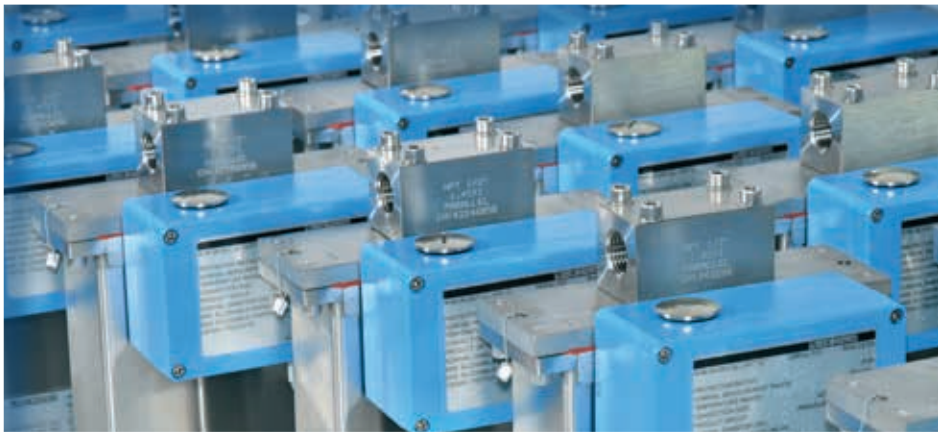
RHEONIK

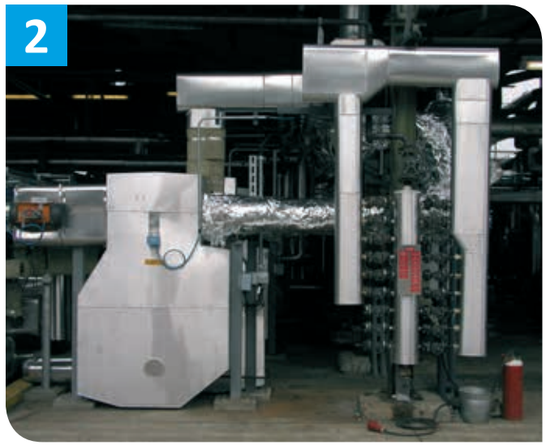


The World's Most Versatile Range of

Coriolis Flowmeters

1. Adhesives
No moving parts to be plugged or fouled

2. Bitumen
Rheonik meters operate at continuous high temperature while providing high accuracy measurement



3. Custody Transfer
Inherent high accuracy is a key requirement for CT

4. Embedded Systems
The small footprint of Rheonik embedded rail mount transmitters and in line sensors are a favourite solution for OEM's

5. Fuel Oil
Rheonik Coriolis mass flow meters are utilized as both transfer meters and check meters for fuel oil deliveries

6. Process Feed
Rheonik Mass flow meters are perfect for batching and continuous feed processes

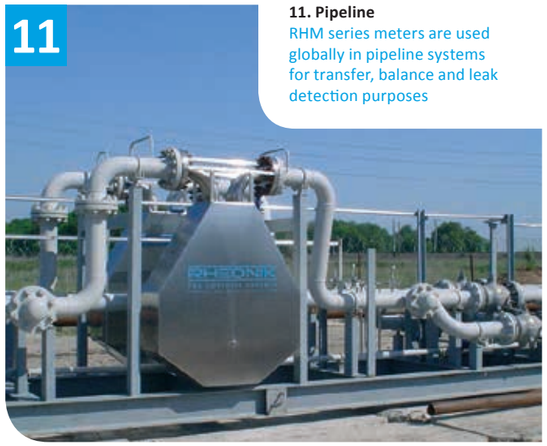
7. Hydrogen Fueling
Rheonik are the world leader in high pressure meters for Hydrogen dispensing

8. Leak Detection
Mission critical systems like LD count upon the reliability of Rheonik Coriolis meters

9. Terminaling
The dependable flow measurement from Rheonik flow meters leads to successful and reliable product movements in terminal complexes

10. Offshore
Rheonik meters are rugged and built with materials necessary for offshore use

12. Onshore Oil Production
Coriolis meters are ideal for measuring well production flows and oil and water streams from test separators in the field



11. Pipeline
RHM series meters are used globally in pipeline systems for transfer, balance and leak detection purposes

13. Oilfield Services
Rheonik high pressure meters provide close-to-the-well flow measurement with high turndown capability and fluid independence for the utmost in deployment flexibility

RHEONIK IN GLOBAL INDUSTRY

On this page are just a few examples of Rheonik meter installations from around the world. Rheonik meters are used every day in just about every industry globally, providing real time input into process and measurement systems.

