ENGINEERING
TOMORROW

User Guide

Vickers by Danfoss

ICMB RADIAL PISTON MOTOR

7,550 - 52,800 cc/rev

VICKERS
by Danfoss

BC498269671314en-000103

Vickers by Danfoss hydraulic motors can operate in the most demanding environments. This radial piston cam curve motor is designed with a rotating cylinder block, which is mounted in roller bearings within the motor housing. The cylinder block(s) incorporate either a hollow shaft to facilitate mounting on a driveshaft via a shrink disc coupling, or splines to facilitate mounting directly on a splined shaft. The block(s) are mounted in fixed rolle r bearings in the housing, which also accommodates the output drive housing.

The pistons are radially located in the cylinder block, and the valve plate directs the incoming and outgoing oil to and from the pistons. Each piston is working against a cam roller.

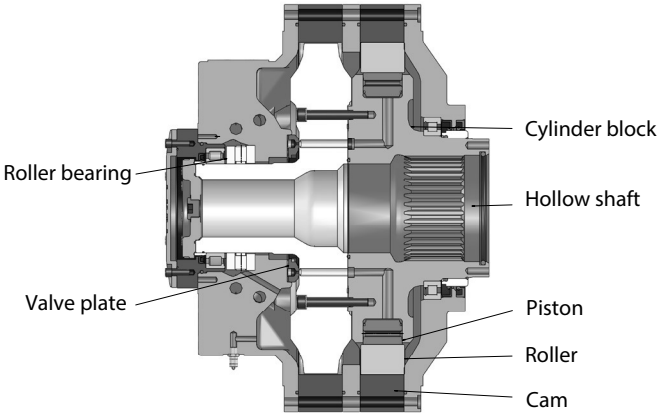
The displacement of the motor is determined by a combination of the number of banks of cylinder blocks within each motor and the cam ring angle of slope , which determines the stroke of the piston, facilitating a wide range of displacements; 18 in total.

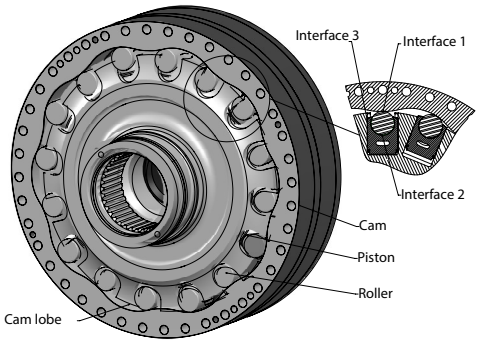
The hydraulic pressure acts upon the pistons, the cam rollers are pushed against the slope on the cam ring connec ted to the housing, thereby translating the linear piston force into a torque producing tangential force, occurring at the rate proportional to the pressure experienced.

We also provide customised solutions. For more information, please contact Vickers by Danfoss sales representative.

KEY FEATURES

- Full torque from zero speed
- Flexible mounting; shrink disc coupling or splines; torque arm or flange mounting
- High output torque and power to weight ratio
- High efficiency and low maintenance cost
- Low inertia
- Through hole





