FS 10/11/15/20
FS 10Ex/11Ex/15Ex/20Ex

Calorimetric flow switch

It is a device that monitors the flow of fluid based on calorimetry principle. If the flow rate drops below a limit set by user, the status output is changed. The flow rate is displayed by ten LEDs and it is possible to select a boundary for contact making/breaking in the same graduation. The measuring cycle takes from 4 sec to 8 sec with the recommended measurement range 4 ... 150 cm/sec. Based on DN piping, the bar sensor is available in three lengths, 65 mm (stan-dard), 125 mm and 175 mm. In case of an empty pipeline, the sensor behaves in the same way as with zero flow.

The flow switch is made
in four versions as follows:

FS 10 – 1× status output
(depending on flow velocity)
FS 11 – 2× status output
(depending on flow velocity)
FS 15 – 2× status output
(1× depending on flow velocity and
1× on temperature)
FS 20 – 1× status output and 1× current output
(depending on flow velocity)

MAIN MERITS

- Possibility to use another status output (version FS 15) for monitoring of temperature according to setting
- For FS20 design, in addition to a closing contact also 4 ... 20 mA current output
- 10 LEDs to display the current flow and adjusted switching limits
- „Self teaching" system with an option to set Q_{min} and Q_{max}
- Possibility of setting the switching limits (insensitivity band preset)
- Electrical connection by means of M12, 4-pin connector
- Continuous control of the sensor for correct operation
- Full stainless construction
- 3 different Ex models available

COMAC CAL

TECHNICAL DATA

Power supply	24 V ± 10 % DC with polarity reversal protection (other upon request)
Input power	1.5/4 VA
Electrical connection	M12 × 1, 4 pin connector
Process connection	according to DIN2353, with the M16 × 1.5 union nut through the 24°
	ring into the direct socket with pipe thread (G1/2"; G1/4"; M14 × 1,5; NPT1/4")
Sensor design installed	compact, separated
Display	10× three-colour LED (flow velocity)
	1× LED (temperature – for FS 15 only)
Output types	relay (for FS 10 only), PNP, NPN, 4 ... 20 mA (for FS 20 only)
Contact rating	130 mA / 60 V / 500 mW
Response time*	1 ... 6 sec
Velocity flow range	4 ... 400 cm/sec
Accuracy	±2 ... ±8 cm/sec
Hysteresis	2 ... 8 cm/sec
Control	2× flush-type push button
Media temperature	0 ... +80 °C
Ambient temperature	-10 ... +55 °C
Material in contact with media	stainless steel 1.4404
Maximum pressure	63 bar
Degree of protection	IP67
Ambient humidity	max. 90 %
Size (H×W×D)	91×74×60 mm (in case of longer version of bar sensor, the overall height will also increased)
Weight	290 g
Status contact	SSR, passive, potential-free, max. 350 V
	AC/DC, 150 mA, 400 mW

* for water (25 °C)

METER STATES DISPLAYED

first LED flashing
the flow below the monitor range

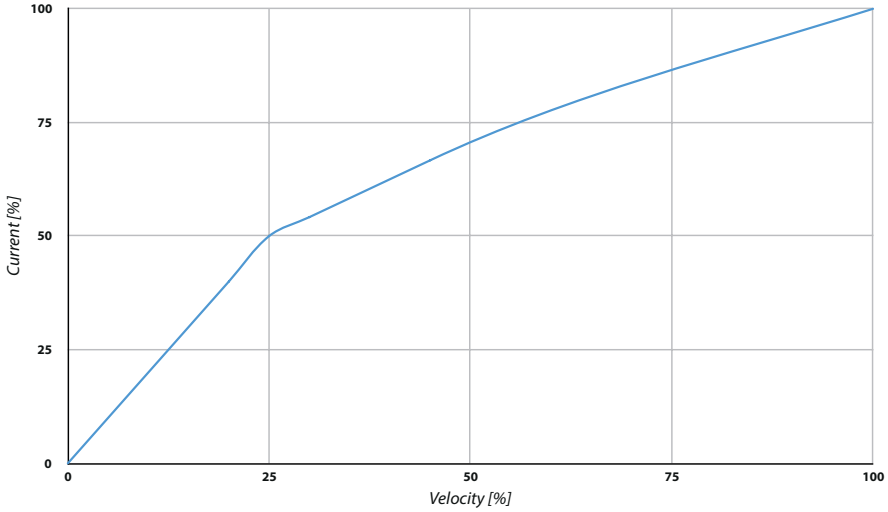
last LED flashing
the flow above the monitor range

the flow velocity
is within the adjusted monitor range

4-20 mA CURRENT OUTPUT (FS 20 ONLY)

