Honsberg Instruments GmbH
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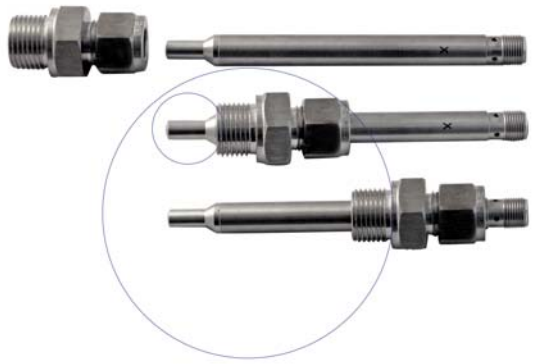
Flow Switch LABO-F012-S



- **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 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.

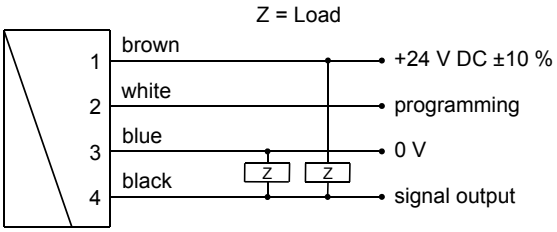
The switching value can be set by the user via teaching (see Handling and Operation). All other values have been preset at the factory, but can be modified by the user with the aid of the optionally available ECI-1 interface and a PC.

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

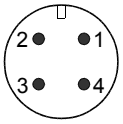
Technical data

Sensor	calorimetric measurement principle
Process connection	push-in sensor Ø12 mm
Switching range	water 2..150 cm/s or 3..300 cm/s oil available on request
Measurement accuracy	dependent on the installation location and flow conditions 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
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 (On = Normal / Off = Alarm / rapid flashing = Programming)
Electrical connection	for round plug connector M12x1, 4-pole
Ingress protection	IP 67
Weight	approx. 0.05 kg (excluding screwed connection)
Conformity	CE

Wiring



Connection example: PNP NPN



The use of shielded cabling is recommended.

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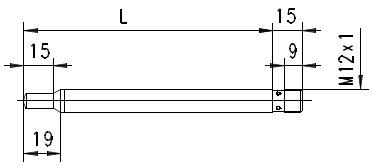
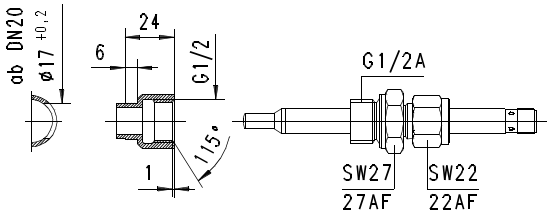
Dimensions

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

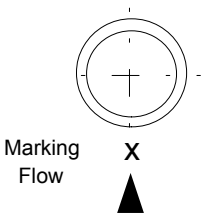
There are various installation options available:

The stainless steel compression fitting is screwed into a G $^1/_2$ 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 10 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, 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 $^1/_3$..$^1/_2$ 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:

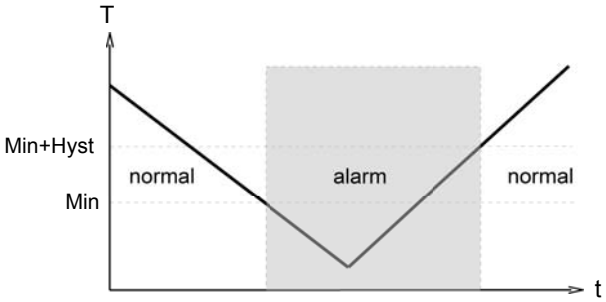
- The flow which is to be set is applied to the device.
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the supply voltage or a pulse from the PLC), in order to accept the measured value.
- When the teaching is complete, pin 2 should be connected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

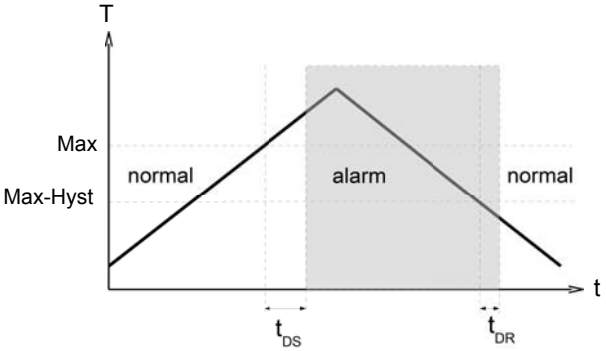
Example: The switching value is to be set to 80 cm/s, because at this flow rate a critical process status is to be notified. However, only 60 cm/s can be achieved without danger. In this case, the device would be ordered with a teach-offset of +20 cm/s. At 60 cm in the process, a switching value of 80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

The LABO-F012-S limit switch can be used to monitor minima or maxima.

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.



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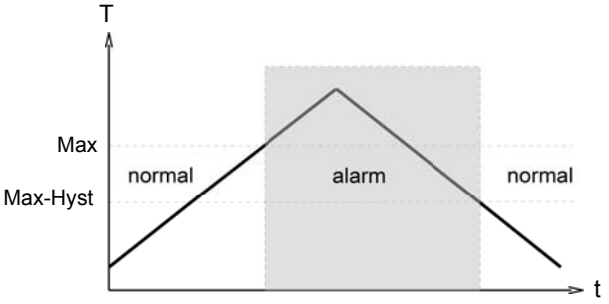
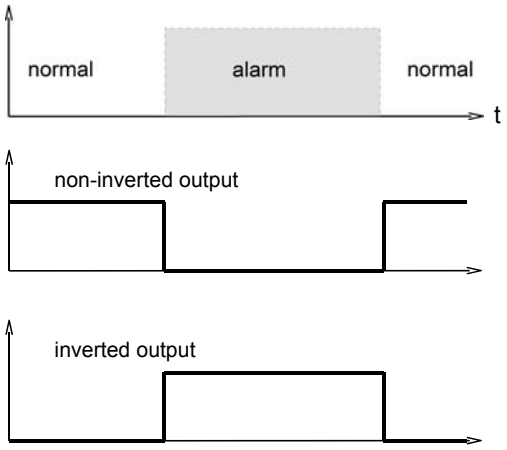
A changeover delay time (t_{DS}) can be applied to switching to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.
In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status 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 ❍	100 °C Version

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