Radial piston hydraulic motor Hägglunds CAb

RE 15354
Edition: 12.2016
Replace: 01.2015

- Frame Size: CAb 10, 20, 30, 40
- Displacement: 503 ... 2 513 cm^3/rev [31 - 153 in^3/rev]
- Specific torque: 8 ... 40 Nm/bar [407 ... 2 034 lb_f·ft/1000 psi]
- Maximum speed: 310 ... 350 rpm
- Maximum operating pressure: 250 bar [3 626 psi]

Features

- High power density
- Energy efficient
- Flexibility, many sizes, few mechanical interfaces
- Insensitive to chock loads
- No vibrations i.e. no flow pulsation 100% constant displacement, the symmetrical design allows forces to be balanced- radial forces oppose each other and no centrifugal forces due to the rotation
- Trough hole diameter 45 mm
- Small footprint (total occupied volume)

Contents

1 Ordering code

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

CA	B		0010		0010		S		F		00	0		0	
01	02		03		04		05		06		07	08		09	

01	**Motor series**	
	Compact	**CA**

02	**Type**		
	Basic	●	**B**
	Premium	–	**P**

03	**Frame size**	
	0010	**0010**
	0020	**0020**
	0030	**0030**
	0040	**0040**

04	**Specific torque, Nm/bar [1)]**				
	Frame size 10		**0008**	**0010**	**0012**
			●	●	●
	Frame size 20	**0016**	**0018**	**0020**	**0022**	**0025**
		●	●	●	●	●
	Frame size 30	**0028**	**0030**	**0032**	**0035**	**0037**
		●	●	●	●	●
	Frame size 40			**0040**	**0045**	**0050**
				●	–	–

05	**Mounting alternatives, drive shaft**	
	Spline DIN 5480 N	**S**

06	**Mounting alternatives, motor case**	**CA 10**	**CA 20**	**CA 30**	**CA 40**	
	Front flange	●	●	●[2)]	–	**F**
	Center flange	–	–	●	●	**C**

07	**Prepared for brake or tandem kit**		
	No	●	**0**
	Prepared for brake	–	**1**
	Prepared for tandem kit	–	**2**
	Mounted brake		
	No	●	**0**
	Yes	–	**A**

08	**Displacement shift**		
	Single speed motor	●	**0**
	Two speed motor	–	**2**

09	**Increased robustness**		
	No	●	**0**
	Yes	–	**C**

0		N		00		0		0		0		3		2002		0		01		00
10		11		12		13		14		15		16		17		18		19		20

10	**Through hole**		
	No	●	**0**
	Yes	●	**1**

11	**Type of seal**		
	NBR (Nitrile)	●	**N**
	FPM (Viton)	–	**V**

12	**Speed encoder**		
	No	●	**00**
	Yes	●	**01**

13	**Temperature sensor**		
	No	●	**0**
	Yes	–	**1**

14	**Reinforced bearing**		
	No	●	**0**
	Yes	–	**1**

15	**Explosive environment**		
	Non explosive environment	●	**0**
	Explosive environment	–	**1**

16	**Painting system** *(Refer to 4.13 Painting system page 31)*		
	C3 (normal industrial atmosphere)	●	**3**
	C5M (marine and other aggressive atmospheres)	●	**5**

17	**Painting colour**		
	std RAL 2002	●	**2002**
	Special RAL 1000 - 9023 **)Specify with RAL colour code	●	****

18	**Internal paint**		
	Painted	–	**0**
	Without paint	●	**1**

19*	**Modification (Technical Improvment) [3]**	**00-99**

20*	**Special design [3]**	
	Standard	**00**
	Special index	**01-99**

● = Available – = Not available

[1]) For exact, non-rounded values of specific torque, see *4.2 Motor data page 8*
[2]) Only valid for specific torque up to 30 Nm/bar
[3]) To be filled in by Bosch Rexroth DC-IA/EHD

2 Functional description

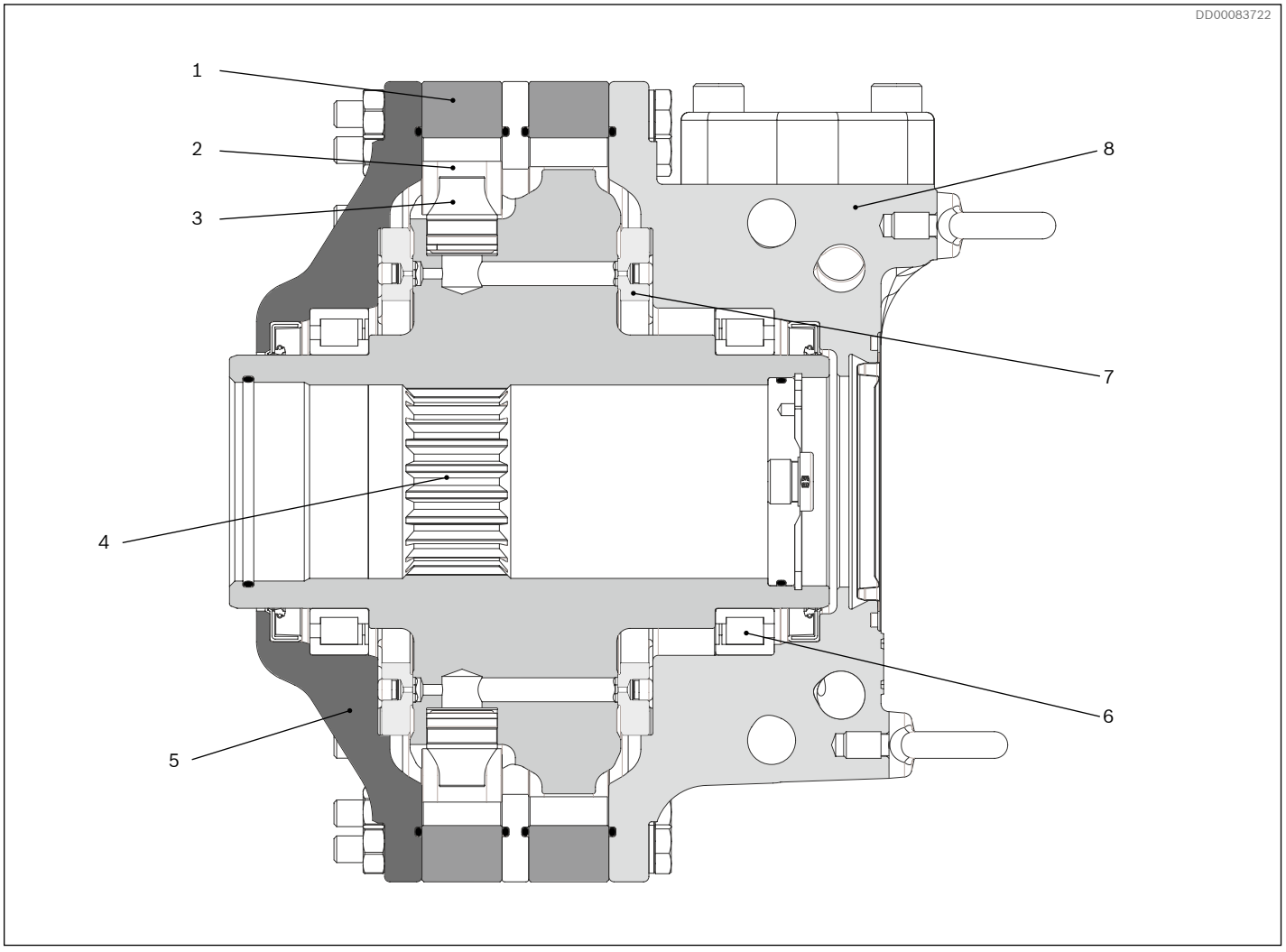

Fig. 1: Section view of radial piston hydraulic motor

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

Bosch Rexroth‘s hydraulic industrial motor Hägglunds CAb is of 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 distributor directs the incoming and outgoing oil to and from the working pistons. Each piston is working against a cam roller.

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

Oil main lines are connected to ports A and C in the connection block and drain lines to ports D1, D2 and D3 in the motor housing.

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

Quality

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

3 Fluid connections

3.1 Hydraulic symbol

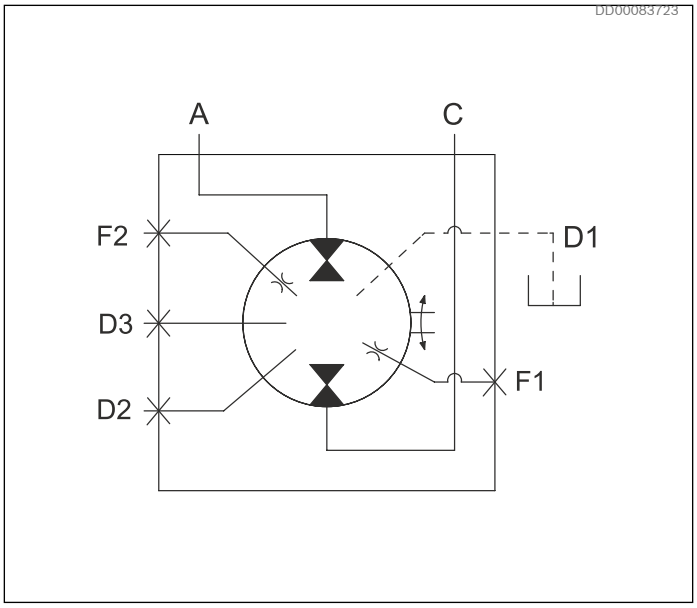

Fig. 2: Hydraulic symbol, radial piston hydraulic motor

Port locations and dimensions, see *Table 1: Port dimensions*

3.2 Port connections

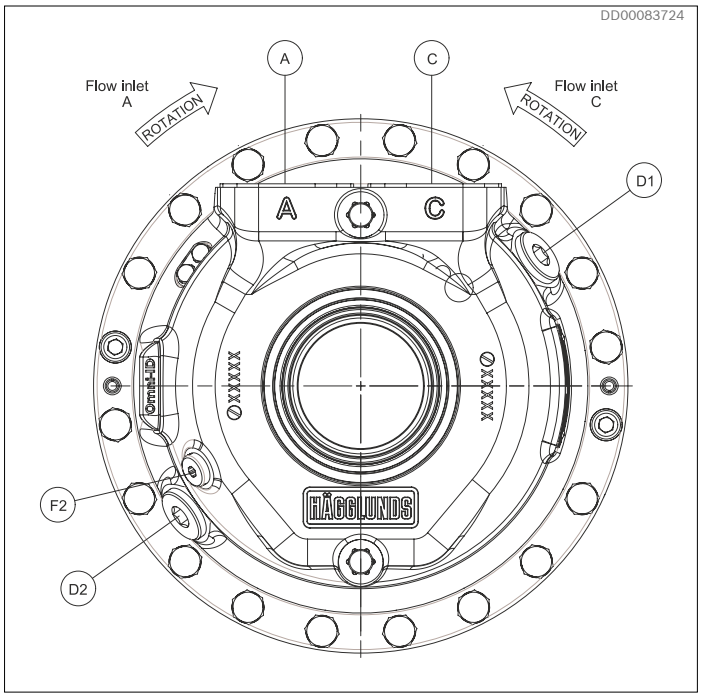

Fig. 3: Connection side of the motor

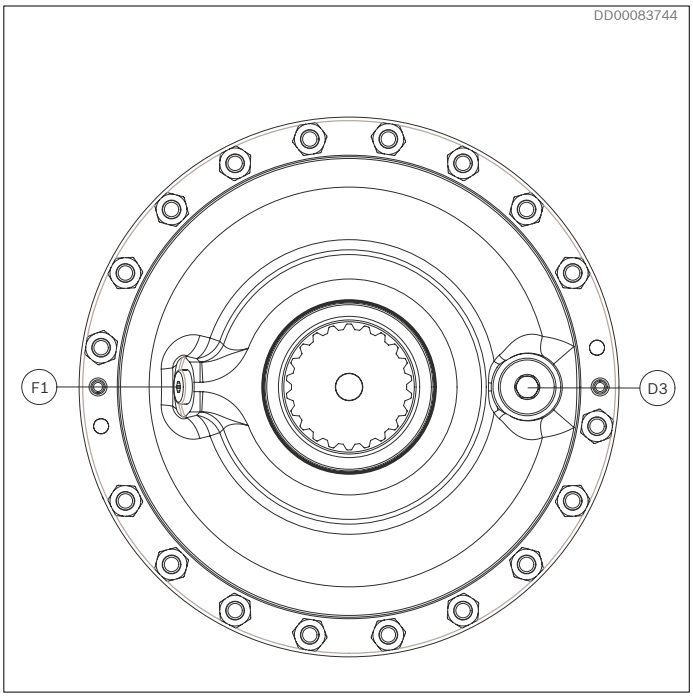

Fig. 4: Shaft side of the motor

Table 1: Port dimensions

Connection	Description	Dimensions		Remarks
		CAb 10 - CAb 20	CAb 30 - CAb 40	
A	Main connection	SAE 1¼" *)	SAE 1¼" *)	If A is used as the inlet, the motor shaft rotates counter clockwise, viewed from the motor shaft side
C	Main connection	SAE 1¼" *)	SAE 1¼" *)	If C is used as the inlet, the motor shaft rotates clockwise, viewed from the motor shaft side
D1	Drain outlet	G ¾"	G ¾"	Normally plugged at delivery.
D2	Alternative drain outlet / or flushing inlet	G ¾"	G ¾"	Normally plugged at delivery.
D3	Alternative drain outlet / or flushing inlet	G ¾"	G ½"	Normally plugged at delivery.
F1	Flushing connection	G ¼"	G ⅛“	For flushing of radial lip seal. Normally plugged.
F2	Flushing connection	G ¼"	G ¼“	For flushing of radial lip seal. Normally plugged.

*) SAE flange J 518 , code 62, 420 bar (6000 psi).

4 Technical data

4.1 Calculation fundamentals

Table 2: Calculation fundamentals.

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

Quantity	Symbol		Metric	US
Power	P	=	kW	hp
Output torque	T	=	Nm	lbf·ft
Specific torque	T_s	=	Nm/bar	lbf·ft/1000 psi
Rotational speed	n	=	rpm	rpm
Required pressure	p	=	bar	psi
Pressure loss	Δp_l	=	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 [1)]	

[1)] Not valid for starting efficiency

4.2 Motor data

Table 3: General data (metric)

			Frame size			
			CAb 10	**CAb 20**	**CAb 30**	**CAb 40**
Type of mounting			See *9 Mounting alternatives*			
Port connections			See *3.2 Port connections*			
External loads			See *4.12 Permissible external loads*			
Hydraulic fluids			See *4.4 Hydraulic fluids*			
Pressure						
	Maximum operating pressure	bar	250	250	250	250
	Maximum peak pressure **1)**	bar	320	320	320	320
	Charge pressure	bar	See *4.3 Recommended charge pressure*			
	Maximum case pressure	bar	3	3	3	3
	Maximum case peak pressure **2)**	bar	8	8	8	8
Temperature limits of case drain oil Seal type: NBR (Nitrile)						
	Minimum	°C	-30	-30	-30	-30
	Maximum	°C	+70	+70	+70	+70
Oil volume in motor case		l	0.7	1.0	1.1	1.2
Moment of inertia for rotary group		$kg \cdot m^2$	0.076	0.146	0.210	0.275
Weight		kg	54	70	90	104

1) Peak pressure 320 bar maximum, allowed to occur up to 10 000 times.
2) Momentary pressure spikes t< 0.1 s of up to 8 bar are permitted

Table 4: Specific data (metric)

Frame size	**Nominal size**	**Specific torque**	**Displacement**	**Maximum torque 3)**	**Minimum speed**	**Maximum speed**	**Maximum operating power 4)**
		Nm/bar	**cm^3/rev**	**Nm**	**rpm**	**rpm**	**kW**
CAb 10	8	8	503	1 945	8	350	66
	10	10	628	2 430	8	350	82
	12.5	12.5	785	3 040	8	350	101
CAb 20	16	16	1 005	3 890	8	350	132
	18	18	1131	4 375	8	350	148
	20	20	1257	4 860	8	350	163
	22.5	22.5	1414	5 470	8	350	182
	25	25	1571	6 075	8	350	200
CAb 30	28	28	1 759	6 805	8	350	218
	30	30	1 885	7 290	8	350	243
	32.5	32.5	2 042	7 900	8	340	251
	35	35	2 199	8 505	8	340	270
	37.5	37.5	2 356	9 115	8	310	264
CAb 40	40	40	2513	9 720	8	330	297

3) Calculated as: Metric = Ts • (250-2) • 0,98
4) Flushing of motor case is required. See *4.9 Flushing*

Table 5: General data (US)

			Frame size			
			CAb 10	**CAb 20**	**CAb 30**	**CAb 40**
Type of mounting			See *9 Mounting alternatives*			
Port connections			See *3.2 Port connections*			
External loads			See *4.12 Permissible external loads*			
Hydraulic fluids			See *4.4 Hydraulic fluids*			
Pressure						
	Maximum operating pressure	psi	3 626	3 626	3 626	3 626
	Maximum peak pressure [1)]	psi	4 641	4 641	4 641	4 641
	Charge pressure	psi	See *4.3 Recommended charge pressure*			
	Maximum case pressure	psi	44	44	44	44
	Maximum case peak pressure [2)]	psi	116	116	116	116
Temperature limits of case drain oil Seal type: NBR						
	Minimum	°F	-22	-22	-22	-22
	Maximum	°F	+158	+158	+158	+158
Oil volume in motor case		US gal	0.19	0.26	0.29	0.32
Moment of inertia for rotary group		$lb_m \cdot ft^2$	1.793	2.395	4.978	6.528
Weight		lb	120	155	199	230

1) Peak pressure 320 bar maximum, allowed to occur up to 10 000 times.
2) Momentary pressure spikes t< 0.1 s of up to 116 psi are permitted

Table 6: Specific data (US)

Frame size	**Nominal size**	**Specific torque**	**Displacement**	**Maximum torque [3)]**	**Minimum speed**	**Maximum speed**	**Maximum operating power [4)]**
		$lb_f \cdot ft$/1000 psi	**in^3/rev**	**$lb_f \cdot ft$**	**rpm**	**rpm**	**hp**
CAb 10	8	407	30.7	1 435	8	350	89
	10	509	38.3	1 792	8	350	110
	12.5	636	47.9	2 242	8	350	135
CAb 20	16	814	61.3	2 869	8	350	177
	18	915	69.0	3 227	8	350	198
	20	1 017	76.7	3 585	8	350	219
	22.5	1 144	86.3	4 034	8	350	244
	25	1 271	95.9	4 481	8	350	268
CAb 30	28	1 424	107.3	5 019	8	350	292
	30	1 526	115.0	5 377	8	350	326
	32.5	1 653	124.6	5 827	8	340	337
	35	1 780	134.2	6 273	8	340	362
	37.5	1 907	143.8	6 723	8	310	354
CAb 40	40	2 034	153.4	7 169	8	330	398

3) Calculated as: US= Ts • (3626-29) • 0,98
4) Flushing of motor case is required. See *4.9 Flushing*

4.3 Recommended charge pressure

The hydraulic system must be such that the motor will recieve sufficient charge pressure at the low pressure port. This applies to all types of installations.
The pressure at the low pressure port shall be at least one bar above the case pressure.

4.3.1 The motor working in driving mode only

For CAb 10 - CAb 40. The required charge pressure at the low pressure port, should be according to diagram. See *Fig. 5*:

4.3.2 The motor working in braking mode

Required charge pressure at the inlet port is according to diagram. See *Fig. 6.*

Notice!
The diagrams is valid for 1 bar (14,5 psi) case pressure.
With increasing case pressure the charge pressure must be increased accordingly.

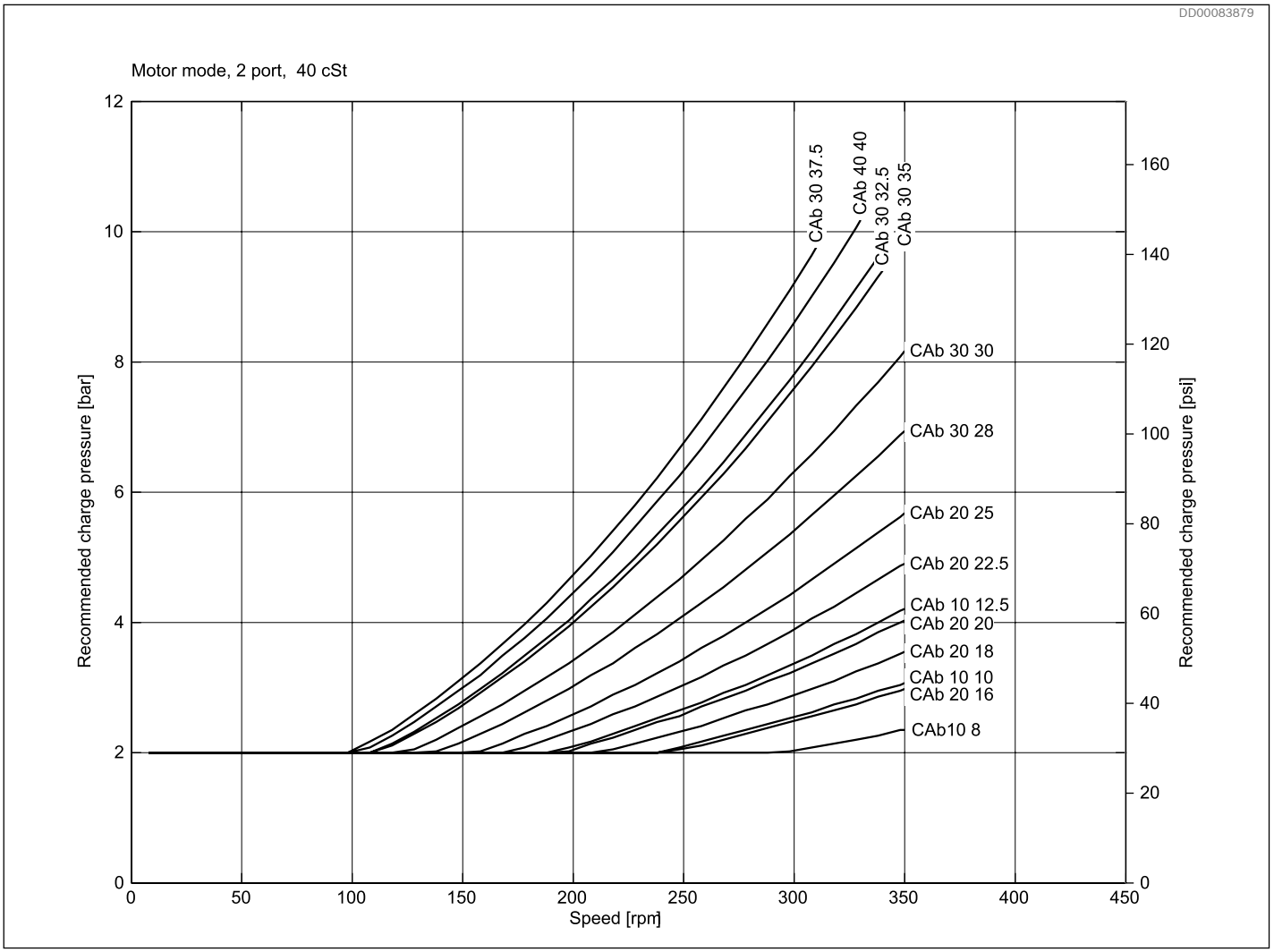

Fig. 5: Recommended charge pressure for motor workning in driving mode, Hägglunds CAb 2-port connection. Valid for oil viscosity 40 cSt.

