

Permanganate Monitor

Model Q46H/83



Permanganate (MnO_4^-) is a strong oxidizer used in the water industry for reduction of organics in raw water. It is also used for control of zebra mussel problems at raw water intake structures. Continuous monitoring of low permanganate concentrations allows operators to adjust chemical feed rates and achieve target values. Chemical feed problems that result in either too little or too much residual can be quickly identified and corrected.

Monitor MnO_4^- without Sensor Contamination!

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Continuous monitoring of permanganate in treated water presents sensor contamination issues. When permanganate reacts with organics or other reducing materials in solution, manganese dioxide (MnO₂) is formed and readily plates out on sensing electrode surfaces. The resulting deposits degrade the measurement and can be difficult to clean. The Q46/83 eliminates this problem by employing a measurement method in which the sensor never comes into contact with the sample. In operation, water containing permanganate is mixed with pH buffer and potassium iodide solutions. Permanganate oxidizes the iodide to iodine (I₂), and the resulting I₂ is stripped out of solution and measured using an I₂ gas sensor. This “gas phase” measurement technique eliminates MnO₂ sensor fouling, resulting in a system capable of providing long term reliability.

The Q46H/83 Permanganate monitor consists of two main components, an electronic display unit and a chemistry module. The chemistry module contains sample and reagent pumps, sample handling systems, and the gas sensor that provides the final measurement. An inlet overflow assembly attached to the bottom of the chemistry module is where the inlet sample line and drain line are connected. Sample inlet flows of 5 - 20 gallons per hour (300-1200 mL/min) are recommended to keep system response time to a minimum. Reagent bottle holders are supplied so that reagents can be wall mounted below the chemistry system.

The electronics module can be mounted near the chemistry unit or up to 100 feet away depending on installation requirements. Permanganate concentration is displayed on a large format back-lit LCD with a second alpha-numeric line below to indicate other operating parameters. Three SPDT alarm relays and two 4-20 mA outputs are provided, and digital communications are available.

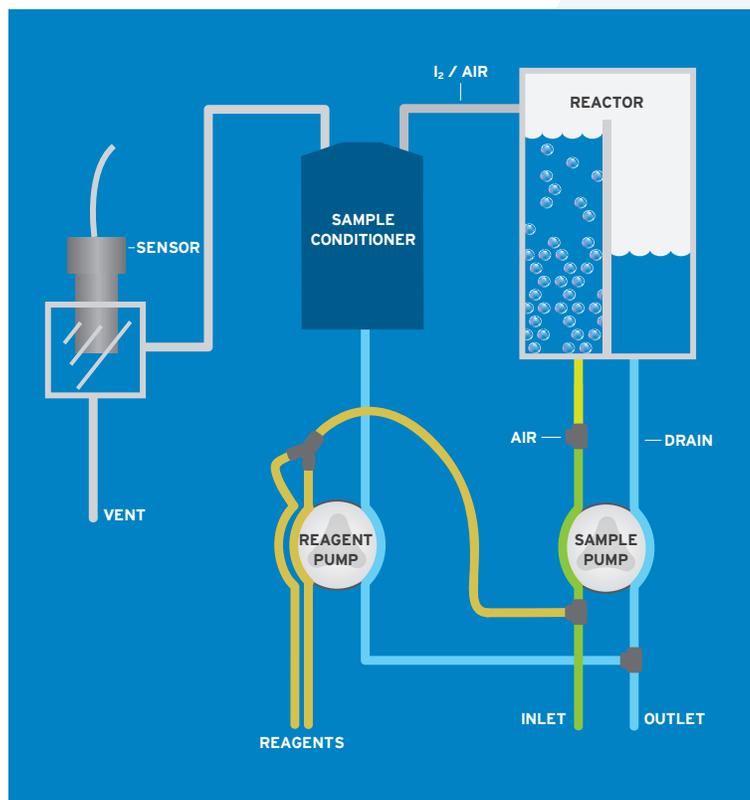
THEORY OF OPERATION

The Q46H/83 Permanganate Monitor employs an Auto-Chem chemistry module to provide chemical treatment of the sample, air stripping of the released iodine, gas sample conditioning, and iodine gas measurement. In operation, a small amount of sample is pumped from an overflow assembly into the chemistry system and mixed with pH 4 buffer and potassium iodide (KI) solution. At pH 4, permanganate compounds in solution react as follows:



The treated sample flows into an air-stripping chamber where a controlled amount of air removes the iodine from the water sample. The air coming from the top of the stripping chamber is directed to a gas conditioning module which removes any excess water and then to a flowcell containing the iodine gas sensor. The iodine gas sensor is an amperometric membraned sensor that generates current in proportion to the amount of iodine in the gas stream. Since the gas sensor is only in contact with clean air containing iodine, sensor fouling due to contaminants in the sample is eliminated.

