

DUAL-INPUT INTELLIGENT ANALYZER

- **Large, easy-to-read display:** Check your process condition at a glance
- **Dual measurements** in any combination of pH/ORP, Conductivity, Chlorine, Dissolved Oxygen, Ozone, Turbidity and more
- **HART® and PROFIBUS® DP** digital communications options
- **Intuitive Menus:** Self-prompting and easy to navigate. User Help screens
- **Easy installation** with simple wiring and slide-out measurement boards
- **7 menu languages** – English, French, German, Italian, Portuguese, Spanish and Chinese
- **FM and CSA** – Class I Div 2 approved, **UL** approved for general purpose



MODEL 1056

Multiparameter analyzer with large easy-to-read screen



This new Rosemount Analytical Inc. product by Emerson Process Management is designed for use in the following Industries: Pulp & Paper, Metals & Mining, Chemical Processing, Food & Beverage, Life Sciences, Wate/Wastewater, Petroleum Refining, Semiconductor, Power and General Applications



Архангельск (8182)63-90-72
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 Белгород (4722)40-23-64
 Брянск (4832)59-03-52
 Владивосток (423)249-28-31
 Волгоград (844)278-03-48
 Вологда (8172)26-41-59
 Воронеж (473)204-51-73
 Екатеринбург (343)384-55-89
 Иваново (4932)77-34-06
 Ижевск (3412)26-03-58
 Казань (843)206-01-48

Калининград (4012)72-03-81
 Калуга (4842)92-23-67
 Кемерово (3842)65-04-62
 Киров (8332)68-02-04
 Краснодар (861)203-40-90
 Красноярск (391)204-63-61
 Курск (4712)77-13-04
 Липецк (4742)52-20-81
 Магнитогорск (3519)55-03-13
 Москва (495)268-04-70
 Мурманск (8152)59-64-93
 Набережные Челны (8552)20-53-41

Нижний Новгород (831)429-08-12
 Новокузнецк (3843)20-46-81
 Новосибирск (383)227-86-73
 Орел (4862)44-53-42
 Оренбург (3532)37-68-04
 Пенза (8412)22-31-16
 Пермь (342)205-81-47
 Ростов-на-Дону (863)308-18-15
 Рязань (4912)46-61-64
 Самара (846)206-03-16
 Санкт-Петербург (812)309-46-40
 Саратов (845)249-38-78

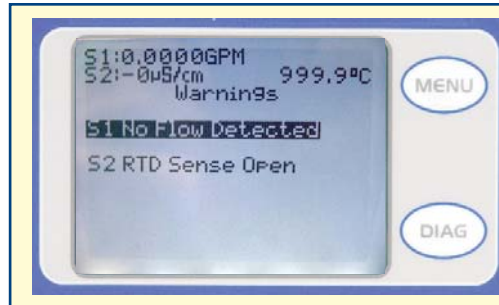
Смоленск (4812)29-41-54
 Сочи (862)225-72-31
 Ставрополь (8652)20-65-13
 Тверь (4822)63-31-35
 Томск (3822)98-41-53
 Тула (4872)74-02-29
 Тюмень (3452)66-21-18
 Ульяновск (8422)24-23-59
 Уфа (347)229-48-12
 Челябинск (351)202-03-61
 Череповец (8202)49-02-64
 Ярославль (4852)69-52-93

FEATURES and APPLICATIONS for MODEL 1056

The Model 1056 dual-input analyzer offers single or dual sensor input with an unrestricted choice of dual measurements thus reducing the cost per loop and saving panel space. This multi-parameter instrument offers a wide range of measurement choices, supporting most industrial, commercial, and municipal applications.

The modular design of the instrument allows signal input boards to be field replaced making configuration changes easy. Live process values are always displayed during programming and

calibration routines. Standard features include isolated inputs, seven embedded local languages, two 4-20mA current outputs and removable connectors for power and current outputs. HART and Profibus DP digital communications are available. Model 1056 HART units communicate with the Model 375 HART® hand-held communicator and HART hosts, such as AMS Intelligent Device Manager. Model 1056 Profibus units are fully compatible with Profibus DP networks and Class 1 or Class 2 masters.



DIAGNOSTICS: The analyzer continuously monitors itself and the sensor(s) for problematic conditions. The display flashes Fault and/or Warning when these conditions occur.

PERFORMANCE and PHYSICAL SPECIFICATIONS

Enclosure: Polycarbonate. NEMA 4X/CSA 4 (IP65).

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: Accepts 1/2" or PG13.5 conduit fittings

Display: Monochromatic graphic liquid crystal display. 128 x 96 pixel display resolution. Backlit. Active display area: 58 x 78mm (2.3 x 3.0 in.).

Ambient Temperature and Humidity: 0 to 55°C (32 to 131°F). Turbidity only: 0 to 50°C (32 to 122°F), RH 5 to 95% (non-condensing)

Storage Temperature Effect: -20 to 60°C (-4 to 140°F)

Power: Ordering Code -01: Code -01: 115/230 VAC ±15%, 50/60 Hz. 10W.

Code -02: 20 to 30 VDC. 15 W.

Code -03: 85 to 265 VAC, 47.5 to 65.0 Hz, switching. 15 W.

Note: Code -02 and -03 power supplies include four programmable relays

Approved by UL for use in ordinary locations and approved by FM and CSA for use in Class I Division 2 hazardous areas.

Alarms relays*: Four alarm relays for process measurement(s) or temperature. Any relay can be configured as a fault alarm instead of a process alarm. Each relay can be configured independently and each can be programmed with interval timer settings.

*Relays only available with -02 power supply (20 - 30 VDC) or -03 switching power supply (85 - 265 VAC)

Relays: Form C, SPDT, epoxy sealed

Inputs: One or two isolated sensor inputs

Outputs: Two 4-20 mA or 0-20 mA isolated current outputs. Fully scalable. Max Load: 550 Ohm.

Current Output Accuracy: ±0.05 mA @ 25 °C

Terminal Connections Rating: Power connector (3-leads): 24-12 AWG wire size. Signal board terminal blocks: 26-16 AWG wire size. Current output connectors (2-leads): 24-16 AWG wire size. Alarm relay terminal blocks: 24-12 AWG wire size (-02 24 VDC power supply and -03 85-265VAC power supply)

Weight/Shipping Weight: (rounded up to nearest lb or nearest 0.5 kg): 3 lbs/4 lbs (1.5 kg/2.0 kg)

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: 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: The 1066 HART communications can be switched between HART version 7 and HART version 5 at the transmitter. This makes it possible to take advantage of the new features of HART 7, or maintain compatibility with older HART 5 hosts, which are not yet HART 7 capable. The Fieldbus version of the 1066 transmitters provide the advanced features of ITK 6, along with additional functions blocks to allow them to participate more fully in control in the field.

Features and Applications, cont.

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.

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.

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.



Figure 6. 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 $\mu\text{S}/\text{cm}$ (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 ($X\%/^{\circ}\text{C}$), 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 400 series conductivity sensors (Pt 1000 RTD) and 410VP 4-electrode sensor.



Figure 7. ENDURANCE™ series of conductivity sensors

PERFORMANCE SPECIFICATIONS

Recommended Range – Contacting Conductivity

Cell Constant	0.01S/cm	0.1 $\mu\text{S}/\text{cm}$	1.0 $\mu\text{S}/\text{cm}$	10 $\mu\text{S}/\text{cm}$	100 $\mu\text{S}/\text{cm}$	1000 $\mu\text{S}/\text{cm}$	10mS/cm	100mS/cm	1000mS/cm
0.01	0.01 $\mu\text{S}/\text{cm}$ to 200 $\mu\text{S}/\text{cm}$		200 $\mu\text{S}/\text{cm}$ to 2000 $\mu\text{S}/\text{cm}$						
0.1	0.1 $\mu\text{S}/\text{cm}$ to 2000 $\mu\text{S}/\text{cm}$		2000 $\mu\text{S}/\text{cm}$ to 20mS/cm						
1.0	1 $\mu\text{S}/\text{cm}$ to 20mS/cm		20mS/cm to 200mS/cm						
4-electrode			2 $\mu\text{S}/\text{cm}$ to 1400mS/cm						

Linearity for Standard Cable \leq 50 ft (15 m)

	$\pm 0.6\%$ of reading in recommended range
	$\pm 2\%$ of reading in recommended range
	$\pm 5\%$ of reading outside low recommended range
	$\pm 4\%$ of reading in recommended range

Temperature specifications:

Temperature range	0 to 200°C
Temperature Accuracy, Pt-1000, 0-50°C	$\pm 0.1^{\circ}\text{C}$
Temperature Accuracy, Pt-1000, Temp. > 50°C	$\pm 0.5^{\circ}\text{C}$

Toroidal Conductivity (Ordering Code –T)

Measures conductivity in the range of 1 $\mu\text{S}/\text{cm}$ to 2,000,000 $\mu\text{S}/\text{cm}$ (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.



