Radial Piston Motor
MCR
Series 30, 31 and 32

Operating Instructions
The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

© This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth AG. It may not be reproduced or given to third parties without its consent.

An example configuration is shown on the title page. The delivered product may, therefore, differ from the product which is pictured.

The original operating instructions were created in the English language.
# Contents

1 About this document ........................................................................................................... 4  
   1.1 Related documents ........................................................................................................ 4  
   1.2 Abbreviations used ...................................................................................................... 5  

2 General safety instructions ................................................................................................. 6  
   2.1 Intended use ................................................................................................................ 6  
   2.2 Improper use ............................................................................................................... 6  
   2.3 Qualification of personnel ......................................................................................... 6  
   2.4 Safety instructions in this document ......................................................................... 7  
   2.5 Adhere to the following instructions ....................................................................... 7  
   2.6 Operating organisation's obligations .................................................................... 8  

3 Delivery contents ............................................................................................................... 9  

4 Product description .......................................................................................................... 10  
   4.1 Performance description ........................................................................................... 10  
   4.2 Device description ...................................................................................................... 10  
   4.3 Product identification ............................................................................................... 16  
   4.4 Product variants ....................................................................................................... 17  

5 Transport and storage ....................................................................................................... 18  
   5.1 Transporting the radial piston motor ................................................................... 18  
   5.2 Storing the radial piston motor ............................................................................ 20  

6 Installation ........................................................................................................................ 22  
   6.1 Unpacking ............................................................................................................... 22  
   6.2 Installation conditions ............................................................................................. 22  
   6.3 Installation position ................................................................................................. 23  
   6.4 Installing the radial piston motor .......................................................................... 25  

7 Commissioning ................................................................................................................ 32  
   7.1 First commissioning ............................................................................................... 33  
   7.2 Recommissioning after downtime ....................................................................... 35  
   7.3 Running-in phase .................................................................................................... 35  
   7.4 Final checks ............................................................................................................. 36  

8 Operation .......................................................................................................................... 37  
   8.1 Manual brake release in case of emergency .................................................... 38  

9 Maintenance and repair .................................................................................................... 39  
   9.1 Cleaning and care .................................................................................................... 39  
   9.2 Inspection ................................................................................................................ 40  
   9.3 Maintenance .......................................................................................................... 40  
   9.4 Repair ..................................................................................................................... 41  
   9.5 Spare parts .............................................................................................................. 41  

10 Decommissioning .......................................................................................................... 42  

11 Removal from machine and replacement ..................................................................... 42  
   11.1 Required tools ....................................................................................................... 42  
   11.2 Preparing for removal ........................................................................................... 42  
   11.3 Removal of the radial piston motor .................................................................... 42  
   11.4 Preparing the motor for storage or further use ................................................. 43  

12 Disposal .......................................................................................................................... 43  
   12.1 Environmental protection ................................................................................... 43  

13 Modification .................................................................................................................... 43  

14 Troubleshooting ............................................................................................................. 44  
   14.1 How to proceed for troubleshooting ................................................................ 44  
   14.2 Troubleshooting table .......................................................................................... 45  

15 Technical data ................................................................................................................ 49  

16 Appendix ........................................................................................................................ 49  
   16.1 Address directory ................................................................................................. 49  

17 Index ................................................................................................................................. 50
1 About this document

These instructions contain important information on the safe and correct installation, transport, commissioning, maintenance, removal and simple troubleshooting of the radial piston motor MCR series 30, 31 and 32.

- Read these instructions completely, especially chapter 2 “General safety instructions”, before working with the MCR radial piston motor.

1.1 Related documents

The MCR radial piston motor is a system component. Also observe the instructions for the other system components.

Further information on the MCR radial piston motor, its installation and operation can be found in the Rexroth documents listed in the following table.

Table 1: Related documents

<table>
<thead>
<tr>
<th>Documentation</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation drawing</td>
<td>Contains the outer dimensions, all connections and the hydraulic circuit diagram for the MCR radial piston motor.</td>
</tr>
<tr>
<td>Data sheet:</td>
<td></td>
</tr>
<tr>
<td>RE 15205</td>
<td>MCR03</td>
</tr>
<tr>
<td>RE 15216</td>
<td>MCR3X</td>
</tr>
<tr>
<td>RE 15206</td>
<td>MCR05</td>
</tr>
<tr>
<td>RE 15214</td>
<td>MCR5X</td>
</tr>
<tr>
<td>RE 15207</td>
<td>MCR10</td>
</tr>
<tr>
<td>RE 15208</td>
<td>MCR15</td>
</tr>
<tr>
<td>RE 15209</td>
<td>MCR20</td>
</tr>
<tr>
<td>Data sheet RE 90220</td>
<td>Describes the requirements for a hydraulic fluid based on mineral oil and related hydrocarbons for operation with Rexroth hydraulic components and assists in selecting a hydraulic fluid for the system.</td>
</tr>
<tr>
<td>Data sheet RE 90221</td>
<td>Describes the requirements of an environmentally acceptable hydraulic fluid for operation with Rexroth hydraulic components and assists in selecting a hydraulic fluid for the system.</td>
</tr>
<tr>
<td>Data sheet RE 90229</td>
<td>Contains additional information on the use of Rexroth radial piston motors with HF hydraulic fluids.</td>
</tr>
<tr>
<td>Data sheet RE 90321</td>
<td>Contains additional information on the use of Rexroth radial piston motors at low temperatures.</td>
</tr>
</tbody>
</table>

Also observe all European or national legislation and regulations, and the rules for the prevention of accidents and for environmental protection applicable in your country.
1.2 Abbreviations used

Table 2: Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCR</td>
<td>Radial piston motor, multi stroke</td>
</tr>
<tr>
<td>RE</td>
<td>Rexroth document in the English language</td>
</tr>
</tbody>
</table>
2 General safety instructions

The radial piston motor has been manufactured according to the accepted rules of current technology. There is, however, still a danger of personal injury or damage to equipment if the following general safety instructions and the warnings contained in this document are not complied with.

- Read these instructions completely and thoroughly before working with the radial piston motor.
- Keep these instructions in a location where they are accessible to all users at all times.
- Always include the operating instructions when you pass the radial piston motor onto third parties.

2.1 Intended use

Radial piston motors are components in terms of the EU machinery directive 98/37/EC (sub units). Radial piston motors are not ready-to-use machines for the purpose of the EU machinery directive. The product/component is exclusively intended for being integrated in a machine or system or for being assembled with other components to form a machine or system. The product may only be commissioned after it has been installed in the machine/system for which it is intended.

The radial piston motor converts hydrostatic flow into mechanical rotation. It is certified for use as a hydraulic motor in hydrostatic drives.

- Observe the technical data, operating conditions and performance limits as specified in the data sheet and installation drawing.

The radial piston motor is not designed for private use.

Intended use includes having read and understood these instructions, especially the chapter 2 “General safety instructions”.

2.2 Improper use

The radial piston motor may not be used in explosive environments, unless supplied with an appropriate ATEX certificate.

In addition, any use of the radial piston motor other than described in section 2.1 “Intended use” is prohibited.

2.3 Qualification of personnel

Installation, commissioning and operation, removal, maintenance and repair require basic mechanical, hydraulic and electrical knowledge, as well as knowledge of the appropriate technical terms. For transporting and handling the product, additional knowledge is necessary with regard to working with a lifting device and the corresponding attachment equipment. In order to ensure operating safety, these activities may therefore only be carried out by qualified personnel or an instructed person under the direction and supervision of qualified personnel.

Qualified personnel are those who can recognise possible hazards and institute the appropriate safety measures due to their professional training, knowledge, and experience, as well as their understanding of the relevant conditions pertaining to the work to be done. Qualified personnel must observe the rules relevant to the subject area.
2.4 Safety instructions in this document

In this manual, there are safety instructions before the steps whenever there is a danger of personal injury or damage to equipment. The measures described to avoid these hazards must be observed.

Safety instructions are set out as follows:

<table>
<thead>
<tr>
<th>SIGNAL WORD!</th>
<th>Type of danger!</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consequences</td>
</tr>
<tr>
<td></td>
<td>Precautions</td>
</tr>
</tbody>
</table>

- **Safety sign** (warning triangle): draws attention to the danger
- **Signal word**: identifies the degree of the danger
- **Type of danger**: identifies the type or source of the danger
- **Consequences**: describes what occurs if the safety instructions are not complied with
- **Precautions**: states how the danger can be avoided.

The signal words have the following meaning:

<table>
<thead>
<tr>
<th>Signal word!</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER!</td>
<td>Indicates an imminently hazardous situation which, if not avoided, will certainly result in death or serious injury.</td>
</tr>
<tr>
<td>WARNING!</td>
<td>Indicates a potential danger which, if not avoided, could result in death or serious injury.</td>
</tr>
<tr>
<td>CAUTION!</td>
<td>Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment.</td>
</tr>
</tbody>
</table>

If this information is disregarded, the operating performance may be impaired.

2.5 Adhere to the following instructions

**General instructions**

- Observe the regulations for accident prevention and environmental protection for the country where the product is used and at the workplace.
- Only use Rexroth radial piston motors in good technical order and condition.
  - Inspect the product for obvious defects.
- Do not modify or retrofit the radial piston motor.
- Only use the product within the performance range provided in the technical data.
- Persons who install, commission, operate, remove or maintain Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.
- The warranty only applies to the delivered configuration.
- The warranty is invalidated if the product is incorrectly installed, commissioned or operated, or if it is not used as intended and/or handled properly.
- Never use the product as a handle or step.
- Do not place any objects on it.
- The noise emission of radial piston motors depends on speed, operating pressure and installation conditions. The sound pressure level may rise to
General safety instructions

significant levels during normal operating conditions. This can cause hearing damage.

- Always wear hearing protection while working in the vicinity of the operating radial piston motor.

- The radial piston motor heats up considerably during operation:
  - Allow the radial piston motor to cool down sufficiently before touching it.
  - Wear heat-resistant protective clothing, e.g. gloves.

