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PRODUCT INFORMATION
GHM GROUP

Flow.
Calorimetry.

Characteristics

System
- Calorimetric flow sensors

Evaluation
- Display, switching, Metering. counting, measurement of consumption

Range
- 2..300 cm/s, 5 ml..10 l/min

Media
- Aqueous media

Pressure resistance
- Max. 200 bar

Medium temperature
- -20..+130 °C

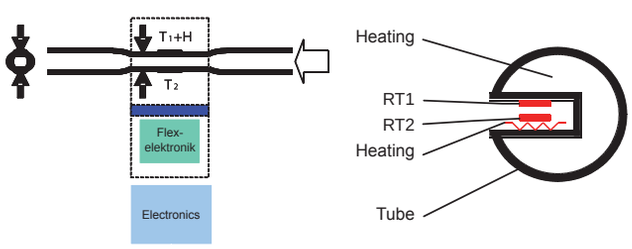
Materials
- 1.4571, (Hastelloy®). Only one material in contact with the medium

Applications

- **Flow monitoring**
- **Dry-run protection**
- **Cooling water control**
- **Continuous mixing processes**
- **Continuous monitoring of very small quantities (in pharmaceutical applications)**
- **Simultaneous monitoring of flow and temperature possible in one device**

Function and benefits

The calorimetric principle of the flow transmitter / switch from HONSBERG is based on two temperature sensors, both in good heat-conducting contact with the medium with simultaneously good heat insulation from one another.



Inline sensor construction principle
One of the sensors is heated to a constant Δ T to the unheated sensor, so that a constant temperature difference between the two temperature sensors is set while the medium being measured is at a standstill. If the medium being measured moves, the thermal energy is extracted from heated temperature sensor and is immediately returned through a regulation until the same difference is provided. The energy required to do so is proportional to the current mass flow of the medium being measured.

In the process, the unheated temperature sensor detects the medium temperature and thereby enables a temperature compensation. In doing so, the flow is even correctly detected in the event of fluctuations of the medium temperature.

Different media influence the response time, because they have different heat conductivity. In general, the following rule applies: the lower the heat conductivity of the medium, the greater the medium flow must be in order to be detected.

With operation of the calorimetric measurement and monitoring principle, the state of the test medium as well as the medium temperature in relation to the desired measurement results play a crucial role. The present standard devices are designed and calibrated for the following parameters: Medium: water, temperature range 0 ..85 °C.

With a deviating medium consistence, e.g. viscosity or air and gases or enduring temperatures of more than 85 °C or less than 0 °C, we recommend leaving the device configuration according to the individual recommendation of the manufacturer.

Explanation of terms

Temperature gradient = temperature change per time unit of the medium (K/s). With volatile changes of the medium temperature, compensation can only be made within a specific range. The range in which fault-free operation is guaranteed is specified. If this temperature is exceeded by the medium, an error message may be issued by the system for a brief time. On such message can, of course be suppressed by switching delays, however, the switch-on and switch-off time of the system in general will be altered.

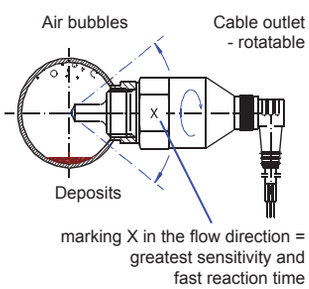
Start-up time = the time in which the device reaches its specified operating mode after operating voltage is applied. After switching on the device, you will see all LEDs illuminate. After approximately three seconds the display switches to the adjusted range. Now the switch-off range can be defined.

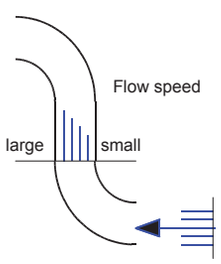
Switch-on and switch-off time = the time in which the regular measurement parameter is detected after a volatile increase or drop of the flow speed. With a medium temperature of approximately 25 °C and a stainless steel sensor in water as a medium, there is an average switch-on and switch-off time of approximately two seconds. Please observe that this time depends on the operating conditions. With media with poor thermal conductivity or poor sensor materials, slower switching times arise.

Temperature range of the medium = the range in which the calorimetric sensor functions faultlessly.

General installation instructions

As a basic principle, any installation location and position in which the „nose“ of the sensor completely protrudes into the flowing media is suitable, see diagram (if the sensor is used for the detection of filled or non-filled tubes, of course this does not apply).





Programmability of parameters

All calorimetric sensors from HONSBERG are a part of the family of intelligent sensors. They have a microcontroller which enables a multitude of parameter changes.
By standard, all three main electronics have the capability of making local changes. In addition, a device configurator can be used to change all saved parameters of a device at any time, if desired or necessary.

EFKP, EFKM EFK2

Switching trigger advance or switching point is adjusted with the potentiometer.

LABO-F012

Pulse programming on pin 2:
Apply the supply voltage level for 1 second and save the current value as the full scale value (for analog outputs) or as a switching value (for limit switches).

FLEX-F

Programming with magnet-clip:
Hold the magnet to the marking for one second and save the present value as the full scale value (for analog outputs) or as a switching value (for limit switches).

OMNI-F

Programming with magnet-ring:
With the aid of the display and of the movable ring, numerous parameters can be conveniently set on the spot.

ECI-3

If required, all parameters can be set at any time on all intelligent sensors, using the ECI-3 device configurator.

Universal switching outputs

The push-pull transistor outputs enable the simplest installation. You install the output like an NPN switch and it is an NPN switch; you install the output like a PNP switch and it is a PNP switch – without programming or wire breaks.

You are assured a resistance to short circuits and pole reversal and an overload or short circuit is also shown in the display with OMNI electronics.

With some devices, an optional relay output can be selected.

Device overview

Device	Range	Pressure resistance in bar	Medium temperature	Supply voltage	Displays	Output signal		Page
						Switching	Measuring	
EFK2	2..300 cm/s	PN 100 (200)	0..+70 °C	24 V DC	Signal LED red / green	1 x Push-Pull or Relay	-	6
EFKP EFKM	2..300 cm/s	PN 100 (200)	0..+70 °C	24 V DC	Signal LED and LED trend display	1 x Push-Pull or Relay	-	8
LABO-F012-S	2..300 cm/s	PN 10..40	-20..+70 °C (100 °C)	24 V DC	Signal LED	1 x Push-Pull	-	10
LABO-F012-I	2..300 cm/s	PN 10..40	-20..+70 °C (100 °C)	24 V DC	Signal LED	-	4..20 mA	13
LABO-F012-U	2..300 cm/s	PN 10..40	-20..+70 °C (100 °C)	24 V DC	Signal LED	-	0..10 V	13
LABO-F012-F	2..300 cm/s	PN 10..40	-20..+70 °C (100 °C)	24 V DC	Signal LED	-	Programmable F / F Transducer 0..2 kHz Push-pull	13
LABO-F012-C	2..300 cm/s	PN 10..40	-20..+70 °C (100 °C)	24 V DC	Signal LED	-	1 pulse per defined quantity Push-Pul	13
FLEX-F	2..300 cm/s + -20..+100 °C	PN 100 (200)	0..+70 °C (100 °C)	24 V DC	Signal LED	1 x Push-Pull	0/4..20 mA or 0..10 V or Frequency 0..2 kHz	16
FLEX-FIN	0,001..2 l/min, 0,025..5 l/min or 0,05..10l/min	PN 10	0..+70 °C (-20..+100 °C)	24 V DC	Signal LED	1 x Push-Pull	4..20 mA 0..20 mA or 0..10 V	21
OMNI-F	2..300 cm/s	PN 100 (200)	0..+70 °C	24 V DC	Graphics LCD illuminated transflective and signal LED	2 x Push-Pull	4..20 mA 0..20 mA or 0..10 V	25
OMNI-FIN	0,001..2 l/min or 0,025..5 l/min or 0,05..10 l/min	PN 10	0..+100 °C (130 °C)	24 V DC	Graphics LCD illuminated transflective and signal LED	2 x Push-Pull	4..20 mA 0..20 mA or 0..10 V	29

Device overview

Device	Range	Pressure resistance in bar	Medium temperature	Supply voltage	Displays	Output signal		Page
						Switching	Measuring	
ECI-3	All LABO, FLEX, and OMNI parameters can be set or modified using the ECI-3 configurator.							33
OMNI-C Counter	Simple filling counter with programmable end signal Counter for flow transmitters: Piston, Dynamic diaphragm, Rotor, Turbine, Gear, Screw, Calorimetry, MID, Vortex							35
OMNI-C1 Counter	Momentary value indicator, transmitter and meter OMNI-C1 electronics Counter for flow transmitters: Piston, Dynamic diaphragm, Rotor, Turbine, Gear, Screw, Calorimetry, MID, Vortex							39
Options	○ LABO transmitter – Temperature up to 150 °C ○ OMNI – Tropical model							49 49
Accessories	○ Type ZV / ZE (Filter) ○ TS1-...(T-piece TS) ○ SL1-...(Welded / soldered nozzles) ○ ADQ-012G0151. / ADQ-012M020AP1 (Crimp connection) ○ ADG-015GS026K (Weld-on adapter) ○ ADM-020F054P2 (Flange) ○ KB..(Round plug connector 4/5-pin) ○ OMNI-TA (Panel meter) ○ OMNI-remote							42 43 45 45 46 46 47 47 49

Errors and technical modifications reserved.

