



## RHM80L

### High Flow Coriolis Mass Flow Meter

#### Features

- Standard pressure ratings up to 341 bar (4946 psi)
- Temperature ratings from -196 to 350°C (-320 to 662°F)
- Mass flow uncertainty down to 0.15%
- Density uncertainty down to 0.0025 kg/l
- Repeatability down to 0.05%
- Typical measuring ranges between 8000 and 200 kg/min
- Accurately measure low flow rates down to 130 kg/min
- Unique robust torsion driven oscillation system
- Rheonik **AnyPipeFit Commitment** brings you the possibility to get any custom process connection type and size for savings on installation costs. Compact design with minimal footprint
- Approved for use in hazardous areas
- Stainless steel case

#### Applications

- Terminal Transfer
- Asphalt/Bitumen and other High Temperature Fluids
- Viscous Fluids
- Barge, Ship, Rail Car and Truck Filling

#### Rheonik Sensor Benefits

- Torsion oscillator design assures a stable and drift free measurement with excellent signal to noise ratios
- Resilient to external noise and vibration
- Insensitive to pipe pressure changes
- Robust tube wall thickness provides increased operational safety in abrasive applications
- Corrosion resistant
- Long sensor life guaranteed due to low mechanical stresses in the meter mechanism
- No moving parts to wear or fail

## General Specification Overview

<b>Nominal Flow (<math>Q_{nom}</math>)*</b>	8000 kg/min (17637 lb/min)
<b>Minimum Flow (<math>Q_{min}</math>)*</b>	200 kg/min (441 lb/min)
<b>Operating Temperature</b>	Fluid from -196°C to 280°C (-320°F to 536°F), design up to 350°C (662°F) Ambient from -50°C to 80°C (-58°F to 176°F), optional up to 210°C (410°F)
<b>Pressure Ratings</b>	Up to 341 bar / 4946 psi - dependent upon material
<b>Electrical Connection</b>	Cable entry M25 x 1.5 (standard), M20 x 1.5, ½" NPT, ¾" NPT (optional) Max. cable length to remote RHE transmitter 30m / 98ft
<b>Sensor Enclosure Materials</b>	Stainless steel (standard), 316 stainless steel (optional) Epoxy coated aluminum terminal box (standard), SS 316 terminal box (optional)
<b>Enclosure Type</b>	Protection class IP65 (standard); IP 66 / NEMA 4X (optional)
<b>Wetted Materials</b>	1.4571 (316Ti), 2.4602 (Alloy C22), 1.4410 (SuperDuplex) Additional/customer specific materials available upon request
<b>Process Connections</b>	Nearly any - <b>the RHEONIK AnyPipeFit Commitment</b> . Consult factory for types/sizes not listed in this data sheet
<b>Pressure Rating Compliance</b>	Europe – PED: Module B3.2+C2
<b>Certifications and Approvals</b>	ATEX / IECEx Approvals for zone 0, 1, 2 (suitably rated RHE transmitter required) North American Approvals for Class I, Div. 1, Groups ABCD (suitably rated RHE transmitter required) American Bureau of Shipping (ABS) Type Approval for use on marine vessels
<b>Documentation, Testing and Inspection</b>	All sensors are hydro tested, calibrated and supplied with a traceable calibration certificate. Customized calibration and testing services available
<b>Project Documentation and QA, Services</b>	Rheonik offers a full set of services for large and complex engineering projects. Typical services offered are, but not limited to: <ul style="list-style-type: none"> <li>• Certificates of origin and conformity, mill certificates</li> <li>• Data books including WPAR, WQS, NDT, test &amp; quality plans, functional testing, calibration procedures, customized packing, factory acceptance etc.</li> <li>• Start up and commissioning services on/offshore</li> </ul>
<b>Options</b>	Enclosure heating for high temperature applications Cleaning for oxygen service Full service painting to project specifications – consult factory

\* At  $Q_{nom}$  pressure drop will be approximately 1 bar (14 psi) for H<sub>2</sub>O. Sensors can be operated at higher flow rates but pressure drop will be higher. Maximum recommended velocity (liquid) through the sensor is 15 m/s. Beyond this point, cavitation may occur.  $Q_{min}$  is the recommended lowest flow rate. Sensors will measure flow rates lower than  $Q_{min}$ , but uncertainty may increase beyond 0.5% of rate.