Reliability is key – Rheonik Coriolis meters have no moving parts to wear or plug and are suited to both gas and liquid streams. The ability to work across a wide range of flow rates and process conditions dramatically lowers installation and operation costs.

Safety is built in to all systems. Low power usage makes all Rheonik meters intrinsically safe and all meters are proof tested to 1.5x their maximum operating pressure before shipment.

With highly accurate measurement performance and high pressure capabilities, Rheonik meters are a natural choice for so many applications and quickly provide payback through improved product quality and greatly reduced maintenance.

Whether used for transfer, batching, process feed or control, Rheonik meters can provide online flow and density measurement. Like all of our customers, you can be assured of a value-for-money flow measurement solution from Rheonik for every application.

14. Fuel Feed
Rheonik meters are found in ships, turbine sets, jet engine test stands, internal combustion engine test cells and dynamometers worldwide

15. Polyurethane Production
Accurate measurement performance and high pressure capability of Rheonik meters make them a natural choice for any polyurethane production application

THE CORIOLIS EXPERTS
Contact us: www.rheonik.com

Rheonik Omega Technology

In/Out Tubes

Decouples measurement tubes from process line stress and misalignment. The in/out tubes are collected close together in the center of the meter body to minimize the effect of any stress and strain caused by pipeline connection misalignment on meter performance. While not a substitute for proper installation technique, this helps when meters are occasionally faced with real-world installation conditions.

Torsion Rods

Help energize and guide the oscillation. The torsion rods are the heart of the Rheonik meter mechanism. As the mass bars are driven and rotate, energy is loaded to and unloaded from the torsion rods to provide smooth and "bump-free" motion on the meter tubes. Also aiding in mechanism efficiency, the torsion rods dramatically reduce energy loss and the need for high energy drive across a wide range of application flow conditions.

Mass Bars

Provide stability and support to the measurement tube oscillation. Not only do the mass bars provide driving force to the meter mechanism (like the pendulum of a clock), their weight is designed to determine the most advantageous base oscillation frequency of the flow meter. For applications where Coriolis meters are to be installed in close proximity, the mass weight is adjusted on each one to suppress any localized cross-talk interference issues.

Measurement Tubes

The part of the meter where the measurement takes place. The measurement tubes within a Rheonik mass flow meter are semi-circular. A long radius (compared to the diameter of the tubes) accentuates the bend and deflection of the tube to provide "macro motions" and provides high resolution time measurements for reliable flow determination. Furthermore, the completely semi-circular geometry of the measurement tubes makes them impervious to internal pressure changes and any measurement shifts such changes can cause when the meter is in service.

Drive Coils

Provide power to maintain oscillations at constant amplitude. Mounted on the mass bars, the coils provide motive force and keep the "pendulum" running, even in applications with highly dampening fluid flows. Straddling the parallel mass bars, the coils provide equal force to both for a totally symmetrical drive of the overall mechanism.

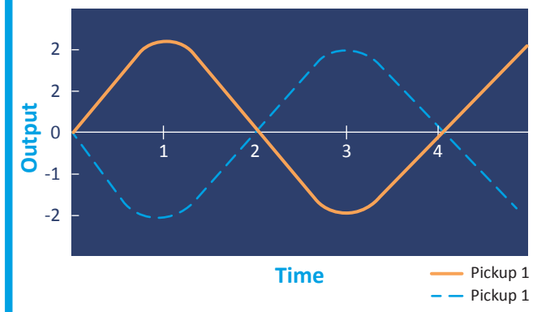
Pickup Coils

Two pick up coils work with precisely placed magnets to provide a sinusoidal feedback waveform from each side of the center of rotation of the meter mechanism.

