

## OPERATING INSTRUCTIONS MINIATURE FLOW SENSOR

SFEV-F series No. 678658

(with separate display unit for the SFET-F series)

- Please read these operating instructions carefully before using this product. Special attention should be paid to the section containing the safety information.
- Keep these instructions for later reference.

### ! Safety information

- This device is designed for air, dry compressed air as well as N<sub>2</sub>. Do not use this device in conjunction with corrosive or flammable gases.
- Do not touch electrical connections (open conducting parts): electric shocks can be fatal. Power supply must be deactivated during connection. Conducting parts must never be touched with bare hands.
- Use only power supply units that guarantee reliable electrical isolation of the operating voltages with at least 4kV isolation resistance to IEC 742/EN 60741/VDE 0551 ( Protected Extra-Low Voltage, PELV). Switch power packs are permitted, providing they guarantee reliable isolation to EN 60950 / VDE 0805.

### 1. ATTENTION:

- This device must not be used for metering in public supply facilities. The device does not fulfil the conditions required for the purpose of invoicing. The device must be used solely for industrial purposes.
- During installation, the device housing must be securely affixed to prevent the housing and the connecting lines from being damaged.
- The device must only be used in conjunction with the flowing media listed as suitable under Technical Data. When used in conjunction with any other media, device performance and safety cannot be guaranteed. The device must never be used with corrosive gases, flammable gases, oxygen etc.
- Compressed air from a compressor supply contains condensed water, petroleum oxides, foreign matter and other contaminants. Therefore, a filter, an air drier and an oil-vapour filter should be attached to the primary side of the sensor (inlet side).
- If the device is being used for suction or other vacuum applications, an air filter must be attached to the suction side to prevent foreign matter from being sucked in.

### 2. Technical data

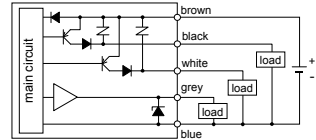
Feature	SFEV-F *1-L-2 **B-K1
flow rate range (l/min)	005 0.05-0.5
	010 0.1-1
	050 0.5-5
	100 1-10
	500 5-50
Switch output	P PNP transistor, open collector
	N NPN transistor, open collector
Display	3 1/2 digits, LED display
Output	operating status, output status
	PNP/NPN transistor output, open collector, 2 switching points, 30 VDC, 50 mA voltage drop (max. 2.4 V)
Analogue output	1-5 V (load impedance > 50 kΩ)
Supply voltage	12-24 VDC ±10% (10.8-26.4 V)
Current consumption	max. 50 mA
Connection cable	Φ 3.7; 5-core; 0.2mm <sup>2</sup> ; 1 m
Functions	flow rate display, peak value storage, switch output and analogue output
Environment temperature/humidity	0-50 °C, 90% F or less (non-condensating)
Protection class	IEC IP40
Protective circuit	Protection from : reversal of supply voltage polarity, reversal of polarity at switch output terminal, switch output short circuit
EMC directive	EN61000-6-2, EN61000-6-3
Weight	approx. 70 g

### • Flow rate units

The sensor measures mass flow independent of temperature and pressure. Display and print-outs show a volumetric flow rate converted to the standard conditions 0°C and 1013mbar. Unit of measurement for the volumetric flow rate is l/min (litres per minute).

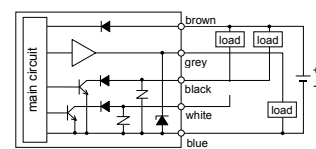
### 3. Terminal allocation

(PNP output)



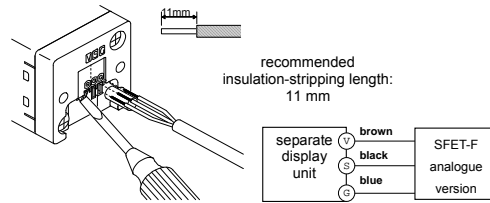
colour	description
brown	12-24 VDC
blue	0 V (ground)
grey	analogue output (1-5 V)
black	OUT
white	OUT

(NPN output)



(connecting analogue version)

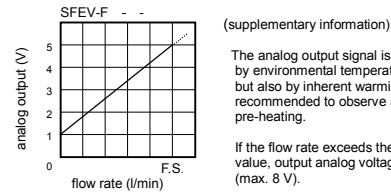
The electric connection of the sensor control unit is established via a terminal strip. Push open the yellow clamp and insert the line.