- Some hydraulic fluids are flammable.
  - Keep open flames and ignition sources away from the radial piston motor.

**During transport**

- Make certain that the lifting gear has adequate lifting capacity. The weight can be found in chapter 5 “Transport and storage”.

**During installation**

- Before installing, make sure that all fluids have been removed from the radial piston motor to prevent mixing with the hydraulic fluid used in the system.
- Always set up the relevant part of the system so that it is depressurised and isolated from the electrical supply before installing the product. Protect the system against being switched on.
- Lay cables and lines so that they cannot be damaged and no one can trip over them.
- Before commissioning, make sure that all hydraulic connections are tight and that all the connection seals and plugs are installed correctly to ensure that they are leakproof and that fluids and contaminants are prevented from penetrating the product.
- When installing, ensure absolute cleanliness in order to prevent contaminants such as welding beads or metal cuttings from getting into the hydraulic lines and causing product wear or malfunction.

**During commissioning**

- Ensure that all electrical and hydraulic connections and ports are connected or plugged. Only commission a completely installed product.

**During cleaning**

- Plug all openings with the appropriate protective equipment in order to prevent detergents from penetrating the system.
- Never use solvents or aggressive detergents. Use only water and, if necessary, a mild detergent to clean the radial piston motor.
- Do not point the high-pressure cleaner at sensitive components, e.g. shaft seal, electrical connections and electrical components.

**During maintenance and repair**

- Perform the prescribed maintenance work at the intervals specified in the operating instructions (see section 9.3 “Maintenance”).
- Make sure that no lines, connections or components are disconnected as long as the system is under pressure. Protect the system against being switched on.

**Disposal**

- Dispose of the product and the hydraulic fluid in accordance with the currently applicable national regulations in the relevant country.

2.6 Operating organisation’s obligations

The organisation operating the radial piston motor from Rexroth must provide personnel training on a regular basis regarding the following subjects:

- Observation and use of the operating instructions and the legal regulations.
- Intended use and operation of the radial piston motor.
- Observation of the instructions from the factory security offices and of the work instructions from the operating organisation.

Rexroth offers specialised training. An overview of the available training can be found on the internet at: http://www.boschrexroth.de/didactic.
3 Delivery contents

The delivery contents includes the ordered quantity of radial piston motors along with the corresponding port protection.

The following ports are protected with shipping plugs/blanking plates:

- Standard
  - main ports A and B
  - drain port L
- Where applicable
  - brake port Z
  - 2-speed port X
  - filler port F (metal plug)
4 Product description

4.1 Performance description

A radial piston motor converts fluid flow into mechanical rotation. It is designed for mobile and static applications. Refer to the data sheet and installation drawing for the technical data, operating conditions and limits of the radial piston motor.

4.2 Device description

The MCR is a hydraulic motor with pistons arranged radially within a rotary group. It is a low-speed, high torque motor which operates according to the multiple stroke principle and delivers torque directly to the output shaft. MCR motors can be used both in open and closed circuits.

Open circuit

In an open circuit, the hydraulic fluid flows from the tank to the hydraulic pump where it is pumped to the radial piston motor. From the motor, the medium then flows in an unpressurised state back to the tank where it is returned to the hydraulic pump. The output direction of the radial piston motor can be changed with a directional valve.

Closed circuit

In a closed circuit, the returning hydraulic fluid flows from the radial piston motor directly to the hydraulic pump. The output direction of the motor is changed by reversing the flow direction in the variable pump. Closed circuits are generally used for hydrostatic transmission in mobile applications.

4.2.1 Section of the radial piston motor

Fig. 2: Typical section of an MCR motor

1 Front case
2 Rear case
3 Piston
4 Cylinder block
5 Cam
6 Output shaft
7 Flow distributor
8 Roller
9 Holding brake or end cover
4.2.2 Functional description

A radial piston motor consists of a two part housing (1, 2), rotary group (3, 4), cam (5), output shaft (6) and flow distributor (7). It converts hydrostatic energy into mechanical energy.

Hydraulic fluid is directed from the motor inlet port in the rear case (2) via the flow distributor (7) through galleries to the cylinder block (4). The radially arranged pistons (3) in the cylinder bores face a pressure increase and perform via rollers (8) a stroke movement against the cam ring (5). The reaction force at the cam ring generates a torque, which is transferred to a output shaft (6) via splines in the cylinder block (4).

If the torque exceeds the shaft load, the cylinder block turns, causing the pistons to stroke (working stroke). Once the end of a stroke is reached the piston is returned to its bore by the reaction force at the cam (return stroke) and the fluid is fed to the motor outlet port in the rear case.

The output torque is produced by the force resulting from the pressure and piston surface. It increases with the pressure difference between the high- and low-pressure side.

The output speed depends on the displacement and is proportional to the inward flow.

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

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

Bearings
- Tapered roller bearings capable of transmitting high axial and radial forces are fitted as standard, except on Hydrobase motors (half motor without front case).

Freewheeling
- In certain applications there may be a requirement to freewheel 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.

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.

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 between 3 – 13.5 l/min based on a boost/charge pressure of 25 bar.
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 brake is mounted by the way of the rear case (2) and brake shaft (16). A disc pack (11), with alternate discs splined to the brake shaft and brake housing, is compressed by the force of a disc spring (10) acting through a piston (12). The friction between the discs generates a holding torque.

When fluid is fed via the brake port Z into the annular area (9), the pressure on the underside of the piston rises, opposing the spring force. If sufficient pressure is applied, the piston moves to the right, removing the compression on the disc pack and allowing the motor to turn freely. When the pressure is removed the spring forces the piston back to the left and once again compresses the disc pack.

Thus, the brake is fail-safe.

The holding brake is designed solely for static use once the motor has stopped rotating.

Manual release of holding brake:
In case of hydraulic system failure, the brake may be manually released by loosening the end cover screws (13), or by removing plug (14), where present, and inserting a puller into the tapped hole on the brake piston (15).
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.

Operation of brake:
- for dynamic braking: hydraulic brake fluid (special order required for mineral oil operation)
- for holding brake: mechanical brake cable (not supplied)

A Hall-Effect speed sensor (14) 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 (15) 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 and for direct connection to 12 V or 24 V unregulated supplies.

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. These “sensor-ready” motors may be fitted with a sensor at a later date.

Some motors are intended for open-circuit operation as drive motors for the slewing function primarily of excavators in the 5 to 8 ton weight range. Therefore a valve block is assembled to the motor to fulfil the special requirements.
Product description

Anti-shock relief valves
Cross-port relief valves are fitted to facilitate use in open circuits. These valves have an anti-shock function to limit the rate of rise of pressure and prevent overly rapid changes in acceleration, thus limiting the shock felt by the machine operator and extending gear life.

With reference to the relief valve section, these valves function as follows:

1. Flow enters as shown, causing the small piston (1) to push against the spring.
2. When sufficient pressure builds up behind the small piston to overcome the spring force, it moves to the right, releasing fluid.
3. The pressure causes oil to flow through the orifice (2) to the rear of the large piston (3).
4. Pressure builds up at the rear of the large piston causing it to move to the right and further compress the spring. This movement gradually increases the relief pressure until the final setting is reached.

The result is a two-stage relief valve giving a rapid step up to the initial opening pressure of the small piston, followed by a gradual rise to the final pressure setting.

Anti-cavitation valves
During deceleration it is necessary to maintain sufficient pressure at the motor inlet to hold the pistons against the cam ring and prevent cavitation. For this reason the motor is equipped with a make-up port M, which feeds anti-cavitation check valves connected to ports A and B (see schematic diagram above).

Brake valve option
The holding brake is designed to be engaged only once the motor has stopped rotating. Premature engagement can lead to noise, overheating and wear or seizure of the brake discs. Thus, there is a need to delay brake engagement after the control joystick pilot pressure falls to zero, for sufficient time to allow the
Product description

machine upperstructure to come to rest in the worst case of maximum speed and maximum moment of inertia. For this reason, a brake control valve with a delay function is offered as an option for the swing drive valve block.

The valve functions as follows (see schematic diagram above):

1. The brake release pressure is fed to port Z.
2. Pilot pressure from the joystick (one line for each direction) is fed to ports X₁ and X₂ and an internal shuttle valve feeds the higher of these to the brake control valve.
3. If the pilot pressure is sufficient, the valve shifts and the brake is immediately released.
4. When the joystick is returned to the centre position, pilot pressure falls, the valve shifts back and flow is drained from the brake at a metered rate determined by the diameter of an orifice within the valve. This metering of the flow out of the brake results in a delay in engagement.

Where the brake valve option is not supplied, the above functions must be implemented externally to the motor.

4.3 Product identification

The radial piston motor can be identified by the label. The following example shows a label from an MCR radial piston motor:

![Label of a MCR motor](image)

Fig. 13: Label of a MCR motor

- 1 Manufacturer
- 2 Customer part number (where applicable)
- 3 Motor serial number
- 4 Barcode of motor serial number
- 5 Internal plant designation
- 6 Manufacture date (yrWwk)
- 7 Motor description
- 8 Barcode of motor part number
- 9 Motor part number

Additionally the motor serial number (3) along with the manufacture date (6) is stamped on either the front case, rear case or the end cover of the radial piston motor.

The cam part number along with the displacement is stamped on the cam. These numbers are normally located in line with the main work ports.
4.4 Product variants

There are many different product variants depending on the motor code.

The main visual differences relate to:

• Frame size
• Front case
• Front shaft
• Brake
• Auxiliary functions such as 2-speed, flushing, speed sensor, valve block

Examples are:

Fig. 14: Examples of different MCR motor types

For full details please refer to the motor code in the relevant data sheet.
5 Transport and storage

5.1 Transporting the radial piston motor

Risk of damage!
Impulse forces on the output shaft can damage the radial piston motor.
- Do not hit the output shaft of the radial piston motor.
- Do not sit the radial piston motor on the output shaft.
- Details on the permissible axial and radial forces can be found in the data sheet.

