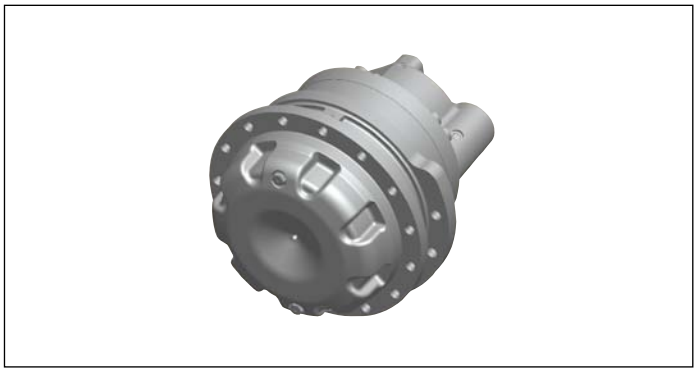
Radial Piston Motor for Track Drives
MCR-T

RE 15221
Edition: 06.2012



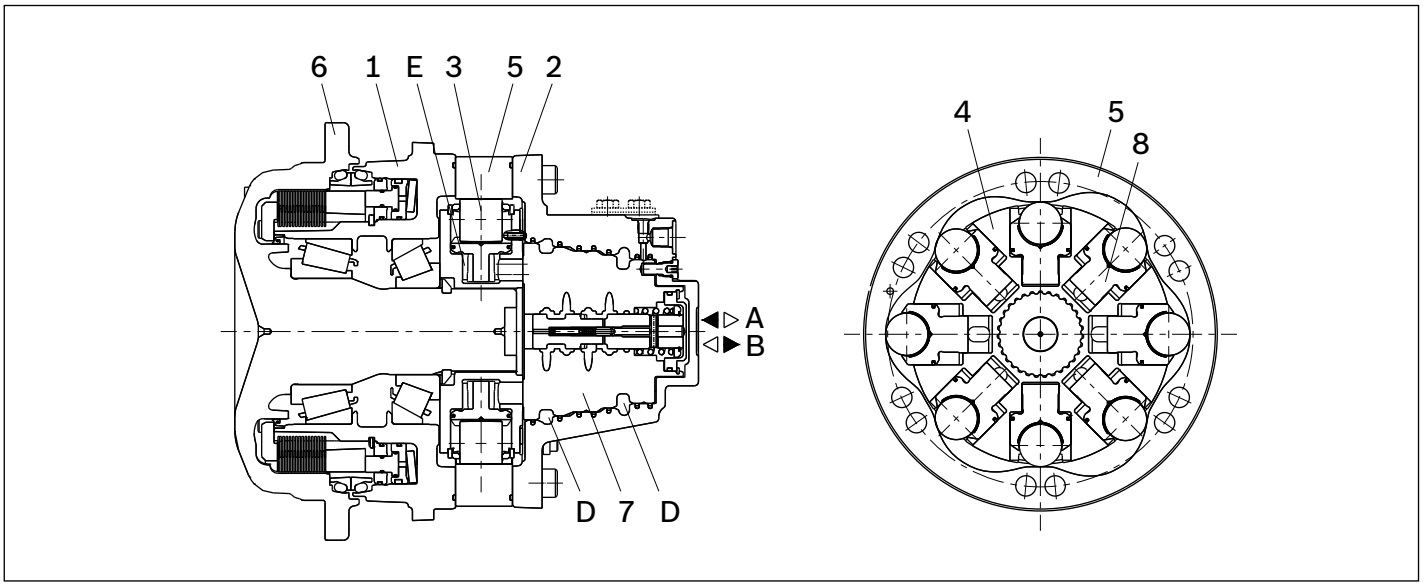
- Series 3X
- Size 380 to 1340
- Differential pressure up to 450 bar
- Torque output up to 8640 Nm (theoretical)
- Speed up to 475 rpm
- Open and closed circuits

Features

- Compact robust construction
- High brake capacity
- High volumetric and mechanical efficiencies
- High pressure rating
- High reliability
- High bearing life
- Low maintenance
- Smooth running at very low speeds
- Low noise
- Freewheeling possible
- Available with
  - Integrated flushing valve
  - Speed sensor
  - Bi-directional two speed
  - Integrated parking brake