Industrial Cam Lobe Motor Model Code

ICMB	0280		0280		S	A	0	N	0	C	0	00		00
1,2,3,4	5,6,7,8		9,10,11,12		13	14	15	16	17	18	19	20, 21		22, 23

1,2,3,4	MOTOR SERIES	ICMB INDUSTRIAL CAM LOBE MOTOR B SERIES
5,6,7,8	FRAME SIZE	0280 0400 0560 0840
9,10,11,12	SPECIFIC TORQUE DISPLACEMENT	0120 120Nm/bar , 7550cm³/Rev 0160 160Nm/bar , 10050cm³/Rev 0200 200Nm/bar , 12550cm³/Rev 0240 240Nm/bar , 15100cm³/Rev 0280 280Nm/bar , 17600cm³/Rev 0320 320Nm/bar , 20100cm³/Rev 0360 360Nm/bar , 22600cm³/Rev 0400 400Nm/bar , 25100cm³/Rev 0440 440Nm/bar , 27600cm³/Rev 0480 480Nm/bar , 30200cm³/Rev 0520 520Nm/bar , 32700cm³/Rev 0560 560Nm/bar , 35200cm³/Rev 0600 600Nm/bar , 37700cm³/Rev 0640 640Nm/bar , 40200cm³/Rev 0680 680Nm/bar , 42700cm³/Rev 0720 720Nm/bar , 45200cm³/Rev 0760 760Nm/bar , 47800cm³/Rev 0800 800Nm/bar , 50300cm³/Rev 0840 840Nm/bar , 52800cm³/Rev
13	MOUNTING ALTERNATIVESSHAFT	**C** SHRINK DISC COUPLING **S** SPLINES
14	MULTI DISC BRAKE OR TANDEM KIT	**A** MOTOR WITHOUT BRAKE OR TA KIT
15	DISPLACEMENT SHIFT VALVE	**0** MOTOR NOT PREPARED FOR DISPLACEMENT SHIFT
16	TYPE OF SEAL	**N** NITRILE **V** VITION
17	THROUGH HOLE KIT	**0** NONE **H** YES
18	COATED PISTIONS ANDCAM ROLLERS	**0** NONE **C** YES
19	PAINTING	**0** BLACK [DEFAULT]
20,21	MODIFICATION	**00-99** **00** Standard
22,23	SPECIAL SETTING	**01-99** SPECIAL INDEX

Torque Arm Model Code

TC	A	0280		0		0		00
1,2,	3,	4,5,6,7		8,		9,		10,11

1,2	TORQUE ARM	**TC** TWIST COUNTER
3	TYPE	**A** ARTICULATED CONNECTION-SINGLE ENDED **B** BRACKET
4,5,6,7	SIZE	**0400** FOR ICMB 280 AND 400 FRAME **0840** FOR ICMB 560 AND 840 FRAME
8	ATTACHMENT	**0** WITHOUT MOUNTING SCREWS AND WASHERS **2** WITH MOUNTING SCREWS AND WASHERS
9	MODIFICATION	**0** DEFAULT
10,11	SPECIAL SETTING	**00** STANDARD **01-99** SPECIAL INDEX

If you have any other auxiliary valve and drawing requirements, please contact the Vickers by Danfoss sales representative

MOTOR DATA

Frame size	Displacement	Specific Torque	Rated speed (1)	Max Speed (2)	Max Pressure**	Max Torque (3)	Max intermittent power (4)
	cm^3 /rev	Nm/bar	rev/min	rev/min	bar	KNm	KW
ICMB0280-0120	7550	120	98	128***	350	39	530
ICMB0280-0160	10050	160	72	96	350	53	530
ICMB0280-0200	12550	200	58	77	350	66	530
ICMB0280-0240	15100	240	53	68	350	79	530
ICMB0280-0280	**17600**	**280**	**44**	**58**	**350**	**92**	**530**
ICMB0400-0240	15100	240	94	125***	350	79	970
ICMB0400-0280	17600	280	73	105***	350	92	950
ICMB0400-0320	20100	320	71	94	350	110	970
ICMB0400-0360	22600	360	59	82	350	120	960
ICMB0400-0400	**25100**	**400**	**58**	**75**	**350**	**130**	**970**
ICMB0560-0440	27600	440	49	65	350	140	930
ICMB0560-0480	30200	480	48	62	350	160	970
ICMB0560-0520	32700	520	41	57	350	170	960
ICMB0560-0560	**35200**	**560**	**40**	**53**	**350**	**180**	**970**
ICMB0840-0600	37700	600	30	45	350	200	880
ICMB0840-0641	40200	640	28	41	350	210	850
ICMB0840-0681	42700	680	27	40	350	220	890
ICMB0840-0721	45200	720	25	37	350	240	870
ICMB0840-0761	47800	760	23	34	350	250	840
ICMB0840-0801	50300	800	23	34	350	260	890
ICMB0840-0840	**52800**	**840**	**21**	**32**	**350**	**280**	**870**

Note: in addition to the above frame sizes, 15 intermediate displacements are available from 12,500 cc/r ev to 50,300 cc/rev.

