

RHM 04

Versatile Coriolis Mass Flowmeter with Fast Response Times for Very High Pressure Applications

The RHM 04 can measure flow rates up to 10 kg/min (22 lb/min) with extremely fast response times and excellent repeatability. A very high pressure version up to 1067 bar is also available, manufactured by GE's Rheonik mass flowmeter experts.

Applications

- General control
- Dosing
- Mixing
- Batching
- Injections
- Filling

Features

- Available as very high pressure version up to 1067 bar
- Response times of 30 ms and better
- Flow uncertainty down to 0.10%
- Repeatability better than 0.05%
- Unique torsion oscillator
- Typical measuring ranges from 0.1 to 10 kg/min
- Minimal flows as low as 50 g/min
- Customization possible
- Extra compact design with minimal space requirement
- Hazardous Area Approvals (ATEX, CSA, ...)



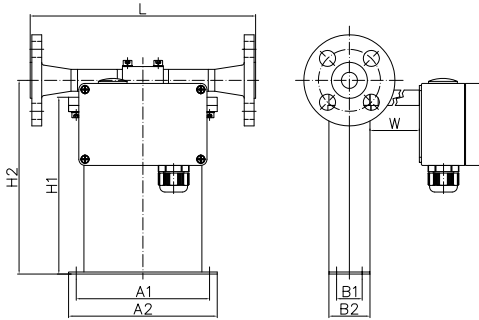
Advantages

- Torsion oscillator design assures most stable and basically drift free measurement and increased signal to noise ratio
- Not sensitive to changes in pressure
- Longest life time and increased safety (low stress in welds and increased wall thickness against abrasion)
- No moving parts, practically no maintenance
- Removable connection manifold available



General Dimensions RHM 04

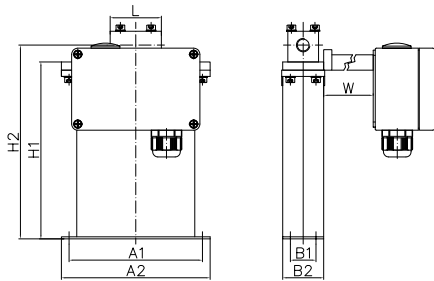
PM0/SM0 (parallel/serial, manifold construction)



Type removable manifold with PTFE seals and flange connection
 H1 = 173 mm (6.79 in)
 H2 = 189 mm (7.44 in)

	Process Connection	Face to face length (L)		Order Code
		mm	in	
Standard	Flange DIN DN15/PN40	220	8.66	D1
	Flange DIN DN15/PN100	220	8.66	D2
	Flange ANSI 1/2" 150# RF/SF	220	8.66	A1
	Flange ANSI 1/2" 300# RF/SF	220	8.66	A2
	Flange ANSI 1/2" 600# RF/SF	220	8.66	A3
	Flange ANSI 1/2" 1500# RF/SF	300	11.81	A6
	Flange ANSI 1/2" 1500# RTJ	300	11.81	R1
Optional	Flange DIN DN15 / PN 160	220	8.66	D3
	Flange JIS RF 10k 15A (1/2")	220	8.66	J1
	Flange JIS RF 20k 15A (1/2")	220	8.66	J2

PM0/SM0/PH0 (parallel/serial, manifold construction with thread connection)



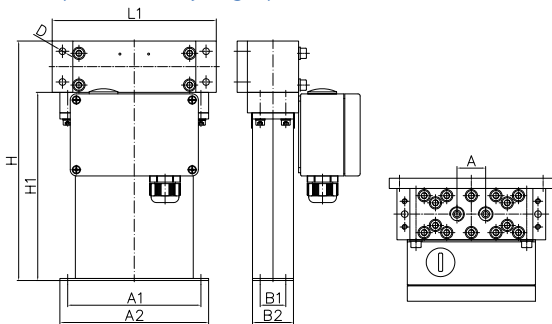
Type removable manifold with PTFE seals and thread connection

	Process Connection	Face to face length (L)		Order Code
		mm	in	
PM0/SM0 Standard	Female Thread G 1/4"	50	1.97	G1
	Female Thread 1/4" NPT	50	1.97	N1
PH0 Standard	Female Thread G 1/4"	70	2.76	G1
	Female Thread 1/4" NPT	70	2.76	N1
	Autoclave 3/8" MP (9/16-18 UNF female thread)	70	2.76	P2

PM0/SM0
 H1 = 173 mm (6.79 in)
 H2 = 189 mm (7.44 in)

