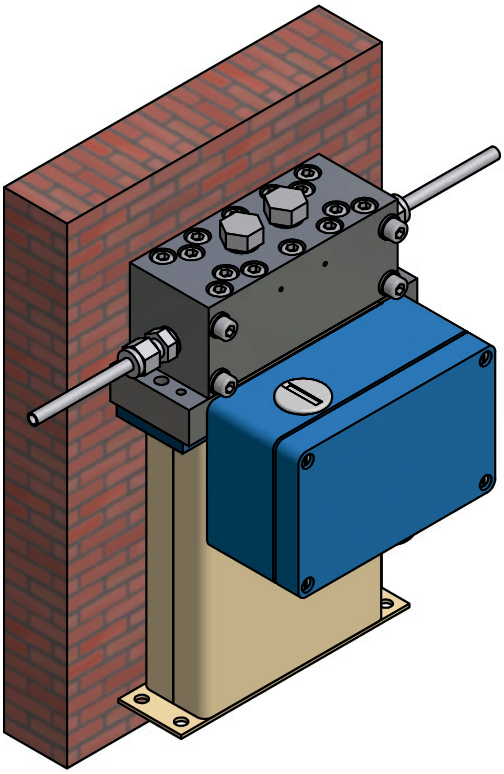
RHM --/HP

The High Pressure Coriolis Mass Flowmeter for Applications up to 900 bar

The RHM HP is a newly developed Coriolis Mass Flowmeter series for very high pressures. It combines the excellent performance of Coriolis Meters with pressure ratings which we only know from other metering technologies.
A new and exciting contribution to the flowmeter market by Rheonik, the mass the mass flow meter experts.



GENERAL

Unlike other mass flowmeter manufacturers, Rheonik uses a patented torsion rod swinger with the Omega shape and support bars. This design allows the use of extra heavy wall thickness measurement loops without compromising on oscillation amplitude - a none reached ideal combination for coriolis high pressure metering. Additionally, the torsion rod / mass bar system guides the oscillation and keeps the Omega flow loops in a fixed shape. Hence, the typical high performance of coriolis meters can be kept under changing pressure conditions.
Rheonik offers the 900 bar meters for flow from 3 to 3000 kg/h – other ranges on request. Similar to the other Rheonik meters the high pressure sensor excel by repeatability and suitability of harshest environmental conditions.

APPLICATIONS

The new sensor is widely used for:

- High pressure H2 measurement
- Dosing for highly pressurized additives
- Chemical injection
- Off-shore

FEATURES

High pressure meters offer outstanding features such as:

- Suitable for 900 bar @ 120 °C
- Max mesuring range up to 50 kg/min
- Minimal flow as low as 0.025 kg/min
- Customized versions for OEMs
- Accuracy of better 0.2% of flow
- Repeatability of better 0.05%
- Compact design for better integration

ADVANTAGES

The following advantages are mostly mentioned:

- Proven concept with references
- No moving parts - no wear - nearly no maintenance
- Removable connection part for more flexibility
- Approved for custody transfer
- CSA and ATEX hazardous area approvals
- No pressure effect - no deterioration of accuracy due to pressure changes by the patented Omega Shape
- Torsion swinger system assures longest life time and increased safety

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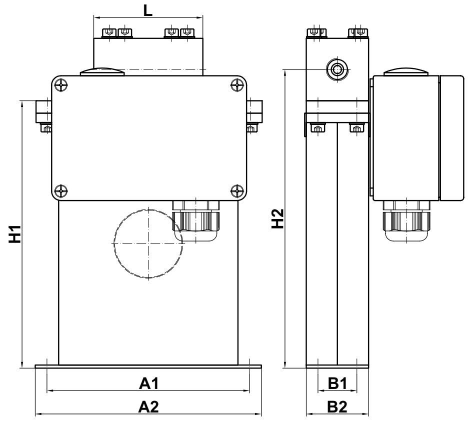
GENERAL DIMENSIONS

