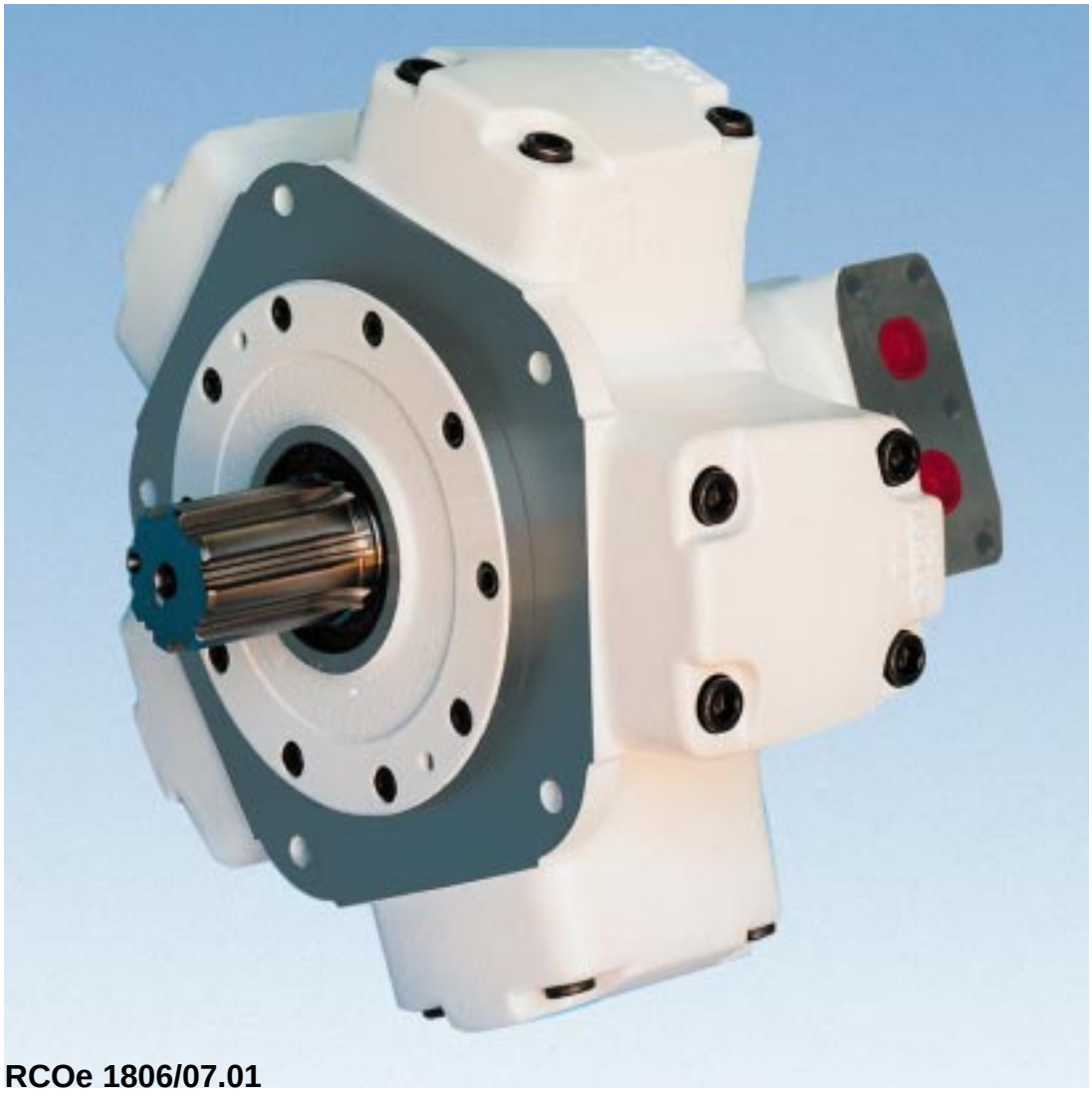
DENISON CALZONI
Radial Piston Motor
Type MR, MRE



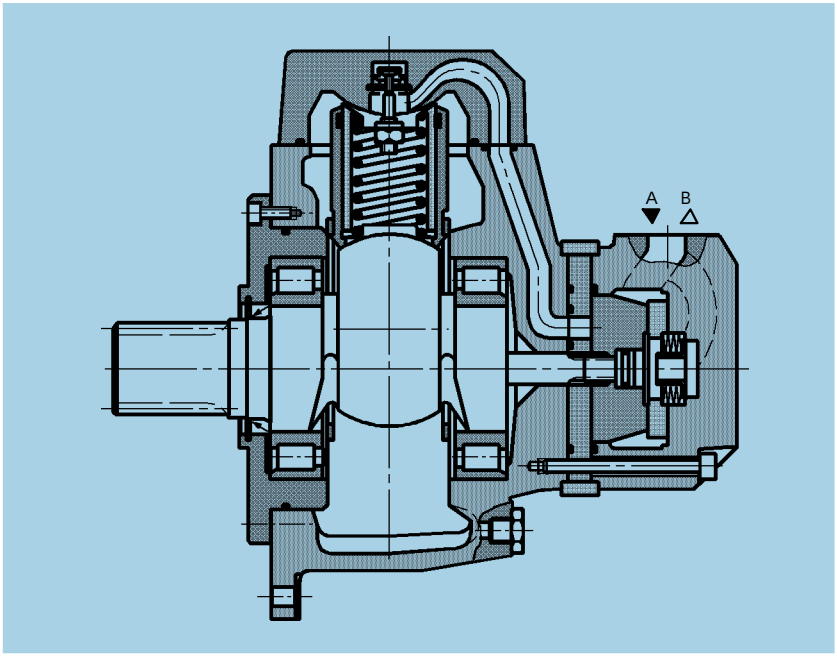
RCOe 1806/07.01

DENISON | CALZONI

CONTENTS PAG.

Ordering Code Back to Content

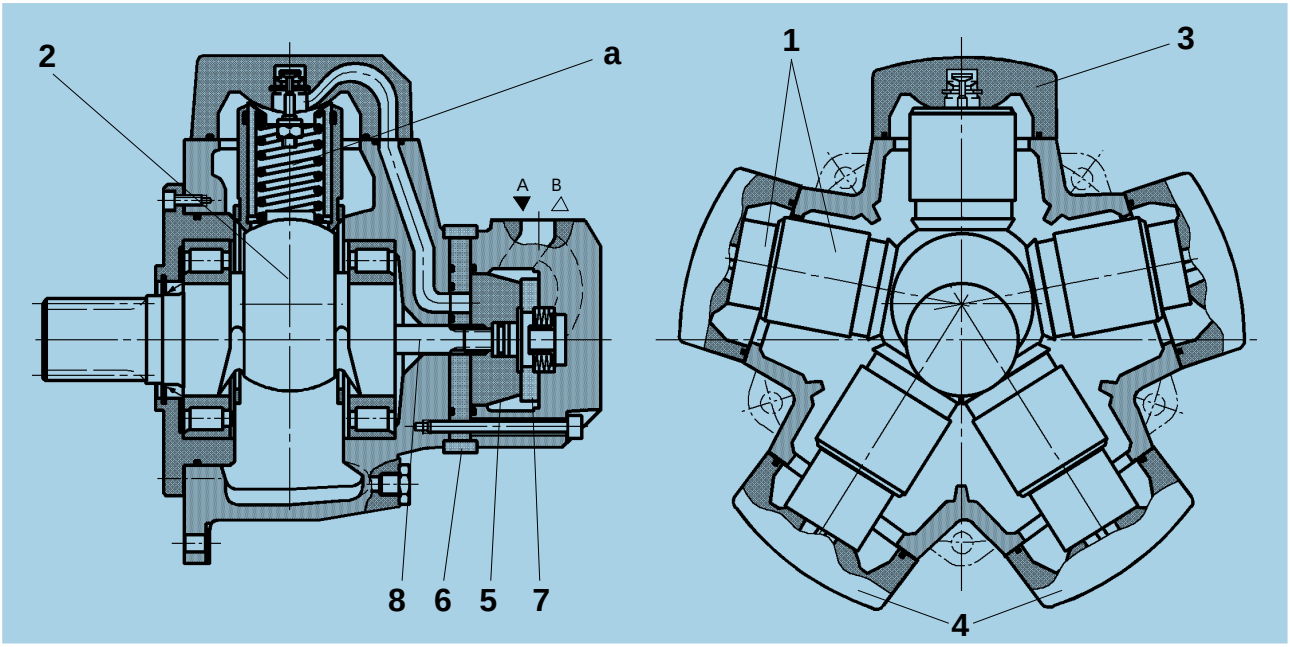
GENERAL CHARACTERISTICS



CONSTRUCTION	Fixed displacement radial piston motor
TYPE	MR ; MRE
MOUNTING	Front flange mounting
CONNECTION	Connection flange
MOUNTING POSITION	Any (please note the installation notes on page 34)
BEARING LIFE, RADIAL LOAD	See page 22 and 23
DIRECTION OF ROTATION	Clockwise, anti-clockwise - reversible
FLUID	HLP mineral oils to DIN 51 524 part 2; Fluid type HFB, HFC and Bio-fluids on enquiry. FPM seals are required with phosphorous acid-Ester (HFD)
FLUID TEMPERATURE RANGE	*t* °C – 30° to + 80°
VISCOSITY RANGE [1)]	*n* mm²/s 18 to 1000: Recommended operating range 30 to 50 (see fluid selection on page 6)
FLUID CLEANLINESS	Maximum permissible degree of contamination of fluid NAS 1638 Class 9. We therefore recommend a filter with a minimum retention rate of $ß_{10} \geq 75$. To ensure a long life we recommend class 8 to NAS 1638. This can be achieved with a filter, with a minimum retention rate of $ß_5 \geq 100$.

1) For different valves of viscosity please contact DENISON Calzoni

Ordering Code | Back to Content



FUNCTIONAL DESCRIPTION

The outstanding performance of this motor is the result of an original and patented design.
The principle is to transmit the effort from the stator to the rotating shaft (2) by means of a pressurized column of oil (a) instead of the more common connecting rods, pistons, pads and pins.
This oil column is contained by a telescopic cylinder (1) with a mechanical connection at the lips at each end which seal against the spherical surfaces of the cylinder-heads (3) and the spherical surface of the rotating shaft (4).
These lips retain their circular cross section when stressed by the pressure so there is no alteration in the sealing geometry. The particular selection of materials and optimisation of design has minimized both the friction and the leakage.
Another advantage of this design stems from the elimination of any connecting rods, the cylinder can only expand and retract linearly so there are no transverse components of the thrust. This means no oval wear on the moving parts and no side forces on the cylinder joints.
A consequence of this novel design is a significant reduction in weight and overall size compared with other motors of the same capacity.

TIMING SYSTEM

The timing system is realized by means of a rotary valve (5) driven by the rotary valve driving shaft (8) that it is connected to the rotating shaft.
The rotary valve rotates between the rotary valve plate (6) and the reaction ring (7) which are fixed with the motor's housing. This timing system is also of a patented design being pressure balanced and self compensating for thermal expansion.

EFFICIENCY

The advantages of this type of valve coupled with a revolutionary cylinder arrangement produce a motor with extremly high values of mechanical and volumetric efficiency. The torque output is smooth even at very low speed and the motor gives a high performance starting under load.

Ordering Code | Back to Content

Size Motor version		Displacement	Moment inertia of rotating parts	Theoretical specific torque	Min. start. torque / Theoretical torque	Maximum Pressure					Speed range		Maximum output power		Weight
						input					flushing		flushing		
						cont.	int.	peak	A+B	Drain	without	with	without	with	
		V	J		%	p	p	p	p	p	n	n	P	P	m
		cm^3	kg cm^2	Nm/bar		bar	bar	bar	bar	bar	rpm	rpm	kW	kW	kg
MR	**33**	32,1	4,32	0,50	90	250	300	420	400	5 (15 bar with "F1" shaft seal)	1-1400	1-1400	6,6	10	30
	57	56,4	4,76	0,90	90						1-1300	1-1300	11	17	30
	73	72,6	14,03	1,20	90						1-1200	1-1200	15	20	38
	93	92,6	15,11	1,50	90						1-1150	1-1150	17	25	38
	110	109,0	16,19	1,70	90						1-1100	1-1100	18	28	38
	125	124,7	56,88	2,00	90						1-900	1-900	17	25	46
	160	159,7	57,50	2,54	90						1-900	1-900	20	30	46
	190	191,6	58,20	3,05	90						1-850	1-850	24	36	46
	200	199,2	57,15	3,20	90						1-800	1-800	25	38	50
	250	250,9	60,80	4,00	90						1-800	1-800	32	48	50
	300	304,1	65,43	4,80	90						1-750	1-750	35	53	50
	350	349,5	225,90	5,57	90						1-640	1-640	41	62	77
	450	451,6	229,80	7,20	90						1-600	1-600	46	75	77
	600	607,9	265,07	9,70	90						1-520	1-520	56	84	97
	700	706,9	358,40	11,30	90						1-500	1-500	65	97	97
	1100	1125,8	451,50	17,90	90						0,5-330	0,5-330	77	119	140
	1600	1598,4	666,43	25,40	90						0,5-260	0,5-260	96	144	209
	1800	1809,6	854,10	28,80	90						0,5-250	0,5-250	103	153	209
	2400	2393,0	2835,40	38,10	90						0,5-220	0,5-220	120	183	325
	2800	2792,0	2975,70	44,50	90						0,5-215	0,5-215	127	194	325
	3600	3636,8	4851,40	57,90	90						0,5-150	0,5-180	123	185	508
	4500	4502,7	5015,10	57,90	91						0,5-130	0,5-170	140	210	508
	6500	6460,5	11376,6	103,57	91						0,5-110	0,5-130	165	240	800
	7000	6967,2	11376,6	111,39	91						0,5-100	0,5-130	170	250	800
MRE	**330**	332,4	65,50	5,30	90	210	250	350	400	5 (15 bar with "F1" shaft seal)	1-750	1-750	32	49	50
	500	497,9	229,80	7,93	90						1-600	1-600	46	70	77
	800	804,2	358,40	12,81	90						1-450	1-450	65	93	97
	1400	1369,5	451,50	21,80	92						0,5-280	0,5-280	77	102	145
	2100	2091,2	854,10	33,30	91						0,5-250	0,5-250	100	148	221
	3100	3103,7	2975,70	49,40	91						0,5-215	0,5-215	125	190	329
	5400	5401,2	5015,10	86,01	92						0,5-120	0,5-160	140	210	512
	8200	8226,4	11376,6	130,90	92						0,5-90	0,5-120	170	250	810

LARGER DISPLACEMENTS ARE AVAILABLE IN THE MRT - MRTE - MRTF MOTOR SERIES

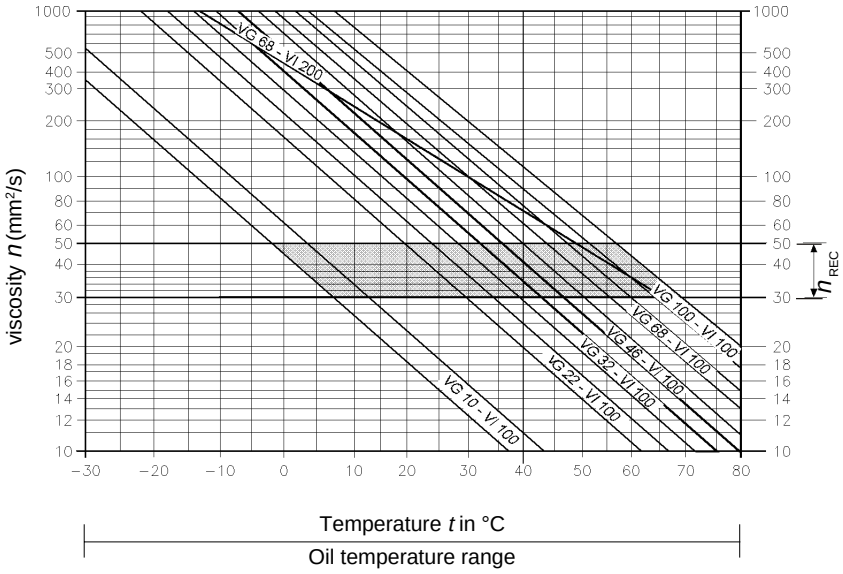
Ordering Code | Back to Content

EXAMPLE: At a certain ambient temperature, the operating temperature in the circuit is 50°C. In the optimum operating viscosity range (v_{rec}; shaded section), this corresponds to viscosity grades VG 46 or VG 68; VG 68 should be selected.

IMPORTANT: The drain oil temperature is influenced by pressure and speed and is usually higher than the circuit temperature or the tank temperature. At no point in the system, however, may the temperature be higher than 80°C.

If the optimum conditions cannot be met due to the extreme operating parameters or high ambient temperature, we always recommend flushing the motor case in order to operate within the viscosity limits.

Should it be absolutely necessary to use a viscosity beyond the recommended range, you should first contact DENISON Calzoni for confirmation.



GENERAL NOTES

More detailed information regarding the choice of the fluid can be requested to DENISON Calzoni. Further notes on installation and commissioning can be found on page 34 of this data sheet. When operating with HF pressure fluids or bio-degradable pressure fluids possible limitations of the technical data must be taken into consideration, please see information sheet TCS 85, or consult DENISON Calzoni.

OPERATING VISCOSITY RANGE

The viscosity, quality and cleanliness of operating fluids are decisive factors in determining the reliability, performance and life-time of an hydraulic component. The maximum life-time and performance are achieved within the recommended viscosity range. For applications that go beyond this range, we recommend to contact DENISON Calzoni.

$\nu_{rec.}$ = recommended operating viscosity 30...50 mm²/s

This viscosity refers to the temperature of the fluid entering the motor, and at the same time to the temperature inside the motor housing (case temperature). We recommend to select the viscosity of the fluid based on the maximum operating temperature, to remain within the recommended viscosity range. To reach the value of maximum continuous power the operating viscosity should be within the recommended viscosity range of 30 - 50 cSt.

LIMITS OF VISCOSITY RANGE

For limit conditions the following is valid:

$\nu_{min.abs.}$ = 10 mm²/s in emergency, short term

$\nu_{min.}$ = 18 mm²/s for continuous operation at reduced performances

$\nu_{max.}$ = 1000 mm²/s short term upon cold start

CHOOSING THE TYPE OF FLUID ACCORDING TO THE OPERATING TEMPERATURE

The operating temperature of the motor is defined as the greater temperature between that of the incoming fluid and that of the fluid inside the motor housing (case temperature).We recommend that you choose the viscosity of the fluid based on the maximum operating temperature, to remain within the recommended viscosity range (see diagram). We recommend that the higher viscosity grade must be selected in each case.

FILTRATION

The motor life also depends on the fluid filtration. At least it must correspond to one of the following cleanliness.

class 9	according to NAS 1638
class 6	according to SAE, ASTM, AIA
class 18/15	according to ISO/DIS 4406

In order to assure a longer life a cleanliness class 8 to NAS 1638 is recommended, achieved with a filter of β_5=100. In case the above mentioned classes can not be achieved, please consult us.