PH0 (high pressure manifold construction)
 H1 = 184 mm (7.24 in)
 H2 = 204 mm (8.03 in)

PHH (parallel, very high pressure manifold construction)



Type parallel, very high pressure manifold with PTFE seals and thread connection
 (orientation upwards)
 H1 = 184 mm (7.24 in)
 A = 28 mm (1.10 in)
 D = 6.5 mm (0.26 in)
 L1 = 160 mm (6.30 in)

	Process Connection	Overall Height (H)		Order Code
		mm	in	
Standard	Autoclave 3/8" MP (9/16-18 UNF female thread)	234	9.21	P2

A1 = 130 mm (5.12 in)
 A2 = 145 mm (5.71 in)

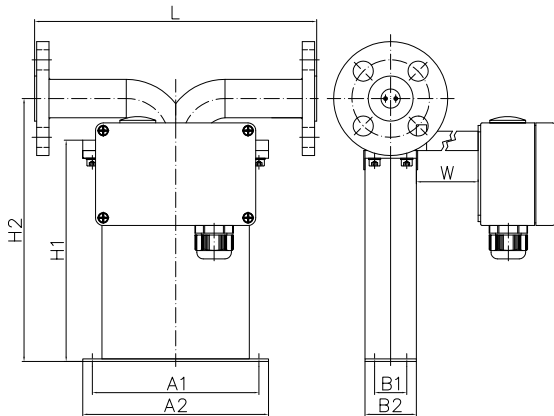
B1 = 25 mm (0.98 in)
 B2 = 40 mm (1.57 in)

Terminal box (without cable gland) 125 x 80 x 58 mm (4.92 x 3.15 x 2.28 in)
 W = 0 mm for Temperature Range T1 and TA
 W = 100 mm (3.94 in) for Temperature Range T2

For weights and packaging dimensions please see last page of this section.

General Dimensions RHM 04

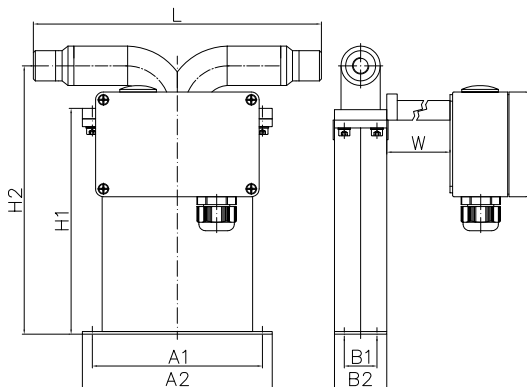
PFO (parallel, sealless construction with flange connection)



Type parallel, welded measuring loops without seals and flange connection

	Process Connection	Face to face length (L)		Order Code
		mm	in	
Standard	Flange DIN DN15/PN40	220	8.66	D1
	Flange DIN DN15/PN100	220	8.66	D2
	Flange ANSI ½" 150# RF/SF	220	8.66	A1
	Flange ANSI ½" 300# RF/SF	220	8.66	A2
	Flange ANSI ½" 600# RF/SF	220	8.66	A3
	Flange ANSI ½" 1500# RF/SF	300	11.81	A6
	Flange ANSI ½" 1500# RTJ	300	11.81	R1
Optional	Flange DIN DN15 / PN160	220	8.66	D3
	Flange DIN DN25 / PN160	260	10.24	D4
	Flange ANSI ½" 2500# RF/SF	300	11.81	A8
	Flange JIS RF 10k 15A (1/2")	220	8.66	J1
	Flange JIS RF 20k 15A (1/2")	220	8.66	J2
	Grayloc Hub 1 GR4 (1")	300	11.81	H3

PFT (parallel, sealless construction with thread connection)



Type parallel, welded measuring loops without seals and thread connection

	Process Connection	Face to face length (L)		Order Code
		mm	in	
Standard	Female Thread G ¼"	220	8.66	G1
	Female Thread ¼" NPT	220	8.66	N1
	Swagelok ¼" tube inlet (SS-400-1-4W)	300	11.81	W1

A1 = 130 mm (5.12 in)
 A2 = 145 mm (5.71 in)
 H1 = 173 mm (6.79 in)
 H2 = 205 mm (8.07 in)

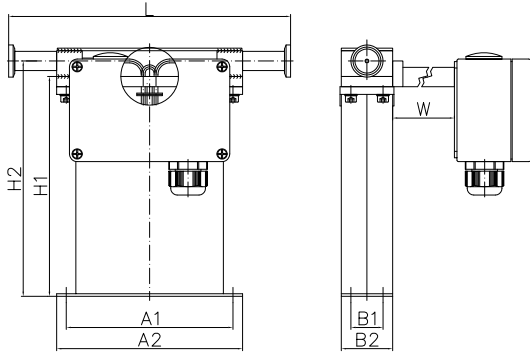
B1 = 25 mm (0.98 in)
 B2 = 40 mm (1.57 in)

Terminal box (without cable gland) 125 x 80 x 58 mm (4.92 x 3.15 x 2.28 in)
 W = 0 mm for Temperature Range T1 and TA
 W = 100 mm (3.94 in) for Temperature Range T2, T3 and T4

For weights and packaging dimensions please see last page of this section.