*** Typical installation orientation for liquids ***

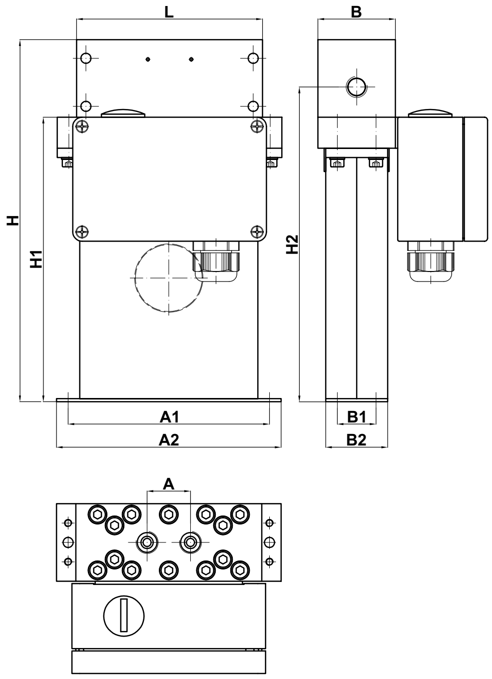
RHM 03/04 HP - High Pressure up to 540 bar



A1 = 130 mm (5.12")
A2 = 145 mm (5.70")
B1 = 25 mm (0.98")
B2 = 40 mm (1.57")
H1 = 184 mm (7.24")
H2 = 192 mm (7.56")
L = 70 mm (2.76")

Weight approx. 5 kg (11 lb)

RHM 03/04 VHP - Very High Pressure up to 900 bar



A = 28 mm (1.10")
A1 = 130 mm (5.12")
A2 = 145 mm (5.70")
B = 50 mm (1.97")
B1 = 25 mm (0.98")
B2 = 40 mm (1.57")
H = 234 mm (9.21")
H1 = 184 mm (7.24")
H2 = 203 mm (7.99")
L = 120 mm (4.72")

Weight approx. 6 kg (13 lb)

	Process connections	Face to face Length L
RHM 03/04 540 bar	Female thread G ¼" (horizontal)	70 mm (2.76")
	Female thread NPT ¼" (horizontal)	70 mm (2.76")
	Autoclave 9/16" MP female thread (horizontal)	70 mm (2.76")
	Autocalve 3/8" MP female thread (horizontal)	70 mm (2.76")
RHM 03/04 900 bar	Female thread G ¼" (horizontal)	120 mm (4.73")
	Female thread NPT ¼" (horizontal)	120 mm (4.73")
	Autoclave 9/16" MP female thread (vertical)	N/A
	Autocalve 3/8" MP female thread (vertical)	N/A

Only our standard process connections are listed. Please contact your local representative for specials.

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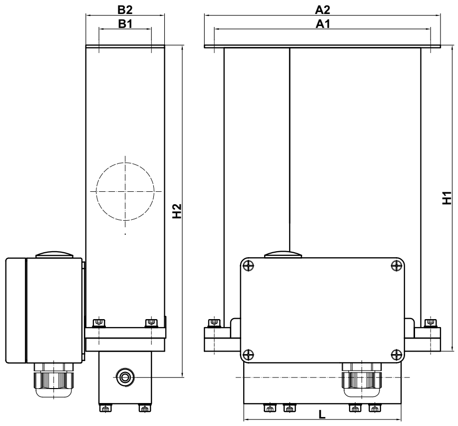
GENERAL DIMENSIONS

*** Typical installation orientation for gases ***

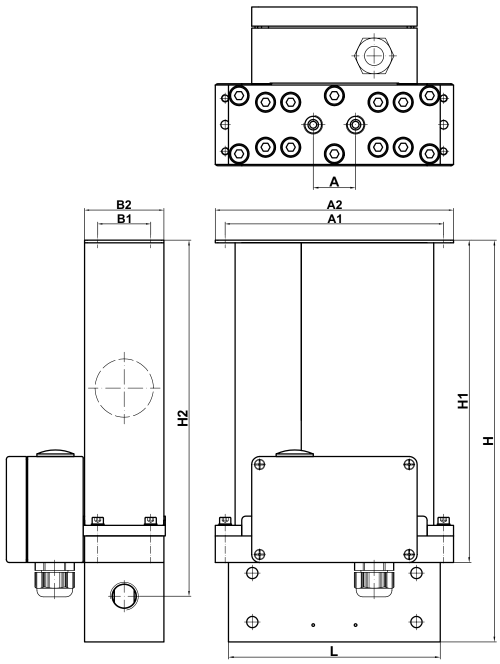
RHM 08 HP - High Pressure up to 540 bar



A1 = 165 mm (6.50")
A2 = 180 mm (7.09")
B1 = 40 mm (1.57")
B2 = 60 mm (2.36")
H1 = 234 mm (9.21")
H2 = 264 mm (10.39")
L = 120 mm (4.72")