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

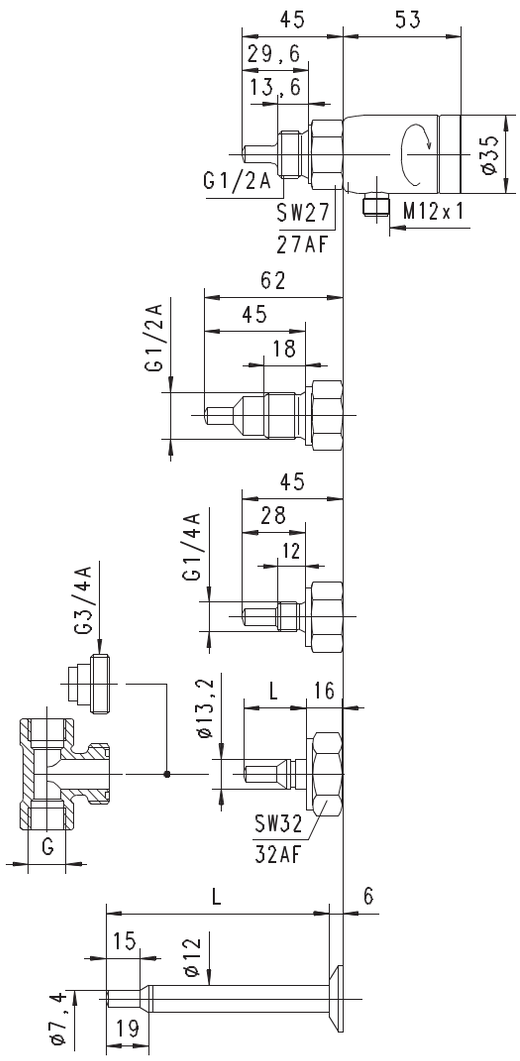
The EFK2 flow switch controls the flow speed of fluid media. Its compact form combines the built-in sensor, a two-colour LED status display, and a switching point which can be set using a potentiometer; it has push-pull or relay output. A flexible gooseneck can be installed between the sensor and the 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



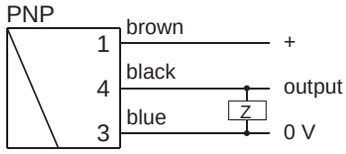
Gooseneck option

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

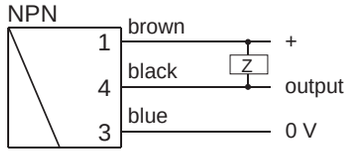
Wiring

Push-pull (Z-Load)

PNP

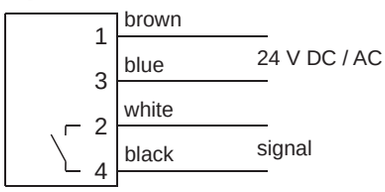


NPN

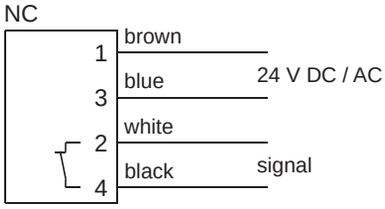


Relay contact

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	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.	**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 and temperature switch EFKP / EFKM

- **Flow and temperature monitoring**
- **No moving parts in the medium being monitored**
- **Installation largely independent of nominal width**

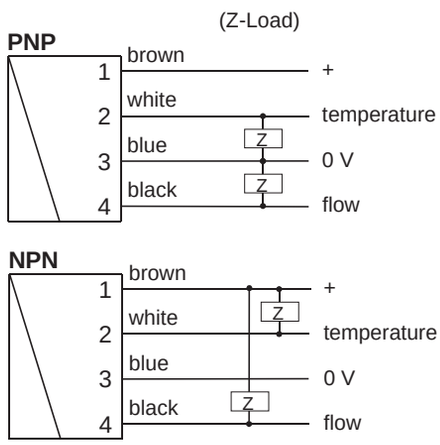
Characteristics

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.

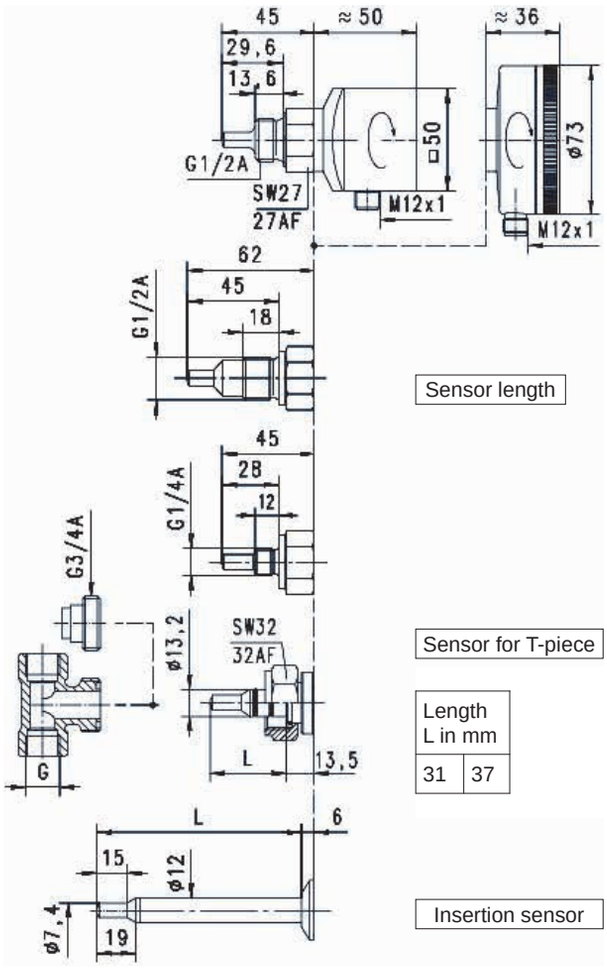
Technical data

Sensor	calorimetric measurement principle
Process connection	screw-in thread G $^{1}/_{4}$ A..G $^{1}/_{2}$ A, push-in sensor Ø12 mm
Metering range	water 2..150 cm/s or 3..300 cm/s 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, 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 IP 67 metal head
Materials medium-contact	1.4571
Materials, non-medium-contact	CW614N plated PA6.6 (only EFKP)
Weight	0.35 kg (EFKP-015HK028PS) 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	

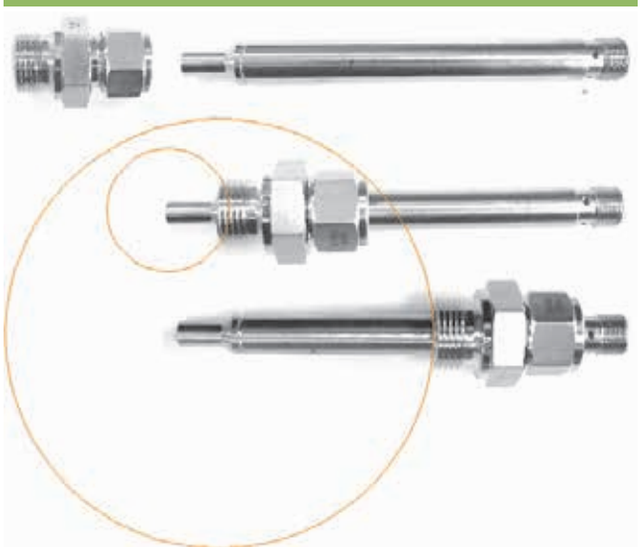
❍=Option

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**						
	T	Push Pull (PNP/NPN)					
	R ❍	Relay (N.O., below limit = open contact)					
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.

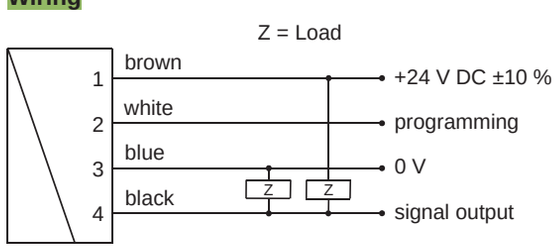
The switching value can be set by the user via teaching (see Handling and Operation). All other values have been preset at the factory, but can be modified by the user with the aid of the optionally available ECI-1 interface and a PC.

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

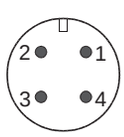
Technical data

Sensor	calorimetric measurement principle	
Process connection	push-in sensor Ø12 mm	
Switching range	water 2..150 cm/s or 3..300 cm/s oil or gases 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 -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 (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



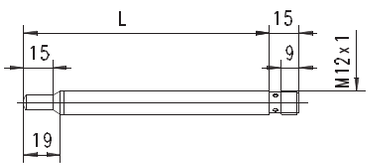
Connection example: PNP NPN



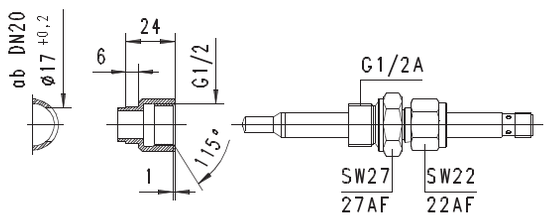
The use of shielded cabling is recommended.

