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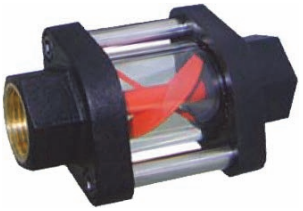
Flow - turbine



Characteristics

System	Turbine RT
Evaluation	Display, switching, measurement
Nominal widths	DN 15..50
Range	1.8..1133 l/min
Media	Water Aqueous emulsions Aggressive media (Oils)
Pressure resistance	Max. 250 bar
Medium temperature	-20..+100 °C

Applications

- **Industrial metering and monitoring technology**
- **Test equipment**
- **Oil circulation control**

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Function and benefits

- **Uncomplicated measurement of flows**
- **No magnets in the flow areas, because the hall sensor is pre-tensioned**
- **Modular system in the evaluation electronics**
- **Long service life due to high-quality Wolfram carbide bearing**
- **Intrinsically safe behavior**

The sensor is comprised of an turbine vane, which is set in rotation by the flow speed. The rotation is proportional to the flow value per time.

All converters which accept a frequency signal as an input signal (see frequency range of the various areas) can be combined with a electronic evaluation. See also device overview.

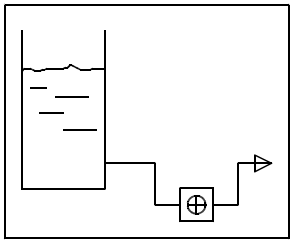
Note
However, it must be ensured that the flow sensor is always filled with medium and remains filled. Any arbitrary installation position is possible, however, the best-possible bleeding position should be selected (flow from left to right or from bottom to top).

Attention: Air bubbles have a significant, negative impact of the measurement results!

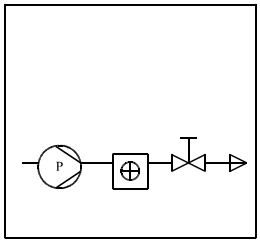
The valve should always be installed after the sensor for emptying processes. Factor in a start-up time (approx. 0.5 sec) and an after-run time (approx. 3 sec).

All specifications provided are based on a run-in and run-out section of 10 x D.

Installation method:



Turbine always under liquid



Turbine before valve

Programmability of parameters

All type RT. turbines can be combined with the intelligent sensor families OMNI, FLEX and LABO. These sensors 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 (ECI-1) can be used to change all saved parameters of a device at any time, if desired or necessary.

LABO-RT..-
I / U / F / C / S

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

FLEX-RT..

Programming with magnet clip:
Hold the magnet to the marking for 1 second and save the present value as the final value (for analog outputs) or as a switching value (for limit value switches).

OMNI-RT..

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-1

If required, all parameters can be set at any time on all intelligent sensors, using the ECI-1 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.

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Device overview

Device		Range l/min	Pressure resistance	Medium temperature	Supply voltage	Display	Output signal		Page
							Switching	Measuring	
HV		0.6..50	PN 10	-20..+100 °C	-	Analog	-	-	**4**
RRF-		0.5..30	PN 14	-20..+100 °C	5..24 V DC	-	-	Frequency Open Collector OC	**5**
RT-		1.8..1133	PN 250	-20..+85 °C (150 °C)	10..30 V DC	Signal LED	-	Frequency Push-Pull	**7**
LABO-RT-..S		1.8..1133	PN 250	-20..+85 °C (150 °C)	10..30 V DC	Signal LED	1 x Push-Pull	-	**9**
LABO-RT-..I		1.8..1133	PN 250	-20..+85 °C (150 °C)	10..30 V DC	Signal LED	-	4..20 mA	**13**
LABO-RT-..U		1.8..1133	PN 250	-20..+85 °C (150 °C)	15..30 V DC	Signal LED	-	0..10 V	**13**
LABO-RT-..F		1.8..1133	PN 250	-20..+85 °C (150 °C)	10..30 V DC	Signal LED	-	Programmable F / F Transducer 0..2 kHz Push-pull	**13**
LABO-RT-..C		1.8..1133	PN 250	-20..+85 °C (150 °C)	10..30 V DC	Signal LED	-	1 pulse per defined quantity Push-Pull	**13**
FLEX-RT		1.8..1133	PN 250	-20..+85 °C (150 °C)	18..30 V DC	Signal LED	1 x Push-Pull	0/4..20 mA or 0..10 V or Frequency 0..2 kHz	**16**
OMNI-RT		1.8..1133	PN 250	-20..+85 °C (150 °C)	18..30 V DC	Graphics LCD illuminated transflective and signal LED	2 x Push-Pull	0/4..20 mA or 0..10 V	**20**

ECI-1	All LABO, FLEX, and OMNI parameters can be set or modified using the ECI-1 configurator.	**27**
Options	● LABO transmitter – Temperature up to 150 ° ● OMNI – Tropical model	**28**
Accessories	● Type ZV / ZE (Filter) ● KB.... (Round plug connector 4/5-pin) ● OMNI-TA (Panel meter) ● OMNI-C-TA (Panel counter) ● OMNI-remote ● EEZ-904 (External universal counter)	**29**

Errors and technical modifications reserved.

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Flow Indicator HV

- **Bidirectional**
- **360 ° visibility**

Characteristics

The flow indicator HV is used for the reliable display of transparent fluids. A signal-red turbine wheel rotates in a glass tube proportional to the flow, and in this way provides an indication of the flow rate present.

The devices provide 360 ° vision, and are built for a long working life, thanks to the design of the turbine's bearings.

Technical data

Nominal width	DN 8..25	
Process connection	female thread G 1/4..G 1	
Display range	0.6..50 l/min	for details see table "Ranges"
$Q_{max.}$	to 50 l/min	
Pressure resistance	PN 10	
Medium temperature	-20..+100 °C	
Ambient temperature	-20..+70 °C	
Materials medium-contact	PA 66, CW614N, 1.4301, Sekurit glass, NBR	
Medium	water (oils have a tendency to a higher rotor start-up value)	
Weight	see table "Dimensions and weights"	
Installation location	as desired, except for inwards flow from above	

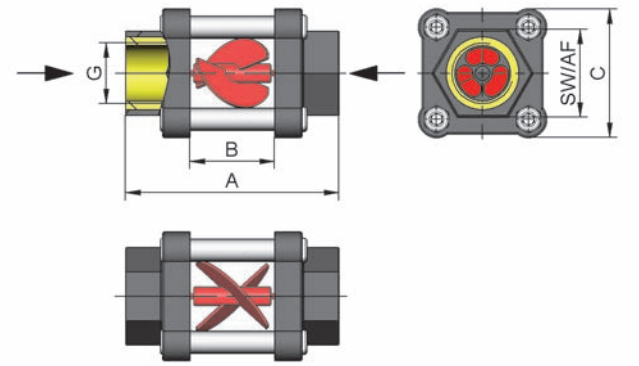
Ranges

G	Start-up quantity for turbine, l/min			$Q_{max.}$ recommended	Types
	H_2O	40 mm²/s	41..150 mm²/s		
G 1/4	0.6	2.5	3.5	6	HV-008GM
G 3/8	1.2	3.0	4.0	10	HV-010GM
G 1/2				15	HV-015GM
G 3/4	2.1	3.7	5.0	30	HV-020GM
G 1				50	HV-025GM

Special ranges are available.

Dimensions and weights

G	Types	A	B	C	SW	Weight kg
G 1/4	HV-008GM	66	22	44	20	0.11
G 3/8	HV-010GM	92	36	60	28	0.18
G 1/2	HV-015GM					
G 3/4	HV-020GM	114	46	70	46	0.60
G 1	HV-025GM					



Ordering code

HV - 1. [ ] 2. [G] 3. [M]

1.	**Nominal width**	
	008	DN 8 - G 1/4
	010	DN 10 - G 3/8
	015	DN 15 - G 1/2
	020	DN 20 - G 3/4
	025	DN 25 - G 1
2.	**Process connection**	
	G	female thread
3.	**Connection material**	
	M	brass

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Flow Transmitter Lineflow RRF

- **High accuracy / repeatability at low costs**
- **Determination of low flow rates**
- **Independent of location**

Characteristics

With the RRF flow meter, an inline turbine is fitted in a plastic housing. A Hall sensor detects, contact-free, the rotation of the turbine, and outputs a frequency signal proportional to the flow.

