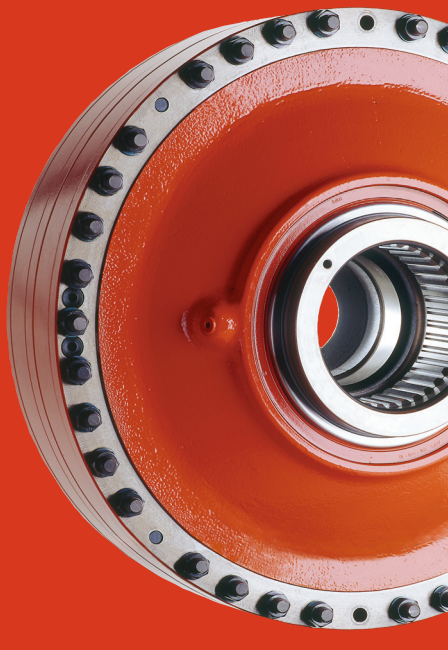
Compact CB

PRODUCT MANUAL

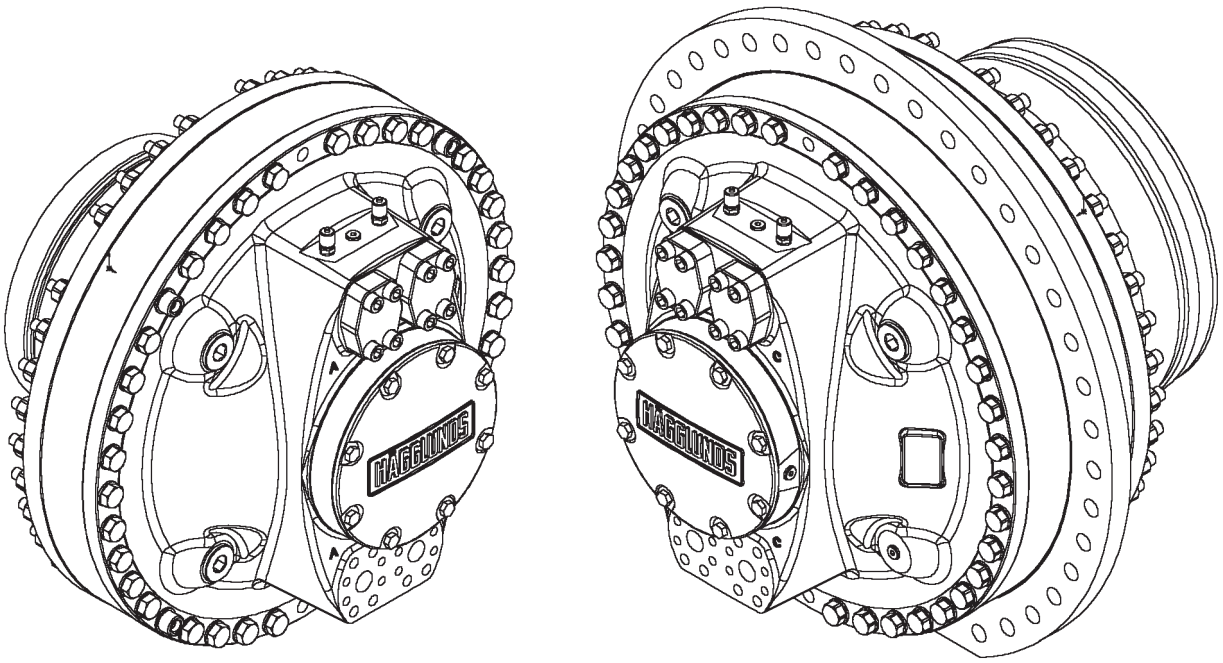


HÄGGLUNDS

Product Manual

COMPACT CB

EN734-7h 2011



One partner all over the world

Hägglunds Drives is a global leader in the hydraulic motors and drive systems niche.
The Group develops, manufactures and markets drive system solutions for applications requiring high torque, low speeds and variable speeds. The drive systems are used in a wide range of industries, such as Mining and materials handling, Marine and offshore, Recycling, Sugar, Pulp and paper, Rubber and plastics, and Building and construction.

We have approximately 900 employees. Production is located in Mellansel, Sweden, Columbus, Ohio, USA and San Antonio, Texas, USA. The Group has 16 subsidiaries, personnel in over 20 countries, and around 50 sales and service offices. In addition, there are distributors in around 20 countries. The largest geographical markets are Europe, China, India, Australia and North America.

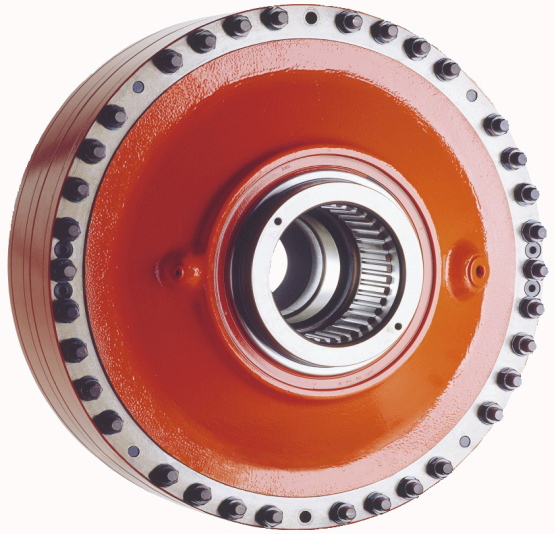
We are owned by Bosch Rexroth, one of the largest hydraulic companies in the world.

Original EN734-5h, 2009

The content in this manual is subject to change without notice or obligation, unless certified referring to a certain purchase order. Information contained herein should be confirmed before placing orders.

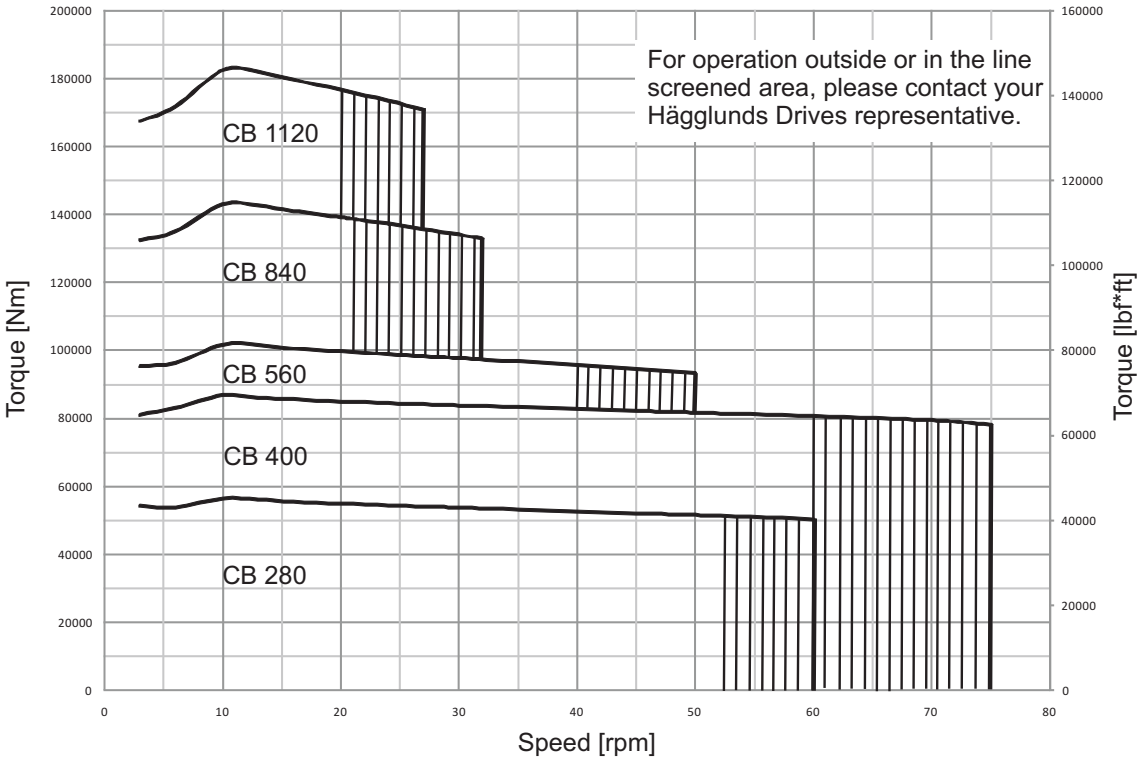
Features of Hägglunds Drives new Compact CB motor

- **High output torque and power to weight ratio**
- **Full torque from zero to maximum speed**
- **Small outer diameter**
- **Many sizes to choose from to optimise the drive**
- **Flexible mounting by using shaft coupling or splines, suitable for torque arm or flange mounting**
- **High efficiency and low maintenance cost**
- **Resistant against shock loads**
- **Through hole**



Quick selection diagram for Compact CB motors

The diagram below represents the torque and speed, corresponding to a modified rating life L_{10aah} = 40 000 h. P_C = 15 bar (218 psi), oil viscosity in motor case 40 cSt (187 SSU). When operating below 3 rpm, coated pistons or oil with higher viscosity shall be used. Contact your Hägglunds representative.



Functional description

Hägglunds hydraulic industrial motor COMPACT CB 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 using a mechanical shaft coupling, or alternatively by splines.

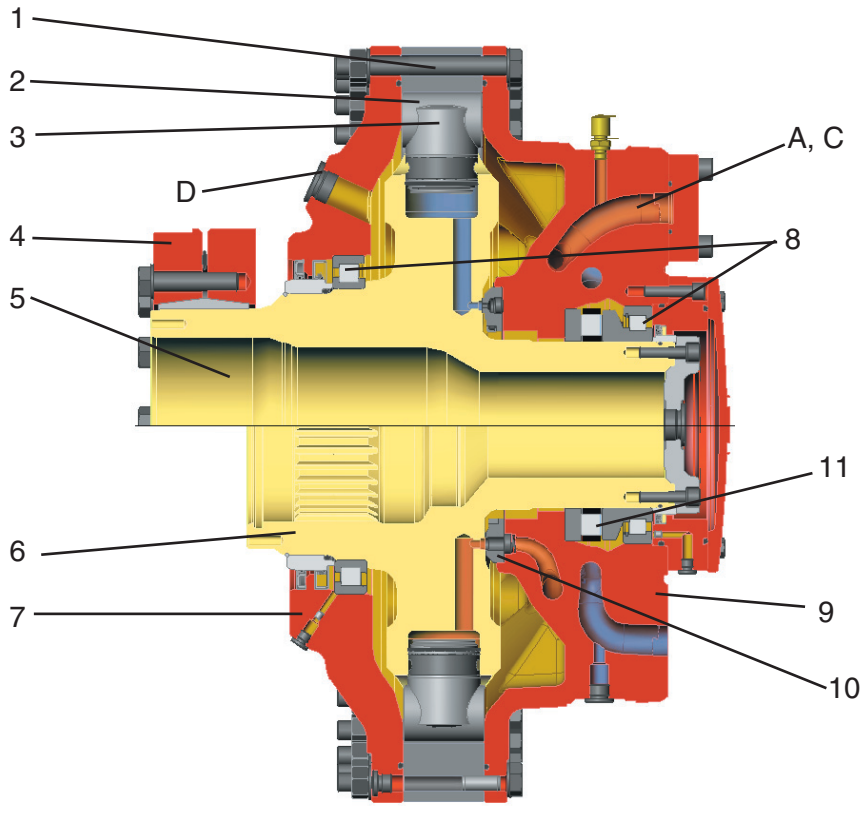
Valid patents

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, EN 29001 and BS 5750; Part 1.

Fig. 1 **Compact CB motor**

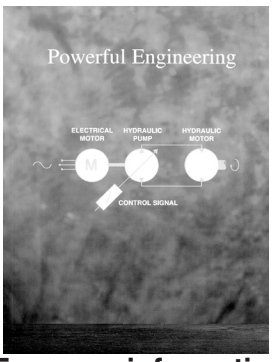


1. Cam ring
2. Cam roller
3. Piston
4. Shaft coupling
5. Cylinder block / hollow shaft
6. Cylinder block / spline
7. Shaft end housing
8. Cylinder roller bearings
9. Connection block
10. Valve plate
11. Axial bearing

A = Inlet or outlet port »A«
C = Inlet or outlet port »C«
D = Drain port

Calculation fundamentals

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)	



For more information
See Powerful Engineering (EN347-4).

