GHM Messtechnik GmbH
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Flow - piston inline design

Characteristics

System	Flow - piston inline design
Evaluation	Display Switching Measurement
Nominal widths	DN 8..50
Range	0.1..110 l/min
Media	Water, Oils Gases, Aggressive media
Pressure resistance	Max. 500 bar
Temperature	-20..+150 °C
Approvals	ATEX

Applications

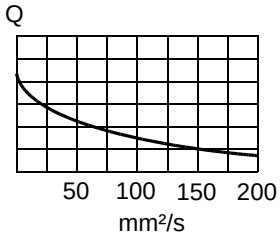
- **Industrial metering and monitoring technology**
- **Oil monitoring in gearings**
- **Flow switching in high pressure cleaners**
- **Flow switching in cooling plants**
- **Emulsion control in machine tools**
- **High pressure technology**
- **Ex applications**

Function and benefits

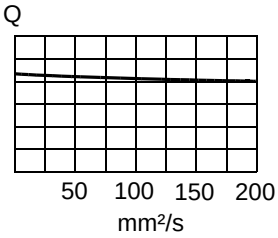
With the inline devices the piston is located in "line" with the connection lines. In the process, the carrying bodies are predominantly manufactured as rotating and can maintain pressure resistances of up to 800 bar. There is a variety of connections available in this device group with predominantly female thread.

The devices have been designed for measurement in water and oil. For use in oil, some devices were modified so that the switching point and/or the measurement is stabilised in the event of a viscosity fluctuation.

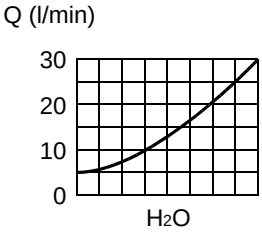
not stabilised

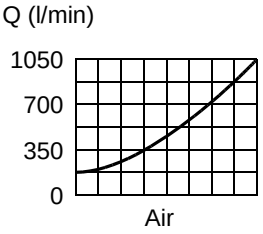


stabilised



There are, however, also versions which are suitable for use in air or gases or which are specially modified for this use. In this case, the mechanics of the devices are provided with additional friction and damping elements.





With aggressive media, other materials are used and/or a protective coating is applied to the components. Feel free to contact us for advice for this application.

Device overview

Device		Displays	Switching	Measuring	Range l/min	Nominal widths	Pressure resistance	Medium temperature	Connection material	Medium				Page
										Water	Oils	Gases	aggressive	
M1J		●			0.4..60	DN 8..25	PN 200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**6**
H1O1 **H2O1**		●			0.1..65	DN 8..25	PN 200 (500)	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**8**
H1VO1		●			2..220	DN 32 - 50	PN 200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**10**
H1O **H2O**		●			0.1..65	DN 8..25	PN 200 (500)	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**12**
H1VO		●			2..220	DN 32 - 50	PN 200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**14**

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Device		Displays	Switching	Measuring	Range l/min	Nominal widths	Pressure resistance	Medium temperature	Connection material	Medium				Page
										Water	Oils	Gases	aggressive	
H1Z1 H2Z1		●			0.1..65	DN 8..25	PN 200 (500)	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**16**
H1VZ1		●			2..220	DN 32 - 50	PN 200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**18**
H1Z H2Z		●			0.1..65	DN 8..25	PN 200 (500)	-20..+70 °C	Brass / stainless steel	●	●	❍	❍	**20**
H1VZ		●			2..220	DN 32 - 50	PN 200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**22**
MF-003			●		1..100	DN 3	PN 6	-20..+80 °C	Brass	-	-	●	-	**24**
MF-007			●		0.05..1	DN 7	PN 6	-20..+80 °C	Brass	●	-	-	-	**25**
FW1-..GP			●		1..11	DN 15..25	PN 10	-20..+90 °C	Plastic	●	❍	-	-	**26**
FW1-..GM			●		1..11	DN 8..25	PN 100 (800)	-20..+90 °C	Brass	●	❍	-	-	**28**
FW3			●		0.4..2.5	DN 8	PN 100	-20..+90 °C	Brass / stainless steel	●	❍	❍	-	**30**
FW4V			●		1	DN 15	PN 300	-20..+90 °C	Brass	-	●	-	-	**32**
RVM			●		0.04..3	DN 8	PN 350	-20..+100 °C (160 °C)	Brass / stainless steel	●	-	❍	❍	**33**
FX			●		0.4..12	DN 15	PN 10	-20..+70 °C (80 °C)	Plastic	●	-	-	-	**35**

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Device		Displays	Switching	Measuring	Range l/min	Nominal widths	Pressure resistance	Medium temperature	Connection material	Medium				Page
										Water	Oils	Gases	Aggressive	
NH1		●	●		3..15	DN 15	PN 10	-20..+65 °C	Brass	●	-	-	-	**37**
NO		●	●		3..60	DN 8..25	PN 50	-20..+90 °C	Brass / stainless steel	●	❍	❍	❍	**38**
NJ NJV		●	●		2..80	DN 8..25	PN 100	-20..+100 °C	Brass / stainless steel	●	●	-	❍	**40**
VF		●	●		0.005..5	DN 8	PN 16	-20..+100 °C	Brass / stainless steel	●	●	-	❍	**44**
VO		●	●		0.1..150	DN 15..25	PN 10	-20..+100 °C	Brass / stainless steel	●	●	-	❍	**46**
MR		●	●		0.5..60	DN 8..25	PN 90..200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**48**
MR1K		●	●		0.4..65	DN 8..25	PN 200	-20..+120 °C (-20..+150 °C)	Brass / stainless steel	●	●	❍	❍	**50**
HD1F HD2F		●	●		0.4..85	DN 8..25	PN 200	-20..+120 °C (-20..+150 °C)	Brass / stainless steel	●	●	❍	❍	**52**
HM1K HM2K		●	●		0.1..85	DN 8..25	PN 200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**54**
HD1K HD2K		●	●		0.4..85	DN 8..25	PN 200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**56**
A-H1.1		ATEX switching head I M1 Ex ia I II 1G Ex ia IIC T4 II 1D Ex iaD 20 T135						-20..+120 °C						**59**
A-H2.1		ATEX switching head I M1 Ex ia I II 1G Ex ia IIC T4 II 1D Ex iaD 20 T135						-20..+120 °C						**60**

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Device		Displays	Switching	Measuring	Range l/min	Nominal widths	Pressure resistance	Medium temperature	Connection material	Medium				Page
										Water	Oils	Gases	Aggressive	
HR1MV		●	●		2..200	DN 32 - 50	PN 200	-20..+120 °C	Brass / stainless steel	●	●	❍	❍	**61**
A-H2.1		ATEX switching head I M1 Ex ia I II 1G Ex ia IIC T4 II 1D Ex iaD 20 T135						-20..+120 °C						**60**
LABO-HD1K **LABO-HD2K**		●	●	●	0.1..85	DN 8..25	PN 200	-20..+85 °C (-20..+150 °C)	Brass / stainless steel	●	●	❍	❍	**64**
FLEX-HD1K **FLEX-HD2K**		●	●	●	0.1..85	DN 8..25	PN 200	-20..+85 °C (-20..+150 °C)	Brass / stainless steel	●	●	❍	❍	**67**
FLEX-HR1MV		●	●	●	2..200	DN 32 - 50	PN 200	-20..+85 °C (-20..+150 °C)	Brass / stainless steel	●	●	❍	❍	**71**
OMNI-HD1K **OMNI-HD2K**		●	●	●	0.1..85	DN 8..25	PN 200	-20..+85 °C (-20..+150 °C)	Brass / stainless steel	●	●	❍	❍	**75**
OMNI-HR1MV		●	●	●	2..200	DN 32 - 50	PN 200	-20..+85 °C (-20..+150 °C)	Brass / stainless steel	●	●	❍	❍	**80**

ECI-1	All LABO, FLEX, and OMNI parameters can be set or modified using the ECI-1 configurator.	**84**
Options	● Special connections ● Higher pressure stages ● Reinforced piston ● Temperature up to 150 °	**85**
Mechanical accessories	● ZV / ZE (Filter) ● VB (Manifold block) ● Metal cover for display	**88**
Electrical accessories	● KB (Round plug connector 4/5-pin) ● OMNI-TA (Panel Meter)	**89**

Errors and technical modifications reserved.

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Flow Indicator M1J

- **No electrical supply required**
- **Individually calibrated display range**
- **Compact design**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Display range	0.4..60 l/min	for details see table "Ranges"
Pressure loss	0.4..1.4 bar at $Q_{max.}$	
$Q_{max.}$	to 80 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200	
Media temperature	-20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water (oils, gases and aggressive media available on request)	
Electrical data	none	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	Acrylic, NBR	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

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

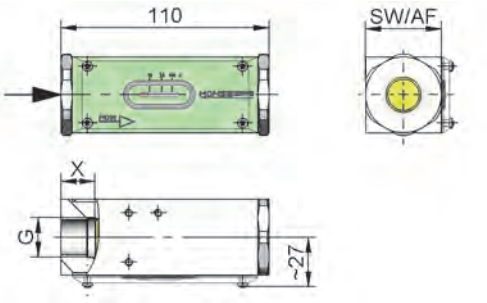
Scaling is via a 10..100 % display.

Display range l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.4 - 4	10	0.6
1.0 - 10	20	
2.0 - 20	30	0.4
3.0 - 30	40	
4.0 - 40	60	0.8
6.0 - 60	80	1.4

Special ranges are available.

Dimensions and weights

	G	**Types**	**SW**	**X**	**Weight** kg
Brass	G $^1/_4$	M1J-008GM	40	15	1.2
	G $^3/_8$	M1J-010GM			
	G $^1/_2$	M1J-015GM			
	G $^3/_4$	M1J-020GM		18	1.1
	G 1	M1J-025GM			1.0
Stainless steel	G $^1/_4$	M1J-008GK	41	15	1.2
	G $^3/_8$	M1J-010GK			
	G $^1/_2$	M1J-015GK			1.1
	G $^3/_4$	M1J-020GK		18	
	G 1	M1J-025GK			1.0



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Handling and operation

- 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)

Ordering code

	1.	2.	3.	4.	5.
M1	**J**	-	**G**		

1.	**Display**	
	J	with frontal measurement display J
2.	**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
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
	K	stainless steel
5.	**Display range H_2O for horizontal inwards flow**	
	004	0.4 - 4 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

Options

- Special ranges/special scaling
- Temperature display 0..120 °C
- Reinforced piston

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Display H1O1 / H2O1

- **No electrical supply required**
- **Individually calibrated display**
- **Compact design**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 8..25	
Connection type	female thread G $^1/_4$..G 1 (further process connections available on request)	
Display range	0.1..85 l/min	for details see table "Ranges"
Pressure loss	0.4..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
Media temperature	-20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water, oils (gases and aggressive media available on request)	
Electrical data	none	
Materials media-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	PC, acrylic	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

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

Standard type H1O1

Display range l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.1 - 1.2	6	0.4
0.5 - 6.0	10	0.5
1.0 - 12.0	20	0.6
2.0 - 23.0	30	0.4
3.0 - 34.0	40	
4.0 - 45.0	60	0.8
6.0 - 65.0	80	1.4
20.0 - 85.0	100	1.6

Special ranges are available.

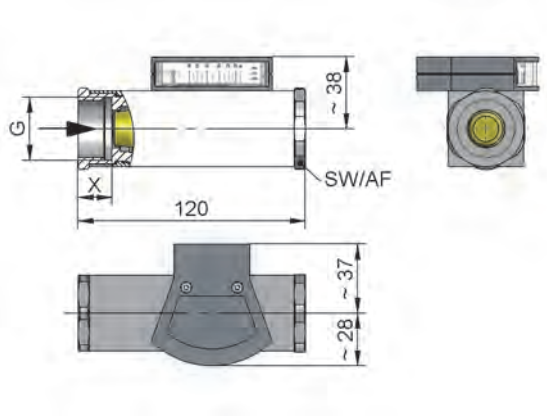
Viscosity compensated type H2O1

Display range l/min oil 30..330 mm²/s	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ oil mm²/s					**Viscosity stability** ±8 %, min.
		30	60	100	205	330	
0.5 - 10	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 20	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 30	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 45	60					2.6	±2.7 l/min
12.0 - 65	80	2.1	2.3	2.4	2.6	2.8	±3.0 /min

Special ranges are available.

Dimensions and weights

	G	**Types**	**SW**	**X**	**Weight** kg
Brass	G $^1/_4$	H.O1-008GM	40	15	1.3
	G $^3/_8$	H.O1-010GM			
	G $^1/_2$	H.O1-015GM			
	G $^3/_4$	H.O1-020GM		18	1.2
	G 1	H.O1-025GM			1.1
Stainless steel	G $^1/_4$	H.O1-008GK	41	15	1.3
	G $^3/_8$	H.O1-010GK			
	G $^1/_2$	H.O1-015GK			1.2
	G $^3/_4$	H.O1-020GK		18	
	G 1	H.O1-025GK			1.1



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Handling and Operation

- 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)

Ordering code

	1.	2.		3.	4.	5.	6.
H		**O1**	**-**		**G**		

1.	**Construction**			
	1	standard		
	2	viscosity compensated		
2.	**Display**			
	O1	with measurement display at side O1		
3.	**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		
4.	**Process connection**			
	G	female thread		
5.	**Connection material**			
	M	brass		
	K	stainless steel		
6.	**H1 - Display range H_2O for horizontal inwards flow**			
	001	0.1 - 1.2 l/min		●
	005	0.5 - 6.0 l/min		●
	010	1.0 - 12.0 l/min		●
	020	2.0 - 23.0 l/min		●
	030	3.0 - 34.0 l/min		●
	040	4.0 - 45.0 l/min		●
	060	6.0 - 65.0 l/min		●
	080	20.0 - 85.0 l/min		●
	H2 - display range oil 30..330 mm²/s for horizontal inwards flow			
	008	0.5 - 10 l/min	●	
	015	1.5 - 20 l/min	●	
	025	2.5 - 30 l/min	●	
	040	6.0 - 45 l/min	●	
	060	12.0 - 65 l/min	●	

Options

- Special ranges/special scaling
- Pressure resistance PN 500
- Temperature display 0..120 °C
- reinforced piston

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Display H1VO1

- **Viscosity stabilised from 30 to 200 mm²/s**
- **No electrical supply required**
- **Individually calibrated display**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 32..50	
Process connection	female thread G $1^1/_4$..G 2 (further process connections available on request)	
Display range	2..220 l/min	for details see table "Ranges"
$Q_{max.}$	to 250 l/min	
Tolerance	±5 % of the full scale value plus viscosity variation	
Pressure resistance	PN 200	
Media temperature	-20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water, oils (gases and aggressive media available on request)	
Electrical data	none	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite *DN 32..40:* NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, *DN 32..40:* FKM
Non-medium-contact materials	PC, acrylic	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

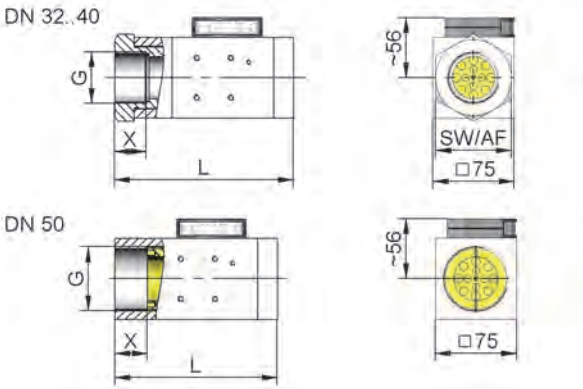
Details in the table correspond to horizontal inwards flow with increasing flow rate.

Display range l/min H_2O or oil 30..200 mm²/s	**$Q_{max.}$** recommended
2 - 15	50
5 - 25	60
10 - 45	100
20 - 65	150
30 - 110	200
50 - 160	230
100 - 220	250

Special ranges are available.

Dimensions and weights

DN	**G**	**Types**	**L**	**SW**	**X**	**Weight** kg
32	G $1^1/_4$	H1VO1-032G.	165	70	29	5.8
40	G $1^1/_2$	H1VO1-040G.				5.5
50	G 2	H1VO1-050G.	150	-	26	5.0



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Handling and Operation

- 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)

Ordering code

	1.		2.	3.	4.	5.
H1V	**O1**	-		**G**		

❍=Option

1.	**Display**	
	O1	with measurement display at side O1
2.	**Nominal width**	
	032	DN 32 - G $1^1/_4$
	040	DN 40 - G $1^1/_2$
	050	DN 50 - G 2
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
	K ❍	stainless steel
5.	**Display range H_2O or oil 30..330 mm^2/s for horizontal inwards flow**	
	012	2 - 15 l/min
	025	5 - 25 l/min
	040	10 - 45 l/min
	060	20 - 65 l/min
	100	30 - 110 l/min
	150	50 - 160 l/min
	200	100 - 220 l/min

Options

- Special ranges/special scaling
- Temperature display 0..120 °C

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Indicator H1O / H2O

- **No electrical supply required**
- **Individually calibrated display**
- **Compact design**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 8.0.25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Display range	0.1..85 l/min	for details see table "Ranges"
Pressure loss	0.4..3.5 bar at $Q_{max.}$	
$Q_{max.}$	To 100 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
Media temperature	-20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water, oil (gases and aggressive media available on request)	
Electrical data	none	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	CW614N nickelled, PC	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

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

Standard type H1O

Display range l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.1 - 1.2	6	0.4
0.5 - 6.0	10	0.5
1.0 - 12.0	20	0.6
2.0 - 23.0	30	0.4
3.0 - 34.0	40	
4.0 - 45.0	60	0.8
6.0 - 65.0	80	1.4
20.0 - 85.0	100	1.6

Special ranges are available.

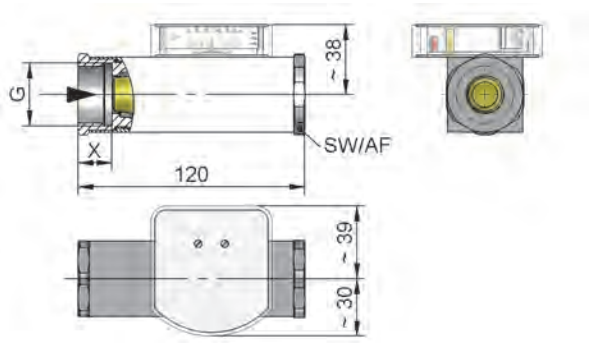
Viscosity compensated type H2O

Display range l/min oil 30..330 mm²/s	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ oil mm²/s					**Viscosity stability** ±8 %, min.
		30	60	100	205	330	
0.5 - 10	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 20	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 30	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 45	60					2.6	±2.7 l/min
12.0 - 65	80	2.1	2.3	2.4	2.6	2.8	±3.0 l/min

Special ranges are available.

Dimensions and weights

	G	**Types**	**SW**	**X**	**Weight** kg
Brass	G $^1/_4$	H.O-008GM	40	15	1.4
	G $^3/_8$	H.O-010GM			
	G $^1/_2$	H.O-015GM			1.3
	G $^3/_4$	H.O-020GM		18	
	G 1	H.O-025GM			1.2
Stainless steel	G $^1/_4$	H.O-008GK	41	15	1.3
	G $^3/_8$	H.O-010GK			
	G $^1/_2$	H.O-015GK			
	G $^3/_4$	H.O-020GK		18	1.2
	G 1	H.O-025GK			1.1



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Handling and Operation

- 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)

Ordering code

	1.	2.		3.	4.	5.	6.
H		**O**	**-**		**G**		

1.	**Construction**			
	1	standard		
	2	viscosity compensated		
2.	**Display**			
	O	with measurement display at side O		
3.	**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		
4.	**Process connection**			
	G	female thread		
5.	**Connection material**			
	M	brass		
	K	stainless steel		
6.	**H1 - Display range H_2O for horizontal inwards flow**			
	001	0.1 - 1.2 l/min		●
	005	0.5 - 6.0 l/min		●
	010	1.0 - 12.0 l/min		●
	020	2.0 - 23.0 l/min		●
	030	3.0 - 34.0 l/min		●
	040	4.0 - 45.0 l/min		●
	060	6.0 - 65.0 l/min		●
	080	20.0 - 85.0 l/min		●
	H2 - display range oil 30..330 mm^2/s for horizontal inwards flow			
	008	0.5 - 10 l/min	●	
	015	1.5 - 20 l/min	●	
	025	2.5 - 30 l/min	●	
	040	6.0 - 45 l/min	●	
	060	12.0 - 65 l/min	●	

Options

- Special ranges/special scaling
- Pressure resistance PN 500
- Temperature display 0..120 °C
- reinforced piston

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, specify pressure (relative or absolute), temperature and medium (e.g. air) (enquire about display range).

