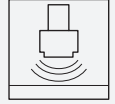




# Ultrasonic Level Sensor

## LUC-M40



- Device for non-contact level measurement
- Measuring range up to 10 m in fluids
- Measuring range up to 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

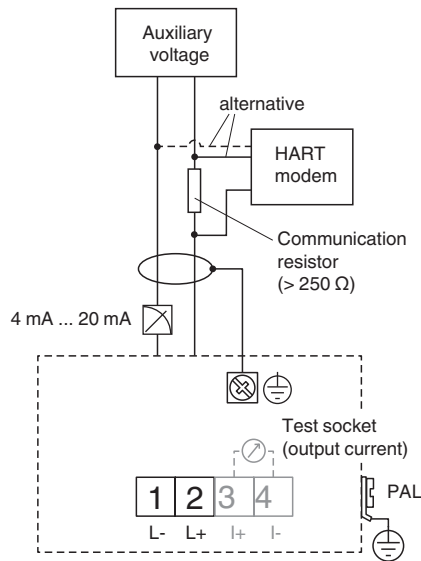


### Function

The LUC-M40 is a compact measuring device for continuous, non-contact level measurement. The maximum measuring range is 10 m in fluids and 5 m in bulk materials. By using the linearisation function, the device 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.

### Connection

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



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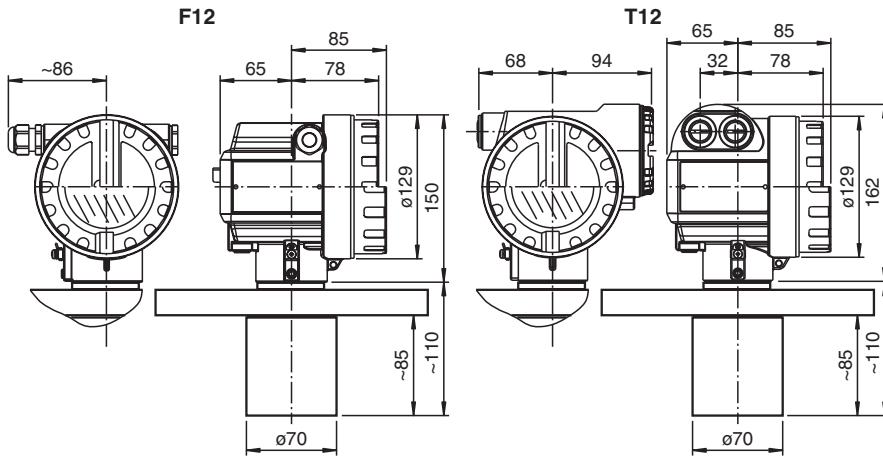
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**Dimensions**



**Technical Data**

<b>General specifications</b>	
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-M40
<b>Supply</b>	
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 $\Omega$ )
Noise	0.5 ... 10 kHz , $U_{rms} = 2.2$ mV (measured at 500 $\Omega$ )
Current consumption	3.6 ... 22 mA
Power consumption	51 ... 800 mW
<b>Input</b>	
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
Measurement range	max. 10 m (32.8 foot) in fluids max. 5 m (16.4 foot) in bulk materials
Operating frequency	approx. 42 kHz
Blocking distance	0.4 m
<b>Output</b>	
Load	min. 250 $\Omega$ 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
<b>Directive conformity</b>	
Electromagnetic compatibility	
Directive 2014/30/EU	EN 61326-1:2006 , EN 61326-2-3:2006 , EN 61326-2-5:2006
Low voltage	
Directive 2014/35/EU	EN 61010-1:2001

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## Technical Data

<b>Conformity</b>	
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
<b>Measurement accuracy</b>	
Reaction time	min. 2 s
Reference operating conditions	temperature = 20 °C (68 °F) pressure = 1013 mbar <sub>abs</sub> 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	2 mm
Measuring frequency	max. 0.5 Hz
Maximum measured error	typical specifications for reference operating conditions (include linearity, repeatability, and hysteresis): ± 4 mm (0.16 inch) or 0.2% of set measuring range (empty calibration) <sup>1)</sup> 1) whichever is greater
<b>Operating conditions</b>	
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 <sup>2</sup> )/Hz; 3 x 100 min
Process conditions	
Process temperature	-40 ... 80 °C (-40 ... 176 °F)
Process pressure (static pressure)	0.7 ... 2.5 bar (10.2 ... 36.3 psi) , absolute pressure
<b>Ambient conditions</b>	
Ambient temperature	-40 ... 80 °C (-40 ... 176 °F) see technical information (TI)
Storage temperature	-40 ... 80 °C (-40 ... 176 °F)
<b>Mechanical specifications</b>	
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 Viton or EPDM, flange PP, PVDF or stainless steel 1.4535/316L housing: aluminum, seawater resistant, chromated, powder-coated cover: - aluminum, for version without on-site display - inspection glass for version with on-site display
Mass	3 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
<b>Data for application in connection with hazardous areas</b>	
EU-type examination certificate	see instruction manuals (SI)
Directive conformity	
Directive 2014/34/EU	EN 60079-0:2006 , EN 60079-1:2004 , EN 60079-7:2003 , EN 60079-11:2007 , EN 60079-18:2005 , EN 60079-26:2004 , EN 60079-27:2007 , EN 61241-0:2006 , EN 61241-1:2004+C11:2006
<b>Mechanical construction</b>	

