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DENISON CALZONI
Radial Piston Motor
Type MRD, MRDE, MRV, MRVE

RCOe 2401/01.02

DENISON CALZONI

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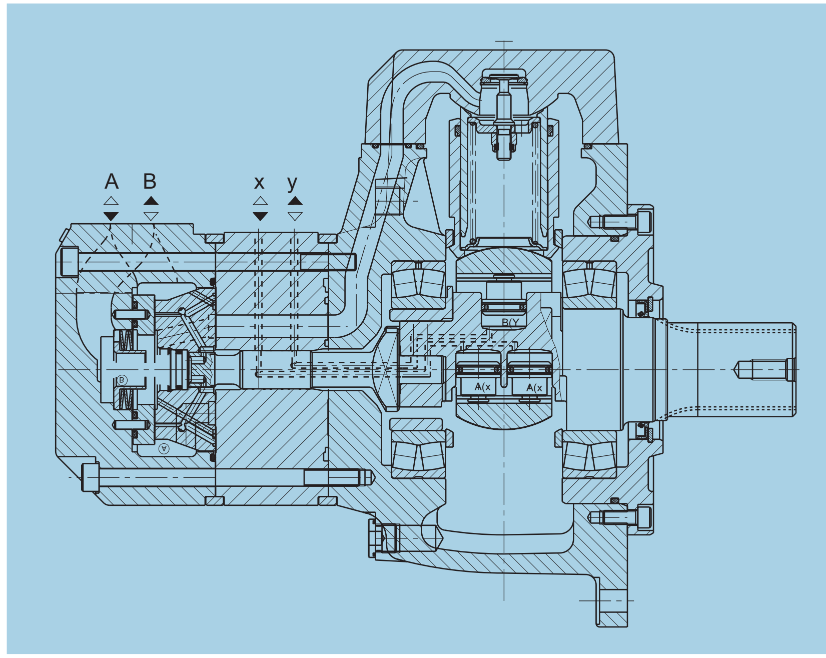
GENERAL CHARACTERISTICS



CONSTRUCTION
Radial piston motor with dual displacement ”MRD - MRDE” and variable displacement ”MRV - MRVE”

TYPE
MRD; MRDE; MRV; MRVE

MOUNTING
Front flange mounting

CONNECTION
Connection flange (See page 40)

MOUNTING POSITION
Any (please note the installation notes on page 44)

BEARING LIFE
See page 26

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
From – 30° to + 80° °C

VISCOSITY RANGE [1)]
From 18 to 1000 mm^2/s: Recommended operating range 30 to 50 (see fluid selection on page 8)

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

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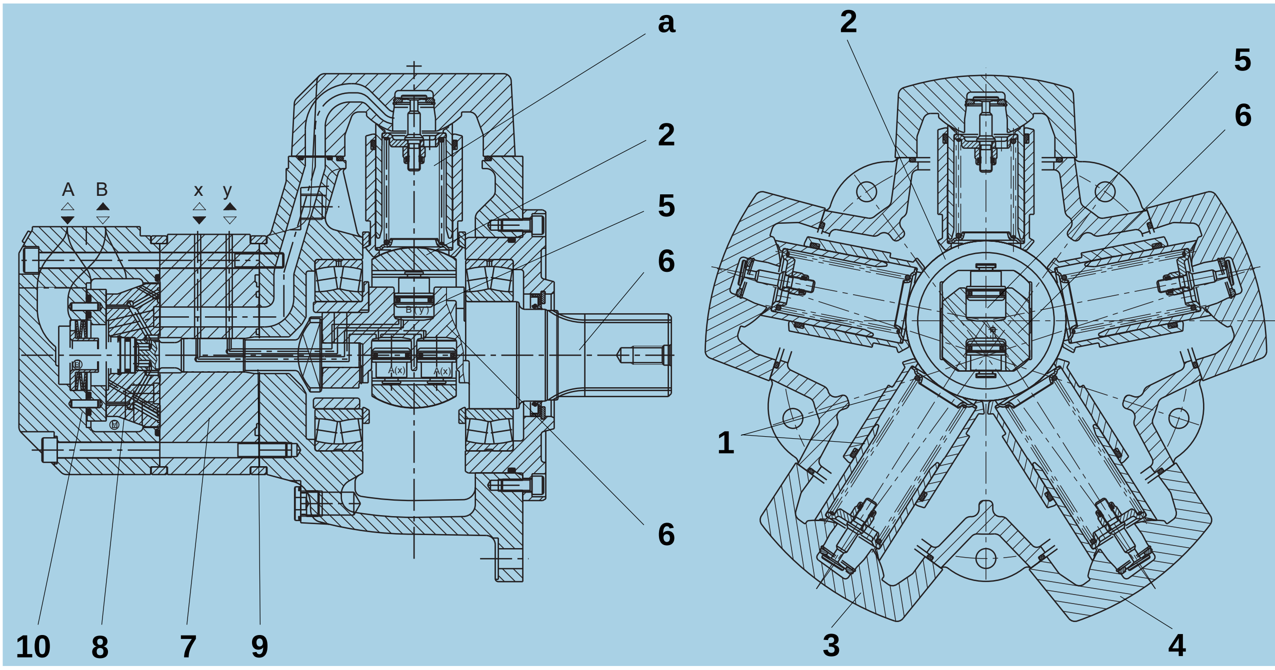

MRD-MRDE
FUNCTIONAL DESCRIPTION

The outstanding performance of the motor is the result of an original and patented design. The principle is to transmit force to the driving shaft (2 and 6) by means of a pressurized column of oil (a) without any 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 (3) of the cylinder-head (4) and the spherical surface of the rotating shaft (2). These lips retain their circular cross section when stressed by the pressure so there is no alteration in the sealing geometry. The careful selection of materials and optimized design has minimized both friction and 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.
Dual displacement is accomplished by having the eccentric shaft cam free to move radially changing its eccentricity. In this way the displacement can be choosen amongst many different values.
The radial motion is controlled by means of hydraulic cylinders (5) located in the drive shaft (6). The feeding of the displacement cylinders is accomplished by means of the rotating intake (7). The displacement can be changed even while rotating under full load.

TIMING SYSTEM

Timing is accomplished by means of a rotary valve (8) driven by the rotary valve driving shaft (9) that it is connected to the rotating eccentric shaft. The rotary valve rotates between the rotating intake (7) and the reaction ring (10) which are fixed to the rotary valve 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 timing system, combined with a revolutionary propulsion system, produces a motor with extremely high values of mechanical and volumetric efficiency. The torque output is smooth even at very low speed under high pressure, and the motor offers high performance starting under load.

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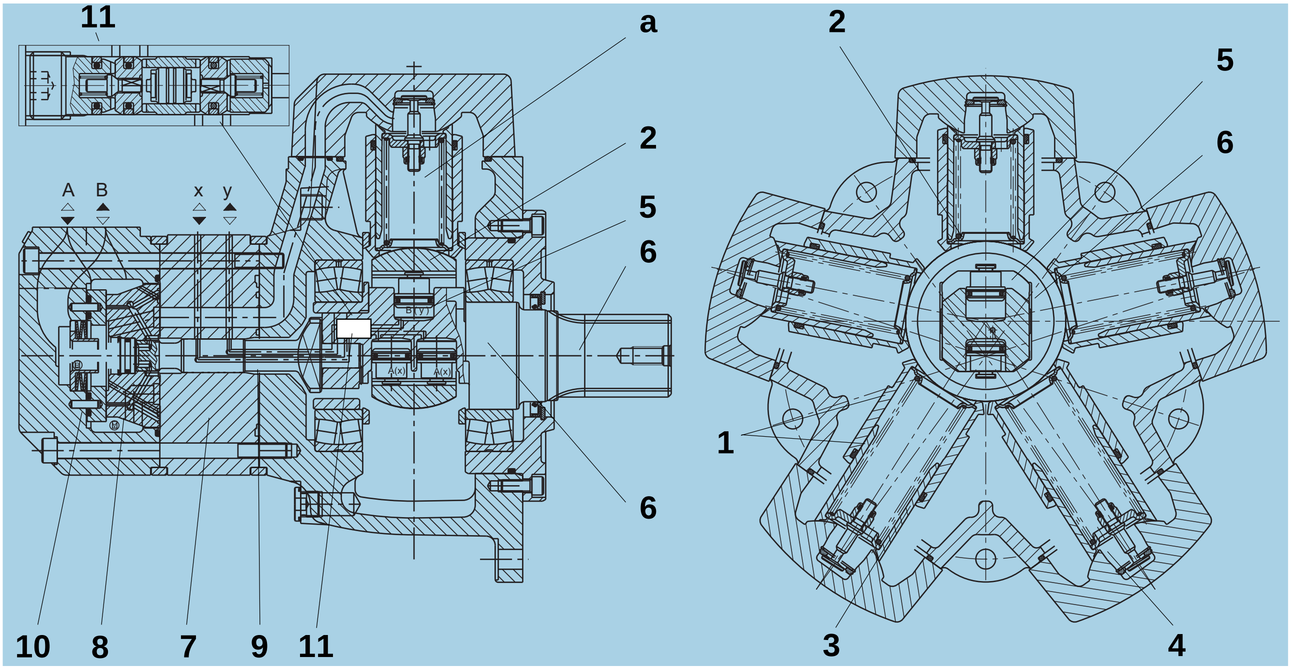

MRV-MRVE
FUNCTIONAL DESCRIPTION

The outstanding performance of the motor is the result of an original and patented design. The principle is to transmit force to the driving shaft (2 and 6) by means of a pressurized column of oil (a) without any 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 (3) of the cylinder-head (4) and the spherical surface of the rotating shaft (2). These lips retain their circular cross section when stressed by the pressure so there is no alteration in the sealing geometry. The careful selection of materials and optimized design has minimized both friction and 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.
Dual displacement is accomplished by having the eccentric shaft cam free to move radially changing its eccentricity. In this way the displacement can be choosen amongst many different values.
The radial motion is controlled by means of hydraulic cylinders (5) and valve (11) located in the drive shaft (6), this valve allows the step by step movement of the cylinder inside the main shaft, so it is possible to change the displacement . The feeding of the displacement cylinders is accomplished by means of the rotating intake (7). The displacement can be changed even while rotating under full load.

TIMING SYSTEM

Timing is accomplished by means of a rotary valve (8) driven by the rotary valve driving shaft (9) that it is connected to the rotating eccentric shaft. The rotary valve rotates between the rotating intake (7) and the reaction ring (10) which are fixed to the rotary valve 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 timing system, combined with a revolutionary propulsion system, produces a motor with extremely high values of mechanical and volumetric efficiency. The torque output is smooth even at very low speed under high pressure, and the motor offers high performance starting under load.

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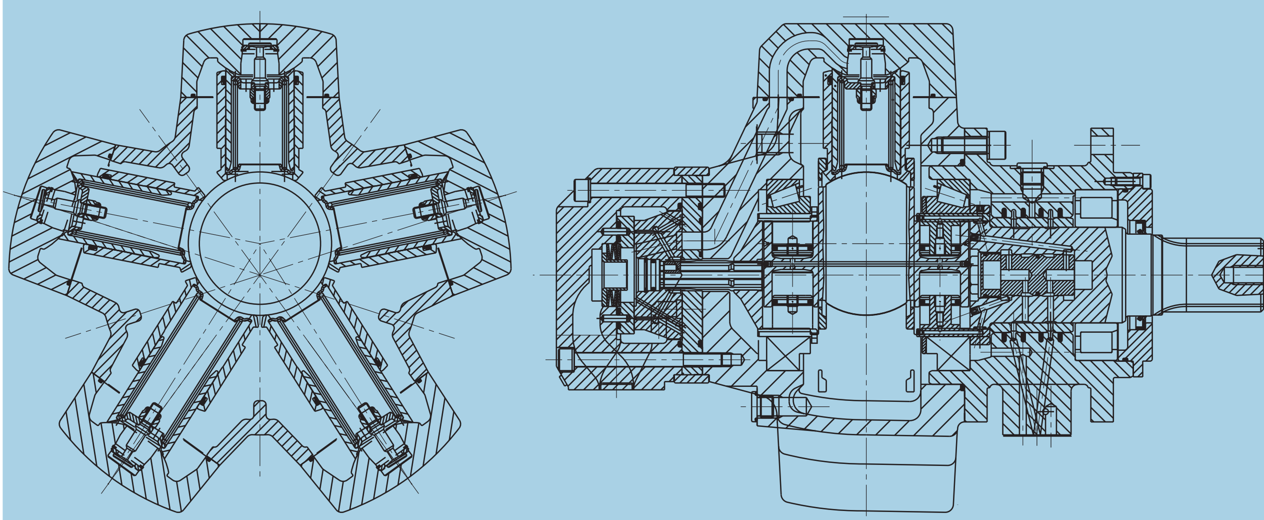

MRV 450

FUNCTIONAL DESCRIPTION

The estreme versatility of this motor is because of two simple but ingenious designs combined in one machine. The rotation of the shaft is by the same original and patended mechanism as the MR motor but, in addition, the MRV has an arrangement of internal cylinders to actually change the motor displacement, even while turning under full load.
The principle of the rotation mechanism is to transmit the effort from the stator to the eccentric part of the shaft by means of a pressurized column of oil.
This oil column is contained by a telescopic cylinder with a mechanical connection only at the lips at each end which seal against the spherical surfaces of the stator and the rotor.
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 optimization 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.
In the MRV motor the eccentric part of the shaft is free to move radially. The radial motion is controlled by two lateral hydraulic cylinders which are an integral part of the shaft.
As the eccentricity changes so does the stroke of the telescopic cylinders and hence the displacement.
The variation is stepless between full eccentricity (maximum displacement) and full concentricy. It is possible to insert spacers in the lateral cylinders to limit the maximum and minimum displacements and so tailor the motor to the exact requirements of any application.
The facility of variable displacement can be used with hydraulic regulation valves to create a variety of control systems ex. constant pressure operation, constant power operation, two speed operation. When used with electronic regulators even more control system are possible ex. high efficiency speed control, high efficiency ring main systems, high efficiency torque control etc.
In common with the MR range, this motor has a patented distributor valve being pressure balanced and self compensating for thermal expansion. The advantages of this type of valve coupled with a revolutionary cylinder arrangement produce a motor with extremely high values of mechanical and volumetric efficiency. The torque output is smooth even at very low speeds and the motor gives a high performance starting under load.

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Size Motor version			Displacement	Moment inertia of rotating parts	Theoretical specific torquea	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	giri/min	giri/min	kW	kW	kg
MRD	300	Min.	152,1	58,50	2,42	-	250	300	420	400	5 (15 bar with "F1" shaft seal)	1-1000	1-1000	20	35	56
		Max.	304,1	65,50	4,80	90						1-750	1-750	35	53	
	450	Min.	225,8	208,40	3,60	-						1-850	1-850	29	45	83
		Max.	451,6	229,80	7,20	90						1-600	1-600	50	75	
MRV	450	Min.	133,5	185,50	2,11	-						1-850	1-850	22	35	110
		Max.	451,6	229,80	7,20	90						1-600	1-600	46	75	
MRD MRV	700	Min.	339,3	317,20	5,40	-						1-700	1-700	36	54	103
		Max.	706,9	358,40	11,30	90						1-500	1-500	65	97	
	1100	Min.	508,4	398,60	8,10	-						0,5-580	0,5-580	45	68	147
		Max.	1125,8	451,50	17,90	90						0,5-330	0,5-330	77	119	
	1800	Min.	904,8	768,70	14,41	-						0,5-400	0,5-400	56	83	209
		Max.	1809,6	854,10	28,80	90						0,5-250	0,5-250	103	157	
	2800	Min.	1396,0	2678,10	22,23	-						0,5-120	0,5-280	60	90	325
		Max.	2792,0	2975,70	44,50	90						0,5-120	0,5-215	127	194	
	4500	Min.	2251,3	4513,60	35,85	-						0,5-100	0,5-250	86	125	508
		Max.	4502,7	5015,10	57,90	91						0,5-80	0,5-170	140	210	
MRDE	330	Min.	166,2	58,50	2,65	-	210	250	350	400	5 (15 bar with "F1" shaft seal)	1-1000	1-1000	21	32	56
		Max.	332,4	65,50	5,30	90						1-750	1-750	32	49	
	500	Min.	248,9	208,40	3,96	-						1-800	1-800	26	38	83
		Max.	497,9	229,80	7,93	90						1-600	1-600	46	70	
MRDE MRVE	800	Min.	386,0	317,20	6,15	-						1-650	1-650	32	48	103
		Max.	804,2	358,40	12,81	90						1-450	1-450	65	93	
	1400	Min.	618,5	398,60	9,85	-						0,5-550	0,5-550	44	65	147
		Max.	1369,5	451,50	21,80	92						0,5-280	0,5-280	77	102	
	2100	Min.	1045,6	768,70	16,65	-						0,5-370	0,5-370	50	78	226
		Max.	2091,2	854,10	33,30	91						0,5-250	0,5-250	100	148	
	3100	Min.	1551,9	2678,10	24,71	-						0,5-120	0,5-280	55	81	335
		Max.	3103,7	2975,70	49,40	91						0,5-120	0,5-215	125	190	
	5400	Min.	2700,6	4513,60	43,00	-						0,5-80	0,5-210	73	109	523
		Max.	5401,2	5015,10	86,01	92						0,5-80	0,5-160	140	210	

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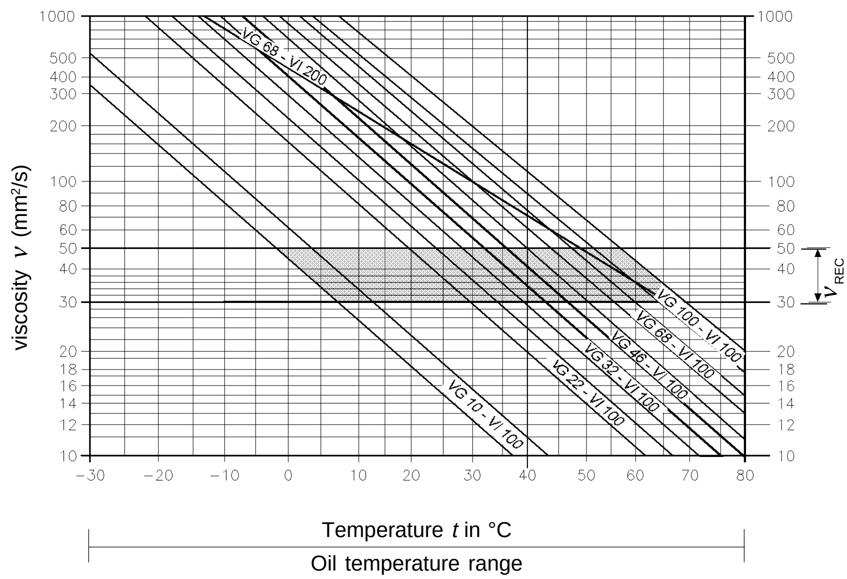
EXAMPLE: At a certain ambient temperature, the operating temperature in the circuit is 50°C. In the optimum operating viscosity range (ν_{rec}; shaded section), this corresponds to viscosity grades VG 46 or VG 68; VG 68 should be selected.

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. 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 45, 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 45, Seals, Code "V1"). These "FPM" seals should be used with HFD fluids.

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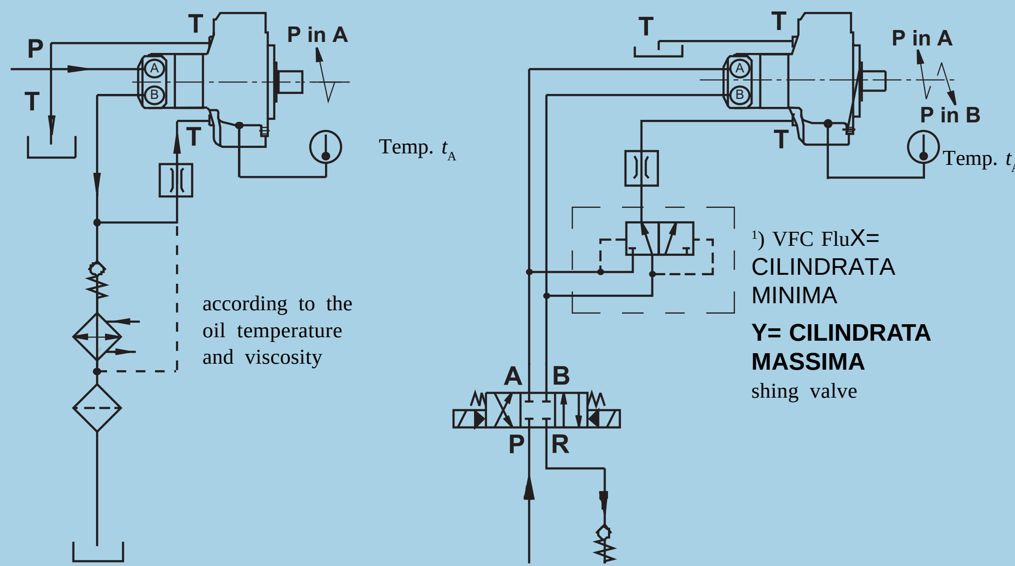

[1]) Please consult us.

FLUSHING CIRCUIT
(MONO-DIRECTIONAL ROTATION)

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 11 to page 25), in order to assure the minimum oil viscosity inside the motor case of 30 mm^2/s (see page 8 - 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 8.

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
MRD - MRDE	300, 330	Q = 6 l/min
MRD - MRDE MRV	450, 500	Q = 8 l/min
MRD - MRDE MRV - MRVE	700, 800, 1100, 1400	Q = 10 l/min
MRD - MRDE MRV - MRVE	1800, 2100	Q = 15 l/min
MRD - MRDE MRV - MRVE	2800, 3100, 4500, 5400,	Q = 20 l/min

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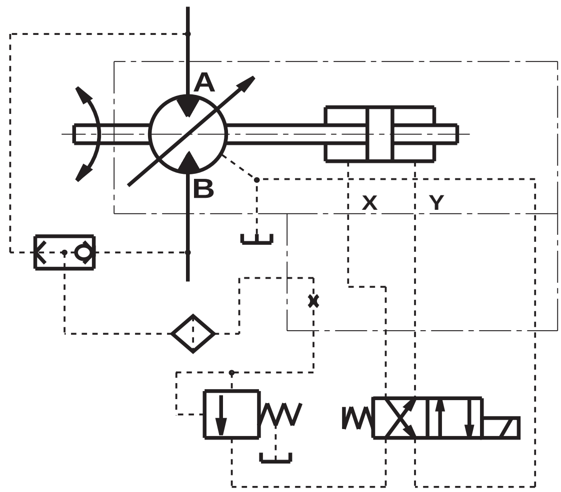
INTERNAL PILOTING

In order to change the motor displacement, see operating diagram for requested minimun pressure.

