

FLEX-HD1K, FLEX-HD2K, FLEX-HR1MV, FLEX-HR2E, FLEX-HR2VE

Датчики протока поршневого типа

GHM MESSTECHNIK



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Flow Meter / Monitor FLEX-HD1K



- 4..20 mA or 0..10 V output signal
- 1 x programmable switch or frequency output
- Programmable switching value, full scale, or zero point via magnet clip
- Programming protection by removal of the clip
- Polished metal housing
- Rotatable electronic head for alignment of the 90° cable outlet
- LED for switching value display

Characteristics

The sensors work with a 16-bit processor, a 12-bit A/D and a 12-bit D/A converter. Linearisations and calibrations are carried out automatically. The Flash memory guarantees the exchangeability of all programs.

There is a choice between a switch with transistor output (push-pull) or a frequency output. The analog output 4..20 mA or 0..10 V can be used at the same time. Many options are available for the switching outputs.

- variable ranges for the analog outputs
- variable hystereses
- Minimum or maximum switch
- Inversion of the outputs
- Window function
- Delay after switching voltage on
- Switching delays (On, Off)

Technical data

Sensor	analog hall sensor	
Nominal width	DN 8..25	
Process connection	female thread G 1/4..G 1 (further process connections available on request)	
Metering range	0.1..80 l/min	for details see table "Ranges"
Pressure loss	0.4..1.6 bar at Q_{max}	
Q_{max}	to 100 l/min	
Tolerance	± 3 % of full scale value	
Pressure resistance	PN 200 bar optionally PN 500 bar	
Media temperature	-20..+85 °C optionally -20..+150 °C	

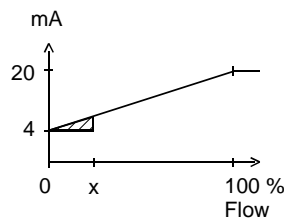
Ambient temperature	-20..+70 °C	
Media	water, oils (gases and aggressive media available on request)	
Wiring	see section "Wiring"	
Supply voltage	18..30 V DC	
Power consumption	<1 W	
Analog output	4..20 mA / load 500 Ω max. or 0..10 V / load min. 1 k Ω	
Switching output	transistor output "push-pull", (resistant to short circuits, and reversal polarity protected) $I_{out} = 100$ mA max.	
Display (only with switching output)	yellow LED (On = OK / Off = Alarm)	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 4-pole	
Materials medium-contact	<i>Brass construction:</i> CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	<i>Stainless steel construction:</i> 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	CW614N, PPS	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the metering and switching range.	

Signal output curves

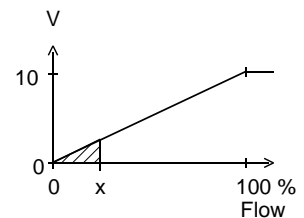
Value x = Begin of the specified range

= not specified range

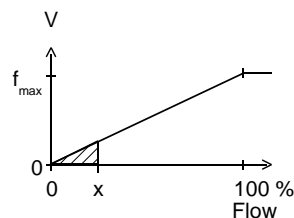
Current output



Voltage output



Frequency output



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

Other characters on request.

Product Information

Sensors and Instrumentation

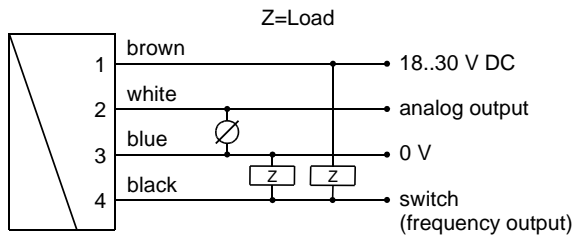
Ranges

Details in the table correspond to horizontal inwards flow with increasing flow rate.

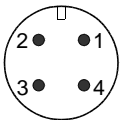
Metering range l/min H ₂ O	Q _{max.} recommended	Pressure loss bar at Q _{max.} H ₂ O
0.1 - 1	6	0.4
0.5 - 5	10	0.5
1.0 - 10	20	0.6
2.0 - 20	30	0.4
3.0 - 30	40	
4.0 - 40	60	0.8
6.0 - 60	80	1.4
20.0 - 80	100	1.6

Special ranges are available.

Wiring

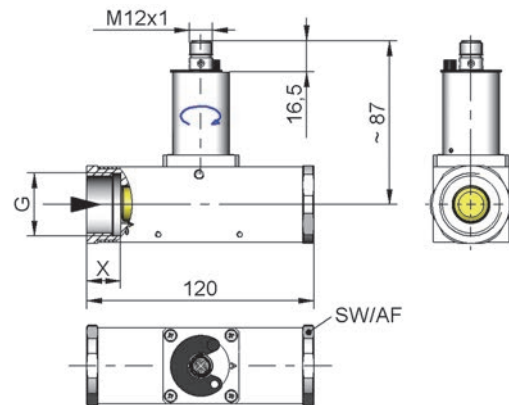


Connection example: PNP NPN



Dimensions and weights

	G	Types	SW	X	Weight kg
Brass	G 1/4	...-008GM	40	15	1.5
	G 3/8	...-010GM			
	G 1/2	...-015GM		18	1.4
	G 3/4	...-020GM			
	G 1	...-025GM			
Stainless steel	G 1/4	...-008GK	41	15	1.5
	G 3/8	...-010GK			
	G 1/2	...-015GK		18	1.4
	G 3/4	...-020GK			
	G 1	...-025GK			



Handling and operation

Note

- Include straight calming section of 5 x DN in inlet and outlet
- Include a filter if the media are dirty (use magnetic filter for ferritic components)

The electronics housing is permanently connected to the primary sensor. There is no electrical connection between the electronics and the piston device. After installation, the electronic head can be turned to align the cable outlet.

It should be noted that the piston device and the FLEX electronics are appropriately matched to each other.

Product Information

Sensors and Instrumentation

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.

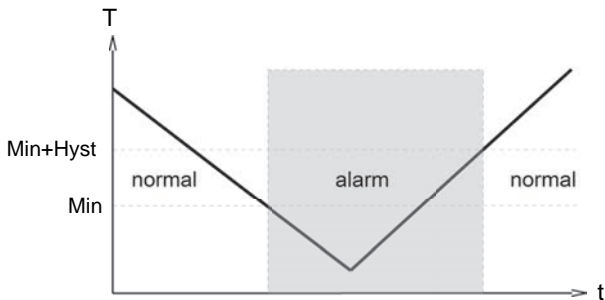
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

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".

