



Gear Wheel Flow Meter for viscous liquids



measuring
•
monitoring
•
analysing

DZR



optional
plug-on
display

- Measuring range:
0.008 - 2 ... 3-700 l/min
- Accuracy:
 $\pm 0.3 \dots \pm 1\%$ of reading
- $p_{\max}$: 480 bar
- $t_{\max}$: 210 °C
- Process connection:
G 1/8, G 3/8, G 1/2, G 1 female
- Material:
cast iron or stainless steel



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

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S4



Description

The KOBOLD Gear Wheel Flow Meter series DZR have been designed for a flow measurement for viscous liquids. 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/
DZR-7 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-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:	see specifications table
Max. pressure loss:	$\Delta p = 16 \text{ bar}$
Media temperature:	see specifications table
Ambient temperature:	-15 ... +80 °C (seal: FPM) -30 ... +80 °C (other seals)
Viscosity range:	1 ... 1 000 000 mm ² /s, according to the flow rate. The max. pressure loss of 16 bar must not be exceeded. See pressure loss diagrams.

Materials

Housing:	
DZR-1/2/4:	globular iron EN-GJS-400-15
DZR-5/6:	stainless steel 1.4404
DZR-7:	globular iron GJS-600
Gear wheels:	
DZR-1/2/4/7:	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:	IP65
Weight:	see dimensions table

Plug-on display

Display:	4-digit LED display digit height 7.62 mm with floating point
Protection:	IP65
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

Fluid Temperature

Model	Sealing material		
	FPM	EPDM	FEP
DZR-1/2/6/7	-40 ... +120 °C	-40 ... +120 °C	-40 ... +120 °C
DZR-4/5	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
DZR-1/2/6 (Electronic H or T)	-40 ... +150 °C	-40 ... +130 °C	-40 ... +150 °C
DZR-1/2/6/7 (Electronic KA)	-40 ... +150 °C	-40 ... +150 °C	-40 ... +210 °C

Higher fluid temperature up to +220 °C on request

Pulse Output Rate

Model	Resolution [pulses/l]
DZR-x001/-x002	40 000
DZR-x003	25 000
DZR-x004	10 000
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-4	DZR-5	DZR-6	DZR-7
Media viscosity	low	medium	medium	medium	low	low
Lubrication properties of media	good	good	bad	bad	good	good
Max. particle size	< 20 µm	< 30 µm	< 30 µm	< 30 µm	< 20 µm	< 20 µm
Bearing	ball bearing	ball bearing (high tolerance)	tungsten c.gl. bearing	tungsten c.gl. bearing	ball bearing	ball bearing
Material housing	Spheroidal cast iron GJS-400-15	Spheroidal cast iron GJS-400-15	Spheroidal cast iron GJS-400-15	Stainless steel 1.4404	Stainless steel 1.4404	Spheroidal cast iron GJS-600
Material gear wheels	Steel 1.7131	Steel 1.7131	Steel 1.7131	Stainless steel 1.4462	Stainless steel 1.4462	Steel 1.7131
Accuracy of measured value	±0.3 % from 20 mm²/s	±0.5 % from 50 mm²/s	±0.5 % from 100 mm²/s	±0.5 % from 100 mm²/s	±0.3 % from 20 mm²/s	±0.3 % from 20 mm²/s
Max. pressure	480 bar	480 bar	480 bar	480 bar	480 bar	480 bar
	Start of rotation with 20 mm²/s at approx. [l/min]	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	0.008	0.04 ... 8	-	0.04 ... 8	0.04 ... 8	-
005	0.01	0.16 ... 16	0.16 ... 16	0.16 ... 16	0.16 ... 16	-
006	0.01	-	-	0.2 ... 30	-	-
007	0.01	0.2 ... 40	-	-	-	-
009	0.02	-	-	0.3 ... 60	-	-
010	0.02	0.4 ... 80	0.4 ... 80	-	0.4 ... 80	-
011	0.03	-	-	0.6 ... 100**	-	-
012	0.03	0.6 ... 160**	0.6 ... 160	-	0.6 ... 160**	-
014	0.04	-	-	1 ... 160**	-	1 ... 160
015	0.04	1 ... 250**	1 ... 250**	-	1 ... 250**	1 ... 250
017	0.1	-	-	-	-	2 ... 600
018	0.2	-	-	-	-	3 ... 700

* Accuracy: ±3%, linearity ±1.5%

** Max. pressure 350 bar



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

Model	Range ¹⁾	Mech. connection (female thread)		Seal	Sensor ⁴⁾	Electronic electr. connection						
DZR-1	001	S10 = G ¾ side H10 = G ¾ 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} K ⁵⁾⁷⁾ = up to 210 °C/ 24 V _{DC} remote electronics	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 ³⁾ = plug-on display with 0(4) ... 20 mA output 4 ³⁾ = plug-on display with 2 x relay contacts A ⁶⁾ = remote electronics with fixed cable between sensor and electronics, electronics with M12 plug (only with sensor option K)						
	003											
	004											
	005											
	007											
	010											
DZR-2	012	S25 = G 1 side H25 = G 1 back										
	015											
	005	S10 = G ¾ side H10 = G ¾ back										
	010	S15 = G ½ side H15 = G ½ back										
	012	S25 = G 1 side H25 = G 1 back										
	015											
DZR-4	004	S10 = G ¾ side H10 = G ¾ back	without connection assembly		S = up to 80°C/ 24 V _{DC} R = up to 80°C/ 12 V _{DC}							
	005											
	006	S15 = G ½ side										
	009	H15 = G ½ back										
	011	S25 = G 1 side										
	014	H25 = G 1 back										
DZR-5	002	R06 = G ⅛ side										
	004	R10 = G ¾ side										
	005											
	006	R15 = G ½ side										
	009											
	011	R25 = G 1 side										
014												
DZR-6	001	R06 = G ⅛ side										
	003	R08 = G ¼ side										
	004	R10 = G ¾ side										
	005											
	010	R15 = G ½ side										
	012	R25 = G 1 side										
015												
DZR-7	014	S40 = flange SAE 1½" side	with connection assembly				K ⁵⁾ = up to 210 °C/ 24 V _{DC} remote electronics					
	015											
	017											
	018											

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⁾ Max. fluid temperature 80 °C

⁴⁾ Pay attention to temperature limits due to sealing material selection

⁵⁾ Only with FEP seal.

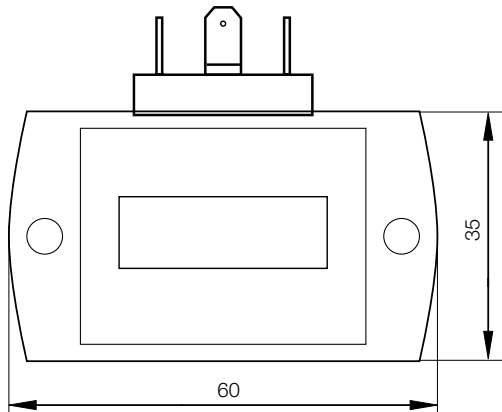
⁶⁾ Specify the cable length in clear text (either 1,5 m, 3 m or 5 m)

⁷⁾ Not for DZR-2.

Order Details for Accessory: Plug-on Display

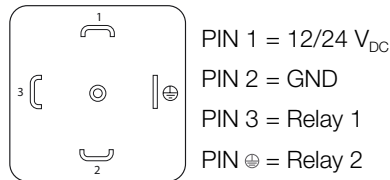
Model	Description	Image
ZUB-DZR-SD1	R12 = square wave signal (incremental signal), 12 V _{DC}	
	R24 = square wave signal (incremental signal), 24 V _{DC}	
	K12 = with 2x relay output, 12 V _{DC}	
	K24 = with 2x relay output, 24 V _{DC}	
	I12 = with 0(4)...20 mA output, 12 V _{DC}	
	I24 = with 0(4)...20 mA output, 24 V _{DC}	

Dimensions [mm]

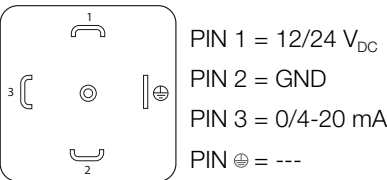


Electrical connection

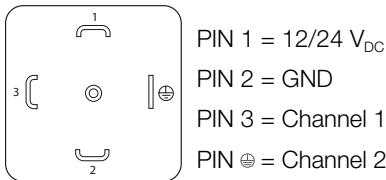
Version K



Version I



Version R



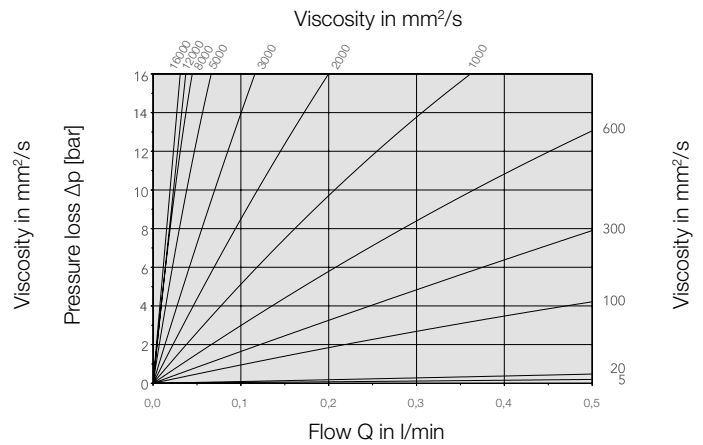
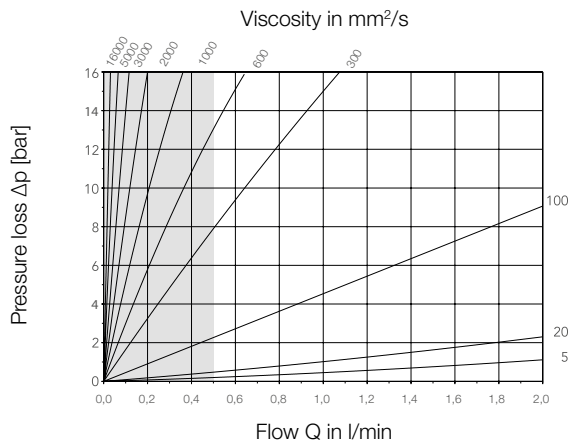


