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SOLITAX sc

User Manual

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Section 1 Specifications

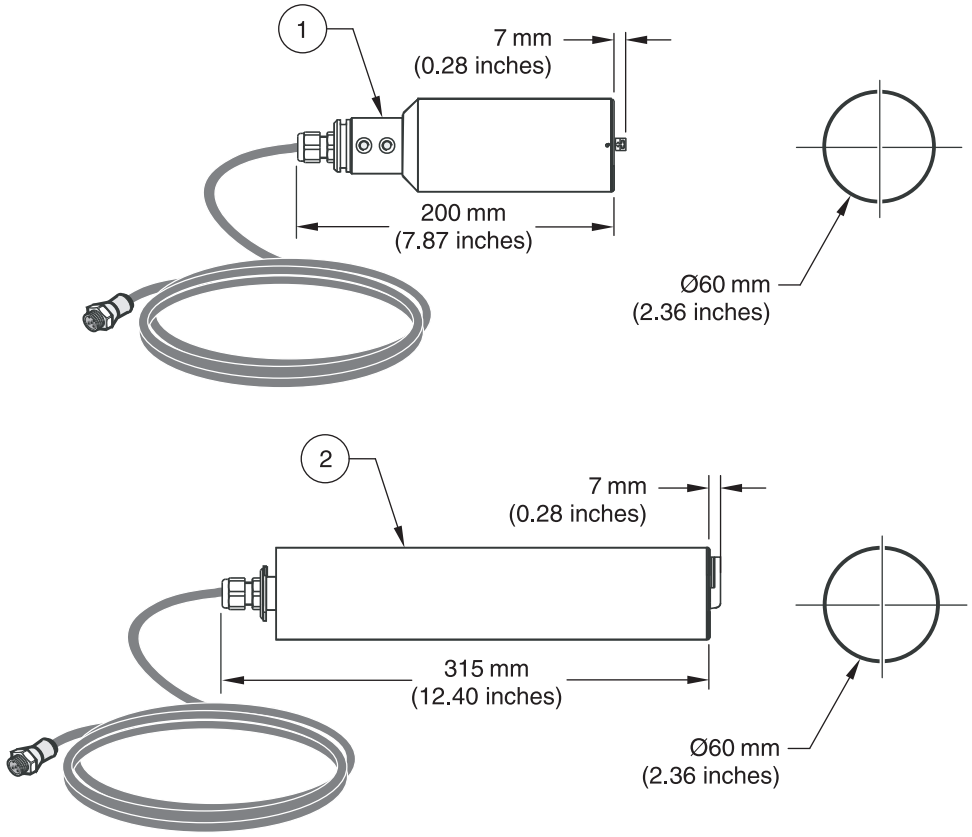
Specifications are subject to change without notice.

The product has only the approvals listed and the registrations, certificates and declarations officially provided with the product. The usage of this product in an application for which it is not permitted is not approved by the manufacturer.

Measuring Technique	Infrared Duo scattered light technique for color-independent turbidity measurement Turbidity in accordance with DIN EN 27027 / TS equivalent DIN 38414
Measuring Range	t-line turbidity: 0.001–4000 FNU/NTU ts-line, inline turbidity: 0.001–4000 FNU/NTU; TSS content: 0.001 mg/L–50 g/L hs-line, highline turbidity: 0.001–4000 FNU/NTU; TSS content: 0.001 mg/L–500 g/L TSS
Reproducibility	Turbidity < 1 %, Total Suspended Solids (TSS) < 3 %
Measuring Accuracy	Turbidity up to 1000 FNU/NTU: without calibration < 5 % of the measured value ± 0.01 FNU/NTU with calibration < 1 % of the measured value ± 0.01 FNU/NTU
Technique variation coefficient	1 % in accordance with DIN 38402
Response Time	1 s ≤ T90 ≤ 300 s (adjustable)
Calibration	Zero point permanently set from the factory, gradient once for the TS content
Cable Length	10 m (33 ft), max. 100 m (328 ft) with extension cable
Ambient Temperature	0 to +40 °C (32 to 104 °F)
Environmental rating	IP68
Pressure Range	Stainless steel: ≤ 6 bar or ≤ 60 m (87 psi) PVC: ≤ 1 bar or ≤ 10 m (14,5 psi)
Flow Velocity	Max. 3 m/s (the presence of air bubbles affects the measurement)
Materials	Optics carrier and sleeve: stainless steel 1.4571 or PVC black
	Wiper shaft: stainless steel 1.4104
	Wiper arm: stainless steel 1.4581
	Wiper rubber: silicone rubber (standard) Optional: Viton[1] (LZX578)
	Windows and light guide: quartz glass
	O-rings (optics carrier, wiper, windows): NBR (acrylonitrile butadiene rubber)
	Housing seals: NBR 70
	Sensor connecting cable (hard-wired): 1 cable pair AWG 22 / 12 V DC twisted, 1 cable pair AWG 24 / data twisted, common cable screen, Semoflex (PUR)
	Sensor connection plug (hard-wired): type M12 enclosure rating IP 67
	Threaded cable fitting: stainless steel 1.4305
Inspection interval	On request 1/year service contract with guarantee extension to 5 years
Dimensions	Tank probe: D x L 60 mm x 200 mm (2 x 8 in.) Probe for pipe installation: D x L 60 mm x 315 mm (2 x 12.4 in.) (Pipe installation fitting: DN 65 / PN 16 DIN 2633; < 5 bar (73 psi); for pipes from DN 80) Distance sensor - wall (floor): TS > 10 cm (4 in.), turbidity > 50 cm (20 in.)
Weight	Tank probe: approx. 1.8 kg (63 oz) (t-line: approx. 0.6 kg (21 oz)) Probe for pipe installation: approx. 2.4 kg (85 oz) Pipe installation fitting: approx. 2.7 kg (95 oz) (without probe) Pipe installation safety fitting:approx. 18 kg (40 lb) (without probe)
User Maintenance	1 h / month, typical
Certifications	CE

[1] Viton® is a registered trademark of E.I. DuPont de Nemours + Co.

