

# SOLITAX™ sc Turbidity and Suspended Solids Sensors

Turbidity and Suspended Solids

## Features and Benefits

### Accurate, Color-independent Measurement

Hach's SOLITAX sc Turbidity and Suspended Solids Sensors are immune to shifts in color of activated sludge caused by variations in through-flow volume, climatic fluctuations, or other unexpected events. Unlike conventional systems, that need to be continually calibrated to compensate for color variation, the proven measurement technique used in the SOLITAX sc sensor is the only technology that provides measurement completely independent of color.

### Self-cleaning Device Prevents Erroneous Values

The SOLITAX sc sensor's self-cleaning wiper device prevents erroneous values and maintenance problems by preventing biological growth. Gas bubbles in the sample do not interfere with the measurement.

### Excellent Correlation to Laboratory Analysis

Comparisons between laboratory analysis and continuous suspended solids measurement using SOLITAX sc sensors show an exceptional correlation to primary and secondary sludge. Online measurement not only saves time on manual analysis but also provides critical real time TSS measurements that can be used to operate the plant more efficiently. (See *Correlation Chart* on page 2.)

### Fully Serviceable Sensors

Conventional Turbidity and Suspended Solids sensors are potted and are discarded when they no longer function. SOLITAX sc sensors are serviceable so that the useful life of the sensor, in many cases, is doubled.

### Easy One-point Calibration

Calibration of SOLITAX sc sensors is easy with a simple correction factor procedure to measure turbidity or suspended solids.

### Versatile Mounting Styles

SOLITAX sc sensors can easily be configured for many applications. Models designed for immersion into a tank are available in PVC plastic or stainless steel. An insertion style sensor for pipes is available in stainless steel. Installation kits for either style sensor are also available.



*Hach SOLITAX sc sensors provide accurate, color-independent measurement of turbidity and suspended solids in drinking water, wastewater, and industrial process applications. A self-cleaning device prevents measurement error due to fouling. These sensors demonstrate excellent correlation with laboratory analysis so it's an exceptional tool for process control.*

### Multi-channel, Multi-parameter System

Any combination of two SOLITAX sc sensors can be installed using one Hach sc100 Controller. The same controller can also accommodate any combination of parameters, including suspended solids, turbidity, pH/ORP, dissolved oxygen, conductivity, and nitrate. All of Hach's model sc sensors are "plug and play" with no complicated wiring or set-up procedure necessary.

**Communications**—Multiple alarm/control schemes are available using three relays and two PID control outputs. Communications use analog 4-20 mA and digital MODBUS®/RS485, MODBUS®/RS232 protocols. (Other digital protocols are available. Contact your Hach representative for details.) Every sc100 controller is equipped with wireless communication through an infrared port.

**Data logger**—A built-in data logger collects measurement data, calibration, verification points, and alarm history for up to 6 months. Data can be retrieved to a computer or PDA.

DW = drinking water WW = wastewater municipal PW = pure water / power  
IW = industrial water E = environmental C = collections FB = food and beverage