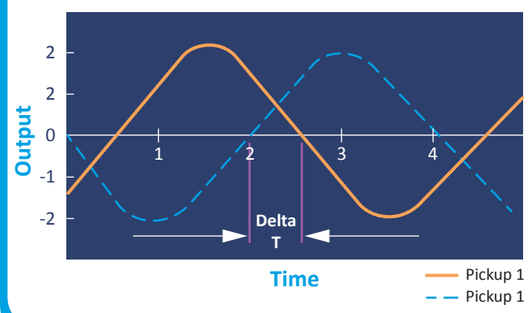
When there is no flow, the waveforms are exactly 180 degrees out of phase. The force of fluid flowing through the meter causes the tubes to bend and deflect and as this happens, the phase difference between the two signals changes. The greater the mass flow rate, the greater the phase change.

High quality electronics measure the phase change by measuring the time difference of the two signals and convert it to mass flow.

Waveforms at zero flow:



Waveforms at flow:



Safety First

All Rheonik sensors are constructed with standard size measurement tubes and carry pressure ratings just like the pipework around them. All are proof tested to 1.5 x their maximum allowable operating pressure and all have a burst pressure rating of 4 x their MAOP.

The electrical and electronic circuitry within Rheonik Omega tube Coriolis sensor housings is certified as intrinsically safe. Rheonik sensors can be safely deployed in any hazardous environment.

THE CORIOLIS EXPERTS
Contact us: www.rheonik.com

Meter Range Overview

Full Scale Meters up to 30000 kg/min (66140 lbs/min)

RHM60 to RHM160

— 4” to 12” line sizes

— Perfect for material movements in small and wide scale operations

Mid range meters up to 1500 kg/min (3400 lbs/min)

RHM12 to RHM40

— 1” to 3” line sizes

— Suited to industrial and process flow control and monitoring

Small sizes up to 50 kg/min (110 lbs/min)

