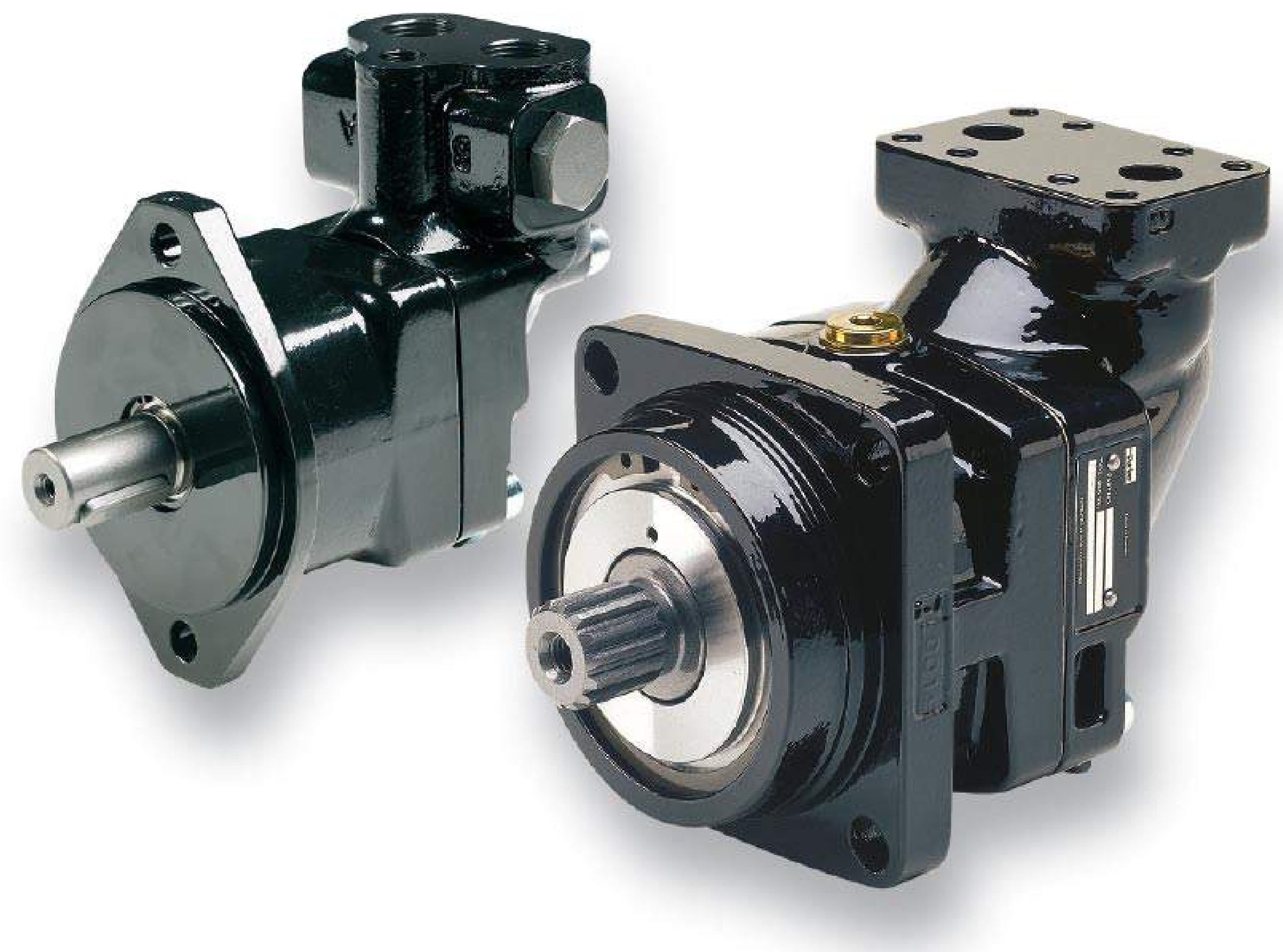


Hydraulic Motor/Pump

Series F11/F12
Fixed Displacement

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

ENGINEERING YOUR SUCCESS.

Basic formulas for hydraulic motors

Flow (q)

$$q = \frac{D \times n}{1000 \times \eta_v} \ [l/min]$$

Torque (M)

$$M = \frac{D \times \Delta p \times \eta_{hm}}{63} \ [Nm]$$

Power (P)

$$P = \frac{q \times \Delta p \times \eta_t}{600} \ [kW]$$

D	-	displacement [cm^3/rev]
n	-	shaft speed [rpm]
η_v	-	volumetric efficiency
Δp	-	differential pressure [bar] (between inlet and outlet)
η_{hm}	-	mechanical efficiency
η_t	-	overall efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Conversion factors

1 kg.. 2.20 lb
1 N.. 0.225 lbf
1 Nm.. 0.738 lbf ft
1 bar ....14.5 psi
1 l..0.264 US gallon
1 cm^3 ....0.061 cu in
1 mm.. 0.039 in
$^9/_5$°C + 32 ....1°F
1 kW .... 1.34 hp

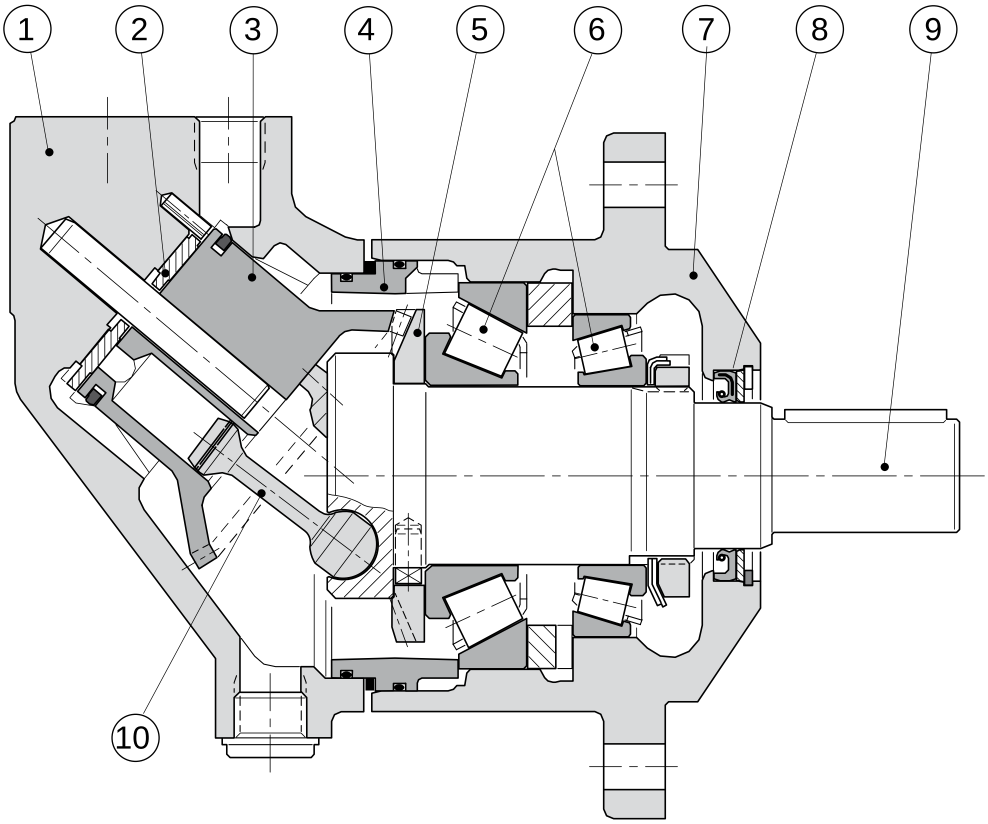
Content | Page

F11 and F12 are bent axis, fixed displacement heavy-duty motor/pump series. They can be used in numerous applications in both open and closed loop circuits.

- Series F11 is available in the following frame sizes and versions:
  - F11-5, -6, -10, -12, -14 and -19 with CETOP mounting flange and shaft end
  - F11-10, -12 and -14 with ISO flange and shaft
  - F11-10, -12, -14 and -19 with SAE flange and shaft
- Series F12 conforms to current ISO and SAE mounting flange and shaft end configurations. A very compact cartridge version is also available.
- Thanks to the unique spherical piston design, F11/F12 motors can be used at unusually high shaft speeds. Operating pressures to 480 bar provides for the high output power capability.
- The 40° angle between shaft and cylinder barrel allows for a very compact, lightweight motor/pump.
- The laminated piston ring offers important advantages such as low internal leakage and thermal shock resistance.
- The pump version has highly engineered valve plates for increased selfpriming speed and low noise, available with left and right hand rotation.
- The F11/F12 motors produce very high torque at start-up as well as at low speeds.
- Our unique timing gear design synchronizes shaft and cylinder barrel, making the F11/F12 very tolerant to high 'G' forces and torsional vibrations.
- Heavy duty roller bearings permit substantial external axial and radial shaft loads.
- The F11's and F12's have a simple and straight-forward design with very few moving parts, making them very reliable motors/pumps.
- The unique piston locking, timing gear and bearing set-up as well as the limited number of parts add up to a very robust design with long service life and, above all, proven reliability.

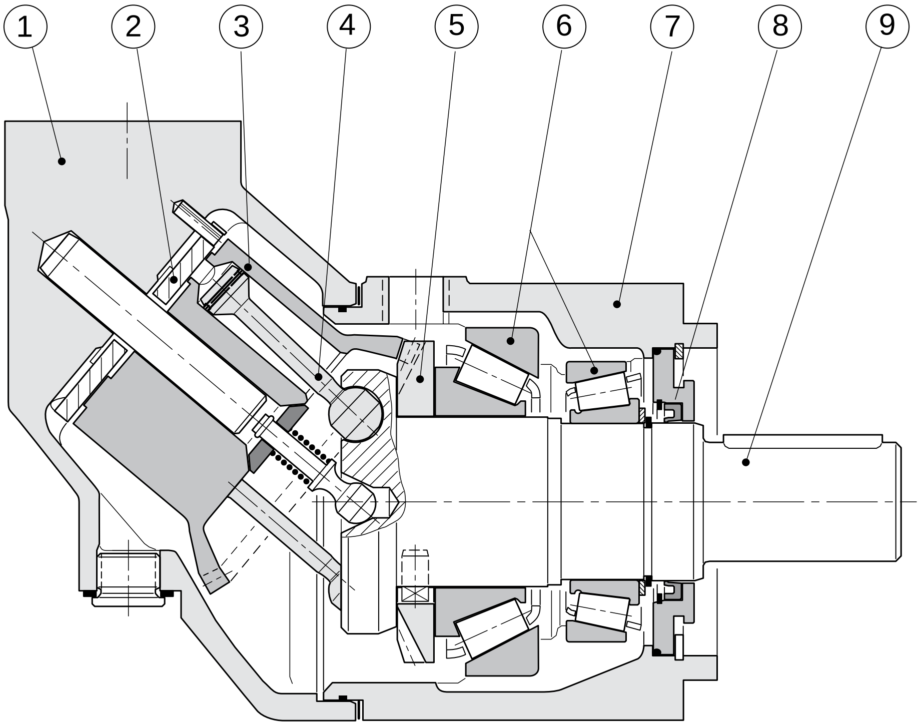
F11 cross section

1. Barrel housing
2. Valve plate
3. Cylinder barrel
4. Guide spacer with O-rings
5. Timing gear
6. Roller bearing
7. Bearing housing
8. Shaft seal
9. Output/input shaft
10. Piston with laminated piston ring



F12 cross sections

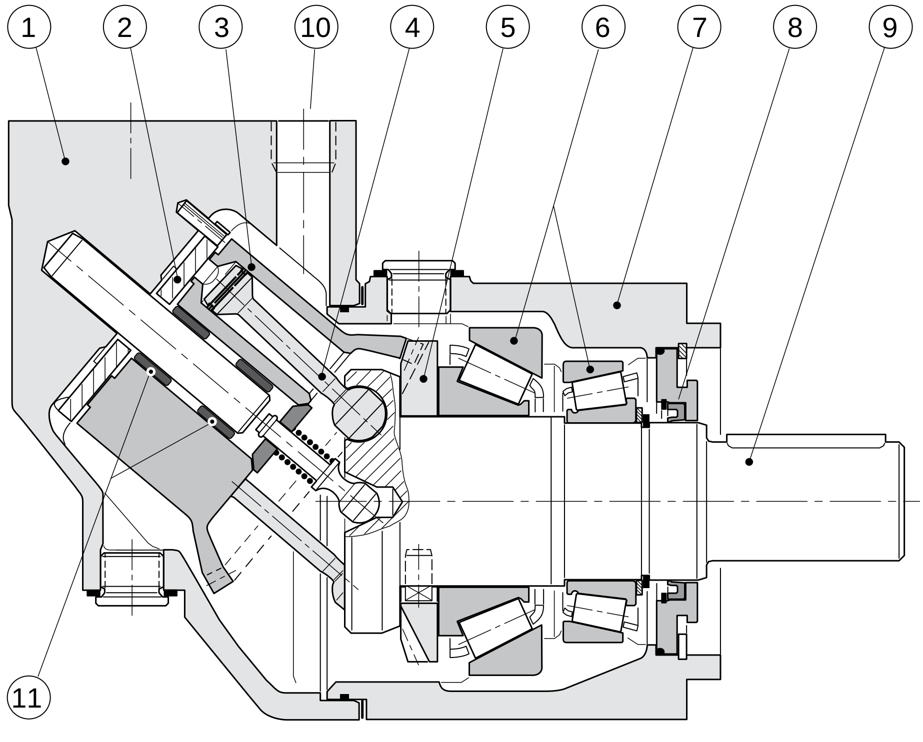
F12-30, -40, -60, -80 and -90
(F12-60 shown)



Legend:

1. Barrel housing
2. Valve plate
3. Cylinder barrel
4. Piston with piston ring
5. Timing gear
6. Tapered roller bearings
7. Bearing housing
8. Shaft seal
9. Output/input shaft
10. Port E (F12-110 and -125)
11. Needle bearings (F12-110 and -125)

F12-110 and -125
(F12-110 shown)



Parker Hannifin
Pump and Motor Division
Trollhättan, Sweden

Frame size F11	-5	-6	-10	-12	-14	-19
Displacement [cm^3/rev]	4.9	6.0	9.8	12.5	14.3	19.0
Operating pressure						
max intermittent[1)] [bar]	420					420
max continuous [bar]	350					350
Motor operating speed [rpm]						
max intermittent[1)]	14 000	11 200	11 200	10 300	9 900	8 900
max continuous	12 800	10 200	10 200	9 400	9 000	8 100
min continuous	50					50
Max pump selfpriming speed[2)]						
L or R function; max [rpm]	4 600	–	4 200	3 900	3 900	3 500
Motor input flow						
max intermittent[1)] [l/min]	69	67	110	129	142	169
max continuous [l/min]	63	61	100	118	129	154
Main circuit temp.[3)], max [°C]	80					80
min [°C]	-40					-40
Theoretical torque at 100 bar [Nm]	7.8	9.5	15.6	19.8	22.7	30.2
Mass moment of inertia						
($x10^{-3}$) [kg m^2]	0.16	0.39	0.39	0.40	0.42	1.1
Weight [kg]	4.7	7.5	7.5	8.2	8.3	11

Frame size F12	-30	-40	-60	-80	-90	-110	-125	-150	-250
Displacement [cm^3/rev]	30.0	40.0	59.8	80.4	93.0	110.1	125.0	150	242
Operating pressure									
max intermittent[1)] [bar]	480			480	420	480	480	420	420
max continuous [bar]	420			420	350	420	420	350	350
Motor operating speed [rpm]									
max intermittent[1)]	7 300	6 700	5 800	5 300	5 000	4 800	4 600	3 500	3 000
max continuous	6 700	6 100	5 300	4 800	4 600	4 400	4 200	3 200	2 700
min continuous	50								50
Max pump selfpriming speed[2)]									
L or R function; max [rpm]	3150	2870	2500	2300	2 250	2200	2 100	1 700	1 500
Motor input flow									
max intermittent[1)] [l/min]	219	268	347	426	465	528	575	525	726
max continuous [l/min]	201	244	317	386	428	484	525	480	653
Main circuit temp.[3)], max [°C]	80								80
min [°C]	-40								-40
Theoretical torque at 100 bar [Nm]	47.6	63.5	94.9	127.6	147.6	174.8	198.4	238.1	384.1
Mass moment of inertia									
($x10^{-3}$) [kg m^2]	1.7	2.9	5	8.4	8.4	11.2	11.2	40	46
Weight [kg]	12	16.5	21	26	26	36	36	70	77

1) Intermittent: max 6 seconds in any one minute.
2) Selfpriming speed valid at sea level.
3) See also installation information, operating temperature.

F11	—		—			—			—		—		—		—	
F11-CETOP		Frame size		Function	Main ports		Mounting flange	Shaft seal		Shaft		Version number		Option page 43		Option page 51

Frame size	
Code	**Displacem.** (cm^3/rev)
005	4.9
006	6.0
010	9.8
012	12.5
014	14.3
019	19.0

Frame size		5	6	10	12	14	19
Code	**Function**						
M	Motor	x	x	x	-	-	x
H	Motor, high pressure	x	-	x	x	x	x
S	Motor, high speed	-	-	(x)	-	-	(x)
R	Pump, clockwise rot'n	(x)	-	(x)	(x)	(x)	(x)
L	Pump, counter clockw.	(x)	-	(x)	(x)	(x)	(x)

For other versions, contact Parker Hannifin

Frame size		5	6	10	12	14	19
Code	**Main ports**						
B	BSP threads	x	x	x	x	x	x
U	SAE, UN threads	(x)	-	(x)	-	-	(x)

Frame size		5	6	10	12	14	19
Code	**Mounting flange**						
C	CETOP flange	x	x	x	x	x	x
W	Saw motor flange	-	-	(x)	(x)	(x)	(x)

Version number
(assigned for special versions)

Frame size		5	6	10	12	14	19
Code	**Option**						
MVR	Make-up valve clockwise rotation	-	-	(x)	(x)	(x)	(x)
MVL	Make-up valve counter clockwise rotation	-	-	(x)	(x)	(x)	(x)

Frame size		5	6	10	12	14	19
Code	**Shaft**						
K	Metric key	x	x	x	x	x	x
K	Metric key, 25 mm[3]	-	(x)	(x)	(x)	-	-
D	Spline, DIN 5480	(x)	(x)	(x)	(x)	(x)	(x)
S	Spline, SAE	(x)	-	-	-	-	-

Frame size		5	6	10	12	14	19
Code	**Shaft seal**						
N	NBR[1], low pressure	(x)	(x)	(x)	-	-	(x)
V	FPM[2], high pressure, high temperature	x	x	x	x	x	x
S	FPM[2], saw motor	-	(x)	(x)	-	-	(x)

Frame size		5	6	10	12	14	19
Code	**Option**						
P	Prepared for speed sensor	-	-	-	(x)	(x)	(x)

x: Available (x): Optional – : Not available

1) NBR - Nitrile rubber
2) FPM - Fluor rubber
3) Special version number 349

F11	—		—			—			—		—		—		—	
F11-ISO		Frame size		Function	Main ports		Mounting flange	Shaft seal		Shaft		Version number		Option page 43		Option page 51

Frame size

Code	Displacem. (cm³/rev)
010	9.8
012	12.5
014	14.3

Version number
(assigned for special versions)

Frame size		10	12	14
Code	**Option**			
MVR	Make-up valve clockwise rotation	(x)	(x)	(x)
MVL	Make-up valve counter clockwise rotation	(x)	(x)	(x)

Frame size		10	12	14
Code	**Function**			
M	Motor	x	-	-
H	Motor, high pressure	x	x	x
S	Motor, high speed	(x)	-	-
R	Pump, clockwise rot'n	(x)	(x)	(x)
L	Pump, counter clockw.	(x)	(x)	(x)

Frame size		10	12	14
Code	**Shaft**			
K	Metric key	x	x	x
D	Spline, DIN 5480	(x)	(x)	(x)
K	Metric key, 25 mm2)	(x)	(x)	-

Frame size		10	12	14
Code	**Main ports**			
F	Metric threads	x	x	x
B	BSP threads	(x)	(x)	(x)

Frame size		10	12	14
Code	**Shaft seal**			
V	FPM1), high pressure, high temperature	x	x	x
S	FPM1), saw motor	(x)	-	-

Frame size		10	12	14
Code	**Mounting flange**			
I	ISO flange	x	x	x

Frame size		10	12	14
Code	**Option**			
P	Prepared for speed sensor	-	(x)	(x)

x: Available (x): Optional – : Not available
1) FPM - Fluor rubber
2) Special version number 349

Ordering codes

Series F11/F12

F11	—		—			—			—		—		—		—	
F11-SAE		Frame size		Function	Main ports		Mounting flange	Shaft seal		Shaft		Version number		Option page 43		Option page 51

Frame size	
Code	**Displacem.** (cm³/rev)
010	9.8
012	12.5
014	14.3
019	19.0

Frame size		10	12	14	19
Code	**Function**				
M	Motor	x	-	-	x
H	Motor, high pressure	x	x	x	x
S	Motor, high speed	(x)	-	-	(x)
R	Pump clockwise rot'n	(x)	(x)	(x)	(x)
L	Pump counter clockw.	(x)	(x)	(x)	(x)

For other versions, contact Parker Hannifin

Frame size		10	12	14	19
Code	**Main ports**				
U	SAE, UN threads	x	x	x	x
B	BSP threads	(x)	(x)	-	(x)

Frame size		10	12	14	19
Code	**Mounting flange**				
S	SAE flange	x	x	x	x

Frame size		10	12	14	19
Code	**Shaft seal**				
N	NBR¹⁾, low pressure	(x)	-	-	(x)
V	FPM²⁾, high pressure, high temperature	x	x	x	x
S	FPM²⁾, saw motor	(x)	-	-	(x)

Frame size		10	12	14	19
Code	**Shaft**				
T	SAE key	-	-	x	x
S	SAE spline	(x)	(x)	(x)	(x)
K	Metric key	x	x	-	-
K	Metric key, 25 mm³⁾	(x)	(x)	-	-

Version number
(assigned for special versions)

Frame size		10	12	14	19
Code	**Option**				
MVR	Make-up valve clockwise rotation	(x)	(x)	(x)	(x)
MVL	Make-up valve counter clockwise rotation	(x)	(x)	(x)	(x)

Frame size		10	12	14	19
Code	**Option**				
P	Prepared for speed sensor	-	(x)	(x)	(x)

x: Available (x): Optional – : Not available

1) NBR - Nitrile rubber
2) FPM - Fluor rubber
3) Special version number 349

F12	—		—			—			—		—		—		—	
F12-ISO		Frame size		Function	Main ports		Mounting flange	Shaft seal		Shaft		Version number		Option page 43-44		Option page 51

Frame size

Code	Displacem. (cm³/rev)
030	30.0
040	40.0
060	59.8
080	80.4
090	93.0
110	110.1
125	125.0

Version number
(assigned for special versions)

Frame size			30	40	60	80	90	110	125
Code	**Shaft**								
D	DIN spline	Optional	(x)	(x)	(x)	(x)	(x)	(x)	(x)
Z	" "	Optional	(x)	(x)	(x)	(x)	(x)	(x)	(x)
K	Metric key	Standard	x	x	x	x	x	x	x
P	" "	Optional	(x)	-	-	-	-	-	-

Frame size		30	40	60	80	90	110	125
Code	**Function**							
M	Motor	x	x	x	x	x	x	x
	Pump:							
L	counter clockw.	(x)	(x)	(x)	(x)	(x)	(x)	(x)
R	clockwise	(x)	(x)	(x)	(x)	(x)	(x)	(x)

Frame size		30	40	60	80	90	110	125
Code	**Option**							
L01	Integr. flushing valve	(x)	(x)	(x)	(x)	(x)	-3)	-3)
MVR	Make-up valve clockwise rotation	(x)	-	-	-	-	-	-
MVL	Make-up valve counter clockwise rotation	(x)	-	-	-	-	-	-

Frame size		30	40	60	80	90	110	125
Code	**Main ports**							
F	SAE 6000 psi flange	x	x	x	x	x	x	x

Frame size		30	40	60	80	90	110	125
Code	**Option**							
P	Prepared for speed sensor	(x)	(x)	(x)	(x)	(x)	(x)	(x)

Frame size		30	40	60	80	90	110	125
Code	**Shaft seal**							
N	NBR1), low pressure	(x)	(x)	(x)	(x)	(x)	(x)	(x)
V	FPM2), high temperature, high pressure	x	x	x	x	x	x	x

Frame size		30	40	60	80	90	110	125
Code	**Mounting flange**							
I	ISO flange	x	x	x	x	x	x	x

x: Available (x): Optional – : Not available
1) NBR - Nitrile rubber
2) FPM - Fluor rubber
3) F12-110 and -125: Accessory valve block (page 45)

F12	—		—			—			—		—		—		—	
		Frame size		Function	Main ports		Mounting flange	Shaft seal		Shaft		Version number		Option page 43-44		Option page 51

F12-Cartridge CETOP

Frame size	
Code	**Displacem.** (cm³/rev)
030	30.0
040	40.0
060	59.8
080	80.4
090	93.0
110	110.1
125	125.0
150	150.0

Version number
(assigned for special versions)

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**
Code	**Shaft**								
C	DIN spline Standard	x	x	x	x	x	x	x	-
K	Metric key Optional	(x)	-	(x)	(x)	(x)	-	-	x
X	Metric key4) Optional	-	(x)	-	-	-	-	-	-
X	Spline 5) DIN 5480	-	-	-	-	-	x	x	-
D	Spline DIN 5480	-	-	-	-	-	-	-	(x)

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**
Code	**Function**								
M	Motor	x	x	x	x	x	x	x	x
H	Motor, high pressure	-	-	-	-	-	-	-	(x)
	Pump:								
R	Clockwice	-	-	-	-	-	-	-	(x)
L	counter clockw.	-	-	-	-	-	-	-	(x)

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**
Code	**Option**								
L01	Integr. flushing valve	(x)	(x)	(x)	(x)	(x)	-3)	-3)	-
MVR	Make-up valve clockwise rotation	(x)	-	-	-	-	-	-	-
MVL	Make-up valve counter clockwise rotation	(x)	-	-	-	-	-	-	-

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**
Code	**Main ports**								
F	SAE 6000 psi flange	x	x	x	x	x	x	x	x

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**
Code	**Option**								
P	Prepared for speed sensor	x	(x)	(x)	(x)	(x)	x	x	-

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**
Code	**Mounting flange**								
C	Cartridge	x	x	x	x	x	x	x	-
C	CETOP	-	-	-	-	-	-	-	x

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**
Code	**Shaft seal**								
N	NBR1), low pressure	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)
V	FPM2), high temperature, high pressure	x	x	x	x	x	x	x	x

x: Available (x): Optional – : Not available

1) NBR - Nitrile rubber
2) FPM - Fluor rubber
3) F12-110 and -125: Accessory valve block (page 45)
4) Special version number 264
5) Special version number 326

F12	—	☐	—	☐	☐	—	☐	☐	—	☐	—	☐	—	☐	—	☐
F12-SAE		Frame size		Function	Main ports		Mounting flange	Shaft seal		Shaft		Version number		Option page 43-44		Option page 51

Frame size	
Code	**Displacem.** (cm^3/rev)
030	30.0
040	40.0
060	59.8
080	80.4
090	93.0
110	110.1
125	125.0
150	150.0
250	242.0

Version number
(assigned for special versions)

Frame size			**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**	**250**
Code	**Shaft**										
S	SAE spline	Optional	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)
U	" "	Optional	-	-	-	(x)	(x)	-	-	-	-
T	SAE key	Standard	x	x	x	x	x	x	x	x	-
K	Metric key		-	-	-	-	-	-	-	(x)	x
F	SAE spline		-	-	-	-	-	-	-	-	(x)
D	Spline, DIN 5480		-	-	-	-	-	-	-	-	(x)

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**	**250**
Code	**Function**									
M	Motor	x	x	x	x	x	x	x	x	-
H	Motor, high pressure	-	-	-	-	-	-	-	(x)	-
Q	Motor	-	-	-	-	-	-	-	-	x
	Pump:									
L	counter clockw.	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)
R	clockwise	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**	**250**
Code	**Option**									
L01	Integr. flushing valve	(x)	(x)	(x)	(x)	(x)	-[3)]	-[3)]	-	-
MVR	Make-up valve clockwise rotation	(x)	-	-	-	-	-	-	-	-
MVL	Make-up valve counter clockwise rotation	(x)	-	-	-	-	-	-	-	-

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**	**250**
Code	**Main ports**									
S	SAE 6000 psi flange	x	x	x	x	x	x	x	-	-
U	SAE, UN threads	(x)	(x)	(x)	(x)	(x)	(x)	(x)	-	-
F	SAE 6000 psi flange[4)]	-	-	-	-	-	-	-	x	x

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**	**250**
Code	**Option**									
P	Prepared for speed sensor	(x)	(x)	(x)	(x)	(x)	(x)	(x)	-	-

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**	**250**
Code	**Shaft seal**									
N	NBR[1)], low pressure	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	-
V	FPM[2)], high temperature, high pressure	x	x	x	x	x	x	x	x	x

Frame size		**30**	**40**	**60**	**80**	**90**	**110**	**125**	**150**	**250**
Code	**Mounting flange**									
S	SAE 4 bolt	x	x	x	x	x	x	x	x	x
T	SAE 2 bolt	x	x	x	-	-	-	-	-	-

x: Available (x): Optional – : Not available

1) NBR - Nitrile rubber
2) FPM - Fluor rubber
3) F12-110 and -125: Accessory valve block (page 45)
4) Metric threads

Preferred versions F11/F12

F11

Ordering Codes	Part number
F11-005-MB-CV-K-000-000-0	3707249
F11-005-HU-CV-K-000-000-0	3707308
F11-010-HU-CV-K-000-000-0	3707310
F11-010-MB-CV-K-000-000-0	3706030
F11-012-HF-IV-K-000-000-0	3786708
F11-012-HF-IV-K-349-000-0	3787600
F11-014-HB-CV-K-000-000-0	3782830
F11-014-HF-IV-K-000-000-0	3783287
F11-019-MB-CV-K-000-000-0	3707893
F11-019-HU-SV-T-000-000-0	3707314

F12

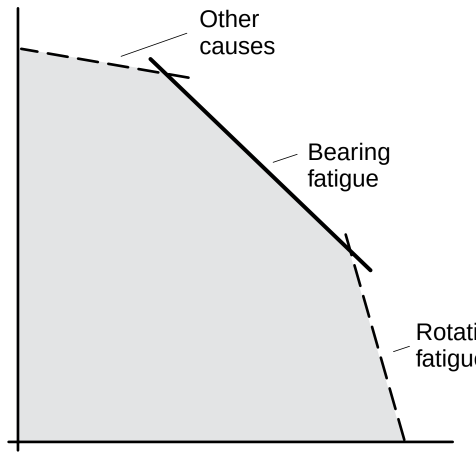
Ordering Codes	Part number
F12-030-MF-IV-K-000-000-0	3799844
F12-030-MS-SV-T-000-000-0	3799852
F12-030-MS-TV-S-000-000-0	3799616
F12-030-MF-IV-D-000-000-0	3799843
F12-030-MS-SV-S-000-000-0	3799855
F12-040-MS-SV-S-000-000-0	3799532
F12-040-MF-IV-K-000-000-0	3799526
F12-040-MS-SV-T-000-000-0	3799533
F12-040-MF-IV-D-000-000-0	3799525
F12-060-MF-IV-D-000-000-0	3799988
F12-060-MS-SV-S-000-000-0	3799998
F12-060-MF-IV-K-000-000-0	3799989
F12-060-MS-SV-T-000-000-0	3799999
F12-080-MF-IV-D-000-000-0	3780767
F12-080-MS-SV-T-000-000-0	3780784
F12-080-MF-IV-K-000-000-0	3780772
F12-080-MS-SV-S-000-000-0	3780783
F12-090-MS-SV-T-000-000-0	3785604
F12-090-MF-IV-D-000-000-0	3785518
F12-090-MF-IV-K-000-000-0	3785609
F12-090-MS-SV-S-000-000-0	3785875
F12-110-MS-SV-S-000-000-0	3781542
F12-110-MF-IV-K-000-000-0	3781534
F12-110-MF-IV-D-000-000-0	3781530
F12-110-MS-SV-T-000-000-0	3782636
F12-125-MS-SV-S-000-000-0	3785504
F12-125-MF-IV-D-000-000-0	3785866
F12-150-MF-SV-S-000-000-0	3787725
F12-150-MF-CV-K-000-000-0	3787721
F12-250-QF-SV-F-000	3787182
F12-250-QF-SV-K-000	3787184

Bearing life

General information
Bearing life can be calculated for that part of the load/ life curve (shown below) that is designated 'Bearing fatigue'. 'Rotating group fatigue and wear' and 'Other' caused by material fatigue, fluid contamination, etc. should also be taken into consideration when estimating the service life of a motor/pump in a specific application.

Bearing life calculations are mainly used when comparing different frame sizes. Bearing life, designated B_{10} (or L_{10}), is dependent of system pressure, operating speed, external shaft loads, fluid viscosity in the case, and fluid contamination level.

The B_{10} value means that 90% of the bearings survive, at a minimum, the number of hours calculated. Statistically, 50% of the bearings will survive at least five times the B_{10} life.



Hydraulic unit life versus system pressure.

Bearing life calculation
An application is usually governed by a certain duty or work cycle where pressure and speed vary with time during the cycle.

In addition, bearing life depends on external shaft forces, fluid viscosity in the case and fluid conta-mination.

Parker Hannifin has a computer program for calculating bearing life and will assist in determining F11 or F12 motor/pump life in a specific application.

Required information
When requesting a bearing life calculation from Parker Hannifin, the following information (where applicable) should be provided:

- A short presentation of the application
- F11 or F12 size and version
- Duty cycle (pressure and speed versus time at given displacements)
- Low system pressure
- Case fluid viscosity
- Life probability (B_{10}, B_{20}, etc.)
- Operating mode (pump or motor)
- Direction of rotation (L or R)
- External shaft loads (Forces, Gear, Belt, Cardan or none)

For forces please provide:

- Axial load, Fixed radial load, Bending moment, Rotating radial load and distance flange to radial load.

For Gear please provide:

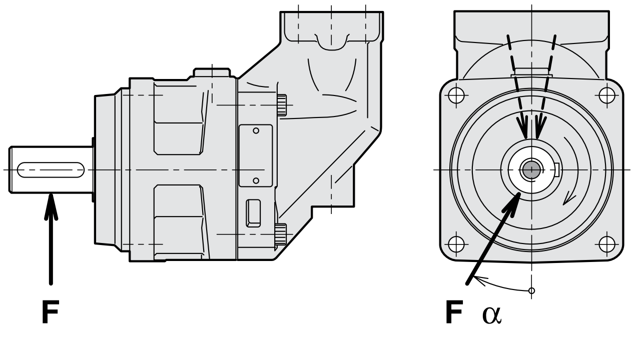
- Pitch diameter, Pressure angle, Spiral angle, Distance flange – gearwheel (mid) and Gearwheel spiral direction (R or L).

For Belt please provide:

- Pretension, Coefficient of friction, Angle of contact, Distance flange – pulley (mid) and Diameter pulley.

For Cardan please provide:

- Shaft angle, Distance flange – first joint and distance between joints
- Angle of attack (α) as defined below



The direction (a) of the radial load is positive in the direction of rotation as shown.

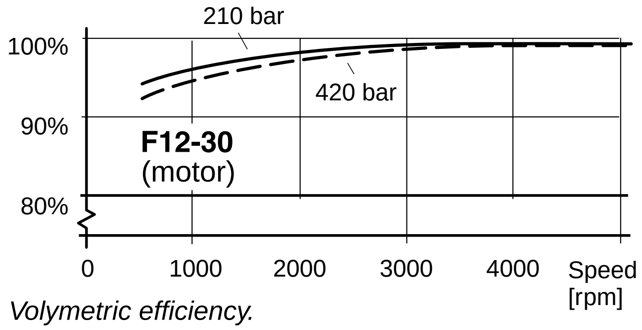
To obtain maximum bearing life, the radial load should, in most cases, be located approximately at 170° (motor; R.H. rot'n) or 190° (pump; R.H rot'n).

Efficiency

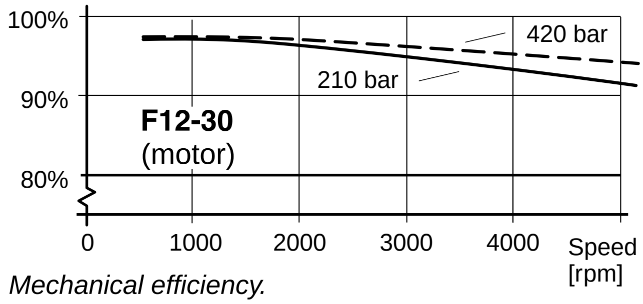
Because of its high overall efficiency, driving a motor/pump from series F11/F12 requires less fuel or electric power. Also, it allows the use of a small reservoir and heat exchanger, which in turn reduce cost, weight, and installation size.

The diagrams to the right shows volumetric and mechanical efficiencies of an F12-30.

Contact Parker Hannifin for efficiency information on a particular F11/F12 frame size that is being considered.



Volymetric efficiency.



Mechanical efficiency.

Noise level

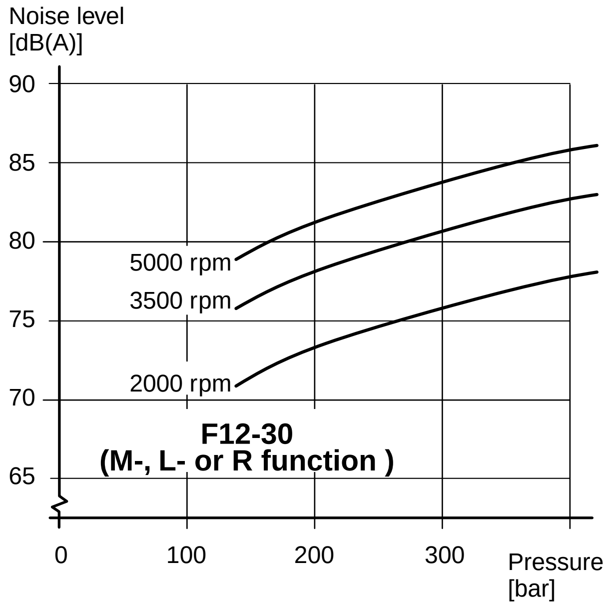
Series F11/F12 feature low noise levels from low to high speeds and pressures.

As an example, the diagram to the right shows the noise level of an F12-30.

The noise level is measured in a semi-anechoic room, 1 m behind the unit.

The noise level for a particular motor/pump may vary ±2 dB(A) compared to what is shown in the diagram.

NOTE: Noise information for F11/F12 frame sizes are available from Parker Hannifin.



Selfpriming speed and required inlet pressure

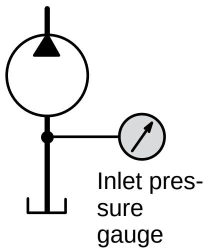
Series F11
In pump applications, the F11 with function **L** (counter clockwise rotation) or **R** (clockwise rotation) is normally used. The L and R (pump) provide the highest selfpriming speeds (see table) as well as the lowest noise level. The **M** (motor) function can also be used as a pump, in either direction, but at a lower selfpriming speed.

Operating above the selfpriming speed (refer to Diagram 1) requires increased inlet pressure.

As an example, at least 1.0 bar is needed when operating the F11-19-M as a pump at 3500 rpm. An F11 used as a motor (e.g. in a hydrostatic transmission), may sometimes operate as a pump at speeds above the selfpriming speed; this requires additional inlet pressure.

Insufficient inlet pressure can cause pump cavitation resulting in greatly increased pump noise and deteriorating performance.

Function	**L** or **R**	**M**	**H**
F11-5	4600	3800	3200
F11-10	4200	3100	2700
F11-12	3900	-	3000
F11-14	3900	-	3200
F11-19	3500	2400	2100
F12-150	1700	1300	1100
F12-250	1500	950	-



Series F12
When operating the F12 as a pump (with **L** or **R** valve plate) above the selfpriming speed, the inlet must be pressurized. Increased noise and deteriorating performance may otherwise be experienced.

Diagrams 2 and 3 show required pump inlet pressure vs. shaft speed.

The F12 motor (type **M** valve plate) sometimes operates as a pump e.g. when used in a propel transmission and the vehicle is going downhill.

Minimum required inlet pressure versus shaft speed is shown in the diagrams.

NOTE:	Diagrams 1, 2 and 3 are valid at sea level.

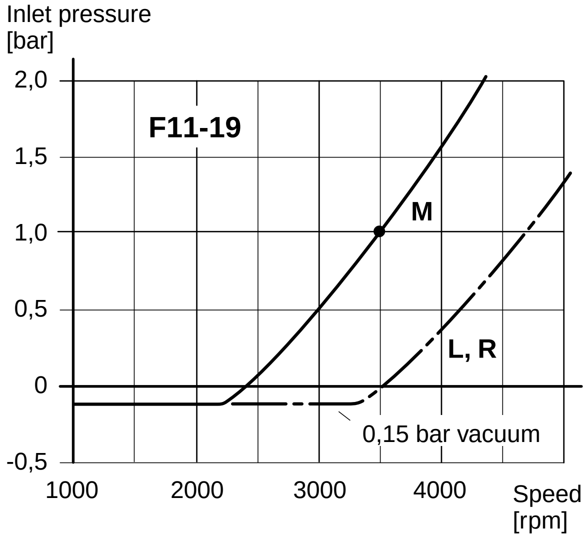


Diagram 1. Min required inlet pressure (F11-19).

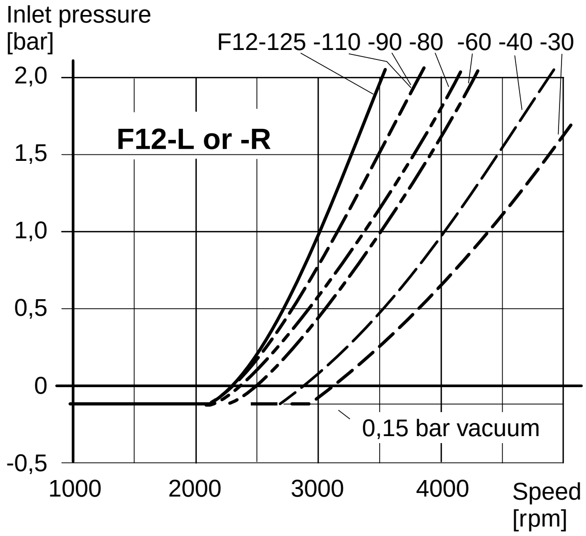


Diagram 2. Min. required pump (F12-L or -R) inlet press.

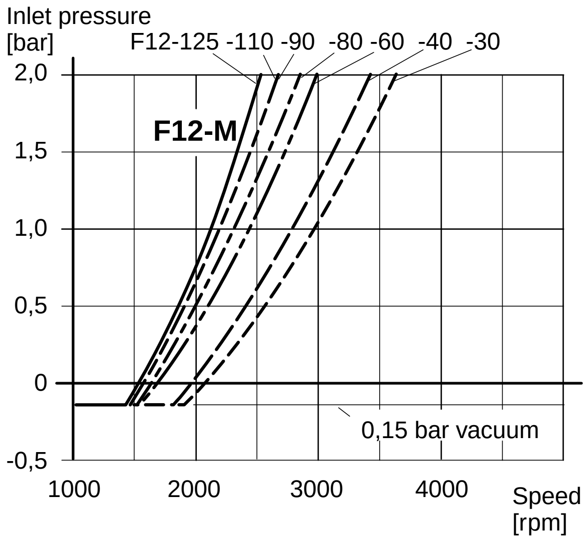
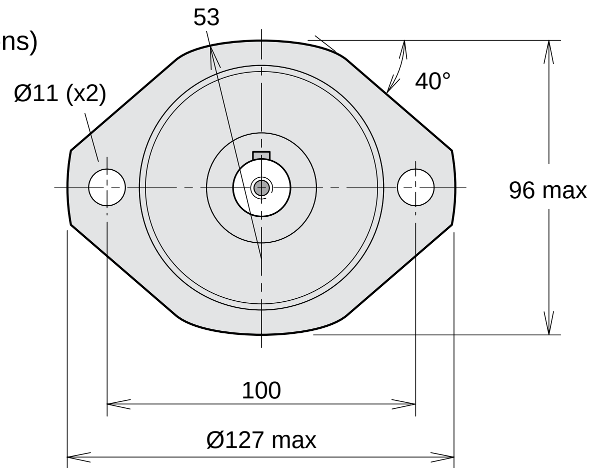
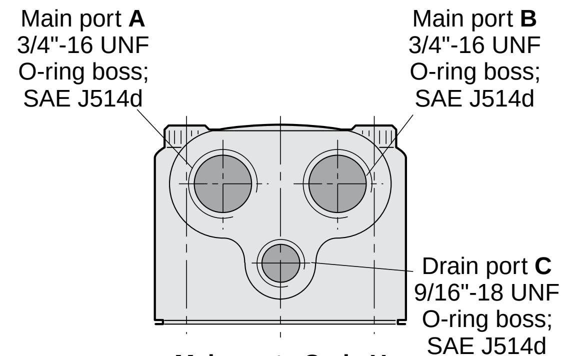


Diagram 3. Min. required motor (F12-M) inlet pressure.

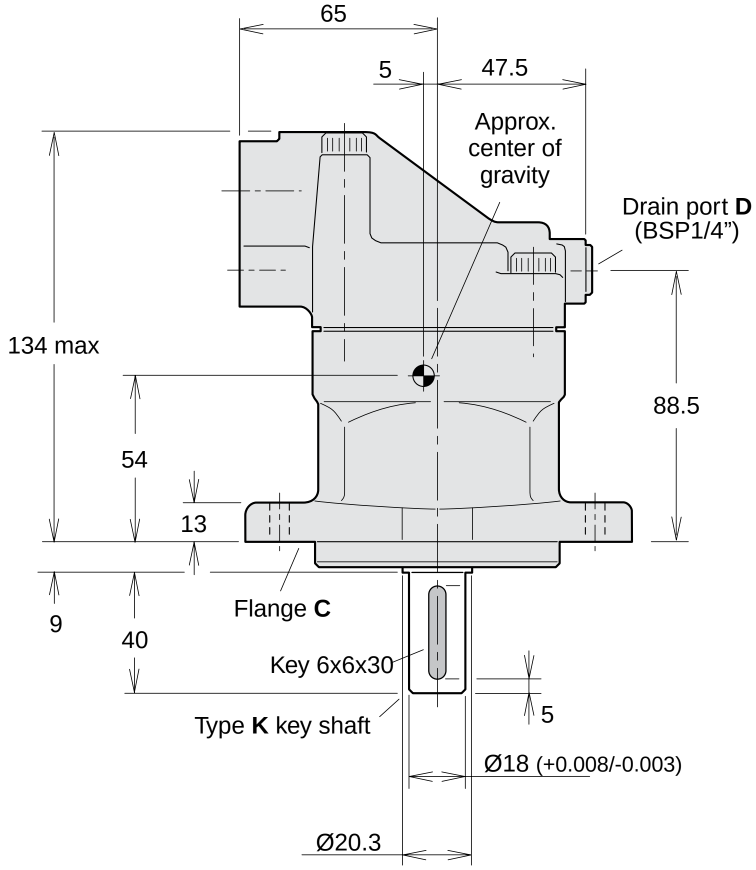
F11-5
(CETOP versions)

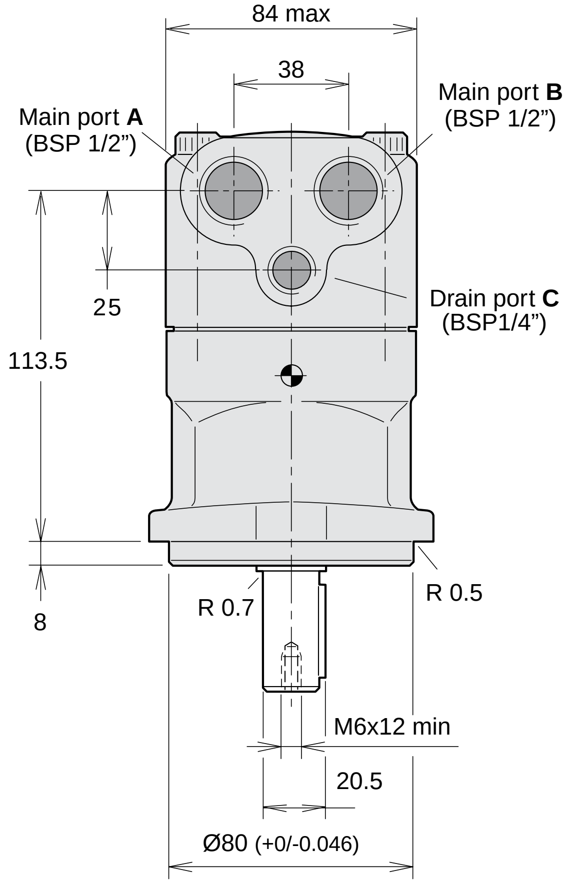


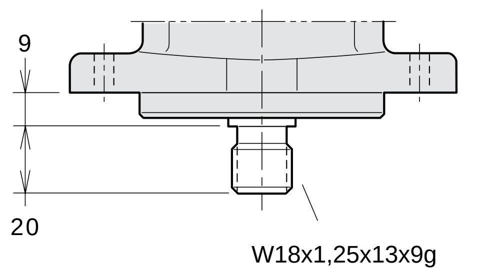
Type **C** mounting flange



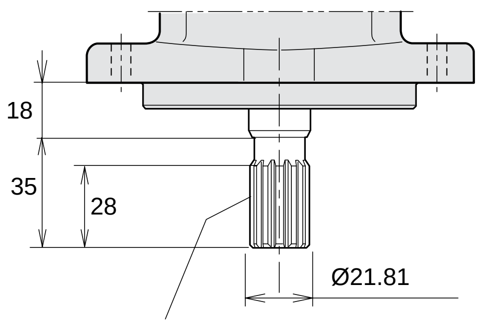
Main ports Code U





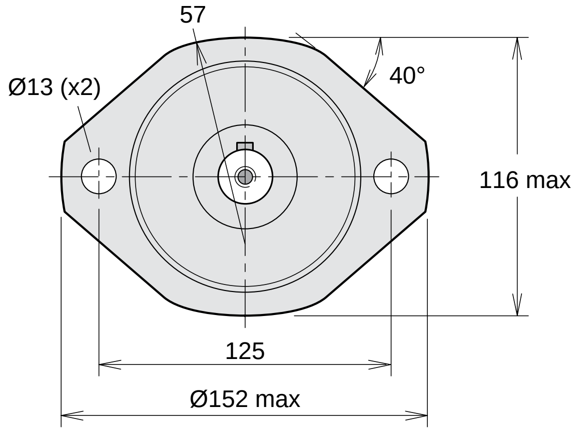


Type **D** spline shaft (DIN 5480)

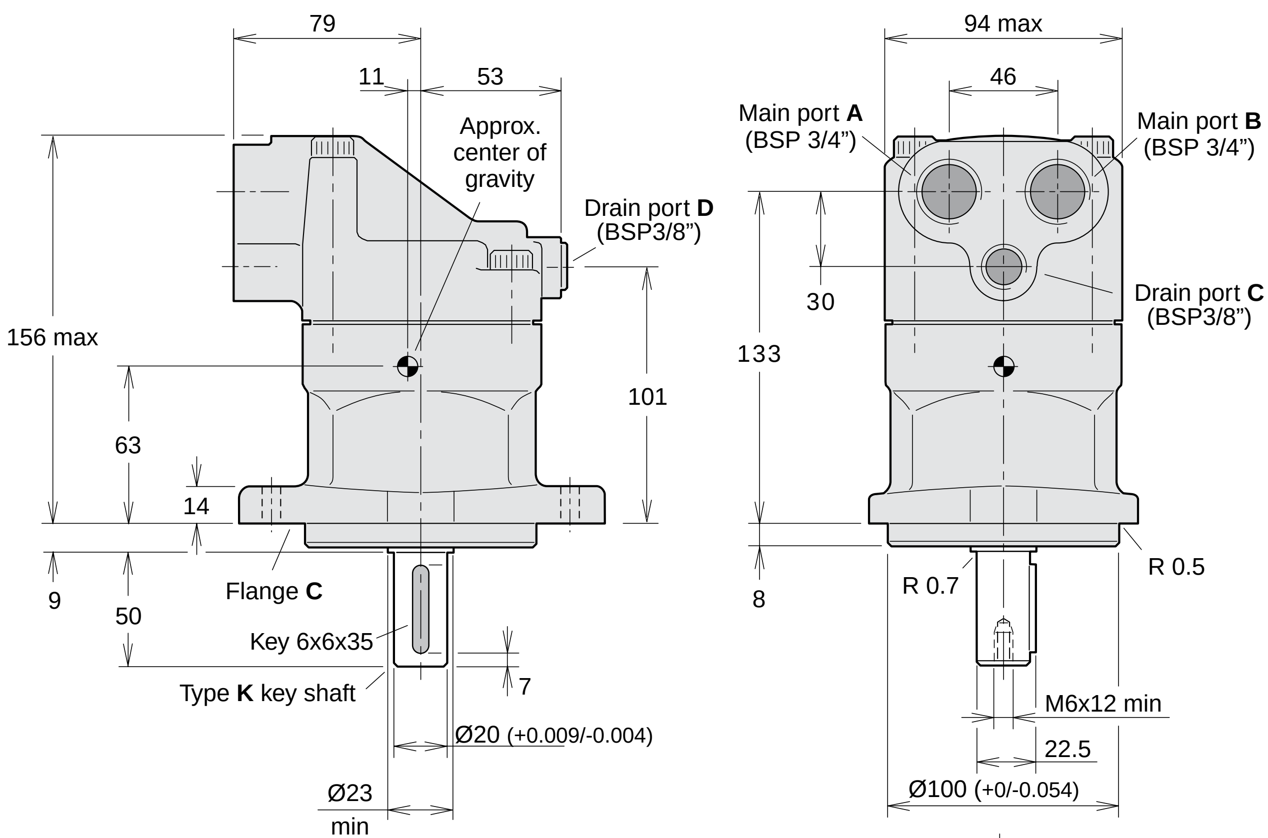


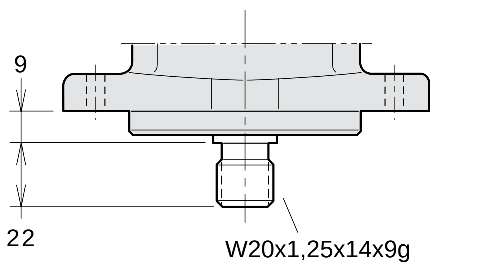
Type **S** spline shaft (13T16/32 DP)

F11-6, -10
(CETOP versions)

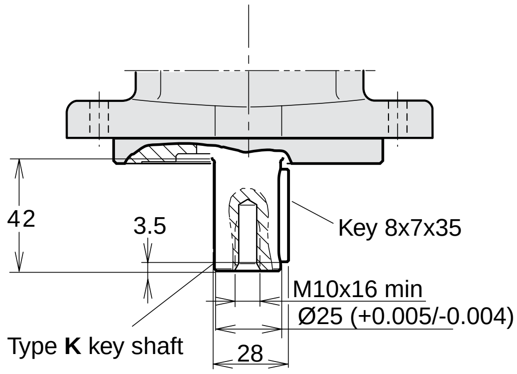


Type **C** mounting flange

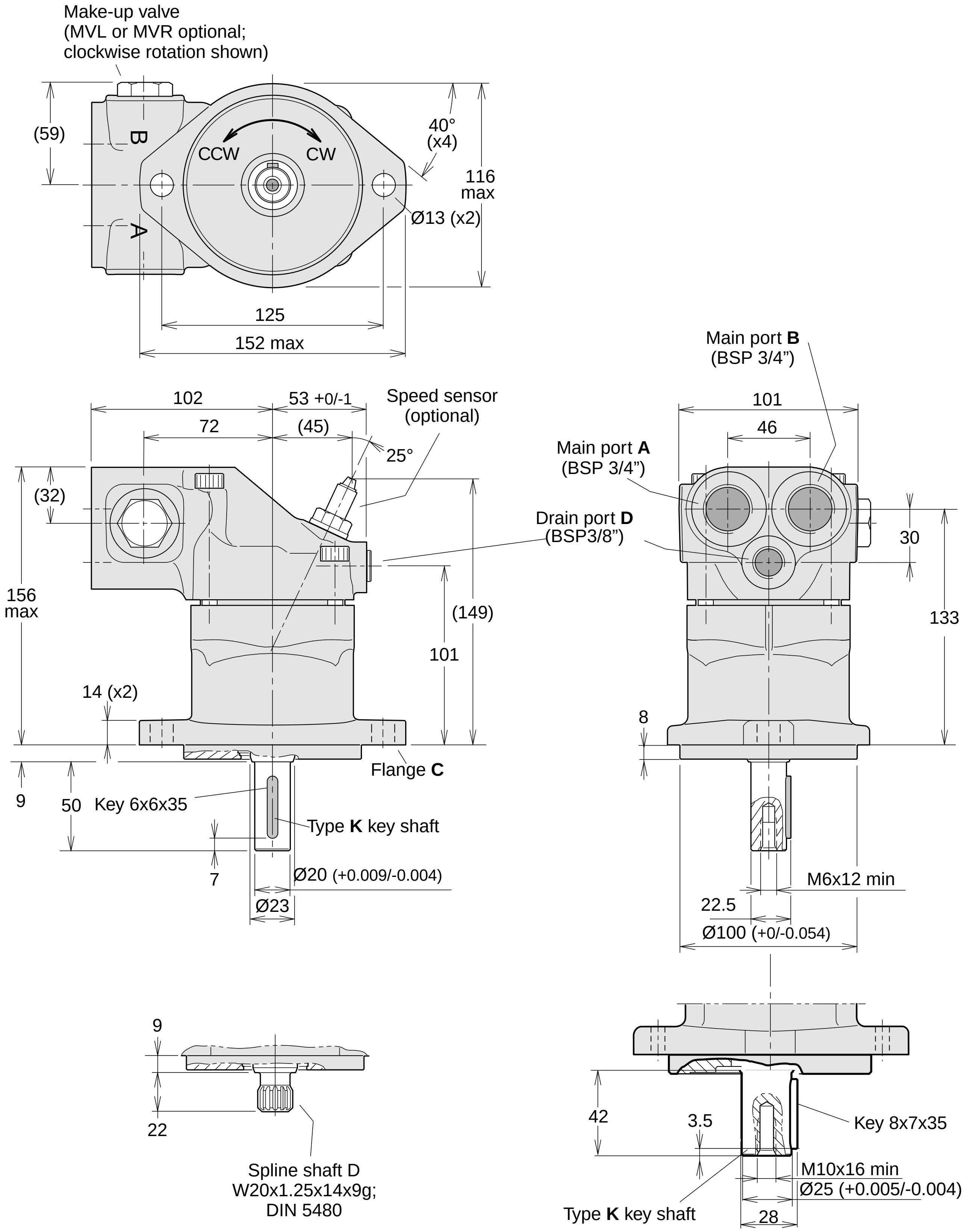




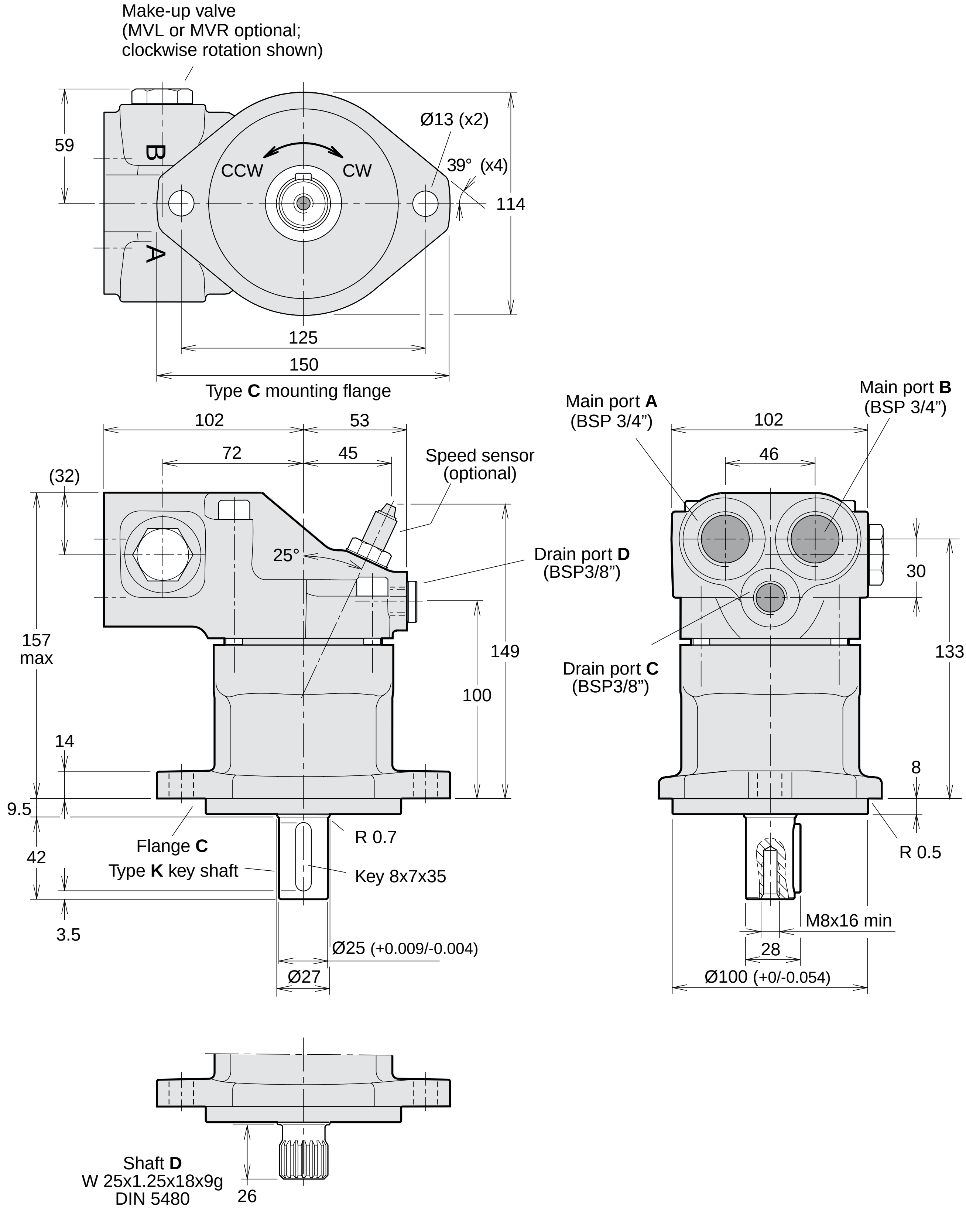
Type **D** spline shaft (DIN 5480)



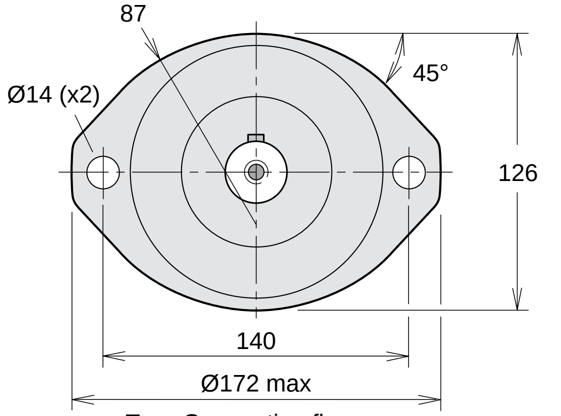
F11-12
(CETOP versions)



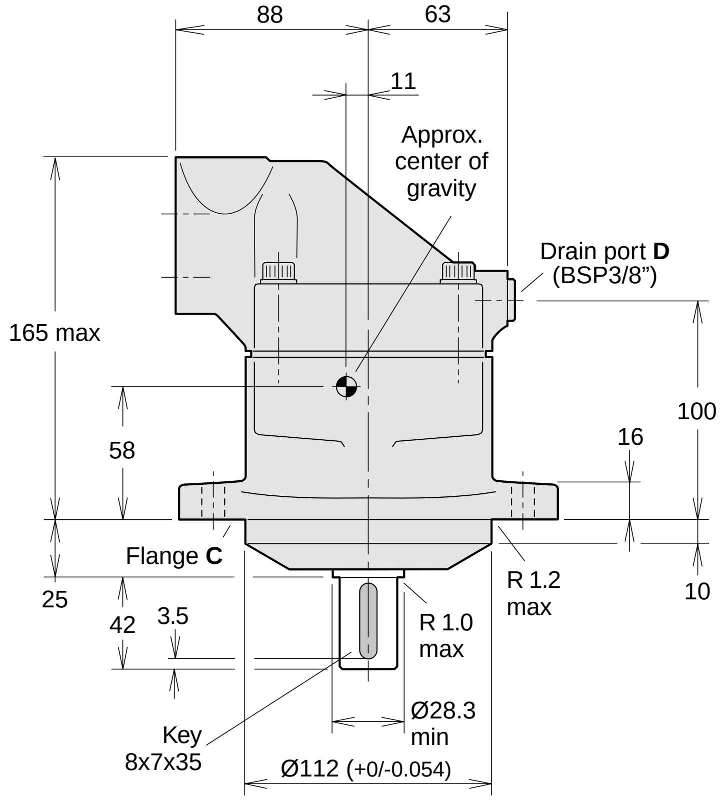
F11-14
(CETOP versions)

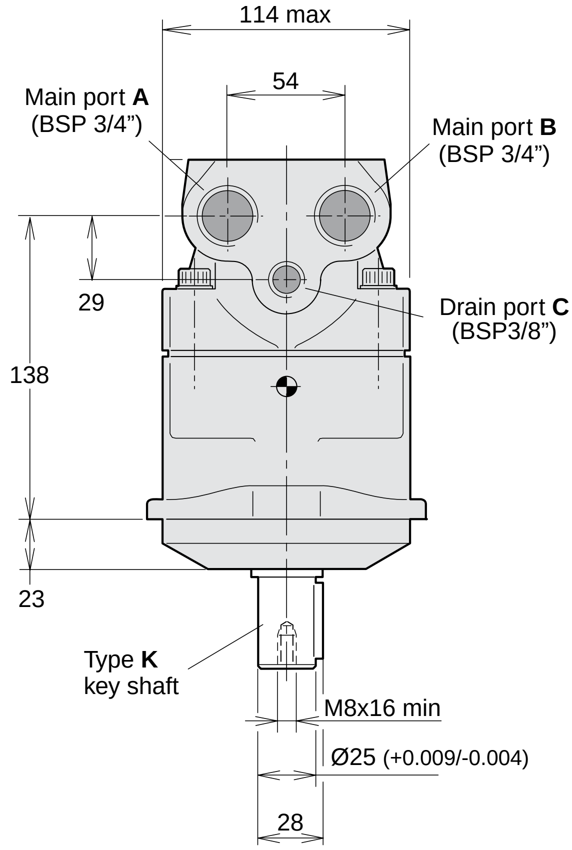


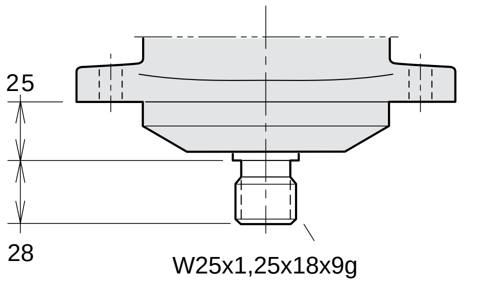
F11-19
(CETOP version)



Type **C** mounting flange

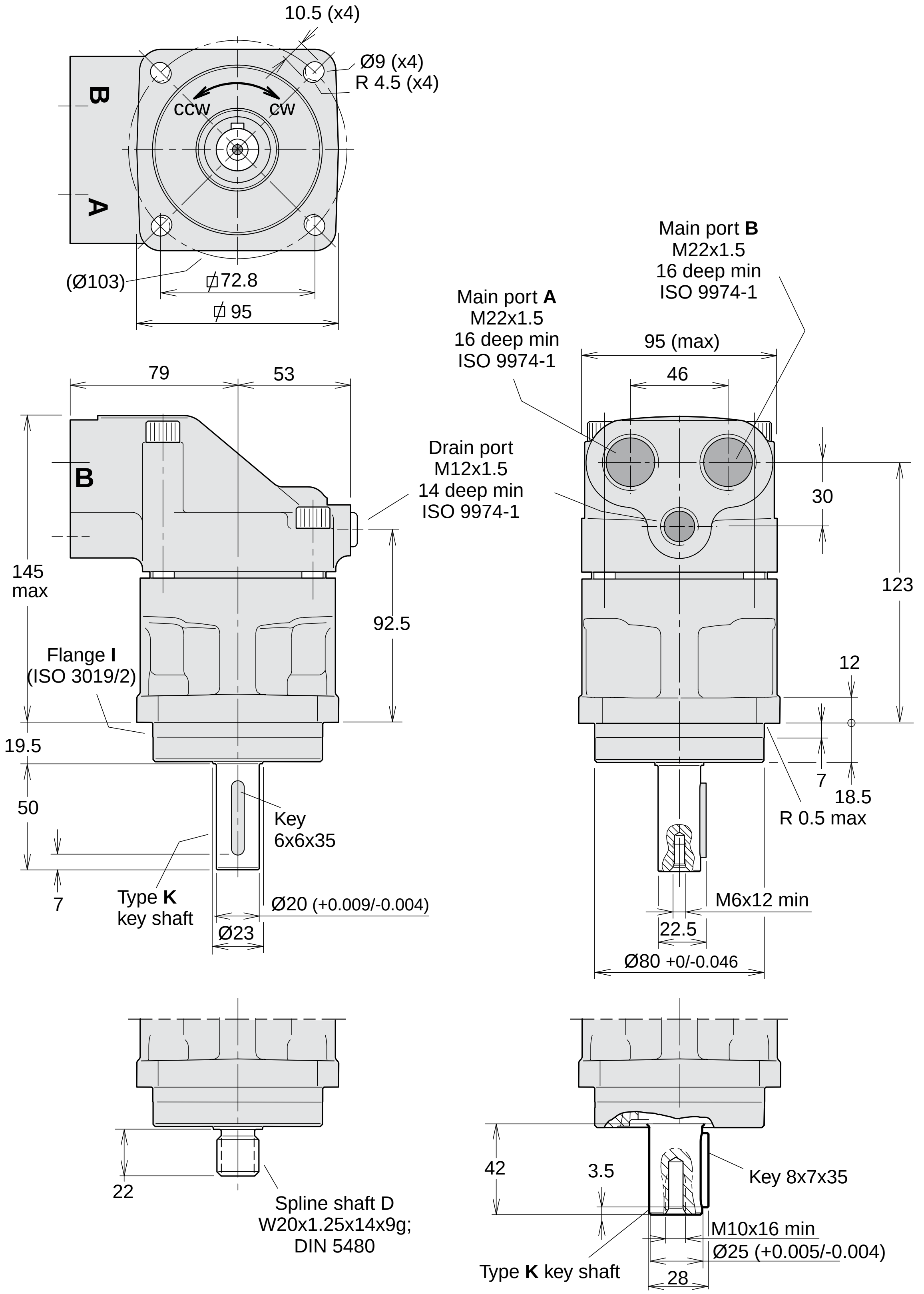




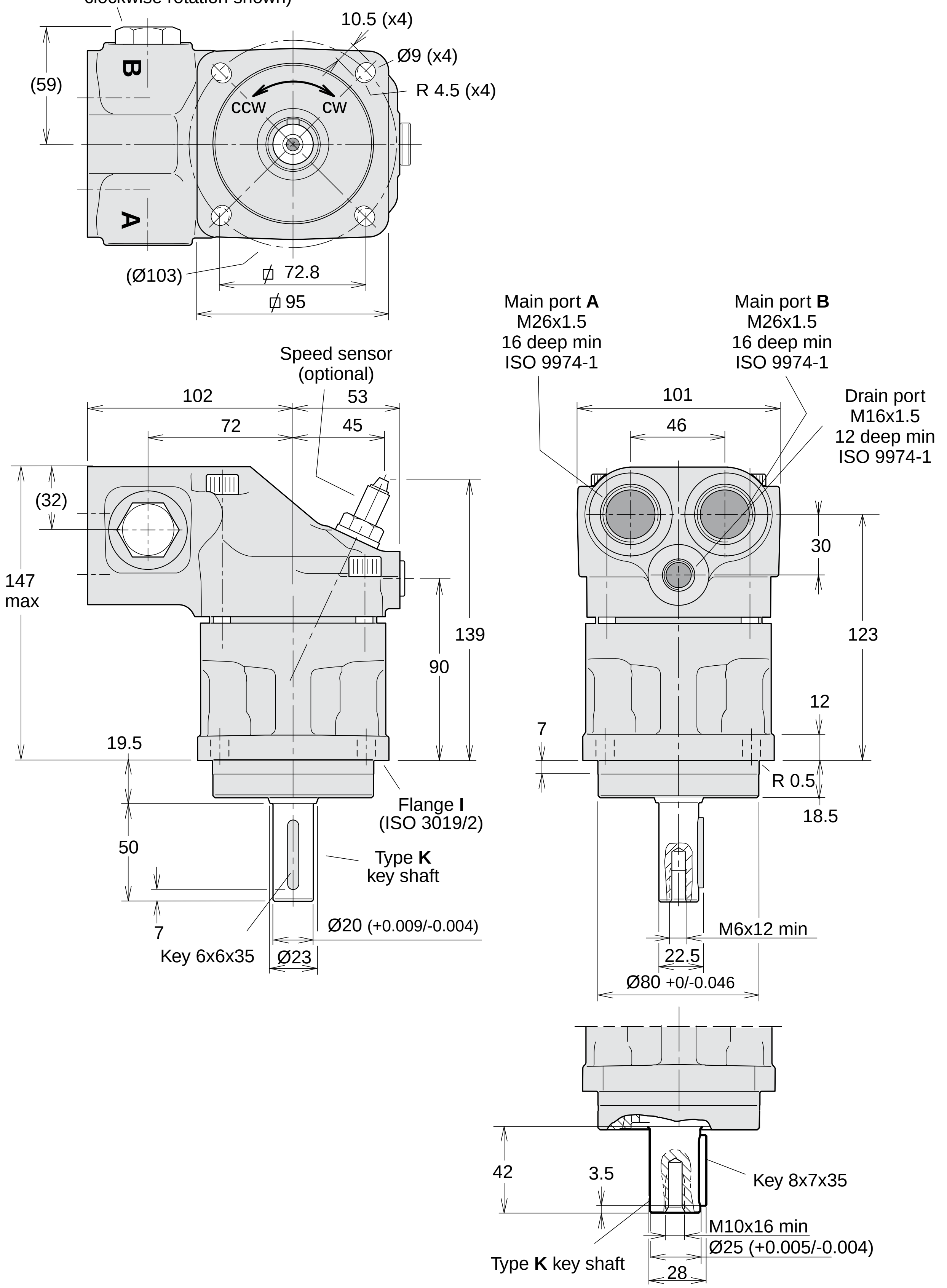


Type **D** spline shaft (DIN 5480)

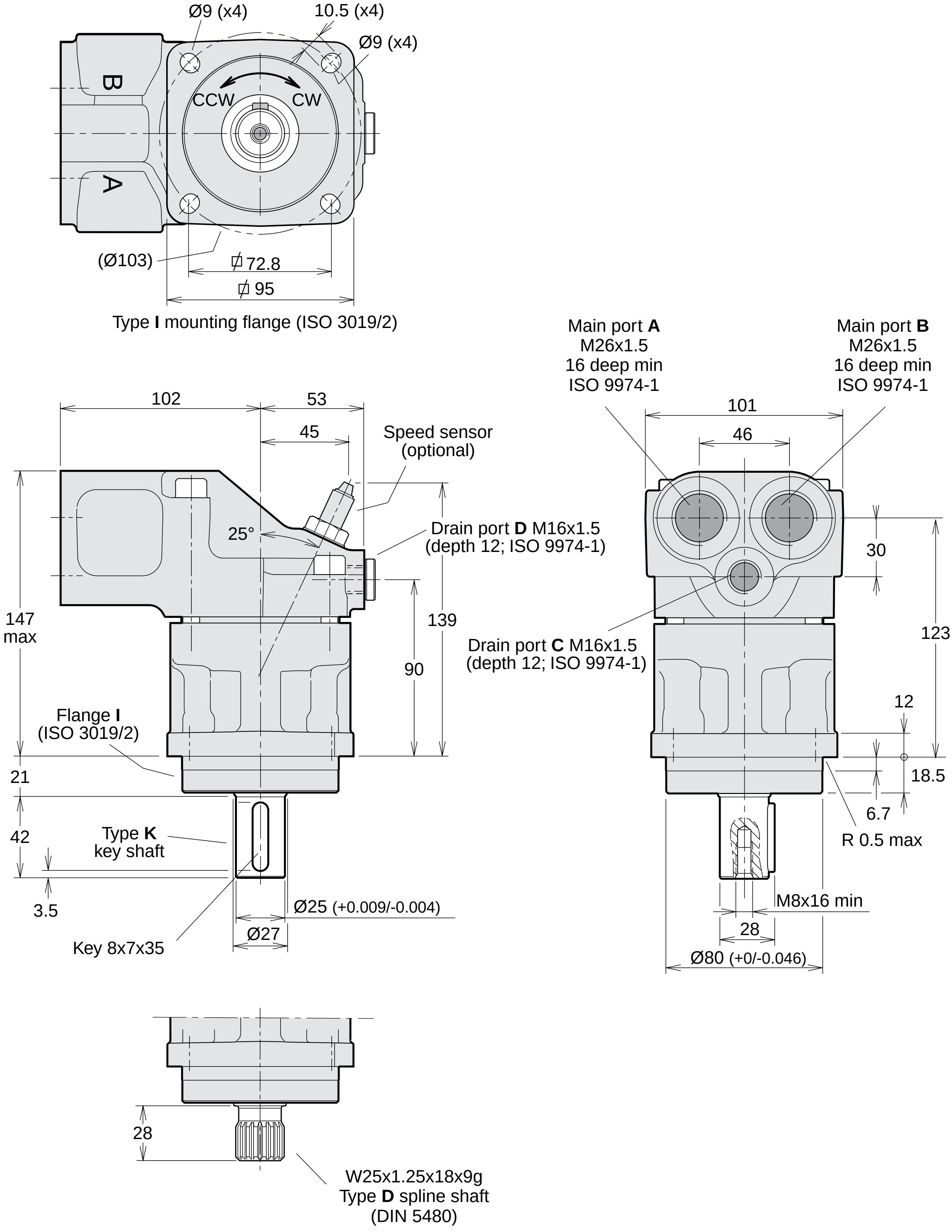
F11-10
(ISO versions)



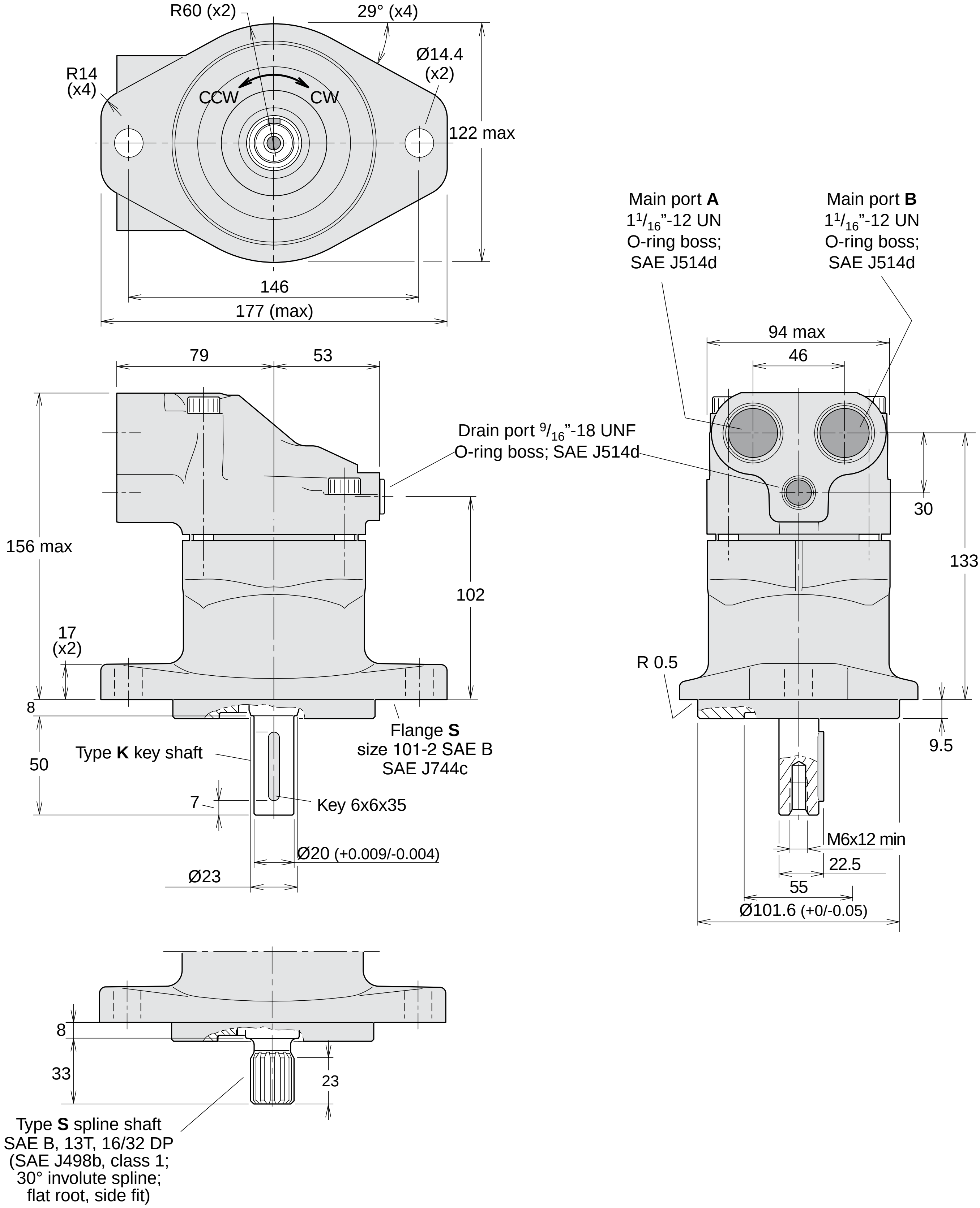
F11-12
(ISO versions)



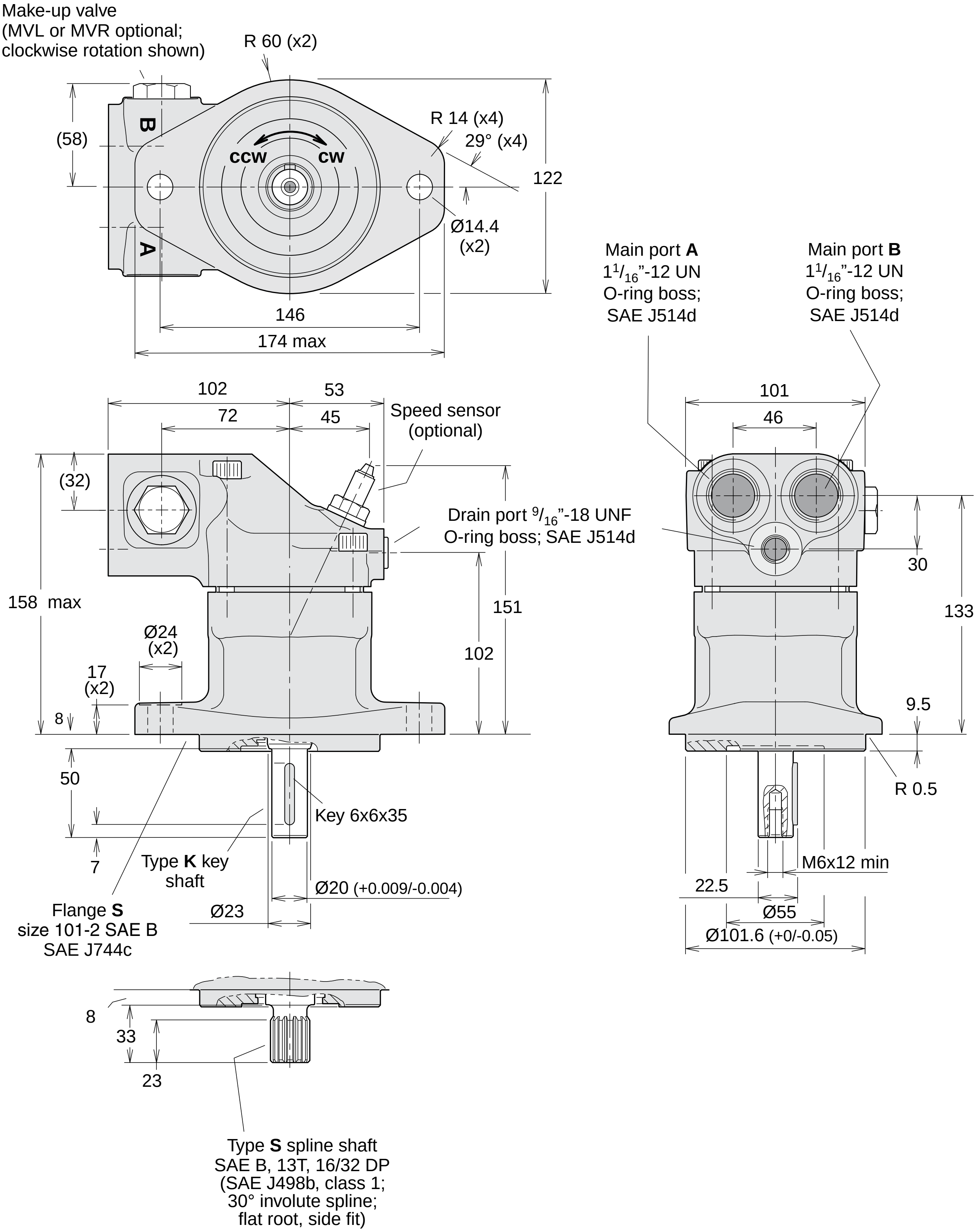
F11-14
(ISO versions)



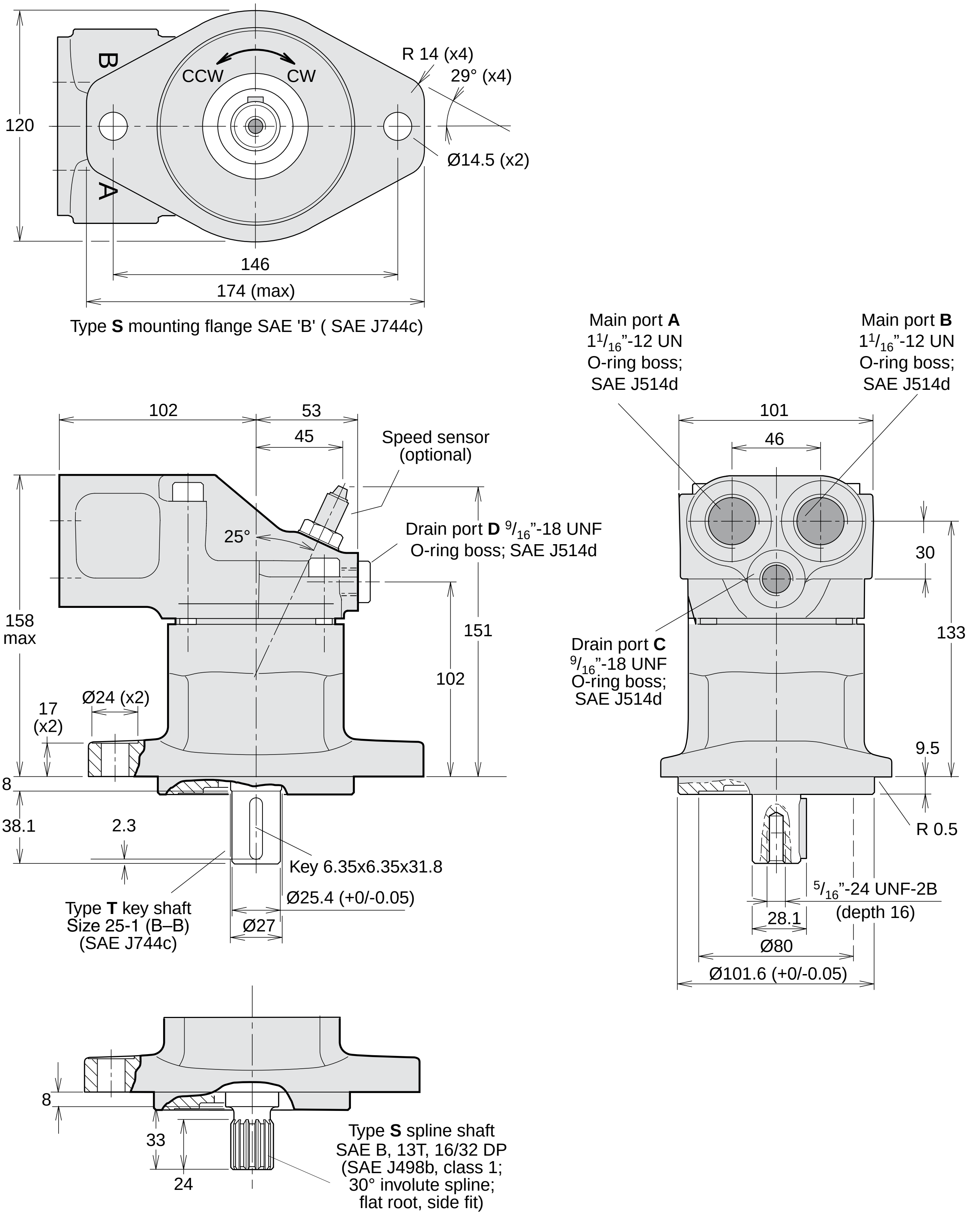
F11-10
(SAE versions)



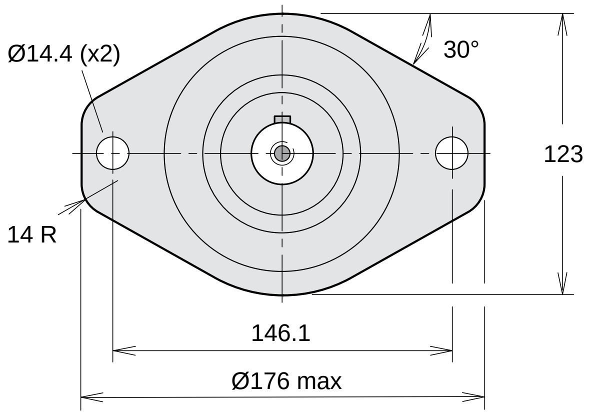
F11-12
(SAE versions)



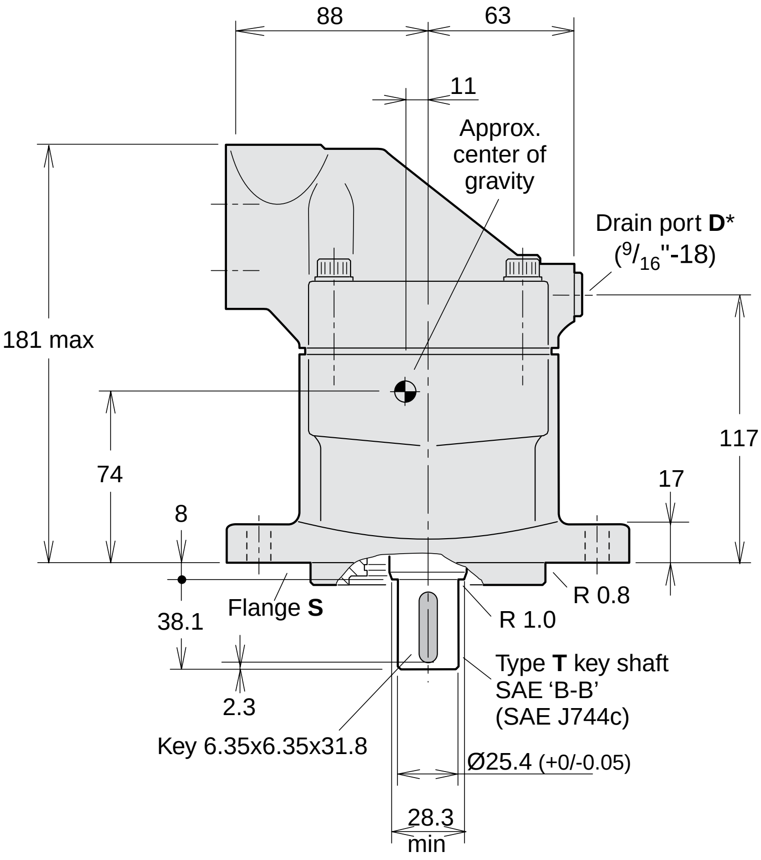
F11-14
(SAE versions)

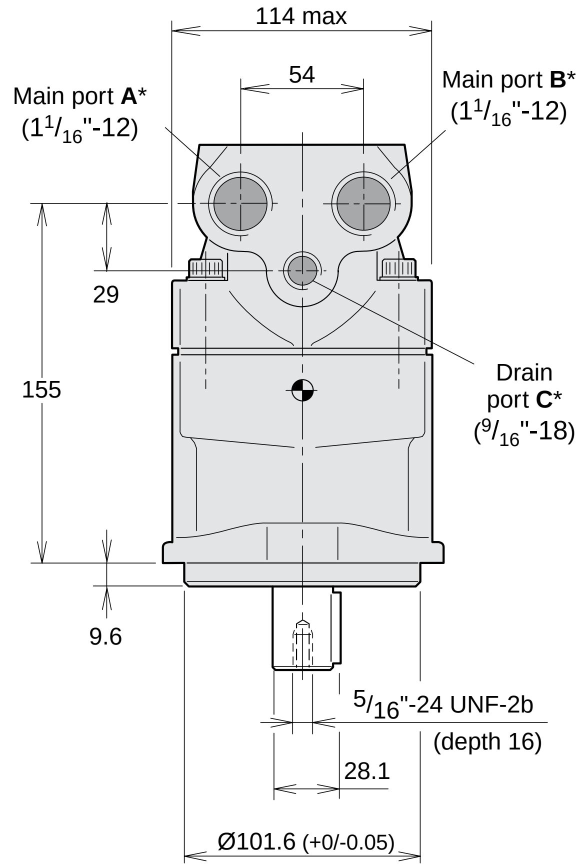


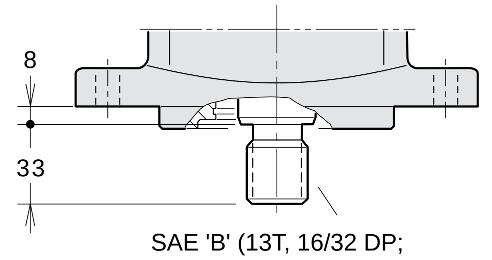
F11-19
(SAE version)



Type **S** mounting flange SAE 'B' (SAE J744c)



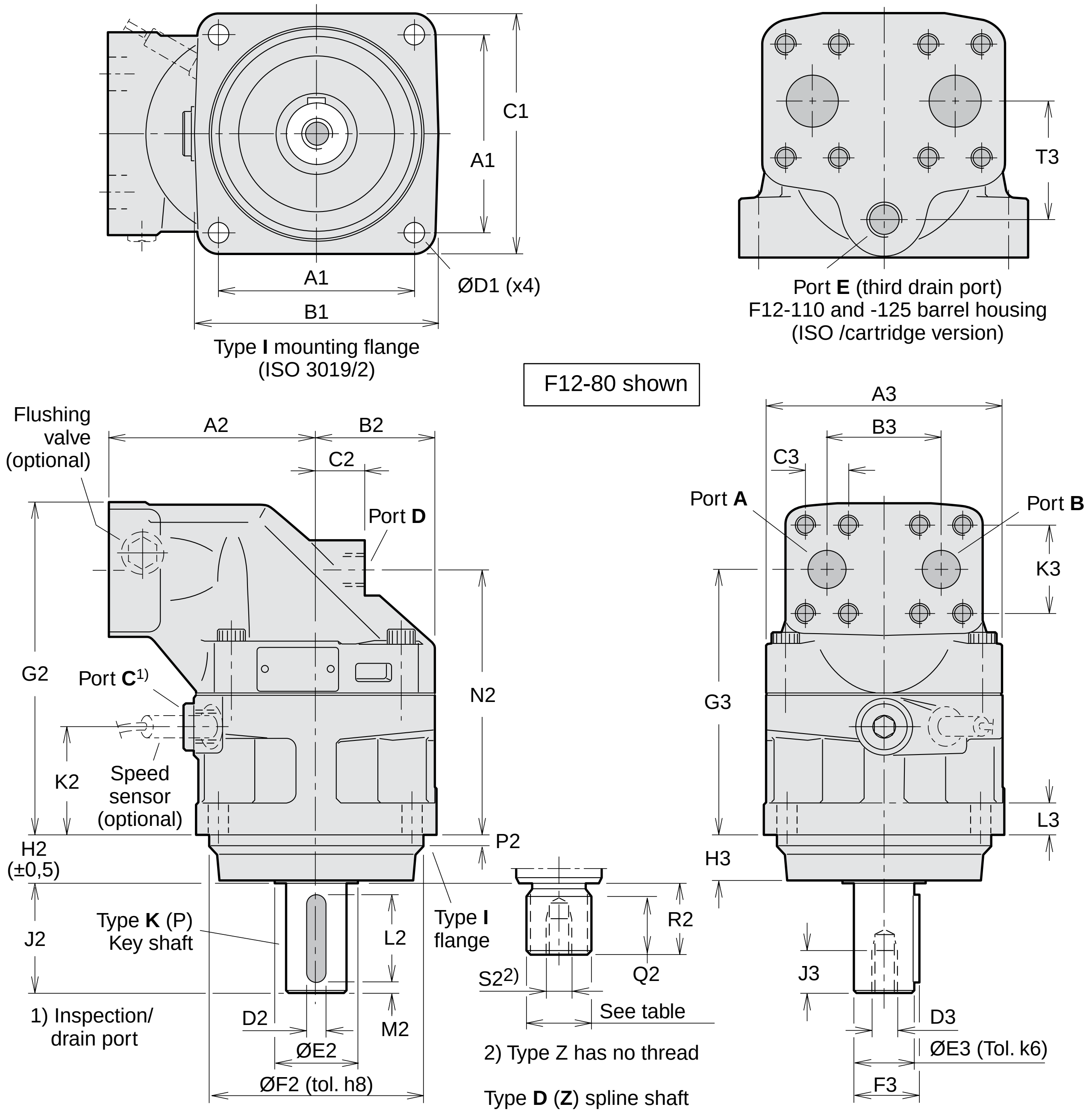




SAE 'B' (13T, 16/32 DP;
Type **S** spline shaft (SAE J498b)

* O-ring ports according to SAE J514d

F12-30, -40, -60, -80, -90, -110 and -125
(ISO versions)



Dim.	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 F12-125
A1	88.4	113.2	113.2	127.2	141.4
B1	118	146	146	158	180
C1	118	142	144	155	180
D1	11	13.5	13.5	13.5	18
A2	100	110	125	135	145
B2	59	65	70	78	85
C2	25	26	22	32	38
D2	8	8	10	12	14
E2	33	42	42	52	58
F2	100	125	125	140	160
G2	172	173	190	216	231
H2	25.5	32.5	32.5	32.5	40.5
J2[1]	50	60	60	70	82
J2[2]	50	-	-	-	-
K2	55	52	54	70.5	66.5
L2	40	50	50	56	70
M2	5	5	5	7	6
N2	136.5	137	154	172.5	179
P2	8	8	8	8	8
Q2	28	28	33	36	41
R2[3]	35	35	40	45	50
R2[4]	43	35	35	41	-
S2[3]	M12 x24	M12 x24	M12 x28	M16 x36	M16 x36
S2[4]	-	M12 x24	-	M12 x28	-
A3	122	134	144	155	170
B3	66	66	66	75	83
C3	23.8	23.8	23.8	27.8	31.8
D3	M12	M12	M12	M16	M16
E3	30	30	35	40	45
F3	33	33	38	43	49
G3	136.5	137	154	172.5	179
H3	23.5	30.5	30.5	30.5	38.5
J3	24	24	28	36	36
K3	50.8	50.8	50.8	57.2	66.7
L3	18	20	20	20	22
T3	-	-	-	-	68

1) Key shaft type K
2) Key shaft type P
3) Spline shaft type D
4) Spline shaft type Z
5) Special number 264

Ports	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 F12-125
A, B size	3/4"	3/4"	3/4"	1"	1 1/4"
Screw thread[1]	M10 x20	M10 x20	M10 x20	M12 x20	M14 x26
C thread[2]	M22 x1.5	M22 x1.5	M22 x1.5	M22 x1.5	M22 x1.5
D thread[2]	M18 x1.5	M18 x1.5	M22 x1.5	M22 x1.5	M22 x1.5
E thread	-	-	-	-	M22 x1.5

A, B: ISO 6162

1) Metric thread x depth in mm
2) Metric thread x pitch in mm.

Spline shaft (DIN 5480)

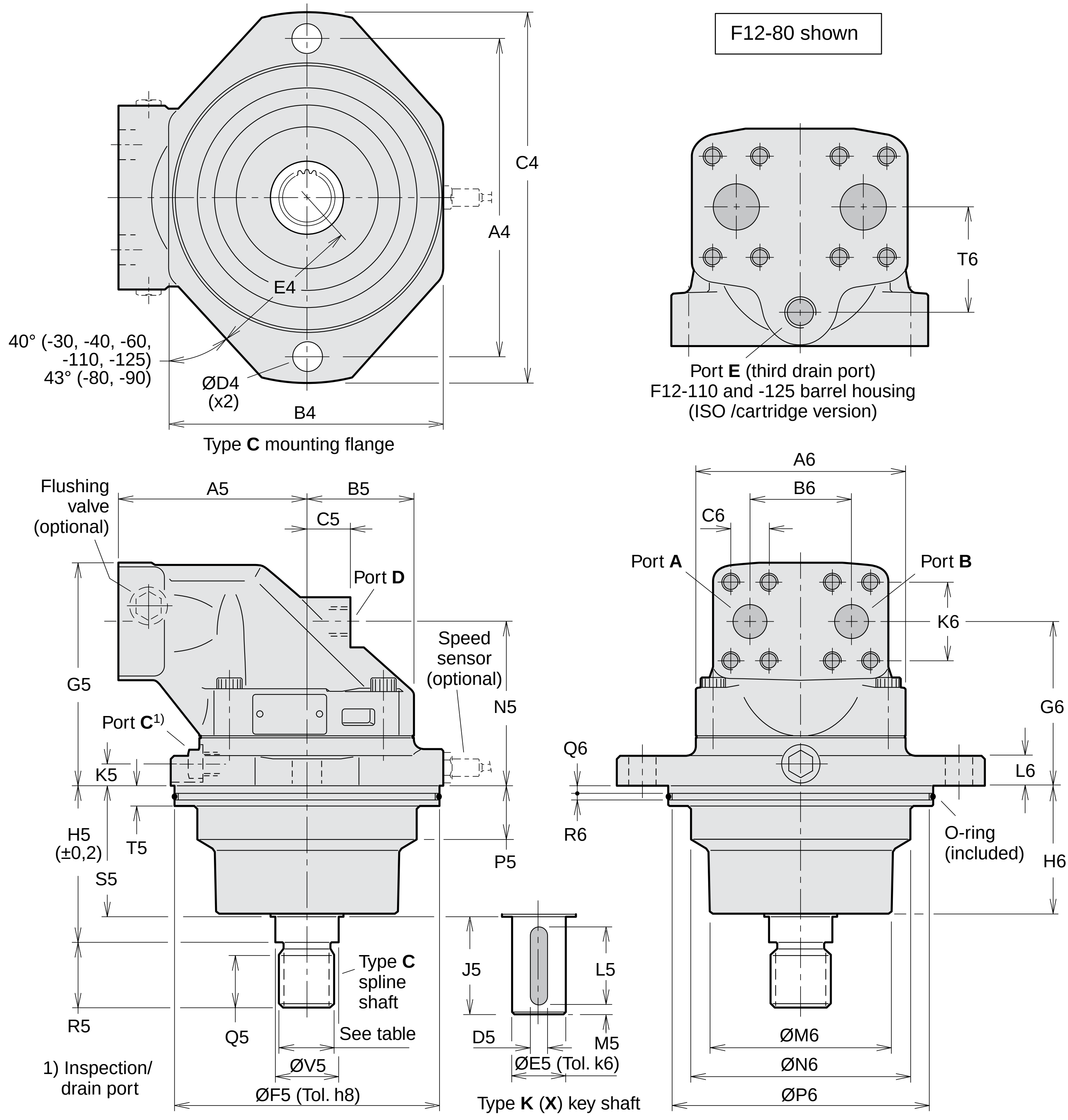
	Type **D** (standard)	Type **Z** (optional)
F12-30	W30x2x14x9g	W25x1.25x18x9g
-40	W32x2x14x9g	W30x2x14x9g
-60	W35x2x16x9g	W32x2x14x9g
-80	W40x2x18x9g	W35x2x16x9g
-90	W40x2x18x9g	W35x2x16x9g
-110	W45x2x21x9g	W40x2x18x9g
-125	W45x2x21x9g	W40x2x18x9g

Key shaft

	Type **K** (std)	Type **P** (opt.)	Type **X** (opt.)
F12-30	Ø30	Ø25	-
-40	Ø30	-	Ø35[5]
-60	Ø35	-	-
-80	Ø40	-	-
-90	Ø40	-	-
-110	Ø45	-	-
-125	Ø45	-	-

= Max 350 bar operating pressure

F12-30, -40, -60, -80, -90, -110 and -125
(Cartridge versions)



1) Inspection/ drain port

Dim.	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 F12-125
A4	160	200	200	224	250
B4	140	164	164	196	206
C4	188	235	235	260	286
D4	14	18	18	22	22
E4	77	95	95	110	116
A5	100	110	125	135	145
B5	59	65	70	77.5	85
C5	25	26	22	32	38
D5	8	8 1) 10 2)	10	12	14
E5	30	30 1) 35 2)	35	40	45
F5	135	160	160	190	200
G5	127	133	146	157	175
H5	89	92.3	92.3	110.5	122.8
J5	50	60	60	70	-
K5	14	16	15	15	15
L5	40	50	50	56	-
M5	5	5	5	7	-
N5	91	97	110	114	123
P5	22	30	31	40	40
Q5	28	28	28	37	37
R5	35	35	35	45	45
S5	70.5	72	76	91	95.7
T5	15	15	15	15	15
V5	32	35	35	45	45
A6	122	134	144	155	170
B6	66	66	66	75	83
C6	23.8	23.8	23.8	27.8	31.8
G6	91.5	97	110	114	123
H6	69.5	71	74	89.5	93.7
K6	50.8	50.8	50.8	57.2	66.7
L6	16	18	18	20	20
M6	92	115	115	130	140
N6	110	127	135	154	160
P6	128.2	153.2	153.2	183.2	193.2
Q6	5	5	5	5	5
R6	5	5	5	5	5
T6	-	-	-	-	68

1) Key shaft type **K**
2) Key shaft type **X** (opt.).
3) Special number 330
4) Special number 326
5) Special number 264

Ports	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 F12-125
A, B size	3/4"	3/4"	3/4"	1"	1 1/4"
Screw thread	M10 x20	M10 x20	M10 x20	M12 x22	M14 x26
C thread	M14 x1.5	M14 x1.5	M14 x1.5	M14 x1.5	M14 x1.5
D, E thread	M18 x1.5	M18 x1.5	M22 x1.5	M22 x1.5	M22 x1.5

A, B: ISO 6162

Spline shaft (DIN 5480)

	Type **C** (standard	Type **X** (optional))
F12-30	W30x2x14x9g	-
-40	W30x2x14x9g	-
-60	W30x2x14x9g	W35x2x16x9g 3)
-80	W40x2x18x9g	W35x2x16x9g 3)
-90	W40x2x18x9g	W35x2x16x9g 3)
-110	W40x2x18x9g	W45x2x21x9g 4)
-125	W40x2x18x9g	W45x2x21x9g 4)

Key shaft

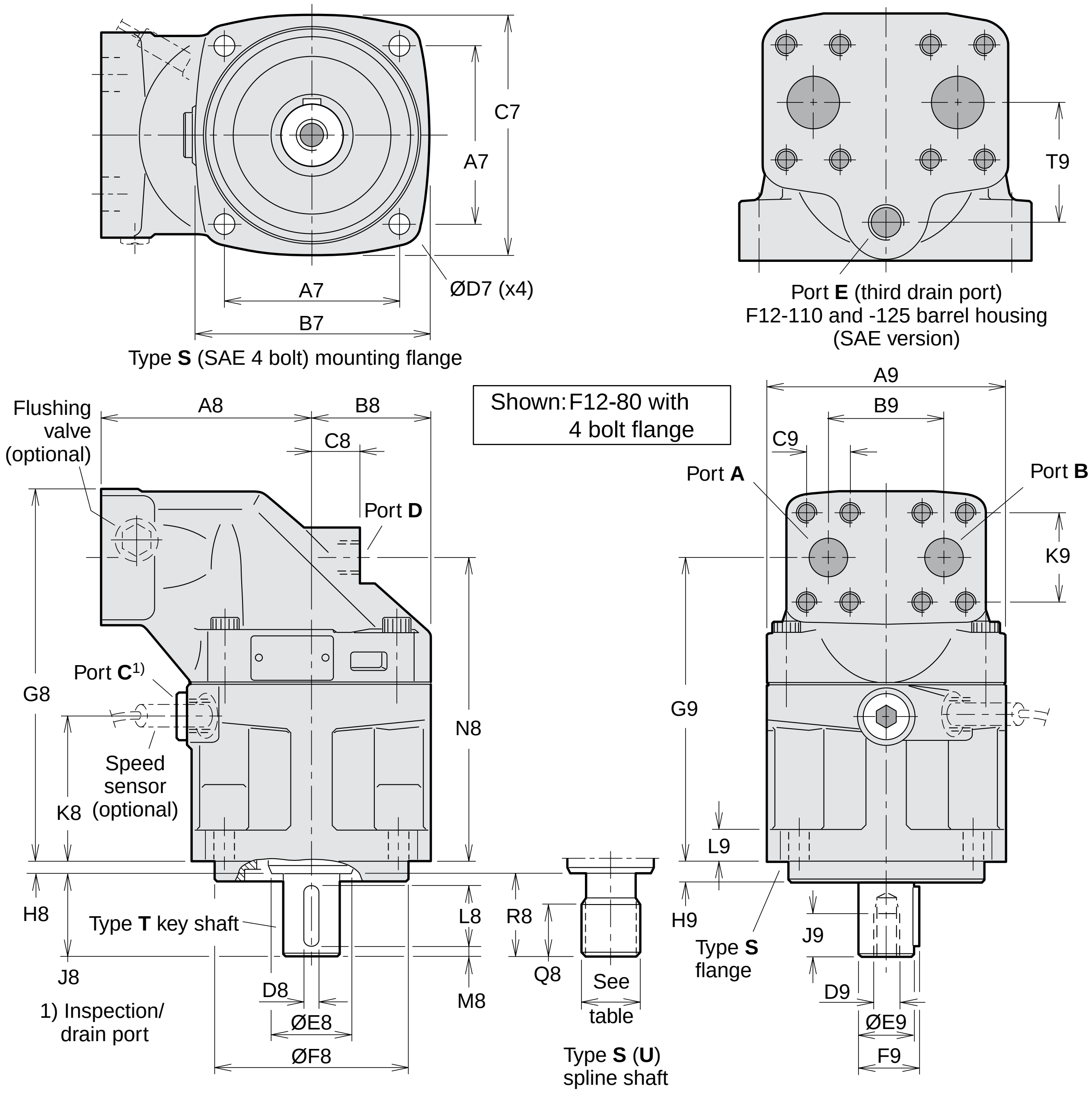
	Type **K** (std)	Type **X** (opt.)
F12-30	Ø30	–
-40	–	Ø35 5)
-60	Ø35	–
-80	Ø40	–
-90	Ø40	–

O-ring dimensions

F12-30	127x4
-40	150x4
-60	150x4
-80	180x4
-90	180x4
-110	190x4
-125	190x4

F12-30, -40, -60, -80, -90, -110 and -125

(SAE versions with 4 bolt flange)



Dim.	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 F12-125
A7	89.8	114.5	114.5	114.5	161.6
B7	118	148	148	155	204
C7	118	144	144	155	200
D7	14	14	14	14	21
A8	100	110	125	135	145
B8	59	65	70	77.5	85
C8	25	26	22	32	38
D8	6.35	7.94	7.94	9.53	11.1
E8	33	42	42	52	57.5
F8	101.60/ 101.55	127.00/ 126.94	127.00/ 126.94	127.00/ 126.94	152.40/ 152.34
G8	189.5	197	214	240	264
H8	8	8	8	8	8
J8	38	48	48	54	67
K8	72	76	79	95	99
L8	31.8	38.1	38.1	44.5	54.1
M8	2.5	4	4	4	7.5
N8	153.5	161	178.3	197.1	212
Q8 1)	23	23	23	25	34
Q8 2)	-	-	-	23	-
R8 1)	33	48	48	54	66.7
R8 2)	-	-	-	48	-
A9	122	134	144	155	170
B9	66	66	66	75	83
C9	23.8	23.8	23.8	27.8	31.8
D9*	$^{5}/_{16}$"-24	$^{3}/_{8}$"-24	$^{3}/_{8}$"-24	$^{1}/_{2}$"-20	$^{5}/_{8}$"-18
E9	25.40/ 25.35	31.75/ 31.70	31.75/ 31.70	38.10/ 38.05	44.45/ 44.40
F9	28.2	35.3	35.3	42.3	49.4
G9	153.8	161	178.3	197.1	212
H9	9.7	12.7	12.7	12.7	12.7
J9	16	19	19	26	32
K9	50.8	50.8	50.8	57.2	66.7
L9	18	20	20	20	22
T9	-	-	-	-	68

* UNF-2B thread
1) Spline shaft type **S**
2) Spline shaft type **U**
3) Special number 254 or 255
4) Special number 255
5) Special number 254
6) Special number 328

Main ports A and B, type U (optional)

F12-80	1 $^{5}/_{16}$" - 12 UN
F12-90	1 $^{5}/_{16}$" - 12 UN
F12-110	1 $^{5}/_{8}$" - 12 UN
F12-125	1 $^{5}/_{8}$" - 12 UN

O-ring ports according to SAE J514d

Ports	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 F12-125
A, B size	$^{3}/_{4}$"	$^{3}/_{4}$"	$^{3}/_{4}$"	1"	$1^{1}/_{4}$"
Screw thread 3)	$^{3}/_{8}$"-16 x22	$^{3}/_{8}$"-16 x20	$^{3}/_{8}$"-16 x22	$^{7}/_{16}$"-14 x27	$^{1}/_{2}$"-13 x25
C thread	$^{7}/_{8}$"-14	$^{7}/_{8}$"-14	$^{7}/_{8}$"-14	$^{7}/_{8}$"-14	$1^{1}/_{16}$"-12
D thread	$^{3}/_{4}$"-16	$^{3}/_{4}$"-16	$^{7}/_{8}$"-14	$^{7}/_{8}$"-14	$1^{1}/_{16}$"-12
E thread	-	-	-	-	$1^{1}/_{16}$"-12

A, B: ISO 6162 C, D, E: O-ring boss (SAE J514)
3) UN thread x depth in mm.

Mounting flange (SAE J744)

	S (standard)	**X** (optional)
F12-30	SAE 'B', 4 bolt	-
-40	SAE 'C', "	-
-60	SAE 'C', "	-
-80	SAE 'C', "	SAE 'D', 4 bolt 3)
-90	SAE 'C', "	SAE 'D', 4 bolt 3)
-110	SAE 'D', "	-
-125	SAE 'D', "	-

Spline shaft (SAE J498b, class 1, flat root, side fit)

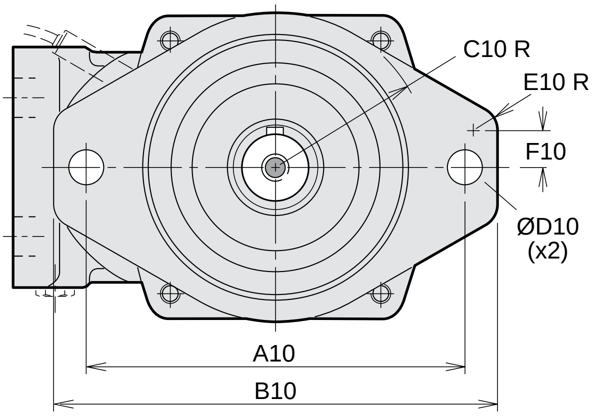
	S (standard)	**U** (opt.)	**X** (optional)
F12-30	SAE 'B' 13T, 16/32 DP	-	-
-40	SAE 'C' 14T, 12/24 DP	-	-
-60	SAE 'C' 14T, 12/24 DP	-	21T, 16/32DP 6)
-80	SAE 'C-C' 17T, 12/24 DP	SAE 'C' 14T,12/24DP	SAE 'D' 13T, 8/16 DP 4)
-90	SAE 'C-C' 17T, 12/24 DP	SAE 'C' 14T,12/24DP	SAE 'D' 13T, 8/16 DP 4)
-110	SAE 'D' 13T, 8/16 DP	-	-
-125	SAE 'D' 13T, 8/16 DP	-	-

= Max 350 bar operating pressure.