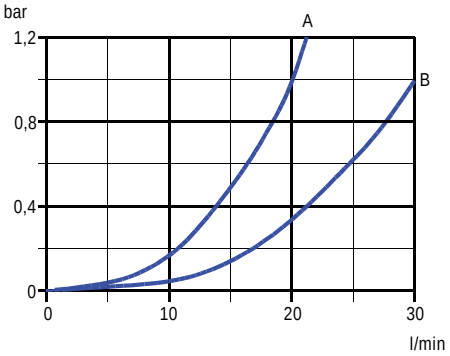
Technical data

Sensor	turbine fitted with magnets with Hall sensor	
Nominal width	DN 10	
Process connection	male thread G $^3/_8$ A	
Metering range	0.5..30 l/min, for details see table "Ranges and pressure loss"	
Measurement accuracy	±3 % of the measured value	
Repeatability	±0.5 % of full scale value	
Medium temperature	-20..+100 °C	
Ambient temperature	0..80 °C	
Pressure resistance	PN 14	
Pressure loss	see table "Ranges and pressure loss"	
Supply voltage	5..24 V DC at 8 mA	
Frequency output	NPN open collector at 50 mA max. (1 to 2.2 K Ohm pull-up resistor required)	
Electrical connection	cable 1 m or open plug contact 2.8/6.3 x 0.8	
Materials	Housing Turbine Bearing	PA 12 PA 12 PTFE 15 % graphite
Ingress protection	Cable Plug contact	IP60 IP00
Weight	0.04 kg	
Conformity	CE	

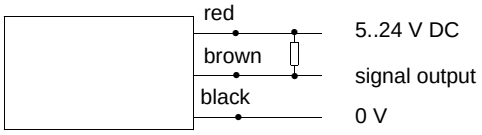
Ranges and pressure loss

Types RRF-010AN	Metering range l/min H_2O	Pulses/ litre	Frequency at Q_{max} Hz	Pressure loss code (see diagram)
005	0.5.. 5	6900	575	A
010	1.0..10	3300	550	A
015	1.0..15	2200	550	A
030	2.0..30	1000	500	B

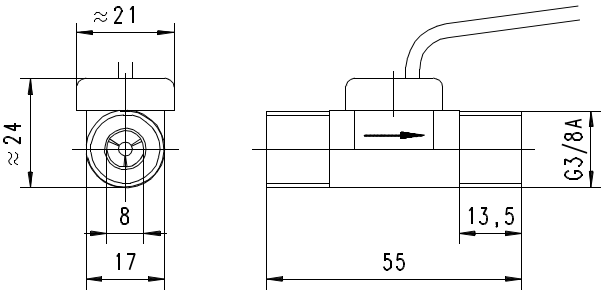
Pressure loss



Wiring



Dimensions



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Handling and Operation

Installation

The turbine's direction of flow is marked by an arrow on the housing. Ideally, flow should be from bottom to top. In any case, prevent entrapment of air. Pressure surges when starting up can damage the turbine. The turbine should therefore first be flooded slowly, and only then should the nominal flow be applied. It should preferably be installed ahead of and not after valves in order to prevent the turbine from running empty.

The turbine is sealed into the pipework using Teflon tape or similar. It should be ensured that the thread is not damaged by tightening too strongly. Bending forces on the turbine caused by the pipework must be avoided under all circumstances.

Ordering code

	1.	2.	3.	4.	5.
RRF-	**010**	**A**	**N**		

❍=Option

1.	**Nominal width**	
	010	DN 10 - G $^{3}/_{8}$
2.	**Process connection**	
	A	male thread
3.	**Housing material**	
	N	nylon
4.	**Metering range**	
	005	0.5.. 5 l/min
	010	1.0..10 l/min
	015	1.0..15 l/min
	030	1.0..30 l/min
5.	**Electrical connection**	
	K	cable connection
	F ❍	open plug contact

Accessories

- OMNI-TA converter / counter for control panel installation
- Counter EEZ-904

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Flow Transmitter RT-...AK

- **High precision**
- **No magnetic components in the flow space**
- **High pressure resistance**

Characteristics

A turbine acts as the primary sensor; its rotational speed is proportional to the flow rate. The rotational speed is detected by means of a biased Hall sensors, i.e. there are no magnets in the flow space.

Technical data

Sensor	biased Hall sensor
Nominal width	DN 15..50
Process connection	male thread G $^1/_2$ A...G 2 A
Metering ranges	1.8..1133 l/min for details, see table "Ranges"
Measurement accuracy	±1 % of full scale value in the specified metering range, including linearity and repeatability
Medium temperature	-20..+85 °C optionally -20..+150 °C (for 8 bar min.)
Ambient temperature	-20..+70 °C
Storage temperature	-20..+80 °C
Materials medium-contact	Housing stainless steel 315 Turbine stainless steel 430 Bearing tungsten carbide
Material electronics housing	CW614N nickelled
Max. particle size	0.5 mm
Pressure loss	0.3 bar at $Q_{max.}$
Pressure resistance	PN 250
Supply voltage	10..30 V DC
Signal output	transistor output "push-pull" (resistant to short circuits and polarity reversal) I_{out} = 100 mA max.
Current consumption	20 mA without load
Max. load current	100 mA

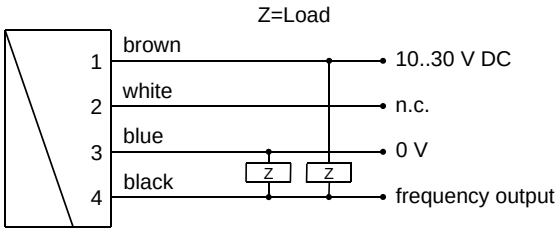
Electrical connection	for round plug connector M12x1, 4-pole
Ingress protection	IP 67
Weight	see table "Dimensions"
Conformity	CE

Ranges

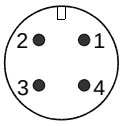
Types	Metering range (1..5 mm²/s)		Pulses / litre
	l/min	m³/h	±10 %
RT-015AK001.	1.8.. 18	0.11.. 1.1	2900
RT-020AK002.	3.7.. 37	0.22.. 2.2	1700
RT-020AK004.	6.7.. 67	0.40.. 4.0	1100
RT-020AK008.	13.3.. 133	0.80.. 8.0	400
RT-025AK016.	26.7.. 267	1.60.. 16.0	190
RT-040AK034.	56.7.. 567	3.40.. 34.0	60
RT-050AK068.	113.3..1133	6.80.. 68.0	24

Wiring

Push-pull output, can be connected to PNP or NPN inputs.



Connection example: PNP NPN



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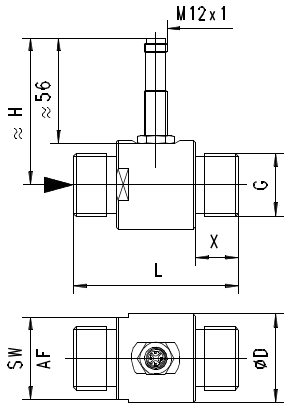
Dimensions



DN	G	ØD	SW / AF	H	L	X	Range m³/h at 1-5 mm² /s	Weight kg
15	1/2	38	35	71	64	19	0.11 – 1.1	0.30
20	3/4	38	35	72	64	19	0.22 – 2.2	0.40
20	3/4	38	35	72	64	19	0.40 – 4.0	0.40
20	3/4	40	38	75	83	22	0.80 – 8.0	0.40
25	1	47	44	78	88	23	1.60 – 16.0	0.60
40	1 1/2	60	52	84	114	28	3.40 – 34.0	1.40
50	2	70	64	89	132	29	6.80 – 68.0	1.90

Handling and Operation

Installation

As with all flow meters, if possible the turbine should be installed ahead of a valve (on the pressure side). Good degassing should be ensured. 10 x D calming sections are recommended before and after the turbine in order to maintain the specified accuracies. The turbine should be filled with fluid at all times.
The electronics housing does not project into the flow space.

