Rexroth
Bosch Group

Radial piston hydraulic motor

Type Hägglunds CBM

RE 15300
Edition: 2012-08

- Size: 2000 ... 6000
- Capacity: 75 838 ... 380 133 cm³/rev *[4 628 - 23 197 in³/rev]*
- Specific torque: 1 200 ... 6 000 Nm/bar
  [61 024 ... 305 119 ft-lbs/1000 psi]
- Nominal speed: 8 ... 53 rpm
- Maximum operating pressure: 350 bar *[5 076 psi]*

Features

- The most powerful direct drive in the world.
- 50 % more torque - now torque up to 1970 kNm
- High torque to weight ratio
- Modular design

Contents

RE 15300, Edition: 2012-08, **Bosch Rexroth Mellansel AB**

Quick selection diagram for Hägglunds CBM motors

The diagram below represents the torque and speed, corresponding to a modified rating life L10mh= 40 000 h. Oil viscosity in motor case 40 cSt. Contamination level not exceeding ISO 4406:1999 18/16/13 (NAS 1638, class 7). The diagram is based on a charge pressure of 15 bar (218 psi).

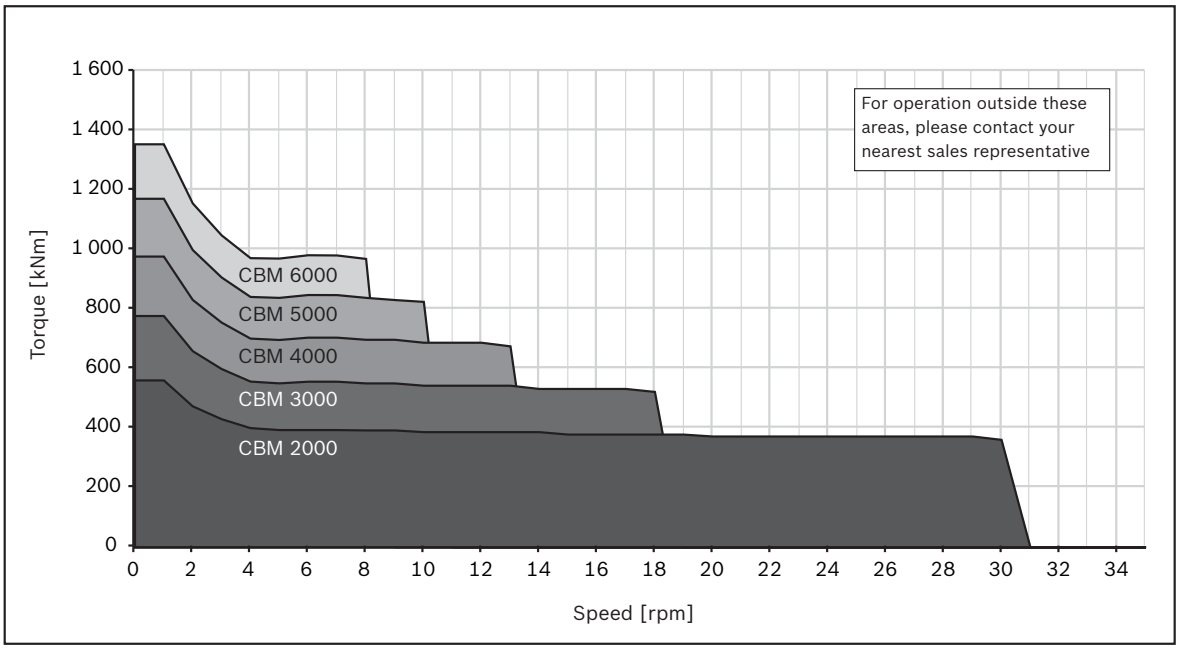

Fig 1a: Quick selection diagram

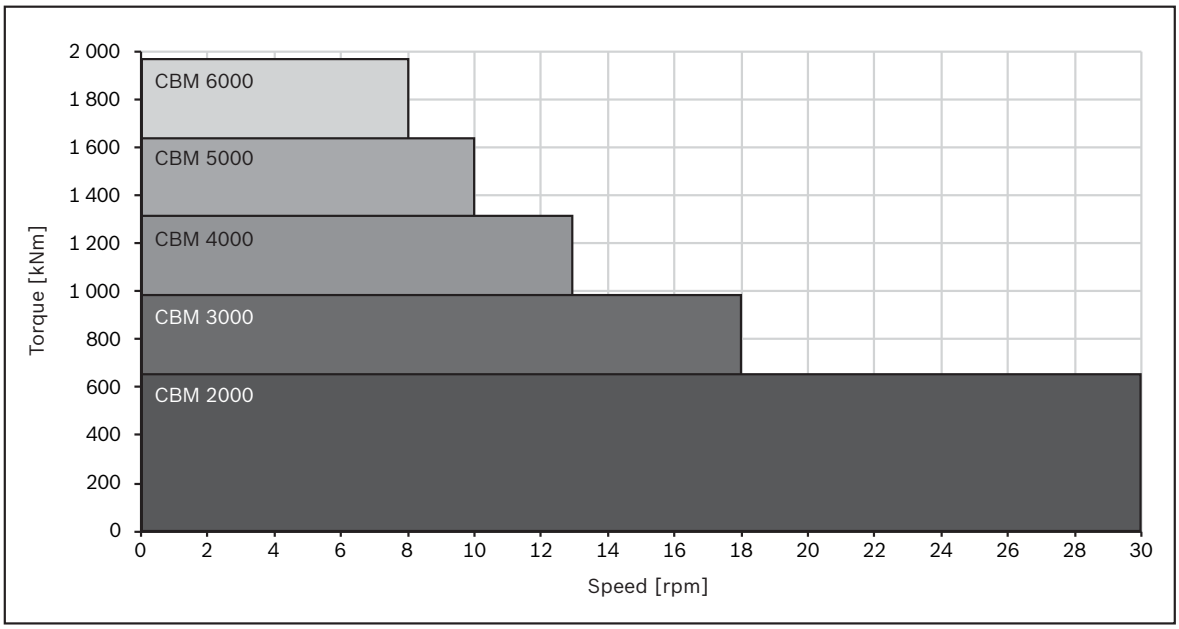

Fig 1b: Max torque diagram

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Functional description

Bosch Rexroth's hydraulic industrial motor Hägglunds CBM is of the radial-piston type with a rotating cylinder block/ hollow 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 valve plate 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 pistons which are guided in the cylinder block. Rotation therefore occurs, and the torque available is proportional to the pressure in the system.
Oil main lines are connected to ports A and C in the connection block and drain lines to ports D1, D2, D3 or D4 in the motor housing.
The motor is connected to the shaft of the driven machine through the hollow shaft of the cylinder block. The torque is transmitted by splines.

Valid patents

US 4522110, US 005979295A, SE 456517, EP 0102915, JP 83162704, GB 1385693, EP 0524437.

Quality

To assure our quality we maintain a Quality Assurance System, certified to standard ISO 9001.

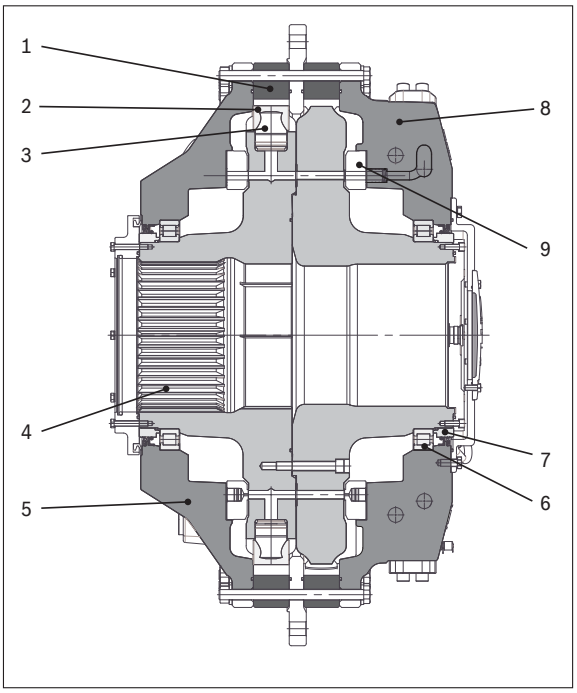


Fig. 2: Hägglunds CBM motor

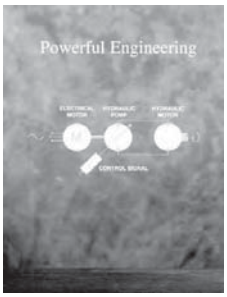
1.	Cam ring	6.	Cylindrical roller bearing
2.	Cam roller	7.	Wearing part
3.	Piston	8.	Connection housing
4.	Cylinder block, spline	9.	Distributor
5.	Housing cover		

Calculation fundementals

Output power	$P = \frac{T \cdot n}{9549}$ (kW) on driven shaft	$P = \frac{T \cdot n}{5252}$ (hp) on driven shaft	
Output torque (η_m=98%)	$T = T_s \cdot (p - \Delta p_l - p_c) \cdot \eta_m$ (Nm)	$T = \frac{T_s \cdot (p - \Delta p_l - p_c) \cdot \eta_m}{1000}$ (lbf·ft)	
Pressure required (η_m=98%)	$p = \frac{T}{T_s \cdot \eta_m} + \Delta p_l + p_c$ (bar)	$p = \frac{T \cdot 1000}{T_s \cdot \eta_m} + \Delta p_l + p_c$	(psi)
Flow rate required	$q = \frac{n \cdot V_i}{1000} + q_l$ (l/min)	$q = \frac{n \cdot V_i}{231} + q_l$	(gpm)
Output speed	$n = \frac{q - q_l}{V_i} \cdot 1000$ (rpm)	$n = \frac{q - q_l}{V_i} \cdot 231$	(rpm)
Inlet power	$P_{in} = \frac{q \cdot (p - p_c)}{600}$ (kW)	$P_{in} = \frac{q \cdot (p - p_c)}{1714}$	(hp)

Quantity	Symbol		Metric	US
Power	P	=	kW	hp
Output torque	T	=	Nm	ft-lbs
Specific torque	Ts	=	Nm/bar	ft-lbs/1000 psi
Rotational speed	n	=	rpm	rpm
Required pressure	p	=	bar	psi
Pressure loss	Δp	=	bar	psi
Charge pressure	pc	=	bar	psi
Flow rate required	q	=	l/min	gpm
Total volumetric loss	ql	=	l/min	gpm
Displacement	Vi	=	cm3/rev	in3/rev
Mechanical efficiency	ηm	=	0.98*	

*Not valid for starting efficiency



For more information, see Powerful Engineering (EN347-4)

Definitions

Rated speed[1)]
Rated speed is the highest allowed speed for a charge pressure of 12 bar (174 psi) above case pressure. When a closed loop system is used, a minimum of 15% of oil is to be exchanged in the main loop.

Max speed
Maximum speed is the maximum allowed speed. Special considerations are necessary regarding charge pressure, cooling and choice of hydraulic system for speeds rated above.

[1)] Operating above rated conditions requires approval from Bosch Rexroth.

Accepted conditions for standard type of motor:

1. Oil viscosity 15 - **40** - 10000 cSt. See page 21.
2. Temperature -35 °C to +70 °C (-31 °F to +158 °F).
3. Running case pressure 0-3 bar (0-43,5 psi) Max case pressure 8 bar (116 psi)
4. Charge pressure (see diagram).
5. Volumetric losses (see diagram).