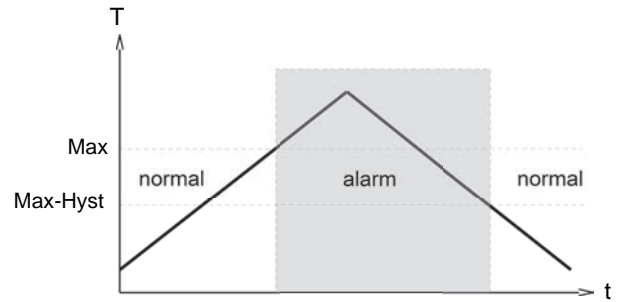
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

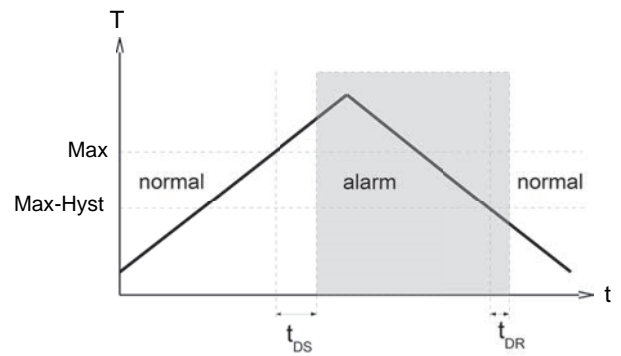
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



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.

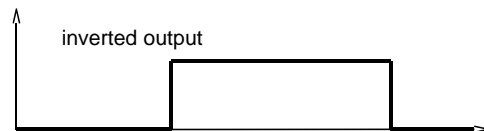
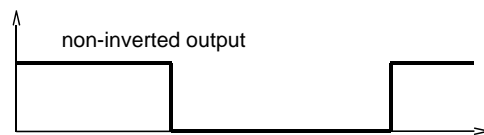


A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



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.

Product Information

Sensors and Instrumentation

Ordering code

The base device e.g. HD1K-015GM005E is ordered with electronics e.g. FLEX-HD1KIULO

HD1K - 1. 2. **G** 3. 4. 5. **E**

FLEX-HD1K 6. 7. 8. 9. **O**

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
K	stainless steel
4. Metering range H₂O for horizontal Inwards flow	
001	0.1 - 1 l/min
005	0.5 - 5 l/min
010	1.0 - 10 l/min
020	2.0 - 20 l/min
030	3.0 - 30 l/min
040	4.0 - 40 l/min
060	6.0 - 60 l/min
080	20.0 - 80 l/min
5. Connection for	
E	electronics
6. Analog output	
I	current output 4..20 mA
U	voltage output 0..10 V
K	no analog output
7. Switching output	
T	push-pull (compatible with PNP and NPN)
K	no switching output
8. Function set to switching output	
L	minimum-switch
H	maximum-switch
R	frequency output
K	no switching output
9. Switching output level	
O	standard
I	inverted

Options for FLEX

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

Special range for frequency output: l/min
 <= Metering range (Standard=Metering range)

End frequency (max. 2000 Hz) Hz
Power-on delay s
 (from Alarm to OK)

Power-off delay s
 (from OK to Alarm)

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

- Measured values for oil or gas
- Special quantities
- Temperature display 0..120 °C
- reinforced piston

Accessories

- Cable/round plug connector (KB...) see additional information "Accessories"

Ordering information

- Specify direction of flow, medium, and metering range.
- For viscous media specify viscosity, temperature, and medium (e.g. ISO VG 68) (enquire about metering range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request metering range)

Combinations with FLEX

FLEX-converter / counter can be combined with very different types of pickup systems for flow rate, level, temperature, and pressure. This has created a family of sensors with which different types of applications can be supported.



Flow Meter / Monitor FLEX-HD2K



- viscosity stabilized
- 4..20 mA or 0..10 V output signal
- 1 x programmable switch or frequency output
- Programmable switching value, full scale, or zero point via magnet clip
- Programming protection by removal of the clip
- Polished metal housing
- Rotatable electronic head for alignment of the 90° cable outlet
- LED for switching value display

Characteristics

The sensors work with a 16-bit processor, a 12-bit A/D and a 12-bit D/A converter. Linearisations and calibrations are carried out automatically. The Flash memory guarantees the exchangeability of all programs.

There is a choice between a switch with transistor output (push-pull) or a frequency output. The analog output 4..20 mA or 0..10 V can be used at the same time. Many options are available for the switching outputs.

- variable ranges for the analog outputs
- variable hystereses
- Minimum or maximum switch
- Inversion of the outputs
- Window function
- Delay after switching voltage on
- Switching delays (On, Off)

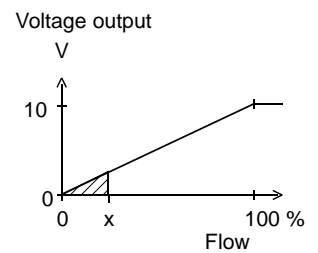
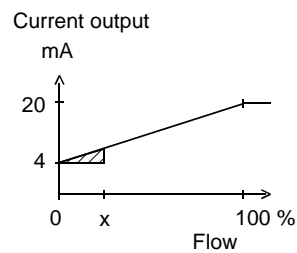
Technical data

Sensor	analog hall sensor	
Nominal width	DN 8..25	
Process connection	female thread G 1/4..G 1 (further process connections available on request)	
Metering range	0,5..60 l/min	for details see table "Ranges"
Pressure loss	1,1..3,5 bar bei Q_{max} .	
Q_{max}	to 80 l/min	
Tolerance	$\pm 3\%$ of full scale value	
Media temperature	PN 200 bar optionally PN 500 bar	

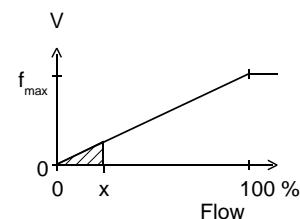
Media temperature	-20..+85 °C optionally -20..+150 °C	
Ambient temperature	-20..+70 °C	
Media	oils	
Wiring	see section "Wiring"	
Supply voltage	18..30 V DC	
Power consumption	<1 W	
Analog output	4..20 mA / load 500 Ω max. or 0..10 V / load min. 1 k Ω	
Switching output	transistor output "push-pull", (resistant to short circuits, and reversal polarity protected) $I_{out} = 100$ mA max.	
Display (only with switching output)	yellow LED (On = OK / Off = Alarm)	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 4-pole	
Materials medium-contact	<i>Brass construction:</i> CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	<i>Stainless steel construction:</i> 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	CW614N, PPS	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the metering and switching range.	

