

# Radial piston motor for wheel drives

## MCR-F

**RE 15198**

Edition: 02.2017

Replaces 07.2015



- ▶ Frame size MCR3, MCR5, MCR10, MCR15  
(for frame size 20 see MCR20-C)
- ▶ Displacement 160 cc to 2150 cc
- ▶ Differential pressure up to 450 bar
- ▶ Torque output up to 13687 Nm
- ▶ Speed up to 875 rpm
- ▶ Open and closed circuits

### Features

- ▶ Compact robust construction
- ▶ High volumetric and mechanical efficiencies
- ▶ Rear case mount
- ▶ Wheel flange with wheel studs
- ▶ High reliability
- ▶ Low maintenance
- ▶ Smooth running at very low speeds
- ▶ Low noise
- ▶ Bi-directional
- ▶ Sealed tapered roller bearings
- ▶ High radial forces permitted on drive shaft
- ▶ Freewheeling possible
- ▶ Available with:
  - Holding brake (multi-disc) or dynamic (drum) brake
  - Bi-directional two speed
  - Integrated flushing valve
  - Speed sensor

### Contents

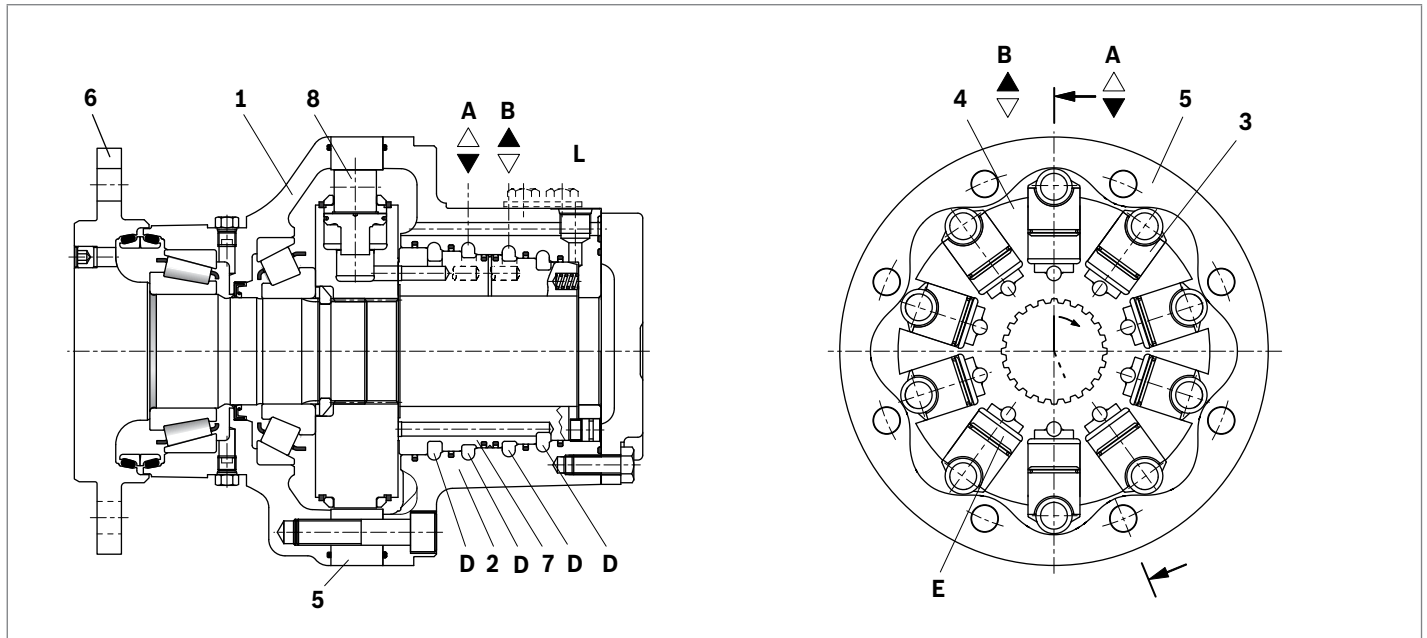
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Siège Social Douala - Cameroun B.P. 12591 Douala  
 contact@2comappro.com  
 Tél : + 237 233 424 913  
 et + 237 674 472 158

[www.2comappro.com](http://www.2comappro.com)

## Functional description



Hydraulic motors of the type MCR-F are radial piston motors with rear case mounting and flange shaft. The MCR-F motors are intended for wheel drives in open or closed circuits. These motors are used in a wide range of applications such as municipal vehicles, fork lift trucks, agricultural and forestry machines. The integrated flange with wheel studs allows easy installation of standard wheel rims.

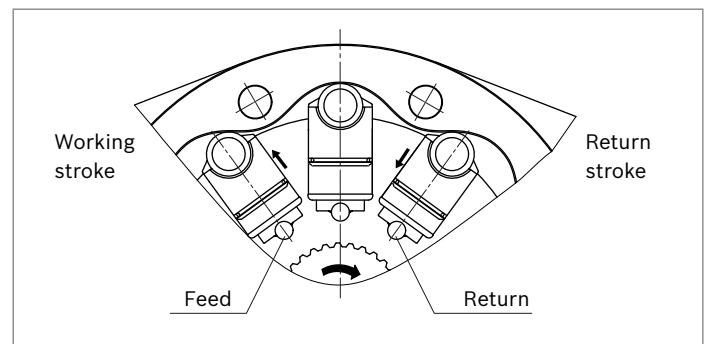
### Construction

Two part housing (1, 2), rotary group (3, 4, 8), cam (5), drive shaft (6) and flow distributor (7)

### Transmission

The cylinder block (4) is connected to the shaft (6) by means of splines. The pistons (3) are arranged radially in the cylinder block (4) and make contact with the cam (5) via rollers (8).

### Torque generation



The number of working and return strokes corresponds to the number of lobes on the cam multiplied by number of pistons in the cylinder block.

### Flow paths

The ports **A** and **B**, which are located in the rear case, carry oil through the distributor to the cylinder chambers (**E**).

### Bearings

Tapered roller bearings capable of transmitting high axial and radial forces are fitted as standard.

### Freewheeling

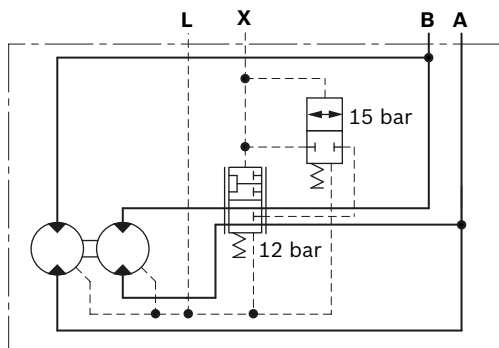
In certain applications there may be a requirement to free-wheel the motor. This may be achieved by connecting ports **A** and **B** to zero pressure and simultaneously applying a pressure of 2 bar to the housing through port **L**. In this condition, the pistons are forced into the cylinder block which forces the rollers to lose contact with the cam thus allowing free rotation of the shaft.

### Two speed operation (2W)

In mobile applications where vehicles are required to operate at high speed with low motor loads, the motor can be switched to a low-torque and high-speed mode. This is achieved by operating an integrated valve which directs hydraulic fluid to only one half of the motor while continuously re-circulating the fluid in the other half. This “reduced displacement” mode reduces the flow required for a given speed and gives the potential for cost and efficiency improvements. The motor maximum speed remains unchanged.

Bosch Rexroth has developed a special spool valve to allow smooth switching to reduced displacement whilst on the move. This is known as “soft-shift” and is a standard feature of 2W motors. The spool valve requires either an additional sequence valve or electro-proportional control to operate in “soft-shift” mode.

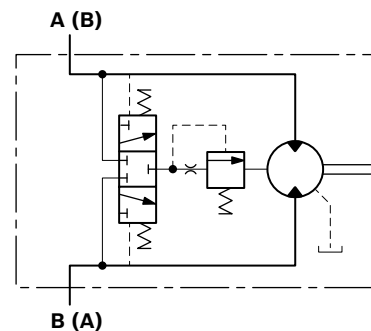
#### ▼ Schematic



### Flushing valve

In a closed circuit, the same hydraulic fluid continuously flows between the pump and the motor. This could therefore lead to overheating of the hydraulic fluid. The function of the flushing valve option is to replace hydraulic fluid in the closed circuit with that from the reservoir. When the hydraulic motor is operated under load, either in the clockwise or anti-clockwise direction, the flushing valve opens and takes a fixed flow of fluid through an orifice from the low pressure side of the circuit. This flow is then fed to the motor housing and back to the reservoir normally via a cooler. In order to charge the low pressure side of the circuit, cool fluid is drawn from the reservoir by the boost pump and is fed to the pump inlet through the check valve. Thus the flushing valve ensures a continuous renewal and cooling of the hydraulic fluid. The flushing feature incorporates a relief valve which is used to maintain a minimum boost pressure and operates at a standard setting of 14 bar (other options available on request). Different orifice sizes may be used to select varying flows of flushing fluid. The following table gives flushing rate values based on a boost/charge pressure of 25 bar.

