



## Gear Wheel Flow Meter for viscous liquids



measuring  
•  
monitoring  
•  
analysing

DZR



- 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

S4



KOBOLD companies worldwide:

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

KOBOLD Messring GmbH  
Nordring 22-24  
D-65719 Hofheim/Ts.  
Head Office:  
+49(0)6192 299-0  
+49(0)6192 23398  
info.de@kobold.com  
www.kobold.com



### 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:	480 bar (DZR-x001 ... DZR-x010, DZR-1017/-1018 and DZR-7014/-7015) 350 bar (DZR-x011 ... DZR-x015)
Max. pressure loss:	$\Delta p = 16$ bar
Media temperature:	see specifications table
Ambient temperature:	-15 ... +80 °C (seal: FPM) -30 ... +80 °C (other seals)
Viscosity range:	1 ... 1 000 000 mm <sup>2</sup> /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 <sub>S</sub>
Supply voltage U <sub>S</sub> :	24 V <sub>DC</sub> (±20%) 12 V <sub>DC</sub> (±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 <sub>DC</sub> ) 50 Ω (10 V <sub>DC</sub> )
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 (Elektronik A)	-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	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-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 GIS-400-15	Spheroidal cast iron GIS-400-15	Spheroidal cast iron GIS-400-15	Stainless steel 1.4404	Stainless steel 1.4404	Spheroidal cast iron GIS-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 mm <sup>2</sup> /s	±0.5% from 50 mm <sup>2</sup> /s	±0.5% from 100 mm <sup>2</sup> /s	±0.5% from 100 mm <sup>2</sup> /s	±0.3% from 20 mm <sup>2</sup> /s	±0.3% from 20 mm <sup>2</sup> /s	
Max. pressure	480 bar	480 bar	480 bar	480 bar	480 bar	480 bar	
	Start of rotation with 20 mm <sup>2</sup> /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	0.01	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	-	-	-	-	-
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**	-
014	0.04	-	-	1 ... 160**	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



**Gear Wheel Flow Meter** for viscous liquids Model DZR

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

Model	Range <sup>1)</sup>	Mech. connection (female thread)	Seal	Sensor <sup>4)</sup>	Electronic electr. connection				
DZR-1	001 003 004 005	S10 = G 3/8 side H10 = G 3/8 back	F = FPM E = EPDM P = FEP	S = up to 120°C/ 24 V <sub>DC</sub> H <sup>2)</sup> = up to 150°C/ 24 V <sub>DC</sub> R = up to 120°C/ 12 V <sub>DC</sub> T <sup>2)</sup> = up to 150°C/ 12 V <sub>DC</sub> K <sup>5)</sup> = up to 210°C/ 24 V <sub>DC</sub> 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 <sup>3)</sup> = plug-on display with 0(4) ... 20 mA output 4 <sup>3)</sup> = plug-on display with 2 x relay contacts A <sup>6)</sup> = remote electronics with fixed cable between sensor and electronics, electronics with M12 plug (only with sensor option K)				
	007 010	S15 = G 1/2 side H15 = G 1/2 back							
	012 015	S25 = G 1 side H25 = G 1 back							
	017 018	S40 = flange SAE 1 1/2" side							
DZR-2	005	S10 = G 3/8 side H10 = G 3/8 back				with connection assembly			
	010	S15 = G 1/2 side H15 = G 1/2 back							
	015	S25 = G 1 side H25 = G 1 back							
DZR-4	004 005	S10 = G 3/8 side H10 = G 3/8 back				F = FPM E = EPDM P = FEP	S = up to 80°C/ 24 V <sub>DC</sub> R = up to 80°C/ 12 V <sub>DC</sub>	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 <sup>3)</sup> = plug-on display with 0(4) ... 20 mA output 4 <sup>3)</sup> = plug-on display with 2 x relay contacts A <sup>6)</sup> = remote electronics with fixed cable between sensor and electronics, electronics with M12 plug (only with sensor option K)	
	006 009	S15 = G 1/2 side H15 = G 1/2 back							
	011 014	S25 = G 1 side H25 = G 1 back							
	002 005 009 011 014	R06 = G 1/8 side R10 = G 3/8 side R15 = G 1/2 side R25 = G 1 side							without connection assembly
001 003 004 005 010 012 015	R06 = G 1/8 side R08 = G 1/4 side R10 = G 3/8 side R15 = G 1/2 side R25 = G 1 side								
014 015	S40 = flange SAE 1 1/2" side	with connection assembly							

<sup>1)</sup> The range of the corresponding model can be taken from the schedule »Specifications«

<sup>2)</sup> Electronic H/T only for DZR-1, DZR-2, DZR-6, not possible with plug-on display


<sup>3)</sup> Max. fluid temperature 80 °C

<sup>4)</sup> Pay attention to temperature limits due to sealing material selection

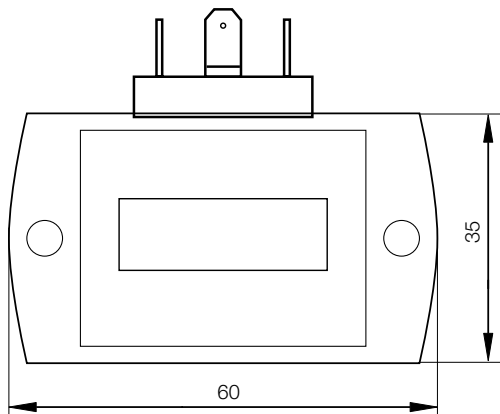
<sup>5)</sup> Only with FEP seal

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

**Order Details for Accessory: Plug-on Display**

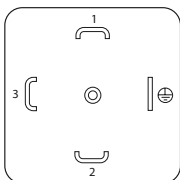
Model	Description	Image
ZUB-DZR-SD1	R12 = square wave signal (incremental signal), 12 V <sub>DC</sub>	
	R24 = square wave signal (incremental signal), 24 V <sub>DC</sub>	
	K12 = with 2x relay output, 12 V <sub>DC</sub>	
	K24 = with 2x relay output, 24 V <sub>DC</sub>	
	I12 = with 0(4)..20 mA output,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

**Dimensions [mm]**



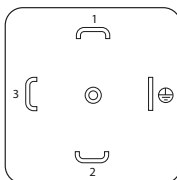
**Electrical connection**

**Version K**



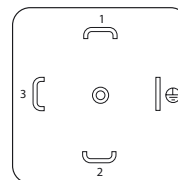
PIN 1 = 12/24 V<sub>DC</sub>  
 PIN 2 = GND  
 PIN 3 = Relay 1  
 PIN ⊕ = Relay 2

**Version I**



PIN 1 = 12/24 V<sub>DC</sub>  
 PIN 2 = GND  
 PIN 3 = 0/4-20 mA  
 PIN ⊕ = ---

**Version R**



PIN 1 = 12/24 V<sub>DC</sub>  
 PIN 2 = GND  
 PIN 3 = Channel 1  
 PIN ⊕ = Channel 2

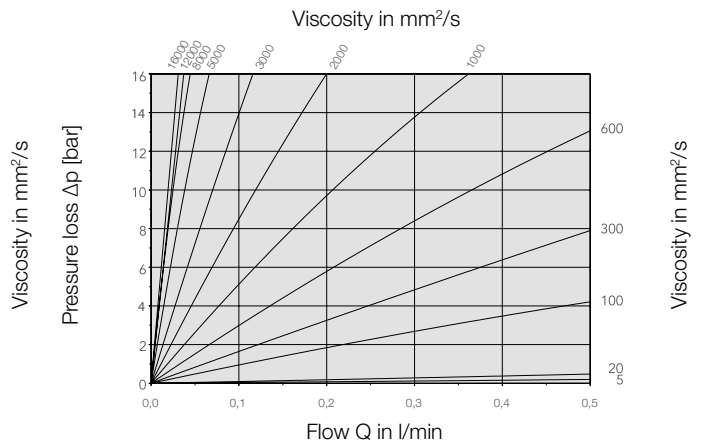
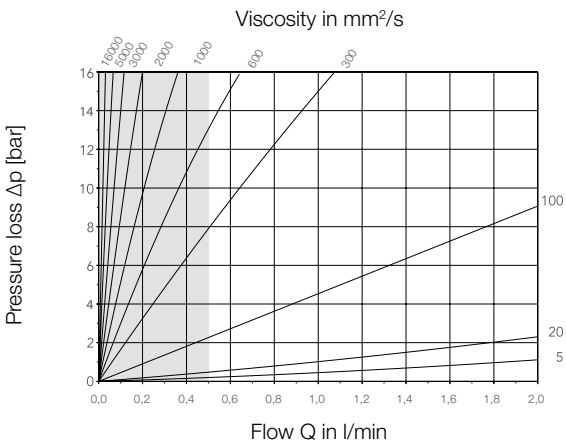


