Product Data Sheet
PDS 71-WQS/rev.D
February 2005

Model WQS

Multi-Parameter Electrochemical / Optical Water Quality System

- COMPLETE SYSTEM INCLUDES sensors, cable, and instruments.
- MEASURES pH, ORP, Conductivity, Temperature, Free Chlorine, Monochloramine, Dissolved Oxygen, Turbidity, and Particle Index.
- VARIOPOL QUICK-DISCONNECT FITTINGS make replacing sensors easy.
- MULTIPLE INSTRUMENT PLATFORM CHOICES.
- FEATURE-PACKED INSTRUMENTS: dual outputs, three fully-programmable alarm relays, two-line display, HART® or FOUNDATION fieldbus® digital communications.

FEATURES

The Model WQS water quality system is intended for the determination of pH, ORP, conductivity, temperature, free chlorine or monochloramine, oxygen, turbidity, and particle index in fresh water. The system combines user-specified instruments and sensors to create a customized system for monitoring water quality. Unlike systems from other manufacturers, the Model WQS does not use expensive sample conditioning systems or messy reagents.

Model WQS systems require less than 3 gph (183 mL/min) sample flow. There is little waste, which is important in areas where water is scarce or a sewer is not available.

Designed for quick startup and low maintenance

- No reagents — free chlorine and monochloramine sensors are completely reagent-free
- Variopol quick disconnect sensors
- Prewired and plumbed
- Low sample flow; <3gph (183 mL/min)

Multiple Instrument choices

- Analog outputs
- Digital outputs: HART, Foundation fieldbus
- 115/230VAC powered
- 24VDC loop powered
- Alarms/relay contacts

Ideal for continuous monitoring of water distribution systems:

- Provides constant surveillance of water quality events that may affect the security of your distribution network.
- Helps ensure acceptable water quality parameters are maintained though out the distribution system.
- Assists in meeting the requirements of the Surface Water Treatment Rule

ROSEMOUNT® Analytical

EMERSON™ Process Management

APPLICATIONS

Rosemount Analytical recognizes that a "one size fits all" approach to water quality monitoring does not provide the most efficient or economical solution to your needs. That is why Rosemount Analytical offers a flexible approach that lets you choose the analyzers you want to make the measurements you need. We offer platforms that range from basic analog output instruments to transmitters with digital outputs powered by solar energy. Through our Emerson Process Solutions Group we can provide wireless solutions and control systems that allow you to look at each parameter from a central location.

ELECTROCHEMICAL MEASUREMENTS AVAILABLE

- **pH**
- **ORP**
- **Conductivity**
- **Free Chlorine**
- **Monochloramine**
- **Dissolved Oxygen**

OPTICAL MEASUREMENTS AVAILABLE

- **Turbidity**
- **Particle Monitor** [Optical laser technology counts particles at much lower levels than turbidity]

WATER QUALITY FLOW SYSTEM SPECIFICATIONS

Sample Inlet: 1/4 inch OD tubing compression fitting or 1/4 FNPT

Sample Flow: minimum 2.2 gal/hr (134 mL/min)
maximum 5.0 gal/hr (305 mL/min)

Maximum Pressure: 65 psig (549 kPa abs)

Sample Temperature: 32 to 122°F (0 to 50°)

Wetted Materials: Polypropylene, acrylic, CPVC, brass, 316 stainless steel

SENSOR SPECIFICATIONS — pH/ORP

Model Number pH: 399VP-09-305

Model Number ORP: 399VP-33

Wetted Materials: Tefzel[1], glass, ceramic, and Viton[2]

Measured Range: pH: AccuGlass 0-14;
ORP: -1400 to +1400 mV

Temperature Compensation: pH: Automatic 32° to 185°F (0° to 85°C);
ORP: Temperature compensation is not required.

[1] Tefzel is a registered trademark of E.I. duPont de Nemours & Co.
[2] Viton is a registered trademark of E.I. duPont de Nemours & Co.

SENSOR SPECIFICATIONS — CONDUCTIVITY

Model Number: 400VP-13

Wetted Materials: Titanium, 316 SST, PEEK, EPDM

Cell Constants: 0.1/cm, 1.0/cm

Linear Range:

When used with 54e platform: 2 - 20,000 µS/cm at 25°C

When used with 1055 platform: 20 - 2,000 µS/cm 25°C

When used with Xmt platform: 10 - 20,000 µS/cm 25°C

SENSOR SPECIFICATIONS — FREE CHLORINE

Model Number: 499ACL-01-54-VP

Wetted Materials: Noryl[1], Viton[2], silicone, and platinum

Linear Range: 0 to 10 ppm (mg/L) as Cl_2.