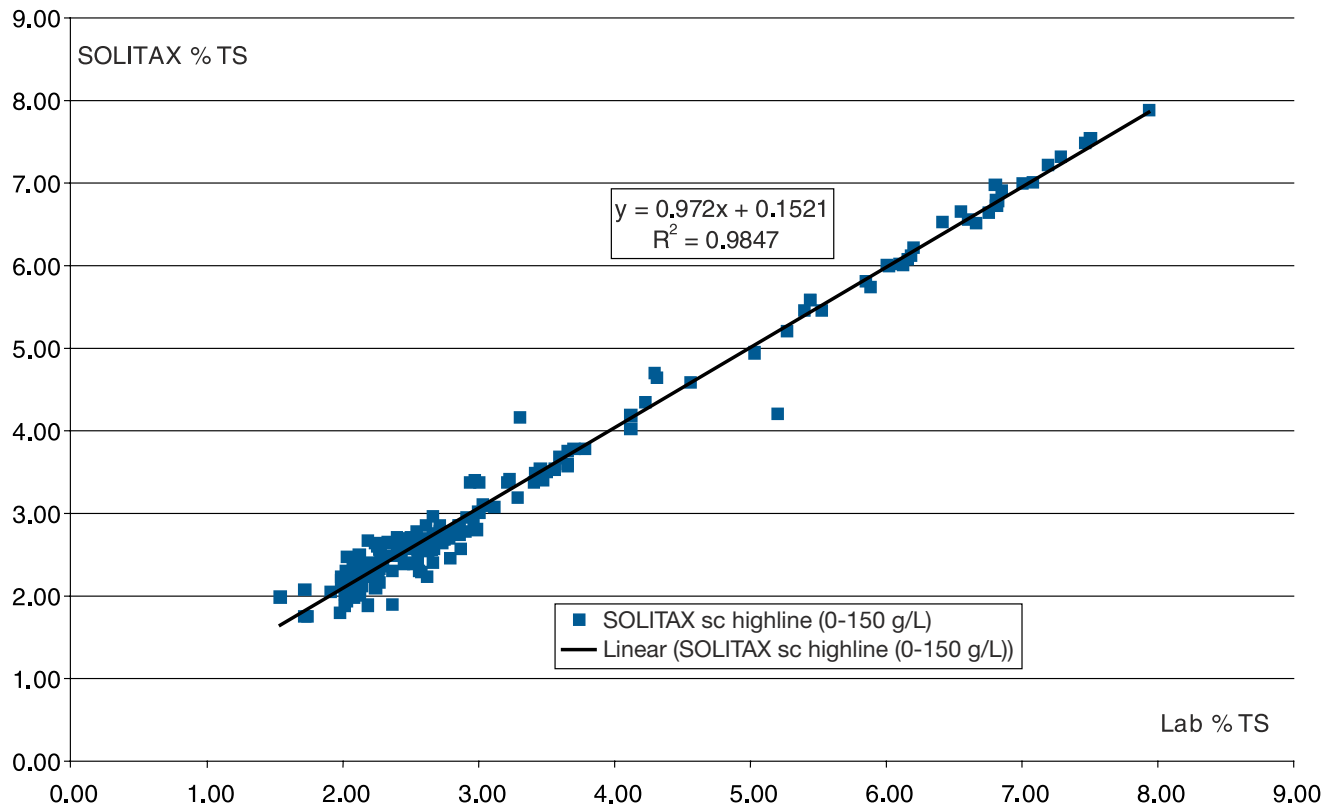
Be Right™

DW

WW

IW

## Correlation of SOLITAX sc *highline* sensor with lab analysis of sludge



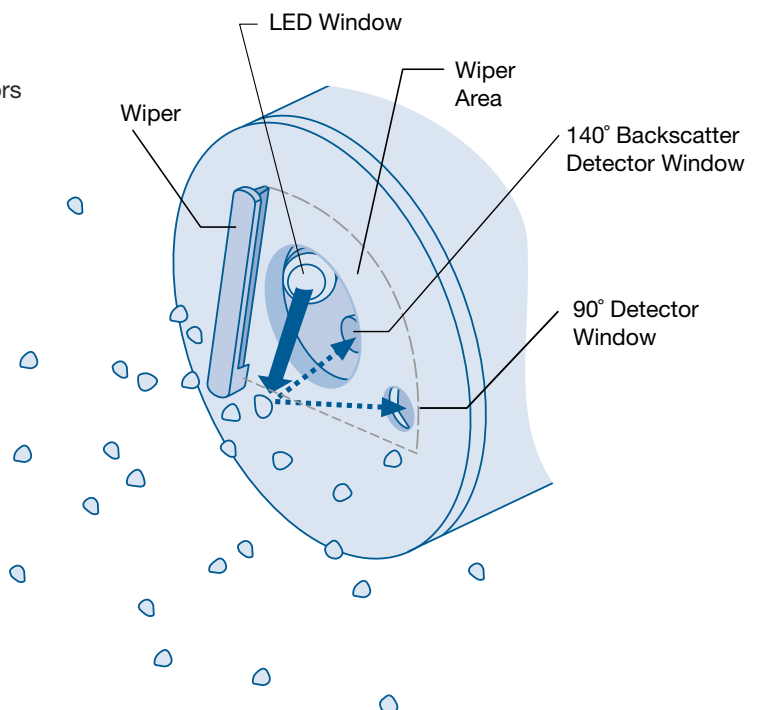
### Principle of Operation

SOLITAX sc sensors use a dual-beam infrared/scattered light photometer to measure turbidity. An LED light source transmits a beam of infrared light into the sample stream at an angle of 45° to the sensor face. A pair of photoreceptors in the sensor face detects scattered light at 90° to the transmitted beam.