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 **PEPPERL+FUCHS**

**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
<b>Indication and operation</b>	
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)
<b>General information</b>	
Supplementary documentation	technical information (TI) manuals, brief instructions (BA, KA) instruction manuals (SI) control drawings (ZD)
Supplementary information	Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a> .
<b>Accessories</b>	
Designation	- LUC-Z17, mounting bracket - LUC-Z3*, mounting frame - LUC-Z5*, wall bracket - LUC-Z15, display and operating module for on-site operation - LUC-Z16, weather protection cover - LUC-Z40-***1*, remote display and operation

**Function**

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

L	U	C	-	M	4	0	-	(1)	(2)	(3)	-	I	H	(4)	(5)	A	-	(6)
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<b>LUC</b>	<b>Device</b>
LUC	Ultrasonic level sensor

<b>M40</b>	<b>Series</b>
M40	Flange version

<b>(1)</b>	<b>Process connection</b>
P	Universal flange DN80/ANSI 3 inch, plastic PP
Q	Universal flange DN80/ANSI 3 inch, plastic PVDF
S	Universal flange DN80/ANSI 3 inch, stainless steel 1.4535/316L
T	Universal flange DN100/ANSI 4 inch, plastic PP
U	Universal flange DN100/ANSI 4 inch, plastic PVDF
V	Universal flange DN100/ANSI 4 inch, stainless steel 1.4535/316L
M	with mounting bracket LUC-Z17

<b>(2)</b>	<b>Housing</b>
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

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

<b>IH</b>	<b>Electrical output</b>
IH	2-wire, 4 mA to 20 mA HART

<b>(4)</b>	<b>Display and operation</b>
A	* Prepared for remote display and operation, order remote display and operation as accessory LUC-Z40.
B	without display and operating module
D	with display and operating module inclusive on-site operation, envelope curve display

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**Function**

<b>(5) Process sealing sensor/flange</b>	
2	Viton
3	EPDM

<b>A Additional equipment</b>	
A	Basic version

<b>(6) Approval</b>	
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
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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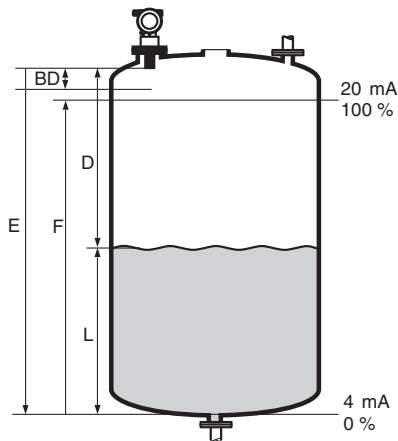
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**Application**

**Blocking distance**

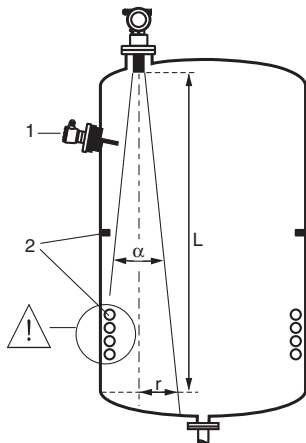


BD	Max. range fluids	Max. range bulk materials
0.4 m (15.7 inch)	10 m (32.8 foot)	5 m (16.4 foot)

- 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  $\alpha$ . Make sure that equipment (1) such as limit switches, temperature sensors, etc. are not located within the emitting angle  $\alpha$ . In particular, symmetrical equipment (2) such as heating coils, baffles etc. can influence measurement.



a	L	r
11°	10 m (32.8 foot)	0.96 m (37.8 inch)

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