Key shaft (SAE J744)

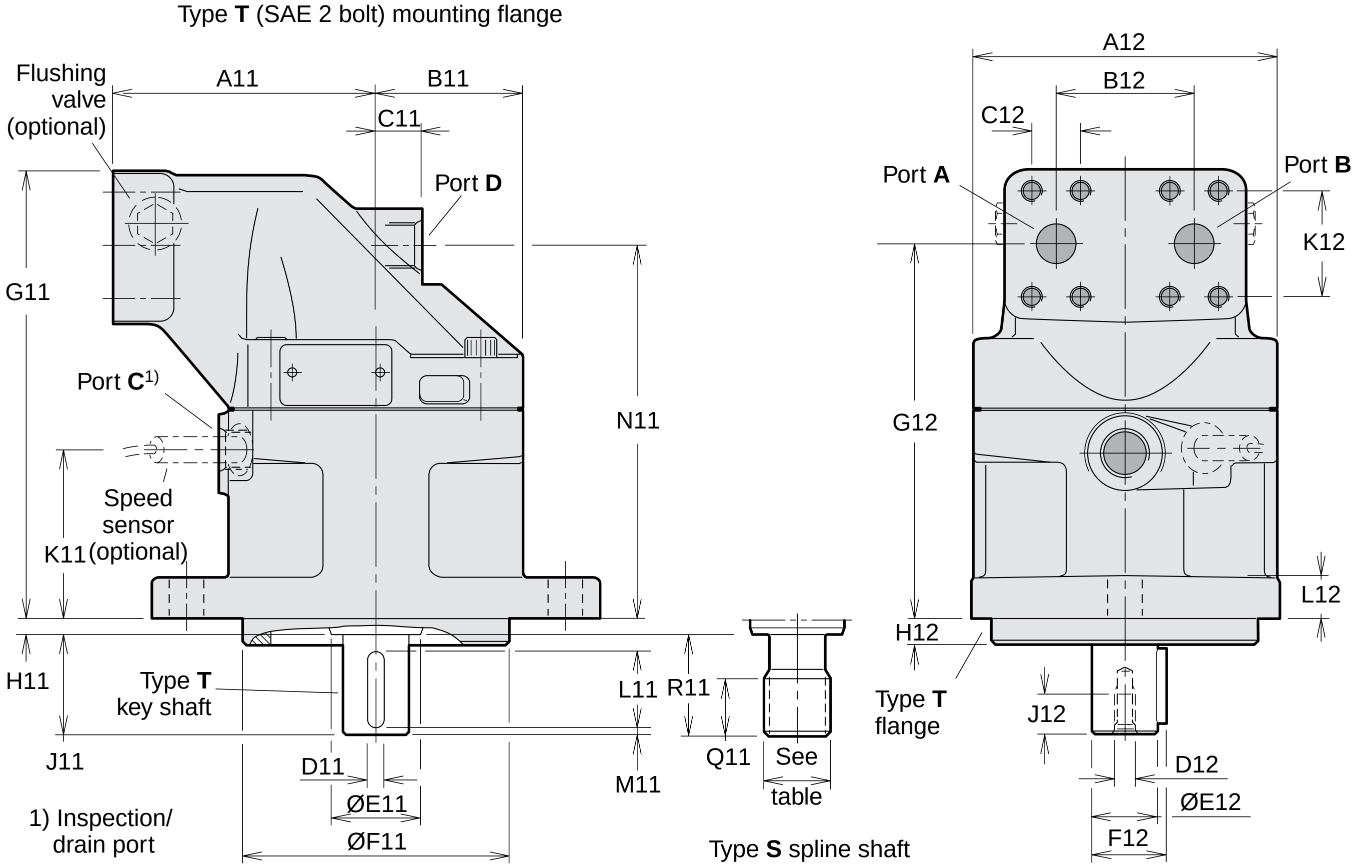
	T (standard)	**X** (optional)
F12-30	SAE 'B-B' (Ø25.4 mm/1")	-
-40	SAE 'C' (Ø31.75 mm/$1^{1}/_{4}$")	-
-60	SAE 'C' (Ø31.75 mm/$1^{1}/_{4}$")	-
-80	SAE 'C-C' (Ø38.1 mm/$1^{1}/_{2}$")	SAE 'D' (Ø44.45 mm/$1^{3}/_{4}$") 5)
-90	SAE 'C-C' (Ø38.1 mm/$1^{1}/_{2}$")	SAE 'D' (Ø44.45 mm/$1^{3}/_{4}$") 5)
-110	SAE 'D' (Ø44.45 mm/$1^{3}/_{4}$")	-
-125	SAE 'D' (Ø44.45 mm/$1^{3}/_{4}$")	-

F12-30, -40, and -60
(SAE versions with 2 bolt flange)



Type **T** (SAE 2 bolt) mounting flange

Shown: F12-60 with 2 bolt flange



Dim.	F12-30	F12-40	F12-60
A10	146	181	181
B10	176	215	215
C10	63	74	74
D10	14.4	17.5	17.5
E10	10	16	16
F10	10	15.5	15.5
A11	100	110	125
B11	59	65	70
C11	25	26	22
D11	6.35	7.94	7.94
E11	33	42	42
F11	101.60/ 101.55	127.00/ 126.95	127.00/ 126.95
G11	189.5	197	214
H11	8	8	8
J11	38	48	48
K11	71	77	81.5
L11	31.8	38.1	38.1
M11	2.5	4	4
N11	154	161	178.5
Q11	26	27	27
R11	33	48	48
A12	122	134	144
B12	66	66	66
C12	23.8	23.8	23.8
D12 1)	$^{5}/_{16}$"-24	$^{3}/_{8}$"-24	$^{3}/_{8}$"-24
E12	25.40/ 25.35	31.75/ 31.70	31.75/ 31.70
F12	28.2	35.2	35.2
G12	154	161	178.5
H12	9.7	12.7	12.7
J12	16	19	19
K12	50.8	50.8	50.8
L12	18	20	20

1) UNF-2B thread

Ports	F12-30	F12-40	F12-60
A, B size	19 ($^{3}/_{4}$")	19 ($^{3}/_{4}$")	19 ($^{3}/_{4}$")
Screw thread 2)	$^{3}/_{8}$"-16 x22	$^{3}/_{8}$"-16 x20	$^{3}/_{8}$"-16 x22
C thread	$^{3}/_{4}$"-16	$^{3}/_{4}$"-16	$^{7}/_{8}$"-14
D thread	$^{3}/_{4}$"-16	$^{3}/_{4}$"-16	$^{7}/_{8}$"-14

A, B (main ports): SAE J518c (6000 psi)
C, D (drain ports): O-ring boss (SAE J514)
2) UN thread

Main ports A and B, type U (optional)

F12-30	1 $^{1}/_{16}$" - 12 UN
-40	1 $^{5}/_{16}$" - 12 UN
-60	1 $^{5}/_{16}$" - 12 UN

O-ring ports according to SAE J514d

= Max 350 bar operating pressure.

Mounting flange T (SAE J744)

F12-30	SAE 'B', 2 bolt
-40	SAE 'C', 2 bolt
-60	SAE 'C', 2 bolt

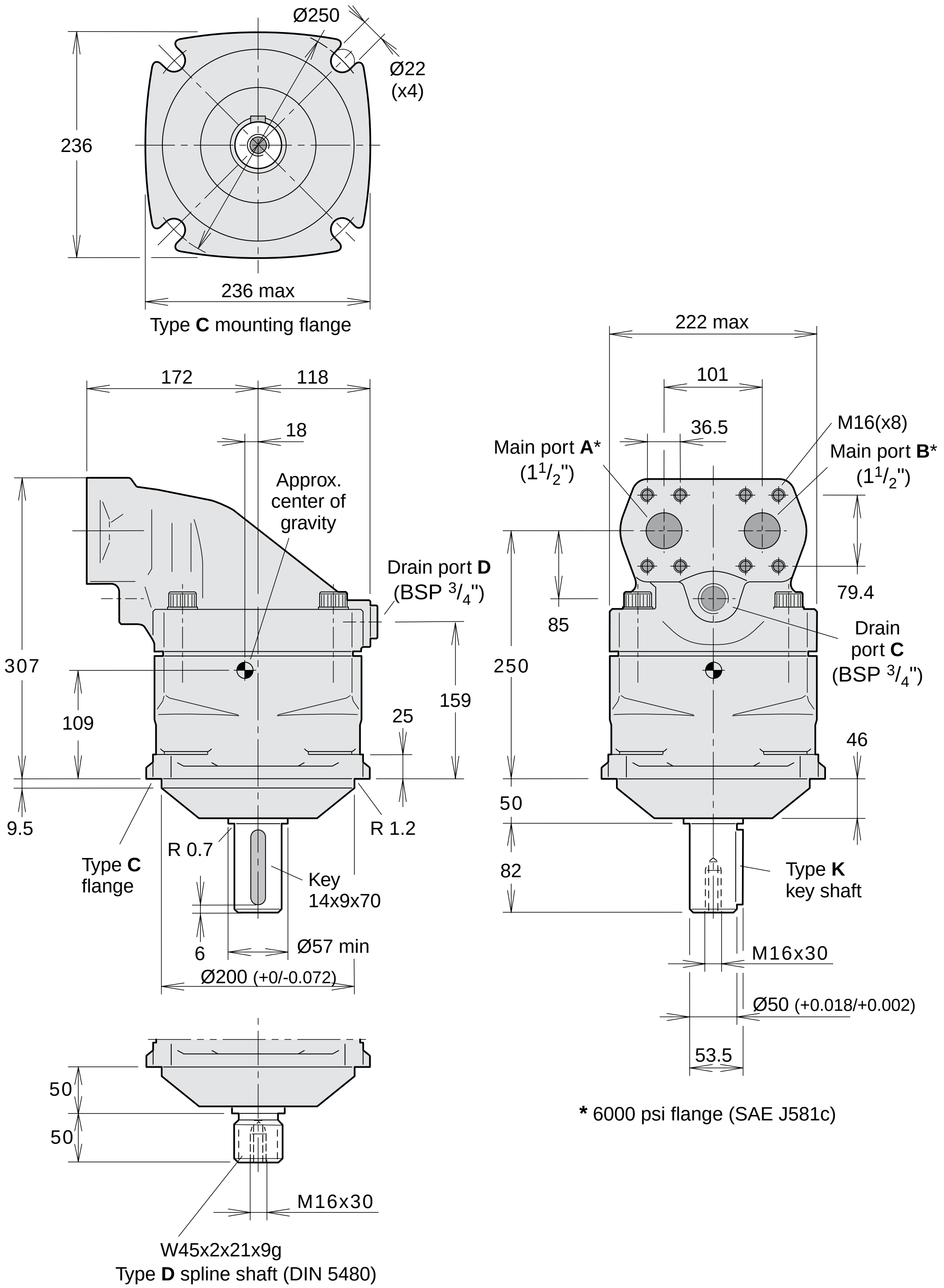
Spline shaft S (SAE J498b, class 1, flat root, side fit)

F12-30	SAE 'B' 13 T; 16/32 DP
-40	SAE 'C' 14 T; 12/24 DP
-60	SAE 'C' 14 T; 12/24 DP

Key shaft T (SAE J744)

F12-30	SAE 'B-B' Ø25.4 mm/1"
-40	SAE 'C' Ø31.75 mm/1$^{1}/_{4}$"
-60	SAE 'C' Ø31.75 mm/1$^{1}/_{4}$"

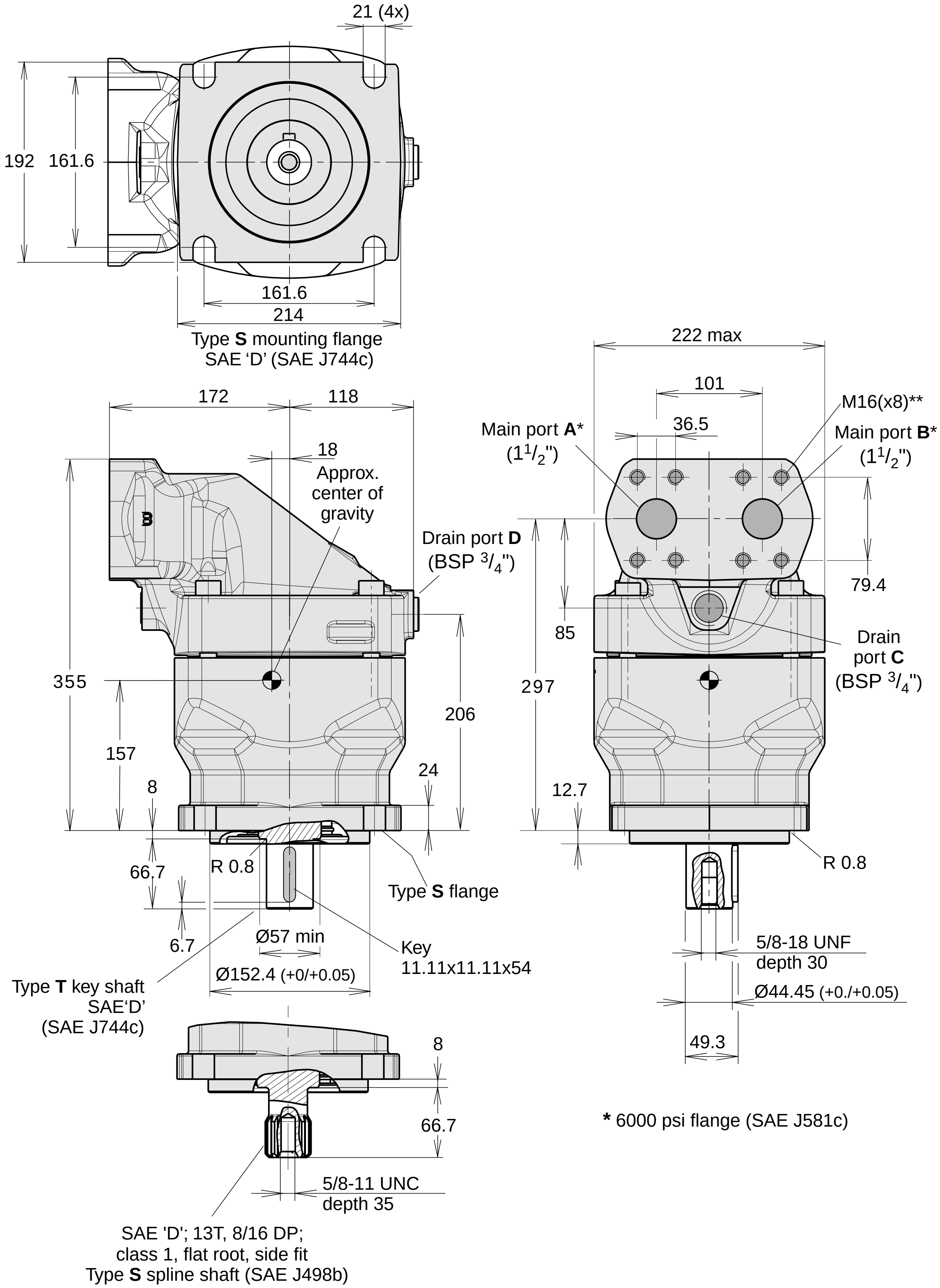
F12-150
(CETOP version)



***** 6000 psi flange (SAE J581c)

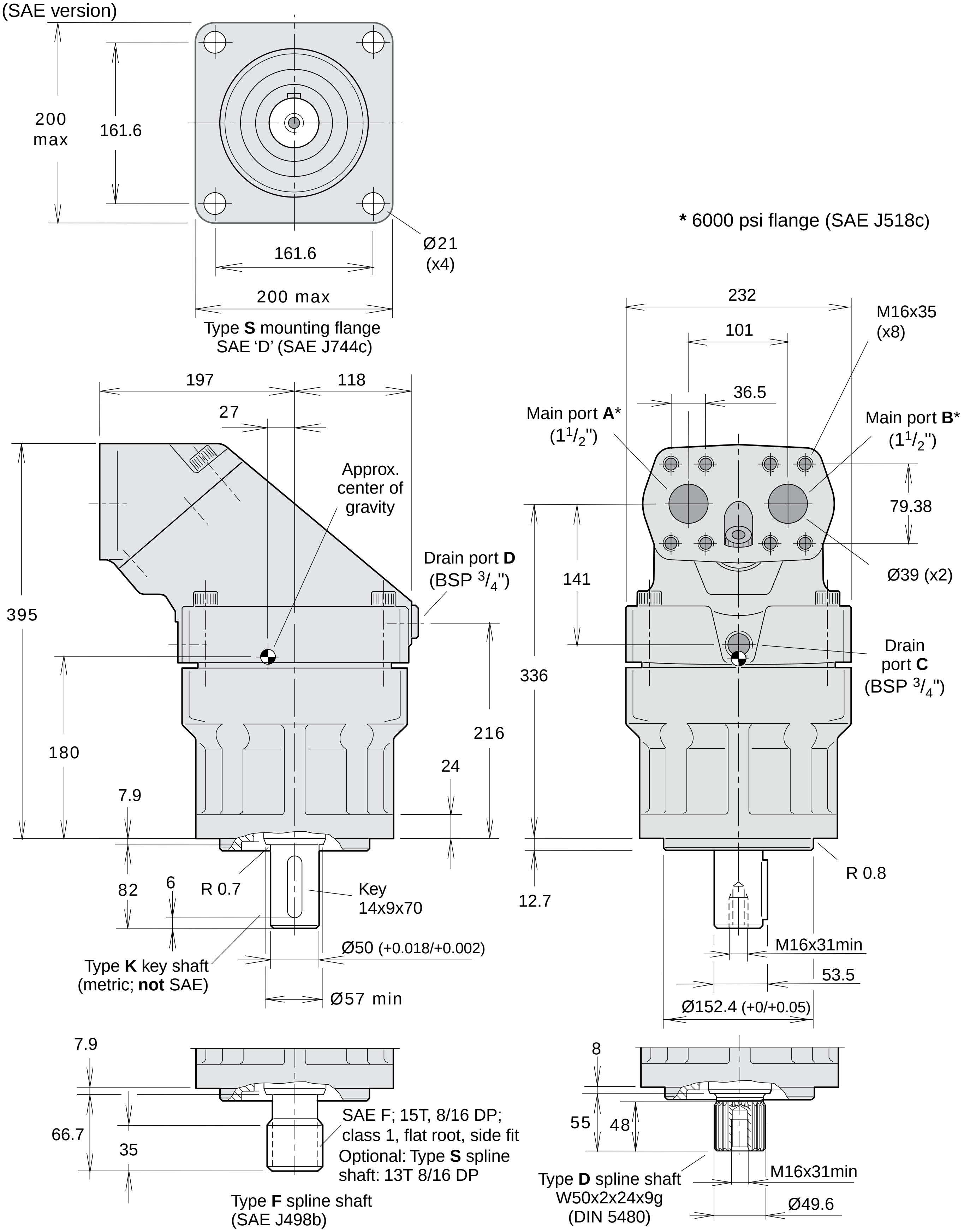
F12-150

(SAE version)



***** 6000 psi flange (SAE J581c)

F12-250
(SAE version)

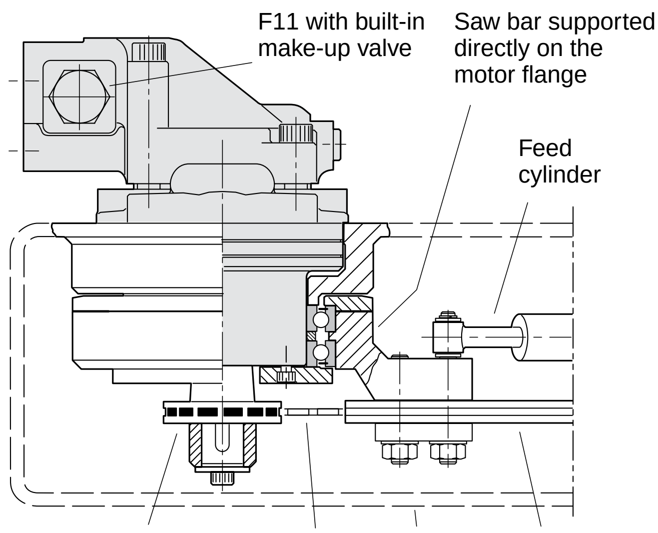


F11 in saw motor applications

Series F11 motors have proven suitable for demanding applications such as chain saws. Primarily due to the 40° bent-axis design, spherical pistons (with laminated piston rings) and gear synchronization, very high speeds are permissible. Not even low temperatures at start-up affect reliability.

To further enhance the saw function and, at the same time, reduce weight, cost and installation dimensions, a specific saw motor has been developed (frame sizes -10, -14 and -19; refer to the illustration to the right) which is specifically dedicated to bar saws. The motor allows the saw bar bearings to be mounted directly on the motor housing, and the sprocket installs on the motor shaft without additional bearings.

For more detailed information (available versions, ordering codes, installation dimensions, etc.), refer to 'F11 Saw Motors' (catalogue HY30-8245).



Chain saw installation (example; F11-10 shown)

Series F11iP

The saw motor unit has integrated functions for start/stop and speed control, which means long motor life.

The saw motor also controls the saw bar feed function, which provides optimal chain speed and saw performance during the entire cutting process.

To further enhance the saw function and, at the same time, reduce weight, cost and installation dimensions, Parker Hannifin has thus developed a motor unit which is specifically dedicated to chain saws.

Benefits

- Simple installation means lower cost
- Low overall weight
- Compact installation
- Reduced motor shaft loading
- Improved performance
- Controlled cutting process.

Saw motor requirements and recommendations

In order to obtain the most satisfactory function of the saw motor, the hydraulic system of the machine must be able to maintain a system pressure through the whole cut of at least 220 bar at the motor; higher pressure levels (up to max allowed for the motor) will, of course, increase the performance even further.

Through the whole cut the corresponding flow into the unit should, at least, be:

- 180 l/min @ 8 500 rpm and 14-tooth chain sprocket
- 195 l/min @ 9 200 rpm and 13-tooth chain sprocket
- 210 l/min @ 9 900 rpm and 12-tooth chain sprocket.

As a consequence, the pump must be able to deliver at least a 5% higher flow than what is shown above to properly secure the saw function.

In order to utilize the full potential of the saw motor, it is most important to minimize pressure losses in the hydraulic system as much as possible. Avoid using so called 'banjo' couplings and make sure there are no sharp bends in the utilized hydraulic hoses, couplings and hydraulic piping.

The saw motor unit has a motor flushing function which is integrated with the sword feed function. By connecting the drain port "D" directly to tank, additional flushing will usually not be required.

As the saw bar feed function is of a re-generative type (refer to the saw function on page 42) a 40/30 or 40/25 mm feed cylinder is recommended; this will ensure the best cutting performance of the saw.

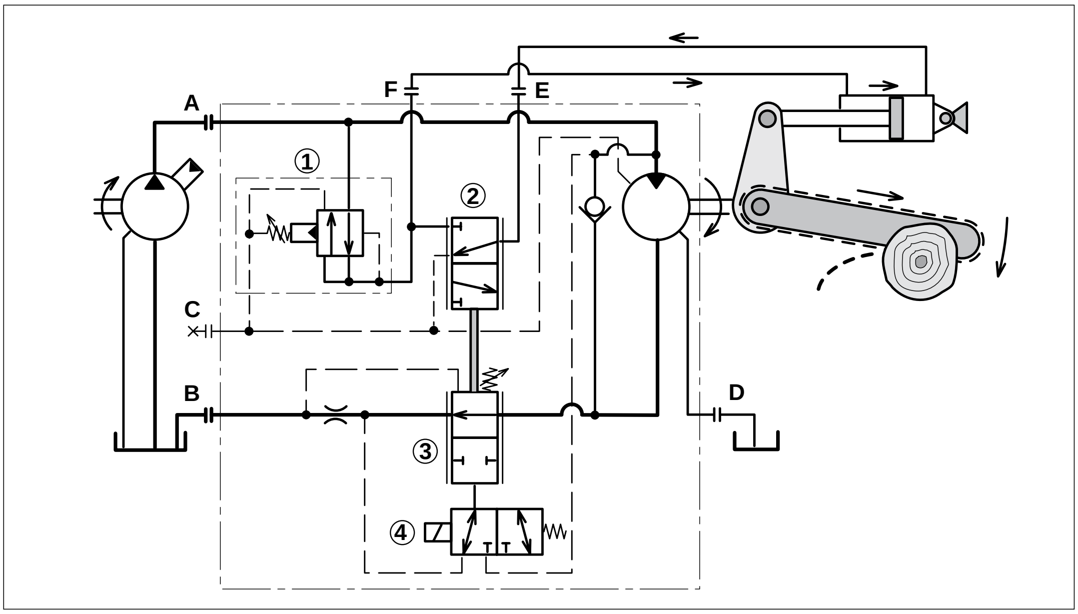
If another cylinder configuration is being considered, please contact Parker Hannifin.

The electric signal to the 'start/stop' solenoid which starts the cutting cycle must be of the 'no ramp' type, so that the saw motor can start immediately without delay; otherwise, there may be a risk of motor breakdown.

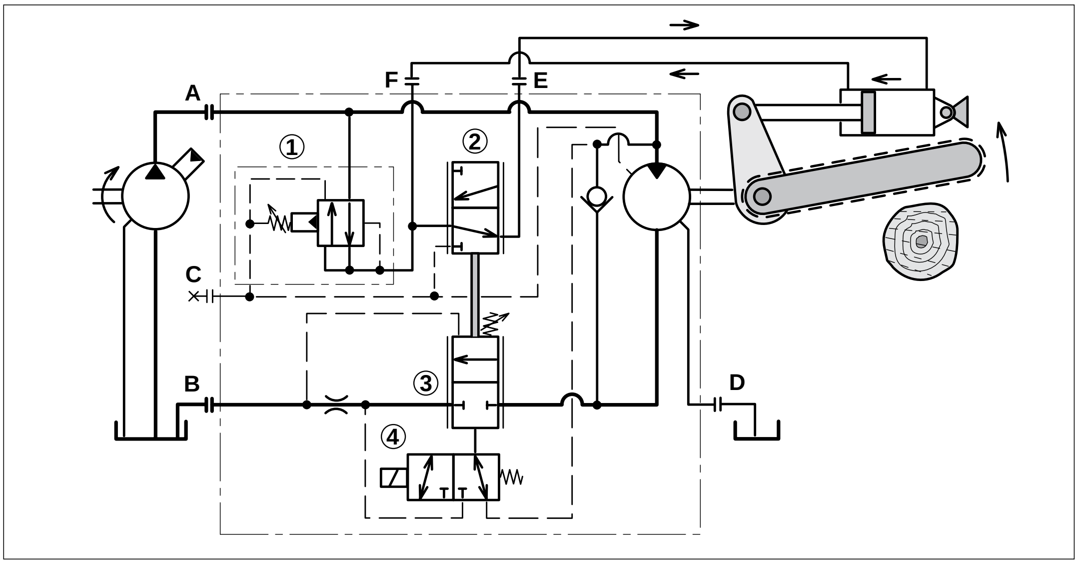
NOTE: The chain saw function is covered on page 42

For more detailed information (available versions, ordering codes, installation dimensions, etc.), refer to 'F11 Saw Motors' (catalogue HY30-8251).

Chain saw function



Chain saw function - cutting mode.



Chain saw function - return mode.

Cutting mode (refer to the top schematic)
The machine operator activates the start/stop function '4' which starts the saw motor. When the motor reaches operating speed, the cylinder piston side (port 'E') is drained and the cutting bar starts to move 'down'.

The drain flow (through port 'E' and valve '2'), provides cooling to the motor case.

Return mode (refer to the bottom schematic)
When the tree or log has been cut through, the operator de-activates the start/stop solenoid valve '4'. Valve spools '2' and '3' move to the 'up' position and the motor stops turning.

At the same time both sides of the cylinder are pressurized and the cutting bar moves 'up' to the start position (because of the re-generative cylinder/valve hook-up).

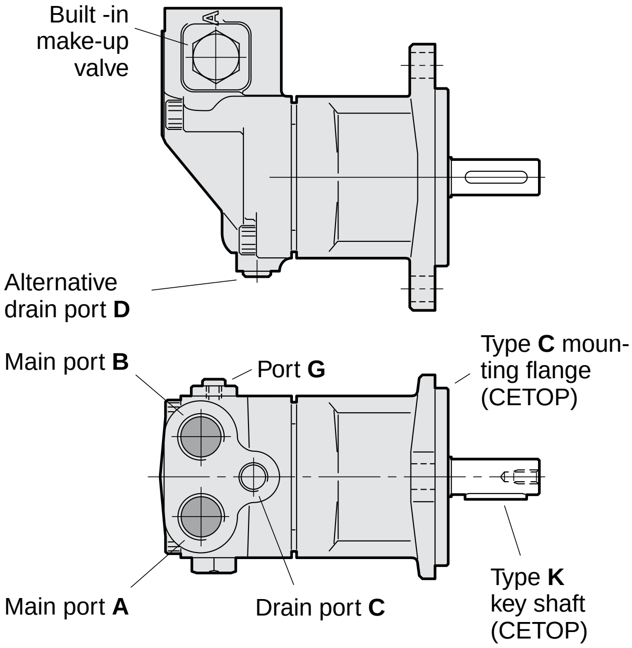
NOTE:
- The pressure compensated pump is operating during the entire cutting cycle.
- The pressure reducing valve, '1', reduces the pressure to the saw bar cylinder.
- The connected spool valve functions, '2' and '3', control the speed of the motor as well as the saw bar speed.

F11 and F12 fan motors

Frame sizes -10, -12, -14, -19 (F11) and -30 (F12) are also available as 'fan motors' with a built-in check valve (refer to the schematic below)

Just like the saw motor, the fan motor can be operated at very high speeds without reliability problems.

The fan is usually installed directly on the motor shaft without additional bearing support.



Fan motor (F11-10 left hand rotated shown).

Fan motor circuit

Because of the built-in check valve, either left hand (L) or right hand (R) rotation must be specified when ordering the motor.

When the pump flow to the motor is shut off and the motor is operating at very high speeds, it is important that sufficient return port back pressure is available (port B in the schematic to the right).

The check valve will then open and direct flow to the motor inlet port. If the inlet pressure is insufficient, motor cavitation will be experienced.

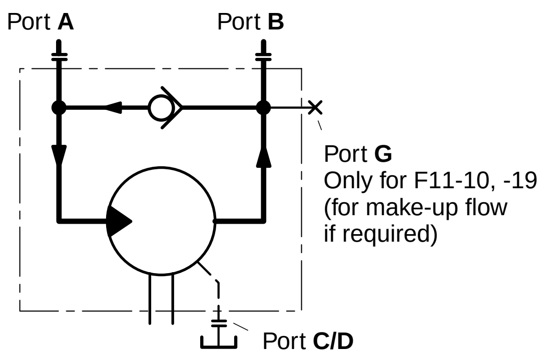
In an open circuit, back pressure can be created by a counter pressure valve installed in the return line; preferably, it should be pilot operated to minimize power losses. A back pressure of about 10 bar is sufficient in most applications.

For more drawings illustrating motors with make-up valve, see page 19, 20, 23 and 26

Example of ordering code

F11-012-HB-IV-K-000-MVL-0

MVL = Make-up valve, counter clockwise rotation
MVR = Make-up valve, clockwise rotation



Fan motor schematic (left hand rotation shown).

Integrated flushing valve (F12-30, -40, -60, -80, -90)

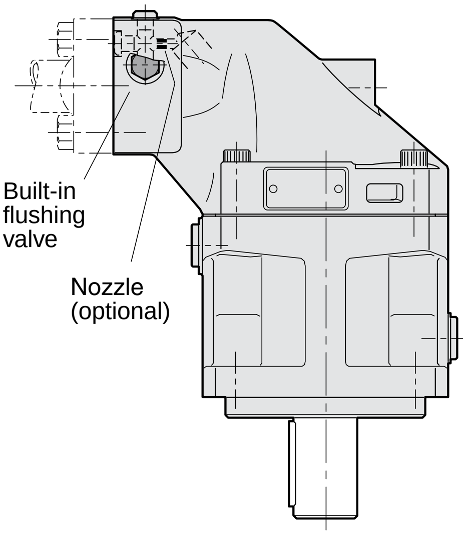
General information

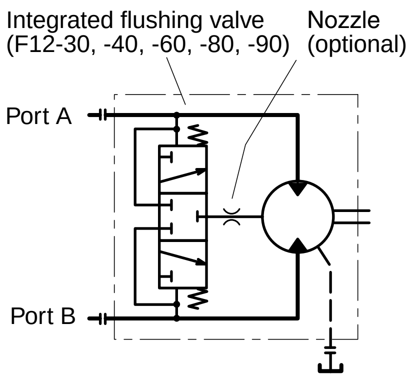
The integrated flushing valve supplies the motor with a cooling flow through the case which may be required when operating at high speeds and power levels.

In a closed loop hydrostatic transmission the flushing valve provides that cool fluid from the charge circuit is constantly added to the main circuit.

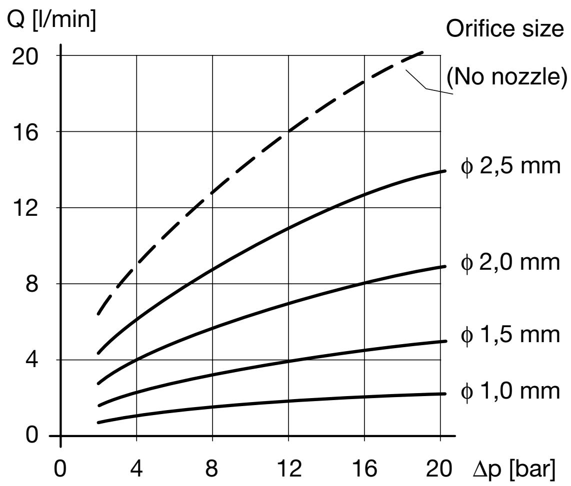
The flushing valve consists of a 'three-position', three-way spool valve which connects the low pressure side of the main hydraulic circuit with the motor case. The valve opens at a pressure differential between port A and port B of about 14 bar.

In order to limit the flow, a nozzle with a suitable orifice is available from Parker Hannifin; refer to the table below right. The diagram to the right shows flow versus differential pressure at selected orifice sizes.





Hydraulic schematic.



Flow versus pressure differential (port A or B to tank).

Ordering code

F12	–	080	–	MF	–	IV	–	K	–	000	–	L01	–	0

Standard F12 ordering code
(for F12-30, -40, -60, -80, -90)

Code	Nozzle designation
L	(refer to the table)

NOTE: FV13 flushing valve block for F12-110 shown on next page.

Restrictor nozzles

The following table shows currently available nozzles and the corresponding F12 ordering code designation (F12-30/-40/-60: M5x0.8 thread; F12-80, -90: M10x1.0).

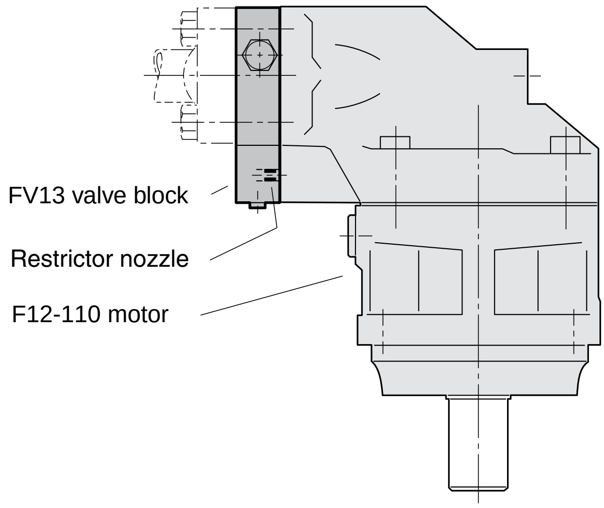
Designation	Orifice size [mm]	Part no. for F12-30/-40/-60	Part no. for F12-80/-90
L01 (std.)	1.3	370 4595	379 4413
L02	0.8	370 4590	379 3326
L06	1.7	370 5821	379 4417
L07	2.0	370 5824	379 4420
L10	2.5	3783025	378 3029

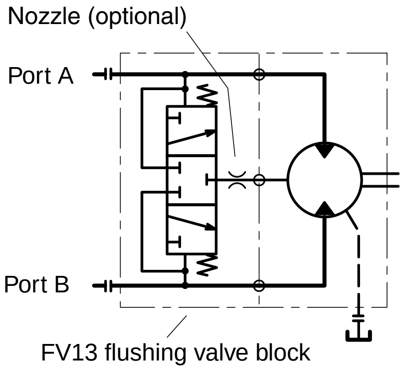
NOTE: L00 - no nozzel.

General information (for F12-110, -125)

The FV13 for the F12-110 / -125 motor has the same function as the integrated flushing valve for the other F12 frame sizes. The valve block mounts between the motor port flange and the split-flange tube/hose connectors utilizing 'long' mounting screws (screw size M14x75 or $^{1}/_{2}$"-13 UNC based on split-flange height as shown below).

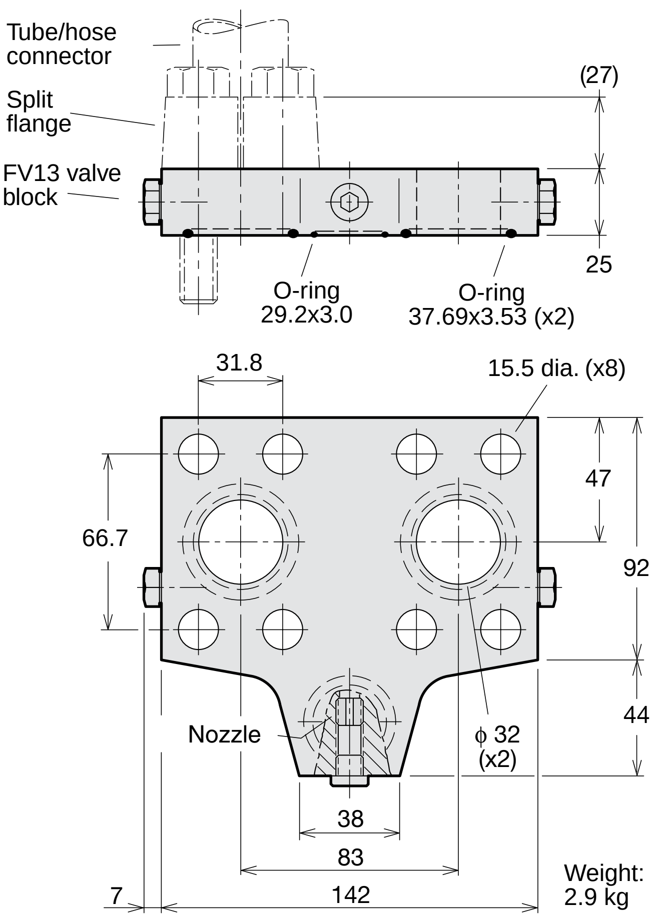
The FV13 flushing valve kit contains the required O-rings (shown below) but no screws, split-flanges or tube/hose connectors.





Hydraulic schematic.

FV13 installation



FV13 Ordering code

FV	1	3	–	H	–	A	–	L01
Valve type	Version	Size		Seals		Techn. status		Nozzel

Valve type: Flushing valve

Code	Version
1	Factory assigned

Code	Size (SAE 6000 psi)
3	$1^{1}/_{2}$" (for F12-110 / -125)

Code	Seals
H	Nitrile rubber

Code	Techn. status
A	Factory assigned

Code	Nozzel
L	Table below

FV13 restrictor nozzles

When required, a nozzle is utilized to restrict the flow through the F12-110, -125 motor case. The nozzle installs in the drilled and tapped (M10x1.0) drain line located in the valve block as shown to the left. The diagram on page 1 shows flushing flow versus differential pressure for selected orifice sizes.

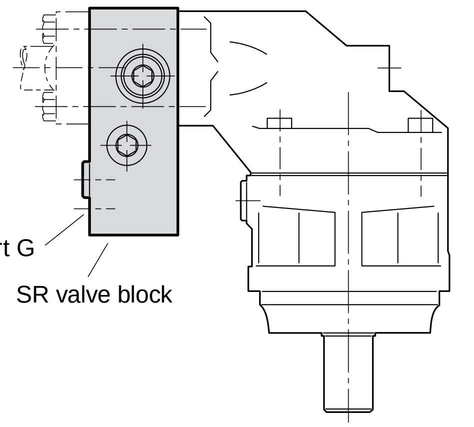
The following table lists currently available nozzles and the corresponding FV13 ordering code designation.

Designation	Flushing valve Part number	Orifice size [mm]	Orifice Part number
L00 no nozzle	3780292		
L01 (std.)	3795623	1.3	379 4413
L04	3780593	1.2	379 4412
L06	3787315	1.7	379 4417
L07	3798322	2.0	379 4420

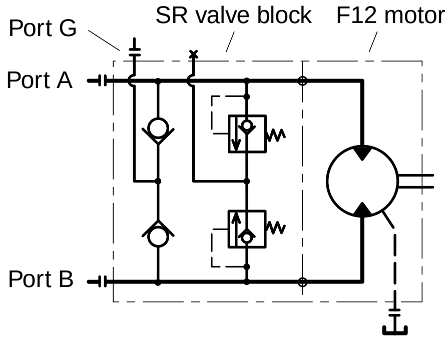
General information

- The SR pressure relief/make-up valve block for series F12 and V12 motors is designed to protect the motor and the main hydraulic lines from short duration pressure spikes. The valve block also provides an excellent make-up function.
- The valve block installs directly on the motor port flange, and is available in three sizes:
  1 $^3/_4$" for F12-30/-40/-60, T12-60 and V12-60/-80
  2 1" for F12-80, -90, T12-80 and V14-110
  3 $1^1/_4$" for F12-110, -125 and V14-160.
- The SR valve block consists of a housing containing two high pressure relief cartridges and two separate check valves for make-up. Cartridges are available in non-adjustable pressure settings between 280 and 420 bar *(4 000 and 6000 psi respectively)*.
- A make-up port (G) is also provided. In certain opera ting conditions, the motor (when operating as a pump) may cavitate because of insufficient inlet pressure.
  To prevent this, the G port should be pressurized. Contact Parker Hannifin for further information.
- The pressure drop through the main ports (A–A' or B–B') is low. As an example, the pressure drop on size 1 ($^3/_4$") is 0.45 bar *(6.5 psi)* at 175 l/min, and on size 2 (1") 0.7 bar *(10 psi)* at 250 l/min.

NOTE: The valve block includes main port O-rings (facing the motor) but no mounting screws.



SR valve block location.



SR valve block schematic.

Ordering code

SR	1		–		/		–	00	–	H	F	–	A
Valve function	Version	Port size		Pressure settings				Serial number		Seals	Threads		Techn. status

Pressure relief/ make-up valve block

Code	Version
1	Factory assigned

Code	Port size (SAE 6000 psi)	
1	$^3/_4$"	For: F12-30, -40, -60, T12-60 and V12-60, -80
2	1"	For: F12-80, -90, T12-80 and V14-110
3	$1^1/_4$"	For: F12-110, -125 and V14-160

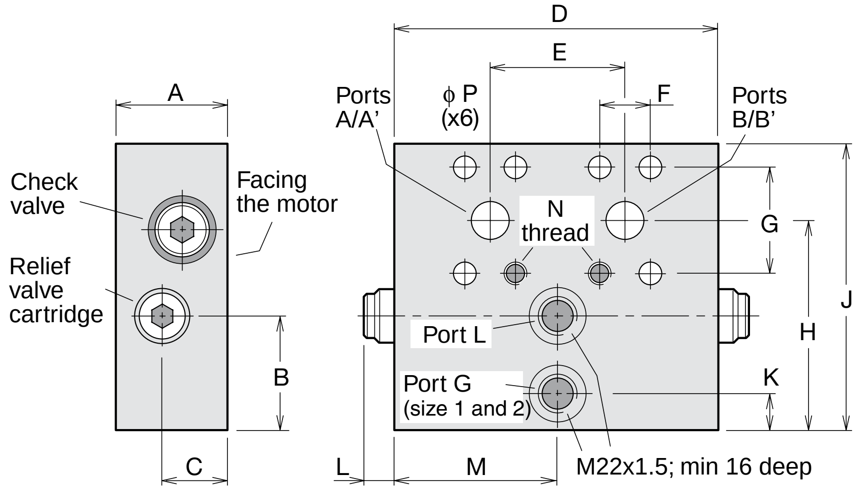
Code Pressure settings (A/B ports) [bar]
280, 300, 330, 350, 380, 400 or **420**

Code	Serial number
00	Factory assigned

Code	Seals
H	Nitrile rubber

Code	Threads (port G)
F	Metric

Code	Techn. status
A	Factory assigned



Dim. [mm]	Size 1 ($^3/_4$")	Size 2 (1")	Size 3 ($1^1/_4$")
A	55	57	57
B	55	55	25
C	32	32	26
D	157	160	160
E	66	75	83
F	23.8	27.8	31.8
G	50.8	57.15	66.7
H	103	109	88
J	140	150	135
K	18	18	-
L	16	16	16
M	78.5	80	-
N	M10 x18	M12 x20	M14 x23
P	11	13	15.5

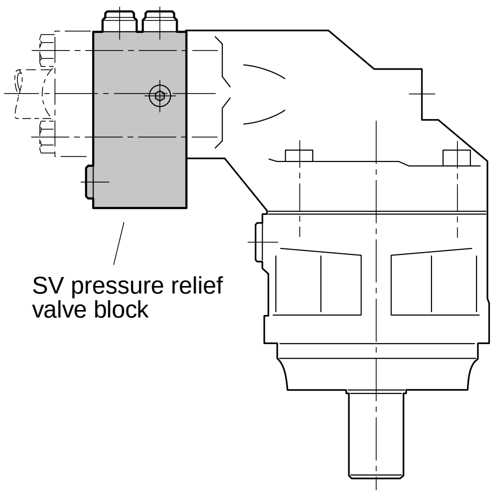
Weight [kg]	Size 1 ($^3/_4$")	Size 2 (1")	Size 3 ($1^1/_4$")
	7.4	9.1	8.5

SV pressure relief valve

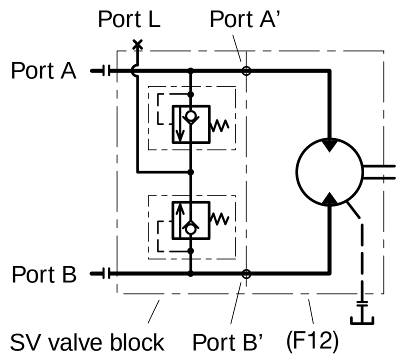
General information

- The SV pressure relief valve block for series F12 and V12 motors is designed to protect the motor and adjacent hydraulic components from short duration pressure peaks.
- It installs directly on the motor port flange and is available in three sizes:
  ’1’: $^3/_4$" for F12-30/-40/-60, T12-60 and V12-60/-80
  ’2’: 1" for F12-80/ -90, T12-80 and V14-110
  ’3’: $1^1/_4$" for F12-110/-125 and V14-160
- The valve block consists of a housing containing two high pressure relief cartridges with anti-cavitation function. Cartridges are available in non-adjustable pressure settings between 280 and 420 bar.
- A make-up/drain port, **L**, is also provided. In certain operating conditions the motor may cavitate because of in-sufficient inlet pressure. To prevent this, the L port can be pressurized. When there is a risk of over-heating, the L port can also be utilized to take out part of the flow for cooling. Contact Parker Hannifin for further information.
- The pressure drop through the main ports (A–A' or B–B') is low. As an example, the pressure drop on size 1 ($^3/_4$") is 0.45 bar *(6,5 psi)* at 175 l/min *(45 gpm)*, and on size 2 (1") 0.7 bar *(10 psi)* at 250 l/min *(65 gpm)*.

NOTE: - The valve block includes main port O-rings (facing the motor) but no mounting screws.
- The valve blocks can be used on all versions of series F12 as well as V12 and T12 motors.



SV valve block installed on an F12 motor.



Hydraulic schematic.

SV	1		–		/		–	00	–	H	F	–	A
Valve function	Version	Port size		Pressure setting				Serial number		Seals	Threads (port L)		Techn. status

Valve function: Pressure relief valve

Code	Version
1	Factory assigned

Code	**Port size** (SAE 6000 psi)	
1	$^{3}/_{4}$"	(F12-30/-40/-60, T12-60, and V12-60/-80)
2	1"	(F12-80/-90, T12-80 and V14-110)
3	$1^{1}/_{4}$"	(F12-110/-125 and V14-160)

Code Pressure setting (A/B ports) [bar]
280, 300, 330, 350, 380, 400 or **420**

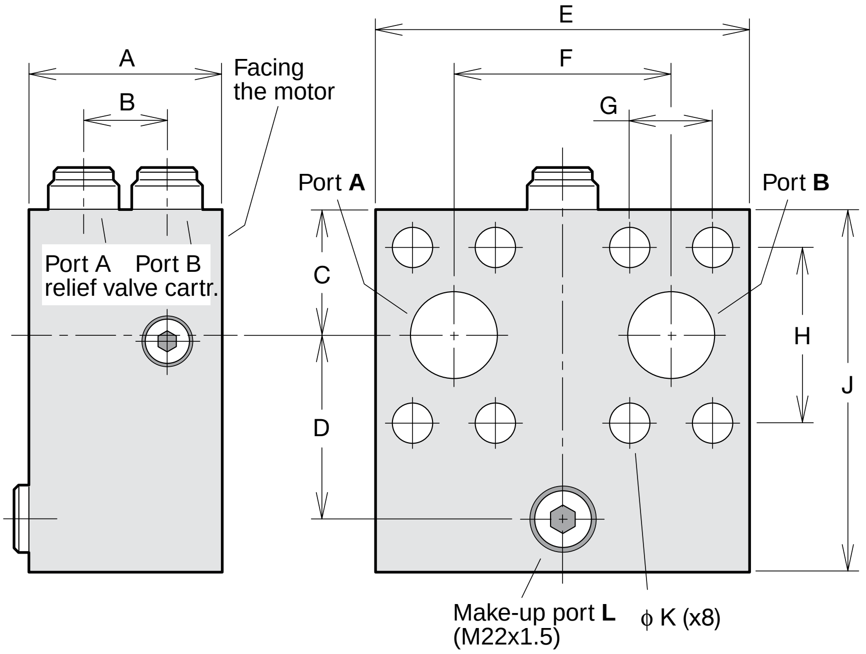
Code	Serial number
00	Factory assigned

Code	Seals
H	Nitrile rubber

Code	**Threads** (port L)
F	Metric

Code	Techn. status
A	Factory assigned

Installation



Dim. [mm]	SV11	SV12	SV13
A	71	73	73
B	31	31	31
C	36	41	47
D	47	51	68
E	130	127	142
F	66	75	83
G	23.8	27.8	31.8
H	50.8	57.2	66.7
J	99	109	135
K	11	13	15.5
Weight [kg]	4.2	5.0	6.7

The SP, super shockless, pressure relief/make-up valve block for series F12 motors is designed mainly for protection of the swing function of an excavator. It features a very 'soft' relief characteristic with very little overshoot and an excellent make-up function.

The pressure/time diagram to the right is a recording of an actual start-brake sequence of an excavator swing function. In the left part ('Start'), port A is pressurized and the swing is accelerating; the pump pressure is limited by the relief valve setting.

In the right part ('Brake'), port B is pressurized (as deter-mined by the relief valve setting), and the swing movement stops.

The valve block installes directly on the motor port flange, and is available in three sizes:

SP11	$^3/_4$" for F12-30/-40/-60
SP12	1" for F12-80/-90
SP13	$1^1/_4$" for F12-110/-125

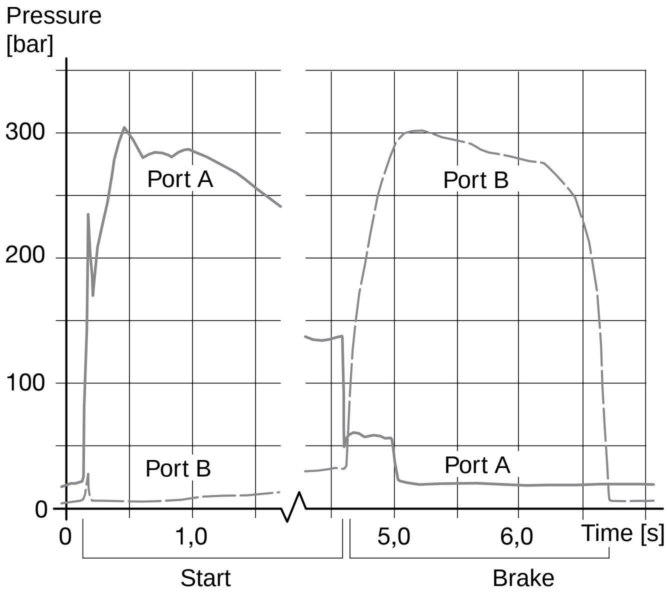
The SP valve consists of a valve block containing two high pressure relief cartridges and two separate check valves for make-up; refer to the split view below.

Cartridges are available in five non-adjustable pressure settings between 190 and 315 bar.

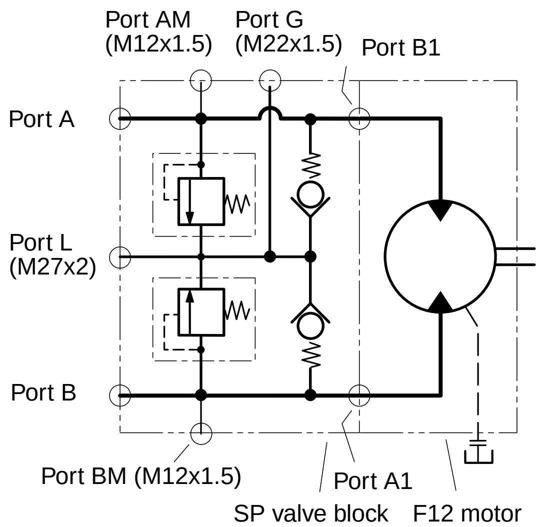
A make-up port (G) is also provided. In certain operating conditions, the motor (when operating as a pump) may cavitate because of insufficient inlet pressure. To prevent this, the G port should be pressurized.

Contact Parker Hannifin, for further information.

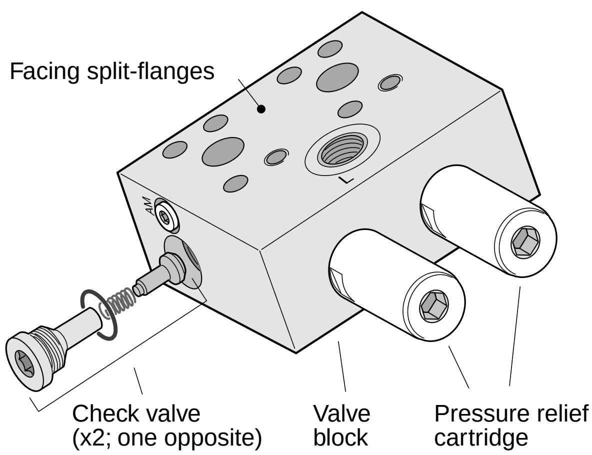
NOTE: The valve block includes main port O-rings (facing the motor) but no mounting screws.



Pressure/time diagram (example).



SP/F12 schematic.



SP valve components.

SP	1		–		/		–	00	–	H	F	–	A

Valve function · Version · Port size · Pressure setting · Serial number · Seals · Threads (port. G) · Techn. status

Pressure relief/ make-up valve

Code	Version
1	Factory assigned

Code	Port size (SAE 6000 psi)	
1	3/4"	(F12-30, -40, -60)
2	1"	(F12-80, -90)
3	1 1/4"	(F12-110, -125)

Code	Pressure setting (A and B ports) [bar]
	190, 220, 250, 285 or **315**

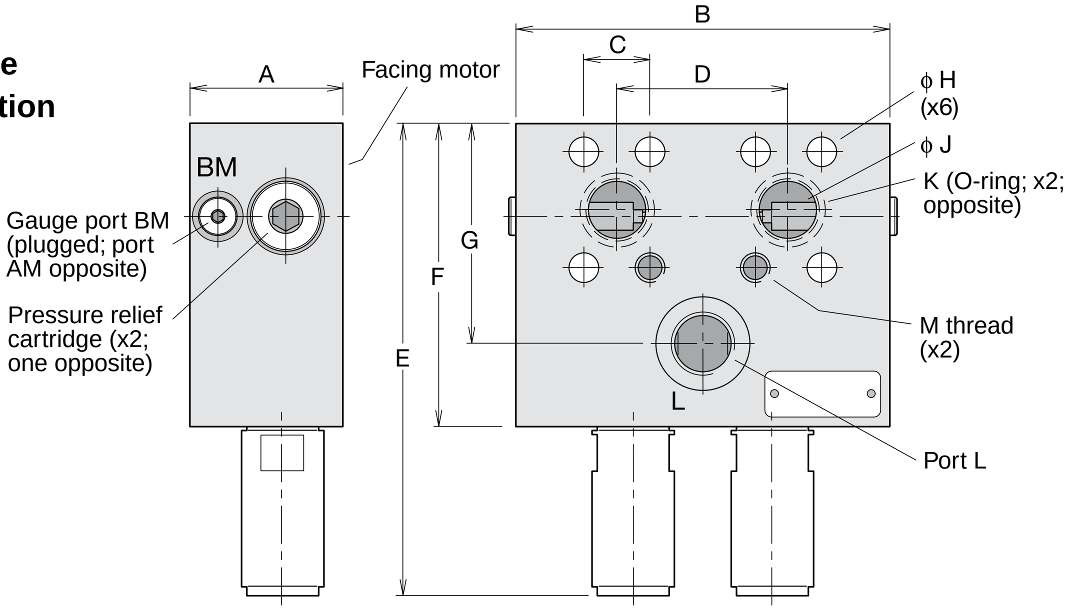
Code	Serial number
00	Factory assigned

Code	Seals
H	Nitrile rubber

Code	Threads (port G)
F	Metric

Code	Tech. status
A	Factory assigned

SP valve installation



Installation dimensions (refer to the illustration)

Valve type	For F12-30/-40/-60	For F12-80/-90	For F12-110/-125
A	63	66	70
B	156	160	160
C	23.8	27.8	31.8
D	66	75	83
E	207	207	225
F	133	133	151
G	97	97	115
H	11	13	15
J	3/4"	12	1 1/4"
K	24.99x3.53	32,93x3.53	37.69x3.53
M	M10 (20 deep)	M12 (20 deep)	M14 (26 deep)
Art. No	0686 371 810	0663 918 801	0663 919 101

Valve assembly part numbers

For motor type	Pressure setting [bar] at 20 l/min 1) 190	220	250	285	315
F12-30/ -40/-60	376 6320	376 7157	376 4631	376 3675	376 3674
F12-80/ -90	376 7161	376 7158	376 6924	376 3678	376 3677
F12-110/ -125	376 7162	376 7159	376 7163	376 7164	376 3679

1) Setting within ±10 bar

Pressure relief cartridges

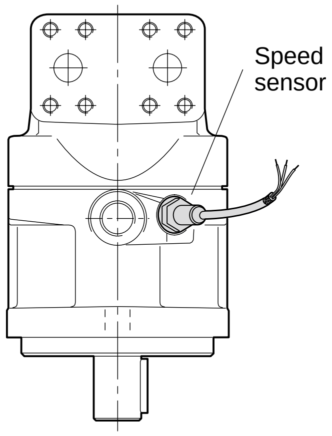
Cartridge type	Pressure setting [bar] at 20 l/min 1) 190	220	250	285	315
Spare part number	376 4610	376 7156	376 4632	376 3824	376 3825

A speed sensor kit is available for series F11/F12. A ferrostat differential (Hall-effect) sensor installs in a separate, threaded hole in the F11/F12 bearing housing.

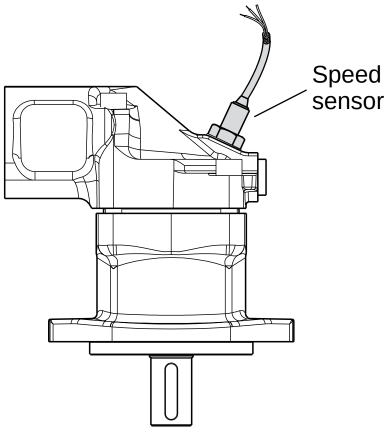
On F12 the speed sensor is directed towards the ring gear. On F11 the speed sensor is directed towards the pistons. The sensor output is a 2 phase shifted square wave signal within a frequency range of 0 Hz to 15 kHz.

NOTE:
- The motor bearing housing must be prepared for the speed pick-up; refer to the F11/F12 ordering codes (pages 7-12).
- On F11 **the pistons position must be known before mounting**.
- Additional information is provided in the Instruction (catalogue HY30-8301/UK).
- The speed sensor is also shown in the illustrations on pages 19, 20, 23, 24, 26, 27, 30, 32, 34 and 36

Part number for Speed sensor is 378 5190.



F12 with speed sensor.



F11-14 with speed sensor.

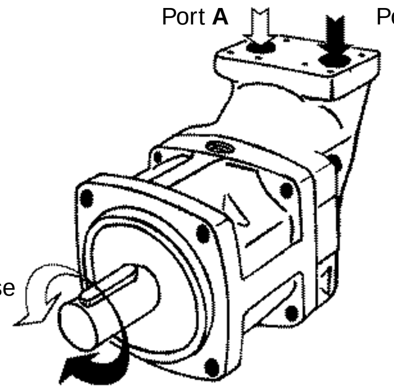
Direction of rotation

The M and H versions of series F11, and the M version of series F12, are bi-directional.

The L and R pump versions are uni-directional, allowing higher selfpriming speeds (refer to page 16).

The illustration to the right shows direction of flow versus shaft rotation. In a motor application, the shaft turns clockwise when port **B** (black arrow) is pressurized, and counter clockwise when port **A** (open arrow) is pressurized.

In a pump application where the shaft turns clock-wise, port B is the inlet port and should be connected to tank; when the shaft turns counter clockwise, port A is the inlet port.



NOTE:
When operating the F11/F12 as a pump above the selfpriming speed (valid for both the pump and motor versions), the inlet must be sufficiently pressurized. Increased noise and deteriorating performance may otherwise be experienced.

For further information refer to 'Selfpriming speed and required inlet pressure' on page 6.

Hydraulic fluids

Ratings and performance data for series F11/F12 are based on operating with good quality, contamination-free, petroleum-based fluids.

Hydraulic fluids type HLP (DIN 51524), automatic transmission fluids type A, or API CD engine oils can be used.

Fire resistant fluids (when used under modified operating conditions) and synthetic fluids may also be suitable.

For additional information, refer to Hydraulic Marketing Information System data base:

- Hydraulic fluid specifications
- Fire resistant fluids.

Operating temperature

The following temperatures should not be exceeded (type **N** shaft seals):

Main circuit 70 °C

Drain circuit: 90 °C.

FPM shaft seals (type **V)** can be used to 115 °C drain fluid temperature.

NOTE: The temperature should be measured at the utilized drain port.

Continuous operation may require case flushing in order to meet the viscosity and temperature limitations.

The following table shows operating speeds, above which flushing is usually required, as well as suggested flow through the case.

Series F11

Frame size	Speed [rpm]	Flow [l/min]
F11-5	5500	1-2
F11-6	4500	2-3
F11-10	4500	2-3
F11-12	4500	2-3
F11-14	4500	2-3
F11-19	4000	2-4

Series F12

Frame size	Speed [rpm]	Flow [l/min]
F12-30	3500	4–8
F12-40	3000	5–10
F12-60	3000	7–14
F12-80	2500	8–16
F12-90	2500	8–16
F12-110	2300	9–18
F12-125	2300	9–18
F12-150	2200	10-20
F12-250	1800	12-22

F11/F12 in series operation

When running F11/F12 in series at higher pressure levels,

Please contact Product Support, Pump and Motors in Trollhättan for further information.

Viscosity
The ideal operating range is15 to 30 mm^2/s [cSt].
At operating temperature, the viscosity (of the drain fluid) should be kept above 8 mm^2/s [cSt].
At start-up, the viscosity should not exceed 1000 mm^2/s [cSt]

Filtration
To obtain the highest service life of the F11/F12, the fluid cleanliness should meet or exceed ISO code 20/18/13 (ISO 4406).

During normal operating conditions, a 10 µm (absolute) filter is recommended.

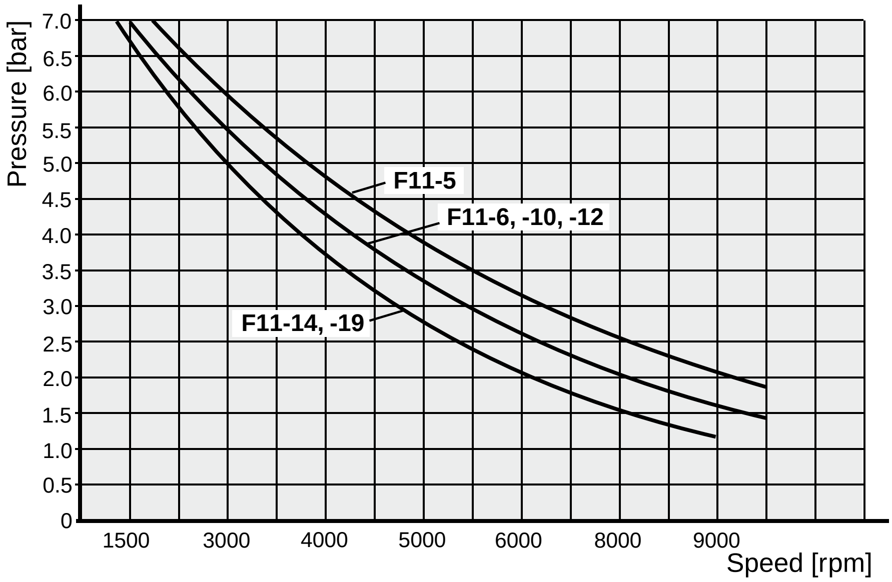
Case pressure
The service life of the shaft seal ring is affected by the speed of the motor and the case drain pressure and it can decrease with an increase in the frequency of pressure peaks.

Note, seal life can be shorter at unfavourable operating conditions (high temperature, low oil viscosity, contaminated oil).

The diagram below show the highest recommended case pressure as a function of shaft speed.

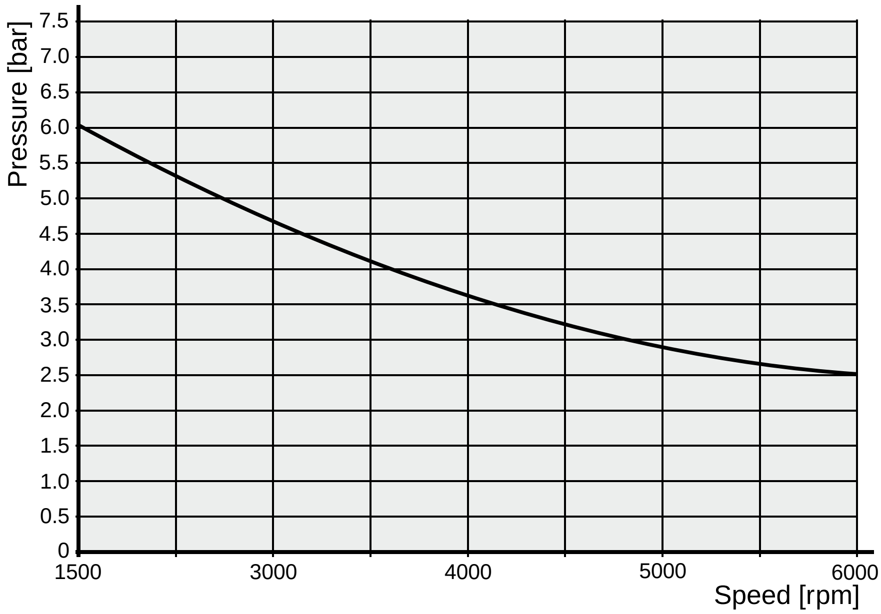
The case pressure must be equal to or greater than the external pressure on the shaft seal ring.

Serie F11



Valid for V seal, for other seals, please contact Parker Hannifin

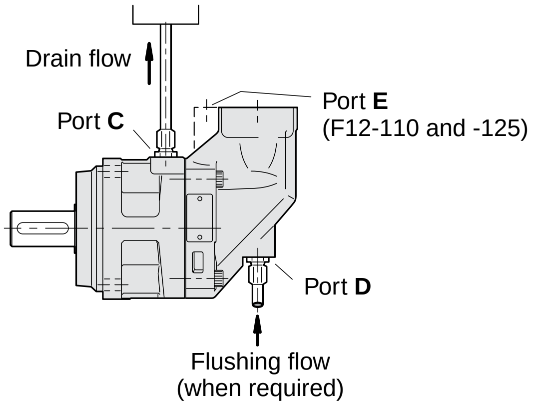
Serie F12

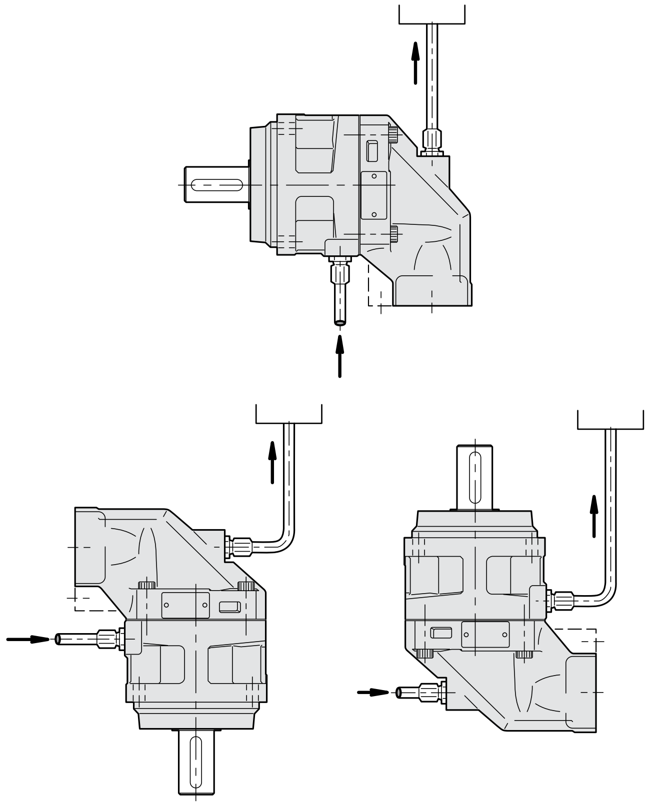


Valid for V seal, for other seals, please contact Parker Hannifin

Case drain connections
Series F11/F12 have two drain ports, **C** and **D**, while F12-110 and -125 have an additional port, **E**.

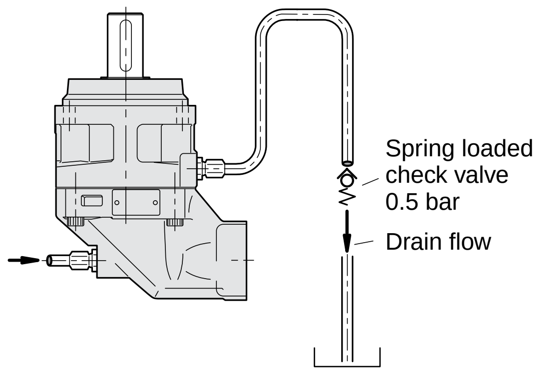
The uppermost drain port (such as port C in the illustration below) should always be utilized.





In mounting positions such as 'shaft up' (below) a spring loaded check valve should be installed in the drain line in order to insure a sufficiently high oil level in the case.

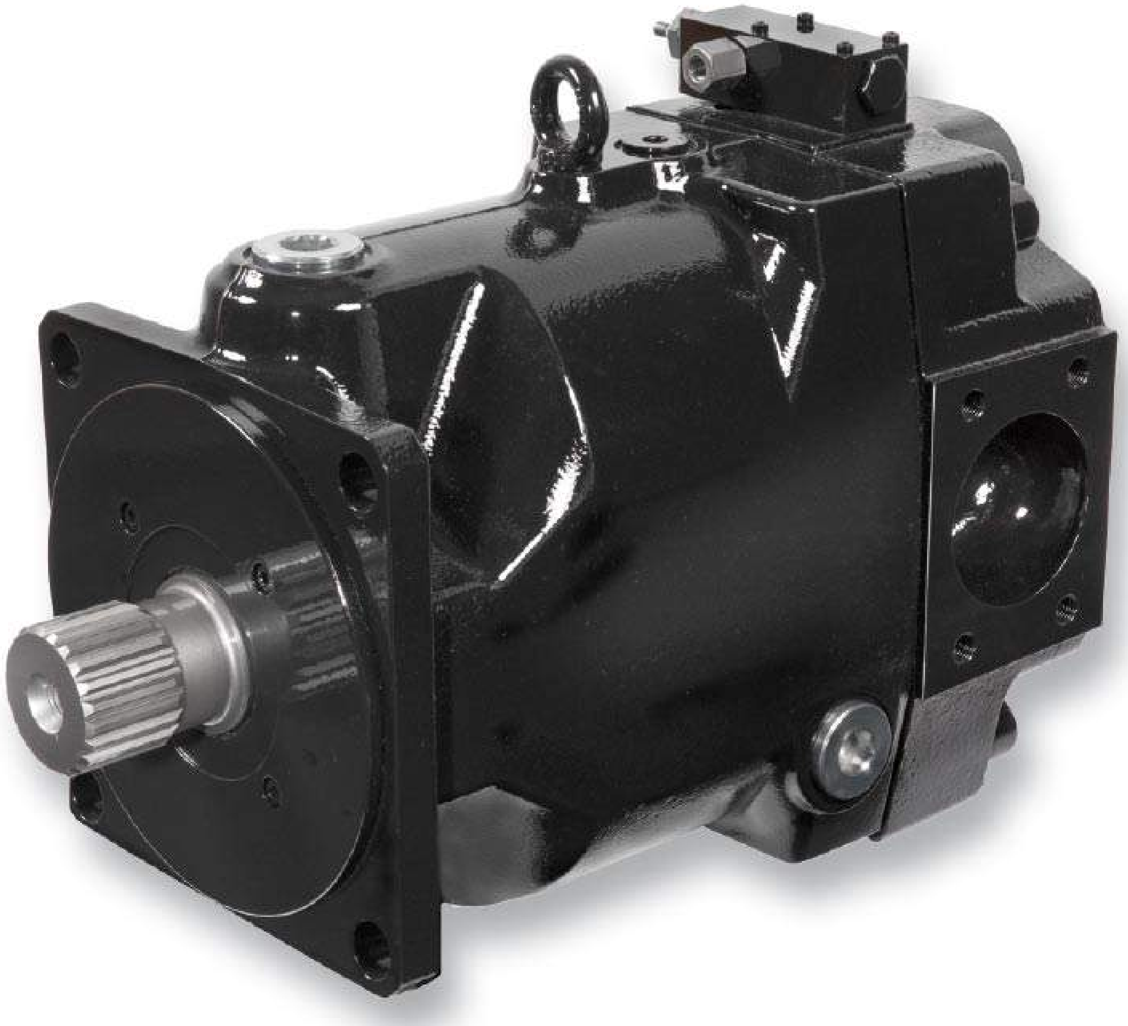
Preferably, the drain line should be connected directly to the reservoir.



Before start-up
Make sure the F11/F12 case as well as the entire hydraulic system is filled with a recommended fluid.

The internal leakage, especially at low operating pressures, is *not* sufficient to provide lubrication at start-up.

NOTE:
- To avoid cavitation and obtain a low noise level as well as reduced heat generation, tubes, hoses and fittings must be adequately dimensioned.
- Preferably, the suction line flow speed should be 0.5 to 1 m/s, and pressure line flow speeds 3 to 5 m/s.



Axial Piston Pump

PV016 - PV360
Variable Displacement

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker

ENGINEERING YOUR SUCCESS.

Contents

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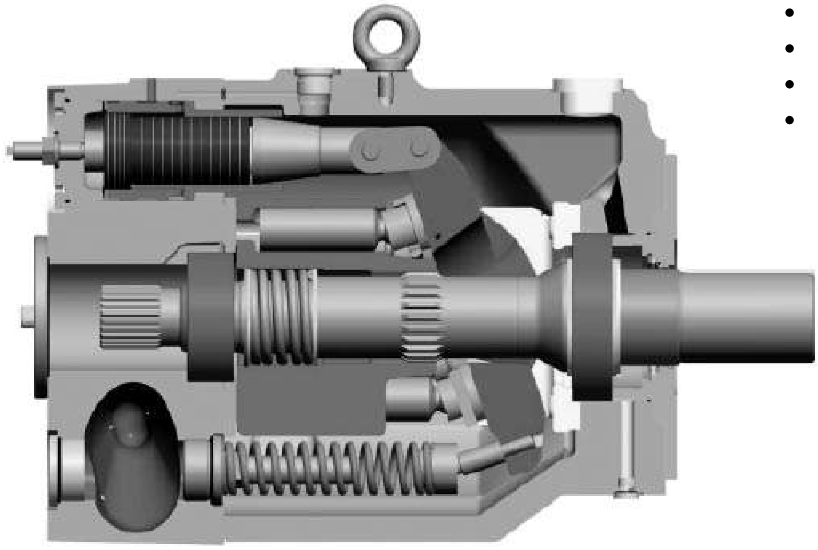
With thru drive for single and multiple pumps

Swash plate type for open circuit



Technical Features

- Low noise level
- Fast response
- Service-friendly
- High self-priming speed
- Compact design
- Thru drive for 100% nominal torque

General Information

Fluid recommendations

Premium quality hydraulic mineral fluid is recomended, like HLP oils to DIN 51524, part 2. Brugger- value has to be 30 N/mm^2 minimum for general application and 50 N/mm^2 for heavily loaded hydraulic equipment and fast cycling machines and/or high dynamic loads, measured in accordance with DIN 51 347-2. See also Document HY30-3248/UK Parker Hydraulic Fluids.

Viscosity

The normal operating viscosity should range between 16 and 100 mm^2/s (cSt). Max. start-up viscosity is 800 mm^2/s (cSt).

Filtration

For maximum pump and system component functionality and life, the system should be protected from contamination by effective filtration.

Fluid cleanliness should be in accordance with ISO classification ISO 4406:1999. The quality of filter elements should be in accordance with ISO standards. General hydraulic systems for satisfactory operation: Class 20/18/15, according to ISO 4406:1999
Recommended cleanliness for maximum component life and functionality: Class 18/16/13, according to ISO 4406:1999

Seals

Check hydraulic fluid specification for chemical resistance of seal material.
Check temperature range of seal material and compare with max. system and ambient temperature.

N - Nitrile -40 ... +90 °C

Note: The highest fluid temperature will be at the drain port of the pump, up to 25 °C higher than in the reservoir.

		PV016	PV020	PV023	PV028	PV032	PV040	PV046
Frame size		1	1	1	1	2	2	2
Max. Displacement	[cm^3/rev.]	16	20	23	28	32	40	46
Output flow at 1500 rpm	[l/min]	24	30	34,5	42	48	60	69
Nominal pressure pN	[bar]	350	350	350	350	350	350	350
Max. pressure pmax at 20% working cycle[1)]	[bar]	420	420	420	420	420	420	420
Case drain pressure, continuous	[bar]	0.5	0.5	0.5	0.5	0.5	0.5	0.55
Case drain pressure, max. peak	[bar]	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Min. Inlet pressure, abs.	[bar]	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Max. Inlet pressure	[bar]	16	16	16	16	16	16	16
Input power at 1500 rpm and 350 bar	[kW]	15.5	19.5	22.5	27.5	31	39	45
Max speed at 1 bar, abs, inlet pressure	[rpm]	3000	3000	3000	3000	2800	2800	2800
Moment of inertia	[kgm^2]	0.0017	0.0017	0.0017	0.0017	0.0043	0.0043	0.0043
Weight	[kg]	19	19	19	19	30	30	30

		PV063	PV080	PV092	PV140	PV180	PV270	PV360
Frame size		3	3	3	4	4	5	5
Max. Displacement	[cm^3/rev.]	63	80	92	140	180	270	360
Output flow at 1500 rpm	[l/min]	94.5	120	138	270	405	405	540
Nominal pressure pN	[bar]	350	350	350	350	350	350	350
Max. pressure pmax at 20% working cycle[1)]	[bar]	420	420	420	420	420	420	420
Case drain pressure, continuous	[bar]	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Case drain pressure, max. peak	[bar]	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Min. Inlet pressure, abs.	[bar]	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Max. Inlet pressure	[bar]	16	16	16	16	16	16	16
Input power at 1500 rpm and 350 bar	[kW]	61.5	78	89.5	136	175	263	350
Max speed at 1 bar, abs, inlet pressure	[rpm]	2800	2500	2300	2400	2200	1800	1750
Moment of inertia	[kgm^2]	0.018	0.018	0.018	0.030	0.030	0.098	0.103
Weight	[kg]	59	59	59	90	90	172	180

1) Special control options required.

P	V				R	1	K	1	T	1	N			

- **axial piston pump variable displacement** (PV)
- **size and displacement**
- **rotation** (R)
- **variation** (1)
- **mounting interface** (K)
- **threads code** (1)
- **thru drive code** (T)
- **coupling code** (1)
- **seals** (N)
- **control** – see next page

Code	Displacement	Size
016	**16 cm³/rev**	**1**
020	**20 cm³/rev**	**1**
023	**23 cm³/rev**	**1**
028	**28 cm³/rev**	**1**

Code	Seals
N	**NBR**
V	FPM
W	NBR with PTFE shaft seal
P	FPM with PTFE shaft seal

Code	Rotation [1]
R	**Clockwise**
L	Counter clockwise

[1] When looked on shaft

Code	Coupling for thru drive	as single part [6]
1	**Single pump, no coupling**	
H	with coupling 25 x 1.5 x 15, DIN 5480	MK-PVBGxK01
Y	with coupling SAE A 9T-16/32 DP	MK-PVBGxK11
A	with coupling SAE - 11T-16/32 DP	MK-PVBGxK12
B	with coupling SAE B 13T-16/32 DP	MK-PVBGxK13
C	with coupling SAE B-B 15T-16/32 DP	MK-PVBGxK14

Code	Variation
1	**Standard**
9	Special adjustment [2]

[2] requires Kxxxx number

Code	Thru drive option	
No adaptor for 2nd pump		
T	**Single pump prepared for thru drive**	
with adaptor for 2nd pump		as single part [6]
Y	SAE AA, Ø 50.8 mm	MK-PVBGxYMN
A	SAE A, Ø 82.55 mm	MK-PVBGxAMN
B	SAE B, Ø 101.6 mm	MK-PVBGxBMN
G	metric, Ø 63 mm	MK-PVBGxGMN
H	metric, Ø 80 mm	MK-PVBGxHMN
J	metric, Ø 100 mm	MK-PVBGxJMN

See dimensions for details
[6] to be ordered separately as single part
x= Frame size, see displacement.

Code	Mounting interface		Shaft
K	**metr. ISO 3019/2**	**4-hole flange Ø100 mm**	**Cylindric, key**
L		**4-hole flange Ø100 mm**	**Splined, DIN 5480**
D	SAE ISO 3019/1	4-hole flange SAE B	Cylindric, key
E		4-hole flange SAE B-B	Splined, SAE

Code	Port [3]	Threads [4]
1	**BSPP**	**metric**
3	UNF	UNC
7	ISO 6149	UNC
8 [5]	ISO 6149	metric

[3] Drain, gauge and flushing ports
[4] All mounting and connecting threads
[5] Mounting interface, code K and L only

Code			Control options
0	0	1	No control
1	0	0	With cover plate, no control function
M	M		Standard pressure control, integrated pilot valve
M	R		Remote pressure control, integrated pilot valve
M	F		Load Sensing (flow) control, integrated pilot valve
M	T		Two spool LS control
			Control variation
		C	Standard version 1)
		1	NG6 interface top side for pilot valves
		W	With unloading function, 24VDC solenoid 1)
		K	Prop.-pilot valve type PVACRE..35 mounted
		Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*
		P	MT1 with mounted pilot valve PVAC1P 2)

1) not for MT
2) only for MT

Horse power / Torque control

Displacem.						Code			Nominal HP at 1.500 rpm	Nominal torque
016 028										
						B			3 kW	20 Nm
						C			4 kW	25 Nm
						D			5.5 kW	35 Nm
						E			7.5 kW	50 Nm
						G			11 kW	71 Nm
						H			15 kW	97 Nm
						K			18.5 kW	120 Nm
Function										
							L		Horse power control with pressure control	
							C		Horse power control with load sensing (single spool)	
Control variation										
								C	Standard version	
								1	NG 6 interface top side	
								W	With unloading function, 24 VDC solenoid	
								K	Prop.-pilot valve type PVACRE..35 mounted	
								Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*	

Code			Control option
electro hydraulic control			
F	P	V	Proportional displacement control, no pressure compensation
U	P		Proportional displacement control, with pressure compensation
Control variation			
		R	pilot operated pressure control, open NG6 interface
		K	pilot operated pressure control, proportional pilot valve type PVACRE..35 mounted
		M	pilot operated pressure control, pressure sensor and proportional pilot valve type PVACRE..35 mounted for pressure control and/or power control

P	V				R	1	K	1	T	1	N			

axial piston pump variable displacement – **size and displacement** – **rotation** – **variation** – **mounting interface** – **threads code** – **thru drive code** – **coupling code** – **seals** – **control**

control: see next page

Code	Displacement	Size
032	**32 cm³/rev**	**2**
040	**40 cm³/rev**	**2**
046	**46 cm³/rev**	**2**

Code	Seals
N	**NBR**
V	FPM
W	NBR with PTFE shaft seal
P	FPM with PTFE shaft seal

Code	Coupling for thru drive	as single part [6]
1	**Single pump, no coupling**	
H	with coupling 25 x 1.5 x 15, DIN 5480	MK-PVBGxK01
J	with coupling 32 x 1.5 x 20, DIN 5480	MK-PVBGxK02
Y	with coupling SAE A 9T-16/32 DP	MK-PVBGxK11
A	with coupling SAE - 11T-16/32 DP	MK-PVBGxK12
B	with coupling SAE B 13T-16/32 DP	MK-PVBGxK13
C	with coupling SAE B-B 15T-16/32 DP	MK-PVBGxK14
D	with coupling SAE C 14T-12/24 DP	MK-PVBGxK15

Code	Rotation [1]
R	**Clockwise**
L	Counter clockwise

[1] When looked on shaft

Code	Variation
1	**Standard**
9	Special adjustment [2]

[2] requires Kxxxx number

Code	Thru drive option	
No adaptor for 2nd pump		
T	**Single pump prepared for thru drive**	
with adaptor for 2nd pump		as single part [6]
A	SAE A, Ø 82.55 mm	MK-PVBGxAMN
B	SAE B, Ø 101.6 mm	MK-PVBGxBMN
C	SAE C, Ø 127 mm	MK-PVBGxCMN
G	metric, Ø 63 mm	MK-PVBGxGMN
H	metric, Ø 80 mm	MK-PVBGxHMN
J	metric, Ø 100 mm	MK-PVBGxJMN
K	metric, Ø 125 mm	MK-PVBGxKMN

Code	Mounting interface		Shaft
K	**metr. ISO 3019/2**	**4-hole flange Ø125 mm**	**Cylindric, key**
L		**4-hole flange Ø125 mm**	**Splined, DIN 5480**
D	SAE	4-hole flange SAE C	Cylindric, key
E	ISO 3019/1	4-hole flange SAE C	Splined, SAE

Code	Port [3]	Threads [4]
1	**BSPP**	**metric**
3	UNF	UNC
7	ISO 6149	UNC
8 [5]	ISO 6149	metric

[3] Drain, gauge and flushing ports
[4] All mounting and connecting threads
[5] Mounting interface, code K and L only

See dimensions for details
[6] to be ordered separately as single part
x= Frame size, see displacement.

Code			Control options
0	0	1	No control
1	0	0	With cover plate, no control function
M	M		Standard pressure control, integrated pilot valve
M	R		Remote pressure control, integrated pilot valve
M	F		Load Sensing (flow) control, integrated pilot valve
M	T		Two spool LS control
			Control variation
		C	Standard version 1)
		1	NG6 interface top side for pilot valves
		W	With unloading function, 24VDC solenoid 1)
		K	Prop.-pilot valve type PVACRE..35 mounted
		Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*
		P	MT1 with mounted pilot valve PVAC1P 2)

1) not for MT
2) only for MT

Horse power / Torque control			
Displacem.	**Code**		
032 046		**Nominal HP at 1.500 rpm**	**Nominal torque**
	D	5.5 kW	35 Nm
	E	7.5 kW	50 Nm
	G	11 kW	71 Nm
	H	15 kW	97 Nm
	K	18.5 kW	120 Nm
	M	22 kW	142 Nm
	S	30 kW	195 Nm
Function			
	L	Horse power control with pressure control	
	C	Horse power control with load sensing (single spool)	
Control variation			
	C	Standard version	
	1	NG 6 interface top side	
	W	With unloading function, 24 VDC solenoid	
	K	Prop.-pilot valve type PVACRE..35 mounted	
	Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*	

Code			Control option
electro hydraulic control			
F	P	V	Proportional displacement control, no pressure compensation
U	P		Proportional displacement control, with pressure compensation
Control variation			
		R	pilot operated pressure control, open NG6 interface
		K	pilot operated pressure control, proportional pilot valve type PVACRE..35 mounted
		M	pilot operated pressure control, pressure sensor and proportional pilot valve type PVACRE..35 mounted for pressure control and/or power control

P	V				R	1	K	1	T	1	N			

axial piston pump variable displacement high pressure version — **size and displacement** — **rotation** — **variation** — **mounting interface** — **threads code** — **thru drive code** — **coupling code** — **seals** — **compensator**

see next page →

Code	Displacement	Size
063	**63 cm³/rev**	**3**
080	**80 cm³/rev**	**3**
092	**92 cm³/rev**	**3**

Code	Rotation [1]
R	**Clockwise**
L	Counter clockwise

[1] When looked on shaft

Code	Variation
1	**Standard**
9	special adjustment [2]

[2] requires Kxxxx number

Code	Mounting interface		Shaft
K	**metr. ISO 3019/2**	**4-hole flange Ø160 mm**	**Cylindric, key**
L	**metr. ISO 3019/2**	**4-hole flange Ø160 mm**	**Splined, DIN 5480**
D	SAE	4-hole flange SAE D	Cylindric, key
E	ISO 3019/1	4-hole flange SAE D	Splined, SAE

Code	Port [3]	Threads [4]
1	**BSPP**	**metric**
3	UNF	UNC
4 [5]	BSPP	metr. M14
7	ISO 6149	UNC
8	ISO 6149	metric

[3] Drain, gauge and flushing ports
[4] All mounting and connecting threads
[5] For PV063-PV092 only: pressure port 1 1/4" with 4 x M14 instead of 4 x M12

Code	Seals
N	**NBR**
V	FPM
W	NBR with PTFE shaft seal
P	FPM with PTFE shaft seal

Code	Coupling for thru drive	as single part [6]
1	**Single pump, no coupling**	
H	with coupling 25 x 1.5 x 15, DIN 5480	MK-PVBGxK01
J	with coupling 32 x 1.5 x 20, DIN 5480	MK-PVBGxK02
K	with coupling 40 x 1.5 x 25, DIN 5480	MK-PVBGxK03
Y	with coupling SAE A 9T-16/32 DP	MK-PVBGxK11
A	with coupling SAE - 11T-16/32 DP	MK-PVBGxK12
B	with coupling SAE B 13T-16/32 DP	MK-PVBGxK13
C	with coupling SAE B-B 15T-16/32 DP	MK-PVBGxK14
D	with coupling SAE C 14T-12/24 DP	MK-PVBGxK15
E	with coupling SAE C - C	MK-PVBGxK16
F	with coupling SAE D, E	MK-PVBGxK17

Code	Thru drive option	
No adaptor for 2nd pump		
T	**Single pump prepared for thru drive**	
with adaptor for 2nd pump		as single part [6]
A	SAE A, Ø 82.55 mm	MK-PVBGxAMN
B	SAE B, Ø 101.6 mm	MK-PVBGxBMN
C	SAE C, Ø 127 mm	MK-PVBGxCMN
D	SAE D, Ø 152,4 mm	MK-PVBGxDMN
G	metric, Ø 63 mm	MK-PVBGxGMN
H	metric, Ø 80 mm	MK-PVBGxHMN
J	metric, Ø 100 mm	MK-PVBGxJMN
K	metric, Ø 125 mm	MK-PVBGxKMN
L	metric, Ø 160 mm	MK-PVBGxLMN

See dimensions for details
[6] to be ordered separately as single part
x= Frame size, see displacement.

Code			Control options
0	0	1	No control
1	0	0	With cover plate, no control function
M	M		Standard pressure control, integrated pilot valve
M	R		Remote pressure control, integrated pilot valve
M	F		Load Sensing (flow) control, integrated pilot valve
M	T		Two spool LS control
			Control variation
		C	Standard version 1)
		1	NG6 interface top side for pilot valves
		W	With unloading function, 24VDC solenoid 1)
		K	Prop.-pilot valve type PVACRE..35 mounted
		Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*
		P	MT1 with mounted pilot valve PVAC1P 2)

1) not for MT
2) only for MT

Horse power / Torque control

Displacem. 063 092						Code			Nominal HP at 1.500 rpm	Nominal torque
						G			11 kW	71 Nm
						H			15 kW	97 Nm
						K			18.5 kW	120 Nm
						M			22kW	142 Nm
						S			30 kW	195 Nm
						T			37 kW	240 Nm
						U			45 kW	290 Nm
						W			55 kW	355 Nm

Function

							L		Horse power control with pressure control
							C		Horse power control with load sensing (single spool)

Control variation

								C	Standard version
								1	NG 6 interface top side
								W	With unloading function, 24 VDC solenoid
								K	Prop.-pilot valve type PVACRE..35 mounted
								Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*

Code			Control option
electro hydraulic control			
F	P	V	Proportional displacement control, no pressure compensation
U	P		Proportional displacement control, with pressure compensation
Control variation			
		R	pilot operated pressure control, open NG6 interface
		K	pilot operated pressure control, proportional pilot valve type PVACRE..35 mounted
		M	pilot operated pressure control, pressure sensor and proportional pilot valve type PVACRE..35 mounted for pressure control and/or power control

P	V				R	1	K	1	T	1	N			

axial piston pump variable displacement – **size and displacement** – **rotation** – **variation** – **mounting interface** – **threads code** – **thru drive code** – **coupling code** – **seals** – **control**

see next page

Code	Displacement	Size
140	**140 cm³/rev**	**4**
180	**180 cm³/rev**	**4**

Code	Rotation [1]
R	**Clockwise**
L	Counter clockwise

1) When looked on shaft

Code	Variation
1	**Standard**
9	Special adjustment [2]

2) requires Kxxxx number

Code	Mounting interface		Shaft
K	**metr. ISO 3019/2**	**4-hole flange Ø160 mm**	**Cylindric, key**
L		**4-hole flange Ø160 mm**	**Splined, DIN 5480**
D	SAE ISO 3019/1	4-hole flange SAE D	Cylindric, key
E		4-hole flange SAE D-F	Splined, SAE
F		4-hole flange SAE D	Cylindric, key
G		4-hole flange SAE D	Splined, SAE

Code	Port[3]	Threads[4]
1	**BSPP**	**metric**
3	UNF	UNC
4 [5]	BSPP	metr. M14
7	ISO 6149	UNC
8 [6]	ISO 6149	metric

3) Drain, gauge and flushing ports
4) All mounting and connecting threads
5) Pressure port 1 1/4" with 4 x M14 instead of 4 x M12
6) Mounting interface, code K and L only

Code	Seals
N	**NBR**
V	FPM
W	NBR with PTFE shaft seal
P	FPM with PTFE shaft seal

Code	Coupling for thru drive	as single part [7]
1	**Single pump, no coupling**	
H	with coupling 25 x 1.5 x 15, DIN 5480	MK-PVBGxK01
J	with coupling 32 x 1.5 x 20, DIN 5480	MK-PVBGxK02
K	with coupling 40 x 1.5 x 25, DIN 5480	MK-PVBGxK03
L	with coupling 50 x 2 x 24, DIN 5480	MK-PVBGxK04
Y	with coupling SAE A 9T-16/32 DP	MK-PVBGxK11
A	with coupling SAE - 11T-16/32 DP	MK-PVBGxK12
B	with coupling SAE B 13T-16/32 DP	MK-PVBGxK13
C	with coupling SAE B-B 15T-16/32 DP	MK-PVBGxK14
D	with coupling SAE C 14T-12/24 DP	MK-PVBGxK15
E	with coupling SAE C - C	MK-PVBGxK16
F	with coupling SAE D, E	MK-PVBGxK17
G	with coupling SAE F	MK-PVBGxK18

Code	Thru drive option	
No adaptor for 2nd pump		
T	**Single pump prepared for thru drive**	
with adaptor for 2nd pump		as single part [7]
A	SAE A, Ø 82.55 mm	MK-PVBGxAMN
B	SAE B, Ø 101.6 mm	MK-PVBGxBMN
C	SAE C, Ø 127 mm	MK-PVBGxCMN
D	SAE D, Ø 152.4 mm	MK-PVBGxDMN
H	metric, Ø 80 mm	MK-PVBGxHMN
J	metric, Ø 100 mm	MK-PVBGxJMN
K	metric, Ø 125 mm	MK-PVBGxKMN
L	metric, Ø 160 mm	MK-PVBGxLMN

See dimensions for details
7) to be ordered separately as single part
x= Frame size, see displacement.

Code			Control options
0	0	1	No control
1	0	0	With cover plate, no control function
M	M		Standard pressure control, integrated pilot valve
M	R		Remote pressure control, integrated pilot valve
M	F		Load Sensing (flow) control, integrated pilot valve
M	T		Two spool LS control
			Control variation
		C	Standard version 1)
		1	NG6 interface top side for pilot valves
		W	With unloading function, 24VDC solenoid 1)
		K	Prop.-pilot valve type PVACRE..35 mounted
		Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*
		P	MT1 with mounted pilot valve PVAC1P 2)

1) not for MT
2) only for MT

Horse power / Torque control

Displacem. 140	180	Code	Nominal HP at 1.500 rpm	Nominal torque
X		K	18.5 kW	120 Nm
X	X	M	22 kW	142 Nm
X	X	S	30 kW	195 Nm
X	X	T	37 kW	240 Nm
X	X	U	45 kW	290 Nm
X	X	W	55 kW	355 Nm
X	X	Y	75 kW	485 Nm
X	X	Z	90 kW	585 Nm
	X	2	110 kW	715 Nm

Function

140	180	Code	Function
X	X	L	Horse power control with pressure control
X	X	C	Horse power control with load sensing (single spool)

Control variation

140	180	Code	Control variation
X	X	C	Standard version
X	X	1	NG 6 interface top side
X	X	W	With unloading function, 24 VDC solenoid
X	X	K	Prop.-pilot valve type PVACRE..35 mounted
X	X	Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*

Code			Control option
electro hydraulic control			
F	P	V	Proportional displacement control, no pressure compensation
U	P		Proportional displacement control, with pressure compensation
Control variation			
		R	pilot operated pressure control, open NG6 interface
		K	pilot operated pressure control, proportional pilot valve type PVACRE..35 mounted
		M	pilot operated pressure control, pressure sensor and proportional pilot valve type PVACRE..35 mounted for pressure control and/or power control

P	V				R	1	K	1	T	1	N			

- **PV**: axial piston pump variable displacement high pressure version
- size and displacement
- **R**: rotation
- **1**: variation
- **K**: mounting interface
- **1**: threads code
- **T**: thru drive code
- **1**: coupling code
- **N**: seals
- compensator – see next page

Code	Displacement	Size
270	**270 cm³/rev**	**5**

Code	Rotation [1]
R	**Clockwise**
L	Counter clockwise

[1] When looked on shaft

Code	Variation
1	**Standard**
9	special adjustment [2]

[2] requires Kxxxx number

Code	Mounting interface		Shaft
K	**metr. ISO 3019/2**	**4-hole flange Ø200 mm**	**Cylindric, key**
L		**4-hole flange Ø200 mm**	**Splined, DIN 5480**
D	SAE	4-hole flange SAE E	Cylindric, key
E	ISO 3019/1	4-hole flange SAE E-F	Splined, SAE

Code	Port [4]	Threads [5]
1	**BSPP**	**metric**
3	UNF	UNC
7	ISO 6149	UNC
8	ISO 6149	metric

[4] Drain, gauge and flushing ports
[5] All mounting and connecting threads

Code	Seals
N	**NBR**
V	FPM
W	NBR with PTFE shaft seal
P	FPM with PTFE shaft seal

Code	Coupling for thru drive	as single part [6]
1	**Single pump, no coupling**	
H	with coupling 25 x 1.5 x 15, DIN 5480	MK-PVBGxK01
J	with coupling 32 x 1.5 x 20, DIN 5480	MK-PVBGxK02
K	with coupling 40 x 1.5 x 25, DIN 5480	MK-PVBGxK03
L	with coupling 50 x 2 x 24, DIN 5480	MK-PVBGxK04
M	with coupling 60 x 2 x 28, DIN 5480	MK-PVBGxK05
Y	with coupling SAE A 9T-16/32 DP	MK-PVBGxK11
A	with coupling SAE - 11T-16/32 DP	MK-PVBGxK12
B	with coupling SAE B 13T-16/32 DP	MK-PVBGxK13
C	with coupling SAE B-B 15T-16/32 DP	MK-PVBGxK14
D	with coupling SAE C 14T-12/24 DP	MK-PVBGxK15
E	with coupling SAE C - C	MK-PVBGxK16
F	with coupling SAE D, E	MK-PVBGxK17

Code	Thru drive option	
No adaptor for 2nd pump		
T	**Single pump prepared for thru drive**	
with adaptor for 2nd pump		as single part [6]
A	SAE A, Ø 82.55 mm	MK-PVBGxAMN
B	SAE B, Ø 101.6 mm	MK-PVBGxBMN
C	SAE C, Ø 127 mm	MK-PVBGxCMN
D	SAE D, Ø 152,4 mm	MK-PVBGxDMN
E	SAE E, Ø 165,1 mm	MK-PVBGxEMN
H	metric, Ø 80 mm	MK-PVBGxHMN
J	metric, Ø 100 mm	MK-PVBGxJMN
K	metric, Ø 125 mm	MK-PVBGxKMN
L	metric, Ø 160 mm	MK-PVBGxLMN
M	metric, Ø 200 mm	MK-PVBGxMMN

See dimensions for details
[6] to be ordered separately as single part
x= Frame size, see displacement.

Code			Control options
0	0	1	No control
1	0	0	With cover plate, no control function
M	M		Standard pressure control, integrated pilot valve
M	R		Remote pressure control, integrated pilot valve
M	F		Load Sensing (flow) control, integrated pilot valve
M	T		Two spool LS control
			Control variation
		C	Standard version 1)
		1	NG6 interface top side for pilot valves
		W	With unloading function, 24VDC solenoid 1)
		K	Prop.-pilot valve type PVACRE..35 mounted
		Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*
		P	MT1 with mounted pilot valve PVAC1P 2)

1) not for MT
2) only for MT

Horse power / Torque control										
Displacem.						**Code**				
270									**Nominal HP at 1.500 rpm**	**Nominal torque**
						T			37 kW	240 Nm
						U			45 kW	290 Nm
						W			55 kW	350 Nm
						Y			75 kW	480 Nm
						Z			90 kW	580 Nm
						2			110 kW	700 Nm
						3			132 kW	840 Nm
Function										
							L		Horse power control with pressure control	
							C		Horse power control with load sensing (single spool)	
Control variation										
								C	Standard version	
								1	NG 6 interface top side	
								W	With unloading function, 24 VDC solenoid	
								K	Prop.-pilot valve type PVACRE..35 mounted	
								Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*	

Code			Control option
electro hydraulic control			
F	P	V	Proportional displacement control, no pressure compensation
U	P		Proportional displacement control, with pressure compensation
Control variation			
		R	pilot operated pressure control, open NG6 interface
		K	pilot operated pressure control, proportional pilot valve type PVACRE..35 mounted
		M	pilot operated pressure control, pressure sensor and proportional pilot valve type PVACRE..35 mounted for pressure control and/or power control

P	V				R	1	K	1	T	1	N			

axial piston pump variable displacement – **size and displacement** – **rotation** – **variation** – **mounting interface** – **threads code** – **thru drive code** – **coupling code** – **seals** – **control**

control: see next page

Code	Displacement	Size
360	**360 cm³/rev**	**5**

Code	Seals
N	**NBR**
V	FPM

Code	Rotation 1)
R	**Clockwise**

1) When looked on shaft

Code	Variation
1	**Standard**
9	Special adjustment 2)

2) requires Kxxxx number

Code	Coupling for thru drive	as single part 6)
1	**Single pump, no coupling**	
H	with coupling 25 x 1.5 x 15, DIN 5480	MK-PVBGxK01
J	with coupling 32 x 1.5 x 20, DIN 5480	MK-PVBGxK02
K	with coupling 40 x 1.5 x 25, DIN 5480	MK-PVBGxK03
L	with coupling 50 x 2 x 24, DIN 5480	MK-PVBGxK04
M	with coupling 60 x 2 x 28, DIN 5480	MK-PVBGxK05
P	with coupling 70 x 3 x 22, DIN 5480	MK-PVBGxK06
Y	with coupling SAE A 9T-16/32 DP	MK-PVBGxK11
A	with coupling SAE - 11T-16/32 DP	MK-PVBGxK12
B	with coupling SAE B 13T-16/32 DP	MK-PVBGxK13
C	with coupling SAE B-B 15T-16/32 DP	MK-PVBGxK14
D	with coupling SAE C 14T-12/24 DP	MK-PVBGxK15
E	with coupling SAE C - C	MK-PVBGxK16
F	with coupling SAE D, E	MK-PVBGxK17
G	with coupling SAE F	MK-PVBGxK18

Code	Mounting interface		Shaft
K	**metr. ISO 3019/2**	**4-hole flange Ø250 mm**	**Cylindric, key**
L		**4-hole flange Ø250 mm**	**Splined, DIN 5480**
R		**4-hole flange Ø224 mm**	**Cylindric, key**
T		**4-hole flange Ø224 mm**	**Splined, DIN 5480**
D	SAE ISO 3019/1	4-hole flange SAE E	Cylindric, key
E		4-hole flange SAE E	Splined, SAE

Code	Port 3)	Threads 4)
1	**BSPP**	**metric**
3	UNF	UNC

3) Drain, gauge and flushing ports
4) All mounting and connecting threads

Code	Thru drive option	
No adaptor for 2nd pump		
T	**Single pump prepared for thru drive**	
with adaptor for 2nd pump		as single part 6)
A	SAE A, Ø 82.55 mm	MK-PVBGxAMN
B	SAE B, Ø 101.6 mm	MK-PVBGxBMN
C	SAE C, Ø 127 mm	MK-PVBGxCMN
D	SAE D, Ø 152.4 mm	MK-PVBGxDMN
E	SAE E, Ø 165.1 mm	MK-PVBGxEMN
H	metric, Ø 80 mm	MK-PVBGxHMN
J	metric, Ø 100 mm	MK-PVBGxJMN
K	metric, Ø 125 mm	MK-PVBGxKMN
L	metric, Ø 160 mm	MK-PVBGxLMN
M	metric, Ø 200 mm	MK-PVBGxMMN

See dimensions for details
6) to be ordered separately as single part
x= Frame size, see displacement.

Code			Control options
0	0	1	No control
1	0	0	With cover plate, no control function
M	M		Standard pressure control, integrated pilot valve
M	R		Remote pressure control, integrated pilot valve
M	F		Load Sensing (flow) control, integrated pilot valve
M	T		Two spool LS control
			Control variation
		C	Standard version 1)
		1	NG6 interface top side for pilot valves
		W	With unloading function, 24VDC solenoid 1)
		K	Prop.-pilot valve type PVACRE..35 mounted
		Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*
		P	MT1 with mounted pilot valve PVAC1P 2)

1) not for MT
2) only for MT

Horse power / Torque control

Displacem.						Code				
360									**Nominal HP at 1.500 rpm**	**Nominal torque**
						U			45 kW	290 Nm
						W			55 kW	350 Nm
						Y			75 kW	480 Nm
						Z			90 kW	580 Nm
						2			110 kW	700 Nm
						3			132 kW	840 Nm
						4			160 kW	1020 Nm
						5			180 kW	1150 Nm
						6			200 kW	1280 Nm
Function										
							L		Horse power control with pressure control	
							C		Horse power control with load sensing (single spool)	
Control variation										
								C	Standard version	
								1	NG 6 interface top side	
								W	With unloading function, 24 VDC solenoid	
								K	Prop.-pilot valve type PVACRE..35 mounted	
								Z	Without integrated pilot valve, NG6 interface, for mounting of accessory code PVAC*	

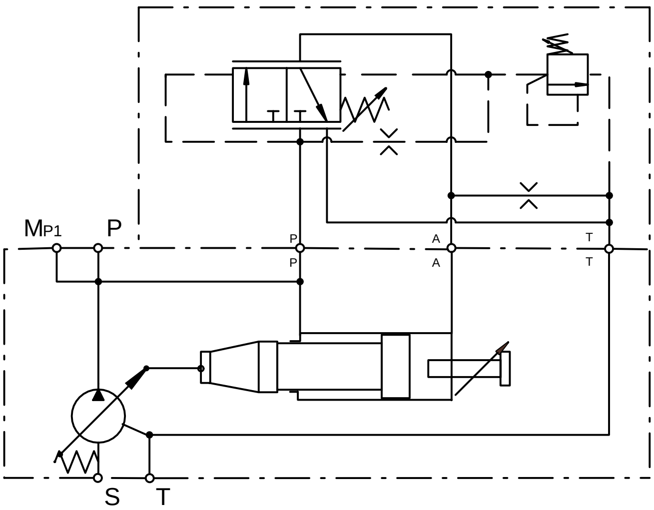
Code			Control option
electro hydraulic control			
F	P	V	Proportional displacement control, no pressure compensation
U	P		Proportional displacement control, with pressure compensation
Control variation			
		R	pilot operated pressure control, open NG6 interface
		K	pilot operated pressure control, proportional pilot valve type PVACRE..35 mounted
		M	pilot operated pressure control, pressure sensor and proportional pilot valve type PVACRE..35 mounted for pressure control and/or power control

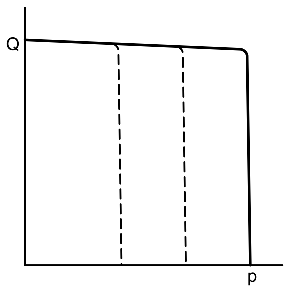
Standard Pressure Control

Control option MMC

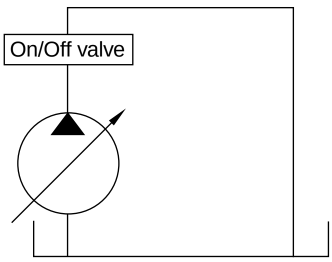
The standard pressure control adjusts the pump displacement according to the actual need of flow in the system in order to keep the pressure constant.

Control schematics

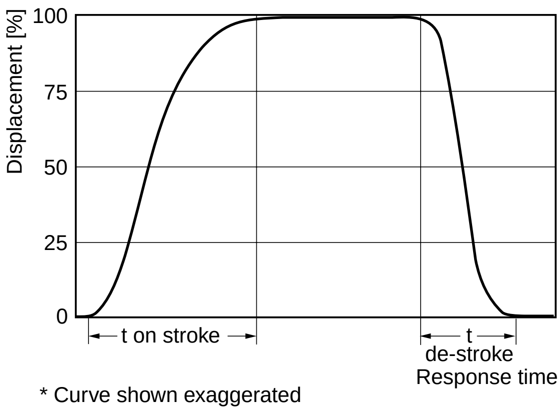




Response times of the pump are collected from a circuit as below by measuring the pumps swash angle movement at different pressures.



Dynamic characteristic of flow control *



* Curve shown exaggerated

	Time on-stroke [ms]		Time de-stroke [ms]	
	against 50 bar	against 350 bar	zero stroke 50 bar	zero stroke 350 bar
PV360	520	180	120	82

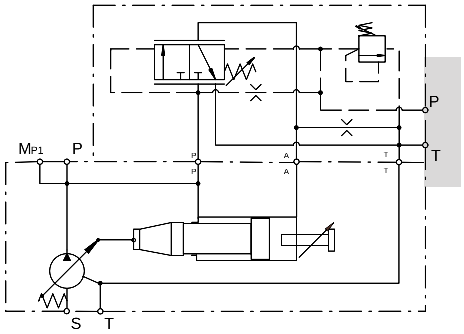
Pressure adjustment range	15 to 350 bar
Factory setting pressure	50 bar
Differential pressure adjustment range	10 to 40 bar
Factory setting differential pressure	15 bar
Control oil consumption	Max 8.0 l/min

Standard Pressure Control with NG6 Interface

Control option MM1

With code MM1 the standard pressure control has a valve interface size NG 6 DIN 24340 (CETOP 03 acc. RP35H, NFPA D03) on the top side.

This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.

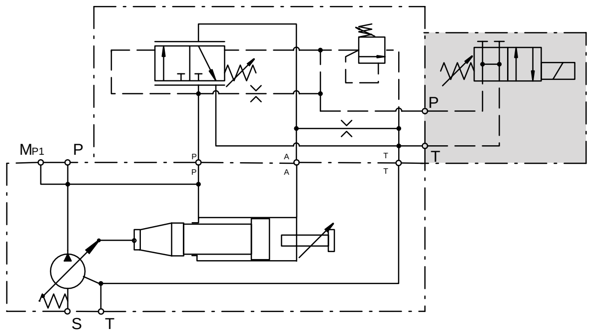


Standard Pressure Control with Electrical Unloading

Control option MMW

With code MMW a solenoid operated directional control valve (D1VW002KNJW) for electrical unloading is mounted on the control top side.

When the solenoid is de-energised, the pump compensates at a stand-by pressure of typically 15 bar. When the solenoid is energised, the pump compensates at the pressure adjusted on the integrated pilot valve.

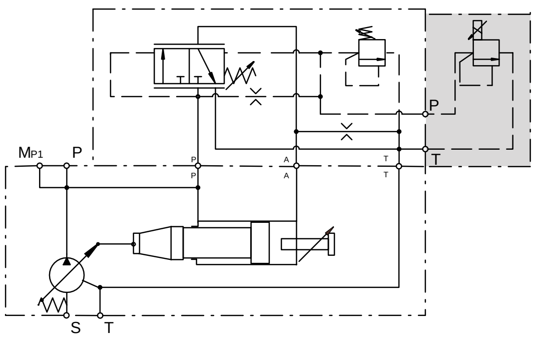


Standard Pressure Control with Proportional Pilot Valve

Control option MMK

With code MMK a proportional pilot valve of type PVACRE..35 (see page 35) is mounted on the top side interface.

This allows a variation of the pump compensating pressure between 20 and 350 bar by an electrical signal.

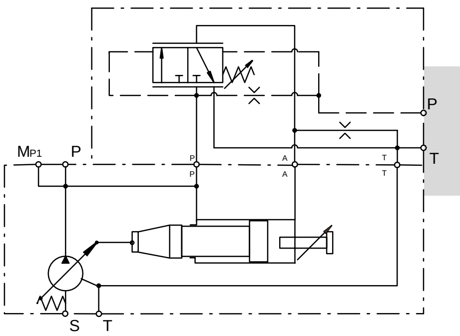


Standard Pressure Control with Accessory

Control option MMZ

Control MMZ has no integrated pilot valve but a valve interface NG6 DIN 24340 on the top.

This version is recommended for valve accessories.