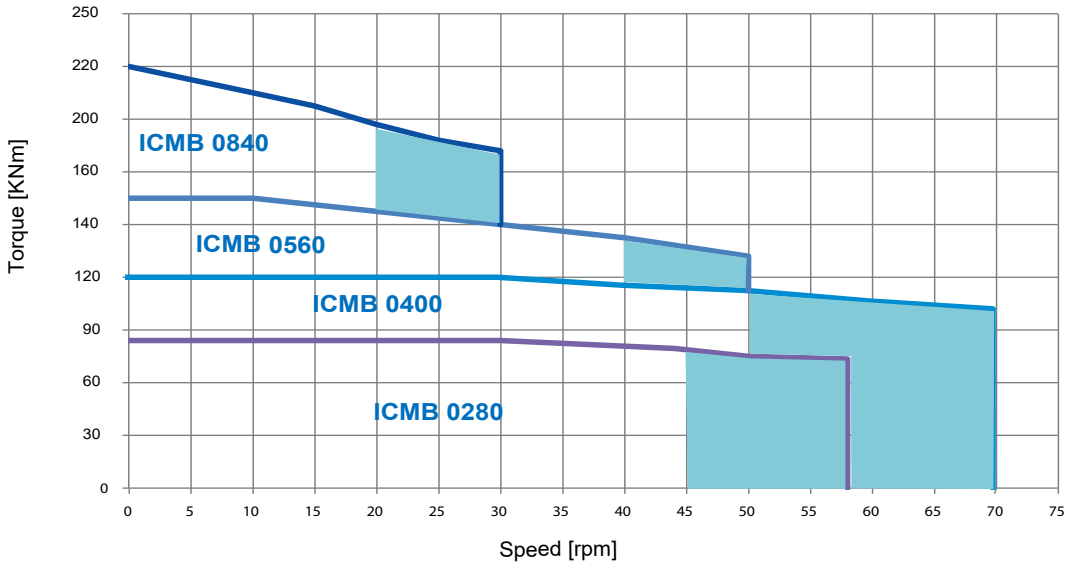
Definitions

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 20% of oil is to be exchanged in t he main loop.
Max. speed (2) - maximum speed is the maximum allowed speed. Special considerations are required regarding charge pressure, cooling and choice of hydraulic system for speeds above rated. At higher speeds four ports should be used. At higher powers case flushing is required.
Max. torque (3) - based on 350 bar system pressure and a charge pressure of 14 bar at the motor.
Max power (4) - Special considerations required when operating at maximum power, motor case flushing required.
*Test pressure 420 bar. Peak/transient pressure 420 bar.
**FKM Shaft Seals Are Preferred for High-Speed Operation

Accepted conditions for motor application:

1. Oil viscosity 20-40 - 150 cSt. Contact Vickers by Danfoss for other viscosity/fluids.
2. Temperature -35°C to +70°C. Motor case flushing required in some conditions.
3. Running case pressure 0-3 bar (0-45 psi). Max case pressure 8 bar (116psi).
4. Charge pressure and volumetric losses (see graph on page 9).
5. Minimum oil viscosity in the motor case 20 cst.

QUICK SELECTION



Note: When operating in the shaded area contact your Vickers by Danfoss sales representative.

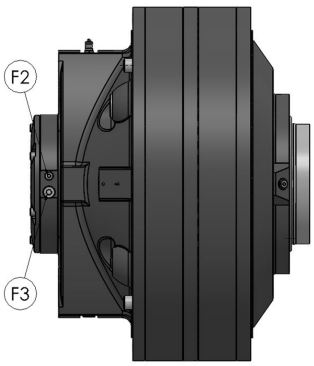
The graph below provides a method to quickly select an ICMB motor based upon the typical speed and tor que requirements of an application . The graph represents the main frame sizes of motor, however the inte rmediate di splacements available within each frame size offer extended speed ranges.

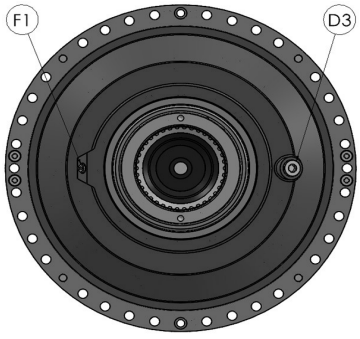
Oil viscosity influences motor life and in the motor case of 40 cst. In high ambient conditions high viscosity fluids should be used and case flushing considered. The life of the motor is related to output torq ue, speed, oil condition and duty cycle.

