RHM20

Industrial Coriolis Mass Flow Meter

Features

- Standard pressure ratings up to 392 bar (5685 psi)
- Temperature ratings from -196 to 350°C (-320 to 662°F)
- Mass flow uncertainty down to 0.15%
- Density uncertainty down to 0.5%
- Repeatability better than 0.05%
- Typical measuring ranges between 3 and 300 kg/min
- Accurately measure low flow rates down to 2.25 kg/min
- Unique robust torsion driven oscillation system
- Process connection customization available
- Minimum pipe footprint versions available
- Approved for use in hazardous areas
- Stainless steel case
- Removable connection manifold version available for easy and efficient maintenance
- Remote and compact transmitter versions available

Applications

Typical applications include:

- General Flow Control
- Plant Balance
- Additive Dosing
- Mixing
- Batching
- Package and Container Filling

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

RHM20 General Specifications

Nominal Max Flow Range:	Parallel/dual path measurement tube versions: 300 kg/min (661.4 lb/min) Serial/single path measurement tube versions: 150 kg/min (330.7 lb/min)
Density Range:	5 to 5000 kg/m^3 (0.31 to 312 lb/ft^3)
Temperature Range:	5 temperature range options cover temperatures from -196°C to 350°C (-320°F to 662°F)
Pressure Ratings:	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 100m (330 ft)
Sensor Housing Materials:	1.4301 / 304 stainless steel (standard), 1.4571 /316Ti (optional) Epoxy coated aluminium electrical box (standard), 1.4571 / 316Ti Stainless Steel (optional)
Enclosure Type:	Protection Class IP 65. Optional IP 66 / NEMA 4X
Material of Wetted Parts:	Sensors are available in a variety of standard and custom materials to suit a wide range of pressure ratings and chemical compatibility requirements. See the pressure ratings listing in this document for further details
Finishes:	ANSI flange finish: AARH 125 to 250 µin, Ra 3.2 to 6.3 µm
Certifications and Approvals:	ATEX approval Zone 0: Ex II 1 G Ex ia IIC T1-T6 Ga ATEX rating Zone 2: Ex II 3 G Ex nA IIC T1-T6 Gc CSA USA-Canada, Class I, Div. 1, Groups A, B, C, D PED according to 97/23/EC Art.3 (3) Sound Engineering Practice (SEP), Module A1 or Module B + Cl (as required by construction type and measured fluid)
Documentation:	All sensors are supplied with a traceable calibration certificate. Optional documentation items available: - Traceable material certificates - Certificates of origin and conformity - Welding - NACE - Quality - Production and manufacturing procedures Other documentation to client requirements available
Proof Testing:	Hydrotest, dye penetrant, x-ray, PMI
Options:	Enclosure heating matrix for high temperature applications

Transmitter Range


RHE07


RHE08


RHE11


RHE12

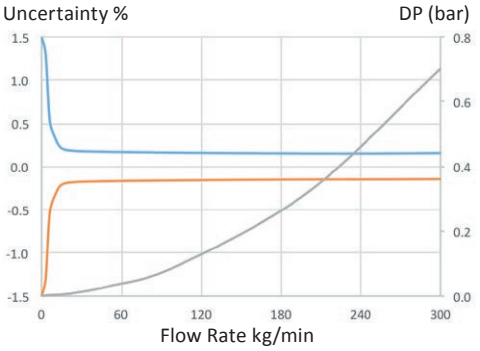

RHE14


RHE16

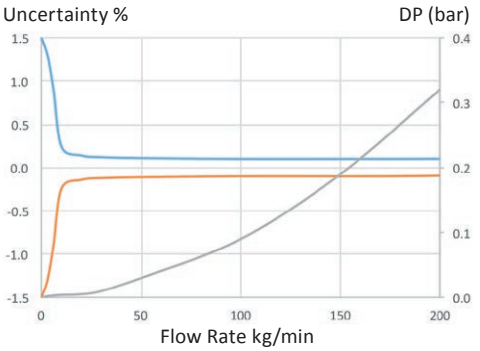
Any Rheonik Mass Flow Transmitter model can be combined with an RHM20 sensor to provide an overall mass flow measurement system to suit any requirement. Rheonik Coriolis transmitters are designed for process, industrial and OEM applications. Together they offer a tremendous range of options for system designers and end users alike.