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

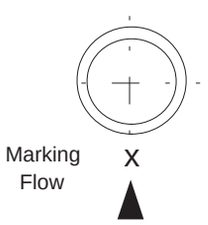
There are various installation options available:

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:

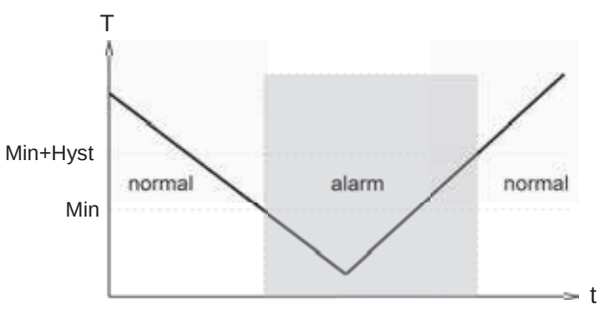
- The flow which is to be set is applied to the device.
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the supply voltage or a pulse from the PLC), in order to accept the measured value.
- When the teaching is complete, pin 2 should be connected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

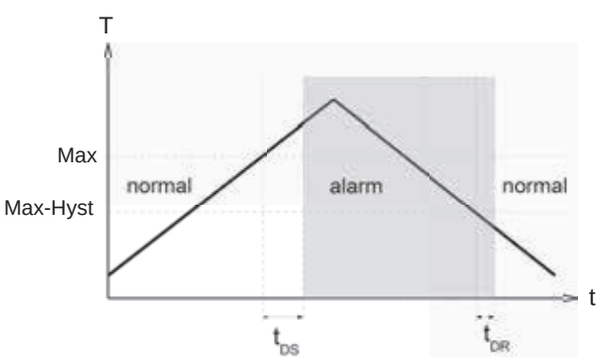
Example: The switching value is to be set to 80 cm/s, because at this flow rate a critical process status is to be notified. However, only 60 cm/s can be achieved without danger. In this case, the device would be ordered with a teach-offset of +20 cm/s. At 60 cm in the process, a switching value of 80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

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

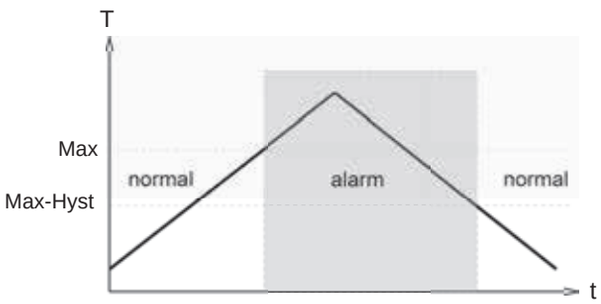
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



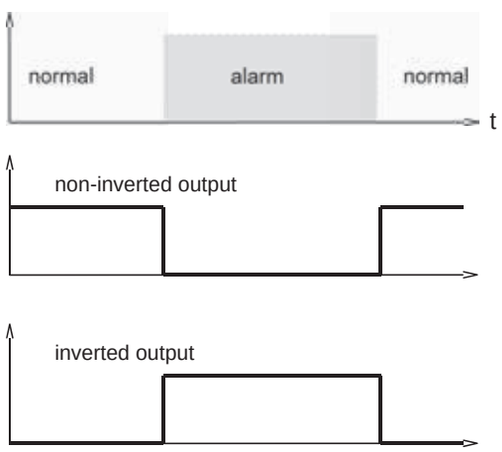
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



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

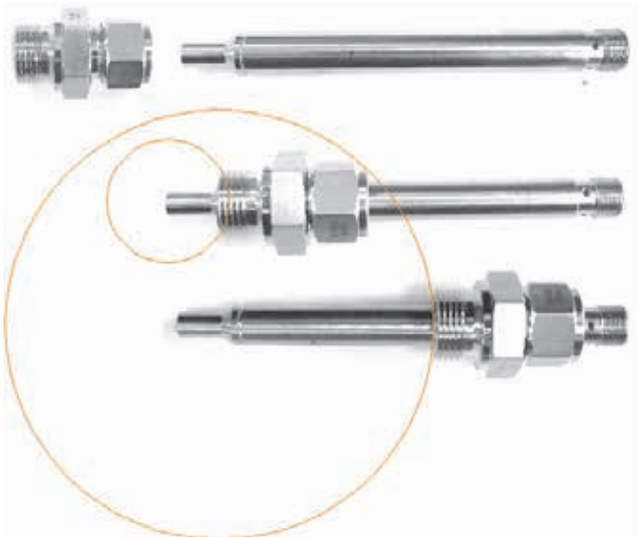
Switching hysteresis ___ %
Standard = 2 % of the metering range

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)

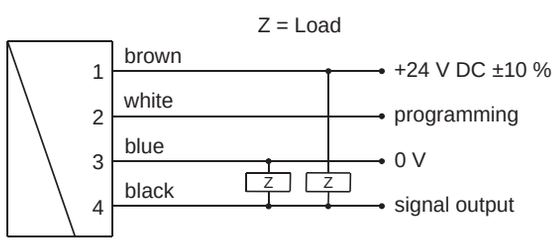
A model with switching output is available under designation LABO-F012-S.

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.

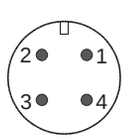
Technical data

Sensor	calorimetric measurement principle	
Process connection	push-in sensor Ø12 mm	
Metering range	water 2..150 cm/s or 3..300 cm/s oil or gases available on request	
Measurement accuracy	depending 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 %	
Pressure resistance	stainless steel compression fitting	PN 40 bar
	plastic cone with union nut	PN 10 bar
Medium temperature	-20..+70 °C -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 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



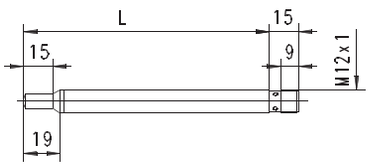
Connection example: PNP NPN



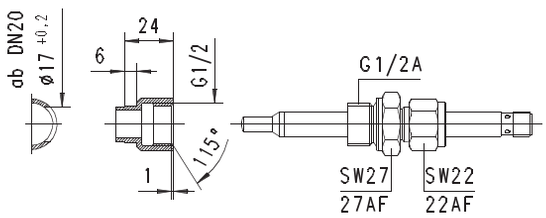
The use of shielded cabling is recommended.

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

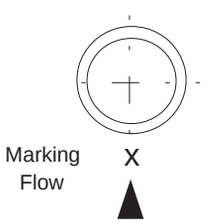
There are various installation options available:

The stainless steel compression fittingis screwed into a G $^1/_2$ 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.



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.

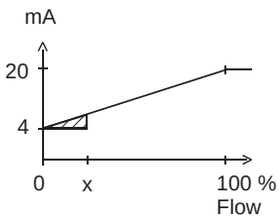
Technical data

Sensor	calorimetric measurement principle	
Process connection	screw-in thread G $^1/_4$ A..G $^1/_2$ A, Push-in sensor Ø12 mm	
Metering range	water 2..150 cm/s or 3..300 cm/s oil available on request	
Measurement accuracy	depending on the installation location and flow conditions 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" (resistant to short circuits and polarity reversal) 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 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	

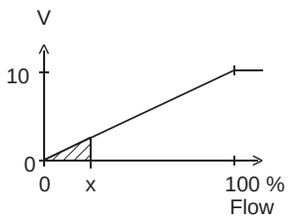
Signal output curves

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

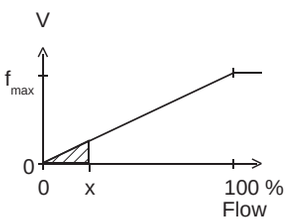
Current output



Voltage output



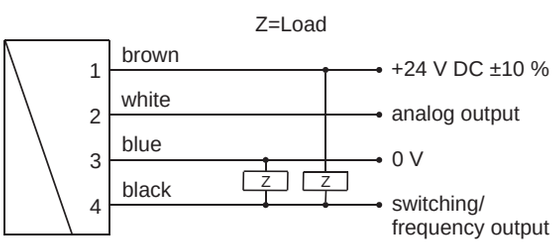
Frequency output



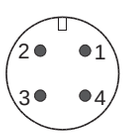
f_{max} selectable in the range of up to 2000 Hz

Other characters on request.

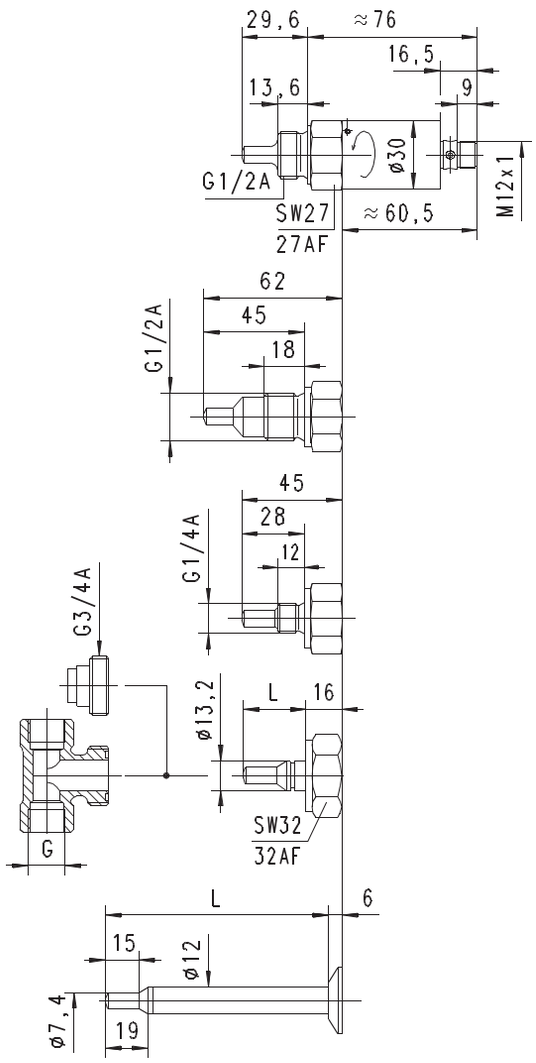
Wiring



Connection example: PNP NPN



Dimensions



Gooseneck option

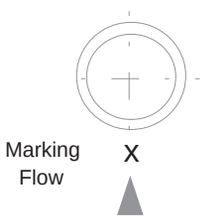
A gooseneck (optional) between the electronics head and the primary sensor provides complete freedom in the orientation and reading direction of the sensor.