Figure 1 Sensor Dimensions



1.	SOLITAX sc models t-line, ts-line, and hs-line for immersion in open tanks
2.	SOLITAX sc models inline and highline sensors for insertion in pipes

Section 2 General Information

2.1 Safety Information

Please read this entire manual before unpacking, setting up, or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

2.1.1 Use of Hazard Information



DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.



CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.

Important Note: *Information that requires special emphasis.*

Note: *Information that supplements points in the main text.*

2.1.2 Precautionary Labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	This symbol indicates that a risk of electrical shock and/or electrocution exists.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. ***Note:*** *For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal.*

2.2 Sensor Overview

Note: *All sensors are also available without wipers for special applications.*

t-line: 0.001–4000 FNU/NTU

High-resolution turbidity probe made of plastic for the outlets of sewage treatment plants and bodies of water.

ts-line: 0.001–4000 FNU/NTU; 0.001 mg/L–50.0 g/L

High-precision turbidity and solids probe made of stainless steel or plastic for color-independent measurement of fine turbidities and sludges.

hs-line: 0.001–4000 FNU/NTU; 0.001 mg/L–500.0 g/L

High-precision turbidity and solids probe made of stainless steel or plastic for color-independent measurement of highly concentrated sludges.

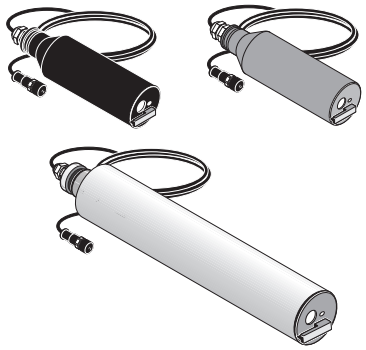
inline: 0.001–4000 FNU/NTU; 0.001 mg/L–50.0 g/L

High-precision pipe installation probe for turbidity and solids made of stainless steel for color-independent measurement of fine turbidities and sludges.

highline: 0.001–4000 FNU/NTU; 0.001 mg/L–500.0 g/L

High-precision pipe installation probe for turbidity and suspended solids made of stainless steel for color-independent measurement of highly concentrated sludges.

Figure 2 Solitax sc Sensors



2.3 Measuring Principle

The measuring principle is based on a combined infrared absorption scattered light technique that measures the lowest turbidity values in accordance with DIN EN 27027 just as precisely and continuously as high sludge content. Using this method, the light scattered sideways by the turbidity particles is measured over an angle of 90°.

2.4 Handling

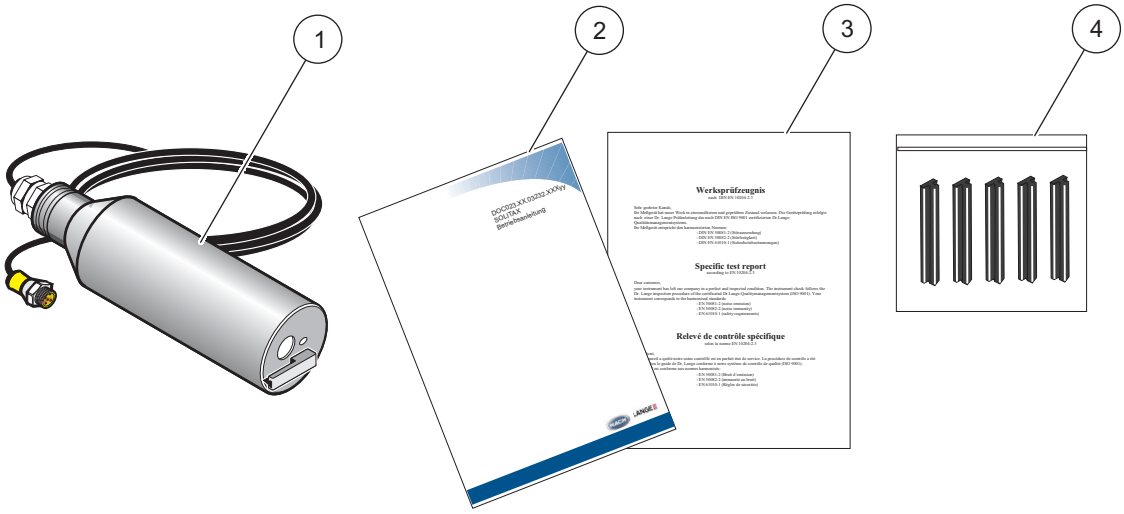
The sensor contains high-quality optical and electronic assemblies. Make sure the sensor is not subjected to any hard mechanical knocks. There are no customer-serviceable items inside the sensor.

Section 3 Installation

DANGER
Only qualified personnel should conduct the tasks described in this section of the manual.

3.1 Unpacking the Instrument

Figure 3 Items Supplied with SensorI



1.	SOLITAX sc Sensor	**3.**	Factory Test Certificate
2.	User Manual	**4.**	Wiper Set (for 5 changes) LZX050

3.1.1 Function Check

After unpacking, both components should be checked for any transport damage and a short function check performed prior to installation.

To perform a function check, connect the sensor to the display unit and power the unit. Shortly after the unit is plugged in, the display is activated and the instrument switches to the measurement display. Measured values taken in air is meaningless.

If no messages appear in the lower part of the display, the function check is then complete.

3.2 Sensor Installation

Figure 4 on page 10 illustrates the installation overview for Solitax sc Models t-line, ts-line, and hs-line for immersion in open tanks.