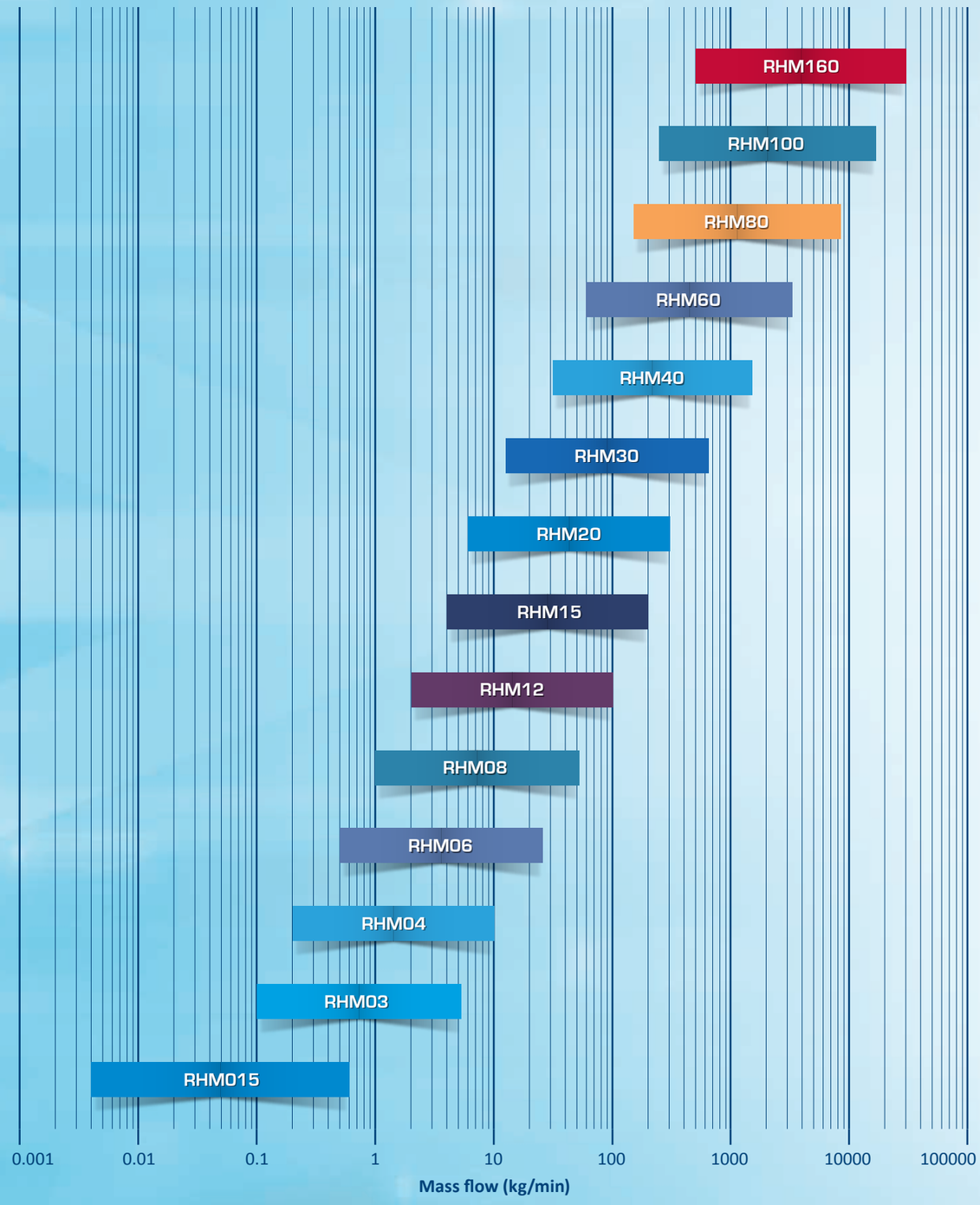
RHM015 to RHM08

— ¼” to 1” line sizes

— Small footprint – ideal for embedded systems and precise small flow applications

Flow Range

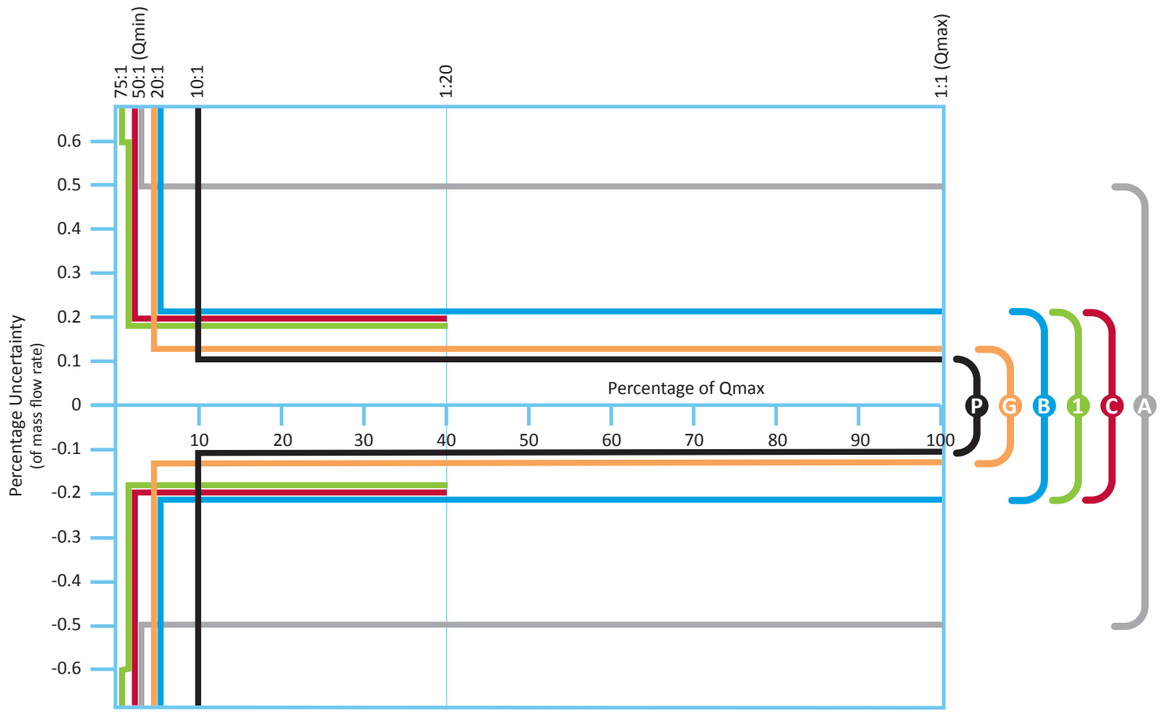
The Rheonik Omega tube Coriolis sensor range is carefully designed to provide complete coverage of mass flow rates from a few grams up to 30 tonnes per minute. Whatever the required flow range, Rheonik can cover it.



