response time: 3 seconds to 95% of final reading using the default input filter

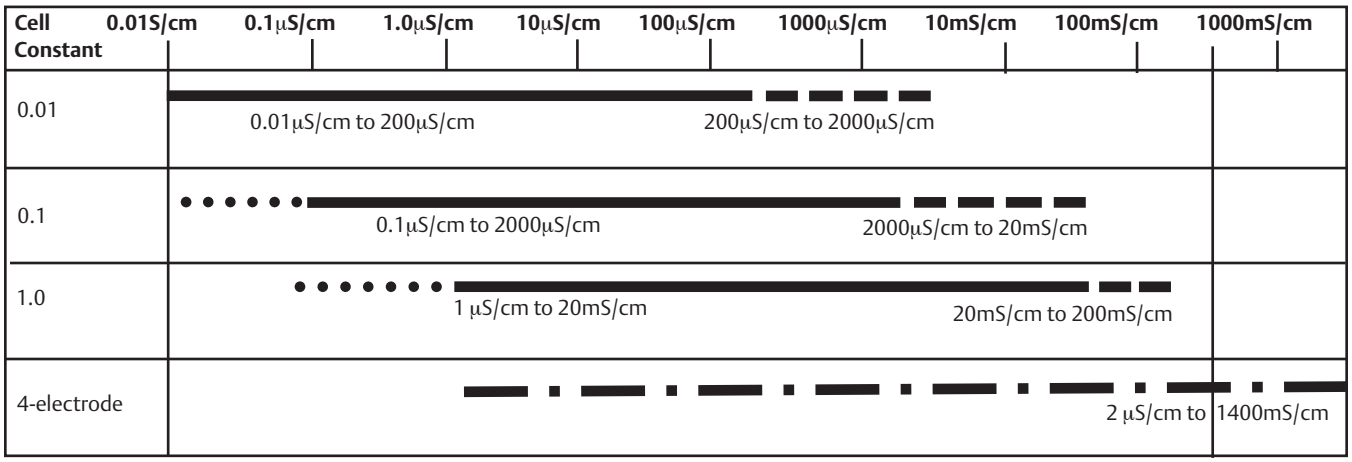
Recommended Sensors

All Rosemount Analytical ENDURANCE Model 400 series conductivity sensors (Pt 1000 RTD) and Model 410VP 4-electrode sensor.

ENDURANCE™ series of conductivity sensors

PERFORMANCE SPECIFICATIONS

Recommended Range – Contacting Conductivity



Linearity for Standard Cable ≤ 50 ft (15 m)*

- ±0.6% of reading in recommended range
- ±2% of reading in recommended range
- ±5% of reading outside low recommended range
- ±4% of reading in recommended range

Temperature specifications:

Temperature range	0 to 200°C
Temperature Accuracy, Pt-1000, 0-50°C	± 0.1°C
Temperature Accuracy, Pt-1000, Temp. > 50°C	± 0.5°C

Toroidal Conductivity
(Ordering Code –T)

Measures conductivity in the range of 1 µS/cm to 2,000,000 µS/cm (2 S/cm). Measurement choices are conductivity, resistivity, total dissolved solids, salinity, and % concentration. The % concentration selection includes the choice of five common solutions (0-12% NaOH, 0-15% HCl, 0-20% NaCl, and 0-25% or 96-99.7% H2SO4). The conductivity concentration algorithms for these solutions are fully temperature compensated. For other solutions, a simple-to-use menu allows the customer to enter his own data. The transmitter accepts as many as five data points and fits either a linear (two points) or a quadratic function (three to five points) to the data. Reference temperature and linear temperature slope may also be adjusted for optimum results. Two temperature compensation options are available: manual slope (X%/°C) and neutral salt (dilute sodium chloride). Temperature compensation can be disabled, allowing the transmitter to display raw conductivity. For more information concerning use of the toroidal conductivity sensors, refer to the product data sheets.

Performance Specifications

Measurement Range: see table below

Input filter: time constant 1 - 999 sec, default 2 sec.

