

RE 15205 R to RE 15210 R  
05.00

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**Rexroth**  
Bosch Group

**MCR Motors Service Manual  
Series 32**

Low Speed High Torque Motor  
MCR3, 5, 10, 15, 20 & 40  
AOM, B-M, C-M Two Speed  
Displacement 160 to 4200 cc/rev



MCR5C ... F180Z -32/B4M/./S

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**Notice:** Designations, descriptions and presentations correspond to the state of information at the date of impression of this manual. Modifications may influence the product service without any obligations for us arising there from. Methods and set-ups are recommendations only, no liability is undertaken by Rexroth for the results.

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## Safety Instructions

**Warning:** Damage or injury may result if any of the instructions in this manual are not followed. If in doubt contact an authorised Rexroth agent.

- a. All shipping plugs shall be removed prior to connection of hydraulic lines to motor.
- b. Prior to attempting any maintenance work on motor ensure all pressure sources have been disconnected.
- c. Motors contain stored energy in the form of compressed springs and this must be released using the method specified in the disassembly instructions.
- d. Motor output shaft rotates on supply of pressure to the motor.
- e. Motors shall be fully supported as specified in installation instructions prior to application of pressure.
- f. Maximum pressures, speeds, and shaft loads applied to motor shall not exceed relevant data sheet limits. If in doubt consult authorised Rexroth agent.
- g. When lifting motors use slings/shackles rated for motor weight.

## General

The following repair instructions are intended to assist in inspections and repairs to be carried out. It is prerequisite that work is carried out only by qualified personnel. These units are manufactured with great care and with adherence to defined tolerances to the highest manufacturing accuracy.

## Installation

- a. Ensure all packing/shipping plugs are removed prior to use.
- b. Hydraulic fluid used is mineral oil (HL, HLP) to DIN 51524. Environmentally acceptable hydraulic fluid. (HTG, HPG, HE to RE90221) are acceptable subject to reduced guarantee.

Note : Motors are tested with mineral oil and system must be fully flushed prior to use of any alternative fluid type.

For acceptability of other fluids please refer to authorized Rexroth agent.

Viscosity should be greater than 10mm<sup>2</sup>/s and less than 2000mm<sup>2</sup>/s under all conditions. Operational limits for full functionality are 16mm<sup>2</sup>/s < a < 100mm<sup>2</sup>/s with optimum results obtained at 16mm<sup>2</sup>/s < a < 36mm<sup>2</sup>/s.

- c. Oil cleanliness is vital to obtaining long service life, therefore well maintained filtration is essential.

Oil contamination must not exceed NAS 1638 class 9 (or SAE class 6, ISO / DIN 4406 class 18/15). The maximum permissible interval between system oil changes is every 2,000 hours running time or yearly, whichever is the shortest.

The required level of cleanliness may normally be achieved by filters with a minimum retention rate of b<sub>10</sub><sup>375</sup>.  
i.e. Typically a 10 micron filter.

Care should be taken in placement of filters in the system and consequent pressure drops across filters.

- d. Motor connections should be accordance with relevant international standards and rated for maximum system pressure. Connection lines are to be designed such as to impose minimum loading on motor due to vibration, movement, temperature changes of system, etc.

All connections must be completed prior to motor operation.

Connections shall be sized to minimise pressure losses. Recommended minimum bore of hydraulic lines is 8mm.

Pressure at leakage port must not exceed 10 bar. Hydraulic line should be sized accordingly, using the maximum motor leakage flow in the relevant data sheet.

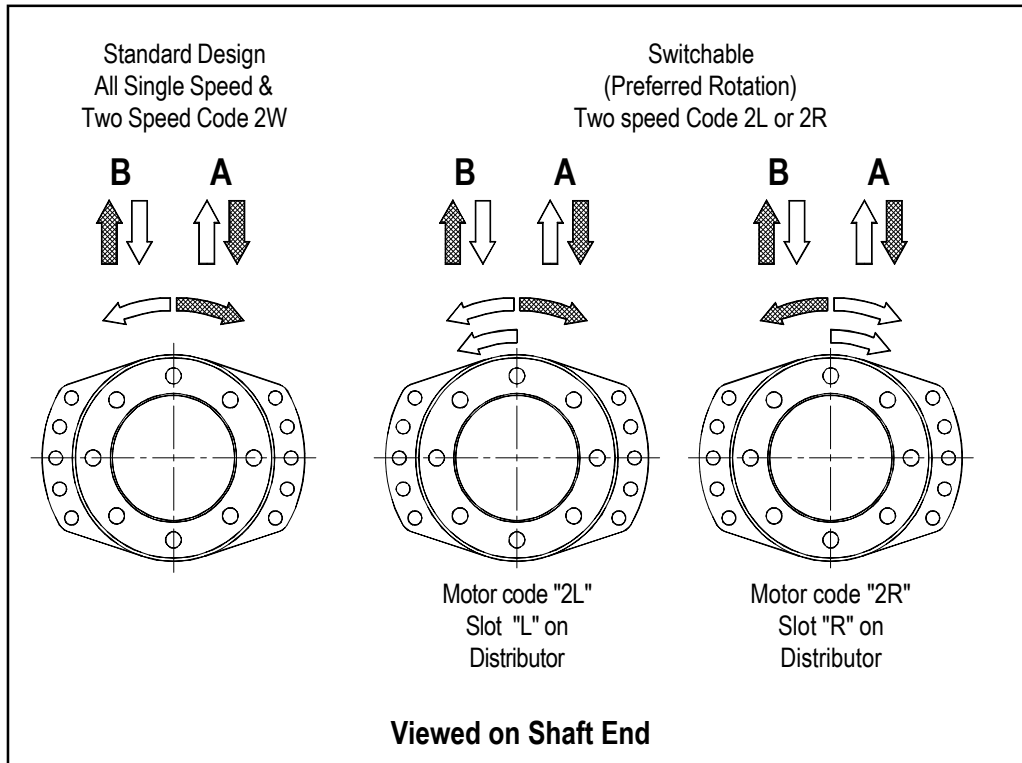
- e. Prior to operation the motor will be securely mounted using all the motor mounting holes with an arrangement capable of with standing maximum torque and all external loads placed on motor shaft.

Ensure mounting face is flat and perpendicular to motor axis, allowing no distortion of motor mounting flange.

Leakage port should be mounted near the top to ensure motor is permanently oil filled. Alternatively a check valve may be placed in drain line to ensure motor is permanently oil filled. Ensure leakage port pressure does not exceed 10 bar.

- f. Shaft connection to mechanical drive must use all mounting holes specified on output shaft. Care must be taken to ensure no loading is generated by eccentric mounting of motor to a load. A suitable flexible coupling should be used if this loading cannot be avoided.
- g. Brake shoes on new drum brake assemblies should be run in by driving with the brakes partially on for a period of 2 minutes.

**Motor Rotation**



**Commissioning**

- a. Ensure system is completely flushed to rated oil cleanliness levels prior to commissioning.
- b. Warning : During the running in period (minimum 24 hours) the motor should not be run unloaded at greater than 50% of maximum speed.
- c. Check motor is free from leaks.
- d. If braked motor, check brake functions.

- e. Storage. For up to 36 months :- Fill with hydraulic fluid. Package if in open air.

**Operation**

- a. Under operating conditions confirm:
  - Case drain pressure is <10 bar (145 psi).
  - Charge pressure of >15 bar (210 psi) is recommended.
  - Park brake pressure is >15 bar (210 psi) and <30 bar (435 psi).
  - 2 speed switching pressure is >15 bar (210 psi) over case pressure and <30 bar (435 psi).
  - Case drain oil leakage temperature <80°C (176°F). For operations above this temperature please consult Rexroth.
  - Operating speeds, pressures, charge pressure and power are within current datasheet recommendations.
- b. For extreme load or speed conditions, flushing may be added to obtain temperature reduction. Flush using both motor drain ports L and F. If in doubt consult authorised Rexroth agent.
- c. Monitor oil cleanliness at regular intervals.
- d. Periodically check motor is still securely mounted and running at normal temperature, sound level and leakage. Confirm unit is oil tight.

**Mechanical brake release**

See Fig. 1, Page 6.

Remove screwed cap, item 73. Position a screw, as per table 1 shown below, fitted with special tool 12, washer, (on MCR10, 15, 20 & 40 motors a bar, special tool 13, is to be used instead of the tool 12) through the centre of end plate, item 72, into item 67. Hand tighten screw to brake piston, item 67. Turn screw until brake is released (Approx 1 turn).

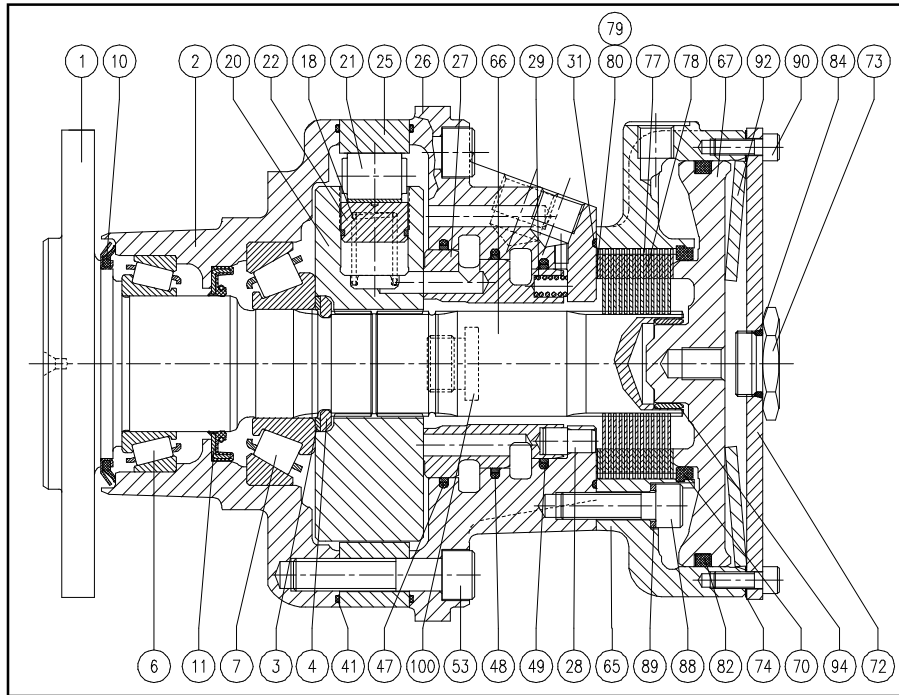
Important : Mechanical brake release should only be used in the event of hydraulic failure. Ensure mechanical release is disengaged after use to maintain fail-safe operation of brake.

**Table 1**

Motor Type	Screw Size	Screw Length	Torque
MCR3	M12	30mm	60Nm Approx.
MCR5	M16	30mm	120Nm Approx.
MCR10	M16	40mm	160Nm Approx.
MCR15	M20	45mm	230Nm Approx.
MCR20	M20	50mm	340Nm Approx.

