

**MANNESMANN
REXROTH****Hydraulic Motor (Radial Piston, Multi-Stroke)
Type MCR 03, Series 3X****RE
15 205/02.98**Size 160 to 400 up to 450 bar up to 400 cm³ up to 2307 Nm

Replaces: 09.97

- Compact, sturdy construction
- Smooth running even at very low speeds
- Low noise
- Reversible
- Sealed tapered roller bearing
- High radial forces permitted on output shaft
- Shaft seal up to 10 bar
- Freewheeling
- Available with optional built-on holding (multi-disc) brake or dynamic (drum) brake

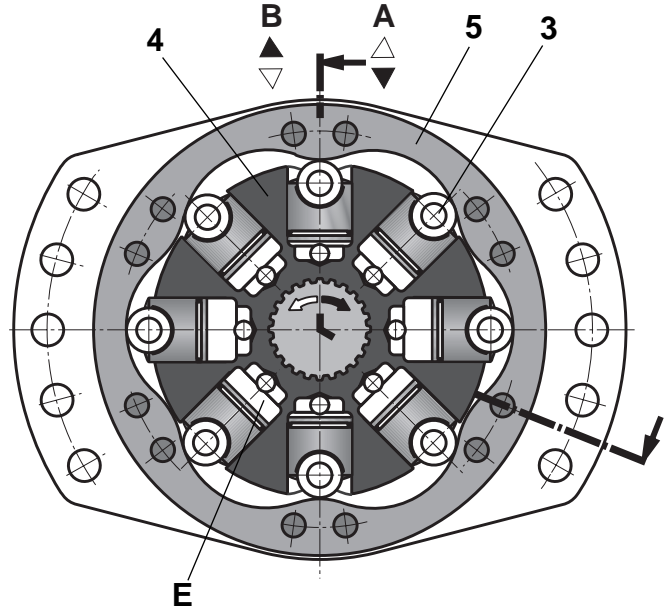
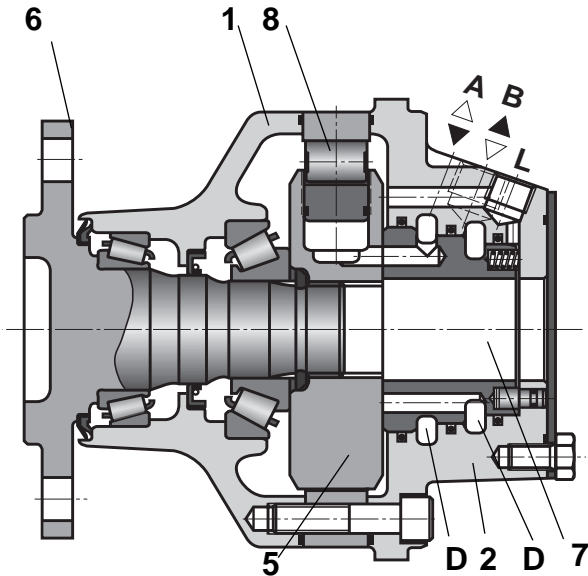


Type MCR 03 A...W40Z-3X/B2M/...

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Section, Functional Description



Hydraulic motors type MCR are radial piston motors with a rotating shaft.

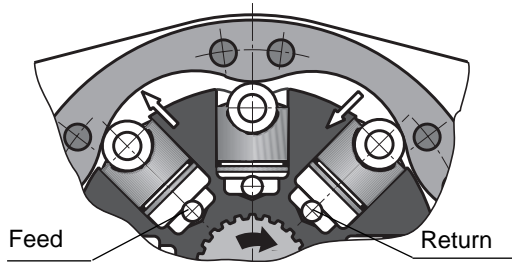
Construction

Two part housing (1: 2), rotor-piston assembly (3: 4), cam (5), output shaft (6) and control section (7).

Transmission

The rotor (4) is connected to the shaft (6) by means of splines. The pistons (3) are arranged radially in the rotor (4) and are supported on the cam plate (5) by way of rollers (8).

Torque generation



Working stroke Idle stroke

The number of working and idle strokes corresponds to the number of lobes on the cam.

Open loop control

The cylinder chambers (E) are connected to ports A and B via the axial bores and the annular passages (D).

Bearings

Tapered roller bearings are capable of absorbing high axial and radial forces.

Freewheeling

If the two ports A and B are connected with no pressure loading and a pressure of 2 bar simultaneously applied to the housing by way of port "L", the pistons will be forced into the rotary piston assembly. The rollers will no longer be lying against the cam curve and it will be possible for the end of the shaft to be rotated freely.

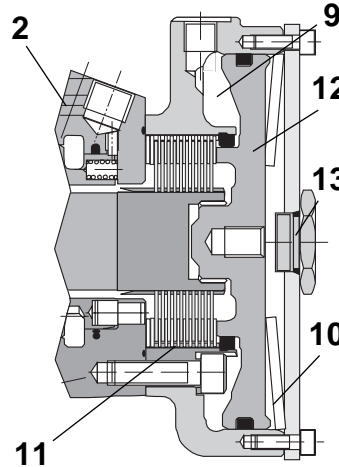
Switching to half displacement

On certain models of radial piston motors halving of displacement is possible. This means that during the working stroke only half the pistons are supplied with fluid by way of a valve in the control system. The remaining pistons are connected to the outlet side of the motor. When connected the motor will run at twice the speed but at half torque.

In the switched position please take into account the preferred direction of rotation!

Brake mounting

Holding brake (multi-disc brake)



Mounting:

by way of control housing (2) and through-drive facility.

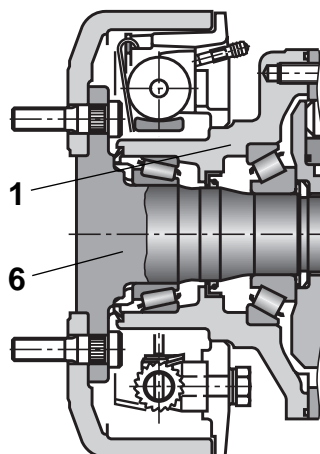
Brake application

If the pressure in the annular area (9) fails to reach a certain pressure the Belleville washer (10) will compress the disc package (11).

Release of holding brake

If the pressure in the annular area (9) exceeds the required level, the brake piston (12) is pushed against the Belleville washer. The load is taken off the multi-disc package (11) and the holding brake is released.

Dynamic brake (drum brake)



The brake may also be released manually by removing plug (13) and inserting a screw with a supporting washer into the hole in the piston (12).

