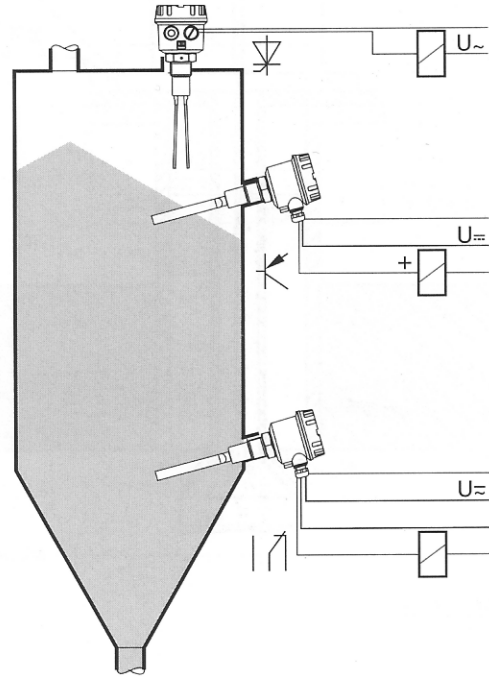




LIMIT SWITCH SOLIPHANT T

FTM 260



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. 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

Features and 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

Measuring System

Soliphant FTM 260 is a compact limit switch to which miniature contactors, solenoid valves and programmable logic controllers (PLC) can be directly connected

Function

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

Soliphant FTM 260 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.

Level	Fail-safe mode	LED	Electronic insert		
			FEM 31	FEM 32	FEM 34
Max.	●	●	1 2	1 L+ 3	3 4 5
	☀	☀	1 2	1 L+ 3	3 4 5
Min.	●	●	1 2	1 L+ 3	3 4 5
	☀	☀	1 2	1 L+ 3	3 4 5
	☒	●	1 2	1 L+ 3	3 4 5

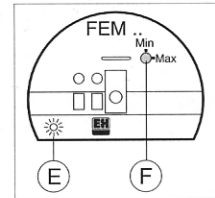
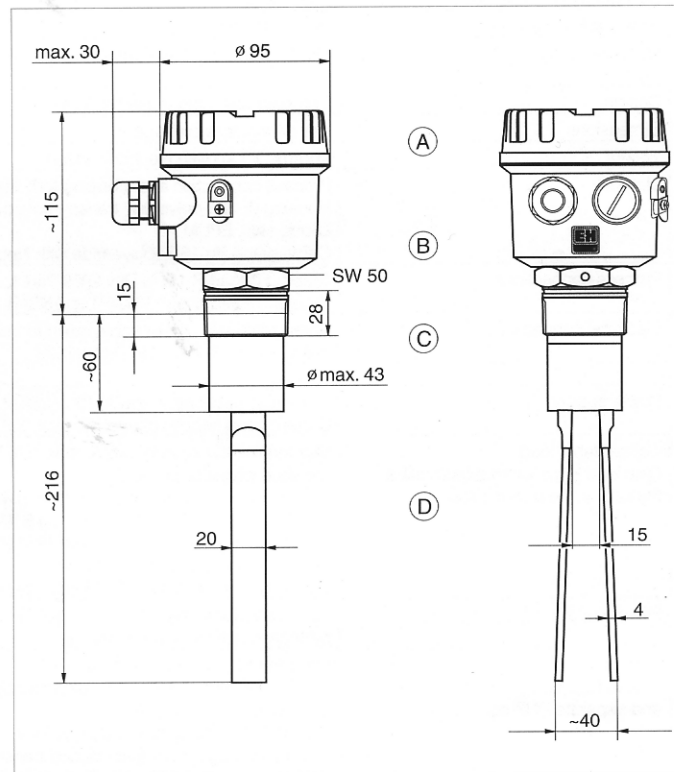
The symmetrical vibrating fork is excited to its resonant frequency. Vibration characteristics change when the fork is submerged in solid material. The change is registered by the electronics which actuate an electronic switch or relay.

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.

