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Küppers Elektromechanik GmbH

Technical Datasheet

ZHM CI Series

Gear Flow Meters

for Oil and Gas Applications

Description

Gear flow meter ZHM CI Series is a dedicated version, which is primarily used in applications for the upstream oil and gas market. Specific and robust design enable our gear flow meters to meet flow metering challenges like high pressure ratings, pulsating flow streams, corrosive media and harsh environment conditions. They perform with outstanding accuracy in oil and gas exploration processes and hydraulic monitoring applications. Their reliability and long-term durability combined with exceptional engineering and production tolerances ensure customers an accurate measurement, efficiency increase and prompt return of investment due to cost reduction in chemicals used for instance.

We work in very close cooperation with our customers to meet their individual measuring requirements. Thanks to our varied manufacturing capabilities, we are able to offer a wide range of flow capacities, connection sizes and exceptional materials of pressure related parts.

In addition, we develop specific designs for onshore installations and offshore fields topside or subsea equipment in conjunction with highest possible chemical compatibility. Optional components and materials like low friction stainless steel ball bearings or tungsten carbide sleeve bearing with nickel binder guarantee high-performance operations.

Applications

Well Injection

- Chemical Injection
- Gas Dehydration
- De-Icing

Well Control

- Topside
- Subsea

Transmission

- Gas Odorization

Chemical & Petrochemical

- Gas Sweetening
- Blending

Principle and Design

Gear flow meters (ZHM) are positive displacement meters. Two precise gears rotate freely inside the measuring chamber.

Sealed cavities are created between the gears and the housing. The measured media causes the rotation of the gears. The flowing medium is distributed evenly in the measuring chamber and causes the rotation of the gears. The gear wheels rotate freely and undamped in the media flow. Their rotational frequency is proportional to the flow rate and is measured by non-intrusive sensors (pickups) through the housing wall.

The sensor system can be variably adjusted to meet the requirements of the application. This allows, for example, providing even very high resolutions or also a signal for determining the direction of flow.

Pulses per unit of volume are available for analysis. The calibration factor (K-factor) of the flow meter describes the exact pulse rate per unit of volume. In order to determine the individual calibration factor of a flow meter, we calibrate each of our meters in house prior to delivery. The operating viscosity specified by the customer is taken into account for calibration. A corresponding calibration certificate is included with every flow meter we supply.

These meters are suitable for accurate measurement of different liquids with viscosities of approximately 1 to 25,000 mm²/s. For low-viscosity media and fuels gear wheel flow meters with ball bearings and reduced tole-rances are used.

Thanks to a high output frequency, excellent resolution and short response times, our gear wheel flow meters are outstanding for measuring pulsing flows, for consumption measurement and for dosing of liquids.

Features

- High Resolution
- Short Response Time
- Bi-Directional Flow
- Pressure Shock Resistance
- Large Viscosity Range
- NACE MR0175 Standard
- Low Maintenance
- Stainless Steel Construction
- PED 97/23/EC

Technical Data

Type	Measuring Range l/min	K-Factor pulses/liter[3]	Max. Pressure bar (psi)		Frequency Hz[3]	Weight kg
			Standard	High Pressure		
ZHM 01/3[1]	0.002 to 1.0	40,000	414 (6,000)	517 (7,500)	1.3 to 700	2.9
ZHM 01/1[2]	0.005 to 2.0	26,500	414 (6,000)	1,035 (15,000)	2.2 to 880	2.9
ZHM 01/2	0.02 to 3.0	14,000	414 (6,000)	1,035 (15,000)	4.6 to 700	2.9
ZHM 02	0.1 to 7.0	4,200	414 (6,000)	1,035 (15,000)	7 to 480	2.9
ZHM 03	0.5 to 25.0	1,740	414 (6,000)	1,035 (15,000)	14 to 730	2.9
ZHM 04	0.5 to 70	475	414 (6,000)	1,000 (14,500)	4 to 560	8.5