Cathode: platinum (normally wetted)

Accuracy: Accuracy depends on the accuracy of the chemical test used to calibrate the sensor.

pH Range: Continuous pH correction defined between 6.0 and 9.5.

Minimum Sample Conductivity: 50 µS/cm

Response Time: 22 sec to 95% of final reading at 25°C

Electrolyte Volume: 25 mL (approx.)

Electrolyte Life: 3 months (approx.)

SENSOR SPECIFICATIONS — MONOCHLORAMINE

Linear Range: 0 - 15 ppm (mg/L)

Wetted Materials: Noryl[1], Viton[2], silicone, wood, Zitex[4] (PTFE)

Cathode: gold mesh

Accuracy: Accuracy depends on the accuracy of the laboratory method used to calibrate the sensor.

Linearity: 2% (typ.)

pH range: Response is practically independent of pH between pH 7.0 and 10.0. Sensor current at pH 10.0 is within 5% of sensor current at pH 7.0.

Sample Conductivity: >10 µS/cm at 25°C

Response time: <30 sec to 90% of final reading (0 to 2 ppm) at 25°C.

Drift: <2% of reading per week

Electrolyte Volume: 25 mL (approx.)

Electrolyte Life: 3 months (approx.)

SENSOR SPECIFICATIONS — DISSOLVED OXYGEN

Range: 0 to 20 ppm (mg/L) as O_2.

Wetted Materials: Noryl[1], Viton[2], EPDM, Teflon[3], silicone

Cathode: gold (not normally wetted)

Accuracy: ±0.2 ppm at 25°C

Repeatability: ±0.05 ppm at 25°C

Response time: 25 sec to 63% of final reading at 25°C

Electrolyte Volume: 25 mL (approx.)

Electrolyte Life: 4 to 6 months (approx.)

[1] Noryl is a registered trademark of General Electric.
[2] Viton is a registered trademark of E.I du Pont de Nemours.
[3] Teflon is a registered trademark of E.I. duPont de Nemours
[4] Zitex is a registered trademark of Performance Plastic Corp.

MODEL 54e SPECIFICATIONS

The Model 54e family of analyzers, with the appropriate sensors, monitor and control pH/ORP, conductivity/resistivity, dissolved oxygen, free chlorine, or monochloramine. For free chlorine measurements requiring automatic pH correction, a second input for a pH sensor is standard.

The Model 54e is a member of the Rosemount SMART FAMILY® of instruments which is designed to communicate with the Model 375 HART® hand-held communicator and any other host, including AMS, that supports the 375 HART communication protocol.

SPECIFICATIONS - GENERAL

Enclosure: Epoxy-painted (light gray) cast aluminum, NEMA4X (IP65). 144 x 144 x 132 mm (5.7 x 5.7 x 5.2 in.), DIN size panel cut-out.

Front Panel: Membrane keypad with tactile feedback. Three green LEDs indicate alarm status. Red LED indicates fault condition.

Display: Three-line, back-lit, dot matrix LCD, 70 x 35 mm. First line is measurement reading. Second line is temperature and current output. Third line is user-selectable. Character heights: 1st line - 16 mm (0.6 in.), 2nd and 3rd lines - 7 mm (0.3 in.).

Power:

Code -01: 115 VAC ± 10%, 50/60 Hz ± 6%, 8 W
230 VAC ± 10%, 50/60 Hz ± 6%, 8 W

Code -02: 20 - 30 VDC, 6 W

RFI/EMI: EN-61326 CE

LVD (Code -01 only): EN-61010-1

Outputs: Two 4-20 mA or 0-20 mA isolated outputs. Continuously adjustable. Outputs can be assigned to the primary measurement, glass impedance (pH only), reference impedance (pH only), or temperature. Output dampening is user-selectable. Maximum load at 24 Vdc or 115/230 Vac is 600 ohms. Maximum load at 100/200 Vac is 550 ohms. Output 1 has superimposed HART signal (option -09 only). Outputs can be programmed for PID control (option -20 only).

