

The Drive & Control Company

Rexroth
Bosch Group

Häggglunds CBM

Radial piston hydraulic motor

**Installation and maintenance
manual**
RE 15300-WA/09.2013

Supersedes:
RE 15300-WA/06.12
English



DD00058266

The data as stated serve to describe the product. If you also want to include details on how to use it, present these as examples of use and suggestions only. Catalogue details are not warranted characteristics, and do not relieve users of the obligation to test and assess themselves. Our products are subject to natural wear and tear and ageing.

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The picture on the front page shows a typical configuration: the product as supplied may therefore differ from this.

Original operating instructions were produced in the English language.

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1 This documentation

1.1 Scope of documentation

This documentation applies to the radial piston hydraulic motor Hägglunds CBM and is intended for machine/system manufactures, fitters and service engineers.

This documentation contains important information required to transport, installation, commission, operate, use, service, dismantle the product safely and professionally.

- ▶ Read this documentation completely, before using the Hägglunds CBM.

1.2 Required and additional documentation




Do not start using the product until you have familiarised yourself with the documentation marked with the book symbol  and followed it.

Table 1: Necessary and supplementary documentation.

Title	Document no	Document type
 Radial piston hydraulic motor, type Hägglunds CBM	RE 15300	Data sheet
 Order confirmation	Contains the order-related technical data for your Hägglunds CBM.	Order confirmation

1.3 Display of information

Standardized safety instructions, symbols, terms and abbreviations are used so that you can use this documentation to work quickly and safely with your product. To give you a better understanding they are explained in the sections below.

1.3.1 Safety instructions

This documentation includes safety instructions in chapter 2.6: *Product-specific safety instructions* and in chapter 3: *General instructions on material damage and product damage* and before a sequence of actions or an instruction for action involving a risk of personal injury or damage to equipment. The described danger prevention measures must be observed.

Safety instructions are formatted as follows:

SIGNAL WORD




Type of risk

Consequences of non-observance

- ▶ Safety precautions
- ▶ <List>

- **Warning sign:** Draws your attention to the hazard
- **Signal word:** Indicates the degree of hazard
- **Type of risk!:** Specifies the type and source of the hazard
- **Consequences:** Describes the consequences of non-compliance
- **Precaution:** Specifies how the hazard can be prevented



Table 2: Risk categories to ANZI Z535.6-2006

Warning signs, signal word	Meaning
 DANGER	Indicates a dangerous situation which will result in death or serious physical injury unless averted.
 WARNING	Indicates a dangerous situation which could result in death or serious physical injury unless averted.
 CAUTION	Indicates a dangerous situation which could result in minor to moderate physical injury unless it is averted.
NOTE	Material damage: the product or its environment could be damaged.

1.3.2 Symbols

The symbols below indicate instructions which are not safety-relevant but help to make the documentation easier to understand.

Table 3: Key to symbols

Symbol	Meaning
	You will be unable to use or operate the product optimally unless this information is observed.
▶	Individual self-contained action (alternatives)
.	
1. 2. 3.	Numbered operating instruction: The numbers indicate the actions follow one another in sequence
	Center of gravity Markings on packaging to indicate where the center of gravity are.

2 Safety instructions

2.1 About this chapter

This product was made in accordance with the generally accepted rules of the art but there is a risk of personal injury and damage to property unless you follow this chapter and the safety instructions in this documentation.

- ▶ Read this documentation carefully through in full before using product.
- ▶ Keep this documentation so it is accessible to all users at all times.
- ▶ Always give products to third parties with the documentation required.

2.2 Intended use

The Hägglunds CBM motor is a radial piston hydraulic motor.

In the application the Hägglunds CBM motor is classified as a partly completed machinery in the sense of the EU machine directive 2006/42/EC. A partly completed machinery is exclusively intended to form an incomplete or a complete machine together with other components or partly completed machineries. The CBM motor may only be commissioned after it has been installed in the machine/system for which it is intended and the safety of the entire system has been established in accordance with the machine directive.

Intended use includes having read and understood the complete documentation, especially the chapter 2: *Safety instructions*.

The product is intended for the following use:

- Radial piston motor in open or closed circuit: The radial piston motor is only approved to be used in motor mode or pump mode for hydrostatic drives.

Observe the technical data, application and operating conditions and performance limits as specified in the product-specific data sheet and in the order confirmation.

2.3 Improper use

Any use other than that described as intended use shall be considered as improper and is therefore impermissible.

Bosch Rexroth shall accept no liability whatsoever for damage resulting from improper use. The user shall bear all risks arising from improper use.

Similarly, the following foreseeable faulty usages are also considered to be improper:

- Using outside the operating parameters approved in the product-specific data sheet or in the order confirmation (unless customer-specific approval has been granted)
- Use of fluids outside of the standards as specified in Appendix 16.1: *Hydraulic fluid quick reference*.
- Modification of factory settings by non-authorized persons

- Use of add/on parts (e.g. mountable filter, control unit, valves) that are not specified by Bosch Rexroth has to be approved by contact at Bosch Rexroth.
- Extension or conversion is not permissible and has to be approved by contact at Bosch Rexroth.
- Using the Radial piston motor under water without necessary additional measures.
- Using the Radial piston motor when the exterior pressure is greater than the interior pressure (case pressure).
- Using the Radial piston motor in explosive environments unless the component or machine/system has been certified as compliant with the ATEX directive 94/9/EC.
- Using the Radial piston motor in an aggressive atmosphere without necessary additional measures.

2.4 Personnel qualifications

The activities described in this documentation require basic mechanical, electrical and hydraulic knowledge, as well as knowledge of the associated 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 safe use, these activities may therefore only be carried out by appropriate qualified personnel or an instructed person under the direction and supervision of qualified personnel.

Qualified personnel are those who can recognize possible hazards and institute the appropriate safety measures due to their professional training, knowledge, and experience, as well as their understanding of the relevant regulations pertaining to the work to be done. Qualified personnel must observe the rules relevant to the subject area and have the necessary hydraulic knowledge.

Hydraulic knowledge means, for instance:

- reading and fully understanding hydraulic diagram,
- fully understanding in particular the interrelationships regarding safety devices and having knowledge on the function and assembly of hydraulic components.



Bosch Rexroth offers training support for special fields. For more information about training, please contact your Bosch Rexroth representative.

2.5 General safety instructions

- Follow current accident prevention and environmental protection rules.
- Observe the safety rules and regulations of the country in which the product is used.
- Do not use Bosch Rexroth products unless they are in perfect working order.
- Follow all the instructions on the product.
- Persons who install, operate, remove or maintain Bosch Rexroth products must not consume any alcohol, drugs or pharmaceuticals that may affect their ability to respond.
- Use only Bosch Rexroth spare parts to avoid the risk of personal injury through using unsuitable parts.
- Comply with the technical data and ambient conditions stated in the product documentation.
- If unsuitable products are fitted or used in safety-critical applications, unintended operating conditions may arise which could cause personal injury and damage to property. So do not use a product for safety-critical applications unless that use is

specifically stated and allowed in the product documentation, e.g. in explosion risk areas or in safety-critical controls (operating safety).

- You may only commission the product if it has been determined that the end product (e.g. machinery or a system) into which the Bosch Rexroth products are installed complies with the country-specific provisions, safety regulations and standards of the application.

2.6 Product-specific safety instructions

The safety instructions below apply to chapters 6: *Transport and storage to 15: Technical data.*

DANGER

Danger from excessively high pressure!

Danger to life or risk of injury, damage to equipment!

Operating the motor above the permissible maximum pressure can cause components to burst and hydraulic fluid to escape under high pressure.

- ▶ Operate the motor only within permissible maximum pressure.

Danger from suspended loads!

Danger to life or risk of injury, damage to equipment!

Improper transportation may cause the Hägglunds motors to fall down lead to injuries e.g. crushing or broken bones or damage to the product.

- ▶ Make certain that the forklift truck or lifting device has adequate lifting capacity.
- ▶ Never stand under or put your hands under suspended loads.
- ▶ Ensure your position is stable during transportation.
- ▶ Use your personal protective equipment (e.g. safety glasses, safety gloves, suitable working clothes, safety shoes).
- ▶ Use suitable lifting device for transport and storage, installation and for removal and repair. Make sure the motor is well mounted or anchored when the lifting device is disconnected.
- ▶ Observe the prescribed position of the lifting strap.
- ▶ Observe the national laws and regulations on work and health protection and transportation.

Pressurized machine/system!

Danger to life or risk of injury, serious injuries when working on machines/systems not shutdown! Damage to equipment!

- ▶ Protect the complete system against being energized.
- ▶ Make sure that the machine/system is depressurized. Please follow the machine/system manufacturer's instructions.
- ▶ Do not disconnect any line connections, ports and components when the machine/system is pressurized.
- ▶ Switch off all power-transmitting components and connections (electric, pneumatic, hydraulic, mechanical) in accordance with the manufacturer's instruction and secure them against being switched back on.

WARNING

Escaping oil mist!

Risk of explosion, fire, health hazard, environmental pollution!

- ▶ Depressurize the machine/system and repair the leak.
- ▶ Keep open flames and ignition sources away from the Hägglunds motors.
- ▶ If Hägglunds motors are to be situated in the vicinity of ignition sources or powerful thermal radiators, a shield must be erected to ensure that any escaped hydraulic fluid can not ignite, and to protect hose lines from premature aging.

CAUTION

High noise development in operation!

Danger of hearing damage, deafness!

The noise emission of Hägglunds motors depends on speed, operating pressure and installation conditions.

- ▶ Always wear hearing protection when in the vicinity of the operating radial piston motor.

Hot surfaces on the radial piston motor!

Risk of burns!

- ▶ Allow the Hägglunds motors to cool down sufficiently before touching it.
- ▶ Wear heat-resistant protective clothing, e.g. gloves.

Improper routing of cables and lines!

Tripping hazard and damage to equipment!

- ▶ Lay cables and lines so that they can not be damaged and nobody can trip over them.

Contact with hydraulic fluid!

Hazard to health/health impairment e.g. eye injuries, skin damage, toxication during inhalation!

- ▶ Avoid contact with hydraulic fluids.
- ▶ When working with hydraulic fluids, strictly observe the safety instructions provided by the lubricant manufacturer.
- ▶ Use your personal protective equipment (e.g. safety glasses, safety gloves, suitable working clothes, safety shoes).
- ▶ If hydraulic fluid should, nevertheless, come into contact with your eyes or bloodstream or is swallowed, consult a doctor immediately.

Escaping hydraulic fluid due to machine/system leakage!

Risk of burns and risk of injury due to escaping oil jet!

- ▶ Depressurize the machine/system and repair the leak.
- ▶ Never attempt to block or seal the leak or oil jet with a cloth.

2.7 Personal protection equipment

The personal protective equipment is the responsibility of the user of the Hägglunds motors. Observe the safety regulations and provisions of your country. All components of the personal protective equipment must be intact.

3 General instructions on material damage and product damage

NOTE

Danger from improper handling!

Product can be damaged!

- ▶ Do not expose the product to an impermissible mechanical load.
- ▶ Never use the product as a handle or step.
- ▶ Do not place/lay any objects on the product.
- ▶ Do not strike the Häggglunds motor or any part of it or its accessories.
- ▶ Do not set/place the Häggglunds motor on the drive shaft or fittings.
- ▶ Do not strike fittings (e.g. sensors or valves).
- ▶ Do not strike sealing surfaces (e.g. service line ports).
- ▶ Leave the protective covers on the Häggglunds motor until shortly before the lines are connected.
- ▶ Do not perform electro-welding on the Häggglunds motor.
- ▶ Make sure that the electronics are not electro-statically charged (e.g. for painting operations).

Damage to equipment due to improper lubrication!

Product can be damaged or destroyed!

- ▶ Never operate the Häggglunds motor with insufficient hydraulic fluid.
- ▶ When commissioning a machine/system, make sure that the case interior and the service lines of the Häggglunds motor are filled with hydraulic fluid and remain filled during operation.
- ▶ Check the hydraulic fluid level in the case interior regularly; if necessary, recommission. With above-reservoir installation, the case interior may drain via the reservoir line after longer standstill periods (air enters via the shaft seal) or via the service line (gap leakage). The bearings are thus insufficiently lubricated at switch on.

Mixing of hydraulic fluids!

Product can be damaged!

- ▶ Before installation, remove all fluids from the Häggglunds motor to prevent mixing with the hydraulic fluid used in the machine/system.
- ▶ Any mixing of hydraulic fluids of different manufacturers or different types of the same manufacturer is not permissible in general.

NOTE

Contamination of the hydraulic fluid!

The cleanliness of the hydraulic fluid has a considerable impact on the cleanliness and service life of the hydraulic system. Contamination of the hydraulic fluid could cause premature wear and malfunctions!

- ▶ Make sure that the working environment at the installation site is fully free of dust and foreign substances in order to prevent contaminants, such as welding beads or metal cuttings, from getting into the hydraulic lines and causing product wear or malfunctions. The Häggglunds motor must be installed in a clean condition.
- ▶ Use only clean connections, hydraulic lines and attachments (e.g. measuring equipment).
- ▶ No contaminants may enter the connections when they are plugged.
- ▶ Before commissioning, make sure that all hydraulic connections are tight and that all of the connection seals and plugs are installed correctly to ensure that they are leakproof and fluids and contaminants are prevented from penetrating the product.
- ▶ Use a suitable filter system to filter hydraulic fluid during filling to minimize solid impurities and water in the hydraulic system.

Improper cleaning!

Product can be damaged!

- ▶ Plug all openings with the appropriate protective equipment in order to prevent detergents from entering the hydraulic system.
- ▶ Never use solvents or aggressive detergents. Use only water and, if necessary, a mild detergent to clean the Häggglunds motor.
- ▶ Do not point the power washer at sensitive components, e.g. shaft seal, electrical connections and components.
- ▶ Use lint-free cloths for cleaning.

Environmental pollution due to incorrect disposal!

Careless disposal of the Häggglunds motor and its fittings, the hydraulic fluid and the packaging material could lead to pollution of the environment!

- ▶ Dispose of the Häggglunds motor, hydraulic fluid and packaging in accordance with the national regulations in your country.
- ▶ Dispose of the hydraulic fluid in accordance with the applicable safety data sheet for the hydraulic fluid.

Escaping or spilling hydraulic fluid!

Environmental pollution and contamination of the ground water!

- ▶ Always place a drip tray under the Häggglunds motor when filling and draining the hydraulic fluid.
- ▶ Use an oil binding agent if hydraulic fluid is spilled.
- ▶ Observe the information in the safety data sheet for the hydraulic fluid and the specifications provided by the system manufacturer.

The warranty applies only to the delivered configuration.

The entitlement to warranty cover will be rendered void if the product is incorrectly installed, commissioned or operated, or if it is used or handled improperly.

4 Delivery contents

Included in the delivery contents are:

- Hägglunds CBM as per order confirmation

5 About this product

5.1 Performance description

Hägglunds CBM is a radial piston hydraulic motor that converts hydraulic flow into mechanical rotation. Refer to product-specific data sheet and the order confirmation for technical data, operating conditions and operating limits of the specific Hägglunds CBM.

5.2 Product description

Hägglunds CBM is a radial piston hydraulic motor with a rotating cylinder block shaft and a stationary housing. The cylinder block is mounted in fixed roller bearings in the housing. An even number of pistons are radially located in bores inside the cylinder block, and the distributor directs the incoming and outgoing oil to and from the working pistons. Each piston is working against a cam roller.

When the hydraulic pressure is acting on the pistons, the cam rollers are pushed against the slope on the cam ring that is rigidly connected to the housing, thereby producing a torque. The cam rollers transfer the reaction force to the piston which are guided in the rotating cylinder block. Rotation therefore occurs, and the torque available is proportional to the pressure in the system.

Oil main lines are connected to ports in the connection block and drain lines to ports in the motor housing.

The motor is connected to the shaft of the driven machine through the cylinder block. The torque is transmitted by splines.

- 1 Cam ring
- 2 Cam roller
- 3 Piston
- 4 Cylinder block, spline
- 5 Housing cover
- 6 Cylindrical roller bearing
- 7 Wearing part
- 8 Connection housing
- 9 Distributor
- 10 Product identification

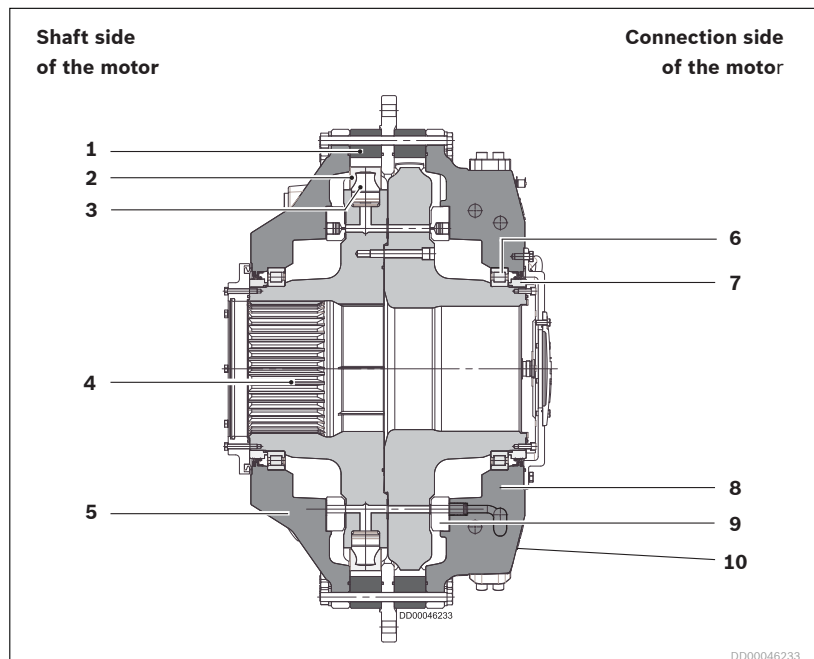


Fig. 1: The Hägglunds CBM radial piston motor

5.3 Product identification

- 1 Type of product
- 2 Serial number
- 3 Weight
- 4 Manufacturer
- 5 Max pressure

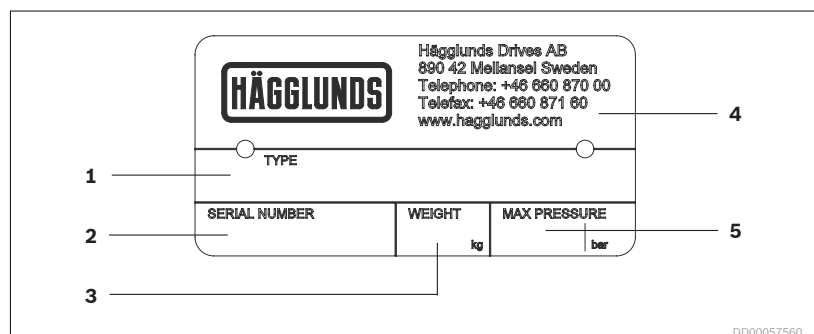


Fig. 2: Plate on motor

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5.4 Sound from a complete installation

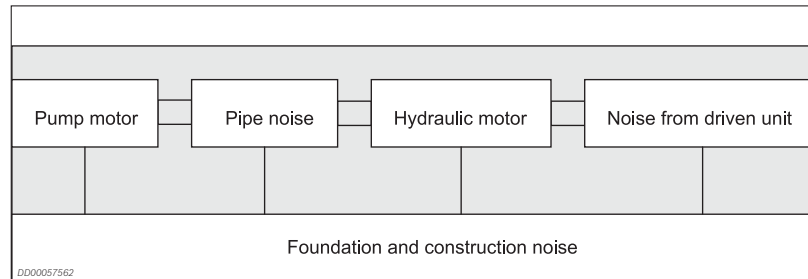


Fig. 3: Background noise

Background noise

The background noise can not normally be influenced but is usually known or easy to measure.

Pump unit

The pump unit is a known noise level.

Pipe noise

The pipe noise is probably the source of the majority of mistakes in installations: all pipe clamps should be of vibration insulating type secured to concrete ceiling, wall or floor. Securing to non-rigid metal structures or structures is likely to give resonance and should be avoided.

Hydraulic motor

The hydraulic motor is a known noise level. Tables of sound data are according to subsection in the product-specific data sheet.

Driven unit

The driven unit is an unknown sound source (for us) but can through certain information probably be obtained from the supplier. When securing the torque arm of a hydraulic motor to the foundation or casing of a driven machine, it is highly important to study the construction of the foundation or casing. This may well be the most important factor to consider, since many structures may give rise to resonance, resulting in severe noise problems.

5.5 Choice of hydraulic fluid

Bosch Rexroths Hägglunds radial piston hydraulic motors are primarily designed to operate on conventional petroleum based hydraulic fluids.

NOTE!

For necessary information how to choose hydraulic fluid, see Appendix 16.1:
Hydraulic fluid quick reference.

6 Transport and storage

6.1 Product transport

6.1.1 Lifting methods

! DANGER

Danger while transporting or lifting Hägglunds motors due to heavy weight!

Danger to life, risk of injury or serious injuries and risk of damage to equipment!

- ▶ Make sure that lifting device is correctly installed.
- ▶ Do not stand under suspended load.

Danger if using wrong lifting eyes!

Danger to life, risk of injury or serious injuries and risk of damage to equipment!