Technical Data – General

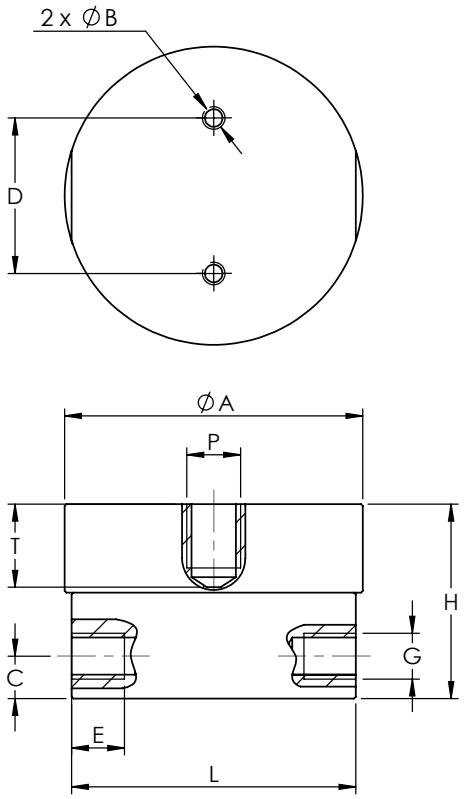
Measuring Accuracy	Up to 0.1 %[4]
Repeatability	± 0.05 % (under the same conditions)
Linearity	± 0.5 % of actual flow (viscosity ≥ 30 mm²/s)
Materials	Housing: as per DIN 1.4404 (AISI 316L) Gears: as per DIN 1.4122, 1.4501 (AISI F55) Bearing: stainless steel ball bearing, tungsten carbide sleeve bearing Seals: FFKM, FKM, PTFE Bolts: Inconel-718 (Standard), Xylan Coated (High Pressure)
Connection Type	NPTF, AEMP
Dimensions	See dimensional drawing (page 6 to 7)

Ordering Code ZHM Gear Flow Meters

	ZHM	-	X	-	X	-	X	-	X
Measuring Range									
0.002 - 1.0 l/min[2]			01/3						
0.005 - 2.0 l/min[3]			01/1						
0.02 - 3.0 l/min			01/2						
0.1 - 7.0 l/min			02						
0.5 - 25.0 l/min			03						
0.5 - 70.0 l/min			04						
Meter Attributes									
Housing 1.4404 (AISI 316L), gears 1.4122, ball bearing, NPT F					M1				
Housing 1.4404 (AISI 316L), gears 1.4122, sleeve bearing. NPT F					M2				
Housing 1.4404 (AISI 316L), gears 1.4501 (AISI F55), sleeve bearing, NPT F					M3				
Housing 1.4404 (AISI 316L), gears 1.4122, ball bearing, AEMP					HP				
Housing 1.4404 (AISI 316L), gears 1.4122, sleeve bearing, AEMP					HC				
Sensor Ports									
M14x1.5							E		
3/8" NPT							B		
M14x1.5 6H (Exd)							Z		
Sealing Options									
FFKM									I
FKM									V
PTFE									T

[1] Stainless steel ball bearing only.
[2] Tungsten carbide sleeve bearing only.
[3] Average values with single-pickup type VTE02-*.
[4] Under laboratory conditions; incl. linearization; viscosity ≥ 30 mm²/s.