(Safety information concerning connection)

- Connection**  
Deactivate power supply before connecting device. Before starting work, ensure that all persons and tools have been electrostatically grounded. For flexible line sections use sufficiently flexible cable material.
- Installation**  
Install the device and connecting lines at the greatest possible distance from sources of interference such as power lines. Protect the power supply line against overvoltage from inductive load.
- Supply voltage**  
Supply voltage must not exceed stated value. If supply voltage is too high or if an AC power supply is connected, the device may be destroyed or catch fire.
- Short circuit of load**  
The load circuit must not be short-circuited. The device may be destroyed or catch fire.
- Incorrect connection**  
When connecting to power supply, ensure that the polarity is correct. Otherwise the device may be destroyed or catch fire.
- Matching sensor**  
The display unit is designed exclusively for flow rate sensors with analogue output (SFEV-F). Flow rate measuring range of display unit and sensor must be harmonised. Do not use any other flow rate sensor or pressure sensor.

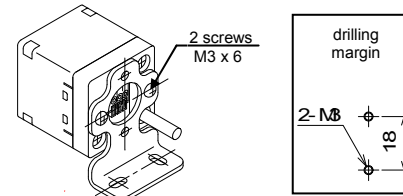
### 4. Relationship between analogue voltage and flow rate



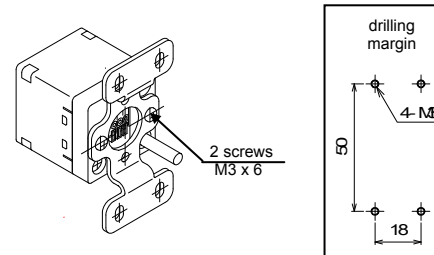
### 5. Installation

Separate mountings are available for the assembly of the display unit.

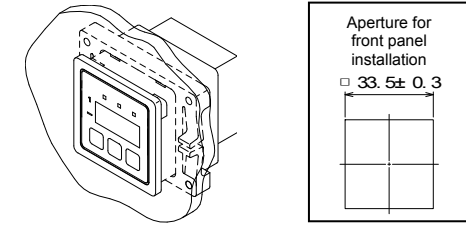
SFEV-BW1: single-sided mounting (radial installation)



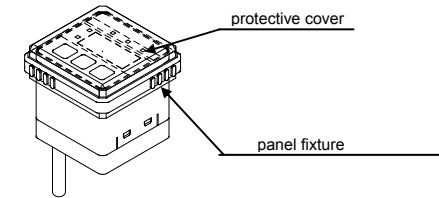
SFEV-WH1 : double-sided mounting (axial installation)



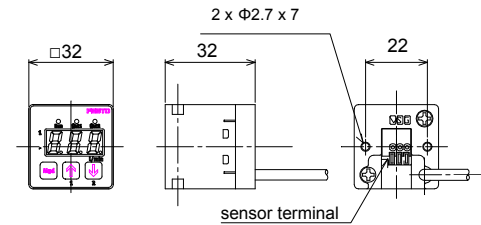
SFEV-FH1 : front panel mounting set with cover



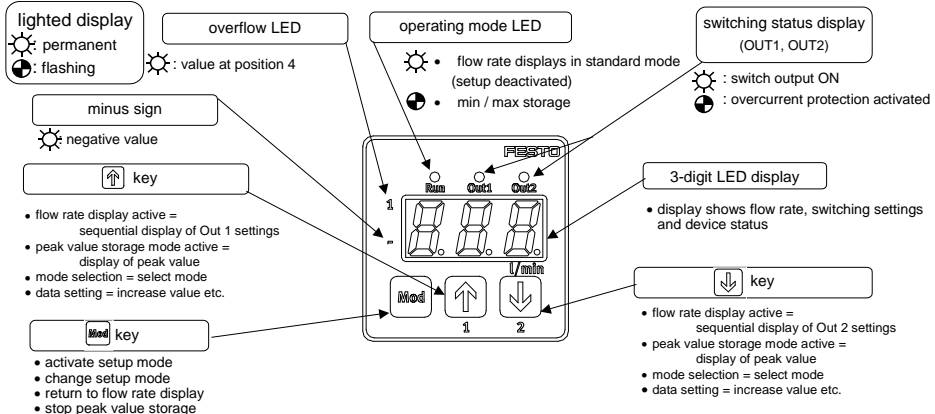
SFEV-SH1 : protective cover (not available for SFEV-FH1)