A backscatter photoreceptor (included on all models except the SOLITAX sc t-line) is used to accurately measure suspended solids. It is positioned at 140° to the transmitted beam and detects light scattered in high-solids sample streams.

### SOLITAX sc ts-line sensor with dual-beam optics and added back-scatter detector

- Dual infrared light beams. LED light source transmits light at 45° to sensor face.
- Nephelometric photoreceptors detect light at 90° to the transmitted light beam.
- Backscatter photoreceptor detects light at 140° to the transmitted light beam to measure suspended solids in heavily loaded sample streams.
- Self-cleaning wiper device, optional.



## Specifications\*

	For insertion in pipes		For immersion in open tanks		
	Model inline sc	Model highline sc	Model t-line sc	Model ts-line sc	Model hs-line sc
<b>Parameter</b>					
	Turbidity Suspended Solids	Turbidity Suspended Solids	Turbidity	Turbidity Suspended Solids	Turbidity Suspended Solids
<b>Measuring Range</b>					
<i>Turbidity Suspended Solids</i>	0.001 to 4000 NTU 0.001 to 50 g/L	0.001 to 4000 NTU 0.001 to 150 g/L	0.001 to 4000 NTU n/a	0.001 to 4000 NTU 0.001 to 50 g/L	0.001 to 4000 NTU 0.001 to 150 g/L
<b>Units of Measure</b>					
<i>Turbidity Suspended Solids</i>	User selectable—NTU, FNU, or TE/F User selectable—g/L, mg/L, ppm, or % solids				
<b>Accuracy</b>	Defined according to ISO/WD 13530.				
<i>Turbidity Suspended Solids</i>	Less than 1% of reading or $\pm 0.001$ NTU, whichever is greater Less than 5% of reading (depends on homogeneity of municipal activated sludge)				
<b>Repeatability</b>	Defined according to ISO/WD 13530.				
<i>Turbidity Suspended Solids</i>	Less than 1% of reading Less than 3% of reading (depends on the homogeneity of municipal activated sludge)				
<b>Detection Limit</b>					
<i>Turbidity Suspended Solids</i>	0.001 NTU 1 mg/L				
<b>Response Time</b>	Initial response in 1 second				
<b>Signal Average Time</b>	User selectable ranging from 1 to 300 seconds				
<b>Calibration</b>					
<i>Turbidity Suspended Solids</i>	Formazin or StablCal® Standard Based on gravimetric TSS analysis with a correction factor procedure				
<b>Certifications</b>	CE certified to EN 61326-1, EN 61326/A1, EN 61326/A2, EN 61010-1				
<b>Mounting</b>					
	Through sidewall of a pipeline using a ball valve; minimum pipe size 100 mm (4 in.) in carbon or stainless steel		Fixed to the rim of the tank		
<b>Flow Velocity</b>	3 m/s (9.8 ft./s) maximum				
<b>Operating Temperature</b>	0 to 40°C (32 to 104°F)				
<b>Sample Temperature</b>	0 to 40°C (32 to 104°F)				
<b>Sample Pressure</b>	6 bar (87 psi) maximum				
<b>Sensor Construction</b>					
<i>Wiper Sensor body</i>	Silicon Stainless steel		Silicon Stainless steel or PVC		
<b>Dimensions</b>	<i>(diameter x length)</i>				
	Insertion sensor: 60 x 315 mm (2.4 x 12.4 in.); Ball valve from flange: 185 x 625 mm (7.3 x 24.6 in.)		Immersion sensor: 60 x 200 mm (2.4 x 7.9 in.)		
<b>Weight</b>					
	Insertion stainless steel: 2.4 kg (5.3 lb.)		Immersion, stainless steel: 1.38 kg (3.0 lb.) Immersion, PVC: 0.52 kg (1.2 lb.)		
<b>Cable Length</b>					
	10 m (33 ft.) standard. Optional extension cables available in 7.6 m (25 ft.), 15.2 m (50 ft.), 30.5 m (100 ft.). Maximum total length: 100 m (328 ft.).				