**Pressure Loss Diagrams**

**Ball-bearing versions**

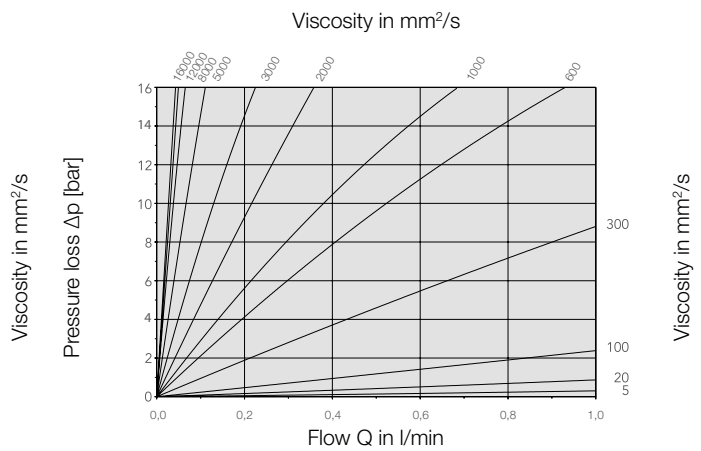
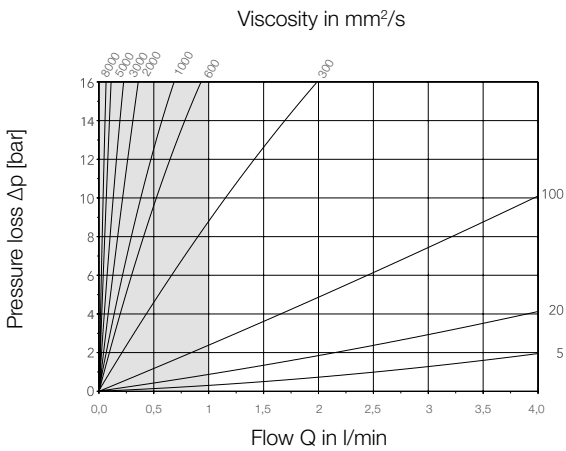
DZR-1001, DZR-6001

DZR-1001, DZR-6001 (Detail)



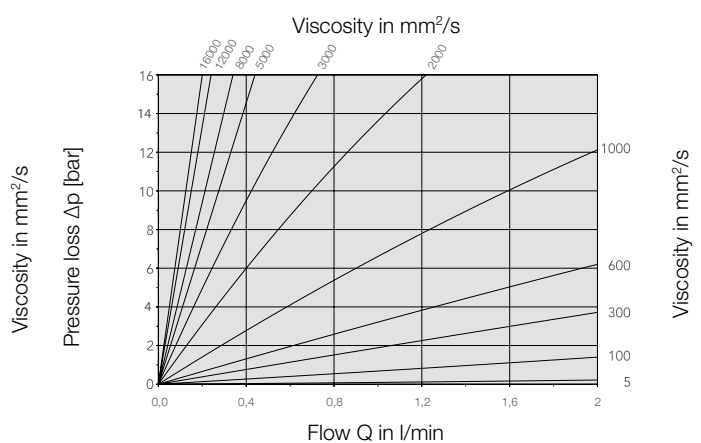
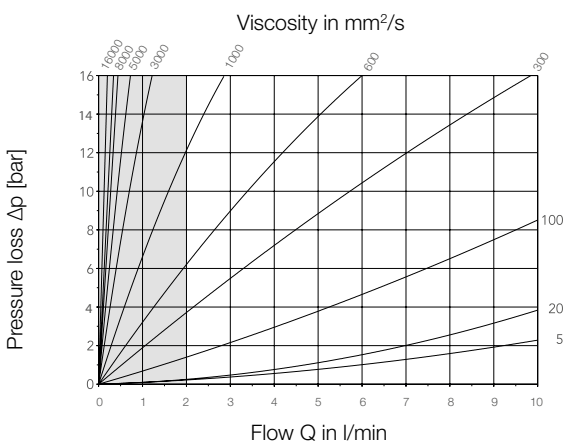
DZR-1003

DZR-1003 (Detail)



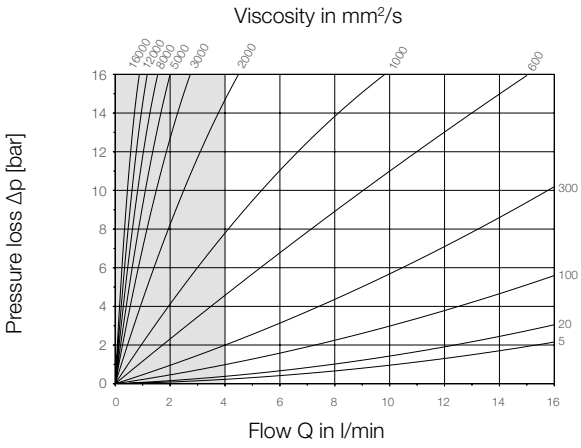
DZR-1004

DZR-1004 (Detail)

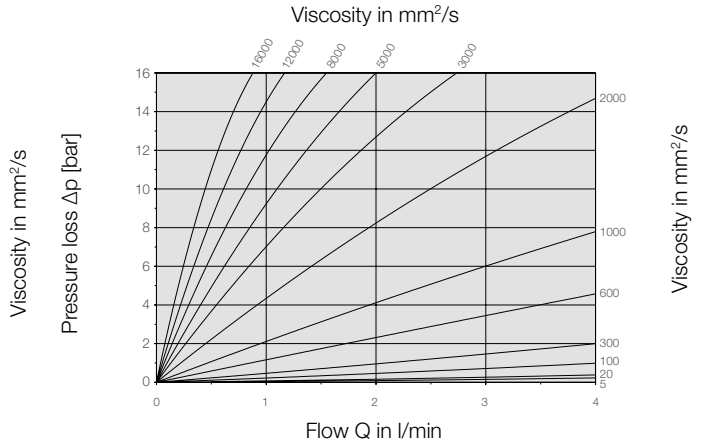




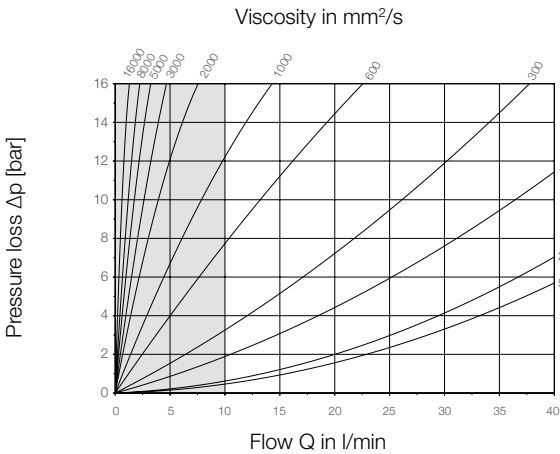
DZR-1005, DZR-2005



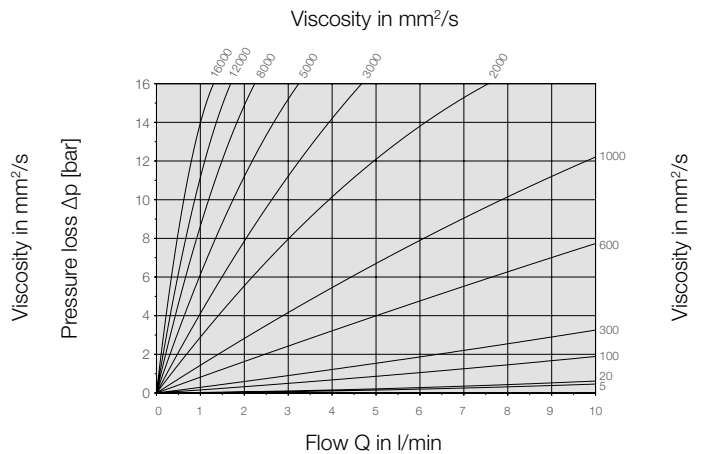
DZR-1005, DZR-2005 (Detail)



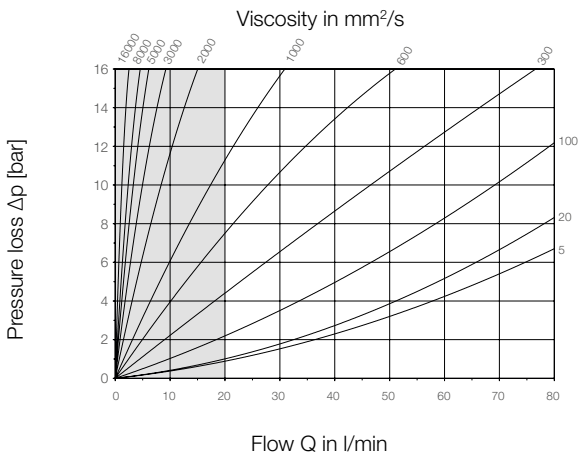
DZR-1007



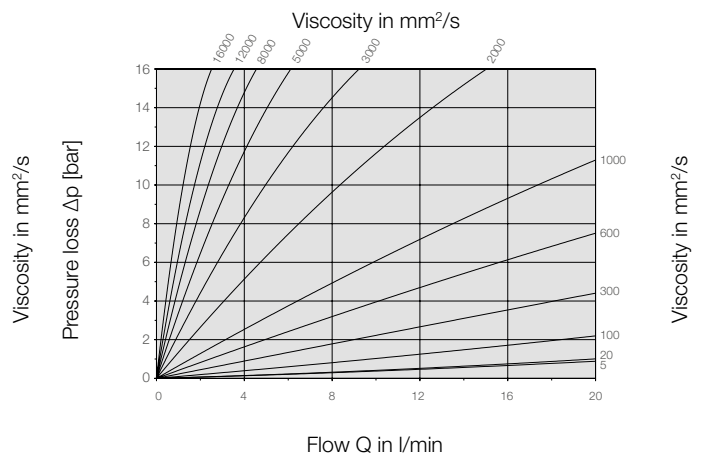
DZR-1007 (Detail)