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Motor data

Table 1a: Metric motor data Hägglunds CBM motor

Motor type	Displacement	Specific torque	Rated speed* [1)]	Max speed	Max pressure**	Max torque [2)]	Max power intermittent [3)]
	cm³/rev	Nm/bar	rpm	rpm	bar	kNm	kW
CBM 2000-1200	75 838	1 200	53	53	350	394	2 186
CBM 2000-1400	88 279	1 400	44	44	350	460	2 118
CBM 2000-1600	100 782	1 600	38	38	350	525	2 090
CBM 2000-1800	113 726	1 800	33	33	350	591	2 042
CBM 2000	126 732	2 000	30	30	350	657	2 063
CBM 3000-2200	138 670	2 200	27	27	350	722	2 042
CBM 3000-2400	151 173	2 400	24	24	350	788	1 980
CBM 3000-2600	164 117	2 600	22	22	350	854	1 966
CBM 3000-2800	177 123	2 800	20	20	350	919	1 925
CBM 3000	190 066	3 000	18	18	350	985	1 856
CBM 4000-3200	201 565	3 200	16	16	350	1 051	1 793
CBM 4000-3400	214 508	3 400	15	15	350	1 116	1 774
CBM 4000-3600	227 514	3 600	14	14	350	1 182	1 755
CBM 4000-3800	240 458	3 800	13	13	350	1 248	1 738
CBM 4000	253 464	4 000	13	13	350	1 313	1 722
CBM 5000-4600	290 849	4 600	11	11	350	1 510	1 678
CBM 5000	316 798	5 000	10	10	350	1 642	1 653
CBM 6000-5600	354 246	5 600	8	8	350	1 838	1 619
CBM 6000	380 133	6 000	8	8	350	1 970	1 599

Table 1b: US motor data Hägglunds CBM motor

Motor type	Displacement	Specific torque	Rated speed* [1)]	Max speed	Max pressure**	Max torque [2)]	Max power intermittent [3)]
	in³/rev	lbf*ft/1000 psi	rpm	rpm	psi	lbf*ft	hp
CBM 2000-1200	4 628	61 024	53	53	5 076	290 543	2 932
CBM 2000-1400	5 387	71 194	44	44	5 076	338 967	2 840
CBM 2000-1600	6 150	81 365	38	38	5 076	387 391	2 803
CBM 2000-1800	6 940	91 536	33	33	5 076	435 815	2 738
CBM 2000	7 734	101 706	30	30	5 076	484 239	2 766
CBM 3000-2200	8 462	111 877	27	27	5 076	532 663	2 738
CBM 3000-2400	9 225	122 047	24	24	5 076	581 087	2 655
CBM 3000-2600	10 015	132 218	22	22	5 076	629 511	2 637
CBM 3000-2800	10 809	142 389	20	20	5 076	677 935	2 582
CBM 3000	11 599	152 559	18	18	5 076	726 359	2 489
CBM 4000-3200	12 300	162 730	16	16	5 076	774 783	2 405
CBM 4000-3400	13 090	172 901	15	15	5 076	823 206	2 378
CBM 4000-3600	13 884	183 071	14	14	5 076	871 630	2 354
CBM 4000-3800	14 674	193 242	13	13	5 076	920 054	2 331
CBM 4000	15 467	203 412	13	13	5 076	968 478	2 309
CBM 5000-4600	17 749	233 924	11	11	5 076	1 113 750	2 251
CBM 5000	19 332	254 266	10	10	5 076	1 210 598	2 217
CBM 6000-5600	21 617	284 777	8	8	5 076	1 355 870	2 171
CBM 6000	23 197	305 119	8	8	5 076	1 452 717	2 144

*) 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.

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Ordering codes

In order to identify Hägglunds equipment exactly, the following ordering code is used. These ordering codes should be stated in full in all correspondence e.g. when ordering spare parts.

Example Hägglunds CBM motor:

C	B	M		2000			S	A	0	N	0	A		00		00
01	02	03		04		05	06	07	08	09	10	11		12		13

01	Motor series	**C**
02	Generation	**B**
03	Magnum	**M**
04	**Motor size**	
	CBM 2000	**2000**
	CBM 3000	**3000**
	CBM 4000	**4000**
	CBM 5000	**5000**
	CBM 6000	**6000**
05	Specific torque (Nm/bar)	
06	**Mounting alternatives, shaft**	
	Splines	**S**
07	**Tandem kit**	
	Motor not prepared for TA kit	**A**
	Motor prepared for TA kit	**B**
08	**Displacement shift valve**	
	Motor not prepared for displacement shift	**0**
09	**Type of seal**	
	Nitrile	**N**
	Viton	**V**
10	**Through hole kit**	
	No	**0**
	Yes	**H**
11	**Piston set**	
	Coated pistons and uncoated cam rollers	**A**
12	Modification*	**00-99**
13	**Design***	
	Standard	**00**
	Special index	**01-99**

* To be filled in by DC-IA/EHD

Painting	
Orange	**Standard**
Other	**Option**

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Order code example Torque arm for Hägglunds CBM:

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 DC-IA/EHD

Order code example for tandem kit for Hägglunds CBM:

T	B	M		40		H		00		00
01	02	03		04		05		06		07

01	Tandem kit	**T**
02	Generation	**B**
03	Magnum	**M**
04	Size	**40**
05	**Through hole**	
	No	**0**
	Yes	**H**
06	Modification*	**00-99**
07	**Design***	
	Standard	**00**
	Special index	**01-99**

* To be filled in by DC-IA/EHD

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Dimensions, motor with splines for torque arm mounting

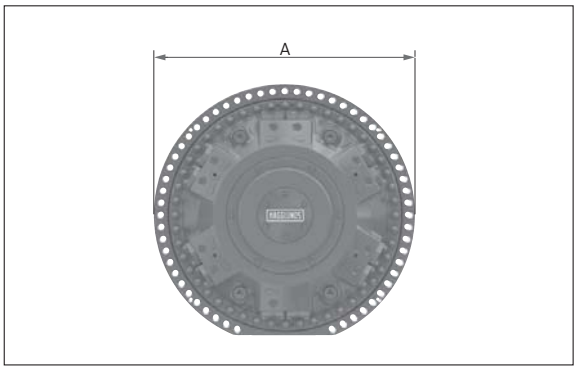

Fig. 3

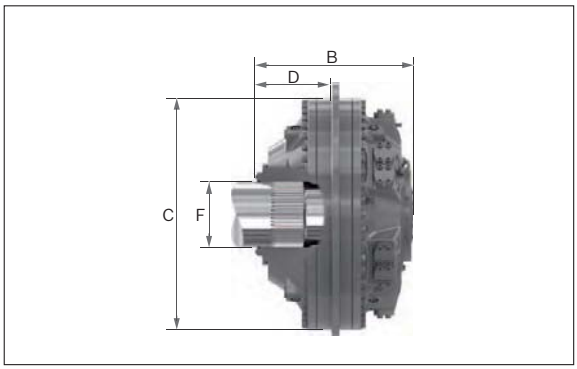

Fig. 4: CBM 2000

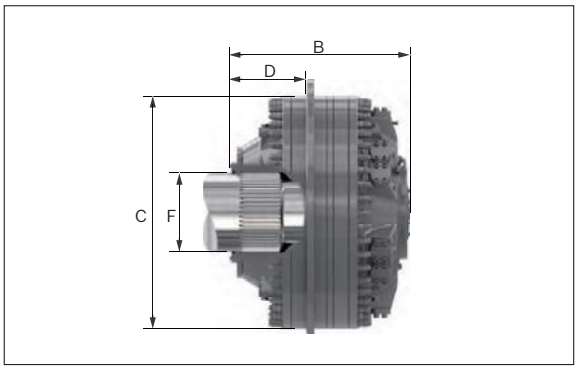

Fig. 5: CBM 3000

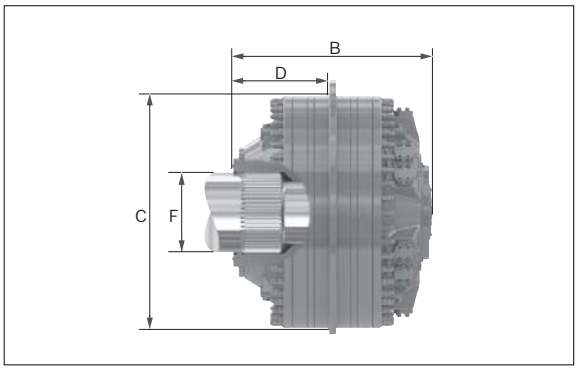

Fig. 6: CBM 4000

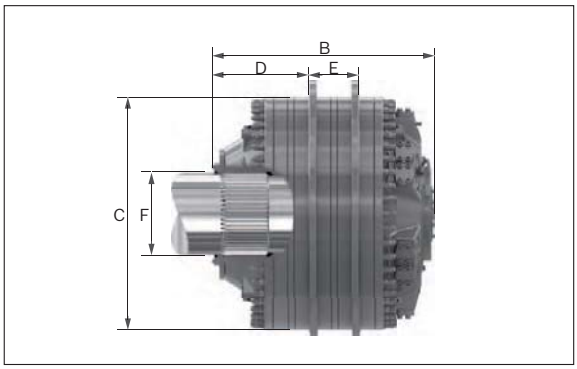

Fig. 7: CBM 5000

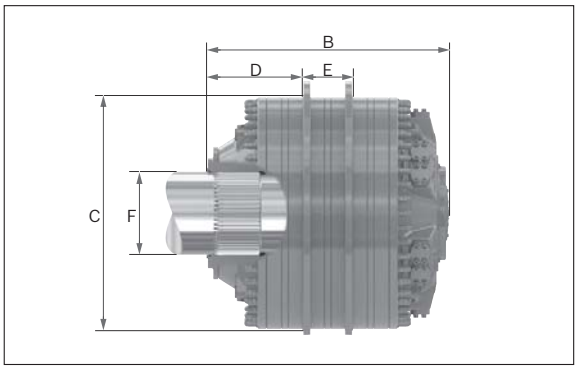

Fig. 8: CBM 6000

Table 2: Dimensions, motor with splines for torque arm mounting

Motor type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Weight (kg)	Main conn.	Drain conn.
CBM 2000	1 460	872	1 300	419	-	N360x8x30x44x9H	4 100	SAE 2”	BSP 1 1/4” and 2”
CBM 3000	1 460	990	1 300	419	-	N440x8x30x54x9H	5 000	SAE 2”	BSP 1 1/4” and 2”
CBM 4000	1 460	1 108	1 300	537	-	N440x8x30x54x9H	5 800	SAE 2”	BSP 1 1/4” and 2”
CBM 5000	1 460	1 224	1 300	535	270	N460x8x30x56x9H	6 700	SAE 2”	BSP 1 1/4” and 2”
CBM 6000	1 460	1 342	1 300	535	270	N460x8x30x56x9H	7 500	SAE 2”	BSP 1 1/4” and 2”

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With splines for flange or torque arm mounting.
The splines shall be lubricated, either oiled with hydraulic oil at assembly, or filled with transmission oil from the connected gearbox. To avoid wear in the splines, the installation must be within the specified tolerances in fig. 9. For control of spline, see table 4. When splines are used for torque arm mounting, the splines shall be lubricated with oil at assembly, see fig. 10. For control of spline, see table 4.

Table 3: Recommeded material in the shaft

Unidirectional drives	Bidirectional drives
Steel with yield strength Rel_{min} = 450 N/mm²	Steel with yield strength Rel_{min} = 700 N/mm²

Table 4

Spline	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	Ø340,8	0 / -1,801	Ø420,8	0 / -1,825	Ø440,8	0 / -1,825
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	

Flange mounting

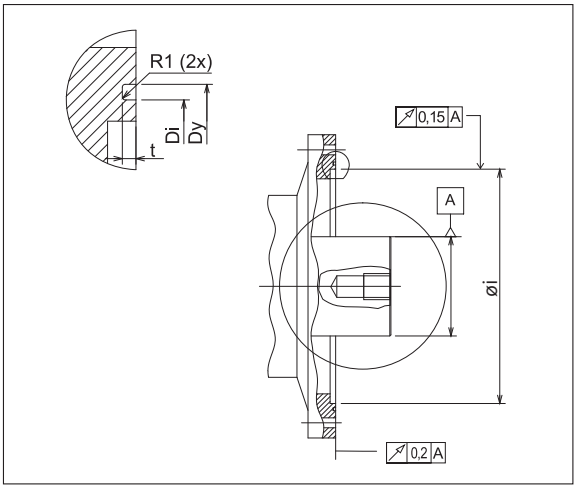

Fig. 9

For production of shaft see dwg 078 2432, 078 2451 and 078 2673.