\*Specifications subject to change without notice.

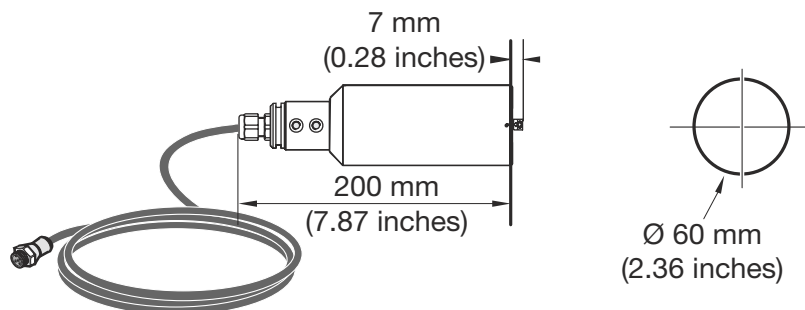
## Engineering Specifications

1. The suspended solids and/or turbidity sensor shall consist of a digital sensor designed to connect to a universal controller.
2. The suspended solids and/or turbidity sensor shall use dual infrared light beam technique design utilizing an LED light source in the sensor to transmit an infrared/scattered dual beam into the sample stream at an angle of 45 degrees to the sensor face.
3. A photoreceptor located in the sensor face shall detect scattered light (turbidity) at 90 degrees to the transmitted beam.
4. A backscatter photoreceptor (included on all models except the SOLITAX sc t-line), positioned at 140 degrees to the transmitted beam, shall detect light scattered for suspended solids readings.
5. The sensor shall analyze the dual-beam data and provides a color independent measurement.
6. The sensor shall have a self-cleaning device to prevent erroneous values and maintenance problems caused by biological activity, scum build-up, and gas bubbles.
7. The self-cleaning device shall ensure that measurements are accurate, continuous, and completely color independent.
8. The sensor shall have an operating range of 0.001 to 50 g/L or 0.001 to 150 g/L and/or 0.001 to 4000 NTU suspended solids and turbidity depending on the model.
9. The sensor shall be capable of immersion in a tank or insertion into a pipe.
10. The materials of construction shall be PVC or polished stainless steel, depending on the sensor selection.
11. The sensor shall have an operating temperature of 2 to 40°C (32 to 104°F).
12. The initial response time shall be 1 second and user-adjustable up to 300 seconds.
13. The accuracy shall be less than 1% of reading or 0.01 NTU, whichever is greater for turbidity and less than 5% of reading for suspended solids.
14. The suspended solids and turbidity sensor shall be Hach Company Model t-line sc for turbidity measurement or ts-line sc, hs-line sc, inline sc, or highline sc for suspended solids and turbidity measurement.

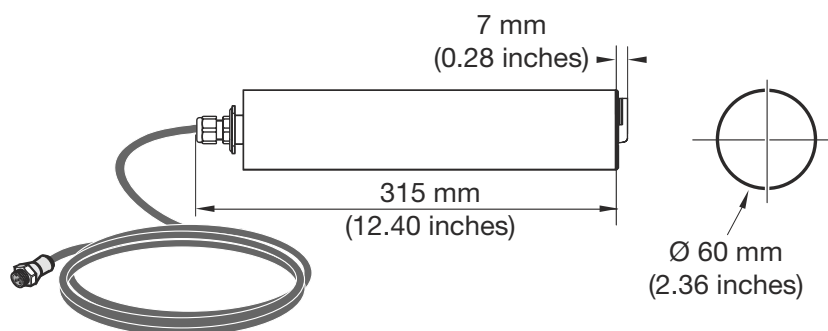
## Dimensions

Hach SOLITAX sc sensors can be fixed to the rim of the tank for immersion applications or inserted directly through the sidewall of a pipeline for insertion applications. The optical unit of the sensor should be installed facing downstream in the direction of the flow to minimize the impact of debris against the measurement system. A variety of installation kits are available.

