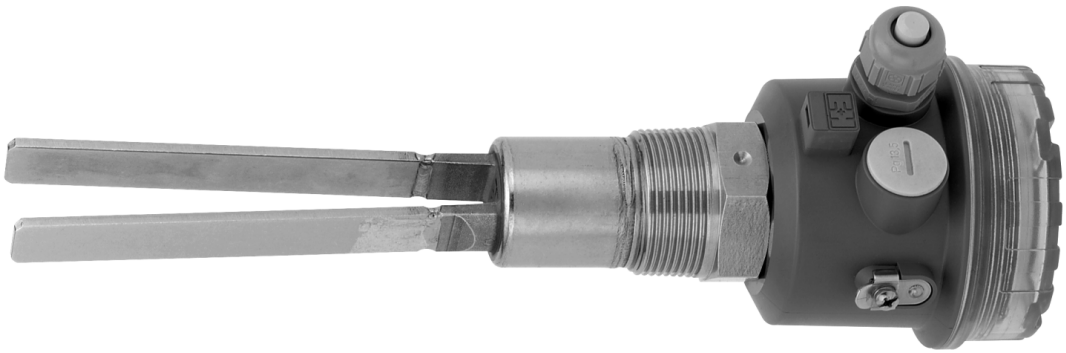
Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Soliphant T FTM260

Level limit switch
Cost-effective vibration limit switch for fine-grained solids



Application
Soliphant is a rugged level limit switch for use in silos containing fine-grained and powdery solids (up to 10 mm).
Its design and constructional materials also make it suitable for foodstuff applications.

Examples:
grain, flour, milk powder, cocoa, sugar, animal feed, washing powders, dyes, chalk, plaster, cement, plastic granulates

Your benefits

- No calibration:
  quick and low-cost start-up
- Insensitive to build-up:
  maintenance-free
- No mechanical moving parts:
  no wear, long operating life
- Various electronic inserts:
  optimum adaptability to the plant process
- External switching status:
  simple control

TI238F/00/en

Endress+Hauser
People for Process Automation

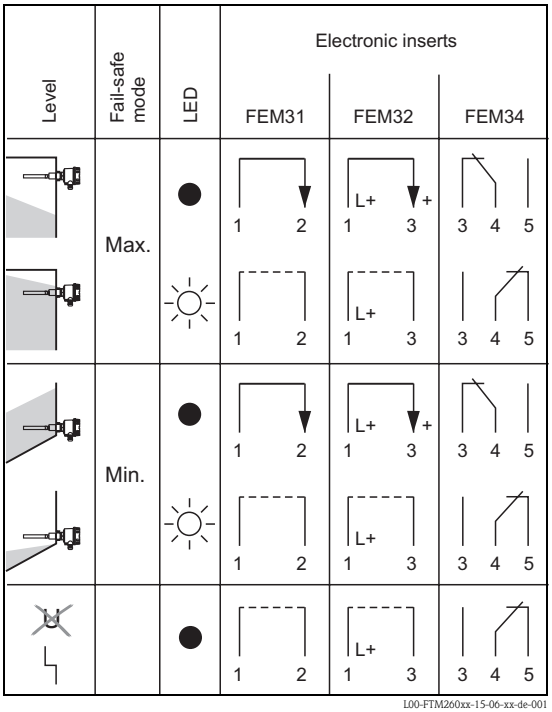
Table of contest

Function and system design

Measuring principle

The symmetrical vibrating fork is excited to its resonant frequency. Vibration characteristics change when the fork is submerged in solid material. The change is registered by the electronics which actuate an electronic switch or relay.
The tip of the Soliphant fork is particularly sensitive, while the base of the fork is completely insensitive. This enables solids of very low density to be detected even with material build-up on the vessel walls.

