RusAutomation

Features

- Limit switch for bulk solids
- Compact device
- No calibration: easy commissioning (plug and play)
- Insensitive to build-up: maintenance-free operation
- No mechanically moving parts: no wear, long operating life
- Sensor material stainless steel: hardly any abrasion even with building materials
- Insensitive to external vibration and flow noises

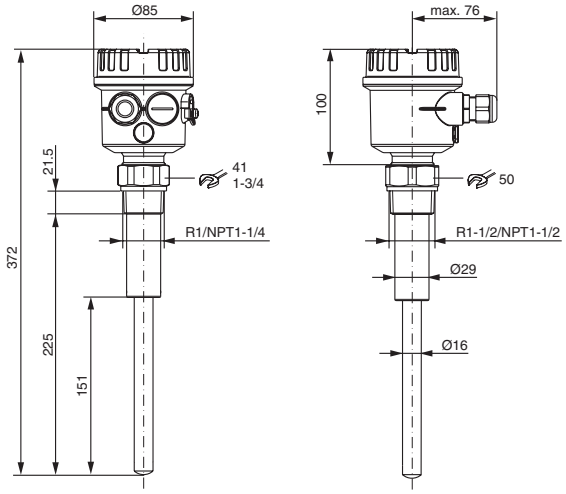
Function

The device is a robust level limit switch for silos with fine-grained or coarse-grained, non-fluidised bulk solids.

The various designs means the device has a wide range of applications. Certificates are also available for use in dust incendive hazard areas.

Typical applications:
cereals, coffee beans, sugar, animal feed, rice, detergents, dye powder, chalk, gypsum, cement, sand, plastic granules

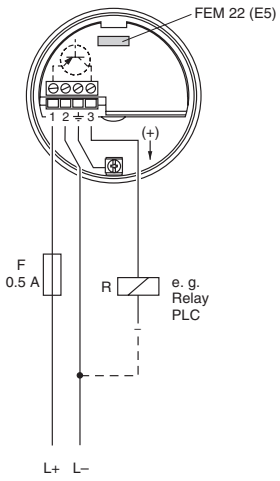
Assembly



Connection

Connection FEM 22 (E5) 3-wire DC connection (example)

- preferably for use with memory programmable controls (PLC), DI modules as per EN 61131-2
- positive signal at the electronics switch output (PNP)
- Output blocked at level limit.



U – 10 V ... 45 V (DC)

Other connection types see section electrical connection.

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General specifications		
Measuring method		A piezoelectric drive excites the vibrating rod of the device to its resonance frequency. If medium covers the vibrating rod, the rod's vibrating amplitude changes (the vibration is damped). The electronics of the device compare the actual amplitude with a target value and indicates whether the vibrating rod is vibrating freely or whether it is covered by medium.
Equipment architecture		The measuring system consists of: - the device with electronic insert - a supply point - the connected control systems, switching units, signalling systems (e. g. lamps, horns, PCS, PLC, etc.)
Construction type		compact device
Operating mode		MAX = maximum safety: 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 MIN = minimum safety: The device switches if the probe is uncovered or if the supply voltage is disconnected in a safetyoriented manner (signal on alarm). example application: dry-running protection
Supply		
Rated voltage	U_r	electronic insert FEM22 (E5): 10 ... 45 V DC electronic insert FEM24 (WA): 19 ... 253 V AC, 50/60 Hz or 19 ... 55 V DC
Ripple		electronic insert FEM22 (E5): max. 5 V, 0 ... 400 Hz
Current consumption		electronic insert FEM22 (E5): max. 18 mA
Power consumption		electronic insert FEM22 (E5): max. 0.81 W electronic insert FEM 24 (WA): max. 1.3 W
Reverse polarity protection		separation voltage 2.2 kV
Electrical specifications		
Surge protection		electronic insert FEM22 (E5) : overvoltage category III
Input		
Input signal		probe covered - small amplitude probe not covered - large amplitude
Measured variable		level (according to the mounting location and the overall length)
Measurement range		The measuring range depends on the mounting location of the device
Output		
Load		electronic insert FEM22 (E5): - load switched via transistor and separate PNP connection - load current: max. 45 V (cyclical overload and short-circuit protection), continuous max. 350 mA - residual current: < 100 µA (for blocked transistor) - capacitive load: max. 0.5 µF for 45 V, max. 1.0 µF for 24 V - residual voltage: < 3 V (for transistor switched through) electronic insert FEM24 (WA): - loads switched via 2 floating change-over contacts - version AC: I max. 6 A, U max. 253 V; P max. 1500 VA, cos ϕ = 1, P max. 750 VA, cos ϕ > 0.7 - version DC: I max. 6 A to 30 V, I max. 0.2 A to 125 V - the following applies when connecting a functional extra-low voltage circuit with double insulation as per IEC 1010: sum of voltages of relay output and power supply max. 300 V
Switch-on delay	t_{on}	correct switching after max. 3 s
Output signal		digital
Signal on alarm		electronic insert FEM22 (E5): output signal on power failure or in the event of device failure - < 100 µA electronic insert FEM24 (WA): output signal in event of power failure - relay de-energised
Galvanic isolation		
Input/power supply		electronic insert FEM22 (E5)
Input/Other circuits		electronic insert FEM24 (WA)
Directive conformity		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2006 , EN 61326-2-3:2006
Low voltage		
Directive 2014/35/EU		electronic insert FEM24 (WA) : EN 61010-1:2010
Conformity		
Electromagnetic compatibility		NE 21
Degree of protection		IEC 60529:2001
Vibration resistance		EN 60068-2-27
Climate class		EN 60068, part 2-38, fig. 2a
Measurement accuracy		
Measuring frequency		700 ... 800 Hz
Switching time		when covering the sensor approx. 0.5 s, when uncovering the sensor approx. 1.0 s
Operating conditions		
Installation conditions		

