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Bosch Group
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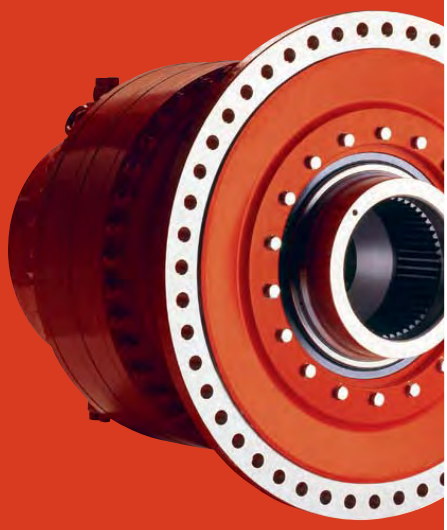
Compact CBP

PRODUCT MANUAL



HÄGGLUNDS

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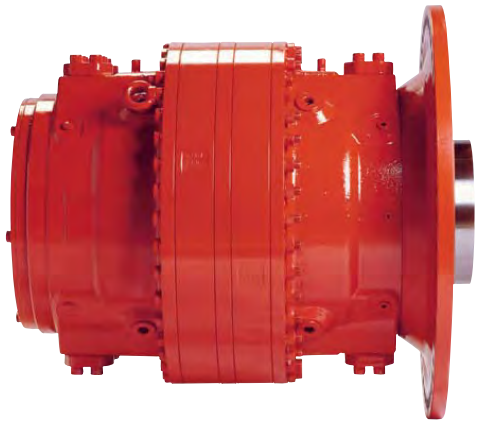
Product Manual

COMPACT CBP

EN 834-4h 2011



One partner all over the world

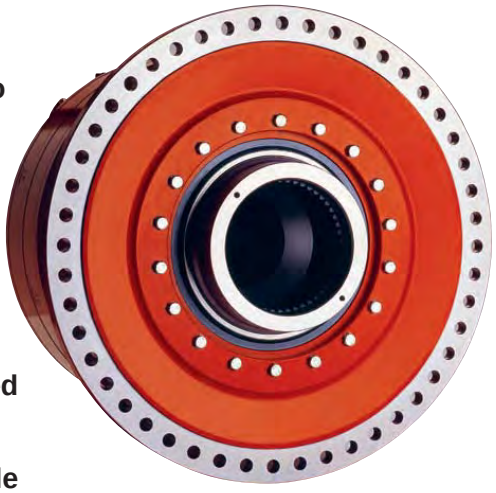
Hägglunds Drives is the worlds leading manufacturer of heavy duty hydraulic drive systems. If what you need is low speed and high torque, then Hägglunds Drives should be your partner. If what you need is a durable drive system that will work under the toughest conditions with a minimum of maintenance, then Hägglunds Drives should be your partner. We develop, manufacture & market complete drive systems and components of the highest quality, based upon our unique radial piston motors. Our industrial and marine customers are to be found all over the world. They know that when they need solutions, support or service, they have in us a partner they can trust. Hägglunds Drives main office and manufacturing plant is situated in Mellansel, Sweden. In addition Hägglunds is represented in 40 countries worldwide.

Original EN834-3h, 2010

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.

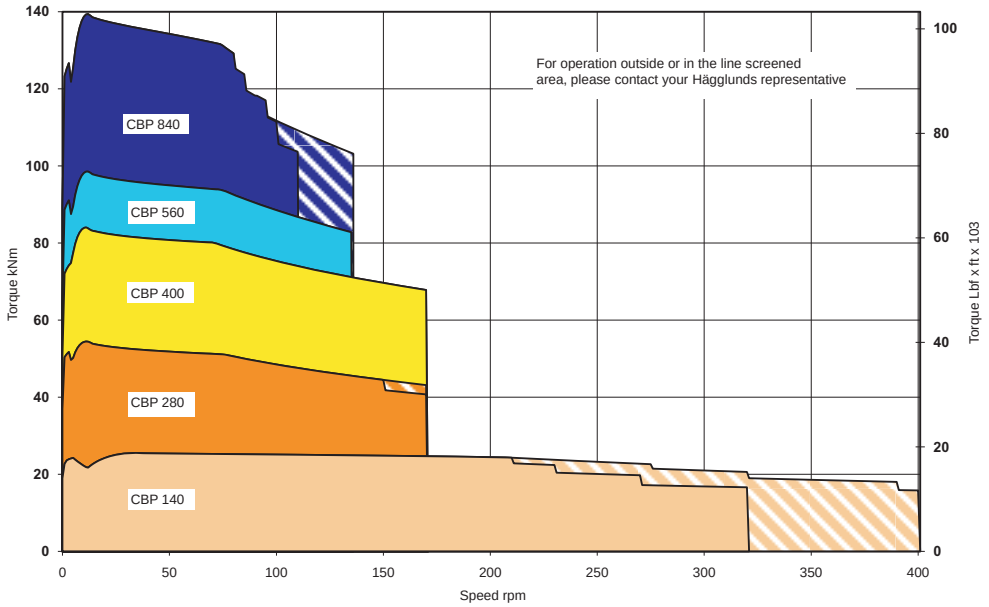
Features of Hägglunds Drives Compact CBP motor

- **Powerful, high power**
- **Higher speeds**
- **High efficiency**
- **High output torque and power to weight ratio**
- **Through hole**
- **Full torque from zero to maximum speed**
- **Small outer diameter**
- **Resistant against shock loads**
- **8 ports for convenient piping and improved performance**
- **Flexible mounting by using splines, suitable for torque arm or flange mounting**



Quick selection diagram for Compact CBP motors

The graphs below represents the torque and speed, corresponding to a modified rating life L_{10aah} = 40 000 hours. Oil viscosity in the motor case 40 cSt (187 SSU).
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).



Functional description

Hägglunds hydraulic industrial motor COMPACT CBP 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 piston 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.

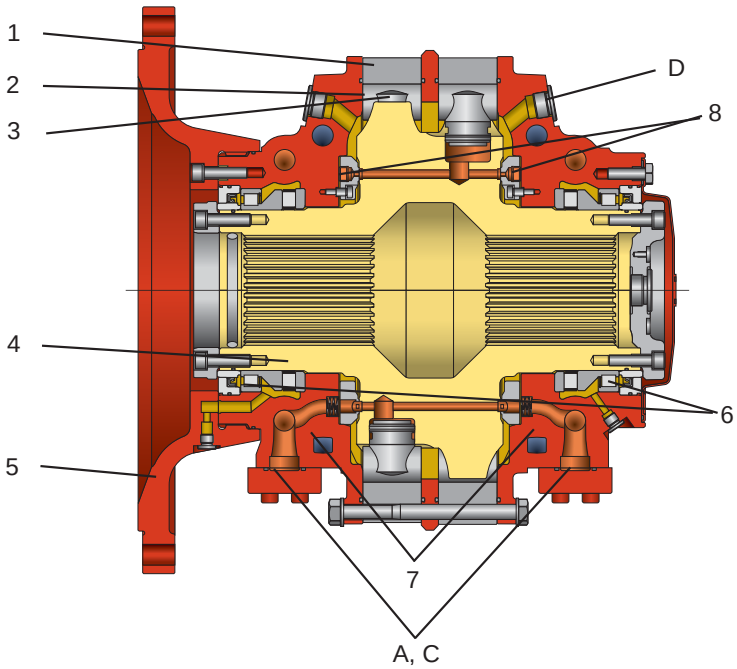
Valid patents

US 4522110, US 005979295A, SE 9101950-5, EP 0102915, JP 83162704, GB 1524437, EP NL 0524437, EP DE 69211238.3.

Quality

To assure our quality we maintain a Quality Assurance system, certified to standard ISO 9001, EN 29001 and BS 5750; Part 1.

CBP 140

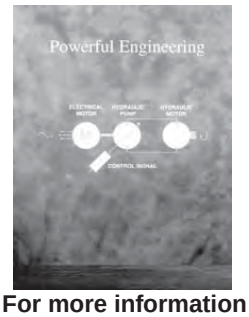


1. Cam ring
2. Cam roller
3. Piston
4. Cylinder block with splines
5. Flange
6. Cylindrical roller bearing
7. Connection block
8. Valve plate

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	=	cm^3/rev	in^3/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 Drives approval.

Accepted conditions for standard type of motor:
1. Oil viscosity 20 - **40** - 10000 cSt (98 - **187** - 4650 SSU). See page 26.
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 page 18).
5. Volumetric losses (see page 22).