Output Accuracy: ± 0.05 mA

Alarms:

Relay 1 - Process, Interval, or Time Proportional Control (TPC requires code -20)

Relay 2 - Process, Interval, or Time Proportional Control (TPC requires code -20)

Relay 3 - Process, Interval, or Time Proportional Control (TPC requires code -20)

Relay 4 - Sensor/analyzer and process fault alarm

Each relay has a dedicated LED on the front panel.

Relay Contacts: Relays 1-3: Epoxy sealed form A contacts, SPST, normally open

Relay 4: Epoxy sealed form C, SPDT

	Resistive	Inductive
28 Vdc	5.0 Amps	3.0 Amps
115 Vac	5.0 Amps	3.0 Amps
230 Vac	5.0 Amps	1.5 Amps

Ambient Temperature: 0 to 50°C (32 to 122°F). Analyzer can be operated between -20 and 60°C (-4 to 140°F) with some degradation in display quality.

Relative Humidity: 95% (maximum) non-condensing

SOLU COMP II MODEL 1055 SPECIFICATIONS

The Solu Comp II Model 1055 analyzers offer the choice of single or dual sensor input with measurement choices of pH/ORP, conductivity, chlorine, monochloramine, or dissolved oxygen. Standard features include two isolated outputs, three alarm relays, customizable two-line display, and temperature correction.

SPECIFICATIONS - General

Case: ABS. Pipe, surface, and panel mount versions are NEMA 4X/CSA 4 (IP65).

Dimensions

Surface/Pipe (code -11): 6.23 x 6.23 x 3.23 in. (158 x 158 x 82 mm); see page 5 for dimensions of pipe mounting bracket.

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

Display: Two line, 16-character, back-lit display. Character height: 4.8 mm. Display can be customized to meet individual requirements. Depending on number of sensors, as many as 14 display screens are available.

Ambient temperature and humidity: 0 to 50°C, (32 to 122°F) RH 5 to 95% (non-condensing)

Note: The analyzer is operable from -20 to 60°C (-4 to 140°F) with some degradation in display performance.

Power:

Code -01: 115/230 Vac ±15%, 50/60 Hz ±6%, 8.0W
Code -02*: 24 Vdc ±15%, 6.0W
Installation Category II

* *For +24Vdc Power Supply use only devices meeting NEC Class II or UL recognized (UL 1950).*

⧈ Equipment protected throughout by double insulation.

RFI/EMI: EN-61326
LVD: EN-61010-1 CE

Input: Choice of single or dual sensor input with measurement choices of pH/ORP, conductivity, chlorine, monochloramine, or dissolved oxygen. Field-commissioned units allow user to change measurements on either or both inputs. Consult factory for details.

Outputs: Two 4-20 mA or 0-20 mA isolated outputs. Continuously adjustable. Linear or logarithmic. Maximum load 600 ohms. Output dampening with time constant of 5 sec is user-selectable.

Alarms: Three alarm relays for process measurement(s) or temperature. Alarm 3 can be configured as a fault alarm, instead of a process alarm. Each relay can be configured independently. Alarm logic (high or low activation) and deadband are user-programmable.

Relays: Form C, single pole double throw, epoxy sealed

	Resistive	Inductive
28 Vdc	5.0 A	3.0 A
115 Vac	5.0 A	3.0 A
230 Vac	5.0 A	1.5 A

Terminal Connections Rating: 26-14 AWG wire size

SOLU COMP MODEL Xmt SPECIFICATIONS

The Solu Comp Model Xmt Two-Wire Transmitter is intended for the determination of pH/ORP, conductivity, dissolved oxygen, free chlorine and monochloramine. For free chlorine measurements, which often require continuous pH correction, a second input for a pH sensor is standard. The Solu Comp Xmt is available with HART communications.

SPECIFICATIONS - GENERAL

Case: ABS. Pipe, surface, and panel mount versions are NEMA 4X/CSA 4 (IP65).

Dimensions

Panel (code -10): 6.10 x 6.10 x 3.72 in. (155 x 155 x 94.5 mm)

Surface/Pipe (code -11): 6.23 x 6.23 x 3.23 in. (158 x 158 x 82 mm); see page 5 for dimensions of pipe mounting bracket.

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

Ambient Temperature: 32 to 122°F (0 to 50°C). Some degradation of display above 50°C.