Response time: 3 seconds to 95% of final reading

Recommended Sensors

All Rosemount Analytical submersion/immersion and flow-through toroidal sensors.

High performance toroidal conductivity sensors 226 and 225

PERFORMANCE SPECIFICATIONS

Recommended Range - Toroidal Conductivity

Model	1µS/cm	10µS/cm	100µS/cm	1000µS/cm	10mS/cm	100mS/cm	1000mS/cm	2000mS/cm
226		15µS/cm to 500mS/cm					500mS/cm to 2000mS/cm	
225 & 228		15µS/cm to 1500mS/cm					1500mS/cm to 2000mS/cm	
242			100µS/cm to 2000mS/cm					
222 (1in & 2in)				500µS/cm to 2000mS/cm				

LOOP PERFORMANCE (Following Calibration)

Model 226: ±1% of reading ±5µS/cm in recommended range

Models 225 & 228: ±1% of reading ±15µS/cm in recommended range

Models 222, 242: ±4% of reading ±5mS/cm in recommended range

Models 225, 226 & 228: ±5% of reading outside high recommended range

Temperature specifications:

Temperature range	-25 to 210°C (-13 to 410ºF)
Temperature Accuracy, Pt-100, -25 to 50 °C	± 0.5°C
Temperature Accuracy, Pt-100,. 50 to 210°C	± 1°C

Chlorine (Codes – CL)

Free and Total Chlorine

The 1066 is compatible with the 499ACL-01 free chlorine sensor and the 499ACL-02 total chlorine sensor. The 499ACL-02 sensor must be used with the TCL total chlorine sample conditioning system. The 1066 fully compensates free and total chlorine readings for changes in membrane permeability caused by temperature changes. For free chlorine measurements, both automatic and manual pH correction are available. For automatic pH correction select an appropriate pH sensor. For more information concerning the use and operation of the amperometric chlorine sensors and the TCL measurement system, refer to the product data sheets.

Performance Specifications

Resolution: 0.001 ppm or 0.01 ppm – selectable
Input Range: 0nA – 100µA
Automatic pH correction for Free Chlorine: (user selectable for code -CL): 6.0 to 10.0 pH
Temperature compensation: Automatic (via RTD) or manual (0-50°C).
Input filter: Time constant 1 - 999 sec, default 5 sec.
Response time: 8 seconds to 90% of final reading

Recommended Sensors

Chlorine: 499ACL-01 Free Chlorine or 499ACL-0_2 Total Residual Chlorine
pH: These pH sensors are recommended for automatic pH correction of free chlorine readings: 3900-02-10, 3900-01-10, and 3900VP-02-10 or any Rosemount Analytical SMART or conventional pH sensor.

499ACL-01
Chlorine sensor

Monochloramine

The 1066 is compatible with the Model 499A CL-03 Monochloramine sensor. The 1066 fully compensates readings for changes in membrane permeability caused by temperature changes. Because monochloramine measurement is not affected by pH of the process, no pH sensor or correction is required. For more information concerning the use and operation of the amperometric chlorine sensors, refer to the product data sheets.

Performance Specifications

Resolution: 0.001 ppm or 0.01 ppm – selectable
Input Range: 0nA – 100µA
Temperature compensation: Automatic (via RTD) or manual (0-50°C).
Input filter: Time constant 1 - 999 sec, default 5 sec.
Response time: 8 seconds to 90% of final reading

Recommended Sensors

Rosemount Analytical 499ACL-03 Monochloramine sensor

Dissolved Oxygen (Codes – DO)

The 1066 is compatible with the 499ADO, 499ATrDO, Hx438, Gx438 and Bx438 dissolved oxygen sensors and the 4000 percent oxygen gas sensor. The 1066 displays dissolved oxygen in ppm, mg/L, ppb, g/L, % saturation, % O2 in gas, ppm O2 in gas. The transmitter fully compensates oxygen readings for changes in membrane permeability caused by temperature changes. Automatic air calibration, including salinity correction, is standard. The only required user entry is barometric pressure. For more information on the use of amperometric oxygen sensors, refer to the product data sheets.