Signal output curves

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



Frequency output



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

Other characters on request.

Product Information

Sensors and Instrumentation

Ranges

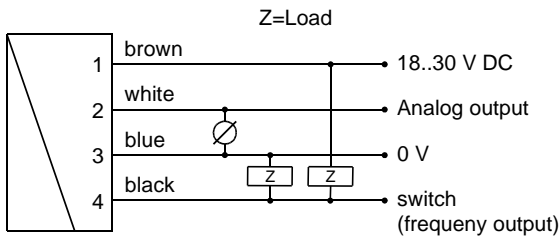
Details in the table correspond to horizontal inwards flow with increasing flow rate.

Viscosity compensated type FLEX-HD2K

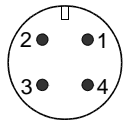
Metering range l/min oil 30..330 mm ² /s	Q _{max.} recommended	Pressure loss bar at Q _{max.} Oil mm ² /s				Viscosity stability ±8 %, min.
		60	100	205	330	
0.5 - 8	12	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 15	22	2.3	2.4			±0.5 l/min
2.5 - 25	35	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 40	60				2.6	±2.7 l/min
12.0 - 60	80	2.3	2.4	2.6	2.8	±3.0 l/min

Special ranges are available.

Wiring

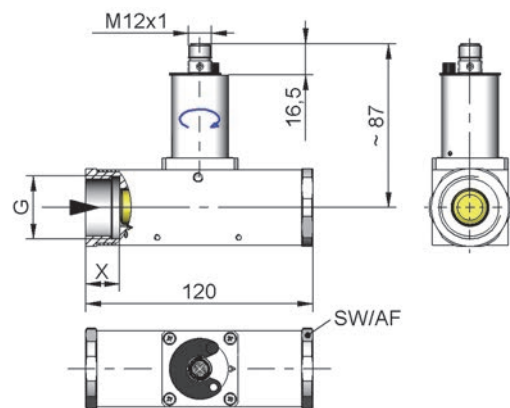


Connection example: PNP NPN



Dimensions and weights

	G	Types	SW	X	Weight kg
Brass	G 1/4	...-008GM	40	15	1.5
	G 3/8	...-010GM			
	G 1/2	...-015GM		18	1.4
	G 3/4	...-020GM			
	G 1	...-025GM			1.3
Stainless steel	G 1/4	...-008GK	41	15	1.5
	G 3/8	...-010GK			
	G 1/2	...-015GK		18	1.4
	G 3/4	...-020GK			
	G 1	...-025GK			



Handling and operation

Note

- Include straight calming section of 5 x DN in inlet and outlet
- Include a filter if the media are dirty (use magnetic filter for ferritic components)

The electronics housing is permanently connected to the primary sensor. There is no electrical connection between the electronics and the piston device. After installation, the electronic head can be turned to align the cable outlet. It should be noted that the piston device and the FLEX electronics are appropriately matched to each other.

Product Information

Sensors and Instrumentation

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.

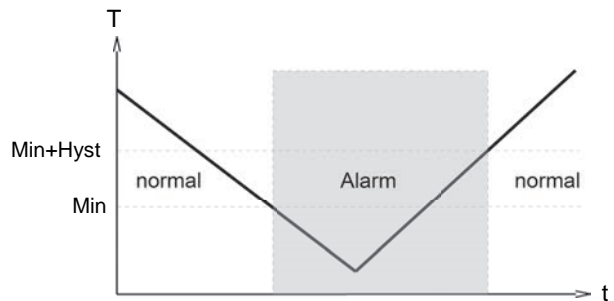
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

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".

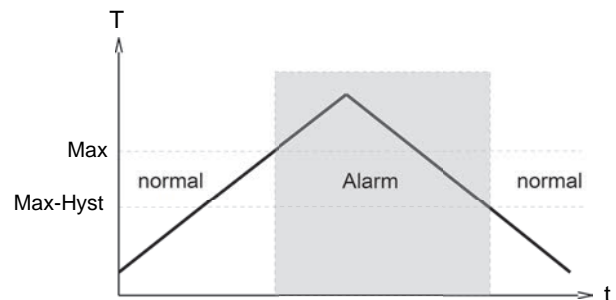
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

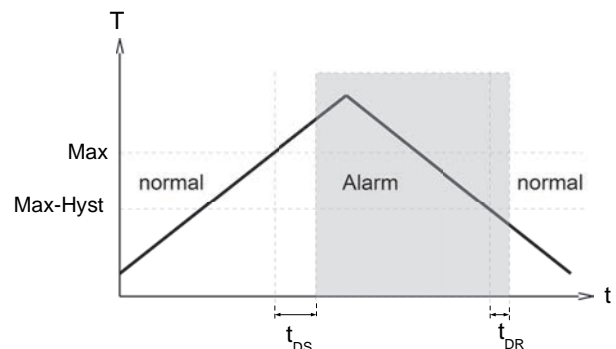
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



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.

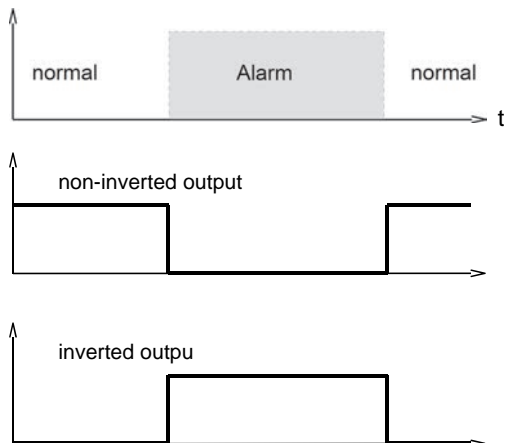


A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



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.

Combinations with FLEX

FLEX-converter / counter can be combined with very different types of pickup systems for flow rate, level, temperature, and pressure. This has created a family of sensors with which different types of applications can be supported.



