

# MicroScatter® 90° Turbidimeter

## Ideal for monitoring the turbidity of filtered drinking water.

The MicroScatter® 90° is designed for the determination of turbidity levels in drinking water. It is also ideal for most raw waters, wastewater discharges, condensate returns and clarifiers. A display resolution of 0.001 and accuracy of  $\pm 2\%$  of the reading is the result of the efficient bubble rejection design, low stray light and high instrument stability.

Instruments with either a USEPA 180.1 compliant sensor using a visible light source or a ISO 7027 compliant sensor using a near infrared LED are available. The turbidimeters meet either US or International regulatory standards.

The MicroScatter 90° turbidity meter consists of an analyzer, which accepts either one or two sensors, the sensors, a debubbling/measuring chamber and cable for each sensor. The cable provided connects the sensor and the analyzer, making setup quick and straightforward. Sensors can be located up to 50 ft (15.2 m) from the analyzer.

Menu prompts are user friendly. Analog outputs are fully scalable. Models with an alarm board with three relays are also available. Alarms are programmable for high/low logic and dead band. The analyzer automatically detects whether a EPA 180.1 or ISO 7027 sensor is being used.

An optional configuration is available in which the analyzer, sensor (s), and debubbling flow cell (s) are mounted on a single back panel. The sensor cables are pre-wired to the analyzer, so setup is simple. All the user does is mount the unit on a wall, supply power and connect sample and drain lines.



- Range 0-200 NTU +/- 0.001 NTU resolution
- System includes single or dual input analyzer, sensor (s), debubbler assembly and alarm board if chosen
- Select either U.S. EPA Method 180.1 or ISO Method 7027 compliant sensor(s)
- Intuitive, user-friendly menu makes setup and calibration easy
- Fully scalable analog outputs and optional fully programmable alarms
- Meets Hazardous Location Installation for Class I, Div. 2. (CSA and CUS Approved)



## SPECIFICATIONS - ANALYZER

**Display:** Two line, 16-character back lit display. Character height 4.8 mm. Display can be customized to meet individual requirements.

**Display resolution-turbidity:** 4 digits; decimal point moves from x.xxx to xxx.x

**Display resolution-TSS:** 4 digits; decimal point moves from x.xxx to xxxx

**Calibration methods:** user-prepared standard, commercially prepared standard, or grab sample. For total suspended solids user must provide a linear calibration equation.

### Accuracy after calibration at 20.0 NTU:

0-1 NTU:  $\pm 2\%$  of reading or  $\pm 0.015$  NTU, whichever is greater.

0-20 NTU:  $\pm 2\%$  of reading

**Security Code:** 3-digit code prevents accidental or unauthorized changes in instrument settings and calibration.

**Languages:** English, German, Spanish, Italian, French, Portuguese

**Units:** Turbidity (NTU, FTU, or FNU); total suspended solids (mg/L, ppm, or no units)

**Outputs:** Single input analyzer has single output. Dual input analyzer has dual outputs. Outputs are 0-20 mA or 4-20 mA isolated. Maximum load is 600 ohms. Output dampening with 5 sec time constant is user-selectable.

**Relays:** Form C, single poll double throw (SPDT), epoxy sealed.

**Output Accuracy:** 0.05 mA

**Alarms:** Instruments with alarm relay board includes three alarms. Each relay can be configured independently. Alarm 3 can be configured as a fault alarm instead of a process alarm. Alarm logic (low or high) and dead band are user-programmable.

### Alarm Board Ratings:

	Resistive	Inductive
115 VAC	5.0 A	3.0 A
230 VAC	5.0 A	1.5 A

**Power:** 85 to 265 VAC, 47.5 to 65.0 Hz.

Maximum current without alarm board: 1.0 amp

Maximum current with option alarm board: 1.3 amp

Equipment protected by double insulation.

### Certifications:

CSA 22.2 61010 (replaces CSA 22.2 No. 1010.1)

### Hazardous Location:

Class I, Div. 2, Groups A, B, C & D: T3C Tamb 0°-50°C. Suitable for use in Class II and III, Div. 2, Groups E, F and G. Enclosure Type 4/4X.



-LR 34186

Install in accordance with control drawing no. 1400315 or 1400316 (CSA).