Quantity	Symbol		Metric	US
Power	P	=	kW	hp
Output torque	T	=	Nm	lbf·ft
Specific torque	T_s	=	Nm/bar	lbf·ft/1000 psi
Rotational speed	n	=	rpm	rpm
Required pressure	p	=	bar	psi

Quantity	Symbol		Metric	US
Pressure loss	Δp	=	bar	psi
Charge pressure	p_c	=	bar	psi
Flow rate required	q	=	l/min	gpm
Total volumetric loss	q_l	=	l/min	gpm
Displacement	V_i	=	cm³/rev	in³/rev
Mechanical efficiency	η_m	=	0.98*	

***Not valid for starting efficiency**

Definitions

Rated speed[1)]

Rated speed is the highest allowed speed for a charge pressure of 12 bar (175 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 Hägglunds approval.

Accepted conditions for standard type of motor:

1. Oil viscosity 20 - **40** - 10000 cSt (98 - **187** - 4650 SSU). See page 21.
2. Temperature -35 °C to +70 °C (-31 °F to +158 °F).
3. Running case pressure 0-3 bar (0-45 psi) Max case pressure 8 bar (116 psi)
4. Charge pressure (see diagram).
5. Volumetric losses (see diagram).

Motor data

Metric **Motor type**	Displacement	Specific torque	Rated * speed 1)	Max. speed	Max. ** pressure	Max. torque 2)	Max. power 3) intermittently
	V_i cm^3/rev	T_s Nm/bar	*n* rpm	*n* rpm	*p* bar	kNm	kW
CB 280-240	15 100	240	53	68	350	79	530
CB 280	17 600	280	44	58	350	92	530
CB 400-240	15 100	240	94	125	350	79	970
CB 400-280	17 600	280	73	105	350	92	950
CB 400-320	20 100	320	71	94	350	110	970
CB 400-360	22 600	360	59	82	350	120	960
CB 400-440	27 600	440	49	65	320	131	820
CB 400-480	30 200	480	48	62	290	129	660
CB 400-520	32 700	520	41	57	270	130	670
CB 400-560	35 200	560	40	53	250	129	630
CB 400	25 100	400	58	75	350	130	970
CB 560-440	27 600	440	49	65	350	140	930
CB 560-480	30 200	480	48	62	350	160	970
CB 560-520	32 700	520	41	57	350	170	960
CB 560	35 200	560	40	53	350	180	970
CB 840-600	37 700	600	30	45	350	200	880
CB 840-640	40 200	640	28	41	350	210	850
CB 840-680	42 700	680	27	40	350	220	890
CB 840-720	45 200	720	25	37	350	240	870
CB 840-760	47 800	760	23	34	350	250	840
CB 840-800	50 300	800	23	34	350	260	890
CB 840	52 800	840	21	32	350	280	870
CB 1120-880	55 300	880	25	34	350	290	970
CB 1120-920	57 800	920	24	33	350	300	980
CB 1120-960	60 300	960	24	32	350	315	990
CB 1120-1000	62 800	1000	22	31	350	330	1000
CB 1120-1040	65 300	1040	21	29	350	340	980
CB 1120-1080	67 900	1080	20	28	350	355	980
CB 1120	70 400	1120	20	27	350	370	980

*) Related to a required pressure of 12 bar for motors in braking mode. (Special considerations regarding charge pressure, cooling and choice of hydraulic system for speeds above rated, 4 ports must be used for higher speed).

**) The motors are designed according to DNV-rules. Test pressure 420 bar. Peak/transient pressure 420 bar maximum, allowed to occur 10 000 times.

[1]) Special considerations regarding charge pressure, cooling and choice of hydraulic system for speed above rated.

[2]) Calculated as: Metric= Ts·(350-15)·0.98

[3]) Valid for minimum permissible oil viscosity 20 cSt in the motor case.

US **Motor type**	Displacement	Specific torque	Rated * speed 1)	Max. speed	Max. ** pressure	Max. torque 2)	Max. power 3) intermittently
	V_i in^3/rev	T_S lbf·ft/1000 psi	*n* rpm	*n* rpm	*p* psi	lbf·ft	hp
CB 280-240	920	12 200	53	68	5000	57 000	710
CB 280	1070	14 200	44	58	5000	67 000	710
CB 400-240	920	12 200	94	125	5000	57 000	1300
CB 400-280	1070	14 200	73	105	5000	67 000	1300
CB 400-320	1230	16 300	71	94	5000	76 000	1300
CB 400-360	1380	18 300	59	82	5000	86 000	1300
CB 400-440	1690	22 400	49	65	4600	97000	1100
CB 400-480	1840	24 400	48	62	4200	95000	890
CB 400-520	1990	26 400	41	57	3900	96000	900
CB 400-560	2150	28 500	40	53	3600	95000	840
CB 400	1530	20 300	58	75	5000	95 000	1300
CB 560-440	1690	22 400	49	65	5000	100 000	1300
CB 560-480	1840	24 400	48	62	5000	110 000	1300
CB 560-520	1990	26 400	41	57	5000	120 000	1300
CB 560	2150	28 500	40	53	5000	130 000	1300
CB 840-600	2300	30 500	30	45	5000	140 000	1200
CB 840-640	2450	32 500	28	41	5000	150 000	1100
CB 840-680	2610	34 600	27	40	5000	160 000	1200
CB 840-720	2760	36 600	25	37	5000	170 000	1200
CB 840-760	2910	38 700	23	34	5000	180 000	1100
CB 840-800	3070	40 700	23	34	5000	190 000	1200
CB 840	3220	42 700	21	32	5000	200 000	1200
CB 1120-880	3370	44 700	25	34	5000	210 000	1300
CB 1120-920	3520	46 700	24	33	5000	220 000	1300
CB 1120-960	3680	48 800	24	32	5000	230 000	1300
CB 1120-1000	3830	50 800	22	31	5000	240 000	1300
CB 1120-1040	3980	52 800	21	29	5000	250 000	1300
CB 1120-1080	4140	54 900	20	28	5000	260 000	1300
CB 1120	4290	56 900	20	27	5000	270 000	1300

*) Related to a required pressure of 175 psi for motors in braking mode. (Special considerations regarding charge pressure, cooling and choice of hydraulic system for speeds above rated, 4 ports must be used for higher speed).

**) The motors are designed according to DNV-rules. Test pressure 6000 psi. Peak/transient pressure 6000 psi maximum, allowed to occur 10 000 times.

[1]) Special considerations regarding charge pressure, cooling and choice of hydraulic system for speed above rated.

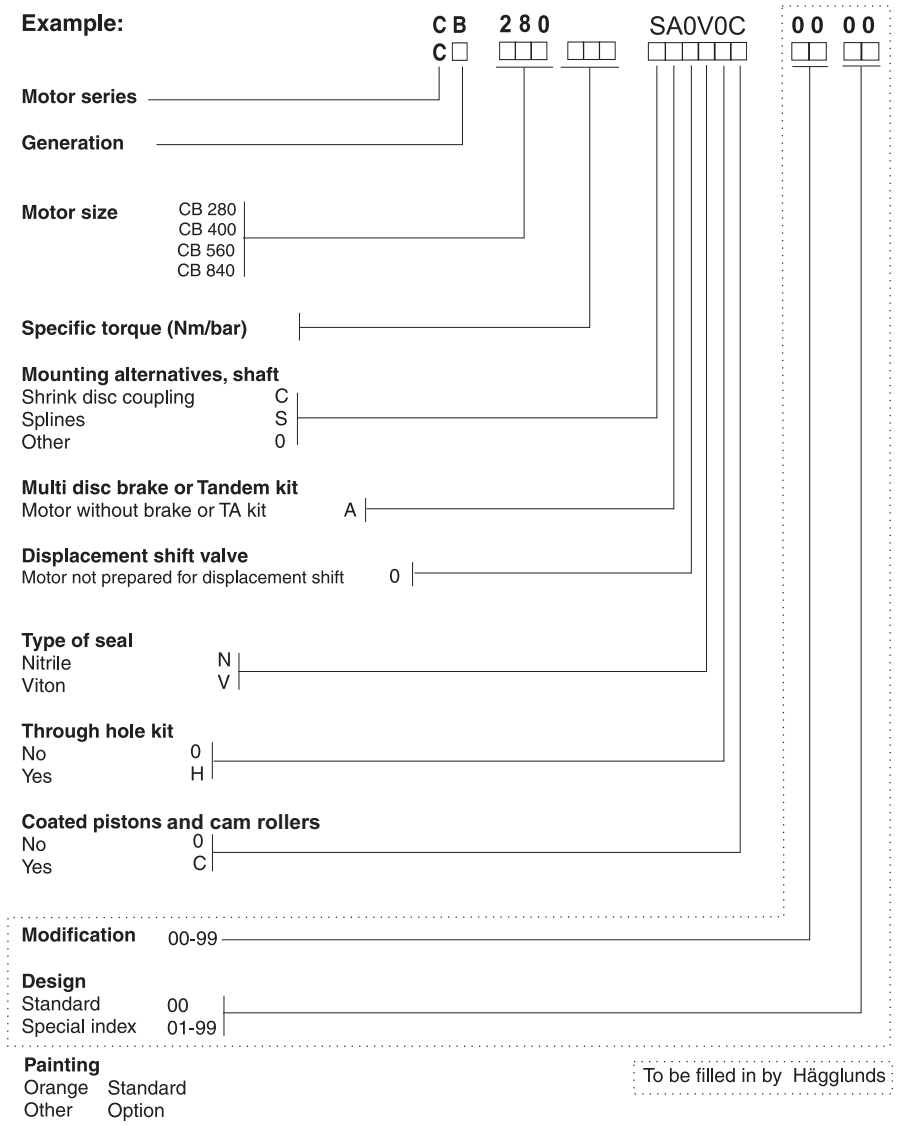
[2]) Calculated as: US= Ts·(5000-218)·0.98.

[3]) Valid for minimum permissible oil viscosity 20 cSt in the motor case.

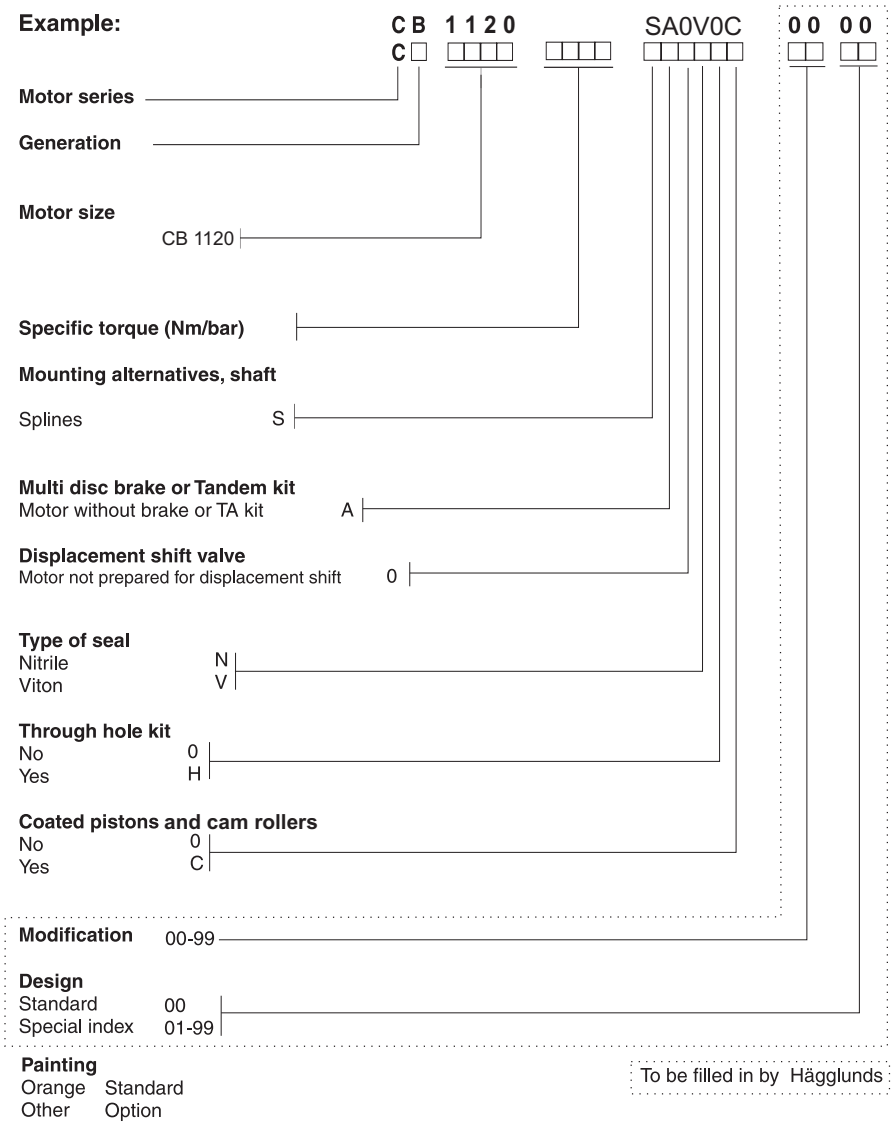
Ordering codes

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.