Radial piston motors may be lifted by hand but for units weighting more than 15 kg, Rexroth recommends using a fork lift truck or lifting device.
- Make sure that the fork lift truck or lifting device has adequate lifting capacity.

<table>
<thead>
<tr>
<th>Dimensions and weights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 3: Dimensions and weights</strong></td>
</tr>
<tr>
<td><strong>Frame size</strong></td>
</tr>
<tr>
<td>Weight kg</td>
</tr>
<tr>
<td>Standard MCR</td>
</tr>
<tr>
<td>add for 2-speed</td>
</tr>
<tr>
<td>add for holding brake</td>
</tr>
<tr>
<td>add for dynamic brake</td>
</tr>
<tr>
<td>Width mm</td>
</tr>
<tr>
<td>Height mm</td>
</tr>
<tr>
<td>Length mm</td>
</tr>
</tbody>
</table>

The weight specification may vary depending on the motor type.

5.1.1 Transporting with lifting device

For transporting, the radial piston motor can be connected to a lifting device via an eye bolt, a hook or a lifting sling.

Transport with eye bolt
Some drive shafts (depending on the motor type) can be used to transport the radial piston motor. Thus, the radial piston motor can be suspended from the drive shaft.
- To do this, screw an eye bolt fully into the thread on the drive shaft. The size of the thread is stated on the installation drawing.
- Make sure that each eye bolt can bear the total weight of the radial piston motor plus approx. 20%.

The radial piston motor can be hoisted as shown in Fig. 15: using the eye bolt screwed into the drive shaft, without any risk of damage.
Fixing the eye bolt

Some motors (depending on the motor type) have a mounting flange which can be used to transport the radial piston motor.

- To do this, insert the hook into one of the mounting holes of the flange.
- Make sure that the hook can bear the total weight of the radial piston motor plus approx. 20 %.

The radial piston motor can be hoisted as shown in Fig. 16.

---

**WARNING:**

**Risk of injury!**

During transport with lifting device, the radial piston motor can fall out of the hook and cause injuries.

- Hold the radial piston motor with your hands to prevent it from falling out of the hook.
- Never stand below the motor during lifting.
Transport and storage

Transport with lifting sling

Place the lifting sling around the radial piston motor in such a way that it encloses either the front or the rear case (see Fig. 17).

**WARNING!**

**Risk of injury!**

During transport with lifting device, the radial piston motor can fall out of the lifting sling and cause injuries.

- Hold the radial piston unit with your hands to prevent it from falling out of the lifting sling.
- Always make sure where the centre of gravity is before any lifting.
- Use the widest possible lifting sling.

**Fig. 17: Transport with lifting sling**

5.2 Storing the radial piston motor

- The storage area must be free from corrosive materials and gases.
- The storage area must be dry and free of dirt.
- Ideal storage temperature: +5 °C to +20 °C.
- Minimum storage temperature: -50 °C.
- Maximum storage temperature: +60 °C.
- Avoid intense lights.
- Do not stack radial piston motors and store them in a shock-proof environment.
- For other storage conditions, see Table 4.

- Check the radial piston motor monthly to ensure proper storage.

After delivery

The radial piston motor is provided ex-works with corrosion protection packaging (corrosion protection bag).

Listed in the following table are the maximum permissible storage times for an originally packed radial piston motor.

**Table 4: Storage time with factory-supplied corrosion protection**

<table>
<thead>
<tr>
<th>Storage conditions</th>
<th>Standard corrosion protection</th>
<th>Long-term corrosion protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed, dry room, uniform temperature between +5 °C and +20 °C. Undamaged and closed corrosion protection bag.</td>
<td>Maximum 6 months from shipping ex-works.</td>
<td>Contact the Rexroth office for details.</td>
</tr>
</tbody>
</table>

The warranty is rendered void if the requirements and storage conditions are not adhered to or after expiry of the maximum storage time (see Table 4).
**Transport and storage**

Procedure after expiry of the maximum storage time:

1. Check the entire radial piston motor for damage and corrosion prior to installation.
2. Check the radial piston motor for proper function and leaks during a test run.
3. Replace seals if a storage time of 36 months is exceeded.

After expiry of the maximum storage time, it is recommended that the radial piston motor is inspected by the Rexroth Service partner.

In the event of questions regarding repair and spare parts, contact the Rexroth Service partner or the service department of the manufacturing plant in Glenrothes (see section 9.5 “Spare parts”).

**After removal**

If a radial piston motor is to be stored after removal from a machine, it must be conserved against corrosion for the duration of the storage.

The following instructions only refer to radial piston motors which are operated with a mineral-oil based hydraulic fluid. Other hydraulic fluids require conservation methods that are specifically designed for them. In such a case, consult the Rexroth Service partner (see section 9.5 “Spare parts” for address).

Rexroth recommends the following procedure:

1. Clean the radial piston motor, see section 9.1 “Cleaning and care”.
2. Empty the radial piston motor.
3. Coat the inside of the radial piston motor with mineral oil.
4. Seal all ports so that they are airtight.
5. Coat the unpainted surfaces of the radial piston motor with mineral oil or a corrosion inhibitor.
6. Pack the radial piston motor together with a desiccant in corrosion protection bag.
7. Store the radial piston motor so that it is protected against shock loading. See “Requirements” in this chapter for further conditions.
6 Installation

Prior to installation, the following documents must be available:

- Installation drawing for the radial piston motor (available from Rexroth)
- Hydraulic circuit diagram for the radial piston motor (in the installation drawing)
- Hydraulic circuit diagram for the system (available from the system manufacturer)
- Data sheet for the radial piston motor (contains the technical data).

6.1 Unpacking

The radial piston motor is delivered in a corrosion protection bag made of polyethylene material.

- Dispose of the packaging according to the national regulations in the relevant country.

CAUTION!

Risk of parts falling out!

If the packaging is not opened correctly, parts may fall out and damage the parts or even result in injury.

- Place the packaging on a flat and solid surface.
- Open the packaging from the top only.

6.2 Installation conditions

- The installation location and position of the radial piston motor essentially determine the procedures during installation and commissioning.

  - Adhere to all limits specified in the data sheet regarding temperature, viscosity, cleanliness of the hydraulic fluid.
  - Make sure that the case of the radial piston motor is filled with hydraulic fluid during commissioning and operation. This will happen automatically where the motor is fitted with a flushing valve. This is also to be observed following relatively long standstill periods as the radial piston motor may empty via the hydraulic lines.
  - Use a check valve in the case drain line where the motor is installed above tank level and the drive shaft is facing upwards (see also section 6.3.2 “Above-tank installation”).
  - To achieve favourable noise values, decouple all connecting lines from all vibration-capable components (e. g. tank) using elastic elements.
  - Make sure that the case drain line, and return line flow into the tank below the minimum fluid level in all operational states.
  - Ensure that the maximum permitted case drain pressure, as specified in the data sheet, is not exceeded.
  - Absolute cleanliness is required. The radial piston motor must be installed in a clean condition. Contamination of the hydraulic fluid can have a considerable impact on the service life of the radial piston motor.
  - Do not use any cotton waste or linty cloths for cleaning.
  - Use suitable liquid detergents to remove lubricants and other difficult-to-remove pollution. Detergents must not penetrate the hydraulic system.
Risk of damage by air inclusions!
An air pocket in the area near the bearings will damage the radial piston motor.
- Make sure that the case is completely filled with hydraulic fluid during commissioning and during operation with the “drive shaft upwards” installation position.
- Using a flushing valve will help to remove possible air pockets.

Risk of damage by hydraulic fluid loss!
With above-tank installation, the case interior may drain via the case drain line after longer standstill periods or via the work ports. The bearings are thus insufficiently lubricated when the motor is restarted.
- Therefore, check the hydraulic fluid level in the case interior regularly; if necessary, recommission.

6.3 Installation position
The following installation positions are permissible. The piping layout shown illustrates the basic installation.

6.3.1 Below-tank installation (standard)
Below-tank installation is when the radial piston motor is installed below the minimum hydraulic fluid level in the tank.

Fig. 18: Below-tank installation with installation position 1–4

L  Drain port  F  Filler port  L₁  Air bleeding

The oil filling of the case should always take place via the filler port F and the air bleeding via port L₁ in the drain line.
6.3.2 Above-tank installation

Above-tank installation is when the radial piston motor is installed above the minimum hydraulic fluid level in the tank.

**CAUTION!**

**Risk of damage to the product!**

An air pocket in the area near the bearings will damage the radial piston motor.

- Make sure that the case is completely filled with hydraulic fluid during commissioning and during operation with the “drive shaft upwards” installation position.
- Using a flushing valve will help to remove possible air pockets.
- With above-tank installation, the case interior may drain via the case drain line after longer standstill periods or via the work ports. The bearings are thus insufficiently lubricated when the motor is restarted.

Recommendation for installation position 6 and 8:

A check valve in the case drain line (opening pressure 0.5 bar) can prevent draining of the case interior.

![Fig. 19: Above-tank installation with installation position 5–8](image)

- **L** Drain port
- **F** Filler port
- **L₁** Air bleeding

The oil filling of the case should always take place via the filler port F and the air bleeding via port L₁ in the drain line.

Where a check valve is fitted to the drain line, it should be sized to ensure the motors case pressure limit per data sheet is not exceeded at start-up.

Note that when the pistons are pushed out of the cylinder block at start-up, this displaces oil from the motor case, delivering full pump flow to the drain line.
6.4 Installing the radial piston motor

DANGER! Systems which are in operation pose a risk of injury!
Working on operating systems poses a danger to life and limb. The work steps described in this chapter must only be performed on systems which are at a standstill. Before beginning work:

- Ensure that the engine cannot be switched on.
- Ensure that all power-transmitting components and connections (electric, pneumatic, hydraulic) are switched off according to the manufacturer’s instructions and are secured against being switched on again. If possible, remove the main fuse for the system.
- Ensure that the system is completely hydraulically relieved (depressurised). Please follow the system manufacturer’s instructions.
- Only qualified personnel (see section 2.3 “Qualification of personnel”) are authorised to assemble the radial piston motor.

