M-Zert
Zertifiziertes QM-System
DIN EN ISO 9001
Zertifikat-Nr. 01017

Gear Wheel Flow Meter

for viscous fluids

KOBOLD

measuring
•
monitoring
•
analysing

DZR

- Measuring range: 0.008-2 ... 3-700 l/min
- Measuring accuracy: ±0.3 ... ±1% of actual flow
- p_{max}: 400 bar
- t_{max}: 150 °C
- Process connection: G⅛, G⅜, G½, G1 F
- Material: cast iron or stainless steel

S4

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ARGENTINA, AUSTRALIA, AUSTRIA, BELGIUM, BULGARIA, CANADA, CHILE, CHINA, COLOMBIA, CZECHIA, EGYPT, FRANCE, GERMANY, GREAT BRITAIN, HUNGARY, INDIA, INDONESIA, ITALY, MALAYSIA, MEXICO, NETHERLANDS, PERU, POLAND, REPUBLIC OF KOREA, ROMANIA, SINGAPORE, SPAIN, SWITZERLAND, TAIWAN, THAILAND, TUNISIA, TURKEY, USA, VIETNAM

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Description

The KOBOLD Gear Wheel Flow Meter series DZR have been designed for a flow measurement for viscous fluids. The measuring unit consists of a pair of gear wheels which is moved by the flow according to the principle of gear wheel motor. The bearings are – according to the material combination – either ball bearings or gliding bearings.

The movement of the gears is sampled without contact by means of two sensors located in the cover. Between sensor compartment and measuring chamber is located a pressure-resistant, non-magnetic separator plate.

The different versions vary through housing materials, bearing assembly, through the medium being used and the accuracy. The mounting position and flow direction is arbitrary.

Version

- DZR-1 Flow measurement, hydraulic test rigs for: Oil, brake fluid, Diesel, Skydrol lubricating, low viscous
- DZR-2 Oil batching, batching installations gear box oil, lubricating, mid viscous
- DZR-3 Consumption measurement printing machines, offset colour, lubricating, high viscous
- DZR-4 Ratio control, 2-component plant, Polyol, Isocyanate, glue, resin, silicone, low lubricating, mid viscous
- DZR-5 Batch control, painting plant, clear paint, clearance volume sealing, low lubricating, mid viscous
- DZR-6 Flow measurement, painting plant, solvent, lubricating, mid viscous

Technical Details

Accuracy:	see specifications table
Recommended filter size:	20 µm
Repeatability:	< 0.1% of measured value
Max. pressure:	400 bar (DZR-x001 ... DZR-x010 and DZR-017/-018) 315 bar (DZR-x011 ... DZR-x015)
Max. pressure loss:	Δp = 16 bar
Media temperature:	see specifications table
Ambient temperature:	-15 ... +80 °C (seal: FPM) -30 ... +80 °C (other seals))
Viscosity range:	1 ... 1 000 000 mm²/s, according to the flow rate. The max. pressure loss of 16 bar must not be exceeded. See pressure loss diagrams.

Materials

Housing:	
DZR-1/2/3/4:	globular iron EN-GJS-400-15
DZR-5/6:	stainless steel 1.4404
Gear wheels:	
DZR-1/2/3/4:	steel 1.7139
DZR-5/6:	stainless steel 1.4462
Bearings:	see specifications table
Seals:	FPM, EPDM or FEP

Electrical data

Output signal:	2 pulse output signals 90° ±30° phase shift
Pulse form:	rectangular duty cycle 1:1 (±15%), short circuit proof, signal PNP
Pulse amplitude:	≥ 0.8 U_S
Supply voltage U_S:	24 V_{DC} (±20%) 12 V_{DC} (±20%) (option) reversed polarity protection
Max. power consumption:	0.9 W
Max. output capacity:	0.3 W
Electric connection:	plug acc. DIN 43650
Protection:	IP 65
ATEX-approval (option A):	Ex II 2 G Ex ia IIC T4 Ex II 2 D Ex ia D 21 T125 °C Ex I M2 Ex ia I
Weight:	see dimensions table

Plug-on display

Display:	4-digit LED display digit height 7.62 mm with floating point
Protection:	IP 65
Electrical connection:	plug acc. DIN 43650 (4 pin)
Fluid temperature:	0 ... 80 °C
Ambient temperature:	0 ... 60 °C
Max. current consumption:	120 mA
Analogue output (option 3):	0-20 mA, 4-20 mA max. load 250 Ω (18 V_{DC}) 50 Ω (10 V_{DC})
Relay contact (option 4):	2×N.O. max. 24 V/1 A

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Fluid Temperature

Model	Sealing material		
	FPM	EPDM	FEP
DZR-1/2/6	-15 ... +120 °C	-30 ... +120 °C	-30 ... +120 °C
DZR-3/4/5	-15 ... +80 °C	-30 ... +80 °C	-30 ... +80 °C
DZR-1/2/6 (Electronic H or T)	-15 ... +150 °C	-30 ... +130 °C	-30 ... +150 °C

Higher fluid temperature up to +220 °C on request

Pulse Output Rate

Model	Resolution [pulses/l]
DZR-x001/-x002	40000
DZR-x003	25000
DZR-x004	10000
DZR-x005	4082
DZR-x006/-x007	2500
DZR-x008/-x009/-x010	965
DZR-x011/-x012	333
DZR-x013/-x014/-x015	191.5
DZR-x017	83.3
DZR-x018	62.5