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

Relative Humidity: 10 to 90% (non-condensing)

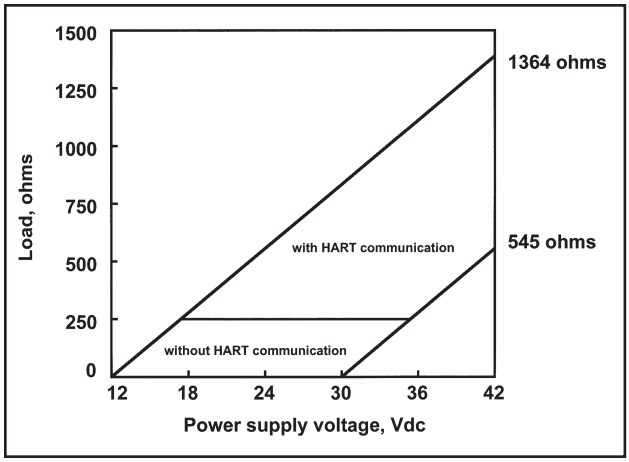
Display: Two line, 16-character display. Character height: 4.8 mm; first line shows process variable (pH, ORP, conductivity, % concentration, oxygen, ozone, chlorine, or monochloramine), second line shows process temperature and output current. For pH/chlorine combination, pH may also be displayed. Fault and warning messages, when triggered, alternate with temperature and output readings.

During calibration and programming, messages, prompts, and editable values appear on the two-line display.

Temperature resolution: 0.1°C (≤99.9°C); 1°C (≥100°C)

RFI/EMI: EN-61326

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



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

MODEL CLARITY II
TURBIDITY SYSTEM SPECIFICATIONS

Model Clarity II Turbidity System is comprised of the following components:

1055 Turbidity Instrument (single or dual channel)

Turbidity Sensor

Flow-through Sampling Chamber/Debubbler

Cable (20 ft) with quick disconnect NEMA connector

Calibration Cup & Secondary Standard

CLARITY II is a 4-wire, AC-powered analyzer capable of dual sensor measurement.

Measurement Methodology: EPA 180.1 or ISO 7027, depending on sensor selection

Power Requirements: 115/230 VAC ±15%, 50/60 Hz ±6%, 8.0W

Display: Two-line, 16-character, back-lit display. Character height: 4.8 mm. Display can be customized to meet individual readout requirements.

Languages: English, French, German, Spanish, Italian, Portuguese

Outputs: Two 4-20 mA or 0-20 mA isolated outputs with programmable span over ±200 NTU range or 0-999 ppm range (software switchable). Continuously adjustable.

Alarms: optional three-alarm relay module for process measurement(s).

Operating Temperature Range: 0 to 50°C (32 to 122°F)

Case: ABS; Pipe, surface, and panel mount versions; NEMA 4X / CSA 4 (IP65)

Range: 0.000 to 200 NTU (Nephelometric Turbidity Units)
0.000 to 900 ppm (Total Suspended Solids)

Accuracy:

RANGE	ACCURACY
0.000 - 1.00 NTU	±0.01 NTU or ±2% of reading
1.00 - 200 NTU	±2% of reading
Overall	±0.01 NTU or ±2% of reading

Readout Units:

Turbidity: NTU, FNU, FTU - software switchable

Suspended Solids: ppm mg/L, none - software switchable

Display Resolution:

Turbidity: 0.001 NTU

Suspended Solids: 0.1

EMI/RFI:

EN61326 CE

LVD:

EN61010-1

MODEL PM-1 PARTICLE MONITOR SPECIFICATIONS

The Model PM-1 Particle Monitor is a continuous reading, on-line instrument that measures particle concentration in a flowing sample. The particle concentration is expressed as particle index.

Power: 110 VAC, 60 Hz, *or*
220 VAC, 50 Hz

Self Diagnostics: LED Feedback Current

Sample Cell Type: Flow Through

Sensor Response Time: <2 seconds

Materials Contacting Sample: Vinyl

Enclosure Type: NEMA 4X, Polycarbonate wall mount

Operating Temperature: 32°F to 180°F

Sample Tubing: 1/8" I.D., 3/16" O.D.