Pressure Loss Diagrams

Ball-bearing versions

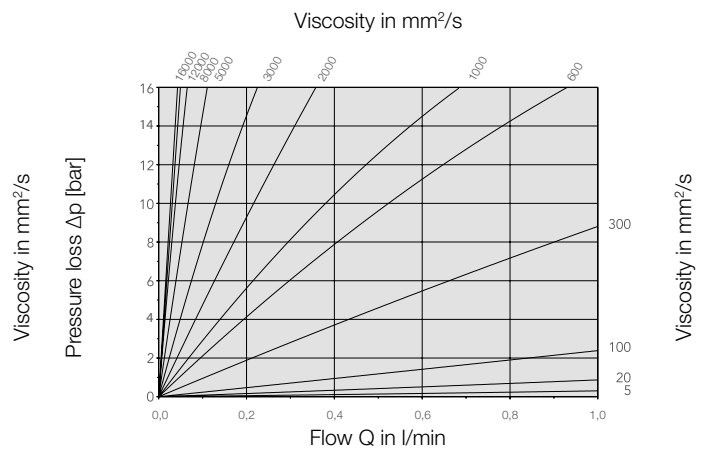
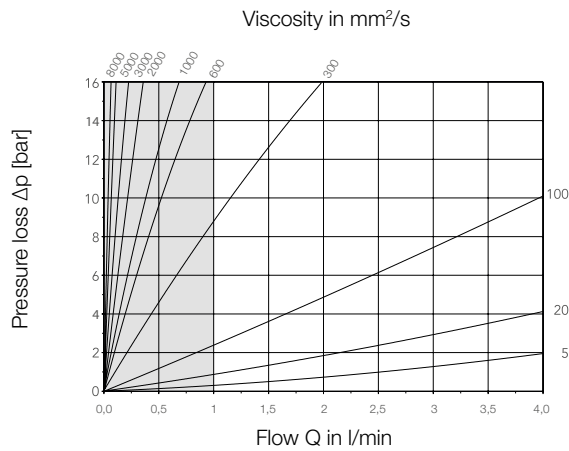
DZR-1001, DZR-6001

DZR-1001, DZR-6001 (Detail)



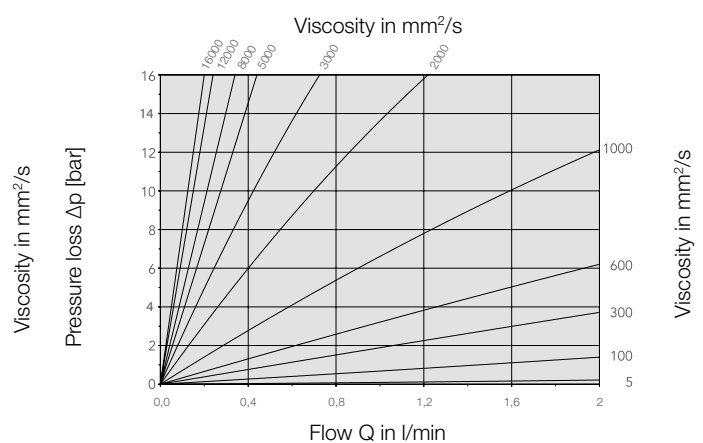
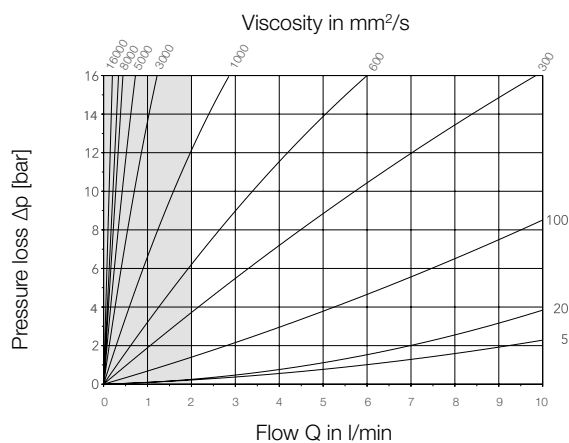
DZR-1003

DZR-1003 (Detail)

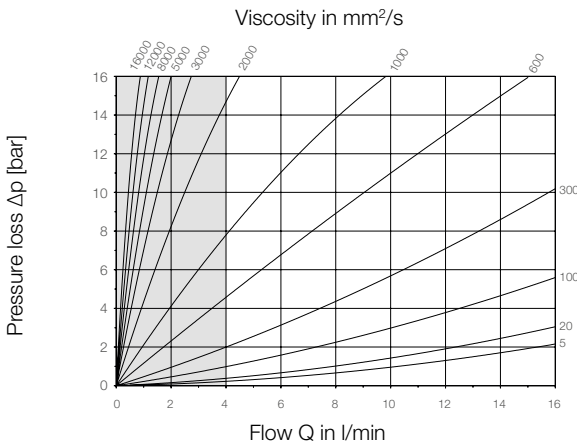


DZR-1004

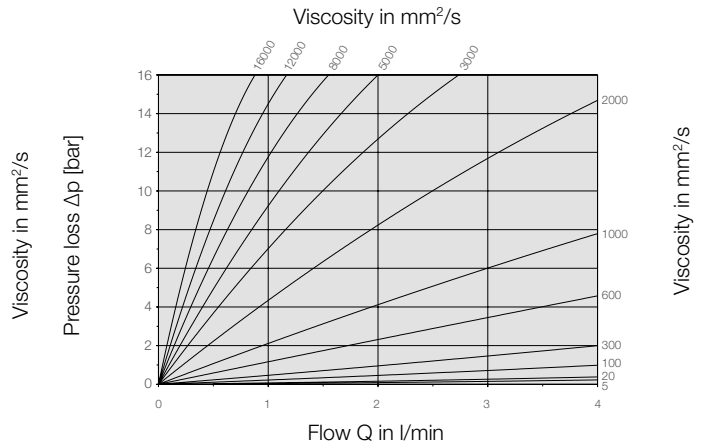
DZR-1004 (Detail)



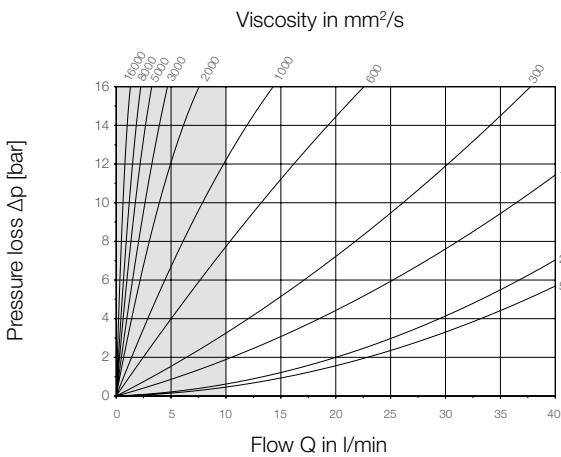
DZR-1005, DZR-2005



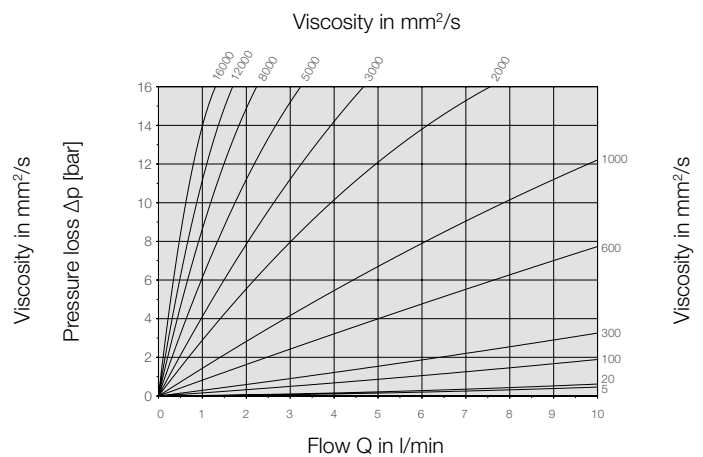
DZR-1005, DZR-2005 (Detail)



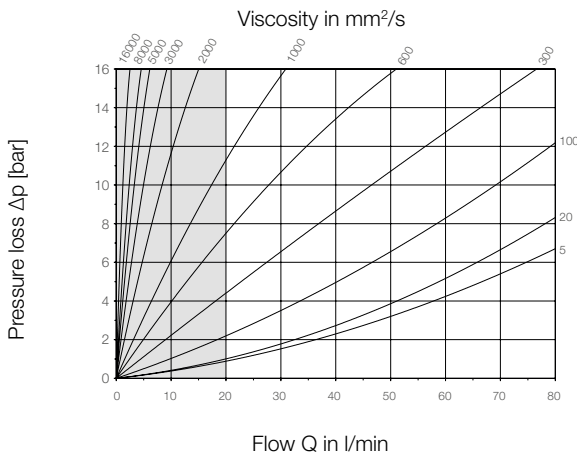
DZR-1007



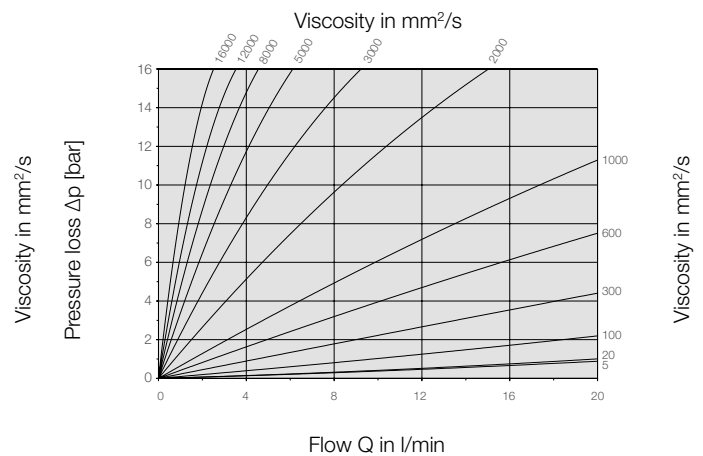
DZR-1007 (Detail)



