

Water Quality Monitor

Q46/88 Suspended Solids

OVERVIEW

Monitoring suspended solids in wastewater and industrial process water can be useful for either process control or for alarming of unusual conditions. In biological treatment systems, monitoring suspended solids in the aeration tank can assist operators in maintaining optimum MLSS (Mixed Liquor Suspended Solids) concentration. In industrial clarifiers, suspended solids monitoring can warn of upset conditions that might result in the discharge of solids that exceed plant permits.

The Q46/88 Suspended Solids Monitor provides real time monitoring of suspended solids in a variety of water and wastewater applications. A submersible sensor immersed in process tanks or effluent channel senses particulates in the water using an optical backscatter technique that allows measurement over a wide range. Results are displayed on the Q46 electronic unit mounted near the sensor with a variety of outputs provided as standard.

FEATURES

- **AC or DC Power Options.** Power options include universal 100...240V AC $\pm 10\%$ or 12...24V DC.
- **Extra Outputs.** Expansion board to add a third 4...20 mA analog output or to add three additional non-isolated low power relays.
- **Flexibility.** Wide range capability with selectable ranges of 0...100.0, 0...1000 mg/L or 0...10.00 g/L provide maximum application flexibility.
- **Analog Output Options.** Two isolated 4...20 mA outputs are standard, with an option for a third output if required. Default setting provides analog outputs for turbidity and temperature.
- **PID Output.** Standard PID control function assignable to one analog output.
- **Digital Communications.** Available in Profibus DP, Modbus RTU, Modbus TCP/IP, Ethernet/IP or Datalogger.
- **Relay Contacts.** Three SPDT relays are standard, with relay functions programmable for alarm, control or trouble indication. Three additional low power relays available as an option.
- **Flexible Mounting.** NEMA 4X (IP66) enclosure is suitable for wall, pipe or panel mounting.
- **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.
- **Sensor Diagnostics.** System automatically checks for sensor fouling, "dry cell" and light source intensity.



APPLICATIONS

- Aeration Tank Mixed Liquor
- Clarifier Effluent
- Industrial Process Water
- Other applications containing high levels of suspended solids

SUSPENDED SOLIDS SENSOR

Suspended solids sensors are optical devices operating in the infrared region. Unlike turbidity sensors that use 90-degree scatter to optimize sensitivity, suspended solids sensors use "backscatter" to allow solids measurements at much higher levels. Operation with infrared light allows very long sensor life and minimizes the effects of changing sample color.

Sensors are designed to withstand the rigorous conditions of wastewater and industrial process streams and to last for years in service with nothing more than occasional cleaning of the sensing surface. There are no protruding surfaces near the sensing element to avoid accumulation of fibrous materials. The sensor is simply pipe mounted using mounting adapters available from Badger Meter.

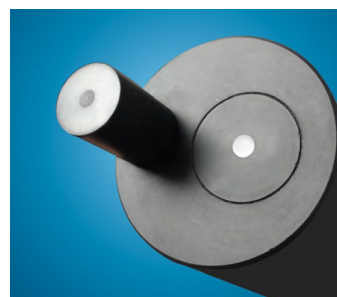


Figure 1: Suspended solids sensor

SENSOR CLEANING OPTION

Optical sensors used for monitoring biologically active systems such as aeration tanks or aerobic digesters require periodic cleaning to maintain the integrity of the measurement. Biological slime deposited on the optical surface degrades the ability to transmit IR light into the sample. The frequency of cleaning varies widely depending on the turbulence in the process. Course bubble diffusion systems tend to scour the sensor while fine bubble diffusion systems result in more rapid sensor fouling. To clean sensor, simply wipe the sensor as needed.

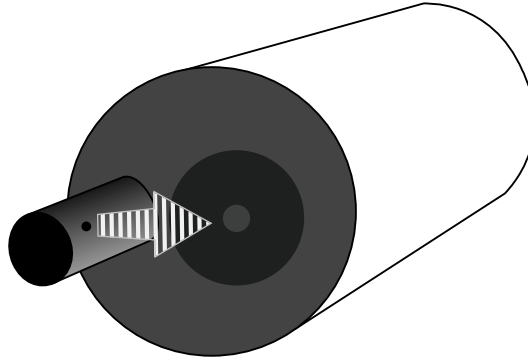


Figure 2: Optical sensor

OPTIONAL Q-BLAST AUTO-CLEAN ASSEMBLY

Badger Meter offers an optional automatic air-blast cleaning system. The Q-Blast Auto-Clean assembly air cleaning system is controlled by the Q46/88 Suspended Solids Monitor and provides a compact air compressor system that periodically applies pulses of compressed air across the optical surface to remove accumulated biofouling. This system greatly reduces the requirement for manual maintenance, with cleaning frequency programmed to occur as often as necessary.

