

# Turbidity Monitor

## Model Q46/76



Flowcell Assembly

Turbidity is a general indicator of the optical clarity of water, and is defined as the amount of light scattered by particles in solution. In practice, a light beam is directed into a water sample and a photo detector measures the light scattered at 90-degrees to the incident light beam. While other scatter angles are possible, the 90-degree measurement angle has become the standard for turbidity measurement in most water systems. It is used as a relative indicator of the amount of suspended solids in a solution, and is measured in virtually all drinking water systems. It is also used in industrial water treatment systems as an indicator of product water quality.

ATI's Model Q46/76 Turbidity Monitor is designed to meet the needs of both municipal drinking water systems and industrial water treatment for reliable, low-range turbidity measurement.

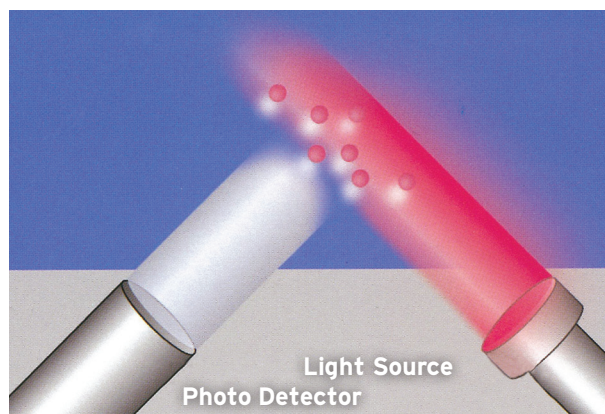
*Highly Sensitive Turbidity Measurement,  
Unmatched Zero Stability!*

# For *Reliable, Low Range* Turbidity Measurement

Using either white light or an infrared energy source in this 90 degree scatter measurement, the system provides high sensitivity measurement with unmatched zero stability. Turbidity measurements down to 0.001 NTU or as high as 400 NTU can be measured with the same monitor, eliminating the need for separate high and low range instruments.

## TURBIDITY SENSOR

The turbidity sensor used in the Q46/76 monitor is a planer sensor with the light source and photo detector mounted on a flat face. Lenses in front of the light source direct the beam of light at a 45-degree angle into the sample. Another lens in front of the photo detector collects the 90-degree scattered light and directs it to the detector. The signal generated by the detector is amplified inside the sensor for transmission to the display unit. Periodic pulsing of the light source allows the sensor zero to be adjusted automatically for improved stability in low-range applications. Turbidity sensors are available for measurement in a pressurized flowcell or for direct submersion in open tanks. A 1-1/2" flow Tee assembly is also available for direct in-line measurements. The flowcell is required for very low measurements (0-2 NTU), while the submersion unit may be used for higher turbidity applications such as wastewater effluent or raw water.



Cross-section of turbidity sensor,  
showing interaction of light beam and photo detector

## SENSOR FLOWCELL

The flowcell used with ATI's turbidity system is designed to eliminate ambient light effects, and to maintain sample pressure inside the flowcell. This in turn minimizes air bubble formation that is a common problem in many turbidity systems, and can cause measurement errors.

There is also a modified flowcell for raw water applications that allows for higher amounts of suspended particles to pass through without creating clogging or settling issues.

## TURBIDITY MONITOR

The turbidity electronics unit is an AC or DC powered instrument providing an LCD display of turbidity value, as well as indication of alarm status and instrument diagnostics. The NEMA 4X housing can be wall, pipe, or handrail mounted using the universal mounting kit included with each system.

The monitor provides display of turbidity over a variety of operating ranges. The minimum display range of 0-2 NTU provides resolution down to 0.001 NTU and is suitable for almost any final filter monitoring application. Ranges of 0-20, 0-200, or 0-400 NTU are available for raw water or clarifier effluent monitoring. The Q46/76 provides three programmable SPDT alarm relays, as well as two isolated 4-20 mA outputs. The analog outputs may be programmed for full-scale outputs as low as 0-0.2 NTU, and can be inverted if desired.

Q46/76 monitors also provide sensor diagnostic functions to warn of conditions that cause inaccurate or invalid readings. The sensor is continuously monitored for optical fouling, and will display an alarm message should the sensor require cleaning. In addition, the sensor will detect the lack of water in the flowcell and provide a "dry cell" when an air interface is detected. These alarm conditions will cause a third alarm relay to activate, which can be used to indicate these conditions remotely.

# Auto-Clean System for Wastewater



## Q-Blast

ATI's Q-Blast option provides the ideal answer for submersible turbidity applications such as wastewater 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.

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 Q46/76 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.



Submersible Turbidity Sensor

## FEATURES

**Flexibility.** Wide range capability, with selectable ranges of 0-2,000, 0-20.0, 0-200.0 or 0-400.0 NTU provide maximum application flexibility.