Ordering code

The base device e.g. HD2K-015GM005E is ordered with electronics e.g. FLEX-HD2KIULO

HD2K - 1. 2. 3. 4. 5.
G **E**

FLEX-HD2K 6. 7. 8. 9.

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
K	stainless steel
4. metering range oil 30..330 mm²/s for horizontal inwards flow	
008	0,5 - 8 l/min
015	1,5 - 15 l/min
025	2,5 - 25 l/min
040	6,0 - 40 l/min
060	12,0 - 60 l/min
5. Connection for	
E	electronics
6. Analog output	
I	current output 4..20 mA
U	voltage output 0..10 V
K	no analog output
7. Switching output	
T	push-pull (compatible with PNP and NPN)
K	no switching output
8. Function set to switching output	
L	minimum-switch
H	maximum-switch
R	frequency output
K	no switching output
9. Switching output level	
O	standard
I	inverted

Product Information

Sensors and Instrumentation

Options for FLEX

Special range for analog output: l/min

<= Metering range (standard=metering range)

Special range for frequency output: l/min

<= Metering range (Standard=Metering range)

End frequency (max. 2000 Hz) Hz

Power-on delay s

(from Alarm to OK)

Power-off delay s

(from OK to Alarm)

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

- Special quantities
- Temperature display 0..120 °C

Accessories

- Cable/round plug connector (KB...) see additional information "Accessories"

Ordering information

- Specify direction of flow, medium, and metering range.
- For viscous media specify viscosity, temperature, and medium (e.g. ISO VG 68) (enquire about metering range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request metering range)

Flow Meter / Monitor FLEX-HR1MV



- Viscosity stabilised from 30 to 200 mm²/s
- 4..20 mA or 0..10 V output signal
- 1 x programmable switch or frequency output
- Programmable switching value, full scale, or zero point via magnet clip
- Programming protection by removal of the clip
- Polished metal housing
- Rotatable electronic head for alignment of the 90° cable outlet
- LED for switching value display

Characteristics

The sensors work with a 16-bit processor, a 12-bit A/D and a 12-bit D/A converter. Linearisations and calibrations are carried out automatically. The Flash memory guarantees the exchangeability of all programs.

There is a choice between a switch with transistor output (push-pull) or a frequency output. The analog output 4..20 mA or 0..10 V can be used at the same time. Many options are available for the switching outputs.

Options allow:

- Variable ranges for the analog outputs
- Variable hystereses
- Minimum or maximum switch
- Inversion of the outputs
- Window function
- Delay after switching voltage on
- Switching delays (On, Off)

Technical data

Sensor	analog Hall sensor	
Nominal width	DN 32..50	
Process connection	female thread G 1 ¹ / ₄ ..G 2 (further process connections available on request)	
Metering range	2..220 l/min	for details see table "Ranges"
Q_{max.}	to 250 l/min	
Tolerance	±3 % of the full scale value plus viscosity variation	
Pressure resistance	PN 200 bar	
Media temperature	-20..+85 °C optionally -20..+150 °C	

Ambient temperature	-20..+70 °C	
Media	water, oils (gases and aggressive media available on request)	
Wiring	see section "Wiring"	
Power supply	18..30 V DC	
Power consumption	<1 W	
Analog output	4..20 mA / load 500 Ω max. or 0..10 V / load min. 1 kΩ	
Switching output	transistor output "push-pull", (resistant to short circuits, and reversal polarity protected) I _{out} = 100 mA max.	
Display (only with switching output)	yellow LED (On = OK / Off = Alarm)	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 4-pole	
Materials medium-contact	<i>Brass construction:</i> CW614N nickelled, CW614N, 1.4310, hard ferrite DN 32..40: NBR	<i>Stainless steel construction:</i> 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, DN 32..40: FKM
Non-medium-contact materials	CW614N, PPS	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the metering and switching range.	

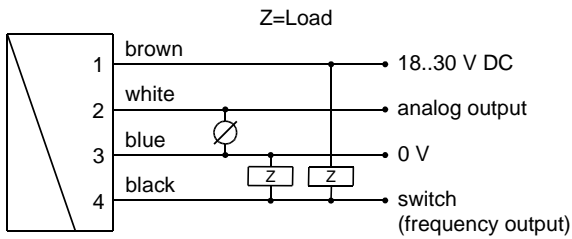
Ranges

Details in the table correspond to horizontal inwards flow with increasing flow rate.

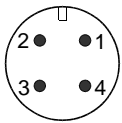
Switching range l/min H ₂ O or oil 30..200 mm ² /s	Display range l/min H ₂ O or oil 30..200 mm ² /s	Q_{max.} recommended
2 - 12	2 - 15	50
5 - 20	5 - 25	60
10 - 40	10 - 45	100
20 - 60	20 - 65	150
30 - 100	30 - 110	200
50 - 150	50 - 160	230
100 - 200	100 - 220	250

Special ranges are available.

Wiring

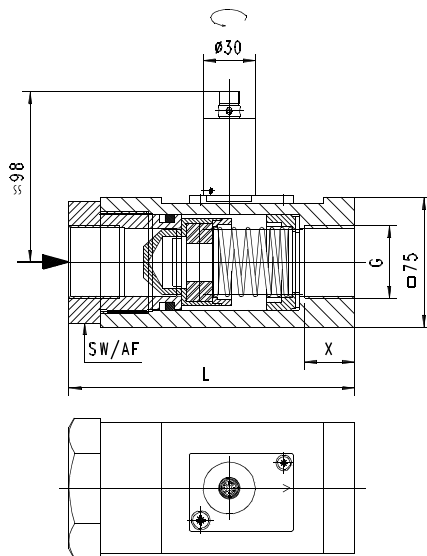


Connection example: PNP NPN



Dimensions and weights

DN	G	Types	L	SW	X	Weight kg
32	G 1 ¹ / ₄	HR1MV-0032G.E	165	70	29	5.8
40	G 1 ¹ / ₂	HR1MV-0040G.E	165	-	-	5.5
50	G 2	HR1MV-0050G.E	150	-	26	5.0



Handling and operation

Note

- Include straight calming section of 5 x DN in inlet and outlet
- Include a filter if the media are dirty (use magnetic filter for ferritic components)

The electronics housing is permanently connected to the primary sensor. There is no electrical connection between the electronics and the piston device. After installation, the electronic head can be turned to align the cable outlet.

It should be noted that the piston device and the FLEX electronics are appropriately matched to each other.

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".

