

Ultrasonic Level Sensor
LUC-M20

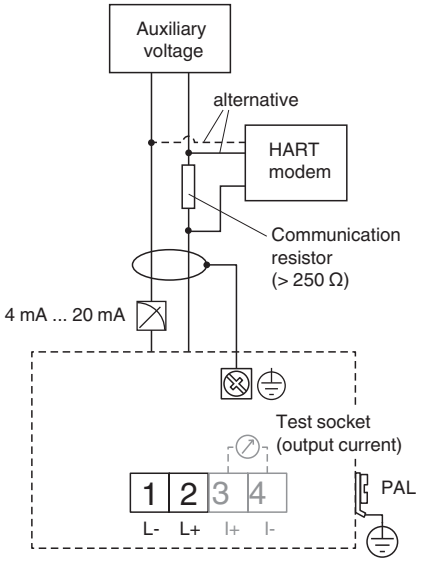
- Device for non-contact level measurement
- Measuring range up to 8 m in fluids
- Measuring range up to 3.5 m in bulk materials
- Quick and simple commissioning via menu-guided onsite operation with four-line display
- Optional remote display and operation (up to 20 m from transmitter)
- Integrated temperature sensor for automatic correction of the temperature dependent sound velocity

Function

The LUC-M20 is a compact measuring device for continuous, non-contact level measurement. The maximum measuring range is 8 m in fluids and 3.5 m in bulk materials. By using the linearisation function, the devcie can also be used for flow measurements in open channels and measuring weirs.
The system integration is ensured via HART (standard), 4 mA ... 20 mA.

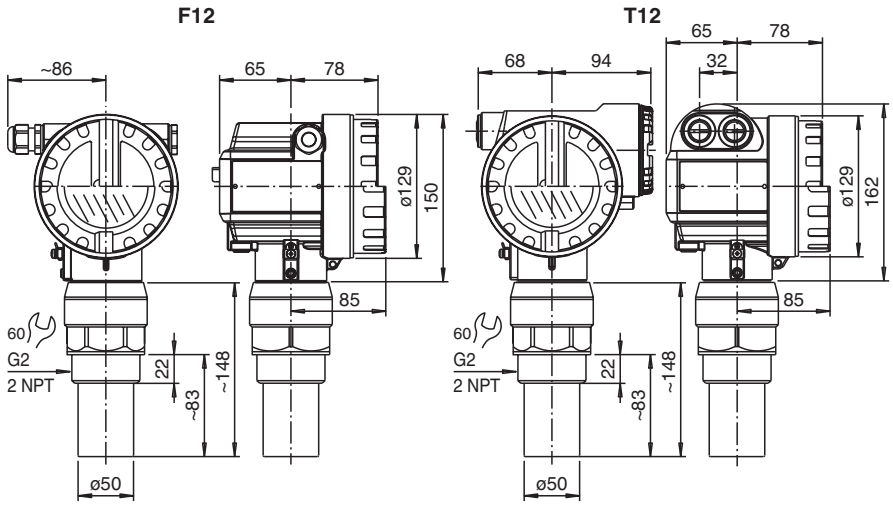
Wiring Diagram

Connection IH, 4 mA ... 20 mA with HART, 2-wire



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Dimensions



Technical Data

General specifications		
Measuring method		The sensor of the device transmits ultrasonic pulses in the direction of the product surface. There, the ultrasonic pulses are reflected back and received by the sensor. The device measures the time between pulse transmission and reception. The instrument uses the time (and the velocity of sound) to calculate the distance between the sensor membrane and the product surface. As the device knows the empty distance from a user entry, the device calculate the level.
Equipment architecture		4 ... 20 mA output with HART protocol
Construction type		compact device
Series		LUC-M20
Supply		
Connection		2-wire , 4 ... 20 mA , HART protocol , 14 ... 30 V DC
Rated voltage	U_r	14 ... 30 V DC , 8 V DC at 20 mA
Ripple		47 ... 125 Hz , U_{pp} = 200 mV (measured at 500 Ω)
Noise		0.5 ... 10 kHz , U_{rms} = 2.2 mV (measured at 500 Ω)
Current consumption		3.6 ... 22 mA
Power consumption		51 ... 800 mW
Input		
Measured variable		distance between the sensor membrane and the product surface using the linearization function, the device calculate - level in any units - volume in any units - flow across measuring weirs or open channels in any units
Measuring range		max. 8 m (26.2 foot) in fluids max. 3.5 m (11.5 foot) in bulk materials
Operating frequency		approx. 50 kHz
Blocking distance		0.35 m
Output		
Load		min. 250 Ω for HART communication
Linearity		The linearization function of the device allows conversion of the measured value into any unit of length or volume. In open channels or measuring weirs, also a flow linearization is possible (calculation of the flow from the measured level).
Output signal		4 ... 20 mA with HART protocol
Output damping		0 ... 255 s , freely selectable
Signal on alarm		error information can be accessed via the following interfaces: - on-site display (error symbol, error code and plain text description) - current output (configurable) - digital interface
Directive conformity		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2006 , EN 61326-2-3:2006 , EN 61326-2-5:2006
Low voltage		