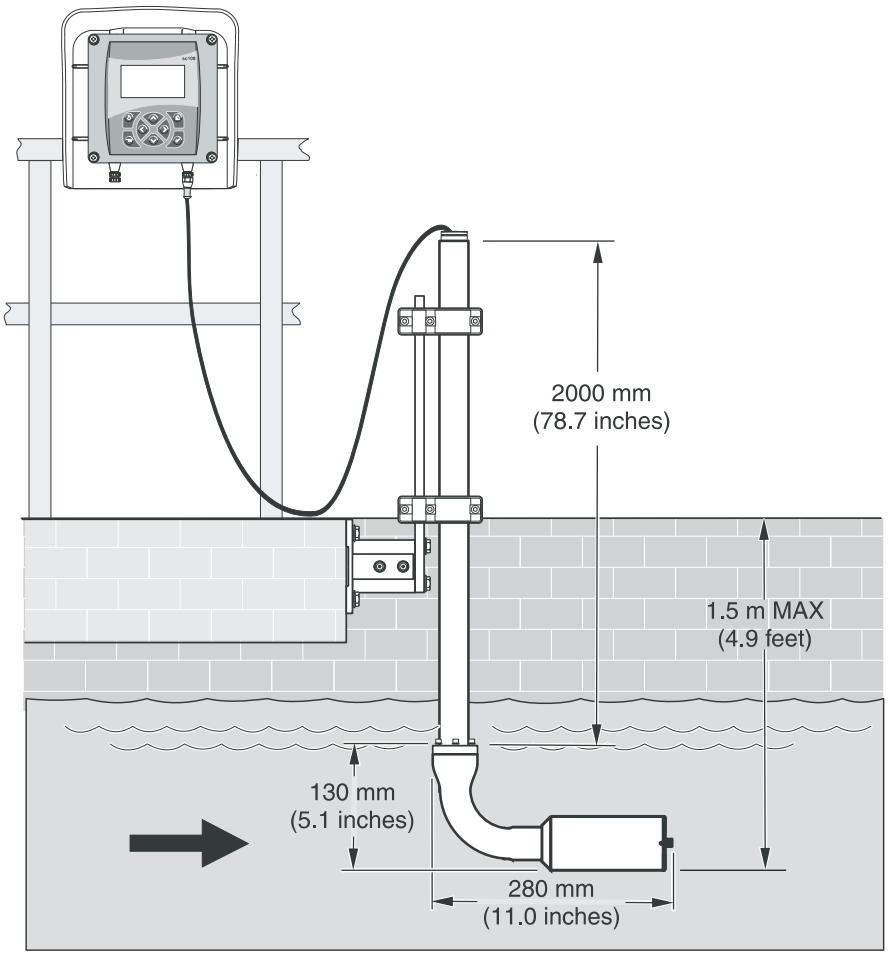
The maximum distance from the mounting surface to the sensor without the use of an extension tube is 1.5 m (4.9 ft). When that distance exceeds 1.5 m (4.9 ft), one of the following extension tubes is required and can be ordered separately:

- 1.0 m (3.28 ft) extension pipe LZY413
- 1.8 m (5.90 ft) extension pipe LZY414

To ensure a suitable measuring position, install the probe to the following conditions:

- The probe optical window must have a ground clearance of at least 30 cm (11.8 in.).
- Install the probe with the optical window facing (downstream) in the direction of the flow to minimize the risk of fouling.
- Avoid installation sites where air bubbles are inconsistent. If this not possible, try moving the probe slightly or adjusting its alignment to minimize the bubble effect.
- Protect the probe against the oncoming flow of large objects, such as branches or ice and against flow surges.
- Avoid installing the probe with the optical window facing into direct light or facing a highly-reflective surface.