Motor data

Metric	Displacement	Specific torque	Rated * speed	Max.**** speed	Max. ** pressure
	$V_i \frac{cm^3}{rev}$	$T_s \frac{Nm}{bar}$	n rpm	n rpm	p bar
CBP 140-80	5 024	80	320	400	350***
CBP 140-100	6 280	100	270	390	350***
CBP 140-120	7 543	120	230	320	350***
CBP 140	8 800	140	210	275	350***
CBP 280-160	10 100	160	170	170	350
CBP 280-200	12 600	200	170	170	350
CBP 280-240	15 100	240	170	170	350
CBP 280	17 600	280	150	170	350
CBP 400-240	15 100	240	170	170	350
CBP 400-280	17 600	280	170	170	350
CBP 400-320	20 100	320	170	170	350***
CBP 400-360	22 600	360	170	170	350***
CBP 400	25 100	400	170	170	350***
CBP 560-440	27 600	440	135	135	350***
CBP 560-480	30 200	480	135	135	350***
CBP 560-520	32 700	520	135	135	350***
CBP 560	35 200	560	135	135	350***
CBP 840-600	37 700	600	110	135	350
CBP 840-640	40 200	640	100	135	350
CBP 840-680	42 700	680	100	135	350
CBP 840-720	45 200	720	95	135	350
CBP 840-760	47 800	760	90	125	350
CBP 840-800	50 300	800	85	120	350
CBP 840	52 800	840	80	115	350

* Related to a required charge pressure of 12 bar/175 psi for motors in braking mode. (Special considerations regarding charge pressure, cooling and choice of hydraulic system for speeds above rated, 8 ports must be used).

** The motors are designed according to DNV-rules. Test pressure 420 bar/6000 psi. Peak/transient pressure 420 bar/6000 psi maximum, allowed to occur 10000 times.

*** Alternating torque direction is not allowed for front mounting flange.

**** For continuous duty, the service life of the shaft seal is affected by case oil temp, case pressure and speed. See Engineering manual ACBP-4.2

US	Displacement	Specific torque	Rated * speed	Max. **** speed	Max. ** pressure
	V_i $\frac{in^3}{rev}$	T_s $\frac{lbf \cdot ft}{1000\ psi}$	n rpm	n rpm	p psi
CBP 140-80	306.6	4 068	320	400	5000***
CBP 140-100	383.2	5 085	270	390	5000***
CBP 140-120	460.3	6 102	230	320	5000***
CBP 140	537	7 119	210	275	5000***
CBP 280-160	610	8 100	170	170	5000
CBP 280-200	760	10 200	170	170	5000
CBP 280-240	920	12 200	170	170	5000
CBP 280	1070	14 200	150	170	5000
CBP 400-240	920	12 200	170	170	5000
CBP 400-280	1070	14 200	170	170	5000
CBP 400-320	1230	16 300	170	170	5000***
CBP 400-360	1380	18 300	170	170	5000***
CBP 400	1530	20 300	170	170	5000***
CBP 560-440	1690	22 400	135	135	5000***
CBP 560-480	1840	24 400	135	135	5000***
CBP 560-520	1990	26 400	135	135	5000***
CBP 560	2150	28 500	135	135	5000***
CBP 840-600	2300	30 500	110	135	5000
CBP 840-640	2450	32 500	100	135	5000
CBP 840-680	2610	34 600	100	135	5000
CBP 840-720	2760	36 600	95	135	5000
CBP 840-760	2910	38 700	90	125	5000
CBP 840-800	3070	40 700	85	120	5000
CBP 840	3220	42 700	80	115	5000

* Related to a required charge pressure of 12 bar/175 psi for motors in braking mode. (Special considerations regarding charge pressure, cooling and choice of hydraulic system for speeds above rated, 8 ports must be used).

** The motors are designed according to DNV-rules. Test pressure 420 bar/6000 psi. Peak/transient pressure 420 bar/6000 psi maximum, allowed to occur 10000 times.

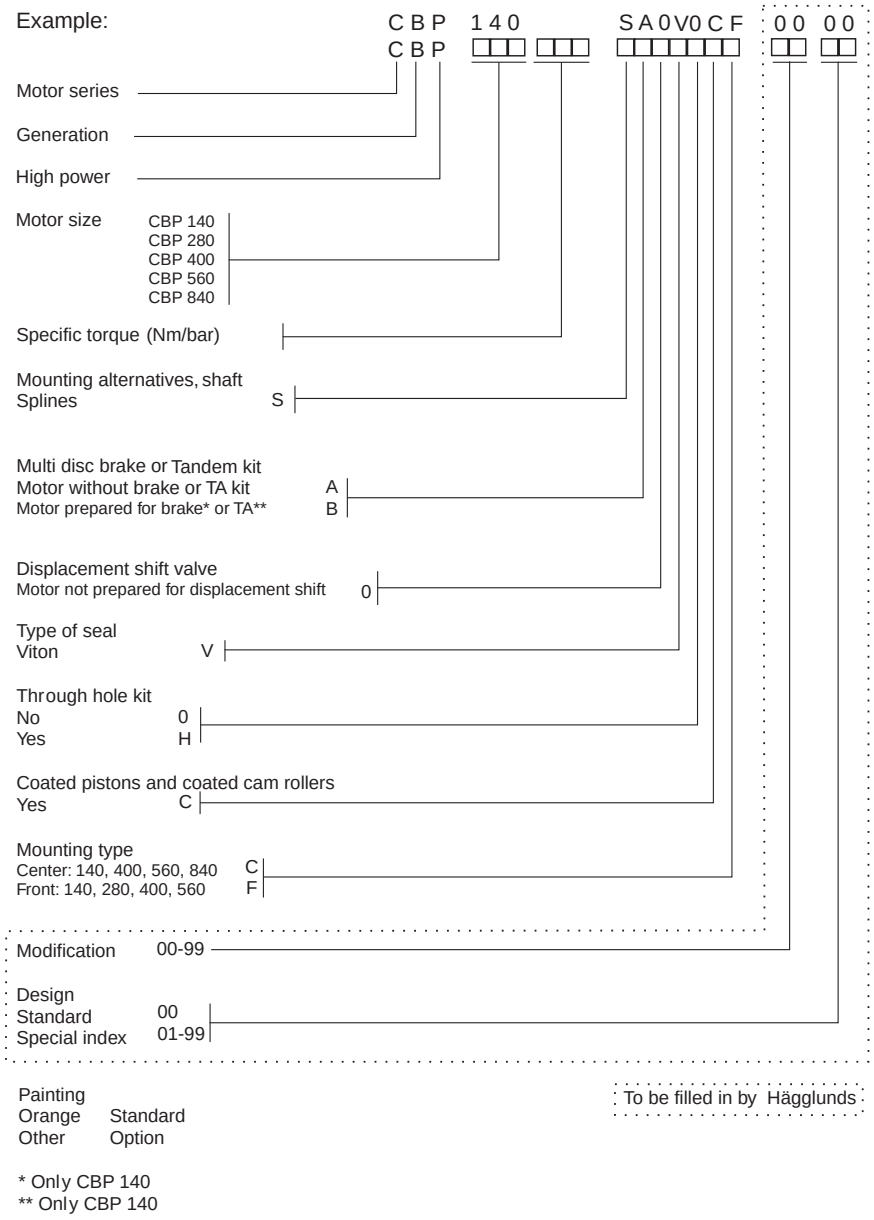
*** Alternating torque direction is not allowed for front mounting flange.

**** For continuous duty, the service life of the shaft seal is affected by case oil temp, case pressure and speed. See Engineering manual ACBP-4.2.

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.

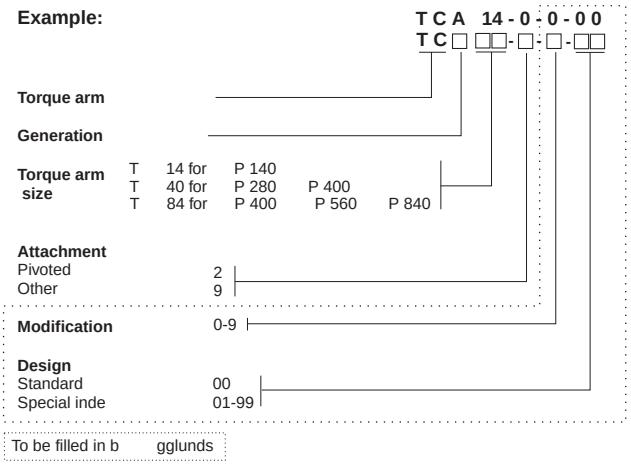
Compact CBP motors



Painting
Orange Standard
Other Option

* Only CBP 140
** Only CBP 140

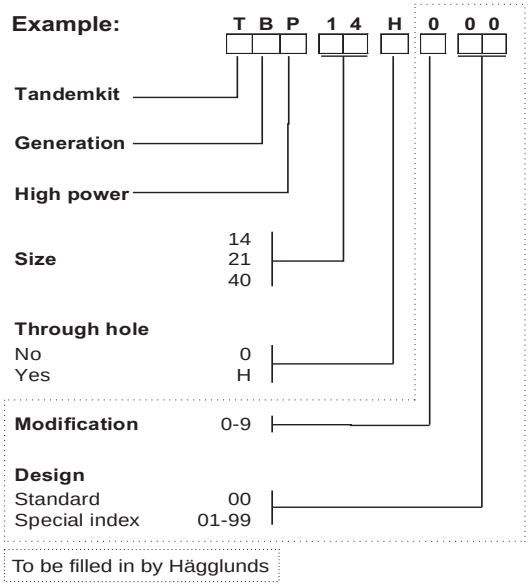
Torque arm



Note: Torque arm incl. Pivot attachment.
TCA 14 - bolts & washers supplied with torque arm.