CASE DRAIN PRESSURE

The lower the speed and the case drain pressure, the longer the life of the shaft seal. The maximum permissible housing pressure is

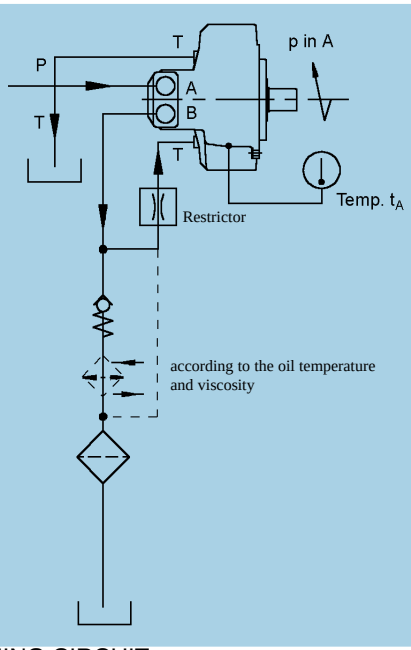
p_{max} = 5 bar

If the case drain pressure is higher than 5 bar it is possible to use a special 15 bar shaft seal (see page 35, Seals, Code"F1").

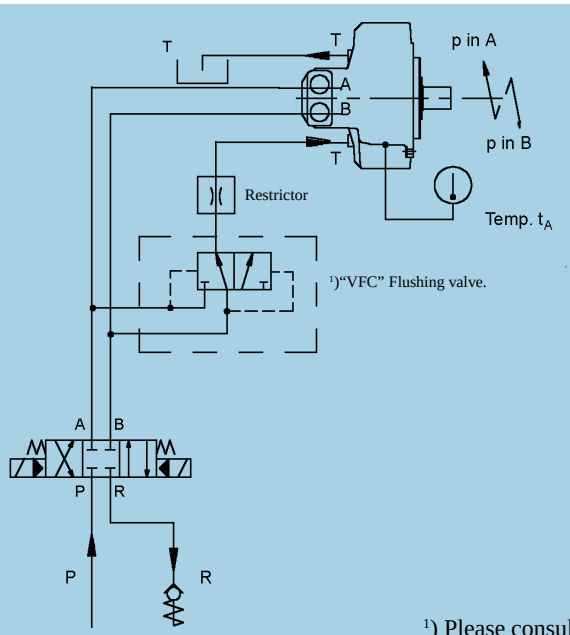
"FPM" SEALS

In case of operating conditions with high oil temperature or high ambient temperature, we recommend to use "FPM" seals (see page 35, Seals, Code "V1"). These "FPM" seals should be used with HFD fluids.

Ordering Code | Back to Content



FLUSHING CIRCUIT
(MONO-DIRECTIONAL ROTATION)



[1]) Please consult us.

FLUSHING CIRCUIT
(BI-DIRECTIONAL ROTATION)

FLUSHING

The motor case must be flushed when the continuous operating performances of the motor are inside the "Continuous operating area with flushing" (see Operating Diagram from page 8 to page 18), in order to assure the minimum oil viscosity inside the motor case of 30 mm^2/s (see page 6 - Fluid Selection). The flushing can be necessary also when the operating performances are outside the "Continuous operating area with flushing", but the system is not able to assure the minimum viscosity conditions requested by the motor as specified at page 6.

NOTE1:

The oil temperature inside the motor case is obtainable by adding 3°C to the motor surface temperature (t_A , see figures).

NOTE2:

With the standard shaft seal the maximum drain case pressure is 5 bar. For the selection of the restrictor, please consult us.

FLOW

TYPE	MOTOR VERSION	FLUSHING FLOW
MR	33, 57, 73, 93, 110	Q = 5 l/min
MR - MRE	125, 160, 190, 200, 250, 300, 330	Q = 6 l/min
MR - MRE	350, 450, 500	Q = 8 l/min
MR - MRE	600, 700, 800, 1100, 1400	Q = 10 l/min
MR - MRE	1600,1800, 2100	Q = 15 l/min
MR - MRE	2400, 2800, 3100, 3600, 4500, 5400, 6500, 7000, 8200	Q = 20 l/min

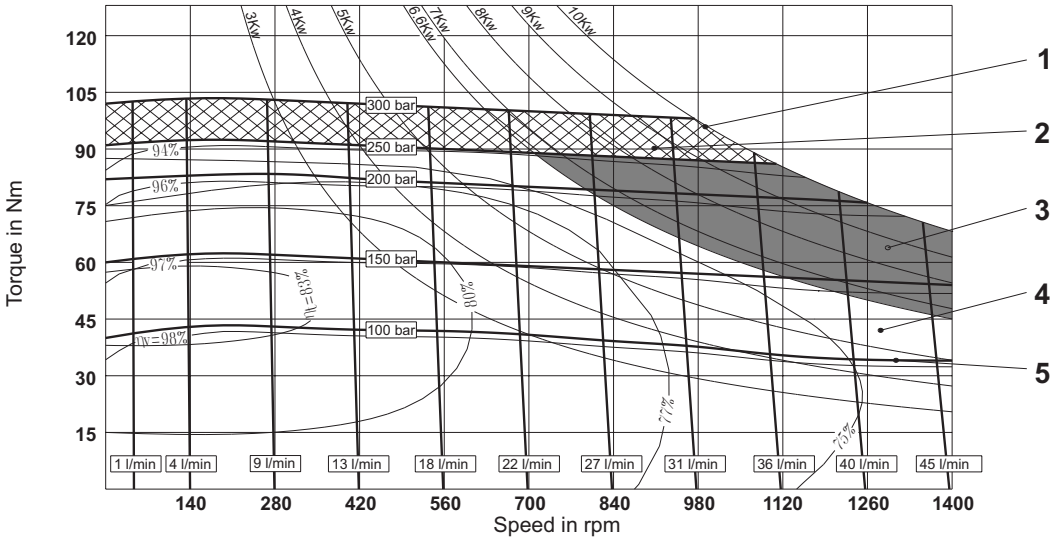
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

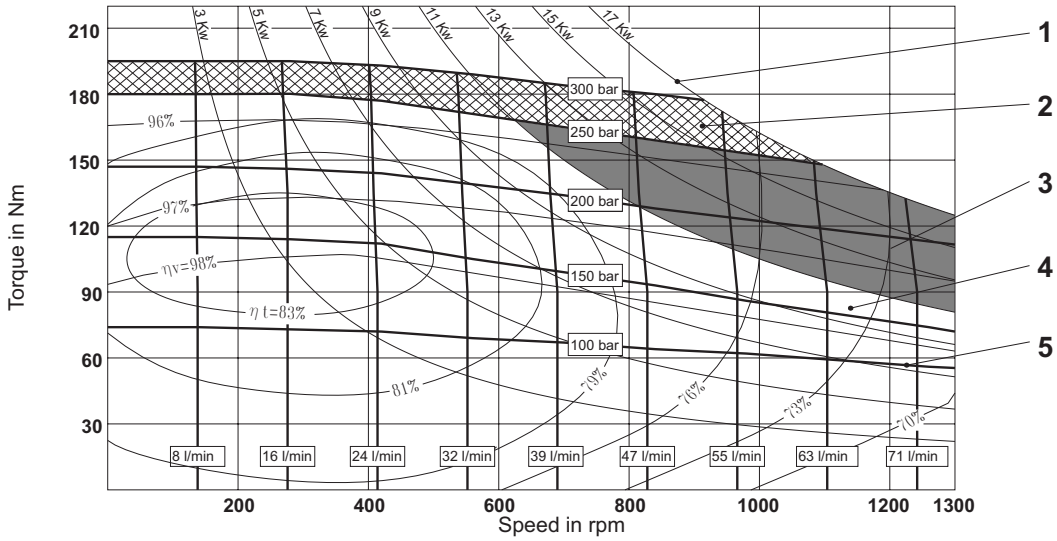
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

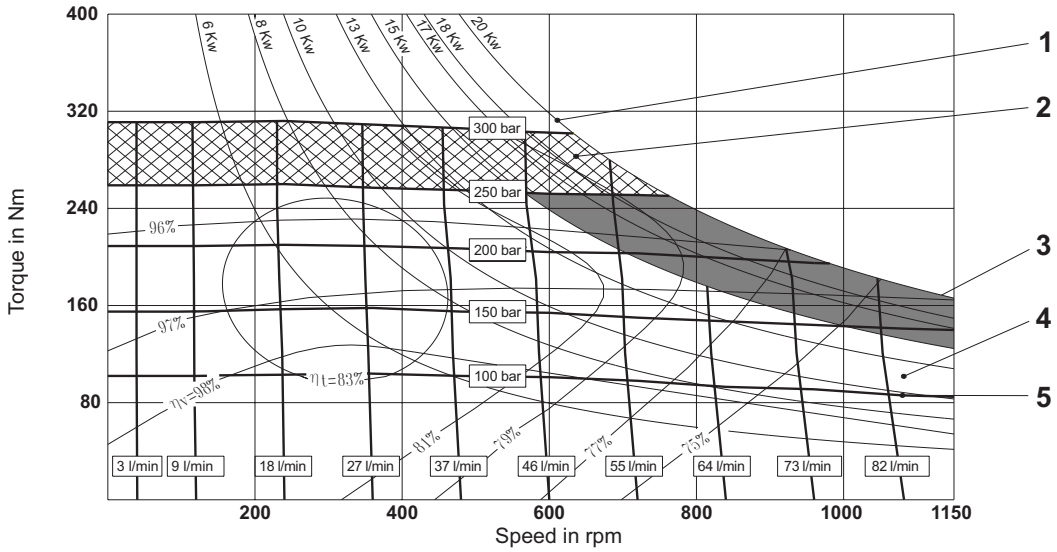
MR 33



MR 57



MR 73



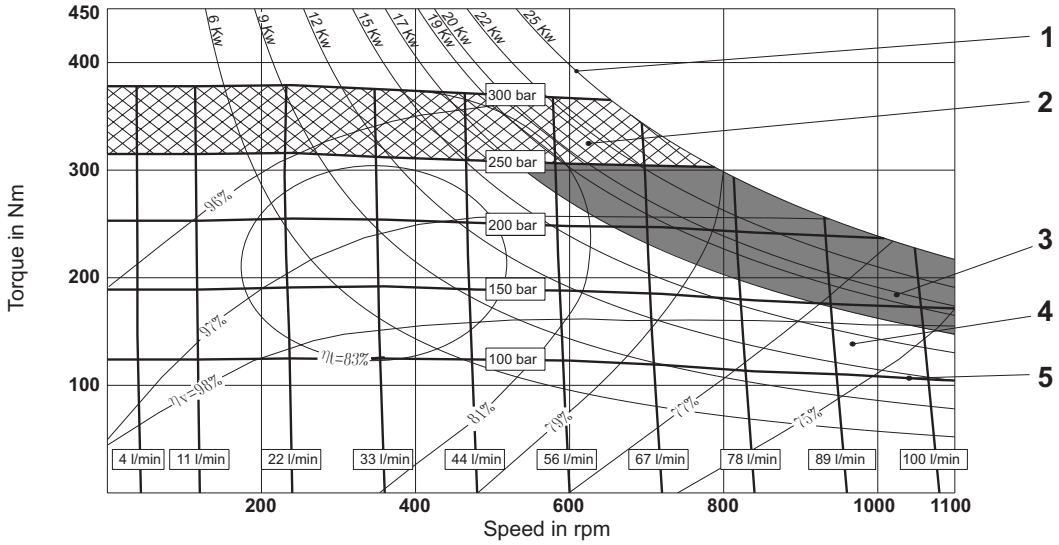
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

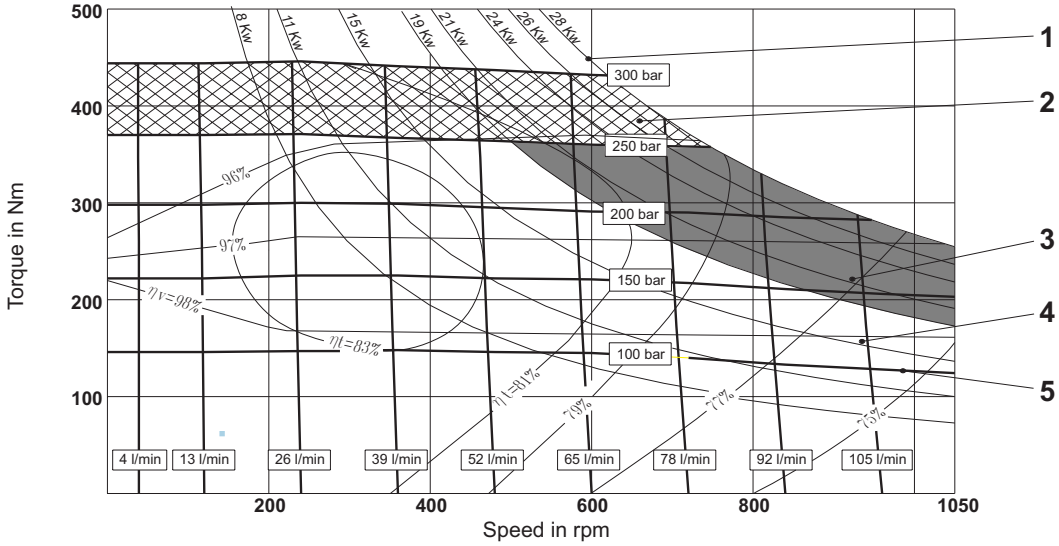
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

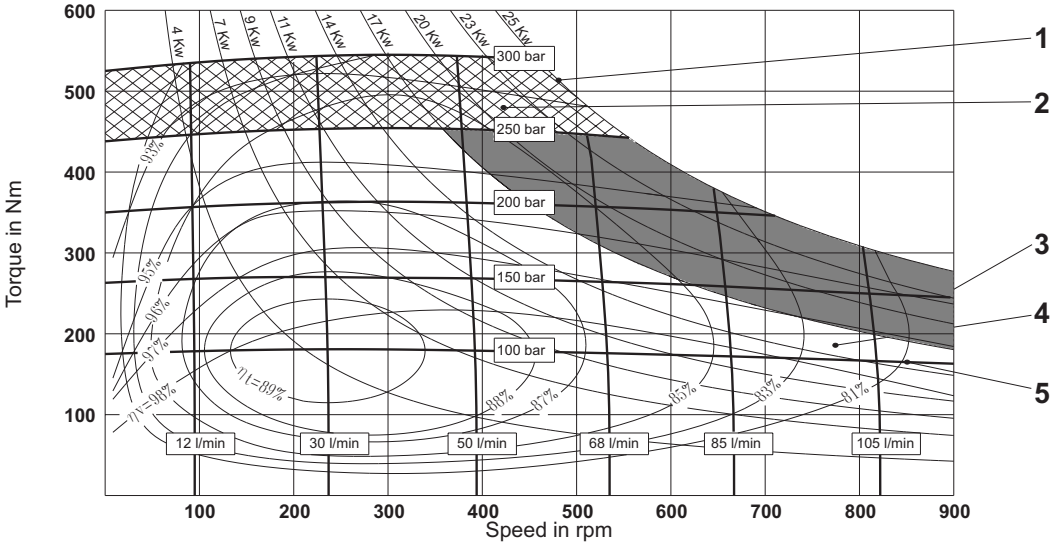
MR 93



MR 110



MR 125



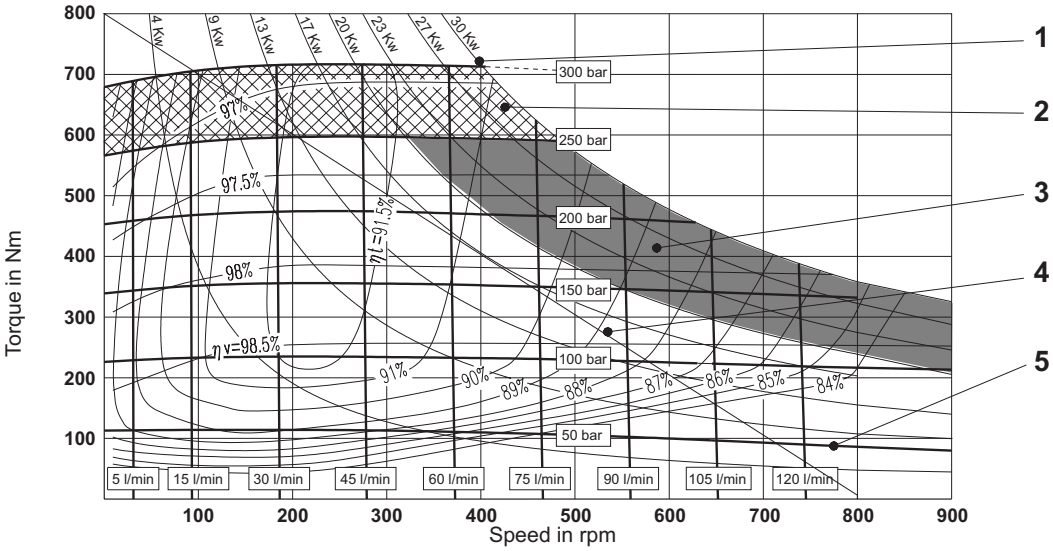
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

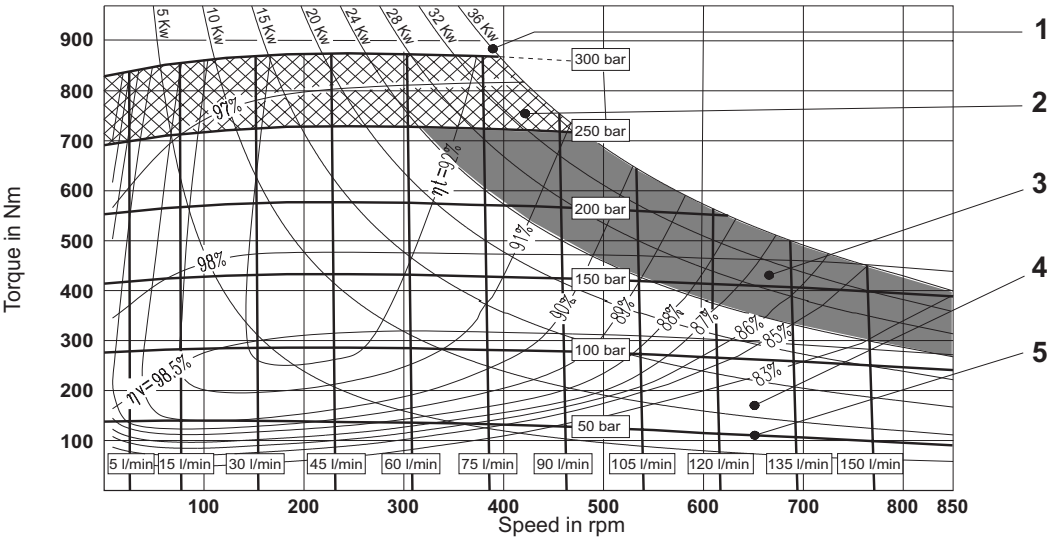
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