**Important :** Always refer to relevant assembly drawing.

**Figure 1, B-M Park Brake.**



**Dismantling**

- a. When dismantling the unit from the machine, immediately close openings with plugs to prevent ingress of contamination.
  - 1.0.2 Drain oil from the motor by removing drainage plug, item 100.
- b. Make note of the details on code plate such as serial number, type number and running time of unit (for ordering spare parts).
  - 1.0.3 Remove all S.H.C.S. (Socket Head Cap Screw), item 90. Unscrew alternately, one turn at a time.
- c. Remove external dirt.
  - 1.0.4 Remove cover plate, item 72, gasket, item 74, disc spring, item 92.
- d. Have ready a clean work place, lay out tools ready.
  - 1.0.5 Remove piston, item 67, using tapped hole.
- e. Use only non-threading cleaning cloths.
  - 1.0.6 Remove piston seal, item 82, from piston, item 67.
- f. Prior to applying Loctite to a part ensure it and its mating part are clean, free from oil, grease and all old Loctite.
  - 1.0.7 Remove all S.H.C.S., item 88 and all washers, item 89.
- g. Carry out step by step dismantling.
  - 1.0.8 The brake housing, item 65, brake discs, items 77 & 78, shims, items 79, 80 and brake shaft, item 66 can now be removed.
- h. The appearance of the parts removed often gives an indication of the condition of the system. For example :-
  - 1.0.9 Remove seal, item 70, from brake housing, item 65.
  - 1.0.10 Bush, item 94, should remain fixed to shaft, item 66, unless damaged in which case it should be replaced.

Scored sliding surfaces, - contaminated operating fluid.  
heavy abrasion.

Discolouration of components with heavy loading. - overheating of operating fluid, incorrect choice of viscosity or inadequate specification of operating fluid.  
- insufficient oil.

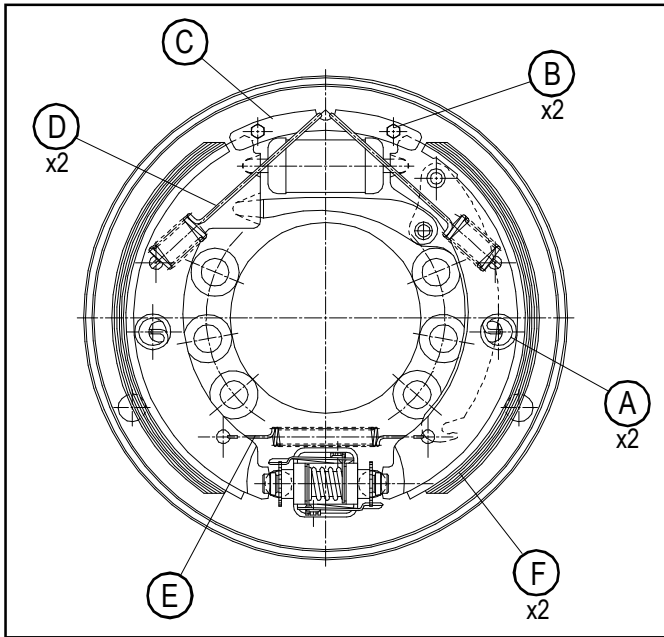
**1.1 Drum Brake shoe inspection and removal. (C-M motors only)** See figures 2 & 3.

**1.0 Park Brake Dismantling Instructions (B-M only)**

See figure 1.

- 1.0.1 Mark rotational position of brake housing, item 65, relative to rear case, item 26.
  - 1.1.1 Fully release dynamic brake.
  - 1.1.2 Plug brake port.
  - 1.1.3 Remove brake drum, item 5. If it is tight, clean off the rust at its joints and apply a small amount of penetrating fluid. Take care to avoid oil on brake shoes.
  - 1.1.4 Check the thickness of the brake shoe friction lining. If friction

Figure 2, Dynamic Brake C-M



lining thickness is 1.5mm (0.06in) or less, the shoe must be renewed.

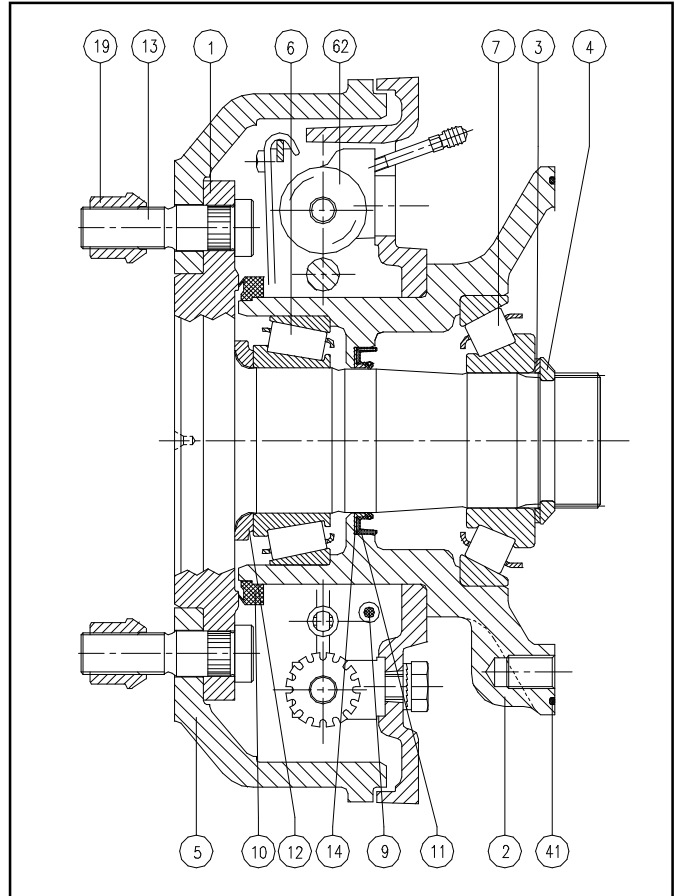
- 1.1.5 Note the position of the shoes, the brake cable position relative to the motor and the holes fixing the retaining springs.
- 1.1.6 Remove brake cable. Note how cable hooks onto dynamic brake.
- 1.1.7 Depress retaining springs, item A (2 off), and unhook from back plate.
- 1.1.8 Remove bolts, item B (2 off). Allowing plate, item C, to be removed.
- 1.1.9 Remove retaining springs, item D (2off).
- 1.1.10 Remove retaining spring, item E.
- 1.1.11 Remove brake shoes, item F (2 off).
- 1.1.12 If brake shoes, item F, are glazed then roughen surface with emery paper.

## 1.2 Motor Dismantling Instruction

See figure 1 on page 5.

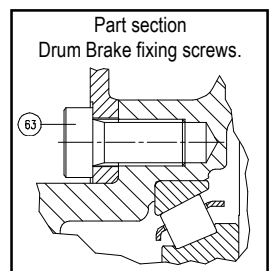
- 1.2.1 Mark the relative rotational positions of the front case, rear case and rotational assemblies.
- 1.2.2 If not previously done, remove plug, item 100 and drain oil from motor.
- 1.2.3 Remove all capscrews, item 53.
- 1.2.4 Remove rear case assembly, items 26 to 60 and rotational assemblies items 18 to 25. For motors fitted with piston springs (motor codes containing XM) take care to hold pistons, item 22, in cylinder block, item 20, using cam, item 25.

Figure 3, Front Case 'F' Type with C-M Brake



## 1.3 Dismantling Front Casing Motor type F with Drum brake(C-M motor only) See figures 2 & 3.

- 1.3.1 Remove O-ring, item 41.
- 1.3.2 Remove split ring, item 4, using a soft steel drift to separate. Then remove washer, item 3.
- 1.3.3 Support front casing on blocks and press shaft, item 1, out of bearings. Remove rear bearing cone, item 7, from assembly.
- 1.3.4 Remove wiper seal, item 10.
- 1.3.5 Remove all S.H.C.S, item 63, from front case, item 2.
- 1.3.6 Lift dynamic brake from front case assembly.
- 1.3.7 Lever lip seal, item 11 (and 14 if fitted), from front case.
- 1.3.8 Remove rear bearing cup, of item 7, from front case using a mechanical puller or a soft steel drift.
- 1.3.9 Remove front bearing cup, of item 6, from front case using a mechanical puller or a soft steel drift.
- 1.3.10 Remove bearing cone, item 6, from the shaft, item 1, using a mechanical puller.
- 1.3.11 If fitted, remove spacer, item 12, from shaft, item 1.



### 1.4 Dismantling Front Casing, all Types

See figures 4, 5, 6 & 7.

- 1.4.1 Remove O-ring, item 41.
- 1.4.2 Remove split ring, item 4, using a soft steel drift to separate. Then remove washer, item 3.
- 1.4.3 Support front casing on blocks and press shaft, item 1, out of bearings. Remove rear bearing cone, item 7, from assembly.
- 1.4.4 Remove bearing cup, of item 7, using mechanical puller.
- 1.4.5 Carefully remove seal, item 10, from shaft, item 1, and/or front case, item 2.
- 1.4.6 Carefully remove seal, item 11, from front case, item 2.
- 1.4.7 Remove rear bearing cup, of item 6, from rear case using a mechanical puller or soft steel drift.
- 1.4.8 Remove bearing cones, items 6 & 7, from the shaft, item 1, using a mechanical puller or soft steel drift.
- 1.4.9 If fitted, remove shaft spacer, item 12, from shaft, item 1.