Mounting

directly on drive shaft (6) and flange housing (1).

Operation of brake

- hydraulic
- mechanical

Order codes

MCR	03				Z -3X/	M	/		*
-----	----	--	--	--	--------	---	---	--	---

Frame size

Size 3 = 03

Flange housing

Compact version = A
 Flange motor = D
 Wheel motor = F
 Hydrobase = H

Nominal size, displacement V

Size 160	=	160 cm ³	=	160
Size 225	=	225 cm ³	=	225
Size 255	=	255 cm ³	=	255
Size 280	=	280 cm ³	=	280
Size 325	=	325 cm ³	=	325
Size 365	=	365 cm ³	=	365
Size 400	=	400 cm ³	=	400

Single shaft end

Splined to DIN 5480 = W40 ¹⁾
 Parallel with key Ø 40 mm = L40 ²⁾
 With flange Ø 172 mm = F180 ³⁾

Without 2nd shaft end = Z

- ¹⁾ only with flange housing A maximum torque 1500 Nm
- ²⁾ only with flange housing D maximum torque 1500 Nm
- ³⁾ only with flange housing F

Further information in clear text

Wheel bolt

No code = without wheel bolt
 /S = with wheel bolt

Ports

01 = pipe thread to ISO 228/1
 12 = UNF- SAE-thread

Two speed operation

No code = not switchable
 2R = switchable clockwise rotation only
 2L = switchable anti-clockwise rotation only

Seals

M = NBR seals suitable for mineral oil to DIN 51 524 (HL, HLP) (except dynamic brake see p.10)

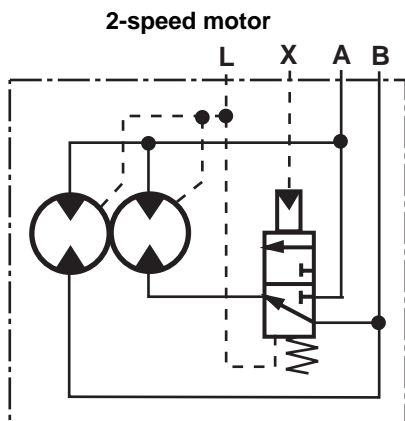
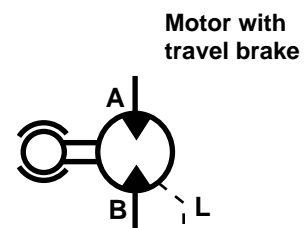
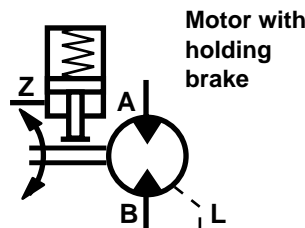
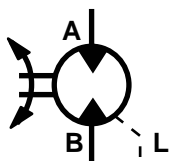
Brake mounting

A0 = without brake
 B2 = hydraulic release holding brake (spring pressure disc brake)
³⁾ C2R = dynamic brake (drum brake) for right hand side of vehicle (see Fig., p.10)
³⁾ C2L = dynamic brake (drum brake) for left hand side of vehicle (see Fig., p.10)

Series

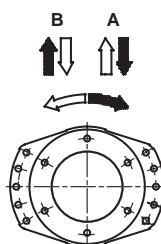
3X = Series 32 to 39 (30 to 39: externally interchangeable)

Symbols

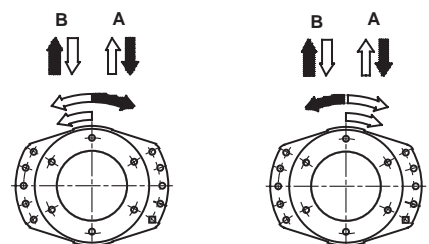


Rotation (viewed on output shaft)

Standard model




Switchable (preferred direction)



Ordering code ...2L..

Ordering code ...2R..

Technical data (For applications outside these parameters please consult us)

General									
Description	Radial piston multi-disc motor with fixed displacement								
Frame size	MCR 03...								
Type of mounting	Flange mounting; face mounting								
Cable connections	Threaded or flanged								
Mounting position	Optional								
Shaft load	See page 7								
Direction of rotation	Right/left – reversible								
Frame size	3								
Nominal size			160	225	255	280	325	365	400
Displacement volume	V	cm ³	160	225	255	280	325	365	400
Flow at $n=100$ rpm/100bar	q_V	L/min	16	22.5	25.5	28	32.5	36.5	40
Output torque ^{1; 7)}									
– specific torque (at $\Delta p = 100$ bar)	T	Nm	225	358	405	445	517	580	636
– peak torque	T	Nm	1022	1386	1570	1760	1875	2105	2307
Output speed ^{1; 7)}			5 to 10 when running smooth, dependent on application						
– min. speed	n	rpm	5 to 10 when running smooth, dependent on application						
– max. continuous speed	n	rpm	320	320	280	260	240	240	240
– max. peak speed	n	rpm	400	400	360	330	310	280	260
– freewheeling speed	n	rpm	900						
Output power ^{1; 7)}									
– continuous power	P	kW	18	18	18	18	22	22	22
– cont. power half displacement	P	kW	12	12	12	12	14	14	14
Weight	see unit dimensions pages 8 to 10								
Polar moment of inertia	J_m	kgmm ²	see unit dimensions pages 8 to 10 (rotating mass only)						
Hydraulic									
Nominal pressure	p	bar	250						
Pressure differential, fixed ^{2; 6)}	Δp								
– with mineral oil (HL, HLP)		bar	250						
Pressure differential, peak ^{3; 6)}	Δp								
– with mineral oil (HL, HLP)		bar	450				400		
Inlet pressure ⁶⁾ Port "A" or "B"	p	bar	450				420		400
Summated pressure ^{4; 6)} Port "A" + "B"	p	bar	450				420		400
Case drain pressure max.	p	bar	10						
Hydraulic fluid ⁵⁾	Mineral oil (HL, HLP) to DIN 51 524								
Hydraulic fluid temperature range	ϑ	°C	– 20 to +80						
Viscosity range	ν	mm ² /s	10 to 2000						
Fluid cleanliness	Maximum degree of contamination of the fluid to NAS 1638 class 9. We therefore recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.								
Brake									
Holding brake (disc brake)									
Holding torque	T	Nm	2200						
Release pressure	p	bar	min. 15; max. 30						
Dynamic brake (drum brake)									
volume to operate brake	V	cm ³	23						
<p>1) the values given apply after 100 hours run-in time</p> <p>2) continuous operation</p> <p>3) peak values may occur for a maximum duration of one second only within an operating minute</p> <p>4) we recommend $p_{\min} = 15$ bar in the return line</p> <p>5) environmentally acceptable hydraulic fluids HETG, HEPG, HEES to RE 90 221</p> <p>6) for series control, please consult our technical sales</p> <p>7)  Warning! During the running in period of the motor (min 20 hours) motors should not be run unloaded at greater than 50% maximum speed.</p>									

