# EFK2, EFKP/EFKM, LABO-F012-S, I, U, F, C, FLEX-F, FLEX-FIN, OMNI-F, OMNI-FIN

## Калориметрические датчики потока

## GHM MESSTECHNIK


# Технические характеристики

# Calorimetric Flow Switch EFK2


- **Very small installation width, therefore very narrow pipework is possible**
- **Mo moving parts in the medium being monitored**
- **Installation largely independent of nominal width**

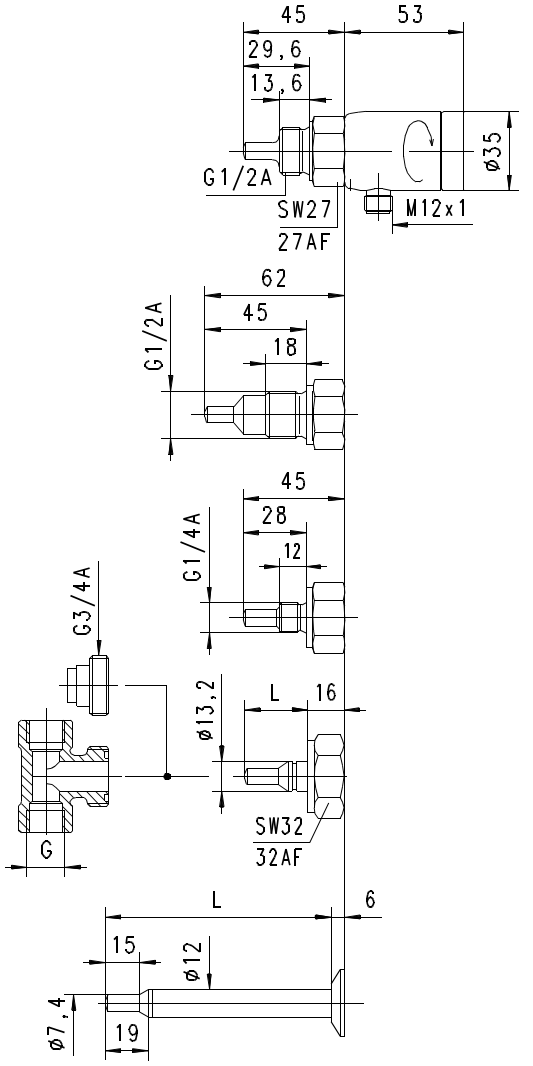
## Characteristics

The EFK2 flow switch controls the flow speed of fluid media. Its compact form combines the built-in sensor, a two-colour LED status display, and a switching point which can be set using a potentiometer; it has push-pull or relay output. A flexible gooseneck can be installed between the sensor and the electronics housing, so that the best possible view of the flow switch display is provided even in awkward installation locations.

## Technical data

| | |
|---|---|
| **Sensor** | calorimetric measurement principle |
| **Process connection** | screw-in thread G $^1/_4$ A..G $^1/_2$ A, push-in sensor Ø12 mm |
| **Metering range** | water 2..150 cm/s or 3..300 cm/s oil available on request |
| **Measurement accuracy** | ±10 % of full scale value |
| **Dynamics** | 1..3 seconds in water |
| **Pressure resistance** | PN 100 bar optionally PN 200 bar |
| **Media temperature** | 0..70 °C |
| **Ambient temperature** | -20..+70 °C |
| **Temperature gradient** | 4 K/s |
| **Supply voltage** | 24 V DC / AC ±10 % |
| **Current consumption** | max. 70 mA |
| **Switching output** | galvanically separated relay contact or "push-pull" transistor output (resistant to short circuits and reversal polarity protected) |
| **Output loading** | 2 A / 30 V DC/AC max. for relay, 100 mA / 24 V max. for transistor output |
| **Display** | red / green LED (red < limit value, green > limit value) |
| **Adjustment potentiometer** | as input |
| **Electrical connection** | for round plug connector M12x1, 4-pole |
| **Resistant to short circuits** | yes |
| **Reversal polarity protected** | yes |
| **Ingress protection** | IP 65 |
| **Materials medium-contact** | 1.4571 |
| **Materials, non-medium-contact** | 1.4305 |
| **Weight** | approx. 0.3 kg |
| **Conformity** | CE |

## Dimensions



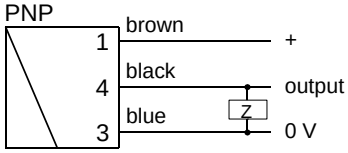

**Gooseneck option**

A gooseneck (optional) between the electronics head and the primary sensor provides complete freedom in the orientation and reading direction of the sensor.

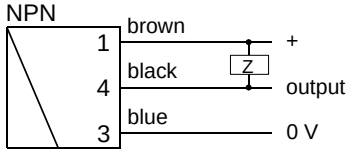
## Wiring

**Push-pull** (Z-Load)

PNP

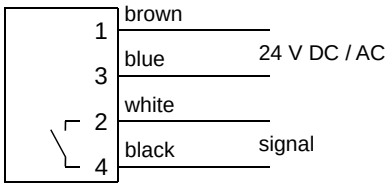



NPN

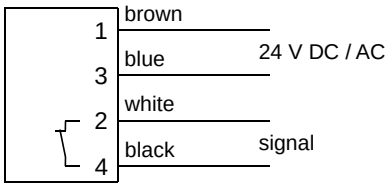



**Relay contact**

NO




NC




The switching outputs are self-configuring, depending on whether they are connected as PNP or NPN switches.

## Handling and operation

### Installation

Installation must be such that the flow impinges on the marking (X) on the sensor. For sensors with screw-in threads, PTFE tape or sealing paste can be used for the seal. The installation location should be selected so that reproducible flow conditions are achieved (sufficient run-in length, wherever possible no valves, kinks, bends, etc directly ahead of the sensor. A sieve just upstream of the sensor may have a beneficial effect on reproducibility.

### Operation

The flow is raised to the limit value, and the switching point is determined by turning the potentiometer to the point where the LED just switches from red to green (teaching).

LED red: Flow rate < Limit value
LED green: Flow rate > Limit value

## Ordering code

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|
| **EFK2 -** | | | **K** | | | **S** | |

❍=Option

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **1.** | **Connection size** | | | | | | |
| | 008 | connection G $^1/_4$ A | | | | | |
| | 015 | connection G $^1/_2$ A | | | | | |
| | 013 | system fastener Ø13.2 | | | | | |
| | 012 | push-in sensor Ø12 | | | | | |
| **2.** | **Process connection** | | | | | | |
| | H | male thread | | | ● | ● | |
| | T | for insertion into the system T-piece | | ● | | | |
| | V | push-in sensor with variable insertion depth | ● | | | | |
| **3.** | **Connection material** | | | | | | |
| | K | stainless steel 1.4571 | ● | ● | ● | ● | |
| **4.** | **Sensor** | | | | | | |
| | 028 | | | | | | ● |
| | 029 | sensor length | | | | ● | |
| | 045 ❍ | | | | | ● | |
| | 031 | sensor for T-piece | G $^3/_8$..G $^1/_2$ | | ● | | |
| | 037 | | G $^3/_4$..G 2 | | ● | | |
| | 050 | insertion sensor | 50 mm | ● | | | |
| | 070 | | 70 mm | ● | | | |
| | 100 | | 100 mm | ● | | | |
| | 150 | | 150 mm | ● | | | |
| | 200 | | 200 mm | ● | | | |
| **5.** | **Switching output** | | | | | | |
| | O | relay contact NO (normally open / open when there is no flow) | | | | | |
| | C | relay contact NC (normally closed / closed when there is no flow) | | | | | |
| | T | push-pull output | | | | | |
| **6.** | **Electrical connection** | | | | | | |
| | S | for round plug connector M12x1, 4-pole | | | | | |
| **7.** | **Optional** | | | | | | |
| | H ❍ | model with gooseneck | | | | | |

## Accessories

- Cable/round plug connector (KB...)
  see additional information “Accessories”
- made-up cable
- T-pieces for system connection Ø13.2
- Weld-on adapter for insertion sensor Ø12
- Compression fitting for insertion sensor Ø12 Flange for insertion sensor Ø12

# Flow Switch
# EFKP / EFKM


- **Flow and temperature monitoring**
- **Moving parts in the medium being monitored**
- **Installation largely independent of nominal width**

## Characteristics

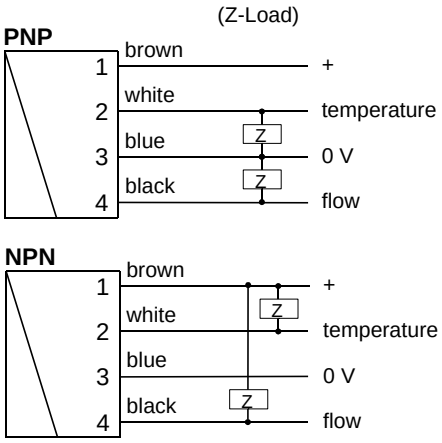
The flow switch EFKP / EFKM monitors the flow rate and optionally the temperature of fluid media. Its compact form combines the built-in sensor, an LED trend display (for FLOW) with two-colour status display, and a switching point which can be set using a potentiometer; it has PNP or NPN output. A temperature limit can also optionally be set and monitored using a PNP or NPN output. In addition, a flexible gooseneck can be installed between the sensor and the electronics housing, so that the best possible angle of view of the flow switch display is provided even in awkward installation locations.

## Technical data

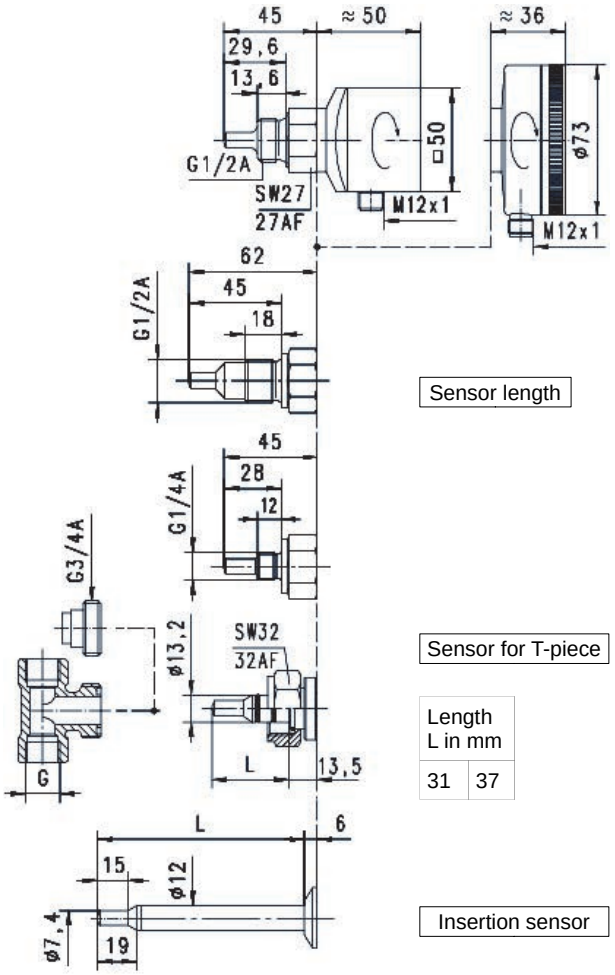
| | |
|---|---|
| **Sensor** | calorimetric measurement principle |
| **Process connection** | screw-in thread G $^{1}/_{4}$ A..G $^{1}/_{2}$ A,<br>push-in sensor Ø12 mm |
| **Metering range** | water 2..150 cm/s or 3..300 cm/s<br>oil available on request |
| **Pressure resistance** | PN 100 bar optionally PN 200 bar |
| **Medium temperature** | 0..+70 °C |
| **Ambient temperature** | -20..+70 °C |
| **Storage temperature** | -20..+80 °C |
| **Temperature gradient** | 4 K/s |
| **Display** | 9 LEDs (red = limit value,<br>green 1-8 = flow rate min.-max.) |
| **Adjustment potentiometer** | as input |
| **Supply voltage** | 24 V DC ±10 % |
| **Current consumption** | 80 mA |

| | |
|---|---|
| **Output** | PNP or NPN (Relais on request) |
| **Output loading** | 200 mA max. |
| **Electrical connection** | for round plug connector M12x1, 4-pole |
| **short circuit proof** | yes |
| **Reverse polarity protected** | yes |
| **Ingress protection** | IP 60 plastic head<br>IP 67 metal head |
| **Materials medium-contact** | 1.4571 |
| **Materials, non-medium-contact** | CW614N plated<br>PA6.6 (only EFKP) |
| **Weight** | 0.35 kg (EFKP-015HK028PS)<br>0.60 kg (EFKM-015HK028PS) |
| **Conformity** | CE |

## Wiring



## Dimensions




| Length L in mm | |
|---|---|
| 31 | 37 |

**Gooseneck option**
A gooseneck (optional) between the electronics head and the primary sensor provides complete freedom in the orientation and reading direction of the sensor.

