

# Level Limit Switch *soliswitch FTE 31*

**Economical paddle limit switch for application in  
dust hazardous explosive areas**



## Features and benefits

- simple operation
- proven principle
- slip clutch
- ingress protection to IP 65 / NEMA 4x / Type 4x

## Application areas

The universal paddle level limit switch FTE 31 is used as a full, empty and demand alarm on silos containing solids. Its construction and materials make the unit suitable for use in the food industry.

The unit is suitable as a level limit switch in dust explosion hazardous areas.

Typical applications are level detection in:

- Cereals
- Sugar
- Cacao
- Animal feeds
- Washing powders
- Chalk
- Dry plaster
- Cement
- Granulates
- Wood chips

Endress + Hauser

The Power of Know How

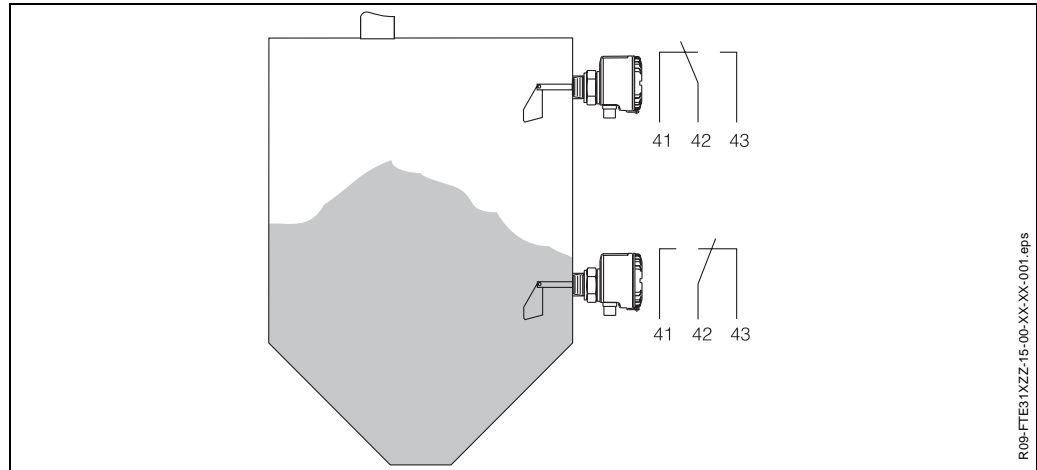


## Function and system construction

### Measurement principle

The shaft and paddle are driven using a reduction gear and synchronous motor. If the paddle is stopped by material covering it, the hinged motor in the housing moves from the rest to the switch position. This movement operates two switch contacts, the first is for external level indication and the second switches the power off to the motor.

The paddle starts to rotate once the medium level falls below the paddle, the hinged motor returns to its rest position and the two contacts switch to normal operation. Intermittent loads that operate against or even in the same direction of rotation are evened out by using a slip clutch.



*Level measurement changeover contact*

### System

Complete level measurement limit switch, paddle, shaft with synchronous motor and slip clutch, single pole double throw switch.

## Input values

### Measurement value

Level of solids

### Range

Variable types dependent on:

- Installation point
- Length of shaft or rope

## Output values

### Output signal

Binary, once the set level is reached the micro switch contact changes.

### Output circuit

Connectable load:  
 $\leq 250$  VAC, 10 A nominal current, 3 A on motor

### Switch output

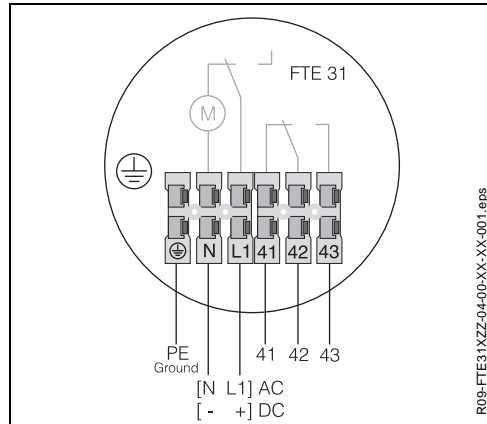
Potential free changeover contact (SPDT)

### Switch delay

Approx. 2 seconds

## Power supply

### Electrical connection



Terminal layout FTE 31

AC	DC	
PE		Earth (ground) connection
N	-	Power connection
L	+	Power connection
41		Normally closed contact
42		Common contact
43		Normally open contact