Contents

Functional description

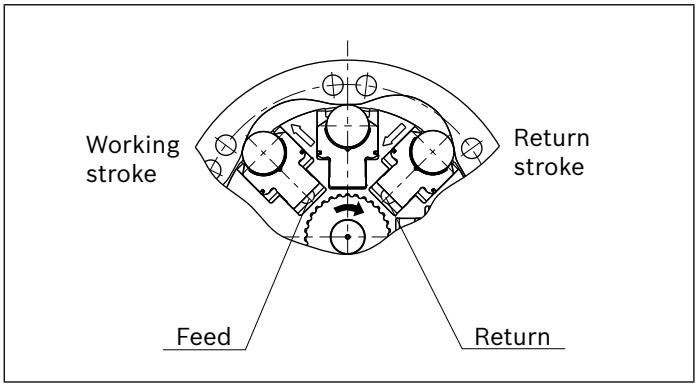


Hydraulic motors type MCR-T are specially designed radial piston motors for track drives.

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 (8) are arranged radially in the cylinder block (4) and make contact with the cam (5) via rollers (3).

Torque generation



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

Flow paths
The ports A and B which are located at 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.

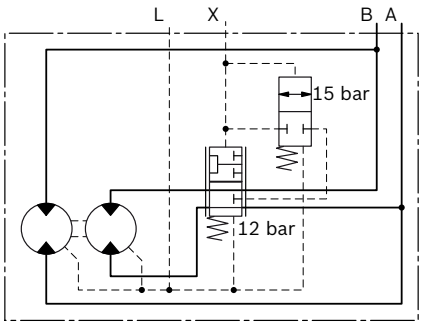
Freewheeling
In certain applications there may be a requirement to free-wheel the motor. This may be achieved by connecting ports A and B to zero pressure and simultaneously applying a pressure of 2 bar to the housing through port L. In this condition, the pistons are forced into the cylinder block which forces the rollers to loose 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. Maximum speed of the motor 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.

▼ **Two-speed motor**

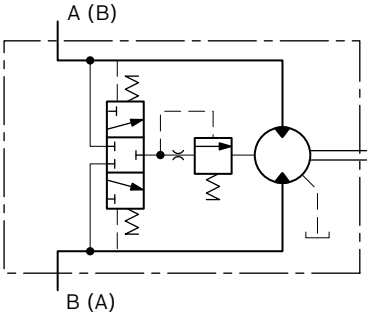


Flushing valve

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 counter-clockwise direction, the flushing valve opens and allows 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, cold 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.

▼ **Motor with flushing valve**



Flushing flow (for $p_{charge} - p_{case}$ = 25 bar)

Ordering code	Flow ±1 L/min
F1	3 L/min
F2	5 L/min
F7	7 L/min
F4	10 L/min
F8	12.5 L/min
F6	13.5 L/min

Holding brake (multi-disc brake)

▼ **Mounting**

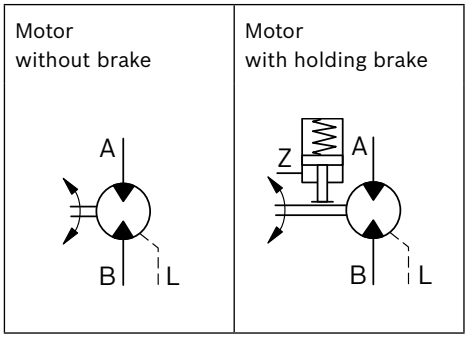
In MCRT, the brake is integrated into the motor itself. The brake parts that are attached to the shaft can rotate while the ones that are attached to the front case remain stationary.

▼ **Brake application**

As a safety requirement in mobile applications a parking brake is 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 that are compressed by a disc spring. The brake is released when oil pressure is applied to brake port “Z” and the pressure in the annular area compresses the disc spring allowing the brake discs to turn independently.

Note: This brake is provided solely for static use - not to be used dynamically.