Specifications

		DZR-1	DZR-2	DZR-3	DZR-4	DZR-5	DZR-6
Media viscosity		low	medium	high	medium	medium	low
Lubrication properties of media		good	good	good	bad	bad	good
Max. particle size		<20 µm	<20 µm	<50 µm	<30 µm	<30 µm	<20 µm
Bearing		ball bearing	ball bearing	bronze gliding bearing	tungsten c.gl. bearing	tungsten c.gl. bearing	ball bearing
Material		cast iron	cast iron	cast iron	cast iron	stainless steel	stainless steel
Accuracy of measured value		±0.3 % from 20 mm²/s	±0.5 % from 50 mm²/s	±1 % from 100 mm²/s	±0.5 % from 100 mm²/s	±0.5 % from 100 mm²/s	±0.3 % from 20 mm²/s
Start of rotation at 20 mm²/s [l/min]	**approx.**	**Measuring range [l/min]**					
001	0.001	0.008 ... 2	-	-	-	-	0.008 ... 2
002	0.001	-	-	-	-	0.02 ... 2*	-
003	0.004	0.02 ... 4	-	-	-	-	0.02 ... 4
004	0.01	0.04 ... 8	-	-	0.04 ... 8	-	0.04 ... 8
005	0.01	0.16 ... 16	0.16 ... 16	-	0.16 ... 16	0.16 ... 16	0.16 ... 16
006	0.01	-	-	-	0.2 ... 30	-	-
007	0.01	0.2 ... 40	-	-	-	-	-
008	0.02	-	-	0.6 ... 40	-	-	-
009	0.02	-	-	-	0.3 ... 60	0.3 ... 60	-
010	0.02	0.4 ... 80	0.4 ... 80	-	-	-	0.4 ... 80
011	0.03		-	-	0.6 ... 100	0.6 ... 100	-
012	0.03	0.6 ... 160	-	-	-	-	0.6 ... 160
013	0.04	-	-	1.2 ... 80	-	-	-
014	0.04	-	-	-	1 ... 160	1 ... 160	-
015	0.04	1 ... 250	1 ... 250	-	-	-	1 ... 250
017	0.1	2 ... 600	-	-	-	-	-
018	0.2	3 ... 700	-	-	-	-	-

* Accuracy: ±3%, linearity ±1.5%

Oder Details (Example: **DZR-1 001 S10 F S 0**)

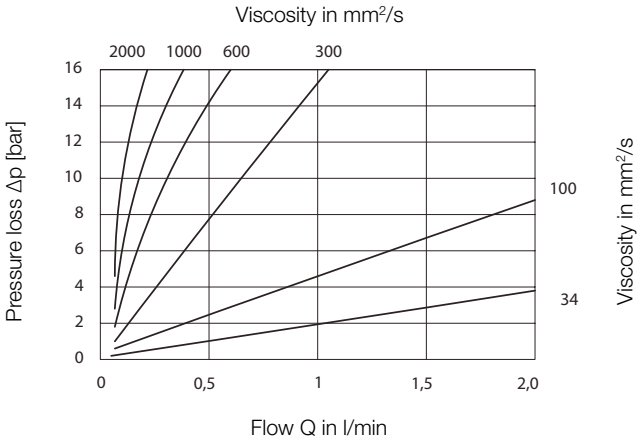
Model	Range[1]	Mech. connection (female thread)		Seal	Sensor[5]	Electronic electr. connection
DZR-1	001 003 004 005	**S10** = G ⅜ side **H10** = G ⅜ back	with connection assembly	**F** = FPM **E** = EPDM **P** = FEP	**S** = up to 120°C/ 24 V_{DC} **H**[2] = up to 150°C/ 24 V_{DC} **R** = up to 120°C/ 12 V_{DC} **T**[2] = up to 150°C/ 12 V_{DC}	**V** = mating plug without cable with pre amplifier **1** = mating plug with 5 m cable with pre amplifier **2** = mating plug with 10 m cable with pre amplifier **3**[4] = plug-on display with 0(4)...20 mA output **4**[4] =plug-on display with 2 x Relay contacts
	007 010	**S15** = G ½ side **H15** = G ½ back				
	012 015	**S25** = G 1 side **H25** = G 1 back				
	017 018	**S40** = flange SAE 1½" side				
DZR-2	005	**S10** = G ⅜ side **H10** = G ⅜ back				
	010	**S15** = G ½ side **H15** = G ½ back				
	015	**S25** = G 1 side **H25** = G 1 back				
DZR-3	008	**S15** = G ½ side **H15** = G ½ back				
	013	**S25** = G 1 side **H25** = G 1 back				
DZR-4	004 005	**S10** = G ⅜ side **H10** = G ⅜ back				
	006 009	**S15** = G ½ side **H15** = G ½ back				
	011 014	**S25** = G 1 side **H25** = G 1 back				
DZR-5	002	**R06** = G ⅛ side	without connection assembly			
	005	**R10** = G ⅜ side				
	009	**R15** = G ½ side				
	011 014	**R25** = G 1 side				
DZR-6	001	**R06** = G ⅛ side				
	003	**R08** = G ¼ side				
	004 005	**R10** = G ⅜ side			**A**[3] = ATEX (only in combination with electr. connection 0)	**0** = mating plug without cable without pre amplifier (only in combination with ATEX option A)
	010	**R15** = G ½ side				
	012 015	**R25** = G 1 side				

[1] The range of the corresponding model can be taken from the schedule »Specifications«
[2] Electronic H/T only for DZR-1, DZR-2, DZR-6, not possible with plug-on display
[3] Only permitted with Ex-separator K130/3-E-10
[4] Max. fluid temperature 80 °C
[5] Pay attention to temperature limits due to sealing material selection