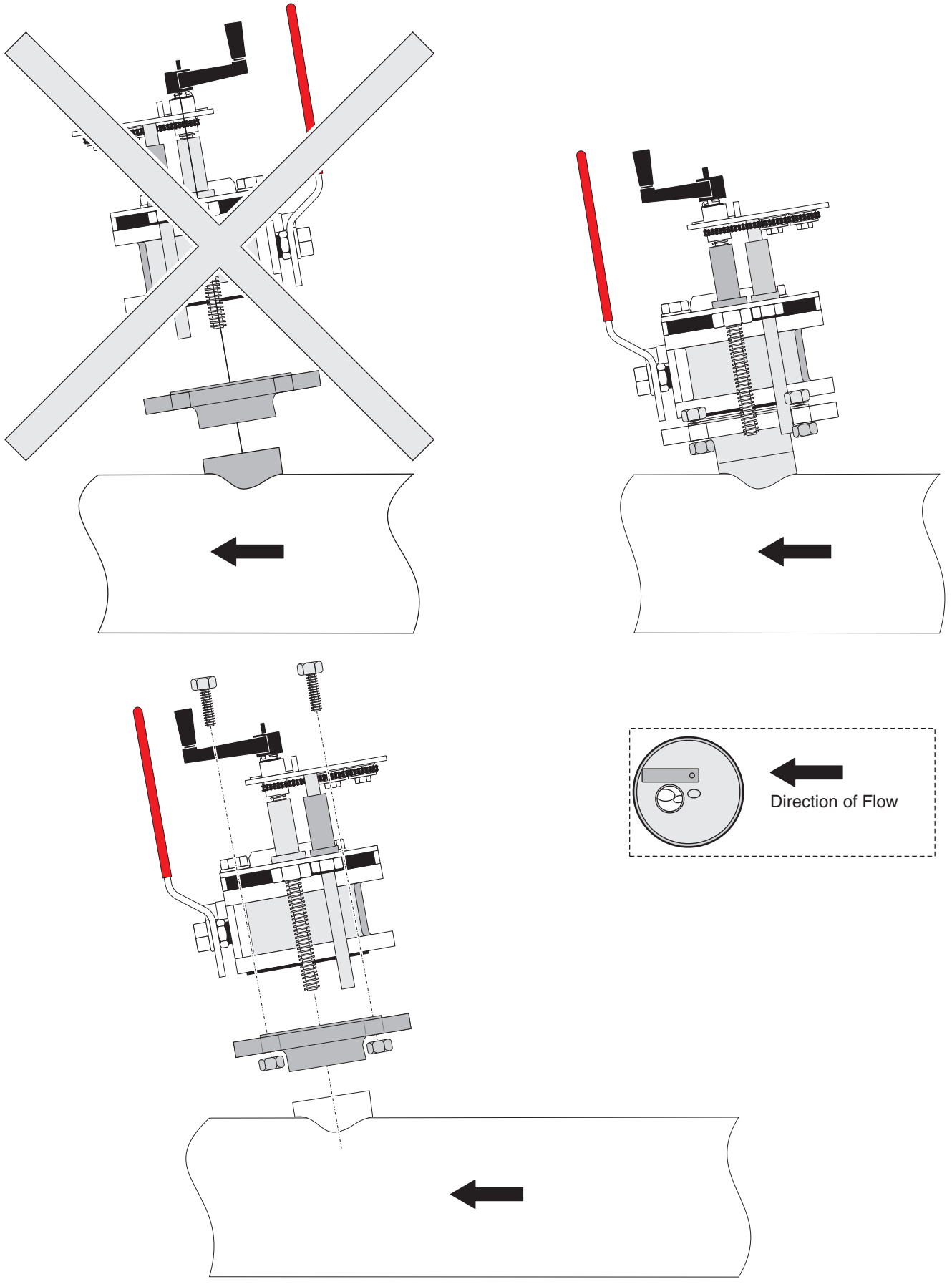
Figure 4 Sensor Installation Overview



3.3 Pipe Installation

- Install the sensor in an up-flow pipe section for best results. Do not mount the sensor in a down-flow pipe section.
- Mounting in a horizontal pipe section is acceptable if the sensor is fully immersed at all times. Usually, mounting 90 degrees from the top of the pipe guarantees full immersion. Do not mount on the top or bottom of a horizontal pipe section.
- Install the sensor in a pipe that is equal to or greater than 4 inches in diameter.
- Install the sensor at least 1.5 m (5 ft.) or three times the pipe diameter (whichever is greater) downstream of pumps, valves, or pipe elbows.
- Install the sensor on the discharge side of a pump, if possible, with a dilution or flush valve installed on the suction side of the pump.
- If the sensor is to be used to measure sludge with significant amounts of debris, install it after a sludge grinding pump or after a pump with a grinding/comminuting unit in front of it.
- Install the sensor within 7.8 m (25 ft.) of the controller with the standard probe cable. Optional cable extensions can be added for a maximum combined distance of 100 meters (330 ft.).
- If the flange cannot be welded to the pipe due to incompatibility of materials between the stud and the pipe, it is recommended that a stainless steel pipe section be fabricated. Weld the flange onto the stainless steel pipe section and attach the stainless steel section as a segment of the process pipe.

Figure 5 Proper Positioning for Insertion into Pipe



3.4 Connecting sensor cable

CAUTION
Always lay cables and hoses so they do not pose a trip hazard and are not bent.

1. Unscrew the protective cap on the controller socket and retain it.
2. Pay attention to the guide in the plug and push the plug into the socket.
3. Tighten the nuts.

Connector cables are available in various lengths (refer to Section 7 Replacement Parts and Accessories on page 23). Maximum overall cable length: 50 m (165 ft).

Figure 6 Connection of the sensor plug to the controller

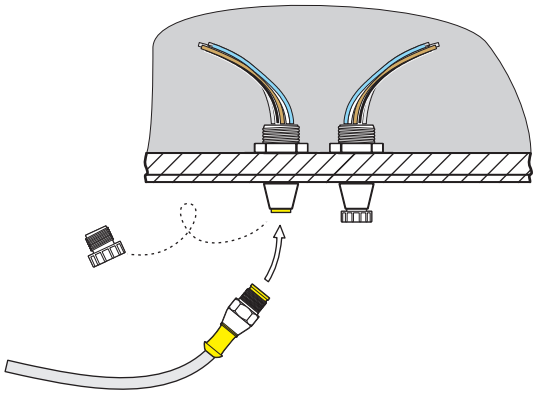
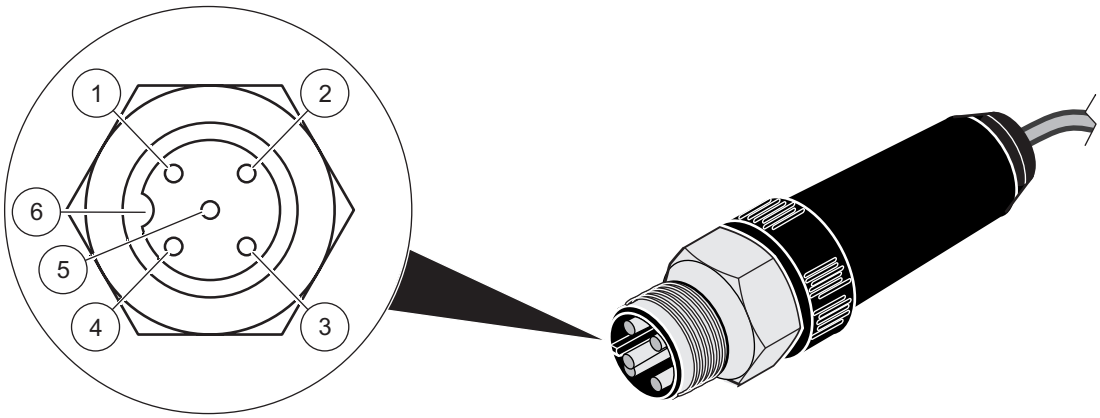


Figure 7 Sensor connector pin assignment



Number	Description	Cable colour (Standard-Cable)
1	+12 VDC	brown
2	Ground	black
3	Data (+)	blue
4	Data (–)	white
5	Screen	Screen (grey)
6	Notch	–

Section 4 Operations

4.1 Use of an sc controller

Before using the sensor in combination with an sc controller, refer to the controller user manual for navigation information.