Figure 4, MCR3 & 5 Front Case 'C', 'F' & 'G' Type

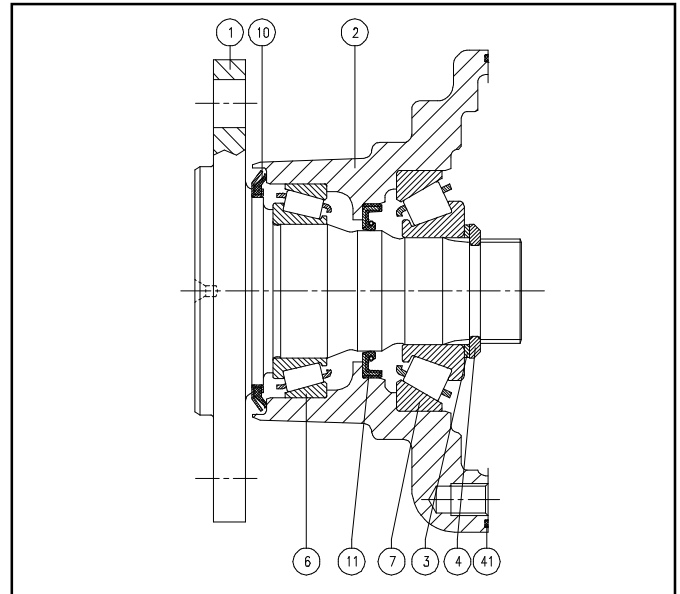


Figure 5, MCR3 & 5 Front Case 'A', 'D' & 'E' Type

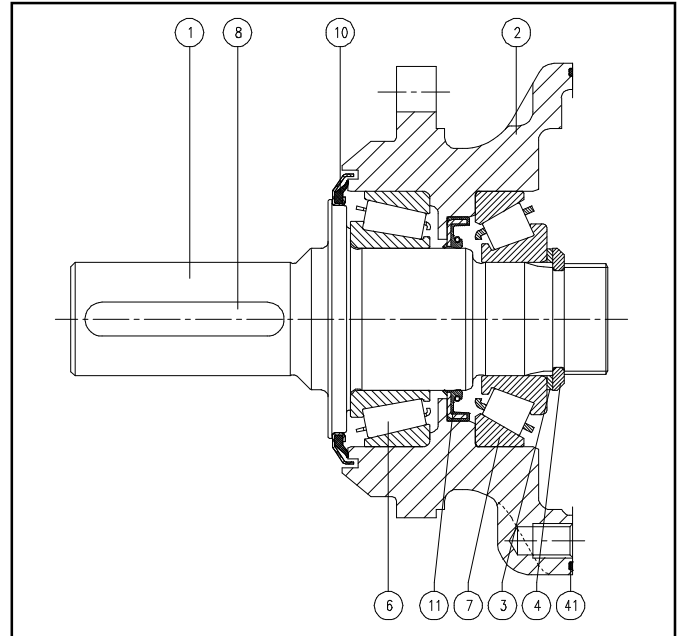


Figure 6, MCR10, 15, 20 & 40 Front Case 'C' & 'F' Type

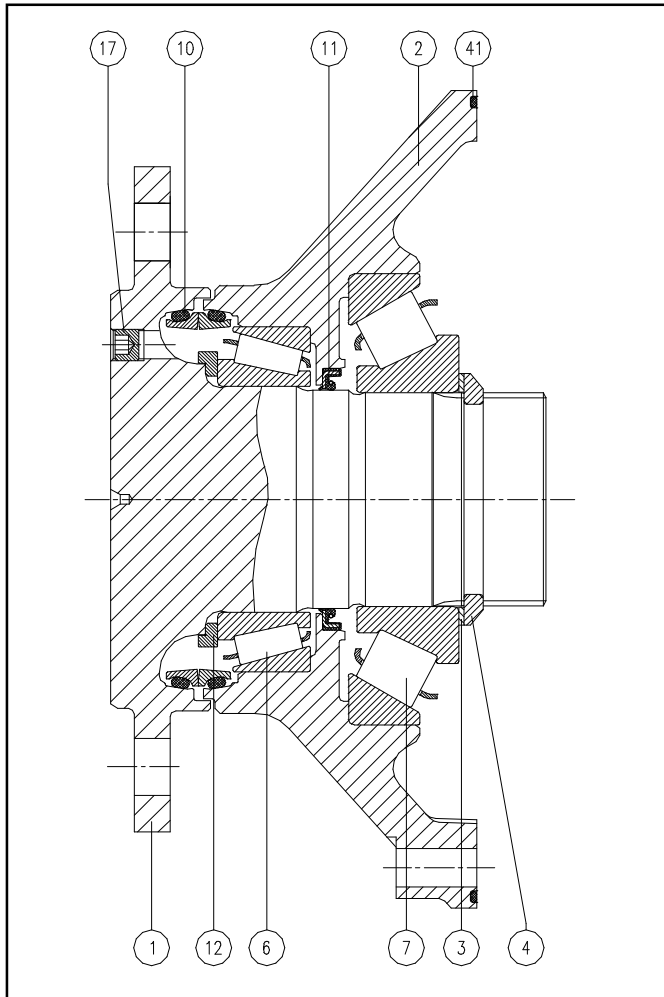
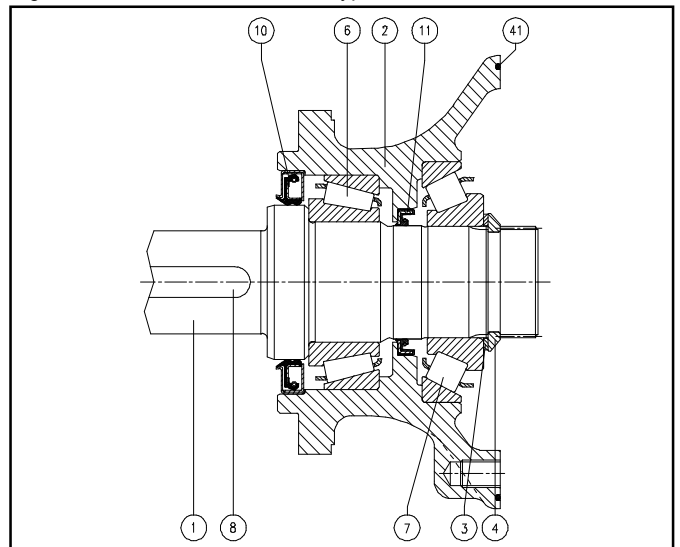


Figure 7, MCR10 Front Case 'D' Type



### 1.5 Dismantling the Rear Casing Assembly

See figures 8, 9 & 10.

- 1.5.1 **A\_M & C\_M Motors only.** Remove all hex head screws, item 39, from rear case, item 26.
- 1.5.2 **A\_M & C\_M Motors only.** Remove end cover, item 38.
- 1.5.3 Remove O-rings, item 31, 41 (and 36 if fitted), from rear case, item 26.

- 1.5.4 Drop the rear case assembly from approximately 80mm onto a wooden or plastic surface (timing face down). This will release distributor, item 27, from assembly. At all times take care not to damage timing face.
- 1.5.5 Remove stop pin, item 28, from rear case, item 26.
- 1.5.6 Check timing face of distributor. If necessary lap timing face.
- 1.5.7 Remove and discard all the seal rings if fitted, items 47 to 51.

Figure 8, MCR3 & 5 Low Displacement, A0M, Single Speed

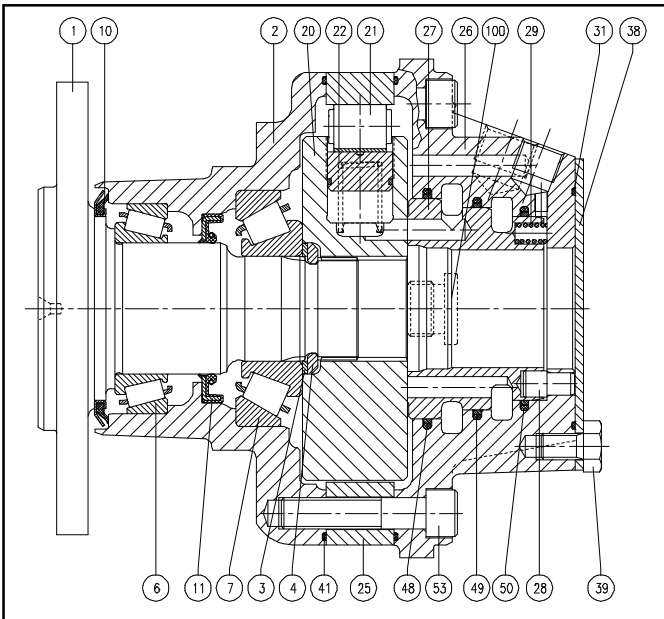


Figure 9, MCR3 & 5 Low Displacement, A0M, Two Speed  
MCR10 & 15 Low Displacement, A0M, Single & Two Speed

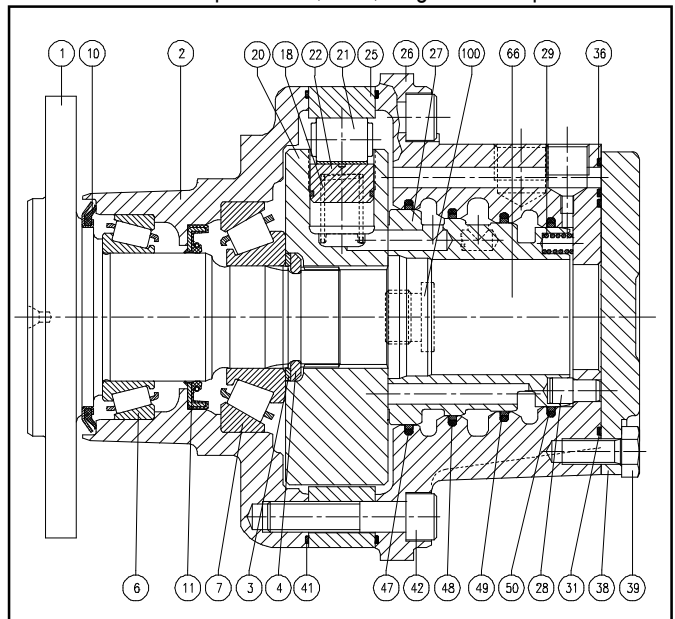
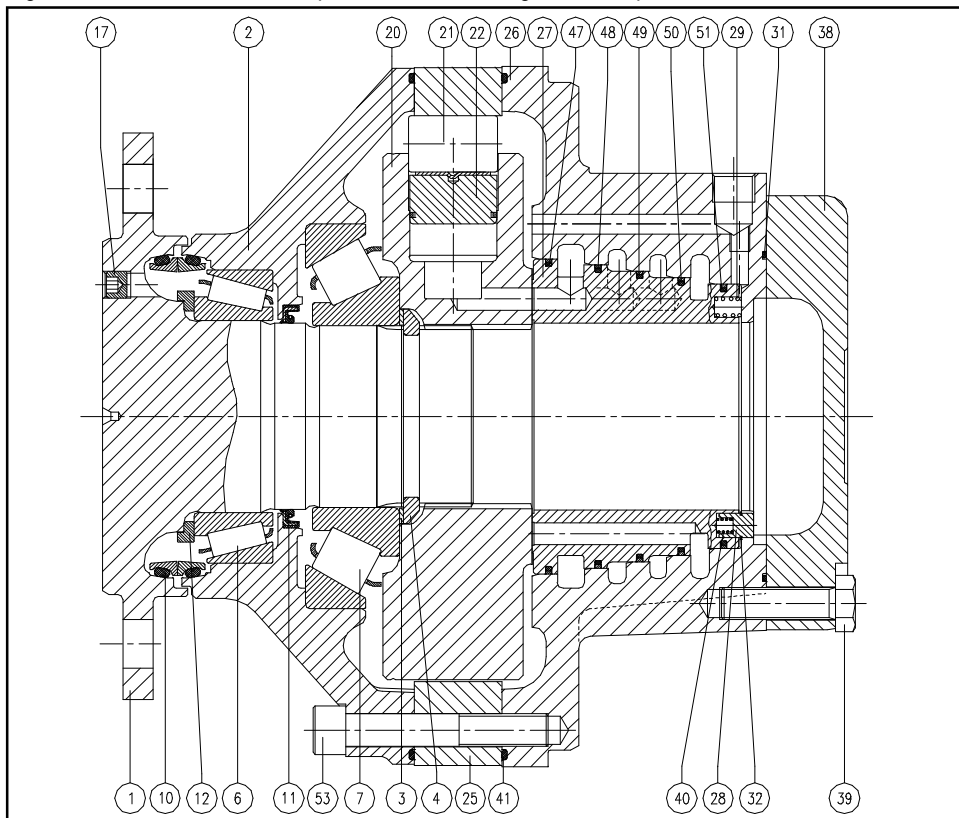


Figure 10, MCR20 & 40 Low Displacement, A0M, Single & Two Speed





**Two Speed Motors Only**

See figures 11, 12 & 12b.

- 1.5.8 Remove spool valve assembly, items 55, 56, 58 and **Code 2W only** items 71 & 76.
- 1.5.9 **2W figure 12 only.** Remove internal spool and spring, item 71, from spool valve assembly.
- 1.5.10 Remove spring, item 57.
- 1.5.11 Remove circlip, item 58, and washer, item 56, from spool valve, item 55.
- 1.5.12 **2W figure 12 only.** Remove seal ring, item 54, and seal, item 60, from cover or brake housing.
- 1.5.13 Remove seal, item 59, from cover or brake housing.
- 1.5.14 Inspect spool for damage, replace if required.

Figure 11, Code "2L/2R"  
Two Speed Spool Valve

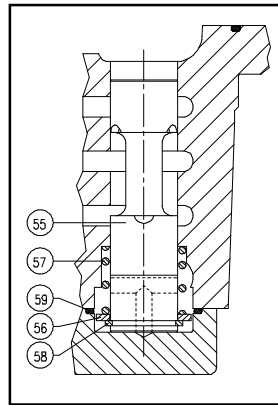


Figure 12, Code "2W"  
Two Speed Spool Valve

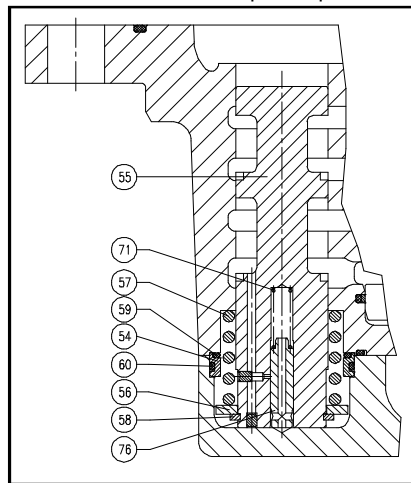


Figure 12b, Code "2W"  
Two Speed Spool Valve, Alternative design.