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Technical Data

Directive 2014/35/EU	EN 61010-1:2001
Conformity	
Electromagnetic compatibility	NE 21
Degree of protection	IEC 60529:2001
Vibration resistance	EN 60068-2-64
Climate class	EN 60068-2-38 (test Z/AD) DIN/IEC 68 T2-30Db
Resistance to alternating temperature cycles	EN 60068-2-14
Measurement accuracy	
Reaction time	min. 2 s
Reference operating conditions	temperature = 20 °C (68 °F) pressure = 1013 $mbar_{abs}$ humidity = 50 % ideal reflective surface (e. g. calm, smooth fluid surface) no interference reflections within signal beam set application parameters: - tank shape = flat ceiling - medium property = liquid - process conditions = calm surface
Measured value resolution	1 mm
Measuring frequency	max. 0.5 Hz
Maximum measured error	typical specifications for reference operating conditions (include linearity, repeatability, and hysteresis): ± 2 mm (0.08 inch) or 0.2% of set measuring range (empty calibration)[1)] [1)] whichever is greater
Operating conditions	
Installation conditions	see technical information (TI)
Ambient conditions	
Resistance to alternating temperature cycles	Nb test: +80 °C/- 40 °C (353 K/233 K), 1 K/min, 100 cycles
Vibration resistance	20 ... 2000 Hz, 1 $(m/s^2)^2/Hz$; 3 x 100 min
Process conditions	
Process temperature	-40 ... 80 °C (-40 ... 176 °F)
Process pressure (static pressure)	0.7 ... 3 bar (10.2 ... 43.5 psi) , absolute pressure
Ambient conditions	
Ambient temperature	-40 ... 80 °C (-40 ... 176 °F) see technical information (TI)
Storage temperature	-40 ... 80 °C (-40 ... 176 °F)
Mechanical specifications	
Degree of protection	with closed housing, tested according to - IP68, NEMA 6P (24 h at 1.83 m under water surface) - IP66, NEMA 4X with open housing: IP20, NEMA 1 (also ingress protection of the display)
Connection	cable gland M20x1.5 cable gland NPT1/2 cable gland G1/2
Material	material in contact with process: sensor PVDF, seal EPDM housing: aluminum, seawater resistant, chromated, powder-coated cover: - aluminum, for version without on-site display - inspection glass for version with on-site display
Mass	2.6 kg
Dimensions	see section dimensions
Process connection	- cylindrical thread G1-1/2B, G2B to DIN/ISO 228/1 - conical thread NPT1-1/2, NPT2 to ANSI B 1.20.1 - flanges to EN 1092-1 from DN80, to ANSI B 16.5 from 3 inch, to JIS B 2238 (RF) from DN80 - mounting bracket LUC-Z17
Data for application in connection with hazardous areas	
EU-type examination certificate	see instruction manuals
Mechanical construction	

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Technical Data

Construction type	housing design: - F12 housing with sealed terminal compartment for standard or EEx ia applications - T12 housing with separate terminal compartment and flameproof encapsulation cover: - version without on-site display - version with on-site display (transparent cover), this version cannot be supplied together with the ATEX II 1/2D certificate
Indication and operation	
Display elements	display and operating module LUC-Z15 at the device
Control elements	on-site operation: - via 3 keys of the display and operating module - via handheld terminal remote control: - operation with operating program (for communication variant HART)
General information	
Supplementary documentation	technical information (TI) manuals, brief instructions (BA, KA) instruction manuals control drawings (ZD)
Supplementary information	Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see www.pepperl-fuchs.com.
Accessories	
Designation	- LUC-Z19, mounting bracket - LUC-Z2*, cantilever - LUC-Z3*, mounting frame - LUC-Z5*, wall bracket - LUC-Z-A**N**, adapter flange with conical thread - LUC-Z-F**G**, adapter flange with metrical thread - LUC-Z15, display and operating module for on-site operation - LUC-Z16, weather protection cover

Type Code

This overview does not mark options which are mutually exclusive.
Option with * = on request/in preparation.