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Flow Indicator H1VO

- **Viscosity stabilised from 30 to 200 mm²/s**
- **No electrical supply required**
- **Individually calibrated display**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 32..50	
Process connection	femalethread G $1^1/_4$..G 2 (further process connections available on request)	
Display range	2..220 l/min	for details see table "Ranges"
$Q_{max.}$	to 250 l/min	
Tolerance	±5 % of the full scale value plus viscosity variation	
Pressure resistance	PN 200	
Media temperature	-20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water, oils (gases and aggressive media available on request)	
Electrical data	none	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite *DN 32..40:* NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, *DN 32..40:* FKM
Non-medium-contact materials	CW614N nickelled, PC	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

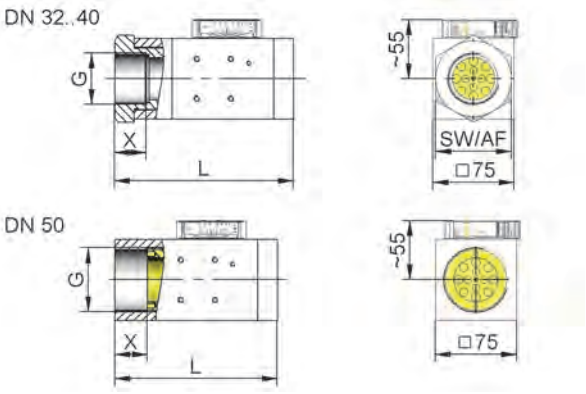
Details in the table correspond to horizontal inwards flow with increasing flow rate.

Display range l/min H_2O or oil 30..200 mm²/s	**$Q_{max.}$** recommended
2 - 15	50
5 - 25	60
10 - 45	100
20 - 65	150
30 - 110	200
50 - 160	230
100 - 220	250

Special ranges are available.

Dimensions and weights

DN	**G**	**Types**	**L**	**SW**	**X**	**Weight** kg
32	G $1^1/_4$	H1VO-032G.	165	70	29	5.8
40	G $1^1/_2$	H1VO-040G.				5.5
50	G 2	H1VO-050G.	150	-	26	5.0



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Handling and Operation

- 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)

Ordering code

	1.		2.	3.	4.	5.
H1V	**O**	**-**		**G**		

❍=Option

1.	**Display**	
	O	with measurement display at side O
2.	**Nominal width**	
	032	DN 32 - G $1^1/_4$
	040	DN 40 - G $1^1/_2$
	050	DN 50 - G 2
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
	K ❍	stainless steel
5.	**Display range H_2O or oil 30..330 mm^2/s for horizontal inwards flow**	
	012	2 - 15 l/min
	025	5 - 25 l/min
	040	10 - 45 l/min
	060	20 - 65 l/min
	100	30 - 110 l/min
	150	50 - 160 l/min
	200	100 - 220 l/min

Options

- Special ranges/special scaling
- Temperature display 0..120 °C

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Indicator H1Z1 / H2Z1

- **No electrical supply required**
- **Individually calibrated display**
- **Compact design**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Display range	0.1..85 l/min	for details see table "Ranges"
Pressure loss	0.4..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
Media temperature	-20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water, oil (gases and aggressive media available on request)	
Electrical data	none	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	PC, acrylic	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

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

Standard type H1Z1

Display range l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.1 - 1.2	6	0.4
0.5 - 6.0	10	0.5
1.0 - 12.0	20	0.6
2.0 - 23.0	30	0.4
3.0 - 34.0	40	
4.0 - 45.0	60	0.8
6.0 - 65.0	80	1.4
20.0 - 85.0	100	1.6

Special ranges are available.

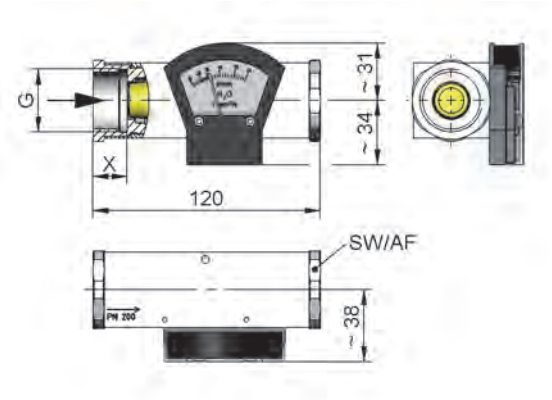
Viscosity compensated type H2Z1

Display range l/min oil 30..330 mm²/s	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ oil mm²/s					**Viscosity stability** ±8 %, min.
		30	60	100	205	330	
0.5 - 10	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 20	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 30	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 45	60					2.6	±2.7 l/min
12.0 - 65	80	2.1	2.3	2.4	2.6	2.8	±3.0 l/min

Special ranges are available.

Dimensions and weights

	G	**Types**	**SW**	**X**	**Weight** kg
Brass	G $^1/_4$	H.Z1-008GM	40	15	1.3
	G $^3/_8$	H.Z1-010GM			
	G $^1/_2$	H.Z1-015GM			
	G $^3/_4$	H.Z1-020GM		18	1.2
	G 1	H.Z1-025GM			1.1
Stainless steel	G $^1/_4$	H.Z1-008GK	41	15	1.3
	G $^3/_8$	H.Z1-010GK			
	G $^1/_2$	H.Z1-015GK			1.2
	G $^3/_4$	H.Z1-020GK		18	
	G 1	H.Z1-025GK			1.1



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Handling and operation

- 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)

Ordering code

	1.	2.		3.	4.	5.	6.
H		**Z1**	**-**		**G**		

1.	**Construction**			
	1	standard		
	2	viscosity compensated		
2.	**Display**			
	Z1	with frontal measurement display Z1		
3.	**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		
4.	**Process connection**			
	G	female thread		
5.	**Connection material**			
	M	brass		
	K	stainless steel		
6.	**H1 - Display range H_2O for horizontal inwards flow**			
	001	0.1 - 1.2 l/min		●
	005	0.5 - 6.0 l/min		●
	010	1.0 - 12.0 l/min		●
	020	2.0 - 23.0 l/min		●
	030	3.0 - 34.0 l/min		●
	040	4.0 - 45.0 l/min		●
	060	6.0 - 65.0 l/min		●
	080	20.0 - 85.0 l/min		●
	H2 - display range oil 30..330 mm^2/s for horizontal inwards flow			
	008	0.5 - 10 l/min	●	
	015	1.5 - 20 l/min	●	
	025	2.5 - 30 l/min	●	
	040	6.0 - 45 l/min	●	
	060	12.0 - 65 l/min	●	

Options

- Special ranges/special scaling
- Pressure resistance PN 500
- Temperature display 0..120 °C
- Reinforced piston

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Indicator H1VZ1

- **Viscosity stabilised from 30 to 200 mm²/s**
- **No electrical supply required**
- **Individually calibrated display**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 32..50	
Process connection	female thread G $1^1/_4$..G 2 (further process connections available on request)	
Display range	2..220 l/min	for details see table "Ranges"
$Q_{max.}$	to 250 l/min	
Tolerance	±5 % of the full scale value plus viscosity variation	
Pressure resistance	PN 200	
Media temperature	-20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water, oils (gases and aggressive media available on request)	
Electrical data	none	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite *DN 32..40:* NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, *DN 32..40:* FKM
Non-medium-contact materials	PC, acrylic	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

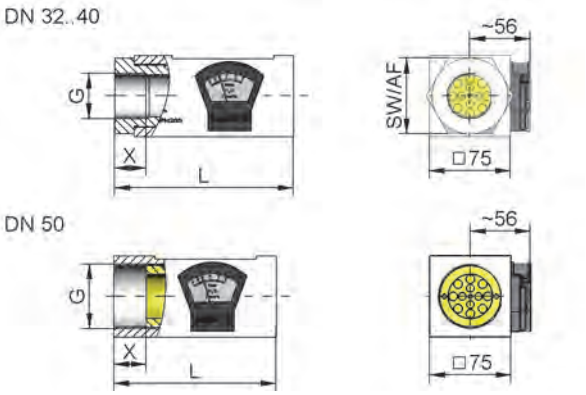
Details in the table correspond to horizontal inwards flow with increasing flow rate.

Display range l/min H_2O or oil 30..200 mm²/s	**$Q_{max.}$** recommended
2 - 15	50
5 - 25	60
10 - 45	100
20 - 65	150
30 - 110	200
50 - 160	230
100 - 220	250

Special ranges are available.

Dimensions and weights

DN	**G**	**Types**	**L**	**SW**	**X**	**Weight** kg
32	G $1^1/_4$	H1VZ1-032G.	165	70	29	5.8
40	G $1^1/_2$	H1VZ1-040G.				5.5
50	G 2	H1VZ1-050G.	150	-	26	5.0



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Handling and Operation

- 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)

Ordering code

	1.		2.	3.	4.	5.
H1V	**Z1**	-		**G**		

❍=Option

1.	**Display**	
	Z1	with frontal measurement display Z1
2.	**Nominal width**	
	032	DN 32 - G $1^1/_4$
	040	DN 40 - G $1^1/_2$
	050	DN 50 - G 2
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
	K ❍	stainless steel
5.	**Display range H_2O or oil 30..330 mm^2/s for horizontal inwards flow**	
	012	2 - 15 l/min
	025	5 - 25 l/min
	040	10 - 45 l/min
	060	20 - 65 l/min
	100	30 - 110 l/min
	150	50 - 160 l/min
	200	100 - 220 l/min

Options

- Special ranges/special scaling
- Temperature display 0..120 °C

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Indicator H1Z / H2Z

- **No electrical supply required**
- **Individually calibrated display**
- **Compact design**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 8..25	
Process connection	female thread G 1/4..G 1 (further process connections available on request)	
Display range	0.1..85 l/min	for details see table "Ranges"
Pressure loss	0.4..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
Media temperature	-20..+70 °C	
Ambient temperature	-20..+70 °C	
Media	water, oil (gases and aggressive media available on request)	
Electrical data	none	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	PC, acrylic	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

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

Standard type H1Z

Display range l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.1 - 1.2	6	0.4
0.5 - 6.0	10	0.5
1.0 - 12.0	20	0.6
2.0 - 23.0	30	0.4
3.0 - 34.0	40	
4.0 - 45.0	60	0.8
6.0 - 65.0	80	1.4
20.0 - 85.0	100	1.6

Special ranges are available.

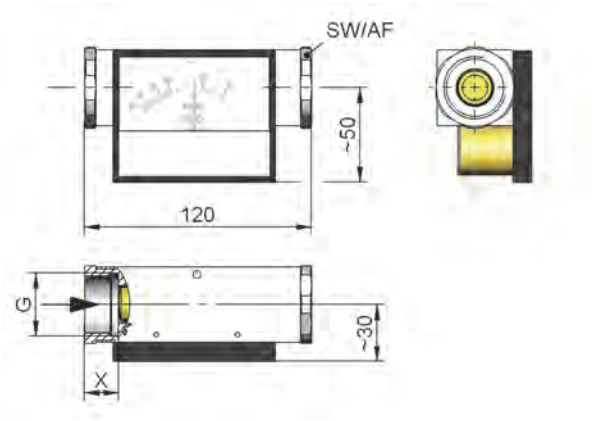
Viscosity compensated H2Z

Display range l/min oil 30..330 mm²/s	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ oil mm²/s 30	60	100	205	330	**Viscosity stability** ±8 %, min.
0.5 - 10	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 20	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 30	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 45	60					2.6	±2.7 l/min
12.0 - 65	80	2.1	2.3	2.4	2.6	2.8	±3.0 l/min

Special ranges are available.

Dimensions and weights

	G	**Types**	**SW**	**X**	**Weight** kg
Brass	G 1/4	H.Z-008GM	40	15	1.4
	G 3/8	H.Z-010GM			1.3
	G 1/2	H.Z-015GM			
	G 3/4	H.Z-020GM		18	
	G 1	H.Z-025GM			1.2
Stainless steel	G 1/4	H.Z-008GK	41	15	1.3
	G 3/8	H.Z-010GK			
	G 1/2	H.Z-015GK			
	G 3/4	H.Z-020GK		18	1.2
	G 1	H.Z-025GK			1.1



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Handling and Operation

- 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)

Ordering code

	1.	2.		3.	4.	5.	6.
H		**Z**	**-**		**G**		

1.	**Construction**			
	1	standard		
	2	viscosity compensated		
2.	**Display**			
	Z	with frontal measurement display Z		
3.	**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		
4.	**Process connection**			
	G	female thread		
5.	**Connection material**			
	M	brass		
	K	stainless steel		
6.	**H1 - Display range H_2O for horizontal inwards flow**			
	001	0.1 - 1.2 l/min		●
	005	0.5 - 6.0 l/min		●
	010	1.0 - 12.0 l/min		●
	020	2.0 - 23.0 l/min		●
	030	3.0 - 34.0 l/min		●
	040	4.0 - 45.0 l/min		●
	060	6.0 - 65.0 l/min		●
	080	20.0 - 85.0 l/min		●
	H2 - display range oil 30..330 mm²/s for horizontal inwards flow			
	008	0.5 - 10 l/min	●	
	015	1.5 - 20 l/min	●	
	025	2.5 - 30 l/min	●	
	040	6.0 - 45 l/min	●	
	060	12.0 - 65 l/min	●	

Options

- Special ranges/special scaling
- Pressure resistance PN 500
- Temperature display 0..120 °C
- Reinforced piston

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Indicator H1VZ

- **Viscosity stabilised from 30 to 200 mm²/s**
- **No electrical supply required**
- **Individually calibrated display**

Characteristics

A piston fitted with a magnet is pushed through the medium against the force of a spring. This activates the pointer of the measuring device by means of a magnetic coupling. Because of the hermetic separation from the medium, the display unit cannot be soiled by the medium.

Technical data

Switch	without	
Nominal width	DN 32..50	
Process connection	female thread G $1^1/_4$..G 2 (further process connections available on request)	
Display range	2..220 l/min	for details see table "Ranges"
$Q_{max.}$	to 250 l/min	
Tolerance	±5 % of the full scale value plus viscosity variation	
Pressure resistance	PN 200	
Media temperature	-20..+70 °C	
Ambient temperature	-20..+70 °C	
Media	water, oils (gases and aggressive media available on request)	
Electrical data	none	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite *DN 32..40:* NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, *DN 32..40:* FKM
Non-medium-contact materials	PC, acrylic	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the display range.	

Ranges

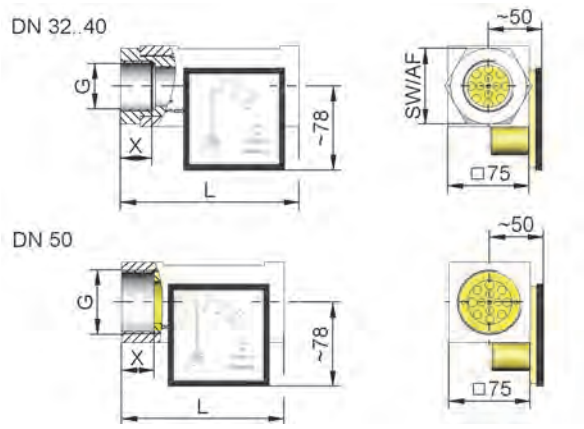
Details in the table correspond to horizontal inwards flow with increasing flow rate.

Display range l/min H_2O or oil 30..200 mm²/s	**$Q_{max.}$** recommended
2 - 15	50
5 - 25	60
10 - 45	100
20 - 65	150
30 - 110	200
50 - 160	230
100 - 220	250

Special ranges are available.

Dimensions and weights

DN	**G**	**Types**	**L**	**SW**	**X**	**Weight** kg
32	G $1^1/_4$	H1VZ-032G.	165	70	29	5.8
40	G $1^1/_2$	H1VZ-040G.				5.5
50	G 2	H1VZ-050G.	150	-	26	5.0



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Handling and Operation

- 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)

Ordering code

	1.		2.	3.	4.	5.
H1V	**Z**	-		**G**		

❍=Option

1.	**Display**	
	Z	with frontal measurement display Z
2.	**Nominal width**	
	032	DN 32 - G $1^1/_4$
	040	DN 40 - G $1^1/_2$
	050	DN 50 - G 2
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
	K ❍	stainless steel
5.	**Display range H_2O or oil 30..330 mm^2/s for horizontal inwards flow**	
	012	2 - 15 l/min
	025	5 - 25 l/min
	040	10 - 45 l/min
	060	20 - 65 l/min
	100	30 - 110 l/min
	150	50 - 160 l/min
	200	100 - 220 l/min

Options

- Special ranges/special scaling
- Temperature display 0..120 °C

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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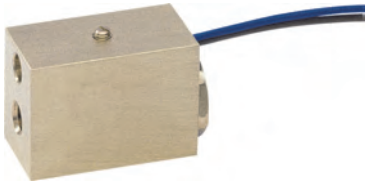
Flow Switch MF-003

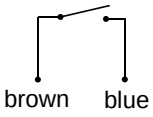


- **Compact construction**
- **Monitoring of small quantities of air/gas**

Characteristics

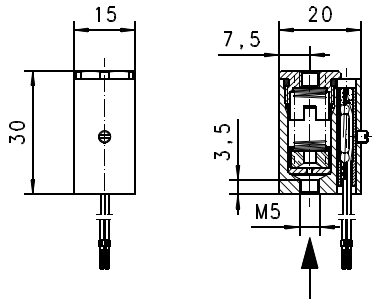
Mechanical flow switch for gaseous media, with magnetic triggering of a reed switch. Robust construction in brass.

Technical data

Switch	reed switch
Nominal width	DN 3
Process connection	female thread M5 (further process connections available on request)
Switching value	selectable between 1..100 Nl/min (air 1 bar abs. 0 °C) The switching point is suitable for horizontally decreasing flows.
$Q_{max.}$	100 l/min
Tolerance	±15 % of full scale value
Pressure resistance	PN 6
Media temperature	-20..+80 °C
Ambient temperature	-20..+70 °C
Medium	gas
Wiring	normally opened (n.o.) no. 0.372 
Switching voltage	max. 125 V AC
Switching current	max. 0.5 A
Switching capacity	max. 10 VA
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	2 wires 170 mm

Materials medium-contact	CW614N, 1.4310, hard ferrite, NBR
Non-medium-contact materials	PVC
Weight	0.06 kg
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the switching point.

Dimensions



Handling and operation

- 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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Ordering code

	1.	2.	3.
MF -	**003**	**G**	**M**

1.	**Nominal width**	
	003	DN 3 - M5
2.	**Process connection**	
	G	female thread
3.	**Connection material**	
	M	brass

Ordering information

- Specify direction of flow, medium, and switching value.
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request switching values).

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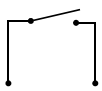
Flow Switch MF-007

- **Monitoring of small flows**

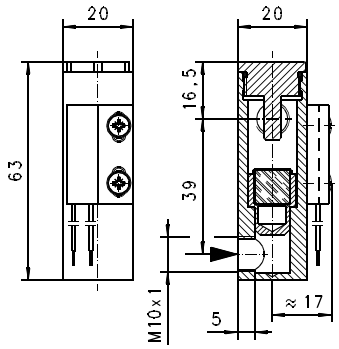
Characteristics

Mechanical flow switch for water, with magnetic triggering of a reed switch. Robust construction in brass.

Technical data

Switch	reed switch
Nominal width	DN 7
Process connection	female thread M10x1 (further process connections available on request)
Switching value	selectable between 0.05..1 l/min H_2O The switching value is suitable for vertical decreasing flows from below.
$Q_{max.}$	2 l/min
Tolerance	±15 % of full scale value
Pressure resistance	PN 6
Media temperature	-20..+80 °C
Ambient temperature	-20..+70 °C
Media	water
Wiring	normally opened (n.o.) no. 0.453 
Switching voltage	max. 125 V AC
Switching current	max. 0.5 A
Switching capacity	max. 10 VA
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	2 wires 300 mm
Materials medium-contact	CW614N, hard ferrite, NBR
Non-medium-contact materials	PTFE, CW614N nickelled, 1.4305
Weight	0.06 kg
Installation location	vertical inwards flow from below.

Dimensions



Handling and operation

- 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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads.
  Capacitive, inductive and lamp loads must be operated using a protective circuit.

Ordering code

	1.	2.	3.
MF -	**007**	**G**	**M**

1.	**Nominal width**	
	007	DN 7 - M10x1
2.	**Process connection**	
	G	female thread
3.	**Connection material**	
	M	brass

Ordering information

- Specify direction of flow, medium, and switching value.

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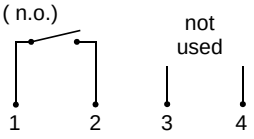
Flow Switch FW1-...GP

- **Economical design**
- **High switching power**
- **Insensitive to dirt**

Characteristics

Mechanical flow switch, for fluid media, with spring-supported piston and magnetic triggering of a reed switch. Robust construction in POM material.

Technical data

Switch	reed switch	
Nominal width	DN 15..25	
Process connection	female thread G 1/2..G 1 (note: for plastic parts it is not possible to guarantee trueness of calibration; further process connections available on request)	
Switching range	1..11 l/min	for details see table "Ranges"
Pressure loss	0.2..0.8 bar at $Q_{max.}$	
$Q_{max.}$	to 30 l/min	
Tolerance	±10 % of full scale value	
Pressure resistance	PN 10	
Media temperature	-20..+90 °C	
Ambient temperature	-20..+70 °C	
Media	water (oil available on request)	
Wiring	normally open (n.o.) No. 0.378 	
Switching voltage	max. 230 V AC	
Switching current	max. 0.5 A	
Switching capacity	max. 50 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 4-pole	
Materials medium-contact	POM GV, POM, 1.4310, hard ferrite	
Non-medium-contact materials	PC, 1.4301, 1.4305	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the switching point and range.	

