

Water Quality Monitor

Q46S/66 Residual Sulfite

OVERVIEW

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 0–10 ppb or 20 ppb 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. Badger Meter's Q46S/66 residual sulfite monitor provides operators with a reliable tool for maintaining a small sulfite residual while reducing excess chemical consumption due to overfeed.

FEATURES

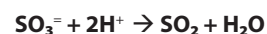
- **Sulfite Measurement.** Sulfite ion is measured selectively by conversion to sulfur dioxide.
- **Gas Phase Sensing.** Measurement is made without contact between sample and sensor, eliminating the potential for sensor fouling.
- **Chemistry Module Power Options.** Power options include 115 or 230V AC, 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.
- **Flexible Mounting.** NEMA 4X (IP66) enclosure is suitable for wall, pipe or panel mounting.
- **Digital Communications.** Available in Profibus DP, Modbus RTU, Modbus TCP/IP, Ethernet/IP or Datalogger.
- **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.



THEORY OF OPERATION

Because measuring the 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.

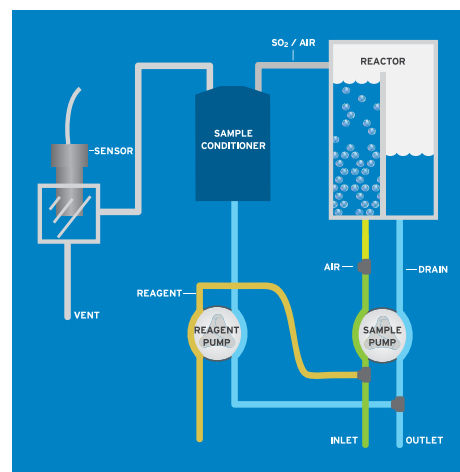


Figure 1: Submersion and flow cell sensors

SENSOR STABILIZATION

A sample inlet overflow block is provided on the bottom of the chemistry module. Sample is connected using 1/4-inch 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 1/2-inch 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.

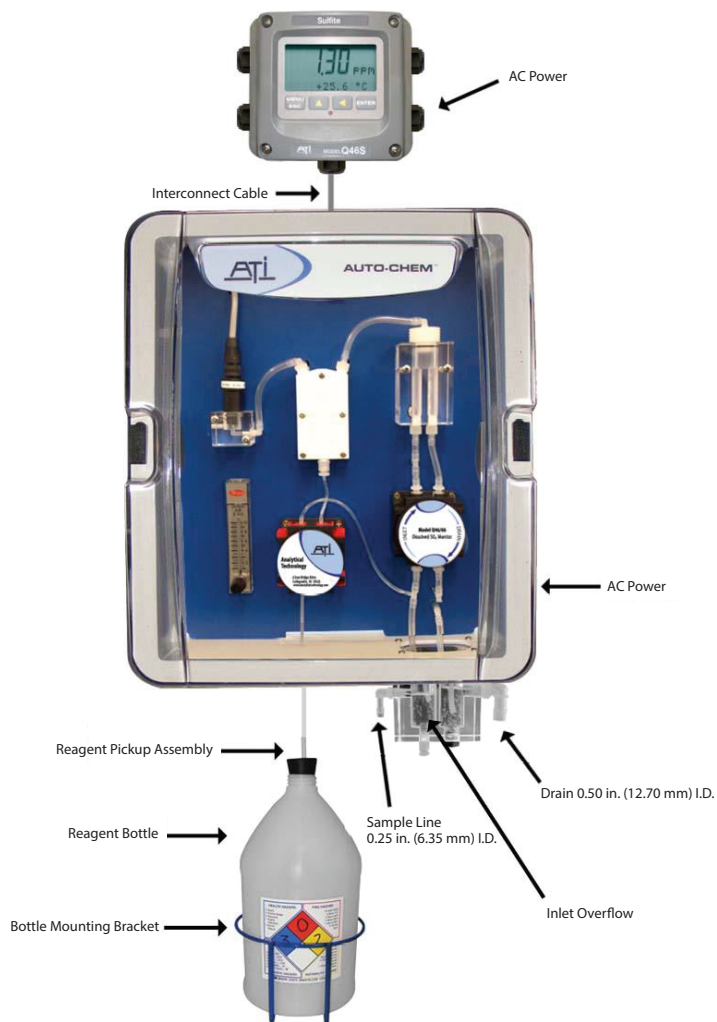


Figure 2: Dissolved sulfite typical system

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/month
Power	100–240V AC, ±10°, 50/60 Hz
Analog Outputs	Two isolated 4–20 mA, 500 Ω load max.
Relays	Three SPDT, 6A @250V AC, 5A @ 24V DC
Display	4-digit, 0.75 in. numeric LCD with 12-digital second line, LED backlight
Enclosure	NEMA 4X (IP66) Polycarbonate, V-0 Flammability
Operating Temperature	–4 to 140° F (–20 to 60° C)
Weight	2.5 lb (1.1 kg)
Digital Output	Profibus DP, Modbus RTU, Modbus TCP/IP, Ethernet/IP, Datalogger

Chemistry Module

Sulfite Sensor	Membraned SO ₂ Gas Sensor
Sensor Cable	25 ft (7.5 m) standard
Response Time	90% in 60 sec
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
Inlet Sample Flow Rate	5–20 gph at inlet overflow assembly
Sample Inlet	1/4 in. I.D. hose barb
Sample Drain	1/2 in. I.D. hose barb
Power	115 or 230V AC (customer specified)
Operating Temperature	36 to 122° F (2 to 50° C)
Enclosure	Kydex with acrylic cover, V-0 Flammability
Weight	15 lb (6.8 kg)

ORDERING INFORMATION

QN-A-B Residual Sulfite Monitor

Suffix A - Power	
8	115V AC, 50/60 Hz
9	230V AC, 50/60 Hz
Suffix B - Digital Output	
1	None
2	Profibus DP
3	Modbus RTU
4	Ethernet/IP
5	Modbus TCP/IP
6	Datalogger

ACCESSORIES

31-0038	Sensor interconnect cable (max. 100 ft)
47-0005	2 in. U-bolt, 304 SS
05-0094	Panel mount bracket kit



