

## **RHM 40 - Coriolis Mass Flowmeter for medium flow rates**

The RHM 40 can measure flow rates up to 90 t/hr with the patented Omega shape meter technology manufactured by Rheonik, the mass flowmeter experts.



### **GENERAL**

The RHM 40 has been designed for medium flow rates and tough application conditions. Due to the optional heavy duty measuring pipes (up to 250 bar), this meter is suitable for a wide range of flow rates operating at higher pressure.

This unique design, which offers excellent performance and reliability, has created the most satisfied customers worldwide. Unlike other mass flowmeter manufacturers, Rheonik uses a patented torsion rod swinger with the Omega shape and support bars which results in high accuracy measurement, which is independent of pressure, even at very low flow velocities. The meter also has extremely good repeatability and high stability for critical applications.

### **APPLICATIONS**

- Loading of boats, vessels, rail tank wagons
- High temperatures and other challenging applications
- Highly viscous media (low pressure drop and excellent performance at low flow conditions)

### **FEATURES**

- As heavy duty version available (increased wall thickness of measuring pipes for additional safety - 250 bar)
- Flow Accuracy of 0.1%
- Repeatability better than 0.05%
- Patented torsion swinger
- Customer adaptations possible for application optimized solutions
- Typical measuring ranges from 15 to 1500 kg/min
- EEx Approvals (i.e. ATEX, CSA, ...)
- Custody Transfer Approvals (i.e. PTB, NMI, ...)

### **ADVANTAGES**

- Medium flow rates in combination with high operating pressure
- Patented torsion swinger design assures most stable and drift free measurement
- Increased signal to noise ratio by torsion swinger
- Longest life time and increased safety (low stress in welds and increased wall thickness against abrasion)
- No moving parts, practically no maintenance

## PERFORMANCE RHM 40

Max Flow 1500 kg/min (3300 lb/min)

### 1) Standard Models

| Rates / turndown ratio  | in kg/min | in lb/min | error in % of reading |
|-------------------------|-----------|-----------|-----------------------|
| nominal rate $Q_{nom}$  | 1250      | 2756      | 0.20                  |
| $0.2 * Q_{max}$ (5:1)   | 300       | 661       | 0.20                  |
| $0.1 * Q_{max}$ (10:1)  | 150       | 330       | 0.20                  |
| $0.05 * Q_{max}$ (20:1) | 75        | 165       | 0.20                  |
| $0.02 * Q_{max}$ (50:1) | 30        | 66        | 0.50                  |

| Typical $\Delta P$ in bar (psi) |                  |           |
|---------------------------------|------------------|-----------|
| 1 cP                            | 100 cP           | 1000 cP   |
| 0.9 (13.5)                      | 2.2 (31.5)       | 8.4 (121) |
| $\sim 0.1$ (1.0)                | 0.2 (3.0)        | 2.0 (28)  |
| $\sim 0$ (0.3)                  | $\sim 0.1$ (1.5) | 1.0 (14)  |
| $\sim 0$ (0.1)                  | $\sim 0.1$ (0.7) | 0.5 (7)   |
| $\sim 0$ (0)                    | $\sim 0$ (0.3)   | 0.2 (3)   |

### 2) Optimized Low Flow Models<sup>(\*)</sup> / optimized to be operated between $0.0165 * Q_{max}$ and $0.33 * Q_{max}$

|                           |     |      |                    |
|---------------------------|-----|------|--------------------|
| $0.33 * Q_{max}$ (1:1)    | 500 | 1102 | 0.12               |
| $0.033 * Q_{max}$ (10:1)  | 50  | 110  | 0.15               |
| $0.0165 * Q_{max}$ (20:1) | 25  | 55   | $\sim 0.50^{(**)}$ |

|              |                |          |
|--------------|----------------|----------|
| 0.2 (2.4)    | 0.4 (5.3)      | 3.3 (48) |
| $\sim 0$ (0) | $\sim 0$ (0.5) | 0.3 (4)  |
| $\sim 0$ (0) | $\sim 0$ (0.2) | 0.1 (2)  |

(\*) serial/single path version offers the same accuracy at half the flow ( $Q_{max} = 750$  kg/min)