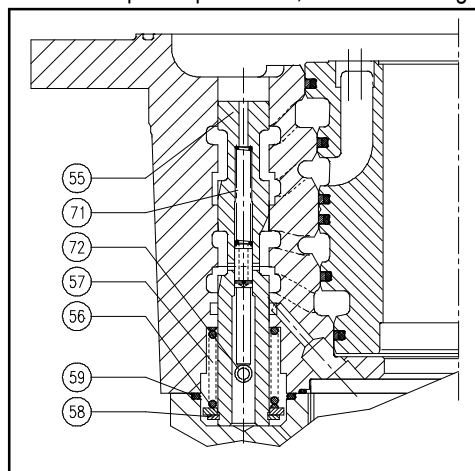


Figure 13, Low Displacement

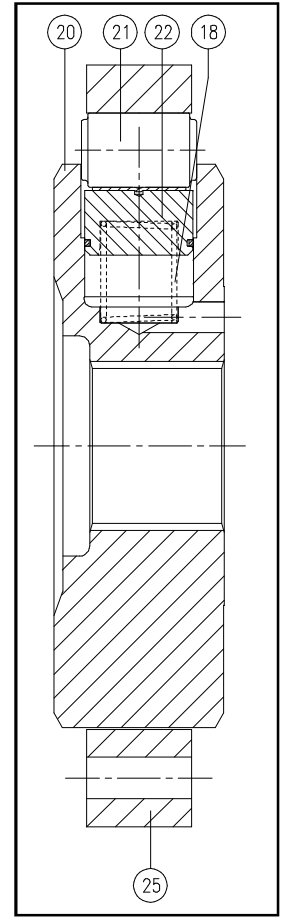
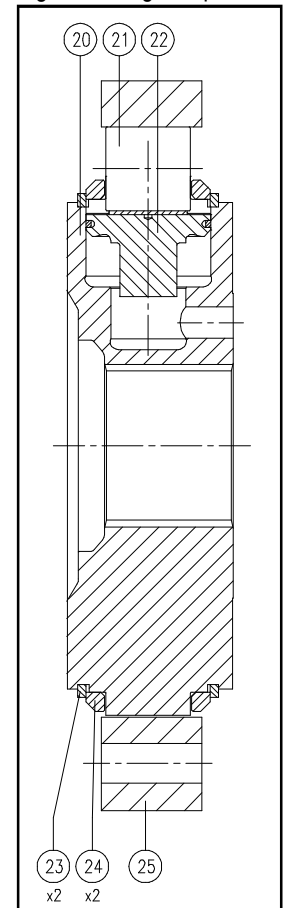


Figure 14, High Displacement



**1.6 Dismantling Rotating Assembly**

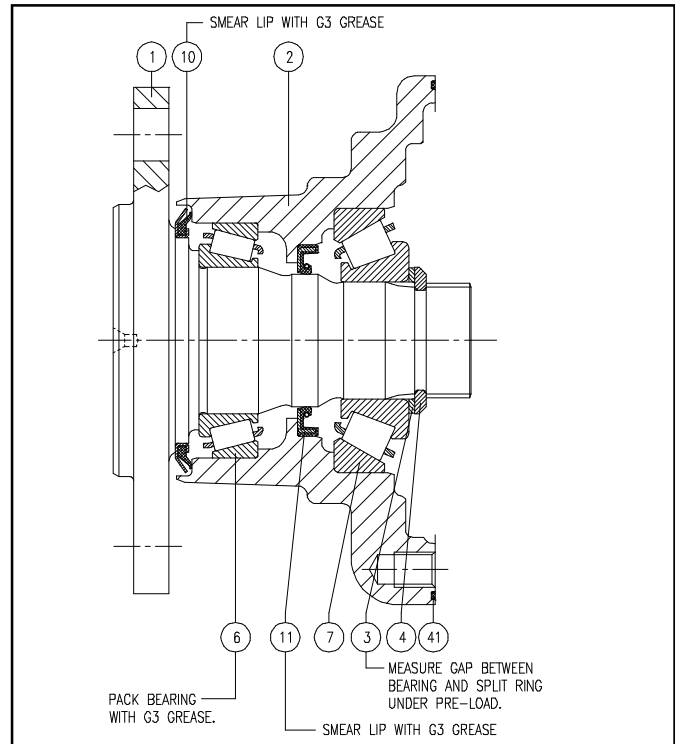
See figures 13 & 14.

- 1.6.1 **Piston spring motors only (motor codes containing XM).** If optional springs fitted, care should be taken when dismantling the piston assemblies. To prevent piston assemblies, items 21, 22 and the springs, item 18, becoming damaged or lost, cloths should be held firmly over the entire rotating group when removing cam, item 25.
- 1.6.2 Remove cam, item 25, from rotational assembly.
- High displacement motors only.**
- 1.6.3 Supporting cylinder block, item 20, at the edges with blocks, remove circlip, item 23, (2 off).
- 1.6.4 Remove retaining rings, item 24 (2 off).
- All motors**
- 1.6.5 Each piston assembly, item 21 & 22, can be removed under gravity or by low air pressure applied to the ports in the cylinder block, item 20.
- 1.6.6 Remove rollers, item 21, from piston assembly and check for wear on rollers piston seats.
- 1.6.7 Check timing face of cylinder block. If necessary lap timing face.

## Reassembly

- a. Use only genuine Rexroth Spare Parts. We recommend the use of pre-assembled, co-ordinated and tested component groups. The required component groups and seal kits should be selected from the spares list and ordered by quoting the name plate details. If in doubt contact the local authorised Rexroth agent.
- b. Assembly should be carried out observing the maximum cleanliness.
- c. On completion of repair, close all openings with plugs. Should difficulties arise, please contact your nearest service centre.
- d. Do not re-use old seals.
- e. Oil all seal contact areas before assembly using system hydraulic oil unless otherwise stated in text.
- f. Tighten screws with torque wrench according to specification. We recommend that all fastening screws, items 53, 88 and 90, are changed at reassembly.

Figure 15, MCR3 & 5 Front Case 'C', 'F' & 'G' Type

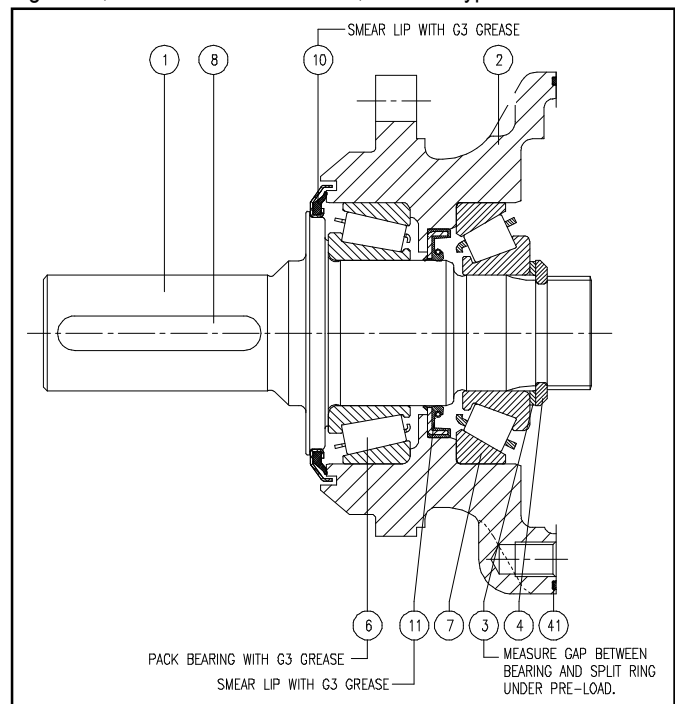


## 2.1 Reassembling Front Casing, All Types (except C-M motors.)

See figures 15, 16, 17 & 18.

- 2.1.1 Ensure all components are clean and free from debris.
- 2.1.2 Insert bearing cup, item 6, into front case, item 2, using special assembly tool 3.
- 2.1.3 **MCR3, 5 & MCR10 'D' Only.** Insert seal item 11, into front case, item 2, using special assembly tool 4. Smear lip of seal, item 11, with G3 grease.
- 2.1.4 Insert rear bearing cup, item 7, into front case, item 2, using special assembly tool 5.
- 2.1.5 **MCR3 & 5 only.** Fit seal, item 10, to shaft, item 1. Smear lip of seal with G3 grease.
- 2.1.6 **MCR10, 15, 20, 40 'C' & 'F' Only.** Fit both halves of seal, item 10, to front case, item 2, and shaft, item 1, using special assembly tool 1. Smear contact faces with system oil.
- 2.1.7 **MCR5 'F', MCR20 & 40 Only.** Place spacer item 12, onto shaft, item 1.
- 2.1.8 Place drive shaft, item 1, vertically on a press.
- 2.1.9 If required, place suitable sized cylinder underneath shaft flange, item 1. (Cylinder should be large enough to ensure shaft rests on cylinder not wheel studs).
- 2.1.10 Warm front bearing cone, item 6, then press onto shaft, item 1, using bench press and special assembly tool 2.

Figure 16, MCR3 & 5 Front Case 'A', 'D' & 'E' Type



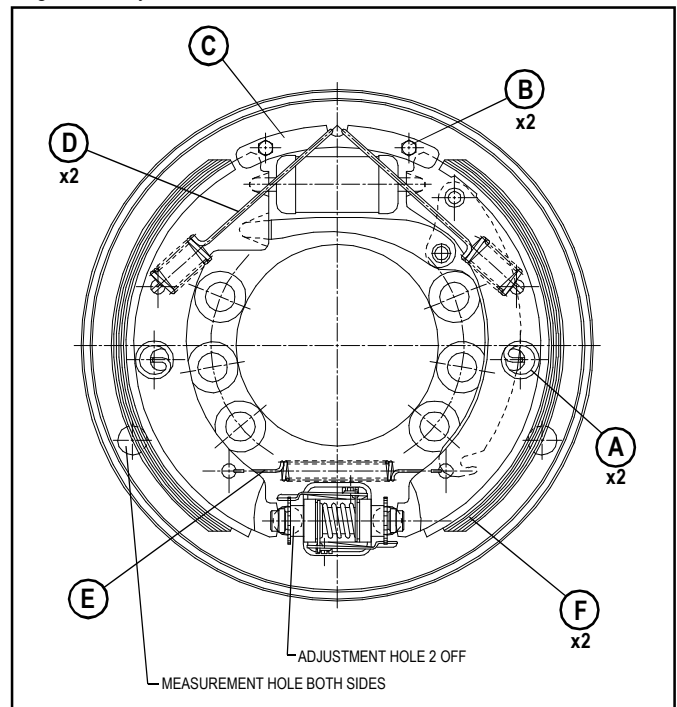
- 2.1.11 **MCR3, 5 and MCR10 'D' Type only.** Pack front bearing cone, item 6, with G3 grease.
- 2.1.12 Cover shaft spline diameter with tape, to protect lip seal.
- 2.1.13 Fit front case assembly to shaft assembly.