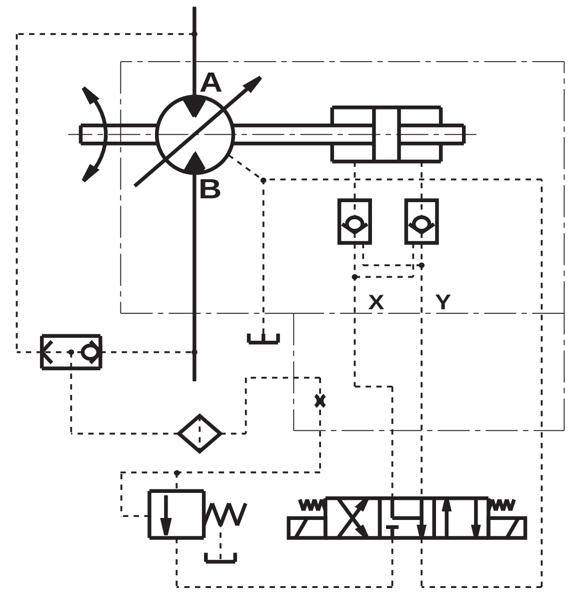
X= MIN. DISPLACEMENT

Y= MAX DISPLACEMENT

Internal piloting
Two displacement valve feeded by motor pressure



Internal piloting
Solenoid operated displacement control valve feeded by motor pressure



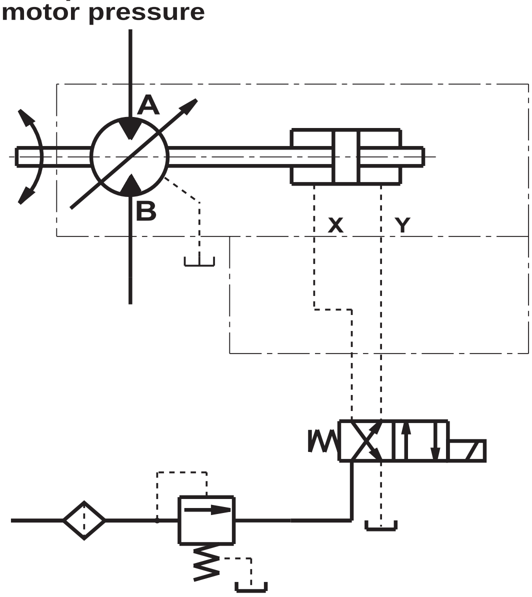
EXTERNAL PILOTING

External piloting pressure requested is 160 bars.

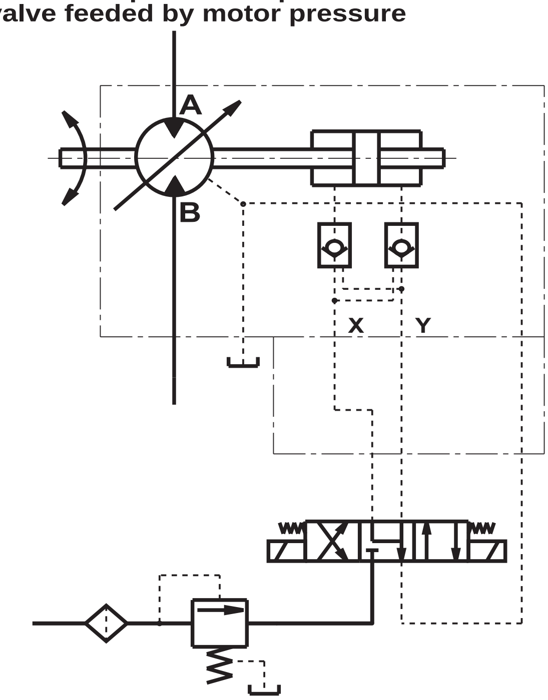
X= MIN. DISPLACEMENT

Y= MAX DISPLACEMENT

External piloting
Two displacement valve feeded by motor pressure



External piloting
Solenoid operated displacement control valve feeded by motor pressure



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

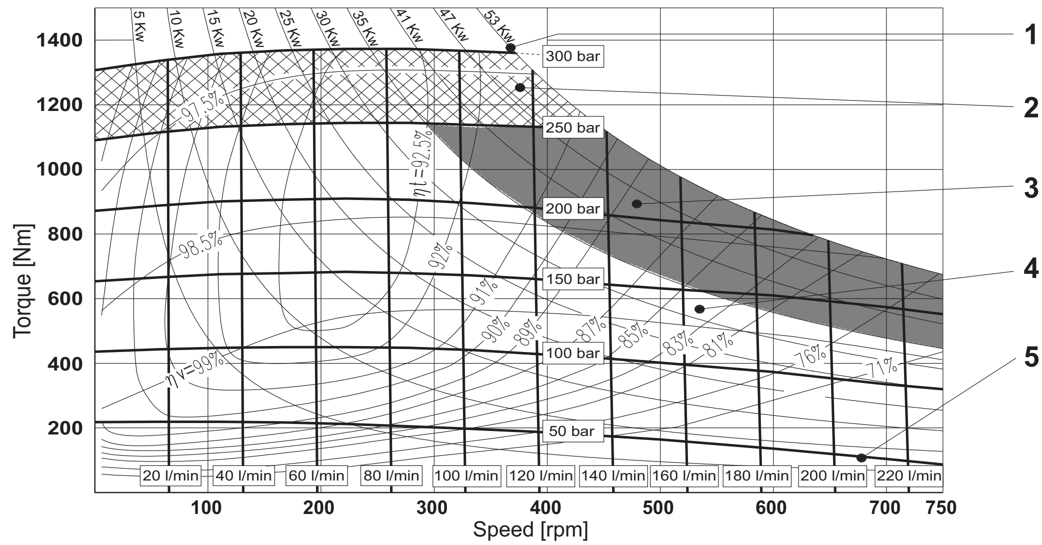
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ηt Total efficiency ηv Volumeter efficiency

MRD 300

set to

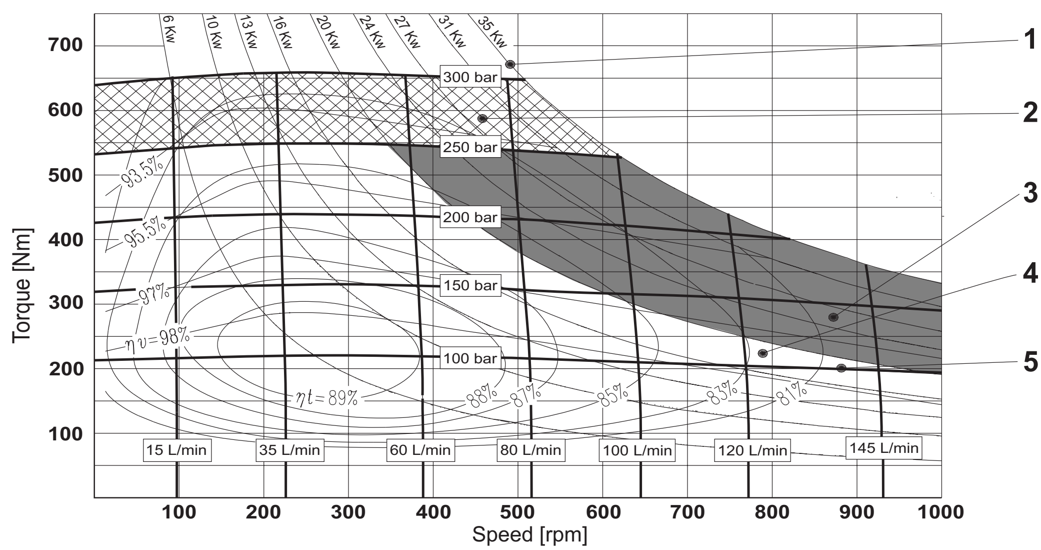
304 cm³



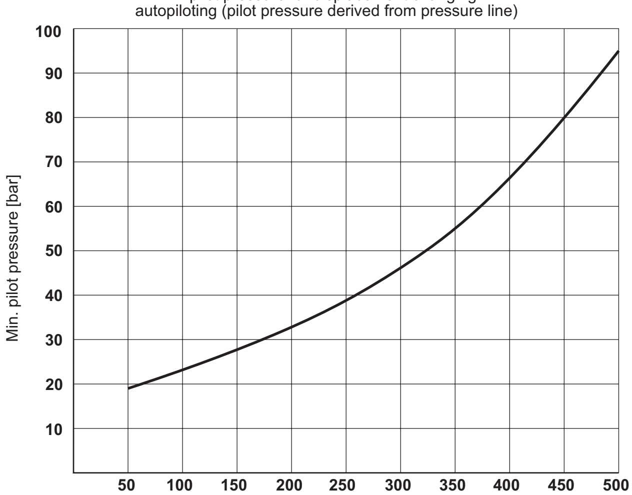
MRD 300

set to

152 cm³

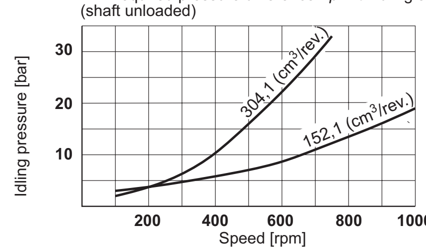


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

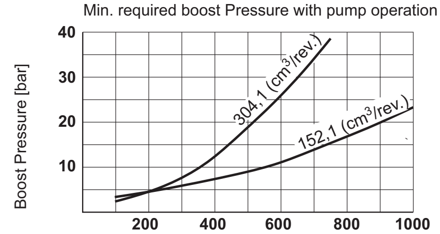


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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

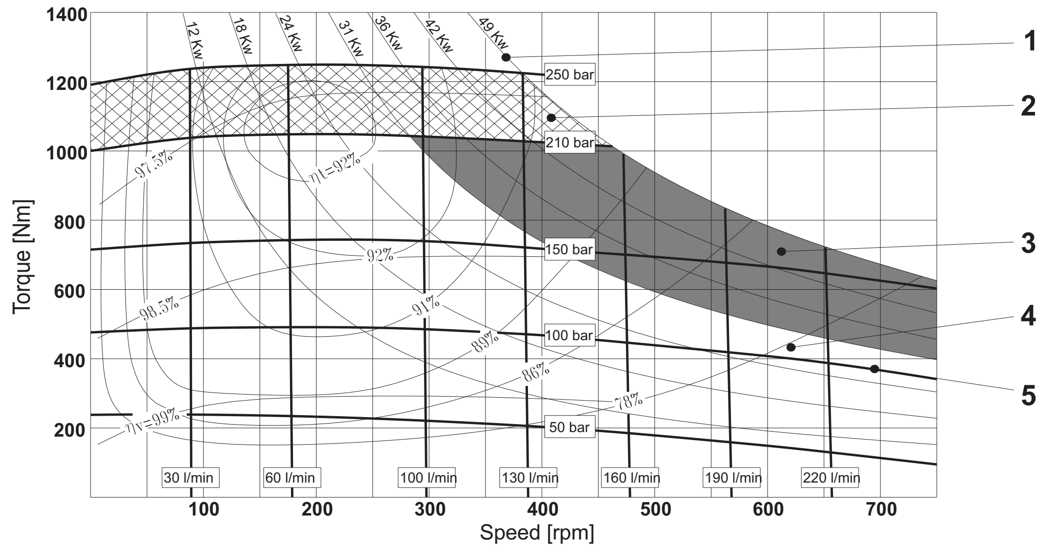
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ηt Total efficiency ηv Volumeter efficiency

MRDE 330

set to

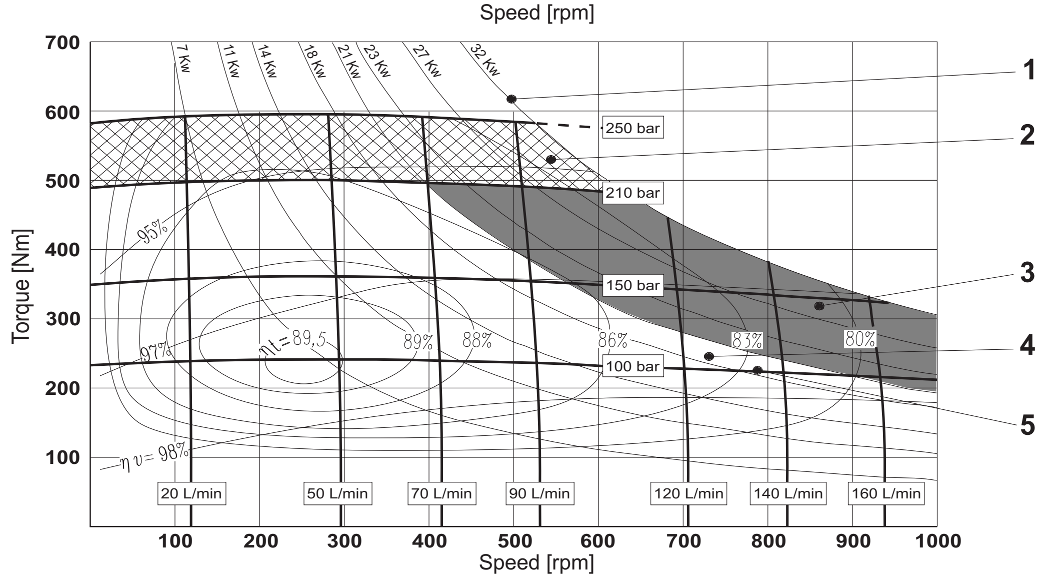
332 cm³



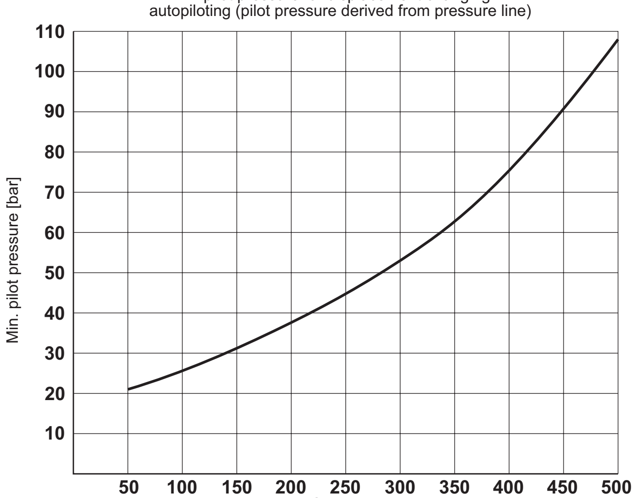
MRDE 330

set to

166 cm³

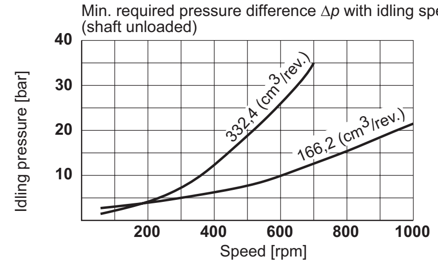


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

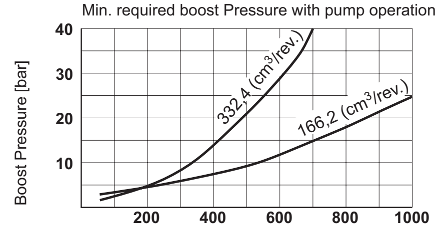


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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

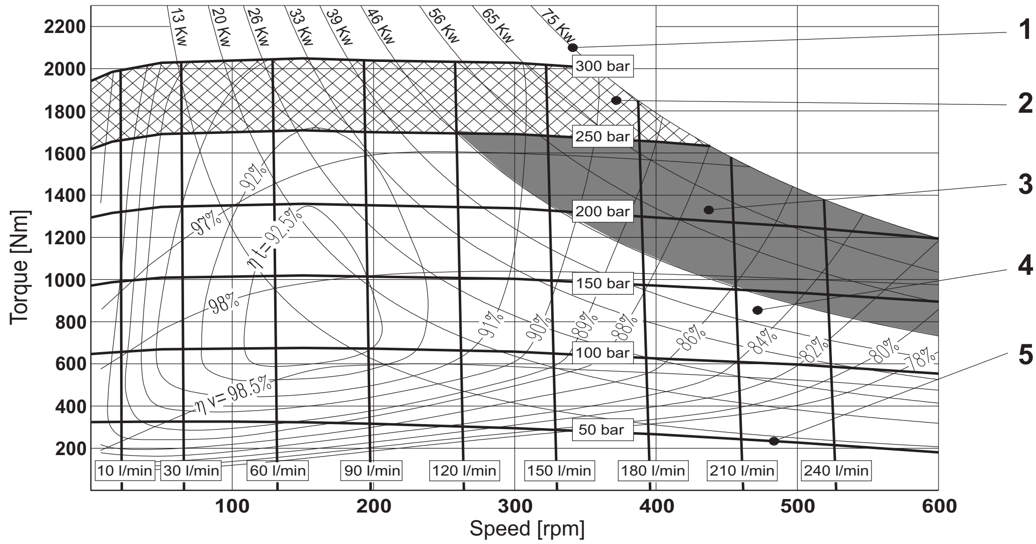
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ηt Total efficiency ηv Volumeter efficiency

MRD 450

set to

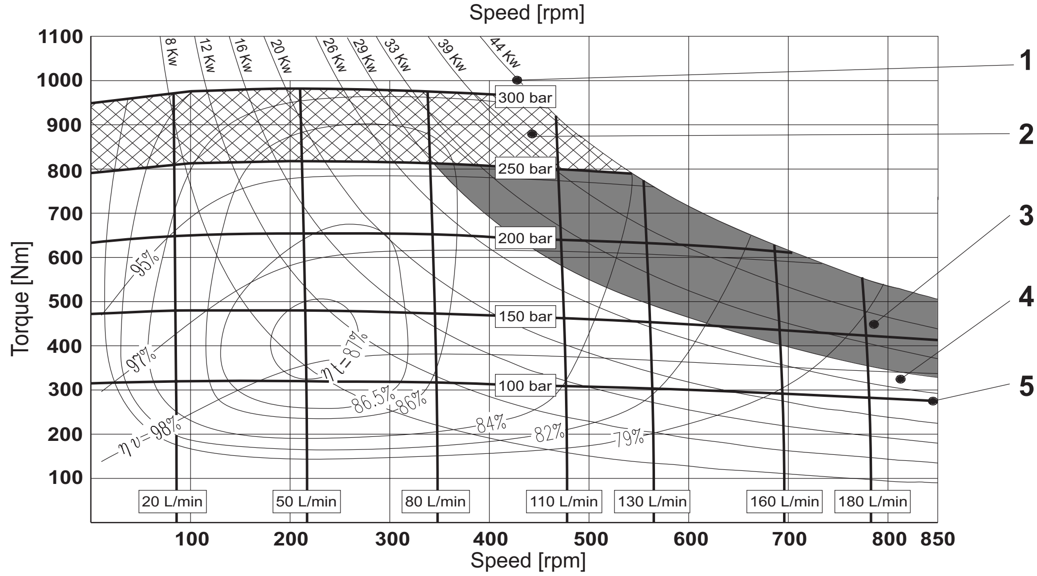
452 cm³



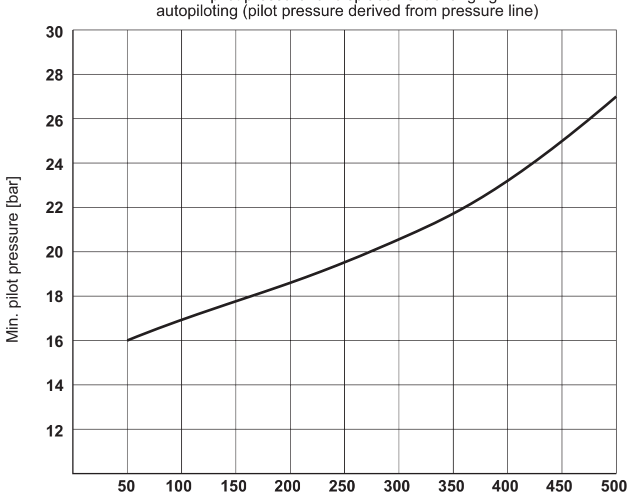
MRD 450

set to

226 cm³

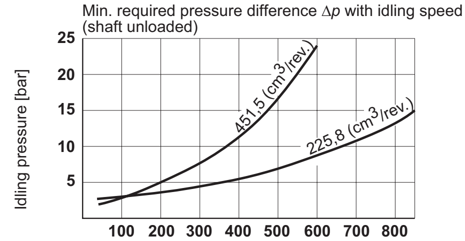


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

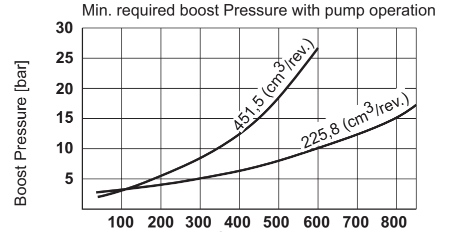


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzonii

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



Min. required boost Pressure with pump operation



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

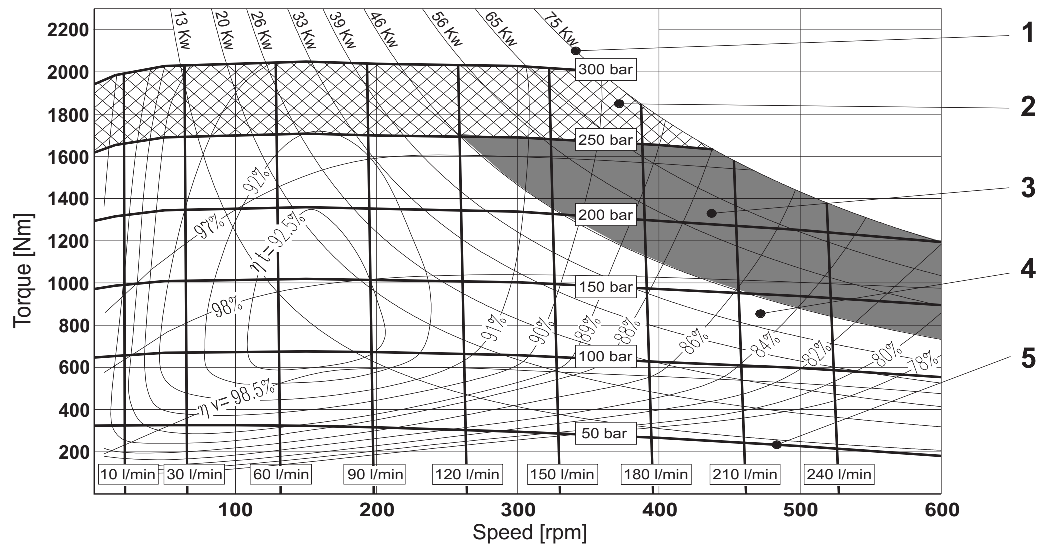
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ηt*** Total efficiency ***ην*** Volumeter efficiency

