

Technical information

Soliphant M

FTM50, FTM51, FTM52

Vibronic

Universal point level switch for fine-grained bulk solids



Application

Soliphant M is a robust point level switch for silos with fine-grained or dusty bulk solids even with a low bulk weight.

The various designs mean the device has a wide range of applications.

Many certificates are available for use in dust or gas incensive hazard areas.

FTM50:

Compact design for installation in any position. A wide range of applications thanks to various variations e.g.

- Polished short fork with stainless steel housing (F15) and Tri-Clamp
- Coated standard fork with aluminum housing (F17) and flange
- Standard fork with 280 °C (536 °F) rating and aluminum housing (F13)

FTM51:

With extension pipe up to 4 m (13 ft) for installation in any position

FTM52:

With rope up to 20 m (66 ft) for installation from above

Typical applications:

Cereals, flour, cocoa, sugar, animal feed, detergents, dye powder, chalk, gypsum, cement, plastic granules, fly ash

Your benefits

- Market leader in the area of level detection of bulk solids
- Functional safety up to SIL 2 as per IEC 61508
- No mechanically moving parts: no wear, long operating life
- Insensitive to external vibrations and build-up
- Various electronic inserts: e.g. NAMUR, relay, thyristor and PFM-signal outputs for optimum alignment with the plant control system
- Configurable density setting (bulk weight setting) and switching delay
- Process temperature up to 280 °C (536 °F)
- Choice of coated or polished sensor
- Diagnostic function: warning in the event of impending device failure due to buildup or abrasion

Cable specifications

Within the indicated standards and guidelines to interference immunity (see also "Electromagnetic compatibility", → [12](#)) a normal instrument cable is sufficient. If higher interference levels are present, a shielded cable must be used.

Immunity to temperature change of connecting cable

The connecting cables must withstand the ambient temperature +5 K.

Connecting cables

- Electronic inserts: cross-section max. 2.5 mm² (13 AWG); strand in ferrule to DIN 46228
- Protective ground in housing: cross-section max. 2.5 mm² (13 AWG)
- Equipotential bonding connection on housing: cross-section max. 4 mm² (11 AWG)

Cable entry

Housing-specific: screw terminal on electronic insert.

Input

Measured variable

Level (according to the mounting location and the overall length)

Measuring range (detection range)

- FTM50: overall length see, → [17](#)
- FTM51: overall length 300 to 4000 mm (11.8 to 157 in)
- FTM52: overall length 750 to 20000 mm (29.5 to 787 in)

The measuring range of Soliphant M depends on the medium, mounting location and fork length. The detection range is located within the length of the fork.

Distinction between the forks:

- For light media:
Standard fork with a fork length of 155 mm (6.1 in) (bulk weight of the medium ≥ 10 g/l)
- For confined installation conditions, high lateral load or increased buildup:
Short fork with a fork length of 100 mm (3.94 in) (bulk weight of the medium ≥ 50 g/l)

Input signal

- Probes covered => little to no vibrating amplitude
- Probes not covered => large vibrating amplitude

Selectable frequency monitoring (diagnosis) for detection of abrasion and build-up.

Measuring frequency

- Standard fork: approx. 140 Hz (in air)
- Short fork: approx. 350 Hz (in air)

Output

Galvanic isolation

- FEM51, FEM52, FEM55: Between sensor and power supply
- FEM54: Between sensor, power supply and load
- FEM57, FEM58: See switching unit connected

Switch-on behavior

When the power supply is switched on the switching status of the outputs corresponds to "signal on alarm". The correct switching status is assumed after a maximum of 3 s.

Fail-safe mode

Minimum/maximum residual current safety selectable on electronic insert.
(with FEM57 only at Nivotester).

MAX = maximum safety:

The output switches safety-oriented when the fork is covered (signal on alarm)

For use with overfill prevention for example.

MIN = minimum safety:

The output switches safety-oriented when the fork is uncovered (signal on alarm)

For use with dry running protection for example.