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**Inputs:** Choice of single or dual input

**RFI/EMI:** EN-61326



**LVD:** EN-61010-1

**Ambient temperature and humidity:** 0 to 50°C, (32 to 122°F); RH 10 to 90% (non-condensing)

**Field wiring terminals:** removable terminal blocks for power, analog outputs, and sensors.

**Enclosure:** Polycarbonate (pipe/wall mount); NEMA 4X/CSA 4 (IP65)

### Dimensions:

Pipe/ Wall mount version: 6.23 X 6.23 X 3.23 inch  
(158 X 158 X 82 mm)

**Conduit openings:** Accepts PG 13.5 or 1/2 inch fittings.

## SPECIFICATIONS - SENSOR

**Method:** EPA 180.1 or ISO.7027 (using 860 nm LED source). Must be specified when ordering.

**Incandescent lamp life:** two years

**LED life:** five years

**Wetted materials:** Delrin<sup>1</sup>, glass, EPDM

**Cable:** 3 ft (9.9 m), 20 ft (6.1 m) or 50 ft (15.2 m). Maximum 50 ft (15.2 m). Connector is IP65.

**Maximum Pressure:** 30 psig (308 kPa abs)

**Temperature:** 40 - 95°F (5 - 35°C)

<sup>1</sup>Delrin is a registered trademark of DuPont Performance Elastomers.

## SPECIFICATIONS - DEBUBBLER AND FLOW CHAMBER

**Minimum inlet pressure :** 3.5 psig (125 kPa abs). 3.5 psig will provide about 250 mL/min sample flow.

**Maximum inlet pressure:** 30 psig (308 kPa abs). Do not block drain tube.

**Sample temperature:** 40 - 95°F (5 - 35°C)

**Recommended sample flow:** 250 - 750 mL/min

**Response Time:** The table shows the time in minutes to percent of final value following a step change in turbidity.

% Response following a step change	Response time in minutes	
	4 gph (250 mL/min)	12 gph (750 mL/min)
10	2.0	0.5
50	2.5	1.0
90	4.5	2.5
99	7.0	4.0

**Inlet:** compression fitting accepts 1/4 in. OD tubing; fitting can be removed to provide 1/4 inch FNPT

**Drain:** barbed fitting accepts 3/8 in. ID tubing; fitting can be removed to provide 1/4 in. FNPT. Must drain to atmosphere.

**Debubbler, Wetted materials:** ABS, EPDM, Polypropylene, Nylon, Kynar<sup>1</sup>

**Dimensions:** 18.1 in. x 4.1 in. diam.

(460 mm x 104 mm diam.) (approx.)

<sup>1</sup> Kynar is a registered trademark of Elf Atochem North America, Inc.

## SPECIFICATIONS - MISCELLANEOUS

### Weight/shipping weight:

Sensor: 1 lb/2 lb (0.5 kg/1.0 kg)

Analyzer: 2 lb/3 lb (1.0 kg/1.5 kg)

Debubbler: 3 lb/4 lb (1.5 kg/2.0 kg)

(rounded to the nearest lb or 0.5 kg)

\*Specifications subject to change without notice.

<b>STS Part Number</b>	<b>Item Description</b>
22530-EPA1-20	Turbidity Analyzer, wall mount, 1-EPA sensor, 20' cable
22530-EPA1-20A	Turbidity Analyzer, wall mount, 1-EPA sensor, 20' cable, w/alarm board
22530-EPA2-20	Turbidity Analyzer, wall mount, 2-EPA sensors, 20' cable
22530-EPA2-20A	Turbidity Analyzer, wall mount, 2-EPA sensors, 20' cable, w/alarm board
22530-IS01-20	Turbidity Analyzer, wall mount, 1-ISO sensor, 20' cable
22530-IS01-20A	Turbidity Analyzer, wall mount, 1-ISO sensor, 20' cable, w/alarm board
22530-IS02-20	Turbidity Analyzer, wall mount, 2-ISO sensors, 20' cable
22530-IS02-20A	Turbidity Analyzer, wall mount, 2-ISO sensors, 20' cable w/alarm board
22530-EPA1-3P	Turbidity Analyzer, panel mounted, 1-EPA sensor, 3' cable
22530-EPA1-3PA	Turbidity Analyzer, panel mounted, 1-EPA sensor, 3' cable, w/alarm board
22530-IS01-3P	Turbidity Analyzer, panel mounted, 1-ISO sensor, 3' cable
22530-IS01-3PA	Turbidity Analyzer, panel mounted, 1-ISO sensor, 3' cable, w/alarm board
<b>Accessories</b>	
22530-NTU-KIT	Premixed 4000 NTU Formazin calibration Kit
22530-NTU-PM	Replacement solution for 4000 NTU premixed Kit
22530-CG-KIT	Cable Gland Kit for Model T1055, Quantity 5
22530-CCUP	Calibration Cup
22530-PMT-KIT	Pipe Mount Kit
22530-FLM-KIT	Flow Meter Kit
22530-TS-EPA	Turbidity sensor EPA
22530-TS-ISO	Turbidity sensor ISO
<b>Spare Parts</b>	
22530-24138-00	Sensor cable, turbidity, 3'
22530-24097-00	Sensor cable, turbidity, 20'
22530-24097-01	Sensor cable, turbidity, 50'
22530-DFC	Molded debubbler with integral flow chamber
22530-9550145	O-ring for sensor