Dimensions

All dimensions in mm
100 mm = 3.94 in
1 in = 25.4 mm

- A The transparent cover shows the LED which indicates the switching mode.
- B Plastic housing, Protection IP 66, with cable gland versions
- C Process connections:
 - 1 1/2 - 11 1/2 NPT (tapered)
 - R 1 1/2, DIN 2999, (tapered) in stainless steel
- D Vibrating fork in solid stainless steel with high mechanical resistance to lateral loads



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

Versions:
FEM 31, Two-wire AC connection (thyristor)
FEM 32, Three-wire DC connection (transistor, PNP)
FEM 34, Universal connection (relay, potential-free changeover contact)

E LED indicates switching status

F Fail-safe mode is selected by turning a switch

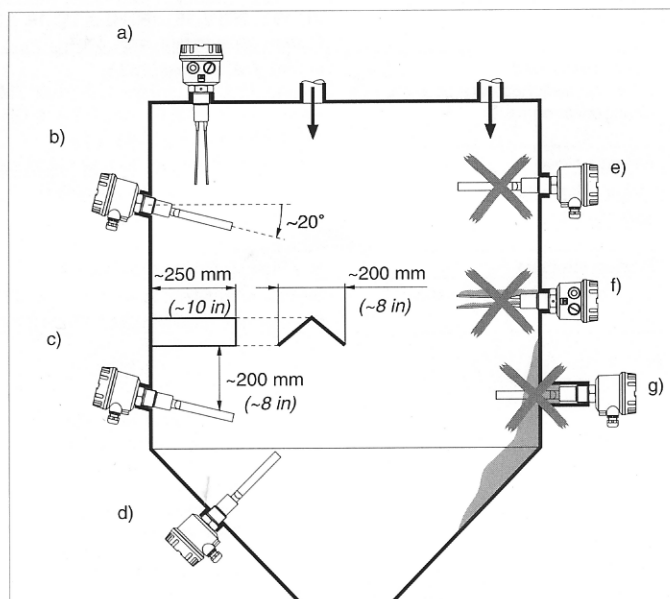
Installation

The Soliphant FTM 260 may be installed at any orientation in a vessel containing bulk solids.

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

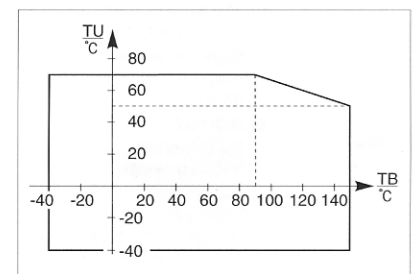
- e) in filling curtain
- f) false orientation of the fork (high load on the wide surface of the fork caused by discharging material; malfunction due to residual material)
- g) mounting nozzle too long

Technical Data

General Specifications	Manufacturer	Endress+Hauser GmbH+Co. D-79689 Maulburg
	Instrument family and type	Soliphant T FTM 260
	Function	Limit switch (binary) for powdery and fine-grained bulk solids
Application conditions	Orientation	Any position
	Ambient temperature	-40 °C ... +70 °C (-40... +160 °F), see also diagram below on this page
	Product temperature	-40 °C ... +150 °C (-40... +300 °F), see also diagram below on this page
	Operating pressure p_e	-1 bar ... +16 bar (-14.5...+230 psi), burst pressure >40 bar
	Storage temperature	-40 °C... +85 °C
	Climatic protection	Climatic protection to IEC 68, Part 2-38, Fig. 2a
	Ingress protection	IP 66 to DIN 40 050
	Electromagnetic compatibility	By attaching the CE mark, Endress+Hauser confirms that the Soliphant FTM 260 fulfils all legal requirements of EC directives. Interference immunity to EN 50082-2 (field strength 10 V/m), Interference emission to EN 50081-1
	Bulk density of material	min. 100 g/l
	Grain size of material	up to 10 mm (0.4 in)
	Mechanical load on fork	600 N, lateral (on fine edges of tines), static
Design	Design	Compact unit, plug-in electronic insert
	Dimensions	see dimensions on Page 2
	Weight	approx. 1.1 kg with electronic insert
	Material	Process connection and vibrating fork: stainless steel 1.4301 (SS 304); Housing (F 10): polyester; transparent cover: polyamide; O-ring seal: EPDM Cable gland Pg 13.5: polyamide with Neoprene-CR seal
	Process connections	Tapered thread R 1 1/2 to DIN 2999 Part 1; Tapered thread 1 1/2 - 11 1/2 NPT to ANSI B 1.20.1
	Electrical connection	Screw terminals on electronic insert for max. 2.5 mm ² wire in end sleeve A 2.5 - 7 to DIN 46 228
Output with electronic insert FEM 31	Power supply	Voltage at Terminals 1 and 2: 19 ... 253 V, 50 / 60 Hz, Current consumption (stand-by) max. 3.8 mA
	Connectable load (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
Output with electronic insert FEM 32	Power supply	10 ... 55 V, ripple max. 1.7 V, 0 ... 400 Hz, current consumption max. 15 mA, protection against reverse polarity
	Connectable load (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)
Output with electronic insert FEM 34	Power supply	AC 19 ... 253 V, 16 ... 60 Hz or DC 19 ... 200 V, Current consumption max. 7 mA
	Connectable load (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 to 30 V, I- max. 0.2 A to 125 V; Additional switching delay 0.3 s
Output, general information	Fail-safe mode	Minimum or maximum fail-safe mode, switchable
	Power failure signal	Output open or relay de-energised
	Switching time	Approx. 0.6 s when covered, approx. 1.4 s when free
Ordering	Product structure	See Product Structure on Page 4
	Supplementary documentation	System Information "Soliphant II" - SI 024F/00/e General information on EMC - TI 241F/00/e