Table 5

	øi		Dy	Di	t
CBM 2000-4000	1 300	+0.125 / 0	ø 1 329	ø 1 315	4.4±0.1

* O-ring to be used in submerged applications, or for external lubrication of the splines.

Torque arm mounting

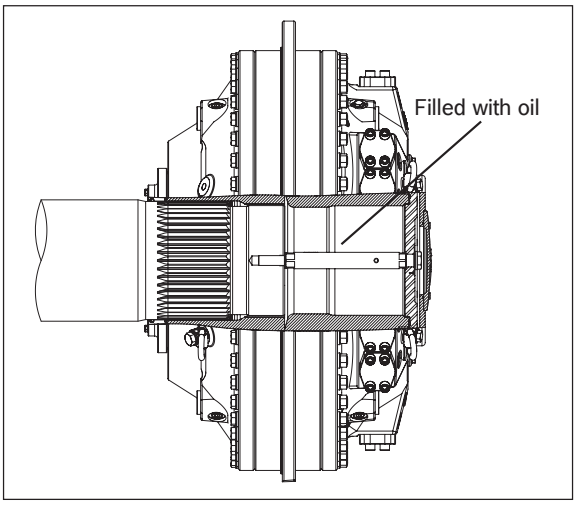

Fig. 10

For production of shaft see dwg 078 2432, 078 2451 and 078 2673.

Dimensions, motor with hollow shaft, coupling adapter

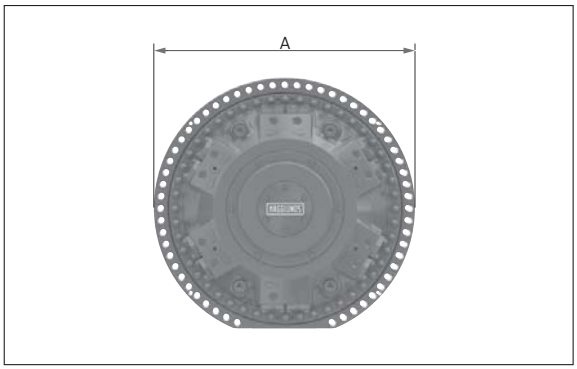

Fig. 11

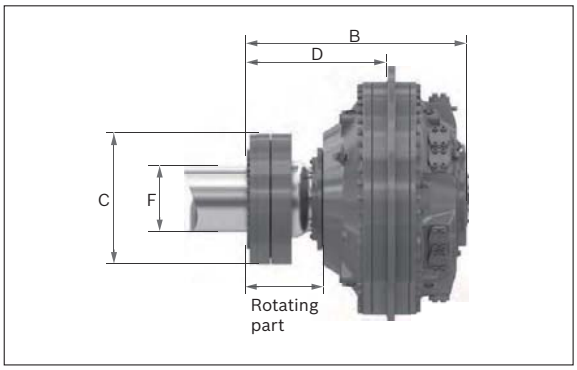

Fig. 12: CBM 2000

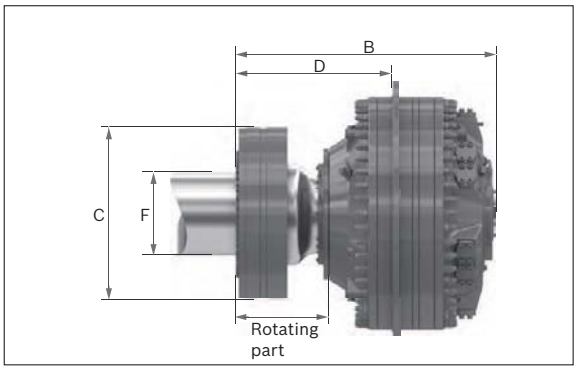

Fig. 13: CBM 3000

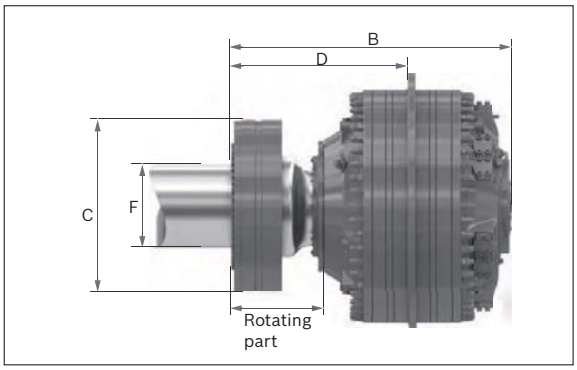

Fig. 14: CBM 4000

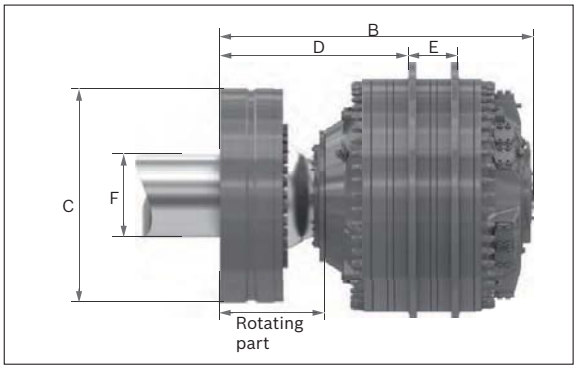

Fig. 15: CBM 5000

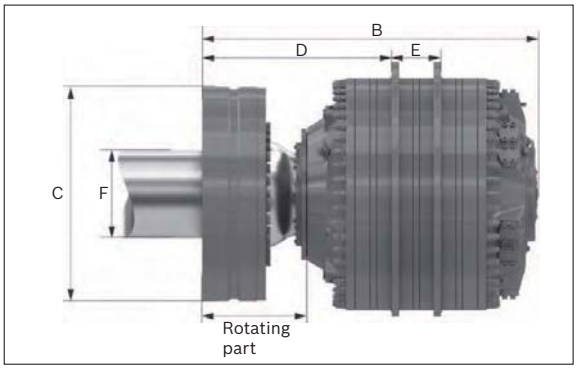

Fig. 16: CBM 6000

Table 6: Dimensions motor with hollow shaft, shaft coupling

Motor	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Weight (kg)	Main conn.	Drain conn.
CB 2000	1 460	1 227	720	773	-	360	4 850	2"	1 1/4" och 2"
CB 3000	1 460	1 434	950	863	-	460	6 600	2"	1 1/4" och 2"
CB 4000	1 460	1 552	950	981	-	460	7 450	2"	1 1/4" och 2"
CB 5000	1 460	1 719	1 180	1 030	270,2	480	9 700	2"	1 1/4" och 2"
CB 6000	1 460	1 838	1 180	1 030	270,2	480	10 500	2"	1 1/4" och 2"

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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; see figure below and tables 8 and 9.

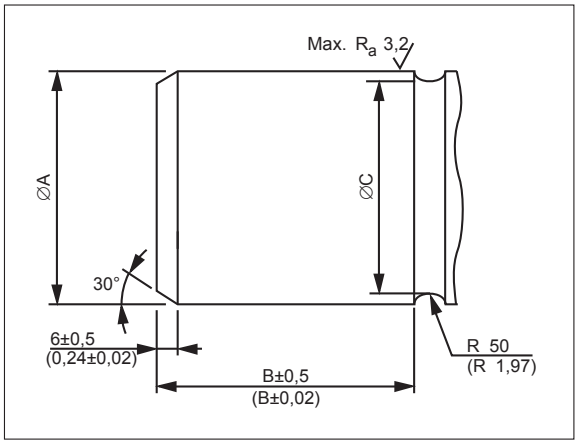

Fig. 17

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, see fig. 18 and tables 8 and 9.

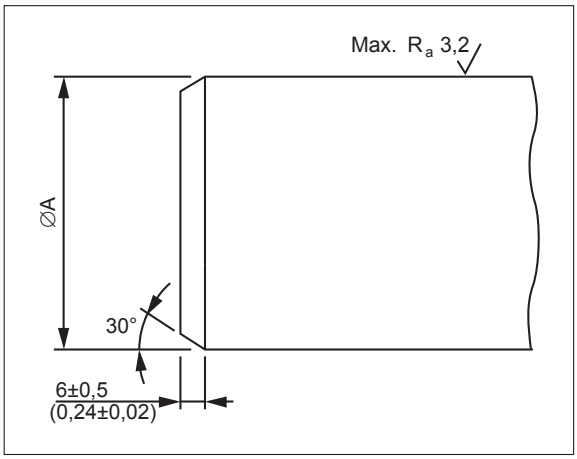

Fig. 18

Table 7

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	

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

Table 8: Recommeded material in the shaft

Unidirectional drives	Bidirectional drives
Steel with yield strength Rel_{min} = 300 N/mm²	Steel with yield strength Rel_{min} = 450 N/mm²

Accessories

Torque arm, type TCA 200 - 600

Easy to apply - Hägglunds torque arms.
A shaft mounted gearless drive is achieved by utilizing the standard Hägglunds torque arm. Spline shaft for external load, or shaft for shaft coupling can be used. As a result, alignment problems, expensive flexible couplings and bed plates are eliminated.

Table 9

Dimensions Torque arms	Max, torque, Nm (lbf.ft)	
	For alternating or pulsating torque	At static torque
TCA 200 for CBM 2000	700 000 (516 300)	840 000 (619 600)
TCA 400 for CBM 3000/CBM 4000	1 400 000 (1 032 600)	1 680 000 (1 239 100)
TCA 600 for CBM 5000/CBM 6000	2 100 000 (1 548 900)	2 520 000 (1 858 700)