Ranges

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

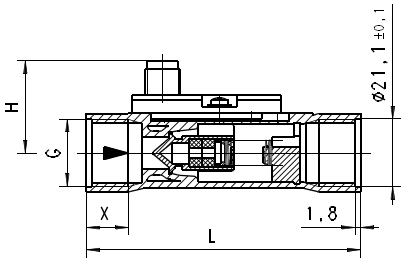
G	DN	Switching range l/min H_2O	$Q_{max.}$ re-com-men-ded	Pressure loss bar at $Q_{max.}$ H_2O
G 1/2	DN 15	1 - 6	20	0.8
G 3/4	DN 20	1 - 11	30	0.2
G 1	DN 25			

Special ranges are available.

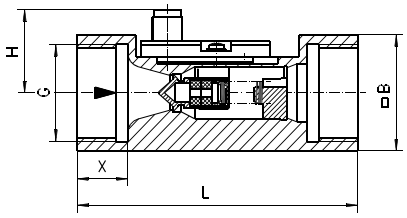
Dimensions and weights

G	Types	L	H	B	SW	X	Weight kg
G 1/2	FW1-015GP	85	30	-	27	12	0.05
G 3/4	FW1-020GP	100	36	36	-	18	0.15
G 1	FW1-025GP		38	40			0.20

FW1-015GP



FW1-020..025GP



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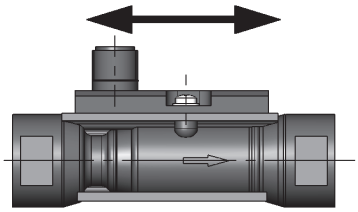
Handling and Operation

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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

Loosen screw slightly, push the switching head into the desired position, and then retighten the screw.



Ordering code

	1.	2.	3.	4.
FW1 -		**G**	**P**	

1.	**Nominal width**				
	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**				
	P	POM			
4.	**Switching range H_2O for horizontal inwards flow**				
	006	1 - 6 l/min			●
	011	1 - 11 l/min	●	●	

Options

- Switching value for oil
- Special values
- Cable outlet 3 m

Ordering information

- Specify direction of flow, medium, and switching range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about switching range).

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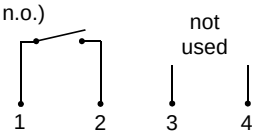
Flow Switch FW1-...GM

- **Economical design**
- **High switching power**
- **Insensitive to dirt**

Characteristics

Mechanical flow switch, for fluid media, with spring-supported piston and magnetic triggering of a reed switch. Robust construction in brass and POM.

Technical data

Switch	reed switch	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Switching range	1..11 l/min	for details see table "Ranges"
Pressure loss	0.2..0.8 bar at $Q_{max.}$	
$Q_{max.}$	to 30 l/min	
Tolerance	±10 % of full scale value	
Pressure resistance	PN 100 optionally up to PN 800	
Media temperature	-20..+90 °C	
Ambient temperature	-20..+70 °C	
Media	water (oils and aggressive media available on request)	
Wiring	normally open (n.o.) No. 0.378 	
Switching voltage	max. 230 V AC	
Switching current	max. 0.5 A	
Switching capacity	max. 50 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 4-pole	
Materials medium-contact	CW614N nickelled, CW614N, POM, 1.4310, hard ferrite	
Non-medium-contact materials	PC, 1.4301, 1.4305	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the switching point and range.	

Ranges

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

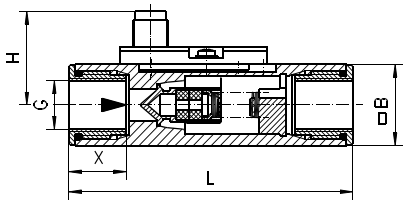
G	DN	Switching range l/min H_2O	$Q_{max.}$ recommended	Pressure loss bar at $Q_{max.}$ H_2O
G $^1/_4$	DN 8	1 - 6	8	0.2
G $^3/_8$	DN 10		10	0.3
G $^1/_2$	DN 15		20	0.8
G $^3/_4$	DN 20	1 - 11	30	0.2
G 1	DN 25			

Special ranges are available.

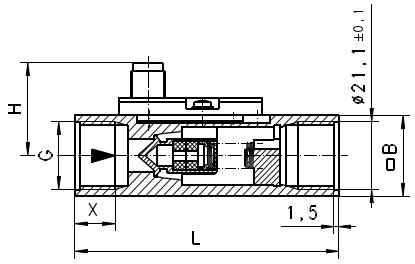
Dimensions and weights

G	Types	L	H	B	X	Weight kg
G $^1/_4$	FW1-008GM	89	30	25	18	0.35
G $^3/_8$	FW1-010GM					
G $^1/_2$	FW1-015GM	85			12	0.30
G $^3/_4$	FW1-020GM	100	36	36	18	0.75
G 1	FW1-025GM		38	40		0.85

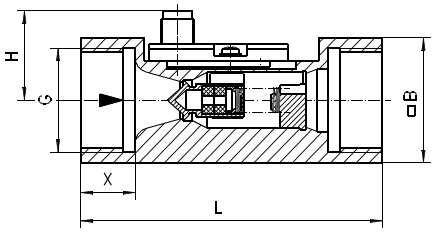
FW1-008..010GM



FW1-015GM



FW1-020..025GM



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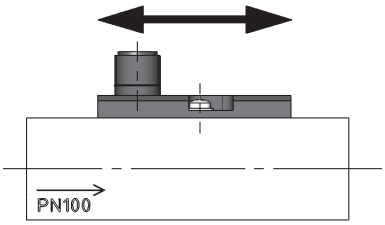
Handling and Operation

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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

Loosen screw slightly, push the switching head into the desired position, and then retighten the screw.



Ordering code

	1.	2.	3.	4.
FW1 -		**G**	**M**	

1.	**Nominal width**							
	008	DN 8 - G 1/4						
	010	DN 10 - G 3/8						
	015	DN 15 - G 1/2						
	020	DN 20 - G 3/4						
	025	DN 25 - G 1						
2.	**Process connection**							
	G	female thread						
3.	**Connection material**							
	M	brass						
4.	**Switching range H_2O for horizontal inwards flow**							
	006	1 - 6 l/min				●	●	●
	011	1 - 11 l/min	●	●				

Options

- Switching value for oil
- Special values
- Cable outlet 3 m
- Pressure stages PS 500 and PS 800 for DN 15

Ordering information

- Specify direction of flow, medium, and switching range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about switching range).

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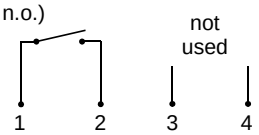
Flow Switch FW3

- **Compact construction**
- **Insensitive to dirt**

Characteristics

Mechanical flow switch, for fluid media, with spring-supported piston and magnetic triggering of a reed switch. Robust construction in brass.

Technical data

Switch	reed switch	
Nominal width	DN 8	
Process connection	female thread G $^1/_4$ (further process connections available on request)	
Adjustment range	0.4..2.5 l/min	for details see table "Ranges"
Pressure loss	up to 1.9 bar at $Q_{max.}$	
$Q_{max.}$	2.5..6 /min	
Tolerance	±10 % of the full scale value, minimum 0.3 l/min	
Pressure resistance	PN 100	
Media temperature	-20..+90 °C	
Ambient temperature	-20..+70 °C	
Media	water (oils available on request)	
Wiring	normally open (n.o.) No. 0.378 	
Switching voltage	max. 230 V AC	
Switching current	max. 0.5 A	
Switching capacity	max. 50 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 4-pole	
Materials medium-contact	*Brass construction:* CW614N nickelled, POM, 1.4310, hard ferrite	*Stainless steel construction: 1.4305*, POM, 1.4310, hard ferrite
Non-medium-contact materials	PC, 1,4301, 1.4305	
Weight	0.25 kg	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the switching point.	

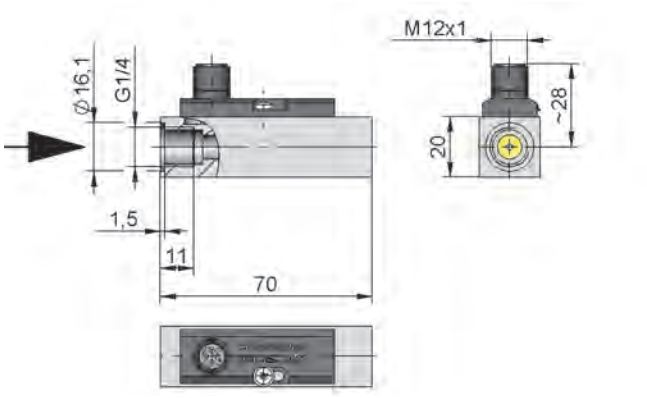
Ranges

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

Switching value l/min H_2O Choose between	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.4 - 0.6	2.5	1.3
0.7 - 1.4	4.0	1.0
1.5 - 2.5	6.0	1.9

Special ranges are available.

Dimensions



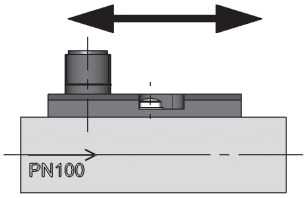
Handling and Operation

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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

As delivered, the device has been set up; if readjustment is required, loosen the screw slightly, twist the switching head to the desired position, and then retighten the screw.



Ordering code

	1.	2.	3.	4.
FW3 -	**008**	**G**		

❍=program option

1.	**Nominal width**	
	008	DN 8 - G 1/4
2.	**Process connection**	
	G	female thread
3.	**Connection material**	
	M	brass
	K ❍	stainless steel
4.	**Switching value selectable in the range for H_2O for horizontal inwards flow (specify switching value when ordering)**	
	006	0.4 - 0.6 l/min
	014	0.7 - 1.4 l/min
	025	1.5 - 2.5 l/min

Options

- Switching value for oil
- Special values
- Cable outlet 3 m

Ordering information

- Specify direction of flow, medium, and switching range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about switching range).

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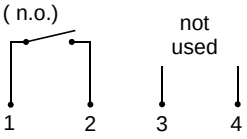
Flow Switch FW4V-015GM

- **Bidirectional flow switching**
- **Viscosity stabilised**
- **Compact design**

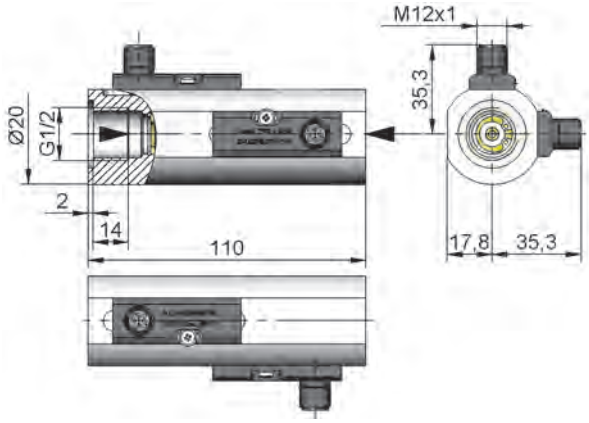
Characteristics

Mechanical flow switch, for viscous media, with spring-supported piston and magnetic triggering of a reed switch.

Technical data

Sensor	reed switch
Nominal width	DN 15
Process connection	female thread G $^1/_2$
Switching point	1 l/min the switching point is suitable for horizontally decreasing flows.
Pressure loss	8 bar at $Q_{max.}$
$Q_{max.}$	10 l/min
Tolerance	±10 %
Viscosity stability	at 30..330 mm²/s ±10 %, min ± 0.5 l/min
Pressure resistance	PS 300
Media temperature	-20 °C..+90 °C
Ambient temperature	-20 °C..+70 °C
Media	oils
Wiring	normally opened (n.o.) No. 0.378 
Switching voltage	max. 230 V AC
Switching current	max. 0.5 A
Switching capacity	max. 50 VA
Protection class	2 - safety insulation
Ingress protection	IP 67
Electrical connection	for round plug connector M12x1, 4-pole
Materials medium-contact	CW614N nickelled, 1.4310, hard ferrite
Non-medium-contact materials	PC, 1.4305
Weight	0.95 kg
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the switching point.

Dimensions



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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

The setting of the switching points to 1 l/min is carried out in the factory.

Ordering code

	1.	2.	3.	4.
FW4V -	**015**	**G**	**M**	**001**

1.	**Nominal width**	
	015	DN 15 - G $^1/_2$
2.	**Process connection**	
	G	female thread
3.	**Connection material**	
	M	brass
4.	**Switching point H_2O for horizontal inwards flow**	
	001	1 l/min

Options

- Special values
- Cable outlet 3 m

Ordering information

- Specify direction of flow, medium, and switching value .
- For viscous media specify viscosity, temperature, and medium (e.g. ISO VG 68) (enquire about switching range).

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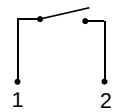
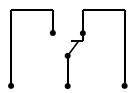
Flow Switch RVM

- **Monitoring of small flows**
- **PN 300 / 350**

Characteristics

Mechanical flow switch, for fluid or gaseous media, with magnetic triggering of a reed switch. Robust construction in brass or stainless steel.

Technical data

Switch	reed switch	
Nominal width	DN 8	
Process connection	female thread G $^1/_4$	
Switching range	0.04..3 l/min	for details see table "Ranges"
$Q_{max.}$	to 3.6 /min	
Tolerance	±10 % of full scale value	
Pressure resistance	brass construction PN 300 stainless steel construction PN 350	
Media temperature	-20..+100 °C optionally 160 °C	
Ambient temperature	-20..+70 °C	
Media	water (gas and aggressive media available on request)	
Wiring	normally open (n.o.) no. 0.372  changeover no. 0.282 	
Switching voltage	max. 200 V AC	
Switching current	max. 1 A	
Switching capacity	max. 20 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 65	
Electrical connection	DIN 43650-C plug	
Materials medium-contact	*Brass construction:* CW614N nickelled, CW614N, 1.4571, hard ferrite	*Stainless steel construction:* 1.4571, hard ferrite
Non-medium-contact materials	switching head PBT, PA, NBR, brass nickelled, stainless steel	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the switching point and range.	

Ranges

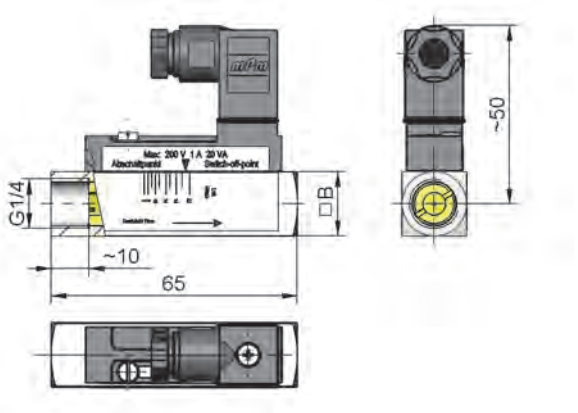
Details in the table correspond to horizontal inwards flow with decreasing flow rate.

Switching range H_2O	Types	$Q_{max.}$ recommended
40.0 - 130.0 ml/min	RVM-008G.013	0.168 l/min
0.1 - 0.6 l/min	RVM-008G.060	0.720 l/min
0.5 - 3.0 l/min	RVM-008G.300	3.600 l/min

Special ranges are available

Dimensions and weights

Construction	Type	B	Weight kg
Brass	RVM-008GM...	17	0.14
Stainless steel	RVM-008GK...	18	0.15



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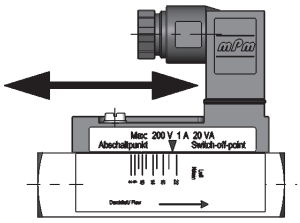
Handling and operation

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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

Loosen screw slightly, push the switching head into the desired position, and then retighten the screw.



Ordering code

	1.	2.	3.	4.
RVM -	**008**	**G**		

1.	**Nominal width**	
	008	DN 8 - G $^1/_4$
2.	**Process connection**	
	G	female thread
3.	**Connection material**	
	M	brass
	K	stainless steel
4.	**Switching range H_2O for horizontal inwards flow**	
	013	40.0 - 130.0 ml/min
	060	0.1 - 0.6 l/min
	300	0.5 - 3.0 l/min

Options

- Switching values for oil or gas
- Special values
- Switch contact as changeover

Ordering information

- Specify direction of flow, medium, and switching range.
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request switching range).

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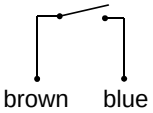
Flow Switch FX

- **Adjusted switching value**
- **Integrated filter**
- **High switching power**
- **Optional flow limiter in the outlet piece**

Characteristics

Mechanical flow switch, for fluid media, with magnetic triggering of a reed switch. Plastic housing with integrated filter.

Technical data

Switch	reed switch	
Nominal width	DN 15	
Process connection	male thread G $^1/_2$ A (note: For plastic parts it is not possible to guarantee trueness of calibration)	
Switching range	0.4..12 l/min	for details see table "Ranges"
Pressure loss	0.75..1.1 bar at $Q_{max.}$	
$Q_{max.}$	12 l/min	
Tolerance	±15 % of full scale value	
Pressure resistance	PN 10	
Media temperature	-20..+70 °C (80 °C at 6 bar)	
Ambient temperature	-20..+70 °C	
Media	water	
Wiring	normally open (n.o.) No. 0.372  	
Switching voltage	max. 230 V AC	
Switching current	max. 1 A	
Switching capacity	max. 50 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 65	
Electrical connection	cable 0.5 m	
Materials medium-contact	POM GV, CW614N, CuSn8, hard ferrite, NBR, Nylon type FXF with additional spring 1.4310	
Non-medium-contact materials	PVC	
Weight	without spring 0.14 kg with spring 0.15 kg	
Installation location	Standard: vertical inwards flow from below; other installation positions are possible with FXF; the installation position affects the switching point.	

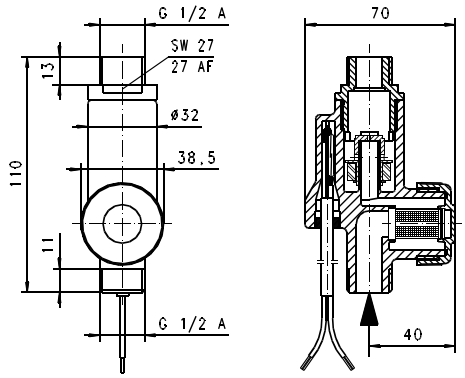
Ranges

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

G	Spring	**Switching value** l/min H_2O Choose between	$Q_{max.}$ recommended	**Pressure loss** bar at $Q_{max.}$ H_2O	Type
G $^1/_2$ A	no	0.4 - 5	12	0.75	FX-01 5AP
	yes	2.0 - 12	15	1.10	FXF-0 15AP

Special ranges are available.

Dimensions



Handling and operation

- Include straight calming section of 5 x DN in inlet and outlet
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

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Ordering code

	1.	2.	3.	4.
FX		**015**	**A**	**P**

1.	**Spring-supported**	
	-	without spring support
	F-	with spring support
2.	**Nominal width**	
	015	DN 15 - G $^1/_2$ A
3.	**Process connection**	
	A	male thread
4.	**Connection material**	
	P	POM

Ordering information

- Specify direction of flow, medium, and switching value.
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request switching value).
- Integrated flow limiter

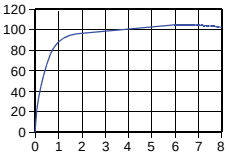
Options

Integrated flow limiter

Characteristics

Mechanical flow limiter for fluid media. From a pre-pressure greater than 2 bar, the flow rate is controlled to the desired volume flow.

Flow value%
of controlled value



Technical data

Controlled values	3 l/min	5 l/min	6 l/min
	8 l/min	10 l/min	12 l/min
Differential pressure	2..10 bar		
Tolerance	±15 %		
Medium temperature	0..65 °C		
Ambient temperature	0..65 °C		
Medium	water		
Materials	POM, NBR		
Weight	0.05 kg additionally		
Installation location	as desired		

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Flow Indicator / Switch NH1

- **Optionally switching contact**
- **Rotatable scale**
- **Visual range 360 °**

Characteristics

The NH1 flow indicator provides a reliable visual display of the present flow of a transparent fluid. The medium moves the indicator against the force of a spring, and in this way provides a quantitative determination of the flow, by reading the scale. The measurement tube is equipped with a dovetail guide which can optionally hold an NH1K limit value unit.