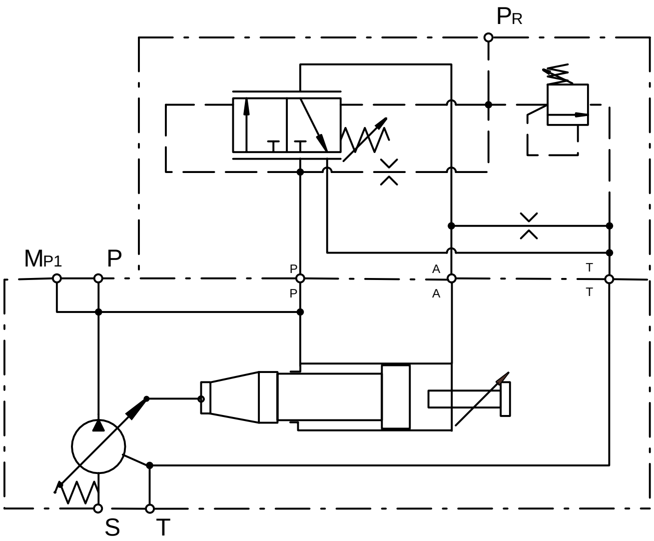


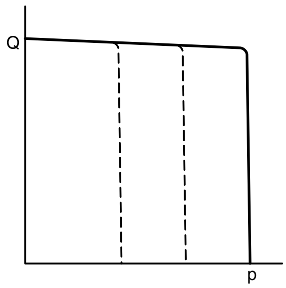
Remote Pressure Control

Control option MRC

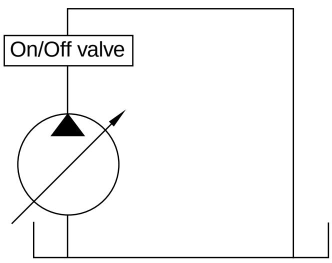
The remote pressure control adjusts the pump displacement according to the actual need of flow in the system in order to keep the pressure constant at a level given by a remotely installed pilot valve.

Control schematics

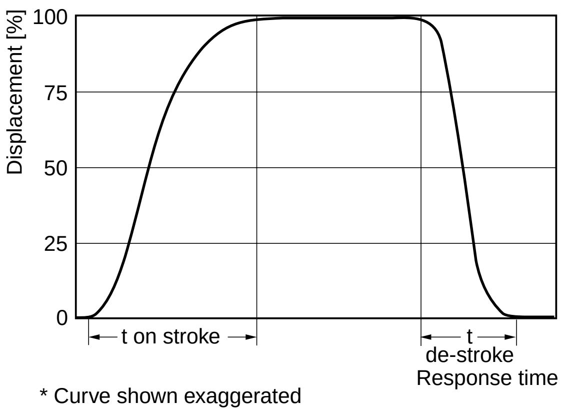




Response times of the pump are collected from a circuit as below by measuring the pumps swash angle movement at different pressures.



Dynamic characteristic of flow control *



* Curve shown exaggerated

	Time on-stroke [ms]		Time de-stroke [ms]	
	against 50 bar	against 350 bar	zero stroke 50 bar	zero stroke 350 bar
PV360	520	180	120	82

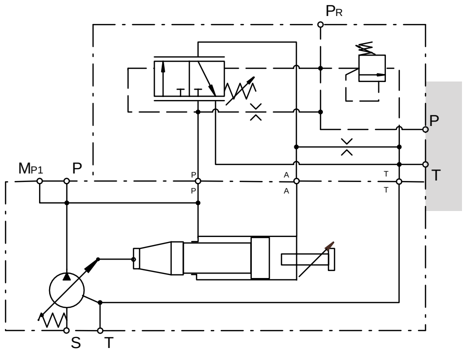
Pressure adjustment range	15 to 350 bar
Factory setting pressure	50 bar
Differential pressure adjustment range	10 to 40 bar
Factory setting differential pressure	15 bar
Control oil consumption	Max 8.0 l/min

Remote Pressure Control with NG6 Interface

Control option MR1

With code MR1 the remote pressure control has a valve interface size NG 6 DIN 24340 (CETOP 03 acc. RP35H, NFPA D03) on the top side.

This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.

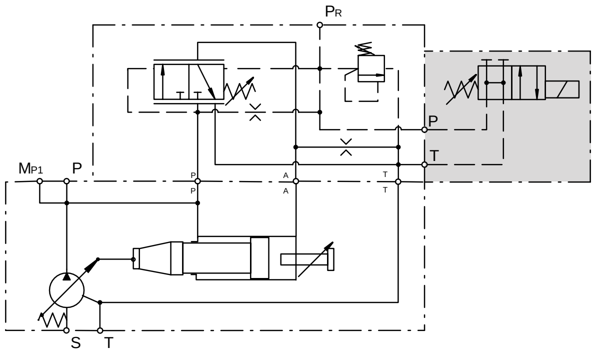


Remote Pressure Control with Electrical Unloading

Control option MRW

With code MRW a solenoid operated directional control valve (D1VW002KNJW) for electrical unloading is mounted on the control top side.

When the solenoid is de-energised, the pump compensates at a stand-by pressure of typically 15 bar. When the solenoid is energised, the pump compensates at the pressure adjusted on the integrated pilot valve.

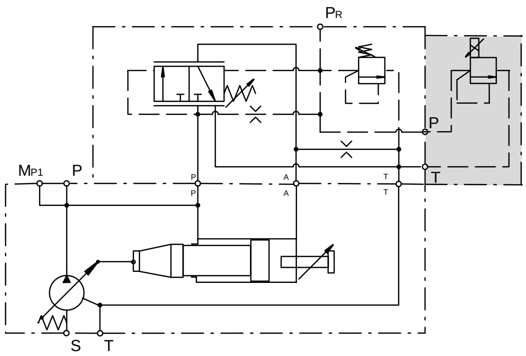


Remote Pressure Control with Proportional Pilot Valve

Control option MRK

With code MRK a proportional pilot valve of type PVACRE..35 (see page 35) is mounted on the top side interface.

This allows a variation of the pump compensating pressure between 20 and 350 bar by an electrical signal.

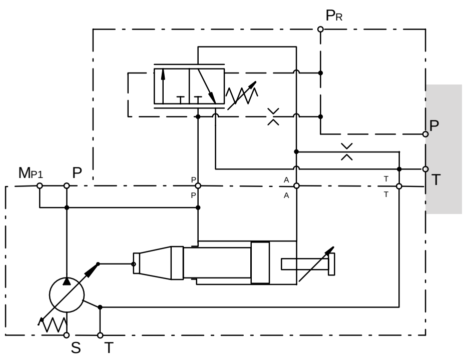


Remote Pressure Control with Accessory

Control option MRZ

Control MRZ has no integrated pilot valve but a valve interface NG6 DIN 24340 on the top.

This version is recommended for valve accessories.

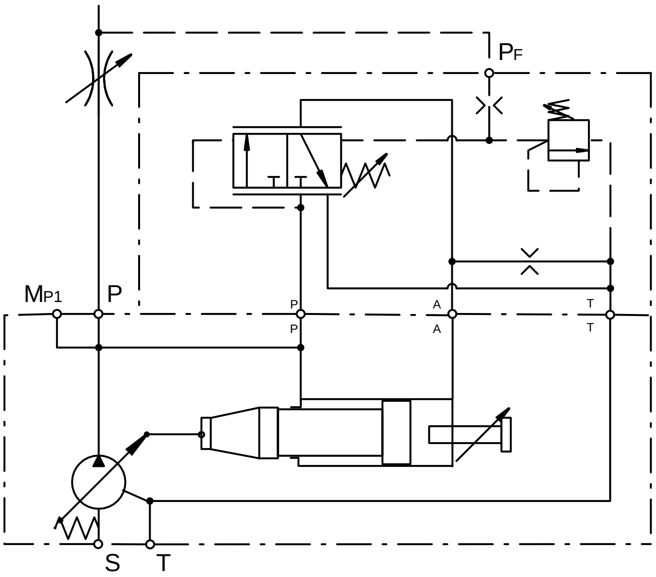


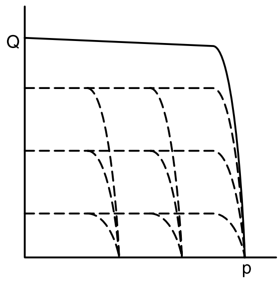
Load Sensing Control

Control option MFC

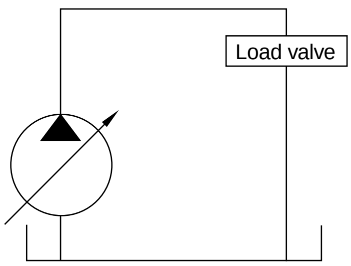
The pilot pressure of the load sensing control is taken from a load sensing port in the hydraulic system. It is used to match pump flow to system demands.

Control schematics





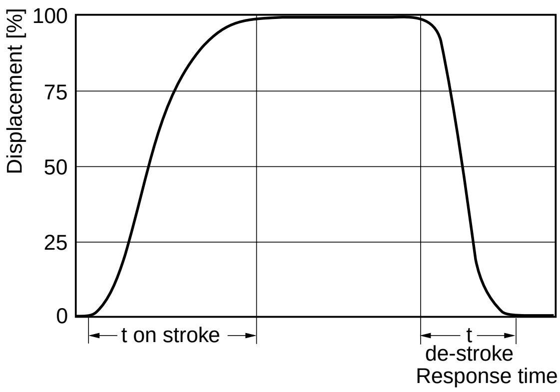
Response times of the pump are collected from a circuit as below by measuring the pumps swash angle movement at different pressures.



	Time on-stroke [ms]		Time de-stroke [ms]	
	stand-by to 50 bar	stand-by to 350 bar	50 bar to stand-by	350 bar to stand-by
PV360	500	690	830	50

Pressure adjustment range	15 to 350 bar
Factory setting pressure	50 bar
Differential pressure adjustment range	10 to 40 bar
Factory setting differential pressure	10 bar
Control oil consumption	Max 8.0 l/min

Dynamic characteristic of flow control *



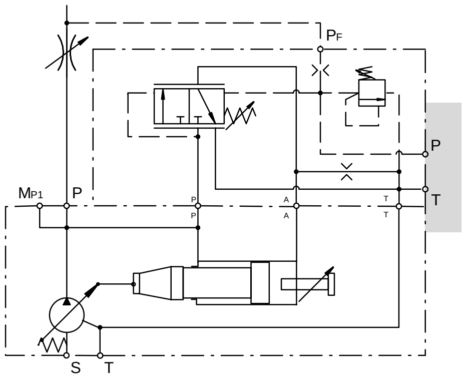
* Curve shown exaggerated

Load Sensing Control with NG6 Interface

Control option MF1

With code MF1 the remote pressure control has a valve interface size NG 6 DIN 24340 (CETOP 03 acc. RP35H, NFPA D03) on the top side.

This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.

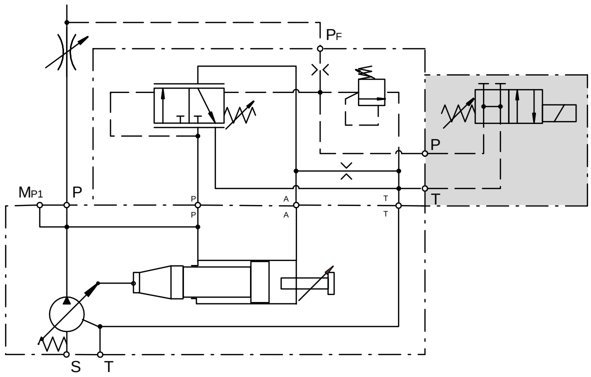


Load Sensing Control with Electrical Unloading

Control option MFW

With code MFW a solenoid operated directional control valve (D1VW002KNJW) for electrical unloading is mounted on the control top side.

When the solenoid is de-energised, the pump compensates at a stand-by pressure of typically 15 bar. When the solenoid is energised, the pump compensates at the pressure adjusted on the integrated pilot valve.

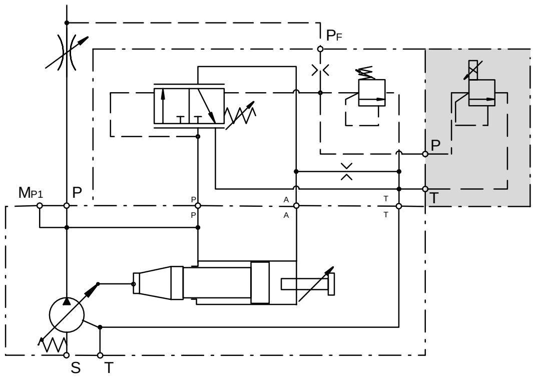


Load Sensing Control with Proportional Pilot Valve

Control option MFK

With code MFK a proportional pilot valve of type PVACRE..35 (see page 35) is mounted on the top side interface.

This allows a variation of the pump compensating pressure between 20 and 350 bar by an electrical signal.

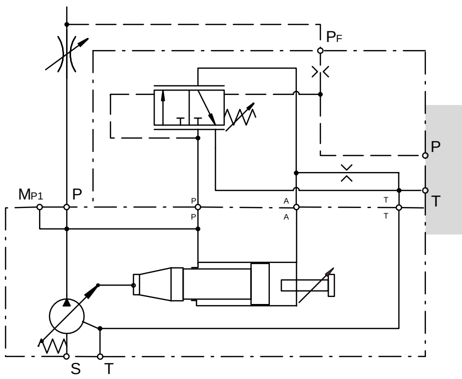


Load Sensing Control with Accessory

Control option MFZ

Control MFZ has no integrated pilot valve but a valve interface NG6 DIN 24340 on the top.

This version is recommended for valve accessories.

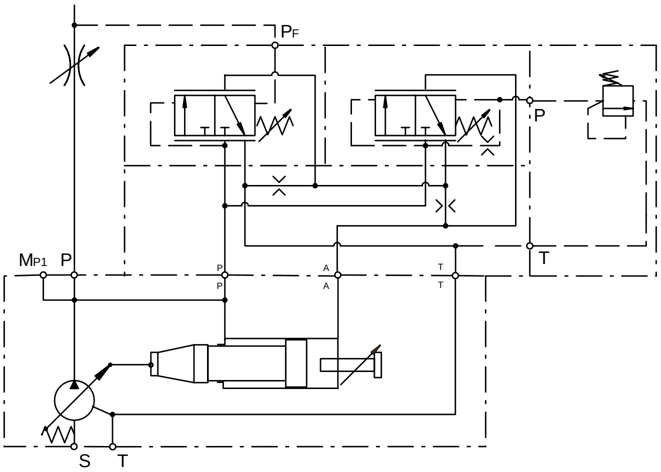


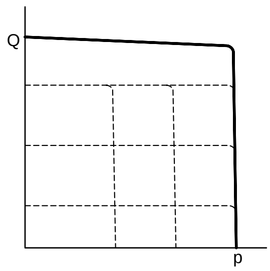
2 Spool Load Sensing Control

Control option MTP

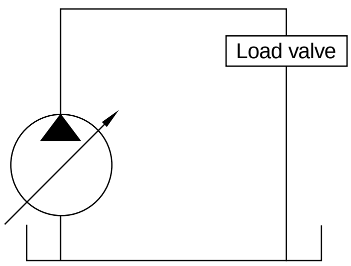
The pilot pressure of the load sensing control is taken from a load sensing port in the hydraulic system. It is used to match pump flow to system demands. With the 2 spool control the interaction of the two control functions is avoided by using two separate control valves for flow and pressure compensation.

Control schematics



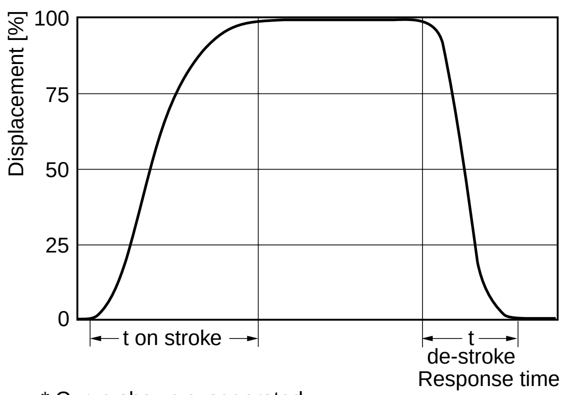


Response times of the pump are collected from a circuit as below by measuring the pumps swash angle movement at different pressures.



	Time on-stroke [ms]		Time de-stroke [ms]	
	stand-by to 50 bar	stand-by to 350 bar	50 bar to stand-by	350 bar to stand-by
PV360	920	670	1000	170

Dynamic characteristic of flow control *



* Curve shown exaggerated

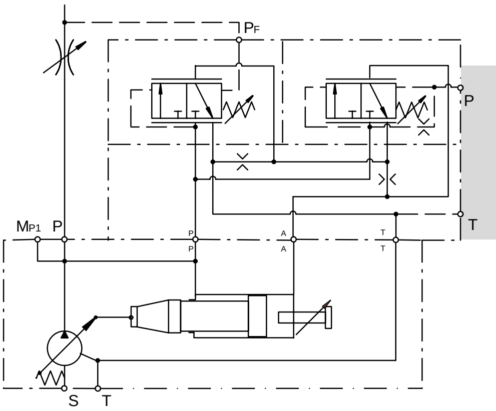
Pressure adjustment range	15 to 350 bar
Factory setting pressure	50 bar
Differential pressure adjustment range	10 to 40 bar
Factory setting differential pressure load sensing	10 bar
Factory setting differential pressure, pressure control	15 bar
Control oil consumption	Max 8.0 l/min

2 Spool Load Sensing Control with NG6 Interface

Control option MT1

With code MT1 the remote pressure control has a valve interface size NG 6 DIN 24340 (CETOP 03 acc. RP35H, NFPA D03) on the top side.

This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.

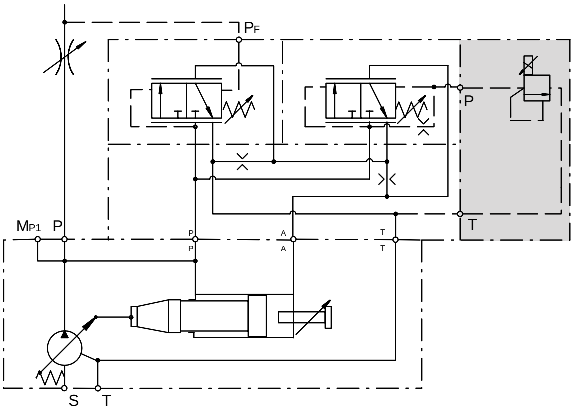


2 Spool Load Sensing Control with Proportional Pilot Valve

Control option MTK

With code MTK a proportional pilot valve of type PVACRE..35 (see page 35) is mounted on the top side interface.

This allows a variation of the pump compensating pressure between 20 and 350 bar by an electrical signal.

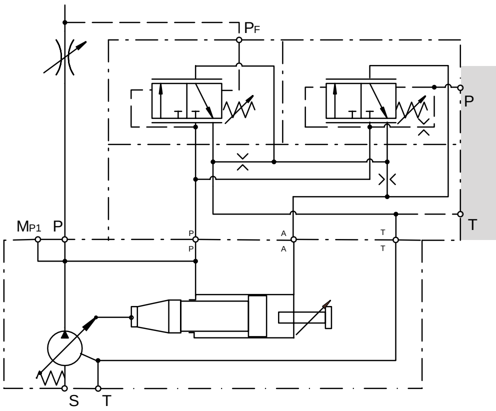


2 Spool Load Sensing Control with Accessory

Control option MTZ

Control MTZ has a valve accessory factory mounted on the NG6 interface.

Available valve accessory can be seen on page 33. Specify the accessory with full ordering code.

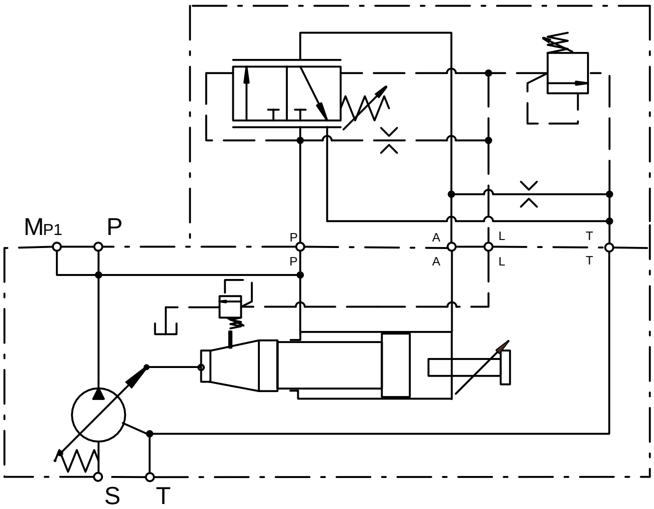


Horse Power/Torque Controls with Pressure Control

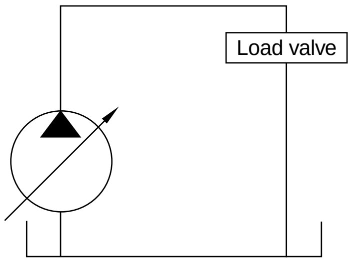
Control option *LC

The horse power control type *L* provides the benefit of the pressure control, plus the ability to limit the input power the pump will draw. These controls are beneficial when the power available from the prime mover for the hydraulics is limited or the application power demand has both high flow/low pressure and low flow/high pressure duty cycles.

Control schematics



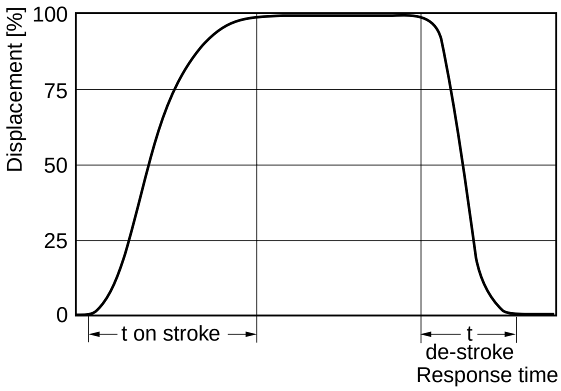
Response times of the pump are collected from a circuit as below by measuring the pumps swash angle movement at different pressures.



	Time on-stroke [ms]		Time de-stroke [ms]	
	against 50 bar	against 350 bar	zero stroke 50 bar	zero stroke 350 bar
PV360	90	90	100	100

Pressure adjustment range	15 to 350 bar
Factory setting pressure	350 bar
Differential pressure adjustment range	10 to 40 bar
Factory setting differential pressure	15 bar
Control oil consumption	Max 8.0 l/min

Dynamic characteristic of flow control *



* Curve shown exaggerated

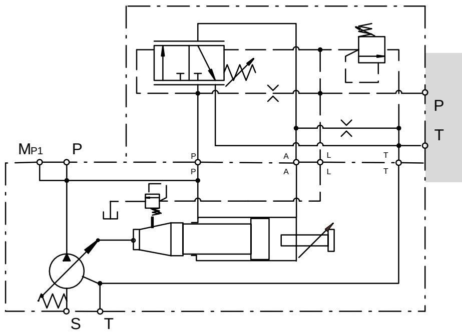
See Horse Power characteristic curves on page 24

Horse Power/Torque Control with NG6 Interface

Control option *L1

With code *L1 the remote pressure control has a valve interface size NG 6 DIN 24340 (CETOP 03 acc. RP35H, NFPA D03) on the top side.

This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.

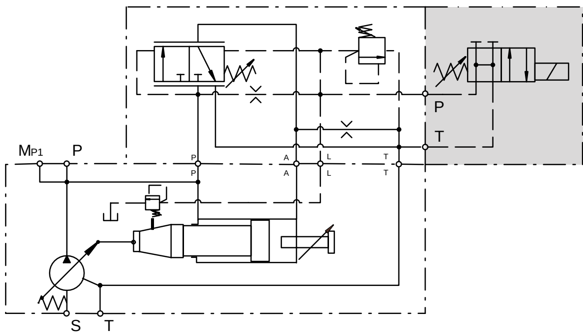


Horse Power/Torque Control with Electrical Unloading

Control option *LW

With code *LW a solenoid operated directional control valve (D1VW002KNJW) for electrical unloading is mounted on the control top side.

When the solenoid is de-energised, the pump compensates at a stand-by pressure of typically 15 bar. When the solenoid is energised, the pump compensates at the pressure adjusted on the integrated pilot valve.

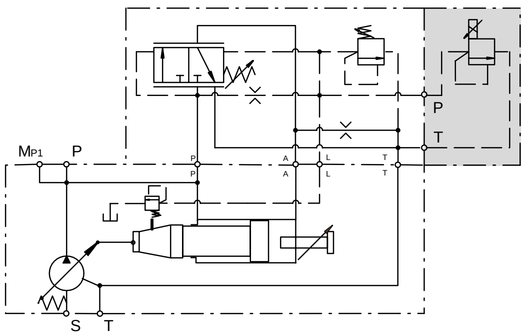


Horse Power/Torque Control with Proportional Pilot Valve

Control option *LK

With code *LK a proportional pilot valve of type PVACRE..35 (see page 35) is mounted on the top side interface.

This allows a variation of the pump compensating pressure between 20 and 350 bar by an electrical signal.

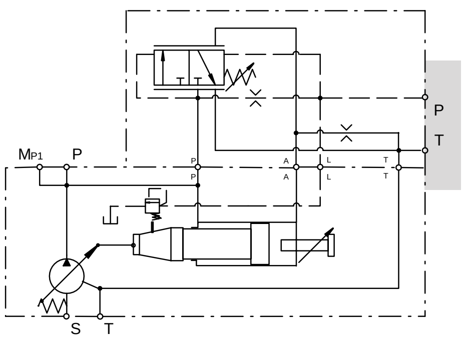


Horse Power/Torque Control with Accessory

Control option *LZ

Control *LZ has no integrated pilot valve but a valve interface NG6 DIN 24340 on the top.

This version is recommended for valve accessories.

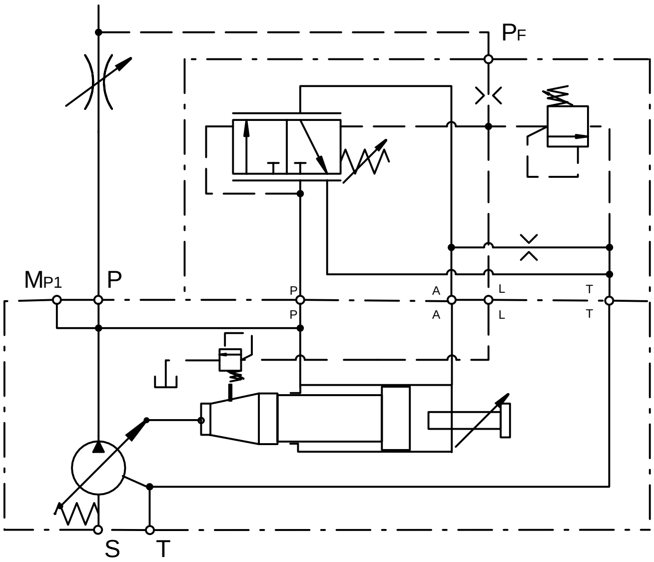


Horse Power/Torque Controls with Load Sensing

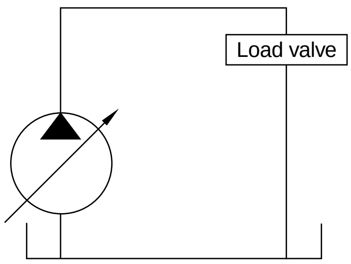
Control option *CC

The horse power control type *C* provides the benefit of the load sensing control, plus the ability to limit the input power the pump will draw. These controls are beneficial when the power available from the prime mover for the hydraulics is limited or the application power demand has both high flow/low pressure and low flow/high pressure duty cycles.

Control schematics



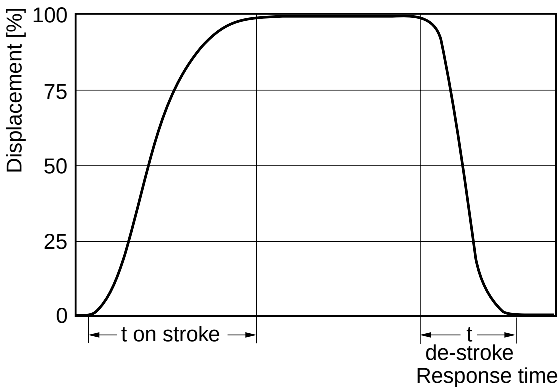
Response times of the pump are collected from a circuit as below by measuring the pumps swash angle movement at different pressures.



	Time on-stroke [ms]		Time de-stroke [ms]	
	stand-by to 50 bar	stand-by to 350 bar	50 bar to stand-by	350 bar to stand-by
PV360	90	90	100	100

Pressure adjustment range	15 to 350 bar
Factory setting pressure	350 bar
Differential pressure adjustment range	10 to 40 bar
Factory setting differential pressure	15 bar
Control oil consumption	Max 8.0 l/min

Dynamic characteristic of flow control *



* Curve shown exaggerated

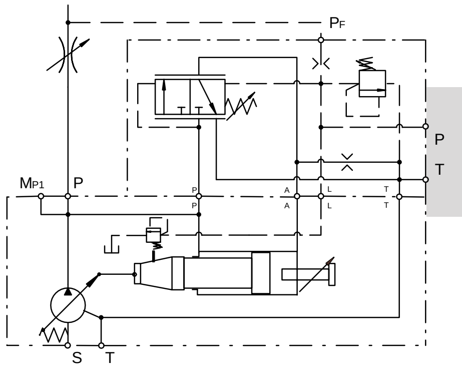
See Horse Power characteristic curves on page 24

Horse Power/Torque Control with NG6 Interface

Control option *C1

With code *C1 the remote pressure control has a valve interface size NG 6 DIN 24340 (CETOP 03 acc. RP35H, NFPA D03) on the top side.

This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.

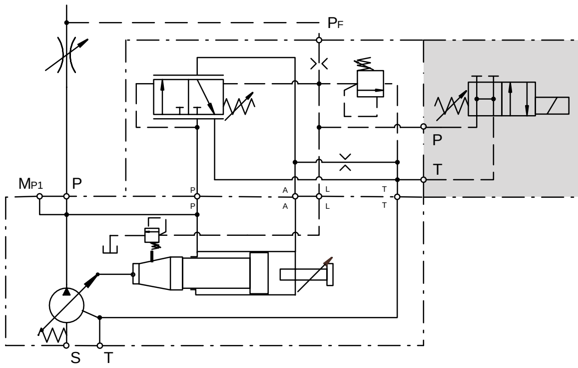


Horse Power/Torque Control with Electrical Unloading

Control option *CW

With code *CW a solenoid operated directional control valve (D1VW002KNJW) for electrical unloading is mounted on the control top side.

When the solenoid is de-energised, the pump compensates at a stand-by pressure of typically 15 bar. When the solenoid is energised, the pump compensates at the pressure adjusted on the integrated pilot valve.

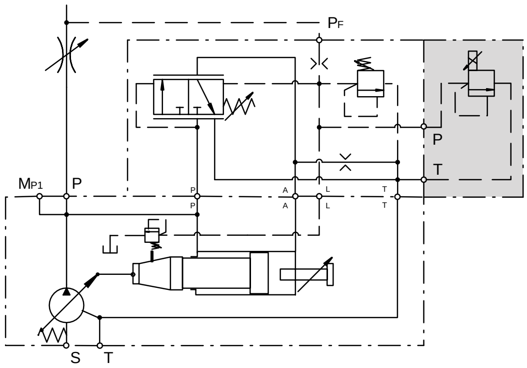


Horse Power/Torque Control with Proportional Pilot Valve

Control option *CK

With code *CK a proportional pilot valve of type PVACRE..35 (see page 35) is mounted on the top side interface.

This allows a variation of the pump compensating pressure between 20 and 350 bar by an electrical signal.

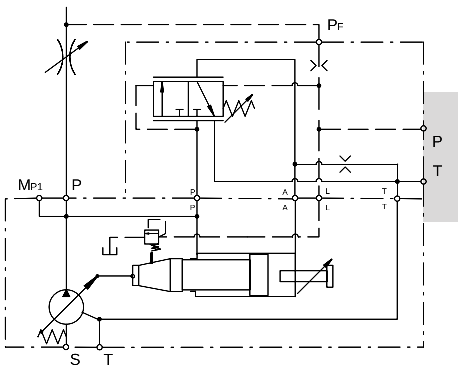


Horse Power/Torque Control with Accessory

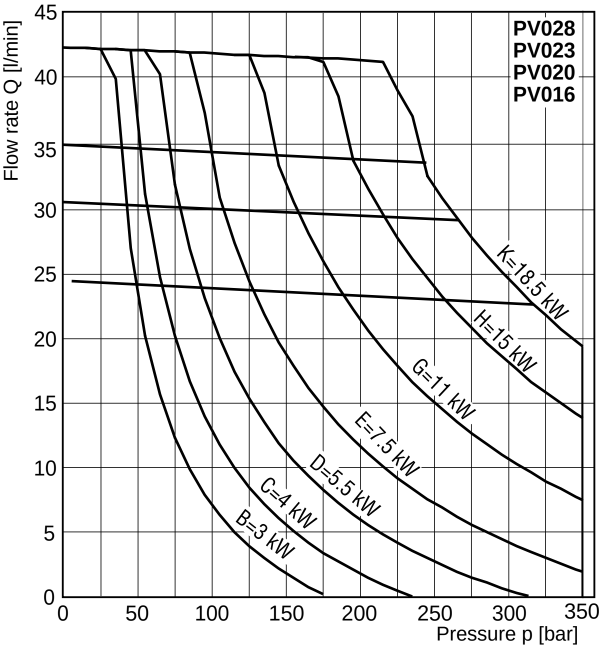
Control option *CZ

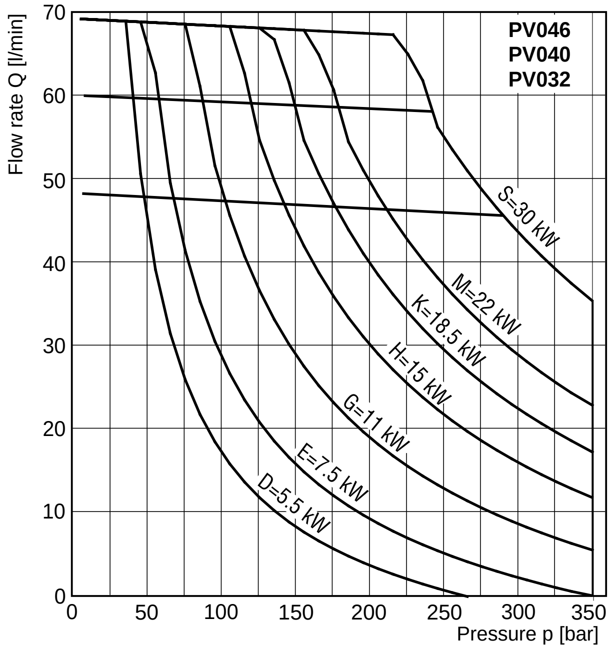
Control *CZ has no integrated pilot valve but a valve interface NG6 DIN 24340 on the top.

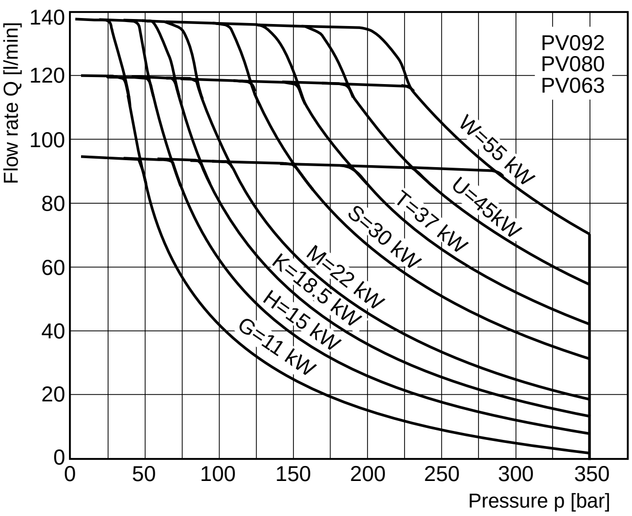
This version is recommended for valve accessories.

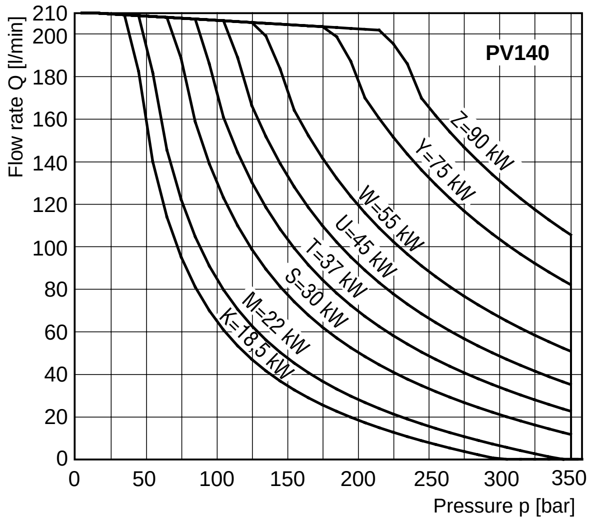


Typical Horse Power/Torque Control Characteristics

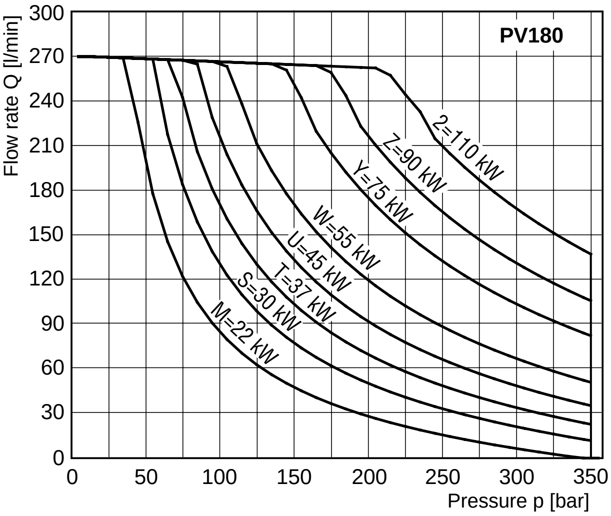


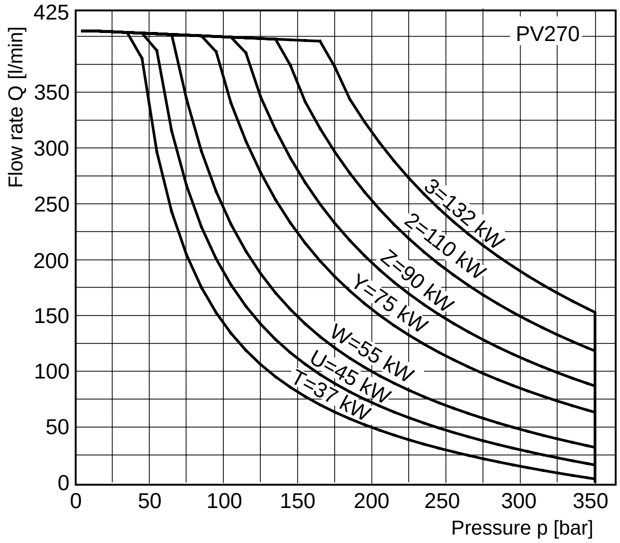


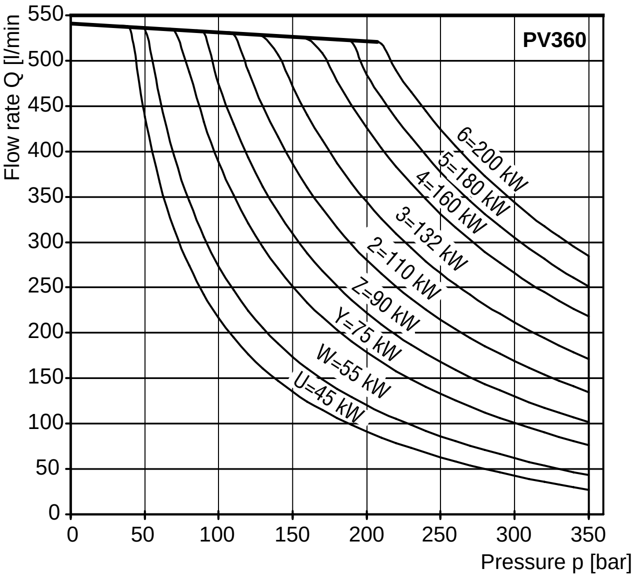




Typical Horse Power/Torque Control Characteristics







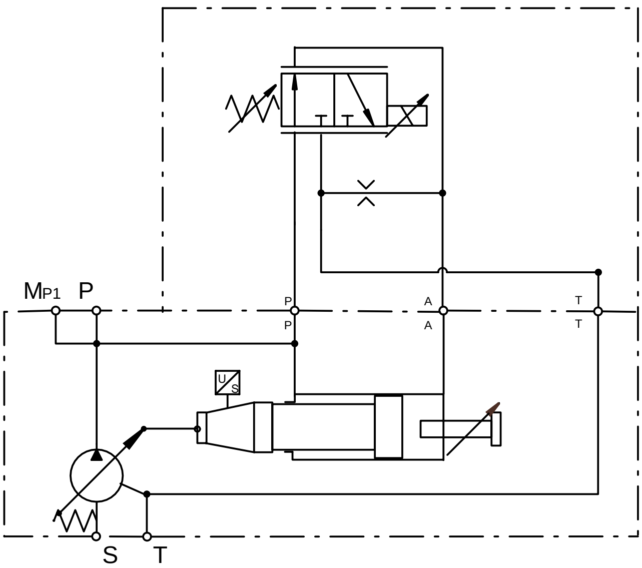
Speed	:	n = 1500 rev/min
Temperature	:	t = 50 °C
Fluid	:	HLP, ISO VG46
Viscosity	:	ν = 46 mm^2/s at 40 °C
Pressure	:	Maximum 350 bar, depending on HP level

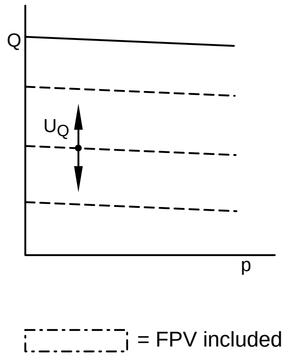
Proportional Displacement Control

Control option FPV

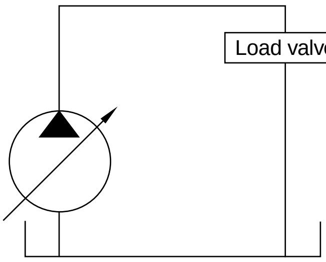
The proportional displacement control allows the adjustment of the pumps output flow with an electrical input signal. The actual displacement of the pump is monitored by an LVDT and compared with the commanded displacement in an electronic control module PQDXXA-Z00. The command is given as an electrical input signal (0 - 10 V) from the supervising machine control or a potentiometer.
Version FPV of the proportional control does not provide a pressure compensation. The hydraulic circuit must be protected by a pressure relief valve.

Control schematics

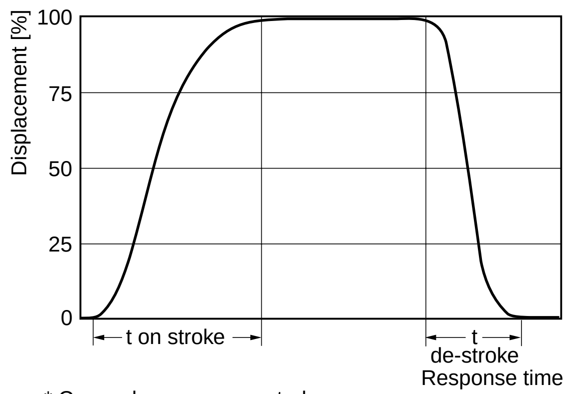




Response times of the pump are collected from a circuit as below by measuring the pumps swash angle movement at different pressures.



Dynamic characteristic of flow control *



* Curve shown exaggerated

	Time on-stroke [ms]		Time de-stroke [ms]	
	stand-by to 50 bar	stand-by to 350 bar	50 bar to stand-by	350 bar to stand-by
PV360	180	100	330	240

Pressure adjustment range *	25 to 350 bar
Factory setting pressure *	50 bar
Differential pressure adjustment range *	10 to 40 bar
Factory setting differential pressure *	15 bar
Control oil consumption	Max 8.0 l/min

Internal pilot pressure required to control the pump	
FPV	15 bar
UPR	25 bar
UPK	25 bar
UPM	25 bar

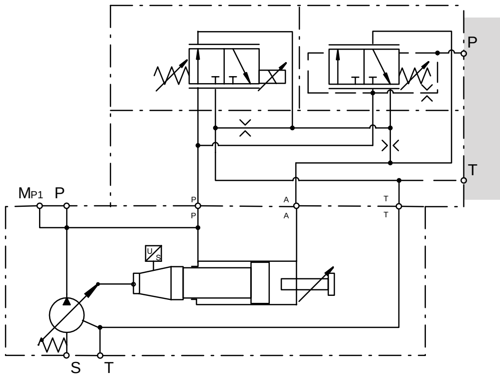
* Data valid for UP* version

Proportional Displacement Control with Overriding Pressure Control

Control option UPR

Control version UPR provides electro- hydraulic displacement control and pressure stage mounted on an elbow manifold.

The elbow manifold provides NG6/D03 interface on top to mount a pressure pilot valve (not included in UPR).

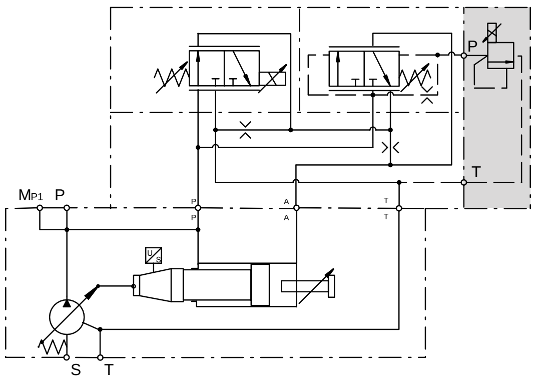


Proportional Displacement Control with Proportional Pressure Control

Control option UPK

When using a proportional pressure pilot valve an electro-hydraulic p/Q control can be realized. The proportional pressure pilot valve PVACRE..35 is included in control version UPK.

By using the digital module PQDXXA-Z00 it is possible to control the displacement proportionally with overriding open loop proportional pressure control.

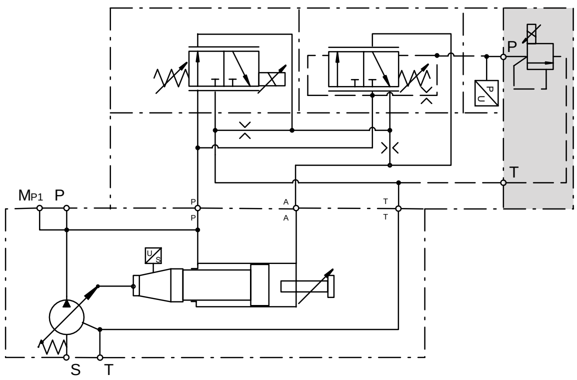


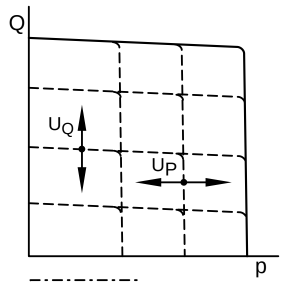
Proportional Displacement Control with Closed Loop Pressure Control

Control option UPM

Control version UPM is completed by a pressure transducer Parker SCP 8181 CE. In combination with control module PQDXXA-Z00 a closed loop pressure control of pump outlet pressure is available.

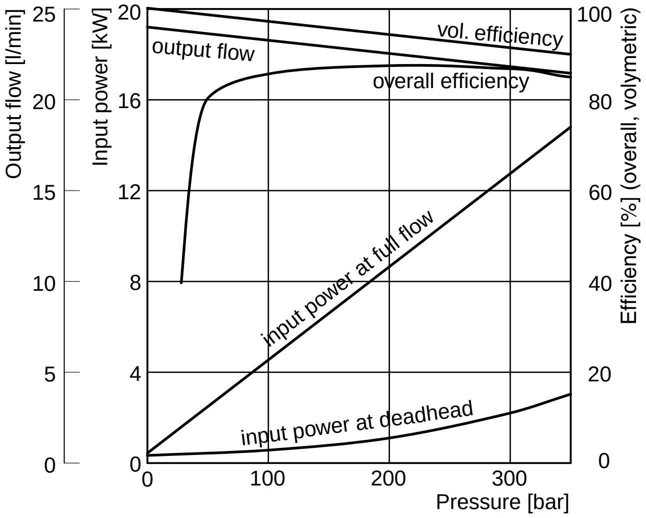
The control module also offers an electronic power limiter in addition to closed loop pressure control with this control option.



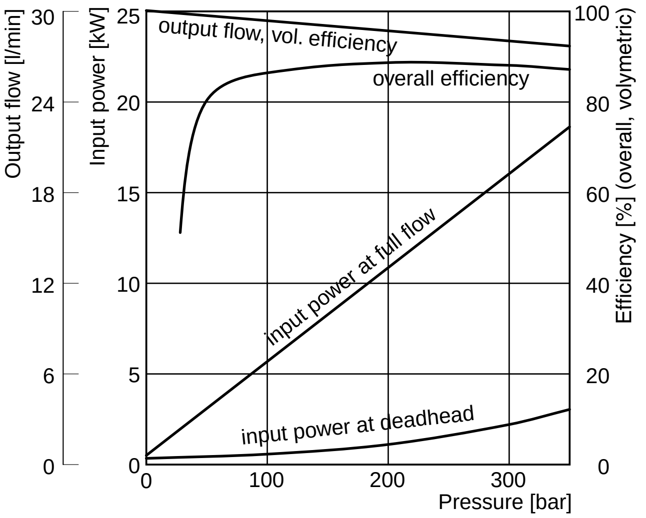


= UPM included

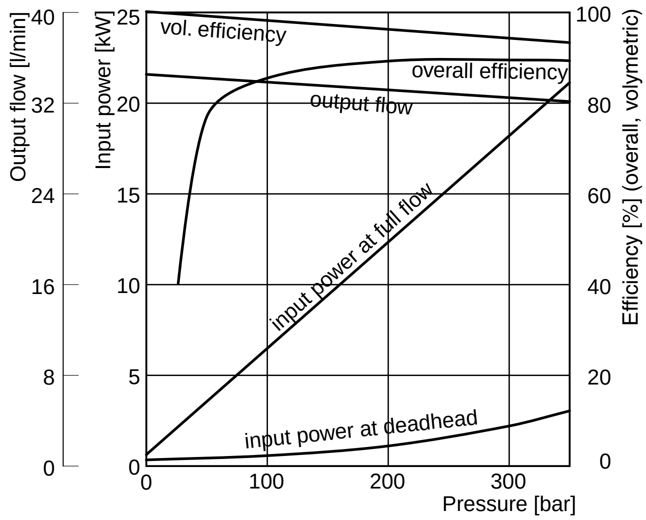
Efficiency, power consumption PV016



PV020



PV023



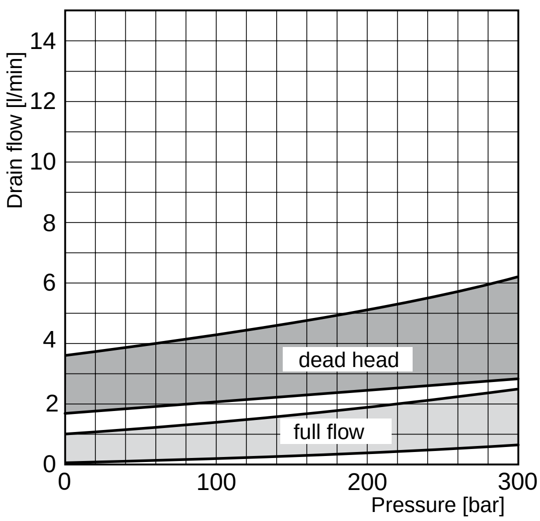
Efficiency and case drain flows PV016, PV020, PV023 and PV028

The efficiency and power graphs are measured at an input speed of n = 1500 rpm, a temperature of 50 °C and a fluid viscosity of 30 mm²/s.

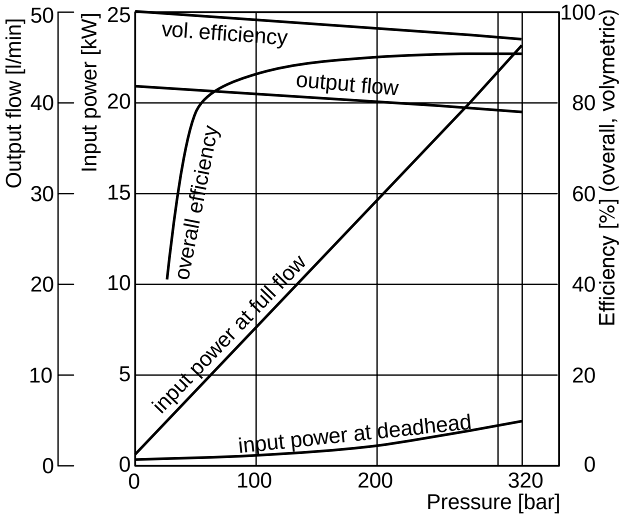
Case drain flow and compensator control flow leave via the drain port of the pump. To the values shown are to be added 1 to 1.2 l/min , if at pilot operated compensators the control flow of the pressure pilot valve also goes through the pump.

Please note: The values shown below are only valid for static operation. Under dynamic conditions and at rapid compensation of the pump the volume displaced by the servo piston also leaves the case drain port. This dynamic control flow can reach up to 40 l/min! Therefore the case drain line is to lead to the reservoir at full size and without restrictions as short and direct as possible.

Case drain flow PV016-028 with pressure compensator (MMC)

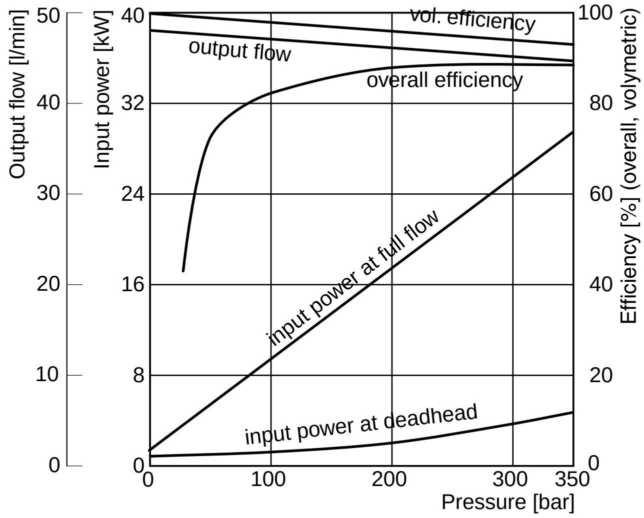


PV028

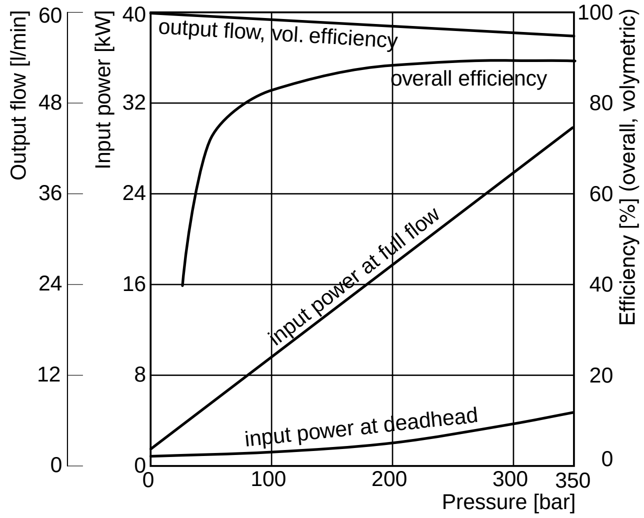


Efficiency, power consumption

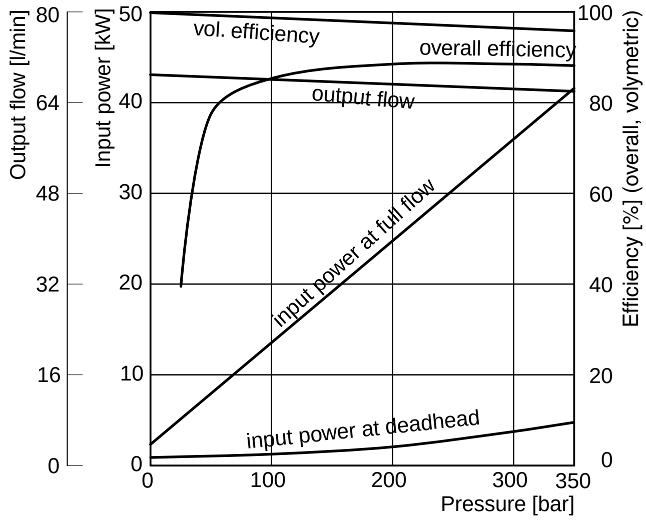
PV032



PV040



PV046



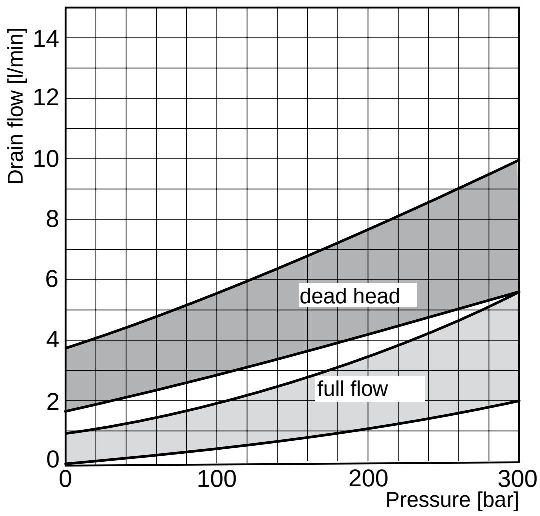
Efficiency and case drain flows PV032 to PV046

The efficiency and power graphs are measured at an input speed of n = 1500 rpm, a temperature of 50 °C and a fluid viscosity of 30 mm^2/s.

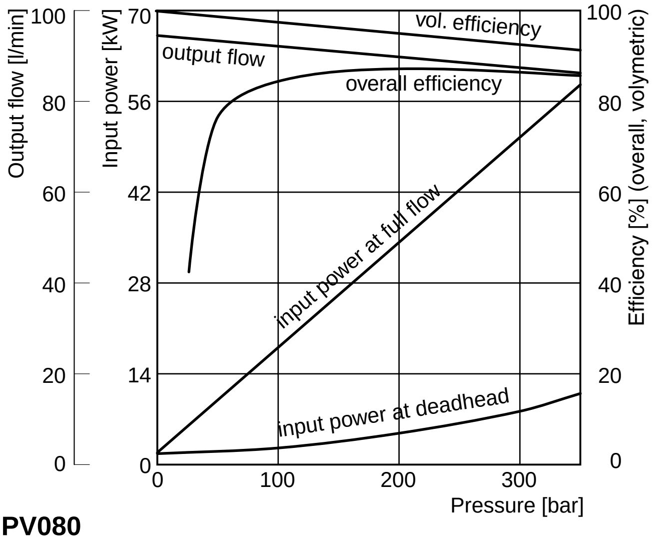
Case drain flow and compensator control flow leave via the drain port of the pump. To the values shown are to be added 1 to 1.2 l/min , if at pilot operated compensators the control flow of the pressure pilot valve also goes through the pump.

Please note: The values shown below are only valid for static operation. Under dynamic conditions and at rapid compensation of the pump the volume displaced by the servo piston also leaves the case drain port. This dynamic control flow can reach up to 60 l/min! Therefore the case drain line is to lead to the reservoir at full size and without restrictions as short and direct as possible.

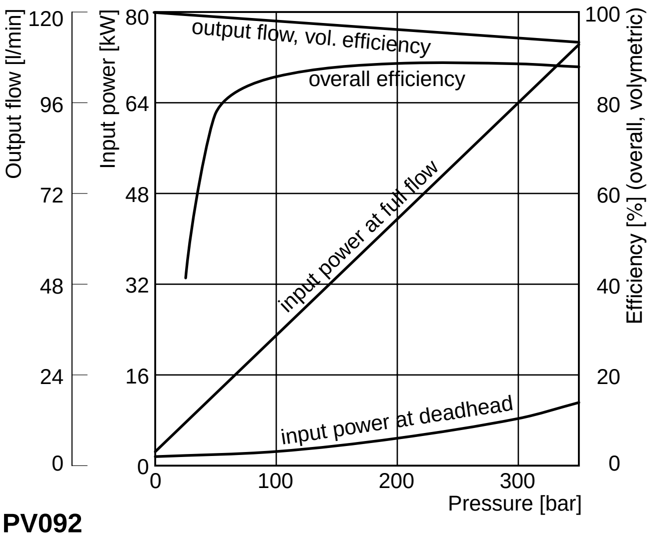
Case drain flow PV032-046 with pressure compensator (MMC)



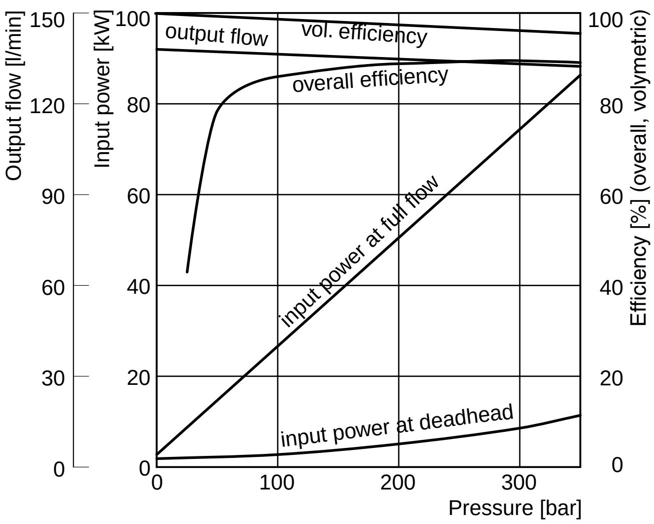
Efficiency, power consumption PV063



PV080



PV092



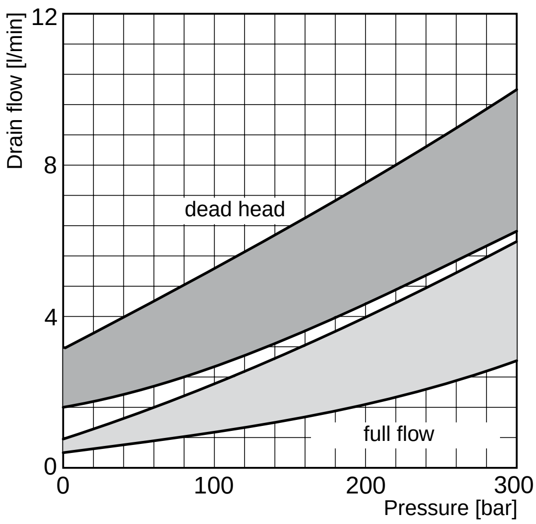
Efficiency and case drain flows PV063, PV080, PV092

The efficiency and power graphs are measured at an input speed of n = 1500 rpm, a temperature of 50 °C and a fluid viscosity of 30 mm^2/s.

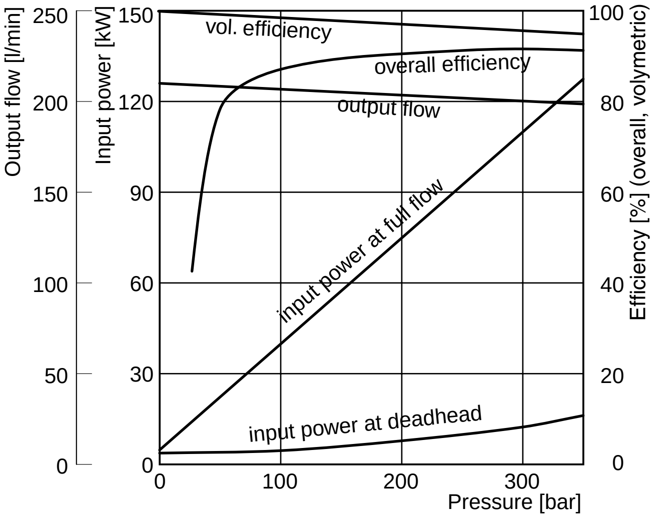
Case drain flow and compensator control flow leave via the drain port of the pump. To the values shown are to be added 1 to 1.2 l/min , if at pilot operated compensators (codes FR*, FF*, FT*, power compensator and p-Q-control) the control flow of the pressure pilot valve also goes through the pump.

Please note: The values shown below are only valid for static operation. Under dynamic conditions and at rapid compensation of the pump the volume displaced by the servo piston also leaves the case drain port. This dynamic control flow can reach up to 80 l/min! Therefore the case drain line is to lead to the reservoir at full size and without restrictions as short and direct as possible.

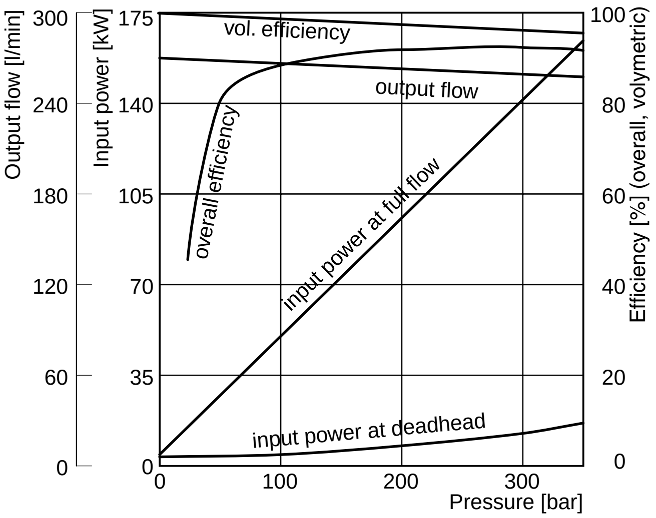
Case drain flows PV063-092



Efficiency, power consumption PV140



PV180



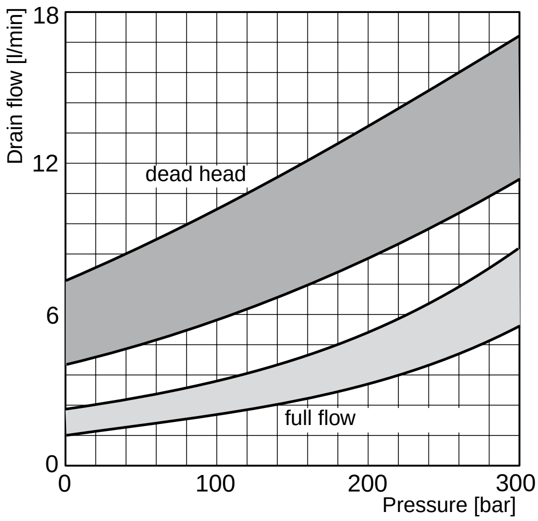
Efficiency and case drain flows PV140, PV180

The efficiency and power graphs are measured at an input speed of n = 1500 rpm, a temperature of 50 °C and a fluid viscosity of 30 mm^2/s.

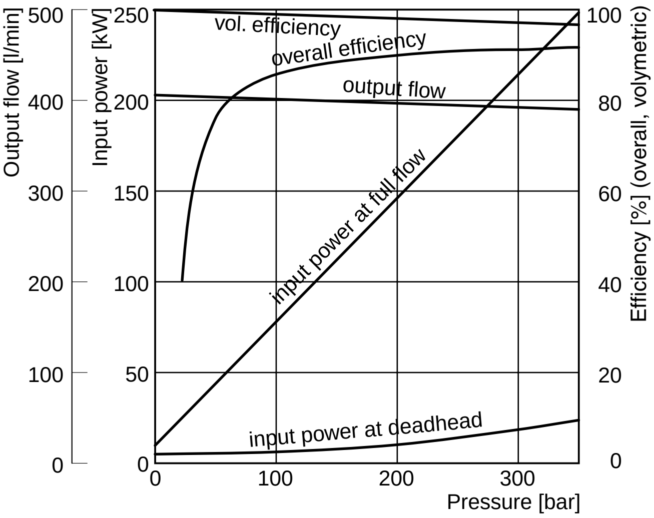
Case drain flow and compensator control flow leave via the drain port of the pump. To the values shown are to be added 1 to 1.2 l/min, if at pilot operated compensators the control flow of the pressure pilot valve also goes through the pump.

Please note: The values shown below are only valid for static operation. Under dynamic conditions and at rapid compensation of the pump the volume displaced by the servo piston also leaves the case drain port. This dynamic control flow can reach up to 120 l/min! Therefore the case drain line is to lead to the reservoir at full size and without restrictions as short and direct as possible.

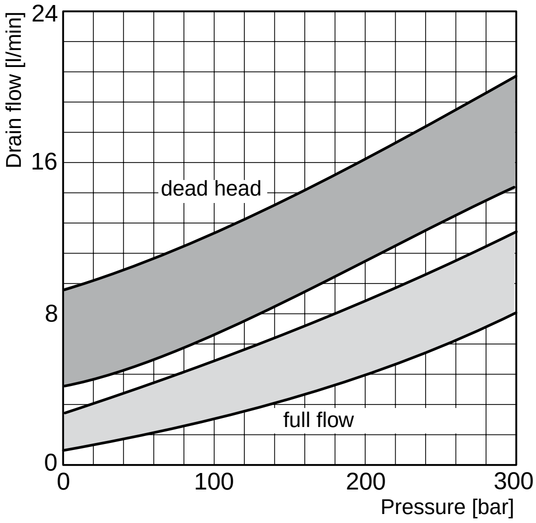
Case drain flows PV140-180



Efficiency, power consumption PV270



Case drain flows PV270



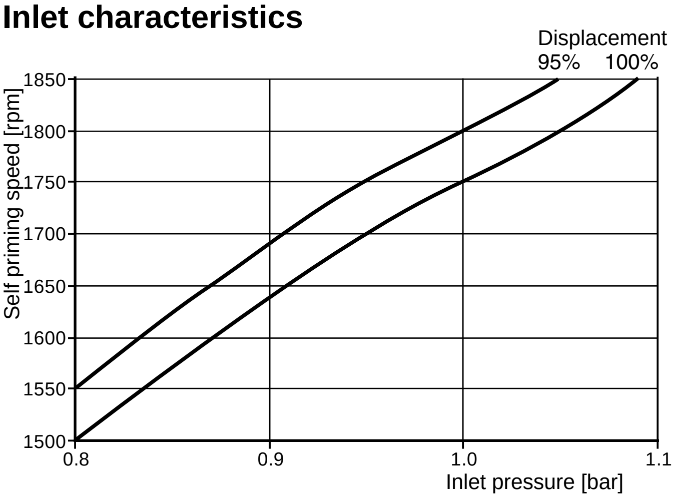
Efficiency and case drain flows PV270

The efficiency and power graphs are measured at an input speed of n = 1500 rpm, a temperature of 50 °C and a fluid viscosity of 30 mm^2/s.

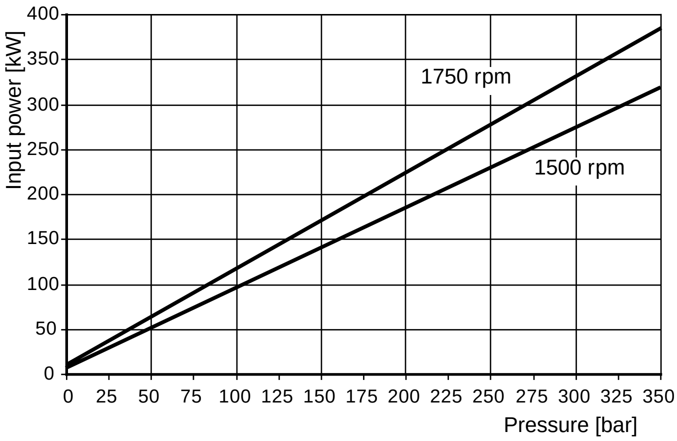
Case drain flow and compensator control flow leave via the drain port of the pump. To the values shown are to be added 1 to 1.2 l/min , if at pilot operated compensators (codes FR*, FF*, FT*, power compensator and p-Q-control) the control flow of the pressure pilot valve also goes through the pump.

Please note: The values shown below are only valid for static operation. Under dynamic conditions and at rapid compensation of the pump the volume displaced by the servo piston also leaves the case drain port. This dynamic control flow can reach up to 120 l/min! Therefore the case drain line is to lead to the reservoir at full size and without restrictions as short and direct as possible.

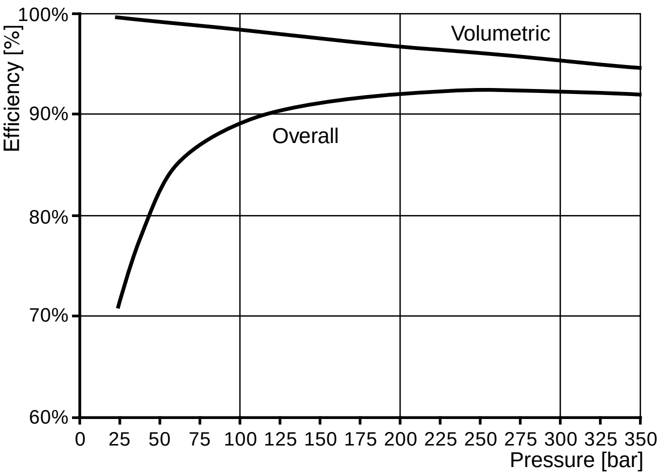
Typical inlet characteristics vs. speed at various percentage displacements
Inlet characteristics



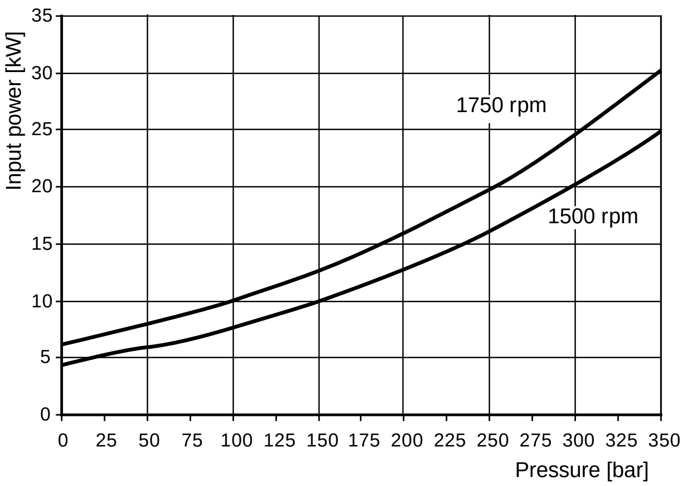
Typical drive power at full displacement
Input power – full stroke



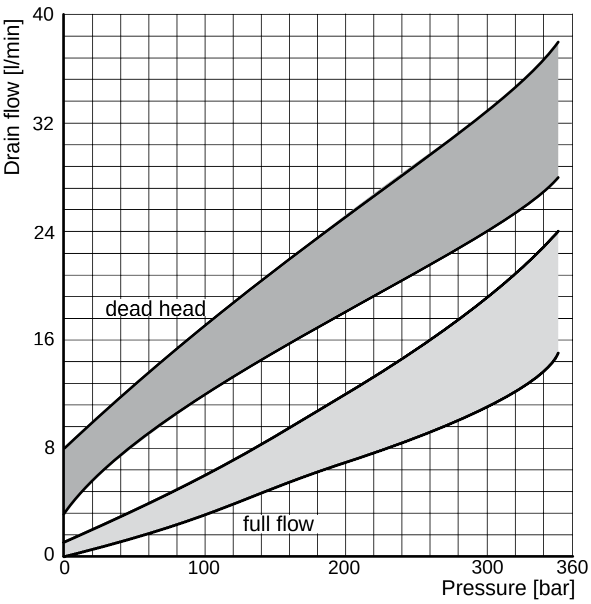
Typical efficiency at full displacement and 1500 rpm



Typical compensated power
Input power – zero stroke



Case drain flows



The curves show typical characteristics measured under following conditions:
Fluid: Mineral oil ISO VG 22 at 32 °C
Inlet pressure 1,0 bar (absolute), measured at inlet port.

PV	AC								35
For PV pump series	Accessories for controls	Function	Mounting bolts	Threads	Seals	Adjustment	Solenoid	Solenoid acces-sories	Nominal pressure 350 bar

Code	Function
1P	Max. pressure relief
1E	1 pressure, electrical unloading stand by default
2P	2 pressures, electrical selection
2E	2 pressures + stand by electrical selection low pressure default
2M	2 pressures + stand by electrical selection stand by default

Code	Mounting bolts
C	For single controls
S	Without bolts
M	For code UP*/MT*

Code	Threads
M	Metric
S	SAE / UNC

Code	Seals
N	NBR
V	FPM

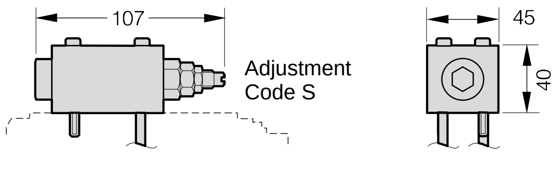
Code	Adjustment
S	Spindle with lock nut

Code	Solenoid accessories
omit	For function 1P
W	DIN plug socket without plug

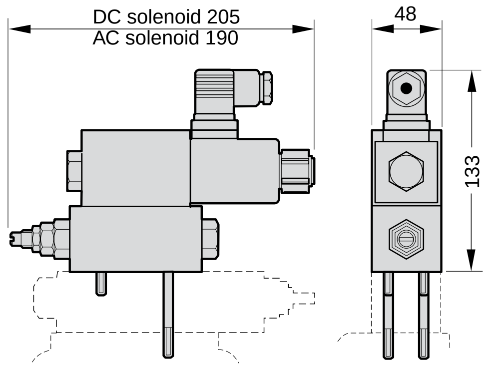
Code	Solenoid voltage
omit	For function 1P
Y	110V/50Hz - 120V/60Hz
T	220V/50Hz - 240V/60Hz
J	24V DC

Dimensions

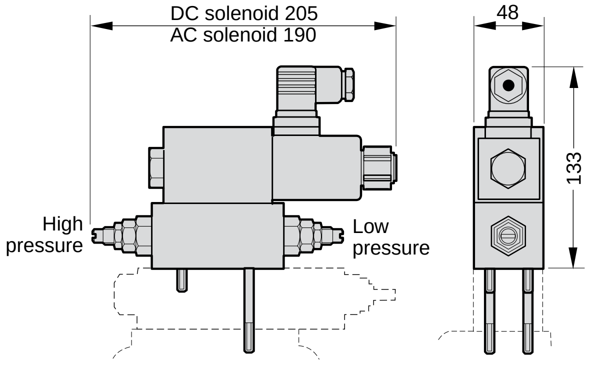
PVAC1P*



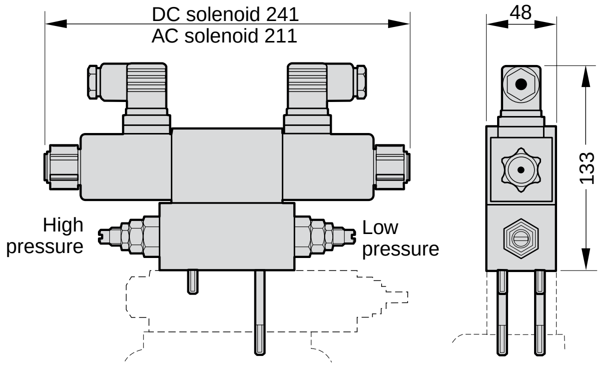
PVAC1E*



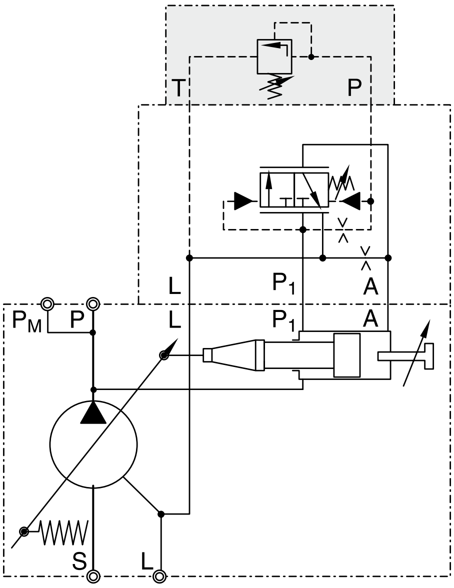
PVAC2P*



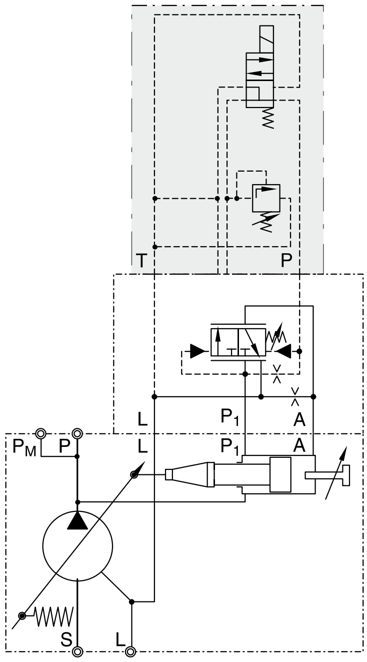
PVAC2M*/PVAC2E*



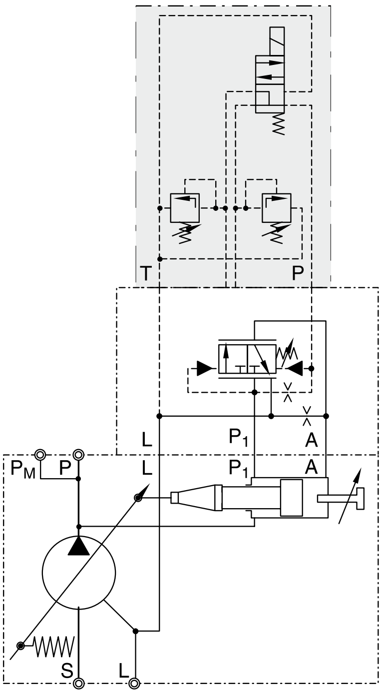
Schematics PVAC1P*



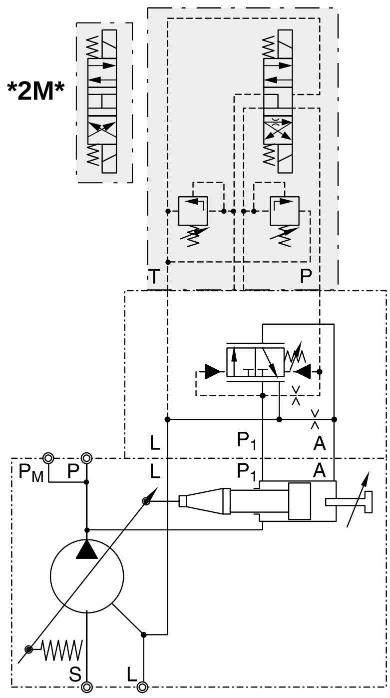
Schematics PVAC1E*



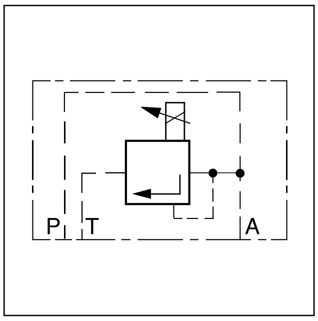
Schematics PVAC2P*



Schematics PVAC2M*/PVAC2E*



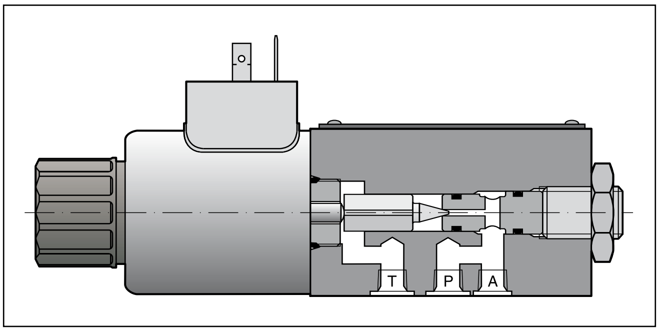
Proportional pressure relief valve PVACRE*



Function

When the pressure in port P exeeds the pressure setting at the solenoid, the poppet opens to port T and limits the pressure in port P to the adjusted level.

The optimum performance can be achieved in combination with the digital amplifier module PCD00A-400 (see catalogue HY11-3500 for reference).



Technical data

General		
Nominal size		DIN NG06 / CETOP03 / NFPA D03
Mounting position		as desired, horizontal mounting preferred
Ambient temperature	[°C]	-20 ... +70
Weight	[kg]	1.8
Hydraulic		
Max. operating pressure	[bar]	Ports P and A up to 420; port T depressurized
Pressure stages	[bar]	350, 420
Fluid		Hydraulic oil as per DIN 51524 ... 525
Viscosity, recommended	[cSt] / [mm^2/s]	30 ... 80
Viscosity, permitted	[cSt] / [mm^2/s]	12 ... 380
Fluid temperature	[°C]	-20 ... +60
Filtration		ISO 4406 (1999), 18/16/13
Linearity	[%]	±2.8
Repeatability	[%]	<±1
Hysteresis	[%]	±1.5 of p_{max}
Electrical		
Duty ratio	[%]	100 ED
Protection class		IP 65 in accordance with EN 60529 (plugged and mounted)
Nominal voltage	[V]	16 (1.3 A max. current)
Coil resistance	[Ohm]	4 at 20°C
Solenoid connection		Connector as per EN 175301-803
Power amplifier, recommended		PCD00A-400

Ordering code proportional pressure relief valve

PV	AC	RE				
Pump series PV	Accessories for controller	Prop. pressure valve	Mounting bolts	Thread option	Seal	Nominal pressure

Code	Mounting bolts/ ports
C	For single controller
S	Without bolts
M	For code UP*/MT* design series 45/46

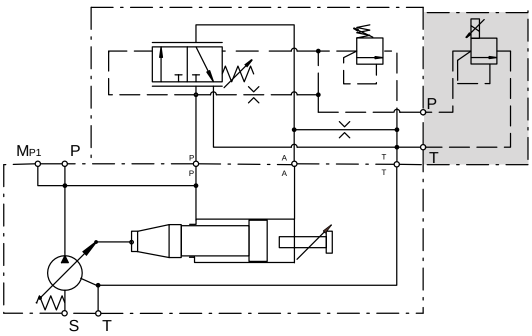
Code	Thread option
M	Metric
S	SAE / UNC

Code	Seal
N	NBR
V	FPM

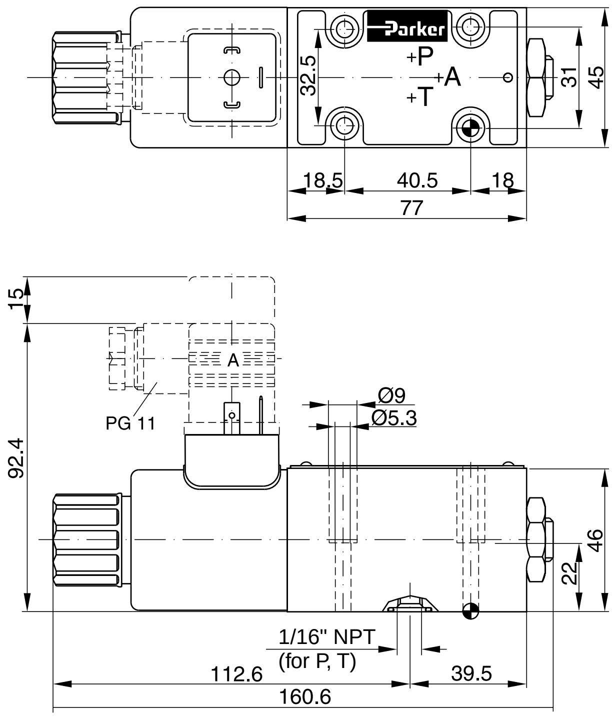
Code	Nominal pressure
35	350 bar
42	420 bar

Schematic PVACRE*

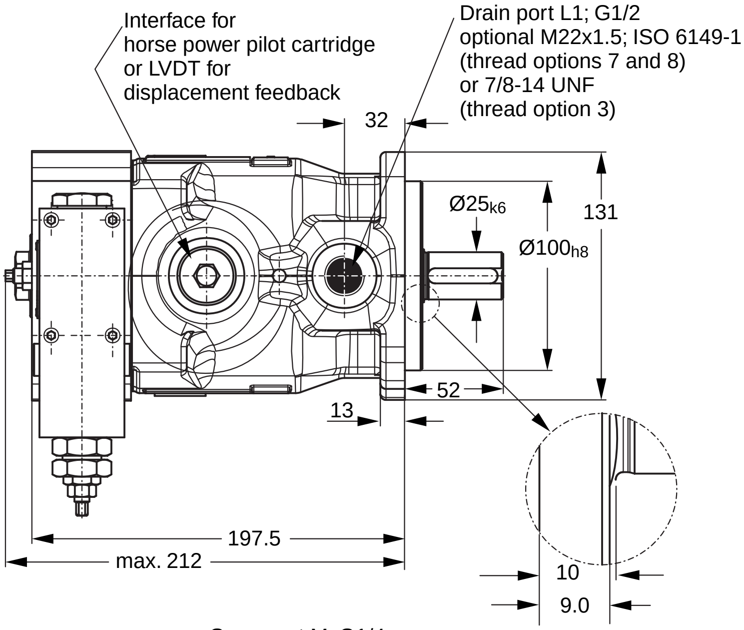
Example for PVACRE* mounted

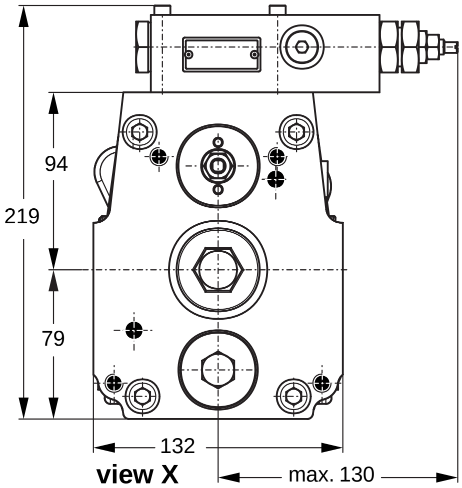


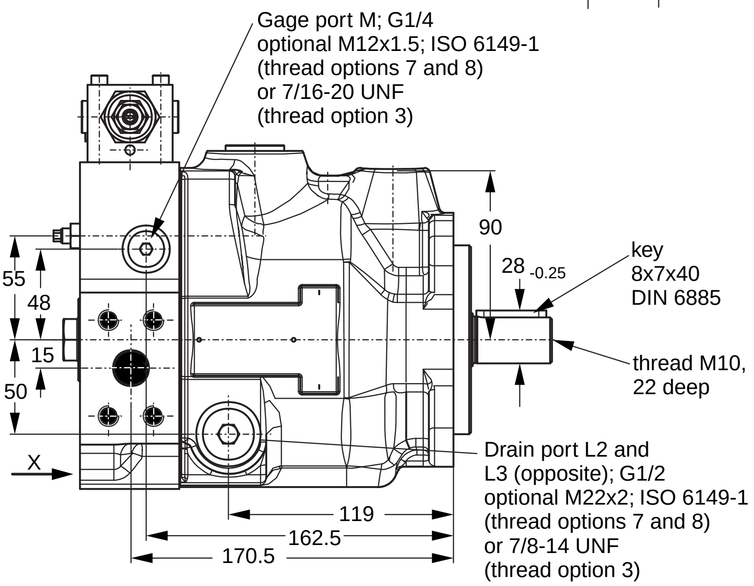
Dimensions PVACRE*

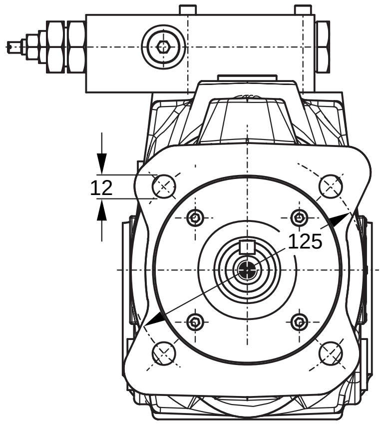


PV016 - 028, metric version

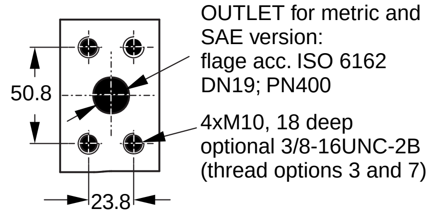


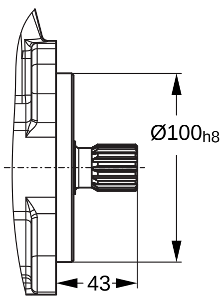




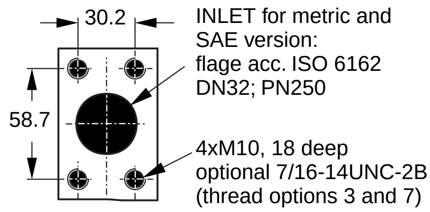


The pump shown above has mounting option **K** and **thru drive option T** (prepared for thru drive)



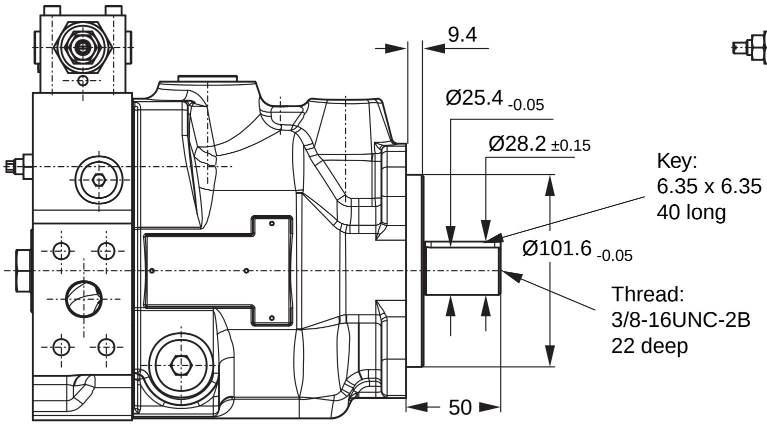


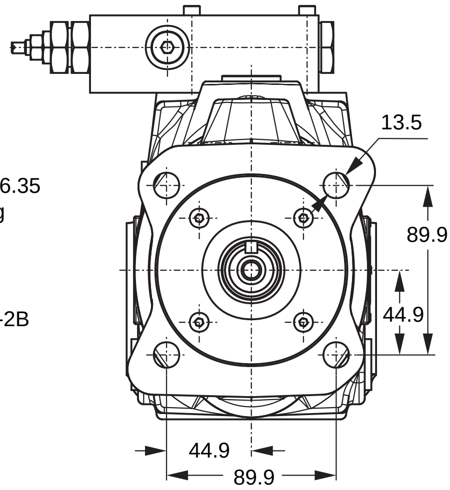
Mounting optional L
splined shaft W25x1.5x15x8f
DIN 5480



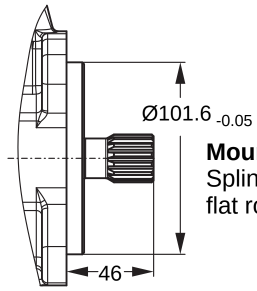
Shown is a clockwise rotating pump with standard pressure compensator.
Counter clockwise rotating pumps have inlet, output and gauge port reversed.

PV016 - 028, SAE version



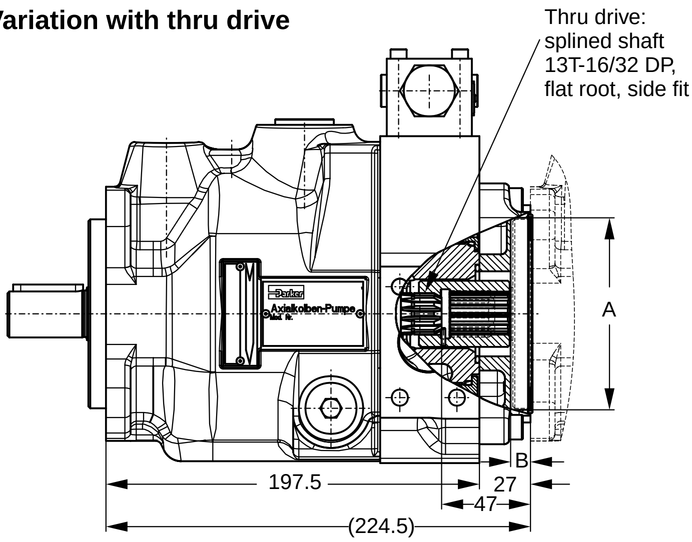


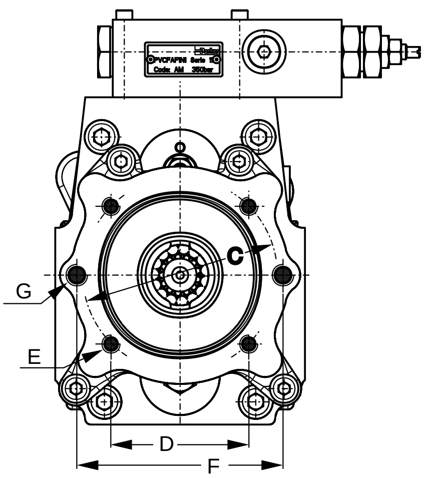
Shown above is
Mounting option D



Mounting option E
Splined shaft 15T-16/32 DP,
flat root, side fit ANSI B92.1

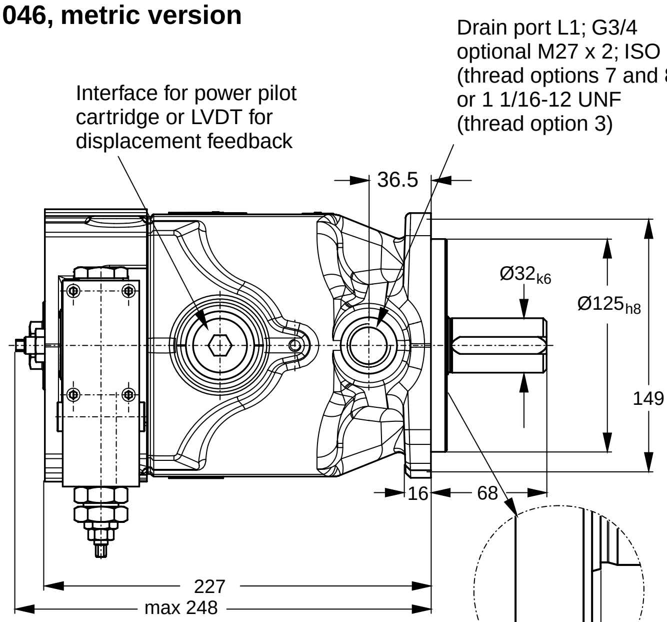
Variation with thru drive

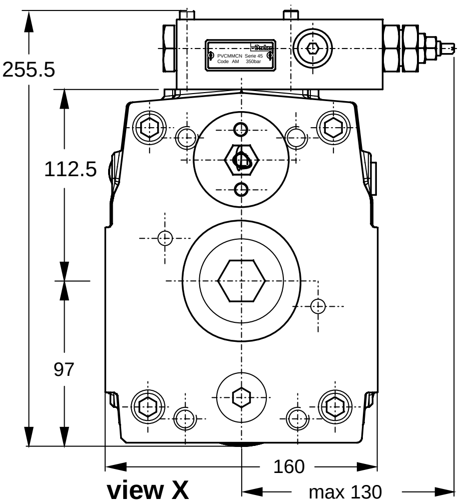


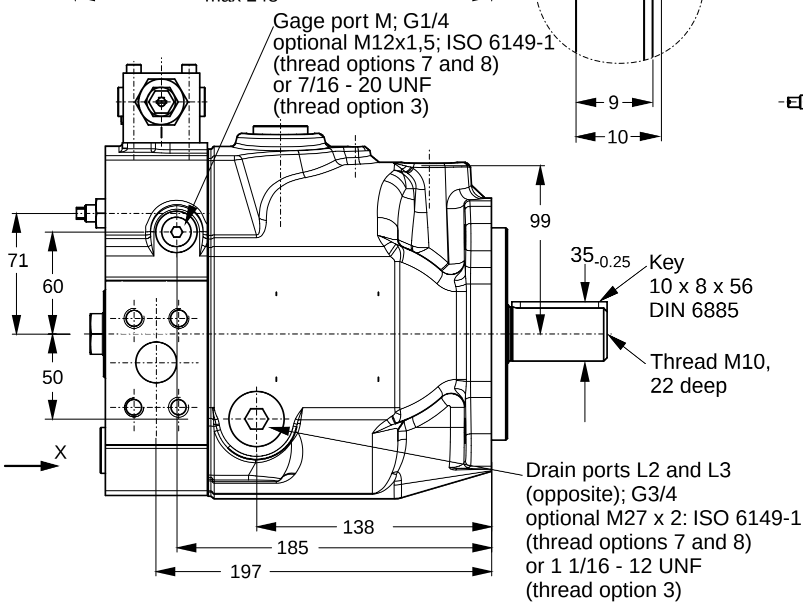


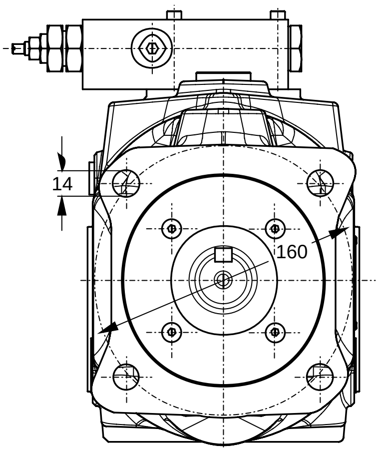
Thru drive adaptors are available with the following dimensions											
Drawing Dimension / Thru drive option	A	B	C	D	E		F	G		Remark
					Metr	UNC		Metr	UNC	
Y	50.8	8	-	-	-	-	82	M8	5/16"-18	SAE AA 2-Bolt
A	82.55	8	-	-	-	-	106	M10	3/8"-16	SAE A 2-Bolt
B	101.6	10.5	127	89.8	M12	1/2"-13	-	-	-	SAE B 4-Bolt
G	63	8.5	85	60.1	M8	5/16"-18	100	M8	5/16"-18	2/4-Bolt
H	80	8.5	103	72.8	M8	5/16"-18	109	M10	3/8"-16	2/4-Bolt
J	100	10,5	125	88.4	M10	3/8"-16	-	-	-	4-Bolt

PV032 - 046, metric version

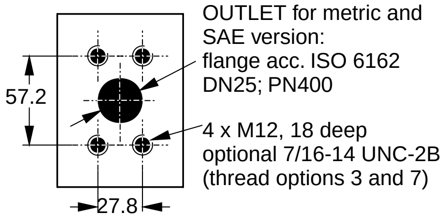




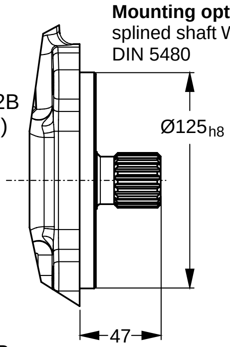


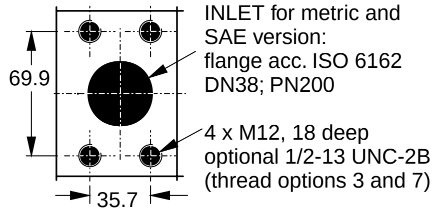


mounting option K



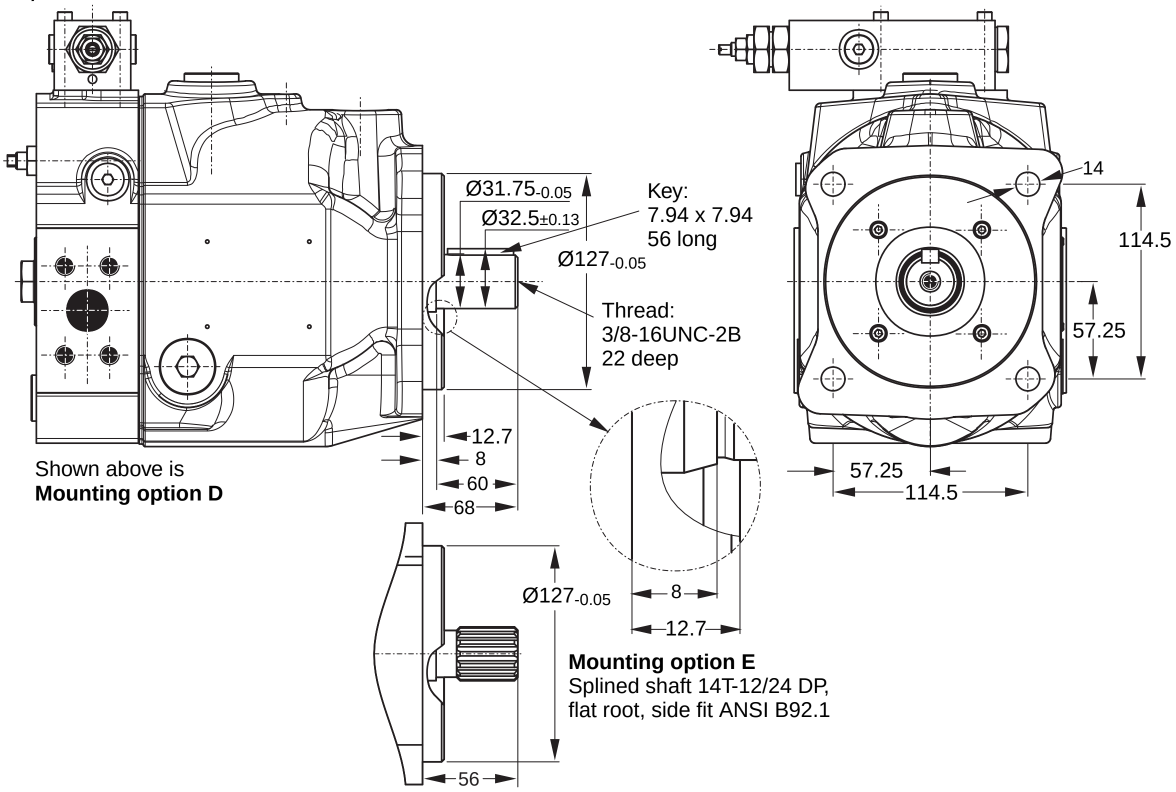
Mounting optional L
splined shaft W32x1,5x20x8f
DIN 5480



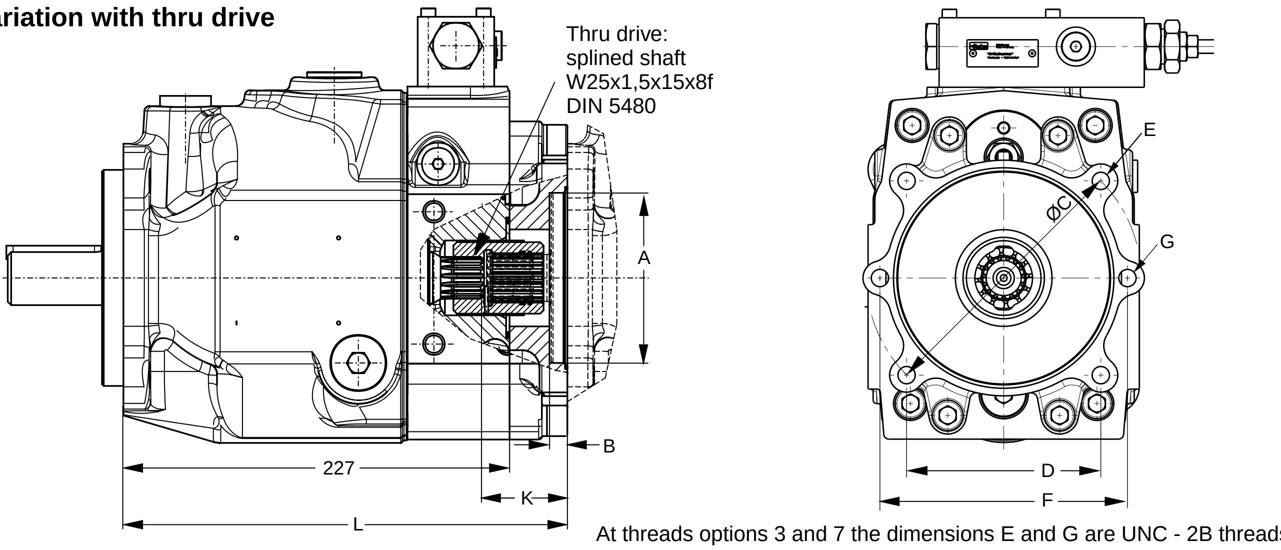


Shown is a clockwise rotating pump with standard pressure compensator.
Counter clockwise rotating pumps have inlet, outlet and gauge port reversed.

PV032 - 046, SAE version



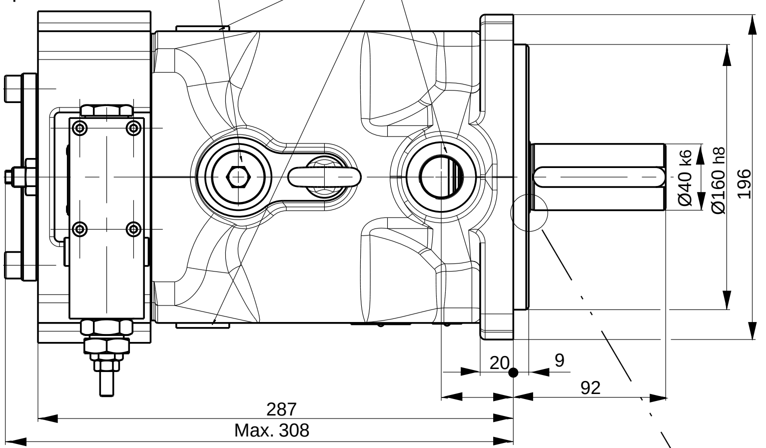
Variation with thru drive

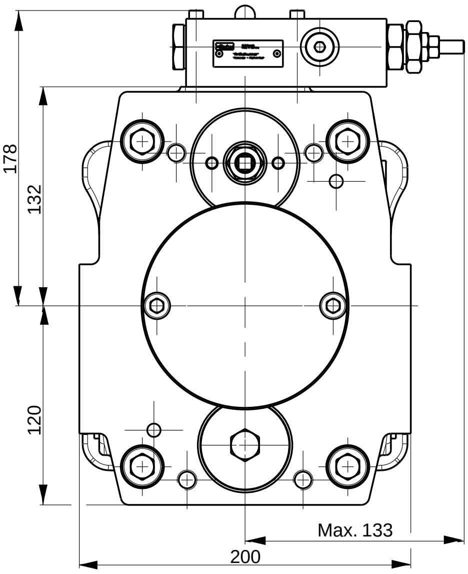


At threads options 3 and 7 the dimensions E and G are UNC - 2B threads.