Ordering code

	1.	2.	3.	4.	5.	6.
RT-		A	K			

❍=Option

1.	**Nominal width**	
	015	DN 15 - G 1/2 A
	020	DN 20 - G 3/4 A
	025	DN 25 - G 1 A
	040	DN 40 - G 1 1/2 A
	050	DN 50 - G 2 A
2.	**Mechanical connection**	
	A	male thread
3.	**Housing material**	
	K	stainless steel
4.	**Metering range**	
	001	0.11.. 1.1 m³/h
	002	0.22.. 2.2 m³/h
	004	0.40.. 4.0 m³/h
	008	0.80.. 8.0 m³/h
	016	1.60..16.0 m³/h
	034	3.40..34.0 m³/h
	068	6.80..68.0 m³/h
5.	**Signal output**	
	S	push-pull (compatible with PNP and NPN)
6.	**Option**	
	H ❍	high temperature model

Options

- Flanged model,
- max. temperature 150 °C
- DN 80-300 PN 16
- model for air / gas
- range from 0.05 m³/h

Accessories

- Cable/round plug connector (KB...)
  see additional information “Accessories”
- Counter EEZ-904
- OMNI-TA

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Flow Switch LABO-RT-S

- **Very short response time**
- **High precision**
- **No magnetic components in the flow space**
- **High pressure resistance**

Characteristics

A turbine acts as the primary sensor; its rotational speed is proportional to the flow rate. The rotational speed is detected by means of pre-tensioned Hall sensors, i.e. there are no magnets in the flow space.

The integrated converter / counter make available an electronic switching output (push-pull) with adjustable characteristics (minimum/maximum) and hysteresis, which responds when an adjustable limit is fallen short of or exceeded.
The switching value can be set to the currently existing flow using "teaching".

Models with analog or pulse output are also available.

Technical data

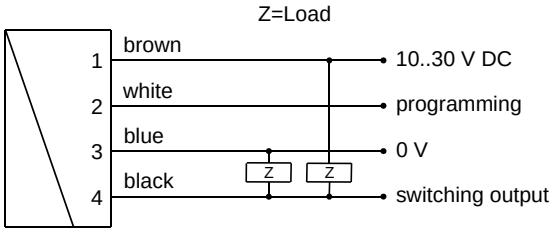
Sensor	turbine with biased Hall sensor	
Nominal width	DN 15..50	
Process connection	G $^1/_2$ A...G 2 A (others on request)	
Switching ranges	see table "Ranges"	
Measurement accuracy	±1 % of full scale value in the specified metering range including linearity and repeatability	
Pressure loss	0.3 bar at $Q_{max.}$	
Pressure resistance	PN 250	
Medium temperature	-20..+85 °C optionally -20..+150 °C (for 8 bar min.)	
Ambient temperature	-20..+70 °C	
Storage temp.	-20..+80 °C	
Materials medium-contact	Housing Turbine Bearing	stainless steel 315 stainless steel 430 tungsten carbide
Material electronics housing	CW614N plated	
Max. particle size	0.5 mm	

Supply voltage	10..30 V DC
Power consumption	< 1 W (without load)
Switching output	transistor output "push-pull" (resistant to short circuits and polarity reversal) I_{out} = 100 mA max.
Display	yellow LED (On = Normal / Off = Alarm / rapid flashing = Programming)
Electrical connection	for round plug connector M12x1, 4-pole
Ingress protection	IP 67
Weight	see table "Dimensions"
Conformity	CE

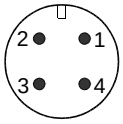
Ranges

Types	**Switching range (1..5 mm²/s)**	
	l/min	m³/h
RT-015AK001.	1.8.. 18	0.11.. 1.1
RT-020AK002.	3.7.. 37	0.22.. 2.2
RT-020AK004.	6.7.. 67	0.40.. 4.0
RT-020AK008.	13.3.. 133	0.80.. 8.0
RT-025AK016.	26.7.. 267	1.60.. 16.0
RT-040AK034.	56.7.. 567	3.40.. 34.0
RT-050AK068.	113.3..1133	6.80.. 68.0

Wiring



Connection example: PNP NPN

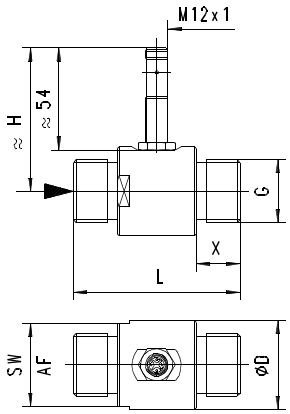


Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.

It is recommended to use shielded wiring.

The push-pull output) can as desired be switched as a PNP or an NPN output.

Dimensions



DN	G	ØD	SW / AF	H	L	X	Range m³/h at 1-5 mm² /s	Weight kg
15	1/2	38	35	69	64	19	0.11 – 1.1	0.32
20	3/4	38	35	70	64	19	0.22 – 2.2	0.42
20	3/4	38	35	70	64	19	0.40 – 4.0	0.42
20	3/4	40	38	73	83	22	0.80 – 8.0	0.42
25	1	47	44	76	88	23	1.60 – 16.0	0.63
40	1 1/2	60	52	82	114	28	3.40 – 34.0	1.42
50	2	70	64	87	132	29	6.80 – 68.0	1.92

Handling and operation

Installation

As with all flow meters, if possible the turbine should be installed ahead of a valve (on the pressure side). Good degassing should be ensured. 10 x D calming sections are recommended before and after the turbine in order to maintain the specified accuracies. The turbine should be filled with fluid at all times.
The electronics housing does not project into the flow space.

Note

The switching value can be programmed by the user via "teaching". If desired, programmability can be blocked by the manufacturer.

The ECI-1 device configurator with associated software is available as a convenient option for programming all parameters by PC, and for adjustment.

Operation and programming

The switching value is set as follows:

- Apply the flow rate to be set 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.

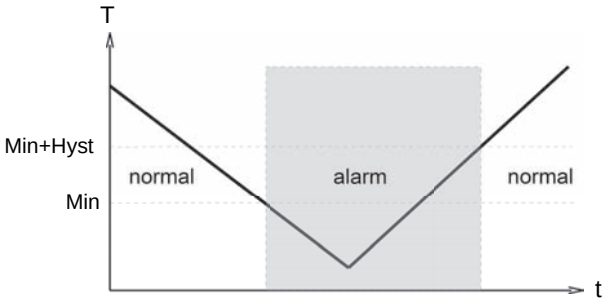
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.

In order to avoid the need to transit to an undesired operating status during the teach-in, the device can be provided ex-works with a teach-offset. The teach-offset point is added to the currently measured value before saving. The offset point can be positive or negative.

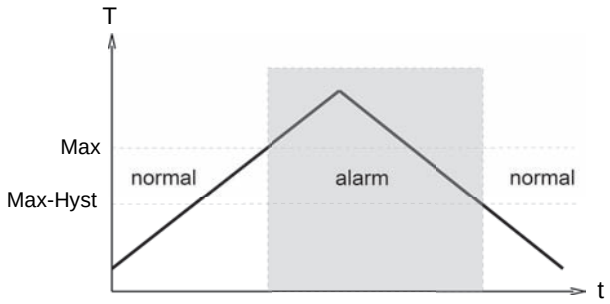
Example: The switching value should be set to 80 l/min. However, it is possible only to reach 60 l/min without problems. In this case, the device would be set using a teach-offset of +20 l/min. At a flow rate of 60 l/min in the process, teaching would then store a value of 80 l/min.

The limit switch can be used to monitor minima or maxima.