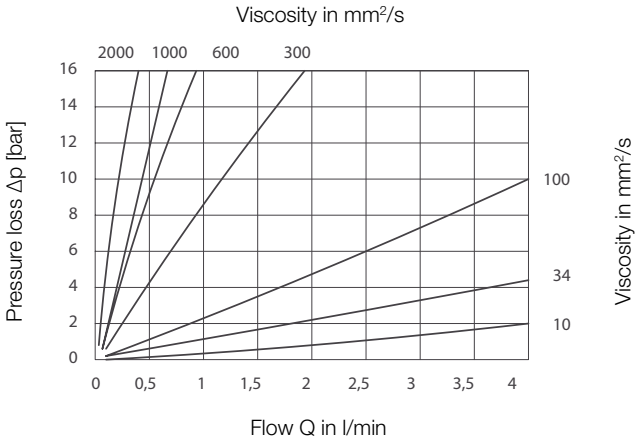
2/07-2016

Pressure Loss Diagrams

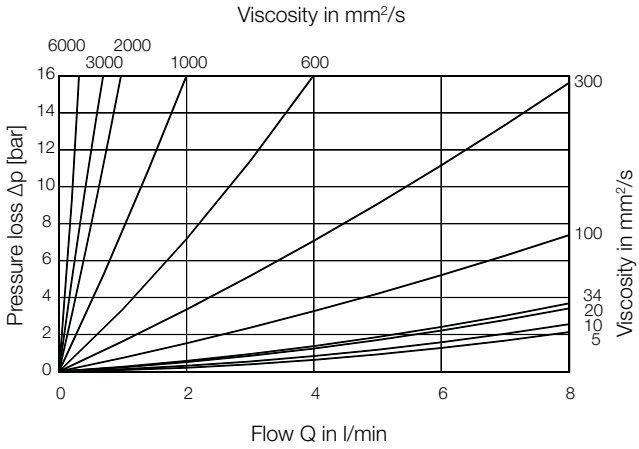
DZR-1001, DZR-6001



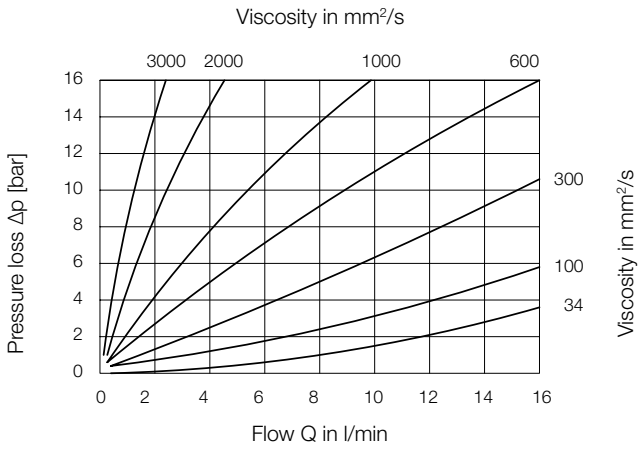
DZR-1003



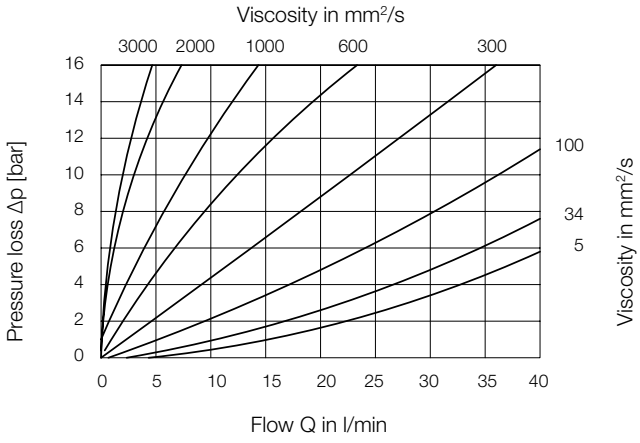
DZR-1004, DZR-4004, DZR-6004



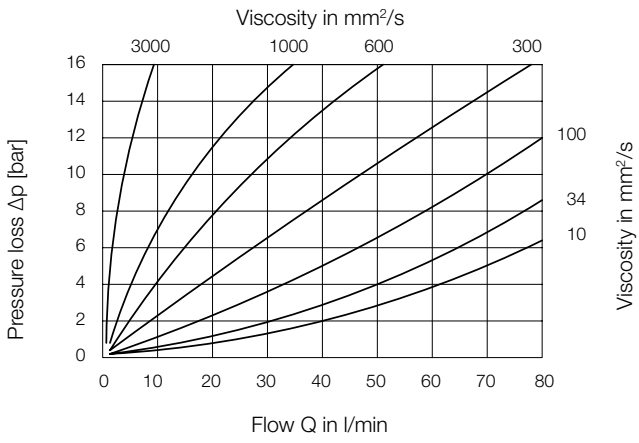
DZR-1005, DZR-2005, DZR-6005



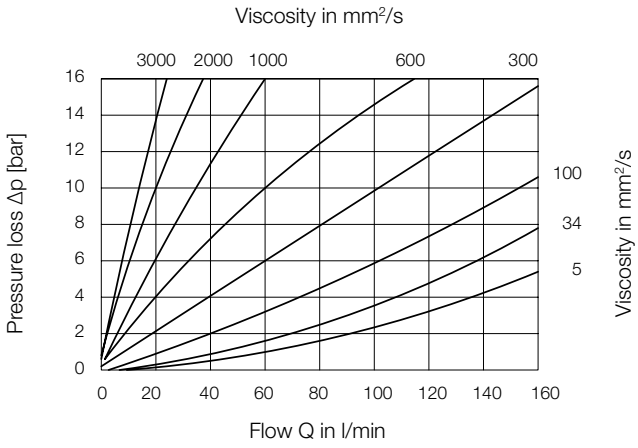
DZR-1007



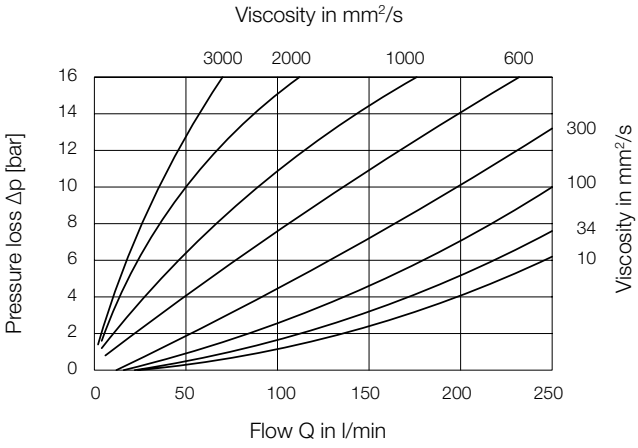