6.4.1 Preparation

1. Check the delivery contents for completeness and transport damage.
2. Compare the motor part number and description (ordering code) with the details in the order confirmation.

If the motor part number for the radial piston motor does not correspond to the one in the order confirmation, contact the Rexroth partner for clarification.

![Fig. 20: Direction of rotation](image)

View motor from shaft with ports uppermost and pressurising port B:

L  Counter-clockwise
R  Clockwise

The direction of rotation as specified in the motor description on the label determines the direction of rotation of the radial piston motor as viewed on the drive shaft, pressurising port B.

6.4.2 Dimensions
The installation drawing contains the dimensions for all ports on the radial piston motor. Also observe the instructions provided by the manufacturers of the other components when selecting the required tools.

6.4.3 General instructions
During installation (and removal) of the radial piston motor, observe the following general instructions and handling instructions:

- Fit the radial piston motor with appropriate fasteners to carry the expected force and torque.
- The permissible axial and radial loading on the drive shaft, the permissible torque and the maximum speed can be found in the data sheet.
- To achieve favourable noise levels, decouple all connecting lines (return and drain connections) from the tank using flexible elements.
- Make sure that the installation location is clean and free of dirt and contaminants.
- All connections must be completed prior to motor operation.
- Oil cleanliness is vital to obtaining long service life, therefore well maintained filtration is essential.
- Care must be taken to ensure no loading is generated by eccentric mounting of the radial piston motor to a load. A suitable flexible coupling should be used if this loading cannot be avoided.

WARNING!
Risk of damage!
Shock or impulse forces on the output shaft can damage the radial piston motor.
- Do not apply heavy shock loads to the drive shaft of the radial piston motor during handling.
- Do not hit the output shaft of the radial piston motor.
- Do not sit the radial piston motor on the output shaft.

6.4.4 Connection to the output shaft
The installation of the radial piston motor depends on the type of connection to the drive shaft. The following connections are possible, depending on the motor type:

**Wheel**
Where wheel studs and nuts are supplied, the nuts must be tightened to the following torque values:

<table>
<thead>
<tr>
<th>Stud</th>
<th>Flat [Nm]</th>
<th>Spherical [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>M14</td>
<td>140</td>
<td>180</td>
</tr>
<tr>
<td>M18</td>
<td>300</td>
<td>380</td>
</tr>
<tr>
<td>M20</td>
<td>420</td>
<td>610</td>
</tr>
<tr>
<td>M22</td>
<td>560</td>
<td>780</td>
</tr>
</tbody>
</table>

The shaft connection to the wheel must use all mounting holes or wheel studs specified on the drive shaft.

WARNING!
Risk of damage and injury!
Ensure mounting face is flat and perpendicular to the motor axis, allowing no distortion of the motor mounting flange.
- Failure to adhere to this could result in shaft breakage.
Protect the spline from frictional corrosion by providing permanent lubrication.

Ensure that the mating bore has an appropriate tight fit.

**WARNING!**
Risk of damage and injury!
When assembling shafts with keyways, an appropriate tight fit (H7 or G6 tolerance for the mating bore) must be used to ensure that the torque is transmitted around the diameter of the shaft.
- Failure to adhere to this could result in the key transmitting all torque which could result in shaft breakage.

Protect the gear from frictional corrosion by providing permanent lubrication.

**WARNING!**
Risk of damage and injury!
An incorrect gear mesh can result in injuries or damage to the radial piston motor.
- Ensure that the gear mesh is not excessively tight as this could transmit high loading to the shaft which could result in shaft failure.
- Also ensure the gear mesh is not excessively loose as this could cause excessive backlash and premature gear wear.

Where wheel studs and nuts are supplied, the nuts must be tightened to the torque values as per Table 5 (see this section above). The shaft connection to the sprocket must use all mounting holes or wheel studs specified on the drive shaft.

**WARNING!**
Risk of damage and injury!
Ensure mounting face is flat and perpendicular to the motor axis, allowing no distortion of the motor mounting flange.
- Failure to adhere to this could result in shaft breakage.

Protect the sprocket on the drive shaft from frictional corrosion by providing permanent lubrication.

**CAUTION!**
Risk of damage!
Ensure chain tension is not excessive as this could result in premature wear of the sprocket.
Where a dirt seal is not fitted to the radial piston motor the oil level in the chain case must come at least to the level of the sprocket.
- Failure to adhere to this could result in insufficient bearing lubrication and premature failure of the bearing.

Please refer to the installation drawing which describes all relevant data such as spline connection, bearing loads and seal grooves.
6.4.5 Assembly of the speed sensor

Where a radial piston motor is supplied “speed sensor prepared” (P0 in the motor code) a sensor may be fitted as follows:

1. Remove blanking plate from speed sensor port.
2. Remove plastic shipping cover from sensor nose.
3. Apply Loctite 243 to the two M6 screws. Use just enough to cover the threads and remove any excess.
4. Insert the sensor into the port and seat o-ring by pressing down firmly on the centre of the sensor.
5. Tighten the two M6 screws, drawing down each side evenly.
6. Tighten to a final torque of 10 Nm.

Fig. 21: Remove blanking plate

Fig. 22: Tighten speed sensor to final torque

6.4.6 Completing installation

1. Remove the transport protection.
   The radial piston motor was delivered with protective shipping plugs, blanking plates or plugs (filler port F). These must be removed before connecting. Use appropriate tools.

2. Make sure that the sealing and functional surfaces are not damaged.

   Ports which are intended for connecting lines are provided with plastic shipping plugs or metal plugs, which serve as transport protection. If no connection is made, these ports must be blanked with a suitable metal plug since the plastic plugs are not pressure-proof.
CAUTION!
Risk of damage to persons and property!
Operating the radial piston motor with plastic plugs can result in injuries or damage to the radial piston motor.

- Before commissioning, remove all plastic shipping plugs and blank any unconnected ports with suitable, pressure-proof, metal plugs.

---

Fig. 23: Removing transport protection

---

6.4.7 Hydraulically connecting the radial piston motor
The machine or system manufacturer is responsible for dimensioning the lines. The radial piston motor must be connected to the rest of the hydraulic system in accordance with the hydraulic circuit diagram of the machine or system manufacturer.

---

CAUTION!
Damage to the radial piston motor!
When assembling hydraulic lines and hoses under mechanical stress, they are exposed to additional mechanical forces during operation which reduce the service life of the radial piston motor and the entire machine or system.

- Assemble hydraulic lines and hoses without mechanical stress.

---

CAUTION!
Wear and malfunction!
The cleanliness of the hydraulic fluid has a considerable impact on the cleanliness and service life of the hydraulic system. Any contamination of the hydraulic fluid leads to wear and malfunctions. In particular, contaminants such as welding beads or metal cuttings in the hydraulic lines may damage the radial piston motor.

- Absolute cleanliness is required.
- The radial piston motor must be installed in a clean condition.
- Make sure that all ports, hydraulic lines and add-on units (e.g. measuring devices) are clean.
- Make sure that no contaminants may penetrate when sealing the ports.
- Take care that no detergents enter the hydraulic system.
- Do not use any cotton waste or linty cloths for cleaning.
- Do not use hemp as sealant under any circumstances.
Installation

**Notes on routing the lines**  
Observe the following notes when routing the pressure, case drain and control lines:

- The line cross section is to be specified so that the minimum pressure at the suction port does not drop below the data sheet limit and the maximum pressure does not exceed the data sheet limit.
- Ensure that the connections are air tight and observe the pressure rating of the hose.
- Sufficient burst resistance of the pipes, hoses and connectors must be observed for pressure lines.
- Always route the case drain line so that the housing is constantly filled with hydraulic fluid and to ensure that no air gets through the shaft seal ring even during extended standstill periods. The case pressure must not exceed the limits listed for the radial piston motor in the data sheet under any operating conditions. The case drain line in the tank must end up below the minimum fluid level under all conditions (see section 6.3 “Installation position”).

**Ports and fixing threads** are designed for the maximum pressures specified in the data sheet. The machine or system manufacturer must ensure that the connectors and lines correspond to the specified operating conditions (pressure, flow, hydraulic fluid, temperature, etc.) with the necessary safety factors.

**Procedure**  
To connect the radial piston motor to the hydraulic system:

1. Remove the shipping plugs at the ports at which the connections are to be made according to the hydraulic circuit diagram.
2. Use only clean hydraulic lines.
3. Connect the lines according to the hydraulic circuit diagram. Either pipes or hoses must be connected to all ports according to the installation drawing and machine or system circuit diagram or the ports plugged using suitable metal plugs.

The installation drawing contains the dimensions for all connections and ports on the radial piston motor. Also observe the instructions provided by the manufacturers of the other hydraulic components when selecting the required tools.

4. Make sure that the hose or pipe connections are correctly tightened (observe tightening torques!). Mark all checked fittings using e.g. a permanent marker.
5. Make sure that the pipes and hose lines and every combination of connecting piece, coupling or connecting point with hoses or pipes have been inspected by a technically qualified person for safe working condition.

**Port specifications**  
Please refer to the data sheet and installation drawing with regards to port sizes, peak pressure etc.

**Tightening torques**  
The following tightening torques apply:

- Ports on the radial piston motor:
  The maximum permissible tightening torques are maximum values to prevent damage to the threaded holes. These must not be exceeded. For values, please refer to the following table.
- Fittings:
  Observe the machine manufacturer’s instruction regarding tightening torques for the fittings used.
- Mounting screws:
  As every application is different, the required grade and torque for the mounting screws must be determined on an individual basis. For correct values, observe the installation instructions of the machine manufacturer.
• Filler Plugs:
For the metal filler plug supplied with the radial piston motor, the tightening torque stated in the below table applies.

• Wheel nuts:
Where wheel studs and nuts are supplied, the nuts must be tightened to the torque values as per table 5 in section 6.4.4 “Connecting to the output shaft”.