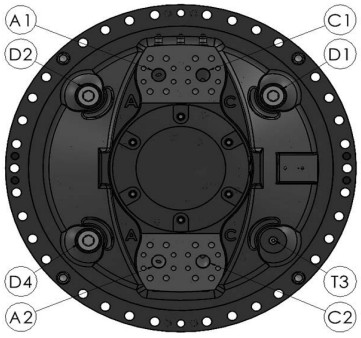
PORT CONNECTIONS

Port	Port specification	Port connection			
A1, C1, A2, C2	Main connection	SAE 1½"&1¼" *	T4	Pressure connection	G ½"
D1, D2, D4	Drain connection	G1¼"	F1, F2	Flushing connection	G ¼"
D3	Alternative drain connection	G 1"	F3	Flusing connection/speed sensor port	G ½"
T1, T2	Test connection	M16 X 2	F4	Speed sensor port	9/16-18UNF
T3	Test connection	G ¼"			

*SAE Flange J518 , Code 62 420bar

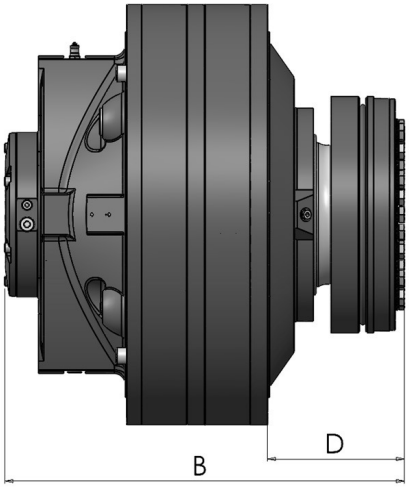


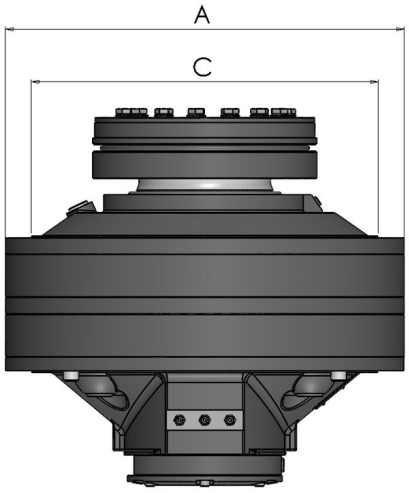




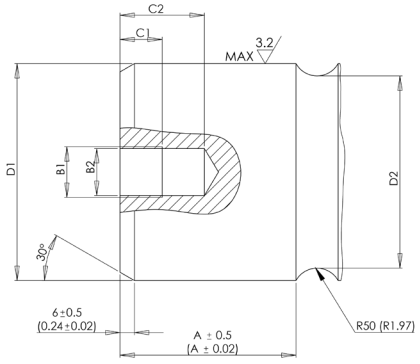
SIZE OF MOTORS WITH HOLLOW SHAFT

Frame size	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)
280	782	612	680	245	800
400	782	740	680	254	1160
560	940	767	800	398	1290
840	940	885	800	398	1620





DESIGN RECOMMENDATIONS FOR SHAFT END, SHRINK DISC

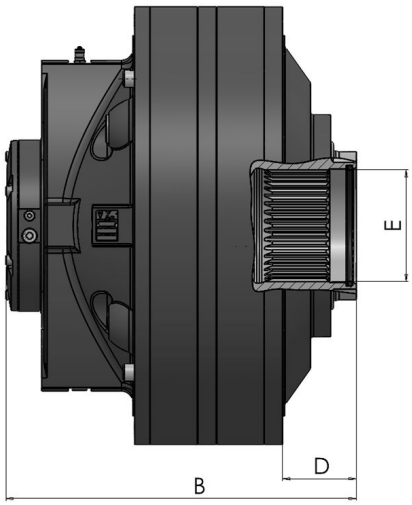


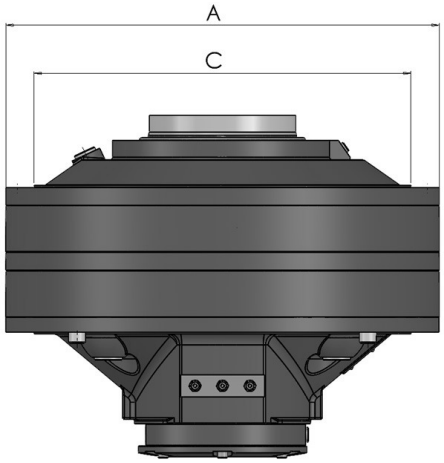
	A (mm)	**D1 (mm)**	**D2 (mm)**	**B1**	**B2 (mm)**	**C1 (mm)**	**C2 (mm)**
280	106	-0.054 180 -0.014	174	M20	>1 7	25	50
400	117	-0.061 200 -0.015	194				
560/840	153	-0.069 260 -0.017	254				