DZR-1010, DZR-2010, DZR-6010



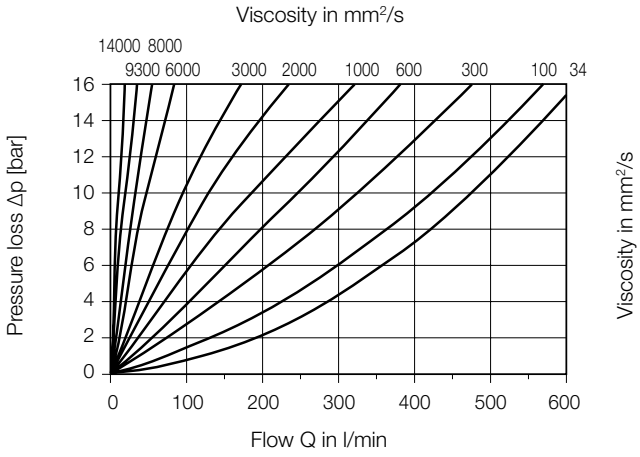
DZR-1012, DZR-6012



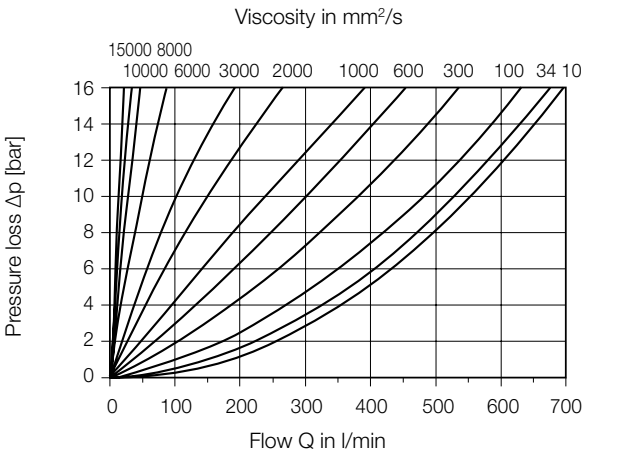
DZR-1015, DZR-2015, DZR-6015



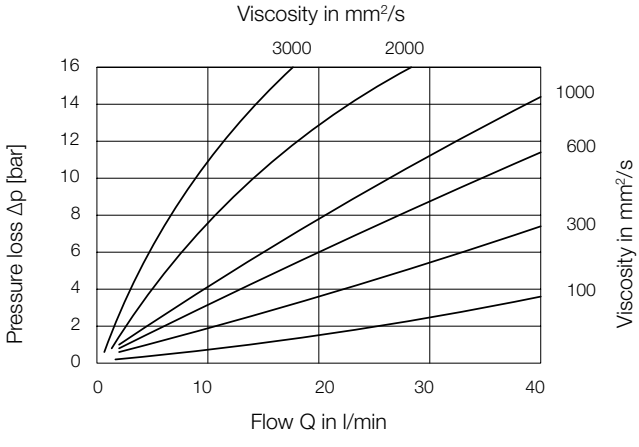
DZR-1017



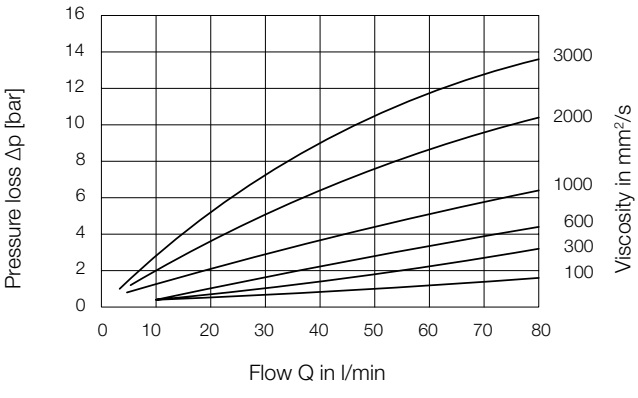
DZR-1018



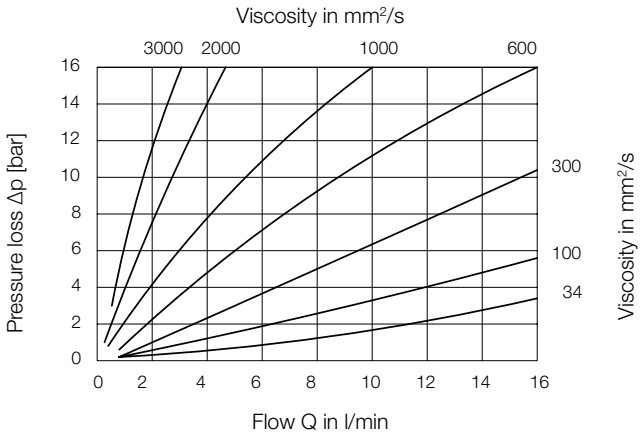
DZR-3008



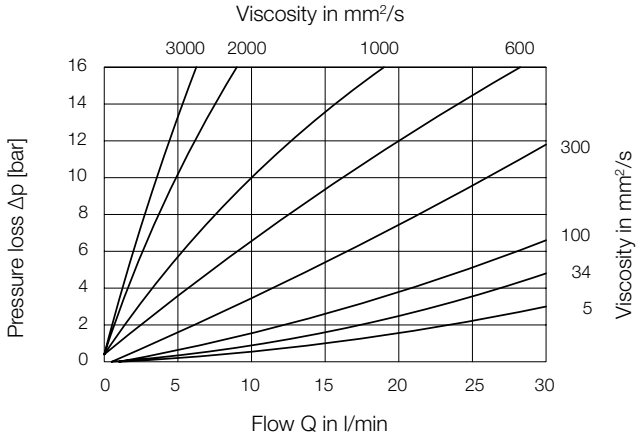
DZR-3013



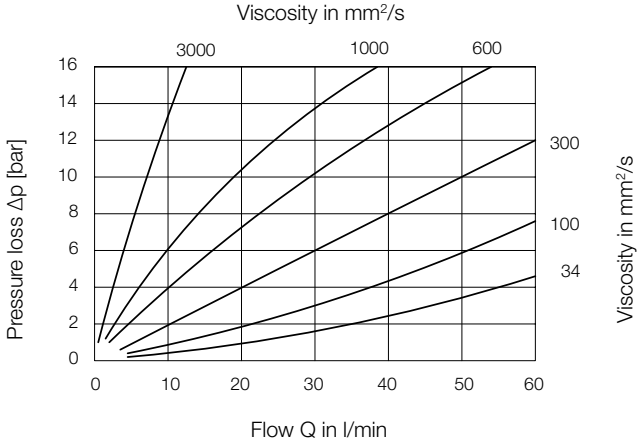