4.2 Sensor Setup

When a sensor is initially installed, the serial number of the sensor will be displayed as the sensor name. To change the sensor name refer to the following instructions:

1. Select Main Menu.
2. From the Main Menu, select SENSOR SETUP and confirm.
3. Highlight the appropriate sensor if more than one sensor is attached and confirm.
4. Select CONFIGURE and confirm.
5. Select EDIT NAME and edit the name. Confirm or cancel to return to the Sensor Setup menu.

4.3 Sensor Data Logging

A data memory and event memory per sensor are available via the sc controller. While measured data are saved in the data memory at stipulated intervals, the event memory collects numerous events such as configuration changes, alarms and warning conditions. Both the data memory and the event memory can be read out in CSV format. For information on how you can download the data, please see the controller manual.

4.4 Sensor Diagnostics Menu for pH and ORP

SELECT SENSOR (if more than one sensor is attached)

STATUS	
ERROR LIST	See section 6.1 on page 21.
WARNING LIST	See section 6.2 on page 21..

4.5 Sensor Setup Menu

SELECT SENSOR (if more than one sensor is attached)

WIPE	
Initiates a wiping action on the sensor window.	
CALIBRATE	
SET OUTMODE	Select the behavior of the outputs during calibration for zero point setting (Hold, Active, Transfer, Selection). Hold maintains the last reading prior to going into the menu. Active transmits the current level readings, corrected with previous calibration data until new data is entered. Set Transfer transmits the value designated during the system setup
SENSOR MEASURE	Displays the current, uncorrected measured value.
CONFIGURE	Select the calibration type and follow the calibration steps for 2 point, 3 point, 4 point, and 5 point calibration.
FACTOR/2 POINTS/ 3 POINTS/4 POINTS/ 5 POINTS	Display depends on the selection in configuration.
SET CAL DEFAULT	Return the instrument to the default calibration settings.

4.5 Sensor Setup Menu (continued)

CONFIGURE	
EDIT NAME	Enter up to a 10-digit name in any combination of symbols and alpha or numeric characters.
SET PARAMETER	This setting configures the Solitax to measure turbidity or suspended solids. The Solitax cannot simultaneously measure both. Choose “TRB” for turbidity measurements, or “TS” for suspended solids measurement. This selection determines which units may be selected in the “Meas Units” menu.
MEAS UNITS	Choose from the displayed units. TRB (FNU, EBC, TE/F, NTU); TS (mg/L, g/L, ppm, %) Default: FNU If TRB was selected in set parameter, select “NTU” (commonly used in the U.S.), FNU, EBC, or TE/F. If TS was selected, choose mg/L, g/L, ppm, or %. Press enter to choose the selection. If the units selected result in a reading that exceeds 4 digits, the display will only show dashes. For example, if mg/L were selected, and the measurement was 10,500 mg/L, the display will show dashes until the reading drops to 9999 or lower.
CLEAN INTERVAL	Select the cleaning interval (1, 5, 15 or 30 minutes; 1, 4, or 12 hours; 1, 3, 7 days) Default: 12 hours This is the interval between wiper cleaning of the sensor window. It is recommended to start with a setting of 30 minutes. This time may be adjusted according to the application. If readings continue to be accurate, try a longer interval. If not, shorten the interval.
RESPONSE TIME	This is a damping function. While the Solitax takes readings continually, it will average them together over the period of the response time. Once the response time has elapsed, the displayed reading, 4-20 outputs, and alarm status are updated. (0 to 300 seconds) Default: 3 seconds
LOGGER INTERVAL	This is the datalog interval, with options from 1–15 minutes. Values logged are the average of the all readings during the previous logging interval. The controller will hold approximately 360 days of readings for one sensor at 15 minute intervals, or 24 days at 1 minute intervals (and proportional in between). Default:10 minutes
SET DEFAULTS	Resets all user-editable options to the factory-defaults.
TEST/MAIN	
PROBE INFO	Displays the sensor type, entered name of the sensor (Default: sensor serial number), the sensor serial number, the software version number, and the sensor driver version number.
PROFILE	Select Profile Counter to display the number of wipes made (from 20000 backwards). Select Reset Config to manually reset the profile counter.
COUNTER	Shows the number of hours or cycles left for operating hours, test/maint, gasket, and the motor.
TEST/MAIN	WIPE—Initiates the wiping action of the wiper.
	SIGNALS—displays the signal outputs for the device.
	OUTPUT MODE—Select the behavior of the instrument outputs (Hold, Active, Transfer, Selection)
	DEFAULT SETUP—Resets all user-editable options to the factory defaults.

4.6 Calibration

There are two calibration techniques; depending on whether turbidity or suspended solid is required (refer to section 4.6.2 or section 4.6.3 on page 18). Before calibration, determine the behavior of the 4–20 outputs and alarm relays while the user is in the CALIBRATE menu (refer to section 4.6.1).

4.6.1 Setting the Outmode

1. From the Main Menu, select SENSOR SETUP and press confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and press confirm.
4. Select SET OUTMODE. Select the available Out Mode (Active, Hold, Transfer) and confirm.