- ▶ Make sure the correct lifting eye is used, see Fig. 5: *Lifting eyes at motor*: and Table 5: *Tightening torque lifting eyes*.

Center of gravity

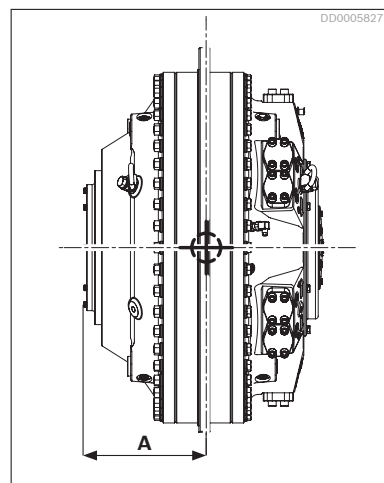


Fig. 4: Center of gravity

Lifting eyes

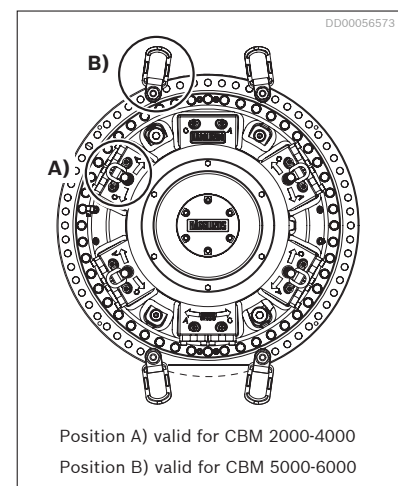


Fig. 5: Lifting eyes at motor

Table 4: Necessary and supplementary documentation Center of gravity

Motor type	Measure A
CBM 2000	445 mm
CBM 3000	502 mm
CBM 4000	555 mm
CBM 5000	630 mm
CBM 6000	690 mm

Table 5: Tightening torque lifting eyes

Motor type	Screw dimension	Number of screws	Tightening torque	
			Nm	lbf-ft
CBM 2000-4000	M24	4	400	295
CBM 5000-6000	M36	4	800	590

6.1.2 Lifting CBM motors and accessories

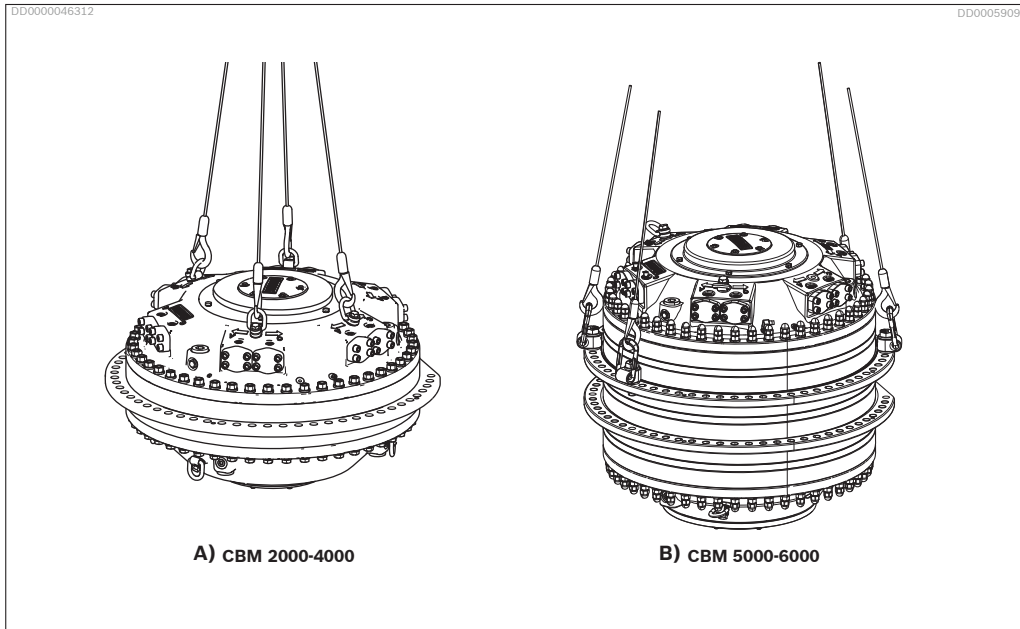


Fig. 6: Lifting motor with shaft in vertical plane

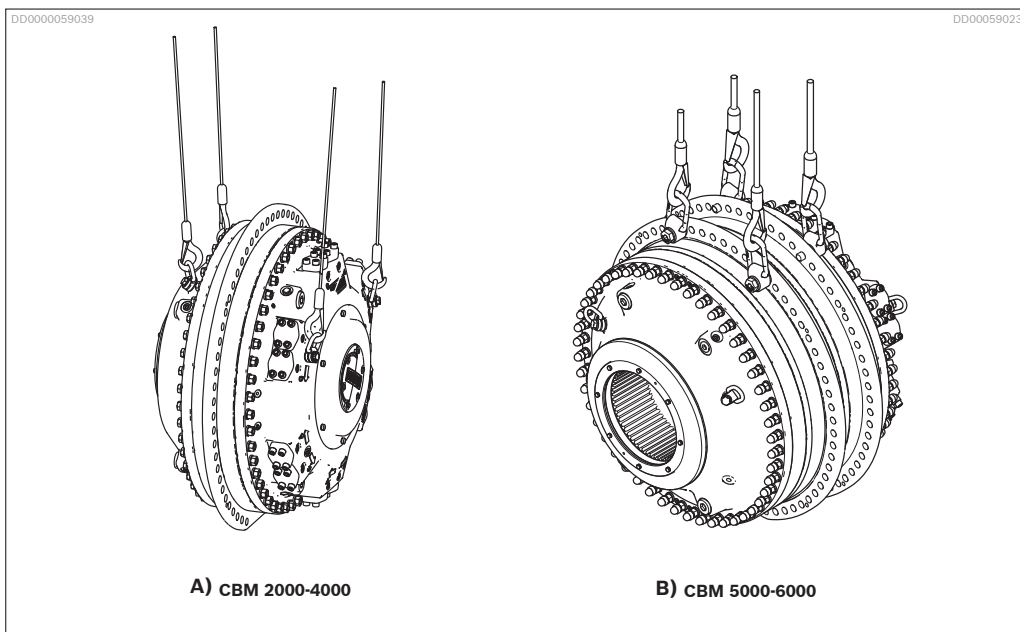


Fig. 7: Lifting motor with shaft in horizontal plane

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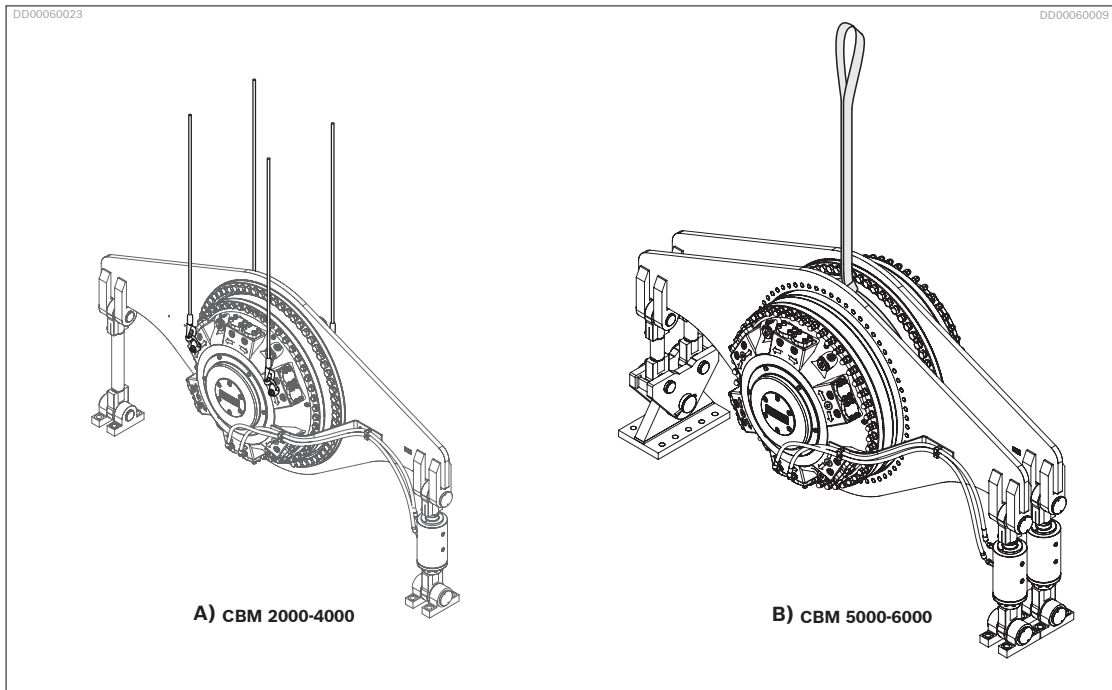


Fig. 8: Lifting CBM mounted to double ended torque arm

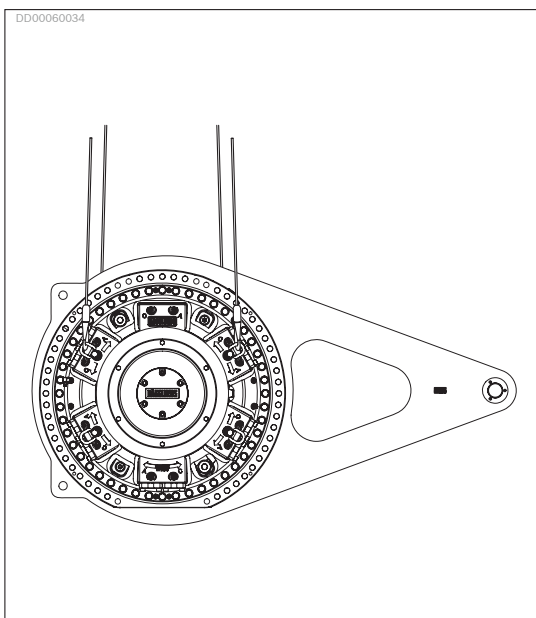


Fig. 9: Lifting CBM 2000-4000 and single ended torque arm

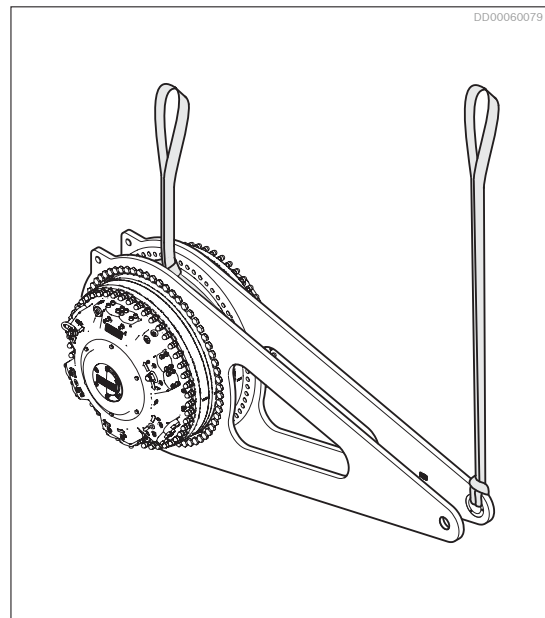


Fig. 10: Lifting CBM 5000-6000 and single ended torque arm

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20/80 Transport and storage

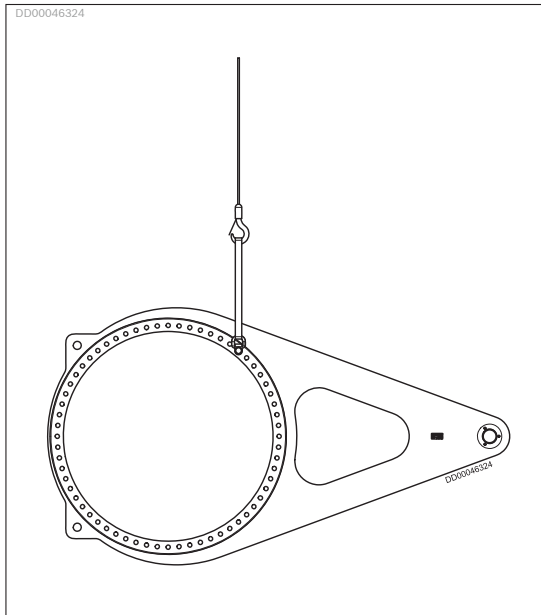


Fig. 11: Lifting single ended torque arm

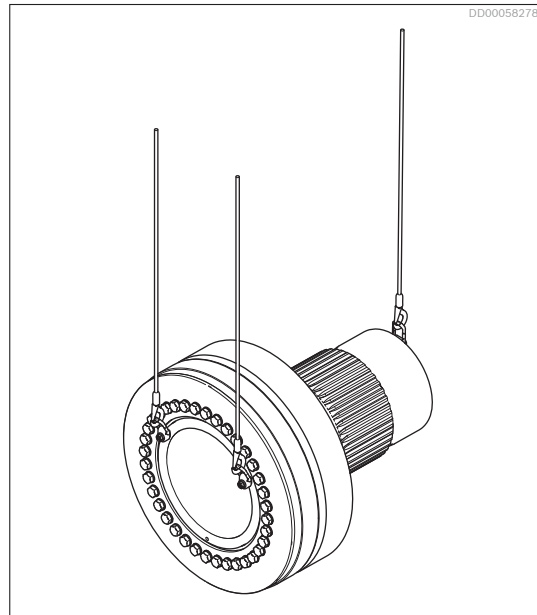


Fig. 12: Lifting Coupling adapter

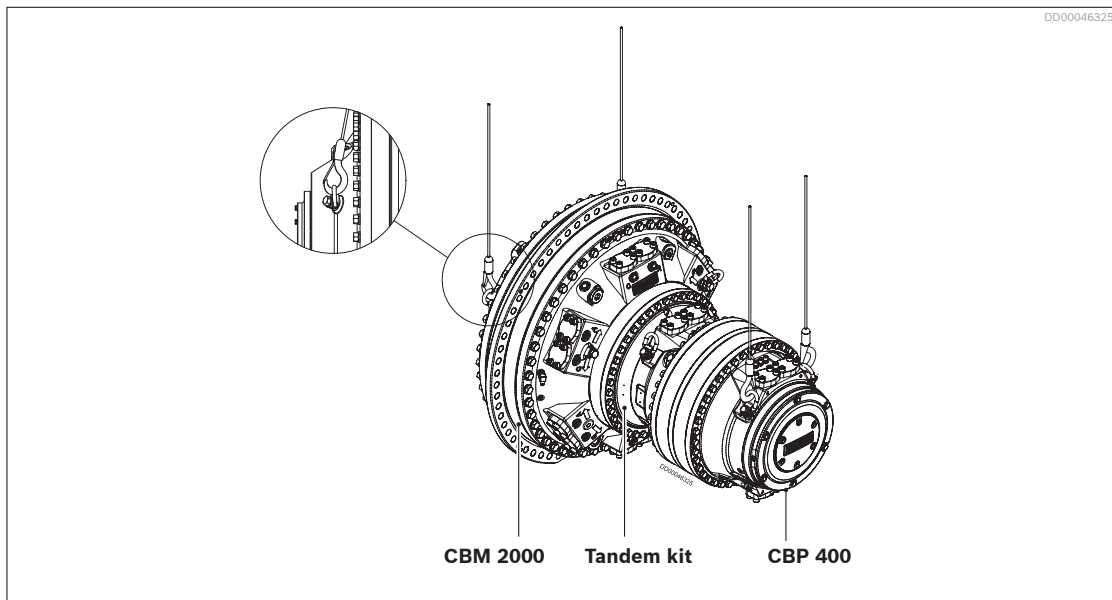


Fig. 13: Lifting CBM 2000 in tandem with CBP 400

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6.2 Product storage

The motor is delivered with internal protection in the form of an oil film with vapor state corrosion inhibitors (Shell VSI 8235), and external protection in the form of an anti-rust film. This provides sufficient protection for indoor storage in normal temperatures for about 12 months.

6.2.1 Standing the motor on a flat surface

! DANGER

Unsecured motor can fall!

Danger to life or risk of injury, damage to equipment!

- ▶ When in storage or during oil filling, the motor must always be secured from falling.

! CAUTION

Incorrect placement of the motor!

Risk of damage to equipment.

- ▶ When in storage with shaft vertical, the motor must always be placed with the hollow shaft facing down.
- ▶ It is also advisable to provide supports at the mounting surface of the motor, see Fig. 14: Hägglunds CBM standing on a flat surface alt.B) Standing with shaft vertical .

When the motor is placed on a flat surface such as a floor, it must stand either on its outer diameter shaft or on the suitably protected end face of the hollow shaft. It is also advisable to provide supports shown in Fig. 14: Hägglunds CBM standing on a flat surface.

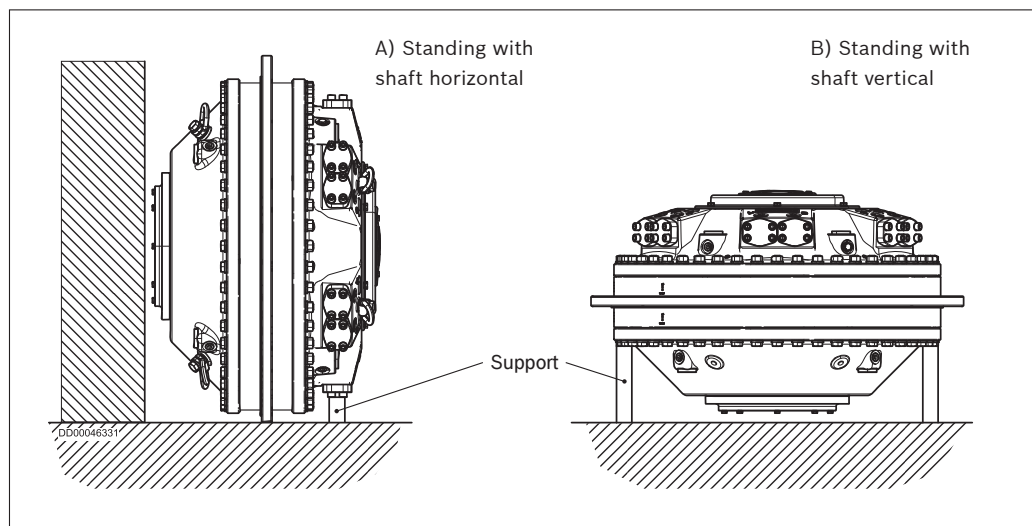


Fig. 14: Hägglunds CBM standing on a flat surface

6.2.2 Storing for extended periods or in uncontrolled environment

! CAUTION

Insufficient cleanliness!

Risk of damage to equipment.

- ▶ Take extreme care to ensure that no contamination enters the motor.

If the motor is stored for more than 3 months in uncontrolled environment or more than 12 months in controlled environment, it must be filled with oil.

- 1 Place the motor as shown in Fig. 14: Häggglunds CBM standing on a flat surface, alt.A) Standing with shaft horizontal.
- 2 Fill the motor with filtered oil in the following order: D1, A1, C1.
NOTE! See Table 6: Oil volume.
- 3 Seal connections A1 and C1 with the cover plate fitted to the connection surface at delivery. Check that the O-rings or rubber seals are in position in the cover plate.
- 4 Fit the plug to D1.
- 5 Position the motor as shown in Fig. 14: Häggglunds CBM standing on a flat surface, alt. A) Standing with shaft horizontal. or B) Standing with shaft vertical.

Table 6: Oil volume

Motor	Oil volume approx.	
	Litres	US gal.
CBM 2000	50	13,2
CBM 3000	70	18,5
CBM 4000	90	23,8
CBM 5000	110	29,0
CBM 6000	130	34,3

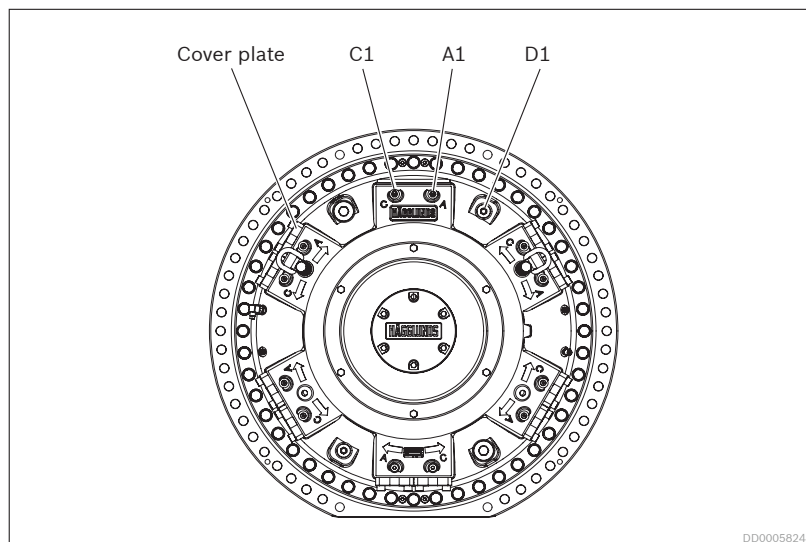


Fig. 15: Filling the motor with oil

6.2.3 Storing during maintenance

If the motor has been used (thus the initial rust protection has been diluted/flushed) it can be stored up to one month, without additional rust protection. After one month it must be protected from internal rust. This can be done as follows:

- Mix anti-rust additive with the hydraulic fluid of the system. Use 2% of Shell VSI 8235, or similar compatible to the selected fluid. This additive gives rust protection for up to about 3 month in uncontrolled environment or 12 months in controlled environment.
- If no additives are used, the motor must be turned a few revolutions once a month to maintain an oil film.
- If it is not possible to turn the motor, or the storage is longer than stated periods above, the motor must be filled according to chapter 6.2.2: *Storing for extended periods or in uncontrolled environment*.