DZR-4005, DZR-5005



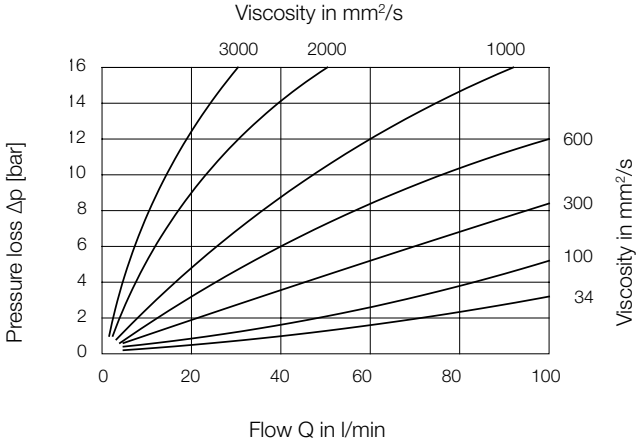
DZR-4006



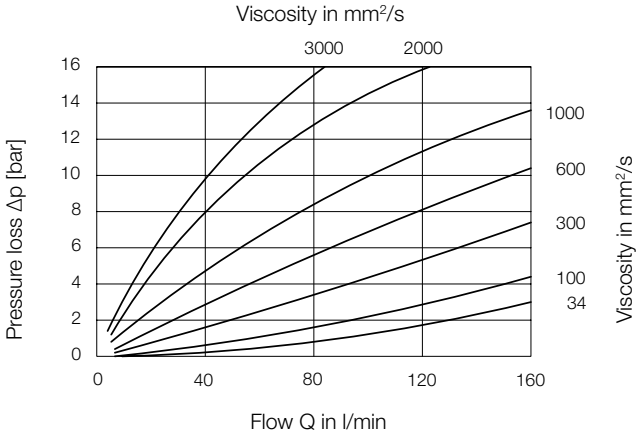
DZR-4009, DZR-5009



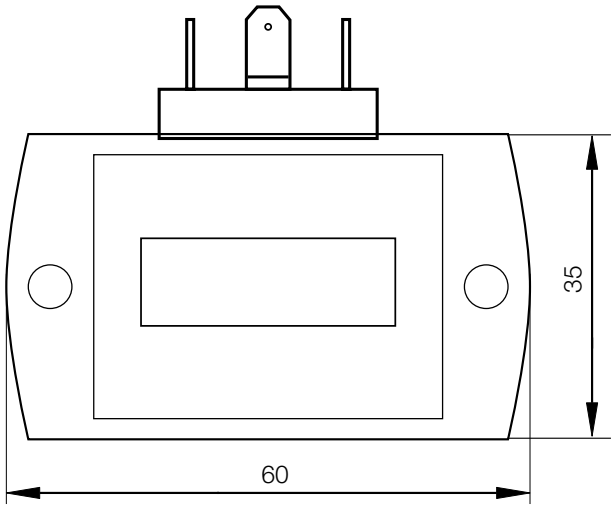
DZR-4011, DZR-5011



DZR-4014, DZR-5014



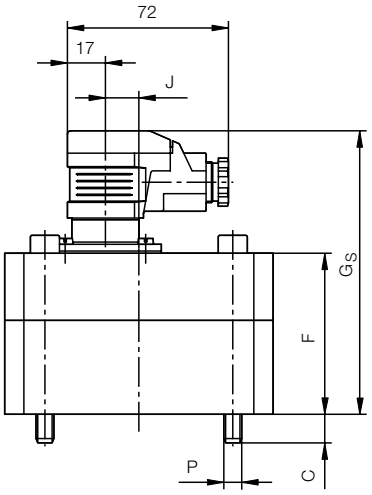
Dimensions of plug-on display (Option 3,4) [mm]



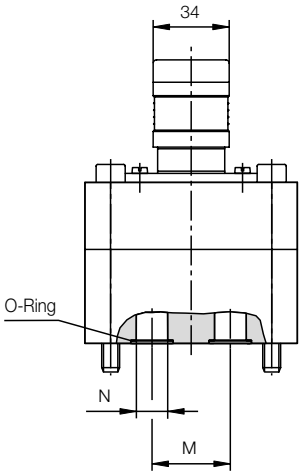
Dimensions DZR-1, DZR-2, DZR-3, DZR-4, without connection assembly