Technical data (Mean values, measured at $v = 46 \text{ mm}^2/\text{s}$ and $\vartheta = 45 \text{ }^\circ\text{C}$)

- All torques apply to run-in motors T = Torque in Nm
- For half displacement operating mode multiply the torques, charge pressure and q_{VL} values by 0.5 q = Input flow in L/min
- For maximum case leakage multiply q_{VL} by 2 q_{VL} = Mean case leakage in L/min
- p = Minimum charge pressure in pump mode

Pressure diff. Δp in bar		Speed n in rpm							Speed n in rpm						
		0	25	50	100	200	300	320	0	25	50	100	150	200	240
		MCR 03 . 160							MCR 03 . 325						
100	T Nm	147	214	219	224	222	213	208	284	447	467	452	429	412	
	q L/min	0.3	4.3	8.3	16.3	32.6	48.7	52.0	0.8	8.9	17.1	33.3	49.6	66.0	79.0
	q_{VL} L/min	0.15	0.15	0.15	0.15	0.30	0.35	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.50
200	T Nm	321	438	453	463	463			672	917	952	952	937		
	q L/min	0.3	4.3	8.3	16.6	32.8			2.0	10.1	18.3	34.5	51.2		
	q_{VL} L/min	0.15	0.15	0.15	0.30	0.40			1.00	1.00	1.00	1.00	1.20		
300	T Nm	519	659	680	695				1086	1397	1432	1440			
	q L/min	0.4	4.4	8.4	16.8				3.6	11.3	19.5	35.9			
	q_{VL} L/min	0.20	0.20	0.20	0.40				1.80	1.60	1.60	1.70			
400	T Nm	693	876	908	926				1489	1875					
	q L/min	0.6	4.6	8.8	17.0				4.4	12.1					
	q_{VL} L/min	0.30	0.30	0.40	0.5				2.20	2.00					
450	T Nm	779	985	1022											
	q L/min	1.0	5.4	9.8											
	q_{VL} L/min	0.5	0.7	0											
Charge pressure	p bar	1	2	2	3	6	9	10	1	2	3	4	6	8	10
Speed	n rpm	0	25	50	100	200	300		0	25	50	100	150	200	240
		MCR 03 . 225							MCR 03 . 365						
100	T Nm	215	308	315	322	318	305		320	503	524	507	495	483	462
	q L/min	0.3	5.9	11.6	22.8	45.6	68.2		0.8	9.9	19.1	37.3	55.6	74.0	88.6
	q_{VL} L/min	0.15	0.15	0.15	0.15	0.3	0.35		0.4	0.4	0.4	0.4	0.4	0.5	0.5
200	T Nm	466	630	651	666	651			755	1030	1069	1068	1053		
	q L/min	0.3	5.9	11.6	23.1	45.8			2.0	11.1	20.3	38.5	57.2		
	q_{VL} L/min	0.15	0.15	0.15	0.3	0.4			1.0	1.0	1.0	1.0	1.2		
300	T Nm	752	946	978	999				1219	1570	1609	1617			
	q L/min	0.4	6.0	11.7	23.3				3.6	12.3	21.5	39.9			
	q_{VL} L/min	0.20	0.20	0.20	0.40				1.80	1.60	1.60	1.70			
400	T Nm	1003	1261	1304					1673	2105					
	q L/min	0.6	6.2	12.1					4.4	13.1					
	q_{VL} L/min	0.3	0.3	0.4					2.2	2.0					
450	T Nm	1128	1386												
	q L/min	1.0	7.0												
	q_{VL} L/min	0.5	0.7												
Charge pressure	p bar	1	2	2	3	6	9		1	3	3	5	6	9	11
Speed	n rpm	0	25	50	100	200	280		0	25	50	100	150	200	240
		MCR 03 . 255							MCR 03 . 400						
100	T Nm	239	342	350	358	354	338		350	551	575	556	543	529	506
	q L/min	0.4	6.8	13.2	25.9	51.8	72.4		0.8	10.8	20.8	40.8	60.8	81.0	97.0
	q_{VL} L/min	0.2	0.2	0.2	0.2	0.4	0.5		0.4	0.4	0.4	0.4	0.4	0.5	0.5
200	T Nm	517	700	724	740	724			828	1129	1171	1171	1153		
	q L/min	0.4	6.8	13.2	26.3	52.2			2.0	12.0	22.0	42.0	62.4		
	q_{VL} L/min	0.2	0.2	0.2	0.4	0.6			1.0	1.0	1.0	1.0	1.20		
300	T Nm	836	1051	1087	1110				1337	1721	1762	1772			
	q L/min	0.6	7.0	13.4	26.7				3.6	13.2	23.2	43.4			
	q_{VL} L/min	0.3	0.3	0.3	0.6				1.8	1.6	1.6	1.7			
400	T Nm	1114	1401	1449					1834	2307					
	q L/min	0.8	7.2	14.0					4.4	14.0					
	q_{VL} L/min	0.4	0.4	0.6					2.20	2.00					
450	T Nm	1253	1575												
	q L/min	1.6	8.4												
	q_{VL} L/min	0.8	1.0												
Charge pressure	p bar	1	2	2	4	6	9		1	3	3	5	6	9	11

Technical data (Mean values, measured at $v = 46 \text{ mm}^2/\text{s}$ and $\vartheta = 45 \text{ }^\circ\text{C}$)

