VHZ, LABO-VHZ-S, LABO-VHZ-I, LABO-VHZ-U, LABO-VHZ-F, LABO-VHZ-C, FLEX-VHZ, OMNI-VHZ

Шестеренчатые расходомеры

GHM MESSTECHNIK

Технические характеристики

Flow Transmitter / Switch FLEX-VHZ

- **Analog output and switching output**
- **Designed for industrial use**
- **Small, compact construction**
- **Simple installation**
- **Simple to use**
- **Cable outlet infinitely rotatable**

Characteristics

The VHZ gearwheel flow meter measures the flow on the volumetric principle, in which a pair of gearwheels is moved proportional to the flow rate. The movement of the gearwheels is measured through the enclosing housing wall by a sensor. The devices are suitable for viscous, fluid, self-lubricating media, as well as for aqueous fluids such as soaps, pasts, emulsions etc. which have a non-abrasive character. Because of the volumetric functioning principle, the devices are almost completely independent of viscosity.

The FLEX transducer on the sensor has an analog output (4..20 mA or 0..10 V) and one switching output, which can be configured as a limit switch for monitoring minimal or maximal, 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 connection; 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.

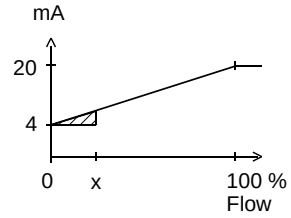
Technical data

Sensor	gearwheel volumeter
Nominal width	DN 8..25
Process connection	G $^1/_4$..G 1
Metering ranges	0.02..150 l/min for details, see table "Ranges"
Measurement accuracy	±3 % of the measured value in the specified metering range (measured at 20 mm²/s)
Repeatability	±0.3 %
Medium temperature	-25..+80 °C, optionally -25.+120 °C
Ambient temperature	-20..+70 °C
Materials medium-contact	see table "Materials"
Construction material Electronic housing	stainless steel 1.4305 Adapter: CW614N nickelled
Pressure resistance	PN 100..200 bar for details see table "Pressure resistance and weight"
Pressure loss	see upstream page "Function and benefits - volumetric, gearwheel"
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 % of full scale value, 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 65
Weight	see table "Pressure resistance and weight"
Conformity	CE

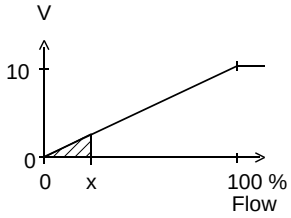
Signal output curves

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

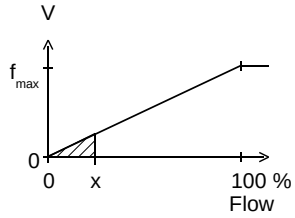
Current output



Voltage output



Frequency output



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

Other characters on request.

Pressure resistance and weight

G	Types	PN bar	Housing material	Weight kg
G 1/4	FLEX-VHZ-008GA	200	Aluminium	0.65
G 1/4	FLEX-VHZ-008GK	160	Stainless steel	1.65
G 3/8	FLEX-VHZ-010GA	200	Aluminium	0.65
G 3/8	FLEX-VHZ-010GK	200	Stainless steel	1.65
G 3/4	FLEX-VHZ-020GA	200	Aluminium	1.75
G 3/4	FLEX-VHZO-020GA	100	Aluminium / glass	1.75
G 1	FLEX-VHZ-025GA	100	Aluminium	6.50

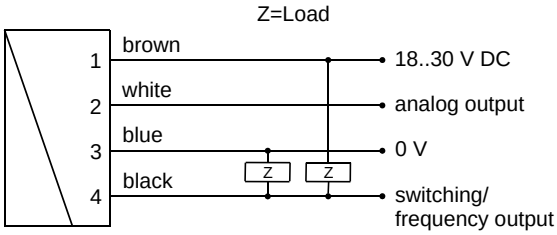
Ranges

Metering range l/min	Types	Pulse volume (= resolution) cm^3
0.02.. 2	FLEX-VHZ-008	0.04
0.10.. 6	FLEX-VHZ-010	0.20
0.50.. 50	FLEX-VHZ(O)-020	2.00
3.00.. 150	FLEX-VHZ-025	5.22

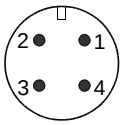
Materials

	FLEX-VHZ-008..025GA	FLEX-VHZ-008GK	FLEX-VHZ-010..025GK
Housing	Al anodised	stainless steel 1.4404	stainless steel 1.4404
gearwheel and Axis	stainless steel 1.4462	stainless steel 1.4462	stainless steel 1.4462
Bearing	Iglidur X	stainless steel 1.4037 / 1.4016 /PVD-coated	Iglidur X
Seal	FKM	FKM	FKM
Sight glass	glass (only with VHZO)		

Wiring



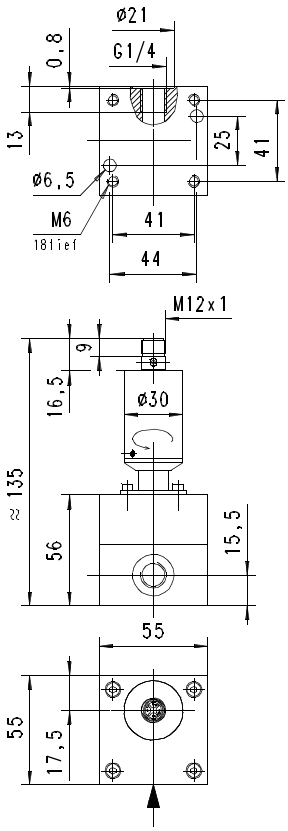
Connection example: PNP NPN



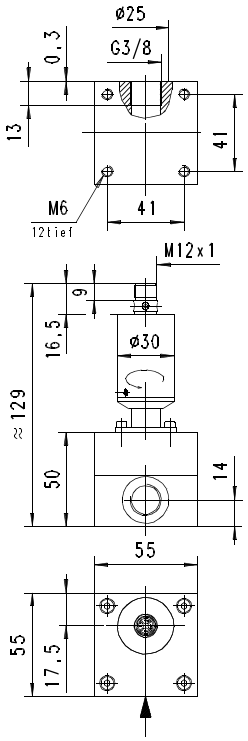
Before the electrical installation, it must be ensured that the supply voltage corresponds with the data sheet.
It is recommended to use shielded wiring.

Dimensions

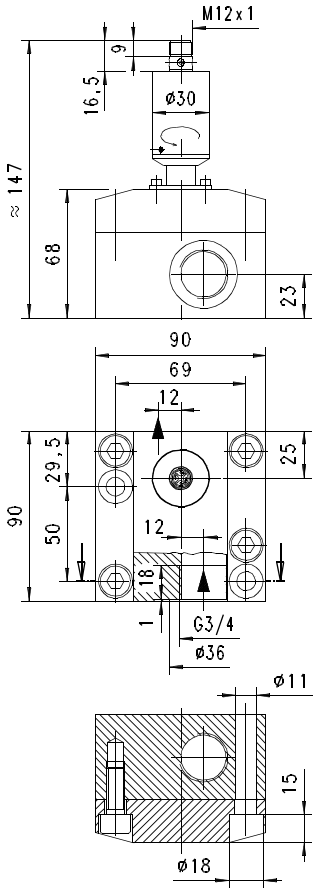
FLEX-VHZ-008



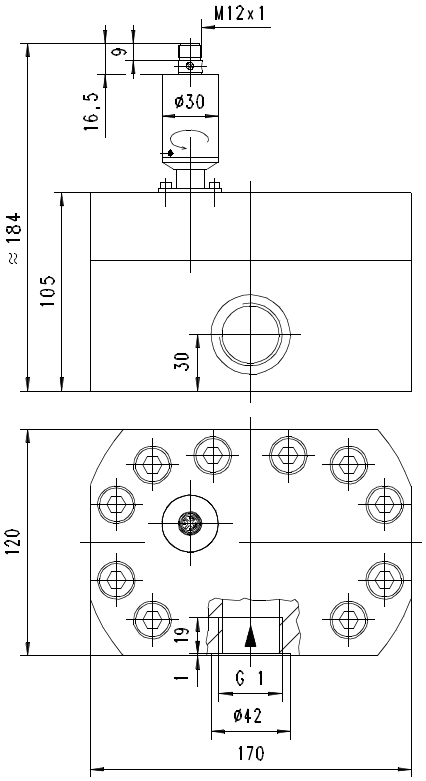
FLEX-VHZ-010



FLEX-VHZ-020



FLEX-VHZ-025



Handling and operation

Installation

The VHZ flow measurement device can be installed anywhere in the pipework system. A run-in section is not required. The direction of flow may be freely chosen.

It should be ensured that no dirt particles (thread cutting swarf) can get into the flow space, as this could cause the blockage of the gearwheels. It may therefore be necessary to install filters upstream of the flow measurement device (mesh size 30 µm).

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).

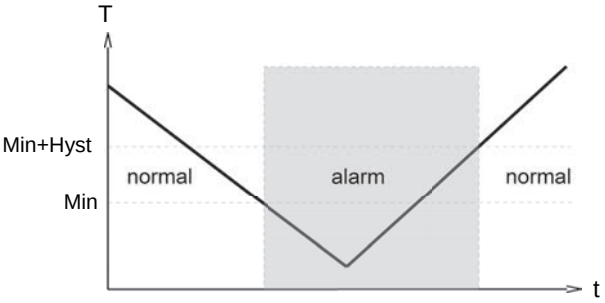
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an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

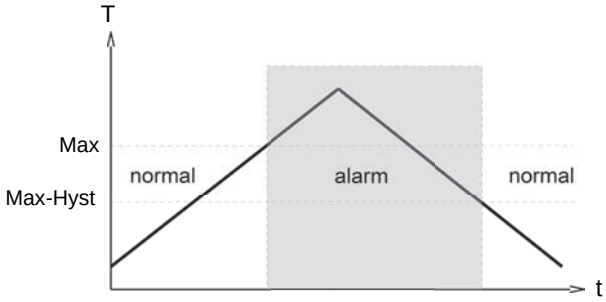
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

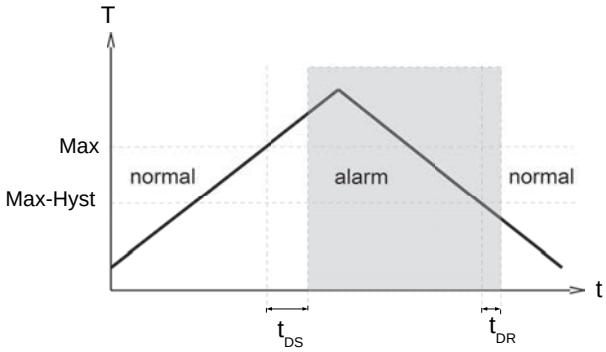
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



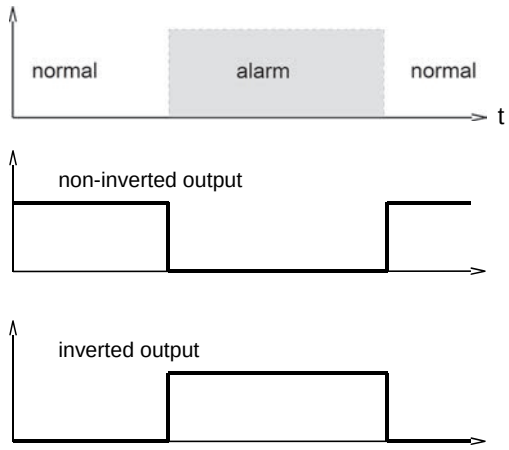
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



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

The base device is ordered, e.g. VHZ-008GA002E with electronics, e.g. FLEX-VHZ-008ILO

	1.	2.	3.	4.	5.	6.
VHZ			**G**			**E**

	7.	8.	9.	10.
FLEX-VHZ-				

❍=Option

1.	**Sight glass**						
	-	no sight glass					
	O-	with sight glass					
2.	**Nominal width**						
	008	DN 8 - G 1/4					●
	010	DN 10 - G 3/8					●
	020	DN 20 - G 3/4				●	●
	025	DN 25 - G 1					●
3.	**Process connection**						
	G	female thread					
4.	**Body material**						
	A	aluminium	●	●	●	●	
	K ❍	stainless steel			●	●	
5.	**Ranges**						
	002	0.02.. 2 l/min				●	
	006	0.10.. 6 l/min			●		
	050	0.50.. 50 l/min		●			
	150	3.00..150 l/min	●				
6.	**Connection for**						
	E	electronics	●	●	●	●	
7.	**For base device**						
	008	VHZ-008G....E				●	
	010	VHZ-010G....E			●		
	020	VHZ(O)-020G....E		●			
	025	VHZ-025G....E	●				
8.	**Analog output**						
	I	current output 4..20 mA					
	U	voltage output 0..10 V					

9.	**Functioning of the switching output**	
	L	minimum-switch
	H	maximum-switch
	R	frequency output
10.	**Switching signal**	
	O	standard output
	I	inverted output

Options

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

Switch-on delay (from Alarm to OK) s

Switch-off-delay (from OK to Alarm) s

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 fields are not completed, the standard setting is selected automatically.