**Table 6: Tightening torques for threaded holes and filler plug**

<table>
<thead>
<tr>
<th>Thread size at ports</th>
<th>Minimum thread engagement [mm]</th>
<th>Maximum permissible tightening torque of the threaded holes [Nm]</th>
<th>Tightening torque for filler plug [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 1/4 ISO 228-1</td>
<td>9.5</td>
<td>70</td>
<td>–</td>
</tr>
<tr>
<td>G 3/8 ISO 228-1</td>
<td>9.5</td>
<td>110</td>
<td>–</td>
</tr>
<tr>
<td>G 1/2 ISO 228-1</td>
<td>13.0</td>
<td>200</td>
<td>60</td>
</tr>
<tr>
<td>G 3/4 ISO 228-1</td>
<td>13.0</td>
<td>330</td>
<td>–</td>
</tr>
<tr>
<td>7/16-20 UNF ISO 11926</td>
<td>9.0</td>
<td>40</td>
<td>–</td>
</tr>
<tr>
<td>9/16-18 UNF ISO 11926</td>
<td>10.0</td>
<td>80</td>
<td>–</td>
</tr>
<tr>
<td>3/4-16 UNF ISO 11926</td>
<td>11.0</td>
<td>160</td>
<td>60</td>
</tr>
<tr>
<td>1 1/16-12 UNF ISO 11926</td>
<td>15.0</td>
<td>360</td>
<td>–</td>
</tr>
</tbody>
</table>

Above torque values are calculated based on the minimum thread engagements quoted.

They represent the maximum values that can be applied without damaging the motor housing. However, the actual tightening torque for the fittings must come from the specification of the machine manufacturer.

Shorter thread engagement lengths result in a lower permissible tightening torque, but higher thread engagement lengths do not result in a higher permissible tightening torque.

If higher thread engagement lengths are used, check the available thread depths in the housing to ensure that the fitting can be screwed fully home.

For the filler plug, the nominal setting on the torque wrench must be within ± 2 Nm.

---

**CAUTION!**

**Risk of mixing up threaded connections!**

The radial piston motors are used in applications with metric as well as Imperial thread standards.

Both the thread standard and the size of the threaded hole/plug must match.

Due to the limited options for visually detecting differences, there is a risk of mixing up.

▶ For all threaded holes, use a plug of the same thread standard and the correct size.

---

**CAUTION!**

**Risk of damage to persons and property!**

If a threaded plug which is of a different thread standard and size with respect to the threaded hole is pressurised, the threaded plug may loosen or even be ejected from the hole in a projectile-like manner.

This can result in serious injury and damage to equipment. Hydraulic fluid can be discharged from this leakage point.

▶ Use the drawings (installation drawing/data sheet) to determine the required plug or fitting for each port.

▶ Make certain that there is no mix up when assembling fittings, mounting screws and plugs.

▶ For all threaded holes, use a plug of the same thread standard and the correct size.
7 Commissioning

**WARNING!** Danger while working in the operating zone of a machine or system!
It is not permissible to work in the operating zone of a machine or system.
- The machine or system must only be operated if safe working is ensured.
- Pay attention to and rectify potential danger sources before operating the machine or system.
- Nobody may stand in the operating zone of the machine or system.
- The emergency stop button for the machine or system must be within the operator’s reach.
- Always follow the instructions of the machine or system manufacturer during commissioning.

**CAUTION!** Risk of damage to persons and property!
Commissioning of the radial piston motor requires basic mechanical and hydraulic knowledge.
- Only qualified personnel (see section 2.3 “Qualification of personnel”) are authorised to commission the radial piston motor.

**WARNING!** Risk of toxication and injury!
Contact with hydraulic fluids may damage your health (e. g. eye injuries, skin damage, toxication upon inhalation).
- Always check the lines for wear or damage before each commissioning.
- While performing these checks, wear safety gloves, safety glasses and suitable working clothes.
- If hydraulic fluid should, nevertheless, come into contact with your eyes or penetrate your skin, consult a doctor immediately.
- When working with hydraulic fluids, strictly observe the manufacturer’s safety instructions.

**WARNING!** Fire hazard!
Hydraulic fluid can be flammable.
- Keep open flames and ignition sources away from the radial piston motor.

**CAUTION!** Missing seals and connections lead to leakage and/or ingress of material into the hydraulic system!
Fluids and contaminants may penetrate and damage the product.
- Prior to assembly, make sure that all seals and connectors are tight.
## 7.1 First commissioning

### CAUTION!

**Risk of damage to the product!**

Contamination of the hydraulic fluid above the specified limit in the data sheet leads to wear and malfunction. In particular, contaminants such as welding beads or metal cuttings in the hydraulic lines may damage the radial piston motor.

- Ensure utmost cleanliness during commissioning.
- Make sure that no contaminants penetrate when sealing the gauge ports.

### CAUTION!

**Risk of damage to the product!**

If the radial piston motor is commissioned with insufficient hydraulic fluid, the radial piston motor can be damaged immediately or even destroyed.

- When commissioning or recommissioning a machine or system, make sure that the case interior and the service lines of the radial piston motor are filled with hydraulic fluid and remain filled during operation. Otherwise damage may result.

When commissioning the radial piston motor, observe the basic safety instructions and intended use provided in chapter 2 “General safety instructions”.

### 7.1.1 Filling the radial piston motor

Use an approved hydraulic fluid.

The machine or system manufacturer can provide precise details of the hydraulic fluid. Details of minimum requirements for mineral-oil based hydraulic fluids, environmentally acceptable hydraulic fluids or HF hydraulic fluids for the radial piston motor are contained in the related Rexroth documents listed in section 1.1 “Related documents”.

### CAUTION!

**Risk of impaired brake performance!**

For braked motors ensure that the fluid does not contain any friction modifying additives (e.g. anti-stick slip additives), as they may cause a significant reduction in brake torque.

- If in doubt please contact Rexroth engineering department in Glenrothes.

To ensure the functional reliability of the radial piston motor, cleanliness level 20/18/15 according to ISO 4406 is necessary for the hydraulic fluid. For permissible temperatures, see the data sheet.

### CAUTION!

**Risk of damage to the product!**

An air pocket in the area near the bearings will damage the radial piston motor.

- Make sure that the case is completely filled with hydraulic fluid during commissioning and during operation with the “drive shaft upwards” installation position.
- Using a flushing valve will help to remove possible air pockets.
- With above-tank installation, the case interior may drain via the case drain line after longer standstill periods or via the work ports. The bearings are thus insufficiently lubricated when the motor is restarted.
Commissioning

Take care to avoid contamination while filling the radial piston motor. The radial piston motor must not be operated while it is being filled.

CAUTION!

Danger of environmental contamination!
The discharge or spillage of hydraulic fluid while filling the radial piston motor can lead to environmental pollution and contamination of the groundwater.

- When filling and changing the hydraulic fluid, always place a tray under the radial piston motor to catch the fluid.
- Observe the information in the safety data sheet for the hydraulic fluid and the specifications provided by the system manufacturer.

Procedure for filling the radial piston motor

1. Fill the radial piston motor via the filler port F. See section 6.3 “Installation position”. This will happen automatically where the motor is fitted with a flushing valve. The hydraulic lines of the system must also be filled.
2. The air bleeding should be done via the port L₁ in the drain line. See section 6.3 “Installation position”.
3. Make sure that all ports are either connected to pipes or plugged according to the general circuit diagram.

7.1.2 Testing the hydraulic fluid supply

For the radial piston motor to function correctly, the pump must always have a sufficient supply of hydraulic fluid. For this reason, the supply of hydraulic fluid must be ensured at the start of the commissioning process.

When testing the hydraulic fluid supply, constantly monitor the noise level and check the hydraulic fluid level in the tank. If the pump becomes louder (cavitation) or the case drain fluid is discharged with bubbles, this is an indication that the pump is not being sufficiently supplied with hydraulic fluid.

If excessive noise is heard from the motor, ensure that sufficient charge pressure is present (see data sheet for values). Pay particular attention during rapid deceleration under maximum load.

To test the hydraulic fluid supply:

1. Allow the pump to run at low speed and without load. Pay attention to leakage and noise.
2. Check the pump’s case drain line during the test. The case drain fluid should not contain any bubbles.
3. Check the case drain pressure of both pump and motor. Refer to the data sheets for the permissible values. If the motor is used in freewheeling mode, ensure that excessive case pressure spikes are not present when reengaging drive.

7.1.3 Performing functional test

WARNING!

Risk of injury in case of incorrectly connected machine or system!
Any swapping of the connections will lead to malfunctions (e.g. reverse instead of forward) and thus represents a corresponding danger to persons and equipment.

- When connecting hydraulic components, observe the specified piping according to the hydraulic circuit diagram of the machine or system manufacturer.
Once you have tested the hydraulic fluid supply, you must perform a functional test on the machine or system. The functional test should be performed according to the instructions of the machine or system manufacturer.

The radial piston motor is checked for functional capability before delivery according to the technical data. During commissioning, it must be ensured that the radial piston motor is installed in accordance with the design of the machine or system.

For braked motors, check brake hold and function.

### 7.1.4 Performing flushing cycle

In order to remove foreign bodies from the system and achieve the required fluid cleanliness level, Rexroth recommends a flushing cycle for the entire system.

During the flushing cycle, the radial piston motor must be operated without load. The flushing cycle can be performed, e.g. by using an additional flushing unit. Follow the instructions of the flushing unit's manufacturer for the exact procedure during the flushing cycle.

### 7.2 Recommissioning after downtime

Depending on the installation conditions and ambient conditions, changes may occur in the system which make recommissioning necessary.

Among others, the following criteria may make recommissioning necessary:

- Air in the hydraulic system
- Water in the hydraulic system
- Old hydraulic fluid
- Other contamination

➢ Before recommissioning, proceed as described in section 7.1 “First commissioning”.

### 7.3 Running-in phase

The bearings and sliding surfaces are subject to a running-in phase. The increased friction at the start of the running-in phase results in increased heat development which decreases with increasing operating hours. The motor efficiency continues to increase until the end of the running-in phase.