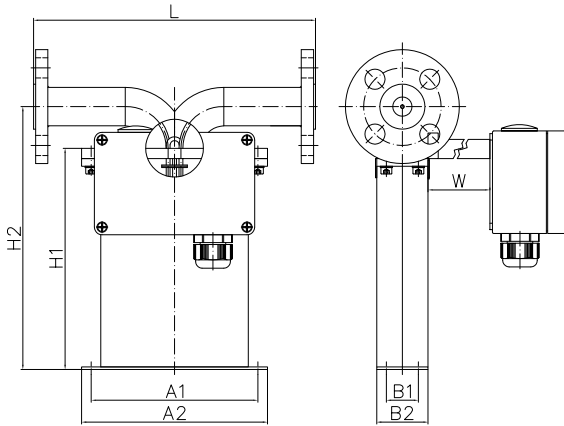
General Dimensions RHM 04

SFO (serial, sealless construction without dead spaces) (*)



Type single path, welded measuring loops without seals and sanitary connection
H2 = 184 mm (7.24 in)

	Process Connection	Face to face length (L)		Order Code
		mm	in	
Standard	Sanitary ½" Triclamp, DIN 32676	220	8.66	S1
	Sanitary NW10, DIN 11851	220	8.66	S2



Type single path, welded measuring loops without seals and flange connection
H2 = 205 mm (8.07 in)

	Process Connection	Face to face length (L)		Order Code
		mm	in	
Standard	Flange DIN DN15/PN40	220	8.66	D1
	Flange ANSI ½" 150# RF/SF	220	8.66	A1
	Flange ANSI ½" 300# RF/SF	220	8.66	A2
Optional	Flange ANSI ½" 150# RTJ	220	8.66	R3

A1 = 130 mm (5.12 in)
A2 = 145 mm (5.71 in)
H1 = 173 mm (6.79 in)

B1 = 25 mm (0.98 in)
B2 = 40 mm (1.57 in)

Terminal box (without cable gland) 125 x 80 x 58 mm (4.92 x 3.15 x 2.28 in)
W = 0 mm for Temperature Range T1 and TA
W = 100 mm (3.94 in) for Temperature Range T2, T3 and T4

(*) SFO construction contains brazed joints (brazing material B-Ni82CrSiBFe-970/1000) which are not as corrosion resistant as the piping material 1.4571 (316Ti).

Weight in standard manifold construction with female threads: approx. 2.5 kg (5.5 lb)

Weight in standard sealless construction and 150# flanges: approx. 3.5 kg (7.7 lb)

Shipping in carton box approx. 60 x 41 x 32 cm (24 x 16 x 13 in), gross weight with sealless construction, 150# standard flanges and RHE 08 approx. 10 kg (22 lb)

Finish type of our ANSI flanges corresponds to SF (AARH 125 up to 250 µm, Ra 3.2 up to 6.3 µm)

For customization with regard to face to face length and special fittings, please consult your local agent

Please note that larger diameter process connections are always possible

Pressure Rating RHM 04

The maximum pressure (pmax) of a sensor is determined by its weakest part. The weakest part can be the measuring loops (pmax indicated below) or the construction type (pmax indicated in the Basic Order Code section, last page) or the selected flanges / fittings (for pmax please see respective standard).