DZR-1010, DZR-2010

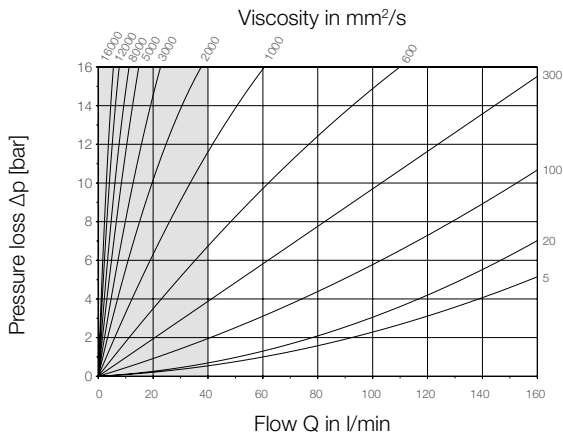


DZR-1010, DZR-2010 (Detail)

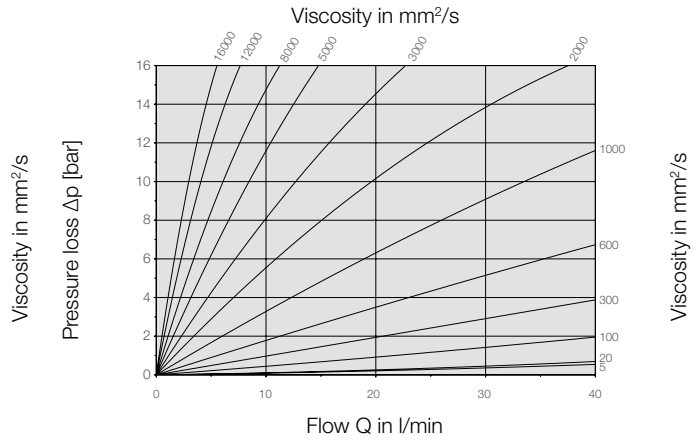




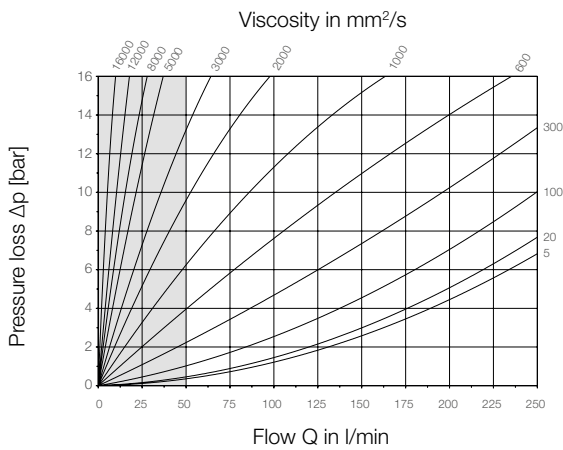
DZR-1012, DZR-7014



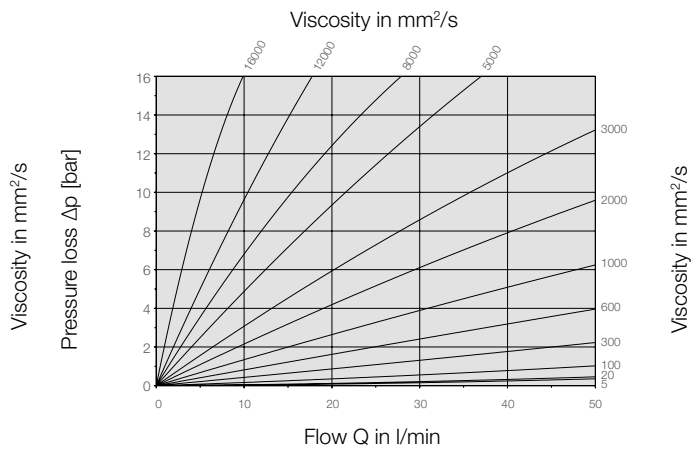
DZR-1012, DZR-7014 (Detail)



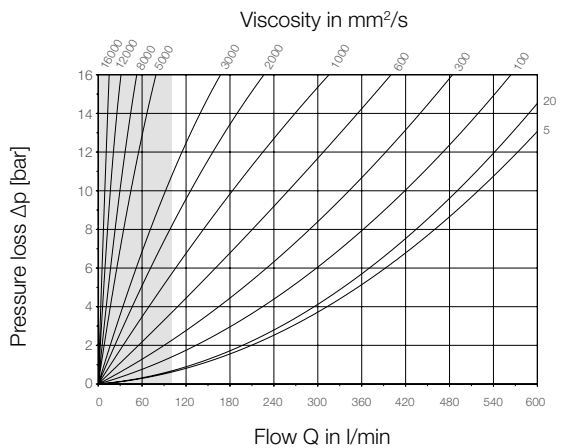
DZR-1015, DZR-7015



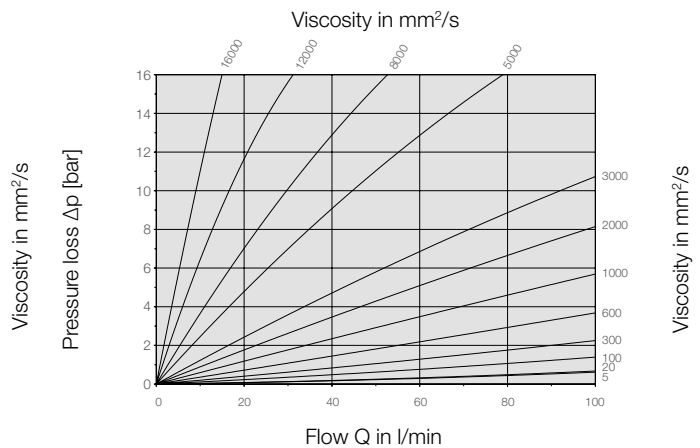
DZR-1015, DZR-7015 (Detail)



DZR-1017



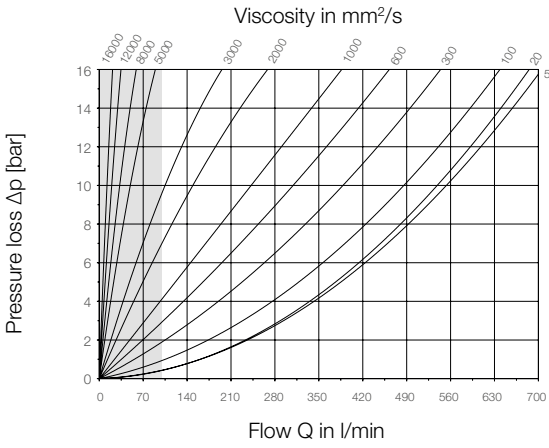
DZR-1017 (Detail)