**AC or DC Power Options.** Power options include universal 100-240 VAC +/- 10%, or 12-24 VDC.

**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.

**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.

**Extra Outputs/Relays.** Expansion board to add a third 4-20 mA analog output or to add three additional non-isolated low power relays.

**PID Output.** Standard PID control function assignable to one analog output.

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

**Flexible Mounting.** NEMA 4X (IP-66) enclosure is suitable for wall, pipe, or panel mounting.

**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.

**Sensor Diagnostics.** System automatically checks for sensor fouling, "dry cell", and external light interference.

# Q46/76 SPECIFICATIONS

## ELECTRONIC MONITOR

<b>Display Range</b>	0-2.000 / 20.00 / 200.0 / 400.0 NTU
<b>Accuracy</b>	0.5% of selected range
<b>Repeatability</b>	0.3% of selected range
<b>Non-Linearity</b>	0.1% of selected range
<b>Temperature Drift</b>	0.01% of span/°C
<b>Power</b>	100-240 VAC, +/- 10%, 50/60 Hz 12-24 VDC, 500 mA max.
<b>Analog Outputs</b>	Two isolated 4-20 mA, 500 Ω load max. (3rd output optional)
<b>Relays</b>	Three SPDT, 6A @250 VAC, 5A @24 VDC (3 additional SPST non-isolated, 1A @30 VDC optional)
<b>Display</b>	4-digit, 0.75" numeric LCD with 12-digital second line, LED back light.
<b>Enclosure</b>	NEMA 4X Polycarbonate V-0 Flammability
<b>Operating Conditions</b>	-40 to 60°C
<b>Weight</b>	6 lbs. (2.7 kg) with sensor, flowcell and accessories
<b>Sensitivity</b>	0.05% of span
<b>Digital Output</b>	Profibus-DP, Modbus-RTU or Ethernet-IP
<b>Mounting</b>	Wall mounting kit standard, Panel mount bracket and pipe u-bolts available
<b>Size</b>	5.6" W x 4.9" H x 6.4" D

## SENSOR

<b>Sensor Type</b>	Tungsten White Light or IR Source (860 nm)
<b>Materials</b>	PVC body, Acrylic Optical windows
<b>Measurement Angel</b>	90-degree scatter (nephelometric)
<b>Response Time</b>	95% in 30 seconds
<b>Temperature Limit</b>	0-50°C
<b>Cable Length</b>	4-conductor sensor cable, 30 ft standard, 350 ft max with junction box
<b>Pressure Limit</b>	100 PSIG max.
<b>Temperature Element</b>	Pt100 RTD in sensor
<b>Flowcell Materials</b>	PVC
<b>Flowcell Connections</b>	4 mm tube fittings (black tubing supplied)
<b>Flowcell Pressure</b>	0-100 PSIG
<b>Flowcell Temperature</b>	0-60°C

## ORDERING INFORMATION

Model Q46/76 A-B-C-D-E Turbidity Conductivity

### Suffix A - Power

- 1 - Tungsten White Light (EPA Compliant)
- 2 - IR Source (ISO-7027, EN 27027 Compliant)

### Suffix B - Power

- 1 - 100-240 VAC, +/-10%, 50/60 Hz
- 2 - 12- 24 VDC, (requires 300 mA)
- 3 - 100-240 V +/- 10%, 50/60 Hz with Q-Blast Auto-Clean Assembly
- 4 - 12-24V VDC with Q-Blast Auto-Clean Assembly (requires 1.0 A)

### Suffix C - Sensor Configuration

- 1 - Flow Sensor with 30 ft. (10 m) cable and Standard Flowcell
- 2 - Flow Sensor with 30 ft. (10 m) cable and 1-1/2" Flow Tee
- 3 - Submersible sensor with 30 ft. (10 m) cable
- 4 - Flow Sensor with 30 ft. (10 m) cable and raw water flowcell
- 5 - Submersible sensor with Auto-Clean nozzle, 30 ft. (10 m) cable

### Suffix D - Optional Output (select only one)

- 1 - None
- 2 - One additional 4-20 mA output
- 3 - Three additional low power relays (SPST, 0.5 A max.)  
Required when option B3 or B4 is selected.

### Suffix E - Digital Output

- 1 - None
- 2 - Profibus-DP
- 3 - Modbus-RTU
- 4 - Ethernet-IP
- 5 - Modbus-TCP/IP

## ACCESSORIES

- 00-1637** Q-Blast system plate assembly with power junction box  
**00-1690** Submersion mounting bracket kit for standard sensors  
**00-1689** 1" Mounting Adapter for standard sensor  
**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" U-bolt, 304SS  
**00-0930** Auto-Clean Monitor Mounting Bracket

## NOTES:

- 1 - Pipe mount requires two 2" U-bolts (47-0005)



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