Thru drive adaptors are available with the following dimensions												
Drawing Dimension / Thru drive option	A	B	C	D	E		F	G		K	L	Remark
					Metr	UNC		Metr	UNC			
A	82.55	8	-	-	-	-	106	M10	3/8"-16	48	261	SAE A 2-Bolt
B	101.6	11	127	89.8	M12	1/2"-13	146	M12	1/2"-13	48	261	SAE B 2/4-Bolt
C	127	13.5	162	114.6	M12	1/2"-13	-	-	-	63	276	SAE C 4-Bolt
G	63	8.5	85	60.1	M8	5/16"-18	100	M8	5/16"-18	48	261	2/4-Bolt
H	80	8.5	103	72.8	M8	5/16"-18	109	M10	3/8"-16	48	261	2/4-Bolt
J	100	10.5	125	88.4	M10	3/8"-16	140	M12	1/2"-13	48	261	2/4-Bolt
K	125	10.5	160	113.1	M12	1/2"-13	-	-	-	48	261	4-Bolt

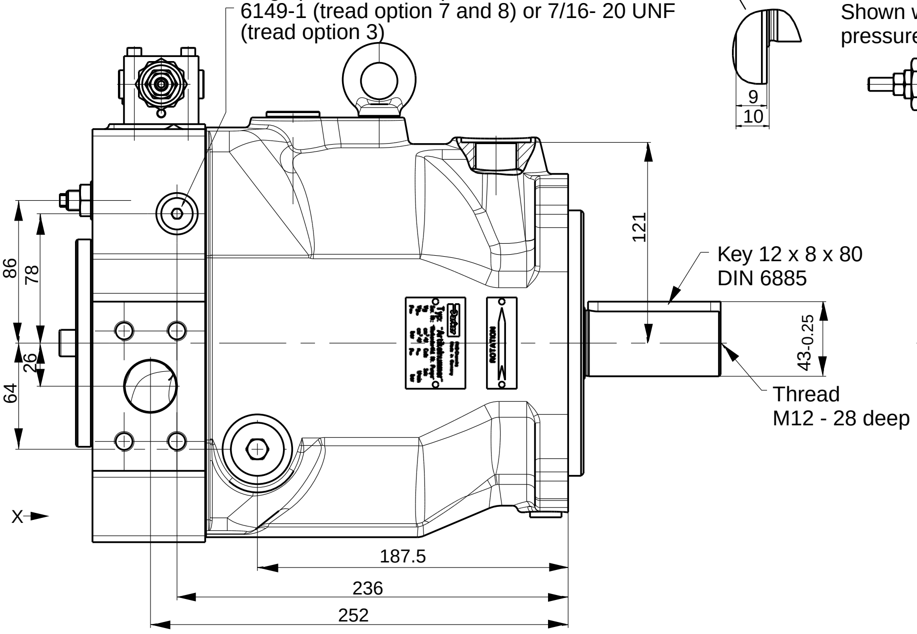
PV 063 - 092 Metric

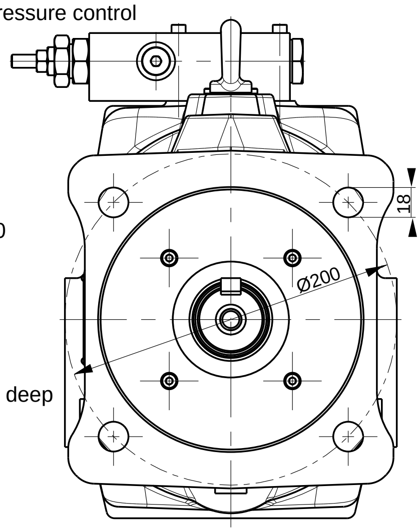


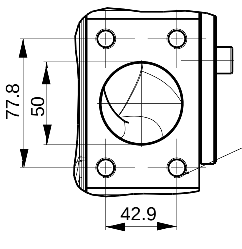


view X

Shown with standard
pressure control



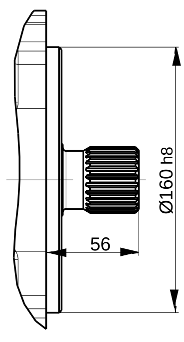




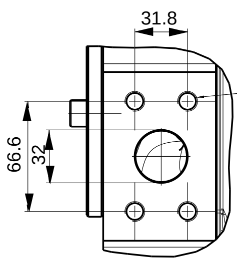
INLET for metric and SAE version:
flange according ISO 6162
DN 51; PN 200 bar

4 x M12, 20 deep
optional 1/2 - 13 UNC - 2B
(thread options 3 and 7)

The pump shown above has **Mounting option K** and **through drive variation T**
(prepared for through drive)



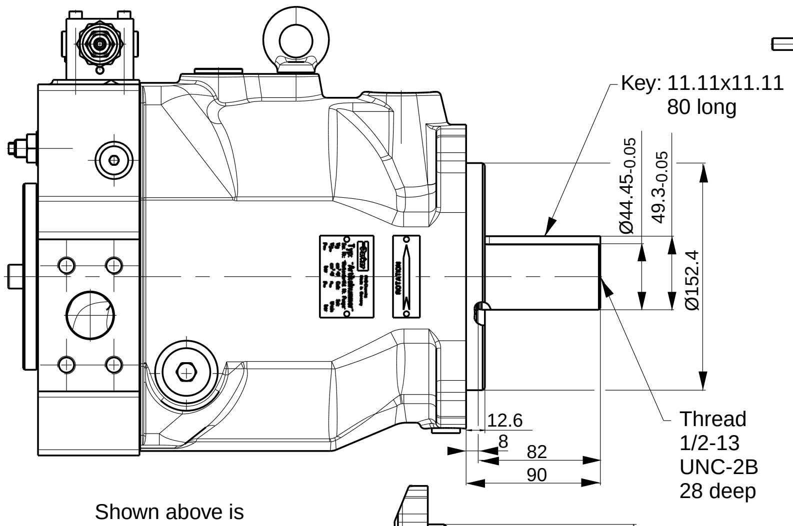
Mounting option L, splined shaft
W40 x 1.5 x 25 x 8f DIN 5480

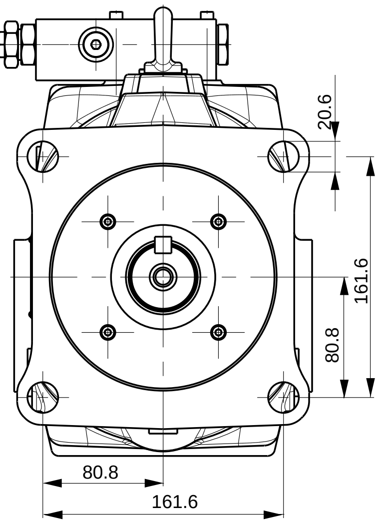


4 x M12, 20 deep
optional 1/2 - 13 UNC - 2B
(thread options 3 and 7)
or thread options 4:
4 x M14, 20 deep

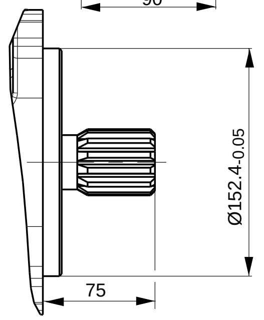
OUTLET for metric and SAE version:
flange according ISO 6162
DN 32; PN 400 bar

PV 063 - 092 SAE Version



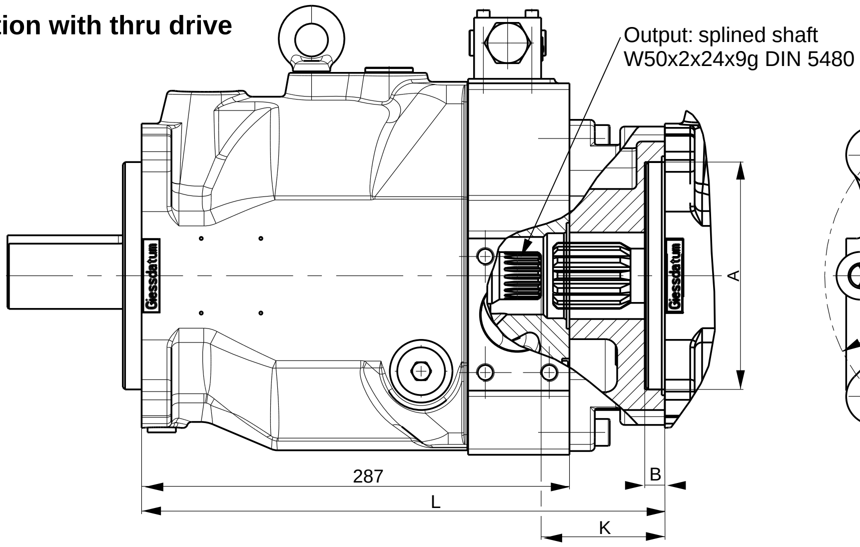


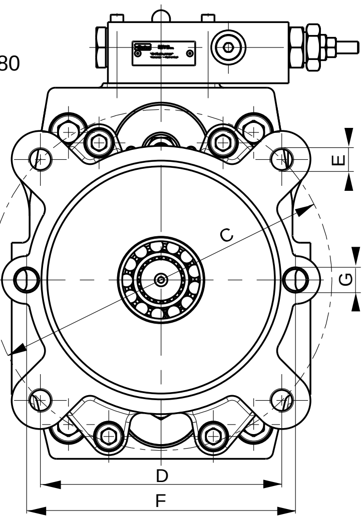
Shown above is
Mounting option D



Mounting option E
splined shaft 13T-8/16 DP,
flat root, side fit ANSI B92.1

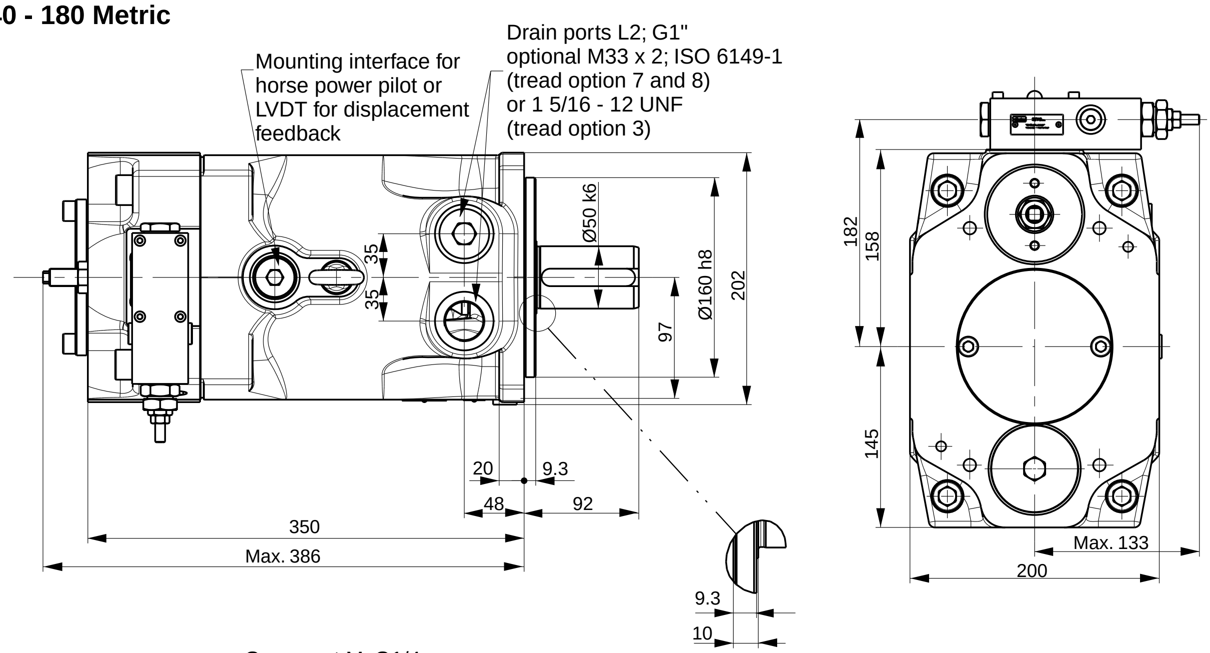
Variation with thru drive

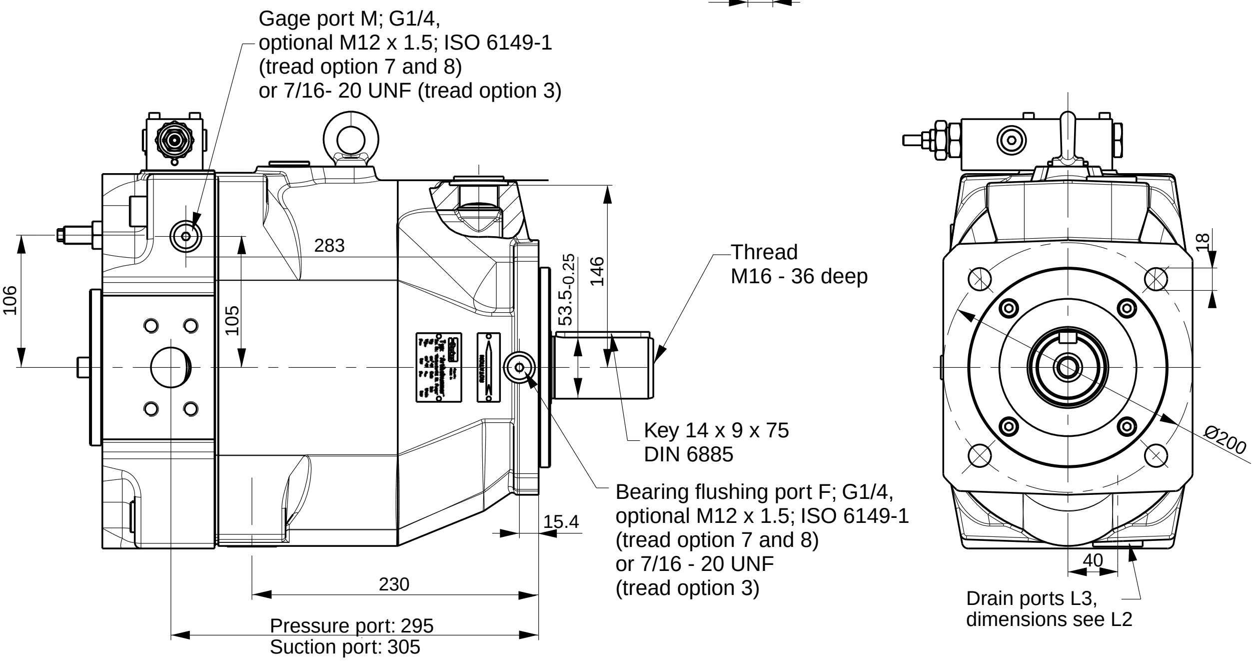


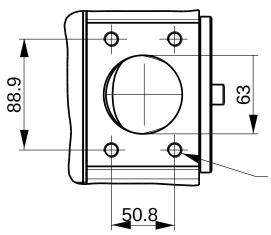


Thru drive adaptors are available with the following dimensions												
Drawing Dimension / Thru drive option	A	B	C	D	E		F	G		K	L	Remark
					Metr	UNC		Metr	UNC			
A	82.55	8	-	-	-	-	106	M10	3/8"-16	58	326	SAE A 2-Bolt
B	101.6	11	127	89.8	M12	1/2"-13	146	M12	1/2"-13	58	326	SAE B 2/4-Bolt
C	127	13.5	162	114.6	M12	1/2"-13	181	M16	5/8"-11	58	326	SAE C 2/4-Bolt
D	152.4	13.5	228.5	161.6	M16	5/8"-11	-	-	-	83	351	SAE D 4-Bolt
G	63	8.5	85	60.1	M8	5/16"-18	100	M8	5/16"-18	58	326	2/4-Bolt
H	80	8.5	103	72.8	M8	5/16"-18	109	M10	3/8"-16	58	326	2/4-Bolt
J	100	10.5	125	88.4	M10	3/8"-16	140	M12	1/2"-13	58	326	2/4-Bolt
K	125	10.5	160	113.1	M12	1/2"-13	180	M16	5/8"-11	58	326	2/4-Bolt
L	160	13.5	200	141.4	M16	5/8"-11	-	-	-	58	326	4-Bolt

PV 140 - 180 Metric



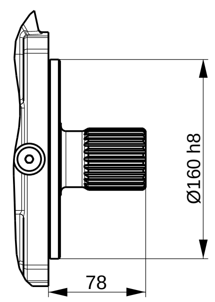




INLET for metric and SAE version:
flange according ISO 6162
DN 64; PN 160 bar

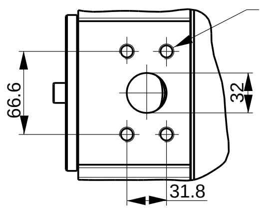
4 x M12, 20 deep
optional 1/2 - 13 UNC - 2B
(thread options 3 and 7)

The pump shown above has **Mounting option K** and **through drive variation T** (prepared for through drive)



Mounting option L, splined shaft
W50x2x24 x 9g DIN 5480

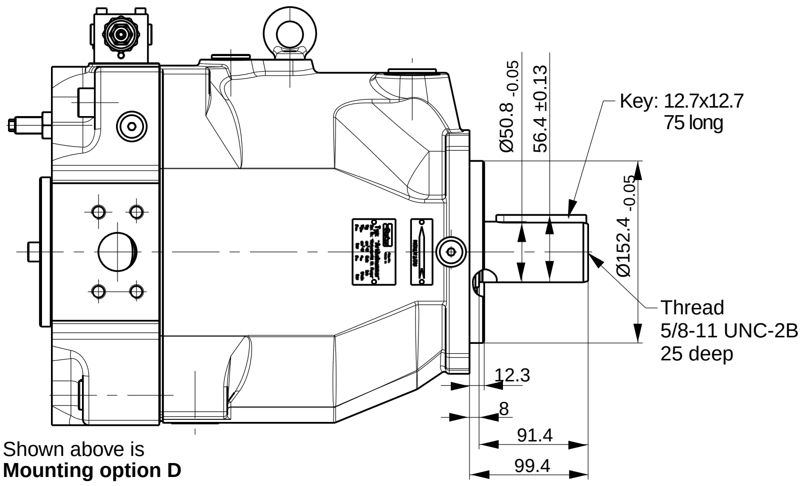
4 x M12, 20 deep
optional 1/2 - 13 UNC - 2B
(thread options 3 and 7)
or thread options 4:
4 x M14, 22 deep

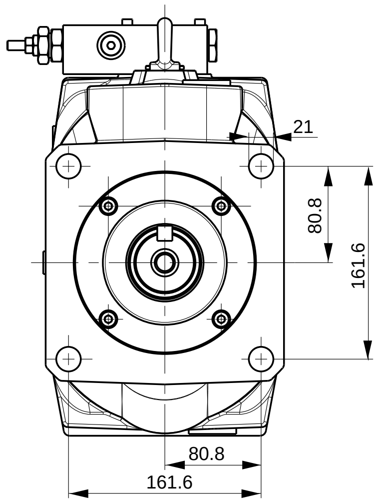


OUTLET for metric and SAE version:
flange according ISO 6162
DN 32; PN 400 bar

Shown is a clockwise rotating pump with standard pressure control.
Counter clockwise rotating pump have inlet, outlet and gauge port reversed.

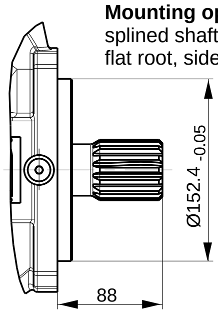
PV 140 - 180 SAE Version

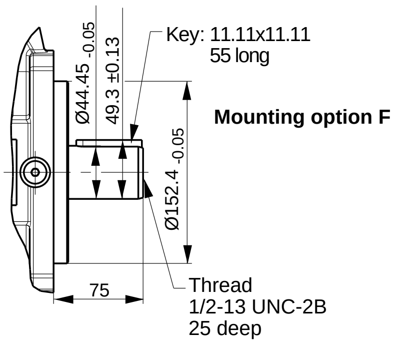




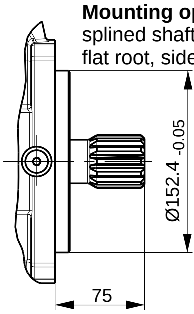
Shown above is
Mounting option D

Mounting option E
splined shaft 15T-8/16 DP,
flat root, side fit ANSI B92.1

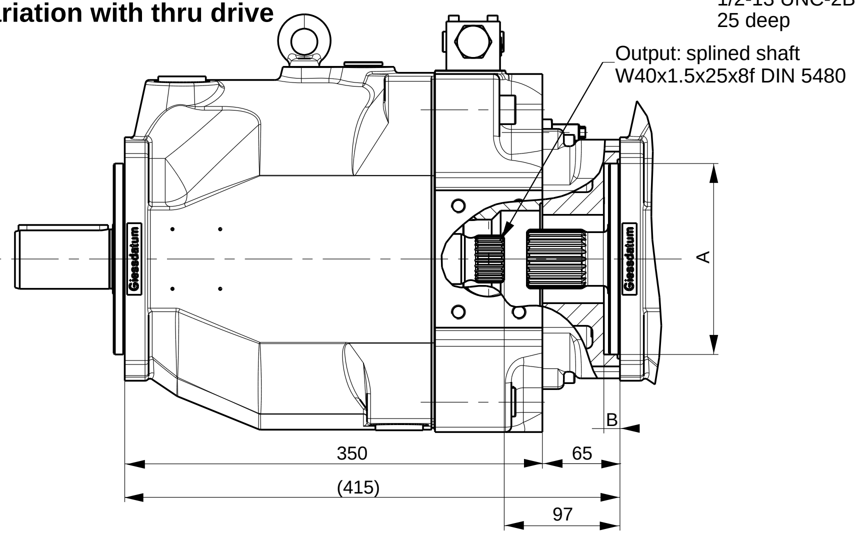


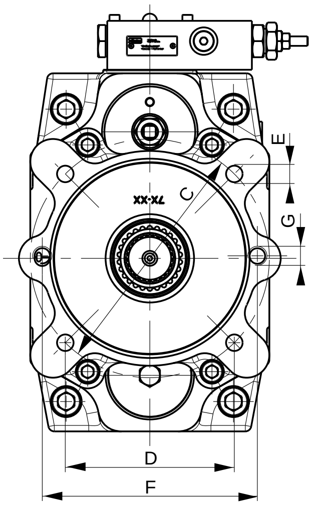


Mounting option G
splined shaft 13T-8/16 DP,
flat root, side fit ANSI B92.1



Variation with thru drive



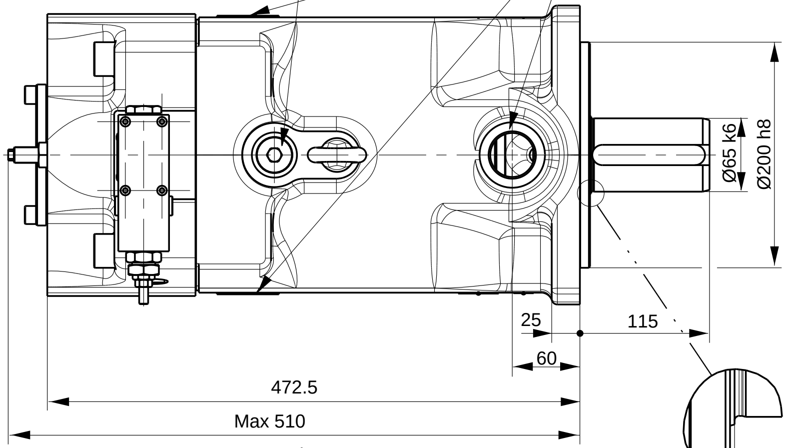


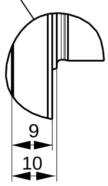
Thru drive adaptors are available with the following dimensions										
Drawing Dimension / Thru drive option	A	B	C	D	E		F	G		Remark
					Metr	UNC		Metr	UNC	
A	82.55	8	-	-	-	-	106	M10	3/8"-16	SAE A 2-Bolt
B	101.6	11	127	89.8	M12	1/2"-13	146	M12	1/2"-13	SAE B 2/4-Bolt
C	127	13.5	162	114.6	M12	1/2"-13	181	M16	5/8"-11	SAE C 2/4-Bolt
D	152.4	13.5	228.5	161.6	M16	5/8"-11	-	-	-	SAE D 4-Bolt
H	80	8.5	103	72.8	M8	5/16"-18	109	M10	3/8"-16	2/4-Bolt
J	100	10.5	125	88.4	M10	3/8"-16	140	M12	1/2"-13	2/4-Bolt
K	125	10.5	160	113.1	M12	1/2"-13	180	M16	5/8"-11	2/4-Bolt
L	160	13.5	200	141.4	M16	5/8"-11	-	-	-	4-Bolt

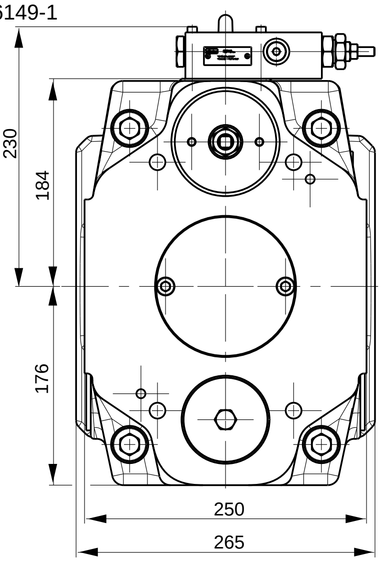
PV 270 Metric

Mounting interface for horse power pilot or LVDT for displacement feedback

Drain ports L1; G1 1/4”
optional M42 x 2; ISO 6149-1
(tread option 7 and 8)
or 1 5/8 - 12 UNF
(tread option 3)



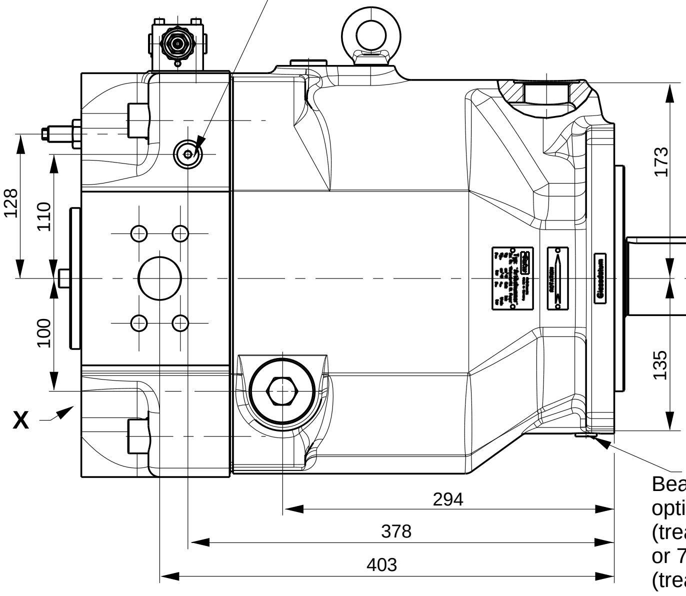




view X

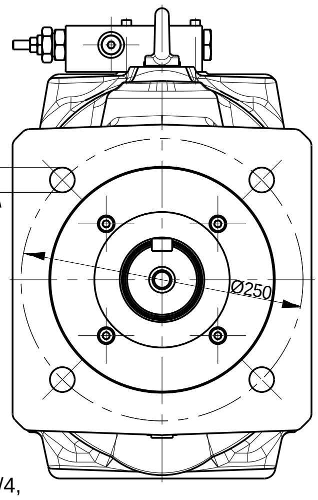
Gage port M; G1/4,
optional M12 x 1.5; ISO 6149-1 (tread option 7 and 8)
or 7/16- 20 UNF (tread option 3)

Shown with standard pressure control



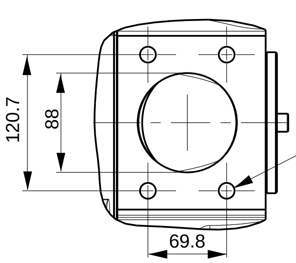
Key 18 x 11 x 98
DIN 6885

Thread
M20 - 42 deep



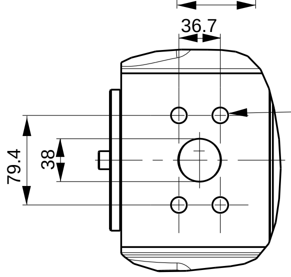
Bearing flushing port F; G1/4,
optional M12 x 1.5; ISO 6149-1
(tread option 7 and 8)
or 7/16 - 20 UNF
(tread option 3)

The pump shown above has **Mounting option K** and **through drive variation T** (prepared for through drive)



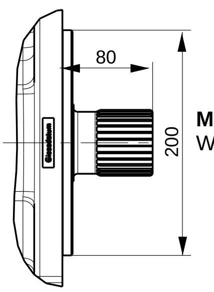
INLET for metric and SAE version:
flange according ISO 6162
DN 89; PN 35 bar

4 x M16, 30 deep
optional 5/8 - 11 UNC - 2B
(thread options 3 and 7)



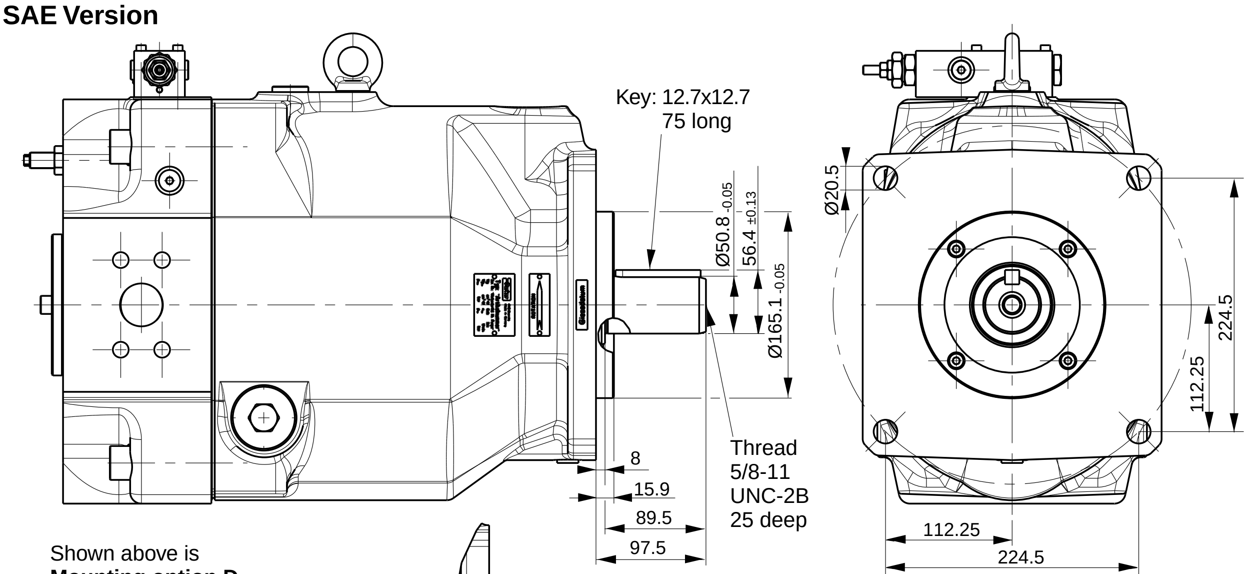
4 x M16, 30 deep
optional 5/8 - 11 UNC - 2B
(thread options 3 and 7)

OUTLET for metric and SAE version:
flange according ISO 6162
DN 38; PN 400 bar

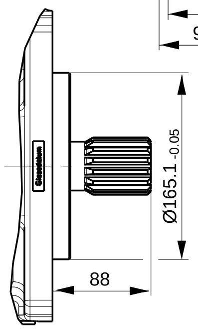


Mounting option L, splined shaft
W60 x 2 x 28 x 9g DIN 5480

PV 270 SAE Version

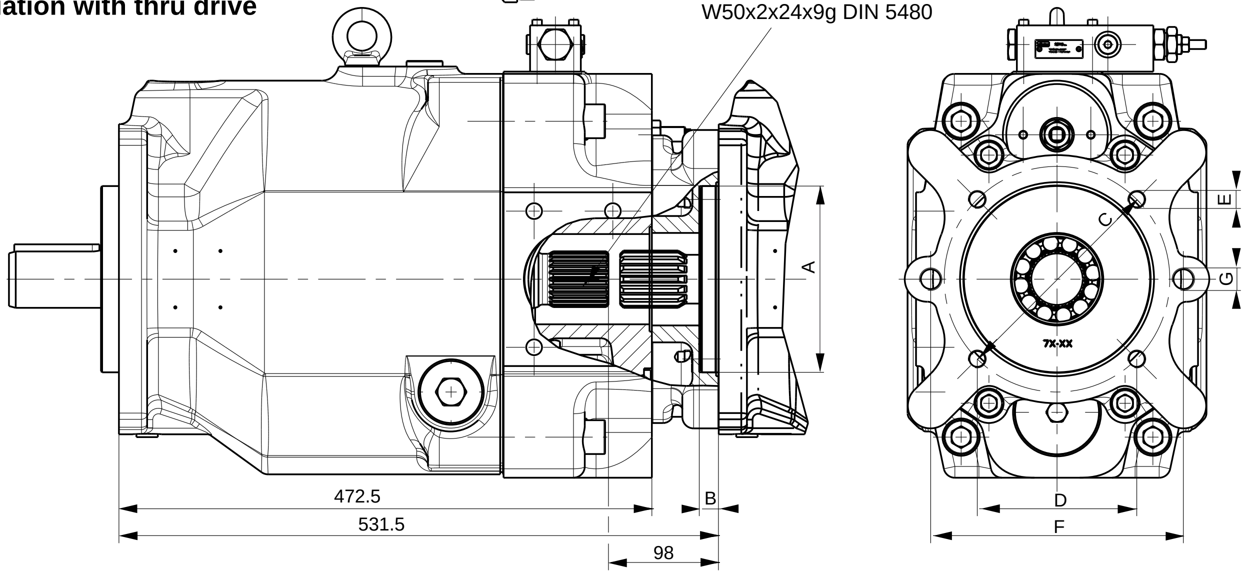


Shown above is
Mounting option D



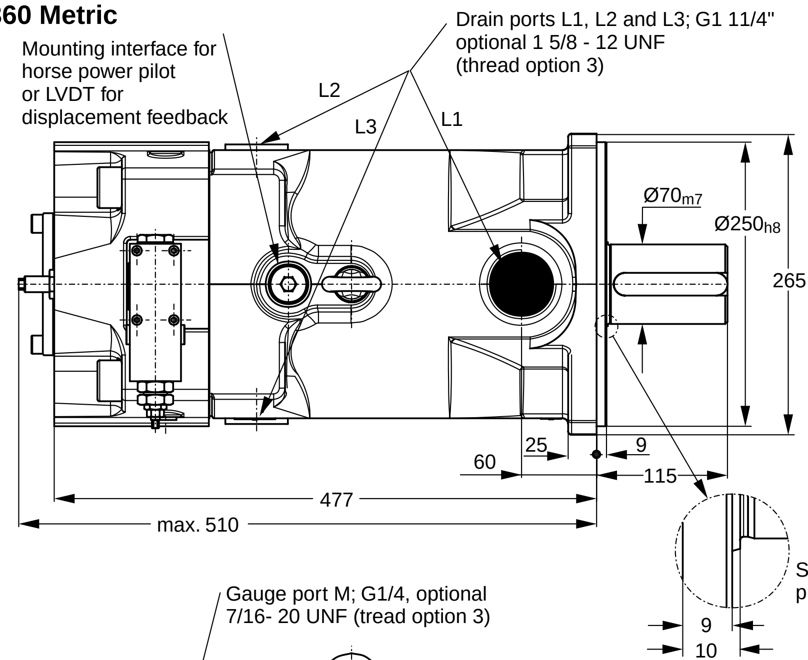
Mounting option E
splined shaft 15T-8/16 DP,
flat root, side fit ANSI B92.1

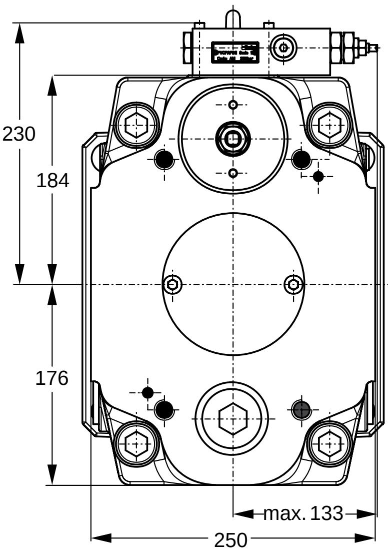
Variation with thru drive



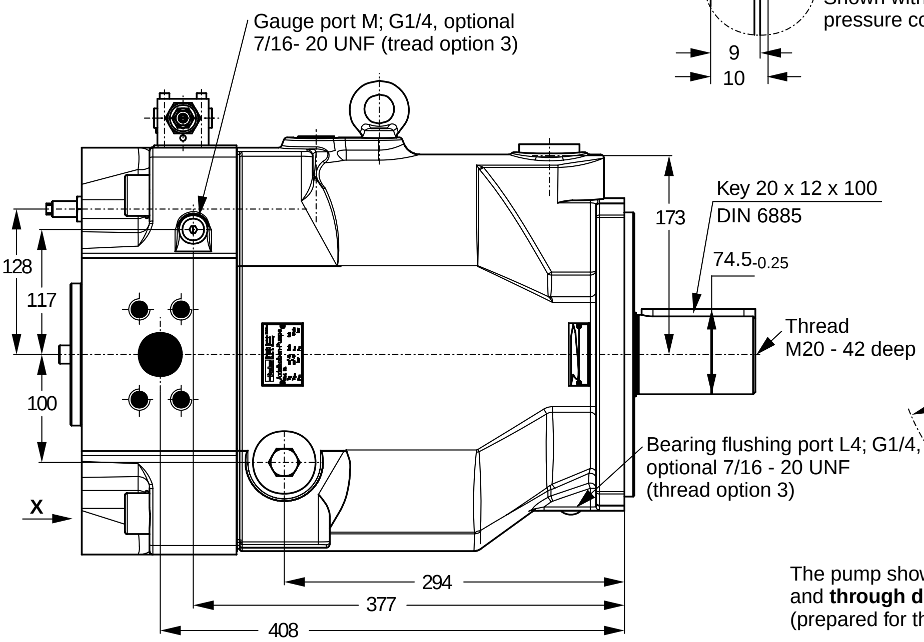
Thru drive adaptors are available with the following dimensions										
Drawing Dimension / Thru drive option	A	B	C	D	E		F	G		Remark
					Metr	UNC		Metr	UNC	
A	82.55	8	-	-	-	-	106	M10	3/8"-16	SAE A 2-Bolt
B	101.6	11	127	89.8	M12	1/2"-13	146	M12	1/2"-13	SAE B 2/4-Bolt
C	127	13.5	162	114.6	M12	1/2"-13	181	M16	5/8"-11	SAE C 2/4-Bolt
D	152.4	13.5	228.5	161.6	M16	5/8"-11	229	M16	5/8"-11	SAE D 2/4-Bolt
E	165.1	17	317.5	224.5	M20	3/4"-10	-	-	-	SAE E 4-Bolt
H	80	8.5	103	72.8	M8	5/16"-18	109	M10	3/8"-16	2/4-Bolt
J	100	10.5	125	88.4	M10	3/8"-16	140	M12	1/2"-13	2/4-Bolt
K	125	10.5	160	113.1	M12	1/2"-13	180	M16	5/8"-11	2/4-Bolt
L	160	13.5	200	141.4	M16	5/8"-11	224	M20	3/4"-10	2/4-Bolt
M	200	13.5	250	176.8	M20	3/4"-10	-	-	-	4-Bolt

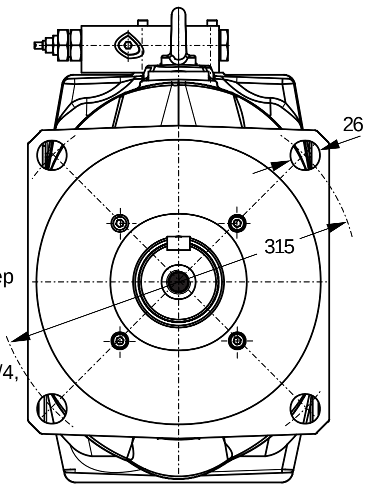
PV 360 Metric



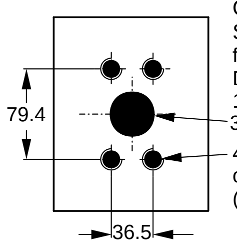


view X

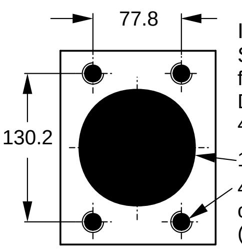




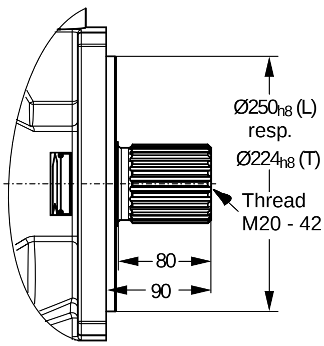
The pump shown above has **Mounting option K** and **through drive variation T** (prepared for through drive)



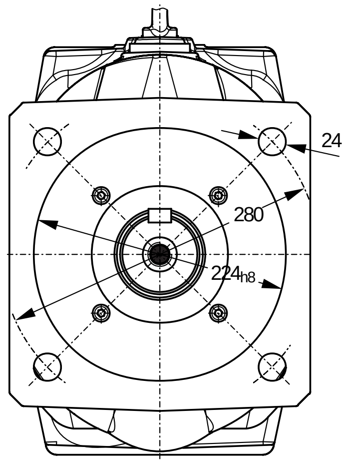
OUTLET for metric and SAE version:
flange according ISO 6162
DN 38; PN 400 bar
1 1/2"
4 x M16, 30 deep
optional 5/8 - 11 UNC - 2B
(thread option 3)



INLET for metric and SAE version:
flange according ISO 6162
DN 102; PN 35 bar
4"
4 x M16, 30 deep
optional 5/8 - 11 UNC - 2B
(thread option 3)

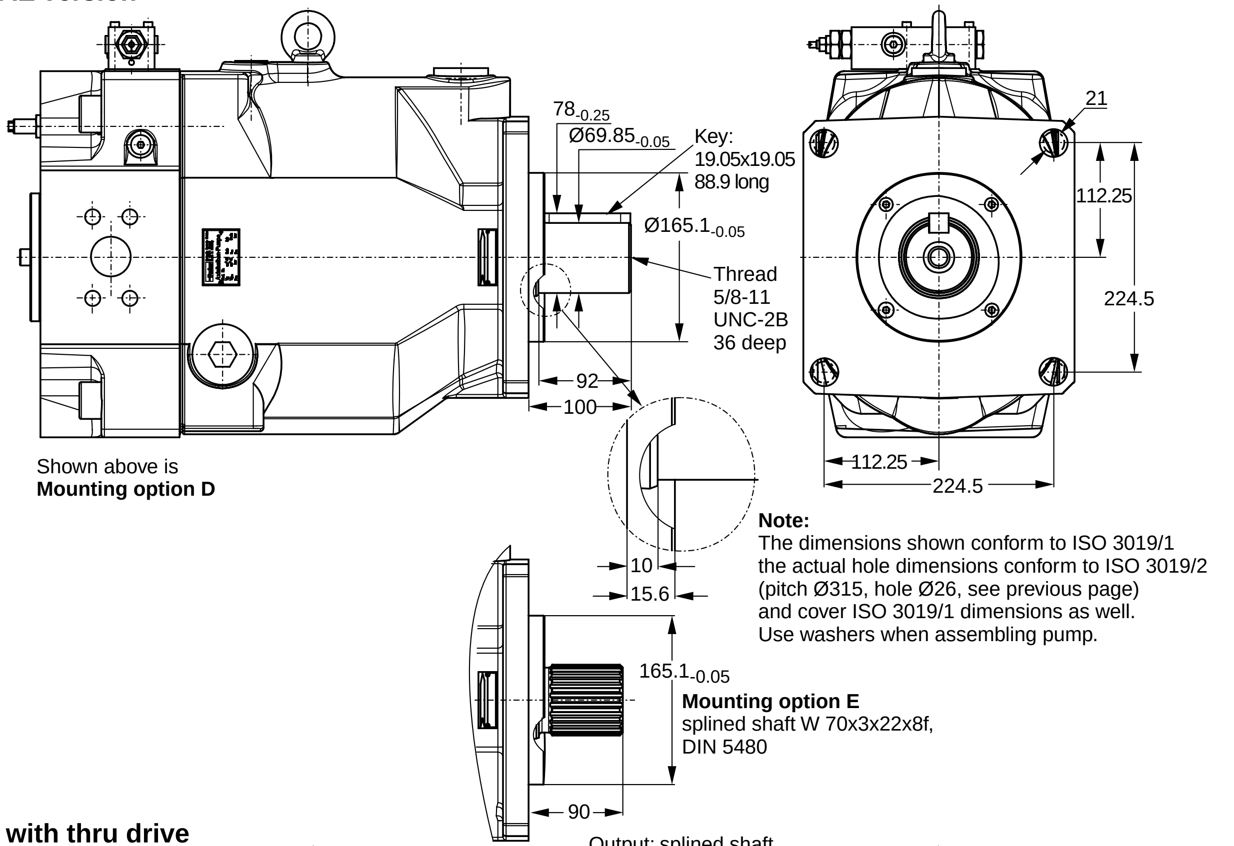


Mounting option L, T, splined shaft
W 70 x 3 x 22 x 8f DIN 5480



m**ounting option R**
pilot diameter Ø224 mm

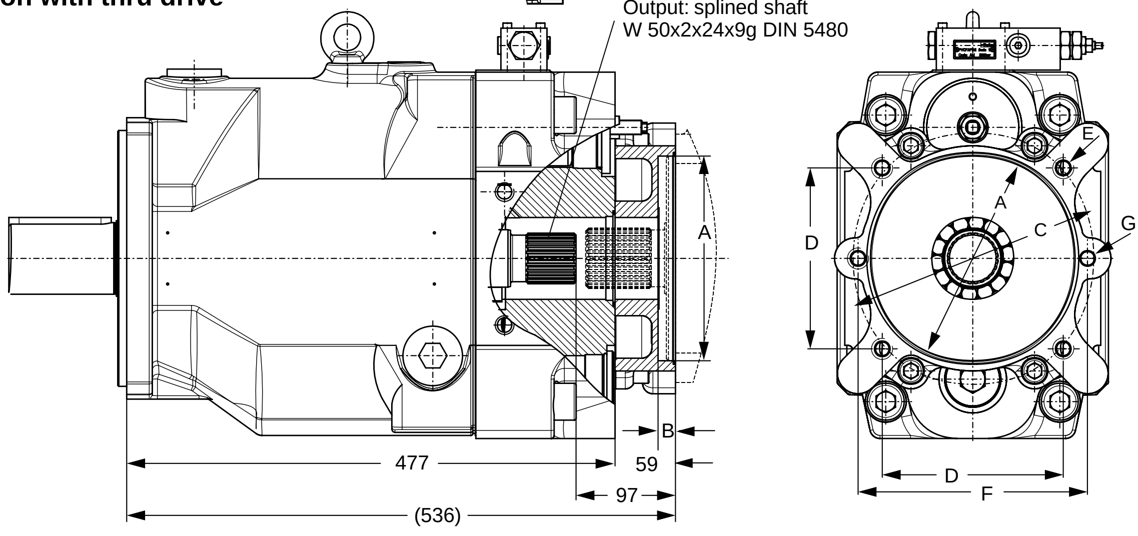
PV 360 SAE Version



Shown above is
Mounting option D

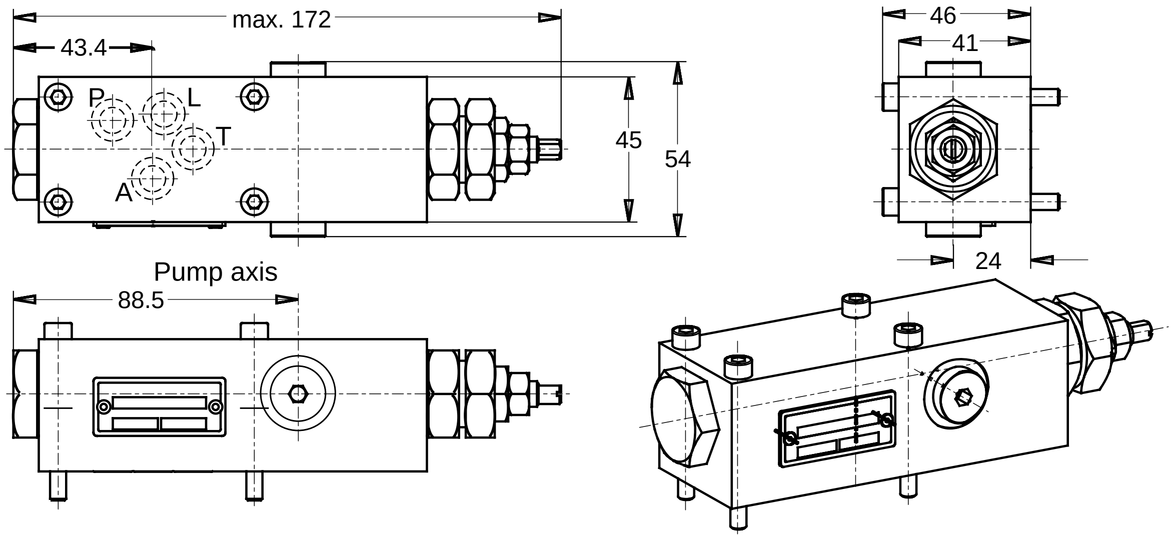
Note:
The dimensions shown conform to ISO 3019/1 the actual hole dimensions conform to ISO 3019/2 (pitch Ø315, hole Ø26, see previous page) and cover ISO 3019/1 dimensions as well. Use washers when assembling pump.

Variation with thru drive



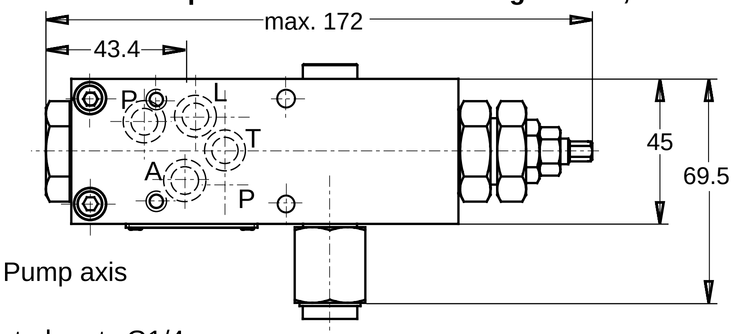
Thru drive adaptors are available with the following dimensions										
Drawing Dimension / Thru drive option	A	B	C	D	E		F	G		Remark
					Metr	UNC		Metr	UNC	
A	82.55	8	-	-	-	-	106	M10	3/8"-16	SAE A 2-Bolt
B	101.6	11	127	89.8	M12	1/2"-13	146	M12	1/2"-13	SAE B 2/4-Bolt
C	127	13.5	162	114.6	M12	1/2"-13	181	M16	5/8"-11	SAE C 2/4-Bolt
D	152.4	13.5	228.5	161.6	M16	5/8"-11	229	M16	5/8"-11	SAE D 2/4-Bolt
E	165.1	17	317.5	224.5	M20	3/4"-10	-	-	-	SAE E 4-Bolt
H	80	8.5	103	72.8	M8	5/16"-18	109	M10	3/8"-16	2/4-Bolt
J	100	10.5	125	88.4	M10	3/8"-16	140	M12	1/2"-13	2/4-Bolt
K	125	10.5	160	113.1	M12	1/2"-13	180	M16	5/8"-11	2/4-Bolt
L	160	13.5	200	141.4	M16	5/8"-11	224	M20	3/4"-10	2/4-Bolt
M	200	13.5	250	176.8	M20	3/4"-10	-	-	-	4-Bolt

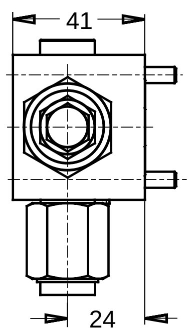
Dimensions standard pressure control, code ...MMC



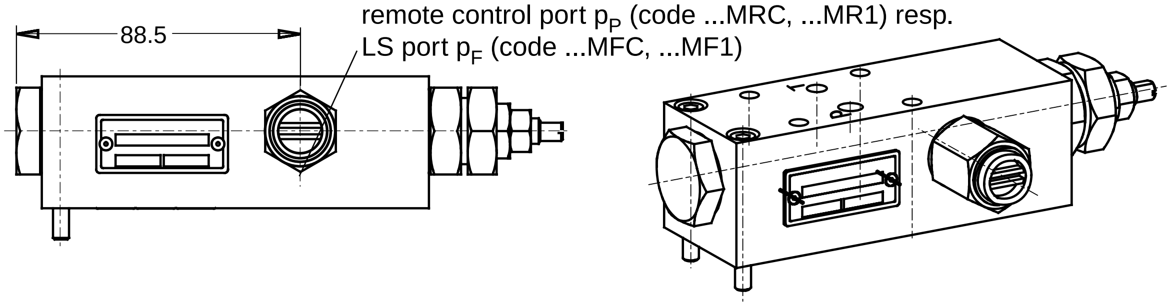
Controls with code ...MM1 have a NG6 / Cetop 3 interface topside (as shown below)

Dimensions remote pressure and load sensing control, codes ...MR1, ...MF1



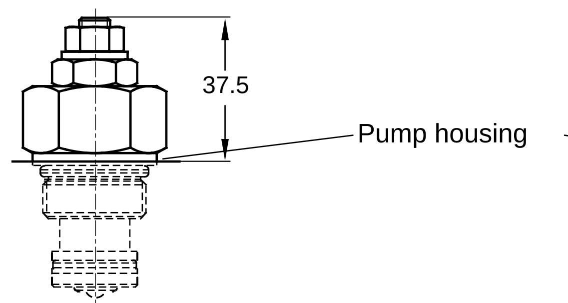


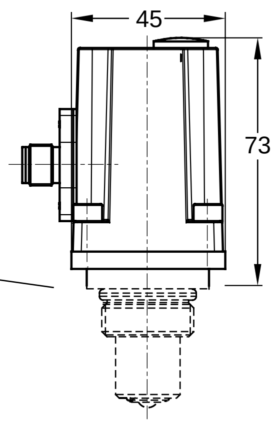
All control ports G1/4
Optional 7/16-20 UNF (option 3)



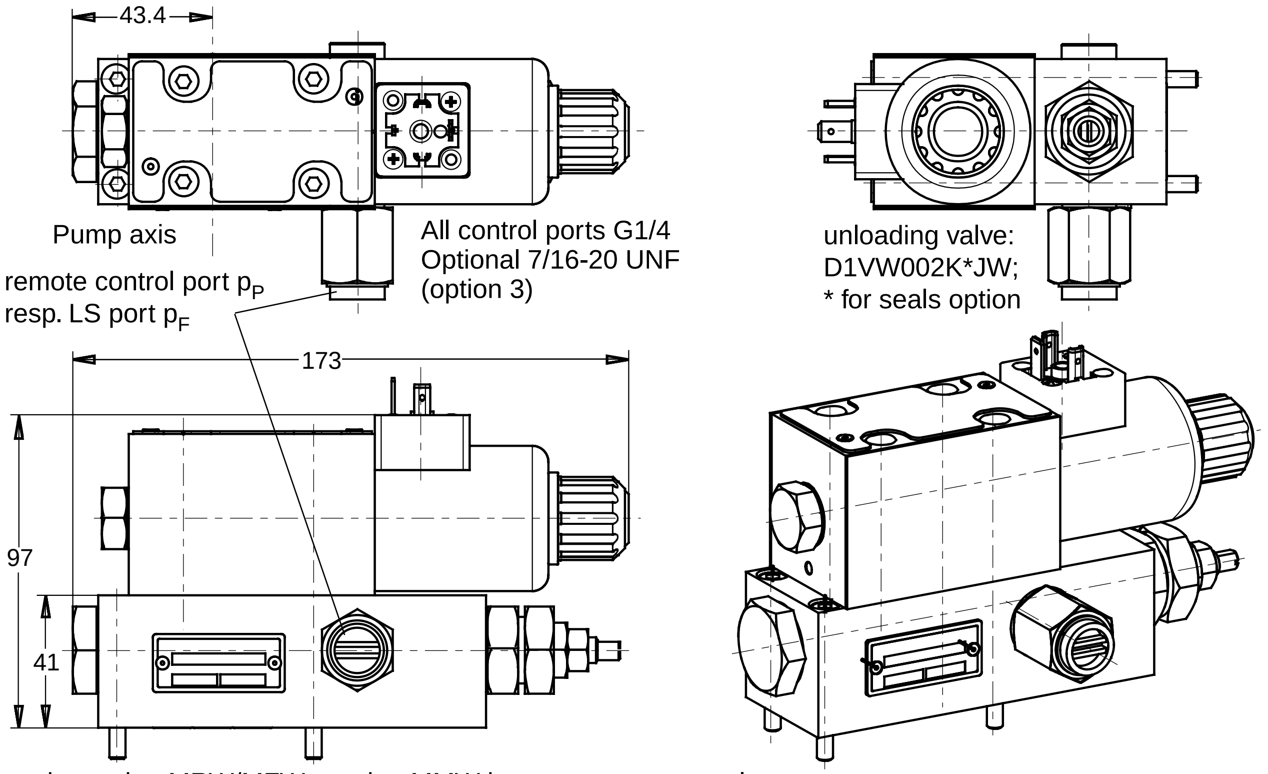
Controls with code ...MRC and MFC have no topside valve interface (as shown above)

Dimensions horse power pilot cartridge, displacement sensor



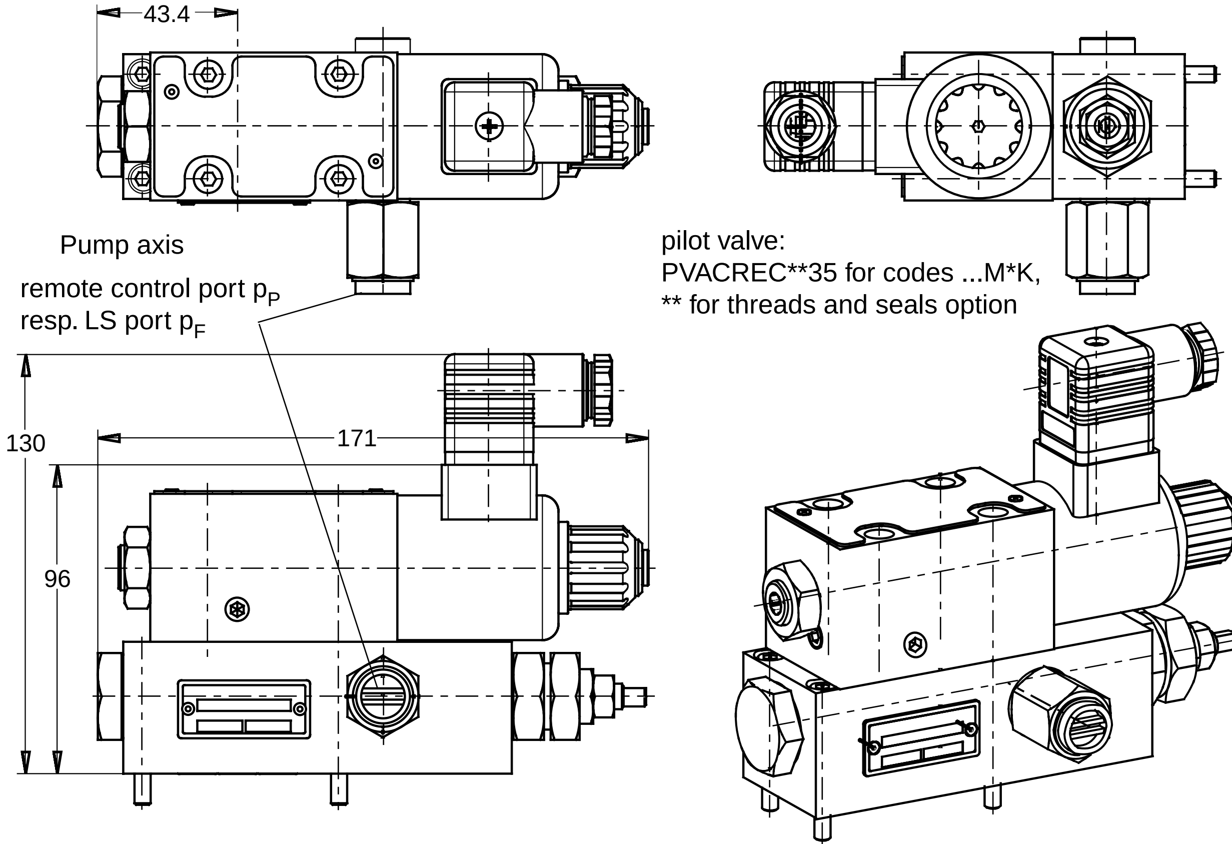


Dimensions for controls with unloading valve, codes ...M*W



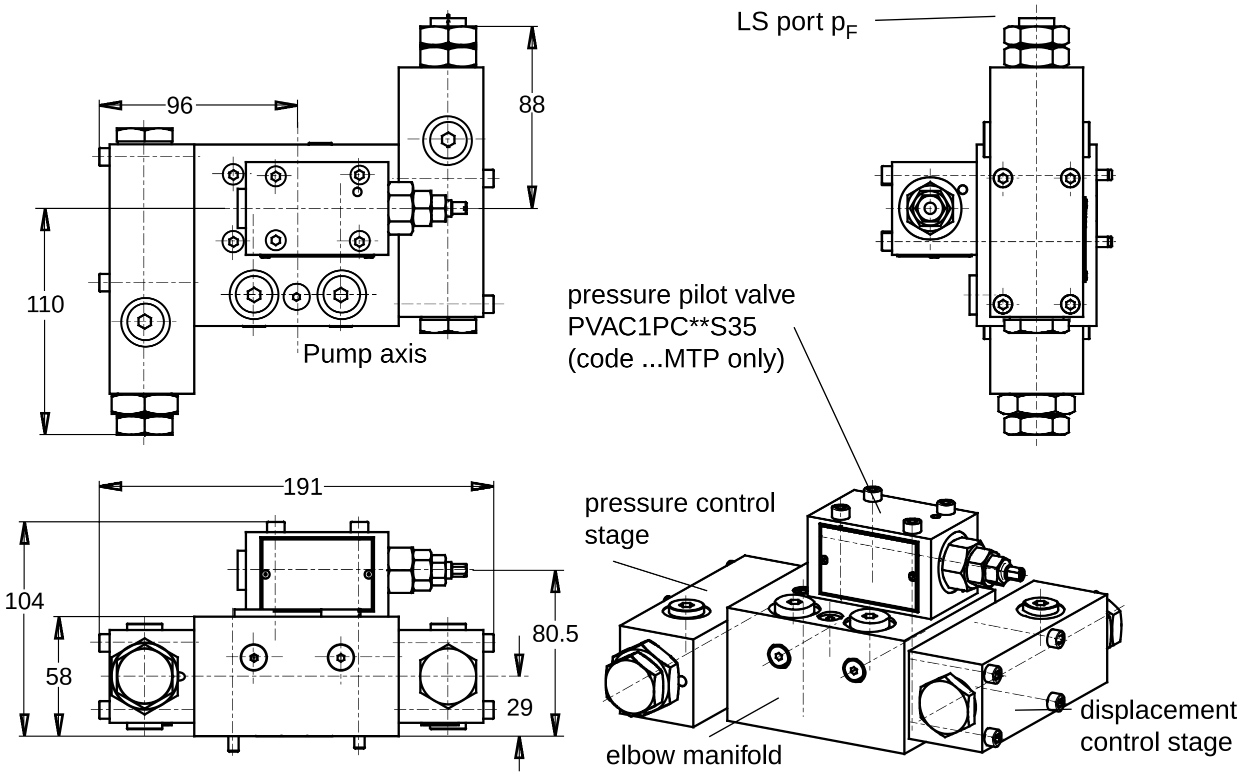
Shown in version MRW/MFW, version MMW has no remote control port.

Dimensions for controls with proportional pressure pilot valve, codes ...M*K

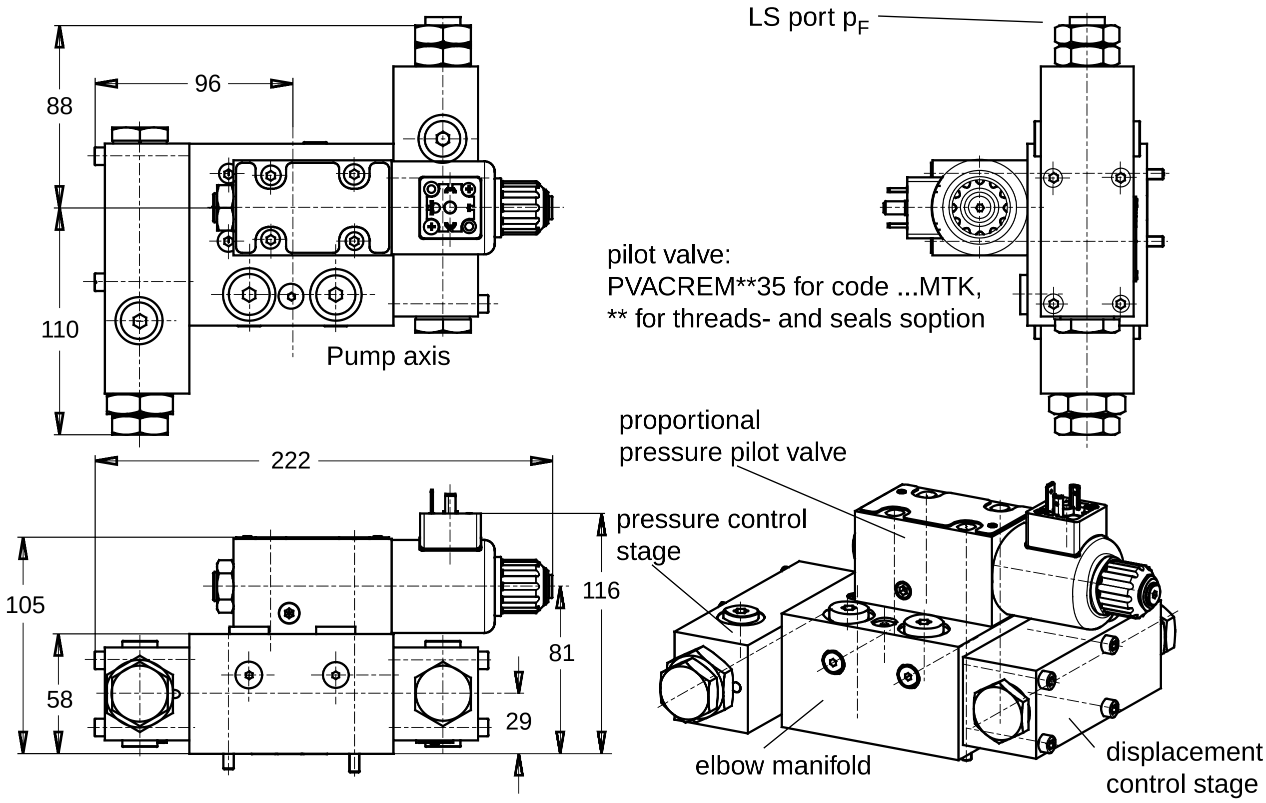


Shown in version MRK/MFK, version MMK has no remote control port.
Dimensions for horse power compensator *L* and *C* are identical to MM* respectively MF*.

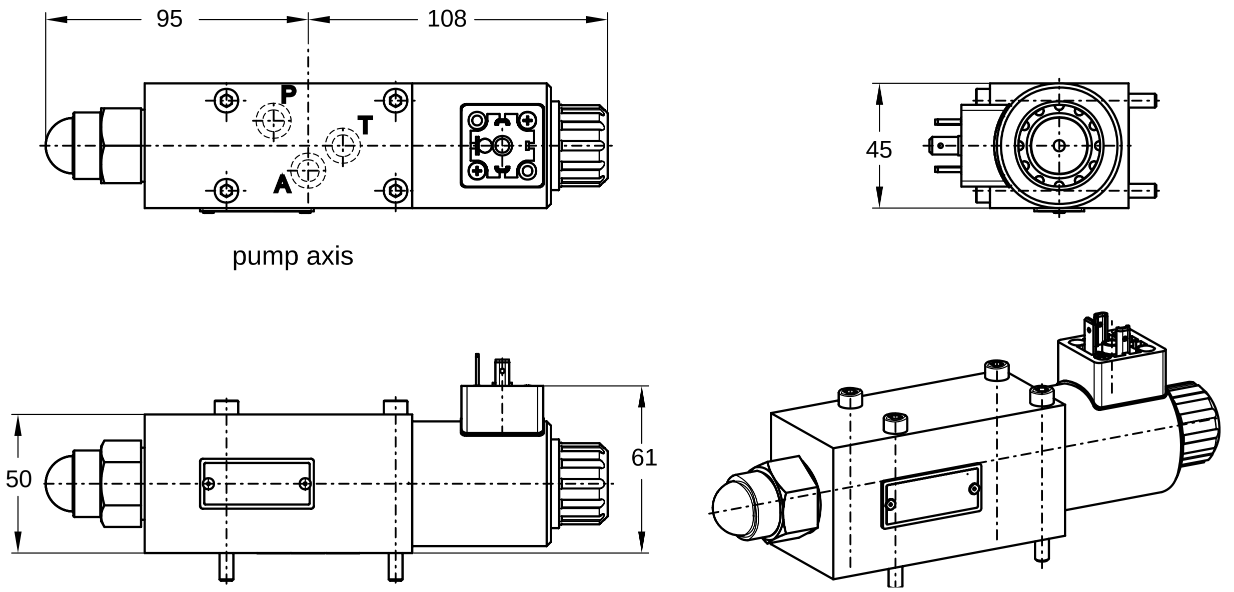
Dimensions two spool load sensing control, code ...MT1, ...MTP



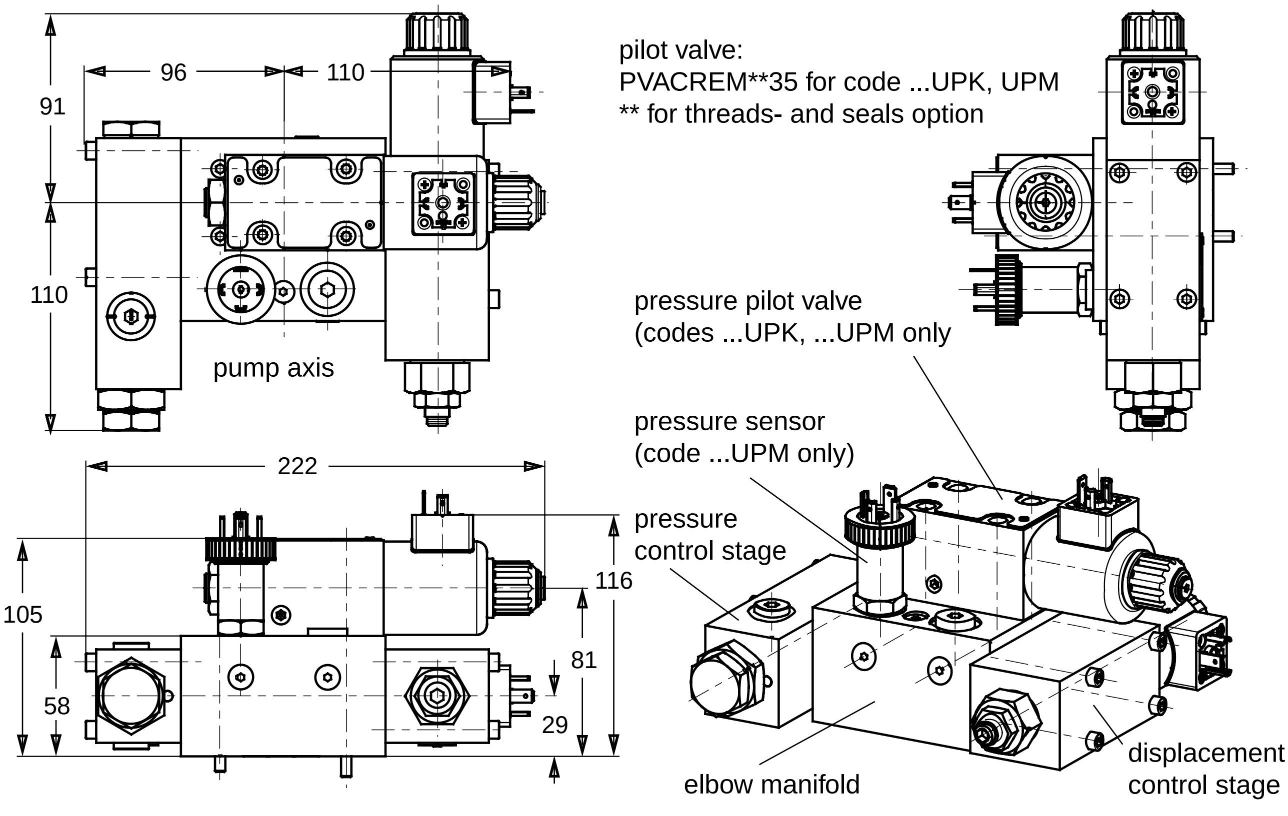
Dimensions two spool load sensing control with proportional pressure pilot valve, code ...MTK



Dimensions proportional displacement control, code ...FPV

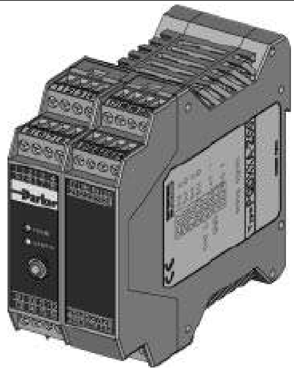


Dimensions proportional p/Q-control, codes ...UPR, ...UPK, ...UPM



Features

- Digital control circuit
- Parameter setting via RS-232 or USB interface
- All settings (ramps, MIN/MAX, control parameters) can be stored digitally and recalled from a PC to duplicate settings to other modules
- Ramp time up to 60 seconds
- Compatible to the relevant european EMC specifications
- Easy to use PC based setup software
- Covers all displacements
- Covers all available functions



Technical data

Mounting style		Snap-on mounting for EN50022 rail
Body material		Polycarbonate
Inflammation class		V2...V0 acc. UL 94
Mounting position		any
Env. temperature range	[°C]	-20...+55
Protection class		IP 20 acc. DIN 40 050
Weight	[g]	160
Duty ratio	[%]	100
Supply voltage	[V]	18...30VDC, ripple <5% eff.
Rush in current	[A]	22 for 0.2 ms
Current consumption	[A]	< 4 for p/Q control ; < 2 for Q-control
Resolution	[%]	0.025 (power 0.1)
Interface		RS232C, 9600 baud, 3.5 mm cinch
EMC		EN 50 081-2, EN 50 082-2
Connctors		Screw terminals 0.2...2.5 mm², plug in style
Cables	[mm²]	Supply and solenoid cables; 1,5 mm² (AWG16) overall braid shield. Sensor and command signals; 0,5 mm² (AWG20) overall braid shield
Max. cable length	[m]	50

For programming the module via PC, an interface cable is needed,
please order part number PQDXXA-KABEL (RS232) or PQDXXA-KABEL-USB (USB) separately.

Ordering code

PQD	XX	A	–	Z00
Digital control module for p/Q control	**For all frame sizes series PV**	**Version A**		**Option**

Programming software

The programming of the p/Q control module is done in an easy to learn mode. To select the pump model and size and to set the control paramters the program ProPVplus must be started. This program runs under WINDOWS® 95 and higher.
The latest version of this software can be downloaded at the following internet address:
www.parker.com/euro_pmd

Features

- Display and documentation of parameter sets
- Save ond reload of optimized parameter sets
- Offers oscilloscope function for easy performance evaluation and optimization
- Parameter sets for all PVplus pumps are pre-installed in the modules

Mounting kits for multiple pumps, for second pump option

MK – PV BG [ ] [ ] [ ] [ ]

Mounting kit | **Axial piston pump series PV** | **Size** | **Second pump** | **Thread** | **Seals**

Code	Pump size
1	Pump size 1: PV016 - PV028
2	Pump size 2: PV032 - PV046
3	Pump size 3: PV063 - PV092
4	Pump size 4: PV140 - PV180
5	Pump size 5: PV270 - PV360

Code	Second pump, SAE
T	Prepared for thru drive option (plugged)
Y	SAE AA, diameter 50.8 mm
A	SAE A, diameter 82.55 mm
B	SAE B, diameter 101.6 mm
C	SAE C, diameter 127 mm
D	SAE D, diameter 152.4 mm
E	SAE E, diameter 165.1 mm
	Second pump, metric
H	Diameter 80 mm
J	Diameter 100 mm
K	Diameter 125 mm
L	Diameter 160 mm
M	Diameter 200 mm

Code	Seals
N	NBR
V	FPM

Code	Thread
M	Metric
S	SAE

Kit contains positions 30, 69, 84, 85 and 87, see drawing below.

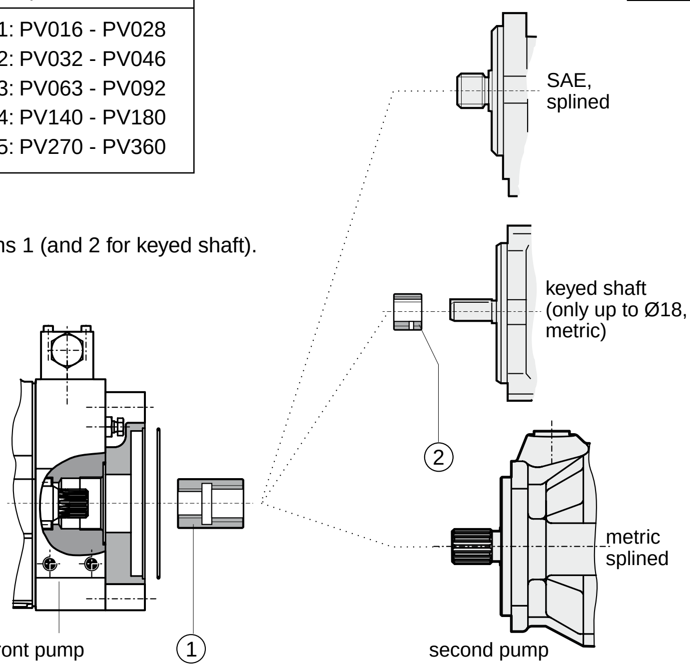
Mounting kits for multiple pumps, couplings

MK – PV BG [ ] K [ ]

Mounting kit | **Axial piston pump series PV** | **Size** | **Coupling**

Code	Pump size
1	Pump size 1: PV016 - PV028
2	Pump size 2: PV032 - PV046
3	Pump size 3: PV063 - PV092
4	Pump size 4: PV140 - PV180
5	Pump size 5: PV270 - PV360

Kit contains positions 1 (and 2 for keyed shaft).



Code	Coupling for metric, splined shaft DIN 5480
01	N25 x 1.5 x 15
02	N32 x 1.5 x 20
03	N40 x 1.5 x 25
04	N50 x 2 x 24
05	N60 x 2 x 28
06	N70 x 3 x 22*
	Coupling for SAE splined shaft flat root, side fit
11	SAE A, 9T 16/32
12	SAE-, 11T 16/32
13	SAE B, 13T 16/32
14	SAE B-B, 15T 16/32
15	SAE C, 14T 12/24
16	SAE C-C, 17T 12/24
17	SAE D+E, 13T 8/16
18	SAE F, 15T 8/16
	Coupling + adaptor for keyed shaft
20	Diameter 12 mm
21	Diameter 16 mm
22	Diameter 18 mm

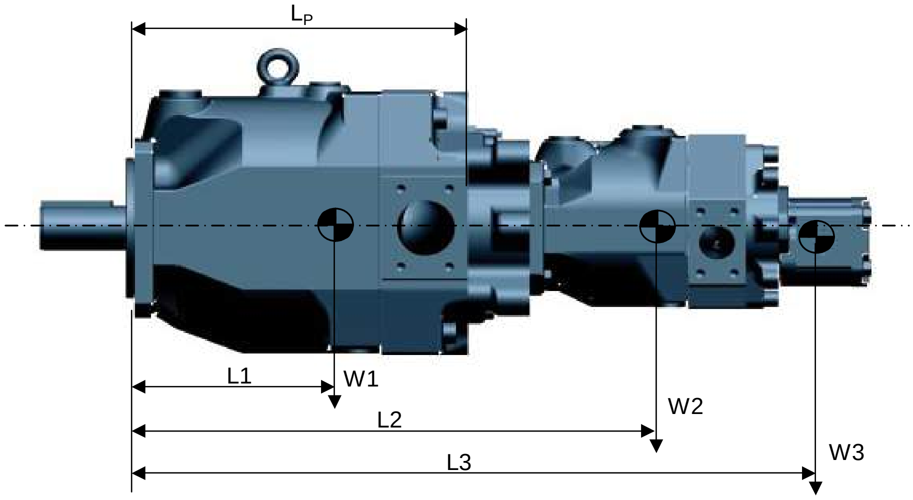
* For PV360 only

Availability of thru drive flange and coupling please check with ordering code options per each pump size, starting at page 6

Multiple Pump Combinations - Maximum Moment

Combinations of multiple pumps might require additional pump support to avoid a too high stress on the front mounting flange. Combinations of two PVplus pumps in the same frame size generally do not need additional support in an industrial application. For combinations of more pumps support is requiered.

In case of combinations of a PVplus pump with another type of pump it is recommended to calculate the moment for the combination and compare with the maximum moment in table 1 below.



Moment M = (L1*W1 + L2*W2 + L3*W3 +...)
Note:
If the calculated moment M exceed the maximum moment in table 1 below, additional pump support is needed

Table 1: Maximum Moment and Pump Dimensions

		PV016-PV028	PV032-PV046	PV063-PV092	PV140-PV180	PV270	PV360
Maximum moment 1)	[Nm]	81	151	401	591	1686	1686
Weight W	[N]	186	294	589	883	1687	1766
Distance L1	[mm to C/G]	106	119	178	184	234	238
Distance Lp	[mm]	197.5	227	287	350	472.5	477

1) at dynamic weight acceleration 10g = 98.1 m/sec^2

Table 2 Through Drive Adapter Plate Thickness [mm]

Adapter option 2)	PV016-PV028	PV032-PV046	PV063-PV092	PV140-PV180	PV270	PV360
Y	27	-	-	-	-	-
A	27	34	39	65	59	59
B	27	34	39	65	59	59
C	-	49	39	65	59	59
D	-	-	39	65	59	59
E	-	-	-	-	59	59
G	27	34	39	-	-	-
H	27	34	39	65	59	59
J	27	34	39	65	59	59
K	-	49	39	65	59	59
L	-	-	39	65	59	59
M	-	-	-	-	59	59

2) See page 6 to 17 for reference per each frame size.

Maximum allowed transferable torque FRONT							
Shaft code	Shaft type	**Transferable torque at FRONT shaft end. [Nm]**					
		PV016-028	**PV032-046**	**PV063-092**	**PV140-180**	**PV270**	**PV360**
D	SAE - Key	300	650	1850	2150	2150	4750
E	SAE - Spline	320	630	1700	2750	2800	8100
F	SAE - Key				1200		
G	SAE - Spline				1700		
R	Metric - Key						3750
T	Metric - Spline						8100
K	Metric - Key	280	640	1200	1550	3300	3750
L	Metric - Spline	320	720	1500	3050	5750	8100
Maximum allowed transferable torque REAR							
Max. torque transmission cap. for rear mounted pump		350	520	1100	1550	3150	3250

Important notice

The max. allowable torque of the individual shaft must not be exceeded. For 2-pump combinations there is no problem because PV series offers 100% thru torque. For 3-pump combinations (and more) the limit torque could be reached or exceeded.

Therefore it is necessary to calculate the torque factor and compare it with the allowed torque limit factor in the table.

Required: calculated torque factor
< torque limit factor

To make the necessary calculations easier and more user friendly it is not required to calculate actual torque requirements in Nm and compare them with the shaft limitations. The table on the right shows limit factors that include material specification, safety factors and conversion factors.

The **total torque factor** is represented by the sum of the individual torque factors of all pumps in the complete pump combination.

Total torque factor of the combination
= sum of individual torque factors of all pumps

The **torque factor of each individual pump** is calculated by multiplying the max. operating pressure p of the pump (in bar) with the max. displacement Vg of the pump (in cm³/rev).

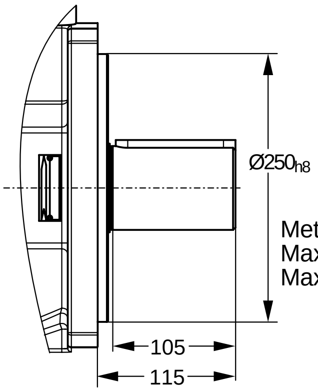
Torque factor of any pump
= p x Vg

Pump	Shaft	Torque limit factor
PV016-028	D	17700
	E	17700
	K	17700
	L	20130
PV032-046	D	32680
	E	36380
	K	33810
	L	40250
PV063-092	D	77280
	E	72450
	K	67620
	L	83720
PV140-180	D	118400
	E	158760
	F	78750
	G	97650
	K	113400
	L	157500
PV270	D	119000
	E	159700
	K	170100
	L	236250

PV360 shaft options

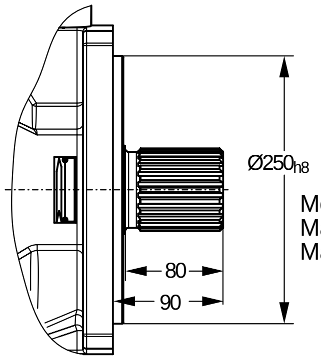
Max. transferable torque in [Nm] for different shaft options

K



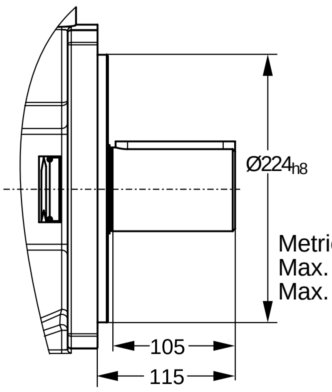
Metric key Ø70 mm
Max. input torque 3750 Nm
Max. through drive torque 3250 Nm

L



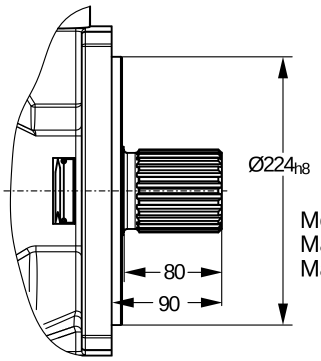
Metric spline W70x3x22x9g DIN5480
Max. input torque 8100 Nm
Max. through drive torque 3250 Nm

R



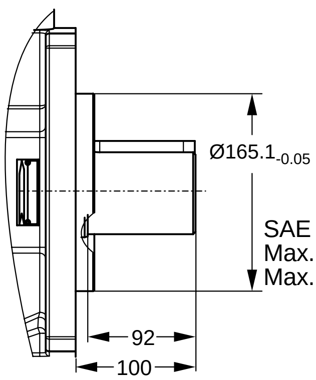
Metric key Ø70 mm
Max. input torque 3750 Nm
Max. through drive torque 3250 Nm

T



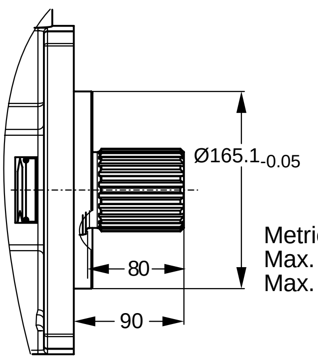
Metric spline W70x3x22x9g DIN5480
Max. input torque 8100 Nm
Max. through drive torque 3250 Nm

D



SAE key Ø69,85 mm
Max. input torque 4750 Nm
Max. through drive torque 3250 Nm

E



Metric spline W70x3x22x9g DIN5480
Max. input torque 8100 Nm
Max. through drive torque 3250 Nm

Torqmotor ™

Series

TE / TJ / TF / TL / TG / TH / TK

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker

ENGINEERING YOUR SUCCESS.

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Excellence of Design

The producers of Parker Hannifin's **Torqmotor™** Series motors have a history of manufacturing reliable, precision parts that stretches back over a century. Milestones include the first patent on roller vane rotor sets for low speed, high torque hydraulic motors. That was forty years ago. Today the technological advances continue.

In the Development Laboratory, engineers continuously measure and analyze motor data to move existing products to even higher levels of performance and to develop new products to serve the ever changing needs of our customers. Design integrity is assured by exhaustive testing on endurance stands. To be sure that this translates into superior performance, advanced manufacturing techniques are employed as well.

Excellence of Manufacturing

Central to manufacturing excellence is the understanding that quality parts make quality motors. The instrumentation in our Quality Assurance laboratory includes devices such as coordinate measuring machines, to accurately measure the parts that we manufacture as well as those that we purchase. Quality cannot be inspected in, however. It must be manufactured. Each machine operator is responsible for the quality of the part that comes off that machine. Efficiency is enhanced by our cellular manufacturing techniques. Accuracy is assured by statistical process control methods. Micrometers and specialized gages are at the disposal of the operator. As a final check, every motor is tested before shipment to our customer. Parker understands that our customers cannot produce quality products unless we do.

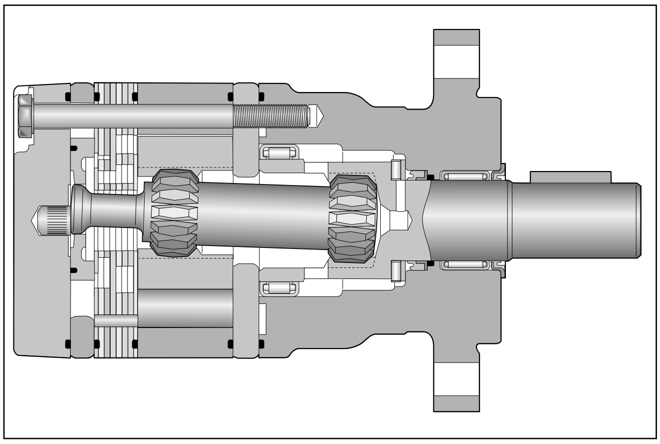
Contents

Contents

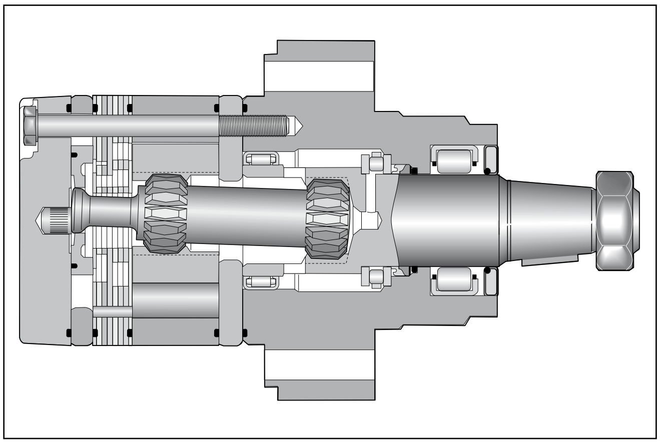
- **Langsamlaufender Gerotor-Motor**
- **Spezielle Orbital-Steuerung**
  Geringe interne Leckage
  Hoher volumetrischer Wirkungsgrad
- **Rollen im Rotorsatz**
  Reduzierte Reibung
  Lange Lebensdauer
- **Patentierte Hochdruckwellendichtung**
  Keine Leckölleitung
  Keine Rückschlagventile
- **Vielzahl von Varianten**
  Großer Einsatzbereich

- **Low Speed Gerotor Motor**
- **Zero leak commutation valve**
  For greater, more consistent
  Volumetric efficiency
- **Roller vane rotor set**
  Reduces friction and internal leakage
  Maintaining efficiency throughout the life of the motor
- **Patented high-pressure shaft seal**
  No check valves needed
  No extra plumbing
- **Wide choice of displacement range, flange and shaft options**
  Greater efficiency in systems design
  to suit your application

Series TE



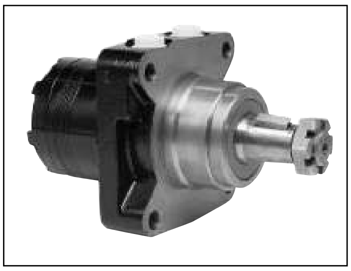
Series TJ



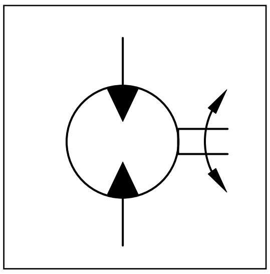
- **Moteur lent système Gerotor**
- **Une distribution orbitale particulière assure**
  fuites internes minimales
  rendements volumétriques élevés
- **Le rotor à rouleaux**
  réduit les frottements
  augmente la durée de vie
- **Par l`utilisation de joints d`arbre haute pression brevetés**
  pas de conduite de drainage
  pas de clapets anti-retour
- **Grâce à de nombreuses variantes**
  larges domaines d`applications

- **Motore orbitale a bassa velocità**
- **Una particolare distribuzione orbitale assicura**
  trafilamento ridotto elevato rendimento volumetrico
- **Con lo statore a rullo**
  si riduce l`attrito interno
  si mantiene nel tempo l`efficienza del motore
- **Una guarnizione di tenuta ad alta pressione brevettata elimina la necessità**
  di una linea di drenaggio esterna e di valvole non ritorno
- **Un`ampia gamma di cilindrate, flangiature ed alberi**
  consentono scelte adeguate ad ogni esigenza costruttiva

Drehzahl Speed Vitesse de rotation Velocità di rotazione	5...1160 rev/min
Schluckstrom Oil flow Débit d`huile Portata	max. 75 l/min
Eingangsdruck Supply pressure Pression entrée Pressione in entrata	max. 200 bar
Drehmoment Torque Couple Coppia	max. 550 Nm
Seitenlast Side load Charges latérales Carico radiale	TE = max. 7000 N TJ = max. 14000 N



Series TJ



Series TE

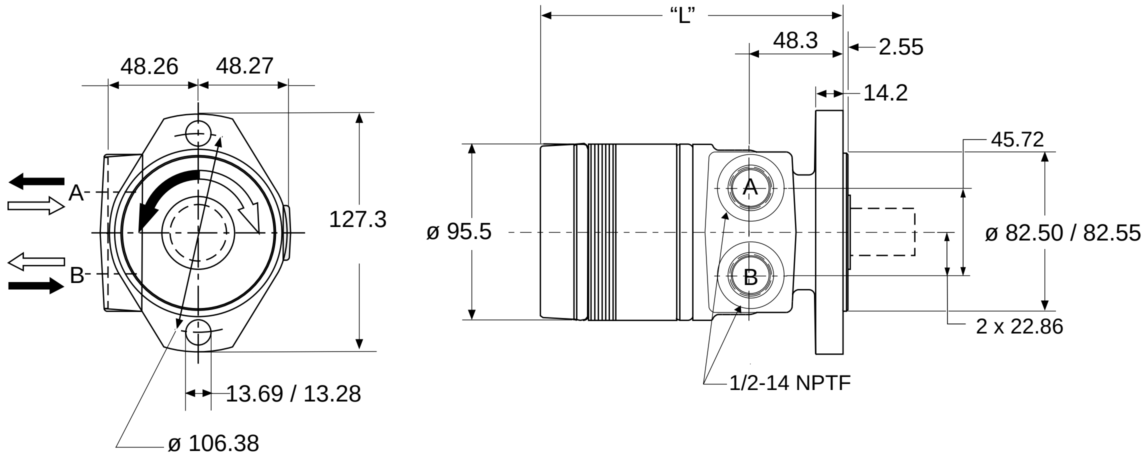
Motor series TE / TJ	Geom. Schluckvolumen Geometric displacement Cylindrée Cilindrata [cm³/U] [cm³/rev]	Max. Drehzahl Max. speed Vitesse de rotation maxi Velocità di rotazione max cont / int [U/min] [rev/min]	Max. Schluckstrom Max. oil flow Débit d`huile maxi Portata max cont / int [l/min]	Max. Druckdifferenz * Max. differential pressure * Chute de pression maxi * Caduta di pressione max * cont / int [bar]	Max. Eingangsdruck Max. supply pressure Pression maxi entrée Pressione max in entrata max [bar]	Max. Drehmoment Max. torque Couple maxi Coppia max cont / int [Nm]	Max. Leistungabgabe Max. performance Puissance de sortie maxi Potenza meccanica max cont / int [KW]	Min. Anlaufmoment Min. starting torque Couple min. fourni au dé manrage Coppia min. di spunto cont / int [Nm]
TE/TJ 36	36	930/1160	35/40	140/190	200	55/71	9	44/52
TE/TJ 45	41	810/1024	35/41	140/190	200	70/100	10	44/64
TE/TJ 50	50	725/1020	35/50	140/190	200	90/127	13	72/98
TE/TJ 65	66	705/940	45/60	140/190	200	125/176	15	100/137
TE/TJ 80	82	560/750	45/60	140/190	200	160/220	17	128/171
TE/TJ 100	98	470/630	45/60	140/190	200	190/264	17	152/205
TE/TJ 130	130	350/470	45/60	140/190	200	255/352	17	204/274
TE/TJ 165	163	280/375	45/60	140/190	200	310/436	17	248/338
TE/TJ 195	196	235/315	45/60	140/190	200	390/528	17	312/411
TE/TJ 230	228	265/330	60/75	120/165	200	380/514	18	304/411
TE/TJ 260	261	230/290	60/75	110/155	200	400/550	17	320/449
TE/TJ 295	293	200/255	60/75	100/145	200	428/582	16	328/445
TE/TJ 330	326	185/235	60/75	100/135	200	443/600	15	344/453
TE/TJ 365	370	150/200	60/75	95/125	200	467/648	14	373/477
TE/TJ 390	392	152/190	60/75	85/120	200	445/628	13	348/462

int. = Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

* Druckdifferenz Δp zwischen Ein- und Ausgang
* Pressure difference is Δp between input and output
* La différence de pression est Δp entre l'entrée et la sortie
* La differenza di pressione corrisponde al Δp tra ingresso e uscita

Achtung: Höhere Drücke auf Anfrage möglich.
Notice: Higher pressures are possible on request.
Remarque : des pressions supérieures sont possibles sur demande.
Nota: Pressioni superiori possibili su richiesta.

Code C



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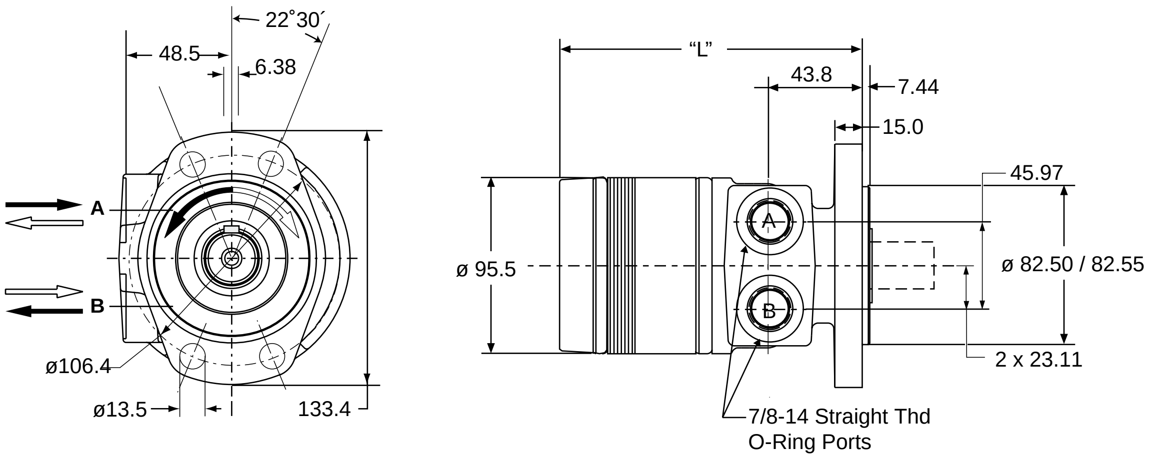
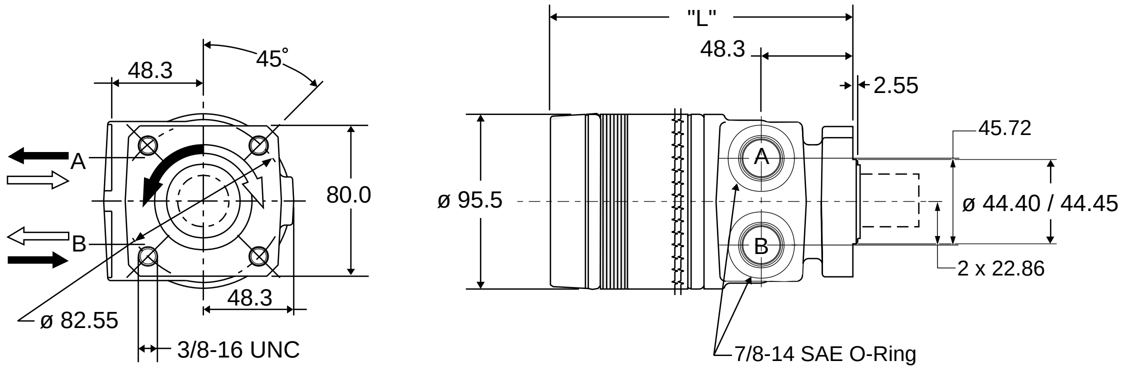
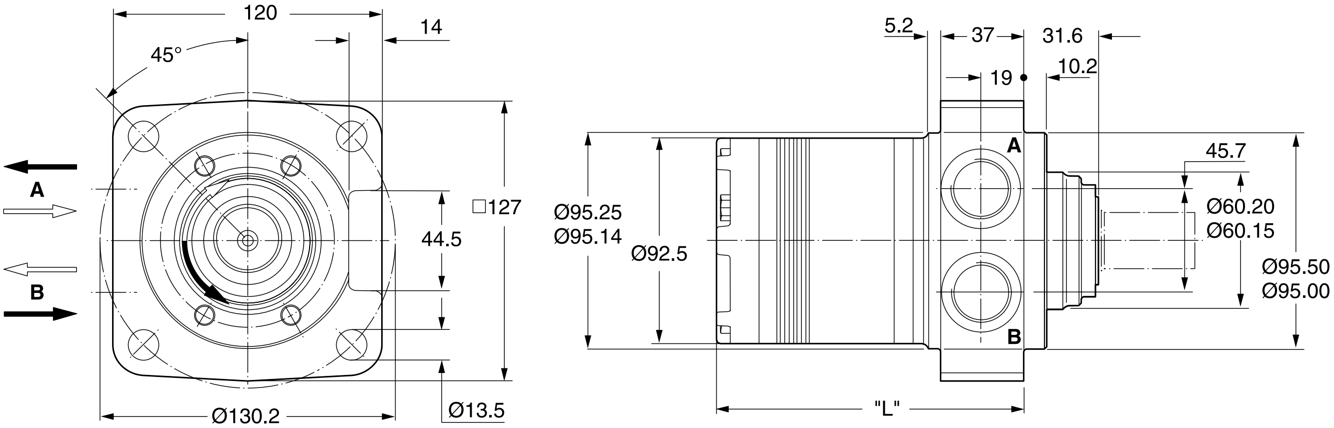


Code D

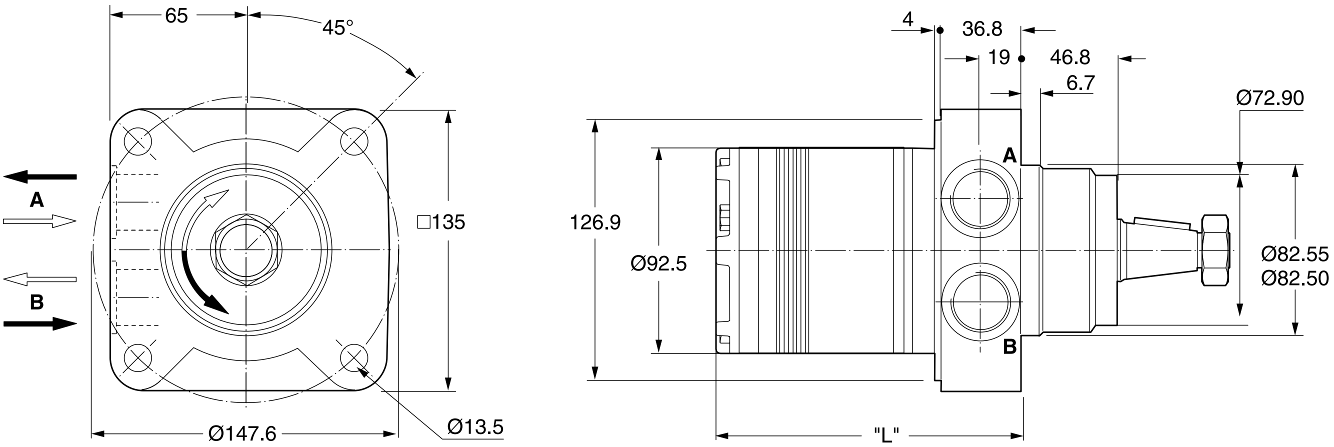


Gewicht / Weight		TE36	TE45	TE50	TE65	TE80	TE100	TE130	TE165	TE195	TE230	TE260	TE295	TE330	TE365	TE390
Poids	/ Peso [kg]	5,8	6,3	6,5	6,6	6,7	6,8	7,1	7,4	7,7	7,9	8,2	8,3	8,7	9,0	9,2
Code C	"L"[mm]	128	131	133	136	140	143	149	155	162	168	174	181	170	195	200
Code M, D	"L"[mm]	134	136	138	141	144	147	153	160	166	173	179	185	192	200	205

Code L

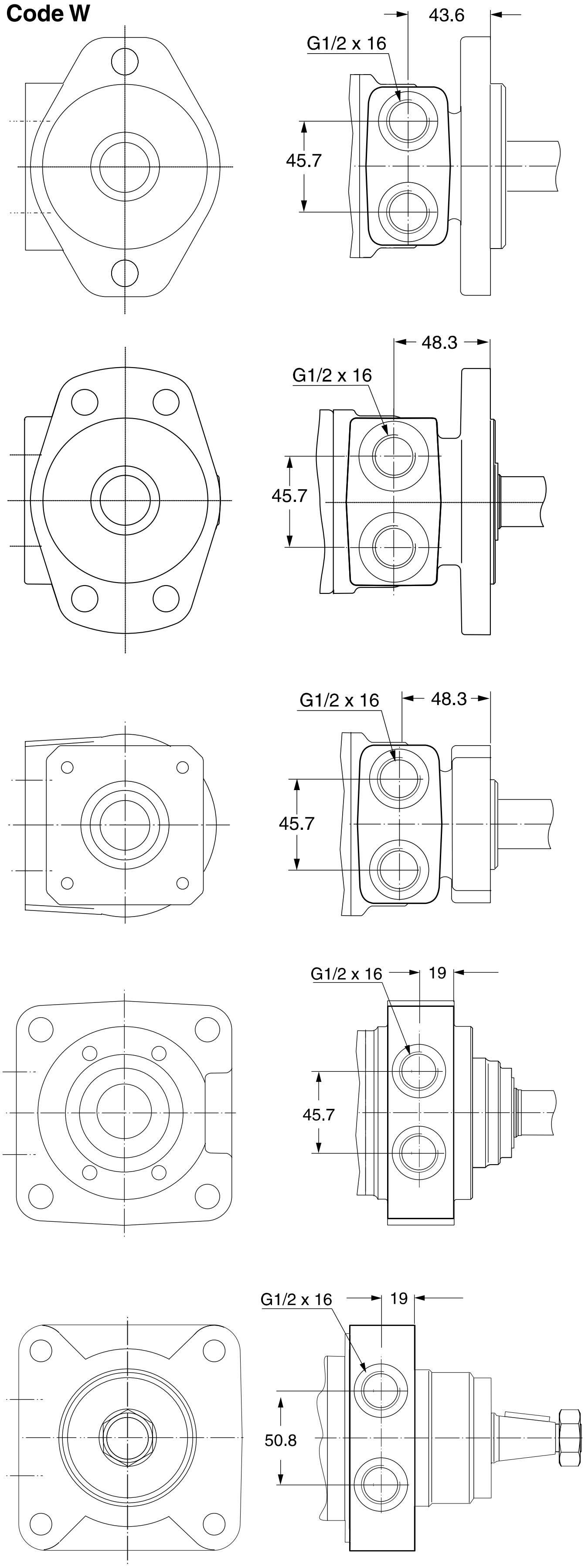


Code U

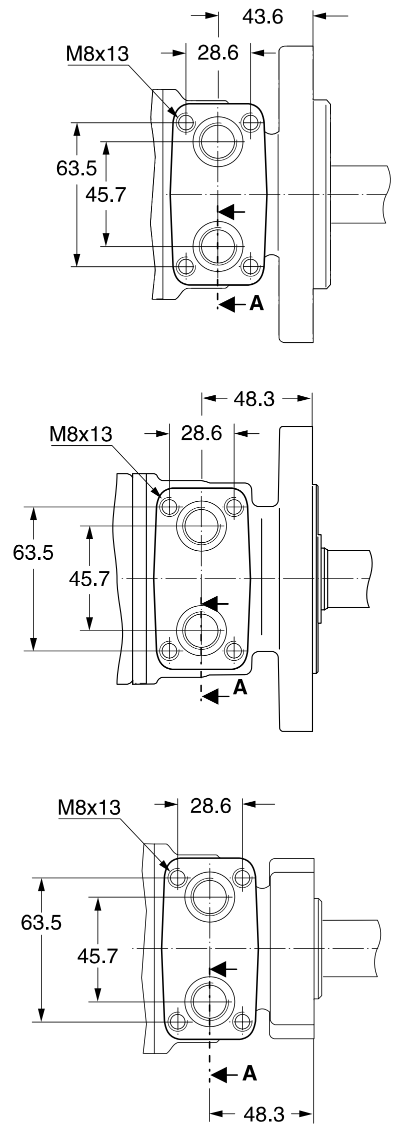


Gewicht	/ Weight	TJ36	TJ45	TJ50	TJ65	TJ80	TJ100	TJ130	TJ165	TJ195	TJ230	TJ260	TJ295	TJ330	TJ365	TJ390
Poids	/ Peso [kg]	6,7	6,8	6,9	7,0	7,1	7,2	7,6	7,8	8,1	8,3	8,6	8,8	9,1	9,4	9,6
Code L, U	"L"[mm]	103	106	109	112	115	118	124	131	137	143	150	156	162	171	175

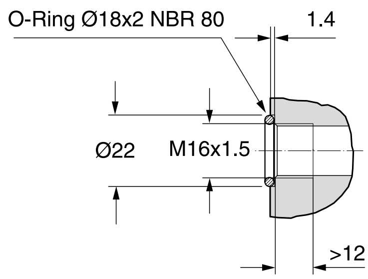
Code W



Code N



Section A



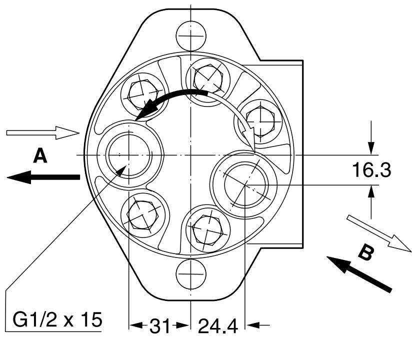
Zum Motor mit Universalanschluss werden 2 O-Ringe geliefert.

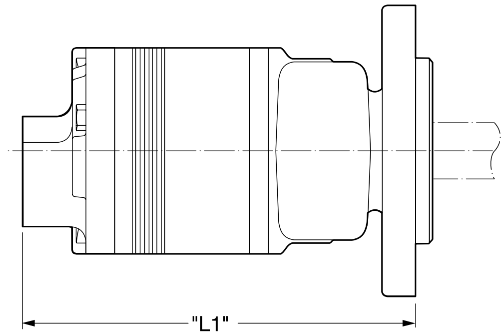
Motor with manifold mount is supplied with 2 O-rings.

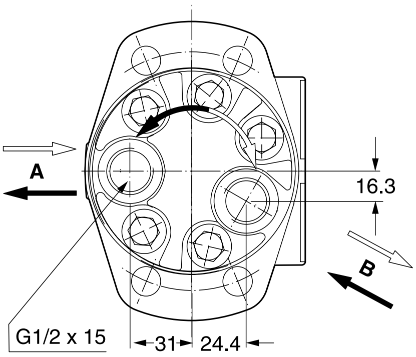
Deux joints toriques sont livrés avec les moteurs au plan de raccordement universel.

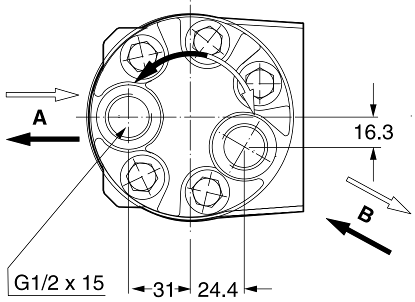
Il blocchetto connessioni è corredato da 2 OR.

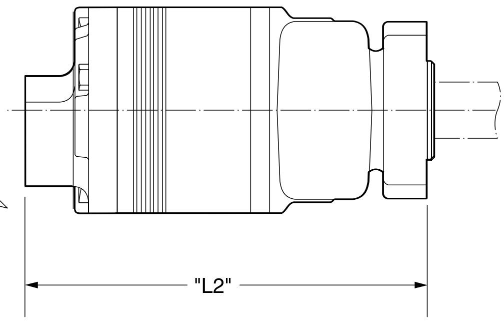
Code Y

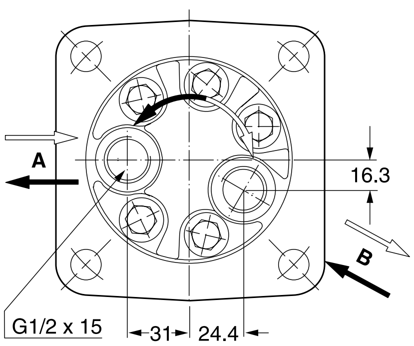


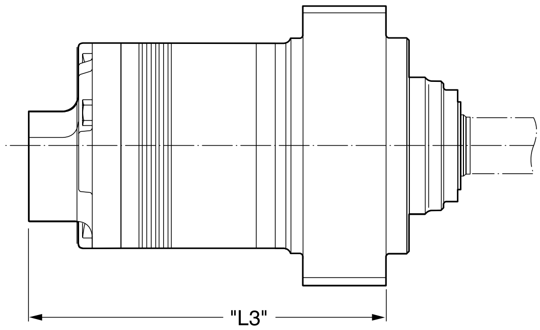






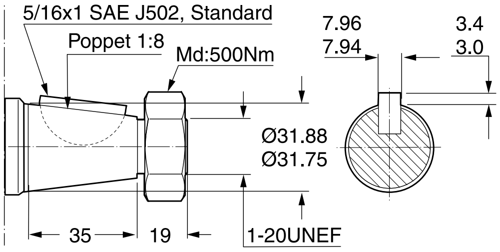




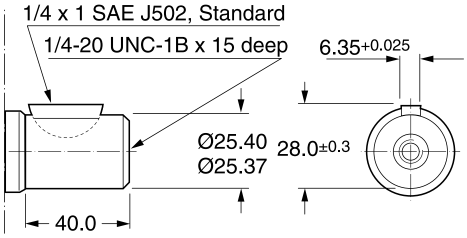


Gewicht / Weight		TE36	TE45	TE50	TE65	TE80	TE100	TE130	TE165	TE195	TE230	TE260	TE295	TE330	TE365	TE390
Poids / Peso [kg]		7,2	7,3	7,4	7,5	7,6	7,7	8,1	8,3	8,6	8,8	9,1	9,3	9,6	9,9	10,1
	"L1"[mm]	151	152	154	157	160	164	170	177	183	189	196	202	208	215,5	221
Code Y	"L2"[mm]	155	156	158	161	165	168	174	181	187	193	200	206	212	220	225
	"L3"[mm]	127	128	130	132	136	139	145	152	158	164	171	177	183	191	196

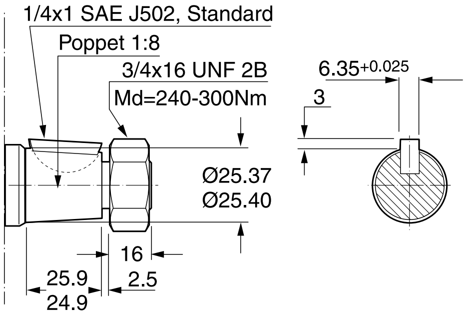
Code 08



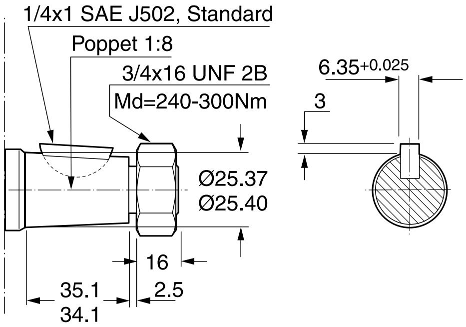
Code 10 3)



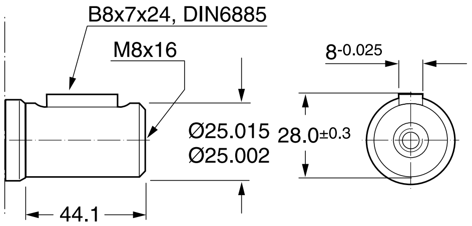
Code 12



Code 25



Code 26 2)



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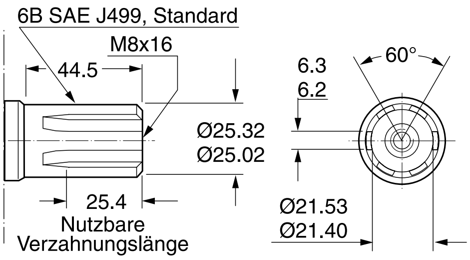
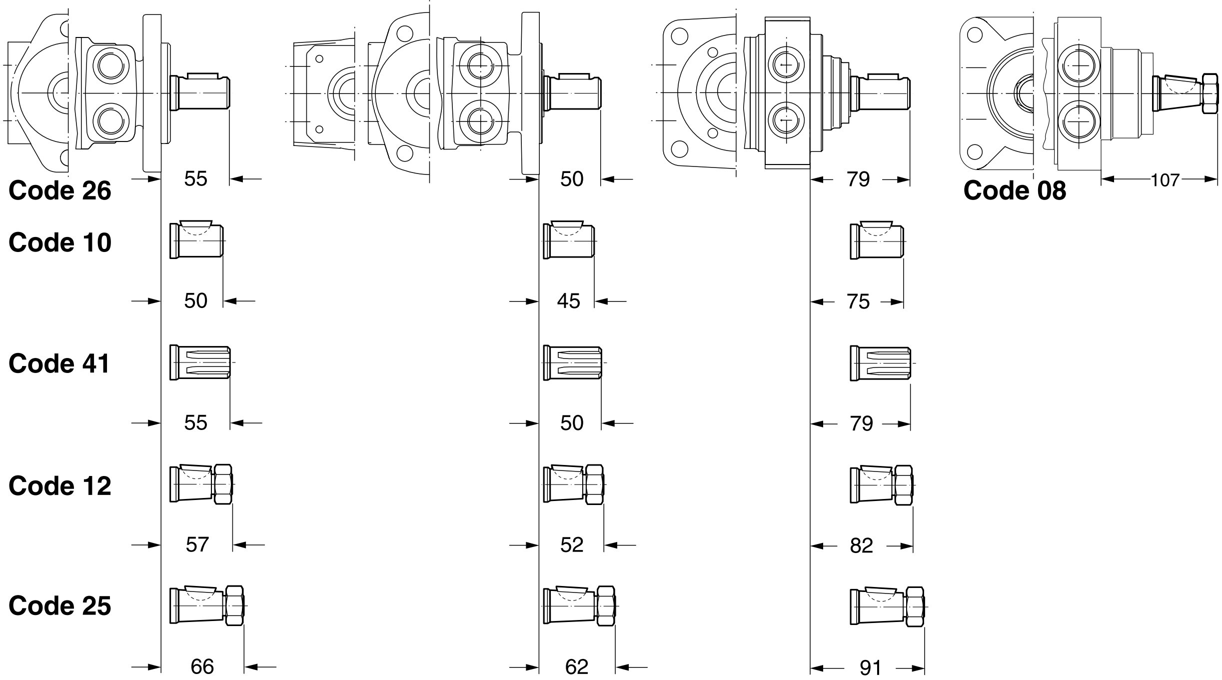
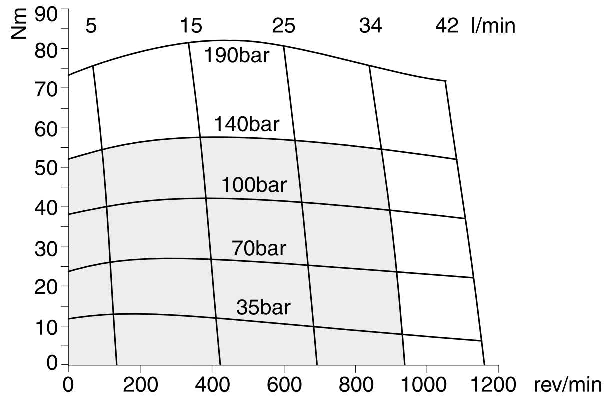


2) **Code 69** = Rostfreie Ausführung
Stainless steel version
Version en acier inoxydable
Versione in acciaio inossidabile
230 Nm (2100lb in) Max. Drehmomentt/
Max Torque/ Couple maxi/ Coppia max

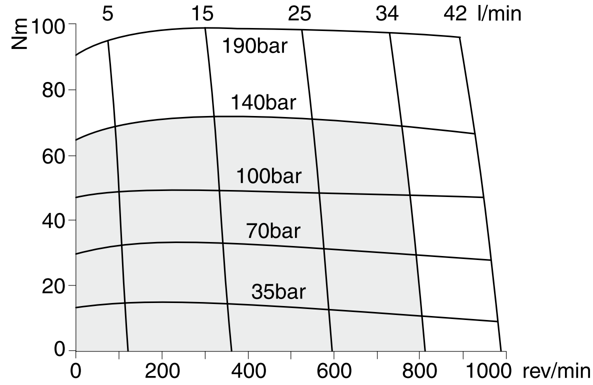
3) **Code 70** = 25,4 mm - Rostfreie Ausführung
25,4 mm - Stainless steel version
25,4 mm - Version en acier inoxydable
25,4 mm - Versione in acciaio inossidabile
230 Nm (2100lb in) Max. Drehmomentt/
Max Torque/ Couple maxi/ Coppia max



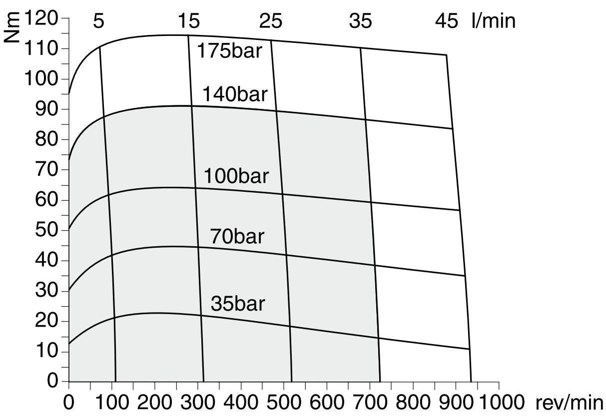
TE/TJ 36



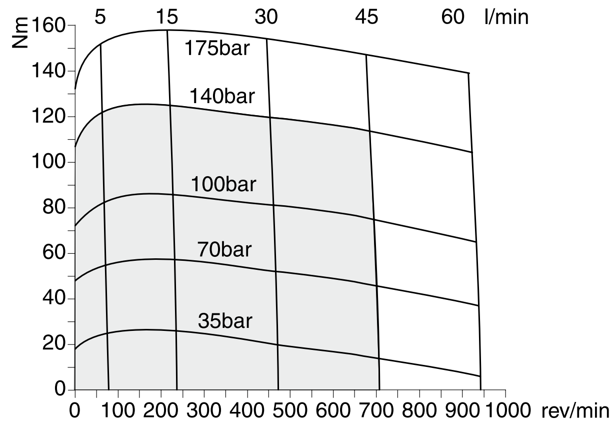
TE/TJ 45



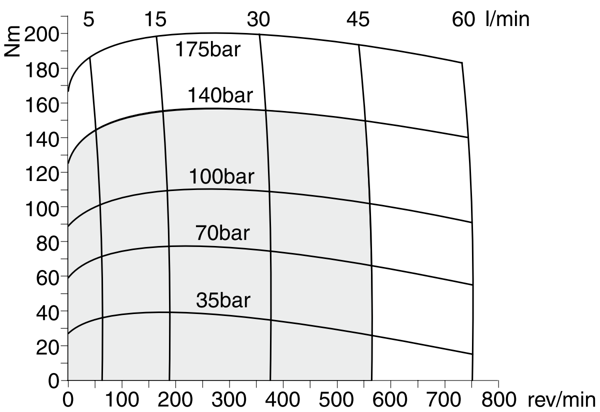
TE/TJ 50



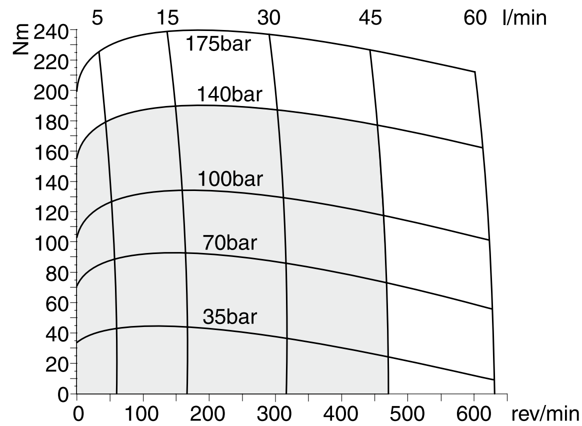
TE/TJ 65



TE/TJ 80



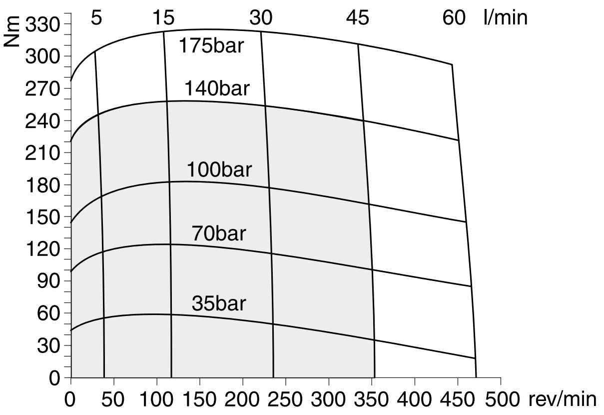
TE/TJ 100



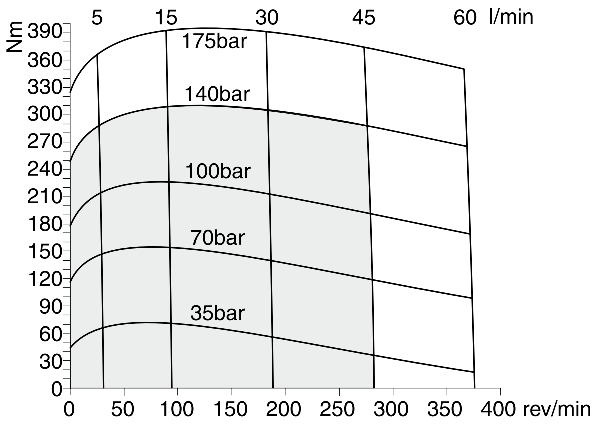
Cont. Int.

int. =
Intermittierende Werte maximal 10% von jeder Betriebsminute.
Fonctionnement interm. 10% max. de chaque minute d`utilisation.
Intermittent operation rating applies to 10% of every minute.
Servizio intermittente 10% max di ogni minuto di utilizzazione.