## Handling and operation

### Installation

Installation must be such that the flow impinges on the marking (X) on the sensor. For sensors with screw-in threads, PTFE tape or sealing paste can be used for the seal. The installation location should be selected so that reproducible flow conditions are achieved (sufficient run-in length, wherever possible no valves, kinks, bends, etc directly ahead of the sensor). A sieve just upstream of the sensor may have a beneficial effect on reproducibility.

Benefits of EFKM:
- robust metal housing
- Ingress protection IP 67
- transparent mineral glass cover
- Optionally, opaque metal cover

## Ordering code

| | 1. | | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|---|---|---|---|---|---|---|---|---|---|
| **EFK** | | - | | | **K** | | | **S** | |

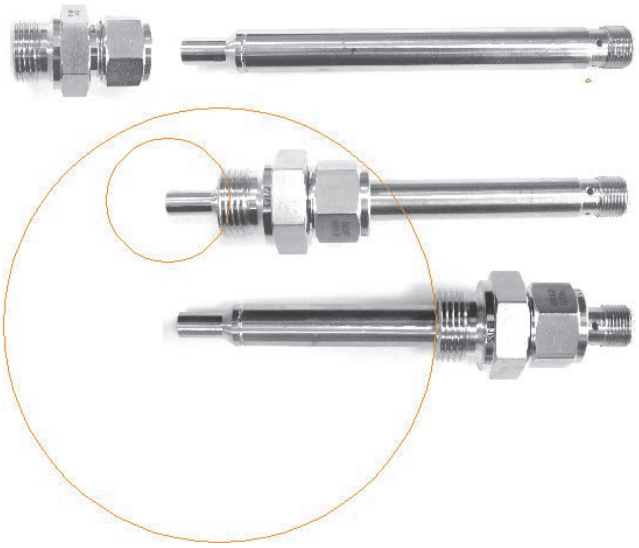
❍=Option

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **1.** | **Function** | | | | | | |
| | P | plastic head / flow | | | | | |
| | PT | plastic head / flow and temperature | | | | | |
| | M | metal head / flow | | | | | |
| | MT | metal head / flow and temperature | | | | | |
| **2.** | **Connection size** | | | | | | |
| | 008 | DN 8 - G $^1/_4$ A | | | | | |
| | 015 | DN 15 - G $^1/_2$ A | | | | | |
| | 013 | system fastener Ø13.2 | | | | | |
| | 012 | push-in sensor Ø12 | | | | | |
| **3.** | **Process connection** | | | | | | |
| | H | male thread | | | | ● | ● |
| | T | for insertion into the system T-piece | | | ● | | |
| | V | push-in sensor with variable insertion depth | | ● | | | |
| **4.** | **Connection material** | | | | | | |
| | K | stainless steel 1.4571 | | ● | ● | ● | ● |
| **5.** | **Sensor length** | | | | | | |
| | 028 | sensor length | 28.0 mm | | | | ● |
| | 029 | | 29.6 mm | | | ● | |
| | 045 ❍ | | 45.0 mm | | | ● | |
| | 031 | sensor for T-piece | G $^3/_8$..G $^1/_2$ | | ● | | |
| | 037 | | G $^3/_4$..G 2 | | ● | | |
| | 050 | insertion sensor | 50 mm | ● | | | |
| | 070 | | 70 mm | ● | | | |
| | 100 | | 100 mm | ● | | | |
| | 150 | | 150 mm | ● | | | |
| | 200 | | 200 mm | ● | | | |
| **6.** | **Switching output** | | | | | | |
| | P | PNP | | | | | |
| | N | NPN | | | | | |
| | R ❍ | Relais | | | | | |
| **7.** | **Electrical connection** | | | | | | |
| | S | for round plug connector M12x1, 4-pole | | | | | |
| **8.** | **Optional** | | | | | | |
| | H ❍ | model with gooseneck | | | | | |

## Accessories

- Cable/round plug connector (KB...)
  see additional information “Accessories”
- T-pieces for system connection Ø13.2
- Weld-on adapter for insertion sensor Ø12
- Compression fitting for insertion sensor Ø12
- Flange for insertion sensor Ø12

# Flow Switch LABO-F012-S



- **Complete flow switch in 12 mm housing**
- **Can be used for various tubing cross-sections**
- **Configurable switching point via plug pin (teaching)**
- **Simple to use**
- **Same form available for flow transmitter, temperature switch / transmitter or level switch**

## Characteristics

The sensors of the LABO-F012 family are used for monitoring non-viscous fluids (for oil or gases on request). They come complete with electronics, and are supplied installed inside a compact sensor housing of 12 mm diameter and with M12x1 round plug outlet. The 16-bit processor carries out temperature compensation and linearisation of the calorimetric signal (measurement of the heat removal at the sensor tip by the flowing medium; for this see also the general description for calorimetry).

The electronics of the LABO-F012-S are a flexibly configurable limit switch.

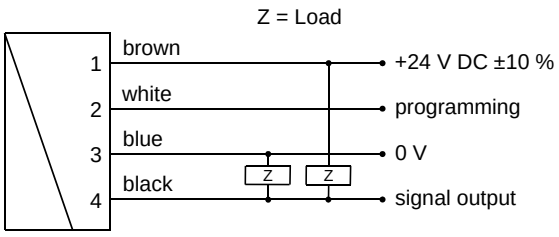
The switching value can be set by the user via teaching (see Handling and Operation). All other values have been preset at the factory, but can be modified by the user with the aid of the optionally available ECI-1 interface and a PC.

The adjustable parameters are:
- Switching value
- Hysteresis
- Minimum/maximum monitoring
- Switching delay
- Switchback delay
- Power-On delay
- Teach-offset

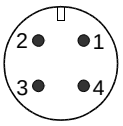
## Technical data

| | |
|---|---|
| **Sensor** | calorimetric measurement principle |
| **Process connection** | push-in sensor Ø12 mm |
| **Switching range** | water 2..150 cm/s<br>or 3..300 cm/s<br>oil or gases available on request |
| **Measurement accuracy** | dependent on the installation location and flow conditions<br>typically ±10 % of full scale value or 2 cm/s, of full scale value measured in the T-piece ±5 % |
| **Repeatability** | ±1 % |
| **Start-up time** | 10 sec. after application of the operating voltage |
| **Response time** | 1..3 s |
| **Pressure resistance** | Stainless steel compression fitting PN 40 bar |
| | Plastic cone with union nut PN 10 bar |
| **Medium temperature** | -20..+ 70 °C<br>-20..+100 °C (extended temperature range) |
| **Ambient temperature** | 0..+60 °C |
| **Temperature dependency** | ± 0.01 % / 1 K |
| **Temperature gradient** | 4 K/s |
| **Materials medium-contact** | Housing 1.4571 |
| **Materials non-medium-contact** | Plug PA6.6 gold-plated contacts |
| **Supply voltage** | 24 V DC ±10 % (controlled) |
| **Power consumption** | < 2 W |
| **LED** | yellow LED<br>(On = Normal / Off = Alarm /<br>rapid flashing = Programming) |
| **Electrical connection** | for round plug connector M12x1, 4-pole |
| **Ingress protection** | IP 67 |
| **Weight** | approx. 0.05 kg<br>(excluding screwed connection) |
| **Conformity** | CE |

## Wiring



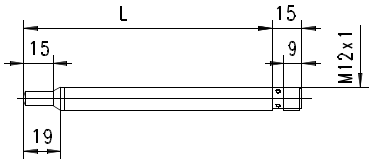

Connection example: PNP NPN



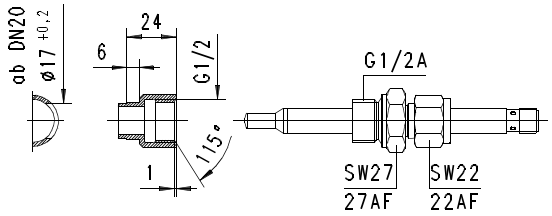

The use of shielded cabling is recommended.

## Dimensions

| L mm | Type |
|---|---|
| 123 | LABO-F012-S100... |
| 173 | LABO-F012-S150... |
| 223 | LABO-F012-S200... |




**Optional accessories**




Weld-on adapter

Compression fitting stainless steel

## Handling and operation

### Installation

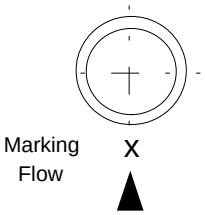
There are various installation options available:

The stainless steel compression fitting is screwed into a G ½ threaded drilling. For this, a G ½ welded-on nozzle is also available. When a suitable seal is used, this arrangement can take pressures up to 10 bar. The stainless steel threaded connection is first tightened by hand, and then by ¼ of a turn, using a spanner. The connection ring of the threaded connection can then no longer be removed from the sensor, and the immersion depth can therefore not be changed further.

The plastic cone is fitted to the separately available welded-on nozzle intended for this purpose, or to a suitable T-piece, using the union nut provided (available in brass or stainless steel). The union nut must be tightened to a torque of 20 Nm. It is possible to loosen the connection again, and so the immersion depth can be changed. This arrangement is suitable for pressures up to 10 bar.

When installing, it should also be noted that the sensors are directional (comply with the marking on the housing). The reduction of the sensor must be at ⅓..½ depth of the pipe diameter.

Avoid bubbles or deposits on the sensor. It is therefore best to install at the side.




## Operation and programming

The switching value can be set by the user by means of teaching. For this, proceed as follows:

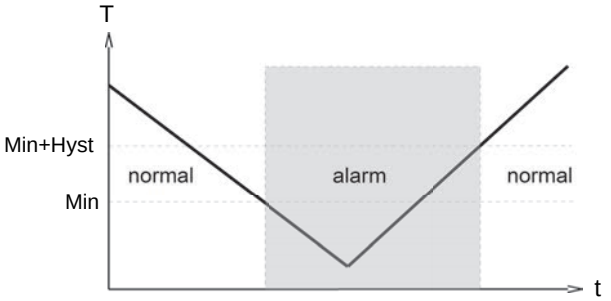
- The flow which is to be set is applied to the device.
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the supply voltage or a pulse from the PLC), in order to accept the measured value.
- When the teaching is complete, pin 2 should be connected to 0 V, so as to prevent unintended programming.