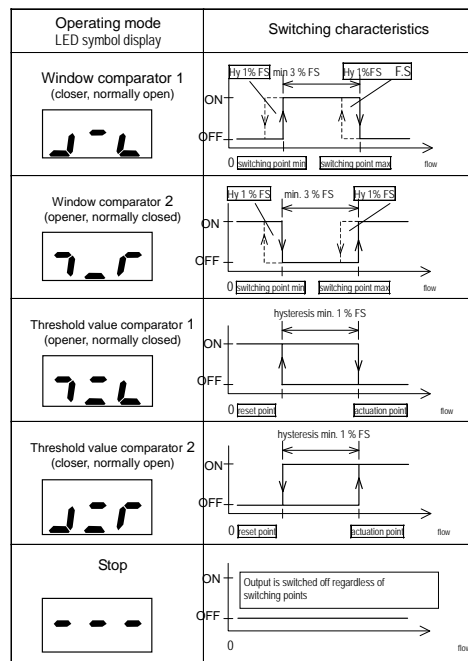
### 6. Exterior measurements (in mm)



## Display and operation



## Switching operation modes



Note 1: During continuous operation, there should be an interval of at least 3% of the measuring range's final value between two switching points. A hysteresis of 1% of the measuring range's final value (FS) is automatically added to the ON and OFF switching points.

Note 2: During threshold value operation, there should be an interval of at least 1% of the measuring range's final value (FS) between two switching points. If both switching points are identical, no switching operation is initiated or the operation is unstable.

Note 3: The left-hand side of the circuit symbol corresponds to a low flow rate, the right-hand side to a high flow rate.

Note 4: The sensor's switching characteristics may be unstable if, e.g., the pressure of the medium fluctuates. Stable switching characteristics must be ensured. This requires either the determination of a sufficient interval between the two switching points or employing the sensor in an area without pressure fluctuation.

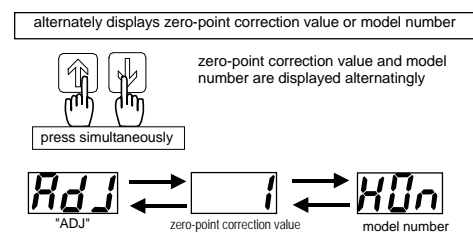
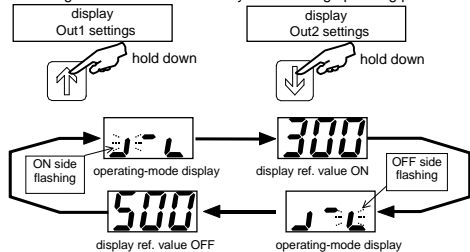
Note 5: The ratio between actuation and reset point is determined during the setting of the operation mode. A reversal of the ratio is impossible. Implementing the set switching characteristics has priority for this device. The ratio is automatically determined when the two switching points are entered. In other words: even if the two switching points are entered in reverse order, the allocation is carried out correctly and the operating mode corresponds to specifications.