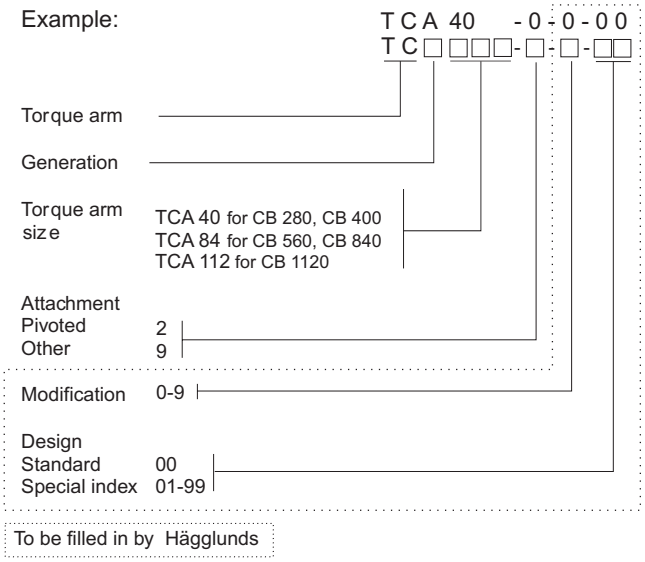
Compact CB 280-840



Compact CB 1120



Torque arm



Dimensions

With splines for flange mounting.

Fig. 2

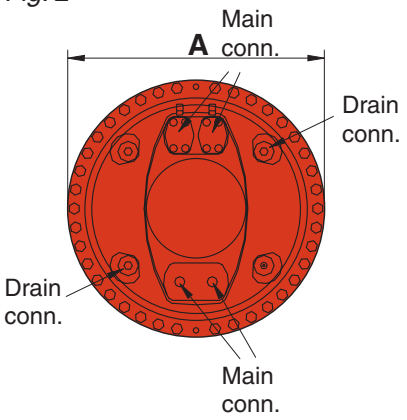


Fig. 3

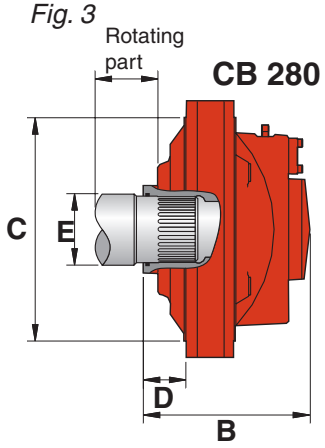


Fig. 4

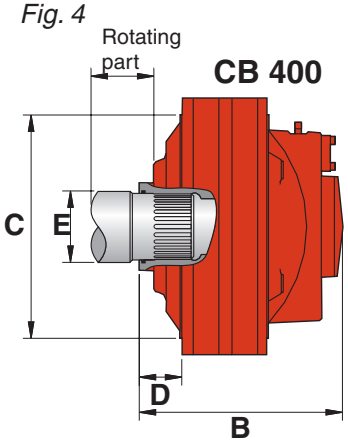


Fig. 5

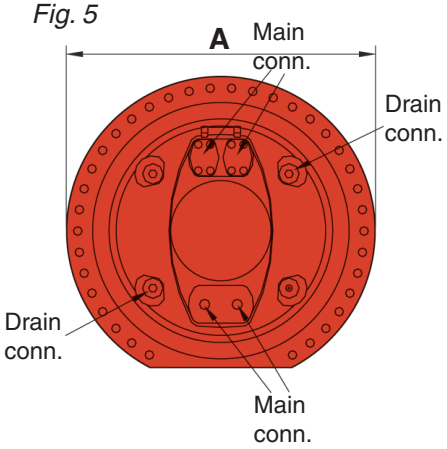


Fig. 6

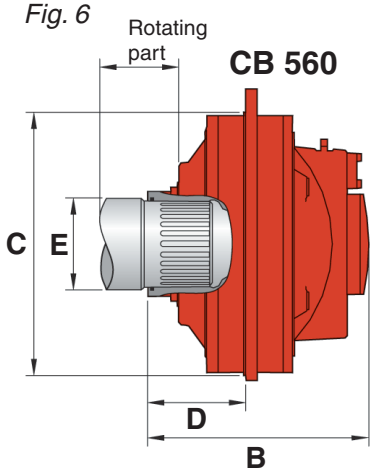


Fig. 7

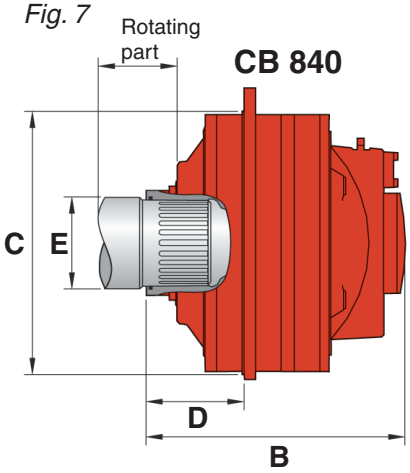


Fig. 8

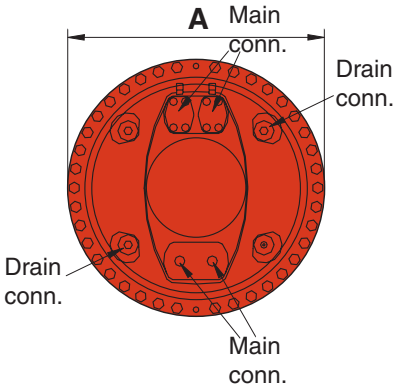


Fig. 9

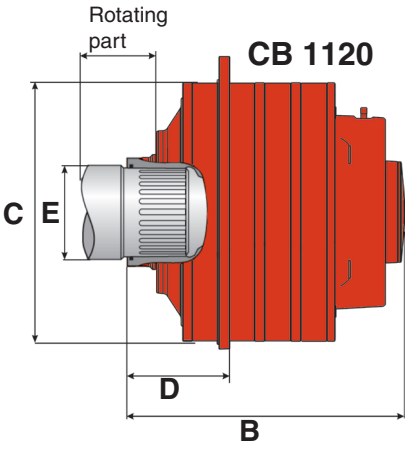


Table 1

Motor type	A (mm)	B (mm)	C (mm)	D (mm)	E Splines diameter (mm)	Weight (kg)	Main conn.	Drain conn.
CB 280	782	501	680	130	N 200x5x30x38x9H	705	SAE 1 1/4" *) SAE 1 1/2" *)	BSP 1 1/4"
CB 400	782	619	680	130	N 200x5x30x38x9H	1060		
CB 560	940	669	800	298	N 260x5x30x50x9H	1115		
CB 840	940	787	800	298	N 260x5x30x50x9H	1445		
CB 1120	940	904	800	298	N 260x5x30x50x9H	1770		

*) Both SAE 1 1/4" and SAE 1 1/2" can be used.

Dimensions

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. 10a. For control of spline, see table 3. When splines are used for torque arm mounting, the splines shall be lubricated with oil at assembly, see fig. 10b. For control of spline, see table 3.

Table 2

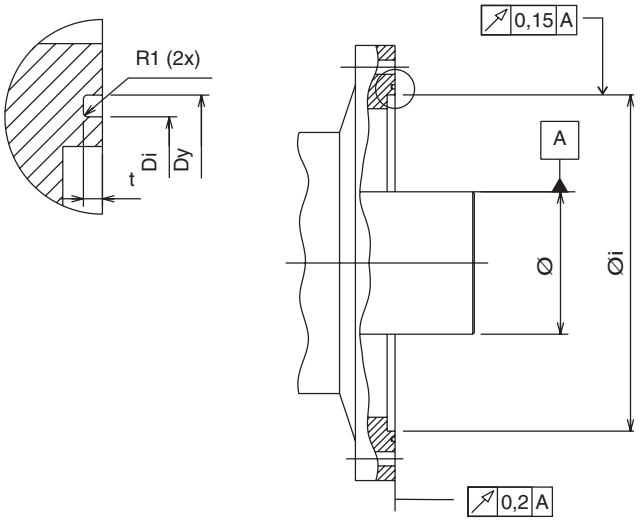
Unidirectional drives
Steel with yield strength Rel_{min} = 450 N/mm²
Bidirectional drives
Steel with yield strength Rel_{min} = 700 N/mm²

Table 3

Motor	CB 280/400	CB 560/840/1120
Tooth profile and bottom form	DIN 5480	DIN 5480
Tolerance	8f	8f
Guide	Flank centring (Back)	Flank centring (Back)
Pressure angle	30°	30°
Module	5	5
Number of teeth	38	50
Pitch diameter	ø 190	ø 250
Minor diameter	ø 188	ø 248
Major diameter	ø $199^{0}_{-1.201}$	ø $259^{0}_{-1.201}$
Measure over measuring pins	$210.158^{0}_{-0.290}$	$270.307^{0}_{-0.320}$
Diameter of measuring pins	ø $10^{-0.088}_{-0.157}$	ø $10^{-0.103}_{-0.181}$
Addendum modification X M	+2.25	+2.25

Flange mounting

Fig. 10a



For production of shaft see 278 5024 and 278 5026.

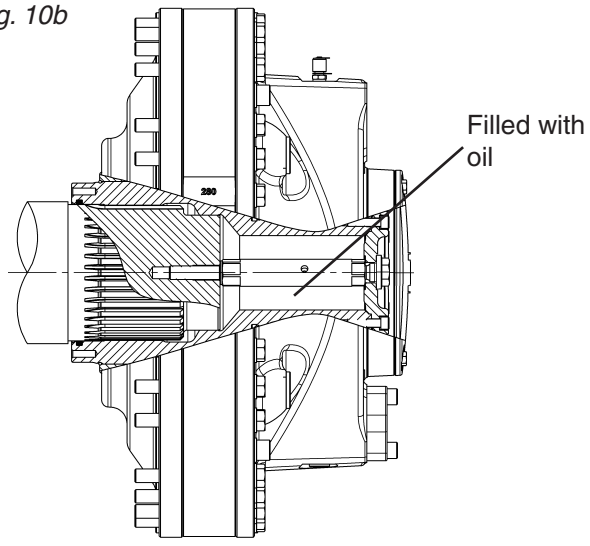
Table 4

	øi	Dy	Di	t	O-ring*
CB 280/400	$680^{+0.20}_{+0.05}$	ø 714	ø 700	4.4±0.1	2152 2115-743
CB 560/840/1120	$800^{+0.20}_{+0.05}$	ø 820	ø 806	4.4±0.1	2152 2115-793

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

Torque arm mounting

Fig. 10b



For production of shaft see 278 5023 and 278 5025.

Dimensions

With hollow shaft, shaft coupling.

