

# SulfiteMonitor

## Model Q46S/66



Dechlorination of wastewater effluent is common practice in many wastewater treatment facilities throughout the U.S. Strongly reducing sulfur compounds are used to eliminate chlorine residuals that might prove toxic to fish in the receiving stream. Because residual chlorine discharge limits are often very close to zero, monitoring residual values to comply with regulations has become very difficult, and controlling residuals at values between zero and 10 or 20 parts-per-billion is often not achievable.

To meet stringent discharge limits, the sulfite or bisulfite used for dechlorination is added in slight excess, providing a small sulfite residual to insure complete dechlorination. ATI's Model Q46S/66 provides operators with a reliable tool for maintaining a small sulfite residual while reducing excess chemical consumption due to overfeed.

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## FEATURES

**Sulfite Measurement.** Sulfite ion is measured selectively by conversion to sulfur dioxide.

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

**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.

**Sample Line Cleaning.** Internal sequencing and relay system for automated sample line cleaning.

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



Q46S/66 Sulfite Monitor

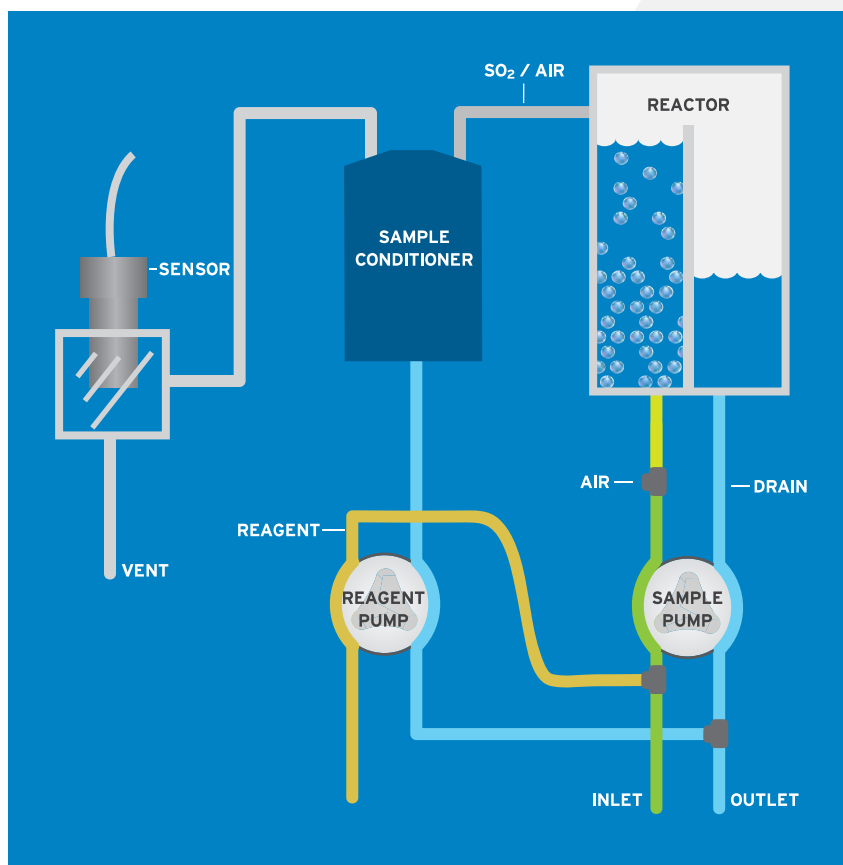
## A *Gas-Phase* approach to Sulfite Measurement

### THEORY OF OPERATION

Because measuring the  $\text{SO}_3^-$  ion in solution is relatively difficult, the Q46S/66 Monitor takes a different approach to the measurement, employing a unique gas-phase method to continuously monitor sulfite without contact between the sensor and the water sample. In operation, a small amount of sample is pumped into the system and mixed with acid. In acidic solution, the sulfite ion is converted to sulfur dioxide gas as follows:



The mixed sample flows into a special chamber where the sulfur dioxide is stripped from the sample. A gas conditioning module prepares the gas sample for measurement prior to contact with a special sulfur dioxide gas sensor designed for the system. Sensor signals are amplified and displayed on a large-format, backlit LCD display in the Q46S electronics unit.