(\*\*) around 0.30 - 0.70 % accuracy depending on the installation conditions

### 3) Gold Line Models / application fine tuned meters

|                         |      |      |      |
|-------------------------|------|------|------|
| $1 * Q_{nom}$ (1:1)     | 1250 | 2756 | 0.10 |
| $0.1 * Q_{nom}$ (10:1)  | 125  | 275  | 0.12 |
| $0.05 * Q_{nom}$ (20:1) | 62   | 136  | 0.15 |

|                |                  |           |
|----------------|------------------|-----------|
| 0.9 (13.5)     | 2.2 (31.5)       | 8.4 (121) |
| $\sim 0$ (0.2) | $\sim 0.1$ (1.2) | 0.8 (12)  |
| $\sim 0$ (0.1) | $\sim 0$ (0.6)   | 0.4 (6)   |

**Repeatability**

better  $\pm 0.05\%$  of rate

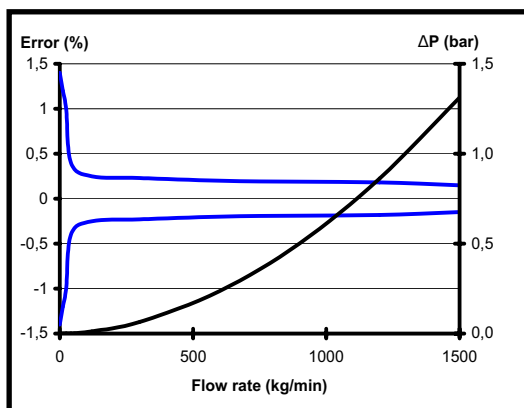
**Density**

better than  $\pm 0.0020$  g/cc - Gold Line: Field adjustable to better  $\pm 0.001$  g/cc