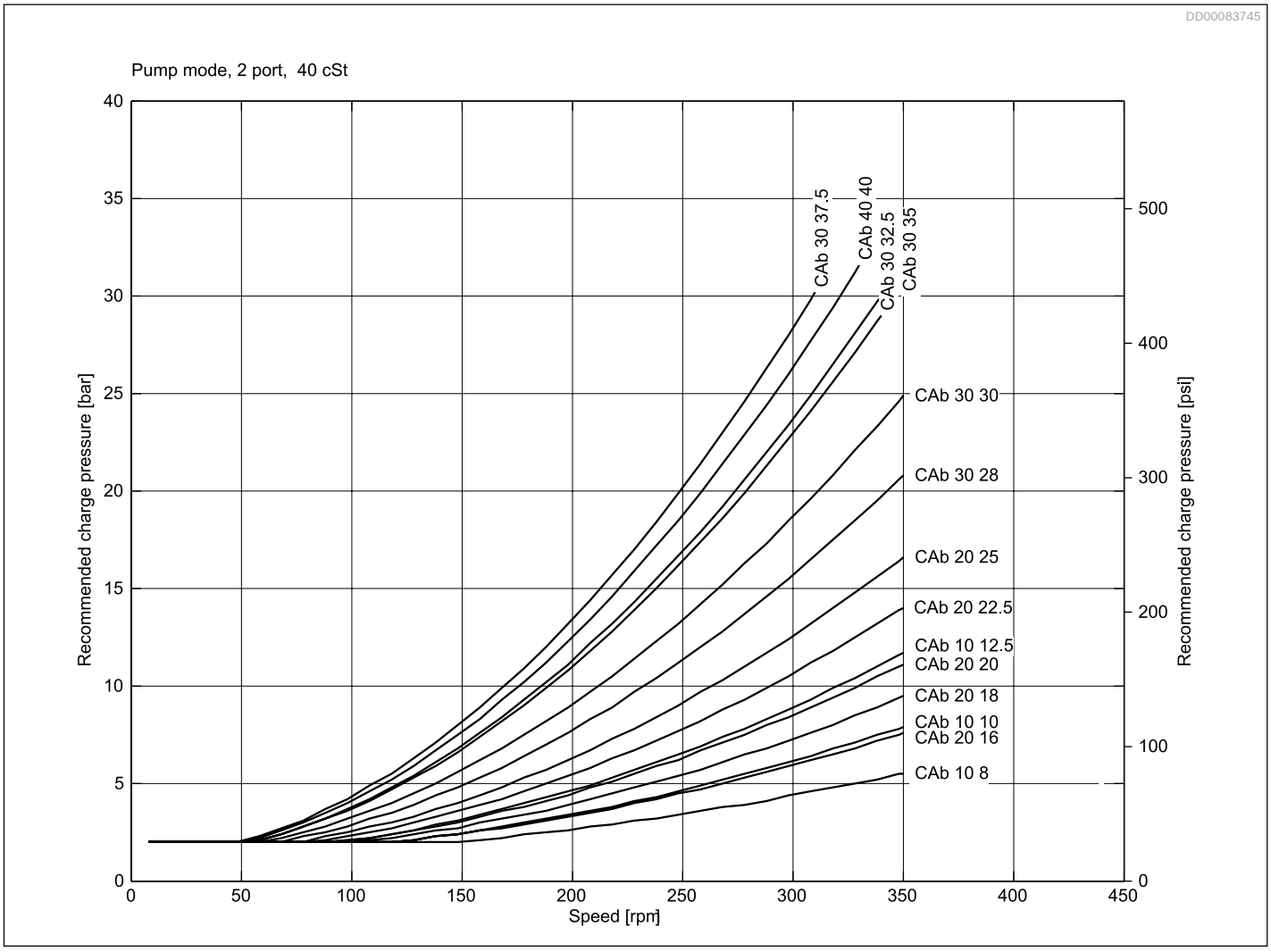

Fig. 6: Recommended charge pressure for motor workning in braking mode, Hägglunds CAb 2-port connection. Valid for oil viscosity 40 cSt.

4.4 Hydraulic fluids

The hydraulic motor Hägglunds CAb is primarily designed for operation with hydraulic fluids according to ISO 11158 HM.

Before the start of project planning, see data sheet RE 15414, Hydraulic fluid quick reference, for detailed information on hydraulic fluids and specific additional demands.

Table 7: Applicable fluids

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

Filtration of the hydraulic fluid

A contamination level of at most 18/16/13 according to ISO 4406 is required. The less contamined the fluid, the longer the service life of the hydraulic motor.

Details regarding the selection of hydraulic fluid

The hydraulic fluid should be selected such that the operating viscosity in the temperature range, as measured in the motor housing, is within optimum operation range, see *Fig. 7*. General recommendation is to have a system temperature of 50°C, see dotted line in *Fig. 7*. An ISO VG 68 fluid will render just above 40 cSt at this point.

- Optimum viscosity range is 40 to 150 cSt.
- Running above 150 cSt or below 40 cSt results in reduced efficiency.
- Running above 400 cSt results in substantial efficiency loss.
- Starting at above 10000 cSt imparts unnecessary strain on parts.
- Running below 30 cSt may impact service life.
- Running below 20 cSt may render instant seizure.

The operating temperature is also limited by the seal type, see Table 3: *General data (metric) or Table 5: General data (US)*.

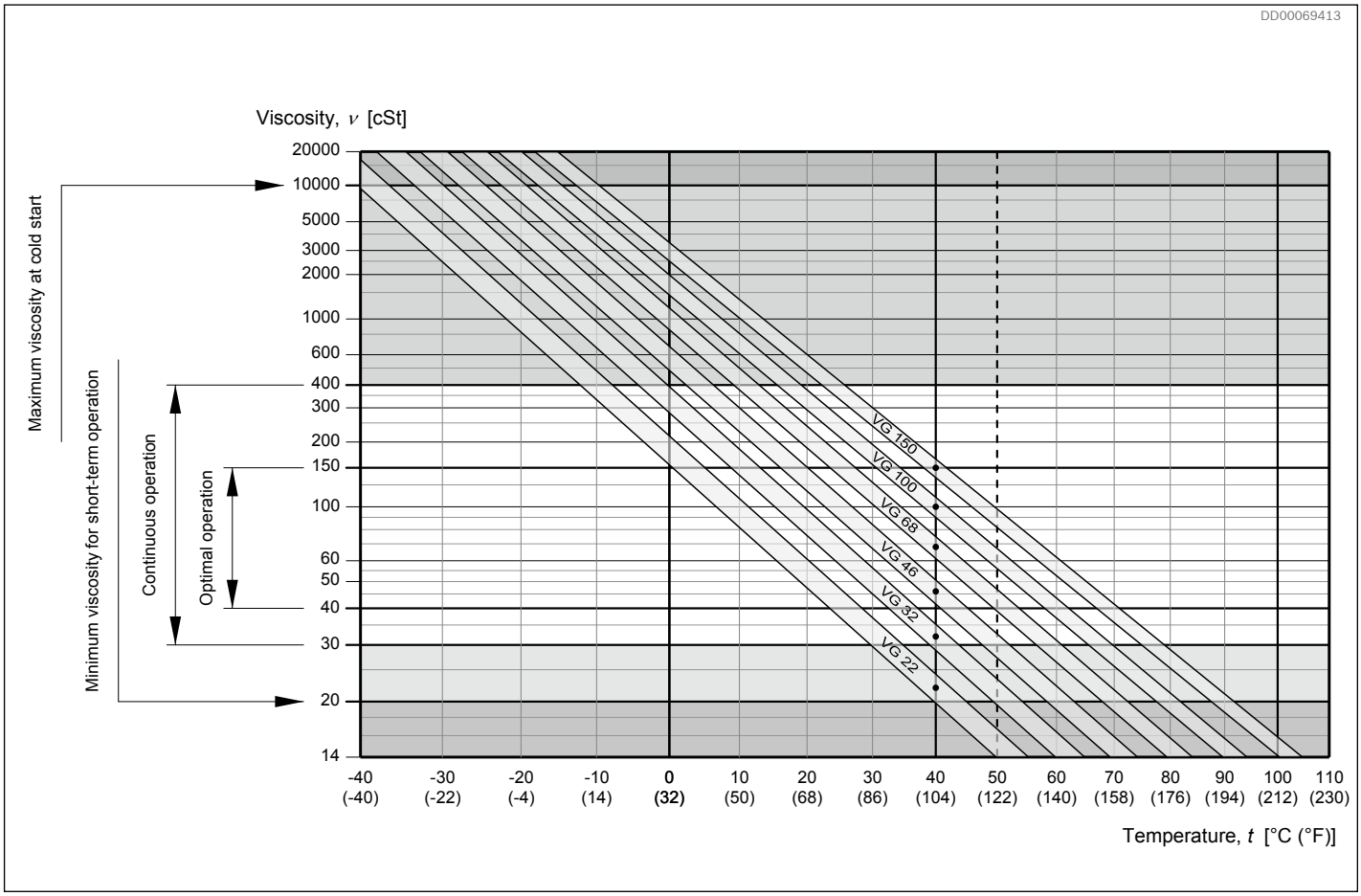

Fig. 7: Selection diagram for viscosity ranges with straight fluids, i.e. viscosity index 100

4.5 Overall efficiency

The diagrams are valid for oil viscosity 40 cSt and low pressure 2 bar (29 psi) at the motor main ports A or C.

Each diagram has the following label definitions:

1. Output power.
2. Constant pressure curves.
3. Overall efficiency.
4. Flushing of motor case is required.

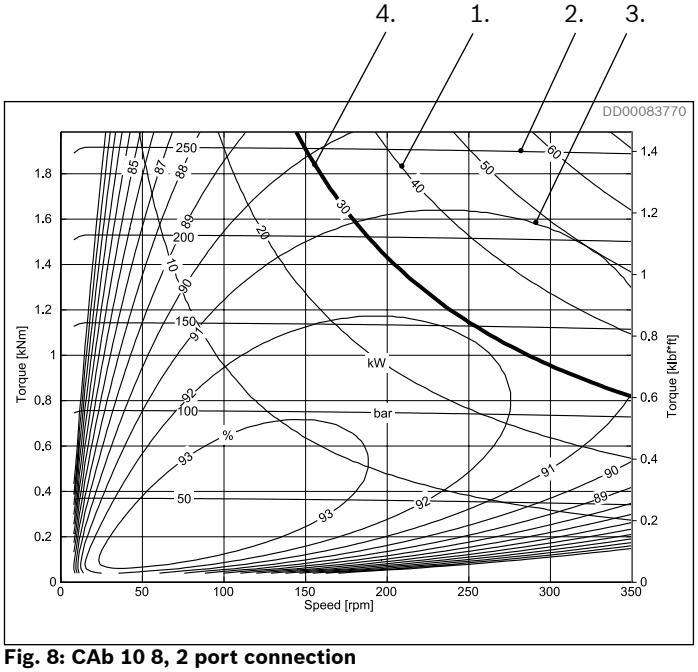

Fig. 8: CAb 10 8, 2 port connection

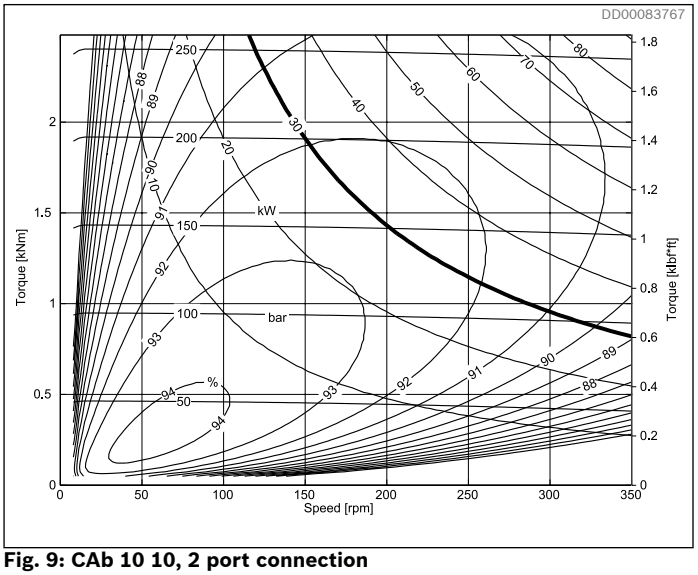

Fig. 9: CAb 10 10, 2 port connection

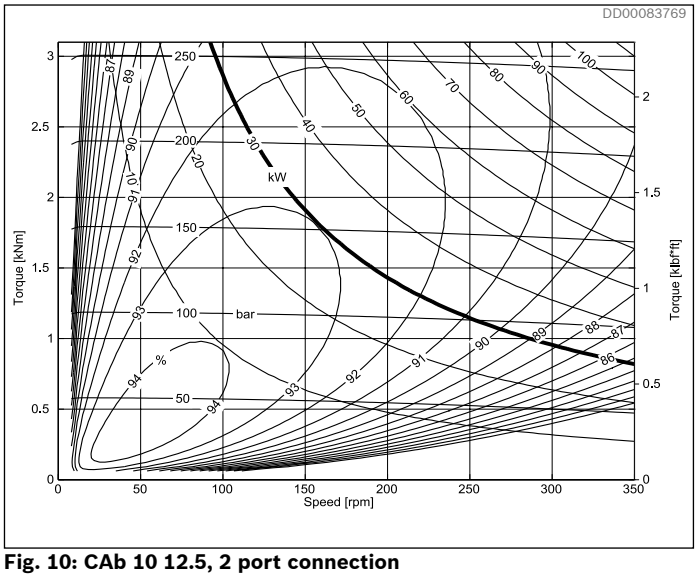

Fig. 10: CAb 10 12.5, 2 port connection

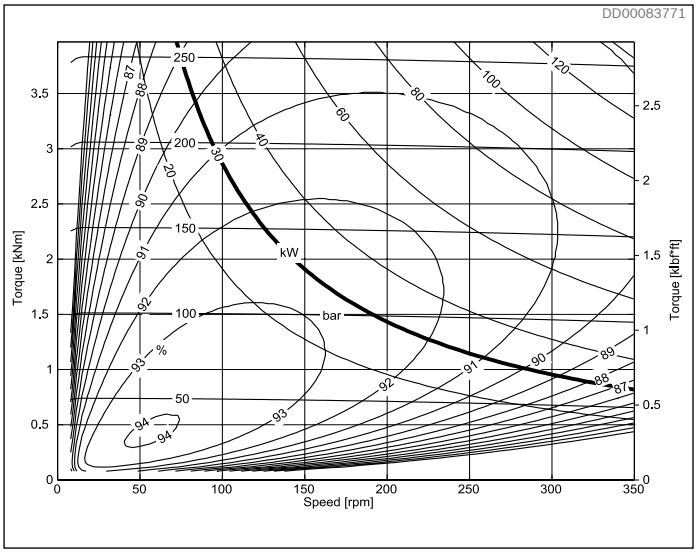

Fig. 11: CAb 20 16, 2 port connection

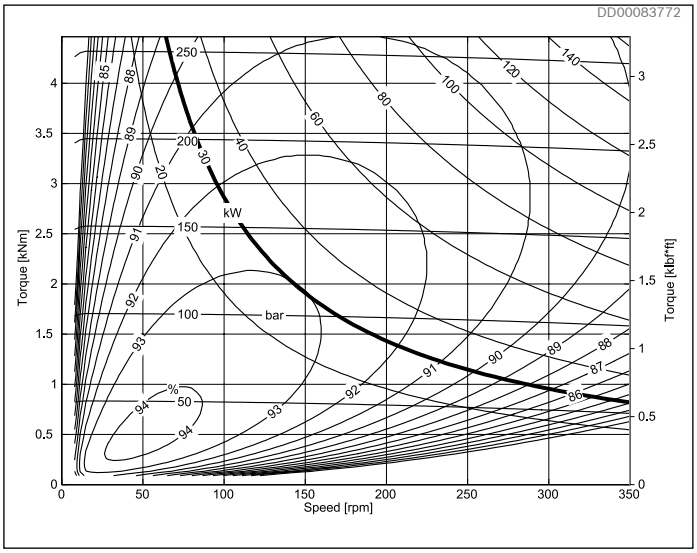

Fig. 12: CAb 20 18, 2 port connection

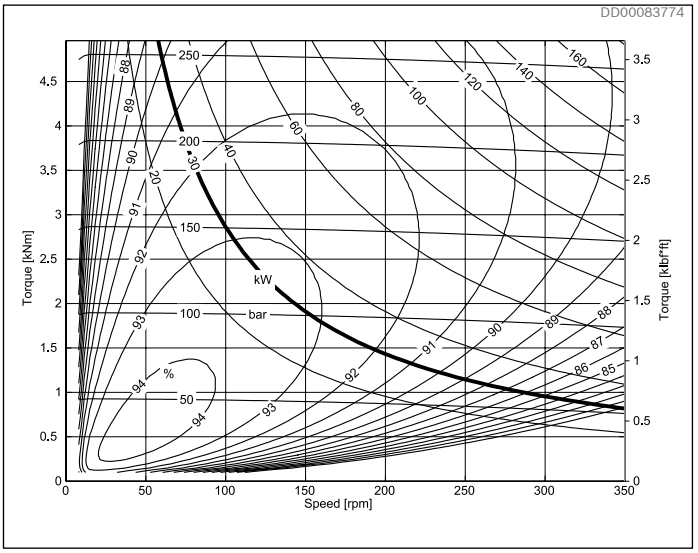

Fig. 13: CAb 20 20, 2 port connection

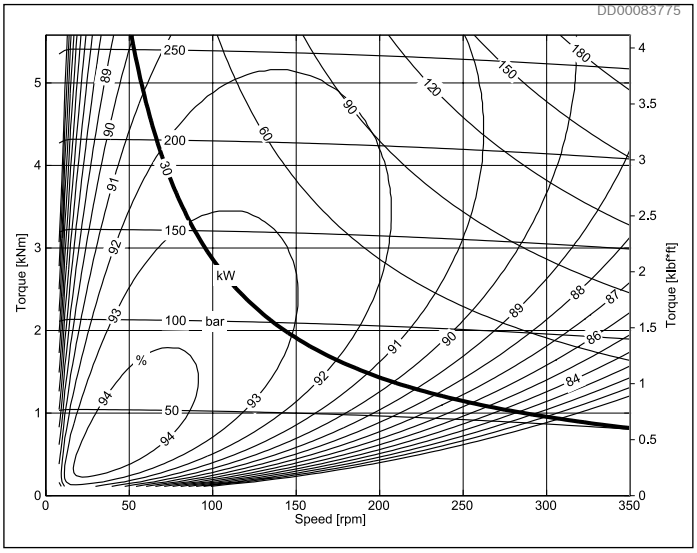

Fig. 14: CAb 20 22.5, 2 port connection

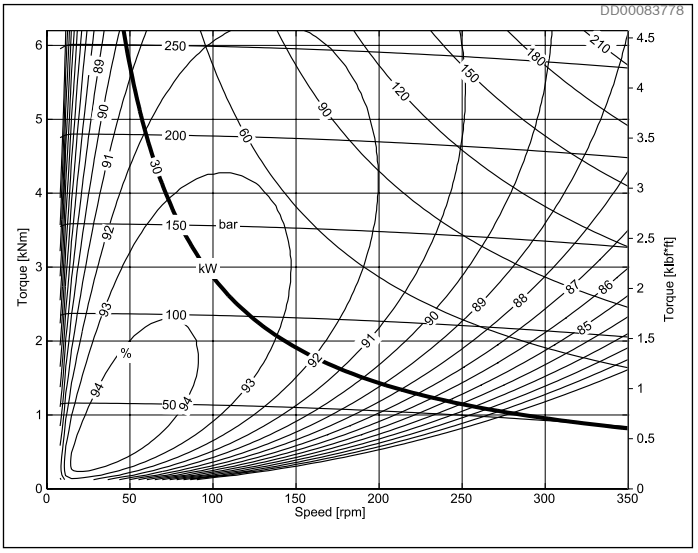

Fig. 15: CAb 20 25, 2 port connection

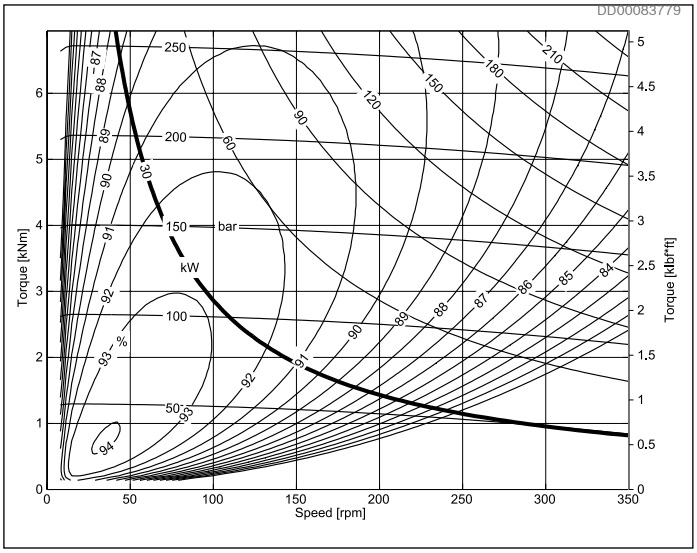

Fig. 16: CAb 30 28, 2 port connection

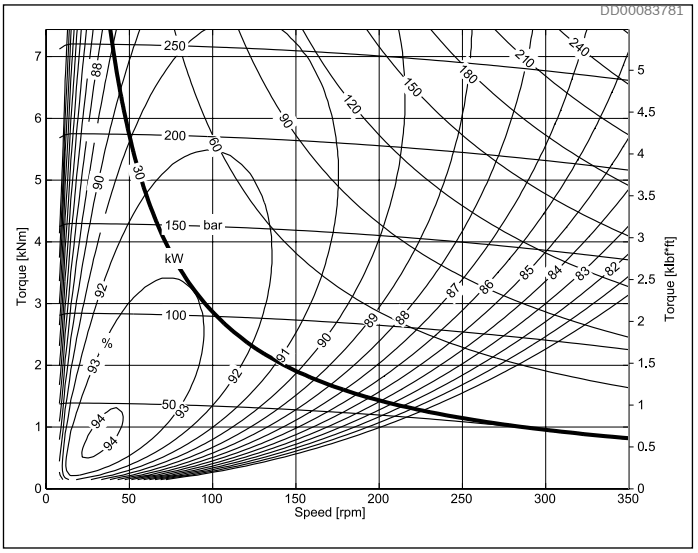

Fig. 17: CAb 30 30, 2 port connection

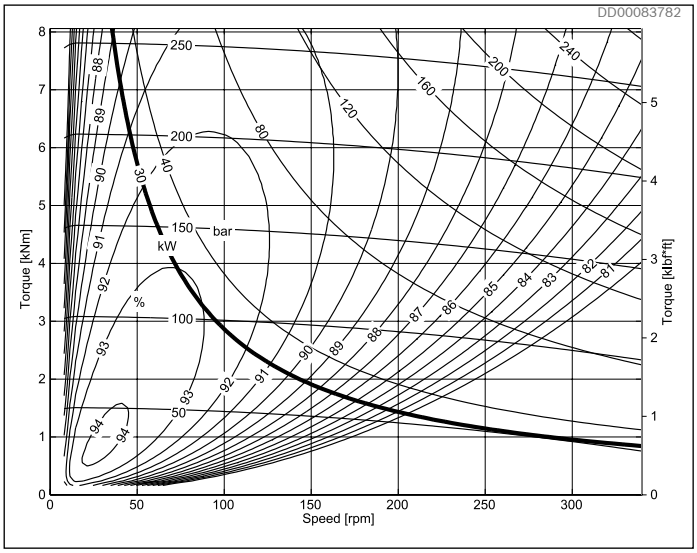

Fig. 18: CAb 30 32.5, 2 port connection

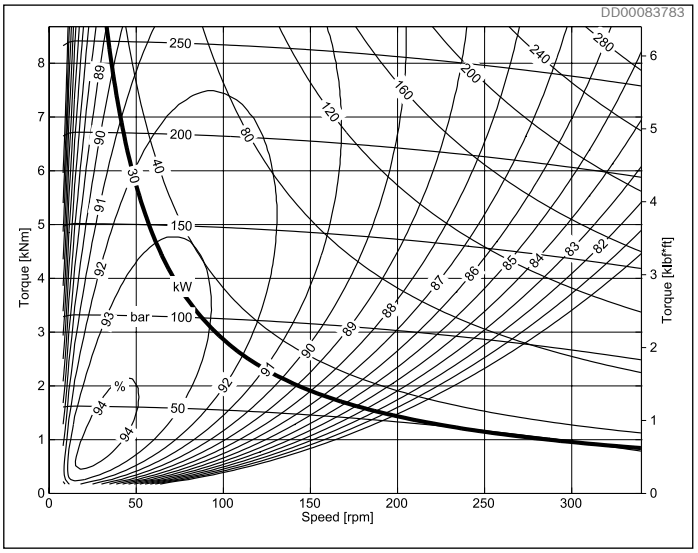

Fig. 19: CAb 30 35, 2 port connection

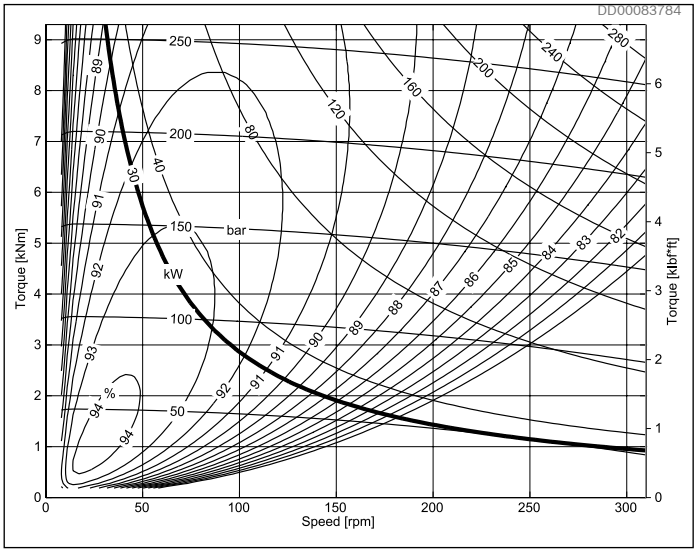

Fig. 20: CAb 30 37.5 , 2 port connection

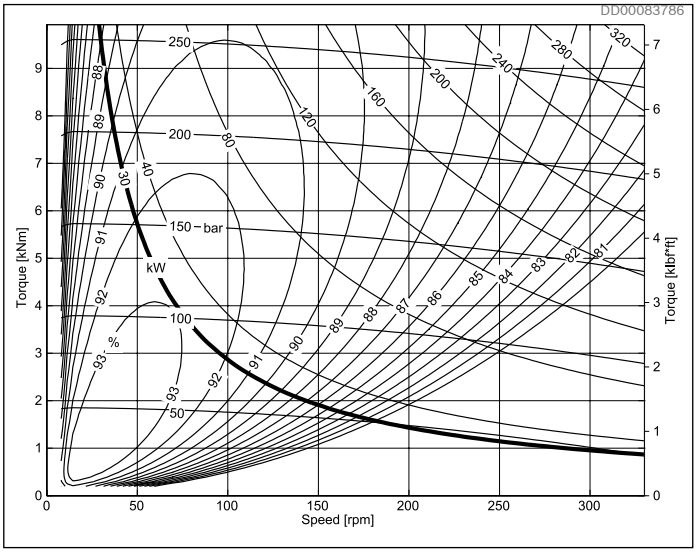

Fig. 21: CAb 40 40, 2 port connection

4.6 Pressure loss diagrams

Pressure loss, oil viscosity 40 cSt

$$\text{Actual pressure difference} = \frac{\text{output torque}}{\text{specific torque} \cdot \text{mechanichal effiency}} + \text{pressure loss} \qquad \Delta p = \frac{T}{Ts \cdot \eta_m} + \Delta p_l$$

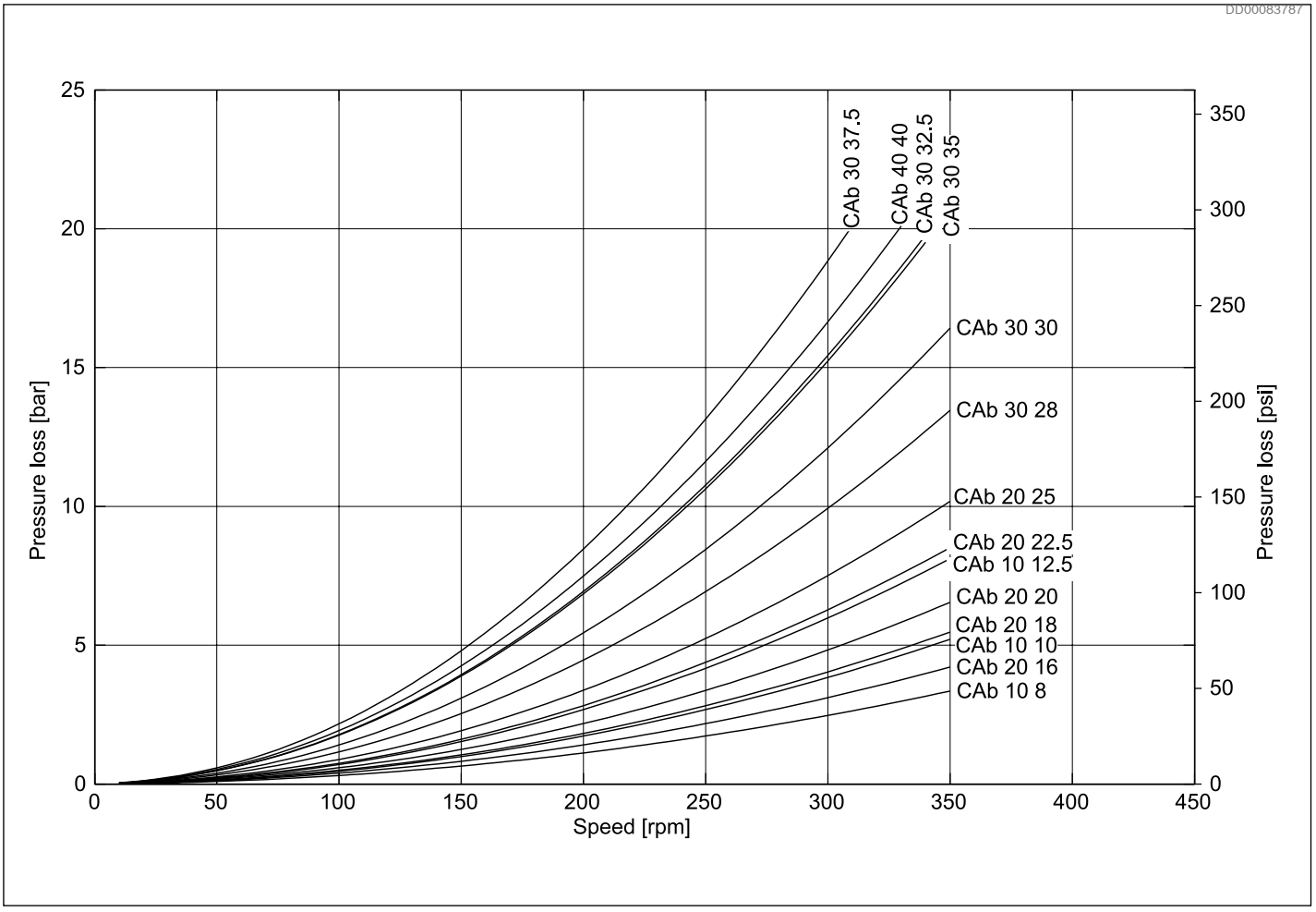

Fig. 22: CAb 10 to CAb 40 pressure loss

4.7 Quick selection diagram

Rated life for Hägglunds CAb is calculated according to DIN ISO 281 Apendix 1.

The diagram below represents the torque and speed, corresponding to a modified rating life L10mh = 20 000 h. Oil viscosity in motor case 40 cSt. Contamination level not exceeding ISO 4406:1999 18/16/13 (NAS 1638, class 7). The diagram is based on a charge pressure of 2 bar (29 psi).

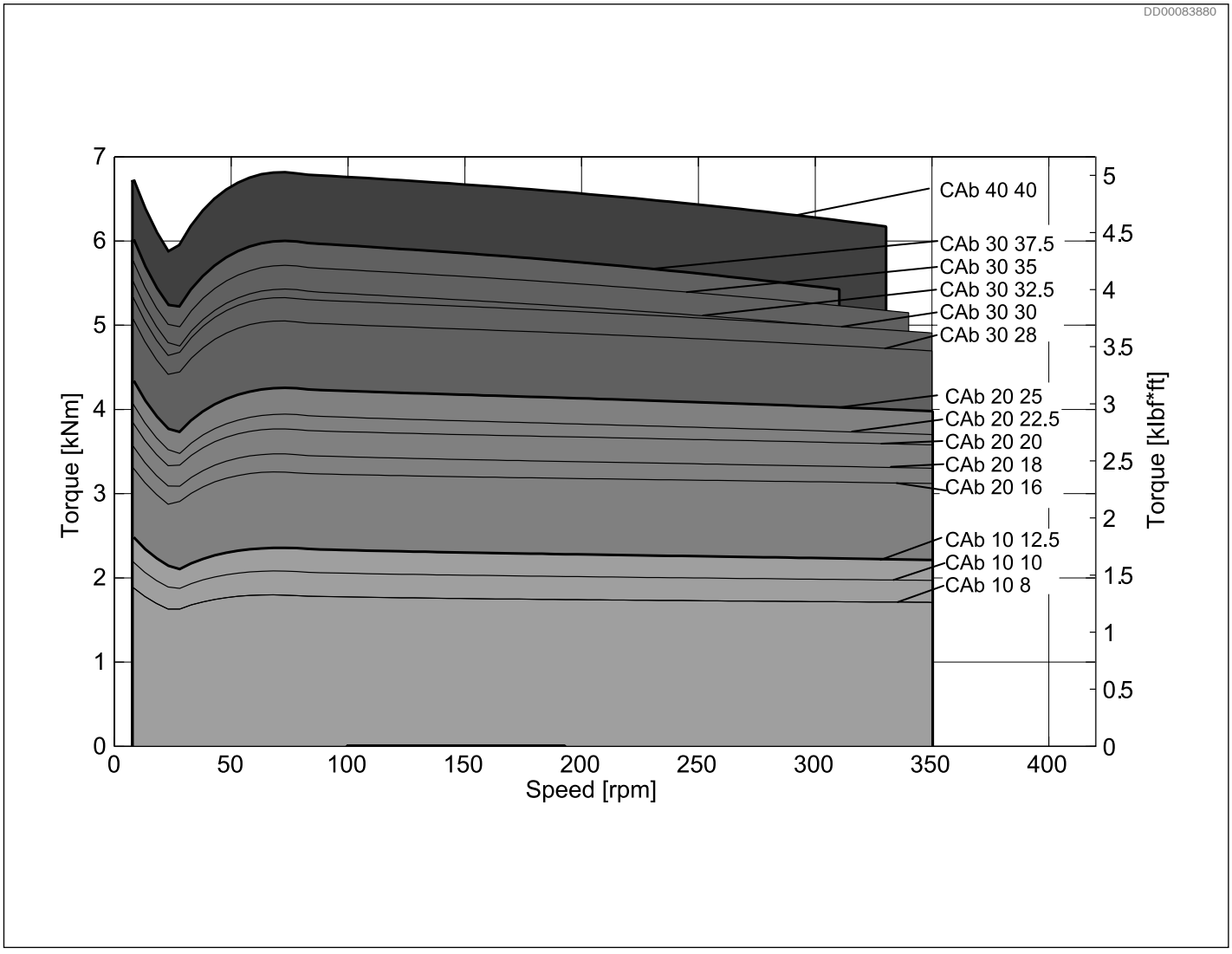

Fig. 23: Quick selection diagram

Notice!
Higher case oil viscosity increases the motor rating life considerably.
Reduced temperature in the motor case, increase rating life for the motor.

4.8 Draining, venting and flushing of the motor

4.8.1 Horizontal mounting

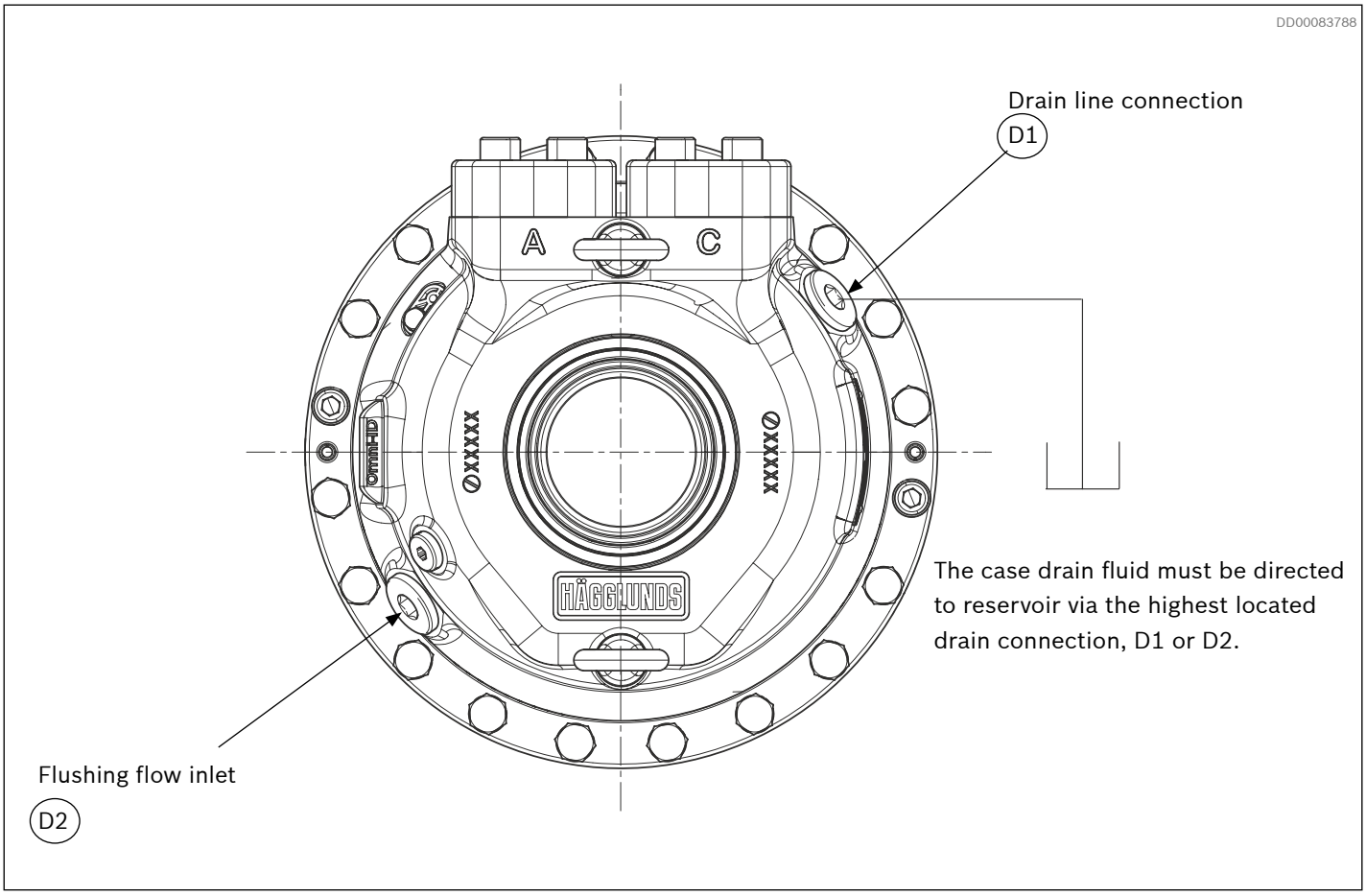

Fig. 24: Horizontal mounting

Horizontal mounting

When the motor is installed with the shaft in the horizontal plane, the highest of the two drain outlets D1 or D2 must always be used (see *Fig. 24*).

