High-performance submersible pressure transmitter
For level measurement
Model LH-20

Applications

- Deep well and borehole measurements
- Groundwater monitoring
- Level measurement in open bodies of water
- Sewage lift and pumping stations
- Settling ponds and rainwater basins

Special features

- Slender design
- Scalable measuring range (option)
- Resistant against the harshest environmental conditions
- Reliable and secure by double-sealed design
- Titanium case for especially high resistance (option)

Submersible pressure transmitter model LH-20
Fig. left: from stainless steel
Fig. right: from titanium

Description

For the most demanding measurement tasks
The model LH-20 submersible pressure transmitter has been designed for the most demanding of level measurement tasks. A slender design, highest accuracies, low temperature errors and an adjustable measuring range ensure the suitability of the LH-20 for all submerged level measurements.

The model LH-20 submersible pressure transmitter can adapt to countless applications and measuring media through a large number of features and options. Depending on the requirements, this submersible pressure transmitter is available with, amongst other things, a titanium case, PUR/PE/FEP cable, 0.1 % accuracy, HART®, scalability or parallel temperature output signal.

For operation in hazardous environments, the model LH-20 submersible pressure transmitter is also available in an intrinsically safe version. For potable and fresh water applications, a potable water conformant product variant is possible in accordance with KTW and ACS.

Hermetically sealed, robust and durable
The model LH-20 submersible pressure transmitter has been engineered for use in the harshest environments. Through a double, redundant sealing concept, it is permanently hermetically sealed. A robust design from stainless steel or titanium, with a spring-reinforced cable seal, ensures a long service life, even under the big mechanical loads of installation and continuous use.

Designs with the highest media resistance using FEP cable and titanium cases, along with the integrated lightning protection, guarantee the longevity of the submersible pressure transmitter even under the most adverse environmental influences in aggressive media, in both indoor and outdoor use.

Data sheets showing similar products:
Submersible pressure transmitter; model LS-10; see data sheet PE 81.09
Intrinsically safe submersible pressure transmitter; model IL-10; see data sheet PE 81.23

Measuring ranges

Relative pressure						
bar	**Measuring range**	**0 ... 0.1**	**0 ... 0.16**	**0 ... 0.25**	**0 ...0.4**	**0 ... 0.6**
	Overpressure limit	15	20	30	30	35
	Measuring range	**0 ... 1**	**0 ... 1.6**	**0 ... 2.5**	**0 ... 4**	**0 ... 6**
	Overpressure limit	35	50	50	65	90
	Measuring range	**0 ... 10**	**0 ... 16**	**0 ... 25**		
	Overpressure limit	90	130	130		
inWC	**Measuring range**	**0 ... 50**	**0 ... 100**	**0 ... 150**	**0 ... 250**	
	Overpressure limit	8,000	12,000	12,000	14,000	
psi	**Measuring range**	**0 ... 5**	**0 ... 10**	**0 ... 15**	**0 ... 25**	**0 ... 50**
	Overpressure limit	400	500	700	700	900
	Measuring range	**0 ... 100**	**0 ... 160**	**0 ... 200**	**0 ... 300**	
	Overpressure limit	1,300	1,900	1,900	1,900	
mH_2O	**Measuring range**	**0 ... 1**	**0 ... 1.6**	**0 ... 2.5**	**0 ... 4**	**0 ... 6**
	Overpressure limit	150	200	300	300	350
	Measuring range	**0 ... 10**	**0 ... 16**	**0 ... 25**	**0 ... 40**	**0 ... 60**
	Overpressure limit	350	500	500	650	900
	Measuring range	**0 ... 100**	**0 ... 160**	**0 ... 250**		
	Overpressure limit	900	1,300	1,300		

Absolute pressure						
bar	**Measuring range**	**0 ... 1.6**	**0 ... 2.5**	**0 ... 4**	**0 ... 6**	**0 ... 10**
	Overpressure limit	50	50	60	90	90
	Measuring range	**0 ... 16**	**0 ... 25**			
	Overpressure limit	130	130			

The given measuring ranges are also available in mbar, kPa and MPa.

Output signals

Output signals	
Standard	**4 ... 20 mA**
Option	4 ... 20 mA and HART® signal, additional Pt100 measurement signal

Load in Ω
The load depends on the selected output signal and measuring deviation (see page 3).

