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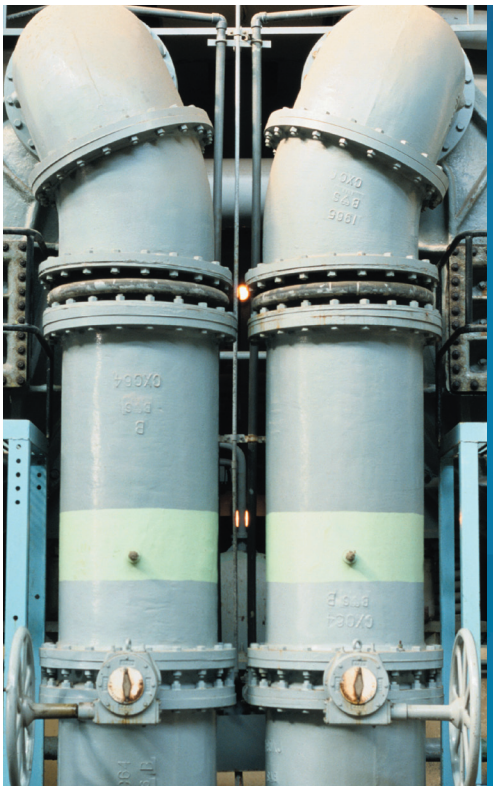
4E-ConductivityMonitor

Model Q46C4



While the theory of monitoring conductivity is simple, in practice it can be very frustrating. While simple 2-electrode sensors are inexpensive and can provide accurate data, continuous monitoring of even relatively clean water can foul the electrodes and degrade the measurement. Maintaining accuracy is made more difficult when the amount of solids dissolved in the process varies over a wide concentration range.

ATI's Q46C4 4-Electrode Conductivity Monitor is the answer for monitoring almost any water-based process. Drinking water, plating bath solutions, cooling water, process wash water, or virtually any other aqueous system can be monitored accurately and reliably. The unique drive/control scheme used in the 4-electrode system allows a single sensor to be used in conductivity ranged from 0-2000 µS to as high as 0-2,000 mS (0-2 S.) For chemical mixing applications, a concentration display can be selected.

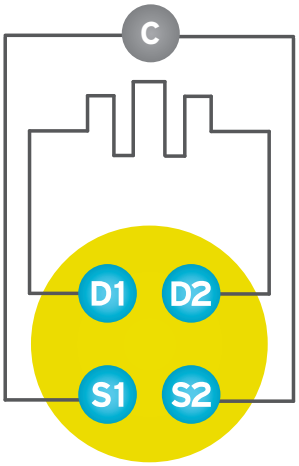
Reliable Conductivity Measurement
with Self-Checking Sensor

ATi ANALYTICAL TECHNOLOGY, INC.

HOW A 4-ELECTRODE SENSOR WORKS

In a traditional 2-Electrode sensor, each electrode performs two functions. The electrodes are used to carry the AC drive voltage and also measure the current flow due to the conductivity of the water. This type of sensor has a limited conductivity range and is affected by electrode coating. In addition, changes in cable resistance and capacitance can cause measurement errors.

A 4-Electrode sensor provides two sets of electrodes, one set to carry the AC drive voltage and a separate set to sense the strength of the electric field between electrodes. This allows the drive voltage to be automatically adjusted for changes in electrode condition and allows the monitor to automatically correct for the effects of electrode fouling. It also allows the sensor to measure accurately over a very wide range of conductivity and eliminates errors due to changes in cable length.



SENSOR CONFIGURATIONS

Sensors for the Q46C4 system are available in a variety of mounting configurations: convertible-style with 1" NPT threads for pipe or tank mounting, 1-1/2" or 2" sanitary-style fittings in 316 stainless steel, and insertion-style for 1-1/4" NPT hot-tap assemblies that allow the sensor to be removed from service without shutting down the process. For low flow bypass applications, a Noryl sensor with quick-disconnect cable and acrylic flowcell are available.

Sanitary Sensor

Convertible Sensor

Insertion Sensor

Flowcell Sensor

FEATURES

Adaptability. Concentration version for direct display of chemical concentrations.

Analog Output Options. Two isolated 4-20 mA outputs are standard, with an option for a third output if required. Default setting provides analog outputs for conductivity and temperature.

Extra Outputs. Expansion board to add a third 4-20 mA analog output.

Flexibility. Wide range capability, with selectable ranges of 0-2000 µS up to 0-2.000 S, provides maximum application flexibility.

AC or DC Power Options. Power options include universal 100-240 VAC +/- 10% or 12-24 VDC.