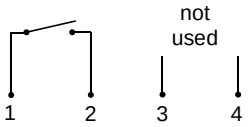
Technical data

Flow indicator NH1

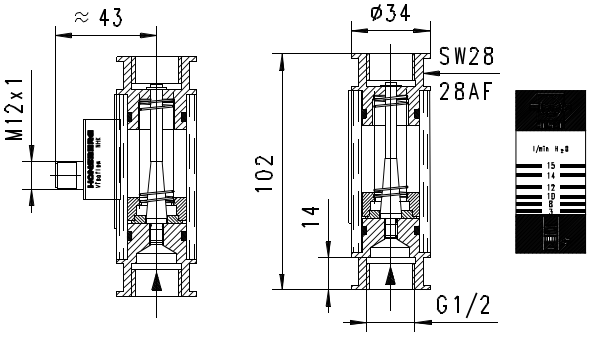
Nominal width	DN 15
Process connection	female thread G $^1/_2$ (further process connections available on request)
Display range	3..15 l/min - the display range corresponds to horizontal inwards flow with increasing flow rate.
$Q_{max.}$	20 l/min
Tolerance	±10 % of full scale value
Pressure resistance	PN 10
Media temperature	-20..+65 °C
Ambient temperature	-20..+65 °C
Media	water
Materials medium-contact	CW614N nickelled, acrylic XT, POM, 1.4310, FKM. with hard ferrite switching head
Non-medium-contact materials	CW614N nickelled, acrylic XT
Weight	0.35 kg
Installation location	vertical inwards flow from below

Switching contact NH1K

Switch	reed switch
Switching range	3..15 l/min - the switching range corresponds to horizontal inwards flow with decreasing flow rate.
Tolerance	±10 % of full scale value
Ambient temperature	-20..+65 °C

Wiring	maker no. 0.378 
Switching voltage	max. 250 V AC
Switching current	max. 0.5 A
Switching capacity	max. 10 VA
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	for round plug connector M12x1, 4-pole
Materials	POM
Weight	0.02 kg

Dimensions



Handling and operation

- 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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Ordering code

	1.	2.	3.	4.	5.
NH1		**015**	**G**	**M**	**015**

1.	**Switching contact**	
	-	flow indicator without switching contact
	K-	flow indicator with switching contact
2.	**Nominal width**	
	015	DN 15 - G $^1/_2$
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
5.	**Display range/switching range H_2O for vertical inwards flow**	
	015	3 -15 l/min

Ordering information

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

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Flow Indicator / Switch NO

- **Optionally switching contact**
- **Also for dark and dirty media**
- **Rotatable scale**
- **Visual range 360 °**

Characteristics

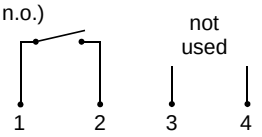
Mechanical flow meter with spring-supported pistons for fluid or gaseous media. The measured value is transferred to a display ring via a magnetic coupling. Because of this separation, the display cannot become dirty. Robust construction in brass or stainless steel.

Technical data

Flow indicator NO

Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Display range	3..60 l/min	for details see table "Ranges"
$Q_{max.}$	60 l/min	
Tolerance	±10 % of the full scale value, minimum 1 l/min	
Pressure resistance	PN 50	
Media temperature	-20..+90 °C	
Ambient temperature	-20..+70 °C	
Media	water (oils, gases and aggressive media available on request)	
Materials medium-contact	Brass construction: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR, FKM	
Non-medium-contact materials	Acrylic XT	
Weight	see table "Dimensions and weights"	
Installation location	Standard: Horizontal inwards flow from the left; other installation positions are possible; the installation position affects the switching point and range.	

Switch contact NOK

Switch	reed switch
Switching range	3..50 l/min, for details see table "Ranges"
Tolerance	±5 % of the full scale value, minimum 1 l/min
Ambient temperature	-20..+70 °C
Wiring	normally open (n.o.) no. 0.378 
Switching voltage	max. 250 V AC
Switching current	max. 0.5 A
Switching capacity	max. 10 VA
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	for round plug connector M12x1, 4-pole
Materials	POM
Weight	0.02 kg

Ranges

For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

G	Display range l/min H_2O	Switching range l/min H_2O	$Q_{max.}$ recommended	Types
G $^1/_4$	3 - 15	3 - 12	15	NO.-008G.015
G $^3/_8$				NO.-010G.015
G $^1/_2$	5 - 30	5 - 25	30	NO.-015G.030
G $^3/_4$	5 - 50	5 - 40	50	NO.-020G.030
G 1	10 - 60	10 - 50	60	NO.-025G.060

Dimensions and weights

G	Types	X	Weight kg
G $^1/_4$	NO.-008G.015	13	1.30
G $^3/_8$	NO.-010G.015		1.25
G $^1/_2$	NO.-015G.030	15	
G $^3/_4$	NO.-020G.030	18	1.15
G 1	NO.-025G.060		1.05

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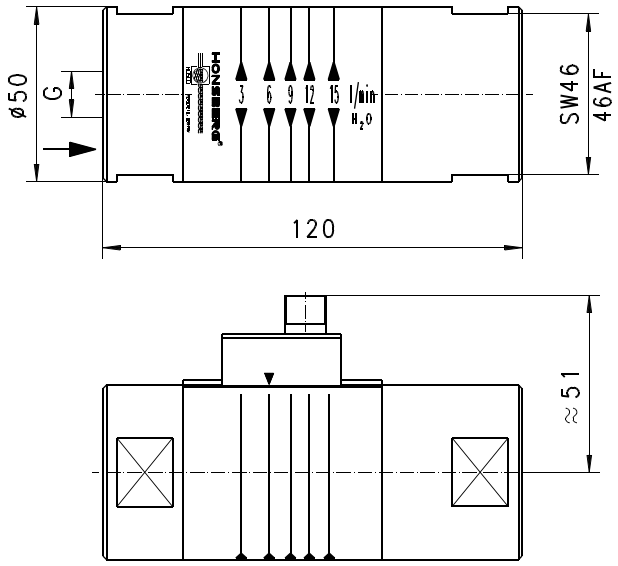

Handling and Operation

- 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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Ordering code

	1.	2.	3.	4.	5.
NO			**G**		

❍=Option

1.	**Switching contact**	
	-	flow indicator without switching contact
	K-	flow indicator with switching contact
2.	**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
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
5.	**Display range/switching range H_2O for vertical inwards flow**	
	015	3 -15 l/min
	030	5 -30 l/min
	050	5 -50 l/min
	060	10 -60 l/min

Options

- Display range 20..100 %
- Special values

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Indicator/ Switch NJ / NJV

- **Scale for various viscosities or viscosity stabilised from 30 to 200 mm²/s**
- **Also for dark or dirty media**
- **Robust construction**

Characteristics

Mechanical flow meter with spring-supported piston for fluid media. The measured value is transferred to a display ring via a magnetic coupling. Because of this separation, the display cannot become dirty. Robust construction in brass or stainless steel.

Technical data

Switch	optional reed switch	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Display range	2..80 l/min	for details see table "Ranges"
$Q_{max.}$	to 80 l/min	
Tolerance	±8 % of the full scale value, minimum 1 l/min	
Pressure resistance	PN 100	
Media temperature	-20..+100 °C	
Ambient temperature	-20..+70 °C	
Media	water (NJ only), oils (aggressive media available on request)	
Wiring	for options, see "Switch contact options"	
Switching voltage		
Switching current		
Switch performance		
Protection class		
Protection class		
Electrical connection		
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction only with NJ*: 1.4571, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	Acrylic HS	
Weight	see table "Dimensions and weights"	
Installation location	Standard: Vertical inwards flow from below; other installation positions are possible; the installation position affects the switching point and range.	

Ranges

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

Standard NJ

G	Display range l/min H_2O	$Q_{max.}$ recommended	Types
G $^1/_4$	2 - 10	10	NJ-008G.010
G $^3/_8$		20	NJ-010G.010
	4 - 20		NJ-010G.020
G $^1/_2$	2 - 10	40	NJ-015G.010
	4 - 20		NJ-015G.020
	10 - 40		NJ-015G.040
G $^3/_4$	2 - 10	60	NJ-020G.010
	4 - 20		NJ-020G.020
	10 - 40		NJ-020G.040
G 1	2 - 10	80	NJ-025G.010
	4 - 20		NJ-025G.020
	10 - 40		NJ-025G.040
	20 - 80		NJ-025G.080

Special ranges are available.

Multi-scale display ranges

1	20-45	75-120	180-250	mm²/s
2 - 10	0.6 - 8	0.2 - 7	0.1 - 4	l/min
4 - 20	2.0 - 19	1.0 - 17	0.5 - 15	
10 - 40	7.0 - 38	6.0 - 37	4.0 - 36	
20 - 80	19.0 - 73	17.0 - 68	13.0 - 63	

Viscosity stabilised NJV

Viscosity compensated devices are measured in the factory as per ISO VG100.

G	Display range l/min oil 30..200 mm²/s	$Q_{max.}$ recommended	Types
G $^1/_4$	2 - 10	10	NJV-008G.010
G $^3/_8$		20	NJV-010G.010
	4 - 20		NJV-010G.020
G $^1/_2$	2 - 10	40	NJV-015G.010
	4 - 20		NJV-015G.020
	10 - 40		NJV-015G.040
G $^3/_4$	2 - 10	60	NJV-020G.010
	4 - 20		NJV-020G.020
	10 - 40		NJV-020G.040
	10 - 60		NJV-020G.080
G 1	2 - 10	80	NJV-025G.010
	4 - 20		NJV-025G.020
	10 - 40		NJV-025G.040
	10 - 60		NJV-025G.080

Special ranges are available.

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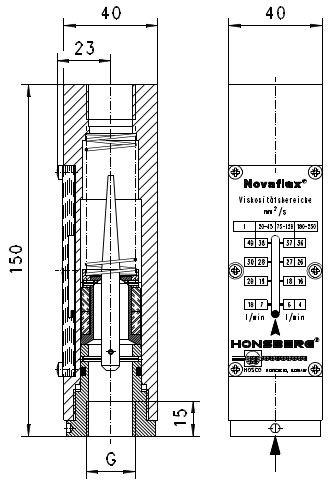
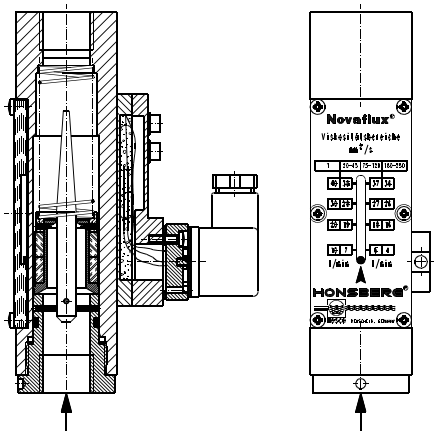
Dimensions and weights

G	Types	Weight kg		
		without switching head NJ- / NJV-	With switching head Plastic NJK / NJVK	with metal switching head NJM / NJVM
G 1/4	...-008G....	1.5	1.65	1.95
G 3/8	...-010G....	1.4	1.55	1.85
G 1/2	...-015G....	1.3	1.45	1.75
G 3/4	...-020G....			
G 1	...-025G....	1.2	1.35	1.65

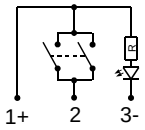


Switch contact options

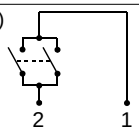
Plastic switch contacts



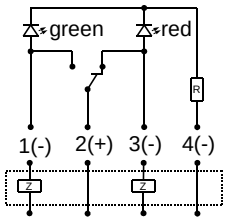
Switch contact K1

Wiring	maker no. 0.338 diode red 
Switching voltage	max. 250 V AC
Switching current	max. 0.5 A
Switch performance	max. 10 VA
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	DIN 43650-A plug
Non-medium-contact materials	PA
Additional weight	0.2 kg

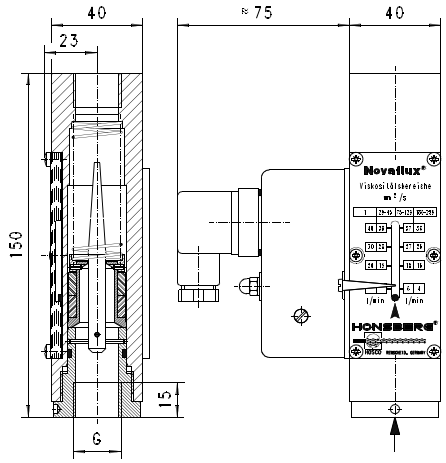
Switch contact K2

Wiring	normally open (n.o.) no. 0.445 
Switching voltage	max. 250 V AC
Switching current	max. 0.5 A
Switching capacity	max. 10 VA
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	DIN 43650-A plug
Non-medium-contact materials	PA
Additional Weight	0.2 kg

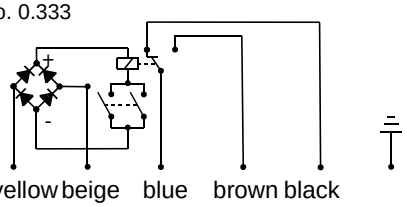
Switch contact K3

Wiring	changeover no. 0.347 
Switching voltage	max. 24 V DC
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	plug Hirschmann G 4
Non-medium-contact materials	PA
Additional weight	0.2 kg

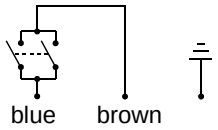
Switching contacts made of metal



Switch contact M1

Wiring	no. 0.333  Attention! Only hood is earthed, not the body of the flow indicator
Switching voltage	max. 250 V AC
Switching current	max. 5 A
Supply voltage	230 V AC, optionally 125 V AC, 24 V DN (10 mA)
Protection class	1 - PE connection
Ingress protection	IP 65
Electrical connection	cable 2.5 m
Non-medium-contact materials	steel, rilsan-coated, PA
Additional weight	0.35 kg

Switch contact M2

Wiring	normally open (n.o.) no. 0.215  Attention! Only hood is earthed, not the body of the flow indicator
Switching voltage	max. 250 V AC
Switching current	max. 0.5 A
Switch performance	max. 10 VA
Protection class	1 - PE connection
Ingress protection	IP 65
Electrical connection	cable 2.5 m
Non-medium-contact materials	steel, rilsan-coated, PA
Additional weight	0.3 kg

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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

If it is necessary to set the switching value, the switching head can be adjusted lengthways. When the switching value is reached, the switch contact is fixed in place by fastening bolts.

Ordering code

1.	2.	3.	4.	5.	6
			G		

❍=Option

1.	**Construction**			
	NJ	standard		
	NJV	viscosity compensated		
2.	**Switching contact**			
	-	without switch contact		
	K1-	with switch contact K1 - wiring 0.338		
	K2- ❍	with switch contact K2 - wiring 0.445		
	K3- ❍	with switch contact K3 - wiring 0.347		
	M1- ❍	with switch contact M1 - wiring 0.333		
	M2- ❍	with switch contact M2 - wiring 0.215		
3.	**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		
4.	**Process connection**			
	G	female thread		
5.	**Connection material**			
	M	brass		
	K ❍	stainless steel		
6.	**NJ - display range H_2O for vertical inwards flow**			
	010	2 - 10 l/min		●
	020	4 - 20 l/min		●
	040	10 - 40 l/min		●
	080	20 - 80 l/min		●
	NJV - display range oil 30..200 mm²/s for vertical inwards flow			
	010	2 - 10 l/min	●	
	020	4 - 20 l/min	●	
	040	10 - 40 l/min	●	
	060	20 - 60 l/min	●	

Options

- Special quantities/special scaling

Ordering information

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

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Flow Indicator / Switch VF

- **Optionally switching contact**

Characteristics

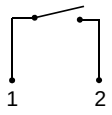
Mechanical flow indicator, which provides a quantitative flow display for fluid or gaseous media.

Technical data

Flow indicator VF

Nominal width	DN 8	
Process connection	female thread G $^1/_4$	
Display range	0.005..5 l/min	for details see table "Ranges"
$Q_{max.}$	5 l/min	
Tolerance	±10 % of full scale value	
Pressure resistance	PN 16	
Media temperature	-20..+100 °C	
Ambient temperature	-20..+70 °C	
Media	water (oils to 46 mm²/s, gases and aggressive media available on request)	
Materials medium-contact	*Brass construction:* CW614N nickelled, Duran 50, 1.4571, hard ferrite, NBR	*Stainless steel construction:* 1.4571, Duran 50, hard ferrite, FKM
Non-medium-contact materials	anodised aluminium	
Weight	0.14 kg	
Installation location	Standard: Vertical inwards flow from below; other installation positions are possible; the installation position affects the switching point and range.	

Switching contact VFR

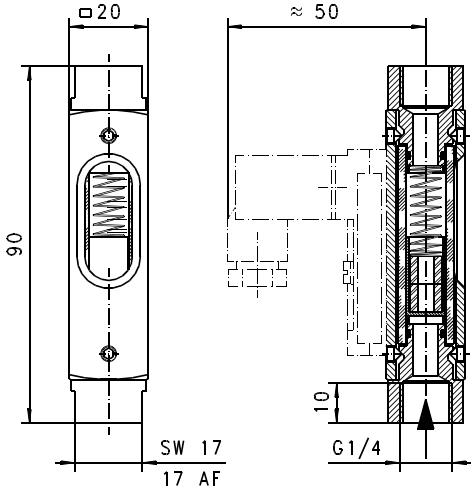
Switch	reed switch
Process connection	female thread G $^1/_4$
Switching range	0.005..5 l/min, for details see "Ranges"
Tolerance	±10 % of full scale value
Ambient temperature	-20..+70 °C
Wiring	normally open (n.o.) no. 0.372 
Switching voltage	max. 200 V AC
Switching current	max. 1 A
Switching capacity	max. 20 VA
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	DIN 43650-C plug
Non-medium-contact materials	PBT, PA, NBR, nickelled brass, stainless steel
Weight	0.02 kg

Ranges

For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

Display/switching range H_2O	**$Q_{max.}$** recommended	**Types**
5.0 - 60.0 ml/min	60.0 ml/min	VF.-008G.006
25.0 - 130.0 ml/min	130.0 ml/min	VF.-008G.013
0.1 - 0.6 l/min	0.6 l/min	VF.-008G.060
0.5 - 3.0 l/min	3.0 l/min	VF.-008G.300
1.0 - 5.0 l/min	5.0 l/min	VF.-008G.500

Dimensions



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Handling and operation

- 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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Ordering code

1.		2.	3.	4.	5.
	-	**008**	**G**		

1.	**Types**	
	VF	flow indicator
	VFR	flow indicator with switching contact
2.	**Nominal width**	
	008	DN 8 - G $^1/_4$
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
	K	stainless steel
5.	**Display / switching range H_2O for vertical inwards flow**	
	006	5.0 - 60.0 ml/min
	013	25.0 - 130.0 ml/min
	060	0.1 - 0.6 l/min
	300	0.5 - 3.0 l/min
	500	1.0 - 5.0 l/min

Options

- Display and switching ranges for oil or gas
- Special values
- Scale 0..100 %
- Types VFR - switching head with changeover
- Model for air

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, state pressure (relative or absolute), temperature and medium (e.g. air) (request display range)

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Flow Indicator / Switch VO

- **Optionally switching contact**

Characteristics

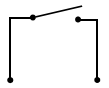
Mechanical flow indicator, which provides a quantitative flow display for fluid media.

Technical data

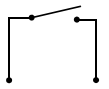
Flow indicator VO

Nominal width	DN 15.0.25	
Process connection	female thread G $^1/_2$..G 1	
Display range	0.1..150 l/min	for details see table "Ranges"
$Q_{max.}$	150 l/min	
Tolerance	±10 % of full scale value	
Pressure resistance	PN 10	
Media temperature	-20..+100 °C	
Ambient temperature	-20..+70 °C	
Media	water (oils, gases and aggressive media available on request)	
Materials medium-contact	*Brass construction:* CW614N nickelled, Duran 50, 1.4571, hard ferrite, NBR	*Stainless steel construction:* 1.4571, Duran 50, hard ferrite, FKM
Non-medium-contact materials	anodised aluminium	
Weight	see table "Dimensions and weights"	
Installation location	Standard: Vertical inwards flow from below; other installation positions are possible; the installation position affects the switching point and range.	