### Example

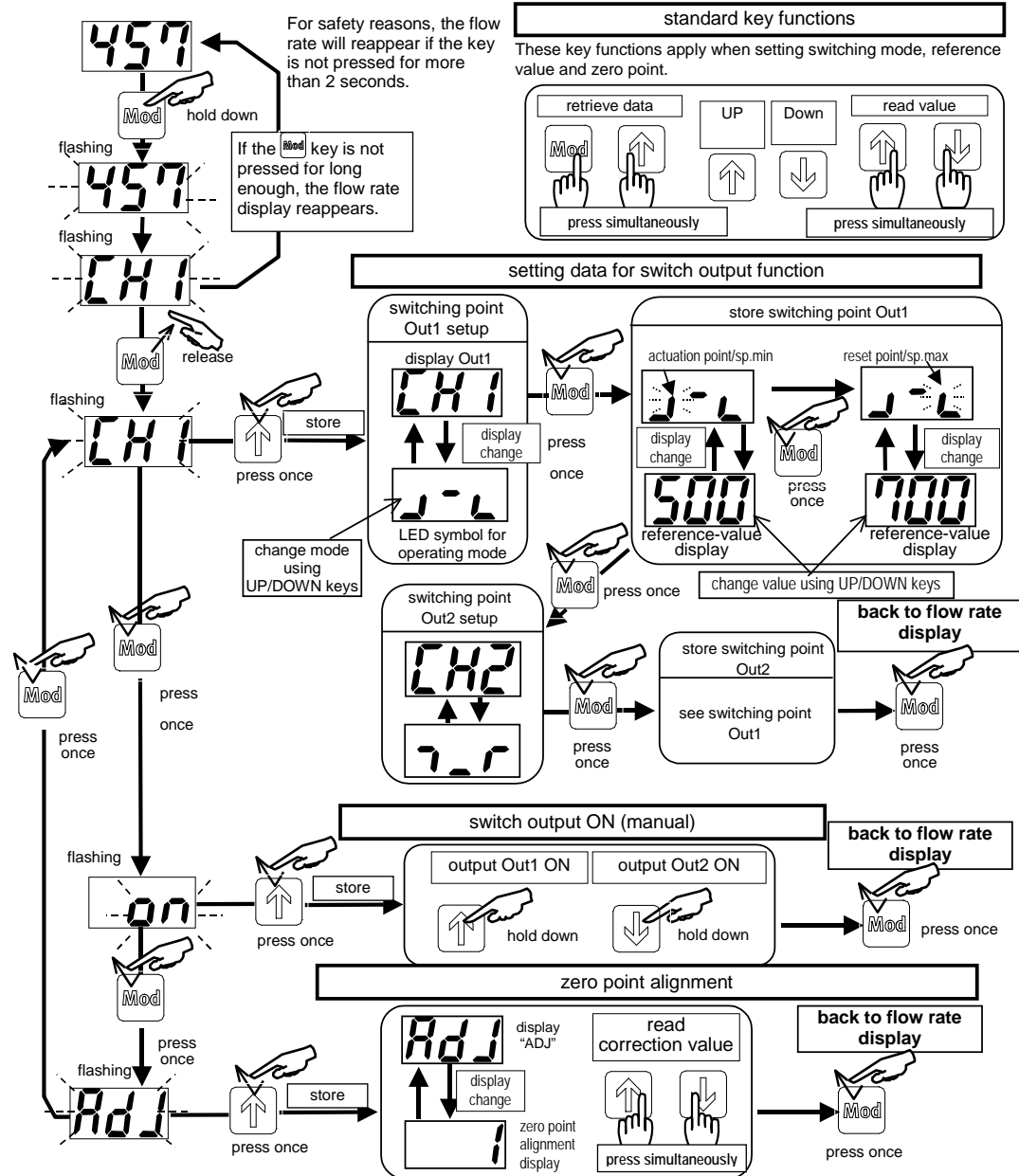
Out	LED symbol	actuation point	reset point
1		200	350
2		300	250

## Checking the settings

If keys are pressed while the flow rate is being displayed, actuation and reset points as well as the LED symbols can be displayed and confirmed. Switching function is not affected by the following operating procedures:

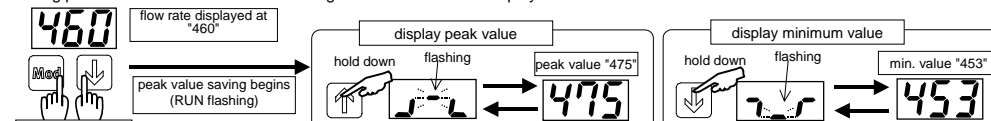


## Operating procedure for switch output function, manual output operation, zero point alignment



## Saving peak value

Minimum and maximum flow rates for a certain time period are displayed. Saving peak values does not affect switching function or flow rate display.



