

# Level Measurement *silometer FMC 420, FMC 423*

## For connecting to capacitance probes or Deltapilot S hydrostatic probes



### Main applications

The Silometer is used for continuous level measurement in tanks containing liquids. The Silometer FMC 423 is also used as a level limit indicator or as a two point controller with adjustable switching differential.

The wide range of capacitance and hydrostatic probes (pressure sensors) allows measurement:

- in aggressive media
- at high pressures or vacuum
- at high or low temperatures
- in high or low viscous liquids
- in media where build-up is expected, etc.

The Silometer in the compact Minipac format for snap-on mounting

above: the simple, cost-effective Silometer FMC 420 measuring instrument. An LED on the front panel indicates stand-by

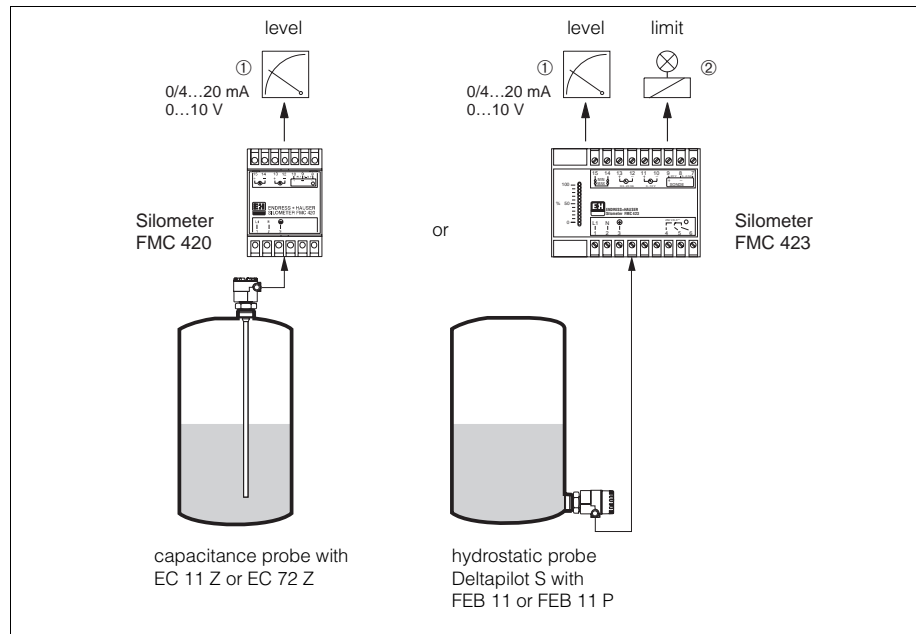
below: The Silometer FMC 423 with switching output, switching mode display and LED chain on the front panel to indicate level

# Endress + Hauser

Nothing beats know-how



# The Complete Measuring System



## The measuring system

① level-proportional analogue current and voltage output signals

② switching output for limit signals or two-point control

The complete measuring system consists of:

- Silometer FMC 420 or FMC 423 measuring instrument
- Sensor
  - capacitance probe with electronic insert (transmitter) EC 11 Z or EC 72 Z
  - or
  - hydrostatic probe Deltapilot S with transmitter FEB 11 or FEB 11 P

## Special Features

### Mechanical

Silometer FMC instruments in Minipac housing are ideal for control panel mounting. As compact units they can be mounted side by side on a standard symmetrical 35 mm DIN rail. Removable terminal blocks make them easy to wire up. The instruments can be replaced without resoldering the wiring.

Without control panel:

A wall mounting unit is available from E+H as an accessory for single mounting. A protective housing IP 55 with transparent cover is available for mounting in the open.

The calibration elements are located under the flip-up front panel and are easily accessible whilst being protected from unauthorized use.

The inside of the front panel shows diagrams to facilitate calibration.