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

4.8.2 Vertical mounting

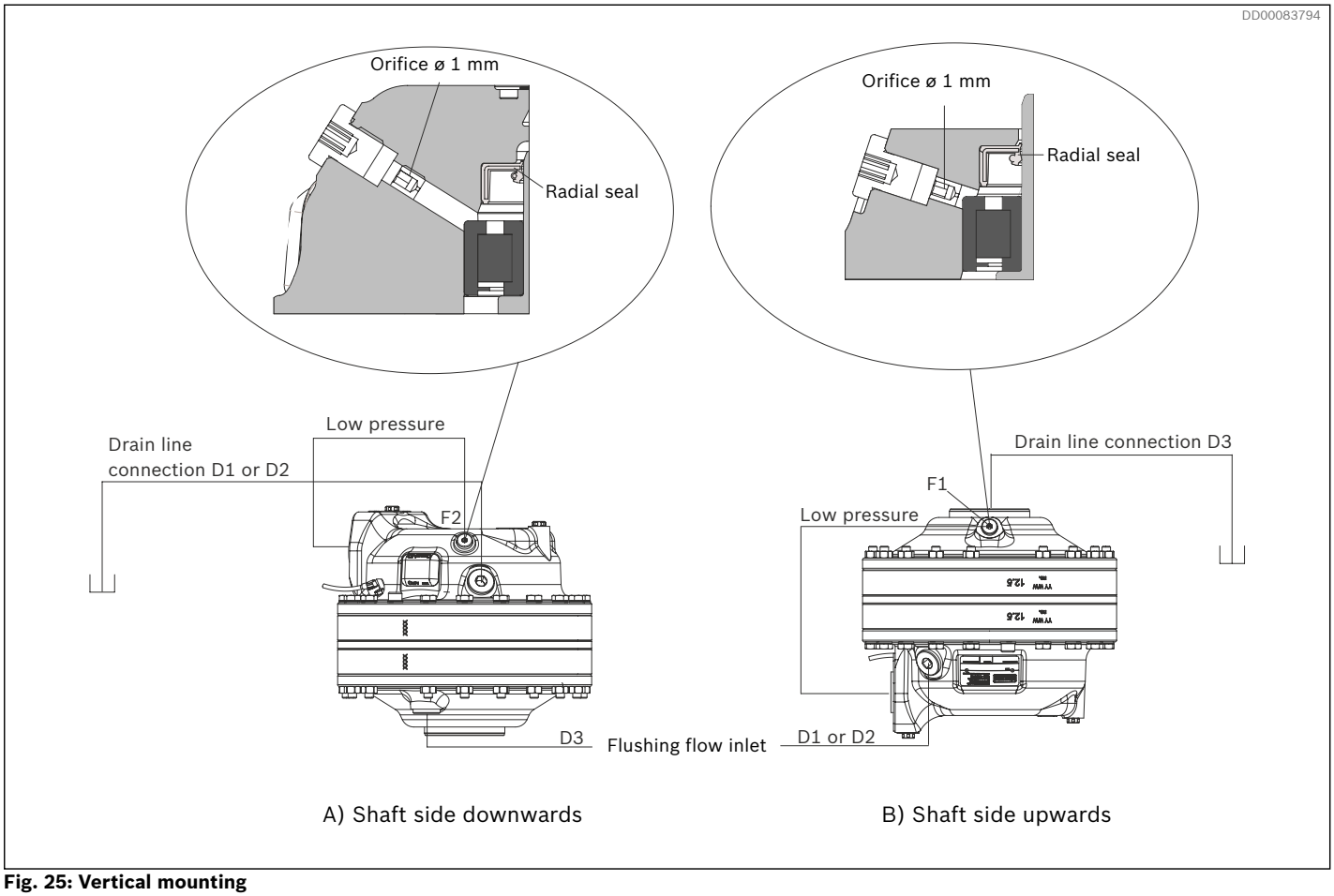

Fig. 25: Vertical mounting

Vertical mounting

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

A) Motor shaft pointing downwards

The drain line must be connected to one of the drain ports D1 or D2 in the connection housing. (See *Fig. 25* alt.*: A) Shaft side downwards*).
The flushing connection F2 on the connection housing shall be connected to low pressure. With bidirectional drives, use the connection with lowest average pressure. (Connecting to high pressure will increase the motor drain flow).

B) Motor shaft pointing upwards

The drain line must be connected to the drain port D3 in the housing cover. (See *Fig. 25*, *alt.: B) Shaft side upwards*).
The flushing connection F1 on the housing cover should be connected to the low pressure. With bidirectional drives, use the connection with lowest average pressure. (Connecting to high pressure will increase the motor drain flow).

4.9 Flushing

Flushing of motor case

Viscosity in the motor case must be controlled according to *4.4 Hydraulic fluids*. The motor must be flushed when shaft power exceeds a defined limit, E_{FL}. The need is also governed by the duty cycle, as shown below.
Flushing can also be necessary if the system is not able to ensure required viscosity in the motor case as specified in *4.4 Hydraulic fluids*.

Table 8: Maximum motor power without flushing

Frame size	Flushing limit power, E_{FL}	
	kW	hp
CAb 10 - CAb 40	30	40

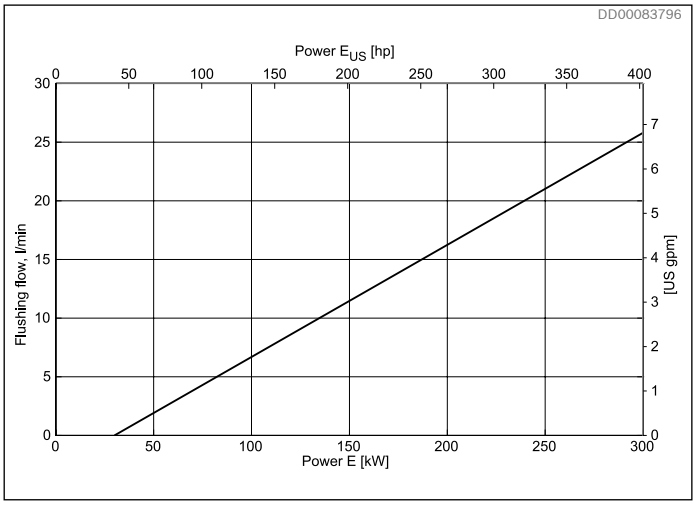

Fig. 26: Required flushing flow

Continuously running motor

The motor power is calculated:

$$E = \frac{p_h \times n \times V_i}{600 \times 1000}\,[\text{kW}], \qquad E_{US} = \frac{p_h \times n \times V_i}{1714 \times 231}\,[\text{hp}]$$

where
p_h = motor high pressure [bar] [psi]
n = motor speed [rpm]
V_i = motor displacement [cm³/rev] [in³/rev]

Intermittently running motor

The time weighted arithmetic average of the motor power is:

$$E = \frac{\sum \Delta t_j \times E_j}{\sum \Delta t_j}, \qquad E_{US} = \frac{\sum \Delta t_j \times E_j}{\sum \Delta t_j}$$

where
Δt_j = the time period the motor is running with the power E_j
E_j = intermittent motor power

A CAb 10 - CAb 40 motor typically reach close to the final temperature in 200 s, after a change in the power.
The calculation model is valid if the total period time of the cycle $\sum \Delta t_j$ is less than this time.

Required flushing

Fig. 26 shows required flushing to keep motor case temperature maximum 10 degrees Celcius (18 F) warmer than the flushing oil, when flushing according to *Fig. 27*

Example 1: Continuously running motor

CAb 20 20
p_h = 150 bar
V_i = 1257 cm³/rev
n = 160 rpm.
The motor power is calculated:

$$E = \frac{150 \times 160 \times 1257}{600 \times 1000} = 50.3\ \text{kW}$$

$E > E_{FL}$, the motor should be flushed according to *Fig. 26*.

Example2: Intermittently running motor

CAb 20 20, working at two different conditions,

1) p_h = 150 bar
   n = 160 rpm
   t = 5 s

The motor power is calculated:

$$E = \frac{150 \times 160 \times 1257}{600 \times 1000} = 50.3\ \text{kW}$$

2) p_h = 0 bar
   n = 0 rpm
   t = 25 s

The motor power is calculated:

$$E = \frac{0 \times 0 \times 1257}{600 \times 1000} = 0\ \text{kW}$$

The average motor power is calculated:

$$E = \frac{\sum \Delta t_j \times E_j}{\sum \Delta t_j} = \frac{5 \times 50.3 + 25 \times 0}{5 + 25} = 8.4\ \text{kW}$$

$E < E_{FL}$, no need for flushing.

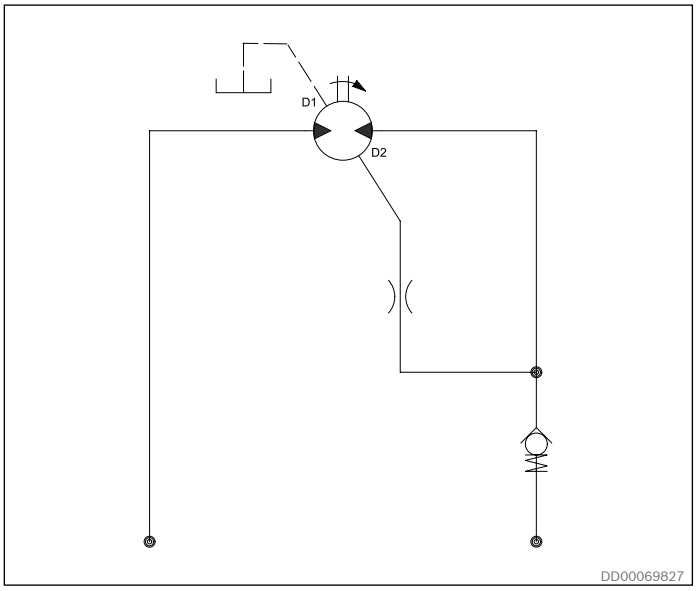

Fig. 27: Circuit design for flushing of motor case in open circuit

4.10 External leakage

External leakage is from the distributor to the motor case and from the piston assembly to the motor case.
Valid for 40 cSt.

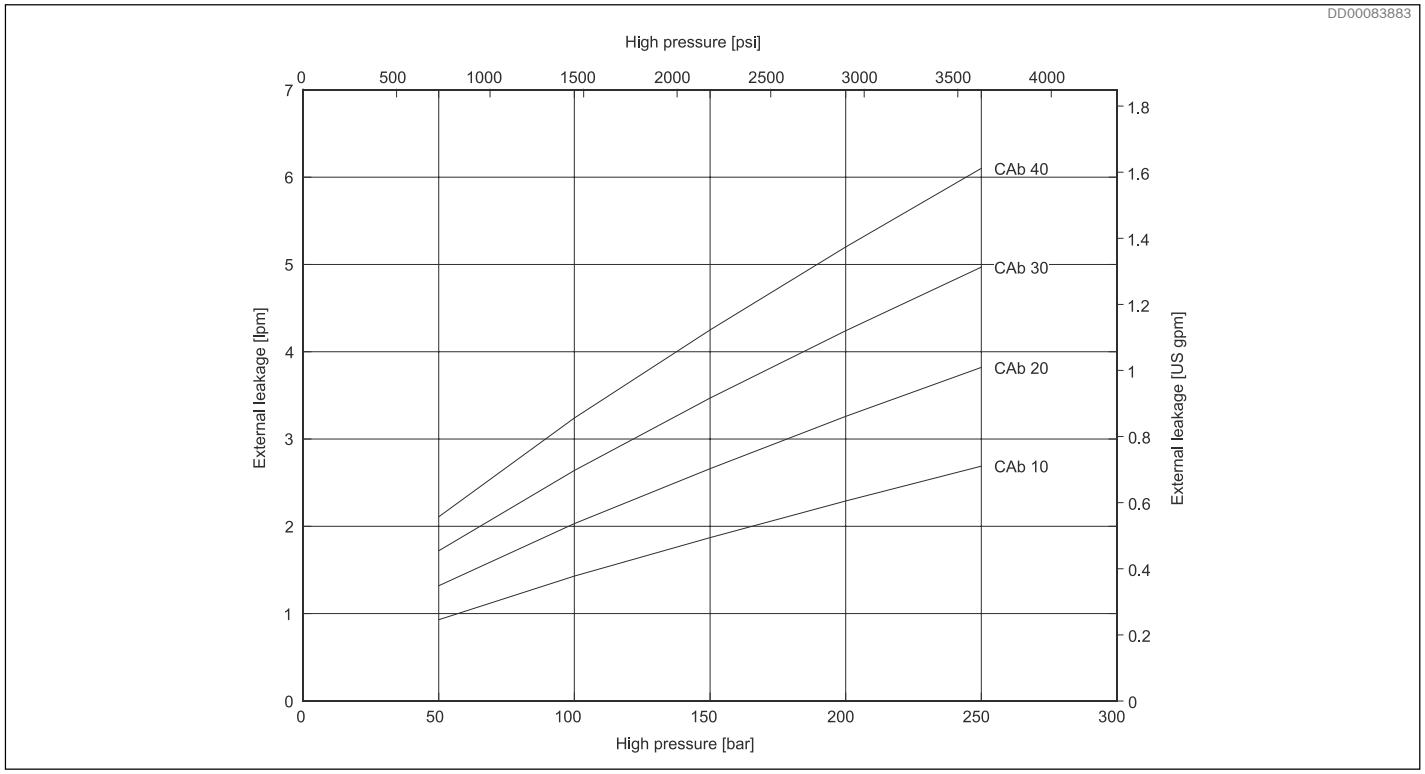

Fig. 28: External leakage. The diagram shows the average values, valid for 40 cSt

4.11 Viscosity factor K

Variation in external leakage at different oil viscosities. When calculating external leakage using other viscosities than 40 cSt, multiply the value given in the external leakage diagram by the factor K.

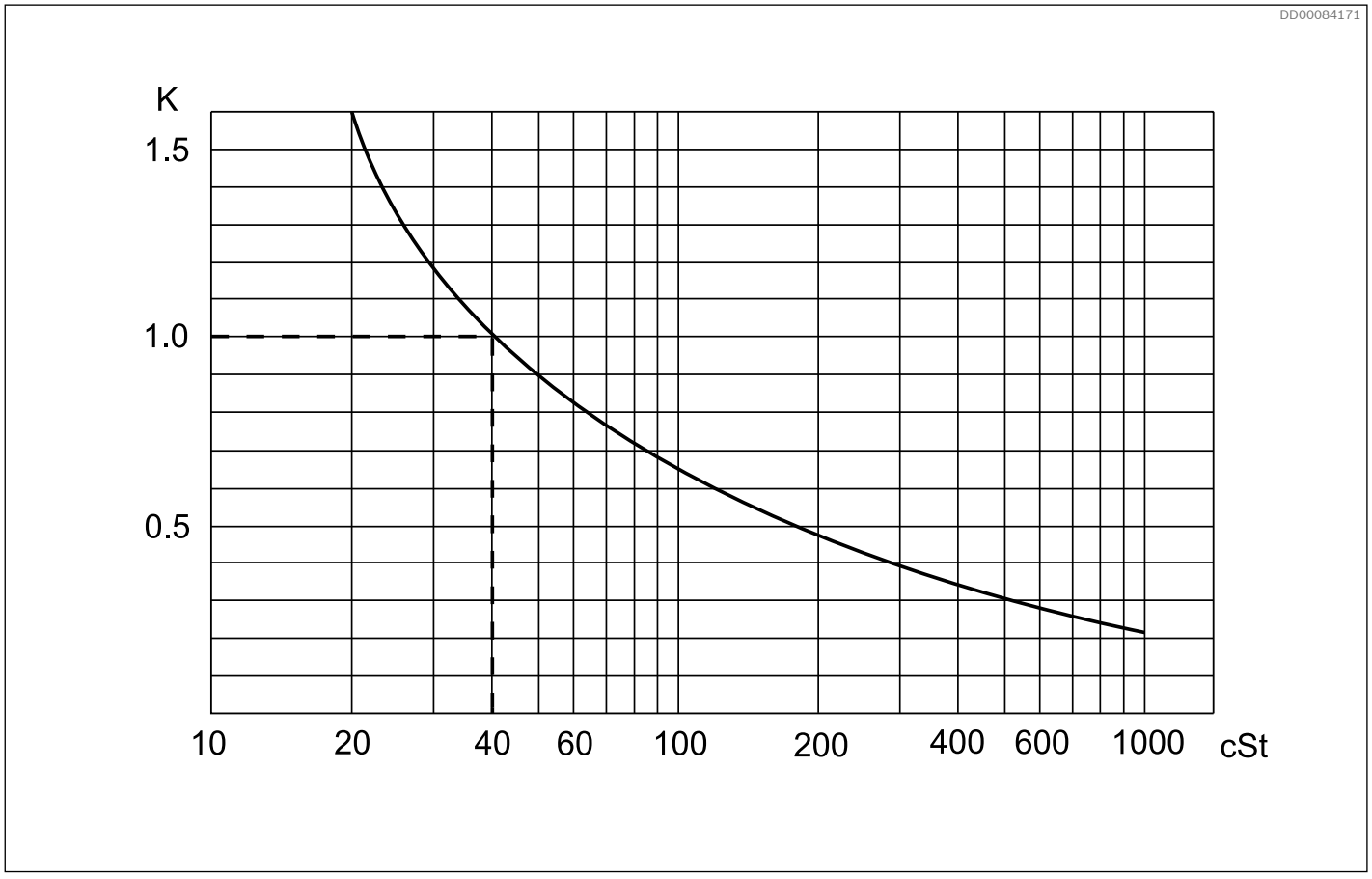

Fig. 29: Viscosity factor K

4.12 Permissible external loads

4.12.1 External load with torque arm mounting

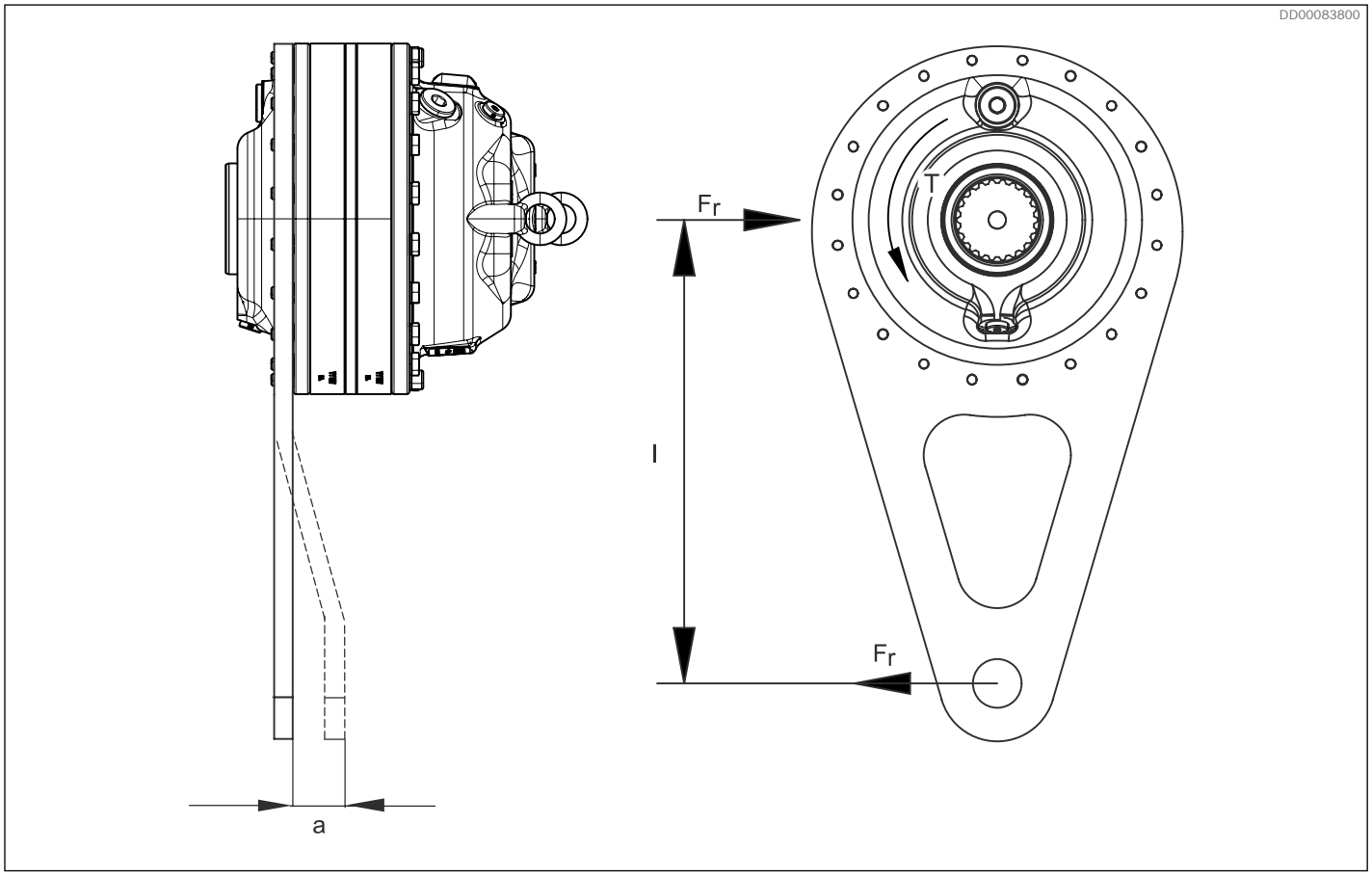

Fig. 30: Shaft mounted motor with torque arm.

If non standard torque arms TCA are used, forces must be checked for main bearings.

$$F_r = \frac{T}{l}$$

F_r = Total radial force on fixed motor mounting

T = Output torque for motor

l = Lever length

a = The axial distance for action point of radial force

4.12.2 Permissible external dynamic load

Torque arm mounted motor. Viscosity 40 cSt/187 SSU and L_{10aah}.