## OPERATING INSTRUCTIONS MINIATURE FLOW SENSOR

**SFEV-R Series No. 678658**

(with separate display unit for the SFET-R series)

- Please read these operating instructions carefully before using this product. Special attention should be paid to the section containing the safety information.
- Keep these instructions for later reference.

### Safety information

- This device is designed for air, dry compressed air as well as N<sub>2</sub>. Do not use this device in conjunction with corrosive or flammable gases.
- Do not touch electrical connections (open conducting parts); electric shocks can be fatal. Power supply must be deactivated during connection. Conducting parts must never be touched with bare hands.
- Use only power supply units that guarantee reliable electrical isolation of the operating voltages with at least 4kV isolation resistance to IEC 742/EN 60741/VDE 0551 ( Protected Extra-Low Voltage, PELV). Switch power packs are permitted, providing they guarantee reliable isolation to EN 60950 / VDE 0805.

### 1. ATTENTION:

- This device must not be used for metering in public supply facilities. The device does not fulfil the conditions required for the purpose of invoicing. The device must be used solely for industrial purposes.
- During installation, the device housing must be securely affixed to prevent the housing and the connecting lines from being damaged.
- The device must only be used in conjunction with the flowing media listed as suitable under Technical Data. When used in conjunction with any other media, device performance and safety cannot be guaranteed. The device must never be used with corrosive gases, flammable gases, oxygen etc.
- Compressed air from a compressor supply contains condensed water, petroleum oxides, foreign matter and other contaminants. Therefore, a filter, an air drier and an oil-vapour filter should be attached to the primary side of the sensor (inlet side).
- If the device is being used for suction or other vacuum applications, an air filter must be attached to the suction side to prevent foreign matter from being sucked in.

### 2. Technical data

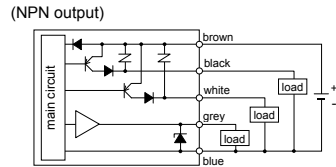
Feature	SFEV-R *1-L-2 *2B-K1	
	005	0.05-0.5
flow rate range (l/min)	*1 010	0.1-1
	050	0.5-5
	100	1-10
	500	5-50
Switch output	*2 P	PNP transistor, open collector
	N	NPN transistor, open collector
Display	3 1/2 digits, LED display	
Output	Switch output	PNP/NPN transistor output, open collector, 2 switching points, 30 VDC, 50 mA voltage drop (max. 2.4 V)
	Analogue output	1-5 V (load impedance > 50 kΩ)
Supply voltage	12-24 VDC ±10% (10.8-26.4 V)	
Current consumption	max. 50 mA	
Connecting cable	Φ 3.7, 5-core, 0.2mm <sup>2</sup> , 1 m	
Functions	flow rate display, peak value storage, switch output and analogue output	
Environment temperature/humidity	0-50 °C, 90% rF or less (non-condensing)	
Protection class	IEC IP40	
Protective circuit	Protection from: reversal of supply voltage polarity, reversal of polarity at switch output terminal, switch output short circuit	
EMC directive	EN61000-6-2, EN61000-6-3	
Weight	approx. 70 g	

- Flow rate units

The sensor measures mass flow independent of temperature and pressure. Display and print outs show a volumetric flow rate converted to the standard conditions 0°C and 1013mbar. Unit of measurement for the volumetric flow rate is l/min (litres per minute).

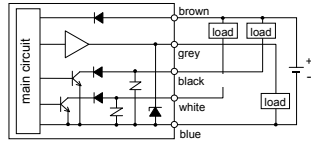
### 3. Terminal allocation

(PNP output)



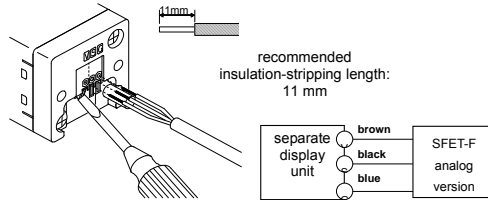
colour	description
brown	12-24 VDC
blue	0 V (ground)
grey	analogue output (1-5 V)
black	OUT
white	OUT

(NPN output)



(connecting analog version)

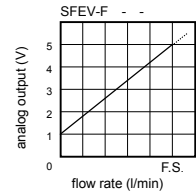
The electrical connection of the sensor control unit is established via a terminal strip. Push open the yellow clamp and insert the wire.