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).

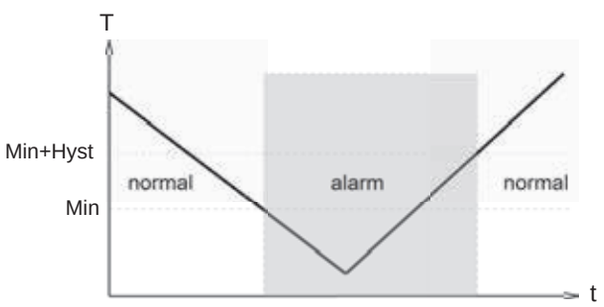
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an 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".

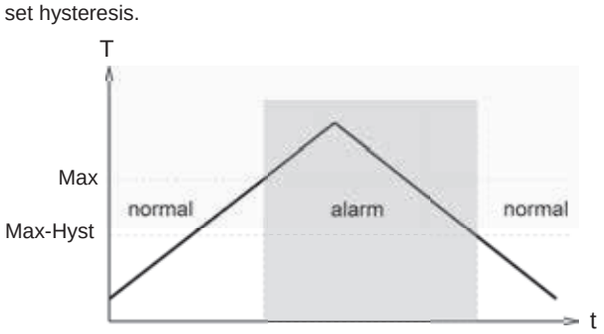
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

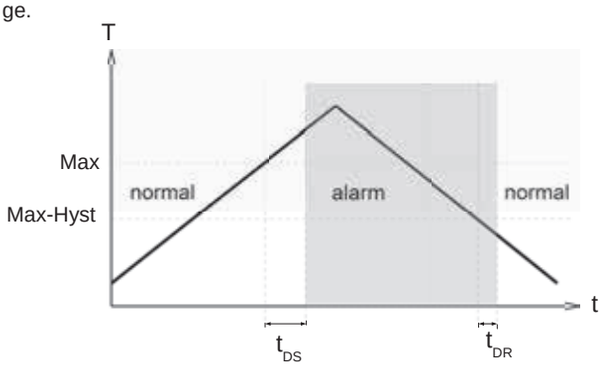
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



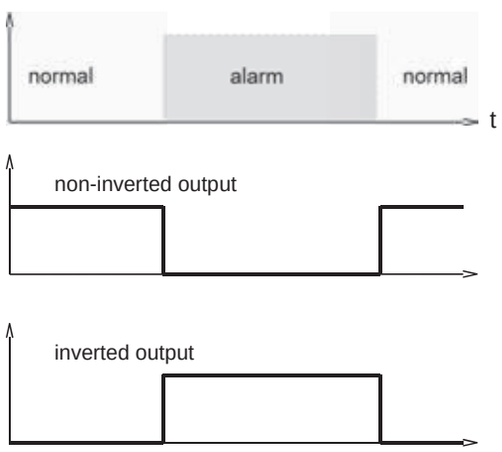
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



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

FLEX-F -	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
		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.	**Analog output**							
	I	current output 4..20 mA						
	U ❍	Voltage output 0..10 V						
	K	without analog output						
6.	**Unit for analog output**							
	F	flow rate to analog output						
	T ❍	temperature to analog output						
	K	without analog output						
7.	**Switching output**							
	T	switching output push-pull						
	M ❍	switching output NPN (open collector)						
	K	without switching output						
8.	**Measurement parameter to switching output**							
	F	flow to switching output						
	T ❍	temperature to switching output						
	K	without 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.

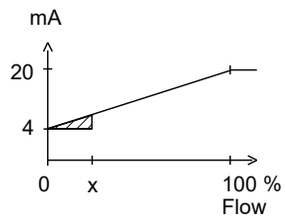
Technical data

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 8 mm tube: 0.025..5 l/min 10 mm tube: 0.05..10 l/min Special ranges available on request
Measurement accuracy	±3 % F.S. (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" (resistant to short circuits and polarity reversal) I_{out} = 100 mA max.
Switching hysteresis	flow 1 % of full scale value Temperature: approx. 1 °C
Pulse output	pulse width 50 ms → max. output frequency < 20 Hz
Display (only with switching output)	yellow LED (On = Normal / Off = Alarm / rapid flashing = Programming)
Adjustment	by means of magnet
Analog output	4..20 mA / Load 500 Ohm max. 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 optional: hastelloy® C-276
Materials, non-medium-contact	PPS, PA6.6, CW614N
Weight	approx. 0.2 kg
Conformity	CE

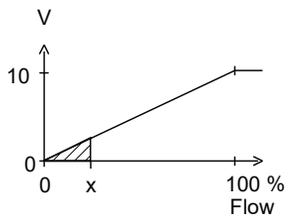
Signal output curves

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

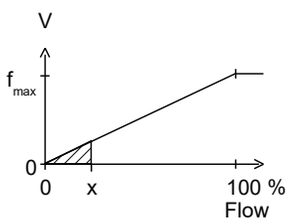
Current output



Voltage output



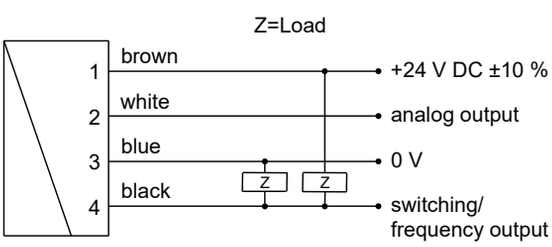
Frequency output



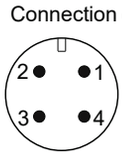
f_{max} selectable in the range of up to 2000 Hz

Other characters on request.

Wiring



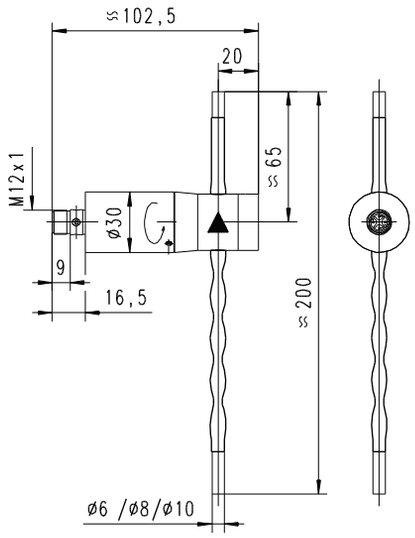
Connection example: PNP NPN



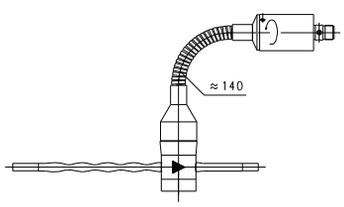
Before the electrical installation, it must be ensured that the supply voltage corresponds with the data sheet.

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).

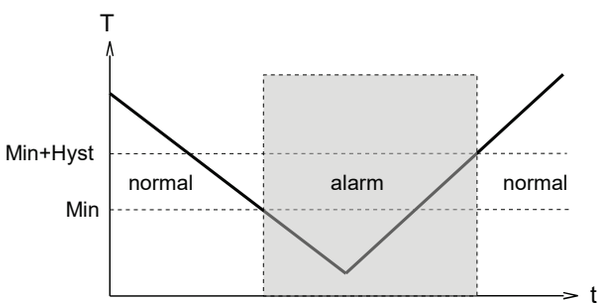
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an 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".

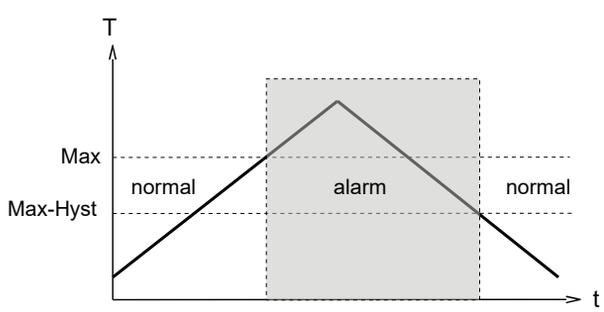
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

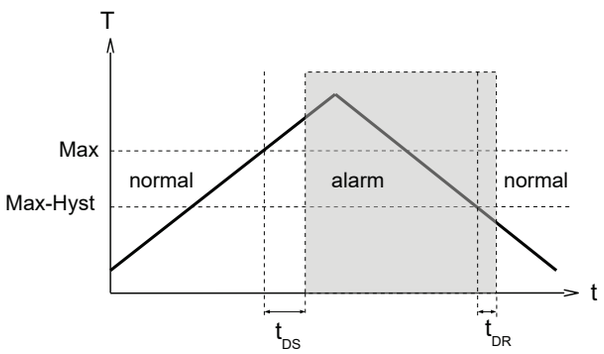
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



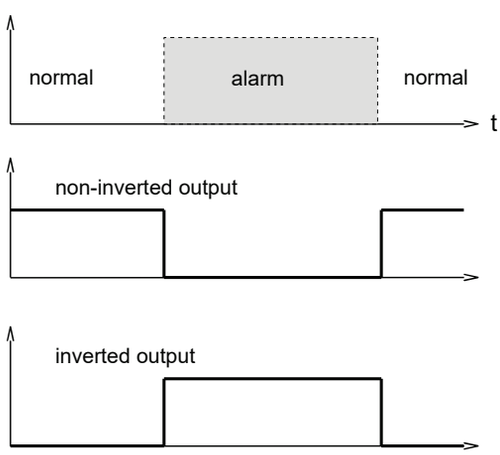
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



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® C-276	
4.	**Unit for analog output**		
	F	flow rate to analog output	
	T	temperature to analog output	
	K	without Analog output	
5.	**Analog output**		
	I	current output 4..20 mA	
	U	voltage output 0..10 V	
	K	without Analog output	
6.	**Switching output**		
	T	switching output push-pull	
	M	switching output NPN (open collector)	
	K	without Switching output	
7.	**Measurement parameter to switching output**		
	F	flow to switching output	
	T	temperature to switching output	
	K	without switching output	
8.	**Function for switching output**		
	L	minimum switch	
	H ❍	maximum switch	
	R	frequency output	
	C	Pulse output	
	K	Without Switching 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 = 2 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
(from Normal to Alarm) ☐☐.☐ s

Switchback delay
(from Alarm to Normal) ☐☐.☐ s

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

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.