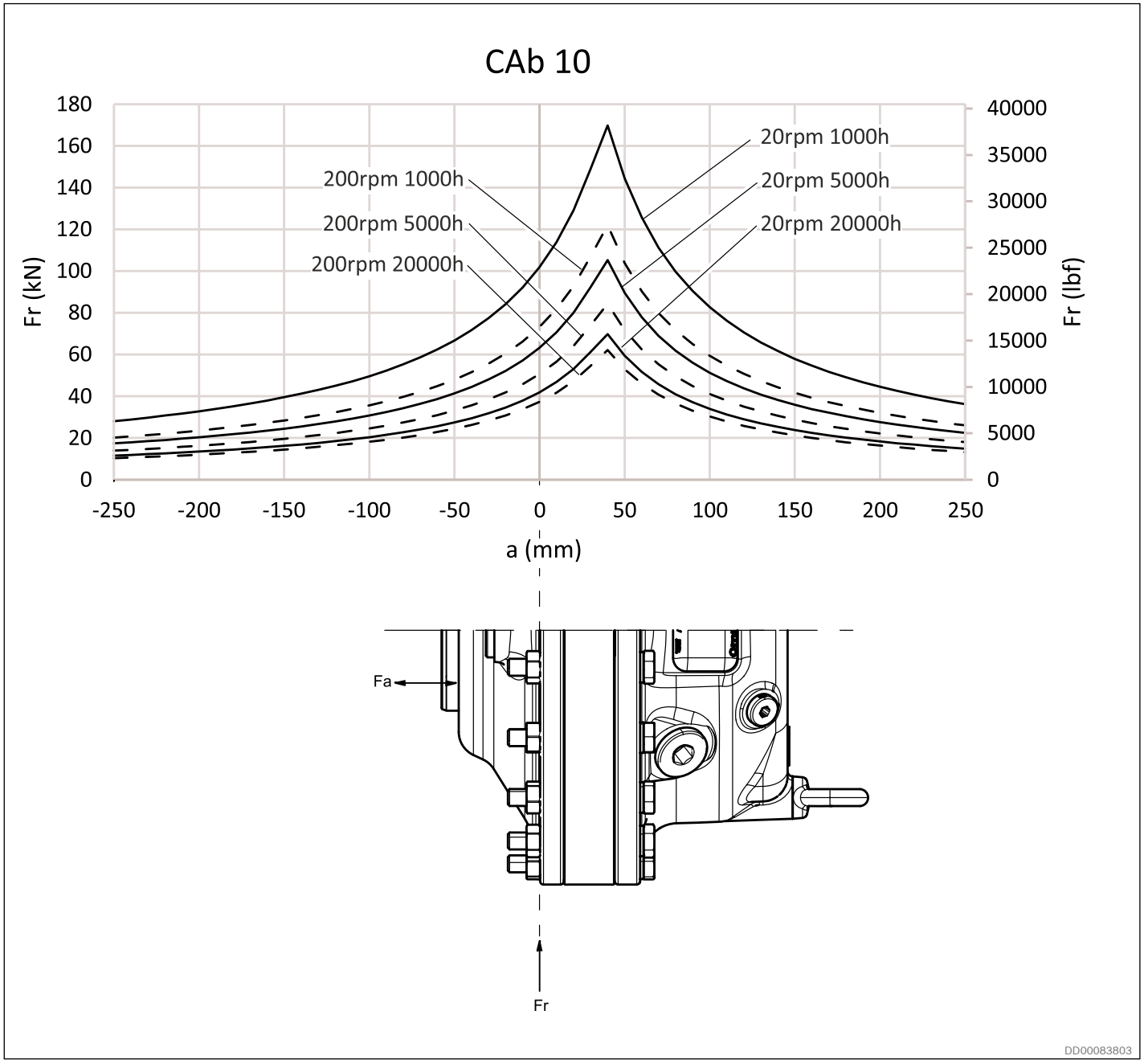

Fig. 31: Permissible external dynamic load Hägglunds CAb 10

Axial loads: Permissible axial load for intermittent duty F_a = 10 000 N (2 200 lbf).

Remark: For continuous axial load applications, please contact your Bosch Rexroth representative.

Torque arm mounted motor. Viscosity 40 cSt/187 SSU and L_{10aah}.

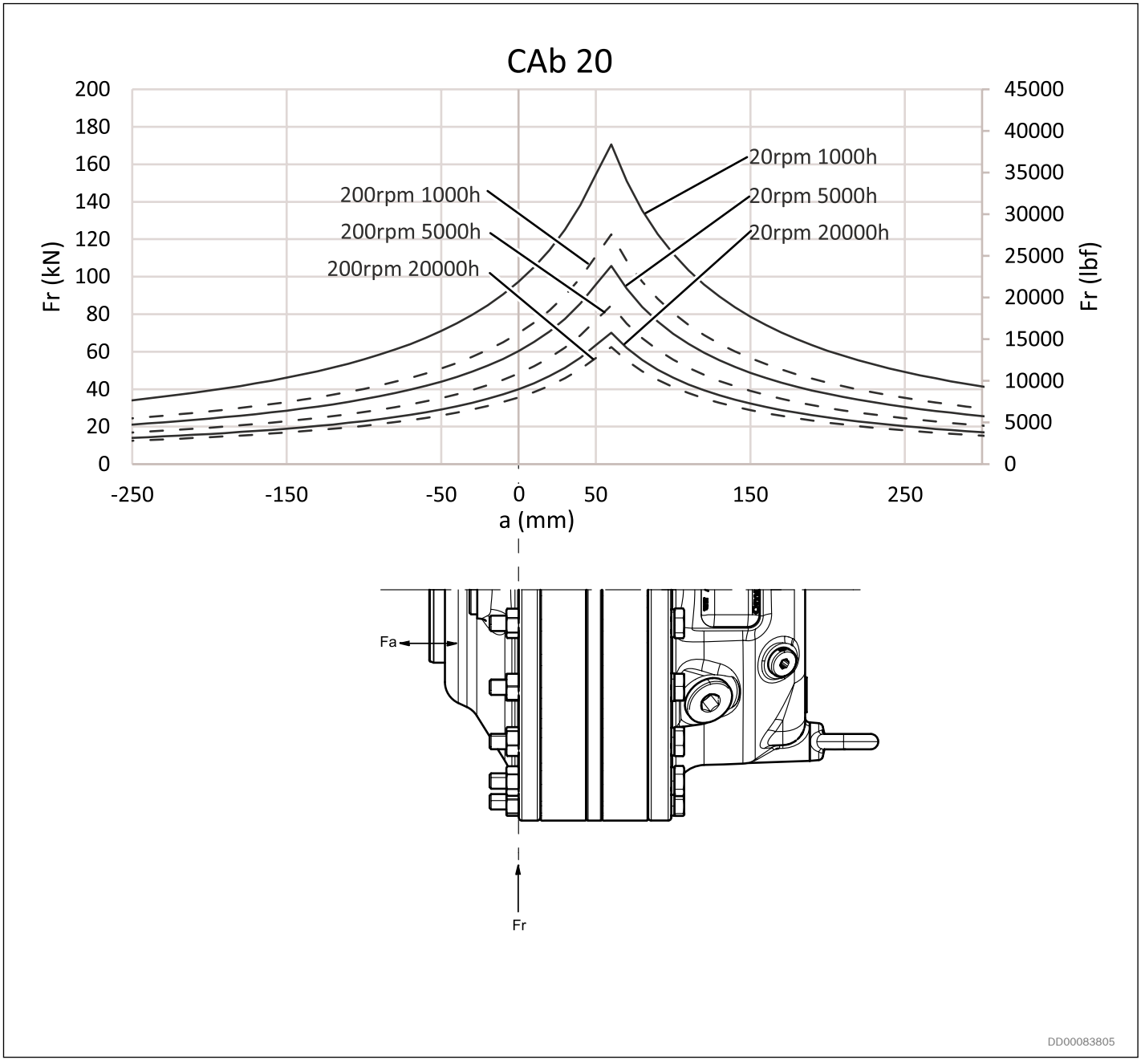

Fig. 32: Permissible external dynamic load Hägglunds CAb 20

Axial loads: Permissible axial load for intermittent duty F_a = 10 000 N (2 200 lbf).

Remark: For continuous axial load applications, please contact your Bosch Rexroth representative.

Torque arm mounted motor. Viscosity 40 cSt/187 SSU and L_{10aah}.

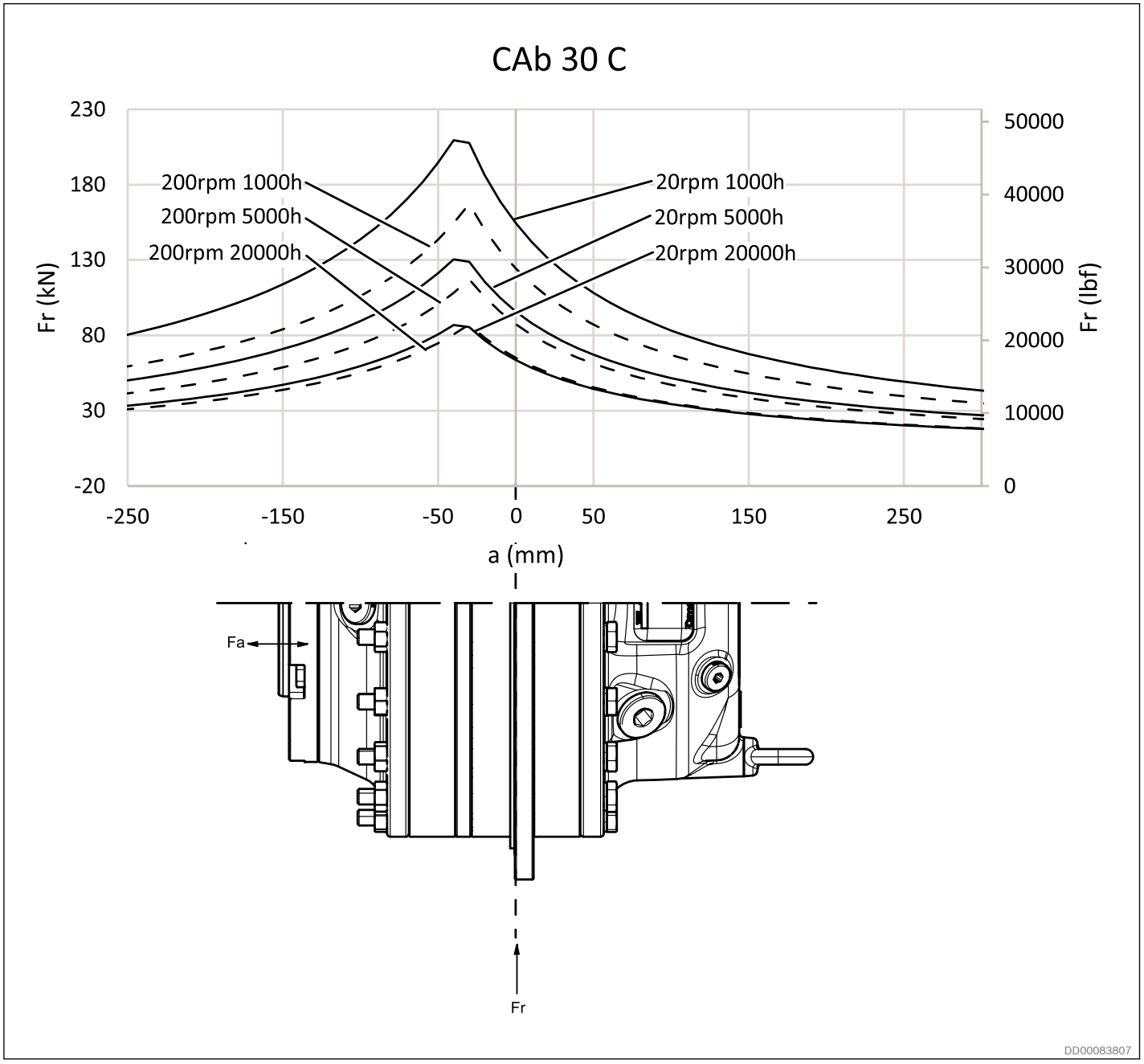

Fig. 33: Permissible external dynamic load Hägglunds CAb 30 C (center flange)

Axial loads: Permissible axial load for intermittent duty
F_a = 10 000 N (2 200 lbf).

Remark: For continuous axial load applications, please contact your Bosch Rexroth representative.

Torque arm mounted motor. Viscosity 40 cSt/187 SSU and L_{10aah}.

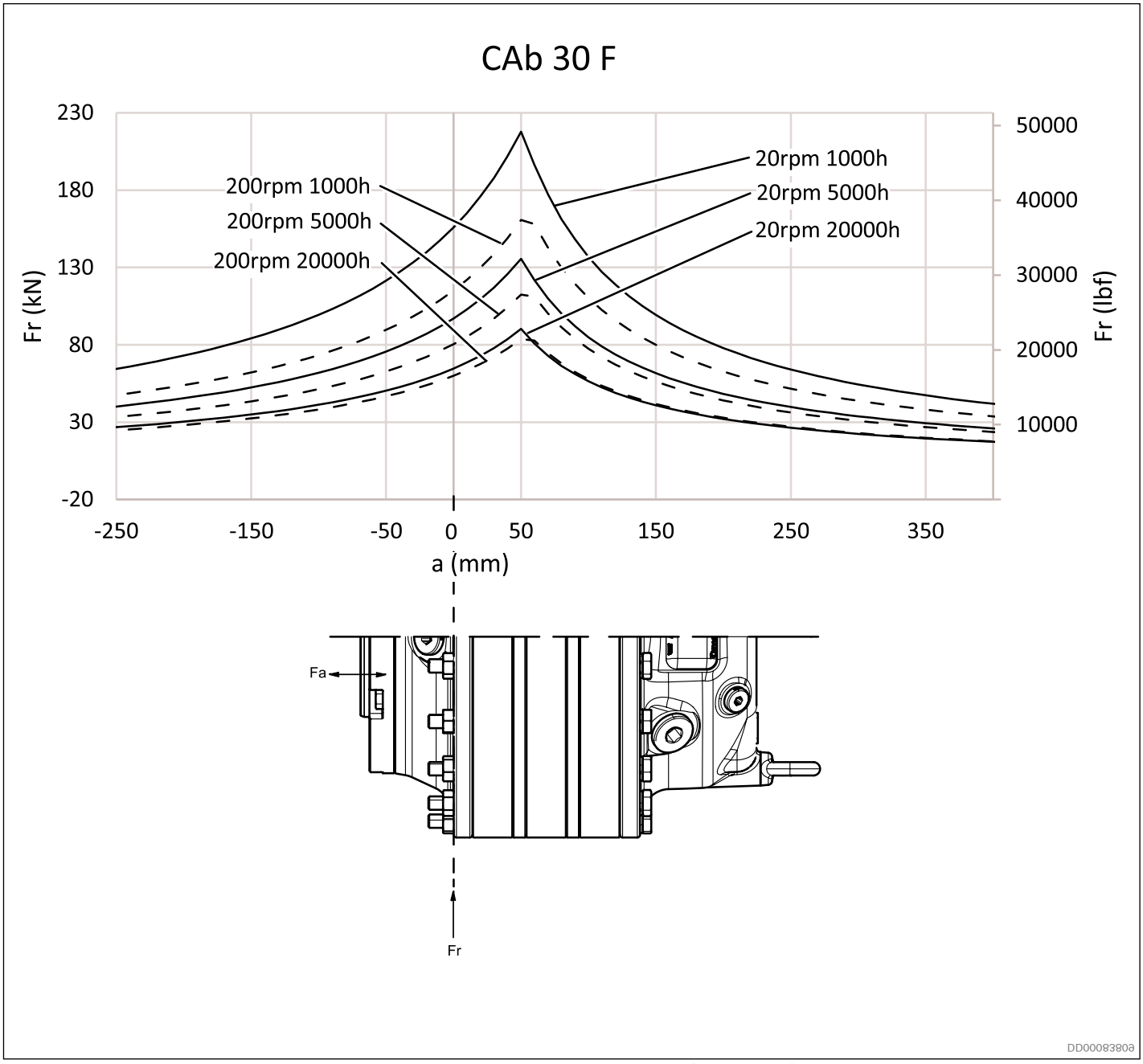

Fig. 34: Permissible external dynamic load Hägglunds CAb 30 28 F and CAb 30 30 F (front flange)

Axial loads: Permissible axial load for intermittent duty
F_a = 10 000 N (2 200 lbf).

Remark: For continuous axial load applications, please contact your Bosch Rexroth representative.

Torque arm mounted motor. Viscosity 40 cSt/187 SSU and L_{10aah}.

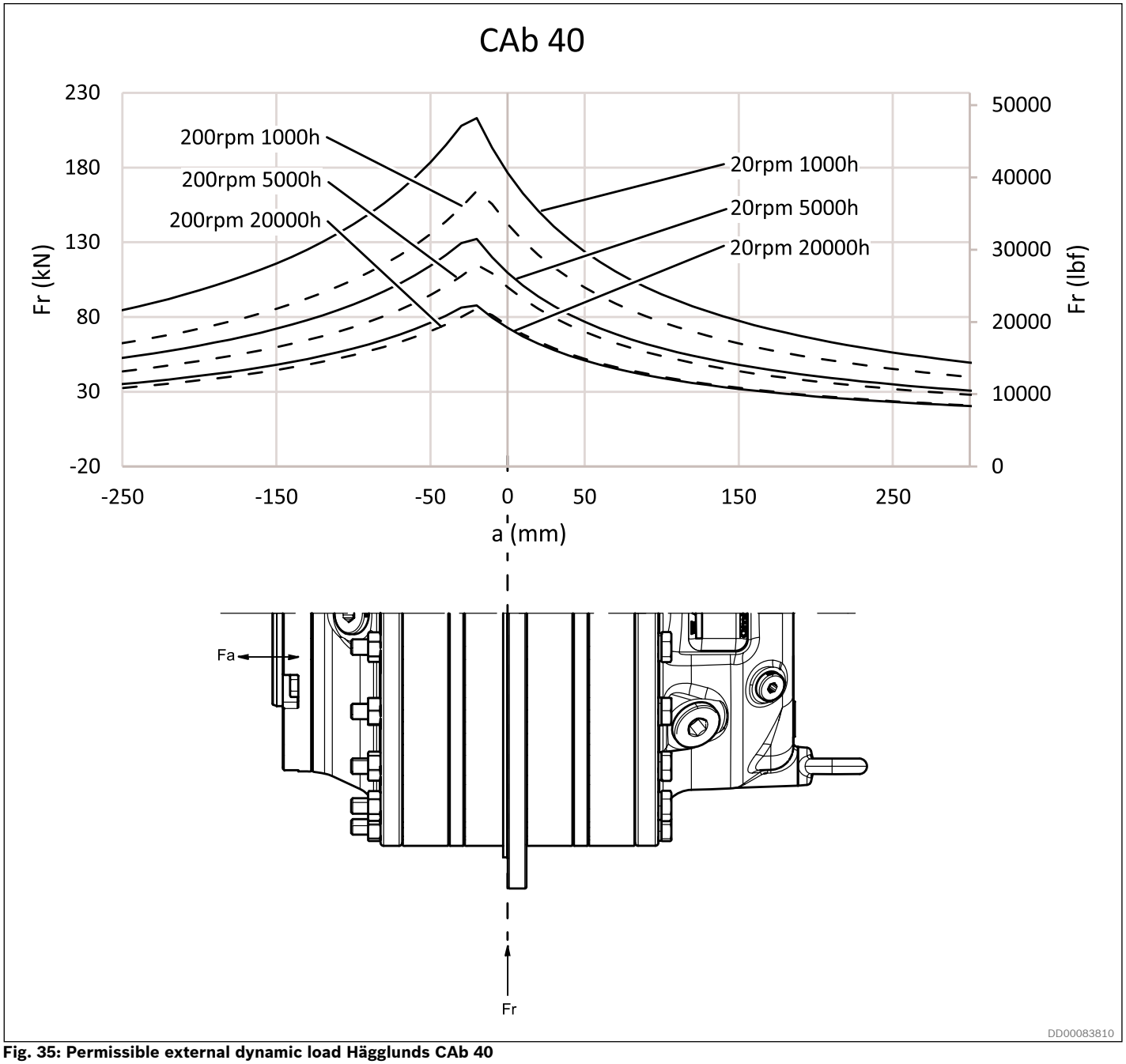

Fig. 35: Permissible external dynamic load Hägglunds CAb 40

Axial loads: Permissible axial load for intermittent duty F_a = 10 000 N (2 200 lbf).

Remark: For continuous axial load applications, please contact your Bosch Rexroth representative.