Accessories

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

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

- **Volumetric flow measurement**
- **Almost no effect from differing viscosities**
- **0..10 V, 4..20 mA , frequency/pulse output, completely configurable**
- **Robust construction**
- **Compact design**

Characteristics

The VHZ gearwheel flow meter measures the flow by a volumetric principle, in which a pair of gearwheels is moved proportional to the flow rate. The movement of the gearwheels is measured through the enclosing housing wall by a sensor. The devices are suitable for viscous, fluid, self-lubricating media, as well as for aqueous fluids such as soaps, pasts, emulsions etc. which have a non-abrasive character. Because of the volumetric functioning principle, the devices are almost completely independent of viscosity.

The LABO electronics make various output signals available:

- Analog signal 0/4..20 mA (LABO-VHZ-...I)
- Analog signal 0/2..10 V (LABO-VHZ-...U)
- Frequency signal (LABO-VHZ-...F) or
- A value signal Pulse / x Litres (LABO-VHZ-...C)

A model with switching output is also available.

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

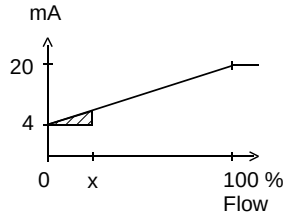
Technical data

Sensor	gearwheel volumeter	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1	
Metering ranges	0.02..150 l/min for details, see table "Ranges"	
Measurement accuracy	±3 % of the measured value in the specified metering range (measured at 20 mm²/s)	
Repeatability	±0.3 %	
Medium temperature	-25..+80 °C optionally -25..+120 °C	
Ambient temperature	-20..+70 °C	
Pressure resistance	see table "Pressure resistance and weight"	
Pressure loss	see upstream page "Function and benefits - volumetric, gearwheel"	
Materials medium-contact	see table "Materials"	
Materials, non-medium-contact	Sensor tube	CW614N nickelled
	Adhesive	Epoxy resin
	Flange bolts	stainless steel
Supply voltage	10..30 V DC at voltage output 10 V: 15..30 V DC	
Power consumption	< 1 W (for no-load outputs)	
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 LED indicates operating voltage (LABO-VHZ-I / U) or output status (LABO-VHZ-F / C) (rapid flashing = Programming)	
Electrical connection	for round plug connector M12x1, 4-pole	
Ingress protection	IP 67	
Weight	see table "Connection, pressure resistance, and weight"	
Conformity	CE	

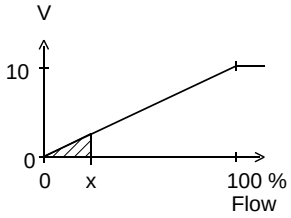
Signal output curves

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

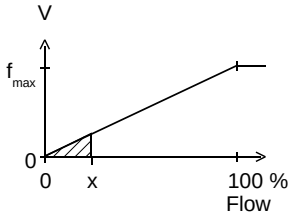
Current output



Voltage output



Frequency output



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

Other characters on request.

Pressure resistance and weight

G	Types	PN bar	Housing material	Weight kg
G 1/4	LABO-VHZ-008GA	200	Aluminium	0.5
G 1/4	LABO-VHZ-008GK	160	Stainless steel	1.5
G 3/8	LABO-VHZ-010GA	200	Aluminium	0.5
G 3/8	LABO-VHZ-010GK	200	Stainless steel	1.5
G 3/4	LABO-VHZ-020GA	200	Aluminium	1.6
G 3/4	LABO-VHZO-020GA	100	Aluminium / glass	1.6
G 1	LABO-VHZ-025GA	100	Aluminium	6.3

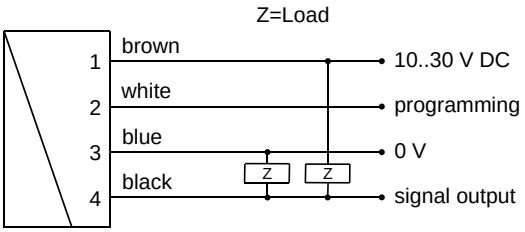
Ranges

Metering range l/min	Types	Pulse volume (= resolution) cm³
0.02.. 2	LABO-VHZ-008	0.04
0.10.. 6	LABO-VHZ-010	0.20
0.50.. 50	LABO-VHZ(O)-020	2.00
3.00.. 150	LABO-VHZ-025	5.22

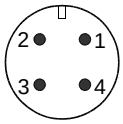
Materials

	LABO-VHZ-008..025GA	LABO-VHZ-008GK	LABO-VHZ-010..025GK
Housing	Al anodised	stainless steel 1.4404	stainless steel 1.4404
gearwheel and Axis	stainless steel 1.4462	stainless steel 1.4462	stainless steel 1.4462
Bearing	iglidur X	stainless steel 1.4037 / 1.4016 /PVD-coated	iglidur X
Seal	FKM	FKM	FKM
Sight glass	glass (only with VHZO)		

Wiring



Connection example: PNP NPN



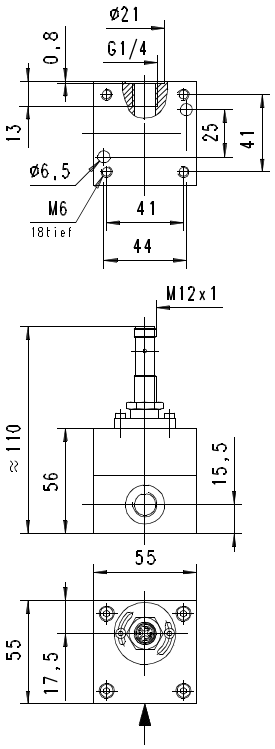
Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.

It is recommended to use shielded wiring.

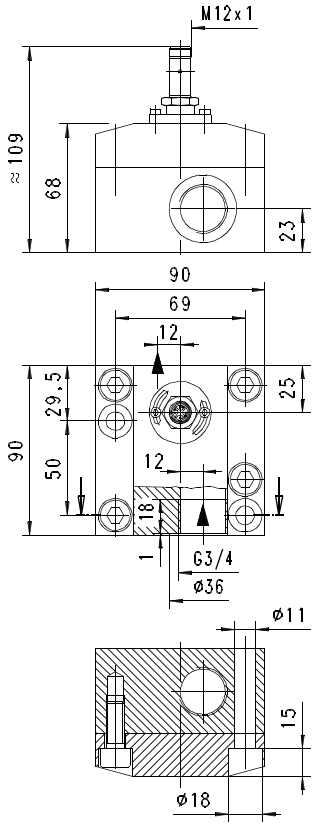
The push-pull output) of the frequency or pulse output version can as desired be switched as a PNP or an NPN output.

Dimensions

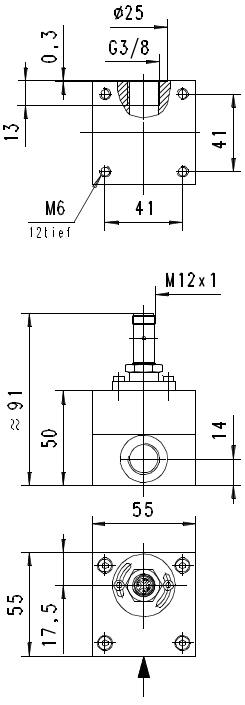
LABO-VHZ-008



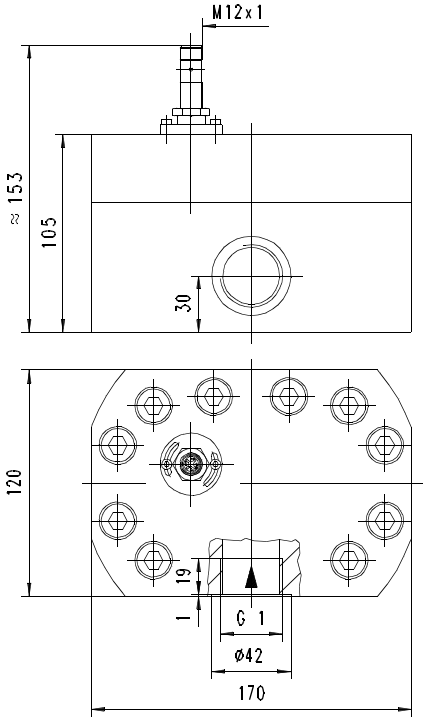
LABO-VHZ-020



LABO-VHZ-010



LABO-VHZ-025



Handling and operation

Installation

The VHZ flow measurement device can be installed anywhere in the pipework system. A run-in section is not required. The direction of flow may be freely chosen.

It should be ensured that no dirt particles (thread cutting swarf) can get into the flow space, as this could cause the blockage of the gearwheels. It may therefore be necessary to install filters upstream of the flow measurement device (mesh size 30 µm).

Note

The metering range 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).

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 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 %.

There are many more parameters which can be programmed by the ECI-1 device configurator if necessary.

Ordering code

The base device is ordered, e.g. VHZ-008GA002E with electronics, e.g. OMNI-VHZ-008IPLO

	1.	2.	3.	4.	5.	6.
VHZ-			**G**			**E**

	7.	8.	9.	10.	11.
LABO-VHZ-				**S**	

❍=Option

1.	**Sight glass**						
	-	no sight glass					
	O-	with sight glass					
2.	**Nominal width**						
	008	DN 8 - G 1/4					●
	010	DN 10 - G 3/8					●
	020	DN 20 - G 3/4				●	●
	025	DN 25 - G 1					●
3.	**Process connection**						
	G	female thread					
4.	**Body material**						
	A	aluminium	●	●	●	●	
	K ❍	stainless steel			●	●	
5.	**Ranges**						
	002	0.02.. 2 l/min				●	
	006	0.10.. 6 l/min			●		
	050	0.50.. 50 l/min		●			
	150	3.00..150 l/min	●				
6.	**Connection for**						
	E	electronics	●	●	●	●	
7.	**For base device**						
	008	VHZ-008G..E				●	
	010	VHZ-010G..E			●		
	020	VHZ(O)-020G..E		●			
	025	VHZ-025G..E	●				
8.	**Signal output**						
	I	current output 4..20 mA					
	U	voltage output 0..10 V					
	F	frequency output					
	C	pulse output					
9.	**Programming**						
	N	cannot be programmed (no teaching)					
	P ❍	programmable (teaching possible)					
10.	**Electrical connection**						
	S	for round plug connector M12x1, 4-pole					
11.	**Option**						
	H ❍	medium temperature max. 120 °C (with 300 mm cable)					

Required ordering information

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

For LABO-VHZ-...C:
The volume must be specified for the pulse output version (with numerical value and unit) which will correspond to one pulse.