For P 400 with center mounting

Tandem motors



Dimensions, motor with splines for front mounting

Motor type	A (mm)	B (mm)	C (mm)	D (mm)	E
CBP 140	600	570	510	54	N120x5x30x22x9H
CBP 280	782	858	680	11.5	N200x5x30x38x9H
CBP 400	782	976	680	11.5	N200x5x30x38x9H
CBP 560	940	1036	800	65.5	N260x5x30x50x9H

Motor type	A (in)	B (in)	C (in)	D (in)	E
CBP 140	23.62	22.44	20.08	2.13	N120x5x30x22x9H
CBP 280	30.79	33.78	26.77	0.45	N200x5x30x38x9H
CBP 400	30.79	38.43	26.77	0.45	N200x5x30x38x9H
CBP 560	37.01	40.79	31.50	2.58	N260x5x30x50x9H

Dimensions, motor with splines for centre mounting

Motor type	A (mm)	B (mm)	C (mm)	D (mm)	E
CBP 140	600	511	510	246	N120x5x30x22x9H
CBP 400	940	959	800	457	N200x5x30x38x9H
CBP 560	940	1036	800	534	N260x5x30x50x9H
CBP 840	940	1154	800	534	N260x5x30x50x9H

Motor type	A (in)	B (in)	C (in)	D (in)	E
CBP 140	23.62	20.12	20.08	9.69	N120x5x30x22x9H
CBP 400	37.01	37.76	31.50	17.99	N200x5x30x38x9H
CBP 560	37.01	40.79	31.50	21.02	N260x5x30x50x9H
CBP 840	37.01	45.43	31.50	21.02	N260x5x30x50x9H

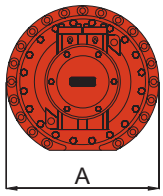
Weight

Front mounting	kg (lb)
CBP 140	410 (900)
CPB 280	1580 (3480)
CBP 400	1930 (4250)
CBP 560	1990 (4390)

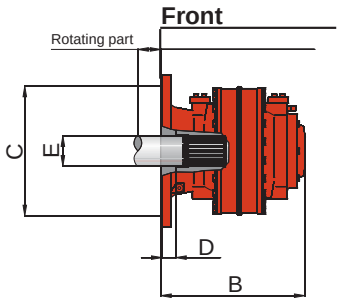
Centre mounting	kg (lb)
CBP 140	360 (780)
CPB 400	1880 (4150)
CBP 560	1890 (4170)
CBP 840	2170 (4780)

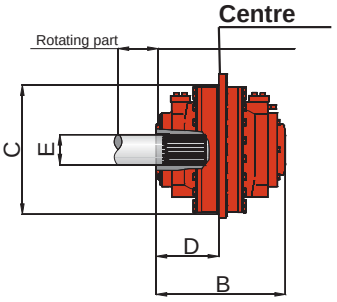
Compact CBP 140

Alternative mounting flange



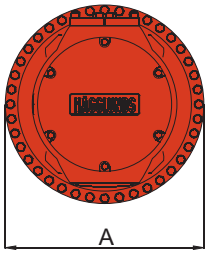
Through hole
ø 110 (4.33)



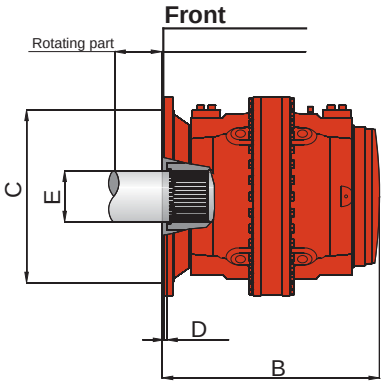


Compact CBP 280, 400

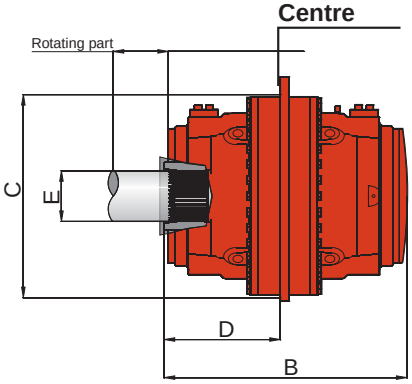
Alternative mounting flange



Through hole
ø 170 (6.69)



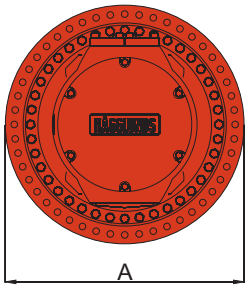
CBP 280, CBP 400



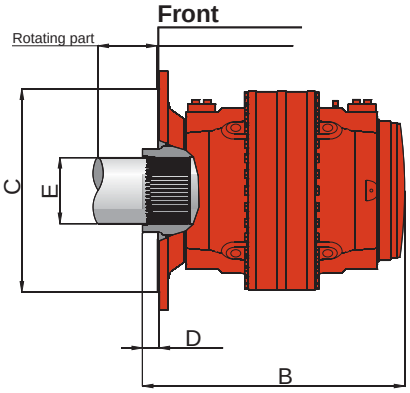
CBP 400 only

Compact CBP 560, 840

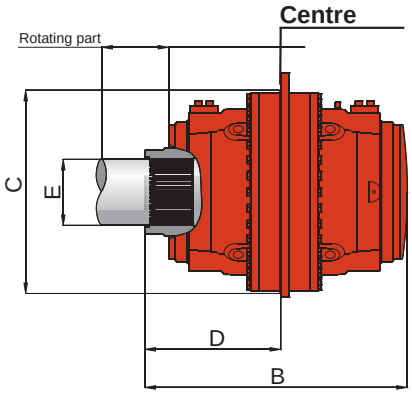
Alternative mounting flange



Through hole
ø 170 (6.69)



CBP 560 only



CBP 560, CBP 840

Dimensions

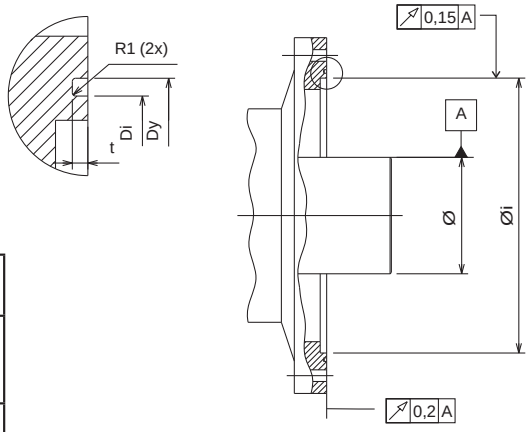
Installation dimensions and material for driven shaft

Spline

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 figure. For control of spline, see table.

When splines are used for torque arm mounting, the spline shall be lubricated with oil at assembly. For production of shaft see, 078 0150, 078 0162, 078 0163, 278 5023, 278 5024, 278 5025 and 278 5026.

Flange mounting



Motor	CBP 140	CBP 280/400	CBP 560/840
Tooth profile and bottom form	DIN 5480	DIN 5480	DIN 5480
Tolerance	8f	8f	8f
Guide	Flank centring	Flank centring	Flank centring
Pressure angle	30°	30°	30°
Module	5	5	5
Number of teeth	22	38	50
Pitch diameter	Ø 110	Ø 190	Ø 250
Minor diameter	Ø 109 $^{0}_{-0.870}$	Ø 188 $^{0}_{-1.201}$	Ø 248 $^{0}_{-1.201}$
Major diameter	Ø 119 $^{0}_{-0.220}$	Ø 199 $^{0}_{-0.290}$	Ø 259 $^{0}_{-0.320}$
Measure over measuring pins	129.781 $^{-0.083}_{-0.147}$	210.158 $^{-0.088}_{-0.157}$	270.307 $^{-0.103}_{-0.181}$
Diameter of measuring pins	Ø 10	Ø 10	Ø 10
Addendum modification X M	+2.25	+2.25	+2.25

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

	Øi	Dy	Di	t	O-ring*
CBP 140	510 $^{+0.1}_{0}$	ø529	ø515	4.4±0.1	2152 2115-566
CBP 280/400	600 $^{+0.20}_{+0.05}$	ø714	ø700	4.4±0.1	2152 2115-743
CBP 560/840	800 $^{+0.20}_{+0.05}$	ø820	ø806	4.4±0.1	2152 2115-793

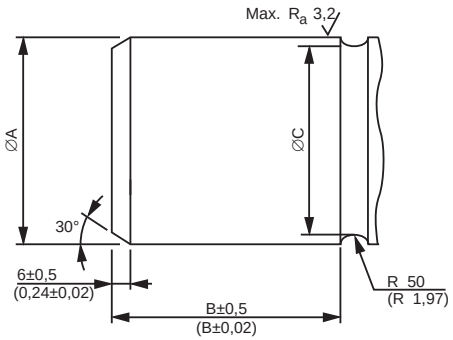
* O-ring to be used in submerged applications, or for external lubrication of the splines.