The meter is shipped by the manufacturer with the 4–20 mA output set in such a manner that the zero velocity flow of the media corresponds to the output of 4 mA whereas the velocity of 4 m/sec corresponds to 20 mA. The dependence of current on velocity is not linear.

4–20 mA current versus velocity



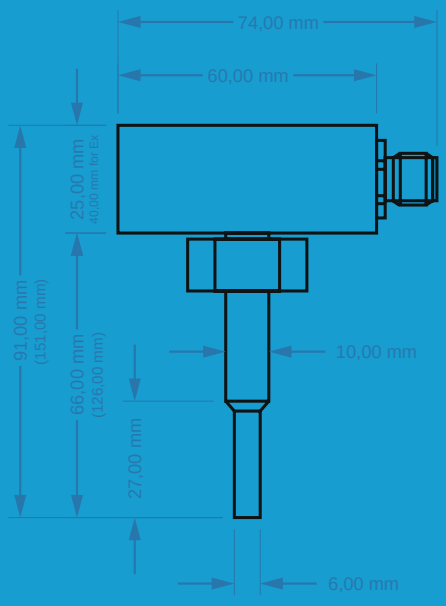
LED INDICATION

The flow switch point on LED scale can be implemented using two colours (red LED or amber LED), indicating at the same time which contact is normally closed or normally, open.

In case of FS15, the temperature switch point is indicated by the LED located between the control push buttons. If the temperature of media is above/below the set-point, the LED is red, indicating that PIN2 is open at the same time (the sensor supplied as standard is configured open at a temperature above the set limit with the LED turned ON). If the logic of the normally open/normally closed point is changed by the user, the logic of both outputs is changed at the same time (applicable to FS 11 and FS15 versions).

Display	LED	Flow velocity in % of set Q_{max}
Flashing	LED 1	below 2 %
Luminous	LED 1	2–5 %
Luminous	LED 2	5–10 %
Luminous	LED 3	10–15 %
Luminous	LED 4	15–20 %
Luminous	LED 5	20–25 %
Luminous	LED 6	25–35 %
Luminous	LED 7	35–47,5 %
Luminous	LED 8	47,5–62,5 %
Luminous	LED 9	62,5–80 %
Luminous	LED 10	80–100 %
Flashing	LED 10	above 100 %

BASIC DIMENSIONS



FS 10/11/15/20

In case when it is necessary to monitor the media flow in the pipe with a smaller DN than DN 25 (or the flow velocity is below the sensor range at the pipe diameter given), it is possible to use an adapter block with a corresponding flow velocity and ensure correct operation and keep the installation conditions in this way.

The adapters are designed for a short version of the **65 mm** sensor by using a direct neck with **G½"** pipe thread.

ADAPTER BLOCK

INDIVIDUAL DESIGNS

FS adapter block DN20/G3/4" for 5 ... 100 l/min. (size 150×50×40 mm)
FS adapter block DN15/G1/2" for 2 ... 40 l/min. (size 150×50×30 mm)
FS adapter block DN10/G1/4" for 0,4 ... 20 l/min. (size 150×50×30 mm)
FS adapter block DN4,5/G1/4" for 0,1 ... 5 l/min. (size 70×50×30 mm)
FS adapter block DN2,7/G1/4" for 0,075 ... 2 l/min. (size 70×50×30 mm)

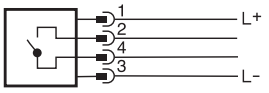
WIRING CONNECTION

Sensor control

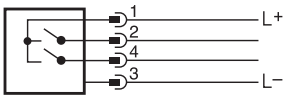
The flow switch has two flush-type control buttons, making it possible

- the switching point/points for flow velocity (temperature in some case)
- to change the logic of the N.O./N.C. output
- to calibrate the minimum and maximum flow values of the monitoring device
- to reset the original parameters from factory