### Electrical

Build-up on a capacitance probe:

This problem is usually solved by choosing the correct probe and the electronic insert EC 72 Z. A hydrostatic probe also operates where build-up occurs providing the material does not crystallise to form a hard crust.

Easy calibration:

Zero calibration is carried out when the container is empty and the measuring span (amplification) is adjusted when the container is full.

These instruments have the advantage that amplification is independent of the zero point.

The flashing row of LEDs on the front panel of the Silometer FMC 423 allows 0% and 100% to be set accurately without the use of auxiliary instruments. Calibration for two-point control in the FMC 423 is simple:

one press of a key, one turn with a screwdriver and a glance at a connected voltmeter are sufficient to calibrate each switchpoint independent of level to an accuracy of 1%.

## Operating Principle of the Silometer FMC

The Silometer supplies a DC current to the sensors with built-in transmitters and receives a level-proportional measuring signal of approx. 0 ... 4 mA. Standardised Silometer outputs of 0...10 V and 0...20 mA (or 4...20 mA) allow remote level indication.

In addition to analogue outputs, the Silometer FMC 423 also has a switchpoint output. The upper switchpoint can be adjusted between 2% and 100% and the lower switchpoint between 0% and the setting of the upper switchpoint. The smallest permissible difference is 2%.

The instrument can be operated in either minimum or maximum fail-safe mode:

### Minimum fail-safe mode

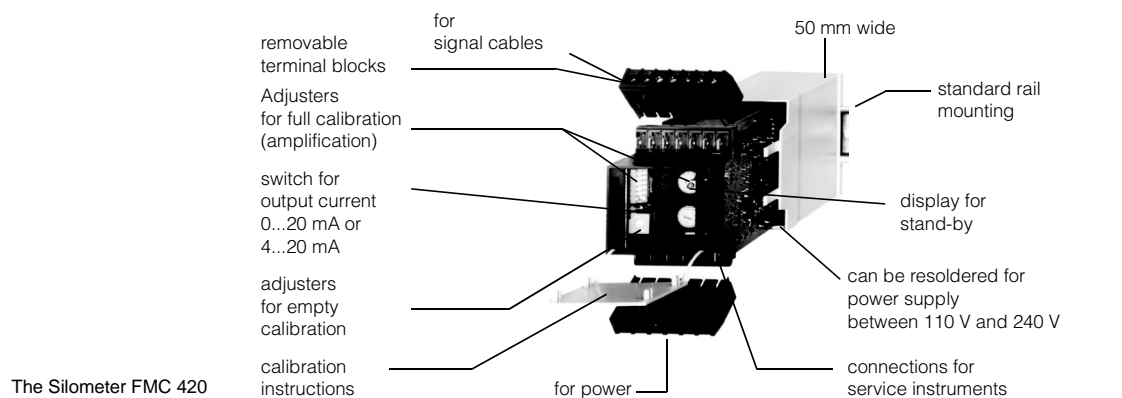
The relay de-energises when the level falls below the switchpoint or the power fails.

### Maximum fail-safe mode

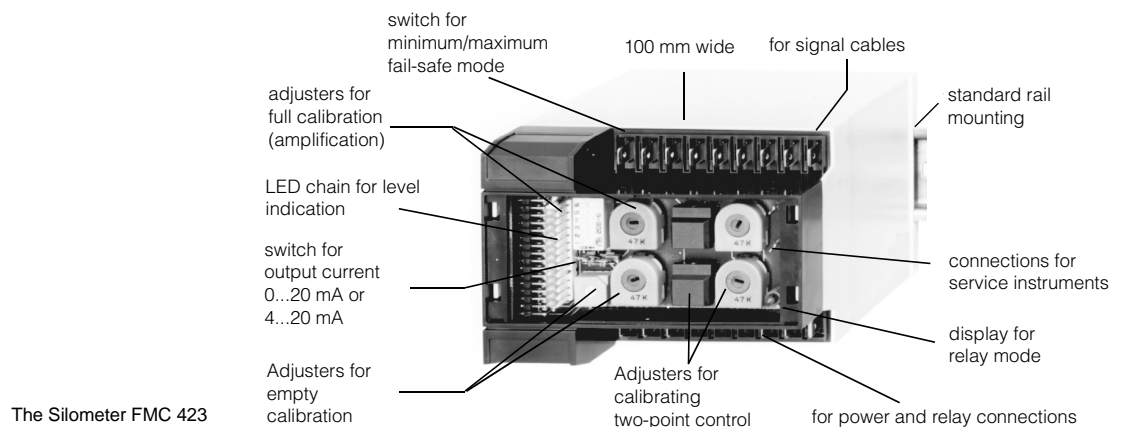
The relay de-energises when the level rises above the switchpoint or the power fails.

