

# Level transmitter SLT03

Submersible digital transmitter for level measurement in liquids



Level transmitter with submersible probe in stainless steel for level measurement in vessels where pressure connection in the bottom of the vessel is not possible or desirable. For example pump pits, reservoirs or plastic tanks.

## INNOVATIVE AND FLEXIBLE DESIGN. KEY FEATURES:

- Digital electronics. 4-20 mA signal. Level and temperature values via MODBUS communication (SLT03RS).
- MODBUS communication via RS485 (SLT03RS). Registry based for all needs (transfer of values, configuration and maintenance).
- Innovative Autozero function as standard. Just shorten two cables.
- Fixed or adjustable ranges (can on SLT03RS be readjusted via MODBUS communication).
- Accuracy 0,35 % (option 0,15 %).
- Small diameter, only 20 mm, to fit in narrow applications.
- Withstands media temperatures up to 80 °C continuously.
- Stainless steel IP68 measurement probe with a 316L stainless steel diaphragm.
- Well protected diaphragm.
- Completely casted electronics for highest possible reliability.
- Well tested and approved for CE (EMC and PED), ATEX (pending) and DNV (pending).



## Types and order codes:

The transmitters order codes for different configurations can be found from the table below.

SLT03xxx - x x x x

	Description	Suffix	Figure 1	Figure 2	Figure 3	Figure 4	Standard cable length
<b>Electronics</b>	Fixed digital	FD					
	Modbus communication	RS					
	Intrinsic safe Exia	RSE					
<b>Diaphragm</b>	Stainless steel 316L		3				
<b>Connection</b>	Submersible probe			0			
<b>Span min.-max.</b>	0-3,5 mH <sub>2</sub> O (4 °C)				1		10 m
	0-5 mH <sub>2</sub> O (4 °C)				2		10 m
	0-10 mH <sub>2</sub> O (4 °C)				3		15 m
	0-20 mH <sub>2</sub> O (4 °C)				4		25 m
	0-35 mH <sub>2</sub> O (4 °C)				5		40 m
	0-70 mH <sub>2</sub> O (4 °C)				6		75 m
	0-200 mH <sub>2</sub> O (4 °C)				7		10 m
	0-400 mH <sub>2</sub> O (4 °C)				8		10 m
<b>Design</b>	Atmospheric pressure					0	
	Absolute pressure					2	

### Ordering example

Level transmitter with submersible measuring probe, Modbus communication and Autozero, 10 m cable and calibrated range 0-5 m water level will have the order code: **SLT03RS-3020**

## Description

SLT03 is a level transmitter for applications where pressure connection in the bottom of the vessel is not possible or desirable, for example pump pits. SLT03 consists of a measurement probe with the diameter 20 mm. The probe has a 316L stainless steel measuring diaphragm for high corrosion resistance.

The probe are suspended in its connection cable. (Standard length see above.) The cable is reinforced with a Kevlar cord and can be delivered in length up to 1000 m. For extremely corrosive media the cable can be delivered with teflon coating, max 10 m. Connection of the probe cable can be done in optional connection box, BOX100. This box is equipped with an appropriate connection for the probe cables atmospheric vent tube. Its also possible to equip this box with a local display and reinforced lightning protection.

SLT03 can as an option also be delivered in intrinsic safe design, Exia (Pending).

SLT03FD have fixed measuring ranges and no communication.

SLT03RS can communicate via MODBUS. Range etc. can be set by the user.

### Function

SLT03 has a piezoresistive sensor connected to the media by means of a diaphragm. The media pressure acts on the diaphragm and is transferred to the sensor through a pressure intermediate oil. Since this oil completely fills the volume between the diaphragm and the sensor the diaphragm movement is very small when the pressure changes. To obtain atmospheric pressure on the back side of the sensor (for reference pressure) it is connected to the surrounding through a capillary tube inside the probe cable (absolute pressure versions have no tube).

SLT03 has microcomputer-based electronics, which communicate with the outside world with 4 to 20 mA signal as well as MODBUS communication (SLT03RS). The electronics measure and converts the output signal from the pressure dependent sensor bridge to digital values. The digital value is converted to analogue for the 4 to 20 mA current loop.

The digital value can also be read via MODBUS communication (SLT03RS) in optional engineering units, percentage or current. SLT03RS can be configured/calibrated fully by means of a PC via MODBUS communication.