RHM20 Measurement Performance

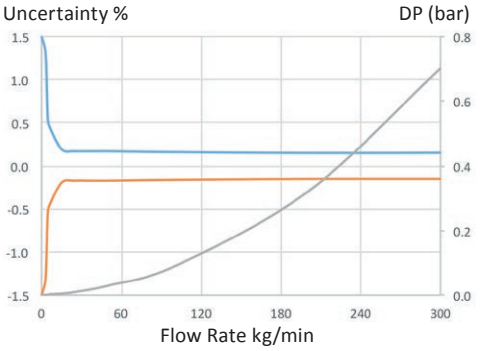
Standard Calibration		
Flow Rate		**Uncertainty**
kg/min	lb/min	in % of reading
300	661	0.20
150	331	0.20
50	110	0.20
15	33.1	0.20
6.0	13.2	0.50



Goldline Calibration*		
Flow Rate		**Uncertainty**
kg/min	lb/min	in % of reading
200	441	0.15
100	220	0.15
75	165	0.15
50	110	0.15
20	44.1	0.15



Low Flow Calibration*		
Flow Rate		**Uncertainty**
kg/min	lb/min	in % of reading
300	661	0.20
150	331	0.20
15	33.1	0.20
6.0	13.2	0.50
4.5	9.9	0.60



*Goldline and Low Flow Calibration is not available with all configurations of the RHM20. Please check with factory.

Mass Flow Calibration Options	
A	50:1 Standard Calibration – 0.5% Uncertainty between 300 and 6 kg/min
B	20:1 Standard Calibration – 0.2% Uncertainty between 300 and 15 kg/min
G	10:1 Goldline Calibration – 0.12% Uncertainty between 200 and 20 kg/min
2	Low Flow Calibration – 0.2% Uncertainty between 300 and 15 kg/min, 0.5% between 15 and 6 kg/min, 0.6% between 6 and 4.5 kg/min

- *Uncertainty of reading (incl. zero drift) stated at reference condition of: H_2O, 18-24°C (66-76°F), 1-3 bar (15-45 psi) when installed according to field manual*
- *Pressure drop indications are based upon H_2O flowing in a meter with P1 pressure rating and PM0 (parallel measuring tubes with manifold block) construction*
- *Serial path versions offer the same accuracy performance at half the flow (Nominal max. flow range of serial versions = 150 kg/min). Pressure drop will be greater*
- *For customized calibration range or uncertainty levels, please consult factory*

Flow Measurement Repeatability
Standard ± 0.1% of rate
Goldline ± 0.05% of rate

Density Measurement Performance (liquids)
Standard 2 point calibration ±1% of value
Optional 3 point calibration ±0.5% of value
Gas density – depends upon pressure

Temperature
Better than ± 1°C

RHM20 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 measuring tube (P_{max} indicated below), the construction type (P_{max} indicated in the Part Number Code section, last page) or the process connection (for P_{max} see published standards or manufacturer information).

RHM20 Measurement Tube Pressure Ratings

Pressure Code	Material Code	Material	p_{max}				
			bar	psi		°C	°F
P1 (std.)	M1 (std.)	1.4571 (316Ti) UNS S31635	120	1740	@	50	122
			110	1595	@	120	248
			92	1334	@	210	410
			77	1117	@	350	662
P1	M3	2.4602 (Alloy C22) UNS N06022	193	2799	@	50	122
			171	2480	@	120	248
			146	2118	@	210	410
			121	1755	@	350	662
P1	M4*	Tantalum UNS R05200	62	899	@	50	122
			48	696	@	120	248
			39	566	@	210	410
P2	M1 (std.)	1.4571 (316Ti) UNS S31635	250	3626	@	50	122
			225	3263	@	120	248
			193	2799	@	210	410
			162	2350	@	350	662
P2	M3	2.4602 (Alloy C22) UNS N06022	260	3771	@	50	122
			232	3365	@	120	248
			196	2843	@	210	410
			163	2364	@	350	662
P4	M1 (std.)	1.4571 (316Ti) UNS S31635	392	5685	@	50	122
			345	5004	@	120	248
			300	4351	@	210	410
			250	3626	@	350	662

*Only with T1, TA, T2 temperature range (note max. operating temp. is 150°C) and PF0 construction type (max. ANSI 300/PN40).