During the running-in period (minimum 24 hours) the motor should not be run unloaded (shaft not connected to load) at greater than 100 rpm.

Example for a wheeled machine: if the machine is jacked in the air, the motor is considered to be unloaded.

---

**CAUTION!**

**Risk of damage by insufficient viscosity!**

The increased temperature of the hydraulic fluid during the running-in phase can cause the viscosity to drop to impermissible levels (see data sheet).

➢ Monitor the operating temperature during the running-in phase.

➢ Reduce the loading (pressure, rpm) of the radial piston motor if impermissible operating temperatures and/or viscosities occur.
Commissioning

CAUTION!

MCR dynamic drum brake run-in procedure!
Where a drum brake is fitted, running in is required to achieve full brake torque. The following procedure should be carried out:
- 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.

7.4 Final checks

After the running-in phase confirm the following conditions:
- Case drain pressure < 10 bar.
- Minimum pressure at ports \( A \) and \( B \) > 15 bar (general rule) or exact value as stated in the data sheet, to avoid cavitation.
- Holding brake release pressure > 15 bar and < 30 bar (standard specification) or exact values as stated on the installation drawing for all non-standard specifications (SO versions)
- Minimum 2 speed switching pressure
  - MCR3/MCR5..2L/2R: 12 bar
  - MCR10/MCR15..2L/2R: 5 bar
  - All 2W: 15 or 21 bar (see installation drawing for exact value)
- Maximum 2 speed switching pressure 35 bar.
- Case drain oil temperature < 85 °C. For operation above this temperature please consult Rexroth engineering department in Glenrothes.
- Operating speeds, pressures and drive power are within current data sheet recommendations.
8 Operation

The product is a component which requires no settings or changes during operation.

For this reason, this chapter of the manual does not contain any information on adjustment options. Only use the product within the performance range provided in the technical data. The machine or system manufacturer is responsible for the proper layout of the hydraulic system and its control.

Confirm at regular intervals:

- Operating speeds, pressures and temperature and fluid viscosity are within current data sheet recommendations (see also section 7.4 “Final checks”).
- Fluid cleanliness within data sheet limits
- Motor is still securely mounted, running at normal sound level and free from external leakage.
- Fluid is changed per the machine manufacturer’s recommendation.

For higher loading or speed conditions, case flushing may be added to obtain a temperature reduction. Flush using both motor drain ports L and F. If in doubt consult Rexroth engineering department in Glenrothes.
8.1 Manual brake release in case of emergency

Mechanical brake release should only be used in the event of hydraulic failure. Ensure mechanical release is disengaged after use to maintain fail-safe operation of the brake.

In case of hydraulic system failure, the brake may be manually released by loosening the end cover screws (13), or by removing the plug (14), where present, and inserting a puller into the tapped hole on the brake piston (15).

Table 7: Required screws for emergency brake release

<table>
<thead>
<tr>
<th>Motor Type</th>
<th>Screw Size</th>
<th>Minimum Screw Length</th>
<th>Approx. Release Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCR 3</td>
<td>M12</td>
<td>30 mm</td>
<td>60 Nm</td>
</tr>
<tr>
<td>MCR 5</td>
<td>M16</td>
<td>30 mm</td>
<td>120 Nm</td>
</tr>
<tr>
<td>MCR 10</td>
<td>M16</td>
<td>40 mm</td>
<td>160 Nm</td>
</tr>
<tr>
<td>MCR 15</td>
<td>M20</td>
<td>45 mm</td>
<td>230 Nm</td>
</tr>
<tr>
<td>MCR 20</td>
<td>M20</td>
<td>50 mm</td>
<td>340 Nm</td>
</tr>
</tbody>
</table>
9 Maintenance and repair

9.1 Cleaning and care

<table>
<thead>
<tr>
<th>CAUTION!</th>
<th>Damage to the surface caused by solvents and aggressive detergents!</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aggressive detergents may damage the seals on the radial piston motor and cause them to age faster.</td>
</tr>
<tr>
<td></td>
<td>▶ Never use solvents or aggressive detergents.</td>
</tr>
<tr>
<td></td>
<td>▶ If in doubt, check the compatibility of the detergent with the seal type (NBR or Viton) specified in the radial piston motor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION!</th>
<th>Damage to the hydraulic system and the seals!</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using a high-pressure cleaner could damage the speed sensor and the seals of the radial piston motor.</td>
</tr>
<tr>
<td></td>
<td>▶ Do not point the high-pressure cleaner at sensitive components, e.g. shaft seal ring, seals in general, electrical connections and speed sensor.</td>
</tr>
</tbody>
</table>

For cleaning and care of the radial piston motor, observe the following:

▶ Plug all openings with suitable protective caps/devices.
▶ Check whether all plugs and plug seals are securely seated to ensure that no moisture can penetrate into the radial piston motor during cleaning.
▶ Use only water and, if necessary, a mild detergent to clean the radial piston motor.
▶ Remove coarse dirt from the outside of the machine and keep sensitive and important components, such as sensors and valve blocks clean.
9.2 Inspection

In order to enable long and reliable operation of the radial piston motor, Rexroth recommends testing the hydraulic system and radial piston motor on a regular basis and documenting the following operating conditions:

### Table 8: Inspection schedule

<table>
<thead>
<tr>
<th>Task to be carried out</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydraulic system</strong></td>
<td></td>
</tr>
<tr>
<td>Check level of hydraulic fluid in the tank.</td>
<td>daily</td>
</tr>
<tr>
<td>Check operating temperature (at comparable load).</td>
<td>weekly</td>
</tr>
<tr>
<td>Check quality of the hydraulic fluid.</td>
<td>yearly or every 2000 hrs (whichever occurs first)</td>
</tr>
<tr>
<td><strong>Radial piston motor</strong></td>
<td></td>
</tr>
<tr>
<td>Check radial piston motor for leakage.</td>
<td>daily</td>
</tr>
<tr>
<td>Early detection of hydraulic fluid loss can help to find faults on the machine or system and to rectify them. For this reason, Rexroth recommends that the radial piston motor and the system should always be kept in a clean condition.</td>
<td>daily</td>
</tr>
<tr>
<td>Check radial piston motor for unusual noise development.</td>
<td>daily</td>
</tr>
<tr>
<td>Check fittings for tight seating.</td>
<td>monthly</td>
</tr>
<tr>
<td>All fittings have to be checked when the system is switched off, depressurised and cooled down.</td>
<td>monthly</td>
</tr>
<tr>
<td>Check tightness of wheel nuts, where fitted.</td>
<td>monthly</td>
</tr>
<tr>
<td>Check the thickness of the brake shoe linings, where a drum brake is fitted.</td>
<td>twice a year</td>
</tr>
</tbody>
</table>

Systematic documentation of the operating conditions (e.g. increasing operating temperatures) will enable detection of increased wear at an early stage and implementation of the necessary countermeasures.

9.3 Maintenance

The radial piston motor is low-maintenance when used as intended.

The service life of the radial piston motor is heavily dependent on the quality of the hydraulic fluid. For this reason, we recommend changing the hydraulic fluid at least once per year or every 2000 operating hours (whichever occurs first), or having it analysed by the hydraulic fluid manufacturer or a laboratory to determine its suitability for further use.

The service life of the radial piston motor is normally limited by the service life of the built-in bearings. A radial piston motor life calculation can be requested from the Rexroth engineering department in Glenrothes. This must, in all cases, be carried out prior to installation of a radial piston motor on a new machine.

Based on these details, a maintenance period is to be determined by the system manufacturer for the replacement of the bearings and included in the maintenance schedule of the hydraulic system.

Where a drum brake is fitted, the thickness of the brake shoe linings has to be checked by sight control through the wear checking hole at regular intervals, depending on the use of the vehicle, but at least twice a year.

When the remaining lining thickness is small, these intervals have to be shortened correspondingly in order to avoid greater damage to the brake and drum.

Remaining thickness must be minimum 2.0 mm at the thinnest point of the lining.
9.4 Repair
Rexroth offers a comprehensive range of services for the repair of radial piston motors.
Repair of the radial piston motor must only be performed by authorised, skilled and instructed staff.
- Only use genuine spare parts from Rexroth for repairing Rexroth radial piston motors.
Original Rexroth sub-assemblies allow for successful repair requiring minimal time.
For further information, please see the service manual for radial piston motors, RE15205-R.

9.5 Spare parts

<table>
<thead>
<tr>
<th>CAUTION!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage to persons and property due to faulty spare parts!</td>
</tr>
<tr>
<td>Spare parts that do not meet the technical requirements specified by Rexroth may cause damage to persons or property.</td>
</tr>
<tr>
<td>Use only original spare parts from Rexroth.</td>
</tr>
</tbody>
</table>

The list of spare parts for radial piston motors are order specific. When ordering spare parts, please quote the part number or serial number of the radial piston motor, as well as the part numbers of the spare parts.
Please address all questions regarding spare parts to the Rexroth Service partner or the service department of the manufacturing plant in Glenrothes.
Details of the manufacturing plant are available on the radial piston motor’s label:

Bosch Rexroth Limited
Drive and Control Technology
Hydraulics
Viewfield Industrial Estate
Glenrothes, Fife
Scotland, KY6 2RD
United Kingdom
Phone +44 (0) 1592-631777
Fax +44 (0) 1592-631936
customerservice@boschrexroth.co.uk

For the addresses of foreign subsidiaries, please refer to www.boschrexroth.com/addresses.
10 Decommissioning

The radial piston motor is a component that does not require decommissioning. For this reason, this chapter of the manual does not contain any information. For details about how to disassemble or replace your radial piston motor, please refer to chapter 11 “Removal from machine and replacement”.

11 Removal from machine and replacement

11.1 Required tools

Removal from the machine can be performed with standard tools. No special tools are necessary.

11.2 Preparing for removal

**WARNUNG!**

Risk of injury due to removal under hydraulic pressure!