The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
To avoid the need to transit to an undesired operating status for the purpose of teaching, the device can be provided ex-works with a teach-offset. The teach-offset point is added to the currently measured value before saving.

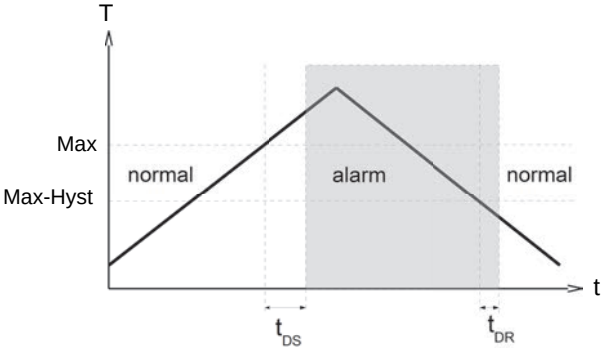
*Example: The switching value is to be set to 80 cm/s, because at this flow rate a critical process status is to be notified. However, only 60 cm/s can be achieved without danger. In this case, the device would be ordered with a teach-offset of +20 cm/s. At 60 cm in the process, a switching value of 80 cm would then be stored during "teaching".*

The LABO-F012-S limit switch can be used to monitor minimal or maximal.

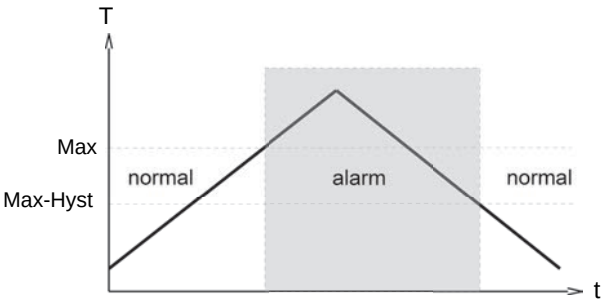
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



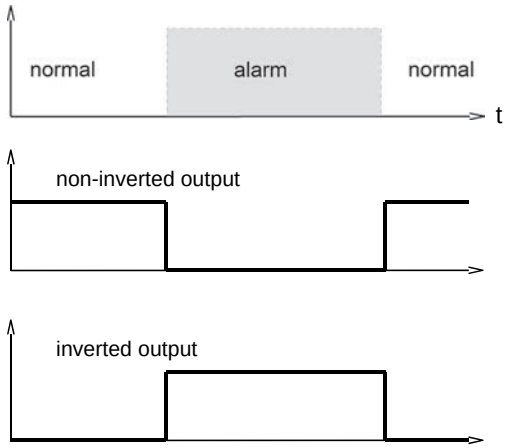

With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



A changeover delay time ($t_{DS}$) can be applied to switching to the alarm state. Equally, one switch-back delay time ($t_{DR}$) of several can be applied to switching back to the normal state.
In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.




In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.




A Power-On delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

## Ordering code

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|
| **LABO-F012 -** | **S** | | **K** | | | | |

❍=Option

| | | | |
|---|---|---|---|
| **1.** | **Switching output (Limit switch)** | | |
| | S | | push-pull (compatible with PNP and NPN) |
| **2.** | **Sensor length L** | | |
| | 100 | | 123 mm |
| | 150 | | 173 mm |
| | 200 | | 223 mm |
| **3.** | **Sensor material** | | |
| | K | | stainless steel 1.4571 |
| **4.** | **Programming** | | |
| | N | | cannot be programmed (no teaching) |
| | P | ❍ | programmable (teaching possible) |
| **5.** | **Switching function** | | |
| | L | | minimum switch |
| | H | | maximum switch |
| **6.** | **Switching signal** | | |
| | O | | standard |
| | I | ❍ | inverted |
| **7.** | **Optional** | | |
| | H | ❍ | extended temperature range |

## Options

**Switching delay period** (0.0..99.9 s) ___.___ s
(from Normal to Alarm)

**Switch-back delay period** (0.0..99.9 s) ___.___ s
(from Alarm to Normal)

**Power-On delay period** (0..99 s) ___ s
(after connecting the supply, time during which the switching output is not activated)

**Switching output fixed at** ___ cm/s

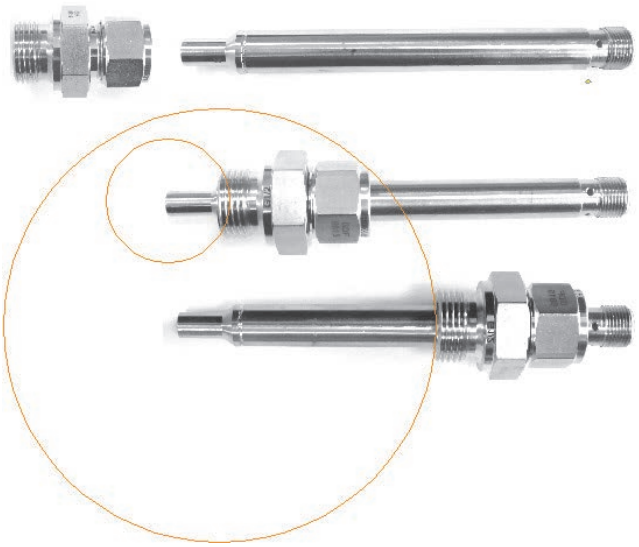
**Switching hysteresis** ___ %
*Standard = 2 % of the metering range*

**Teach-offset** ___ %
(in percent of the metering range)
*Standard = 0 %*

## Accessories

- Cable/round plug connector (KB...)
  see additional information “Accessories”
- ECI-1 device configurator (USB programming adapter)
- Weld-on adapter
- Compression fitting
- Flange

# Flow Transmitter LABO-F012-I / U / F / C



- **Complete transmitter in 12 mm housing**
- **For various nominal tubing widths, the same transmitter**
- **Signal proportional to the flow speed**
- **4..20 mA or 0..10 V or frequency output**
- **Adjustable working range**
- **User-configurable via plug pin (teaching)**
- **Can be used for various tubing cross-sections**
- **Very simple to use**

## Characteristics

The sensors of the LABO-F012 family are used for monitoring non-viscous fluids (for oil or gases on request). They come complete with electronics, and are supplied installed inside a compact sensor housing of 12 mm diameter and with M12x1 round plug outlet. The 16-bit processor carries out temperature compensation and linearisation of the calorimetric signal (measurement of the heat removal at the sensor tip by the flowing medium).

The LABO-F012 electronics transmit the result as:
- Analog 0/4...20 mA signal (LABO-F012-I)
- Analog 0/2..10 V signal (LABO-F012-U)
- Frequency signal (LABO-F012-F) or
- Pulse output, pulse / x litres (LABO-F012-C)

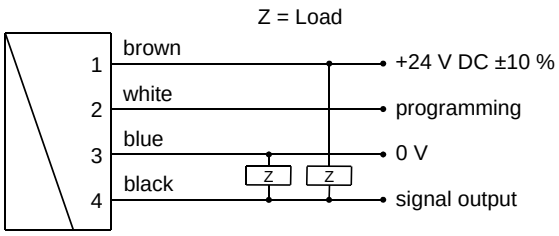
A model with switching output is available under designation LABO-F012-S.

If desired, the range end value can be set to the currently existing flow using "teaching".
If the transmitter is ordered in a specific T-piece, it can also be adjusted in l/min. Here, it should be noted that the flow speed is measured at only one point in the tubing cross-section.

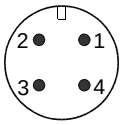
## Technical data

| | |
|---|---|
| **Sensor** | calorimetric measurement principle |
| **Process connection** | push-in sensor Ø12 mm |
| **Metering range** | water 2..150 cm/s<br>or 3..300 cm/s<br>oil or gases available on request |
| **Measurement accuracy** | depending on the installation location and flow conditions<br>typically ±10 % of full scale value or 2 cm/s,<br><br>of full scale value measured in the T-piece ±5 % |
| **Repeatability** | ±1 % |
| **Pressure resistance** | stainless steel compression fitting PN 40 bar |
| | plastic cone with union nut PN 10 bar |
| **Medium temperature** | -20..+70 °C<br>-20..+100 °C ( extended temperature range) |
| **Ambient temperature** | 0..+60 °C |
| **Temperature dependency** | ±0.01 % / K |
| **Supply voltage** | 24 V DC ±10 % (controlled) |
| **Power consumption** | < 2 W |
| **Analog output** | 4..20 mA / load max. 500 Ohm or<br>0..10 V / min. load 1 kOhm |
| **Frequency output** | selectable, max. 2 kHz. |
| **Pulse output** | selectable pulse per volume, details of Nominal pipework width required, pulse width 50 ms |
| **LED** | yellow LED (On = Normal / Off = Alarm / rapid flashing = Programming) |
| **Electrical connection** | for round plug connector M12x1, 4-pole |
| **Ingress protection** | IP 67 |
| **Materials medium-contact** | Housing 1.4571 |
| **Materials non-medium-contact** | Plug PA6.6 gold-plated contacts |
| **Weight** | approx. 0.05 kg (excluding screwed connection) |
| **Conformity** | CE |

## Wiring



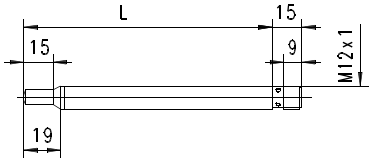

Connection example: PNP NPN



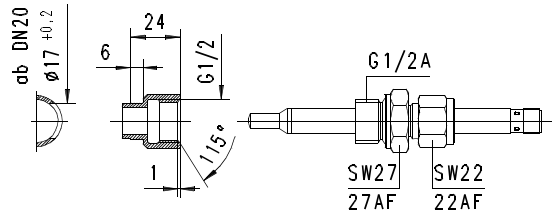

The use of shielded cabling is recommended.

## Dimensions

| L mm | Type |
|---|---|
| 123 | LABO-F012-S100... |
| 173 | LABO-F012-S150... |
| 223 | LABO-F012-S200... |




**Optional accessories**




Weld-on adapter

Compression fitting stainless steel

## Handling and operation

### Installation

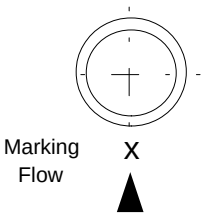
There are various installation options available:

The stainless steel compression fittingis screwed into a G ½ threaded drilling. For this, a G ½ welded-on nozzle is also available. When a suitable seal is used, this arrangement can take pressures up to 10 bar. The stainless steel threaded connection is first tightened by hand, and then by ¼ of a turn, using a spanner. The connection ring of the threaded connection can then no longer be removed from the sensor, and the immersion depth can therefore not be changed further!

The plastic cone is fitted to the separately available welded-on nozzle intended for this purpose, or to a suitable T-piece, using the union nut provided (available in brass or stainless steel). The union nut must be tightened to a torque of 20 Nm. It is possible to loosen the connection again, and so the immersion depth can be changed. This arrangement is suitable for pressures up to 10 bar.

When installing, it should also be noted that the sensors are directional (comply with the marking on the housing). The reduction of the sensor must be at ⅓..½ depth of the pipe diameter.

Avoid bubbles or deposits on the sensor. It is therefore best to install at the side.




## Programming

If desired, the metering range endpoint can be set by the user by means of teaching.
For this, proceed as follows:

- Apply the flow rate end range to the device
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the supply voltage or a pulse from the PLC), in order to accept the measured value.
- When the teaching is complete, pin 2 should be connected to 0 V, so as to prevent unintended programming.

The devices have a yellow LED which flashes during the programming pulse. During operation, the LED acts as a display for the operating voltage.

**Note:** Requirement for programmability must be stated when ordering, otherwise the device cannot be programmed. See also programming options by PC for all parameters and for adjustment (accessory).