If the motor is kept mounted on the driven shaft, any air should be bled off through D1-D4 or F1/F2 for vertical shaft mount, before shut down.

7 Installation

7.1 Unpacking

CAUTION

Danger from parts falling out!

If the packaging is not opened correctly, parts may fall out and damage the parts or even cause injuries!

- 1** Place the packaging on a flat and solid surface.
- 2** Only open the packaging from the top.
- 3** Remove the packaging from the Häggglunds motor.
- 4** Check the Häggglunds motor for transport damage and completeness, see chapter 4: *Delivery contents*.
- 5** Dispose of the packaging according to the environmental regulations of your country.

7.2 Installation conditions

7.2.1 Dimensions shaft end with spline

The splines shall be lubricated, with hydraulic oil or filled with transmission oil from the connected gearbox (see chapter 7.5.3: *Step 3: Mounting the motor onto the coupling adapter/driven shaft*). To avoid wear in the splines, the installation must be within the specified tolerances in figure below. If there is no radial or axial force on the shaft, the shaft can be oiled only.

For production of the shaft, see drawing 078 2432 (CBM 2000), 078 2451 (CBM 3000-4000) and 078 2673 (CBM 5000-6000). For control of spline, see Table 7: Recommended material in spline and Table 8: Spline data.

Table 7: Recommended material in spline

Steel with yield strength	
Unidirectional drive	$Re_{l_{min}} = 450 \text{ N/mm}^2$
Bidirectional drives	$Re_{l_{min}} = 700 \text{ N/mm}^2$

Table 8: Spline data

Spline	Motor					
	CBM 2000		CBM 3000/4000		CBM 5000/6000	
Tooth data	W360		W440		W460	
Tooth profile and bottom form	DIN 5480		DIN 5480		DIN 5480	
Tolerance	8f		8f		8f	
Guide	Flank		Flank		Flank	
Pressure angle	30°		30°		30°	
Module	8		8		8	
Number of teeth	44		54		56	
Pitch diameter	Ø352		Ø432		Ø448	
Bottom diameter	Ø342,4	0 -3,401	Ø422,4	0 -3,425	Ø442,4	0 -3,425
Tip diameter	Ø358,4	h11	Ø438,4	h11	Ø458,4	h11
Measure over measuring pins	377,099	-0,107 -0,188	457,155	-0,121 -0,212	476,907	-0,118 -0,208
Diameter of measuring pins	Ø16		Ø16		Ø16	
Addendum modification x*m	-0,4		-0,4		-1,6	

Thread for assembly tool

To make it easier to mount the motor on the driven shaft end or to remove the motor from the shaft it is recommended that a hole (*Table 9: Threads for assembly tool (spline shaft), see Fig. 16 Measures, thread for assembly tool*) should be drilled and tapped in the centre of the shaft for an assembly tool (see chapter 7.5.3: *Step 3: Mounting the motor onto the coupling adapter/driven shaft, Fig. 42: Mount Hågglunds motor with assembly tool*).

The tool has both a UNC thread and a metric thread, so that the hole can be drilled and tapped to conform to one of the two alternatives given in table below.

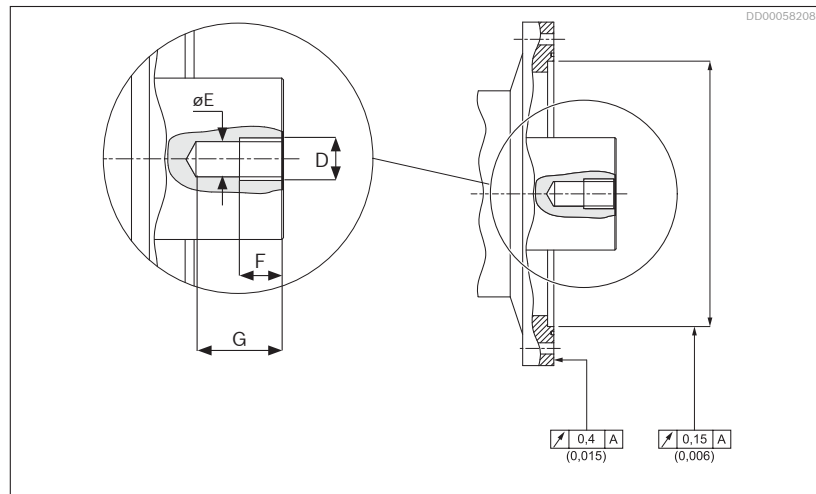


Fig. 16: Measures, thread for assembly tool

Table 9: Threads for assembly tool (spline shaft), see Fig. 16 Measures, thread for assembly tool

Measures	Dimensions, threads for assembly tool			
D	M30	UNC 1"		
E	>25 mm	0,98 in	-	-
F	82 mm	3,23 in	30 mm	1,18 in
G	100 mm	3,94 in	-	-

7.2.2 Dimensions plain shaft end for shaft adapter

Design of driven shaft end on normally loaded shaft

In drives with only one direction of rotation and/or load where the stresses in the shaft are moderate, the shaft can be plain.

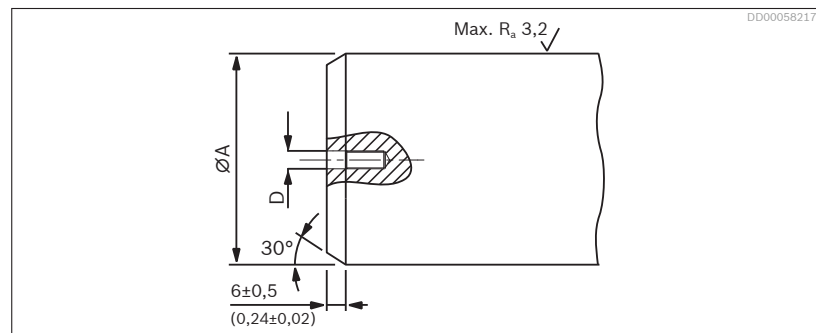


Fig. 17: Shaft end, normally loaded

Table 10: Threads for assembly tool (plain shaft), see Fig. 17 and Fig. 18

Measures	Dimensions, threads for assembly tool			
D	M20	UNC 5/8"		
E	>17 mm	0,67 in	>13,5	0,53 in
F	25 mm	0,98 in	22 mm	0,87 in
G	50 mm	1,97 in	30 mm	1,18 in

Design of driven shaft end on heavily loaded shaft.

Where the driven shaft is heavily loaded and is subject to high stresses, for example for changes in the direction of rotation and/or load, it is recommended that the driven shaft should have a stress relieving groove.

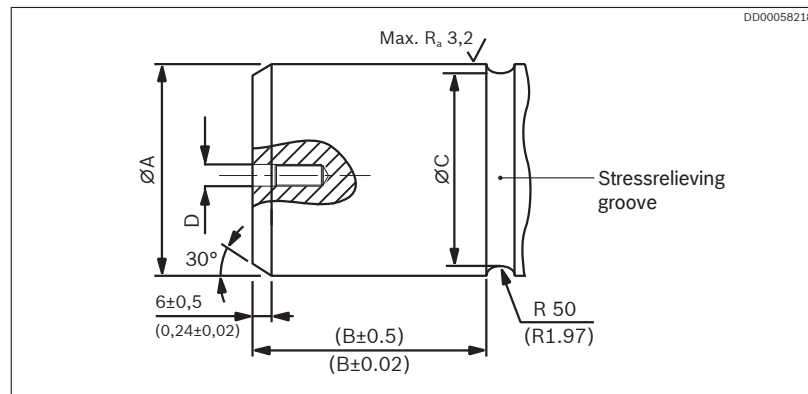


Fig. 18: Shaft end, heavily loaded

Note!
The dimensions are
valid for +20 °C (68 °F)

Table 11: Shaft recommendation

Dim	CBM 2000		CBM 3000 CBM 4000		CBM 5000 CBM 6000	
	A	mm	ø360 -0,018 -0,075	ø460 -0,020 -0,083	ø480 -0,020 -0,083	
in		ø14,1732 -0,00068 -0,00292	ø18,1102 -0,00075 -0,00323	ø18,8976 -0,00075 -0,00323		
B	mm	257	300	320		
	in	10,12	11,81	12,60		
C	mm	354	454	474		
	in	13,94	17,87	18,66		

Table 12: Recommended material in the shaft

Steel with yield strength	
Unidirectional drive	$Re_{l_{min}} = 300 \text{ N/mm}^2$
Bidirectional drives	$Re_{l_{min}} = 450 \text{ N/mm}^2$

7.3 Required tools

7.3.1 Assembly tool Coupling adapter

An assembly tool can be used for easier and faster mounting of the coupling adapter to the drive shaft. The assembly tool is passed through the coupling adapter and screwed into a pre made thread in the driven shaft. The coupling adapter is pulled onto the shaft by turning the nut on the assembly tool.

Material ID Assembly tool Coupling adapter:

Material ID R939003803

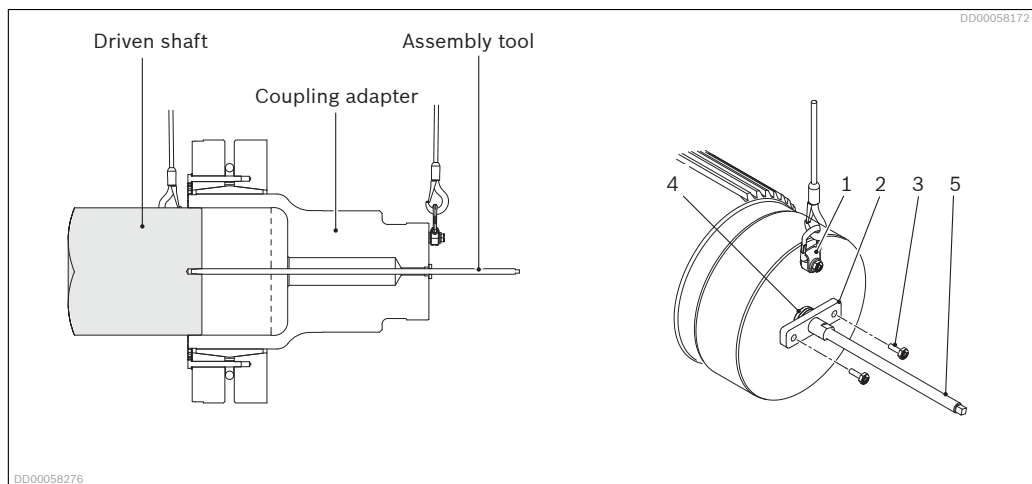


Fig. 19: Mounting coupling adapter with assembly tool

Included in Coupling adapter:

- 1 Lifting eye
- 2 Dismounting tool
- 3 Screws

Assembly tool coupling adapter:

- 4 Nut
- 5 Carriage beam

7.3.2 Spline align assembly tool

Before the motor is mounted on the drive shaft, the teeth in the cylinder block must be aligned against the teeth gap of the drive shaft. The spline align tool is used to rotate the cylinder block to the correct position. The spline align tool consists of two sprockets, adapter and a chain. In addition to the special tool, it is also needed a 24 mm wrench with long handle.

Material ID Spline align assembly tool:

Material ID R939054022

! CAUTION

Crushing risk!

Danger of crushing fingers between sprocket and chain!

- ▶ Do not touch the tool parts when using the tool.

- 1 Sprocket incl. screws
- 2 Adapter
- 3 Sprocket
- 4 Chain
- 5 Wrench 24 mm (not included)

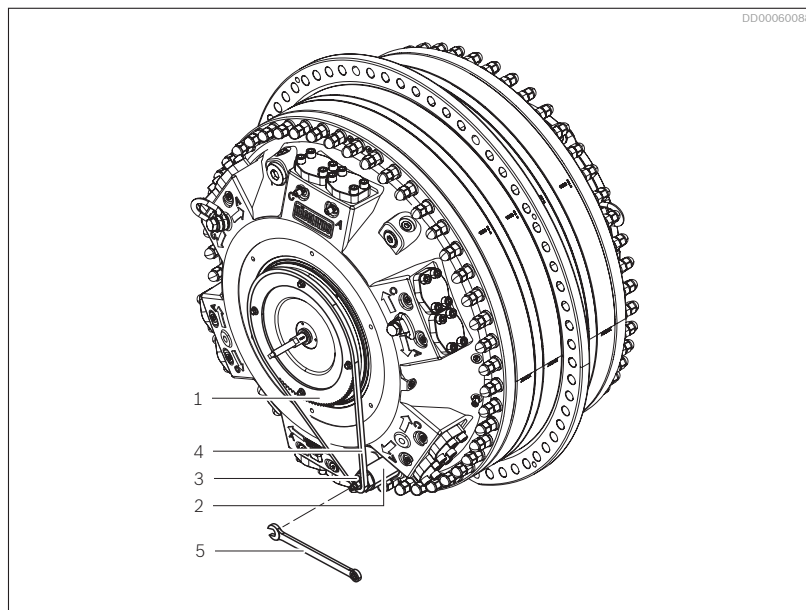


Fig. 20: Spline align assembly tool

7.3.2.1 Mount the spline align assembly tool

NOTE!

Make sure that there is no oil in the motor case.

1. Remove the cover including screws and washers (pos A-B).
2. Remove four of eight screws (pos C), every second screw.
3. Remove the plug D3 or D4 (pos F).
4. Clean the threads on the adapter (pos G) properly to avoid contamination in the motor and fit the adapter.
5. Place the chain (pos H) over the sprocket (pos D) and the small sprocket in top of the adapter (pos G).
6. Mount the sprocket (pos D) with the four supplied screws (pos E).
7. Use the assembly tool (pos K) to pull the motor closer to the drive shaft. Turn a 24 mm wrench in the top of the adapter (pos G) to rotate the cylinder block to fit the teeth with the drive shaft.

Remove the spline align assembly tool

Carry out items 1-6 above in reverse order to remove the tool. Tightening torque according to Fig. 21: Mounting the spline align tool.

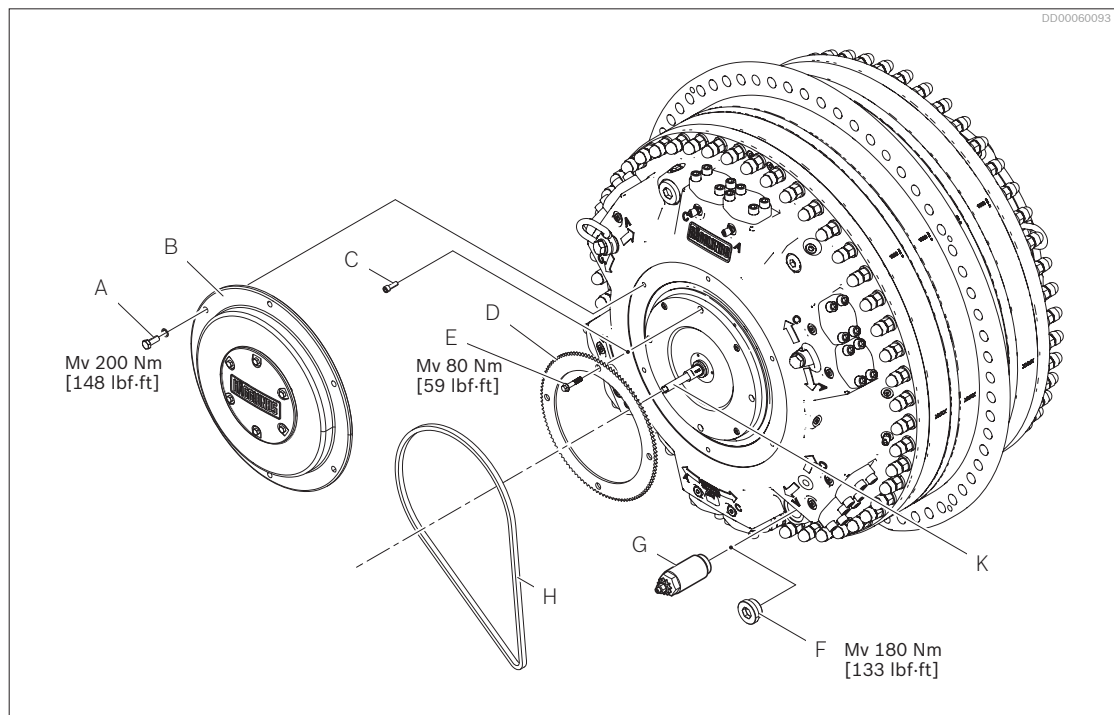


Fig. 21: Mounting the spline align tool

7.3.3 Assembly tool Hägglunds motor

For easier and faster mounting of the motor on the coupling adapter or drive shaft, a special assembly tool can be used. The assembly tool is passed through the motor and screwed into a pre made thread in the coupling adapter or drive shaft. The motor is pulled onto the shaft by turning the nut on the assembly tool.

Material ID Assembly tool Hägglunds motor:

Material ID R939003866

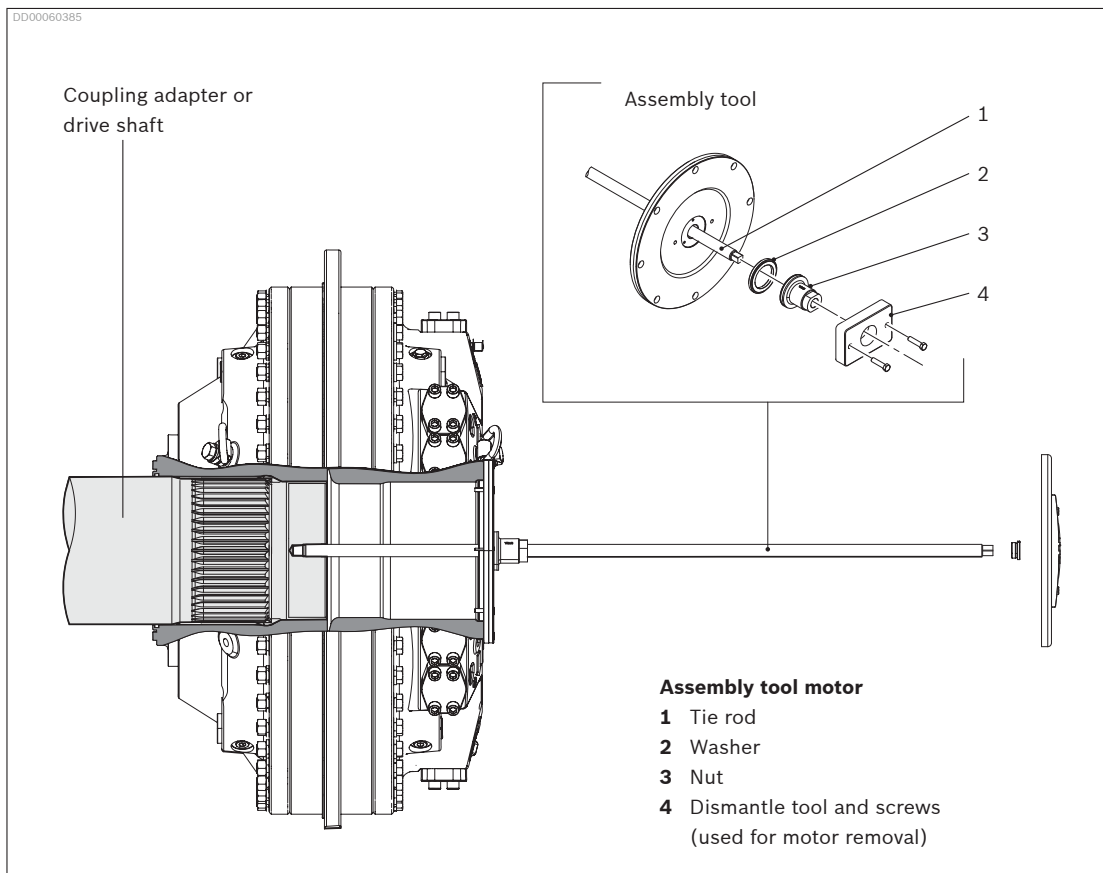


Fig. 22: Mounting Hägglunds motor with assembly tool

7.4 Required accessories

7.4.1 Coupling adapter

The coupling adapter are required if the drive shaft is plain (no splines). The coupling adapter comprises a shrink disc and a shaft adapter.