4.6.2 Calibration for Turbidity

Turbidity calibration requires the use of a Turbidity Standard Solution. The manufacturer recommends the 800 NTU Turbidity Standard Solution (part of the calibration kit No. 57330-00). A zero-point calibration using deionized water is also recommended.

1. From the Main Menu, select SENSOR SETUP and press confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and press confirm.
4. Select SENSOR MEASURE and confirm.
5. Place the sensor in the calibration cylinder with deionized water, mounting it with the supplied clamp. The tip of the probe should be approximately 1-inch below the surface of the water. Record the reading from the sensor measure display.
6. Select OFFSET. Multiply the reading obtained in step 5 and enter the value.
7. Select SENSOR MEASURE.
8. Rinse the outside of the StablCal® 800 NTU standard with water to remove any dust or debris adhering to the surface of the bottle. Gently invert both StablCal standard bottles a minimum of 50 times. Remove the lid and seal from each bottle. Slowly (to avoid creating bubbles) pour the contents of the bottles into the calibration cylinder. Immediately place the tip of the probe into the positioning bracket in the calibration cylinder. The tip of the probe should be approximately 1-inch below the surface standard. Allow the reading to become stable on the SENSOR MEASURE screen. Record the value (measured value). Calculate the factor. Refer to section 4.6.2.1.
9. Select FACTOR to display the corrected measurement.

4.6.2.1 Calculating the Factor

$$\text{New Factor} = \frac{\text{800 NTU Standard}}{\text{measured value}}$$

For example, if a sample measures 750 NTU using the sensor and the standard is 800 NTU, the new factor would be calculated as follows:

$$\text{New Factor} = \frac{\text{800 NTU}}{\text{750 NTU}} = 1.07$$

4.6.3 Calibration for Suspended Solids

Suspended solids calibration requires calibration to the actual sample. This optimizes the compensation for the particle size and shape typical at a measuring site. It is best performed by mounting the sensor as usual for normal measurement, and then grab samples collected and evaluated by laboratory methods. While a single point calibration is usually sufficient to provide accuracy, the SOLITAX does offer the ability to calibrate with up to 5 calibration points.

1. From the Main Menu, select SENSOR SETUP and press confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and press confirm.
4. Select CONFIGURE and confirm.
5. Select the number of points desired for calibration (the unit with linearly interpolate values between calibration points). Select Factor for a single point calibration.
6. Mount the sensor as is during normal operation. Alternatively, place the sensor in the calibration cylinder (or a container with dark, non-reflective walls) 2 inches of clearance from the probe face with the probe face submerged by 1 inch or more.
7. Select SENSOR MEASURE and record the reading.
8. Immediately take a grab sample. Determine the total suspended solids using a gravimetric method such as Method 2540 D in *Standards Methods for the Examination of Water and WasteWater.*
9. Calculate the new factor. Refer to section 4.6.3.1 for single point (Factor) calibration. Refer section 4.6.3.2 on page 18 for multiple point calibrations.
10. Select FACTOR and press confirm. The corrected measurement should be displayed.

4.6.3.1 For Single Point (Factor) Calibration

Calculate the new factor:

$$\text{New Factor} = \frac{\text{Determined gravimetric value}}{\text{measured value}}$$

For example, if a sample measures 2.3 g/L using the SS sensor and the gravimetric value was 2.0 g/L, the new factor would be calculated as follows:

$$\text{New Factor} = \frac{2.0\ \text{g/L}}{2.3\ \text{g/L}} = 0.87$$

4.6.3.2 Multi-point Calibration

1. Repeat steps 6–8 in section 4.6.3 on page 18 at different times to obtain different measurements.
2. From the CONFIGURE menu, select the appropriate calibration point menu.
3. Enter the pairs of values for each reading, the target value being the laboratory determined value, and the actual value being the reading that the SOLITAX produced in step 5. The pairs should be entered in order from lowest values to highest.

Section 5 Maintenance



DANGER
Only qualified personnel should conduct the tasks described in this section of the manual.

Proper maintenance of the measuring windows in the sensor is critical for accurate measurements. The measuring windows should be checked monthly for soiling and the wiper checked for wear.

Important Note: *The seals must be replaced every 2 years by the Service Department. If the seals are not changed regularly, water may enter the probe head and seriously damage the instrument.*

5.1 Maintenance Schedule

Maintenance Task	Duration
Visual inspection	monthly
Check calibration	monthly *(depending on the ambient conditions)*
Inspection	six months (counter)
Seal change	every 2 years (counter)
Change wiper and reset counter	as per counter (20000 cycles)

5.2 Cleaning the Sensor Measuring Windows



CAUTION
Always were
- ***Safety glasses,***
- ***Gloves and***
- ***Overal***

handling hydrochloric acid and observe safety regulations.

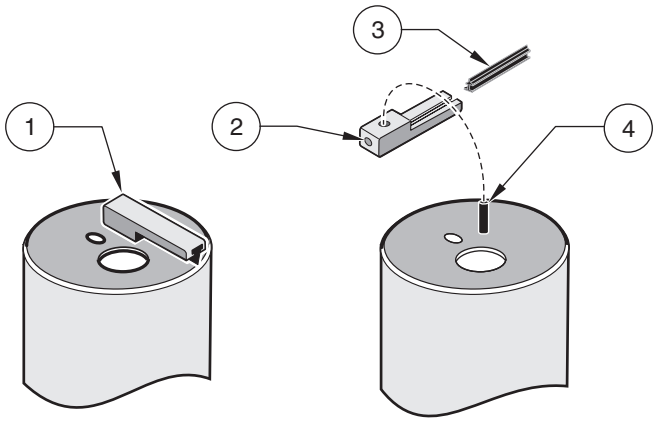
The measuring windows are made of quartz glass. If necessary, they can be cleaned with a cleaning agent and a cloth.