Weight approx. 8 kg (18 lb)

RHM 08 VHP - Very High Pressure up to 900 bar



A = 32 mm (1.25")
A1 = 165 mm (6.50")
A2 = 180 mm (7.09")
B1 = 40 mm (1.57")
B2 = 60 mm (2.36")
H = 304 mm (11.97")
H1 = 235 mm (9.25")
H2 = 255 mm (10.04")
L = 160 mm (6.30")

Weight approx. 10 kg (22 lb)

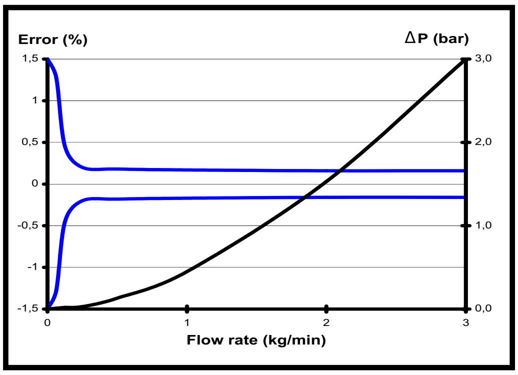
	Process connections	Face to face Length L
RHM 08 540 bar	Female thread G ½" (horizontal)	120 mm (4.72")
	Female thread NPT ½" (horizontal)	120 mm (4.72")
	Autoclave 9/16" MP female thread (horizontal)	120 mm (4.72")
	Autocalve 3/8" MP female thread (horizontal)	120 mm (4.72")
RHM 08 900 bar	Female thread G ½" (horizontal)	160 mm (6.30")
	Female thread NPT ½" (horizontal)	160 mm (6.30")
	Autoclave 9/16" MP female thread (vertical)	N/A
	Autocalve 3/8" MP female thread (vertical)	N/A

Only our standard process connections are listed. Please contact your local representative for specials.

PERFORMANCE High Pressure Sensor - Liquid

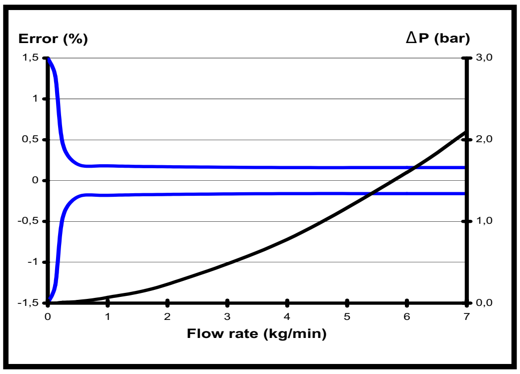
RHM 03 - Max Flow 5 kg/min (11 lb/min)

Rates / turndown ratio	**in kg/min**	**in lb/min**	**error in % of reading**
nominal rate Qnom:	3.00	6.62	0.20
0.2 *Qnom (5:1)	0.60	1.32	0.20
0.1 *Qnom (10:1)	0.30	0.66	0.20
0.05 *Qnom (20:1)	0.15	0.33	0.35
0.02 *Qnom (50:1)	0.06	0.13	1.00
0.01 *Qnom (100:1)	0.03	0.07	< 5



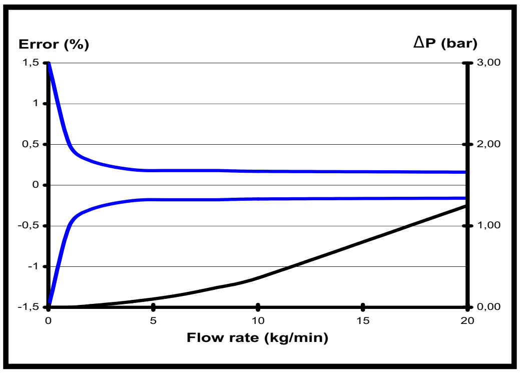
RHM 04 - Max Flow 10 kg/min (22 lb/min)