- 4 ... 20 mA with measuring deviation 0.1 %:
  ≤ (power supply - 9.6 V) / 0.022 A
- 4 ... 20 mA with measuring deviation 0.2 %:
  ≤ (power supply - 8 V) / 0.022 A
- 4 ... 20 mA and HART® signal:
  ≤ (power supply - 9.6 V) / 0.022 A

Voltage supply

Power supply
The power supply depends on the selected output signal and measuring deviation (see page 3).

- 4 ... 20 mA with measuring deviation 0.1 %: DC 9.6 ... 30 V
- 4 ... 20 mA with measuring deviation 0.2 %: DC 8 ... 30 V
- 4 ... 20 mA and HART® signal: DC 9.6 ... 30 V

When being operated in Ex areas, the submersible pressure transmitter must be powered via an Ex isolated barrier.
For Ex isolated barrier see “Accessories”

Additional Pt100 measuring element

Die HART® version has an additional Pt100 measuring element for measuring the medium temperature.

- Pt100 per DIN EN 60751
- Measuring range -50 ... +100 °C (-58 ... 212 °F)
- Resolution of 1 °K

Reference conditions

Temperature
15 ... 25 °C (59 ... 77 °F)

Atmospheric pressure
860 ... 1,060 mbar (12.48 ... 15.38 psi)

Humidity
45 ... 75 % relative

Mounting position
Calibrated in vertical mounting position with pressure connection facing downwards.

Accuracy data

Measuring deviation at reference conditions

Measuring deviation	
Standard	**≤ ±0.2 % of span**
Option	≤ ±0.1 % of span

By setting a turndown of greater than 5:1, a higher measuring deviation applies.

Measuring deviation determined using the limit point method per IEC 60770.

Temperature error of the zero point in the temperature range 0 ... 80 °C (32 ... 176 °F)

- with measuring deviation ≤ ±0.2 % of span
  - Standard, without turndown ≤ ±0.15 % of span/10 K
  - Turndown ≤ 5:1 ≤ ±0.20 % of span/10 K
  - Turndown > 5:1 ≤ ±0.25 % of span/10 K

- with measuring deviation ≤ ±0.1 % of span
  - Standard, without turndown ≤ ±0.05 % of span/10 K
  - Turndown ≤ 5:1 ≤ ±0.10 % of span/10 K
  - Turndown > 5:1 ≤ ±0.15 % of span/10 K

Long-term drift
≤ ±0.1 % of span/year

Settling time (0 ... 63 %)
Depending on the output signal the following settling times apply:
- 4 ... 20 mA: 100 ms
- 4 ... 20 mA, HART® signal: 200 ms

Scalability (turndown)
The HART® version enables scaling of the measuring range (turndown).

It is recommended that turndown is not set to over 5:1, since the accuracy can decrease dependant on the scaling.

Operating conditions

Ingress protection (per IEC 60529)
IP 68

Immersion depth
up to 250 m (820 ft)

Vibration resistance (per IEC 60068-2-6)
4 g (at 5 ... 100 Hz)

Lightning protection
Nominal discharge current ≥ 5 kA, response time < 25 ns

Explosion protection (optional)
The model LH-20 is available with the following Ex approvals, which can be ordered separately.

Approvals	
ATEX	II 1G Ex ia IIC T6 Ga, II 2G Ex ia IIC T6 Gb
IECEx	Ex ia IIC T6 Ga, Gb
FM	IS Class I, Div 1, Groups A, B, C, D; Class II, Div 1, Groups E, F, G; Class III, T6. Type 4X/6P; Class I Zone 0 AEx ia IIC
CSA	Class I, div 1, groups A, B, C, D; class II, div 1, groups E, F, G; class III, T6. encl. type 4X Ex ia IIC

Temperatures

- **for use without explosion protection**
  The permissible temperature ranges are dependent on the cable material used:

  Medium: PE cable: -40 ... +60 °C (-40 ... +140 °F)
  PUR cable: -40 ... +80 °C (-40 ... +176 °F)
  FEP cable: -40 ... +80 °C (-40 ... +176 °F)