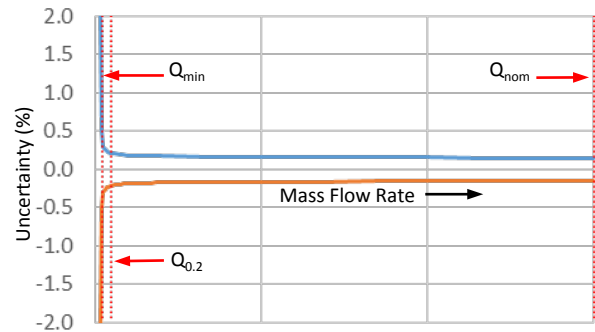
These flow rate and pressure drop statements relate to standard pressure tube sensor versions. Models with higher pressure ratings have increased wall thickness and will have higher pressure drops and lower  $Q_{nom}$  values.

## Measurement Performance

### Standard Calibration

A	<b>0.5% Uncertainty</b> ±0.5% uncertainty between $Q_{nom}$ and $Q_{min}$
B	<b>0.2% Uncertainty</b> ±0.2% uncertainty between $Q_{nom}$ and $Q_{0.2}$

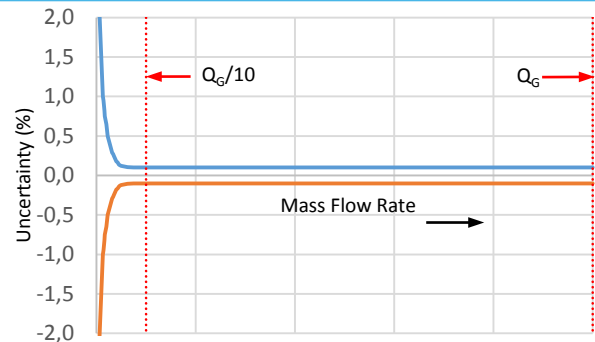
Higher pressure units may have lower  $Q_{nom}$  values due to reduced tube ID



### Goldline Calibration

G	<b>0.15% Uncertainty</b> ±0.15% uncertainty between $Q_G$ and $(Q_G/10)$
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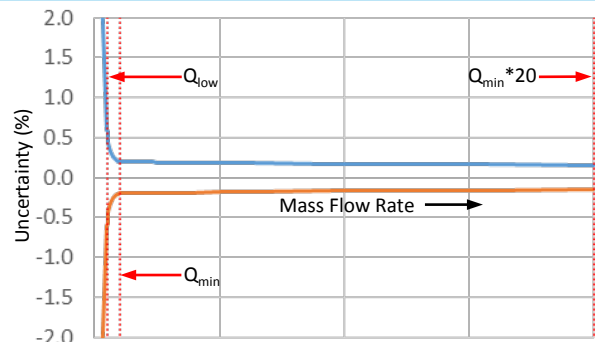
Only for sensors with standard temperature and pressure range  
Customized calibration services are available – consult factory



### Low Flow Calibration

2	<b>Low Flow Optimized Calibration</b> ±0.2% uncertainty between $Q_{min}$ and $(Q_{min} * 20)$ and ±0.6% uncertainty between $Q_{min}$ and $Q_{low}$
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Only for sensors with standard temperature and pressure range



$Q_{nom}$	8000 kg/min (17637 lb/min)
$Q_{min}$	200 kg/min (441 lb/min)
$Q_G$	6000 kg/min (13228 lb/min)
$Q_{0.2}$	400 kg/min (882 lb/min)
$Q_{low}$	130 kg/min (287 lb/min)

Select the calibration option (A,B,G,2) required and include in the overall part number

### Flow Measurement Repeatability

Standard ± 0.1% of rate  
Goldline ± 0.05% of rate

### Temperature Performance

Better than ±1°C

### Density Calibration

N*	No Live Density Calibration
S	Standard +/- 0.005 kg/liter uncertainty between 500 and 1400 kg/m3
D	Enhanced +/- 0.0025 kg/liter uncertainty between 500 and 1400 kg/m3

For live volumetric flow, S or D calibration must be included in the part number and the sensor must be operated by an RHE with live density capability.

\* Even with No Live Density Calibration, volumetric flow can still be calculated with an inferred density value based upon a manually entered norm density value and its temperature gradient.

### Calibration Reference Conditions

Performance statements relate to the following conditions:

- Water (for mass flow accuracy)
- Temperature: 18 to 24°C (66 to 76°F)
- Pressure at 1 to 3 barg (15 to 45 psig)
- RHM with standard temperature, material and pressure range

## Measurement Tube Pressure Ratings

The maximum pressure ( $P_{max}$ ) of a sensor is determined by its lowest rated part. The lowest rated part can be either the measurement tube ( $P_{max}$  indicated below), the construction type ( $P_{max}$  indicated in the Part Number Code section) or the process connection (for  $P_{max}$  see published standards or manufacturer information).