An LED shows switching status.

The row of LEDs on the front panel of the Silometer FMC 423 shows the level in 10% steps and is used for exact full and empty calibration without the use of auxiliary instruments.



The Silometer FMC 420



The Silometer FMC 423

## Installation

Mounting is usually done in a control cabinet on a symmetrical DIN rail (standard rail) conforming to EN 50022-35 x 7.5 or EN 50022 35 x 15. If the instruments are to be mounted side by side then the maximum ambient temperature in the control panel should be 50 °C. A distance of at least 10 mm should be kept between instruments, to allow a temperature maximum of 60 °C measured 1 cm above the row.

Further mounting variations: wall mounting or protective housing IP 55. See Technical Information TI 009F/00/en.

# Electrical Connection

The terminal block for power connection (and for relay contact in the FMC 423) is located at the bottom of the instrument with the terminal block for input and output signals at the top.

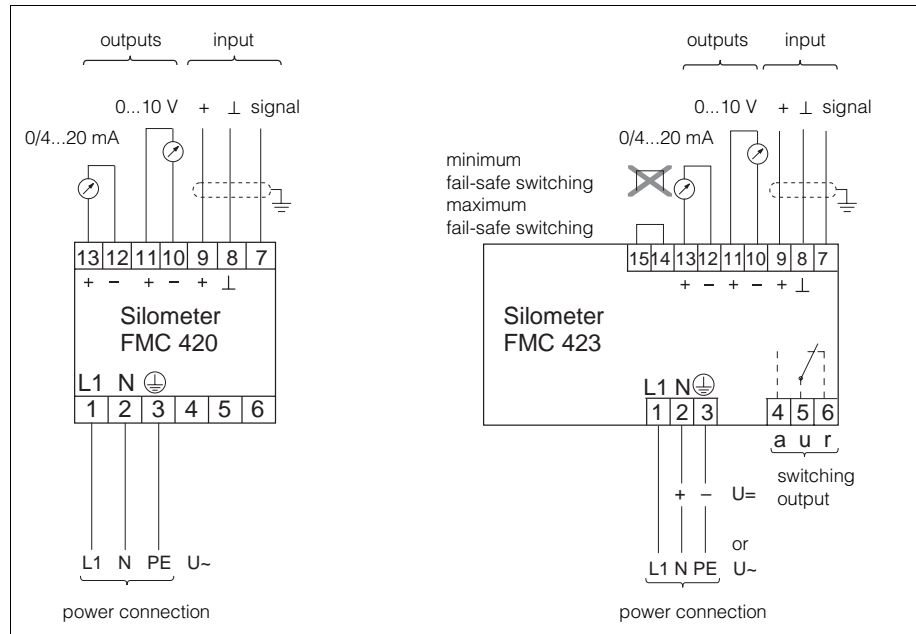
The potential-free signal outputs are electrically isolated from the vessel by a capacitor. They are also electrically isolated from the power supply.

Voltmeters, recorders, limit signal transmitters etc. can be connected in parallel to the 0...10 V voltage output provided the total load resistance is larger than 5 kΩ. The voltage output is protected against short-circuiting.