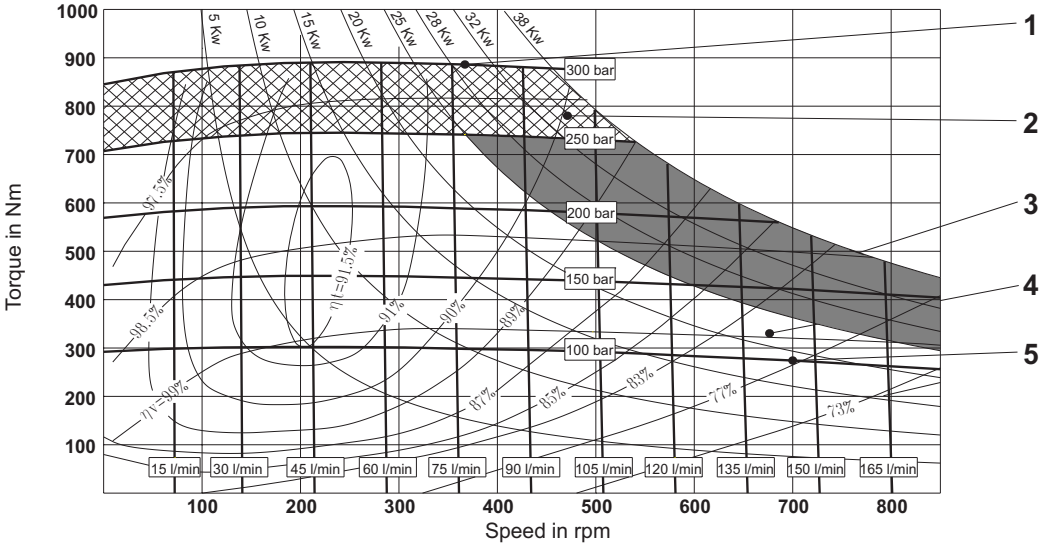
MR 160



MR 190



MR 200



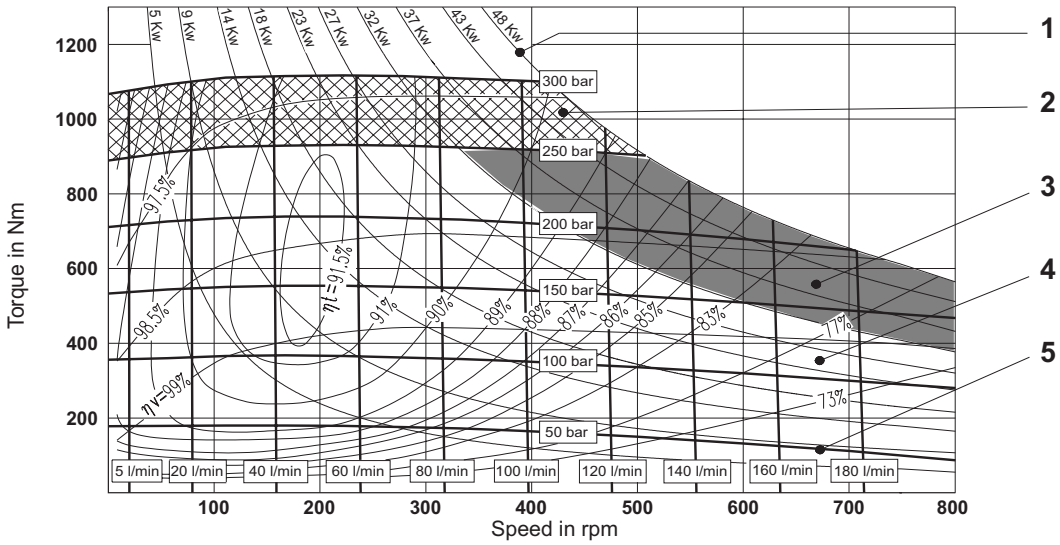
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

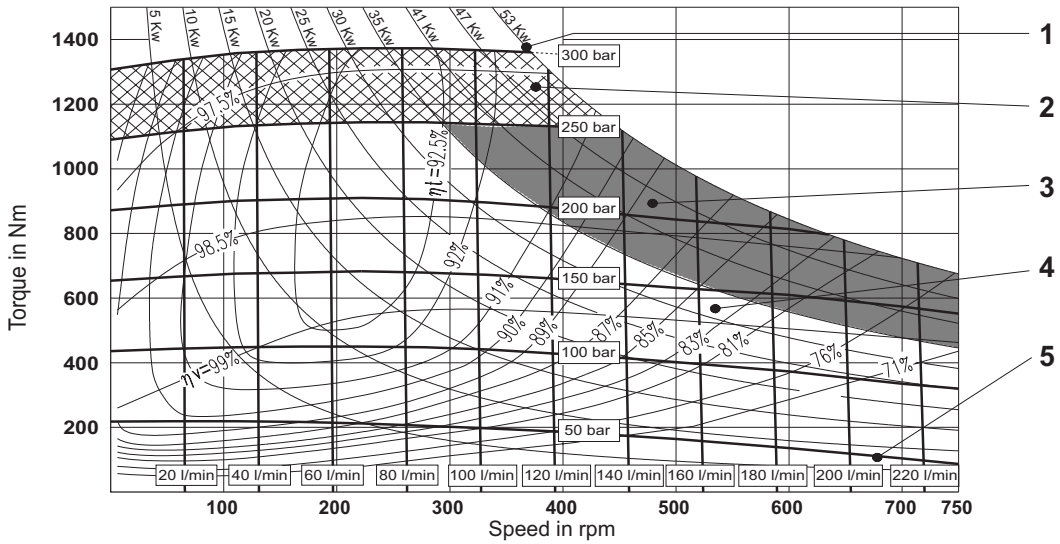
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

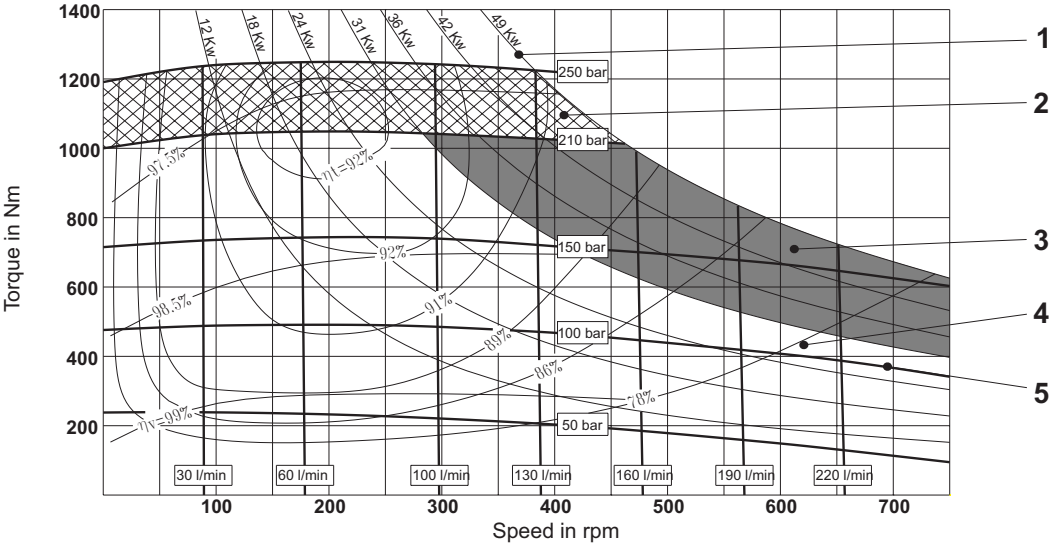
MR 250



MR 300



MRE 330



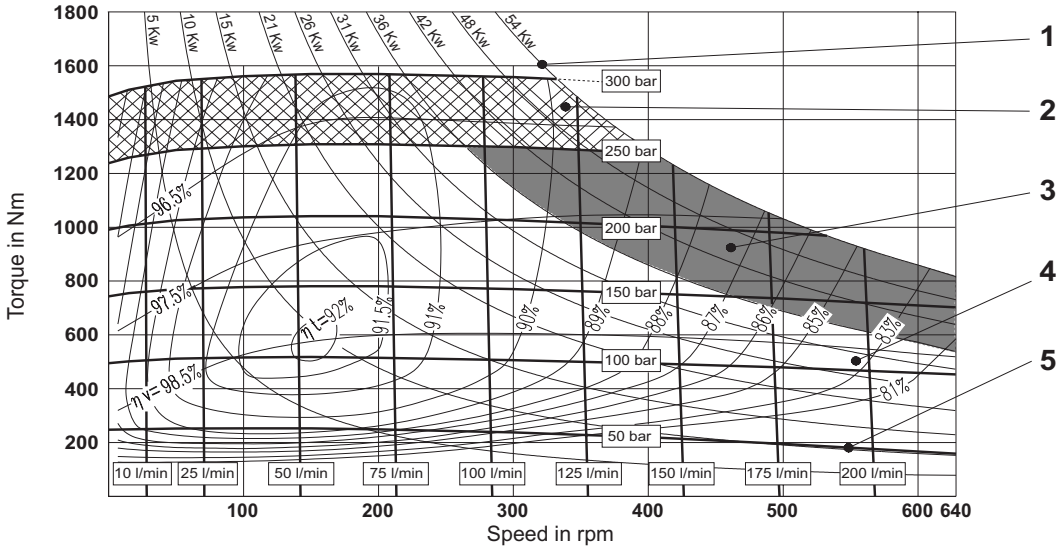
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

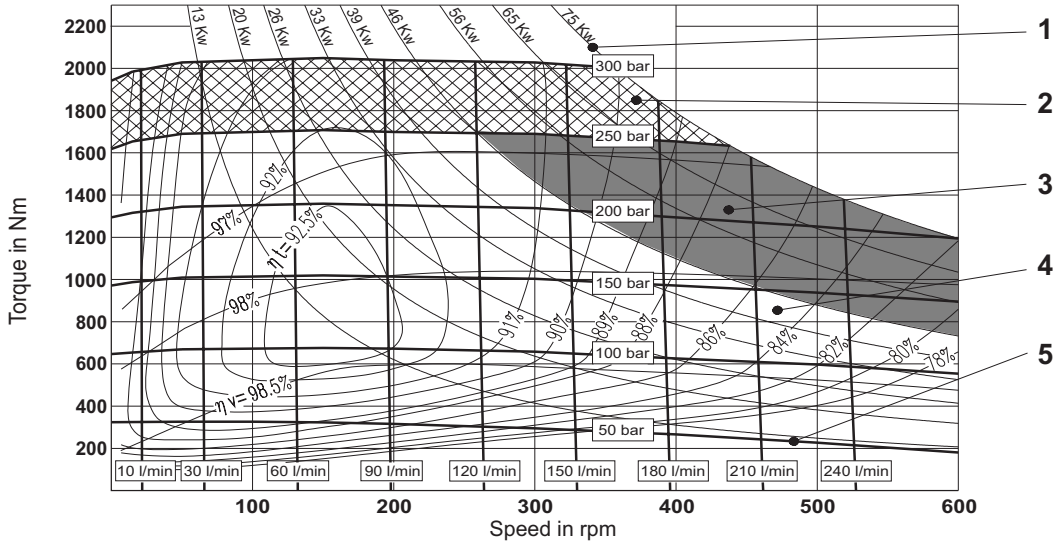
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

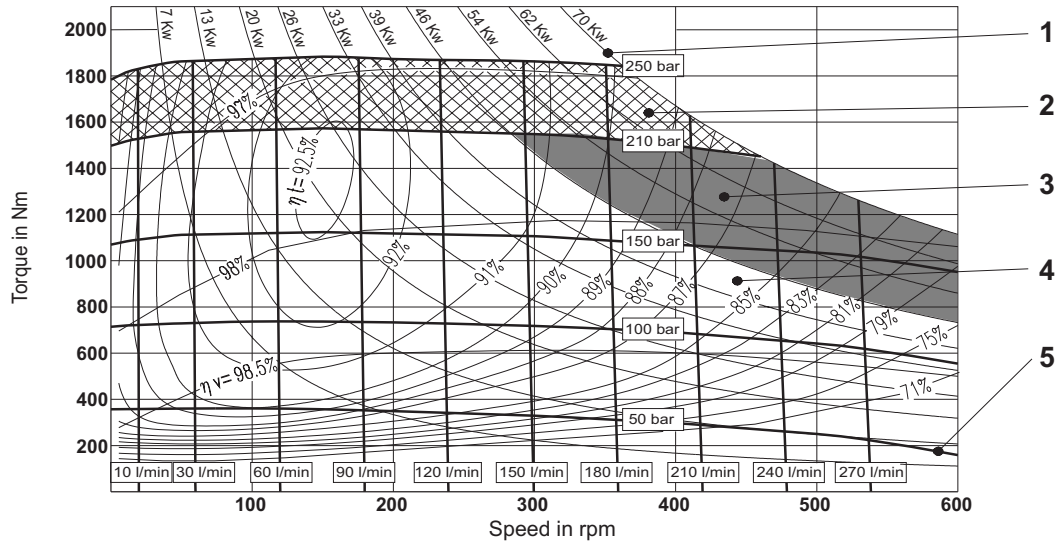
MR 350



MR 450



MRE 500



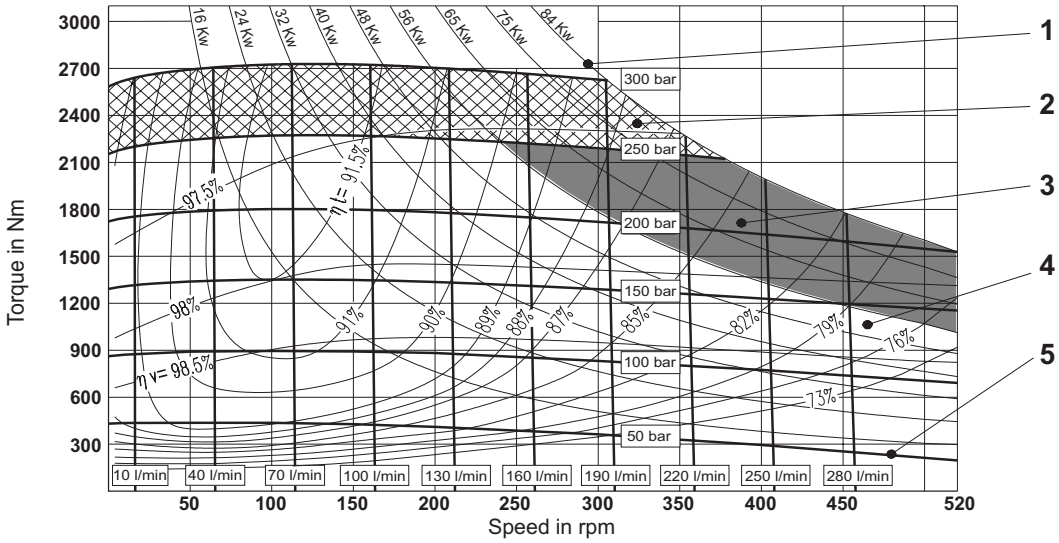
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

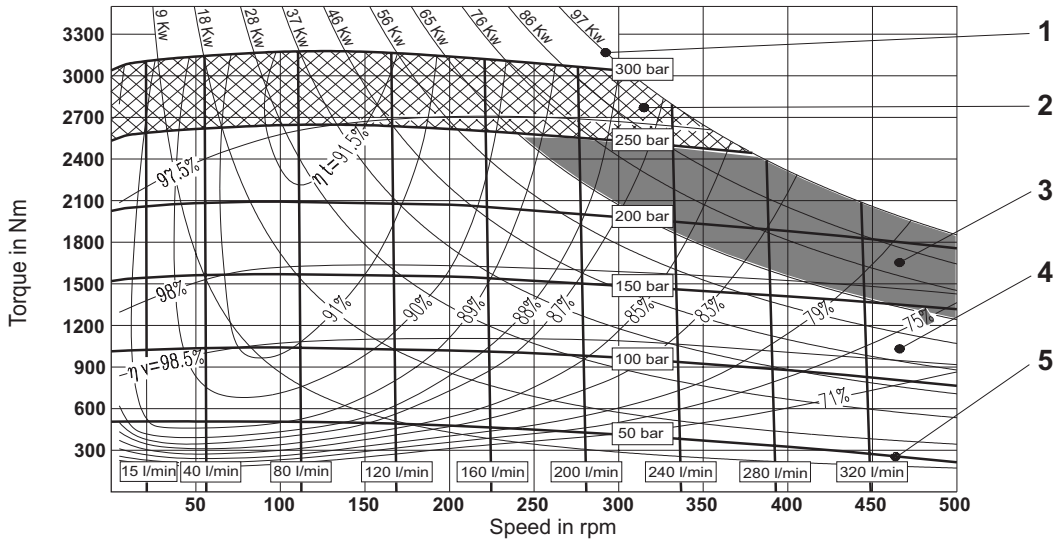
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

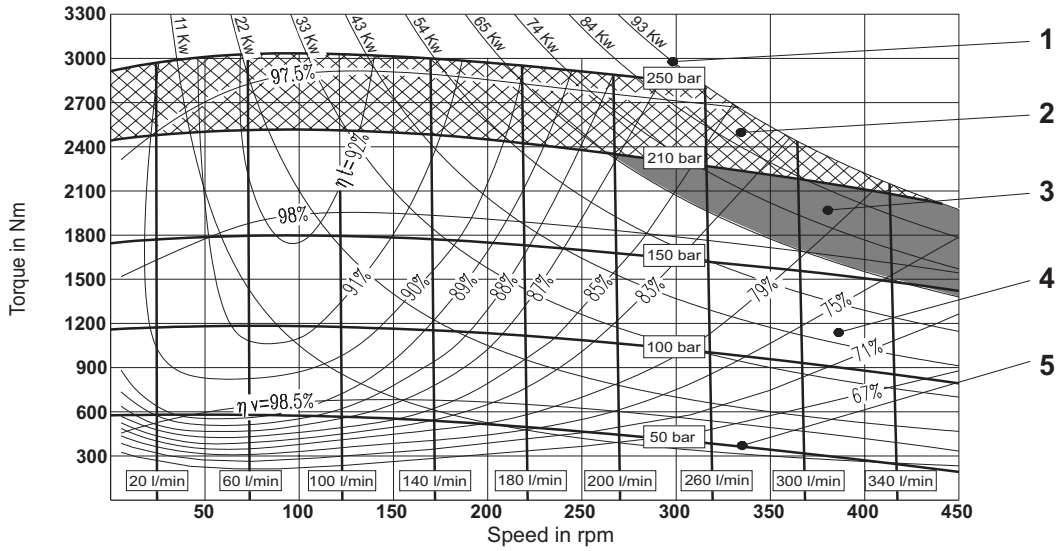
MR 600



MR 700



MRE 800



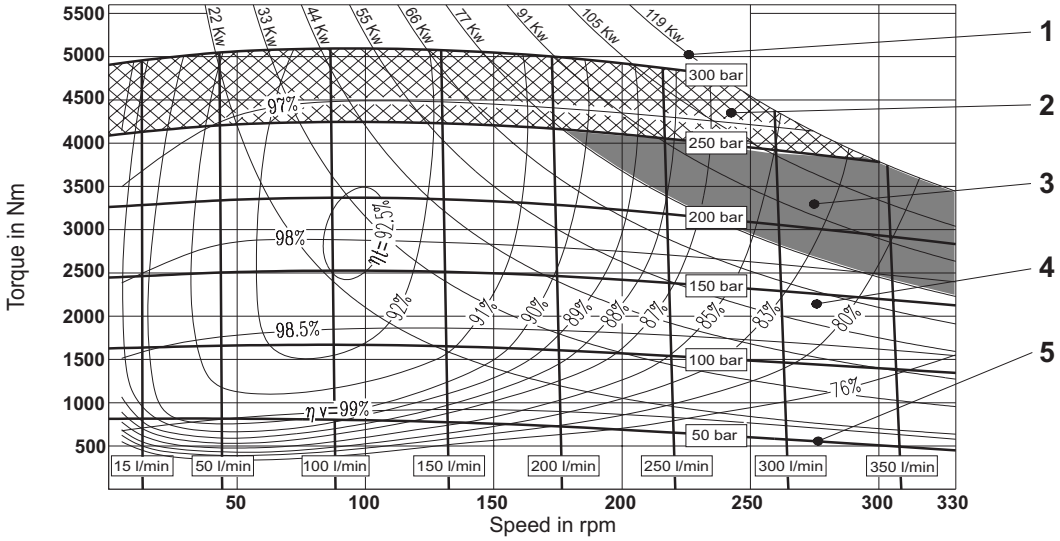
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

