PotassiumPermanganate **Monitor**

Model Q46H/83

Potassium Permanganate ($KMnO_4$) 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 $KMnO_4$ without Sensor Contamination!

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or visit us on the web at **www.analyticaltechnology.com**

ATi ANALYTICAL TECHNOLOGY, INC.

Continuous monitoring of potassium permanganate in treated water presents sensor contamination issues. When permanganate reacts with organics or other reducing materials in solution, manganese dioxide (MnO_2) 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 (I_2), and the resulting I_2 is stripped out of solution and measured using an I_2 gas sensor. This "gas phase" measurement technique eliminates MnO_2 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 250-100 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.

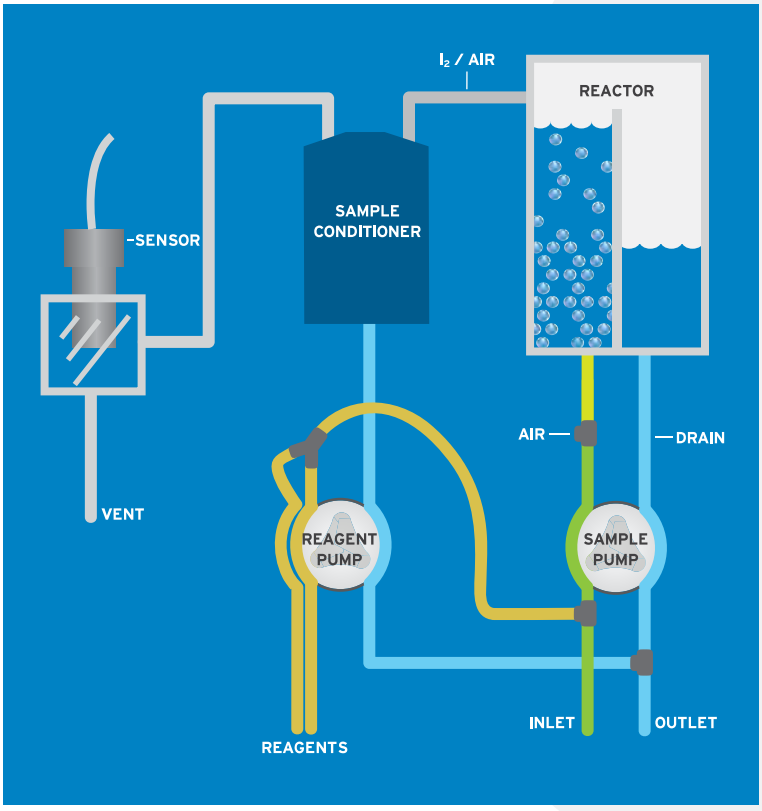
THEORY OF OPERATION

The Q46H/83 Potassium Permanganate Monitor employs ATI's 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:

$$2MnO_4^- + 6I^- \rightarrow 3I_2 + 2MnO_2$$

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. Potassium 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.

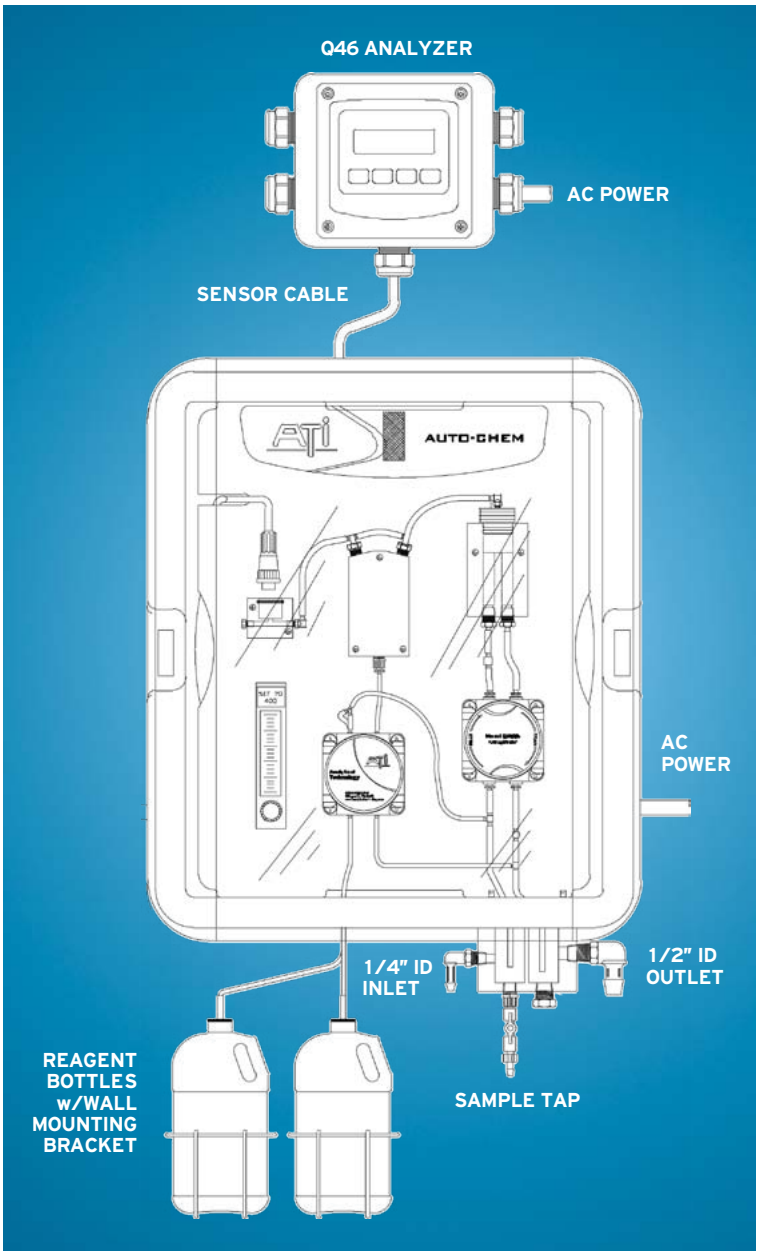
Clear Display. Back-lit large LCD display provides clear visibility in any lighting condition. A scrolling second line on the display provides additional information and programming prompts.

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 SO_2 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.

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