pmax of P1 measuring loops, standard M0 standard material - 1.4539 (904 L) OD x WT 4.5 x 0.3 mm (0.18 x 0.012 in)

bar	°C	psi	°F
170	50	2466	122
150	120	2176	248
120	210	1740	410
100	350	1450	662

pmax of P2 measuring loops M0 standard material - 1.4539 (904 L) OD x WT 4.5 x 0.5 mm (0.18 x 0.02 in)

bar	°C	psi	°F
295	50	4279	122
250	120	3626	248
200	210	2901	410
170	350	2466	662

pmax of P1 measuring loops M3 optional material - 2.4602 (Alloy C22) OD x WT 4.5 x 0.3 mm (0.18 x 0.012 in)

bar	°C	psi	°F
215	50	3118	122
190	120	2756	248
153	210	2219	410
128	350	1856	662

pmax of PH measuring loops HP optional material - HP160 OD x WT 4.5 x 0.9 mm (0.18 x 0.035 in)

bar	°C	psi	°F
1067	20	15476	68
900	50	13053	122
870	120	12618	248

pmax of P1 measuring loops* M1 optional material - 1.4571 (316 Ti) OD x WT 4.5 x 0.3 mm (0.18 x 0.012 in)

bar	°C	psi	°F
156	50	2263	122

*Only for T3 temperature rating

Performance RHM 04

Max Flow Rate Q_{max} and Q_{nom} (*) = 10 kg/min (22 lb/min)

Standard Models		
Flow Rate		Uncertainty
kg/min	lb/min	in % of reading
10.0	22.05	0.20
7.0	15.43	0.20
4.0	8.82	0.20
0.5	1.10	0.20
0.2	0.44	0.50

Goldline Models (**) - selected sensors		
Flow Rate		Uncertainty
kg/min	lb/min	in % of reading
10.0	22.05	0.10
7.0	15.43	0.10
4.0	8.82	0.10
1.0	2.20	0.10
0.5	1.10	0.12

Low Flow Models (**) - selected sensors		
Flow Rate		Uncertainty
kg/min	lb/min	in % of reading
4.0	8.82	0.20
2.0	4.41	0.20
1.0	2.20	0.20
0.2	0.44	0.20
0.1	0.22	0.60

Repeatability

Better $\pm 0.1\%$ of rate,
Goldline 0.05%

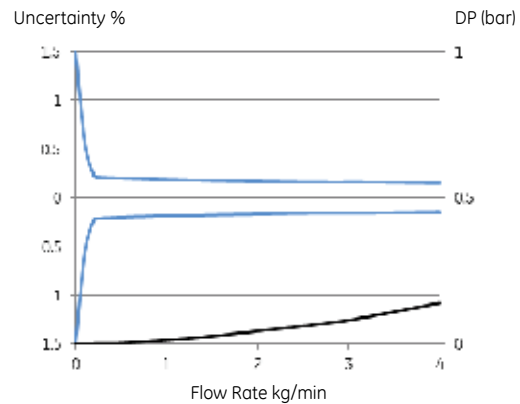
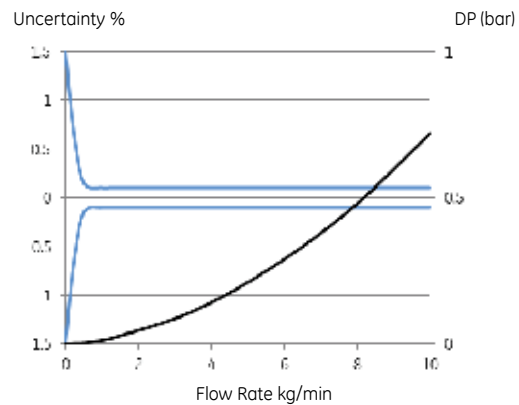
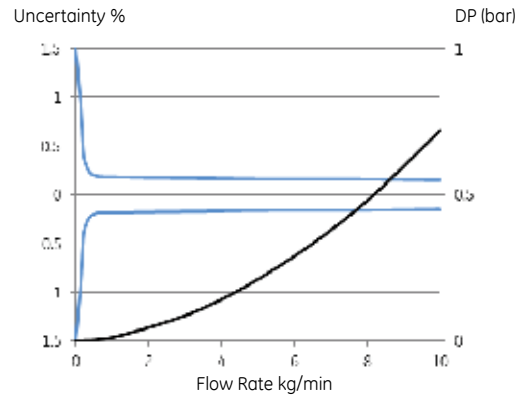
Temperature

Better $\pm 1^\circ\text{C}$

(*) Nominal flow Q_{nom} refers to roughly 8 - 10 m/s (33 ft/s) velocity in measuring loops for best performance.

(**) Selected sensors are only available in combination with temperature options T1, TA, standard material and pressure range.

- Serial/single path versions offer the same accuracy at half the flow (Q_{max} serial version = 5 kg/min).
- No relevant pressure effect due to torsional oscillation and semi-circle (non-deforming) measurement section.