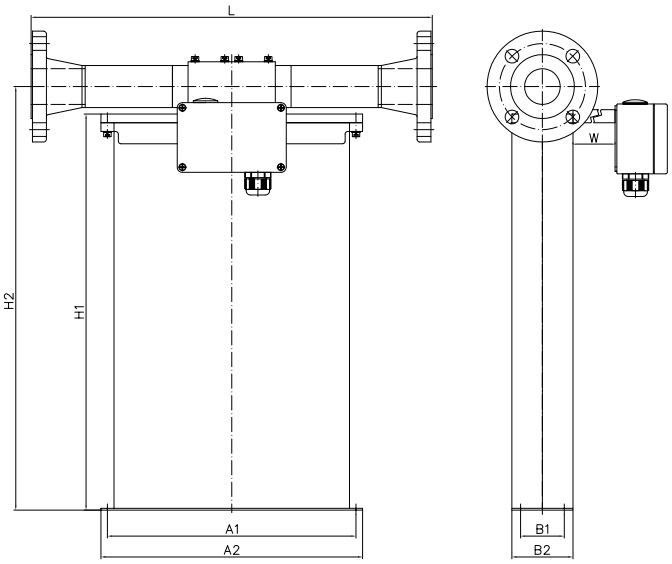
Other Materials

Additional/custom wetted materials (Inconel, Monel, 304 stainless steel, others) may be possible for chemical compatibility, lower pressure drop, abrasion allowance, other application specific requirements.

Contact factory with specification for assessment and availability.

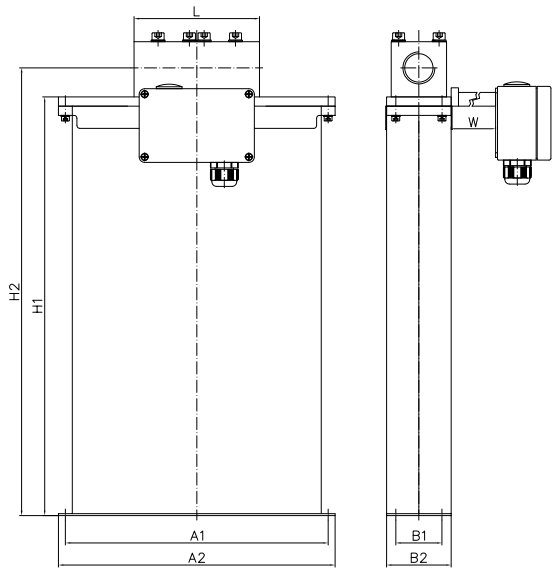
RHM20 Mechanical Construction

PM0/SM0: Serial or parallel measuring tubes with flange connection and removable manifold with PTFE seals



Process Connection	Face to face length (L)		Order Code
	mm	in	
ANSI 1½" 150# RF	460	18.11	F1
ANSI 1½" 300# RF	460	18.11	F2
ANSI 1½" 600# RF	500	19.69	F3
DIN DN40/PN40	460	18.11	C1
DIN DN40/PN100	500	19.69	C2
JIS B 2220 RF 10k 40A (1½")	460	18.11	J1
JIS B 2220 RF 20k 40A (1½")	460	18.11	J2

PM0/SM0: Serial or parallel measuring tubes with female thread connection and removable manifold with PTFE seals



Process Connection	Face to face length (L)		Order Code
	mm	in	
Female Thread G 1"	136	5.35	G1
Female Thread 1" NPT	136	5.35	N1

The sensor is manufactured with two internal measurement tubes arranged side by side. In parallel or dual path sensors, these tubes are connected in parallel and the flowing fluid is split equally between them. In serial or single path sensors, the tubes are connected end to end creating a single path through which all fluid flows.
For customization of face to face length and/or special fittings other than the ones listed on this page, please consult factory.
Note that larger diameter flange process connections are always possible.