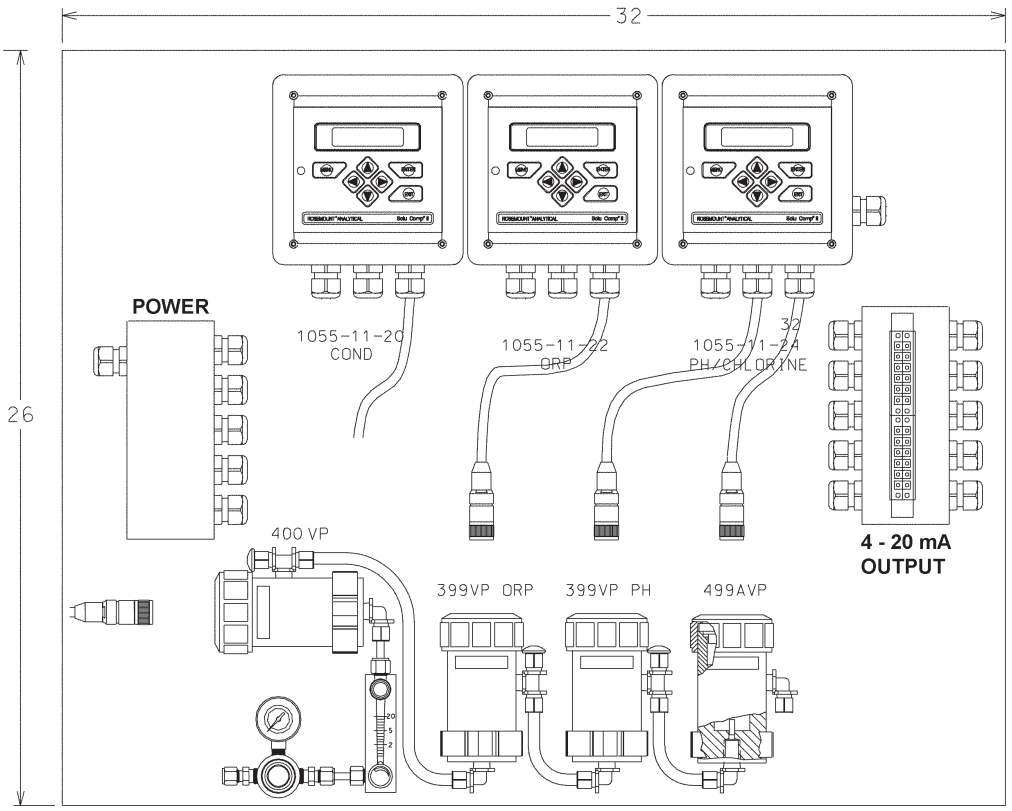
Particle Size Range: 1 micron and above

Particle Size Index: 0 - 9999

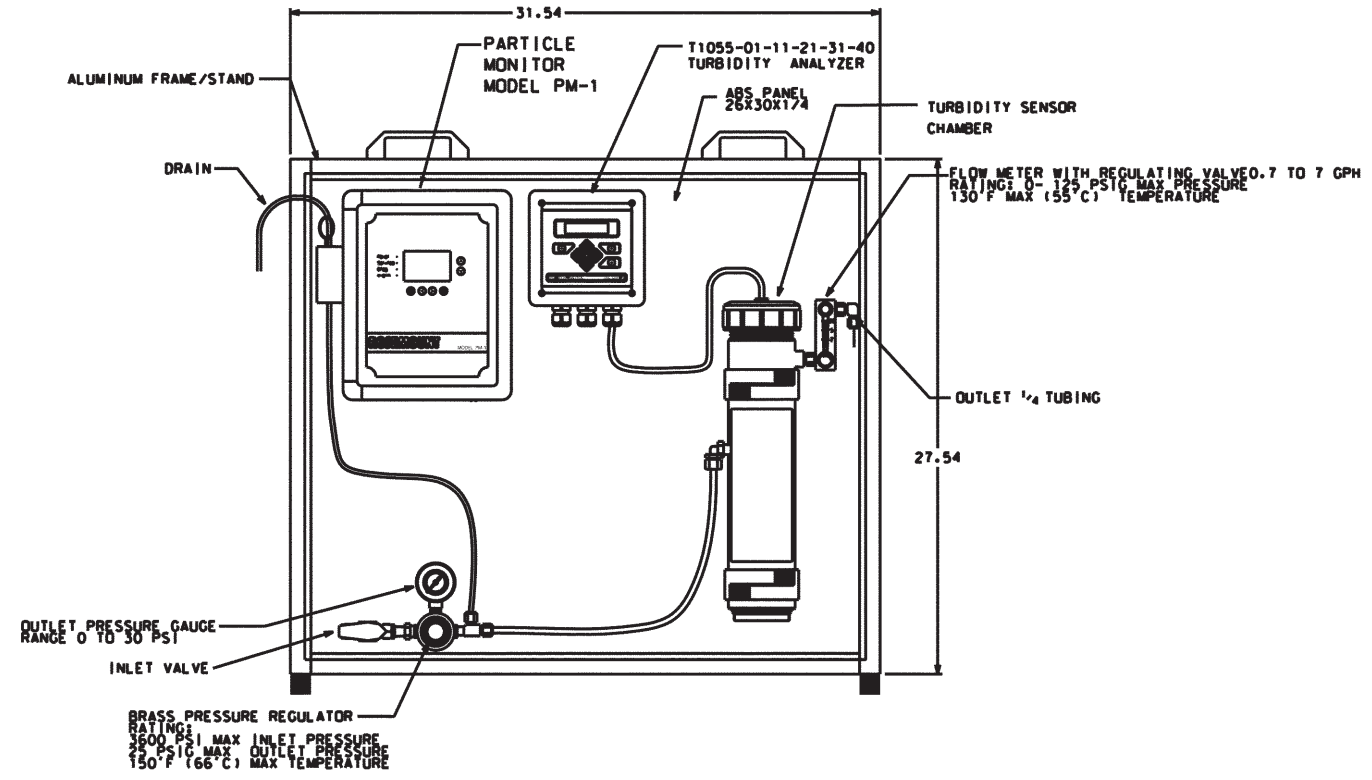
Signal Output: 4-20 mA proportional to particle index