Signal on alarm

Output signal on power failure or in the event of device failure: I_R

Connectable load

- For relays with a minimum holding power/rated power > 2.5 VA at 253 V (10 mA) or > 0.5 VA at 24 V (20 mA)
- For relays with a maximum holding power/rated power < 89 VA at 253 V or 8.4 VA at 24 V
- Voltage drop across FEM51 max. 12 V
- Residual current with blocked thyristor max. 4 mA (5.5 mA for short fork)
- Load current max. 350 mA (short-circuit proof)

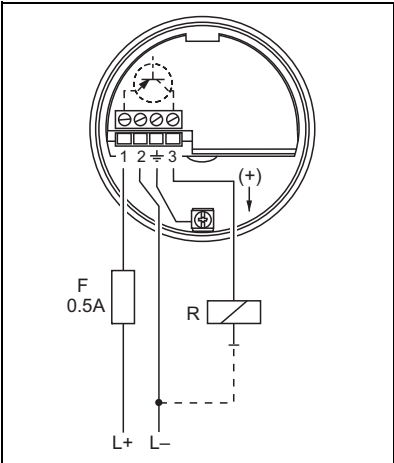
FEM52 electronic insert
(DC PNP)

Power supply

- DC voltage: 10 to 55 V
- Ripple: max. 1.7 V, 0 to 400 Hz
- Current consumption: max. 16 mA
- Power consumption: max. 0.86 W
- Reverse polarity protection/short-circuit protection
- Separation voltage: 3.6 kV
- FEM52 overvoltage protection: overvoltage category III

Three-wire DC connection

Preferably used with programmable logic controllers (PLC), DI modules as per EN 61131-2.
Positive signal at switching output of the electronics (PNP).



DC: $U = 10\text{ V to }55\text{ V}$

Output signal

I_L = load current (switched through)

I_R = residual current (blocked)

☀ = lit

☀ = flashes

● = unlit

* See also "Operating elements", → 23

Safety mode	Level	Output signal	LEDs green yellow red
MAX		$L+ \xrightarrow{I_L} 3$	☀ ☀ ●
		$1 \xrightarrow{I_R} 3$	☀ ● ●
MIN		$L+ \xrightarrow{I_L} 3$	☀ ☀ ●
		$1 \xrightarrow{I_R} 3$	☀ ● ●
Maintenance required *		$1 \xrightarrow{I_L / I_R} 3$	☀ ● ☀
Instrument failure		$1 \xrightarrow{I_R} 3$	☀ ● ☀

L00-FTM5xxxx-04-05-xx-en-007

Signal on alarm

Output signal on power failure or in the event of device failure: < 100 μ A

Connectable load

- Load switched via transistor and separate PNP connection, max. 55 V
- Load current max. 350 mA (pulsed overload and short-circuit protection)
- Residual current < 100 µA (with transistor blocked)
- Capacitance load max. 0.5 µF at 55 V, max. 1.0 µF at 24 V
- Residual voltage < 3 V (with transistor switched through);

FEM54 electronic insert (AC/DC with relay output)

Power supply

- Alternating voltage AC: 19 to 253 V, 50/60 Hz
- DC voltage: 19 to 55 V
- Power consumption: max. 1.5 W
- Reverse polarity protection/short-circuit protection
- Separation voltage: 3.6 kV
- FEM54 overvoltage protection: overvoltage category II

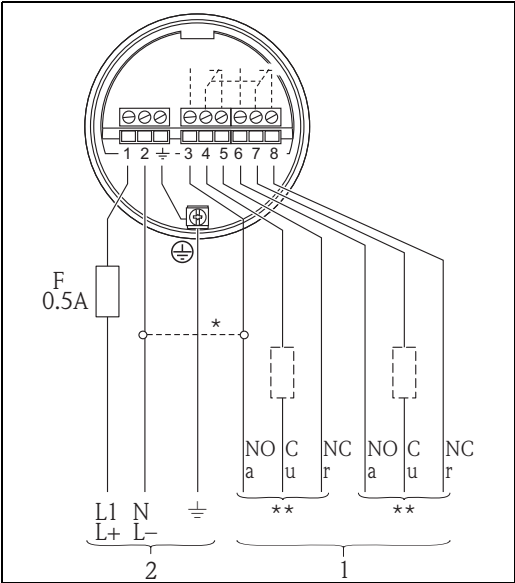
Universal current connection with relay output (DPDT)

Note!
Please note the different voltage ranges for AC and DC.

Output:
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 on short-circuiting. The relay contacts switch simultaneously.