MRV 450

set to

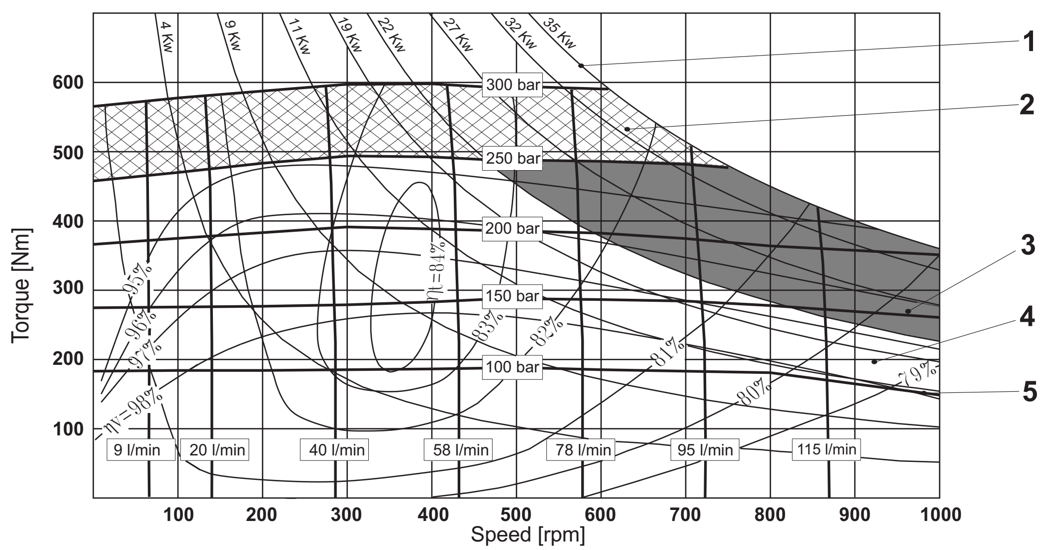
452 cm³

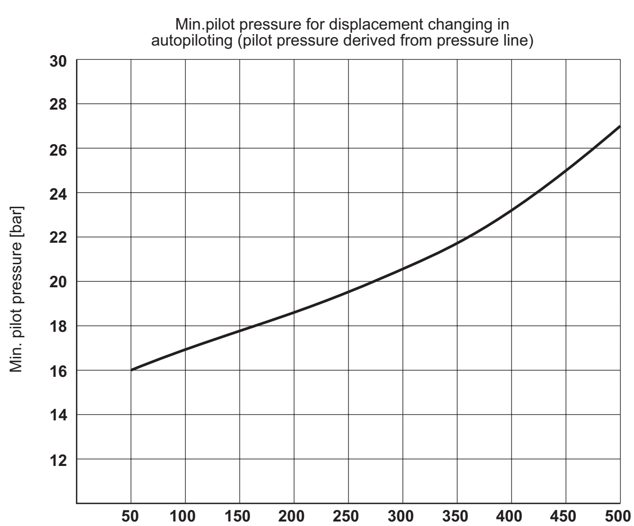


MRV 450

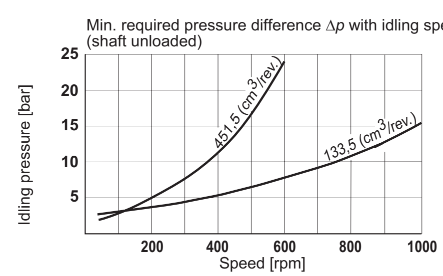
set to

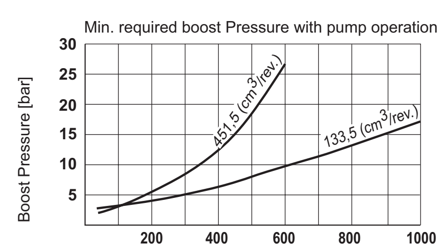
134 cm³





Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni





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

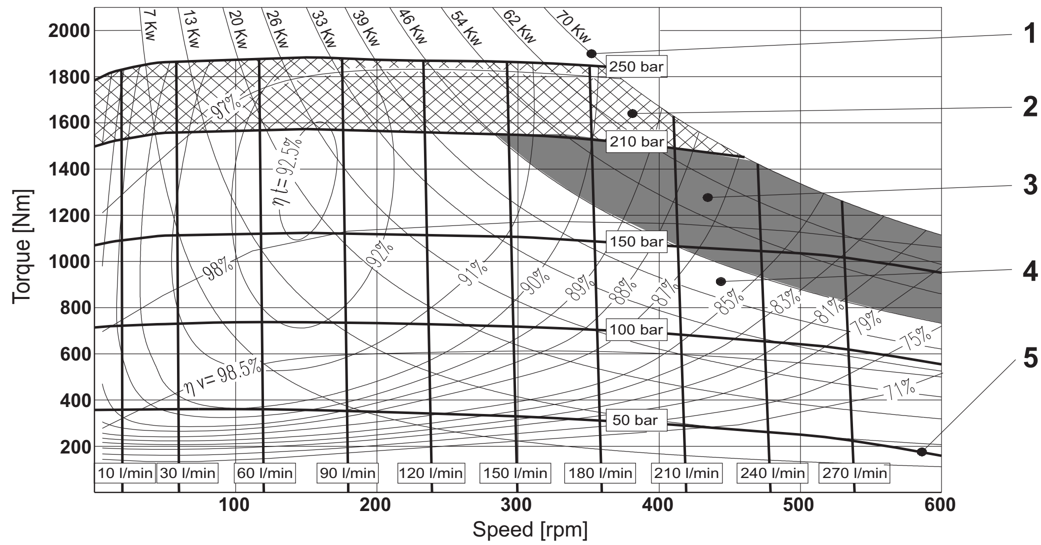
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ηt*** Total efficiency ***ηv*** Volumeter efficiency

MRDE 500

set to

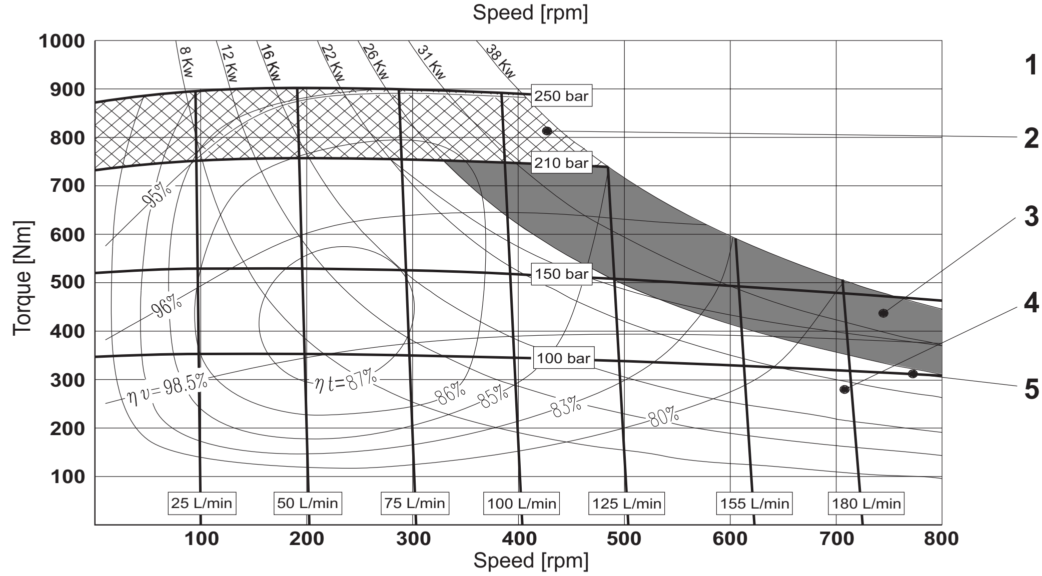
498 cm³



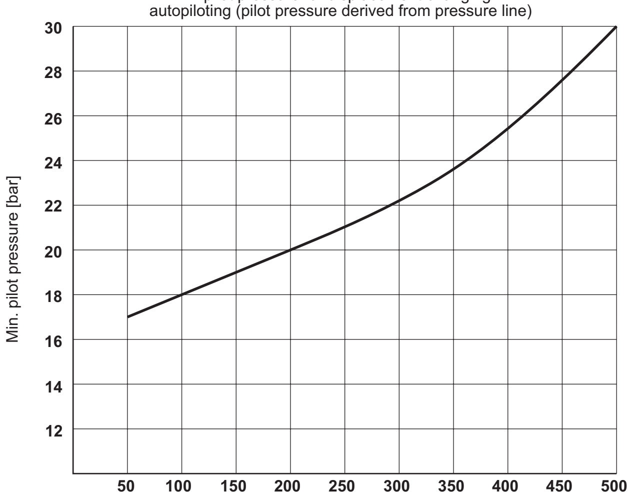
MRDE 500

set to

249 cm³

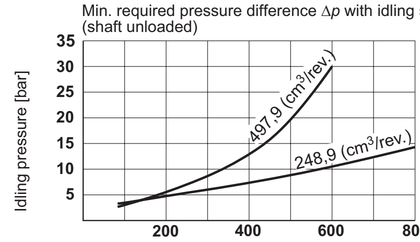


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

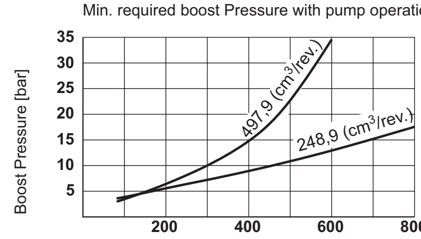


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

Min. required pressure difference Δ*p* with idling speed (shaft unloaded)



Min. required boost Pressure with pump operation



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

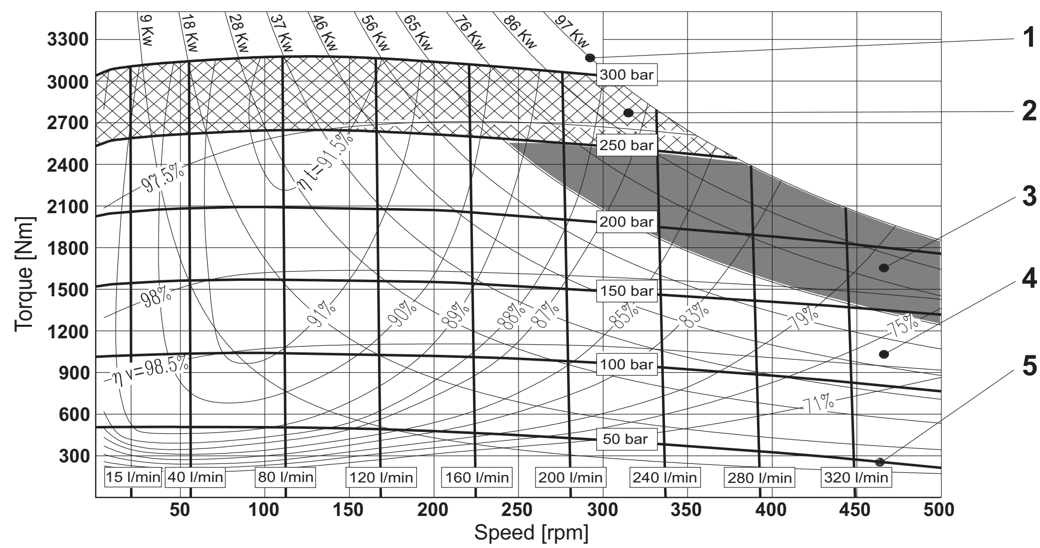
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ηt*** Total efficiency ***ηv*** Volumeter efficiency

MRD 700
MRV 700

set to

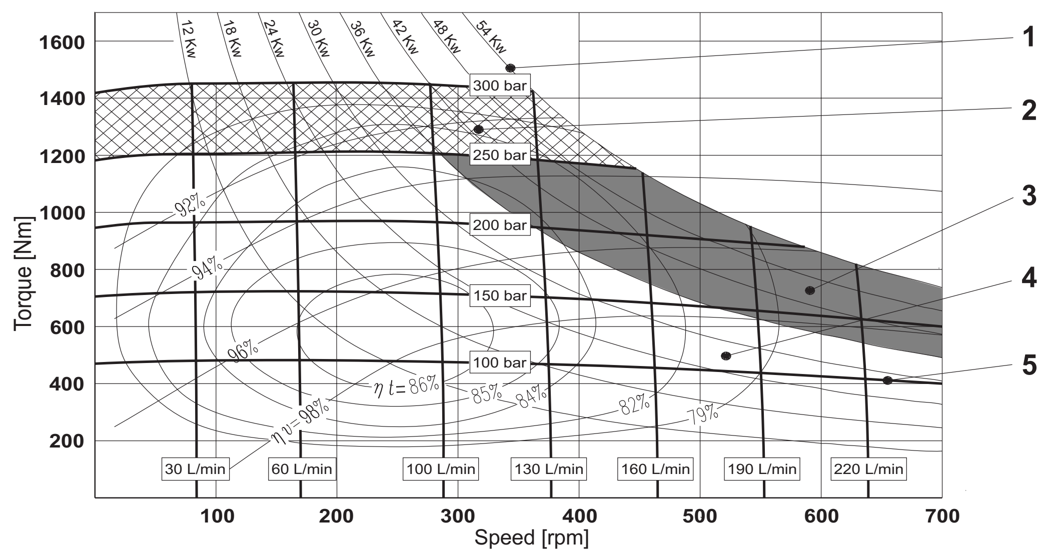
707 cm³



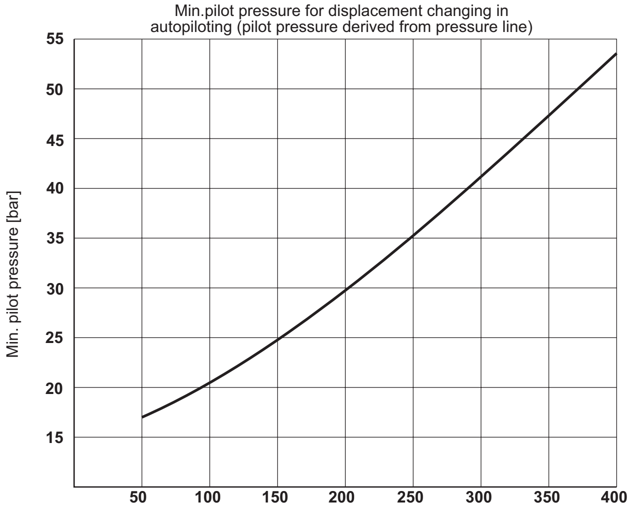
MRD 700
MRV 700

set to

339 cm³

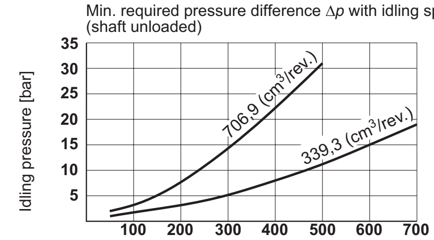


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

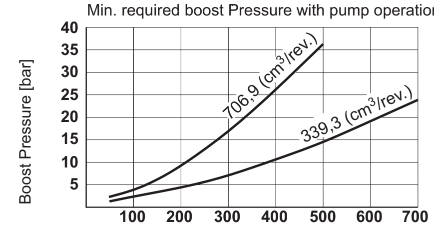


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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

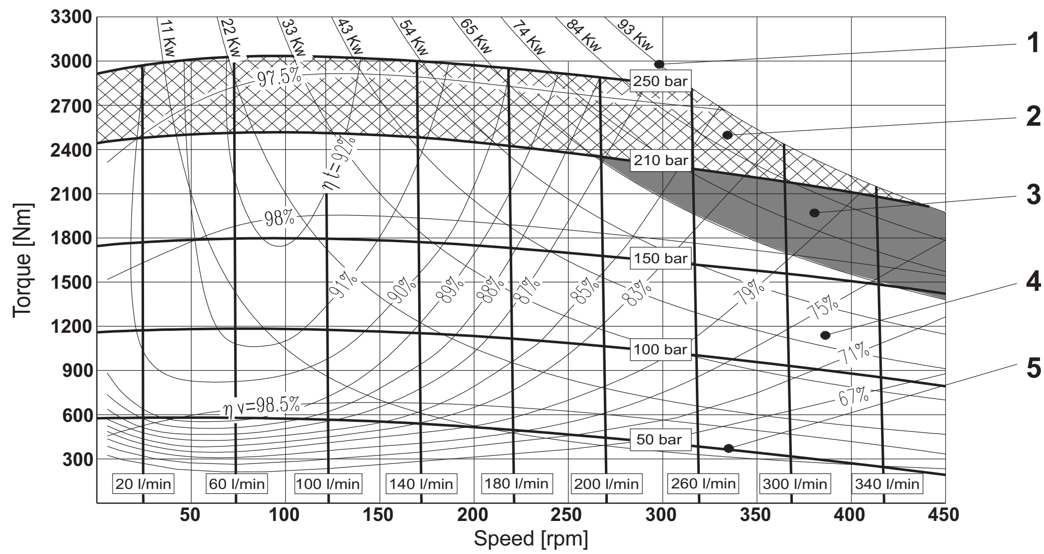
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ηt Total efficiency ηv Volumeter efficiency

MRDE 800
MRVE 800

set to

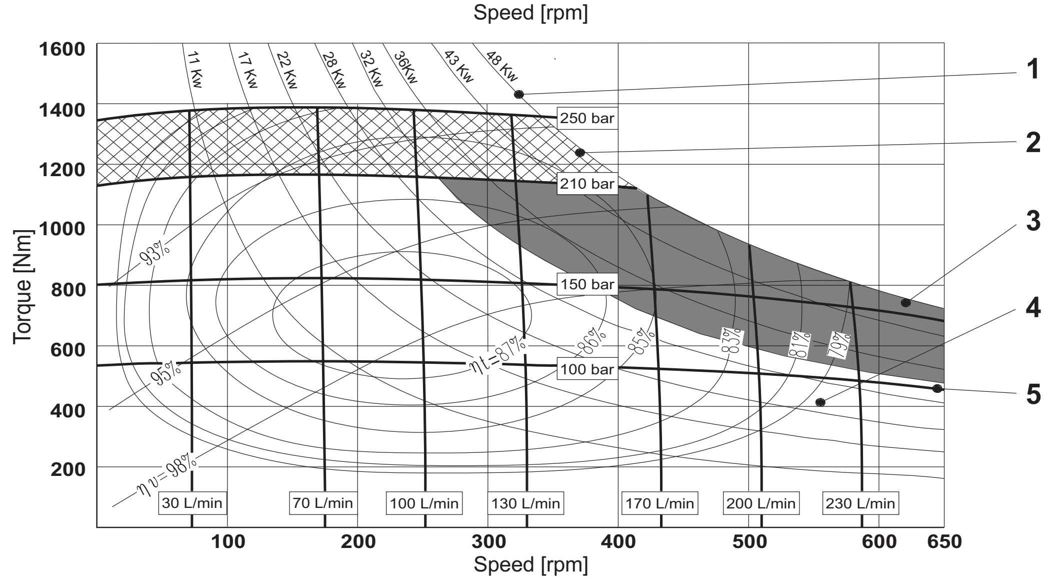
804 cm³



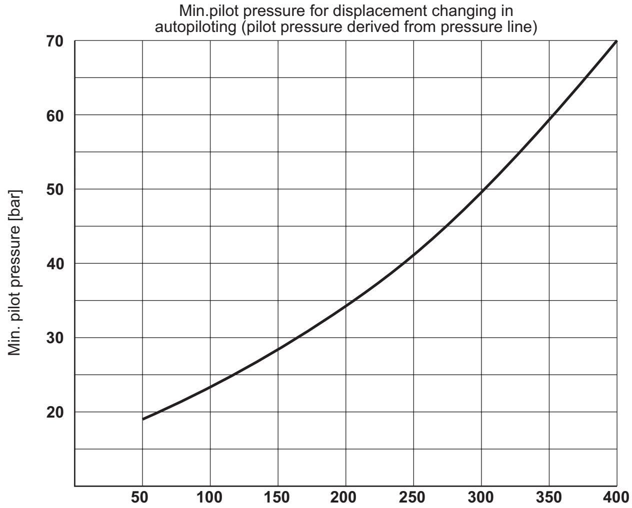
MRDE 800
MRVE 800

set to

386 cm³

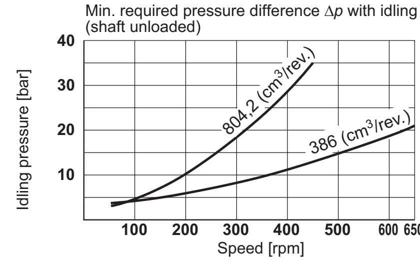


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

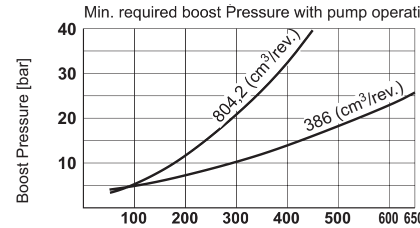


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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

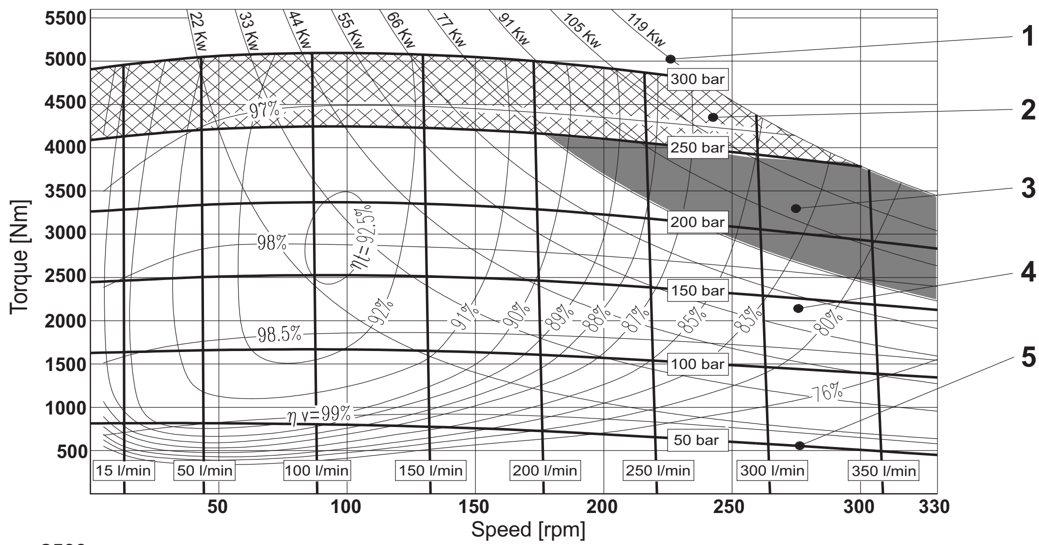
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ηt*** Total efficiency ***ηv*** Volumeter efficiency