### MODBUS Communication

MODBUS communication can be used for transfer of measured values, for example the level and the media temperature (etc.). The communication can also be used for configuration of all SLT03RS parameters direct from a suited control system or from a PC (with appropriate software).

The MODBUS communication is fully registry based (see the manual for SLT03 for more information).

Physical interface for MODBUS is RS485, 4 lines.

Supply voltage (8-36 VDC) use the 4-20 mA lines and the communication use two separate lines A and B.

A standard RS485 dongle can be use (it is recommended to use an optoisolated RS485 dongle).

NOTE! RS485 connection can not be used in Ex zone!

### Autozero function

SLT03RS and SLT03FD has an innovative solution to eliminate the problem of zero shift (due to for example covering or mechanical damage of the diaphragm). Just place SLT03 in free air (zero pressure on the diaphragm) and shorten two cables for ten seconds. This action resets the 4 mA to zero pressure (and also makes the communication to send zero level in engineering units).

### Approvals

SLT03 is CE approved according to the EU directives for pressure equipment, PED, and EMC. SLT03RSE is explosionproof approved, ATEX Exia IIB T4, by NEMKO (Pending). Approved for marine use by DNV (pending).

### Intrinsic safety, Exia (pending)

SLT03RS can as an option be delivered in intrinsic safe design, Exia IIB T4, according to ATEX. The transmitter will then have the code SLT03RSE where E indicates "Exia".  
NOTE! RS485 connection can not be used in Ex zone!

### PI 200PS and MEP7 Modbus Tool

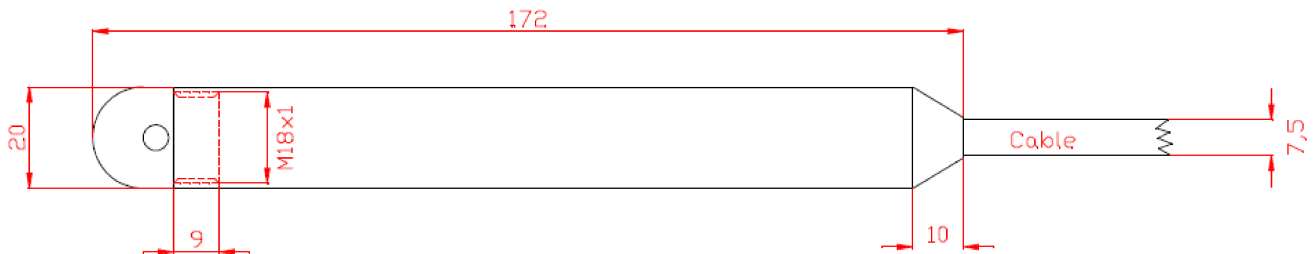
PI200PS is a configuration tool complete with the PC program MEP7 Modbus Tool, RS485 modem and battery supply (see separate documentation). The PC program MEP7 Modbus Tool is a Windows software tool for reading of values, configuration, calibration and documentation. The program can configure transmitter specific values and perform maintenance, output signal and factory calibration.

### Connection box, BOX100

A specially designed connection box can be delivered as an accessory. The box is equipped with cable glands and terminals for connection of the probe cable and the signal/supply cable. The box is equipped with an appropriate connection for the probe cables atmospheric vent tube. This connection does not affect the tightness of the box. Protection class IP67. The vent connection is design so that high pressure water from for example cleaners not can enter the vent or the box.

### Display

The box can also be equipped with a local display. The display can show the signal in optional engineering units, for example mWc or mH<sub>2</sub>O. Unit and limits is made to order. The display is connected in series with the signal/supply cable and is feed by the current loop.



## Connection and adjustment

### Connection

The probe cables consists of 4 wires, shield and a vent tube. The wires is colour marked:

White	Signal/supply +
Brown	Signal/supply -
Green	RS485A/Autozero 1
Yellow	RS485B/Autozero 2
Shield	Ground
Vent tube	Atmosphere pressure (in the absolute pressure version there is no vent tube)

On the Vent tube there is a Fluid Filter mounted to prevent moisture to enter. DO NOT REMOVE!

### Adjustment

Adjustments can be done through MODBUS communication and with the Autozero function.