DZR-1010, DZR-2010

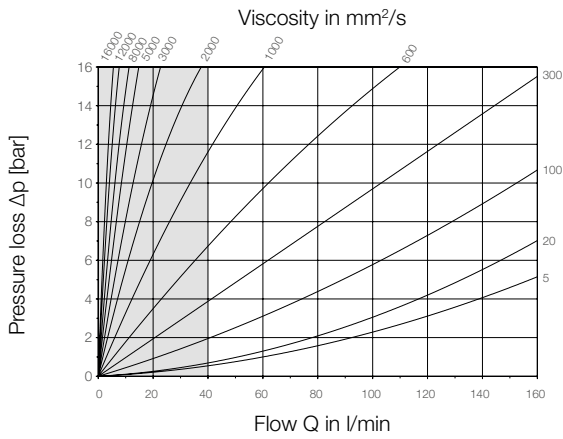


DZR-1010, DZR-2010 (Detail)

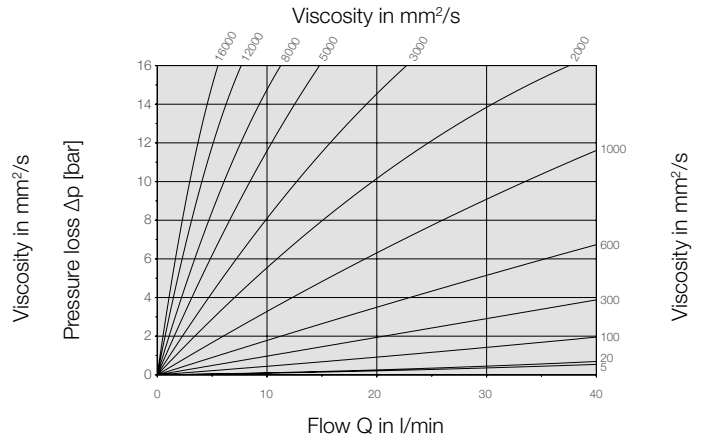




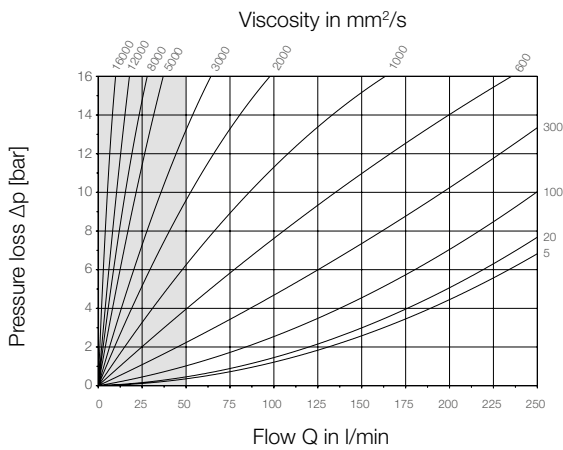
DZR-1012, DZR-7014



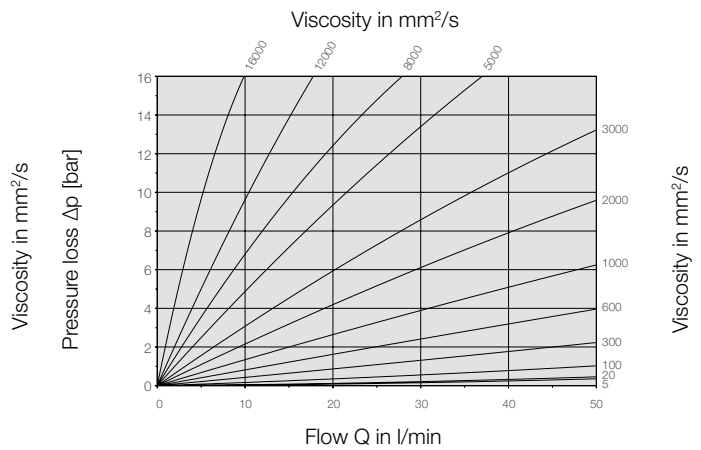
DZR-1012, DZR-7014 (Detail)



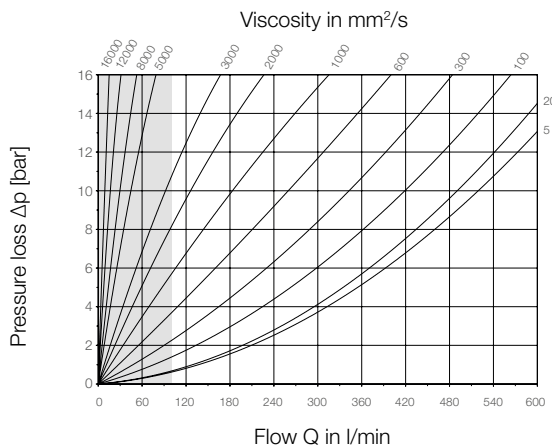
DZR-1015, DZR-7015



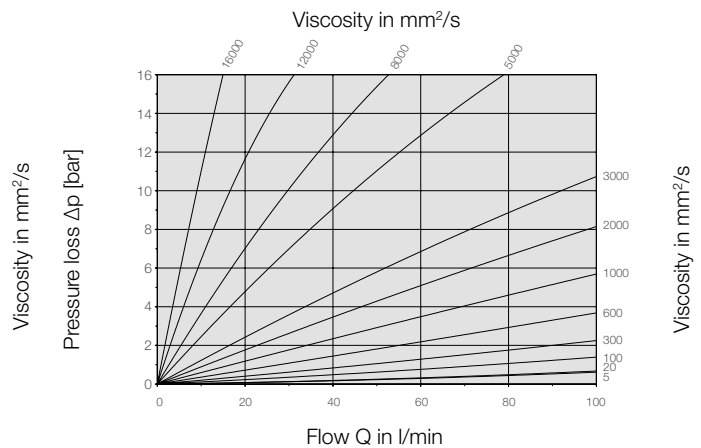
DZR-1015, DZR-7015 (Detail)



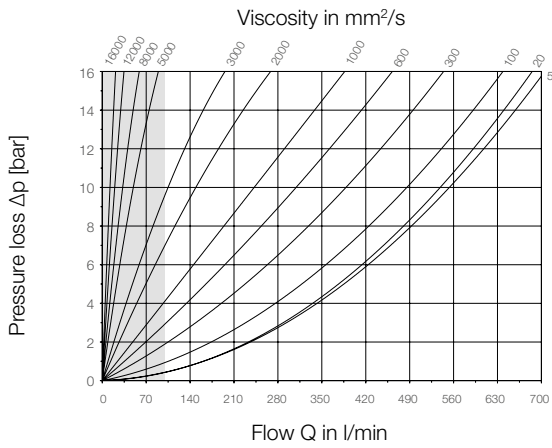
DZR-7017



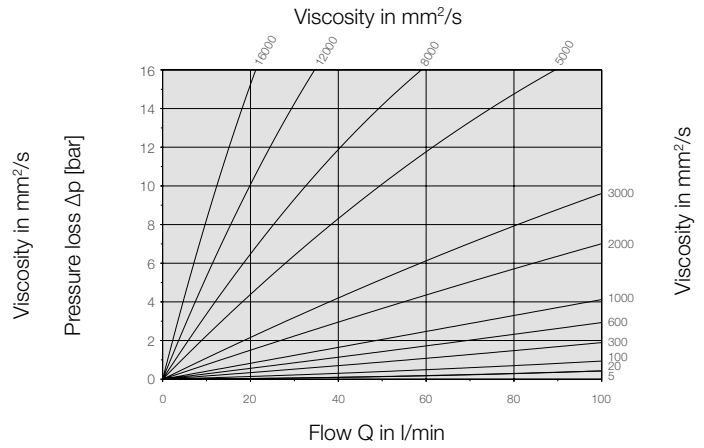
DZR-7017 (Detail)



DZR-7018

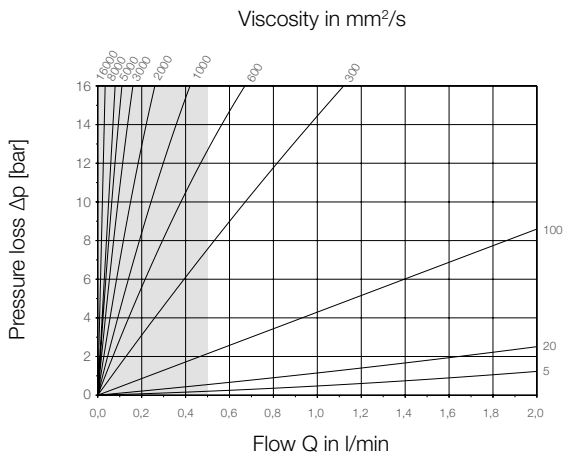


DZR-7018 (Detail)