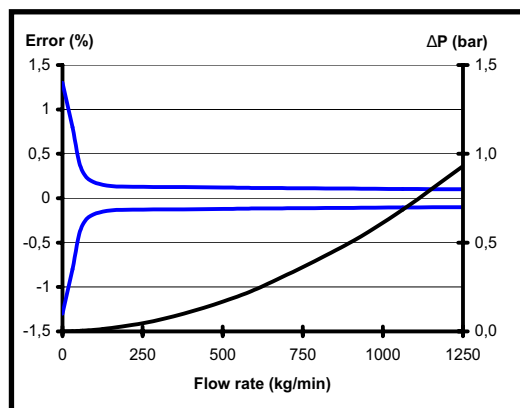
**Temperature**

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

Standard Models



Gold Line Models

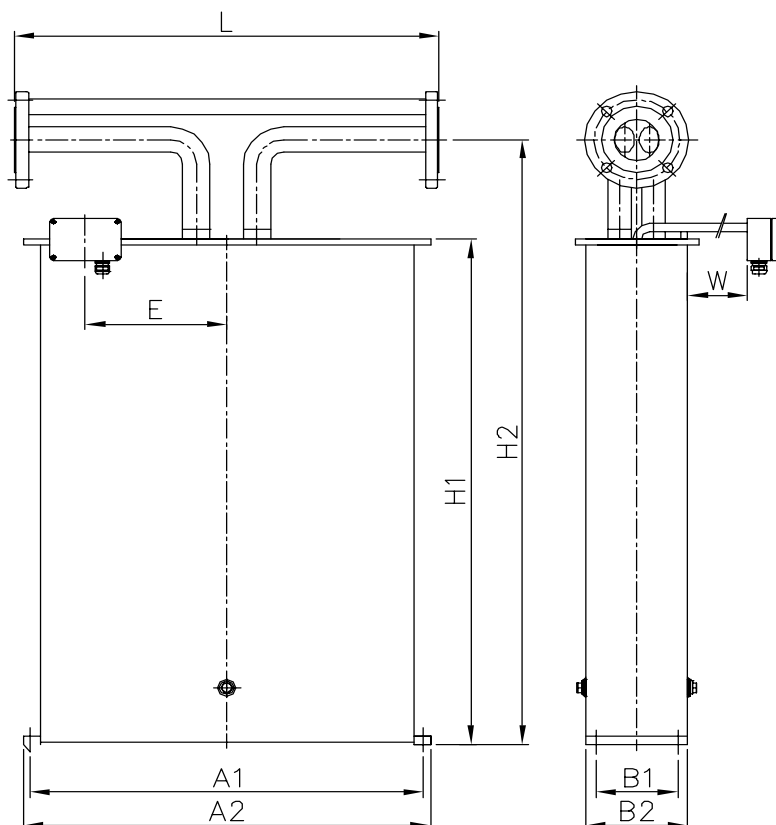


For serial (single pipe/path) sanitary design  $Q_{max}$  is 750 kg/min (50%). Data above refer to standard wall thickness.  
 Error of reading (including zero drift) indications refer to reference conditions  $H_2O$ ,  $18-24^\circ\text{C}$  ( $66-76^\circ\text{F}$ ), 1-3 bar (15-45 psi).  
 RHM sensor do not suffer from pressure effect due to torsional oscillation and semi circle (non-deforming) measurement section.  
 Temperature changes of  $\pm 25^\circ\text{C}$  around the operating point are negligible.  
 Pressure drop refers to Newton liquids, with parallel measuring loops and block/manifold connection.  
 Nominal flow refers to approx. 10 m/s (33 ft/sec) velocity in measuring loops for best performance.  
**Calibration to customer range, with increased accuracy, possible.**

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## GENERAL DIMENSIONS RHM 40

**Type II** (sealless welded parallel measuring loops w/o sealings / [PF0])



|    |   |                  |
|----|---|------------------|
| A1 | = | 690 mm (27.16")  |
| A2 | = | 720 mm (28.34")  |
| B1 | = | 143 mm (5.63")   |
| B2 | = | 180 mm (7.08")   |
| H1 | = | 963 mm (37.91")  |
| H2 | = | 1153 mm (45.39") |
| E  | = | 250 mm (9.84")   |
| W  | = | 150 mm (5.91")   |

- Weight:  
approx. 120 kg (265 lb)
- Shipping box:  
approx. 145 x 95 x 70 cm  
(57 x 38 x 28 inch)

|          | Process Connection             | Face to face length (L) <sup>(*)</sup> | Order Code |
|----------|--------------------------------|----------------------------------------|------------|
| Standard | 3" CL 150 acc. ANSI B16.5      | 725 mm (28.54")                        | A1         |
|          | 3" CL 300 acc. ANSI B16.5      | 725 mm (28.54")                        | A2         |
|          | 3" CL 600 acc. ANSI B16.5      | 725 mm (28.54")                        | A3         |
|          | DN80 / PN40 acc. DIN 2527 - C  | 725 mm (28.54")                        | D1         |
|          | DN80 / PN100 acc. DIN 2527 - E | 725 mm (28.54")                        | D2         |
| Optional | 3" CL 900 acc. ANSI B16.5      | 725 mm (28.54")                        | A4         |
|          | 3" CL 1500 acc. ANSI B16.5     | 725 mm (28.54")                        | XX         |
|          | DN80 / PN160 acc. DIN 2527 - E | 725 mm (28.54")                        | D4         |
| Special  | DN80 / PN250 acc. DIN 2527 - E | 725 mm (28.54")                        | XX         |
|          | Different sized flanges        | please consult factory                 | XX         |

<sup>(\*)</sup> Customization possible on request.