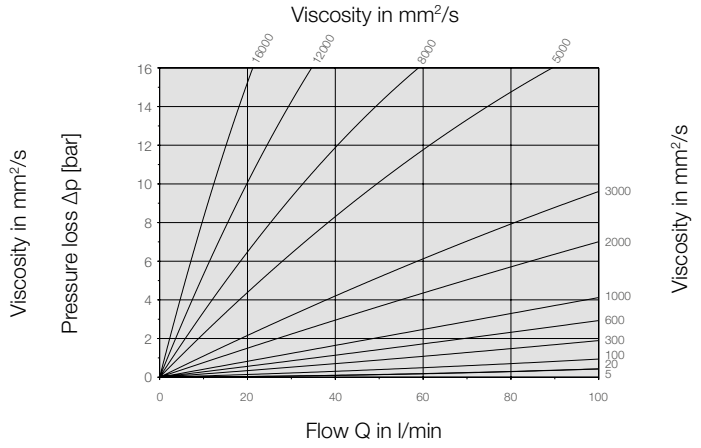




**DZR-1018**

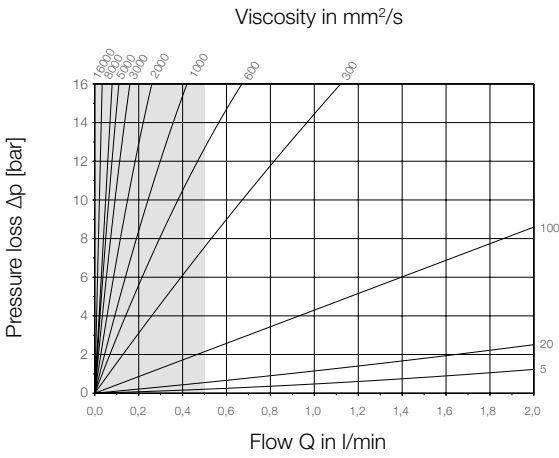


**DZR-1018 (Detail)**

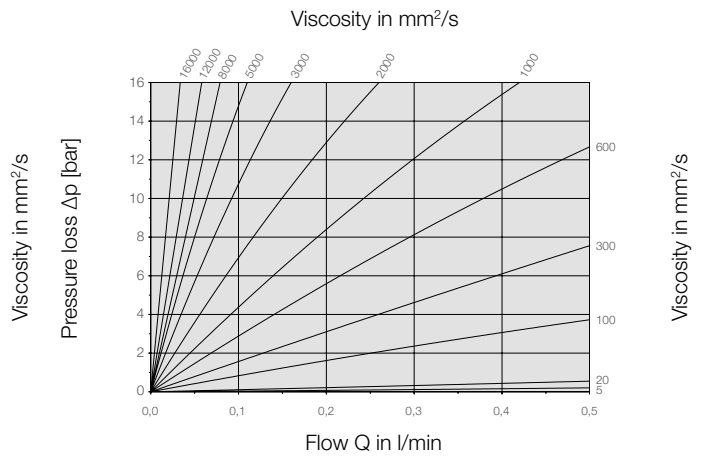


**Plain-bearing versions**

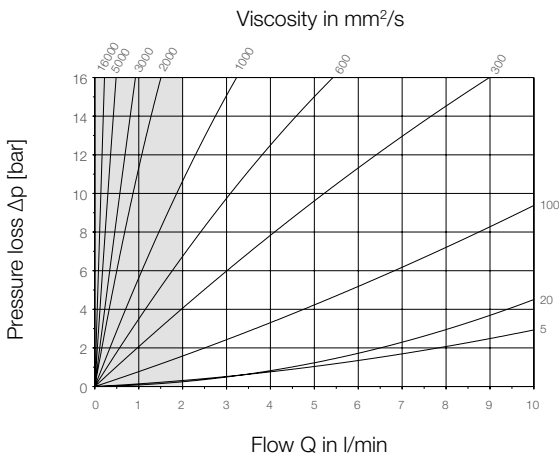
**DZR-5002**



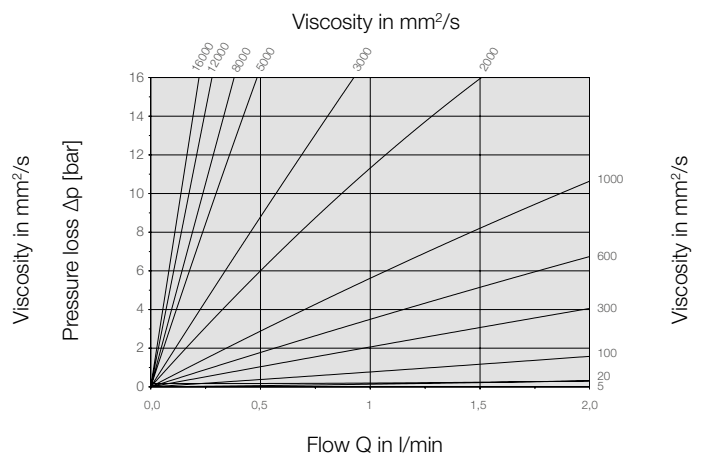
**DZR-5002 (Detail)**



**DZR-4004**



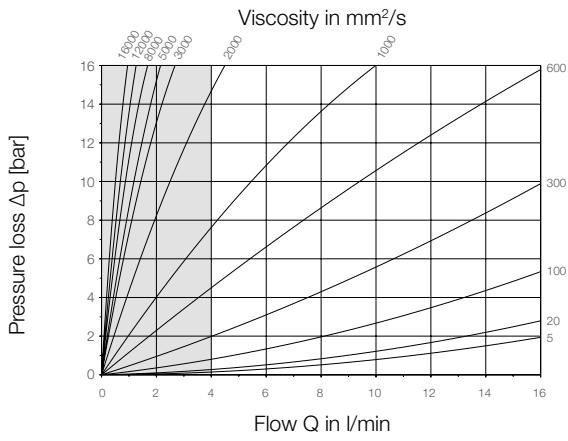
**DZR-4004 (Detail)**



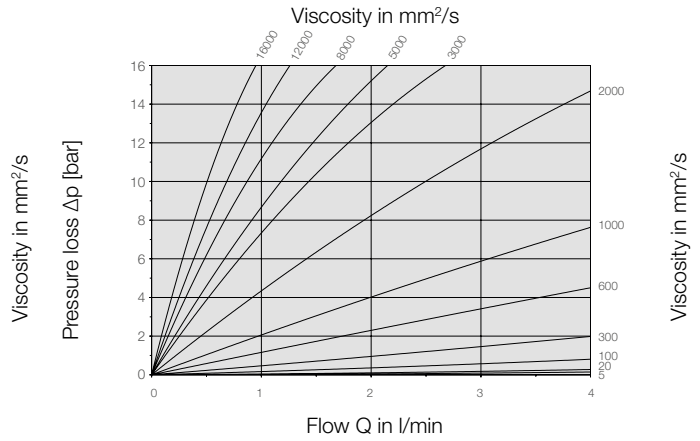


**Gear Wheel Flow Meter for viscous liquids Model DZR**

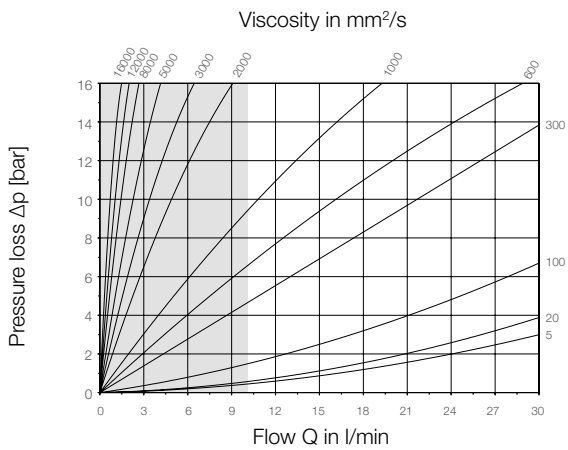
**DZR-4005, DZR-5005**



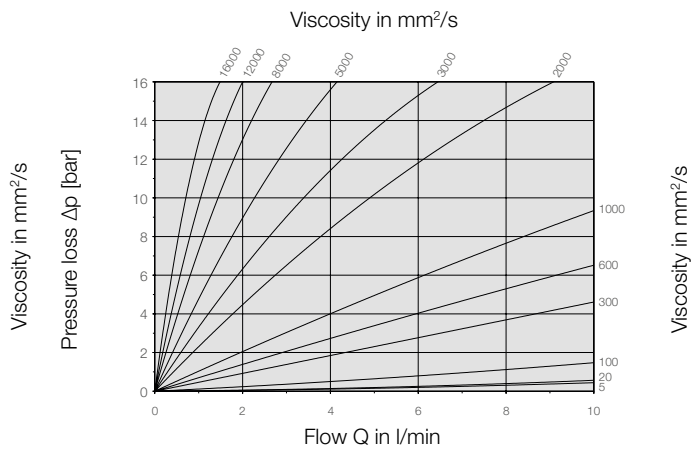
**DZR-4005, DZR-5005 (Detail)**



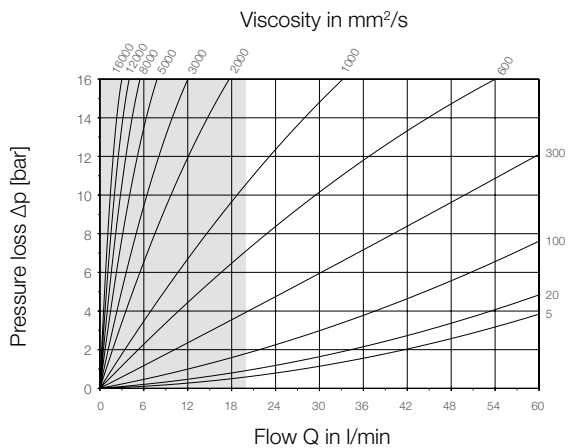