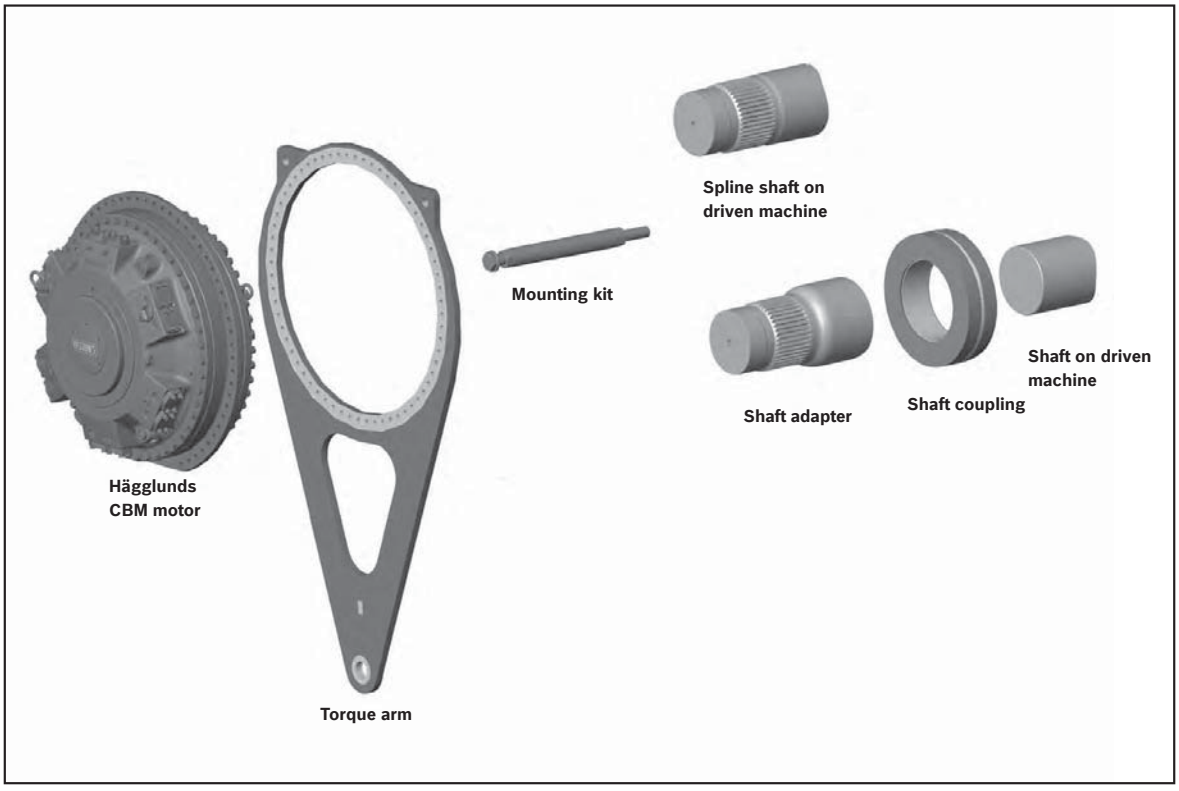

Fig. 19: Torque arm

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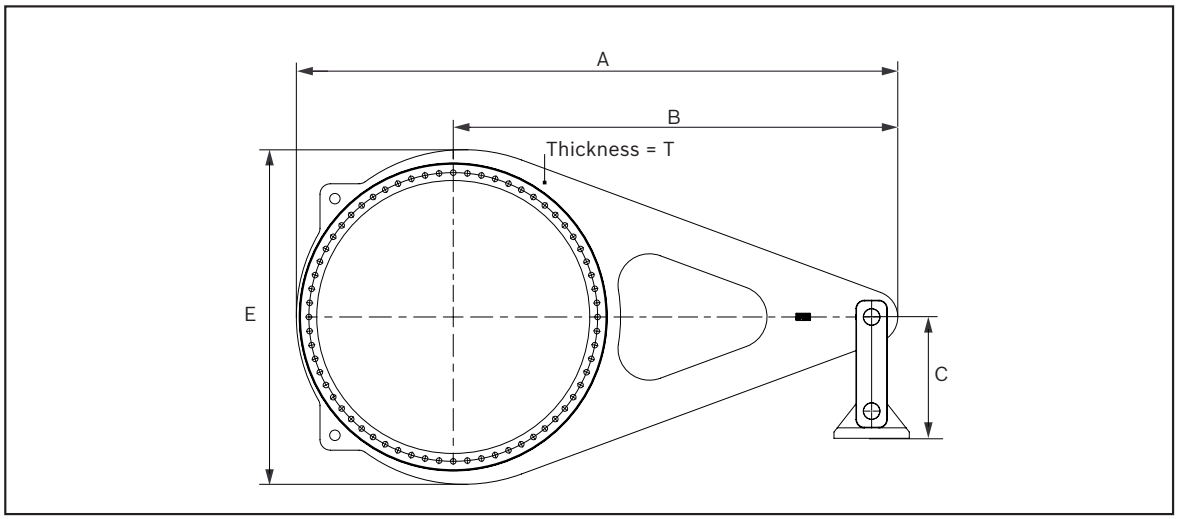

Fig. 20: Dimensions torque arm

Table 10: Dimensions torque arm

Torque arm	A mm (in)	B mm (in)	C mm (in)	D	E mm (in)	T mm (in)	Weight kg (lb)
TCA 200 for CBM 2000	2 875 (113,19)	2 000 (78,74)	580 (22,83)	M30	1 600 (62,99)	40 (1,57)	445 (981)
TCA 400 for CBM 3000/ CBM 4000	3 900 (153,54)	3 000 (118,11)	690 (27,17)	M30	1 600 (62,99)	50 (1,97)	875 (1 929)
TCA 600 for CBM 5000/ CBM 6000	3 900 (153,54)	3 000 (118,11)	840 (33,07)	M30	1 600 (62,99)	50 (1,97)	2 000 (4 409)

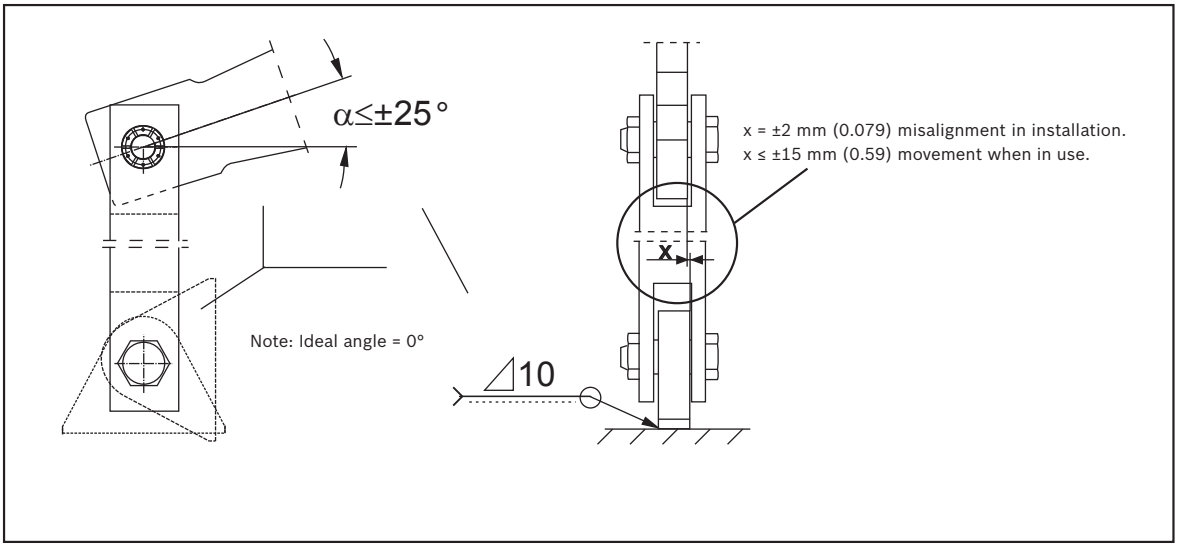

Fig 21: Mounting of pivoted attachment

Double ended torque arm, DTCBM 2000-1200 - DTCBM 6000

Double ended torque arm, including double acting hydraulic cylinder and pivoted attachment.
Following are included in delivery:

- Screws and washers (motor-torque arm)
- Hose kit + clamps
- Hose flange connections

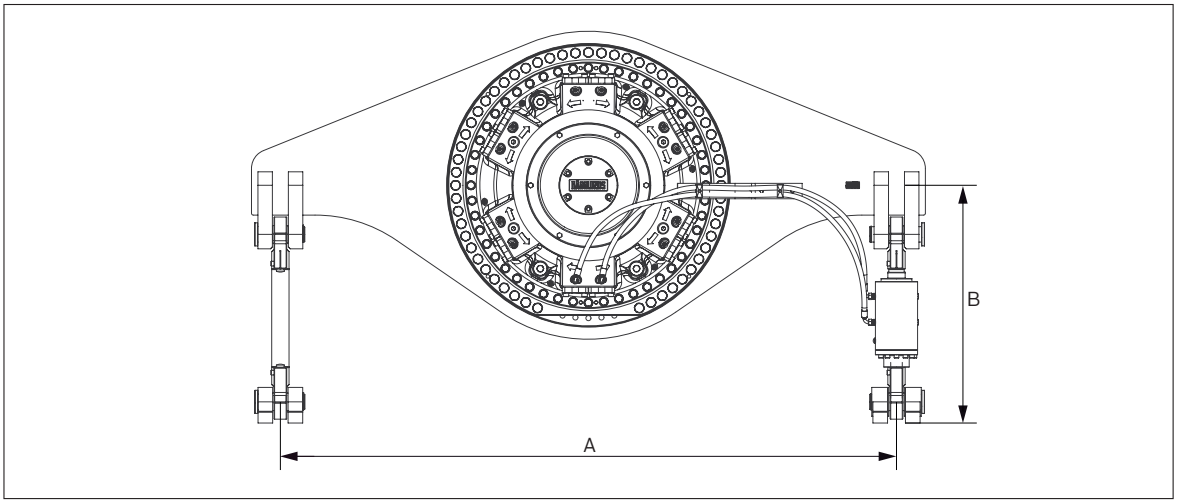

Fig. 22: Dimensions double torque arm

Table 11: Dimensions double torque arm

Torque Arm	Motor type	Ordering code	A mm (In)	B mm (In)	Weight Kg (lb)
078 2510-801 R939056847	CBM 6000-6000	DTCBM 6000	3 600 (141,73)		2 170 (4 784)
078 2510-802 R939056848	CBM 6000-5600	DTCBM 6000-5600	3 200 (125,98)		1 960 (4 321)
	CBM 5000-5000				
078 2510-803 R939056849	CBM 5000-4600	DTCBM 5000-4600	2 800 (110,23)		1 760 (3 880)
078 2509-801 R939056144	CBM 4000-4000	DTCBM 4000	4 200 (165,35)		1 130 (2 491)
	CBM 4000-3800				
078 2509-802 R939056145	CBM 4000-3600	DTCBM 4000-3600	3 600 (141,73)		950 (2 094)
	CBM 4000-3400				
	CBM 4000-3200				
078 2509-803 R939056850	CBM 3000-3000	DTCBM 3000		1 235 (48,62)	
	CBM 3000-2800				
078 2509-804 R939056851	CBM 3000-2600	DTCBM 3000-2600			
	CBM 3000-2400				
078 2509-805 R939056146	CBM 3000-2200	DTCBM 3000-2200	3 200 (125,98)		850 (1 874)
	CBM 2000-2000				
078 2509-806 R939056852	CBM 2000-1800	DTCBM 2000-1800			
078 2509-807 R939056853	CBM 2000-1600	DTCBM 2000-1600			
	CBM 2000-1400		2 800 (110,24)		740 (1 631)
078 2509-808 R939056854	CBM 2000-1200	DTCBM 2000-1200			

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Mounting set SMCB1 for speed encoder

Speed encoder kit for Compact CBM 2000-6000 motors where the speed encoder is enclosed and well protected.
The mounting set can be used for both spline and shaft coupling motors.
The encoder is used for detection of speed by pulse-frequency or/either direction of rotation by pulse-train.

Fig. 23

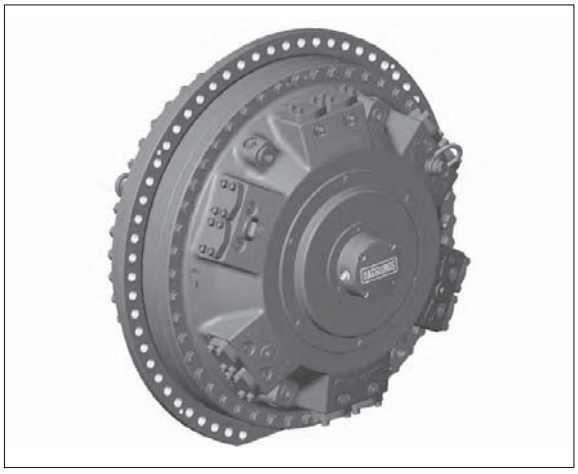

Fig. 24 CBM 2000 with SMCB1

Cross-over valve, COCB 1000

The valve can be used on CBM motors with adapter 041 0523-801. The valve is bolted on the adapter which is bolted on the motor, and the valve protects the motor and system from too high pressure, if the motor is suddenly stopped.
The relief valves have a standard pressure settings of 350 bar (5076 psi), but are fully adjustable between 50 bar (725 psi) to 350 bar (5076 psi). Pressure setting is made without charge pressure.
Screws and O-rings are included in delivery.
The valve for charge pressure have a standard pressure setting of 15 bar (218 psi), but are fully adjustable down to 3 bar (43,5 psi).
Anti-cavitation check valves are built into the block, and makes it possible to arrange for external supply of charge pressure.