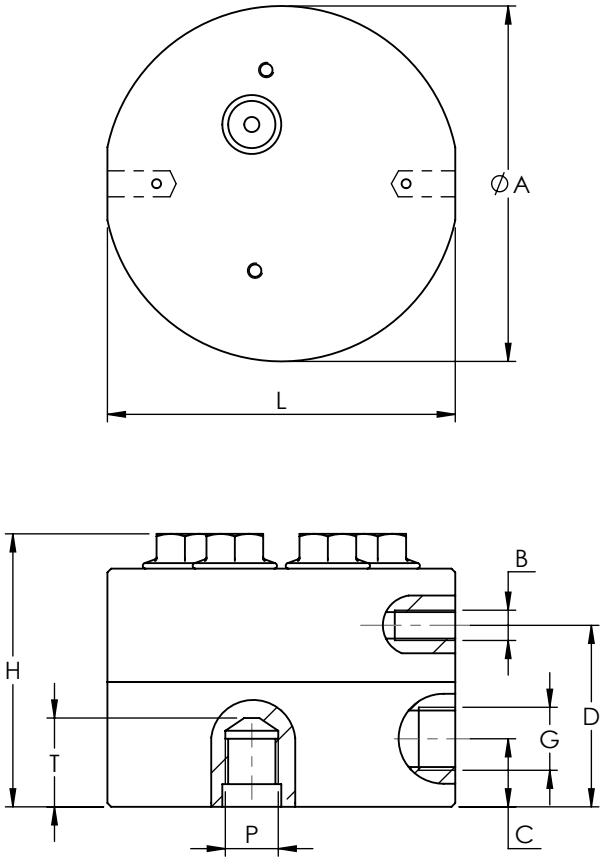
Dimensional Drawing - ZHM Standard



Type	Ø A	B	C	D	G	H	L	P	T[5)]
ZHM 01/3	3.30 in (84 mm)	M6x10	0.55 in (14 mm)	1.73 in (44 mm)	½“ NPT F	2.64 in (67 mm)	3.17 in (80.5 mm)	E/B	0.93 in (23.5 mm)
ZHM 01/1	3.30 in (84 mm)	M6x10	0.55 in (14 mm)	1.73 in (44 mm)	½“ NPT F	2.64 in (67 mm)	3.17 in (80.5 mm)	E/B	0.93 in (23.5 mm)
ZHM 01/2	3.30 in (84 mm)	M6x10	0.55 in (14 mm)	1.73 in (44 mm)	½“ NPT F	2.64 in (67 mm)	3.17 in (80.5 mm)	E/B	0.93 in (23.5 mm)
ZHM 02	3.30 in (84 mm)	M6x10	0.55 in (14 mm)	1.73 in (44 mm)	½“ NPT F	2.64 in (67 mm)	3.17 in (80.5 mm)	E/B	0.93 in (23.5 mm)
ZHM 03	3.30 in (84 mm)	M6x10	0.55 in (14 mm)	1.73 in (44 mm)	½“ NPT F	2.64 in (67 mm)	3.17 in (80.5 mm)	E/B	0.93 in (23.5 mm)
ZHM 04	4.92 in (125 mm)	M6↧10	0.67 in (17 mm)	2.36 in (60 mm)	¾“ NPT F	3.94 in (100 mm)	4.76 in (121 mm)	E/B	1.20 in (30.5 mm)

[5)] Please notice that total height is calculated by adding up the height (H) and height of transmitter hence substract the bore hole depth (T).