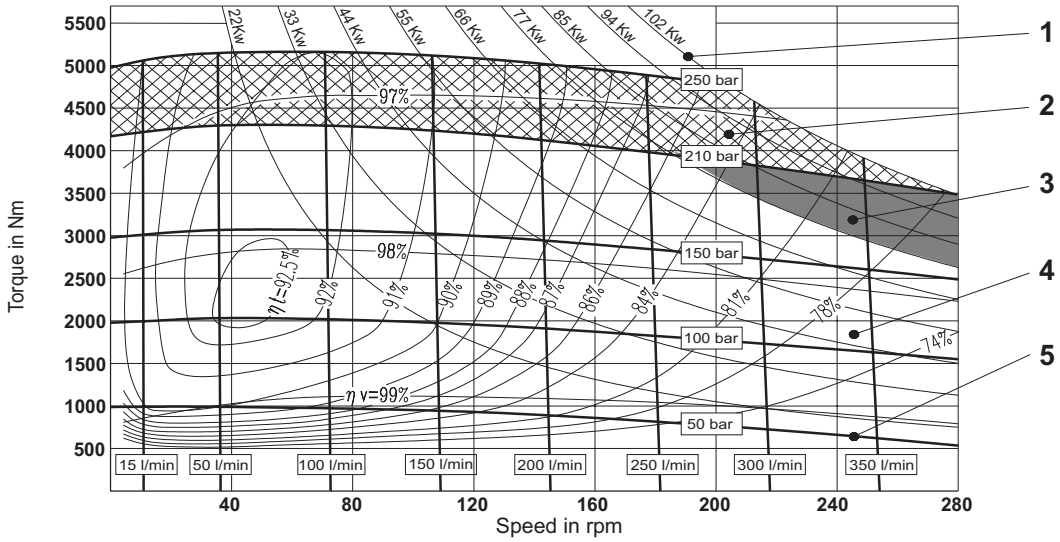
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

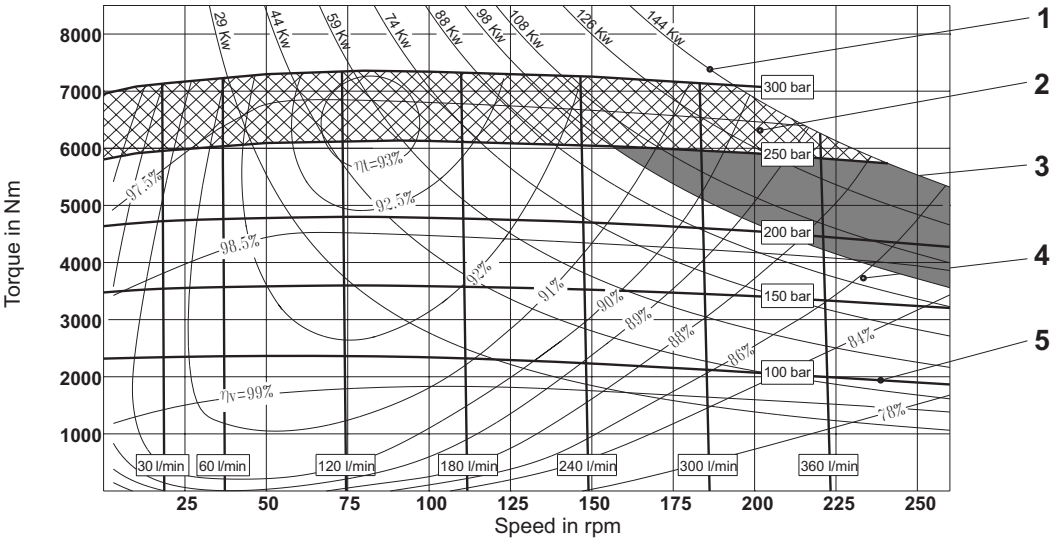
MR 1100



MRE 1400



MR 1600



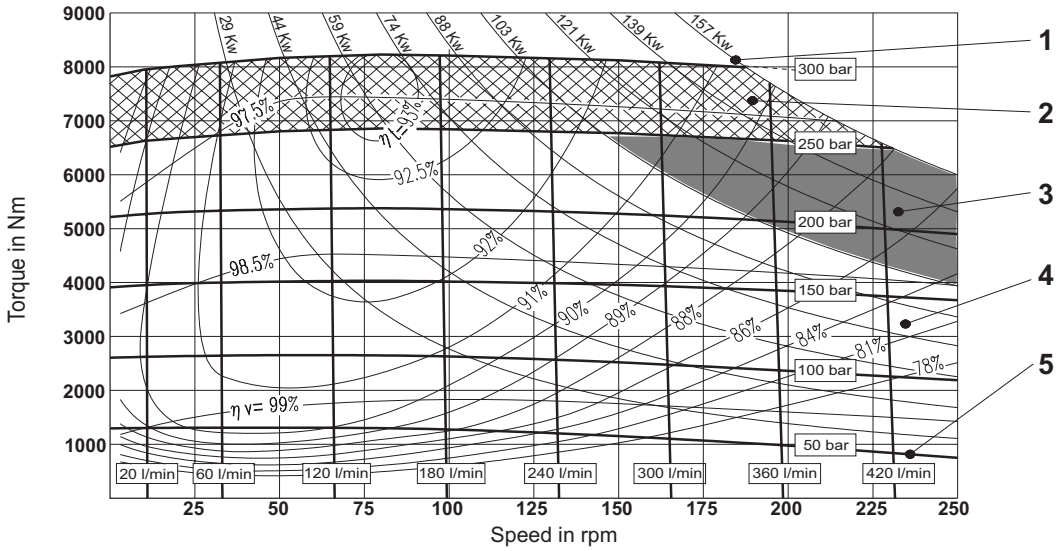
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

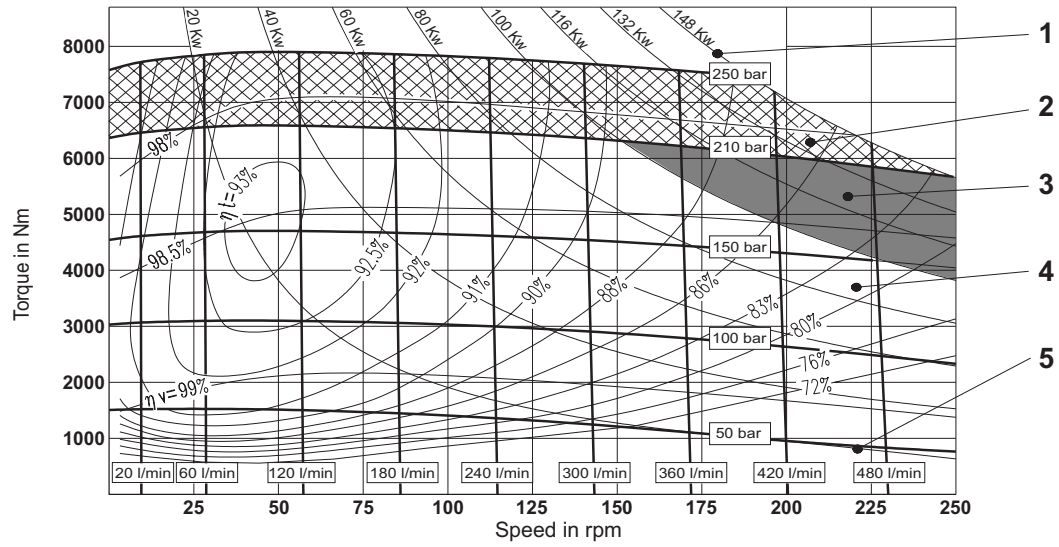
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

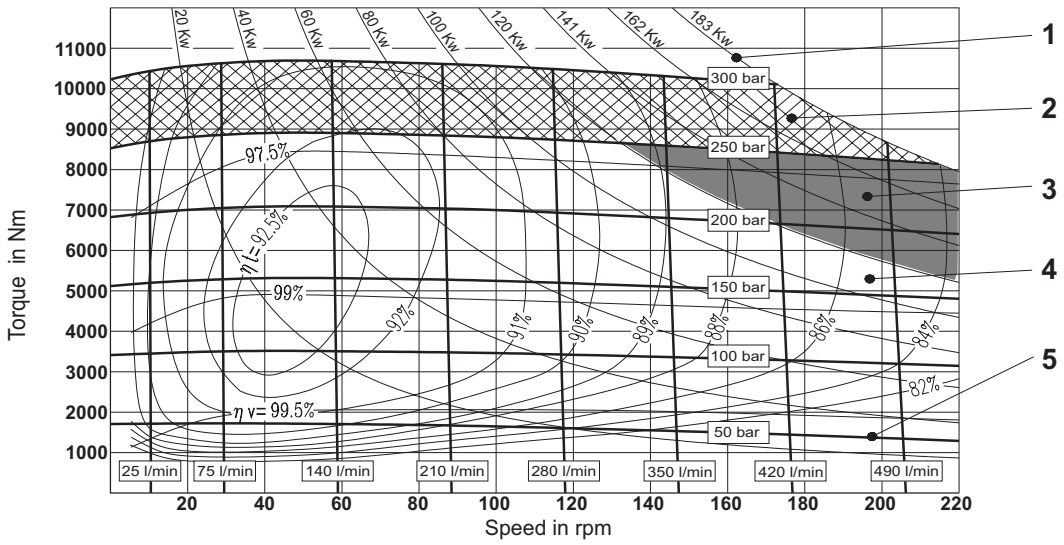
MR 1800



MRE 2100



MR 2400



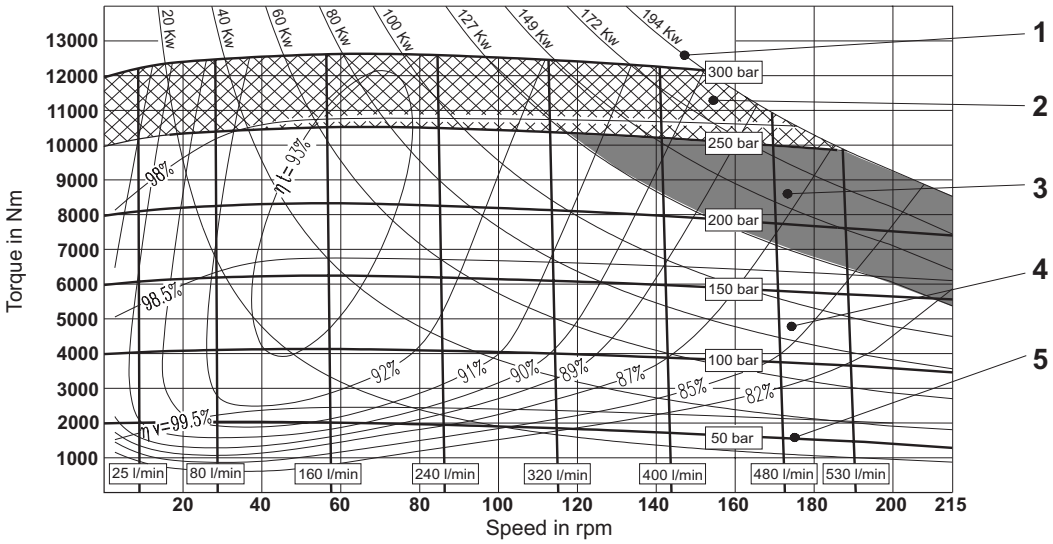
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

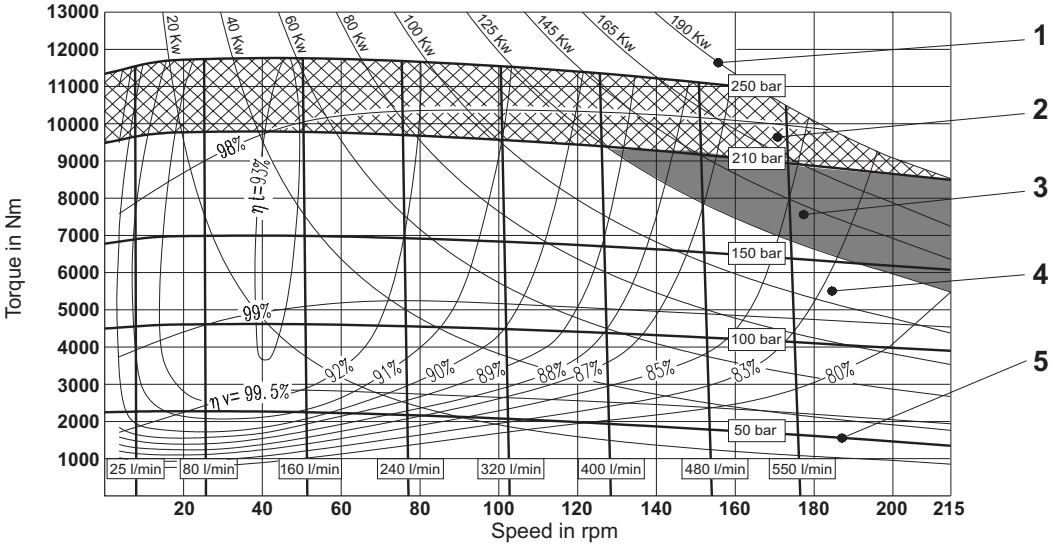
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

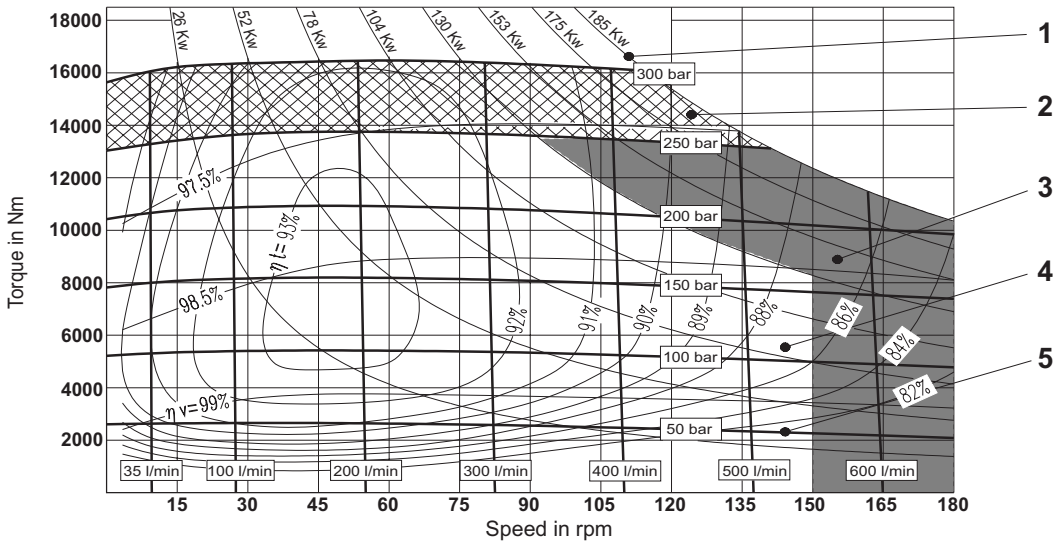
MR 2800



MRE 3100



MR 3600



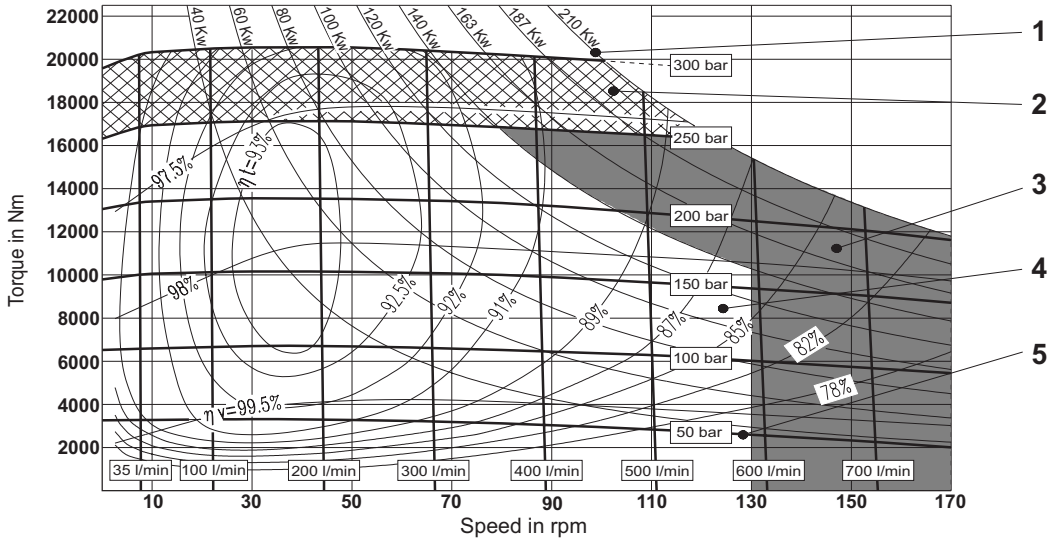
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

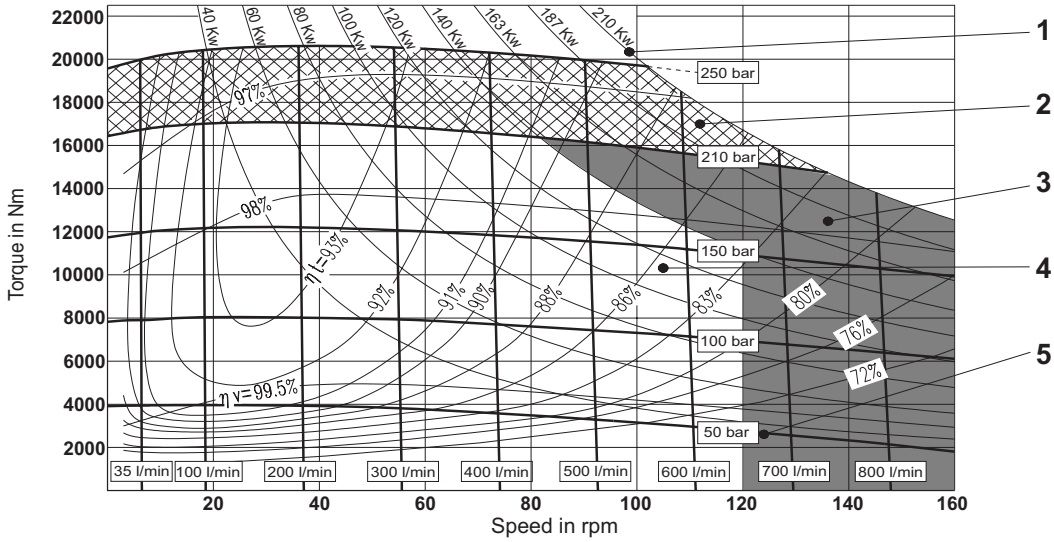
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