- Uncertainty of reading (incl. zero drift) indications refer to reference conditions H_2O , 18-24°C (66 - 76°F), 1 - 3 bar (15 - 45 psi) and installation according to field manual.
- Pressure drop indications refer to H_2O , with parallel measuring loops type P1 and standard manifold block connections.
- For calibration to customer range and / or with improved uncertainty, please consult factory.

General Specifications RHM 04

Temperature Range

- NT Models from -20 to +120°C (-4 to +248°F)
 - ET Models from -45 to +120°C (-49 to +248°F)
 - ET2 Models from -45 to +210°C (-49 to +410°F)
 - ET1 Models from -196 to +50°C (-320 to +122°F)
 - HT Models from 0 to 350°C (+32 to +662°F)
- (Heating for housing optional, please consult your local agent)

Electrical Connection

- Junction box Aluminium coated (standard). Junction box in SS 316Ti optional
- Cable entry M25 x 1.5. Optional cable entries M20 x 1.5, 1/2" NPT or 3/4" NPT
- Max cable length between RHM and RHE is 100m (330 ft). 200m (660 ft) only with factory approval

Material of Wetted Parts

- 1.4539 / SS 904 L / UNS N08904 (standard measuring loops material)
- 1.4571 / SS 316 Ti / UNS S31635 (standard connection part material, optional measuring loops material)
- 2.4602 / Alloy C22 / UNS N06022
- HP 160
- Others on request

Sensor Enclosure/Housing

- Stainless Steel 1.4301 / SS 304, optional in 1.4571 / SS 316Ti. Others on request
- Protection Class IP 65. Optional IP 66 / NEMA 4x

Approvals

- ATEX (CESI 02 ATEX 053 X) Ex II 1 G, EEx ia IIC T6-T1
- CSA USA-Canada, Class I, Div. 1, Groups A, B, C, D
- PED according to directive 97/23/EC Art.3 (3) Sound Engineering Practice (SEP)
- Others on request

Basic Order Code RHM 04

Sensor Size

Temperature Range

- T1 NT from -20°C to +120°C (standard)
- TA ET from -45°C to +120°C
- T2 ET2 Extended Temperature Range from -45°C to +210°C
- T3 ET1 Extended Temperature Range from -196°C to +50°C
- T4 HT High Temperature Range from 0°C to +350°C

Pressure Range of Measuring Loops @ 120°C

- P1 pmax = 150 bar, M0 Material (standard)
- P2 pmax = 250 bar, M0 Material
- PH pmax = 870 bar, HP Material

Construction Type (pmax indications @ 120°C)

- PM0 Parallel Measuring Loops with removable Manifold and PTFE Seals, pmax = 400 bar with thread connection, 214 bar with flange connection
- SM0 Serial Measuring Loops with removable Manifold and PTFE Seals pmax = 400 bar with thread connection, 214 bar with flange connection
- PF0 Parallel Measuring Loops Seal Less Version
- SF0 Serial Measuring Loops Seal Less Version, pmax = 42.9 bar
- PFT Parallel Measuring Loops Seal Less Version for Thread Connection, pmax = 530 bar
- PH0 Parallel Measuring Loops with High Pressure Manifold and PTFE Seals, pmax = 540 bar
- PHH Parallel Measuring Loops with Very High Pressure Manifold and PTFE Seals, pmax = 870 bar

Material of Wetted Parts

- M0 Measuring Loops 1.4539 (904L), Manifold/Connection 1.4571 (316Ti) (standard)
- M1 Measuring Loops and Manifold/Connection 1.4571 (316Ti)
- M3 Measuring Loops and Connection Part 2.4602 (Alloy C22), Seal Less Construction Types only
- HP Measuring Loops HP 160; not with PF0, SF0, PFT Construction Type

Process Connection

- D1 Flange DIN DN15/PN40 Form C
- D2 Flange DIN DN15/PN100 Form E
- A1 Flange ANSI ½" 150# RF/SF
- A2 Flange ANSI ½" 300# RF/SF
- A3 Flange ANSI ½" 600# RF/SF
- R1 Flange ANSI ½" 1500# RTJ
- A6 Flange ANSI ½" 1500# RF
- G1 Female Thread G ¼"
- N1 Female Thread ¼" NPT
- W1 Swagelok ¼" tube inlet (SS-400-1-4W) - valid for SS only
- S1 Sanitary ½" Triclamp, DIN 32676, pmax = 40 bar @ 120°C
- S2 Sanitary NW10, DIN 11851, pmax = 40 bar @ 120°C
- P2 Autoclave 3/8" MP (9/16-18 UNF female thread)
- Others on request

RHM 04

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