Dimensional Drawing - ZHM High Pressure

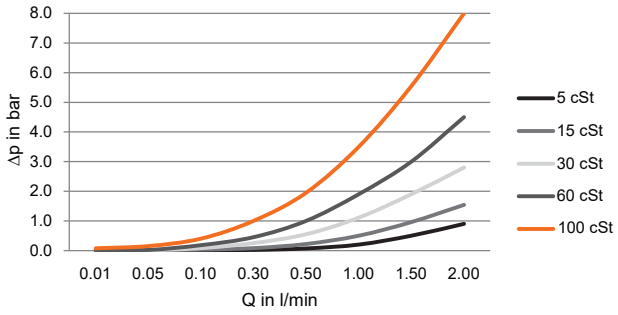


Type	Ø A	B	C	D	G	H	L	P	T[6]	AEMP	R[7]
ZHM 01/3	3.70 in (94 mm)	M8x16	0.71 in (18 mm)	1.89 in (48 mm)	UNF 9/16“	2.83 in (72 mm)	3.62 in (92 mm)	E/B	0.90 in (23 mm)	SF375CX20	3/8“
ZHM 01/1	3.70 in (94 mm)	M8x16	0.71 in (18 mm)	1.89 in (48 mm)	UNF 9/16“	2.83 in (72 mm)	3.62 in (92 mm)	E/B	0.90 in (23 mm)	SF375CX20	3/8“
ZHM 01/2	3.70 in (94 mm)	M8x16	0.71 in (18 mm)	1.89 in (48 mm)	UNF 9/16“	2.83 in (72 mm)	3.62 in (92 mm)	E/B	0.90 in (23 mm)	SF375CX20	3/8“
ZHM 02	3.70 in (94 mm)	M8x16	0.71 in (18 mm)	1.89 in (48 mm)	UNF 9/16“	2.83 in (72 mm)	3.62 in (92 mm)	E/B	0.93 in (23.5 mm)	SF375CX20	3/8“
ZHM 03	3.70 in (94 mm)	M8x16	0.71 in (18 mm)	2.36 in (60 mm)	UNF 9/16“	3.31 in (84 mm)	3.62 in (92 mm)	E/B	0.93 in (23.5 mm)	SF375CX20	3/8“
ZHM 04	4.92 in (125 mm)	M8x16	0.71 in (18 mm)	2.36 in (60 mm)	3/4“ 14 NPS	4.57 in (116 mm)	4.76 in (121 mm)	E/B	1.20 in (30.5 mm)	SF750CX20	3/4“

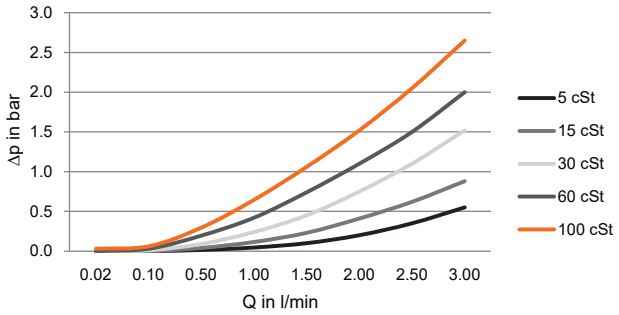
[6] Please notice that total height is calculated by adding up the height (H) and height of transmitter hence substract the bore hole depth (T).
[7] R = Pipe Diameter.

Pressure Drop Curves

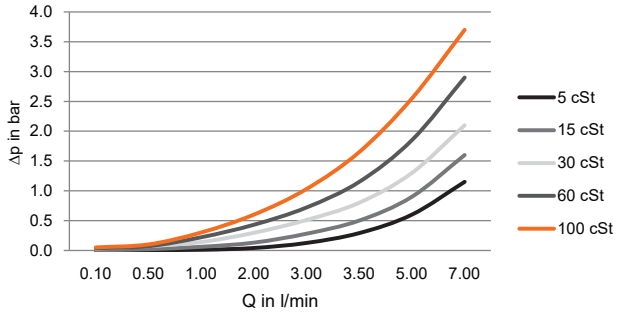
ZHM 01/1



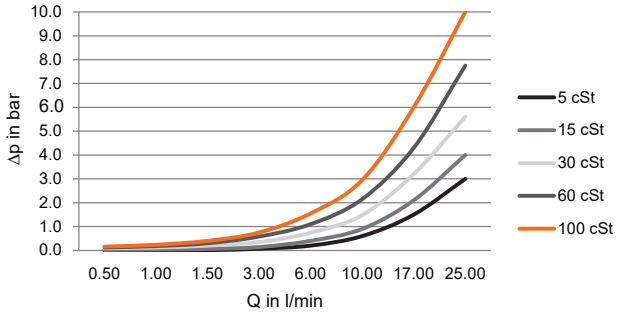
ZHM 01/2



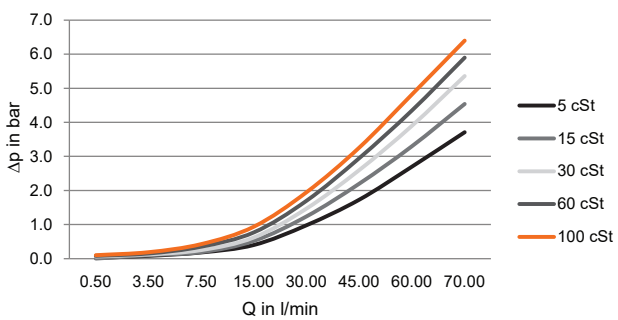
ZHM 02



ZHM 03



ZHM 04



*Δp at different viscosities on request.

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