Permissible values for ambient temperature T_U at housing are dependent on the operating temperature T_B in the silo

$$x^{\circ}\text{C} = (1.8 \cdot x + 32)^{\circ}\text{F}$$



Electrical Connection

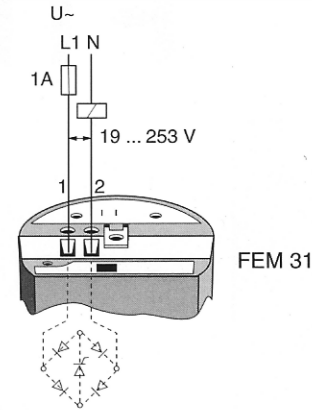
Electronic insert FEM 31

Two-wire AC connection

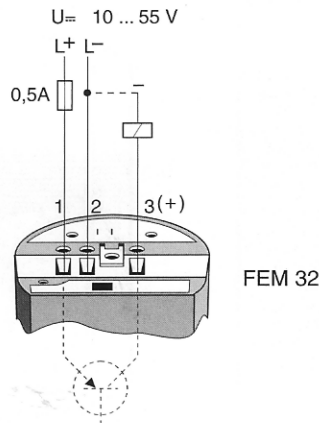
Always connect in series with the load!

Check the following:

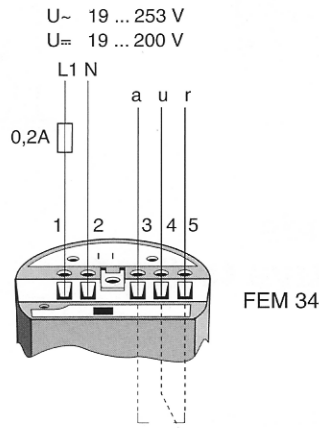
- the residual current in blocked state (up to 3.8 mA)
- that for low voltage - the voltage drop across the load such so that the minimum terminal voltage at the electronic insert (19 V) when blocked is not too low.
- the voltage drop across the electronic insert when open is observed (up to 12 V).
- 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.



FEM 31



FEM 32



FEM 34

Electronic insert FEM 32

Three-wire DC connection

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

Electronic insert FEM 34

Universal AC/DC connection

Potential-free changeover contact.

Product Structure Soliphant T

FTM 260 Level limit switch

Process Connection

- G R 1 ½, DIN 2999 (tapered)
- N 1 ½- 11 ½ NPT (tapered)

Electronics

- 1 FEM 31, two-wire AC connection, U~: 19 ... 253 V
- 2 FEM 32, three-wire DC connection, U=: 10 ... 55 V
- 4 FEM 34, universal AC/DC connection, relay output, potential-free changeover contact
- 8 No electronic insert

Housing and Cable Gland

- A Plastic, IP 66, Pg 13.5
- B Plastic, IP 66, NPT ½"
- C Plastic, IP 66, G ½
- D Plastic, IP 66, M 20 x 1.5

FTM 260-