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.

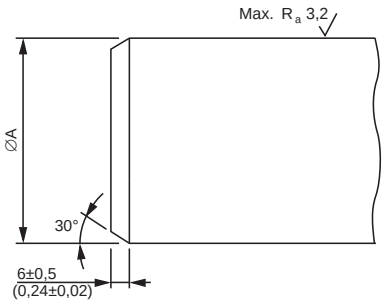


Dim	CBP 280	CBP 400	CBP 560/840
A mm	180 $^{-0.014}_{-0.054}$	200 $^{-0.015}_{-0.061}$	260 $^{-0.017}_{-0.069}$
A in	7.0866 $^{-0.00055}_{-0.00215}$	7.8740 $^{-0.00059}_{-0.00240}$	10.2362 $^{-0.00067}_{-0.00272}$
B mm	106	117	153
B in	4.17	4.61	6.02
C mm	174	194	254
C in	6.85	7.64	10

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

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 and tables.



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

CBP 280 - 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)

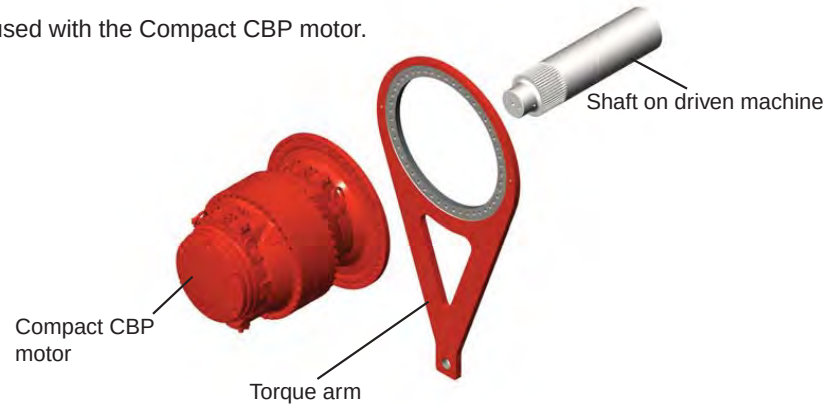
Accessories

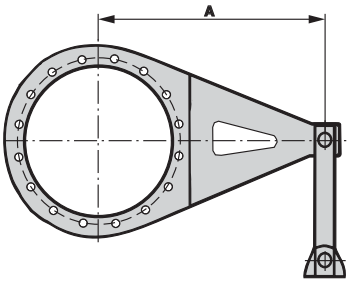
Torque arm, type TCA

Easy to apply - Hägglunds torque arms.

A shaft mounted gearless drive is achieved by utilizing the standard Hägglunds torque arm. As a result, alignment problems, expensive flexible couplings and bed plates are eliminated (see figure below).
For CBP 140/280/400/560 front flange is recommended to be used, to reduce load on splines.

To be used with the Compact CBP motor.

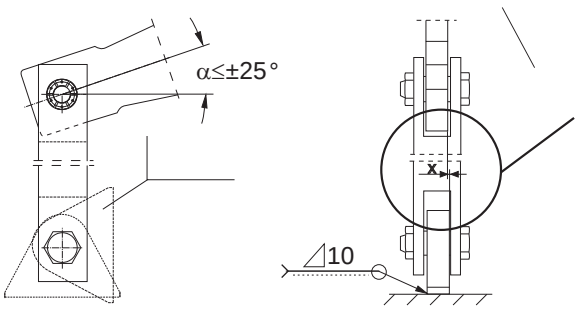




Torque arm	A	
	mm	in
TCA 14	800	31.50
TCA 40	1250	49.21
TCA 84	1500	59.06

Torque arm	Max torque (Nm) For alternating or pulsating torque	Max torque (lbf·ft) For alternating or pulsating torque	Max torque (Nm) At static torque	Max torque (lbf·ft) At static torque
TCA 14 for CBP 140	70 000	51 600	84 000	62 000
TCA 40 for CBP 280/CBP 400	140 000	103 200	170 000	125 300
TCA 84 for CBP 400*/CBP 560/ CBP 840	294 000	216 700	350 000	258 000

* For CBP 400 with centre mounting



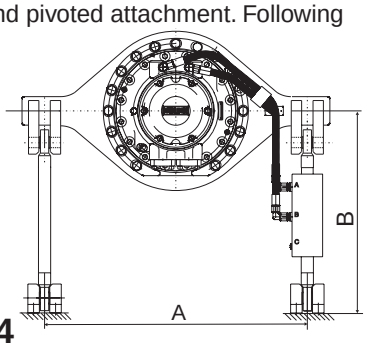
x = ±2 mm (0.079) misalignment in installation.
x ≤ ±15 mm (0.59) movement when in use.

Note: Ideal angle = 0°

Double ended torque arm, type DTCA 140

The double ended torque arm is designed for CBP 140 (not reduced displacement), to eliminate external forces from the torque arm.
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

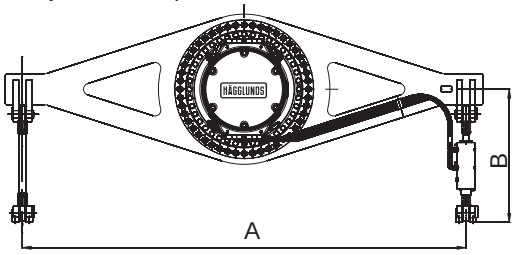


Torque arm	A mm (in)	B mm (in)	Weight kg (lb)
DTCA 140	1165 (45.9)	780 (30.7)	155 (341)

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



	Motor		Tandem motor				
Torque arm	Motor type	Ordering code	Tandem motor type	Ordering code	A mm (in)	B mm (in)	Weight kg (lb)
DTCB 40	CBP 280 F	078 1476-812	CBP280 F + TBP 14 + CBP140	078 1476-814	2120 (83.46)	900 (35.43)	335 (739)
	CBP 280-240 F	078 1476-811	CBP400 F + TBP 14 + CBP140				
	CBP 400 F	078 1476-814					
	CBP 400-360 F	078 1476-813					
	CBP 400-320 F	078 1476-812					
	CBP 400-280 F						
	CBP 400-240 F	078 1476-811					
DTCB 84	CBP 400 C	078 1476-805	CBP400 C + TBP 14 + CBP140	078 1476-805	3000 (118.11)		500 (1102)
	CBP 400-360 C	078 1476-810	CBP560 F + TBP 14 + CBP140	078 1476-808			
	CBP 400-320 C		CBP560 C + TBP 14 + CBP140				
	CBP 400-280 C		CBP840 C + TBP 14 + CBP140	078 1476-809			
	CBP 400-240 C		CBP840 C + TBP 21 + CA210 S28				
	CBP 560 F/C	078 1476-806	CBP560 C + TBP 40 + CBP280	078 1476-808			
	CBP 560-520 F/C		CBP560 C + TBP 40 + CBP400	078 1476-809			
	CBP 560-480 F/C	078 1476-805					
	CBP 560-440 F/C						
	CBP 840 C	078 1476-809					
	CBP 840-800 C						
	CBP 840-760 C	078 1476-808					
	CBP 840-720 C						
	CBP 840-680 C						
	CBP 840-640 C						
	CBP 840-600 C	078 1476-807					

F = Front C = Centre

Mounting set SMCB1 for speed encoder

Speed encoder kit for Compact CBP 140 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.

The speed encoder kit is also available in a explosion proof version, please see Engineering Manual ACBP-3.4.1.