(Safety information concerning connection)

- Connection**  
Deactivate power supply before connecting device. Before starting work, ensure that all persons and tools have been electrostatically grounded. For flexible line sections use sufficiently flexible cable material.
- Installation**  
Install the device and connecting lines at the greatest possible distance from sources of interference such as power lines. Protect the power supply line against overvoltage from inductive load.
- Supply voltage**  
Supply voltage must not exceed stated value. If supply voltage is too high or if an AC power supply is connected, the device may be destroyed or catch fire.
- Shorting of load circuit**  
The load circuit must not be short-circuited. The device may be destroyed or catch fire.
- Incorrect connection**  
When connecting to power supply, ensure that the polarity is correct. Otherwise the device may be destroyed or catch fire.
- Matching sensor**  
The display unit is designed exclusively for flow rate sensors with analogue output (SFET-F). Flow rate measuring range of display unit and sensor must be harmonised. Do not use any other flow rate sensor or pressure sensor.

### 4. Relationship between analogue voltage output and flow rate



(supplementary information)

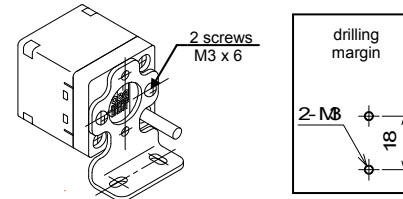
The analog output signal is influenced not only by environmental temperature characteristics, but also by inherent warming. It is therefore recommended to observe at least 5 min. of pre-heating.

If the flow rate exceeds the device's nominal value, output analog voltage is more than 5 V (max. 8 V).

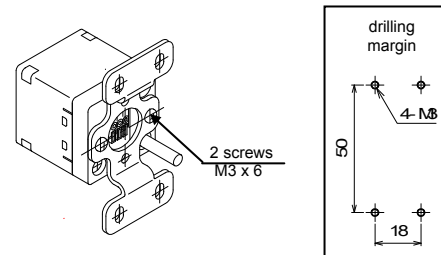
### 5. Installation

Separate mountings are available for the display unit.

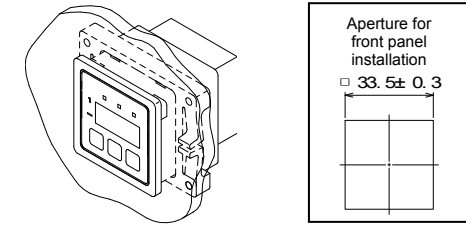
#### SFEV-BW1: single-sided mounting (radial installation)



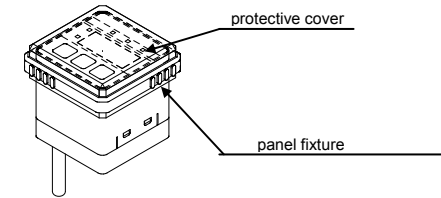
#### SFEV-WH1: double-sided mounting (axial installation)



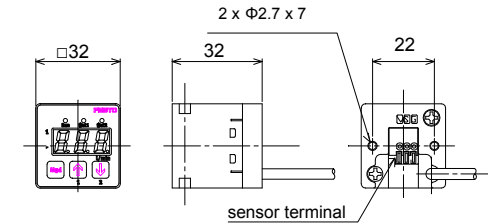
#### SFEV-FH1 front panel mounting set with cover