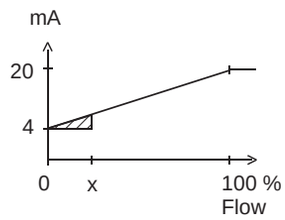
Technical data

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 range, 3..300 cm/s available on request 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 %	
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" (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	

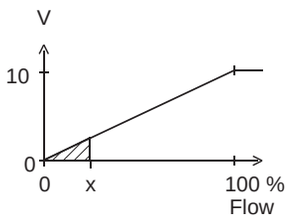
Signal output curves

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

Current output

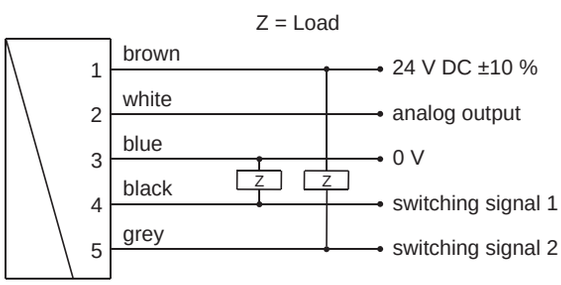


Voltage output

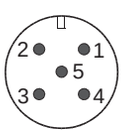


Other characters on request.

Wiring



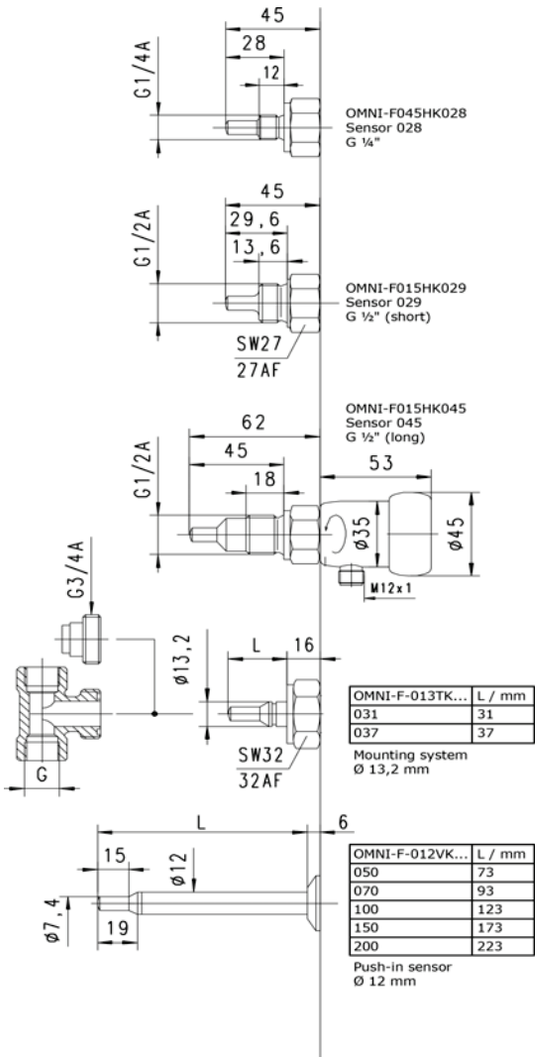
Connection example: PNP NPN



connector M12x1

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:

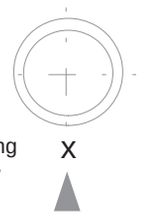
Set to 1 = continue (STEP)
Set to 2 = modify (PROG)

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)



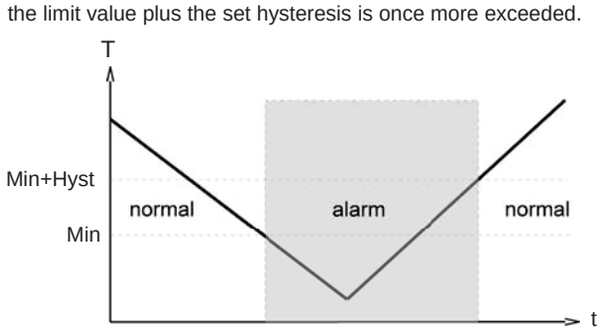
Edit, using position 2

If the currently visible parameter is to be modified:

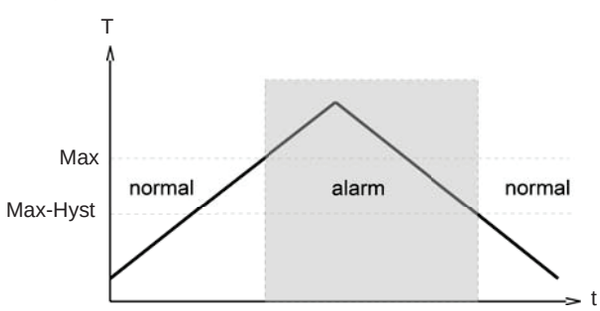
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the next digit is reached.
- Leave the parameter by turning to position 1 (until the cursor 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.
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.	**Analogue output**						
	I	Current output 0/4 – 20 mA					
	U ❍	Voltage output 0/2 – 10 V (available on request)					
6.	**Electrical connection**						
	S	for round plug connector M12x1, 5-pole					
7.	**Options 1**						
	H ❍	model with gooseneck					

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

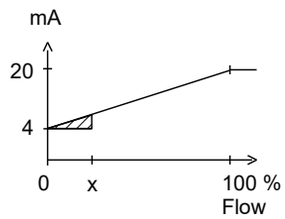
Technical data

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 % F.S. (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 Flow speed of approx. 1-2 sec.
Pressure resistance	PN 10 bar
Media temperature	0..+100 °C Optionally with spacer: 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 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) 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 optional: hastelloy® C-276
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

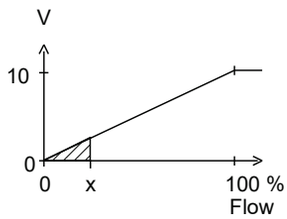
Signal output curves

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

Current output

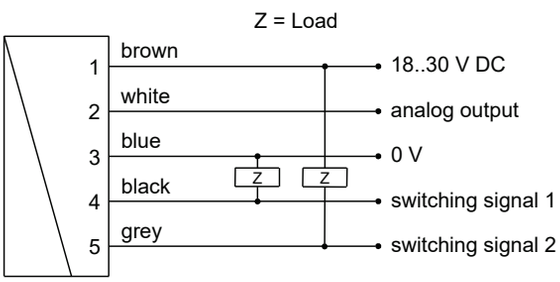


Voltage output

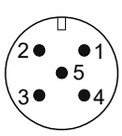


Other characters on request.

Wiring



Connection example: PNP NPN

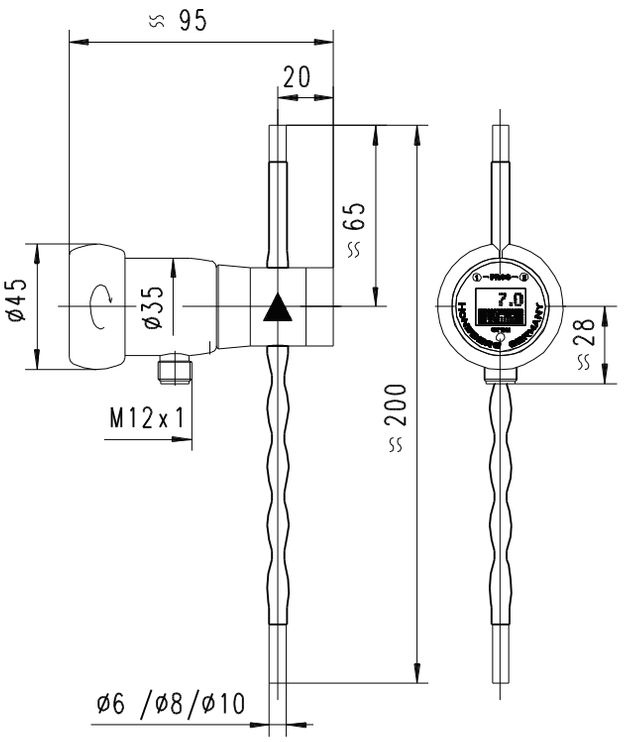


connector M12x1

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)

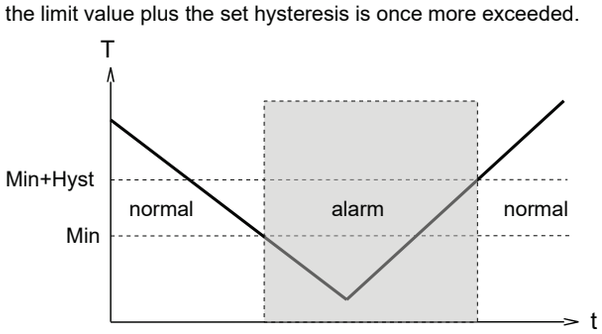
For models with a voltage output, replace 20 mA accordingly with 10 V.