MRD 1100
MRV 1100

set to

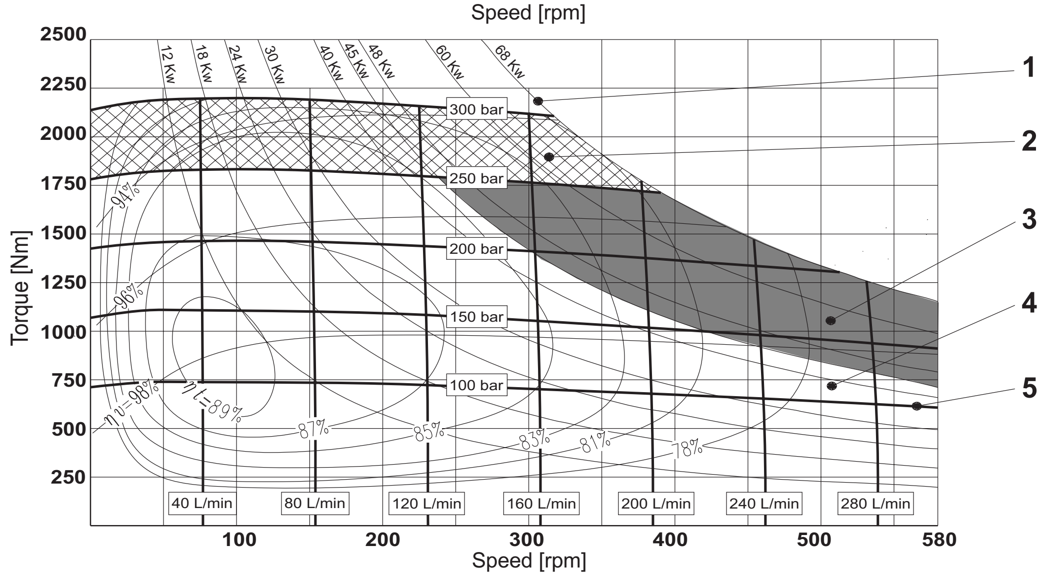
1126 cm³



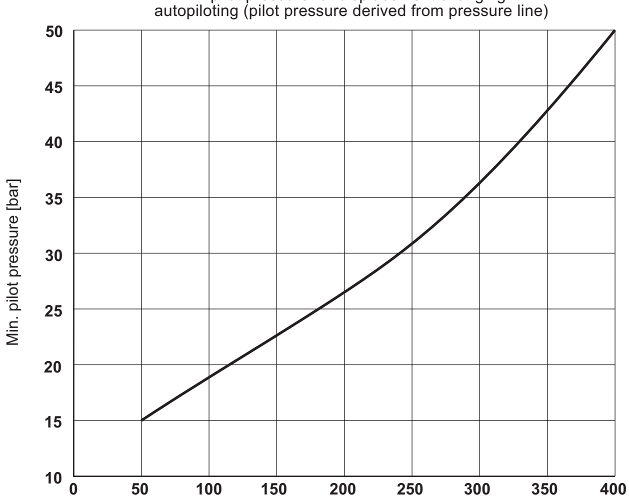
MRD 1100
MRV 1100

set to

508 cm³

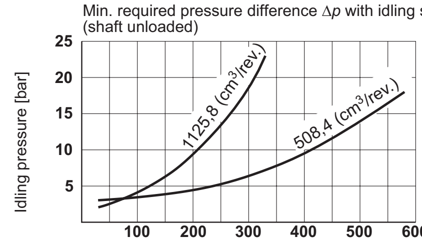


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

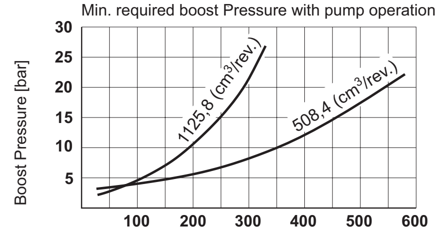


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

Min. required pressure difference Δ*p* with idling speed (shaft unloaded)



Min. required boost Pressure with pump operation



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

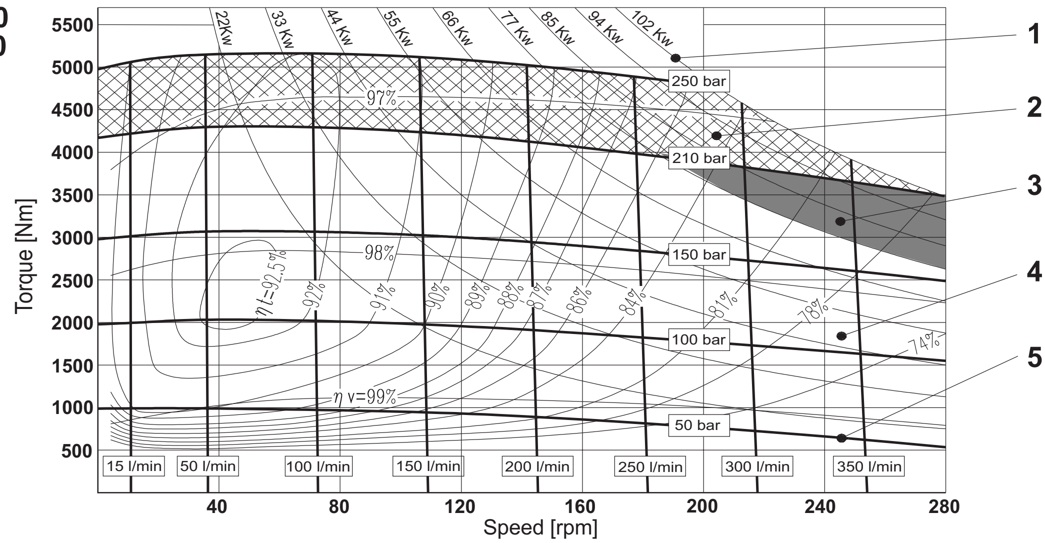
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ηt Total efficiency ηv Volumeter efficiency

MRDE 1400
MRVE 1400

set to

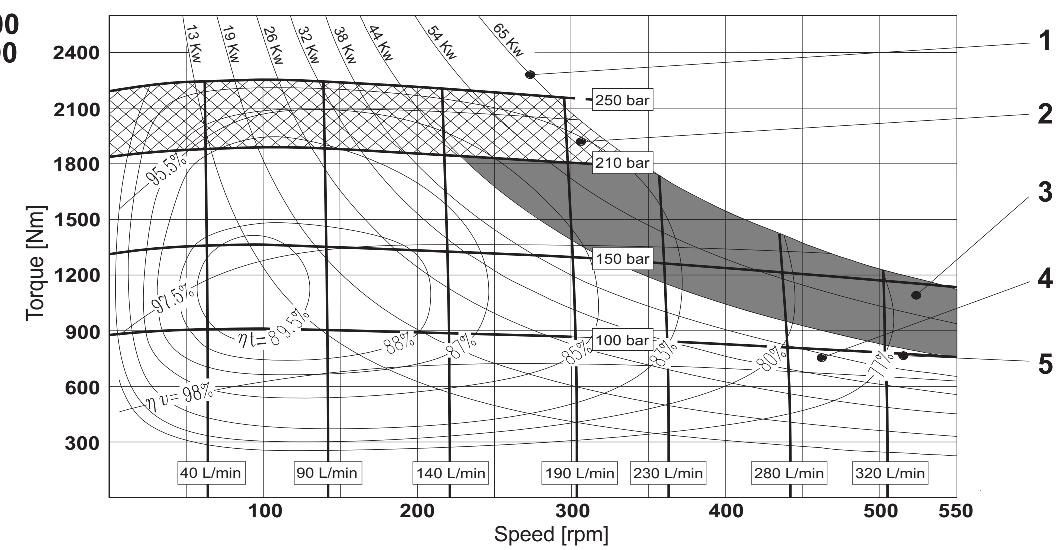
1370 cm³



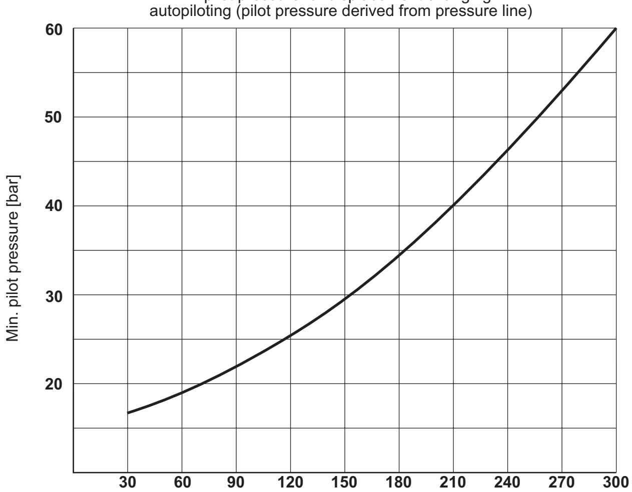
MRDE 1400
MRVE 1400

set to

619 cm³

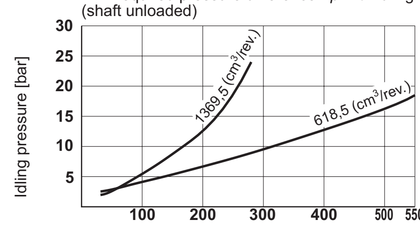


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

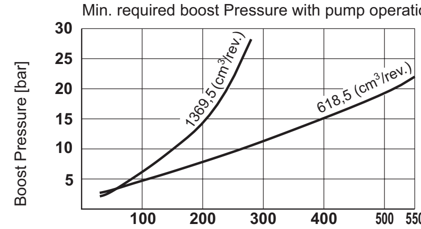


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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

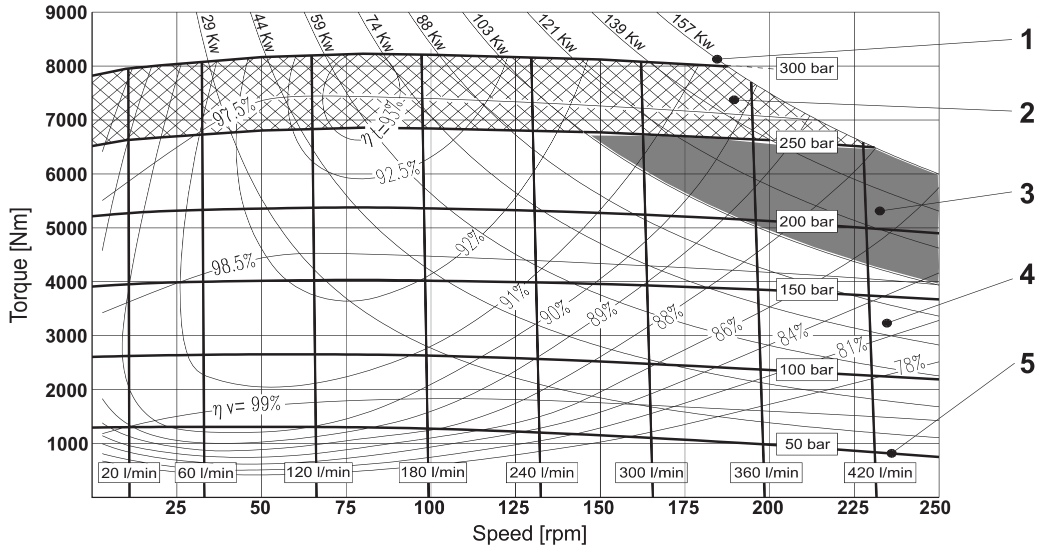
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ***ηt*** Total efficiency ***ην*** Volumeter efficiency

MRD 1800
MRV 1800

set to

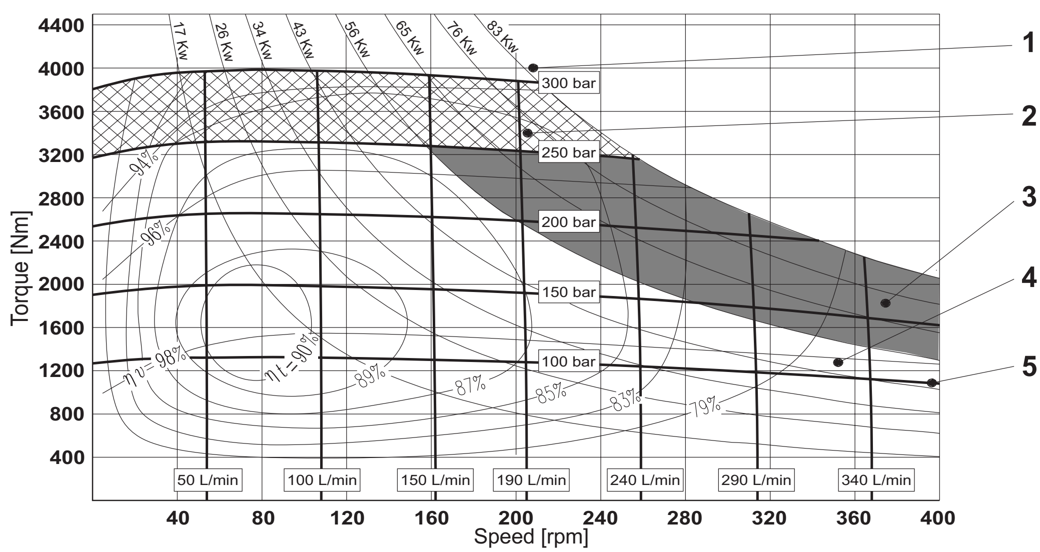
1810 cm³



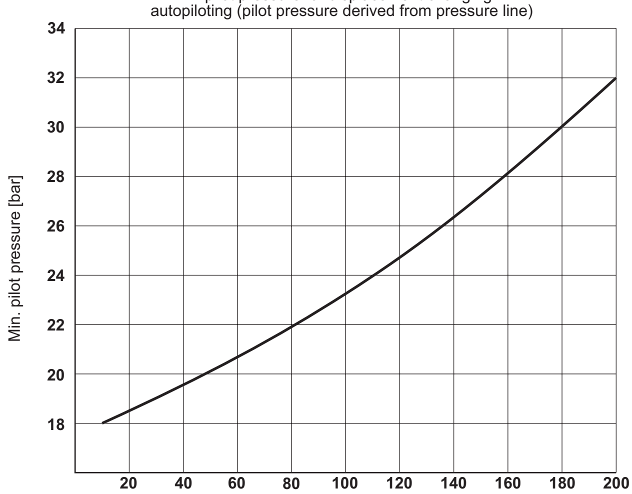
MRD 1800
MRV 1800

set to

905 cm³

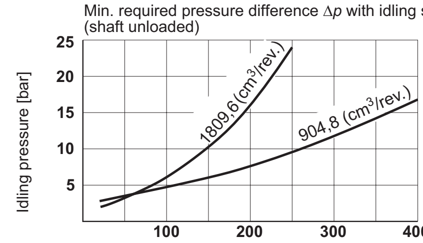


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

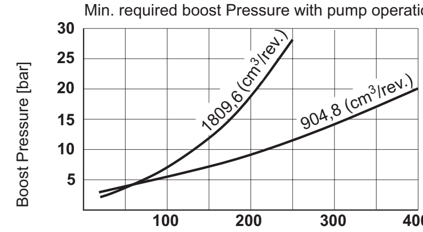


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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

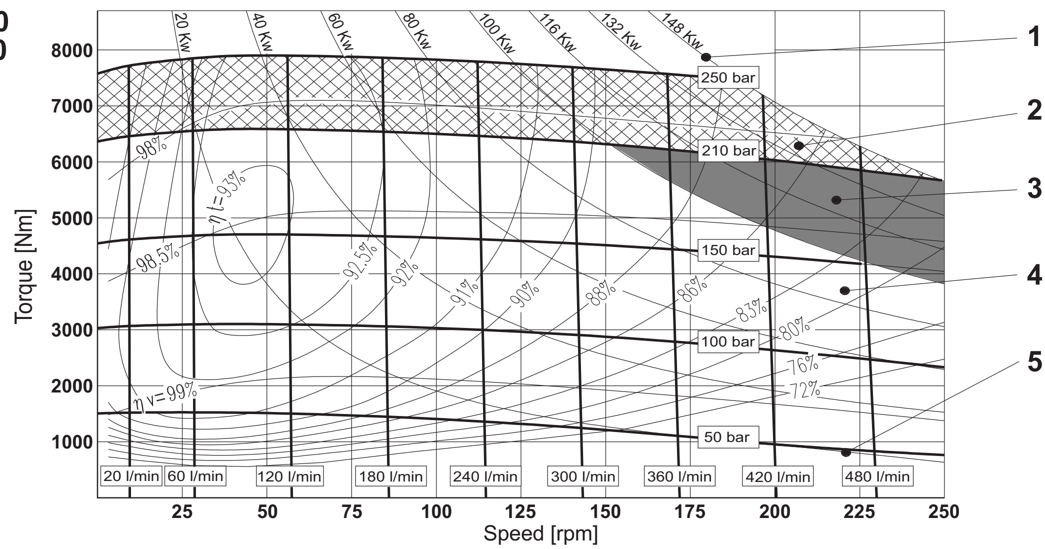
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ηt Total efficiency ηv Volumeter efficiency

MRDE 2100
MRVE 2100

set to

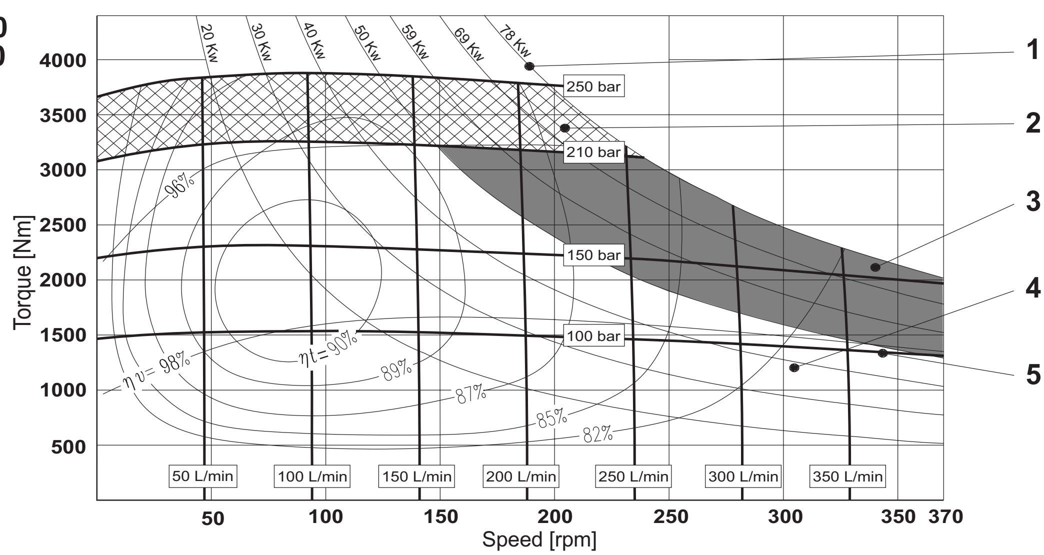
2091 cm³

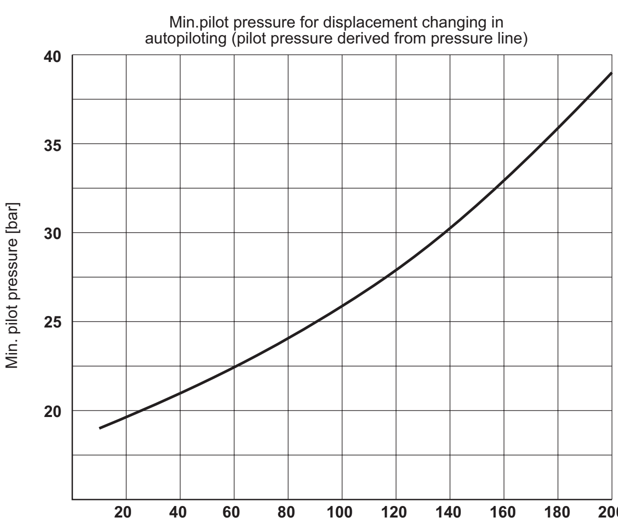


MRDE 2100
MRVE 2100

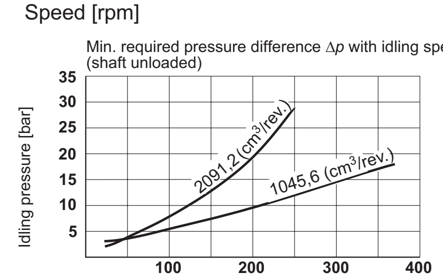
set to

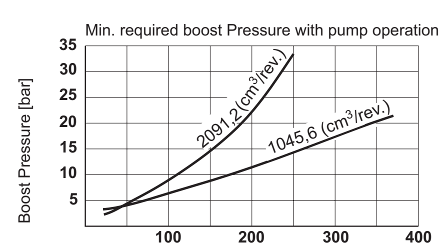
1046 cm³





Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni





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

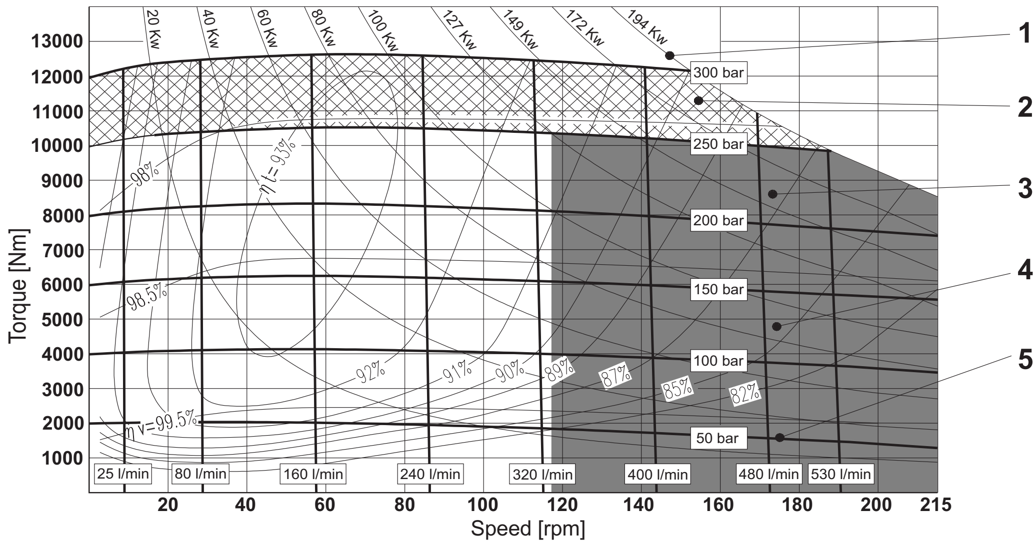
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure **ηt** Total efficiency **ηv** Volumeter efficiency