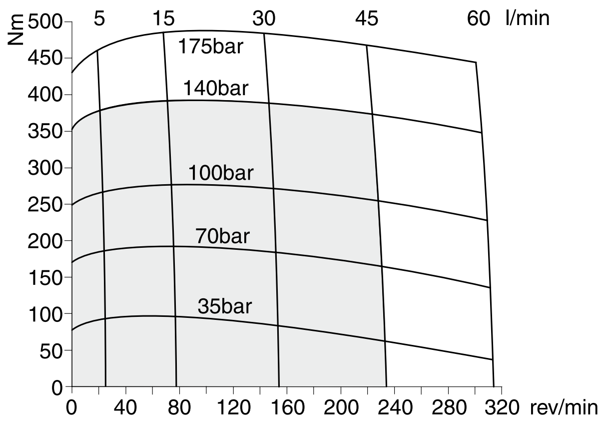
TE/TJ 130



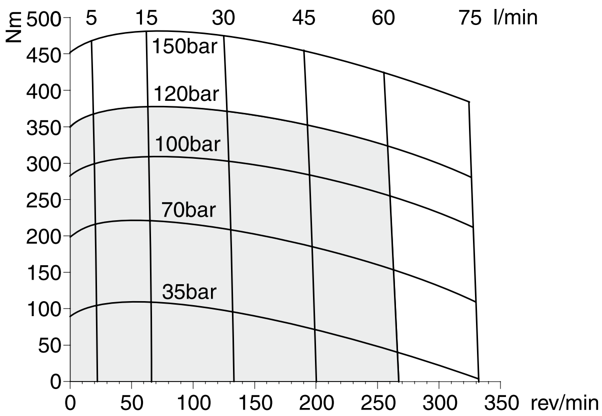
TE/TJ 165



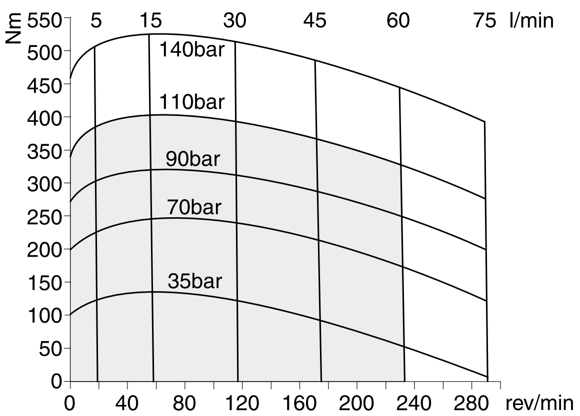
TE/TJ 195



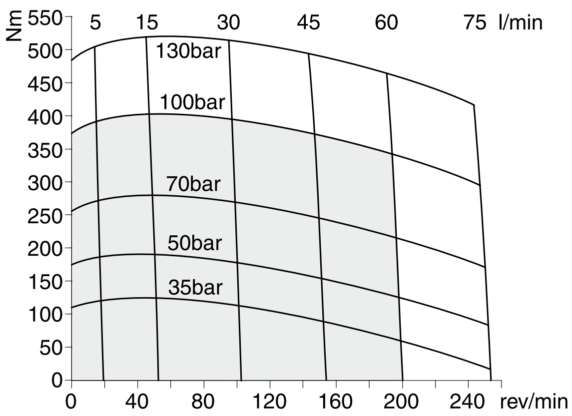
TE/TJ 230



TE/TJ 260



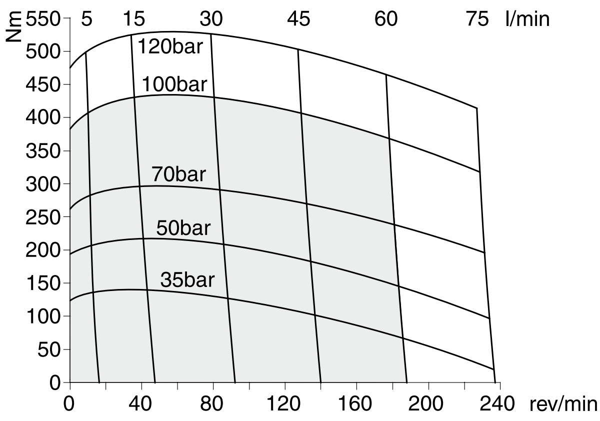
TE/TJ 295



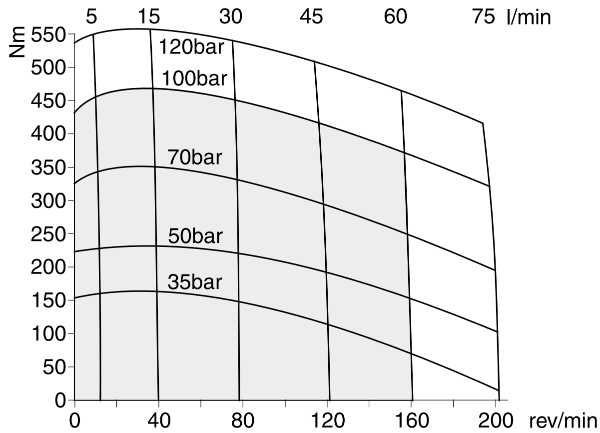
Cont. Int.

int. =
Intermittierende Werte maximal 10% von jeder Betriebsminute.
Fonctionnement interm. 10% max. de chaque minute d`utilisation.
Intermittent operation rating applies to 10% of every minute.
Servizio intermittente 10% max di ogni minuto di utilizzazione.

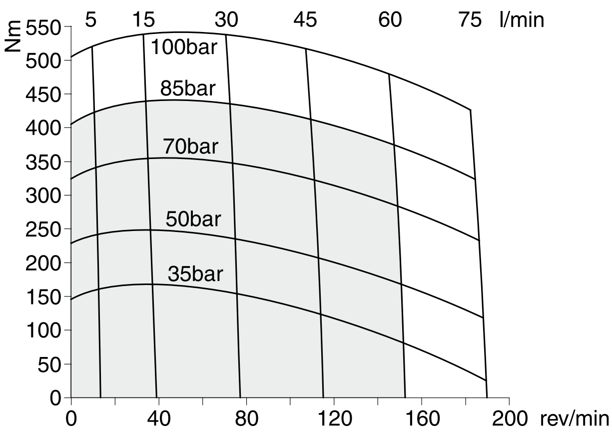
TE/TJ 330



TE/TJ 365



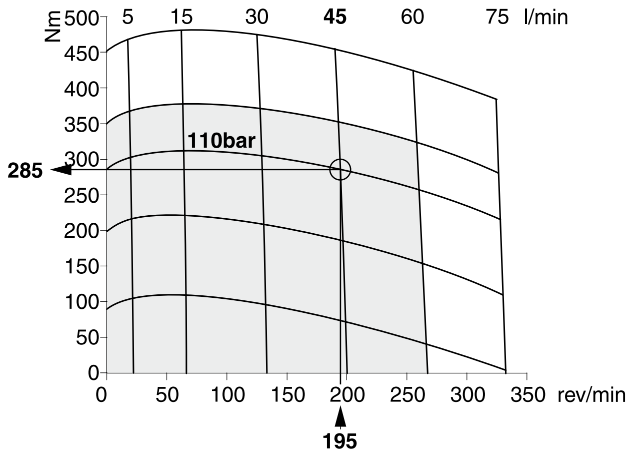
TE/TJ 390



☐ Cont. ☐ Int.

int. =
Intermittierende Werte maximal 10% von jeder Betriebsminute.
Fonctionnement interm. 10% max. de chaque minute d`utilisation.
Intermittent operation rating applies to 10% of every minute.
Servizio intermittente 10% max di ogni minuto di utilizzazione.

Beispiel / Example Series TE / TJ230



Md	=	285 Nm		V	=	229.4 cm^3/rev
n	=	195 rev/min		Q	=	45 l/min
Δp	=	110 bar				

Volumetrischer Wirkungsgrad (η_{vol})
Volumetric efficiency
Rendement volumétrique
Rendimento volumetrico

$$\eta_{vol} = \frac{n \cdot V}{Q \cdot 10^3} = \frac{195 \cdot 229.4}{45 \cdot 10^3}$$

$$\eta_{vol} = 0.99$$

Hydraulisch-mechanischer Wirkungsgrad (η_{hm})
Hydraulic-mechanical efficiency
Rendement hydro-mécanique
Rendimento idro-meccanico

$$\eta_{hm} = \frac{Md \cdot 20 \cdot \pi}{\Delta p \cdot V} = \frac{285 \cdot 20 \cdot \pi}{110 \cdot 229.4}$$

$$\eta_{hm} = 0.71$$

Gesamtwirkungsgrad (η_{ges})
Overall efficiency
Rendement global
Rendimento totale

$$\eta_{ges} = \eta_{vol} \cdot \eta_{hm} = 0,99 \cdot 0,71$$

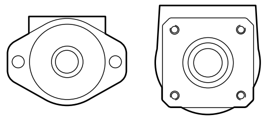
$$\eta_{ges} = 0.70$$

Leistung P (kW)
Power P
Puissance P
Potenza P

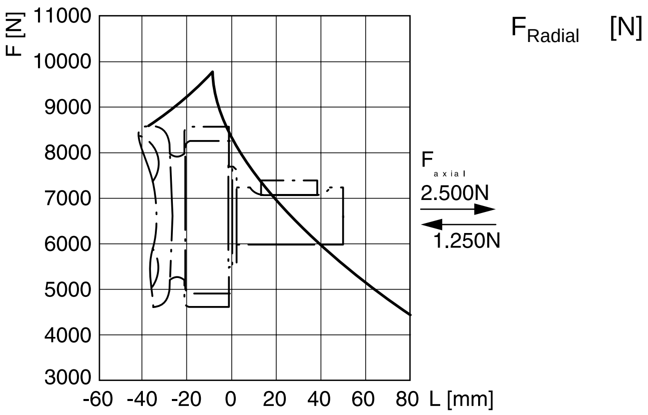
$$P = \frac{Md \cdot n \cdot \pi}{10^4 \cdot 3} = \frac{285 \cdot 195 \cdot \pi}{10^4 \cdot 3}$$

$$P = 5.8 \text{ kW}$$

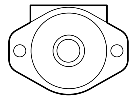
TE Code C/D



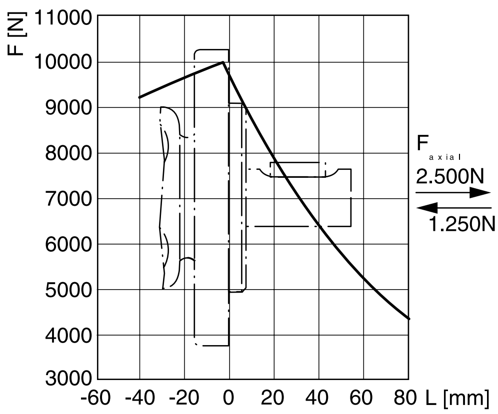
$$L_h = \frac{\left(\dfrac{357300}{F_R \cdot \left(1.161 + \dfrac{L}{62\,mm}\right)}\right)^{3.3}}{n}$$



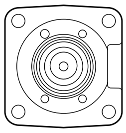
TE Code C



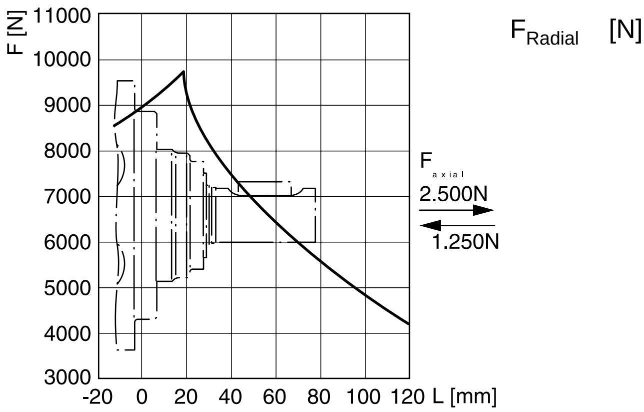
$$L_h = \frac{\left(\dfrac{357300}{F_R \cdot \left(1.076 + \dfrac{L}{62\,mm}\right)}\right)^{3.3}}{n}$$



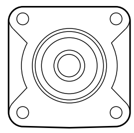
TE Code L



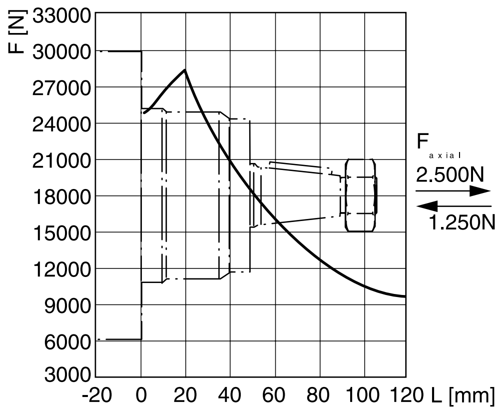
$$L_h = \frac{\left(\dfrac{357300}{F_R \cdot \left(0.69 + \dfrac{L}{62\,mm}\right)}\right)^{3.3}}{n}$$



TJ Code U



$$L_h = \frac{\left(\dfrac{840000}{F_R \cdot \left(0.57 + \dfrac{L}{71\,mm}\right)}\right)^{3.3}}{n}$$



Die Lebensdauer der Radiallager (L_h in Stunden) lässt sich nach folgender Formel berechnen. Die Größe F_R ist durch die mechanische Festigkeit der Abtriebswelle begrenzt (siehe Diagramm). Das Maß ”L” ist das Längenmaß vom Gehäuseflansch bis zum Angriffspunkt der Radialkraft F_R .

Life time (L_h in hours) of the radial bearings can be calculated with the following formula. The value F_R is limited by the mechanical strength of the shaft (see diagram). The measurement ”L” is the length from the housing flange up to the point of impact of the radial force F_R .

La durée de vie des roulements radiaux (L_h en heures) peut être calculée par les formules suivantes. La grandeur F_R est limitée par les résistances mécaniques de l`arbre de sortie (voir diagramme). La cote ”L” est la longueur entre la bride du carter jusqu`au point d`appui de l`effort radial F_R .

La durata dei cuscinetti (L_h in ore) può essere calcolata con la seguente formula. Il valore F_R è limitato dalla resistenza meccanica dell`albero (vedi diagramma). La quota ”L” è la distanza tra la flangia del corpo ed il punto di applicazione della forza radiale F_R .

Vorstehende Formeln gelten für eine B10-Lebensdauer.	L_h	=	**[h]**
The preceding formulas are valid for a B10 duration of life.	**L**	=	**[mm]**
Les formules précédentes sont valables pour une durée de vie B10.	**n**	=	**[rev/min]**
Le formule precedenti sono valide per una durata della vita B10.			

TE														

Series – TE

Schluckvolumen / Displacement / Cylindrée / Cilindrata

Gehäuse / Housing / Carter / Scatola motore

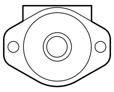
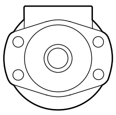
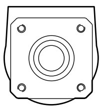
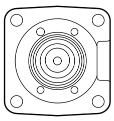
Anschluss / Ports / Plan de raccordement / Connessioni

Welle / Shaft / Arbre / Albero

Drehrichtung / Direction of rotation / Direction de rotation / Direzione di rotazione

Option

Code	cm³/rev
0036	36
0045	41
0050	50
0065	66
0080	82
0100	98
0130	130
0165	163
0195	196
0230	228
0260	261
0295	293
0330	326
0365	370
0390	392

Code	Housing
C	
M	
D	
L	

Code	Port
W	G 1/2
N [1]	universal port M8x13
Y	rear port G 1/2 axial

[1] Nicht verfügbar für Gehäuse L

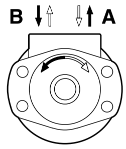
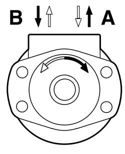
Not availble for housing code L

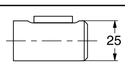
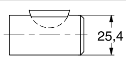
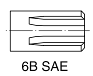
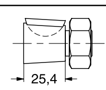
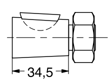
Pas disponible pour carter code L

Non Disponibile per Alloggiamento codice L

Code	Option
AAAB	standard
AANC	shuttle valve
BBCP [2]	internal relief valve 100 bar
BBCN [2]	internal relief valve 140 bar
HAAP	external relief valve 100 bar
HAAU	external relief valve 140 bar

[2] Nicht verfügbar für Anschluss Y
Not availble for port code Y
Pas disponible pour raccordement code Y
Non Disponibile per connessioni codice Y

Code	Direction
0	 Standard
1	

Code	Shaft
26 69[3]	
10 70[3]	
41	
12	
25	

[3] 230 Nm (2100lb in) Max. Drehmomentt/ Max Torque/ Couple maxi/ Coppia max

Ordering Code

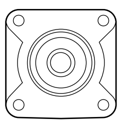
TJ | ☐☐☐☐ | ☐ | ☐ | ☐☐ | ☐ | ☐☐☐☐

Series

Schluckvolumen / Displacement / Cylindrée / Cilindrata

Code	cm^3/rev
0036	36
0045	41
0050	50
0065	66
0080	82
0100	98
0130	130
0165	163
0195	196
0230	228
0260	261
0295	293
0330	326
0365	370
0390	392

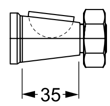
Gehäuse / Housing / Carter / Scatola motore

Code	Housing
U	

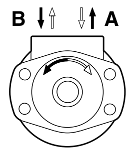
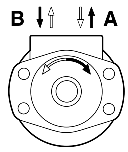
Anschluss / Ports / Plan de raccordement / Connessioni

Code	Port
W	G 1/2

Welle / Shaft / Arbre / Albero

Code	Shaft
08	

Drehrichtung / Direction of rotation / Direction de rotation / Direzione di rotazione

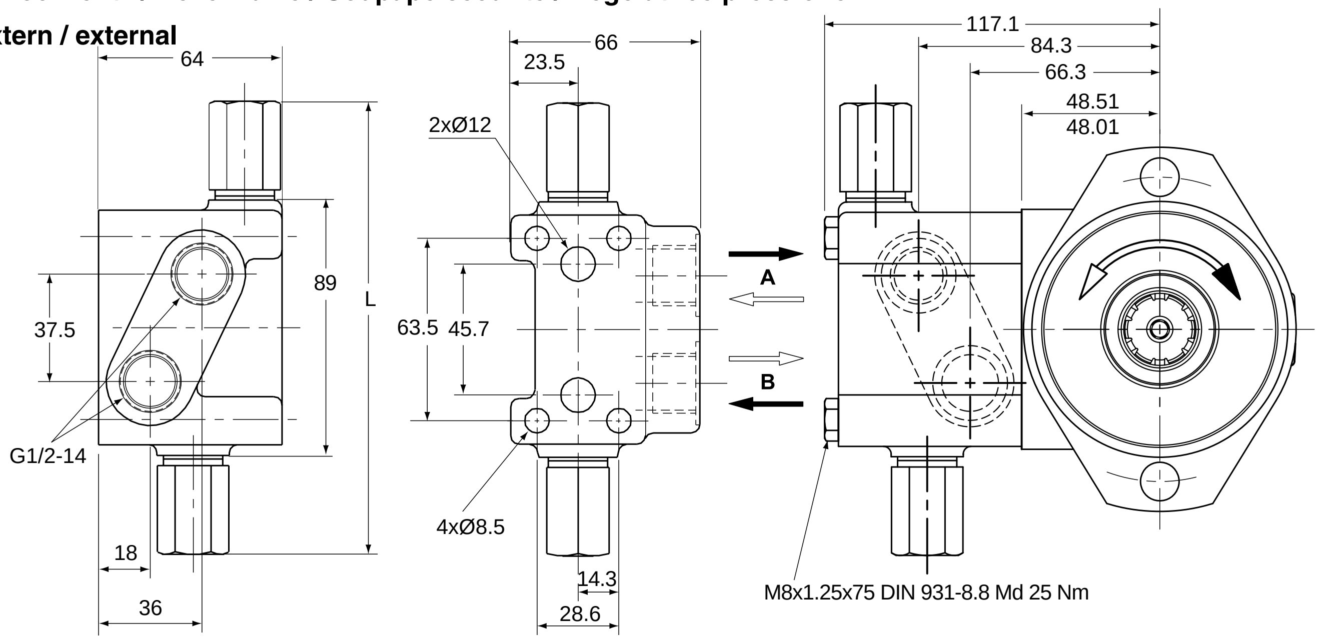
Code	Direction
0	 Standard
1	

Option

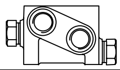
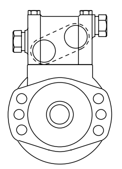
Code	Option
AAAB	Standard

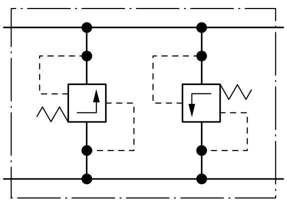
Schockventil / Relief valve / Soupape sécurité / Regolatrice pressione

Extern / external

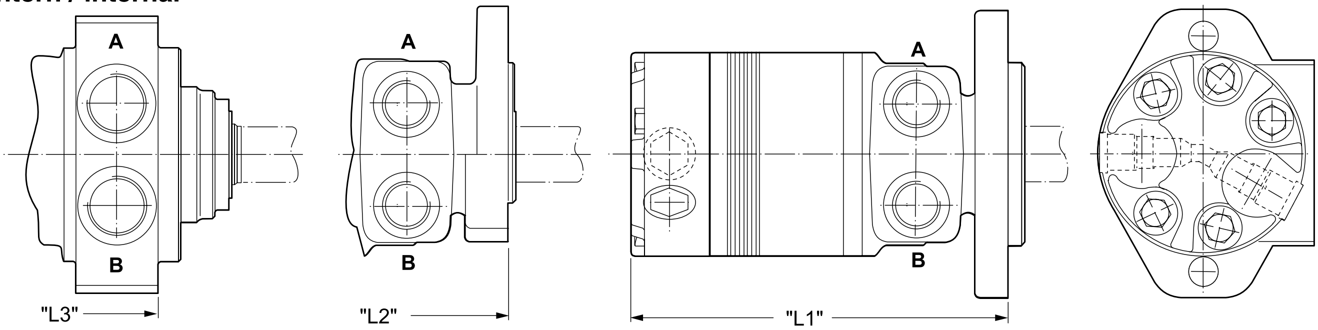


Bestellschlüssel / Ordering code / Système de commande / Sistema di ordinazione

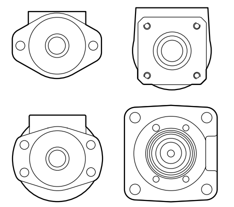
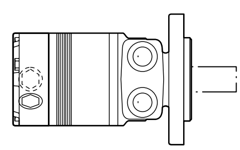
Option code	Shift pressure	Single valve 	Single part order no.	Option code		Length "L"
HAAP	100 bar	**Zubehör / Fixtures** 4 x M8 x 75mm 2 x O Ring	410017-100	**HAAP**		158 mm
HAAU	140 bar		410017-140	**HAAU**		158 mm

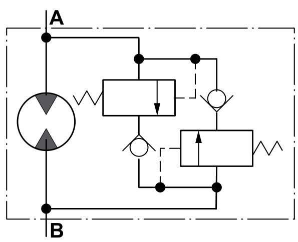


Intern / internal



Bestellschlüssel / Ordering code / Système de commande / Sistema di ordinazione

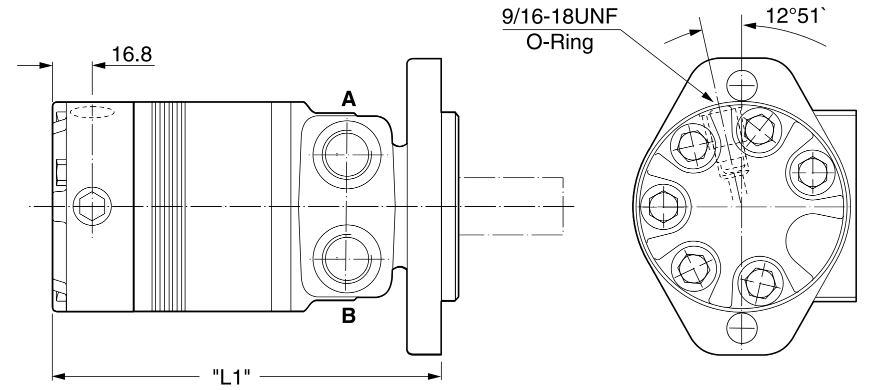
Option code			Shift pressure
BBCP			100 bar
BBCN			140 bar

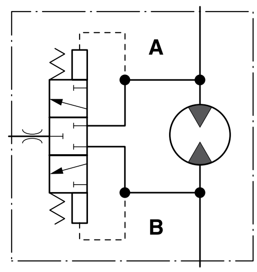


Ventilkurve auf Anfrage
Valve curve available on request
La courbe caractéristique de la vanne est disponible sur demande
Curva della valvola disponibile su richiesta

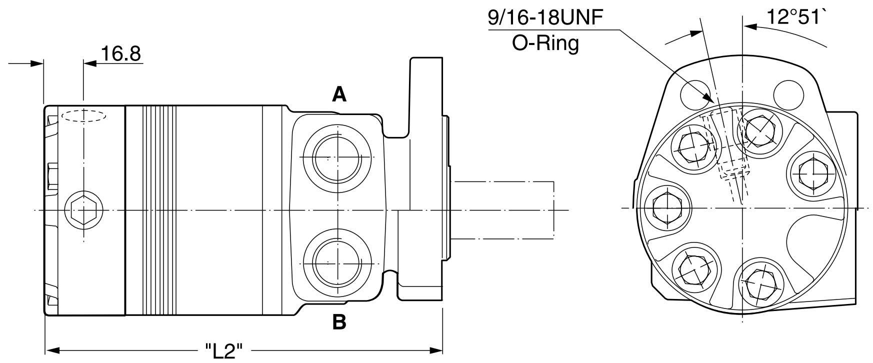
Gewicht / Weight		TE36	TE45	TE50	TE65	TE80	TE100	TE130	TE165	TE195	TE230	TE260	TE295	TE330	TE365	TE390
Poids /	Peso [kg]	7.8	7.9	8.0	8.1	8.2	8.3	8.6	8.9	9.2	9.4	9.7	9.8	10.2	10.5	10.7
Code	"L1" [mm]	157	159.8	161.8	164.8	168.2	171.2	177.5	183.9	190.2	196.6	202.9	209.3	215.6	223.8	228.
	"L2" [mm]	163	164.4	166.4	169.4	172.7	175.7	182.1	188.5	194.8	201.2	207.5	213.9	220.2	228.2	233.2
	"L3" [mm]	134	135.5	137.5	140.5	143.5	146.7	153.2	159.5	165.8	172.3	178.6	185.0	191.3	199.4	204.3

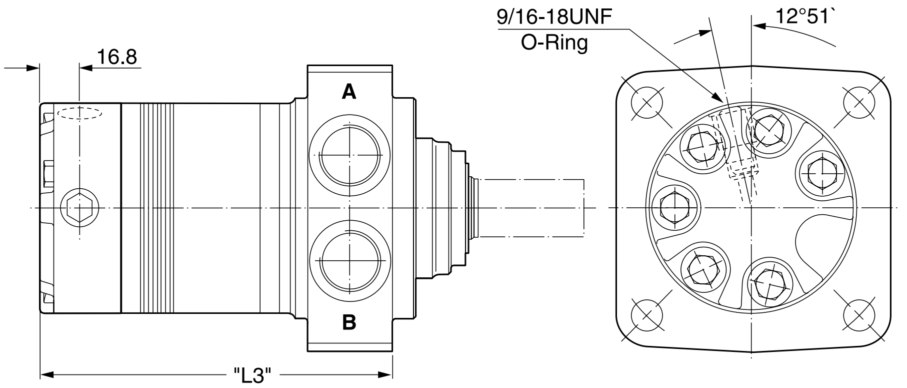
Code AANC





Q=5 l p=9 bar ϑ=39 mm²/s





Spülventil für geschlossene Systeme zur Rückführung einer definierten Menge des Niederdrucköls in den Tank zur Abkühlung innerhalb des Selben Kreislaufs.

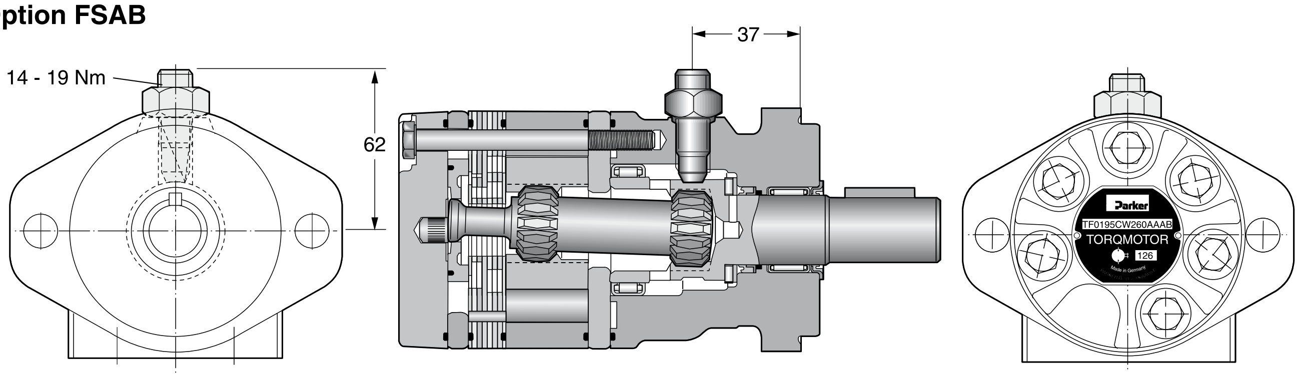
Hot oil shuttle valve allows for diverting of low pressure oil in closed loop applications to be returned to tank, cooler or filter for cooling in the same circuit.

Valve de rinçage pour systèmes fermes pour le retour d`un volume déterminé de fluide basse pression vers le réservoir, un refroidisseur ou un filtre de réfrigération, dans le même circuit.

Una valvola scambiatrice di calore permette di deviare olio a bassa pressione direttamente al serbatoio o allo scambiatore de calore consentendo, nelle applicazioni a circuito chiuso, un miglior raffreddamento dell`olio.

Gewicht / Weight		TE36	TE45	TE50	TE65	TE80	TE100	TE130	TE165	TE195	TE230	TE260	TE295	TE330	TE365	TE390
Poids /	Peso [kg]	7.4	7.5	7.6	7.7	7.8	7.9	8.3	8.5	8.8	9.0	9.3	9.5	9.8	10.0	10.3
Code	"L1" [mm]	149	150	152	155	158	161	168	174	180	187	193	199	206	214	219
	"L2" [mm]	153	154	156	159	162	166	172	178	184	191	197	203	210	218	222
	"L3" [mm]	124	125	127	130	134	137	143	150	156	162	168	175	181	189	194

Option FSAB



Der Sensor ist gegen Verpolung der Versorgungsspannung, jedoch nicht gegen Kurzschluss geschützt.

The sensor has reverse polarity protection but no short circuit protection.

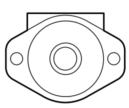
Le capteur est protégé contre l`inversion de polarité de la tension d`alimentation, mais pas contre les courts circuits.

Il sensore è protetto contro l' inversione della polarità della tensione di alimentazione, ma non contro il corto circuito.

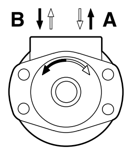
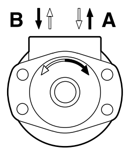
Ordering code

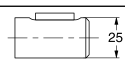
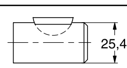
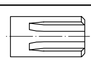
TE	☐☐☐☐	☐	☐	☐☐	☐	F S A B
Series	Schluckvolumen Displacement Cylindrée Cilindrata	Gehäuse Housing Carter Scatola motore	Anschluss Ports Plan de raccordement Connessioni	Welle Shaft Arbre Albero	Drehrichtung Direction of rotation Direction de rotation Direzione di rotazione	Option

Code	cm^3/rev
0036	36
0045	41
0050	50
0065	66
0080	82
0100	98
0130	130
0165	163
0195	196
0230	228
0260	261
0295	293
0330	326
0365	370
0390	392

Code	Housing
C	

Code	Port
W	G 1/2
N	universal port M8x13
Y	rear port G 1/2 axial

Code	Direction
0	 Standard
1	

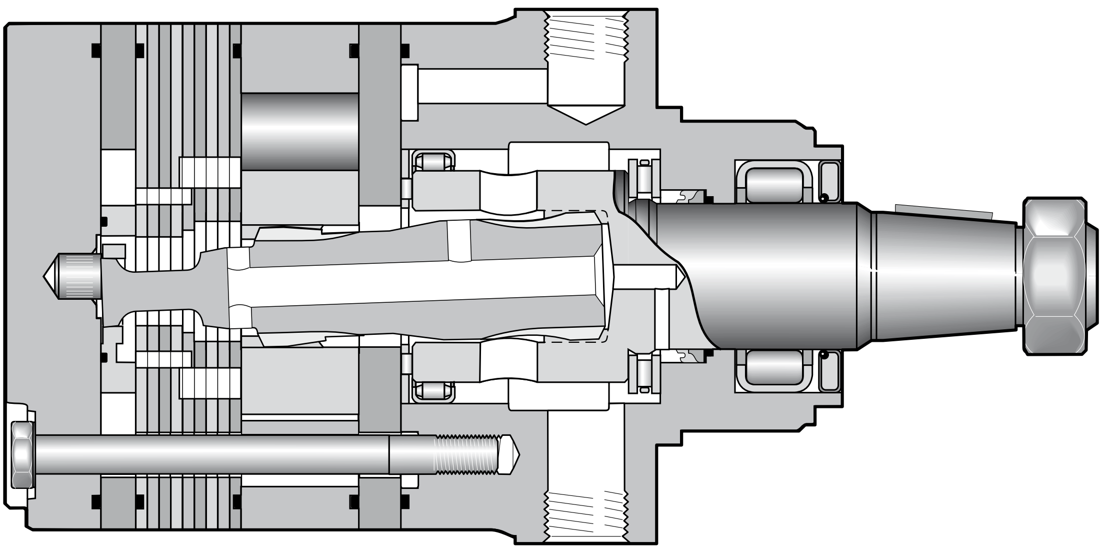
Code	Shaft
26	
10	
41	 6B SAE

- **Langsamlaufender Gerotor-Motor**
- **Spezielle Orbital-Steuerung**
  Geringe interne Leckage
  Hoher volumetrischer Wirkungsgrad
- **Rollen im Rotorsatz**
  Reduzierte Reibung
  Lange Lebensdauer
- **Patentierte Hochdruckwellendichtung**
  Keine Leckölleitung
  Keine Rückschlagventile
- **Vielzahl von Varianten**
  Großer Einsatzbereich

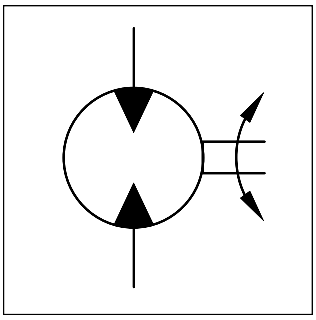
- **Low Speed Gerotor Motor**
- **Zero leak commutation valve**
  For greater, more consistent
  volumetric efficiency
- **Roller vane rotor set**
  Reduces friction and internal leakage
  Maintaining efficiency throughout
  the life of the motor
- **A patented high-pressure shaft seal**
  No check valves needed
  No extra plumbing
- **Wide choice of displacement range, flange and shaft options**
  Greater efficiency in systems design
  to suit your application

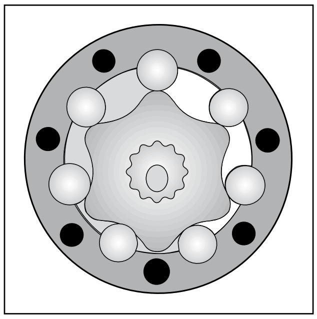
- **Moteur lent système Gerotor**
- **Une distribution orbitale particulière assure**
  fuites internes minimales
  rendements volumétriques élevés
- **Le rotor à rouleaux**
  réduit les frottements
  augmente la durée de vié
- **Par l`utilisation de joints d`arbre haute pression brevetés**
  pas de conduite de drainage
  pas de clapets anti-retour
- **Grâce à de nombreuses variantes**
  larges domaines d`application

- **Motore orbitale a bassa velocità**
- **Una particolare distribuzione orbitale assicura**
  trafilamento ridotto
  elevato rendimento volumetrico
- **Con lo statore a rullini**
  si riduce l`attrito interno
  si mantiene nel tempo l`efficienza del motore
- **Una guarnizione di tenuta ad alta pressione brevettata elimina la necessità**
  di una linea di drenaggio esterna
  e di valvole di non ritorno
- **Un`ampia gamma di cilindrate, flange ed alberi**
  consentono scelte adeguate ad
  ogni esigenza costruttiva



Drehzahl Speed Vitesse de rotation Velocità di rotazione	5...750 rev/min
Schluckstrom Oil flow Débit d`huile Portata	max. 100 l/min
Eingangsdruck Supply pressure Pression entrée Pressione in entrata	max. 300 bar
Drehmoment Torque Couple Coppia	max. 900 Nm
Seitenlast Side load Charges latérales Carico radiale	max. 16.000 N





	Geom. Schluckvolumen Geometric displacement Cylindrée Cilindrata	Max. Drehzahl Max. speed Vitesse de rotation maxi Velocità di rotazione max	Max. Schluckstrom Max. oil flow Débit d`huile maxi Portata max	Max. Druckdifferenz * Max. differential pressure * Chute de pression maxi * Caduta di pressione max *	Max. Eingangsdruck Max. supply pressure Pression maxi entrée Pressione max in entrata	Max. Drehmoment Max. torque Couple maxi Coppia max	Max. Leistungabgabe Max. performance Puissance de sortie maxi Potenza meccanica max	Min. Anlaufmoment Min. starting torque Couple min. fourni au dé manrage Coppia min. di spunto
Motor series TF	**[cm^3/U] [cm^3/rev]**	**cont / int [U/min] [rev/min]**	**cont / int [l/min]**	**cont / int [bar]**	**max [bar]**	**cont / int [Nm]**	**cont / int [KW]**	**cont / int [Nm]**
TF 80	81	550/730	45/60	210/280	300	220/295	22	172/236
TF 100	100	600/750	60/75	160/240	300	200/320	25	168/252
TF 130	128	470/580	60/75	140/210	300	230/360	22	192/280
TF 140	141	370/530	60/75	140/210	300	250/390	22	197/308
TF 170	169	355/440	60/75	140/210	300	320/490	23	264/388
TF 195	197	300/380	60/75	140/210	300	365/560	22	304/448
TF 240	238	320/420	75/100	140/210	300	430/670	28	368/548
TF 280	280	270/350	75/100	140/210	300	550/800	28	440/672
TF 360	364	200/260	75/100	130/190	300	590/910	24	517/779
TF 405	405	170/230	75/100	130/175	300	660/920	22	575/789
TF 475	477	150/200	75/100	115/140	300	680/850	17	603/740

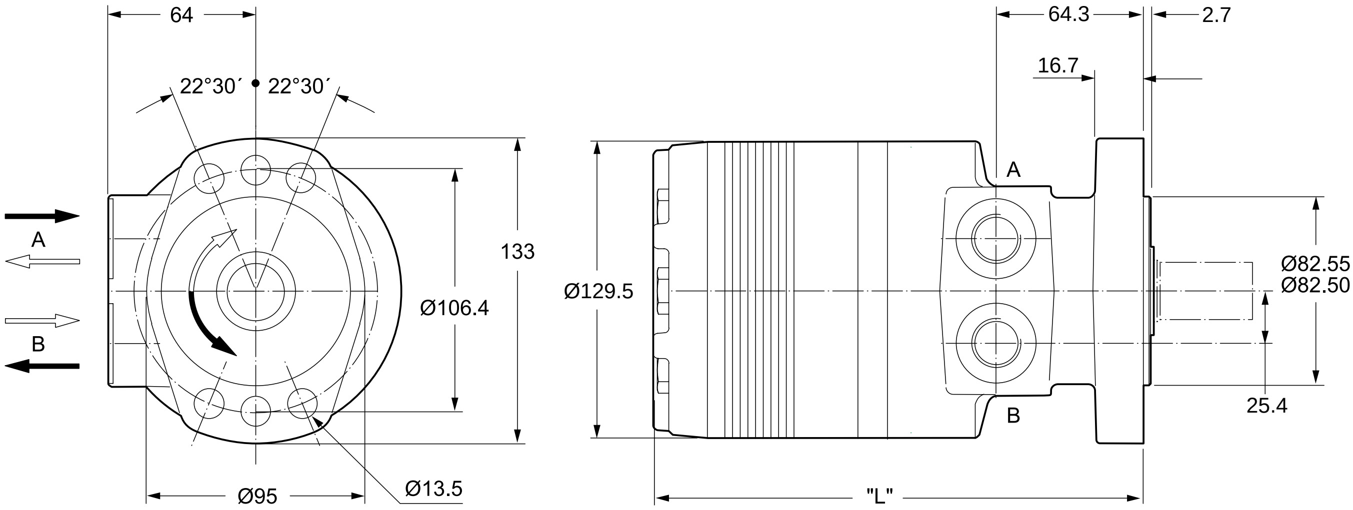
int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

* Druckdifferenz Δp zwischen Ein- und Ausgang
* Pressure difference is Δp between input and output
* La différence de pression est Δp entre l'entrée et la sortie
* La differenza di pressione corrisponde al Δp tra ingresso e uscita

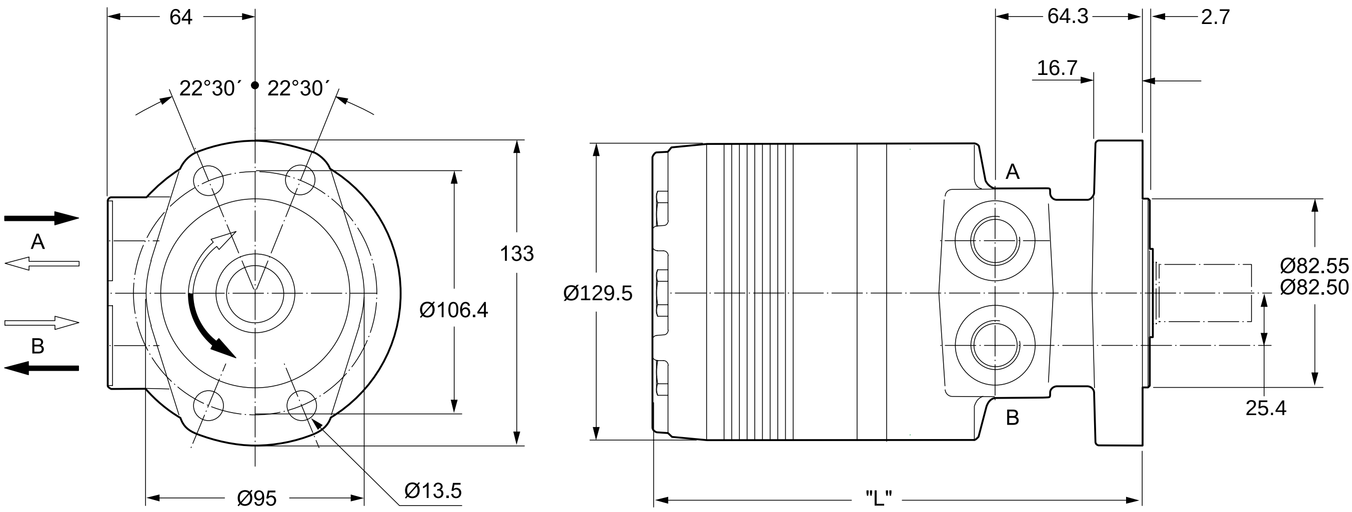
Achtung: Höhere Drücke auf Anfrage möglich.
Notice: Higher pressures are possible on request.
Remarque : des pressions supérieures sont possibles sur demande.
Nota: Pressioni superiori possibili su richiesta.

* Druckdifferenz ist Δp zwischen Ein- und Ausgang
Notice: Höhere Drücke auf Anfrage möglich.

Code E

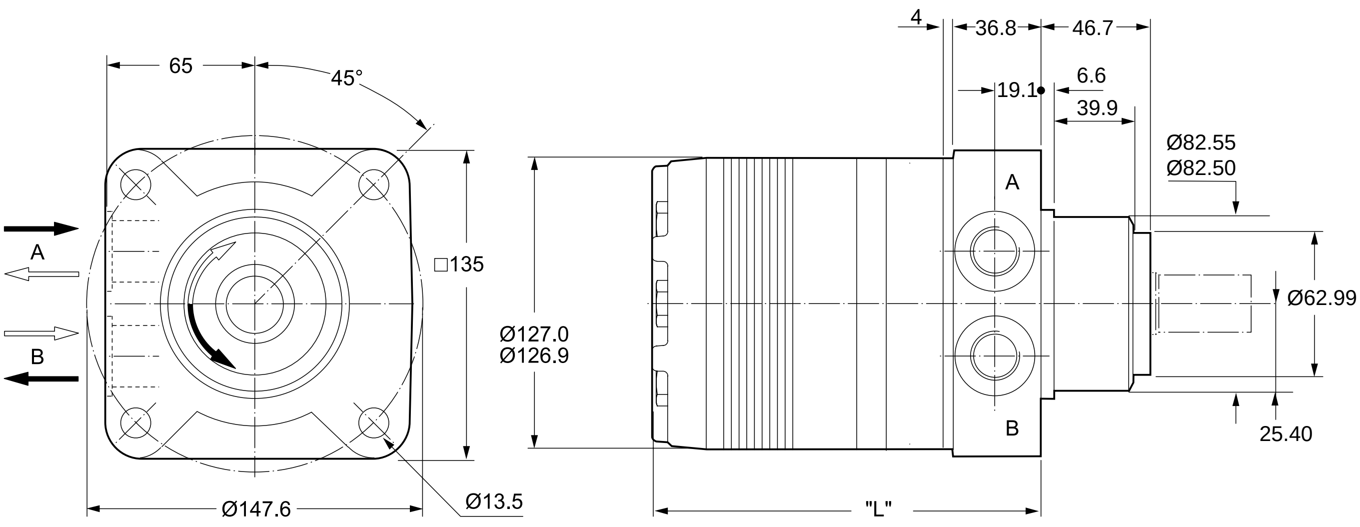


Code M

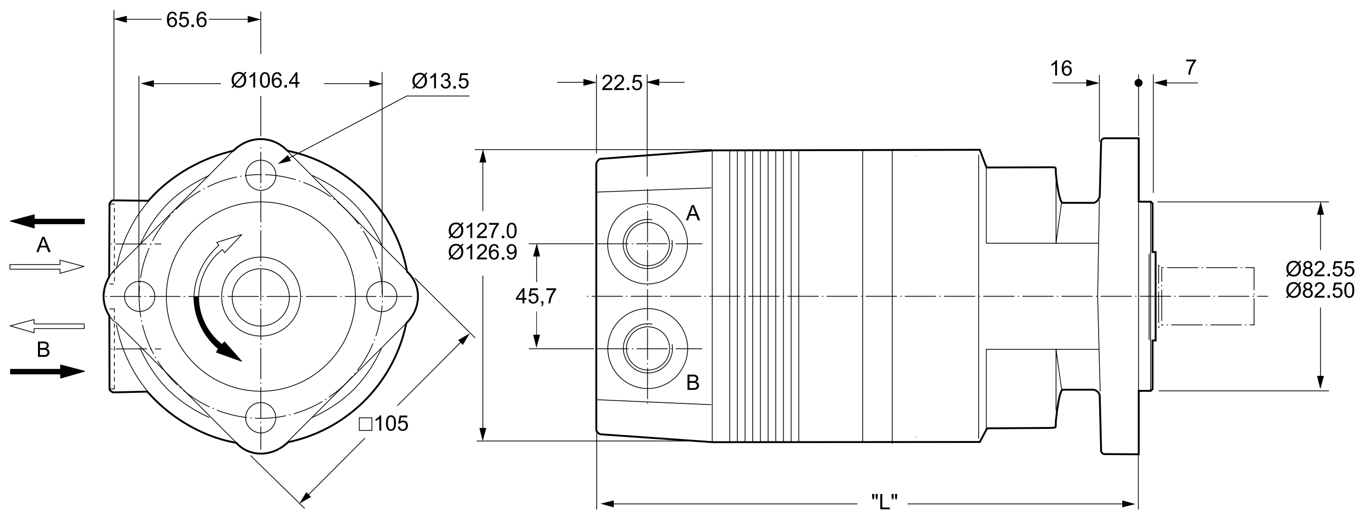


Gewicht /	Weight	TF80	TF100	TF130	TF140	TF170	TF195	TF240	TF280	TF360	TF405	TF475
Poids /	Peso [kg]	13.6	13.7	13.9	14.0	14.2	14.7	15.0	15.5	16.0	16.5	17.5
Code E	”L” [mm]	186	186	189	191	194	197	202	206	215	220	229
Code M	”L” [mm]	191	191	194	196	199	202	207	212	220	225	234

Code H

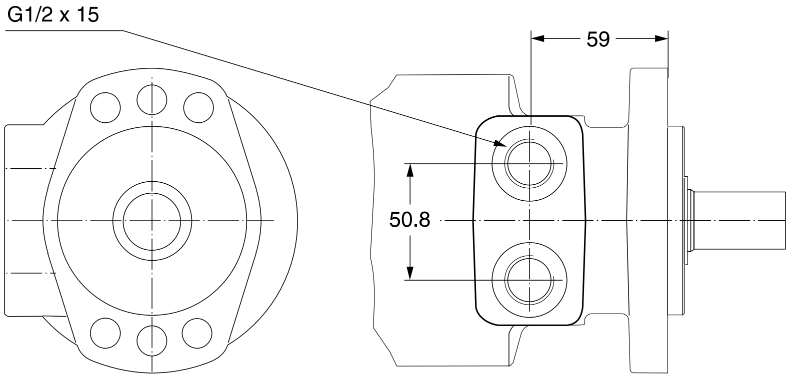


Code V

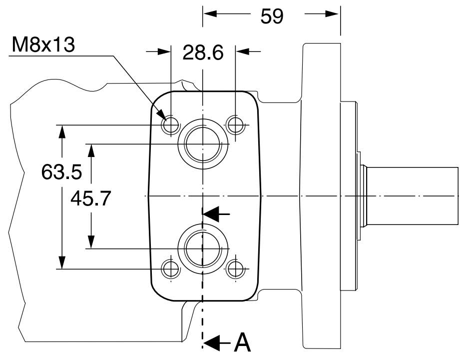


Gewicht / Weight		TF80	TF100	TF130	TF140	TF170	TF195	TF240	TF280	TF360	TF405	TF475
Poids / Peso [kg]		14.0	14.0	14.2	14.3	14.6	14.9	15.3	15.6	16.3	17.0	17.5
Code H	"L" [mm]	146	146	149	151	154	157	162	167	175	180	189
Code V	"L" [mm]	213	213	216	218	221	224	229	233	242	247	256

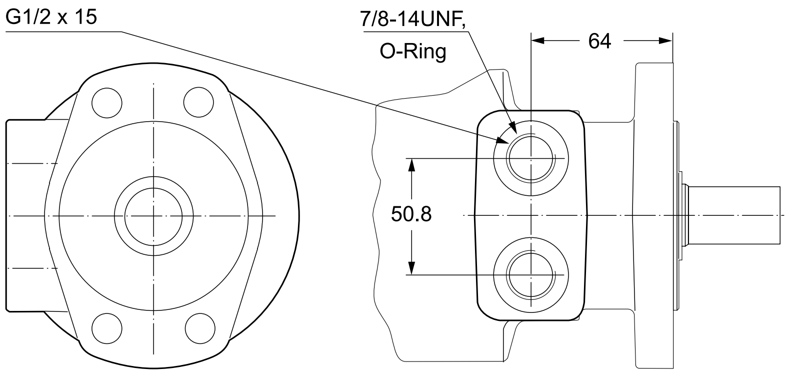
Code W



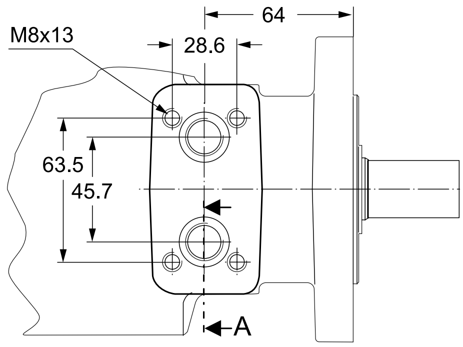
Code N



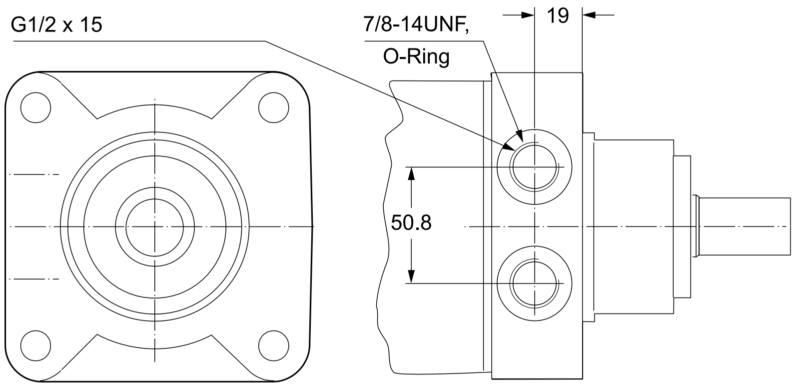
Code W **Code V**



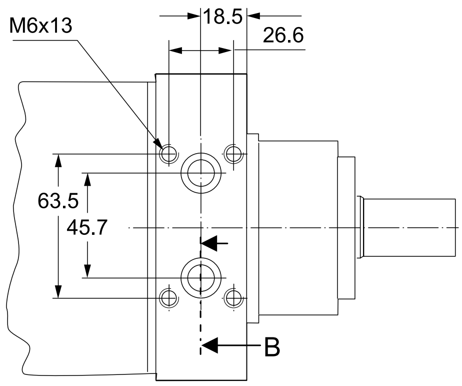
Code N



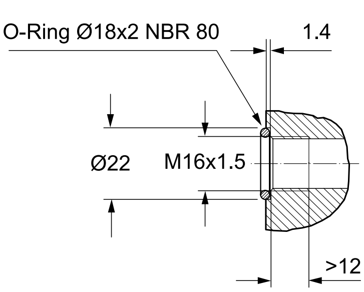
Code W **Code V**



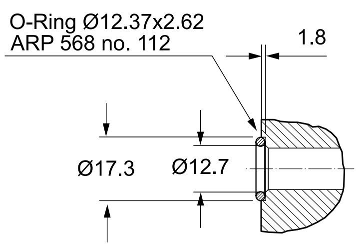
Code K



Section A



Section B



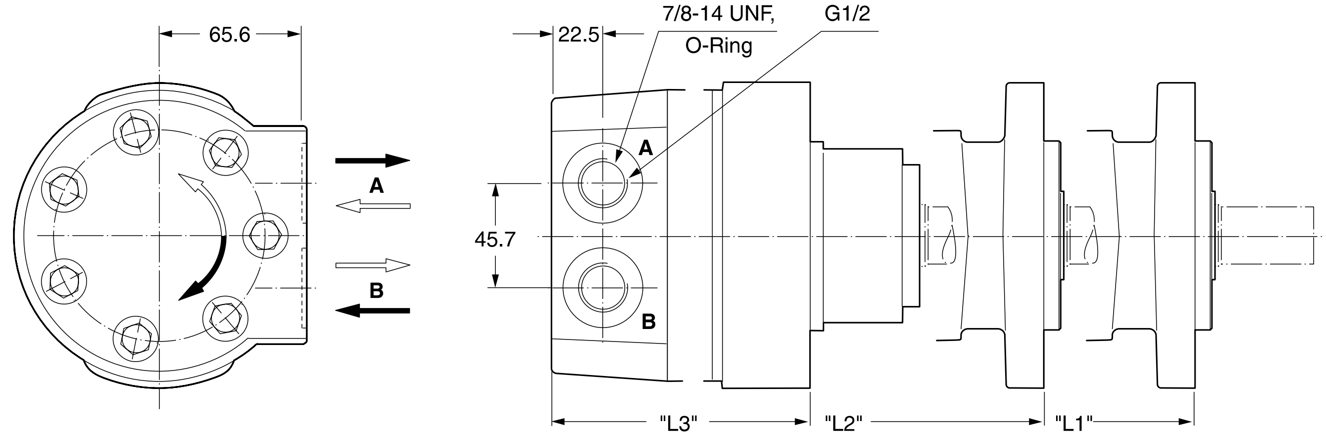
Zum Motor mit Universalanschluss werden 2 O-Ringe geliefert.

Motor with manifold mount is supplied with 2 O-rings.

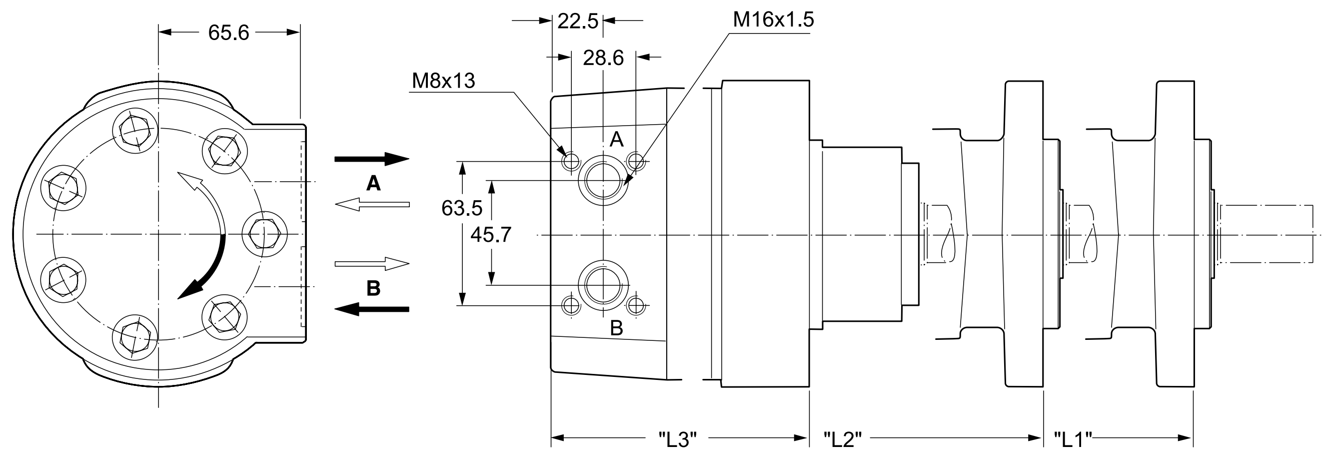
Deux joints toriques sont livrés avec les moteurs au plan de raccordement universel.

Il blocchetto connessioni è corredato da 2 OR.

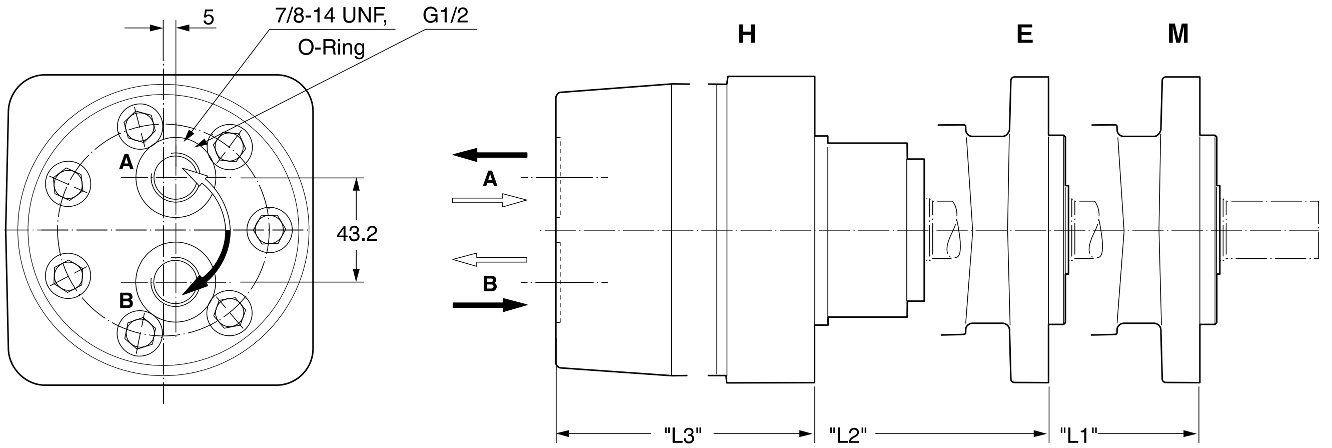
Code B 7/8-14UNF **Code X** G 1/2



Code L

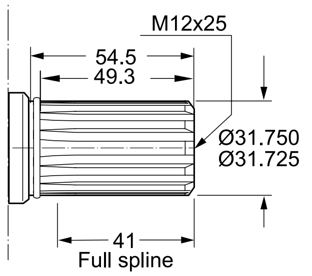


Code A 7/8-14UNF **Code Y** G 1/2



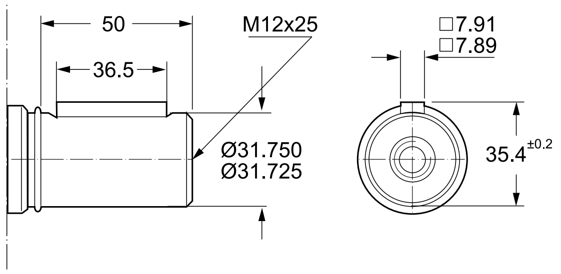
Gewicht /	Weight	TF 80	TF100	TF130	TF140	TF170	TF195	TF240	TF280	TF360	TF405	TF475
Poids /	Peso [kg]	15,3	15,4	15,6	15,7	16,0	16,3	16,7	17,0	17,8	18,3	19,0
Code B,	"L1"[mm]	211	211	214	216	219	222	227	231	240	245	254
A, X, Y,	"L2"[mm]	216	216	219	221	224	227	232	236	246	250	259
L	"L3"[mm]	170	170	173	175	178	181	186	191	201	205	213

Code 44

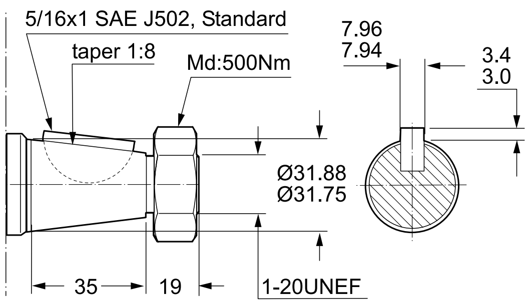


Involute spline
ANS B92.1-1970 Standard
Flat root side fit
Pitch 12/24
Teeth 14
Major diam. 1.25 in
Pressure angle 30°

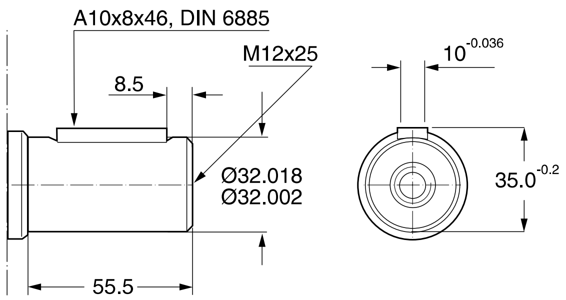
Code 45



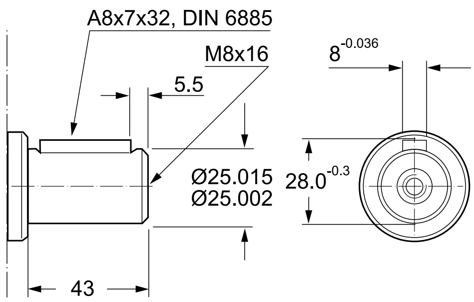
Code 08



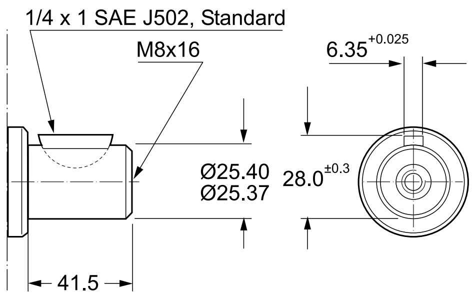
Code 46



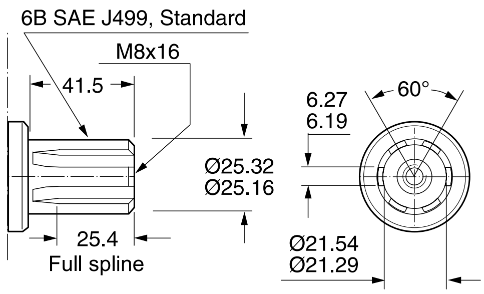
Code 26



Code 47

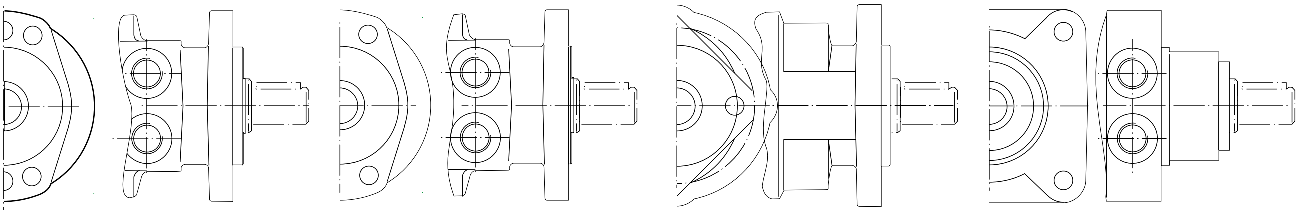


Code 41



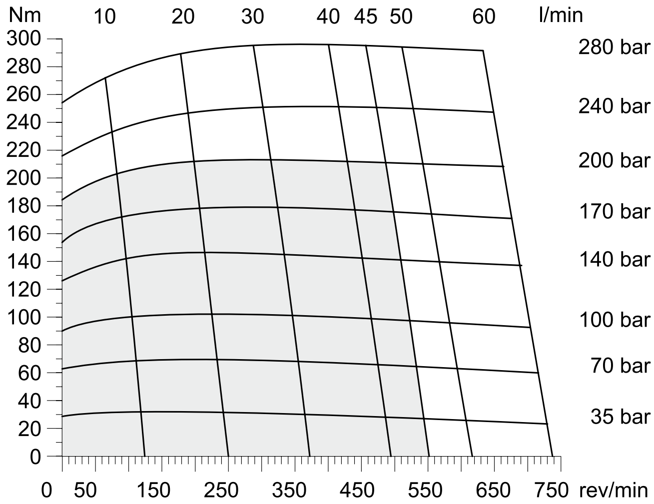
Codes 26, 41, 47

Abtriebswelle	Ø 25mm	Max. Moment cont./int.	450/550 Nm
Coupling shaft	Ø 1 inch	Max. torque cont./int.	
Arbre	6B SAE	Couple maxi cont./int.	
Albero		Coppia max cont./int.	

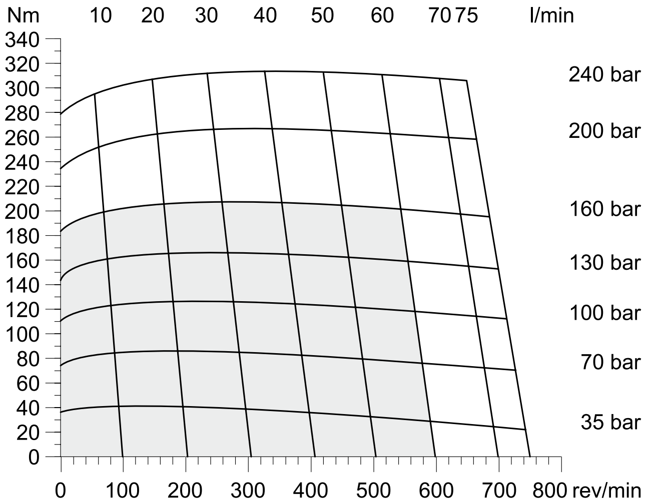


Code 26	54	49	54	94
Code 47	54	49	54	94
Code 41	54	49	54	94
Code 44	65	60	64	105
Code 45	65	60	64	105
Code 08	67	62	66	107
Code 46	65	60	64	105

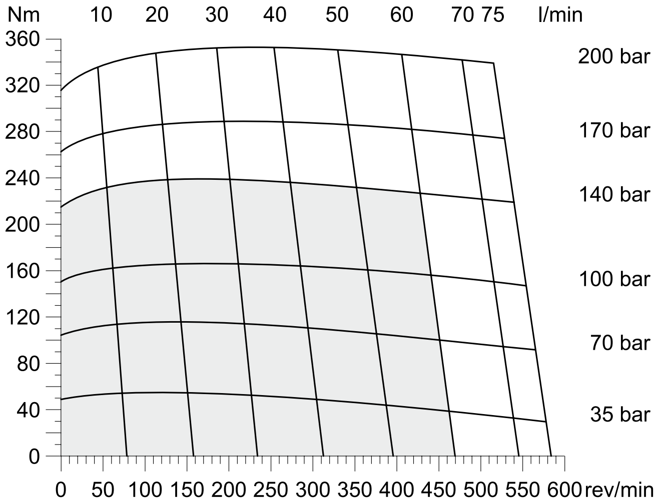
TF 80



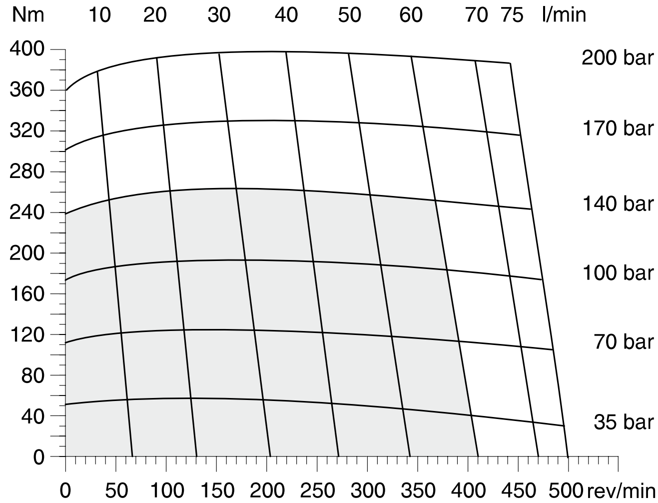
TF 100



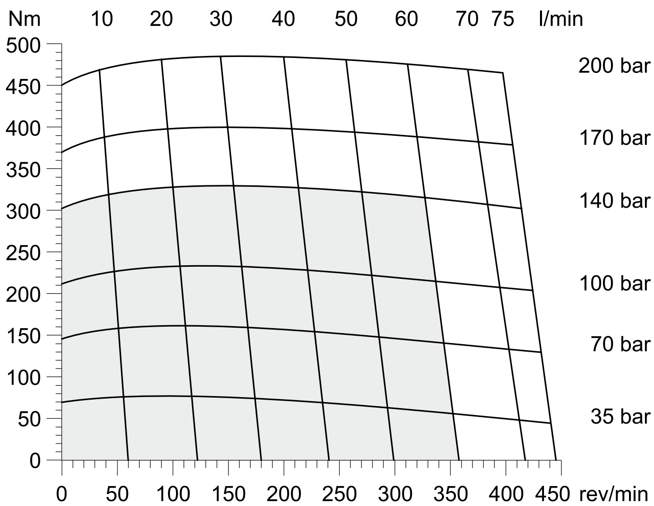
TF 130



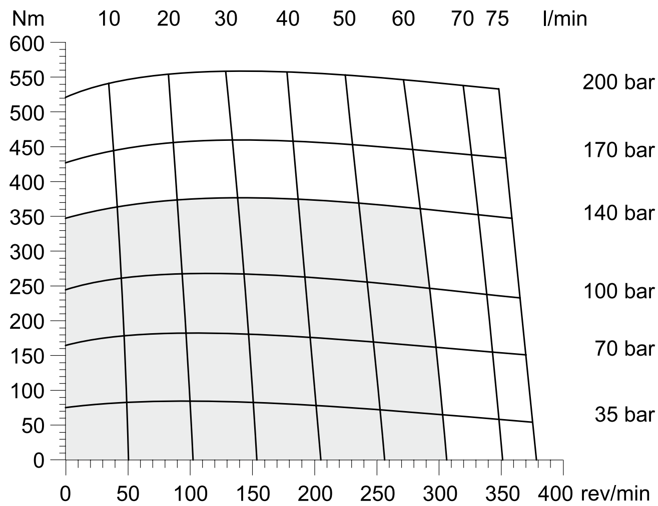
TF 140



TF 170



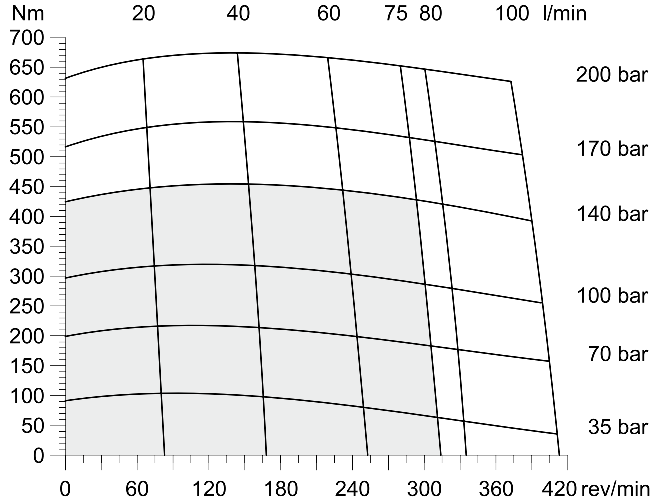
TF 195



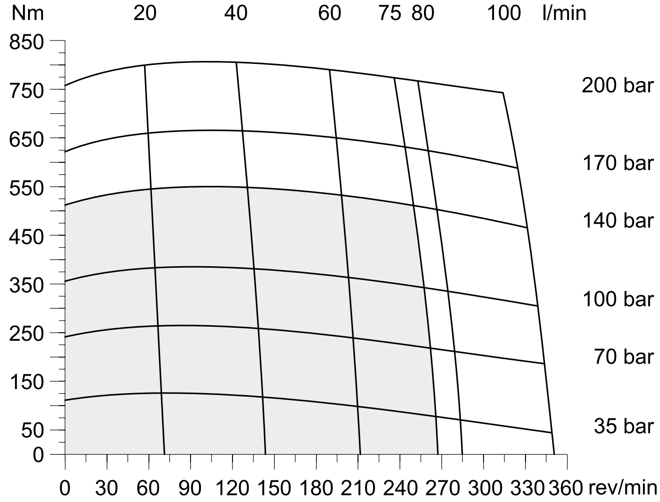
Cont. Int.

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

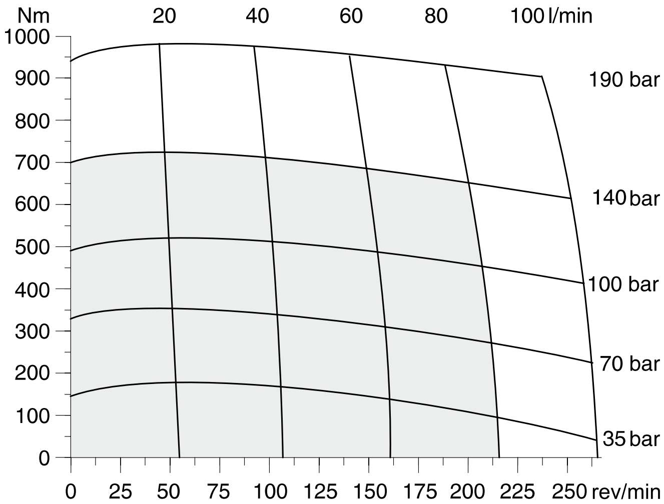
TF 240



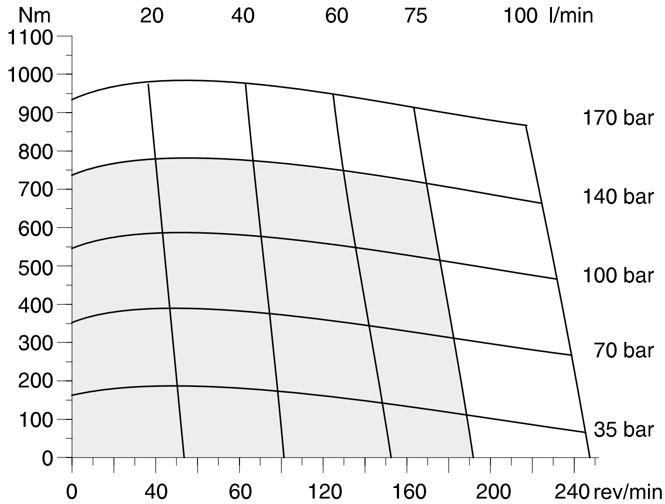
TF 280



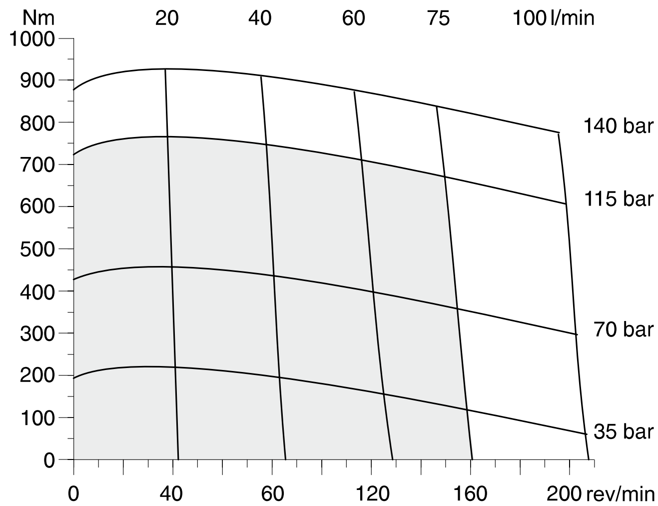
TF 360



TF 405



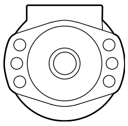
TF475



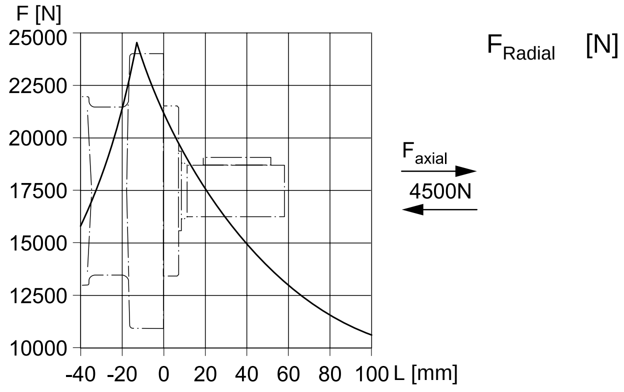
Cont. Int.

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

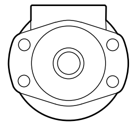
Code E



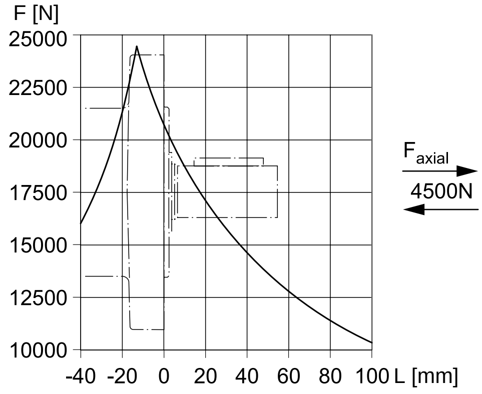
$$L_h = \frac{\left(\dfrac{670000}{F_R \cdot \left(1.10 + \dfrac{L}{88mm}\right)}\right)^{3.3}}{n}$$



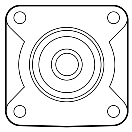
Code M



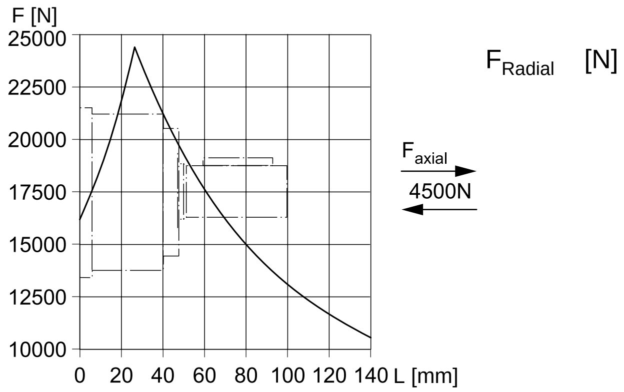
$$L_h = \frac{\left(\dfrac{670000}{F_R \cdot \left(1.16 + \dfrac{L}{88mm}\right)}\right)^{3.3}}{n}$$



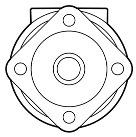
Code H



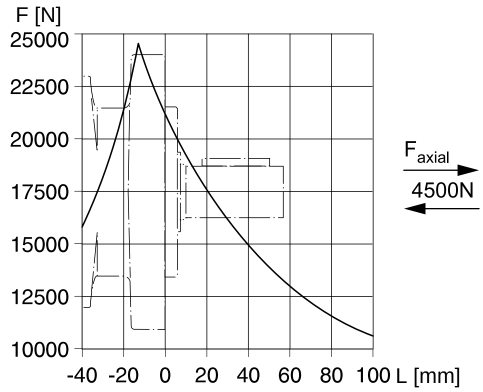
$$L_h = \frac{\left(\dfrac{670000}{F_R \cdot \left(0.56 + \dfrac{L}{88mm}\right)}\right)^{3.3}}{n}$$



Code V



$$L_h = \frac{\left(\dfrac{670000}{F_R \cdot \left(1.11 + \dfrac{L}{88mm}\right)}\right)^{3.3}}{n}$$



Die Lebensdauer der Radiallager (L_h in Stunden) lässt sich nach folgender Formel berechnen. Die Größe F_R ist durch die mechanische Festigkeit der Abtriebswelle begrenzt (siehe Diagramm). Das Maß ”L” ist das Längenmaß vom Gehäuseflansch bis zum Angriffspunkt der Radialkraft F_R.

Life time (L_h in hours) of the radial bearings can be calculated with the following formula. The value F_R is limited by the mechanical strength of the shaft (see diagram). The measurement ”L” is the length from the housing flange up to the point of impact of the radial force F_R.

La durée de vie des roulements radiaux (L_h en heures) peut être calculée par les formules suivantes. La grandeur F_R est limitée par les résistances mécaniques de l`arbre de sortie (voir diagramme). La cote ”L” est la longueur entre la bride du carter jusqu`au point d`appui de l`effort radial F_R.

La durata dei cuscinetti (L_h in ore) può essere calcolata con la seguente formula. Il valore F_R è limitato dalla resistenza meccanica dell`albero (vedi diagramma). La quota ”L” è la distanza tra la flangia del corpo ed il punto di applicazione della forza radiale F_R.

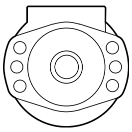
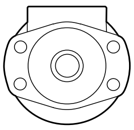
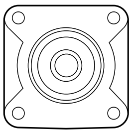
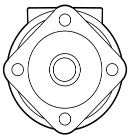
Vorstehende Formeln gelten für eine B10-Lebensdauer. The preceding formulas are valid for a B10 duration of life. Les formules prècèdentes sont valables pour une durèe de vie B10. Le formule precedenti sono valide per una durata della vita B10.	**L_h = [h]** **L = [mm]** **n = [rev/min]**

TF											A	A	A	B

Serie / Series / Série / Serie	Schluckvolumen / Displacement / Cylindrée / Cilindrata	Gehäuse / Housing / Carter / Corpo motore	Anschluss / Ports / Plan de raccordement / Connessioni	Welle / Shaft / Arbre / Albero	Drehrichtung / Direction of rotation / Direction de rotation / Direzione di rotazione	Option code

For further options different to standard 'AAAB' see page 84

Code	cm^3/rev
0080	81
0100	100
0130	128
0140	141
0170	169
0195	195
0240	237
0280	280
0360	364
0405	405
0475	477

Code	Housing
E	
M	
H	
V [1]	

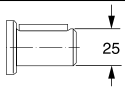
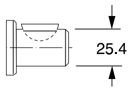
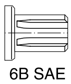
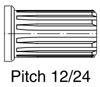
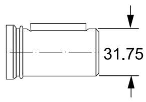
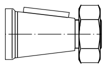
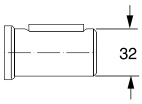
[1] Nur verfügbar mit Endanschluss
Only possible with rear port
Possible seulement avec orifice arrière
Possible solo con connessioni Posteriori

Code	Front port
W	G 1/2
V	7/8-14 UNF O-Ring
N [2]	Universal-M8x13
K [3]	Universal-M6x12

[2] Nicht verfügbar für Gehäuse "H"
Not possible for housing "H"
Pas disponible pour carter "H"
Non disponibile con il corpo codice "H"

[3] Nicht verfügbar für Gehäuse "M, E, V"
Not possible for housing "M, E, V"
Pas disponible pour carter "M, E, V"
Non disponibile con il corpo codice "M, E, V"

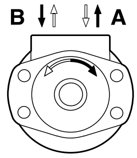
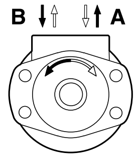
Code	Rear port
Y	G 1/2 Axial
A	7/8-14 UNF Axial
X	G 1/2 Radial
B	7/8-14 UNF Radial
L	Universal Radial M8x13

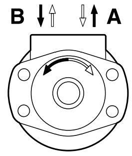
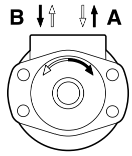
Code	Shaft
26 [4]	
47 [4][5]	
41 [4][5]	
44	
45	
08	
46	

4) Codes 26, 41, 47

Abtriebswelle	ø 25 mm	Max. Moment cont./int.	450/550 Nm
Coupling shaft	ø 1 inch	Max. torque cont./int.	450/550 Nm
Arbre	6B SAE	Couple maxi cont./int.	450/550 Nm
Albero		Coppia max cont./int.	450/550 Nm

5) ≤TF0280

Code	Front port
0	 Standard
1	

Code	Rear port
0	 Standard
1	

Exceptional Power Density and Durability

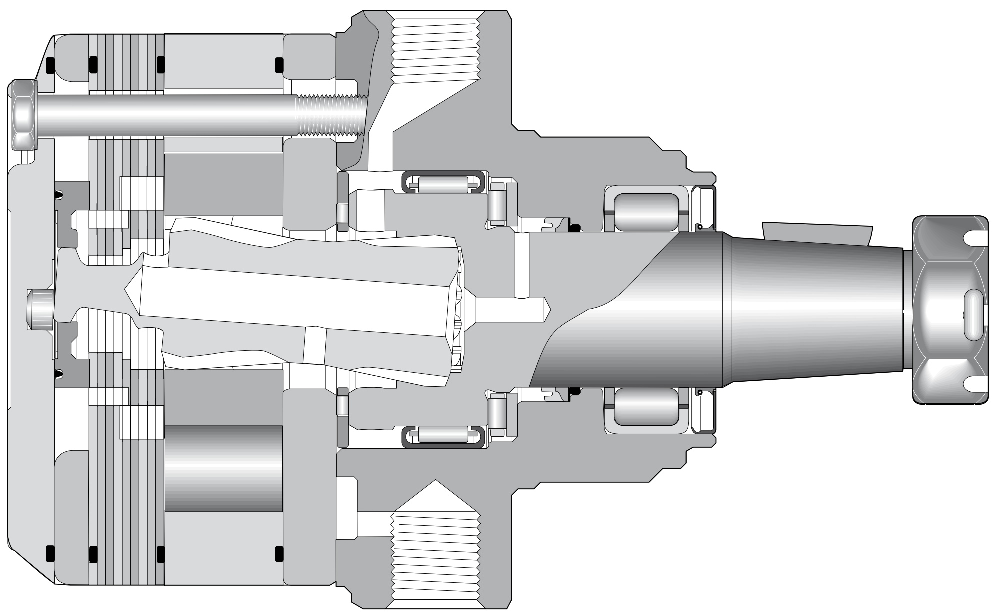
The heart of the new compact Torqmotor™ is the strongest drive train in its class. Coupled with this extra heavy-duty drive train are the high efficiencies and low speed performance for which the Parker Torqmotor™ is known. As with all Torqmotors™, high speed valving and full flow drive train lubrication are standard. Case drains are not required. Roller vanes and a sealed commutator maintain high efficiencies and provide smooth low speed performance.

- **Langsamlaufender Gerotor-Motor**
- **Spezielle Orbital-Steuerung**
  Geringe interne Leckage
  Hoher volumetrischer Wirkungsgrad
- **Rollen im Rotorsatz**
  Reduzierte Reibung
  Lange Lebensdauer
- **Patentierte Hochdruckwellendichtung**
  Keine Leckölleitung
  Keine Rückschlagventile
- **Vielzahl von Varianten**
  Großer Einsatzbereich

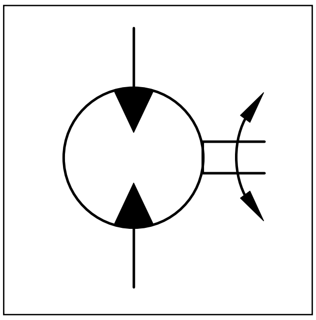
- **Low Speed Gerotor Motor**
- **Zero leak commutation valve**
  For greater, more consistent volumetric efficiency
- **Roller vane rotor set**
  Reduces friction and internal leakage
  Maintaining efficiency throughout the life of the motor
- **A patented high-pressure shaft seal**
  No check valves needed
  No extra plumbing
- **Wide choice of displacement range, flange and shaft options**
  Greater efficiency in systems design to suit your application

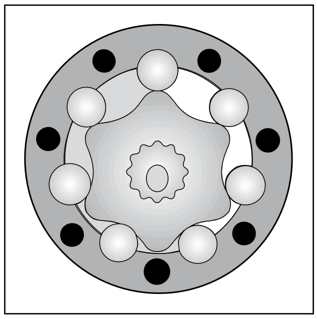
- **Moteur lent systéme Gerotor**
- **Une distribution orbitale particuliére assure**
  fuites internes minimales
  rendements volumàtriques élevés
- **Le rotor à rouleaux**
  réduit les frottements
  augmente la durée de vié
- **Par l`utilisation de joints d`arbre haute pression brevetés**
  pas de conduite de drainage
  pas de clapets anti-retour
- **Gràce à de nombreuses variantes**
  larges domaines d`application

- **Motore orbitale a bassa velocità**
- **Una particolare distribuzione orbitale assicura**
  trafilamento ridotto
  elevato rendimento volumetrico
- **Con lo statore a rullini**
  si riduce l`attrito interno
  si mantiene nel tempo l`efficieza del motore
- **Una guarnizione di tenuta ad alta pressione brevettata elimina la necessità**
  di una linea di drenaggio esterna
  e di valvole di non ritorno
- **Un`ampia gamma di cilindrate, flange ed alberi**
  consentono scelte adeguate ad
  ogni esigenza costruttiva



Displacements Schluckvolumen Cylindrée Despazamientos	**140 . . . 364 cm³/rev**	
	Cont.	**Int.**
Maximum Pressure Eingangsdruck Pression entrée Presion Maxima	**190 bar**	**241 bar**
Maximum Oil Flow Schluckstrom Débit d'huile Caudal Maximo de Aceite	**95 l/min**	
Maximum Speed Drehzahl Vitesse de rotation Velocidad Maxima	**484 rev/min**	
	Cont.	**Int.**
Maximum Torque MaxDrehmoment Couple Torque Maximo	**977 Nm**	**1164 Nm**





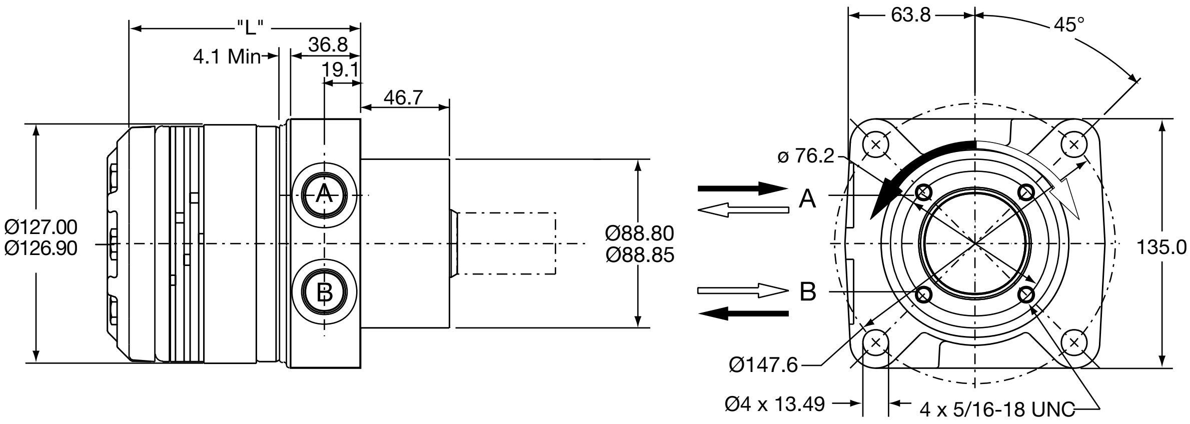
	Geom. Schluckvolumen Geometric displacement Cylindrée Cilindrata	**Max. Drehzahl Max. speed Vitesse de rotation maxi Velocità di rotazione max**	**Max. Schluckstrom Max. oil flow Débit d'huile maxi Portata max**	**Max. Druckdifferenz * Max. differential pressure * Chute de pression maxi * Caduta di pressione max ***	**Max. Eingangsdruck Max. supply pressure Pression maxi entrée Pressione max in entrata**	**Max. Drehmoment Max. torque Couple maxi Coppia max**	**Max. Leistungabgabe Max. performance Puissance de sortie maxi Potenza meccanica max**	**Min. Anlaufmoment Min. starting torque Couple min. fourni au dé manrage Coppia min. di spunto**
Motor series TF	**[cm³/U] [cm³/rev]**	**cont / int [U/min] [rev/min]**	**cont / int [l/min]**	**cont / int [bar]**	**max [bar]**	**cont / int [Nm]**	**cont / int [KW]**	**cont / int [Nm]**
TL0140	140	613	68/95	190/241	300	364/463	30	294/365
TL0170	169	512	68/95	190/241	300	449/570	31	354/445
TL0195	195	484	68/95	190/241	300	511/648	34	414/526
TL0240	238	399	68/95	190/241	300	620/790	34	536/679
TL0280	280	335	68/95	190/241	300	730/929	34	619/787
TL0310	310	310	68/95	190/241	300	847/1079	36	713/907
TL0360	364	255	68/95	172/224	300	890/1163	31	778/1002

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

* Druckdifferenz Δp zwischen Ein- und Ausgang
* Pressure difference is Δp between input and output
* La différence de pression est Δp entre l'entrée et la sortie
* La differenza di pressione corrisponde al Δp tra ingresso e uscita

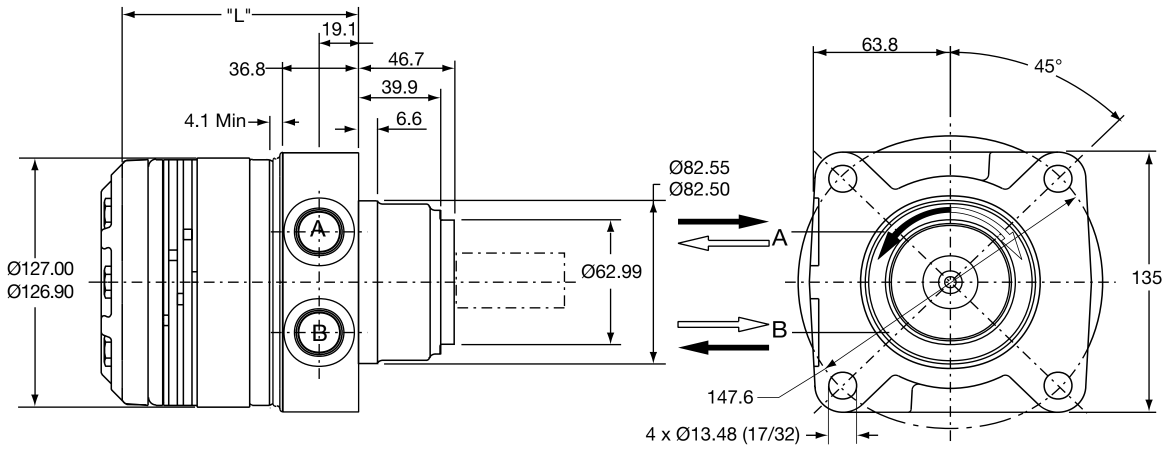
Achtung: Höhere Drücke auf Anfrage möglich.
Notice: Higher pressures are possible on request.
Remarque : des pressions supérieures sont possibles sur demande.
Nota: Pressioni superiori possibili su richiesta.

Code: L



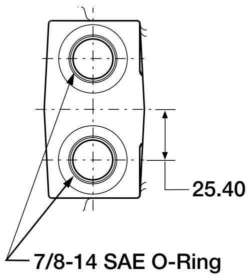
Code L disp.	0140	0170	0195	0240	0280	0310	0360
Weight/Gewicht kg Poids/Peso	**10.9**	**11.1**	**11.4**	**11.8**	**12.2**	**12.4**	**12.9**
Length "L" mm	**124**	**124**	**124**	**127**	**132**	**135**	**143**

Code: U



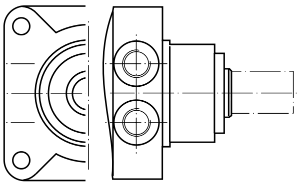
Code U disp.	0140	0170	0195	0240	0280	0310	0360
Weight/Gewicht [kg] Poids/Peso	**10.9**	**11.1**	**11.4**	**11.8**	**12.2**	**12.4**	**12.9**
Length "L" mm	**124**	**124**	**124**	**127**	**132**	**135**	**143**

Code: S

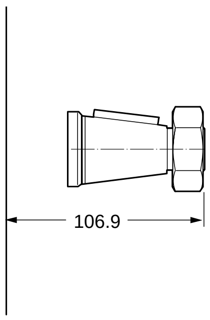


Shafts / Abtriebswellen
Arbre / Ejes

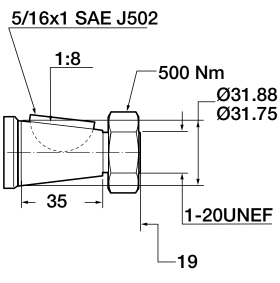
Code: L, U

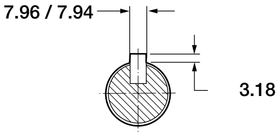


Code: 08

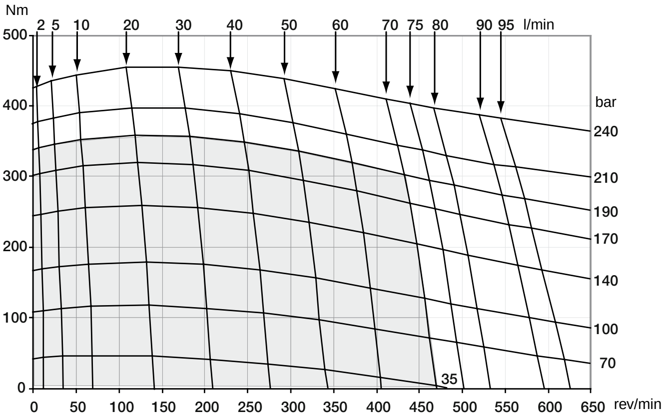


Code: 08

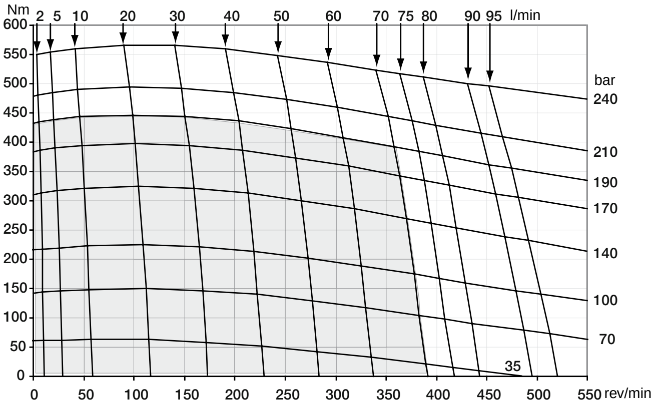




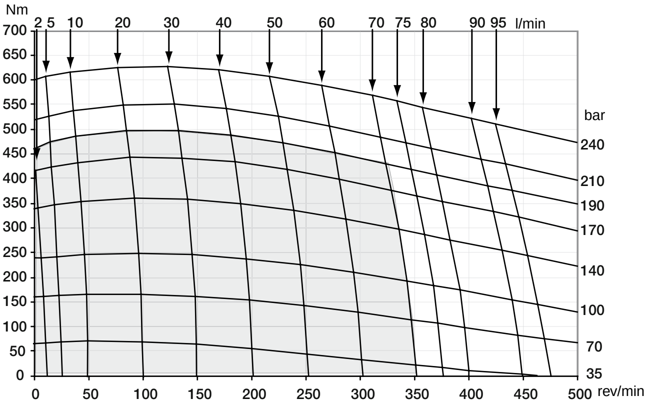
TL 140



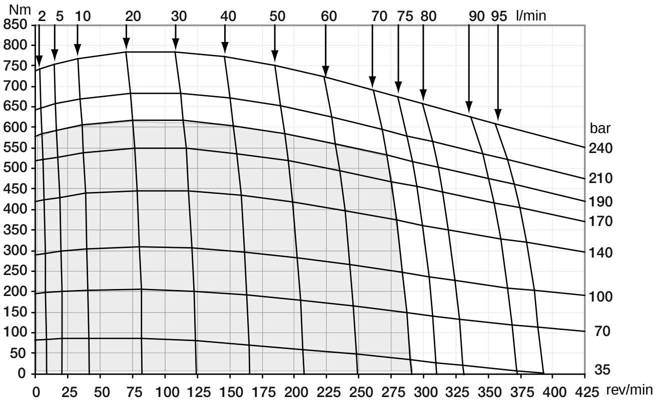
TL 169



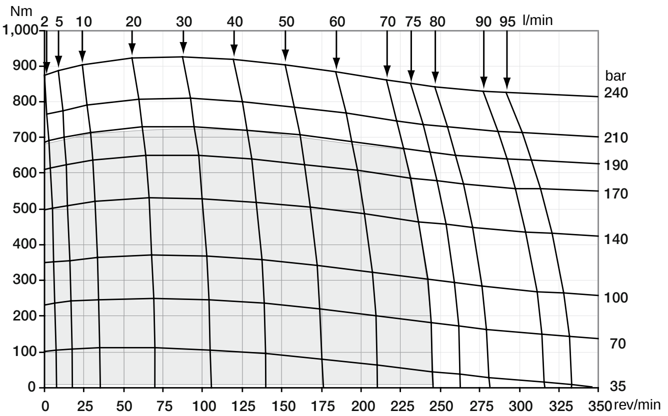
TL 195



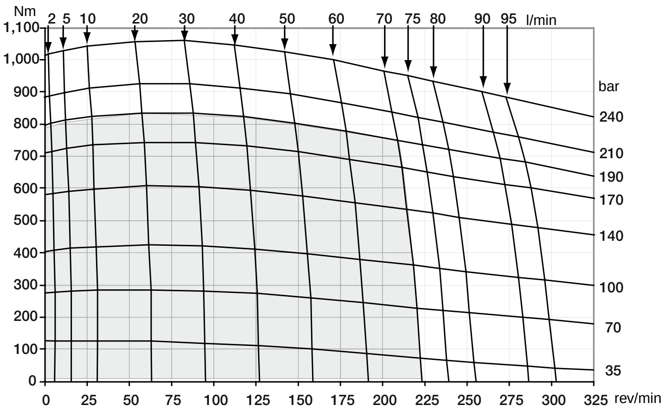
TL 238



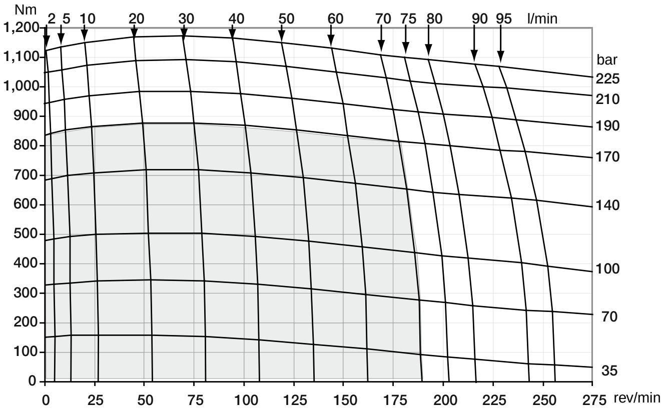
TL 280



TL 310



TL 334

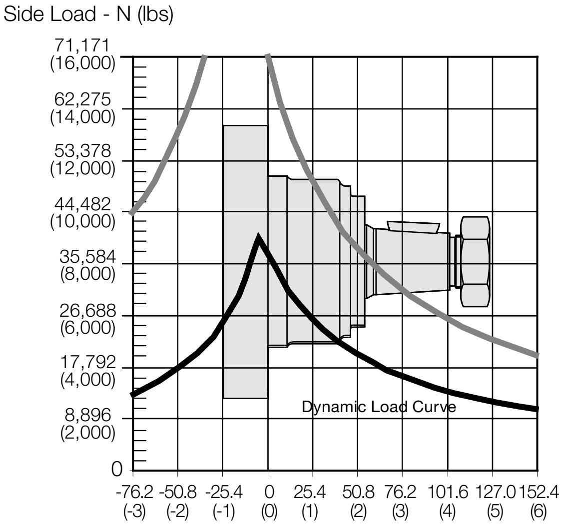


☐ Cont. ☐ Int.

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

Wheel Mount / Radnabengehäuse

Monture à roue/ Montaje de rueda



Motor Image Not To Scale

The dynamic side load curve is based on uni-directional steady state loads for L_{10} bearing life at 3 x 10^6 revolutions.

Die zulässige auslegbare radiale Wellenbelastungskurve ist unter ruhenden, einseitig statisch gerichteten Lastverhältnissen auf eine L_{10} Lebensdauer mit 3 x 10^6 Umdrehungen kalkuliert.

La courbe de charge latérale permise se base sur des charges unidirectionnelles en régime permanent pour le roulement L_{10} à 3 x 10^6 révolutions.

La curva de valores admisibles de carga lateral está basada en cargas constantes para cojinetes L_{10} a 3 x 10^6 revoluciones.

The maximum load curve is defined by bearing static load capacity. This curve should not be exceeded at any time including shock loads.

Die maximale radiale Wellenbelastungskurve ist definiert als maximale statische Last ohne Drehzahl. Sie gilt als Grenze und sollte keinesfalls überschritten werden.

La courbe de charge maximale est définie par la capacité de charge statique portante. Cette courbe ne devrait être dépassée en aucun moment y compris pour les charges par à-coups.

La curva de carga máxima queda definida por la capacidad de carga estática del cojinete. No se deben superar los valores de esta curva, ni siquiera con cargas provisorias de impacto.