Table 14: Material ID Coupling adapter

Motor type	Material ID Unidirectional drive	Material ID Bidirectional drive
CBM 2000	R939055538	R939055544
CBM 3000-4000	R939056668	R939056674
CBM 5000-6000	R939056676	R939056676

- Coupling adapter**
- 1 Shrink disc
 - 2 Shaft adapter

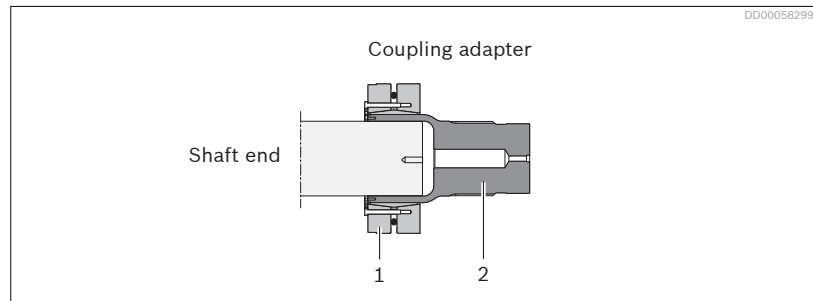


Fig. 23: Coupling adapter

7.4.2 Mounting kit

The mounting kit is used to fix the motor to the driven shaft and designed for applications with torque arm and spline shaft. Mounting kit is not needed when the motor is flange mounted.

Table 13: Material ID Mounting kit

Hägglands CBM	Material ID
CBM 2000	R939055413
CBM 3000	R939055509
CBM 4000	R939055497
CBM 5000	R939055505
CBM 6000	R939055506

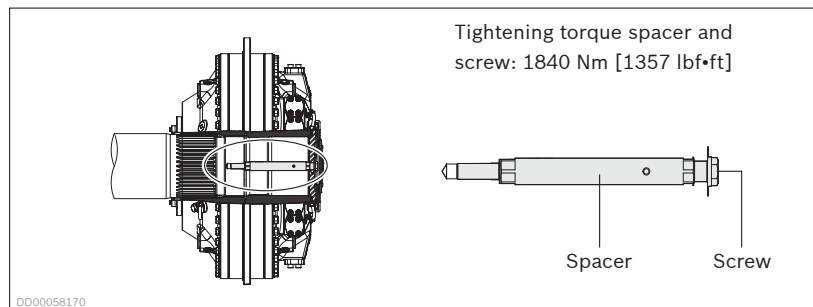


Fig. 24: Mounting kit.

7.4.3 Single ended torque arm

Torque arms are used to secure the motor to the foundation, e.g. the floor or a base.

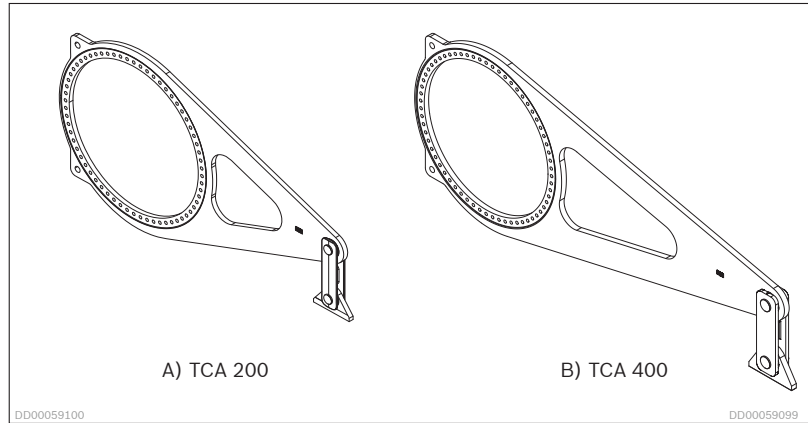


Fig. 25: Single ended torque arm TCA 200 and TCA 400

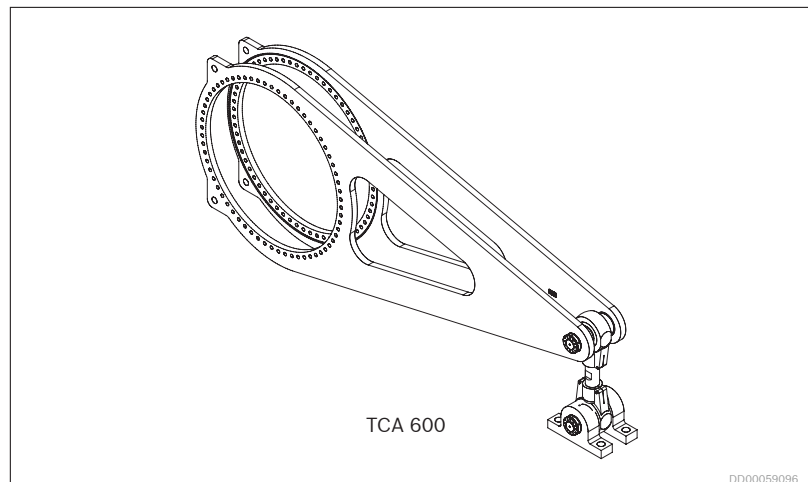


Fig. 26: Single ended torque arm TCA 600

Table 15: Dimension drawings Single ended torque arms Hägglunds CBM motor

Torque arm	Motor	Dimension drawing
TCA 200	CBM 2000	078 2668
TCA 400	CBM 3000-4000	078 2667
TCA 600	CBM 5000-6000	078 2718

Table 16: Order code Torque arm

Exemple order code:

TC	A	200	-	0	-	0	-	00
01	02	03		04		05*		06*

01	Torque arm	TC
02	Generation	A
03	Torque arm size	
	TCA 200 for CBM 2000	200
	TCA 400 for CBM 3000 and CBM 4000	400
	TCA 600 for CBM 5000 and CBM 6000	600
04	Attachment	
	Pivoted	2
	Other	9
05*	Modification	00-99
06*	Design	
	Standard	00
	Special index	01-99

*) To be filled in by Bosch Rexroth DC-IA/EHD

Table 17: Material ID Torque arm

Material ID	Motor type	Torque arm	Order code
R939056150	CBM 2000	TCA 200	TCA 200 2 0 00
R939056151	CBM 2000	TCA 200	TCA 200 9 0 00
R939056478	CBM 3000/CBM 4000	TCA 400	TCA 400 2 0 00
R939056749	CBM 3000/CBM 4000	TCA 400	TCA 400 9 0 00
R939057000	CBM 5000/CBM 6000	TCA 600	TCA 600 2 0 00

7.4.4 Double ended torque arm

Torque arms are used to secure the motor to the foundation, e.g. the floor or a base.

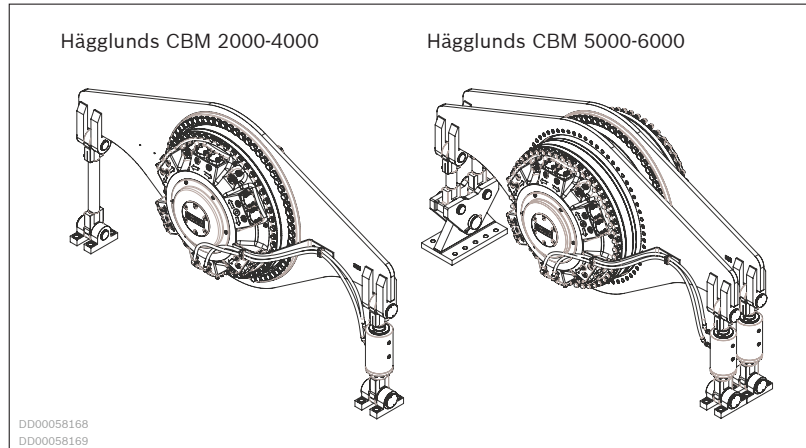


Fig. 27: Double ended torque arm

Table 18: Dimension drawings Double ended torque arm

Double ended torque arm	Dimension drawing
DTCBM 2000 to DTCBM 4000	078 2669
DTCBM 5000 to DTCBM 6000	078 2682

Table 19: Material ID Double ended torque arm

Material ID	Motor type	Torque arm
R939056854	CBM 2000-1200	DTCBM 2000-1200
R939056853	CBM 2000-1600 CBM 2000-1400	DTCBM 2000-1600
R939056852	CBM 2000-1800	DTCBM 2000-1800
R939056146	CBM 2000-2000 CBM 3000-2200	DTCBM 3000-2200
R939056851	CBM 3000-2400 CBM 3000-2600	DTCBM 3000-2600
R939056850	CBM 4000-3200 CBM 4000-3400 CBM 4000-3600	DTCBM 4000-3600
R939056144	CBM 4000-3800 CBM 4000-4000	DTCBM 4000
R939056849	CBM 5000-4600	DTCBM 5000-4600
R939056848	CBM 5000-5000 CBM 6000-5600	DTCBM 6000-5600
R939056847	CBM 6000-6000	DTCBM 6000

7.5 Product installation

There are three main steps to install the Hägglunds CBM motor:

Step 1: Fitting the torque arm on the CBM motor

Chapter 7.5.1: Step 1: Fitting the torque arm on the CBM motor.

Step 2: Assemble and/or mounting the coupling adapter

Valid if the driven shaft is plain (without splines).

Chapter 7.5.2: Step 2: Mounting the the coupling adapter onto the driven shaft.

Step 3: Mounting the motor onto the driven shaft

Chapter 7.5.3: Step 3: Mounting the motor onto the coupling adapter/drive shaft.

7.5.1 Step 1: Fitting the torque arm on the CBM motor.

7.5.1.1 Fitting the single ended torque arm on the CBM motor

The torque arm is fitted to the motor before the motor is mounted on the driven shaft.

1. Clean the spigot surface on the torque arm and motor.
2. Oil the screws.
3. Make sure that the torque arm will be pointing in the right direction when the motor is mounted in place on the machine. To achieve the highest possible oil level in the motor housing, the motor must be turned until the drain outlets are positioned according to chapter 7.5.4: *Draining and venting the motor*.
4. Line up the torque arm on the motor by using the screws with washers.
5. Tighten the screws to the torque stated in *Table 20: Screw dimensions*.

CAUTION!

Risk of damage of equipment!

- ▶ Do not weld, drill, grind or carry out any similar work on the torque arm without Bosch Rexroths approval.

Table 20: Screw dimensions

Motor type	Screw dimension	Number of screws	Tightening torque	
			Nm	lbf-ft
CBM 2000	M30x80 10.9	57	1840	1357
CBM 3000-4000	M30x90 10.9	57	1840	1357
CBM 5000-6000	M30x90 10.9	114	1840	1357

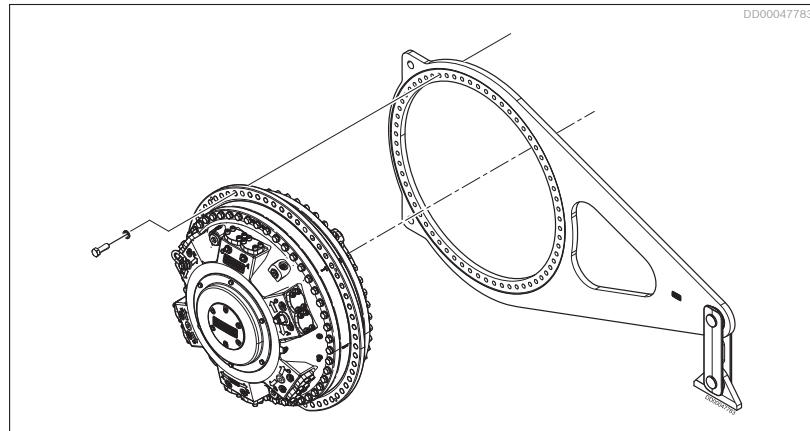


Fig. 28: Mounting Torque arm, CBM 2000-4000

Recommended is to use a hydraulic torque wrench with width max 135 mm.

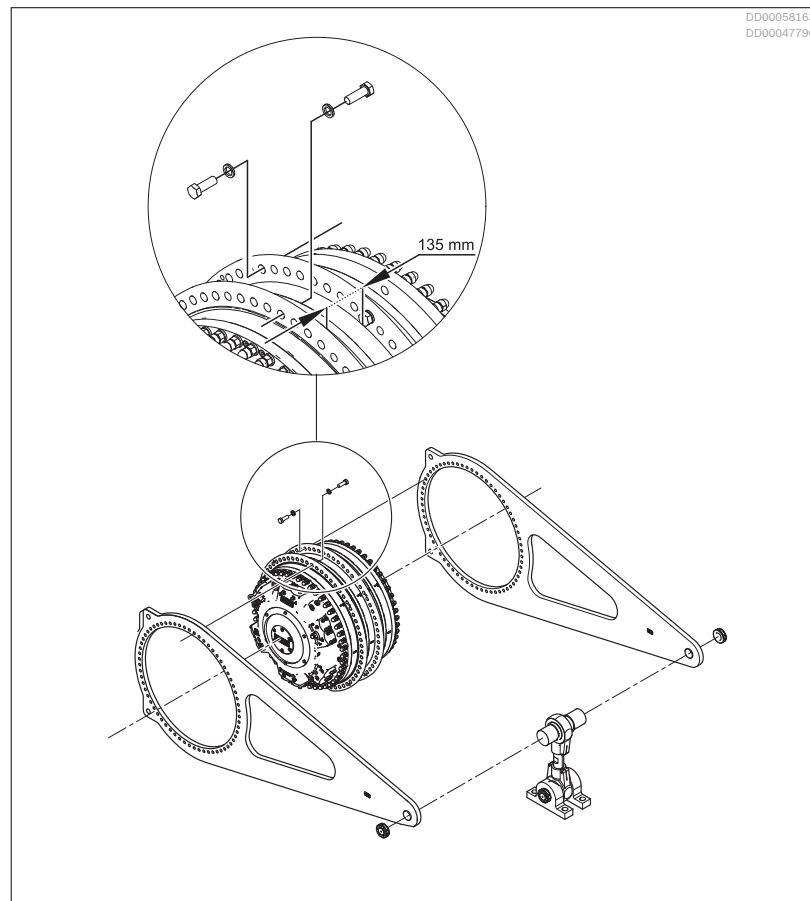


Fig. 29: Mounting Torque arm, CBM 5000-6000

7.5.1.2 Fitting the double ended torque arm on the motor

1. The double ended torque arm is fitted to the motor before the motor is mounted on to the driven shaft, see assembly instruction 7.5.1.1: *Fitting the single ended torque arm on the CBM motor.*

See Fig. 30: Double ended torque arm CBM 2000-6000 for paragraph 2-7:

2. Check and adjust the rod end (1) according to the dimension drawing (see Table 18: Dimension drawings double ended torque arms).
3. Mount the rod to the torque arm, use the shafts (2) and lock them with circlips.
4. Tighten the 4 pcs of screw (3) on the rod end with torque according to *Table 21: Cylinder screw dimensions, double ended torque arm.*
5. Mount the hydraulic cylinder. The piston rod has to be mounted upwards, and on the right hand viewed from the motors main connection side.
6. Cylinders oil connection A, B and C must point in the direction to the motor.
7. Mount the hoses. The hose mounted to connection A4 (4) has to be mounted to the hydraulic cylinder connection (A) and the hose from connection C4 (5) has to be mounted to the cylinder connection (B).

This is valid with the cylinder on the right side hand-side of the the motor.

NOTE!

Start the system and run it for some minutes. Vent the cylinder from air. Use the vent screws on the cylinder, see *Fig. 30: Double ended torque arm CBM 2000-6000.*

Fig. 30: Double ended torque arm CBM 2000-6000

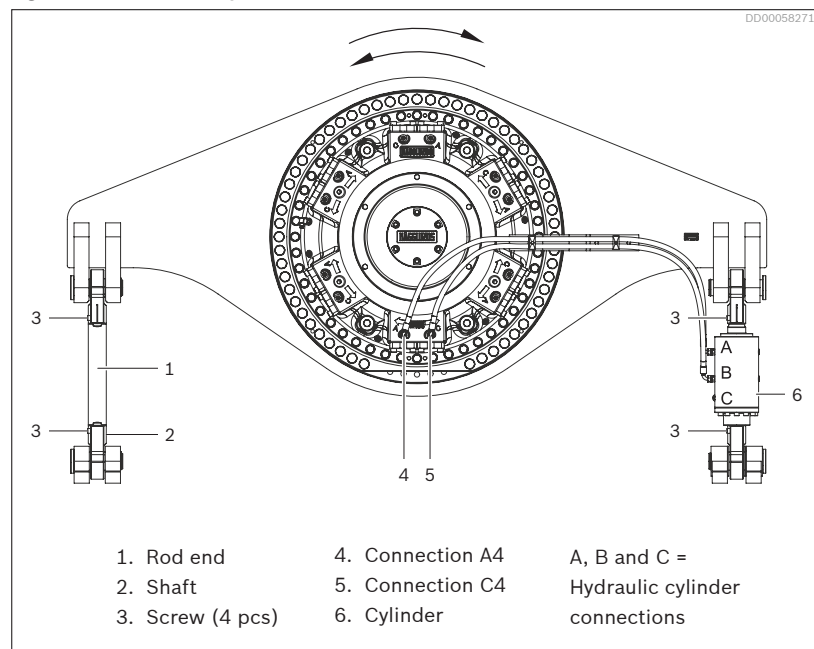


Table 21: Cylinder screw dimensions, double ended torque arm

Cylinder	Screw dimension	Tightening torque	
		Nm	lbf ft
Cylinder 100/70	M10x30	49	36
Cylinder 110/75			
Cylinder 125/90			
Cylinder 140/90			
Cylinder 140/100			

Fig. 31: Double ended torque arm CBM 2000-4000

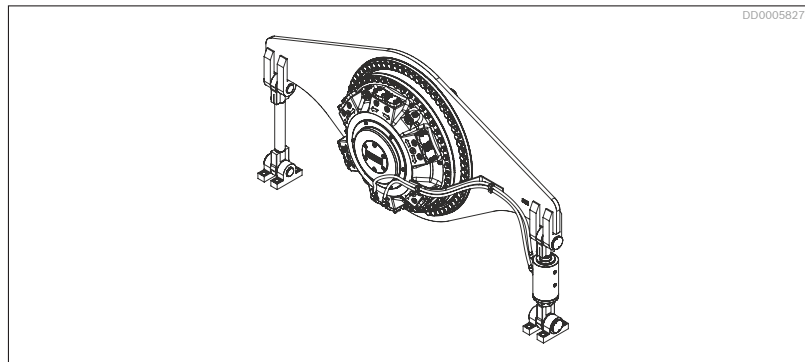
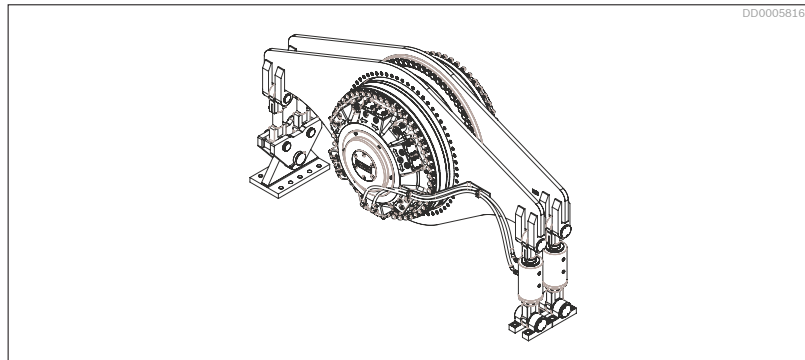


Fig. 32: Double ended torque arm CBM 5000-6000



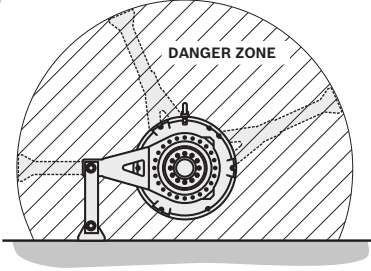
7.5.1.3 Mounting the reaction point

! **DANGER**

Pivoted attachment rotates with the motor!
Risk to life and risk of injury or serious injuries and risk of damage to equipment!

DD00058224

- ▶ Make sure the foundation can withstand the forces from the torque arm.
- ▶ Do not stand in the danger zone.



! **WARNING**

Escaping oil mist!
Risk of explosion, fire, health hazard, environmental pollution!

- ▶ Only perform welding work when the machine/system is depressurized.
- ▶ The product is painted with thermosetting plastic paint containing an isocyanate component. When a thermosetting plastic paint is heated to over 150-175°C, air pollutions are emitted that can cause serious health risk. If hot work (e.g. welding) is done on the product, protective measures against the air pollution must be taken.

Mounting of pivoted attachment

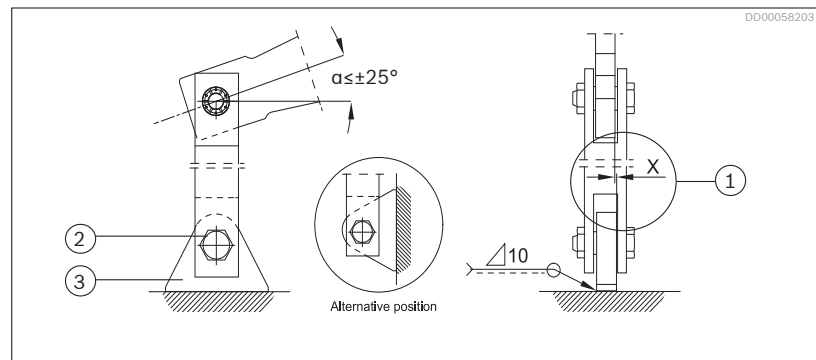


Fig. 33: Mounting of pivoted attachment

- 1** $x = \pm 2$ mm (0,079 inch) misalignment in installation.
 $x \leq \pm 15$ mm (0,59 inch) movement when in use.
- 2** The toggle bearing must be dismantled during welding.
- 3** Steel: EN 10113S355N, DIN St E39, BS 4360 Grade 50 C, Protected against corrosion, after welding.