L	U	C	–	M	2	0	–	(1)	(2)	(3)	–	I	H	(4)	–	(5)

LUC	Device
LUC	Ultrasonic level sensor

M20	Series
M20	Thread version

(1)	Process connection
G6	Thread G2, DIN/ISO 228/1, plastic PVDF
N6	Thread NPT2, ANSI, plastic PVDF

(2)	Housing
A1	Aluminium housing F12, IP68, thread M20x1.5
A2	Aluminium housing T12, IP68, coated, with separate terminal compartment
A4	Aluminium housing T12, IP68, coated, with separate terminal compartment, overvoltage protection

(3)	Cable entry
2	Cable gland M20x1.5
3	Thread G1/2
4	Thread NPT1/2

IH	Electrical output
IH	2-wire, 4 mA to 20 mA HART

(4)	Display and operation
B	without display and operating module
D	with display and operating module inclusive on-site operation, envelope curve display

(5)	Approval
NA	Version for non-explosion-hazardous area
EX	ATEX II 1/2G Ex ia IIC T6...T4 Ga/Gb ATEX II 2G Ex ia IIC T6...T4 Gb
ES	ATEX II 1/2D Ex ta/tb IIIC T104°C Da/Db ATEX II 2D Ex tb IIIC T95°C Db

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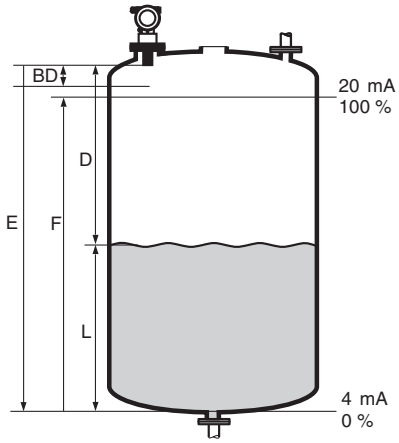
Type Code

(5)	Approval
E2	ATEX II 1/3D Ex ta/tc IIIC T104°C Da/Dc ATEX II 3D Ex tc IIIC T95°C Dc
SX	ATEX II 1/2G Ex db [ia] IIC T6...T4 Ga/Gb ATEX II 2G Ex db [ia] IIC T6...T4 Gb
S2	ATEX II 3G Ex ec IIC T6...T4 Gc
F1	FM IS, Cl. I/II/III, Div.1 Group A-G, N.I .Cl. I, Div.2
F2	FM XP, Cl. I/II/III, Div. 1, Group A-G
CG	CSA, General Purpose
C1	CSA IS, Cl. I/II/III, Div. 1, Group A-D, G + coal dust, N.I.
C2	CSA XP, Cl. I/II/III, Div. 1, Group A-D, G + coal dust, N.I.

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Application

Blocking distance

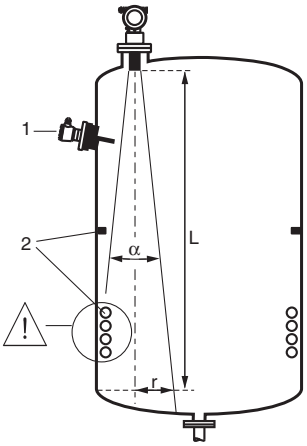


BD	Max. range fluids	Max. range bulk materials
0.35 m (13.8 inch)	8 m (26.2 foot)	3.5 m (11.5 foot)

E: empty distance
F: span (full distance)
D: distance from sensor membrane - product surface
L: level
BD: blocking distance

Emitting angle

To estimate the detection range, use the 3 dB emitting angle α. Make sure that equipment (1) such as limit switches, temperature sensors, etc. are not located within the emitting angle α. In particular, symmetrical equipment (2) such as heating coils, baffles etc. can influence measurement.



a	L	r
11°	8 m (26.2 foot)	0.77 m (30.3 inch)

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