Figure 8. High performance toroidal conductivity sensors 226 and 225

PERFORMANCE SPECIFICATIONS

Recommended Range - Toroidal Conductivity

Model	1 $\mu\text{S}/\text{cm}$	10 $\mu\text{S}/\text{cm}$	100 $\mu\text{S}/\text{cm}$	1000 $\mu\text{S}/\text{cm}$	10mS/cm	100mS/cm	1000mS/cm	2000mS/cm
226		15 $\mu\text{S}/\text{cm}$ to 500mS/cm			500mS/cm to 2000mS/cm			
225 & 228		15 $\mu\text{S}/\text{cm}$ to 1500mS/cm			1500mS/cm to 2000mS/cm			
242		100 $\mu\text{S}/\text{cm}$ to 2000mS/cm						
222 (1in & 2in)		500 $\mu\text{S}/\text{cm}$ to 2000mS/cm						

LOOP PERFORMANCE (Following Calibration)

- Model 226: $\pm 1\%$ of reading $\pm 5\mu\text{S}/\text{cm}$ in recommended range
- Models 225 & 228: $\pm 1\%$ of reading $\pm 15\mu\text{S}/\text{cm}$ in recommended range
- Models 222, 242: $\pm 4\%$ of reading $\pm 5\text{mS}/\text{cm}$ in recommended range
- Models 225, 226 & 228: $\pm 5\%$ of reading outside high recommended range

Temperature specifications:

Temperature range	-25 to 210°C (-13 to 410°F)
Temperature Accuracy, Pt-100, -25 to 50 °C	$\pm 0.5^\circ\text{C}$
Temperature Accuracy, Pt-100, 50 to 210°C	$\pm 1^\circ\text{C}$

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-02 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.



Figure 9. 499ACL-01 Chlorine sensor

Monochloramine

The 1066 is compatible with the 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 O₂ <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



Figure 10. Dissolved Oxygen 499ADO sensor with Variopool 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



Figure 11. Dissolved Ozone 499AOZ sensors with Variopool connection.

- Excellent long term stability and low drift
- Measurement inherently fails high if sensor damaged (no false zero)
- LOD = 0.5 ppm O₂ gas phase
- No membranes to foul; No electrolytes to poison; No consumption of O₂
- Hazardous area approvals: FM, CSA, ATEX, UL and CE
- No cross-sensitivity or damage caused by: CO₂, H₂S, NH₃, NO₂, heavy metals, ethanol, methanol or ionic species pH, S₂⁻, SO₄²⁻, Cl⁻, salinity or turbidity
- Measurement independent of flow velocity

The 4401OXY analyzer optically measures oxygen in either the gas or liquid phase by utilizing quench luminescence of an oxygen specific luminophore.

The analyzer is suitable for direct field installation (NEMA 4X) in hazardous area (Class I, Division 2). The optical fiber sensor platform allows small inline sensors to be installed into sample tubing lines (1/4"), flow cells using NPT fittings, or directly into tanks or process lines using our retractable "hot tap" sensor design. BOS optical oxygen sensors are impervious to typical O₂ poisons (H₂S) and interferences (combustibles, magnetic, CO₂ and H₂) with high accuracy and long-term stability measurements without the need for complex or advanced sample conditioning systems. The threaded version of the optical sensor has optional Dual Seal (ANSI/ISA 12.27.01) classification for high pressure applications up to 1200 PSIG (82.7 BAR).



Typical Applications - Gas Phase (g)

- O₂ in hydrocarbon streams
- O₂ detection in nitrogen headers
- O₂ in process streams
- O₂ in nitrogen tank blanketing
- Trace level oxygen in flare gas

Limit of Detection: 0.5 ppm O₂ @ 1atm, 20°C (0.0005 hPa)

Typical Applications - Liquid Phase (l)

- High pressure produced water Dissolved O₂
- ppb dissolved O₂ for waterflood injection
- Oxygen in methanol and ethanol
- Oxygen in oils
- Dissolved O₂ in liquid process streams
- Dissolved O₂ in product streams

Precision Optical Oxygen Measurement

4401OXY Oxygen Analyzer & BOS Sensors

Principle of Operation

The 4401 OXY is a phase fluorometric analyzer that utilizes phase modulation to evaluate the luminescent decay time of an oxygen specific luminophore to calculate oxygen concentration. The sensor comprises of a small luminophore embedded in a polymeric matrix at the end of a fiber optic cable allowing for an extremely sensitive and accurate measurement of the partial pressure of oxygen that is applicable in both gas phase and liquid phase.

The analyzer uses an LED to emit blue light through fiber optic cable down the sensor tip [Fig 1]. The sensor tip contains the luminophore which absorbs the energy and rises to an excited state. In the absence of oxygen the excited luminophore will fall back to its ground state at a specific rate and in the process emits a red shifted light which is transmitted to the analyzer (spectrometer) via the optic cable where it is detected by a photomultiplier tube. When oxygen is present it quenches the fluorescence at a rate proportional to the oxygen concentration [Fig 2.]. The phase shift between the excitation source and the fluorescent signal is measured and the oxygen concentration is calculated [Fig 3].

Light transmission through fiber optic to luminophore

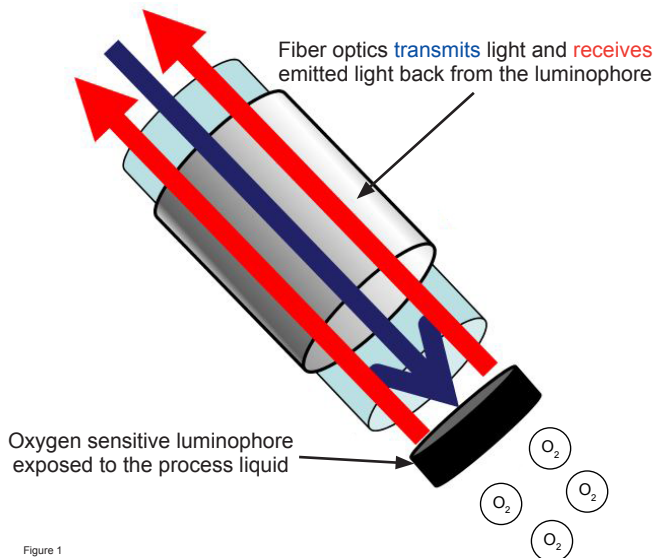


Figure 1

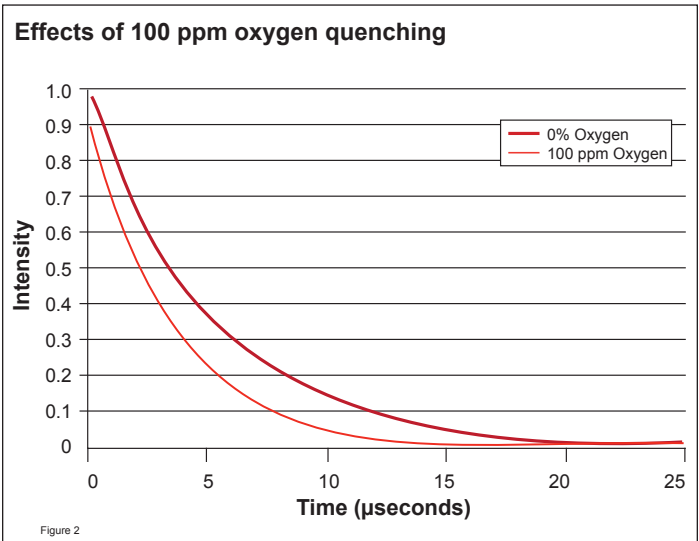


Figure 2

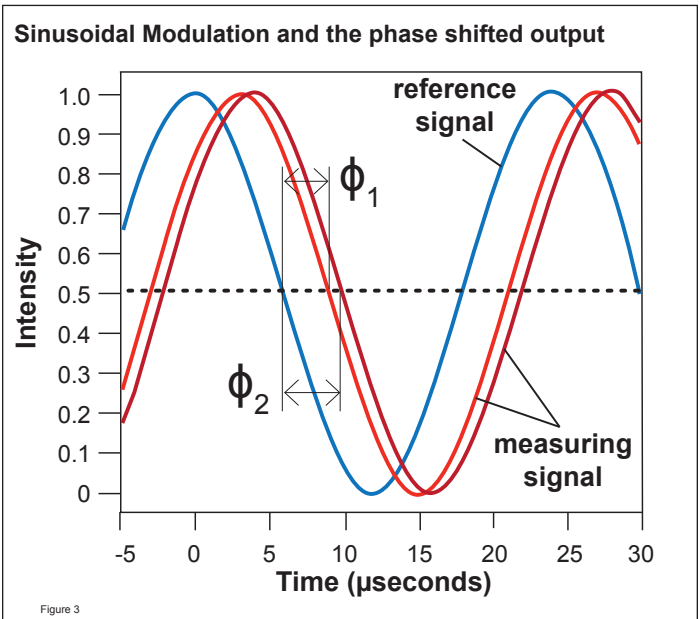


Figure 3

TWO-WIRE TRANSMITTERS FOR pH, ORP, CONDUCTIVITY, OXYGEN, OZONE, AND CHLORINE

Model 5081 Family of Two-wire Transmitters

- CHOICE OF COMMUNICATION PROTOCOL: HART or FOUNDATION Fieldbus.
- LARGE, EASY-TO-READ two-line display shows the process measurement and temperature.
- SIMPLE MENU STRUCTURE.
- ROBUST NEMA 4X and NEMA 7B ENCLOSURE.
- INTRINSICALLY SAFE DESIGN allows the transmitter to be used in hazardous environments (with appropriate safety barriers).
- NON-VOLATILE MEMORY retains program settings and calibration data during power failures.