PID Output. Standard PID control function assignable to one analog output.

Digital Communications. Available in either Profibus-DP, Modbus-RTU, or Ethernet-IP.

Relay Contacts. Three SPDT relays are standard, with relay functions programmable for alarm, control, or trouble indication. Three additional low power relays available as an option.

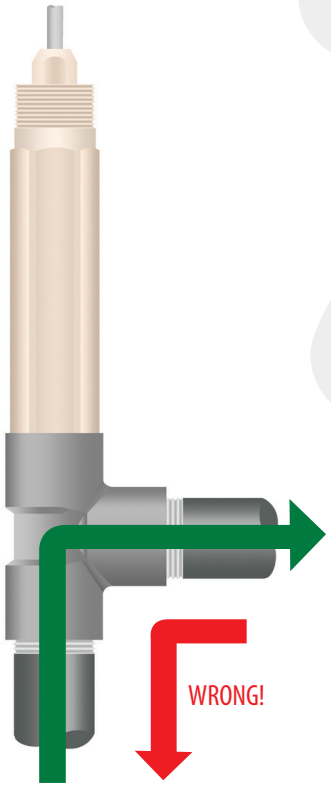
Flexible Mounting. NEMA 4X (IP-66) enclosure is suitable for wall, pipe, or panel mounting.

Clear Display. Back-lit large LCD display provides clear visibility in any lighting conditions. A scrolling second line on the display provides additional information and programming prompts.

INSTALLATION

4-Electrode Conductivity sensors can be installed in a variety of ways, including simple 1" pipe tees, union-mount pipe assemblies, sanitary pipe clamps, and hot-tap insertion assemblies (CPVC or 316SS). The method used will depend on specific application requirements.

Regardless of the mounting method, 4-Electrode sensors should always be mounted so that the sensing electrodes at the tip of the sensor are no closer than 2" to pipe or tank walls. It is best to have sample flow directed at the sensor, but in all cases the sensor should not be mounted at the top of a horizontal pipe run to avoid entrained air problems.

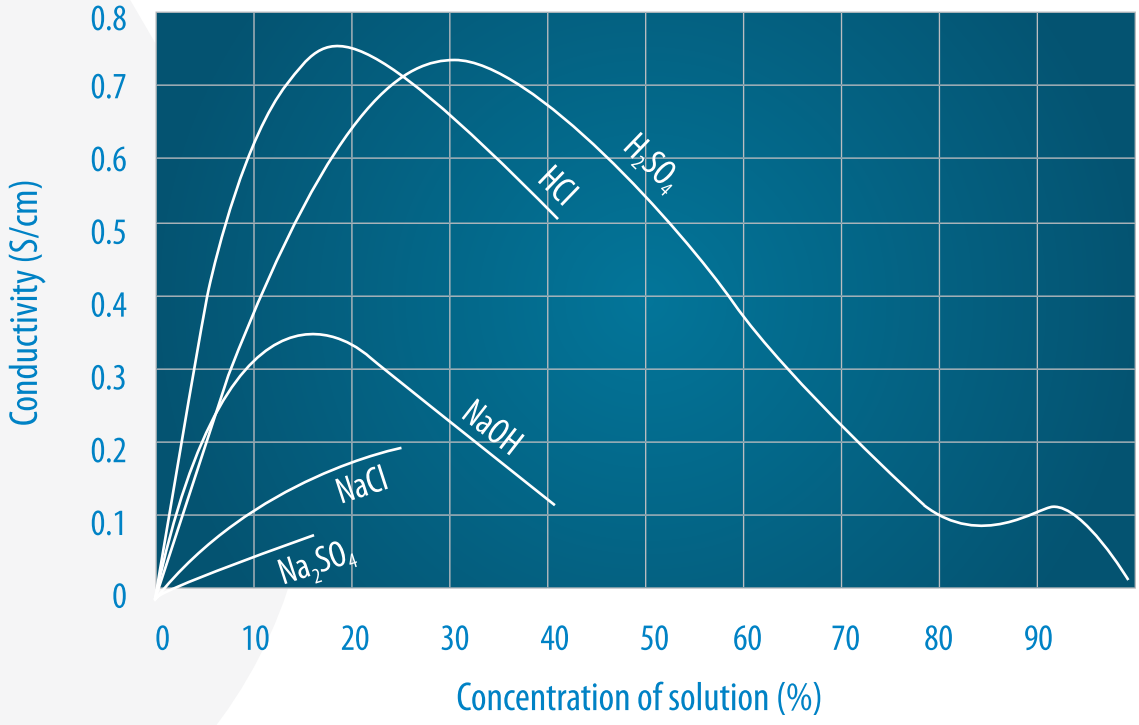


Correct Flow

CONCENTRATION MONITOR

Conductivity monitors can be used to measure and display the concentration of acids or bases used in various chemical process applications. The Q46C4 is available with pre-loaded tables allowing direct display of concentration for solutions of sodium chloride (NaCl), hydrochloric acid (HCl), potassium hydroxide (KOH), and sodium hydroxide (NaOH).