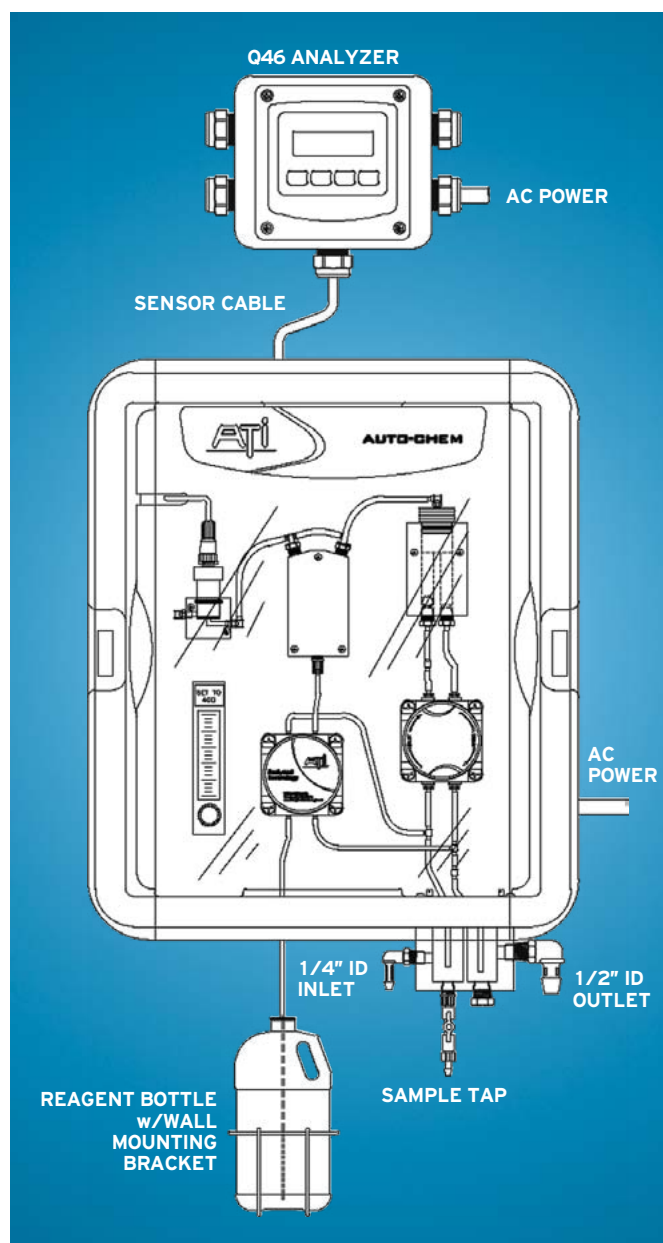
## INSTALLATION

A sample inlet overflow block is provided on the bottom of the chemistry module. Sample is connected using ¼" I.D. flexible tubing, with a recommended flow rate of 5-20 gallons per hour. While the monitor uses only a small fraction of this sample, the higher flow keeps sample delivery times to a minimum. Excess sample simply overflows to a gravity drain chamber requiring a ½" I.D. flexible tube.

Sulfite monitoring systems are extremely easy to operate and maintain, with acid usage of one gallon every 25 days at standard flow rates. Sample and acid are pumped using long life peristaltic pump tubing that requires replacement approximately every 6 months. Pump heads are designed for easy tube changes, requiring about 10 minutes to replace both pump tubes. The sulfite sensor requires no maintenance other than an occasional visual inspection to insure that no deposits have collected due to airborne particulates.

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.

## Keep *Chemical Costs* Under *Control*



## CHEMICAL SAVINGS

Maintaining a small sulfite residual in dechlorinated water has the benefit of insuring complete dechlorination. Monitoring the concentration of this residual allows chemical feed control that can result in significant chemical cost savings.

The best way to look at potential chemical savings is to calculate the cost of each PPM of residual sulfite in a specific volume of dechlorinated water. For simplicity, the formula uses MGD units as the specific volume and estimates chemical cost in terms of "equivalent SO<sub>2</sub>" since bisulfite, metabisulfite, or SO<sub>2</sub> gas could be used in a given plant.

$$\text{Cost (SO}_2 \text{ / lb.)} \times \text{Flow (MGD)} \times 8.34 \text{ lb./PPM} \times 365 \text{ days} = \text{Cost/year of 1 PPM}$$

Using this calculation for a 7 MGD plant currently paying \$0.50/lb. for bisulfite (as SO<sub>2</sub>), you get a sense of the cost of 1 PPM of excess sulfite over the year.

$$\$0.50 \times 7 \times 8.34 \times 365 = \$10,654$$

Reducing the residual by 0.5 PPM would result in \$5,000 per year in chemical savings for this plant.

# Q46S/66 SPECIFICATIONS

## ELECTRONIC MONITOR

Display Range	0-2.000 or 0-20.00 PPM
Accuracy	+/- 0.03 PPM
Repeatability	+/- 0.01 PPM
Linearity	0.5% of F.S.
Zero Drift	< 0.01 PPM per month
Power	100-240 VAC +/- 10%, 50/60 Hz
Analog Outputs	Two isolated 4-20 mA, 500 $\Omega$ 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)

## ORDERING INFORMATION

Model Q46S/66 A-B Sulfite 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

## CHEMISTRY MODULE

Sulfite Sensor	Membraned SO <sub>2</sub> 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	Cast Acrylic
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	15lbs (6.8 Kg)

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