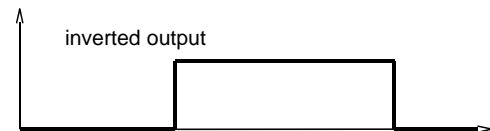
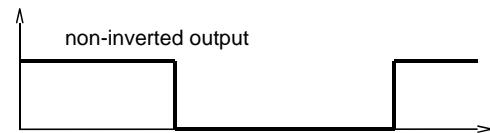
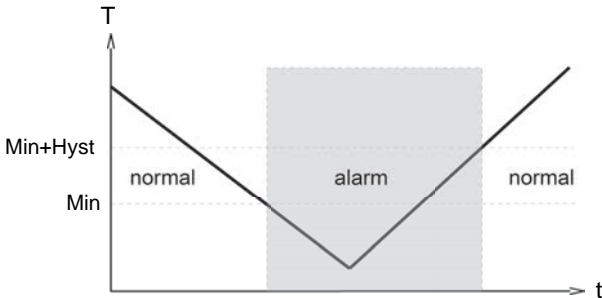
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

Product Information

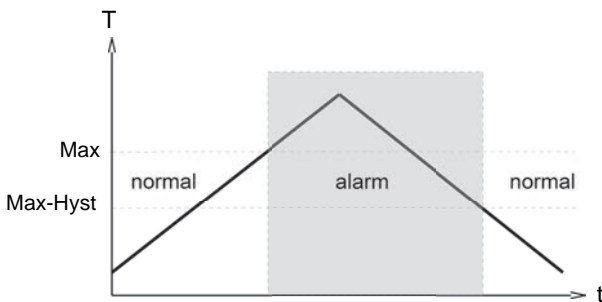
Sensors and Instrumentation

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.

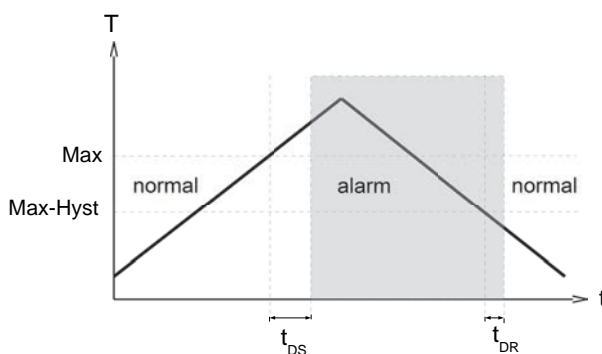


A Power-On delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Combinations with FLEX

FLEX-converter / counter can be combined with very different types of pickup systems for flow rate, level, temperature, and pressure. This has created a family of sensors with which different types of applications can be supported.

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.

Product Information

Sensors and Instrumentation

Ordering code

The base device, e.g. HR1MV-032GM040E is ordered with electronics e.g. FLEX-HR1MVIULO

HR1MV - 1. 2. 3. 4. 5.
 G **E**

FLEX-HR1MV 6. 7. 8. 9.

1. Nominal width	
032	DN 32 - G 1 ¹ / ₄
040	DN 40 - G 1 ¹ / ₂
050	DN 50 - G 2
2. Process connection	
G	female thread
3. Connection material	
M	brass
K	stainless steel
4. Metering range H₂O or oil 30..200 mm²/s for horizontal inwards flow	
012	2 - 12 l/min
025	5 - 25 l/min
040	10 - 40 l/min
060	20 - 60 l/min
100	30 - 100 l/min
150	50 - 150 l/min
200	100 - 200 l/min
5. Connection for	
E	electronics
6. Analog output	
I	current output 4..20 mA
U	voltage output 0..10 V
K	no analog output
7. Switching output	
T	push-pull (compatible with PNP and NPN)
K	no switching output
8. Function set to switching output	
L	minimum-switch
H	maximum-switch
R	frequency output
K	no switching output
9. Switching output level	
O	standard
I	inverted

Options for FLEX

Special range for analog output:

<= Metering range (standard=metering range)

l/min

Special range for frequency output:

<= Metering range (Standard=Metering range)

l/min

End frequency (max. 2000 Hz)

Hz

Power-on delay

(from Alarm to OK)

s

Power-off delay

(from OK to Alarm)

s

Power-On delay

(time after power on, during which the outputs are not actuated)

s

Switching output fixed

Special hysteresis (standard = 2 % EW)

l/min

Gooseneck

(recommended at operating temperatures above 70 °C)

%

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

Options

- Measured values for oil or gas
- Special quantities
- Temperature display 0..120 °C

Accessories

- Cable/round plug connector (KB...) see additional information "Accessories"

Ordering information

- Specify direction of flow, medium, and metering range.
- For viscous media specify viscosity, temperature, and medium (e.g. ISO VG 68) (enquire about metering range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request metering range)

Flow transmitter / switch FLEX-HR2E



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

Characteristics

Mechanical flow switch, for fluid media, with spring-supported piston and magnetic triggering of Hall sensors. Robust construction in brass or stainless steel.

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 or a pulse 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 signaled 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 present 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	analog Hall sensor	
Nominal width	DN 32 / 40 / 50	
Process connection	female thread G 1 1/4..G 2 (further process connections available on request)	
Metering range	5..300 l/min	for details see table "Ranges"
Pressure loss	~1 bar at Q _{max}	
Q_{max}	Up to 300l/min	
Measurement accuracy	±8 % of full scale value	
Pressure resistance	PS 200 bar	
Medium temperature	-20..+85 °C, optionally -20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water	
Wiring	see section "Wiring"	
Materials medium-contact	<i>Brass construction:</i> CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite,	<i>Stainless steel construction:</i> 1.4571, 1.4310, hard ferrite (on request)
Materials, non-medium-contact	electronic adapter electronics housing	CW614N nickelled Stainless steel 1.4305
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 output	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	
Pulse output	pulse width 50 ms → max. output frequency < 20 Hz	
Display (only with switching output)	yellow LED (On = OK / Off = Alarm)	
Electrical connection	for round plug connector M12x1, 5-pole	
Ingress protection	IP 67	
Weight	see table "Dimensions and weights"	
Conformity	CE	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the display, metering and switching range.	