CBP 140 with SMCB1

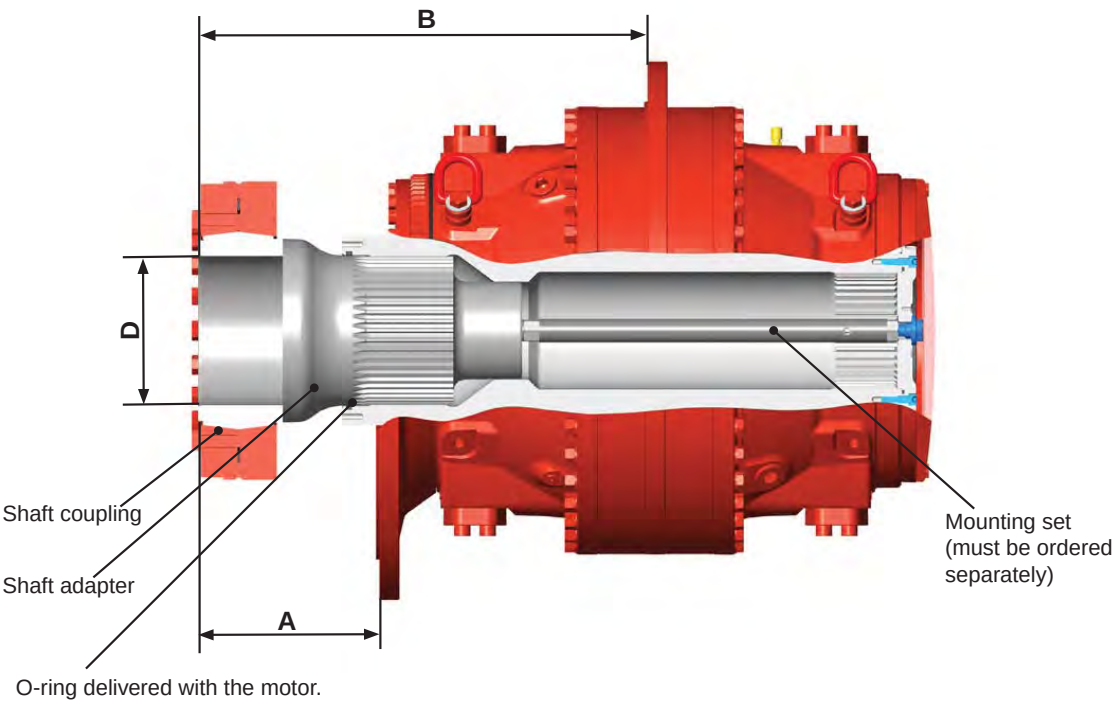
CBP 560 with SMCB1

Shaft coupling set, CBP 140-840

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 CBP 140	078 0693-804
Shaft coupling set CBP 280	078 0693-803
Shaft coupling set CBP 400	078 0693-802
Shaft coupling set CBP 560/840	078 0693-801

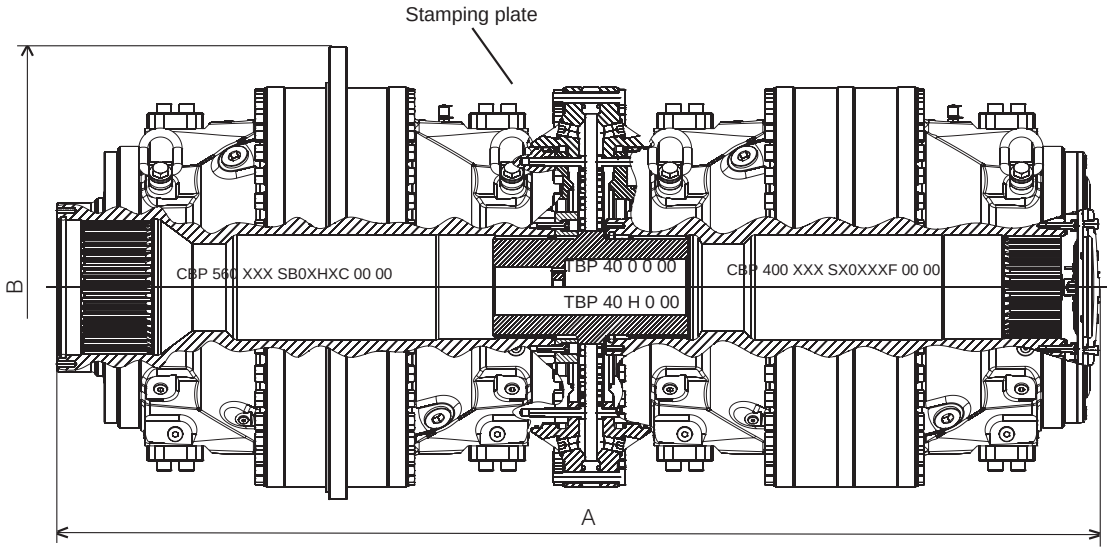


Motor	A mm (in)	B mm (in)	D mm (in)	Weight kg (lb)
CBP 140	94 (3.7)	394 (15.51)	140 (5.5)	84 (185)
CBP 280	161 (6.3)	N/A	180 (7.1)	134 (295)
CBP 400	183 (7.2)	651 (25.6)	200 (7.9)	160 (353)
CBP 560	315 (12.4)	783 (30.8)	260 (10.2)	277 (611)
CBP 840	N/A	783 (30.8)	260 (10.2)	277 (611)

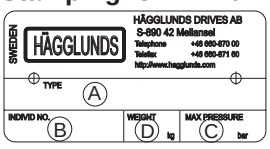
Compact Tandem Motors

A Tandem motor consists of 3 major units, Front motor + Tandem kit TBP xx + Rear motor. The Tandem kit (TBP 14/21/40) shall always be chosen according to the rear Standard spline motor. On the stamping sign on the Tandem kit, are the max pressure and the total weight for the complete unit declared. Note that the complete Ordering code for a Tandem motor, contains of 3 individual Ordering codes (3 parts).

Example:
CBP 560 XXX SB0XHXC 00 + TBP 40 X 00 + CBP 400 XXX SX0XXXF 00 00



Stamping for TBP-unit

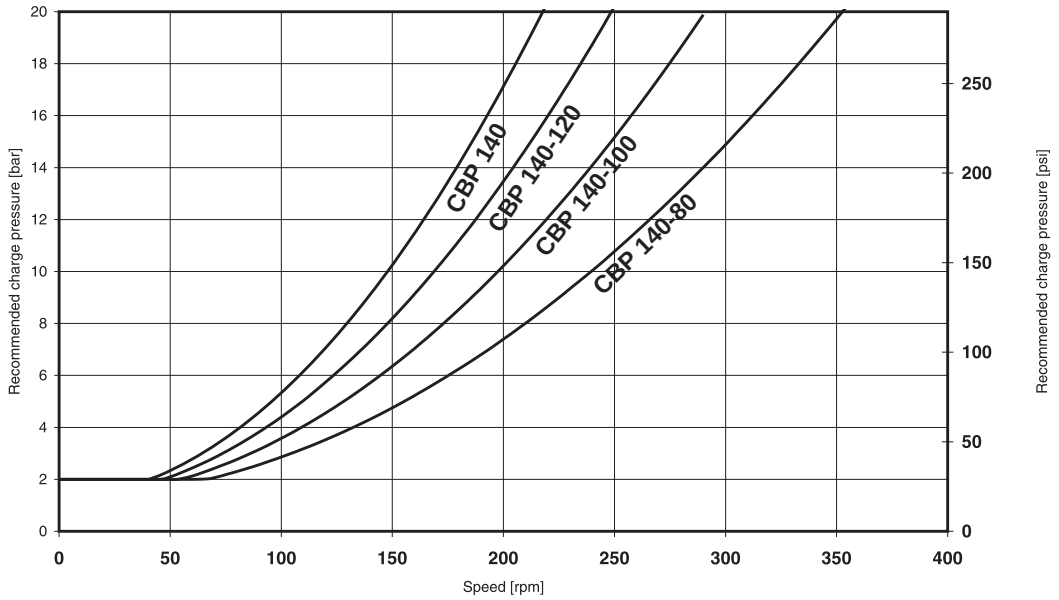


A: TA-type, same as Ordering code
B: Week of assembly (yy-ww)
C: Max working pressure for the assembly
D: Total weight of the assembly

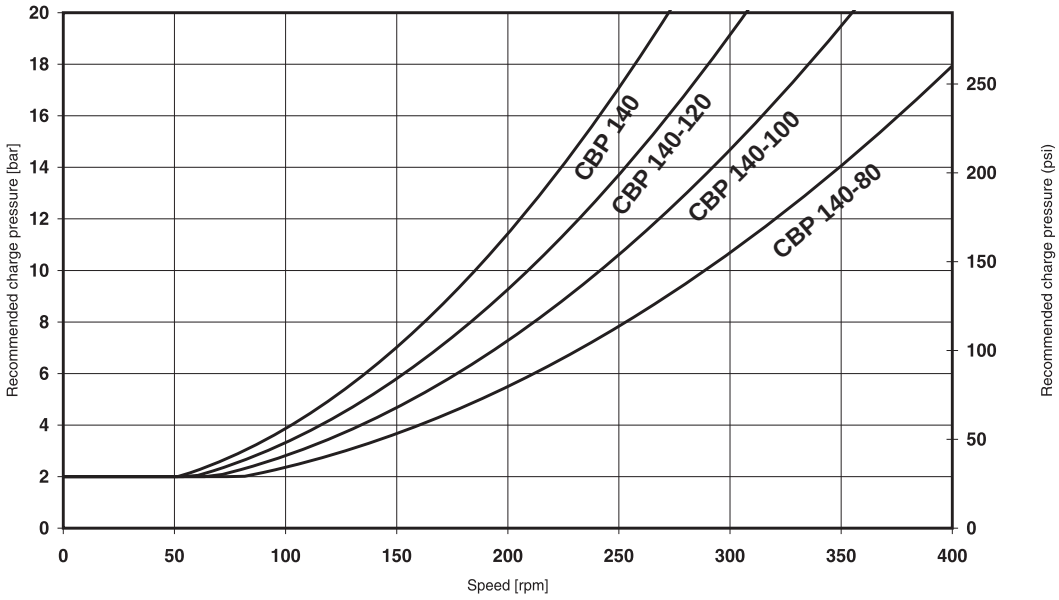
Tandem motor	Max. pressure bar (psi)	Total weight kg (lb)	A Length mm (in)	B Diameter mm (in)	Max. torque to driven shaft* Nm (lbf·ft)
CBP280 F + TBP 14 + CBP140	350 (5000)	2080 (4586)	1387 (54.6)	782 (30.8)	147 000 (108 422)
CBP400 F + TBP 14 + CBP140	350 (5000)	2430 (5357)	1505 (59.3)		189 000 (139 399)
CBP400 C + TBP 14 + CBP140	350 (5000)	2380 (5247)	1494 (58.8)	940 (37.0)	
CBP560 F + TBP 14 + CBP140	350 (5000)	2500 (5512)	1505 (59.3)		245 000 (180 703)
CBP560 C + TBP 14 + CBP140	350 (5000)	2400 (5291)	1571 (61.9)		
CBP840 C + TBP 14 + CBP140	350 (5000)	2670 (5886)	1689 (66.5)		343 000 (252 984)
CBP840 C + TBP 21 + CA210 S28	350 (5000)	2860 (6305)	1664 (65.5)		367 500 (271 054)
CBP560 C + TBP 40 + CBP280	350 (5000)	3690 (8135)	1929 (75.9)		294 000 (216 843)
CBP560 C + TBP 40 + CBP400	350 (5000)	4040 (8906)	2047 (80.6)		392 000 (289 124)