4.12.3 Permissible external static load

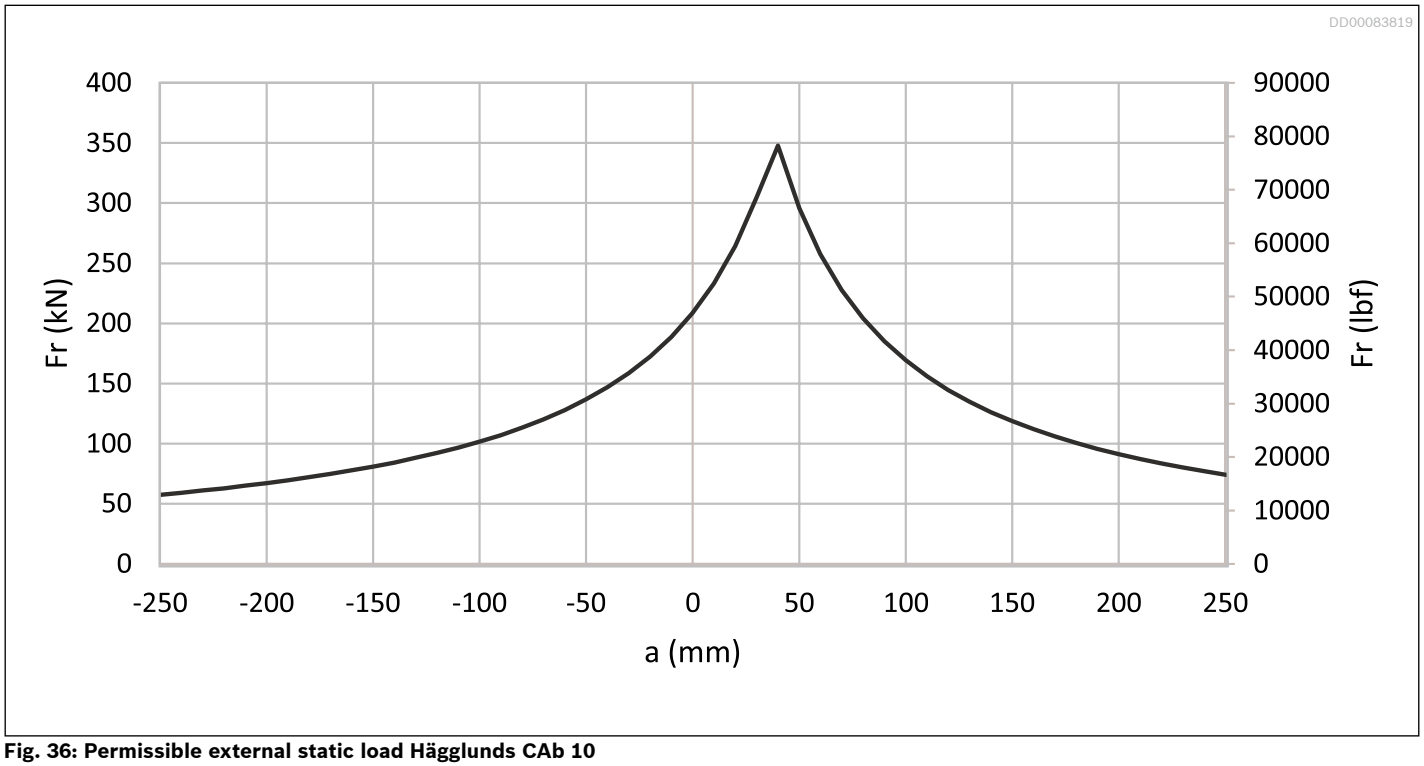

Fig. 36: Permissible external static load Hägglunds CAb 10

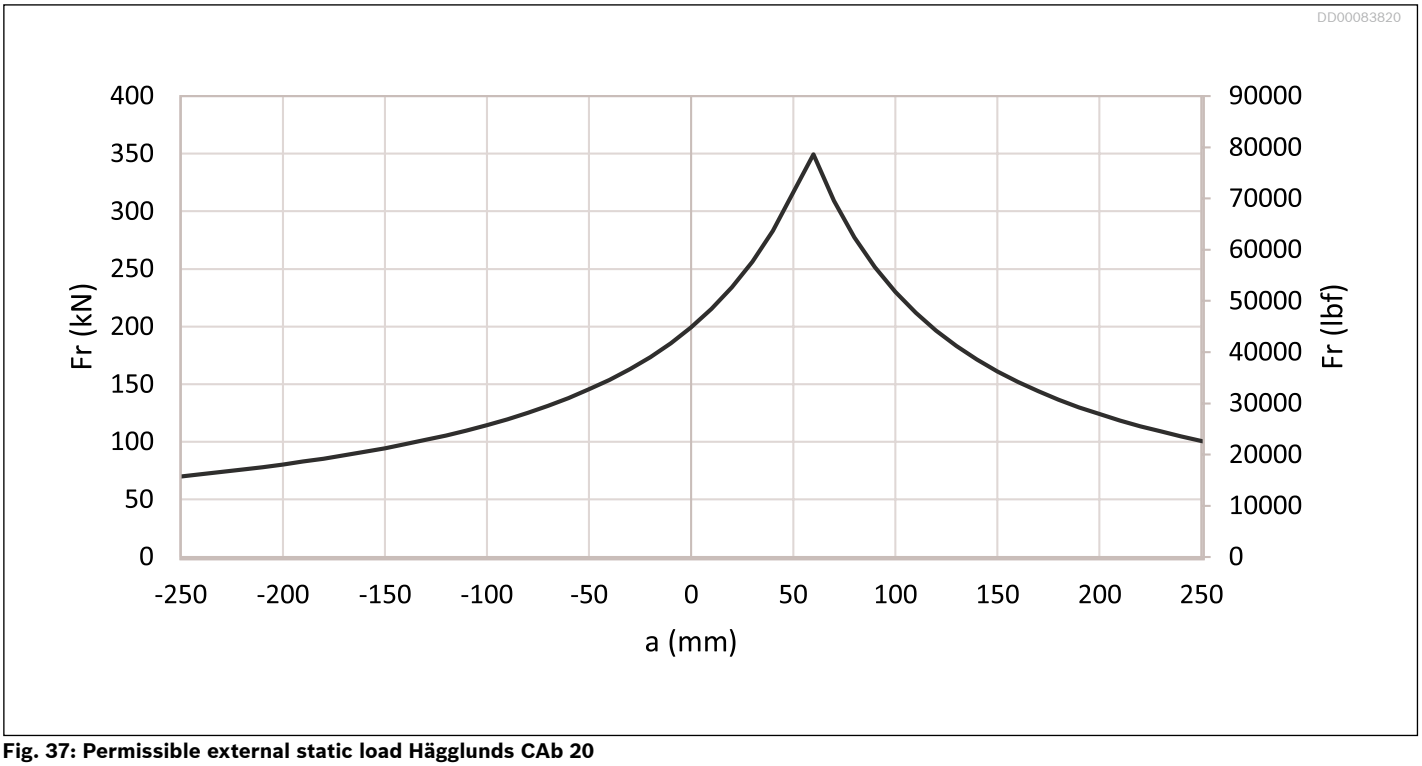

Fig. 37: Permissible external static load Hägglunds CAb 20

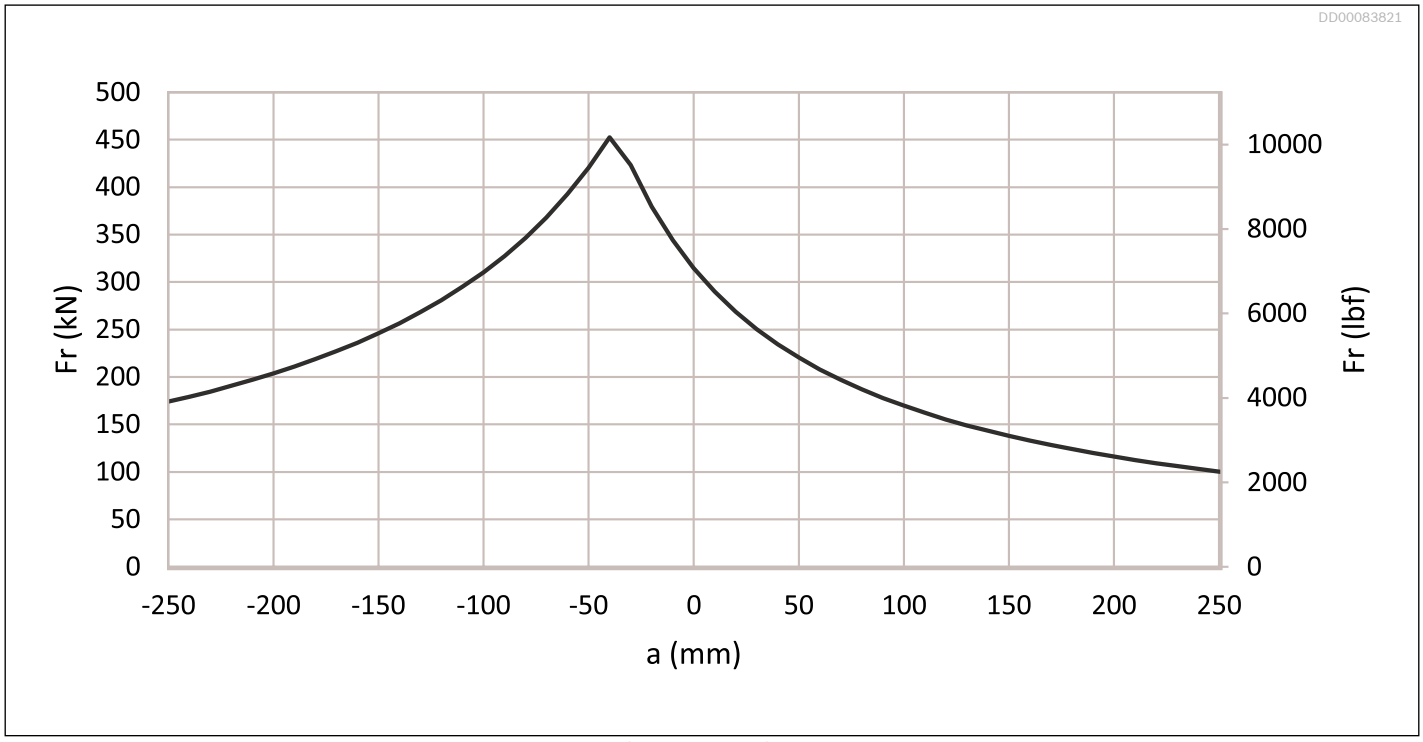

Fig. 38: Permissible external static load Hägglunds CAb 30 C (center flange)

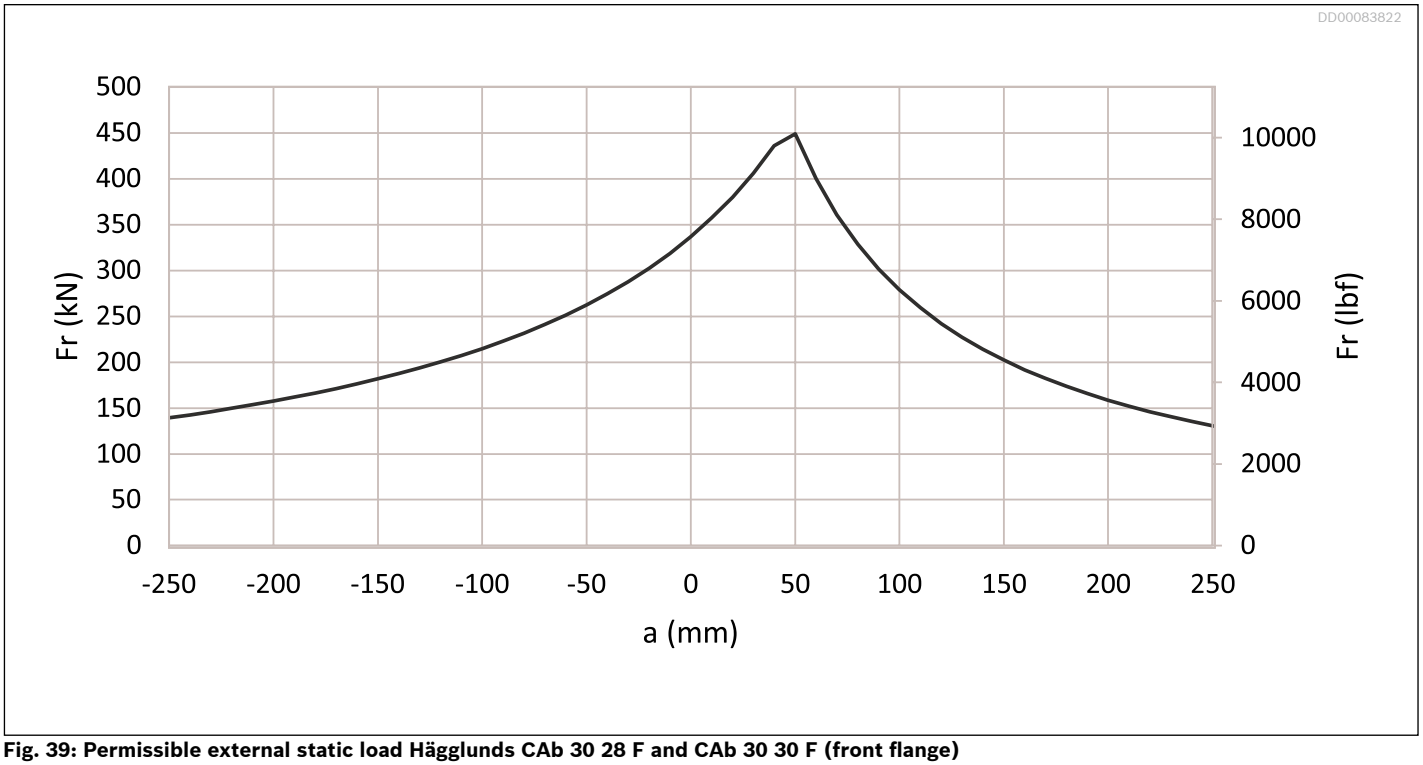

Fig. 39: Permissible external static load Hägglunds CAb 30 28 F and CAb 30 30 F (front flange)

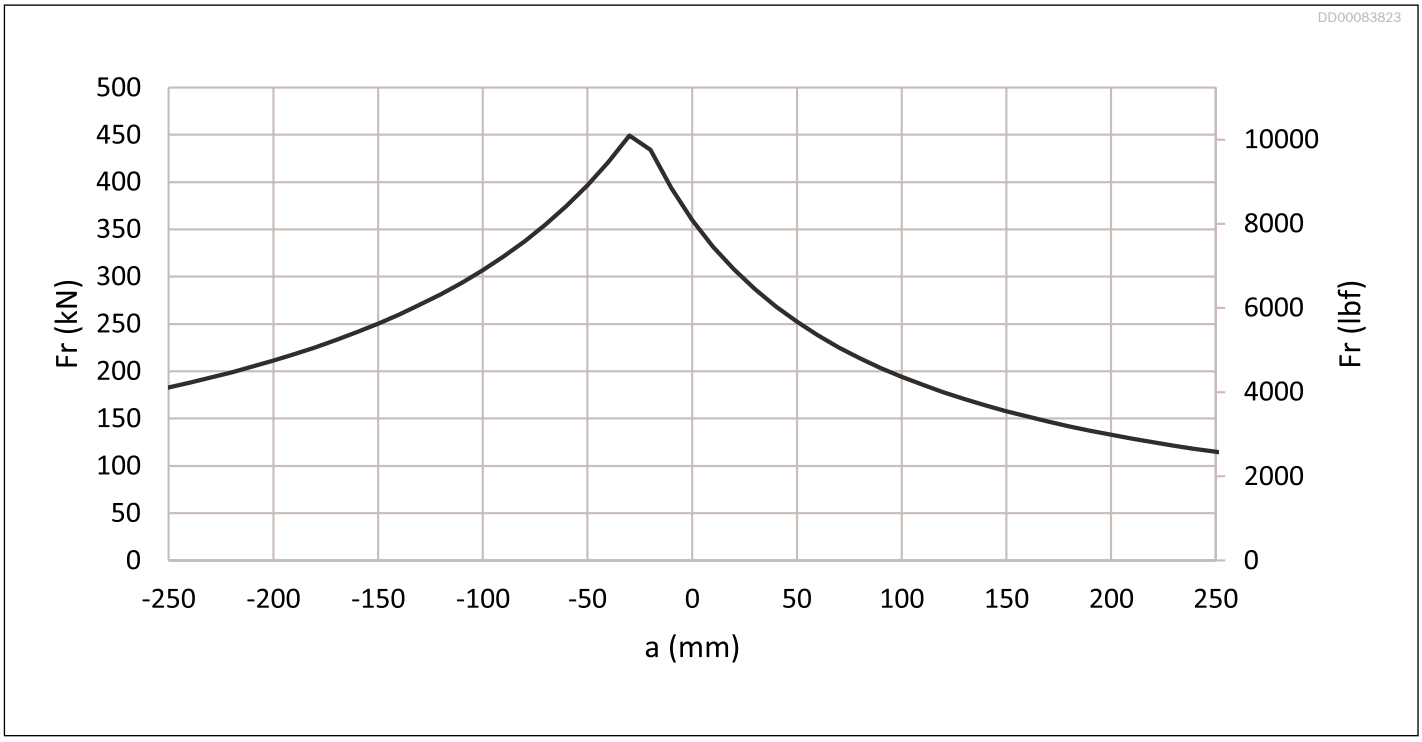

Fig. 40: Permissible external static load Hägglunds CAb 40

4.13 Painting system

Corrosion protection
The painting system of Hägglunds motors and accessories are avalible in two different corrosivity categories regarding corrosion protection in accordance with SS-EN ISO 12944.

- C3 - Corrosivity category Medium - which is recommended for normal urban and industrial atmosphere
- C5M - Corrosivity category Very High - which is recommended for marine environment with high salt load or other aggressive atmosphere

Colour
Standard colour for Hägglunds motors and accessories is orange (RAL 2002)

5 Type of seal

Option N:
NBR (Nitrile) Preferred alternative at low ambient temperatures and moderate case oil temperatures. See section *4.2: Motor data*

Option V:
FPM (Viton) Not available

6 Increased robustness

Option 0:
CAb has uncoated piston assembly as standard.

Option C:
Not available

7 Through hole kit

This device makes it possible to flush through the driven shaft or to draw electric cables through the motor.

Dimension drawing
See section *12: Related documents*

Ordering code
See ordering code for Hägglunds CAb section *1: Ordering code*.

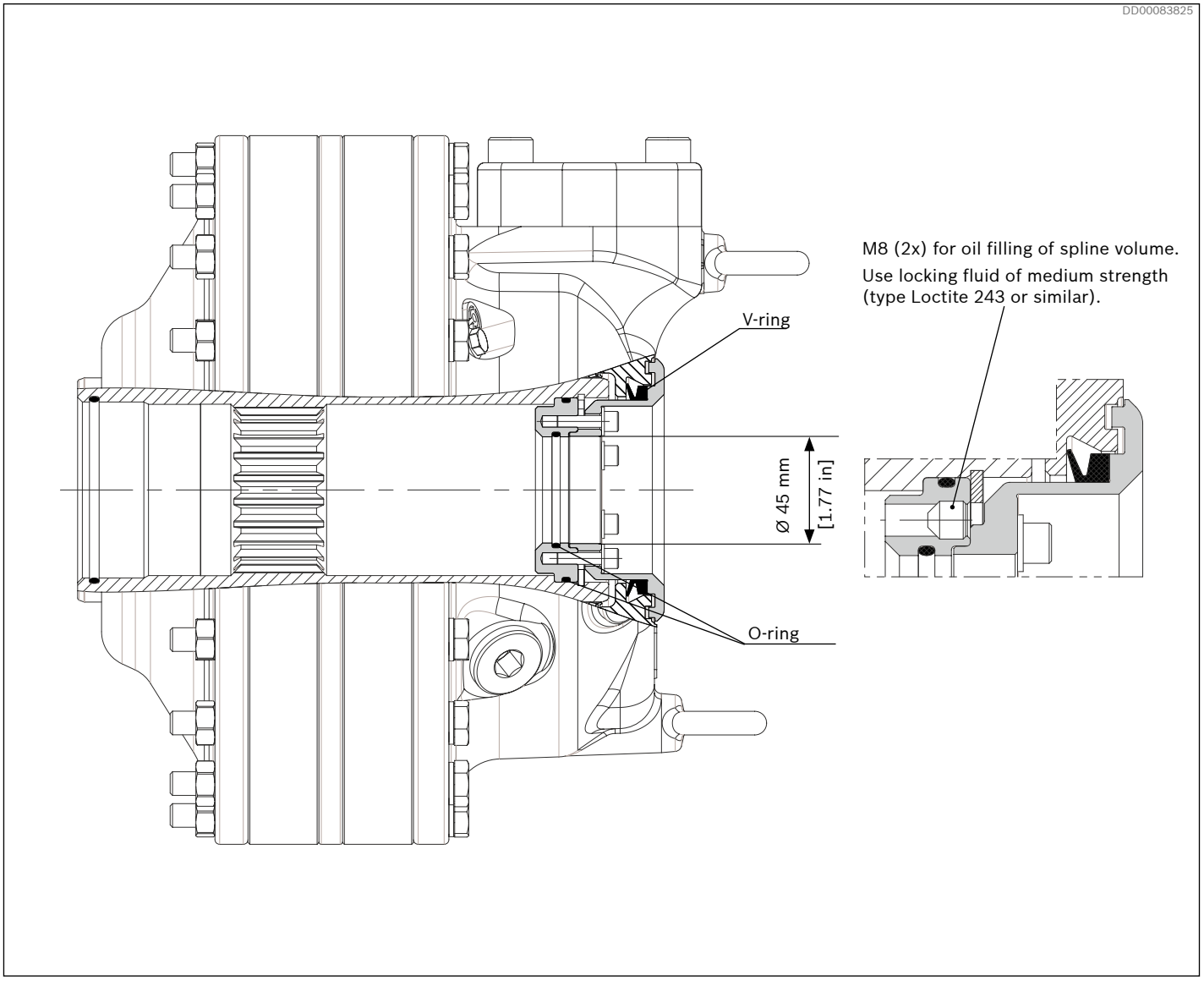

Fig. 41: Example: Hägglunds CAb 20 with through hole kit.

