Level transmitter LT300

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 exampel 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 (LT300RS).
- MODBUS communication via RS485 (LT300RS). 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 LT300RS 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).

PONDUS INSTRUMENTS

Types and order codes:

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

LT300xxx - x x x x

	Description	Suffix	Figure 1	Figure 2	Figure 3	Figure 4	Standard cable lenght
Electronics	Fixed digital	FD					
	Modbus communication	RS					
	Intrinsic safe Exia	RSE					
Diaphragm	Stainless steel 316L		3				
Connection	Submersible probe			0			
Span min.-max.	0-3,5 mH2O (4°C)				1		10 m
	0-5 mH2O (4°C)				2		10 m
	0-10 mH2O (4°C)				3		15 m
	0-20 mH2O (4°C)				4		25 m
	0-35 mH2O (4°C)				5		40 m
	0-70 mH2O (4°C)				6		75 m
	0-200 mH2O (4°C)				7		10 m
	0-400 mH2O (4°C)				8		10 m
Design	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: **LT300RS-3020**

Description

LT300 is a level transmitter for applications where pressure connection in the bottom of the vessel is not possible or desirable, for exampel pump pits.
LT300 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 lenght see above.) The cable is reinforced with a Kevlar cord and can be delivered in lenght 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 equiped with an appropriate connection for the probe cables atmoshperic vent tube.
Its also possible to equip this box with a local display and reinforced lightning protection.
LT300 can as an option also be delivered in intrinsic safe design, Exia (Pending).
LT300FD have fixed measuring ranges and no communication.
LT300RS can communicate via MODBUS. Range etc. can be set by the user.

Function

LT300 has a piezoresistive sensor connected to the media by means of a diaphragm. The media pressure acts on the diaphragm and is tranfered 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).
LT300 has microcomputer-based electronics, which communicate with the outside world with 4 to 20 mA signal as well as MODBUS communication (LT300RS). 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 (LT300RS) in optional engineering units, percentage or current.
LT300RS 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 LT300RS 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 LT300 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 recomended to use an optoisolated RS485 dongle).

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

Autozero function
LT300RS and LT300FD has an innovative solution to eliminate the problem of zero shift (due to for example covering or mechanical damage of the diaphragm). Just place LT300 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).

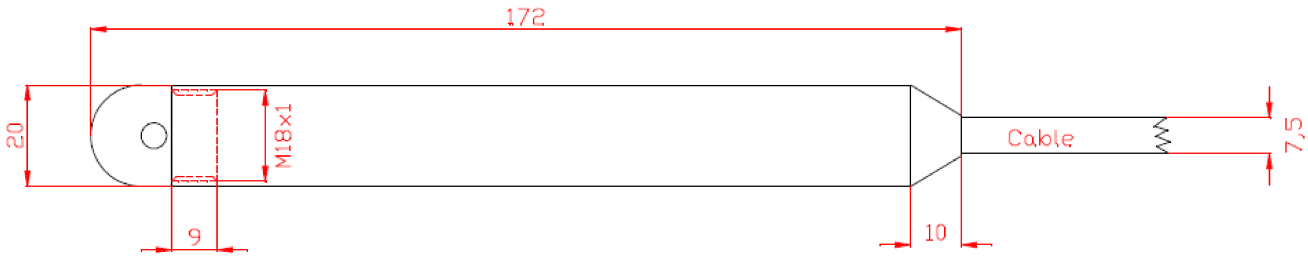
Approvals
LT300 is CE approved according to the EU directives for pressure equipment, PED, and EMC.
LT300RSE is explosionproof approved, ATEX Exia IIB T4, by NEMKO (Pending).
Approved for marine use by DNV (pending).

Intrinsic safety, Exia (pending)
LT300RS can as an option be delivered in intrinsic safe design, Exia IIB T4, according to ATEX. The transmitter will then have the code LT300RSE 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 accessorie. The box is equiped with cable glands and terminals for connection of the probe cable and the signal/supply cable.
The box is equiped with an appropriate connection for the probe cables atmoshperic 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 equiped with a local display. The display can show the signal in optional engineering units, for example mWc or mH2O.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 mm2
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 +80ºC.
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 LT300:

Type:	Electronic submersible level transmitter with digital electronics	**Filling liquid:**	Silicon oil
Function:	Directly connected transmitter with piezoresistive sensor	**Series resistance:**	R kohm = (Supply voltage - 6)/20.
Operating range:	From 0% to 100% of upper sensorlimit	**Series resistance dependance:**	Better than +/- 0,1%
Span:	Fixed or adjustable ranges see page 2	**Supply voltage dependance:**	Better than +/- 0,1%
Zero:	0 mH20 fixed or adjustable (4 mA+/-0,35%)	**Temperature dependance:**	From 0 to 80 degrees C.
Overload: 3,5 mH2O:	Max 11 mH2O	Zero:	Max +/-0,01% per degree C*2
5 mH2O:	Max 30 mH2O	Span:	Max +/-0,02% per degree C*2
10 mH2O:	Max 30 mH2O	**Long time stability:**	Better than 0,1 % per year.
20 mH2O:	Max 60 mH2O	**Vibration dependance:**	
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	**Repeatability:**	Better than +/- 0,1% of max range.
400 mH2O:	Max 1000 mH2O	**Accuracy:**	Better than +/- 0,35% of max range (including nonliearity, hysteresis and repeatability).*1
Material: Diaphragm:	Stainless steel 316L (certain coatings on request)	**Electrical connection:**	Lose wires, 2x0,34 and 2x0,25 mm2 (twisted pair)
Other media tuched parts:	Stainless steel SS2353	**Intrinsic safety (option):**	Exia IIB T4 according to ATEX (by NEMKO)*3
Cable:	Polyurethane	**Encapsulation:**	Better than IP68 (tested to 500 m depht)
Ambient temperature:	-20 to +80 degrees C	**Electrical safety:**	According to EN 60204-1
Damping:	1 s fixed or adjustable	**EMC:**	According to EN 61326-1-2-3
Media temperature:	Max 80 degrees C	**PED:**	According to 97/23/EG
Output:	4-20 mA, two wire connection, signal proportional to the pressure. Max current at overload 24 mA. MODBUS communication.	**Lightning protection (with option BOX100):**	Class 1 testing according to IEC61643-1. 5kA (10/350 uS).
Supply:	6-36 V DC (for Ex version 6-27 V DC)	**Weight:**	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.

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