FEATURES AND APPLICATIONS

The Model 5081 family of transmitters can be used to measure pH, ORP, conductivity (using either contacting or toroidal sensors), resistivity, oxygen (ppm and ppb level), free chlorine, total chlorine, and ozone in a variety of process liquids. The 5081 is compatible with most Rosemount Analytical sensors. See the Specification sections for details.

The transmitter has a rugged, weatherproof, corrosion-resistant enclosure (NEMA 4X and IP65) of epoxy-painted aluminum. The enclosure also meets NEMA 7B explosion-proof standards.

The transmitter has a two-line seven-segment display. The main measurement appears in 0.8-inch (20 mm) high numerals. The secondary measurement, temperature (and pH if free chlorine is being measured), appears in 0.3-inch (7 mm) high digits.

Two digital communication protocols are available: HART (model option -HT) and Foundation Fieldbus (model options -FF or -FI). Digital communications allows access to AMS (Asset Management Solutions). Use AMS to set up and configure the transmitter, read process variables, and troubleshoot problems from a personal computer or host anywhere in the plant.

A handheld infrared remote controller or the HART and Foundation Fieldbus Model 375 communicator can also be used for programming and calibrating the transmitter. The remote controller works from as far away as six feet.



Model 5081-P pH/ORP Transmitter

- CHANGING FROM pH TO ORP operation takes only seconds.
- AUTOMATIC TWO-POINT BUFFER CALIBRATION reduces errors.
- SOLUTION TEMPERATURE COMPENSATION converts measured pH to the pH at 25°C.
- CONTINUOUS DIAGNOSTICS monitor sensor performance and warn the user of failure (FAULT) or approaching failure (WARNING).

Model 5081-C Contacting Conductivity Transmitter

- MEASURES CONDUCTIVITY, RESISTIVITY, OR CUSTOM CURVE VARIABLE.
- AUTOMATIC TC RECOGNITION simplifies start up.
- AUTOMATIC/MANUAL TEMPERATURE COMPENSATION ensures accurate monitoring and control.
- AUTOMATIC COMPENSATION FOR SENSOR CABLE RESISTANCE improves accuracy of high conductivity/ low resistivity measurements.
- BUILT-IN TEMPERATURE COMPENSATION ALGORITHMS include straight slope, ultra-pure water, cation conductivity, and no compensation.



Model 5081-T Toroidal Conductivity Transmitter

- MEASURES CONDUCTIVITY, PERCENT CONCENTRATION, OR CUSTOM CURVE VARIABLE.
- AUTOMATIC TC RECOGNITION simplifies start up.
- AUTOMATIC/MANUAL TEMPERATURE COMPENSATION ensures accurate monitoring and control.
- BUILT-IN CONCENTRATION CURVES FOR 0-12% NaOH, 0-15% HCl, 0-25% and 96-99.7% H₂SO₄.
- PROGRAMMABLE REFERENCE TEMPERATURE enables temperature compensation to temperatures other than 25 degrees Celsius.
- AUTOMATIC COMPENSATION FOR SENSOR CABLE RESISTANCE improves accuracy of high conductivity measurements.



Model 5081-A Amperometric Transmitter

- MEASURES dissolved oxygen (ppm and ppb level), free chlorine, total chlorine, and ozone.
- SECOND INPUT FOR A pH SENSOR ALLOWS AUTOMATIC pH CORRECTION for free chlorine measurement. No expensive, messy reagents needed.
- AUTOMATIC BUFFER RECOGNITION FOR pH CALIBRATION.



SPECIFICATIONS - GENERAL

Enclosure: Cast aluminum containing less than 6% magnesium, with epoxy polyester coating. NEMA 4X (IP65) and NEMA 7B. Neoprene O-ring cover seals.

Dimensions: See drawing.

Conduit Openings: ¾-in. NPT

Ambient Temperature: -4 to 149°F (-20 to 65°C)

Storage Temperature: -22 to 176°F (-30 to 80°C)

Relative Humidity: 0 to 95% (non-condensing)

Weight/Shipping Weight: 10 lb/11 lb (4.5/5.0 kg)

Display: Two-line LCD; first line shows process variable (pH, ORP, conductivity, % concentration, oxygen, ozone, or chlorine), second line shows process temperature and output current. For pH/chlorine combination, the second line can be toggled to show pH. Fault and warning messages, when triggered, alternate with temperature and output readings.

First line: 7 segment LCD, 0.8 in. (20 mm) high.


Second line: 7 segment LCD, 0.3 in. (7mm) high.

Display board can be rotated 90 degrees clockwise or counterclockwise.

During calibration and programming, messages and prompts appear in the second line.

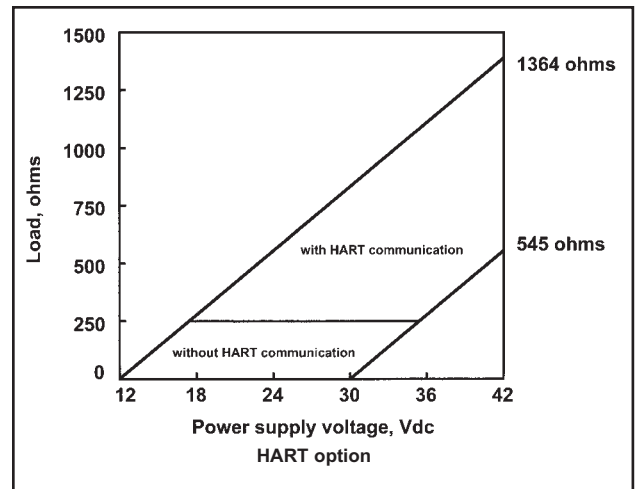
Temperature resolution: 0.1°C

Hazardous Location Approval: For details, see specifications for the measurement of interest.

RFI/EMI: EN-61326 

Digital Communications: For details, see specifications for the measurement of interest.

Specifications subject to change without notice.



HART —

Power & Load Requirements:

Supply voltage at the transmitter terminals should be at least 12 Vdc. 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 Vdc. 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 Output: Two-wire, 4-20 mA output with superimposed HART digital signal. Fully scalable over the operating range of the sensor.

Output accuracy: ±0.05 mA

FOUNDATION FIELDBUS —

Power & Load Requirements: A power supply voltage of 9-32 Vdc at 22 mA is required.

Fieldbus Intrinsically Safe COnccept/FISCO-compliant versions of Model 5081 Foundation Fieldbus transmitter are available.

- **Rugged Two Electrode Conductivity Sensors**
- **Unique Four Electrode Conductivity Sensors**
- **Versatile Installation Options (Threaded, Quick Change, Retractable)**
- **Specialized High Pressure / High Temperature Options**



Conductivity sensors measure the specific conductance of liquid processes. The specific conductance is directly related to the presence of ionic species and their concentration. Barben Analytical offers a full range of two electrode and four electrode contacting conductivity sensors for a variety of industrial measurement applications.

Two Electrode Conductivity Sensors

- Designed for pure water and other low to medium conductivity applications.
- Threaded in-line, submersible, and “Hot Tap” retractable product options
- Large range of cell constants to ensure the sensor range properly matches the application.

Four Electrode Conductivity Sensors

- Ideal for medium to high conductivity applications
- A great low cost alternative to toroidal sensor technology
- Additional electrode pair compensates for particulate and scale build-up.

Compatibility with All Major Vendor’s Electronics

- Proven with major vendors of conductivity analyzers (Rosemount, ABB, E&H, Mettler Toledo, Knick)
- Improve your measurement by replacing only the sensor
- Wiring information available

Industrial Mounting Options

- Mounting fittings for sample line installations
- Submersible cleaners and scrubbers
- Ball Valve “Hot Tap” retraction solutions
- Variety of materials for corrosive applications

Liquid Conductivity Two & Four Electrode Sensors

Model CS10 / CS51

Two Electrode Threaded In-line, Submersible

The threaded CS10 / CS51 products are ideal for clean water sample stream applications using the NPT process connection. The same NPT adapter fitting can be reversed to mount the sensor in submersible installations.



