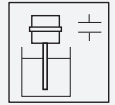




# Capacitive limit switch

## LCL1



- Limit switch for bulk solids
- Device with rod probe
- Complete unit consisting of the probe and electronic insert
- Integrated active build-up compensation: exact switch point, even with strong build-up
- Mechanically rugged: no wearing parts, long operating life, maintenance-free



### Function

The capacitive limit switch is designed for limit detection of light bulk solids, e. g. grain products, flour, milk powder, animal feed, cement, chalk or plaster.

Versions:

- Device with 140 mm (5.5 inch) rod probe, for bulk solids
- Relay output (potential-free change-over contact) with AC or DC connection
- PNP output with 3-wire DC connection

### Connection

Connection type E5, 3-wire DC connection (example)

3-wire DC connection

F: Fine-wire fuse, 500 mA

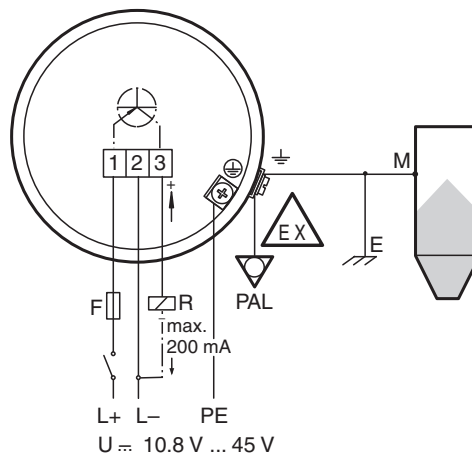
R: connected load, e. g. PLC, DCS, relay

M: Connection to ground, silo or metal parts silo

E: Grounding

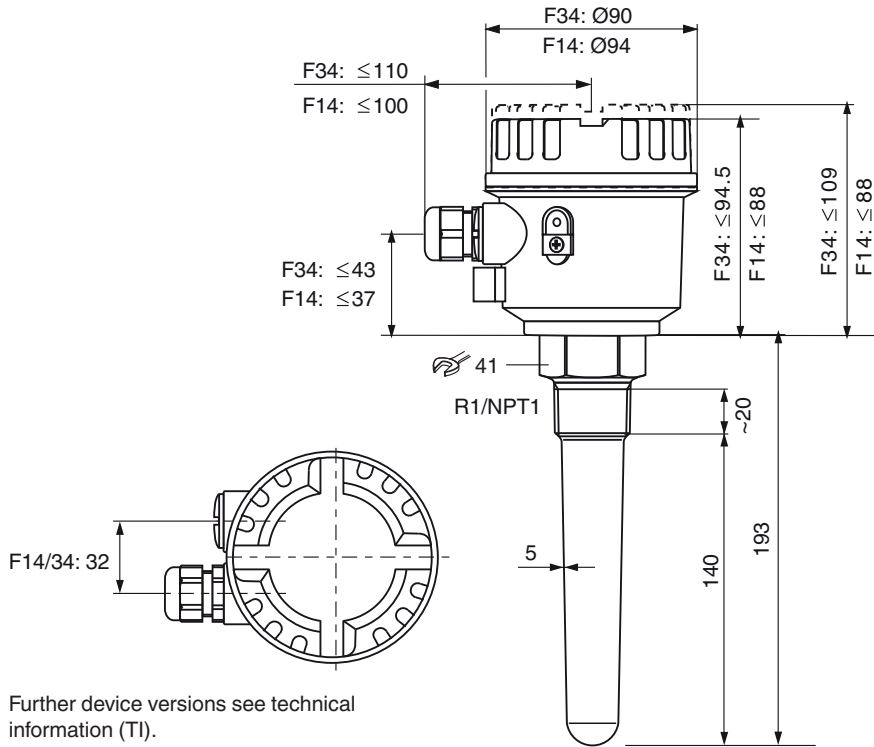
The LCL is protected against reverse polarity. In case of mixing up the connections, the green LED does not illuminate "ready to operate".

PE-connection and PAL-connection for LCL1 are unnecessary.



Other connection types see section electrical connection.

Dimensions



Further device versions see technical information (TI).