  Ambient: PE cable: -40 ... +60 °C (-40 ... +140 °F)
  PUR cable: -40 ... +85 °C (-40 ... +185 °F)
  FEP cable: -40 ... +85 °C (-40 ... +185 °F)

  Storage: PE cable: -40 ... +80 °C(-40 ... +176 °F)
  PUR cable: -40 ... +80 °C(-40 ... +176 °F)
  FEP cable: -40 ... +80 °C(-40 ... +176 °F)

- **ATEX, IECEx for use as category 1G / Ga equipment (for zone 0)**
  Ambient: Temperature class T6: -20 ... +50 °C (-4 ... +122 °F)
  Temperature class T1 ... T5: -20 ... +60 °C (-4 ... +140 °F)

- **ATEX / IECEx for use as category 2G / Gb equipment (for zone 1)**
  Ambient: Temperature class T6: -40 ... +66 °C (-40 ... +150 °F)
  Temperature class T1 ... T5: -40 ... +80 °C (-40 ... +176 °F)

- **CSA (Ex)**
  Ambient: Temperature class T6: -40 ... +60 °C (-40 ... +140 °F)
  Temperature class T1 ... T4: -40 ... +80 °C (-40 ... +176 °F)

- **FM (Ex)**
  Ambient: Temperature class T6: -40 ... +60 °C (-40 ... +140 °F)
  Temperature class T1 ... T4: -40 ... +80 °C (-40 ... +176 °F)

Maximum tensile force on the cable
1,200 N (270 lbf)

Weight
- Submersible pressure transmitter: approx. 370 g (13.05 oz)
- Cable: approx. 100 g/m (1.08 oz/ft)

Process connections

The model LH-20 is available in two process connection variants:

Available process connections	
Standard	**M14 x 1 with protective cap**
Option	Flush measuring cell

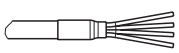
Electrical connections

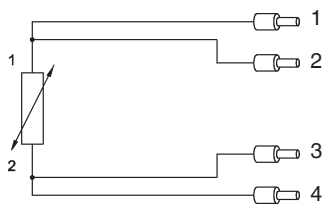
Reverse polarity protection
U_+ vs. U-

Overvoltage protection
see lightning protection under “Operating conditions”

Cable lengths
Cable length to customer requirements, freely selectable

Connection diagrams

Cable outlet		
	**U_+**	brown
	U-	blue
	Shield	black sheathed cable

Pt100 measuring element (4-wire connection)		
	**1**	white
	2	yellow
	3	red
	4	black

CE conformity

EMC directive

- Output signal 4 ... 20 mA:
  2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (industrial application)

- Output signal 4 ... 20 mA and HART® signal:
  2004/108/EC, EN 61326 emission (group 1, class A) and interference immunity (industrial application)

ATEX directive (option)
94/9/EC

Approvals

On request the submersible pressure transmitter can be supplied with the following approvals:

Approvals	Description
IECEx	International certification for the Ex area
FM	Certification for the Ex area, USA
CSA	Certification for the Ex area, Canada
GL	Ships, shipbuilding (e.g. offshore), Germany

Certificates

On request the submersible pressure transmitter can be supplied with the following certificates:

Certificates
Drinking water declaration of conformity in accordance with KTW and ACS [1]
Test protocol [2]

1) Only available in combination with PE cable and not available in intrinsically safe version
2) The test certificate documents the product-specific instrument specifications and include a detailed listing of the individual measured values of the acceptance test.

Materials (wetted)

Case	
Standard	**Stainless steel 316L**
Option	Titanium [1]

Cable material	
Standard	**PUR**
Option	PE, FEP

Sealing material [2]	
Standard	**FKM**
Option	EPDM

1) Not available in intrinsically safe version.
2) The model LH-20 is double sealed behind the sensor.

Sensor
Ceramic Al_2O_3 96 %

Titanium for especially high resistance (option)

For a particularly high resistance against aggressive media, the model LH-20 submersible pressure transmitter is available with a titanium case.