CS10 with 0.01 Electrode

Wetted Material

- Electrodes 316 Stainless Steel
- Insulator Teflon
- Seals EPR
- Mounting Polypropylene or 316 Stainless

Temperature Compensation

- PT100 RTD
- PT1000 RTD
- 8550 Ohm (Honeywell)

Pressure / Temperature Ratings

Sensor Design	Max. Pressure / Temperature
Polypropylene Adapter	100 PSIG (690 kPa) @ 212°F (100°C)
316 Stainless Adapter	200 PSIG (1380 kPa) @ 248°F (120°C)

CS10 / CS51 Dimensions

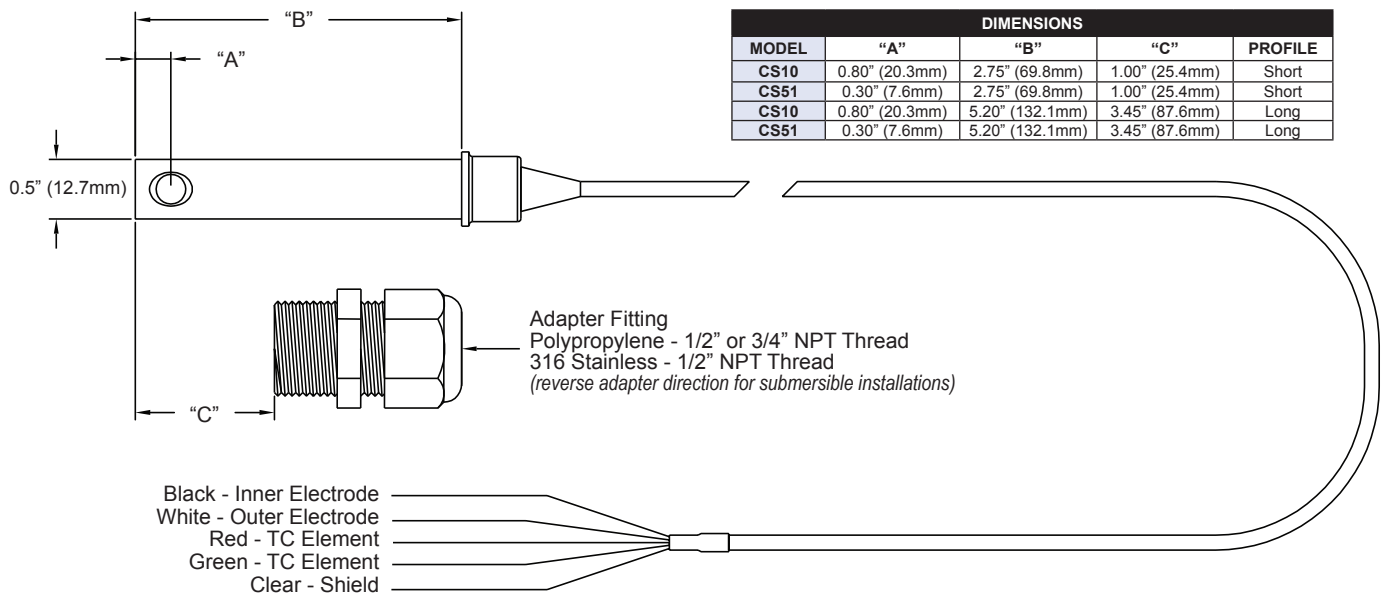


Figure 6

Liquid Conductivity Two & Four Electrode Sensors

Model CS41

Two Electrode High Pressure Threaded In-line

The CS41 Two Electrode Conductivity Sensor is specifically designed to handle the high pressure requirements found in boiler water measurement. It uses a rugged, explosionproof junction box with a high temp terminal strip for internal wiring.

Wetted Material

- Electrodes 316 Stainless Steel
- Insulator PEEK
- Seals EPR (dual o-ring)
- Mounting 316 Stainless

Pressure / Temperature Ratings

Sensor Design	Max. Pressure / Temperature
316 Stainless	400 PSIG (2758 kPa) @ 212°F (100°C) 250 PSIG (1724 kPa) @ 401°F (205°C)

CS41 with 0.10 Electrode



Temperature Compensation

- PT100 RTD
- PT1000 RTD
- 8550 Ohm (Honeywell)

CS51 Dimensions

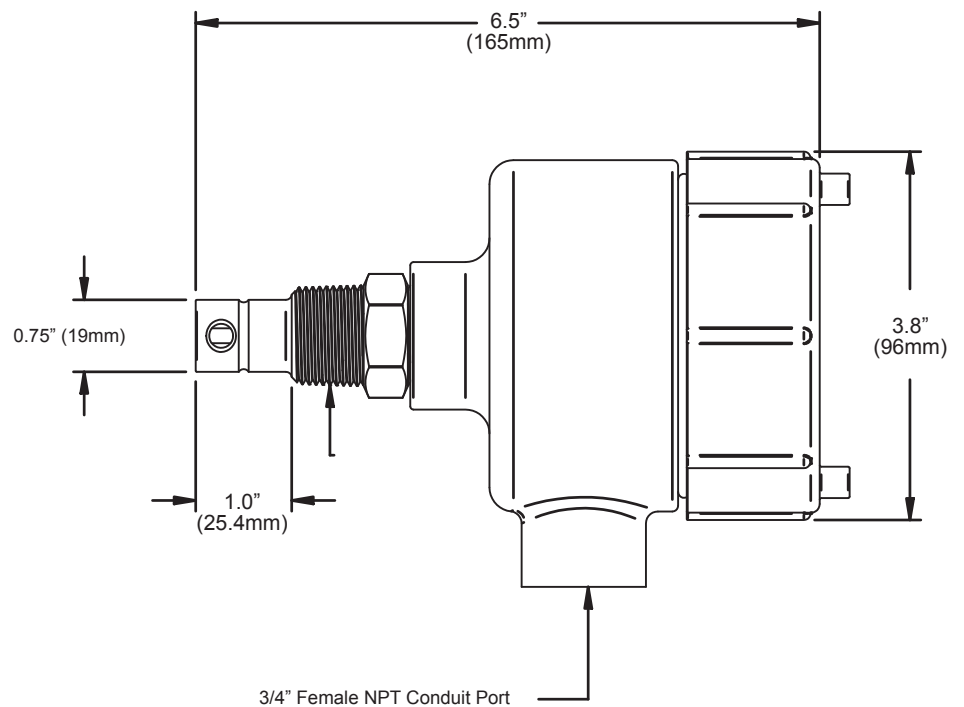


Figure 7

Liquid Conductivity Two & Four Electrode Sensors

Model CS40 Two Electrode Hot Tap Retractable

For applications where a sample line is not present the CS40 Two Electrode Sensor provides an easy method to remove and isolate the sensor for cleaning and calibration.

Wetted Material

- Electrodes 316 Stainless Steel
- Insulator Kel-F PCTEF (std), PEEK (high temp)
- Seals EPDM / Viton / Buna-N
- Hardware 316 Stainless

Pressure / Temperature Ratings

Sensor Design	Max. Pressure / Temperature
Standard Temp	100 PSIG (689 kPa) @ 302°F (150°C)
High Temp	250 PSIG (1724 kPa) @ 401°F (205°C)

Temperature Compensation

- PT100 RTD
- PT1000 RTD
- 8550 Ohm (Honeywell)



CS40 Dimensions

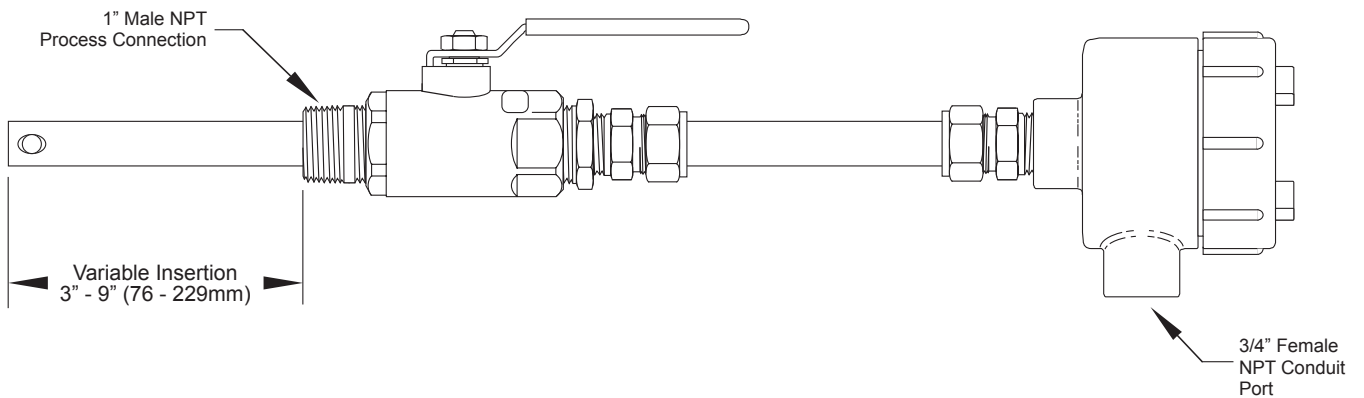


Figure 8

Liquid Conductivity Two & Four Electrode Sensors

Model 551 / 546 / 547

Four Electrode In-line, Hot Tap, and Submersible

Barben's four electrode conductivity sensors use the same housing and accessories as our pH products.