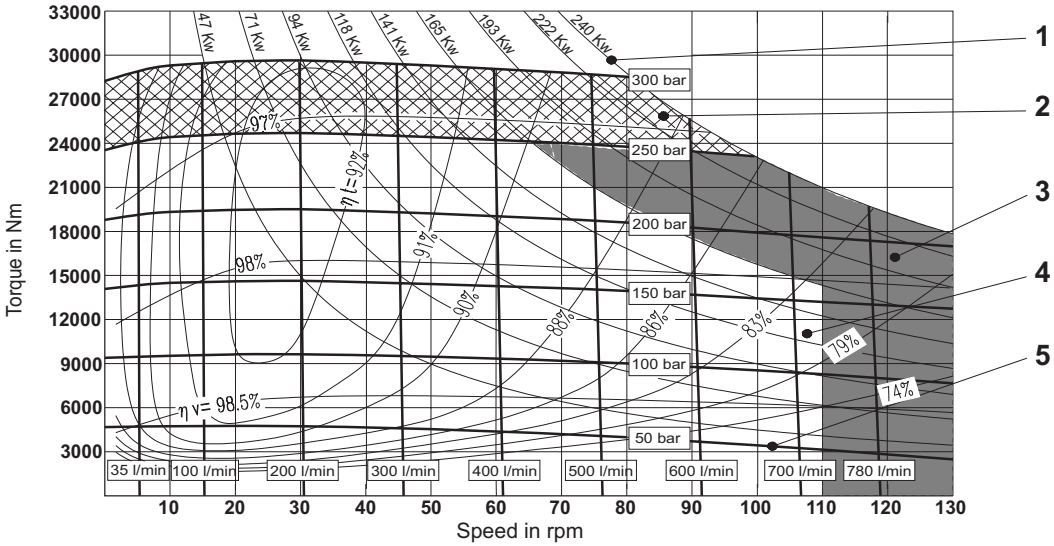
MR 4500



MRE 5400



MR 6500



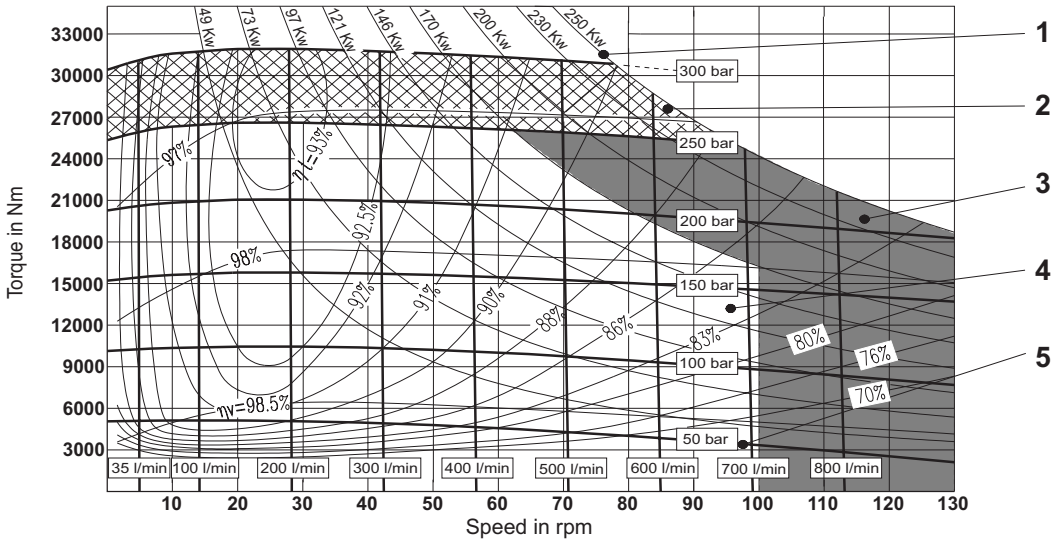
Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

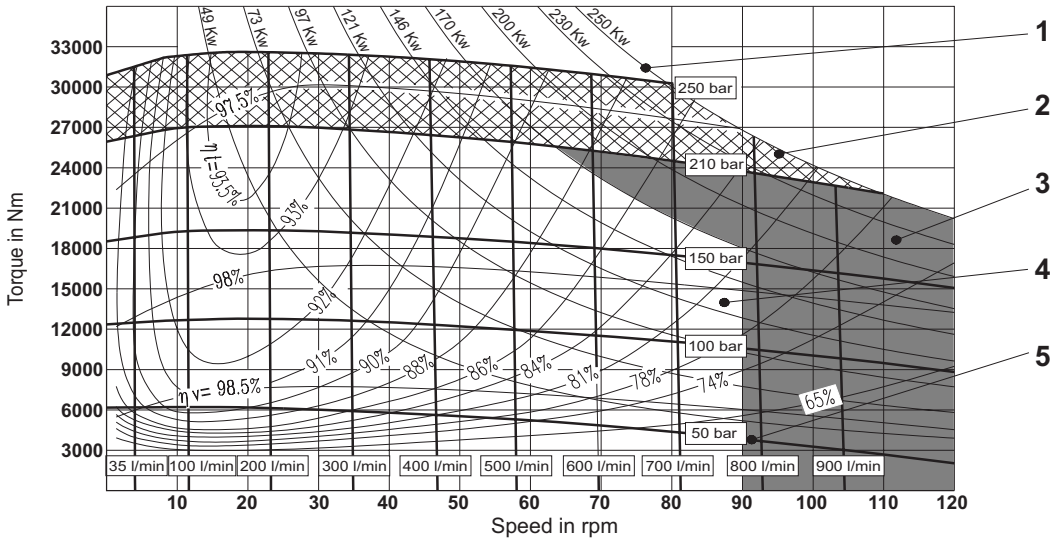
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ht*** Total efficiency ***hv*** Volumeter efficiency

MR 7000



MRE 8200

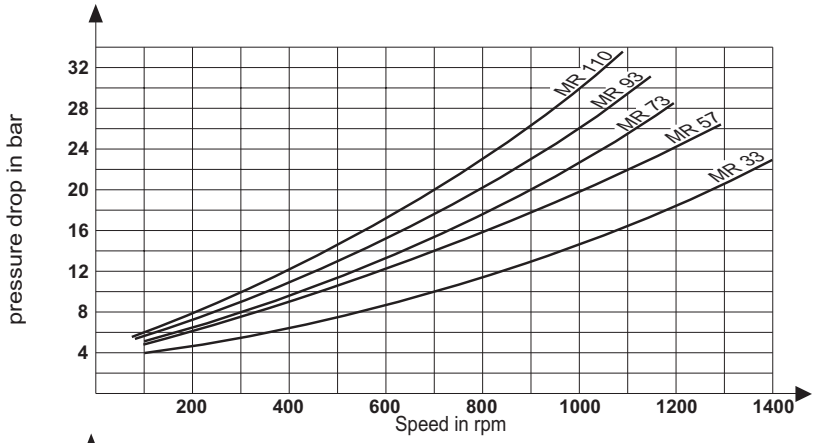


Ordering Code | Back to Content

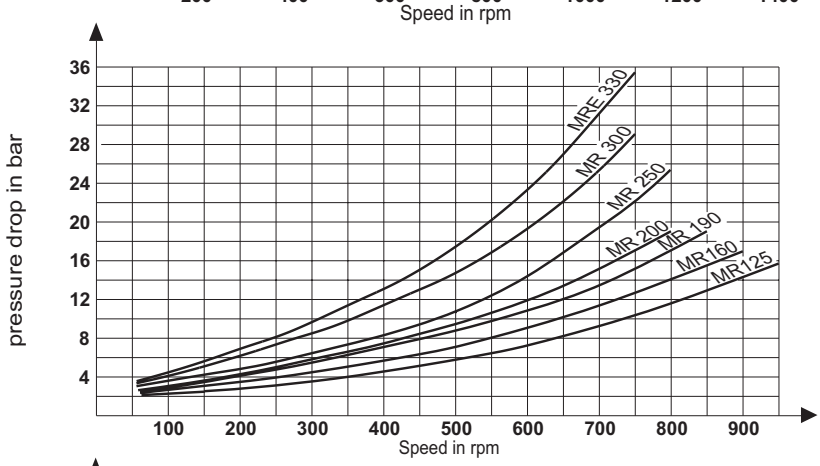
OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

Min. required pressure difference Δp with idling speed (shaft unloaded)

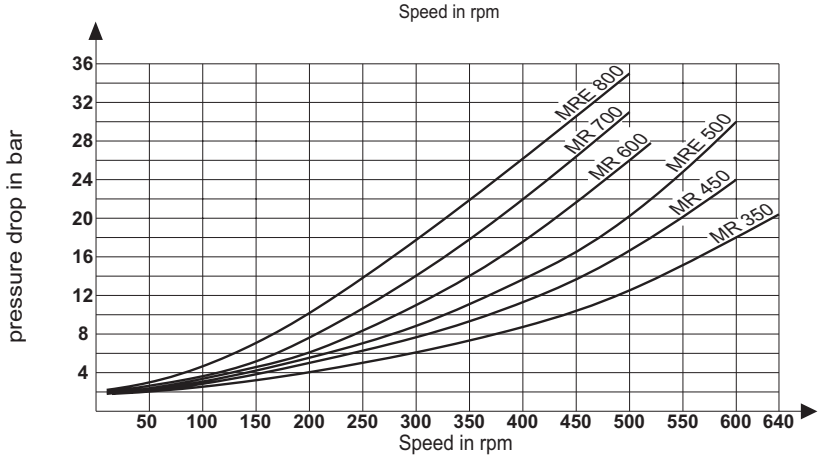
MR
33 - 110



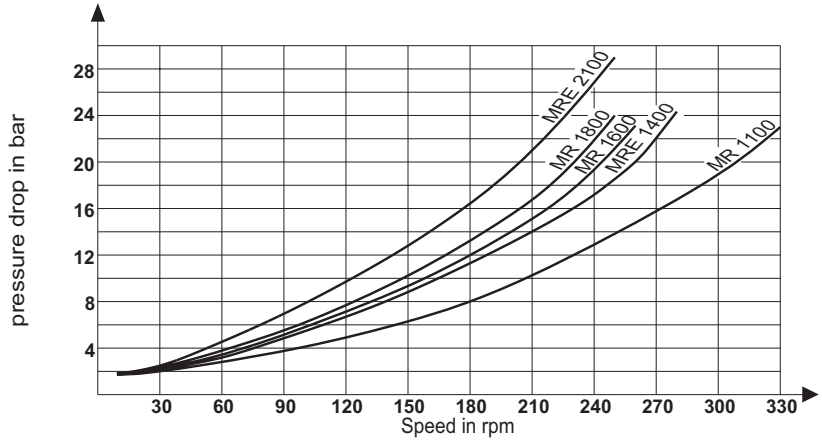
MR - MRE
125 - 330



MR - MRE
350 - 800



MR - MRE
1100 - 2100

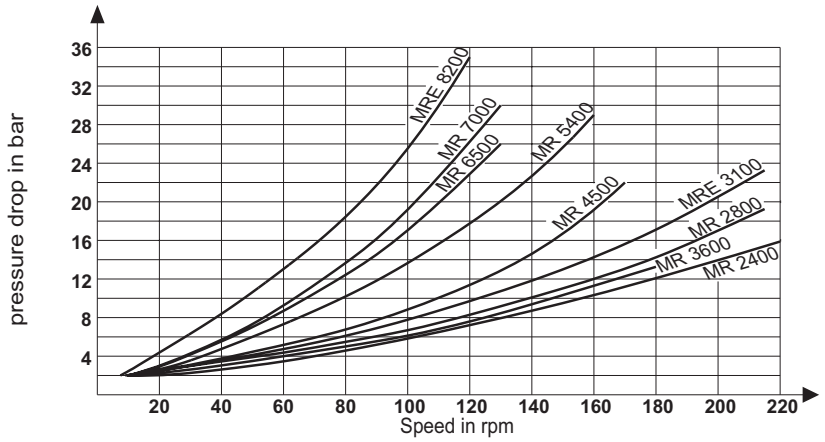


Ordering Code | Back to Content

OPERATING DIAGRAM (average values) measured at η = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

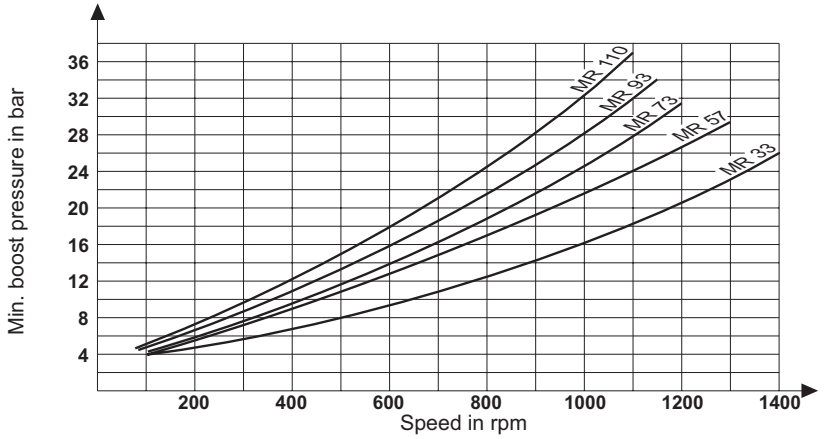
Min. required pressure difference Δp with idling speed (shaft unloaded)

MR - MRE
2400 - 8200

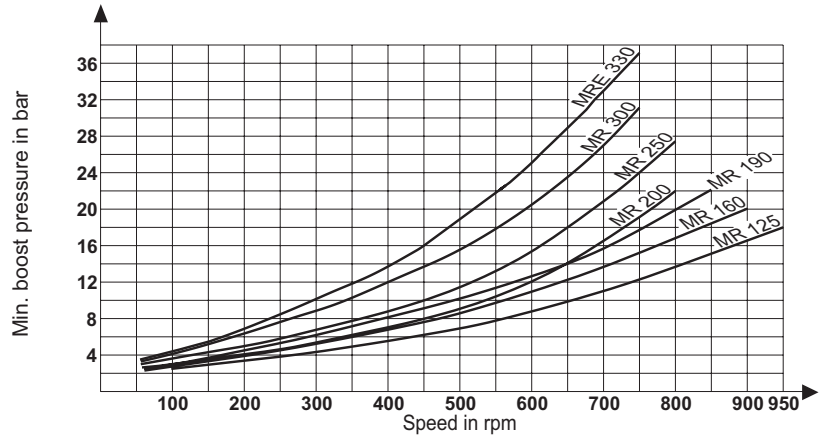


Minimum boost pressure during pump operation

MR
33 - 110



MR - MRE
125 - 330

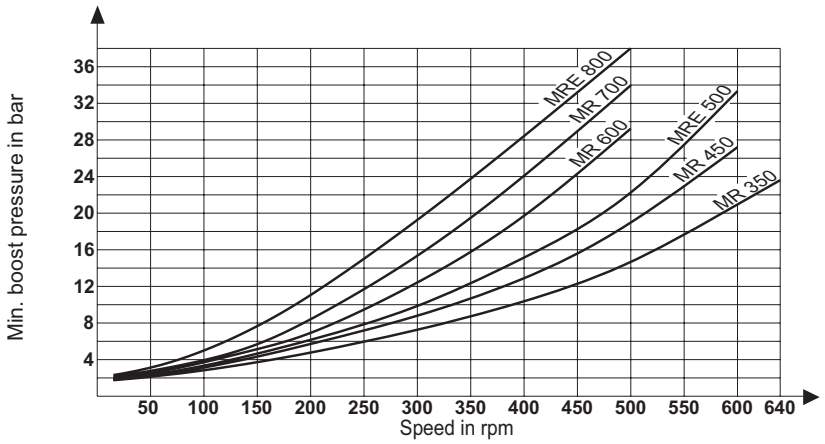


Ordering Code | Back to Content

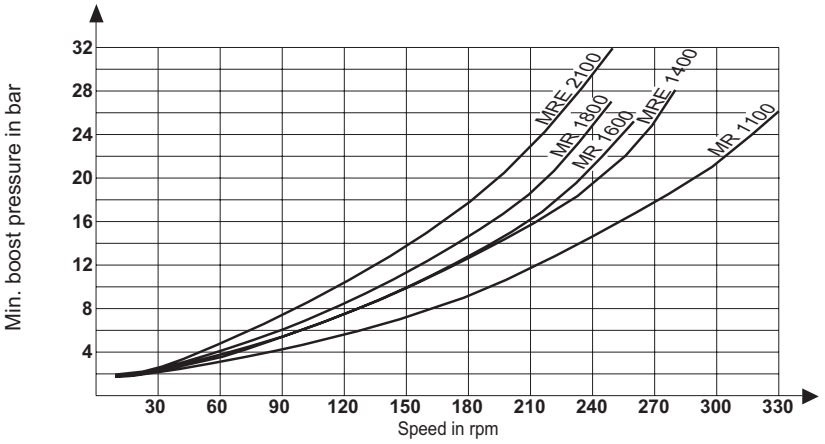
OPERATING DIAGRAM (average values) measured at n = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