### Cable entry

Power supply and signal cable (in-/output):

- Thread for cable gland [½" NPT]

### Power supply

Standard:

- 230 V AC, 50/60 Hz (-15%...+10%)

Option:

- 115 V AC, 50/60 Hz (-15%...+10%)
- 20...28 V DC

### Power consumption

AC:  $P < 4,5 \text{ VA}$ ; DC:  $P < 3,5 \text{ W}$

### Current requirement

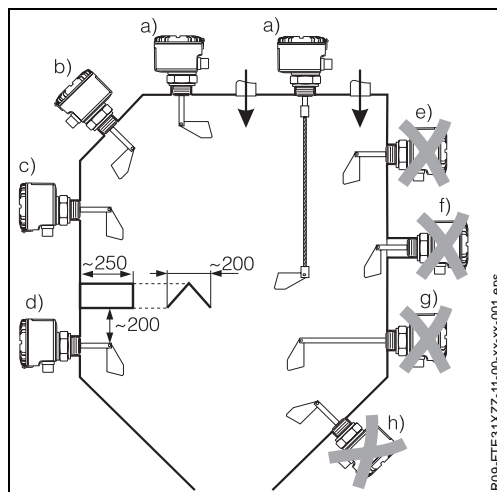
DC:  $I_{\text{max}} \leq 66 \text{ mA}$

## Application conditions (installation)

### Installation hints

Installation position:

- horizontal (up to shaft length >300 mm) or vertical (see diagram)
- side load on the shaft max. 60 N
- Load on the rope max. 1500 N



Installation of the FTE 31 paddle level limit switch  
Dimensions in mm.

Correct installation	Incorrect installation
a) Vertical from top of silo	e) In direction of solids flow
b) Angled from the top	f) Installation coupling too long
c) From the side	g) Horizontal with shaft length > 300 mm
d) With protective cover against falling solids	h) Angled from below

The FTE 31 paddle limit switch can be installed in solids silos as shown under points a, b, c and d.

## Application conditions (environment)

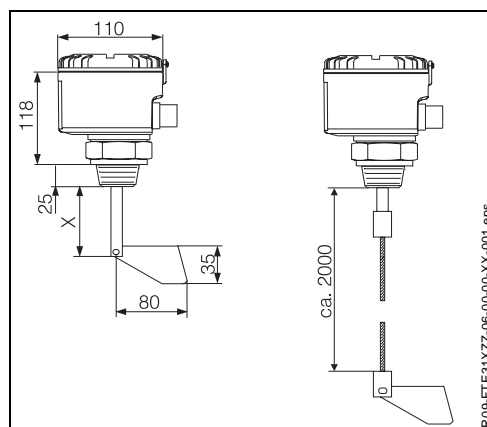
<b>Ambient temperature</b>	- 20 °C ... + 60 °C
<b>Storage temperature</b>	- 20 °C ... + 60 °C
<b>Ingress protection</b>	<ul style="list-style-type: none"> <li>• IP 65 / NEMA 4x / Type 4x with closed cover</li> <li>• IP 20 / NEMA 1 with open cover</li> </ul>
<b>Vibration protection</b>	IEC 654-3, dimension V.S.1 ( $v < 3$ mm/s, $1 < f < 150$ Hz)
<b>EMC</b>	To EN 61 326, Class B
<b>Protection class</b>	I
<b>Over voltage protection category</b>	II

## Application conditions (process)

<b>Material temperature range</b>	- 20 °C ... + 80 °C
<b>Operating pressure range</b>	0.5 bar ... 1.8 bar
<b>Material conditions</b>	Solids - grain size $\leq 50$ mm
<b>Product density (solids weight)</b>	100 g/l

## Mechanical construction

### Model/dimensions



Construction of the compact unit - dimensions in mm.