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



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



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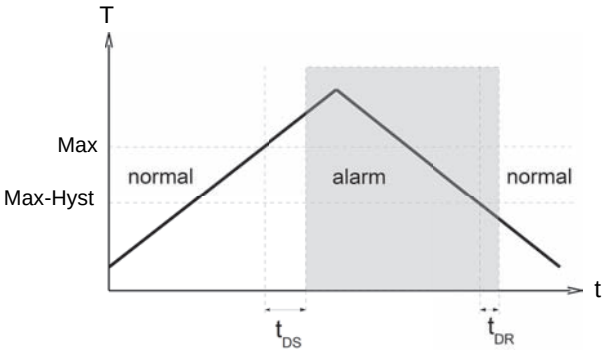
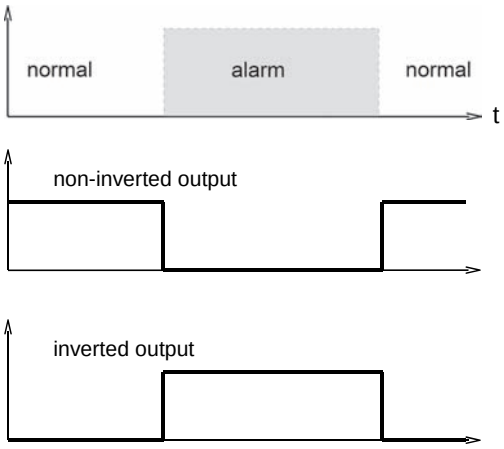
A changeover delay time (t_{DS}) can be applied to switching to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.

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



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

Ordering code

The basic device is ordered e.g. RT-xxx with electronics
e.g. LABO-RT-xxx

	1.	2.	3.	4.	5.
RT -		**A**	**K**		**E**

		6.	7.	8.	9.	10.	11.
LABO -	**RT-**	**S**				**S**	

❍ = Option

1.	**Nominal width**							
	015	DN 15 - G $^1/_2$ A						
	020	DN 20 - G $^3/_4$ A						
	025	DN 25 - G 1 A						
	040	DN 40 - G $1^1/_2$ A						
	050	DN 50 - G 2 A						
2.	**Mechanical connection**							
	A	male thread						
3.	**Housing material**							
	K	stainless steel						
4.	**Metering range**							
	001	0.11.. 1.1 m³/h						●
	002	0.22.. 2.2 m³/h					●	
	004	0.40.. 4.0 m³/h					●	
	008	0.80.. 8.0 m³/h					●	
	016	1.60..16.0 m³/h				●		
	034	3.40..34.0 m³/h			●			
	068	6.80..68.0 m³/h		●				
5.	**Connection for**							
	E	electronics						

6.	**Signal output**	
	S	push-pull (compatible with PNP and NPN)
7.	**Programming**	
	P	programmable (teaching possible)
	N ❍	cannot be programmed (no teaching)
8.	**Switching function**	
	L	minimum-switch
	H	maximum-switch
9.	**Switching signal**	
	O	standard
	I ❍	inverted
10.	**Electrical connection**	
	S	for round plug connector M12x1, 4-pole
11.	**Optional**	
	H ❍	100 °C version (with 300 mm cable)

Options for LABO

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 actuated)

Switching output fixed at ☐☐☐ l/min

Switching hysteresis ☐☐ %
standard = 2 % of the metering range

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

Further options available on request.

Options

- Flanged model,
- max. temperature 150 °C
- DN 80-300 PN 16
- model for air / gas
- range from 0.05 m³/h

Accessories

- Cable/round plug connector (KB...)
  see additional information “Accessories”
- Device configurator ECI-1
- OMNI-TA

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Flow Transmitter LABO-RT-I / U / F / C

- **High precision**
- **No magnetic components in the flow space**
- **High pressure resistance**
- **0..10 V, 4..20 mA , frequency/pulse output, completely configurable**

Characteristics

A turbine acts as the primary sensor; its rotational speed is proportional to the flow rate. The rotational speed is detected by means of pre-tensioned Hall sensors, i.e. there are no magnets in the flow space.

The LABO-RT electronics make various output signals available:

- Analog signal 0/4..20 mA (LABO-RT-I)
- Analog signal 0/2..10 V (LABO-RT-U)
- Frequency signal (LABO-RT-F) or
- Value signal pulse / x litres (LABO-RT-C)

A model with switching output is also available (see separate datasheet).

If desired, the range end value can be set to the currently existing flow using "teaching".

Technical data

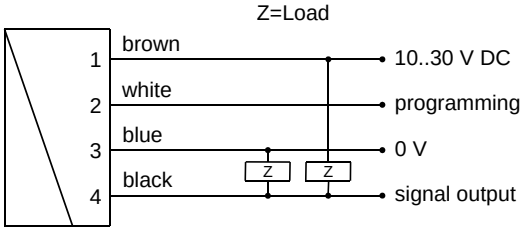
Sensor	turbine with biased Hall sensor
Nominal width	DN 15..50 (others on request)
Process connection	G $^1/_2$ A...G 2 A
Metering ranges	see table "Ranges"
Measurement accuracy	±1 % of full scale value in the specified metering range including linearity and repeatability
Max. particle size	0.5 mm
Pressure loss	0.3 bar at $Q_{max.}$
Pressure resistance	PN 250
Medium temperature	-20..+85 °C optionally -20..+150 °C (for 8 bar min.)
Ambient temperature	-20..+70 °C
Storage temperature	-20..+80 °C

Materials medium-contact	Housing Turbine Bearing	stainless steel 315 stainless steel 430 tungsten carbide
Material Electronics housing	CW614N nickelled	
Supply voltage	10..30 V DC voltage output 10 V: 15..30 V DC	
Power consumption	< 1 W (without load)	
Output data:	all outputs are resistant to short circuits and reversal polarity protected	
Current output:	4..20 mA (0..20 mA available on request)	
Voltage output:	0..10 V (2..10 V available on request) output current max. 20 mA	
Frequency output:	transistor output "push-pull" I_{out} = 100 mA max.	
Pulse output:	transistor output "push-pull" I_{out} = 100 mA max. pulse width 50 ms pulse per volume is to be stated	
Display	yellow LCD shows operating voltage (LABO-RT-I / U) or output status (LABO-RT-F / C) (rapid flashing = Programming)	
Electrical connection	for round plug connector M12x1, 4-pole	
Ingress protection	IP 67	
Weight	see table in "Dimensions"	
Conformity	CE	

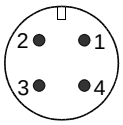
Ranges

Types	Metering range (1..5 mm²/s)	
	l/min	m³/h
RT-015AK001.	1.8.. 18	0.11.. 1.1
RT-020AK002.	3.7.. 37	0.22.. 2.2
RT-020AK004.	6.7.. 67	0.40.. 4.0
RT-020AK008.	13.3.. 133	0.80.. 8.0
RT-025AK016.	26.7.. 267	1.60..16.0
RT-040AK034.	56.7.. 567	3.40..34.0
RT-050AK068.	113.3..1133	6.80..68.0

Wiring



Connection example: PNP NPN



Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.
It is recommended to use shielded wiring.
The push-pull output of the frequency or pulse output version can as desired be switched as a PNP or an NPN output.

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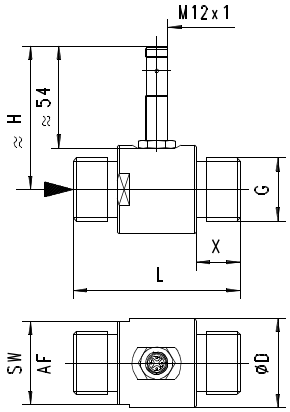
Dimensions



DN	G	ØD	SW / AF	H	L	X	Range m³/h at 1-5 mm² /s	Weight kg
15	1/2	38	35	69	64	19	0.11 – 1.1	0.32
20	3/4	38	35	70	64	19	0.22 – 2.2	0.42
20	3/4	38	35	70	64	19	0.40 – 4.0	0.42
20	3/4	40	38	73	83	22	0.80 – 8.0	0.42
25	1	47	44	76	88	23	1.60 – 16.0	0.63
40	1 1/2	60	52	82	114	28	3.40 – 34.0	1.42
50	2	70	64	87	132	29	6.80 – 68.0	1.92

Handling and operation

Installation

As with all flow meters, if possible the turbine should be installed ahead of a valve (on the pressure side). Good degassing should be ensured. 10 x D calming sections are recommended before and after the turbine in order to maintain the specified accuracies. The turbine should be filled with fluid at all times.
The electronics housing does not project into the flow space.