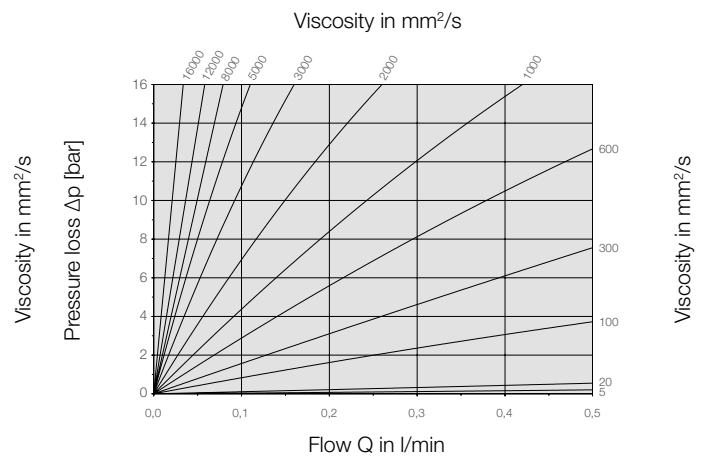


Plain-bearing versions

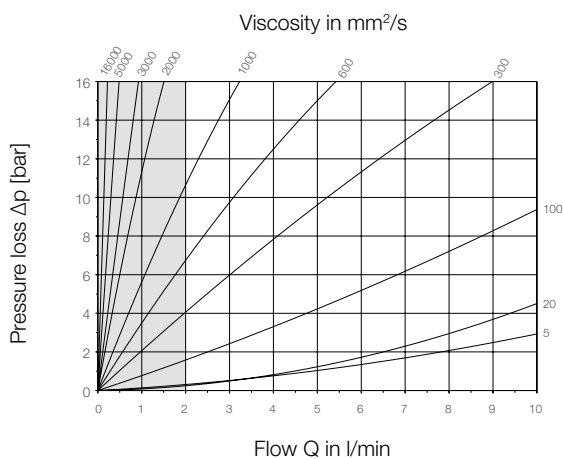
DZR-5002



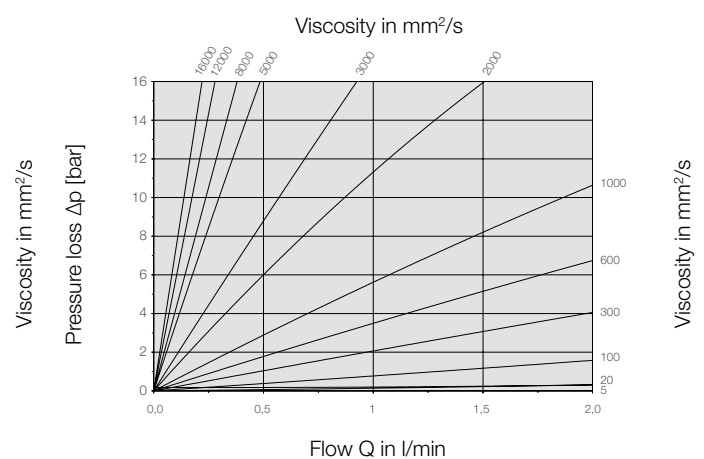
DZR-5002 (Detail)



DZR-4004

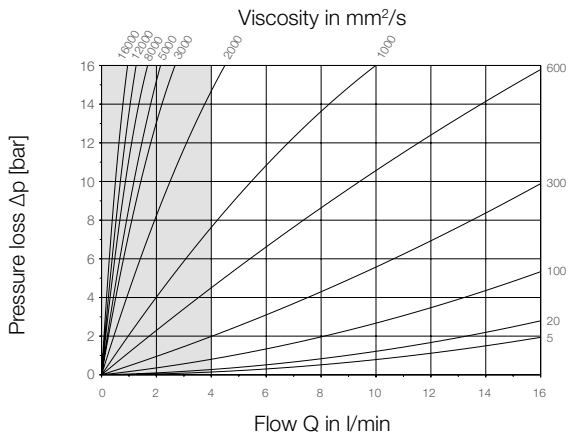


DZR-4004 (Detail)

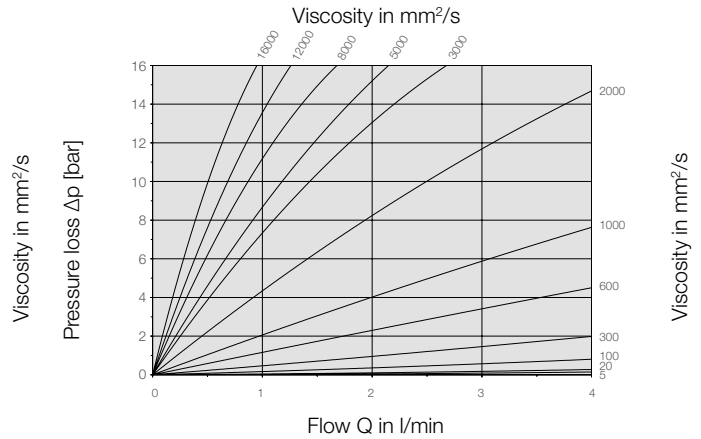




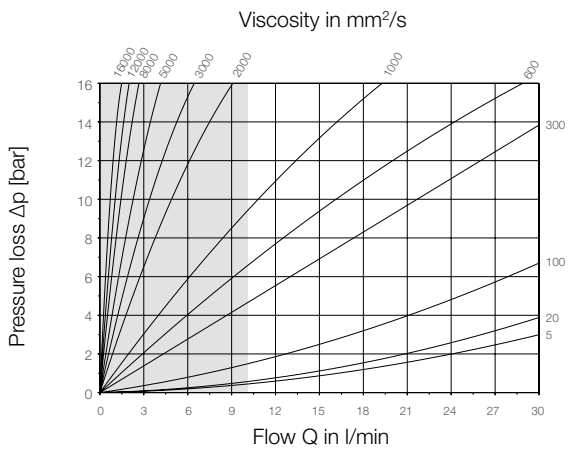
DZR-4005, DZR-5005



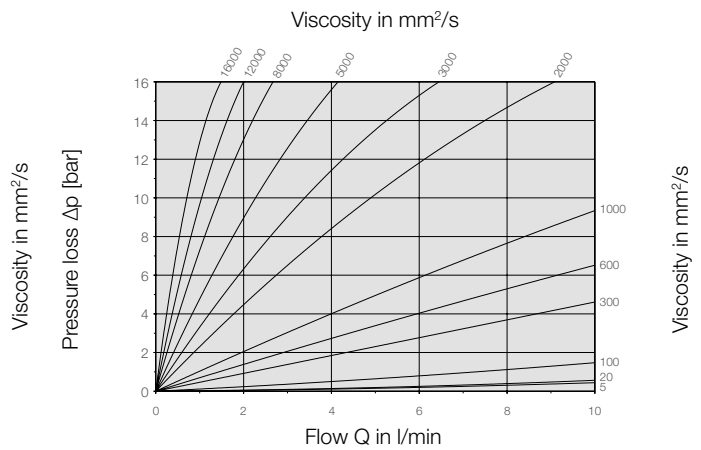
DZR-4005, DZR-5005 (Detail)



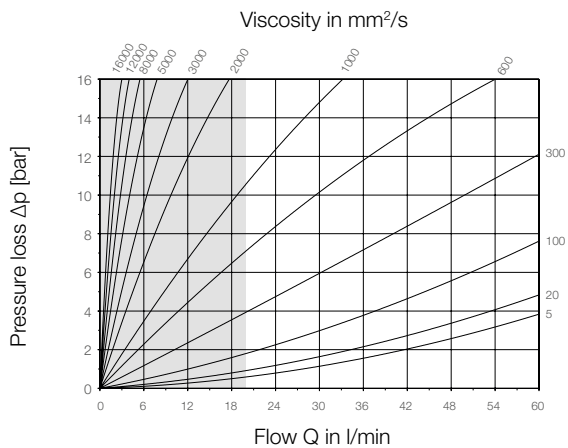
DZR-4006



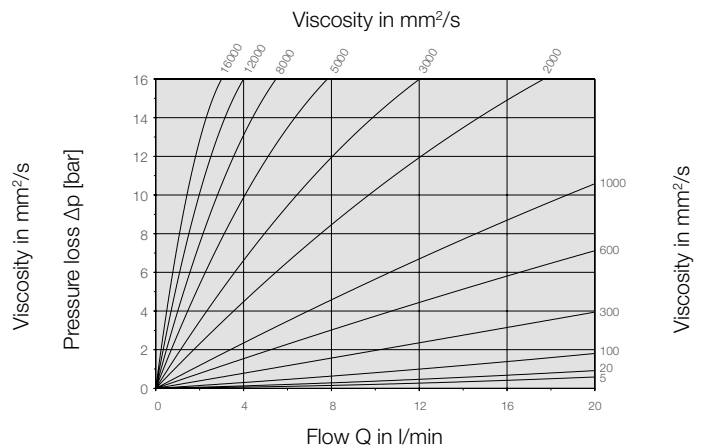
DZR-4006 (Detail)



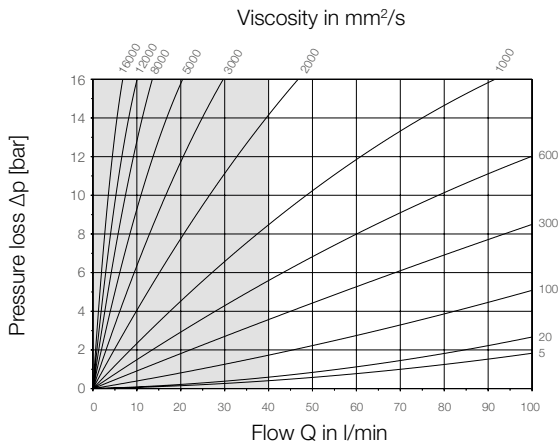
DZR-4009, DZR-5009



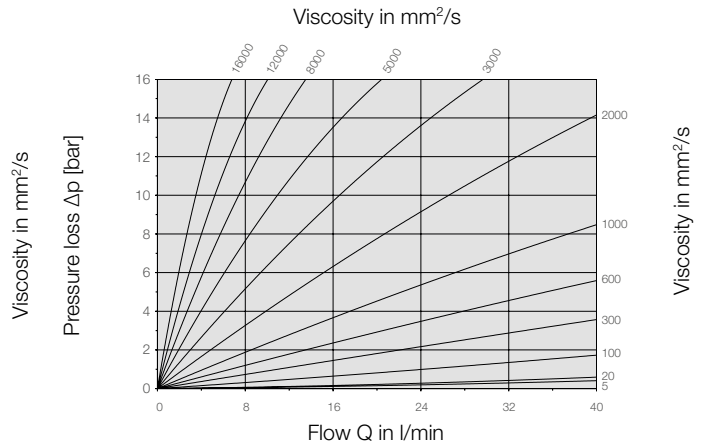
DZR-4009, DZR-5009 (Detail)