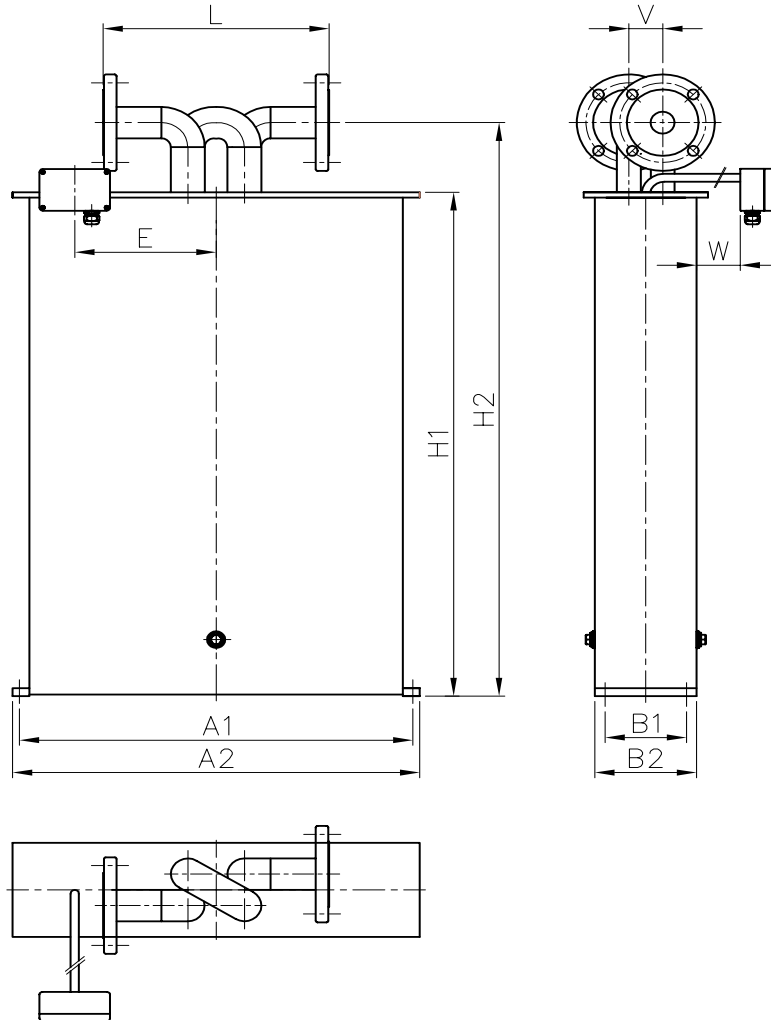
The finish type of our ANSI flanges is RF/SF (AARH 125-250 (μinch) - Ra 3,2 up to 6,3 (μm)). Others available on request.

Above table only shows our general process fittings.

For further customization with regard to special fittings and face to face length please contact your local agent.

## GENERAL DIMENSIONS RHM 40

**Type III** (sealless welded serial measuring loops w/o sealings / [SF0])



|    |   |                  |
|----|---|------------------|
| A1 | = | 690 mm (27.16")  |
| A2 | = | 720 mm (28.34")  |
| B1 | = | 143 mm (5.63")   |
| B2 | = | 180 mm (7.08")   |
| H1 | = | 963 mm (37.91")  |
| H2 | = | 1153 mm (45.39") |
| E  | = | 300 mm (9.84")   |
| W  | = | 150 mm (5.91")   |
| V  | = | 60 mm (2.36")    |

- Weight:  
approx. 120 kg (265 lb)
- Shipping box:  
approx. 145 x 95 x 70 cm  
(57 x 38 x 28 inch)

|                                   | Process Connection             | Face to face length (L) <sup>(*)</sup> | Order Code |
|-----------------------------------|--------------------------------|----------------------------------------|------------|
| Sanitary Fittings <sup>(**)</sup> | 2" Tri Clamp acc. DIN 32676    | 400 mm (15.74")                        | S1         |
|                                   | DN50 / Sanitary acc. DIN 11851 | 400 mm (15.74")                        | S2         |
| Flange Other Fittings             | 3" CL 150 acc. ANSI B16.5      | 400 mm (15.75")                        | A1         |
|                                   | 3" CL 300 acc. ANSI B16.5      | 400 mm (15.75")                        | A2         |
|                                   | DN80 / PN40 acc. DIN 2527 - C  | 400 mm (15.75")                        | D1         |
|                                   | 2" CL 150 acc. ANSI B16.5      | 400 mm (15.75")                        | A7         |
|                                   | 2" CL 300 acc. ANSI B16.5      | 400 mm (15.75")                        | A9         |
|                                   | DN50 / PN40 acc. DIN 2527 - C  | 400 mm (15.75")                        | D7         |
|                                   | Different sized flanges        | please consult factory                 | XX         |

<sup>(\*)</sup> Customization possible on request.

<sup>(\*\*)</sup> Fitting material is 1.4435 / SS 316L.

The finish type of our ANSI flanges is RF/SF (AARH 125-250 (μinch) - Ra 3,2 up to 6,3 (μm)). Others available on request.

Above table only shows our general process fittings.

For further customization with regard to special fittings and face to face length please contact your local agent.