## 2.2 Reassembling Dynamic Brake (C-M motors only) See figure 19.

- 2.2.1 Fit plate, item C, to back plate.
- 2.2.2 Insert (2 off) screws, item B.
- 2.2.3 Fit first brake shoe with attached lever.
- 2.2.4 Fit second brake shoe without lever and hook lever with first brake shoe.
- 2.2.5 With a soft mallet tap shoes inward. This decrease's brake shoe O.D. so allowing brake drum to be fitted.
- 2.2.6 With pliers fit lower retaining spring, item E.
- 2.2.7 With pliers fit upper retaining springs, item D (2 off).
- 2.2.8 Insert retaining springs, item A (2 off).
- 2.2.9 Depress retaining springs, item A (2 off) and hook springs onto back plate.
- 2.2.10 Fit brake cable.
- 2.2.11 If brake shoe has oil on it then remove all evidence of oil from shoe. (Use brake and clutch cleaner).

Figure 19, Dynamic Brake C-M

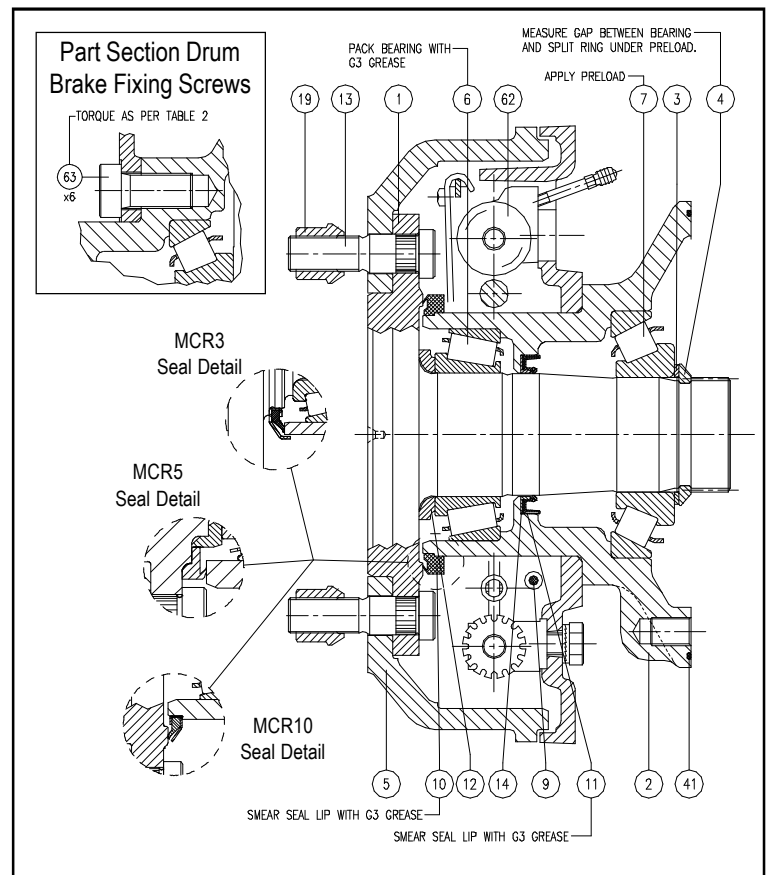


## 2.3 Reassembling Casing, 'F' Type with Drum brake (C-M)

See figure 20.

- 2.3.1 Ensure all components are clean and free from debris.
- 2.3.2 Insert bearing cup, item 6, into front case, item 2, using special assembly tool 3.
- 2.3.3 Combine back up ring, item 14, with lip seal, item 11 (MCR10 only).
- 2.3.4 Insert seal, item 11, or seal assembly (MCR10 only), items 11 & 14, into front case, item 2, using special assembly tool 4.
- 2.3.5 Smear lip of seal, item 11, with G3 grease.
- 2.3.6 Insert rear bearing cup, item 7, into front case, item 2, using special assembly tool 5.
- 2.3.7 Lift dynamic brake, item 62, onto front case assembly. Align bolt holes.
- 2.3.8 **MCR3 and 10 only;** Insert socket head capscrew, item 63 (6 off), into front case, item 2.  
**MCR5 and 15 only;** Fit washers, (6 off), to hex head screw, item 63 (6 off), and insert into front case, item 2.
- 2.3.9 Torque screws, item 63 (6 off), in accordance with Table 2.

Figure 20, Front Case 'F' Type with C-M brake (MCR15 shown)



**Table 2**

Motor Type	Item 63 Torque
MCR3	117-122 Nm (89-90 lbf.ft)
MCR5	170-176 Nm (129-134 lbf.ft)
MCR10	560-580 Nm (426-441 lbf.ft)
MCR15	560-580 Nm (426-441 lbf.ft)

- 2.3.10 **MCR5, 10 and 15 only**; Insert spacer, item 12, onto shaft, item 1.
- 2.3.11 Place suitable sized cylinder underneath shaft, item 1. Cylinder should be large enough to ensure shaft rests on cylinder not wheel studs, if fitted.
- 2.3.12 Warm front bearing cone, item 6, then press onto shaft, item 1, using bench press and special assembly tool 2.
- 2.3.13 Pack front bearing cone, item 6, with G3 grease.
- 2.3.14 Fit wiper seal, item 10, to shaft (**MCR3 & 5 only**), item 1, or front casing (**MCR10 & 15 only**), item 2, as shown in Figure 20. Smear wiper seal with G3 grease.
- 2.3.15 Place front casing assembly, shaft assembly, rear bearing, item 7, washer, item 3, and split ring, item 4, on bench.
- 2.3.16 Cover shaft spline diameter with tape, to protect lip seal, item 11.
- 2.3.17 Fit front case assembly to shaft assembly.
- 2.3.18 Remove tape from spline.
- 2.3.19 Warm rear bearing cone, item 7, and fit to shaft, item 1, by pressing onto shaft using bench press and special assembly tool 6 to a load of 4 tonnes. Rotate front case 5 times during this process.
- 2.3.20 Using bench press and special assembly tool 7, apply a load of 4 tonne to rear bearing, item 7, and fit split ring, item 4, onto shaft, item 1. Rotate case during this process.

- 2.3.21 With pre-load still applied, measure gap between bearing and split ring with slip gauges (this step should be completed less than 10 minutes after removing bearing from heater).
- 2.3.22 Remove split ring, item 4, and fit washer, item 3, thickness 0.05 to 0.1mm (0.002" to 0.004") greater than measured gap, then refit split ring.
- 2.3.23 Remove load.
- 2.3.24 **MCR3 & 5 only**. Remove split ring, item 4, and fit a washer, item 3, with thickness 0.1 to 0.2mm (0.004" to 0.008") greater than measured gap, then refit split ring.
- 2.3.25 **MCR10, 15, 20 & 40 only**. Remove split ring, item 4, and fit a washer, item 3, with thickness 0.2 to 0.3mm (0.008" to 0.012") greater than measured gap, then refit split ring.
- 2.3.26 Check shaft, item 1, runs free but slightly stiff in front casing assembly.
- 2.3.27 Fit brake drum, item 5, to front case assembly.

### Setting Drum Brake

- 2.3.28 Remove plastic plugs (4 off) from holes in drum brake back plate, see Figure 19.
- 2.3.29 Using feeler gauges/shims measure gap between brake drum, item 5, and brake shoe, item F, on each side through measurement holes (2 off), see Figure 19 & 20.
- 2.3.30 **MCR5, 10 & 15 only**: Set each gap in turn to 0.5mm (0.020") by rotating relevant adjustor with a screwdriver through adjustment holes, see Figure 19.
- 2.3.31 **MCR3 only**: Set gap on one side to 0.5mm (0.020") and greater than 0.5mm (0.020") on the other by rotating single adjustor with a screwdriver through adjustment hole, see figure 19.
- 2.3.32 Replace plastic plugs (4 off) in drum brake back plate.
- 2.3.33 Place aside and cover to protect against ingress of dirt.

**Table 3**

Motor Type	Items 21 & 22 No. of	Low Displacement (cc/rev)	High Displacement (cc/rev)
MCR3	8	160, 225, 255, 280	325, 365, 400
MCR5	8	380, 470, 520, 565	680, 750, 820
MCR10	10	780, 940	1120, 1250, 1340
MCR15	10	1130, 1250, 1500	1780, 2150
MCR20	10	1750, 2100	2500, 3000
MCR40	10	2500, 3000, 3500, 4200	-

## 2.4 Reassembling Rotating Assembly

See figures 21 & 22.

- 2.4.1 Check all components are clean and free from debris. Take care not to damage timing face.
- 2.4.2 Fit roller, item 21, to piston assembly, item 22. Dip piston assembly into oil.
- 2.4.3 Fit piston, item 22, and roller, item 21, to piston bore in cylinder block, item 20.
- 2.4.4 Repeat for each piston bore in cylinder block, item 20.

### Piston Spring motors only (motor codes containing XM)

- 2.4.5 If optional springs are fitted, insert piston assemblies, items 21 & 22, and springs, item 18, into the cylinder block and hold in position using special tool 10.
- 2.4.6 Place the cam, item 25, over the assembled rotary group and carefully remove each special tool 10.

### High displacement motors only

- 2.4.7 Fit retaining rings, item 24 (2 off) to cylinder block, item 20 (Ensuring orientation of ring area as shown in part view). Align and secure using circlips, item 23 (2 off).

Figure 21, Low Displacement

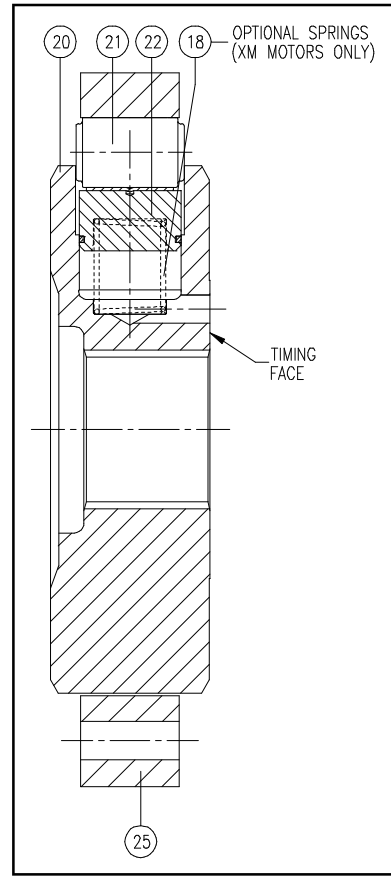


Figure 22, High Displacement

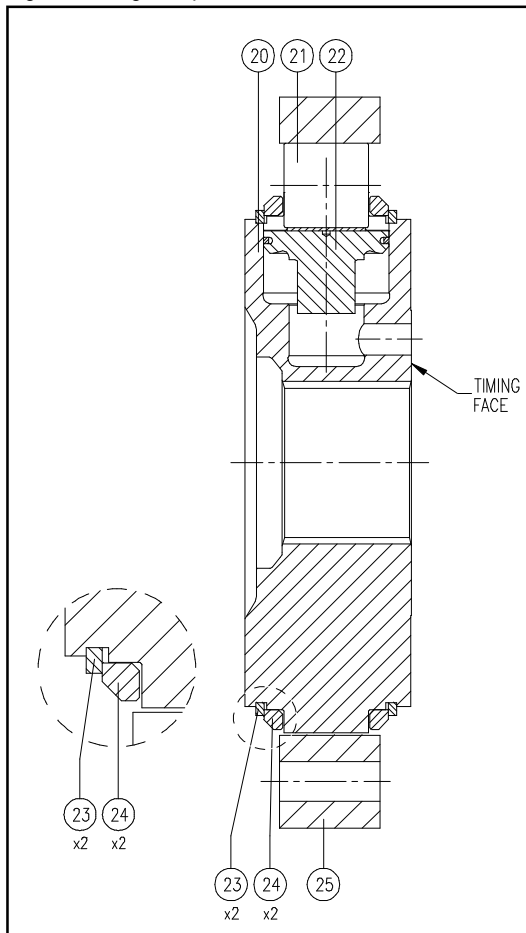


Figure 23, Low Displacement, AOM  
MCR3, 5 Two Speed & MCR10, 15 Single & Two Speed