Fig. 11

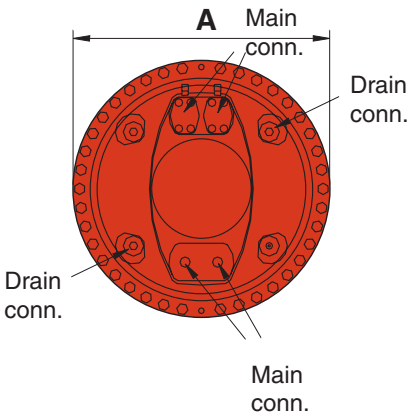


Fig. 12

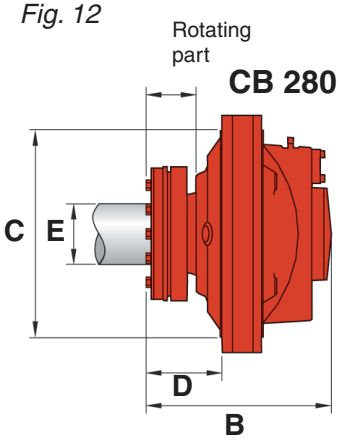


Fig. 13

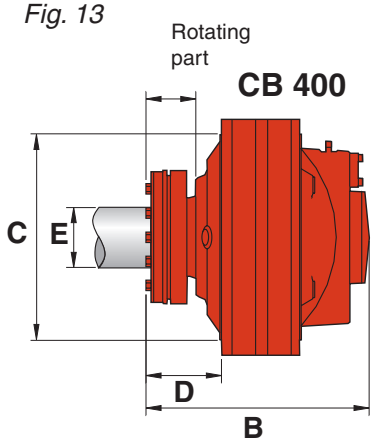


Fig. 14

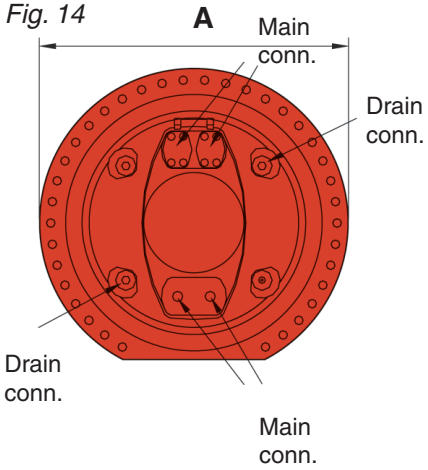


Fig. 15

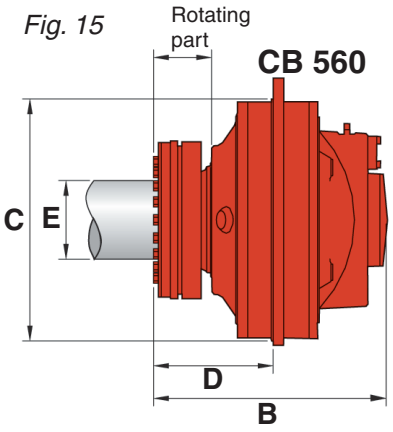


Fig. 16

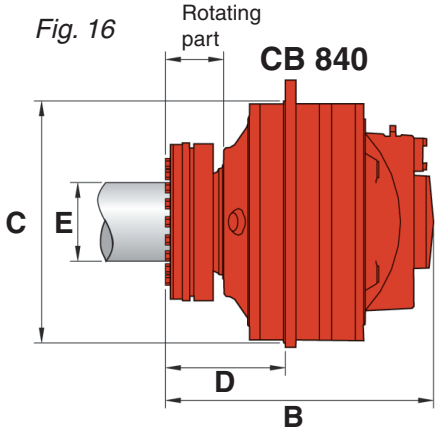


Fig. 17

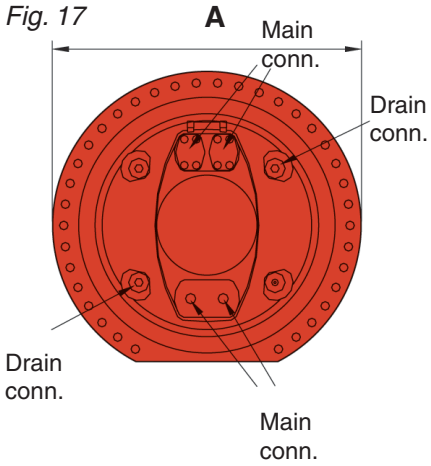
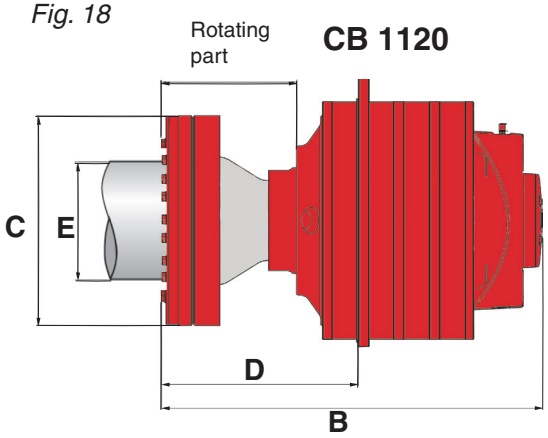


Fig. 18



Note. Shaft adapter is only available as accessory

Table 5

Motor-type	A (mm)	B (mm)	C (mm)	D (mm)	E dw (mm)	Weight (kg)	Main. conn.	Drain conn.
CB 280	782	612	680	241	180	800	SAE 1 1/4" *) SAE 1 1/2" *)	BSP 1 1/4"
CB 400	782	740	680	251	200	1160		
CB 560	940	767	800	396	260	1290		
CB 840	940	885	800	396	260	1620		
CB 1120	940	1257	800	650	340	2340		

*) Both SAE 1 1/4" and SAE 1 1/2" can be used.

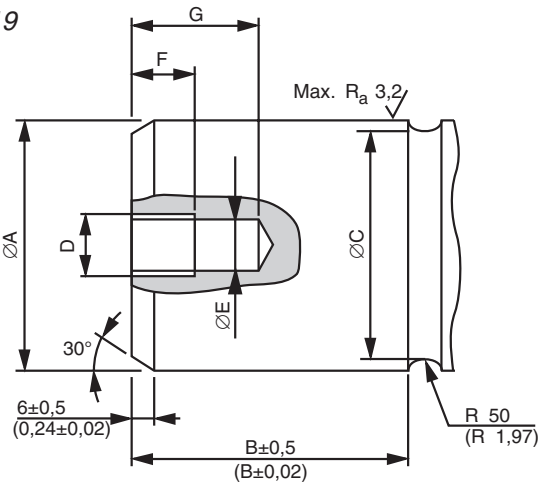
Dimensions

With hollow shaft, shaft coupling.

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 6, 7 and 8.

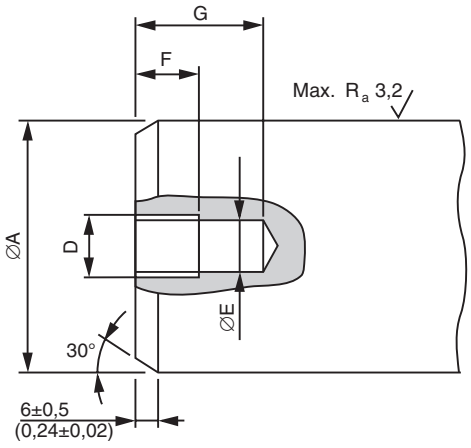
Fig. 19



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. 16 and tables 1, 2 and 3.

Fig. 20



Mounting tool for CB 280-840

Mounting the motor (fig. 21) onto the shaft with mounting tool MTMB art. nr. 378 0846-801 (same as for MA 141 - MB 800)

Table 6

Dim	CB 280	CB 400	CB 560/840
A mm in	180 $^{-0.014}_{-0.054}$ 7.0866 $^{-0.00055}_{-0.00215}$	200 $^{-0.015}_{-0.061}$ 7.8740 $^{-0.00059}_{-0.00240}$	260 $^{-0.017}_{-0.069}$ 10.2362 $^{-0.00067}_{-0.00272}$
B mm in	106 4.17	117 4.61	153 6.02
C mm in	174 6.85	194 7.64	254 10

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

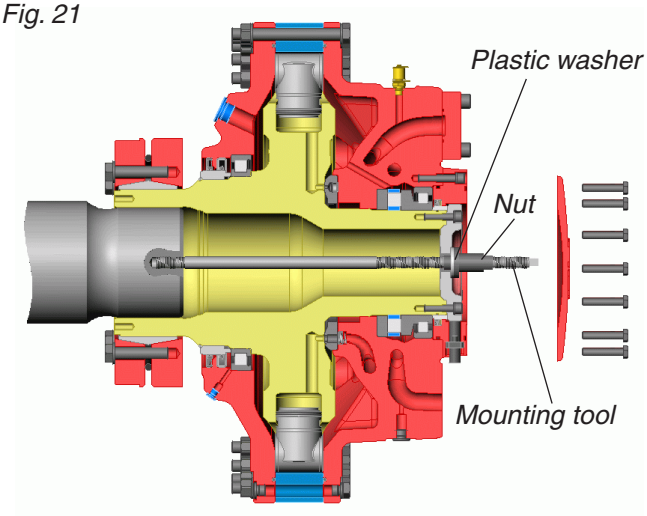
Table 7 Recommended material in the shaft

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

Table 8 Alternative thread (fig. 19 & 20)

	CB 280 - CB 840	
D	M20	UNC 5/8"
E	>17 (0.67)	>13.5 (0.53)
F	25 (0.98)	22 (0.87)
G	50 (1.97)	30 (1.18)

Fig. 21



Dimensions CB1120

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.

Fig. 22

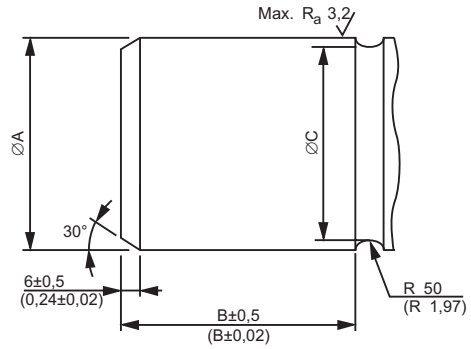


Table 9

Dim	CB 1120
A **mm** **in**	340 $^{-0.018}_{-0.075}$ 13.3858 $^{-0.00068}_{-0.00292}$
B **mm** **in**	215 8.46
C **mm** **in**	334 13.15

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

Table 10 Recommended material in the shaft

Unidirectional drives
Steel with yield strength Rel_{min} = 300 N/mm^2
Bidirectional drives
Steel with yield strength Rel_{min} = 450 N/mm^2

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 figure below.

Fig. 23

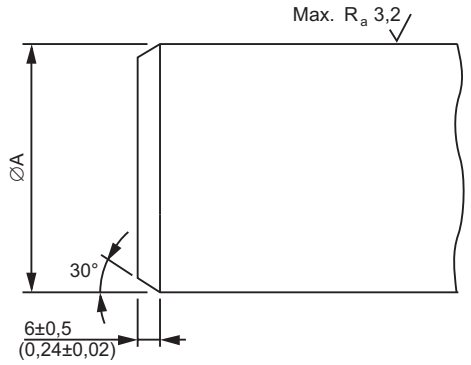
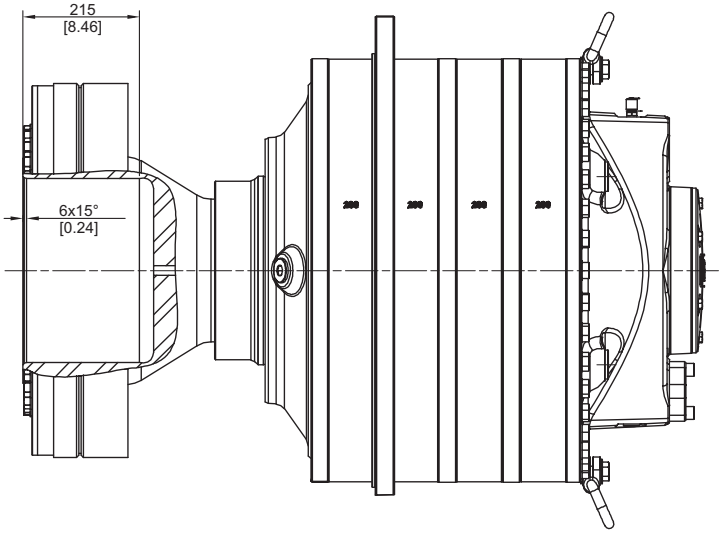


Fig. 24



Accessories

Torque arm, type TCA 40 - 112

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.