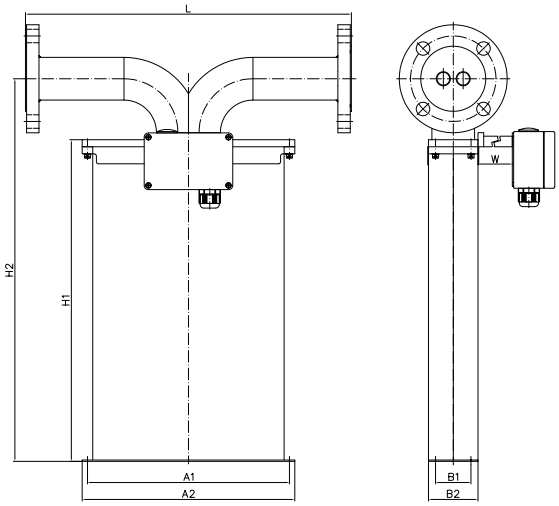
Common Dimensions

A1 = 285 mm 111.22 in) A2 = 300 mm (11.81 in) B1 = 50 mm (1.97 in) B2 = 70 mm (2.76 in) H1 = 454 mm (17.87 in) H2 = 486 mm (19.11 in)
W: temp. range T1, TA = 0 mm (0 in), temp. range T2 = 150 mm (5.91 in)
Electrical box: std. = 125 x 80 x 58 mm (4.92 x 3.15 x 2.28 in), RHE16 compact = 120 x 120 x 80 mm (4.72 x 4.72 x 3.15 in)

For weights and packaging dimensions please see last page of the Mechanical Construction section.

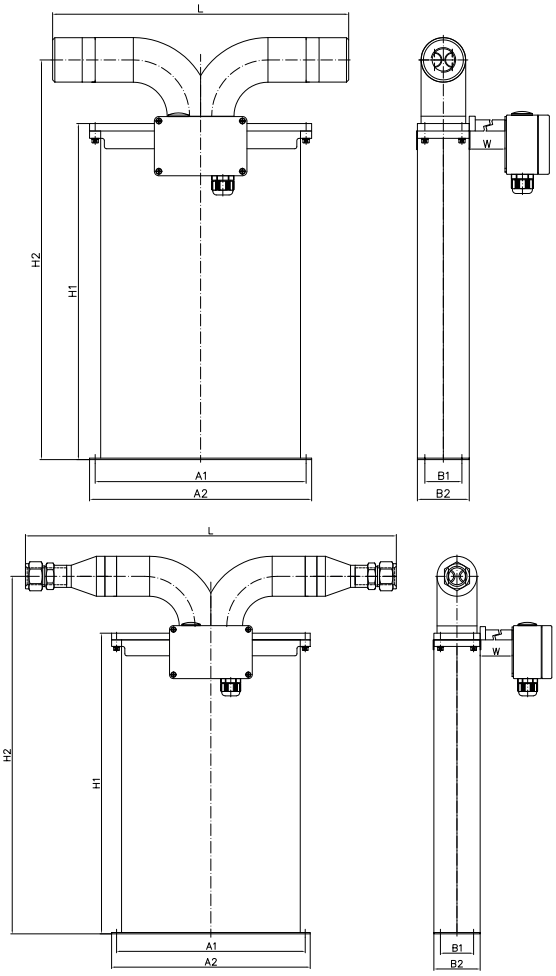
RHM20 Mechanical Construction

PF0: Seal-less parallel measuring tube construction with flange connections



Process Connection	Face to face length (L)		Order Code
	mm	in	
ANSI 2" 150# RF	460	18.11	A1
ANSI 2" 300# RF	460	18.11	A2
ANSI 2" 600# RF	500	19.69	A3
ANSI 2" 1500# RF	500	19.69	A5
ANSI 2" 2500# RF	500	19.69	A8
ANSI 2" 600# RTJ	500	19.69	R1
ANSI 2" 1500# RTJ	500	19.69	R2
ANSI 2" 2500# RTJ	500	19.69	R4
DIN DN50/PN40	460	18.11	D1
DIN DN50/PN100	500	19.69	D2
DIN DN50/PN160	500	19.69	D3
JIS RF 10k 50A (2")	460	18.11	K1

PFT: Seal-less parallel measuring tube construction with thread and compression fitting connections



Process Connection	Face to face length (L)		Order Code
	mm	in	
Female Thread G 1"	400	15.75	G1
Female Thread 1" NPT	400	15.75	N1
Swagelok 1" tube compression fitting (SS-1610-1-16W)	560	22.05	W1

The sensor is manufactured with two internal measurement tubes arranged side by side. In parallel or dual path sensors, these tubes are connected in parallel and the flowing fluid is split equally between them. For customization of face to face length and/or special fittings other than the ones listed on this page, please consult factory.
Note that larger diameter flange process connections are always possible.