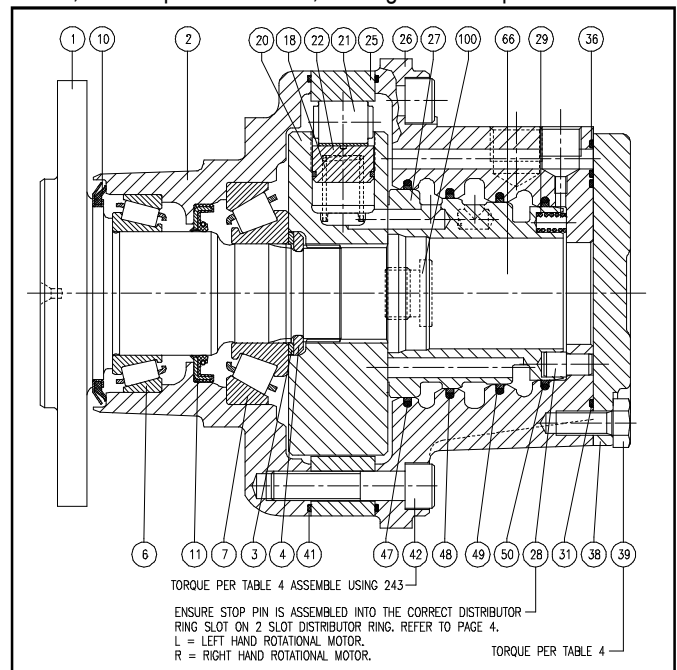
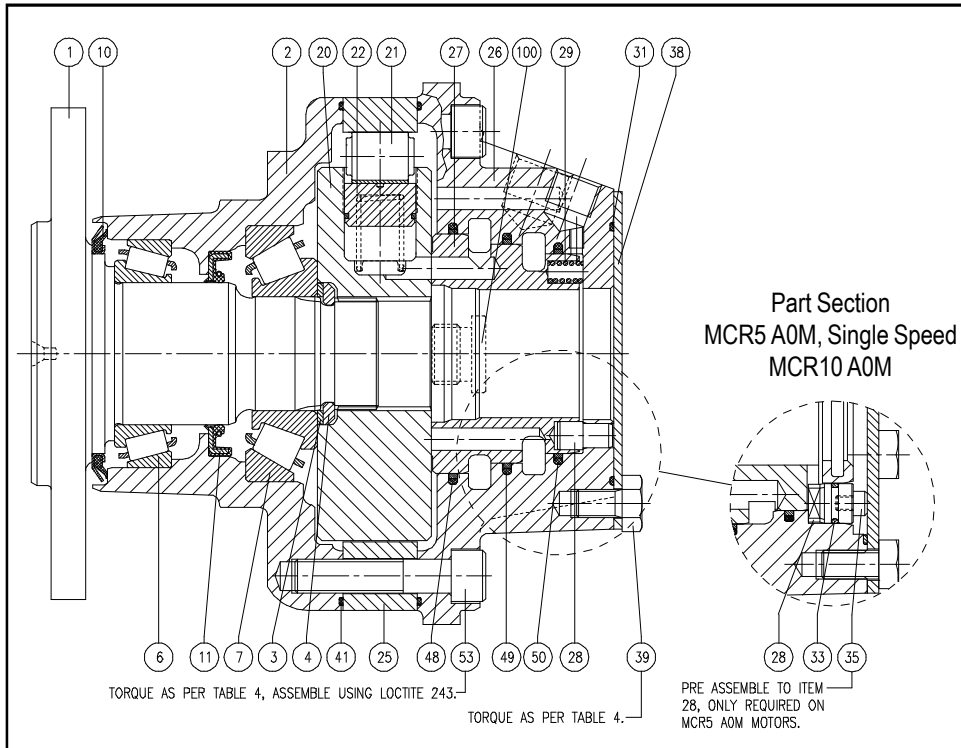


Figure 24, MCR3 Low Displacement, A0M, Single Speed

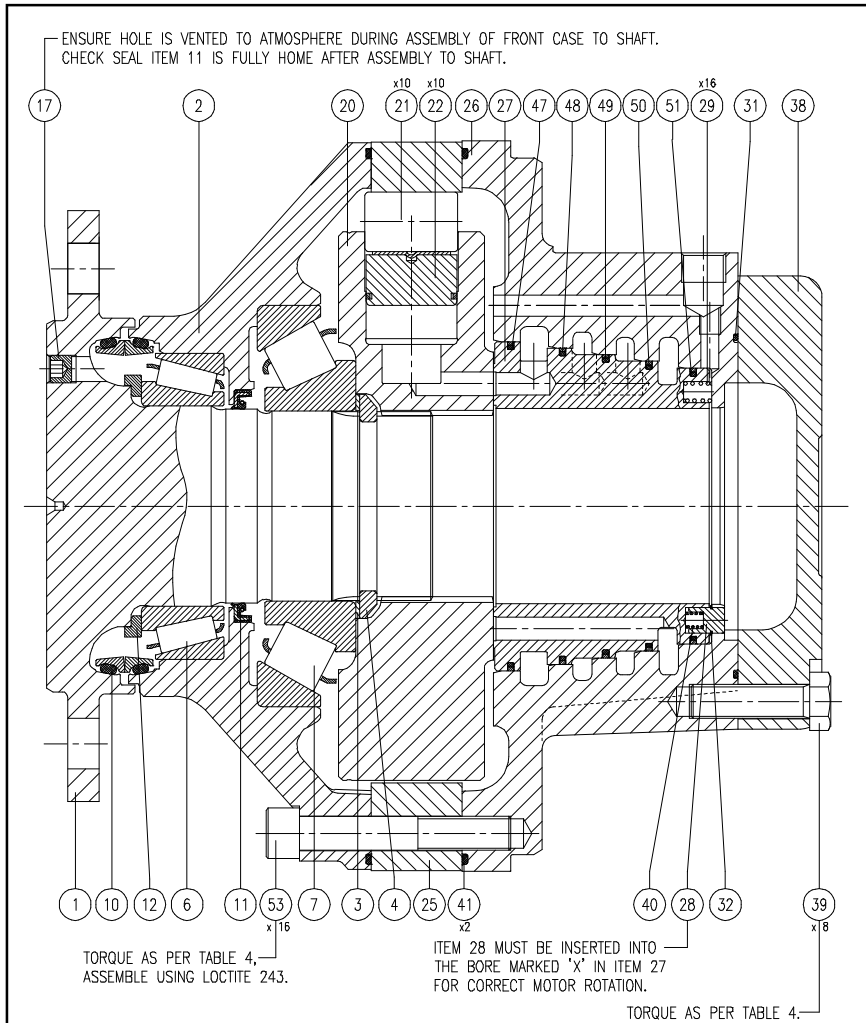


**2.5 Reassembling Rear Casing Assembly**

See figures 23, 24 & 25.

- 2.5.1 Check all components are clean and free from debris.
- 2.5.2 Place springs, item 29 (see table 4), into recesses in distributor, item 22, using a small amount of mineral based grease to hold springs in position.
- 2.5.3 Insert distributor seals, items 47 to 51 as depicted in relevant figures 23, 24 & 25, into correct grooves with minimum distortion of seals.

Figure 25, MCR20 & 40 Low Displacement, A0M, Single & Two Speed



- 2.5.4 **MCR5 Single speed & MCR10 only.** Fit O-ring item 33, to stop pin, item 28.  
**MCR5 Single speed A0M only.** Fit capscrew, item 35, to stop pin, item 28.
- 2.5.5 **MCR20 & 40 only.** Assemble circlip, item 32, onto stop pin, item 28.
- 2.5.6 **All motor except MCR5 Single speed & MCR10.** Insert stop pin, item 28, into correct distributor stop pin hole stamped L & R, per motor code, see page 4.
- 2.5.7 Using special tool 11, fit and align distributor, item 27, into rear case, item 26, in line with stop pin hole in rear case.
- 2.5.8 **MCR5 Single speed & MCR10 only.** Insert stop pin, item 28, into rear case, item 26, ensuring the stop pin fully engages with the correct distributor slot per motor code, see page 4.
- 2.5.9 Insert plug assembly, item 100, and secure with Allen key.

**Table 4**

Motor Type	Items 29 No. of	Items 53 No. of	Item 53 Torque	Item 39 Torque
MCR3	6	6	150-155 Nm (111-114 lbf.ft)	40-45 Nm (29-33 lbf.ft)
MCR5	6	12	117-122 Nm (86-90 lbf.ft)	40-45 Nm (29-33 lbf.ft)
MCR10	12	8	282-300 Nm (208-221 lbf.ft)	75-80 Nm (55-59 lbf.ft)
MCR15	14	16	282-300 Nm (208-221 lbf.ft)	150-160 Nm (111-118 lbf.ft)
MCR20	16	16	282-300 Nm (208-221 lbf.ft)	150-160 Nm (111-118 lbf.ft)
MCR40	16	16	282-300 Nm (208-221 lbf.ft)	150-160 Nm (111-118 lbf.ft)

**Two Speed Motors, code 2L/2R only.**

See figure 26.

- 2.5.10 Fit circlip, item 58, and washer, item 56, onto spool, item 55.
- 2.5.11 Insert spring, item 57, into rear case, item 26.
- 2.5.12 Insert O-ring, item 59, into cover or brake housing, item 38.
- 2.5.13 Oil spool and fit spool assembly, items 55, 56 and 58, into rear case, item 26 (Check that assembly is free to move).

**Two Speed Motors, code 2W, only.**

See figure 27.

- 2.5.14 Fit circlip, item 58, and washer, item 56, onto spool, item 55.
- 2.5.15 Insert spring, item 57, into rear case, item 26.
- 2.5.16 **2W figure 27 only.** Insert spring, item 71, and poppet, item 76, into spool valve, item 55.
- 2.5.17 Insert O-rings, item 59 and item 60 into seal ring, item 54 and fit seal ring to brake housing or end cover, item 38.
- 2.5.18 Oil spool and fit shuttle valve assembly, items 55, 56, 58, 71 and 76 into rear case, item 26 (Check that assembly is free to move).

**Two Speed Motors, code 2W, Alternative design only.**

See figure 27b.

- 2.5.19 Ensure the correct combination of washer and spring is selected before assembly. Fit circlip, item 58, and washer, item 56, onto spool, item 55.
- 2.5.20 Insert spring, item 57, into rear case, item 26.
- 2.5.21 Insert O-ring, item 59, into cover or brake housing, item 38.
- 2.5.22 Oil spool and fit shuttle valve assembly, items 55, 56, 58 and 76 into rear case, item 26 (Check that assembly is free to move).