## GENERAL SPECIFICATIONS RHM 40

### Approvals

- ATEX (CESI 02 ATEX 053 X):  
Ex II 1 G, EEx ia IIC T6-T1
- CSA (220705)  
Class I, Div 1 and 2,  
Groups A, B, C and D; Type 3
- Custody Transfer Approvals  
(PTB 1.32-97027224 and NMI TC 3382)
- PED according to directive 97/23/EC  
available
- 3A Sanitary Approvals

### Electrical connection

- Junction box / aluminium coated (standard)  
IP 65 (Nema 4X)  
(Junction box in SS optional)
- Cable entry M25 x 1.5  
(M20 x 1.5, 1/2" and 3/4" NPT optional)
- Max cable length between RHM and RHE:  
100 m (330 ft)  
200 m (660 ft) only with factory approval

### Housing

- Stainless Steel: 1.4301 / SS 304  
- others on request -
- Protection class: IP 65 (Nema 4X)  
- higher on request -

### Material of wetted parts

- 1.4571 / SS 316Ti (standard)
- 1.4539 / SS 904L on request
- Hastelloy C22 on request
- Tantalum on request
- Other material on request

### Pressure rating

- Pressured part of the meter consists of the  
measuring loops and the connection part.  
The weaker of both parts decides the maximum  
allowed operating pressure.  
Below is the max. operating pressure of the  
measuring loops<sup>(\*)</sup>.

(\*) These values are only valid for SS 316Ti & SS 904L materials.  
Statements for others materials on request.

#### Standard version:

165 bar @ 120°C (2390 psi @ 248°F)  
145 bar @ 210°C (2100 psi @ 410°F)  
120 bar @ 350°C (1665 psi @ 662°F)  
wall thickness is generally 3.2 mm (0.13")

#### Optional high pressure version:

250 bar @ 120°C (3625 psi @ 248°F)  
wall thickness is generally 4.8 mm (0.19")

#### Other pressure rating

- on request -

### Temperature rating

- NT Models from -20 to +120°C (-4 to +248°F)
- ET Models from -45 to +120°C (-49 to +248°F)
- ET1 Models from -200 to +50°C (-328 to +122°F)
- ET2 Models from -45 to +210°C (-49 to +410°F)
- HT Models from 0 to +350°C (+32 to +662°F)



- to be continued with the order code on the next page -

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## ORDER CODE RHM 40

### 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)  |
| T3 | ET1 Models (Extended Temperature Models) from -200 to +50°C (-328 to +122°F) |
| T4 | HT Models (High Temperature Models) from 0 to +350°C (+32 to +662°F)         |

#### Pressure Rating

|    |                                                                                  |
|----|----------------------------------------------------------------------------------|
| P1 | Standard pressure version (165 bar @ 120°C / 2390 psi @ 248°F) - <i>page 5</i> - |
| P2 | High pressure version (250 bar 120°C / 3625 psi @ 248°F) - <i>page 5</i> -       |
| PX | Other pressure version (on request) - <i>page 5</i> -                            |

#### Construction Type

|     |                                                                                 |
|-----|---------------------------------------------------------------------------------|
| PF0 | Parallel Measuring Loops Seal Less Welded Version - <i>page 3</i> -             |
| SF0 | Serial Measuring Loops Seal Less Welded Version / Single Path - <i>page 4</i> - |
| XXX | Other construction type on request                                              |

#### Material of Wetted Parts

|    |                   |
|----|-------------------|
| M1 | 1.4571 / SS 316Ti |
| M2 | 1.4539 / SS 904L  |
| M3 | Hastelloy C22     |
| M4 | Tantalum          |

#### Process Connection

|    |                                  |
|----|----------------------------------|
| XX | Code available on pages 3 and 4. |
|----|----------------------------------|

#### 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#40 T1 P1 PF0 M1 A1 AT

T1: NT (Normal Temperature Models) from -20 to +120°C (-49 to +248°F)  
P1: Standard pressure version (165 bar @ 120°C / 2390 psi @ 248°F)  
PF0: Parallel Measuring Loops Seal Less Welded Version  
M1: 1.4571 / SS 316 Ti  
A1: 3" CL 150 acc. ANSI B 16.5  
AT: ATEX Approvals (CESI 02 ATEX 053 X)

M#40