Rates / turndown ratio	**in kg/min**	**in lb/min**	**error in % of reading**
nominal rate Qnom:	7.00	15.44	0.20
0.2 *Qnom (5:1)	1.40	3.09	0.20
0.1 *Qnom (10:1)	0.70	1.54	0.20
0.05 *Qnom (20:1)	0.35	0.77	0.35
0.02 *Qnom (50:1)	0.14	0.31	1.00
0.01 *Qnom (100:1)	0.07	0.15	< 5



RHM 08 - Max Flow 50 kg/min (110 lb/min)

Rates / turndown ratio	**in kg/min**	**in lb/min**	**error in % of reading**
nominal rate Qnom:	20.00	44.10	0.20
0.2 *Qnom (5:1)	4.00	8.84	0.20
0.1 *Qnom (10:1)	2.00	4.42	0.20
0.05 *Qnom (20:1)	1.00	2.21	0.35
0.02 *Qnom (50:1)	0.40	0.88	1.00
0.0125 *Qnom (80:1)	0.25	0.55	< 5



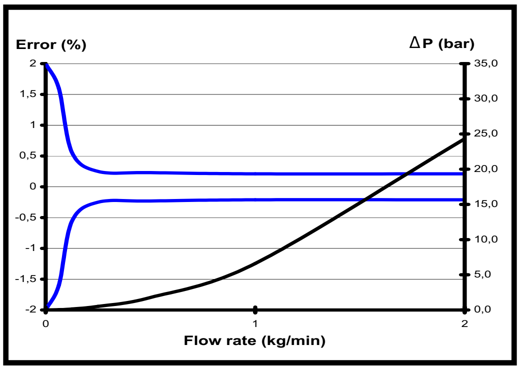
Repeatability better ± 0.05 % of rate
Temperature better ± 1°C

Error of reading (including zero drift) indications refer to reference conditions H20, 20°C (68°F), 5 bar (73 psi)
Nominal flow refers to approx. 10 m/s (0,66-33 ft/s) velocity in measuring loops for best performance
Calibration to customer range and increased accuracy of 0.15% possible

PERFORMANCE High Pressure Sensors - Gas

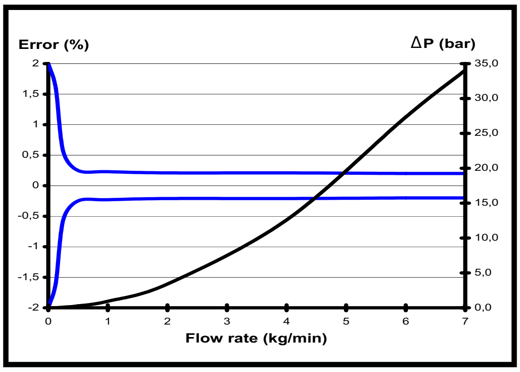
RHM 03 - Max Flow 5 kg/min (11 lb/min)

Rates / turndown ratio	in kg/min	in lb/min	error in % of reading
nominal rate Qnom:	2.00	4.41	0.20
0.2 *Qnom (5:1)	0.40	0.88	0.25
0.1 *Qnom (10:1)	0.20	0.44	0.40
0.05 *Qnom (20:1)	0.10	0.22	0.75
0.02 *Qnom (50:1)	0.04	0.09	< 5



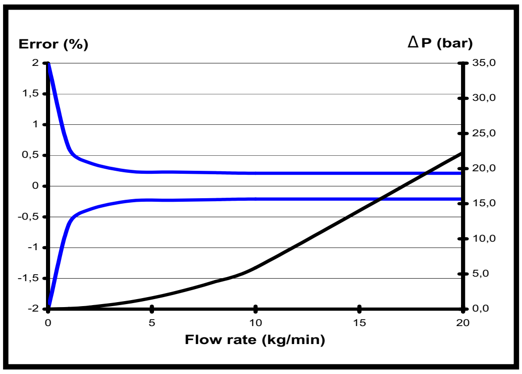
RHM 04 - Max Flow 10 kg/min (22 lb/min)

Rates / turndown ratio	in kg/min	in lb/min	error in % of reading
nominal rate Qnom:	7.00	15.44	0.20
0.2 *Qnom (5:1)	1.40	3.09	0.20
0.1 *Qnom (10:1)	0.70	1.54	0.25
0.05 *Qnom (25:1)	0.35	0.77	0.40
0.02 *Qnom (50:1)	0.14	0.31	< 2.50