MRD 2800
MRV 2800

set to

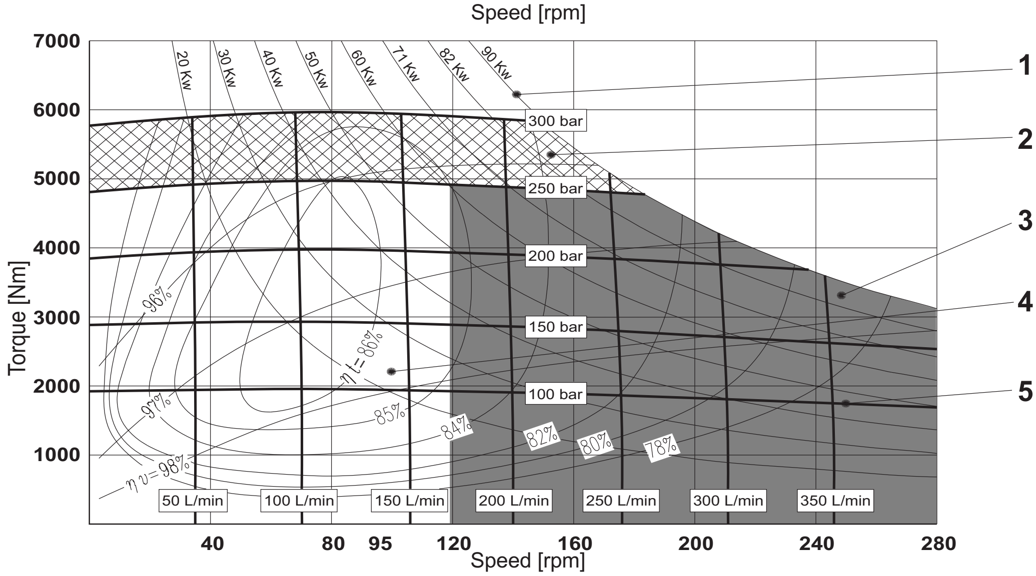
2792 cm³



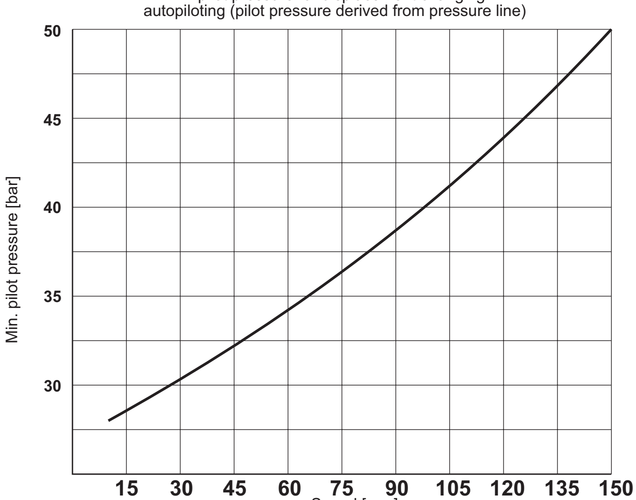
MRD 2800
MRV 2800

set to

1396 cm³

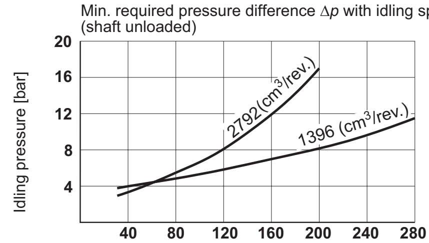


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

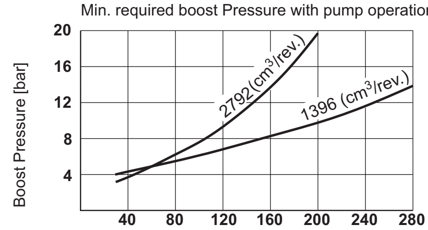


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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

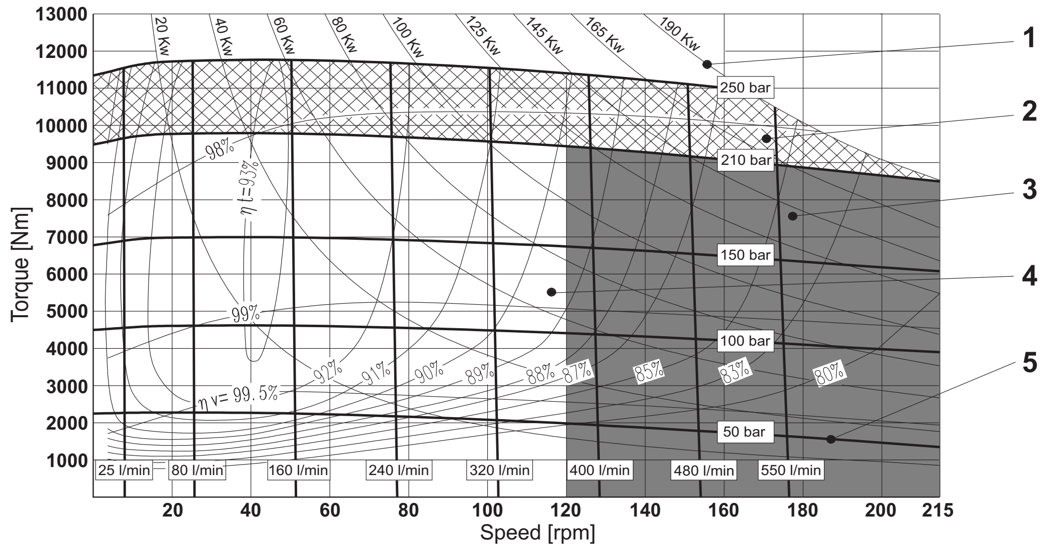
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ηt Total efficiency ηv Volumeter efficiency

MRDE 3100
MRVE 3100

set to

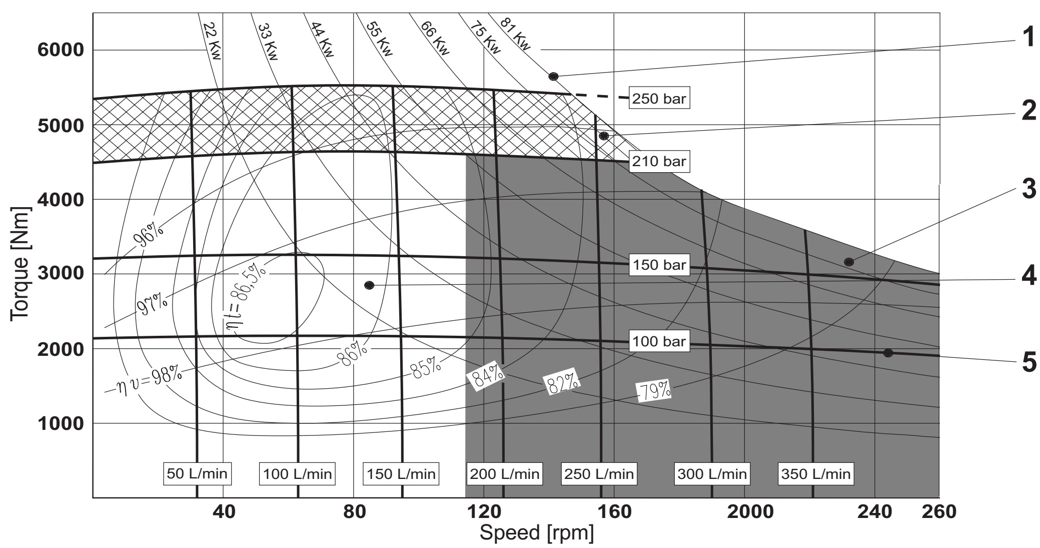
3104 cm³



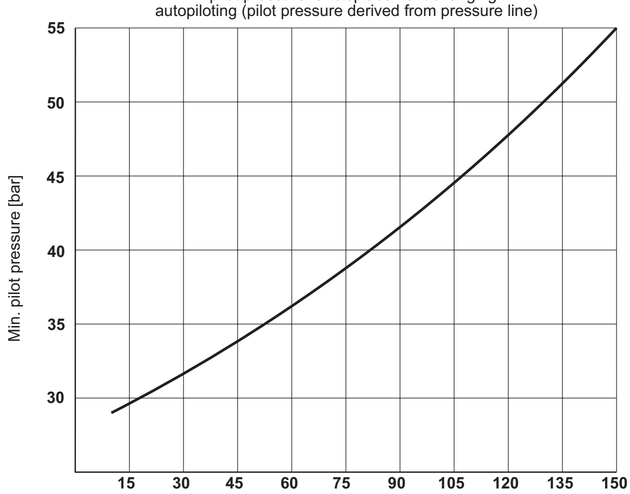
MRDE 3100
MRVE 3100

set to

1552 cm³

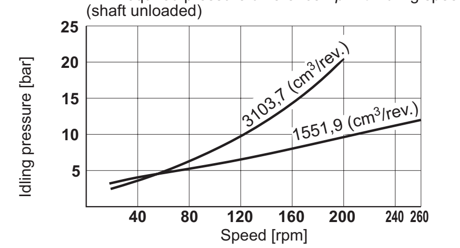


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

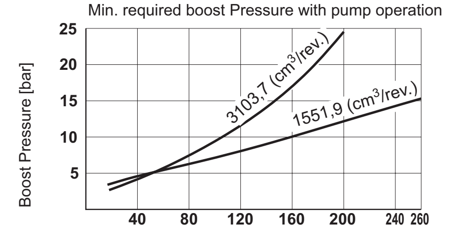


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

Min. required pressure difference Δ*p* with idling speed (shaft unloaded)



Min. required boost Pressure with pump operation



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

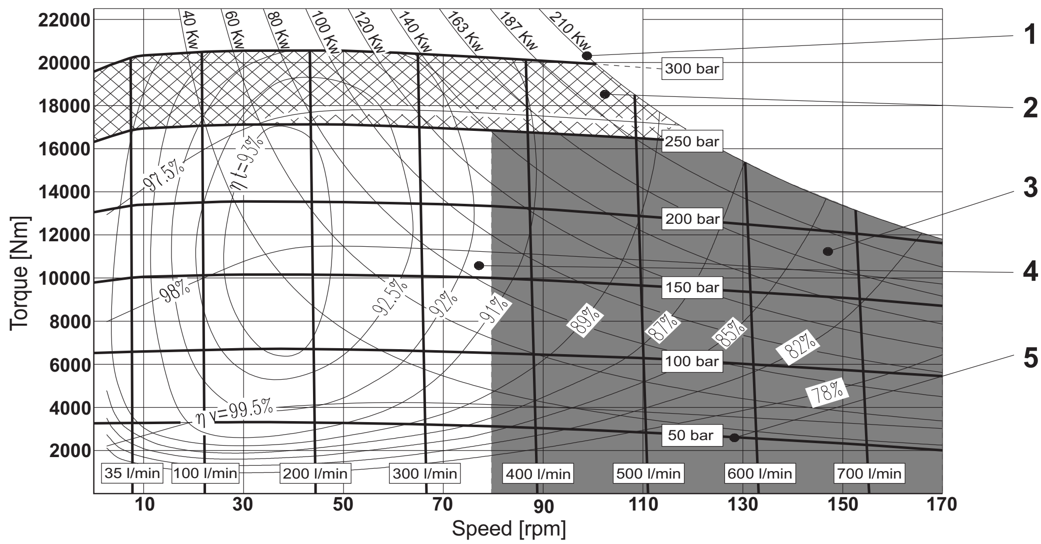
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure ηt Total efficiency ηv Volumeter efficiency

MRD 4500
MRV 4500

set to

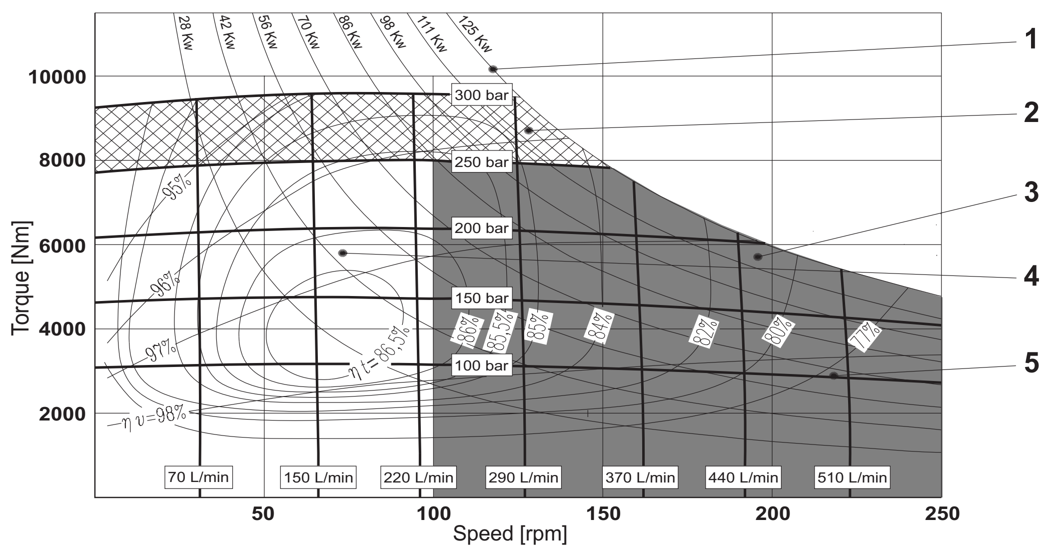
4502 cm³



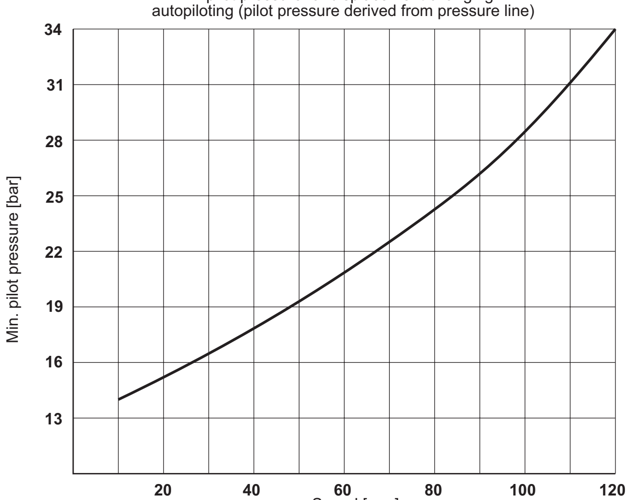
MRD 4500
MRV 4500

set to

2251 cm³

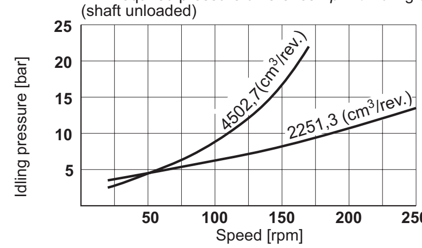


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

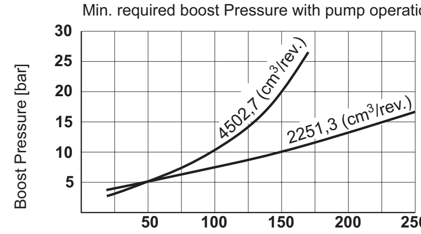


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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

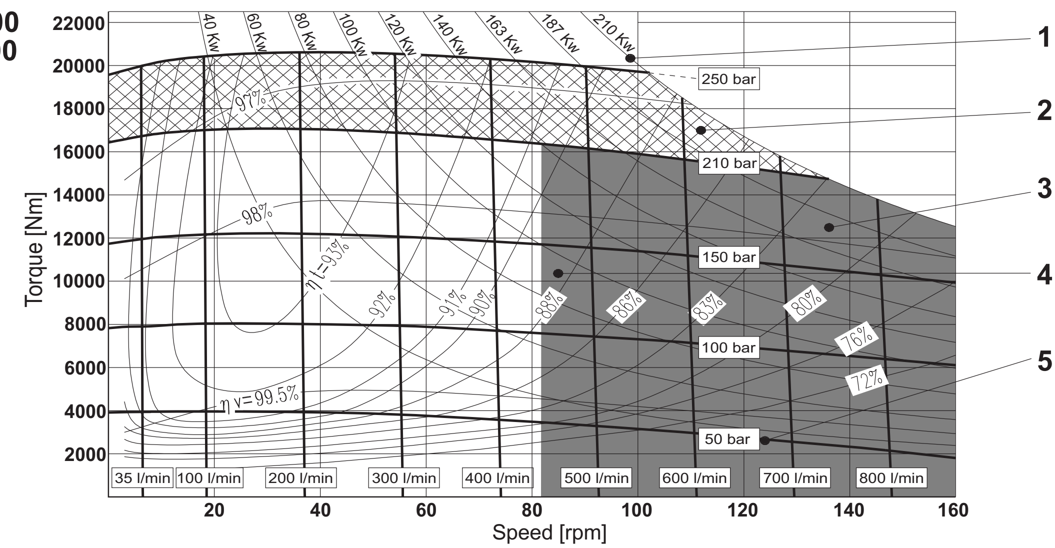
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure **ηt** Total efficiency **ηv** Volumeter efficiency

MRDE 5400
MRVE 5400

set to

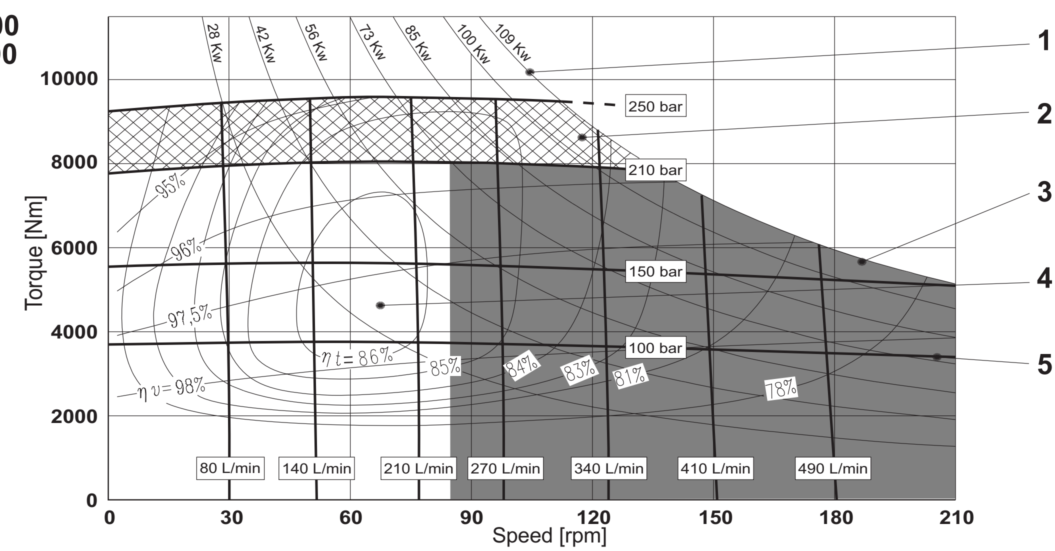
5401 cm³



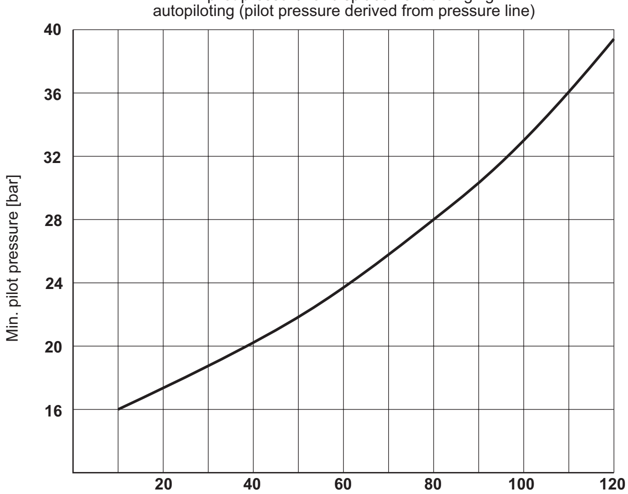
MRDE 5400
MRVE 5400

set to

2701 cm³

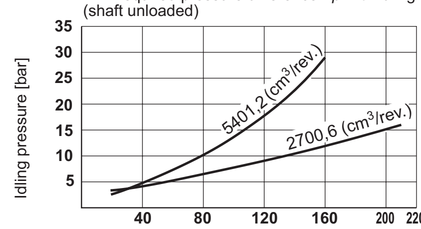


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

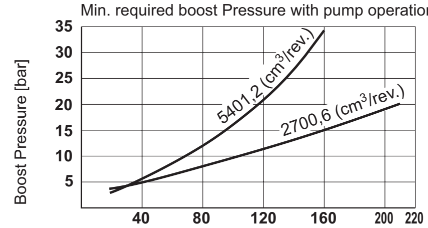


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult DENISON Calzoni

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



Min. required boost Pressure with pump operation



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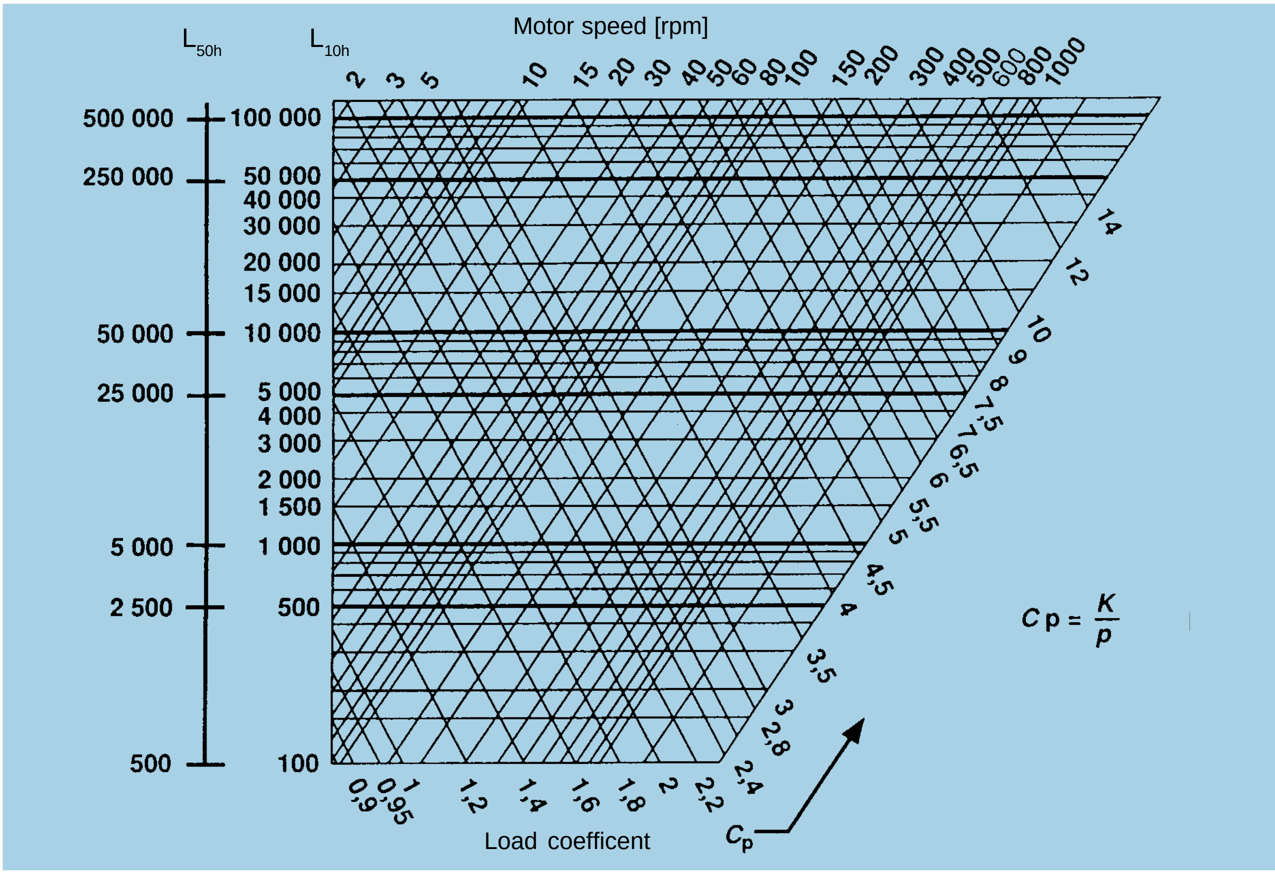
BEARING LIFE