Wetted Material

- Electrodes 316 Stainless, Titanium Gr2, Hastelloy C
- Insulator PEEK
- Seals EPDM / Viton
- Hardware *(see accessories guide for hardware options)*

547 Cartridge style Four Electrode Sensor



Temperature Compensation

- PT100 RTD
- PT1000 RTD
- 3K Ohm RTD (Balco)

Pressure / Temperature Ratings

Sensor Type	Installation Type		
	Threaded Nut Lock (plastic / metal body with hand nut only)	Threaded Nut Lock (metal body & metal hex nut only)	Flanged / Threaded Nut Lock (plastic body & metal hex nut only)
551	100 PSIG @ 158°F (70°C) 40 PSIG @ 212°F (100°C)	300 PSIG @ 176°F (80°C) 40 PSIG @ 266°F (130°C)	150 PSIG @ 73°F (25°C) 25 PSIG @ 266°F (130°C)

Sensor Type	Installation Type	
	3/4" In-line or Submersible*	High Pressure Hot Tap
546	150 PSIG @ 158°F (70°C) 40 PSIG @ 266°F (130°C)	300 PSIG @ 176°F (80°C) 40 PSIG @ 266°F (130°C)

Sensor Type	Installation Type	
	Threaded In-line High Pressure	Retractable
547	2500 PSIG @ 122°F (50°C) 50 PSIG @ 266°F (130°C)	150 PSIG @ 158°F (70°C) 40 PSIG @ 266°F (130°C)

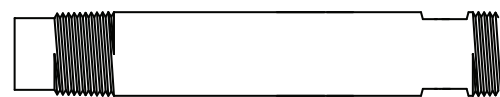
Four Electrode Tip Options

HIGH RANGE ELECTRODES (0 - 2 SIEMENS) SH, TH, HH SERIES



Metal Electrodes
316SS, Titanium, Hastelloy C
Dual EPDM or Viton O-ring Seals

Flush High Range Electrodes



LOW RANGE ELECTRODES (0 - 1400 MICROSIEMENS) SM, HM SERIES



Metal Electrodes
316SS, Hastelloy C
Dual EPDM or Viton O-ring Seals

Extended Low Range Current Electrodes

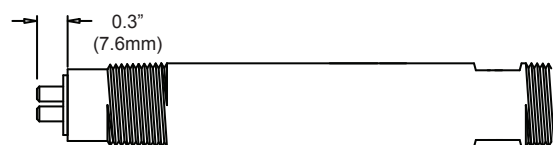


Figure 9

- Replaceable Extended Life Silicone Protected Luminophore
- Not Effected / Damaged by Sunlight
- Watertight NEMA 6P / IP68 Luminophore Seal
- 6 Status Levels of Luminophore Life
- High Temp Sensor 185°F / 85°C
- Accuracy to ± 0.01 mg/L (ppm) DO
- Output Options Include Wireless Handheld and 120/240VAC Analyzer
- Pre-Calibrated, No Calibration Code or Chip Needed



PDO₂ Direct Connect Smart Sensor Technology

With the PDO₂ optical dissolved oxygen (DO) sensor, the functionality of the traditional transmitter has been replaced by a microprocessor within the sensor. RS-485 (Modbus), 4-20 mA or ECS outputs allow the PDO₂ to connect directly with PLCs or other control systems. Each sensor is provided with software that can be used to directly interface the sensor to any Window™ OS Computer. The PDO₂ Sensor can also be connected to the Barben 1401DO four wire analyzer for conventional installations.

The PDO₂ sensor also has an on-board adaptive measurement algorithm to track and maximize the life of the replaceable silicone luminophore. The Barben PDO₂ is extremely stable and ships pre-calibrated from the factory. Typical calibration intervals are between 6 to 12 months. The sensing element is resistant to interference from CO₂, H₂S, SO₂, Ethanol, Methanol, H₂O₂ and sunlight. Watertight seals protect the electronics and the silicone protected luminophore is scratch and damage resistant.

status levels to the life of the luminophore, from excellent to defective, allowing the operator to schedule preventive maintenance and replacement of the luminophore. Multiple PDO₂ sensors can be coupled with a Wireless ARC View Handheld Display to create advanced solutions for installations running digital or analog networks.

Wireless Sensor Adapter

The VP8 cable from the PDO₂ sensor plugs directly into the field mount wireless sensor adapter. The wireless sensor adapter provides configuration-free plug-and-play communication between the PDO₂ sensor and ARC View Handheld Display unit. A status light in the top of the wireless sensor adapter provides positive confirmation of the communication link with an individual PDO₂ sensor.

1401DO Optical Dissolved Oxygen Analyzer

The 1401DO Analyzer provides simple, field mounted NEMA 4X electronics to interface with the PDO₂ sensor. Both 4-20 mA and relay outputs are provided for process control or wash logic. A large backlight display provides easy-to-read local indication during setup and periodic checks.

Industrial Process Control & Monitoring

- **Patented Axial Ion Path® Reference**
- **Specialized pH Glass Formulations and ORP Electrodes**
- **Proprietary Low-Noise, High Temperature Signal Cable**
- **Sensors are Compatible with Most Major Manufacturer's Analyzers**
- **Industrial Mounting Options**
- **Industry Leading Pressure and Temperature Ratings**
- **NEW O-ring and Seal Options: Viton® Extreme™, EPDM & FFKM**



Axial Ion Path® Reference

- Patented design increases sensor life, accuracy and reliability
- High resistance to poison: Reduced calibration offset error
- Large surface area reference junction eliminates plugging issues
- Eliminates error due to fluctuating pressure
- No exotic gel or polymer electrolyte which may be incompatible with the process

Specialized Electrode Glass Formulations & Styles

- High accuracy and lifespan in strong acids and bases
- Coating resistant glass electrode reduces fouling
- Silica resistant option to eliminate bonding to glass
- Ruggedized hemispherical and flat glass options resist breaking

Compatibility with Most Major Vendor's Electronics

- Proven with major vendors of pH analyzers (Rosemount, ABB, Foxboro, E&H, Mettler Toledo, GLI/Hach, Knick)
- Get higher accuracy and longer life in your application by upgrading the sensor

Industrial Mounting Options

- Mounting fittings for sample line installations
- Submersible cleaners and scrubbers
- Ball Valve "Hot Tap" retraction solutions
- Variety of materials for corrosive applications

Highest Pressure & Temperature Ratings

- In-line sensor installation to 2,500 PSIG (172 BAR)
- Quick Change "Nut Lock" to 300 PSIG (20 BAR)
- Retractable "Hot Tap" to 300 PSIG (20 BAR)
- Process temperature to 266°F (130°C)

Performance Series pH/ORP Sensors

Performance Series

The Barben Analytical Performance Series products are 3rd generation combination pH/ORP electrodes targeted at harsh, industrial measurement applications. High pressures, strong chemicals, and elevated temperatures typically shorten the lifespan of conventional double-junction pH probes. In these applications the Performance Series sensor offers extended sensor lifespan, as well as decreased drift, and longer calibration intervals.

Each sensor is manufactured with our patented Axial Ion Path[®] reference technology, proprietary Low-Noise & High-Temp Signal Cable along with proprietary ruggedized, high temp and coat resistant glass formulations.

A wide selection of sensor body styles and process fittings in a variety of corrosion resistant materials allow direct replacement of short-lived OEM pH/ORP sensors. Barben Performance Series sensors are compatible with all major manufacturers of pH analyzers and transmitters. Upgrade your analytical measurement without the hassle and expense of replacing costly field instruments.