#### ▼ Schematic



### Flushing flow rates

Flushing code	Orifice size [mm]	Flow [l/min] at 25 bar <sup>1)</sup>	
		min	max
F1	Ø1	2.2	2.7
F2	Ø1.5	5.0	6.1
F7	Ø1.7	6.4	7.8
F4	Ø2	8.2	10.7
F6	Ø2.3	8.8	11.4

1) 0.6 mm Shim (Standard), Cracking pressure = 11±3 bar

### Holding brake (multi-disc brake)

#### Mounting

By way of rear housing (2) and brake shaft (14).

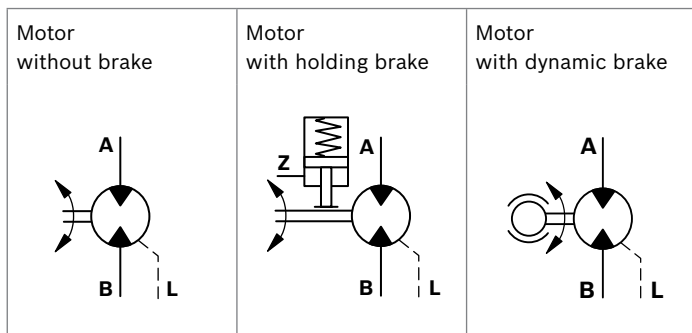
#### Brake application

As a safety requirement in mobile applications a parking brake may be provided to ensure that the motor cannot turn when the machine is not in use. The parking brake provides holding torque by means of discs (11) that are compressed by a disc spring (10). The brake is released when oil pressure is applied to brake port "Z" and the pressure in the annular area (9) compresses the disc spring using brake piston (12) thus allowing the brake discs (11) to turn independently.

#### Notice

Brakes not for dynamic use!

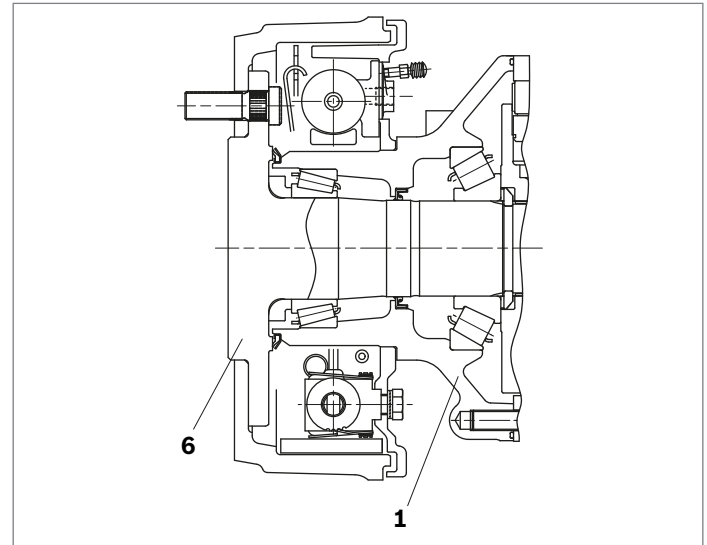
#### Schematic diagrams



### Dynamic brake

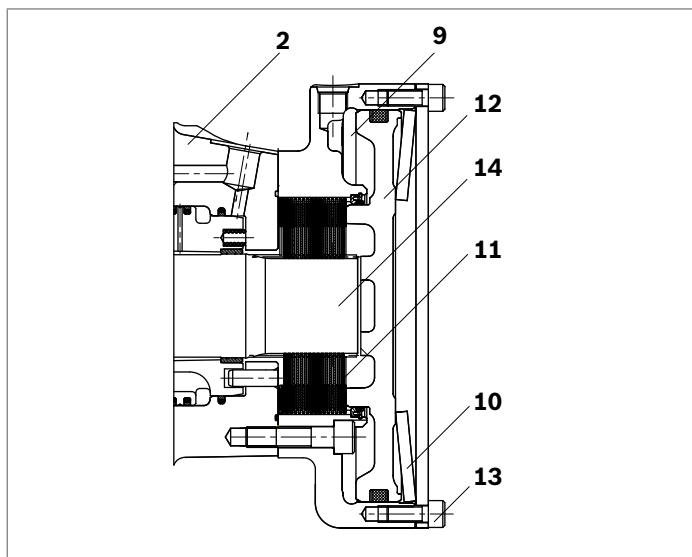
Where mechanical dynamic braking is required, a drum brake may be specified. The drum brake is mounted directly onto the drive shaft (6) and front housing (1). Braking torque is provided by brake shoes acting on the inside of the drum.

The drum brake can also provide mechanical park brake function by use of bowden cable.



### Manual release of holding brake

The brake may also be released manually by loosening screws (13).



**Speed sensor**

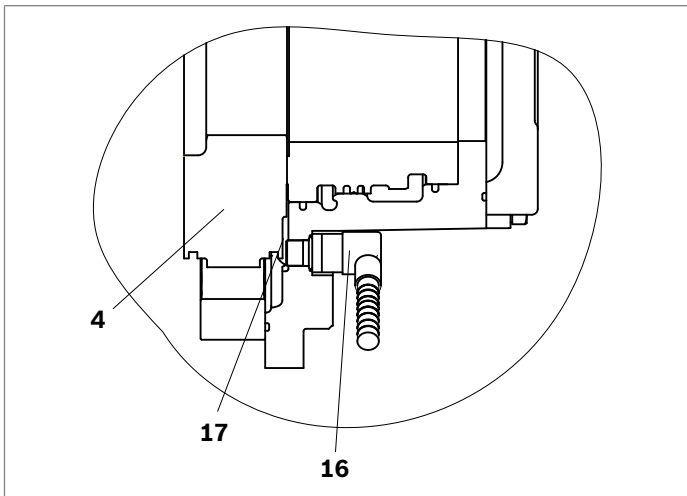
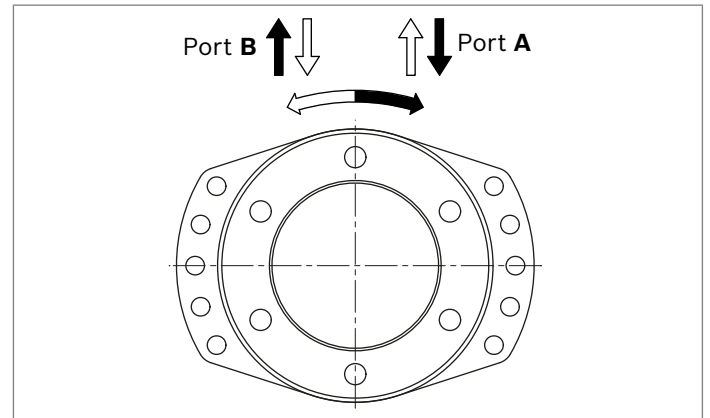
A Hall-effect speed sensor (**16**) may be fitted as an option, giving a two-channel output of phase-displaced square waves, and enabling detection of speed and direction. A toothed target disc (**17**) is fitted to the motor cylinder block (**4**), and the sensor, fitted to a port in the rear case, produces a pulse on each channel as each tooth passes in front of it. The frequency of the pulses is proportional to the rotational speed.

Versions are available for use with regulated supplies 10 V (Code P1) and for direct connection to a 12 V or 24 V unregulated supply (Code P2).

The motor can also be supplied fitted with a target disc and with a speed sensor port machined, but covered and sealed with a blanking plate (Code P0). These “sensor-ready” motors may be fitted with a sensor at a later date.