SIZE OF MOTORS WITH SPLINED INTERNAL BORE

Frame size	A (mm)	B (mm)	C (mm)	D (mm)	E major spline diameter (mm)	Weight (kg)
280	782	501	680	130	∅199 0 -1,201	705
400	782	619	680	130		1060
560	940	669	800	298	∅259 0 -1,201	1115
840	940	787	800	298		1445

Tooth profiles to DIN5480





DESIGN RECOMMENDATIONS FOR SHAFT END, SPLINED

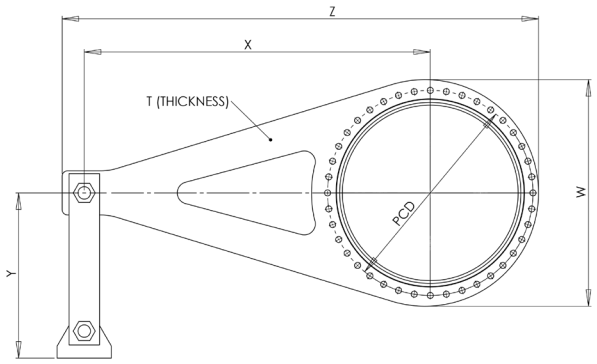
SPLINE SHAFT DETAIL

Motor	280/ 400	560/ 840
Toth Profile and bottom form	DIN 5480	DIN 5480
Tolerance	8f	8f
Guide	Back	Back
Pressure angle	30°	30°
Module	5	5
Number of teeth	38	50
Pitch diameter	Ø 190	Ø 250
Minor diameter	Ø 188 0 -1 ,201	Ø 248 0 -1 ,201
Major diameter	Ø 199 0 -1 ,290	Ø 259 0 -1 ,320

MOUNTING ARRANGEMENT

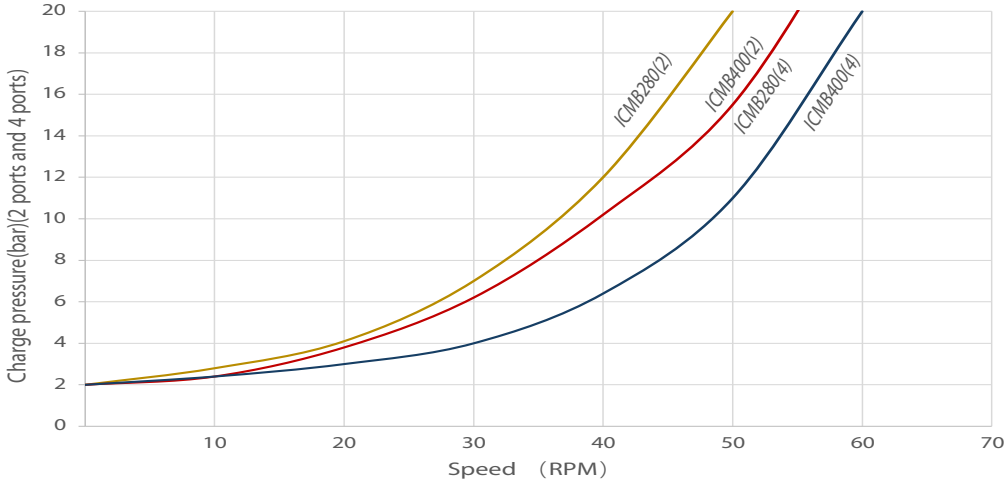
The ICMB motor can be torque arm mounted, which removes the need for additional couplings, flanges or bedplates.