Flow rate chart depicts flow ranges for liquid applications at typical/common process pressure ratings.
Flow ranges for meters with higher pressure ratings may vary. Gas flow ranges will depend upon pressure.

THE CORIOLIS EXPERTS
Contact us: www.rheonik.com

Uncertainty Chart



Only Rheonik offers a selection of calibration options to match application range for the best possible flow measurement performance. Select for wide turndown, higher accuracy or low flow optimized performance from the Rheonik calibration portfolio to maximize the value of your Rheonik Coriolis flow meter.

Mass Flow Calibration Options

A	Calibration optimized for wide flow range use – 0.5% uncertainty across a flow range of 50:1 from Qmax
B	Calibration optimized for higher flow rate use – 0.2% uncertainty across a flow range of 20:1 from Qmax
C	Low flow calibration – 0.2% uncertainty across a flow range of 1:20 from Qmin
G	Goldline higher accuracy calibration – 0.12% (0.15%)* uncertainty across a flow range of 20:1 from Qmax
P	Goldline high accuracy calibration – 0.10% (0.12%)* uncertainty across a flow range of 10:1 from Qmax
1	Low flow optimized calibration – 0.2% uncertainty across a flow range of 1:20 plus 0.6% uncertainty across a flow range of 2.5:1 around Qmin

Uncertainties stated are percentage of reading.

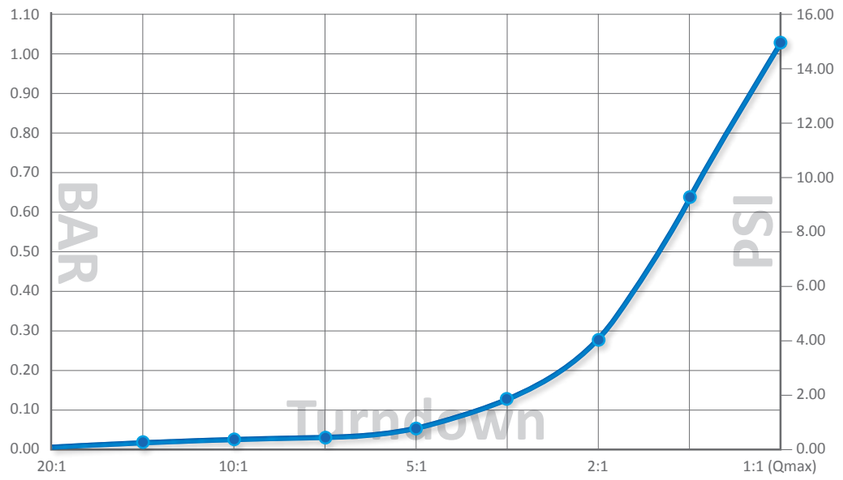
Some meter models will have slightly different turndown ranges – see specific model literature for details.

Uncertainty chart is applicable to liquid applications only. Gas application uncertainty may vary depending upon pressure and velocity.