**Direction of shaft rotation with flow**

(viewed from drive shaft)



## Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
<b>MCR</b>		<b>F</b>			<b>Z</b>	<b>/</b>									

### Radial piston motor

01	Radial-piston type, low-speed, high-torque motor	<b>MCR</b>
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### Frame size

02	Frame size	3	<b>3</b>
		5	<b>5</b>
		10	<b>10</b>
		15	<b>15</b>

### Housing type

03	Rear case mounting flange	<b>F</b>
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### Nominal size, displacement $V_g$ in $\text{cm}^3/\text{rev}$

04	Frame size 3		<b>160</b>	<b>225</b>	<b>255</b>	<b>280</b>	<b>325</b>	<b>365</b>	<b>400</b>	
	Low displacement: motors use standard cylindrical pistons	LD	●	●	●	●	-	-	-	
	High displacement: motors use stepped pistons	HD	-	-	-	-	●	●	●	
	Frame size 5		<b>380</b>	<b>470</b>	<b>520</b>	<b>565</b>	<b>620</b>	<b>680</b>	<b>750</b>	<b>820</b>
	Low displacement: motors use standard cylindrical pistons	LD	●	●	●	●	-	-	-	-
	High displacement: motors use stepped pistons	HD	-	-	-	-	●	●	●	●
	Frame size 10		<b>780</b>	<b>860</b>	<b>940</b>	<b>1120</b>	<b>1250</b>	<b>1340</b>		
	Low displacement: motors use standard cylindrical pistons	LD	●	●	●	-	-	-		
	High displacement: motors use stepped pistons	HD	-	-	-	●	●	●		
	Frame size 15		<b>1130</b>	<b>1250</b>	<b>1500</b>	<b>1780</b>	<b>2150</b>			
	Low displacement: motors use standard cylindrical pistons	LD	●	●	●	-	-			
	High displacement: motors use stepped pistons	HD	-	-	-	●	●			

### Drive shaft

		<b>MCR3</b>	<b>MCR5</b>	<b>MCR10</b>	<b>MCR15</b>	
05	With flange $\varnothing 180$ mm	●	●	-	-	<b>F180</b>
	With flange $\varnothing 250$ mm	-	●	●	-	<b>F250</b>
	With flange $\varnothing 280$ mm	-	-	-	●	<b>F280</b>

### Rear shaft

06	Without rear shaft	<b>Z</b>
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### Series

07	Series 32	<b>32</b>
	Series 33	<b>33</b>

### Brake

			<b>MCR3</b>	<b>MCR5</b>	<b>MCR10</b>	<b>MCR15</b>	
08	Without brake		●	●	●	●	<b>A0</b>
	Hydraulic release spring applied multi-disc holding brake	2200 Nm	●	●	-	-	<b>B2</b>
		4400 Nm	-	●	-	-	<b>B4</b>
		4400 Nm	-	-	●	-	<b>B5</b>
		7000 Nm	-	-	●	-	<b>B7</b>
		11000 Nm	-	-	-	●	<b>B11</b>
	Dynamic brake (drum-brake) with maximum torque	2900 Nm	●	-	-	-	<b>C2L/R</b>
		4000 Nm	-	●	-	-	<b>C4L/R</b>
		6400 Nm	-	-	●	-	<b>C7L/R</b>
		12000 Nm	-	-	-	●	<b>C12L/R</b>

● = Available      - = Not available

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
<b>MCR</b>		<b>F</b>			<b>Z</b>	<b>/</b>									

**Seals**

09	NBR (nitrile rubber)	<b>M</b>
	FKM (fluoroelastomer / Viton)	<b>V</b>

**Single/two-speed operation**

		<b>MCR3</b>	<b>MCR5</b>	<b>MCR10</b>	<b>MCR15</b>	
10	Single speed, standard direction of rotation	●	●	●	●	<b>1L</b>
	Bi-directional two speed, standard direction of rotation	●	●	●	-	<b>2WL</b>
	Switchable two speed, anti-clockwise direction of rotation	-	-	-	●	<b>2L</b>
	Switchable two speed, clockwise direction of rotation	-	-	-	●	<b>2R</b>

**Ports**

		<b>MCR3</b>	<b>MCR5</b>	<b>MCR10</b>	<b>MCR15</b>	
11	Tapped with UNF thread (SAE J514)	●	●	-	-	<b>12</b>
	Tapped with UNF thread (SAE J514) (A and B ports SAE split flange metric bolt holes)	-	-	●	●	<b>42</b>

**Studs**

12	Without studs (no code)	
	With wheel studs and nuts	<b>S</b>
	With twice the normal number of wheel studs and nuts	<b>SS</b>

**Speed sensor**

13	Without sensor (no code)	
	Sensor ready	<b>P0</b>
	Sensor without regulator	<b>P1</b>
	Sensor with regulator	<b>P2</b>

**Flushing**

14	Without flushing (no code)	
	With flushing (see table on page 3)	<b>F1-F7</b>

**Special order**

15	Special feature	<b>SOXXX</b>
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**Other**

16	Mark in text here	<b>*</b>
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● = Available      - = Not available

## Technical data

Frame size			MCR3	MCR5	MCR10	MCR15				
Type of mounting			Flange mounting							
Pipe connections <sup>1)2)</sup>			Threaded per SAE J514; Flanged per SAE J518							
Shaft loading			see page 11							
Weight										
Single speed (1L)	<i>m</i>	kg	21	38	65	95				
Two speed (2WL, 2L and 2R)	<i>m</i>	kg	26	46	70	95				
Hydraulic fluid <sup>3)</sup>										
Mineral oil type HLP/HLVP to DIN 51524										
Fluid cleanliness										
ISO 4406, Class 20/18/15										
Fluid viscosity range										
$v_{\min/\max}$		mm <sup>2</sup> /s	10 to 2000							
Fluid temperature range <sup>4)</sup>										
$\theta_{\min/\max}$		°C	-20 to +85							
Pressure			Low displacement				High displacement			
Maximum differential pressure <sup>5)6)</sup>	$\Delta p_{\max}$	bar	450				400			
Maximum pressure at port <b>A</b> or <b>B</b> <sup>5)6)</sup>	$p_{\max}$	bar	470				420			
Maximum case drain pressure	$p_{\text{case max}}$	bar	10				10			
<b>Motor performance MCR3</b>										
Displacement	$V_g$	cm <sup>3</sup> /rev	160	225	255	280	325	365	400	
Specific torque		Nm/bar	3	4	4	4	5	6	6	
Maximum torque <sup>5)</sup>	$T_{\max}$	Nm	1146	1611	1826	2005	2069	2324	2546	
Minimum speed for smooth running <sup>7)</sup>	$n_{\min}$	rpm	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Maximum speed (1L) <sup>8)9)</sup>	$n_{\max}$	rpm	670	475	420	385	330	295	270	
Maximum speed (2WL) <sup>8)9)</sup>	$n_{\max}$	rpm	875	620	550	500	430	385	350	
<b>Motor performance MCR5</b>										
Displacement	$V_g$	cm <sup>3</sup> /rev	380	470	520	565	620	680	750	820
Specific torque		Nm/bar	6	7	8	9	10	11	12	13
Maximum torque <sup>5)</sup>	$T_{\max}$	Nm	2722	3366	3724	4047	3947	4329	4775	5220
Minimum speed for smooth running <sup>7)</sup>	$n_{\min}$	rpm	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Maximum speed (1L) <sup>8)9)</sup>	$n_{\max}$	rpm	475	385	350	320	290	265	240	220
Maximum speed (2WL) <sup>8)9)</sup>	$n_{\max}$	rpm	570	465	420	385	350	320	290	265
<b>Motor performance MCR10</b>										
Displacement	$V_g$	cm <sup>3</sup> /rev	780	860	940		1120	1250	1340	
Specific torque		Nm/bar	12	14	15		18	20	21	
Maximum torque <sup>5)</sup>	$T_{\max}$	Nm	5586	6159	6732		7130	7958	8531	
Minimum speed for smooth running <sup>7)</sup>	$n_{\min}$	rpm	0.5	0.5	0.5		0.5	0.5	0.5	
Maximum speed (1L and 2WL) <sup>8)9)</sup>	$n_{\max}$	rpm	215	195	178		150	135	125	
<b>Motor performance MCR15</b>										
Displacement	$V_g$	cm <sup>3</sup> /rev	1130	1250	1500		1780	2150		
Specific torque		Nm/bar	18	20	24		28	34		
Maximum torque <sup>5)</sup>	$T_{\max}$	Nm	8093	8952	10743		11332	13687		
Minimum speed for smooth running <sup>7)</sup>	$n_{\min}$	rpm	0.5	0.5	0.5		0.5	0.5		
Maximum speed (1L, 2L and 2R) <sup>8)9)</sup>	$n_{\max}$	rpm	145	130	110		90	75		