The function of the electronic switch or relay and the LED is dependent on both the level and fail-safe mode selected



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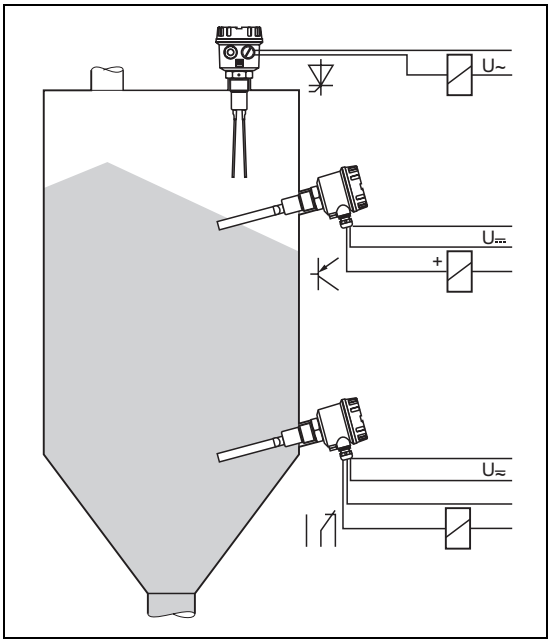
Soliphant FTM260 can be operated in both minimum or maximum fail-safe mode, i.e. the electronic switch opens or the relay de-energises on reaching the limit value, on a fault or on a loss of power.

Measuring system

Soliphant FTM260 is a compact limit switch to which miniature contactors, solenoid valves and programmable logic controllers (PLC) can be directly connected.



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Output

Signal on alarm

Output open or relay de-energised

Connectable load

- with FEM31
  (The load is switched directly via a thyristor in the power circuit)
  Short-term (40 ms) max. 1.5 A, max. 375 VA at 250 V or max. 36 VA at 24 V
  (no short circuit protection),
  continuous max. 87 VA at 253 V, max. 8.4 VA at 24 V,
  min. 2.5 VA at 253 V (10 mA), min. 0.5 VA at 24 V (20 mA);
  Voltage drop across FEM 31 max. 12 V at load current >10 mA
  (max. 10 V at load current >20 mA);
  Quiescent current max. 3.8 mA with open thyristor
- with FEM32
  (The load is switched via a transistor and separate PNP connection)
  Short-term (1 s) max. 1 A, max. 55 V
  (cyclic overload and short-circuit protection),
  continuous max. 350 mA,
  max. 0.5 µF at 55 V, max. 1.0 µF at 24 V;
  Residual voltage <3 V (with closed transistor);
  Residual current <100 µA (with open transistor)
- with FEM34
  (The load switched via a potential-free changeover contact)
  I~ max. 6 A, U~ max. 253 V,
  P~ max. 1500 VA, cos φ = 1, P~ max. 750 VA, cos φ > 0.7;
  I– max. 6 A bis 30 V, I– max. 0.2 A to 125 V;
  Additional switching delay 0.3 s