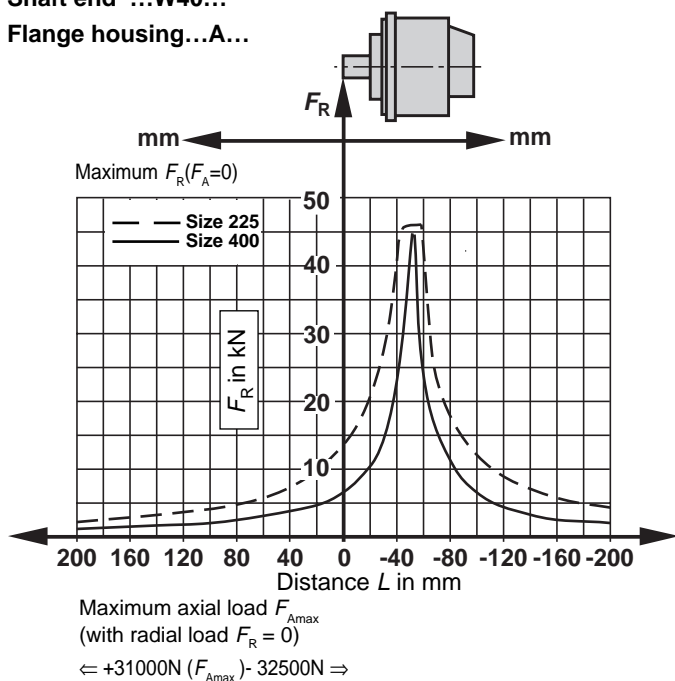
- All torques apply to run-in motors
- For half displacement operating mode multiply the torques, charge pressure and q_{VL} values by 0.5
- For maximum case leakage multiply q_{VL} by 2

T = Torque in Nm
 q = Input flow in L/min
 q_{VL} = Mean case leakage in L/min
 p = Minimum charge pressure in pump mode

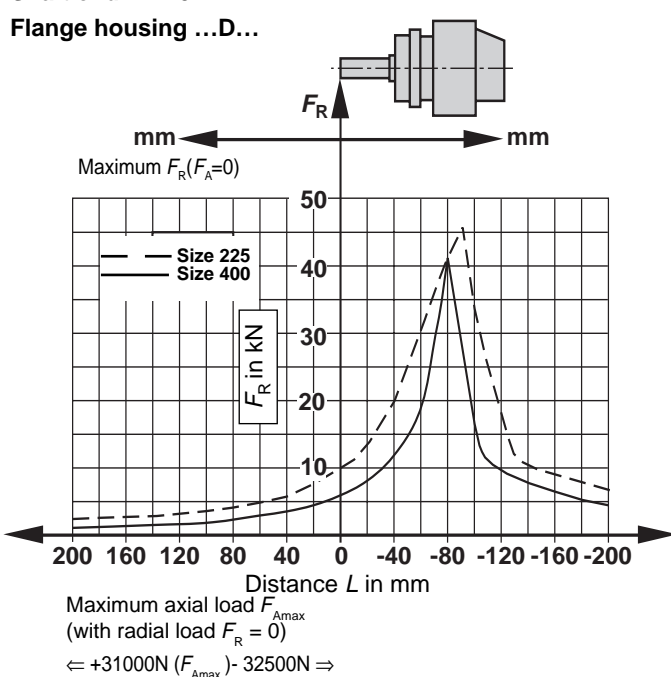
Pressure diff. Δp in bar		Speed n in rpm					
		0	25	50	100	200	300
		MCR 03. 280					
100	T Nm	287	383	392	401	397	365
	q L/min	0.6	7.6	14.6	28.6	56.8	85.0
	q_{VL} L/min	0.30	0.30	0.30	0.30	0.40	0.50
200	T L/min	579	784	811	829	811	
	q L/min	0.6	7.6	14.6	28.8	57.2	
	q_{VL} L/min	0.30	0.30	0.30	0.40	0.60	
300	T Nm	936	1177	1217	1243		
	q L/min	0.6	7.6	14.6	29.2		
	q_{VL} L/min	0.30	0.30	0.30	0.60		
400	T Nm	1248	1569	1623			
	q L/min	0.8	7.8	15.2			
	q_{VL} L/min	0.40	0.40	0.60			
450	T Nm	1404	1764				
	q L/min	1.6	9.0				
	q_{VL} L/min	0.8	1.0				
Charge pressure	p bar	1	2	2	4	7	10

Permitted loading on output shaft (at speed $n=50\text{rpm}$, differential $\Delta p=250\text{bar}$, 2000 hrs L10 life at 50°C)

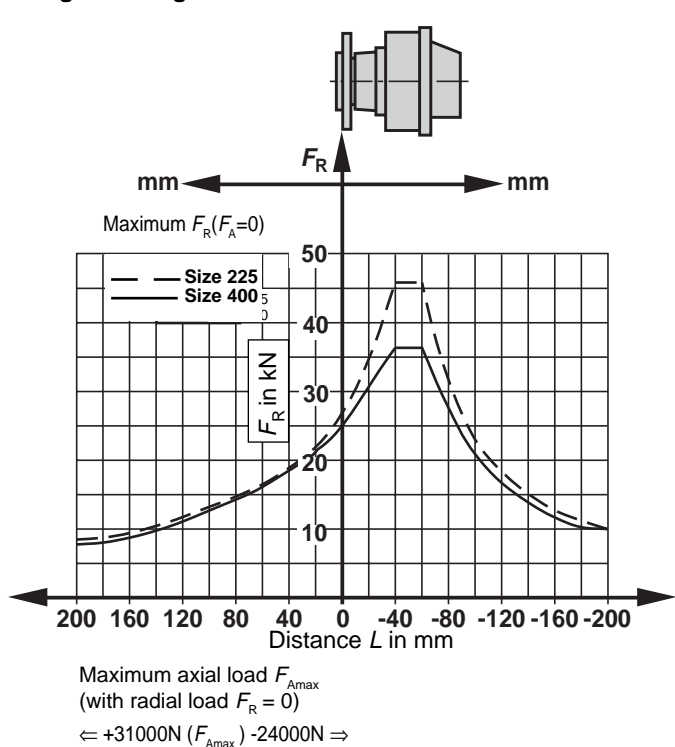
Shaft end ...W40...
Flange housing...A...