▼ **Schematic diagrams**

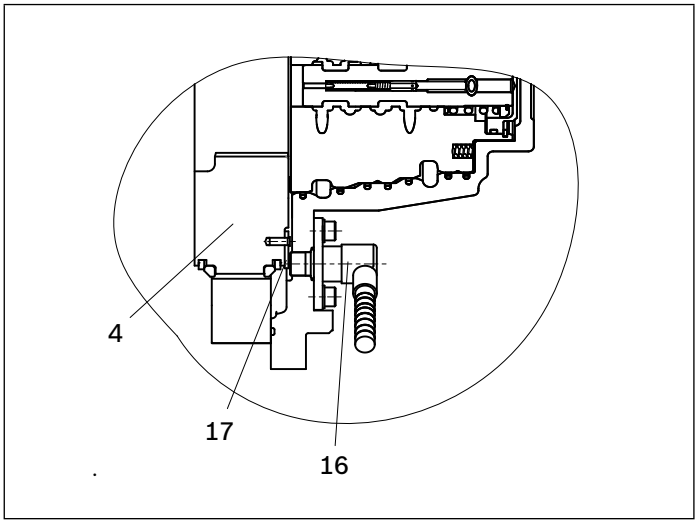


Speed sensor

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.

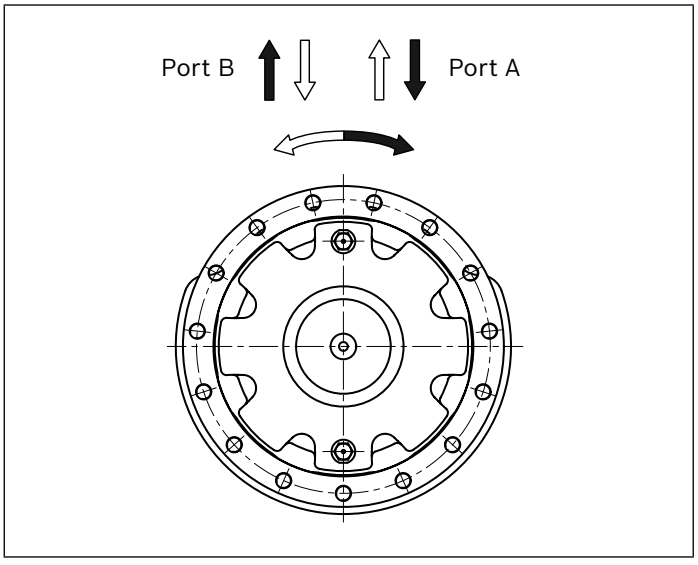
Versions are available for use with regulated supplies (code P1) and for direct connection to a 12 V or 24 V unregulated supply (code P2).

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

(view from drive shaft)



Ordering code

01	02	03	04	05	06		07	08	09	10	11	12	13	14	15	16
MCR		**T**			**Z**	**/**	**3X**		**V**							

Radial piston motor

01	Radial-piston type, low-speed, high-torque motor	**MCR**

Frame size

02	Frame size	5	**5**
		6	**6**
		10	**10**

Housing type

03	Front case flanged	**T**

Nominal size, displacement V_g in cm^3/rev

04	Frame size 5		**380**	**470**	**520**	**565**	**620**	**680**	**750**	**820**
	Low displacement: motors use standard cylindrical pistons	LD	●	●	●	●	–	–	–	–
	High displacement motors use stepped pistons	HD	–	–	–	–	●	●	●	●
	Frame size 6									**920**
	High displacement motors use stepped pistons	HD								●
	Frame size 10			**780**	**860**	**940**	**1120**	**1180**	**1250**	**1340**
	Low displacement: motors use standard cylindrical pistons	LD		●	●	●	–	–	–	–
	High displacement motors use stepped pistons	HD		–	–	–	●	●	●	●

Drive shaft

05	With flange ø284 mm	**F284**
	With flange ø315 mm (only available with MCR10T)	**F315**

Through shaft

06	Without through shaft	**Z**

Series

07	Series 30 to 39 (series 30 to 39 are dimensionally interchangeable)	**3X**

Brake

08	Without brake	**A0**
	Hydraulic release spring applied multi-disc holding brake 4500 Nm	**B4.5**
	Hydraulic release spring applied multi-disc holding brake 5000 Nm	**B5**
	Hydraulic release spring applied multi-disc holding brake 7000 Nm (only available with MCR10T)	**B7**