### *SOLITAX sc models t-line, ts-line, and hs-line sensors for immersion in open tanks*

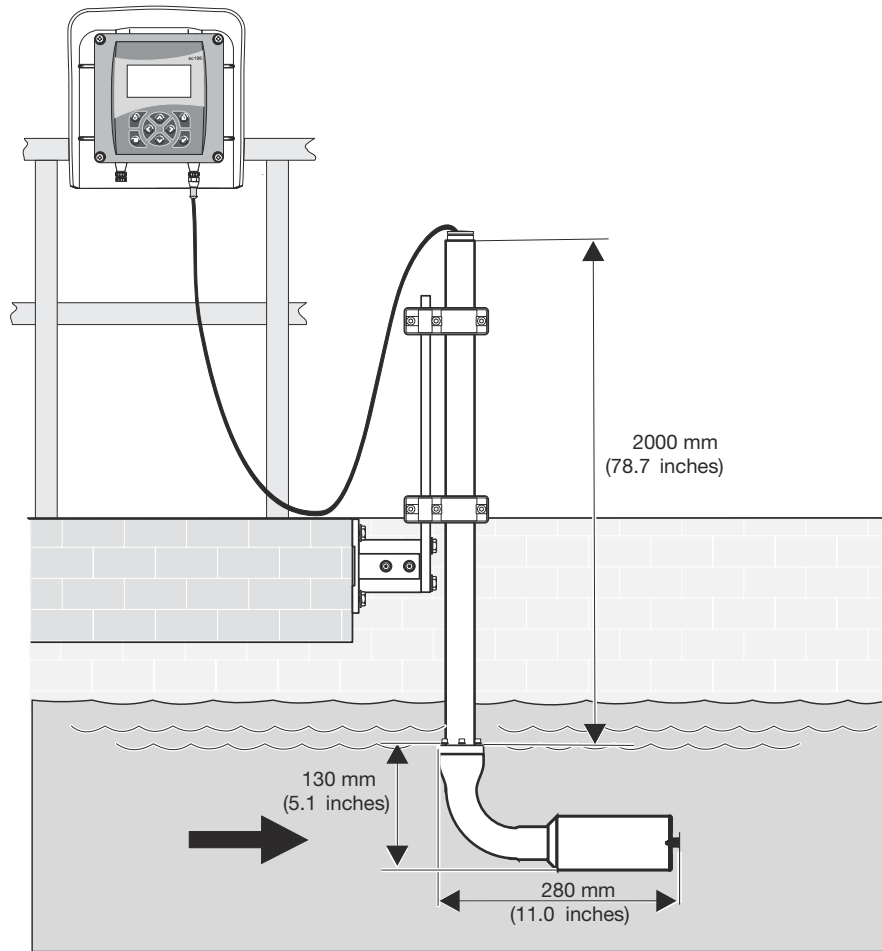


### *SOLITAX sc models inline and highline sensors for insertion in pipes*

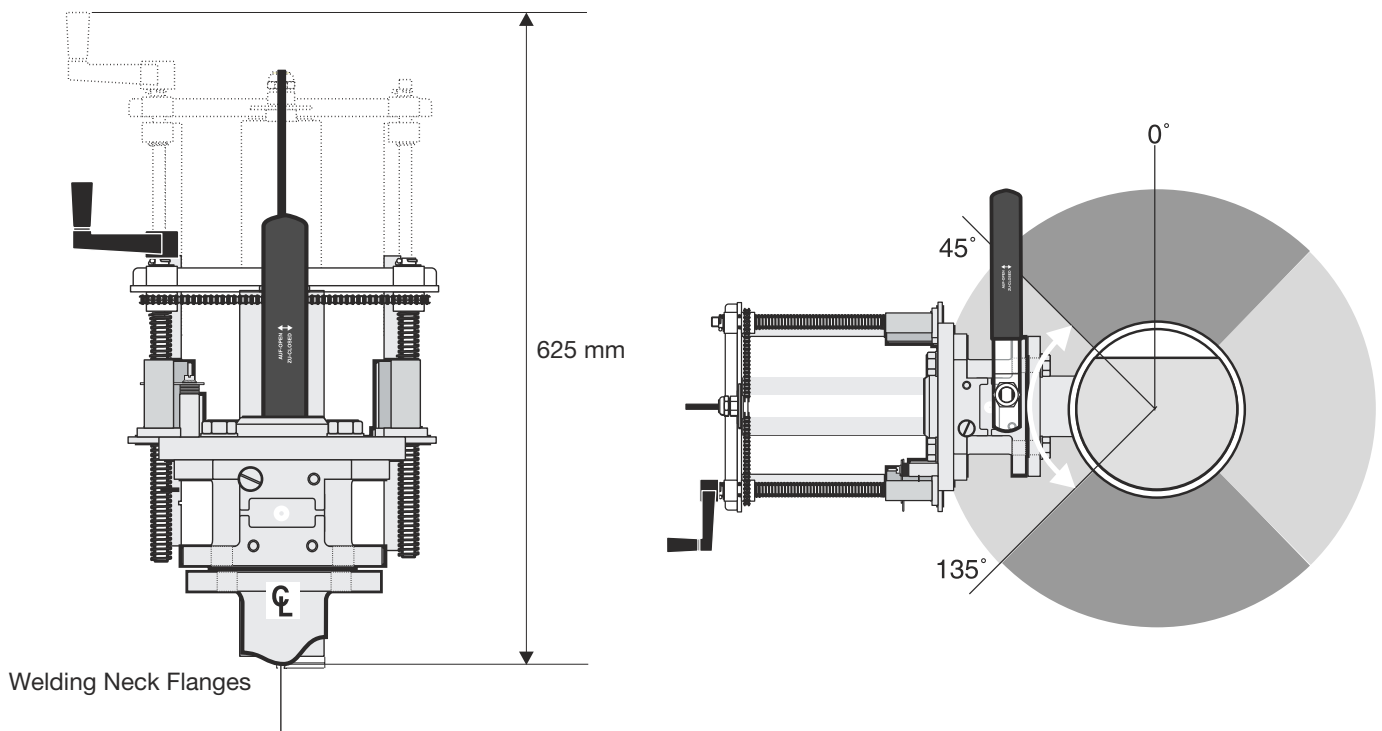


## Dimensions continued

Installation for mounting SOLITAX sc models t-line, ts-line, and hs-line sensors for immersion in open tanks.  
(Fixed point Installation Kit, P/N 57344-00)



Fixture with ball valve for mounting SOLITAX sc models inline and highline sensors in pipes



## Ordering Information

### Sensor Selection

	Range	For insertion in pipes		For immersion in open tanks		
		<i>inline</i>	<i>highline</i>	<i>t-line</i>	<i>ts-line</i>	<i>hs-line</i>
<b>Wastewater</b>						
Final effluent	0 to 0.1 g/L or 0 to 1000 NTU	•		•	•	
Influent suspended solids	0 to 1.5 g/L				•	•
Filtrate/centrate	0 to 2 g/L	•			•	•
Mixed liquor suspended solids	0 to 5 g/L				•	
Return activated sludge	0 to 25 g/L	•			•	