Volume per pulse (numerical value) ☐☐☐☐

Volume per pulse (unit) ☐☐☐☐

Options

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 activated or set to defined values)

Further options available on request.

Accessories

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

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

- **Volumetric flow measurement**
- **Almost no effect from differing viscosities**
- **0..10 V, 4..20 mA , frequency/pulse output, completely configurable**
- **Robust construction**
- **Compact design**

Characteristics

The VHZ gearwheel flow meter measures the flow by a volumetric principle, in which a pair of gearwheels is moved proportional to the flow rate. The movement of the gearwheels is measured through the enclosing housing wall by a sensor. The devices are suitable for viscous, fluid, self-lubricating media, as well as for aqueous fluids such as soaps, pasts, emulsions etc. which have a non-abrasive character. Because of the volumetric functioning principle, the devices are almost completely independent of viscosity.

The LABO electronics make various output signals available:

- Analog signal 0/4..20 mA (LABO-VHZ-...I)
- Analog signal 0/2..10 V (LABO-VHZ-...U)
- Frequency signal (LABO-VHZ-...F) or
- A value signal Pulse / x Litres (LABO-VHZ-...C)

A model with switching output is also available.

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

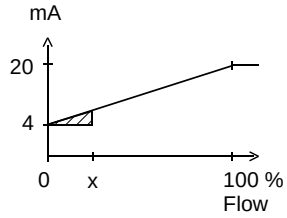
Technical data

Sensor	gearwheel volumeter	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1	
Metering ranges	0.02..150 l/min for details, see table "Ranges"	
Measurement accuracy	±3 % of the measured value in the specified metering range (measured at 20 mm²/s)	
Repeatability	±0.3 %	
Medium temperature	-25..+80 °C optionally -25..+120 °C	
Ambient temperature	-20..+70 °C	
Pressure resistance	see table "Pressure resistance and weight"	
Pressure loss	see upstream page "Function and benefits - volumetric, gearwheel"	
Materials medium-contact	see table "Materials"	
Materials, non-medium-contact	Sensor tube	CW614N nickelled
	Adhesive	Epoxy resin
	Flange bolts	stainless steel
Supply voltage	10..30 V DC at voltage output 10 V: 15..30 V DC	
Power consumption	< 1 W (for no-load outputs)	
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 LED indicates operating voltage (LABO-VHZ-I / U) or output status (LABO-VHZ-F / C) (rapid flashing = Programming)	
Electrical connection	for round plug connector M12x1, 4-pole	
Ingress protection	IP 67	
Weight	see table "Connection, pressure resistance, and weight"	
Conformity	CE	

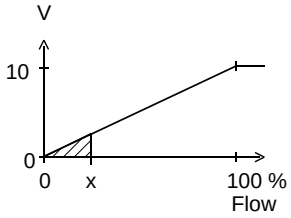
Signal output curves

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

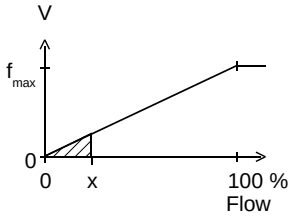
Current output



Voltage output



Frequency output



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

Other characters on request.

Pressure resistance and weight

G	Types	PN bar	Housing material	Weight kg
G 1/4	LABO-VHZ-008GA	200	Aluminium	0.5
G 1/4	LABO-VHZ-008GK	160	Stainless steel	1.5
G 3/8	LABO-VHZ-010GA	200	Aluminium	0.5
G 3/8	LABO-VHZ-010GK	200	Stainless steel	1.5
G 3/4	LABO-VHZ-020GA	200	Aluminium	1.6
G 3/4	LABO-VHZO-020GA	100	Aluminium / glass	1.6
G 1	LABO-VHZ-025GA	100	Aluminium	6.3

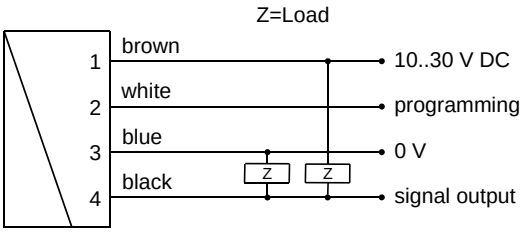
Ranges

Metering range l/min	Types	Pulse volume (= resolution) cm³
0.02.. 2	LABO-VHZ-008	0.04
0.10.. 6	LABO-VHZ-010	0.20
0.50.. 50	LABO-VHZ(O)-020	2.00
3.00.. 150	LABO-VHZ-025	5.22

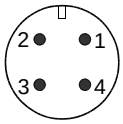
Materials

	LABO-VHZ-008..025GA	LABO-VHZ-008GK	LABO-VHZ-010..025GK
Housing	Al anodised	stainless steel 1.4404	stainless steel 1.4404
gearwheel and Axis	stainless steel 1.4462	stainless steel 1.4462	stainless steel 1.4462
Bearing	iglidur X	stainless steel 1.4037 / 1.4016 /PVD-coated	iglidur X
Seal	FKM	FKM	FKM
Sight glass	glass (only with VHZO)		

Wiring



Connection example: PNP NPN



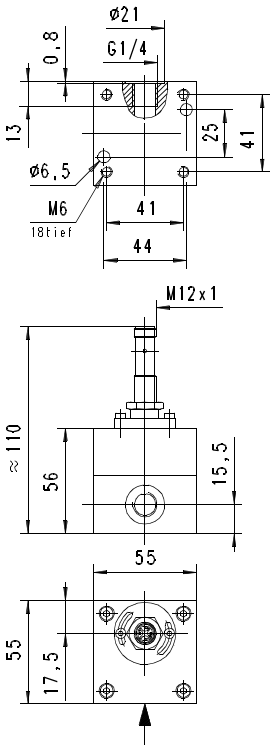
Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.

It is recommended to use shielded wiring.

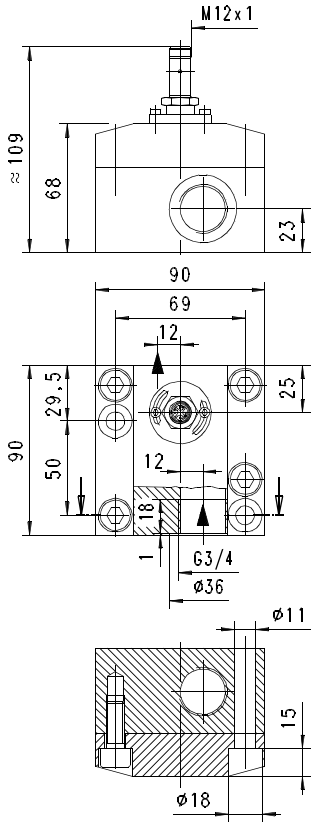
The push-pull output) of the frequency or pulse output version can as desired be switched as a PNP or an NPN output.

Dimensions

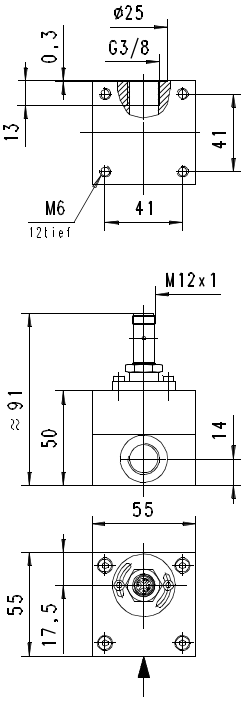
LABO-VHZ-008



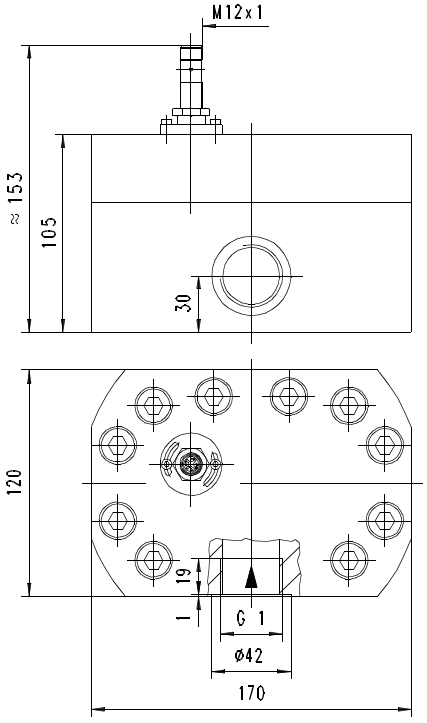
LABO-VHZ-020



LABO-VHZ-010



LABO-VHZ-025



Handling and operation

Installation

The VHZ flow measurement device can be installed anywhere in the pipework system. A run-in section is not required. The direction of flow may be freely chosen.

It should be ensured that no dirt particles (thread cutting swarf) can get into the flow space, as this could cause the blockage of the gearwheels. It may therefore be necessary to install filters upstream of the flow measurement device (mesh size 30 µm).

Note

The metering range 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).

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 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 %.

There are many more parameters which can be programmed by the ECI-1 device configurator if necessary.

Ordering code

The base device is ordered, e.g. VHZ-008GA002E with electronics, e.g. OMNI-VHZ-008IPLO

	1.	2.	3.	4.	5.	6.
VHZ-			**G**			**E**

	7.	8.	9.	10.	11.
LABO-VHZ-				**S**	

❍=Option

1.	**Sight glass**						
	-	no sight glass					
	O-	with sight glass					
2.	**Nominal width**						
	008	DN 8 - G 1/4					●
	010	DN 10 - G 3/8					●
	020	DN 20 - G 3/4				●	●
	025	DN 25 - G 1					●
3.	**Process connection**						
	G	female thread					
4.	**Body material**						
	A	aluminium	●	●	●	●	
	K ❍	stainless steel			●	●	
5.	**Ranges**						
	002	0.02.. 2 l/min				●	
	006	0.10.. 6 l/min			●		
	050	0.50.. 50 l/min		●			
	150	3.00..150 l/min	●				
6.	**Connection for**						
	E	electronics	●	●	●	●	
7.	**For base device**						
	008	VHZ-008G..E				●	
	010	VHZ-010G..E			●		
	020	VHZ(O)-020G..E		●			
	025	VHZ-025G..E	●				
8.	**Signal output**						
	I	current output 4..20 mA					
	U	voltage output 0..10 V					
	F	frequency output					
	C	pulse output					
9.	**Programming**						
	N	cannot be programmed (no teaching)					
	P ❍	programmable (teaching possible)					
10.	**Electrical connection**						
	S	for round plug connector M12x1, 4-pole					
11.	**Option**						
	H ❍	medium temperature max. 120 °C (with 300 mm cable)					

Required ordering information

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

For LABO-VHZ-...C:
The volume must be specified for the pulse output version (with numerical value and unit) which will correspond to one pulse.

Volume per pulse (numerical value) ☐☐☐☐

Volume per pulse (unit) ☐☐☐☐

Options

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 activated or set to defined values)

Further options available on request.