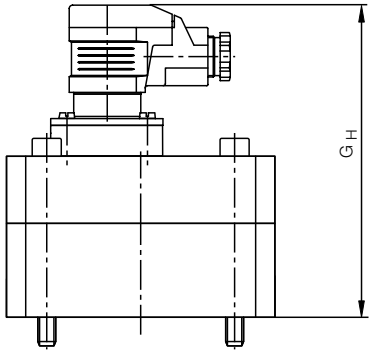
Measuring range code	Weight [kg]	Dimensions [mm]											
		A	C	D	F	G_S	G_H	J	K	L	M	N	P
001/002	1.8	85	10	60	50	101	114	-	70	40	20	6.5	M6
003	2	85	9	60	56	107	120	-	70	40	20	6.5	M6
004	2	85	9	60	56	107	120	-	70	40	20	6.5	M6
005	2	85	13	60	57	108	121	-	70	40	20	9	M6
006/007	3.7	100	17	90	63	114	127	-	80	38	34	16	M8
008/009/010	5.2	120	13	95	72	123	136	15.5	84	72	35	16	M8
011/012	9	170	18	120	89	140	153	46.5	46	95	50	25	M12
013/014/015	13	170	22	120	105	156	169	46.5	46	95	50	25	M12

DZR-1, DZR-2, DZR-3, DZR-4 without connection assembly



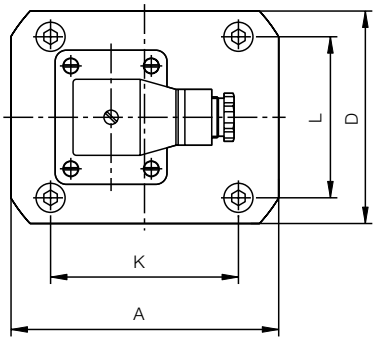
Version S

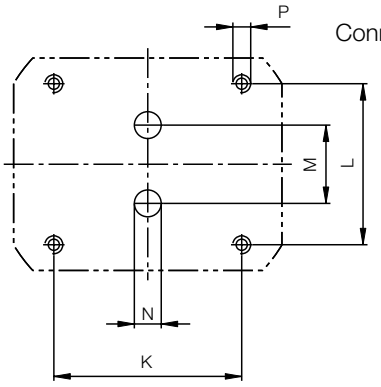




Version H

Connection dimensions

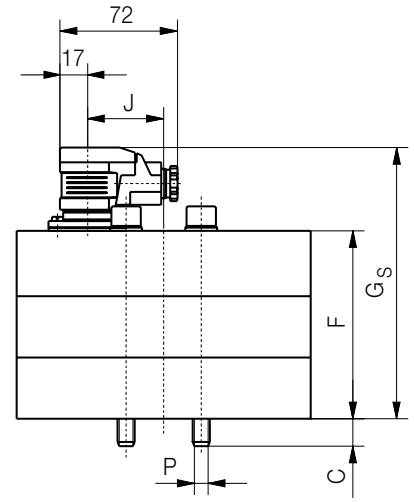


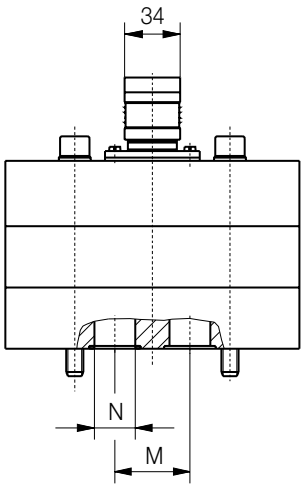


Dimensions DZR-1

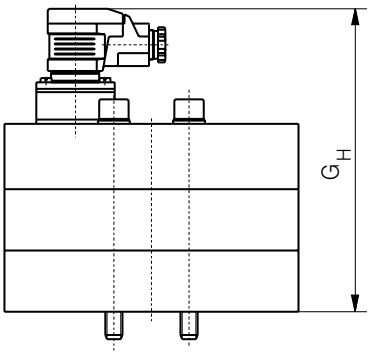
Measuring range code	Weight [kg]	Dimensions [mm]										
	m	C	D	F	G_S	G_H	J	K	L	M	N	P
017	53.5	44	249	168	219	232	77	120	140	70	38	M20
018	57.4	44	249	184	235	248	77	120	140	70	38	M20