Product Information

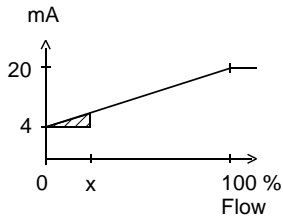
Sensors and Instrumentation

Signal output curves

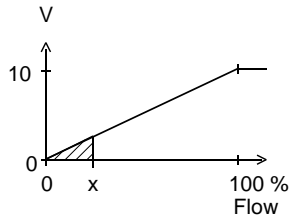
Value x = Begin of the specified range

 = not specified range

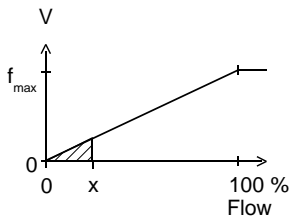
Current output



Voltage output



Frequency output



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

Other characters on request.

Ranges

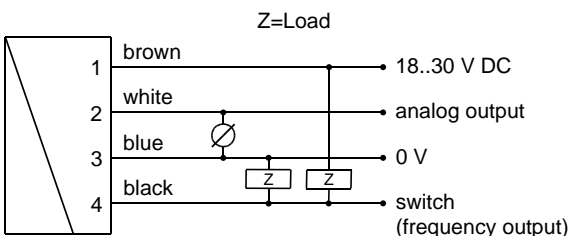
Details in the table correspond to metering ranges with horizontal inwards flow and increasing flow rate.

Standard type FLEX-HR2E

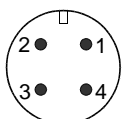
Metering range l/min H ₂ O	Q _{max.} recommended
5 - 60	300 l/min
10 - 100	300 l/min
15 - 200	300 l/min
25 - 300	300 l/min

Special ranges are available.

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.

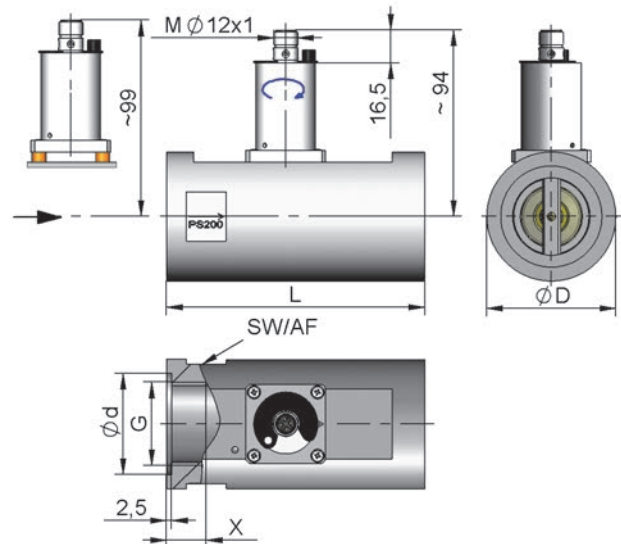
The Push-Pull output can as desired be switched as a PNP or an NPN output.

Dimensions and weights

..including FLEX electronics

DN	G	Types	L	ØD	SW	Ød	X	Weight Kg
32	G 1 1/4	HR2E -032GM	130	65	60	51	23	2.7
40	G 1 1/2	HR2E -040GM	170	65	60	56	24	3.2
50	G 2	HR2E -050GM	185	80	75	70	26	5.4

High temperature



Handling and operation

Note

- Include straight calming section of 5 x DN in inlet and outlet
- If the media are dirty, install a filter (use magnetic filter for ferritic components)

The electronics housing is permanently connected to the primary sensor. There is no electrical connection between the electronics and the piston device. After installation, the electronic head can be turned to align the cable outlet.

It should be ensured that the piston device and the FLEX electronics are appropriately matched to each other.

Product Information

Sensors and Instrumentation

Programming

The FLEX 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.

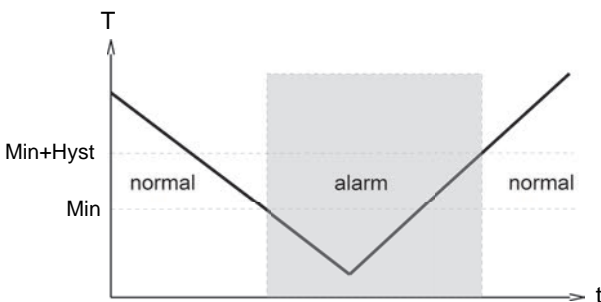
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

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".

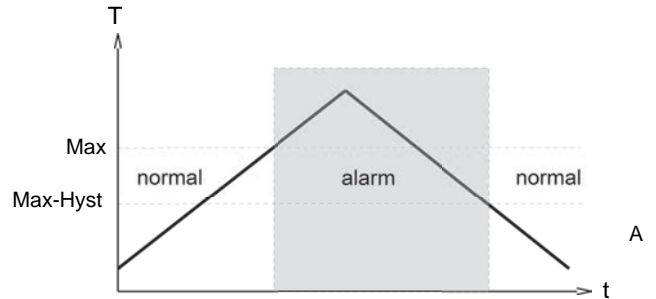
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

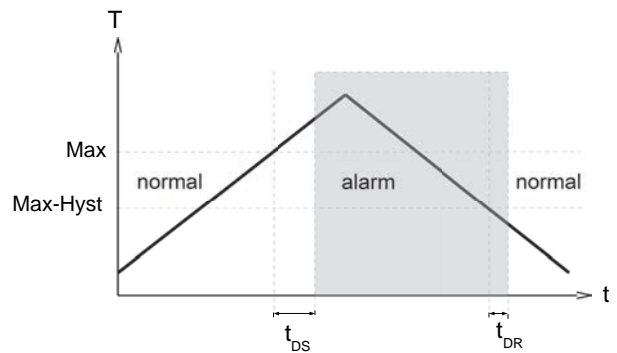
With a minimum switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



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.

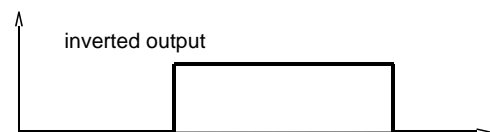
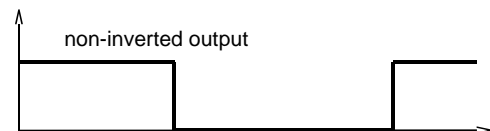


switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



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.

Product Information

Sensors and Instrumentation

Combinations with FLEX

FLEX-evaluation electronics can be combined with very different types of pickup systems for flow rate, level, temperature, and pressure. This has created a family of sensors with which different types of applications can be supported.