A Gas-Phase approach to Permanganate Measurement



FEATURES

Gas Phase Sensing. Measurement is made without contact between sample and sensor, eliminating the potential for sensor fouling.

Standard Method. Permanganate is measured using iodometric measurement after reaction of the sample with buffer and potassium iodide.

Analog Output Options. Two isolated 4-20 mA outputs are standard. One output is programmable for PID function.

Chemistry Module Power Options. Power options include 115 or 230 VAC, 50/60 Hz.

Three Control Relays. Relays are programmable for setpoint, deadband, and time delay.

Digital Communications. Communication options for Profibus-DP, Modbus-RTU, or Ethernet-IP.

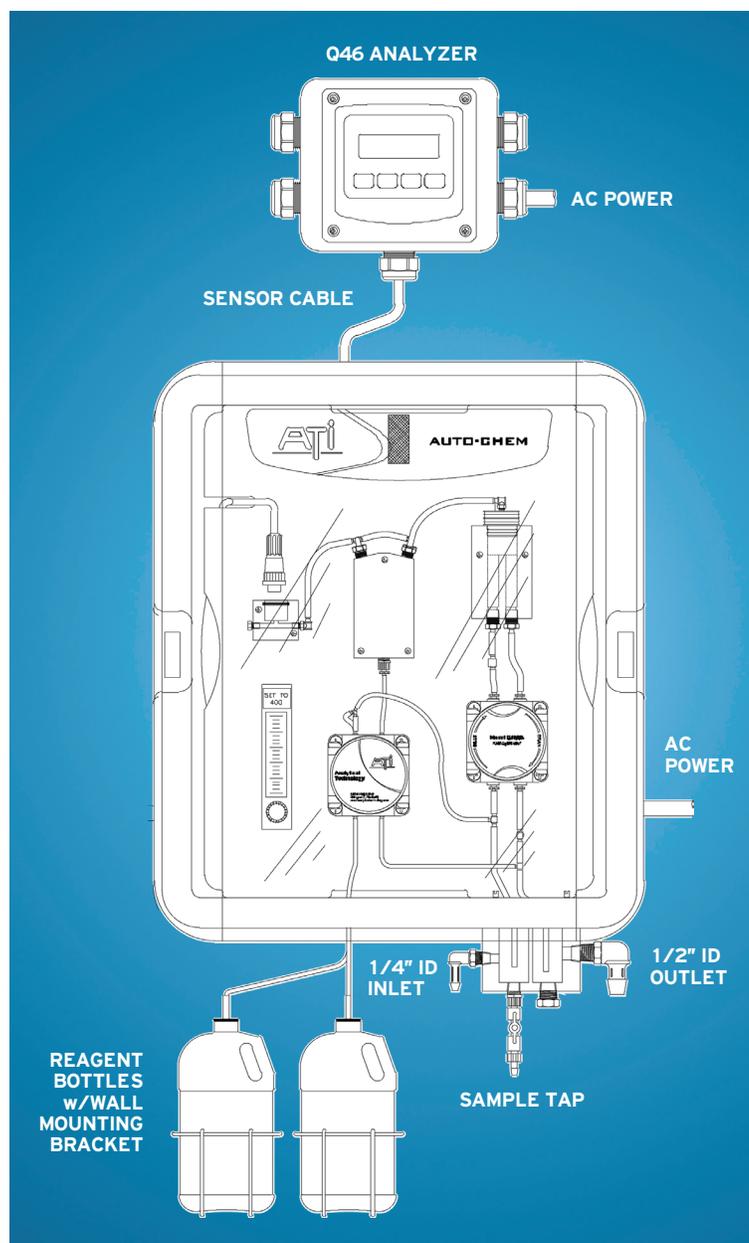
Clear Display. Back-lit large LCD display provides clear visibility in any lighting condition. A scrolling second line on the display provides additional information and programming prompts.