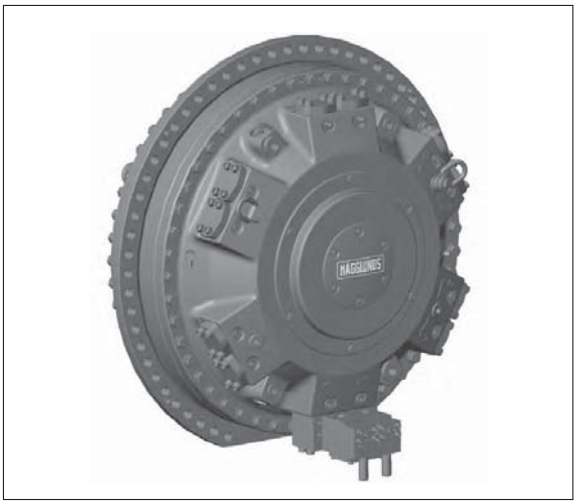

Fig. 25

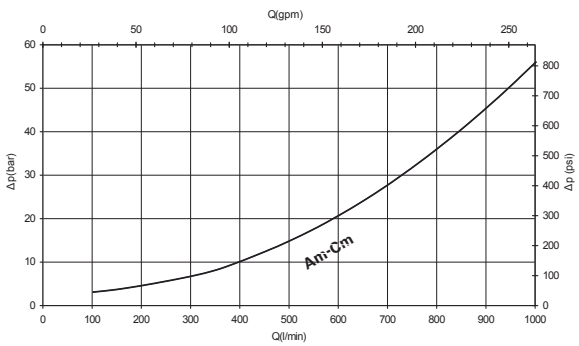

Fig. 25: Pressure loss COCB

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Coupling adapter, CBM 2000-6000

The adapter includes shrink disk and shaft adapter. Mounting kit must be ordered separately.
The coupling adapter is designed for shaft, that can not be made with splines.

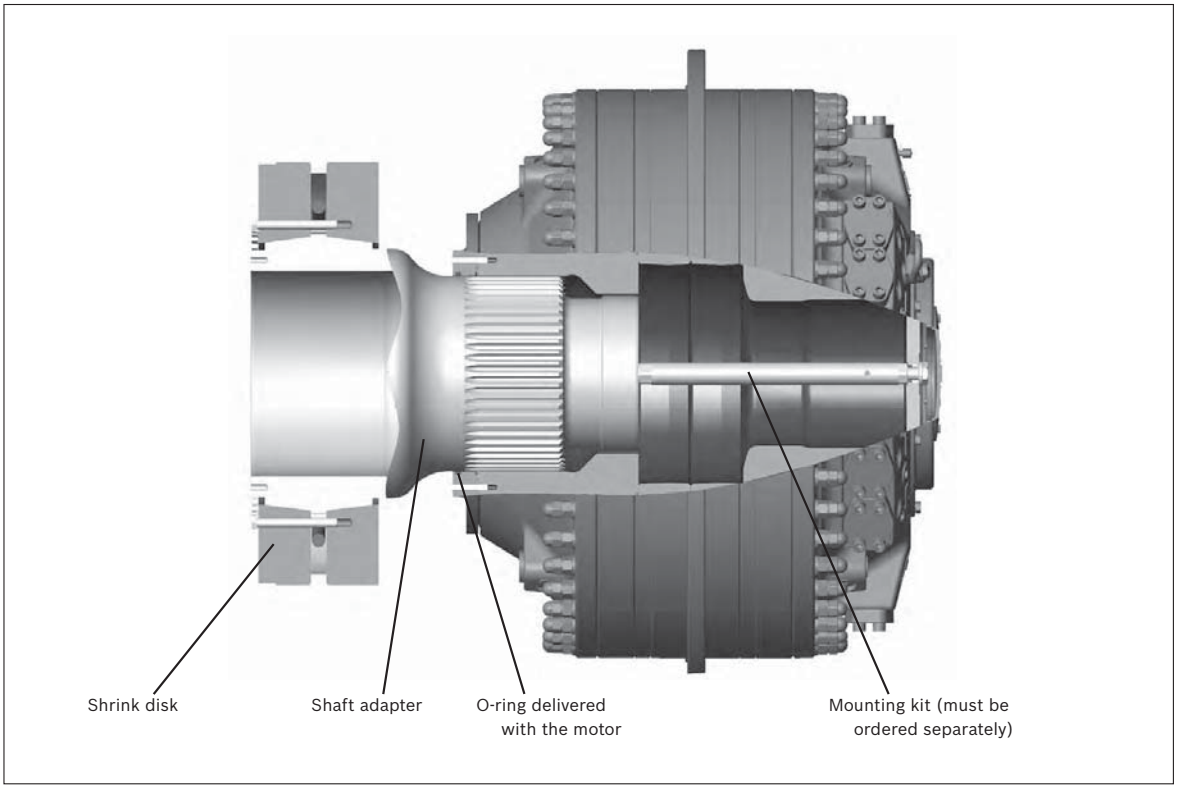

Fig. 26

Table 12: Ordering code, coupling adapter

Motor type	Unidirectional drive	Bidirectional drive
CBM 2000	078 2411-801 R939055538	078 2412-801 R939055544
CBM 3000/4000	078 2411-802 R939056668	078 2412-802 R939056674
CBM 5000/6000		078 2412-803 R939056676

Table 13: Ordering code

Motor type	Ordering code
CBM 2000	R939055413 078 2315-801
CBM 3000	R939055509 078 2315-802
CBM 4000	R939055497 078 2315-803
CBM 5000	R939055505 078 2315-804
CBM 6000	R939055506 078 2315-805

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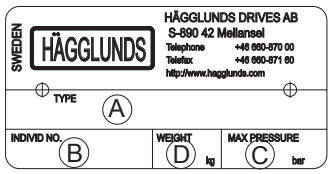
Hägglunds tandem motors

A Tandem motor consists of 3 major units, Front motor + Tandem kit TBM xx + Rear motor. On the stamping sign on the Tandem kit, the max pressure and the total weight for the complete unit are declared. Note that the complete Ordering code for a Tandem motor, contains of 3 individual Ordering codes (3 parts).



A: TBM-type, same as Ordering code
B: Week of assembly (yy-ww)
C: Max working pressure for the assembly
D: Total weight of the assembly

Fig 27: Stamping for TBM-unit

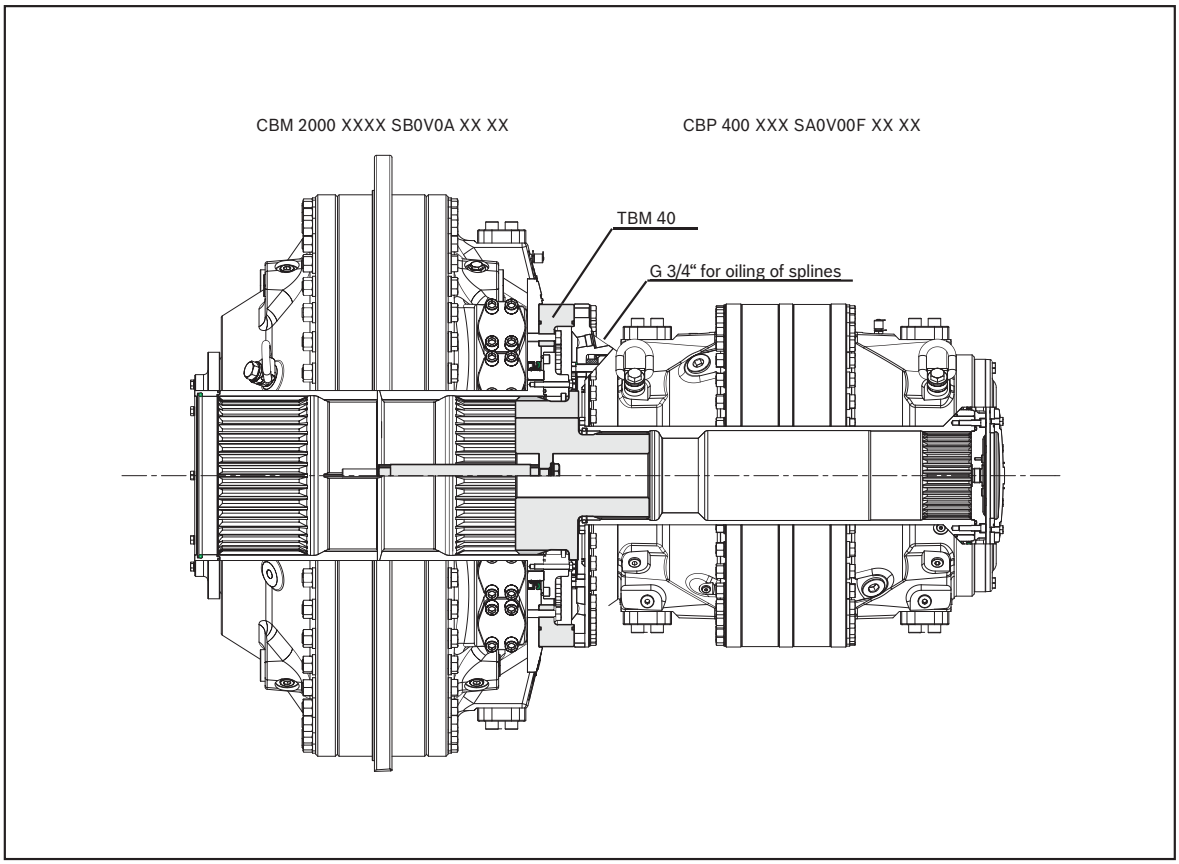


Fig. 27: Example, CBM 2000 XXXX SB0V0A XX XX + TBM 40 X 00 00 + CBP 400 XXX SA0V00F XX XX

Table 14

Tandem motor	Max. pressure		Total weight		A Lenght		B Diameter		Max. torque to driven shaft	
	bar	psi	kg	lb	mm	in	mm	in	Nm	lbf•ft
CBM 2000 + TBM 40 +CBP 400			6 505	14 344	1 845	72,6			840 000	619 554
CBM 3000 + TBM 40 +CBP 400			7 437	16 399	1 963	77,3			1 190 000	877 702
CBM 4000 + TBM 40 +CBP 400	350	5 076	8 320	18 346	2 081	81,9	1 460	57,5	1 540 000	1 135 850
CBM 5000 + TBM 40 +CBP 400			9 140	20 154	2 199	86,6			1 890 000	1 393 997
CBM 6000 + TBM 40 +CBP 400			10 005	22 061	2 317	91,2			2 240 000	1 652 145

Diagrams for Hägglunds CBM

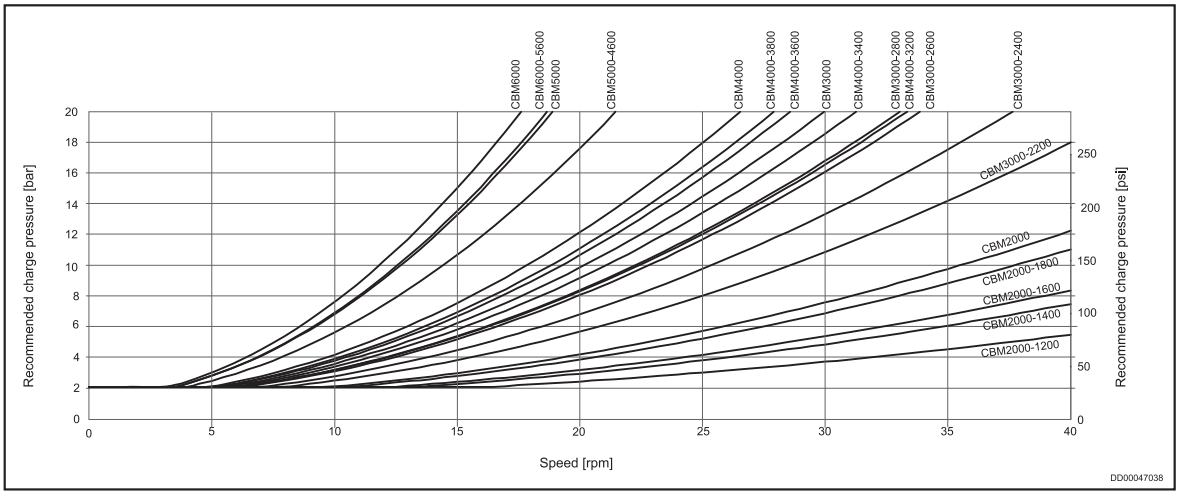


Fig 28: Recommended charge pressure - Compact CBM motors 4-port connection. Valid for oil viscosity 40 cSt.