Edit, using position 2

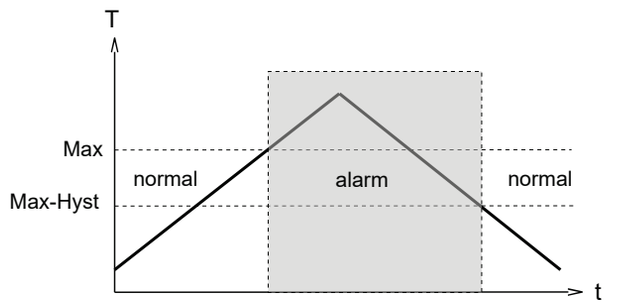
If the currently visible parameter is to be modified:
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the cursor moves to the next digit.
- 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® C-276			
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	130 °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”

Configuration Interface ECI-3

- **Can be used on site for:**
  - **parameter modification**
  - **firmware update**
  - **adjustment of inputs and outputs**
- **Can be connected via USB**

Characteristics

The ECI-3 configuration interface enables connection of GHM HONSBERG sensors to the USB port of a computer.
All sensors of the OMNI, FLEX, and LABO families, as well as other sensors which contain a microcontroller are supported.

Both 2-wire and 3-wire sensors are supported.

In combination with the 'HI-Tools' Windows software, it enables

- the modification of all the sensor's configuration settings
- the reading of measured values
- the adjustment of inputs and outputs
- firmware updates

Technical data

Auxiliary voltage	Supply of the interface via USB 3-wire sensors also require a supply according to the sensor specifications in the range of 10 – 30 V (Observe the sensor data sheet!)
Connections	
Sensor	Device socket M12x1, 5-pin
Supply	Device connector M12x1, 5pole
USB	USB jack type B
Operating temperature	0..+50 °C
Storage temperature	-20..+80 °C
Dimensions	109 mm (W) x 67.5 mm (D) x 34 mm (H)
Housing material	Aluminium
Ingress protection	IP 40
Weight	0.16 kg (interface without accessories) 1.02 kg (case, incl. contents)
Conformity	CE

Handling and operation

Operating and display elements

Front:

LED	Meaning
USB	Illuminates with established USB connection
COMM	Blinks during USB communication
SUPPLY	Indicates that the supply voltage is present at the sensor connection
BYPASS	Illuminates when there is no communication, pins of sensor and supply connection are connected to each other
3-WIRE (A)	MODE LEDs indicate the current operating mode of the interface. This depends on the connected sensor and is automatically adjusted by the software.
3-WIRE (B)	
2-WIRE	

Rear side:

SENSOR	M12x1 socket, 5-pin for sensor connection
SUPPLY	M12x1 plug connector, 5-pin for supply line connection (only for 3-wire sensors) Pin 1 = +V Pin 3 = 0 V The assignment of the remaining pins depends on the connected sensor
USB	USB B-socket for connection to the USB port of the computer

Commissioning

The configuration interface is intended for temporary connection to the application. Permanent installation in the system is not intended.

The interface is initially connected to the USB port of the computer using the supplied USB cable. The power supply of the interface takes place via the USB port. Additional auxiliary voltage is not necessary at first. The drivers required for operation are provided on the supplied USB stick and are installed in the usual manner.

Connection of the sensors takes place at the 'Sensor' port with the supplied M12x1 extension cable. The supplied adapter can be used for connection of sensors with a valve connector.

No additional connections are necessary for operation with **2-wire sensors**. The supply of sensors and interface takes place from the USB port.

An amperemeter can be connected to Pin 1 and 2 of the SENSOR socket to measure the loop current. If the BYPASS LED on the front illuminates, the current can be read here. It must be ensured that the voltage drop-off at the amperemeter is not higher than 0.5 V, which means the internal resistance of the measuring device may not be higher than 25 Ohm. Modern multimeters with a digital display normally satisfy this requirement. No damage can occur with high voltages within the supply voltage area, but the display of the loop current becomes faulty.

With **3-wire sensors** the supply voltage of the sensor must be connected to the 'Supply' connection. For this purpose, the available supply line of the sensor or an optionally available power supply plug can be used. The supply voltage must match the specifications of the connected sensor. If the supply line has a 4-pin M12x1 round plug connector without middle hole, the supplied adapter K04-05 must be used; otherwise connection with the 5-pin plug of the interface is not possible. 4-pole leads with a middle hole can be used without an adapter.
In the inactive state (without communication), the interface behaves entirely neutral (BYPASS LED on the front illuminates). All signals of the sensor are still available to the application. During communication between computer and sensor, the signal lines are separated in the interface, so that in this state the sensor's output signals are not available.

Operation of the interface takes place using the HI-Tools program package. The software is provided in the latest respective version on the supplied USB stick. Updates can be downloaded free of charge from the download area of the GHM website .www.ghm-messtechnik.de.

The software can be used for all standard sensors. Special software is available under certain circumstances for customer-specific sensors or for special requirements. In case of uncertainty, contact GHM Sales.

Ordering code

Configuration Interface (for scope of delivery, see the diagram below)	**ECI-3**

Scope of delivery:
1. ECI-3 configuration interface
2. 1.8 m USB cable
3. 500 mm M12x1 extension
4. Valve connector adapter
5. Adapter K04-05
6. SUB stick with driver software
7. Carry case

A mains connector is not included in the scope of delivery.

Accessories:

Mains connector 24 V DC / 0.75 A with round plug connector M12x1 incl. interchangeable adapters for universal use		**EPWR24-1**
Mains connector 24 V DC / 0.5 A with round plug connector M12x1 with Euro plug		**EPWR24**

OMNI-C Counter

Counter for flow transmitters:
- Piston
- Dynamic diaphragm
- Rotor
- Turbine
- Gear
- Screw
- Calorimetry
- MID
- Vortex

- **Simple totalisation**
- **Simple filling counter with programmable end signal**
- **Control switchover at present value**
- **Automatic, dynamic change of display unit and decimal places in the graphics display**
- **Antivalent outputs**
- **Simple guided menu via graphics display**

Characteristics

The totaliser of the OMNI flow rate system enables a totalisation or measurement of consumption for all HONSBERG device families (for fluids and gases) with which the OMNI system is compatible; this is independent of the input signal, pulse or analogue input, and of the measurement process.

Simple filling control is also possible. Here, the counter can be set to count upwards or downwards.
When the preset point is reached, a switching signal is emitted which is available in antivalent form to two outputs.
Resetting can be carried out by means of a signal input or also by a programming ring.

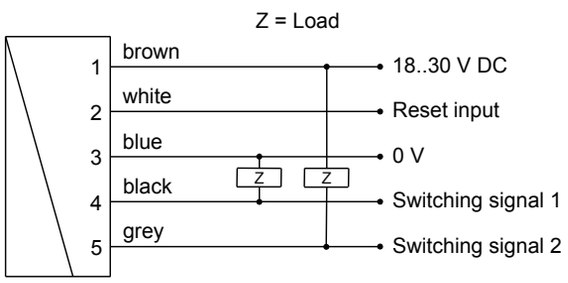
The state of the counter is indicated in an LCD display with only four digits. Here, the number of decimal places and the unit displayed is continuously matched to the current state of the counter. In this case, the smallest value which can be displayed is 0.001 ml (= 1 µl), and the largest is 9999 m³. The counter therefore has 13 places, of which the four most significant are displayed at any one time. The display resolution at all times is therefore at least 1 per thousand of the displayed value, or better, and this generally exceeds the accuracy of the connected flow transmitter. The non-displayed digits of the counter are in that case irrelevant to the accuracy of the measurement.
The automatic dynamic changeover of units in the display in relation to the state of the counter makes the value easy to read in spite of a display with only four digits. In addition, user configuration of the counter is unnecessary.

In addition to the totalised value, the present flow rate can be displayed.

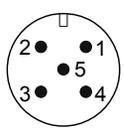
Technical data

Counter range	0.000 ml to 9999 m³ with automatic setting of the decimal places and of the applicable unit.
Switching signal outputs (Pin 4 + 5)	2 x pushpull output, max. 100 mA, resistant to short circuits and polarity reversal, antivalent states, configurable on the device as a wipe or edge signal
Counter reset signal (Pin 2)	Input 18..30 V resistant to short circuits and reversed polarity PIN 2, wiper signal, positive or negative edge can be selected locally

Wiring



Connection example: PNP NPN



Before the connecting the supply voltage, it must be ensured that this corresponds with the data sheet! The use of shielded cabling is recommended

Sensor connection to OMNI-C-TA, see dimensions.

Handling and operation

Installation

For assembly, please observe the handling instructions for the different device versions.

After assembly, it is possible to move the sensor head to the most optimal reading position opposite the sensor part using its rotating function.

Programming

On the display, the counter indicates the state of the totaliser as a value and unit. The units ml, L, m³ are set automatically.

For operation as a totaliser, no configuration by the user is necessary.

To use the other functions, configuration may be required. This is carried out using the programming ring located on the device.

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 dialogue with the display messages, which makes its use very simple.

The control display of the present flow rate depends on the metering range of the selected flow transmitter, and has already been set appropriately in the factory (ml/min, l/min, l/h, m³/h).
It is activated by turning the ring to position 1
After 10 seconds, the display automatically returns to the totaliser mode.

For operation as a preset counter, the following must be set:

1. The preset point
2. The type of output signal ("Preset has been reached"):
   Signal edge / wiper pulse
   width of the wiper pulse, if required
3. The unit of the preset point:
   (ml, litre, m³).

Starting from the normal display (total and unit), if 1 (Step) is selected repeatedly, then the counter shows the following information:

- Normal display is total and unit (e.g. litre)
- Display of present value (e.g. l/min)
- Preset point incl. type of switching output.
- Code

The code gives access to various input levels into which parameters can be entered (so that this does not occur inadvertently, the code must be entered!).