4-20 mA proportional to LED Feedback Current

Particle Index Averaging:
Interval: 1 second, 10 seconds

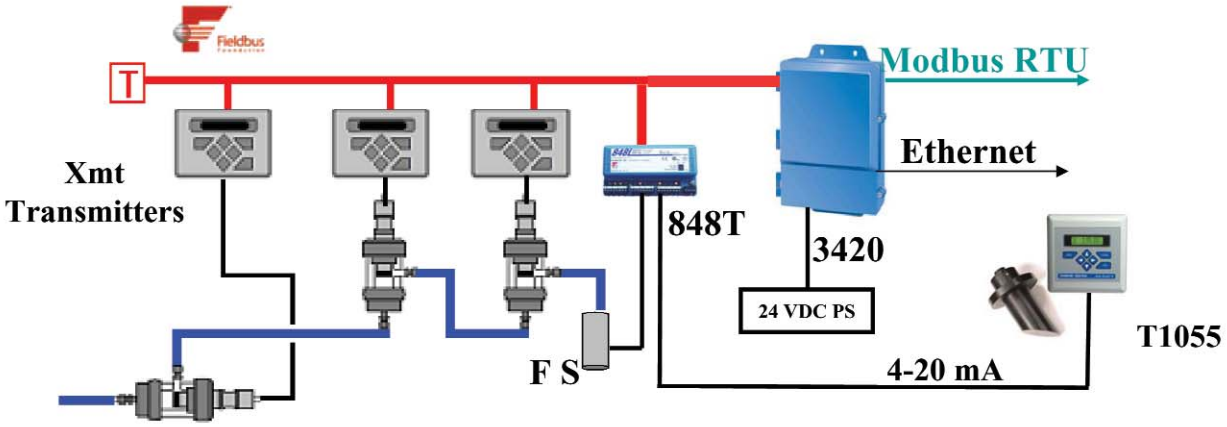
Noise Rejection: Standard



Electrochemical Water Quality System (SQ 8876)