Technical Data

General specifications	
Measuring method	A metal plate at the end of the probe, within the insulation, and the surroundings (e. g. the silo walls) combine to form the two electrodes of a capacitor. If the probe is covered or free of material, then the capacitance changes and the LCL switches.
Equipment architecture	The measuring system consists of: - the device - a supply point - the connected control systems, switching units, signalling systems (e. g. lamps, horns, PCS, PLC, etc.)
Construction type	device with rod probe
Operating mode	<b>MAX = maximum safety:</b> The device switches if the probe is covered or if the supply voltage is disconnected in a safety-oriented manner (signal on alarm). example application: overspill protection <b>MIN = minimum safety:</b> The device switches if the probe is uncovered or if the supply voltage is disconnected in a safety-oriented manner (signal on alarm). example application: dry-running protection
Series	LCL1
Supply	
Rated voltage	$U_r$ electrical connection E5: 10.8 ... 45 V DC, short-term pulse on 55 V DC electrical connection WA: 20 ... 235 V AC, 50/60 Hz or 20 ... 55 V DC
Current consumption	electrical connection E5: max. 30 mA, reverse-polarity-proof electrical connection WA: max. 130 mA
Electrical specifications	
Surge protection	overvoltage category III
Input	

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## Technical Data

Measured variable		limit level (limit value)
Measuring range		dielectric constant $\geq 1.6$
<b>Output</b>		
Switch-on delay	$t_{on}$	correct switching after max. 1.5 s
Output signal		connection E5: switching PNP, $I_{max} = 200$ mA - overload and short circuit protection - residual voltage at transistor at $I_{max} < 2.9$ V connection WA: contact change-over, potential-free - $U_{max} = 253$ V - $I_{max} = 4$ A (AC) - $P_{max} = 1000$ VA, $\cos \phi = 1$ , $P_{max} = 500$ VA, $\cos \phi > 0.7$
Signal on alarm		connection E5: $< 100$ $\mu$ A connection WA: relay de-energized
<b>Directive conformity</b>		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2006 , EN 61326-2-3:2006
Low voltage		
Directive 2014/35/EU		EN 61010-1:2010
<b>Conformity</b>		
Electromagnetic compatibility		NE 21
Degree of protection		IEC 60529:2001
Vibration resistance		EN 60068-2-64
Climate class		EN 60068, part 2-38 (test Z/AD)
<b>Measurement accuracy</b>		
Reference operating conditions		vessel type: plastic vessel, ambient temperature: 73 °F (23 °C, 296 K), medium temperature: 73 °F (23 °C, 296 K) medium pressure $p_e$ : 0 bar, medium: dielectric constant = 2.6, conductivity: $< 1$ $\mu$ S sensitivity setting: C
Hysteresis		horizontal 4 mm (0.16 inch), vertical 7 mm (0.28 inch)
Long-term drift		horizontal 3 mm (0.12 inch), vertical 6 mm (0.24 inch)
Influence of medium temperature		depending on the filling material
Switching time		approx. 0.5 s when covering and uncovering the sensor
<b>Operating conditions</b>		
Installation conditions		
Installation position		any position
Mounting location		The capacitive limit switch can be installed in silos made of different materials (e. g. metal, plastic, concrete).
Process conditions		
Process temperature		-40 ... 130 °C (-40 ... 266 °F) -40 ... 80 °C (-40 ... 176 °F) (Dust-Ex version)
Medium pressure limits		-1 ... 25 bar
State of aggregation		solids
Solid contents		$\leq \varnothing 30$ mm
Bulk density		$\leq 200$ g/l
<b>Ambient conditions</b>		
Ambient temperature		-40 ... 80 °C (-40 ... 176 °F) -40 ... 60 °C (-40 ... 140 °F) (Dust-Ex version)
Storage temperature		-40 ... 80 °C (-40 ... 176 °F)
Shock resistance		device with F34 housing: 7 J
Vibration resistance		$a(\text{RMS}) = 50$ m/s <sup>2</sup> , ASD = 1.25 (m/s <sup>2</sup> ) <sup>2</sup> /Hz, f = 5 to 2000 Hz, t = 3 x 2 h
<b>Mechanical specifications</b>		
Degree of protection		IP66, NEMA 4
Connection		gland M20 thread G1/2, NPT1/2
Material		F14 housing: polyester PBT-FR F34 housing F34: aluminum Probe: PPS GF40
Dimensions		max. $\varnothing 94$ mm (3.7 inch), length 391 mm (15.4 inch)

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**Technical Data**

Process connection	thread R1 acc. to EN 10226, BSPT, adapter for R1-1/2 and G1-1/2 see accessories thread NPT1 to ANSI B 1.20.1, adapter for NPT1-1/4 see accessories
<b>Data for application in connection with hazardous areas</b>	
EU-type examination certificate	see instruction manuals (SI)
<b>Directive conformity</b>	
Directive 2014/34/EU	EN 60079-0:2012+A11:2013 , EN 60079-11:2012 , EN 60079-31:2009
<b>General information</b>	
Supplementary documentation	technical information (TI) manuals, brief instructions (BA, KA) instruction manuals (SI)
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	- LCL-Z10 cover with sight glass for F14 housing - LCL-Z11 adapter for R1-1/2, EN 10226 - LCL-Z12 adapter for G1-1/2, DIN ISO 228 - LCL-Z13 adapter for NPT1-1/4, steel - LCL-Z15 adapter for NPT1-1/4, 1.4571

**Type Code**

This overview does not mark options which are mutually exclusive.