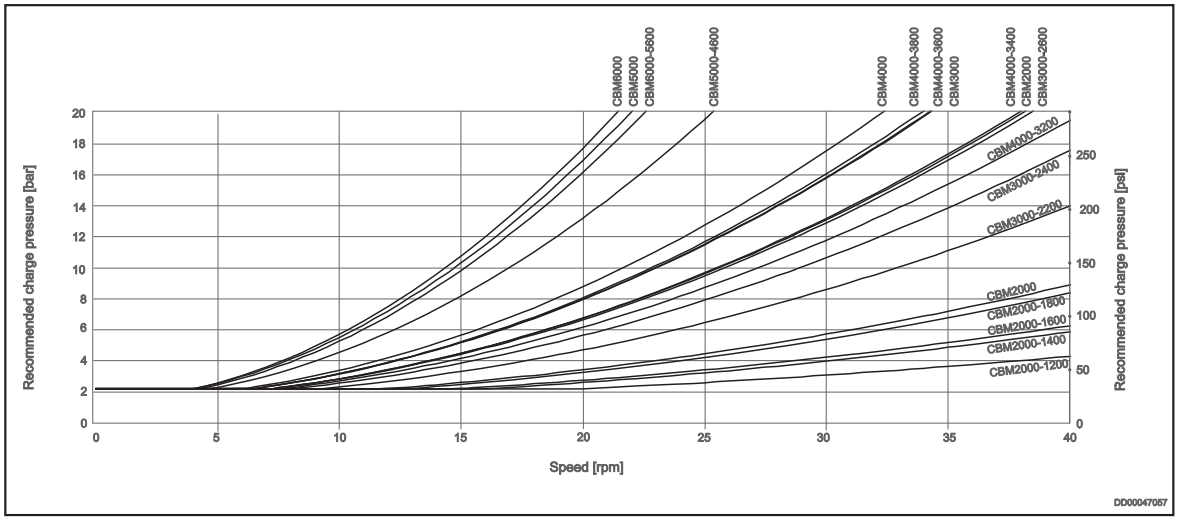


Fig 29: Recommended charge pressure -Compact CBM motors 8-port connection. Valid for oil viscosity 40 cSt.

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

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Overall efficiency, oil viscosity 40 cSt, Pc = 15 bar (217 psi)

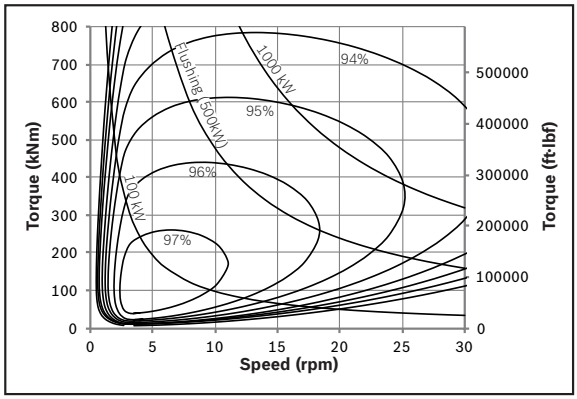

Fig 30: CBM 2000 8-port

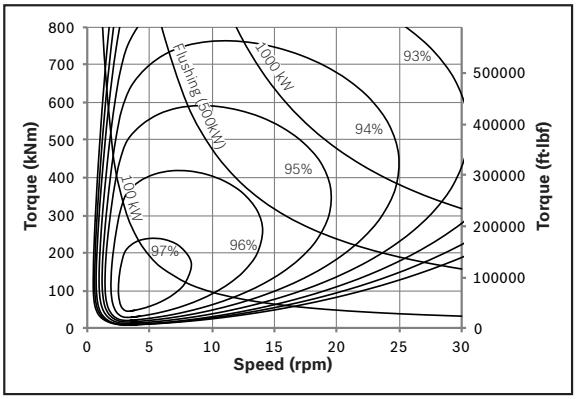

Fig 31: CBM 2000 4-port

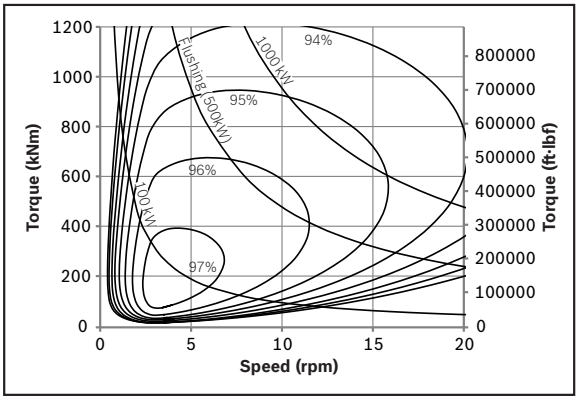

Fig 32: CBM 3000 8-port

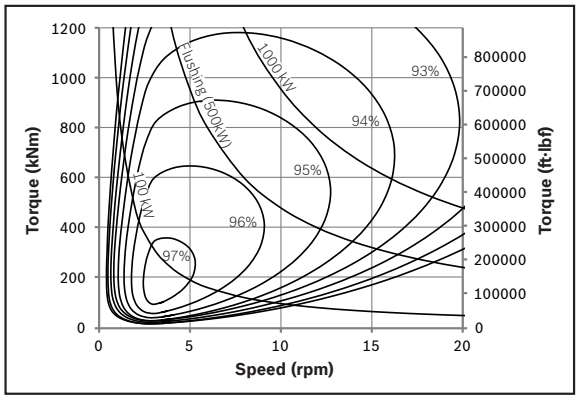

Fig 33: CBM 3000 4-port

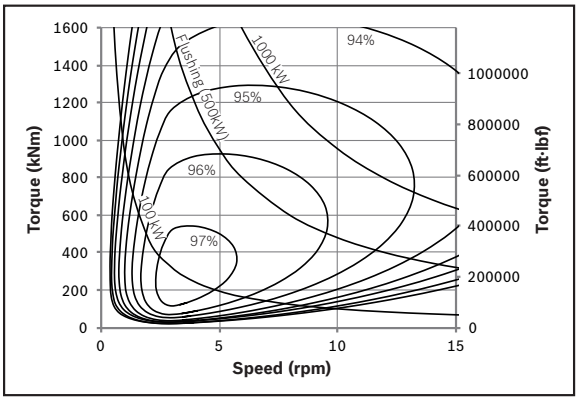

Fig 34: CBM 4000 8-port

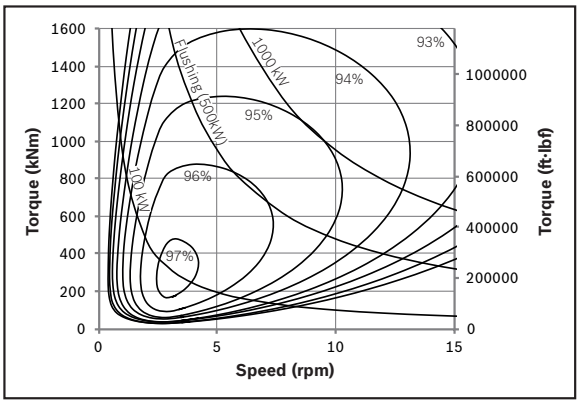

Fig 35: CBM 4000 4-port

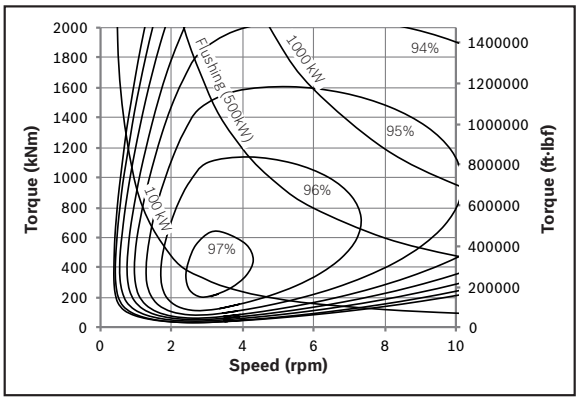

Fig 36: CBM 5000 8-port

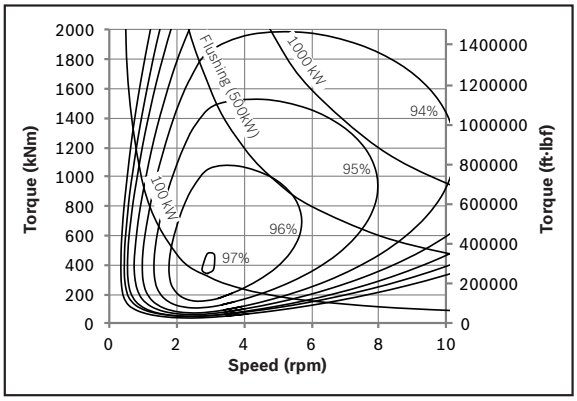

Fig 37: CBM 5000 4-port

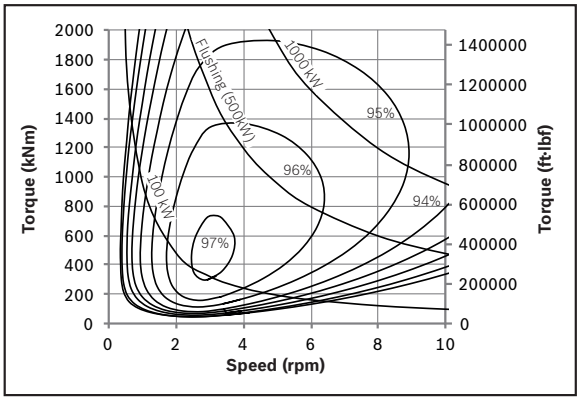

Fig 38: CBM 6000 8-port

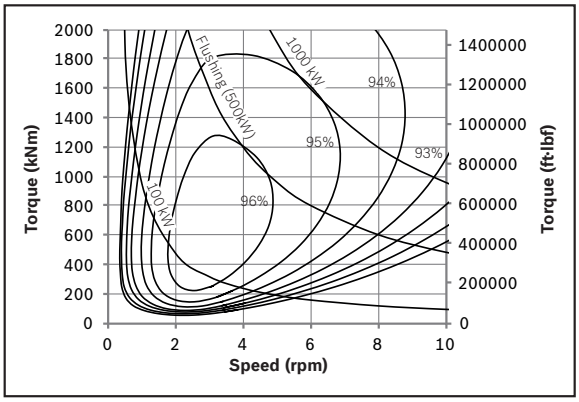

Fig 39: CBM 6000 4-port

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Flushing of motor case

The Hägglunds CBM motors have very high total efficiency, and they are now frequently used in applications with high power. To avoid high temperature in the motor case, the losses generated in the motors must be cooled away, because high temperature gives lower viscosity and this gives reduction in rating life and max allowed power for the motor.
For continuous duty the motor case must be flushed when the power exceed the following max power:

Max power without flushing

- CBM 2000 - 6000 500 kW (670 hp)

Volumetric losses - Compact CBM motors

Valid for an oil viscosity of 40 cSt.

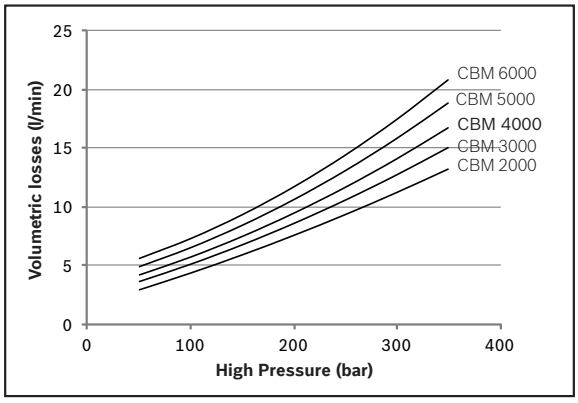

Fig 40: volumetric loss

Variation in volumetric loss at different oil viscosities for Compact motors
When calculating volumetric losses using other viscosities than 40 cSt, multiply the value given in the volumetric loss diagram by the factor K.