***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
MRD 300	950	**MRDE 1400**	693	**MRV 4500**	709
MRDE 330	850	**MRVE 1400**	693	**MRDE 5400**	591
MRD 450	1126	**MRD 1800**	835	**MRVE 5400**	591
MRV 450	1126	**MRV 1800**	835		
MRDE 500	1021	**MRDE 2100**	722		
MRD 700	920	**MRVE 2100**	722		
MRV 700	920	**MRD 2800**	924		
MRDE 800	808	**MRV 2800**	924		
MRVE 800	808	**MRDE 3100**	828		
MRD 1100	844	**MRVE 3100**	828		
MRV 1100	844	**MRD 4500**	709		

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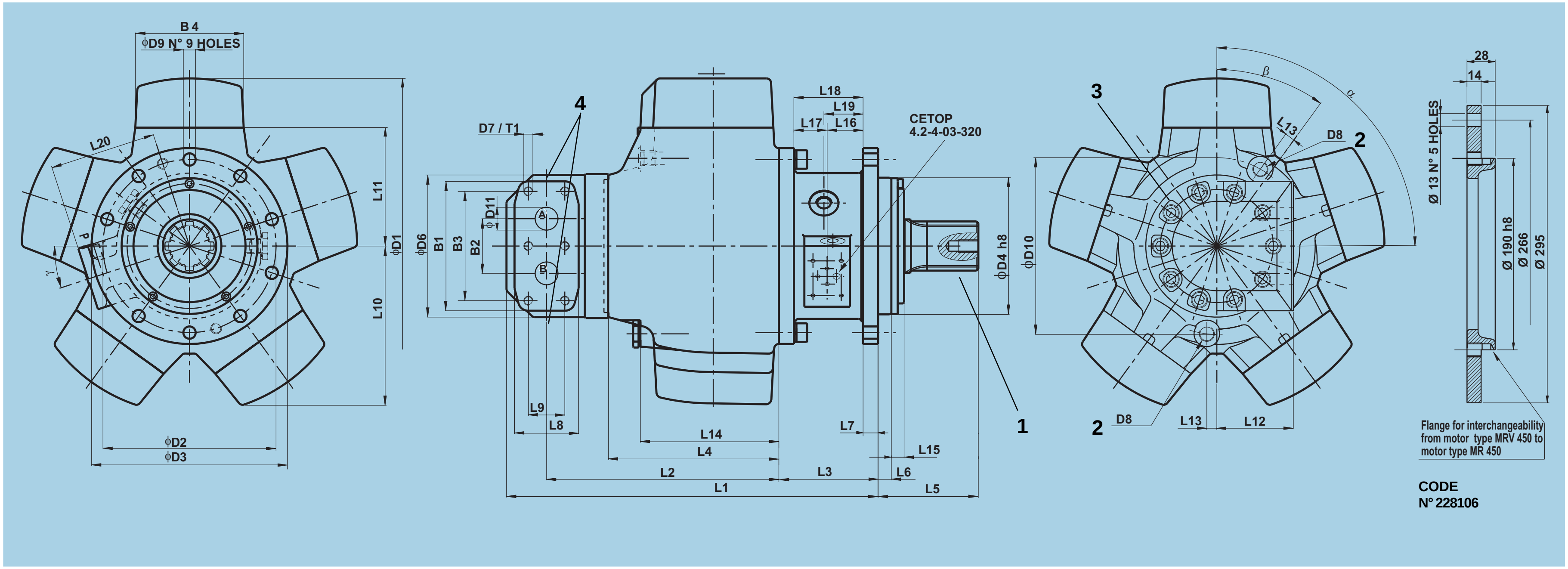

1 Splined shaft with flank contact
(for dimension see page 30)
Ordering code "N1"
(for further shaft ends see page 30 - 31)

2 Case drain port
BSP threads to ISO 228/1

3 On request the port flange can be rotated by 36°

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

MOTOR TYPE	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20
MRV 450	408	255	109	187	110	14,5	16,5	70,4	40	174,5	130	84	11	152	14	39,5	36,5	76	43	117

MOTOR TYPE	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	Ø D12	α	β	γ
MRV 450	142	60	120	119	368	190	215	150	-	156	M10	18	G 3/8	13,5	194	25	G 1/4	90°	36°	18°

Ordering Code
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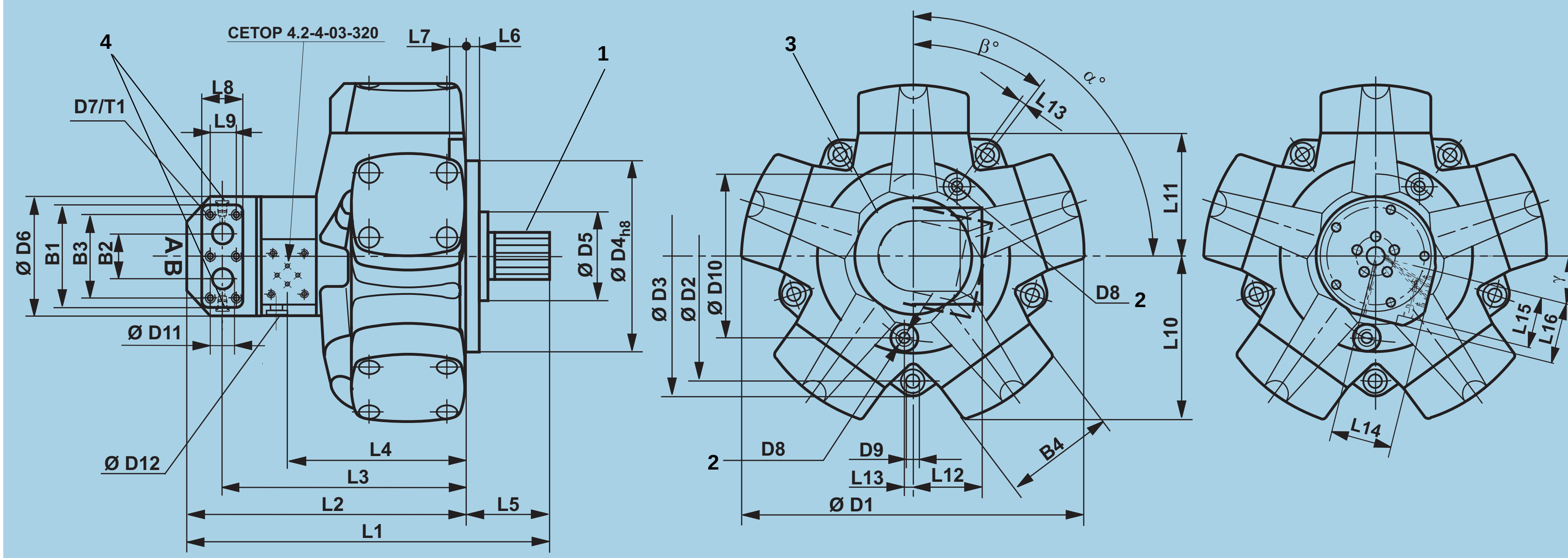

1 Splined shaft with flank contact
(for dimension see page 26)
Ordering code "N1"
(for further shaft ends see page 26 - 27)

2 Case drain port
BSP threads to ISO 228/1

3 On request the port flange can be rotated by 72°
(For MRD 300, MRDE 330, MRD 450, MRDE 500, MRD 700, MRDE 800 can be rotated by 36°)
For standard position see ange α.

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
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MOTOR TYPE	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16
MRD 300 MRDE 330	363	282	244	173	81	15	16	54	34	153,5	119	72	7,5	70	65	65
MRD 450 MRDE 500	426	329	285	202	97	15	18	70,4	40	174,5	130	84	9,5	79	70	78
MRD 700 MRDE 800 MRV 700 MRVE 800	450	349	305	222	101	15	20	70,4	40	192	143	84	8	79	70	78
MRD 1100 MRDE 1400 MRV 1100 MRVE 1400	518	401	353	235	117	20	22	82	50	223	165	105	9	88	75	88
MRD 1800 MRDE 2100 MRV 1800 MRVE 2100	566	434	386	268	132	21	24	82	50	264	197	105	11	88	75	88
MRD 2800 MRDE 3100 MRV 2800 MRVE 3100	679	526	452	317	153	24	26	98	62	303	221	123	15	108	84	108
MRD 4500 MRDE 5400 MRV 4500 MRVE 5400	759,5	549,5	478,5	340,5	210	34	28	98	68	359,5	255	140	19	108	84	108

MOTOR TYPE	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	Ø D12	α	β	γ
MRD 300 MRDE 330	120	50	100	100	328	232	256	175	90	129	M8	15	G 3/8	11	162	20	G 1/4	90°	36°	0°
MRD 450 MRDE 500	142	60	120	119	368	266	296	190	96	156	M10	18	G 3/8	13	194	25	G 1/4	90°	36°	0°
MRD 700 MRDE 800 MRV 700 MRVE 800	142	60	120	133	405	290	320	220	102	156	M10	18	G 3/8	13	207	25	G 1/4	90°	36°	0°
MRD 1100 MRDE 1400 MRV 1100 MRVE 1400	162	73	136	148	470	330	367	250	120	172	M12	21	G 1/2	15	228	31	G 1/4	104°	36°	14°
MRD 1800 MRDE 2100 MRV 1800 MRVE 2100	162	73	136	168	558	380	423	290	148	172	M12	21	G 1/2	17	266	31	G 1/4	90°	36°	14°
MRD 2800 MRDE 3100 MRV 2800 MRVE 3100	208	86	180	190	642	440	494	335	140	215	M14	28	G 1/2	19	314	37	G 1/4	90°	36°	18°
MRD 4500 MRDE 5400 MRV 4500 MRVE 5400	230	116	200	240	766	540	597	400 **D4$_{h7}$***	-	215	M16	32	G 1/2	23	380	38	G 1/4	108°	36°	18°

Ordering Code

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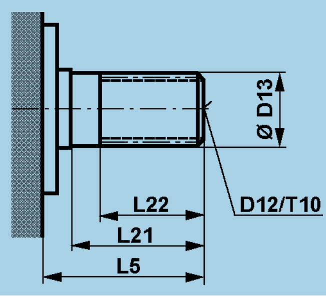
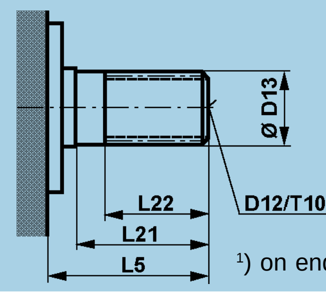
Code N 1 (Standard)

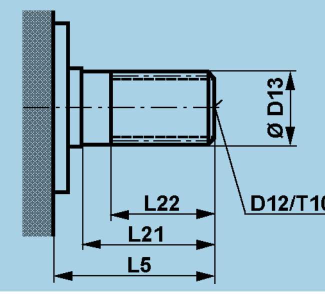


Code B 1 - BS 3550 - [1])



[1]) on enquiry

Code D 1 - DIN 5480



Version	N						B						D					
TYPE	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**
MRD 300 MRDE 330	81	60	46	M12	25	B8x42x48	81	60	45	M12	25	12/24-21	81	60	46	M12	25	W48x2x22-8e
MRD 450 MRDE 500	97	74	56,5	M12	25	B8x46x54	97	74	61	M12	25	8/16-17	97	74	60	M12	25	W55x3x17-8e
MRV 450	110	74	56,5	M14	22	B8x52x60	-	-	-	-	-	-	110	74	56,5	M14	22	W55x3x17-8e
MRD 700 MRDE 800 MRV 700 MRVE 800	101	78	62	M12	25	B8x52x60	101	78	62	M12	25	8/16-17	101	78	62	M12	25	W60x3x18-8e
MRD 1100 MRDE 1400 MRV 1100 MRVE 1400	117	88	69	M12	25	B8x62x72	117	88	67	M12	25	6/12-14	117	88	72	M12	25	W70x3x22-8e
MRD 1800 MRDE 2100 MRV 1800 MRVE 2100	132	100	79	M12	25	B10x72x82	132	100	76	M12	25	6/12-20	132	100	80	M12	25	W80x3x25-8e
MRD 2800 MRDE 3100 MRV 2800 MRVE 3100	153	120	99	M12	25	B10x82x92	153	120	76	M12	25	6/12-20	153	120	100	M12	25	W90x4x21-8e
MRD 4500 MRDE 5400 MRV 4500 MRVE 5400	210	173	144	M12	25	B10x102x112	210	173	142,5	M12	25	6/12-20	210	173	144	M12	25	W110x4x26-8e

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.

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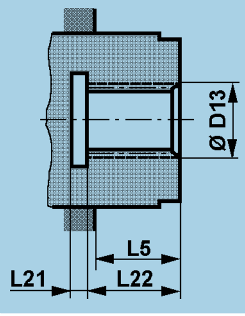
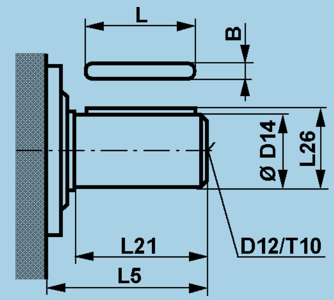
Code F 1 - DIN 5480



Code P 1



Version	F				P							
Type	**L5**	**L21**	**L22**	**ØD13 DIN 5480**	**L5**	**L21**	**L26**	**D12**	**T10**	**ØD14**	**Key L x B**	**Transmitted torque (Nm)**
MRD 300 MRDE 330	27	5	36	N40x2x18-9H	81	60	53,5	M12	25	50 k6	56 x 14	897
MRD 450 MRDE 500	28	5	38	N47x2x22-9H	97	74	59	M12	25	55 k6	70 x 16	1413
MRV 450	33	5	38	N47x2x22-9H	110	74	59	M14	25	55 k6	70 x 16	1413
MRD 700 MRDE 800 MRV 700 MRVE 800	28	5	44	N55x3x17-9H	101	78	64	M12	25	60 k6	70 x 18	2030
MRD 1100 MRDE1400 MRV 1100 MRVE1400	38	8	50	N65x3x20-9H	117	88	76,5	M12	25	70 k6	80 x 20	2690
MRD 1800 MRDE 2100 MRV 1800 MRVE 2100	47	8	57	N75x3x24-9H	132	100	85	M12	25	80 k6	90 x 22	4020
MRD 2800 MRDE 3100 MRV 2800 MRVE 3100	48	8	62	N85x3x27-9H	153	120	95	M12	25	90 k6	110 x 25	6207
MRD 4500 MRDE 5400 MRV 4500 MRVE 5400	50	14	68	N100x3x32-9H	210	173	116	M12	25	110 k6	160 x 28	10757

NOTE
For higher values of the torque to be transmitted, please consult DENISON Calzoni

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.

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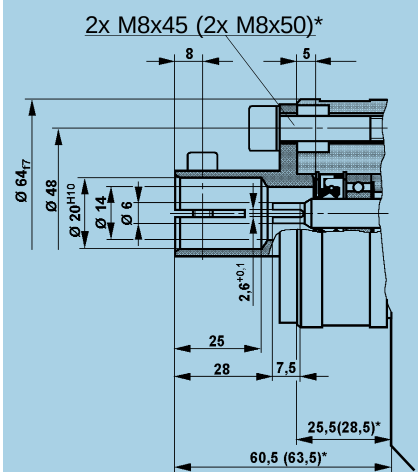
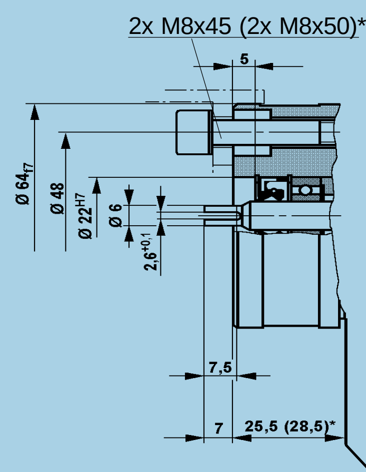
MECHANICAL TACHOMETER DRIVE | **TACHOGENERATOR DRIVE** | **ENCODER DRIVE**

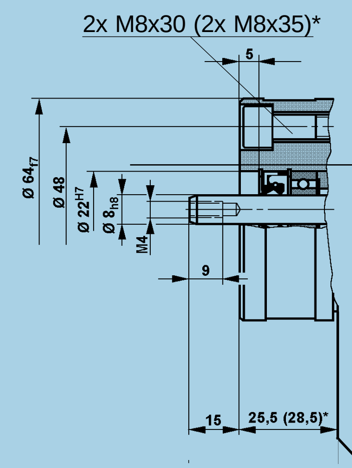
Code "C1"



Code "T1"

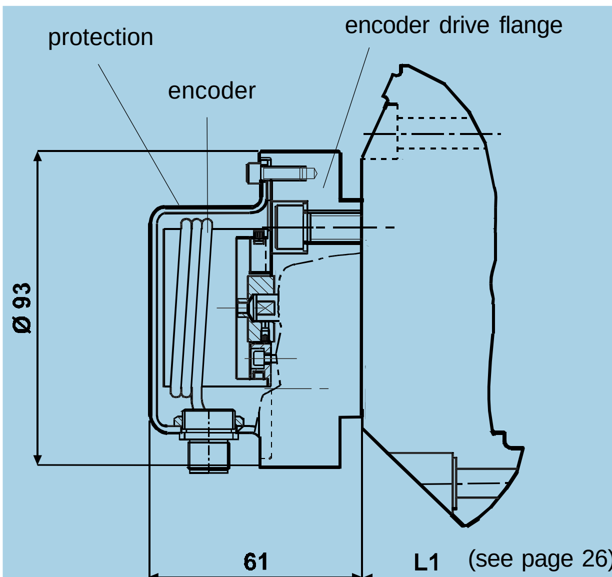


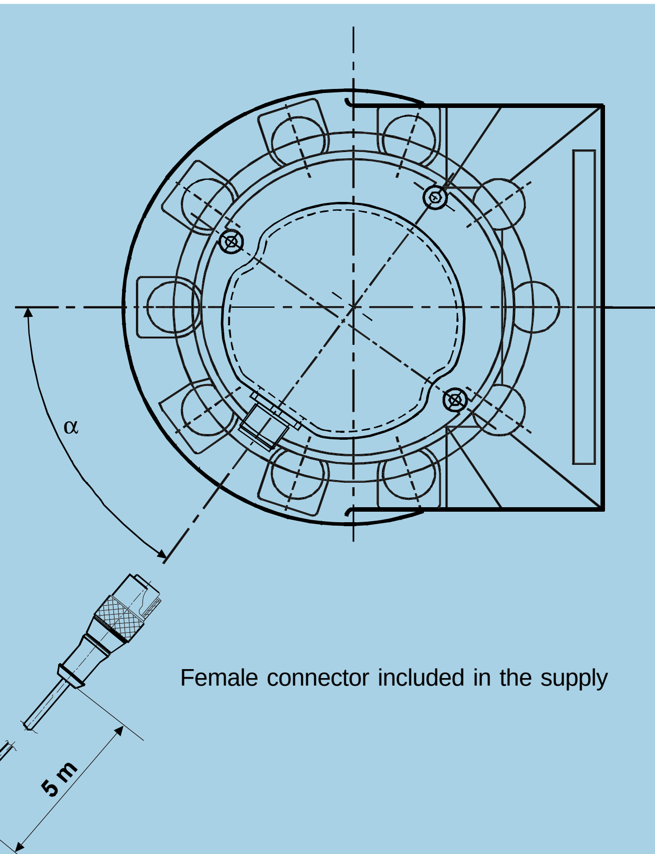
Code "Q1"



( ) * Motor MRD 300, MRDE 330

INCREMENTAL ENCODER DIMENSIONS





α = 54° for the motor types MRD 300, MRDE 330

α =45° for the other types

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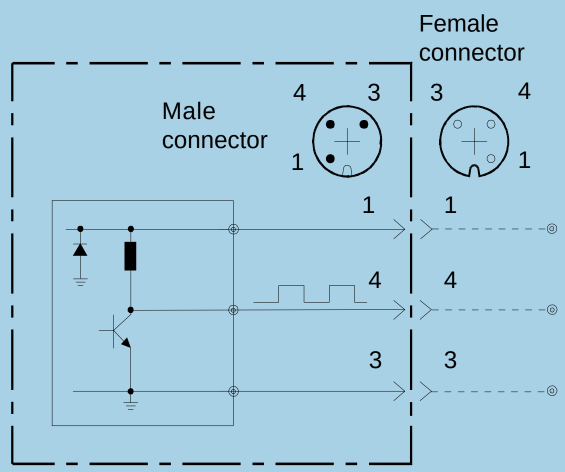
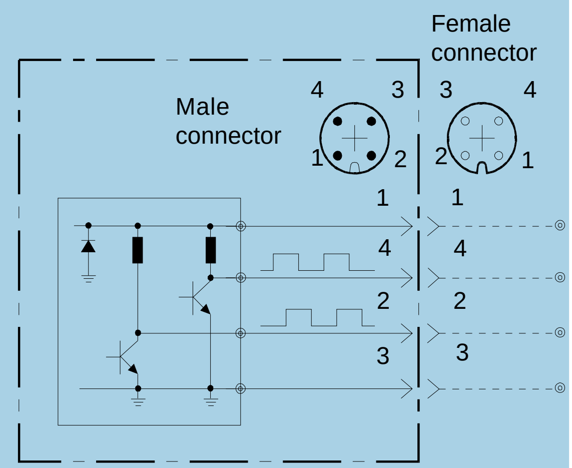
INCREMENTAL ENCODER CONNECTION DIAGRAMS

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

Note: Female connectors cable length equal to 5 m.

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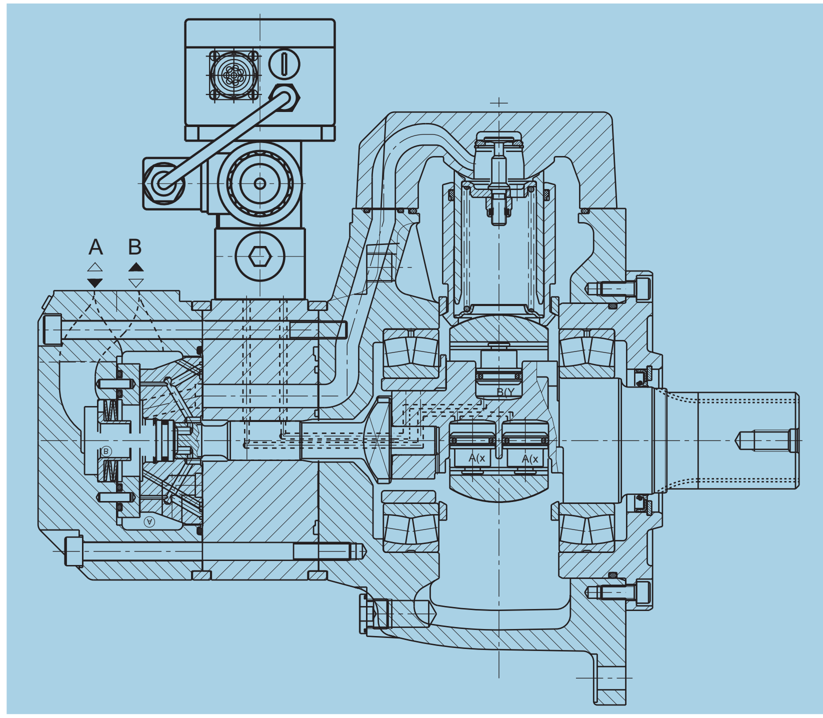
RCE

USING GENERALITIES

The electronic regulator type RCE is designed to be mounted on board of the motors type “MRV/MRVE”, to control their displacement in relation to a reference value of:

- displacement
- pressure
- speed

The RCE regulator is of the bi-directional ON-OFF type, with successive integratory pulses. It is mounted directly on a 4 way, 3 position solenoid valve (CETOP size 6) which pilots the displacement variation of the motor.
The power supply is 24 V DC or 24 V AC rectified.