Accessories

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

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

- **Volumetric flow measurement**
- **Almost no effect from differing viscosities**
- **0..10 V, 4..20 mA , frequency/pulse output, completely configurable**
- **Robust construction**
- **Compact design**

Characteristics

The VHZ gearwheel flow meter measures the flow by a volumetric principle, in which a pair of gearwheels is moved proportional to the flow rate. The movement of the gearwheels is measured through the enclosing housing wall by a sensor. The devices are suitable for viscous, fluid, self-lubricating media, as well as for aqueous fluids such as soaps, pasts, emulsions etc. which have a non-abrasive character. Because of the volumetric functioning principle, the devices are almost completely independent of viscosity.

The LABO electronics make various output signals available:

- Analog signal 0/4..20 mA (LABO-VHZ-...I)
- Analog signal 0/2..10 V (LABO-VHZ-...U)
- Frequency signal (LABO-VHZ-...F) or
- A value signal Pulse / x Litres (LABO-VHZ-...C)

A model with switching output is also available.

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

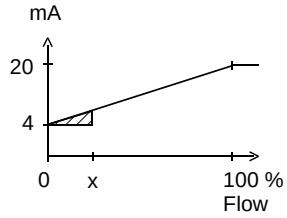
Technical data

Sensor	gearwheel volumeter	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1	
Metering ranges	0.02..150 l/min for details, see table "Ranges"	
Measurement accuracy	±3 % of the measured value in the specified metering range (measured at 20 mm²/s)	
Repeatability	±0.3 %	
Medium temperature	-25..+80 °C optionally -25..+120 °C	
Ambient temperature	-20..+70 °C	
Pressure resistance	see table "Pressure resistance and weight"	
Pressure loss	see upstream page "Function and benefits - volumetric, gearwheel"	
Materials medium-contact	see table "Materials"	
Materials, non-medium-contact	Sensor tube	CW614N nickelled
	Adhesive	Epoxy resin
	Flange bolts	stainless steel
Supply voltage	10..30 V DC at voltage output 10 V: 15..30 V DC	
Power consumption	< 1 W (for no-load outputs)	
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 LED indicates operating voltage (LABO-VHZ-I / U) or output status (LABO-VHZ-F / C) (rapid flashing = Programming)	
Electrical connection	for round plug connector M12x1, 4-pole	
Ingress protection	IP 67	
Weight	see table "Connection, pressure resistance, and weight"	
Conformity	CE	

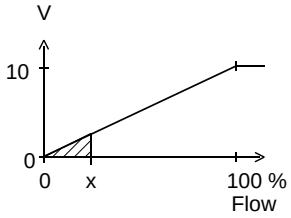
Signal output curves

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

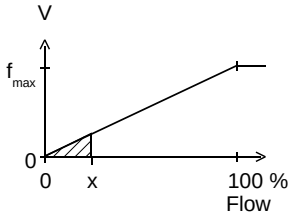
Current output



Voltage output



Frequency output



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

Other characters on request.

Pressure resistance and weight

G	Types	PN bar	Housing material	Weight kg
G 1/4	LABO-VHZ-008GA	200	Aluminium	0.5
G 1/4	LABO-VHZ-008GK	160	Stainless steel	1.5
G 3/8	LABO-VHZ-010GA	200	Aluminium	0.5
G 3/8	LABO-VHZ-010GK	200	Stainless steel	1.5
G 3/4	LABO-VHZ-020GA	200	Aluminium	1.6
G 3/4	LABO-VHZO-020GA	100	Aluminium / glass	1.6
G 1	LABO-VHZ-025GA	100	Aluminium	6.3

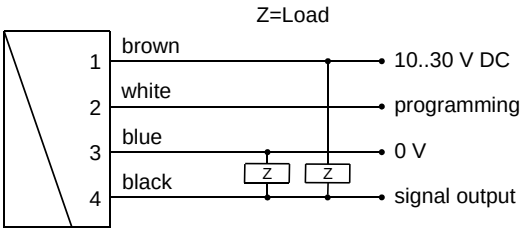
Ranges

Metering range l/min	Types	Pulse volume (= resolution) cm³
0.02.. 2	LABO-VHZ-008	0.04
0.10.. 6	LABO-VHZ-010	0.20
0.50.. 50	LABO-VHZ(O)-020	2.00
3.00.. 150	LABO-VHZ-025	5.22

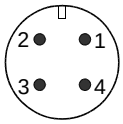
Materials

	LABO-VHZ-008..025GA	LABO-VHZ-008GK	LABO-VHZ-010..025GK
Housing	Al anodised	stainless steel 1.4404	stainless steel 1.4404
gearwheel and Axis	stainless steel 1.4462	stainless steel 1.4462	stainless steel 1.4462
Bearing	iglidur X	stainless steel 1.4037 / 1.4016 /PVD-coated	iglidur X
Seal	FKM	FKM	FKM
Sight glass	glass (only with VHZO)		

Wiring



Connection example: PNP NPN



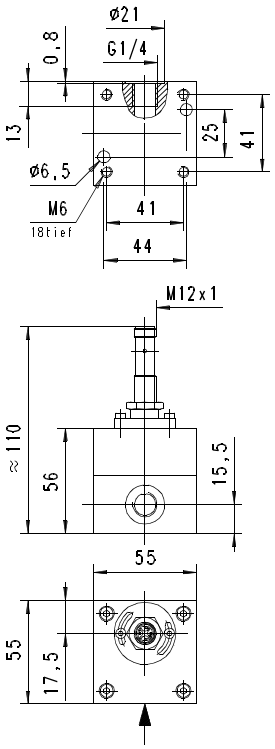
Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.

It is recommended to use shielded wiring.

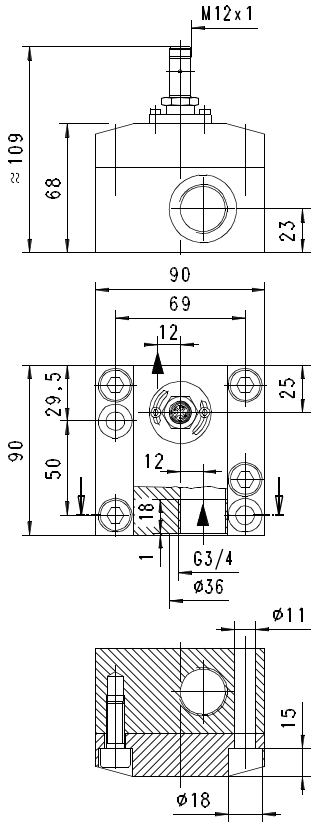
The push-pull output) of the frequency or pulse output version can as desired be switched as a PNP or an NPN output.

Dimensions

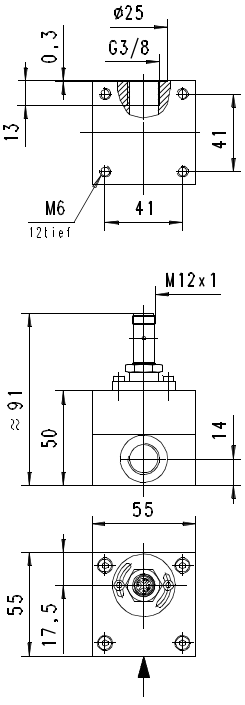
LABO-VHZ-008



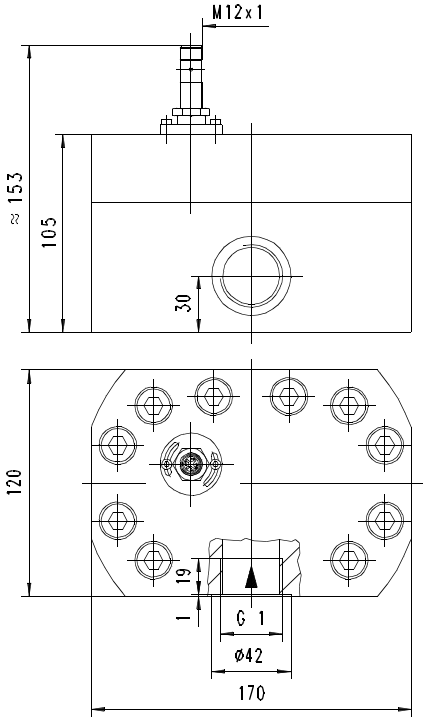
LABO-VHZ-020



LABO-VHZ-010



LABO-VHZ-025



Handling and operation

Installation

The VHZ flow measurement device can be installed anywhere in the pipework system. A run-in section is not required. The direction of flow may be freely chosen.

It should be ensured that no dirt particles (thread cutting swarf) can get into the flow space, as this could cause the blockage of the gearwheels. It may therefore be necessary to install filters upstream of the flow measurement device (mesh size 30 µm).

Note

The metering range 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).

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 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 %.

There are many more parameters which can be programmed by the ECI-1 device configurator if necessary.

Ordering code

The base device is ordered, e.g. VHZ-008GA002E with electronics, e.g. OMNI-VHZ-008IPLO

	1.	2.	3.	4.	5.	6.
VHZ-			**G**			**E**

	7.	8.	9.	10.	11.
LABO-VHZ-				**S**	

❍=Option

1.	**Sight glass**						
	-	no sight glass					
	O-	with sight glass					
2.	**Nominal width**						
	008	DN 8 - G 1/4					●
	010	DN 10 - G 3/8					●
	020	DN 20 - G 3/4				●	●
	025	DN 25 - G 1					●
3.	**Process connection**						
	G	female thread					
4.	**Body material**						
	A	aluminium	●	●	●	●	
	K ❍	stainless steel			●	●	
5.	**Ranges**						
	002	0.02.. 2 l/min				●	
	006	0.10.. 6 l/min			●		
	050	0.50.. 50 l/min		●			
	150	3.00..150 l/min	●				
6.	**Connection for**						
	E	electronics	●	●	●	●	
7.	**For base device**						
	008	VHZ-008G..E				●	
	010	VHZ-010G..E			●		
	020	VHZ(O)-020G..E		●			
	025	VHZ-025G..E	●				
8.	**Signal output**						
	I	current output 4..20 mA					
	U	voltage output 0..10 V					
	F	frequency output					
	C	pulse output					
9.	**Programming**						
	N	cannot be programmed (no teaching)					
	P ❍	programmable (teaching possible)					
10.	**Electrical connection**						
	S	for round plug connector M12x1, 4-pole					
11.	**Option**						
	H ❍	medium temperature max. 120 °C (with 300 mm cable)					

Required ordering information

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

For LABO-VHZ-...C:
The volume must be specified for the pulse output version (with numerical value and unit) which will correspond to one pulse.

Volume per pulse (numerical value) ☐☐☐☐

Volume per pulse (unit) ☐☐☐☐

Options

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 activated or set to defined values)

Further options available on request.

Accessories

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

Flow Switch LABO-VHZ-S

- **Volumetric flow switching**
- **Almost no effect from differing viscosities**
- **Versatile, configurable switching output in push-pull design**
- **Robust construction**
- **Compact design**

Characteristics

The VHZ gearwheel flow meter measures the flow by a volumetric principle, in which a pair of gearwheels is moved proportional to the flow rate. The movement of the gearwheels is measured through the enclosing housing wall by a sensor. The devices are suitable for viscous, fluid, self-lubricating media, as well as for aqueous fluids such as soaps, pasts, emulsions etc. which have a non-abrasive character. Because of the volumetric functioning principle, the devices are almost completely independent of viscosity.

The LABO electronics fitted to the device 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.

If desired, the switching value can be set to the currently existing flow using "teaching". Models with analog or pulse output are also available (see separate data sheets).