## Ordering code

| | 1. | 2. | 3. | 4. | 5. |
|---|---|---|---|---|---|
| **LABO-F012 -** | | | **K** | | |

❍=Option

| | | | |
|---|---|---|---|
| **1.** | **Electrical output** | | |
| | I | | current output 4..20 mA |
| | U | | voltage output 0..10 V |
| | F | | frequency output |
| | C | | pulse output (x litre/ pulse relative to nominal pipework width, see "Option") |
| **2.** | **Sensor length L** | | |
| | 100 | | 123 mm |
| | 150 | | 173 mm |
| | 200 | | 223 mm |
| **3.** | **Sensor material** | | |
| | K | | stainless steel 1.4571 |
| **4.** | **Programming** | | |
| | N | | cannot be programmed (no teaching) |
| | P | ❍ | programmable (teaching possible) |
| **5.** | **Optional** | | |
| | H | ❍ | extended temperature range |

## Required ordering information

**For LABO-F012-F:**
**Output frequency at full scale** ☐☐☐☐ Hz
Maximum value: 2,000 Hz

**For LABO-F012-C:**
For LABO-F012-C, the volume must be stated (with numerical value and unit) which will correspond to one pulse. Because the adjustment depends on the inner diameter of the piping, this model is supplied only with a T-piece (which must be ordered separately).

**Volume per pulse (numerical value)** ☐☐☐☐

**Volume per pulse (unit)** ☐☐☐☐

## Options

**Special range for analog output:** ☐☐☐ cm/s
<= Metering range (Standard=Metering range)

**Special range for frequency output:** ☐☐☐ cm/s
<= Metering range (Standard=Metering range)

**Power-On delay period** (0..99 s) ☐☐ s
(time after applying power during which the outputs are not activated or set to defined values)

Further options available on request

## Accessories

- Cable/round plug connector (KB...)
  see additional information “Accessories”
- Device configurator ECI-1
- Weld-on adapter
- Compression fitting
- flange
- External display OMNI-TA or OMNI Remote

# Flow Transmitter / Switch FLEX-F

- **Compact robust flow switch / transmitter**
- **Combination with temperature switch or transmitter possible**
- **Mo moving parts in the medium being monitored**
- **Only one medium-contact material**
- **Simple to use**
- **Very low pressure loss**
- **Various sensor lengths and models**
- **Short response times for a calorimetric sensor**
- **Cable outlet infinitely rotatable**
- **Small installation width, therefore very narrow pipework**

## Characteristics

The FLEX-F flow sensor monitors fluid media. Its compact form combines the built-in sensor and converter / counter which, depending on the model, trigger a limit value output (push-pull, compatible with PNP and NPN) or an analog output (4..20 mA or 0..10 V) or both. The limit switch can optionally also be operated as frequency output. .
The converter / counter record two process parameters: the flow speed of the medium and its temperature. Both parameters can be assigned to the analog output or to the switching output. The following output combinations are available:

| Flow | | Temperature | |
|---|---|---|---|
| Analog output | Switching output | Analog output | Switching output |
| ● | | | |
| | ● | | |
| ● | ● | | |
| ● | | | ● |
| | ● | ● | |

The switching output can be ordered as a minimum or a maximum switch.

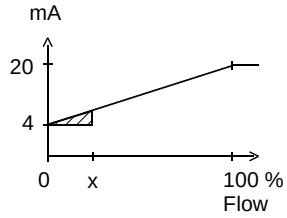
## Technical data

| | | |
|---|---|---|
| **Sensor** | calorimetric measurement principle | |
| **Process connection** | screw-in thread G $^1/_4$ A..G $^1/_2$ A,<br>Push-in sensor Ø12 mm | |
| **Metering range** | water 2..150 cm/s<br>or 3..300 cm/s<br>oil available on request | |
| **Measurement accuracy** | depending on the installation location and flow conditions<br>typically ±10 % of full scale value or 2 cm/s, measured in the T-piece ±5 % of full scale value | |
| **Repeatability** | ±1 % | |
| **Operating pressure** | PN 100 bar, 200 bar available on request | |
| **Metering range Temperature** | 0..+70 °C (high temperature model 0..+120 °C with gooseneck) | |
| **Operating temperature** | 0..+70 °C | |
| **Storage temperature** | -20..+80 °C | |
| **Temperature gradient** | 4 Kelvin/s | |
| **Materials medium-contact** | Sensor | 1.4571 |
| **Materials, non-medium-contact** | Housing | 1.4305 |
| | Plug | PA6.6 |
| | Clip | PA6.6 |
| **Adjustment** | by means of magnet | |
| **Supply voltage** | 24 V DC ±10 % | |
| **Current requirement** | max. 100 mA | |
| **Switching output** | transistor output "push-pull"<br>(resistant to short circuits and polarity reversal)<br>$I_{out}$ = 100 mA max. | |
| **Switching hysteresis** | flow 4 % of full scale value, temp.: approx. 2 °C | |
| **Display** | yellow LED (On = Normal / Off = Alarm / rapid flashing = Programming) | |
| **Analog output** | 4..20 mA / Load 500 Ohm max. or<br>0..10 V | |
| **Electrical connection** | for round plug connector M12x1, 4-pole | |
| **Weight** | approx. 0.2 kg (standard version) | |
| **Ingress protection** | IP 67 | |
| **Conformity** | CE | |

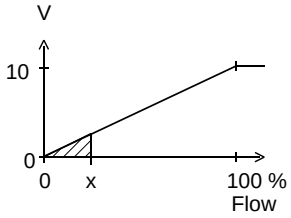
## Signal output curves

Value x = Begin of the specified range
= not specified range

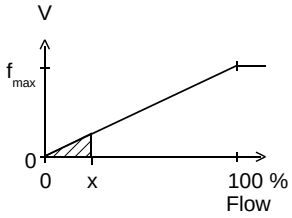
Current output




Voltage output



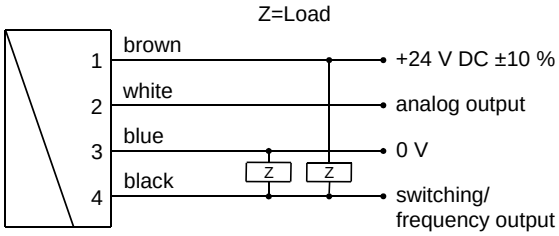

Frequency output



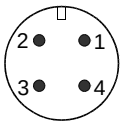

$f_{max}$ selectable in the range of up to 2000 Hz

Other characters on request.

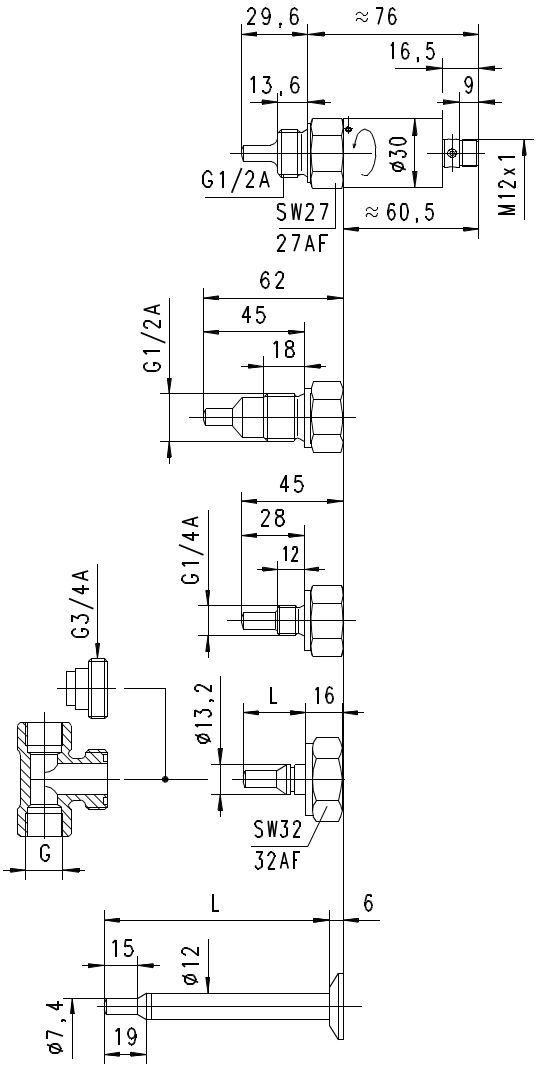
## Wiring




Connection example: PNP NPN




## Dimensions



**Gooseneck option**

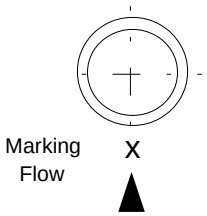
A gooseneck (optional) between the electronics head and the primary sensor provides complete freedom in the orientation and reading direction of the sensor.

## Handling and operation

### Installation

Before the electrical installation, it must be ensured that the supply voltage corresponds with the data sheet.
In order to ensure the sensor's maximum insensitivity to interference, the flow should run from bottom to top (best degassing even at the slowest flow speed).

Screw-in sensors are to be sealed using Teflon tape, so that the inwards flow is directed to the incised cross. This is the position at which measurement is undertaken in the factory, and which guarantees the best results. The sensor must be screwed in using its hexagonal spanner only.




There are various options for installing the 12 mm push-in sensors (OMNI-F012):

The stainless steel crimp screw jointis screwed into a G $^1/_2$ threaded drilling. For this, a G $^1/_2$ welded-on nozzle is also available. When a suitable seal is used, this arrangement can take pressures up to 40 bar. The stainless steel threaded connection is first tightened by hand, and then by $^1/_4$ of a turn, using a spanner. The connection ring of the threaded connection can then no longer be removed from the sensor, and the immersion depth can therefore not be changed further.

The plastic cone is fitted to the separately available welded-on nozzle intended for this purpose, or to a suitable T-piece, using the union nut provided (available in brass or stainless steel). The union nut must be tightened to a torque of 20 Nm. It is possible to loosen the connection again, and so the immersion depth can be changed. This arrangement is suitable for pressures up to 10 bar.

When installing the push-in sensors, it should also be noted that the sensors are directional (comply with the marking on the housing).

For all types of installation, the reduction of the sensor tip must lie completely in the open flow cross-section, wherever possible at a depth of $^1/_3$..$^1/_2$ of the pipe diameter.
Run-in and run-out sections of 10 x D should be provided.

### Programming

The electronics contain a magnetic contact, with the aid of which different parameters can be programmed. Programming takes place when a magnet clip is applied for a period between 0.5 and 2 seconds to the marking located on the label. If the contact time is longer or shorter than this, no programming takes place (protection against external magnetic fields).

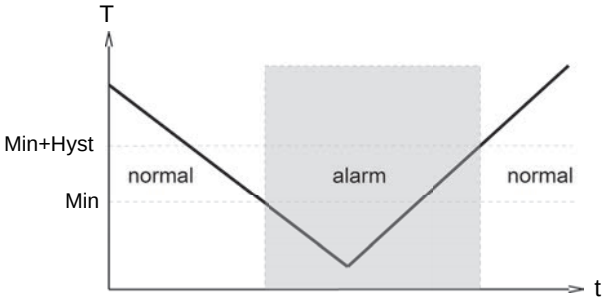
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

*Example: The switching value is to be set to 70 % of the metering range, because at this flow rate a critical process status is to be notified. However, only 50% can be achieved without danger. In this case, the device would be ordered with a "teach-offset" of +20 %. At 50 % in the process, a switching value of 70 % would then be stored during "teaching".*

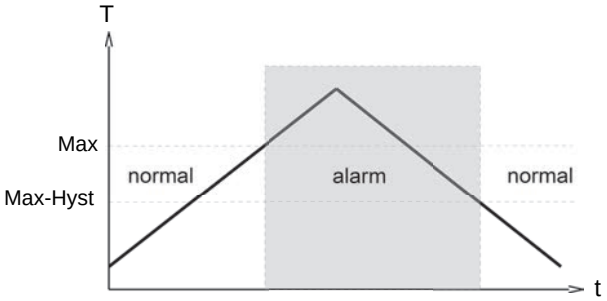
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

The limit switch can be used to monitor minimal or maximal.