#### SFEV-SH1 protective cover (not available for SFE-FH1)



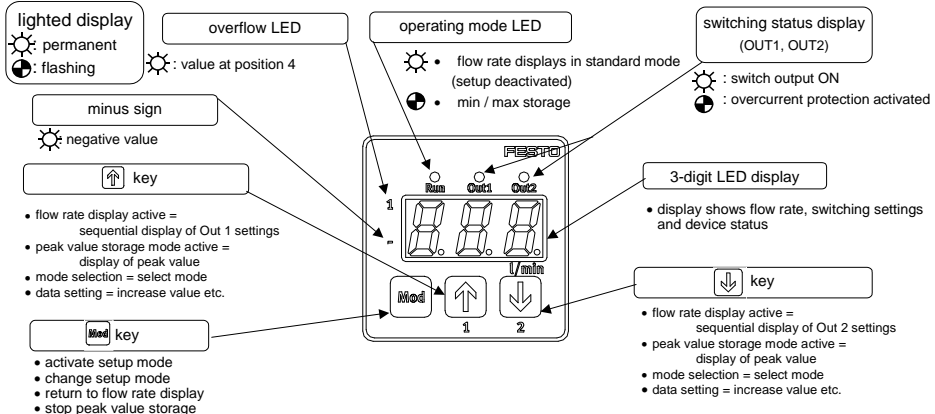
### 6. Exterior measurements (in mm)



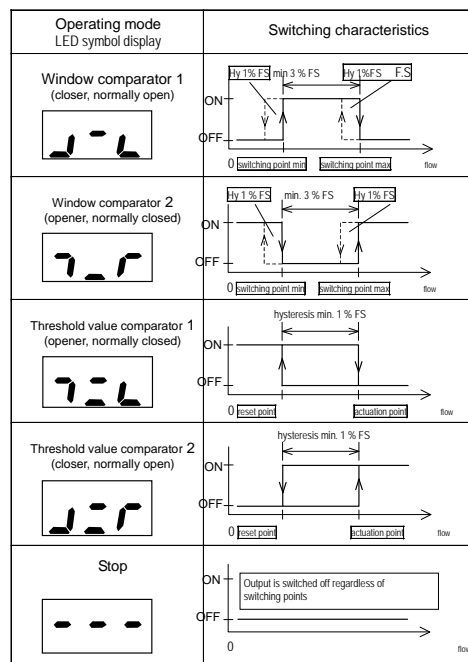
## Festo AG & Co. KG

Ruiter Strasse 82, 73734 Esslingen, Germany  
Telephone +49/711/347-0

## Display and operation



## Switching operation modes



Note 1: During continuous operation, there should be an interval of at least 3% of the measuring range's final value between two switching points. A hysteresis of 1% of the measuring range's final value (FS) is automatically added to the ON and OFF switching points.

Note 2: During threshold value operation, there should be an interval of at least 1% of the measuring range's final value (FS) between two switching points. If both switching points are identical, no switching operation is initiated or the operation is unstable.

Note 3: The left-hand side of the circuit symbol corresponds to a low flow rate, the right-hand side to a high flow rate.

Note 4: The sensor's switching characteristics may be unstable if, e.g., the pressure of the medium fluctuates. Stable switching characteristics must be ensured. This requires either the determination of a sufficient interval between the two switching points or employing the sensor in an area without pressure fluctuation.

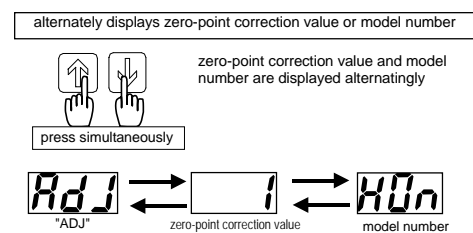
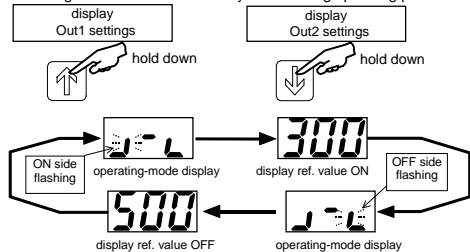
Note 5: The ratio between actuation and reset point is determined during the setting of the operation mode. A reversal of the ratio is impossible. Implementing the set switching characteristics has priority for this device. The ratio is automatically determined when the two switching points are entered. In other words: even if the two switching points are entered in reverse order, the allocation is carried out correctly and the operating mode corresponds to specifications.