Figure 26, Code "2L/2R" Two Speed Only

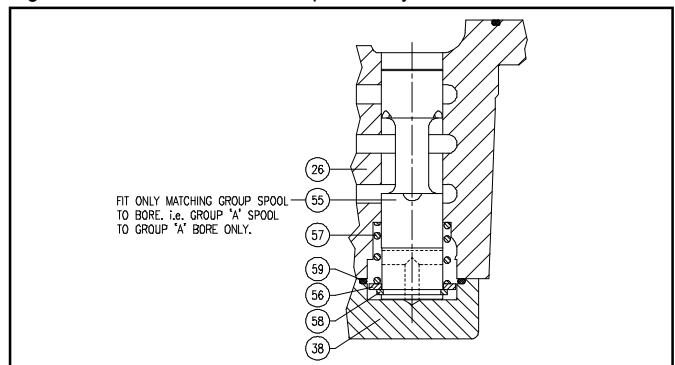


Figure 27, Code "2W" Two Speed Only

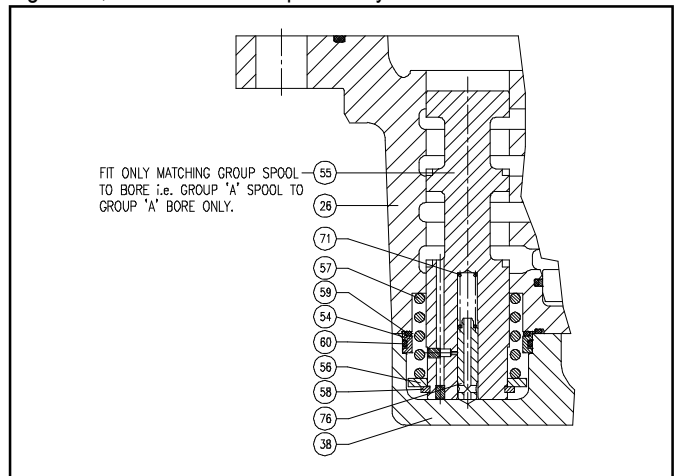
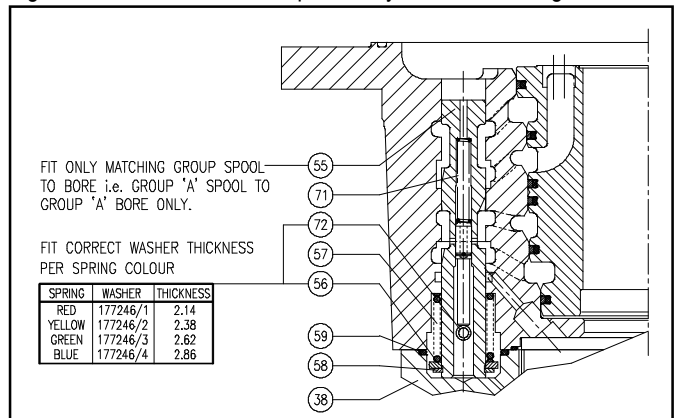


Figure 27a, Code "2W" Two Speed Only Alternative design.





**MCR10, 15 & 20 Single Speed Motors only.**

See figures 29 &amp; 30.

- 2.5.23 Assemble plug, item 62, into spool bore using loctite 542 and torque plug to 42-45 Nm.
- 2.5.24 Assemble plug, item 63 (x2 on MCR20), into spool bore(s) and torque to 79-85 Nm.

**MCR40 Single Speed Motors only.**

See figure 28.

- 2.5.25 Fit circlip, item 58, onto spool, item 55. Insert O-ring, item 59, into cover or brake housing. Oil spool and fit into rear case.

**A0M C-M Motors only.**

- 2.5.26 Place end cover, item 38, onto rear case, item 26.
- 2.5.27 Insert capscrews, item 39, into rear case, item 26. Start bolts by hand.
- 2.5.28 Torque capscrews, item 39, per table 4. Tighten opposites to maintain squareness.

**2.6 Motor Assembly.**

See figures 23, 24 &amp; 25.

- 2.6.1 Check all components are clean and free from debris.
- 2.6.2 Fit face O-ring, item 41, to front casing assembly, item 2.
- 2.6.3 Fit rotating assembly to front casing assembly, being careful not to damage splines on shaft, item 1, or cylinder block, item 20. Position cam, item 25, on front casing assembly, aligning reference marks made before dismantling.
- 2.6.4 Fit O-ring, item 41, to rear casing assembly and position rear case assembly on cam, aligning reference marks.
- 2.6.5 Put Loctite 243 on capscrews, item 53.
- 2.6.6 Fit capscrews, item 53, to assembly and start all capscrews by hand before tightening.
- 2.6.7 Torque capscrews, item 53, as per table 4. Tighten opposites to maintain squareness.
- 2.6.8 Check drive shaft to ensure motor rotates freely.
- 2.6.9 **A\_M or C\_M motors only.** Remove plug, item 100, from rear case, item 26, and fill motor with clean hydraulic system oil. Replace plug, item 100.

Figure 28, MCR40 Single Speed Only

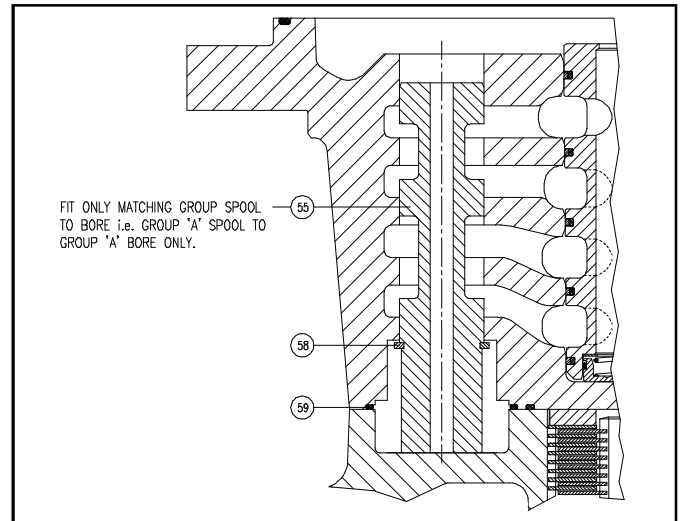


Figure 29, MCR20 Single Speed Only

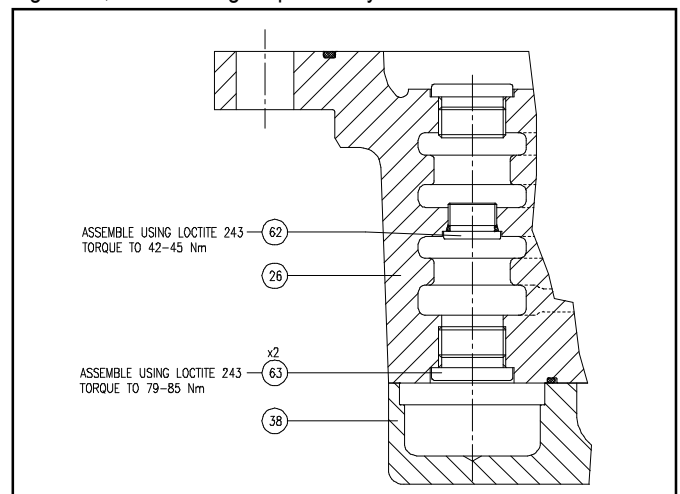
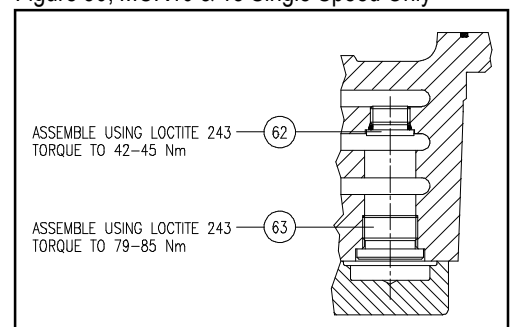


Figure 30, MCR10 &amp; 15 Single Speed Only



## 2.7 Reassembly of Park Brake (B-M motor only)

See Figure 31.

- 2.7.1 Check all components are clean and free from debris.
- 2.7.2 If bush, item 94, has been removed, press fit new bush to shaft, item 66 (or brake piston, item 67, on **MCR15, 20 & 40**). Ensure bush is assembled fully home in shaft, item 66 (or brake piston, item 67, on **MCR15, 20 & 40**).
- 2.7.3 Insert brake shaft, item 66, through distributor, item 27, to cylinder block, item 20. Ensure shaft fully enters cylinder block, item 20.
- 2.7.4 Assemble brake discs, items 77 & 78 (see table 5), into a pack. Clamp pack in vice. Ensure inner discs, item 77, alternates with outer discs, item 78, and an outer disc is placed at each end of the pack. **MCR5 only**. Washer, item 61, is to be included when assembling the pack.

- 2.7.5 Check pack height adding shims, items 79 & 80, as required to obtain a pack height as per table 5. An extra outer plate is preferred to reduce the number of required shims. Shims should be placed at end of pack in contact with rear case, item 26 (or washer, item 61).
- 2.7.6 **MCR5 only**. Fit washer, item 61, to rear case, item 26.
- 2.7.7 Fit brake housing, item 65, to rear casing assembly. Aligning reference marks made prior to disassembly
- 2.7.8 Apply Loctite 243 to socket head capscrews, item 88 (see table 5). Fit capscrew, item 88, with washers, item 89, to rear case, item 26. Start each screw by hand then tighten as per table 5. Tighten opposites to maintain squareness.
- 2.7.9 Fit brake pack, items 77, 78, 79 & 80 to brake shaft, item 66.
- 2.7.10 Fit outer seal, item 70, to brake housing, item 65, ensuring correct orientation of seal to groove.  
(On latest motors this seal has been revised and may required a tool for assembly)
- 2.7.11 Fit piston seal, item 82, to piston, item 67.
- 2.7.12 Fit piston, item 67, and seal, item 82, to brake assembly. Oil seals prior to fitting and ensure no damage to seals occurs on assembly.
- 2.7.13 Fit disc spring, item 92. Ensure contact surfaces are coated with S1 grease.
- 2.7.14 Place end cover, item 72, and gasket item 74, onto brake housing, item 65.
- 2.7.15 Insert bolts, item 90 (see table 5), into brake housing, item 65. Start bolts by hand.
- 2.7.16 Torque bolts, item 90, as per table 5. Tighten opposites to maintain squareness.
- 2.7.17 Refit plug assembly, item 73, and tighten.
- 2.7.18 Close all openings with plugs.
- 2.7.19 Remove plug, item 100, from rear case, item 26, and fill motor with clean hydraulic system oil. Replace plug, item 100.

Figure 31, Low Displacement, Single Speed, B-M

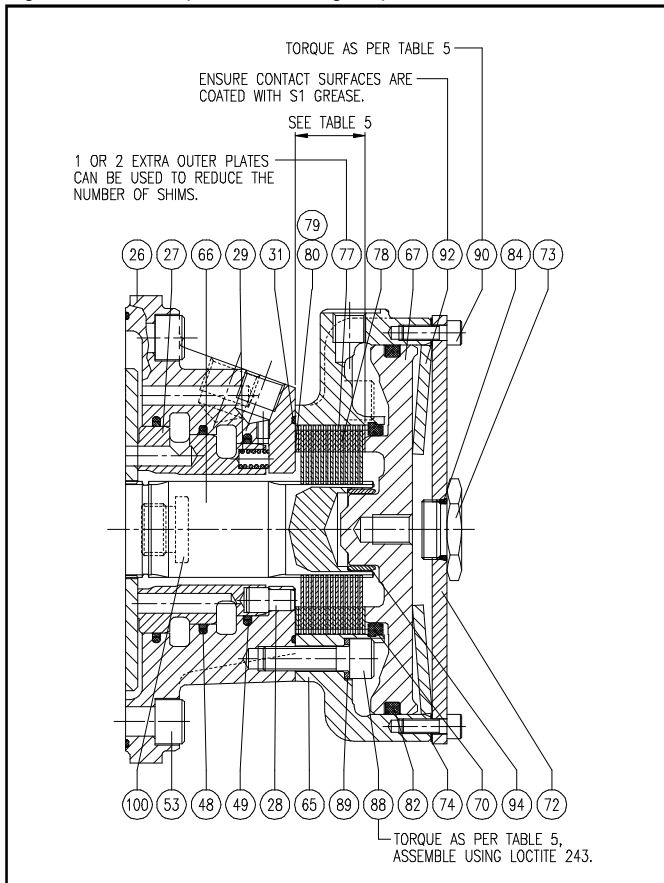


Table 5

Motor Type	Pack Height	No of Item 77	No of Item 78	No of Item 90	No of Item 88 & 90	Item 90 Torque	Item 88 Torque
MCR3	28.2±0.1	15	13	12	8	14-16 Nm (10-12lbf.ft)	70-77 Nm (52-57 lbf.ft)
MCR5	36.45±0.05	16	14	24	8	35-39 Nm (26-29 lbf.ft)	70-77 Nm (52-57 lbf.ft)
MCR10	41±0.1	19	17	24	8	70-77 Nm (52-57 lbf.ft)	117-122 Nm (86-90 lbf.ft)
MCR15	39.7±0.1	19	17	24	8	70-77 Nm (52-57 lbf.ft)	282-300 Nm (208-221 lbf.ft)
MCR20	48.5±0.1	20	18	24	8	117-122 Nm (86-90 lbf.ft)	282-300 Nm (208-221 lbf.ft)
MCR40							

**2.8 Park Brake Test (B-M motor only)**

See figure 31.