INSTALLATION

Q46H/83 "Gas Stripping" permanganate analyzers consist of two main components, the Auto-Chem chemistry module and a separate electronic unit (Q46H) that provides the permanganate concentration display and various outputs. AC power is required for both components and a 25 ft. interconnecting sensor cable is supplied. The two components can be separated by up to 100 feet, if desired.

Q46H Monitors provide a large format concentration display with a second alpha-numeric lower line for secondary information. The monitor provides two standard 4-20 mA analog outputs and three SPDT relays. If desired, one analog output can be configured for PID control use. In addition, the monitor provides options for digital communications including Profibus-DP, Modbus-RTU, and Ethernet-IP.

Auto-Chem chemistry systems include peristaltic pumps for sample and reagents, air supply for the stripping system, and gas conditioning components. All components are easily accessible from the front of the unit making service quick and easy. Attached to the bottom of the enclosure is an inlet overflow chamber where sample and drain connections are made. A sample flow rate of 5 - 20 gallons per hour (300-1200 mL/min) is recommended.



Q46H/83 SPECIFICATIONS

ELECTRONIC MONITOR

| | |
|------------------------------|---|
| Display Range | 0-2.000 or 0-20.00 PPM |
| Accuracy | +/- 0.005 PPM |
| Repeatability | +/- 0.002 PPM |
| Linearity | 0.5% of F.S. |
| Zero Drift | < 0.005 PPM per month |
| Power | 100-240 VAC +/- 10%, 50/60 Hz |
| Analog Outputs | Two isolated 4-20 mA, 500 Ω load max. |
| Relays | Three SPDT, 6A @250 VAC, 5A @24 VDC |
| Display | 4-digit, 0.75" numeric LCD with 12-digit second line, LED back light. |
| Enclosure | NEMA 4X (IP-66) Polycarbonate, V-0 flammability |
| Operating Temperature | -20 to 60°C (-4 to 140°F) |
| Weight | 2.5 lbs. (1.1 Kg) |

CHEMISTRY MODULE

| | |
|-------------------------------|--|
| Sensor Type | Membraned Iodine Gas Sensor |
| Sensor Cable | 25 ft standard, 100 ft max. |
| Response Time | 95% in 3 minutes |
| Sample Pump | Internal tubing pump, 7 cc/min |
| Acid Pump | Internal tubing pump, 0.1 cc/min |
| Air Supply | Diaphragm air pump with precision flow control |
| Air-Stripping Chamber | Teflon™ |
| Inlet Sample Flow Rate | 5-20 GPH at inlet overflow assembly |
| Sample Inlet | 1/4" I.D. Hose Barb |
| Sample Drain | 1/2" I.D. Hose Barb |
| Power | 115 or 230 VAC (customer specified) |
| Operating Temp. | 2 to 50°C |
| Enclosure | Kydex with acrylic cover, V-0 flammability |
| Weight | 15 lbs. (6.8 Kg) |

ORDERING INFORMATION

Model Q46H/83-A-B Permanganate Monitor

Suffix A - Power

- 1 - 115 VAC, 50/60 Hz
- 2 - 230 VAC, 50/60 Hz

Suffix B - Digital Output

- 1 - None
- 2 - Profibus-DP
- 3 - Modbus-RTU
- 4 - Ethernet-IP

ACCESSORIES

31-0038 7-c Sensor interconnect cable, 100 ft max.

05-0094 Panel Mount Bracket Kit

47-0005 2" U-bolt, 304SS

NOTE:

All systems are supplied with one package of membranes, one 120 cc bottle of electrolyte, one 50 gram container of KI, 2 reagent bottles with reagent pickup assemblies, and 2 reagent bottle brackets.

ATI's Solution to Dechlorination Control! Q46S/66 Residual Sulfite

Maintain your sulfite residual and eliminate costly over feed events with another "air-stripping" system.



ATI's Model Q46S/66 Residual Sulfite Monitor provides the solution to dechlorination control in wastewater effluent. The sample stream is acidified which converts the sulfite ion into sulfur dioxide. The air-stripping system removes the sulfur dioxide from the solution and is measured with a gas-phase SO₂ sensor.

The gas stripping technique for monitoring sulfite in solution provides an extremely sensitive on-line monitor. Measurements down to low parts-per-billion can be done easily, and zero and span stability inherent in the sensor allow for monthly calibration cycles.



Visit Us on the Web: www.analyticaltechnology.com

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