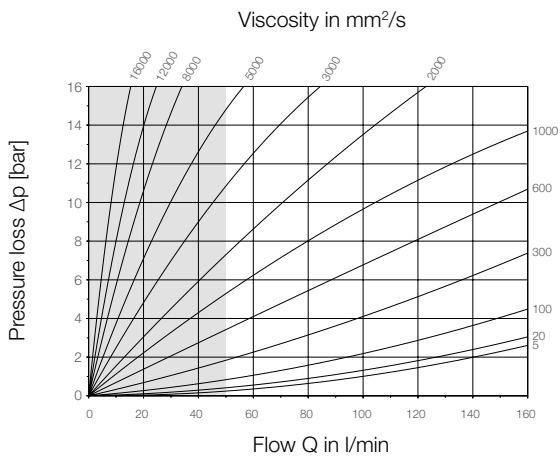
DZR-4011, DZR-5011



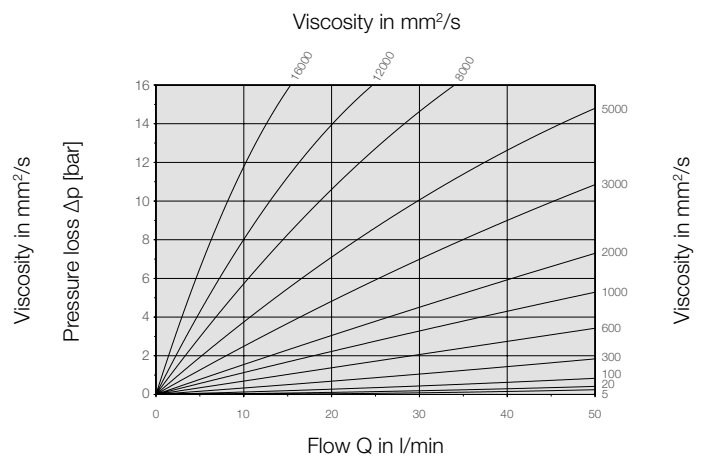
DZR-4011, DZR-5011 (Detail)



DZR-4014, DZR-5014



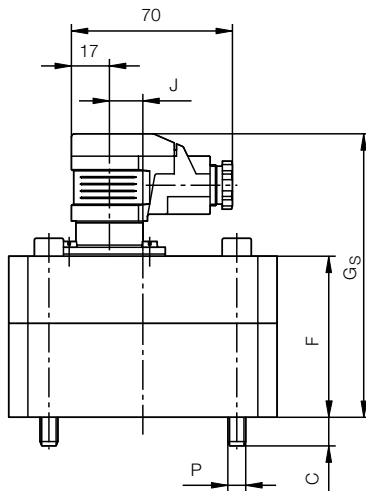
DZR-4014, DZR-5014 (Detail)



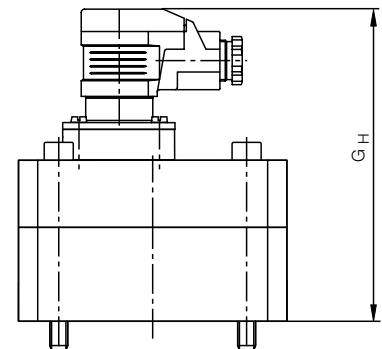
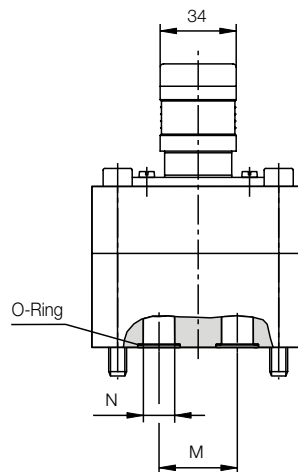
Dimensions DZR-1, DZR-2, DZR-4 (grey cast iron) without connection assembly
Electronics version: S/H/R/T/Kx

Measuring range code	Weight [kg]	Dimensions [mm]											
		A	C	D	F	G _S	G _H	J	K	L	M	N	P
001	1.8	85	10	60	50	101	113	-	70	40	20	6,7	M6
003	2	85	9	60	56	107	119	-	70	40	20	6,7	M6
004	2.5	85	10	60	55	106	118	-	70	40	20	9	M6
005	2	85	13	60	57	108	120	-	70	40	20	9	M6
006/007	3.7	100	17	90	63	114	126	-	80	38	34	16	M8
009/010	5.2	120	13	95	72	123	135	15.5	84	72	35	16	M8
011/012	9	170	18	120	89	140	152	46.5	46	95	50	25	M12
014/015	13	170	22	120	105	156	168	46.5	46	95	50	25	M12

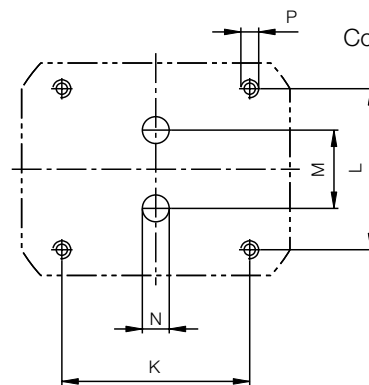
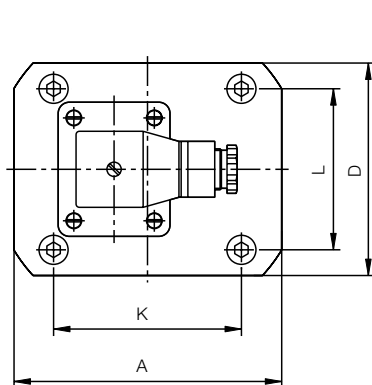
DZR-1, DZR-2, DZR-4 without connection assembly



Version S



Version H



Connection dimensions

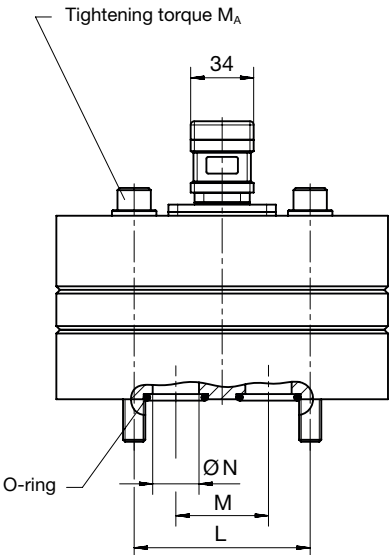
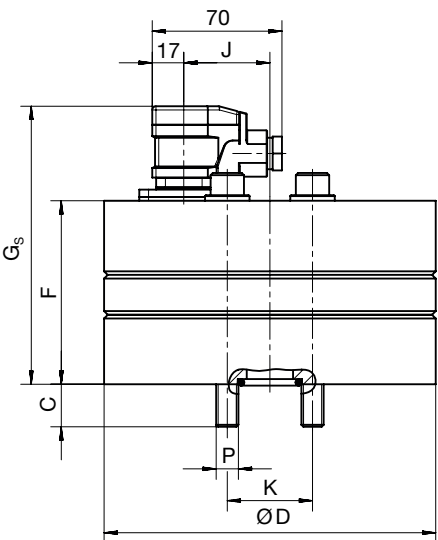
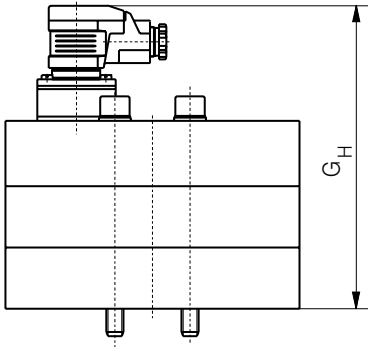
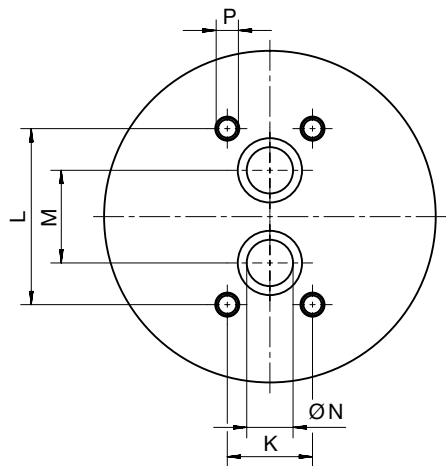
Dimensions DZR-7 (grey cast iron)

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]										
	M_A	m	C	D	F	G_S	G_H	J	K	L	M	N	P
017	400	53.5	44	249	168	219	231	78	120	140	70	38	M20
018	400	57.4	38	249	184	235	247	78	120	140	70	38	M20