			<b>MCR3</b>	<b>MCR5</b>		<b>MCR10</b>		<b>MCR15</b>		
Holding brake (disc brake)			<b>B2</b>	<b>B2</b>	<b>B4</b>	<b>B5</b>	<b>B7</b>	<b>B11</b>		
Minimum holding torque	$t_{\min/\max}$	Nm	2200	2200	4400	4400	7000	11000		
Release pressure (min)	$p_{\text{rel min}}$	bar	11	11	11	11	11	12		
Release pressure (max)	$p_{\text{rel max}}$	bar	15	15	15	15	15	15		
Maximum pressure at brake port „Z“	$p_{\text{max}}$	bar	40	40	40	30	30	30		
Oil volume to operate brake	$V_{\text{rel}}$	cm <sup>3</sup>	23	23	46	17	36	77		
			<b>MCR3</b>	<b>MCR5</b>		<b>MCR10</b>		<b>MCR15</b>		
Dynamic brake			<b>C2L/R</b>	<b>C4L/R</b>		<b>C7L/R</b>		<b>C12L/R</b>		
Braking torque	$t_{\min/\max}$	Nm	2000	2900	3000	4000	4700	6400	9000	12000
Brake cable tension		N	1000	1440	1270	1661	1755	2400	2580	3460
Brake port pressure	$p_{\text{max}}$	bar	82	117	73	97	89	120	84	112
Brake cylinder operating volume	$V$	cm <sup>3</sup>	7	7	9	9	13	13	24.91	24.91

### Notice

- ▶ Motor performance values are based on theoretical calculations.
- ▶ Efficiencies are not taken into consideration for theoretical calculations.
- ▶ Brake torque accounts for tolerances. Values are based when used with standard mineral oil (HLP).
- ▶ For MCR20 frame size, please refer MCR-C data sheet (15197).

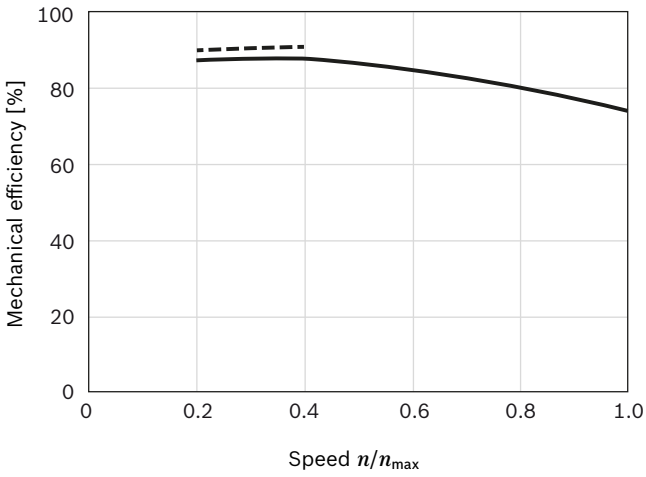
Please refer the related foot notes for more details.

### Footer from page 8 and 9

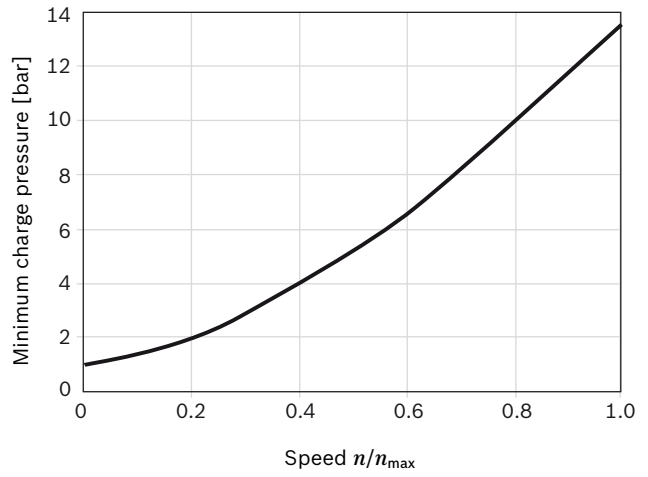
- 1) Ensure motor case is filled with oil prior to start-up. See instruction manual 15215-B.
- 2) For installation and maintenance details, please see instruction manual 15215-B.
- 3) For any other fluid type contact the Engineering Department at Bosch Rexroth, Glenrothes. For more information on hydraulic fluids, see datasheets 90220 and 90223.
- 4) Extension of the allowable temperature range may be possible depending on specification. Please consult Bosch Rexroth Engineering Department in Glenrothes for further details.
- 5) Maximum values should only be applied for a small portion of the duty cycle. Please consult Bosch Rexroth Engineering Department in Glenrothes for motor life calculations based on particular operating cases.
- 6) When operating motors in series, please consult Bosch Rexroth Engineering Department in Glenrothes.
- 7) For continuous operation at speeds <5 rpm please consult Bosch Rexroth Engineering Department in Glenrothes.
- 8) Based on nominal no-load  $\Delta p$  of 20 bar in full-displacement mode.
- 9) Warning! During the running in period of the motor (min. 20 hrs) it should not be run unloaded at >100 rpm.

## Efficiencies

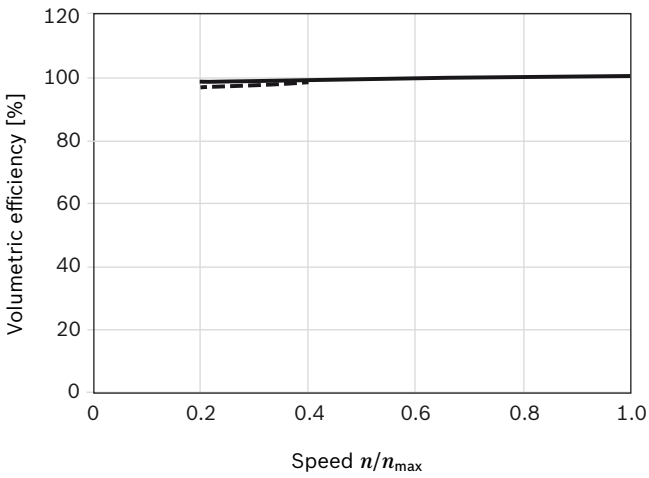
### ▼ Mechanical efficiency



### ▼ Charge pressure



### ▼ Volumetric efficiency



— 100 bar / 1450 psi  
- - - 300 bar / 4350 psi

### Notice

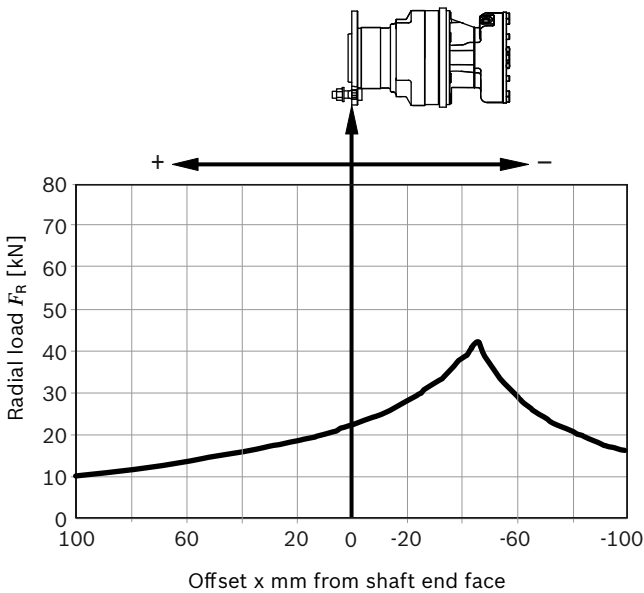
For specific performance information or operating conditions contact the Engineering Department at Bosch Rexroth, Glenrothes.