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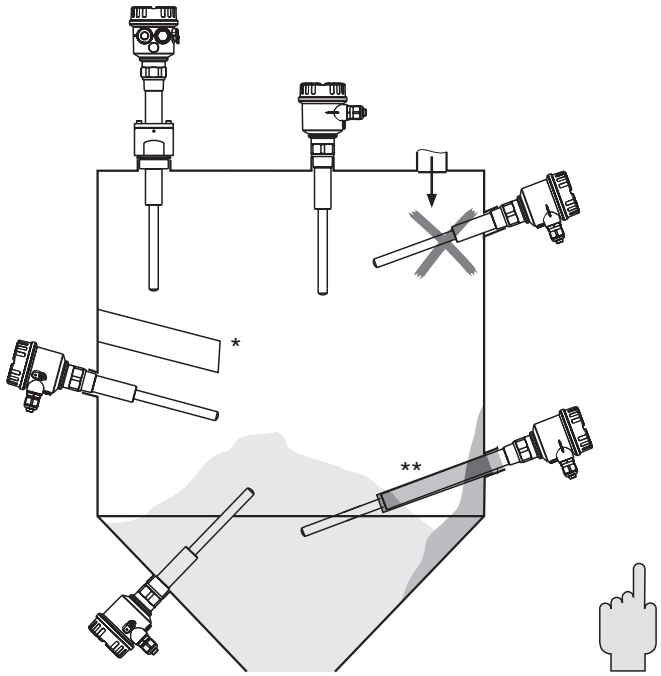
Installation position	see section mounting position
Process conditions	
Process temperature	-40 ... 150 °C (-40 ... 302 °F)
Medium pressure limits	-1 ... 25 bar max. working pressure 25 bar, burst pressure 100 bar
Thermal shock resistance	max. 120 K
State of aggregation	solids
Solid contents	≤ Ø25 mm
Bulk density	≥ 200 g/l, not fluidised
Ambient conditions	
Ambient temperature	-40 ... 70 °C (-40 ... 158 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Mechanical specifications	
Degree of protection	IP66/IP67, NEMA 4X
Connection	gland M20 thread G1/2, NPT1/2
Material	F16 housing: PTB-FR, cover with transparent glass made of PA12, EPDM cover seal F18 housing: aluminum EN-AC-AlSi10Mg, plastic coated cover seal: EPDM process connections, sensor: stainless steel 1.4435/316L
Mass	device with F16 housing, electronic insert FEM24 (WA) and R1 thread: approx. 1.0 kg
Dimensions	max. Ø85 mm (3.3 inch), length 372 mm (14.6 inch)
Process connection	thread R1, R1-1/2 acc. to DIN 2999 thread 1-1/4 - 11-1/2 NPT, 1-1/2 - 11-1/2 NPT acc. to ANSI B 1.20.1
Data for application in connection with hazardous areas	
EC-Type Examination Certificate	KEMA 06 ATEX 0055
Group, category, type of protection	Ⓔx II 1/3D Ex ta/tc IIIC T170°C Da/Dc
Directive conformity	
Directive 2014/34/EU	EN 60079-0:2012 , EN 60079-31:2009
International approvals	
IECEx approval	IECEx DEK 11.0068
Approved for	Ex ta/tc IIIC T170°C Da/Dc
General information	
Supplementary documentation	technical information (TI) manuals, brief instructions (BA, KA) instruction manuals (SI)
Supplementary information	EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity, Attestation of Conformity and instructions have to be observed where applicable. For information see www.pepperl-fuchs.com.