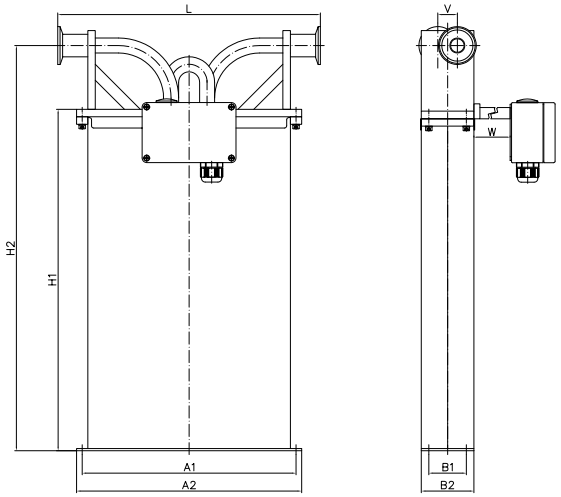
Common Dimensions

A1 = 285 mm (11.22 in) A2 = 300 mm (11.81 in) B1 = 50 mm (1.97 in) B2 = 70 mm (2.76 in) H1 = 454 mm (17.87 in) H2 = 540 mm (21.26 in)
W: temp. range T1, TA = 0 mm (0 in), temp. range T2, T3, T4 = 150 mm (5.91 in)
Electrical box: std. = 125 x 80 x 58 mm (4.92 x 3.15 x 2.28 in), RHE16 compact = 120 x 120 x 80 mm (4.72 x 4.72 x 3.15 in)

For weights and packaging dimensions please see last page of the Mechanical Construction section.

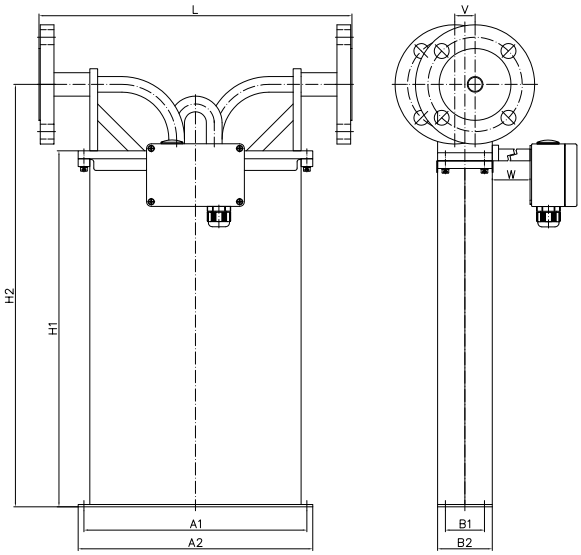
RHM20 Mechanical Construction

SF0: Seal-less serial measuring tube construction with sanitary connections*



Process Connection	Face to face length (L)		Order Code
	mm	in	
Sanitary 1" Triclamp, DIN 32676 (P_{max} = 17.2 bar (249.5 psi) @ 120°C (248°F))	350	13.78	S1
Sanitary NW20, DIN 11851 (P_{max} = 40 bar (580 psi) @ 120°C (248°F))	350	13.78	S2

SF0: Seal-less serial measuring tube construction with flange connections*



Process Connection	Face to face length (L)		Order Code
	mm	in	
ANSI 2" 150# RF	460	18.11	A1
ANSI 2" 300# RF	460	18.11	A2
DIN DN50/PN40	460	18.11	D1

The sensor is manufactured with two internal measurement tubes arranged side by side. In serial or single path sensors, the tubes are connected end to end creating a single path through which all fluid flows. For customization of face to face length and/or special fittings other than the ones listed on this page, please consult factory.
Note that larger diameter flange process connections are always possible.