Switching contact VOR for DN 15

Switch	reed switch
Switching range	0.1..28 l/min, for details see "Ranges"
Tolerance	±10 % of full scale value
Ambient temperature	-20..+70 °C
Wiring	normally open (n.o.) no. 0.372 
Switching voltage	max. 230 V AC
Switching current	max. 3 A
Switching capacity	max. 60 VA
Protection class	2 -safety insulation
Ingress protection	IP 65
Connection	DIN 43650-C plug
Non-medium-contact materials	PC, PA, NBR, nickelled brass, stainless steel
Weight	0.02 kg

Switching contact VOR for DN 25

Switch/sensor	reed switch
Switching range	15..150 l/min, for details see "Ranges"
Tolerance	±10 % of full scale value
Ambient temperature	-20..+70 °C
Wiring	normally open (n.o.) no. 0.372 
Switching voltage	max. 230 V C
Switching current	max. 1.5 A
Switching capacity	max. 100 VA
Protection class	2 - safety insulation
Ingress protection	IP 65
Electrical connection	plug DIN 43650-A / ISO 4400
Non-medium-contact materials	PBC, PA, NBR, nickelled brass, stainless steel
Weight	0.02 kg

Ranges

For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

G	Display/ Switching range l/min H_2O	$Q_{max.}$ recommended	Types
G $^1/_2$	0.2 - 0.5	0.5	VO.-015G.0005
	0.3 - 1.0	1.0	VO.-015G.0010
	0.7 - 2.0	2.0	VO.-015G.0020
	1.6 - 4.0	4.0	VO.-015G.0040
	3.0 - 8.0	8.0	VO.-015G.0080
	8.0 - 20.0	20.0	VO.-015G.0200
	12.0 - 28.0	28.0	VO.-015G.0280
G 1	15.0 - 45.0	45.0	VO.-025G.0450
	30.0 - 90.0	90.0	VO.-025G.0900
	60.0 - 150.0	150.0	VO.-025G.1500

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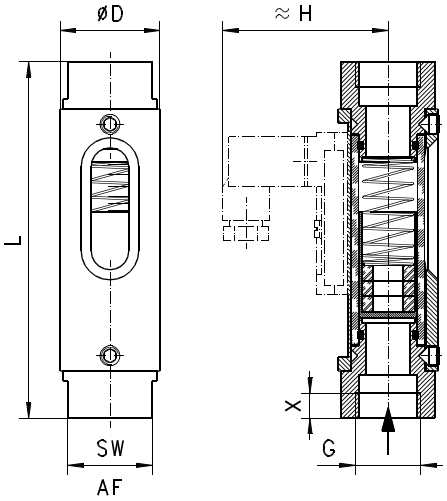
Dimensions and weights

G	Types	D	H	L	X	SW	Weight kg
G $^1/_2$	VO-015G.	32	-	114	8	27	0.30
	VOR-015G.		53				0.32
G 1	VO-025G.	50	-	158	10	41	1.00
	VOR-025G.		77				1.02



Handling and operation

- 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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Ordering code

1.		2.	3.	4.	5.
	-		G		

1.	**Types**			
	VO	flow indicator		
	VOR	flow indicator with switching contact		
2.	**Nominal width**			
	015	DN 15 - G $^1/_2$		
	025	DN 25 - G 1		
3.	**Process connection**			
	G	female thread		
4.	**Connection material**			
	M	brass		
	K	stainless steel		
5.	**Display / switching range H_2O for vertical inwards flow**			
	0005	0.2 - 0.5 l/min		●
	0010	0.3 - 1.0 l/min		●
	0020	0.7 - 2.0 l/min		●
	0040	1.6 - 4.0 l/min		●
	0080	3.0 - 8.0 l/min		●
	0220	8.0 - 20.0 l/min		●
	0280	12.0 - 28.0 l/min		●
	0450	15.0 - 45.0 l/min	●	
	0900	30.0 - 90.0 l/min	●	
	1500	60.0 - 150.0 l/min	●	

Options

- Display and switching ranges for oil or gas
- Special values
- Scale 0..100 %
- Optionally transformer 250 V AC, 1,5 A, 50 VA, Wiring no. 0.282
- Types VOR - switching head with changeover
- Model for air

Ordering information

- Specify direction of flow, medium, and display range.
- For oils. State viscosity, temperature and designation (e.g. ISO VG 68) (enquire about display range).
- For gases, specify pressure (relative or absolute), temperature and medium (e.g. air) (enquire about display range).

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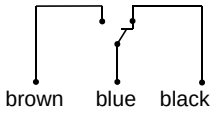
Flow Switch MR

- **High switching power**
- **Compact design**

Characteristics

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

Technical data

Switch	reed switch	
Nominal width	DN 8.0.25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Switching range	0.4..60 l/min	for details see table "Ranges"
Pressure loss	0.4..1.9 bar at $Q_{max.}$	
$Q_{max.}$	to 80 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200 (with optional display O1 G $^1/_4$..G $^3/_4$ PN 90)	
Media temperature	-20..+120 °C	
Ambient temperature	-20..+70 °C	
Media	water (oils, gases and aggressive media available on request)	
Wiring	transformer no. 0.213 	
Switching voltage	max. 250 V AC	
Switching current	max. 1.5 A	
Switching capacity	max. 50 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 65	
Electrical connection	cable 2.5 m (others cable lengths available on request)	
Materials medium-contact	Brass construction: CW614N nickelled, 1.4301, 1.4310, hard ferrite, NBR	Stainless steel construction: 1.4305, 1.4571, 1.4301, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	PA, PVC	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the switching point and range.	

Ranges

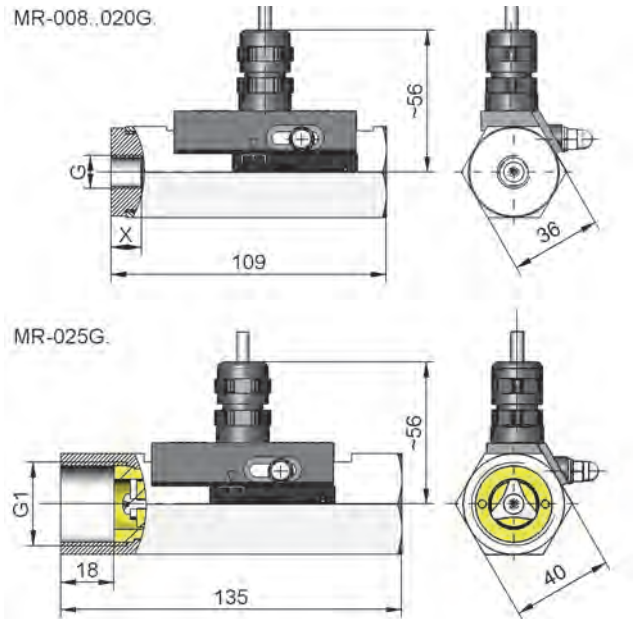
For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

Switching range l/min H_2O	**Optionally Display range** l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.4 - 4	0.5 - 5	10	0.4
1.0 - 10	1.0 - 12	20	0.9
5.0 - 20	5.0 - 25	30	0.7
10.0 - 40	5.0 - 40	60	1.9
20.0 - 60	20.0 - 60	80	1.6

Special ranges are available.

Dimensions and weights

	G	**Types**	**X**	**Weight** kg
Brass	G $^1/_4$	MR1K-008GM	12	0.9
	G $^3/_8$	MR1K-010GM		
	G $^1/_2$	MR1K-015GM		
	G $^3/_4$	MR1K-020GM	18	
	G 1	MR1K-025GM		1.2
Stainless steel	G $^1/_4$	MR1K-008GK	12	0.9
	G $^3/_8$	MR1K-010GK		
	G $^1/_2$	MR1K-015GK		
	G $^3/_4$	MR1K-020GK	18	0.8
	G 1	MR1K-025GK		1.1



additional weights for options

Display O1 / Z1 0.04 kg

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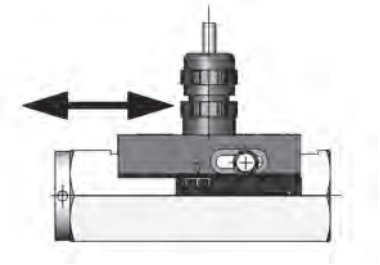
Handling and Operation

Note

- Install 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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

If it is necessary to set the switching value, the switching head can be adjusted lengthways. When the switching value is reached, the switching unit is fixed in place by fastening bolts.



Ordering code

	1.	2.	3.	4.	5.
MR			**G**		

1.	**Display options**	
	-	no mechanical display
	O1-	with measurement display at side O1
2.	**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
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
	K	stainless steel
5.	**Switching range H_2O for horizontal inwards flow**	
	004	0.4 - 4 l/min
	010	1.0 - 10 l/min
	020	5.0 - 20 l/min
	040	10.0 - 40 l/min
	060	20.0 - 60 l/min

MR1O1-

Options

- Switching values for oil or gas
- Special values
- Connection for round plug connector M12x1
- Additional switching head
- Damping for gas monitoring
- Rhodium contact 250 V AC, 0.5 A, 30 VA

Ordering information

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

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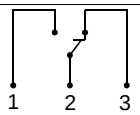
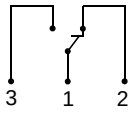
Flow Switch MR1K-

- **High switching power**
- **Compact design**

Characteristics

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

Technical data

Switch	reed switch	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Switching range	0.4..60 l/min	for details see table "Ranges"
Pressure loss	0.4..1.4 bar at $Q_{max.}$	
$Q_{max.}$	to 80 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
Media temperature	-20..+120 °C optionally -20..+150 °C	
Ambient temperature	-20..+70 °C	
Media	water (oils, gases and aggressive media available on request)	
Wiring	changeover no. 0.213  optionally changeover no. 0.282  optionally red or red / green diode in the DIN 43650-A plug	
Switching voltage	max. 250 V AC	
Switching current	max. 1.5 A	
Switching capacity	max. 50 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 65	
Electrical connection	plug DIN 43650-A / ISO 4400, optionally round plug connector M12x1, 4-pole	

Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	PA, CW614N, NBR	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the switching point and range.	

Ranges

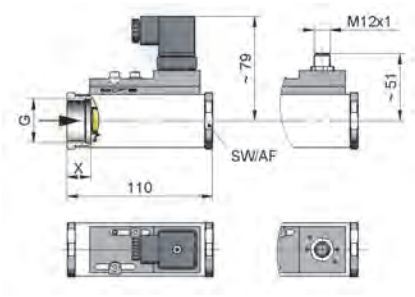
For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

Switching range l/min H_2O	**Display range** l/min H_2O O / O1	J	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.4 - 4	0.5 - 5	0.4 - 4	10	0.6
1.0 - 10	1.0 - 12	1.0 - 10	20	
2.0 - 20	2.0 - 23	2.0 - 20	30	0.4
3.0 - 30	3.0 - 34	3.0 - 30	40	
4.0 - 40	4.0 - 45	4.0 - 40	60	0.8
6.0 - 60	6.0 - 65	6.0 - 60	80	1.4

Special ranges are available.

Dimensions and weights

	G	**Types**	**SW**	**X**	**Weight** kg
Brass	G $^1/_4$	MR1K-008GM	40	15	1.3
	G $^3/_8$	MR1K-010GM			
	G $^1/_2$	MR1K-015GM			
	G $^3/_4$	MR1K-020GM		18	1.2
	G 1	MR1K-025GM			1.1
Stainless steel	G $^1/_4$	MR1K-008GK	41	15	1.2
	G $^3/_8$	MR1K-010GK			
	G $^1/_2$	MR1K-015GK			
	G $^3/_4$	MR1K-020GK		18	1.1
	G 1	MR1K-025GK			



Additional weights for options

Additional switching head	0.09 kg	Display O	0.09 kg
Display O1	0.04 kg	Display J	0.02 kg

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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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

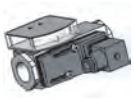
If it is necessary to set the switching value, the switching head can be adjusted lengthways. When the switching value is reached, the switching unit is fixed in place by fastening bolts.

Ordering code

	1.	2.	3.	4.	5.
MR1K			**G**		

1.	**Display options**	
	-	no mechanical display
	O1-	with measurement display at side O1
	O-	with measurement display at side O
	J-	with frontal measurement display J
2.	**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
3.	**Process connection**	
	G	female thread
4.	**Connection material**	
	M	brass
	K	stainless steel
5.	**Switching range H_2O for horizontal inwards flow**	
	004	0.4 - 4 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

MR1KO1



MR1KO

MR1KJ

Options

- Signal lamp red or red / green in the plug DIN 43650-A
- Connection for round plug connector M12x1
- Reinforced piston
- Additional switching head
- High pressure model PN 500 (only if made of brass)
- Damping for gas monitoring
- Rhodium contact
- Switching values for oil or gas
- Special values
- Temperature display 0..120 °C

Ordering information

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

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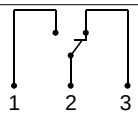
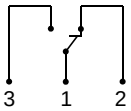
Flow Switch HD1F / HD2F

- **High switching power**
- **Compact design**

Characteristics

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

Technical data

Switch	reed switch	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Switching range	0.1..80 l/min	for details see table "Ranges"
Pressure loss	0.4..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
Media temperature	-20..+120 °C with display Z -20..+70 °C optionally -20..+150 °C	
Ambient temperature	-20..+70 °C	
Media	water, oil (gases and aggressive media available on request)	
Wiring	changeover No. 0.213  optionally changeover No. 0.282  optionally red or red / green diode in the plug DIN 43650-A / ISO 4400	
Switching voltage	max. 250 V AC	
Switching current	max. 1.5 A	
Switching capacity	max. 50 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 65	

Electrical connection	plug DIN 43650-A / ISO 4400 optionally for round plug connector M12x1, 4-pole	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	PA, CW614N, NBR	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the switching point and range.	

Ranges

For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

Standard type HD1F

Switching range l/min H_2O	**optionally Display range** l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.1 - 1.0	0.1 - 1.2	6	0.4
0.5 - 5.0	0.5 - 6.0	10	0.5
1.0 - 10.0	1.0 - 12.0	20	0.6
2.0 - 20.0	2.0 - 23.0	30	0.4
3.0 - 30.0	3.0 - 34.0	40	
4.0 - 40.0	4.0 - 45.0	60	0.8
6.0 - 60.0	6.0 - 65.0	80	1.4
20.0 - 80.0	20.0 - 85.0	100	1.6

Special ranges are available.

Viscosity compensated type HD2F

Switching range	**Optionally Display range**	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ oil mm²/s					**Viscosity stability**
l/min oil 30..330 mm²/s			30	60	100	205	330	±8 %, min.
0.5 - 8	0.5 - 10	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 15	1.5 - 20	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 25	2.5 - 30	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 40	6.0 - 45	60					2.6	±2.7 l/min
12.0 - 60	12.0 - 65	80	2.1	2.3	2.4	2.6	2.8	±3 l/min

Special ranges are available.

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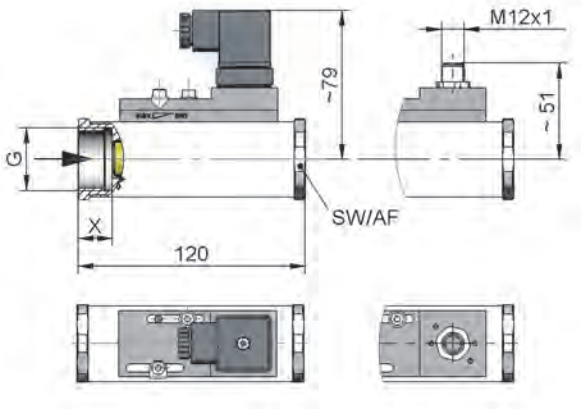
Dimensions and weights

	G	Types	SW	X	Weight kg
Brass	G 1/4	HD.F-008GM	40	15	1.4
	G 3/8	HD.F-010GM			
	G 1/2	HD.F-015GM			1.3
	G 3/4	HD.F-020GM		18	
	G 1	HD.F-025GM			1.2
Stainless steel	G 1/4	HD.F-008GK	41	15	1.3
	G 3/8	HD.F-010GK			
	G 1/2	HD.F-015GK			
	G 3/4	HD.F-020GK		18	1.2
	G 1	HD.F-025GK			1.1



additional weights for options

additional switching head 0.10 kg Display O / Z 0.10 kg
Display O1 / Z1 0.05 kg

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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

If it is necessary to set the switching value, the switching head can be adjusted lengthways. When the switching value is reached, the switching unit is fixed in place by fastening bolts.

Ordering code

HD [1.] [2.] [3.] [4. G] [5.] [6.]

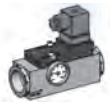
1.	**Construction**			
	1F	standard		
	2F	viscosity compensated		
2.	**Display options**			
	-	no mechanical display		
	O1-	with measurement display at side O1		
	O-	with measurement display at side O		
	Z1-	with frontal measurement display Z1		
	Z-	with frontal measurement display Z		
	A-	with temperature display at side		
3.	**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		
4.	**Process connection**			
	G	female thread		
5.	**Connection material**			
	M	brass		
	K	stainless steel		
6.	**HD1F - switching range H_2O 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		●
	HD2F - switching 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	●	


HD.FO1-


HD.FO-


HD.FZ1-


HD.KZ-


HD.FA-

Options

- Signal lamp red or red / green in the plug DIN 43650-A
- Rhodium contact
- Temperature resistant up to 150 °C
- Reinforced piston (only if made of brass)
- Additional switching head
- Connection for round plug connector M12x1
- High pressure model PN 500 (only if made of brass)
- Switching values for oil or gas
- Special values
- Temperature display 0..120 °C

Ordering information

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

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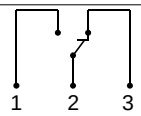
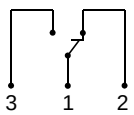
Flow Switch HM1K / HM2K

- **High switching power**
- **Compact design**

Characteristics

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

Technical data

Switch	microswitch	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Switching range	0.1..74 l/min	for details see table "Ranges"
Pressure loss	0.4..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200	
Media temperature	-20..+70 °C	
Ambient temperature	-20..+70 °C	
Media	water, oil (gases and aggressive media available on request)	
Wiring	changeover No. 0.371  optionally changeover No. 0.282 	
Switching voltage	max. 250 V AC	
Switching current	max. 5 A (round plug connector max. 4A)	
Protection class	2 - safety insulation	
Ingress protection	IP 65	
Electrical connection	plug DIN 43650-A / ISO 4400 optionally for round plug connector M12x1, 4-pole	

Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	PA, CW614N, NBR	
Weight	see table "Dimensions and weights"	
Installation location	horizontal inwards flow; switching head on top.	

Ranges

For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

Standard type HM1K

Switching range l/min H_2O	**Optionally Display range** l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.1 - 0.8	0.1 - 1.2	6	0,4
0.5 - 4.0	0.5 - 6.0	10	0,5
1.0 - 8.0	1.0 - 12.0	20	0,6
2.0 - 16.0	2.0 - 23.0	30	0,4
3.0 - 26.0	3.0 - 34.0	40	
4.0 - 36.0	4.0 - 45.0	60	0,8
6.0 - 55.0	6.0 - 65.0	80	1,4
20.0 - 74.0	20.0 - 85.0	100	1,6

Special ranges are available.

Viscosity compensated HM2K

Switching range	**Optionally Display range**	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ oil mm²/s					**Viscosity stability**
l/min oil 30..330 mm²/s			30	60	100	205	330	±8 %, min.
0.5 - 8	0.5 - 10	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 15	1.5 - 20	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 25	2.5 - 30	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 40	6.0 - 45	60					2.6	±2.7 l/min
12.0 - 60	12.0 - 65	80	2.1	2.3	2.4	2.6	2.8	±3 l/min

Special ranges are available.

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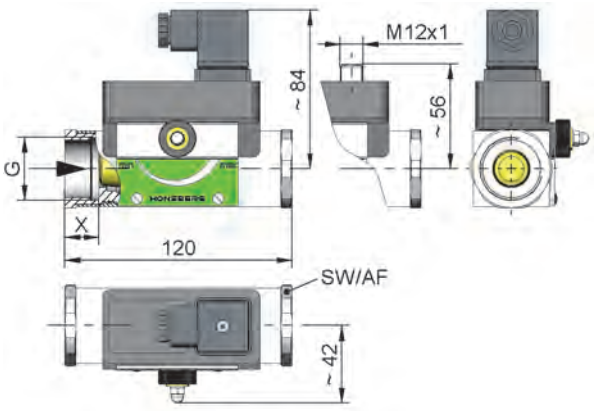
Dimensions and weights

	G	Types	SW	X	Weight kg
Brass	G 1/4	...-008GM	40	15	1.4
	G 3/8	...-010GM			
	G 1/2	...-015GM			1.3
	G 3/4	...-020GM		18	
	G 1	...-025GM			1.2
Stainless steel	G 1/4	...-008GK	41	15	1.4
	G 3/8	...-010GK			
	G 1/2	...-015GK			1.3
	G 3/4	...-020GK		18	
	G 1	...-025GK			1.2



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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive and inductive loads must be operated using a protective circuit.

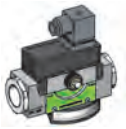
Adjustment

If it is necessary to set the switching value, the switching head can be adjusted by adjustment of a pinion. When the switching value is reached, the switching unit is fixed in place by a fastening bolt (SW 8).

Ordering code

HM | 1. | 2. | 3. | 4. G | 5. | 6.

1.	**Construction**			
	1K	standard		
	2K	viscosity compensated		
2.	**Display options**			
	-	no mechanical display		
	O1-	with measurement display at side O1		
	O-	with measurement display at side O		
	A-	with temperature display 0 - 12 °C		
3.	**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		
4.	**Process connection**			
	G	female thread		
5.	**Connection material**			
	M	brass		
	K	stainless steel		
6.	**HM1K - switching range H_2O for horizontal inwards flow**			
	001	0.1 - 0.8 l/min		●
	004	0.4 - 4.0 l/min		●
	008	1.0 - 8.0 l/min		●
	016	2.0 - 16.0 l/min		●
	026	3.0 - 26.0 l/min		●
	036	4.0 - 36.0 l/min		●
	055	6.0 - 55.0 l/min		●
	074	20.0 - 74.0 l/min		●
	HM2K - switching range oil 30..330 mm²/s for horizontal inwards flow			
	006	0.5 - 6.0 l/min	●	
	012	1.5 - 12.0 l/min	●	
	022	2.5 - 22.0 l/min	●	
	036	6.0 - 36.0 l/min	●	
	055	12.0 - 55.0 l/min	●	


HM.KO1-


HM.KO-

Options

- Signal lamp red or red / green in the plug DIN 43650-A
- Gold contact
- Reinforced piston (only if made of brass)
- Connection for round plug connector M12x1
- Switching head with metal cap
- Adjustment scale with markings in l/min
- Switching values for oil or gas
- Special values
- Temperature display 0..120 °C

Ordering information

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

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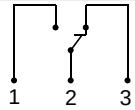
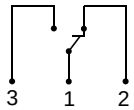
Flow Switch HD1K / HD2K

- **High switching power**
- **Compact design**

Characteristics

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

Technical data

Switch	reed switch	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1 (further process connections available on request)	
Switching range	0.1..80 l/min	for details see table "Ranges"
Pressure loss	0.4..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±5 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
Media temperature	-20..+120 °C with display Z -20..+70 °C optionally -20..+150 °C	
Ambient temperature	-20..+70 °C	
Media	water, oil (gases and aggressive media available on request)	
Wiring	changeover No. 0.213  optionally changeover No. 0.282  optionally red or red / green diode in the DIN 43650-A plug	
Switching voltage	max. 250 V AC	
Switching current	max. 1.5 A	
Switching capacity	max. 50 VA	
Protection class	2 - Safety insulation	
Ingress protection	IP 65	

Electrical connection	plug DIN 43650-A / ISO 4400 Optionally for round plug connector M12x1, 4-pole	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	PA, CW614N, NBR	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the switching point and range.	