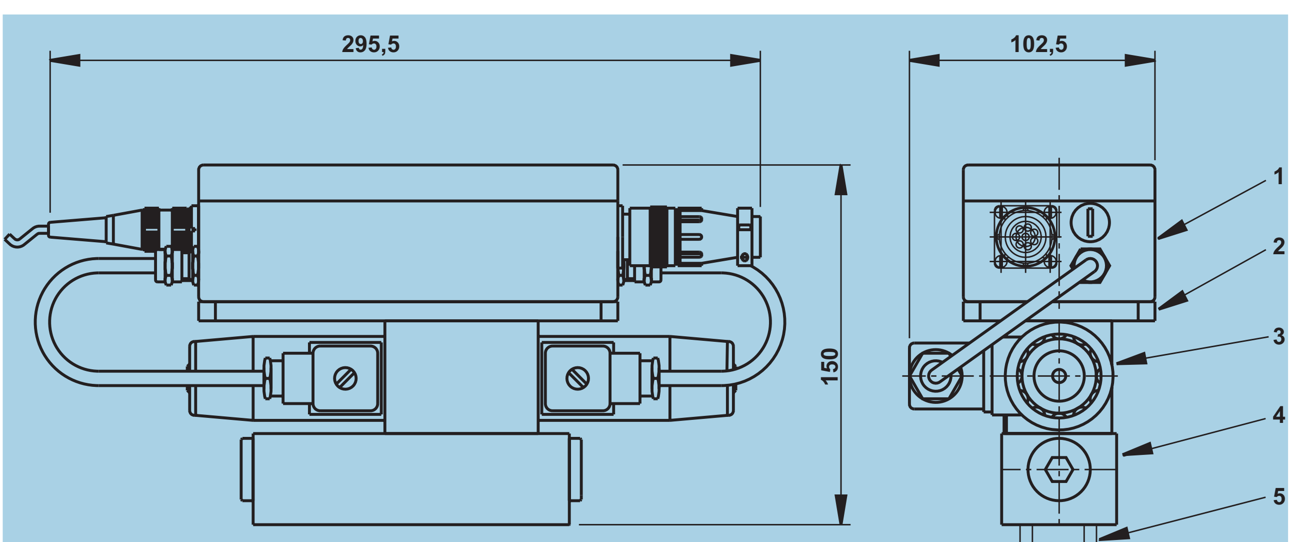
TECHNICAL DATA

Supply Voltage:	**24 Vcc ± 10%rectified (Vmax. peak 35 V)**
Max power needed:	**35 W (60 W if you use the solenoid output: SOLENOID C)**
Referenced voltage:	**0 - 10 Vcc (range 2 - 10 Vcc)**
Displacement output signal:	**2 - 10 Vcc**
Pressure - speed output signal:	**0 - 10 Vcc**
Regolation and speed aptitute pulse command:	**12 - 24 Vcc (opto-insulated input)**

Galvanic insulation between power and control circuits
Reversal of input polarity protection
Output power with self proofed MOSFET
IP 64 protection
Complying with standard CEE

DIMENSION AND DATA

1 Elettronic unit RCE/I-20
2 Middle plate
3 DENISON valve
4 Double metering valve VDD
5 House case fixing screw



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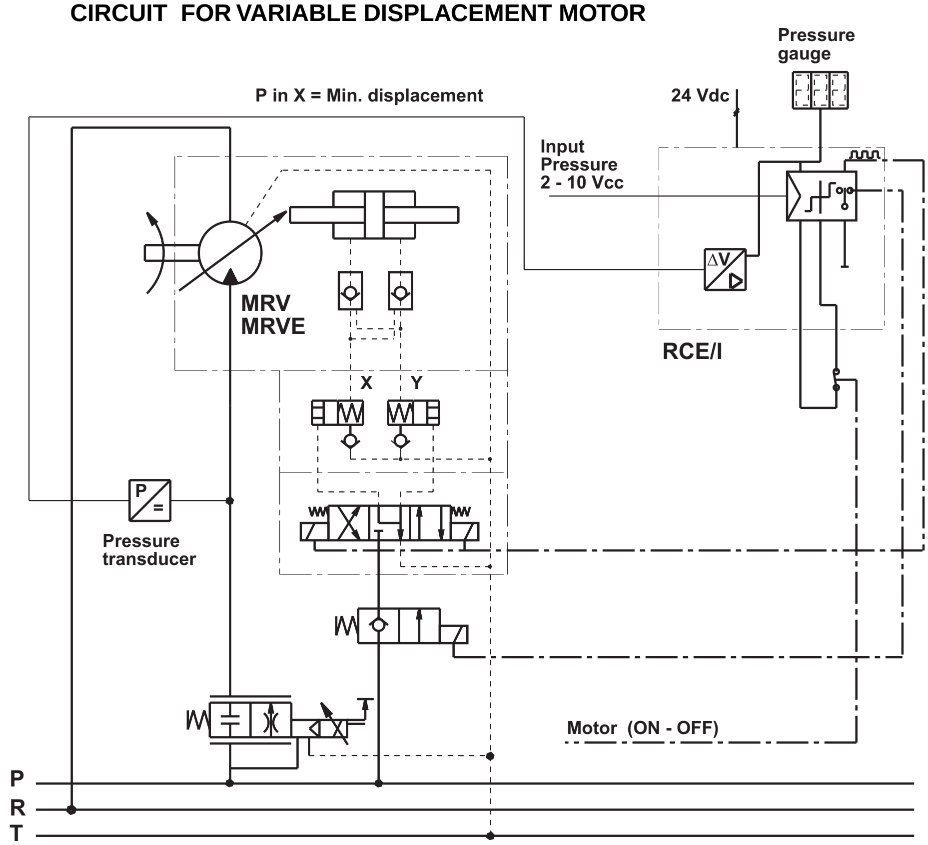
RCE

CIRCUIT FOR VARIABLE DISPLACEMENT MOTOR



DESCRIPTION

The circuits of the regulator are powered through a DC/DC converter having 15 V DC output, so to obtain a total galvanic separation from the 24 V DC power lines. The input reference signal to the regulator has been set in the range 2¸10 V DC, as for the output of the regulated values (displacement, pressure, speed). Three internal led show the command condition (+ or -). The pilot oil is dosed at each pulse by a specific dual metering valve type “VDD”, fitted beneath the solenoid valve. In relation to the parameter that it is wished to keep under control by acting on the motor displacement, the RCE/I regulator can allow 3 different regulation modes.

CONSTANT DISPLACEMENT MODE

The hydraulic motor is equipped with an inductive (TEC) displacement transducer powered by the regulator, which statically reads and saves the current displacement position at each motor revolution.
Through special built-in valves, the motor keeps the set displacement position constant. Due to an intrinsic feature of radial-piston motors, the tendency under load is to move toward maximum displacement.
Thus the function of the regulator is to restore the original setting with an external voltage reference (range 2¸10 V DC from min. displ. to max displacement).
The precision of the actual displacement value is approximately + 2¸3% over the rated value set.
For remote reading of the displacement a 2¸10 V DC output signal is provided, almost linear in the range of the motor displacement variation.
To quickly change from one value to another of the set displacement, a special opto-insulated input circuit may be activated in transitory mode with a 24 V DC signal.
To enable the regulator only when the motor is running, it is necessary to activate a special opto-insulated input circuit with a 24 V DC signal simultaneously with the start command; an internal trimmer allows a short enabling delay to be inserted if desired.
The regulator is normally set to perform stable adjustments up to a minimum speed of 60 r.p.m.
For lower speeds, to approximately 6 r.p.m., it is necessary to use an internal multiple-turn trimmer to modify the pause length between the control pulses.
The pause length must be greater than the time required by the motor to complete one turn, this is to permit the displacement position read by the transducer at each shaft revolution to be updated in the memory.

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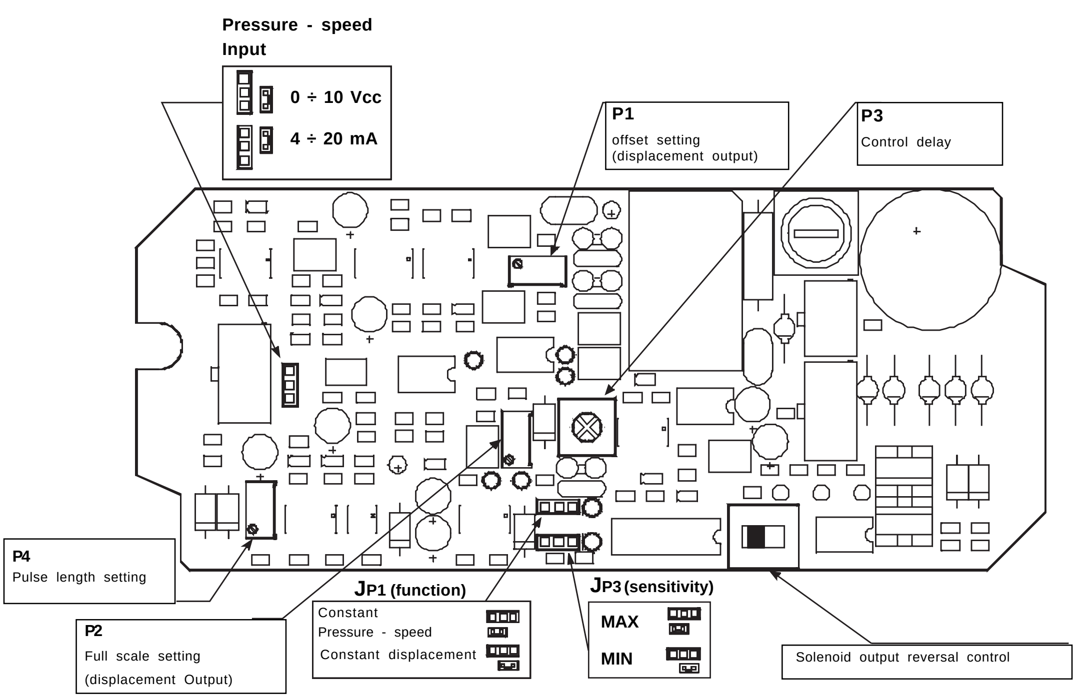
CONSTANT WORKING PRESSURE MODE

When the motor is used in systems equipped with hydraulic accumulators and the torque required by the motor may vary in relation to the process characteristics, the displacement is controlled in relation to the working pressure set for the motor, so that the working pressure remains constant as the required torque varies.
The constant pressure regulation can be achieved for torque variations within the displacement variation ratio allowed by the motor.
The hydraulic circuit that feed the motor must include a pressure transducer that may be powered by the regulator itself with a voltage of 15 V DC and a signal output of 0¸10 V DC or 4¸20 mA. The hydraulic motor is equipped with built-in valves, to maintain the displacement, as well as with the displacement transducer if it is wished to read the actual displacement during torque changes (by processing the displacement signal together with the pressure and speed signals, it is possible to determine the torque and absorbed power). The pressure setting is achieved by means of an external signal in the range 0¸10 V DC (2¸ 10 V DC); the 10 V value must correspond to the full scale value (10 V or 20 mA) of the pressure transducer. The min. acceptable reference value is 2 V DC. During the startup transitory, the regulator remains disabled for an adjustable period of time (internal trimmer).
Also in this case the regulator is enable with a 24 V DC input signal.
Even with frequent start-stop cycles, the regulator can change the motor displacement to adapt it to the average pressure value saved during the running cycle.
The saved pressure signal can be read remotely, again in the range 0¸10 V DC. A third 24 V DC power output is available on the regulator to simultaneously energize a 2-way solenoid valve of the type with a conical diaphragm, which intercepts the pilot oilupstream the 4-way solenoid valve.

CONSTANT SPEED MODE

If multi-stage fixed displacement pumps are used to drive the motor, in certain conditions it is necessary to drain off the excess delivery in relation to the set motor speed.
In order to avoid this dissipation, it is possible to use a variable-displacement motor which would absorb the excess delivery by adjusting its displacement. The regulator in this case accents the speed signal and compares it to the reference value; when the motor speed exceeds the set value, the regulator increases the displacement until the excess delivery provided by the pump is absorbed; at the same time, the working pressure is proportionally reduced, to the advantage of the life of the components of the system (pump, motor, etc.).
This provides a simple speed regulating system without energy dissipation, since the circuit includes neither flow regulator valves nor drainage valves. The speed signal saved is also available as output signal for remote reading, again in the field of 0¸10 V DC; this signal may be useful for detecting the maximum speed reached when the motor running cycle is very short (< 2 sec). Here again, the regulation is enable by activating the special 24 V DC input circuit; the command may be delayed by the time the motor needs to accelerate in order to reach the rated speed. If it is wished to switch quickly the speed from one value to another, a special input may be activated with a 24 V DC signal in transitory mode. The precision attainable through this system varies: it is approximately ± 2% on the fullscale value with the motor at maximum displacement; at minimum displacement the precision is slightly lower.



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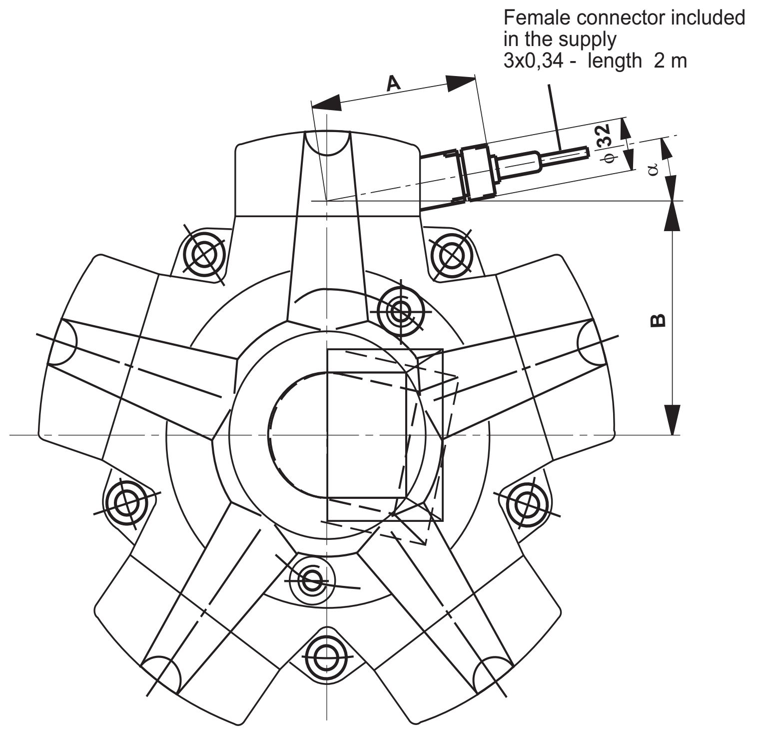
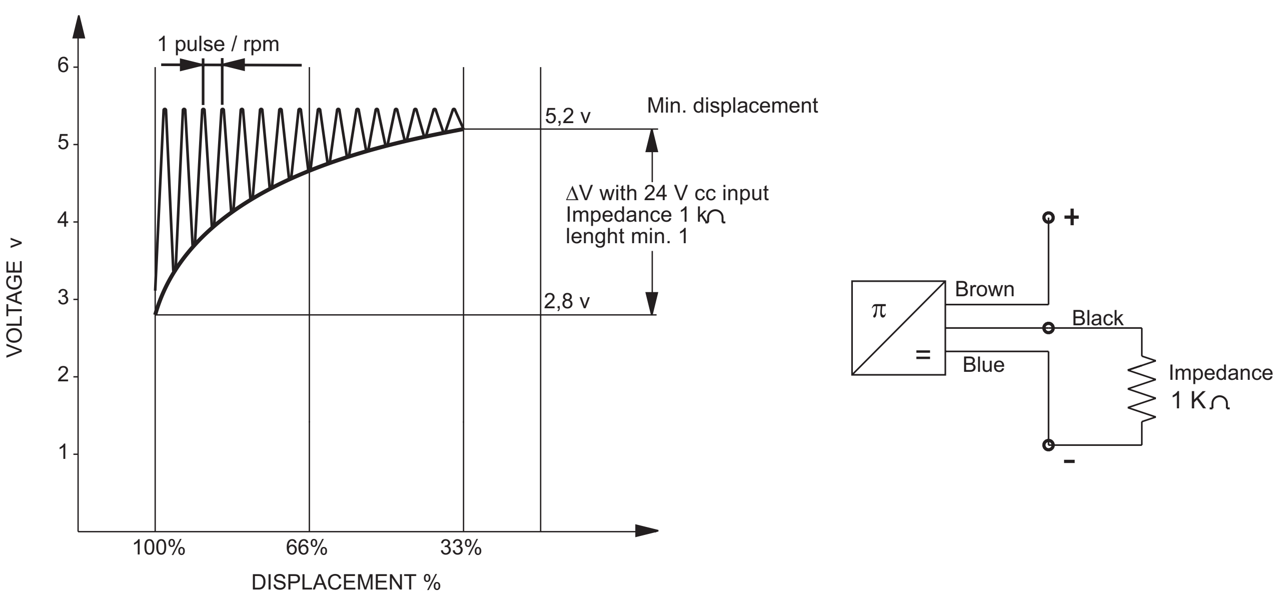
ELECTRONIC DISPLACEMENT TRANSDUCER

DIMENSIONS

MOTOR TYPE	A	B	α
MRV 450	108	135,6	12° 30'
MRV 700 MRVE 800	115,3	147,8	12°
MRV 1100 MRVE 1400	124,6	179	5°
MRV 1800 MRVE 2100	132,3	210	5°
MRV 2800 MRVE 3100	141,2	237,5	5°
MRV 4500 MRVE 5400	155,8	266	7°





ELECTRONIC DISPLACEMENT TRANSDUCER TECHNICAL DATA

Max cont. pressure:	**2,5 bar**
Supply voltage:	**18 - 24 Vdc - stab. ± 0,5%**
Current consuption:	**10 mA**
Output current:	**1 - 6 mA**
Working temperature range:	**da 0 a 60°C**
Load impedance:	**1 KΩ**
Reading displacement range:	**1:3**
protection degree:	**IP 68**
Precision F.S.	**± 1%**

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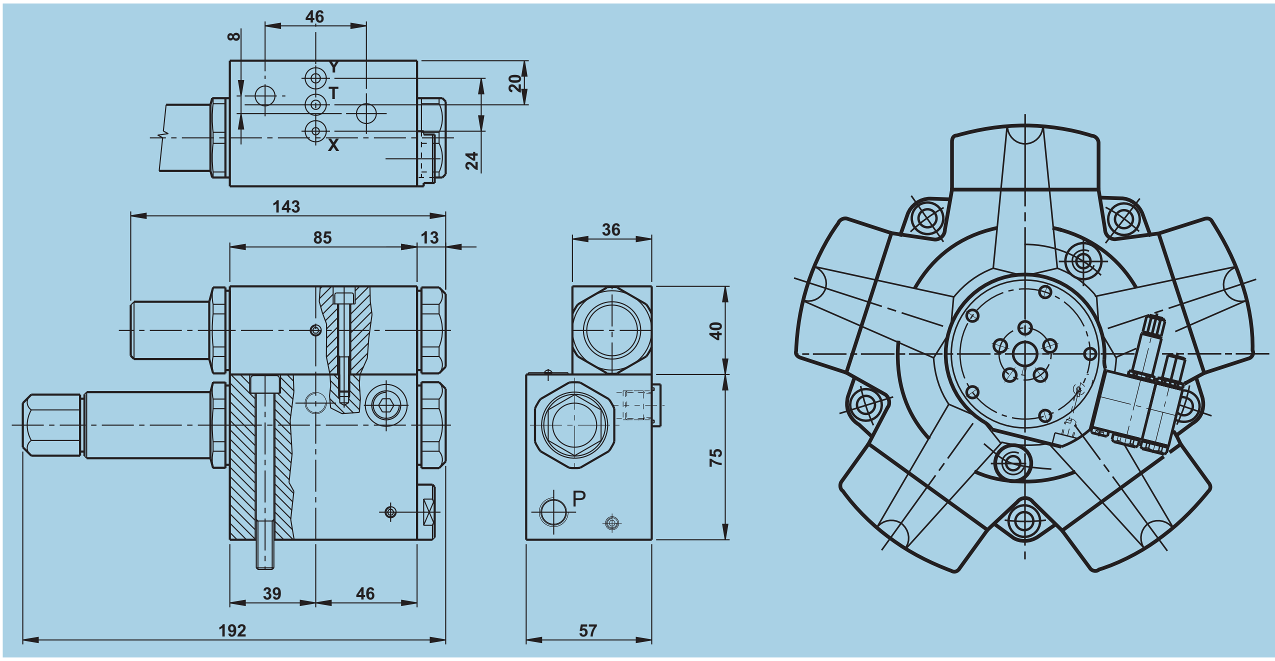
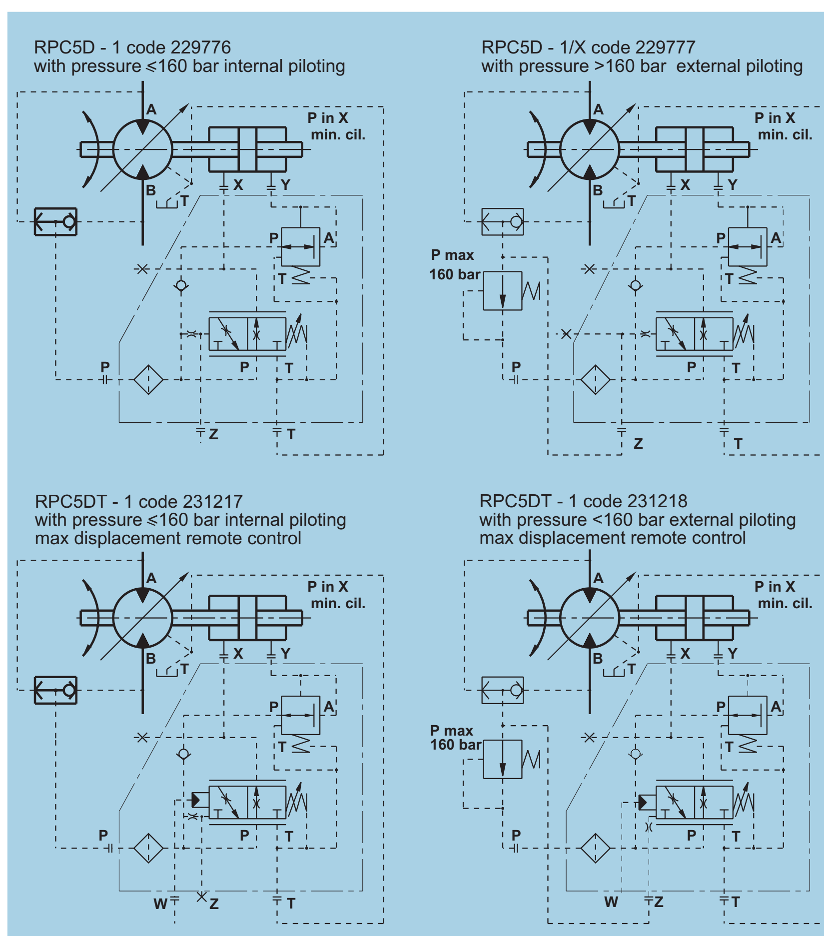


RPC
FUNCTIONAL DESCRIPTION

The RPC hydraulic regulator keeps the motor working at a constant pressure while supplying a variable torque. The pressure value can be set in the range from 50 to 250 bar

BASIC CIRCUITS



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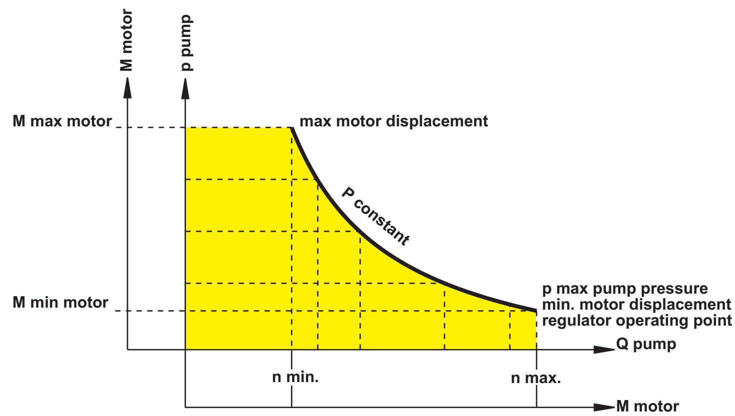
RPC

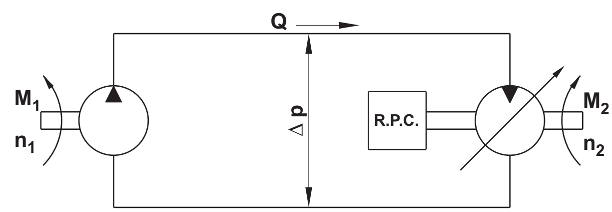
USING GENERALITIES

A variable torque and speed, constant power system can be obtained by using the MRV - MRVE motor provided with the RPC constant pressure regulator along with a fixed displacement pump.