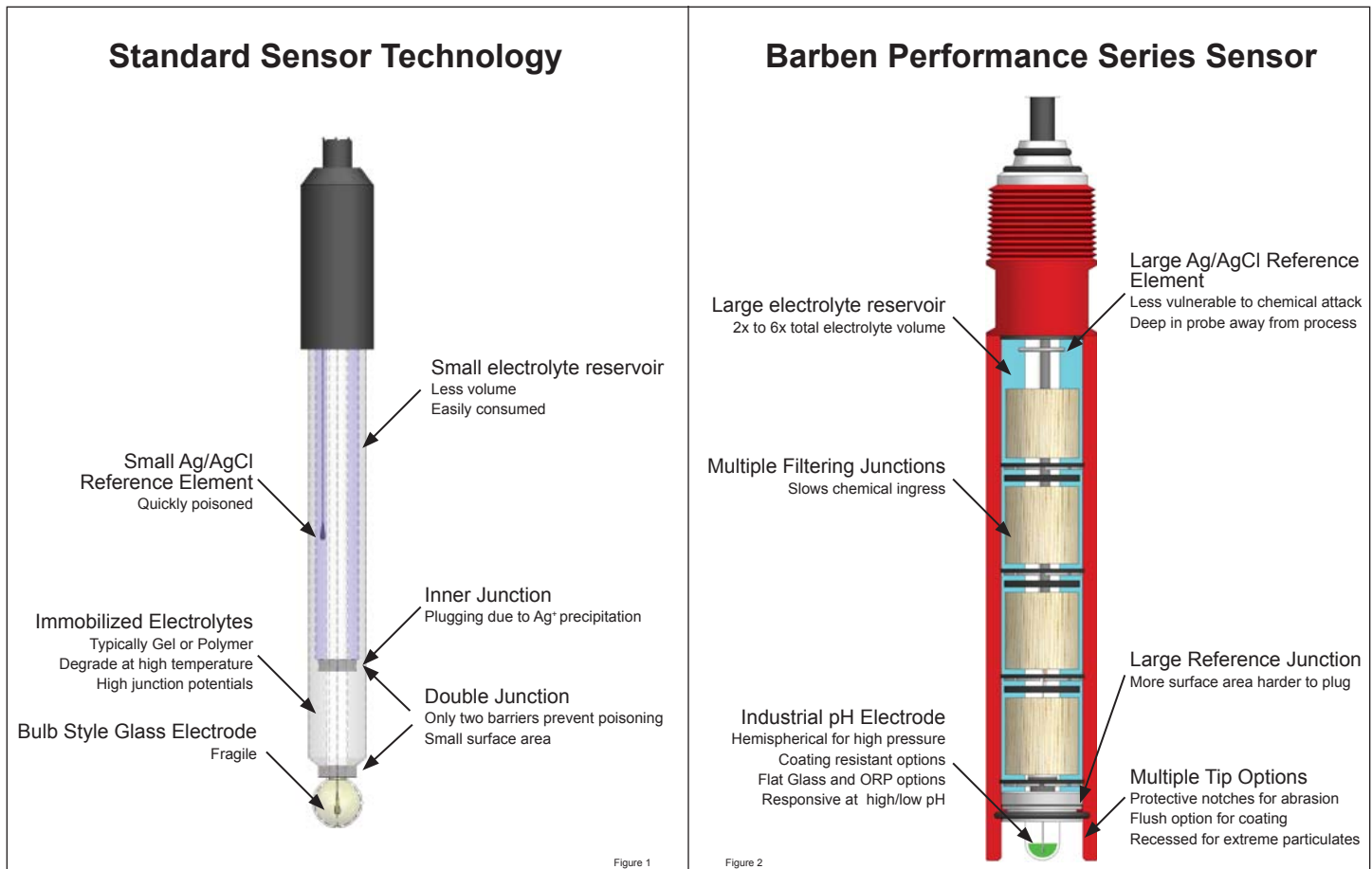
Typical Process Applications

Many industrial processes shorten pH/ORP sensor lifespan. Barben Performance Series sensors excel in applications that may have the following characteristics:

- **H₂S (Sulfides)¹**
- **High Ion-Strength Solutions**
- **Ammonia**
- **Heavy Metals [Ag, Pb, Hg]²**
- **Strong Caustics**
- **Strong Acids**
- **High Cyclic Pressures**
- **High Temperature**
- **Proteins¹**
- **Organics**
- **Mercaptans¹**
- **Cyanides¹**
- **Iodides¹**
- **Bromines**

NOTES

1. Chemicals that react with Ag⁺ (Silver) and restrict traditional reference junction designs
2. Heavy metals which react with Cl⁻ (Chloride) and reduce the voltage potential of the sensor.



Performance Series pH/ORP Sensors

Industry Leading Reference Technology Axial Ion Path®

In 90% of industrial applications the reference cell is the cause of sensor failure. The typical industry standard “double junction” pH sensor (fig. 1) uses reference technology designed to minimize mixing of internal electrolyte and process liquid. This simplistic design is achieved by dividing the reference cell into two chambers, each protected with a porous junction. Once process liquid penetrates each junction, poisoning of the sensor may occur or the measurement signal may be impeded by plugging of the porous junction.

The Barben sensor (fig. 2) has a unique, patented reference cell design which combats these common problems.

Performance Series sensor’s reference technology utilizes multiple innovations within the reference cell to greatly extend sensor life.

- Multiple annular wood filtering junctions
- Axial Ion Path® Communication Disks
- Large volume of electrolyte
- Large surface area Ag/AgCl reference element
- Teflon junction

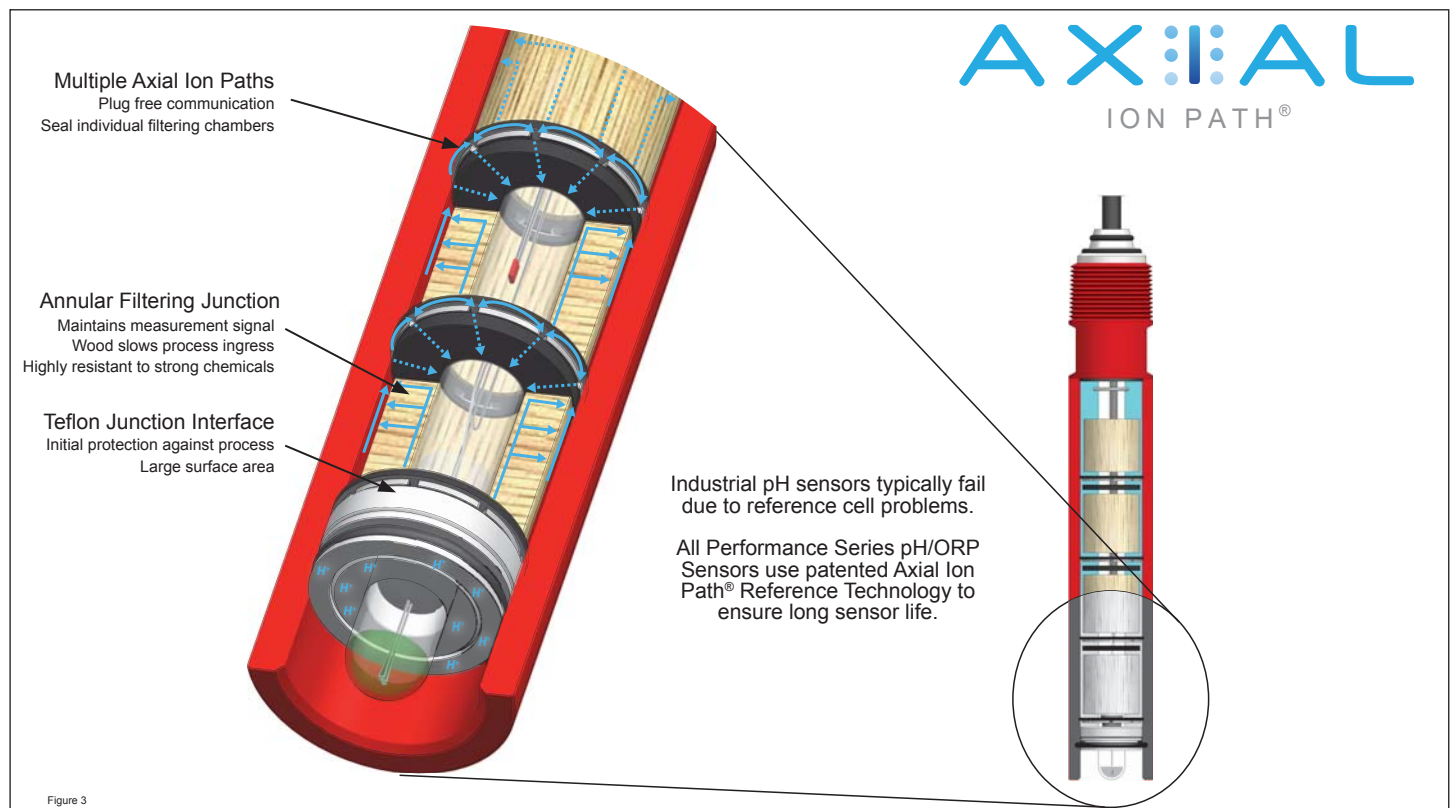
Each sensor uses multiple “solid-state” annular wood

filtering junctions. Wood’s natural cellular makeup greatly slows the ingress of process liquid into the sensor. Each wood filtering junction chamber is separated by patented Axial Ion Path® communication disks. The communication disk seals each chamber while providing multiple electrolyte paths thus ensuring a reliable measurement signal.

Barben Performance Series sensors contain a much higher volume of KCl electrolyte than typically found in double junction sensors. More electrolyte provides on-going insurance against the leaching effects of fluctuating process pressure and temperature.

An oversized Ag/AgCl reference element is located near the rear of the sensor. This innovation serves two purposes. Distancing the reference element far from the sensor tip keeps it away from process chemicals. Over time, if chemicals such as sulfides were to penetrate within the sensor, then the large reference element is capable of withstanding long-term poisoning while maintaining a stable measurement.

As a final preventative measure, a porous Teflon insert placed at the tip of the sensor provides a large surface area to prevent plugging. Teflon also serves as a great initial barrier to chemical attack. All of these features combine to make the Performance Series sensors the best choice for industrial measurement applications.