In addition to these standard tables, the user may enter their own table data for other chemicals, or may edit the standard tables supplied by ATI. Custom tables require data on both concentration vs. conductivity and temperature vs. conductivity for the chemical of interest.



Relationship between Concentration of Solutions and Conductivity (at 18° C)

Q46C4 SPECIFICATIONS

ELECTRONIC MONITOR

Display Range	0-2000 µS, 0-2.000 / 20.00 / 200.0 / 2000 mS, 0-2.000 S
Accuracy	0.5% of selected range
Repeatability	0.3% of selected range
Non-Linearity	0.1% of selected range
Temperature Drift	0.01% of span/°C
Power	100-240 VAC +/- 10%, 50/60 Hz, 10 VA max. 12-24 VDC, 500 mA max.
Analog Outputs	Two isolated 4-20 mA, 500 Ω load max. (3rd output optional)
Relays	Three SPDT, contacts rated 6 amp @ 250 VAC, 5 amp @ 24 VDC (3 additional low power SPST non-isolated relays optional)
Display	4 digit, 0.75" numeric LCD with 12 character second line, LED back light.
Enclosure	NEMA 4X Polycarbonate V-0 Flammability
Operating Conditions	-20 to 60°C (-4 to 140°F)
Weight	6 lbs. (2.7 kg) with Sensor
Sensitivity	0.05% of span
Digital Output	Profibus-DP, Modbus-RTU, or Ethernet-IP
Mounting	Wall mounting kit standard, Panel mount bracket and pipe u-bolts available
Size	5.6"W x 4.9"H x 6.4"D

SENSOR

Sensor Type	4-Electrode
Materials	PEEK with Titanium Electrodes
Cable Length	15 ft (4.6 m) standard, 60 ft (18.3 m) max. with junction box
Temperature Limits	0-125°C (14 to 257°F)
Pressure Limit	100 PSIG max.
Connection	1" NPT for convertible-style
Flowcell Sensor	1-1/4" NPT with Quick Disconnect Cable
Temperature Element	Pt1000 RTD

NOTES:

1 - Flow sensor used in sealed flowcell is Noryl. Temp limit is 70°C

ORDERING INFORMATION

Model Q46C4-A-B-C-D-E-F 4-Electrode Monitor

Suffix A - Power
1 - 100-240 VAC, +/-10%, 50/60 Hz
2 - 12- 24 VDC, (requires 300 mA)

Suffix B - Sensor Type
1 - Convertible, PEEK body
2 - Insertion, 316SS body
3 - Sanitary-Style, 1½", 316SS body
4 - Sanitary-Style, 2", 316SS body
5 - Convertible, PEEK body with connector (requires 03-0029 cable)
6 - Noryl sensor with connector, for sealed flowcell 00-1522 (requires 03-0029 cable)

Suffix C - Cable Length
1 - 15'
2 - 30'
9 - Special

Suffix D - Digital Output
1 - None
2 - Profibus-DP
3 - Modbus-RTU
4 - Ethernet-IP

Suffix E - Optional Output
1 - None
2 - One additional 4-20 mA output
3 - Three additional low power relays

Suffix F - Measurement Type
1 - Conductivity
2 - Concentration

ACCESSORIES

07-0100 Universal Junction Box, NEMA 4X
31-0057 Sensor Interconnect cable
03-0029 Sensor Cable with Connector (25 ft)
00-0628 Mounting Bracket Kit for Submersible Sensor
00-1522 Sealed Flowcell (60 PSI Max)
05-0094 Panel Mount Bracket Kit
47-0005 2" U-bolt, 304SS
07-0203 Insertion Assembly without Assist, 1¼"NPT, 316SS
07-0228 Insertion Assembly with Assist, 1¼"NPT, 316SS
07-0223 Insertion Assembly without Assist, 1¼"NPT, CPVC
09-0047 Conductivity Standard - 447 mS, 500 mL
09-0048 Conductivity Standard - 1,500 mS, 500 mL
09-0049 Conductivity Standard - 8,974 mS, 500 mL
09-0050 Conductivity Standard - 80,000 mS, 500 mL

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