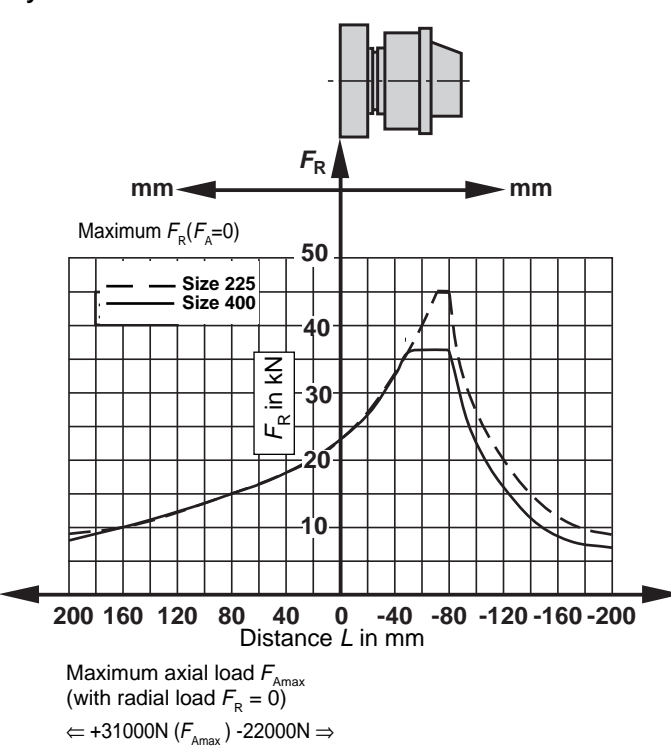
Shaft end ...L40...
Flange housing ...D...



Shaft end ...F 180...
Flange housing...F...



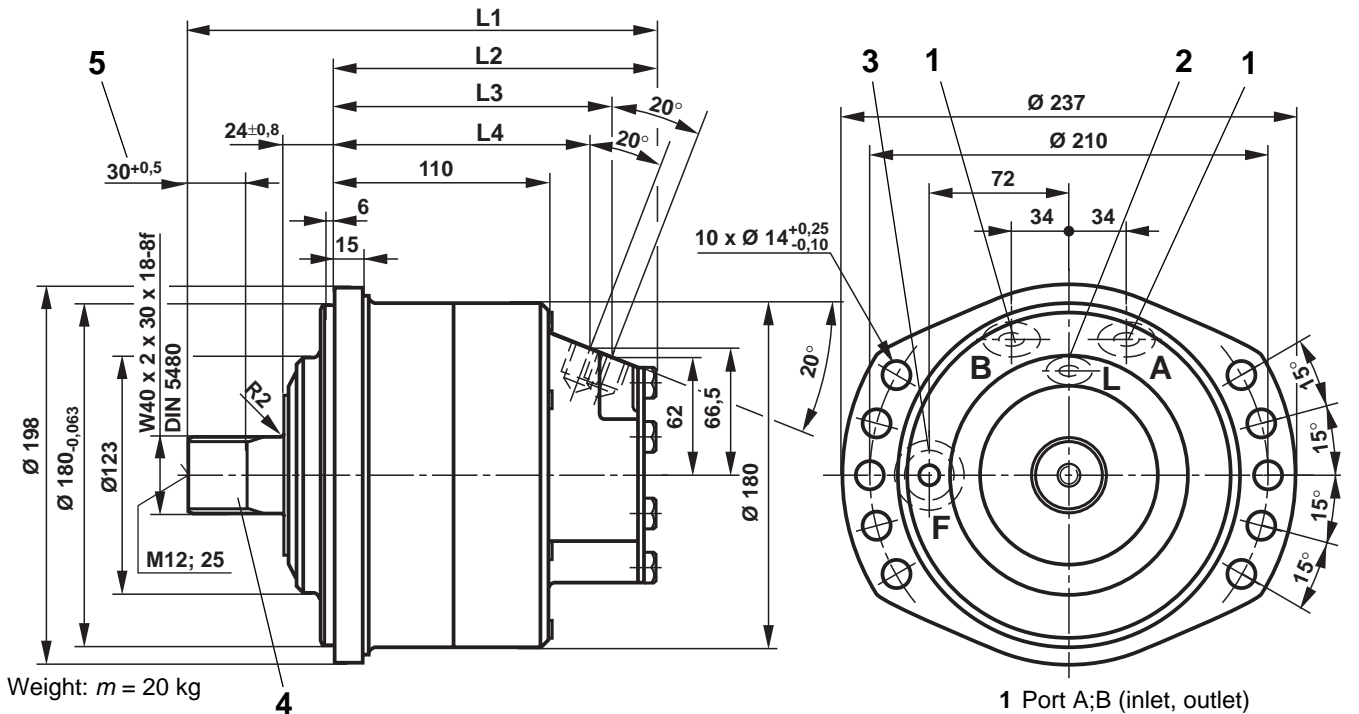
Shaft end ...F 180...
Dynamic brake ...C2...



Unit dimensions

(in mm)

Flange housing: Order code "A"



Weight: $m = 20$ kg

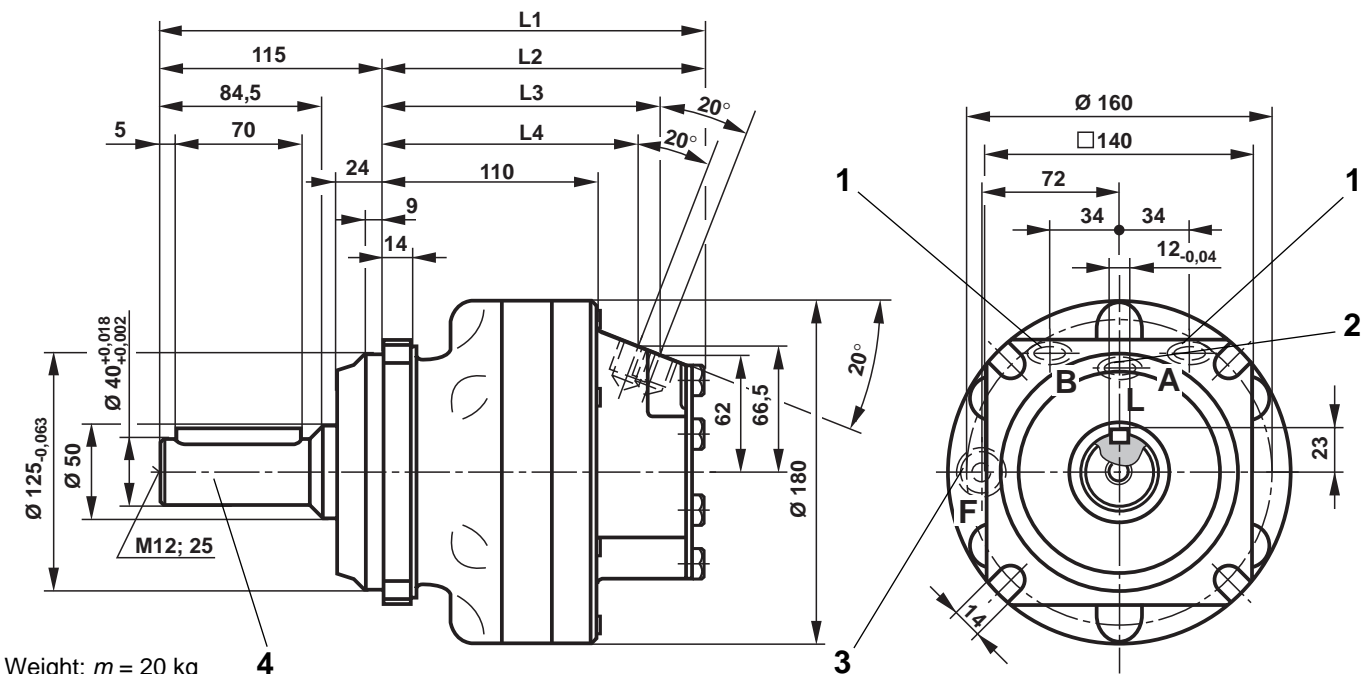
- 1 Port A;B (inlet, outlet)
- 2 Case drain port L
- 3 Filling port F, may also be used as drain port
- 4 Single shaft end splined to DIN 5480; order code "W40"
- 5 Spline length available