Note

The fullscale end value can be programmed by the user via "teaching". Requirement for programmability must be stated when ordering, otherwise the device cannot be programmed.

The ECI-1 device configurator with associated software is available as a convenient option for programming all parameters by PC, and for adjustment.
The teaching option is not available for the pulse output version.

Operation and programming

The teaching process can be carried out by the user as follows:

- The flow rate 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 devices have a yellow LED which flashes during the programming pulse. During operation, the LED serves as an indicator of operating voltage (for analog output) or of switching status (for frequency or pulse 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. The offset point can be positive or negative.

Example: The end of the metering range should be set to 80 %. However, only 60 % can be achieved without problem. In this case, the device would be ordered with a "teach-offset" of +20°%.. At a flow rate of 60 % in the process, teaching would then store a value of 80 %.

If necessary, a far greater number of parameters can also be programmed using the ECI-1 device configurator.

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Ordering code

The base device RT-XXX is ordered with electronics
e.g. LABO-RT-xxxx

	1.	2.	3.	4.	5.
RT -		**A**	**K**		**E**

	6.	7.	8.	9.
LABO - RF-			**S**	

❍=Option

1.	**Nominal width**							
	015	DN 15 - G 1/2 A						
	020	DN 20 - G 3/4 A						
	025	DN 25 - G 1 A						
	040	DN 40 - G 1 1/2 A						
	050	DN 50 - G 2 A						
2.	**Mechanical connection**							
	A	male thread						
3.	**Housing material**							
	K	stainless steel						
4.	**Metering range**							
	001	0.11.. 1.1 m³/h						●
	002	0.22.. 2.2 m³/h					●	
	004	0.40.. 4.0 m³/h					●	
	008	0.80.. 8.0 m³/h					●	
	016	1.60..16.0 m³/h				●		
	034	3.40..34.0 m³/h			●			
	068	6.80..68.0 m³/h		●				
5.	**Connection for**							
	E	electronics						

6.	**Signal output**		
	I		current output 4..20 mA
	U		voltage output 0..10 V
	F		frequency output (see "Ordering information")
	C		pulse output (see "Ordering information")
7.	**Programming**		
	N		cannot be programmed (no teaching)
	P	❍	programmable (teaching possible)
8.	**Electrical connection**		
	S		for round plug connector M12x1, 4-pole
9.	**Optional**		
	H	❍	100 °C version (with 300 mm cable)

Required ordering information

For LABO-RT-F:
Output frequency at full scale ☐☐☐☐ Hz
Maximum value: 2.000 Hz

For LABO-RT-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 for LABO

Special range for analog output: ☐☐☐ l/min
<= metering range (standard=metering range)

Special range for frequency output: ☐☐☐ l/min
<= metering range (standard=metering range)

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

Further options available on request.

Options

- Flanged model,
- max. temperature 150 °C
- DN 80-300 PN 16
- model for air / gas
- range from 0.05 m³/h

Accessories

- Cable/round plug connector (KB...)
  see additional information “Accessories”
- converter / counter OMNI-TA
- Device configurator ECI-1

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Flow Transmitter / Switch FLEX-RT

- **Versatile turbine flow sensor**
- **Switching output and analog output (4..20 mA / 0..10 V)**
- **Top quality materials**
- **Designed for industrial use**
- **Ingress protection IP 67**
- **Infinitely adjustably rotatable cable outlet for clean alignment**
- **Small, compact construction**
- **Very simple installation**

Characteristics

A turbine acts as the primary sensor; its rotational speed is proportional to the flow rate. The rotational speed is detected by means of a biased Hall sensors, i.e. there are no magnets in the flow space.

The FLEX transducer located on the sensor has an analog output (4..20 mA or 0..10 V) and a switching output, which can be configured as a limit switch for monitoring minima or maxima, or as a frequency output.

The switching output is designed as a push-pull driver, and can therefore be used both as a PNP or an NPN output. The state of the switching output is signalled with a yellow LED in the switching outlet; the LED has all-round visibility.
The sensor is configured in the factory, or alternatively this can be done with the aid of the optionally available ECI-1 device configurator (USB interface for PC). A selectable parameter can be modified on the device, with the aid of the magnet clip provided. In this case, the current measured value is saved as the parameter value. Examples of these parameters are the switching value or the metering range end value.
The stainless steel electronics housing is rotatable, so it is possible to orient the cable outlet after installation.

Technical data

Sensor	turbine with biased Hall sensor	
Nominal width	DN 15..50 (others on request)	
Process connection	G $^1/_2$ A...G 2 A	
Metering ranges	see table "Ranges"	
Measurement accuracy	±1 % of full scale value in the specified metering range including linearity and repeatability	
Medium temperature	-20..+85 °C optionally -20..+150 °C (for 8 bar min.)	
Ambient temperature	-20..+70 °C	
Storage temperature	-20..+80 °C	
Materials medium-contact	Housing Turbine Bearing	stainless steel 316 stainless steel 430 tungsten carbide
Material electronics housing	stainless steel 1.4305 adapter CW614N plated	
Max. particle size	0.5 mm	
Pressure loss (average)	0.3 bar at $Q_{max.}$	
Pressure	PN 250	
Supply voltage	18..30 V DC	
Power consumption	<1 W	
Analog output	4..20 mA / load 500 Ohm max. or 0..10 V / load min. 1 kOhm	
Switching output	transistor output "push-pull" (resistant to short circuits and polarity reversal) I_{out} = 100 mA max.	
Switching hysteresis	adjustable (please state when ordering) Standard setting: 2 % F.S., for Min-switch, position of the hysteresis above the limit value, and for Max-switch, below the limit value	
Display	yellow LED (On = Normal / Off = Alarm)	
Electrical connection	for round plug connector M12x1, 4-pole	
Ingress protection	IP 67	
Weight	see table in "Dimensions"	
Conformity	CE	

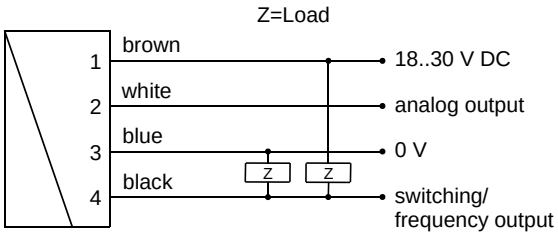
Ranges

Types	**Metering range (1..5 mm²/s)**	
	l/min	m³/h
RT-015AK001.	1.8.. 18	0.11.. 1.1
RT-020AK002.	3.7.. 37	0.22.. 2.2
RT-020AK004.	6.7.. 67	0.40.. 4.0
RT-020AK008.	13.3.. 133	0.80.. 8.0
RT-025AK016.	26.7.. 267	1.60..16.0
RT-040AK034.	56.7.. 567	3.40..34.0
RT-050AK068.	113.3..1133	6.80..68.0

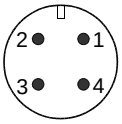
Wiring

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

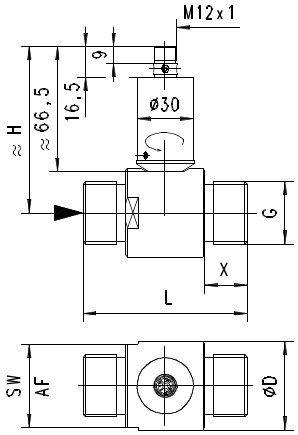
It is recommended to use shielded wiring,



Connection example: PNP NPN



Dimensions



DN	G	ØD	SW / AF	H	L	X	Range m³/h at 1-5 mm² /s	Weight kg
15	1/2	38	35	81.5	64	19	0.11 – 1.1	0.44
20	3/4	38	35	82.5	64	19	0.22 – 2.2	0.54
20	3/4	38	35	82.5	64	19	0.40 – 4.0	0.54
20	3/4	40	38	85.5	83	22	0.80 – 8.0	0.54
25	1	47	44	88.5	88	23	1.60 – 16.0	0.74
40	1 1/2	60	52	94.5	114	28	3.40 – 34.0	1.54
50	2	70	64	99.5	132	29	6.80 – 68.0	2.04

Handling and operation

Installation

As with all flow meters, if possible the turbine should be installed ahead of a valve (on the pressure side). Good degassing should be ensured. 10 x D calming sections are recommended before and after the turbine in order to maintain the specified accuracies. The turbine should be filled with fluid at all times.
The electronics housing does not project into the flow space.