Injury or damage to components may result if hydraulic fittings or mounting screws are loosened prior to de-pressurising the system.

- Ensure that the system is de-pressurised according to the machine manufacturer's instructions.

11.3 Removal of the radial piston motor

Proceed as follows to remove the radial piston motor:

1. Make sure that the hydraulic system is de-pressurised.
2. Check whether the radial piston motor has cooled down enough so that it can be removed without danger.
3. Place a drip tray under the radial piston motor to collect any hydraulic fluid that may escape.

**CAUTION!**

Danger of environmental contamination!

The discharge or spillage of hydraulic fluid while filling the radial piston motor can lead to environmental pollution and contamination of the groundwater.

- When filling and changing the hydraulic fluid, always place a drip tray under the radial piston motor.
- Note the information in the safety data sheet for the hydraulic fluid and the specifications provided by the system manufacturer.

4. Loosen the lines and collect the escaping hydraulic fluid in the drip tray.
5. Remove the radial piston motor. Use an appropriate lifting device.
6. Completely empty the radial piston motor.
7. Plug all openings.
11.4 Preparing the motor for storage or further use

Proceed as described in section 5.2 “Storing the radial piston motor”.

12 Disposal

Note the following points when disposing of the radial piston motor:

1. Completely empty the radial piston motor.
2. Dispose of the hydraulic fluid according to the national regulations of your country.
3. Disassemble the radial piston motor into its individual parts and properly recycle these parts.
4. Separate parts by:
   - Cast
   - Steel
   - Non-ferrous metal
   - Electronics
   - Seals.

12.1 Environmental protection

Careless disposal of the radial piston motor, the hydraulic fluid and the packaging material could lead to pollution of the environment.

Therefore, dispose of the radial piston motor, the hydraulic fluid and the packaging material in accordance with the currently applicable regulations in your country.

Dispose of hydraulic fluid residues according to the applicable safety data sheets for these hydraulic fluids.

13 Modification

Do not modify the radial piston motor. This also includes adjustment of the relief valve setting screws (where fitted). However, where a motor is supplied prepared for speed sensor, a sensor may be fitted later.

The warranty from Rexroth only applies to the delivered configuration. In case of modifications, the warranty will be invalidated.

The relief valve setting screws are protected against unauthorised resetting by means of protective caps. Removal of the protective caps will void the warranty. If you need a modification of the setting, please contact the engineering department in Glenrothes for confirmation.
14 Troubleshooting

The following table will assist you during troubleshooting. The table is not necessarily complete.

In practical use, problems which are not listed here may also occur.

### Qualification of personnel!

If the radial piston motor or some of its components need to be replaced, this has to be done only by qualified personnel with specialised hydraulics knowledge who have attended a service training course at Rexroth. If in doubt, please contact the Rexroth service department in Glenrothes.

- Maintenance on the machine must be done only by suitably qualified personnel as stipulated by the machine manufacturer.
- If in doubt, please contact the machine manufacturer.

Qualification of personnel!

<table>
<thead>
<tr>
<th>CAUTION!</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
</tr>
</tbody>
</table>

If assistance is required, always contact the machine manufacturer in the first instance.

14.1 How to proceed for troubleshooting

- Always act systematically and in a targeted manner, even under pressure of time. Random and imprudent disassembly and readjustment of settings might result in the inability to ascertain the original root cause.
- First obtain a general overview of how your product works in conjunction with the entire system.
- Try to find out whether the product has worked properly in conjunction with the entire system before the troubles first occurred.
- Try to determine any changes to the entire system in which the product is integrated.
  - Were there any changes to the product’s operating conditions or operating range?
  - Were there any changes or repair works on the complete system (machine/system, electrics, control) or on the product? If yes, which?
  - Was the product or machine used as intended?
  - How did the malfunction appear?
- Try to get a clear idea of the root cause. Directly ask the machine operator.
- If the fault cannot be rectified, contact one of the contact addresses which can be found under www.boschrexroth.com/addresses.
## 14.2 Troubleshooting table

Table 9: Troubleshooting table for radial piston motors

<table>
<thead>
<tr>
<th>Problem/Symptom</th>
<th>Possible fault</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unusual noise</td>
<td>Output speed too high, causing cavitation and/or pistons to lift off cam.</td>
<td>Check motor speed versus machine specification. If too high, reset pump, and/or engine speed.</td>
</tr>
<tr>
<td></td>
<td>Charge pressure too low, causing cavitation and/or pistons to lift off cam.</td>
<td>Check charge pressure versus machine specification. If necessary, adjust, repair or replace charge pump (closed circuit) or other source of charge pressure (open circuit).</td>
</tr>
<tr>
<td></td>
<td>High case pressure causing pistons to lift off cam, or 2-speed spool (where fitted) to remain partially shifted.</td>
<td>Check case pressure versus machine specification. If too high, check drain line for blockages.</td>
</tr>
<tr>
<td></td>
<td>Low 2-speed shift pressure causing partial shifting of 2-speed spool (where fitted).</td>
<td>Check 2-speed shift pressure versus machine specification. If too low, adjust, repair or replace pressure source.</td>
</tr>
<tr>
<td></td>
<td>2-speed spool (where fitted) jammed in a partially shifted position.</td>
<td>Check 2-speed spool and replace spool and/or motor housing as necessary.</td>
</tr>
<tr>
<td></td>
<td>Motor mounting screws are loose, causing motor to rattle against frame.</td>
<td>Check motor mounting screws are correctly tightened per machine manufacturer’s specifications.</td>
</tr>
<tr>
<td></td>
<td>Improper fixing of wheel or load to motor output shaft.</td>
<td>Check wheel or load is attached per machine manufacturer’s specifications and is correctly aligned.</td>
</tr>
<tr>
<td></td>
<td>Improper fixing of hydraulic lines causing rattling against machine frame.</td>
<td>Check installation of lines per machine manufacturer’s specifications.</td>
</tr>
<tr>
<td></td>
<td>Internal damage to radial piston motor.</td>
<td>Strip down and inspect motor. Replace defective parts or complete motor as necessary.</td>
</tr>
<tr>
<td></td>
<td>Air intake.</td>
<td>Completely bleed hydraulic system. Check tightness of all connections.</td>
</tr>
<tr>
<td></td>
<td>Brake release pressure too low, causing brake (where fitted) not to be fully released.</td>
<td>Check brake release pressure versus machine manufacturer’s specification and adjust, repair or replace pressure source as necessary.</td>
</tr>
<tr>
<td>High pressure fluctuations</td>
<td>Internal damage to radial piston motor.</td>
<td>Strip down and inspect radial piston motor. Replace defective parts or complete motor as necessary.</td>
</tr>
<tr>
<td></td>
<td>Out-of-balance or fluctuating load.</td>
<td>Check load and attachment of load per machine manufacturer’s specifications, and adjust as necessary.</td>
</tr>
<tr>
<td></td>
<td>Blocked or incorrectly sized supply or return line.</td>
<td>Check main lines to motor A and B ports for blockages, and that they are correctly sized per machine manufacturer’s specifications.</td>
</tr>
<tr>
<td>High speed fluctuations</td>
<td>Internal damage to motor, causing leakage variation.</td>
<td>Blank off flushing (if fitted) and check motor case drain leakage for pulsations, while rotating motor at low speed, under load. If necessary, strip down and inspect motor, paying particular attention to piston rings. Replace defective parts or complete motor as necessary.</td>
</tr>
<tr>
<td></td>
<td>Faulty pump or pump controller.</td>
<td>Check pump and pump controller versus machine manufacturer’s specifications and adjust, repair or replace as necessary.</td>
</tr>
<tr>
<td></td>
<td>Fluctuating signal from speed sensor (where fitted and used in closed-loop speed control system).</td>
<td>Check output from speed sensor on oscilloscope (should give correct number of pulses per motor revolution per specification). Replace sensor or target disc as necessary.</td>
</tr>
</tbody>
</table>
## Troubleshooting

### Table 9: Troubleshooting table for radial piston motors

<table>
<thead>
<tr>
<th>Problem/Symptom</th>
<th>Possible fault</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected output torque or tractive effort not achieved</td>
<td>Insufficient pressure generated by pump.</td>
<td>Apply full load to motor(s) and check maximum pressure per machine manufacturer’s specification. If too low, block A and B lines and check maximum pressure at blocked lines. If pressure is still too low, adjust, repair or replace pump, pump control or system pressure relief valves as necessary.</td>
</tr>
<tr>
<td>High leakage in motor does not allow full pressure to be generated.</td>
<td>Apply full load to motor(s) and check maximum pressure per machine manufacturer’s specification. If too low, block A and B lines and check maximum pressure at blocked lines. If pressure is now correct, strip down and inspect motor. Replace defective parts or complete motor as necessary.</td>
<td></td>
</tr>
<tr>
<td>Motor not fully run in.</td>
<td>Continue to run motor (under load) for 24 – 48 hours to achieve maximum efficiency. A continuing increase in output torque may be noticed over this period.</td>
<td></td>
</tr>
<tr>
<td>High 2-speed shift pressure causing partial or full shifting of 2-speed spool (where fitted) when not intended.</td>
<td>Check 2-speed pressure when not shifted versus machine specification. If too high, adjust, repair or replace control valve and check for blocked lines as necessary.</td>
<td></td>
</tr>
<tr>
<td>2-speed spool (where fitted) jammed in a partially or fully shifted position.</td>
<td>Strip 2-speed valve and check all components, including bore in motor housing. Remove any contamination and replace components or motor housing as necessary.</td>
<td></td>
</tr>
<tr>
<td>Brake release pressure too low, causing brake (where fitted) not to be fully released.</td>
<td>Check brake release pressure versus machine manufacturer’s specification and adjust, repair or replace pressure source as necessary. If pressure source OK, strip down brake, check and replace brake seal as necessary.</td>
<td></td>
</tr>
<tr>
<td>Internal damage to motor.</td>
<td>Apply full load to motor(s) and check maximum pressure per machine manufacturer’s specification. If pressure is correct, and none of other above faults are apparent, strip down and inspect motor. Replace defective parts or complete motor as necessary.</td>
<td></td>
</tr>
<tr>
<td>Expected output speed not achieved</td>
<td>Insufficient flow generated by pump.</td>
<td>Check engine/prime mover speed and pump flow. Adjust, repair or replace engine/prime mover or pump as necessary.</td>
</tr>
<tr>
<td>High leakage in motor.</td>
<td>Strip down and inspect motor. Replace defective parts or complete motor as necessary.</td>
<td></td>
</tr>
<tr>
<td>Low 2-speed shift pressure causing partial or non-shifting of 2-speed spool (where fitted).</td>
<td>Check 2-speed pressure when shifted versus machine specification. If too low, adjust, repair or replace external control valve for 2-speed actuation and check for blocked lines as necessary.</td>
<td></td>
</tr>
<tr>
<td>2-speed spool (where fitted) jammed in a partially or non-shifted position.</td>
<td>Strip 2-speed valve and check all components, including bore in motor housing. Remove any contamination and replace components or motor housing as necessary.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 9: Troubleshooting table for radial piston motors