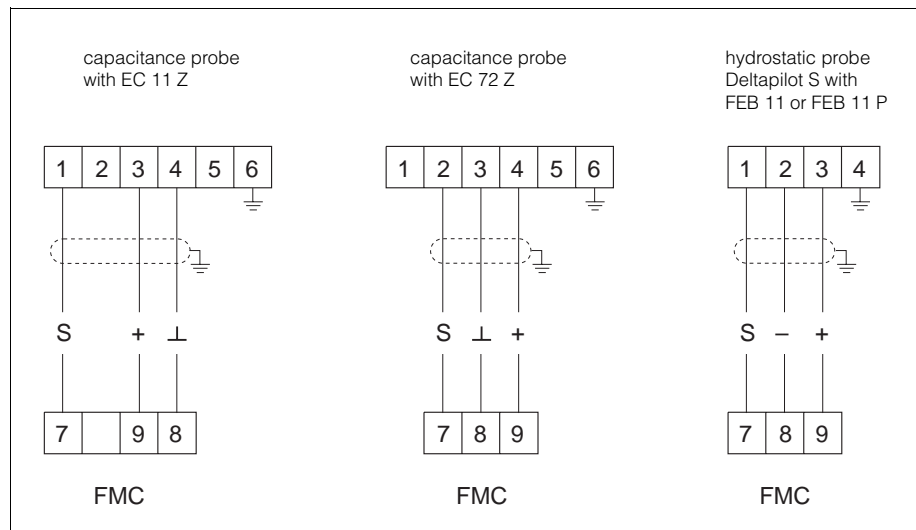
Ammeters, recorders, controllers etc. can be connected in series to the 0...20 mA or 4...20 mA current output provided the total load resistance is smaller than 500 Ω.

The current and voltage outputs are electrically connected, i.e. only one of the two outputs may be grounded (current output or voltage output).

Connecting diagram for the FMC 420, FMC 423



Connecting the probes to the Silometer (input)



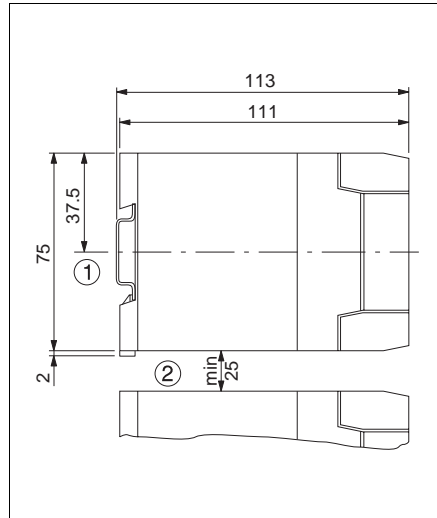
# Technical Data

## Construction

Housing: row housing (Minipac design) in light grey plastic, blue front panel

Mounting: on standard DIN rail conforming to EN 50022-35 × 7.5 or EN 50022-35 × 15

## Dimensions



- ① mounting with standard rail 35 × 7.5 or 35 × 15
- ② minimum distance between next instrument row above and below

Housing width FMC 420: 50 mm  
Housing width FMC 423: 100 mm

Weight FMC 420: 0.3 kg  
Weight FMC 423: 0.5 kg

Protection conforming to DIN 40050: housing IP 40, terminals IP 20

Ambient temperature:  
Single mounting:  
–20 °C...+60 °C (0...140 °F)  
Side by side row mounting:  
–20 °C...+50 °C (0...120 °F)  
Storage:  
–20 °C...+85 °C (0...180 °F)

## Electrical connection

Terminals: removable terminal blocks, non-interchangeable, black;  
FMC 420: 1 × 6-pole, 1 × 7-pole,  
FMC 423: 1 × 6-pole, 1 × 9-pole

Max. terminal diameter: (fine wire)  
1 × 0.5 mm<sup>2</sup> to 1 × 2.5 mm<sup>2</sup> or  
2 × 0.5 mm<sup>2</sup> to 2 × 1.5 mm<sup>2</sup>