Fig. 25 **Torque arm**

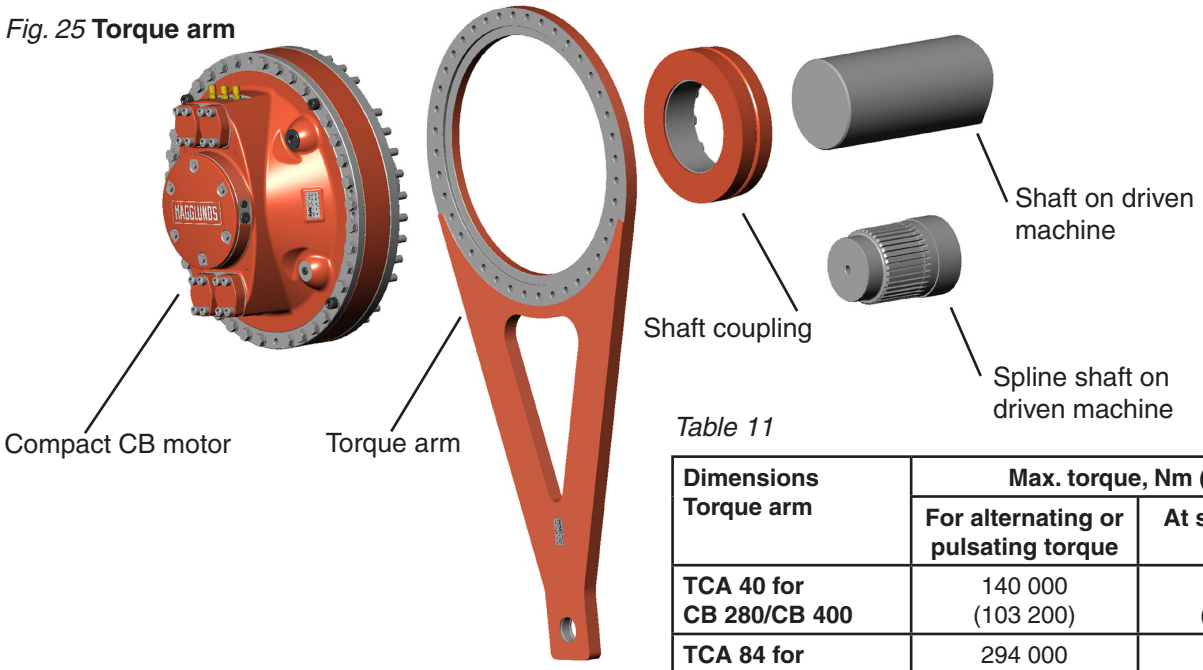


Table 11

Dimensions Torque arm	Max. torque, Nm (lbf·ft)	
	For alternating or pulsating torque	At static torque
TCA 40 for CB 280/CB 400	140 000 (103 200)	170 000 (125 300)
TCA 84 for CB 560/CB 840	294 000 (216 700)	350 000 (258 000)
TCA 112 for CB 1120	392 000 (289 000)	470 000 (347 000)

Table 12

Torque arm	A mm (in)	B mm (in)	C mm (in)	D Ø	E mm (in)	T mm (in)	Weight kg (lb)
TCA 40 for CB 280 and CB 400	1721 (67.76)	1250 (49.21)	545 (21.46)	M20	820 (32.28)	36 (1.42)	162 (357)
TCA 84 for CB 560 and CB 840	2088 (82.21)	1500 (59.05)	545 (21.46)	M24	1088 (42.84)	36 (1.42)	258 (568)
TCA 112 for CB 1120	2588 (101.89)	2000 (78.74)	545 (21.46)	M24	1088 (42.84)	36 (1.42)	344 (759)

Fig. 26

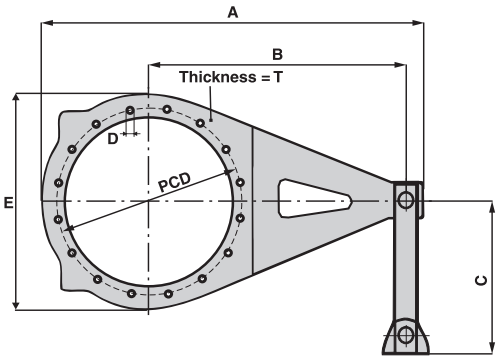
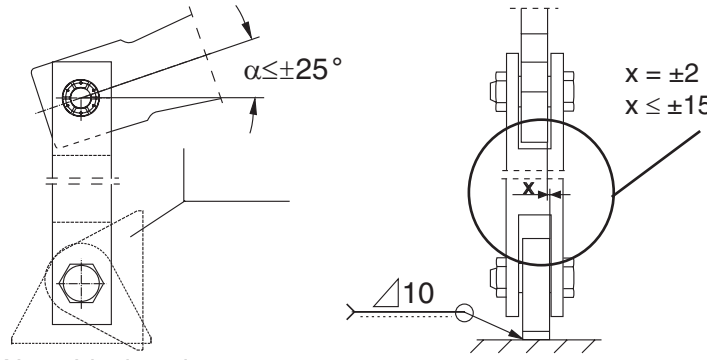


Fig. 27 **Mounting of pivoted attachment**



x = ±2 mm (0.079) misalignment in installation.
x ≤ ±15 mm (0.59) movement when in use.

Note: Ideal angle = 0°

Double ended torque arm, DTCB 40 - DTCB 84

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. 28

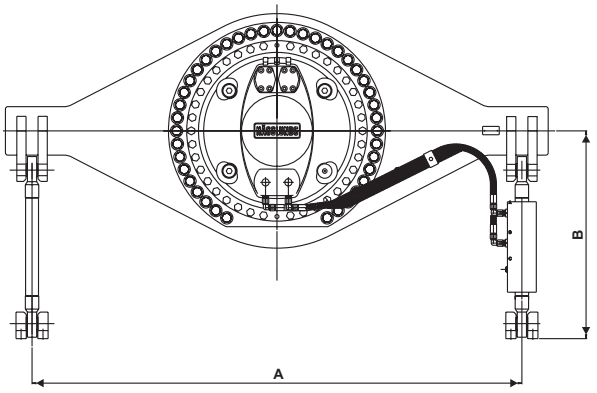


Table 13

Torque arm	Motor type	Ordering code	A mm (in)	B mm (in)	Weight kg (lb)
DTCB 40	CB 280	078 1476-802	2120 (83.46)	900 (35.43)	335 (739)
	CB 280-240	078 1476-801			
	CB 400	078 1476-804			
	CB 400-560				
	CB 400-520				
	CB 400-480				
	CB 400-440				
	CB 400-360	078 1476-802			
	CB 400-320				
	CB 400-280				
	CB 400-240	078 1476-801			
DTCB 84	CB 560	078 1476-806	3000 (118.11)		500 (1102)
	CB 560-520				
	CB 560-480	078 1476-805			
	CB 560-440				
	CB 840	078 1476-809			
	CB 840-800				
	CB 840-760	078 1476-808			
	CB 840-720				
	CB 840-680				
	CB 840-640				
	CB 840-600	078 1476-807			
	CB 1120	078 1476-809			
	CB 1120-1080				
	CB 1120-1040				
	CB 1120-1000				
	CB 1120-960				
	CB 1120-920				
	CB 1120-880				

Mounting set SMCB1 for speed encoder

Speed encoder kit for Compact CB 280-CB 1120 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. 29

Fig. 30 CB 280-CB 1120 with SMCB1

Cross-over valve, COCB 1000

The valve is designed for use with Compact motors CB 280-CB 1120. The valve is bolted directly 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 (5075 psi), but are fully adjustable between 50 bar (500 psi) to 350 bar (5075 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 (214 psi), but are fully adjustable down to 3 bar (42 psi).

Anti-cavitation check valves are built into the block, and makes it possible to arrange for external supply of charge pressure.

Fig. 31 **COCB mounted on motor**

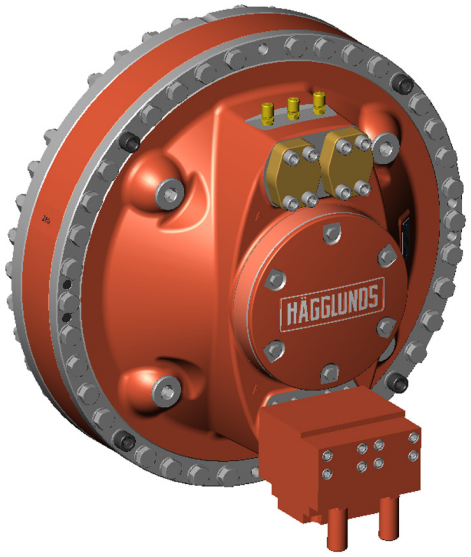
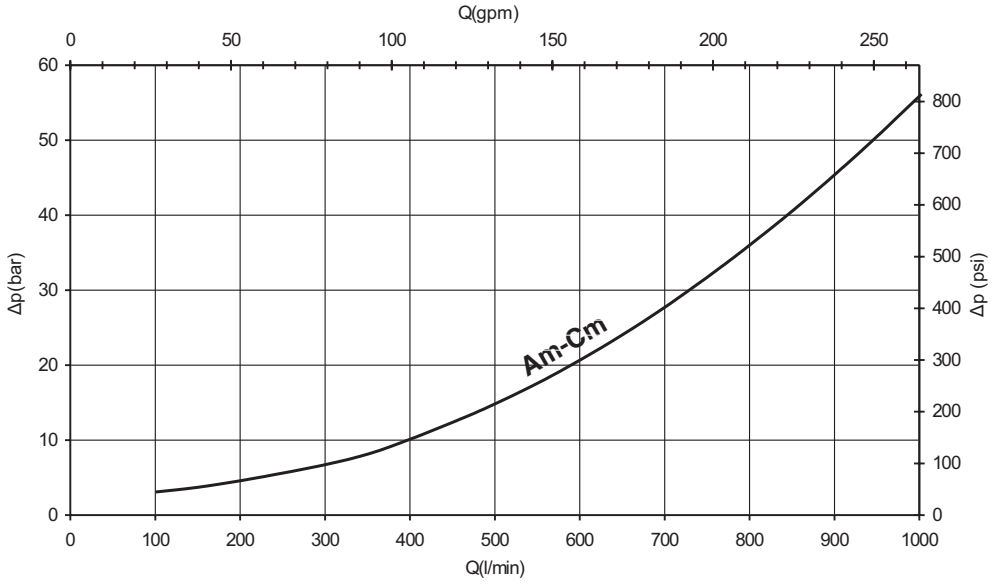