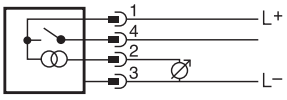
FS 10 – RELAY



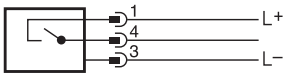
FS 11 / FS 15 – PNP



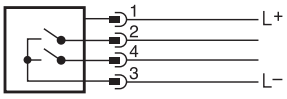
FS 20 – PNP



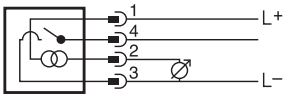
FS 10 – PNP



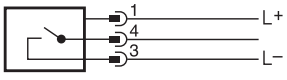
FS 11 / FS 15 – NPN



FS 20 – NPN



FS 10 – NPN



FS 10
RELAY
PIN 1 – Supply voltage +24 V
PIN 2 – Relay contact switch point
PIN 3 – Supply voltage GND
PIN 4 – Relay contact switch point

FS 10/FS 11/FS 15
PNP/NPN
PIN 1 – Supply voltage +24 V
PIN 2 – PNP/NPN contact of the flow switch point (FS 11 only) / / temp. (FS 15 only)
PIN 3 – supply voltage GND
PIN 4 – PNP/NPN contact of the flow switch point

FS 20
PNP/NPN
PIN 1 – Supply voltage +24 V
PIN 2 – 4–20 mA output
PIN 3 – Supply voltage GND
PIN 4 – PNP/NPN contact switch point

FS 10Ex/11Ex/15Ex/20Ex

Additional design for Ex version

Wattage	*max. 2,4 W*
Design	*only compact*
Status contact	*SSR, passive, potential-free, max. 28,5 V*
	max. 115 mA, max. 330 mW
Weight	*374 g*
Size (height x width x depth)	*106×74×60 mm (in case of longer version of bar sensor, the overall height will also increased)*
Classification Ex	*I M1 Ex ia I Ma* *II 1G Ex ia IIC T4 Ga* *II 1D Ex ia IIIC T135°C Da*

It is a device that monitors the flow of fluid. Full stainless steel construction designed for technological processes where there are demanding requirements related to explosion hazard.

The meter is delivered in compact design and due to its unique stainless steel construction it is ideal for use where long service life is required also in extreme conditions.

FS 10/11/15/20 — **FSxx/Ax/Bx/Cx/Dx/Ex/Fx**

FS (Flowswitch)
10… one N.O. contact
11… two N.O. contacts
15… N.O. contact + temperature monitoring
20… N.O. contact + 4 ... 20 mA

A (Operating contact type)
A1… SSR passive (FS10 only)
A2… transistor PNP
A3… transistor NPN

B (Sensor length)
B1… 65 mm
B2… 125 mm
B3… 175 mm

C (Screwed connection)
C1… G1/2" C3… NPT1/4" C5… CLAMP DN25 (50, 5 mm)
C2… G1/4" C4… M14x1,5 C6… CLAMP DN50 (64 mm)

F (Sensor construction)
F1… compact construction
F2… separated version

E (Adapter for small sizes)
E1… without adapter
E2… DN20
E3… DN15
E4… DN10
E5… DN4,5
E6… DN2,7

D (M12, 4 pin counter connector)
D1… YES
D2… NO

FS 10Ex/11Ex/15Ex/20Ex — **FSxxEx/Ax/Bx/Cx/Dx/Ex/F1/Gx**

FS (Flowswitch)
10… one N.O. contact
11… two N.O. contacts
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C1… G1/2" C3… NPT1/4" C5… CLAMP DN25 (50, 5 mm)
C2… G1/4" C4… M14x1,5 C6… CLAMP DN50 (64 mm)

G (Clasification)
G1… I M1 Ex ia I Ma
G2… II 1G Ex ia IIC T4 Ga
G3… II 1D Ex ia IIIC T135°C Da

F (Sensor construction)
F1… compact construction

E (Adapter for small sizes)
E1… without adapter
E2… DN20
E3… DN15
E4… DN10
E5… DN4,5
E6… DN2,7

D (M12, 4 pin counter connector)
D1… YES
D2… NO

09_2017

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