Ranges

For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

Standard type HD1K

Switching range l/min H_2O	**Optionally Display range** l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
0.1 - 1.0	0.1 - 1.2	6	0.4
0.5 - 5.0	0.5 - 6.0	10	0.5
1.0 - 10.0	1.0 - 12.0	20	0.6
2.0 - 20.0	2.0 - 23.0	30	0.4
3.0 - 30.0	3.0 - 34.0	40	
4.0 - 40.0	4.0 - 45.0	60	0.8
6.0 - 60.0	6.0 - 65.0	80	1.4
20.0 - 80.0	20.0 - 85.0	100	1.6

Special ranges are available.

Viscosity compensated type HD2K

Switching range	**Optionally Display range**	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ oil mm²/s					**Viscosity stability**
l/min oil 30..330 mm²/s			30	60	100	205	330	±8 %, min.
0.5 - 8	0.5 - 10	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 15	1.5 - 20	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 25	2.5 - 30	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 40	6.0 - 45	60					2.6	±2.7 l/min
12.0 - 60	12.0 - 65	80	2.1	2.3	2.4	2.6	2.8	±3 l/min

Special ranges are available.

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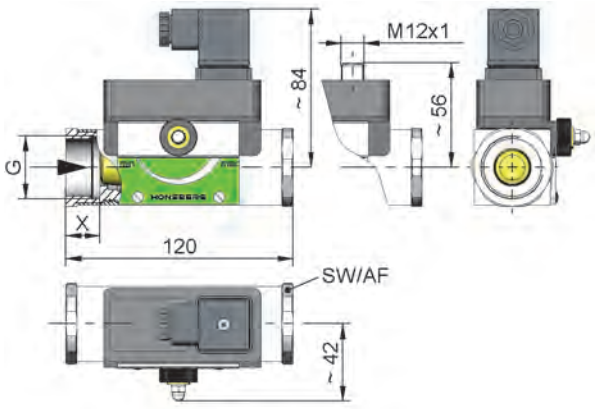
Dimensions and weights

	G	Types	SW	X	Weight kg
Brass	G 1/4	HD.K-008GM	40	15	1.4
	G 3/8	HD.K-010GM			
	G 1/2	HD.K-015GM			1.3
	G 3/4	HD.K-020GM		18	
	G 1	HD.K-025GM			1.2
Stainless steel	G 1/4	HD.K-008GK	41	15	1.3
	G 3/8	HD.K-010GK			
	G 1/2	HD.K-015GK			
	G 3/4	HD.K-020GK		18	1.2
	G 1	HD.K-025GK			1.1



additional weights for options

additional switching head	0.10 kg	Display O / Z	0.10 kg
Display O1 / Z1	0.05 kg		

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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

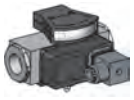
Adjustment

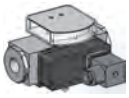
If it is necessary to set the switching value, the switching head can be adjusted by adjustment of a pinion. When the switching value is reached, the switching unit is fixed in place by a fastening bolt (SW 8).

Ordering code

HD [1.] [2.] [3.] [4. G] [5.] [6.] [7.]

1.	**Construction**			
	1K	standard		
	2K	viscosity compensated		
2.	**Display options**			
	-	no mechanical display		
	O1-	with measurement display at side O1		
	O-	with measurement display at side O		
	Z1-	with frontal measurement display Z1		
	Z-	with frontal measurement display Z		
	A-	with temperature display at side		
3.	**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		
4.	**Process connection**			
	G	female thread		
5.	**Connection material**			
	M	brass		
	K	stainless steel		
6.	**HD1K - switching range H_2O 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		●
	HD2K - switching 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	●	
7.	**Special switching head**			
	A	switching head ATEX A-H1.1 / A-H2.1 Please order the switching head for Ex -use in addition.		


HD.KO1-


HD.KO-


HD.KZ1-


HD.KZ-


HD.KA-

Options

- Signal lamp red or red / green in the plug DIN 43650-A
- Rhodium contact
- Temperature resistant up to 150 °C
- Reinforced piston (only if made of brass)
- Additional switching head
- Connection for round plug connector M12x1
- High pressure model PN 500 (only if made of brass)
- Adjustment scale with markings in l/min
- Temperature monitoring
- Damping for gas monitoring (only for standard version)
- Switching values for oil or gas
- Special values
- Temperature display 0..120 °C
- Switching head made of metal

Ordering information

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

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Switching Head A-H1.1

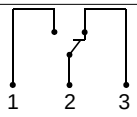
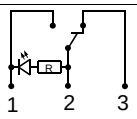
For devices **HD1K-** **HD2K-**
HD1KO- **HD2KO-**

- **I M1 Ex ia I**
- **II 1G Ex ia IIC T4**
- **II 1D Ex iaD 20 T135**

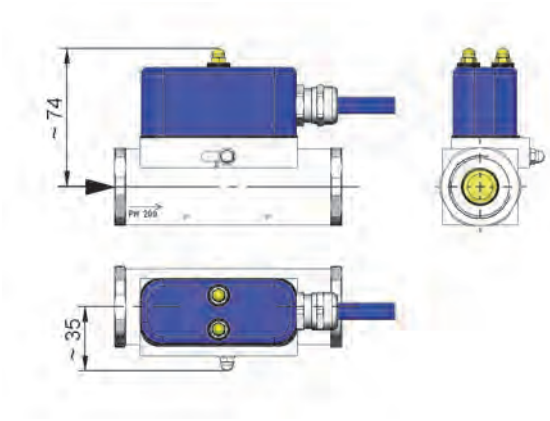
Characteristics

Intrinsically safe switching head with reed switch and ATEX approval, for the HD range of devices, for use in intrinsically safe power circuits.

Technical data

Switch	reed switch
Medium temperature	-20..+120 °C
Ambient temperature	-20..+50 °C
Weight	0.5 kg additionally
without diode	
Wiring	changeover No. 0.213 
Switching voltage	max. 30 V
Switching current	max. 1.5 A
Switching capacity	max. 50 W
with diode	
Wiring	changeover with diode no. 0.208 
Switching voltage	max. 15 V, 28 V or 36 V
Switching current	max. 1.5 A
Switching capacity	max. 45 W
Protection class	3 - protective extra low voltage
Ingress protection	IP 65
Electrical connection	cable 2.5 m, other cable lengths up to max. 5 m are optionally available

Dimensions



Handling and operation

Note

All

- For use only in intrinsically safe power circuits - Provide a suitable isolating amplifier.
- Cable lengths max. 5 m.
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switched on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

HD1KO- / HD2KO-

- Display with plastic parts - do not open in an explosive atmosphere.

Adjustment

If it is necessary to set the switching value, the switching head can be adjusted lengthways. When the switching value is reached, the switching unit is fixed in place by a fastening bolt.

Ordering code

The basic device is ordered e.g. HD1K-015GM005A with Switching head e.g. A-H1.1-1.

A-H1.1 - 1. ☐

1.	Wiring - switching voltage	
	1	wiring no. 0.213 - 30 V
	2	wiring no. 0.208 - 15 V
	3	wiring no. 0.208 - 28 V
	4	wiring no. 0.208 - 36 V

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Switching Head A-H2.1

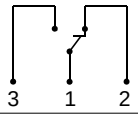
For devices **HD1K-** **HD2K-**
HD1KO- **HD2KO-**

- **I M1 Ex ia I**
- **II 1G Ex ia IIC T4**
- **II 1D Ex iaD 20 T135**

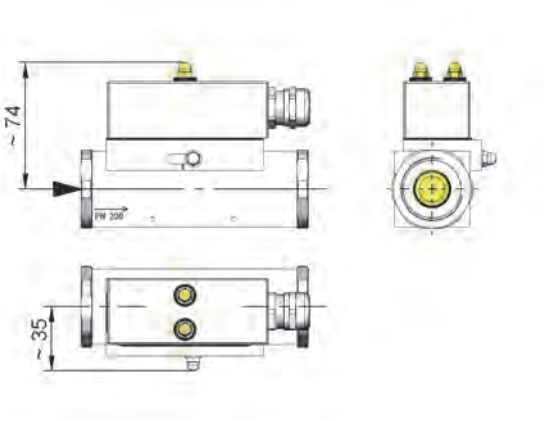
Characteristics

Intrinsically safe switching head with reed switch and ATEX approval, for the HD range of devices, for use in intrinsically safe power circuits.

Technical data

Switch	reed switch
Temperature	T_u max. 50 °C
Weight	0.35 kg additionally
Switch	reed switch
Wiring	changeover no. 0.282 
Switching voltage	max. 30 V
Switching current	max. 1.5 A
Switching capacity	max. 50 W
Ingress protection	IP 65
Protection class	3 - protective extra low voltage
Electrical connection	cable screw gland M20x1.5 for cable diameter 7-13 mm corresponding to DIN EN 60067-14, VDE 0165 part 1, blade cross-section max. 1.5 mm²

Dimensions



Handling and operation

Note

All

- For use only in intrinsically safe power circuits - Provide a suitable isolating amplifier.
- Cable lengths max. 5 m.
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switched on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

HD1KO- / HD2KO-

- Display with plastic parts - do not open in an explosive atmosphere.

Adjustment

If it is necessary to set the switching value, the switching head can be adjusted lengthways. When the switching value is reached, the switching unit is fixed in place by a fastening bolt.

Ordering code

The basic device is ordered e.g. HD1K-015GM005A with Switching head A-H2.1

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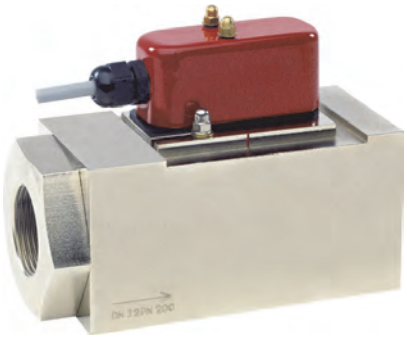
Flow Switch HR1MV

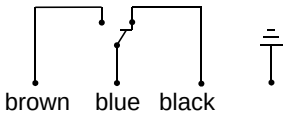


- **Viscosity stabilised from 30 to 200 mm²/s**
- **High switching power**
- **Solid construction**

Characteristics

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

Technical data

Switch	reed switch	
Nominal width	DN 32..50	
Process connection	female thread G $1^1/_4$..G 2 (further process connections available on request)	
Switching range	2..220 l/min	for details see table "Ranges"
$Q_{max.}$	to 250 l/min	
Tolerance	±5 % of the full scale value plus viscosity variation	
Pressure resistance	PN 200	
Media temperature	-20..+120 °C with display Z -20..+70 °C	
Ambient temperature	-20..+70 °C	
Media	water, oils (gases and aggressive media available on request)	
Wiring	changeover No. 0.227 	
Switching voltage	max. 250 V AC	
Switching current	max. 1.5 A	
Switching capacity	max. 50 VA	
Protection class	2 - safety insulation	
Ingress protection	IP 65	
Electrical connection	cable 2.5 m, optionally plug DIN 43650-A / ISO 4400 or for round plug connector M12x1, 4-pole	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite *DN 32..40:* NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, *DN 32..40:* FKM
Non-medium-contact materials	steel coated with Rilsal, CW614N, NBR	

Weight	see table "Dimensions and weights"
Installation location	Standard: horizontal inwards flow from the left; other installation positions are possible; the installation position affects the switching point and range.

Ranges

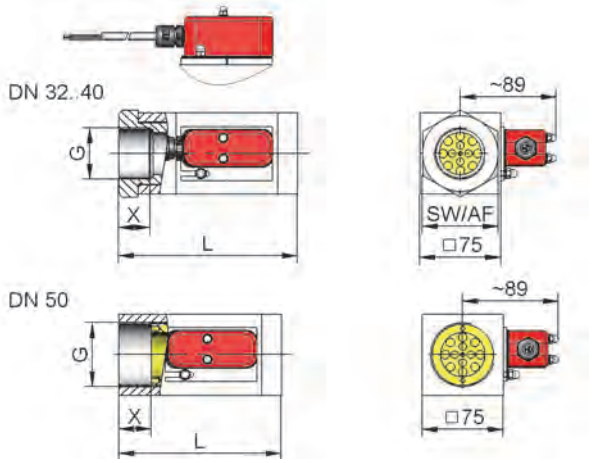
For switching ranges, the details in the table correspond to horizontal inwards flow and decreasing flow rate; for display ranges they correspond to horizontal inwards flow and increasing flow rate.

Switching range l/min H_2O or oil 30..200 mm²/s	**Display range** l/min H_2O or oil 30..200 mm²/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.

Dimensions and weights

DN	G	Types	L	SW	X	Weight kg
32	G $1^1/_4$	HR1MV-0032G.	165	70	29	6.0
40	G $1^1/_2$	HR1MV-0040G.	165			5.7
50	G 2	HR1MV-0050G.	150	-	26	5.2



Additional weights for options

Display O1 / Z1	0.05 kg
Display O	0.10 kg
Display Z	0.15 kg

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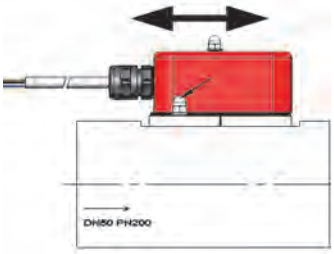
Handling and Operation

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).
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switch on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

Adjustment

If it is necessary to set the switching value, the switching head can be adjusted lengthways. When the switching value is reached, the switching unit is fixed in place by fastening bolts.



Ordering code

	1.	2.	3.	4.	5.	6.
HR1MV			G			

❍=Option

1.	**Display options**		
	-	no mechanical display	
	O1-	with measurement display at side O1	HR1MVO1
	O-	with measurement display at side O	
	Z1-	with frontal measurement display Z1	HR1MVO
	Z-	with frontal measurement display Z	
	A-	with temperature display at side	HR1MVZ1
2.	**Nominal width**		
	032	DN 32 - G $1^1/_4$	
	040	DN 40 - G $1^1/_2$	HR1MVZ
	050	DN 50 - G 2	
3.	**Process connection**		
	G	female thread	HR1MVA
4.	**Connection material**		
	M	brass	
	K ❍	stainless steel	
5.	**Switching range H_2O or oil 30..330 mm^2/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	
6.	**Special switching head**		
	A	switching head ATEX A-H1.1 / A-H2.1Please order the switching head for Ex-use in addition.	

Options

- Signal lamp red or red / green in the hood
- Rhodium contact
- Temperature display up to 150 °C
- Reinforced piston
- Additional switching head
- Plug DIN 43650-A / ISO 4400, Tuchel or Harting
- Connection for round plug connector M12x1
- Temperature monitoring
- Damping for gas monitoring
- Switching values for oil or gas
- Special values

Ordering information

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

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Switching Head A-H1.2

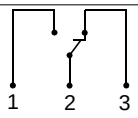
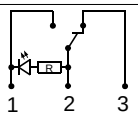
For devices **HR1MV-**
HR1MVO-

- **I M1 Ex ia I**
- **II 1G Ex ia IIC T4**
- **II 1D Ex iaD 20 T135**

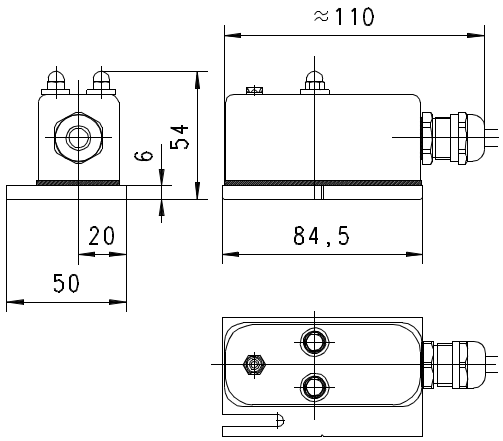
Characteristics

Intrinsically safe switching head with reed switch and ATEX approval, for the HR range of devices, for use in intrinsically safe power circuits.

Technical data

Switch	reed switch
Medium temperature	-20..+120 °C
Ambient temperature	-20..+50 °C
Weight	0.5 kg additionally
Without diode	
Wiring	changeover no. 0.213 
Switching voltage	max. 30 V
Switching current	max. 1.5 A
Switch performance	max. 50 W
With diode	
Wiring	changeover with diode no. 0.208 
Switching voltage	max. 15 V, 28 V or 36 V
Switching current	max. 1.5 A
Switch performance	max. 50 W
Protection class	3 - protective extra low voltage
Ingress protection	IP 65
Electrical connection	cable 2.5 m, other cable lengths up to max. 5 m are optionally available

Dimensions



Handling and operation

Note

All

- For use only in intrinsically safe power circuits - Provide a suitable isolating amplifier.
- Cable lengths max. 5 m.
- It must be ensured that the values given for voltage, current, and power are not exceeded.
- When switched on, a load must be connected in series.
- The electrical details apply to ohmic loads. Capacitive, inductive and lamp loads must be operated using a protective circuit.

HR1MVO-

- Display with plastic parts - do not open in an explosive atmosphere.

Adjustment

If it is necessary to set the switching value, the switching head can be adjusted lengthways. When the switching value is reached, the switching unit is fixed in place by a fastening bolt.

Ordering code

The basic device is ordered e.g. HR1MV-040GM060A with switching head e.g. A-H1.2-1.

A-H1.2 - 1. ☐

1.	Wiring - switching voltage	
	1	wiring no. 0.213 - 30 V
	2	wiring no. 0.208 - 15 V
	3	wiring no. 0.208 - 28 V
	4	wiring no. 0.208 - 36 V

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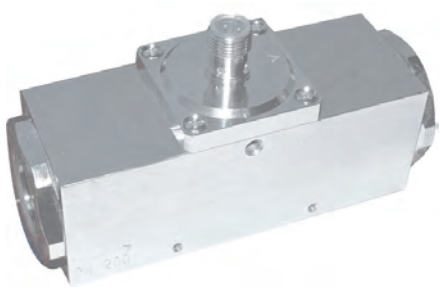
Flow Transmitter/Switch LABO-HD1K / -HD2K



- **4..20 mA output linearised**
- **0..10V output linearised**
- **Frequency output proportional, linear**
- **Switching output push-pull (small hysteresis possible)**
- **Programmable through teaching**
- **LED for status display**
- **All metal housing**
- **Fully potted IP 67**
- **All parameters programmable via USB interface ECI-1**

Characteristics

The LABO electronics provide the smallest and most economical option for electronic connection to a PLC or to another electronic unit.

The position of the piston is determined via analog Hall sensors, and is converted to the desired outputs by means of a 16-bit microcontroller. Adjustment and calibration is carried out automatically in the factory, and the flow values are presented proportionally and linearly at the output.
The Flash memory guarantees the exchangeability of all programs.

There is a choice between an analog output (4..20 mA or 0..10 V) or a switch with a transistor output (push-pull). The switch can be provided either as a limit switch or a frequency output. Many options are available for the switching outputs in all versions:

- Variable ranges for the analog outputs
- Minimum or maximum switches
- Adjustable hysteresis (also very small)
- Inversion of the outputs
- Window function
- Delay after switching voltage on
- Separately adjustable switching and switch-back delays
- Teaching offsets

In contrast to electromechanical switches (Reed contacts or microswitches), electronic switches are insensitive to impact and wear. Hysteresis in much smaller than in eletromechanical switches.

There is no galvanic separation from the supply circuit.

Technical data

Sensor	analog Hall sensors	
Nominal width	DN 8..25	
Process connection	female thread G $^1/_4$..G 1	
Metering range	0.1..80 l/min	for details see see table "Ranges"
Pressure loss	0.4..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±3 % of full scale value	
Pressure resistance	PN 200, optionally PN 500	
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	
Outputs	LABO-....I: current output 4..20 mA (alternatively 0..20 mA) max. load 500 Ohm	
	LABO-....U: voltage output 0..10 V (alternatively 2..10 V) load min. 1 kOhm	
	LABO-....F: frequency output transistor output "push-pull" (resistant to short circuits, and reversal polarity protected) I_{out} = 100 mA max. selectable frequency, max. 2 kHz	
	LABO-....S: limit switch transistor output "push-pull" (resistant to short circuits, and reversal polarity protected) I_{out} = 100 mA max.	
Display	yellow LED indicates the switching status of the output or the presence of the supply voltage	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 4-pole	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Non-medium-contact materials	CW614N nickelled	
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.	

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Ranges

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

Standard type LABO-HD1K

Metering range l/min H_2O	$Q_{max.}$ recommended	Pressure loss bar at $Q_{max.}$ H_2O
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

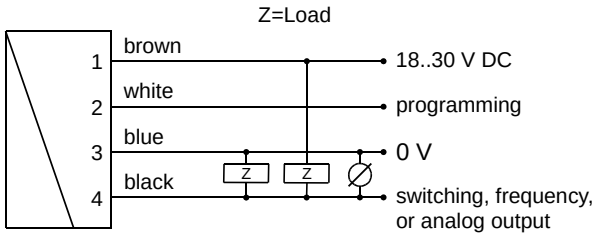
Special ranges are available.