Code 111:

- Gate time (available only for sensors which transmit frequency)
- Filter time
- Direction of count (pos / neg)
- Unit for switching value reset point
- Decimal place for switching value / reset point
- Switching type for switching value (edge / wiper signal)
- Pulse duration (for wiper signal)
- Reset method (manual / via signal)

Code 100:

- Manual reset for totaliser

The detailed flow chart for operation is available in the "Operating instructions for OMNI-C".

Combination examples

Vortex CF..	
Calorimetric F.. (separate data sheet)	
Calorimetric FG.. (separate data sheet)	
Calorimetric FIN..	
Magnetic inductive FIS.. (separate data sheet)	
Piston HD.. HR.. MR..	
Magnetic inductive MID1..	
Panel mounting **OMNI-TA** (separate data sheet)	
Rotor RR..	
Turbine RT..	
Screw VHS..	

Gear VHZ..	
Dynamic diaphragm XF..	

OMNI-C Counter

Counter for flow transmitters:
- Piston
- Dynamic diaphragm
- Rotor
- Turbine
- Gear
- Screw
- Calorimetry
- MID
- Vortex

- **Simple totalisation**
- **Simple filling counter with programmable end signal**
- **Control switchover at present value**
- **Automatic, dynamic change of display unit and decimal places in the graphics display**
- **Antivalent outputs**
- **Simple guided menu via graphics display**

Characteristics

The totaliser of the OMNI flow rate system enables a totalisation or measurement of consumption for all HONSBERG device families (for fluids and gases) with which the OMNI system is compatible; this is independent of the input signal, pulse or analogue input, and of the measurement process.

Simple filling control is also possible. Here, the counter can be set to count upwards or downwards.
When the preset point is reached, a switching signal is emitted which is available in antivalent form to two outputs.
Resetting can be carried out by means of a signal input or also by a programming ring.

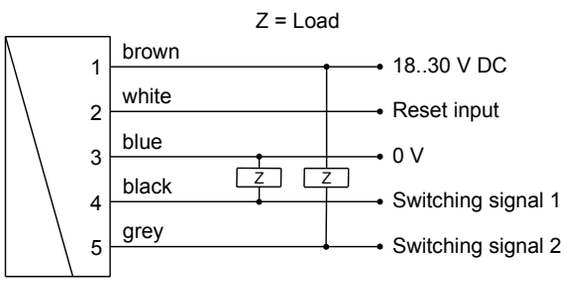
The state of the counter is indicated in an LCD display with only four digits. Here, the number of decimal places and the unit displayed is continuously matched to the current state of the counter. In this case, the smallest value which can be displayed is 0.001 ml (= 1 µl), and the largest is 9999 m³. The counter therefore has 13 places, of which the four most significant are displayed at any one time. The display resolution at all times is therefore at least 1 per thousand of the displayed value, or better, and this generally exceeds the accuracy of the connected flow transmitter. The non-displayed digits of the counter are in that case irrelevant to the accuracy of the measurement.
The automatic dynamic changeover of units in the display in relation to the state of the counter makes the value easy to read in spite of a display with only four digits. In addition, user configuration of the counter is unnecessary.

In addition to the totalised value, the present flow rate can be displayed.

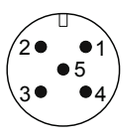
Technical data

Counter range	0.000 ml to 9999 m³ with automatic setting of the decimal places and of the applicable unit.
Switching signal outputs (Pin 4 + 5)	2 x pushpull output, max. 100 mA, resistant to short circuits and polarity reversal, antivalent states, configurable on the device as a wipe or edge signal
Counter reset signal (Pin 2)	Input 18..30 V resistant to short circuits and reversed polarity PIN 2, wiper signal, positive or negative edge can be selected locally

Wiring



Connection example: PNP NPN



Before the connecting the supply voltage, it must be ensured that this corresponds with the data sheet! The use of shielded cabling is recommended

Sensor connection to OMNI-C-TA, see dimensions.

Momentary value indicator, transmitter and meter OMNI-C1 electronics

Counter for flow transmitters:
- Piston
- Dynamic diaphragm
- Rotor
- Turbine
- Gear
- Screw
- MID
- Vortex

- **Momentary value indicator and totalisation**
- **Pulse output with adjustable pulse per volume**
- **Antivalent outputs**
- **Analogue output of the momentary value**
- **Simple guided menu via graphics display**

Characteristics

The local OMNI-C1 electronics offers a momentary value indicator and a totalisation of the flow rate quantity.

The momentary value is output at the analogue output as a 4..20 mA signal (or optionally as a 0..10 V signal).
In addition, the electronics has a pulse output, which outputs a pulse after a preset quantity with a duration of 36 ms. The pulse is available at two switching outputs in anitvalent form.

The primary displayed value is the flow rate. Using the programming ring, you can temporarily switch to the totalisation.

The state of the totalisation is indicated in an LCD display with only four digits. Here, the number of decimal places and the unit displayed is continuously matched to the current state of the counter. In this case, the smallest value which can be displayed is 0.001 ml (= 1 µl), and the largest is 9999 m³. The counter therefore has 13 places, of which the four most significant are displayed at any one time. The display resolution at all times is therefore at least 1 per thousand of the displayed value, or better, and this generally exceeds the accuracy of the connected flow transmitter. The non-displayed digits of the counter are in that case irrelevant to the accuracy of the measurement.
The automatic dynamic changeover of units in the display in relation to the state of the counter makes the value easy to read in spite of a display with only four digits. In addition, user configuration of the counter is unnecessary.

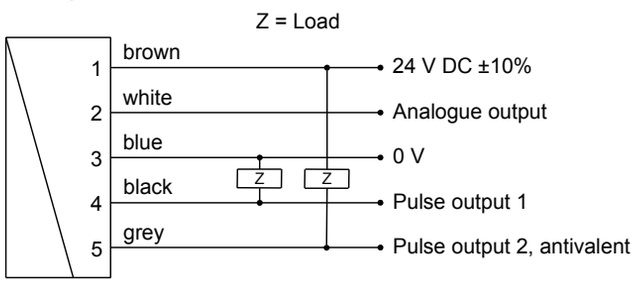
Counter C:

Instead of the counter option C1 the counter option C is available (see corresponding datasheet). It offers a totalizer with adjustable preset value and external reset. This allows to realize a filling control application for example. Additionally the actual flow rate value can be displayed, however without an analog output.

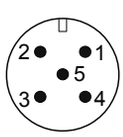
Technical data

Counter range	0.000 ml to 9999 m³ with automatic setting of the decimal places and of the applicable unit
Pulse outputs (Pin 4 + 5)	2 x pushpull output, max. 100 mA, resistant to short circuits and polarity reversal, antivalent statuses, pulse width 36 ms

Wiring



Connection example: PNP NPN



Plug connector M12x1

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

Handling and operation

Installation

For assembly, please observe the handling instructions for the different device versions.

After assembly, it is possible to move the sensor head to the most optimal reading position opposite the sensor part using its rotating function.

Programming

The resetting of the meter to zero takes place through the programming.

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.

On the display, the meter indicates the current flow rate as a value and unit. For this purpose, no adjustments by the user are necessary.

To use the other functions, configuration may be required. This is carried out using the programming ring located on the device.

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 dialogue with the display messages, which makes its use very simple.

Rotating the ring once to Pos. 1 displays the totaliser status. In the process, the unit is automatically set to the quantity already counted.
After 10 seconds, the display automatically returns to the momentary value mode.
If the ring is turned to position 1 again while the totaliser status is shown, the code input is reached.
The code gives access to various input levels into which parameters can be changed (so that this does not occur inadvertently, the code must be entered!).

Code 100:

Reset for totaliser

Code 111:

Filter	Enables the input of a filter time in multiple levels The filter time describes the time after which a volatile change in flow occurs until the display value has adopted the new value
PlsUnit	Enables the input of the unit of the pulse volume (pulse per volume), e.g. cm³, Litre, m³
PlsVal	Enables the input of the meter value of the pulse flow (0..9999)
Output	Enables switching of the analogue output between 0..20 mA and 4..20 mA (optionally (0..10 V and 2..10 V)
4 mA	Defines the momentary value at which 4 mA should be output
20 mA	Defines the momentary value at which 20 mA should be output

Combination examples

Vortex CF..	
Calorimetric F.. (separate data sheet)	
Calorimetric FG.. (separate data sheet)	
Calorimetric FIN..	
Magnetic inductive FIS.. (separate data sheet)	
Piston HD.. HR.. MR..	
Magnetic inductive MID1..	
Panel mounting **OMNI-TA** (separate data sheet)	
Rotor RR..	
Turbine RT..	
Screw VHS..	

Gear VHZ..	
Dynamic diaphragm XF..	

Filter

Type ZV

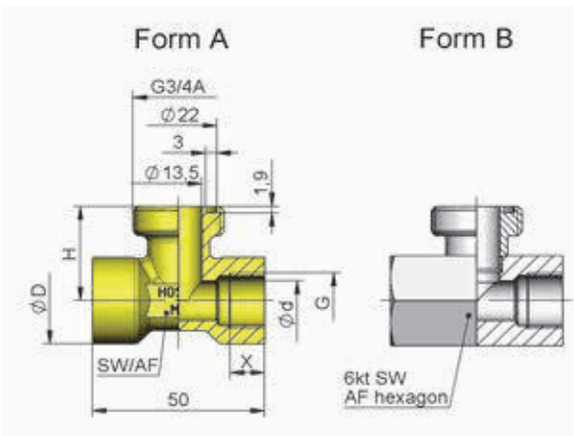
Type ZE

The HONSBERG filters are offered for the protection of the devices from dirt or as independent components for coarse and fine filtration of liquids.