Performance Series pH/ORP Sensors

Low Noise, High Temperature Cable

Since Performance Series sensors are often mounted directly into the process, all products are manufactured with proprietary low-noise, high temperature cable. Competitive designs may use low-temperature cable to reduce signal noise (thus de-rating the sensor). Alternately, when high temperature cable is improperly specified, triboelectric noise can cause signal error. Barben Analytical has developed a proprietary cable that can withstand 130°C (266°F) process temperatures while providing stable pH measurement.

Specialized Glass Formulations and Configurations

Barben glass pH measurement electrodes are designed with unique formulations to prevent coating and scaling. Additional coating resistant options further improve lifespan in strong caustic (NaOH) and silica applications. These specialty glass formulations are manufactured to precision impedance ranges to ensure the best balance between high strength signal, speed of response, structural integrity under high pressure, long life in high temperatures and extreme acid and caustic pH conditions. Unique billet style ORP electrodes completely eliminate glass from the process thus further eliminating potential breakage.

Industrial Grade Mounting Options and Accessories

Barben Analytical provides a comprehensive offering of accessories to ensure convenient, safe and economical installation into your applications. In-line, submersible and hot tap (retractable through a isolation ball valve) are all standard options. In-line sensors with quick change “Nut Lock” adapters, rated to 300 psig, allow for easy access for calibration or maintenance in an isolated sample stream. In-line high pressure housings allow for operations up to 2,500 psig. Hot-Tap or Ball-valve retraction systems, rated to 300 psig allow for direct use into process without the need for sample or bypass lines. We offer hardware in 316 Stainless, Titanium and Hastelloy C-276, sensor bodies in Kynar, CPVC and PEEK and seals in Viton® Extreme™, EPDM, and FFKM (Kalrez) to meet the specific demands of your process.

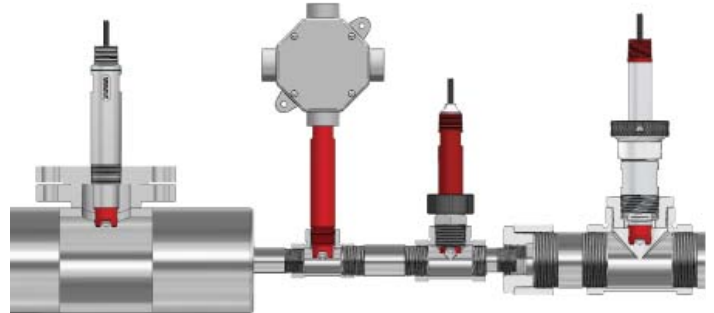
Interconnection with Existing pH and ORP Analyzers

Performance Series sensors are compatible with all major manufacturer’s pH analyzers with voltage input. Temperature compensation options for PT100, PT1000, 3k Ω (Balco), and 8550 Ω (Honeywell) ensure full compatibility with existing analyzers. Now you can upgrade your process without replacing your field instrument. Wiring diagrams for many analyzers can be found at BarbenAnalytical.com.

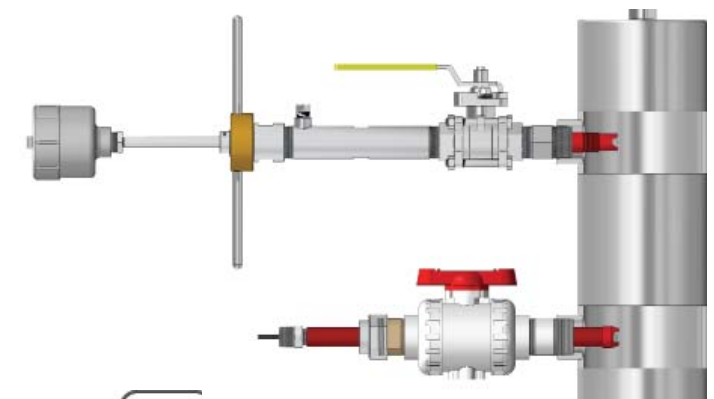
Sensor Selection: Mounting

The first consideration when selecting a pH sensor is how will it be mounted into the process. Examples of various process mounting configurations are provided below.

In-line Sensor Mounting: In-line installations are common on sample streams off the main process. Isolation valves should be upstream / downstream of sensor for removal.



Hot Tap Sensor Mounting: Hot Tap refers to the ability to remove the sensor from the process while under pressure. A ball valve is used to isolate the sensor for removal.



Submersible Sensor Mounting: Submersible mounting installations are required when the measurement is needed directly into a tank, reactor vessel or open channel. Typically the sensor must be mounted on a “dip tube” which is the hardware to submerge the sensor in the application.

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: 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: The 1066 HART communications can be switched between HART version 7 and HART version 5 at the transmitter. This makes it possible to take advantage of the new features of HART 7, or maintain compatibility with older HART 5 hosts, which are not yet HART 7 capable. The Fieldbus version of the 1066 transmitters provide the advanced features of ITK 6, along with additional functions blocks to allow them to participate more fully in control in the field.

Features and Applications, cont.

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.

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.

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.



Figure 6. 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 $\mu\text{S}/\text{cm}$ (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 ($X\%/^{\circ}\text{C}$), 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 400 series conductivity sensors (Pt 1000 RTD) and 410VP 4-electrode sensor.



Figure 7. ENDURANCE™ series of conductivity sensors

PERFORMANCE SPECIFICATIONS

Recommended Range – Contacting Conductivity

Cell Constant	0.01S/cm	0.1 $\mu\text{S}/\text{cm}$	1.0 $\mu\text{S}/\text{cm}$	10 $\mu\text{S}/\text{cm}$	100 $\mu\text{S}/\text{cm}$	1000 $\mu\text{S}/\text{cm}$	10mS/cm	100mS/cm	1000mS/cm
0.01	0.01 $\mu\text{S}/\text{cm}$ to 200 $\mu\text{S}/\text{cm}$		200 $\mu\text{S}/\text{cm}$ to 2000 $\mu\text{S}/\text{cm}$						
0.1	0.1 $\mu\text{S}/\text{cm}$ to 2000 $\mu\text{S}/\text{cm}$			2000 $\mu\text{S}/\text{cm}$ to 20mS/cm					
1.0	1 $\mu\text{S}/\text{cm}$ to 20mS/cm		20mS/cm to 200mS/cm						
4-electrode	2 $\mu\text{S}/\text{cm}$ to 1400mS/cm								

Linearity for Standard Cable ≤ 50 ft (15 m)

	$\pm 0.6\%$ of reading in recommended range
	$\pm 2\%$ of reading in recommended range
	$\pm 5\%$ of reading outside low recommended range
	$\pm 4\%$ of reading in recommended range

Temperature specifications:

Temperature range	0 to 200°C
Temperature Accuracy, Pt-1000, 0-50°C	$\pm 0.1^{\circ}\text{C}$
Temperature Accuracy, Pt-1000, Temp. > 50°C	$\pm 0.5^{\circ}\text{C}$

Toroidal Conductivity (Ordering Code –T)

Measures conductivity in the range of 1 $\mu\text{S/cm}$ to 2,000,000 $\mu\text{S/cm}$ (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.



Figure 8. High performance toroidal conductivity sensors 226 and 225

PERFORMANCE SPECIFICATIONS

Recommended Range - Toroidal Conductivity

Model	1 $\mu\text{S/cm}$	10 $\mu\text{S/cm}$	100 $\mu\text{S/cm}$	1000 $\mu\text{S/cm}$	10mS/cm	100mS/cm	1000mS/cm	2000mS/cm
226		15 $\mu\text{S/cm}$ to 500mS/cm				500mS/cm to 2000mS/cm		
225 & 228		15 $\mu\text{S/cm}$ to 1500mS/cm				1500mS/cm to 2000mS/cm		
242		100 $\mu\text{S/cm}$ to 2000mS/cm						
222 (1in & 2in)		500 $\mu\text{S/cm}$ to 2000mS/cm						

LOOP PERFORMANCE (Following Calibration)

- Model 226: $\pm 1\%$ of reading $\pm 5\mu\text{S/cm}$ in recommended range
- Models 225 & 228: $\pm 1\%$ of reading $\pm 15\mu\text{S/cm}$ in recommended range
- Models 222, 242: $\pm 4\%$ of reading $\pm 5\text{mS/cm}$ in recommended range
- Models 225, 226 & 228: $\pm 5\%$ of reading outside high recommended range

Temperature specifications:

Temperature range	-25 to 210°C (-13 to 410°F)
Temperature Accuracy, Pt-100, -25 to 50 °C	$\pm 0.5^\circ\text{C}$
Temperature Accuracy, Pt-100, 50 to 210°C	$\pm 1^\circ\text{C}$

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-02 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.



Figure 9. 499ACL-01 Chlorine sensor

Monochloramine

The 1066 is compatible with the 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 O₂ <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



Figure 10. Dissolved Oxygen 499ADO sensor with Variopool 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 – 100 μ A

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



Figure 11. Dissolved Ozone 499AOZ sensors with Variopol connection.