Diagrams for Compact CBP

Charge pressure - Compact CBP 140, 4-port connection



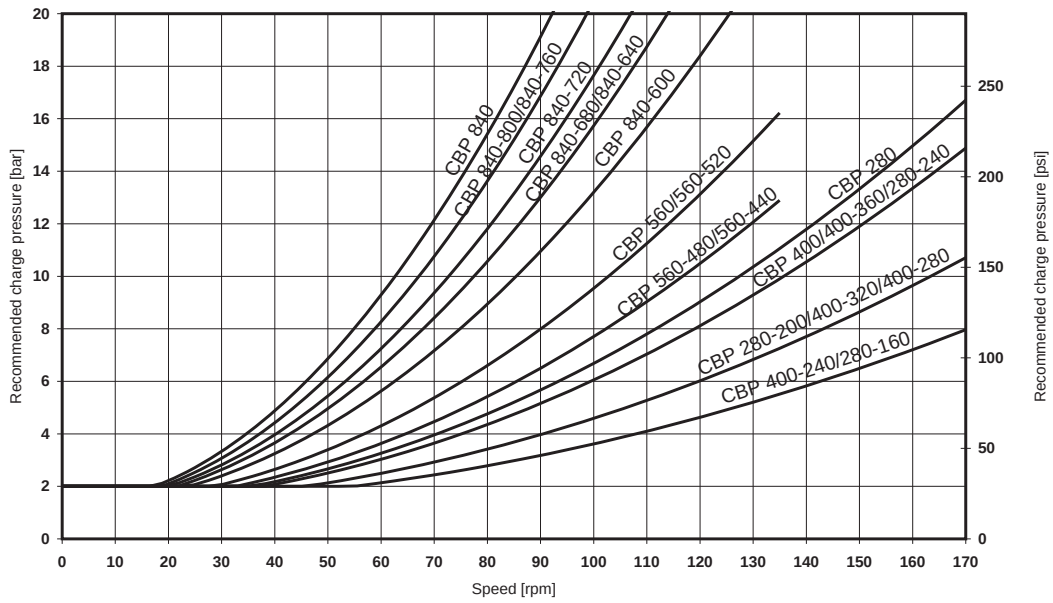
Charge pressure - Compact CBP 140, 8-port connection



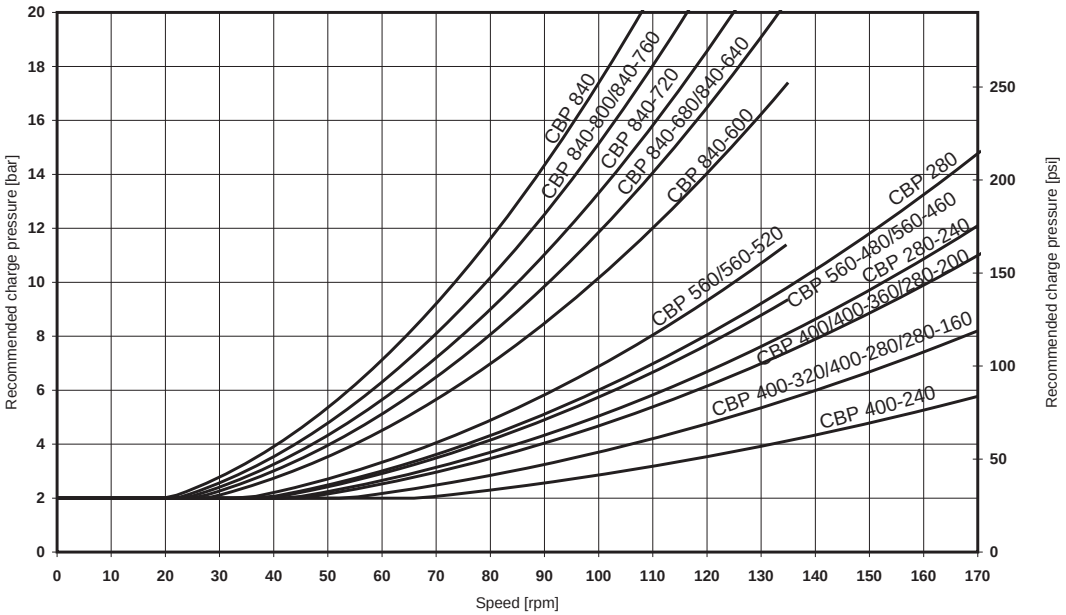
Case 1: The motor works in braking mode. Required charge pressure at the inlet port is according to diagram above.

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).

Charge pressure - Compact CBP 280-840, 4-port connection



Charge pressure - Compact CBP 280-840, 8-port connection

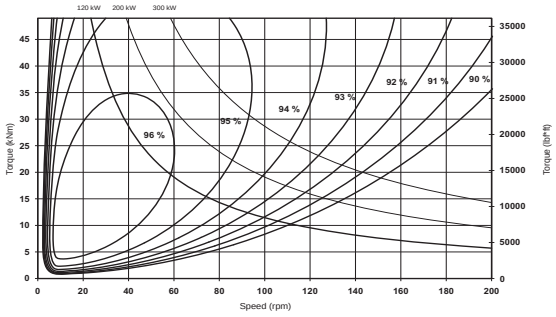


Case 1: The motor works in braking mode. Required charge pressure at the inlet port is according to diagram above.

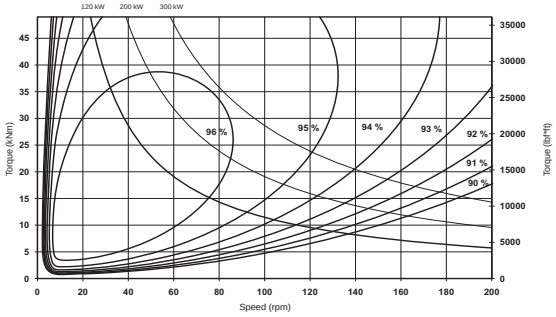
Case 2: The motor works in driving mode only. Required back pressure at the outlet port corresponds to 30% of value given in diagram above, but may not be lower than 2 bar (29 psi).