Mounting the bearing

The bearing shall be mounted so that the slot in the outer race is perpendicular towards the load direction.

The bearing shall be mounted with a mounting sleeve or tube applied on the bearing outer ring.

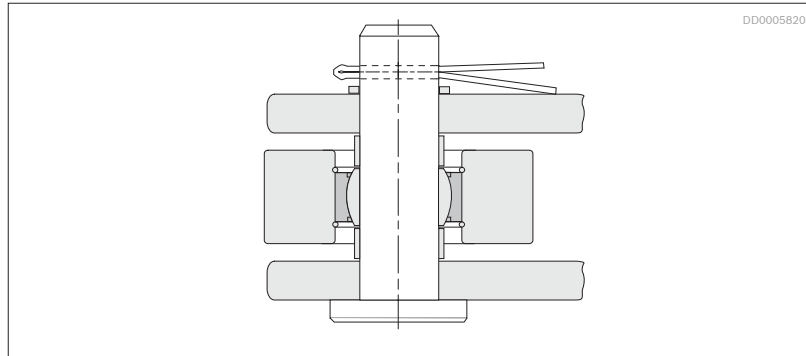


Fig. 34: Mounting the bearing

7.5.2 Step 2: Mounting the the coupling adapter onto the driven shaft

This installation instruction refers to a driven plain shaft with no splines.

7.5.2.1 Assemble the coupling adapter

Before the motor is mounted, there are some preconditions which must be fulfilled:

1. You should note that the couplings are from the factory lubricated with MoS₂ (grease) on the conical surfaces and the screws (see Fig. 35: Shrink disc).
2. This lubricants shall remain on those surfaces.

CAUTION

- ▶ MoS₂ (grease) must under no circumstances be transferred to the surfaces between the driven shaft and the shaft adapter (see Fig. 35: Shrink disc).
3. It is therefore important that you clean your hands free from MoS₂ (grease). If those conditions are fulfilled you may start the mounting.
 4. Clean the driven shaft and the out- and inside of the shaft adapter.
 5. Remove the spacers between the two clamping rings of the coupling.
 6. Mount the shrink disc on the hollow shaft of the shaft adapter. The coupling must be pushed right up to the stop of the shaft adapter. Use a screwdriver to separate the clamping rings for easier mounting.

NOTE!

- ▶ The conical surface between the coupling ring and the clamping rings as well as the screws shall be coated with MoS₂ (grease), (see Fig. 35: Shrink disc). This is done from the factory at delivery.

- ▶ When a motor has been in for overhaul or service and shall be reassembled it may be necessary to relubricate those surfaces with MoS₂ (grease) again but remember only the specified surfaces.
7. Absolutely no MoS₂ (grease) on the surfaces between shaft and motor. Clean the driven shaft and the inside of the motor hollow shaft.
 8. Align the motor on the shaft (see chapter 7.5.2.3: *Tightening of shrink disc* paragraph 2).
 9. Minimum variation in the gap between the clamping rings, (see chapter 7.5.2.3: *Tightening of shrink disc* paragraph 2).
 10. Right torque on the screws. Use torque wrench.

Mount the coupling adapter onto the driven shaft by following the instruction in the chapter 7.3.3: *Assembly tool Hägglunds motor*, with or without using the assembly tool.

CAUTION!

- ▶ Before starting the motor, check that the rotating coupling can not cause damage.
- ▶ Never tighten the coupling screws until the shaft adapter has been mounted onto the driven shaft.

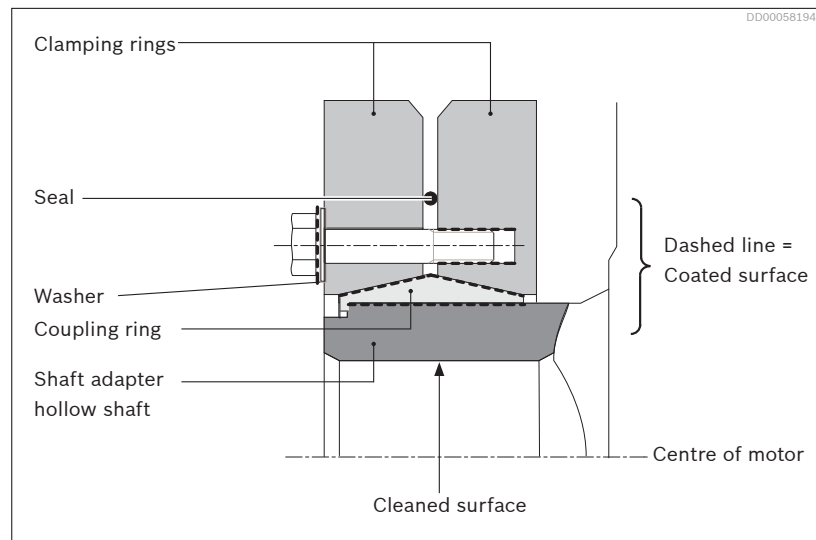


Fig. 35: Shrink disc

Coupling adapter

- 1 Shrink disc
- 2 Shaft adapter

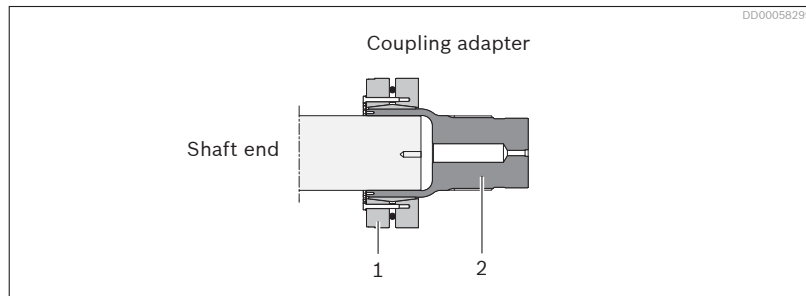


Fig. 36: Shaft end with coupling adapter.

7.5.2.2 Mounting the coupling adapter onto the driven shaft

1. Mount 3 lifting eyes on the coupling adapter for lifting, see Fig. 12: *Lifting Coupling adapter* in chapter 6.1.2: *Lifting CBM motors and accessories*.
2. Use a lifting device to transport and move the coupling adapter towards the driven shaft.
3. Align the coupling adapter on the driven shaft.
4. Pass the assembly tool through the centre of the coupling adapter and screw it into the driven shaft by using the key handle in the end of the tool, see Fig. 37: *Mounting the coupling adapter on the driven shaft with the Assembly tool*.
5. Pull the coupling adapter onto the shaft by turning the nut on the assembly tool to stated depth (measures B, see Fig. 40: *Gap between the clamping rings* and Fig. 41: *Tightening order* and Table 22: *Clamping length*).
6. Remove the assembly tool.
7. Tightening of shrink disc, (see chapter 7.5.2.3: *Tightening of shrink disc*).
8. Remove the lifting device and the lifting eyes from the coupling adapter.

Assembly tool

- 1 Nut
- 2 Carriage beam

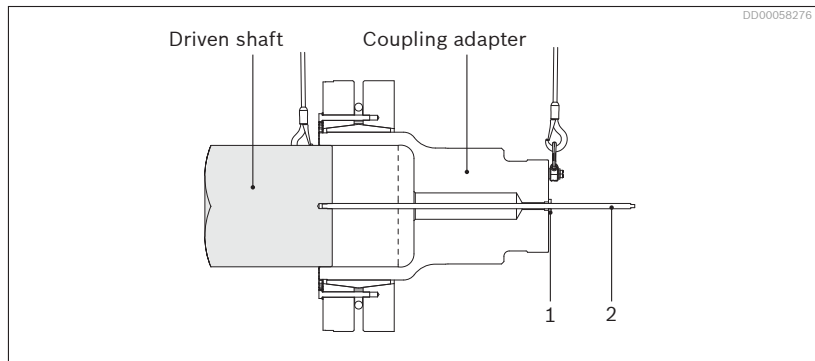


Fig. 37: Mounting the coupling adapter on the driven shaft with the Assembly tool.

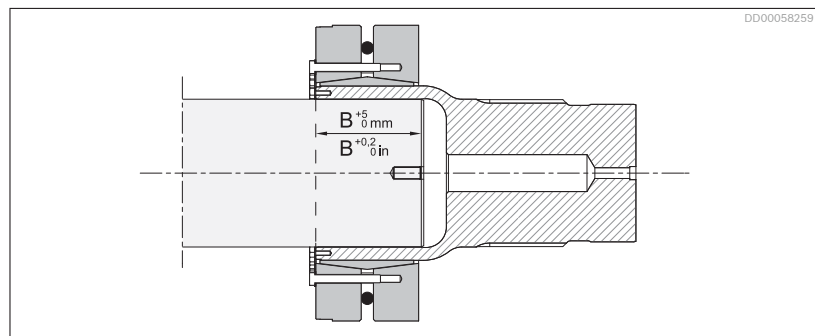


Fig. 38: Driven shaft without stress relieving groove

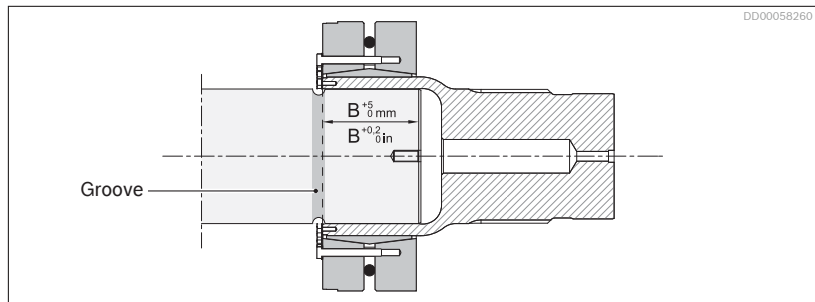


Fig. 39: Driven shaft with stress relieving groove

Table 22: Clamping length

Motor	Lenght B	
	mm	in
CBM 2000	257	10,12
CBM 3000-4000	300	11,81
CBM 5000-6000	320	12,60

7.5.2.3 Tightening of shrink disc

However for the tightening of the coupling screws the following must be observed:

1. Keep tension in your lifting straps to avoid a skew setting of the coupling adapter during the tightening of the screws. Wobbling caused by a skew setting of the coupling adapter gives extra forces on the main bearings.
2. In order to avoid the misalignment of the two clamping rings during the screw tightening, the gap between the rings must be measured in several places during the process, see *Fig. 40: Gap between the clamping rings*. The difference between the measured gaps must never vary more than 1 mm (0,04") during any stage of the tightening process.
3. Pre-set the coupling screws in opposite pairs (12-6-3-9 o'clock) until you reach max. 50% of the torque specified for the screws, see *Table 23: Screws and tightening torque, shaft adapter*, shaft adapter. It is very important that when you reach this stage the misalignment is controlled as described above.
4. Mark the screw head at 12 o'clock with a pen or paint so that you can follow the turning sequence of the screws.
5. Set the torque wrench for the specified maximum torque. Tightening torque of the coupling screws; see the sign on the coupling, or *Table 23: Screws and tightening torque, shaft adapter*.
6. Start tightening the screws in sequence shown in *Fig. 41: Tightening order*.
7. Keep on doing this until you have reached the stated torque. Several passes are required before the screws are tightened to specified torque. Keep checking the alignment of the coupling. (15-20 passes may be necessary).
8. When the specified torque is reached it is important that all screws are tightened with specified torque and that no further movement can be observed.

Table 23: Screws and tightening torque, shaft adapter

Motor type	Number of screws	Screw dim.	Strength	Tightening		Type of head
				Nm	lbf ft	
CBM 2000	32	M20x130	10.9	490	362	Hexagon M6S
CBM 3000-4000	48	M20x180	12.9	570	421	Hexagon M6S
CBM 5000-6000	32	M30x240	12.9	1650	1217	Hexagon M6S

NOTE!

- Uncoated screws greased with MoS₂ (grease).
- There is a metallic sign on every coupling with a tightening torque stamped on it. This torque is always to be used.
- Tightening torque value is critical. Use calibrated torque wrench.

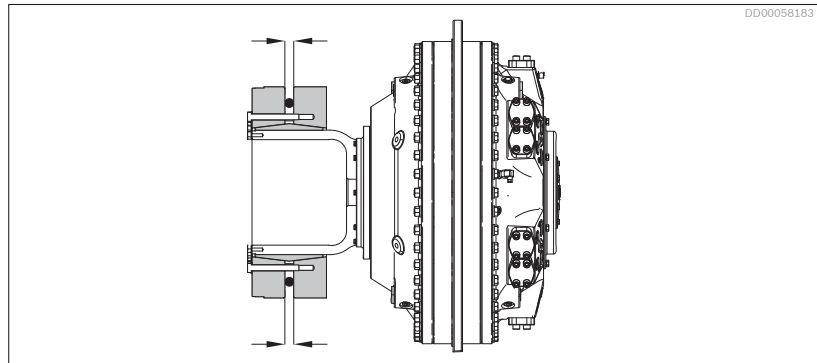


Fig. 40: Gap between the clamping rings

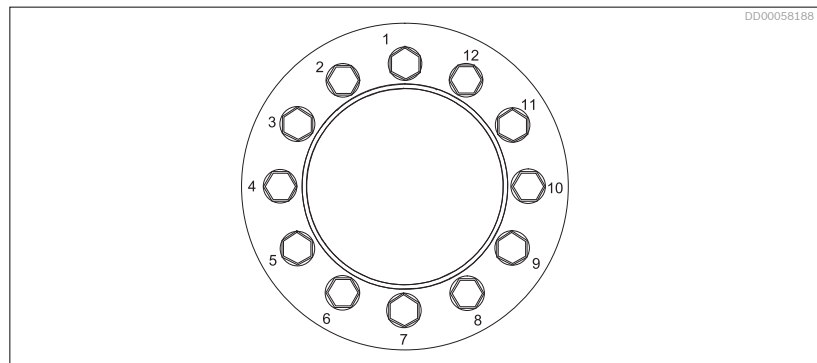


Fig. 41: Tightening order

7.5.3 Step 3: Mounting the motor onto the coupling adapter/drive shaft

7.5.3.1 Mounting motor without using the assembly tool

The motor can be mounted onto the driven shaft without using an assembly tool, though this is more difficult and takes longer time. It is easier to mount the motor if during mounting the compressed air trapped within the hollow shaft is evacuated. Evacuate the compressed air trapped within the hollow shaft by remove the cover and plug G 1 1/4 as described in 7.5.3.2: *Mounting torque arm mounted motor by using the assembly tool*.

Align the motor with the driven shaft using a lifting device and press it carefully onto the shaft.

7.5.3.2 Mounting torque arm mounted motor by using the assembly tool

Motors that carry radial load, must have the splines oiled. The motor can be used for horizontal mounting and mounting with motor shaft pointing downwards.

This instruction is related to the pictures *Fig. 42: Mount Hägglunds motor with assembly tool* and *Fig. 43: Fix the motor with the mounting kit*.

1. Mount torque arm to the motor with screws supplied as described in chapter 7.5.1: *Step 1: Fitting the torque arm on the CBM motor*.
2. If the driven shaft is plain (without splines) assemble and mount the coupling adapter according to 7.5.2: *Step 2: Mounting the the coupling adapter onto the driven shaft*.
3. Lubricate and install o-ring at leading edge of motor bore.
4. Check shaft/splines for burrs and lubricate shaft/splines with hydraulic fluid.
5. Remove the cover together with screws and washers.
6. Mark spline tooth location on outside of motor bore to assist alignment during installation. Install the spline align assembly tool to align the motor spline with the drive shaft according to chapter 7.3.2.1: *Mount the spline align assembly tool*.
7. Remove the plug G1 1/4.
8. Align the motor with the drive shaft.
9. Install the assembly tool by pass the tie rod through the centre of the motor, and screw it into the driven shaft by using a wrench at the key grip at the end of the assembly tool. Assemble the washer and then the nut tight to the bearing holder.
10. Pull the motor onto the shaft by turning the nut on the assembly tool.
11. Remove the assembly tool and the spline align assembly tool.
12. Remove bearing holder.
13. Fix the motor to the drive shaft by using the mounting kit: Mount the spacer.
Torque 1840 Nm (1357 lbf-ft).
14. Mount bearing holder. Torque 80 Nm (59 lbf-ft).
15. Fill up hydraulic oil to the G1 1/4 thread. Axial clearance 10 mm [0,4 in] during filling.
16. Mount the screw M30. Torque 1840Nm (1357 lbf-ft).
17. Mount the cover. Torque 200 Nm (148 lbf-ft).

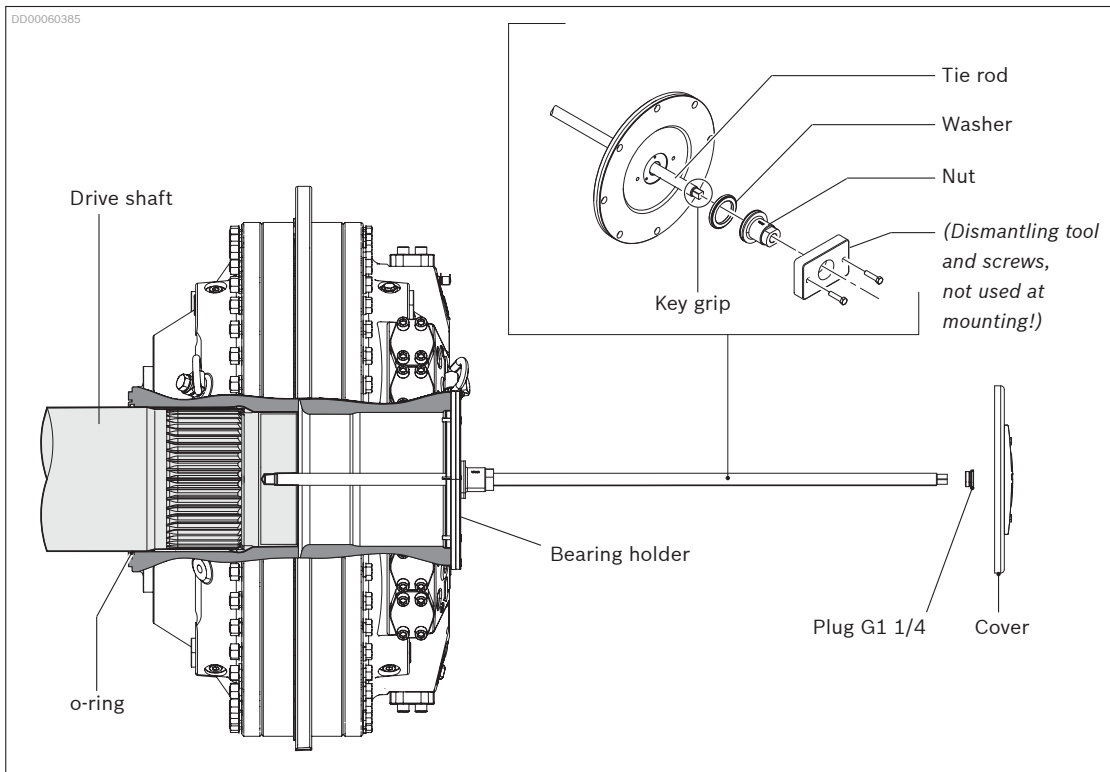


Fig. 42: Mount Hägglunds motor with assembly tool

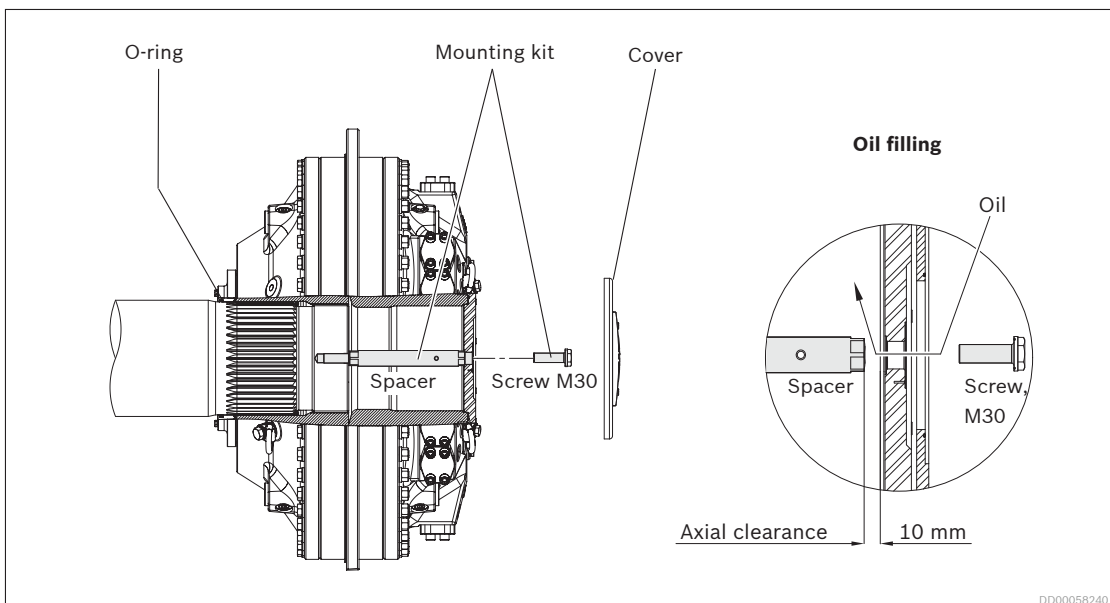


Fig. 43: Fix the motor with the mounting kit

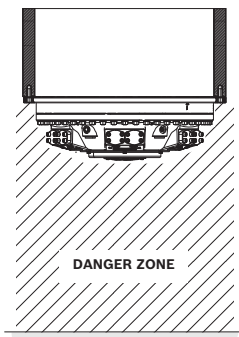
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7.5.3.3 Mounting flange mounted motor by using the assembly tool

⚠ **DANGER**

Vertical mounted motor: Motor/flange falls down!
Risk to life and risk of injury or serious injuries and risk of damage to equipment!