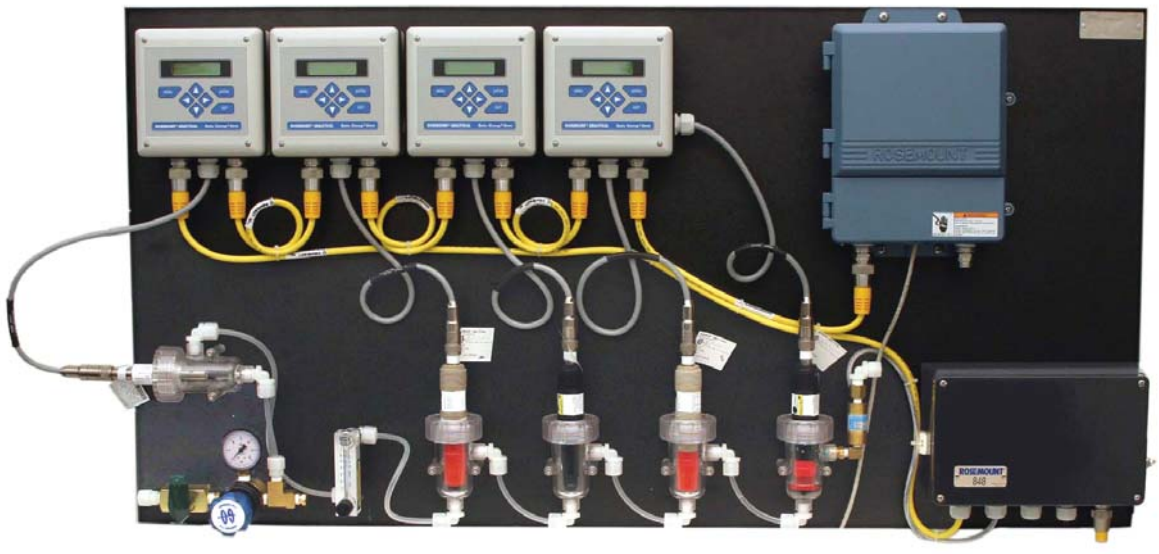


Optical Water Quality System (SQ 9239)



- 3420 Fieldbus Interface Module and Xmt Transmitter Solution
  - Only 1 power Connection to the 3420
  - Reduced transmitter wiring using Fieldbus
  - Flow switch added to Fieldbus via a Rosemount 848T.
  - Can accommodate non-Fieldbus Analyzers via their 4-20 mA output through the Rosemount 848T

Monitoring with Foundation Fieldbus



Combination Electrochemical/Optical Water Quality System (SQ 8899)

ORDERING INFORMATION

Multi-parameter Electrochemical/Optical Water Quality Systems for Water Integrity. Measure pH,ORP, conductivity, dissolved oxygen, free chlorine, ozone, monochloramine, temperature, turbidity and particle index in simple plug and plumb packages. *Customer must consult factory to finalize configuration.*

Model WQS Multi-parameter Electrochemical/Optical Water Quality System	
CODE	**INSTRUMENT (required selection)**
01	1055 (Solu Comp II)
02	54e
03	Xmt

CODE	ELECTROCHEMICAL MEASUREMENT (optional selection)
20	pH
21	ORP
22	Contacting Conductivity
23	Free Chlorine
24	Monochloramine
25	Dissolved Oxygen
26	Temperature

CODE	OPTICAL MEASUREMENT (optional selection)
30	Turbidity
31	Particle Index

CODE	ACCESSORIES (optional selection)
40	Power and Current Output Junction Box
41	Mounting Stand
42	Flow Switch

CODE	CUSTOM FACTORY CONFIGURATION (required selection)
99SQ	Factory System Code
WQS -02 -20 -21 -22 -23 -26 -31 -99SQ8899	**EXAMPLE**

REPLACEMENT SENSORS

PN	DESCRIPTION
399VP-09-305	pH sensor
399VP-33	ORP sensor
400VP-13	Conductivity sensor
499ACL-01-54-VP	Free Chlorine sensor
499ACL-03-54-VP	Monochloramine sensor
499ADO-54-VP	Dissolved Oxygen sensor
8-0108-0003-ISO	Turbidity sensor ISO
8-0108-0002-EPA	Turbidity sensor EPA

The right people,
the right answers,
right now.

ROSEMOUNT ANALYTICAL
CUSTOMER SUPPORT CENTER
1-800-854-8257

ON-LINE ORDERING NOW AVAILABLE ON OUR WEB SITE
http://www.raihome.com

Specifications subject to change without notice.

Credit Cards for U.S. Purchases Only.

Emerson Process Management

Liquid Division
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: (949) 757-8500
Fax: (949) 474-7250

http://www.raihome.com

EMERSON
Process Management