Equation to Calculate the Expected Radial Bearing Life
Gleichung zur Ermittlung der Lagerlebensdauer

Equation to calculate the dynamic bearing life for a given load:
Bestimmung der erlaubten radialen Wellenbelastung mit vorgegebener Last

Use F_a, F_b and S in equation to determine hours of L_{10} bearing life.
Die Lebensdauer in Stunden ergibt sich durch einsetzen von F_a, F_b, und S in die nachstehende Formel.

$$L = \frac{3 \times 10^6}{60 \times S} \left\{ \frac{F_a}{F_b} \right\}^{3.33}$$

Where / Mit:

S = Shaft Speed RPM / Abtriebswellendrehzahl in min $^{-1}$
L = Life In Hours / Lebensdauer in Stunden
F_a = Dynamic side load defined by above curve at a distance from mounting flange. / Erlaubte radiale Wellenbelastung als Function der Laenge
F_b = Application side load. / Anwendungsseitige Wellenbelastung

TL	XXXX	X	X	XX	0	XXXX
Series	Displacement Schluckvolumen Cylindrée Desplazamiento	Mounting Gehäuse Carter Montaje	Ports Anschluß Plan de raccordement Lumbreras	Shaft Welle Arbre Eje	Rotation Drehrichtung Direction de rotation Rotacion	Options Opciones

Code	cm^3/tr cm^3/giro cm^3/U in^3/rev
0140	141 / 8.6
0170	169 / 10.3
0195	195 / 11.9
0240	238 / 14.5
0280	280 / 17.1
0310	310 / 18.9
0360	364 / 22.2

Code	Mounting
L	Wheel, Front Brake Nose
U	Wheel, Standard

Code	Ports
S	7/8-14 SAE

Code	Shaft
08	1 1/4" Tapered

Code	Front Port Rotation
0	Standard (B ↓↑ ↓↑ A)
1	Reverse Timed Manifold (B ↓↑ ↓↑ A)

Code	
AAAB	No Paint No lackiert
AAAA	Black Paint Schwarz lackiert

- **Langsamlaufender Gerotor-Motor**
- **Spezielle Orbital-Steuerung**
  Geringe interne Leckage
  Hoher volumetrischer Wirkungsgrad
- **Rollen im Rotorsatz**
  Reduzierte Reibung
  Lange Lebensdauer
- **Patentierte Hochdruckwellendichtung**
  Keine Leckölleitung
  Keine Rückschlagventile
- **Vielzahl von Varianten**
  Großer Einsatzbereich

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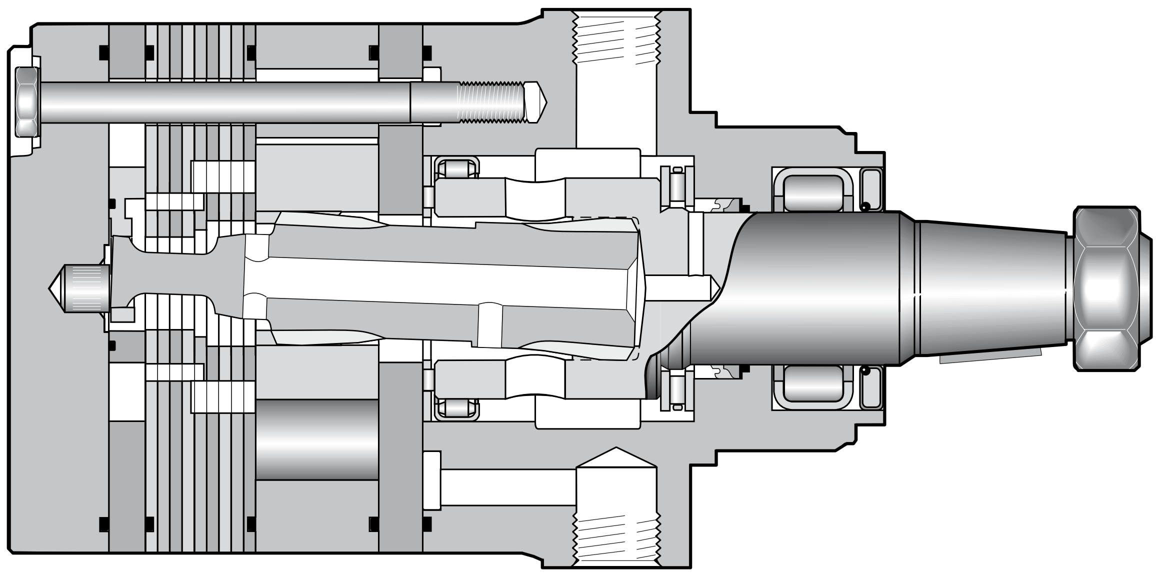
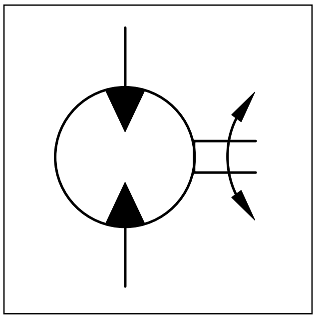
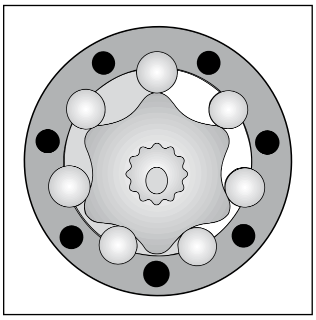
- **Moteur lent systéme Gerotor**
- **Une distribution orbitale particuliére assure**
  fuites internes minimales
  rendements volumàtriques élevés
- **Le rotor à rouleaux**
  réduit les frottements
  augmente la durée de vié
- **Par l`utilisation de joints d`arbre haute pression brevetés**
  pas de conduite de drainage
  pas de clapets anti-retour
- **Gràce à de nombreuses variantes**
  larges domaines d`application

- **Motore orbitale a bassa velocità**
- **Una particolare distribuzione orbitale assicura**
  trafilamento ridotto
  elevato rendimento volumetrico
- **Con lo statore a rullini**
  si riduce l`attrito interno
  si mantiene nel tempo l`efficieza del motore
- **Una guarnizione di tenuta ad alta pressione brevettata elimina la necessità**
  di una linea di drenaggio esterna
  e di valvole di non ritorno
- **Un`ampia gamma di cilindrate, flange ed alberi**
  consentono scelte adeguate ad
  ogni esigenza costruttiva



Drehzahl Speed Vitesse de rotation Velocità di rotazione	5...710 rev/min
Schluckstrom Oil flow Débit d`huile Portata	max. 115 l/min
Eingangsdruck Supply pressure Pression entrée Pressione in entrata	max. 300 bar
Drehmoment Torque Couple Coppia	max. 1490 Nm
Seitenlast Side load Charges latérales Carico radiale	max. 16.000 N





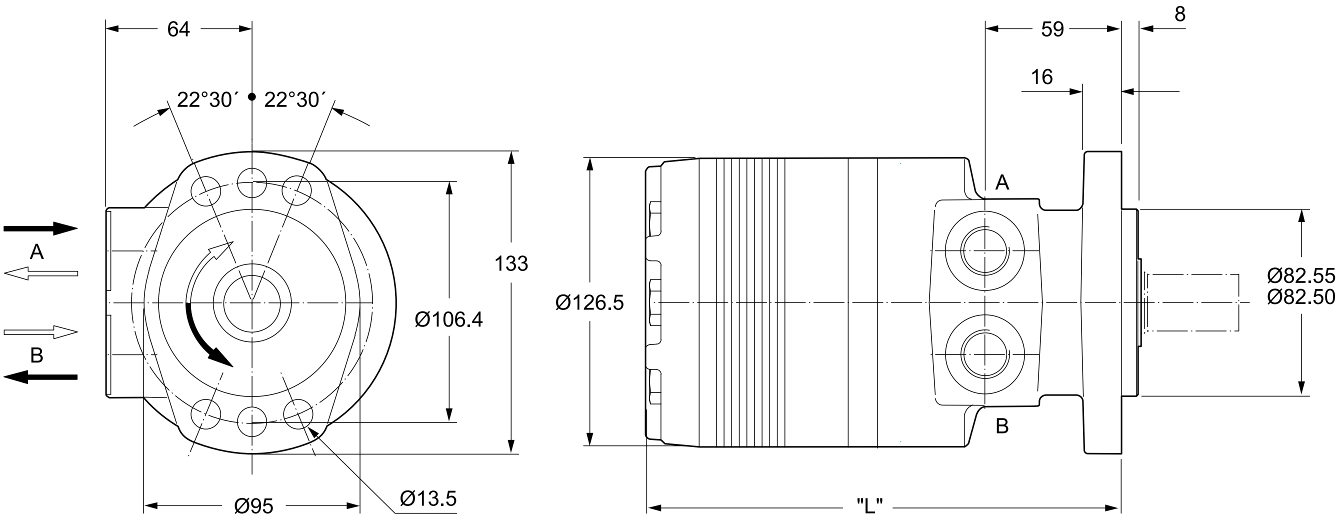
Motor series TF	Geom. Schluckvolumen Geometric displacement Cylindrée Cilindrata [cm^3/U] [cm^3/rev]	Max. Drehzahl Max. speed Vitesse de rotation maxi Velocità di rotazione max cont / int [U/min] [rev/min]	Max. Schluckstrom Max. oil flow Débit d´huile maxi Portata max cont / int [l/min]	Max. Druckdifferenz * Max. differential pressure * Chute de pression maxi * Caduta di pressione max * cont / int [bar]	Max. Eingangsdruck Max. supply pressure Pression maxi entrée Pressione max in entrata max [bar]	Max. Drehmoment Max. torque Couple maxi Coppia max cont / int [Nm]	Max. Leistungabgabe Max. performance Puissance de sortie maxi Potenza meccanica max cont / int [KW]	Min. Anlaufmoment Min. starting torque Couple min. fourni au dé manrage Coppia min. di spunto cont / int [Nm]
TG 140	141	530/710	75/100	210/280	300	400/545	33	320/436
TG 170	169	440/575	75/100	210/280	300	485/670	33	388/536
TG 195	195	380/510	75/100	210/280	300	560/770	33	448/616
TG 240	238	320/420	75/100	210/280	300	685/945	32	548/756
TG 280	280	270/350	75/100	210/280	300	800/1100	31	675/880
TG 335	337	225/290	75/100	210/280	300	980/1350	30	784/1080
TG 405	405	185/245	75/100	170/240	300	960/1350	27	791/1145
TG 475	477	160/240	75/115	140/210	300	960/1400	28	768/1120
TG 530	529	140/215	75/115	140/170	300	1050/1280	23	874/1091
TG 625	613	120/185	75/115	120/160	300	1040/1360	20	895/1165
TG 785	786	95/145	75/115	100/140	300	1150/1490	17	991/1341
TG 960	959	78/119	75/115	70/100	300	925/1390	12	763/1177

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

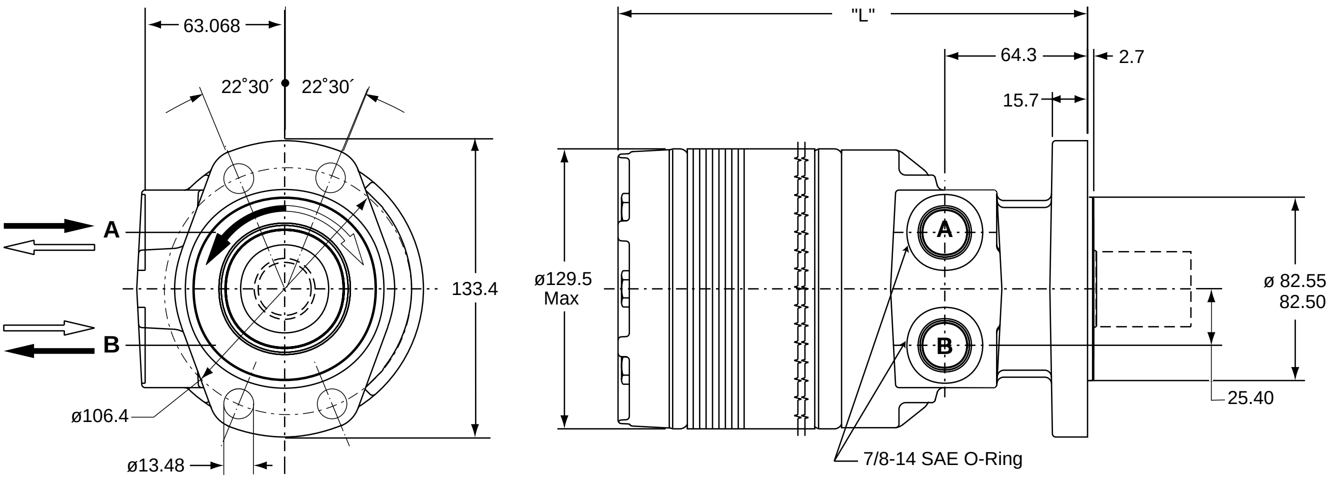
* Druckdifferenz Δp zwischen Ein- und Ausgang
* Pressure difference is Δp between input and output
* La différence de pression est Δp entre l'entrée et la sortie
* La differenza di pressione corrisponde al Δp tra ingresso e uscita

Achtung: Höhere Drücke auf Anfrage möglich.
Notice: Higher pressures are possible on request.
Remarque : des pressions supérieures sont possibles sur demande.
Nota: Pressioni superiori possibili su richiesta.

Code E

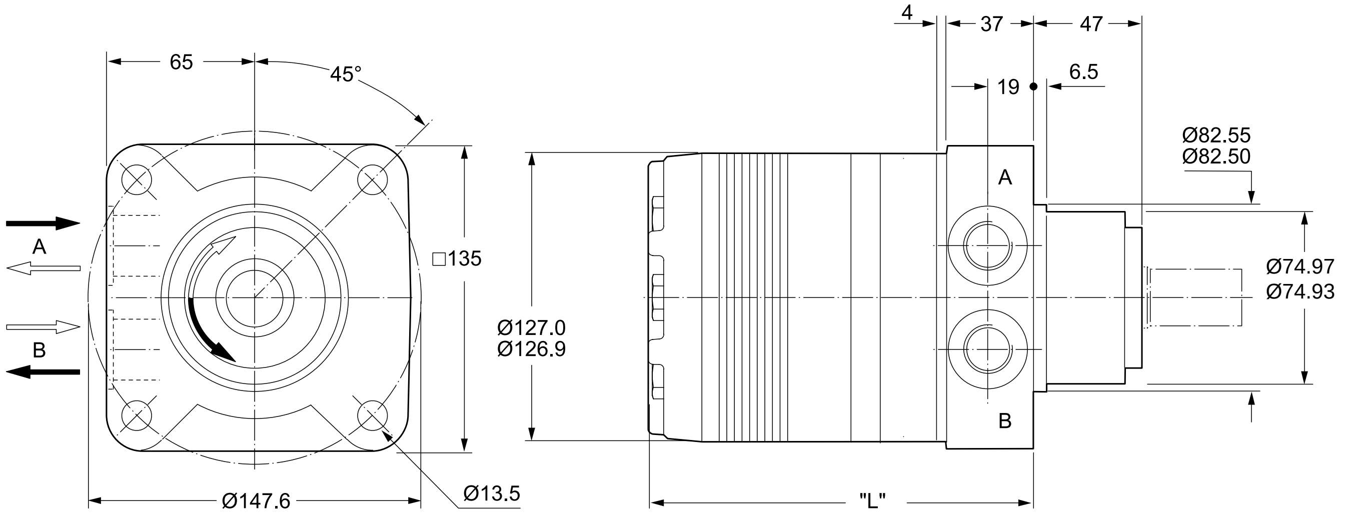


Code M

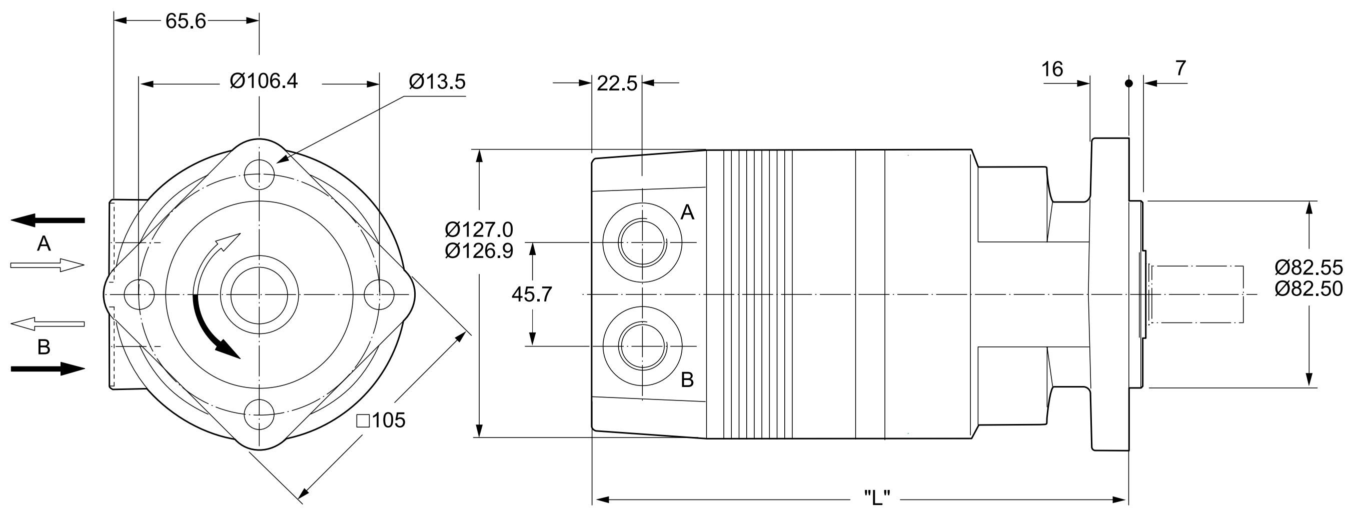


Gewicht /	Weight	TG140	TG170	TG195	TG240	TG280	TG335	TG405	TG475	TG530	TG625	TG785	TG960
Poids /	Peso [kg]	14.2	14.5	14.7	15.1	15.5	15.9	16.5	17.2	17.9	18.6	20.2	22.0
Code H	"L" [mm]	191	194	197	202	207	213	220	229	235	245	264	283
Code V	"L" [mm]	196	199	202	208	212	218	225	234	240	250	269	288

Code H

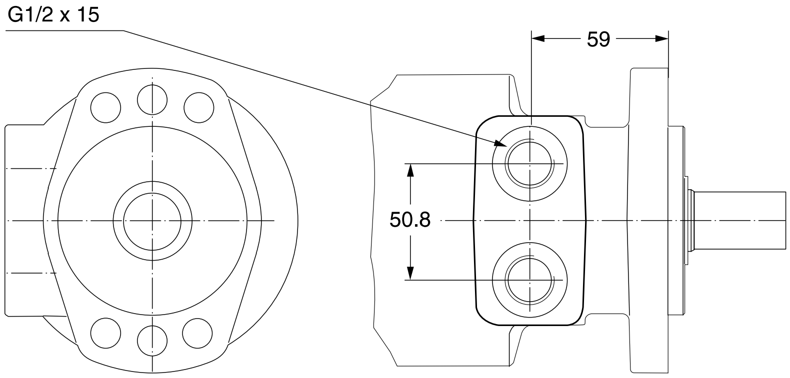


Code V

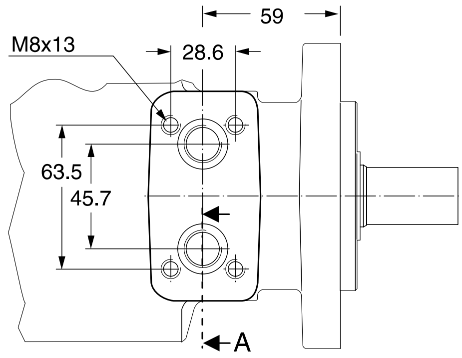


Gewicht / Poids /	Weight Peso [kg]	TG140	TG170	TG195	TG240	TG280	TG335	TG405	TG475	TG530	TG625	TG785	TG960
		16.1	16.3	16.6	17.0	17.4	17.8	18.4	19.0	19.8	20.5	22.0	23.7
Code H	”L” [mm]	150	154	157	162	166	173	180	188	195	204	223	242
Code V	”L” [mm]	217	220	224	228	233	238	246	255	262	272	290	309

Code W

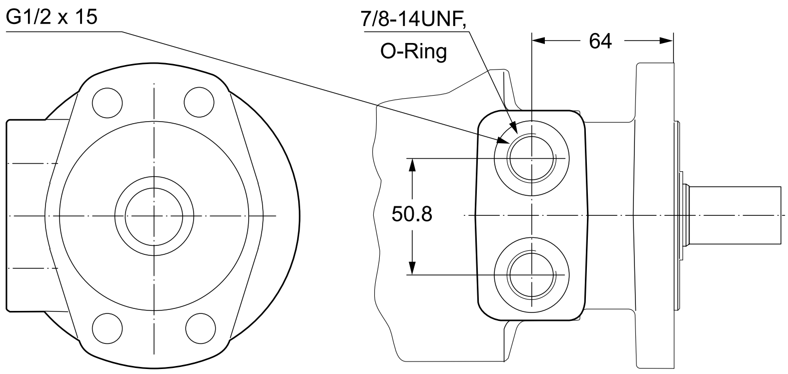


Code: N

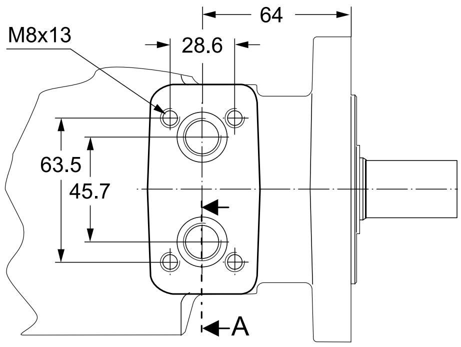


Code W

Code V

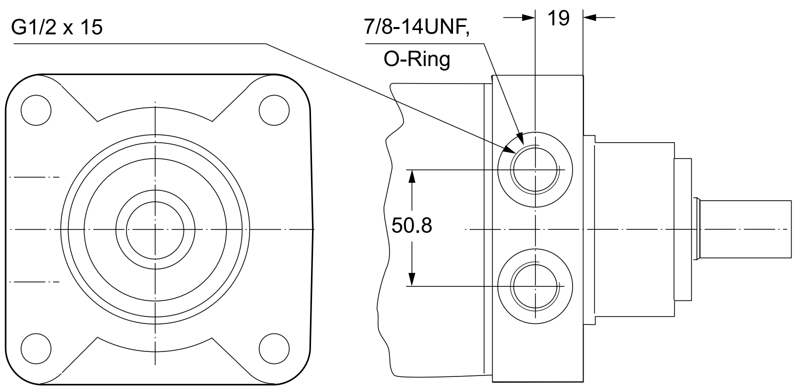


Code N

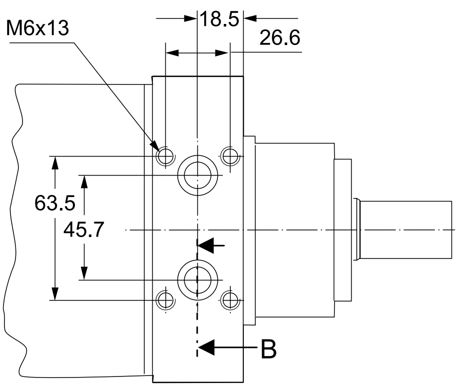


Code W

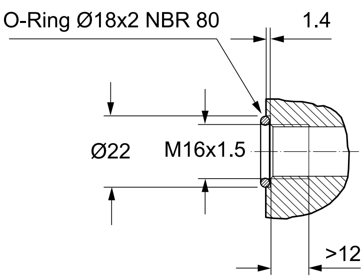
Code V



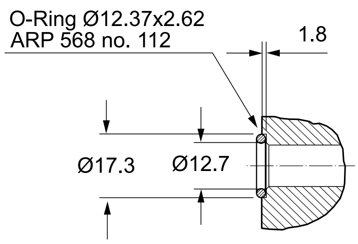
Code K



Section A



Section B



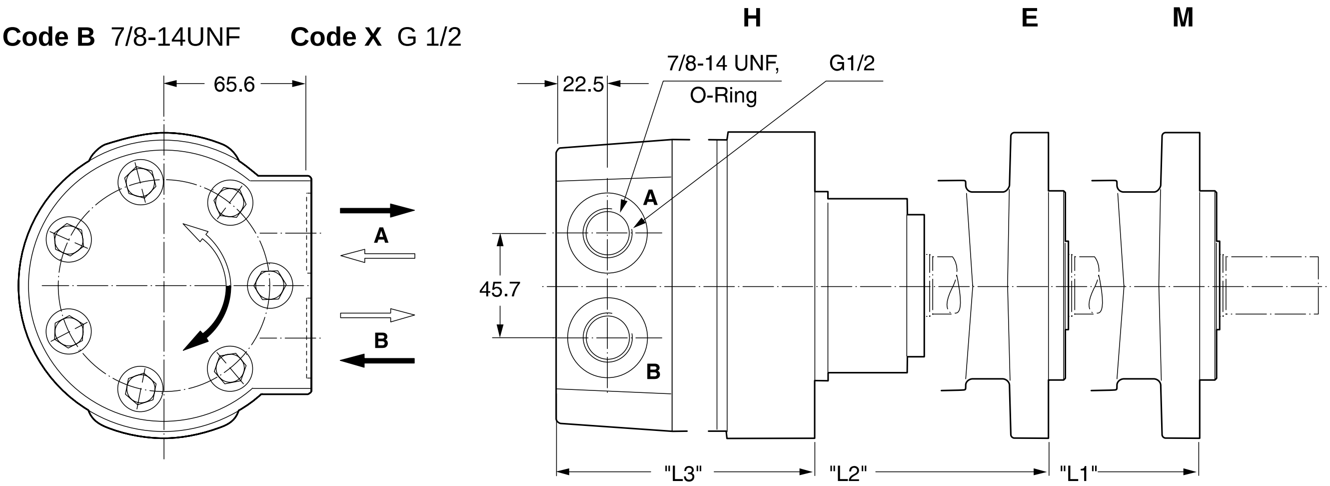
Zum Motor mit Universalanschluss werden 2 O-Ringe geliefert.

Motor with manifold mount is supplied with 2 O-rings.

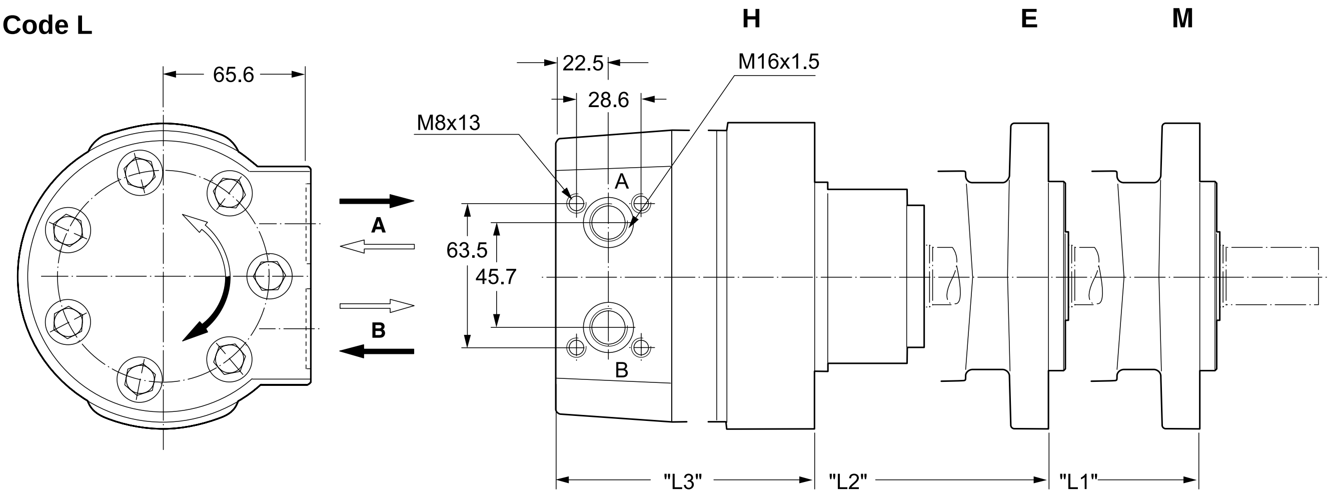
Deux joints toriques sont livrés avec les moteurs au plan de raccordement universel.

Il blocchetto connessioni è corredato da 2 OR.

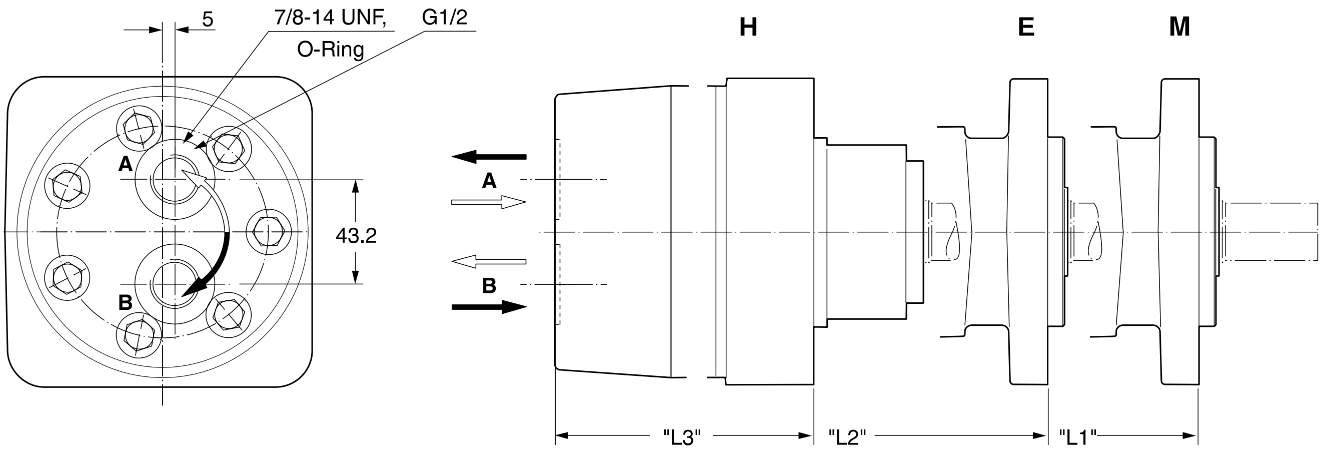
Code B 7/8-14UNF **Code X** G 1/2



Code L

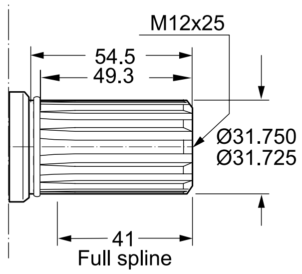


Code A 7/8-14UNF **Code Y** G 1/2



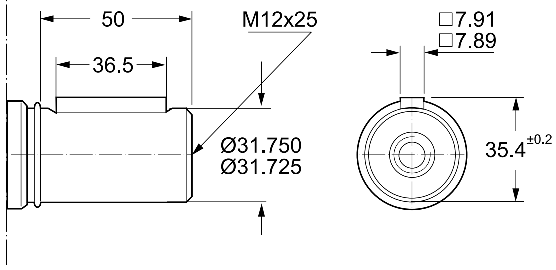
Gewicht / Poids /	Weight Peso [kg]	TG140	TG170	TG195	TG240	TG280	TG335	TG405	TG475	TG530	TG625	TG785	TG960
		16.1	16.3	16.6	17.0	17.4	17.8	18.4	19.0	19.8	20.5	22.0	23.7
Code B, X, L, A, Y	"L1"[mm]	216	219	222	227	232	238	245	254	260	270	289	308
	"L2"[mm]	221	224	227	232	237	243	250	259	265	275	294	313
	"L3"[mm]	175	179	182	187	191	198	205	213	220	229	247	267

Code 44

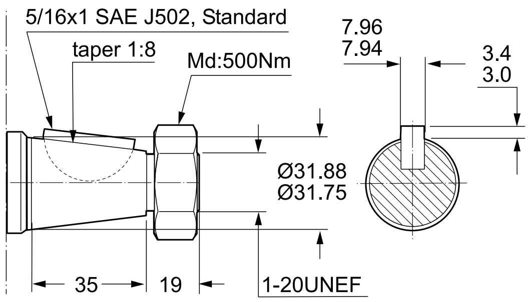


Involute spline
ANS B92.1-1970 Standard
Flat root side fit
Pitch 12/24
Teeth 14
Major diam. 1.25 in
Pressure angle 30°

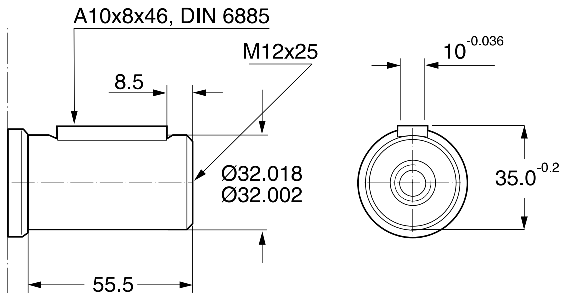
Code 45



Code 08

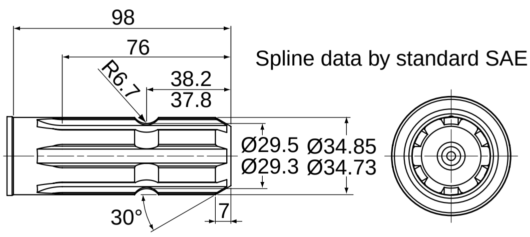


Code 46



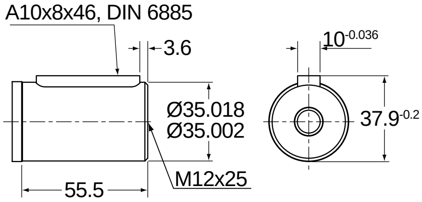
* On request shaft with 35mm diameter

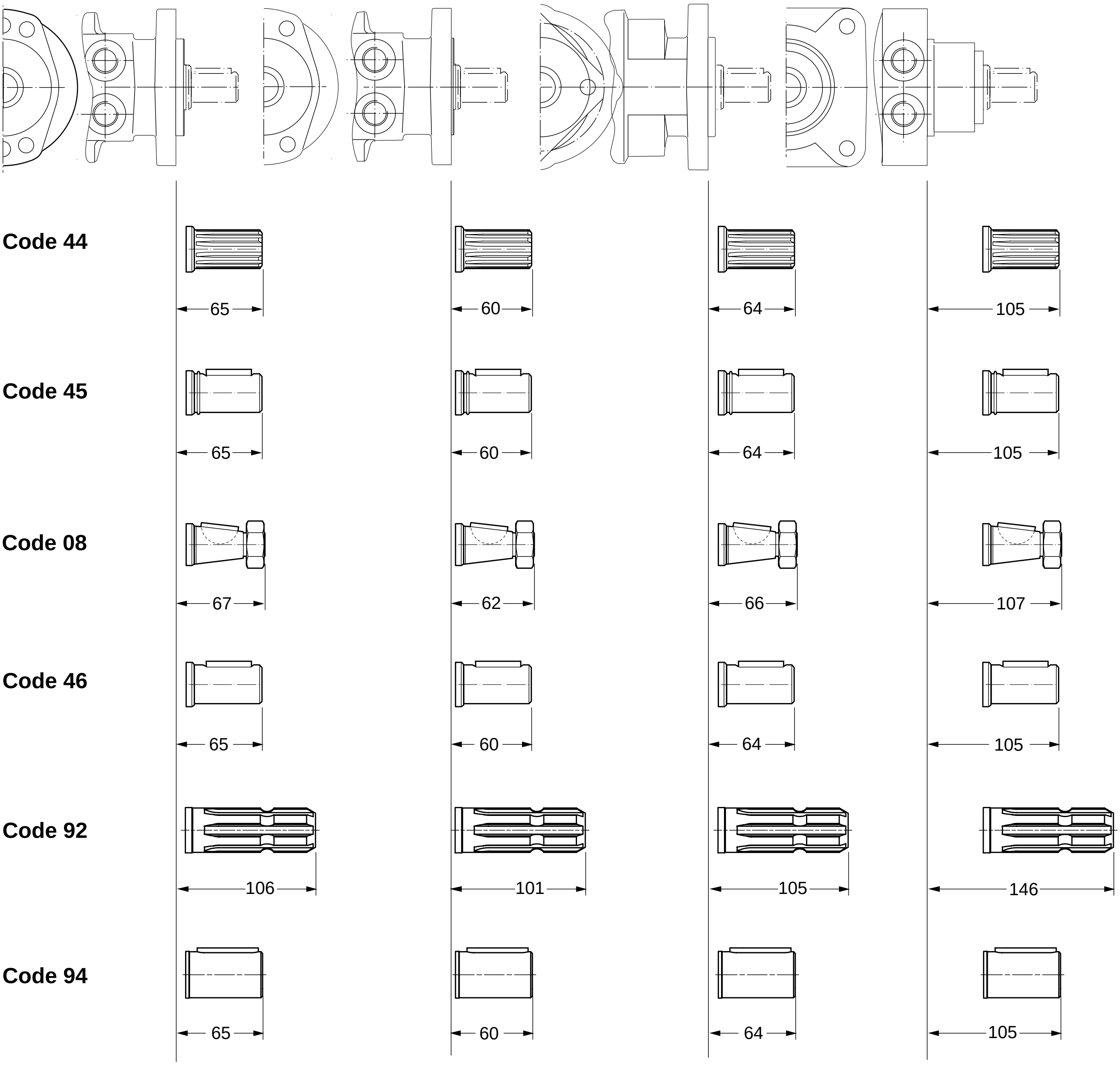
Code 92



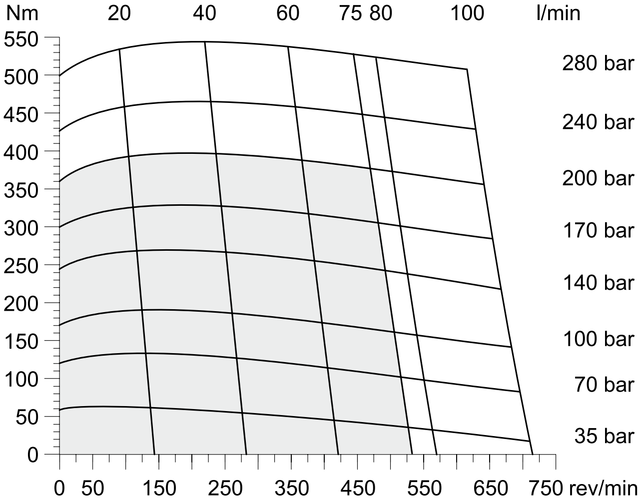
Spline data by standard SAE J1170

Code 94

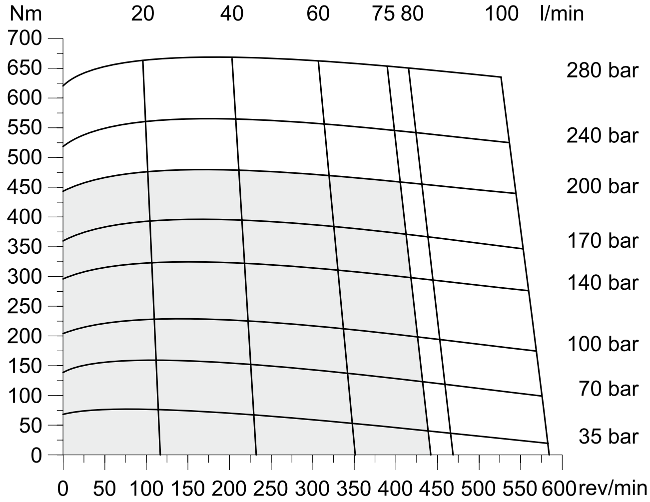



Code 44
65
60
64
105
Code 45
65
60
64
105
Code 08
67
62
66
107
Code 46
65
60
64
105
Code 92
106
101
105
146
Code 94
65
60
64
105

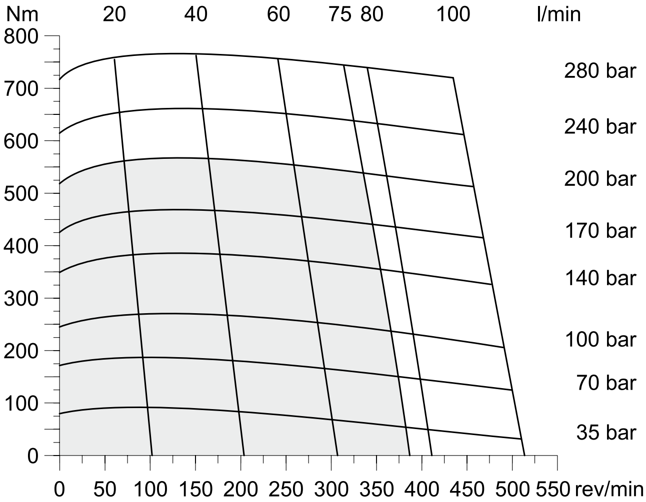
TG 140



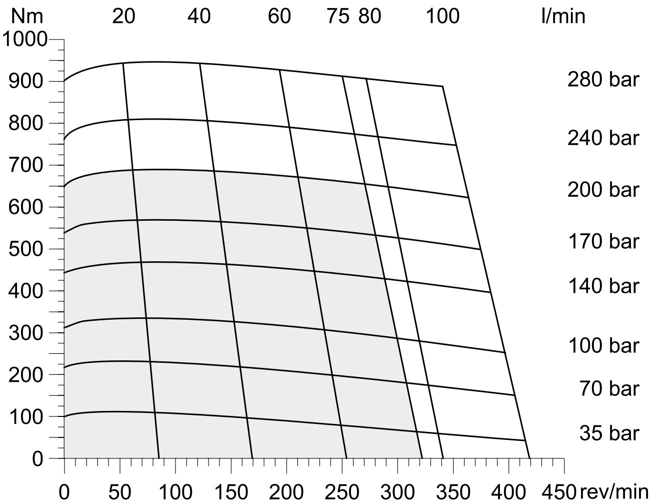
TG 170



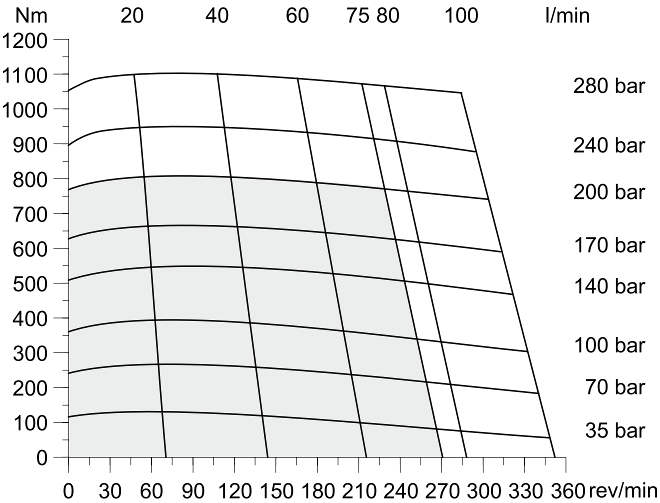
TG 195



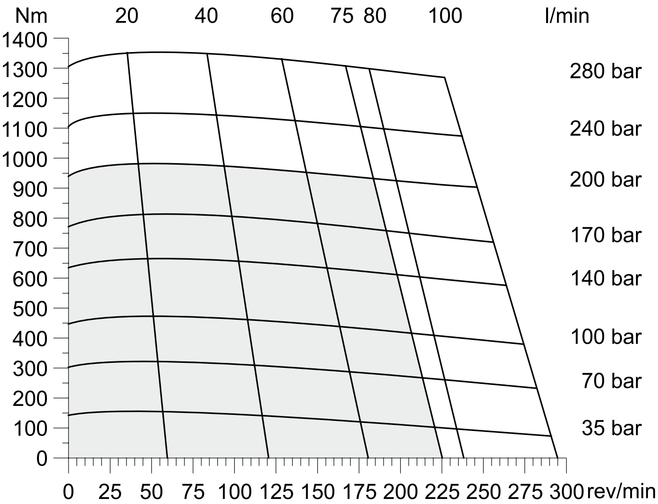
TG 240



TG 280



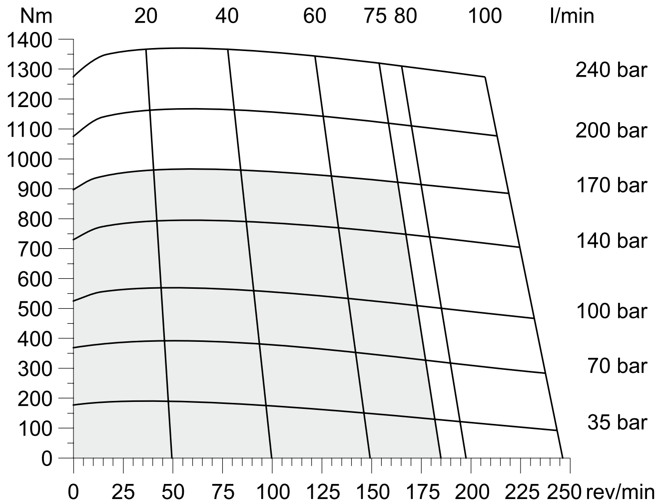
TG 335



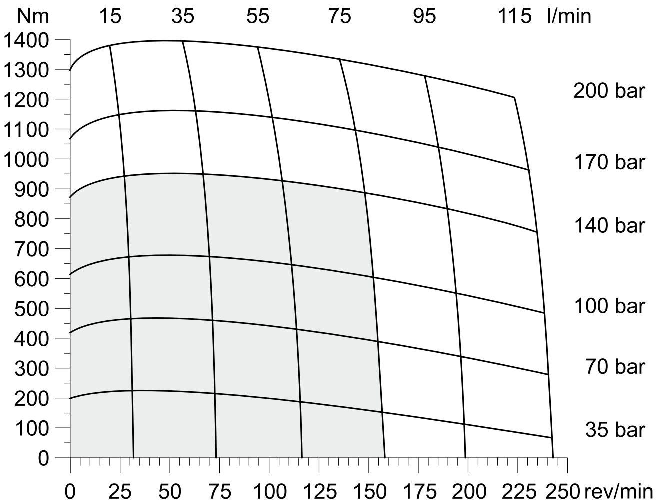
Cont. Int.

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

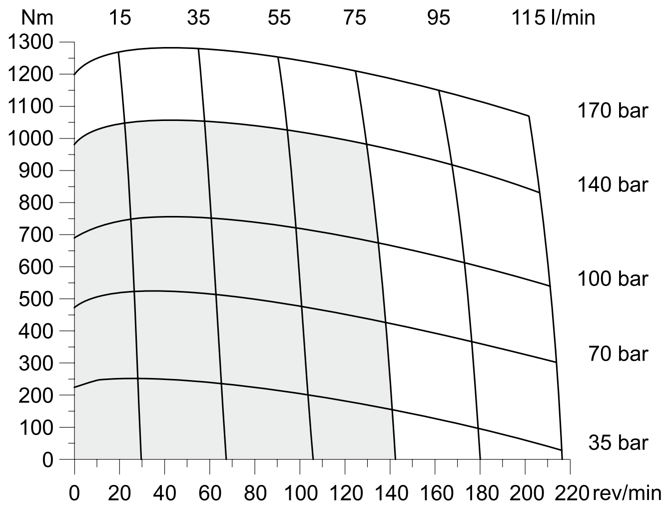
TG 405



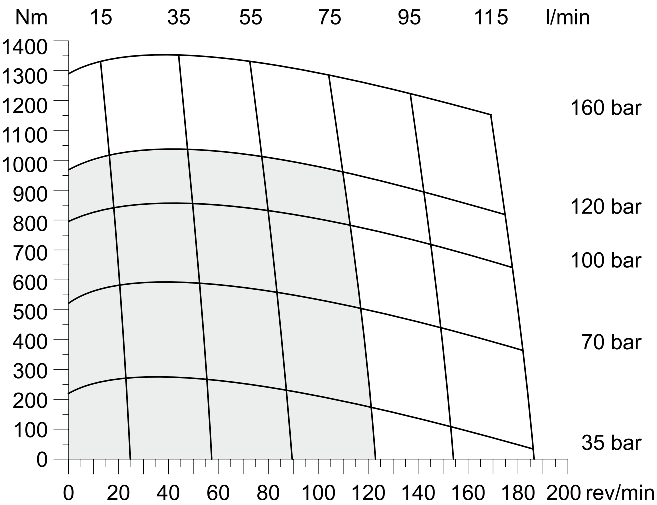
TG 475



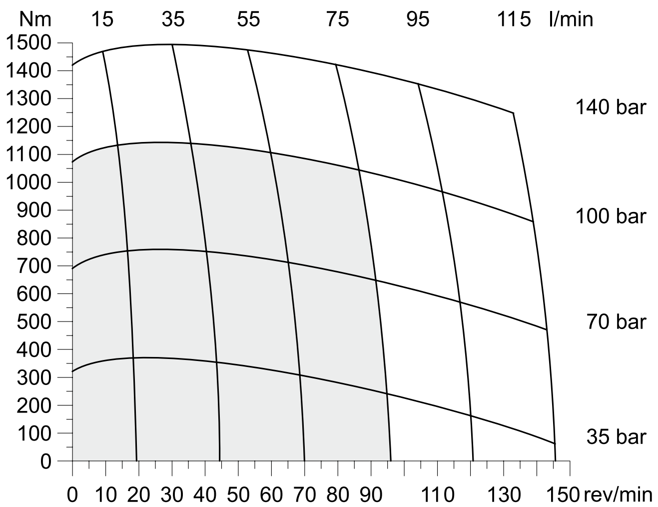
TG 530



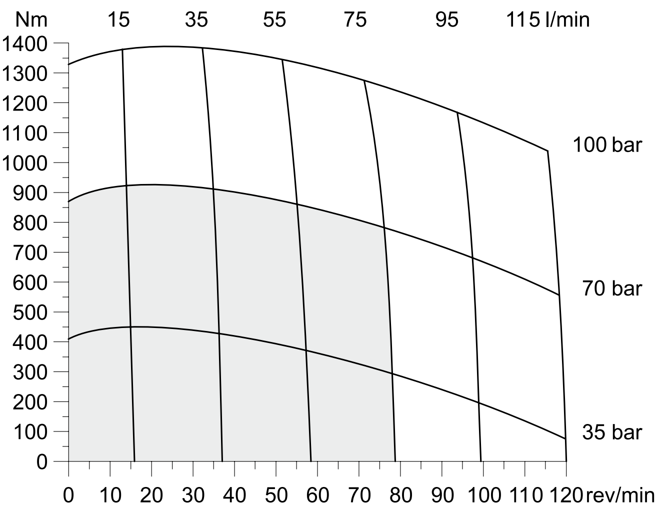
TG 625



TG 785



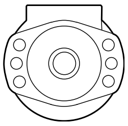
TG 960



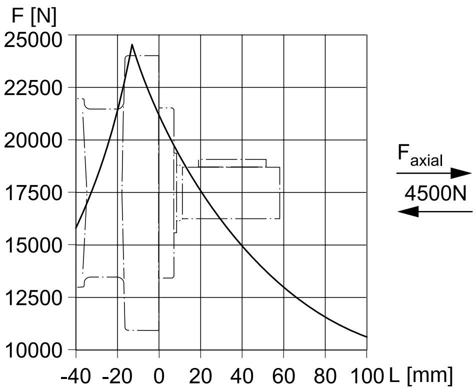
Cont. Int.

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

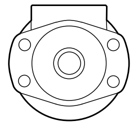
Code E



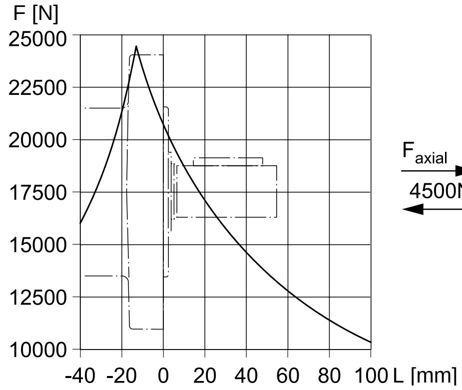
$$L_h = \frac{\left(\frac{670000}{F_R \cdot \left(1.10 + \frac{L}{88mm}\right)}\right)^{3.3}}{n}$$



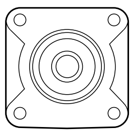
Code M



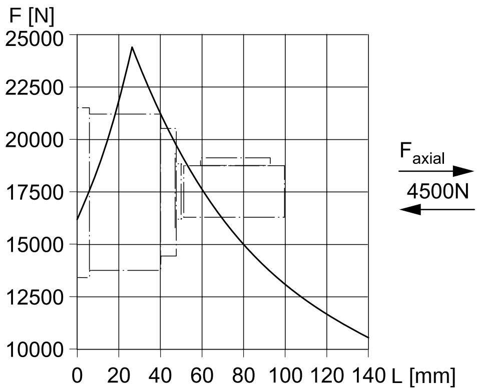
$$L_h = \frac{\left(\frac{670000}{F_R \cdot \left(1.16 + \frac{L}{88mm}\right)}\right)^{3.3}}{n}$$



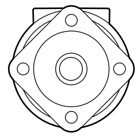
Code H



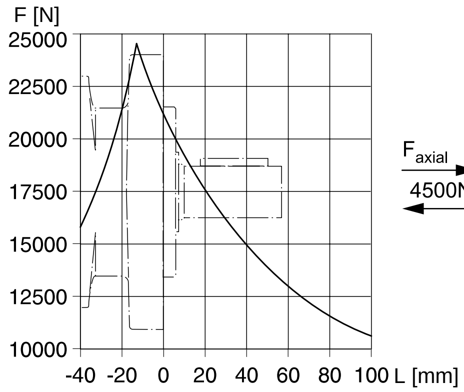
$$L_h = \frac{\left(\frac{670000}{F_R \cdot \left(0.56 + \frac{L}{88mm}\right)}\right)^{3.3}}{n}$$



Code V



$$L_h = \frac{\left(\frac{670000}{F_R \cdot \left(1.11 + \frac{L}{88mm}\right)}\right)^{3.3}}{n}$$



Die Lebensdauer der Radiallager (L_h in Stunden) lässt sich nach folgender Formel berechnen. Die Größe F_R ist durch die mechanische Festigkeit der Abtriebswelle begrenzt (siehe Diagramm). Das Maß ”L” ist das Längenmaß vom Gehäuseflansch bis zum Angriffspunkt der Radialkraft F_R.

Life time (L_h in hours) of the radial bearings can be calculated with the following formula. The value F_R is limited by the mechanical strength of the shaft (see diagram). The measurement ”L” is the length from the housing flange up to the point of impact of the radial force F_R.

La durée de vie des roulements radiaux (L_h en heures) peut être calculée par les formules suivantes. La grandeur F_R est limitée par les résistances mécaniques de l`arbre de sortie (voir diagramme). La cote ”L” est la longueur entre la bride du carter jusqu`au point d`appui de l`effort radial F_R.

La durata dei cuscinetti (L_h in ore) può essere calcolata con la seguente formula. Il valore F_R è limitato dalla resistenza meccanica dell`albero (vedi diagramma). La quota ”L” è la distanza tra la flangia del corpo ed il punto di applicazione della forza radiale F_R.

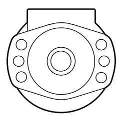
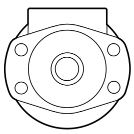
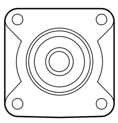
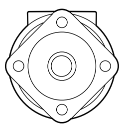
Vorstehende Formeln gelten für eine B10-Lebensdauer.	**L_h**	**=**	**[h]**
The preceding formulas are valid for a B10 duration of life.	**L**	**=**	**[mm]**
Les formules prècèdentes sont valables pour une durèe de vie B10.	**F_R**	**=**	**F [N]**
Le formule precedenti sono valide per una durata della vita B10.	**n**	**=**	**[rev/min]**

TG											A	A	A	B

Serie / Series / Série / Serie	Schluckvolumen / Displacement / Cylindrée / Cilindrata	Gehäuse / Housing / Carter / Corpo motore	Anschluss / Ports / Plan de raccordement / Connessioni	Welle / Shaft / Arbre / Albero	Drehrichtung / Direction of rotation / Direction de rotation / Direzione di rotazione	Option

Option: For further options different to standard 'AAAB' see page 57.

Code	cm^3/rev
0140	140
0170	169
0195	195
0240	237
0280	280
0335	337
0405	405
0475	476
0530	529
0625	624
0785	786
0960	958

Code	Housing
E	
M	
H	
V [1]	

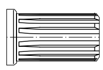
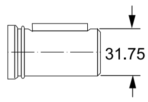
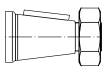
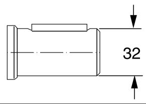
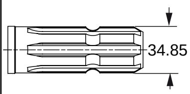
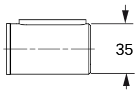
[1] Nur verfügbar mit Endanschluss
Only possible with rear port
Possible seulement avec orifice arrière
Possible solo con connessioni posteriori

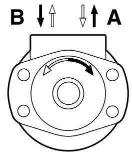
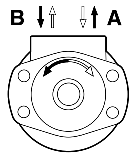
Code	Front port
W	G 1/2
V	7/8-14 UNF O-Ring
N [2]	Universal M8x13
K [3]	Universal M6x13

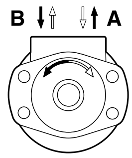
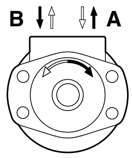
[2] Nicht verfügbar für Gehäuse "H"
Not possible for housing "H"
Pas disponible pour carter "H"
Non Disponibile con il corpo codice "H"

[3] Nicht verfügbar für Gehäuse "M, E, V"
Not possible for housing "M, E, V"
Pas disponible pour carter "M, E, V"
Non disponibile con il corpo codice "M, E, V"

Code	Rear port
Y	G 1/2 Axial
A	7/8-14 UNF Axial
X	G 1/2 Radial
B	7/8-14 UNF Radial
L	Universal Radial M8x13

Code	Shaft
44	 Pitch 12/24
45	
08	
46	
92	
94	

Code	Front port
0	 Standard
1	

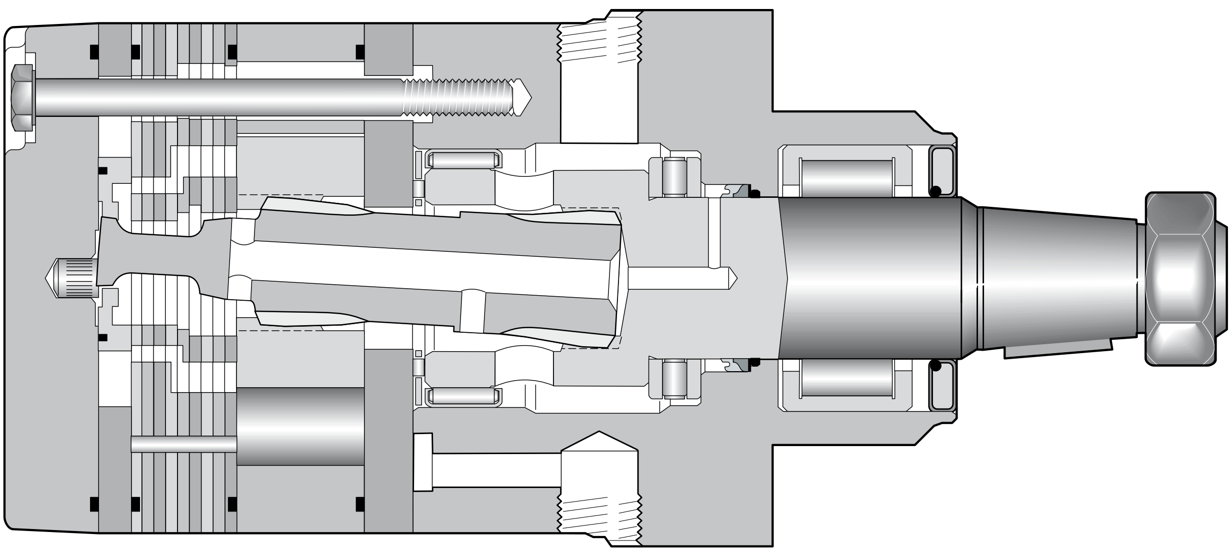
Code	Rear port
0	 Standard
1	

- **Langsamlaufender Gerotor-Motor**
- **Spezielle Orbital-Steuerung**
  Geringe interne Leckage
  Hoher volumetrischer Wirkungsgrad
- **Rollen im Rotorsatz**
  Reduzierte Reibung
  Lange Lebensdauer
- **Patentierte Hochdruckwellendichtung**
  Keine Leckölleitung
  Keine Rückschlagventile
- **Vielzahl von Varianten**
  Großer Einsatzbereich

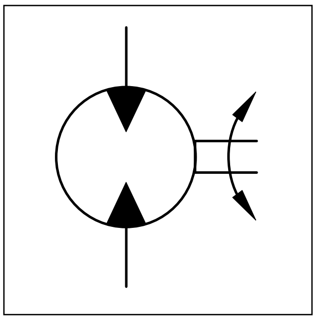
- **Low Speed Gerotor Motor**
- **Zero leak commutation valve**
  For greater, more consistent
  volumetric efficiency
- **Roller vane rotor set**
  Reduces friction and internal leakage
  Maintaining efficiency throughout the life of the motor
- **A patented high-pressure shaft seal**
  No check valves needed
  No extra plumbing
- **Wide choice of displacement range, flange and shaft options**
  Greater efficiency in systems design to suit your application

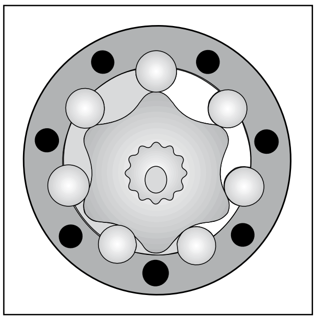
- **Moteur lent systéme Gerotor**
- **Une distribution orbitale particuliére assure**
  fuites internes minimales
  rendements volumàtriques élevés
- **Le rotor à rouleaux**
  réduit les frottements
  augmente la durée de vié
- **Par l`utilisation de joints d`arbre haute pression brevetés**
  pas de conduite de drainage
  pas de clapets anti-retour
- **Gràce à de nombreuses variantes**
  larges domaines d`application

- **Motore orbitale a bassa velocità**
- **Una particolare distribuzione orbitale assicura**
  trafilamento ridotto
  elevato rendimento volumetrico
- **Con lo statore a rullini**
  si riduce l`attrito interno
  si mantiene nel tempo l`efficieza del motore
- **Una guarnizione di tenuta ad alta pressione brevettata elimina la necessità**
  di una linea di drenaggio esterna
  e di valvole di non ritorno
- **Un`ampia gamma di cilindrate, flange ed alberi**
  consentono scelte adeguate ad ogni esigenza costruttiva



Drehzahl Speed Vitesse de rotation Velocità di rotazione	5...710 rev/min
Schluckstrom Oil flow Débit d`huile Portata	max. 115 l/min
Eingangsdruck Supply pressure Pression entrée Pressione in entrata	max. 300 bar
Drehmoment Torque Couple Coppia	max. 1490 Nm
Seitenlast Side load Charges latérales Carico radiale	max. 30.000 N





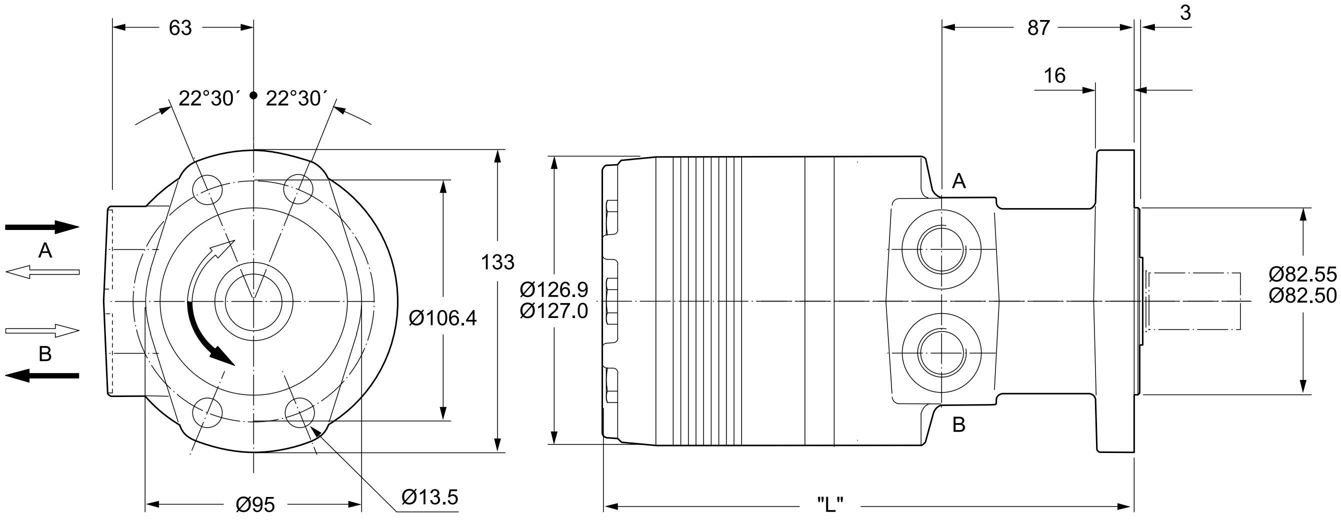
Motor series TF	Geom. Schluckvolumen Geometric displacement Cylindrée Cilindrata [cm³/U] [cm³/rev]	Max. Drehzahl Max. speed Vitesse de rotation maxi Velocità di rotazione max cont / int [U/min] [rev/min]	Max. Schluckstrom Max. oil flow Débit d´huile maxi Portata max cont / int [l/min]	Max. Druckdifferenz * Max. differential pressure * Chute de pression maxi * Caduta di pressione max * cont / int [bar]	Max. Eingangsdruck Max. supply pressure Pression maxi entrée Pressione max in entrata max [bar]	Max. Drehmoment Max. torque Couple maxi Coppia max cont / int [Nm]	Max. Leistungsabgabe Max. performance Puissance de sortie maxi Potenza meccanica max cont / int [KW]	Min. Anlaufmoment Min. starting torque Couple min. fourni au dé manrage Coppia min. di spunto cont / int [Nm]
TH 140	141	530/710	75/100	210/280	300	400/545	33	320/436
TH 170	169	440/575	75/100	210/280	300	485/670	33	388/536
TH 195	195	380/510	75/100	210/280	300	560/770	33	448/616
TH 240	238	320/420	75/100	210/280	300	685/945	32	548/756
TH 280	280	270/350	75/100	210/280	300	800/1100	31	675/880
TH 335	337	225/290	75/100	210/280	300	980/1350	30	784/1080
TH 405	405	185/245	75/100	170/240	300	960/1350	27	791/1145
TH 475	477	160/240	75/115	140/210	300	960/1400	28	768/1120
TH 530	529	140/215	75/115	140/170	300	1050/1280	23	874/1091
TH 625	613	120/185	75/115	120/160	300	1040/1360	20	895/1165
TH 785	786	95/145	75/115	100/140	300	1150/1490	17	991/1341
TH 960	959	78/119	75/115	70/100	300	925/1390	12	763/1177

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

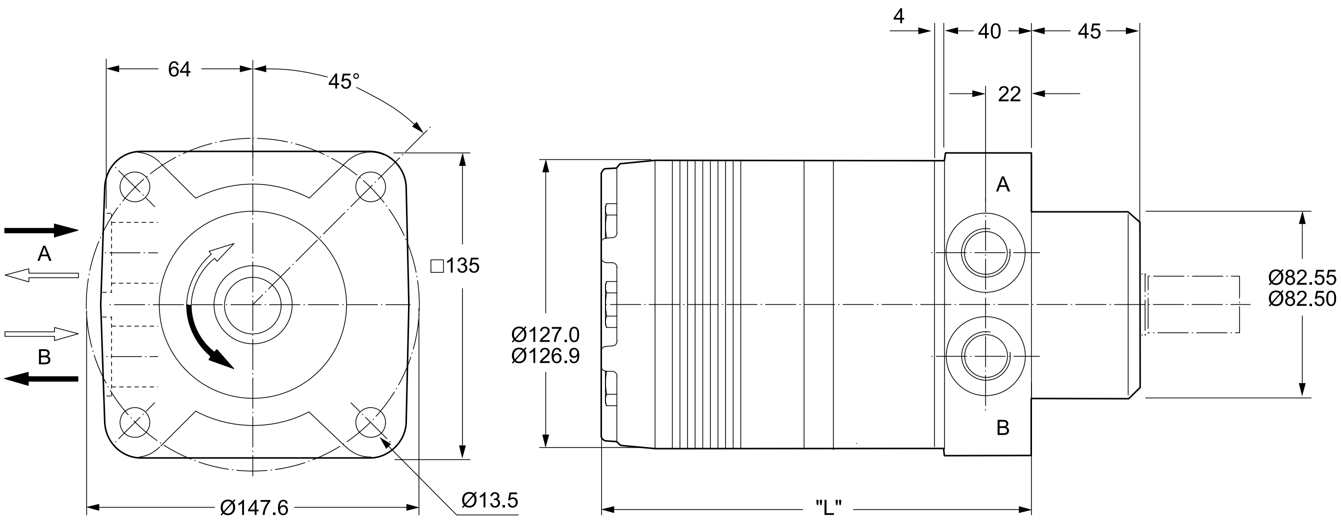
* Druckdifferenz Δp zwischen Ein- und Ausgang
* Pressure difference is Δp between input and output
* La différence de pression est Δp entre l’entrée et la sortie
* La differenza di pressione corrisponde al Δp tra ingresso e uscita

Achtung: Höhere Drücke auf Anfrage möglich.
Notice: Higher pressures are possible on request.
Remarque : des pressions supérieures sont possibles sur demande.
Nota: Pressioni superiori possibili su richiesta.

Code M

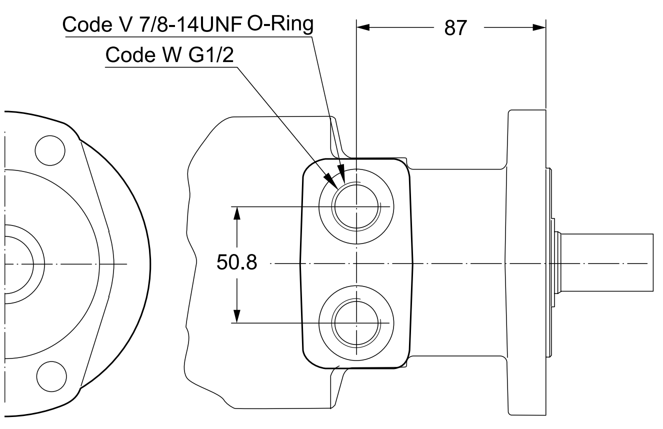


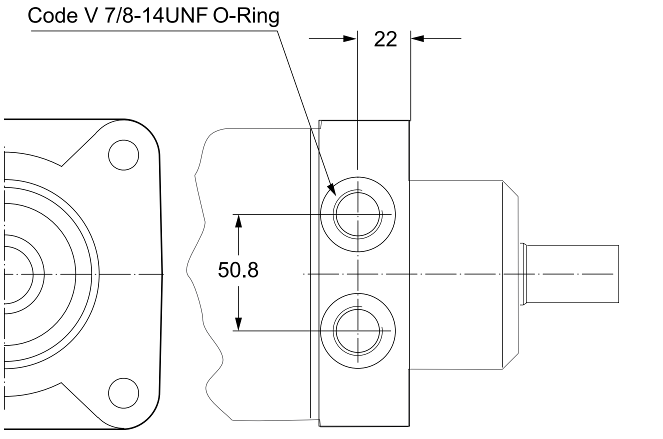
Code U



Gewicht /	Weight	TH140	TH170	TH195	TH240	TH280	TH335	TH405	TH475	TH530	TH625	TH785	TH960
Poids /	Peso [kg]	17.0	17.2	17.4	17.8	18.2	18.6	19.2	19.8	20.6	21.3	22.9	24.5
Code M	”L” [mm]	216	219	222	227	232	238	245	254	260	270	289	308
Code U	”L” [mm]	173	177	180	184	189	196	203	212	218	227	246	265

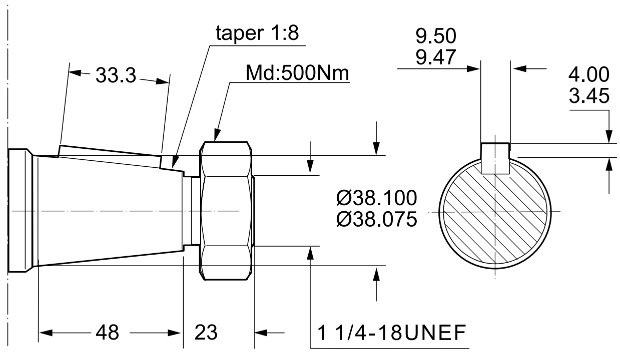
Ports



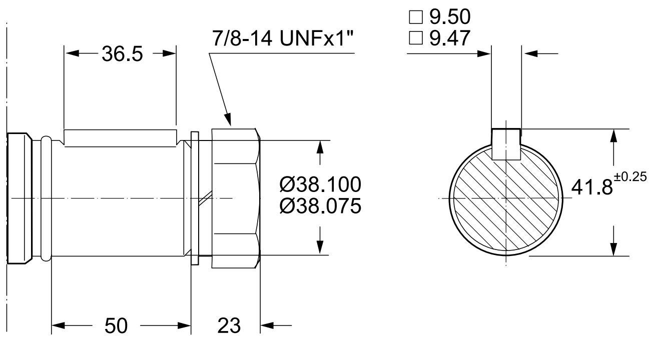


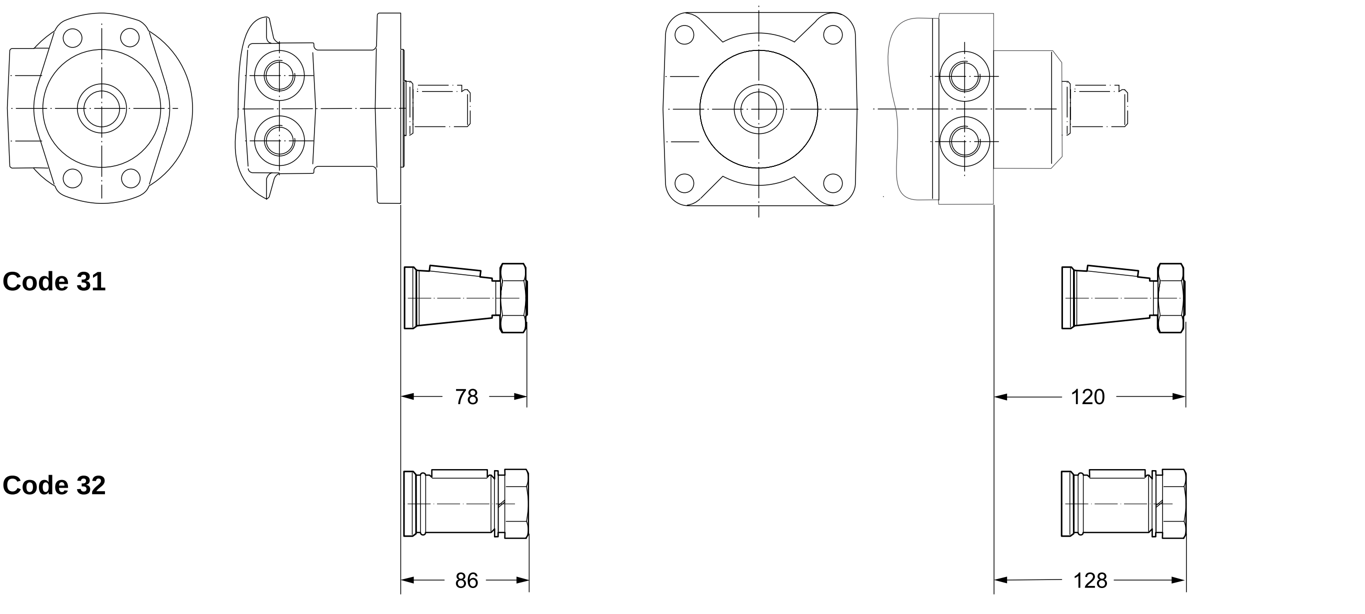
Coupling shaft

Code 31



Code 32



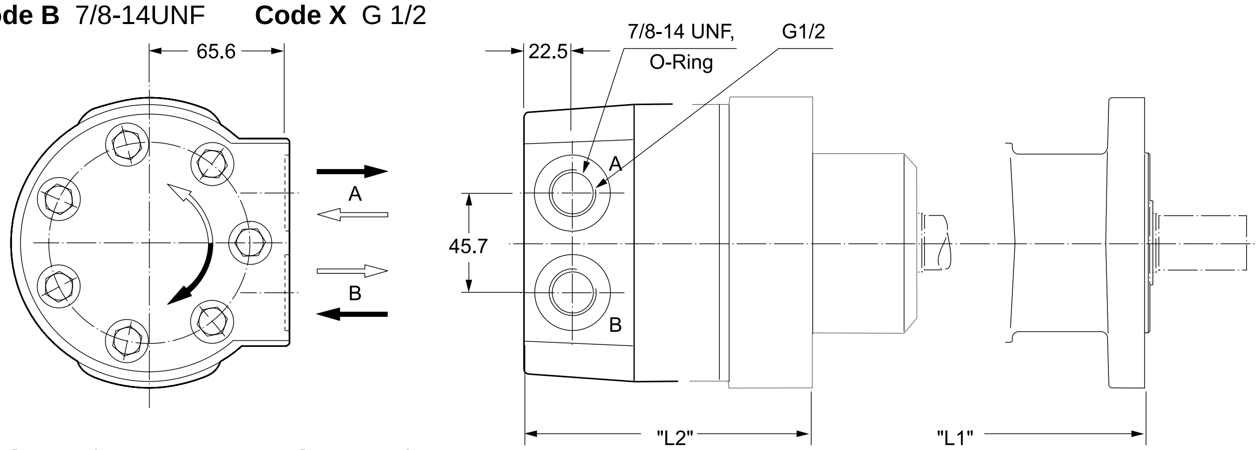


Code 31

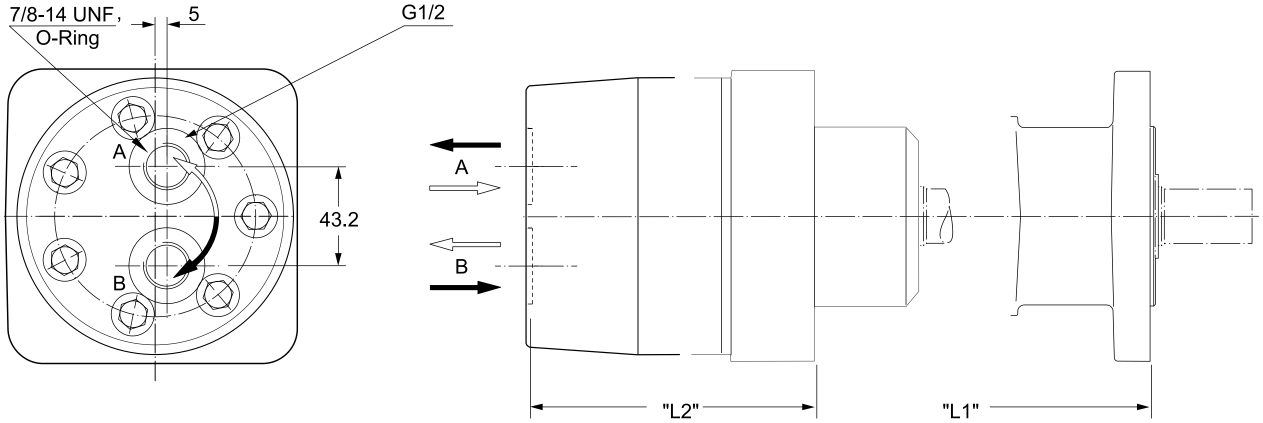
Code 32

Parker Hannifin
Pump and Motor Division
Chemnitz, Germany

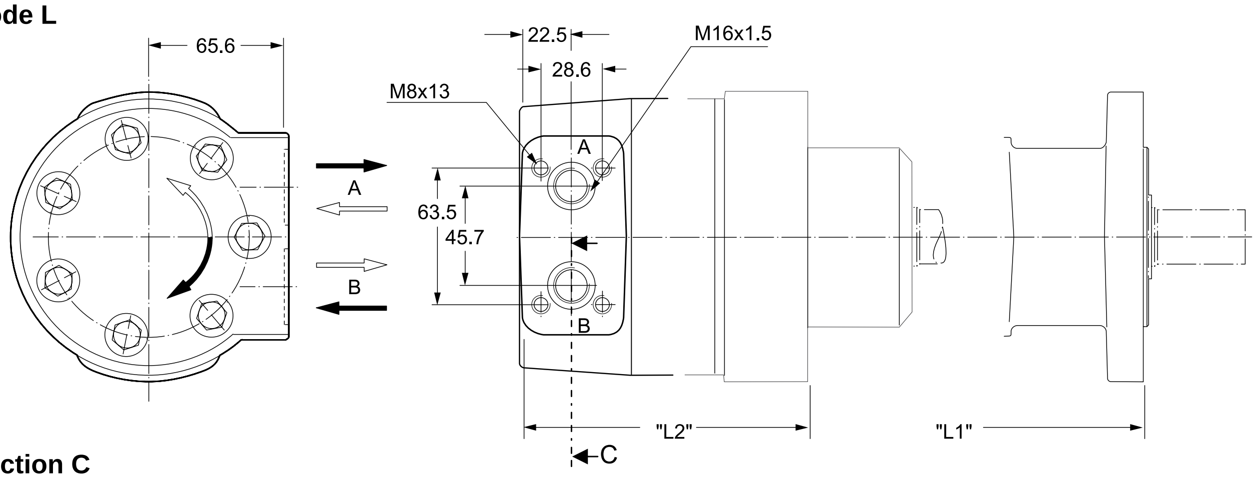
Code B 7/8-14UNF **Code X** G 1/2



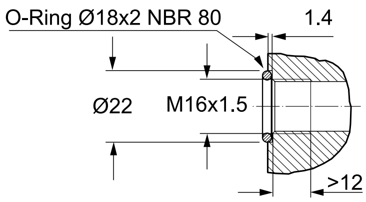
Code A 7/8-14UNF **Code Y** G 1/2



Code L



Section C



Zum Motor mit Universalanschluss werden 2 O-Ringe geliefert.

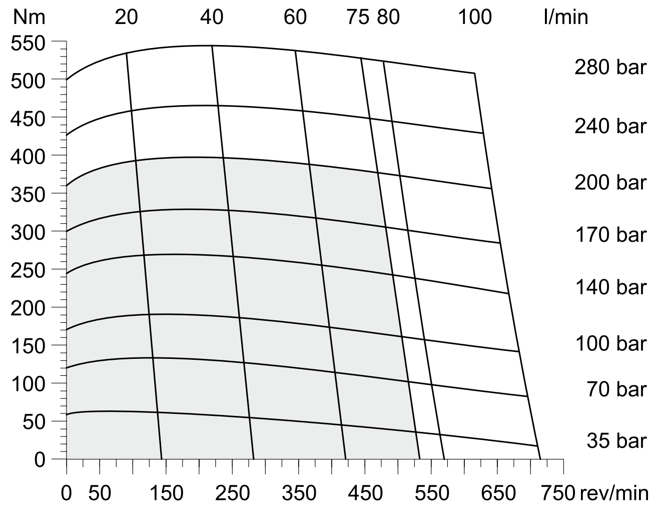
Motor with manifold mount is supplied with 2 O-rings.

Deux joints toriques sont livrés avec les moteurs au plan de raccordement universel.

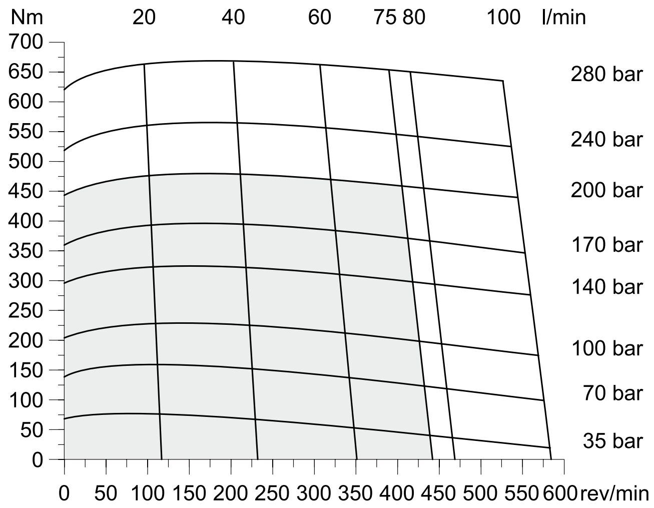
Il blocchetto connessioni è corredato da 2 OR.

Gewicht /	Weight	TH140	TH170	TH195	TH240	TH280	TH335	TH405	TH475	TH530	TH625	TH785	TH960
Poids /	Peso [kg]	18.6	18.8	19.0	19.4	19.8	20.2	20.8	21.4	22.2	22.9	24.5	26.1
Code	"L1" [mm]	241	244	247	252	257	263	270	279	285	295	314	333
B, X, L, A, Y	"L2" [mm]	198	202	205	209	214	221	228	237	243	252	271	290

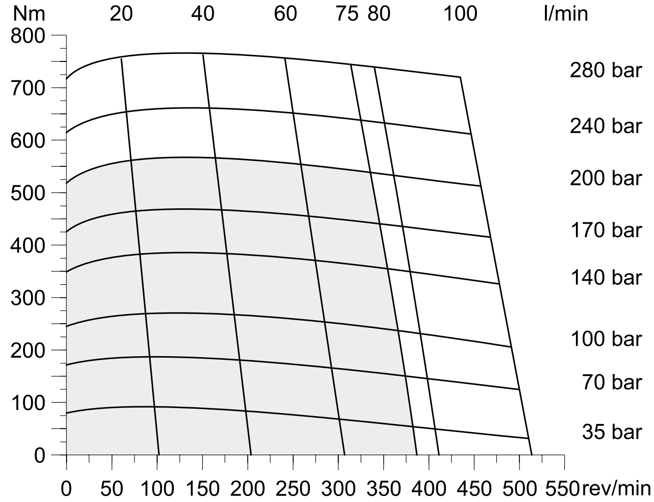
TH 140



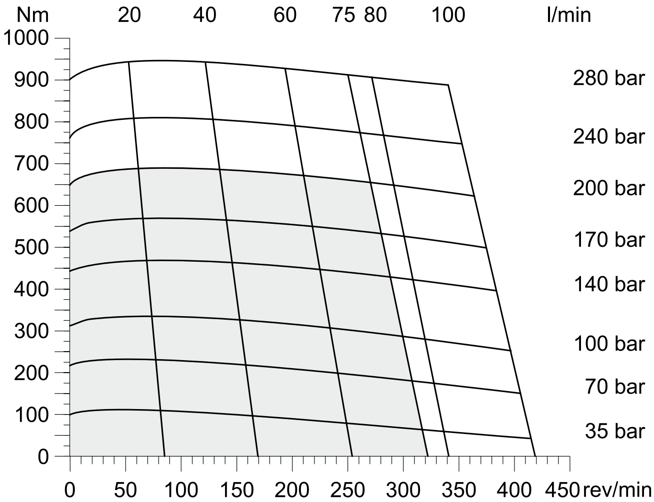
TH 170



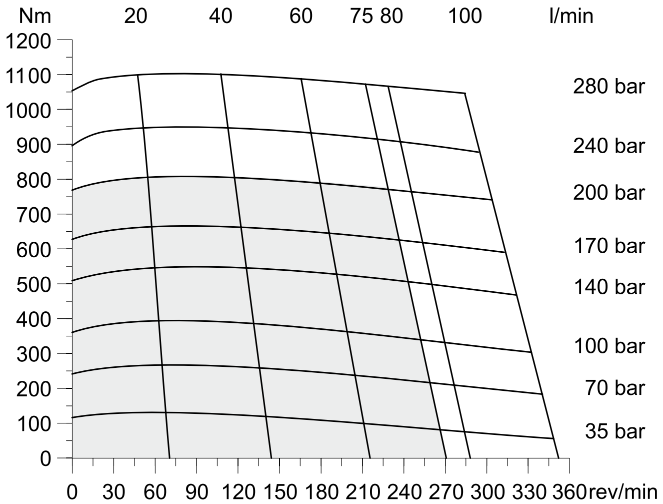
TH 195



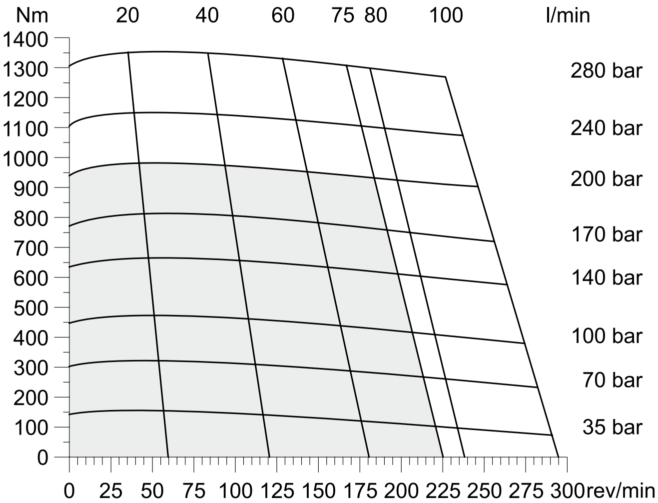
TH 240



TH 280



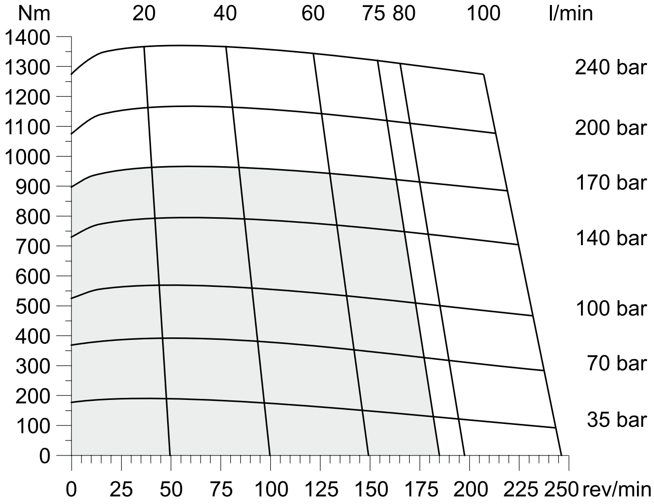
TH 335



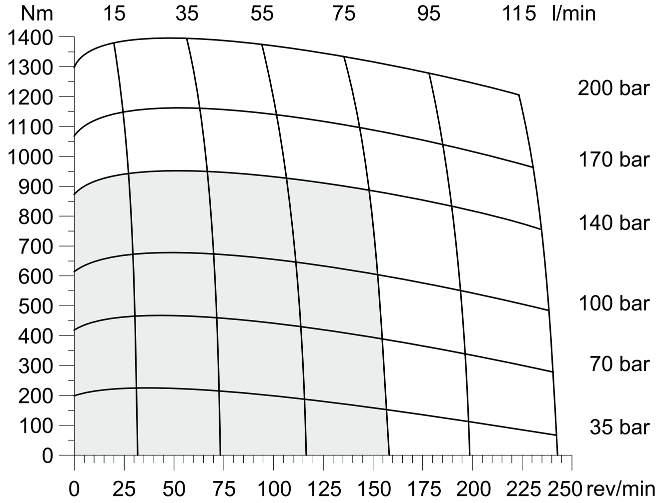
☐ Cont. ☐ Int.

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

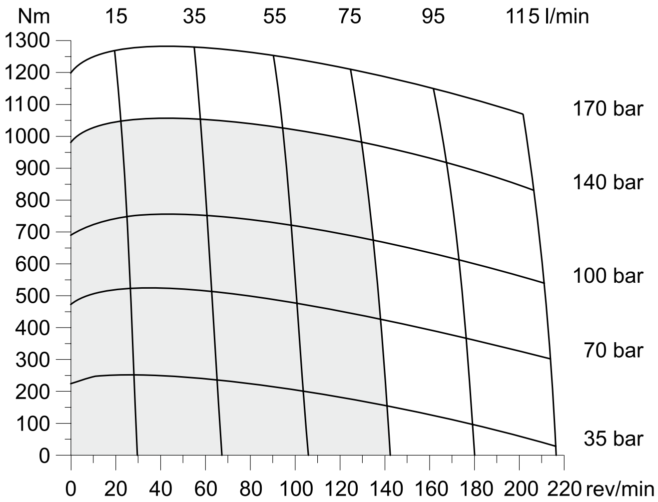
TH 405



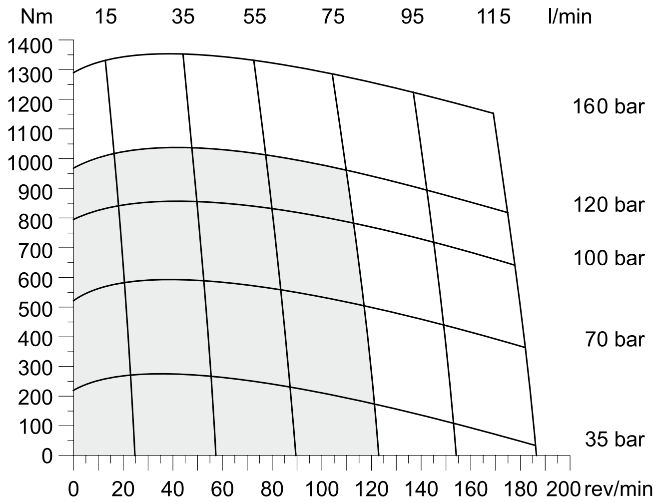
TH 475



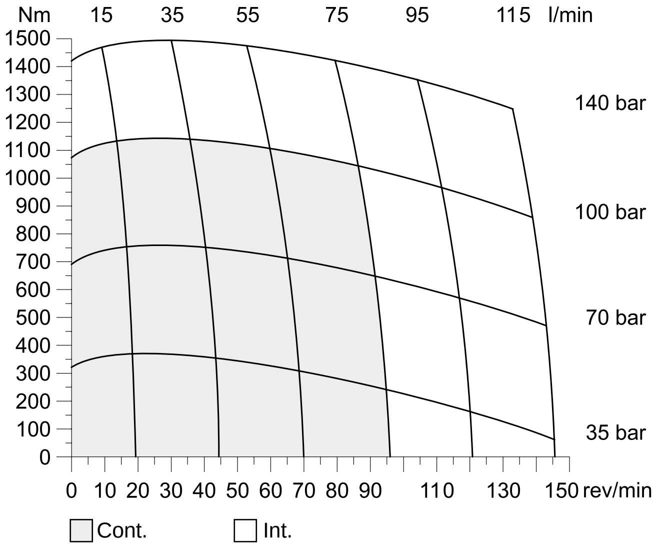
TH 530



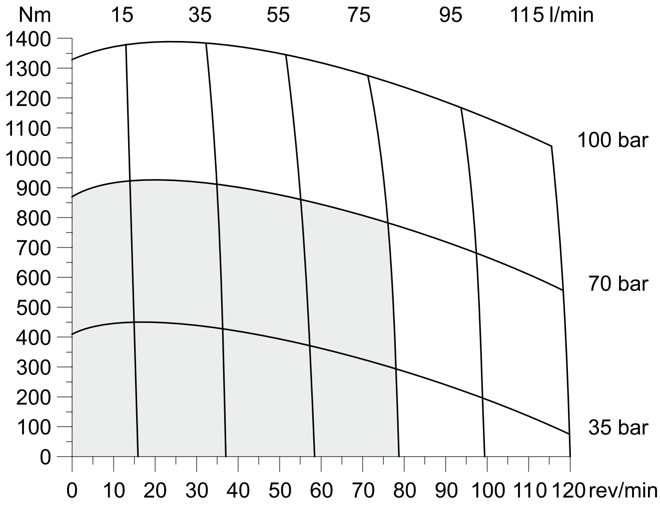
TH 625



TH 785

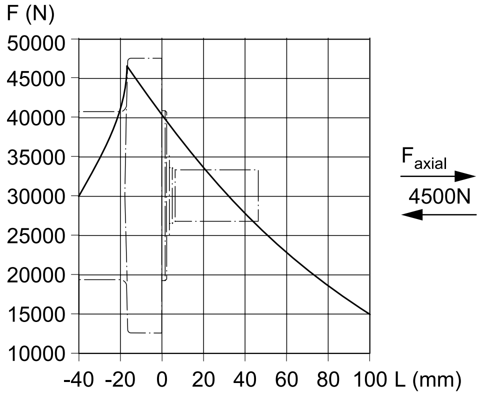


TH 960

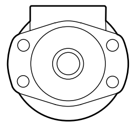


int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

Code M

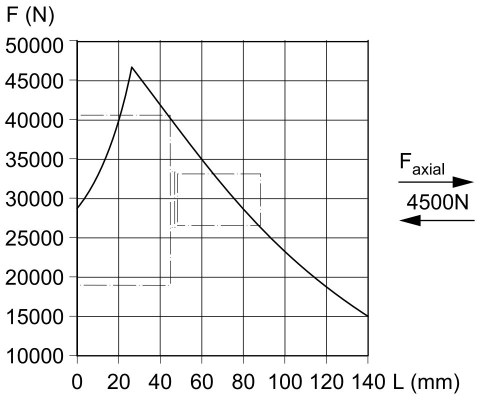


F_{Radial} [N]

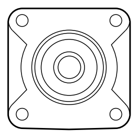


$$L_h = \frac{\left(\frac{1500000}{F_R \cdot \left(1.20 + \frac{L}{95mm}\right)}\right)^{3.3}}{n}$$

Code U



F_{Radial} [N]



$$L_h = \frac{\left(\frac{1500000}{F_R \cdot \left(0.76 + \frac{L}{95mm}\right)}\right)^{3.3}}{n}$$

Die Lebensdauer der Radiallager (L_h in Stunden) lässt sich nach folgender Formel berechnen. Die Größe F_R ist durch die mechanische Festigkeit der Abtriebswelle begrenzt (siehe Diagramm). Das Maß ”L” ist das Längenmaß vom Gehäuseflansch bis zum Angriffspunkt der Radialkraft F_R.

Life time (L_h in hours) of the radial bearings can be calculated with the following formula. The value F_R is limited by the mechanical strength of the shaft (see diagram). The measurement ”L” is the length from the housing flange up to the point of impact of the radial force F_R.

La durée de vie des roulements radiaux (L_h en heures) peut être calculée par les formules suivantes. La grandeur F_R est limitée par les résistances mécaniques de l`arbre de sortie (voir diagramme). La cote ”L” est la longueur entre la bride du carter jusqu`au point d`appui de l`effort radial F_R.

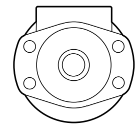
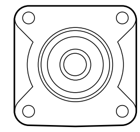
La durata dei cuscinetti (L_h in ore) può essere calcolata con la seguente formula. Il valore F_R è limitato dalla resistenza meccanica dell`albero (vedi diagramma). La quota ”L” è la distanza tra la flangia del corpo ed il punto di applicazione della forza radiale F_R.

Vorstehende Formeln gelten für eine B10-Lebensdauer.	**L_h**	**=**	**[h]**
The preceding formulas are valid for a B10 duration of life.	**L**	**=**	**[mm]**
Les formules prècèdentes sont valables pour une durèe de vie B10.	**n**	**=**	**[rev/min]**
Le formule precedenti sono valide per una durata della vita B10.			

TH											A	A	A	B

Serie / Series / Série / Serie — **Schluckvolumen / Displacement / Cylindrée / Cilindrata** — **Gehäuse / Housing / Carter / Corpo motore** — **Anschluss / Ports / Plan de raccordement / Connessioni** — **Welle / Shaft / Arbre / Albero** — **Drehrichtung / Direction of rotation / Direction de rotation / Direzione di rotazione** — **Option**

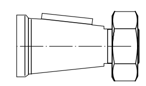
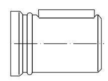
Code	cm³/rev
0140	140
0170	169
0195	195
0240	237
0280	280
0335	337
0405	405
0475	476
0530	529
0625	624
0785	786
0960	958

Code	Housing
M	
U	

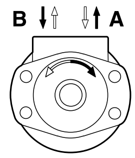
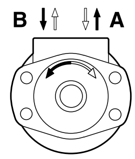
Code	Front port
S	7/8-14 UNF O-Ring
W [1]	G 1/2

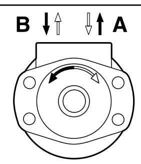
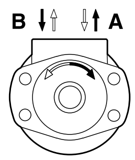
[1] Nicht verfügbar für Gehäuse "U"
Not possible for housing "U"
Pas disponible pour carter "U"
Non Disponibile con il corpo codice "U"

Code	Rear port
Y	G 1/2 Axial
A	7/8-14 UNF Axial
X	G 1/2 Radial
B	7/8-14 UNF Radial
L	Universal Radial M8x13

Code	Shaft
31	
32	

For further options different to standard 'AAAB' see page 57.

Code	Front port
0	 Standard
1	

Code	Rear port
0	 Standard
1	

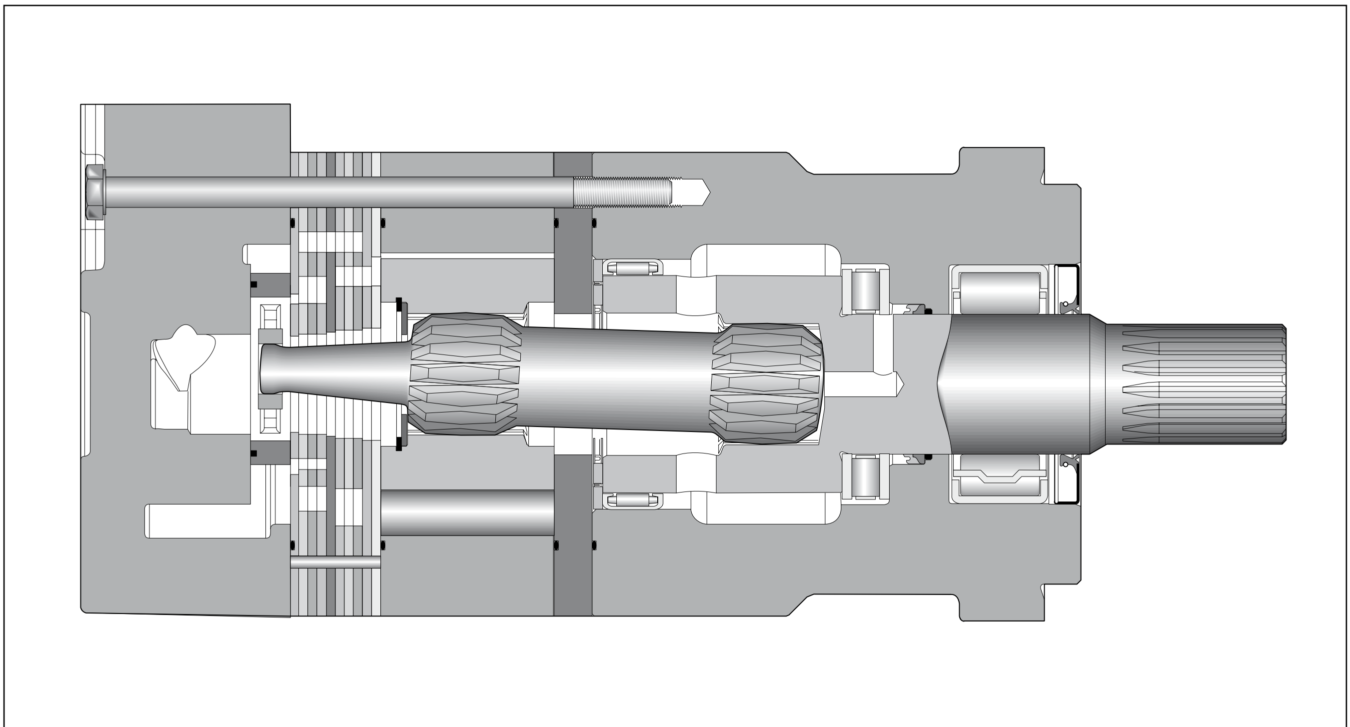
Parker Hannifin
Pump and Motor Division
Chemnitz, Germany

- **Langsamlaufender Gerotor-Motor**
- **Spezielle Orbital-Steuerung**
  Geringe interne Leckage
  Hoher volumetrischer Wirkungsgrad
- **Rollen im Rotorsatz**
  Reduzierte Reibung
  Lange Lebensdauer
- **Patentierte Hochdruckwellendichtung**
  Keine Leckölleitung
  Keine Rückschlagventile
- **Vielzahl von Varianten**
  Großer Einsatzbereich

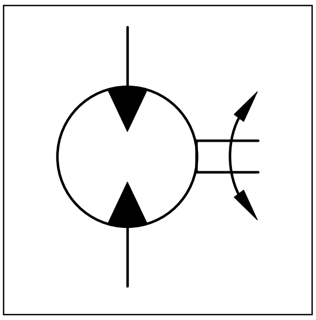
- **Low Speed Gerotor Motor**
- **Zero leak commutation valve**
  For greater, more consistent volumetric efficiency
- **Roller vane rotor set**
  Reduces friction and internal leakage
  Maintaining efficiency throughout the life of the motor
- **A patented high-pressure shaft seal**
  No check valves needed
  No extra plumbing
- **Wide choice of displacement range, flange and shaft options**
  Greater efficiency in systems design to suit your application

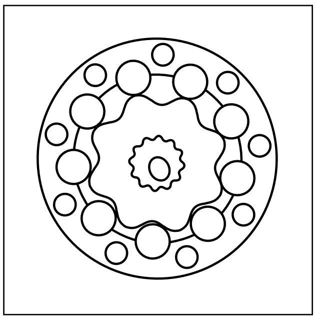
- **Moteur lent systéme Gerotor**
- **Une distribution orbitale particuliére assure**
  fuites internes minimales
  rendements volumàtriques élevés
- **Le rotor à rouleaux**
  réduit les frottements
  augmente la durée de vié
- **Par l`utilisation de joints d`arbre haute pression brevetés**
  pas de conduite de drainage
  pas de clapets anti-retour
- **Gràce à de nombreuses variantes**
  larges domaines d`application

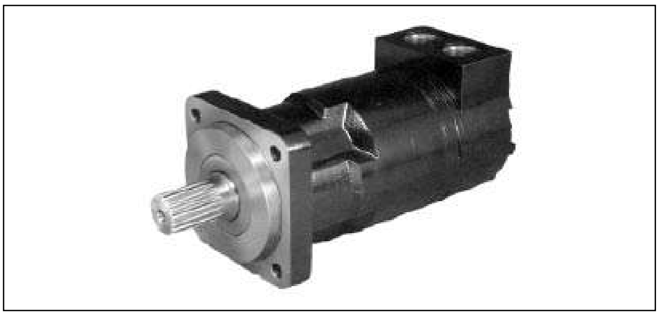
- **Motore orbitale a bassa velocità**
- **Una particolare distribuzione orbitale assicura**
  trafilamento ridotto
  elevato rendimento volumetrico
- **Con lo statore a rullini**
  si riduce l`attrito interno
  si mantiene nel tempo l`efficieza del motore
- **Una guarnizione di tenuta ad alta pressione brevettata elimina la necessità**
  di una linea di drenaggio esterna
  e di valvole di non ritorno
- **Un`ampia gamma di cilindrate, flange ed alberi**
  consentono scelte adeguate ad
  ogni esigenza costruttiva



Drehzahl Speed Vitesse de rotation Velocità di rotazione	5...520 rev/min
Schluckstrom Oil flow Débit d`huile Portata	max. 225 l/min
Eingangsdruck Supply pressure Pression entrée Pressione in entrata	max. 330 bar
Drehmoment Torque Couple Coppia	max. 2700 Nm
Seitenlast Side load Charges latérales Carico radiale	max. 26.000 N







Motor series TF	Geom. Schluckvolumen Geometric displacement Cylindrée Cilindrata [cm³/U] [cm³/rev]	Max. Drehzahl Max. speed Vitesse de rotation maxi Velocità di rotazione max cont / int [U/min] [rev/min]	Max. Schluckstrom Max. oil flow Débit d´huile maxi Portata max cont / int [l/min]	Max. Druckdifferenz * Max. differential pressure * Chute de pression maxi * Caduta di pressione max * cont / int [bar]	Max. Eingangsdruck Max. supply pressure Pression maxi entrée Pressione max in entrata max [bar]	Max. Drehmoment Max. torque Couple maxi Coppia max cont / int [Nm]	Max. Leistungabgabe Max. performance Puissance de sortie maxi Potenza meccanica max cont / int [KW]	Min. Anlaufmoment Min. starting torque Couple min. fourni au dé manrage Coppia min. di spunto cont / int [Nm]
TK 250	250	523	114/133	240/310	330	815/1043	49	690/880
TK 315	315	413	114/133	240/310	330	1030/1315	47	950/1220
TK 400	400	373	114/151	205/275	330	1150/1525	49	1050/1410
TK 500	500	300	114/151	205/275	330	1440/1915	48	1320/1780
TK 630	630	240	114/151	205/225	330	1620/1715	34	1500/1620
TK 800	800	276	151/227	190/205	330	1915/2300	44	1740/1900
TK 1000	1000	220	151/227	175/190	330	2410/2660	35	1980/2180

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

- * Druckdifferenz Δp zwischen Ein- und Ausgang
- * Pressure difference is Δp between input and output
- * La différence de pression est Δp entre l'entrée et la sortie
- * La differenza di pressione corrisponde al Δp tra ingresso e uscita

Achtung: Höhere Drücke auf Anfrage möglich.
Notice: Higher pressures are possible on request.
Remarque : des pressions supérieures sont possibles sur demande.
Nota: Pressioni superiori possibili su richiesta.