- ▶ Make sure that the flange is correctly mounted to the fundament and can withstand the weight and forces from the motor.
- ▶ Make sure the motor is correctly mounted to the flange.
- ▶ Do not stand in the danger zone!



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For flange mounted motors, the spline shall normally not be subject to radial load. With no radial load, the spline shaft can be oiled before mounting the motor. If the motor is subject to radial load, the splines shall be filled up with oil.

Mounting the motor onto the drive shaft using the assembly tool, see chapter 7.5.3.2: *Mounting torque arm mounted motor by using the assembly tool, paragraph 3-11.*

1. Screw the motor to the flange. For screw dimensions and tightening torque, see *Table 20: Screw dimensions.*
2. Fill up hydraulic oil to the G1 1/4 thread. (see *Fig. 44: Flange mounted motor, shaft horizontal.*)
3. Torque the G1 1/4 plug. MV=180 Nm (133 lbf·ft).
4. Mount the cover. Torque 200 Nm (148 lbf·ft).

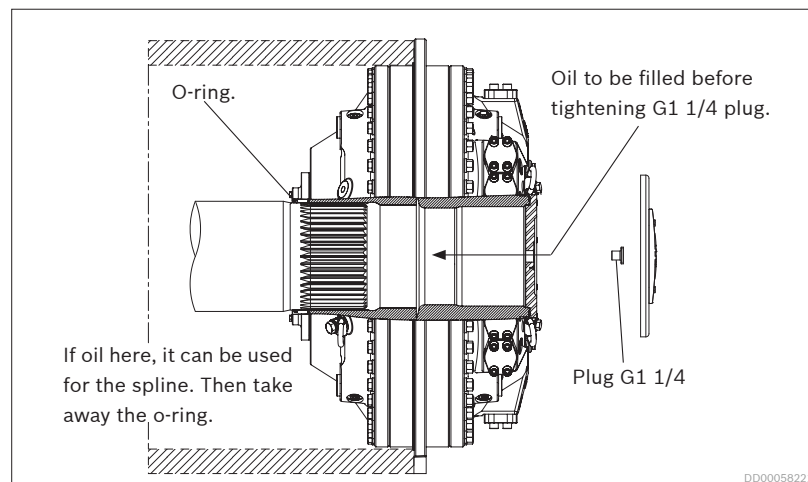


Fig. 44: Flange mounted motor, shaft horizontal

7.5.4 Draining and venting the motor

Horizontal mounting

When the motor is installed with the shaft in the horizontal plane, the highest of the four drain outlets D1, D2, D3 or D4 must always be used (see Fig. 45: *Horizontal mounting*: Horizontal mounting).

Drain line must be connected to the tank with a minimum of restrictions, to ensure that the maximum case pressure is not exceeded.

A magnetic plug is pre assembled from factory in connection T8, in the drain outlet D3. If other drain outlet is used (D1-D2, D4-D8), the magnetic plug should be moved to the connection (T7 or T9) in the selected drainage.

For maintenance, see chapter 10.3: *Maintenance plan*.

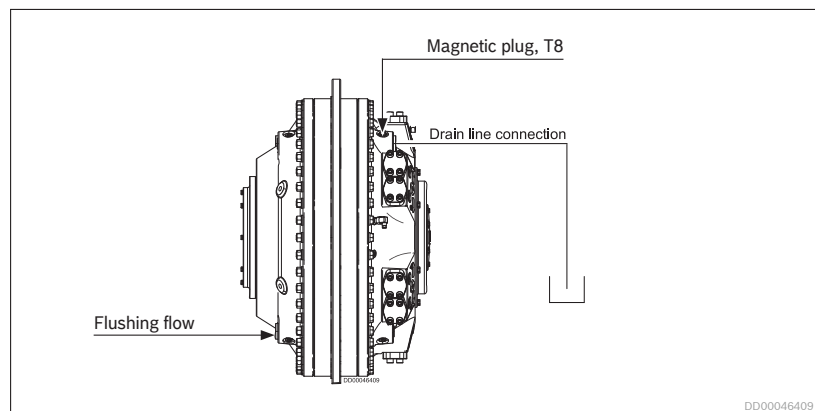


Fig. 45: Horizontal mounting

Vertical mounting

When the motor is mounted vertically, the highest of the four drain outlets D1, D2, D3 or D4 must be used. Flushing (lubrication) of radial seal from low pressure is necessary.

A) Motor shaft pointing downwards

The drain line must be connected to one of the drain outlets in the connection block. (See Fig. 46: *Vertical mounting*, alt. A).

The flushing connection F2 shall be connected to low pressure connection. With bidirectional drives, use the connection with lowest average pressure. (Connection to high pressure will increase the motor drain flow). It is advisable to fit the nipple and the hose to the motor before fitting the torque arm.

B) Motor shaft pointing upwards

The drain line must be connected to one of the drain outlets in the shaft end housing. (See Fig. 46: *Vertical mounting*, alt. B).

The flushing connection F1 on the shaft end housing should be connected to the low pressure connection. With bidirectional drives, use the connection with lowest average pressure. (Connection to high pressure will increase the motor drain flow). It is advisable to fit the nipple and the hose to the motor before fitting the torque arm.

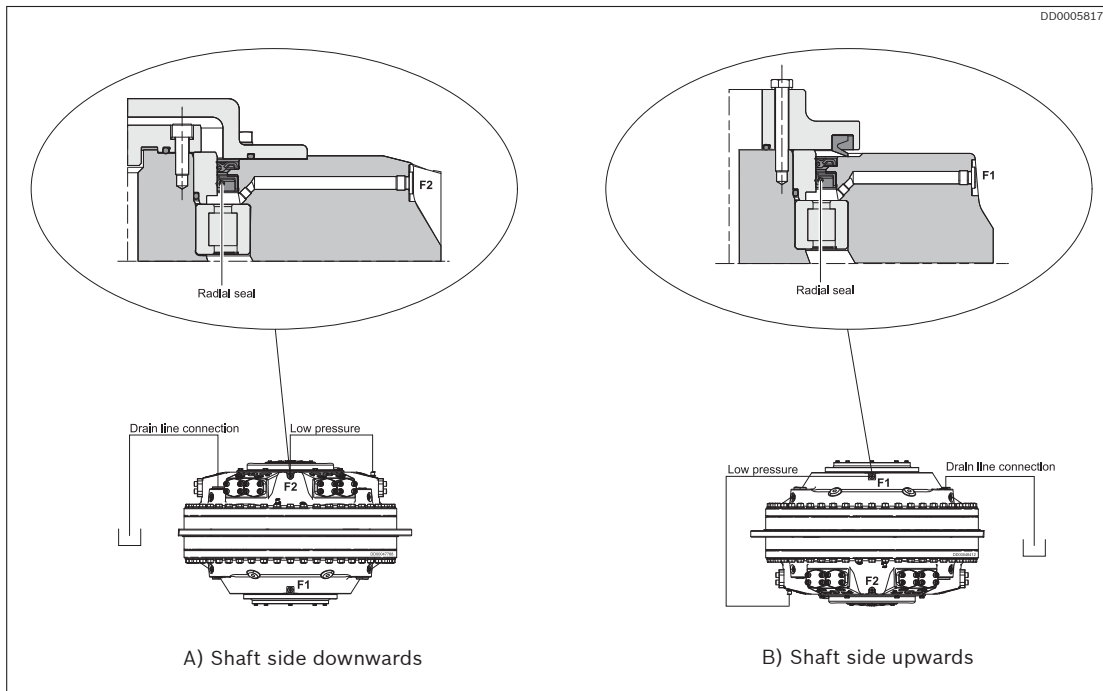


Fig. 46: Vertical mounting

7.5.5 Flushing

To avoid high temperature in the motor case the heat must be removed, because high temperature gives lower viscosity and that gives reduction in basic rating life/service life. The motor case must be flushed when the output power exceeds the max. values.

CAUTION!

High temperature in motor case!

Reduction in basic rating life/service life.

- ▶ Max. power without flushing:
Häggglunds CBM 2000-6000 500 kW (670 hp)

For calculation of required flushing, please contact your Bosch Rexroth representative. The flushing oil shall be drained in the normal drainline, see chapter 7.5.4: *Draining and venting the motor.*

Connect the input line for flushing in the lowest drain port, D1-D8, Fig. 45: *Horizontal mounting* and Fig. 46: *Vertical mounting.*

7.5.6 Hydraulic connections

When using (thick wall) piping and in frequent reversal drives, it is recommended to fit flexible hoses between the motor and piping to avoid damage due to vibration and to simplify installation of the motor. The length of the hoses should be kept fairly short.

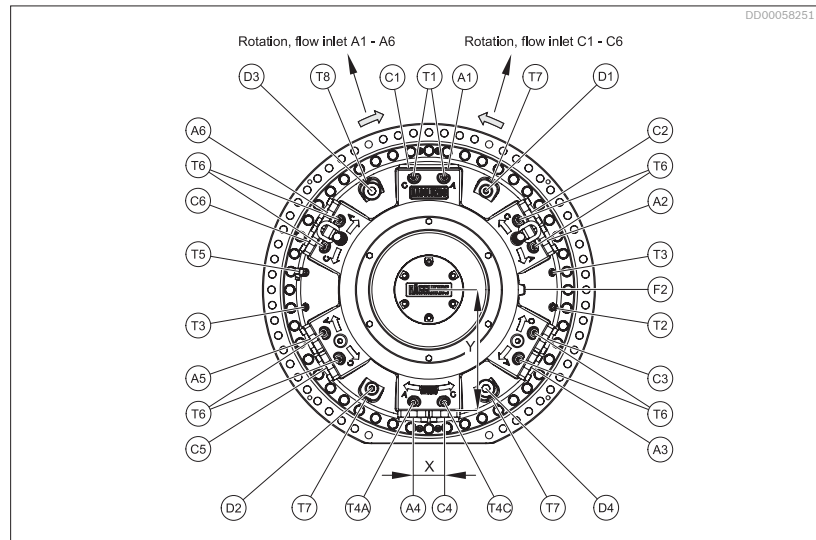


Fig. 47: Connection side of the motor

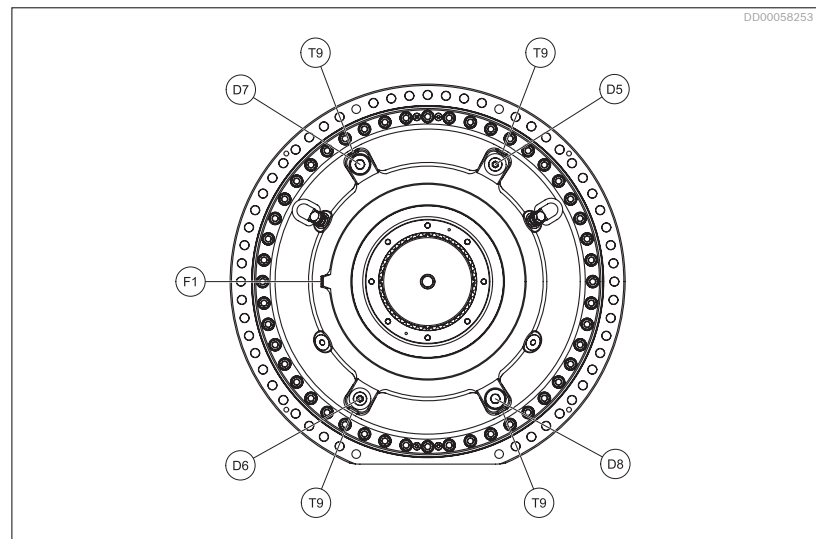


Fig. 48: Shaft side of the motor

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Table 24: Table Connections

Connection	Description	Remarks
C1	Main connection	If C is used as the inlet, the motor shaft rotates clockwise, viewed from the motor shaft side.
C2, C3, C4, C5, C6	Alternative main connection	Normally plugged at delivery.
A1	Main connection	If A is used as the inlet, the motor shaft rotates counterclockwise, viewed from the motor shaft side.
A2, A3, A4, A5, A6	Alternative main connection	Normally plugged at delivery.
D3	Drain outlet	Normally plugged at delivery.
D1, D2, D5, D6	Alternative drain outlets	Normally plugged at delivery.
D4, D7, D8	Alternative drain outlets	Normally plugged at delivery.
F1, F2	Flushing connection	For flushing of radial lip seal. Normally plugged.
T1	Test connection	Used to measure pressure and/or temperature at the main connections.
T2	Test connection	Used to measure pressure and/or temperature in drain oil.
T3	Test connection	Normally plugged at delivery.
T4A, T4C	Pressure connection	Connection for double ended torque arm.
T5	Temperatur sensor PT100	Used to measure temprature in the housing.
T6	Alternative test connection or pressure connection	Normally plugged at delivery.
T8	Magnetic plug	Used to monitor impurities in the oil.
T7, T9	Alternative magnetic plug connection	Normally plugged at delivery.

Fig. 49: Main connections A1-A6 and C1-C6

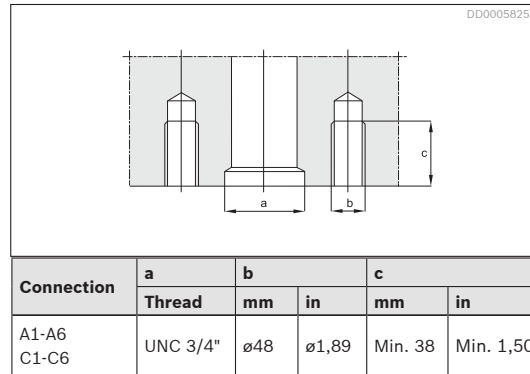


Fig. 50: Test connection T1-T3, T4, T5-T9

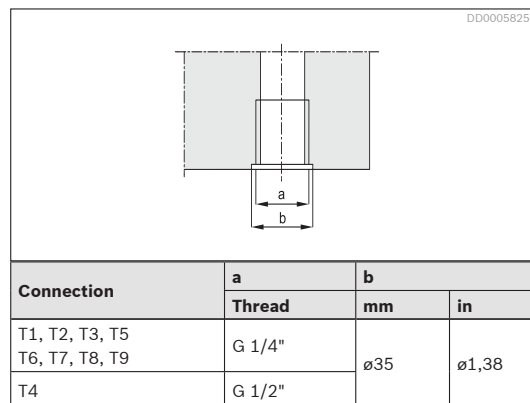
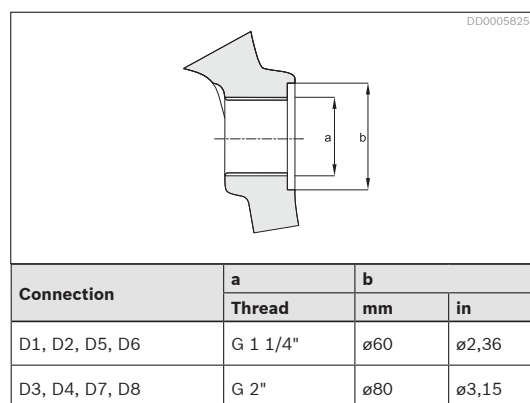


Fig. 51: Drain connections D1-D8



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Table 25: Connection dimensions

Connection	Dimension
A*	2"
C*	2"
D1, D2, D5, D6	G 1 1/4"
D3, D4, D7, D8	G 2"
T1, T2	G 1/4" M16
T3, T5, T6	G 1/4"
T4	G 1/2"
T7, T8, T9	1 1/16-12-UN-2B
y	530 mm 20,87 in
x	137 mm 5,39 in

*SAE coupling J 518 C, code 62, 414 bar (6000 psi).

7.5.7 Direction of rotation of motor shaft



WARNING!

Rotating parts!

Risk of injury or serious injuries.

- ▶ Do not touch rotating parts or in the zone of rotating parts.

With the inlet flow supply connected to A port, the motor shaft rotates in the direction shown by the arrow, anti-clockwise viewed from the motor shaft side.
With the inlet flow supply connected to C port, the motor shaft rotates clockwise viewed from the motor shaft side.

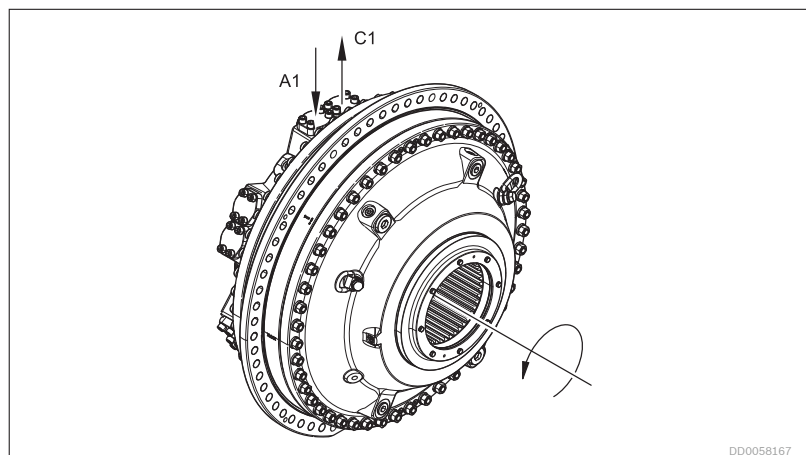


Fig. 52: Direction of rotation

8 Commissioning

CAUTION

Dirt particles!

A not run-in motor in combination with dirt particles in the oil can badly affect the sliding surfaces in the motor. This is valid during the first 100 hours.

- ▶ The Häggglunds radial piston hydraulic motor must be installed and commissioned in a clean condition.

8.1 Commissioning

Check the following points before commissioning the motor, i.e. before starting the first time:

- Make sure that all fluids has been removed from the motor to prevent accidental mixing with the hydraulic fluid used in the system.
- Check that the motor is connected to give the correct direction of rotation, see chapter 7.5.6: *Hydraulic connections* and 7.5.7: *Direction of rotation of motor shaft*.
- Select the hydraulic fluid in accordance with the recommendations, see chapter 5.5: *Choice of hydraulic fluid* and appendix 16.1: *Hydraulic fluid quick reference*.

8.1.1 Oil filling

1. Fill the motor housing with hydraulic fluid via a filter into the drain outlets D1, D2 or the vent hole (depending on how the motor is mounted), see *Table 6: Oil volume*.
2. Check the drain line to ensure that excessive pressure does not build up in the motor case; see chapter 7.2: *Installation conditions* and 7.5.4: *Draining and venting the motor*.
3. Check that the motor is protected from overloads, see chapter 15.1.1: *Motor data*.
4. Check that the charge pressure conforms to the charge pressure curve, see chapter 15.1.2: *Recommended charge pressure*.
5. Check that all hydraulic couplings and plugs are properly tightened to prevent leakage.
6. Make sure that the torque arm is sufficiently fastened, see chapter 7.5.1: *Step 1: Fitting the torque arm on the CBM motor*.

8.1.2 Start of the hydraulic supply

1. During initial starting and the period immediately after it, any hydraulic installation must be regularly and carefully checked at frequent intervals.
2. The working pressure and charge pressure must be checked to ensure that they correspond to the contracted values.
3. The pressure in the drain line measured at the motor must be less than 3 bar (43.5 psi). This pressure limit is important for the life of the motor seals.
4. If leakage occurs, correct the fault and carry out new measurements.
5. Check all lines, connections, screws, etc. and correct if necessary.
6. Check other possible leakage points and replace faulty parts.
7. During the start up period, dirt particles in the system are removed by the filters. The filter cartridges have to be changed after the first 100 working hours and after that according to the maintenance chart, *Table 26: Maintenance chart*.

See also Chapter 10.3: *Maintenance plan* (second point) about filter clogged indicators.

NOTE!

- It is important that the pressure is limited to 250 bar (3626 psi) when starting up the motor. This is valid for the first 100 hours.

8.2 Re-commissioning after standstill

For re-commissioning, proceed as described in chapter 8.1: *Commissioning*.

WARNING!

Material or product damage!

Risk of injury or serious injuries.

- ▶ Before re-commissioning, make sure that the Hägglunds product not been damaged so that the original function changed.

In case of accident or malfunction where it is not possible to determine the implications for Hägglund product's fitness, please contact your Bosch Rexroth representative.

9 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. Use the product only within the performance range provided in the technical data. The machine/system manufacturer is responsible for the proper project planning of the hydraulic system and its control.

10 Maintenance and repair

10.1 Cleaning and care

! CAUTION

Damage to surface!

Aggressive solvents and detergents may damage the seals on the hydraulic motor and cause them to age faster.