Technical data

Sensor	gearwheel volumeter	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1	
Switching ranges	0.02..150 l/min for details, see table "Ranges"	
Measurement accuracy	±3 % of the measured value in the specified metering range (measured at 20 mm²/s)	
Repeatability	±0,3 %	
Medium temperature	-25..+80 °C optionally -25..+120 °C	
Ambient temperature	-20..+70 °C	
Pressure resistance	see table "Pressure resistance and weight"	
Pressure loss	see upstream page "Function and benefits - volumetric, gearwheel"	
Materials medium-contact	see table "Materials"	
Materials, non-medium-contact	Sensor tube Adhesive Flange bolts	CW614N nickelled Epoxy resin stainless steel
Supply voltage	10..30 V DC	
Power consumption	< 1 W (for no-load output)	
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 "Pressure resistance and weight"	
Conformity	CE	

Pressure resistance and weight

G	Types	PN bar	Housing material	Weight kg
G $^1/_4$	LABO-VHZ-008GA	200	Aluminium	0.5
G $^1/_4$	LABO-VHZ-008GK	160	stainless steel	1.5
G $^3/_8$	LABO-VHZ-010GA	200	Aluminium	0.5
G $^3/_8$	LABO-VHZ-010GK	200	stainless steel	1.5
G $^3/_4$	LABO-VHZ-020GA	200	Aluminium	1.6
G $^3/_4$	LABO-VHZO-020GA	100	Aluminium / glass	1.6
G 1	LABO-VHZ-025GA	100	Aluminium	6.3

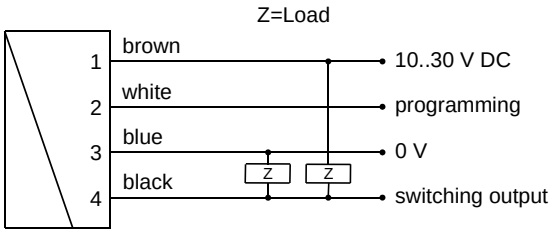
Ranges

Metering range l/min	Types	Pulse volume (= resolution) cm³
0.02.. 2	LABO-VHZ-008	0.04
0.10.. 6	LABO-VHZ-010	0.20
0.50.. 50	LABO-VHZ(O)-020	2.00
3.00.. 50	LABO-VHZ-025	5.22

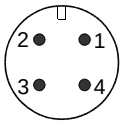
Materials

	LABO-VHZ-008..025GA	LABO-VHZ-008GK	LABO-VHZ-010..025GK
Housing	Al anodised	stainless steel 1.4404	stainless steel 1.4404
gearwheel and Axis	stainless steel 1.4462	stainless steel 1.4462	stainless steel 1.4462
Bearing	Iglidur X	stainless steel 1.4037 / 1.4016 /PVD-coated	Iglidur X
Seal	FKM	FKM	FKM
Sight glass	glass (only with VHZO)		

Wiring



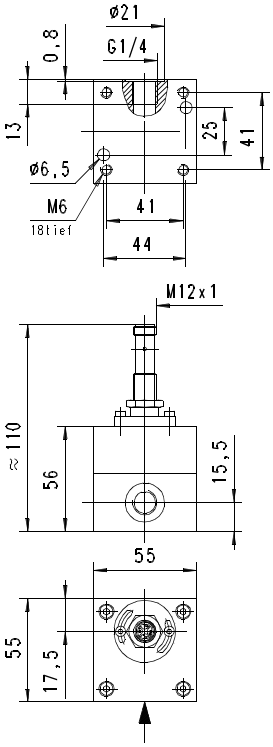
Connection example: PNP NPN



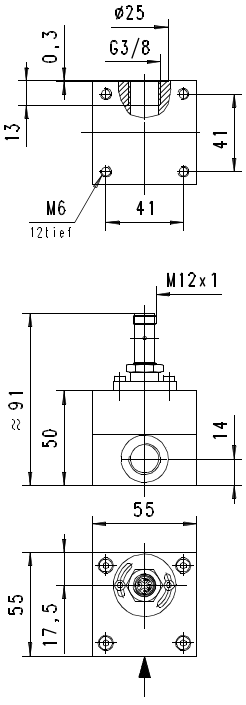
Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.
It is recommended to use shielded wiring.

Dimensions

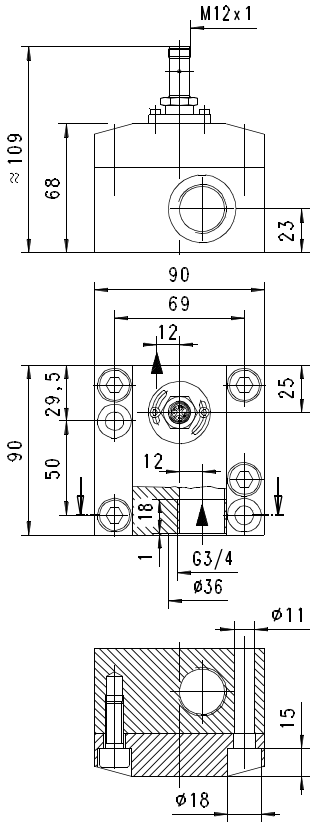
LABO-VHZ-008



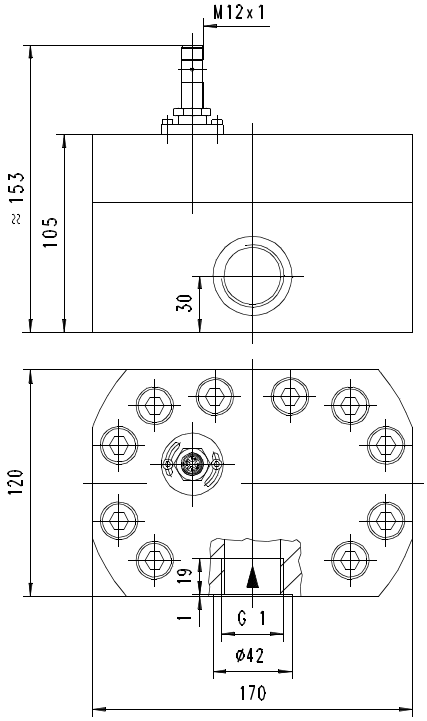
LABO-VHZ-010



LABO-VHZ-020



LABO-VHZ-025



Handling and operation

Installation

The VHZ flow measurement device can be installed anywhere in the pipework system. A run-in section is not required. The direction of flow may be freely chosen.

It should be ensured that no dirt particles (thread cutting swarf) can get into the flow space, as this could cause the blockage of the gearwheels. It may therefore be necessary to install filters upstream of the flow measurement device (mesh size 30 µm).

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:

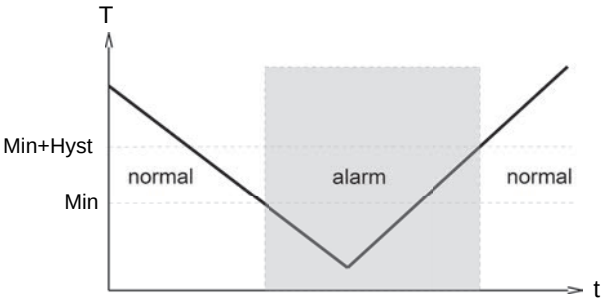
- Apply the flow rate to be set to the device.
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the supply voltage or a pulse from the PLC), in order to accept the measured value.
- When the teaching is complete, pin 2 should be connected to 0 V, so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

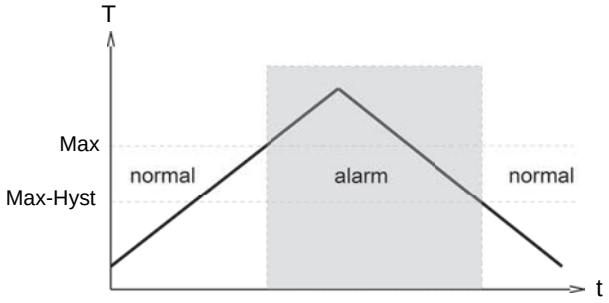
Example: The switching value should be set to 80 l/min. However, it is possible only to reach 60 l/min without problems. In this case, the device would be set using a teach-offset of +20 l/min. At a flow rate of 60 l/min in the process, teaching would then store a value of 80 l/min.

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

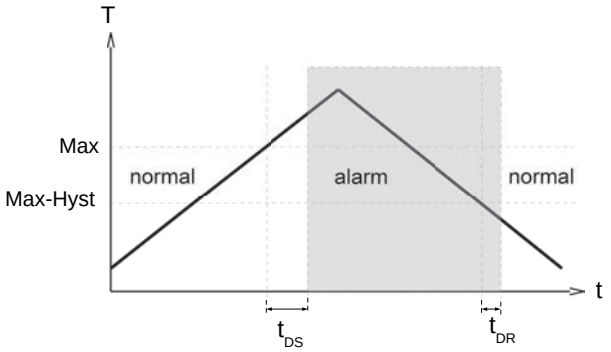
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



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.

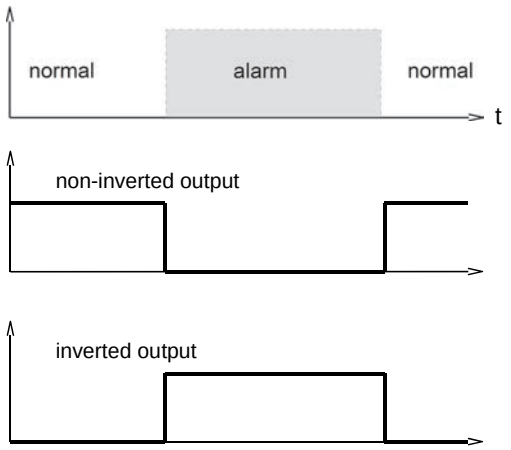


A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can



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

The base device is ordered, e.g. VHZ-008GA002E with electronics, e.g. OMNI-VHZ-008IPLO

	1.	2.	3.	4.	5.	6.
VHZ-			G			E

	7.	8.	9.	10.	11.	12.	13.
LABO-VHZ-		S				S	

❍=Option

1.	**Sight glass**						
	-	no sight glass					
	O-	with sight glass					
2.	**Nominal width**						
	008	DN 8 - G 1/4					●
	010	DN 10 - G 3/8					●
	020	DN 20 - G 3/4				●	●
	025	DN 25 - G 1					●
3.	**Process connection**						
	G	female thread					
4.	**Body material**						
	A	aluminium	●	●	●	●	
	K ❍	stainless steel			●	●	
5.	**Ranges**						
	002	0.02.. 2 l/min					●
	006	0.10.. 6 l/min			●		
	050	0.50.. 50 l/min		●			
	150	3.00..150 l/min	●				
6.	**Connection for**						
	E	electronics	●	●	●	●	
7.	**For base device**						
	008	VHZ-008G....E					●
	010	VHZ-010G....E			●		
	020	VHZ(O)-020G....E		●			
	025	VHZ-025G....E	●				
8.	**Switching output (Limit switch)**						
	S	push-pull (compatible with PNP and NPN)					
9.	**Programming**						
	N	cannot be programmed (no teaching)					
	P ❍	programmable (teaching possible)					
10.	**Switching function**						
	L	minimum-switch					
	H	maximum-switch					
11.	**Switching signal**						
	O	standard					
	I ❍	inverted					
12.	**Electrical connection**						
	S	for round plug connector M12x1, 4-pole					
13.	**Option**						
	H ❍	medium temperature max. 120 °C (with 300 mm cable)					

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 outputs are 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.