### Permitted loading on drive shaft

(Speed  $n = 50$  rpm, pressure differential  $\Delta p = 250$  bar, 2000 hrs L10 life at 50 °C)

#### Drive shaft ...3F F180...

Maximum radial load  $F_{R \max}$  (with axial load  $F_{ax} = 0$ )



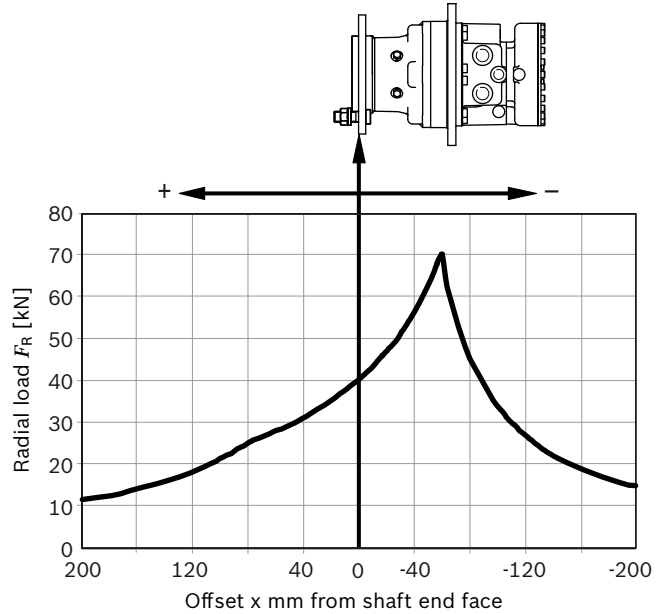
Maximum axial load  $F_{ax \max}$  (with radial load  $F_R = 0$ ):

$F_{ax \max} = 18300$  N ← +

$F_{ax \max} = 28000$  N → -

#### Drive shaft ...5F F250...

Maximum radial load  $F_{R \max}$  (with axial load  $F_{ax} = 0$ )



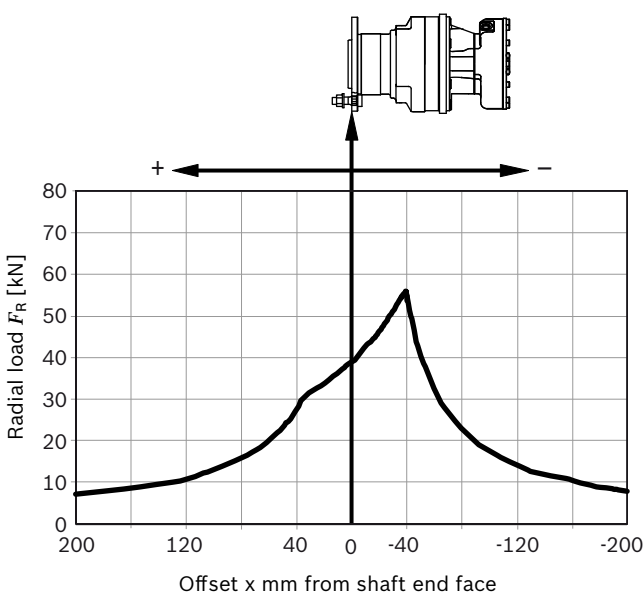
Maximum axial load  $F_{ax \max}$  (with radial load  $F_R = 0$ ):

$F_{ax \max} = 37500$  N ← +

$F_{ax \max} = 36800$  N → -

#### Drive shaft ...5F F180...

Maximum radial load  $F_{R \max}$  (with axial load  $F_{ax} = 0$ )



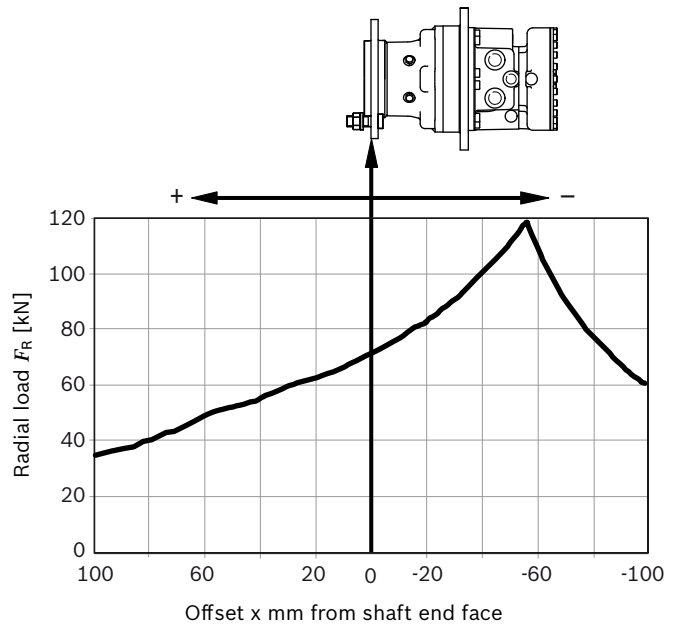
Maximum axial load  $F_{ax \max}$  (with radial load  $F_R = 0$ ):

$F_{ax \max} = 37500$  N ← +

$F_{ax \max} = 36800$  N → -

#### Drive shaft ...10F F250...

Maximum radial load  $F_{R \max}$  (with axial load  $F_{ax} = 0$ )



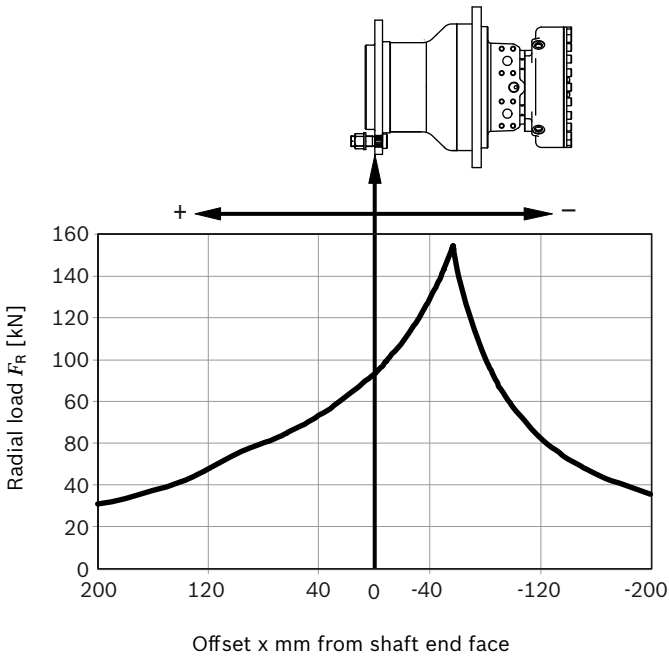
Maximum axial load  $F_{ax \max}$  (with radial load  $F_R = 0$ ):

$F_{ax \max} = 76100$  N ← +

$F_{ax \max} = 67400$  N → -

**Drive shaft ...15F F280...**

Maximum radial load  $F_{R \max}$  (with axial load  $F_{ax} = 0$ )



Maximum axial load  $F_{ax \max}$  (with radial load  $F_R = 0$ ):

$$F_{ax \max} = 95400 \text{ N} \leftarrow +$$

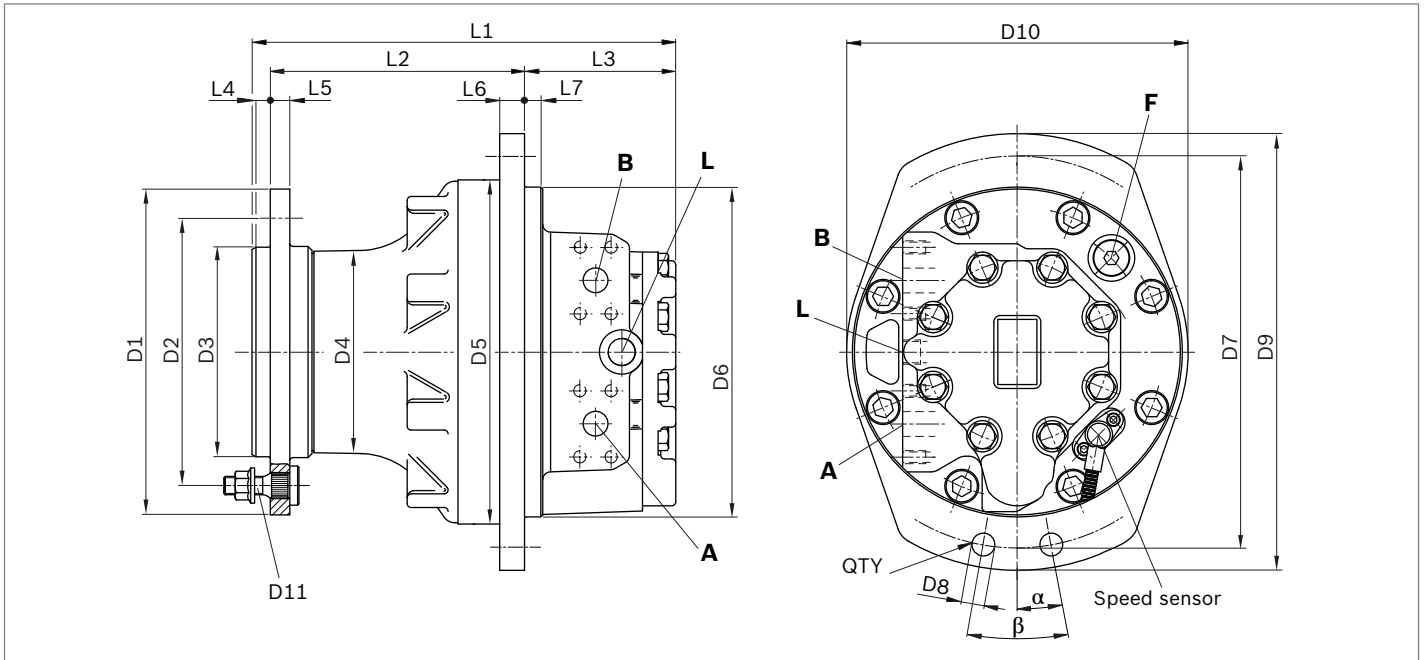
$$F_{ax \max} = 88700 \text{ N} \rightarrow -$$