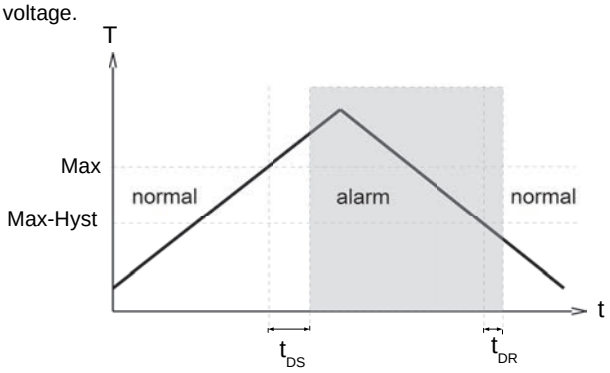
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



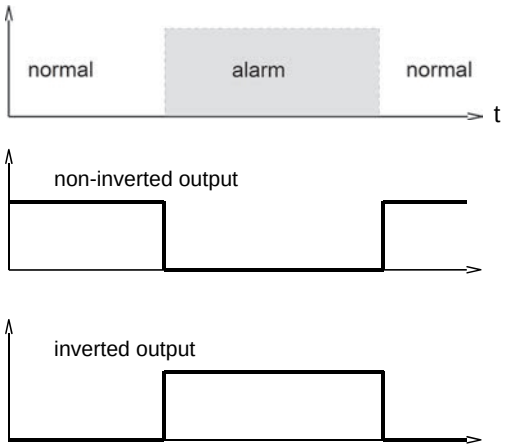

With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



A switchover delay time ($t_{DS}$) can be applied to the switchover to the alarm state. Equally, one switch-back delay time ($t_{DR}$) of several can be applied to switching back to the normal state.
In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.




In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.




A Power-On delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

## Ordering code

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
|---|---|---|---|---|---|---|---|---|---|---|
| **FLEX-F** | | | **K** | | | | | | | |

❍=Option

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **1.** | **Connection size** | | | | | | | |
| | 008 | connection G $^1/_4$ A | | | | | | |
| | 015 | connection G $^1/_2$ A | | | | | | |
| | 013 | system fastener Ø13.2 | | | | | | |
| | 012 | push-in sensor Ø12 | | | | | | |
| **2.** | **Process connection** | | | | | | | |
| | H | male thread | | | | ● | ● | |
| | T | for insertion into the system T-piece | | | ● | | | |
| | V | push-in sensor with variable insertion depth | | ● | | | | |
| **3.** | **Connection material** | | | | | | | |
| | K | stainless steel 1.4571 | | ● | ● | ● | ● | |
| **4.** | **Sensor** | | | | | | | |
| | 028 | sensor length | 28.0 mm | | | | ● | |
| | 029 | | 29.6 mm | | | ● | | |
| | 045 ❍ | | 45.0 mm | | | ● | | |
| | 031 | sensor for T-piece | G $^3/_8$..G $^1/_2$ | | ● | | | |
| | 037 | | G $^3/_4$..G 2 | | ● | | | |
| | 050 | insertion sensor | 50 mm | ● | | | | |
| | 070 | | 70 mm | ● | | | | |
| | 100 | | 100 mm | ● | | | | |
| | 150 | | 150 mm | ● | | | | |
| | 200 | | 200 mm | ● | | | | |
| **5.** | **Unit for analog output** | | | | | | | |
| | F | flow rate to analog output | | | | | | |
| | T ❍ | temperature to analog output | | | | | | |
| **6.** | **Analog output** | | | | | | | |
| | I | current output 4..20 mA | | | | | | |
| | U ❍ | Voltage output 0..10 V | | | | | | |
| **7.** | **Switching output** | | | | | | | |
| | T | switching output push-pull | | | | | | |
| | M ❍ | switching output NPN (open collector) | | | | | | |
| **8.** | **Measurement parameter to switching output** | | | | | | | |
| | F | flow to switching output | | | | | | |
| | T ❍ | temperature to switching output | | | | | | |
| **9.** | **Function for switching output** | | | | | | | |
| | L | minimum switch | | | | | | |
| | H | maximum switch | | | | | | |
| | R ❍ | frequency output | | | | | | |
| **10.** | **Switching output level** | | | | | | | |
| | O | standard output | | | | | | |
| | I ❍ | inverted output | | | | | | |

## Options

**Special measuring range for flow:** ___ cm/s
Max. 300 cm/s (standard = 150 cm/s)

**Special measuring range for temperature:** ___ °C
Maximum 120 °C (standard = 70 °C)

Minimum -20 °C (standard = 0 °C) ___ °C

**Special range for analog output:** ___ cm/s °C
<= Metering range (standard = metering range)

**Special range for frequency output:** ___ cm/s °C
<= Metering range (Standard = Metering range)

**End frequency (max. 2000 Hz)** ___ Hz

**Switching delay** ___ s
(from Normal to Alarm)

**Switchback delay** ___ s
(from Alarm to Normal)

**Power-On delay (0..99 s)** ___ s
(time after power on, during which the outputs are not actuated)

**Switching output fixed** ___ cm/s °C

**Special hysteresis** (standard = 4 % EW) ___ %

**Gooseneck** ☐
(recommended at operating temperatures above 70 °C)

If the field is not completed, the standard setting is selected automatically.

## Accessories

- Device configurator ECI-1
- T-pieces for system connection Ø13.2
- Weld-on adapter for insertion sensor Ø12
- Compression fitting for insertion sensor Ø12
- Flange for insertion sensor Ø12
- Cable/round plug connector (KB...)
  see additional information “Accessories”

# Flow Transmitter / Switch FLEX-FIN

- **Flow switch / transmitter for small flows**
- **Combination with temperature switch or transmitter possible**
- **No moving parts in the medium being measured**
- **Only one medium-contact material**
- **Simple to use**
- **Low pressure loss**
- **Various nominal widths**
- **Short response times for a calorimetric sensor**
- **Linearised and temperature compensated**
- **Simultaneous measurement of flow and temperature is possible**

## Characteristics

The FLEX-FIN flow sensor monitors fluid media. Its compact form combines the measurement tube and converter / counter which, depending on the model, trigger an adjustable limit value with transistor output or an analog output (4..20 mA or 0..10 V) or both. In addition, the limit switch can alternatively be replaced by a frequency output or a Pulse output.
The converter / counter record two process parameters: the flow speed of the medium and its temperature. Both parameters can be assigned to the analog output or to the switching output.

The following output combinations are available:

| Flow | | Temperature | |
|---|---|---|---|
| Analog | Switching output | Analog | Switching output |
| ● | | | |
| | ● | | |
| ● | ● | | |
| ● | | | ● |
| | ● | ● | |

The switching output is a "push-pull" transistor output and provides PNP and NPN inputs equally. It can be offered as a minimum switch or a maximum switch, or as a frequency output or a Pulse output.

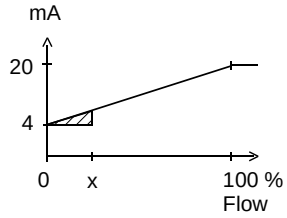
## Technical data

| | |
|---|---|
| **Sensor** | calorimetric measurement principle |
| **Nominal widths** | DN 6..10 |
| **Process connection** | smooth tube for crimp connector or hose connection |
| **Metering ranges (for water)** | 6 mm tube: (0.001) 0.01..2 l/min<br>8 mm tube: 0.025..5 l/min<br>10 mm tube: 0.05..10 l/min<br>Special ranges available on request |
| **Measurement accuracy** | ±3 % of the measured value ($H_2O$ dist.) |
| **Repeatability** | ±1 % of the measured value ($H_2O$ dist.) |
| **Temperature gradient** | 4 K/s |
| **Pressure resistance** | PN 10 bar |
| **Medium temperature** | 0..+70 °C (-20..+100 °C available on request) |
| **Operating temperature** | -20..+70 °C (electronics) |
| **Storage temperature** | -20..+80 °C |
| **Pressure loss** | max. 0.3 bar at max. flow |
| **Supply voltage** | 24 V DC ±10 % |
| **Current consumption** | max. 100 mA |
| **Switching output** | transistor output "push-pull"<br>(resistant to short circuits and polarity reversal)<br>$I_{out}$ = 100 mA max. |
| **Switching hysteresis** | flow 1 % of full scale value<br>Temperature: approx. 1 °C |
| **Pulse output** | pulse width 50 ms<br>→ max. output frequency < 20 Hz |
| **Display (only with switching output)** | yellow LED<br>(On = Normal / Off = Alarm / rapid flashing = Programming) |
| **Adjustment** | by means of magnet |
| **Analog output** | 4..20 mA / Load 500 Ohm max.<br>or 0..10 V / Load min. 1 kOhm |
| **Ingress protection** | IP 65 |
| **Electrical connection** | for round plug connector M12x1, 4-pole |
| **Materials medium-contact** | stainless steel 1.4571 |
| **Materials, non-medium-contact** | PPS, PA6.6, CW614N |
| **Weight** | approx. 0.2 kg |
| **Conformity** | CE |

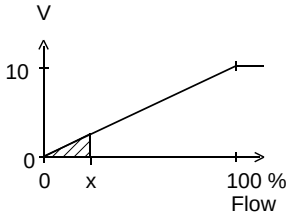
## Signal output curves

Value x = Begin of the specified range
= not specified range

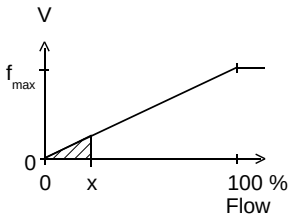
Current output




Voltage output



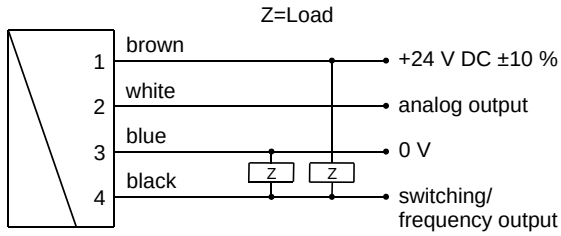

Frequency output



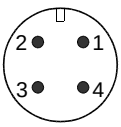

$f_{max}$ selectable in the range of up to 2000 Hz

Other characters on request.

## Wiring



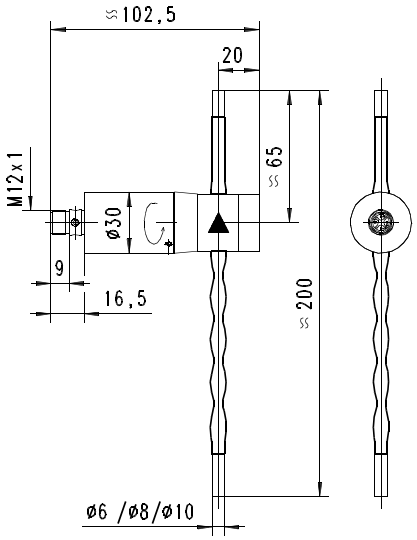

Connection example: PNP NPN



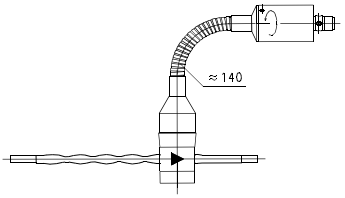

Before the electrical installation, it must be ensured that the supply voltage corresponds with the data sheet.