- * When jumpered, the relay output works with NPN logic.
- ** See "Connectable load"

- 1 Relay outputs: normally open/closed (NO, NC)
- 2 AC: U~19 to 253 V, DC: U=19 to 55 V



Output signal

- ⏏ = relay energized
- ⏏ = relay de-energized
- ☀ = lit
- ⚡ = flashes
- = unlit

* See also "Operating elements",
→ 23

Safety mode	Level	Output signal	LEDs green yellow red
MAX			
MIN			
Maintenance required *			
Instrument failure			

L00-FTM5xxxx-04-05-xx-en-008

Signal on alarm

Output signal on power failure or in the event of device failure: relay de-energized

Connectable load

- Loads switched via 2 floating change-over contacts (DPDT)
- AC: I~ max. 6 A (Ex de 4 A), U~ max. 253 V; P~ max. 1500 VA, cos ϕ = 1, P~ max. 750 VA, cos ϕ > 0.7
- DC: I= max. 6 A (Ex de 4 A) to 30 V, I= max. 0.2 A to 125 V
- The following applies when connecting a functional low-voltage circuit with double isolation as per IEC 1010: Sum of voltages of relay output and power supply max. 300 V

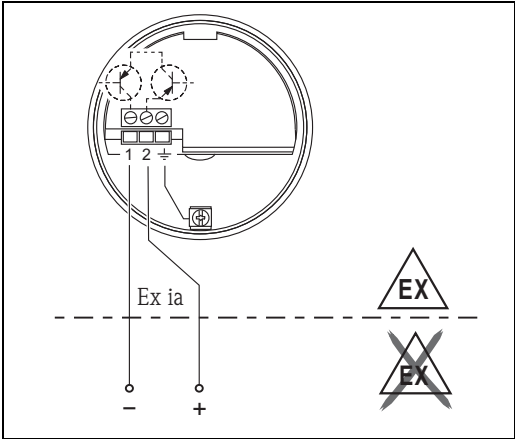
FEM55 electronic insert
(8/16 mA)

Power supply

- DC supply voltage: 11 to 36 V
- Power consumption: < 600 mW
- Reverse polarity protection/short-circuit protection
- Separation voltage: 3.6 kV
- FEM55 overvoltage protection: overvoltage category III

Two-wire connection
for separate switching unit

For connecting to programmable logic controllers (PLC), AI modules 4-20 mA to EN 61131-2.
Output signal jump from high to low current on point level.



L00-FTM5xxxx-04-05-xx-xx-000

U= 11 to 36 e.g. PLC

Output signal

~ 16 mA = 16 mA ± 5 %

~ 8 mA = 8 mA ± 6 %

☀ = lit

☀ = flashes

● = unlit

* See also "Operating elements", → 23

Safety mode	Level	Output signal	LEDs		
			green	yellow	red
MAX		+ 2 ~16 mA → 1	☀	☀	●
		+ 2 ~8 mA → 1	☀	●	●
MIN		+ 2 ~16 mA → 1	☀	☀	●
		+ 2 ~8 mA → 1	☀	●	●
Maintenance required *		+ 2 8/16 mA → 1	☀	☀	●
		 3.6 mA	☀	●	☀
Instrument failure		+ 2 3.6 mA → 1	●	●	☀

