TotalChlorine**Monitor**
Model Q46H/79S

Chlorination of potable water, wastewater effluent, and industrial cooling water is widely used throughout the world to control biological activity in the water. Disinfection of potable water with chlorine ensures that tap water is safe to drink after passing through the distribution system piping. Wastewater disinfection helps to ensure that receiving streams are safe for recreational use, and cooling water chlorination reduces biofouling that can degrade heat transfer efficiency. This wide use of chlorination for disinfection purposes results in the need for a reliable "residual chlorine" analyzer that can operate in a variety of applications.

Non-Contacting "Total Chlorine" Monitoring

Call **800.959.0299** to speak with a sales representative
or visit us on the web at **www.analyticaltechnology.com**

ATi ANALYTICAL TECHNOLOGY, INC.

Residual chlorine is found in many chemical forms in water systems. Residuals in clean water are often predominantly free chlorine while wastewater and cooling water can contain mixtures of free chlorine, combined chlorine, and organochlorine species. Measurement of residual chlorine in applications where only free chlorine (potable water) or only combined chlorine (chloraminated water) exist can often be monitored with direct sensor measurement. However, applications where a variety of chlorine forms can exist (wastewater effluent and some cooling water) require a more complicated measurement method. These applications generally require a "Total Chlorine" measurement and involve chemically converting all chlorine species into a single chemical form. This is normally done by reacting the sample with pH 4 buffer and potassium iodide, where the various chlorine compounds convert iodide ion into molecular iodine.

Many on-line monitors for total chlorine use this iodometric method, often measuring the current between two exposed electrodes to determine iodine concentration. ATI's Model Q46H/79S uses this same standard iodometric chemistry, but with a unique sensing technique for measuring the released iodine. The system takes the reacted sample containing iodine and uses an air-stripping system to remove molecular iodine from solution. The gas-phase iodine from the water sample is channeled through a conditioning module and then directly to an iodine gas sensor. The result is that the iodine measurement is made without any contact between the water sample and the sensor. Contaminants in the sample that cause fouling and contamination of standard electrodes do not affect the Q46 system, providing greater operational reliability.

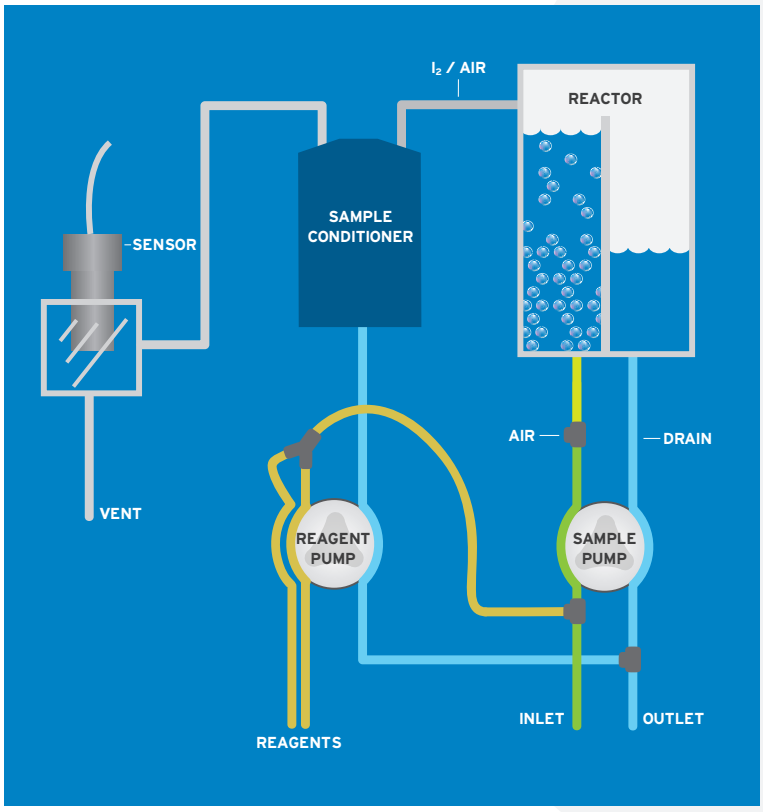
A *Gas-Phase* approach to *Chlorine Measurement*

THEORY OF OPERATION

The Q46H/79S Total Chlorine 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, chlorine compounds in solution react as follows (equation shown for one chlorine compound only):

$$HOCl + 2KI + H^+ \rightarrow 2KCl + I_2 + H_2O$$

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.