Common Dimensions

A1 = 285 mm (11.22 in) A2 = 300 mm (11.81 in) B1 = 50 mm (1.97 in) B2 = 70 mm (2.76 in)
H1 = 454 mm (17.87 in) H2 = 540 mm (21.26 in) V = 26 mm (1.02 in)
W: temp. range T1, TA = 0 mm (0 in), temp. range T2, T3, T4 = 150 mm (5.91 in)
Electrical box: std. = 125 x 80 x 58 mm (4.92 x 3.15 x 2.28 in), RHE16 compact = 120 x 120 x 80 mm (4.72 x 4.72 x 3.15 in)

* SF0 meters are constructed with offset inlet/outlet ports. Consideration should be given to the offset (dimension V) when planning installation.

Weights and Shipping Dimensions

Typical weight for standard manifold construction (PM0/SM0) sensor with female threads: approx. 16 kg (135 lb).
Typical weight for standard seal-less construction (PF0/SF0) sensor with 150# flanges: approx. 23 kg (51 lb).
RHM20 sensors typically ship on a pallet approx. 80 x 60 x 65 cm (31.5 x 23.6 x 25.6 in) complete with transmitter and cable.
Typical gross shipping weight example: RHM20 seal-less construction sensor with 150# flanges c/w RHE08 transmitter approx. 35 kg (77 lb).

RHM20 Part Number Code

Temperature Range

T1 -20°C to +120°C (-4 to +248°F) (std.)
TA -45°C to +120°C (-49 to +248°F)
T2 -45°C to +210°C (-49 to +410°F)
T3 -196°C to +50°C (-320 to +122°F)
T4 0°C to +350°C (+32 to +662°F)

P_{max} of Measuring Loops (see pressure rating page)

P1 P_{max} depends upon material
P2 P_{max} depends upon material
P4 P_{max} = 345 bar (5004 psi) @ 120°C (248°F) (M1 Material), PF0 construction only

Construction Type (P_{max} @ 120°C (248°F))

PM0 Parallel manifold, P_{max} = 270 bar (3916 psi) with thread, 185 bar (2683 psi) with flange
SM0 Serial manifold, P_{max} = 130 bar (1885 psi)
PF0 Parallel path, seal-less
SF0 Serial path, seal-less, P_{max} = 200 bar (2901 psi)
PFT Parallel path, seal-less for thread connection, P_{max} = 210 bar (3046 psi)

Material of Wetted Parts

M1 1.4571 (316Ti) (std.)
M3 2.4602 (Alloy C22), Seal-less construction types only
M4 Tantalum, PF0 construction type only, max. ANSI 300/PN40

Process Connection

See mechanical construction pages for available connections and codes

Options Codes

See options listing for specific codes

Terminal Box Selection

9 Remote transmitter cable termination box (std.)
C Enclosure for compact mount RHE16 transmitter

Hazardous Area Certifications

N Without Ex approval
A ATEX approval Zone 0: Ex II 1 G Ex ia IIC T1-T6 Ga
2 ATEX rating Zone 2: Ex II 3 G Ex nA IIC T1-T6 Gc
C CSA approvals USA-Canada Class I, Div. 1, Gr,. A, B, C, D

Pressure Design Compliance

NN No specific design compliance required
SE PED (SEP) [Europe]
A1 PED to module A1 [Europe]
BC PED to module B+C1 [Europe]
CA CRN (Alberta Province) [Canada]
CR CRN (All other Provinces) [Canada]

Mass Flow Calibration Selection

See performance page for code options

Density Calibration Selection

D 1% Accuracy (std.)
S 0.5% Accuracy

RHM20										N		

Options

H1	Hot oil/steam heating matrix for housing, DN15 PN40
H2	Hot oil/steam heating matrix for housing, ½" ANSI 150 RF
H3	Hot oil/steam heating matrix for housing, ½" ANSI 300 RF
HF	Hot oil/steam trace heating for flange
P2	Housing purge for dry gas – ¼" NPT (2 pcs)

SH	Housing in 316Ti stainless steel
WH	Fully welded/sealed housing
DY	Dye penetrant inspection
XR	X-ray test – PFT, PM0 (flange), SM0 (flange) types only
O	Oil/grease free cleaning