It is recommended to use shielded wiring.

## Dimensions




**Gooseneck option**




A gooseneck (optional) between the electronics head and the primary sensor provides freedom in the orientation of the sensor.

## Handling and operation

### Installation

In order to ensure the sensor's maximum insensitivity to interference, the flow should run from bottom to top (best degassing even at the slowest flow speed). Standard crimp connectors, hoses with crush protection, or the crimp connectors provided by HONSBERG can be used for the connection.
The insulation hoses offer the best possible insulation against the surroundings, and must therefore not be removed.
There is a marking on the rear of the housing. The sensor should be fixed there using a sheet metal screw. The penetration depth of the screw must not exceed 5 mm.
The piping must not be bent or deformed.
When testing, use only hoses, because the transmitter can no longer be returned if the connection pieces have been crimped.

### Programming

The electronics contain a magnetic contact, with the aid of which different parameters can be programmed. Programming takes place when a magnet clip is applied for a period between 0.5 and 2 seconds to the marking located on the label. If the contact time is longer or shorter than this, no programming takes place (protection against external magnetic fields).

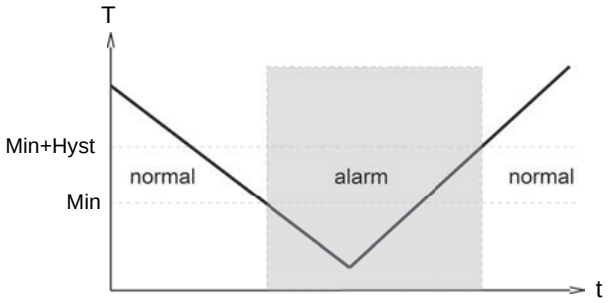
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

*Example: The switching value is to be set to 70 % of the metering range, because at this flow rate a critical process status is to be notified. However, only 50% can be achieved without danger. In this case, the device would be ordered with a "teach-offset" of +20 %. At 50 % in the process, a switching value of 70 % would then be stored during "teaching".*

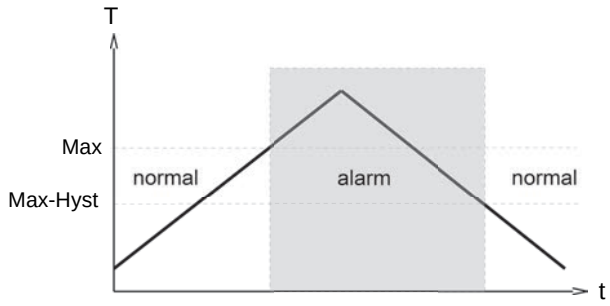
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

The limit switch can be used to monitor minimal or maximal.

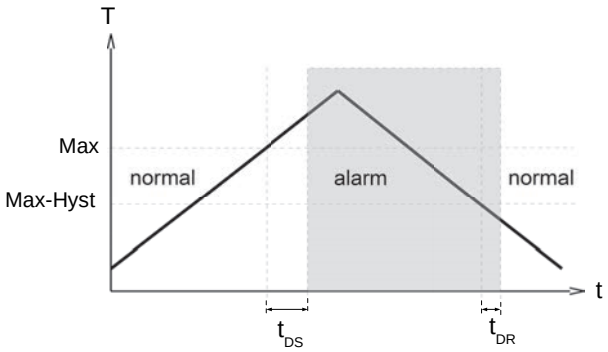
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



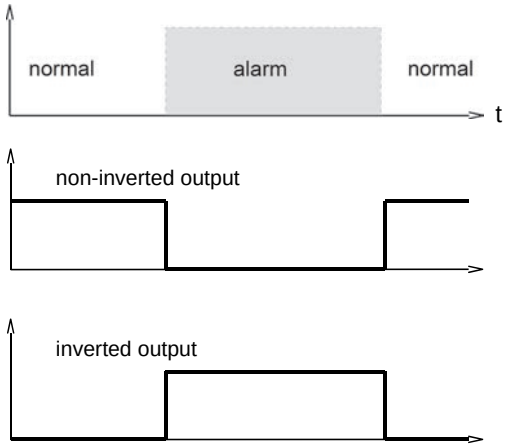

With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.




A switchover delay time ($t_{DS}$) can be applied to the switchover to the alarm state. Equally, one switch-back delay time ($t_{DR}$) of several can be applied to switching back to the normal state.
In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.




In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.




A Power-On delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

## Ordering code

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|---|---|---|---|---|---|---|---|---|---|
| **FLEX-FIN** | | **R** | | | | | | | |

❍=Option

| | | | |
|---|---|---|---|
| **1.** | **Connection size** | | |
| | 006 | tube Ø in mm / 0.5 mm wall thickness | 6 mm |
| | 008 | | 8 mm |
| | 010 | | 10 mm |
| **2.** | **Process connection** | | |
| | R | tube | |
| **3.** | **Connection material** | | |
| | K | stainless steel 1.4571 | |
| | H ❍ | Hastelloy® | |
| **4.** | **Unit for analog output** | | |
| | F | flow rate to analog output | |
| | T | temperature to analog output | |
| **5.** | **Analog output** | | |
| | I | current output 4..20 mA | |
| | U | voltage output 0..10 V | |
| **6.** | **Switching output** | | |
| | T | switching output push-pull | |
| | M | switching output NPN (open collector) | |
| **7.** | **Measurement parameter to switching output** | | |
| | F | flow to switching output | |
| | T | temperature to switching output | |
| **8.** | **Function for switching output** | | |
| | L | minimum switch | |
| | H ❍ | maximum switch | |
| | R | frequency output | |
| | C | Pulse output | |
| **9.** | **Switching output level** | | |
| | O | standard output | |
| | I | inverted output | |

## Required ordering information

**For FLEX-FIN-C:**
For the pulse output version, the volume (with numerical value and unit) which will correspond to one pulse must be stated.

**Volume per pulse (numerical value)** ____

**Volume per pulse (unit)** ____

## Options

**Special measuring range for flow:**
Metering range start value ____,____ l/min

**Metering range end value** ____,____ l/min

**Filter time** (standard = 0.5 s) ____ s
Possible values:
OFF/0.2/0.5/1/2/4/8/16/32 s.

**Special measuring range for temperature:**
Maximum 100 °C (standard = 70 °C) ____ °C

Minimum -20 °C (standard = 0 °C) ____ °C

**Special range for analog output:**
<= Metering range (standard = metering range) ____ cm/s °C

**Special range for frequency output:**
<= Metering range (standard = Metering range) ____ cm/s °C

**End frequency** (max. 2000 Hz) ____ Hz

**Switching delay** ____.____ s
(from Normal to Alarm)

**Switchback delay** ____.____ s
(from Alarm to Normal)

**Power-On delay (0..99 s)** ____ s
(time after power on, during which the outputs are not actuated)

**Switching output fixed** ____ cm/s °C

**Special hysteresis** ____ %
(standard = 1 % of full scale value)

**Gooseneck** ____

If the field is not completed, the standard setting is selected automatically.

## Accessories

- Crimp connector
- Connector / made-up cable
- Device configurator ECI-1
- Cable/round plug connector (KB...)
  see additional information “Accessories”

# Flow Transmitter / Switch OMNI-F


- **Flow indicator for industrial use, without moving parts**
- **Short response times for a calorimetric sensor**
- **Medium comes into contact with only one material**
- **Analog output 4..20 mA or 0..10 V**
- **Two programmable switches (push-pull)**
- **Graphical LCD display, backlit (transreflective), can be read in sunlight and in the dark**
- **Programmable parameters via rotatable, removable ring (programming protection)**
- **Full metal housing with non-scratch, chemically resistant glass**
- **Rotatable electronic head for best reading position**
- **Small, compact construction**
- **Simple installation**

## Characteristics

The calorimetric sensor measures the flow speed in aqueous fluids. The display shows the measured value in a range from 0..100 % as a digital value and as a bar graph. The measured value is output as a 0/4..20 mA value. Both the 0/4 mA and the 20 mA value can be programmed via a scaling of the display range, and so the sensor can be adapted to any flow speed lying within the overall range.
Measurement is supported in terms of temperature compensation and signal processing (linearistion, interpolation, amplification) by the use of a microcontroller.
Because a conclusion on the whole cross-section is drawn based on a point measurement in a pipe, the accuracy achievable is not so good as with a flow sensor in a permanently installed tube (OMNI-FIN or FLEX-FIN).

By turning the programming ring to right or left, it is simple to modify the parameters (e.g. switching point, hysteresis...). To protect from unintended programming, it can be removed, turned through 180 °, and replaced, or completely removed, thus acting as a key.

**OPTION C:**
Preset Counter with external reset option, complementary switching outputs and actual value display.

**OPTION C1:**
Instantaneous value display with analogue output, pulse-volume output and totalizer

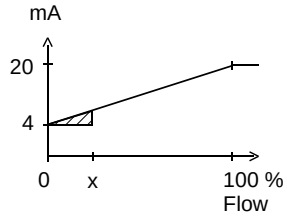
## Technical data

| | | |
|---|---|---|
| **Sensor** | calorimetric measurement principle | |
| **Process connection** | screw-in thread G $^{1}/_{4}$ A..G $^{1}/_{2}$ A,<br>push-in sensor Ø12 mm | |
| **Metering range** | water 2..150 cm/s range,<br>3..300 cm/s available on request<br>oil (available on request) | |
| **Measurement accuracy** | dependent on the installation location and flow conditions<br>typically ±10 % of full scale value or 2 cm/s, of full scale value measured in the T-piece ±5 % | |
| **Repeatability** | ±1 % | |
| **Dynamics** | in water (25 °C) at average flow speed of approx. 1-2 s | |
| **Hysteresis** | adjustable, position of hysteresis depends on min. or max. switching value | |
| **Pressure resistance** | PN 100 bar (PN 200 bar available on request) | |
| **Medium temperature** | 0..+70 °C | |
| **Ambient temperature** | -20..+70 °C | |
| **Storage temperature** | -20..+80 °C | |
| **Materials medium-contact** | stainless steel 1.4571 | |
| **Materials non-medium-contact** | Housing | Stainless steel 1.4305 |
| | Glass | Mineral glass, hardened |
| | Magnet | Samarium-Cobalt |
| | Ring | POM |
| **Supply voltage** | 24 V DC ±10 % | |
| **Analog output** | 0/4..20 mA or 0/2..10 V | |
| **Power consumption** | < 1 W | |
| **Switching outputs S1 and S2** | transistor output "push-pull"<br>(resistant to short circuits and polarity reversal) $I_{out}$ = 100 mA max. per output | |
| **Display** | backlit graphical LCD-Display (transreflective), extended temperature range -20..+70 °C, 32 x 16 pixels, background illumination, displays value and unit, flashing LED signal lamp with simultaneous message on the display. | |
| **Electrical connection** | for round plug connector M12x1, 5-pole | |
| **Ingress protection** | IP 67 | |
| **Weight** | approx. 0.25 kg | |
| **Conformity** | CE | |

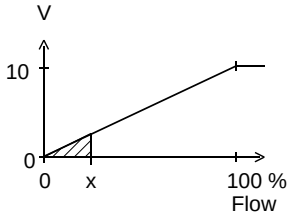
## Signal output curves

Value x = Begin of the specified range
= not specified range

Current output

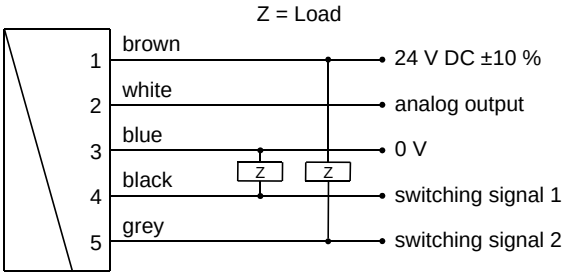



Voltage output

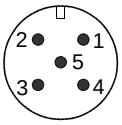



Other characters on request.