Diagram 1 **Pressure loss, COCB**



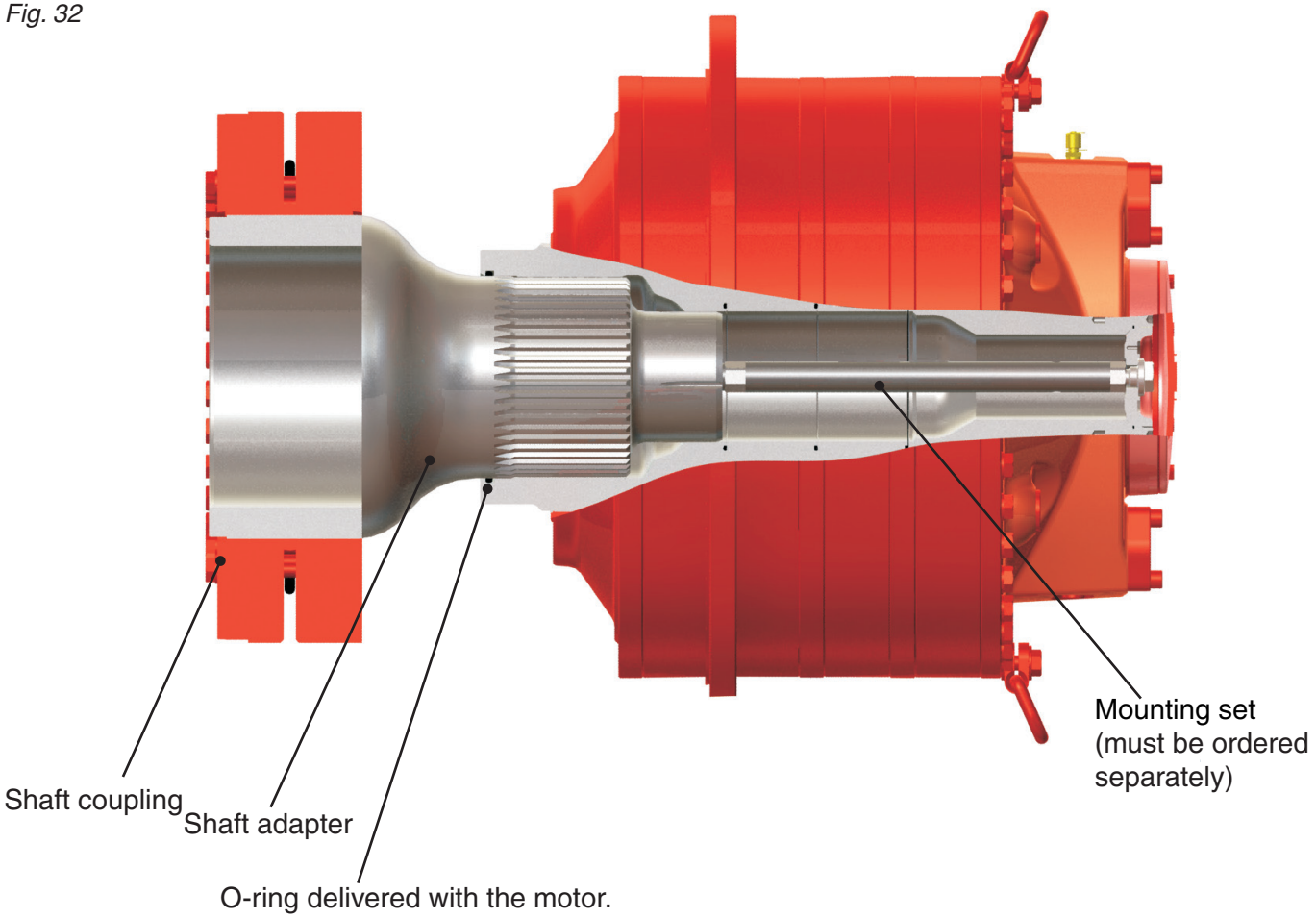
Shaft coupling set, CB 1120

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

Ordering Code

Shaft coupling set CB 1120	078 1322-801

Fig. 32



Weight of complete set: 573 kg (1263 lb).

Diagrams for Compact CB

Diagram 2 **Charge pressure - Compact CB 2-port connection**

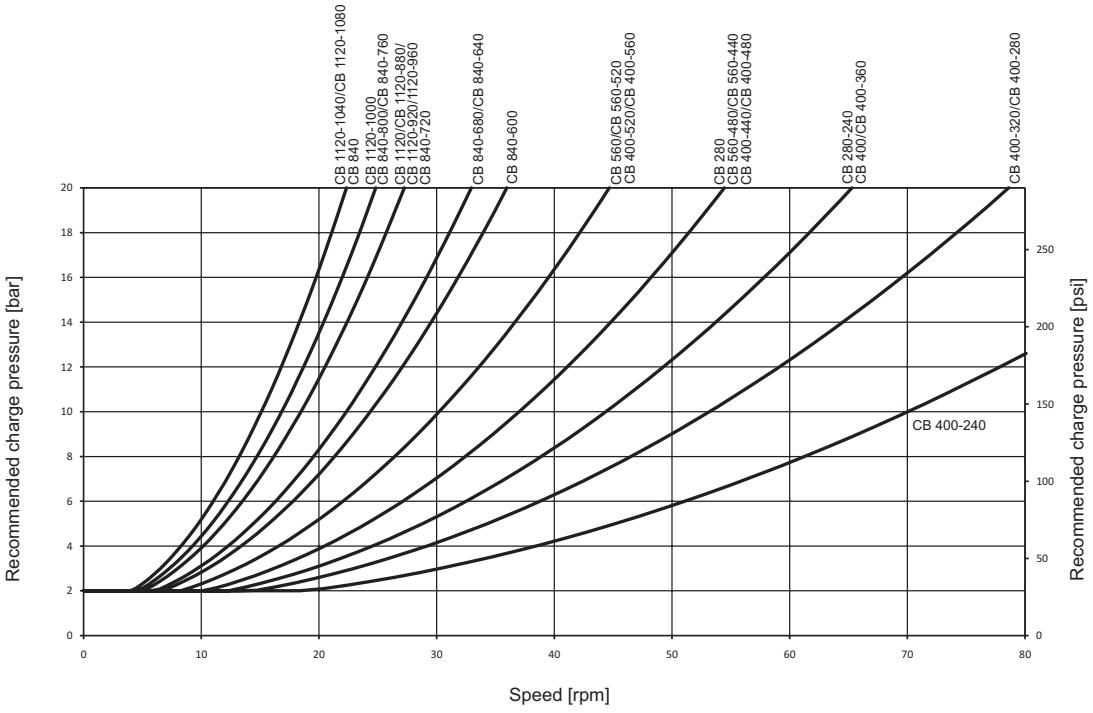
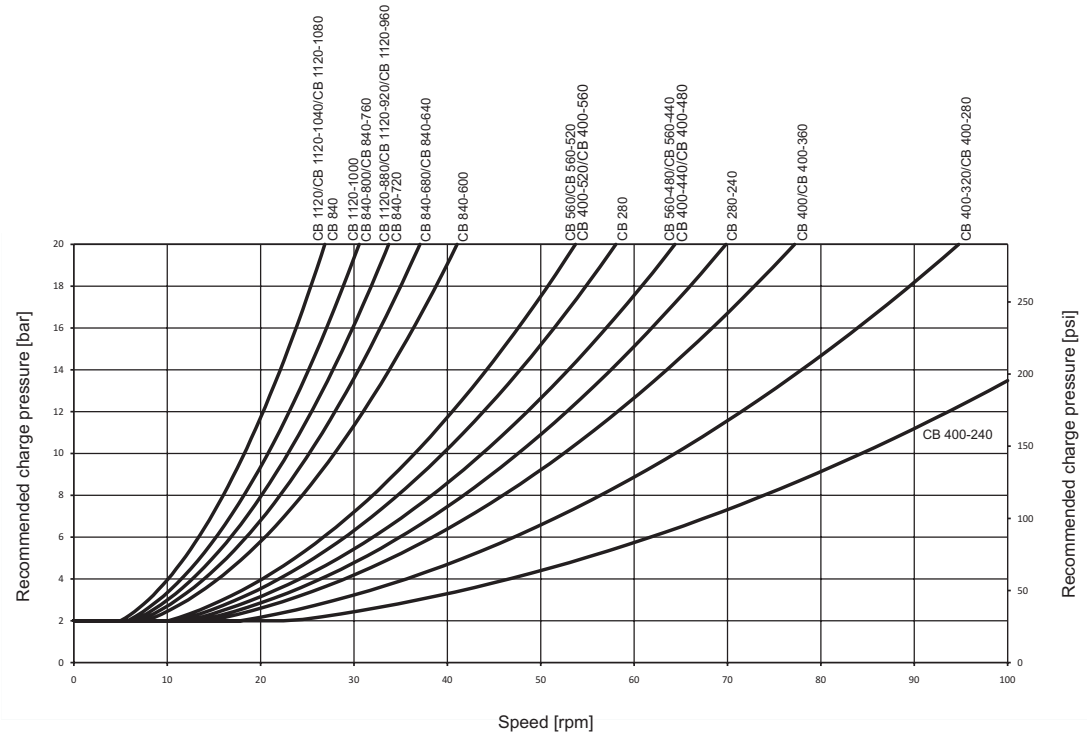


Diagram 3 **Charge pressure - Compact CB 4-port connection**



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).

Diagrams for Compact CB

Overall efficiency, oil viscosity 40 cSt/187 SSU, Pc = 15 bar (217 psi)