8 Dimensions / Interface

8.1 Dimensions

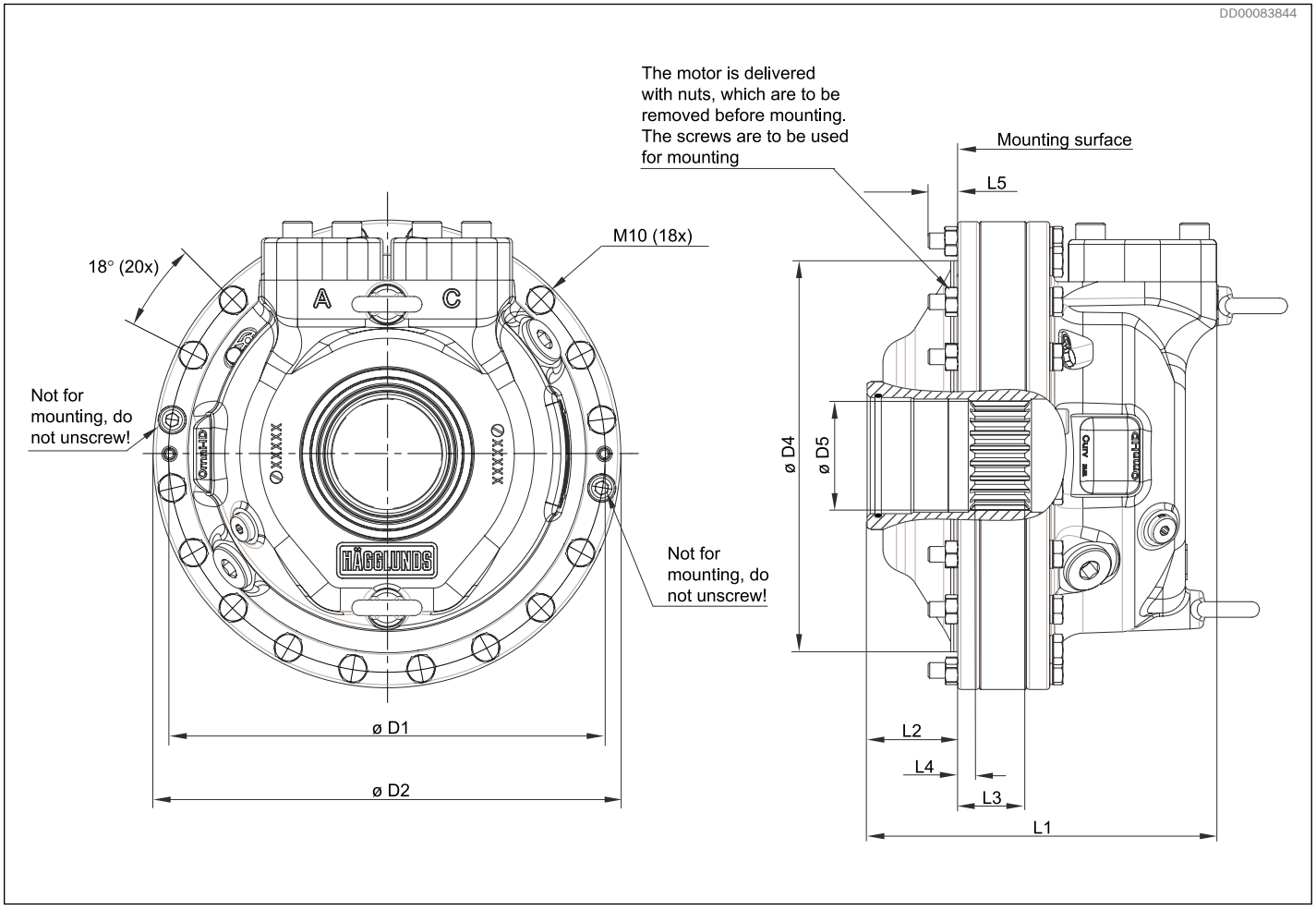

Fig. 42: CAb 10

Table 9: Dimensions CAb 10

		Dimensions	
		mm	**in**
D1	Pitch diameter	279	10.98
D2	Outer diameter	300	11.81
D4	Guide diameter	256	10.08
D5	Spline size	DIN 5480 N70 x 3 x 30 x 22	
L1	Total length	225	8.86
L2	Length to mounting surface	58	2.29
L3	Length to spline end	43	1.69
L4	Length to spline	11	0.43
L5	Protruding length of screws	19	0.75

For dimensional drawings CAb 10, see chapter *12 Related documents*

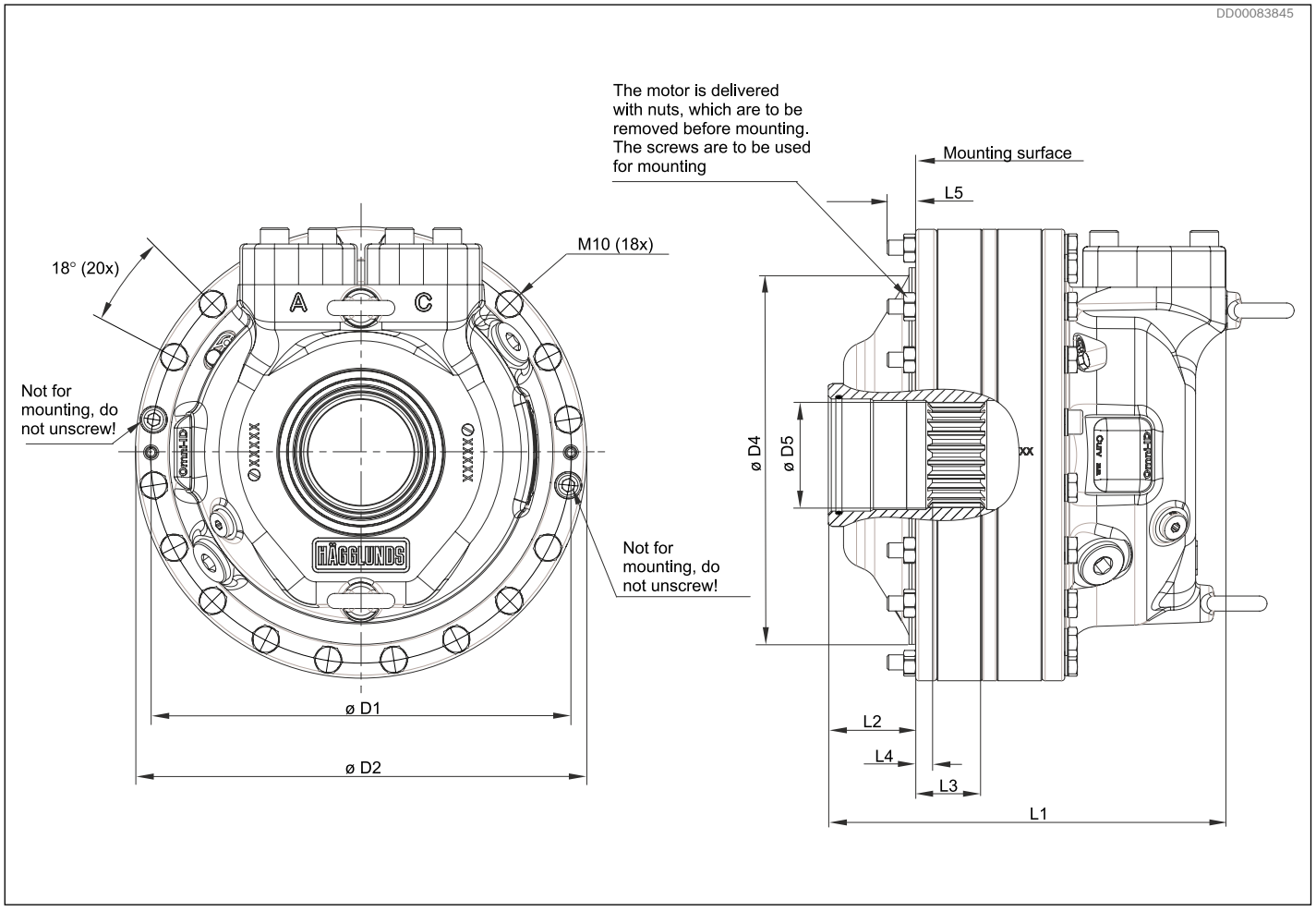

Fig. 43: CAb 20

Table 10: Dimensions CAb 20

		Dimensions	
		mm	**in**
D1	Pitch diameter	279	10.98
D2	Outer diameter	300	11.81
D4	Diameter of guide edge	256	10.08
D5	Spline size	DIN 5480 N70 x 3 x 30 x 22	
L1	Total length	265	10.43
L2	Length to mounting surface	58	2.28
L3	Length to spline end	43	1.69
L4	Length to spline	11	0.43
L5	Protruding length of screws	19	0.75

For dimensional drawings CAb 20, see chapter *12 Related documents*

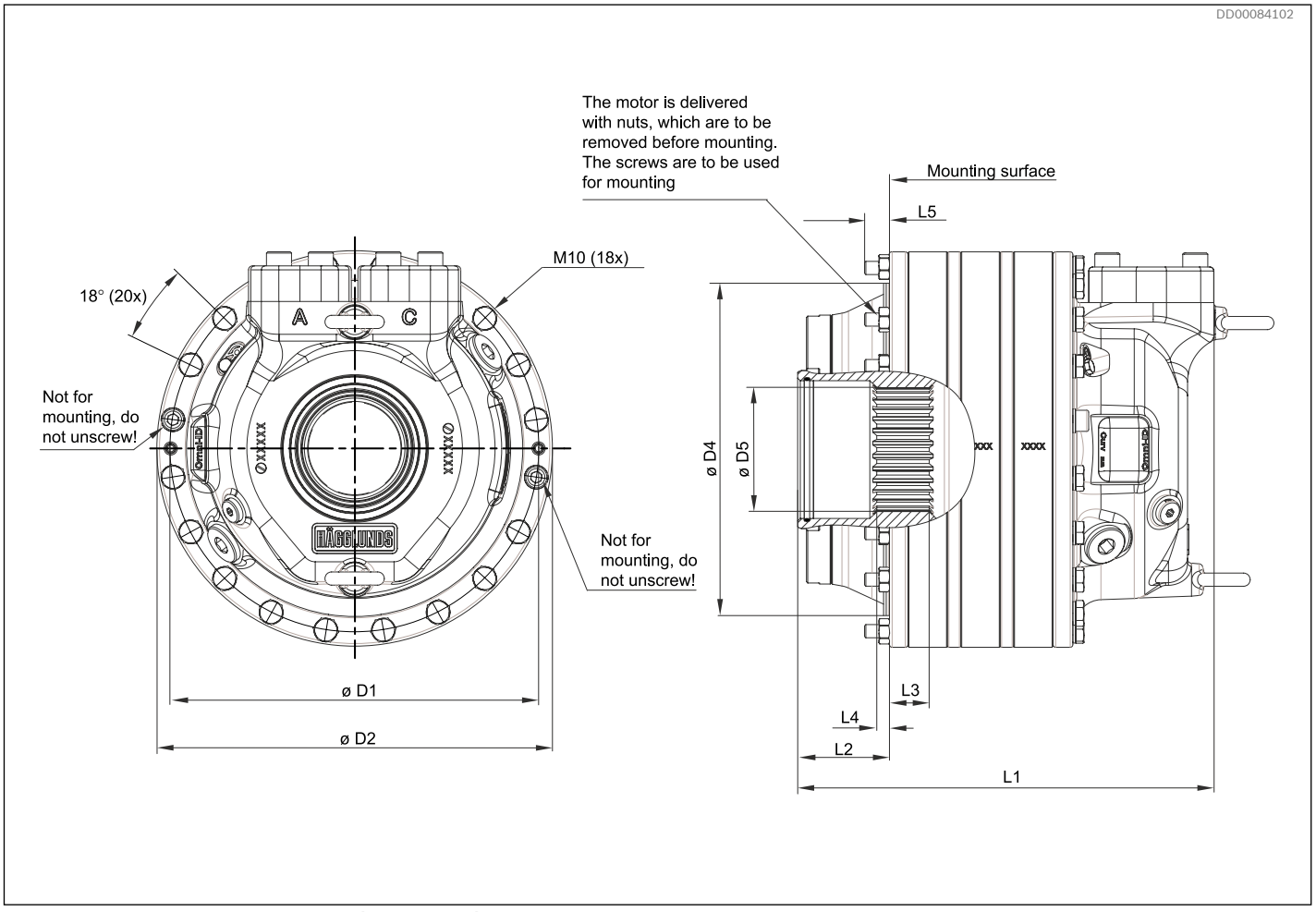

Fig. 44: CAb 30 28 F and CAb 30 30 F (front flange)

Table 11: Dimensions CAb 30 28 F and CAb 30 30 F (front flange).

		Dimensions	
		mm	**in**
D1	Pitch diameter	279	10.98
D2	Outer diameter	300	11.81
D4	Diameter of guide edge	256	10.08
D5	Spline size	DIN 5480 N100 x 3 x 30 x32	
L1	Total length	317	12.48
L2	Length to mounting surface	70	2.76
L3	Length to spline end	30	1.18
L4	Length to spline	10	0.39
L5	Protruding length of screws	19	0.75

For dimensional drawings CAb 30, see chapter *12 Related documents*

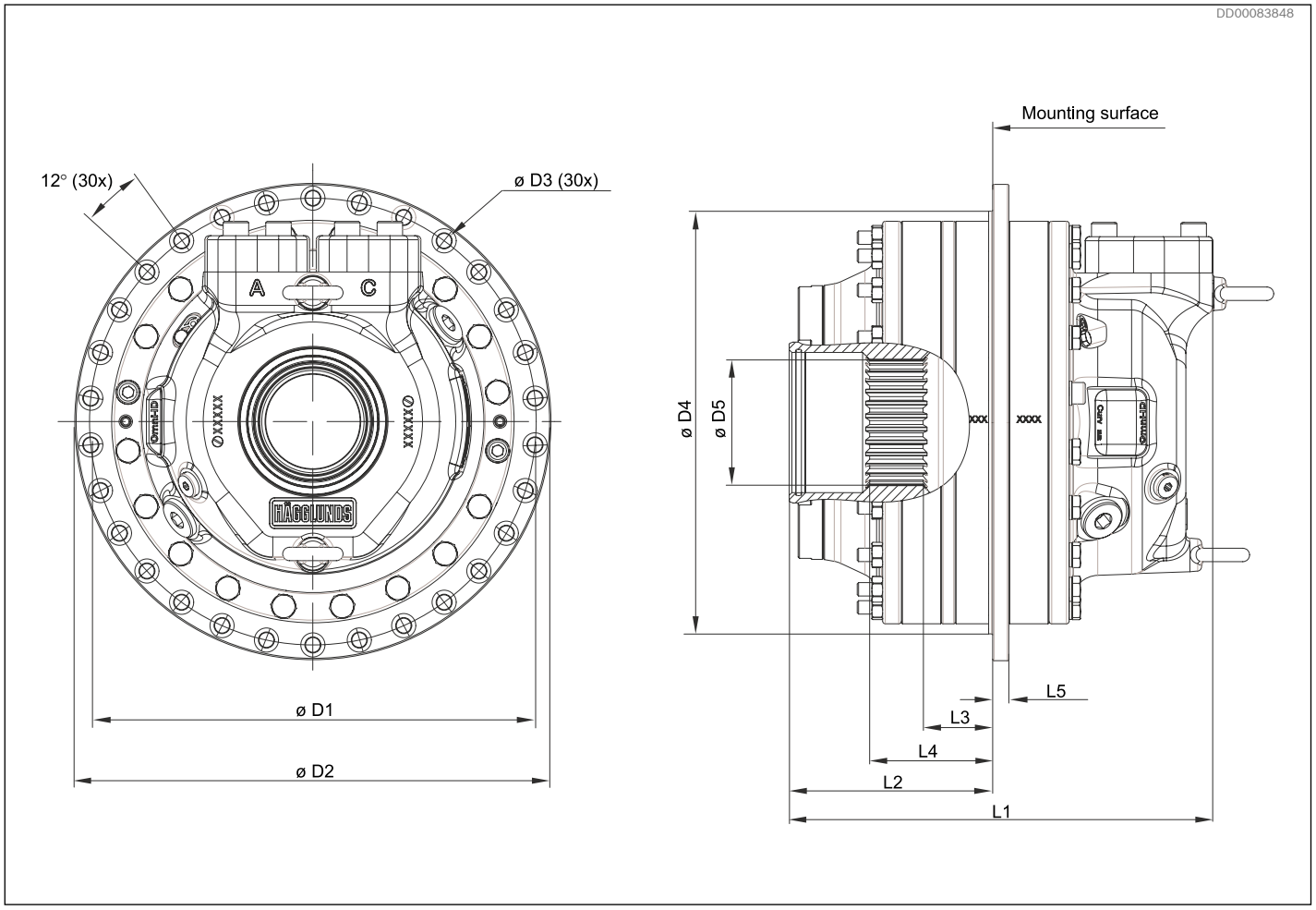

Fig. 45: CAb 30 C (center flange)

Table 12: Dimensions CAb 30 C (center flange)

		Dimensions	
		mm	**in**
D1	Pitch diameter	333	13.11
D2	Outer diameter	355	13.98
D3	Screw hole	11	0,43
D4	Guide diameter	315	12.40
D5	Spline size	DIN 5480 N100 x 3 x 30 x32	
L1	Total length	317	12.48
L2	Length to mounting surface	152	5.98
L3	Length to spline end	52	2.05
L4	Length to spline	92	3.62
L5	Thickness of mounting ring	12	0.47

For dimensional drawings CAb 30, see chapter *12 Related documents*

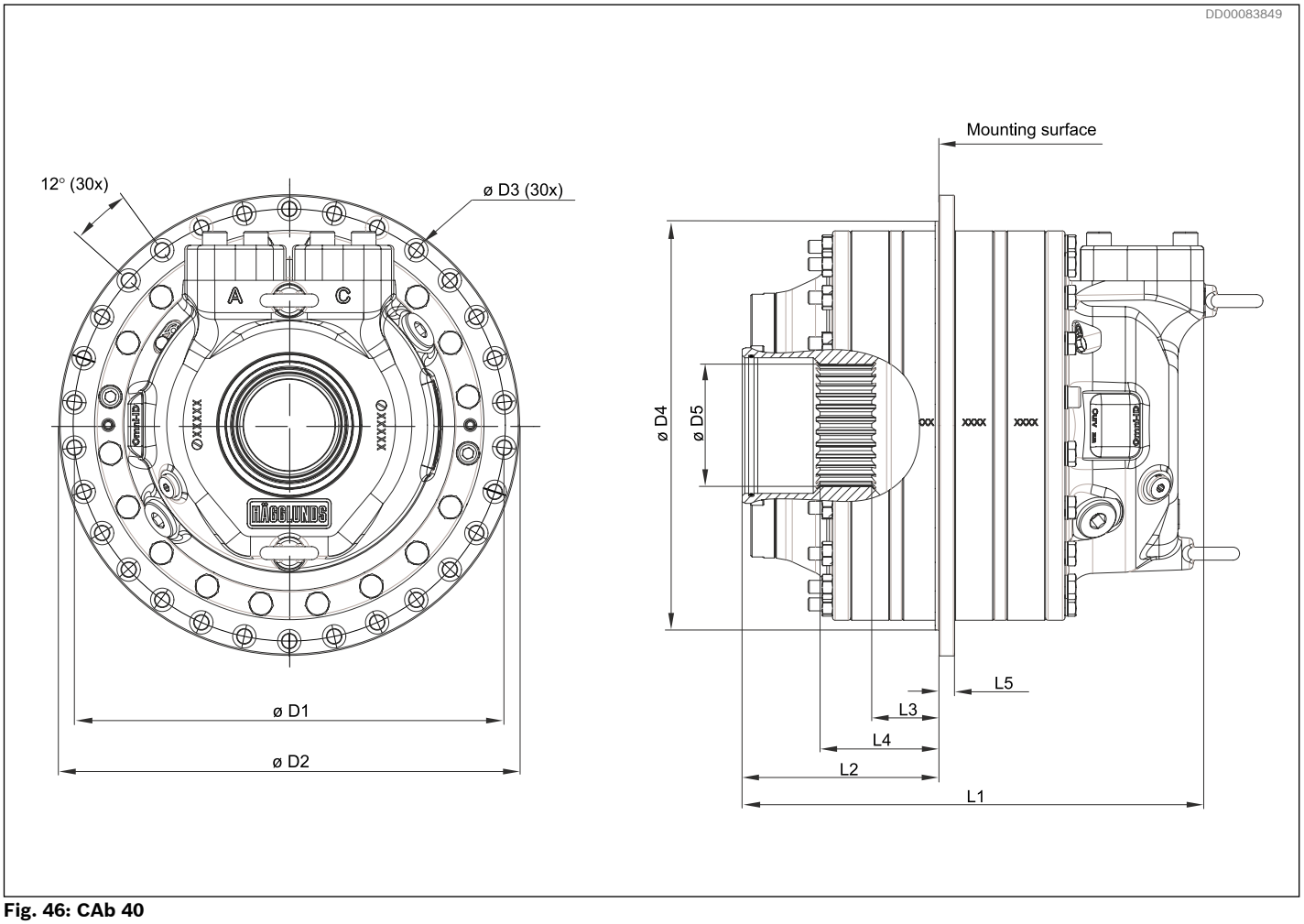

Fig. 46: CAb 40

Table 13: Dimensions CAb 40

		Dimensions	
		mm	**in**
D1	Pitch diameter	333	13.11
D2	Outer diameter	355	13.98
D3	Screw hole	11	0.43
D4	Guide diameter	315	12.40
D5	Spline size	DIN 5480 N100 x 3 x30 x32	
L1	Total length	357	14.06
L2	Length to mounting surface	152	5.98
L3	Length to spline end	52	2.05
L4	Length to spline	92	3.62
L5	Thickness of mounting ring	12	0.47

For dimensional drawings CAb 40, see chapter *12 Related documents*

9 Mounting alternatives

9.1 General information

With splines for flange or torque arm mounting.
The splines shall be lubricated and filled 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. 47, Fig. 48, Table 14. and Table 15* The splines must be accordning to *Table 17*. For production of driven shaft, see chapter *12 Related documents*.