**DZR-4006**



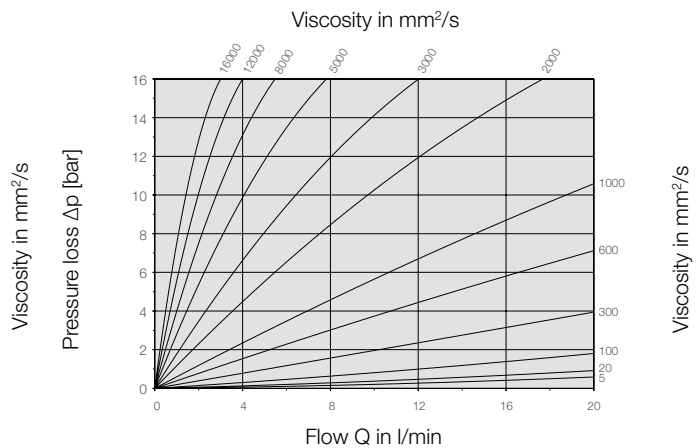
**DZR-4006 (Detail)**



**DZR-4009, DZR-5009**

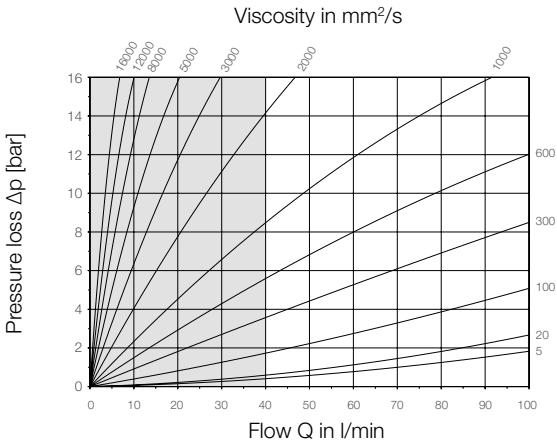


**DZR-4009, DZR-5009 (Detail)**

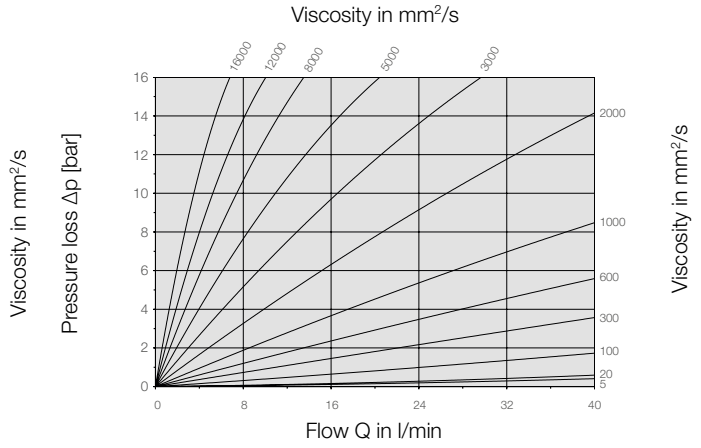




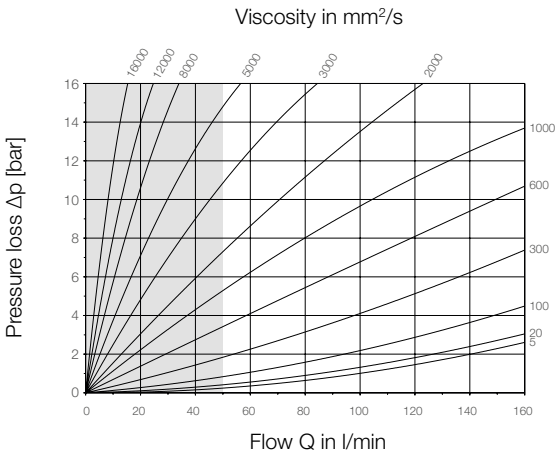
DZR-4011, DZR-5011



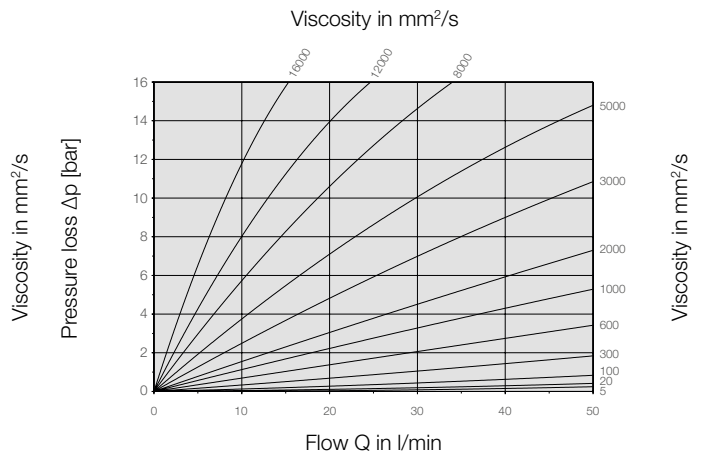
DZR-4011, DZR-5011 (Detail)



DZR-4014, DZR-5014



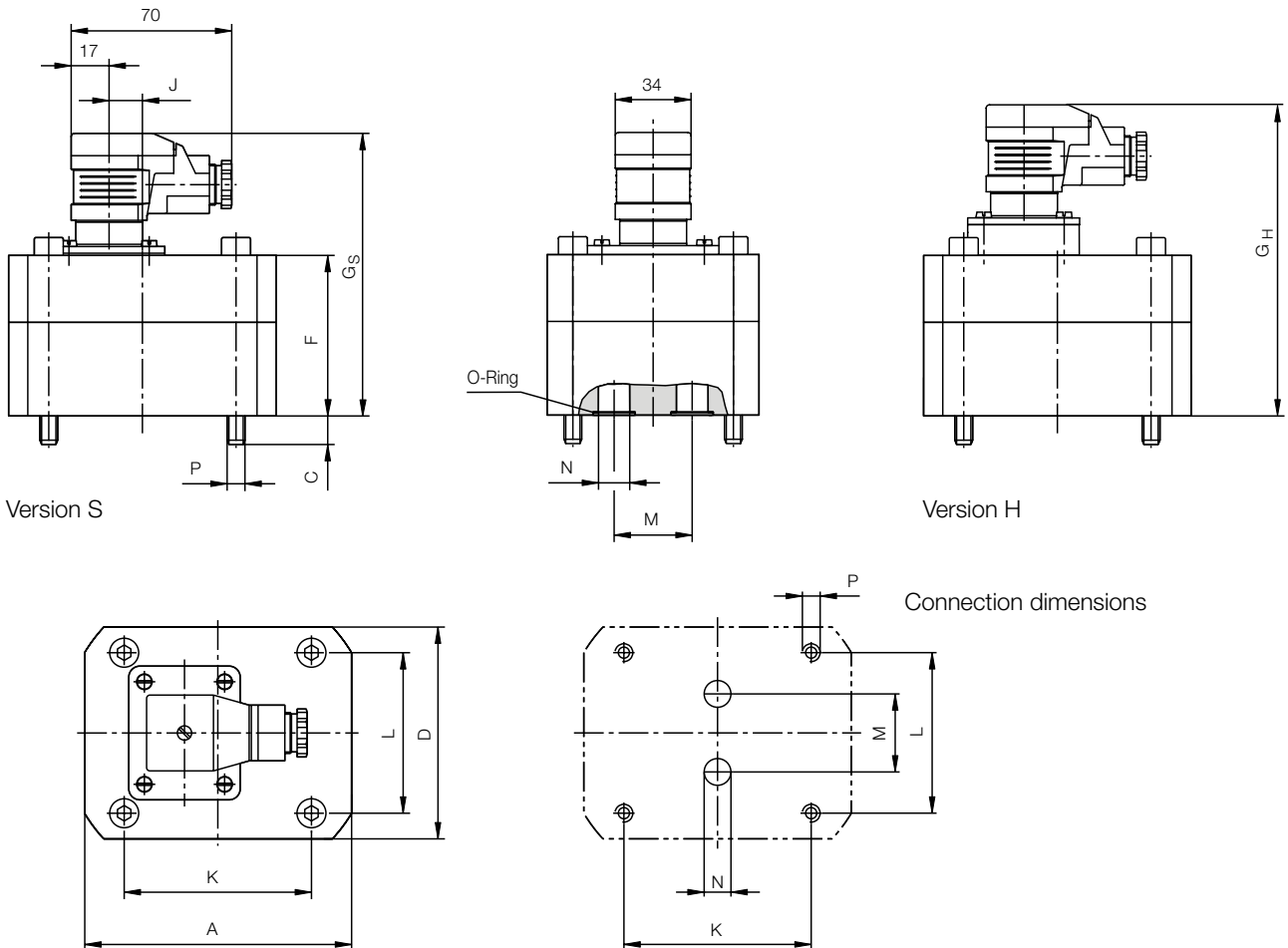
DZR-4014, DZR-5014 (Detail)



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

Measuring range code	Weight [kg]	Dimensions [mm]											
		A	C	D	F	G <sub>S</sub>	G <sub>H</sub>	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**