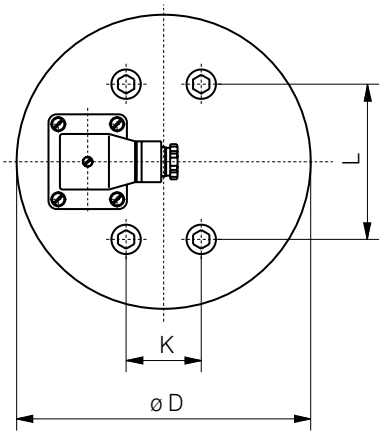
Standard temperature version S and R

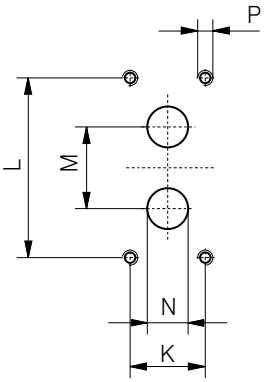




High temperature version H and T



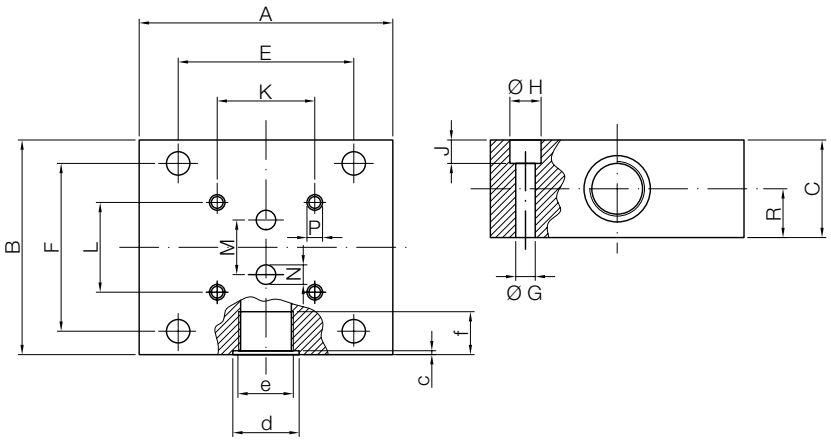




Dimensions of connection assembly for DZR-1, DZR-2, DZR-3, DZR-4

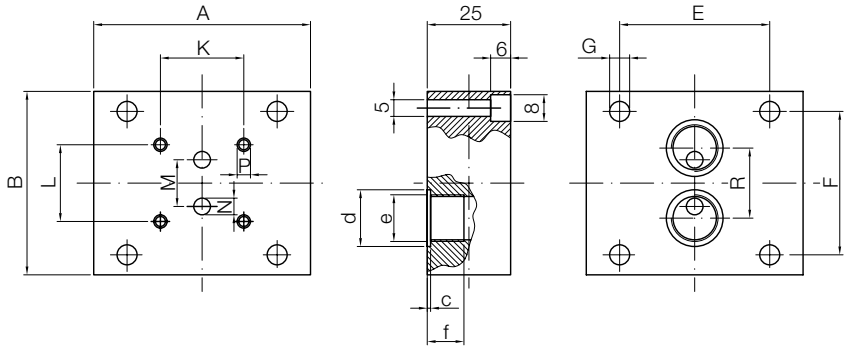
Side connection

Meas. range code	Weight [kg]	Dimensions [mm]																	
		A	B	C	E	F	G	H	J	K	L	M	N	P	R	c	d	e	f
001-005	1.8	85	90	35	65	76	7	11	7	70	40	20	6,5	M6/14t	17	0.7	25	G⅜	13
006-007	2.7	100	110	37	86	96	7	11	7	80	38	34	16	M8/18t	18.5	0.7	29	G½	15
008-010	2.9	100	120	37	80	106	7	11	7	84	72	35	12	M8/18t	17.5	0.7	29	G½	15
011-015	14	160	165	80	140	145	9	15	9	46	95	50	25	M12/24t	28	1	42	G1	19



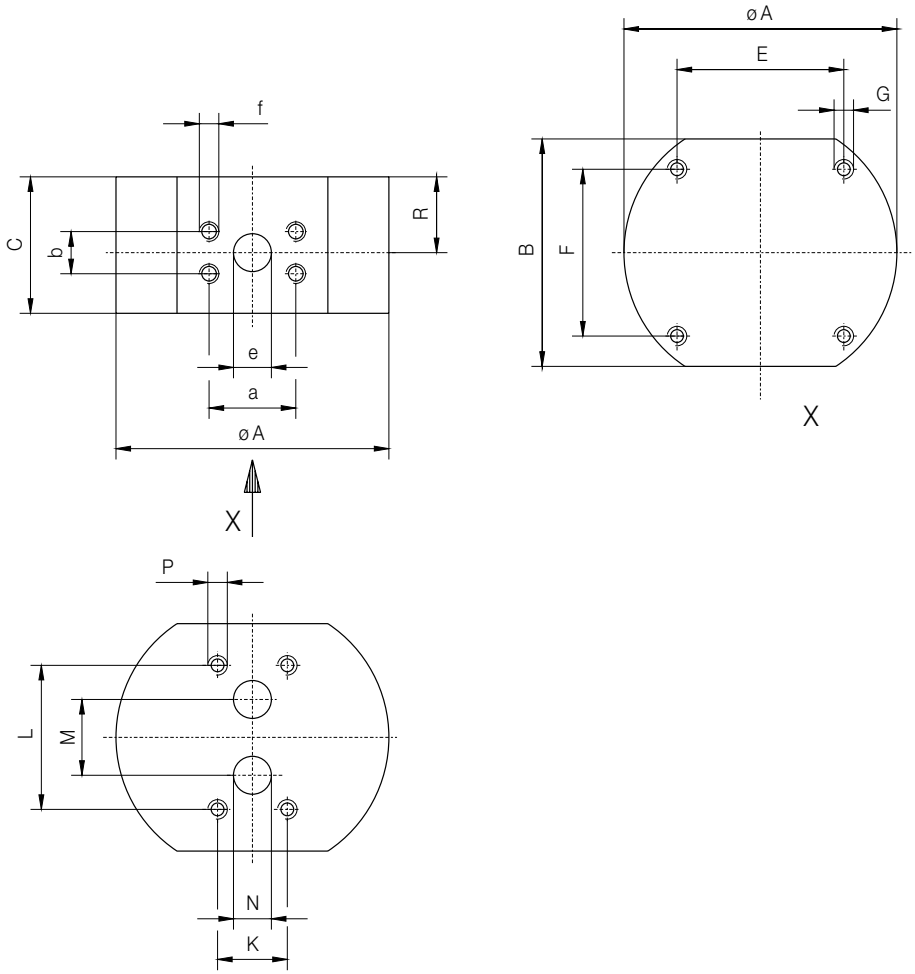
Connection back

Meas. range code	Weight [kg]	Dimensions [mm]																	
		A	B	C	E	F	G	H	J	K	L	M	N	P	R	c	d	e	f
001-005	1.6	85	90	35	65	76	7	11	7	70	40	20	6,5	M6/14t	28	0.7	25	G⅜	13
006-007	2.5	100	110	37	86	96	7	11	7	80	38	34	16	M8/18t	46	0.7	29	G½	15
008-010	2.7	100	120	37	80	106	7	11	7	84	72	35	12	M8/18t	50	0.7	29	G½	15
011-015	9.6	160	165	55	140	145	9	15	9	46	95	50	25	M12/24t	55	1	42	G1	19