- ▶ Never use solvents or aggressive detergents.
- ▶ If in doubt, check the compatibility of the detergent with the seal type (Nitrile or Viton) specified in the hydraulic motor.

Damage to the hydraulic system and the seals!

Using a high-pressure cleaner could damage the speed encoder and the seals of the hydraulic motor.

- ▶ Do not point the high-pressure cleaner at sensitive components, e. g. shaft seal, seals in general, electrical connections and speed encoder.

For cleaning and care of the hydraulic motor, observe the following:

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

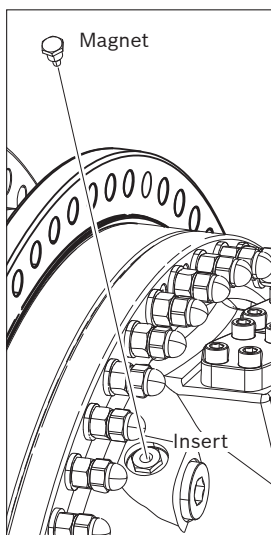


Fig. 53: Magnetic plug

10.2 Inspections

10.2.1 Magnetic plug inspection

A magnetic plug is installed in the drain connection. By regularly inspecting the magnetic plug a malfunction of the hydraulic system can be detected and corrected. It is important that the inspection of the magnet will be done on a regular basis so changes in the amount of metal particles can be correctly detected. The valve insert is self-sealing and the magnet can be removed for inspections while the drive is in operation. **NOTE!** Only remove the magnet. Oil leakage if insert is removed.

When running in a new motor, the metal content are higher than normal, and the magnet will therefore contain more metal particles than normal. This may also be the situation when inspecting the magnet the first time after work has been done in the system.

At normal conditions the magnetic plug shall not contain visible particles.

Inspection routine

- First inspection after installation, or work has been done in the system, shall be done after 12 hours and then after every 100 hours of operation. At this point, the

metal content are higher than normal and metal particles on the magnet can be left without notice. Clean and re-install the magnet.

- Recommended inspection intervals are two weeks (see *Table 26: Maintenance chart*).
- The magnet shall be cleaned (wiped of) before re-installation.
- If visible particles are found on the magnet, reduce the checking interval to every second day to determine how quick the motor is failing. Please contact your Bosch Rexroth representative for further action.

10.2.2 Oil inspection

Purpose to take oil sample

The purpose to take an oil sample is to check the condition of the oil. With scheduled oil analysis, wear products can be identified and corrective action can be taken before failure occurs. Oil analysis can indicate when an oil change is required, point out shortcomings in maintenance and keep repair cost to a minimum. Using oil analysis can create a “window of opportunity”, allowing the user to schedule, overhauls, maintenance or repairs, thus saving money on equipment repairs and downtime.

The most used method is to take samples in a special bottle and send it to a fluid laboratory for an analysis and from the laboratory you get a report, which follow a specific international standard.

The analysis should cover viscosity, oxidation, water content, particle counting possibly including element analysis of particles. Another method is to install an inline particle counter direct in your hydraulic system which give you the contamination level according to international standards, the disadvantage with this method is that you only get the contamination level in the oil.

General

The intention is to verify the condition of the oil during operation. The motors should be running at normal operation while the sample is taken.

The cleanliness is extremely important during sampling.

Always use bottles adapted to oil samples, they can be ordered from any fluid analysis laboratory.

Never try to clean your own bottle if you want a true value of the result.

The sample should be taken by using a mini-mess hose connected to a mini-mess coupling.

Always clean the connections carefully before you connect the mini-mess hose to the coupling.

Be careful when connecting the mini-mess hose because the oil beam can be dangerous and should never point against any person or other sensible object.

Check and be aware of the pressure you may have on the connection before you connect.

How to do bottle samples

The sample shall be taken at the mini-mess coupling on the low pressure side of the motor in the main loop. Never take the sample out of the tank using the ball valves. Clean the coupling and the hose carefully.

Connect the mini-mess hose to the coupling but be careful and be aware of the direction of the oil beam.

Let minimum 2 litres (0,53 gallon US) of oil flush into a bucket before you fill the bottle.

Remove the cap of the bottle as late as possible and don't let any contamination be in touch with the cap, bottle or the mini-mess hose when the sample is taken.

To get a reliable result the system must run without moving any valves and the mini-mess hose should not touch the bottle.

Only $\frac{3}{4}$ of the bottle shall be filled because the laboratory has to shake the sample to get a mixed fluid when they analyse it. Minimum 200 ml are needed for a good analysis.

When the bottle is filled close the cap as soon as possible to prevent contamination from the air that might enter the bottle and give you a wrong result.

Inline measure

The sample shall be taken at the mini-mess coupling on the charge pressure side of the motor in of the main loop system. Clean the coupling and the hose carefully.

Connect the hoses according to the particle counters manual.

To get a true value the contamination readings have to be stable about 10 min before you stop to measure.

10.3 Maintenance plan

When a hydraulic system has been in service for some time, it must undergo periodic maintenance and servicing at intervals which depend on the equipment and the type of duty.

This periodic maintenance must include the following operations:

- Check the hydraulic system for leakage. Tighten the screws, fittings, replace faulty seals and keep the drive clean.
- Inspect tank, pump, filters (e.g. air-, oil-, magnetic filters etc.) and clean or change if necessary. Replace all filter cartridges for which a filter clogged indication has been given.
- Check the pressure and temperature of the hydraulic fluid and carry out routine operations. Adjust valves etc. if necessary.
- Check the hydraulic fluid; see chapter 10.4.2: *Oil maintenance*.
- Make sure that no dirt or other contaminations enter the system during inspection. Check that the outside of the hydraulic motor in an installation is kept free of dirt; thus leakage and faults will be detected earlier.
- We recommend that a running log be kept and that planned inspections are carried out at set intervals.
- Maintenance checks and operations, see *Table 26: Maintenance chart*.
- Check the magnetic plug, see chapter 10.2.1: *Magnetic plug inspection* and *Table 26: Maintenance chart*.
- Check torque arm and pivoted attachment.

Table 26: Maintenance chart

In operation	Oil filters	Oil	Torque arm	Magnetic plug
After the first 100 hours	R	-	I	-
After 3 months or 500 hours	R	-	-	-
Once every 2 weeks	-	-	-	I
Once every 6 months	R	I	I	-
Once every 12 months	-	-	-	-

R = Replacement, **I** = Inspection

10.4 Maintenance

10.4.1 Filter maintenance

Filters must be changed after the first 100 working hours and the second change is to be carried out after 3 months or 500 working hours whichever is earlier. They must then be changed at regular intervals of 6 months or 4000 working hours.

10.4.2 Oil maintenance

See also chapter 5.5: *Choice of hydraulic fluid* Choice of hydraulic fluid and appendix 16.1: *Hydraulic fluid quick reference*

Analysis

It is recommended that the oil should be analysed every 6 months. The analysis should cover viscosity, oxidation, water content, particle counting possibly including element analysis of particles.

Most oil suppliers are equipped to analyse the state of the oil and to recommend appropriate action. The oil must be replaced immediately if the analysis shows that it is exhausted.

Viscosity

Many hydraulic oils display viscosity loss with increasing use, and this means poorer lubrication. The viscosity of the oil in service must never fall below the minimum recommended viscosity.

Oxidation

Hydraulic oil oxidizes with time of use and temperature. This is indicated by changes in colour and smell, increased acidity or the formation of sludge in the tank. The rate of oxidation increases rapidly at surface temperatures above 60 °C (140 °F), and the oil should then be checked more often.

The oxidation process increases the acidity of the fluid; the acidity is stated in terms of the "neutralisation number". Typical oxidation is slow initially and increases rapidly later.

All hydraulic fluids are affected differently. Obtain the advice of your oil supplier or by nearest Bosch Rexroth representative.

A sharp increase (by a factor of 2 and 3) in the neutralisation number between inspections is a signal that the oil has oxidized too much and should be replaced immediately.

Water content

Contamination of the oil by water can be detected by sampling from the bottom of the tank. Most hydraulic oils repel the water, which then collects at the bottom of the tank. This water must be drained off at regular intervals. Certain types of transmission oils and engine oils emulsify the water; this can be detected by coatings on filter cartridges or a change in the colour of the oil. Obtain the advice of your oil supplier in such cases.

Degree of contamination

Heavy contamination of the oil causes increased wear of the hydraulic system components. The cause of the contamination must be immediately investigated and remedied.

10.5 Repair

Bosch Rexroth offers a comprehensive range of services for the repair of Hägglunds products.

Repairs on the Hägglunds products may only be performed by service centers certified by Bosch Rexroth.

- ▶ Use exclusively original spare parts from Bosch Rexroth to repair the Hägglunds product, otherwise the functional reliability of the product can not be assured and you lose your entitlement under warranty.

In the event of questions regarding repairs, contact your responsible Bosch Rexroth Service partner or the service department of the manufacturer's plant for the Hägglunds product, see chapter 10.6: *Spare parts*.

10.6 Spare parts

CAUTION

Use of unsuitable spare parts!

Spare parts that do not meet the technical requirements specified by Bosch Rexroth may cause personal injury or property damage!

- ▶ Use exclusively original spare parts from Bosch Rexroth to repair the Hägglunds product, otherwise the functional reliability of the Hägglunds product can not be assured and you lose your entitlement under warranty.

Address all questions regarding spare parts to your responsible Bosch Rexroth Service partner or the service department of the manufacturer's plant for the Hägglunds products. Details of the manufacturer's plant can be found on the name plate of the Hägglunds product.

11 Removal and replacement

11.1 Required tools

In addition to standard tools are also needed:

- ▶ Lifting tool/device
- ▶ Assembly tool
- ▶ Oil barrel (wide opening)
- ▶ Lifting eyes
- ▶ Wrench

11.2 Preparing for removal

1. Decommission the entire system as described in the instruction manual for the machine or system.
 - Relieve pressure in the hydraulic system according to the instructions of the machine or system manufacturer.
 - Make sure that the relevant system components are not under pressure or voltage.
2. Protect the complete system against being energized.
3. Remove the hoses, cables and pipelines from the motor.

11.3 Removing Hägglunds CBM and coupling adapter

Proceed as follows to remove the motor:

DANGER! **Danger from suspended loads!**
▶ See chapter 2.6: *Product-specific safety instructions*

CAUTION! **Contact with hydraulic fluid!**
▶ See chapter 2.6: *Product-specific safety instructions*

NOTE! **Escaping or spilling hydraulic fluid!**
▶ See chapter 2.6: *Product-specific safety instructions*

Removing the motor

1. Secure the motor to a lifting device, see chapter 6.1: *Product transport*.
2. Remove the cover.
3. Dismount the screw M30.
4. Place the oil barrel below the motor and remove the bearing holder. The oil will drain out.
5. Dismount the spacer (torque armed mounted motor) or the plug G1 1/4 (flange mounted motor).
6. Mount the bearing holder.
7. Install the assembly tool by pass the tie rod through the centre of the motor and screw it into the driven shaft by using a wrench at the key grip at the end of the assembly tool.
8. Mount the nut and then the washer tight to the bearing holder. Mount the dismantling tool with the screws to the bearing holder.
9. If the motor is flange mounted, unscrew the motor from the flange. If the motor is torque armed mounted, release the pivoted link.
10. Pull the motor off the shaft by turning the nut on the assembly tool.

NOTE! If there are no screw holes predrilled in the bearing holder, use the dismantling tool as a template to drill new holes, M12x15-20.

**Assembly tool
motor**

- 1 Tie rod
- 2 Nut
- 3 Washer
- 4 Dismantling tool
and screws

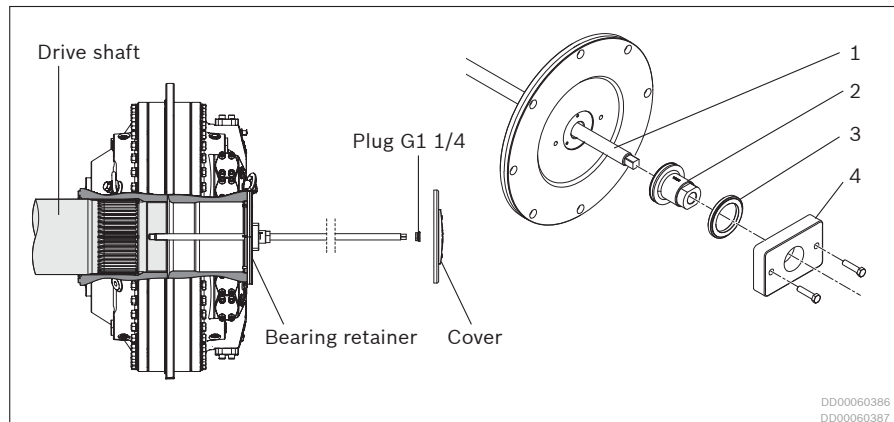


Fig. 54: Assembly tool for removing the motor

Removing the coupling adapter

1. Secure the coupling adapter to a lifting device, see chapter 6.1: *Product transport*.
2. Remove the coupling adapter by mounting the carriage beam to the customer shaft through the center hole of the coupling-adapter.
3. Tighten the nut on the carriage beam against the coupling-adapter by hand.
4. Mount the dismantling tool with the carriage beam going through the center hole.
5. Fasten the dismantling tool against the end of the coupling-adapter by using the two screws supplied with the coupling adapter.
6. Mount one lifting eye above the dismantling tool at the end of the coupling adapter.
7. Mount two lifting eyes on the opposite side of shaft adapter.
8. Untighten the screws on the shrink disc gradually, appr. a quarter turn each. Keep doing this until all screws are untighten.
9. Remove the coupling-adapter from the customer shaft by turning the nut on the mounting tool counterclockwise.

**Included in coupling
adapter**

- 1 Lifting eye
- 2 Dismounting tool
- 3 Screws

**Assembly tool coupling
adapter**

- 4 Nut
- 5 Carriage beam

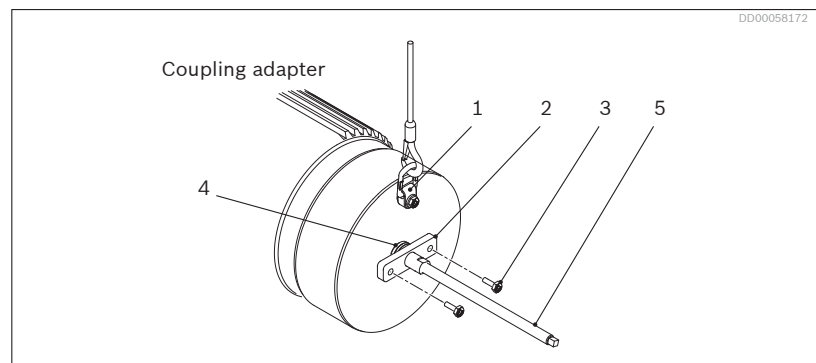


Fig. 55: Assembly tool for removing the coupling adapter

11.4 Preparing the components for storage or further use

Proceed as described in chapter 6.2: *Product storage*.

12 Disposal

12.1 Environmental protection

Careless disposal of the Hägglunds CBM, the hydraulic fluid and the packaging material could lead to pollution of the environment.

Observe the following points when disposing of the Hägglunds CBM motor:

1. Completely empty the motor.
2. Dispose of the motor and packaging material in accordance with the national regulations in your country.
3. Dispose of the hydraulic fluid according to the national regulations of your country. Also observe the applicable safety data sheet for the hydraulic fluid.
4. Remove the motor into its individual parts and properly recycle these parts

Separate according to, for instance:

- Cast parts
- Steel
- Aluminum
- Non-ferrous metal
- Electronic waste
- Plastic
- Seals

13 Extension and conversion

Do not modify Hägglunds products. Please contact your Bosch Rexroth representative for extension or conversion.

14 Troubleshooting

Please, contact your nearest Bosch Rexroth representative.

Table 27: Troubleshooting hydraulic motor

Fault	Probable cause	Action
The motor does not run.	Mechanical stop in the drive.	Check system pressure. If the pressure has risen to the relief valve setting, remove the load from the drive.
	The motor does not deliver enough torque because the pressure difference across the motor is not enough for the load.	Investigate the pressure level in the system and correct the setting of the pressure limiting valve if necessary.
	Insufficient or no oil being supplied to motor.	Check the hydraulic system. Check the external leakage of the motor (D connection).
Motor rotates in wrong direction.	Oil supply connections to motor incorrectly connected.	Connect the oil supply correctly.
Motor runs jerkily.	Pressure or flow fluctuations in the hydraulic system.	Find the cause in the system or in the driven unit.
	The motor is being operated with too low charge pressure.	Adjust the charge pressure to the correct level. See chapter 15.1.2: <i>Recommended charge pressure</i>
Noise in the motor.		Investigate the drain oil, if necessary. Put a magnetic plug in the oil flow and check the material that sticks to the magnet. Steel particles indicate damage. Note that fine material from the castings may be deposited and does not mean internal damage in the motor.
	Internal faults in the motor.	
External oil leakage on the motor.	The radial lip seal is worn.	Replace the radial lip seal.

15 Technical data

15.1 Technical data, Hägglunds CBM

15.1.1 Motor data

Table 28: Motor data, metric

Motor type	Displacement	Specific torque	Rated speed * 1)	Max speed	Max ** pressure	Max torque ²⁾	Max power ³⁾ intermittent
	cm ³ /rev	Nm/bar	rpm	rpm	bar	kNm	kW
CBM 2000-1200	75832	1200	58	58	350	394	2384
CBM 2000-1400	88301	1400	48	48	350	460	2301
CBM 2000-1600	100770	1600	41	41	350	525	2247
CBM 2000-1800	113748	1800	36	36	350	591	2227
CBM 2000	126726	2000	32	32	350	657	2207
CBM 3000-2200	138686	2200	29	29	350	722	2184
CBM 3000-2400	151155	2400	26	26	350	788	2134
CBM 3000-2600	164133	2600	24	24	350	854	2137
CBM 3000-2800	177111	2800	22	22	350	919	2119
CBM 3000	190089	3000	20	20	350	985	2068
CBM 4000-3200	201540	3200	18	18	350	1051	1981
CBM 4000-3400	214518	3400	17	17	350	1116	1991
CBM 4000-3600	227496	3600	16	16	350	1182	1987
CBM 4000-3800	240474	3800	15	15	350	1248	1970
CBM 4000	253452	4000	14	14	350	1313	1939
CBM 5000-4600	290859	4600	12	12	350	1510	1907
CBM 5000	316815	5000	11	11	350	1642	1903
CBM 6000-5600	354222	5600	9	9	350	1838	1746
CBM 6000	380178	6000	9	9	350	1970	1871

*) Related to a required pressure of 12 bar for motors in braking mode.

**) The motors are designed according to DNV-rules. Test pressure 420 bar. Peak/transient pressure 420 bar maximum, allowed to occur 10000 times.

1) Special considerations regarding charge pressure, cooling and choice of hydraulic system for speed above rated, 8 ports must be used for higher speed.

2) Calculated as: Metric= Ts·(350-15)·0,98.

3) Valid for minimum permissible oil viscosity 15 cSt in the motor case.

Table 29: Motor data, US

Motor type	Displacement	Specific torque	Rated* ¹⁾ speed	Max speed	Max** pressure	Max torque ²⁾	Max power ³⁾ intermittent
	in ³ /rev	lbf-ft/1000 psi	rpm	rpm	psi	lbf-ft	hp
CBM 2000-1200	4628	61024	58	58	5076	290543	3197
CBM 2000-1400	5388	71194	48	48	5076	338967	3086
CBM 2000-1600	6149	81365	41	41	5076	387391	3013
CBM 2000-1800	6941	91536	36	36	5076	435815	2986
CBM 2000	7733	101706	32	32	5076	484239	2960
CBM 3000-2200	8463	111877	29	29	5076	532663	2929
CBM 3000-2400	9224	122047	26	26	5076	581087	2862
CBM 3000-2600	10016	132218	24	24	5076	629511	2866
CBM 3000-2800	10808	142389	22	22	5076	677935	2842
CBM 3000	11600	152559	20	20	5076	726359	2773
CBM 4000-3200	12299	162730	18	18	5076	774783	2657
CBM 4000-3400	13091	172901	17	17	5076	823206	2670
CBM 4000-3600	13883	183071	16	16	5076	871630	2665
CBM 4000-3800	14675	193242	15	15	5076	920054	2642
CBM 4000	15467	203412	14	14	5076	968478	2600
CBM 5000-4600	17749	233924	12	12	5076	1113750	2557
CBM 5000	19333	254266	11	11	5076	1210598	2552
CBM 6000-5600	21616	284777	9	9	5076	1355870	2341
CBM 6000	23200	305119	9	9	5076	1452717	2509

*) Related to a required pressure of 12 bar for motors in braking mode.

**) The motors are designed according to DNV-rules. Test pressure 420 bar. Peak/transient pressure 420 bar maximum, allowed to occur 10000 times.

¹⁾ Special considerations regarding charge pressure, cooling and choice of hydraulic system for speed above rated, 8 ports must be used for higher speed.

²⁾ Calculated as: US= Ts·(5000-218)·0,98.

³⁾ Valid for minimum permissible oil viscosity 15 cSt in the motor case.

15.1.2 Recommended charge pressure

DANGER

Hanging load falls down!