**Depending upon meter size.*

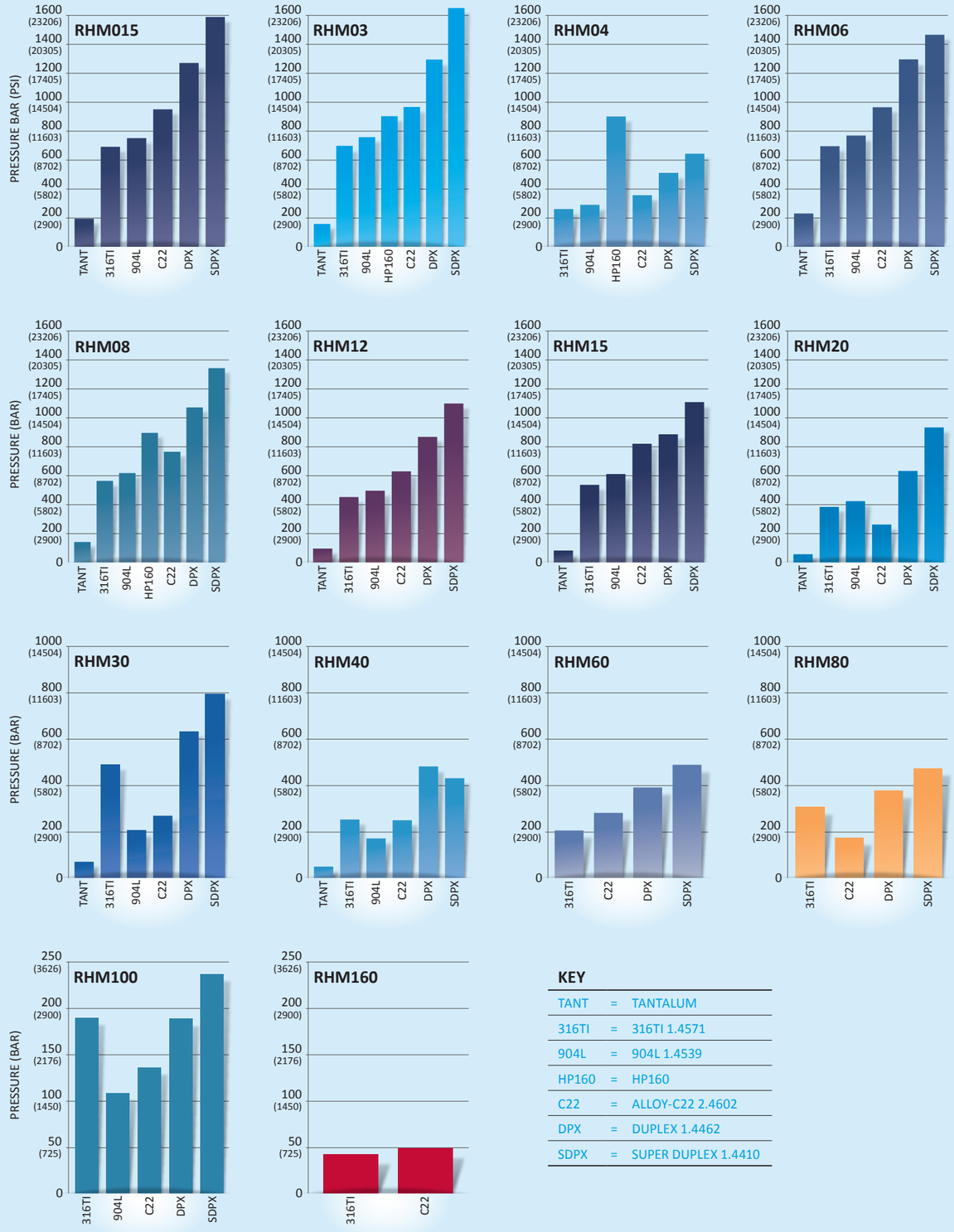
Pressure Drop

This chart gives a general indication of expected pressure drop when measuring water flow across the full range of a meter with standard pressure rating stainless steel measuring tubes. Actual pressure drop in operation is determined by construction type, pressure rating of the sensor tubes and the application fluid characteristics. Contact Rheonik or your local agent for pressure drop information for your specific application conditions.



Standard Material Pressure Ratings

All pressure ratings stated are at 50°C. The overall pressure rating of any flow sensor is always the lowest value of its tube rating, any construction limit, and its process connection rating.



KEY

TANT	=	TANTALUM
316TI	=	316TI 1.4571
904L	=	904L 1.4539
HP160	=	HP160
C22	=	ALLOY-C22 2.4602
DPX	=	DUPLEX 1.4462
SDPX	=	SUPER DUPLEX 1.4410