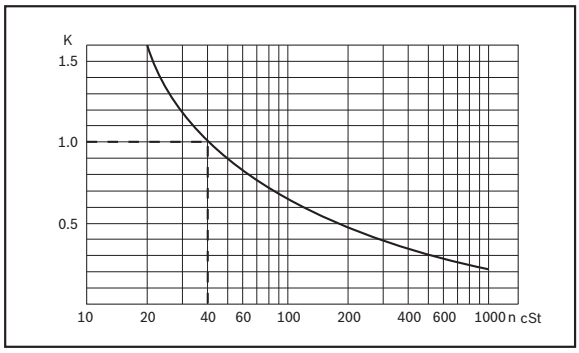

Fig 41

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Diagrams for Hägglunds CBM

Pressure loss, oil viscosity 40 cSt

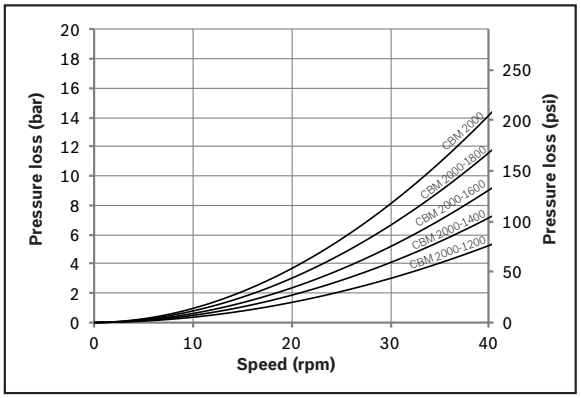

Fig 42: CBM 2000 pressure loss 4 ports

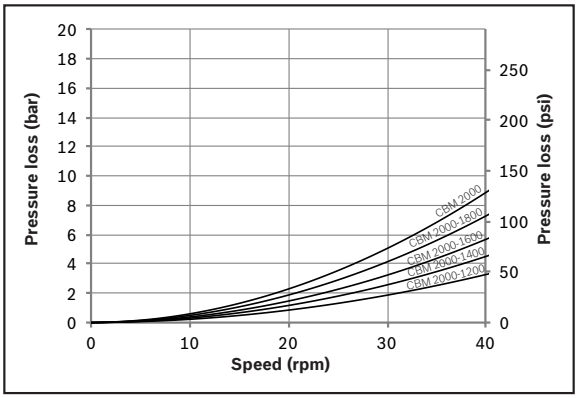

Fig 43: CBM 2000 pressure loss 8 ports

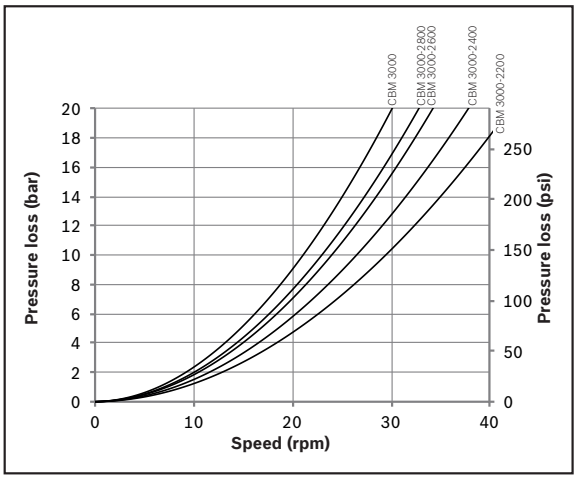

Fig 44: CBM 3000 pressure loss 4 ports

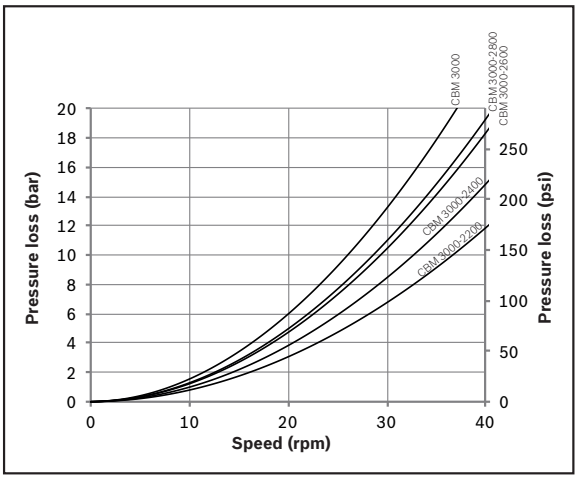

Fig 45: CBM 3000 pressure loss 8 ports

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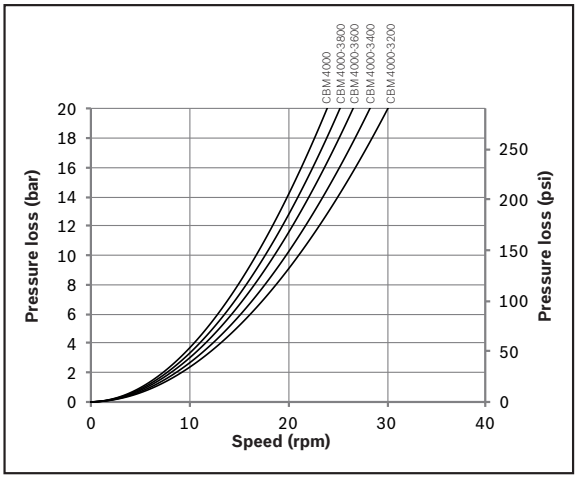

Fig 46: CBM 4000 pressure loss 4 ports

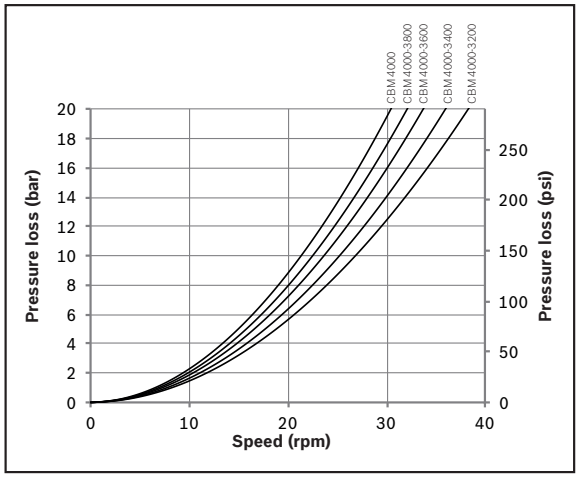

Fig 47: CBM 4000 pressure loss 8 ports

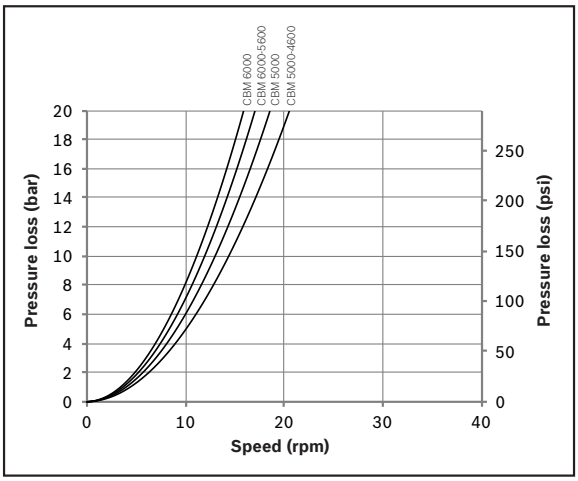

Fig 48: CBM 5000, 6000 pressure loss 4 ports

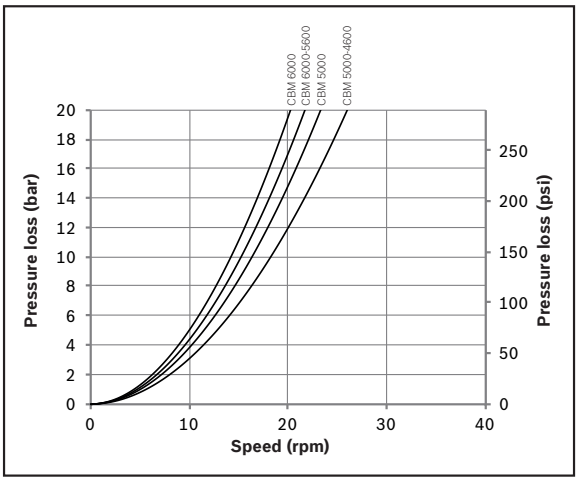

Fig 49: CBM 5000, 6000 pressure loss 8 ports

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Choice of hydraulic fluid

The Hägglunds hydraulic motors are primarily designed to operate on conventional petroleum based hydraulic oils. The hydraulic oil can be chosen in consultation with the oil supplier of your local sales office, bearing the following requirements in mind:

General

The oil shall have FZG (90) fail stage minimum 11 described in IP 334 (DIN 51354). The oil must also contain inhibitors to prevent oxidation, corrosion and foaming. The viscosity of mineral oil is highly dependent of the temperature. The final choice of oil must depend on the operating temperature that can be expected or that has been established in the system and not in the hydraulic tank. High temperatures in the system greatly reduce the service life of oil and rubber seals, as well as resulting in low viscosity, which in turn provides poor lubrication. Content of water shall be less than 0,1%. In industrial applications with high demands for service life, the content of water shall be less than 0,05%.
Viscosity index = 100 is recommended. Viscosity index = 150 can be used for operation with large temperature difference, however many hydraulic fluids are subject to temporary and permanent reductions of the viscosity. Hägglunds recommendation is always to use the base oil viscosity when calculating the rated life and max allowed power. For heavy-duty applications we recommend synthetic oils.

Recomended viscosity in motor case at operating temperature: 40-150 cSt.

Table 15: Temperature limits

Normal operating temperature should be less than +50 °C (122 °F)		
	Temp °C	**Temp °F**
Nitrile seals (std motor)	-35 °C to +70 °C	-31 °F to +158 °F
Viton seals	-20 °C to +100 °C	-4 °F to +212 °F

Table 16: Viscosity limits

Minimum viscosity limits at operating temprature in motor case	
Standard motors with coated piston, uncoated cam rollers and charge pressure below 50 bar (725 psi).	15 cSt *

*) Low viscosity gives reduced service life for the motors. Maximum permitted viscosity is 10.000 cSt.

Fire resistant fluid

The following fluids are tested for Hägglunds motors (ISO/DP 6071).

Table 17

Fluid	**Approved**	**Seals**	**Internal paint**
HFA: Oil (3-5%) in water emulsion	No	-	-
HFB: Inverted emulsion 40-45% water in oil	Yes	Nitrile (std motor)	Not painted*
HFC: Water-glycol	Yes	Nitrile * (std motor)	Not painted*
HFD synthetic fluids			
HFD:S - Chlorinated hydrocarbons	Yes	Viton	Not painted*
HFD:T - Mixture of the above	Yes	Viton	Not painted*
HFD:U - Other compositions	Yes	Viton	Not painted*

* Must be specified in the order.

Down rating of pressure data and basic rating life

Down rating of pressure, for motors used in systems with fire resistant fluids, the maximum pressure for motor given on data sheet must be multiplied with following factors:

HFA-fluid	not fit for use
HFB-fluid	0.7 x maximum pressure for motor
HFC-fluid	0.7 x maximum pressure for motor
HFD-fluid	0.9 x maximum pressure for motor

Down rating of basic rating life, for motors used in systems with fire resistant fluids, the “expected basic rated life” must be multiplied with following factors:

HFA-fluid	not fit for use
HFB-fluid	0.26 x expected life with mineral oil
HFC-fluid	0.24 x expected life with mineral oil
HFD-fluid	0.80 x expected life with mineral oil

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Filtration

The oil in a hydraulic system must always be filtered and also new oil from your supplier has to be filtered when adding it to the system. The grade of filtration in a hydraulic system is a question of service life v.s. money spent on filtration.
In order to obtain stated service life it is important to follow our recommendations concerning contamination level.
When choosing the filter it is important to consider the amount of dirt particles that the filter can absorb and still operate satisfactory. For that reason we recommend a filter with an indicator that gives a signal when it is time to change the filter cartridge.