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

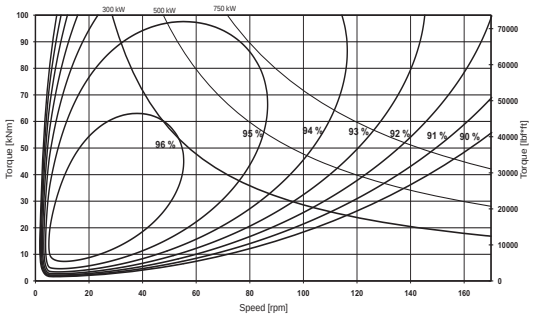
CBP 140, 4 ports



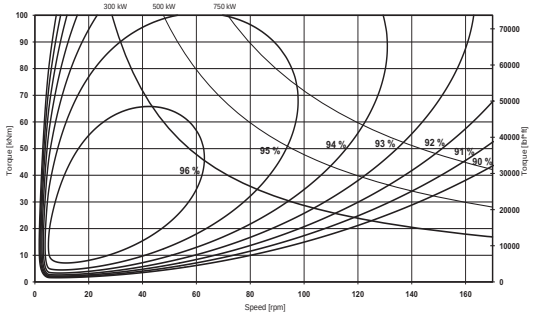
CBP 140, 8 ports



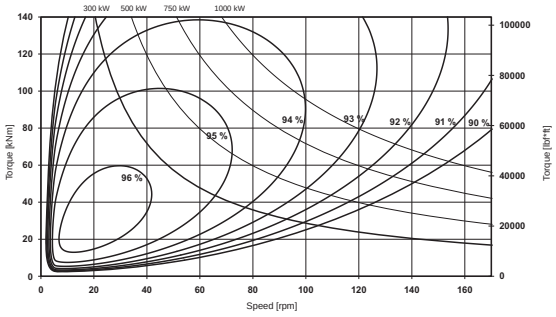
CBP 280, 4 ports



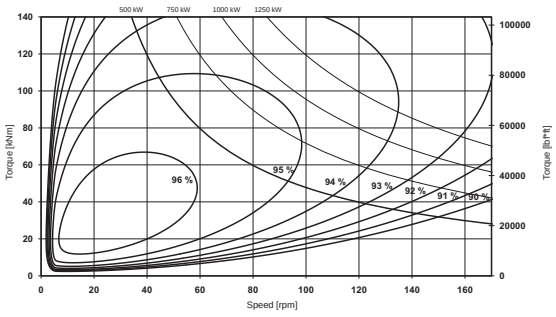
CBP 280, 8 ports



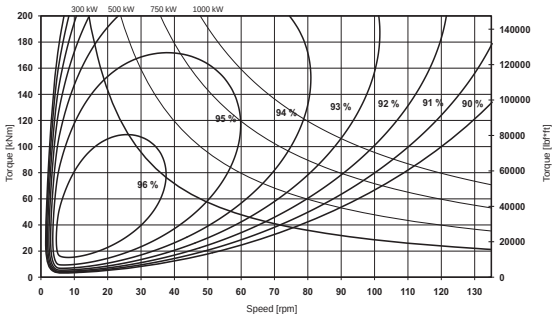
CBP 400, 4 ports



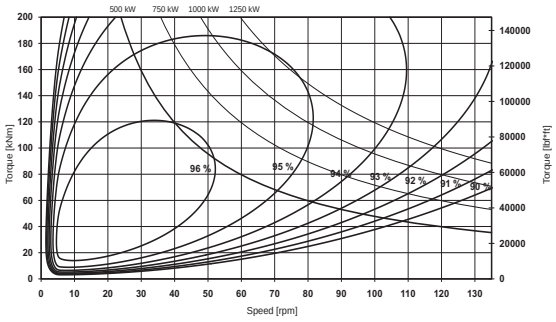
CBP 400, 8 ports



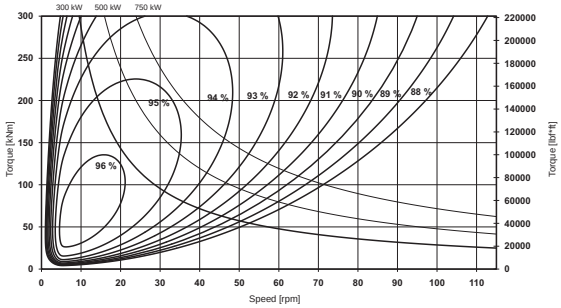
CBP 560, 4 ports



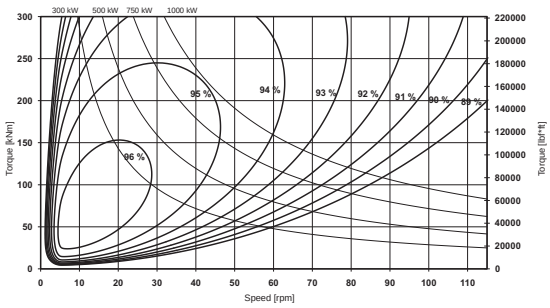
CBP 560, 8 ports



CB 840, 4 ports



CBP 840, 8 ports



For more information about flushing of motor case please see Engineering manual ACBP-4.5.

Flushing of motor case

The Compact CBP motors have very high total efficiency and 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 maximum allowed power for the motor.

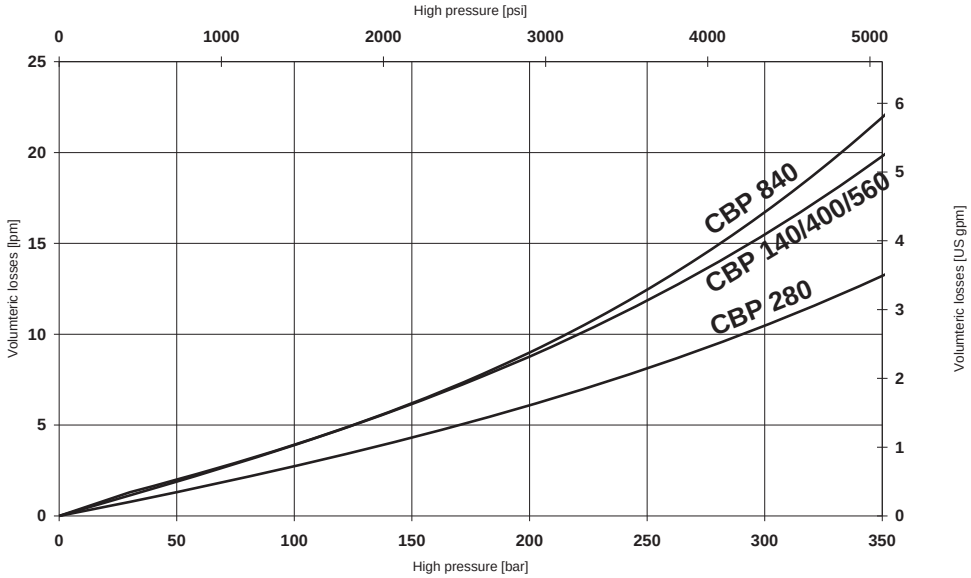
For continuous duty the motor case must be flushed when the power exceed the following maximum power:

Max power without flushing

CBP 140/280	120 kW	(160 hp)
CBP 400/560/840	170 kW	(227 hp)

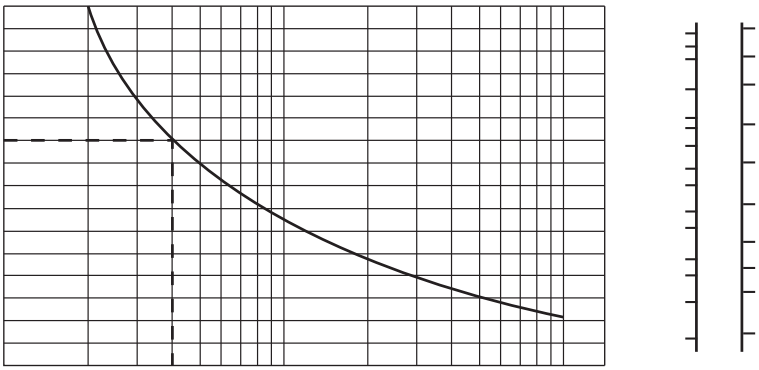
Volumetric losses - Compact CBP motors

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



Variation in volumetric loss at different oil viscosities for Compact motors

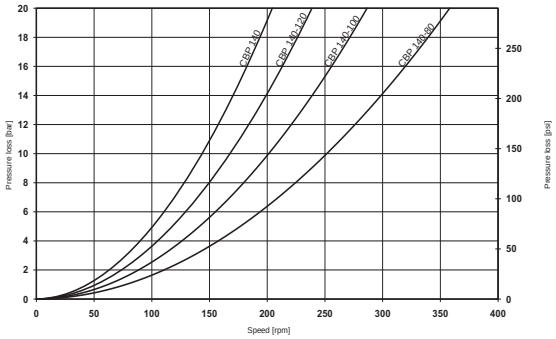
When calculating volumetric losses using other viscosities than 40 cSt/187 SSU, multiply the value given in the volumetric loss diagram by the factor K.