TWO-WIRE TRANSMITTERS FOR pH, ORP, CONDUCTIVITY, OXYGEN, OZONE, AND CHLORINE

Model 5081 Family of Two-wire Transmitters

- CHOICE OF COMMUNICATION PROTOCOL: HART or FOUNDATION Fieldbus.
- LARGE, EASY-TO-READ two-line display shows the process measurement and temperature.
- SIMPLE MENU STRUCTURE.
- ROBUST NEMA 4X and NEMA 7B ENCLOSURE.
- INTRINSICALLY SAFE DESIGN allows the transmitter to be used in hazardous environments (with appropriate safety barriers).
- NON-VOLATILE MEMORY retains program settings and calibration data during power failures.



FEATURES AND APPLICATIONS

The Model 5081 family of transmitters can be used to measure pH, ORP, conductivity (using either contacting or toroidal sensors), resistivity, oxygen (ppm and ppb level), free chlorine, total chlorine, and ozone in a variety of process liquids. The 5081 is compatible with most Rosemount Analytical sensors. See the Specification sections for details.

The transmitter has a rugged, weatherproof, corrosion-resistant enclosure (NEMA 4X and IP65) of epoxy-painted aluminum. The enclosure also meets NEMA 7B explosion-proof standards.

Two digital communication protocols are available: HART (model option -HT) and Foundation Fieldbus (model options -FF or -FI). Digital communications allows access to AMS (Asset Management Solutions). Use AMS to set up and configure the transmitter, read process variables, and troubleshoot problems from a personal computer or host anywhere in the plant.

A handheld infrared remote controller or the HART and Foundation Fieldbus Model 375 communicator can also be used for programming and calibrating the transmitter. The remote controller works from as far away as six feet.



Model 5081-P pH/ORP Transmitter

- CHANGING FROM pH TO ORP operation takes only seconds.
- AUTOMATIC TWO-POINT BUFFER CALIBRATION reduces errors.
- SOLUTION TEMPERATURE COMPENSATION converts measured pH to the pH at 25°C.
- CONTINUOUS DIAGNOSTICS monitor sensor performance and warn the user of failure (FAULT) or approaching failure (WARNING).

Model 5081-C Contacting Conductivity Transmitter

- MEASURES CONDUCTIVITY, RESISTIVITY, OR CUSTOM CURVE VARIABLE.
- AUTOMATIC TC RECOGNITION simplifies start up.
- AUTOMATIC/MANUAL TEMPERATURE COMPENSATION ensures accurate monitoring and control.
- AUTOMATIC COMPENSATION FOR SENSOR CABLE RESISTANCE improves accuracy of high conductivity/ low resistivity measurements.
- BUILT-IN TEMPERATURE COMPENSATION ALGORITHMS include straight slope, ultra-pure water, cation conductivity, and no compensation.



Model 5081-T Toroidal Conductivity Transmitter

- MEASURES CONDUCTIVITY, PERCENT CONCENTRATION, OR CUSTOM CURVE VARIABLE.
- AUTOMATIC TC RECOGNITION simplifies start up.
- AUTOMATIC/MANUAL TEMPERATURE COMPENSATION ensures accurate monitoring and control.
- BUILT-IN CONCENTRATION CURVES FOR 0-12% NaOH, 0-15% HCl, 0-25% and 96-99.7% H₂SO₄.
- PROGRAMMABLE REFERENCE TEMPERATURE enables temperature compensation to temperatures other than 25 degrees Celsius.
- AUTOMATIC COMPENSATION FOR SENSOR CABLE RESISTANCE improves accuracy of high conductivity measurements.

Model 5081-A Amperometric Transmitter

- MEASURES dissolved oxygen (ppm and ppb level), free chlorine, total chlorine, and ozone.
- SECOND INPUT FOR A pH SENSOR ALLOWS AUTOMATIC pH CORRECTION for free chlorine measurement. No expensive, messy reagents needed.
- AUTOMATIC BUFFER RECOGNITION FOR pH CALIBRATION.



DUAL-INPUT INTELLIGENT ANALYZER

- **Large, easy-to-read display:** Check your process condition at a glance
- **Dual measurements** in any combination of pH/ORP, Conductivity, Chlorine, Dissolved Oxygen, Ozone, Turbidity and more
- **HART® and PROFIBUS® DP** digital communications options
- **Intuitive Menus:** Self-prompting and easy to navigate. User Help screens
- **Easy installation** with simple wiring and slide-out measurement boards
- **7 menu languages** – English, French, German, Italian, Portuguese, Spanish and Chinese
- **FM and CSA** – Class I Div 2 approved, **UL** approved for general purpose



MODEL 1056

Multiparameter analyzer with large easy-to-read screen



This new Rosemount Analytical Inc. product by Emerson Process Management is designed for use in the following Industries: Pulp & Paper, Metals & Mining, Chemical Processing, Food & Beverage, Life Sciences, Waste/Wastewater, Petroleum Refining, Semiconductor, Power and General Applications

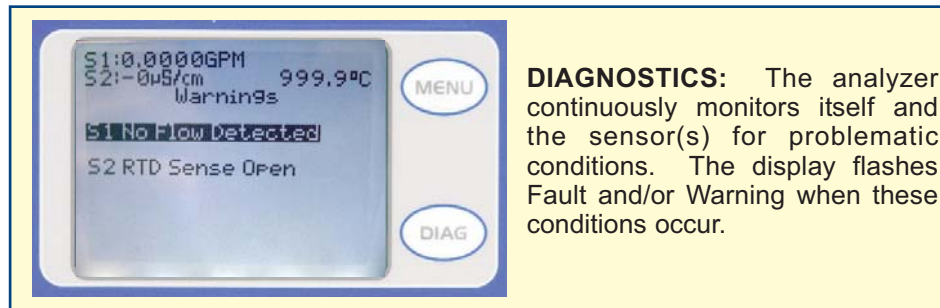


FEATURES and APPLICATIONS for MODEL 1056

The Model 1056 dual-input analyzer offers single or dual sensor input with an unrestricted choice of dual measurements thus reducing the cost per loop and saving panel space. This multi-parameter instrument offers a wide range of measurement choices, supporting most industrial, commercial, and municipal applications.

The modular design of the instrument allows signal input boards to be field replaced making configuration changes easy. Live process values are always displayed during programming and

calibration routines. Standard features include isolated inputs, seven embedded local languages, two 4-20mA current outputs and removable connectors for power and current outputs. HART and Profibus DP digital communications are available. Model 1056 HART units communicate with the Model 375 HART® hand-held communicator and HART hosts, such as AMS Intelligent Device Manager. Model 1056 Profibus units are fully compatible with Profibus DP networks and Class 1 or Class 2 masters.



DIAGNOSTICS: The analyzer continuously monitors itself and the sensor(s) for problematic conditions. The display flashes Fault and/or Warning when these conditions occur.

PERFORMANCE and PHYSICAL SPECIFICATIONS

Enclosure: Polycarbonate. NEMA 4X/CSA 4 (IP65).

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: Accepts 1/2" or PG13.5 conduit fittings

Display: Monochromatic graphic liquid crystal display. 128 x 96 pixel display resolution. Backlit. Active display area: 58 x 78mm (2.3 x 3.0 in.).

Ambient Temperature and Humidity: 0 to 55°C (32 to 131°F). Turbidity only: 0 to 50°C (32 to 122°F), RH 5 to 95% (non-condensing)

Storage Temperature Effect: -20 to 60°C (-4 to 140°F)

Power: Ordering Code -01: Code -01: 115/230 VAC ±15%, 50/60 Hz. 10W.

Code -02: 20 to 30 VDC. 15 W.

Code -03: 85 to 265 VAC, 47.5 to 65.0 Hz, switching. 15 W.

Note: Code -02 and -03 power supplies include four programmable relays

Alarms relays*: Four alarm relays for process measurement(s) or temperature. Any relay can be configured as a fault alarm instead of a process alarm. Each relay can be configured independently and each can be programmed with interval timer settings.

*Relays only available with -02 power supply (20 - 30 VDC) or -03 switching power supply (85 - 265 VAC)

Relays: Form C, SPDT, epoxy sealed

Inputs: One or two isolated sensor inputs

Outputs: Two 4-20 mA or 0-20 mA isolated current outputs. Fully scalable. Max Load: 550 Ohm.

Current Output Accuracy: ±0.05 mA @ 25 °C

Terminal Connections Rating: Power connector (3-leads): 24-12 AWG wire size. Signal board terminal blocks: 26-16 AWG wire size. Current output connectors (2-leads): 24-16 AWG wire size. Alarm relay terminal blocks: 24-12 AWG wire size (-02 24 VDC power supply and -03 85-265VAC power supply)

Weight/Shipping Weight: (rounded up to nearest lb or nearest 0.5 kg): 3 lbs/4 lbs (1.5 kg/2.0 kg)

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