Accessories

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

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

- **Volumetric flow measurement**
- **Almost no effect from differing viscosities**
- **0..10 V, 4..20 mA , frequency/pulse output, completely configurable**
- **Robust construction**
- **Compact design**

Characteristics

The VHZ gearwheel flow meter measures the flow by a volumetric principle, in which a pair of gearwheels is moved proportional to the flow rate. The movement of the gearwheels is measured through the enclosing housing wall by a sensor. The devices are suitable for viscous, fluid, self-lubricating media, as well as for aqueous fluids such as soaps, pasts, emulsions etc. which have a non-abrasive character. Because of the volumetric functioning principle, the devices are almost completely independent of viscosity.

The LABO electronics make various output signals available:

- Analog signal 0/4..20 mA (LABO-VHZ-...I)
- Analog signal 0/2..10 V (LABO-VHZ-...U)
- Frequency signal (LABO-VHZ-...F) or
- A value signal Pulse / x Litres (LABO-VHZ-...C)

A model with switching output is also available.

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

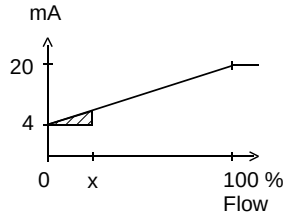
Technical data

Sensor	gearwheel volumeter	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1	
Metering ranges	0.02..150 l/min for details, see table "Ranges"	
Measurement accuracy	±3 % of the measured value in the specified metering range (measured at 20 mm²/s)	
Repeatability	±0.3 %	
Medium temperature	-25..+80 °C optionally -25..+120 °C	
Ambient temperature	-20..+70 °C	
Pressure resistance	see table "Pressure resistance and weight"	
Pressure loss	see upstream page "Function and benefits - volumetric, gearwheel"	
Materials medium-contact	see table "Materials"	
Materials, non-medium-contact	Sensor tube	CW614N nickelled
	Adhesive	Epoxy resin
	Flange bolts	stainless steel
Supply voltage	10..30 V DC at voltage output 10 V: 15..30 V DC	
Power consumption	< 1 W (for no-load outputs)	
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 LED indicates operating voltage (LABO-VHZ-I / U) or output status (LABO-VHZ-F / C) (rapid flashing = Programming)	
Electrical connection	for round plug connector M12x1, 4-pole	
Ingress protection	IP 67	
Weight	see table "Connection, pressure resistance, and weight"	
Conformity	CE	

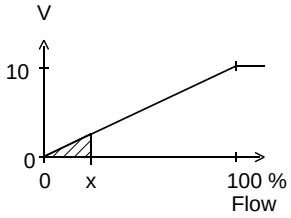
Signal output curves

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

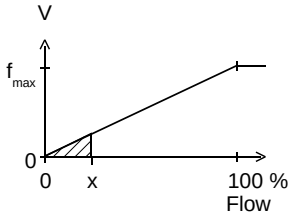
Current output



Voltage output



Frequency output



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

Other characters on request.

Pressure resistance and weight

G	Types	PN bar	Housing material	Weight kg
G 1/4	LABO-VHZ-008GA	200	Aluminium	0.5
G 1/4	LABO-VHZ-008GK	160	Stainless steel	1.5
G 3/8	LABO-VHZ-010GA	200	Aluminium	0.5
G 3/8	LABO-VHZ-010GK	200	Stainless steel	1.5
G 3/4	LABO-VHZ-020GA	200	Aluminium	1.6
G 3/4	LABO-VHZO-020GA	100	Aluminium / glass	1.6
G 1	LABO-VHZ-025GA	100	Aluminium	6.3

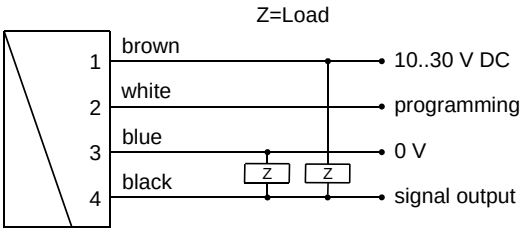
Ranges

Metering range l/min	Types	Pulse volume (= resolution) cm³
0.02.. 2	LABO-VHZ-008	0.04
0.10.. 6	LABO-VHZ-010	0.20
0.50.. 50	LABO-VHZ(O)-020	2.00
3.00.. 150	LABO-VHZ-025	5.22

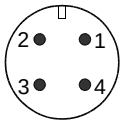
Materials

	LABO-VHZ-008..025GA	LABO-VHZ-008GK	LABO-VHZ-010..025GK
Housing	Al anodised	stainless steel 1.4404	stainless steel 1.4404
gearwheel and Axis	stainless steel 1.4462	stainless steel 1.4462	stainless steel 1.4462
Bearing	iglidur X	stainless steel 1.4037 / 1.4016 /PVD-coated	iglidur X
Seal	FKM	FKM	FKM
Sight glass	glass (only with VHZO)		

Wiring



Connection example: PNP NPN



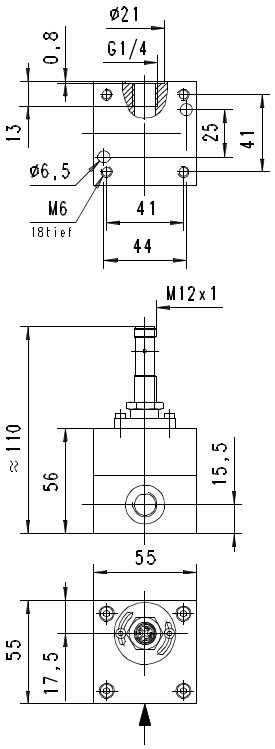
Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.

It is recommended to use shielded wiring.

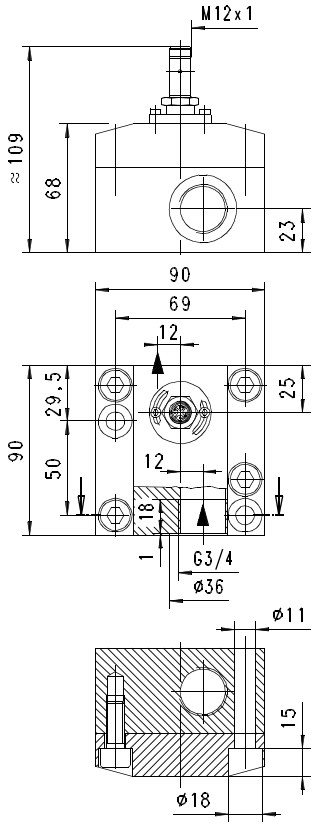
The push-pull output) of the frequency or pulse output version can as desired be switched as a PNP or an NPN output.

Dimensions

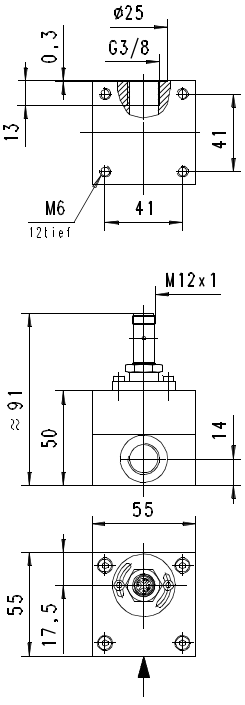
LABO-VHZ-008



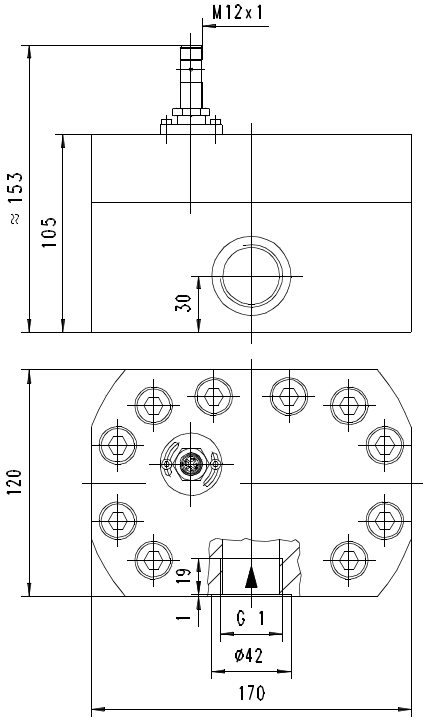
LABO-VHZ-020



LABO-VHZ-010



LABO-VHZ-025



Handling and operation

Installation

The VHZ flow measurement device can be installed anywhere in the pipework system. A run-in section is not required. The direction of flow may be freely chosen.

It should be ensured that no dirt particles (thread cutting swarf) can get into the flow space, as this could cause the blockage of the gearwheels. It may therefore be necessary to install filters upstream of the flow measurement device (mesh size 30 µm).

Note

The metering range 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).

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 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 %.

There are many more parameters which can be programmed by the ECI-1 device configurator if necessary.

Ordering code

The base device is ordered, e.g. VHZ-008GA002E with electronics, e.g. OMNI-VHZ-008IPLO

	1.	2.	3.	4.	5.	6.
VHZ-			**G**			**E**

	7.	8.	9.	10.	11.
LABO-VHZ-				**S**	

❍=Option

1.	**Sight glass**						
	-	no sight glass					
	O-	with sight glass					
2.	**Nominal width**						
	008	DN 8 - G 1/4					●
	010	DN 10 - G 3/8					●
	020	DN 20 - G 3/4				●	●
	025	DN 25 - G 1					●
3.	**Process connection**						
	G	female thread					
4.	**Body material**						
	A	aluminium	●	●	●	●	
	K ❍	stainless steel			●	●	
5.	**Ranges**						
	002	0.02.. 2 l/min				●	
	006	0.10.. 6 l/min			●		
	050	0.50.. 50 l/min		●			
	150	3.00..150 l/min	●				
6.	**Connection for**						
	E	electronics	●	●	●	●	
7.	**For base device**						
	008	VHZ-008G..E				●	
	010	VHZ-010G..E			●		
	020	VHZ(O)-020G..E		●			
	025	VHZ-025G..E	●				
8.	**Signal output**						
	I	current output 4..20 mA					
	U	voltage output 0..10 V					
	F	frequency output					
	C	pulse output					
9.	**Programming**						
	N	cannot be programmed (no teaching)					
	P ❍	programmable (teaching possible)					
10.	**Electrical connection**						
	S	for round plug connector M12x1, 4-pole					
11.	**Option**						
	H ❍	medium temperature max. 120 °C (with 300 mm cable)					

Required ordering information

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

For LABO-VHZ-...C:
The volume must be specified for the pulse output version (with numerical value and unit) which will correspond to one pulse.

Volume per pulse (numerical value) ☐☐☐☐

Volume per pulse (unit) ☐☐☐☐

Options

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 activated or set to defined values)

Further options available on request.

Accessories

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

Flow Transmitter / Switch OMNI-VHZ

- **Flow sensor using the gearwheel principle**
- **Suitable for viscous media (oils, emulsions)**
- **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**
- **Modifiable units in the display**
- **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 VHZ gearwheel flow meter measures the flow by a volumetric principle, in which a pair of gearwheels is moved proportional to the flow rate. The movement of the gearwheels is measured through the enclosing housing wall by a sensor. The devices are suitable for viscous, fluid, self-lubricating media, as well as for aqueous fluids such as soaps, pasts, emulsions etc. which have a non-abrasive character. Because of the volumetric functioning principle, the devices are almost completely independent of viscosity.