5.3 Replacing the Wiper

The life of the wiper is dependent on the number of cleaning actions performed and the type of deposits to be removed. The life of the wiper varies. The wipers supplied with the instrument should last for approximately one year.

1. From the Main Menu, select SENSOR SETUP and press confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select TEST/MAINT and press confirm.
4. Select PROFILE and confirm. Change the wiper, see section 5.3 on page 20.
5. Select RESET CONFIG and confirm.
6. Select MAN. RESET ARE YOU SURE? and confirm.

Figure 8 Wiper Replacement



1.	Wiper arm	**3.**	Wiper
2.	M4 hex socket head bolt	**4.**	Wiper axle

Section 6 Troubleshooting

6.1 Error Codes

In the case of an error, the indication of the measured value flashes on the display and all the contacts and current outputs allocated to this sensor are placed on hold. The following conditions will result in flashing measured values:

- Data transmission between controller and sensor interrupted

On the Main menu open the SENSOR DIAG menu using **ENTER** and determine the cause of the fault.

Table 1 Error Messages

Error Displayed	Cause	Solution
POS. UNKNOWN	Wiper position unknown	Open the TEST/MAINT menu and trigger the ”WIPE” function, if the problem persists contact the manufacturer's customer service
LED FAULTY	Faulty LED	Contact customer service
MOIST	Moisture value > 10	Remove the sensor immediately and store in a dry place, contact customer service
CAL. DATA	Factory calibration data lost	Contact customer service

6.2 Warnings

A warning results in a flashing warning icon on the right of the display, all menus, contacts and outputs remain unaffected and continue to work normally. On the Main menu open the SENSOR DIAG menu using **ENTER** and determine the cause of the warning.

A warning may be used to trigger a relay and users can set warning levels to define the severity of the warning.

Table 2 Warnings

Warning Displayed	Cause	Solution
WARNING	Cause	Action
REPLACE WIPER	Counter elapsed	Replace wiper, reset counter
TEST/MAINT	Counter elapsed	Contact customer service
GASKET	Counter elapsed	Contact customer service

Section 7 Replacement Parts and Accessories

7.1 Immersion Sensors[1]

Description	Catalog Number
Turbidity, t-line sc, PVC with wiper (0.001 to 4000 NTU)	LXV423.99.10000
Turbidity, t-line sc, PVC without wiper (0.001 to 4000 NTU)	LXV423.99.12000
Turbidity and Suspended Solids, ts-line sc, PVC with wiper (0.001 to 4000 NTU, 0.001 mg/L to 50 g/L)	LXV423.99.10100
Turbidity and Suspended Solids, ts-line sc, PVC without wiper (0.001 to 4000 NTU, 0.001 mg/L to 50 g/L)	LXV423.99.12100
Turbidity and Suspended Solids, ts-line sc, stainless steel with wiper (0.001 to 4000 NTU, 0.001 mg/L to 50 g/L)	LXV423.99.00100
Turbidity and Suspended Solids, ts-line sc, stainless steel without wiper (0.001 to 4000 NTU, 0.001 mg/L to 50 g/L)	LXV423.99.02100
Turbidity and Suspended Solids, hs-line sc, PVC with wiper (0.001 to 4000 NTU, 0.001 mg/L to 500 g/L)	LXV423.99.10200
Turbidity and Suspended Solids, hs-line sc, PVC without wiper (0.001 to 4000 NTU, 0.001 mg/L to 500 g/L)	LXV423.99.12200
Turbidity and Suspended Solids, hs-line sc, stainless steel with wiper (0.001 to 4000 NTU, 0.001 mg/L to 500 g/L)	LXV423.99.00200
Turbidity and Suspended Solids, hs-line sc, stainless steel without wiper (0.001 to 4000 NTU, 0.001 mg/L to 500 g/L)	LXV423.99.02200

[1] All sensors come with the sensor, replacement wipers, and manual.

7.2 Insertion Sensors[1]

Description	Catalog Number
Turbidity and Suspended Solids, inline sc, stainless steel with wiper (0.001 to 4000 NTU, 0.001 mg/L to 50 g/L)	LXV424.99.00100
Turbidity and Suspended Solids, inline sc, stainless steel without wiper (0.001 to 4000 NTU, 0.001 mg/L to 50 g/L)	LXV424.99.02100
Turbidity and Suspended Solids, highline sc, stainless steel with wiper (0.001 to 4000 NTU, 0.001 mg/L to 500 g/L)	LXV424.99.00200
Turbidity and Suspended Solids, highline sc, stainless steel without wiper (0.001 to 4000 NTU, 0.001 mg/L to 500 g/L)	LXV424.99.02200

[1] All sensors come with the sensor, replacement wipers, and manual.

7.3 Replacement Parts

Description	Catalog Number
Set of wipers (for 5 changes) made of silicone for normal applications	LZX050
Set of wipers (for 5 changes) made of Viton for e. g. media containing oil	LZX578
SOLITAX sc User Manual, english	DOC023.52.03232
Extension cable, 5 m (16.4 ft)	LZX848
Extension cable, 10 m (33 ft)	LZX849
Extension cable, 15 m (50 ft)	LZX850
Extension cable, 20 m (65 ft)	LZX851
Extension cable, 30 m (100 ft)	LZX852
Extension cable, 50 m (165 ft)	LZX853

