RHM160

Coriolis Mass Flow Meter for High Flow Terminal and Pipeline Applications

Features

- Standard pressure ratings up to 50 bar (725 psi)
- Temperature ratings from -196 to 120 °C (-320 to 248 °F)
- Mass flow uncertainty down to 0.15%
- Density uncertainty down to 0.0025 kg/liter
- Repeatability down to 0.05%
- Typical measuring ranges between 30000 and 750 kg/min
- Accurately measure low flow rates down to 600 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
- Allocation Metering
- 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

Nominal Flow (Q_{nom})*	30000 kg/min (66139 lb/min)
Minimum Flow (Q_{min})*	750 kg/min (1653 lb/min)
Operating Temperature	Fluid from -196°C to 120°C (-320°F to 248°F), see options in Part Number Code Ambient from -50°C to 80°C (-58°F to 176°F)
Pressure Ratings	Up to 50 bar / 725 psi - dependent upon material
Electrical Connection	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
Sensor Enclosure Materials	Stainless steel (standard), 316 stainless steel (optional) Epoxy coated aluminum terminal box (standard), SS 316 terminal box (optional)
Enclosure Type	Protection class IP65 (standard); IP 66 / NEMA 4X (optional)
Wetted Materials	1.4571 (316Ti), 2.4602 (Alloy C22) Additional/customer specific materials available upon request
Process Connections	Nearly any - **the RHEONIK AnyPipeFit Commitment**. Consult factory for types/sizes not listed in this data sheet
Pressure Rating Compliance	Europe – PED: Module B3.2+C2
Certifications and Approvals	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
Documentation, Testing and Inspection	All sensors are hydro tested, calibrated and supplied with a traceable calibration certificate. Customized calibration and testing services available
Project Documentation and QA, Services	Rheonik offers a full set of services for large and complex engineering projects. Typical services offered are, but not limited to: • Certificates of origin and conformity, mill certificates • Data books including WPAR, WQS, NDT, test & quality plans, functional testing, calibration procedures, customized packing, factory acceptance etc. • Start up and commissioning services on/offshore
Options	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_20. 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.

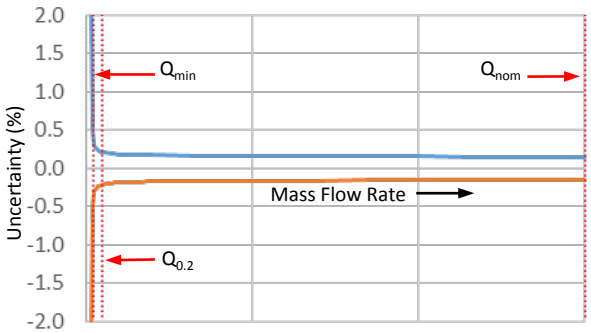
These flow rate and pressure drop statements relate to standard pressure tube sensor versions. Models with higher pressure ratings have increased wall thickness and will have higher pressure drops and lower Q_{nom} values.

Measurement Performance

Standard Calibration

A	**0.5% Uncertainty** ±0.5% uncertainty between Q_{nom} and Q_{min}
B	**0.2% Uncertainty** ±0.2% uncertainty between Q_{nom} and $Q_{0.2}$

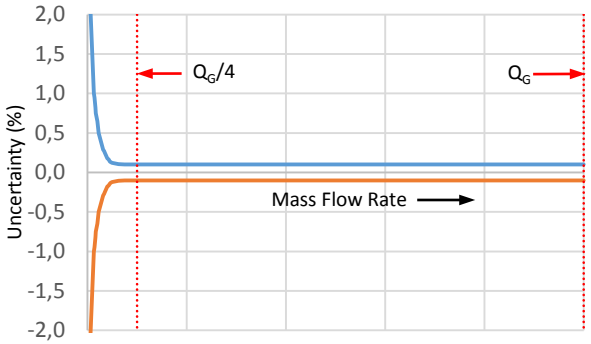
Higher pressure units may have lower Q_{nom} values due to reduced tube ID



Goldline Calibration

G	**0.15% Uncertainty** ±0.15% uncertainty between Q_G and (Q_G/4)

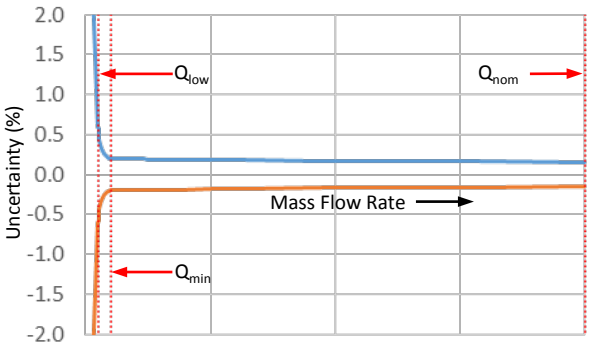
Only for sensors with standard temperature and pressure range
Customized calibration services are available – consult factory



