A Badger Meter® Brand

# Water Quality Monitor

## Q46CT Toroidal Conductivity Monitor

## OVERVIEW

Conductivity measurement in aggressive chemical solutions or in water systems containing large amounts of solids, oils and grease is very maintenance intensive using conventional 2- or 4-electrode sensors. The model Q46CT monitor employs an inductive (toroidal) sensor that allows measurement in corrosive samples with virtually no maintenance.

Toroidal conductivity monitoring systems contain a variety of features and options to meet virtually any conductivity monitoring and control application. While not suitable for low level conductivity measurement, toroidal monitors are an excellent choice for high conductivity applications. The Q46CT monitor is also available as a concentration monitor. See *"Concentration Monitor" on page 2*.

The Q46 platform represents our latest generation of monitoring and control systems. Control features have been expanded to include an optional third analog output or an additional bank of low power relays. Digital communication options include Profibus DP, Modbus RTU or Ethernet IP variations.

## TOROIDAL SENSOR

The model Q46CT toroidal conductivity system is designed for online monitoring of chemically aggressive process solutions. This sensor consists of two metallic ribbon coils that are fixed in place by the sensor jacket material. The drive coil establishes a strong magnetic field around the sensor body that induces a current in the process solution. The sensing coil is used to measure the induced current in the process solution.The magnitude of this current is proportional to the conductivity of the process solution.

The toroidal sensor is available in Noryl, making the sensor wetted materials chemically resistant to both strong acids and strong bases. Sensor material is also non-conductive, thereby isolating the sensor from electrical noise and ground loops that can influence the integrity of the measurement. This material also makes the sensor resistant to electrode coating, as most substances do not adhere to the sensor material.

*Figure 1: Noryl toroidal sensor*


Sensors can be submersion-mounted using the 3/4 inch NPT pipe thread at the back of the sensor for easy installation in open tanks. The sensor may also be pipe-mounted using the special 2 inch CPVC tee fitting that has an alignment key to automatically orient the sensor to the sample flow.

A Pt1000 RTD in the sensor body provides temperature input for both display and automatic temperature compensation of the conductivity measurement.

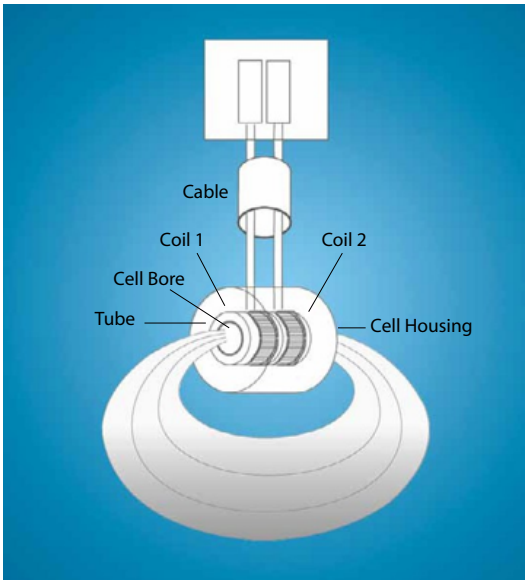


*Figure 2: Non-contacting sensor*

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**Product Data Sheet**

## APPLICATIONS

- High Conductivity Processes
- High Solids Content Processes
- Pharmaceutical Applications
- Fume Scrubbers
- Boiler Blowdown
- Cooling Towers
- Chemical Feed
- Food and Beverage
- Metal Plating / Rinsing
- Bioremediation
- Clean-In-Place
- Potable Water
- Wastewater Treatment
- Pulp and Paper
- Textile Manufacturing
- Neutralization Tanks
- Refining
- Acid / Caustic Feed

## FEATURES

- **Adaptability.** Concentration version for direct display of chemical concentrations.
- **Extra Outputs.** Expansion board to add a third 4…20 mA analog output or to add three additional non-isolated low power relays.
- **Flexibility.** Wide range capability, with selectable ranges of 0…200.0 uS up to 0…2.000 S provide maximum application flexibility.
- **AC or DC Power Options.** Power options include universal 100…240V AC ±10%, or 12…24V DC.
- **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.
- **PID Output.** Standard PID control function assignable to one analog output.
- **Digital Communications.** Available in Profibus DP, Modbus RTU, Modbus TCP/IP. Ethernet/IP, Datalogger.
- **Relay Assignable.** 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 (IP66) enclosure is suitable for wall, pipe or panel mounting.
- **Clear Display.** Backlit large LCD display provides clear visibility in any lighting conditions. A scrolling second line on the display provides additional information and programming prompts.

## CONCENTRATION MONITOR

Conductivity monitors can be used to monitor and display the concentration of acids or bases used in various chemical process applications. The Q46CT 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 Badger Meter. Custom tables require data on both concentration vs. conductivity and temperature vs. conductivity for the chemical of interest.