L	C	L	1	-	(1)	K	-	(2)	(3)	(4)	-	(5)
<b>LCL</b>		<b>Device</b>										
LCL		Capacitive limit switch										
<b>1</b>		<b>Design</b>										
1		Device with rod probe										
<b>(1)</b>		<b>Process connection</b>										
Threads												
N3		NPT1, ANSI, PPS										
R3		R1, EN 10226, PPS										
<b>K</b>		<b>Probe length</b>										
K		140 mm										
<b>(2)</b>		<b>Housing</b>										
C		Polyester housing F14, IP66, NEMA 4, thread NPT1/2										
H		Aluminium housing F34, IP66, NEMA 4X, thread NPT1/2										
I		Aluminium housing F34, IP66, NEMA 4X, thread G1/2										
J		Aluminium housing F34, IP66, NEMA 4X, cable gland M20										
P		Polyester housing F14, IP66, NEMA 4, cable gland M20										
Q		Polyester housing F14, IP66, NEMA 4, thread G1/2A										
<b>(3)</b>		<b>Electrical connection</b>										
E5		3-wire, PNP, 10,8 V DC to 45 V DC										
WA		Relay, potential-free change-over contact, 20 AC to 253 V AC, 20 V DC to 55 V DC										
<b>(4)</b>		<b>Additional equipment</b>										
N		without additional equipment										
D		Cover with sight glass										
<b>(5)</b>		<b>Approval</b>										
NA		Version for non-explosion-hazardous area										
CS		CSA, DIP Cl.II, Gr.E-G, Cl.III										
CG		CSA General Purpose										
EX		ATEX II 1/2D Ex ta/tb IIIC T <sub>200</sub> 105°C Da/Db										
FS		FM, DIP Cl.II,III, Gr.E-G, T5										

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**Connection**

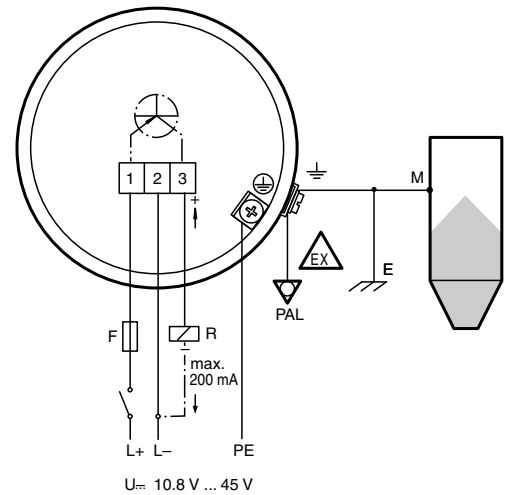
**Electronic insert E5**

3-wire DC connection

- F: fine-wire fuse, 500 mA
- R: connected load, e. g. PLC, DCS, relay
- M: connection to ground, silo or metal parts silo
- E: grounding

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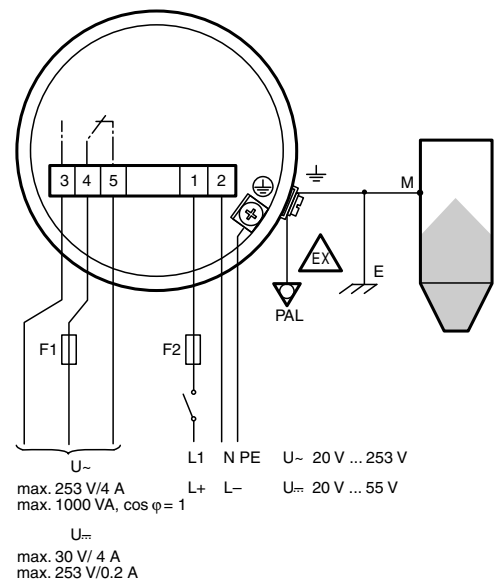


**Electronic insert WA**

AC/DC connection with relay output

- F1: fine-wire fuse for the protection of the relay contact, dependent on the connected load
- F2: fine-wire fuse, 500 mA
- M: connection to ground, silo or metal parts silo
- E: grounding

PE-connection and PAL-connection for LCL1 are unnecessary.



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