Mounting position



Horizontal installation/vertical installation
* with protective cover (to be provided by customer)
** with protecting tube (to be provided by customer)

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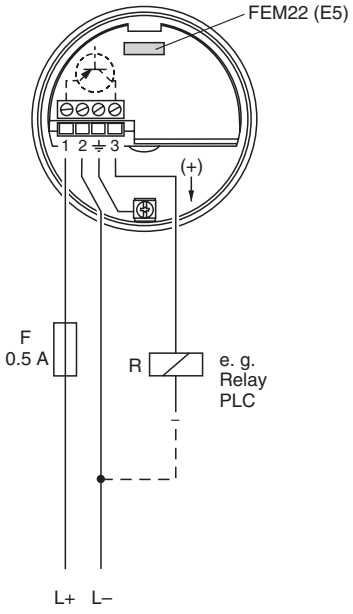
Electrical connection

Electronic insert FEM22 (E5)

Three-wire DC connection

- preferred in conjunction with programmable logic controllers (PLC), DI modules as per EN 61131-2
- positive signal at electronics switch output (PNP)
- Output blocked at level limit.



U ⎓ 10 V ... 45 V (DC)

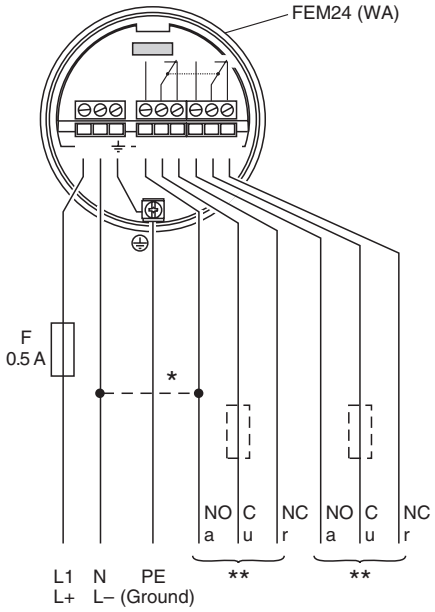
Electronic insert FEM24 (WA)

Universal current connection with relay output

- Power supply:
  Please note the different voltage ranges for AC and DC.
- When connecting a device with high inductance, provide a spark arrester to protect the relay contact.
  A fine-wire fuse (depending on the load connected) protects the relay contact in the event of a short-circuit. Both relay contacts switch simultaneously.
  DPDT (double pole double throw)

* When jumpered, the relay output works with NPN logic.

** see "Connectable load"



U ≂ 19 V ... 253 V (AC) U ⎓ 19 V ... 55 V (DC)

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Type Code

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

Device	
LVL	Vibration limit switch

Design	
B1	Compact device

Process connection	
N3	Thread NPT1-1/4, ANSI, 1.4435/316L
N5	Thread NPT1-1/2, ANSI, 1.4435/316L
R3	Thread R1, DIN 2999, 1.4435/316L
R5	Thread R1-1/2, DIN 2999, 1.4435/316L
XX	Special version

Housing, cable entrance	
A6	Aluminium housing F18, IP66/IP67, NEMA 4X, cable gland M20
A7	Aluminium housing F18, IP66/IP67, NEMA 4X, thread NPT3/4
A8	Aluminium housing F18, IP66/IP67, NEMA 4X, thread G1/2
C2	Polyester housing F16, IP66/IP67, NEMA 4X, cable gland M20
Q3	Polyester housing F16, IP66/IP67, NEMA 4X, thread NPT1/2
P4	Polyester housing F16, IP66/IP67, NEMA 4X, thread G1/2A

Electrical output	
E5	FEM22, 3-wire, PNP, 10 V DC ... 45 V DC
WA	FEM24, relay, DPDT, 19 V AC ... 253 V AC, 19 V DC ... 55 V DC

Additional equipment	
A	Basic version

Approval	
NA	Version for non-hazardous area
CU	CSA General Purpose, CSA C US
EX	ATEX II 1/3D Ex ta/tc IIIC T170°C Da/Dc
IK	IECEx Ex ta/tc IIIC T170°C Da/Dc