Port	Dimensions / Order code	
	01	12
A, B	G 1/2	7/8-14 SAE
L	G 3/8	9/16-18 SAE
F	G 1/2	3/4-16 SAE

Size	single speed	two speed
L1	242	266
L2	167	191
L3	145	163
L4	133	145

Polar moment of inertia $J_m = 8920$ kgmm²

Flange housing: Order code "D"



Weight: $m = 20$ kg

- 1 Port A; B (Input, output)
- 2 Case drain port L
- 3 Filling port F, may also be used as drain port
- 4 Single shaft end cylindrical Ø 40 mm with key, Order code "L40"

Port	Dimensions / Order code	
	01	12
A, B	G 1/2	7/8-14 SAE
L	G 3/8	9/16-18 SAE
F	G 1/2	3/4-16 SAE

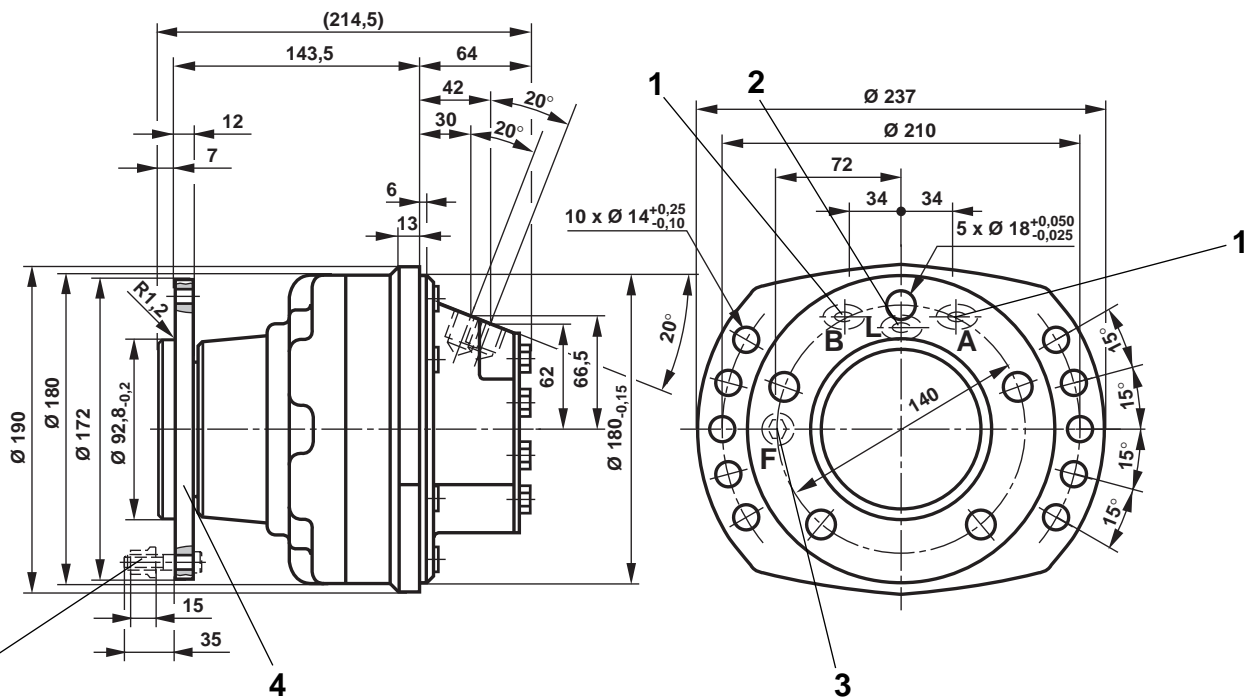
Size	single speed	two speed
L1	282	306
L2	167	191
L3	145	163
L4	133	145

Polar moment of inertia $J_m = 8920$ kgmm²

Unit dimensions

(in mm)

Flange housing: Order code "F"



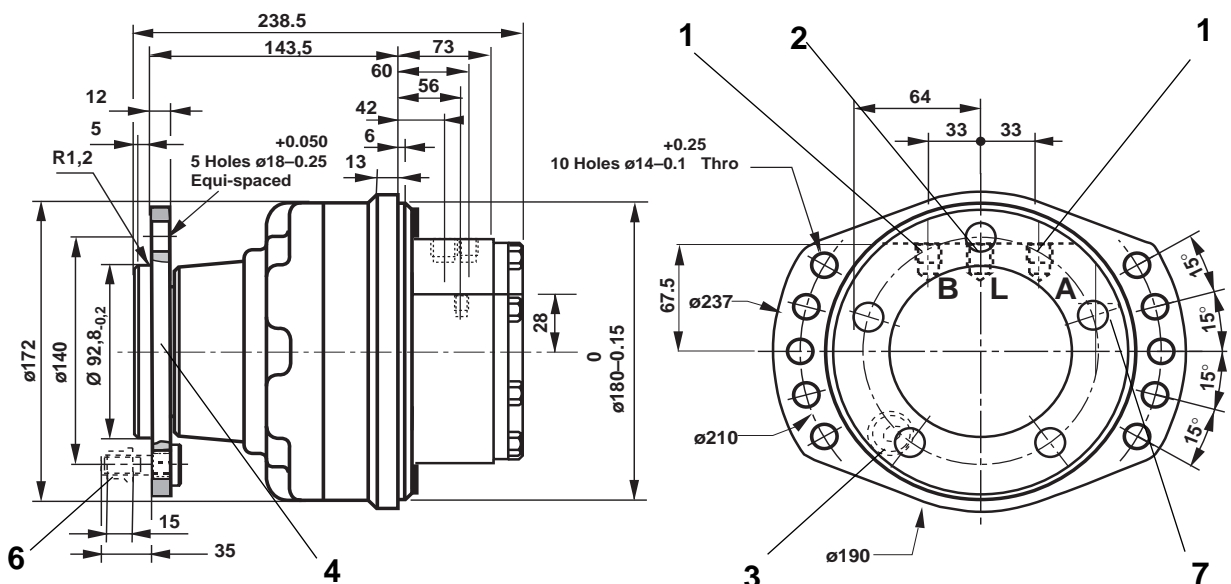
Weight: $m = 20$ kg

Port	Dimensions / Order code	
	01	12
A, B	G 1/2	7/8-14 SAE
L	G 3/8	9/16-18 SAE
F	G 1/2	3/4-16 SAE