For more information, see additional product information.

T-piece TS-2

For system fastener Ø13.2
examples:
OMNI-F / FLEX-F
OMNI-T / FLEX-T
ETS-...K013



Characteristics

T-pieces for direct installation in pipework with
G - female thread in the material brass or stainless steel.

Technical data

Nominal width	DN 10 - 50
Process connection	female thread G $^{3}/_{8}$..G 2
Pressure	PN 25
Materials medium-contact	CW617N nickelled or 1.4305
Weight	see table

Dimensions and weights

	Type	G	H	X	Ød	ØD	SWAF	Weight kg
Form A	TS-2M010	G $^{3}/_{8}$	28.0	10	12	26	19	0.15
	TS-2M015	G $^{1}/_{2}$			13			0.12
	TS-2M020	G $^{3}/_{4}$	29.5	12	20	32	29	0.16
	TS-2M025	G 1	33.0		25	39	36	0.20
	TS-2M032	G 1$^{1}/_{4}$	37.5		32	46	44	0.23
	TS-2M040	G 1$^{1}/_{2}$	40.5		40	55	53	0.33
	TS-2M050	G 2	49.5		50	70	68	0.56
Form B	TS-2K010	G $^{3}/_{8}$	28.0	10	12	-	27	0.20
	TS-2K015	G $^{1}/_{2}$			13			0.18
	TS-2K020	G $^{3}/_{4}$	29.5	12	20		30	0.16
	TS-2K025	G 1	33.5		25		38	0.25
	TS-2K032	G 1$^{1}/_{4}$	37.5		32		46	0.32
	TS-2K040	G 1$^{1}/_{2}$	40.5		40		55	0.45
	TS-2K050	G 2	49.5		50		70	0.75

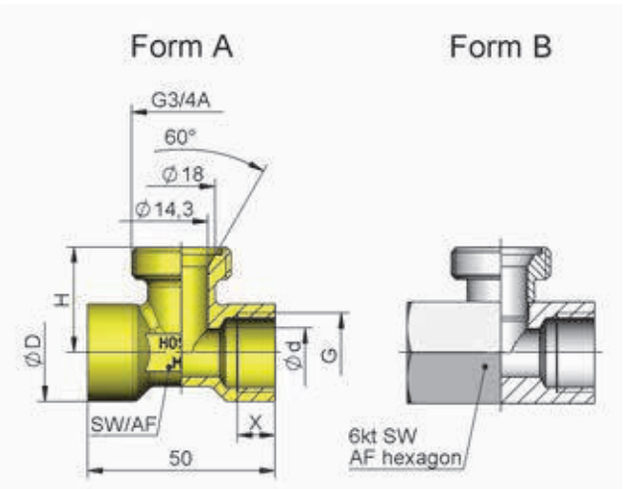
Ordering code

	1.	2.	3.
TS-	**2**		

1.	**Connection**	
	2	for temperature sensor and calorimetric flowsensors using for liquid Media with system fastener Ø13.2
2.	**Construction material**	
	M	nickelled brass
	K	stainless steel
3.	**Nominal width**	
	010	DN 10 - G $^{3}/_{8}$
	015	DN 15 - G $^{1}/_{2}$
	020	DN 20 - G $^{3}/_{4}$
	025	DN 25 - G 1
	032	DN 40 - G 1$^{1}/_{4}$
	040	DN 40 - G 1$^{1}/_{2}$
	050	DN 50 - G 2

T-piece TS-3

For devises with plug-in sensor Ø12
examples:
OMNI-F / FLEX-F
EFKS / EFK2



Characteristics

T-pieces for direct installation in pipework with
G - female thread in the material brass or stainless steel.

Technical data

Nominal width	DN 10 - 50
Process connection	female thread G $^3/_8$..G 2
Pressure	PN 25
Materials medium-contact	CW617N nickelled or 1.4305
Weight	see table

Dimensions and weights

	Type	G	H	X	Ød	ØD	SWAF	6 kt SW AF hexagon	Weight kg
Form A	TS-3M015	G $^1/_2$	28.0	10	13	26	19	-	0.12
	TS-3M020	G $^3/_4$	29.5	12	20	32	29		0.16
	TS-3M025	G 1	33.0		25	39	36		0.20
	TS-3M032	G 1$^1/_4$	37.5		32	46	44		0.23
	TS-3M040	G 1$^1/_2$	40.5		40	55	53		0.33
	TS-3M050	G 2	49.5		50	70	68		0.56
Form B	TS-3K015	G $^1/_2$	28.0	10	13	-		27	0.18
	TS-3K020	G $^3/_4$	29.5	12	20			30	0.16
	TS-3K025	G 1	33.5		25			38	0.25
	TS-3K032	G 1$^1/_4$	37.5		32			46	0.32
	TS-3K040	G 1$^1/_2$	40.5		40			55	0.45
	TS-3K050	G 2	49.5		50			70	0.75

Ordering code

	1.	2.	3.
TS-	**3**	-	

1.	**Connection**	
	2	Ffor calorimetric plug-in sensors Ø12 for gaseous and liquid media
2.	**Construction material**	
	M	nickelled brass
	K	stainless steel
3.	**Nominal width**	
	010	DN 10 - G $^3/_8$
	015	DN 15 - G $^1/_2$
	020	DN 20 - G $^3/_4$
	025	DN 25 - G 1
	032	DN 40 - G 1$^1/_4$
	040	DN 40 - G 1$^1/_2$
	050	DN 50 - G 2

Welded / soldered nozzles

For paddle systems

Ordering code

	1.	2.
SL	1	-

1.	Connection	
	1	for paddle systems
2.	**Material**	
	M	brass
	K	stainless steel

For system connection Ø13,2

Ordering code

	1.	2.
SL	2	-

1.	Connection	
	2	for system connection Ø13,2
2.	**Material**	
	M	brass
	K	stainless steel

Assurance-Set

For securing 12 mm sensor in its bore. Consisting of: Flap, plastic disc, chain, screw

Weld-on adapter

For crimp connector ADQ-012G015A.

Ordering code

	1.	2.	3.	4.	5.
ADG-	015	G	S	026	K

1.	**Connection size**	
	015	G 1/2 A
2.	**Process connection**	
	G	female thread
3.	**Installation**	
	S	weld-on adapter
4.	**Welded-on nozzle**	
	026	26 mm
5.	**Construction material**	
	K	stainless steel 1.4571

Crimp connection

For push-in sensors Ø12 mm

Ordering code

Metal

	1.	2.	3.	4.	5.
ADQ-	012	G	015	A	

1.	**Connection size**	
	012	for sensors Ø12 mm
2.	**Process connection**	
	G	thread G
3.	**Connection size**	
	015	G 1/2 A
4.	**Process connection**	
	A	male thread
5.	**Construction material**	
	K	stainless steel 1.4571
	M	brass

Plastic

	1.	2.	3.	4.	5.
ADQ-	012	M	020	A	P1

1.	**Connection size**	
	012	for sensors Ø12 mm
2.	**Process connection**	
	M	metric thread
3.	**Connection size**	
	020	M20x1.5
4.	**Process connection**	
	A	male thread
5.	**Construction material**	
	P1	plastic PA66

Flange

For crimp-on threaded connection ADQ-012M20A.

Ordering code

Plastic

	1.	2.	3.	4.
ADM-	**020**	**F**	**054**	**P2**

1.	**Connection size**	
	020	M20x1.5
2.	**Process connection**	
	F	flange
3.	**Flange size**	
	054	54 mm
4.	**Construction material**	
	P2	plastic POM black

Round plug connector 4-pin

1 ⟷ brown
2 ⟷ white
3 ⟷ blue
4 ⟷ black

Ordering code

Packaged

	1.	2.	3.	4.	5.	
K	**04**	**PU-**				❍= Option

1.	**Number of pins**	
	04	4-polig
2.	**Cable material**	
	PU-	PUR
3.	**Cable length**	
	02	2 m
	05	5 m
	10	10 m
		Others on request
4.	**Shielding**	
	S	shielding applied to coupling
	U	unshielded
	N ❍	shielding not applied to coupling
5.	**Steckerabgang**	
	G	straight
	W	elbow 90 °

Round plug connector 4 / 5-pin

Ordering code

Self-assembly

	1.	2.
KB		

1.	**Number of pins**	
	04	4-polig
	05	5-polig
2.	**Steckerabgang**	
	G	gerade
	W	gewinkelt 90 °

Round plug connector 5-pin

1 ⟷ brown
2 ⟷ white
3 ⟷ blue
4 ⟷ black
5 ⟷ grey

Ordering code

Packaged

	1.		2.	3.	4.	5.	
K	**05**	**-**	**PU-**				❍= Option

1.	**Number of pins**	
	05	5-polig
2.	**Cable material**	
	PU-	PUR
3.	**Cable length**	
	02	2 m
	05	5 m
	10	10 m
		Others on request
4.	**Shielding**	
	S	shielding applied to coupling
	U	unshielded
	N ❍	shielding not applied to coupling
5.	**Steckerabgang**	
	G	straight
	W	elbow 90 °

Primary Sensors
0..10 V
4..20 mA
Frequency

Converter with the same data as the OMNI in situ electronics; but as an external panel-mounting variant with IP 67 housing.

OMNI - Tropical model

This OMNI electronic option should be used where temperatures change quickly, or for external installations (the device is filled with oil, and thus prevents condensate formation in the electronics housing, even under adverse circumstances)

LABO transmitter - Temperature up to 150 °C

All LABO transmitters can be used with electronics positioned in a separate area with media temperatures up to 150 °C.

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