RHM 08 - Max Flow 50 kg/min (110 lb/min)

Rates / turndown ratio	in kg/min	in lb/min	error in % of reading
nominal rate Qnom:	20.00	44.10	0.20
0.2 *Qnom (5:1)	4.00	8.82	0.20
0.1 *Qnom (10:1)	2.00	4.41	0.25
0.05 *Qnom (20:1)	1.00	2.21	0.40
0.02 *Qnom (50:1)	0.40	0.88	< 2.50



Repeatability better ± 0.1 % of rate
Temperature better ± 1°C

Error of reading (including zero drift) indications refer to reference conditions H_2, 20°C (68°F), 500 bar (7252 psi)
Nominal flow refers to approx. 240 m/s (788 ft/s) velocity in measuring loops for best performance
Calibration to customer range and increased accuracy possible

GENERAL SPECIFICATIONS

Temperature rating

- NT Models -20 to +120°C (-4 to +248°F)
- ET Models -45 to +120°C (-49 to +248°F)

Electrical connection

- Junction box / aluminium coated
  IP 65 (Nema 4X)
- Cable entry M25 x 1.5
  NPT optional
- Max cable length between RHM and RHE:
  100 m (330 ft)
  200 m (655 ft) only with factory approval

Material of wetted parts

- Measuring Loops Sandvik HP 160
  (special high pressure steel)
- Connection block 1.4571 (SS316 Ti)

Housing

- Stainless Steel: 1.4301 (SS 304)
  - other optional -
  - optional rupture disc -
- Protection class: IP 65 (NEMA 4X)
  - higher on request -

Pressure rating

- Measuring Loops 900 bar @ 120°C
  (13053 psi @ 248°F)
- Connections 540 bar / 900 bar (7832 / 13053 psi)

Approvals

- ATEX (CESI 02 ATEX 053 X):
  Ex II 1 G, EEx ia IIC T6-T1
- CSA (220495):
  Class I, Div 1 and 2
  Group A,B,C and D; Type 3
- Custody Transfer Approvals
  (PTB 1.32-97027224 and NMI TC 3382)
- PED according directive 97/23/EC available

For further information
please contact your
local representative

ORDER CODE RHM 03/04/08

Order Code Structure

The order code of the Rheonik Sensors consists of 6 sections (see previous pages / below).
Restrictions of combinations may apply. For specials, please comment your needs in plain text / sketches.

Temperature Rating

T1	NT Models (Normal Temperature Models) from -20 to +120°C (-4 to +248°F)
TA	ET Models (Extended Temperature Models) from -45 to +120°C (-49 to +248°F)
T2	ET2 Models (Extended Temperature Models) from -45 to +210°C (-49 to +410°F)

Pressure Rating

PH	High / Very high pressure version

Construction Type

PH0	Parallel Measuring Loops with removable Block/Manifold and PTFE Seals (8 bolts) (540 bar @ 120°C / 7830 psi @ 248°F)
PHH	Serial Measuring Loops with removable Block/Manifold and PTFE Seals (14 bolts) (900 bar @ 120°C / 13050 psi @ 248°F)

Material of Wetted Parts

PH	Measuring Loops HP 160 Manifold 1.4571 (SS 316Ti)

Process Connection

XX	Code available on pages 4 and 5.

Hazardous Area Approvals

NN	Without Ex Approvals
AT	ATEX Approvals (CESI 02 ATEX 053 X) - Ex II 1 G, EEx ia IIC T6-T1
CS	CSA Approvals (220705) - Class 1, Div 1 / Group A, B, C, and D; Type 3

Order Code Example

M#04 T1 PH PH0 HP G1 AT

T1: NT (Normal Temperature Models) from -20 to +120°C (-49 to +248°F)
PH: High pressure version
PH0: Parallel Measuring Loops with removable Block/Manifold and PTFE Seals
High pressure version (540 bar @ 120°C / 7830 psi @ 248°F)
HP: HP 160
G1: Female Thread G ¼"
AT: ATEX Approvals (CESI 02 ATEX 053 X)

M#04 __ __ ___ __ __ __

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