Danger to life, risk of injury or damage to equipment, in hanging load applications!

- ▶ Charge pressure at motors connection must be according to recommended pressure under all conditions, see *Fig. 56: Recommended charge pressure - CBM motors 4-port connection* and *Fig. 57: Recommended charge pressure -CBM motors 8-port connection*.
- ▶ Changes to the factory settings must only be made by Bosch Rexroth specialist personnel.

The hydraulic system must be such that the motor will receive sufficient charge pressure at the low-pressure port. This applies to all types of installations.

There are two distinct cases:

1. The motor works in braking mode. Required charge pressure at the inlet port is according to diagram below.
2. The motor works in driving mode only. Required back pressure at the outlet port corresponds to 30% of value given in diagram below, but may not be lower than 2 bar (29 psi).

NOTE!

The diagrams are valid for 1 bar (14,5 psi) case pressure. With increasing case pressure the charge pressure must be increased accordingly. Max casing pressure is 3 bar (43,5 psi) (for 1% of the operation time evenly divided, pressure peaks of max 5 seconds upto 8 bar (116 psi) are allowed). Max permitted case pressure at stand-still is 8 bar (116 psi).

See *Fig. 56: Recommended charge pressure - CBM motors 4-port connection* and *Fig. 57: Recommended charge pressure -CBM motors 8-port connection*.

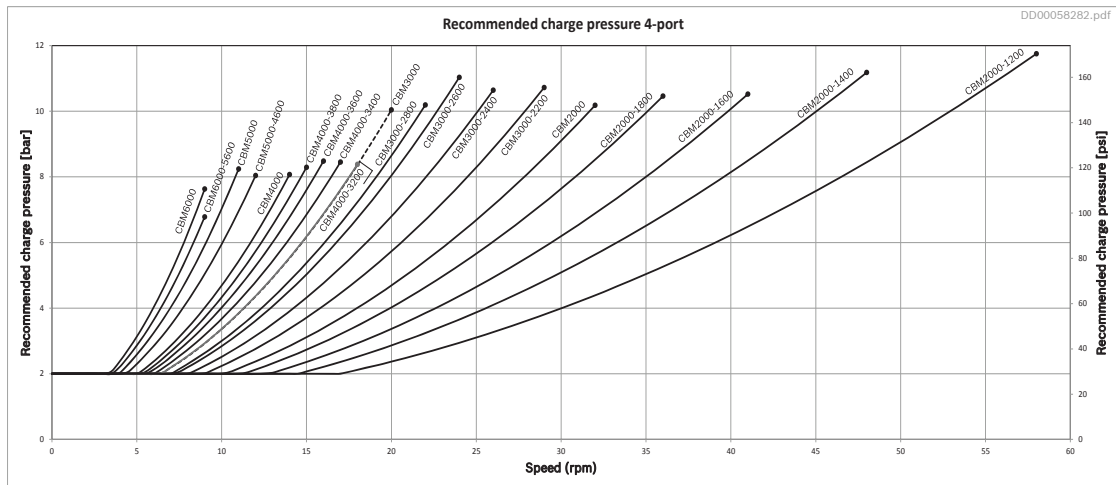


Fig. 56: Recommended charge pressure - CBM motors 4-port connection

Recommended charge pressure for CBM motors 4-port connection. Valid for oil viscosity 40 cSt.

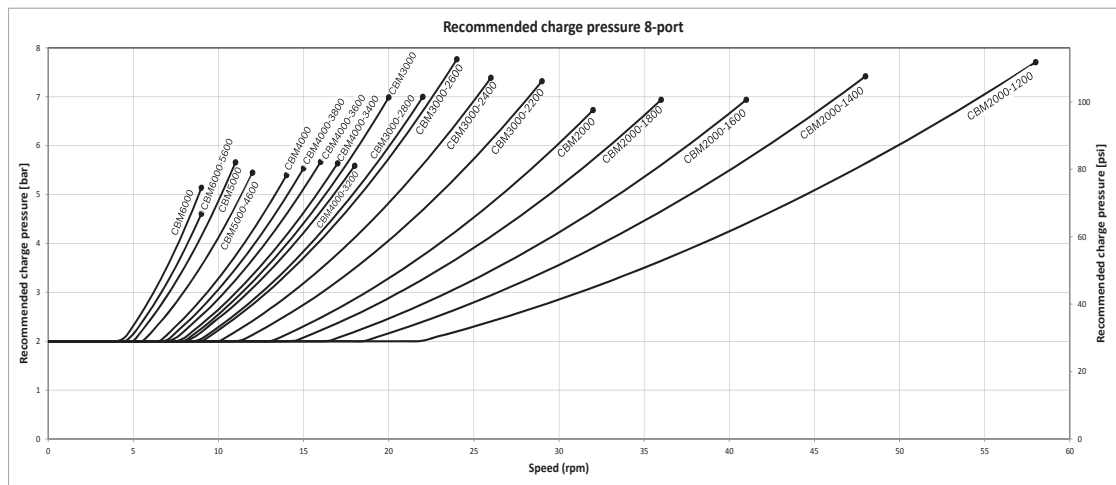


Fig. 57: Recommended charge pressure -CBM motors 8-port connection

Recommended charge pressure for CBM motors 8-port connection. Valid for oil viscosity 40 cSt.

Bosch Rexroth Mellansel AB, Intallation and maintenance manual, Hägglunds CBM, RE 15300-WA/09.2013

15.1.3 Dimensions and weights, motor

Table 30: Dimensions, CBM 2000-6000

Motor type	Dimension							
	A (∅)		B		C		D	
	mm	in	mm	in	mm	in	mm	in
Häggglunds CBM 2000	1460	57,48	870	34,25	416	16,43	-	-
Häggglunds CBM 3000	1460	57,48	981	38,62	409	16,04	-	-
Häggglunds CBM 4000	1460	57,48	1099	43,27	527	20,81	-	-
Häggglunds CBM 5000	1460	57,48	1217	47,91	527	20,79	270	10,63
Häggglunds CBM 6000	1460	57,48	1335	52,56	527	20,79	270	10,63

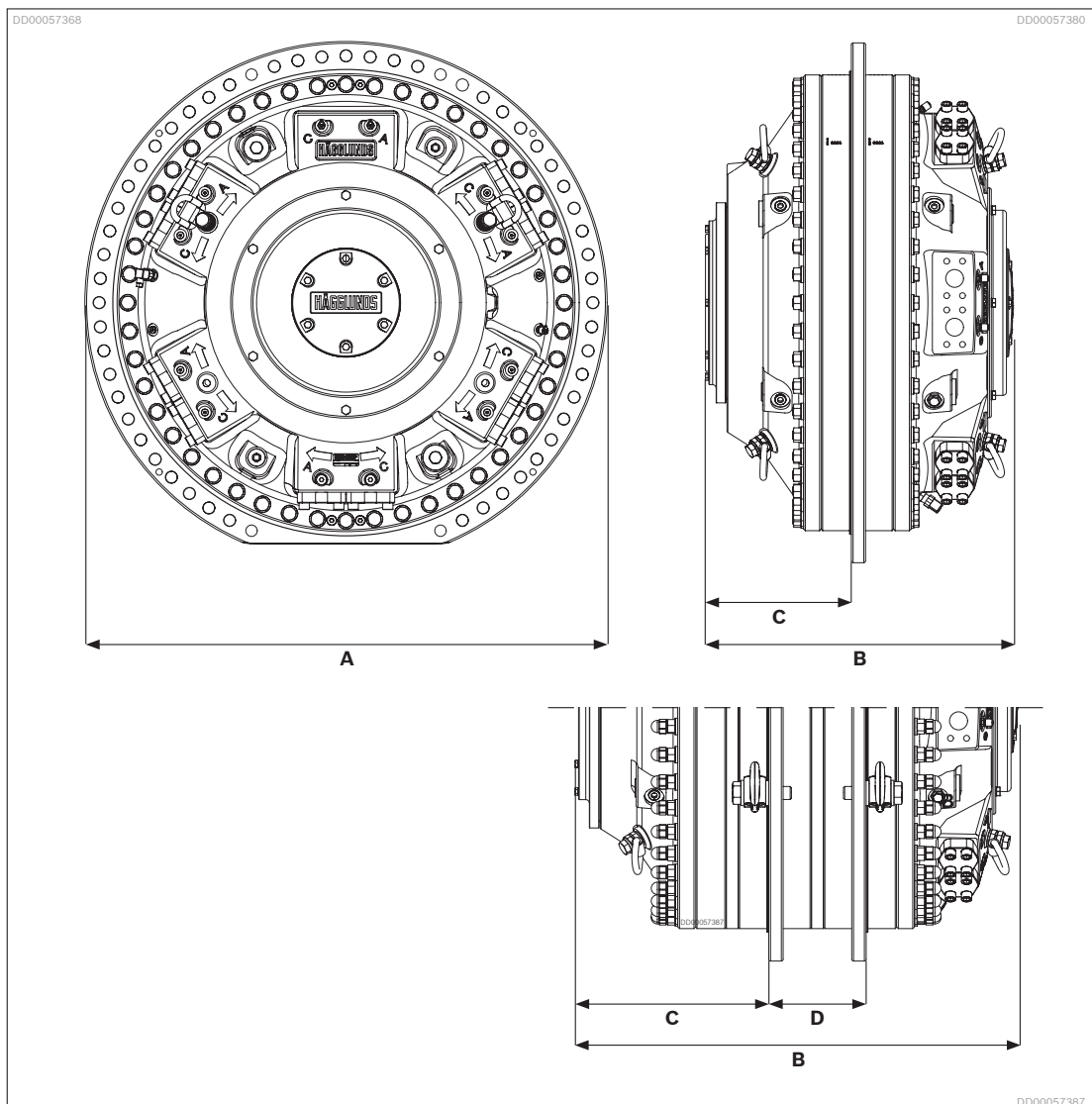


Fig. 58: Dimensions Häggglunds CBM

15.1.4 Dimensions and weights, motor with coupling adapter

Table 31: Dimensions, CBM 2000-6000, with coupling adapter

Motor type, with coupling adapter	Dimension					
	E		F		G (∅)	
	mm	in	mm	in	mm	in
Hägglands CBM 2000	1227	48,31	773	30,43	720	28,35
Hägglands CBM 3000	1434	56,46	863	33,98	950	37,40
Hägglands CBM 4000	1552	61,10	981	38,62	950	37,40
Hägglands CBM 5000	1719	67,68	1030	40,55	1180	46,46
Hägglands CBM 6000	1838	72,36	1030	40,55	1180	46,46

- 1 Coupling adapter
- 2 CBM motor

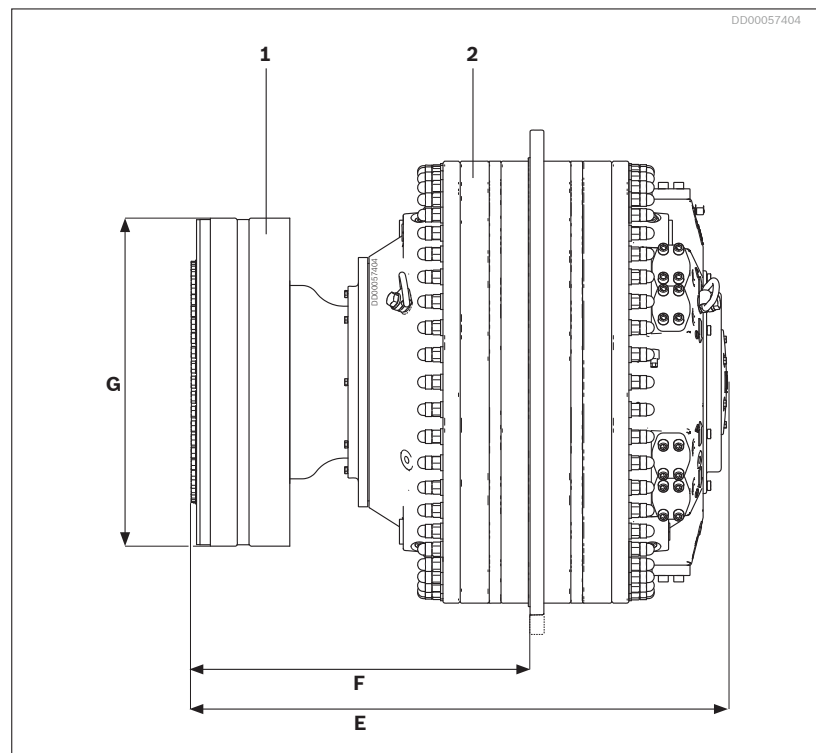


Fig. 59: Dimensions CBM with coupling adapter

Table 32: Weights CBM

Motor	Motor with splines		Motor with splines and coupling adapter	
	kg	lb	kg	lb
CBM 2000	4100	9000	4850	10650
CBM 3000	5000	11000	6600	14550
CBM 4000	5800	12800	7450	16400
CBM 5000	6700	14750	9700	21300
CBM 6000	7500	16550	10500	23150

Bosch Rexroth Mellansel AB, Intallation and maintenance manual, Hägglands CBM, RE 15300-WA/09.2013

15.1.5 Technical data, dimensions and weights, Hägglunds CBM Tandem

Table 33: Technical data, dimensions and weights CBM Tandem

Tandem motor	Max. pressure		Total weight		A Length		B Diameter		Max. torque to driven shaft	
	bar	psi	kg	lb	mm	in	mm	in	Nm	lbf·ft
CBM 2000 + TBM 40 +CBP 400	350	5076	6400	14110	1845	72,6	1460	57,5	840000	619554
CBM 3000 + TBM 40 +CBP 400			7437	16399	1963	77,3			1190000	877702
CBM 4000 + TBM 40 +CBP 400			8320	18346	2081	81,9			1540000	1135850
CBM 5000 + TBM 40 +CBP 400			9140	20154	2199	86,6			1890000	1393997
CBM 6000 + TBM 40 +CBP 400			10005	22061	2317	91,2			2240000	1652145

- 1 Hägglunds CBM 4000
- 2 Tandem kit TBM 40
- 3 Hägglunds CBP 400

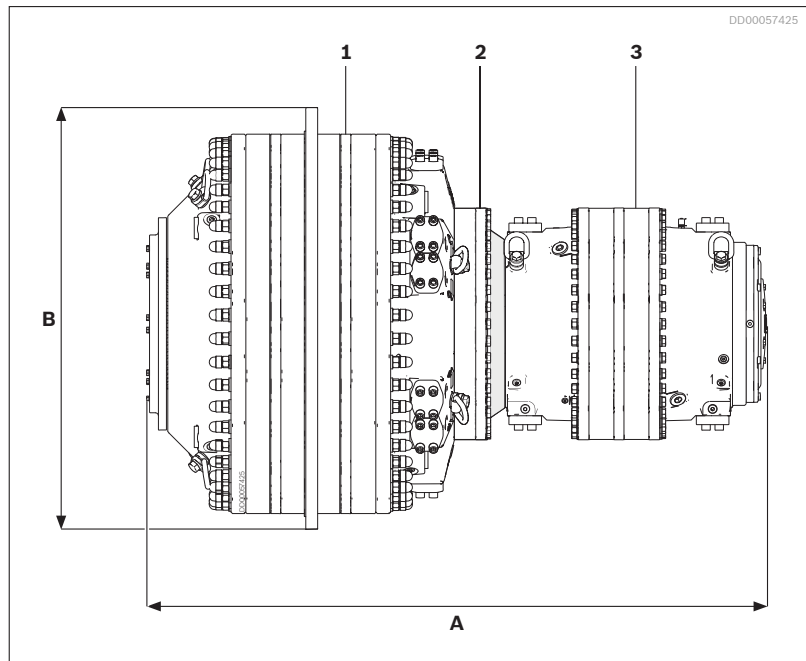


Fig. 60: Dimensions Tandem Hägglunds CBM 4000 / Hägglunds CBP 400

16 Appendix

16.1 Hydraulic fluid quick reference

2/4 Hydraulic fluid quick reference

1 Hydraulic fluid quick reference

Bosch Rexroths Hägglunds radial piston hydraulic motors are primarily designed to operate on conventional petroleum based hydraulic fluids.

To get a well working drive system it is very important to follow the recommendations given in this instruction. Improper hydraulic fluid might cause a shorter service life or in worst case instant failure.

1.1 Applicable fluids

Only fluids by the standards given in Table 1 are suggested. Fluids complying to other standards only, are not approved.

Table 1: Standards for detailed requirements of respective fluid group

ISO 11158 (DIN 51524-2)	ISO 11158 (DIN 51524-3)	ISO 15380	ISO 12922
HM (HLP)	HV (HVLP)	HEES	HFB
		HEPG	HFC
		HEPR	HFDR
			HFDU

Within these standards, not all fluid classes are allowed, and only some are recommended (see Table 2).

Table 2: Applicable fluids by designation according to ISO 6743-4

Recommended	Allowed	Not allowed
HM (HLP)	HV (HVLP) [mineral] ¹⁾	HH
HV (HVLP) no VI improver [PAO]	HEPG	HL
HEES [saturated]	HEPR	HR
	HETG	HG
	HEES [un-saturated]	HFA (HFAE and HFAS)
	HFB ²⁾ ³⁾	
	HFC ²⁾ ³⁾	
	HFD (HFDR and HFDU) ²⁾ ³⁾	

1) Recommended to be without VI improver

2) Not allowed for accessories (brakes) Hägglunds BICA and Hägglunds MDA

3) Special precautions apply, see chapter 1.4 Down-rating

NOTICE

Wrong hydraulic fluid for Hägglunds accessories!

Risk of damage to equipment and impact on service life for accessories (brakes)
Hägglunds BICA and Hägglunds MDA

► Fluids HFB, HFC and HFD are not allowed.

Bosch Rexroth Mellansel AB, Hydraulic fluid quick reference, DD00044274/09.2013

Bosch Rexroth Mellansel AB, Intallation and maintenance manual, Hägglunds CBM, RE 15300-WA/09.2013

ISO and DIN standards for hydraulic fluids are similar, but some of the corresponding classes has different designation (see Table 3).

Table 3: Fluid type designation translator

ISO 6743-4	DIN 51524
HL	HL
HM	HLP
HV	HVLP

1.2 Viscosity Limits

The actual viscosity of the fluid, at the current motor case temperature, controls the fluid's ability to lubricate contacts under high pressure and high shear. For viscosity limits see Table 4. Shear induced viscosity loss must be taken into account.

Table 4: Viscosity limits

[cSt]	Recommended		Intermittent	Start-up
	Min _{rec}	Max _{rec}	Min _{int}	Max _{start} ²⁾
Motors	40	150	20 ¹⁾	10000
SP pumps	40	150	20	2000
HD pumps	40	150	20	1600

1) A lower viscosity limit may apply depending on motor configuration, please contact your Bosch Rexroth representative for further information.

2) Short period at start-up

1.3 Additional demands

In addition to the fluid standards, we have demands and recommendations for some fluid characteristics (see Table 5).

Table 5: Additional properties exceeding respective fluid standard

Property	Standard	Misc info.	Range	Unit	Value
Gear endurance	ISO 14635-1	FZG (A/8.3/90)	Min	fail stage	11
Shear stability	ISO 26422	KRL, 20h, Visc. reduction	Max ¹⁾	%	10
Oxidation stability	ISO 4263-1	TOST	Min ²⁾	hours	2000
	ISO 4263-3	"Dry" TOST	Min ²⁾	hours	2000
Cleanliness	ISO 4406	Particle count	Max	class	18/16/13
Filter Grade	ISO 16889	β10	Min	grade	75
Water content	ISO 12937	Solved and free (m/m)	Max ³⁾	ppm	200

1) Recommended limit. The reduction must be considered when calculating actual viscosity.

2) Recommended limits, undershooting these values calls for more frequently recurring fluid samples

3) Not applicable for fluid types with intended water content, like HFB and HFC (see Table 6).

DD00044274/09.2013, Hydraulic fluid quick reference, **Bosch Rexroth Mellansel AB**

RE 15300-WA/09.2013, Installation and maintenance manual, Hägglunds CBM, **Bosch Rexroth Mellansel AB**

4/4 Hydraulic fluid quick reference

1.4 Down-rating

There are fluids with lesser lubricity, or characteristics incompatible with the system components, that needs specific precautions.

For some fluids, special sealing materials are recommended, and some fluids may require that the paint inside the motor is removed. For these fluids, maximum pressure and rated life must be down-rated. See Table 6 for fluids that are subject to down-rating.

Table 6: Down-rating factors

Fluid group	Down-rating		Recommended seal	Internal paint
	Pressure	Rated life ¹⁾		
HFB (>40% water in fluid)	0.7 x stated	0.26 x PCMV	Nitrile (NBR)	No
HFC (>35% water in "glycol")	0.7 x stated	0.24 x PCMV	Nitrile (NBR)	No
HFDR (phosphate esters)	0.9 x stated	0.8 x PCMV	Viton (FPM)	No
HFDU (other water free)	0.9 x stated	0.8 x PCMV	Viton (FPM)	No

¹⁾ PCMV is our proprietary software for system sizing and service life rating.

Bosch Rexroth Mellansel AB, Hydraulic fluid quick reference, DD00044274/09.2013

Bosch Rexroth Mellansel AB, Intallation and maintenance manual, Hägglunds CBM, RE 15300-WA/09.2013