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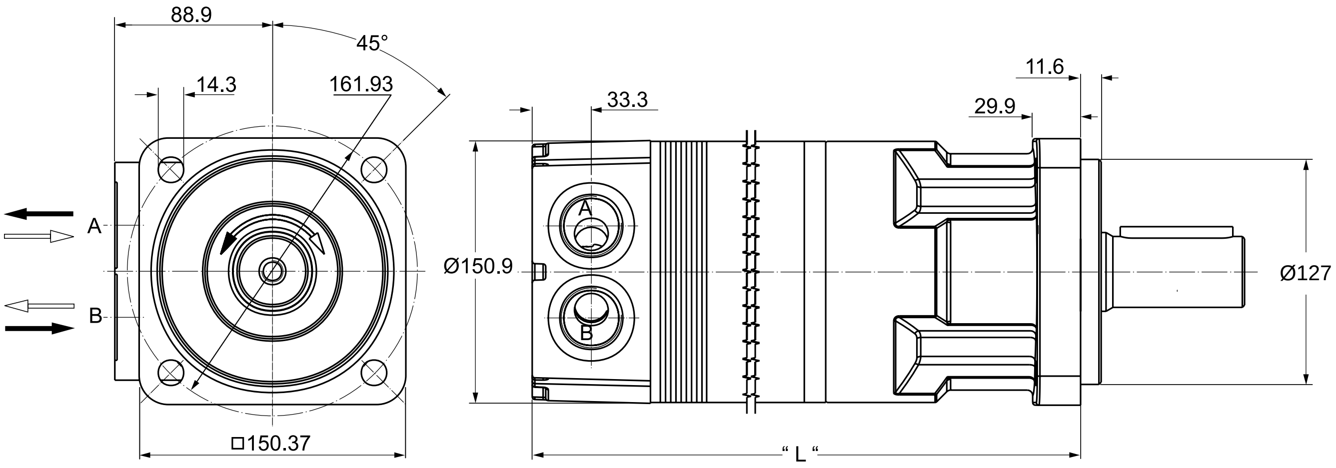
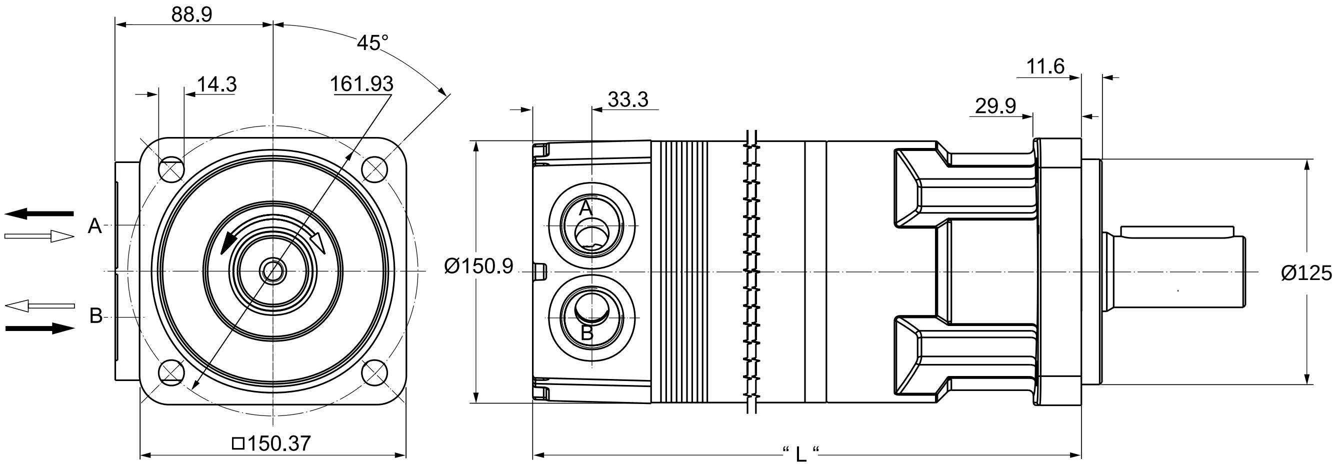
Pump and Motor Division
Chemnitz, Germany

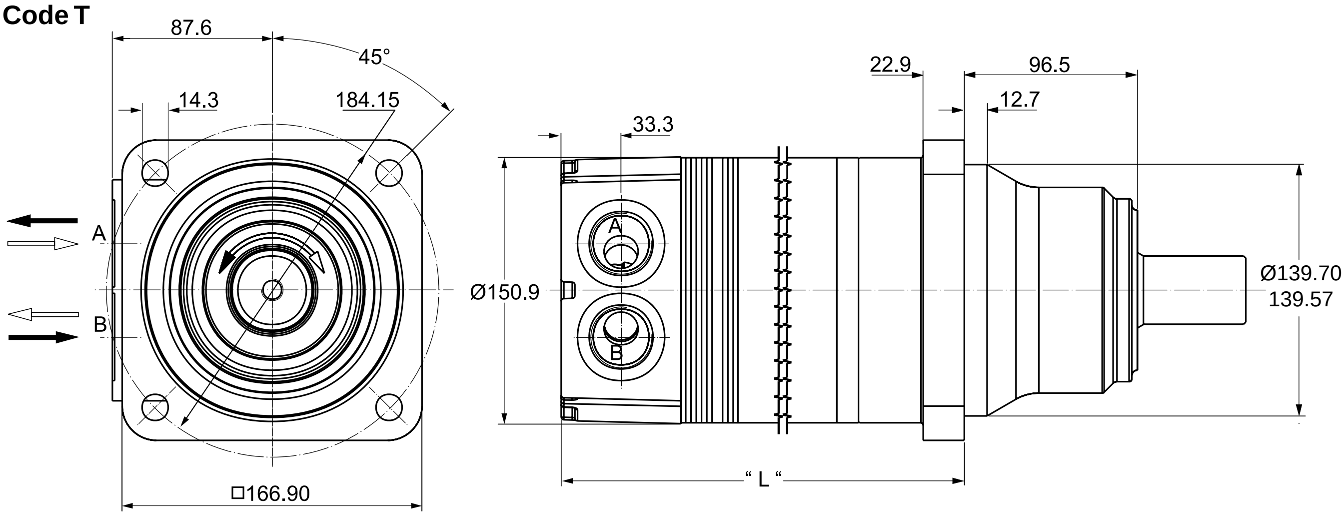
Code K



Code R

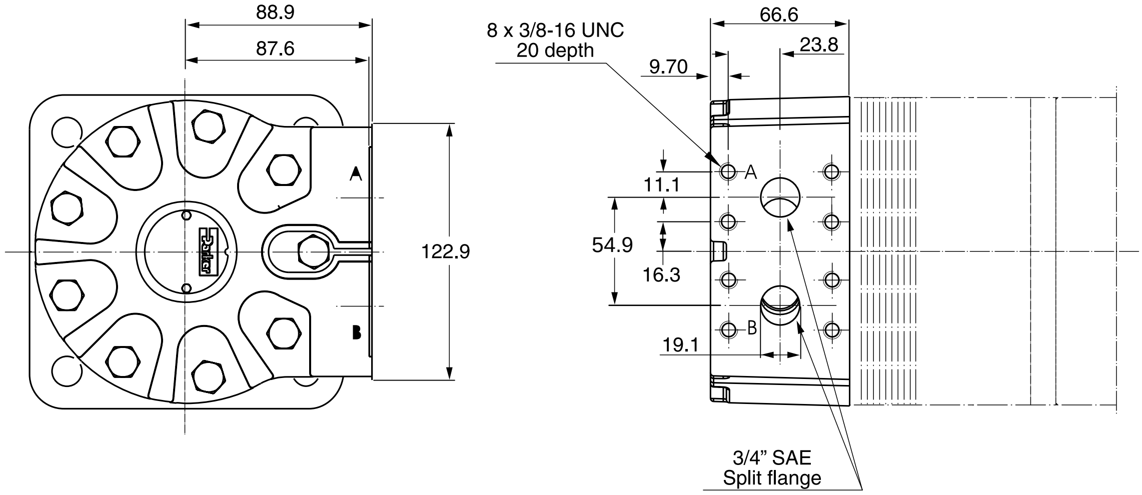


Code T

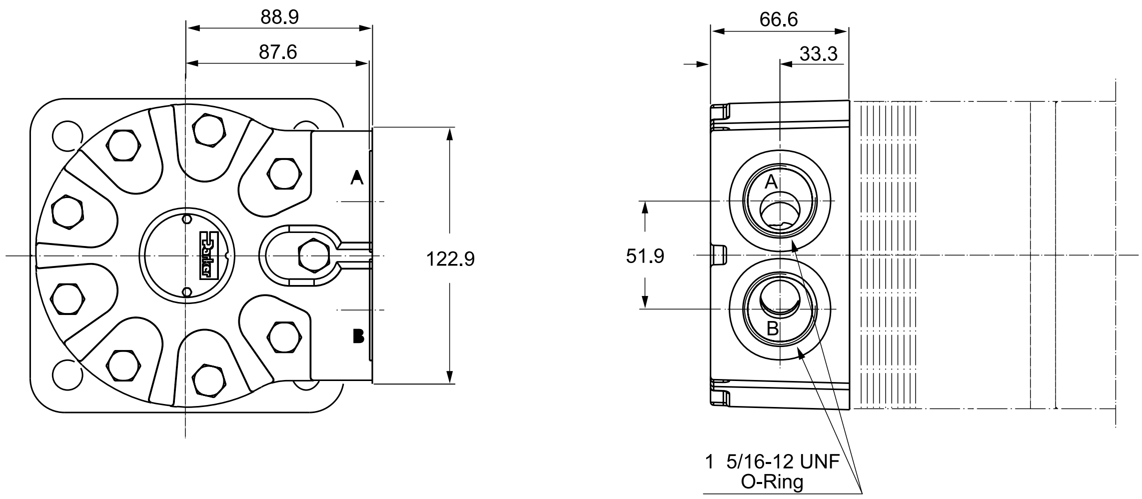


Gewicht / Weight / Poids / Peso		TK250	TK315	TK400	TK500	TK630	TK800	TK1000
Code K, R	[kg]	32.0	32.7	33.5	34.5	35.7	37.2	39.1
Code T	[kg]	30.8	31.4	32.3	33.2	34.5	36.0	37.9
Code K, R	"L" [mm]	277	282	290	297	310	323	340
Code T	"L" [mm]	191	196	203	213	224	239	257

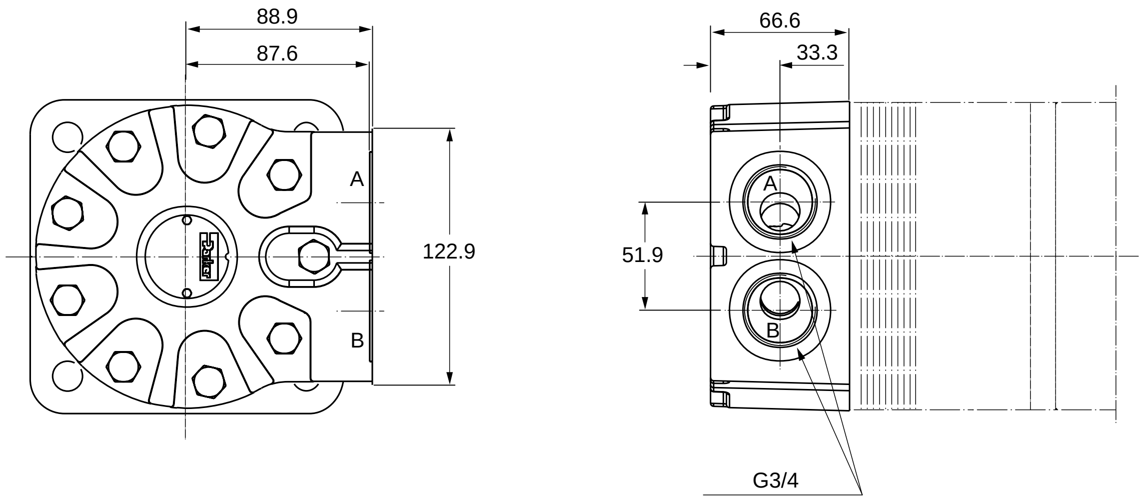
Code 4



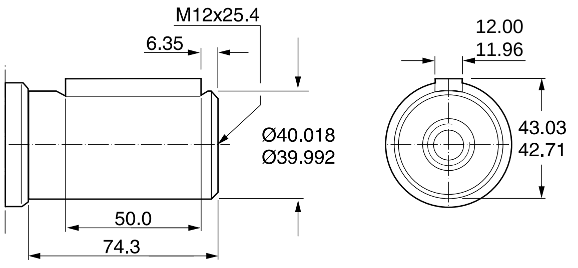
Code 5



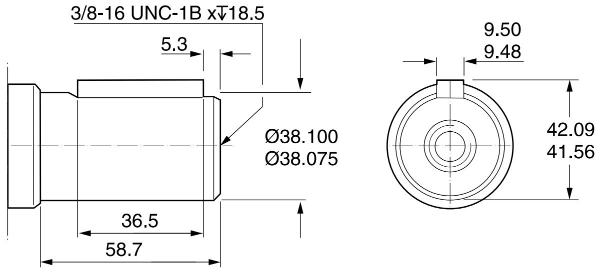
Code 6



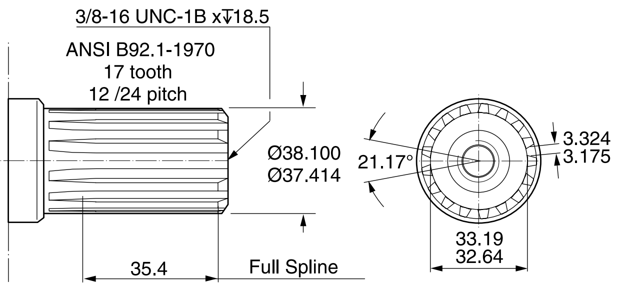
Code 64



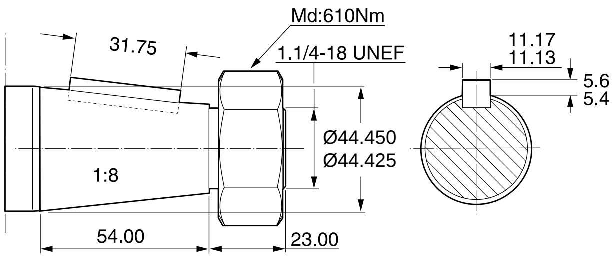
Code 32

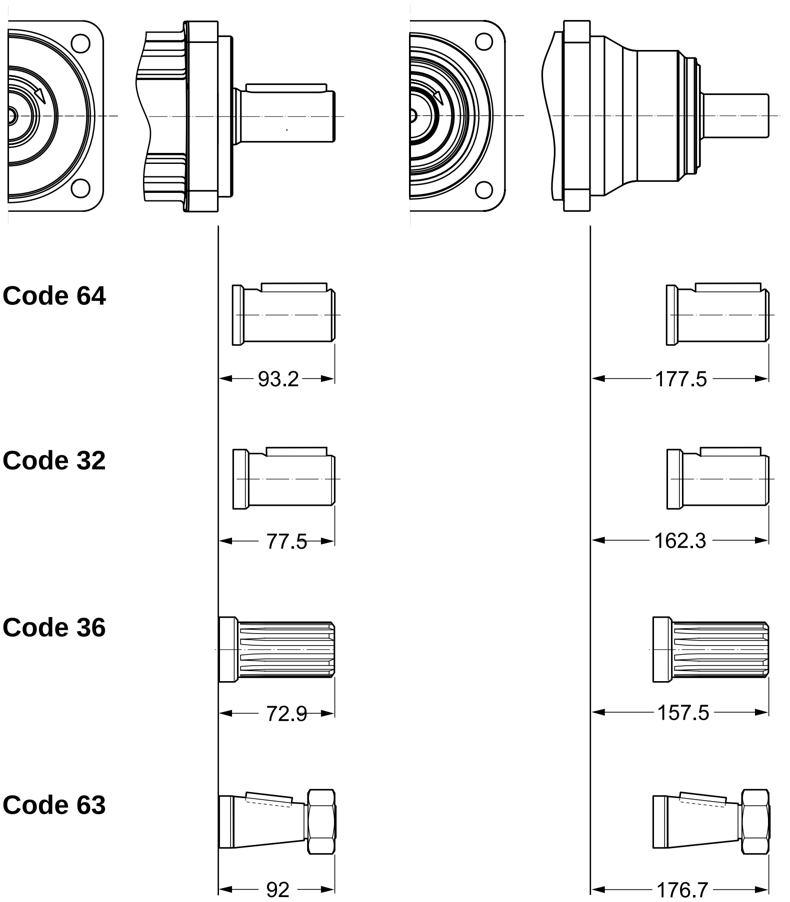


Code 36



Code 63





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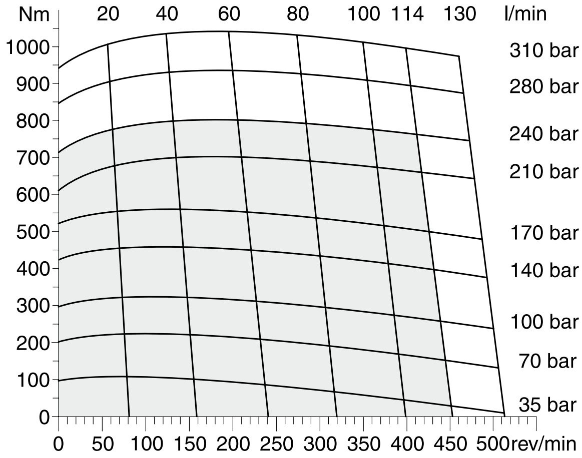
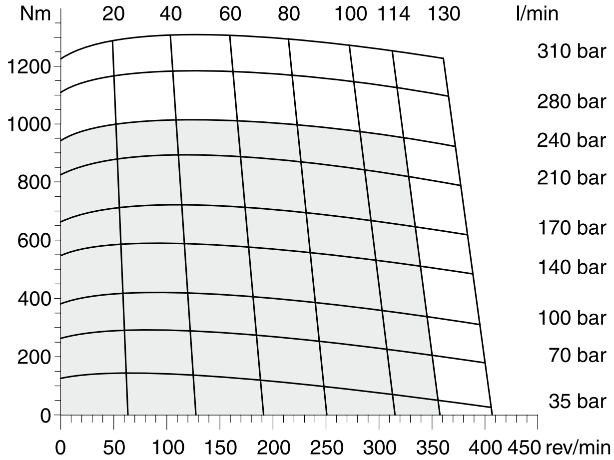
Pump and Motor Division
Chemnitz, Germany

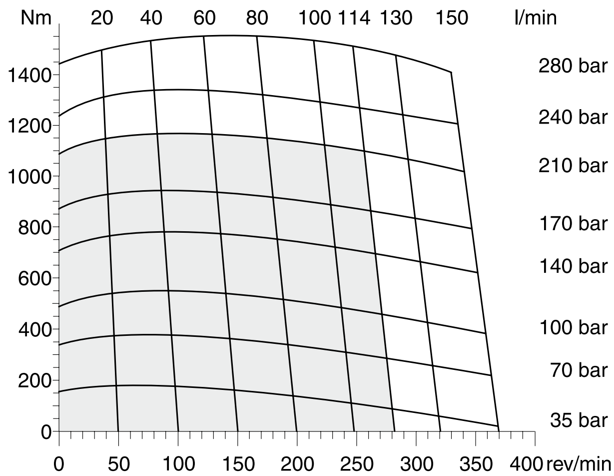
TK 250



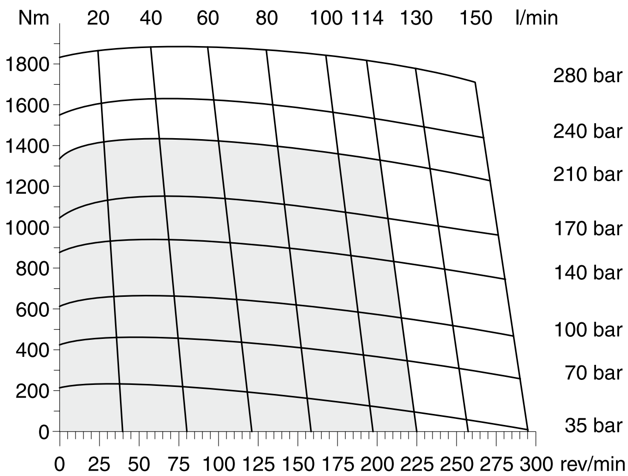
TK 315



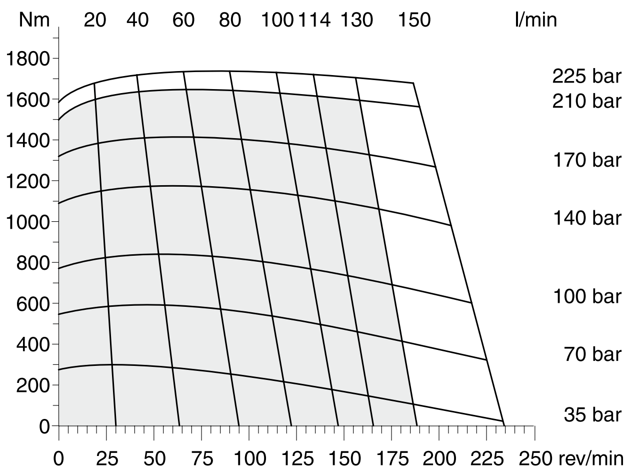
TK 400



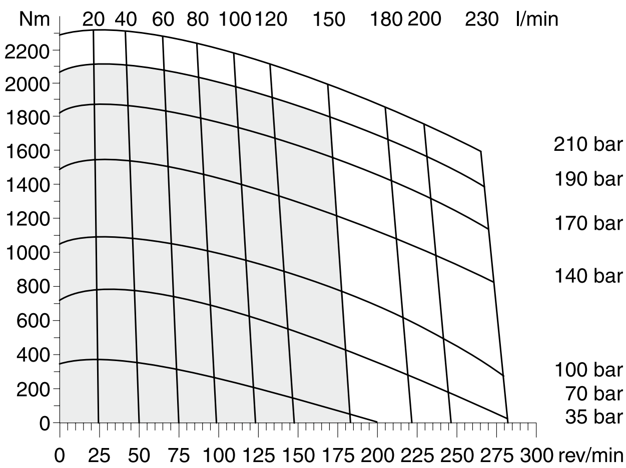
TK 500



TK 630



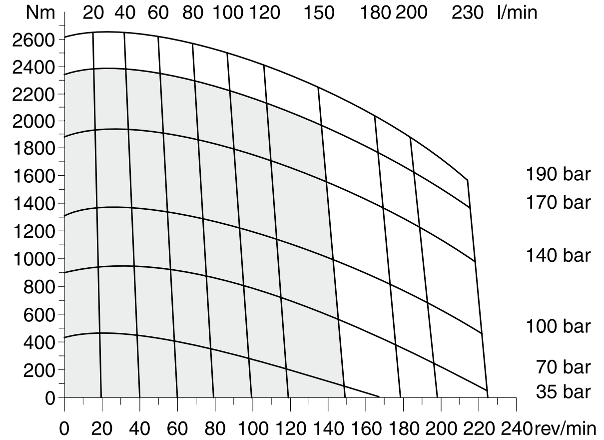
TK 800



Cont. Int.

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

TK 1000



Life Time

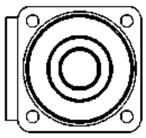
Die Lebensdauer der Radiallager (L_h in Stunden) lässt sich nach folgender Formel berechnen. Die Größe F_R ist durch die mechanische Festigkeit der Abtriebswelle begrenzt (siehe Diagramm). Das Maß "L" ist das Längenmaß vom Gehäuseflansch bis zum Angriffspunkt der Radialkraft F_R.

Life time (L_h in hours) of the radial bearings can be calculated with the following formula. The value F_R is limited by the mechanical strength of the shaft (see diagram). The measurement "L" is the length from the housing flange up to the point of impact of the radial force F_R.

La durée de vie des roulements radiaux (L_h en heures) peut être calculée par les formules suivantes. La grandeur F_R est limitée par les résistances mécaniques de l`arbre de sortie (voir diagramme). La cote "L" est la longueur entre la bride du carter jusqu`au point d`appui de l`effort radial F_R.

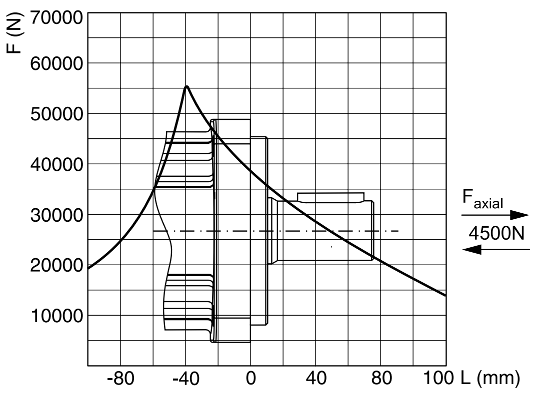
La durata dei cuscinetti (L_h in ore) può essere calcolata con la seguente formula. Il valore F_R è limitato dalla resistenza meccanica dell`albero (vedi diagramma). La quota "L" è la distanza tra la flangia del corpo ed il punto di applicazione della forza radiale F_R.

Code K

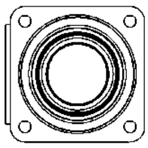


$$L_h = \frac{12 \cdot 10^6}{60 \cdot n} \left\{ \frac{F_a}{F_b} \right\}^{3.33}$$

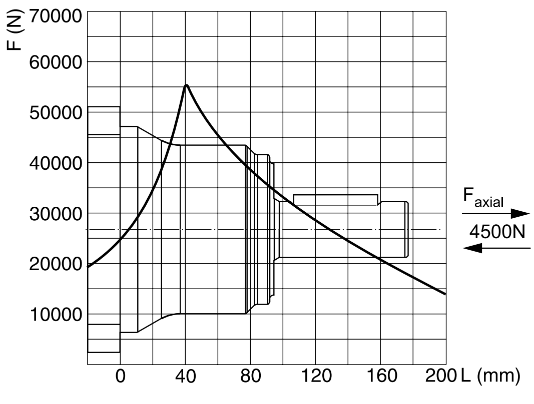
F_{Radial} [N]



Code T



$$L_h = \frac{12 \cdot 10^6}{60 \cdot n} \left\{ \frac{F_a}{F_b} \right\}^{3.33}$$



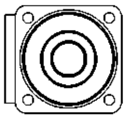
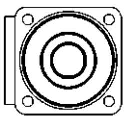
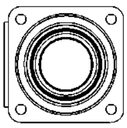
Life in hours / Lebensdauer in Stunden	L_h	=	**[h]**
Shaft speed / Abtriebswellendrehzahl	**n**	=	**[rev/min]**
Allowable side load defined by above curve at a distance from mounting flange / Erlaubte radiale Wellenbelastung als Funktion der Länge	F_b	=	**F [N]**
Application side load / Anwendungsseitige Wellenbelastung			

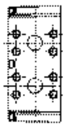
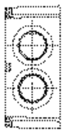
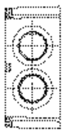
Vorstehende Formeln gelten für eine B10-Lebensdauer. / The preceding formulas are valid for a B10 duration of life.
Les formules prècèdentes sont valables pour une durèe de vie B10. / Le formule precedenti sono valide per una durata della vita B10.

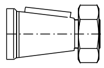
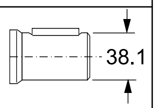
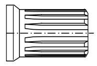
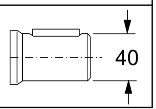
Ordering Code

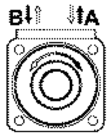
TK											A	A	A	B
Serie Series Série Serie	**Schluckvolumen Displacement Cylindrée Cilindrata**				**Gehäuse Housing Carter Corpo motore**	**Anschluss Ports Plan de raccorde-ment Connessioni**	**Welle Shaft Arbre Albero**		**Drehrichtung Direction of rotation Direction de rotation Direzione di rotazione**		**Option**			

Code	cm^3/rev
0250	250
0315	315
0400	400
0500	500
0630	630
0800	800
1000	1000

Code	Housing
K	
R1)	
T	

Code	Port
4	3/4 Split Flange Manifold 
5	1 5/16-12 SAE 
6	G3/4 

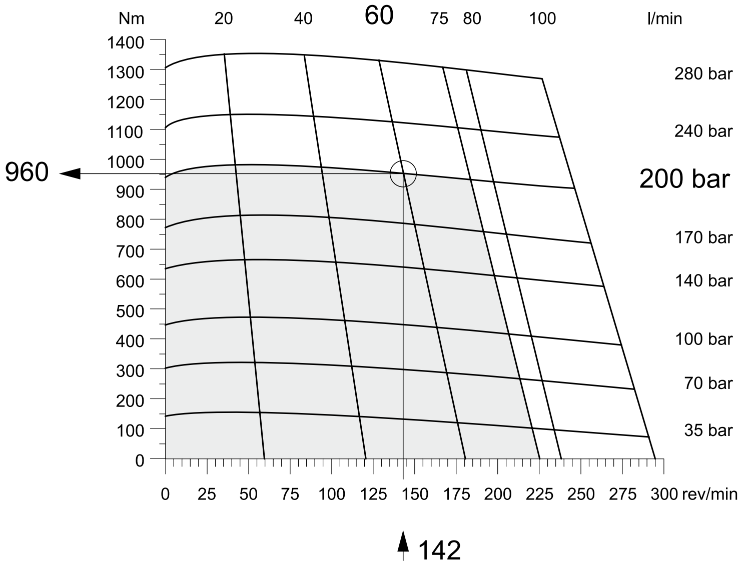
Code	Shaft
63	
32	
36	
64	

Code	Direction
0	 Standard
1	

Berechnung von Wirkungsgrad und Leistung
Calculation of efficiency and output power
Dètermination du rendement et de la puissance
Calcoli di rendimento e potenza utile

TG 335

Md = 960 Nm
n = 142 rev/min
Δp = 200 bar
V = 337 cm^3/rev
Q = 60 l/min



Hydraulisch-mechanischer Wirkungsgrad (η_{hm})
Hydraulic-mechanical efficiency
Rendemment hydro-mècanique
Rendimento idro-meccanico

$$\eta_{hm} = \frac{Md \cdot 20 \cdot \pi}{\Delta p \cdot V} = \frac{960 \cdot 20 \cdot \pi}{200 \cdot 337}$$

$\eta_{hm} = 0.89$

Volumetrischer Wirkungsgrad (η_{vol})
Volumtric efficiency
Rendement volumètrique
Rendimento volumetrico

$$\eta_{vol} = \frac{n \cdot V}{Q \cdot 10^3} = \frac{142 \cdot 337}{60 \cdot 10^3}$$

$\eta_{vol} = 0.80$

Gesamtwirkungsgrad (η_{ges})
Overall efficiency
Rendement global
Rendimento totale

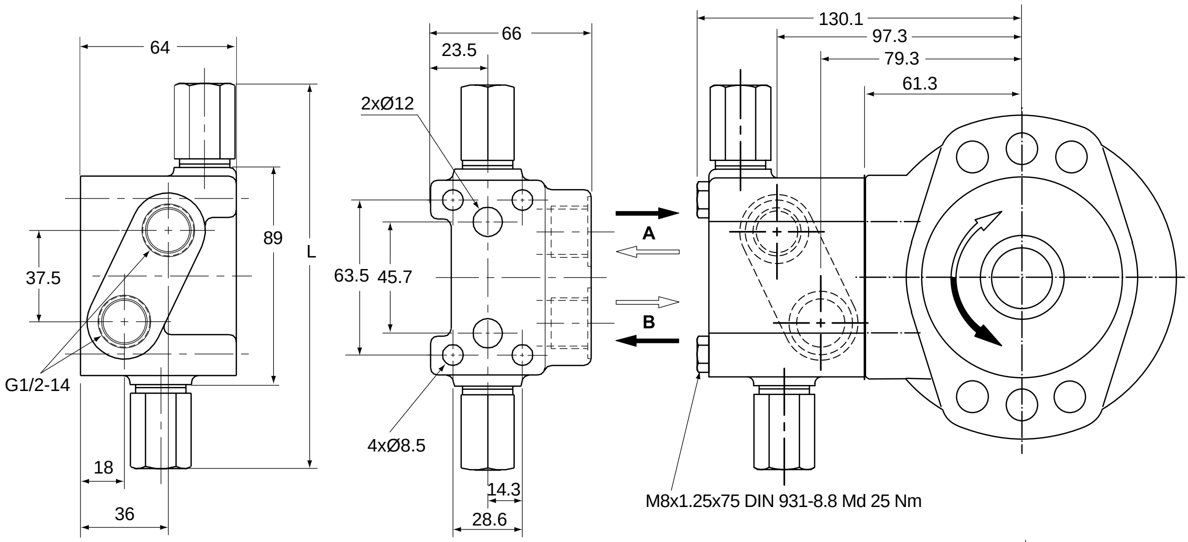
$$\eta_{ges} = \eta_{vol} \cdot \eta_{hm} = 0.80 \cdot 0.89$$

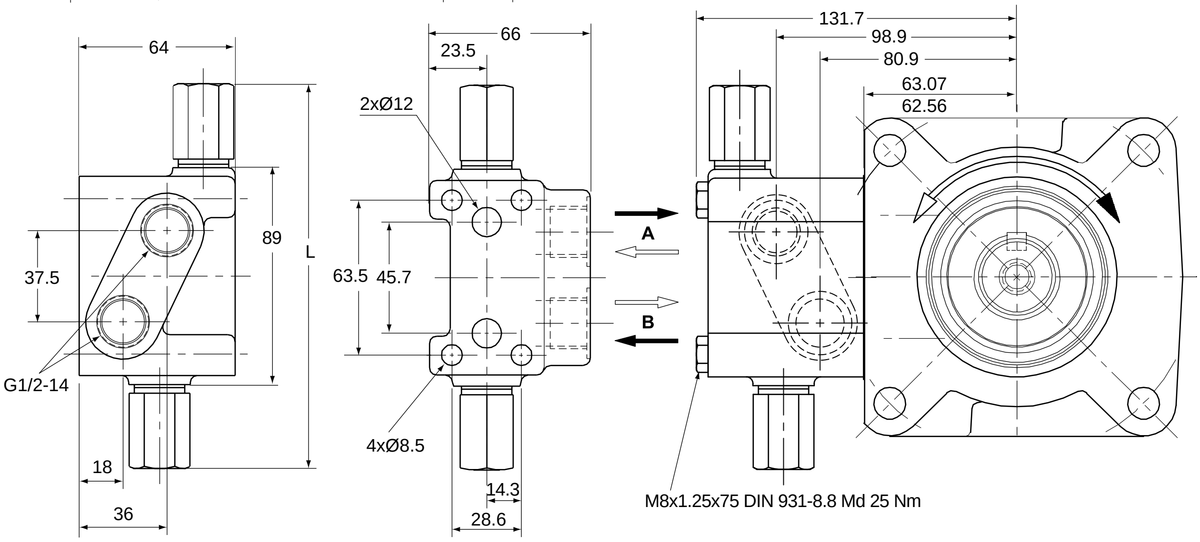
$\eta_{ges} = 0.71$

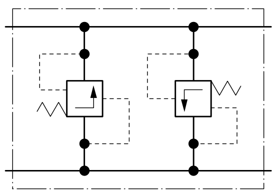
Leistung P (kW)
Power P
Puissance P
Potenza P

$$P = \frac{Md \cdot n \cdot \pi}{10^4 \cdot 3} = \frac{960 \cdot 142 \cdot \pi}{10^4 \cdot 3}$$

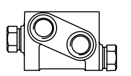
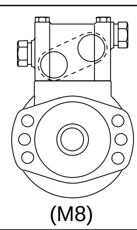
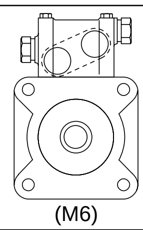
P = 14.3 kW





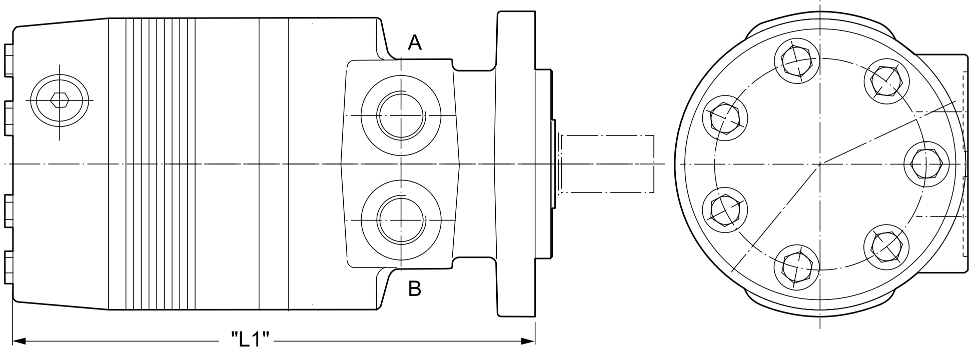


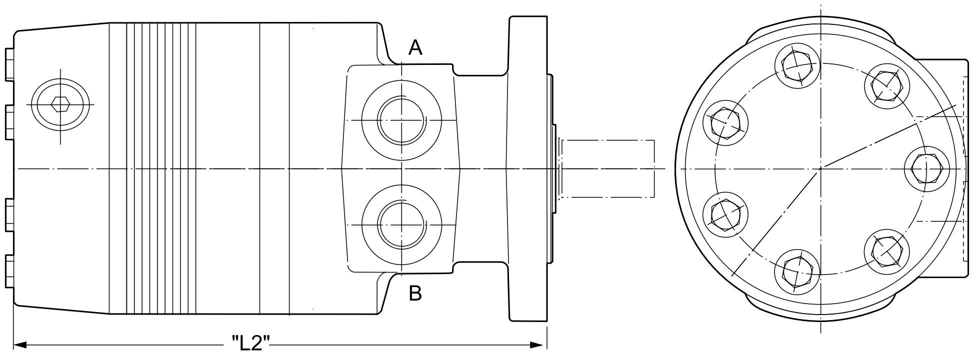
Bestellschlüssel / Ordering Code / Systéme de commande / Sistema di ordinazione

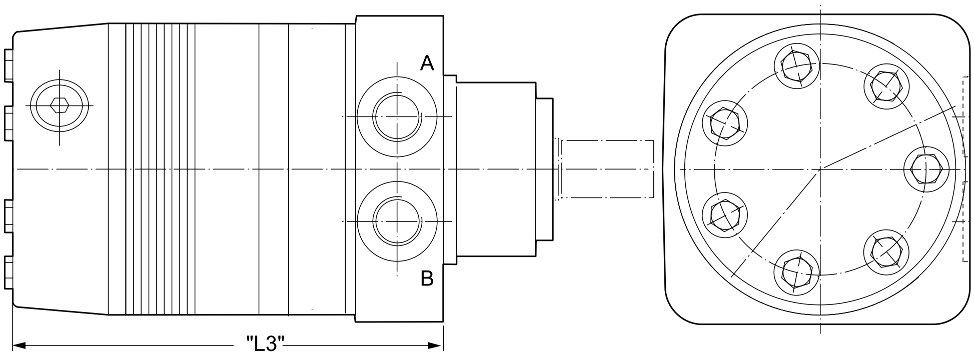
Opening pressure	Single valve 		 (M8)	 (M6)	
	Order no. (M8)	**Order no. (M6)**	**Option code**	**Option code**	**Length "L"**
100 bar	**410017-100**	**410018-100**	**HAAP**	**HAAF**	**158 mm**
140 bar	**410017-140**	**410018-140**	**HAAU**	**HAAH**	158 mm
170 bar	**410017-170**	**410018-170**	**HAAX**	**HAAK**	158 mm
200 bar	**410017-200**	**410018-200**	**HABA**	**HAAM**	158 mm

Zubehör / Fixtures / Fournitures / Part. di fissaggio

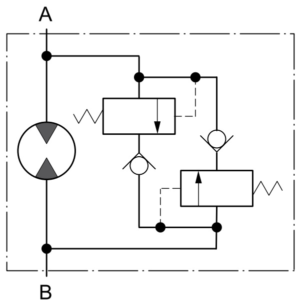
4 x M8 (M6) x 75mm ; 2 x O-Ring



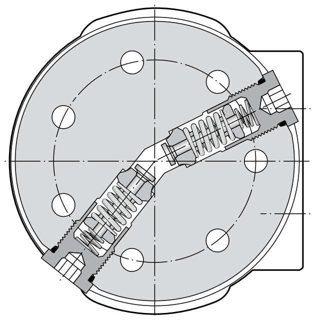




Motor Series	"L1" mm	"L2" mm	"L3" mm
TF80	213.5	218.5	173.2
TF100	213.5	218.5	173.2
TF130	216.5	221.5	176.3
TF140	218.3	223.3	178.1
TG140	218.3	223.3	178.1
TH140		243.6	201.2
TF170	221.3	226.3	181.1
TG170	221.6	226.6	180.4
TH170		246.9	204.3
TF195	224.6	229.6	184.4
TG195	224.6	229.6	184.4
TH195		250.0	207.6
TF240	229.2	234.2	189.0
TG240	229.2	234.2	189.0
TH240		254.8	212.2
TF280	234.0	239.0	193.8
TG280	234.0	239.0	193.8
TH280		259.6	217.0
TG330	240.4	245.4	200.2
TH330		266.0	223.3
TF365	243.7	248.7	203.5
TF405	247.7	252.7	207.5
TG405	247.7	252.7	207.5
TH405		275.3	230.7
TF475	256.4	261.4	216.2
TG475	256.4	261.4	216.2
TH475		281.7	239.3
TG530	262.7	267.7	222.5
TH530		288.1	245.7
TG620	272.1	277.1	231.9
TH620		297.8	255.1
TG790	291.2	296.2	251.0
TH790		316.8	274.1
TG960	310.2	315.2	270.0
TH960		335.9	293.2



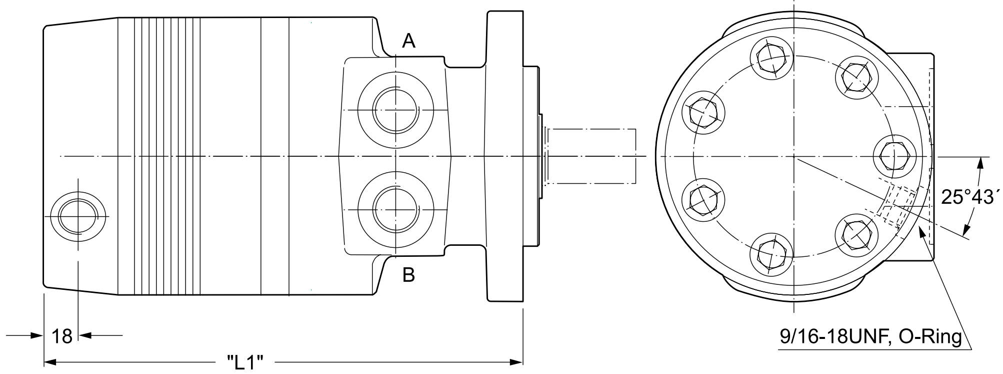
Ventilkurve auf Anfrage
Valve curve available on request
La courbe caractéristique de la vanne est disponible sur demande
Curva della valvola disponibile su richiesta

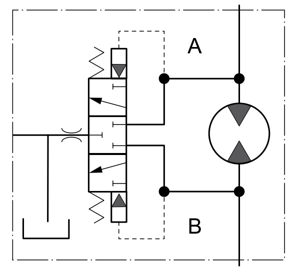


Bestellschlüssel / Ordering Code / Systéme de commande / Sistema di ordinazione

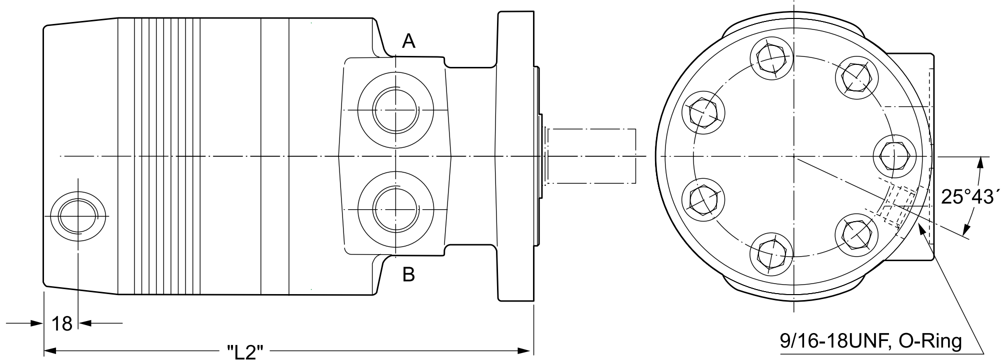
Option code	Opening pressure
BBBM	70 bar
BBBJ	100 bar
BBBN	140 bar
BBCG	170 bar
BBBF	200 bar

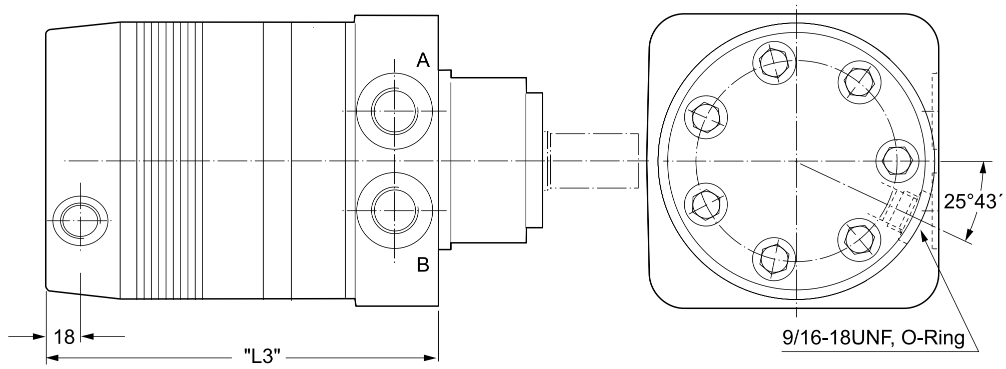
Code AAFX





Q=3.5 l p=8 bar ϑ=39 mm^2/s





Spülventil für geschlossene Systeme zur Rückführung einer definierten Menge des Niederdrucköls in den Tank zur Abkühlung innerhalb desselben Kreislaufs.

Hot oil shuttle valve allows for diverting of low pressure oil in closed loop applications to be returned to tank, cooler or filter for cooling in the same circuit.

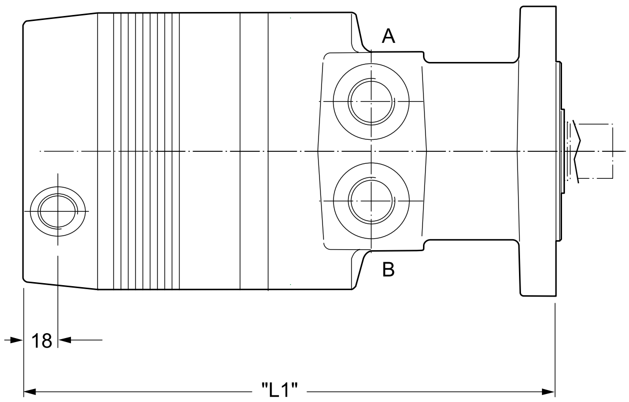
Valve de rincage pour systèmes fermés pour le retour d`un volume déter-miné de fluide basse pression vers le réservoir, un refroidisseur ou un filtre de réfrigération, dans le même circuit.

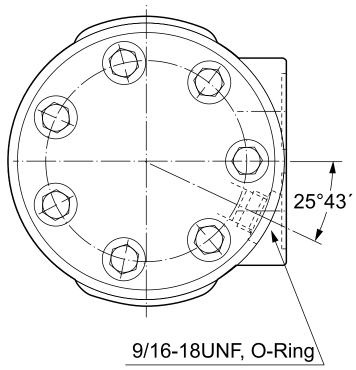
Una valvola selettice permette di deviare olio a bassa pressione direttamente al serbatoio o allo scambiatore di calore consentendo, nelle applicazioni a circuito chiuso, un miglior raffreddamento dell`olio.

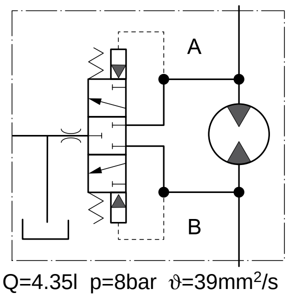
Gewicht /	Weight	TG140	TG170	TG195	TG240	TG280	TG335	TG405	TG475	TG530	TG625	TG785	TG960
Poids /	Peso [kg]	16.0	16.3	16.5	16.9	17.3	17.7	18.3	19.0	19.7	20.4	22.0	23.7
Code AAFX	"L1" [mm]	210.5	213.8	216.8	221.4	226.2	232.6	239.9	248.6	254.9	264.3	283.4	302.4
Code AAFX	"L2" [mm]	215.5	218.8	221.8	226.4	231.2	237.6	244.9	253.6	259.9	269.3	288.4	307.4
Code AAFX	"L3" [mm]	170.3	173.6	176.6	181.2	186.0	192.4	199.7	208.4	214.7	224.1	243.2	262.2

Gewicht /	Weight	TF80	TF100	TF130	TF140	TF170	TF195	TF240	TF280	TF360	TF405	TF475
Poids /	Peso [kg]	15.0	15.1	15.3	15.4	15.6	16.1	16.4	16.9	17.4	17.9	18.9
Code AAFX	"L1" [mm]	205.9	205.9	208.9	210.9	213.9	216.9	221.9	225.9	234.9	239.9	248.9
Code AAFX	"L2" [mm]	210.9	210.9	213.9	215.9	218.9	221.9	226.9	231.9	239.9	244.9	253.9
Code AAFX	"L3" [mm]	165.9	165.9	168.9	170.9	173.9	176.9	181.9	186.9	194.9	199.9	208.9

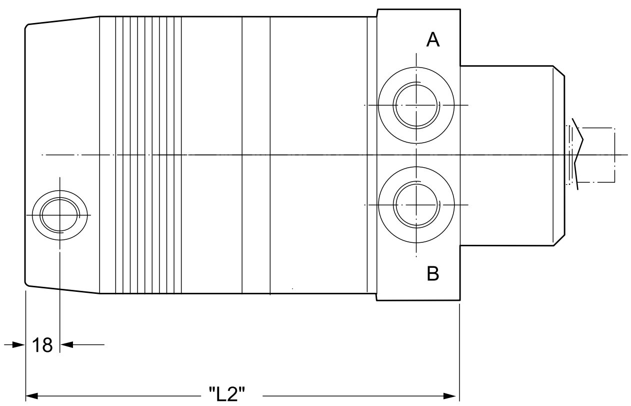
Code AAFX

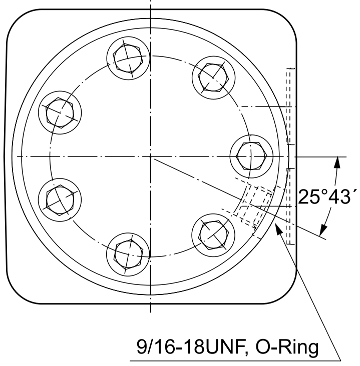






Q=4.35l p=8bar ϑ=39mm²/s





Spülventil für gesch-los-sene Systeme zur Rückführung einer definierten Menge des Niederdrucköls in den Tank zur Abkühlung innerhalb desselben Kreislaufs.

Hot oil shuttle valve allows for diverting of low pressure oil in closed loop applications to be re-turned to tank, cooler or filter for cooling in the same circuit.

Valve de rincage pour systèmes fermés pour le retour d`un volume déter-miné de fluide basse pression vers le réservoir, un refroidisseur ou un filtre de réfrigération, dans le même circuit.

Una valvola selettice permette di deviare olio a bassa pressione direttamente al serbatoio o allo scambiatore di calore consentendo, nelle applicazioni a circuito chiuso, un miglior raffreddamento dell`olio.

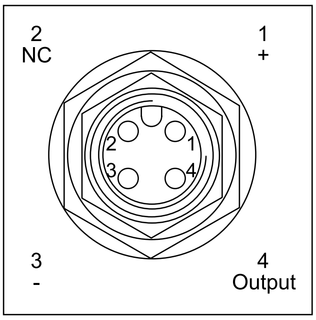
Gewicht /	Weight	TH140	TH170	TH195	TH240	TH280	TH335	TH405	TH475	TH530	TH620	TH785	TH960
Poids /	Peso [kg]	18.4	18.6	18.9	19.2	19.6	20.0	20.6	21.3	22.0	22.7	24.3	26.0
Code AAFX	”L1” [mm]	235.8	239.1	242.2	247.0	251.8	258.2	265.5	273.9	280.3	290.0	309.0	328.1
Code AAFX	”L2” [mm]	193.4	196.5	200.0	204.4	209.2	215.5	222.9	231.5	237.9	247.3	266.3	285.4

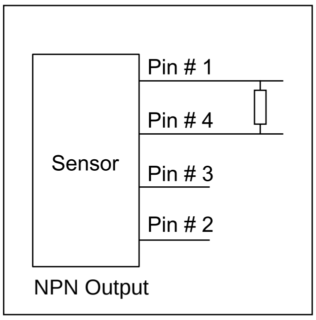
Dieser robuste, wetterfeste Drehzahlaufnehmer arbeitet nach dem Halleffekt. Es werden 30 Rechteckimpulse pro Abtriebswellenumdrehung erzeugt. Durch Erfassung der positiven und negativen Wellenflanken sind 60 Impulse pro Umdrehung möglich. Der Sensor führt zu keiner Leistungsbeschränkung des Motors. Die volle Radiallast-kapazität bleibt erhalten.

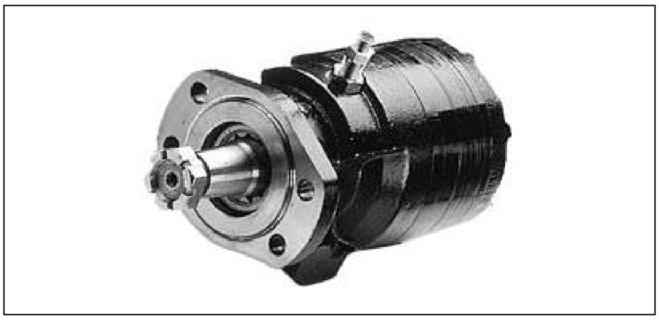
This rugged, weather resistant speed sensor is a Hall effect device. When externally powered, 30 square wave digital pulses per output shaft revolution are produced. By signal multiplication, 60 pulses per revolution can be obtained. The installation of this economical sensor does not affect the torque or side load capability of the motor into which it is installed.

Un capteur économique pour mesure de la vitesse. Ce capteur robuste et résistant aux intempéries est a effet Hall. Alimenté par une source externe, il fournit 30 impulsions carrées par tour. Par multiplication électroni-que, on obtient 60 impulsions par tour. Son montage ne modifie pas le couple ni la charge radiale du moteur qui le reçoit.

Sensore di velocità ad effetto Hall, estremamente robusto e resistente alle condizioni ambientali. Genera 30 impulsi al giro, con uscita digitale ad onda quadra. Il numero di impulsi può essere elettronicamente raddoppiato. L'utilizzo di questo sensore, non influisce sulle caratteri-stiche di coppia o di potenza del motore idraulico.





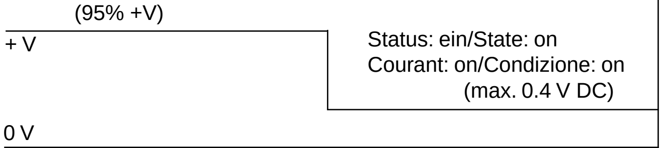


Versorgungsspannung Operating voltage range Courant d`alimentaion Tensione di alimentazione	4.5...24 V (DC)
Arbeitstemperatur Operating temperature Température Temperatura di funzionamento	-30°...100° C
Arbeitsfrequenz Operating frequency range Fréquence d`utilisation Frequenza di lavoro	0...10 KHZ
Erforderlicher Laststrom Sink current Courant depeau Corrente di alimentazione	0...20 mA (max.)
Anschluss Connection Raccordement Connessione elettrica	4 Pin (12mm) DIN Standard

Formel Pullup-Widerstand (0.25 Watt, Tol. 5%)
Formula pull-up resistor value (0.25 Watt, 5% tol.)
Formule valeur pull-up resistor (0.25 Watt, tol. 5%)
Calcolo resistenza di carico (0.25 Watt, toll. 5%)

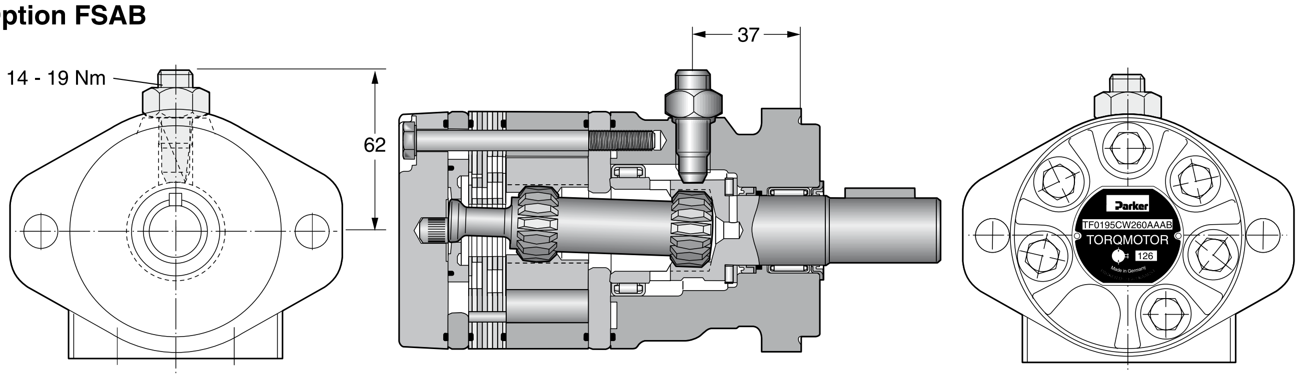
$$\frac{\text{Spannung/Voltage Courant/Tensione} \quad 4.5...24\ \text{V}}{\text{Laststrom/Sink current Courant/Corrente} \quad 0...20\ \text{mA}} = \text{Widerstand / Resistor / Résistance / Resistenze} \quad \text{k Ohm}$$

Status: aus/State: off
Courant: off/Condizione: off
(95% +V)



Status: ein/State: on
Courant: on/Condizione: on
(max. 0.4 V DC)

Option FSAB



Der Sensor ist gegen Verpolung der Versorgungsspannung, jedoch nicht gegen Kurzschluss geschützt.

The sensor has reverse polarity protection but no short circuit protection.

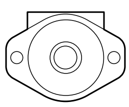
Le capteur est protégé contre l`inversion de polarité de la tension d`alimentation, mais pas contre les courts circuits.

Il sensore è protetto contro l' inversione della polarità della tensione di alimentazione, ma non contro il corto circuito.

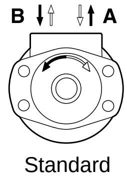
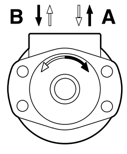
Ordering code

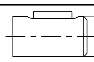
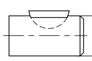
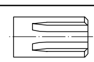
TE	☐☐☐☐	☐	☐	☐☐	☐	F S A B
Series	**Schluckvolumen** **Displacement** **Cylindrée** **Cilindrata**	**Gehäuse** **Housing** **Carter** **Scatola motore**	**Anschluss** **Ports** **Plan de raccordement** **Connessioni**	**Welle** **Shaft** **Arbre** **Albero**	**Drehrichtung** **Direction of rotation** **Direction de rotation** **Direzione di rotazione**	**Option**

Code	cm³/rev
0036	36
0045	41
0050	50
0065	66
0080	82
0100	98
0130	130
0165	163
0195	196
0230	228
0260	261
0295	293
0330	326
0365	370
0390	392

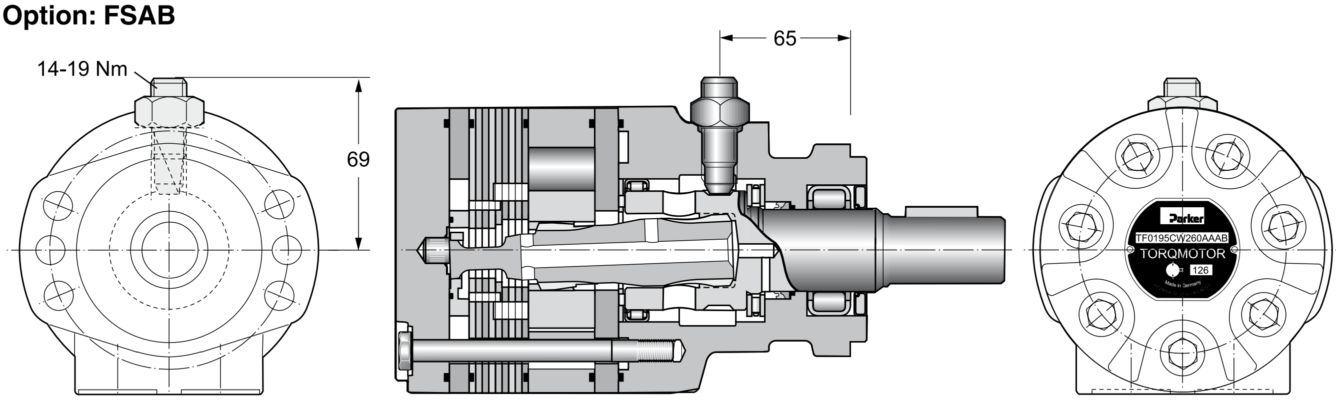
Code	Housing
C	

Code	Port
W	G 1/2
N	universal port M8x13
Y	rear port G 1/2 axial

Code	Direction
0	B A  Standard
1	B A 

Code	Shaft
26	 25
10	 25,4
41	 6B SAE

Option: FSAB



Der Sensor ist gegen Verpolung der Versorgungsspannung, jedoch nicht gegen Kurzschluss geschützt.

The sensor has reverse polarity protection but no short circuit protection.

Le capteur est protégé contre l`inversion de polarite la tension d`alimentation, mais pas contre les courtcircuits.

Il sensore é protetto contro l'inversione della polarità della tensione di alimentazione, ma non contro corto circuito.

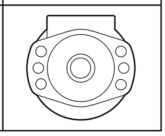
Ordering Code

☐	☐☐☐☐	☐	☐	☐☐	☐	F S A B
Serie **Series** **Série** **Serie**	**Schluckvolumen** **Displacement** **Cylindrée** **Cilindrata**	**Gehäuse** **Housing** **Carter** **Corpo motore**	**Anschluss** **Ports** **Plan de raccordement** **Connessioni**	**Welle** **Shaft** **Arbre** **Albero**	**Drehrichtung** **Direction of rotation** **Direction de rotation** **Direzione di rotazione**	**Option**

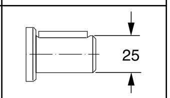
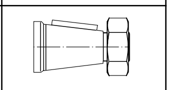
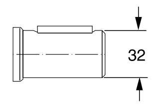
Code
TF
TG

Code TF	cm³/rev
0080	81
0100	100
0130	128
0140	141
0170	169
0195	195
0240	237
0280	280
0360	364
0405	405
0475	477

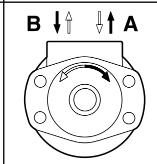
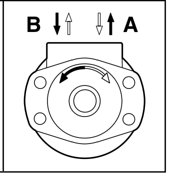
Code TG	cm³/rev
0140	140
0170	169
0195	195
0240	237
0280	280
0335	337
0405	405
0475	476
0530	529
0625	624
0785	786
0960	958

Code	Housing
E	

Code	Port
W	G 1/2

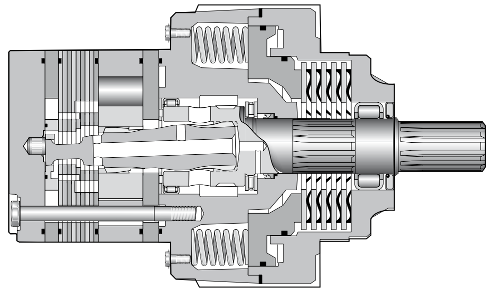
Code	Shaft
26[1]	
08	
46	

[1] Nur für TF Motoren
Only possible for TF motors
Possible seulement avec TF moteur
Possible solo con motore TF

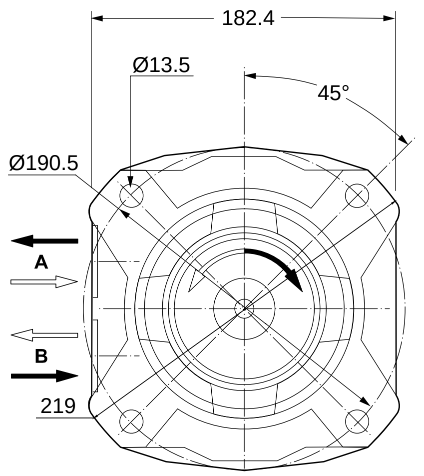
Code	Direction
0	 Standard
1	

Kenndaten / Performance / Puissance / Potenza

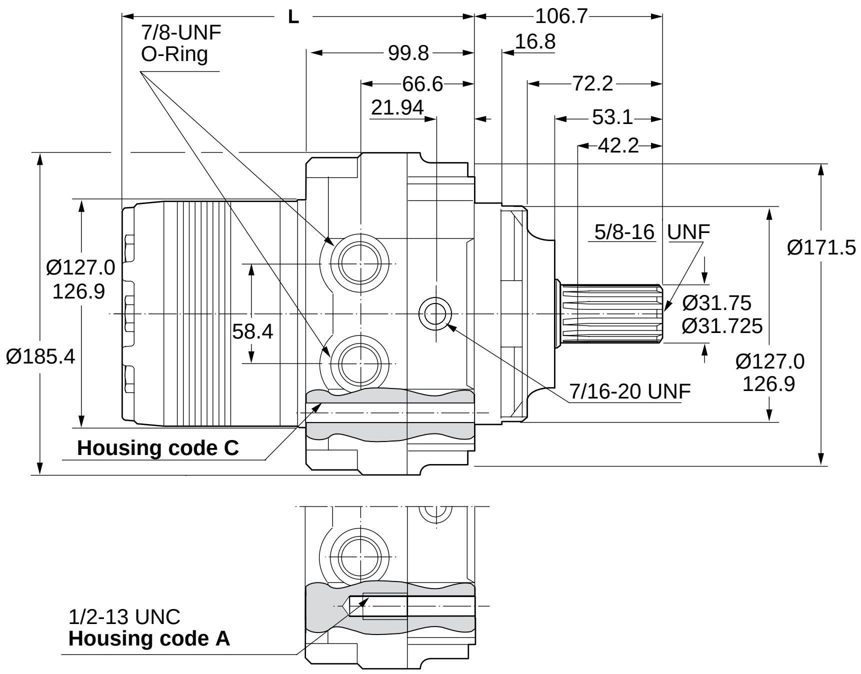
Drehmoment (Nasslauf)/Torque (wet operation)/Couple/Coppia statica	dyn. Ms Nm	1000
Luftüberdruck/Pressure rating/Pression de déblocage/Pressione sbloccaggio	p min. bar	19-21
	p max. bar	210
Drehzahl/Speed/ Vitesse de rotation/Velocità di rotazione	n max. U/min n max. rev/min n max tr/min n maxi giri/min	710
Hubvolumen/Working stroke Cylindrée/Cilindrata	cm^3 max.	22.5



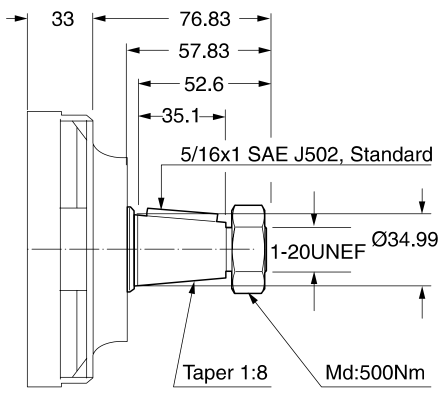
Gewicht / Weight		BG140	BG170	BG195	BG240	BG280	BG335	BG405	BG475	BG530	BG625	BG785	BG960
Poids / Peso	kg	27.3	27.5	27.8	28.1	28.5	28.9	29.5	30.2	30.9	31.7	33.2	34.9
Code A+C	"L" mm	192.3	195.3	198.6	203.2	208.0	214.4	221.7	230.4	236.7	246.1	265.2	284.2



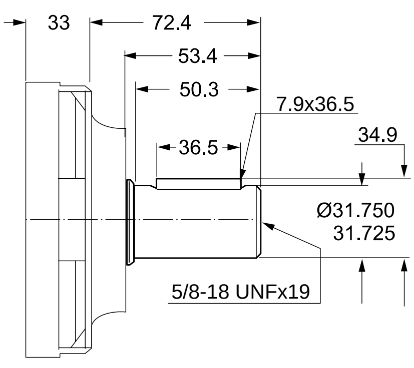
Shaft Code 05



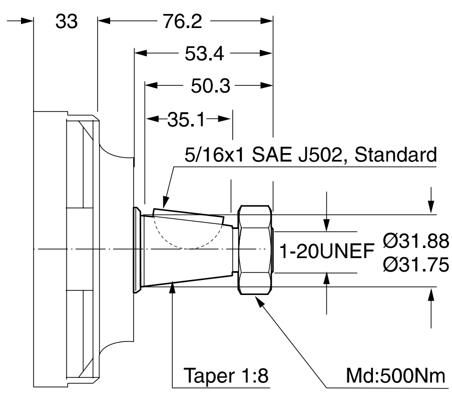
Shaft Code 19



Shaft Code 03

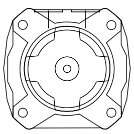
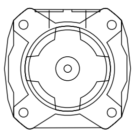


Shaft Code 08

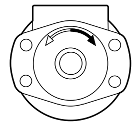
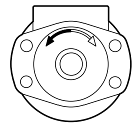


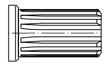
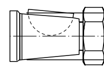
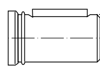
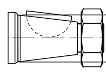
BG										A	A	A	B
Serie / Series / Série / Serie	**Schluckvolumen / Displacement / Cylindrée / Cilindrata**				**Gehäuse / Housing / Carter / Corpo motore**	**Anschluss / Ports / Plan de raccorde-ment / Connessioni**	**Welle / Shaft / Arbre / Albero**		**Drehrichtung / Direction of rotation / Direction de rotation / Direzione di rotazione**	**Option**			

Code	cm³/rev
0140	140
0170	169
0195	195
0240	237
0280	280
0335	337
0405	405
0475	476
0530	529
0625	624
0785	786
0960	958

Code	Housing
A	
C	

Code	Port
S	7/8-14 SAE O-Ring

Code	Direction
0	B A  Standard
1	B A 

Code	Shaft
05	 Pitch 12/24
19	 35.0
03	 31.75
08	 31.75

Option Code	Discription Series	TE/TJ	TF	TL	TG	TH	TK
AAAA	black paint	x	x		x	x	x
AAAH	FPM seals	x	x		x	x	x
AABP	castle nut	x	x		x	x	x
AAFX	shuttle valve		x		x	x	
BBBF	internal relief valve 200bar		x		x	x	
BBBJ	internal relief valve 100bar		x		x	x	
BBBM	internal relief valve 70bar		x		x	x	
BBBN	internal relief valve 140bar		x		x	x	
BBCG	internal relief valve 170bar		x		x	x	
HAAF	external relief valve 100bar (M6)		x		x		
HAAP	external relief valve 100bar (M8)	x	x		x	x	
HAAH	external relief valve 140bar (M6)		x		x		
HAAU	external relief valve 140bar (M8)	x	x		x	x	
HAAK	external relief valve 170bar (M6)		x		x		
HAAX	external relief valve 170bar (M8)	x	x		x	x	
HAAM	external relief valve 200bar (M6)		x		x		
HABA	external relief valve 200bar (M8)		x		x	x	
JAAB	motor-brake combination 11bar	x	x				
JAAD	motor-brake combination 16bar	x	x				
JAAG	motor-brake combination 22bar	x	x				
JAAJ	motor-brake combination 11bar		x		x		
JAAL	motor-brake combination 16bar		x		x		
JAAN	motor-brake combination 22bar		x		x		
JAAT	motor-brake combination 22bar		x		x		
JAAW	motor-brake combination 22bar		x		x		
FSAB	Speedsensor	X	x		x		
FSAA	Speedsensor + Lack	x	x		x		
FSBR	Speedsensor Detection of rotating direction	x	x		x		
FSAN	Int Short Speed Sensor, 1500 psi Int Bidrectional Relief, No paint		x		x		

Empfohlen wird die Verwendung eines Hydrauliköls auf Mineralölbasis mit mindestens 0,1% Zinkadditiv als Antiverschleißzusatz. Vor Einsatz anderer Flüssigkeiten bitten wir um Rücksprache mit unserer Technik.
Die normale Arbeitstemperatur sollte im Bereich von +30 °C bis +60 °C liegen.
Die Maximaltemperatur darf +90 °C nicht überschreiten, während die Mindesttemperatur auf -30° C begrenzt ist.
Wird die normale Arbeitstemperatur wesentlich überschritten, wird die Lebensdauer des Öls stark verkürzt.
Die Viskosität im Arbeitstemperaturbereich sollte 20 bis 120 mm^2/s betragen.
Zweckmäßig ist eine Filtereinheit von 20 - 50 µm.
Die im Katalog angegebenen technischen Daten gelten für den Motorbetrieb.
Arbeitet der Motor als Pumpe, ist das auf die Antriebswelle wirkende Moment auf den angegebenen kontinuierlichen Maximalwert zu begrenzen. Dabei muss ein Vorspanndruck von 5 - 10 bar, abhängig vom Förderstrom, vorhanden sein (Kavitationsgefahr).

It is recommended to use a mineral based hydraulic oil with minimum 0.1% of zinc as anti-wear additive.
Before using other liquids, please consult our engineering department.
Normal working temperatures should be in the range of between +30 °C and +60 °C.
Maximum temperatures must not exceed +90 °C while minimum temperatures should be limited to -30 °C.
If normal working temperatures are substantially exceeded this will result in reduced life duration of the oil used.
Viscosity in the range of working temperatures should be 20 to 120mm^2/s.
It is advisable to use a filtering fineness of 20 - 50 µm.
The technical data are applicable to motor operation. If the motor is used as a pump, the input torque on the couping shaft must be limited to the indicated continuous maximum value. For this, an inlet pressure of 5 -10 bar must be applied depending on oil flow (danger of cavitation).

Il est recommande d`utiliser une huile hydraulique à base minérale contenant au minimum 0,1% d`additif zinc comme produit anti-usure.
La température normale d`utilisation devrait être située entre +30 °C à +60 °C.
La température maximale d`utilisation ne doit pas être supérieure à +90° C, alors que la température minimale est limitée à -30 °C.
Lorsque la tempétrature de service est largement dépassée, la durée de vie de l`huile est fortement diminuée.
Dans la plage de température de service, la viscosité devrait être située entre 20 et 120 mm^2/s.
Dans ce but, la filtration est de 20 à 50 µm.
Les caractéristiques techniques indiquées dans le catalogue sont considérées pour une utilisation en fonction moteur.
Si le moteur fonctionne en pompe, il faut limiter le couple à la valeur maximale indiquée. Dans ce cas, en fonction du débit, il faut créer une contre-pression de 5 à 10 bar (danger de cavitation).

Si consiglia l`impiego di olio idraulico a base di olio minerale con almeno 0,1% di zinco come additivo anti usura.
Prima dell`impiego di altri liquidi si prega di contattare il nostro ufficio tecnico.
La temperatura normale di esercizio dovrebbe essere da +30 °C a +60 °C.
La temperatura massima non deve superare +90 °C, mentre la temperatura minima è limitata a -30 °C.
Se la temperatura normale di esercizio viene sostanzialmente superata, la durata dell`olio diminuisce sensibilmente.
La viscosità nel campo della temperatura di esercizio dovrebbe essere da 20 a 120 mm^2/s.
Si deve prevedere un sistema filtrante per 20...50 micron.
I dati sopraesposti sono validi negli impieghi come motore. Se il motore viene usato come pompa, la coppia sull `albero deve essere limitata a quella massima ammessa. Pertanto il motore deve essere pressurizzato a 5...10 bar in funzione della portata d`olio per evitare cavitazione.

Produktübersicht Motor range Gamme de moteurs Serie di motori	Geom. Schluckvolumen Geometric displacement Cylindrée Cilindrata	Max. Drehzahl Max. speed Vitesse de rotation maxi Velocità di rotazione max	Max. Schluckstrom Max. oil flow Debit d´huile maxi Portata max	Max. Druckdifferenz * Max. differential pressure * Chute de pression maxi * Caduta di pressione max *	Max. Eingangsdruck Max. supply pressure Pression maxi entrée Pressione max in entrata	Max. Drehmoment Max. torque Couple maxi Coppia max	Max. Leistungsabgabe Max. performance Puissance de sortie maxi Potenza meccanica max
TE/TJ	cm³/rev	cont/int rev/min	cont / int l / min	cont / int bar	max bar	cont / int Nm	cont / int KW
TE/TJ 36	36	930/1160	35/40	140/190	200	55/71	9
TE/TJ 45	41	810/1024	35/41	140/190	200	70/100	10
TE/TJ 50	50	725/1020	35/50	140/190	200	90/127	13
TE/TJ 65	66	705/940	45/60	140/190	200	125/176	15
TE/TJ 80	82	560/750	45/60	140/190	200	160/220	17
TE/TJ 100	98	470/630	45/60	140/190	200	190/264	17
TE/TJ 130	130	350/470	45/60	140/1960	200	255/352	17
TE/TJ 165	163	280/375	45/60	140/190	200	310/436	17
TE/TJ 195	196	235/315	45/60	140/190	200	390/528	17
TE/TJ 230	228	265/330	60/75	120/165	200	380/514	18
TE/TJ 260	261	230/290	60/75	110/155	200	400/550	17
TE/TJ 295	293	200/255	60/75	100/145	200	428/582	16
TE/TJ 330	326	185/235	60/75	100/135	200	443/600	15
TE/TJ 365	370	150/200	60/75	95/125	200	467/648	14
TE/TJ 390	392	152/190	60/75	85/120	200	445/628	13

Radiale Wellen-belastung Side loads Charges latérales Carico radiale
TE 7.000 N **TJ 14.000 N**

TF	cm³/rev	cont/int rev/min	cont / int l / min	cont / int bar	max bar	cont / int Nm	cont / int KW
TF 80	81	550/730	45/60	210/280	300	220/295	22
TF 100	100	600/750	60/75	160/240	300	200/320	25
TF 130	128	470/580	60/75	140/210	300	230/360	22
TF 140	141	370/530	60/75	140/210	300	250/390	22
TF 170	169	355/440	60/75	140/210	300	320/490	23
TF 195	197	300/380	60/75	140/210	300	365/560	22
TF 240	238	320/420	75/100	140/210	300	430/670	28
TF 280	280	270/350	75/100	140/210	300	550/800	28
TF 360	364	200/260	75/100	130/190	300	590/910	24
TF 405	405	170/230	75/100	130/175	300	660/920	22
TF 475	477	150/200	75/100	115/140	300	680/850	17

Radiale Wellen-belastung Side loads Charges latérales Carico radiale
TF 16.000 N

TL	cm³/rev	cont/int rev/min	cont / int l / min	cont / int bar	max bar	cont / int Nm	cont / int KW
TL 140	140	613	68/95	190/241	300	364/463	30
TL 170	169	512	68/95	190/241	300	449/570	31
TL 195	195	484	68/95	190/241	300	511/648	34
TL 240	238	399	68/95	190/241	300	620/790	34
TL 280	280	335	68/95	190/241	300	730/929	34
TL 310	310	310	68/95	190/241	300	847/1079	36
TL 360	364	255	68/95	172/224	300	890/1163	31

Radiale Wellen-belastung Side loads Charges latérales Carico radiale
TL 16.000 N

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

***** Druckdifferenz Δp zwischen Ein- und Ausgang
***** Pressure difference is Δp between input and output
***** La différence de pression est Δp entre l'entrée et la sortie
***** La differenza di pressione corrisponde al Δp tra ingresso e uscita

Achtung: Höhere Drücke auf Anfrage möglich.
Notice: Higher pressures are possible on request.
Remarque : des pressions supérieures sont possibles sur demande.
Nota: Pressioni superiori possibili su richiesta.

Produktübersicht Motor range Gamme de moteurs Serie di motori	Geom. Schluckvolumen Geometric displacement Cylindrée Cilindrata	Max. Drehzahl Max. speed Vitesse de rotation maxi Velocità di rotazione max	Max. Schluckstrom Max. oil flow Debit d'huile maxi Portata max	Max. Druckdifferenz * Max. differential pressure * Chute de pression maxi * Caduta di pressione max *	Max. Eingangsdruck Max. supply pressure Pression maxi entrée Pressione max in entrata	Max. Drehmoment Max. torque Couple maxi Coppia max	Max. Leistungsabgabe Max. performance Puissance de sortie maxi Potenza meccanica max
TG	cm³/rev	cont/int rev/min	cont / int l / min	cont / int bar	max bar	cont / int Nm	cont / int KW
TG 140	141	530/710	75/100	210/280	300	400/545	33
TG 170	169	440/575	75/100	210/280	300	485/670	33
TG 195	195	380/510	75/100	210/280	300	560/770	33
TG 240	238	320/420	75/100	210/280	300	685/945	32
TG 280	280	270/350	75/100	210/280	300	800/1100	31
TG 335	337	225/290	75/100	210/280	300	980/1350	30
TG 405	405	185/245	75/100	170/240	300	960/1350	27
TG 475	477	160/240	75/115	140/210	300	960/1400	28
TG 530	529	140/215	75/115	140/170	300	1050/1280	23
TG 625	613	120/185	75/115	120/160	300	1040/1360	20
TG 785	786	95/145	75/115	100/140	300	1150/1490	17
TG 960	959	78/119	75/115	70/100	300	925/1390	12

Radiale Wellenbelastung Side loads Charges latérales Carico radiale
TG/BG 16.000 N **TH 30.000 N**

TH	cm³/rev	cont/int rev/min	cont / int l / min	cont / int bar	max bar	cont / int Nm	cont / int KW
TH 140	141	530/710	75/100	210/280	300	400/545	33
TH 170	169	440/575	75/100	210/280	300	485/670	33
TH 195	195	380/510	75/100	210/280	300	560/770	33
TH 240	238	320/420	75/100	210/280	300	685/945	32
TH 280	280	270/350	75/100	210/280	300	800/1100	31
TH 335	337	225/290	75/100	210/280	300	980/1350	30
TH 405	405	185/245	75/100	170/240	300	960/1350	27
TH 475	477	160/240	75/115	140/210	300	960/1400	28
TH 530	529	140/215	75/115	140/170	300	1050/1280	23
TH 625	613	120/185	75/115	120/160	300	1040/1360	20
TH 785	786	95/145	75/115	100/140	300	1150/1490	17
TH 960	959	78/119	75/115	70/100	300	925/1390	12

Radiale Wellenbelastung Side loads Charges latérales Carico radiale
TG/BG 16.000 N **TH 30.000 N**

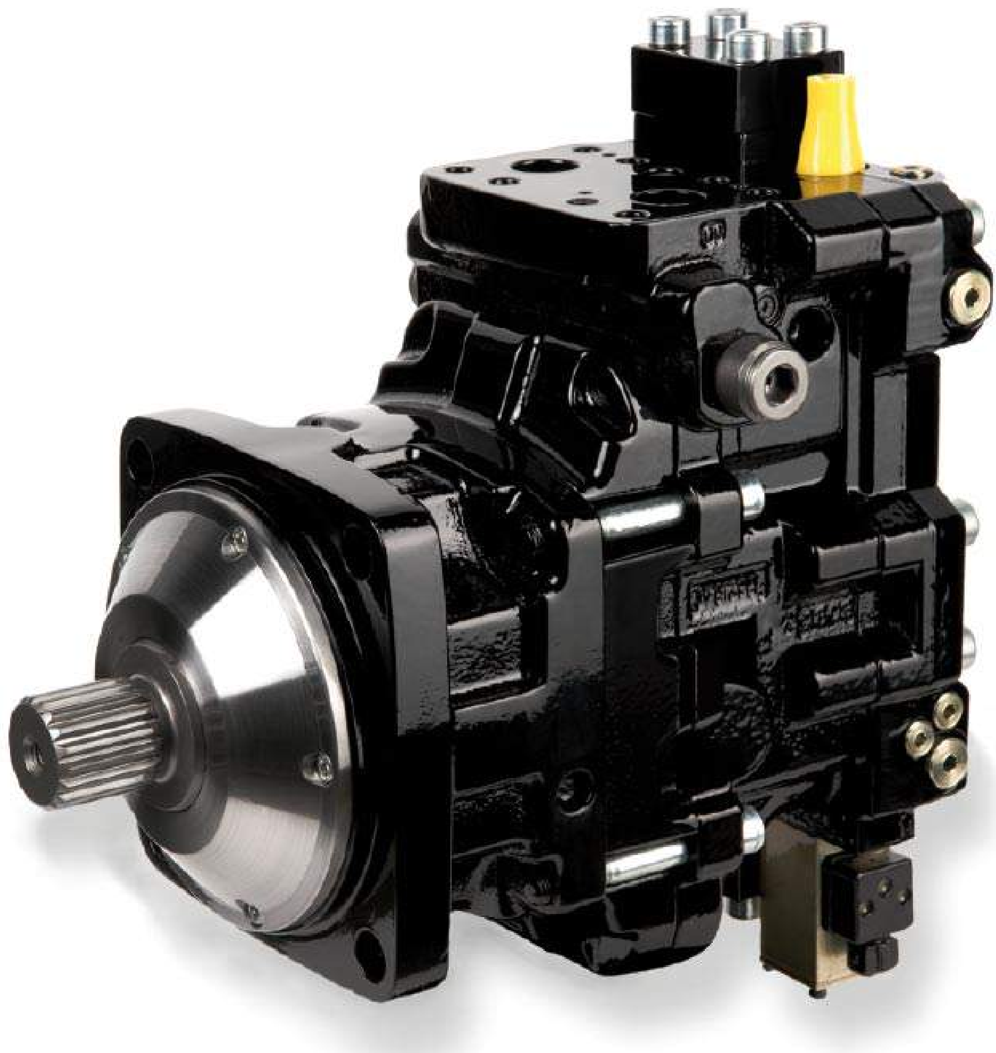
TK	cm³/rev	cont/int rev/min	cont / int l / min	cont / int bar	max bar	cont / int Nm	cont / int KW
TK 250	250	523	114/133	240/310	330	815/1043	49
TK 315	315	413	114/133	240/310	330	1030/1315	47
TK 400	400	373	114/151	205/275	330	1150/1525	49
TK 500	500	300	114/151	205/275	330	1440/1915	48
TK 630	630	240	114/151	205/225	330	1620/1715	34
TK 800	800	276	151/227	190/205	330	1915/2300	44
TK 1000	1000	220	151/227	175/190	330	2410/2660	35

Radiale Wellenbelastung Side loads Charges latérales Carico radiale
TK 26.000 N

int. =
Intermittierende Werte maximal: 10% von jeder Betriebsminute.
Intermittent operation rating applies to 10% of every minute.
Fonctionnement interm.: 10% max. de chaque minute d`utilisation.
Servizio intermittente: 10% max di ogni minuto di utilizzazione.

- * Druckdifferenz Δp zwischen Ein- und Ausgang
- * Pressure difference is Δp between input and output
- * La différence de pression est Δp entre l'entrée et la sortie
- * La differenza di pressione corrisponde al Δp tra ingresso e uscita

Achtung: Höhere Drücke auf Anfrage möglich.
Notice: Higher pressures are possible on request.
Remarque : des pressions supérieures sont possibles sur demande.
Nota: Pressioni superiori possibili su richiesta.



Hydraulic Motors

Series V12, V14, T12
Variable Displacement

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker

ENGINEERING YOUR SUCCESS.

Basic formulas for hydraulic motors

A) Displacement (D_α)

$$D_\alpha = D_{35} \times \frac{\sin \alpha}{\sin 35°} \text{ [cm}^3\text{/rev]}$$

α - displacement angle [°] (between 35° and 6.5°)
D_{35} - max displ. at 35° [cm^3/rev]

B) Flow (q)

$$q = \frac{D \times n}{1000 \times \eta_v} \text{ [l/min]}$$

D - displacement [cm^3/rev]
n - shaft speed [rpm]
η_v - volumetric efficiency

C) Torque (M)

$$M = \frac{D \times \Delta p \times \eta_{hm}}{63} \text{ [Nm]}$$

Δp - differential pressure [bar] (between inlet and outlet)
η_{hm} - mechanical efficiency

D) Power (P)

$$P = \frac{q \times \Delta p \times \eta_t}{600} \text{ [kW]}$$

η_t - overall efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Conversion factors

1 bar ....14.5 psi
1 cm^3 ....0.061 cu in
1 kg.. 2.20 lb
1 kW ....1.34 hp
1 l..0.264 US gallons
1 mm.. 0.039 in
1 N .... 0.225 lbf
1 Nm ....0.738 lbf ft
1 °C.. 1.8 F° + 32

Parker Hannifin
Pump and Motor Division
Trollhättan, Sweden

V12

V14

Series V12

Series V12 is a bent-axis, variable displacement motor.

It is intended for both open and closed circuits, mainly in mobile applications, but the V12 can also be utilized in a wide variety of other applications.

Features

- Max intermittent pressure to 480 bar and continuous operating pressure to 420 bar
- Thanks to low weight pistons with laminated piston rings and a compact design of the rotating parts, the V12 tolerates very high speeds
- High allowable speeds and operating pressures means high output power; the overall efficiency remains high throughout the entire displacement range
- The 9-piston design provides high start-up torque and smooth motor operation
- Wide displacement ratio (5:1)
- Broad range of controls and accessory valves for most applications
- Small envelop size and a high power-to-weight ratio
- ISO, cartridge and SAE versions
- Low noise levels due to a very compact and sturdy design with smooth fluid passages
- Positive piston locking, strong synchronizing shaft, heavy-duty bearings and small number of parts add up to a compact and robust motor with long service life and proven reliability.

Series V14

Series V14 is a new generation of variable displacement, bent-axis motors, a further development of our well known V12 motor.

It is designed for both open and closed circuit transmissions with focus on high performance machines .

Applications

- Excavators
- Forestry machines
- Mining and drilling machines
- Wheel loaders
- Winch drives

Optional equipment

- Integrated sensors for speed and displacement
- Integrated flushing and pressure relief valves

Additional benefits (compared to those of the V12)

- Improved speed capability
- Improved control performance
- Reduced number of parts
- Stronger shaft bearing support.

(cont'd ...)

T12

Available motors

Model	Frame size	Version	Chapter
V12	60	ISO	2
	“	Cartridge	“
	“	SAE	“
	80	ISO	“
	“	Cartridge	“
	“	SAE	“
V14	110	ISO	3
	“	Cartridge	“
	“	SAE	“
	160	ISO	“
	“	SAE	“
T12	60	Cartridge	4
	80	“	“

Series T12

The T12 two-displacement motor is tailor-made for track drives. It allows a high ratio between high and low speed and installs as easily as a fixed displacement motor. Max speed ratio is 3.33-to-1.

The T12 is a cartridge motor based on the well proven V12 series. The specially designed end cap with dual ports permits a very short installation.

A simple setting device moves the cylinder barrel to the maximum or minimum displacement position. The setting is controlled by an external hydraulic pilot signal.

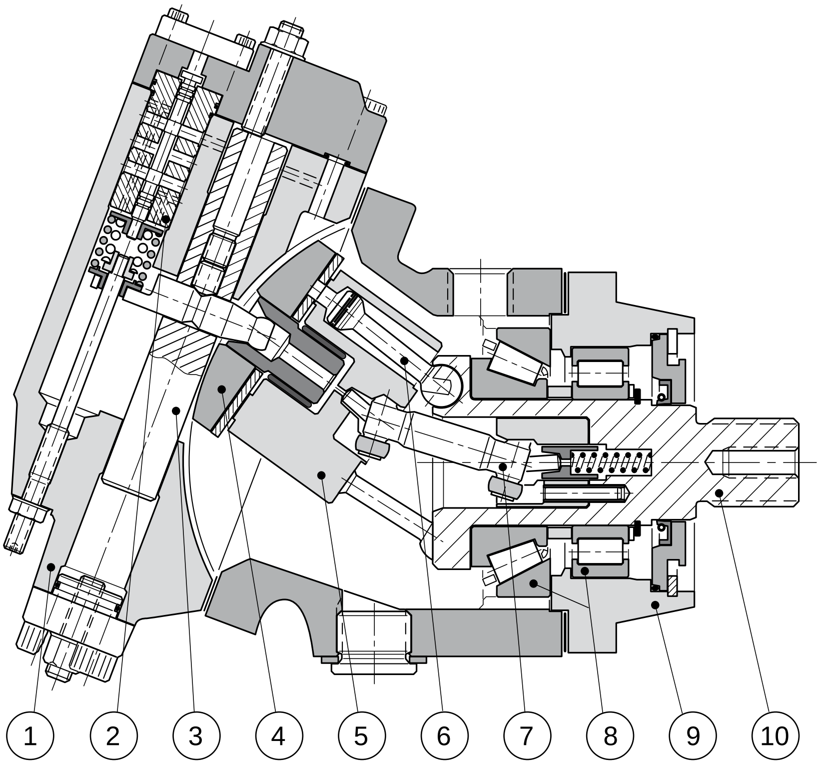
A brake valve can be fitted without increasing the axial length of the motor. The twin ports have the same mounting pattern as those of the F12 and V12 motors.

The F12/V12 accessory valve program also fits the T12 motor. As an option, integrated pressure relief valves can be included.

Content

V12 cross section

1. End cap
2. Servo control valve
3. Setting piston
4. Valve segment
5. Cylinder barrel
6. Spherical piston with laminated piston ring
7. Synchronizing shaft
8. Heavy-duty roller bearings
9. Bearing housing
10. Output shaft



Specifications

V12 frame size	**60**	**80**
Displacement [cm³/rev]		
- max, at 35°	60	80
- min, at 6.5°	12	16
Operating pressure [bar]		
- max intermittent 1)	480	480
- max continuous	420	420
Operating speed [rpm]		
- at 35°, max intermittent 1)	4 400	4 000
max continuous	3 600	3 100
- at 6.5°–20°, max intermittent 1)	7 000	6 250
max continuous	5 600	5 000
- min continuous	50	50
Flow [l/min]		
- max intermittent 1)	265	320
- max continuous	215	250
Torque (theor.) at 100 bar [Nm]	95	127
Output power [kW]		
- max intermittent 1)	150	175
- max continuous	95	105
Corner power [kW]		
- intermittent 1)	335	400
- continuous	235	280
Mass moment of inertia		
($x10^{-3}$) [kg m^2]	3.1	4.4
Weight [kg]	28	33

1) Max 6 seconds in any one minute.

Efficiency diagrams

The following diagrams show volumetric and overall efficiencies versus shaft speed at 210 and 420 bar operating pressure, and at full (35°) and reduced (10°) displacements.

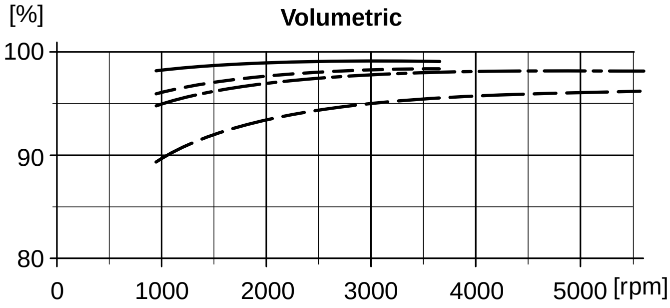
Information on efficiencies for a specific load condition can be made available from Parker Hannifin.

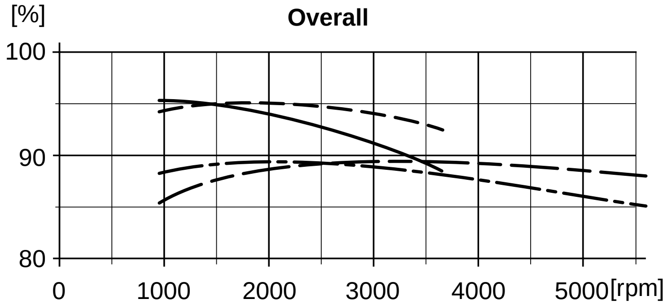
210 bar at full displacement
420 bar “ “ “

210 bar at reduced displacement
420 bar “ “ “

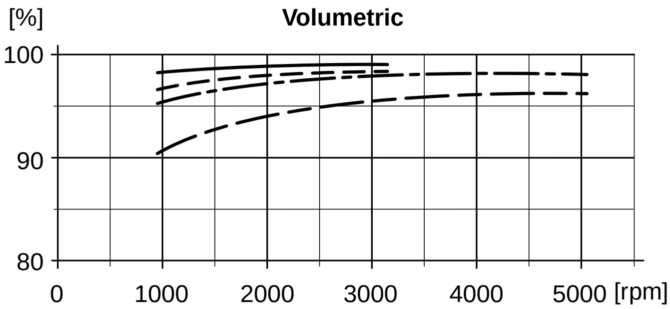
2

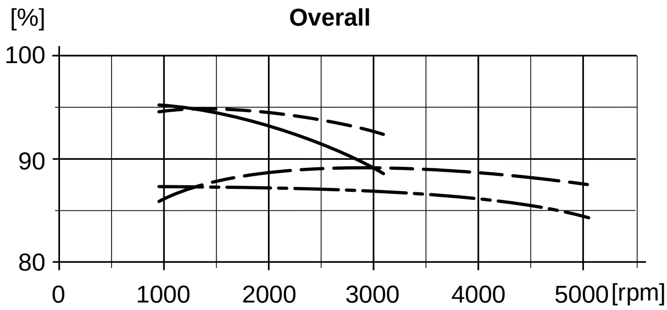
V12-60





V12-80





ISO version (basic configuration)

V12	–		–			–		V	–		–		–	D	–		–		/	
Motor type		Frame size		Func-tion	Main ports		Mount.-flange	Shaft seal		Shaft		Version number		Status		Speed sensor		Max displacement		Min displacement

Code	Frame size [cm³/rev]
060	60
080	80

Frame size		**60**	**80**
Code	**Function**		
M	Motor; normal end cap position: EO, EP, HO and HP	x	x
T	Motor; normal end cap position: AC and AH	x	x

Frame size		**60**	**80**
Code	**Main ports**		
A	SAE flange; metric threads, rear ports	x	x
F	SAE flange; metric threads, side ports	x	x

Frame size		**60**	**80**
Code	**Mounting flange**		
I	ISO flange	x	x
N	ISO flange	(x)	(x)

Frame size		**60**	**80**
Code	**Shaft seal**		
V	PPS	x	x

Frame size		**60**	**80**
Code	**Shaft** (DIN 5480)		
C	Spline	(x)	(x)
D	Spline	x	x

x: Available (x): Optional – : Not available

Version number
Factory assigned
for special versions

Code	**Status**
D	Control pressure setting; max and min displacement screws sealed

Code	**Speed sensor***
P	Prepared for speed sensor
O	None

Max and min displacement [cm³/rev]

* Note.
See information on page 30, Speed Sensor

Cartridge version (basic configuration)

V12	–		–			–	C	V	–		–		–	D	–		–		/	
Motor type		Frame size		Func-tion	Main ports		Mount.-flange	Shaft seal		Shaft		Version number		Status		Speed sensor		Max displacement		Min displacement

2

Code	Frame size [cm^3/rev]
060	60
080	80

Frame size		60	80
Code	**Function**		
M	Motor; normal end cap position: EO, EP, HO and HP	x	x
T	Motor; normal end cap position: AC and AH	x	x

Frame size		60	80
Code	**Main ports**		
A	SAE flange; metric threads, rear ports	x	x
F	SAE flange; metric threads, side ports	x	x

Frame size		60	80
Code	**Mounting flange**		
C	Cartridge flange	x	x

Frame size		60	80
Code	**Shaft seal**		
V	PPS	x	x

Frame size		60	80
Code	**Shaft** (DIN 5480)		
C	Spline	(x)	(x)
D	Spline	x	x

x: Available (x): Optional – : Not available

Max and min displacement [cm^3/rev]

Code	Speed sensor*
P	(Speed sensor only available for V12-60)
O	None

Code	Status
D	Control pressure setting; max and min displacement screws sealed

Version number
Factory assigned for special versions

* Note.
See information on page 30, Speed Sensor

SAE version (basic configuration)

V12	–		–			–	S	V	–	S	–		–	D	–		–		/	
Motor type		Frame size		Func-tion	Main ports		Mount.-flange	Shaft seal		Shaft		Version number		Status		Speed sensor		Max displacement		Min displacement

Code	Frame size [cm³/rev]
060	60
080	80

Frame size		**60**	**80**
Code	**Function**		
M	Motor; normal end cap position: EO, EP, HO and HP	x	x
T	Motor; normal end cap position: AC and AH	x	x

Frame size		**60**	**80**
Code	**Main ports**		
S	SAE flange; UN threads, side ports	x	x
U	SAE flange; UNthreads, rear ports	x	x

Frame size		**60**	**80**
Code	**Mounting flange**		
S	SAE flange	x	x

Frame size		**60**	**80**
Code	**Shaft seal**		
V	PPS	x	x

Frame size		**60**	**80**
Code	**Shaft** (SAE J498b)		
S	Spline	x	x

x: Available (x): Optional – : Not available

Version number
Factory assigned for special versions

Code	Status
D	Control pressure setting; max and min displacement screws sealed

Code	Speed sensor*
P	Prepared for speed sensor
O	None

Max and min displacement [cm³/rev]

* Note.
See information on page 30, Speed Sensor

Controls and flushing valve

Basic configuration (ISO, Cartridge or SAE; see previous three pages) – [ ] – [ ] – [ ]

Control designation — Settings — Flushing valve

Frame size		**60**	**80**
Code	Control designation		
AC I 01 I	Pressure compensator, internal pilot pressure, internal servo supply	x	x
AC E 01 I	Pressure compensator, external pilot pressure, internal servo supply	(x)	(x)
AH I 01 I	Pressure compensator, hydraulic override, internal pilot pressure, internal servo supply	x	x
AH E 01 I	Pressure compensator, hydraulic override, external pilot pressure, internal servo supply	(x)	(x)
AEL 01 B	Pressure compensator electrohydraulic override, 12 VDC	-	x
AEH 01 B	Pressure compensator electrohydraulic override, 24 VDC	-	x
EOL 01 I	Electrohydraulic, two-position, 12 VDC, internal servo supply	x	x
EOL 01 E	Electrohydraulic, two-position, 12 VDC, external servo supply	(x)	(x)
EOH 01 I	Electrohydraulic, two-position, 24 VDC, internal servo supply	x	x
EOH 01 E	Electrohydraulic, two-position, 24 VDC, external servo supply	(x)	(x)
EPL 01 I	Electrohydraulic proportional, 12 VDC, internal servo supply	x	x
EPL 01 E	Electrohydraulic, proportional, 12 VDC, external servo supply	(x)	(x)
EPH 01 I	Electrohydraulic, proportional, 24 VDC, internal servo supply	x	x
EPH 01 E	Electrohydraulic, proportional, 24 VDC, external servo supply	(x)	(x)
HOS 01 I	Hydraulic two-position, standard version internal servo supply	x	x
HOS 01 E	Hydraulic two-position, standard version external servo supply	(x)	(x)
HPS 01 I	Hydraulic proportional, standard version internal servo supply	x	x
HPS 01 E	Hydraulic proportional, standard version external servo supply	(x)	(x)

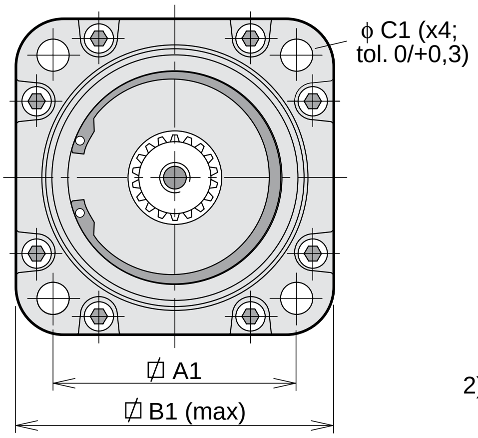
NOTE: '01' - Standard nozzles   x: Available   (x): Optional   – : Not available
Brake defeat valve: Internal servo supply

Settings

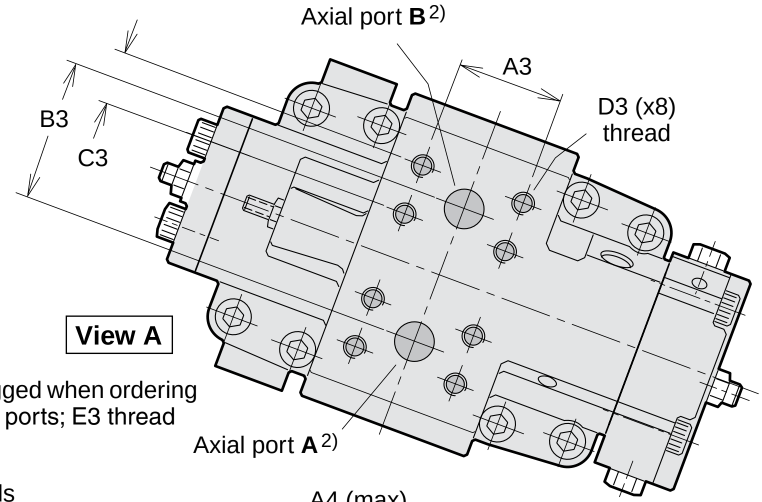
AC, AE, AH:	Threshold pressure: **150** to **400** bar / Modulating pressure: **015**, **025** or **050** bar
EO, EP:	Threshold current: 12 VDC - **400** mA; 24 VDC - **200** mA Modulating current: EO - **000**; EP, 12 VDC - **600** mA; EP, 24 VDC - **300** mA
HO, HP:	Threshold pressure: **010** bar / Modulating pressure: HO - **000**; HP - **015** or **025** bar

Code	**Flushing valve**
L 01	Integrated flushing valve; 01 - std. nozzle 1.3 mm (option; refer to page 28).

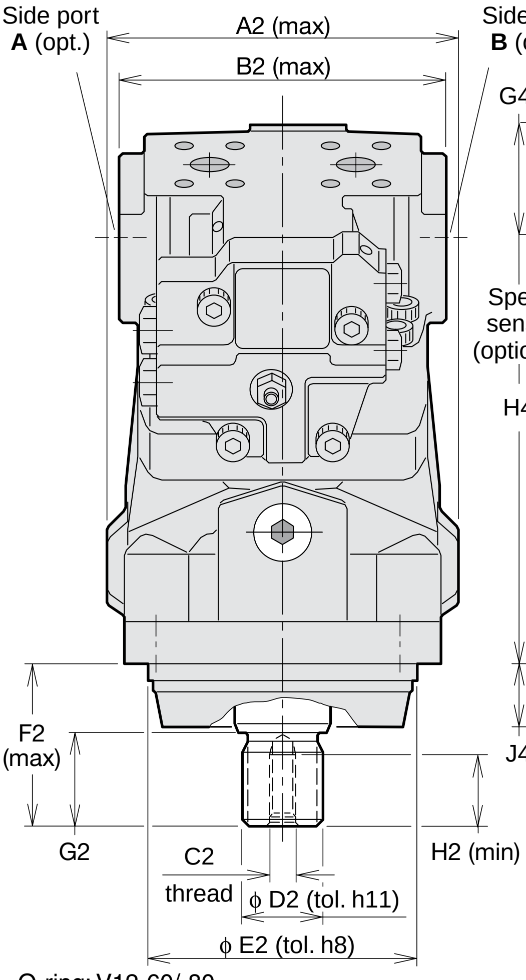
ISO version

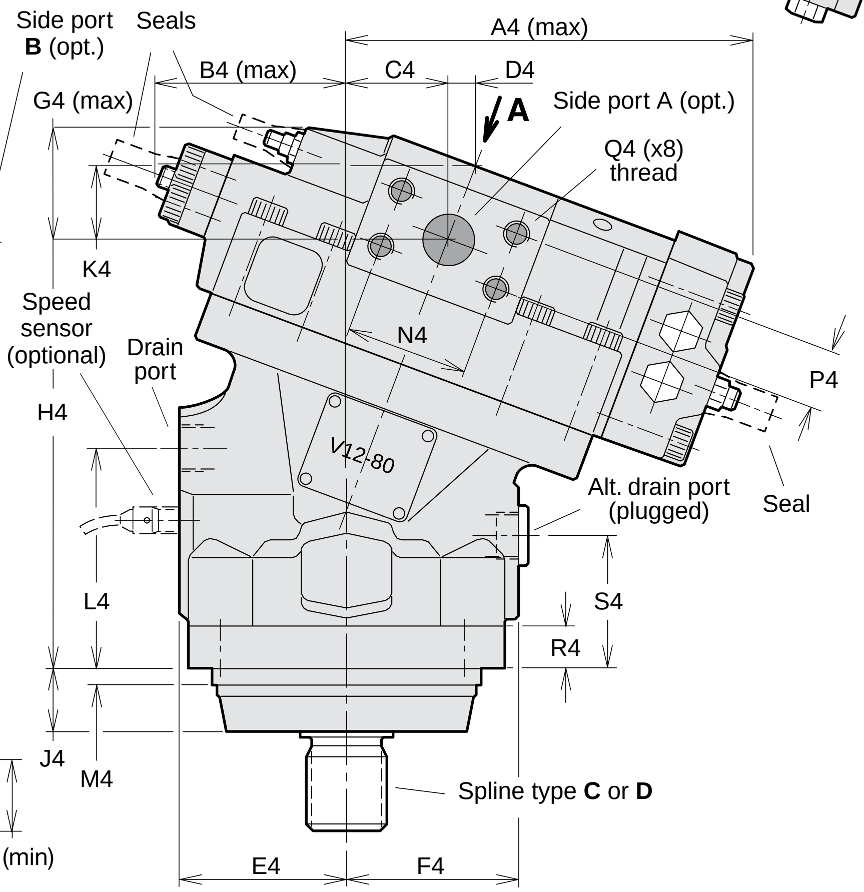


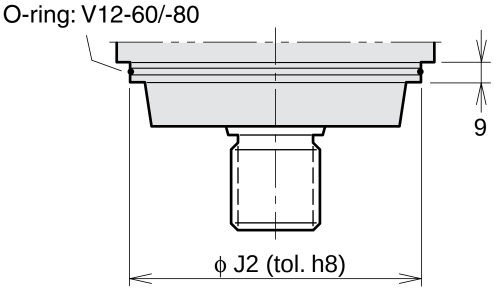
Mounting flange type **I** (ISO 3019/2)



2) Plugged when ordering side ports; E3 thread







Flange type **N**
V12-60/-80: Optional
A1: 127.3
B1: 171
O-ring (incl.) - 134,5x3

Shown: V12-80 with AC compensator

Size	**V12-60**	**V12-80**
A1	113.2	113.2
B1	151	151
C1	14	14
A2	159	165
B2	146	154
C2	M12	M12
D2*	34.6	39.6
E2	125	125
F2*	73	78
G2*	40	45
H2	28	24
J2	140	140
A3	50.8	50.8
B3	66	66
C3	23.8	23.8
D3 1)	M10x20	M10x20
E3 2)	M22x1.5	M22x1.5
A4	188	193
B4	87	90
C4	45	48.3
D4	13.4	13.1
E4	76	78
F4	77	80
G4	55	57
H4	188	199
J4	31.5	31.5
K4	35.5	34.6
L4	94	101
M4	9	9
N4	50.8	57.2
P4	23.8	27.8
Q4 1)	M10x20	M12x23
R4	20	20
S4	57.5	60.5

* Dimension for shaft type **D**.
Shaft type **C** dimensions are 5 mm shorter than those of type D.

1) Metric thread x depth in mm
2) Metric thread x pitch in mm
3) '30° involute spline, side fit'.

Ports

Type	V12-60	V12-80
Axial	19 [3/4"]	19 [3/4"]
Side	19 [3/4"]	25 [1"]
Drain 2)	M22x1.5	M22x1.5

Main ports: ISO 6162, 41.5 MPa, type II
(SAE J518c, 6000 psi)

2

Spline type **C** 3) (DIN 5480)

Size	Dimension
V12-60	W30x2x14x9g
-80	W35x2x16x9g

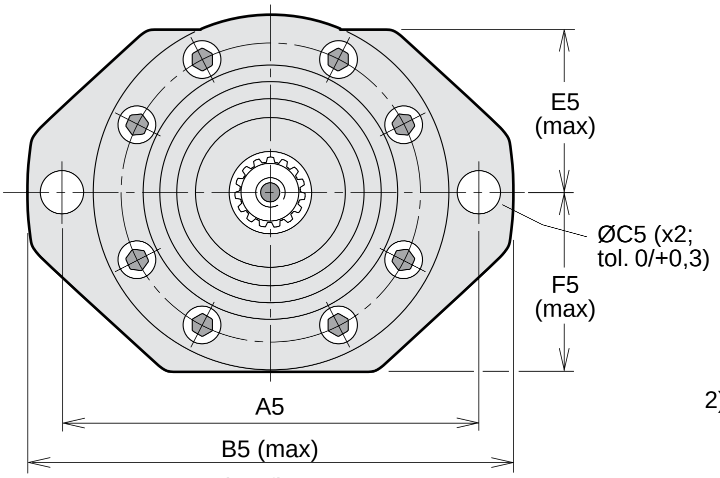
Spline type **D** 3) (DIN 5480)

Size	Dimension
V12-60	W35x2x16x9g
-80	W40x2x18x9g

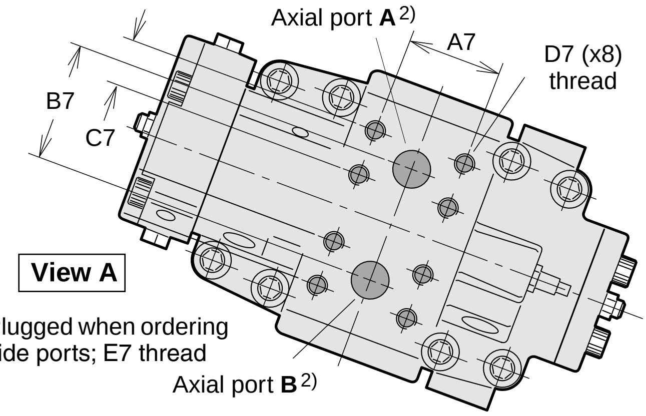
Flange

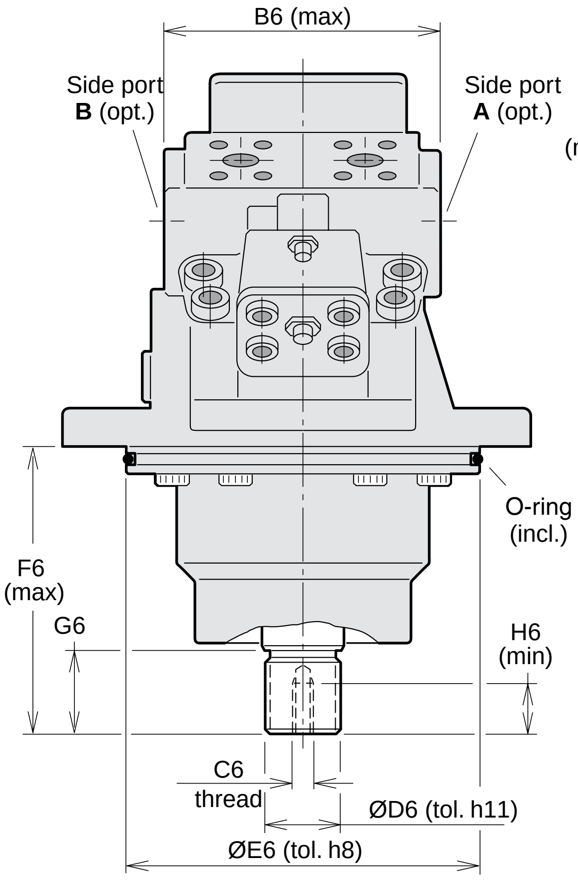
Size	**I**	**N**
V12-60	standard	optional
-80	standard	optional

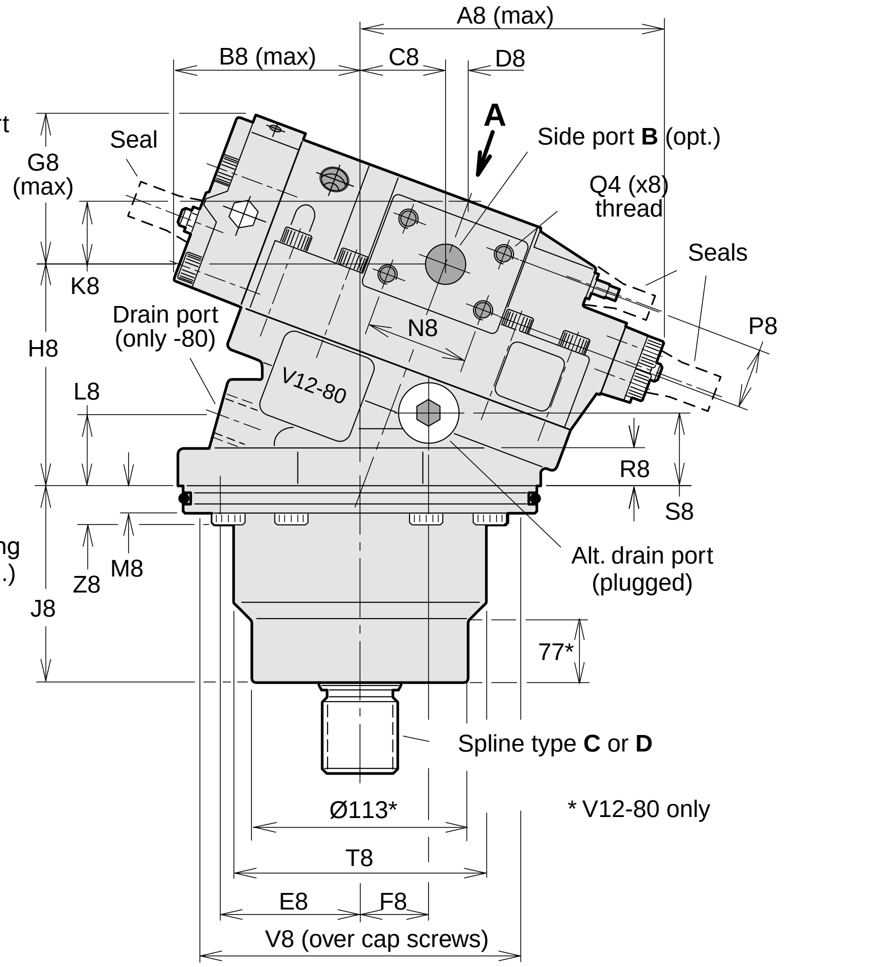
Cartridge version



Mounting flange type **C**







Shown: V12-80 with HO control

Size	V12-60	V12-80
A5	200	224
B5	238	263
C5	18	22
E5	78.5	89.5
F5	83	99.5
B6	146	154
C6	M12	M12
D6*	34.6	39.6
E6	160	190
F6	133	156.5
G6*	40	45
H6	28	28
A7	50.8	50.8
B7	66	66
C7	23.8	23.8
D7 1)	M10x20	M10x22
E7 2)	M22x1.5	M22x1.5
A8	166	173
B8	108	108
C8	45	48.3
D8	13.4	13.1
E8	77	77.5
F8	39	38
G8	86	85
H8	127	120.5
J8	90	106
K8	35.5	34.6
L8	39	39
M8	15	15
N8	50.8	57.2
P8	23.8	27.8
Q8 1)	M10x20	M12x23
R8	20	20
S8	39	39
T8	121	139
V8	151	177
Z8	22	22

* Dimension for shaft type **D**.
Shaft type **C** dimensions are 5 mm shorter than those of type D.

1) Metric thread x depth in mm
2) Metric thread x pitch in mm
3) ’30° involute spline, side fit’.

Ports

Type	V12-60	V12-80
Axial	19 [3/4”]	19 [3/4”]
Side	19 [3/4”]	25 [1”]
Drain	–	M22x1.5
Alt. drain	M18x1.5	M18x1.5

Main ports: ISO 6162, 41.5 MPa, type II
[SAE J518c, 6000 psi]

Spline type **C** 3) (DIN 5480)

Size	Dimension
V12-60	W30x2x14x9g
-80	W35x2x16x9g

Spline type **D** 3) (DIN 5480)

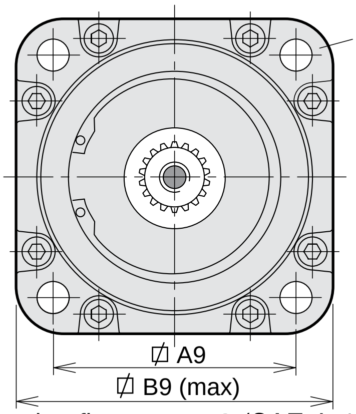
Size	Dimension
V12-60	W35x2x16x9g
-80	W40x2x18x9g

O-rings

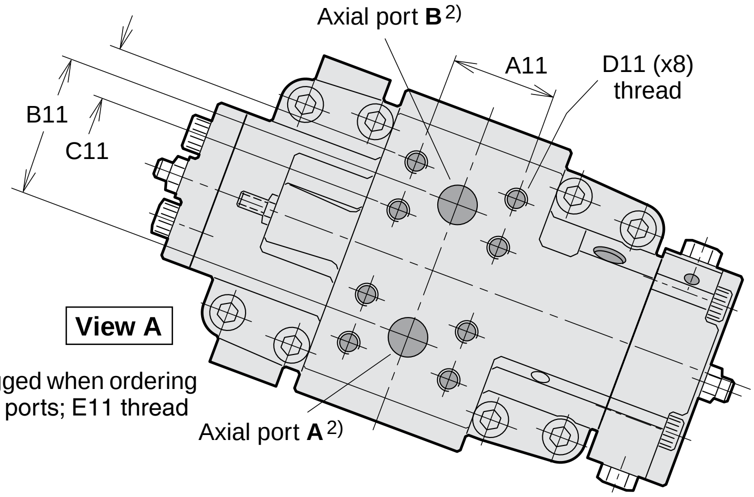
Size	Dimension
V12-60	150x4
-80	180x4

2

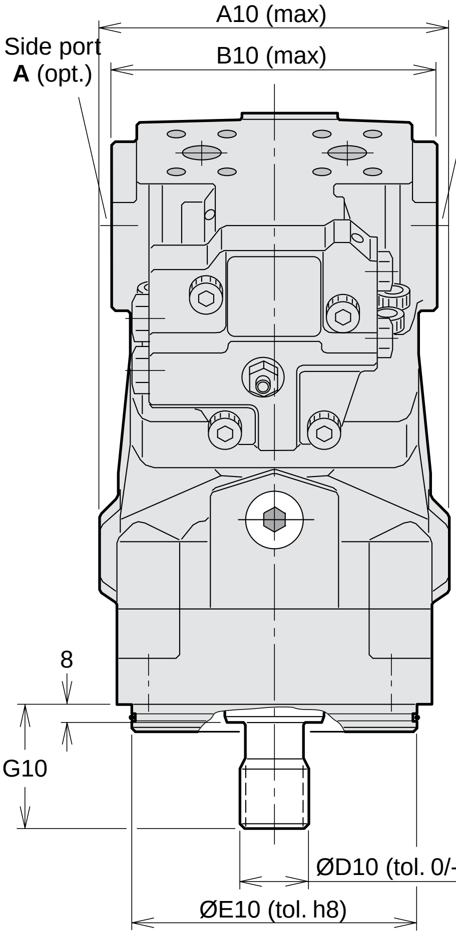
SAE version

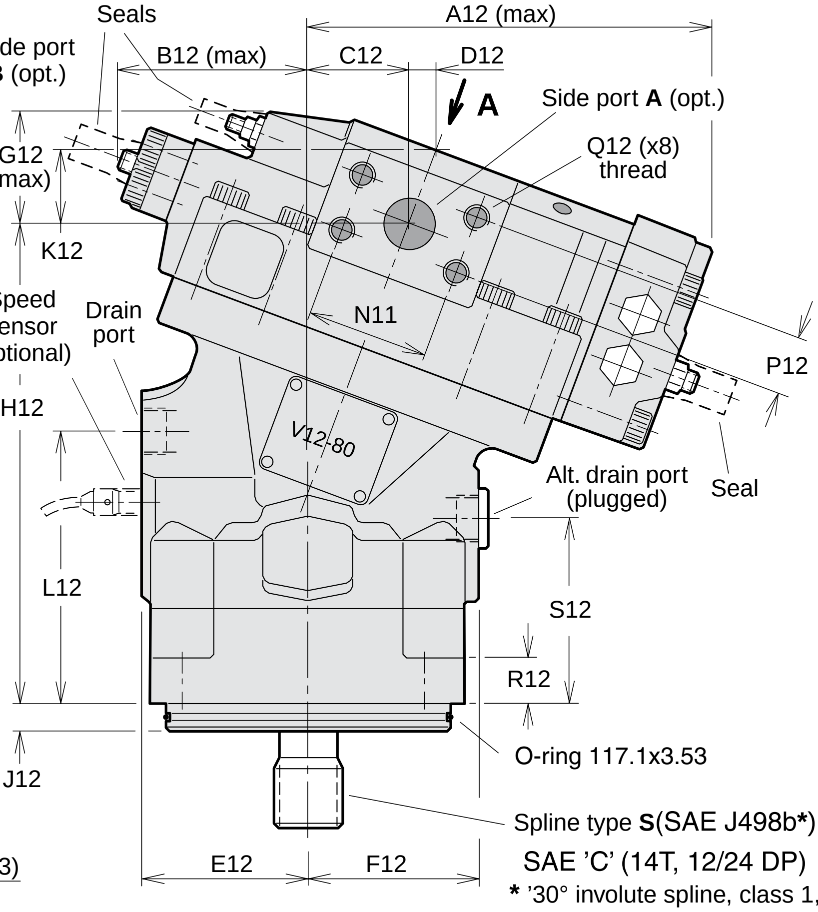


Mounting flange type **S** (SAE J744c)
Dimension SAE C



2) Plugged when ordering side ports; E11 thread





Spline type **S**(SAE J498b*****)
SAE ’C’ (14T, 12/24 DP)
***** ’30° involute spline, class 1,
flat root, side fit’.