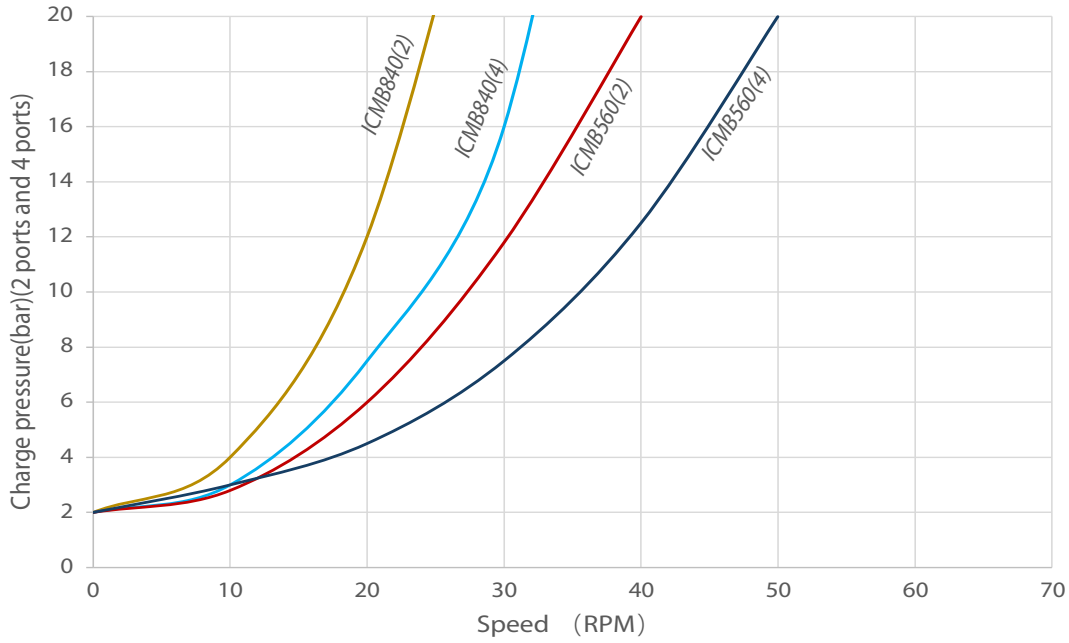
It can be used with both coupling and spline shaft motors and is of a standard design. The torque arm and its attachment aid installation of the motor and eliminate the need for aligning bearings. Special torque arm arrangements are available on request.



Torque arm	Z (mm)	X (mm)	Y (mm)	W (mm)	T (mm)	Weight (kg)	PCD (mm)
280/400	1721	1250	545	820	36	162	742
560/840	2088	1500	545	1088	36	258	870