Seals

09	NBR (nitrile rubber)	**M**
	FKM (fluoroelastomer/Viton)	**V**

Single/two-speed operation

10	Single speed, standard direction of rotation	**1L**
	Bi-directional two speed, standard direction of rotation	**2WL**

Ports

11	Tapped with UNF thread (SAE J514)	**12**
	Tapped with UNF thread (SAE J514) (A & B ports SAE split flange metric bolt holes) (only available with MCR10T)	**48**

● = Available – = Not available

01	02	03	04	05	06		07	08	09	10	11	12	13	14	15	16
MCR		**T**			**Z**	**/**	**3X**		**V**							

Studs

12	Without studs (no code)	
	With wheel studs and nuts	**S**

Speed sensor

13	Without sensor (no code)	
	Sensor ready	**P0**
	Sensor without regulator	**P1**
	Sensor with regulator	**P2**

Flushing

14	Without flushing (no code)	
	With flushing (see table on page 3)	**F1-F8**

Special order

15	Special feature	**SOXXX**

Other

16	Mark in text here	*

Technical data

Frame size			**MCR5T**								**MCR6T**
Type of mounting			Flange mounting								
Pipe connections[1)2)]			Threaded per SAE J514								
Displacement[11)]	V_g	cm^3/rev	380	470	520	565	620	680	750	820	920
Output torque											
Specific torque (at Δp = 250 bar)		Nm	1360	1680	1860	2020	2220	2440	2690	2940	3290
Maximum torque[3)]	T_{max}	Nm	2450	3030	3350	3640	4000	4380	4830	5290	5930
Output speed											
Minimum speed for smooth running[4)]	n_{min}	rpm	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Maximum speed (1L)[5)6)]	n_{max}	rpm	475	385	345	320	290	265	240	220	195
Maximum speed (2WL)[5)6)]	n_{max}	rpm	475	385	345	320	290	265	240	220	195
Output power											
Nominal power[8)]	P	kW	29	29	29	29	35	35	35	35	35
Pressure											
Operating pressure[8)]	p_{nom}	bar	250	250	250	250	250	250	250	250	250
Maximum differential pressure[3)7)]	Δp_{max}	bar	450	450	450	450	450	450	450	450	450
Maximum pressure at port „A“ or „B“[3)7)]	p_{max}	bar	470	470	470	470	470	470	470	470	470
Maximum case drain pressure	$p_{case\ max}$	bar	10	10	10	10	10	10	10	10	10
Weight	m	kg	62.8	62.8	62.8	62.8	62.8	62.8	62.8	62.8	65.9
Moment of Inertia	J	kgm^2	0.000139	0.000139	0.000139	0.000139	0.000139	0.000139	0.000139	0.000139	0.000150
Hydraulic fluid[9)]											
Hydraulic fluid type			Mineral oils (HLP) to DIN 51524								
Hydraulic fluid temperature range[10)]	$t_{min/max}$	°C	-20 to 85								
Viscosity range	$\nu_{min/max}$	mm^2/s	10 to 2000								
Fluid cleanliness			ISO 4406, Class 20/18/15								
Holding brake (disc brake)			B4.5						B5		
Minimum holding torque	T_{min}	Nm	4500						5000		
Release pressure (min)	$p_{rel\ min}$	bar	12.0						12.0		
Release pressure (max)	$p_{rel\ max}$	bar	15.0						15.0		
Maximum pressure at brake port „Z“	p	bar	40						40		
Oil volume to operate brake	V_{rel}	cm^3	20.0						20.0		

1) Ensure motor case is filled with oil prior to start-up. See operating manual RE 15215-B
2) For installation and maintenance details, please see operating manual RE 15215-B.
3) Maximum values should only be applied for a small portion of the duty cycle. Please consult Rexroth Engineering Department in Glenrothes for motor life calculations based on particular operating cases.
4) For continuous operation at speeds <5 rpm please consult Rexroth Engineering Department in Glenrothes
5) Based on nominal no-load Δp of 20 bar in full-displacement mode.
6) Warning! During the running in period of the motor (min. 20 hrs) it should not be run unloaded at >100 rpm.
7) When operating motors in series, please consult Rexroth Engineering Department in Glenrothes.
8) Guide values for continuous operation.
9) For use with environmentally acceptable fluids HEES, HEPG, HETG, Viton seals must be specified.
   For further information, please refer to RE 90221.
10) Extension of the allowable temperature range may be possible depending on specification.
    Please consult Rexroth Engineering Department in Glenrothes for further details.
11) For available displacement options please consult Rexroth Engineering Department in Glenrothes
    Note: For actual motor life calculations under typical or specified duty cycles, contact Rexroth Engineering Department in Glenrothes.