- 2.8.1 Increase pressure to brake port until motor shaft just begins to move by hand. This brake release pressure should not exceed 15 bar g (217 psi g).
- 2.8.2 With 250 bar (3625 psi) differential pressure applied to motor, and zero brake release pressure, the brake should hold the motor torque.

**3.0 Optional Accessories**

**3.1 Flushing Valve.**

See figure 32.

**Disassembly**

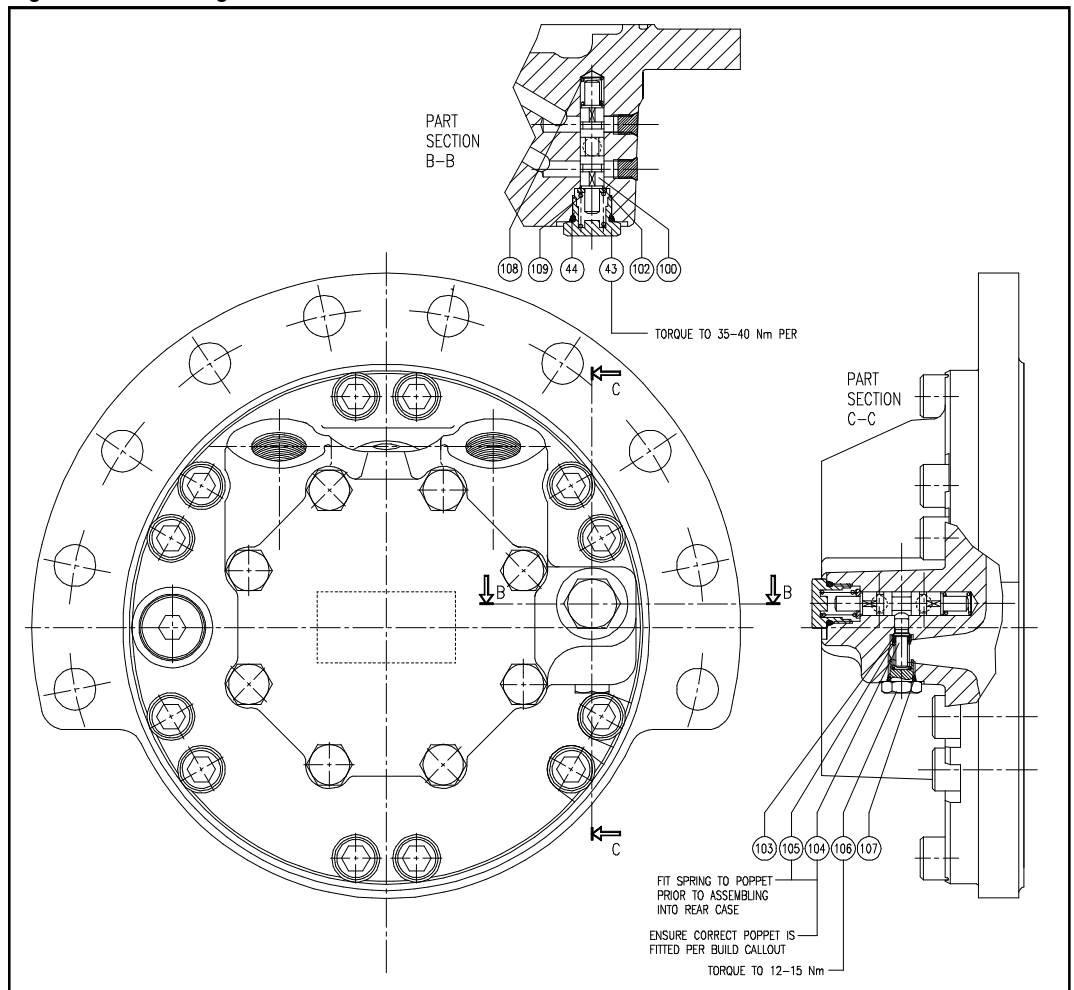
(motor may require to be disassembled prior to starting work. See section 1.2)

- 3.1.1 Remove plug, item 106, and O-ring, item 107, from rear case, item 26.
- 3.1.2 Remove spring, item 105.
- 3.1.3 Remove poppet, item 104, and shim, item 103, if fitted.
- 3.1.4 Remove plug, item 43, and O-ring, item 44, from rear case, item 26.
- 3.1.5 Remove spring, item 109.
- 3.1.6 Remove flushing spool, item 100 and washer, item 102.
- 3.1.7 Remove spring, item 108, from rear case spool bore.
- 3.1.8 Inspect spool and poppet for any damage, scores or debris. If necessary replace.

**Reassembly**

- 3.2.1 Fit spring, item 108, into rear case spool bore.
- 3.2.2 Oil and insert flushing spool, item 100, into rear case spool bore. Ensure that it is free to move.
- 3.2.3 Fit flushing washer, item 102.
- 3.2.4 Fit spring, item 109.
- 3.2.5 Fit plug and O-ring, items 43 and 44.
- 3.2.6 Torque plug to 35-40 Nm.
- 3.2.7 Assemble shim (if required), item 103, and spring, item 105, to poppet, item 104, before inserting poppet in to rear case.
- 3.2.8 Oil and insert poppet assembly items 103, 104 and 105.
- 3.2.9 Fit plug and O-ring, items 106 and 107.
- 3.2.10 Torque plugs to 12-15 Nm.

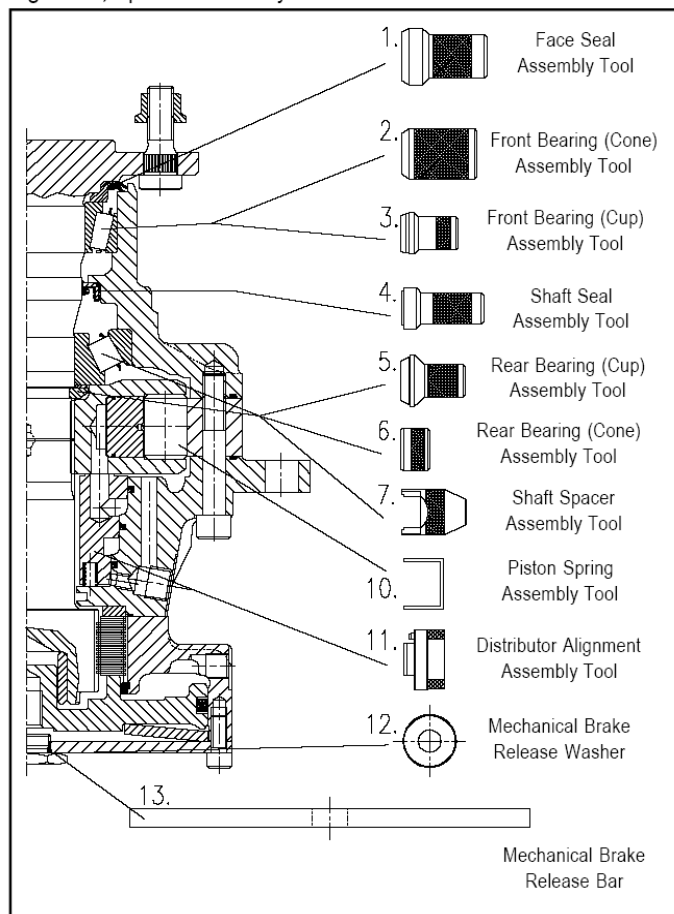
Figure 32, Flushing Valve



## Appendix A

See figure 33 for special tools

Figure 33, Special Assembly Tools



### Note

Special tools can be obtained from Mannesmann Rexroth (Scotland). State full motor code, tool description and number required.

### General Equipment (Assembly and Dismantling)

1. Allen key set and double ended ring spanner set.
2. Soft mallet.
3. Torque wrench covering the ranges:
 

a. 14-19 Nm (10-12 lbf.ft)	f. 117-122 Nm (86-90 lbf.ft)
b. 35-39 Nm (26-29 lbf.ft)	g. 150-160 Nm (111-118 lbf.ft)
c. 40-45 Nm (30-33 lbf.ft)	h. 170-176 Nm (129-134 lbf.ft)
d. 70-77 Nm (52-57 lbf.ft)	i. 282-300 Nm (208-221 lbf.ft)
e. 75-80 Nm (55-59 lbf.ft)	j. 560-580 Nm (426-441 lbf.ft)
4. Soft steel drift.
5. Small screwdriver (no sharp edges).
6. Bench press max load at least 4 tonnes.
7. Slip gauges & mechanical (or hydraulic) puller.

## Appendix B

### Grease Specification Codetype

- S1 Lithium-base high temperature grease containing molybdenum disulphide (Mo S2) for specific high load/ temperature use. **Only** to be used where specifically called out on drawing.
- eg. B.P. Energrease L21-M, Castrol LMM, Esso Multipurpose Grease Moly, Shell Retinax M
- G3 A high performance industrial grease of medium/hard consistency (NLG1 No 3). Temperature range -30°C to 150°C. (-22°F to 302°F)
- eg. Shell Alvania G3

## Appendix C

### Fault Finding

- a. Motor does not rotate :-
  - Confirm there is pressure and oil flow supplied to the motor and the return line is clear.
  - Disconnect motor from mechanical load (ensure no pressure is applied to motor during disconnection). Then confirm motor rotates.
  - Check motor case drain leakage is within datasheet recommendations.
  - If still jammed confirm pump is outputting correct oil flow.
  - Strip and inspect motor for damage.
- b. External oil leaks :-
  - Check oil cleanliness and motor pressure.
  - Confirm leakage line is unblocked and case drain pressure is less than 10 bar (145 psi).
  - Strip and inspect motor. Replace seals.
  - Ensure all bolts are torqued to correct setting.
- c. High temperature/noisy operation :-
  - Check case drain pressure is less than 10 bar (145 psi).
  - Check charge pressure is above case drain pressure and in accordance with datasheet recommendations for operation as a pump.
  - Check motor mounting is correct (see installation).
  - Strip motor and inspect cam, rollers, pistons and main bearings for wear.
- d. Motor speed incorrect :-
  - Check pump flow is sufficient for desired motor speed.
  - Check motor leakage flow. If higher than maximum specified in data sheet, inspect motor.
  - Check motor differential pressure is correct.

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 Fax : 01592 631888 01592 631936 (Sales/Engineering)