Performance Specifications

Resolution: 0.01 ppm; 0.1 ppb for 499A TrDO sensor (when O_2 <1.00 ppm); 0.1%
Input Range: 0nA – 100µA
Temperature Compensation: Automatic (via RTD) or manual (0-50°C).
Input filter: Time constant 1 - 999 sec, default 5 sec.
Response time: 8 seconds to 90% of final reading

Recommended Sensors

Rosemount Analytical amperometric membrane and steam-sterilizable sensors listed above

Dissolved Oxygen
499ADO sensor with
Variopol connection

Dissolved Ozone (Codes –OZ)

The 1066 is compatible with the 499AOZ sensor. The 1066 fully compensates ozone readings for changes in membrane permeability caused by temperature changes. For more information concerning the use and operation of the amperometric ozone sensors, refer to the product data sheets.

Performance Specifications

Resolution: 0.001 ppm or 0.01 ppm – selectable
Input Range: 0nA – 100µA
Temperature Compensation: Automatic (via RTD) or manual (0-35°C)
Input filter: Time constant 1 - 999 sec, default 5 sec.
Response time: 8 seconds to 90% of final reading

Recommended Sensors

Rosemount Analytical 499A OZ ozone sensor

Dissolved Ozone
499AOZ sensors with
Variopol connection

Ordering Information

The 1066 2-Wire Transmitter is intended for the continuous determination of pH, ORP (Redox), conductivity, (both contacting and toroidal), and for measurements using membrane-covered amperometric sensors (oxygen, ozone, free and total chlorine, and monochloramine). For free chlorine measurements, which often require continuous pH correction a second input for a pH sensor is available. Two 4-20mA analog outputs are standard on HART® units. The 1066 is compatible with SMART pH sensors from Rosemount Analytical. HART digital communications is standard and FOUNDATION® fieldbus digital communications is offered as an option.

Communication with the 1066 is through:

- Local keypad interface
- 475 HART® and FOUNDATION fieldbus Communicator
- HART protocol version 7
- FOUNDATION® fieldbus
- AMS (Asset Management Solutions) Aware
- Smart Wireless THUM™ Adapter for WirelessHART™ networks

Description	
1066 Two-Wire Transmitter	
Measurement	
P	pH/ORP
C	Contacting Conductivity
T	Toroidal Conductivity
CL	Chlorine
DO	Dissolved Oxygen
OZ	Ozone

Communication	
HT	HART® Digital Communication Superimposed on 4-20mA Output
FF	FOUNDATION™ fieldbus Digital Output
FI	FOUNDATION™ fieldbus Digital Output with FISCO

Agency Approval	
60	None Required
67	FM Approved, Intrinsically Safe, and Non-Incendive
69	CSA/CUS Approved, Intrinsically Safe, and Non-Incendive
73	ATEX/IECEx Approved, Intrinsically Safe

ACCESSORIES (Weights are rounded up to nearest whole lb or 0.5 kg)			
PART #	**DESCRIPTION**	**WEIGHT**	**SHIPPING WT**
23820-00	Pipe mounting kit, includes U-bolts, mounting bracket, nuts, washers, and screws (complete)	2 lb (1.0 kg)	4 lb (2.0 kg)
23554-00	Gland fittings, PG 13.5, 5 per package	1 lb (0.5 kg)	2 lb (1.0 kg)
9240048-00	Tag, stainless steel (specify marking)	1 lb (0.5 kg)	1 lb (0.5 kg)
pH INPUT			
9210014	Buffer Solution, 4.01 pH, 1 pt.	1 lb (0.5 kg)	2 lb (1.0 kg)
9210013	Buffer Solution, 7.0 pH, 1 pt.	1 lb (0.5 kg)	2 lb (1.0 kg)
9210012	Buffer Solution, 10.0 pH, 1 pt.	1 lb (0.5 kg)	2 lb (1.0 kg)

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