Viscosity compensated type LABO-HD2K

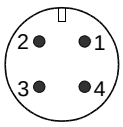
Metering range l/min oil 30..330 mm²/s	$Q_{max.}$ recommended	Pressure loss bar at $Q_{max.}$ oil mm²/s 30	60	100	205	330	Viscosity stability ±8 %, min.
0.5 - 8	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 15	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 25	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 40	60					2.6	±2.7 l/min
12.0 - 60	80	2.1	2.3	2.4	2.6	2.8	±3.0 l/min

Special ranges are available.

Wiring

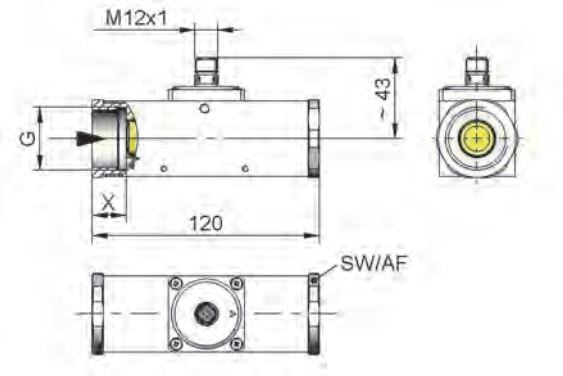


Connection example: PNP NPN



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			1.4
	G 3/4	...-020GM		18	
	G 1	...-025GM			1.3
Stainless steel	G 1/4	...-008GK	41	15	1.5
	G 3/8	...-010GK			
	G 1/2	...-015GK			1.4
	G 3/4	...-020GK		18	
	G 1	...-025GK			1.3



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)

Programming

The switching value is programmed via the plug, by applying a 1 second pulse to pin 2 at the level of the supply voltage. The electronics then accept the applied value as the switching value or full scale value of the analog or frequency output. A teaching offset can also be used to set a value with a percentage displacement from the present value (must be specified when ordering).

The LED flashes during the programming procedure. Immediately after the programming, the switching output goes into the normal state (LED on, output at supply level, if this is not the inverted model).

Programmability can be blocked by the manufacturer, and a fixed value can be set instead.

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Ordering code

The basic device is ordered e.g. HD1K-015GM005E with electronics e.g. LABO-HD1KILO

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

	7.	8.	9.	10.
LABO-HD				

1.	**Construction**			
	1K	standard		
	2K	viscosity compensated		
2.	**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		
3.	**Process connection**			
	G	female thread		
4.	**Connection material**			
	M	brass		
	K	stainless steel		
5.	**HD1K - Metering range H_2O 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		●
	HD2K - 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	●	
6.	**Connection for**			
	E	electronics	●	●

7.	**For base device**			
	1K	standard		●
	2K	viscosity compensated	●	
8.	**Analog output**			
	I	current output 4..20 mA		
	U	voltage output 0..10 V		
	S	push-pull (compatible with PNP and NPN)		
	R	frequency output		
9.	**Function set to switching output**			
	L	minimum		
	H	maximum		
10.	**Switching output level**			
	O	standard		
	I	inverted		

Options for LABO:

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

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

End frequency (max. 2000 Hz) ☐☐☐☐ Hz

Switching delay ☐☐ s
(from Normal to Alarm)

Switchback delay ☐☐ s
(from Alarm to Normal)

Power-On delay ☐☐ s
(after connecting the supply, time during which the switching output is not activated)

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.

Options

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

Accessoires

- 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)

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Flow Meter / Monitor FLEX-HD1K / -HD2K

- **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 8.0.25	
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..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±3 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
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 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	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 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.	

Ranges

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

Standard type FLEX-HD1K

Metering range l/min H_2O	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ H_2O
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.

Viscosity compensated type FLEX-HD2K

Metering range l/min oil 30..330 mm²/s	**$Q_{max.}$** recommended	**Pressure loss** bar at $Q_{max.}$ Oil mm²/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.

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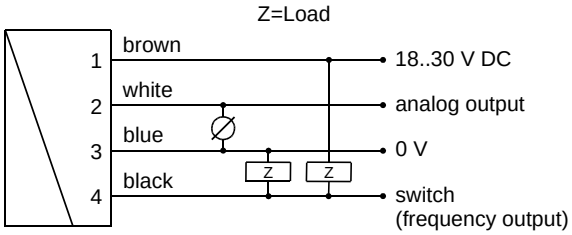
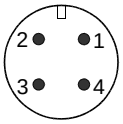
Wiring

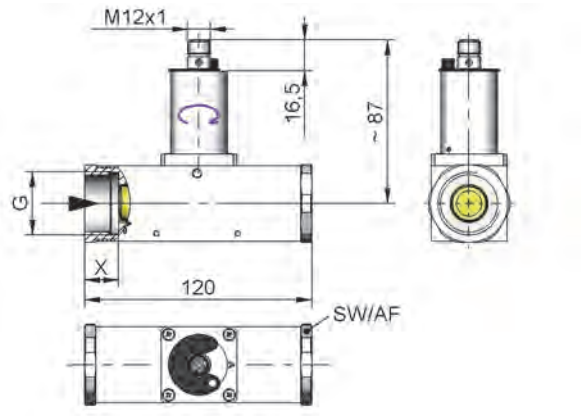


Connection example: PNP NPN



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			1.4
	G 3/4	...-020GM		18	
	G 1	...-025GM			1.3
Stainless steel	G 1/4	...-008GK	41	15	1.5
	G 3/8	...-010GK			
	G 1/2	...-015GK			1.4
	G 3/4	...-020GK		18	
	G 1	...-025GK			1.3



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).

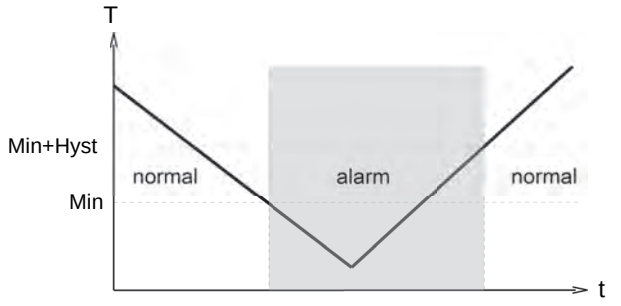
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an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

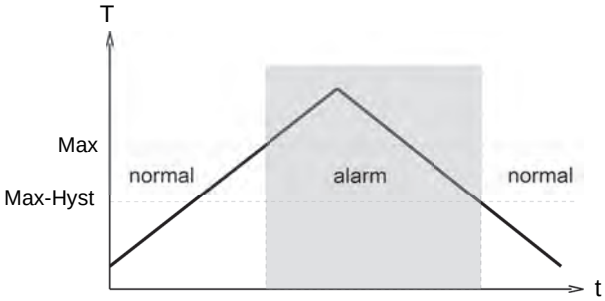
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

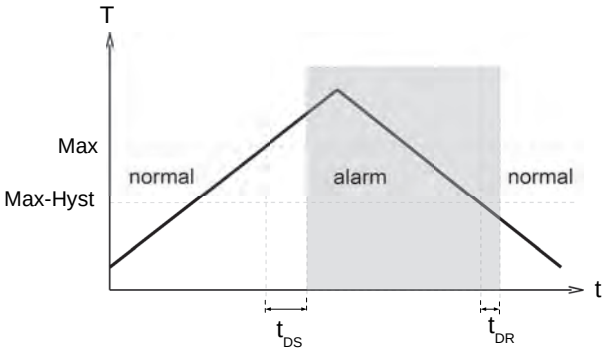
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



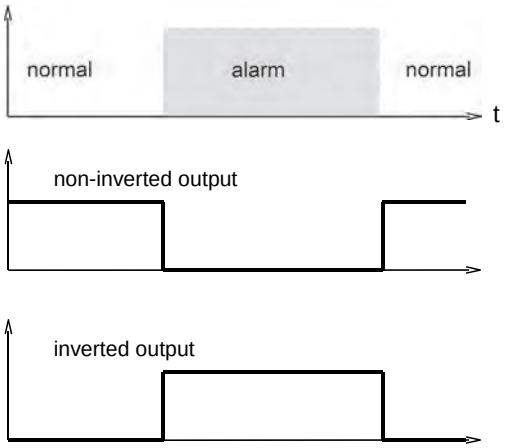
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



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



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.
In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



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

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.

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Ordering code

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

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

	7.	8.	9.	10.	11.
FLEX-HD					**O**

1.	**Construction**			
	1K	standard		
	2K	viscosity compensated		
2.	**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		
3.	**Process connection**			
	G	female thread		
4.	**Connection material**			
	M	brass		
	K	stainless steel		
5.	**HD1K - Metering range H_2O 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		●
	HD2K - 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	●	
6.	**Connection for**			
	E	electronics	●	●

7.	**For base device**			
	1K	standard		●
	2K	viscosity compensated	●	
8.	**Analog output**			
	I	current output 4..20 mA		
	U	voltage output 0..10 V		
	K	no analog output		
9.	**Switching output**			
	S	push-pull (compatible with PNP and NPN)		
	K	no switching output		
10.	**Function set to switching output**			
	L	minimum-switch		
	H	maximum-switch		
	R	frequency output		
	K	no switching output		
11.	**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)

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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	
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	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite *DN 32..40:* NBR	*Stainless steel construction*: 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_2O or oil 30..200 mm²/s	**Display range** l/min H_2O or oil 30..200 mm²/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.

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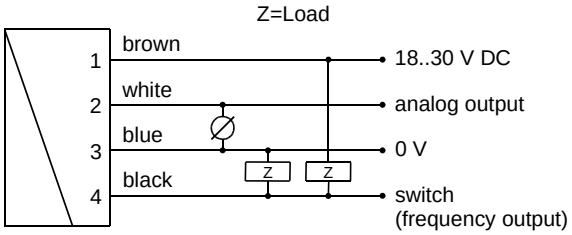
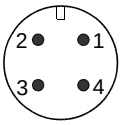
Wiring

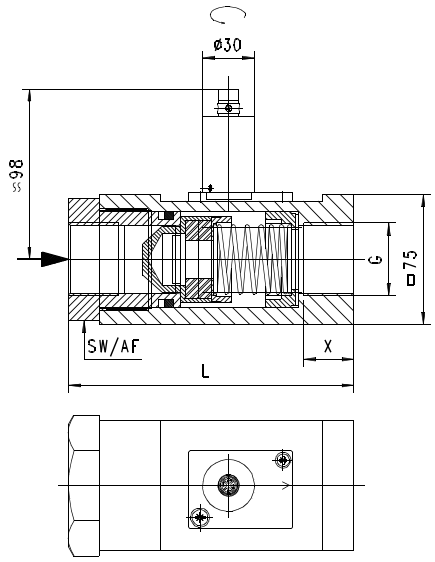


Connection example: PNP NPN



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).

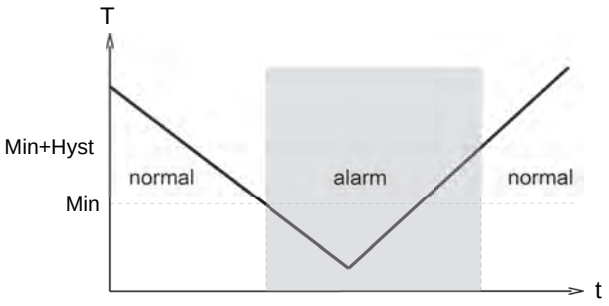
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.
In order to avoid the need to transit to an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

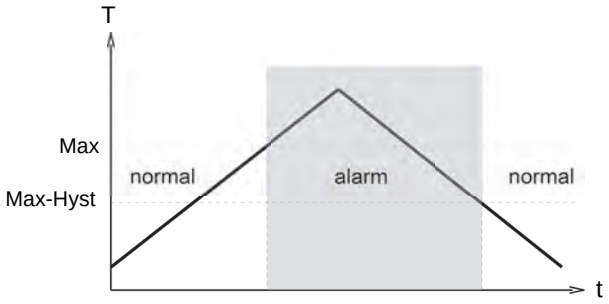
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

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

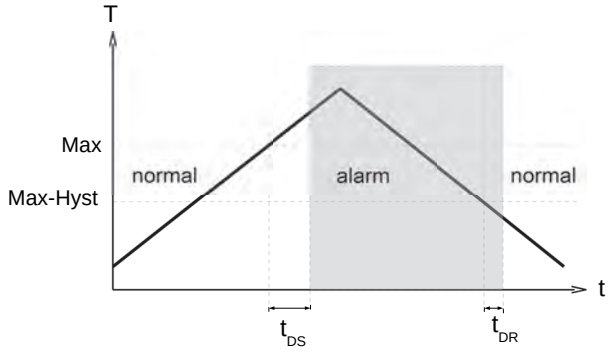
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



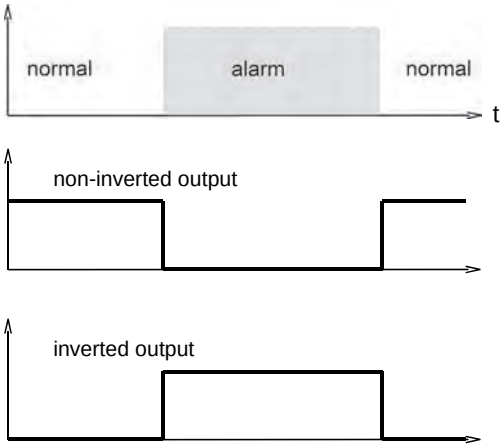
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



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



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.
In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



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

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.

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Ordering code

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

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

	6.	7.	8.	9.
FLEX-HR1MV				

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 H_2O or oil 30..330 mm^2/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**	
	S	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 ☐☐ 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

Accesories

- 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)

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Flow Meter / Switch / Indicator OMNI-HD1K / -HD2K

- **0/4..20 mA or 0/2..10 V output signal**
- **2 x programmable switches (push-pull)**
- **Backlit graphical LCD-Display (transreflective), can be read in sunlight and in the dark**
- **Programmable parameters via rotatable, removable ring (programming protection)**
- **All metal housing with scratch and chemical resistant glass**
- **Unit is displayed (selectable)**
- **Rotatable electronic head for best reading position**
- **Parameter interface**

Characteristics

The electronics can be used on the spot to set switching values where process values are exceeded or fallen short of. This setting can be carried out via the display even without a process. The present values or error messages from the measuring point are visible at any time, and all major parameters can be accessed on the spot. The analog current signal can be evaluated from large distances, and the present values can be made available there. If desired, the sensor can be configured at the factory with your parameters. It is therefore ready for immediate use, without programming. If you wish to change parameters, you can set the device directly at the sensor, by means of the programming ring.

The entire family of OMNI sensors is made up in a modular way, by means of a building-block system (hardware and software). A 16-bit microcontroller with a 14-bit A/D converter and a 12-bit D/A converter ensure the necessary processing speed and accuracy. The signal is displayed with the unit of measure by a backlit LCD graphical display, and is converted into a 0/4..20 mA signal. Two switching values with a choice of PNP or NPN output can be programmed across the whole range. The hystereses of the switching values can be set separately in value and direction (min., max. switching value).

Exceeding or falling short of switching values, and error messages, are indicated by a flashing red LED visible from a long distance, together with a message in the display.

Further parameters can be modified by means of a code:

Signal filter, selectable unit (l/min, m^3/h ...) incl. automatic conversion of the values, selectable output 0..20 mA, 4..20 mA, 0..10 V or 2..10 V, value assignment of 0/4..20 mA or 0/2..10 V (setting of zero point and range).

For commissioning, the sensor supports a simulation mode for the analog output. It is possible to create a programmable mA value at the output (without modifying the process variable). The range is 0..20 mA. This enables the commissioner to test the run between the sensor and the downstream electronics.

The complete housing can be rotated around the mechanical connection, and so after sealing, the correct position for reading can be set. Operation is through dialog with the display messages. It is possible to reset to the factory settings at any time.

Technical data

Sensor	analog hall sensor	
Nominal width	DN 8.0.25	
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..3.5 bar at $Q_{max.}$	
$Q_{max.}$	to 100 l/min	
Tolerance	±3 % of full scale value	
Pressure resistance	PN 200 optionally PN 500	
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	0/4..20 mA, 0/2..10 V via a 500 OhmΩ resistance after 0 V.	
Switching values S1 + S2	PNP or NPN, selectable, 300 mA max. load in total, programmable as min. value or max. value, resistant to short circuits, reversal polarity protected.	
Display	backlit graphical LCD-Display (transreflective), extended temperature range -20..+70 °C, 32 x 16 pixels, background illumination, displays value and unit, flashing LED signal lamp with simultaneous message on the display.	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 5-pole	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite, NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, FKM
Materials, non-medium-contact	CW614N, PPS, glass	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the display, metering and switching range.	

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Ranges

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

Standard type OMNI-HD1K

Metering range l/min H_2O	$Q_{max.}$ recommended	Pressure loss bar at $Q_{max.}$ H_2O
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

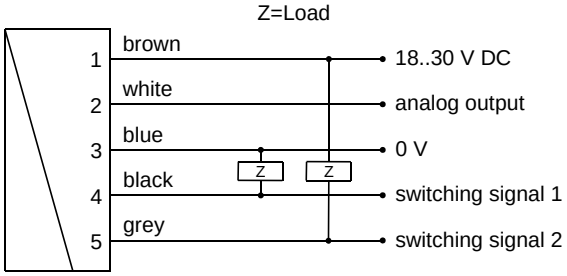
Special ranges are available.

Viscosity compensated type OMNI-HD2K

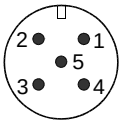
Metering range l/min oil 30..330 mm²/s	$Q_{max.}$ recommended	Pressure loss bar at $Q_{max.}$ oil mm²/s 30	60	100	205	330	Viscosity stability ±8 %, min.
0.5 - 8	12	1.1	1.4	1.6	2.8	3.5	±0.3 l/min
1.5 - 15	22	2.2	2.3	2.4			±0.5 l/min
2.5 - 25	35	1.9	2.0	2.1	2.3	2.9	±0.8 l/min
6.0 - 40	60					2.6	±2.7 l/min
12.0 - 60	80	2.1	2.3	2.4	2.6	2.8	±3.0 l/min

Special ranges are available.

Wiring

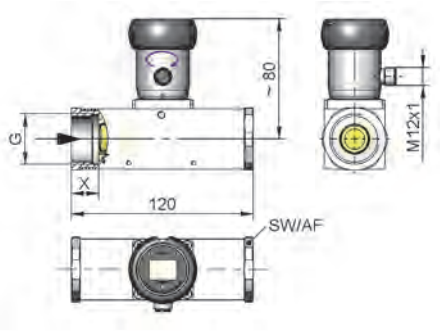


Connection example: PNP NPN



Dimensions and weights

	G	Types	SW	X	Weight kg
Brass	G 1/4	...-008GM	40	15	1.6
	G 3/8	...-010GM			
	G 1/2	...-015GM			1.5
	G 3/4	...-020GM		18	
	G 1	...-025GM			1.4
Stainless steel	G 1/4	...-008GK	41	15	1.6
	G 3/8	...-010GK			
	G 1/2	...-015GK			1.5
	G 3/4	...-020GK		18	
	G 1	...-025GK			1.4



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)

Programming

The annular gap of the programming ring can be turned to positions 1 and 2. The following actions are possible:

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

Neutral position between 1 and 2

The ring can be removed to act as a key, or turned through 180 ° and replaced to create a programming protector.
Operation is by dialog with the display messages, which makes its use very simple.
Starting from the normal display (currently measured value with unit), if 1 (STEP) is repeatedly selected, then the display shows the following information in this order:

Display of the parameters, using position 1

- Switching value S1 (switching point 1 in the selected unit)
- Switching characteristic of S1
- (MIN = monitoring of minimum value, hysteresis greater than switching value,
- MAX = monitoring of maximum value, hysteresis less than switching value)
- Hysteresis 1 (hysteresis value of S1 in the set unit)
- Switching value S2
- Switching characteristic of S2
- Hysteresis 2
- Code:
  After entering the code 111, further parameters can be defined:
- Filter (settling time of the display and output)
- Units: e.g. l/min or m³/h
- Output: 0..20 mA or 4..20 mA
- 0/4 mA (flow rate corresponding to 0/4 mA)
- 20 mA (flow rate corresponding to 20 mA)

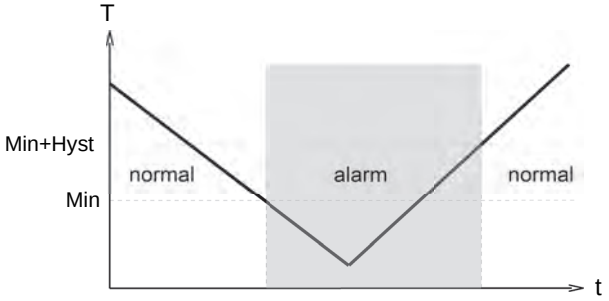
Edit, using position 2

If the currently visible parameter is to be modified:

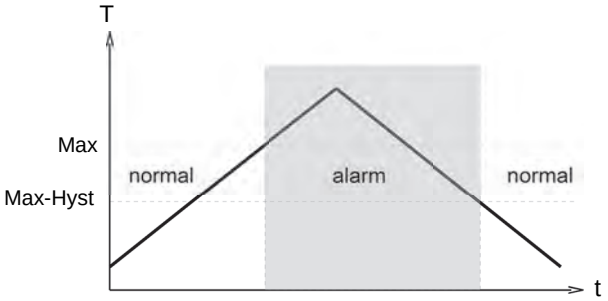
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the next digit is reached.
- Leave the parameter by turning to position 1 (until the cursor leaves the row); this accepts the modification.
- If there is no action within 30 seconds, the device returns to the normal display range without accepting the modification.