Standard temperature version S and R

High temperature version H and T

Connection dimensions



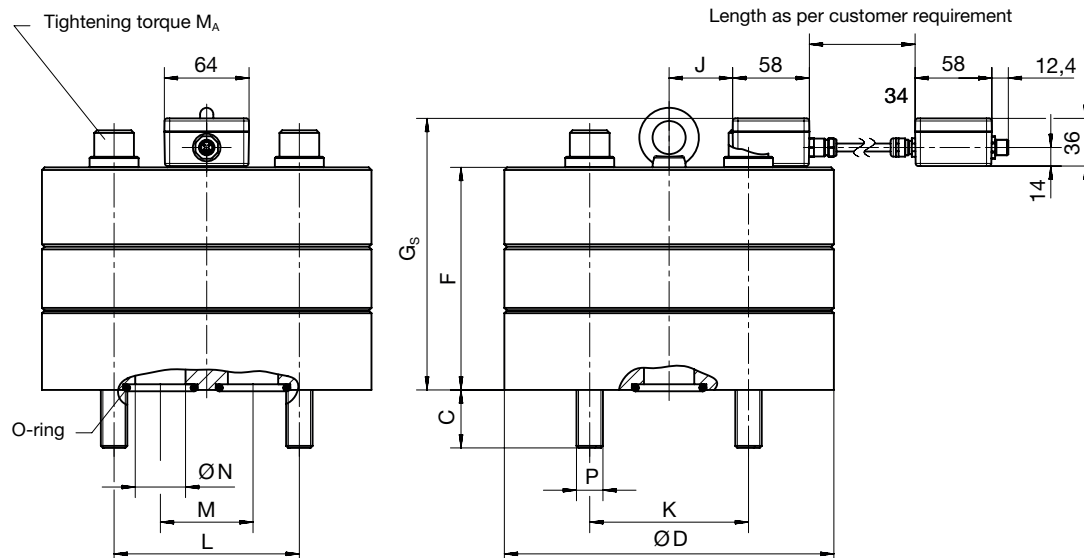
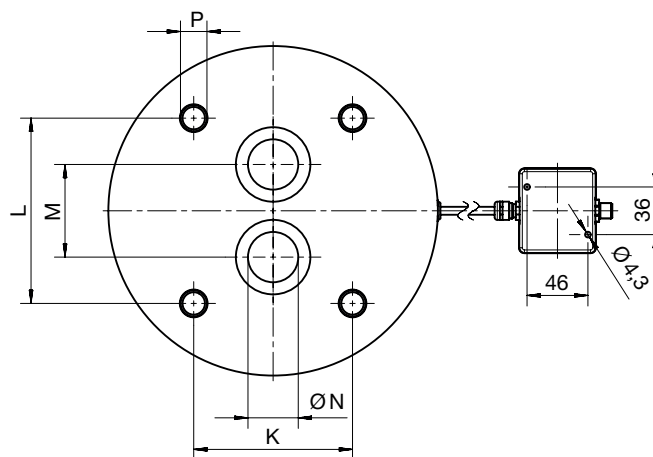
Dimensions DZR-7 (grey cast iron)

Electronics version high temperature with remote electronics KA

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]									
	M _A	m	C	D	F	G _s	J	K	L	M	N	P
017	400	53.5	44	249	168	205	78	120	140	70	38	M20
018	400	57.4	38	249	184	221	78	120	140	70	38	M20

High temperature version H and T
with remote electronics

Connection dimensions

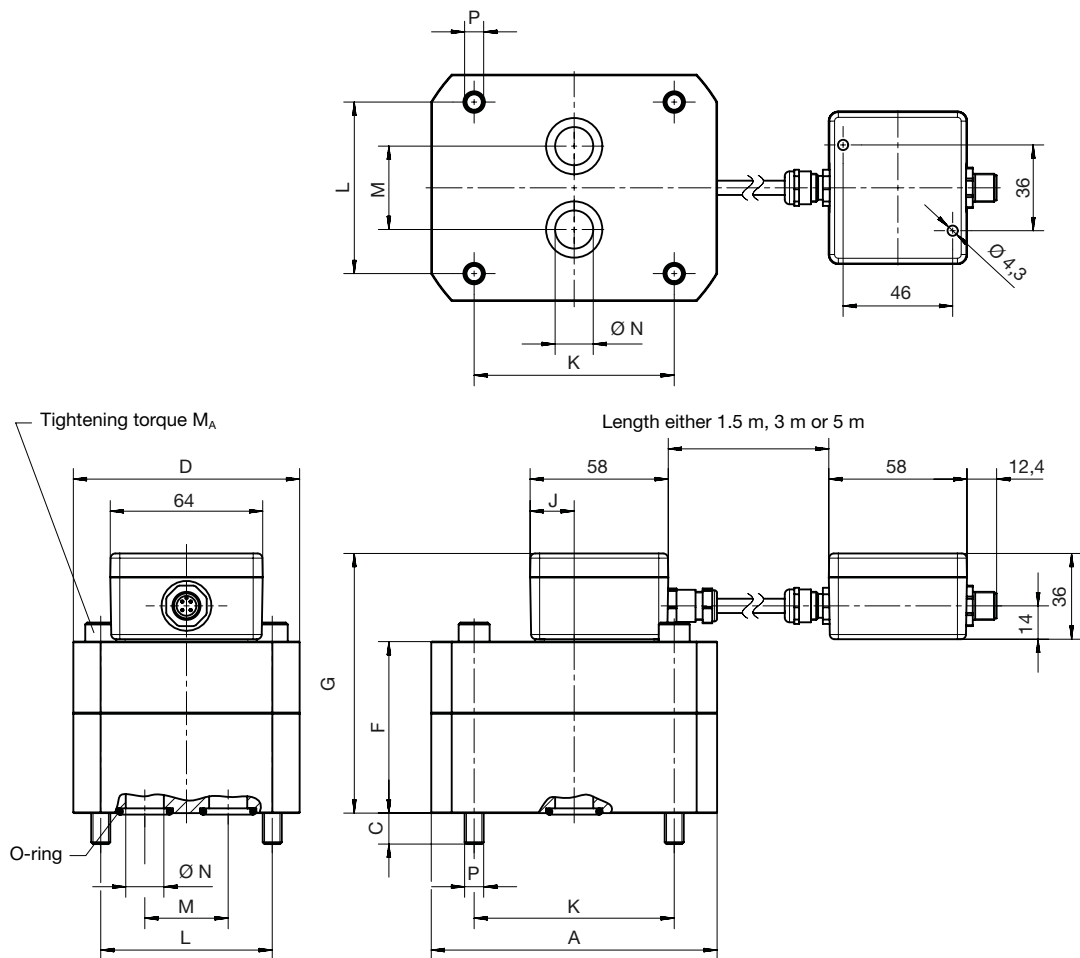


Dimensions DZR-1, DZR-2, DZR-4 (grey cast iron) without connection assembly

Electronics versions: high-temperature option ...KA with remote electronics

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]										
	M_A	m	A	C	D	F	G	J	K	L	M	N	P
001, 002	14	1.8	85	10	60	50	87	-	70	40	20	6.7	M6
003	14	2	85	9	60	56	93	-	70	40	20	6.7	M6
004	14	2.3	85	10	60	55	92	-	70	40	20	9	M6
005	14	2	85	13	60	57	94	-	70	40	20	9	M6
006, 007	35	3.7	100	17	90	63	100	-	80	38	34	16	M8
009, 010	35	5.2	120	13	95	72	109	18.5	84	72	35	16	M8
011, 012	120	9	170	18	120	89	126	11	46	95	50	25	M12
014, 015	120	13	170	22	120	105	142	11	46	95	50	25	M12

Connection dimensions



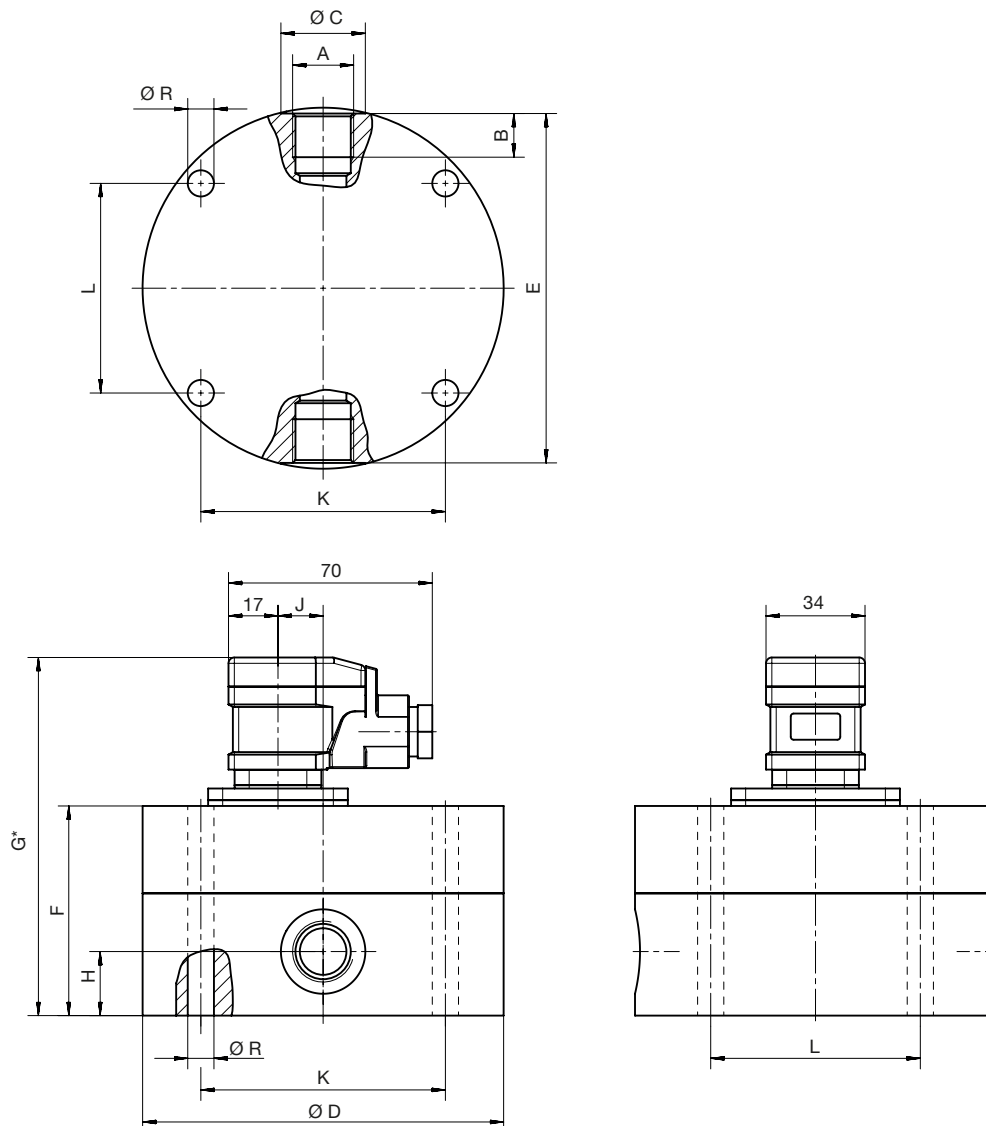
Dimensions DZR-5, DZR-6 (stainless steel)