Ordering code

The base device, e.g. HR2E-032GM100 is ordered with electronics e.g. FLEX-HR2E-ITLO

HR2E - 1. 2. **G** 3. 4.

FLEX - HR2E - 5. 6. 7. 8. 9.

○=Option

1. Nominal width	
032	DN 32 - G 1 ¹ / ₄
040	DN 40 - G 1 ¹ / ₂
050	DN 50 - G 2
2. Process connection	
G	female thread
3. Connection material	
M	brass
K	stainless steel (on request)
4. HR2E - Metering range H₂O for horizontal inwards flow	
060	5 - 60 l/min
100	10 -100 l/min
200	15 -200 l/min
300	25 -300 l/min

5. Analog output	
I	current output 4..20 mA
U	voltage output 0..10 V
K	no analog output
6. Switching output	
T	Push-Pull
M	<input type="radio"/> NPN (open collector)
K	no switching output
R	frequency output
C	Pulse output
7. Function set to switching output	
L	minimum-switch
H	maximum-switch
K	no switching output
8. Switching output level	
O	standard
M	<input type="radio"/> inverted
9. Optional	
D	high temperature up to 120°C
H	model with gooseneck
O	<input type="radio"/> tropical model - oil-filled version for heavy duty or external use

Required ordering information

For FLEX-HR2E-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 FLEX

Special range for analog output: l/min

<= Metering range
(Standard=Metering range)

Special range for frequency output: l/min

<= Metering range (Standard=Metering range)

End frequency (max. 2000 Hz) Hz

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 (0..99 s) s

(After connecting the supply, time during which the switching output is not activated)

Switching output fixed l/min

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

Options

- Special quantities

Ordering information

- Specify direction of flow, medium, and metering range.

Accessories

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

Flow Transmitter / Switch FLEX-HR2VE



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

Characteristics

Mechanical flow switch, for fluid media, with spring-supported piston and magnetic triggering of Hall sensors. Robust construction in brass or stainless steel.

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 or a pulse 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 signaled 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 present 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	analog Hall sensor	
Nominal width	DN 32 / 40 / 50	
Process connection	female thread G 1 1/4..G 2 (further process connections available on request)	
Metering range	10..160 l/min	for details see table "Ranges"
Pressure loss	~ 4..7 bar at Q _{max}	
Q_{max}	up to 160 l/min	
Measurement accuracy	±5 % of full scale value at constant viscosity	
Viscosity-stability	±10 % of full scale value (20-330 mm ² /s)	
Pressure resistance	PS 200 bar	
Medium temperature	-20..+85 °C, optionally -20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	oil	
Wiring	see section "Wiring"	
Materials medium-contact	<i>Brass construction:</i> CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite,	<i>Stainless steel construction:</i> 1.4571, 1.4310, hard ferrite
Materials, non-medium-contact	electronic adapter electronics housing	CW614N nickelled Stainless steel 1.4305
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 output	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	
Pulse output	pulse width 50 ms → max. output frequency < 20 Hz	
Display (only with switching output)	yellow LED (On = OK / Off = Alarm)	
Electrical connection	for round plug connector M12x1, 5-pole	
Ingress protection	IP 67	
Weight	see table "Dimensions and weights"	
Conformity	CE	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the display, metering and switching range.	

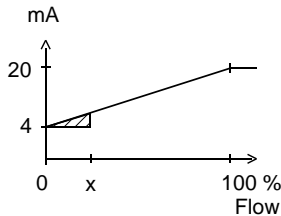
Product Information

Sensors and Instrumentation

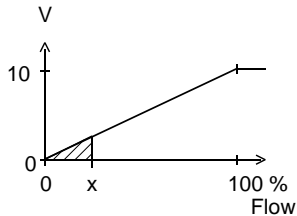
Signal output curves

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

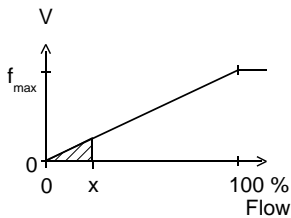
Current output



Voltage output



Frequency output



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

Other characteristics on request.

Ranges

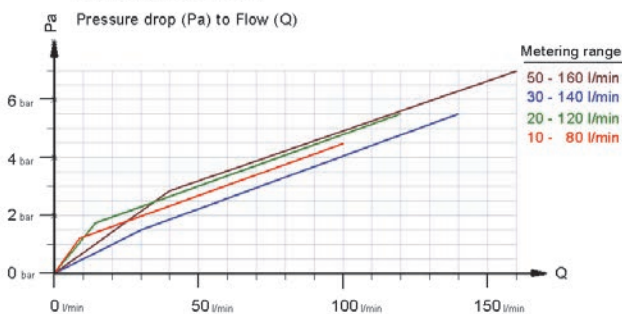
Details in the table correspond to metering ranges with horizontal inwards flow and increasing flow rate.

Standard type FLEX-HRV2E

Metering range l/min oil 20-330 mm ² /s	Q _{max.} Recommended l/min	Pressure loss bar at Q _{max.} oil
10 - 80	100	4
20 - 120	120	5
30 - 140	140	5
50 - 160	160	7

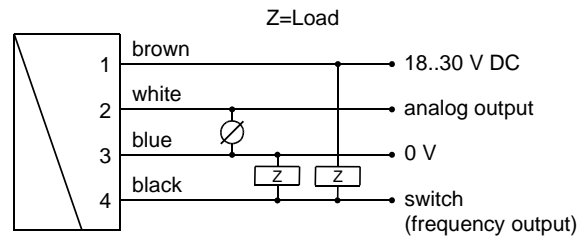
Special ranges are available.

Reference Data:

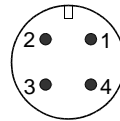


Metering spaces of the flow switch HR2VK1

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.

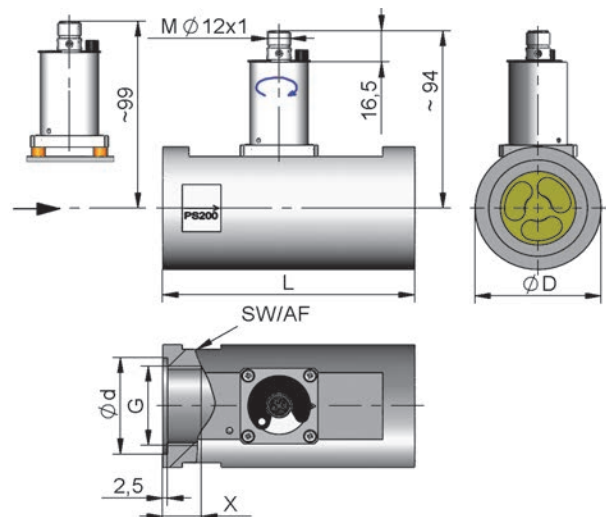
The Push-Pull output can as desired be switched as a PNP or an NPN output.