Waste activated sludge	0 to 2% or 0 to 20 g/L	•			•	
Primary sludge (settled sludge)	0.5 to 10% or 5 to 100 g/L		•			•
Anaerobic digested sludge	1.5 to 7% or 15 to 70 g/L		•			•
Gravity thickened sludge	2 to 10% or 20 to 100 g/L		•			•
Mechanically thickened sludge	3 to 8% or 30 to 80 g/L		•			•
<b>Drinking Water</b>						
Source water monitoring	0 to 500 NTU			•	•	
Influent pressurized raw water	0 to 500 NTU					•
Clarifier efficiency	0 to 20 NTU			•	•	
Filter backwash	0 to 20 NTU	•		•	•	
De-watering	0.5 to 10% or 5 to 100 g/L		•			•
<b>Industrial Water</b>						
Make-up water—Power, Pulp & Paper, Petrochemical, Food & Beverage		•		•	•	
Boiler and cooling water—Petrochemical, Pulp & Paper				•	•	
Lime addition—Petrochemical, Mining, Pulp & Paper			•			•
Wastewater (activated sludge process)—Power, Pulp & Paper, Petrochemical, Food & Beverage		•	•	•	•	•
White liquid applications—Pulp & Paper			•			•
Stormwater—Pulp & Paper, Petrochemical		•		•	•	

