

# Limit Switch *soliphant T FTM 260*

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



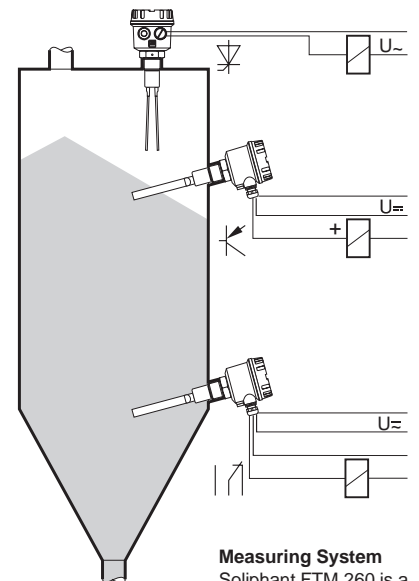
## Application

Soliphant is a rugged level limit switch for use in silos containing fine-grained and powdery solids. Its design and construction 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.

Endress + Hauser

Nothing beats know-how



# 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	Electronic insert			
		LED	FEM 31	FEM 32	FEM 34
Max.	●				
	☀				
Min.	●				
	☀				

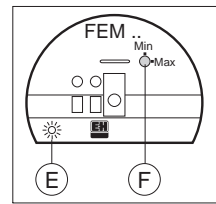
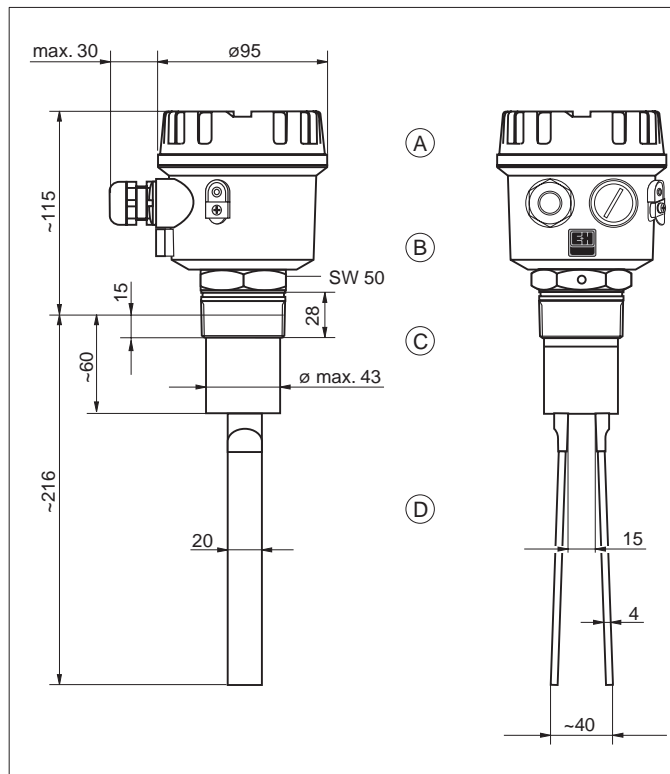
The symmetrical vibrating fork is excited to its resonant frequency. Vibration characteristics change when the fork is submerged in solid material. The change is registered by the electronics which actuate an electronic switch or relay.

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:
  - 1½ - 11½ NPT (tapered)
  - R 1½, 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

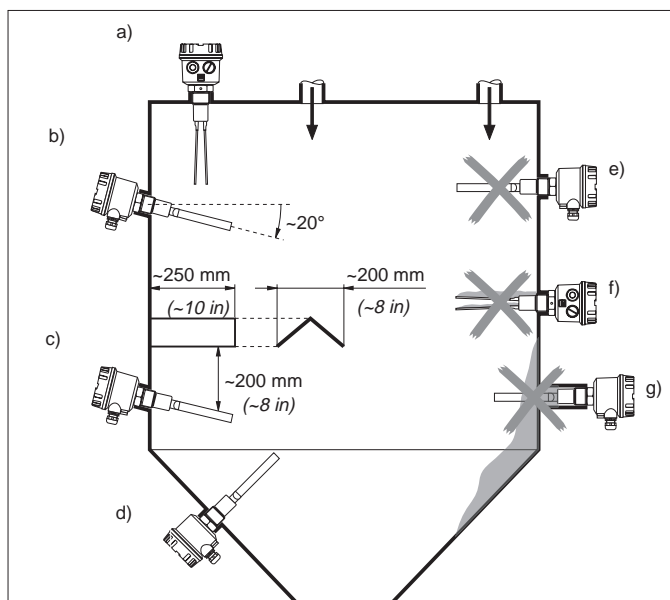
- Versions:
- FEM 31**, Two-wire AC connection (thyristor)
  - FEM 32**, Three-wire DC connection (transistor, PNP)
  - FEM 34**, Universal connection (relay, potential-free changeover contact)

- 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 (SS304); 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 1½ to DIN 2999 Part 1; Tapered thread 1½ - 1½ NPT to ANSI B 1.20.1
Electrical connection	Screw terminals on electronic insert for max. 2.5 mm² 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

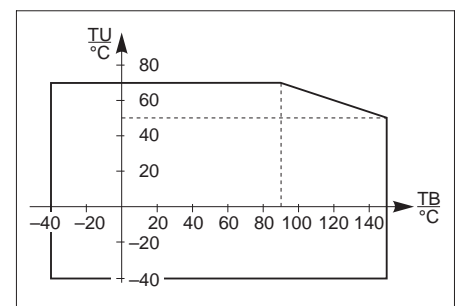
## Output, general information

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

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


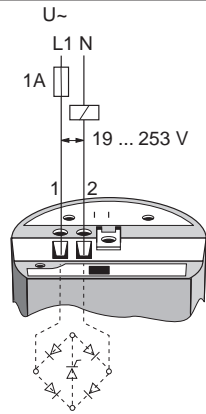
# Electrical Connection

## Electronic insert FEM 31

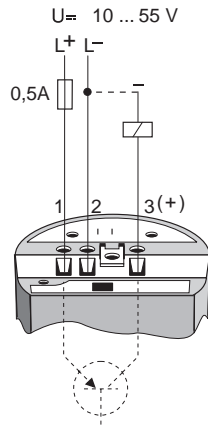
### Two-wire AC connection

Always connect in series with the load!  
Check the following:

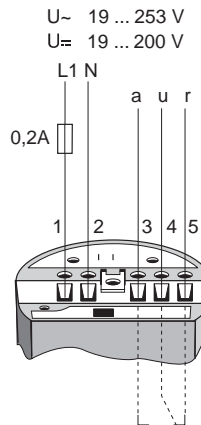
- the residual current in blocked state (up to 3.8 mA)
- that for low voltage – the voltage drop across the load such so that the minimum terminal voltage at the electronic insert (19 V) when blocked is not too low.
- the voltage drop across the electronic insert when open is observed (up to 12 V).
-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

with relay output  
Potential-free changeover contact.

## Product Structure Soliphant T

FTM 260 Level limit switch

### Process Connection

G R 1½, DIN 2999 (tapered)  
N 1½ - 11½ 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- [ ] [ ] [ ] [ ] product designation

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