Dimensions and weights

..including FLEX-electronics

DN	G	Types	L	ØD	SW	Ød	X	Weight Kg
32	G 1 ¹ / ₄	HR2VE-032GM	130	65	60	51	23	2.7
40	G 1 ¹ / ₂	HR2VE-040GM	170	65	60	56	24	3.2
50	G 2	HR2VE-050GM	185	80	75	70	26	5.4

High temperature



Product Information

Sensors and Instrumentation

Handling and operation

Note

- Include straight calming section of 5 x DN in inlet and outlet
- If the media are dirty, install a filter (use magnetic filter for ferritic components)
- Under unfavorable pressure conditions, e.g. with a free outlet, there is a risk of cavitation.

The electronics housing is permanently connected to the primary sensor. There is no electrical connection between the electronics and the piston device. After installation, the electronic head can be turned to align the cable outlet.

It should be ensured that the piston device and the FLEX electronics are appropriately matched to each other.

Programming

The FLEX 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.

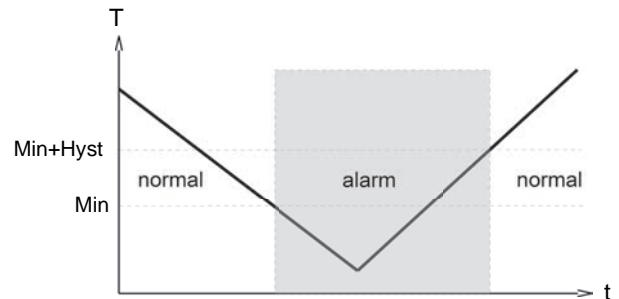
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

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".

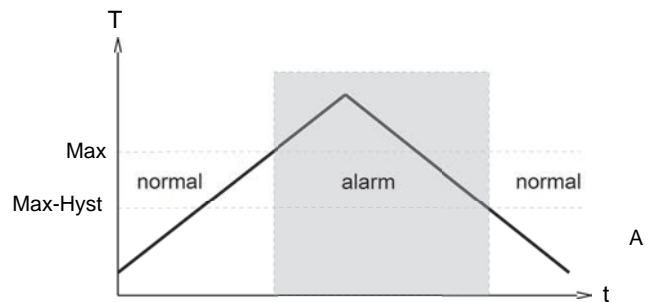
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

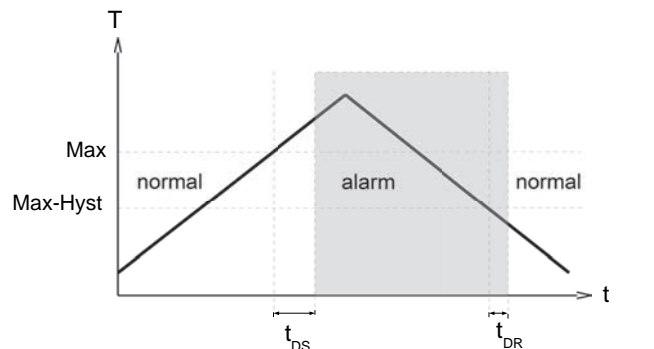
With a minimum switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



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.



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.

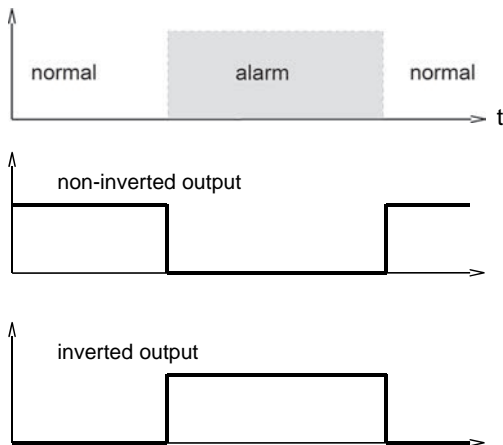


In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.

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.

Product Information

Sensors and Instrumentation



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.

Combinations with FLEX

FLEX-evaluation electronics can be combined with very different types of pickup systems for flow rate, level, temperature, and pressure. This has created a family of sensors with which different types of applications can be supported.

Ordering code

The base device, e.g. HR2VE-032GM100 is ordered with electronics e.g. FLEX-HR2VE-ITLO

HR2VE - 1. 2. **G** 3. 4.

FLEX - HR2VE - 5. 6. 7. 8.

○=Option

1. Nominal width	
032	DN 32 - G 1 ¹ / ₄
040	DN 40 - G 1 ¹ / ₂
050	DN 50 - G 2
2. Process connection	
G	female thread
3. Connection material	
M	brass
K	stainless steel
4. HR2VE - Metering range oil for horizontal inwards flow	
080	10.. 80 l/min
120	20..120 l/min
140	30..140 l/min
160	50..160 l/min

5. Analog output	
I	current output 4..20 mA
U	voltage output 0..10 V
K	no analog output
6. Switching output	
T	Push-Pull
M	○ NPN (open collector)
K	no switching output
7. Function set to switching output	

L	minimum-switch
H	maximum-switch
R	frequency output
C	Pulse output
K	no switching output
8. Switching output level	
O	standard
M	○ inverted

Required ordering information

For FLEX-HR2VE-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 FLEX

Special range for analog output: l/min

<= Metering range
(Standard=Metering range)

Special range for frequency output: l/min

<= Metering range (Standard=Metering range)

End frequency (max. 2000 Hz) Hz

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

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

Power-On delay (0..99 s) s

(After connecting the supply, time during which the switching output is not activated)

Switching output fixed l/min

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

Options HR2VE

- Special quantities

Ordering information

- Specify direction of flow, medium, and metering range.

Accessories

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



Архангельск (8182)63-90-72	Иваново (4932)77-34-06	Липецк (4742)52-20-81	Пенза (8412)22-31-16	Ставрополь (8652)20-65-13
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