The S1 and S2 limit switches can be used to monitor minima or maxima.

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



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



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 of the switching output is detected, indicated on the display ("Check S 1 / S 2"), and the switching output is switched off.

Simulation mode
To simplify commissioning, the sensor supports a simulation mode for the analog output. It is possible to create a programmable value in the range 0..26 mA at the output (without modifying the process variable). This allows the wiring run between the sensor and the downstream electronics to be tested during commissioning. This is mode is accessed by means of code 311.

Overload display
Overload of the switching output is detected, indicated on the display, and the switching output is set to high impedance.

Default setting
After setting the configuration parameters, they can be reset to factory values at any time, by means of **Code 989**.

Starting from the normal display (currently measured value with unit), if 1 (STEP) is selected repeatedly, then the display shows the following information:

Display of the parameters, using position 1

- Switching values S1 and S2: Switching values in the selected unit.
- Hysteresis direction of S1 and S2:
  Max = Hysteresis less than S1 or S2
- Max = Hysteresis greater than S1 or S2
- Hystereses Hyst 1 and Hyst 2:
- Hysteresis values of the switching values in the set unit
- After entering code 111, further parameters can be defined (this should take place only if necessary)
- Filter: Selectable filter constant in seconds (affects display and output)
- Unit: e.g. bar or psi ...
- Output: 0..20 mA or 4..20 mA
- 0/4 mA: Displayed value for 0/4 mA
- 20 mA: Displayed value for 20 mA

Edit, using position 2

- If the**visible** parameter is to be modified:
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified. By repeatedly turning to position 2, values are increased; by turning to position 1, the next digit is reached. In this way, every digit can be modified. If there is no action within 5 seconds, the device returns to the normal display range without accepting the modification.

Saving the changes using position 1

- After leaving the last value, turn once to position 1; this accepts the modification.

Ordering code

The basic device is ordered e.g. HD1K-015GM005E with electronics e.g. OMNI-HD1KS

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

	7.	8.	9.
OMNI-HD		**S**	

1.	**Construction**			
	1K	standard		
	2K	viscosity compensated		
2.	**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		
3.	**Process connection**			
	G	female thread		
4.	**Connection material**			
	M	brass		
	K	stainless steel		
5.	**HD1K - Metering range H_2O 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		●
	HD2K - metering range oil 30..330 mm^2/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	●	
6.	**Connection for**			
	E	electronics	●	●

7.	**For base device**			
	1K	standard		●
	2K	viscosity compensated	●	
8.	**Electrical connection**			
	S	for round plug connector M12x1, 5-pole		
9.	**Optional**			
	H ❍	model with gooseneck		

Options

- Tropical model (completely oil-filled for severe external applications or for rapidly changing temperatures. Reliably prevents condensation).
- Measured values for oil or gas
- Special quantities
- Version for 150 °C
- Temperature display 0..120 °C
- Reinforced piston

Accessoires

- 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 OMNI

OMNI-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.

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Flow Meter / Switch / Indicator OMNI-HR1MV

- **Viscosity stabilised from 30 to 200 mm²/s**
- **0/4..20 mA or 0/2..10 V output signal**
- **2 x programmable switches (push-pull)**
- **Backlit graphical LCD-Display (transreflective), can be read in sunlight and in the dark**
- **Programmable parameters via rotatable, removable ring (programming protection)**
- **All metal housing with scratch and chemical resistant glass**
- **Unit is displayed (selectable)**
- **Rotatable electronic head for best reading position**
- **Parameter interface**

Characteristics

The electronics can be used on the spot to set switching values where process values are exceeded or fallen short of. This setting can be carried out via the display even without a process. The present values or error messages from the measuring point are visible at any time, and all major parameters can be accessed on the spot. The analog current signal can be evaluated from large distances, and the present values can be made available there. If desired, the sensor can be configured at the factory with your parameters. It is therefore ready for immediate use, without programming. If you wish to change parameters, you can set the device directly at the sensor, by means of the programming ring.

The entire family of OMNI sensors is made up in a modular way, by means of a building-block system (hardware and software). A 16-bit microcontroller with a 14-bit A/D converter and a 12-bit D/A converter ensure the necessary processing speed and accuracy. The signal is displayed with the unit of measure by a backlit LCD graphical display, and is converted into a 0/4..20 mA signal. Two switching values with a choice of PNP or NPN output can be programmed across the whole range. The hystereses of the switching values can be set separately in value and direction (min., max. switching value).

Exceeding or falling short of switching values, and error messages, are indicated by a flashing red LED visible from a long distance, together with a message in the display.

Further parameters can be modified by means of a code:

Signal filter, selectable unit (l/min, m^3/h ...) incl. automatic conversion of the values, selectable output 0..20 mA, 4.0.20mA, 0..10 V or 2..10 V, value assignment of 0/4..20 mA or 0/2..10 V (setting of zero point and range).

For commissioning, the sensor supports a simulation mode for the analog output. It is possible to create a programmable mA value at the output (without modifying the process variable). The range is 0..20 mA. This enables the commissioner to test the run between the sensor and the downstream electronics.

The complete housing can be rotated around the mechanical connection, and so after sealing, the correct position for reading can be set. Operation is through dialog with the display messages. It is possible to reset to the factory settings at any time.

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	
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	0/4..20 mA, 0/2..10 V via a 500 OhmΩ resistance after 0 V.	
Switching values S1+S2	PNP or NPN, selectable, 300 mA max. load in total, programmable as min. value or max. value, resistant to short circuits, reversal polarity protected.	
Display	backlit graphical LCD-Display (transreflective), extended temperature range -20..+70 °C, 32 x 16 pixels, background illumination, displays value and unit, flashing LED signal lamp with simultaneous message on the display.	
Ingress protection	IP 67	
Electrical connection	for round plug connector M12x1, 5-pole	
Materials medium-contact	*Brass construction*: CW614N nickelled, CW614N, 1.4310, hard ferrite *DN 32..40:* NBR	*Stainless steel construction*: 1.4571, 1.4404, 1.4310, hard ferrite PTFE-coated, *DN 32..40:* FKM
Materials, non-medium-contact	CW614N, PPS, glass	
Weight	see table "Dimensions and weights"	
Installation location	Standard: horizontal inwards flow; other installation positions are possible; the installation position affects the display, metering and switching range.	

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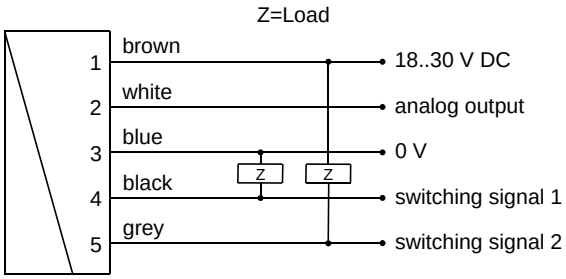
Ranges

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

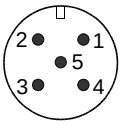
Switching range l/min H_2O or oil 30..200m-m^2/s	**Display range** l/min H_2O or oil 30..200m-m^2/s	$Q_{max.}$ recommended
2 - 12	2 - 15	50
5 - 20	5 - 25	60
10 - 40	10 - 45	100
20 - 60	20 - 65	150
30 - 100	30 - 110	200
50 - 150	50 - 160	230
100 - 200	100 - 220	250

Special ranges are available.

Wiring

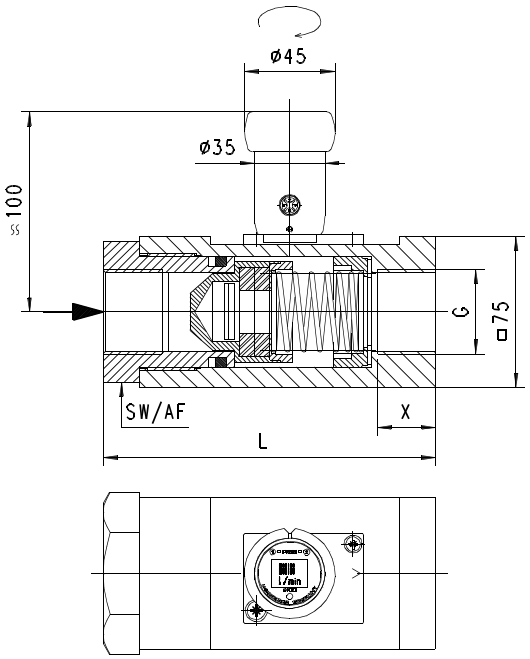


Connection example: PNP NPN



Dimensions and weights

G	DN	Types	L	SW	X	Weight kg
G $1^1/_4$	32	HR1MV-0032G.E	165	70	29	5.8
G $1^1/_2$	40	HR1MV-0040G.E	165			5.5
G 2	50	HR1MV-0050G.E	150	-	26	5.0



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)

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 (EDIT)

Neutral position between 1 and 2

The ring can be removed to act as a key, or turned through 180 ° and replaced to create a programming protector.
Operation is by dialog with the display messages, which makes its use very simple.
Starting from the normal display (currently measured value with unit), if 1 (STEP) is repeatedly selected, then the display shows the following information in this order:

Display of the parameters, using position 1

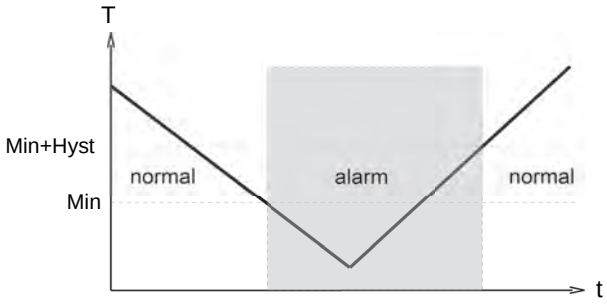
- Switching value S1 (switching point 1 in the selected unit)
- Switching characteristic of S1
- (MIN = monitoring of minimum value, hysteresis greater than switching value,
- MAX = monitoring of maximum value, hysteresis less than switching value)
- Hysteresis 1 (hysteresis value of S1 in the set unit)
- Switching value S2
- Switching characteristic of S2
- Hysteresis 2
- Code:
  After entering the code 111, further parameters can be defined:
- Filter (settling time of the display and output)
- Units: e.g. l/min or m³/h
- Output: 0..20 mA or 4..20 mA
- 0/4 mA (flow rate corresponding to 0/4 mA)
- 20 mA (flow rate corresponding to 20 mA)

Edit, using position 2
If the currently visible parameter is to be modified:

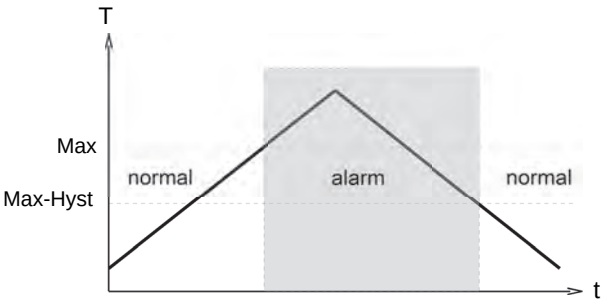
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the next digit is reached.
- Leave the parameter by turning to position 1 (until the cursor leaves the row); this accepts the modification.
- If there is no action within 30 seconds, the device returns to the normal display range without accepting the modification.

The limit switches S1 and S2 can be used to monitor minima or minima or maxima.

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



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



The change to the alarm state is indicated by the integrated red LED and a cleartext in the display.
While in the normal state the switching outputs are at the level of the supply voltage; in the alarm state they are at 0 V, so that a wire break would also display as an alarm state at the signal receiver.
Overload of the switching output is detected, indicated on the display ("Check S1 / S2"), and the switching output is switched off.

Simulation mode
To simplify commissioning, the sensor supports a simulation mode for the analog output. It is possible to create a programmable value in the range 0..26 mA at the output (without modifying the process variable). This allows the wiring run between the sensor and the downstream electronics to be tested during commissioning. This is mode is accessed by means of code 311.

Overload display
Overload of the switching output is detected, indicated on the display, and the switching output is set to high impedance.

Default setting
After setting the configuration parameters, they can be reset to factory values at any time, by means of code 989.

Starting from the normal display (currently measured value with unit), if 1 (STEP) is selected repeatedly, then the display shows the following information:

Display of the parameters, using position 1

- Switching values S1 and S2: Switching values in the selected unit.
- Hysteresis direction of S1 and S2:
  Max = Hysteresis less than S1 or S2
- Max = Hysteresis greater than S1 or S2
- Hystereses Hyst1 and Hyst2:
- Hysteresis values of the switching values in the set unit
- After entering code 111, further parameters can be defined (this should take place only if necessary)
- Filter: Selectable filter constant in seconds (affects display and output)
- Unit: e.g. bar or psi ...
- Output: 0..20 mA or 4..20 mA
- 0/4 mA: Displayed value for 0/4 mA
- 20 mA: Displayed value for 20 mA

Edit, using position 2

- If the visible parameter is to be modified:
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified. By repeatedly turning to position 2, values are increased; by turning to position 1, the next digit is reached. In this way, every digit can be modified. If there is no action within 5 seconds, the device returns to the normal display range without accepting the modification.

Saving the changes using position 1

- After leaving the last value, turn once to position 1; this accepts the modification.

Ordering code

The basic device is ordered e.g. HR1MV-032GM040E with electronics e.g. OMNI-HR1MVS

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

	6.	7.
OMNI-HR1MV	**S**	

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 H_2O or oil 30..330 mm^2/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.	**Electrical connection**	
	S	for round plug connector M12x1, 5-pole
7.	**Optional**	
	H	model with gooseneck

Options

- Tropical model (completely oil-filled for severe external applications or for rapidly changing temperatures. Reliably prevents condensation).
- Measured values for oil or gas
- Special quantities
- Temperature display 0..120 °C
- Reinforced piston

Accessoires

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

Ordering information

- Specify direction of flow, medium, and metering range.
- For viscous media, state 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 OMNI

OMNI-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.

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Device Configurator ECI-1

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

Characteristics

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

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

Technical data

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

Handling and operation

Connection

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

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

Ordering code

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

Scope of delivery

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

Incl. software

Accessories:

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

Replacement parts:

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

Options

Special connections

Examples:

FW1
with M24x1.5 and
conical nipple

HR1M
with Parker connections,
special body and
special switching head.

Customer-specific connections are available
e.g. male thread, female thread NPT, hose connections or system connections.

Higher pressure stages

In order to reach higher pressure stages, the wall thickness of the device is increased, materials with greater rigidity are used and a different seal shape is selected for the brass construction.

FW1-015GM

In order to reach a pressure stage of PS 800 with the device, the materials, construction and weight are changed.

- Material change at PN 800 - aluminium bronze instead of brass
- Additional weight
  - 0.45 kg
- Installation sizes:
  - Square 33
  - Height +4 mm

H1O1, H1O, H1Z1, H1Z, HD1K, LABO-HD1K, FLEX-HD1K, OMNI-HD1K
H2O1, H2O, H2Z1, H2Z, HD2K, LABO-HD2K, FLEX-HD2K, OMNI-HD2K

In order to reach a pressure stage of PN 500 with the devices, the materials, construction and weight are changed.

Example: HD1K008GM

- Materials coming in contact with the media
  - Additional aluminium bronze
  - FKM instead of NBR
- Other materials
  - Additional PC
- Additional weight
  - 0.7 kg with H.1
  - 1.1 kg with H.2
- Installation sizes:
  - Length of the devices 164.5 mm with H.1
  - Length of the devices 171.5 mm with H.2
  - Wrench size 46
  - Heights and widths +2.5 mm

MR1K

In order to reach a pressure stage of PN 500 with the device, the materials, construction and weight are changed.

- Materials coming in contact with the media
  - Additional aluminium bronze
  - FKM instead of NBR
- Other materials
  - Additional PC
- Additional weight
  - 0.7 kg
- Installation sizes:
  - Length of the devices 155 mm
  - Wrench size 46
  - Heights and widths +2.5 mm

Reinforced piston

A special piston design made of brass / stainless steel is available for demanding applications with sudden load changes. These pistons have a higher pressure loss than the standard piston.

FW1

DN	Range [l/min] water	$Q_{max.}$ recommended	Pressure loss [bar] at $Q_{max.}$ water
8	1 - 6	8	on request
10		10	
15		20	
20	1 - 11	30	
25			

M1J, MR1K

Range [l/min] water	$Q_{max.}$ recommended	Pressure loss [bar] at $Q_{max.}$ water
0.4 - 4	10	0.4
1.0 - 10	20	
2.0 - 20	30	0.7
3.0 - 30	40	1.0
4.0 - 40	60	2.3
6.0 - 60	80	4.1

H1O1, H1O, H1Z1, H1Z, HD1K, LABO-HD1K, FLEX-HD1K, OMNI-HD1K

Range [l/min] water	$Q_{max.}$ recommended	Pressure loss [bar] at $Q_{max.}$ water
0.1 - 1	6	0.4
0.5 - 5	10	
1.0 - 10	20	
2.0 - 20	30	0.7
3.0 - 30	40	1.0
4.0 - 40	60	2.3
6.0 - 60	80	4.1

Temperature up to 150 °C

HD1F, HD2F, HR1MV, LABO-HD1K, LABO-HD2K, LABO-HR1MV, FLEX-HD1K, FLEX-HD2K, FLEX-HR1MV, OMNI-HD1K, OMNI-HD2K, OMNI-HR1MV

In order to operate in a higher temperature range, additional space is provided with an air cushion between the hydraulic part and the electronic component. This area may not be thermally insulated.

Example: OMNI-HD1K

Temperature display A

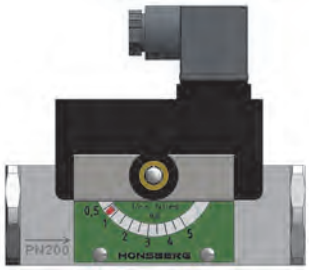
HD1F, HD2F, HD1K, HD2K, HR1MV

Example: HD1K

Temperature display from 0 - 120 °C mounted on the side

Adjustment scale

HD1K, HD2K, HM1K, HM2K



In order to enable a more precise setting, an individual scale can be created for the switching head.

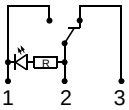
Gooseneck

FLEX-HD1K, FLEX-HD2K, FLEX-HR1MV, OMNI-HD1K, OMNI-HD2K, OMNI-HR1MV

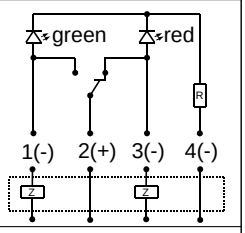
A gooseneck between the electronics head and the primary sensor provides freedom in the orientation of the sensor. This option simultaneously provides thermal decoupling between the two units. The length of the gooseneck is 140 mm.

Plug DIN 43650-A / ISO 4400 with diodes

Diode red

Wiring	changeover with diode No. 0.208 
Switching voltage	max. 12 V AC, 24 V AC, 48 V AC, 115 V DC or 230 V DC (when ordering please state)

Red / green diode

Wiring	changeover with diode No. 0.347 
Switching voltage	max. 12 V AC, 24 V AC, 48 V AC, 115 V DC or 230 V DC (when ordering please state)

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Mechanical Accessories

Filter

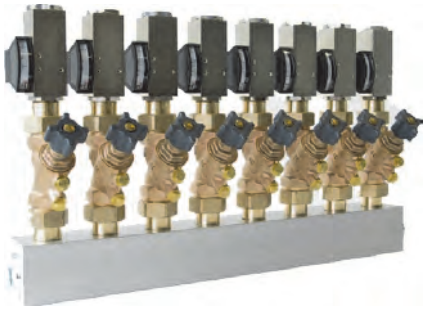
Type ZV

Type ZE

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

For more information, see additional product information.

Manifold block VB



For further information, see
For more information, see additional product information.

Metal cover for displays

for display O1

for display Z1

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Electrical Accessories

Round plug connector 4 / 5-pin

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

Ordering code

Self-assembly

	1.	2.
KB		

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

Packaged

1.	2.		3.	4.	5.	6.
	PU	-				

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

Panel meter OMNI-TA

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

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Product overview

„Industrial Sensors and Instrumentation“

Temperature
Flow
Level / Filling Height
Analysis
Humidity
Pressure
Weighing Instruments

„Process Instrumentation Hygienic Design“

GHM*adapt*
Temperature
Flow
Level / Filling Height
Analysis

“Laboratory Instrumentation”

„Industrial Electronics“

Displays / Controller
Transmitter / Signal conditioning
Isolating converters
Safety and Monitoring Devices
Power Electronics
Calibration and Testing

“Measuring Data Acquisition“

Data Logging and Monitoring
Test Bench Measurement Technology
Renewable Energies