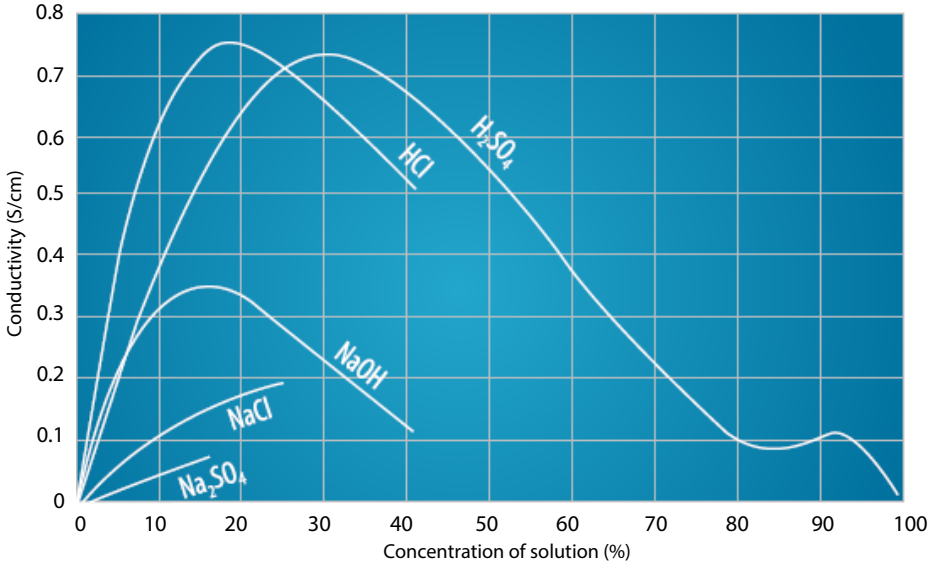


*Figure 3: Relationship between concentration of solutions and conductivity (at 18° C)*

# SPECIFICATIONS

## Electronic Monitor

| | |
|---|---|
| **Display Range** | 0…200.0 uS, 0…2.000 / 20.00 / 200.0 / 2000 mS, 0…2.000 S |
| **Accuracy** | 0.5% of selected range or 0.02 ppm |
| **Repeatability** | 0.3% of seleted range or 0.01 ppm |
| **Non-Linearity** | 0.1% of selected range |
| **Temperature Drift** | 0.01% of span/°C |
| **Power** | 100…240V AC, ±10%, 50/60 Hz, 12…24V DC, 500 mA max. |
| **Analog Outputs** | Two isolated 4…20 mA, 500 Ω load max. (3rd output optional) |
| **Relays** | Three SPDT, 6A @250V AC, 5A @24V DC (Three additional SPST non-isolated, 1A @30V DC optional) |
| **Display** | 4-digit, 0.75 in. numeric LCD with 12-digital second line, LED backlight |
| **Enclosure** | NEMA 4X Polycarbonate V-0 Flammability |
| **Operating Conditions** | –4…140° F (–20…60° C) |
| **Weight** | 6 lb (2.7 kg) with sensor, flow cell and accessories |
| **Sensitivity** | 0.05% of span or 0.01 mS |
| **Digital Output** | Profibus DP, Modbus RTU, Modbus TCP/IP. Ethernet/IP, Datalogger |
| **Mounting** | Wall mounting kit standard, panel mount bracket and pipe U-bolts available |
| **Size** | 5.6 in. W × 4.9 in. H × 6.4 in. D (142.2 mm × 124.5 mm × 162.6 mm) |

## Sensor

| | |
|---|---|
| **Sensor Type** | Toroidal (Inductive) |
| **Materials** | Noryl |
| **Cable Length** | 20 ft (6 m) standard, 200 ft (61 m) max. with junction box |
| **Temperature Limits** | 0…105° C, 0…80° C with flow cell |
| **Pressure Limit** | 150 psig max. |
| **Connection** | 3/4 in. MNPT rear thread |
| **Flowcell** | 2 in. CPVC with alignment key |
| **Temperature Element** | Pt1000 RTD |

# ORDERING INFORMATION

**QP-A-B-C-D-E Toroidal Conductivity**

| **Suffix A - Power** |
|---|
| 1 - 100…240V AC, ±10%, 50/60 Hz |
| 2 - 12…24V DC, requires 500 mA |
| **Suffix B - Sensor Type** |
| WW - None |
| T1 - Noryl with 20 ft cable |
| **Suffix C - Digital Output** |
| 1 - None |
| 2 - Profibus DP |
| 3 - Modbus RTU |
| 4 - Ethernet IP |
| 5 - Modbus TCP/IP |
| 6 - Datalogger |

| **Suffix D - Optional Output** |
|---|
| A - None |
| B - One additional 4…20 mA output |
| C - Three additional low power relays |
| **Suffix E - Measurement Type** |
| 1 - Conductivity |
| 2 - Concentration |

## ACCESSORIES

| | |
|---|---|
| **07-0100** | Junction box, NEMA 4X |
| **31-0068** | Sensor interconnect cable |
| **63-0083** | 2 in. CPVC tee with sensor adapter |
| **00-1447** | Mounting bracket kit for submersible sensor. |
| **05-0094** | Panel mount bracket kit |
| **47-0005** | 2 in. U-bolt, 304SS |
| **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 |