## Ordering Information *continued*

### SOLITAX sc Turbidity and Suspended Solids Analyzers

(common controller and sensor configurations)

#### Immersion in Open Tanks Applications

- 69400-00** Turbidity Analyzer includes sc100 controller and PVC t-line sc sensor (0.001 to 4000 NTU) with wiper
- 69401-00** Turbidity and Suspended Solids Analyzer includes sc100 controller and stainless steel ts-line sc sensor (0.001 to 4000 NTU, 0.001 to 50 g/L) with wiper
- 69402-00** Turbidity and High Range Suspended Solids Analyzer includes sc100 controller and stainless steel hs-line sc sensor (0.001 to 4000 NTU, 0.001 to 150 g/L) with wiper

#### Insertion in Pipes Applications

- 69403-00** Turbidity and Suspended Solids Analyzer includes sc100 controller, stainless steel inline sc sensor (0.001 to 4000 NTU, 0.001 to 50 g/L) with wiper, and insertion mounting kit
- 69404-00** Turbidity and High Range Suspended Solids Analyzer includes sc100 controller, stainless steel highline sc sensor (0.001 to 4000 NTU, 0.001 to 150 g/L) with wiper, and insertion mounting kit

#### NOTE

1. Power cords must be ordered separately.
2. Fixed point installation kit or handrail mount kit must be ordered separately for all immersion analyzers.

### Individual SOLITAX sc Sensors

#### Immersion Sensors

- LXV423.99.10000** Turbidity, t-line sc, PVC with wiper (0.001 to 4000 NTU)
- LXV423.99.12000** Turbidity, t-line sc, PVC without wiper (0.001 to 4000 NTU)
- LXV423.99.10100** Turbidity and Suspended Solids, ts-line sc, PVC with wiper (0.001 to 4000 NTU, 0.001 to 50 g/L)
- LXV423.99.12100** Turbidity and Suspended Solids, ts-line sc, PVC without wiper (0.001 to 4000 NTU, 0.001 to 50 g/L)
- LXV423.99.00100** Turbidity and Suspended Solids, ts-line sc, stainless steel with wiper (0.001 to 4000 NTU, 0.001 to 50 g/L)
- LXV423.99.02100** Turbidity and Suspended Solids, ts-line sc, stainless steel without wiper (0.001 to 4000 NTU, 0.001 to 50 g/L)
- LXV423.99.10200** Turbidity and Suspended Solids, hs-line sc, PVC with wiper (0.001 to 4000 NTU, 0.001 to 150 g/L)
- LXV423.99.12200** Turbidity and Suspended Solids, hs-line sc, PVC without wiper (0.001 to 4000 NTU, 0.001 to 150 g/L)
- LXV423.99.00200** Turbidity and Suspended Solids, hs-line sc, stainless steel with wiper (0.001 to 4000 NTU, 0.001 to 150 g/L)
- LXV423.99.02200** Turbidity and Suspended Solids, hs-line sc, stainless steel without wiper (0.001 to 4000 NTU, 0.001 to 150 g/L)

#### Insertion Sensors

- LXV424.99.00100** Turbidity and Suspended Solids, inline sc, stainless steel with wiper (0.001 to 4000 NTU, 0.001 to 50 g/L)
- LXV424.99.02100** Turbidity and Suspended Solids, inline sc, stainless steel without wiper (0.001 to 4000 NTU, 0.001 to 50 g/L)
- LXV424.99.00200** Turbidity and Suspended Solids, highline sc, stainless steel with wiper (0.001 to 4000 NTU, 0.001 to 150 g/L)
- LXV424.99.02200** Turbidity and Suspended Solids, highline sc, stainless steel without wiper (0.001 to 4000 NTU, 0.001 to 150 g/L)