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 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

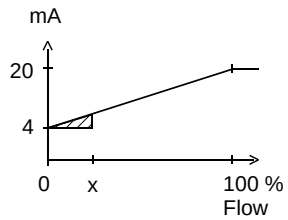
Sensor	gearwheel volumeter	
Nominal width	DN 8..25	
Process connection	G $^1/_4$..G 1	
Metering ranges	0.02..150 l/min for details, see table "Ranges"	
Measurement accuracy	±3 % of the measured value in the specified metering range (measured at 20 mm²/s)	
Repeatability	±0.3 %	
Medium temperature	-25..+80 °C optionally -25..+120 °C	
Ambient temperature	-20..+70 °C	
Pressure resistance	see table "Pressure resistance and weight"	
Pressure loss	see upstream page "Function and benefits - volumetric, gearwheel"	
Materials medium-contact	see table "Materials"	
Materials non-medium-contact	Electronic housing	stainless steel 1.4305
	Glass	mineral glass, hardened
	Magnet	Samarium-Cobalt
	Ring	POM
	Adapter	CW614N nickelled
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 "Pressure resistance and weight"
Conformity	CE

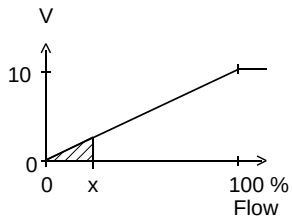
Signal output curves

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

Current output



Voltage output



Other characters on request.

Pressure resistance and weight

G	Types	PN bar	Housing material	Weight kg
G 1/4	OMNI-VHZ-008GA	200	Aluminium	0.7
G 1/4	OMNI-VHZ-008GK	160	Stainless steel	1.7
G 3/8	OMNI-VHZ-010GA	200	Aluminium	0.7
G 3/8	OMNI-VHZ-010GK	200	Stainless steel	1.7
G 3/4	OMNI-VHZ-020GA	200	Aluminium	1.8
G 3/4	OMNI-VHZO-020GA	100	Aluminium / glass	1.8
G 1	OMNI-VHZ-025GA	100	Aluminium	6.7

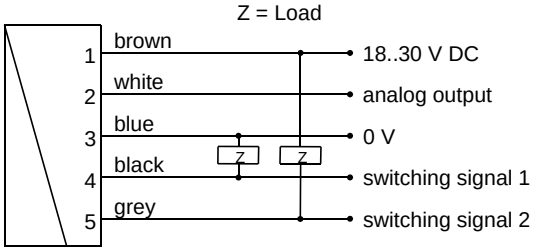
Ranges

Metering range l/min	Types	Pulse volume (= resolution) cm³
0.02.. 2	OMNI-VHZ-008	0.04
0.10.. 6	OMNI-VHZ-010	0.20
0.50.. 50	OMNI-VHZ(O)-020	2.00
3.00.. 150	OMNI-VHZ-025	5.22

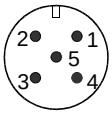
Materials

	OMNI-VHZ-008..025GA	OMNI-VHZ-008GK	OMNI-VHZ-010..025GK
Housing	Al anodised	stainless steel 1.4404	stainless steel 1.4404
gearwheel and Axis	stainless steel 1.4462	stainless steel 1.4462	stainless steel 1.4462
Bearing	Iglidur X	stainless steel 1.4037 / 1.4016 / PVD-coated	Iglidur X
Seal	FKM	FKM	FKM
Sight glass	Glass (only with VHZO)		

Wiring



Connection example:PNP NPN



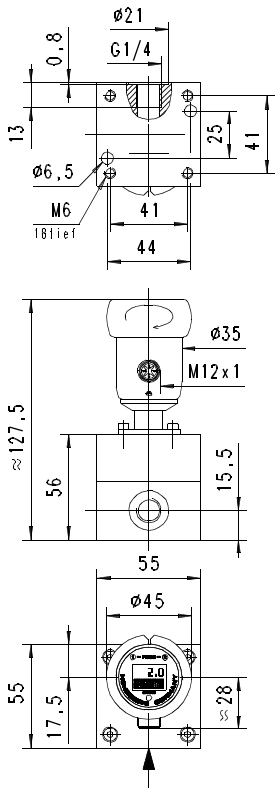
connector M12x1

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

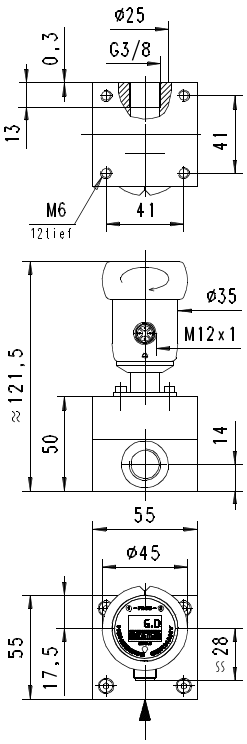
Before the electrical installation, it must be ensured that the supply voltage complies with the data sheet.
The use of shielded cabling is recommended.

Dimensions

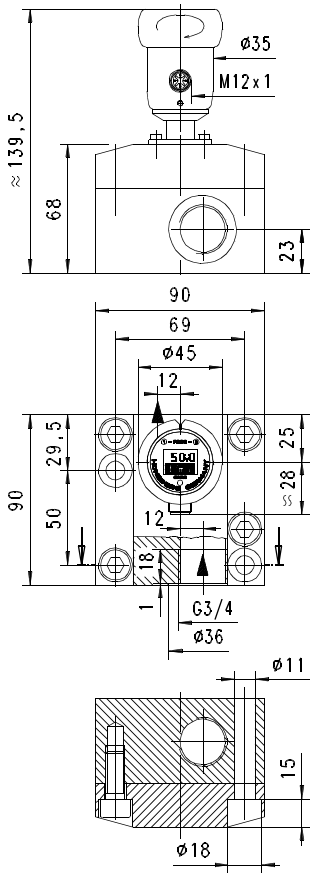
OMNI-VHZ008



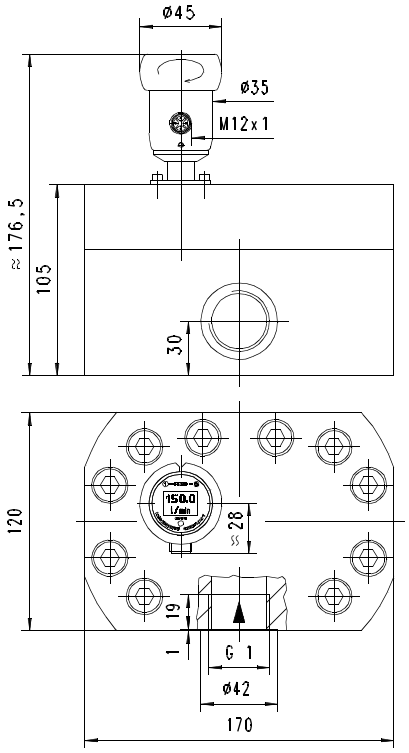
OMNI-VHZ010



OMNI-VHZ-020



OMNI-VHZ-025



Gooseneck option

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

Handling and operation

Installation

The VHZ flow measurement device can be installed anywhere in the pipework system. A run-in section is not required. The direction of flow may be freely chosen.

It should be ensured that no dirt particles (thread cutting swarf) can get into the flow space, as this could cause the blockage of the gearwheels. It may therefore be necessary to install filters upstream of the flow measurement device (mesh size 30 µm).

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)

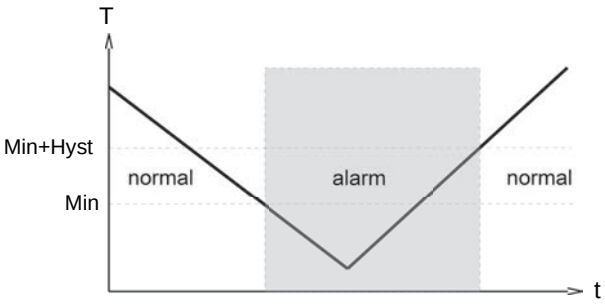
For models with a voltage output, replace 20 mA accordingly with 10 V.

Edit, using position 2

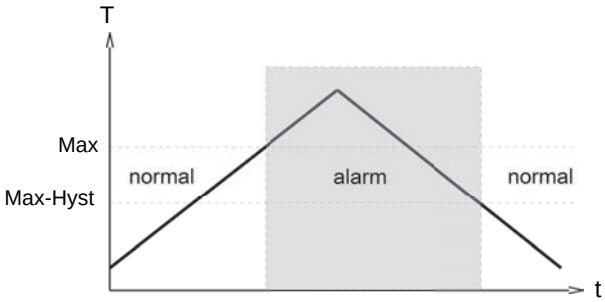
If the currently visible parameter is to be modified:

- 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 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.**

Ordering code

The base device is ordered, e.g. VHZ-008GA002E with electronics, e.g. OMNI-VHZ-008ILO

	1.	2.	3.	4.	5.	6.
VHZ-			**G**			**E**

	7.	8.	9.	10.	11.
OMNI-VHZ-			**S**		

❍=Option

			008	010	020	025	002	006	050	150	008	010	020	025	I	U	K
1.	**Sight glass**																
	-	no sight glass															
	O-	with sight glass															
2.	**Nominal width**																
	008	DN 8 - G 1/4	●	●	●	●											
	010	DN 10 - G 3/8					●	●	●	●							
	020	DN 20 - G 3/4									●	●	●	●			
	025	DN 25 - G 1													●	●	●
3.	**Process connection**																
	G	female thread	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
4.	**Body material**																
	A	aluminium	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	K ❍	stainless steel			●	●	●	●	●	●	●	●	●	●	●	●	●
5.	**Ranges**																
	002	0.02.. 2 l/min				●	●										
	006	0.10.. 6 l/min			●			●									
	050	0.50.. 50 l/min		●					●				●				
	150	3.00..150 l/min	●							●				●			
6.	**Connection for**																
	E	electronics	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
7.	**For base device**																
	008	VHZ-008G....E				●	●				●				●	●	●
	010	VHZ-010G....E			●			●				●			●	●	●
	020	VHZ(O)-020G....E		●					●				●		●	●	●
	025	VHZ-025G....E	●							●				●	●	●	●
8.	**Analog output**																
	I	current output 4..20 mA	●	●	●	●	●	●	●	●	●	●	●	●			
	U ❍	voltage output 0..10 V	●	●	●	●	●	●	●	●	●	●	●	●			
	K	without															
9.	**Electrical connection**																
	S	for round plug connector M12x1, 5-pole	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
10.	**Option**																
	H ❍	gooseneck	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	O ❍	tropical model Oil-filled version for heavy duty or external use	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
11.	**Option 2**																
	C ❍	Counter C	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	C1 ❍	Counter C1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

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

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

Flow Transmitter VHZ

- **Ideally suited for viscous media (oils)**
- **Light and compact construction in an aluminium housing**
- **For cost-sensitive applications**

Characteristics

The VHZ gearwheel flow meter measures the flow by a volumetric principle, in which a pair of gearwheels is moved proportional to the flow rate. The movement of the gearwheels is measured through the enclosing housing wall by a sensor. The devices are suitable for viscous, fluid, self-lubricating media, as well as for aqueous fluids such as soaps, pasts, emulsions etc. which have a non-abrasive character. Because of the volumetric functioning principle, the devices are almost completely independent of viscosity.

A push-pull transistor output, an A / B output or a two wire output are available as signal output.
The push-pull output can as desired be connected as a PNP or an NPN output, and emits a frequency proportional to the flow rate.
The A / B output consists of two push-pull outputs, whose signals are phase-shifted by 90 °. This makes it possible to determine the direction of flow using the bidirectionally driven sensor. The 2 wire model represents the pulse as two different currents, and has the advantage of reduced wiring effort.

Alternatively, it is possible to use add-on electronics with signal processing, in the series OMNI, FLEX and LABO.