- 1 Port A; B (inlet, outlet)
- 2 Case drain port L
- 3 Filling port F, may also be used as drain port
- 4 Single shaft end with flange; order code "F180"
- 6 M14 x 1,5 studs with hexagon wheel nuts; clamping length 5 to 20 mm; order code "S"

Polar moment of inertia $J_m = 18717$ kgmm²

Flange housing: Order code "F Two Speed"



Weight: $m = 20$ kg

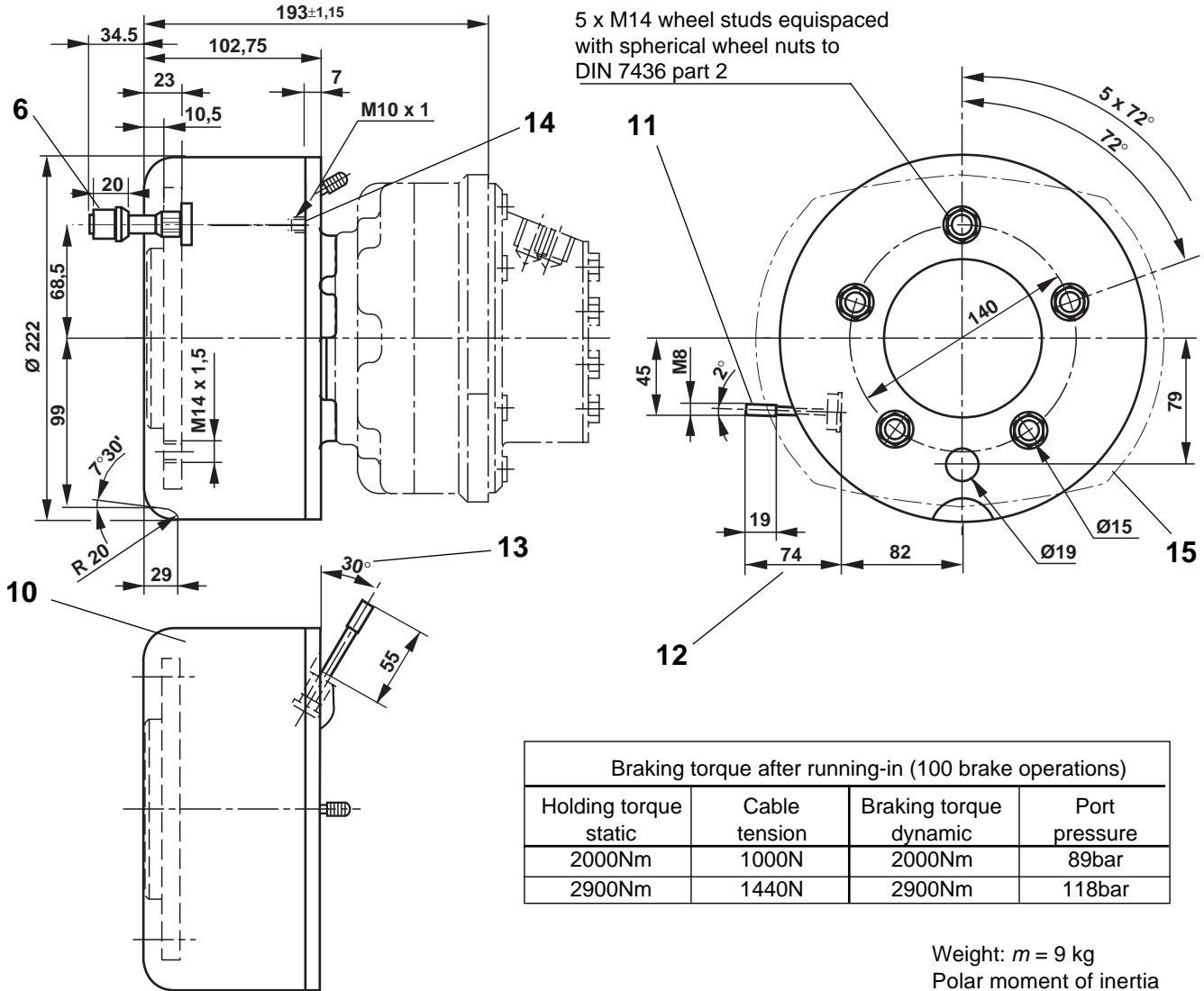
Port	Dimensions / Order code	
	01	12
A, B	G 1/2	7/8-14 SAE
L	G 3/8	9/16-18 SAE
F	G 1/2	3/4-16 SAE
X	G 1/4	9/6-18 SAE

- 1 Port A; B (inlet, outlet)
- 2 Case drain port L
- 3 Filling port F, may also be used as drain port
- 4 Single shaft end with flange; order code "F180"
- 6 M14 x 1,5 studs with hexagon wheel nuts; clamping length 5 to 20 mm; order code "S"
- 7 Two speed port X

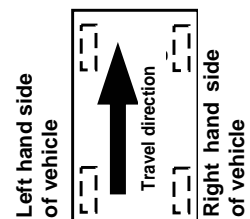
Polar moment of inertia $J_m = 18717$ kgmm²

Unit dimensions: Dynamic brake (drum brake)

(in mm)