Minimum boost pressure during pump operation

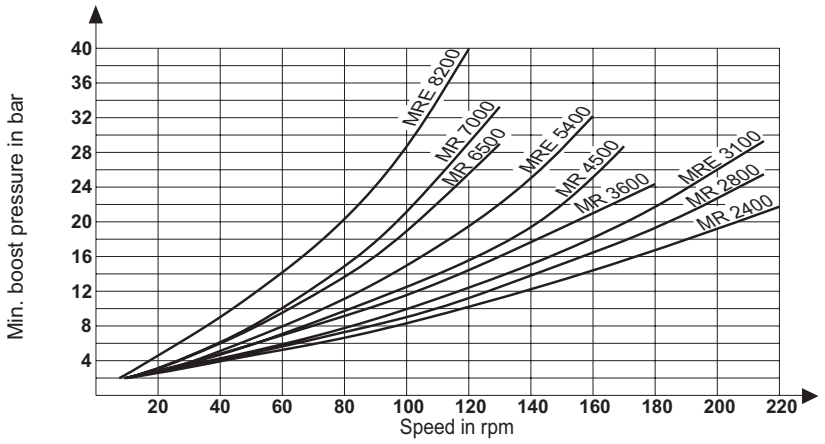
MR - MRE 350 - 800



MR - MRE 1100 - 2100

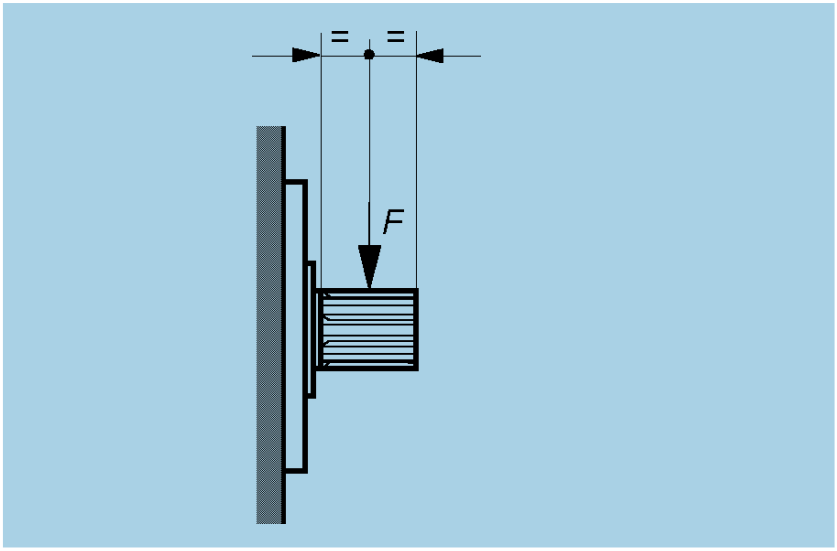


MR - MRE 2400 - 8200



Ordering Code | Back to Content

RADIAL LOAD

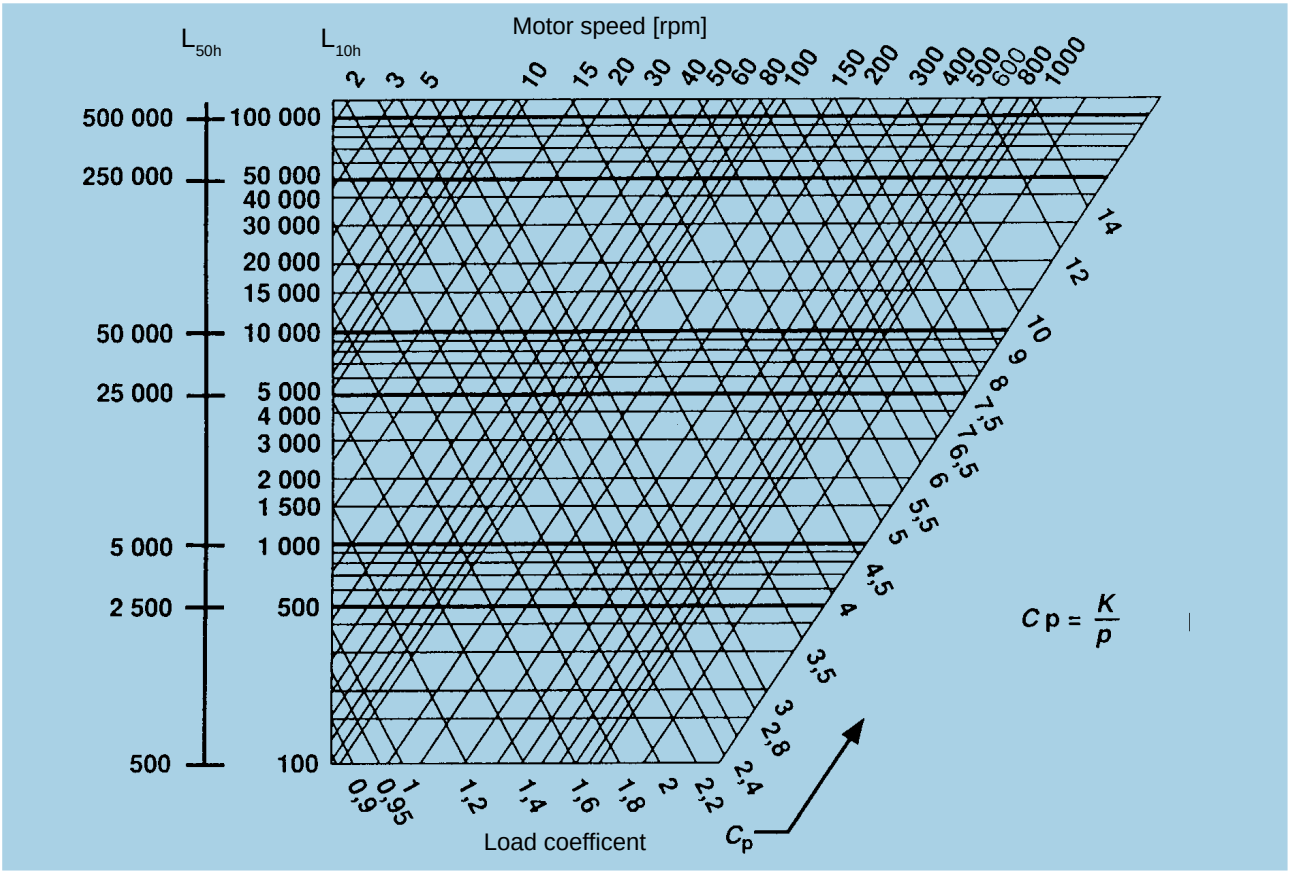


MOTOR TYPE	RADIAL FORCE$_{MAX}$ I BRIEFLY PERMITTED WITH DYNAMIC LOAD F in kN [1]	MAX. PERMITTED RADIAL FORCE IN SHAFT CENTRE BASED ON L_{H10} 5000 HOURS			speed in rpm
		INPUT PRESSURE 200 bar F in kN	INPUT PRESSURE 150 bar F in kN	INPUT PRESSURE 100 bar F in kN	
MR 33	19,0	9,5	10,2	10,6	400
MR 57	19,0	9,5	10,2	10,6	400
MR 73	22,5	9,0	11,6	13,5	350
MR 93	22,5	9,0	11,6	13,5	350
MR 110	22,5	9,0	11,6	13,5	350
MR 125	22,5	5,0	9,9	12,9	275
MR 160	22,5	5,0	9,9	12,9	275
MR 190	22,5	5,0	9,9	12,9	275
MR 200 *	-	-	-	-	-
MR 250	28,0	5,6	9,9	12,6	250
MR 300	28,0	5,6	9,9	12,6	250
MR 350	35,0	14,5	18,4	21,2	225
MR 450	35,0	14,5	18,4	21,2	225
MR 600	43,0	15,0	22,5	27,3	200
MR 700	43,0	15,0	22,5	27,3	200
MR 1100	54,0	18,5	28,5	35,2	150
MR 1600	68,0	26,2	40,6	50,0	125
MR 1800	68,0	26,2	40,6	50,0	125
MR 2400	85,0	50,1	66,0	76,8	110
MR 2800	85,0	54,0	69,0	79,4	100
MR 3600	108,0	55,0	90,0	103,0	100
MR 4500	108,0	78,0	97,0	109,0	85
MR 6500	134,0	74,0	123,0	141,0	50
MR 7000	134,0	74,0	123,0	141,0	50
MRE 330	28,0	4,5	8,5	11,9	250
MRE 500	35,0	12,4	17,3	20,8	225
MRE 800	43,0	8,5	19,8	26,3	200
MRE 1400	54,0	8,6	24,0	33,6	140
MRE 2100	68,0	12,5	35,6	48,3	120
MRE 3100	85,0	45,0	64,5	77,6	100
MRE 5400	108,0	63,0	90,2	107,3	80
MRE 8200	134,0	68,0	110,0	128,0	50

[1] in accordance with the dynamic condition, higher values can be accepted – MR 200* only code "F1"

Ordering Code | Back to Content

BEARING LIFE

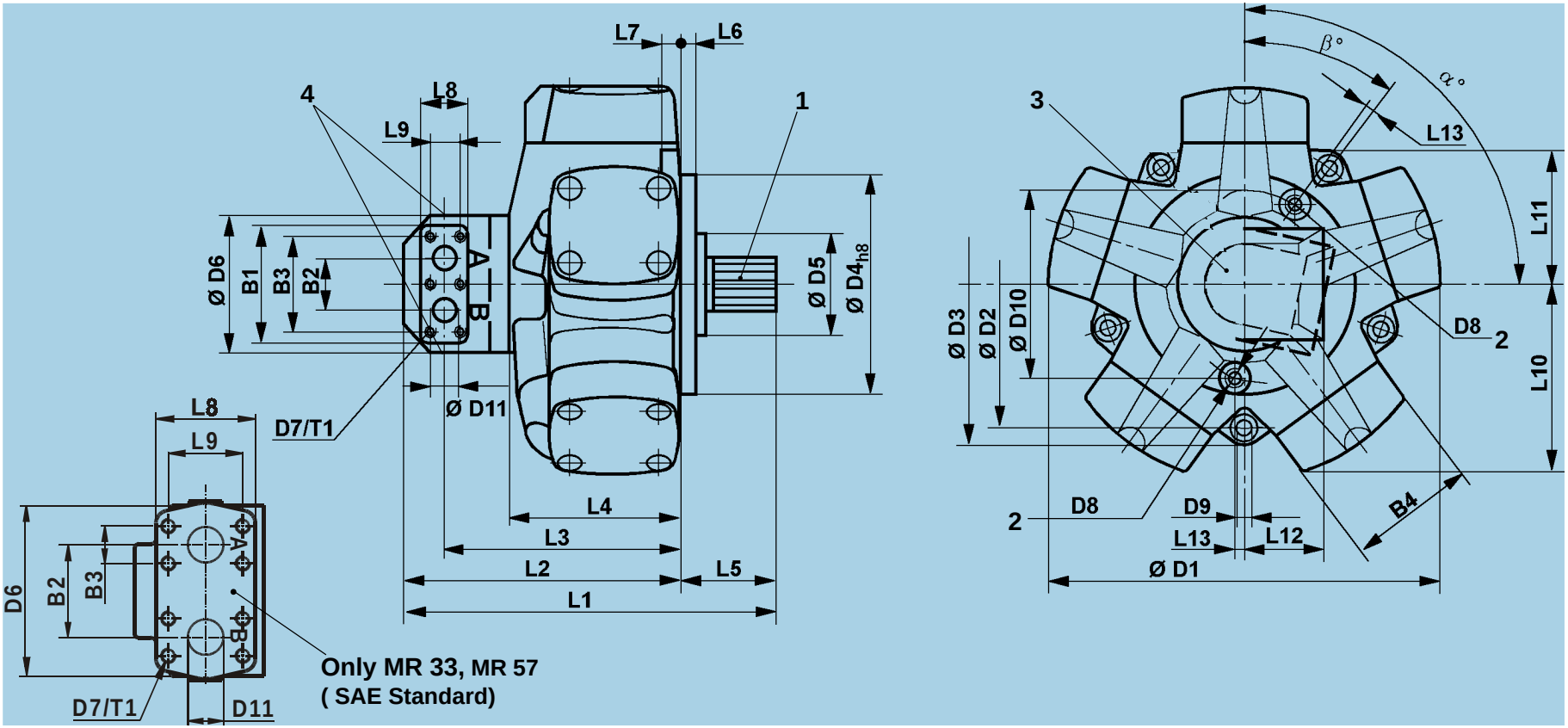


C_p = Load coefficent
K = Sevice life coefficent for standard bearing
p = operating pressure in bar

L_{10h} is the theoretically service life value normally reached or exceeded by the 90% of the bearings.
50 % of the bearings reach the value L_{50h} = 5 times $L_{10h.}$

MOTOR TYPE	K	MOTOR TYPE	K	MOTOR TYPE	K
MR 33	2150	**MRE 330**	850	**MRE 2100**	722
MR 57	2150	**MR 350**	1126	**MR 2400**	924
MR 73	1320	**MR 450**	1126	**MR 2800**	924
MR 93	1320	**MRE 500**	1021	**MRE 3100**	828
MR 110	1320	**MR 600**	920	**MR 3600**	709
MR 125	950	**MR 700**	920	**MR 4500**	709
MR 160	950	**MRE 800**	808	**MRE 5400**	591
MR 190	950	**MR 1100**	844	**MR 6500**	710
MR 200	950	**MRE 1400**	693	**MR 7000**	710
MR 250	950	**MR 1600**	835	**MRE 8200**	550
MR 300	950	**MR 1800**	835		

Ordering Code | Back to Content



1 Splined shaft with flank contact
(for dimension see page 26)
Ordering code "N1"
(for further shaft ends see page 26 - 27)

2 Case drain port
BSP threads to ISO 228/1

3 On request the port flange can be rotated by 72°
(For MR 33, MR 57, MR 73, MR 93, MR 110, MR 125, MR 160, MR 190, MR 200, MR 250, MR 300, MRE 330, MR 350, MR 450, MRE 500, MR 600, MR 700, MRE 800
can be rotated by 36°)
For standard position see ange a.

4 Port 1/4“ BSP threads to ISO 228/1
for pressure reading.

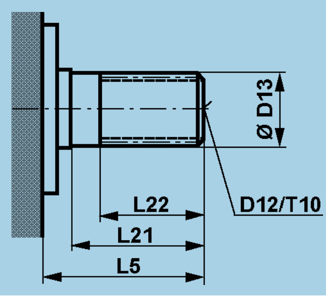
Dir. of Rotation (Viewed on shaft end)	Port inlet	ordering code (see page35)
clockwise	A	"N"
anti-clockwise	B	
clockwise	B	"S"
anti-clockwise	A	

Ordering Code
Back to Content

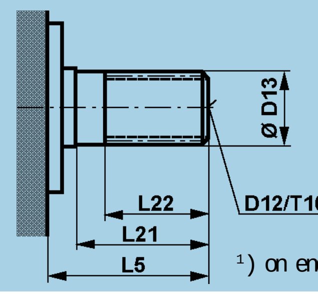
MOTOR TYPE	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	B1	B2	B3	B4	Ø D1	Ø D2	Ø D3	Ø $D4_{h8}$*	Ø D5	Ø D6	D7	T1	D8	D9	Ø D10	Ø D11	α	β
MR 33 MR 57	253,2	196	148	107	57,2	14	19	70	52,4	110,2	78,5	70	19,7	124	65	26,2	69,4	235,4	160	180	125	-	120	M10	25	G1/4	9	97	25	108°	36°
MR 73 MR 93 MR 110	297	228,5	190,5	131,5	68,5	17	20	54	34	119,8	94	72	-	120	50	100	90	250	204	224,4	145	-	129	M8	15	G3/8	11	-	20	90°	36°
MR 125 MR 160 MR 190	309	242	204	145	67	14	16	54	34	147,5	103	72	6,5	120	50	100	100	313,2	225	249	160	-	129	M8	15	G 3/8	11	160	20	90°	36°
MR 200 MR 250 MR 300 MRE 330	323	242	204	145	81	15	16	54	34	153,5	119	72	7,5	120	50	100	100	328	232	256	175	90	129	M8	15	G 3/8	11	162	20	90°	36°
MR 350 MR 450 MRE 500	376	279	235	167	97	15	18	70,4	40	174,5	130	84	9,5	142	60	120	119	368	266	296	190	96	156	M10	18	G 3/8	13	194	25	90°	36°
MR 600 MR 700 MRE 800	400	299	255	187	101	15	20	70,4	40	192	143	84	8	142	60	120	133	405	290	320	220	102	156	M10	18	G 3/8	13	207	25	90°	36°
MR 1100 MRE 1400	458	341	293	203	117	20	22	82	50	223	165	105	9	162	73	136	148	470	330	367	250	120	172	M12	21	G 1/2	15	228	31	104°	36°
MR 1600 MR 1800 MRE 2100	506	374	326	236	132	21	24	82	50	264	197	105	11	162	73	136	168	558	380	423	290	148	172	M12	21	G 1/2	17	266	31	90°	36°
MR 2400 MR 2800 MRE 3100	619	466	392	285	153	24	26	98	62	303	221	123	15	208	86	180	190	642	440	494	335	140	215	M14	28	G 1/2	19	314	37	90°	36°
MR 3600 MR 4500 MRE 5400	699,5	489,5	418,5	307,5	210	34	28	98	68	359,5	247	140	19	230	116	200	240	766	540	597	400 *$D4_{h7}$	-	215	M16	32	G 1/2	23	380	38	108°	36°
MR 6500 MR 7000 MRE 8200	796	566	495	384	230	37	30	98	68	407,3	247	140	21	230	116	200	264	864	600	658,6	450 *$D4_{h7}$	190	215	M16	32	G 1/2	25	450	38	108°	36°

Ordering Code
Back to Content

Code N 1 (Standard)

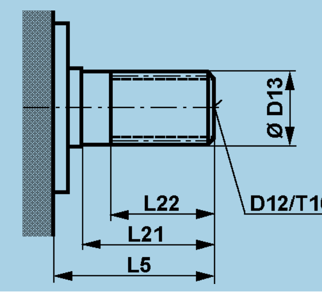


Code B 1 - BS 3550 - [1])



[1]) on enquiry

Code D 1 - DIN 5480 - (Standard)

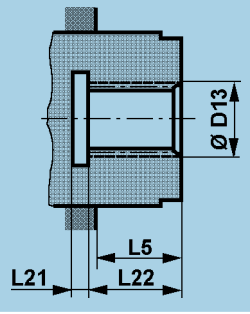


Version	N						B						D					
TYPE	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**
MR 33 MR 57	57	40	28	-	-	B6x26x32	-	-	-	-	-	-	57	40	28	-	-	W32x1,5x20-8e
MR 73 MR 93 MR 110	68,5	51,5	31,5	M12	-	B6x28x34	-	-	-	-	-	-	68,5	51,5	31,5	M12	-	W35x2x16-8e
MR 125 MR 160 MR 190	67	50	35,5	M12	20	B8x32x38	67	50	35,5	M12	20	12/24-17	67	50	35,5	M12	20	W38x2x18-8e
MR 200 *	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MR 250 MR 300 MRE 330	81	60	46	M12	25	B8x42x48	81	60	45	M12	25	12/24-21	81	60	46	M12	25	W48x2x22-8e
MR 350 MR 450 MRE 500	97	74	56,5	M12	25	B8x46x54	97	74	61	M12	25	8/16-17	97	74	60	M12	25	W55x3x17-8e
MR 600 MR 700 MRE 800	101	78	62	M12	25	B8x52x60	101	78	62	M12	25	8/16-17	101	78	62	M12	25	W60x3x18-8e
MR 1100 MRE 1400	117	88	69	M12	25	B8x62x72	117	88	67	M12	25	6/12-14	117	88	72	M12	25	W70x3x22-8e
MR 1600 MR 1800 MRE 2100	132	100	79	M12	25	B10x72x82	132	100	76	M12	25	6/12-20	132	100	80	M12	25	W80x3x25-8e
MR 2400 MR 2800 MRE 3100	153	120	99	M12	25	B10x82x92	153	120	76	M12	25	6/12-20	153	120	100	M12	25	W90x4x21-8e
MR 3600 MR 4500 MRE 5400	210	173	144	M12	25	B10x102x112	210	173	142,5	M12	25	6/12-20	210	173	144	M12	25	W110x4x26-8e
MR 6500 MR 7000 MRE 8200	230	188	150	M12	25	B10x112x125	230	188	153	M12	25	6/12-26	230	188	153	M12	25	W120x4x28-8e

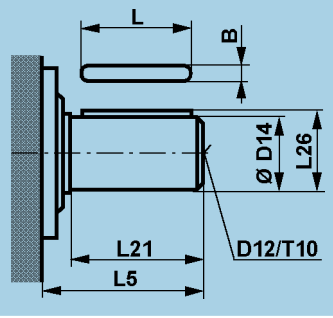
NOTE: the threaded holes (D12/T10) for the shaft versions "N1", "B1" and "D1" must be considered as service holes. In case the holes dimensions required by the application are different from the ones listed here above, plese contact DENISON Calzoni.
MR 200 * only code "F1"

Ordering Code
Back to Content

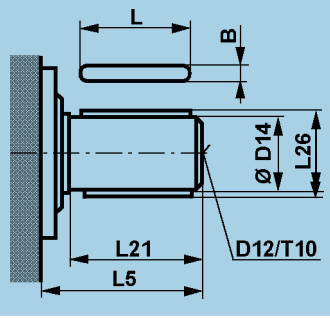
Code F 1 - DIN 5480 -



Code P 1



Code P 1 **



Only MR 6500, MR 7000, MRE 8200

Version	F				P								
Type	L5	L21	L22	ØD13 DIN 5480	L5	L21	L26	D12	T10	ØD14	Key L x B	Transmitted torque (Nm)	
MR 33 MR 57	17	5	21	N28x1,25x21-9H	-	-	-	-	-	-	-		
MR 73 MR 93 MR 110	17	5	26	N32x2x14-9H	-	-	-	-	-	-	-		
MR 125 MR 160 MR 190	14	5	28	N35x2x16-9H	67	50	43	M12	20	40 k6	45 x 12	496	
MR 200 *	27	5	36	N40x2x18-9H	-	-	-	-	-	-	-	-	
MR 250 MR 300 MRE330	27	5	36	N40x2x18-9H	81	60	53,5	M12	25	50 k6	56 x 14	897	
MR 350 MR 450 MRE 500	28	5	38	N47x2x22-9H	97	74	59	M12	25	55 k6	70 x 16	1413	**NOTE** For higher values of the torque to be transmitted, please consult DENISON Calzoni
MR 600 MR 700 MRE 800	28	5	44	N55x3x17-9H	101	78	64	M12	25	60 k6	70 x 18	2030	
MR 1100 MRE 1400	38	8	50	N65x3x20-9H	117	88	76,5	M12	25	70 k6	80 x 20	2690	
MR 1600 MR 1800 MRE 2100	47	8	57	N75x3x24-9H	132	100	85	M12	25	80 k6	90 x 22	4020	
MR 2400 MR 2800 MRE 3100	48	8	62	N85x3x27-9H	153	120	95	M12	25	90 k6	110 x 25	6207	
MR 3600 MR 4500 MRE 5400	50	14	68	N100x3x32-9H	210	173	116	M12	25	110 k6	160 x 28	10757	
MR 6500 MR 7000 MRE 8200	50	14	76	N110x3x35-9H	230	188	138 **	M12	25	124 b8	N°2-180 x 32	28270	