Technical data

Sensor		gearwheel volumeter
Nominal width		DN 8..25
Process connection		female thread G $^1/_4$..G 1
Metering ranges		0.02..150 l/min for details, see table "Ranges"
Measurement accuracy		±3 % of the measured value in the specified metering range (measured at 20 mm²/s)
Repeatability		±0,3 %
Medium temperature		-25..+80 °C (optionally -25..+120 °C 2-wire model DN 10-25)
Ambient temperature		-20..+70 °C
Pressure resistance		see table "Pressure resistance and Weight"
Pressure loss		see upstream page "Function and benefits - volumetric, gearwheel"
Materials medium-contact		see table "Materials"
3 wire or A / B-output	**Supply voltage**	10..30 V DC
	Current consump-tion	approx. 20 mA without load
	Signal output	transistor output "push-pull" (resistant to short circuits and polarity reversal) I_{out} = 100 mA max.
2 wire	**Supply voltage**	4.5..24 V DC
	Signal output	Low: 7 mA High: 14 mA
	Reversed polarity protected	yes
Electrical connection		optional plug DIN 43650-A / ISO 4400 or for round plug connector M12x1, 4-pole
Ingress protection		IP 65
Weight		see table "Pressure resistance and weight"
Conformity		CE

Pressure resistance and weight

G	Types	PN bar	Housing material	Weight kg
G $^1/_4$	VHZ-008GA	200	Aluminium	0.5
G $^1/_4$	VHZ-008GK	160	Stainless steel	1.5
G $^3/_8$	VHZ-010GA	200	Aluminium	0.5
G $^3/_8$	VHZ-010GK	200	Stainless steel	1.5
G $^3/_4$	VHZ-020GA	200	Aluminium	1.6
G $^3/_4$	VHZO-020GA	100	Aluminium / glass	1.6
G 1	VHZ-025GA	100	Aluminium	6.3

Ranges

Metering range l/min	Types	Pulse volume cm³	Frequency Hz at $Q_{max.}$
0.02.. 2	VHZ-008	0.04	833
0.10.. 6	VHZ-010	0.20	500
0.50.. 50	VHZ(O)-020	2.00	417
3.00.. 150	VHZ-025	5.22	479

Materials

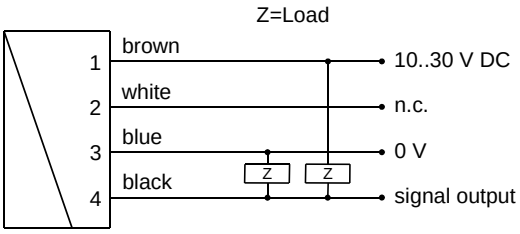
	VHZ-008..025GA	VHZ-008GK	VHZ-010..025GK
Housing	Al anodised	stainless steel 1.4404	stainless steel 1.4404
gearwheel and Axis	stainless steel 1.4462	stainless steel 1.4462	stainless steel 1.4462
Bearing	Iglidur X	stainless steel 1.4037 / 1.4016 /P VD-coated	Iglidur X
Seal	FKM	FKM	FKM
Sight glass	Glass (only with VHZO)		

Wiring

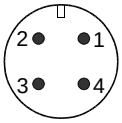
Before the electrical installation, it must be ensured that the supply voltage complies with the data sheet.
The use of shielded cabling is recommended.

Push-pull output

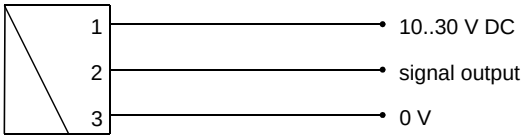
with round plug connector M12x1

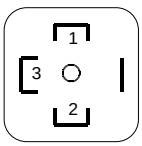


Connection example: PNP NPN



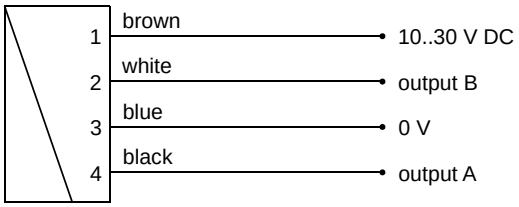
with plug as per DIN 43650-A / ISO 4400

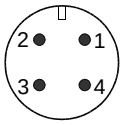




A / B output

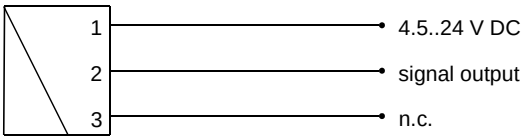
only with 4-pole round plug connector

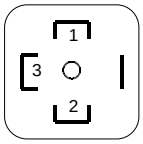




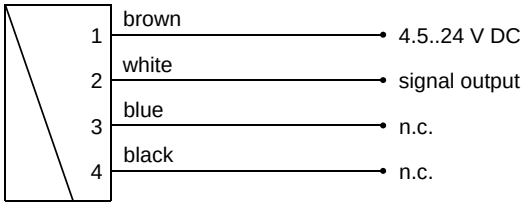
2 wire model

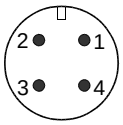
with plug as per DIN 43650-A / ISO 4400





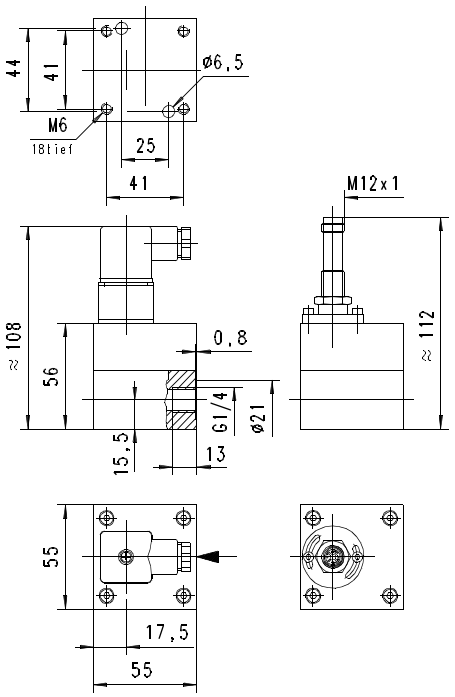
with round plug connector M12x1



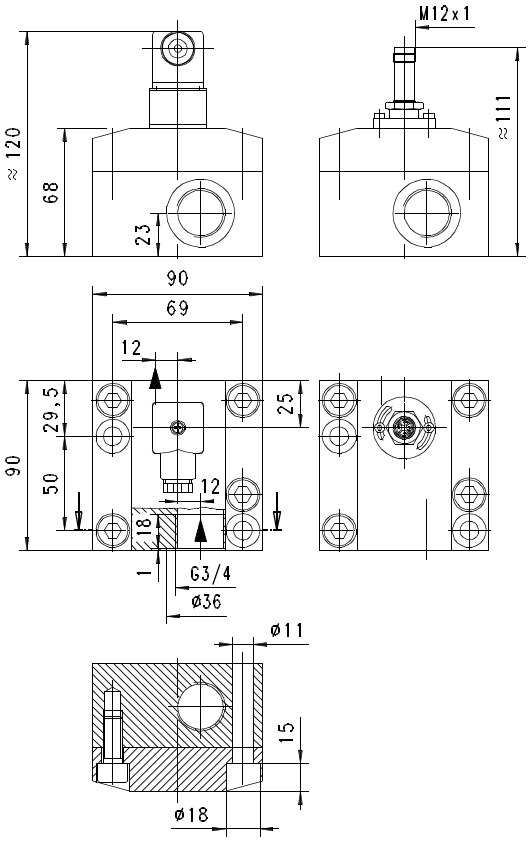


Dimensions

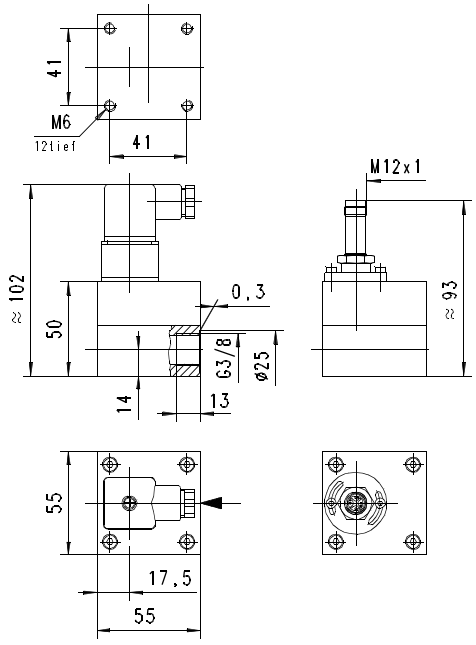
VHZ-008



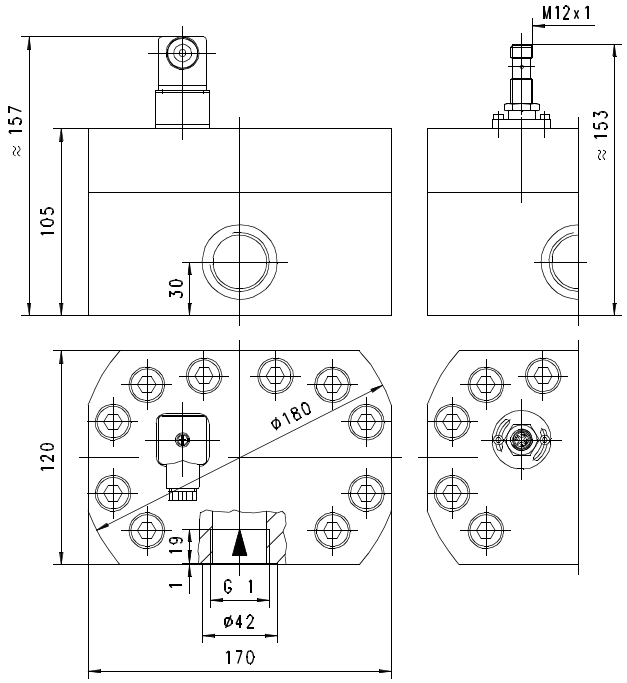
VHZ-020



VHZ-010



VHZ-025



Handling and Operation

Installation

The VHZ flow measurement device can be installed anywhere in the pipework system. A run-in section is not required. The direction of flow may be freely chosen. It should be ensured that no dirt particles (thread cutting swarf!) can get into the flow space, as this could cause the blockage of the gearwheels. It may therefore be necessary to install filters upstream of the flow measurement device (mesh size 30 µm).

Ordering code

	1.	2.	3.	4.	5.	6.	7.
VHZ-			G				

❍=Option

1.	**Sight glass**						
	-	no sight glass					
	O-	with sight glass					
2.	**Nominal width**						
	008	DN 8 - G 1/4					●
	010	DN 10 - G 3/8					●
	020	DN 20 - G 3/4				●	●
	025	DN 25 - G 1					●
3.	**Process connection**						
	G	female thread					
4.	**Body material**						
	A	aluminium	●	●	●	●	
	K ❍	stainless steel			●	●	
5.	**Ranges**						
	002	0.02.. 2 l/min				●	
	006	0.10.. 6 l/min			●		
	050	0.50.. 50 l/min		●			
	150	3.00..150 l/min	●				
6.	**Signal output**						
	M	push-pull transistor output					
	A ❍	A / B output (2 x push-pull)					
	Z ❍	2 wire					
7.	**Electrical connection**						
	B	plug DIN 43650A / ISO 4400					
	S ❍	for round plug connector M12x1, 4-pole					

Attention: The A / B output requires the use of a 4-pole round plug connector!

Options

- Highest temperature 120 °C

Accessories

- Cable/round plug connector (KB...) see additional information “Accessories”
- Remote flow display OMNI-TA
- Totaliser OMNI-C-TA
- Universal panel mount counter EEZ-904