### Size

Probe size:	
Diameter	20 mm
Lenght	157 mm

### Cable:

Lenght (standard)	see text (option up to 1000 m)
Diameter	7,5 mm
Area	0,34/0,25 mm <sup>2</sup>
Vent tube (diam.)	2,3 mm
Reinforced with a Kevlar cord.	

### To consider

Dont expose the diaphragm to unnecessary damage. As standard the probe is delivered with a diaphragm protection cover. Dont descend the probe so that it stands on the bottom of the vessel. If the media are turbulent or flowing fasten the probe appropriately. Highest media temperature is +80°C. Make sure that the vent tube is connected to the surrounding atmosphere (via the Fluid Filter) without the risk for plugging. Make sure there is no free hydrogen ions in the media! Make sure that the diaphragm withstands the media!

## Technical specification SLT03:

<b>Type:</b>	Electronic submersible level transmitter with digital electronics	<b>Filling liquid:</b>	Silicon oil
<b>Function:</b>	Directly connected transmitter with piezoresistive sensor	<b>Series resistance:</b>	$R_{kohm} = (Supply\ voltage - 6)/20$ .
<b>Operating range:</b>	From 0% to 100% of upper sensorlimit	<b>Series resistance dependance:</b>	Better than +/- 0,1%
<b>Span:</b>	Fixed or adjustable ranges see page 2	<b>Supply voltage dependance:</b>	Better than +/- 0,1%
<b>Zero:</b>	0 mH2O fixed or adjustable (4 mA+/-0,35%)	<b>Temperature dependance:</b>	From 0 to 80 degrees C.
<b>Overload:</b>	3,5 mH2O: Max 11 mH2O	<b>Zero:</b>	Max +/-0,01% per degree C*2
	5 mH2O: Max 30 mH2O	<b>Span:</b>	Max +/-0,02% per degree C*2
	10 mH2O: Max 30 mH2O	<b>Long time stability:</b>	Better than 0,1 % per year.
	20 mH2O: Max 60 mH2O	<b>Vibration dependance:</b>	
	35 mH2O: Max 150 mH2O	Perpendicular to the diaphragm:	Max +0,3 kPa/G
	70 mH2O: Max 200 mH2O	Parallell to the diaphragm:	Max +0,02 kPa/G
	200 mH2O: Max 600 mH2O	<b>Repeatability:</b>	Better than +/- 0,1% of max range.
	400 mH2O: Max 1000 mH2O	<b>Accuracy:</b>	Better than +/- 0,35% of max range (including nonlinearity, hysteresis and repeatability).*1
<b>Material:</b>	Diaphragm: Stainless steel 316L (certain coatings on request)	<b>Electrical connection:</b>	Lose wires, 2x0,34 and 2x0,25 mm <sup>2</sup> (twisted pair)
	Other media tuched parts: Stainless steel SS2353	<b>Intrinsic safety (option):</b>	Exia IIB T4 according to ATEX (by NEMKO)*3
	Cable: Polyurethane	<b>Encapsulation:</b>	Better than IP68 (tested to 500 m depht)
<b>Ambient temperature:</b>	-20 to +80 degrees C	<b>Electrical safety:</b>	According to EN 60204-1
<b>Damping:</b>	1 s fixed or adjustable	<b>EMC:</b>	According to EN 61326-1-2-3
<b>Media temperature:</b>	Max 80 degrees C	<b>PED:</b>	According to 97/23/EG
<b>Output:</b>	4-20 mA, two wire connection, signal proportional to the pressure. Max current at overload 24 mA. MODBUS communication.	<b>Lightning protection (with option BOX100):</b>	Class 1 testing according to IEC61643-1. 5kA (10/350 uS).
<b>Supply:</b>	6-36 V DC (for Ex version 6-27 V DC)	<b>Weight:</b>	750 g including 10 m cable.

\*1 Option accuracy 0,15% (for 3,5 mH2O range 0,25%)

\*2 Span and zero temperature dependance for 3,5 mH2O range max +/-0,06 per degree C.

\*3 Pending

MODBUS is a registred trademark for Modbus Organisation.



**ABB Measurement Products**  
Kundcenter: 021-32 50 00

Internet: [www.abb.se](http://www.abb.se)  
E-post: [kundservice.instrumentation@se.abb.com](mailto:kundservice.instrumentation@se.abb.com)