Dimensions of connection assembly for DZR-1 / connection sideways

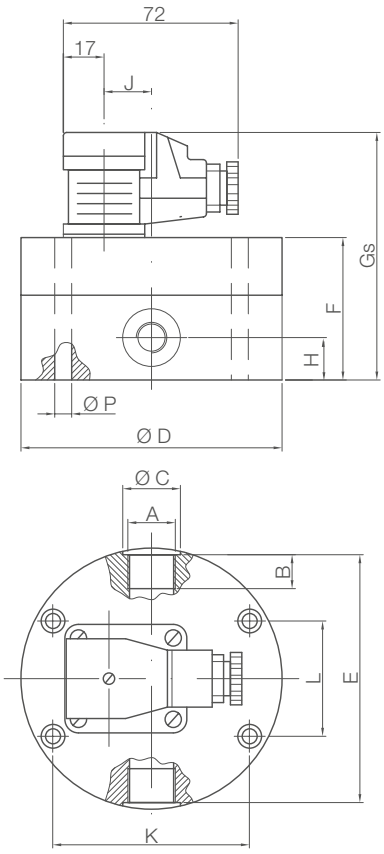
Meas. range code	Weight [kg]	Dimensions [mm]															
	m	A	B	C	E	F	G	K	L	M	N	P	R	a	b	e	f
017/018	41.2	249	200	140	120	140	M10/20t	120	140	70	38	M20/45t	70	79.4	36,5	38	M16/25t



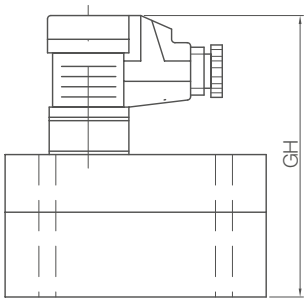
Dimensions DZR-5, DZR-6

Meas. range code	Weight [kg]	Dimensions [mm]												
		A	B	C	D	E	F	G_S	G_H	H	J	K	L	P
001-002	3	G⅛	9	17	94	86	55	106	119	15	-	70	40	6.7
004-005	3.1	G⅜	13	25	94	90	57	108	121	16	-	70	40	6.7
008-010	7	G½	15	29	124	120	72	123	136	22	15.5	84	72	9
011-012	15.9	G1	19	42	170	162	89	140	153	30	46.5	46	50	13
013-015	18.7	G1	19	42	170	162	105	156	169	30	46.5	46	50	13

with sensor ... S/R/A without plug-on display



with sensor ... H/T without plug-on display



Gear wheel flow meter for viscous fluids Model DZR ATEX version

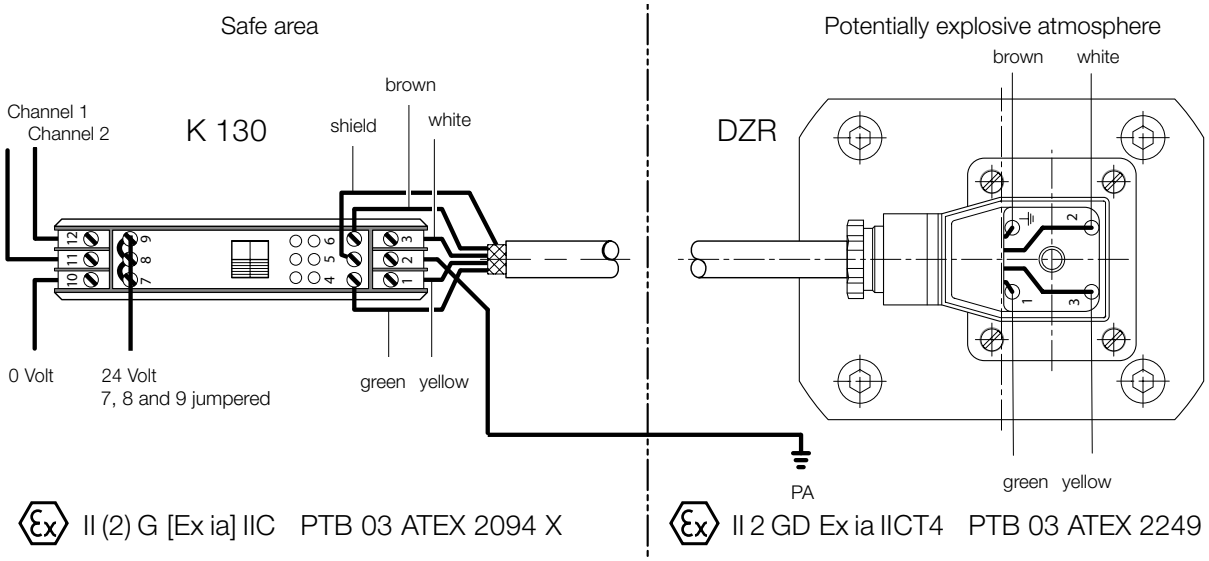
Operation in ATEX area

- All volume counters are available in explosion-proof design according to ATEX.
- The explosion-proof design consists of the volume counter (intrinsically safe electrical apparatus) and the switching amplifier K 130 (associated electrical apparatus). The type of protection „intrinsic safety“ applies to this construction.
- The volume counter is installed in the potentially explosive atmosphere.
- The mounting of the amplifier K 130 is carried out in the safe area.
- Volume counter and switching amplifier are electrically connected to each other. The switching amplifier evaluates the sensor signals and converts them to square-wave signals.
- Without switching amplifier, the volume counter must not be operated in the potentially explosive atmosphere.
- Cable lengths of up to 400 m are possible between volume counter and switching amplifier.
- LEDs for monitoring line breaks / short circuits, channel switching state and power supply are located on the switching amplifier.

Technical Details

Switching amplifier K-130 /3-E-10

Supply voltage:	24 V_{DC} ± 20%
Ripple content white WSS:	<10%
Outputs (non-intrinsically safe):	electrically isolated via optoelectronic coupler
Short-circuit current:	approximately 25 mA
Signal level 1-signal:	0.8 × supply voltage with RL > 2 k Ω
Signal level 0-signal:	inhibited output, residual current < 10 µA
Ambient temperature:	-25 °C ... +60 °C
Dimensions:	107.5 × 92 × 22 mm
Weight:	approximately 150 g



Note: *This graph is an example only for connection of flow meter with isolation amplifier K 130.*
National laws for potentially explosive areas must be considered.