THE CORIOLIS EXPERTS
Contact us: www.rheonik.com

Process Connection

	ANSI FLANGE	DIN FLANGE	GRAYLOK® HUB	FEMALE THREAD	SWAGELOK® FITTING	TRICLAMP	DIN 11851 SANITARY	MP AUTOCLAVE
								
RHM015	0.5"	DN15	1" GR4	0.25"	0.25"	0.5"	NW10	—
RHM03	0.5"	DN15	1" GR4	0.25"	0.25"	0.5"	NW10	3/8"
RHM04	0.5"	DN15	1" GR4	0.25"	0.25"	0.5"	NW10	3/8"
RHM06	1"	DN25	1" GR5	0.5"	0.5"	0.5"	—	—
RHM08	1"	DN25	1" GR5	0.5"	0.5"	0.5"	—	9/16"
RHM12	1"	DN25	1.5" GR11	0.75"	0.75"	0.75"	NW20	—
RHM15	1" / 1.5"	DN25 / 40	2" GR14	0.75"	0.75"	0.75"	NW20	—
RHM20	1.5" / 2"	DN40 / 50	2.5" GR20	1"	1"	1"	NW20	—
RHM30	2" / 3"	DN50 / 80	—	—	—	1.5"	NW32	—
RHM40	3"	DN80	—	—	—	2"	NW50	—
RHM60	4"	DN100	—	—	—	—	—	—
RHM80	6"	DN150	—	—	—	—	—	—
RHM100	8"	DN200	—	—	—	—	—	—
RHM160	12"	DN300	—	—	—	—	—	—

Table shows standard size/offering.
Customer specific process connections available on request.

Material Availability

	1.4571 (316Ti) UNS S31635 (std.)	1.4539 (904L) UNS N08904	Sandvik HP160	2.4602 (Alloy C22) UNS N06022	1.4462 (Duplex) UNS S31803	1.4410 (Super Duplex) UNS S32750	Tantalum UNS R05200	Custom Materials to Customer Specification
RHM015	●	●		●	●	●	●	●
RHM03	●	●	●	●	●	●	●	●
RHM04	●	●	●	●	●	●		●
RHM06	●	●		●	●	●	●	●
RHM08	●	●	●	●	●	●	●	●
RHM12	●	●		●	●	●	●	●
RHM15	●	●		●	●	●	●	●
RHM20	●	●		●	●	●	●	●
RHM30	●	●		●	●	●	●	●
RHM40	●	●		●	●	●	●	●
RHM60	●			●	●	●		●
RHM80	●			●	●	●		●
RHM100	●	●		●	●	●		●
RHM160	●			●				●

Transmitter Range

TRANSMITTER MODEL	RHE07	RHE08	RHE11	RHE12	RHE14	RHE16
Mounting	19" rack/ panel	Field	Field	Field	DIN rail	DIN rail
Housing type	DIN Cassette	Aluminium	Stainless Steel	Aluminium	Plastic	Plastic
Housing Rating	IP 20	IP 65	IP 66	IP 66	IP 20	IP 20
PARAMETER AVAILABILITY						
Mass Flow	s	s	s	s	s	s
Volumetric Flow	s	s	s			o
Density	s	s	s			o
Temperature	s	s	s	s	s	s
Process Specific Functions	*Gain, Gas Nm3, etc. See individual data sheets for more details.*					
SUPPLY VOLTAGE						
230 VAC	o	o	o			
115 VAC	o	o	o			
24 VDC	o	o	o	s	s	s
INPUTS/OUTPUTS						
4-20 mA	2	2	1-2	1	1	0/1
Pulse/frequency	1	1	1	1	2	0/2
Digital/status out	3	3	o		1	0/2
Digital/control in	2	2	o		1	
DIGITAL INTERFACES						
RS 485 / ASCII	o	o	o			
RS 422 / ASCII	o	o				
RS 232 / ASCII	o	o			o	
HART		o	o	s	o	
Modbus						s
Profibus DP					o	
EX APPROVALS						
ATEX approval Ex II(1) G [Ex ia Ga] IIC	o	o				
ATEX approval Ex II 2(1) G Ex db eb [ia Ga] IIC T5			s			
ATEX approval Ex II 2 (1) G Ex db [ia Ga] IIC T6				o		
ATEX rating EX II 3 G Ex nA IIC T4 Gc	o	o				o
CSA	o	o		o		

s = standard
o = selectable

THE CORIOLIS EXPERTS
Contact us: www.rheonik.com

RHEONIK

Unlike many other flow meter manufacturers, Rheonik only make Coriolis meters – we are **The Coriolis Experts** – and your purchase of a Rheonik Mass Flow solution is supported globally by engineering professionals with many years of experience in metering and measurement instrumentation.

Rheonik has been manufacturing high quality, high specification Coriolis mass flow meters for over 30 years. Contact us today to discover more about Rheonik Coriolis technology and become one of the many satisfied users around the world who rely on Rheonik for critical flow measurement in their applications.

Your local agent:

THE CORIOLIS EXPERTS

Contact us: www.rheonik.com