## Wiring




Connection example: PNP NPN

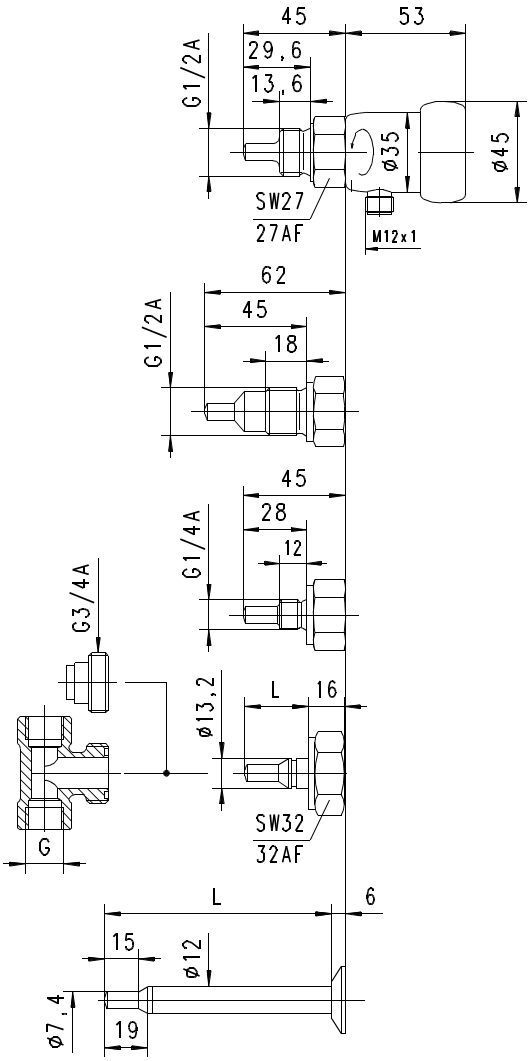



connector M12x1

See separate wiring at C and C1 option in the separate descriptions.

Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.
The use of shielded cabling is recommended.

## Dimensions




**Gooseneck option**

A gooseneck (optional) between the electronics head and the primary sensor provides complete freedom in the orientation and reading direction of the sensor.

## Handling and operation

### Installation

In order to ensure the sensor's maximum insensitivity to interference, the flow should run from bottom to top (best degassing even at the slowest flow speed).

Screw-in sensors are to be sealed using Teflon tape, so that the inwards flow is directed to the incised cross. This is the position at which measurement is undertaken in the factory, and which guarantees the best results. The sensor must be screwed in using its hexagonal spanner only.

A gooseneck (optional)

between the electronics head and the primary sensor provides freedom in the alignment and reading direction of the sensor. This option simultaneously provides thermal decoupling between the two units

There are various options for installing the 12 mm push-in sensors (OMNI-F012):

The stainless steel compression fittingis screwed into a G $^1/_2$ threaded drilling. For this, a G $^1/_2$ welded-on nozzle is also available. When a suitable seal is used, this arrangement can take pressures up to 40 bar. The stainless steel threaded connection is first tightened by hand, and then by $^1/_4$ of a turn, using a spanner. The connection ring of the threaded connection can then no longer be removed from the sensor, and the immersion depth can therefore not be changed further.

The plastic cone is fitted to the separately available welded-on nozzle intended for this purpose, or to a suitable T-piece, using the union nut provided (available in brass or stainless steel). The union nut must be tightened to a torque of 20 Nm. It is possible to loosen the connection again, and so the immersion depth can be changed. This arrangement is suitable for pressures up to 10 bar.

When installing the push-in sensors, it should also be noted that the sensors are directional (comply with the marking on the housing).

For all types of installation, the reduction of the sensor tip must lie completely in the open flow cross-section, wherever possible at a depth of $^1/_3$..$^1/_2$ of the pipe diameter.
Run-in and run-out sections of 10 x D should be provided.

After installation, the OMNI head can be aligned in the best reading position, thanks to its rotatability.

## Programming

The annular gap of the programming ring can be turned to positions 1 and 2. The following actions are possible:

**Set to 1 = continue (STEP)**
**Set to 2 = modify (PROG)**

**Neutral position between 1 and 2**

The ring can be removed to act as a key, or turned through 180 ° and replaced to create a programming protector.
Operation is by dialog with the display messages, which makes its use very simple.
Starting from the normal display (currently measured value with unit), if 1 (STEP) is repeatedly selected, then the display shows the following information in this order:

**Display of the parameters, using position 1**

- Switching value S1 (switching point 1 in the selected unit)
- Switching characteristic of S1
- (MIN = monitoring of minimum value, hysteresis greater than switching value,
- MAX = monitoring of maximum value, hysteresis less than switching value)
- Hysteresis 1 (hysteresis value of S1 in the set unit)
- Switching value S2
- Switching characteristic of S2
- Hysteresis 2
- Code:
- After entering the code 111, further parameters can be defined:
- Filter (settling time of the display and output)
- Units: e.g. l/min or %
- Output: 0..20 mA or 4..20 mA
- 0/4 mA (flow rate corresponding to 0/4 mA)
- 20 mA (flow rate corresponding to 20 mA)

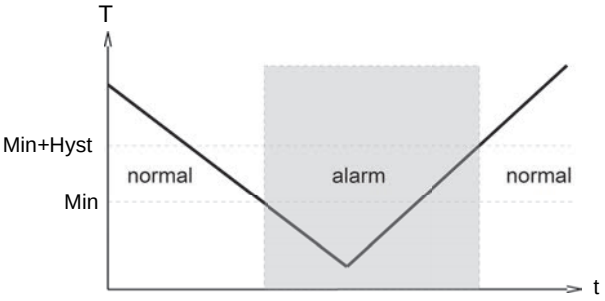
**Edit, using position 2**

If the currently visible parameter is to be modified:

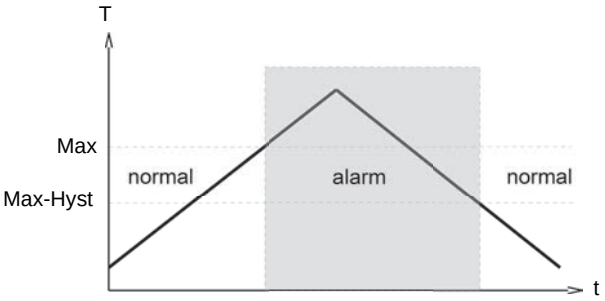
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the next digit is reached.
- Leave the parameter by turning to position 1 (until the cursor leaves the row); this accepts the modification.
- If there is no action within 30 seconds, the device returns to the normal display range without accepting the modification.

The limit switches S1 and S2 can be used to monitor minimal or maximal.

With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.




With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.




The change to the alarm state is indicated by the integrated red LED and a cleartext in the display.
While in the normal state the switching outputs are at the level of the supply voltage; in the alarm state they are at 0 V, so that a wire break would also display as an alarm state at the signal receiver.

**Overload display**
Overload of the switching output is detected, indicated on the

display ("Check S 1 / S 2"), and the switching output is switched off.

**Simulation mode**
To simplify commissioning, the sensor supports a simulation mode for the analog output. It is possible to create a programmable value in the range 0..26.0 mA at the output (without modifying the process variable). This allows the wiring run between the sensor and the downstream electronics to be tested during commissioning. This is mode is accessed by means of **Code 311**.

**Factory settings**
After modifying the configuration parameters, it is possible to reset them to the factory settings at any time using **Code 989**.

## Ordering code

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|---|---|---|---|---|---|---|---|---|
| **OMNI-F-** | | | **K** | | | **S** | | |

❍=Option

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **1.** | **Connection size** | | | | | | |
| | 008 | | connection G 1/4 A | | | | |
| | 015 | | connection G 1/2 A | | | | |
| | 013 | | system fastener Ø13.2 | | | | |
| | 012 | | push-in sensor Ø12 | | | | |
| **2.** | **Process connection** | | | | | | |
| | H | | male thread | | | ● | ● |
| | T | | for insertion into the system T-piece | | ● | | |
| | V | | push-in sensor with variable insertion depth | ● | | | |
| **3.** | **Connection material** | | | | | | |
| | K | | stainless steel 1.4571 | ● | ● | ● | ● |
| **4.** | **Sensor** | | | | | | |
| | 028 | | sensor length | 28.0 mm | | | | ● |
| | 029 | | | 29.6 mm | | | ● | |
| | 045 | ❍ | | 45.0 mm | | | ● | |
| | 031 | | sensor for T-piece | G 3/8..G 1/2 | | ● | | |
| | 037 | | | G 3/4..G 2 | | ● | | |
| | 050 | | sensor length L | L=73 | ● | | | |
| | 070 | | | L=93 | ● | | | |
| | 100 | | | L=123 | ● | | | |
| | 150 | | | L=173 | ● | | | |
| | 200 | | | L=223 | ● | | | |
| **5.** | **Analog output** | | | | | | | |
| | I | | Current output 0/4..20 mA | | | | | ● |
| | U | ❍ | Voltage output 0/2..10 V | | | | | ● |
| | K | | without | | | | ● | |
| **6.** | **Electrical connection** | | | | | | | |
| | S | | for round plug connector M12x1, 5-pole | | | | | |
| **7.** | **Options 1** | | | | | | | |
| | H | ❍ | model with gooseneck | | | | | |
| **8.** | **Options 2** | | | | | | | |
| | C | ❍ | counter C | | | | | |
| | C1 | ❍ | counter C1 | | | | | |

## Options

**Counter C** (hardware and software option):
Preset Counter with external reset option, complementary switching outputs and actual value display
(modified wiring diagram!)

**Counter C1** (software option):
Instantaneous value display with analogue output, pulse-volume output and totalizer

## Accessories

- ECI-1 device configurator (USB programming adapter)
- Cable / round plug connector (KB...)
  see additional information “Accessories”
- T-pieces for system connection Ø13.2
- Weld-on adapter for insertion sensor Ø12
- Compression fitting for insertion sensor Ø12
- Flange for insertion sensor Ø12

# Flow Transmitter / Switch OMNI-FIN

- **For foodstuffs use**
- **Analog output 0/4..20 mA or 0/2..10 V**
- **Two programmable switches (push-pull)**
- **Graphical LCD display, backlit (transreflective), can be read in sunlight and in the dark**
- **Programmable parameters via rotatable, removable ring (programming protection)**
- **Full metal housing with non-scratch, chemically resistant glass**
- **Physical unit in the display (selectable)**
- **Rotatable electronic head for best reading position**
- **Connection to USB interface for setting parameters**

## Characteristics

The OMNI-FIN calorimetric sensor measures small fluid flows, and has been designed specially for use in the foodstuffs industry (for the measurement principle, see also "General description: calorimetric sensors").

The integrated transducer has a backlit graphics LCD display which is very easy to read both in the dark and in bright sunlight. The graphics display allows the presentation of measured values and parameters in a clearly understandable form. The measured values are displayed to 4 places, together with their physical unit, which may also be modified by the user. The electronics have an analog output (4..20 mA or 0..10 V) and two switching outputs, which can be used as limit switches for monitoring minimal or maximal, or as two-point controllers. The switching outputs are designed as push-pull drivers, and can therefore be used both as PNP and NPN outputs. Exceeding limit values is signalled by a red LED which is visible over a long distance, and by a cleartext in the display. The stainless steel case has a hardened non-scratch mineral glass pane. It is operated by a programming ring fitted with a magnet, so there is no need to open the operating controls housing, and its leakproofness is permanently ensured.