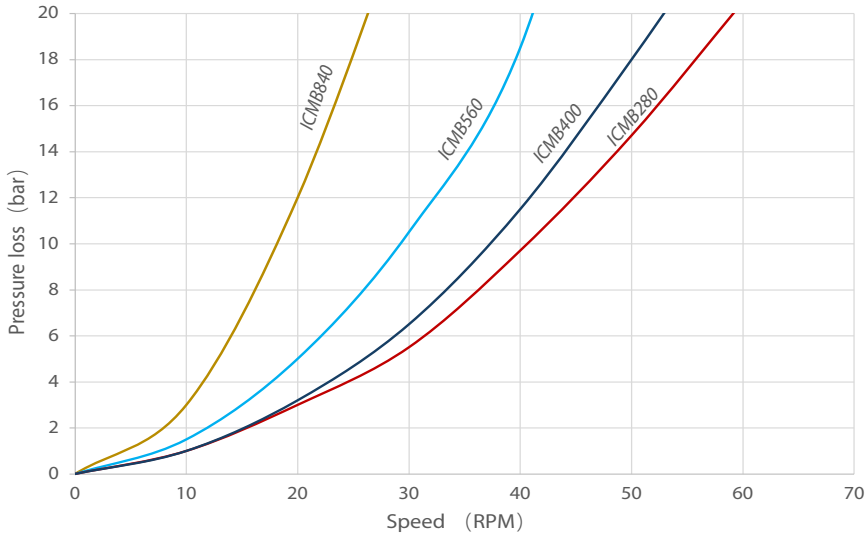
CHARGE PRESSURE - 2 AND 4 PORTS



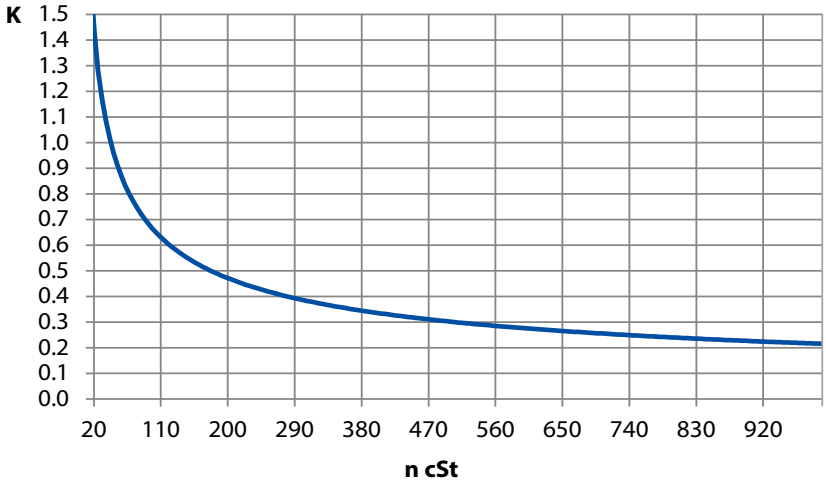


Note: Charge pressure must be maintained at the low pressure port for all types of installation.

PRESSURE LOSS - 2 PORTS



FLUID VISCOSITY CORRECTION



MOTOR CASE FLUSHING

The motor has a high efficiency and low volumetric loss. When operating at high continuous power or in high ambient conditions, the motor case oil must be flushed away to maintain adequate oil viscosity in the motor case.

Maximum power without flushing:

- 280 - 120 kW
- 400 to 840 - 165 kW

OIL CHOICE

The hydraulic oil can be chosen in consultation with the oil supplier or your local Vickers by Danfoss office. The motors are designed to operate on conventional petroleum based hydraulic fluids. The viscosity of mineral oil is highly dependent on the temperature.

The final choice of oil depends on the operating temperature that can be expected, or that has been established i n the system. High temperatures reduce the life of components and the fluids. The recommended minimum viscosity in the motor case at running condition is 40cSt. The contamination level in ICMB motors should n ot exceed ISO 4406 18/16/13 (NAS 7).

CONVERSION CHART

FDM Conversation Chart		
Inches	**Decimal**	**Mm**
1/16	0.06	1.59
1/8	0.13	3.18
3/16	0.19	4.76
1/4	0.25	6.35
5/16	0.31	7.94
3/8	0.38	9.53
7/16	0.44	11.11
1/2	0.50	12.70
9/16	0.56	14.29
5/8	0.63	15.88
11/16	0.69	17.46
3/4	0.75	19.05
13/16	0.81	20.64
7/8	0.88	22.23
15/16	0.94	23.81
1	1.00	25.40

Pressure
1 psi = 0,069 bar
1 bar = 14.50 psi
= 10 N/cm^2
1 kPa = 0.145 psi
1 MPa = 145 psi

Force
1 lbf = 4.45 N
1 klbf = 1,000 lbf
1kN = 1,000 N

Weight
1 pound (lb) = 0.4536 kg
1 kg = 2.205 lbs
1 metric ton = 2,205 lbs
= 1,000 kg
1 ton (short) = 2,000 lbs
= 907,18 kg

Temperature
To convert °C to °F: T
°F = (T°C x 1.8) + 32

To convert °F to °C: T
°C = (T°F – 32) / 1.8

Volume
1 in^3 = 16,387 cm^3
1 cm^3 = 0,061 in^3
1 litre = 61,02 in^3
= 0,264 gal
1 US gal = 3,785 cm^3
= 3,785 l
= 231 in^3

Other measurements
1 in = 25.4 mm
1 mm = 0.039 in
1 ft = 0.3048 m
1 m = 3.2808 ft
1 cm^2 = 0.155 in^2
1 hp = 0.746 kW
1 kW = 1.340 hp
1 Nm = 0.738 Ft.lbs
1 Ft.lbs = 1.356 Nm
1 kN = 224.82 lbs
1 lb = 4.448 N

ENGINEERING
TOMORROW

VICKERS
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