**Notice**

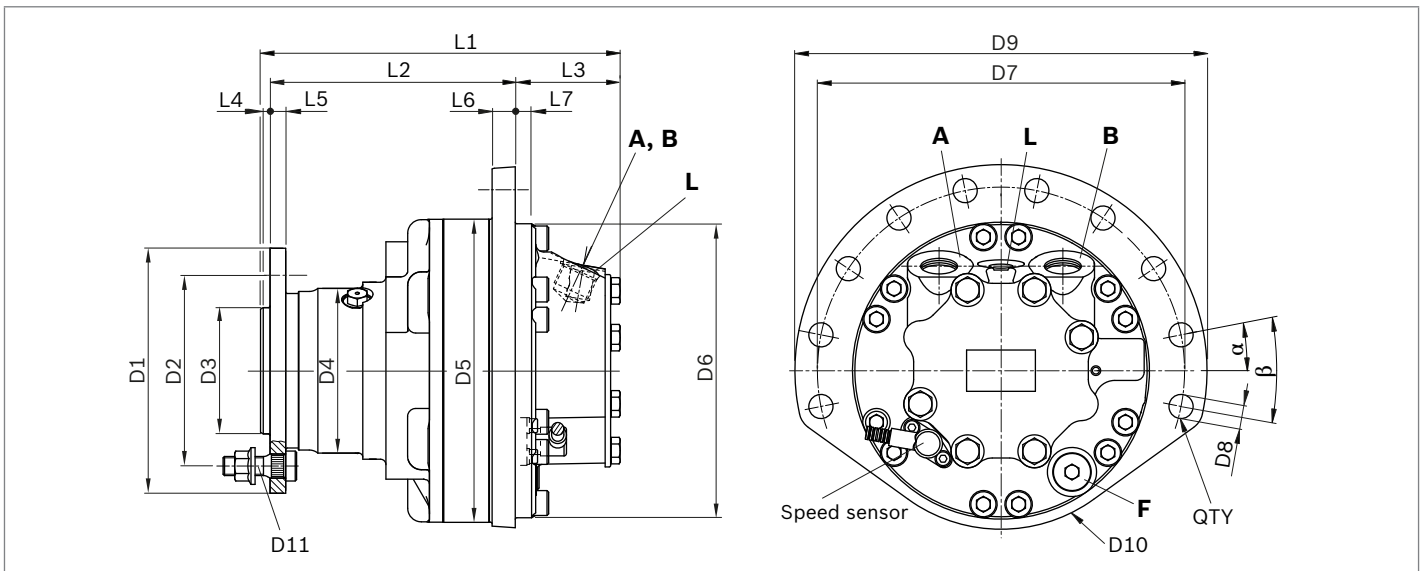
- ▶ These values and graphs are for initial guidance only
- ▶ For actual motor life calculations under typical or specified duty cycles, contact the Engineering Department at Bosch Rexroth, Glenrothes.
- ▶ For drum braked motors, the permitted loading varies depending on the offset.

## Dimensions

### MCR3F, MCR10F and MCR15F single speed (1L)



### MCR5F single speed (1L)



Motor	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
<b>MCR3</b>	ø172.5	ø140	ø92.8	-	ø180	ø180	ø210	ø14	ø237	ø190	5×M14×1.5
<b>MCR5</b>	ø180	ø140	ø92.7	ø116.5	ø223	ø215.95	ø267	ø17.4	ø298	ø228	8×M20×1.5
<b>MCR10</b>	ø250	ø205	ø160	ø162	ø264	ø253	ø300	ø17.5	ø335	ø264	10×M22×1.5
<b>MCR15</b>	ø280	ø225	ø175.8	ø190	ø304	ø285	ø335	ø17.4	ø375	-	10×M22×1.5

Motor	L1	L2	L3	L4	L5	L6	L7	α	β	QTY
<b>MCR3</b>	217.5	143.5	67	6	12	13	6	0°	15°	10
<b>MCR5</b>	264.1	180	77	5	11.5	17	12	11.25°	22.5°	10
<b>MCR10</b>	325	195	116	14	15	19	12.5	0°	15°	10
<b>MCR15</b>	334.4	219.4	98.9	15	16	36.5	9	10°	20°	8

Before finalizing your design, request a binding installation drawing.

**Ports**

Motor	Designation	Port function	Code	Size	$p_{\max}$ [bar]	State <sup>2)</sup>
<b>MCR3</b>	<b>A, B</b>	Inlet, outlet	SAE J514	7/8-14 UNF	470/420 <sup>1)</sup>	O
	<b>L</b>	Case drain	SAE J514	9/16-18 UNF	10	O
	<b>F</b>	Filler port	SAE J514	3/4-16 UNF	10	X
<b>MCR5</b>	<b>A, B</b>	Inlet, outlet	SAE J514	1 1/16-12 UNF	470/420 <sup>1)</sup>	O
	<b>L</b>	Case drain	SAE J514	3/4-16 UNF	10	O
	<b>F</b>	Filler port	SAE J514	3/4-16 UNF	10	X
<b>MCR10</b>	<b>A, B</b>	Inlet, outlet	SAE J518 <sup>3)</sup>	3/4 in	470/420 <sup>1)</sup>	O
	<b>L</b>	Case drain	SAE J514	3/4-16 UNF	10	O
	<b>F</b>	Filler port	SAE J514	3/4-16 UNF	10	X
<b>MCR15</b>	<b>A, B</b>	Inlet, outlet	SAE J518 <sup>3)</sup>	3/4 in	470/420 <sup>1)</sup>	O
	<b>L</b>	Case drain	SAE J514	3/4-16 UNF	10	O
	<b>F</b>	Filler port	SAE J514	3/4-16 UNF	10	X

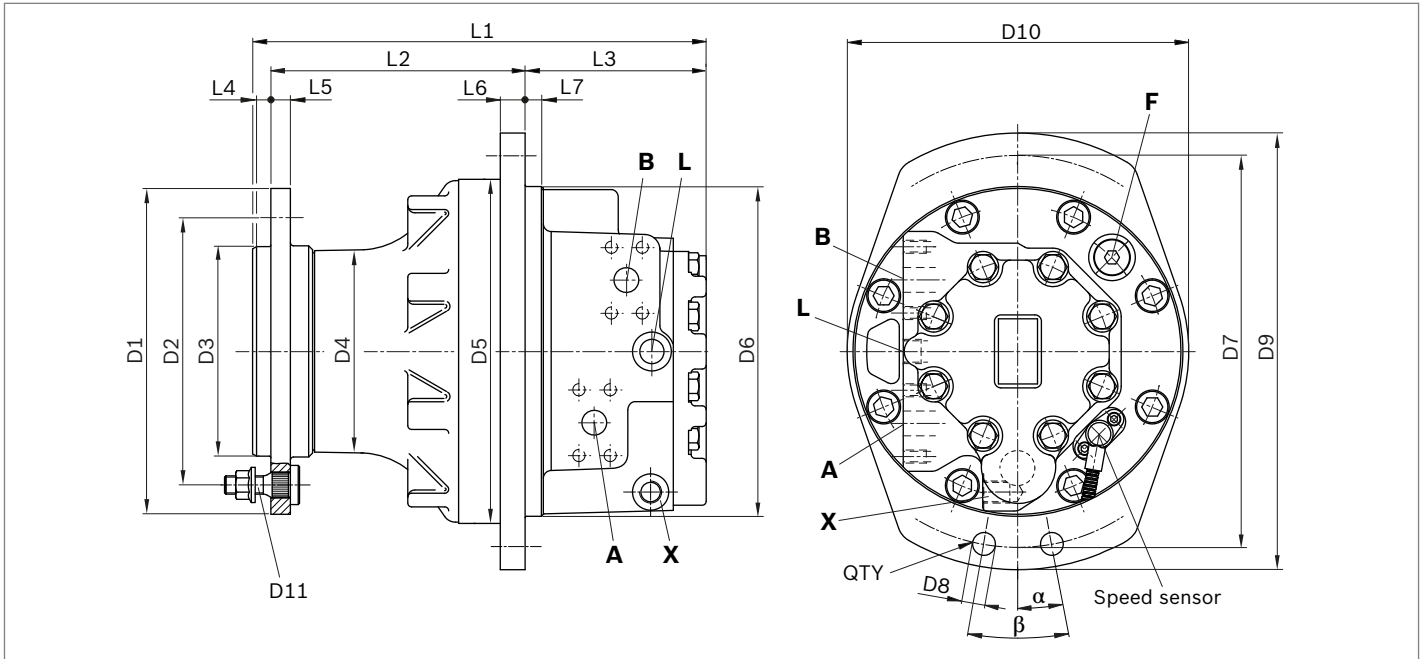
1) Depends on nominal size

2) O = Must be connected (plugged on delivery)