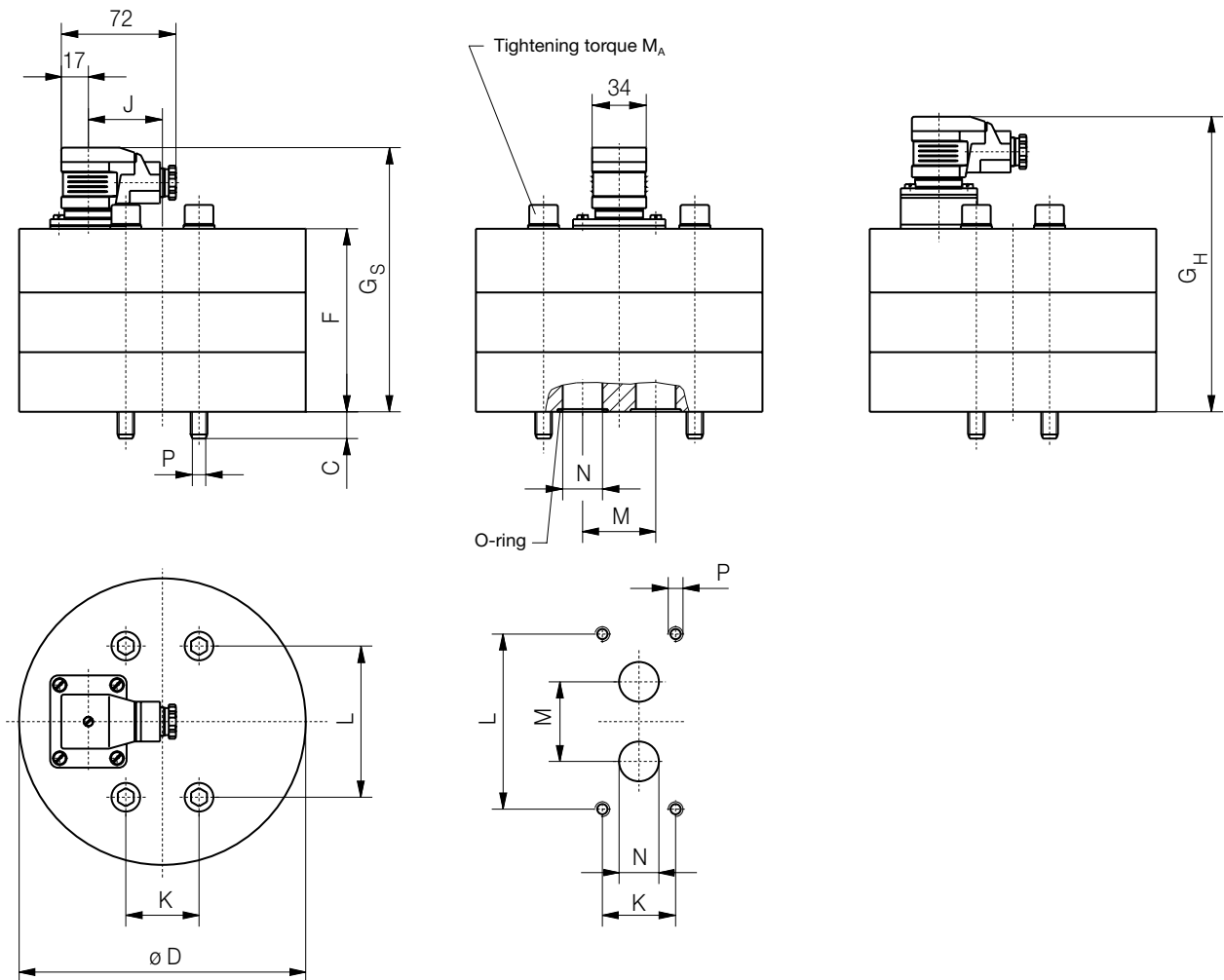


**Dimensions** DZR-1 (grey cast iron)

Measuring range code	Tightening torque [Nm] $M_A$	Weight [kg] $m$	Dimensions [mm]										
			C	D	F	$G_S$	$G_H$	J	K	L	M	N	P
017	400	53.5	44	249	168	219	232	77	120	140	70	38	M20
018	400	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**

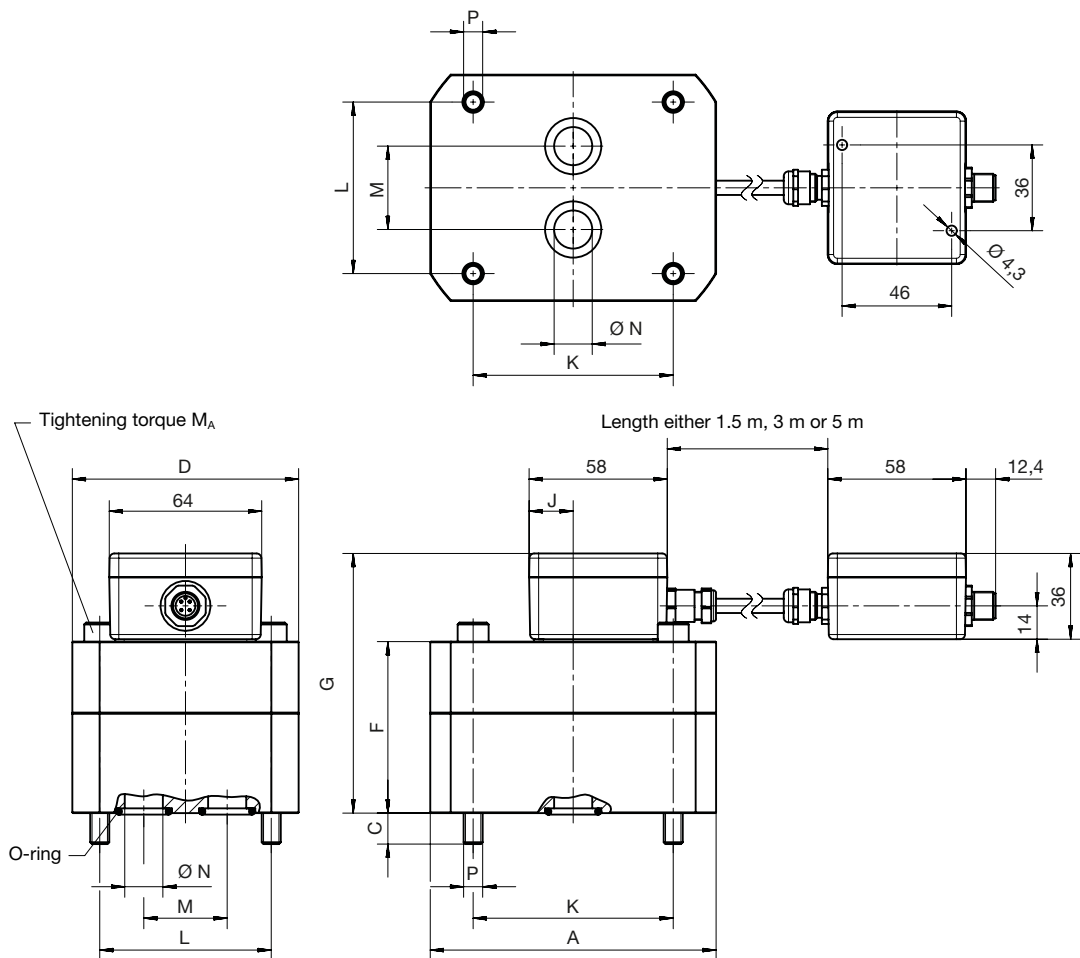


**Dimensions** DZR-1, DZR-2, DZR-4 (grey cast iron) without connection assembly

Electronics versions: high-temperature option ...K

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]										
			$M_A$	m	A	C	D	F	G	J	K	L	M
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



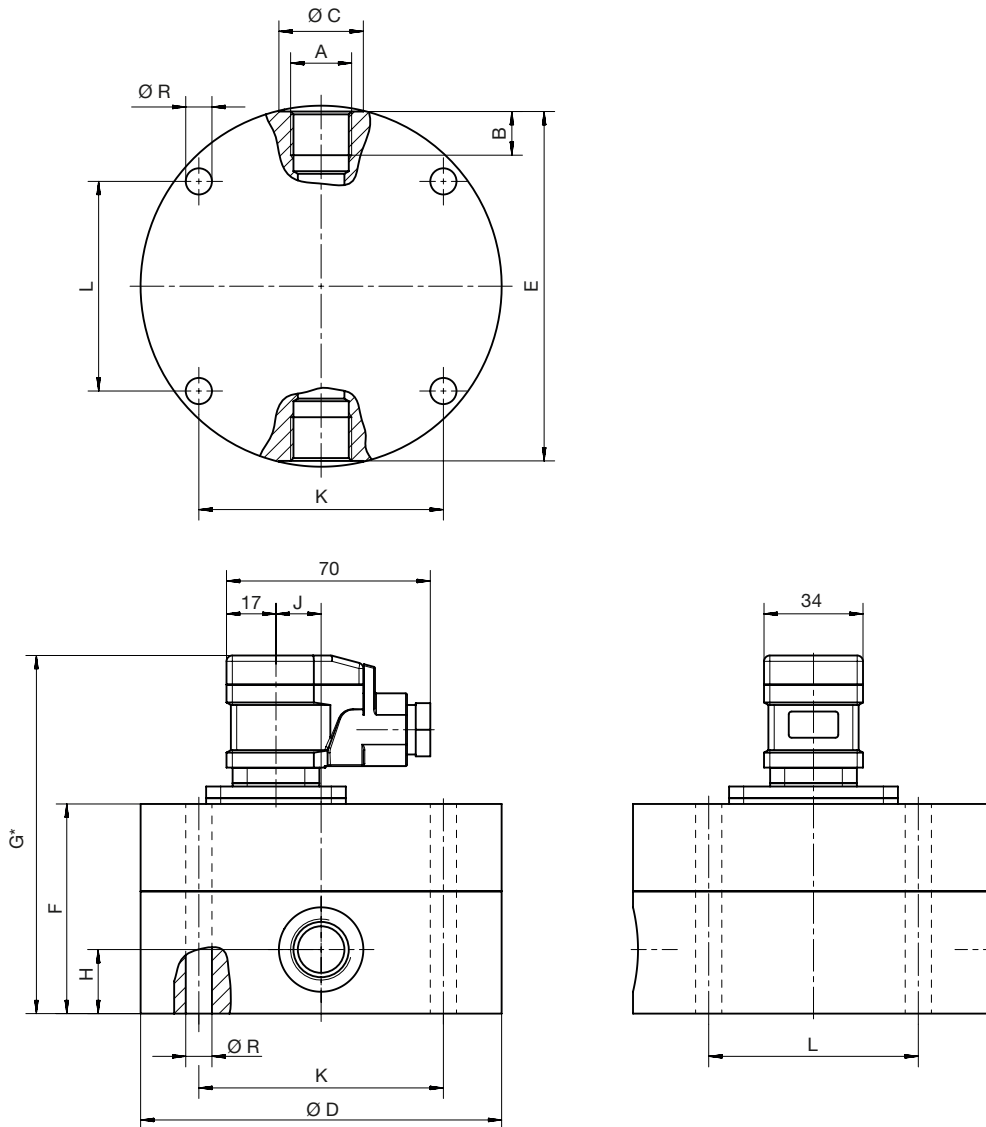
**Dimensions** DZR-5, DZR-6 (stainless steel)