By turning the ring to right or left, it is simple to modify the parameters (e.g. switching point, hysteresis...). To protect from unintended programming, it can be removed, turned through 180 ° and replaced, or completely removed, thus acting as a key.

**OPTION C:**
Preset Counter with external reset option, complementary switching outputs and actual value display.

**OPTION C1:**
Instantaneous value display with analogue output, pulse-volume output and totalizer

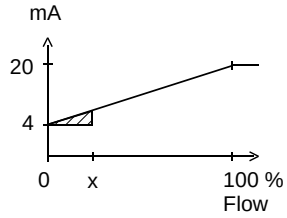
## Technical data

| | | |
|---|---|---|
| **Sensor** | calorimetric measurement principle | |
| **Nominal widths** | DN 6..10 | |
| **Process connection** | smooth tube for crimp connector or hose connection | |
| **Metering ranges (for water)** | 6 mm tube | (0.001) 0.01..2 l/min |
| | 8 mm tube | 0.025..5 l/min |
| | 10 mm tube | 0.05..10 l/min |
| | Special ranges available on request | |
| **Measurement accuracy** | ±3 % of the measured value ($H_2O$ dist.) | |
| **Repeatability** | ±1 % of the measured value ($H_2O$ dist.) | |
| **Temperature gradient** | 4 K/s | |
| **Start-up time** | 10 sec. after application of operating voltage | |
| **Response time** | in water (25 °C) at average<br>Flow speed of approx. 1-2 sec. | |
| **Pressure resistance** | PN 10 bar | |
| **Media temperature** | 0..+100 °C<br>Optionally with spacer:<br>130 °C, 45 minutes max. | |
| **Ambient temperature** | -20..+70 °C | |
| **Storage temperature** | -20..+80 °C | |
| **Supply voltage** | 24 V DC ±10 % | |
| **Analog output** | 0/4..20 mA or<br>0/2..10 V | |
| **Power consumption** | < 1 W | |
| **Switching outputs** | transistor output "push-pull", compatible with PNP and NPN, (resistant to short circuits, and reversal polarity protected)<br>$I_{out}$ = 100 mA max. | |
| **Hysteresis** | adjustable, position of the hysteresis depends on minimum or maximum switching value | |
| **Display** | backlit graphical LCD-Display (transreflective), extended temperature range -20..+70 °C, 32 x 16 pixels, background illumination, displays value and unit, flashing LED signal lamp with simultaneous message on the display. | |
| **Ingress protection** | IP 67 | |
| **Electrical connection** | for round plug connector M12x1, 5-pole | |
| **Materials medium-contact** | stainless steel 1.4571 | |
| **Non-medium-contact materials** | Housing: | stainless steel 1.4305 |
| | Glass: | mineral glass, hardened |
| | Magnet: | samarium-Cobalt |
| | Ring: | POM |
| **Weight** | approx. 0.25 kg | |
| **Conformity** | CE | |

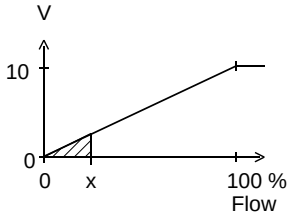
## Signal output curves

Value x = Begin of the specified range
= not specified range

Current output

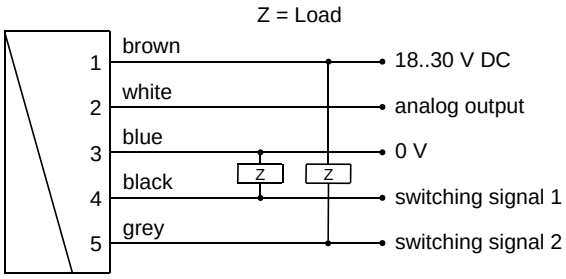



Voltage output

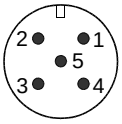



Other characters on request.

## Wiring




Connection example: PNP NPN

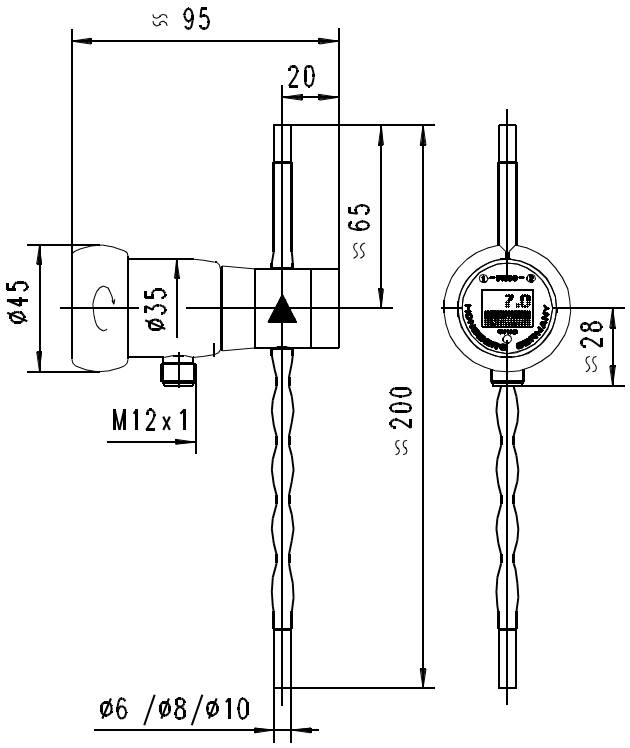



connector M12x1

See separate wiring at C and C1 option in the separate descriptions.

Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.
The use of shielded cabling is recommended.

## Dimensions




A spacer between the electronics head and the medium-contact measurement tube provides thermal decoupling between the two units. The media temperature may be raised for 45 min. to 130 °C.

## Handling and operation

### Installation

In order to ensure the sensor's maximum insensitivity to interference, the flow should run from bottom to top (best degassing even at the slowest flow speed). Standard crimp connectors, hoses with crush protection, or the crimp connectors provided by HONSBERG can be used for the connection.

The insulation hoses provide the best possible insulation from the environment, and should therefore not be removed.

It must be ensured that the calming section with the static mixer is not kinked.

### Programming

The annular gap of the programming ring can be turned to positions 1 and 2. The following actions are possible:


**Set to 1 = continue (STEP)**
**Set to 2 = modify (PROG)**

**Neutral position between 1 and 2**

The ring can be removed to act as a key, or turned through 180 ° and replaced to create a programming protector.

Operation is by dialog with the display messages, which makes its use very simple.
Starting from the normal display (present value and unit), if 1 (STEP) is repeatedly selected, then the display shows the following information in this order:

**Display of the parameters, using position 1**

- Switching value S1 (switching point 1 in the selected unit)
- Switching characteristic of S1
  MIN = Monitoring of minimum value
  MAX = Monitoring of maximum value
- Hysteresis 1 (hysteresis value of S1 in the set unit)
- Switching value S2
- Switching characteristic of S2
- Hysteresis 2
- Code
  After entering the **code 111**, further parameters can be defined:
- Filter (settling time of the display and output)
- Physical unit (Units)
- Output: 0..20 mA or 4..20 mA
- 0/4 mA (measured value corresponding to 0/4 mA)
- 20 mA (measured value corresponding to 20 mA)

For models with a voltage output, replace 20 mA accordingly with 10 V.

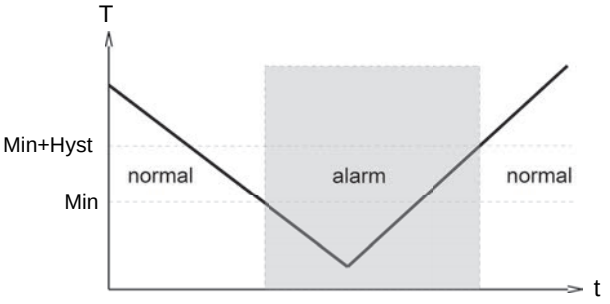
**Edit, using position 2**

If the currently visible parameter is to be modified:

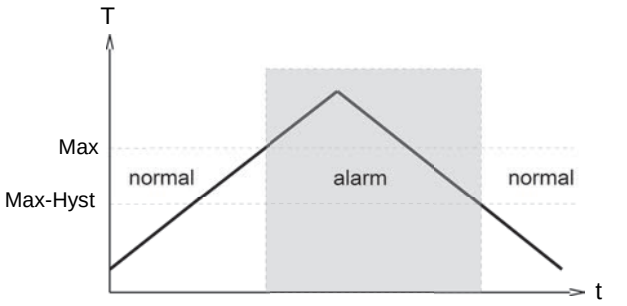
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the cursor moves to the next digit.
- Leave the parameter by turning to position 1 (until the cursor leaves the row); this accepts the modification.
- If there is no action within 30 seconds, the device returns to the normal display range without accepting the modification.

The limit switches S1 and S2 can be used to monitor minimal or maximal.

With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.




With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.




The change to the alarm state is indicated by the integrated red LED and a cleartext in the display.
While in the normal state the switching outputs are at the level of the supply voltage; in the alarm state they are at 0 V, so that a wire break would also display an alarm state at the signal receiver.

**Overload display**
Overload of a switching output is detected and indicated on the display ("Check S 1 / S 2"), and the switching output is switched off.

**Simulation mode**
To simplify commissioning, the sensor provides a simulation mode for the analog output. It is possible to create a programmable value in the range 0..26.0 mA at the output (without modifying the process variable). This allows the wiring run between the sensor and the downstream electronics to be tested during commissioning. This mode is accessed by means of code **311**.

**Factory settings**
After modifying the configuration parameters, it is possible to reset them to the factory settings at any time using **code 989**.

## Ordering code

| | 1. | | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|---|---|---|---|---|---|---|---|---|---|
| **OMNI-FIN** | - | | - | **R** | | | **S** | | |

❍=Option

| | | | | | |
|---|---|---|---|---|---|
| **1.** | **Tubing diameter** | | | | |
| | 006 | | 6 mm | | |
| | 008 | | 8 mm | | |
| | 010 | | 10 mm | | |
| **2.** | **Metering range** | | | | |
| | 02000 | | (0.001) 0.01..2 l/min | | ● |
| | 05000 | | 0.025..5 l/min | ● | |
| | 10000 | | 0.05..10 l/min | ● | |
| **3.** | **Process connection** | | | | |
| | R | | tube | | |
| **4.** | **Pipework material** | | | | |
| | K | | stainless steel 1.4571 | | |
| | H | ❍ | hastelloy® | | |
| **5.** | **Analog output** | | | | |
| | I | | current output 0/4..20 mA | | ● |
| | U | ❍ | voltage output 0/2..10 V | | ● |
| | K | | without | ● | |
| **6.** | **Electrical connection** | | | | |
| | S | | for round plug connector M12x1.5-pole | | |
| **7.** | **Spacer** | | | | |
| | H | | 140 °C, 45 minutes max. | | |
| **8.** | **Options** | | | | |
| | C | ❍ | Counter C | | |
| | C1 | ❍ | Counter C1 | | |

## Options

**Counter C** (hardware and software option):
Preset Counter with external reset option, complementary switching outputs and actual value display
(modified wiring diagram!)

**Counter C1** (software option):
Instantaneous value display with analogue output, pulse-volume output and totalizer

## Accessories

- ECI-1 device configurator (USB programming adapter)
- Process adapter
- Cable/round plug connector (KB...)
  see additional information “Accessories”