Frame size			**MCR10T**						
Type of mounting			Flange mounting						
Pipe connections[1)2)]			Flanged per SAE J518 (code 62), threaded per SAE J514						
Displacement[11)]	V_g	cm³/rev	**780**	860	940	1120	1180	1250	1340
Output torque									
Specific torque (at Δp = 250 bar)		Nm	2790	3080	3370	4010	4230	4480	4800
Maximum torque[3)]	T_{max}	Nm	5030	5540	6060	7220	7610	8060	8640
Output speed									
Minimum speed for smooth running[4)]	n_{min}	rpm	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Maximum speed (1L)[5) 6)]	n_{max}	rpm	**335**	300	275	230	220	210	195
Maximum speed (2WL)[5) 6)]	n_{max}	rpm	**335**	300	275	230	220	210	195
Output power									
Nominal power[8)]	P	kW	44	44	44	50	50	50	50
Pressure									
Operating pressure[8)]	p_{nom}	bar	250	250	250	250	250	250	250
Maximum differential pressure[3)7)]	Δp_{max}	bar	450	450	450	450	450	450	450
Maximum pressure at port „A“ or „B“[3)7)]	p_{max}	bar	470	470	470	470	470	470	470
Maximum case drain pressure	$p_{case\ max}$	bar	10	10	10	10	10	10	10
Weight	m	kg	93.6	93.6	93.6	93.6	93.6	93.6	93.6
Moment of Inertia	J	kgm²	0.000266	0.000266	0.000266	0.000266	0.000266	0.000266	0.000266
Hydraulic fluid[9)]									
Hydraulic fluid type			Mineral oils (HLP) to DIN 51524						
Hydraulic fluid temperature range[10)]	$t_{min/max}$	°C	-20 to 85						
Viscosity range	$v_{min/max}$	mm²/s	10 to 2000						
Fluid cleanliness			ISO 4406, Class 20/18/15						
Holding brake (disc brake)			B7						
Minimum holding torque	T_{min}	Nm	7000						
Release pressure (min)	$p_{rel\ min}$	bar	10.0						
Release pressure (max)	$p_{rel\ max}$	bar	15.7						
Maximum pressure at brake port „Z“	p	bar	40						
Oil volume to operate brake	V_{rel}	cm³	22.0						