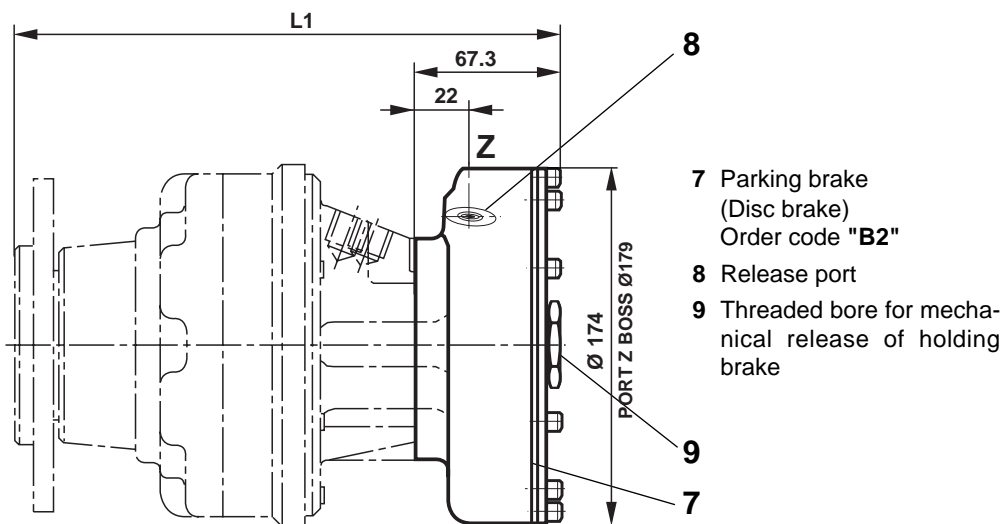
- 6 M14 x 1.5 studs with hexagon wheel nuts; clamping length 5 to 20 mm; Order code "S"
- 10 Dynamic brake (drum brake) Order code "C2..", for brake fluid DOT 3+4 or SAE J1703
- 11 Line of cable (Bowden cable): illustrated here is a motor with brake arranged for the right hand side of the vehicle. For the left hand side of the vehicle the position of the cable line is symmetrically opposite to the right hand side arrangement.
- 12 Length of cable
- 13 Angularity of cable line
- 14 Brake pipe connection: $p_{max} = 118$ bar
Brake cylinder operation volume $V = 7$ cm³
- 15 Mounting flange as model " F "



Unit dimensions: Holding brake (disc brake)

(in mm)

Weight: $m = 7 \text{ kg}$
 Polar moment of inertia
 $J_m = 1420 \text{ kgmm}^2$



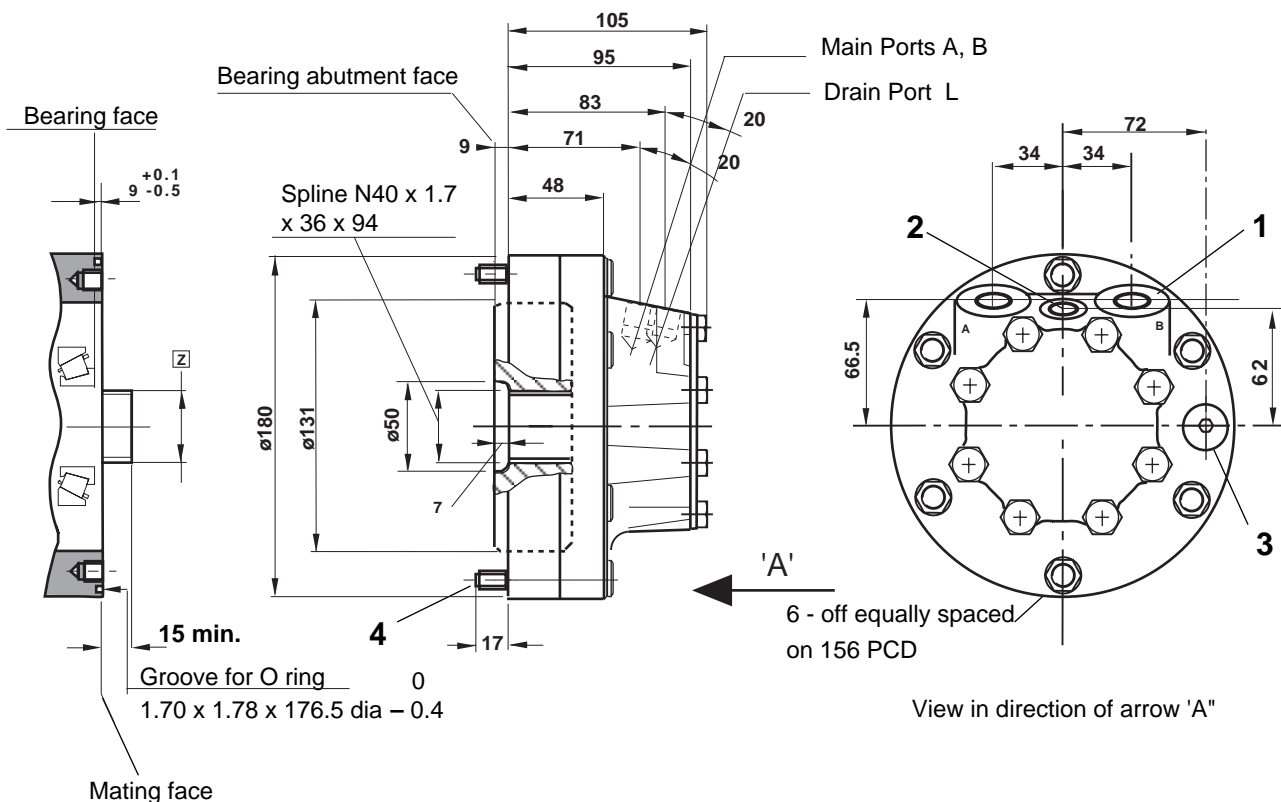
- 7 Parking brake (Disc brake)
Order code "B2"
- 8 Release port
- 9 Threaded bore for mechanical release of holding brake

Flange Housing	Single speed L1	Two speed L1
A Type	299.3	318.3
D Type	339.3	358.3
F Type	271.8	290.8

Port	Dimensions / Order code	
	01	12
Z	G 3/8	9/16-18 SAE
Pos. 9	M 12	M12

Unit dimensions: Hydrobase

(in mm)



- 1 Ports A,B (inlet/outlet)
- 2 Case drain port L
- 3 Filling port F, may also be used as a drain port
- 4 Holding bolts 6-off M12 x 1.75

Weight: $m = 9 \text{ kg}$
 Polar moment of inertia
 $J_m = 8316 \text{ kgmm}^2$

Port	Dimensions / Order code	
	01	12
A, B	G 1/2	7/8-14 SAE
L	G 3/8	9/16-18 SAE
F	G 1/2	3/4-16 SAE

Notes



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