7.3 Replacement Parts (continued)

Description	Catalog Number
Extension pipe, 1,0 m (3.28 ft)	LZY413
Extension pipe, 1,8 m (5.90 ft)	LZY414
Installation kit, fixed-point (for t-line, ts-line, and hs-line immersion sensors)	LZX414.00.10000
Consisting of:	
Base	ATS010
Mounting plate	HPL061
Holding clamp (2×)	LZX200
Assembly pipe 2 m	BRO075
HS small parts set	LZX416
Installation kit with straight adapter	LZX414.00.20000
Kit, screws and seals for sensor adapters	LZX417
Miscellaneous hardware for probe installation kit	LZX416
Second fastening point, includes: bracket, sensor pipe stand, sensor pipe stand bracket, screws, and grommet)	LZX456
Sensor fixed-point mounting kit: Sensor pipe bracket	ATS010
Sensor pipe stand bracket	LZX200
L-bracket	ATS011
Adapter, Sensor 90° elbow	AHA034
Ball valve for insertion probes without adapting flange	LZX337
Welded flange made of C-steel for the pipe installation fitting	LZX703
Welded flange made of stainless steel for pipe installation safety fitting	LZX660

Section 8 Warranty and liability

The manufacturer warrants that the product supplied is free of material and manufacturing defects and undertakes the obligation to repair or replace any defective parts at zero cost.

The warranty period for instruments is 24 months. If a service contract is taken out within 6 months of purchase, the warranty period is extended to 60 months.

With the exclusion of the further claims, the supplier is liable for defects including the lack of assured properties as follows: all those parts that, within the warranty period calculated from the day of the transfer of risk, can be demonstrated to have become unusable or that can only be used with significant limitations due to a situation present prior to the transfer of risk, in particular due to incorrect design, poor materials or inadequate finish will be improved or replaced, at the supplier's discretion. The identification of such defects must be notified to the supplier in writing without delay, however at the latest 7 days after the identification of the fault. If the customer fails to notify the supplier, the product is considered approved despite the defect. Further liability for any direct or indirect damages is not accepted.

If instrument-specific maintenance and servicing work defined by the supplier is to be performed within the warranty period by the customer (maintenance) or by the supplier (servicing) and these requirements are not met, claims for damages due to the failure to comply with the requirements are rendered void.

Any further claims, in particular claims for consequential damages cannot be made.

Consumables and damage caused by improper handling, poor installation or incorrect use are excluded from this clause.

The manufacturer process instruments are of proven reliability in many applications and are therefore often used in automatic control loops to provide the most economical possible operation of the related process.

To avoid or limit consequential damage, it is therefore recommended to design the control loop such that a malfunction in an instrument results in an automatic change over to the backup control system; this is the safest operating state for the environment and the process.

Appendix A Modbus Register Information

Table 3 Sensor Modbus Registers

Group Name	Tag Name	Register	Data Type#	Length	R/W	Description
Measurements	TurbidityFNU	40001	Float	2	R	Turbidity FNU
Measurements	TurbidityEBC	40003	Float	2	R	Turbidity EBC
Measurements	SolidsMGL	40005	Float	2	R	Solids mg/L
Measurements	SolidsGL	40007	Float	2	R	Solids g/L
Measurements	SolidsPR	40009	Float	2	R	Solids %
—	Reserved	40011	Unsigned Integer	1	R	Reserved
Base	Parameter	40012	Unsigned Integer	1	R/W	Parameter
Base	UnitTRB	40013	Unsigned Integer	1	R/W	Unit Turbidity
Base	UnitTS	40014	Unsigned Integer	1	R/W	Units Solids
Calibration	OffsetTRB	40015	Float	2	R/W	Turbdity Offset
Calibration	FactorTRB	40017	Float	2	R/W	Turbidity Factor
Calibration	FactorTS	40019	Float	2	R/W	Solids Factor
Data	Wiperstate	40021	Unsigned Integer	1	R/W	Wiper register
Setup	ResponseInterval	40022	Unsigned Integer	1	R/W	Response time
Setup	CleaningInterval	40023	Unsigned Integer	1	R/W	Wiper interval
Setup	LogInterval	40024	Unsigned Integer	1	R/W	Logger interval
Setup	Outputmodekal	40025	Unsigned Integer	1	R/W	Output when calibrate
Setup	Outputmodesrv	40026	Unsigned Integer	1	R/W	Output when service
Setup	Location	40027	String	8	R/W	Edited name
Setup	ProfilCounter	40035	Unsigned Integer	1	R/W	Profi counter
Data	SerienNummer	40036	String	6	R	Serial number
Calibration	DateUserCal	40042	Date	2	R	Date of manufacturing calibration
Calibration	DateUserCalTURB	40044	Date	2	R	Date of calibration turbidity
Calibration	DateUserCalSOLID	40046	Date	2	R	Date of calibration solid
Data	VersionAppl	40048	Float	2	R	Version application
Data	VersionBoot	40050	Float	2	R	Version Bootlader
Data	VersionStruct	40052	Unsigned Integer	1	R	Version structure probedriver
Data	VersionContent	40053	Unsigned Integer	1	R	Version register probedriver
Data	VersionFirmware	40054	Unsigned Integer	1	R	Version firmware probedriver
Data	FormatMinFNU	40055	Float	2	R	Minimum turbidity FNU
Data	FormatMaxFNU	40057	Float	2	R	Maximum turbidity FNU
Data	FormatMinEBC	40059	Float	2	R	Minimum turbidity EBC
Data	FormatMaxEBC	40061	Float	2	R	Maximum turbidity EBC
Data	FormatMinGL	40063	Float	2	R	Minimum solids g/L
Data	FormatMaxGL	40065	Float	2	R	Maximum solids g/L
Data	FormatMinMGL	40067	Float	2	R	Minimum solids mg/L
Data	FormatMaxMGL	40069	Float	2	R	Maximum mg/L
Data	FormatMinPR	40071	Float	2	R	Minimum solids %
Data	FormatMaxPR	40073	Float	2	R	Maximum solids %
Data	SignalsLED	40075	Unsigned Integer	1	R	Signal LED
Data	SignalsMoist	40076	Unsigned Integer	1	R	Signal moist

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