# SAMPLE ENGINEERING SPECIFICATION

## MicroScatter® 90° ONLINE TURBIDIMETER (EPA or ISO)

### TURBIDIMETER

1. The turbidimeter shall be a complete system consisting of sensor, analyzer, flow chamber/debubbler, and interconnecting cable. The analyzer shall accept input from either one or two sensors. Both USEPA Method 180.1 and ISO Method 7027 sensors shall be available. The analyzer shall automatically recognize which sensor is being used.
2. The turbidimeter shall have the following accuracy (after calibration with 20.0 NTU standard): a) 0-1 NTU:  $\pm 2\%$  of reading or 0.015 NTU, whichever is greater; b) 0-20 NTU:  $\pm 2\%$  of reading
3. The response time at 4 gph (250 mL/min) to 90% of final value following a step change shall be 4.5 minutes.
4. The sensor shall be constructed of corrosion-resistant Delrin® with glass lamp and detector windows.
5. Incandescent lamp life (USEPA-compliant sensor) shall be at least two years. LED life (ISO-compliant sensor) shall be at least five years.
6. The sensor shall include advanced diagnostics, which will continuously measure the lamp intensity and automatically adjust the lamp output thereby maintaining the correct lamp intensity, correct for lamp drifting and aging, and allow for longer sensor operation with reduced calibration requirements.
7. The measuring chamber shall be constructed of polypropylene, Kynar, Delrin and PVC. A bubble removal section shall allow entrained bubbles to escape from the sample before measurement.
8. The turbidimeter shall accept a sample stream having temperature between 40 and 95°F (5 and 35°C) with inlet pressure as high as 30 psig (308 kPa abs) with drain to open atmosphere.
9. The sample chamber shall include a two-stage removal of entrained bubbles and outgassed bubbles to prevent erroneous turbidity readings.

### ANALYZER

1. The analyzer shall have a two-line back-lit display.
2. The analyzer shall measure turbidity in the range 0 to 200 NTU with a display resolution of 0.001 NTU. Display units shall be user selectable among NTU, FTU, and FNU.
3. The analyzer shall display menu items and prompts in a language selected by the user. The languages shall be English, German, French, Spanish, Italian, and Portuguese.
4. The analyzer shall allow direct button key access to comprehensive diagnostics from the main display screen.
5. The analyzer shall allow the user to customize the read-outs on the main display screen.
6. A user-defined security code shall be available to protect against accidental or unauthorized changes to program settings and calibration.

*Delrin is a registered trade mark of Dupont Performance Plastics.  
Kynar is a registered trade mark of Elf Atochem North America Inc.*

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7. Bubble rejection, signal averaging, and output hold features shall be available.
8. The analyzer shall continuously monitor itself and the sensor for faults. The analyzer shall display fault and warning messages when problems such as lamp/LED failure, weak lamp, or sensor failure are detected.
9. The single input analyzer shall have single output, and the dual input analyzer shall have dual output. User-selectable 0-20 mA and 4-20 mA outputs shall be provided. Outputs shall be isolated with 600 ohm maximum load.
10. Instruments configured with an alarm board with three relays shall be available. The alarms shall be fully programmable for high/low logic and deadband. One alarm shall be configurable as a fault alarm.
11. Environmental limits for the analyzer shall be 32 to 122°F (0 to 50°C) and 10 to 90% relative humidity.
12. Interconnecting cable shall plug into the sensor and analyzer. Integral cable or cable with fly leads shall not be permitted. Maximum cable length shall be 50 ft (15.2 m).
13. Field wiring terminal blocks for power, sensor, analog outputs, and alarm relays shall be removable for ease of wiring.
14. The analyzer shall meet safety certifications and CSA 22.2 61010 (replaces CSA 22.2 No. 1010.1).
15. The analyzer shall meet hazardous location installation as per: Class I, Div. 2, Groups A, B, C & D: T3C Tamb 0°-50°C. Suitable for use in Class II and III, Div. 2, Groups E, F and G. Enclosure Type 4/4X.



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(Ordinary Location only)

16. The analyzer enclosure shall be NEMA 4X (IP65), and the power requirements shall be in the range of 85 - 265 VAC, 47.5 - 65.0 Hz.
17. If so programmed, the analyzer shall convert measured turbidity to a total suspended solids (TSS) reading using a linear equation entered by the user. Units for TSS shall be user selectable among ppm, mg/L, or no units.

### CALIBRATION

1. The analyzer shall offer three methods of Calibration: two-point slope calibration with de-ionized water and diluted Formazin, standard calibration to a commercial standard, and calibration to a grab sample measured on a reference turbidimeter.
2. A maximum of 400 mL of calibration standard shall be required to calibrate the analyzer.
3. Optional Accessories: Calibration Cup

The MicroScatter® 90° Turbidimeter warranty shall be 18 months from shipment or one year after installation, whichever occurs first. The analyzer shall be Severn Trent Services MicroScatter® 90° Turbidimeter or approved equal.

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