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).

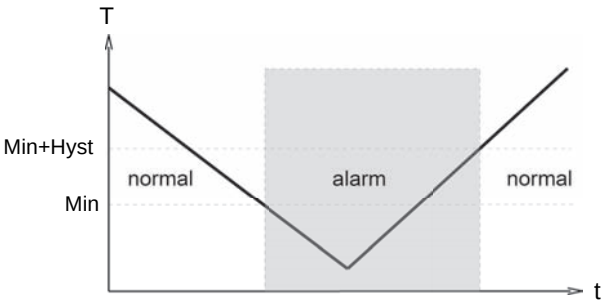
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an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

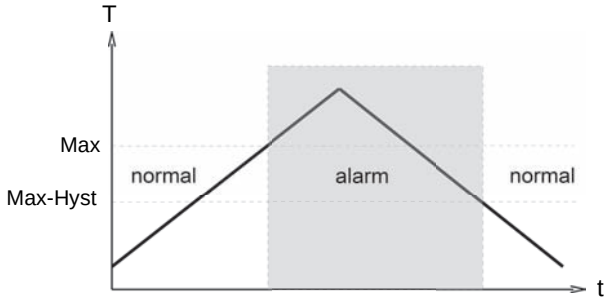
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

The limit switch can be used to monitor minima or maxima.

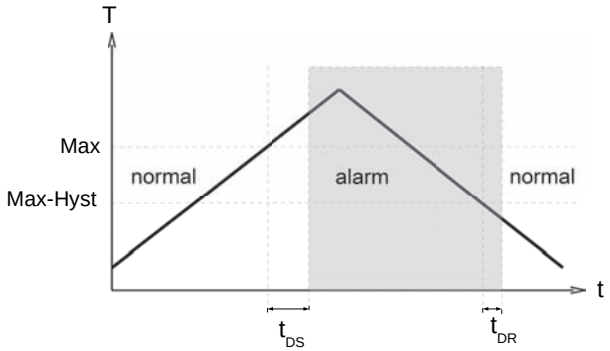
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



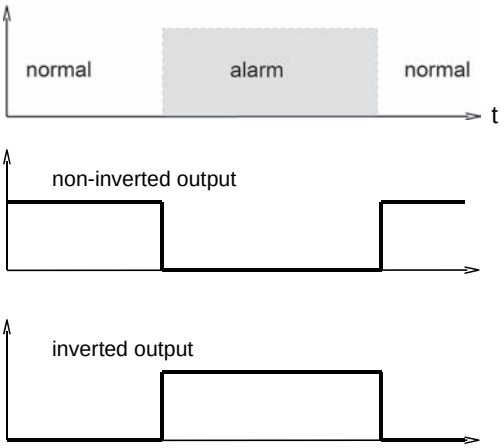
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



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.

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Ordering code

The base device RT-XXX is ordered with FLEX-RT-XXX electronics.

	1.	2.	3.	4.	5.
RT-		**A**	**K**		**E**

	6.	7.	8.	9.	10.
FLEX-RT-					

❍=Option

1.	**Nominal width**							
	015	DN 15 - G 1/2 A						●
	020	DN 20 - G 3/4 A					●	
	025	DN 25 - G 1 A				●		
	040	DN 40 - G 1 1/2 A			●			
	050	DN 50 - G 2 A		●				
2.	**Mechanical connection**							
	A	male thread						
3.	**Housing material**							
	K	stainless steel						
4.	**Metering range**							
	001	0.11.. 1.1 m³/h						●
	002	0.22.. 2.2 m³/h					●	
	004	0.40.. 4.0 m³/h					●	
	008	0.80.. 8.0 m³/h					●	
	016	1.60..16.0 m³/h				●		
	034	3.40..34.0 m³/h			●			
	068	6.80..68.0 m³/h		●				
5.	**Connection for**							
	E	electronics						

6.	**For nominal width**							
	015	DN 15 - G 1/2 A						●
	020	DN 20 - G 3/4 A					●	
	025	DN 25 - G 1 A				●		
	040	DN 40 - G 1 1/2 A			●			
	050	DN 50 - G 2 A		●				
7.	**Analog output**							
	I	current output 4..20 mA						
	U	voltage output 0..10 V						
8.	**Switching function**							
	L	minimum-switch						
	H	maximum-switch						
9.	**Switching signal**							
	O	standard						
	I ❍	inverted						
10.	**Option**							
	H ❍	100 °C Version						

Options for FLEX

Special range for analog output: l/min
(not greater than the sensor's working range)

Special range for frequency output: l/min
(not greater than the sensor's working 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 l/min

Special hysteresis (standard = 2% EW) %

Gooseneck
(recommended at operating temperatures above 70 °C)

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

Options

- Flanged model,
- max. temperature 150 °C
- DN 80-300 PN 16
- model for air / gas
- range from 0.05 m³/h

Accessories

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

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Flow Transmitter / Switch OMNI-RT

- **Universal turbine flow sensor**
- **Analog output, two switching outputs**
- **Clear, easily legible, illuminated LCD display**
- **Modifiable units in the display**
- **Designed for industrial use**
- **Small, compact construction**
- **Simple installation**

Characteristics

A turbine acts as the primary sensor; its rotational speed is proportional to the flow rate. The rotational speed is detected by means of pre-tensioned Hall sensors, i.e. there are no magnets in the flow space.

The OMNI transducer located on the sensor 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 minima or maxima, 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.

Technical data

Sensor	turbine with pre-tensioned Hall sensor	
Nominal width	DN 15..50	
Process connection	G $^1/_2$ A...G 2 A	
Metering ranges	see table "Ranges"	
Measurement accuracy	±1 % of full scale value in the specified metering range including linearity and repeatability	
Medium temperature	-20..+85 °C optionally -20..+150 °C (for 8 bar min.)	
Ambient temperature	-20..+70 °C	
Storage temperature	-20..+80 °C	
Max. particle size	0.5 mm	
Pressure loss	maximum 0.3 bar at $Q_{max.}$	
Pressure	PN 250	
Materials medium-contact	Housing Turbine Bearing	stainless steel 316 stainless steel 430 tungsten carbide
Materials Electronic housing	Housing Glass Magnet Ring	stainless steel 1.4305 mineral glass hardened samarium-Cobalt POM
Supply voltage	18..30 V DC	
Power consumption	< 1 W	
Analog output	4..20 mA / max. load 500 Ω or 0..10 V / min. load 1 kΩ	
Switching outputs	transistor output "push-pull" (resistant to short circuits and polarity reversal) I_{out} = 100 mA max.	
Hysteresis	adjustable, position of the hysteresis depends on minimum or maximum	
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 / (IP 68 when oil-filled)	
Weight	see table "Dimensions"	
Conformity	CE	

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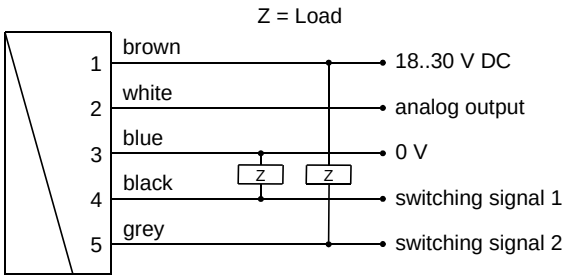
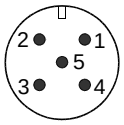
Ranges