FEATURES

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

Standard Method. Total Chlorine is measured using EPA recommended 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.

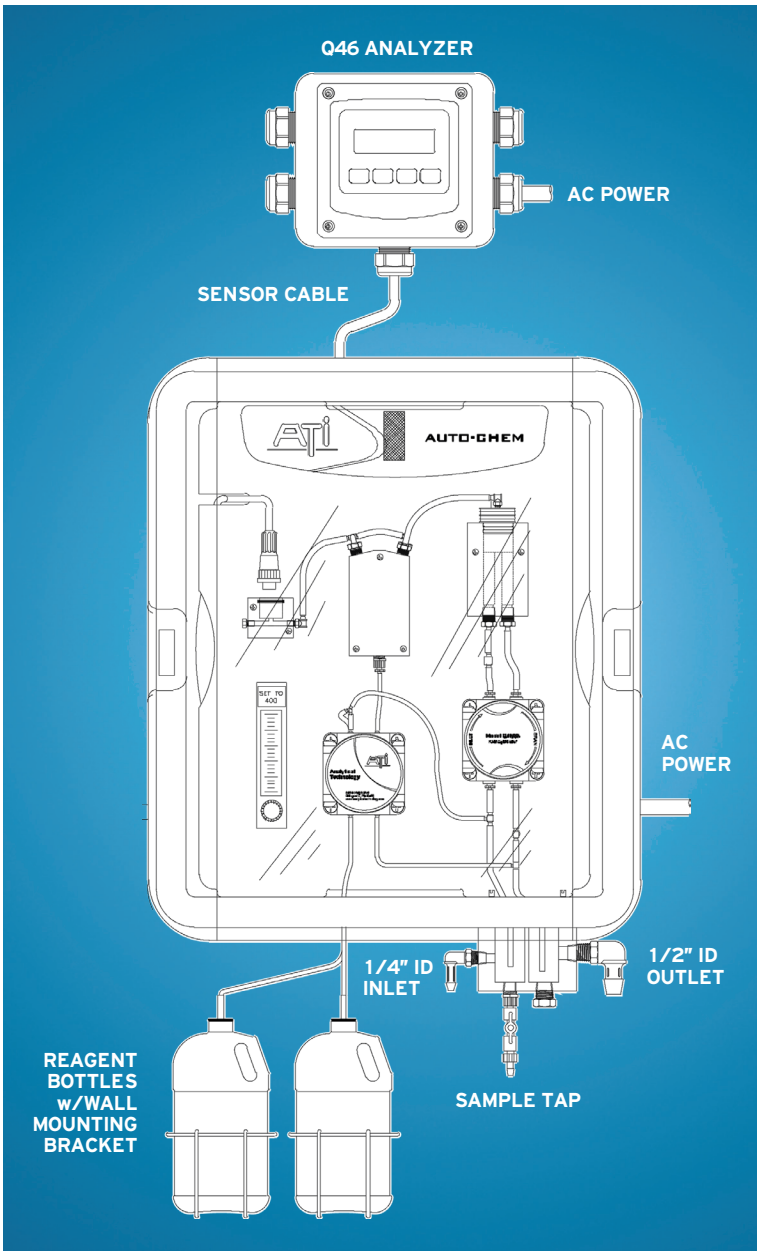
Clear Display. Back-lit large LCD display provides clear visibility in any lighting condition. A scrolling second line on the display provides additional information and programming prompts.

INSTALLATION

Q46H/79S "Gas Stripping" Total Chlorine Analyzers consist of two main components, the Auto-Chem chemistry module and a separate electronic unit (Q46H) that provides the chlorine 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 output 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/79S **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	Membraned I_2 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/79S-A-B Total Chlorine 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 overfeed 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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