The Q-Blast Auto-Clean assembly is housed in a NEMA 4X enclosure suitable for indoor or outdoor use. The system includes an integral compressor and air-pulse control components, with a power supply for the entire air supply system incorporated into the design. A simple connection to the Q46/88 monitor provides the sequencing for the system and allows the operator to select cleaning frequencies as often as once every hour to as little as once every 999 hours. To insure performance in extreme cold conditions, a thermostatically controlled heater is included in the assembly, allowing operation down to -40°C .

The Q-Blast option provides the ideal answer for suspended solids applications such as clarifier effluent. Employing a unique “air-blast” cleaning method, sensors can be cleaned as often as necessary without operator attention. Pulses of pressurized air delivered through a nozzle at the tip of the sensor remove accumulated solids from critical sensing surfaces, resulting in accurate and reliable measurements.



Figure 3: Q-Blast Auto-clean assembly

SPECIFICATIONS

Electronic Monitor

Display Range	0...100.0, 0...1000 mg/L or 0...10.00 g/L
Accuracy	0.5% of range or 0.5 mg/L
Repeatability	0.3% of range or 0.3 mg/L
Non-Linearity	2% of selected range
Temperature	0.01% of span/°C
Power	100...240V AC $\pm$ 10%, 50/60 Hz 12...24V DC, 500 mA max.
Analog Outputs	Two isolated 4...20 mA, 500 Ω load max. (3rd output optional)
Relays	Three SPDT, 6 A @250V AC, 5 A @ 24V DC (3 additional SPST non-isolated, 1 A @ 30V DC optional)
Display	4-digit, 0.75 in. numeric LCD with 12-digital second line, LED backlight
Enclosure	NEMA 4X Polycarbonate V-0 Flammability
Operating Conditions	-4...140° F (-20...60° C)
Weight	6 lb (2.7 kg) with sensor, flow cell and accessories
Digital Output	Profibus DP, Modbus RTU, Modbus TCP/IP, Ethernet/IP, Datalogger
Mounting	Wall mounting kit standard, panel mount bracket and pipe U-bolts available
Size	5.6 in. W $\times$ 4.9 in. H $\times$ 6.4 in. D (142.2 mm $\times$ 124.5 mm $\times$ 162.6 mm)

Sensor

Sensor Type	Optical Backscatter
Materials	PVC
Measurement Angle	180° backscatter
Response Time	95% in 60 seconds
Temperature Limit	0...50° C
Sensor Cable	4-conductor sensor cable, 30 ft (9.1 m) standard, 350 ft (106.7 m) max.
Pressure Limit	100 psig max.
Temperature Element	Integral to Sensor

ORDERING INFORMATION

QO-A-B-C-D-E Suspended Solids Monitor

Suffix A - Power	
1	100...240V AC, $\pm$ 10%, 50/60 Hz
2	12...24V DC (requires 300 mA)
3	100...240V AC, $\pm$ 10%, 50/60 Hz with Q-Blast auto-clean assembly
4	12...24V DC with Q-Blast auto-clean assembly (requires 1.0 A)
Suffix B - Sensor Type	
81	Submersible sensor, 30 ft cable
82	Auto-Clean submersible SS sensor, 30 ft cable
83	SS sensor, 1-1/2 in. flow tee
84	SS sensor, high solids flow cell
WW	None
Suffix C - Digital Output	
1	None
2	Profibus DP
3	Modbus RTU
4	Ethernet/IP
5	Modbus TCP/IP
6	Datalogger
Suffix D - Optional Output	
A	None
B	One additional 4...20 mA output
C	Three additional low power relays (SPST, 0.5 A max.) (Required when options A3 or A4 is selected)
Suffix E - System Assembly	
6	Q-Blast mounting plate, VAC
7	Q-Blast mounting plate, VDC
X	N/A

ACCESSORIES

00-1637	Q-Blast system plate assembly with power junction box
07-0100	Universal junction box, NEMA 4X
31-0001	5 conductor sensor interconnect cable (max. 1000 ft)
00-0624	Mounting bracket kit for Auto-clean sensor
45-0043	Pipe adapter for Auto-clean sensor
05-0094	Panel mount bracket kit
47-0005	2 in. U-bolt, 304 SS
00-0930	Auto-clean monitor mounting bracket

NOTE: Pipe mount requires two 2 in. U-bolts (47-0005).



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