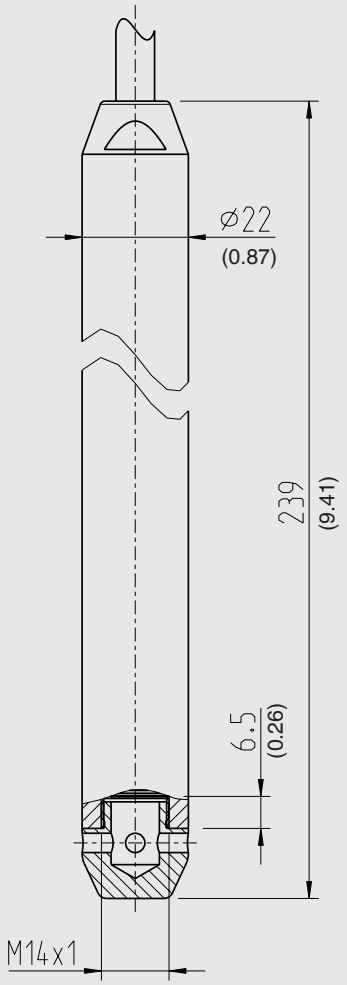
This exceptionally high-quality material enables the submersible pressure transmitter to be used under the most adverse conditions.

The highly chemically-resistant titanium design ensures a long service life, even in aggressive media and the most demanding applications.

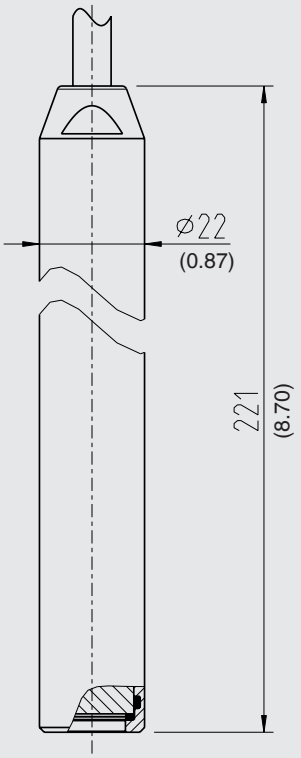
Dimensions in mm (inch)

Submersible pressure transmitter model LH-20

with M14 x 1 process connection and protection cap



with flush measuring cell



Accessories

	Description	Order no.	
	**Cable strain relief clamp** The cable strain relief clamp ensures easy and secure mechanical fastening of the submersible pressure transmitter's cable. It serves to guide the cable to prevent mechanical damage and to reduce the action of tensile stresses.	14052336	
	**Additional weight** The additional weight increases the dead weight of the submersible pressure transmitter. It simplifies the lowering in monitoring wells, narrow shafts and deep wells. It effectively reduces negative environmental influences of the measuring medium (e.g. turbulent flows) on the measurement result. The additional weight is available in two versions: ■ Stainless steel 316L, approx. 350 g (12.3 oz), length 120 mm (4.7 inch) ■ Titanium, approx. 350 g (12.3 oz), length 214.5 mm (8.4 inch) It is recommended that the design of the additional weight is selected in line with the case material of the submersible pressure transmitter.	14052322 14052330	(316L) (titanium)
	**Cable socket** The cable socket, with IP 67 ingress protection and watertight ventilation element, provides a moisture-free electrical termination for the submersible pressure transmitter. It should be mounted in a dry environment, outside any shafts or vessels, or directly in the switch cabinet.	14052339	
	**Ex isolated barrier** Ex isolated barrier, power supply DC 20 ... 32 V, output: max. DC 25.4 V, max. 88.2 mA	2341268	
	**Display module DIH52 and DIH62** 5-digit display, 20-segment bargraph, without separate power supply, with additional HART® functionality. Automatic adjustment of measuring range and span. “Secondary-master” functionality: Setting the measuring range and unit of the connected transmitter using HART® standard commands possible. Optionally explosion protection per ATEX	on request	
	**HART® modem with USB, RS-232 or Bluetooth® interface** For scaling the measuring range using a PC via the HART® protocol, a HART® modem with USB, RS-232 or Bluetooth® interface is available. The modem communicates with all registered HART® field devices and can be used with the most popular HART® compatible software programs.	7957522 11025166 11364254	(RS-232 interface) (USB interface) (Bluetooth® interface)

Ordering information

Model / Measuring range / Output signal / Accuracy / Cable material / Cable length / Case / Process connection / Sealing / Approval / Certificate / Accessories

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