Filtering recommendations
Before start-up, check that the system is thoroughly cleaned.

- 1. For industrial applications the contamination level should not exceed ISO 4406:1999 18/16/13 (NAS 1638, class 7).
- 2. When filling the tank and motor case, we recommend the use of a filter with the grade of filtration β10≥75.
-

Explanation of "Grade of Filtration"
Grade of filtration **β10≥75** indicates the following:
β10 means the size of particle ≥10µm that will be removed by filtration.
=75 means the grade of filtration of above mentioned size of particle. The grade of filtration is defined as number of particles in the oil before filtration in relation to number of particles in the oil after filtration.

Ex. Grade of filtration is **β10≥75**.
Before the filtration the oil contains N number of particles ≥10µm and after passing the filter once the oil contains

$$\frac{N}{75}$$

number of particles ≥10µm.
This means that

$$N - \frac{N}{75} = \frac{74 \cdot N}{75}$$

number of particles have been filtered (=98.6%).

Environmentally acceptable fluids

Table 18

Fluid	Approved	Seals	Internal paint
Vegetable */** Fluid HTG	Yes	Nitrile (std motor)	-
Synthetic ** Esters HE	Yes	Nitrile (std motor)	-

* Vegetable fluids give good lubrication and small change of viscosity with different temperature. Vegetable fluids must be controlled every 3 months and temperature shall be less than +45 °C (113 °F) to give good service life for the fluid.
** Environmentally acceptable fluid give the same service life for the drive, as mineral oil.

Versatile mounting - examples of installations

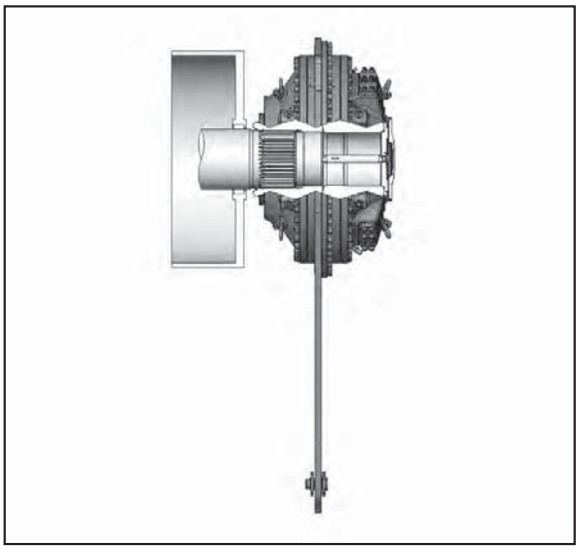


Fig 50: Torque arm mounted motor with splines.

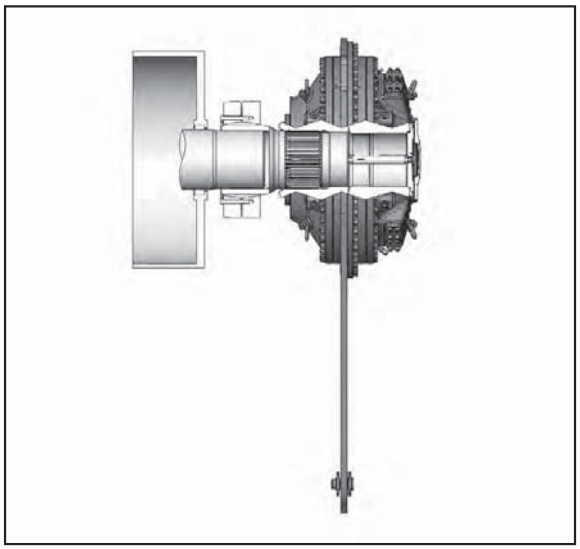


Fig 51: Torque arm mounted motor with coupling adapter.

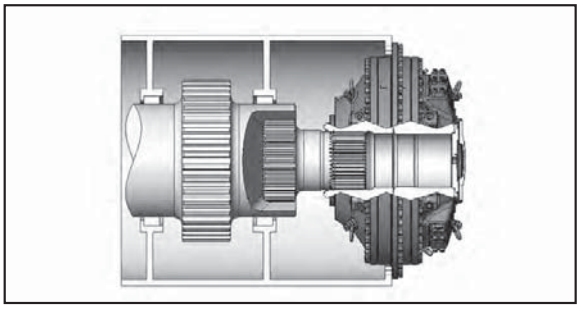


Fig 52: Flange mounted motor with splines and high radial load Fr on driven shaft.

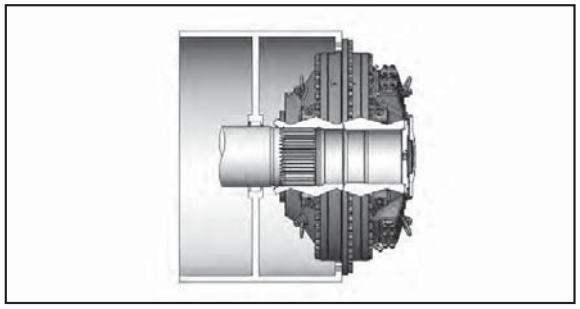


Fig 53: Flange mounted motor with splines and low radial load from driven shaft.

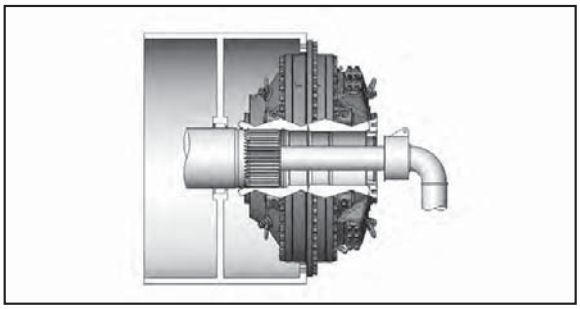
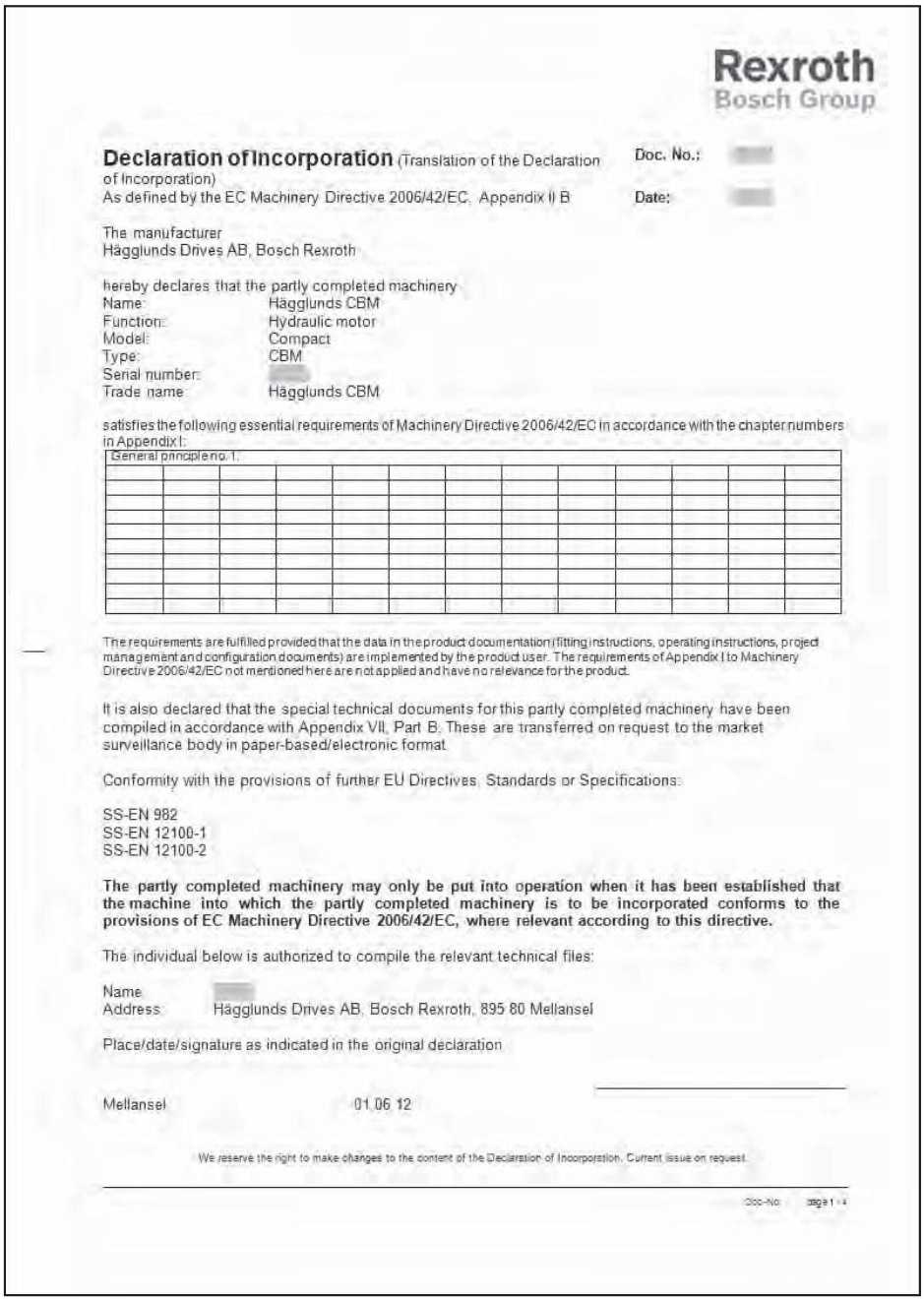


Fig 54: Flange mounted motor with splines and through hole for cooling of the driven machine.

Bosch Rexroth Mellansel AB, RE 15300, Edition: 2012-08

Declaration of Conformity

Example of the Declaration of Conformity given by Hägglunds Drives AB



Rexroth
Bosch Group

Declaration of Incorporation (Translation of the Declaration of Incorporation)
As defined by the EC Machinery Directive 2006/42/EC, Appendix II B

Doc. No.:
Date:

The manufacturer
Hägglunds Drives AB, Bosch Rexroth

hereby declares that the partly completed machinery

Name:	Hägglunds CBM
Function:	Hydraulic motor
Model:	Compact
Type:	CBM
Serial number:	
Trade name:	Hägglunds CBM

satisfies the following essential requirements of Machinery Directive 2006/42/EC in accordance with the chapter numbers in Appendix I:

General principle no. 1.													

The requirements are fulfilled provided that the data in the product documentation (fitting instructions, operating instructions, project management and configuration documents) are implemented by the product user. The requirements of Appendix I to Machinery Directive 2006/42/EC not mentioned here are not applied and have no relevance for the product.

It is also declared that the special technical documents for this partly completed machinery have been compiled in accordance with Appendix VII, Part B. These are transferred on request to the market surveillance body in paper-based/electronic format.

Conformity with the provisions of further EU Directives, Standards or Specifications:

SS-EN 982
SS-EN 12100-1
SS-EN 12100-2

The partly completed machinery may only be put into operation when it has been established that the machine into which the partly completed machinery is to be incorporated conforms to the provisions of EC Machinery Directive 2006/42/EC, where relevant according to this directive.

The individual below is authorized to compile the relevant technical files:

Name:
Address: Hägglunds Drives AB, Bosch Rexroth, 895 80 Mellansel

Place/date/signature as indicated in the original declaration

Mellansel 01.06.12

We reserve the right to make changes to the content of the Declaration of Incorporation. Current issue on request.

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The Declaration of Conformity above, is available on request for deliveries from Hägglunds Drives AB. Translations into other languages are also available.

RE 15300, Edition: 2012-08, **Bosch Rexroth Mellansel AB**