Switch behaviour

approx. 0.6 s when covered,
approx. 1.4 s when free

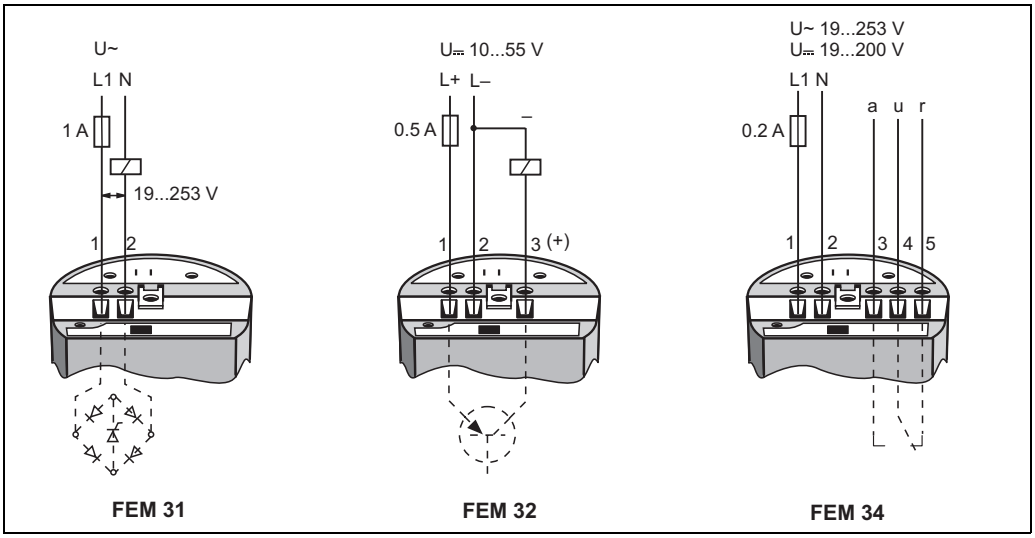
Fail-safe mode

Minimum or maximum fail-safe mode, switchable

Power supply

Electrical connection

Screw terminals on electronic insert for max. 2.5 mm² wire in end sleeve A 2.5 - 7 to DIN 46 228



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Electronic insert FEM31

Two-wire AC connection (thyristor)

Note!
Always connect in series with the load!

Check the following:

- the residual current in blocked state (up to 3.8 mA)
- that for low voltage
  - the voltage drop across the load such so that the minimum terminal voltage at the electronic insert (19 V) when blocked is not too low.
  - the voltage drop across the electronic insert when open is observed (up to 12 V).
- that a relay cannot de-energise with a retaining current below 3.8 mA.
  If this is the case, a resistor should be connected parallel to the relay.

Electronic insert FEM32

Three-wire DC connection (transistor, PNP)

Designed to be connected to programmable logic controllers (PLC).
Positive signal at switching output of the electronic insert (PNP).

Electronic insert FEM34

Universal connection (relay, potential-free changeover contact)

Potential-free changeover contact.

Supply voltage

- Output with FEM31
  Voltage at Terminals 1 and 2: 19...253 V, 50/60 Hz,
  Current consumption (stand-by) max. 3.8 mA
- Output with FEM32
  10...55 V, ripple max. 1.7 V, 0...400 Hz,
  Current consumption max. 15 mA, protection against reverse polarity
- Output with FEM34
  AC 19...253 V, 16...60 Hz or DC 19...200 V,
  Current consumption max. 7 mA