Types	Metering range (1..5 mm²/s)	
	l/min	m³/h
OMNI-RT-015AK001.	1.8.. 18	0.11.. 1.1
OMNI-RT-020AK002.	3.7.. 37	0.22.. 2.2
OMNI-RT-020AK004.	6.7.. 67	0.40.. 4.0
OMNI-RT-020AK008.	13.3.. 133	0.80.. 8.0
OMNI-RT-025AK016.	26.7.. 267	1.60..16.0
OMNI-RT-040AK034.	56.7.. 567	3.40..34.0
OMNI-RT-050AK068.	113.3..1133	6.80..68.0

Wiring

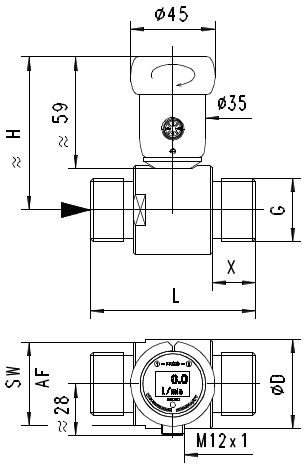


Connection example: PNP NPN



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



G	DN	ØD	SW / AF	H	L	X	Range m³/h at 1-5 mm² /s	Weight
G 1/2	15	38	35	74	64	19	0.11 – 1.1	0.50
G 3/4	20	38	35	75	64	19	0.22 – 2.2	0.60
G 3/4	20	38	35	75	64	19	0.40 – 4.0	0.60
G 3/4	20	40	38	78	83	22	0.80 – 8.0	0.60
G 1	25	47	44	81	88	23	1.60 – 16.0	0.80
G 1 1/2	40	60	52	87	114	28	3.40 – 34.0	1.60
G 2	50	70	64	92	132	29	6.80 – 68.0	2.10

Gooseneck option

A gooseneck (optional) between the electronics head and the primary sensor provides freedom in the orientation of the sensor. This option simultaneously provides thermal decoupling between the two units.

Handling and operation

Installation

As with all flow meters, if possible the turbine should be installed ahead of a valve (on the pressure side). Good degassing should be ensured. 10 X D calming sections are recommended before and after the turbine in order to maintain the specified accuracies. The turbine should be filled with fluid at all times.

It should be ensured that the flow meter and the OMNI electronics are matched to each other.

The electronics housing is permanently connected to the primary sensor, and cannot be removed by the user. After installation, the electronic head can be turned to the best position for reading.

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)

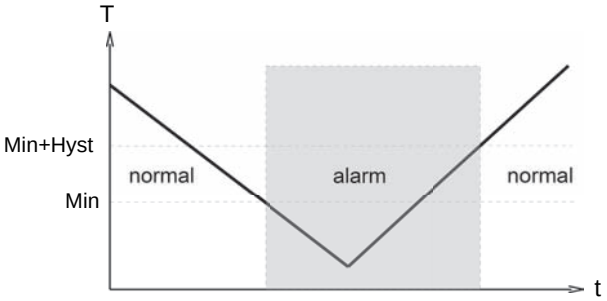
For models with a voltage output, replace 20 mA accordingly with 10 V.

Edit, using position 2

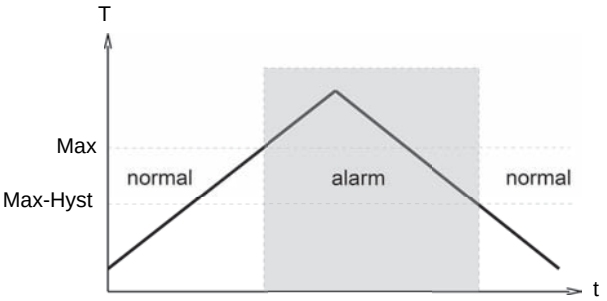
If the currently visible parameter is to be modified:

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



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



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 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**.

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Ordering code

The basic device is ordered e.g. RT-xxx with electronics e.g. OMNI-RT-xxxx

	1.	2.	3.	4.	5.	6.
RT-		**A**	**K**		**E**	

	7.	8.	9.	10.
OMNI-RT-			**S**	

❍=Option

1.	**Nominal width**							
	015	DN 15 - G 1/2 A						●
	020	DN 20 - G 3/4 A					●	
	025	DN 25 - G 1 A				●		
	040	DN 40 - G 1 1/2 A			●			
	050	DN 50 - G 2 A		●				
2.	**Mechanical connection**							
	A	male thread						
3.	**Housing material**							
	K	stainless steel						
4.	**Metering range**							
	001	0.11.. 1.1 m³/h						●
	002	0.22.. 2.2 m³/h					●	
	004	0.40.. 4.0 m³/h					●	
	008	0.80.. 8.0 m³/h					●	
	016	1.60..16.0 m³/h				●		
	034	3.40..34.0 m³/h			●			
	068	6.80..68.0 m³/h		●				
5.	**Connection for**							
	E	electronics						
6.	**Option**							
	H	high temperature model						

7.	**For nominal width**							
	015	DN 15 - G 1/2 A						●
	020	DN 20 - G 3/4 A					●	
	025	DN 25 - G 1 A				●		
	040	DN 40 - G 1 1/2 A			●			
	050	DN 50 - G 2 A		●				
8.	**Analog output**							
	I	current output 0/4..20 mA						
	U ❍	voltage output 0/2..10 V						
9.	**Electrical connection**							
	S	for round plug connector M12x1, 5-pole						
10.	**High temperature**							
	H ❍	150 °C version						
	O ❍	tropical model oil-filled version for heavy duty or external use						

Accessories

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

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OMNI-C-RT Counter

- **Simple totalisation**
- **Simple filling counter with programmable end signal**
- **Control switchover at present value**
- **Automatic, dynamic change of displayed unit and decimal places in the graphics display**
- **Antivalent outputs**
- **Simple guided menu via graphics display**
- **Very compact dimensions**
- **Full metal housing with high protection class**
- **Rotatable head for optimum reading direction**

Characteristics

A turbine acts as the primary sensor; its rotational speed is proportional to the flow rate. The rotational speed is detected by means of biased Hall sensors, i.e. there are no magnets in the flow space.

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 analog 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. The stainless steel housing 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.

Technical data

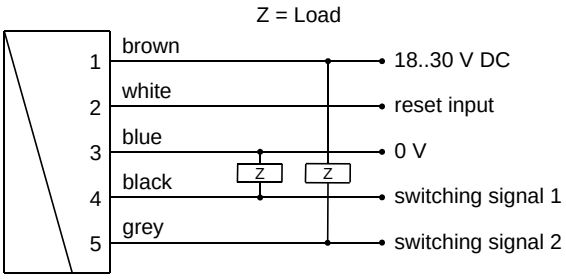
Sensor	turbine with biased Hall sensor	
Nominal width	DN 15..50	
Process connection	G $^1/_2$ A...G 2 A	
Metering ranges	see table "Ranges"	
Measurement accuracy	±1 % of full scale value in the specified metering range including linearity and repeatability.	
Medium temperature	-20..+85 °C optionally -20..+150 °C (for 8 bar min.)	
Ambient temperature	-20..+70 °C	
Storage temperature	-20..+80 °C	
Max. particle size	0.5 mm	
Pressure loss	maximum 0.3 bar at $Q_{max.}$	
Pressure	PN 250	
Materials medium-contact	Housing Turbine Bearing	stainless steel 316 stainless steel 430 tungsten carbide
Materials electronic housing	Housing Glass Magnet Ring	stainless steel 1.4305 mineral glass hardened samarium-Cobalt POM
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 push-pull output, max. 100 mA, resistant to short circuits, and reversal polarity protected 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 polarity reversal PIN 2, wipe signal, pos. or neg. , edge pos. or neg., can be selected on site	
Counting input	(normally not directly accessible from the device) Frequency input 0..10 kHz analog input 0/4..20 mA analog input 0..10 V	
Supply voltage	18..30 VDC	
Power consumption	< 1 W	
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 / (IP 68 when oil-filled)
Weight	see table "Dimensions"
Conformity	CE