Without terminals:  
Flat plug 0.8 × 6.3 conforming to  
DIN 46244

Power supply, AC:  
220 V, –10%...230 V, +10%, 50/60 Hz

Other versions, AC:  
240 V, 115 V, 110 V, 24 V,  
each +15%, –10%, 50/60 Hz

Power supply, DC, FMC 423 only:  
16...32 V,  
protected against reverse polarity,  
electrically isolated from the power  
supply by DC/DC converter

Power consumption FMC 420:  
max. 3.3 W (4.4 VA)

Power consumption FMC 423:  
max. 3.4 W (6.4 VA)

Sensors:  
see The Measuring System

Cable to probe:  
3-core, screened, max. 25 Ω per core

Power supply for  
sensors: approx. 20 V

Calibrating input signals  
for zero point: approx. 40...360 μA  
(approx. 30...350 pF with capacitance  
measurement)  
for measuring span:  
approx. 20...4000 μA (or pF)

## Electromagnetic compatibility

According to EN 61326-1  
Class B device

## Signal outputs

Analogue level signal voltage:  
0...10 V,  $R_L$  min. 5 kΩ

Analogue level signal current:  
0...20 mA, switchable to 4...20 mA,  
 $R_L$  max. 500 Ω

Response time: typical 0.5 s for  
changes to input signal in steps of 1 mA.

Linearity accuracy, power and load  
variation:  
< 0.5% (voltage output)

## Switching output with FMC 423

Adjustment range: 0...100%

Relay output: 1 relay with potential-free  
changeover contact, switchpoint  
difference adjustable between 2% and  
98%.

Minimum/maximum fail-safe mode,  
selectable

Switching voltage: max. 250 V

Continuous current: max. 4 A

Switching load, with AC:  
max. 500 VA,  $\cos \phi > 0.7$   
with DC: max. 100 W to 48 V,  
max. 50 W to 250 V

# Product Structure

Silometer FMC 420					
<b>Certificates, approvals</b>					
R	standard (non-certified)				
C	CSA version				
<b>Version</b>					
0	Minipac housing, 50 mm, with terminal strip				
9	others on request				
<b>Power supply</b>					
J	AC 240 V, 50/60 Hz				
A	AC 220...230 V, 50/60 Hz				
F	AC 115 V, 50/60 Hz				
B	AC 110 V, 50/60 Hz				
D	AC, 24 V, 50/60 Hz				
Y	others on request				
<b>Analogue outputs</b>					
1	0/4...20 mA, 0...10 V				
9	others on request				
<b>Product designation</b>					
FMC 420-					

Silometer FMC 423					
<b>Certificates, approvals</b>					
R	standard (non-certified)				
C	CSA version				
<b>Version</b>					
0	Minipac housing, 100 mm, with terminal strip				
9	others on request				
<b>Power supply</b>					
J	AC 240 V, 50/60 Hz				
A	AC 220...230 V, 50/60 Hz				
F	AC 115 V, 50/60 Hz				
B	AC 110 V, 50/60 Hz				
D	AC, 24 V, 50/60 Hz				
E	DC 16 V ... 32 V				
Y	others on request				
<b>Analogue outputs</b>					
1	0/4...20 mA, 0...10 V				
9	others on request				
<b>Limit signal</b>					
A	potential-free change-over contact				
<b>Product designation</b>					
FMC 423-					

## Supplementary Documentation

- System Components Minipac  
Technical Information TI 009F/00/en
- Electronic Inserts EC 11 Z, EC 72 Z  
Technical Information TI 270F/00/en
- Electronic Inserts FEB 11/11 P  
Technical Information TI 257F/00/en



Accessory: protective housing  
Two Silometer FMC 420 units  
or one Silometer FMC 423  
in plastic housing IP 55 with  
transparent cover

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