Electronics versions: standard / high-temperature / sensor S/H/R/T without plug-on display

Measuring range code	Weight [kg]	Dimensions [mm]											
	m	A	B	C	D	E	F	G*	H	J	K	L	R
001, 002	3	G 1/8	9	17	94	90	55	106	15	-	70	40	6.7
003	3	G 1/4	13	21	94	90	56	107	15	-	70	40	6.7
004	3	G 3/8	13	25	94	90	55	106	15	-	70	40	6.6
005	3.1	G 3/8	13	25	94	90	57	108	16	-	70	40	6.5
006, 007	4.8	G 1/2	15	29	118	114	63	114	17.5	-	80	38	9
009, 010	7	G 1/2	15	29	124	120	72	123	22	15.5	84	72	9
011, 012	15.9	G 1	19	51.5	170	162	89	140	30	46.5	46	95	13
014, 015	18.7	G 1	19	42	170	162	105	156	30	46.5	46	95	13

* electronics version H: plus 12 mm
electronics version X: plus 6 mm

Connection dimensions

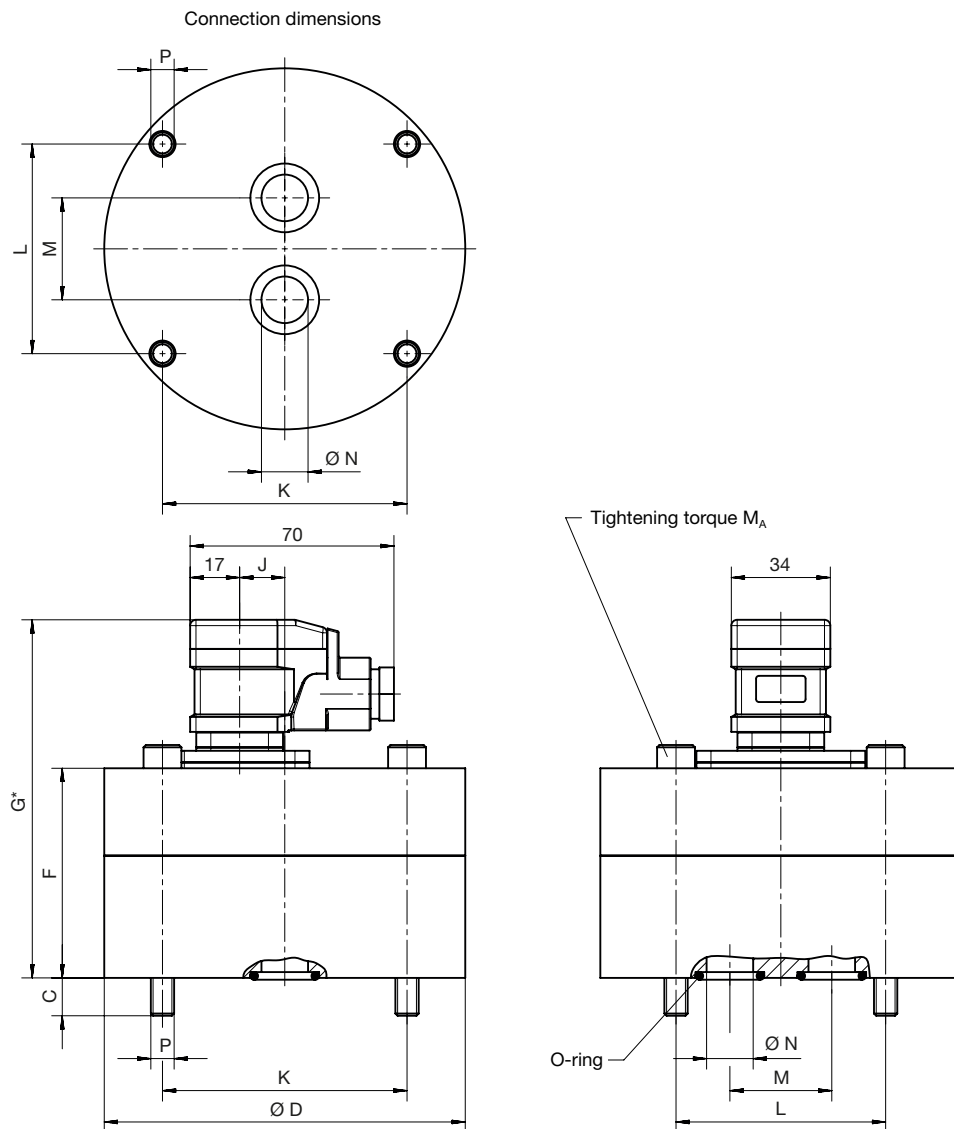


Dimensions DZR-5, DZR-6 (stainless steel) without connection assembly

Electronics versions: standard/high-temperature/sensor ... S/R/A without plug-on display

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]									
	M_A	m	C	D	F	G*	J	K	L	M	N	P
001, 002	14	3	10	94	55	106	-	70	40	20	6.7	M6
003	14	3	9	94	56	107	-	70	40	20	6.7	M6
004	14	3	10	94	55	106	-	70	40	20	9	M6
005	14	3.1	13	94	57	108	-	70	40	20	9	M6
006, 007	35	4.8	17	118	63	114	-	80	38	34	16	M8
009, 010	35	7	13	124	72	123	15.5	84	72	35	16	M8
011, 012	120	15.9	18	170	89	140	46.5	46	95	50	25	M12
014, 015	120	18.7	22	170	105	156	46.5	46	95	50	25	M12

* electronics version H: plus 12 mm
electronics version X: plus 6 mm



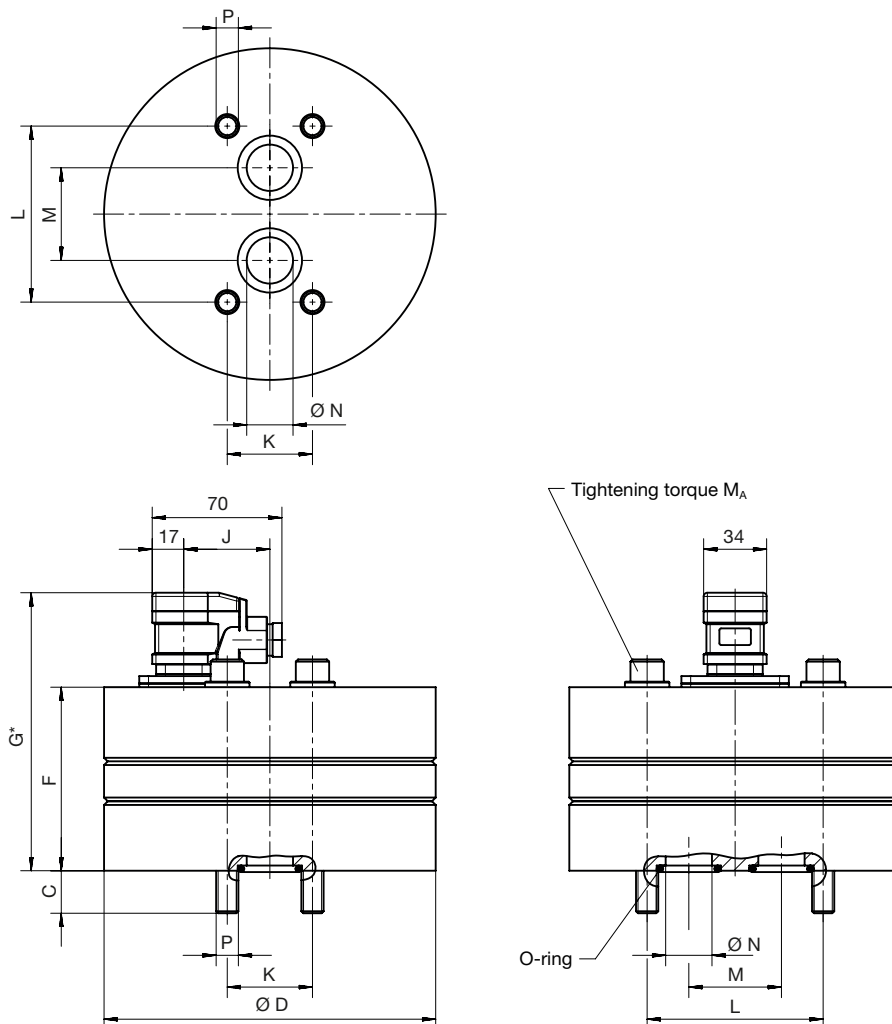
Dimensions DZR-7 (spheroidal cast iron) without connection assembly

Electronics versions: ... S/R/A without plug-on display

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]									
	M_A	m	C	D	F	G*	J	K	L	M	N	P
014	145	16.3	23	179	99	150	46.5	46	95	50	25	M12
015	145	18.9	22	179	115	166	46.5	46	95	50	25	M12