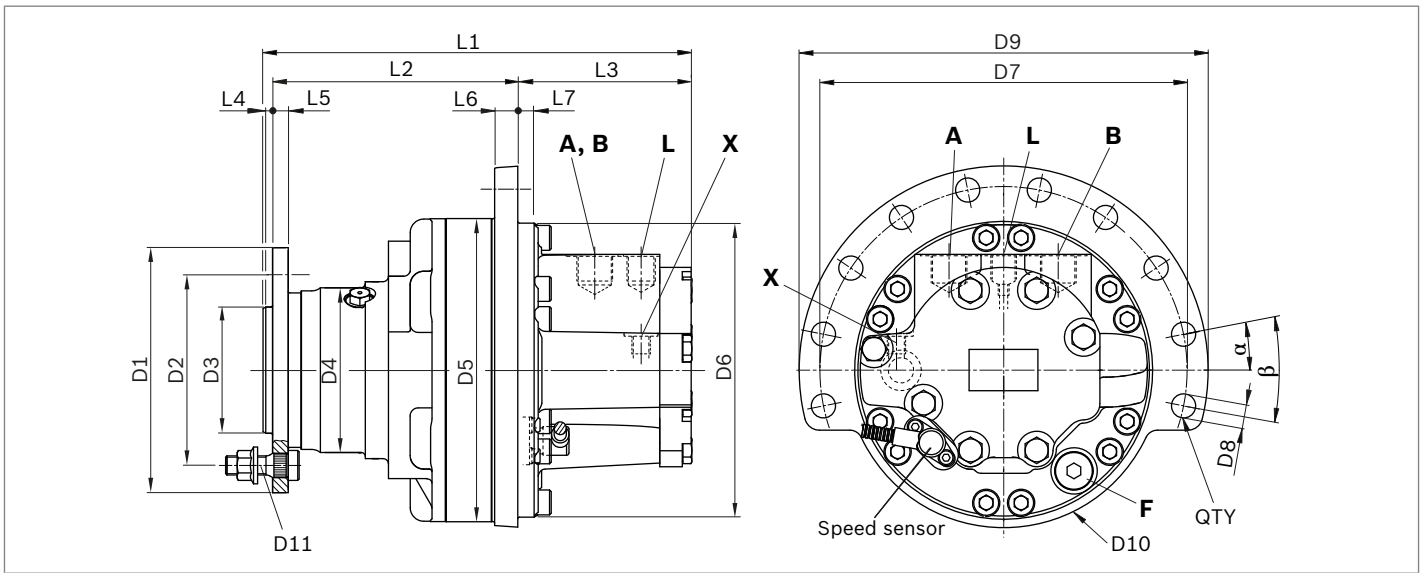
X = Plugged (in normal operation)

3) Dimensions according to SAE J518 (Code 62 - high pressure series)

**MCR3F, MCR10F and MCR15F two speed (2WL, 2L and 2R)**



**MCR5F two speed (2WL, 2L and 2R)**



Motor	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
<b>MCR3</b>	ø172	ø140	ø92.7	-	ø180	ø180	ø210	ø14	ø237	ø190	5×M14×1.5
<b>MCR5</b>	ø180	ø140	ø92.7	ø116.5	ø223	ø215.96	ø267	ø17.4	ø298	ø228	10×M18×1.5
<b>MCR10</b>	ø250	ø205	ø160	ø162	ø264	ø253	ø300	ø17.5	ø330	ø262	8×M20×1.5
<b>MCR15</b>	ø280	ø225	ø175.8	ø190	ø304	ø285	ø335	ø22.4	ø375	-	10×M22×1.5

Motor	L1	L2	L3	L4	L5	L6	L7	α	β	QTY
<b>MCR3</b>	274.1	143.6	123.5	6	12	13	6	0°	15°	10
<b>MCR5</b>	313.8	180	126.7	7	11.5	17	12	11.25°	22.5°	10
<b>MCR10</b>	350	195	141	14	15	19	12.5	0°	15°	10
<b>MCR15</b>	334.4	219.5	98.9	14	16	36.5	9	10°	20°	8

Before finalizing your design, request a binding installation drawing.

**Ports**

Motor	Designation	Port function	Code	Size	$p_{\max}$ [bar]	State <sup>2)</sup>
<b>MCR3</b>	<b>A, B</b>	Inlet, outlet	SAE J514	1 1/16-12 UNF	470/420 <sup>1)</sup>	O
	<b>L</b>	Case drain	SAE J514	9/16-18 UNF	10	O
	<b>F</b>	Filler port	SAE J514	3/4-16 UNF	10	X
	<b>X</b>	2 speed port	SAE J514	9/16-18 UNF	35	O
<b>MCR5</b>	<b>A, B</b>	Inlet, outlet	SAE J514	1 1/16-12 UNF	470/420 <sup>1)</sup>	O
	<b>L</b>	Case drain	SAE J514	3/4-16 UNF	10	O
	<b>F</b>	Filler port	SAE J514	3/4-16 UNF	10	X
	<b>X</b>	2 speed port	SAE J514	9/16-18 UNF	35	O
<b>MCR10</b>	<b>A, B</b>	Inlet, outlet	SAE J518 <sup>3)</sup>	3/4 in	470/420 <sup>1)</sup>	O
	<b>L</b>	Case drain	SAE J514	3/4-16 UNF	10	O
	<b>F</b>	Filler port	SAE J514	3/4-16 UNF	10	X
	<b>X</b>	2 speed port	SAE J514	9/16-18 UNF	35	O
<b>MCR15</b>	<b>A, B</b>	Inlet, outlet	SAE J518 <sup>3)</sup>	3/4 in	470/420 <sup>1)</sup>	O
	<b>L</b>	Case drain	SAE J514	3/4-16 UNF	10	O
	<b>F</b>	Filler port	SAE J514	3/4-16 UNF	10	X
	<b>X</b>	2 speed port	SAE J514	9/16-18 UNF	35	O

1) Depends on nominal size

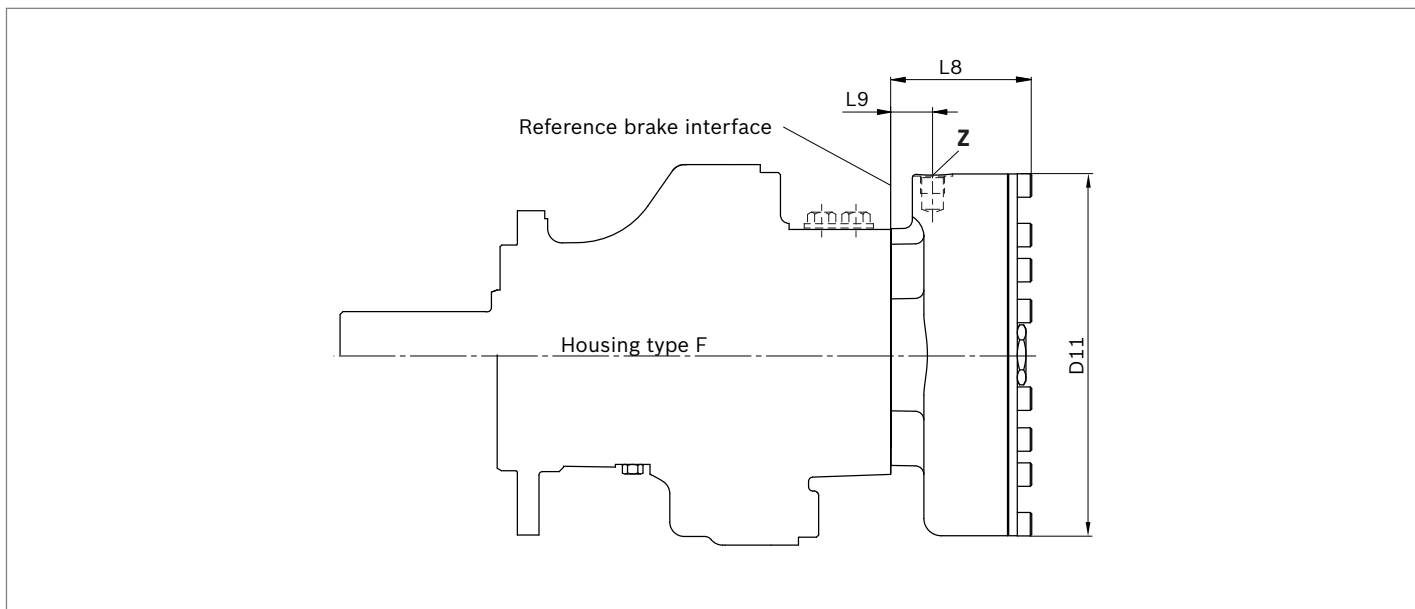
2) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