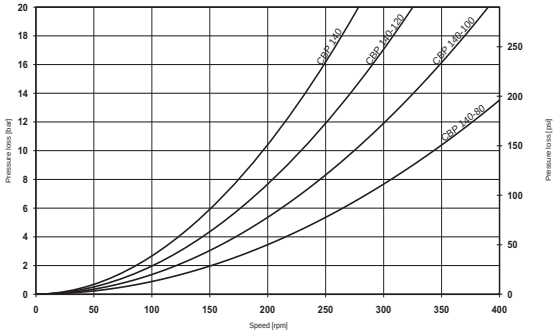
Diagrams for Compact CBP

Pressure loss, oil viscosity 40 cSt/187 SSU

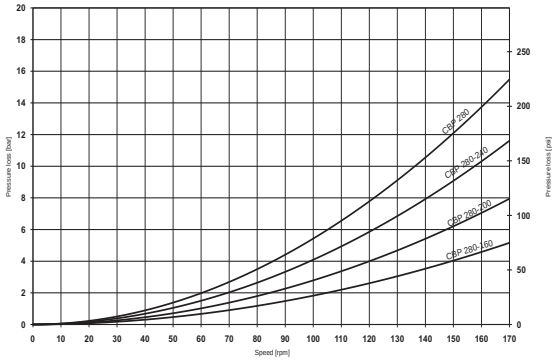
CBP 140 pressure loss 4 ports



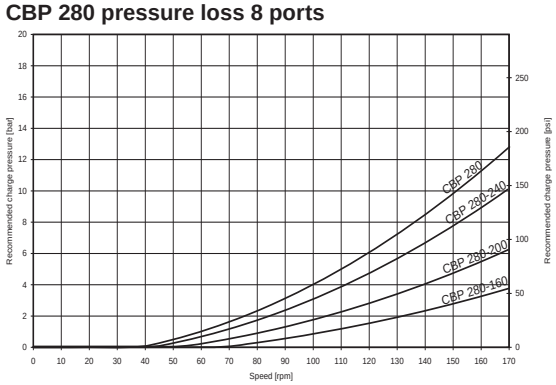
CBP 140 pressure loss 8 ports



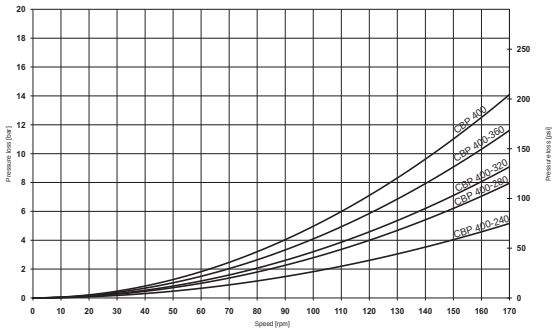
CBP 280 pressure loss 4 ports



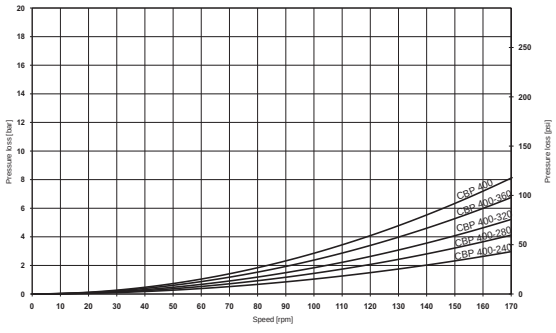
CBP 280 pressure loss 8 ports



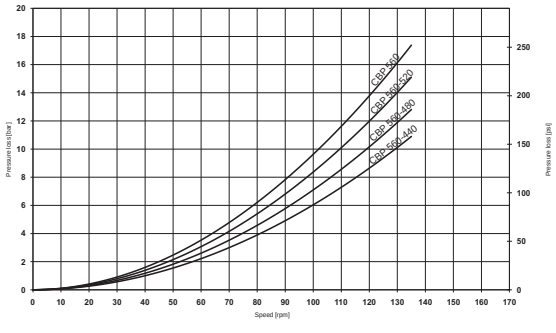
CBP 400 pressure loss 4 ports



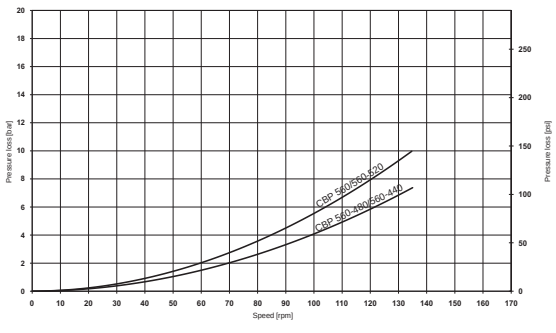
CBP 400 pressure loss 8 ports



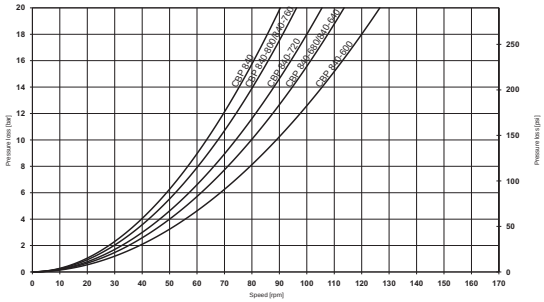
CBP 560 pressure loss 4 ports



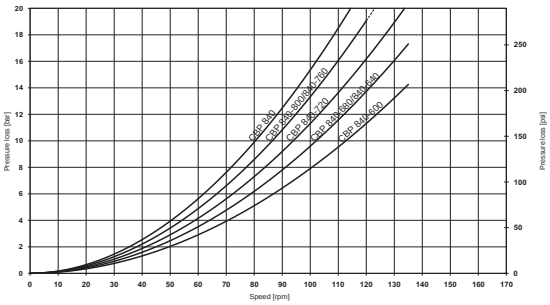
CBP 560 pressure loss 8 ports



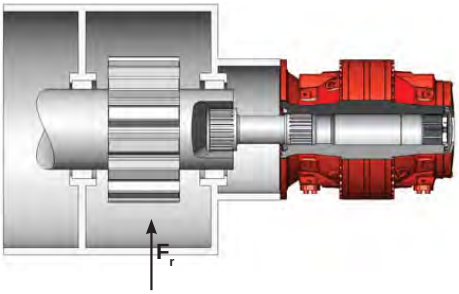
CBP 840 pressure loss 4 ports



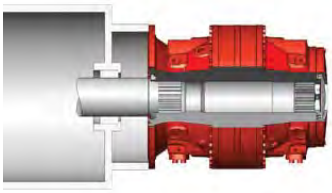
CBP 840 pressure loss 8 ports



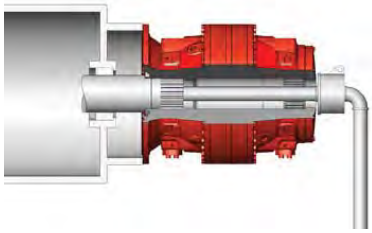
Versatile mounting - examples of installations



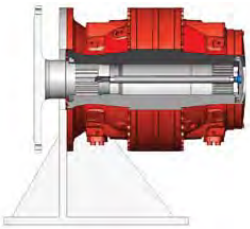
Flange mounted motor with splines and high radial load F_r on driven shaft.



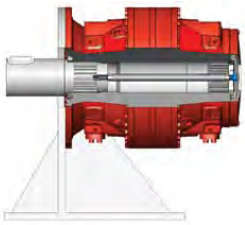
Flange mounted motor with splines and low radial load from driven shaft.



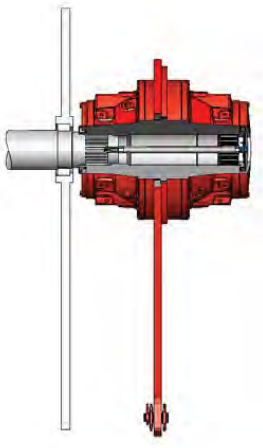
Flange mounted motor with spline and through hole for cooling of driven machine.



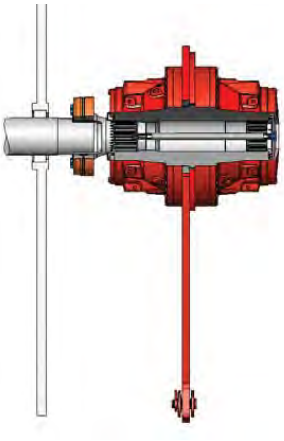
Bracket mounted motor with flange adapter.



Bracket mounted motor with stub shaft.



Torque arm mounted motor with splines.



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 or 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%.

Minimum viscosity limits at operating temperature in motor case	
CBP 140 motors type C (coated pistons and coated cam rollers)	10 cSt/ 59 SSU*
CBP 280-840 motors type C (coated pistons and coated cam rollers) up to 80 rpm	10 cSt/ 59 SSU*
CBP 280-840 motors type C (coated pistons and coated cam rollers) up to 170 rpm	30 cSt/ 142 SSU*

Temperature limits	
Normal operating temperature should be less than +50 °C (122 °F). When operating with synthetic fluids, temperature should be less than +65 °C (150 °F).	
Viton seals	-20 °C to +100 °C
Viton seals	-4 °F to +212 °F

*Low viscosity gives reduced service life for the motors.
Max permitted viscosity is 10000 cSt/48000 SSU
Viscosity index = 100 is recommended. Viscosity index = 150 can be used for operation with large temperature difference, however many hydraulic fluids with VI-improvers 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.

Fire resistant fluid

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

Fluid	Approved	Internal paint
HFA: Oil (3-5%) in water emulsion	No	-
HFB: Inverted emulsion 40-45% water in oil	Yes	Not painted*
HFC: Water-glycol	Yes	Not painted*
HFD synthetic fluids		
HFD:R - Phosphate esters	Yes	Not painted*
HFD:S - Chlorinated hydrocarbons	Yes	Not painted*
HFD:T - Mixture of the above	Yes	Not painted*
HFD:U - Other compositions	Yes	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 ≥ 10 μm 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 ≥ 10 μm and after passing the filter once the oil contains $\frac{N}{\mathbf{75}}$ number of particles ≥ 10 μm.

This means that $N - \frac{N}{\mathbf{75}} = \frac{74 \cdot N}{\mathbf{75}}$ number of particles have been filtered (=98.6%).

Environmentally acceptable fluids

Fluid	Approved	Internal paint
Vegetable */** Fluid HTG	Yes	-
Synthetic ** Esters HE	Yes	-

* 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 CBP
Function: Hydraulic motor
Model: Compact
Type: CBP
Trade name: Compact CBP

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	1.2.1	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	1.7.2	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.