* electronics version H: plus 12 mm

Connection dimensions

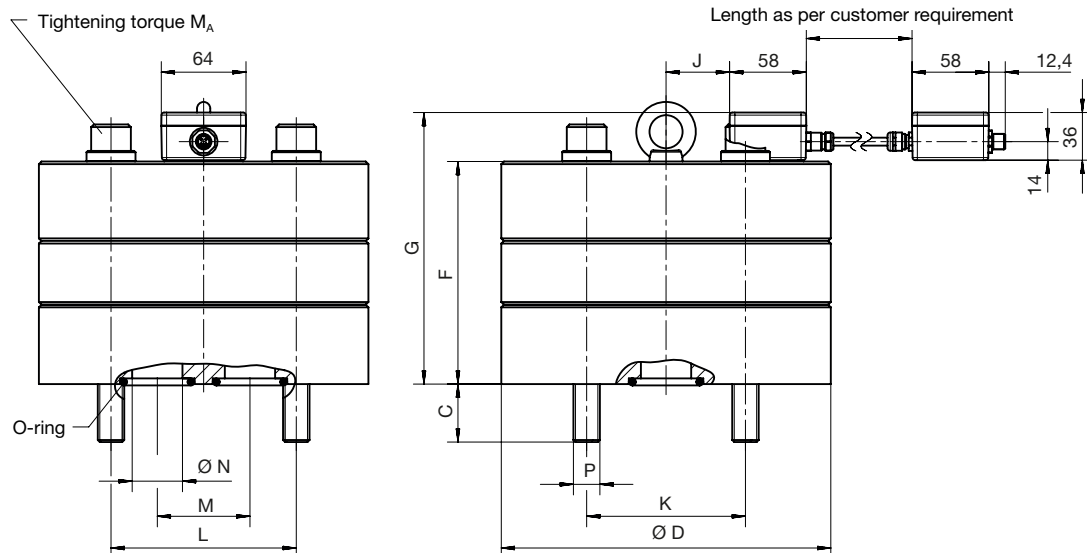
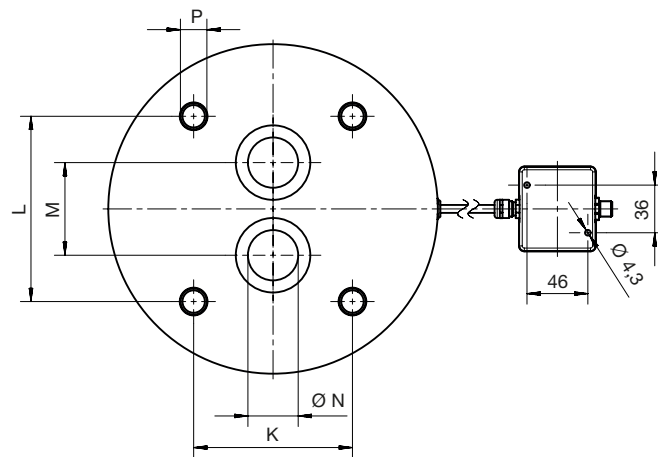


Dimensions DZR-7 (spheroidal cast iron) without connection assembly

Electronics versions: high-temperature option ...KA with remote electronics

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]									
	M_A	m	C	D	F	G	J	K	L	M	N	P
014	120	16.3	23	179	99	136	-	46	95	50	25	M12
015	120	18.9	22	179	115	152	11	46	95	50	25	M12

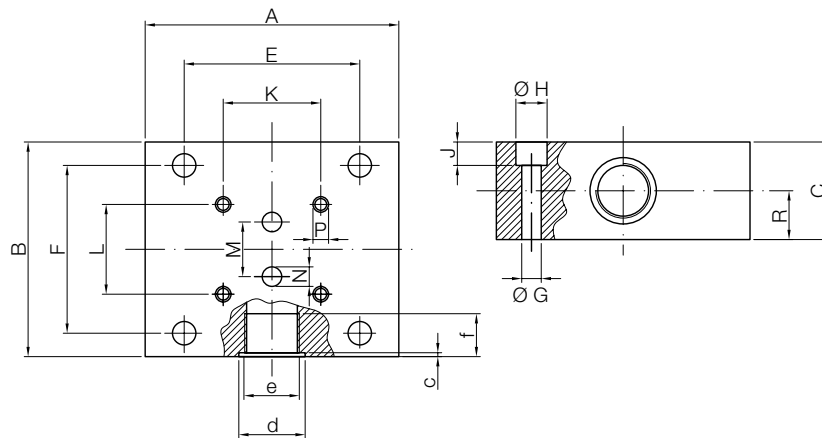
Connection dimensions



Dimensions of connection assembly (grey cast iron) for DZR-1, DZR-2, DZR-4

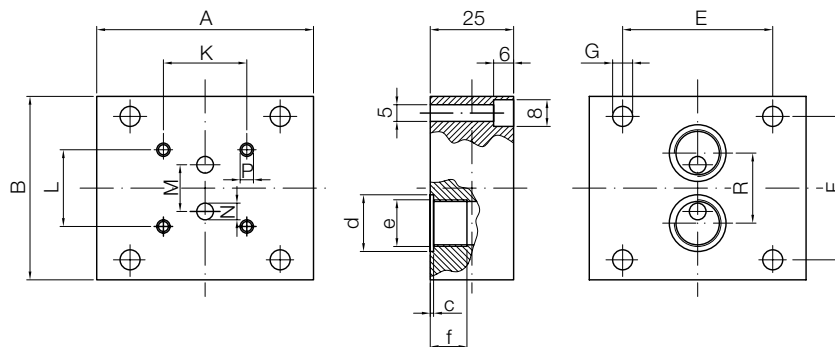
Side connection

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	G $\frac{3}{8}$	13
006-007	2.7	100	110	37	86	96	7	11	7	80	38	34	16	M8/18t	18.5	0.7	29	G $\frac{1}{2}$	15
008-010	2.9	100	120	37	80	106	7	11	7	84	72	35	12	M8/18t	17.5	0.7	29	G $\frac{1}{2}$	15
011-015	14	160	165	80	140	145	9	15	9	46	95	50	25	M12/24t	28	1	42	G1	19



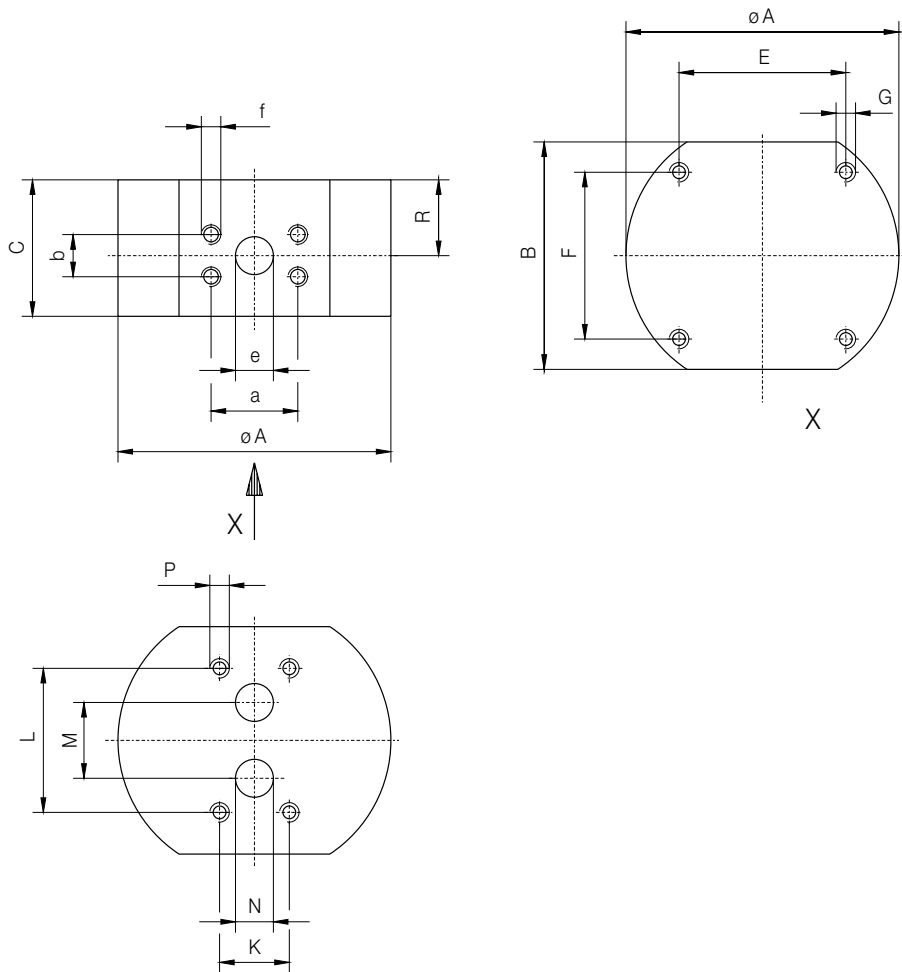
Connection back

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	G $\frac{3}{8}$	13
006-007	2.5	100	110	37	86	96	7	11	7	80	38	34	16	M8/18t	46	0.7	29	G $\frac{1}{2}$	15
008-010	2.7	100	120	37	80	106	7	11	7	84	72	35	12	M8/18t	50	0.7	29	G $\frac{1}{2}$	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 (spheroidal cast iron) for DZR-7 / SAE-flange connection sideways

Meas. range code	Weight [kg] m	Dimensions [mm]															
		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 of connection assembly (spheroidal cast iron) for DZR-7 / SAE-flange connection sideways

Meas. range code	Weight [kg]	Dimensions [mm]															
	m	B	C	D	E	F	G	K	L	M	N	P	R	a	b	e	f
014/015	14.2	150	90	180	110	110	M8/24t	46	95	50	25	M12/24t	50	57.2	27.8	25	M12/24t