### Example

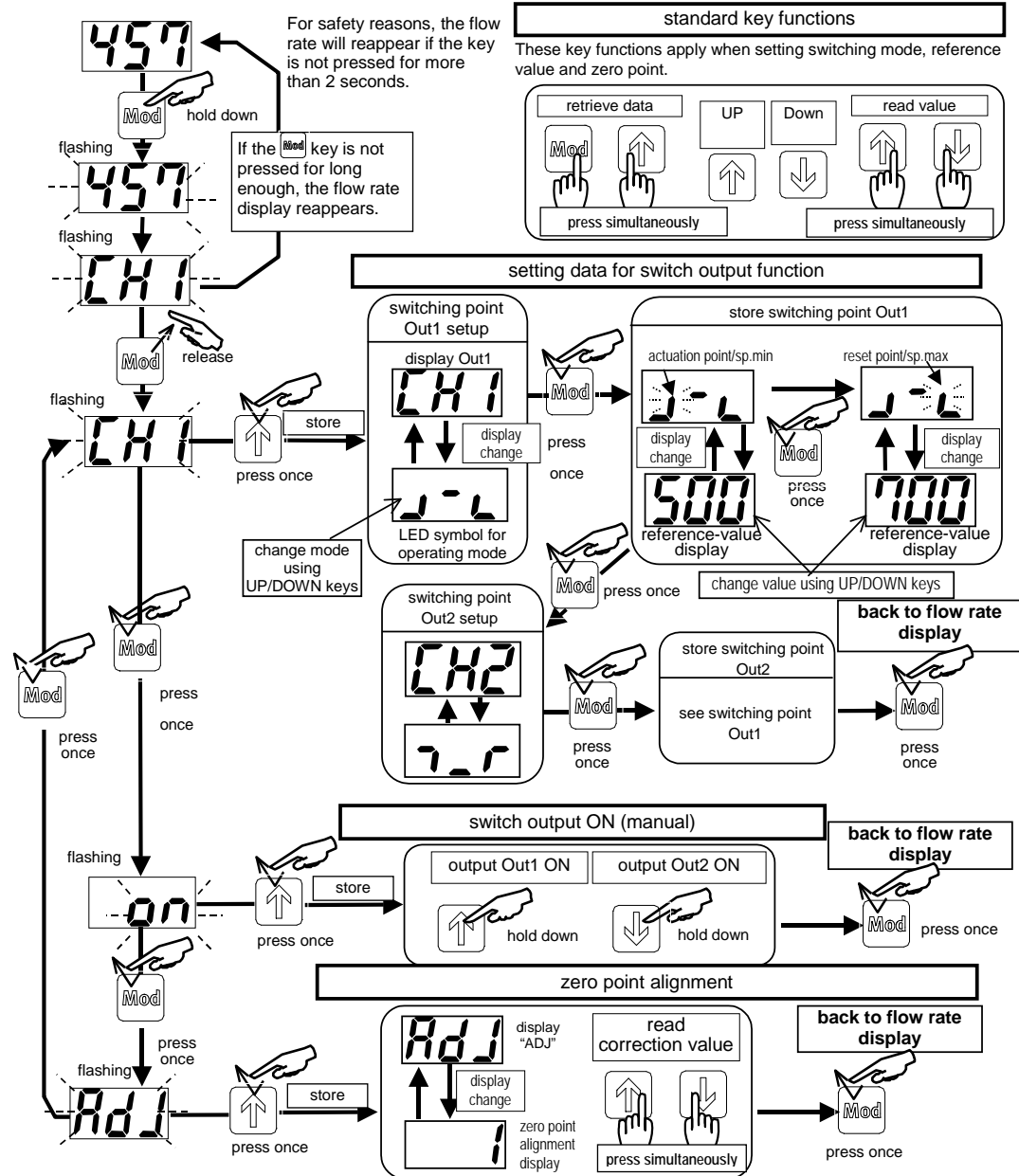
Out	LED symbol	actuation point	reset point
1		200	350
2		300	250

## Checking the settings

If keys are pressed while the flow rate is being displayed, actuation and reset points as well as the LED symbols can be displayed and confirmed. Switching function is not affected by the following operating procedures:



## Operating procedure for switch output function, manual output operation, zero point alignment



## Saving peak value

Minimum and maximum flow rates for a certain time period are displayed. Saving peak values does not affect switching function or flow rate display.