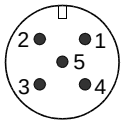
Ranges

Types	**Metering range (1..5 mm²/s)**	
	l/min	m³/h
OMNI-C-RT-015AK001.	1.8.. 18	0.11.. 1.1
OMNI-C-RT-020AK002.	3.7.. 37	0.22.. 2.2
OMNI-C-RT-020AK004.	6.7.. 67	0.40.. 4.0
OMNI-C-RT-020AK008.	13.3.. 133	0.80.. 8.0
OMNI-C-RT-025AK016.	26.7.. 267	1.60.. 16.0
OMNI-C-RT-040AK034.	56.7.. 567	3.40.. 34.0
OMNI-C-RT-050AK068.	113.3..1133	6.80.. 68.0

Wiring

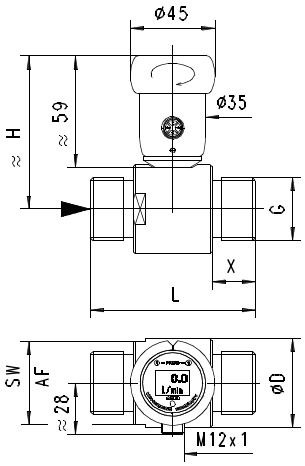


Connection example: PNP NPN



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

Dimensions



G	DN	ØD	SW / AF	H	L	X	Range m³/h at 1-5 mm² /s	Weight
G 1/2	15	38	35	74	64	19	0.11 – 1.1	0.50
G 3/4	20	38	35	75	64	19	0.22 – 2.2	0.60
G 3/4	20	38	35	75	64	19	0.40 – 4.0	0.60
G 3/4	20	40	38	78	83	22	0.80 – 8.0	0.60
G 1	25	47	44	81	88	23	1.60 – 16.0	0.80
G 1 1/2	40	60	52	87	114	28	3.40 – 34.0	1.60
G 2	50	70	64	92	132	29	6.80 – 68.0	2.10

Gooseneck option

A gooseneck (optional) between the electronics head and the primary sensor provides freedom in the orientation of the sensor. This option simultaneously provides thermal decoupling between the two units Length of the gooseneck is 140 mm.

Handling and operation

Installation

As with all flow meters, if possible the turbine should be installed ahead of a valve (on the pressure side). Good degassing should be ensured. 10 x D calming sections are recommended before and after the turbine in order to maintain the specified accuracies. The turbine should be filled with fluid at all times.
The electronics housing does not project into the flow space.

It should be ensured that the flow meter and the OMNI electronics are matched to each other.
The electronics housing is permanently connected to the primary sensor, and cannot be removed by the user. After installation, the electronic head can be turned to the best position for reading.

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 dialog 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 unintendedly, 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".

Ordering code

The basic device is ordered e.g. RT-xxx with electronics
e.g. OMNI-C-RT- xxxx

	1.	2.	3.	4.	5.	6.
RT-		**A**	**K**		**E**	

	7.	8.	9.	10.
OMNI-C-RT-		**A**	**S**	

❍=Option

1.	**Nominal width**						
	015	DN 15 - G ¹/₂ A					●
	020	DN 20 - G ³/₄ A				●	
	025	DN 25 - G 1 A			●		
	040	DN 40 - G 1¹/₂ A		●			
	050	DN 50 - G 2 A	●				
2.	**Mechanical connection**						
	A	male thread					
3.	**Housing material**						
	K	stainless steel					
4.	**Metering range**						
	001	0.11.. 1.1 m³/h					
	002	0.22.. 2.2 m³/h					
	004	0.40.. 4.0 m³/h					
	008	0.80.. 8.0 m³/h					
	016	1.60..16.0 m³/h					
	034	3.40..34.0 m³/h					
	068	6.80..68.0 m³/h					
5.	**Connection for**						
	E	electronics					
6.	**Option**						
	H	high temperature model					

7.	**For nominal width**						
	015	DN 15 - G ¹/₂ A					●
	020	DN 20 - G ³/₄ A				●	
	025	DN 25 - G 1 A			●		
	040	DN 40 - G 1¹/₂ A		●			
	050	DN 50 - G 2 A	●				
8.	**Signal output**						
	A	antivalent switching signal (counter state reached)					
9.	**Electrical connection**						
	S	for round plug connector M12x1, 5-pole					
10.	**High temperature**						
	H ❍	150 °C version					
	O ❍	tropical model oil-filled version for heavy duty or external use					

Accessoires

- Cable/round plug connector (KB...)
  see additional information "Accessories"
- Device configurator ECI-1

Options

- Flanged model,
- max. temperature 150 °C
- DN 80-300 PN 16
- model for air / gas
- range from 0.05 m³/h

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Device Configurator ECI-1

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

Characteristics

The device configurator ECI-1 is an interface which allows the connection of microcontroller-managed HONSBERG sensors to the USB port of a computer.
Together with the Windows software "HONSBERG Device Configurator" 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

Supply voltage	12..30 V DC (depending on the connected sensor) and via USB
Power consumption	< 1 W
Connection	
Sensor	cable bushing M12x1, 5-pole, straight length approx. 50 cm
Lead	device connector M12x1, 5-pole
USB	USB bushing type B
Operating temperature	0..50 °C
Storage temperature	-20..+80 °C
Dimensions of housing	98 mm (L) x 64 mm (W) x 38 mm (H)
Housing material	ABS
Ingress protection	IP 40

Handling and operation

Connection

The device configurator is intended for temporary connection to the application. It is connected between the the existing sensor lead and the sensor. Power supply is via the supply to the sensor and the computer's USB port. When inactive (no communication), the configurator behaves completely neutrally; all signals from the sensor remain available to the application. During communication between computer and sensor, the signal wirings are separated in the configurator, so that in this state the sensor's output signals are not available.

To connect 4-pole leads without a middle hole to the installed 5-pole device connector, adapter K04-05 is included. 4-pole leads with a middle hole can be used without an adapter.

Ordering code

Device configurator (for scope of delivery, see the diagram below)	**ECI-1**

Scope of delivery

1. Device configurator ECI-1
2. USB cable
3. Adapter K04-05
4. Plug KB05G
5. Cable K05PU-02SG
6. Carrying case

Incl. software

Accessories:

Mains connector 24 V DC (with fitted round plug connector, 5-pole, incl. international plug set)		**EPWR24-1**

Replacement parts:

M12x1 adapter 4- / 5-pole	**K04-05**
PUR cable, 5-pole, shielded with round plug connector M12x1	**K05PU-02SG**
Round plug connector M12x1, 5-pole (without cable)	**KB05G**

Options

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.

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)

Accessories

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.

Round plug connector 4 / 5-pin

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

Ordering code

Self-assembly

1. 2.
KB ☐ ☐

1.	**Number of pins**	
	04	4-pin
	05	5-pin
2.	**Connector output**	
	G	straight
	W	elbow 90 °

Packaged

1. 2. 3. 4. 5. 6.
☐ **PU** - ☐ ☐ ☐ ☐

1.	**Number of pins**	
	K	4-pin
	K05	5-pin
2.	**Cable material**	
	PU	PUR
3.	**Cable length**	
	02	2 m
	05	5 m
	10	10 m
4.	**Shielding**	
	N	shielding not applied to coupling
	S	shielding applied to coupling
5.	**Connector output**	
	G	straight
	W	elbow 90 °
6.	**Shielding**	
	A	shielded

Panel meter OMNI-TA

External converter with the same data as the electronics; can be mounted directly on the primary sensor, but as an external panel-mounting variant with IP 67 housing.

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Panel counter OMNI-C-TA

External counter with the same data as the electronics; can be mounted directly on the primary sensor, but as an external panel-mounting variant with IP 67 housing.

OMNI - Remote

Function is identical to OMNI-suburb. Connection to the sensor is, however, made by wire, and so the measurement point and display location can be apart

EEZ-904

External universal counter