Diagram 4 **CB 280, 2 ports**

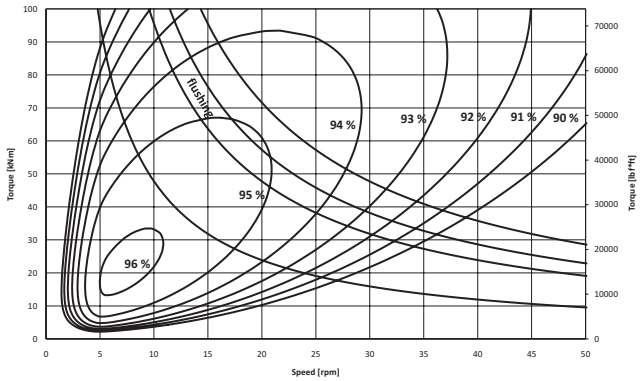


Diagram 5 **CB 280, 4 ports**

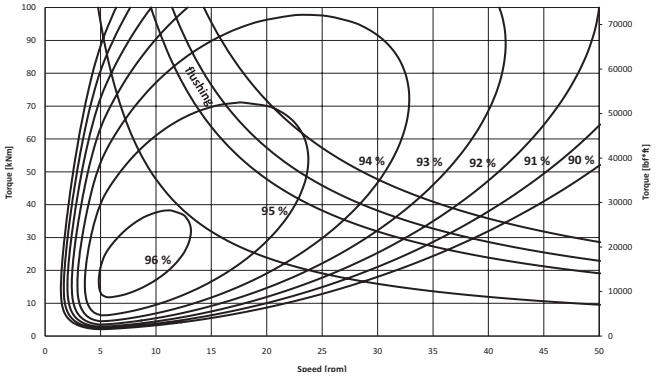


Diagram 6 **CB 400, 2 ports**

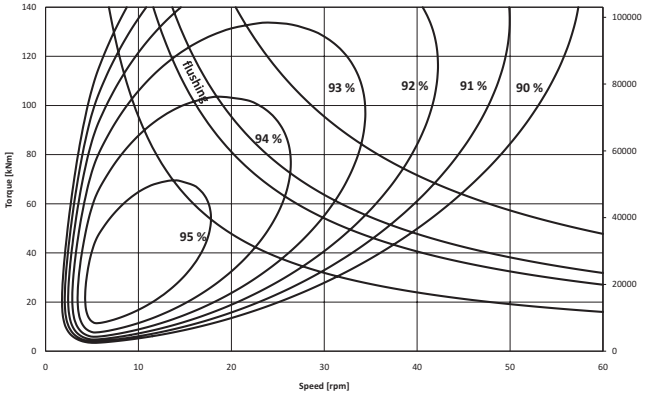


Diagram 7 **CB 400, 4 ports**

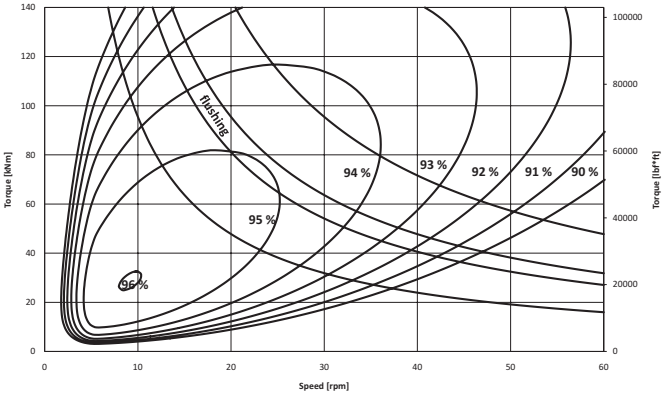


Diagram 8 **CB 560, 2 ports**

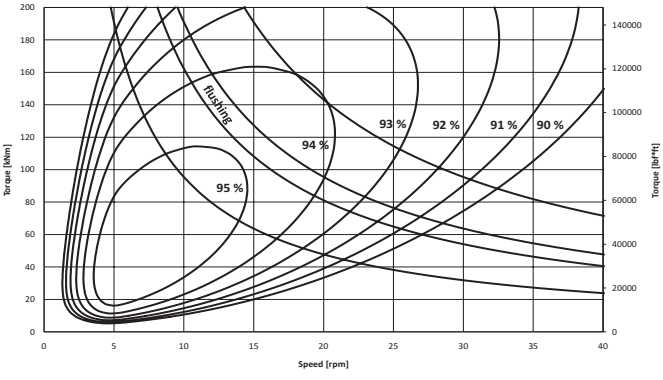


Diagram 9 **CB 560, 4 ports**

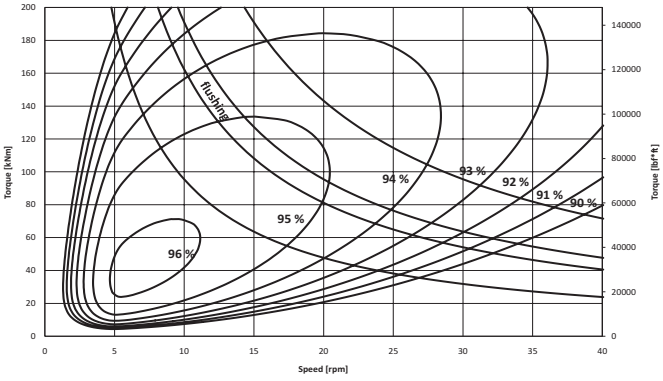


Diagram 10 **CB 840, 2 ports**

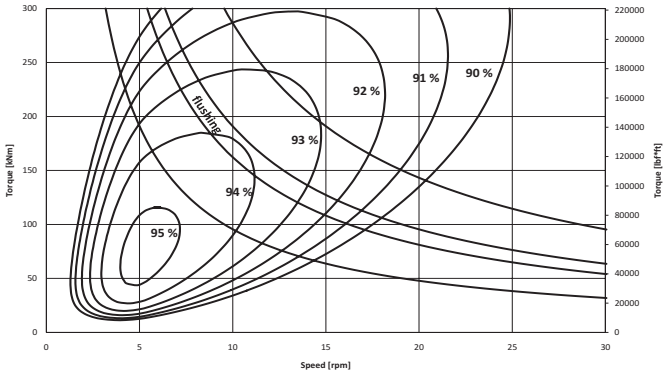


Diagram 11 **CB 840, 4 ports**

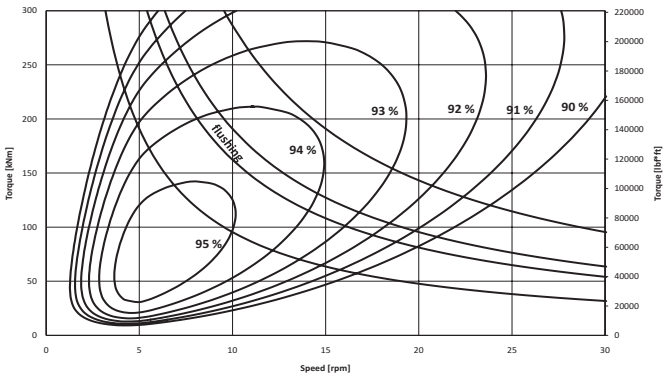


Diagram 12 **CB 1120, 2 ports**

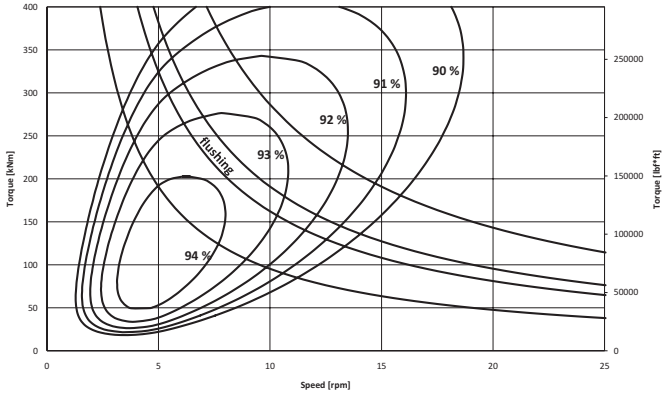
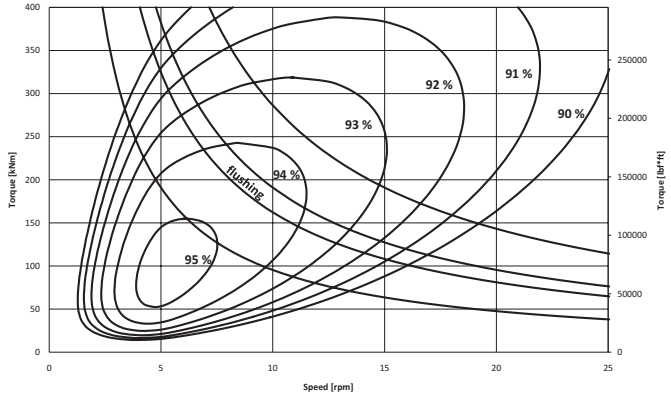


Diagram 13 **CB 1120, 4 ports**



For more information about flushing of motor case please see ACB-4.5.

Flushing of motor case

The Compact CB 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:

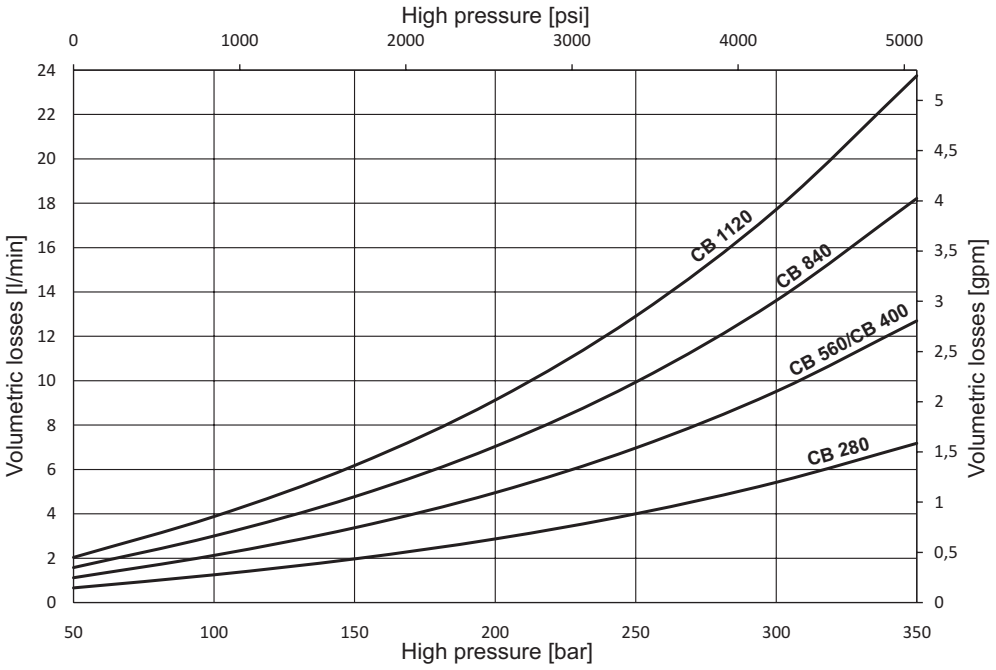
Max power without flushing

CB 280	120 kW	(160 hp)
CB 400/560/840/1120	170 kW	(227 hp)

Volumetric losses - Compact CB motors

Valid for an oil viscosity of 40 cSt/187 SSU.

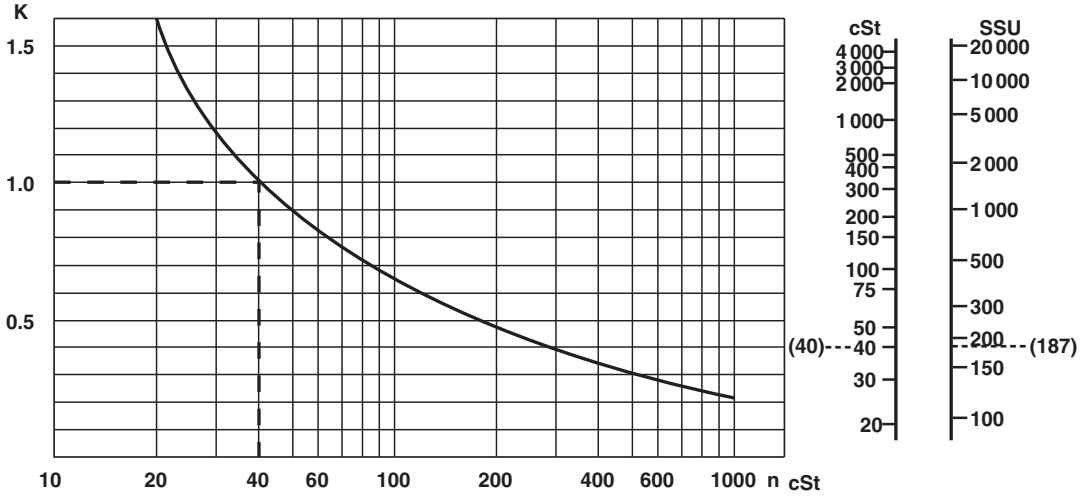
Diagram 14



Variation in volumetric loss at different oil viscosities for Compact motors

When calculating volumetric losses using other viscosities than 40 cSt/187 SSU, multiply the value given in the volumetric loss diagram by the factor K.