Low Flow Calibration

2	**Low Flow Optimized Calibration** ±0.2% uncertainty between Q_{nom} and $Q_{0.2}$ ±0.5% uncertainty between $Q_{0.2}$ and Q_{min} ±0.6% uncertainty between Q_{min} and Q_{low}

Only for sensors with standard temperature and pressure range



Q_{nom}	30000 kg/min (17637 lb/min)
Q_{min}	750 kg/min (441 lb/min)
Q_G	12000 kg/min (13228 lb/min)
$Q_{0.2}$	2000 kg/min (882 lb/min)
Q_{low}	600 kg/min (287 lb/min)

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

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.*

Flow Measurement Repeatability

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

Temperature Performance

Better than ±1°C

Calibration Reference Conditions

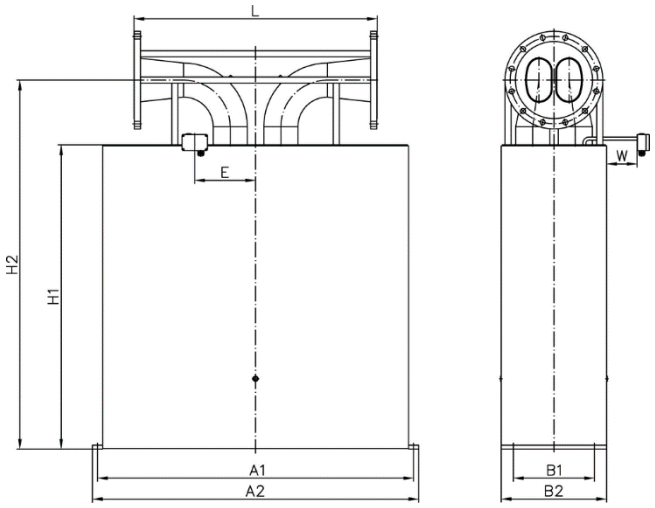
Performance statements relate to the following conditions:

- 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

Mechanical Construction

Seal-less design

PF0: parallel/dual path



Process Connection	Dim. L mm / in	Dim. H2 mm / in	Order Code
ANSI 12" 150#RF Flange	1200 / 47.24	1820 / 71.65	A1
ANSI 12" 300#RF Flange	1200 / 47.24	1820 / 71.65	A2
DIN DN300 PN16 Flange	1200 / 47.24	1820 / 71.65	D1
DIN DN300 PN40 Flange	1200 / 47.24	1820 / 71.65	D2

Dimensions	mm	in
A1	1560	61.42
A2	1610	63.39
B1	400	15.75
B2	520	20.47
E	300	11.81
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.

RHM160 Pressure Ratings

Pressure Code	Flange	Material Code	Pmax				
			bar	psi		°C	°F
P1	A1 / 12” 150# RF	M1 / SS 316Ti	18.6	269	@	50	122
			16.4	237	@	120	248
	A2 / 12” 300# RF	M1 / SS 316Ti	46.7	677	@	50	122
			42.9	622	@	120	248
	D1 / DN300 PN16	M1 / SS 316Ti	16	232	@	50	122
			15.2	220	@	120	248
	D2 / DN300 PN40	M1 / SS 316Ti	32	464	@	50	122
			30	435	@	120	248
	A1 / 12” 150# RF	M3 / Alloy C22	19.5	282	@	50	122
			16.9	245	@	120	248
	A2 / 12” 300# RF	M3 / Alloy C22	60	870	@	50	122
			50	725	@	120	248
	D1 / DN300 PN16	M3 / Alloy C22	16	232	@	50	122
			16	232	@	120	248
	D2 / DN300 PN40	M3 / Alloy C22	40	580	@	50	122
			40	580	@	120	248

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.

RHM160 Part Number Code

Temperature Range

N1 -20 to +120°C (-4 to +248°F) (std.)

NA -50 to +120°C (-58 to +248°F)

E3 -196 to +50°C (-320 to +122°F)

Pressure Code (see pressure ratings page)

P1 pmax depends upon material and flange selection

Material of Wetted Parts

M1 1.4571 (316Ti) (std.)

M3 2.4602 (Alloy C22)

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

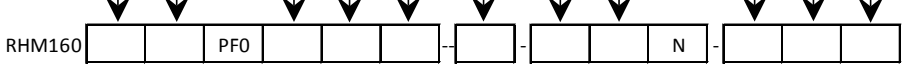
See performance page for code options

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.