NOTE: the threaded holes (D12/T10) for the shaft versions "P1" must be considered as service holes. In case the holes dimensions required by the application are different from the ones listed here above, plese contact DENISON Calzoni.
MR 200 * only code "F1"
**This dimension includes two keys

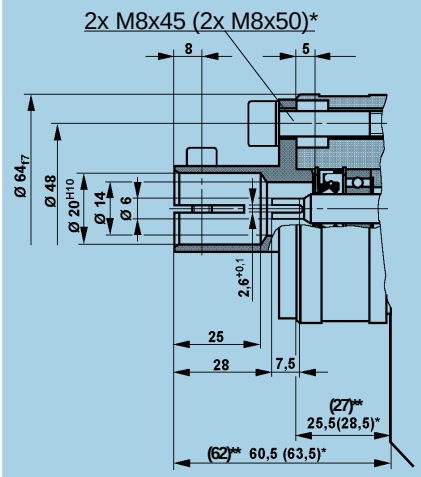
Ordering Code
Back to Content

MECHANICAL TACHOMETER DRIVE

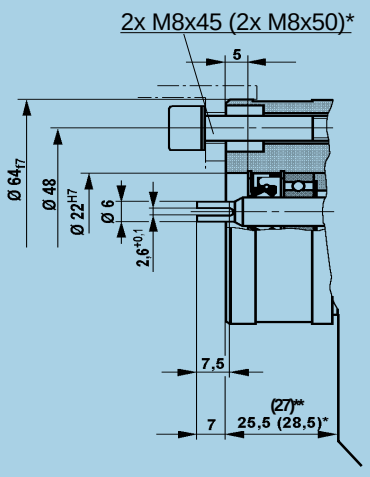
TACHOGENERATOR DRIVE

ENCODER DRIVE

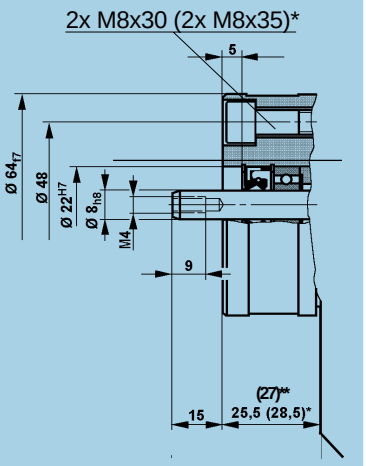
Code "C1"



Code "T1"

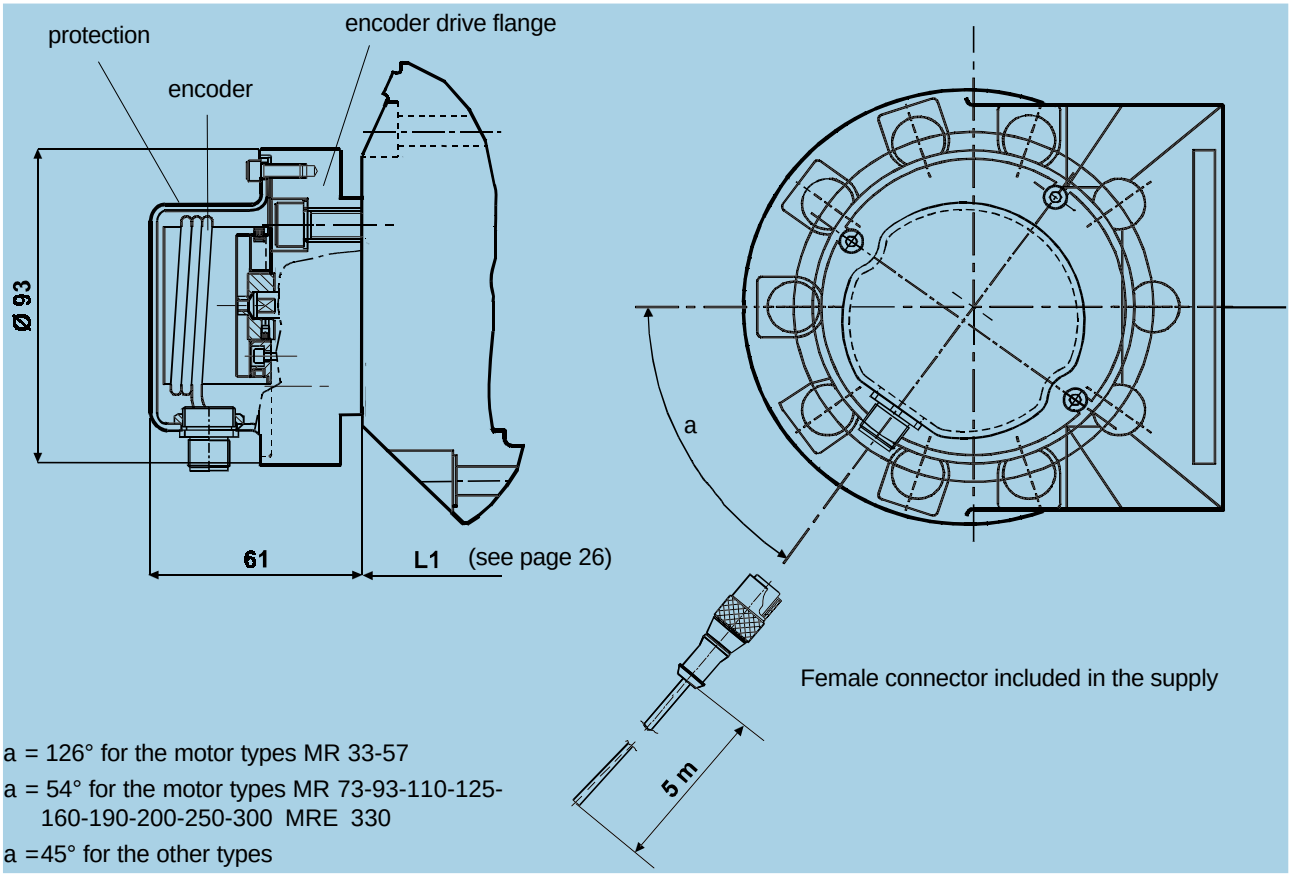


Code "Q1"



( ) * Motor MR 73-93-110-125-160-190-200-250-300 MRE 330
( )** Motor MR 33-57

INCREMENTAL ENCODER DIMENSIONS

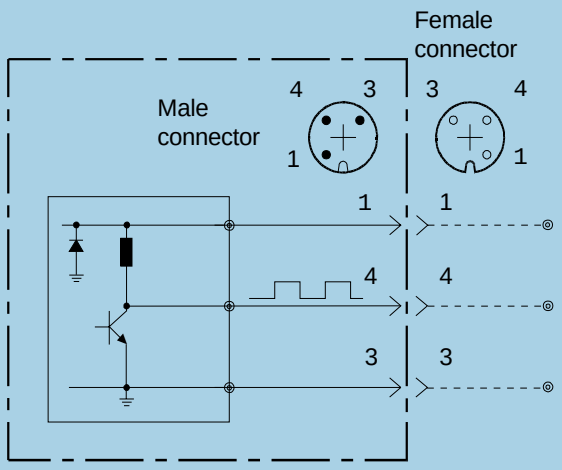


a = 126° for the motor types MR 33-57
a = 54° for the motor types MR 73-93-110-125-160-190-200-250-300 MRE 330
a =45° for the other types

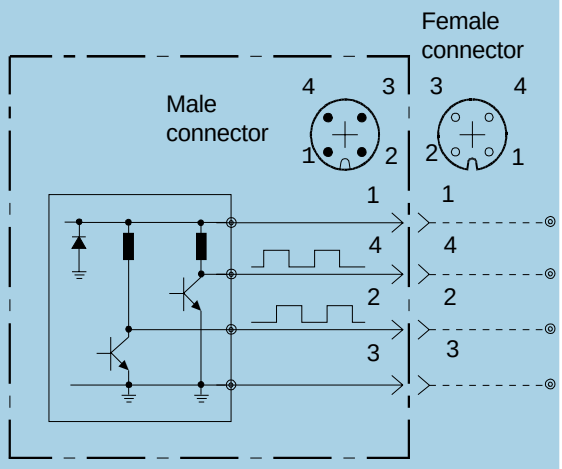
Ordering Code | Back to Content

INCREMENTAL ENCODER
CONNECTION DIAGRAMS

Monodirectional



Bidirectional



Color wires and function		
1	**Brown**	Power Supply (8 to 24 Vdc)
2	**White**	Output B phase (MAX 10 mA - 24 Vcc)
3	**Blue**	Power Supply (0 Vdc)
4	**Black**	Output A phase (MAX 10 mA - 24 Vcc)

INCREMENTAL ENCODER
TECHNICAL DATA

Encoder type:	**ELCIS mod. 478**
Supply voltage:	**8 to 24 Vcc**
Current consumption:	**120 mA max**
Current output:	**10 mA max**
Output signal:	**A phase- MONODIRECTIONAL A and B phase BIDIRECTIONAL**
Response frequency:	**100 KHz max**
Number of pulses:	**500 (others on request - max 2540)**
Slew speed:	**Always compatible with maximum motor speed**
Operating temperature range:	**from 0 to 70 °C**
Storage temperature range:	**from -30 to +85 °C**
Ball bearing life:	**$1.5x10^9$ rpm**
Weigth:	**100 gr**
Protection degree:	**IP 67 (with protection and connector assembled)**

Connectors:

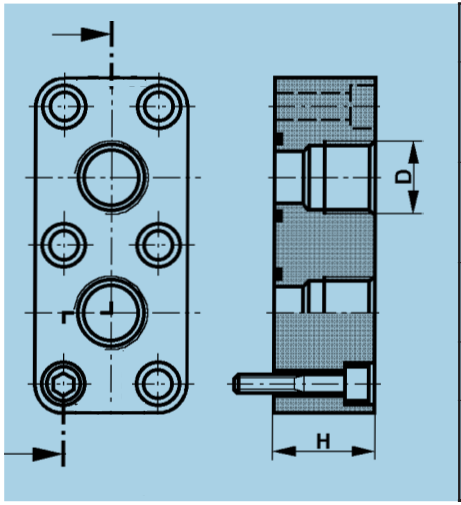
MONODIRECTIONAL	**RSF3/0.5 M (Lumberg) RKT3-06/5m (Lumberg)**	**male female**
BIDIRECTIONAL	**RSF4/0.5 M (Lumberg) RKT4-07/5m (Lumberg)**	**male female**

Note: Female connectors cable length equal to 5 m.

Ordering Code | Back to Content

STANDARD CONNECTION FLANGE
Code “C1“

Flange is supplied complete with screws and seals.

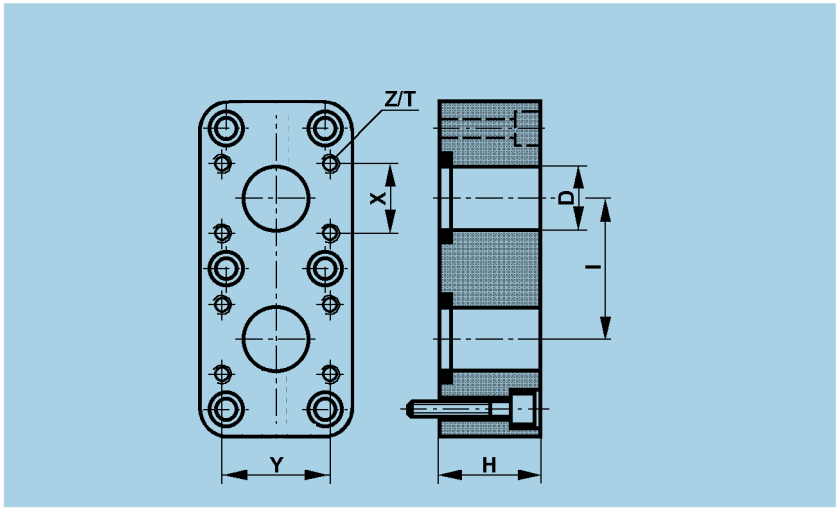


MR MRE	D (BSP)	H	CODE NBR	CODE FPM
125 - 160 190 200 - 250 300 - 330	3/4"	36	262 098	229 394
350 - 450 500 600 - 700 800	1 1/4"	40	262 089	229 395
1100 - 1400 1600 - 1800 2100	1 1/2"	45	262 093	229 396
2400 - 2800 3100	1 1/2"	60	264 572	229 397
3600 - 4500 5400 6500 - 7000 8200	2"	60	272 724	229 398

BSP threads to ISO 228/1

Permitted up to 6000 PSI

SAE CONNECTION FLANGE
Codice “S1“
Codice “T1“
Codice “G1“
Codice “L1“

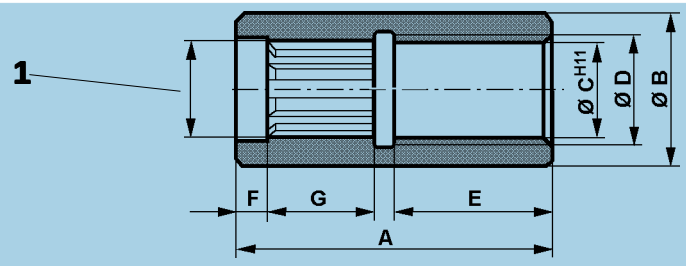


Flange is supplied complete with screws and seals. FPM seals enquiry.

MR MRE	SAE PSI	D		H	I	X	Y	METRIC		UNC		
		"	mm					Z / T	Denison Calzoni part N° NBR	Z (")	T	Denison Calzoni part N° NBR
125 - 160 190 200 - 250 300 - 330	5000	3/4"	19	36	55	22,2	47,6	M10/25	277 295	3/8"- 16	25	223 335
350 - 450 500 600 - 700 800	5000	1"	25	40	60	26,2	52,4	M10/25	277 297	3/8"- 16	25	223 336
1100 - 1400 1800 - 1600 2100	4000	1 1/4"	31	45	75	30,2	58,7	M10/25	277 299	7/16"- 14	30	223 337
	6000	1"	25	45	71	27,8	57,15	M12/22	230 166	7/16"- 14	30	342 092
2400 - 2800 3100	3000	1 1/2"	37	60	86	35,7	69,8	M12/30	277 301	1/2"- 13	30	223 338
	6000	1 1/2"	37	60	97,5	36,5	79,4	M16/30	230 168	5/8"- 11	35	349068
3600 - 4500 5400 6500 - 7000 8200	3000	2"	50	60	112	42,9	77,8	M12/30	277 303	1/2"- 13	30	223 339
	6000	2"	50	60	116	44,45	96,82	M20/35	230 170	3/4"- 10	38	342 547

Ordering Code | Back to Content

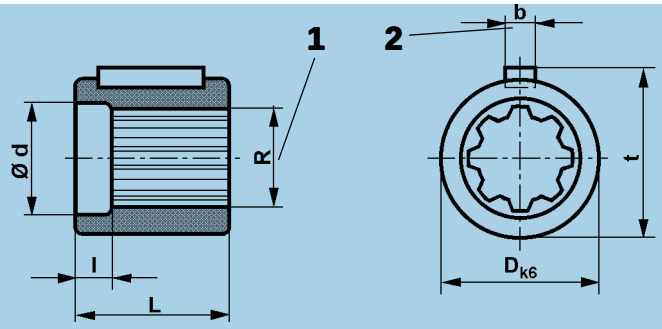
COUPLINGS



1 For standard male splined shaft version "N1" (see page 26).

MR MRE	ORDERING CODE	A	B	C^{H11}	D	E	F	G
125 - 160 190	465 203	114	56	39	47	54	15,5	34,5
250 - 300 330	465 202	135	71	49	60	64	15	45
350 - 450 500	465 201	155	80	55	68	68	18,5	55,5
600 - 700 800	465 200	171	90	61	75	80	19	59
1100 1400	464 785	186	106	73	88,5	85,5	20	65,5
1600 - 1800 2100	465199	224	118	83	98	107	22	78
2400 - 2800 3100	465 198	265	132	93	112	127	23	97
3600 - 4500 5400	474 692	355	150	113	126	165	30	140
6500 - 7000 8200	422 544	390	195	126	140	185	38	147

ADAPTERS WITH KEY

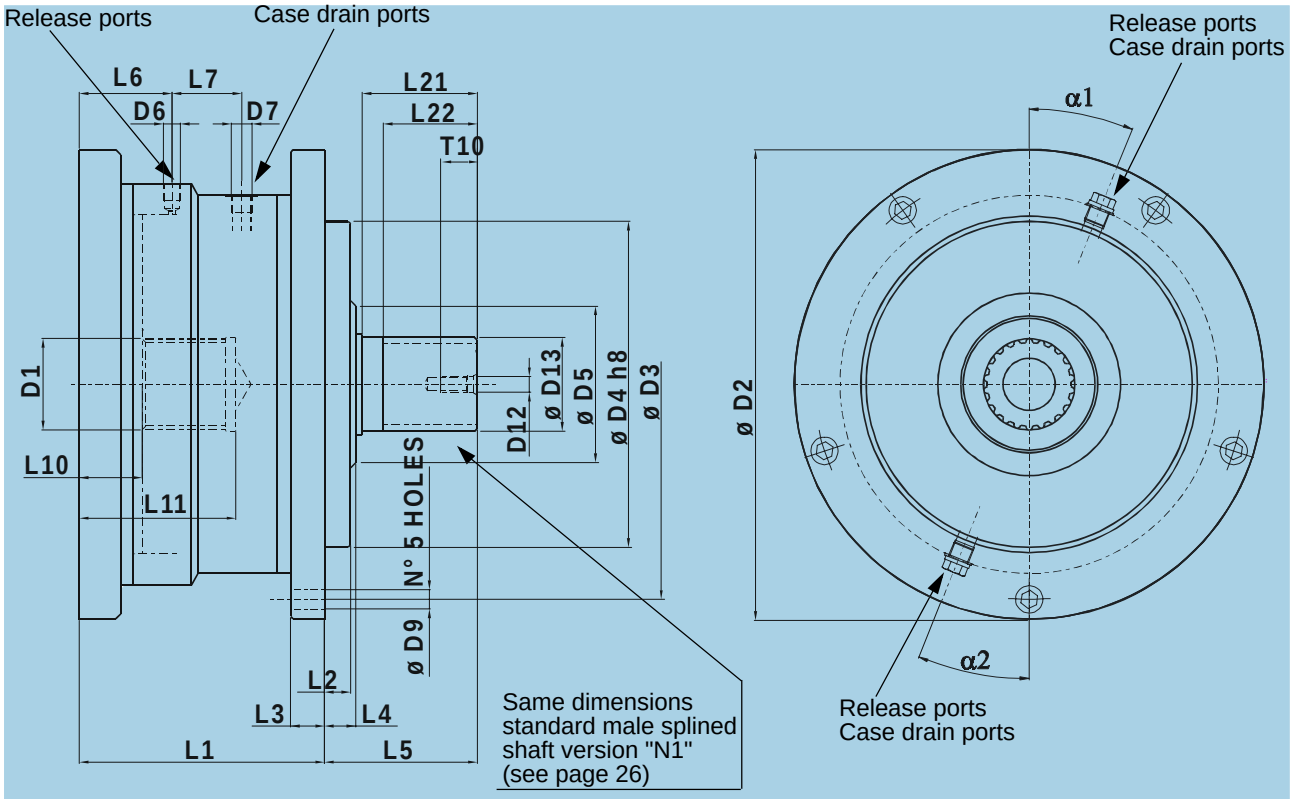


1 For standard male splined shaft version "N1" (see page 26).
2 Key to DIN 6885

MR MRE	ORDERING CODE	R EX DIN 5463 (mm)	d	l	D_{k6}	L	b	t	Key (mm) DIN 6885
125 - 160 190	271 117	A8x32x38	38,3	15,5	58	50	10	61	10x8x45
250 - 300 330	271 118	A8x42x48	48,3	15	70	60	14	73,5	14x9x56
350 - 450 500	271 119	A8x46X54	54,3	18,5	80	75	16	84	16x10x70
600 - 700 800	271 120	A8x52x60	60,3	19	90	80	18	94	18x11x70
1100 - 1400	271 121	A8x62x72	72,3	20	105	98	20	109,5	20x12x90
1600 - 1800 2100	271 122	A10x72x82	82,3	22	118	118	22	123	22x14x110
2400 - 2800 3100	271 123	A10x82x92	92,3	23	130	148	25	135	25x14x140
3600 - 4500 5400	272 719	A10x102x112	112,3	30	160	188	28	166	28x16x180
6500 - 7000 8200	223 476	A10x112x125	126,6	38	185	188	45	195	45x25x180