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

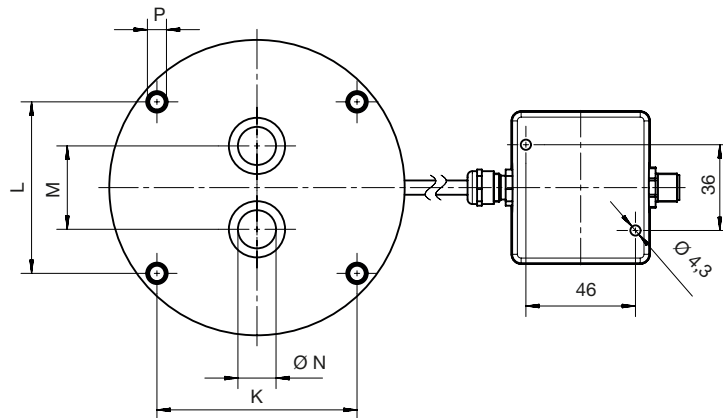


**Dimensions** DZR-5, DZR-6 (stainless steel) without connection assembly

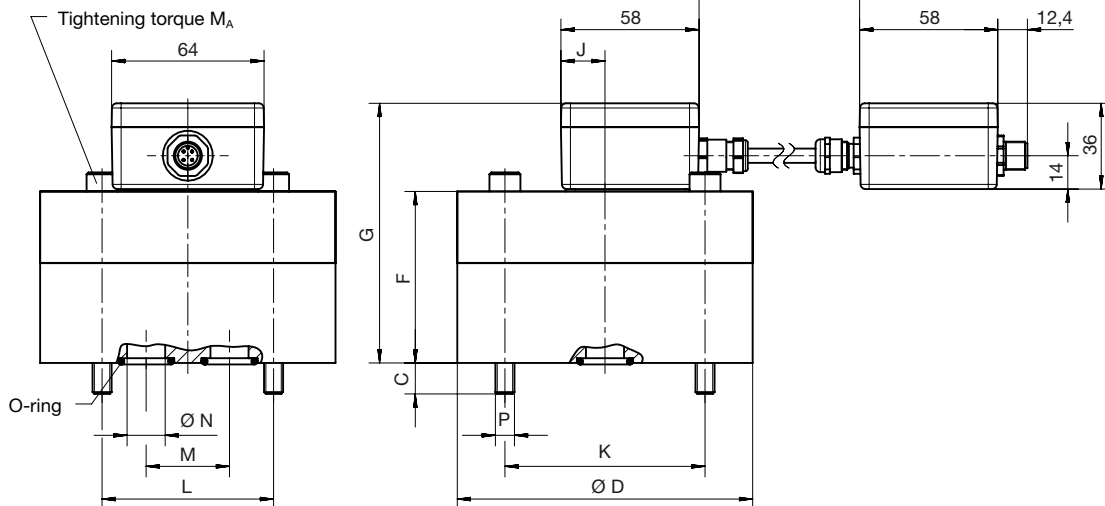
Electronics versions: high-temperature option ...KA

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]									
			$M_A$	m	C	D	F	G	J	K	L	M
001, 002	14	3	10	94	55	92	-	70	40	20	6.7	M6
003	14	3	9	94	56	93	-	70	40	20	6.7	M6
004	14	3	10	94	55	92	-	70	40	20	9	M6
005	14	3.1	13	94	57	94	-	70	40	20	9	M6
006, 007	35	4.8	17	118	63	100	-	80	38	34	16	M8
009, 010	35	7	13	124	72	109	18.5	84	72	35	16	M8
011, 012	120	15.9	18	170	89	126	11	46	95	50	25	M12
014, 015	120	18.7	22	170	105	142	11	46	95	50	25	M12

Connection dimensions



Length as per customer requirement



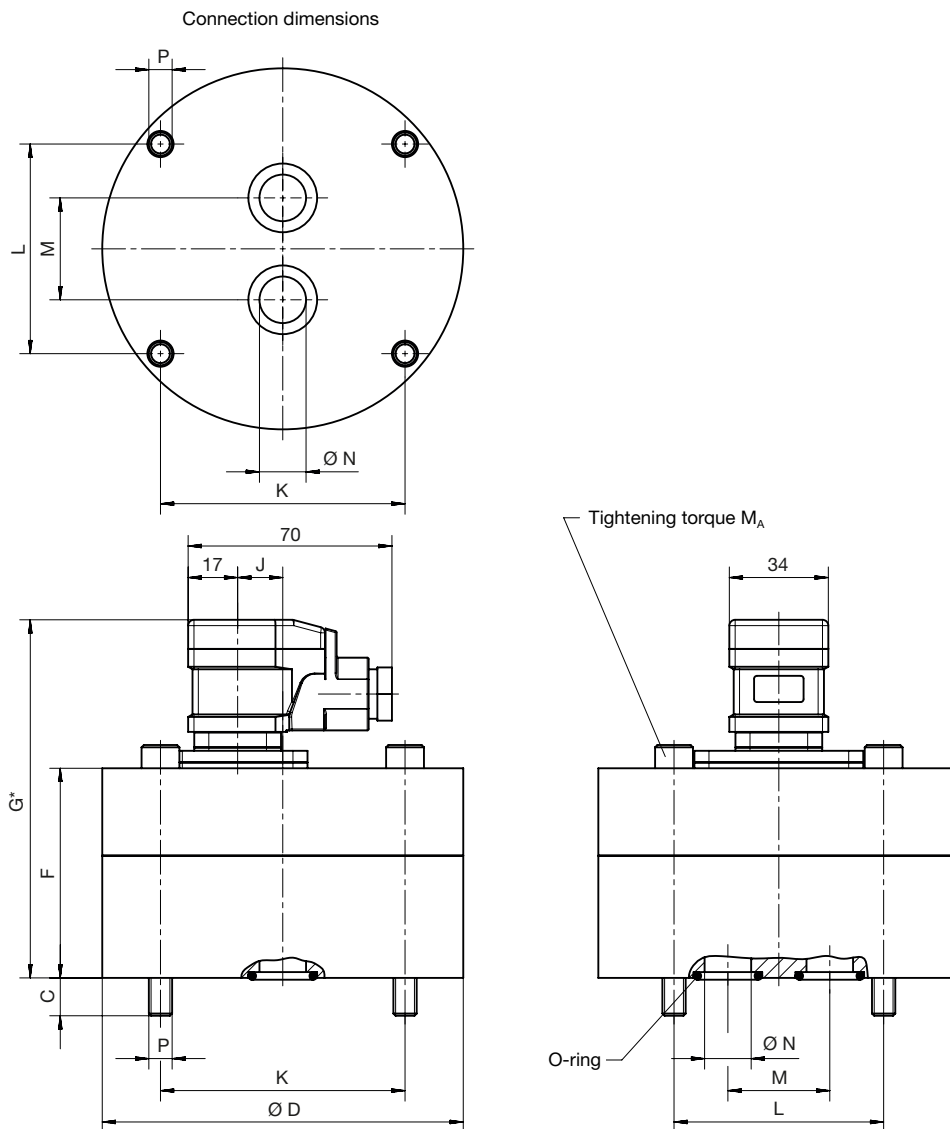


**Dimensions** DZR-5, DZR-6 (stainless steel) without connection assembly

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
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



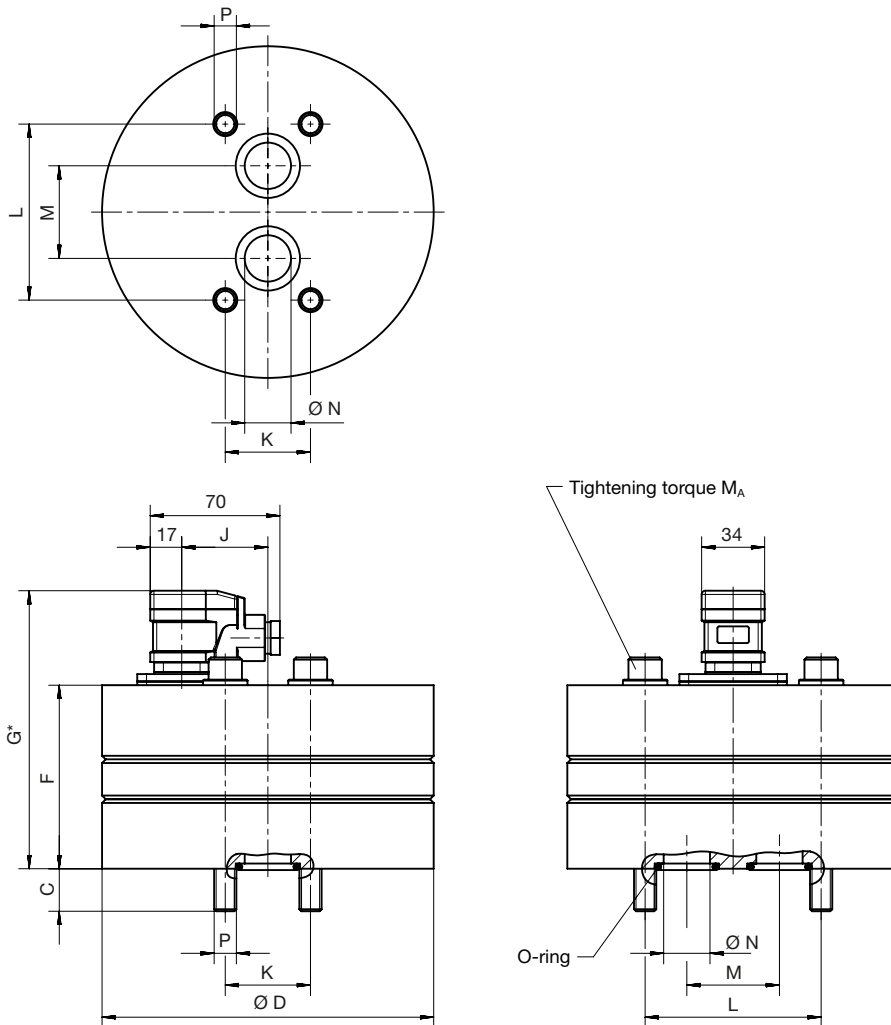
**Dimensions** DZR-7 (spheroidal cast iron) without connection assembly