1) Ensure motor case is filled with oil prior to start-up. See operating manual RE 15215-B
2) For installation and maintenance details, please see operating manual RE 15215-B.
3) Maximum values should only be applied for a small portion of the duty cycle. Please consult Rexroth Engineering Department in Glenrothes for motor life calculations based on particular operating cases.
4) For continuous operation at speeds <5 rpm please consult Rexroth Engineering Department in Glenrothes
5) Based on nominal no-load Δp of 20 bar in full-displacement mode.
6) Warning! During the running in period of the motor (min. 20 hrs) it should not be run unloaded at >100 rpm.
7) When operating motors in series, please consult Rexroth Engineering Department in Glenrothes.
8) Nominal values are guide values for continuous operation.
9) For use with environmentally acceptable fluids HEES, HEPG, HETG, Viton seals must be specified.
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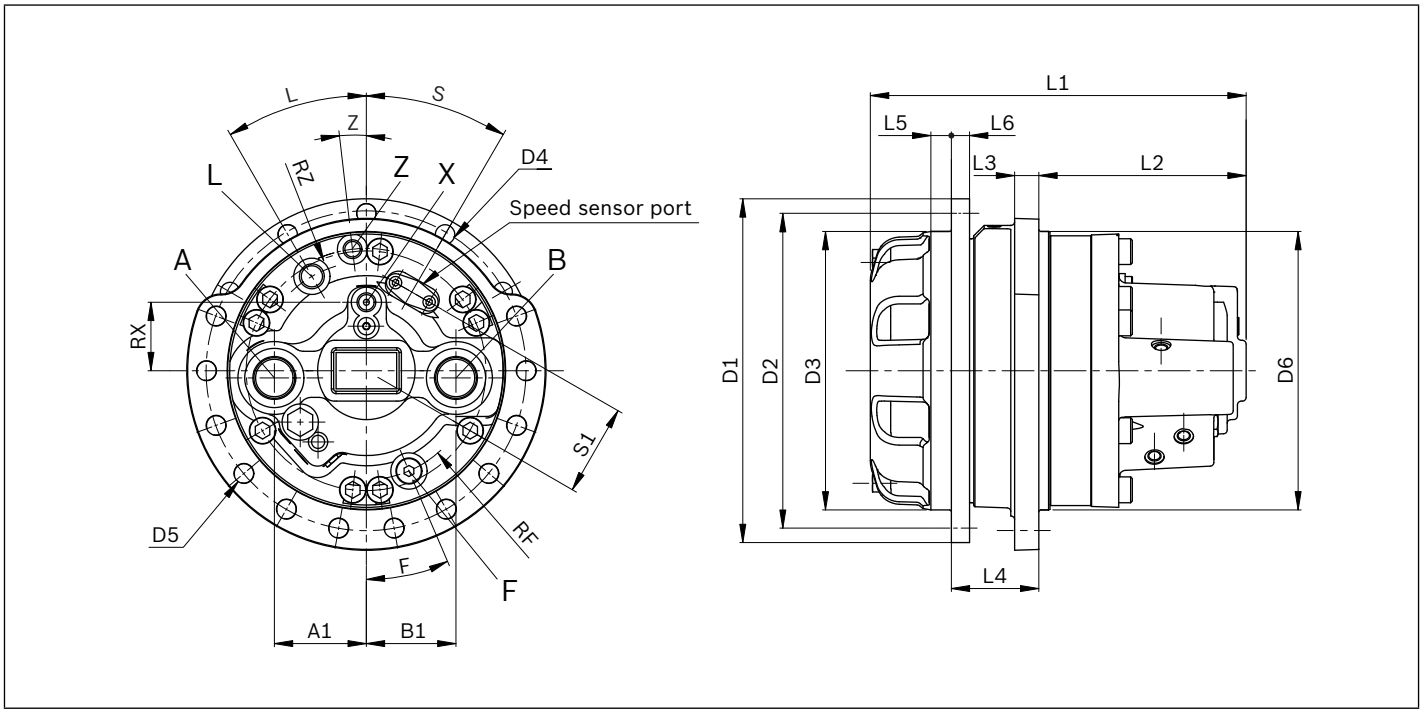
Dimensions



Motor	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6
MCR5T	ø284	ø260	ø230	15 x 1/2-13UNC	8 x 5/8-11UNC	ø230	310.4	171.2	20	72	17	15
MCR6T	ø284	ø260	ø230	15 x 1/2-13UNC	10 x ø17	ø240	310.4	171.2	20	72	17	15
MCR10T	ø321	ø285	ø255	8 x M16	10 x ø17	ø268	349.8	195.8	16	86	16	18

Motor	L	S	Z	F	RX	RZ	RF	A1	B1	S1
MCR5T	30°	30°	6.5°	23°	56.5	R101	R90	76	74	75
MCR6T	35°	30°	18.5°	23°	56.5	R101	R95	76	74	75
MCR10T	-87°	150°	-76.2°	-87°	71	R121	R108	45	45	89

Ports

Designation	Port function	Ordering code 12	Size	Ordering code 48[1)]	Size[1)]	Maximum pressure [bar]	State[2)]
A, B	Inlet, outlet	SAE J514	1 5/16-12 UN	SAE J518	3/4 in	470	O
L	Case drain	SAE J514	3/4-16 UNF	SAE J514	3/4-16 UNF	10	O
X	2 speed port	SAE J514	9/16-18 UNF	SAE J514	9/16-18 UNF	30	O
Z	Brake port	SAE J514	9/16-18 UNF	SAE J514	9/16-18 UNF	40	O
F	Filler port	SAE J514	3/4-16 UNF	SAE J514	3/4-16 UNF	10	X

1) Applicable to MCR10T only

2) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Before finalizing your design, request a binding installation drawing.
Dimensions in mm

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