REGULATION SCHEME



HYDRAULIC CIRCUIT



RPC = motor constant pressure regulator

P = Q x p max = constant

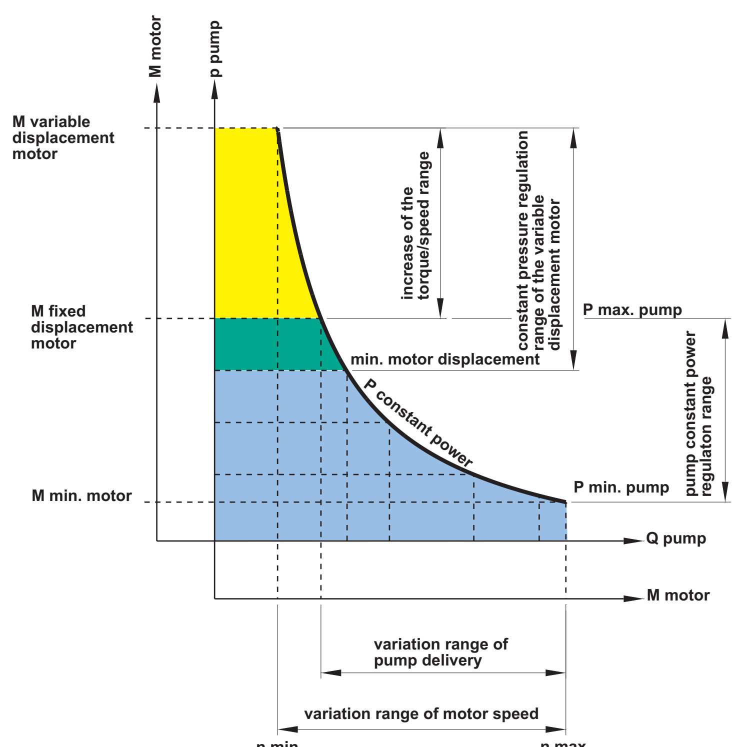
$M_1 \times n_1 = M_2 \times n_2$ = constant

RPC

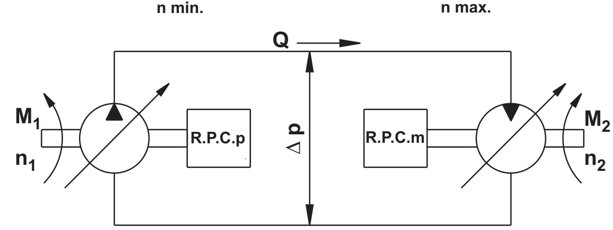
USING GENERALITIES

By replacing the fixed displacement pump with a variable one provided with a constant regulator, it is possible to obtain an enlargement of the torque and speed regulation range to constant power.

REGULATION SCHEME



HYDRAULIC CIRCUIT



RPCp = pump constant power regulator

RPCm = motor constant pressure regulator

$P = M_1 \times n_1 = M_2 \times n_2$ = constant

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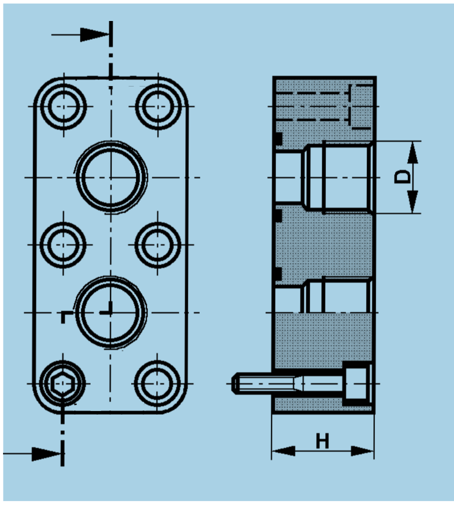
STANDARD CONNECTION FLANGE
Code “C1“



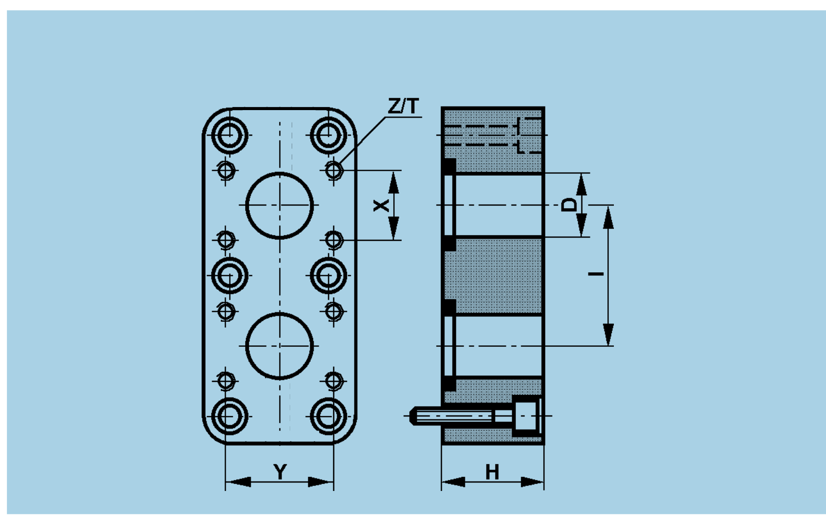
Flange is supplied complete with screws and seals.

MRD - MRDE MRV - MRVE	D	H	CODE NBR	CODE FPM
300 - 330	G 3/4	36	262 098	229 394
450 - 500 700 - 800	G 1 1/4	40	262 089	229 395
1100 - 1400 1800 - 2100	G 1 1/2	45	262 093	229 396
2800 - 3100	G 1 1/2	60	264 572	229 397
4500 - 5400	G 2	60	272 724	229 398

BSP threads to ISO 228/1

Permitted up to 6000 PSI

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



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

MRD - MRDE MRV - MRVE	SAE PSI	D		H	I	X	Y	METRIC		UNC		
		"	mm					Z/T	Denison Calzoni part N° NBR	Z	T	Denison Calzoni part N° NBR
300 - 330	5000	3/4"	19	36	55	22,2	47,6	M10/25	277 295	3/8"- 16	25	223 335
450 - 500 700 - 800	5000	1"	25	40	60	26,2	52,4	M10/25	277 297	3/8"- 16	25	223 336
1100 - 1400 1800 - 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
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
4500 - 5400	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

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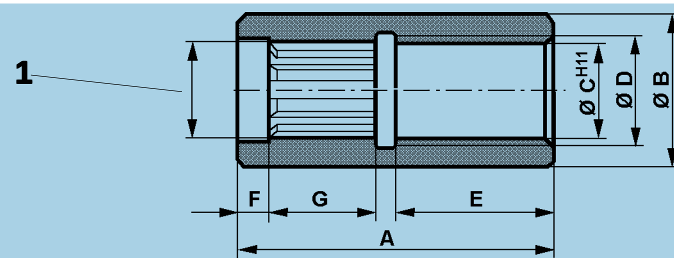
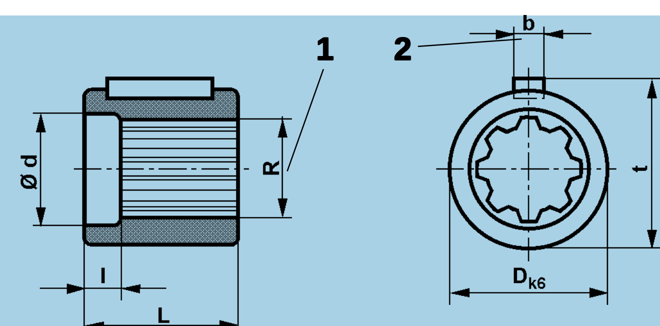
COUPLINGS



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

MRD - MRDE MRV - MRVE	ORDERING CODE	A	B	C^{H11}	D	E	F	G
300 - 330	465 202	135	71	49	60	64	15	45
450 - 500	465 201	155	80	55	68	68	18,5	55,5
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
1800 - 2100	465199	224	118	83	98	107	22	78
2800 - 3100	465 198	265	132	93	112	127	23	97
4500 - 5400	474 692	355	150	113	126	165	30	140

ADAPTERS WITH KEY



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

MRD - MRDE MRV - MRVE	ORDERING CODE	R	d	l	D_{k6}	L	b	t	KEY DIN 6885
300 - 330	271 118	A8x42x48	48,3	15	70	60	14	73,5	14x9x56
450 - 500	271 119	A8x46X54	54,3	18,5	80	75	16	84	16x10x70
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
1800 - 2100	271 122	A10x72x82	82,3	22	118	118	22	123	22x14x110
2800 - 3100	271 123	A10x82x92	92,3	23	130	148	25	135	25x14x140
4500 - 5400	272 719	A10x102x112	112,3	30	160	188	28	166	28x16x180

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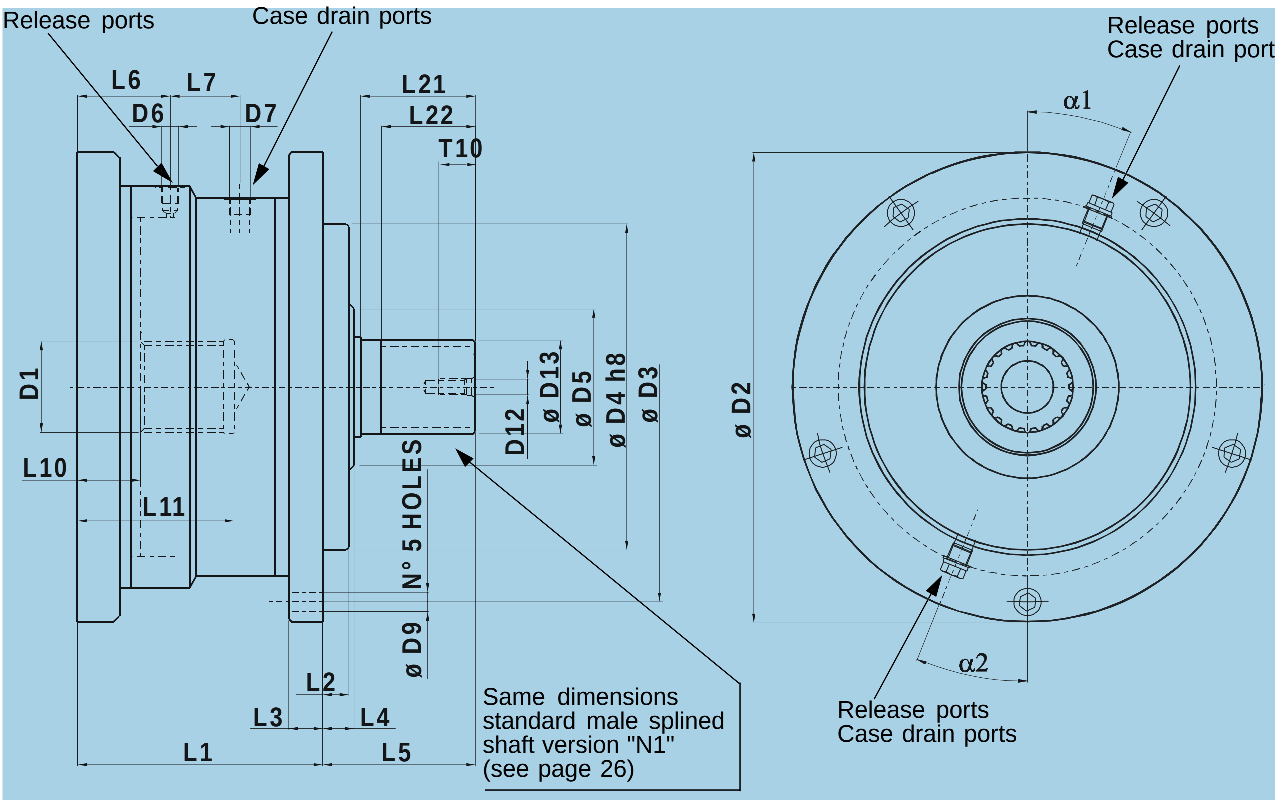
BRAKE TYPE	B 300	B 450	B 700	B 1100	B 1800	B 2800
MOTOR TYPE MRD - MRDE MRV - MRVE	300 - 330	450 - 500	700 - 800	1100 - 1400	1800 - 2100	2800 - 3100



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 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'

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

CHARACTERISTICS		B 300	B 450	B 700	B 1100	B 1800	B 2800
STATIC BRAKING TORQUE	Nm	1800	2650	4000	6200	11400	17100
DYNAMIC BRAKING TORQUE	Nm	1200	1450	2200	4200	6250	12000
RELEASE PRESSURE	bar	28	27	27	27	30	30
MAX. OPERATING PRESSURE	bar	420	420	420	420	420	420
MOMENT OF INERTIA OF ROTATING PARTS	Kgm^2	0,0062	0,029	0,043	0,061	0,20	0,27
WEIGHT	Kg	39	54	74	100	158	262
MOTOR TYPE MRD - MRDE -MRV - MRVE		300 330	450 500	700 800	1100 1400	1800 2100	2800 3100

CODE

Example: BRAKE - B 450 - N1 V1 **

1. BRAKE - **B 450** N1 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

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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

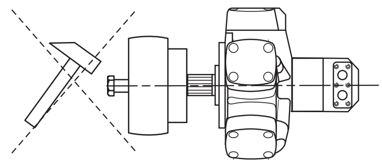
Pipes, pipe connections

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

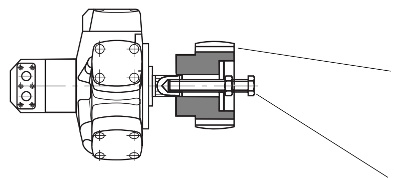
Choose pipes and hoses suitable for the installation
- Please note manufacturing data!

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.

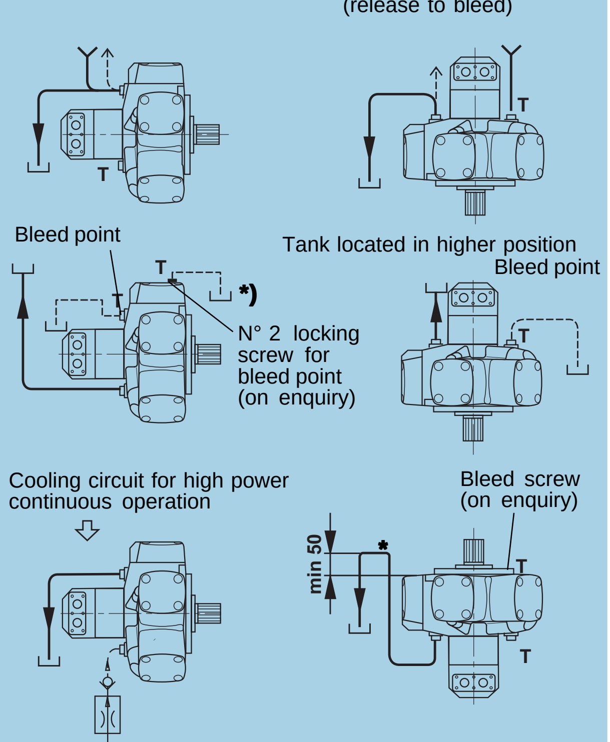
DRAIN AND FLUSHING LINK INSTALLATION EXAMPLES

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 "MRD - MRDE - MRV - MRVE"

Low pressure case drain returns to tank.

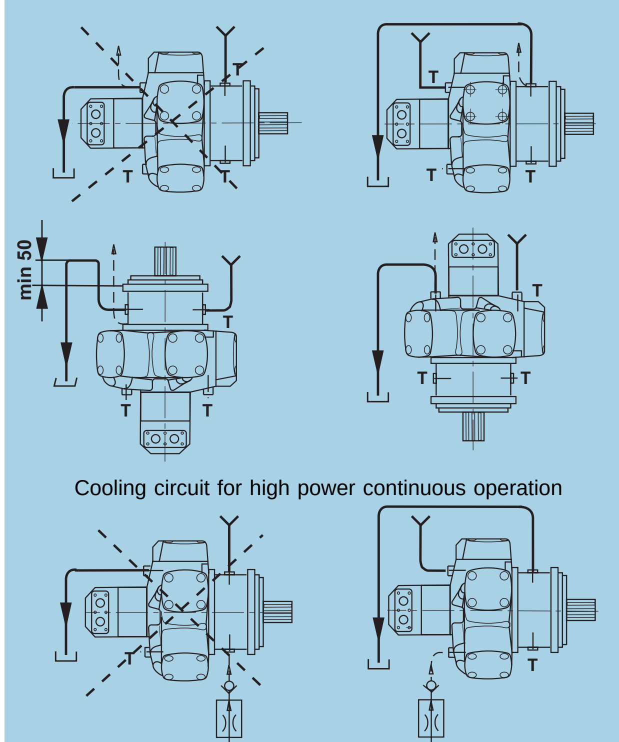


Flushing p max= 5 bar

*) 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 "MRD - MRDE - MRV - MRVE with brakes"

Low pressure case drain returns to tank.



Flushing p max= 5 bar

Motors without shaft seal used with brake

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CODE

Example: MRD 700 F 340 N1 M1 F1 N1 N **

1. **MRD** 700 F 340 N1 M1 F1 N1 N **

SERIES

MRD	standard 250 bar max. continuous
MRDE	expanded 210 bar max. continuous
MRV	standard 250 bar max. continuous
MRVE	expanded 210 bar max. continuous

2. MRD **700 F 340** N1 M1 F1 N1 N **

SIZE & DISPLACEMENT

D	code	**MRD 300 D 150**		**MRDE 330 D 165**					
	Cm^3	304,1	152,1	332,4	166,2				
E	code	**MRD 450 E 225**		**MRDE 500 E 250**		**MRV 450 E 133**			
	Cm^3	451,6	225,8	497,9	248,9	451,6	133.5		
F	code	**MRD 700 F 340**		**MRDE 800 F 390**		**MRV 700 F 340**		**MRVE 800 F 390**	
	Cm^3	706,9	339,3	804,2	386,0	706,9	339,3	804,2	386,0
G	code	**MRD 1100 G 500**		**MRDE 1400 G 620**		**MRV 1100 G 500**		**MRVE 1400 G 620**	
	Cm^3	1125,8	508,4	1369,5	618,5	1125,8	508,4	1369,5	618,5
H	code	**MRD 1800 H 900**		**MRDE 2100 H 1050**		**MRV 1800 H 900**		**MRVE 2100 H 1050**	
	Cm^3	1809,6	904,8	2091,2	1045,6	1809,6	904,8	2091,2	1045,6
I	code	**MRD 2800 I 1400**		**MRDE 3100 I 1550**		**MRV 2800 I 1400**		**MRVE 3100 I 1550**	
	Cm^3	2792,0	1396,0	3103,7	1551,9	2792,0	1396,0	3103,7	1551,9
L	code	**MRD 4500 L 2250**		**MRDE 5400 L 2700**		**MRV 4500 L 2250**		**MRVE 5400 L 2700**	
	Cm^3	4502,7	2251,3	5401,2	2700,6	4502,7	2251,3	5401,2	2700,6

3. MRD 700 F 340 **N1** M1 F1 N1 N **

SHAFT

N1	spline ex DIN 5463 (see page 30)
D1	spline DIN 5480 ((see page 30)
F1	female spline DIN 5480 (see page 31)
P1	shaft with key (see page 31)
B1	spline B.S. 3550 (see page 30)

4. MRD 700 F 340 N1 **M1** F1 N1 N **

SPEED SENSOR OPT ION

N1	none	
Q1	encoder drive (see page 32)	
C1	mechanical tachometer drive (see page 32)	
T1	tachogenerator drive (see page 32)	
M1	incremental Elcis encoder (500 pulse/rev) (see page 32)	Uni-directional
B1		Bi-directional

5. MRD 700 F 340 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. MRD 700 F 340 N1 M1 F1 **N1** N **

CONNECTION FLANGE

N1	none
C1	standard DENISON Calzoni (see page 40)
S1	standard SAE metric (see page 40)
T1	standard SAE UNC (see page 40)
G1	SAE 6000 psi metric (see page 40)
L1	SAE 6000 psi UNC (see page 40)

7. MRD 700 F 340 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. MRD 700 F 340 N1 M1 F1 N1 N ******
SPECIAL

**	space reserved to Denison Calzoni

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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

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DENISON CALZONI