3) Dimensions according to SAE J518 (Code 62 - high pressure series)



**Holding brake (multi-disc brake)**



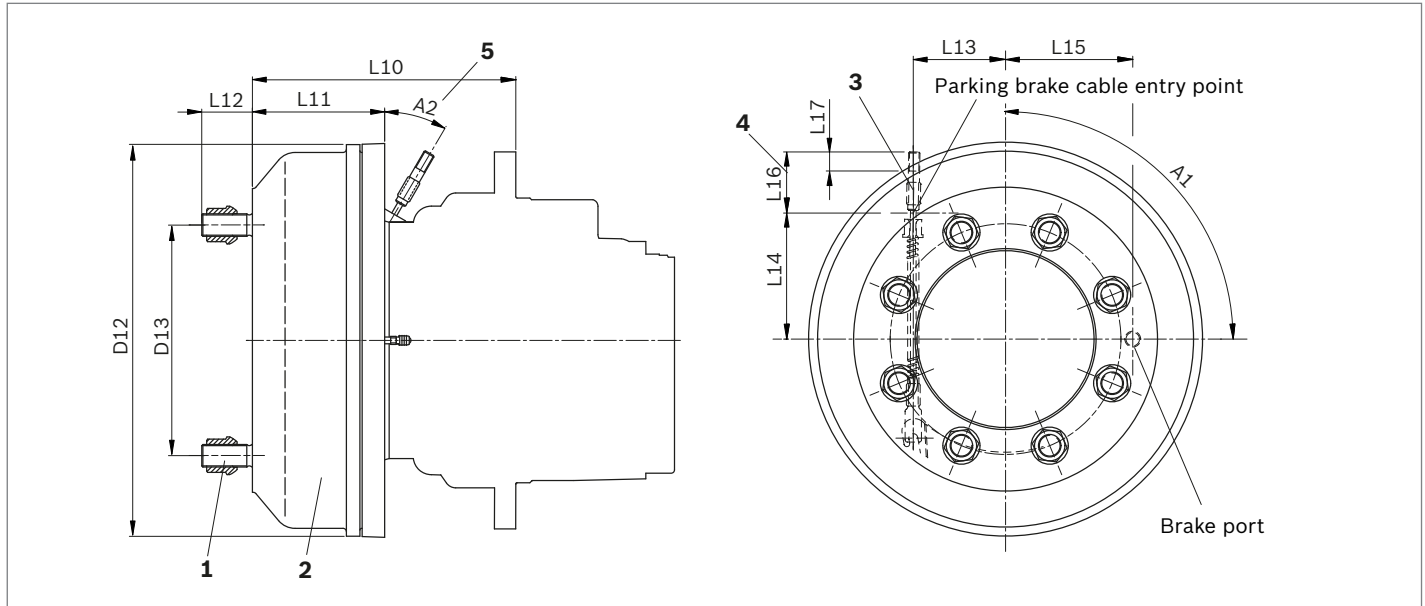
Motor	Brake	L8	L9	D11
MCR3	B2	67.3	22	ø174
MCR5	B2	67.3	22	ø174
	B4	80.7	26.5	ø215
MCR10	B5	84.7	26.5	ø215
	B7	97.8	29	ø251
MCR15	B11	102.3	33	ø282

Motor	Designation	Port function	Code	Size	$p_{max}$ [bar]	State <sup>1)</sup>
MCR3	Z	Brake port	SAE J515	9/16-18 SAE	40	O
MCR5	Z	Brake port	SAE J515	9/16-18 SAE	40	O
MCR10	Z	Brake port	SAE J515	9/16-18 SAE	30	O
MCR15	Z	Brake Port	SAE J515	9/16-18 SAE	30	O

1) O = Must be connected (plugged on delivery)

Before finalizing your design, request a binding installation drawing.

**Dynamic brake (drum brake)**



Motor	Brake	L10	L11	L12	L13	L14	L15	L16	L17	D12	D13	A1	A2
<b>MCR3</b>	<b>C2</b>	193	94.75	34.5	45	82	68.5	55	19	ø222	ø140	90°	30°
<b>MCR5</b>	<b>C4</b>	192	95	32.5	65	86	89	83	19	ø272	ø140	30°	30°
<b>MCR10</b>	<b>C7</b>	234.1	117.5	45	82	-	113	54	17	ø348	ø205	90°	30°
<b>MCR15</b>	<b>C12</b>	294.6	132	36	80	-	120	40	17	ø365	ø225	90°	30°

- 1** **C2** 5 Studs M14x1.5 with spherical wheel nuts
  - C4** 10 Studs M18x1.5 with spherical wheel nuts
  - C7** 8 Studs M20x1.5 with spherical wheel nuts
  - C12** 10 Studs M22x1.5 with hexagonal wheel nuts
- 2** Dynamic drum brake for use with brake fluid DOT 3+5 or SAE JI 703. If brake is to be used with mineral oil a special order is to be made. Please state if seals for mineral oil are required when placing order.
- 3** For use as a mechanical park brake a brake cable (Bowden cable) can be connected from right side for C\*R and left side for C\*L (left is s mirror image of the right type) (\* = 2, 4, 7, 12). Mechanical brake cable is not supplied with the motor.
- 4** Brake cable length.
- 5** Angular position of brake cable.

Before finalizing your design, request a binding installation drawing.

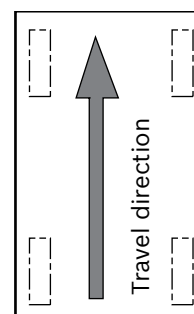
**Dynamic drum brake run-in procedure**

- ▶ Brake the machine hard in forward and reverse directions until the brake drum temperature reaches 200 °C.
- ▶ Allow the brake to cool.
- ▶ To remove residue, brake gently 2 times each in the forward and reverse directions.

**Notice**

The drum brake cylinder port must be oriented as instructed in the installation drawing. The drum brake also has an influence on permitted radial loading due to its offset.











Left side of vehicle  
Ordering code C4L



Right side of vehicle  
Ordering code C4R



## Selection guide

Data sheet	Motor type Application		Frame size					
			3 160..400 cc	5 380..820 cc	6 820..920 cc	10 780..1340 cc	15 1130..2150 cc	20 1750..3000 cc
15198	<b>MCR-F</b> Wheel drives		•	•	-	•	•	-
15200	<b>MCR-W</b> Heavy duty wheel drives		•	•	-	•	-	-
15195	<b>MCR-A</b> Frame integrated drives		•	•	-	•	•	-
15199	<b>MCR-H</b> Integrated drives		•	•	-	•	•	•
15221	<b>MCR-T</b> Track drives		-	•	•	•	-	-
15223	<b>MCR-R Series 41</b> Hydraulic drive assist		-	-	-	•	-	-
15214	<b>MCR-X</b> Slew drives		•	•	-	-	-	-
15197	<b>MCR-C</b> Compact drives		-	-	-	-	-	•
15196	<b>MCR-D</b> Industrial applications		•	•	-	•	-	-
	<b>MCR-E</b> Industrial applications		-	•	-	-	-	-

**Bosch Rexroth Limited**  
Viewfield Industrial Estate  
Glenrothes, Fife  
Scotland, KY6 2RD  
UK  
Phone +44 15 92 631 777  
Telefax +44 15 92 631 936  
www.boschrexroth.com

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