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Signal on alarm

Output signal on power failure or in the event of device failure: < 3.6 mA

Environment

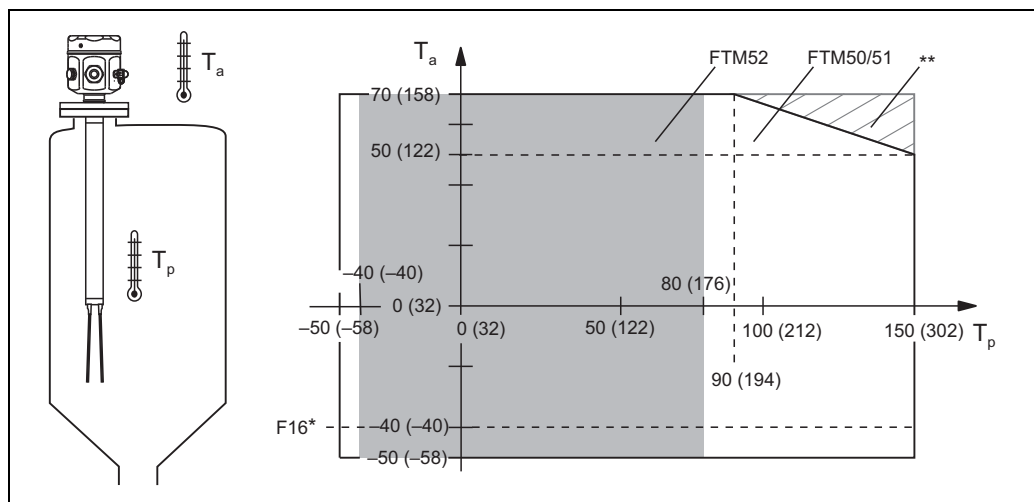
Ambient temperature range	-50 °C to +70 °C (-58 °F to +158 °F); With F16 housing: -40 °C to +70 °C (-40 °F to +158 °F)
Storage temperature	-50 °C to +85 °C (-58 °F to +185 °F)
Climate class	Climate protection as per DIN IEC 68, Part 2-38, Fig. 2a
Degree of protection	<ul style="list-style-type: none"> ■ Housing F15, F16, F17, separate housing: IP66/IP67, NEMA4X ■ Housing F13, T13, F27: IP66/IP68, NEMA4X/6P
Vibration resistance	To EN 60068-2-64: 0.01 g ² /Hz
Shock resistance	To EN 60068-2-27: 30 g
Electrical safety	IEC 61010, CAN/CSA-C22.2 No. 61010-1-04 US standard UL 61010-1, 2 nd Edition
Electromagnetic compatibility	<ul style="list-style-type: none"> ■ Interference emission to EN 61326, Equipment Class B, ■ Interference immunity to EN 61326; Annex A (Industrial) and NAMUR Recommendation NE21 (EMC).

Process

Medium temperature limits	Non-hazardous area and Ex d + DIP certificates (Ex ia certificates see Seite 35, "Certificates")
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NOTICE

Permitted ambient temperature T_a at housing depending on the process temperature T_p in the container.



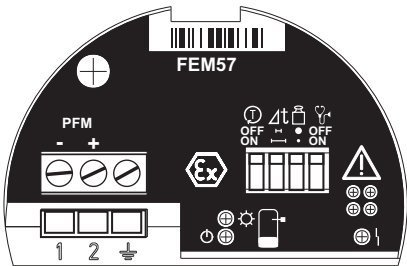
* Restriction to -40 °C with F16 housing

** Additional temperature range for sensors (FTM50, FTM51) with temperature spacer

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FEM57

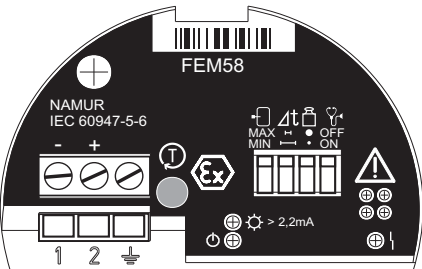
- Green LED lit:
Indicates operational status
- Yellow LED lit:
Indicates covered status
- Red LED
 - flashing: indicates maintenance is required
 - lit: indicates device failure



L00-FTM5xxxx-03-05-xx-xx-007

FEM58

- Green LED flashing:
Indicates operational status
- Yellow LED lit:
Indicates switching status
- Red LED
 - flashing: flashes alternately with green LED if maintenance is required
 - flashing: indicates device failure



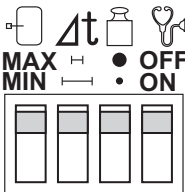
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NOTICE

If the test key is pressed this breaks the cable connection.

Operating elements of
FEM51, FEM52, FEM54,
FEM55, FEM58

Factory setting:



L00-FTM5xxxx-19-05-xx-xx-001

	Switch for safety mode	
	MAX	Overfill prevention
	MIN	Dry running protection
4t	Switch for switching delay	
	—	0.5 s when covered 150 °C (302 °F): 1.5 s when uncovered (short fork 1 s) 230/280 °C (446/536 °F): 2 s when uncovered (short fork 1 s)
	—	5 s when covered, 5 s when uncovered
	Switch for bulk weight/density setting	
	●	50 g/l standard fork, 200 g/l short fork (high bulk weight)
	•	10 g/l standard fork, 50 g/l short fork (low bulk weight)
	Switch for diagnosis	
	OFF	Diagnosis of abrasion and buildup switched OFF
	ON	Diagnosis of abrasion and buildup switched ON <ul style="list-style-type: none">■ For additional density setting to high bulk density: abrasion and build-up are indicated per LED at the electronic insert only■ For additional density setting to low bulk density: output of "signal on alarm" for abrasion and build-up