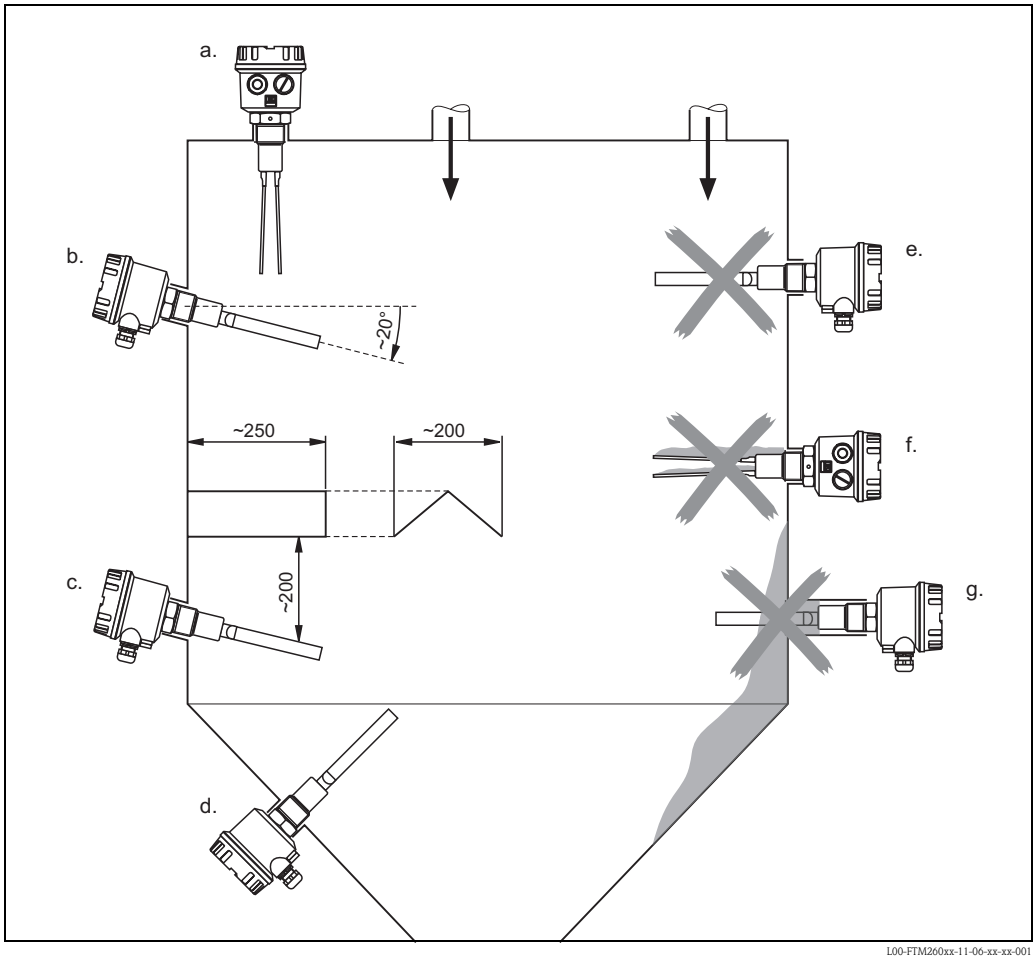
Installation

Note!
All dimensions in mm

100 mm = 3.94 in

Installation instructions

Mounting location



Left: correct

a. vertically mounted from above; any fork position

b. laterally mounted with fork angled slightly downwards, nozzle length max. 60 mm

c. with roof (length approx. 250 mm, width approx. 200 mm) to protect against collapsing mounds

d. in discharge hopper

Right: incorrect

e. in filling curtain

f. false orientation of the fork (high load on the wide surface of the fork caused by discharging material; malfunction due to residual material)

g. mounting nozzle too long

Orientation

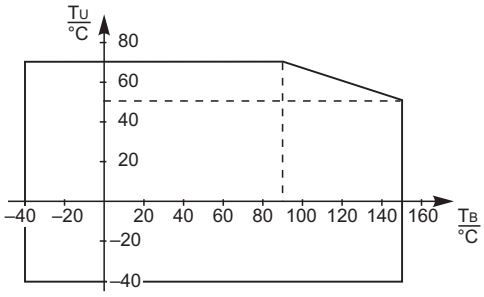
The Soliphant FTM260 may be installed at any orientation in a vessel containing bulk solids.

Environment

Ambient temperature	–40 °C...+70 °C (–40°F…+160°F), see also "Temperature diagram"
Storage temperature	–40 °C...+85 °C (–40°F…+185°F)
Climate class	Climatic protection according to IEC 68, Part 2-38, Fig. 2a
Degree of protection	IP66 according to DIN 40050
Mechanical load on fork	600 N, lateral (on fine edges of tines), static
Electromagnetic compatibility	Interference Emission to EN 61326, Electrical Equipment Class B Interference Immunity to EN 61326, Annex A (Industrial) and NAMUR Recommendation NE 21 (EMC)

Process

Medium temperature	–40 °C...+150 °C (–40°F…+300°F), see also "Temperature diagram"
Temperature diagram	Permissible values for ambient temperature T_U at housing are dependent on the operating temperature T_B in the silo:



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x °C = (1.8 x + 32)°F

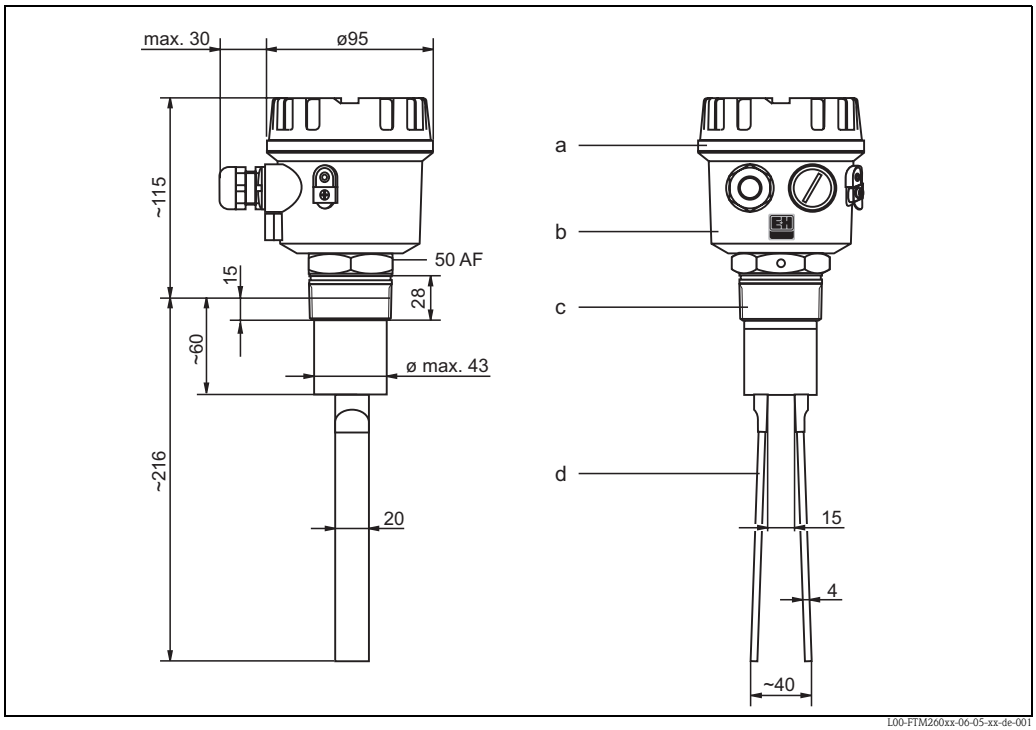
Bulk density of material	min. 100 g/l
Grain size of material	up to 10 mm (0.4 in)
Operating pressure p_e	–1 bar...+16 bar (–14.5…+230 psi), burst pressure >40 bar

Mechanical construction

Note!
All dimensions in mm

100 mm = 3.94 in

Design, dimensions



a. The transparent cover shows the LED which indicates the switching mode

b. Plastic housing,
Protection IP66, with cable gland versions

c. Process connections:
– R 1½, DIN 2999, (tapered)
in stainless steel
– 1½" NPT, (tapered)

d. Vibrating fork in solid stainless steel with high mechanical resistance to lateral loads

Weight

approx. 1.1 kg with electronic insert

Material

- Process connection and vibrating fork: stainless steel AISI 304 (1.4301) and AISI 316Ti (1.4571)
- Housing (F14): polyester
- Transparent cover: polyamide
- O-ring seal: EPDM
- Cable gland M20x1.5: polyamide with Neoprene-CR seal

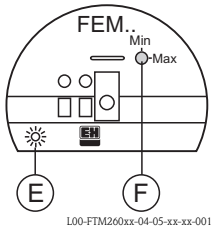
Process connection

Tapered thread R 1½, DIN 2999;
Tapered thread 1½" NPT

Human interface

Display elements, operating elements

The plug-in electronic insert can be easily replaced with another electronic insert - without calibration



E = LED indicates switching status

F = Fail-safe mode is selected by turning a switch

Ordering information

Product structure

20	**Process Connection**					
	G	Thread	DIN2999		R1½	304
	N	Thread	ANSI		NPT1½	304
	Y	Special version				
30		**Electronics; Output**				
	Y	Special version				
	1	FEM31	2-wire			19...253 V AC
	2	FEM32	3-wire		PNP	10...55 V DC
	4	FEM34	relay			19...253 V AC/200 V DC
	8	not selected				
40			**Housing; Cable Entry**			
	B	F14	Polyester		NEMA4X	thread NPT½
	C	F14	Polyester		IP66	thread G½
	D	F14	Polyester		IP66	gland M20
	R	F14	Polyester		IP66	thread NPT½
		CSA GP, non transparent cover				
	S	F14	Polyester		IP66	gland M20
		CSA GP, non transparent cover				
	Y	Special version				

FTM260	Complete product designation

Supplementary Documentation

Technical Information

General information on EMC
TI241F/00

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