<table>
<thead>
<tr>
<th>Problem/Symptom</th>
<th>Possible fault</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor does not rotate</td>
<td>Expected motor torque achieved and load exceeds motor torque.</td>
<td>Check system pressure. If pressure has risen to relief valve setting, reduce load on motor.</td>
</tr>
<tr>
<td></td>
<td>Expected motor torque not achieved and load exceeds motor torque.</td>
<td>See Problem/Symptom “Expected output torque or tractive effort not achieved”.</td>
</tr>
<tr>
<td></td>
<td>No oil being supplied to motor.</td>
<td>Check engine/prime mover speed, pump flow and operation of control valve (if fitted). Adjust, repair or replace engine/prime mover, pump or valve as necessary.</td>
</tr>
<tr>
<td></td>
<td>Brake not released.</td>
<td>See Problem/Symptom “Brake does not release”.</td>
</tr>
<tr>
<td>Motor rotates in wrong direction</td>
<td>Oil supply connections to motor incorrectly connected.</td>
<td>Connect oil supply correctly.</td>
</tr>
<tr>
<td>Hydraulic fluid temperature too high</td>
<td>Excessive inlet temperature at motor.</td>
<td>Check cooling system and external flushing valve, if fitted.</td>
</tr>
<tr>
<td></td>
<td>Malfunction of pressure control valves (e.g. high-pressure relief valve, pressure cut-off, pressure controller).</td>
<td>Check appropriate components and repair or replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>Output speed too high.</td>
<td>Check motor speed versus machine specification. If too high, reset pump, and/or engine speed.</td>
</tr>
<tr>
<td></td>
<td>Motor case drain pressure too high, causing integrated flushing valve (where fitted) to close.</td>
<td>Check case pressure versus machine specification. If too high, check drain line for blockages.</td>
</tr>
<tr>
<td></td>
<td>Pump charge pressure below opening pressure of integrated flushing valve (where fitted).</td>
<td>Check charge pressure versus machine specification. Reset charge pressure, and check/repair charge pump as necessary.</td>
</tr>
<tr>
<td></td>
<td>Malfunction of integrated flushing valve (where fitted).</td>
<td>Apply a differential pressure of &gt; 10 bar across motor, and check case drain flow versus machine manufacturer’s specification. If insufficient flow is present, check flushing poppet for blocked orifice. If poppet OK, remove flushing spool and springs,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and inspect parts including bore in motor housing. Clean and/or replace parts as required.</td>
</tr>
<tr>
<td>External leakage</td>
<td>External seals (e.g. shaft/cam/brake seal) damaged.</td>
<td>Check oil cleanliness and motor pressure, confirm drain line is unblocked and case drain pressure is within machine manufacturer’s specification. Strip down motor and inspect suspected leaking seals. If shaft seal is damaged, check bearings. Replace parts as necessary.</td>
</tr>
<tr>
<td></td>
<td>Loose bolts.</td>
<td>Ensure all bolts are tightened to correct torque setting per Service Manual or motor assembly drawing.</td>
</tr>
<tr>
<td></td>
<td>Loose fittings.</td>
<td>Ensure all fittings are tightened to correct torque setting per manufacturer’s specification.</td>
</tr>
</tbody>
</table>
## Troubleshooting

### Table 9: Troubleshooting table for radial piston motors

<table>
<thead>
<tr>
<th>Problem/Symptom</th>
<th>Possible fault</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient brake torque</td>
<td>Excessive pressure in brake release chamber (disc brake).</td>
<td>Check brake pressure in engaged state per machine manufacturer’s specification. If too high, check control valve and drain lines to tank, and repair/replace, or remove blockage, as necessary.</td>
</tr>
<tr>
<td></td>
<td>Motor case drain pressure too high, causing partial release of brake (disc brake).</td>
<td>Check case pressure versus machine specification. If too high, check drain line for blockages.</td>
</tr>
<tr>
<td></td>
<td>Worn brake linings or discs.</td>
<td>Replace brake shoes or brake discs as necessary. In case of wear on parking brake (disc brake), investigate cause, as brake should not be used dynamically and should not wear.</td>
</tr>
<tr>
<td></td>
<td>Anti-stick/slip additive in hydraulic fluid (disc brake).</td>
<td>Drain and flush system and refill with hydraulic fluid without additive. Strip and thoroughly clean all motor components, replacing all brake discs.</td>
</tr>
<tr>
<td></td>
<td>Insufficient brake actuation pressure (dynamic brake).</td>
<td>Check pressure versus machine specification and check pressure source. Repair or replace components as required.</td>
</tr>
<tr>
<td></td>
<td>Drum brake not run in.</td>
<td>Carry out drum brake run-in procedure per motor data sheet.</td>
</tr>
<tr>
<td>Brake does not release</td>
<td>Brake release pressure too low (disc brake).</td>
<td>Check brake release pressure versus machine manufacturer’s specification and adjust, repair or replace pressure source as necessary. If pressure source OK, strip down brake and check and replace brake seal as necessary.</td>
</tr>
<tr>
<td></td>
<td>Brake piston or seals damaged (disc brake).</td>
<td>Replace brake piston or seals as required.</td>
</tr>
<tr>
<td></td>
<td>Brake plates seized (disc brake).</td>
<td>Strip and inspect brake, replacing parts as required. If seized, investigate cause of seizure, as parking brake should not be used dynamically.</td>
</tr>
<tr>
<td>Incorrect function of 2-speed control (where fitted)</td>
<td>2-speed control pressures incorrect.</td>
<td>Check shifted and non-shifted control pressures versus machine specification. Check, and repair or replace control components as necessary.</td>
</tr>
<tr>
<td></td>
<td>Integrated 2-speed valve damaged.</td>
<td>Strip 2-speed valve and check all components, including bore in motor housing. Remove any contamination and replace components or motor housing as necessary.</td>
</tr>
<tr>
<td></td>
<td>Motor case drain pressure too high, causing partial or non-shifting of 2-speed valve.</td>
<td>Check case pressure versus machine specification. If too high, check drain line for blockages.</td>
</tr>
<tr>
<td>Incorrect signal from speed sensor (where fitted)</td>
<td>Speed sensor or target disc damaged.</td>
<td>Check output from speed sensor on oscilloscope (should give correct number of pulses per motor revolution per specification). Replace sensor or target disc as necessary.</td>
</tr>
</tbody>
</table>
15 Technical data
The technical data of the radial piston motor can be found in data sheets “RE 15205” to “RE 15209”, depending on the motor type.
The data sheet can be found on the Internet under www.boschrexroth.com/radial-piston-motors

16 Appendix

16.1 Address directory
For the addresses of the global Rexroth sales and service network, please refer to www.boschrexroth.com/addresses
## 17 Index

### A
- Abbreviations 5
- Above-tank installation 24
- Address directory 49
- Air bleeding 23, 24

### B
- Below-tank installation 23
- Brake release 38

### C
- Care 39
- Caution 7
- Cleaning 39
- Commissioning 32
  - First 33
- Connecting
  - Hydraulic 29
  - Output shaft 26
- Corrosion protection 20

### D
- Danger 7
- Decommissioning 42
- Delivery contents 9
- Device description 10
- Dimensions 18
- Direction of rotation 25
- Disposal 43
- Documentation 4
- Drain port 23, 24

### E
- Environmental protection 43
- Eye bolt 18

### F
- Filling 23, 24, 33
- Final checks 36
- Flushing cycle 35
- Fork lift truck 18
- Functional description 11
  - Closed circuit 10
  - Motor function 11
  - Open circuit 10
- Functional test 34

### H
- Hook 19
- Hydraulic fluid 33

### I
- Identification 16
- Inspection 40
- Installation conditions 22
- Installation position 23
  - Above-tank installation 24
  - Below-tank installation 23
- Installing
  - Completing 28
  - Connection 26
  - General instructions 26
  - Preparation 25
  - Radial piston motor 25
- Instructions
  - General 7, 26

### L
- Label 16
- Lifting device 18
- Lifting sling 20

### M
- Maintenance 39, 40
- Modification 43
- Motor function 11

### O
- Obligations
  - Operating organisation’s 8
- Operation 37
- Output shaft 26

### P
- Performance description 10
- Piston 10
- Product description 10

### Q
- Qualification
  - Personnel 6

### R
- Recommissioning 35
- Removal 42
  - Preparing 42
- Repair 39
- Replacement 42
- Running-in phase 35
Index

S
Safety instructions 6, 7
Section 10
Spare parts 41
Speed sensor 28
Storage 18
Storage time 20
Storing 20

T
Technical data 49
Tightening torques 31
Tools 42
Transport 18
with eye bolt 18
with hook 19
with lifting sling 20
Transporting 18
Transport protection 29
Troubleshooting 44
Table 45

U
Unpacking 22
Use
Improper 6
Intended 6

V
Variants 17

W
Warning 7
Warranty 7, 20, 43
Weight 18