Diagram 15



Diagrams for Compact

Pressure loss, oil viscosity 40 cSt/187 SSU

Diagram 16 **CB 280 pressure loss 2 ports**

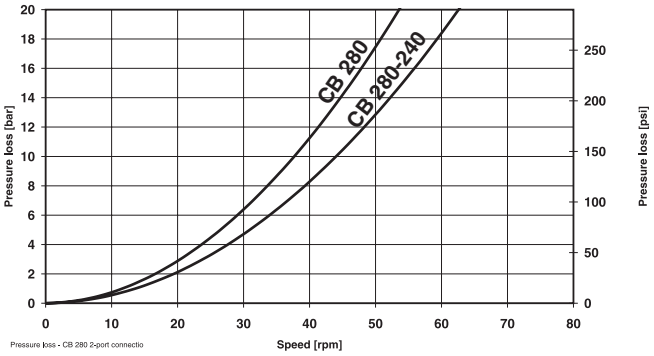


Diagram 17 **CB 280 pressure loss 4 ports**

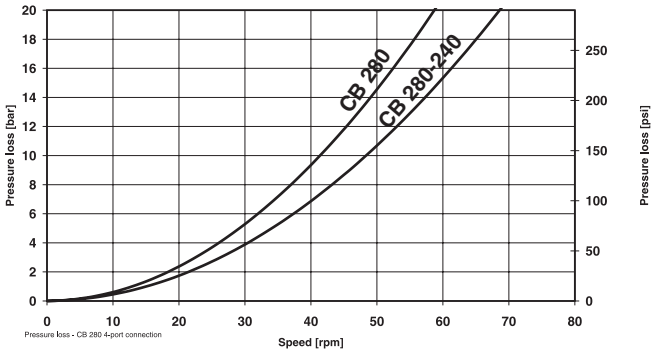


Diagram 18 **CB 400 pressure loss 2 ports**

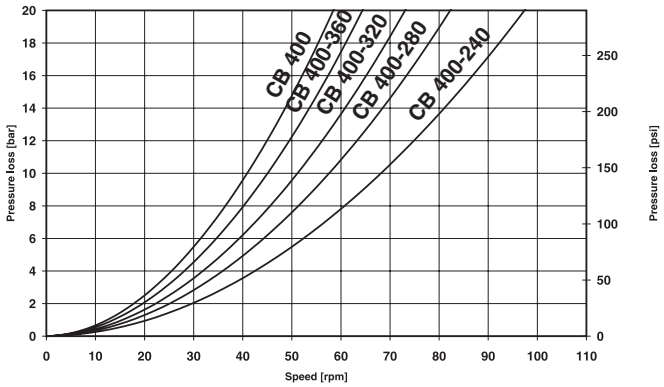


Diagram 19 **CB 400 pressure loss 4 ports**

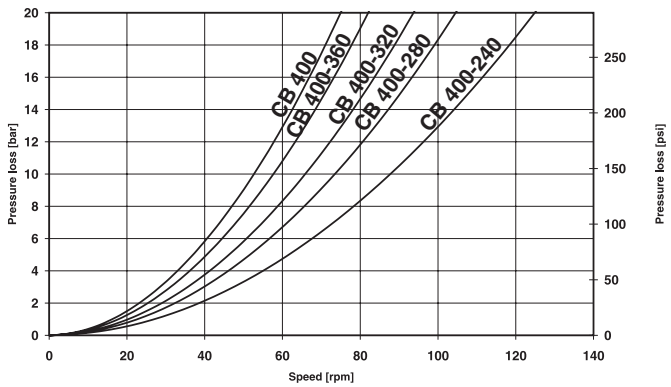


Diagram 20 **CB 560 pressure loss 2 ports**

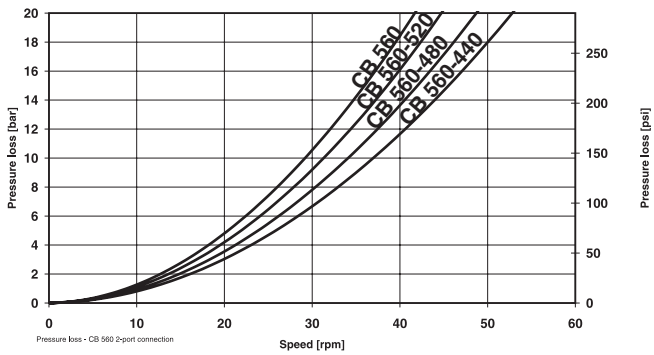


Diagram 21 **CB 560 pressure loss 4 ports**

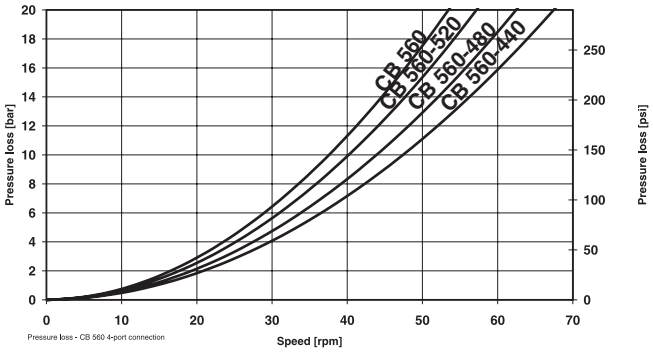


Diagram 22 **CB 840 pressure loss 2 ports**

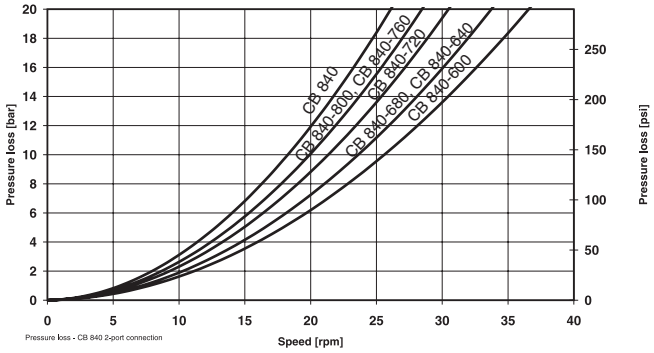


Diagram 23 **CB 840 pressure loss 4 ports**

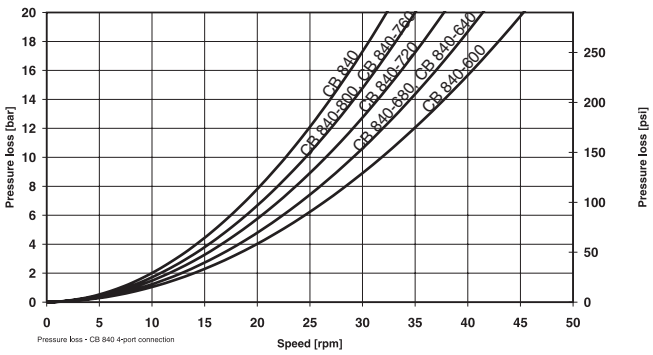


Diagram 24 **CB 1120 pressure loss 2 ports**

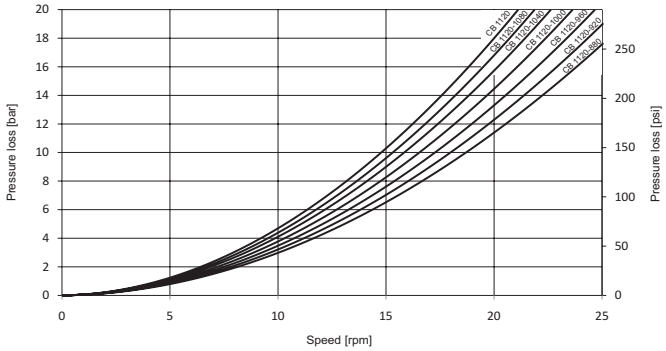
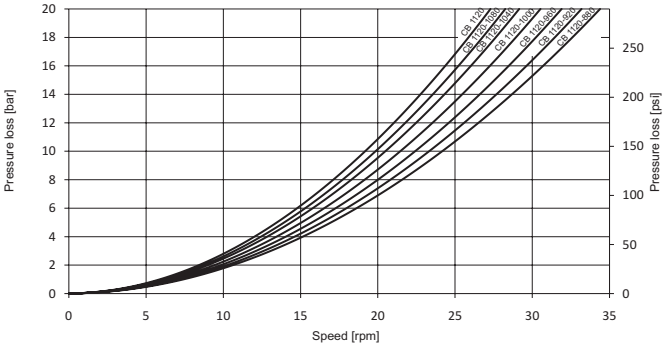
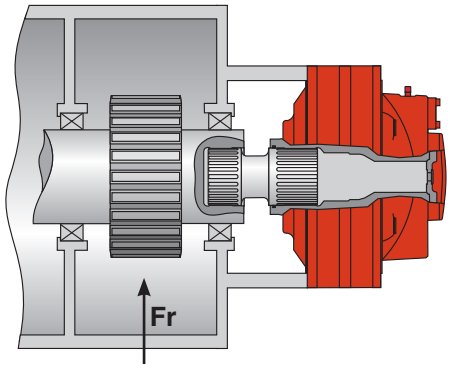


Diagram 25 **CB 1120 pressure loss 4 ports**



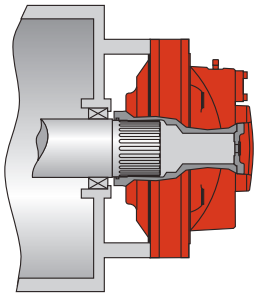
Versatile mounting - examples of installations

Fig. 33



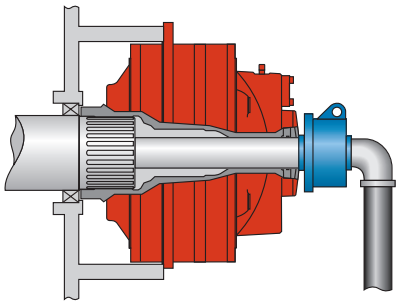
Flange mounted motor with splines and high radial load Fr on driven shaft.

Fig. 34



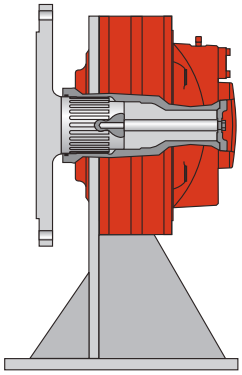
Flange mounted motor with splines and low radial load from driven shaft.

Fig. 35



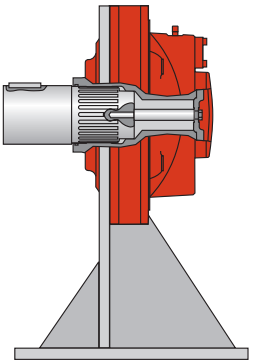
Flange mounted motor with spline and through hole for cooling of driven machine.

Fig. 36



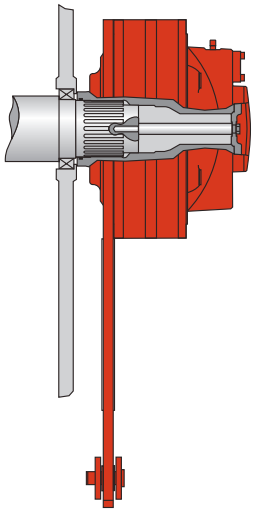
Bracket mounted motor with flange adapter.

Fig. 37



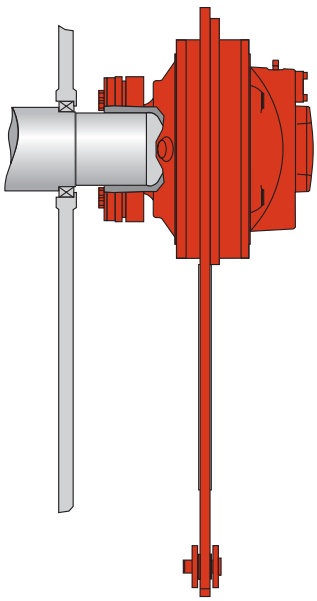
Bracket mounted motor with stub shaft.

Fig. 38



Torque arm mounted motor with splines.

Fig. 39



Torque arm mounted motor with shaft coupling.

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.

RECOMMENDED VISCOSITY IN MOTOR CASE AT OPERATING TEMPERATURE 40-150 cSt/187-720 SSU.
FOR SPEEDS BELOW 3 RPM, COATED PISTON OR HIGH VISCOSITY SHALL BE USED.

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

Minimum viscosity limits at operating temperature in motor case	
Standard motors with uncoated piston and uncoated cam rollers	20 cSt/98 SSU *
Motors type C (coated pistons and coated cam rollers) for speed below 3 rpm or when charge pressure exceeds 50 bar (725 psi) at speed above 50 rpm	10 cSt/59 SSU

* Low viscosity gives reduced service life for the motors

Maximum permitted viscosity is 10 000 cSt/48 000 SSU.

Fire resistant fluid

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

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:R - Phosphate esters	Yes	Viton	Not painted*
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.

Choice of hydraulic fluid

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

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 $\beta 10=75$.

Explanation of "Grade of Filtration"

Grade of filtration β**10=75** indicates the following:
β**10** means the size of particle $\geq 10\mu m$ 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 β**10=75**.
Before the filtration the oil contains *N* number of particles $\geq 10\mu m$ and after passing the filter once the oil contains $\frac{N}{75}$ number of particles $\geq 10\mu m$.
This means that $N - \frac{N}{75} = \frac{74 \cdot N}{75}$ number of particles have been filtered (=98.6%).

Environmentally acceptable fluids

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.

Declaration of Conformity

Example of the Declaration of Conformity given by Hägglunds Drives AB

HÄGGLUNDS

Declaration of Incorporation of partly completed machinery
As defined by the EC Machinery Directive 2006/42/EC, Appendix II B

The manufacturer

Hägglunds Drives AB

hereby declares that the partly completed machinery

Name: Compact CB
Function: Hydraulic motor
Model: Compact
Type: CB
Trade name: Compact CB

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

General principle no. 1.									
1.1.3	1.1.5	1.3.1	1.3.2	1.3.3	1.3.4	1.3.6	1.3.7	1.5.3	1.5.4
1.5.5	1.5.6	1.5.8	1.5.13	1.6.1	1.6.3	1.7.3	1.7.4		

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 ISO 12100-1
SS-EN ISO 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: Björn Leidelöf
Address: Hägglunds Drives AB, S-890 42 Mellansel

Björn Leidelöf Mellansel, 2009-12-29

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

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

www.hagglunds.com

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Our drive is your performance.

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