### Shaft variations:

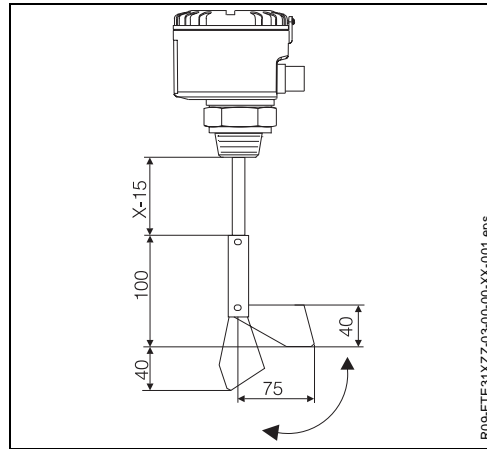
Standard shaft  $X = 75$  mm  
 Special length  $X$ :  
 100 mm, 200 mm, 300 mm, 400 mm, 500 mm,  
 600 mm

### Rope version:

Rope length approx. 2000 mm, can be shortened.



If the shaft length is  $> 300$  mm the FTE 31 can only be installed vertically downwards.



Hinged paddle - dimensions in mm

**Option hinged paddle:**

The paddle is hinged so that it can be easily mounted through a threaded mounting boss. Because it is spring loaded the paddle returns to its normal operation once inside the vessel. Removal of the unit is always possible.

The hinged paddle can be mounted to both the solid shaft as well as the rope extension versions.

<b>Weight</b>	approx. 1 kg
<b>Materials</b>	<p>Housing, cover and process connection:</p> <ul style="list-style-type: none"> <li>- VALOX 553 plastic with 30% fibre glass.</li> </ul> <p>Shaft:</p> <ul style="list-style-type: none"> <li>- Corrosion resistant steel 1.4435</li> </ul> <p>Paddle:</p> <ul style="list-style-type: none"> <li>- Corrosion resistant steel 1.4435</li> </ul> <p>Option:</p> <ul style="list-style-type: none"> <li>- Process connection - corrosion resistant steel 1.4435</li> <li>- Rope extension- corrosion resistant 1.4571 with corrosion resistant steel 1.4305 weight</li> <li>- Hinged paddle - corrosion resistant steel 1.4435</li> </ul> <p>O-ring seal:</p> <ul style="list-style-type: none"> <li>- NBR</li> </ul> <p>Shaft sealing ring:</p> <ul style="list-style-type: none"> <li>- NBR Perbunan</li> </ul> <p>Cable entries NPT 1/2 ":</p> <ul style="list-style-type: none"> <li>- Nickel plated brass</li> </ul>
<b>Shaft bearing</b>	High performance friction bearing - maintenance free
<b>Shaft revolution</b>	approx. 1 revolution per minute
<b>Process connection</b>	Threaded boss - thread NPT 1 1/4 "
<b>Electrical connection</b>	Plug-in terminals 2.5 mm <sup>2</sup> solid core, 1.5 mm <sup>2</sup> stranded with ferrule

## Certification



Recommendations to:

- 89/336/EWG
- 73/23/EWG



DIP Class II, Div. 1+2, Groups E, F, G and Class III



DIP Class II, Div. 1+2, Groups E, F, G and Class III

## Ordering information

Paddle switch Soliswitch FTE 31	
<p><b>Certification</b></p> <p>A Version for non hazardous areas</p> <p>B DIP Class II, Div. 1+2, Groups E, F, G and Class III</p> <p>C DIP Class II, Div. 1+2, Groups E, F, G and Class III</p>	
<p><b>Power supply</b></p> <p>1 230 V AC</p> <p>2 115 V AC</p> <p>3 24 V DC</p>	
<p><b>Process connection</b></p> <p>A Threaded boss NPT 1 1/4", Valox 553 (PBT)</p> <p>B Threaded boss NPT 1 1/4", 316L (1.4435)</p>	
<p><b>Version</b></p> <p>1 Compact version 75 mm shaft length</p> <p>2 2 m rope, can be shortened, material shaft 1.4401</p> <p>A Shaft 100 mm</p> <p>B Shaft 200 mm</p> <p>C Shaft 300 mm</p> <p>D Shaft 400 mm</p> <p>E Shaft 500 mm</p> <p>F Shaft 600 mm</p>	
<p><b>Paddle</b></p> <p>1 Standard 316Ti (1.4571)</p> <p>2 Hinged paddle 316L (1.4435)</p>	
FTE 31 -	1 ← Order code

<b>Accessories</b>	Hinged paddle for retro-fitting	Order no. 500 89768
<b>Further documentation</b>	Short form operating manual	KA 094R/09/a3

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