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

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]									
	$M_A$		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

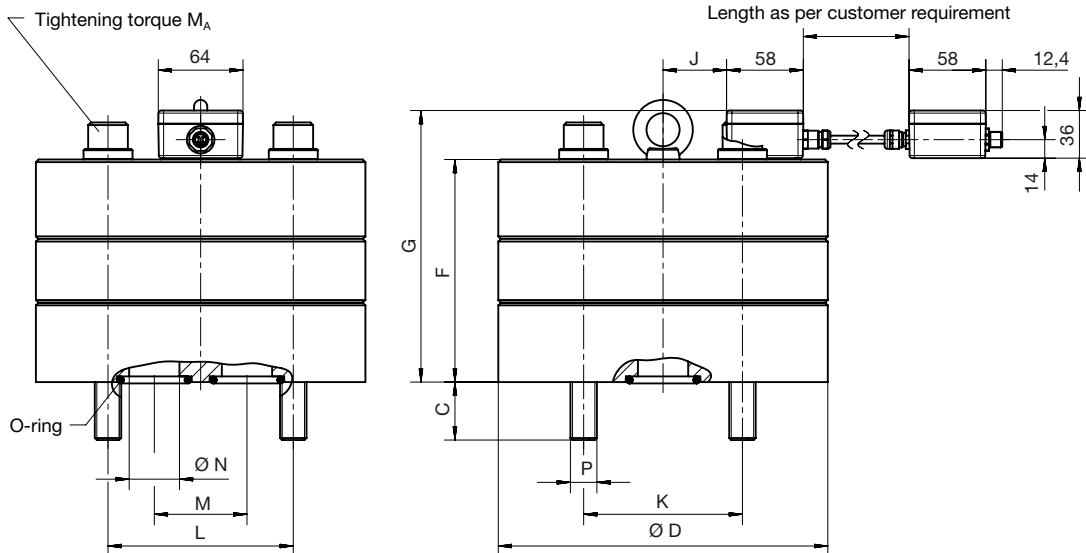
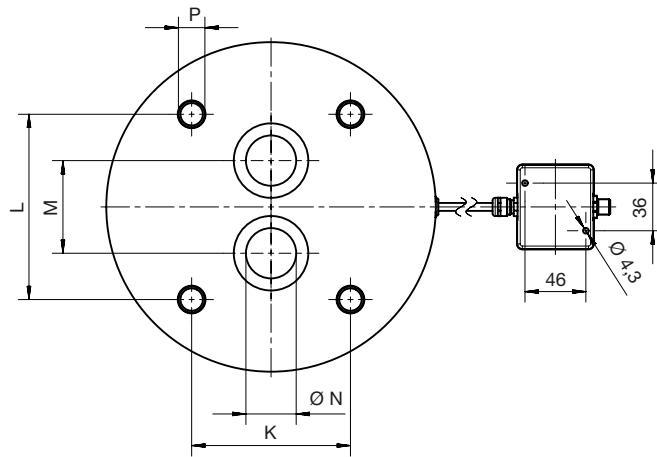


**Dimensions** DZR-7 (spheroidal cast iron) without connection assembly

Electronics versions: high-temperature option ...KA

Measuring range code	Tightening torque [Nm]	Weight [kg]	Dimensions [mm]									
	$M_A$		$m$	C	D	F	G	J	K	L	M	N
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

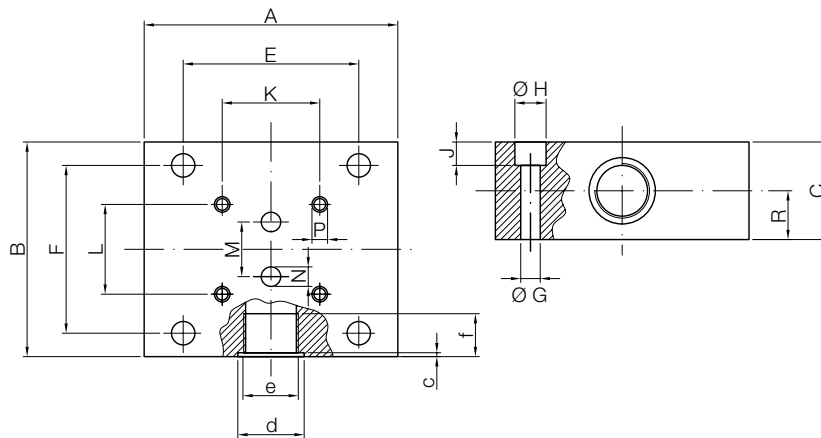
Connection dimensions



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

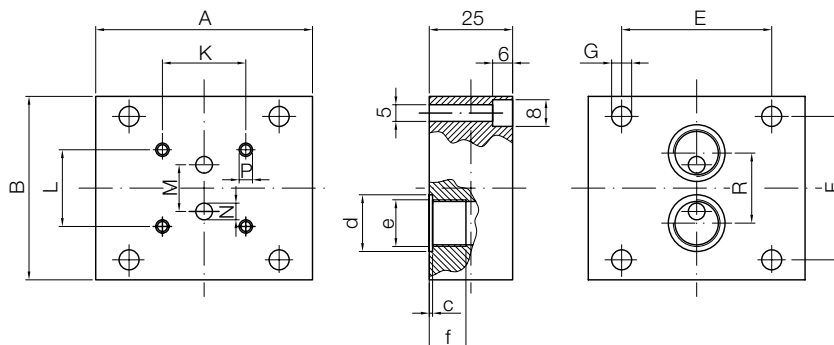
**Side connection**

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



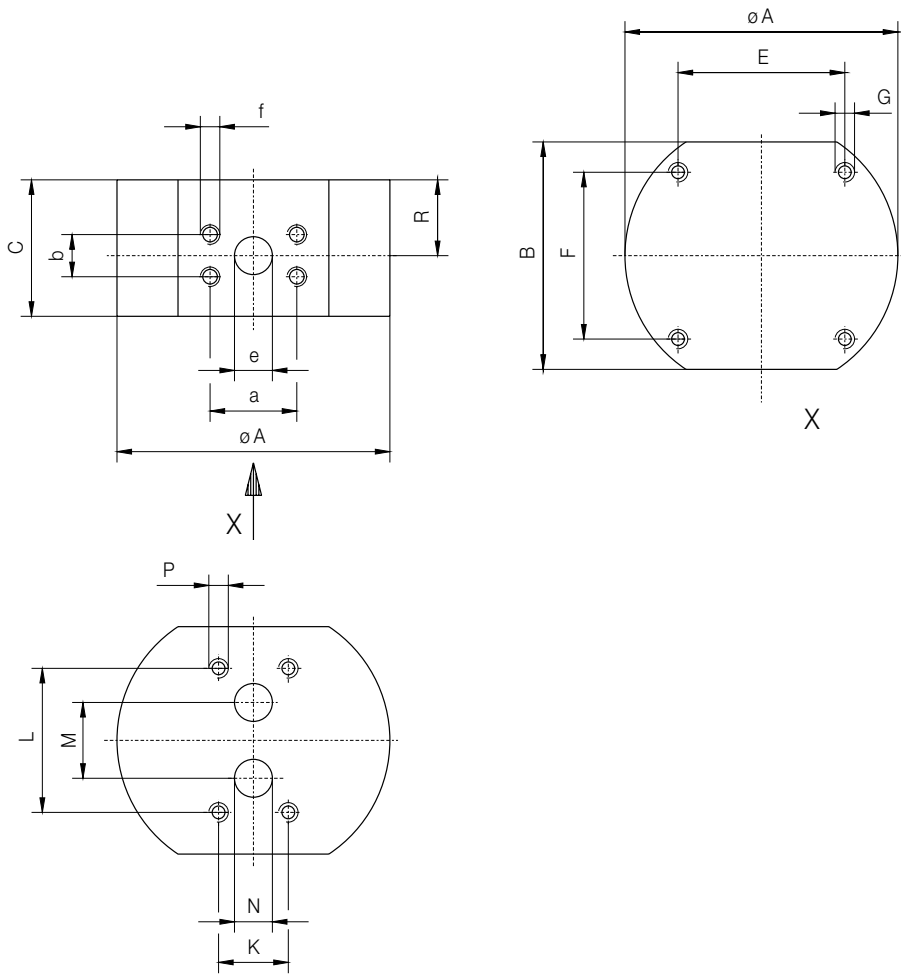
**Connection back**

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-1 / 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] m	Dimensions [mm]															
		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