Pressure Code	Material Code	Material	Pmax					
			bar	psi	@	°C	°F	
P1 (std.)	M1 (std.)	1.4571 (316Ti) UNS S31635	104	1508	@	50	122	
			93	1349	@	120	248	
			80	1160	@	210	410	
			67	972	@	350	662	
	M3	2.4602 (Alloy C22) UNS N06022	141	2045	@	50	122	
			125	1813	@	120	248	
			106	1537	@	210	410	
			89	1291	@	350	662	
	62*	1.4462 (Duplex) UNS S31803	198	2871	@	50	122	
			174	2523	@	120	248	
			152	2204	@	210	410	
	10*	1.4410 (Super Duplex) UNS S32750	248	3596	@	50	122	
			218	3161	@	120	248	
			197	2857	@	210	410	
	P2	M1	1.4571 (316Ti) UNS S31635	165	2393	@	50	122
				148	2147	@	120	248
127				1842	@	210	410	
107				1552	@	350	662	
62*		1.4462 (Duplex) UNS S31803	272	3945	@	50	122	
			238	3451	@	120	248	
			209	3031	@	210	410	
10*		1.4410 (Super Duplex) UNS S32750	341	4945	@	50	122	
			299	4336	@	120	248	
			270	3916	@	210	410	

\*Only with N1, NA, E2 temperature range (note Super Duplex min. temp. is -40°C) and seal-less construction type

## Other Materials and Pressure Ratings

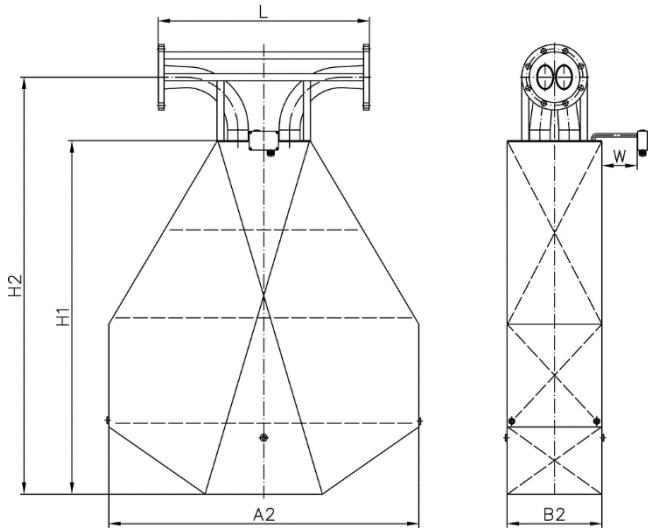
Higher pressure rated measurement tubes in the materials above may be possible. Other wetted materials are also possible for chemical compatibility, lower pressure drop, abrasion allowance and other application specific requirements.

Contact factory with specification for assessment and availability.

## Mechanical Construction

### Seal-less design

PFO: parallel/dual path



Process Connection	Dim. L	Dim. H2	Order Code
	mm / in	mm / in	
ANSI 6" 150#RF Flange	900 / 35.43	1775 / 69.88	A1
ANSI 6" 300#RF Flange	900 / 35.43	1775 / 69.88	A2
ANSI 6" 600#RF Flange	900 / 35.43	1775 / 69.88	A3
DIN DN150 PN16 Flange	900 / 35.43	1775 / 69.88	D1
DIN DN150 PN40 Flange	900 / 35.43	1775 / 69.88	D2

1. A3 flange selection will reduce maximum measurement tube pressure rating by a factor of 0.73

Dimensions	mm	in
A2	1320	51.97
B2	403	15.87
H1	1505	59.25
W	150	5.91

**Standard blue terminal box in Aluminum, size = 125 x 80 x 57 mm (4.92 x 3.15 x 2.24 in)**

- optionally available with integral RHE45 transmitter

Optional SS 316 box, size = 100 x 100 x 61 mm (3.94 x 3.94 x 2.40 in)

- only for remote transmitter

*NOTE: Junction boxes are supplied with M25 x 1.5 cable entries as standard. M20 x 1.5, ½" NPT, ¾" NPT cable entries are optionally available and must be ordered separately.*

All dimensions are for standard products. For customization of face to face length and/or process connection types other than the ones listed on this page, please consult factory. Note that larger diameter flange process connections are always possible.