#### Accessories

- 57330-00** Calibration Kit, includes calibration cylinder, two 500-mL 800 NTU StablCal®, and a sensor bracket
- 26605-49** 800 NTU StablCal®, 500-mL (two required per calibration)
- LZX050** Wiper Blades, replacement only, pkg. of 5
- 58690-00** Sun Shield for sc100 controller

#### Cable Accessories

- 58670-00** Junction Box (for extension cables\*)
- 57960-00** 7.6 m (25 ft.) Extension Cable
- 57961-00** 15.2 m (50 ft.) Extension Cable
- 57962-00** 30.5 m (100 ft.) Extension Cable

\*Maximum total length 100 m (328 ft.)

#### Installation Accessories

- 57344-00** Fixed Point Installation Kit for t-line, ts-line, and hs-line immersion sensors, includes stand and sun shield for controller and pipe for sensor cable
- 57384-00** Insertion Mounting Kit for inline and highline insertion sensors (ball valve and extraction system)
- AHA033NPT** Sensor Adapter, straight 1-1/2 FNPT
- AHA034NPT** Sensor Adapter, elbow 1-1/2 FNPT
- MH236B00Z** Handrail Mounting Kit (for sensor to be used with either adapter above) includes 1.5-inch diameter by 7.5-ft long CPVC pipe and swivel/pivot/ pipe clamp assembly

# To complete your Turbidity and Suspended Solids measurement system, choose the sc100 Controller...

## Model sc100 Controller

(see Lit. #2463)

There's no complicated wiring or set up procedures with the Hach sc100 controller. Just plug in any Hach digital sensor and it's ready to use—it's "plug and play" with one or two sensors. A built-in data logger collects measurements at user selectable intervals of one to 15 minutes. Local display, recall, graphing and trending in CSV format make chart recorders redundant. No analog/digital conversion is required—it communicates via MODBUS® or IR port. Two PID controllers and three form 'C' relay contacts for alarm or control are available.



- LXV401.52.00002** sc100 Controller, standard  
**LXV401.52.01002** sc100 Controller with RS-232 (MODBUS®)  
**LXV401.52.02002** sc100 Controller with RS-485 (MODBUS®)

*Note: Power cords must be ordered separately.*

### Power Cords for sc100 Controller

- 54488-00** Power Cord with strain relief, 125 Vac  
**54489-00** Power Cord with strain relief, 230 Vac, European-style plug

*Note: Other communication options are available. Please contact Hach Technical Support or your Hach representative.*

*At Hach, it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...*

*Keep it pure.*

*Make it simple.*

*Be right.*

*For current price information, technical support, and ordering assistance, contact the Hach office or distributor serving your area.*

*In the United States, contact:*

HACH COMPANY World Headquarters  
 P.O. Box 389  
 Loveland, Colorado 80539-0389  
 U.S.A.  
 Telephone: 800-227-4224  
 Fax: 970-669-2932  
 E-mail: orders@hach.com  
**www.hach.com**

*U.S. exporters and customers in Canada, Latin America, sub-Saharan Africa, Asia, and Australia/New Zealand, contact:*

HACH COMPANY World Headquarters  
 P.O. Box 389  
 Loveland, Colorado 80539-0389  
 U.S.A.  
 Telephone: 970-669-3050  
 Fax: 970-461-3939  
 E-mail: intl@hach.com  
**www.hach.com**

*In Europe, the Middle East, and Mediterranean Africa, contact:*

HACH + LANGE Europe  
 Dr. Bruno Lange GmbH & Co. KG  
 Willstätterstraße 11  
 D-40549 Düsseldorf  
 GERMANY  
 Tel: +49 (0) 211 5288-0  
 Fax: +49 (0) 211 5288-143  
 E-mail: info@hach-lange.de  
**www.hach-lange.com**

Lit. No. 2472

X43 Printed in U.S.A.

©Hach Company, 2004. All rights reserved.

*In the interest of improving and updating its equipment, Hach Company reserves the right to alter specifications to equipment at any time.*



**Be Right™**