9.2 Flange mounting

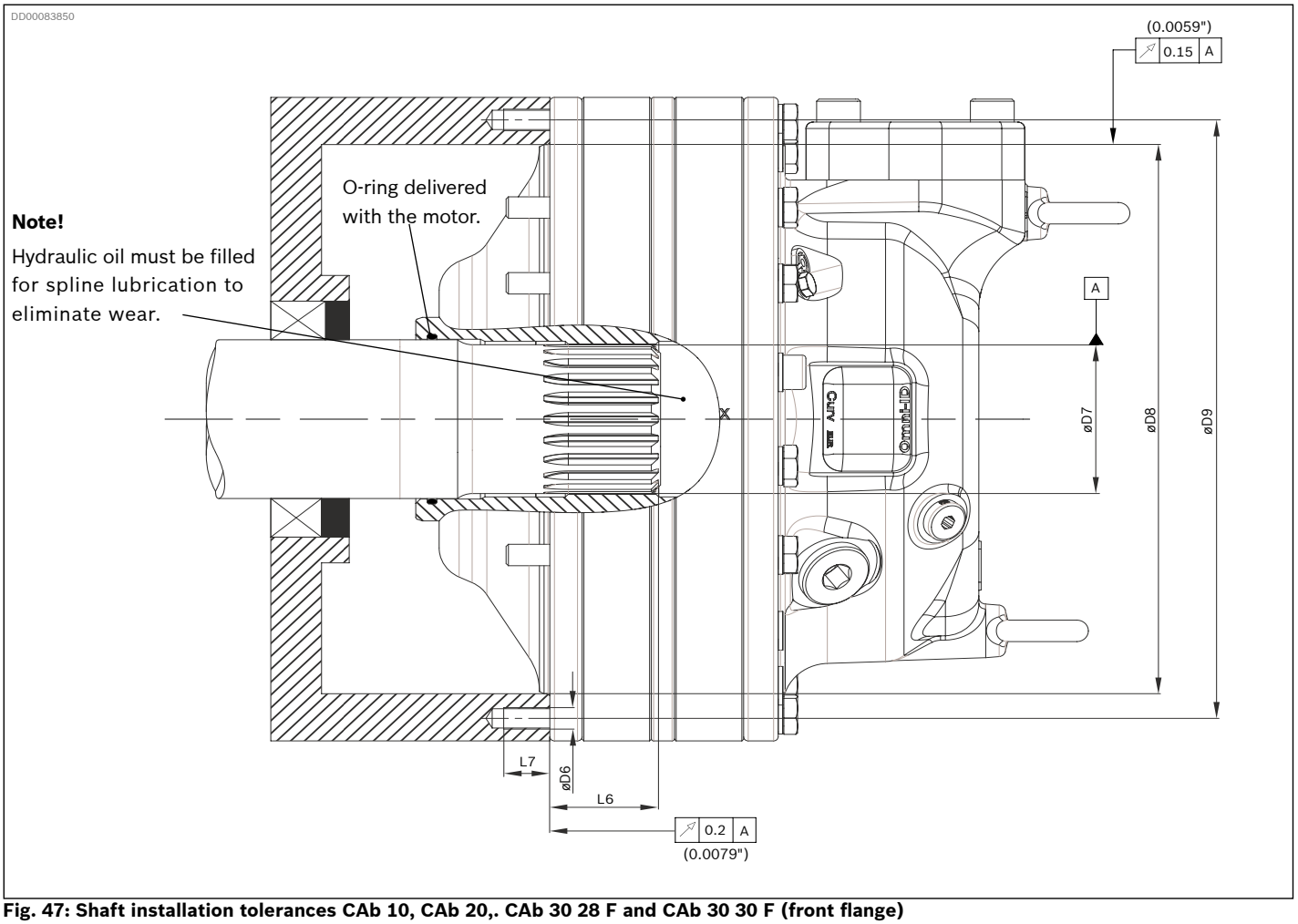

Fig. 47: Shaft installation tolerances CAb 10, CAb 20,. CAb 30 28 F and CAb 30 30 F (front flange)

Table 14: Dimensions installation tolerances CAb 10, CAb 20, CAb 30 28 F and CAb 30 30 F

		Frame size CAb 10 - CAb 20			Frame size CAb 30 F		
		mm	in	Tolerance	mm	in	Tolerance
D6	Screw hole	M10			M10		
D7	Spline size shaft	DIN 5480 W70			DIN 5480 W100		
D8	Guide diameter	256	10.08	H11	256	10.08	H11
D9	Pitch diameter	279	10.98		279	10.98	
L6	Length to spline	47	1.86		35	1.38	
L7	Length of thread	min. 20	min 0.79		min. 20	min 0.79	

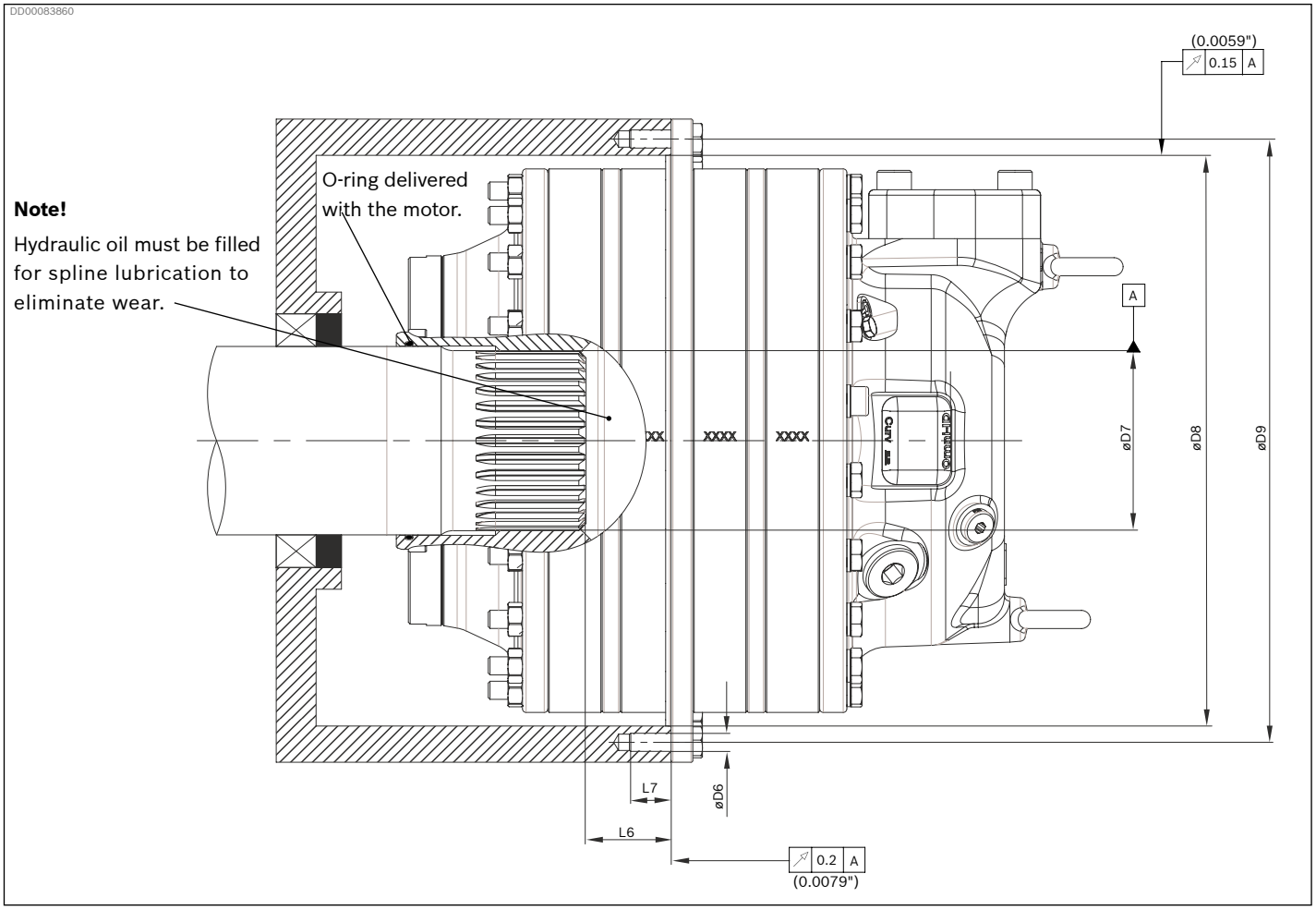

Fig. 48: Shaft installation tolerances CAb 30 C (center flange), CAb 40

Table 15: Dimensions installation tolerances CAb 30 C, CAb 40

		Frame size CAb 30 C, CAb 40		
		mm	**in**	**Tolerance**
D6	Screw hole	M10		
D7	Spline size shaft	DIN 5480 W100		
D8	Guide diameter	315	12.40	H11
D9	Pitch diameter	333	13.11	
L6	Length to spline	48	1.89	
L7	Length of thread	min. 20	min 0.79	

Table 16: Recommended material in the driven shaft

Drive	**Steel with yield strenght**
Unidirectional drive	Rel_{min} = 450 N/mm²
Bidirectional drive	Rel_{min} = 700 N/mm²

Table 17: Spline designation of driven shaft

	Spline	
Frame size	**CAb 10 - CAb 20**	**CAb 30 - CAb 40**
Designation Standard DIN 5480	W70x3x30x22x8f	W100x3x30x32x8f

9.3 Torque arm mounting

For torque arm mounting, please contact your Bosch Rexroth representative.

10 Accesories

10.1 Speed sensor, DSA series 12

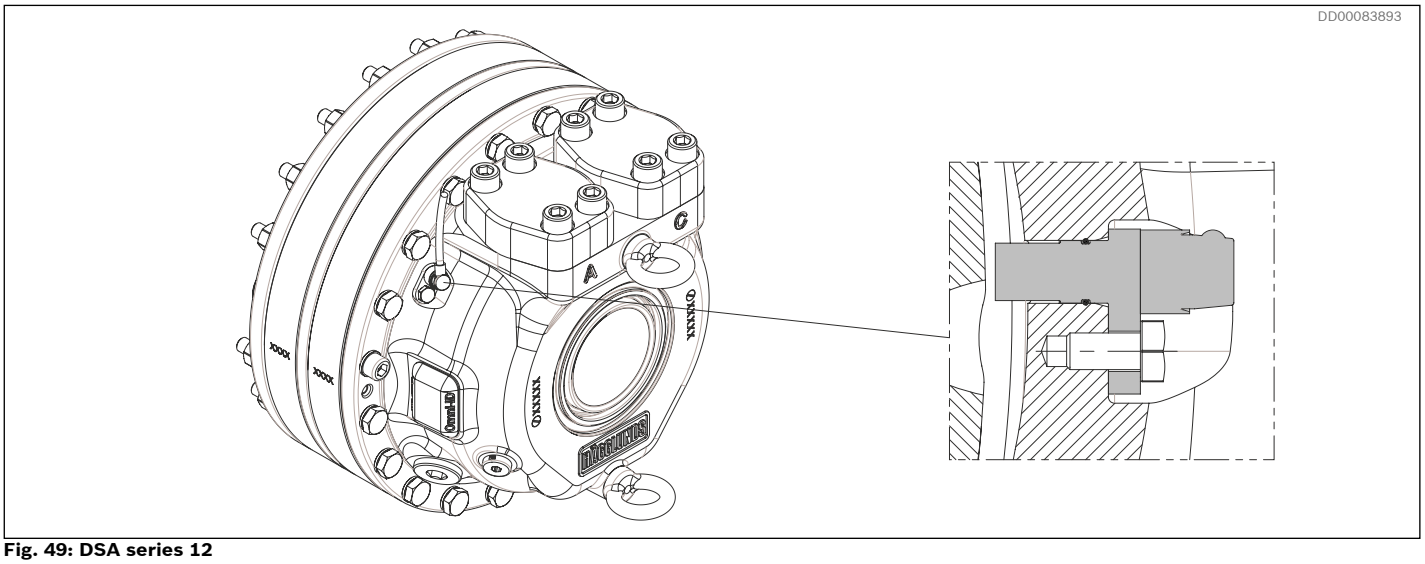

Fig. 49: DSA series 12

For technical data, see document nr: **RE 95133**

10.1.1 Description

The speed sensor is of hall-effect type for contactless sensing. The sensor has two sensing elements and will give two incremental pulse trains (S1 and S2) with 16 pulses per revolution. The signals can be used to sense rotational direction

10.1.2 Technical information

Connection

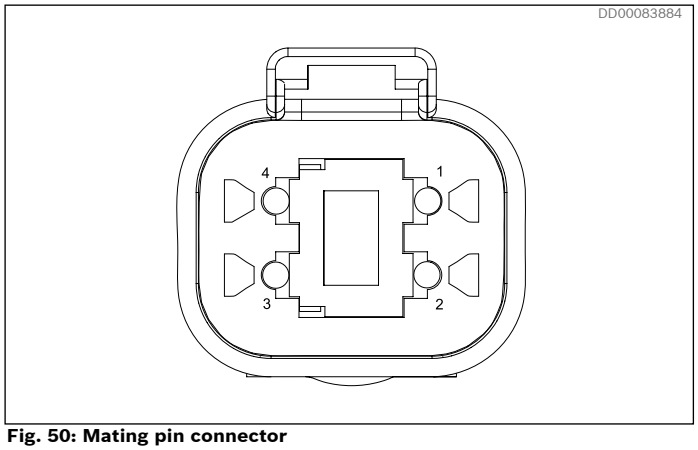

Fig. 50: Mating pin connector

Table 18: Mating pin connector

Pin	Function
1	Supply voltage U_B , 24 V_{DC}
2	Ground GND
3	S1 signal
4	S2 signal
Cable length 1.5 m (78.74 ft)	

Table 19: Mating socket connector

	Material number
Socket	R902601805
Socket including cable	R939065113

Socket is not included in the delivery contents. This can be supplied by Bosch Rexroth on request.

Socket including extension cable. Length 30 m and open end. Not included in the delivery contents. This can be supplied by Bosch Rexroth on request.

Table 20: Output pulses

		Pulse	Gap	Tooth
Per revolution	n	16	16	16
Angle of a turn	α	22,5°	10,09°	12,41°
Duty		100%	44,84%	55,16%
S1 signal			$0*U_B$	$1*U_B$
S2 signal			$1*U_B$	$0*U_B$
Correction factor for 50%/50%	cf50	0,5	1,115	0,907

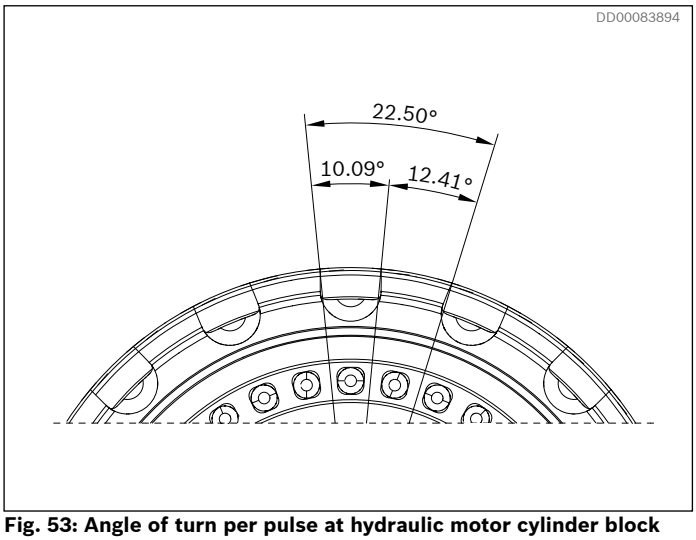

Fig. 53: Angle of turn per pulse at hydraulic motor cylinder block

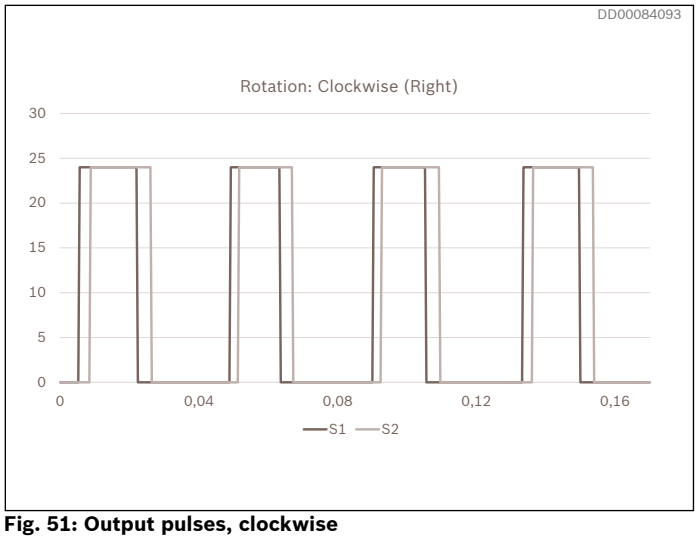

Fig. 51: Output pulses, clockwise

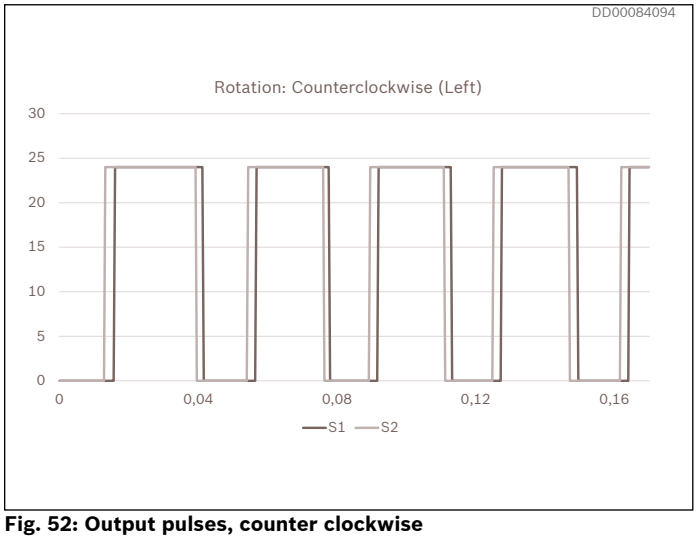

Fig. 52: Output pulses, counter clockwise

11 Circuit design

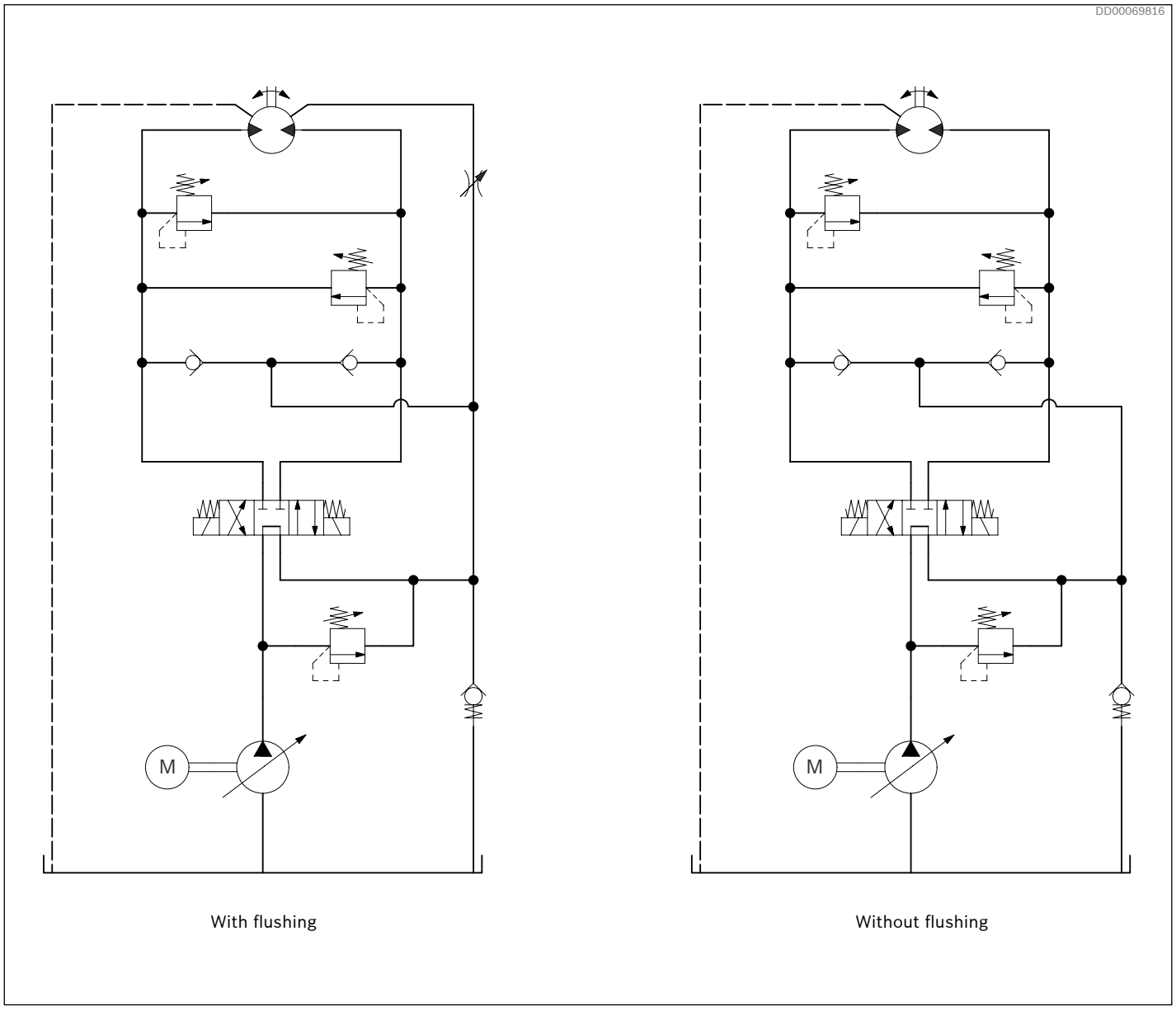

Fig. 54: Simplified open circuit design example

12 Related documents

	Title	Document no	Document type
🕮	Installation and maintenance manual CAb	RE 15354-WA	Installation & maintenance manual
🕮	Hydraulic fluid quick reference	RE 15414	Data sheet
🕮	Sound and vibrations	RE 15411	Data sheet
🕮	Sound CAb	RE 15412	Data sheet
🕮	Speed sensor DSA series 12	RE 95133	Data sheet
🕮	Radial piston motor CAb 10	078 4399	Dimension drawing
🕮	Radial piston motor CAb 20	078 4400	Dimension drawing
🕮	Radial piston motor CAb 30	078 4401	Dimension drawing
🕮	Radial piston motor CAb 40	078 4402	Dimension drawing
🕮	Splined shaft CA 10- 20	078 3098	Dimension drawing
🕮	Splined shaft CA 30- 40	078 3099	Dimension drawing
🕮	Through hole unit	078 4670	Dimension drawing

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