Ordering Code | Back to Content

BRAKE TYPE	B 190	B 300	B 450	B 700	B 1100	B 1800	B 2800
MOTOR TYPE MR - MRE	125 - 160 190	250 - 300 330	350 - 450 500	600 - 700 800	1100 - 1400	1600 - 1800 2100	2400 - 2800 3100



α1, α2 Corresponding angles to the release ports 1 and 2, to case the drain ports 1 and 2

BRAKE TYPE	L1	L2	L3	L4	L5	L6	L7	L10	L11	L21	L22	D1	D2	D3	$D4_{h8}$	D5	D6	D7	D9	D12	D13	T10	α1	α2
B 190	121	-	22	14	67	41	29,3	20	72	50	35,5	N 38x 2x18-9H DIN 5480	250	225	160	-	G1/4"	G3/8'	10,5	M12	B 8x32x38 ex DIN 5463	28	22°30'	22°30'
B 300	136	-	25	15	81	42	39,5	21	86	60	46	N 48x2x22-9H DIN 5480	256	232	175	-	G1/4"	G3/8'	10,5	M12	B 8x42x48 ex DIN 5463	28	22°30'	22°30'
B 450	147	-	27	15	97	49,5	36	24	100	74	56,5	N 55x3x17-9H DIN 5480	296	266	190	-	G1/4"	G3/8'	13,5	M12	B 8x46x54 ex DIN 5463	28	22°30'	22°30'
B 700	172	-	28	15	101	55	46	25	105	78	62	N 60x3x18-9H DIN 5480	320	290	220	-	G1/4"	G3/8'	13,5	M12	B 8x52x60 ex DIN 5463	28	22°30'	22°30'
B 1100	188	20	26	24	117	71	53,5	48	120	88	72	N 70x3x22-9H DIN 5480	360	330	250	120	G1/4"	M16-x1,5	15	M12	B 8x62x72 ex DIN 5463	28	0°	0°
B 1800	216	-	28	21	132	63,5	58,5	34	135	100	79	N 80x3x25-9H DIN 5480	423	380	290	-	G1/4"	G1/2'	17,5	M12	B 10x72x82 ex DIN 5463	28	22°30'	22°30'
B 2800	263	-	30	24	153	87	67	42,5	165	120	99	N 90x4x21-9H DIN 5480	494	440	335	-	G1/4"	G1/2'	19	M12	B 10x82x92 ex DIN 5463	28	22°30'	22°30'

Ordering Code | Back to Content

TECHNICAL DATA (For operation outside these parameters, please consult **DENISON Calzoni)**

CHARACTERISTICS		BRAKE TYPE						
		B 190	**B 300**	**B 450**	**B 700**	**B 1100**	**B 1800**	**B 2800**
STATIC BRAKING TORQUE	**Nm**	1250	1800	2650	4000	6200	11400	17100
DYNAMIC BRAKING TORQUE	**Nm**	870	1200	1450	2200	4200	6250	12000
RELEASE PRESSURE	**bar**	28	28	27	27	27	30	30
MAX. OPERATING PRESSURE	**bar**	420	420	420	420	420	420	420
MOMENT OF INERTIA OF ROTATING PARTS	**Kgm²**	0,0047	0,0062	0,029	0,043	0,061	0,20	0,27
WEIGHT	**Kg**	32	39	54	74	100	158	262
MOTOR TYPE MR MRE		125 160 190	250 300 330	350 450 500	600 700 800	1100 1400	1600 1800 2100	2400 2800 3100

CODE

Example: BRAKE - B 450 - N1 V1 **

1. BRAKE - **B 450** NI V1 **

BRAKE TYPE

B 190	Brake for motor size "C"
B 300	Brake for motor size "D"
B 450	Brake for motor size "E"
B 700	Brake for motor size "F"
B 1100	Brake for motor size "G"
B 1800	Brake for motor size "H"
B 2800	Brake for motor size "I"

2. BRAKE - B 450 - **N1** V1 **

SHAFT

N1	Spline ex DIN 5463 (see page 26)
D1 *	Spline DIN 5480 (see page 26)
F1 *	Female spline DIN 5480 (see page 27)
*** please contact DENISON Calzoni**	

3. BRAKE - B 450 - N1 **V1** **

SEALS

N1	NBR: mineral oil
V1 *	FPM seals
U1	No shaft seal (for brake)
*** please contact DENISON Calzoni**	

4. BRAKE - B 450 - N1 V1 **

SPECIAL

**	Space reserved to Denison Calzoni

Ordering Code | Back to Content

Mounting

Any mounting position
- Note the position of the case drain port (see below)

Install the motor properly
- Mounting surface must be flat and resistant to bending

Min. tensile strength of mounting screws to DIN 267 Part 3 class 10.9
- Note the prescribed fastening torque

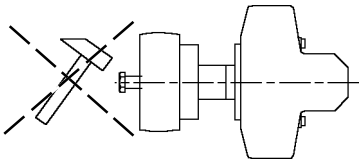
Pipes, pipe connections

Use suitable screws!
- Depending on type of motor use either threaded or flange connection

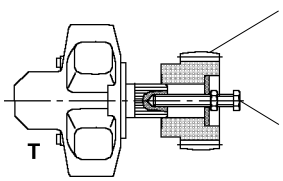
Choose pipes and hoses suitable for the installation
- Please note manufacturing data!

Before operation fill with hydraulic fluid
- Use the prescribed filter!

Coupling



- Mounting with screws
- Use threaded bore in the drive shaft
- Take apart with extractor



NOTE: Two of the mounting screws must be precisely located/fitted if operation is started and stopped frequently or if high reversible frequencies exist.

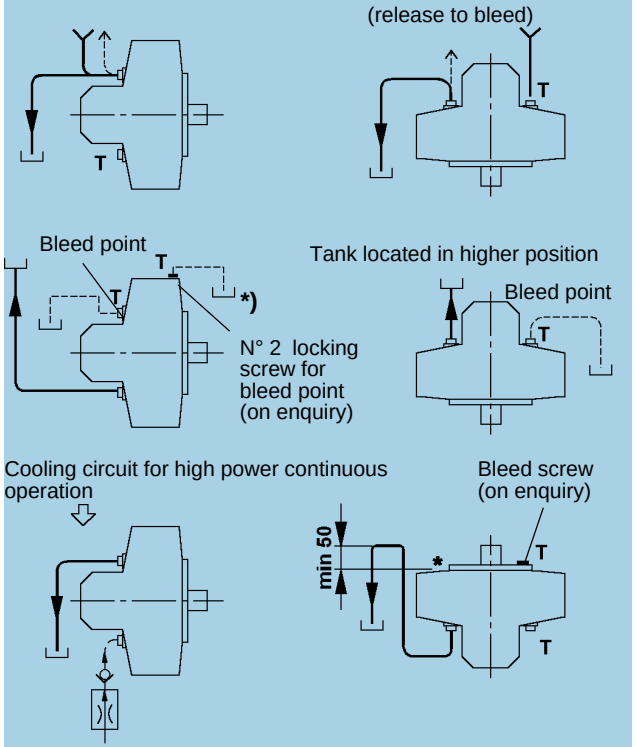
DRAIN AND FLUSHING LINK INSTALLATION EXAMPLES

Note: Position the case drain pipe, so that the motor **cannot run** empty.

T = Seal
Y = Motor housing feeding line
⟵ = Bleed

Installation instructions for motors of the series "MR - MRE"

Low pressure case drain returns to tank.

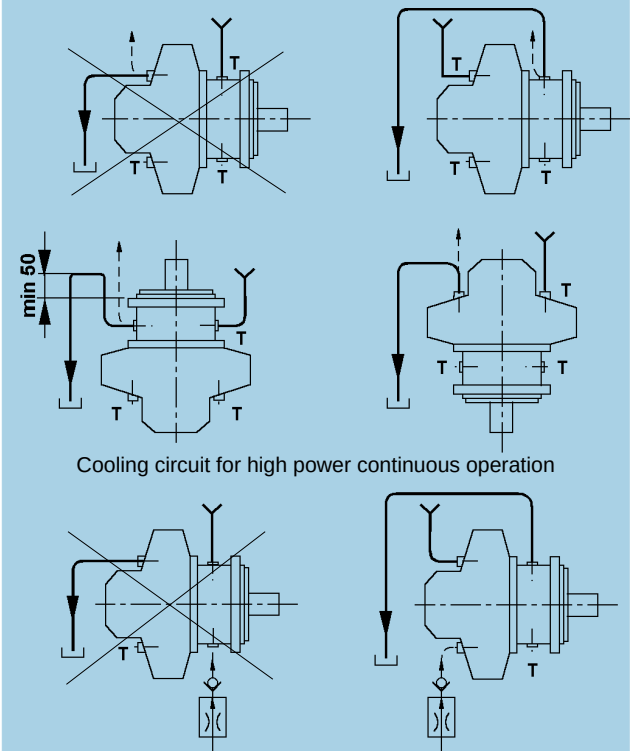


Flushing *p* max= 5 bar

*) Special designs for applications, where the equipment needs to be filled with oil.(e.g. in a salty atmosphere)

Installation instructions for motors of the series "MR - MRE with brakes"

Low pressure case drain returns to tank.



Flushing *p* max= 5 bar

Motors without shaft seal used with brake

Ordering Code | Back to Content

CODE

Example: MR 160C - N1 M1 F1 N1 N **

1. **MR** 160C - N1 M1 F1 N1 N **
SERIES

MR	standard 250 bar max. continuous
MRE	expanded 210 bar max. continuous

2. MR **160C** - N1 M1 F1 N1 N **
SIZE & DISPLACEMENT

A	code	**MR 33 A**	**MR 57 A**		
	Cm³	32,1	56,4		
B	code	**MR 73 B**	**MR 93 B**	**MR110 B**	
	Cm³	72,6	92,6	109,0	
C	code	**MR 125 C**	**MR 160 C**	**MR 190 C**	
	Cm³	124,7	159,7	191,6	
D	code	**MR 200 D**	**MR 250 D**	**MR 300 D**	**MRE 330 D**
	Cm³	199,2	250,9	304,1	332,4
E	code	**MR 350 E**	**MR 450 E**	**MRE 500 E**	
	Cm³	349,5	451,6	497,9	
F	code	**MR 600 F**	**MR 700 F**	**MRE 800 F**	
	Cm³	607,9	706,9	804,2	
G	code	**MR 1100 G**	**MRE 1400 G**		
	Cm³	1125,8	1369,5		
H	code	**MR 1600 H**	**MR 1800 H**	**MRE 2100 H**	
	Cm³	1598,4	1809,6	2091,2	
I	code	**MR 2400 I**	**MR 2800 I**	**MRE 3100 I**	
	Cm³	2393,0	2792,0	3103,7	
L	code	**MR 3600 L**	**MR 4500 L**	**MRE 5400 L**	
	Cm³	3636,8	4502,7	5401,2	
M	code	**MR 6500 M**	**MR 7000 M**	**MRE 8200 M**	
	Cm³	6460,5	6967,2	8226,4	

3. MR 160C - **N1** M1 F1 N1 N **
SHAFT

N1	spline ex DIN 5463 (see page 26)
D1	spline DIN 5480 ((see page 26)
F1	female spline DIN 5480 (see page 27)
P1	shaft with key (see page 27)
B1	spline B.S. 3550 (see page 26)

4. MR 160C - N1 **M1** F1 N1 N **
SPEED SENSOR OPTION

N1	none	
Q1	encoder drive (see page 28)	
C1	mechanical tachometer drive (see page 28)	
T1	tachogenerator drive (see page 28)	
M1	incremental Elcis encoder (500 pulse/rev) (see page 28)	Uni-directional
B1		Bi-directional

5. MR 160C - N1 M1 **F1** N1 N **
SEALS

N1	NBR mineral oil
F1	NBR, 15 bar shaft seal
V1	FPM seals
U1	no shaft seal (for brake)

6. MR 160C - N1 M1 F1 **N1** N **
CONNECTION FLANGE

N1	none
C1	standard DENISON Calzoni (see page 30)
S1	standard SAE metric (see page 30)
T1	standard SAE UNC (see page 30)
G1	SAE 6000 psi metric (see page 30)
L1	SAE 6000 psi UNC (see page 30)

7. MR 160C - N1 M1 F1 N1 **N** **
ROTATION

N	standard rotation (CW: inlet in A, CCW: inlet in B)
S	reversed rotation (CW: inlet in B, CCW: inlet in A)

8. MR 160C - N1 M1 F1 N1 N ******
SPECIAL

******	space reserved to Denison Calzoni

Ordering Code | Back to Content

International Distributors

In Europe :
Cyprus
Czech Republic
Greece
Hungary
Iceland
Jugosavia
Norway
Portugal
Poland
Romania
Russia
Slovakia
Slovenia
Switzerland
The Faroe Islands
Turkey

In Africa :
Algeria
Egypt
Ivory Coast
Morocco
Nigeria
South Africa
Tunisia

In Middle East :
Bahrein
Iran
Israel
Jordan
Kuwait
Lebanon
Pakistan
Qatar
Saudi Arabia
Syria
United Arab Emirates

In Far East :
Indonesia
Korea
Malaysia
New Zealand
Philippines
Thailand

South-America :
Argentina
Brazil
Chile
Colombia
Ecuador
Mexico
Peru
Venezuela

Denison Calzoni S.p.a.
Via Caduti di Sabbiuno 15/17
40011 Anzola dell'Emilia
Bologna Italy
Tel: +39 (051) 6501611
Fax: +39 (051) 736221
e-mail: rco@rco.it

Asia-Pacific

Australia

Denison Hydraulics PTY
41-43 St Hilliers Road
P.O.Box 192
Auburn N.S.W. 2144, Australia
Tel : +61 (2) 9646 5200
Fax : +61 (2) 9643 1305

Hong Kong

Denison Hydraulics Ltd.
Unit 6A, 33/F Cable TV Tower
9 Hoi Shing Road, Tsuen Wan
NT, Hong Kong
Tel : +852 2498 8381
Fax : +852 2499 1522

Japan

Denison Japan Inc.
4-2-1 Tsujido-Shinmachi
Fujisawa 251, Japan
Tel : +81 (466) 35-3050
Fax : +81 (466) 35-2019

China

Denison Hydraulics
Engineering Ltd.
Room 8018, No. 601, Zhang Yang
Road Pudong New Area
Shanghai 200120, China
Tel : +86 (21) 58205042/58205034
Fax : +86 (21) 58205014

Singapore

Denison Hydraulics LTD
11 Lorong Tukang Dua,
Singapore 2261
Tel : +65 268 7840
Fax : +65 268 7847

Taiwan

Denison Hydraulics LTD
6F-10. No. 79,Sec. 2
Roosevelt Road, Taipei
Tel : +65 268 7840
Fax : +65 268 7847

Europe

Austria

Denison Hydraulics GmbH
Zweigneiderlassung Linz
Haibachstraße 69
4061 Pasching, Austria
Tel : +43 (72 29) 48 87
Fax : +43 (72 29) 6 30 92

Benelux

Denison Hydraulics Benelux B.V.
Pascalstraat 100
3316 GR Dordrecht, Holland
Tel : +31 (78) 6179 900
Fax : +31 (78) 6175 755

Denmark

Denison Hydraulics Denmark A/S
Industrikrogen 2
2635 Ishöj, Denmark
Tel : +45 (4371) 15 00
Fax : +45 (4371) 15 16

Finland

Denison Lokomec
Polunmäenkatu 22
P.O.Box 116
33721 Tampere, Finland
Tel : + 358 (3) 3575 100
Fax : + 358 (3) 3575 111

France

Denison Hydraulics S.A.
14 route du bois blanc
BP 539
18105 Vierzon, France
Tel : +33 (2) 48 53 01 20
Fax : +33 (2) 48 75 02 91

Great Britain

Denison Hydraulics UK LTD
Kenmore road
Wakefield 41, Industrial Park
Wakefield, WF2 OXE
West Yokshire, England
Tel : +44 (1924) 826 021
Fax : +44 (1924) 826 146

Germany

Denison Hydraulik GmbH.
Auf dem Sand 14
D-40721 Hilden
Tel : +49 (2103) 940 300
Fax : +49 (2103) 940 558

Italy

Denison Hydraulics Srl
Via Le Europa 68
20090 Cusago (MI), Italy
Tel : +39 (02) 90330-1
Fax : +39 (02) 90390694/5/6

Denison Calzoni S.p.A
Via Caduti di Sabbiuno15/17
40011 Anzola dell'Emilia
Bologna, Italy
Tel : +39 (051) 6501611
Fax : +39 (051) 736221

Spain

Denison Hydraulics S.A.
Gomis 1
08023 Barcelona, Spain
Tel : +34 (93)253 1919
Fax : +34 (93) 211 6507

Sweden

Denison Hydraulics Svenska AB
Sporregatan 13
213 77 - Malmö, Sweden
Tel : +46 (40) 600 13 00
Fax : +46 (40) 600 13 50

North America

Canada

Denison Hydraulics Canada Inc.
2320-1 Bristol Circle, Unit 1
Oakville, ON L6H 5S2, Canada
Tel : +1 (905) 829 5800
Fax : +1 (905) 829 5805

Mexico, Central America, South America, Caribbean countries

Denison Hydraulics Corp.
6167 NW 181 Terrace Circle
North
Miami, FL 33015, USA
Tel : +1 (305) 362 2246
Fax : +1 (305) 362 2246

USA

Denison Hydraulics Corp.
14249 Industrial Parkway
Marysville, OH 43040, USA
Tel : +1 (937) 644 3915
Fax : +1 (937) 642 3738

Others

Other European, Middle East, African countries

Denison Hydraulics S.A.
14 route du bois blanc
BP 538
18105 Vierzon, France
Tel : +33 (2) 48 53 01 20
Fax : +33 (2) 48 53 01 46

Your local Denison Hydraulics representative

DENISON CALZONI