## RHM80L Part Number Code

### Temperature Range

- N1 -20 to +120°C (-4 to +248°F) (std.)
- NA -50 to +120°C (-58 to +248°F)
- E2 -50 to +210°C (-58 to +410°F)
- E3 -196 to +50°C (-320 to +122°F)
- H4 0 to +350°C (+32 to +662°F) - max. operating temperature 280°C

### Pressure Code for Pmax of Measuring Loops (see pressure ratings page)

- P1 pmax depends upon material
- P2 pmax depends upon material

### Material of Wetted Parts

- M1 1.4571 (316Ti) (std.)
- M3 2.4602 (Alloy C22), seal-less construction types only
- XX Other materials, e.g. (Super)Duplex are available upon request

### Process Connection

See mechanical construction pages for available connections and codes

### Terminal Box Selection

- JM Coated aluminum TB, M25 cable entry (options available)
- SM SS 316 TB, M25 cable entry (options available)
- TM No TB. 2m fixed / integral PTFE cable to RHE
- J5 Coated aluminum TB for integral RHE45, one or two M12 sockets

### Options Codes

- NN No options
- See options listing for specific codes

### Hazardous Area Certifications

- NN Without Ex Approval
- A0 ATEX/IEC Approval Zone 0: Ex II 1G Ex ia IIC T1-T6 Ga
- A1 ATEX/IEC Approval Zone 1: Ex II 2G Ex ia IIC T1-T6 Gb
- C0 CSA Approval USA-Canada Class I, Div. 1, Groups ABCD

### Pressure Design Compliance

- NN No specific design compliance required
- BC PED [Europe] module B3.2+C2
- CA CRN [Canada] - Alberta province
- CR CRN [Canada] - all other provinces

### Mass Flow Calibration Selection

See performance page for code options

### Density Calibration Selection

See performance page for code options

### Additional Manufacturing Instructions

- N No manufacturing instructions
- O Oil/grease free cleaning
- S Marine packing



## Options and Accessories

RHM80L Part Number Option Codes	
H1	Hot oil/steam heating matrix for housing, DN25 PN40
H2	Hot oil/steam heating matrix for housing, 1" ANSI 150 RF
H3	Hot oil/steam heating matrix for housing, 1" ANSI 300 RF
P2	Housing purge connections - ½" NPT (2 pcs)
SB	Housing in 316 stainless steel
DY	Dye penetrant inspection
XR	X-ray test

NOTE: when specifying a sensor with multiple part code options (i.e. DY and XR), separate each code with a comma in the part string (i.e. ...DY,XR...)

Cable Entry Options (order separately)	
ORHM-E1	½" NPT Terminal Box Cable Entry
ORHM-E2	M20 x 1.5 Terminal Box Cable Entry
ORHM-E3	¾" NPT Terminal Box Cable Entry

Standard cable entry on terminal box is M25 x 1.5

## Transmitter Range



Any Rheonik Mass Flow Transmitter model can be combined with any Rheonik Mass Flow Sensor to provide an overall mass flow measurement system to suit any requirement. Rheonik Coriolis transmitters are available in versions specifically designed for process, industrial and OEM applications. Together they offer a tremendous range of options for system designers and end users alike.

See separate data sheet for the features of each transmitter style

## About Rheonik

Rheonik has a single purpose: to design and manufacture the very best Coriolis meters available. Our research and engineering resources are dedicated to finding new and better ways to provide cost effective accurate mass flow solutions. Our manufacturing group care for each and every meter we produce from raw materials all the way to shipping and our service and support group are available to help you specify, integrate, start-up and maintain each and every Rheonik meter you have in service. Whether you own just one meter or have hundreds, you will never be just another customer to us. You are our valued business partner.

Need a specific configuration for your plant - don't compromise with a "standard" product from elsewhere that will add extra cost to your installation. If we can't configure it from our extensive product range, our exclusive **AnyPipeFit Commitment** can have your flow sensor customized with any size or type process connection you need.

No matter what control system you use as the backbone in your enterprise, with our **AnyInterface Commitment**, you can be sure that connection and communication will not be a problem. Alongside a wide variety of discrete analog or digital signal connections, we can also provide just about any network/bus interface available (for example: HART, ProfibusDP, ProfiNet, EtherCAT, PowerLink, EtherNet/IP, CAN, ....) with our RHE4x family of transmitters. Rheonik RHE4X transmitters can connect to your system – no headache and no conversion needed.