Shown: V12-80 with AC compensator

Size	**V12-60**	**(inch)**	**V12-80**	**(inch)**
A9	114.5	4.51	114.5	4.51
B9	149	5.87	149	5.87
C9	14.3	0.56	14.3	0.56
A10	159	6.26	165	6.50
B10	146	5.75	154	6.06
D10	31.22	1.23	31.22	1.23
E10	127.00	5.00	127.00	5.00
G10	55.6	2.19	55.6	2.19
A11	50.8	2.00	50.8	2.00
B11	66	2.60	66	2.60
C11	23.8	0.98	23.8	0.98
D11 1)	$^{3}/_{8}$"-16 x20	$^{3}/_{8}$"-16 x0.79	$^{3}/_{8}$"-16 x20	$^{3}/_{8}$"-16 x0.79
E11 2)	M22x1.5	-	M22x1.5	-
A12	188	7.40	193	7.60
B12	87	3.43	90	3.54
C12	45	1.77	48.3	1.90
D12	13.4	0.53	13.1	0.52
E12	76	2.99	78	3.07
F12	77	3.03	80	3.15
G12	55	2.17	57	2.24
H12	212	8.35	223	8.78
J12	12.7	0.50	12.7	0.50
K12	35.5	1.40	34.6	1.36
L12	118	4.65	125	4.92
N12	50.8	2.00	57.2	2.25
P12	23.8	0.93	27.8	1.09
Q12*	$^{3}/_{8}$"-16 x20	$^{3}/_{8}$"-16 x0.79	$^{7}/_{16}$"-14 x23	$^{7}/_{16}$"-14 0.91
R12	20	0.79	20	0.79
S12	81.5	3.21	84.5	3.33

1) UNC thread x depth in mm
2) Metric thread x pitch in mm.

Ports

Type	V12-60	V12-80
Axial	$^{3}/_{4}$"	$^{3}/_{4}$"
Side	$^{3}/_{4}$"	1"
Drain	$^{7}/_{8}$"-14	$^{7}/_{8}$"-14

Main ports: 6000 psi (SAE J518c).
Drain ports: O-ring boss, UNF thread (SAE 514).

Bearing life

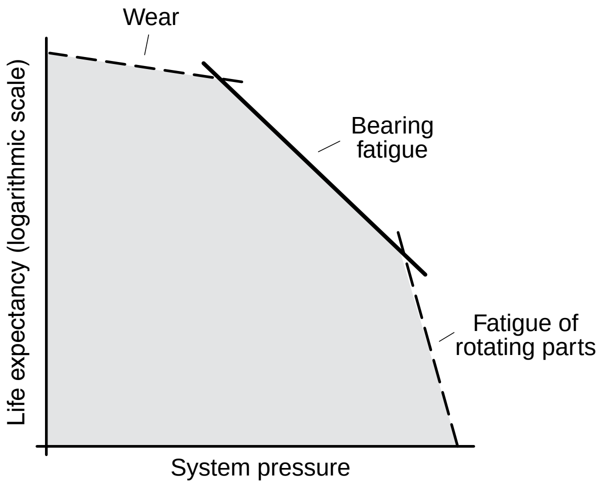
General information

Bearing life can be calculated for that part of the load/ life curve (shown below) that is designated 'Bearing fatigue'. 'Fatigue of rotating parts' and 'Wear'caused by fluid contamination, etc., should also be taken into consi-deration when estimating the service life of a motor/pump in a specific application.

In reality, bearing life can vary considerably due to the quality of the hydraulic system (fluid condition, cleanli-ness, etc.)

Bearing life calculations are mainly used when comparing different motor frame sizes. Bearing life, designated B_{10} (or L_{10}), depends of system pressure, opera-ting speed, external shaft loads, fluid viscosity in the motor case, and fluid contamination level.

The B_{10} value means that 90% of the bearings survive at least the number of hours calculated. Statistically, 50% of the bearings will survive at least five times the B_{10} life.



Hydraulic motor life versus system pressure.

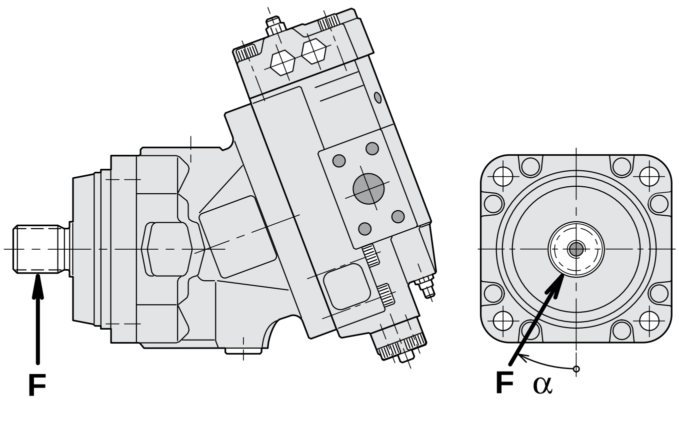
Bearing life calculation

An application is usually governed by a certain duty or work cycle where pressure, speed and displacement vary with time during the cycle.
Bearing life is also dependent on external shaft loads, case fluid viscosity and fluid contamination.
Parker Hannifin has a computer program for bearing life calculation and will assist in determining life for spe-cific V12 load conditions; refer to MI 170, 'V12 bearing life', available from Parker Hannifin.

Required information

When requesting a bearing life calculation from Parker Hannifin, the following information (where applicable) should be provided:

- A short presentation of the application
- V12 size and version
- Duty cycle (pressure and speed versus time at specified displacements)
- Low pressure
- Case fluid viscosity
- Life probability (B_{10}, B_{20}, etc.)
- Direction of rotation (L or R)
- Axial load
- Fixed or rotating radial load
- Distance between flange and radial load
- Angle of attack (α) as defined below.



Controls (general information)

The following six V12 controls described below satisfy most application requirements:

- Pressure compensator (AC and AH)
- Two-position controls (EO and HO)
- Proportional controls (EP and HP).

All controls utilize a setting piston that connects to the valve segment (refer to the picture on page 8).

The built-in four-way servo valve acts on the setting piston and determines the displacement which can vary between 35° (max) and 6.5° (min).

Servo supply pressure is usually obtained from the main high pressure port through the built-in shuttle valve.

When using external servo supply, the servo pressure should be at least 30 bar.

The response time (i.e. from max to min displacement) is determined by orifices in the servo valve supply and return lines.

NOTE: The modulating pressure/current, Δp/ΔI values are valid for motors that are not displacement limited.

AC pressure compensator

The AC compensator is used in off-road vehicle hydro-static transmissions; it automatically adjusts motor dis-placement to the output torque requirement (up to max available system pressure).

Normally, the motor stays in the minimum displacement position. When there is a demand for additional torque, i.e. when the vehicle enters an upgrade, the displace-ment increases (providing more torque) while the motor shaft speed decreases proportionally.

The threshold pressure (‘ps’; refer to the AC diagram) where displacement starts to increase, is adjustable between 150 and 400 bar.

To reach max displacement, an additional modulating pressure (Δp) above the threshold pressure (ps) is required.

To satisfy specific hydraulic circuit requirements, a modulating pressure, Δp, of 15, 25 or 50 bar can be selected.

The AC compensator is available in two versions:

ACI 01 I - Internal pilot pressure

ACE 01 I - (optional) External pilot pressure; port X5 can, for example, be connected to the ’forward drive’ pressure line of a vehicle trans-mission to prevent motor displacement increase when the vehicle is going downhill.

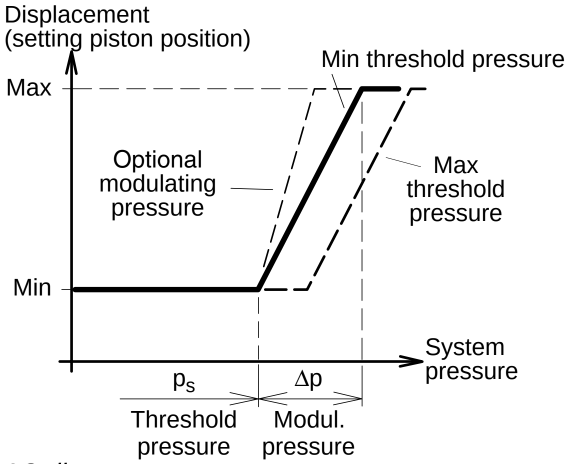
Gauge/pilot ports (AC compensator):

X1	Setting piston pressure (increasing displ.)
X2	Servo supply pressure (after orifice)
X4	Servo supply pressure (before orifice)
X5	External pilot pressure
X6	Setting piston pressure (decreasing displ.)

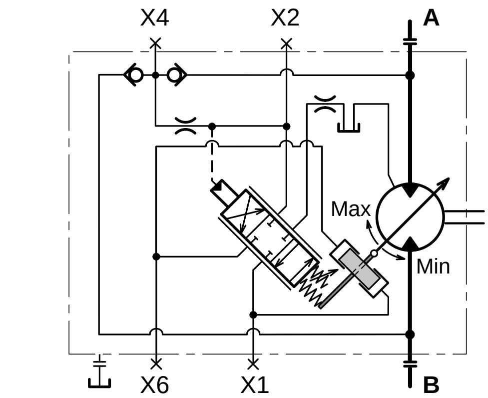
Ports are:

– M14x1.5 (ISO and cartridge versions)

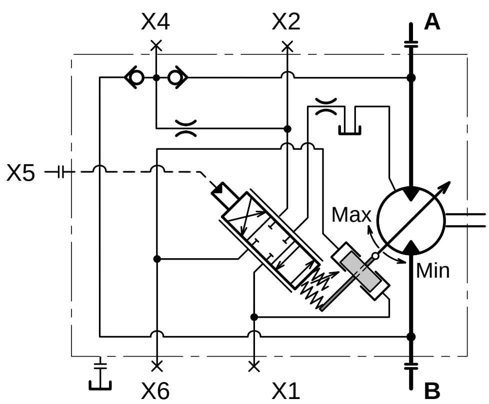
– $^{9}/_{16}$”-18 O-ring boss (SAE version).



AC diagram.



ACI 01 I schematic (spool in a balanced, mid-pos.).



ACE 01 I schematic (spool in a balanced, mid-pos.).

AH pressure compensator

The AH compensator is similar to the AC (page 21) but incorporates an hydraulic override device. It is utilized in hydrostatic transmissions where a high degree of manœuvrability at low vehicle speeds is desirable.

When the override is pressurized, the servo piston moves to the max displacement position irrespective of system pressure, provided the servo supply pressure is at least 30 bar.

The AH compensator is available in two versions:

AHI 01 I - Same as the ACI except for the override; internal pilot pressure.

AHE 01 I (optional) - External pilot pressure (port X5; compare ACE, page 21).

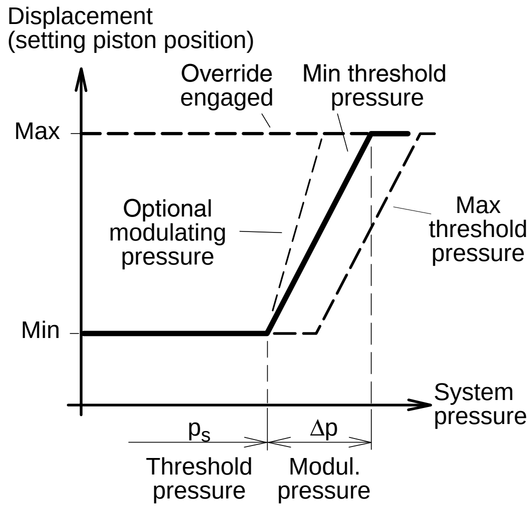
Required override pressure, port X7 (min 20 bar):

$$p_7 = \frac{p_S + \Delta p}{24} \quad [\text{bar}]$$

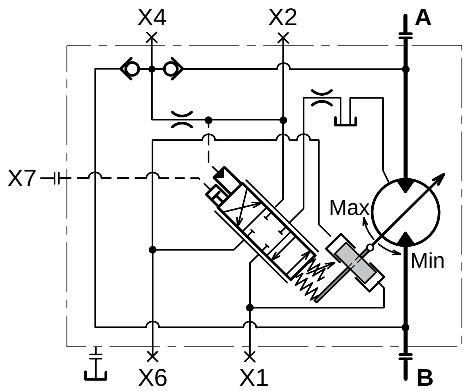
p_7 = Override pressure
p_s = System pressure
Δp = Modulating pressure

Gauge/pilot ports (AH compensator):
- X1 Setting piston pressure (increasing displ.)
- X2 Servo supply pressure (after orifice)
- X4 Servo supply pressure (before orifice)
- X5 External pilot pressure
- X6 Setting piston pressure (decreasing displ.)
- X7 Override pressure

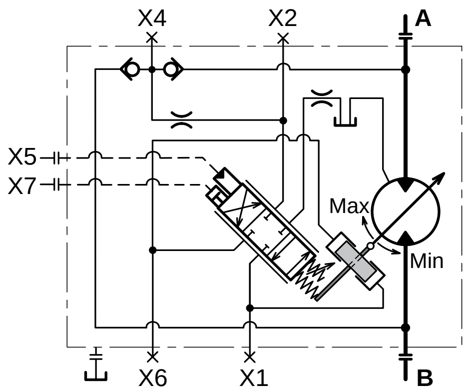
Ports are:
- M14x1.5 (ISO and cartridge versions)
- $^9/_{16}$"-18 O-ring boss (SAE version).



AH diagram.



AHI 01 I schematic (spool in a balanced, mid-pos.).



AHE 01 I schematic (spool in a balanced, mid-pos.).

2

AE pressure compensator with brake defeat

The **AE** control is similar to the ACI (internal pilot pressure supply; page 21) but incorporates a solenoid controlled override function.

In addition, the AE includes a brake defeat valve which prevents motor displacement increase in the braking mode.

The **override** consists of a piston built into the AE end cover and an external electrohydraulic solenoid valve. When the solenoid is energized, system pressure is directed to the piston which in turn pushes on the spool of the servo control valve.

This causes the motor to lock in the max displacement position, irrespective of system pressure (min 30 bar).

Solenoids are available in 12 VDC (designated **L**) and 24 VDC (design. **H**); the required current is 2 and 1 A respectively.

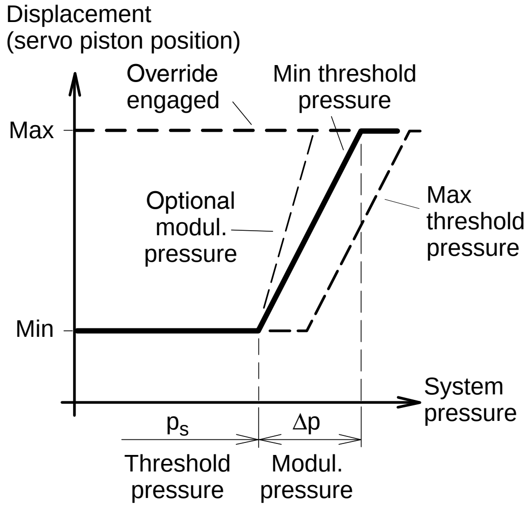
The **brake defeat** valve is also part of the AE end cover and consists of a two-position, three-way spool. The two ports, x9 and x10 (below) should be connected to the corresponding ports of the displacement control of the variable displacement pump.

The brake defeat function prevents the motor outlet port pressure to influence the pressure compensator. If, for example, port A is being pressurized when driving 'forward', pressure in port B during braking will not cause the motor to increase its displacement.

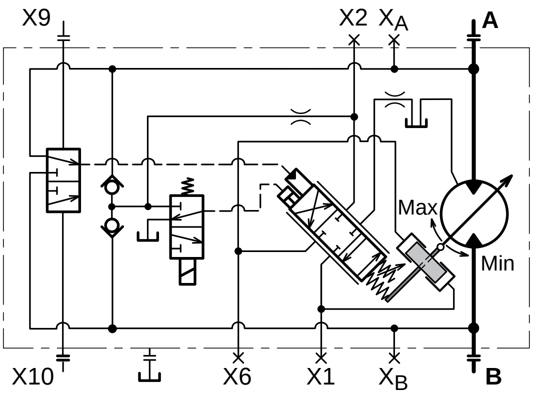
Likewise, when driving in 'reverse' (port B pressurized), any braking pressure in port A will not influence the control; refer to the schematic.

Gauge/pilot ports (AE control):
- XA System pressure, port A
- XB System pressure, port B
- X1 Servo piston pressure (increasing displ.)
- X2 Servo supply pressure (after orifice)
- X6 Servo piston pressure (decreasing displ.)
- X9 Brake defeat, port A
- X10 Brake defeat, port B

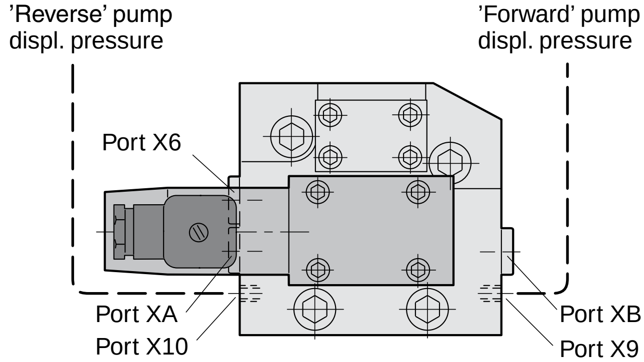
Ports are:
- M14x1.5 (ISO and Cartridge versions)
- 9/16"-18 O-ring boss (SAE version).



AE diagram.



AE schematic (spool in balanced, mid-position).



AE end cover with solenoid valve and brake defeat.

EO two-position control

The EO is a two-position control, where max and min dis-placements are governed by a DC solenoid attached to the control cover (refer to the installation drawing on page 27).

The EO control is utilized in transmissions where only two operating modes are required: Low speed/high torque or high speed/low torque.

The servo piston, normally in the max displacement position, shifts to the min displacement position when the solenoid is activated. Intermediate displacements cannot be obtained with this control.

Servo pressure is supplied internally (through the shuttle valve from one of the main high pressure ports) or exter-nally (port X4).

The solenoid is either 12 or 24 VDC, requiring 1.2 and 0.6 A respectively. An electrical connector is included (DIN 43650/IP54).

The EO two-position control is available in four versions:

EOH 01 I - Internal servo supply, 24 VDC

EOL 01 I - Internal servo supply, 12 VDC

EOH 01 E - External servo supply, 24 VDC (optional)

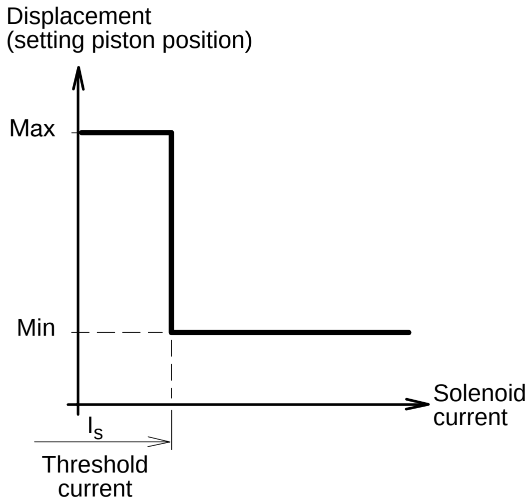
EOL 01 E - External servo supply, 12 VDC (optional)

Gauge ports (EO control):

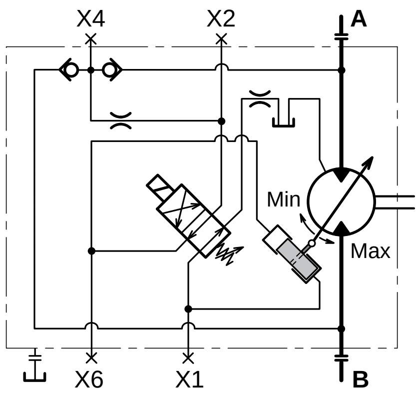
- X1 Setting piston pressure (max-to-min)
- X2 Servo supply pressure (after orifice)
- X4 Servo supply pressure (before orifice)
- X6 Setting piston pressure (min-to-max)

Ports are:

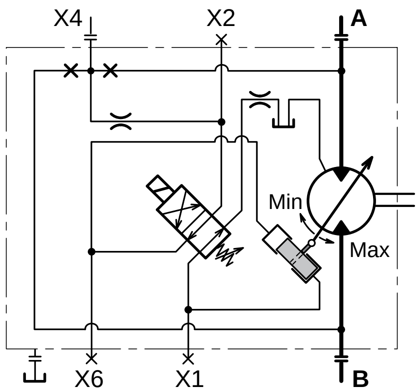
- M14x1.5 (ISO and cartridge versions)
- $^{9}/_{16}$"-18 O-ring boss (SAE version).



EO diagram.



EO H 01 I schematic (non-activated solenoid).



EO H 01 E schematic (non-activated solenoid).

EP proportional control

The EP electrohydraulic proportional control is used in hydrostatic transmissions requiring a continuously variable shaft speed. The servo valve is governed by a DC solenoid attached to the control cover.

When the solenoid current increases above the threshold current, the servo piston starts to move from the max towards the min displacement position. The displacement vs. solenoid current is shown in the diagram to the right. Please note, that the shaft speed vs. current is non-linear; refer to the diagram below.

Solenoids are available in 12 and 24 VDC versions, requiring a max current of approx. 1.1 and 0.55 A respectively.

The threshold current (I_S) is factory set (0.4 A at 12 VDC/0,2 A at 24 VDC) but is adjustable (12 VDC: 0.25–0.45 A; 24 VDC: 0.10–0.23 A).

When utilizing the full displacement range, the required modulating current (ΔI) is 0.6 and 0.3 A respectively. In order to minimize hysteresis, a pulse-width modulated control signal of 70 to 90 Hz should be utilized.

See also “Controls, Note” on page 21.

NOTE: The modulating current (ΔI) is not adjustable.

The EP control is available in four versions:

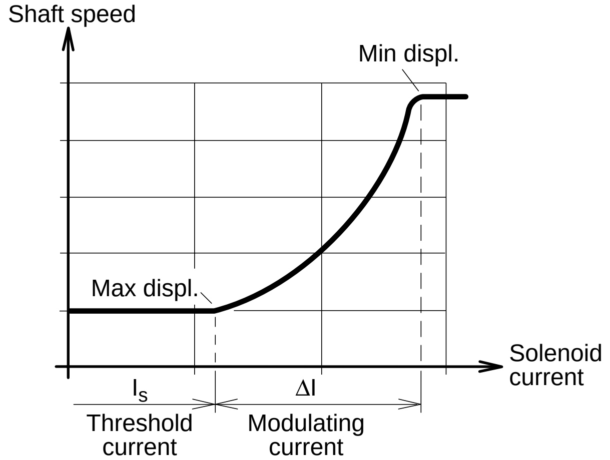
- **EP H 01 I** - Internal servo supply, 24 VDC
- **EP L 01 I** - Internal servo supply, 12 VDC
- **EP H 01 E** - External servo supply, 24 VDC (optional)
- **EP L 01 E** - External servo supply, 12 VDC (optional)

Gauge ports (EP control):

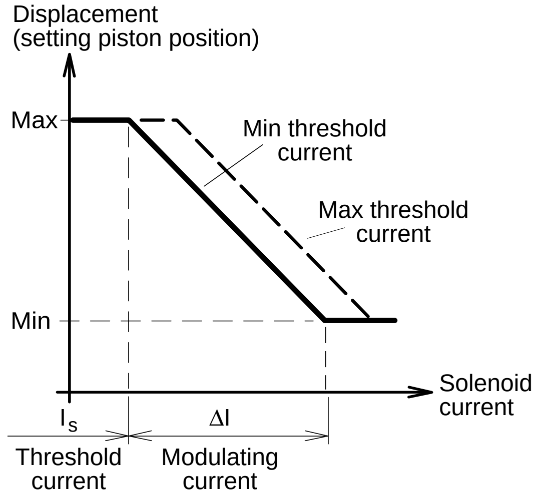
X1	Setting piston pressure (decreasing displ.)
X2	Servo supply pressure (after orifice)
X4	Servo supply pressure (before orifice)
X6	Setting piston pressure (increasing displ.)

Ports are:

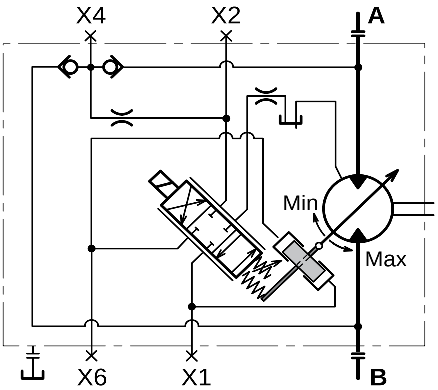
– M14x1.5 (ISO and cartridge versions)
– $^9/_{16}$”-18 O-ring boss (SAE version).



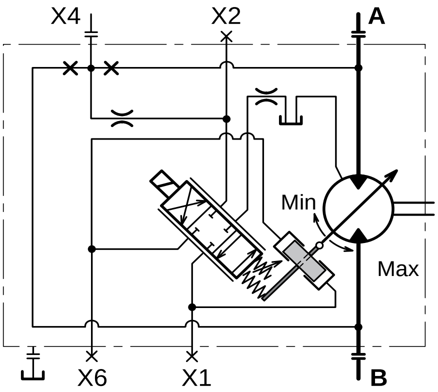
Shaft speed vs. solenoid current (EP control).



EP diagram.



EP H 01 I schematic (spool in a balanced, mid-pos.).



EP H 01 E schematic (spool in a balanced, mid-pos.).

HO two-position control

The two-position HO control is similar to the EO (page 23) but the pilot signal is hydraulic. The position of the setting piston is governed by the built-in servo valve (same on all compensators and controls).

When the applied pilot pressure (port X5) exceeds the pre-set threshold pressure, the piston moves from the max to the min displacement position.

The threshold pressure is factory set at 10 bar but can be adjusted between 5 and 25 bar.

The HO two-position control is available in two versions:

HO S 01 I - Internal servo supply

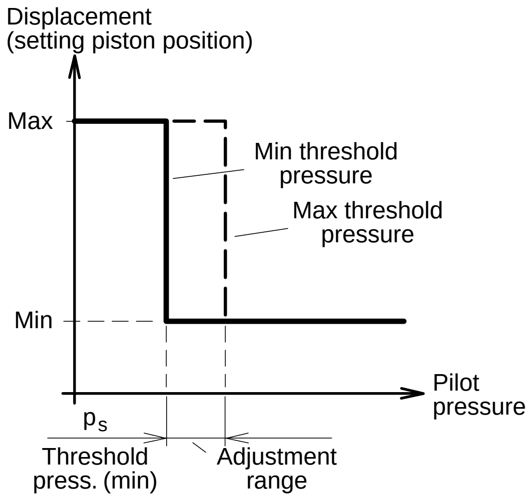
HO S 01 E - External servo supply (port X4) (optional)

Gauge/pilot ports (HO control):

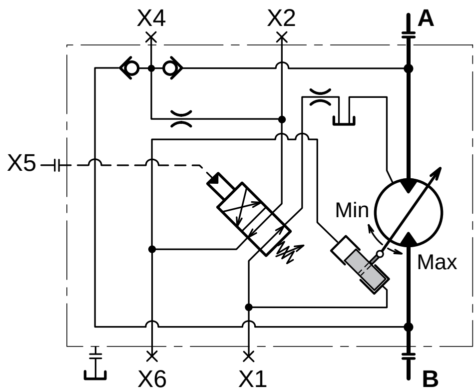
- X1 Setting piston pressure (max-to-min)
- X2 Servo supply pressure (after orifice)
- X4 Servo supply pressure (before orifice)
- X5 External pilot pressure (max 100 bar)
- X6 Setting piston pressure (min-to-max)

Ports are:

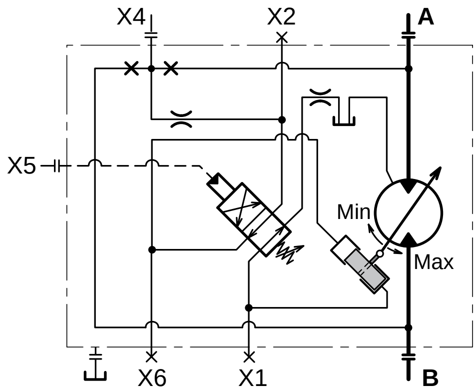
- M14x1.5 (ISO and cartridge versions)
- $^{9}/_{16}$"-18 O-ring boss (SAE version).



HO diagram.



HO S 01 I schematic (X5 not pressurized).



HO S 01 E schematic (X5 not pressurized).

2

HP proportional control

Like the EP control described on page 24, the HP proportional control offers continuously variable displacement, but the pilot signal is hydraulic.

Normally, the servo piston stays in the max displacement position. When a sufficiently high pilot pressure (p_S) is applied to port X5, the piston starts to move towards the min displacement position.

As can be seen in the diagram to the right, the displacement changes in proportion to the applied modulating pressure.

In contrast, shaft speed vs. pilot pressure is non-linear; refer to the diagram below.

The following modulating pressures (Δp) can be selected: 15 or 25 bar.

The threshold pressure (p_S) is factory set at 10 bar but is adjustable between 5 and 25 bar.

See also “Controls, Note” on page 21.

Two versions of the HP control are available:

HPS 01 I - Internal servo supply

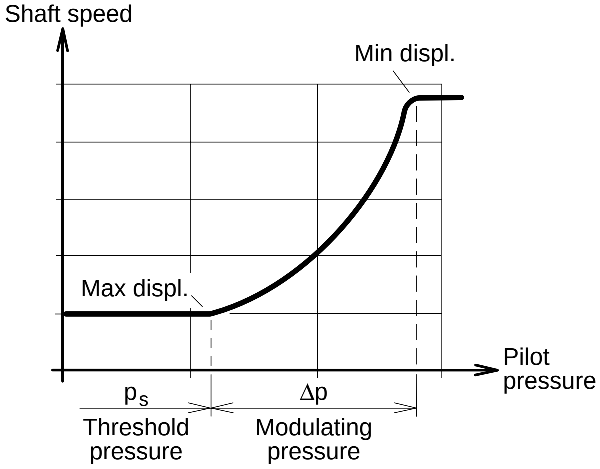
HPS 01 E - External servo supply (port X5) (optional)

Gauge/pilot ports (HP control):

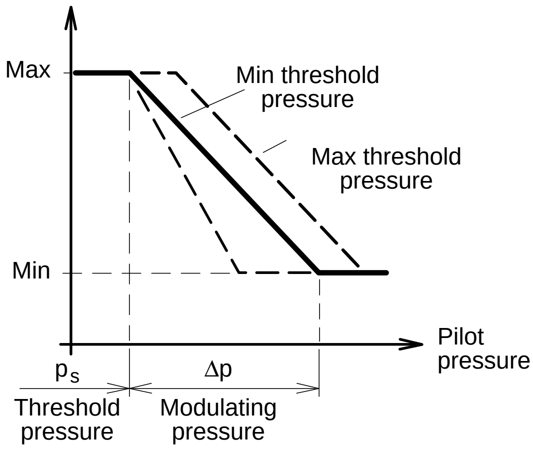
- X1 Servo piston pressure (decreasing displ.)
- X2 Servo supply pressure (after orifice)
- X4 Servo supply pressure (before orifice)
- X5 External pilot pressure (max 100 bar)
- X6 Servo piston pressure (increasing displ.)

Ports are:

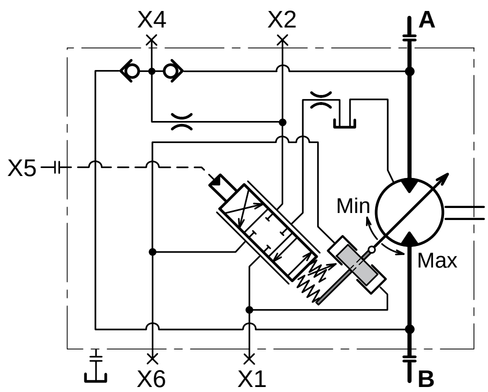
- M14x1.5 (ISO and Cartridge versions)
- $^9/_{16}$”-18 O-ring boss (SAE version).



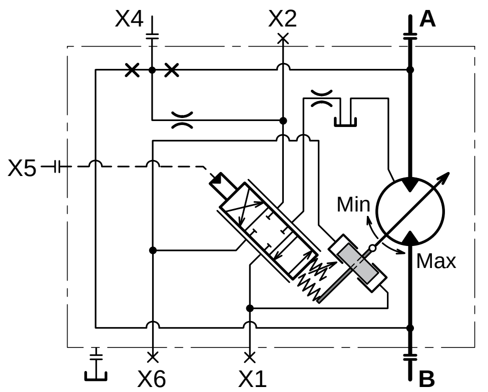
Shaft speed vs. pilot pressure (HP control).



HP diagram.



HP S 01 I schematic (spool in a balanced, mid-pos.).



HP S 01 E schematic (spool in a balanced, mid-pos.).

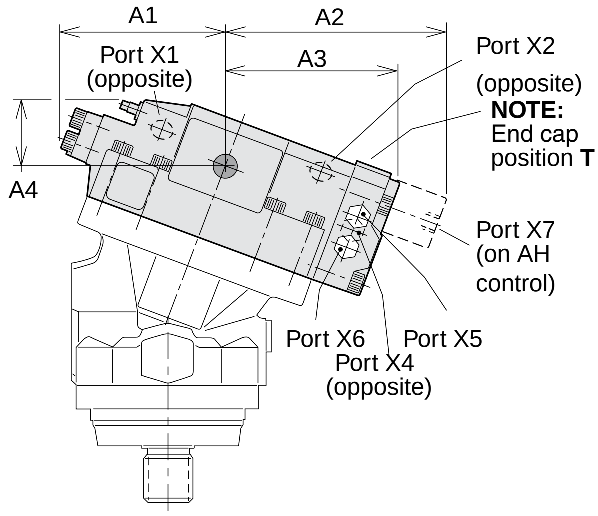
Control installation dimensions

NOTE: - The basic motor side port locations are shown on pages 14, 16 and 18.
- End cap position: Refer to the ordering codes, pages 10-12.

- Control/gauge ports are:
  - M14x1.5 (ISO and cartridge versions).
  - $^{9}/_{16}$”-18 UNF (SAE version).
- All dimensions are max.

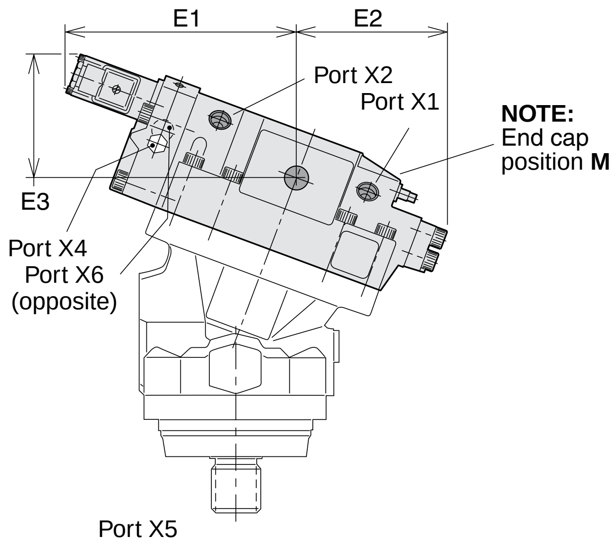
AC and AH compensators

Dim.	V12-60	(inch)	V12-80	(inch)
A1	132	5.20	138	5.43
A2	186	7.32	188	7.40
A3	143	5.63	145	5.71
A4	55	2.17	57	2.24



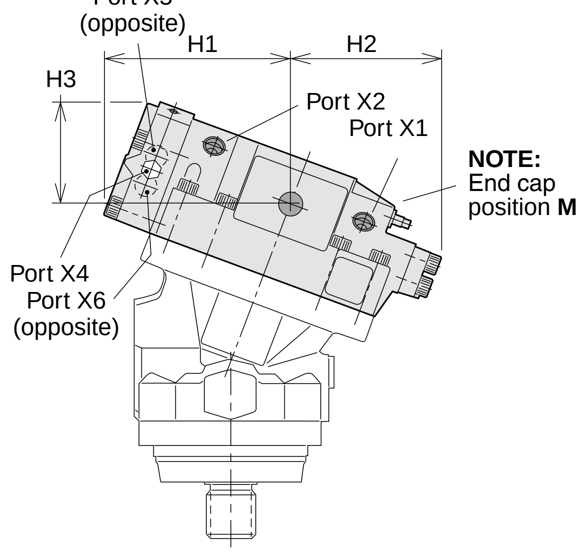
EO and EP controls

Dim.	V12-60	(inch)	V12-80	(inch)
E1	190	7.48	192	7.56
E2	121	4.76	125	4.92
E3	106	4.17	106	4.17



HO and HP controls

Dim.	V12-60	(inch)	V12-80	(inch)
H1	153	6.02	156	6.14
H2	121	4.76	125	4.92
H3	86	3.39	85	3.35



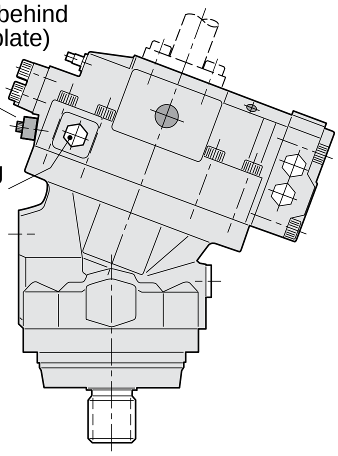
Flushing valve

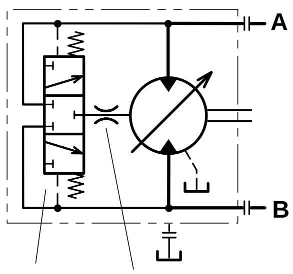
As an option, **L**, the V12 is available with a flushing (or shuttle) valve that supplies the motor with a cooling flow through the case. Cooling the motor may be required when operating at high speeds and/or power levels.

The flushing valve consists of a three-position, three-way spool valve built into a special end cap. It connects the low pressure side of the main circuit to a nozzle (optional size) that empties fluid into the motor case.

In a closed circuit transmission, the flushing valve removes part of the fluid in the main loop. The removed fluid is continuously being replaced by cool, filtered fluid from the low pressure charge pump on the main pump.

NOTE: The flushing valve ordering code is shown on page 13 (‘L 01’).





Available nozzles

Nozzle design.	Orifice size [mm]	Status
L 01	**1.3**	**Standard**
L 02	0.8	Optional
L 03	1.0	“
L 04	1.2	“
L 05	1.5	“
L 06	1.7	“
L 07	2.0	“
L 08	3.0	“

NOTE: - ’00’ - no nozzle

High speed operation

Contact Parker Hannifin for additional information.

Accessory valve blocks

SR pressure relief/check valve

To protect the main hydraulic circuit from unwanted pressure peaks, an add-on valve block, type SR, with two independent pressure relief cartridges and two large capacity check valves can be ordered for series V12.

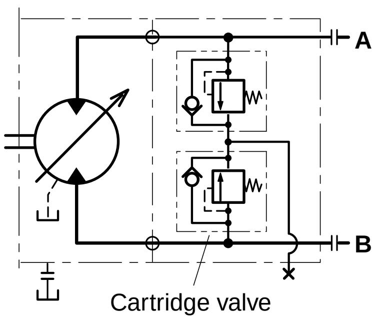
The valve block is mounted on the motor end cap as shown to the right. The individual cartridge has a fixed, factory-set opening pressure.

An external port for make-up fluid is provided. When sufficiently pressurized, it prevents motor cavitation due to pressure losses in the main circuit.

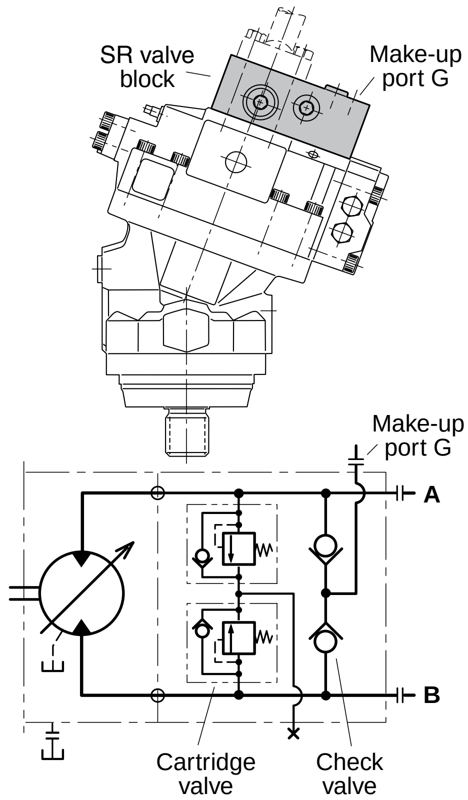
SV pressure relief valves

The SV relief valve block is an alternative to the SR valve block above.

The SV contains the same cartridge valves as the SR but lacks the two check valves; refer to the SV schematic, below.



V12 with SV relief valve block.



V12 with SR relief valve block.

Note:

Brake valves, please contact Parker Hannifin for additional information.

Speed sensor

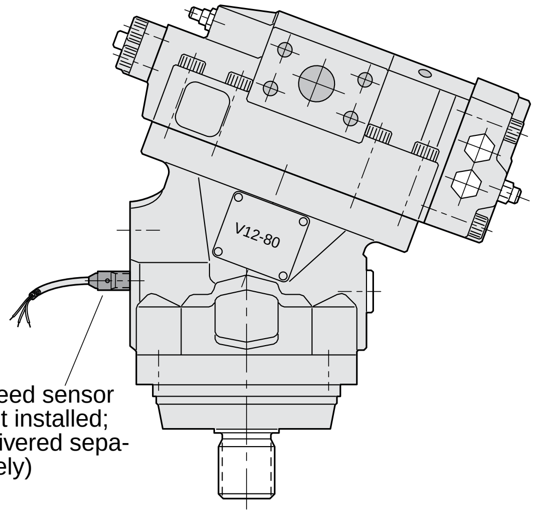
A speed sensor kit is available for the **ISO, Cartridge** and **SAE** versions of series V12, V12-80-Cartridge excepted.

The ferrostat differential (Hall-effect) sensor installs in a separate, threaded hole in the V12 bearing housing.

The speed sensor is directed towards the V12 shaft flange and outputs a 2 phase shifted square wave signal within a frequency range of 0 Hz to 15 kHz. Number of pulses per shaft rev is 36 which, at 5 Hz, corresponds to approx. 8 rpm.

When a 'Speed sensor' is ordered (refer to the ordering codes on pages 10 and 12), the housing is machined with the threaded hole; the speed sensor kit is delivered in a separate bag.

NOTE:
- The motor bearing housing must be prepared for the speed pick-up; refer to the V12 ordering codes on pg. 10, 11 and 12 (Code P).
- Additional information is provided in our publication HY30-8301/UK 'Speed sensor for series F11/F12 and V12/T12/V14'; available from Parker Hannifin.
- The speed sensor is also shown in the illustrations on pg. 14 and 18.



Speed sensor (not installed; delivered separately)

How to order

Please order the speed sensor on a separate order line next to the product order line.

Part number for speed sensor is 3785190.

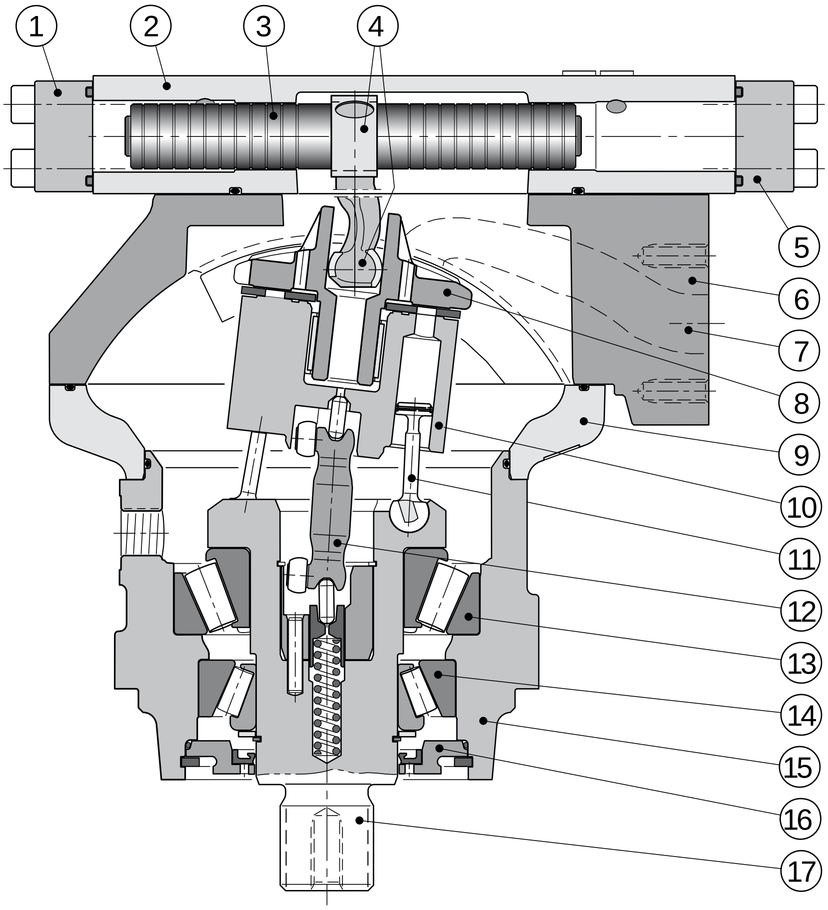
V14

Content Page

3

V14 cross section

1. End cover, min displ.
2. Control module
3. Setting piston
4. Connecting arm
5. End cover, max displ.
6. Connection module
7. Main pressure port
8. Valve segment
9. Intermediate housing
10. Cylinder barrel
11. Spherical piston with laminated piston ring
12. Synchronizing shaft
13. Inner roller bearing
14. Outer roller bearing
15. Bearing housing
16. Shaft seal with retainer
17. Output shaft



Specifications

V14 frame size	**110**	**160**
Displacement [cm^3/rev]		
- at 35° (max)	110	160
- at 6.5° (min)	22	32
Operating pressure [bar]		
- max intermittent1)	480	480
- max continuous	420	420
Operating speed [rpm]		
- max intermittent at 35°1)	3 900	3 400
- max continuous at 35°	3 400	3 000
- max intermittent at 6.5°-20°1)	6 500	5 700
- max continuous at 6.5°-20°	5 700	5 000
- min continuous	50	50

V14 frame size	**110**	**160**
Flow [l/min]		
- max intermittent1)	430	550
- max continuous	375	480
Output torque [Nm]		
at 100 bar (theor.)	175	255
Max output power1) [kW]	262	335
Corner power [kW]		
- intermittent1)	570	730
- continuous	440	560
Weight [kg]	54	68

1) Max 6 seconds in any one minute.

Efficiency diagrams

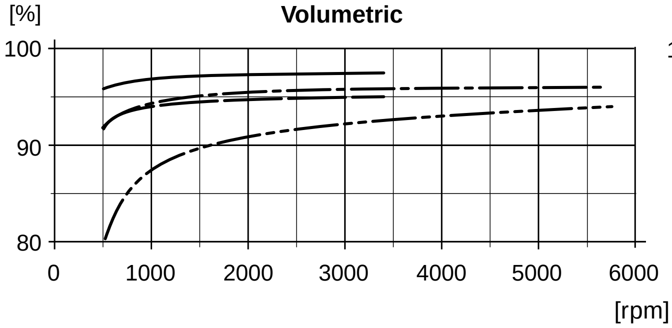
The following diagrams show volumetric, mechanical and overall efficiencies versus shaft speed at 210 and 420 bar operating pressure, and at full (35°) and reduced (10°) displacements.

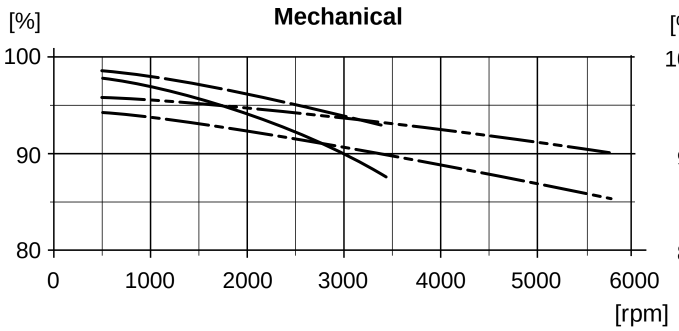
Information on efficiencies for a specific load condition can be made available from Parker Hannifin.

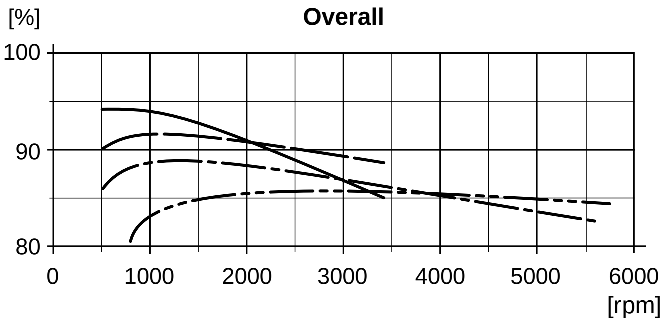
210 bar at full displacement
420 bar “ “ “

210 bar at reduced displacement
420 bar “ “ “

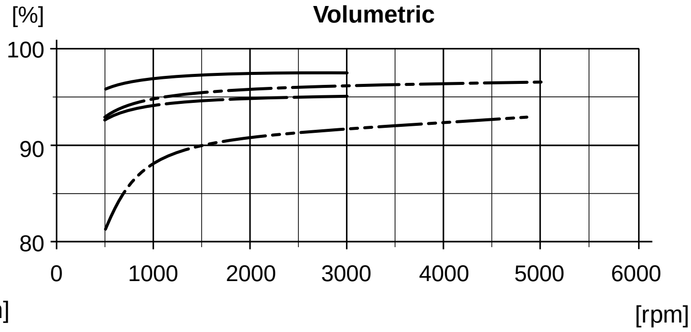
V14-110

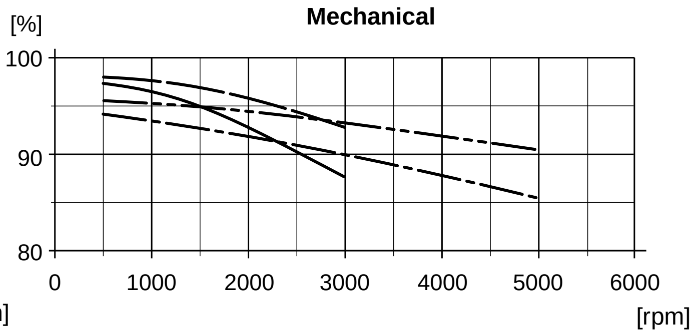


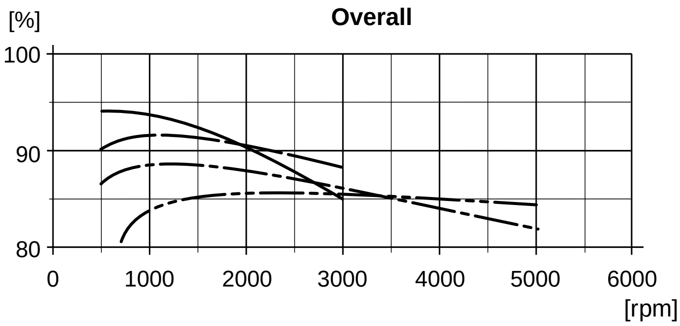




V14-160







ISO version

V14	–		–	I	V		–					–			–		–		–		/	–		

Motor type — Frame size — Mounting flange — Shaft seal — Shaft end — Control — Control signal — Restrictor set — Modulating press./current — Valve options — Valve opening pressure — Sensor options — Version — Max and min displacement — Thresh-old setting

Code	**Frame size**
110	110 [cm³/rev]
160	160 [cm³/rev]

Code	**Mounting flange**
I	ISO version

Code	**Shaft seal**
V	PPS

Code	**Shaft end**
C	DIN (ISO version)
D	DIN (ISO version)

Code	**Control**
AC	Pressure compensator
AD	Press. compensator with electrohydraulic override and brake defeat valve
AH	Pressure compensator with hydraulic override
EO	Electrohydraulic, two-position
EP	Electrohydraulic, proportional
HO	Hydraulic, two-position
HP	Hydraulic, proportional

Code	**Pilot control signal**
E	External pressure (AH, HO, HP)
I	Internal pressure (AC, AD, AH)
H	24 VDC (AD, EO, EP)
L	12 VDC (AD, EO, EP)

Code	**Control restrictor set** (orifice dia in mm)
1	0.7
2	0.8
3	**1.0 (standard)**
4	1.2
X	Special

Code	**Control modulating pressure/current**
N	AC, AD, AH, EO, HO: 0 bar; EP: Non-selectible current
A	15 [bar] (AC, AD, AH, HP)
B	25 [bar] (AC, AD, AH, HP)
C	50 [bar] (AC, AD, AH)

Code	**Valve options** (pages 54-57)
N	None
(B)	Brake valve and pressure relief valves*
L	Flushing valve
P	Pressure relief valves
R	Extra valve block (Contact Parker Hannifin)

* Note.
See information on page 55

Valve opening pressure:
Pressure relief valve opening pressure [bar] (page 56)
Alternatively:
Flushing valve restrictor (page 54)

Code	**Sensor options** (pages 54-57)
N	None
C	Prepared for setting piston position sensor and shaft speed sensor
D	Setting piston position sensor and prepared for shaft speed sensor
L	Setting piston position sensor
P	Prepared for speed sensor*
T	Prepared for setting piston position sensor

Version:
Factory issued for special versions

Max and min displacement:
Max and min displ. [cm³/rev]

Threshold setting
AC, AD, AH:
Select pressure between 100 and 350 [bar]
EO, EP:
400 [mA] - 12 [VDC]
200 [mA] - 24 [VDC]
HO, HP:
10 [bar]

3

Cartridge version

V14	–	110	–	C	V	C	–					–			–		–		–		/		–	
Motor type		Frame size		Mounting flange	Shaft seal	Shaft end		Control	Control signal	Restrictor set	Modulating press./current		Valve options	Valve opening press.		Sensor options		Version		Max and min displacement				Threshold setting

Code	Frame size
110	110 [cm³/rev]

Code	Mounting flange
C	Cartridge version

Code	Shaft seal
V	PPS

Code	Shaft end
C	DIN (ISO version)

Code	Control
AC	Pressure compensator
AD	Press. compensator with electrohydraulic override and brake defeat valve
AH	Pressure compensator with hydraulic override
EO	Electrohydraulic, two-position
EP	Electrohydraulic, proportional
HO	Hydraulic, two-position
HP	Hydraulic, proportional

Code	Control signal
E	External pressure (AH, HO, HP)
I	Internal pressure (AC, AH)
H	24 [VDC] (AD, EO, EP)
L	12 [VDC] (AD, EO, EP)

Code	Control restrictor set (orifice dia in mm)
1	0.7
2	0.8
3	**1.0 (standard)**
4	1.2
X	Special

Code	Control modulating pressure/current
N	AC, AD, AH, EO, HO: 0 bar; EP: Non-selectible current
A	15 [bar] (AC, AD, AH, HP)
B	25 [bar] (AC, AD, AH, HP)
C	50 [bar] (AC, AD, AH)

Code	Valve options (pages 54-57)
N	None
(B)	Brake valve and pressure relief valves*
L	Flushing valve
P	Pressure relief valves
R	Extra valve block (Contact Parker Hannifin)

Pressure relief valve opening pressure [bar] (page 56)
Alternatively:
Flushing valve restrictor (page 54)

Code	Sensor options (pages 54-57)
N	None
C	Prepared for setting piston position sensor and shaft speed sensor (EP)
D	Setting piston position sensor and and prepared for shaft speed sensor (EP)
L	Setting piston position sensor (EP)
P	Prepared for speed sensor*
T	Prepared for setting piston position sensor (EP)

Factory issued for special versions

Max and min displ. [cm³/rev]

Threshold setting
AC, AD, AH:
Select pressure between 100 and 350 [bar]
EO, EP:
400 [mA] - 12 [VDC]
200 [mA] - 24 [VDC]
HO, HP:
10 [bar]

* Note.
See information on page 55

SAE version

V14	–		–	S	V	S	–					–			–		–		–		/		–	

Motor type · Frame size · Mounting flange · Shaft seal · Shaft end · Control · Control signal · Restrictor set · Modulating press./current · Valve options · Valve opening press. · Sensor options · Version · Max and min displacement · Threshold setting

Code	Frame size
110	110 [cm³/rev]
160	160 [cm³/rev]

Code	Mounting flange
S	SAE version

Code	Shaft seal
V	PPS

Code	Shaft end
S	SAE (SAE version)

Code	Control
AC	Pressure compensator
AD	Press. compensator with electrohydraulic override and brake defeat valve
AH	Pressure compensator with hydraulic override
EO	Electrohydraulic, two-position
EP	Electrohydraulic, proportional
HO	Hydraulic, two-position
HP	Hydraulic, proportional

Code	Control signal
E	External pressure (AH, HO, HP)
I	Internal pressure (AC, AH)
H	24 [VDC] (AD, EO, EP)
L	12 [VDC] (AD, EO, EP)

Code	Control restrictor set (orifice dia in mm)
1	0.7
2	0.8
3	**1.0 (standard)**
4	1.2
X	Special

Code	Control modulating pressure/current
N	AC, AD, AH, EO, HO: 0 bar; EP: Non-selectible current
A	15 [bar] (AC, AD, AH, HP)
B	25 [bar] (AC, AD, AH, HP)
C	50 [bar] (AC, AD, AH)

Code	Valve options (pages 54-57)
N	None
(B)	Brake valve and pressure relief valves*
L	Flushing valve
P	Pressure relief valves
R	Extra valve block (Contact Parker Hannifin)

Valve opening press.:
Pressure relief valve opening pressure [bar] (page 56)
Alternatively:
Flushing valve restrictor (page 54)

Code	Sensor options (pages 54757)
N	None
C	Prepared for setting piston position sensor and shaft speed sensor
D	Setting piston position sensor and and prepared for shaft speed sensor
L	Setting piston position sensor
P	Prepared for speed sensor*
T	Prepared for setting piston position sensor

Version: Factory issued for special versions

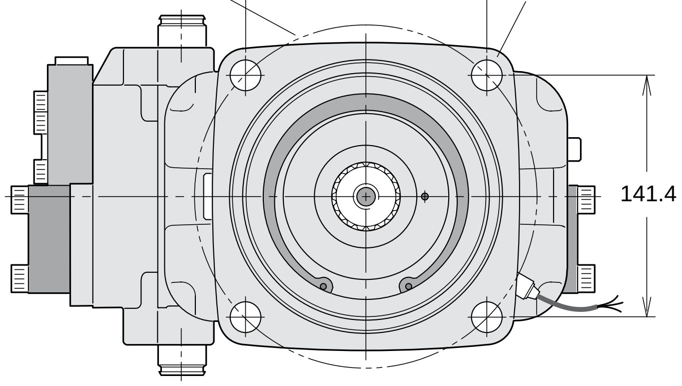
Max and min displacement: Max and min displ. [cm³/rev]

Threshold setting
AC, AD. AH:
Select pressure between 100 and 350 [bar]
EO, EP:
400 [mA] - 12 [VDC]
200 [mA] - 24 [VDC]
HO, HP:
10 [bar]

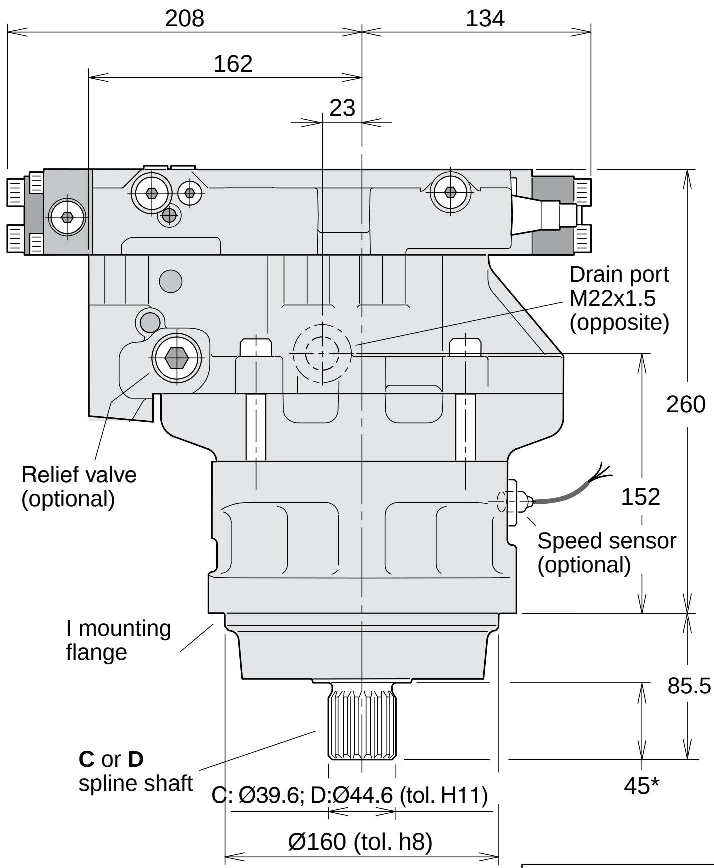
* Note.
See information on page 55

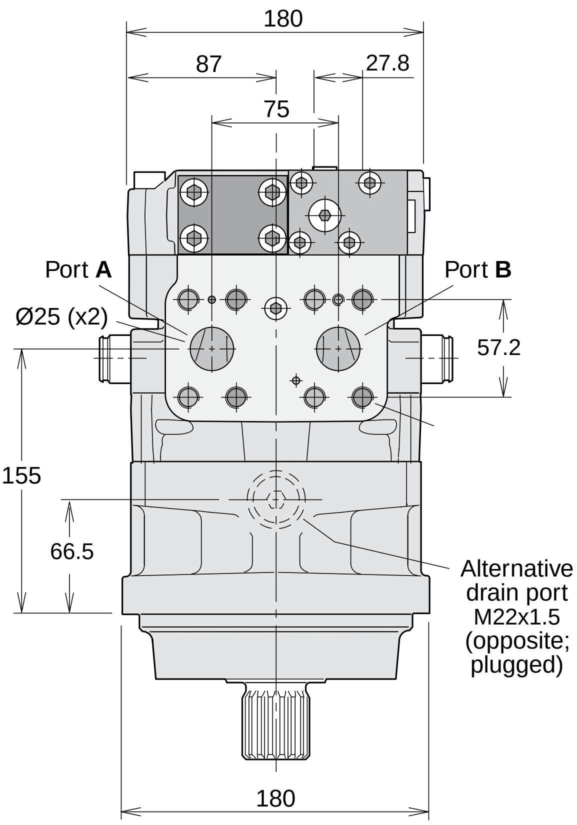
3

V14-110, ISO version



Shown: V14-110-ISO with AC compensator





***** Measurement valid for spline type C. Corresponding measurement for spline type D is 5 mm longer.

Spline type **C**1) (DIN 5480)	
V14-110	W40x2x18x9g

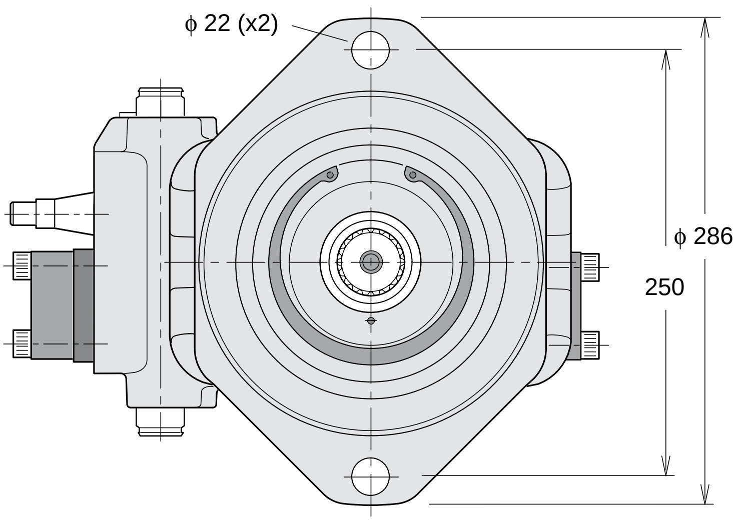
Spline type **D**1) (DIN 5480)	
V14-110	W45x2x21x9g

1) '30° involute spline, side fit'
C:Ø 39.6; D:Ø 44.6; tol. h11

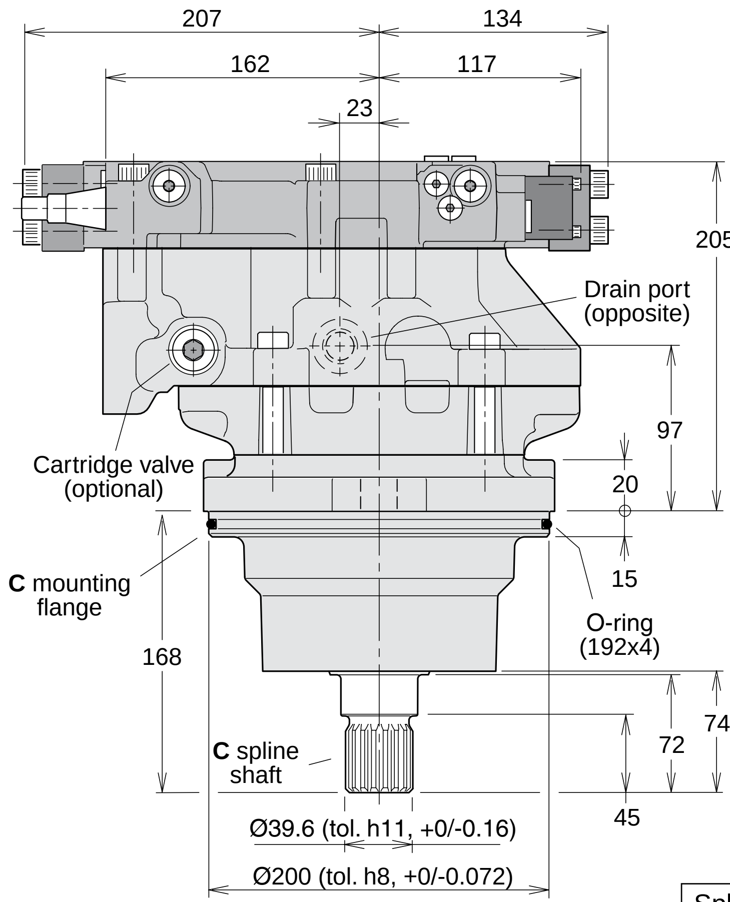
Ports	V14-110
Main ports	25 [1"]
Drain ports	M22x1.5

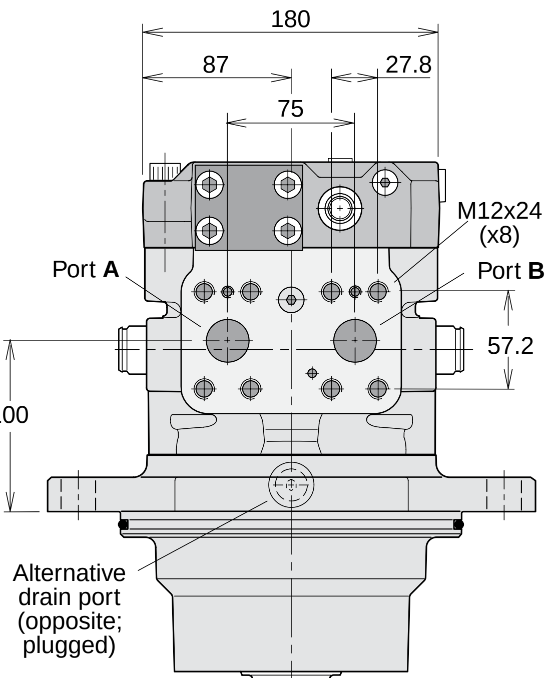
Main ports: ISO 6162, 41.5 MPa, type II

V14-110, Cartridge version



Shown: V14-110-SAE with HO/HP control





Spline type **C*** (DIN 5480)	
V14-110	W40x2x18x9g

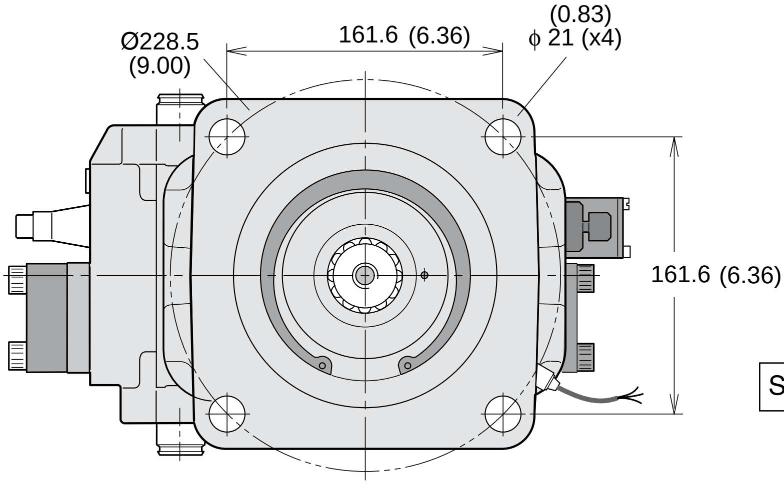
***** '30° involute spline, side fit'.

Ports	V14-110
Main ports	25 [1"]
Drain ports	M22x1.5

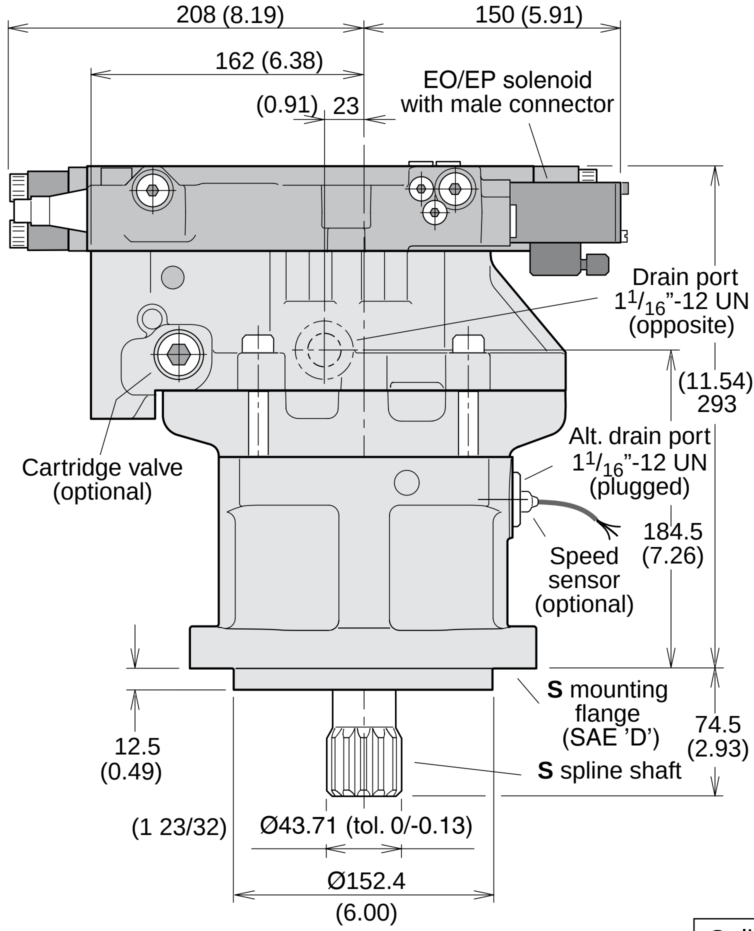
Main ports: ISO 6162, 41.5 MPa, type II

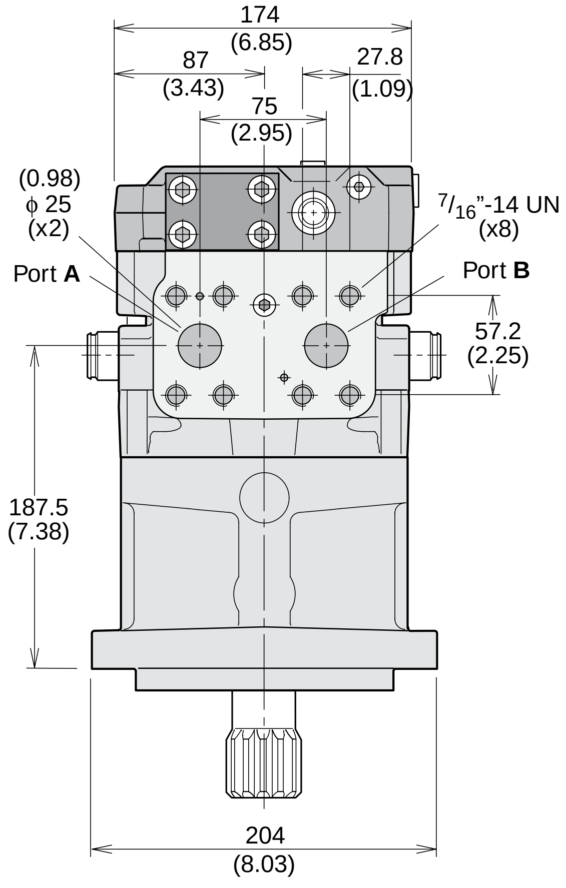
V14-110, SAE version

(inch)



Shown: V14-110-SAE with EO/EP control





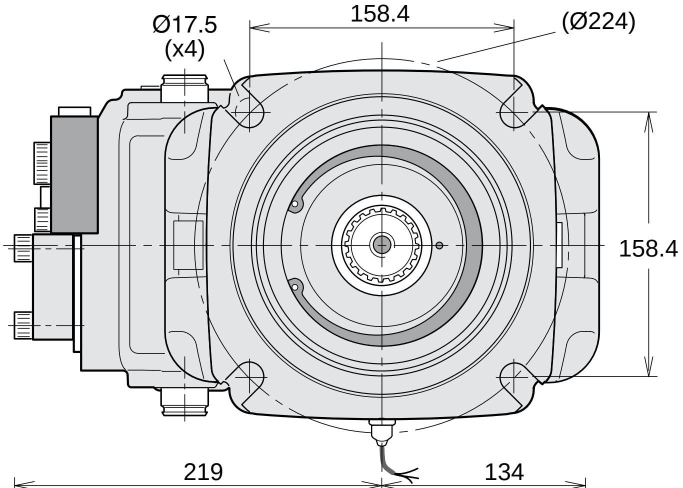
Spline type **S** (SAE J498b*)	
V14-110	SAE 'D'
	(13T, 8/16 DP)

***** 30° involute spline, side fit

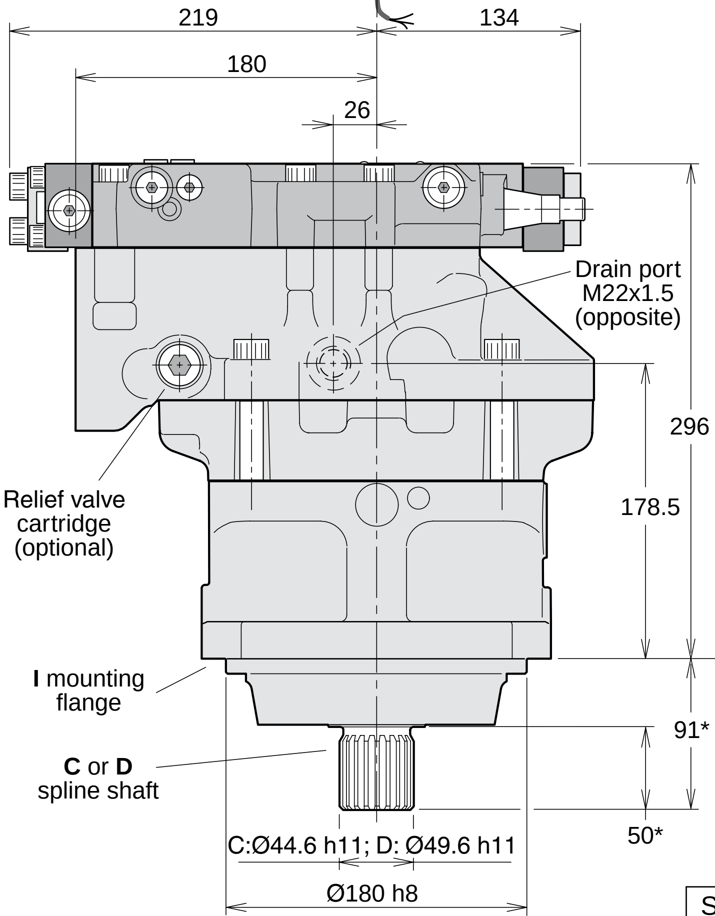
Ports	V14-110
Main ports	25 [1"]
Drain ports	$1^{1}/_{16}$"-12 UN

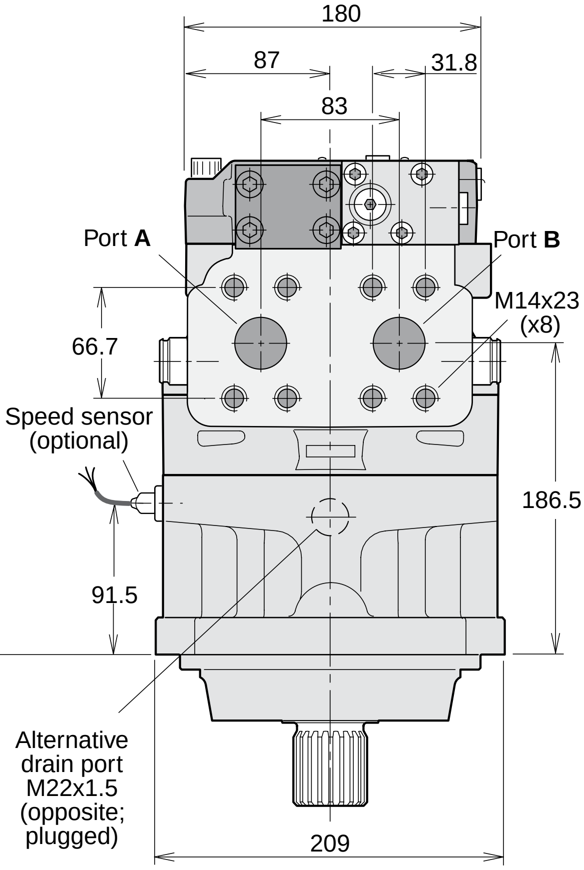
Main ports: SAE J518c, 6000 psi

V14-160, ISO version



Shown: V14-160-ISO with AC compensator





***** Measurement valid for spline type C. Corresponding measurement for spline type D is 5 mm longer.

Spline type **C** 1) (DIN 5480)	
V14-160	W45x2x21x9g

Spline type **D*** (DIN 5480)	
V14-160	W50x2x24x9g

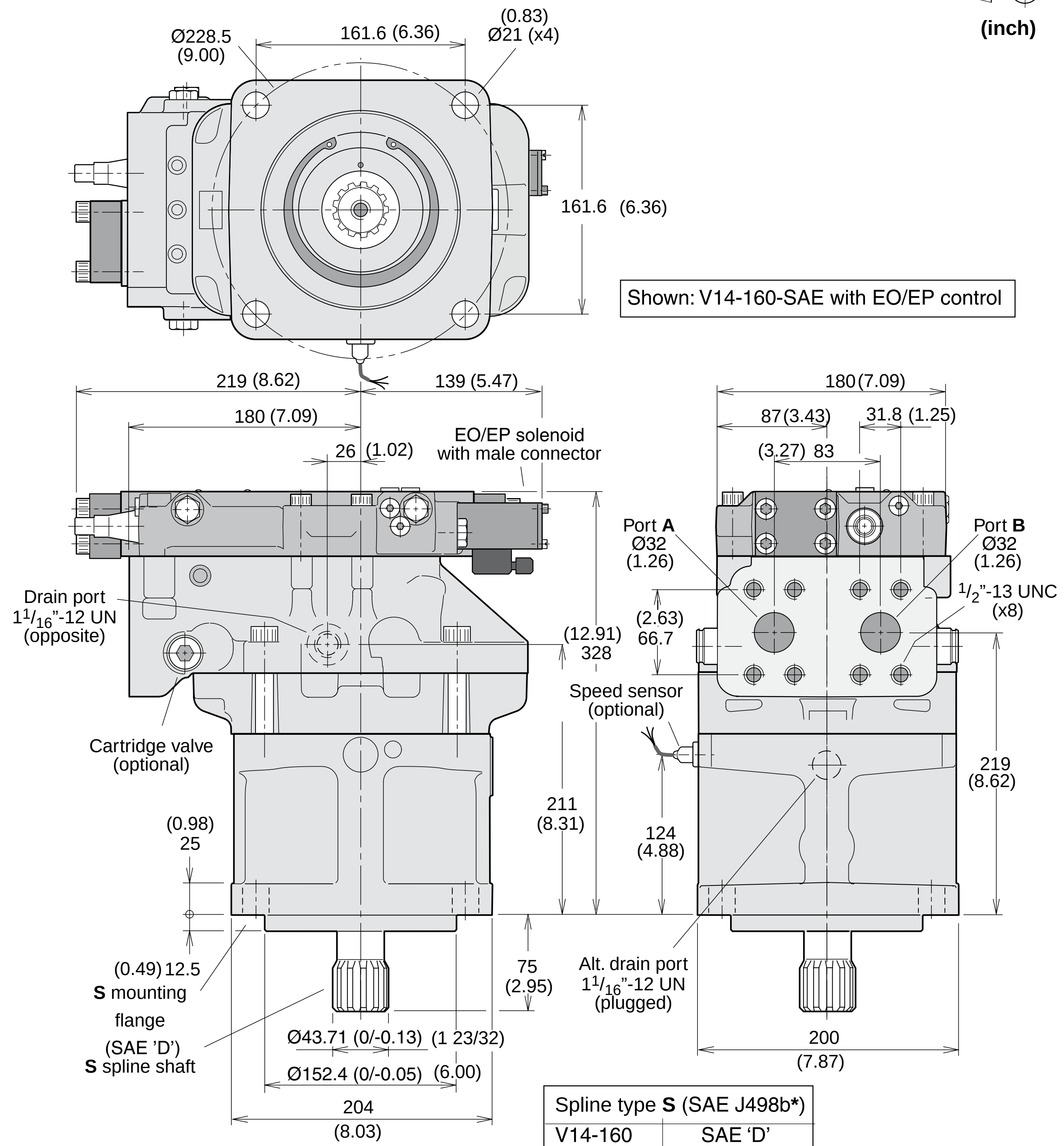
1) '30° involute spline, side fit'.

Ports	V14-160
Main ports	32 [$1^1/_4$"]
Drain ports	M22x1.5

Main ports: ISO 6162, 41.5 MPa, type II

V14-160, SAE version

(inch)



Spline type **S** (SAE J498b*)	
V14-160	SAE ‘D’ (13T, 8/16 DP)

***** ‘30° involute spline, side fit’.

Ports	V14-160
Main ports	32 [$1^1/_4$”]
Drain ports	$1^1/_{16}$”-12 UN

Main ports: SAE J518c, 6000 psi

Controls - general information

The following V14 controls satisfy most application requirements:

- AC, AD and AH (automatic pressure compensators)
- EO and HO (two-position controls)
- EP and HP (proportional controls)

All controls utilize a servo piston that connects to the valve segment (refer to the illustration on page 32).

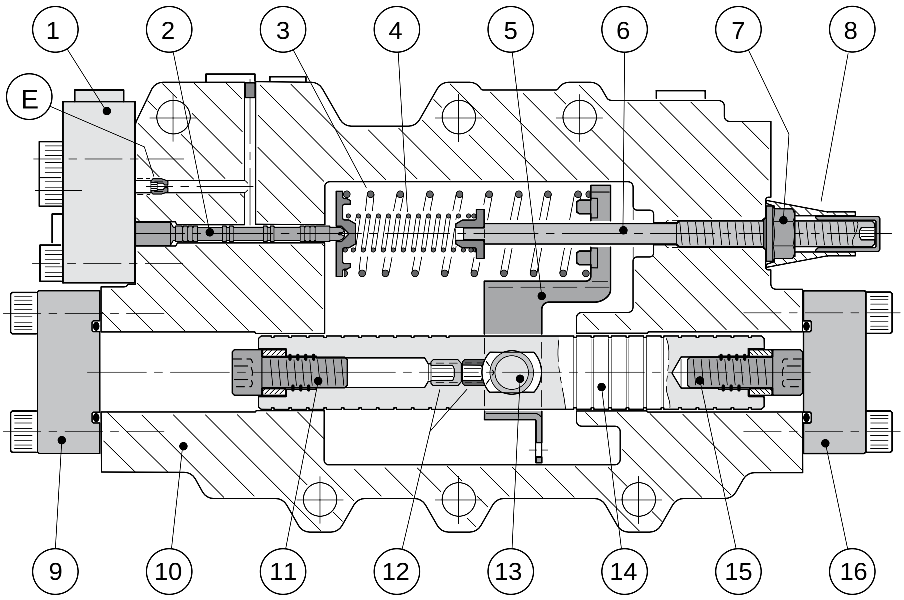
The built-in four-way servo valve determines the position of the servo piston and, in turn, the displacement. The displacement angle (between output shaft and cylinder barrel) ranges from 35° (max) to 6.5° (min).

Servo supply pressure is obtained from the pressurized, main port through the corresponding, built-in shuttle valve.

The response time (i.e. from max-to-min or from min-to-max displacement) is determined by restrictor nozzles in the servo valve supply and return lines; refer to the schematics.

NOTE: The modulating pressure/current, Δp/ΔI values are valid for motors that are not diplacement limited.

AC pressure compensator



Cross section of the AC pressure compensator module.

1. AC control cover
2. Servo valve spool
3. Modulating spring
4. Threshold spring
5. Feedback arm
6. Threshold adjustment screw
7. Seal nut
8. Two-part seal (threshold adjustm’t)
9. End cover (max displ.)
10. Control module housing
11. Max displ. limiting screw/bushing
12. Set screws
13. Connecting arm
14. Setting piston
15. Min displ. limiting screw/bushing
16. End cover (min displ.).

E. Nozzle location; refer to the hydraulic schematics, pag. 44-46.

AC compensator function

Refer to the illustration below (left):

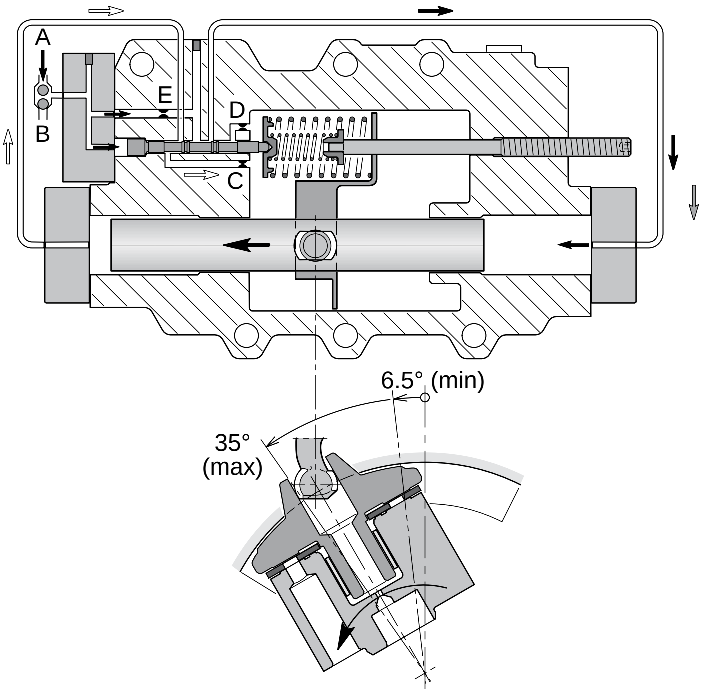
When pressure in port A (or B) increases, the servo valve spool is pushed to the right, directing flow to the right hand setting chamber - the setting piston moves to the left; displacement and output torque increases.

At the same time, the shaft speed decreases correspondingly (at a constant pump flow to the motor).

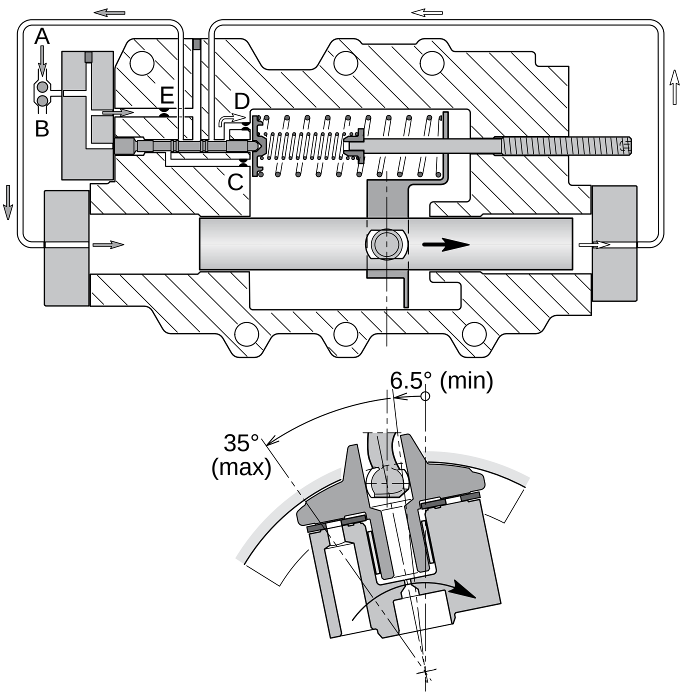
Refer to the illustration below (right):

When pressure in port A (or B) decreases, the servo valve spool moves to the left, directing flow to the left hand setting chamber - the setting piston moves to the right; displacement and output torque decreases.

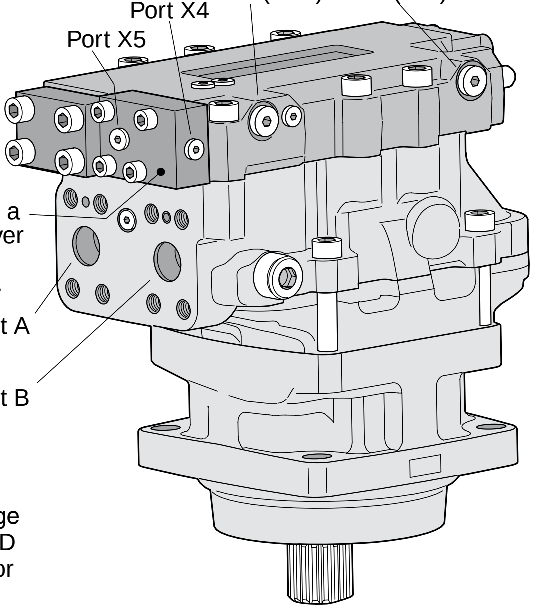
At the same time, the shaft speed increases correspondingly (at a constant pump flow to the motor).



AC function (displ. increases at increasing system pressure).



AC function (displ. decreases at decreasing system pressure).



NOTE:
The AH has a different cover incl. port X7 (beside X4).

NOTE:
Refer to page 45 for the AD compensator ports.

Port locations - V14- with AC or AH compensator.

Gauge/pilot ports (AC and AH compensators):
- X1 Setting piston pressure (decreasing displ.)
- X2 Setting piston pressure (increasing displ.)
- X4 Servo supply pressure (before orifice and filter)
- X5 Pilot pressure
- X7 Override pressure (on the AH)

Port sizes:
- M14x1.5 (ISO and cartridge versions)
- $^{9}/_{16}$"-18 O-ring boss (SAE version)

AC compensator function (cont'd)

The AC compensator is used in off-road vehicle hydrostatic propel transmissions. The compensator automatically adjusts motor displacement between available max and min to the output torque requirement (up to max available system pressure).

Normally, the motor stays in the minimum displacement position. When there is a demand for additional torque, e.g. when the vehicle enters an upgrade, the displacement increases (providing more torque) while the motor shaft speed decreases proportionally.

The threshold pressure, where displacement starts to increase ('p_S'; refer to the AC diagram), is adjustable between 100 and 400 bar.

To reach max displacement, an additional modulating pressure (Δp) above the threshold pressure is required.

To satisfy specific hydraulic circuit requirements, a modulating pressure of 15, 25 or 50 bar can be selected.

The pressure compensator is supplied with a small filter installed in the AC control cover (between ports X4 and X5); refer to the schematic below right.

Gauge/pilot ports (AC and AH compensators):

X1 Setting piston pressure (decreasing displ.)

X2 Setting piston pressure (increasing displ.)

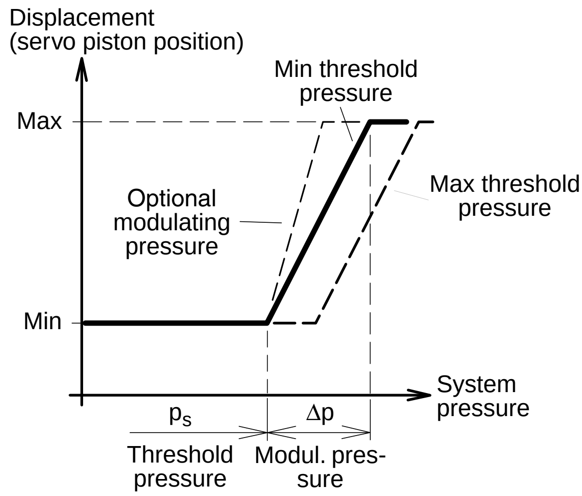
X4 Servo supply pressure (before orifice and filter)

X5 Pilot pressure

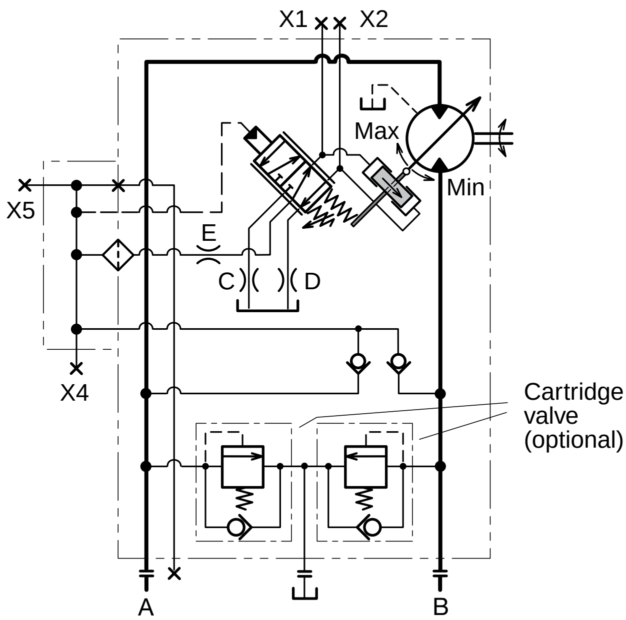
Port sizes:

- M14x1.5 (ISO and cartridge versions)
- $^{9}/_{16}$"-18 O-ring boss (SAE version)

NOTE: Port locations are shown in the illustration on page 43.



AC diagram (displacement vs. system pressure).



AC schematic (shown: control moving towards min displ.)

AD pressure compensator

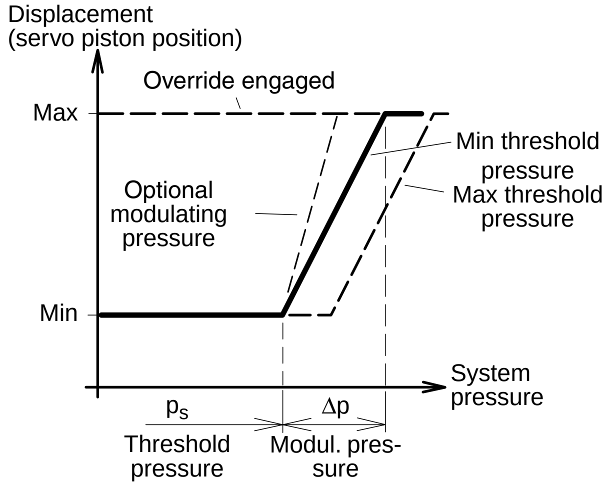
The AD control is similar to the AC (shown on previous pages) but incorporates a solenoid controlled override function and a brake defeat valve.

Override

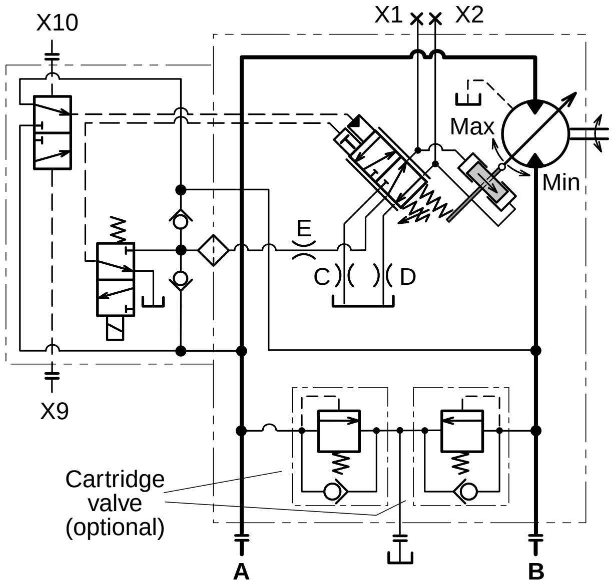
- The override consists of a piston built into a special end cover and an external solenoid.
- When the solenoid is energized, system pressure is directed to the piston which in turn pushes on the spool of the servo control valve. This causes the motor to lock in the max displacement position, irrespective of system pressure (min 30 bar).
- Solenoids are available in 12 VDC (designated **L**) and 24 VDC (design. **H**); the required current is 2 and 1 A respectively.

Brake defeat valve

- The brake defeat function, which is also built into the special end cover, consist of a two-position, three-way valve. Ports X9 and X10 (refer to the schematic) are connected to the corresponding ports of the pump displacement control.
- The function prevents any pressure in the motor return port to influence the pressure compensator. Say, e.g., that motor port A is pressurized to move the vehicle ‘forward’. Thus, back pressure in return port B, which develops in the braking mode, will not cause the compensator to move towards the max displacement position and vehicle braking will be smooth.
- Likewise, when port B is pressurized when the vehicle moves ‘backward’, braking presssure in port A will not influence the compensator.



AH diagram (displacement vs. system pressure).



AD schematic (shown: override solenoid not engaged; the compensator moves towards min displacement).

Gauge/pilot ports (AD compensator):

X2 Servo piston pressure (increasing displ.)

X9 Pressure (from the pump control) to the brake defeat valve (for port A)

X10 Pressure (from the pump control) to the brake defeat valve (for port B)

Port sizes:

– M14x1.5 (ISO version)

– X2 is M14x1.5 O-ring boss (SAE version)

NOTE: Some of the ports are shown in the illustration on page 43.

AH pressure compensator

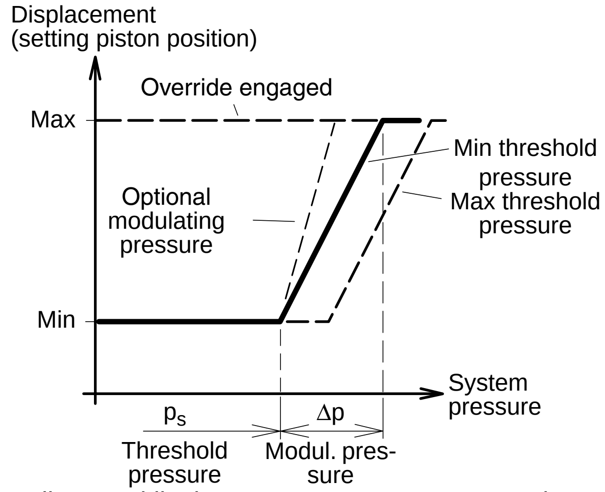
The AH compensator is similar to the AD (shown on previous page) but incorporates only an hydraulic override device. It is utilized in hydrostatic transmissions where a high degree of manœuvrability at low vehicle speeds is desirable.

When the override is pressurized, the servo piston moves to the max displacement position irrespective of system pressure, provided the servo supply pressure is at least 30 bar.

Required override pressure, port X7 (min 20 bar):

$$p_7 = \frac{p_S + \Delta p}{24} \quad \text{[bar]}$$

p_7 = Override pressure
p_s = System pressure
Δp = Modulating pressure



AH diagram (displacement vs. system pressure).

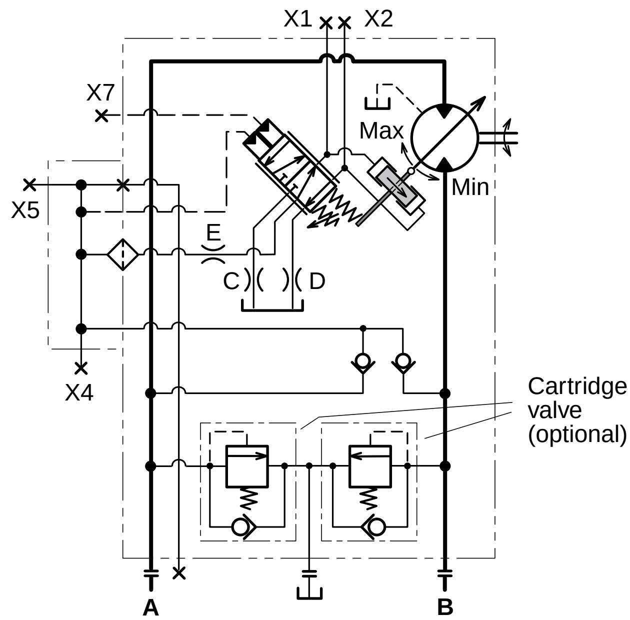
Gauge/pilot ports (AH compensator):

- X1 Servo piston pressure (decreasing displ.)
- X2 Servo piston pressure (increasing displ.)
- X4 Servo supply pressure (before orifice and filter)
- X5 Pilot pressure
- X7 Override pressure

Port sizes:

- M14x1.5 (ISO version)
- $^{9}/_{16}$"-18 O-ring boss (SAE version)

NOTE: Port locations are shown in the illustration on page 43.



AH schematic (shown: override port X7 not pressurized; the compensator is moving towards min displacement).

EO, EP, HO and HP controls (general information)

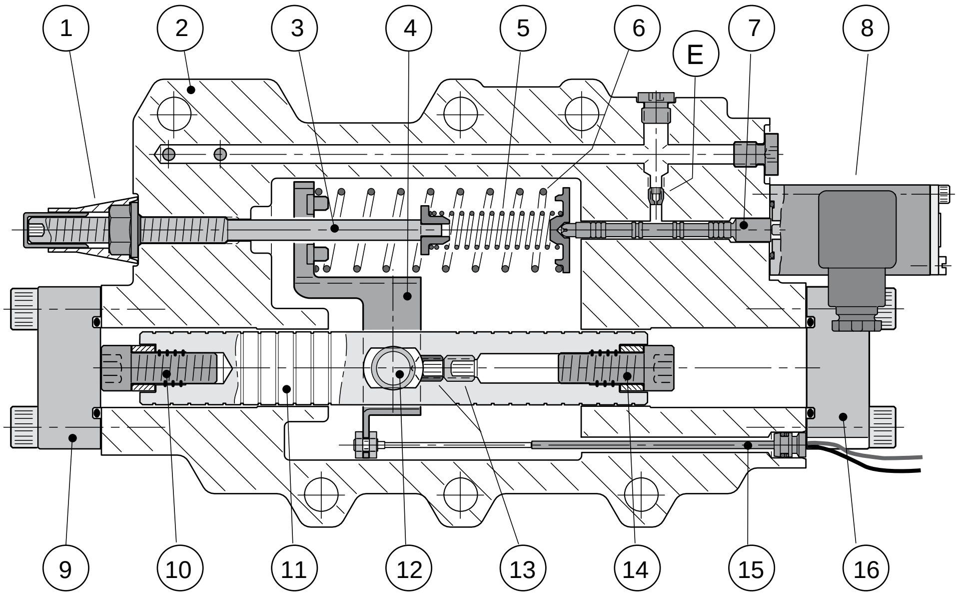
Basically, these controls function in a similar way.

At increasing solenoid current (EP) or increasing pilot pressure (HP) the control moves towards the min displacement position.

At decreasing current or pilot pressure, the control retracts towards max displacement.

In comparison with EP and HP, the EO and HO controls have no modulating spring; this means that only min and max displacements can be obtained with these controls.

Max and min displacements can be limited by a screw with spacer bushing as shown below.



Cross section of the EP control module.

1. Two-part seal (threshold adjustm't)
2. Control module housing
3. Threshold adjustment screw
4. Feedback arm
5. Threshold spring
6. Modulating spring (EP, HP only)
7. Servo valve spool
8. Solenoid (EO, EP only); cover on HO, HP
9. End cover (max displ. limit)
10. Max displ. limiting screw/bushing
11. Setting piston
12. Connecting arm
13. Set screws
14. Min displ. limiting screw/bushing
15. Setting piston position sensor
16. End cover (min displ. limit)

E. Nozzle location; refer to the hydraulic schematics.

EP control function (solenoid current increasing)

NOTE: Valid also for the HP at increasing pilot pressure.

Refer to the illustration below left:

At an increasing current (above the threshold value), the solenoid spool pushes left on the servo valve spool, and flow is directed to the left hand setting chamber - the setting piston moves to the right and the displacement decreases. This means, that the shaft speed in-creases while the output torque decreases correspondingly (at a constant pump flow and system pressure).

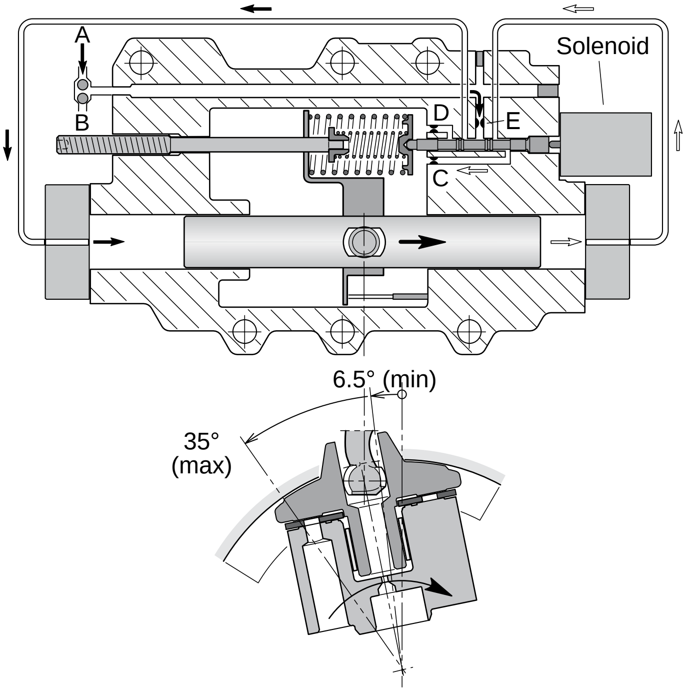
HP control function (decreasing pilot pressure)

NOTE: Valid also for the EP at decreasing current.

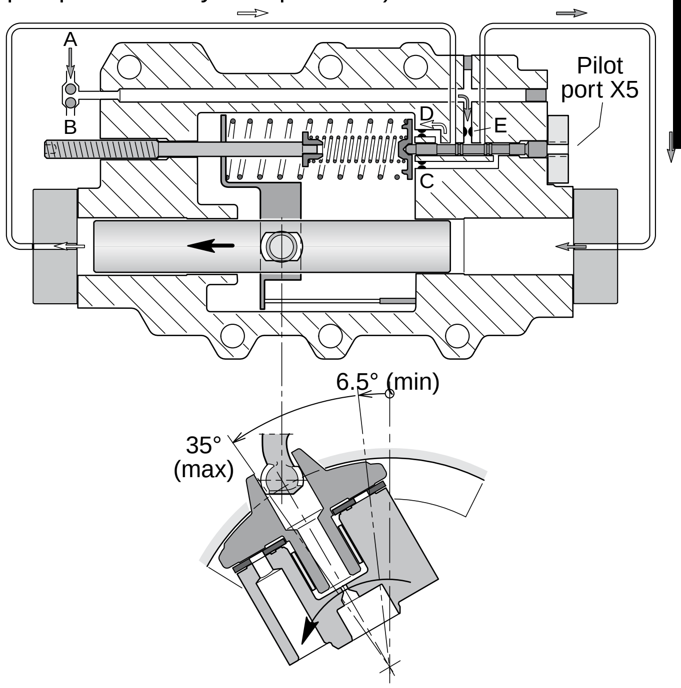
Refer to the illustration below right:

When the pilot pressure decreases, the servo valve spool moves to the right and flow is directed to the right hand setting chamber - the setting piston moves to the left and the displacement increases.

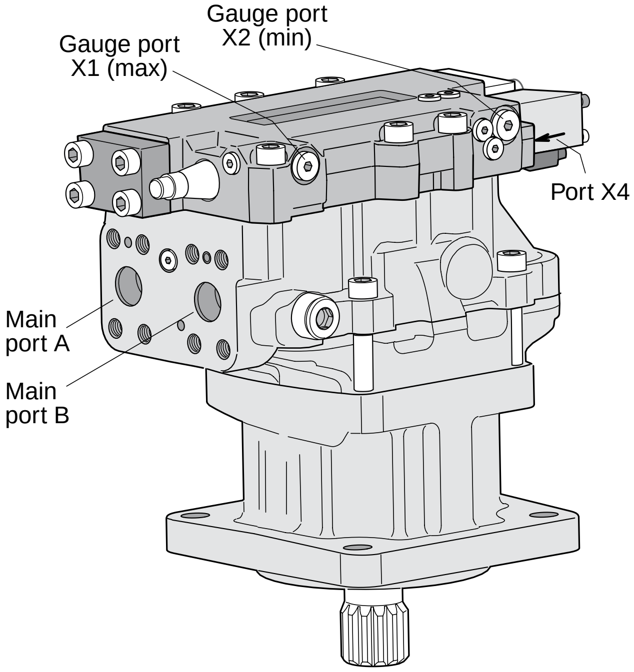
The shaft speed now decreases and the available output torque increases correspondingly (at a constant pump flow and system pressure).



EP control function (displ. decrease at increasing current).



HP control function (displ. increase at decreasing pilot press.).

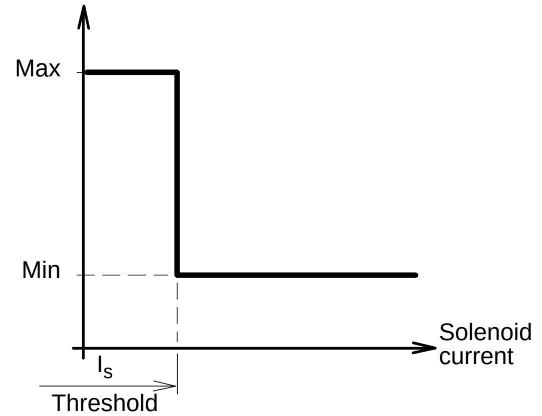


Port locations - V14- with EO or EP control.

Gauge ports (EO and EP controls):
X1 Setting piston pressure (decreasing displ.)
X2 Setting piston pressure (increasing displ.)
X4 Servo supply pressure (before orifice)
Port sizes:
–M14x1.5 (ISO version)
–$^{9}/_{16}$"-18 O-ring boss (SAE version).

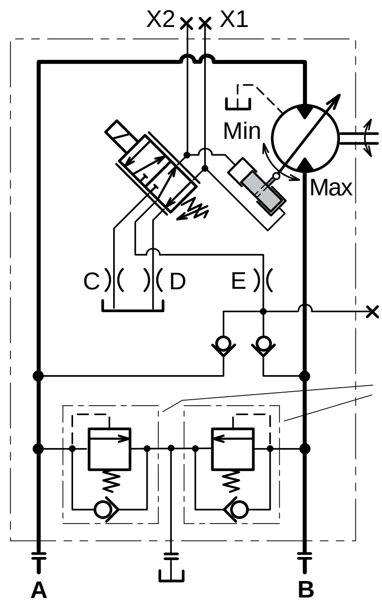
EO electric two-position control

- The EO is a two-position control where the max and min displacements are governed by a DC solenoid (acting on the servo spool) which is attached to the control module (refer to the illustration on page 48).
- The EO is utilized in transmissions where only two operating modes are required - low speed/high torque and high speed/low torque.
- The servo piston, normally in the max displacement position, shifts to min displacement as soon as the solenoid is activated.
- Intermediate displacements cannot be obtained with this control.



Gauge ports (EO and EP controls): X1 Setting piston pressure (decreasing displ.) X2 Setting piston pressure (increasing displ.) X4 Servo supply pressure (before orifice) Port sizes: – M14x1.5 (ISO version) – $^9/_{16}$"-18 O-ring boss (SAE version). **NOTE:** Port locations are shown in the illustration on page 49.

- Servo pressure is supplied internally (through a check valve from the utilized high pressure port); refer to the schematic below.
- The solenoid is either 12 or 24 VDC, requiring 1.2 and 0.6 A respectively.
- The male connector (type 'Junior Timer') is permanently installed on the solenoid. The corresponding female connector is not included.
  Note: The female connector is available as spare part P-N 3781939.
- The threshold current of the 12 VDC solenoid is factory set at 400 mA; it is adjustable between 200 and 500 mA. The 24 VDC solenoid is factory set at 200 mA and is adjustable between 100 and 250 mA.

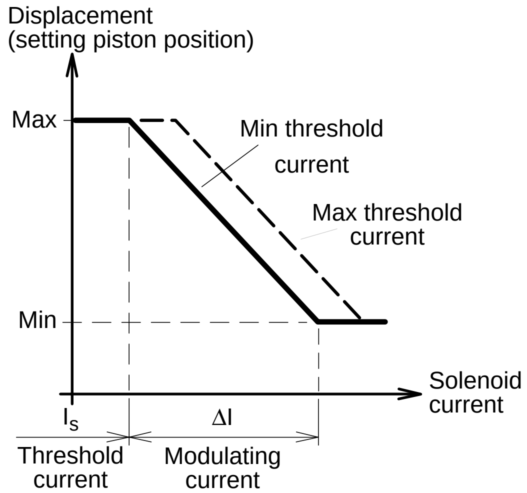


EO schematic (shown: non-activated solenoid; control in max displacement position).

EP electrohydraulic proportional control

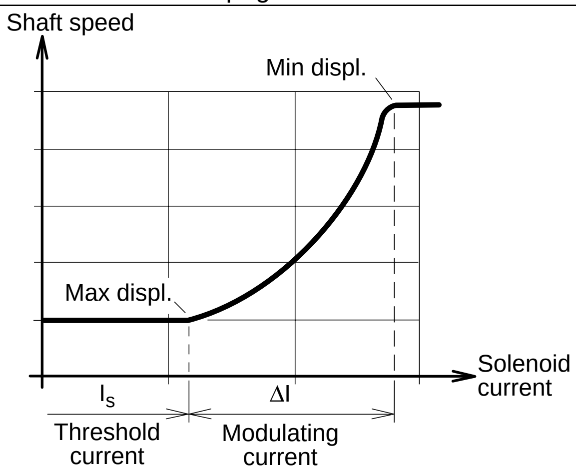
- The EP electrohydraulic proportional control is used in hydrostatic transmissions requiring a continuously variable shaft speed. The servo valve is governed by a DC solenoid (acting on the servo spool), attached to the control module (refer to the illustration on page 48).
- When the solenoid current increases above the threshold value, the servo piston starts to move from max towards min displacement. The displacement vs. solenoid current is shown in the diagram below.

NOTE: The shaft speed is **not** proportional to the solenoid current; refer to the bottom diagram.



EP diagram (displacement vs. solenoid current).

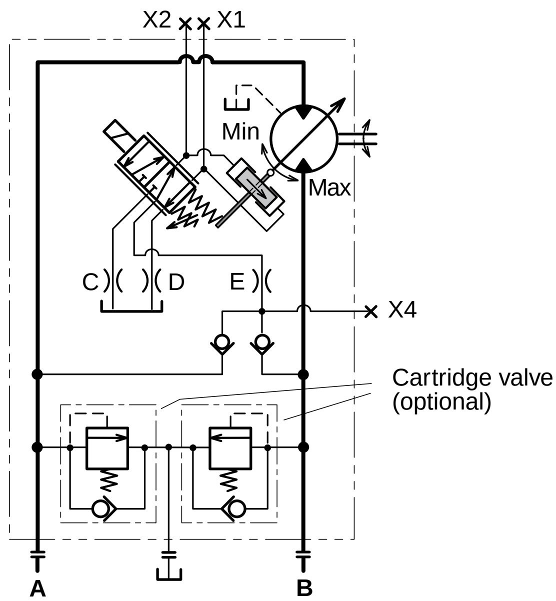
Gauge ports (EP control): X1 Setting piston pressure (decreasing displ.) X2 Setting piston pressure (increasing displ.) X4 Servo supply pressure (before orifice) Port sizes: – M14x1.5 (ISO version) – $^{9}/_{16}$"-18 O-ring boss (SAE version). **NOTE:** Port locations are shown in the illustration on page 49.



Please note: The shaft speed is **not** proportional to the solenoid current.

- The solenoid (which is the same as the one used on the EO control) is either 12 or 24 VDC, requiring 1200 and 600 mA respectively.
- The male connector (type 'Junior Timer') is permanently installed on the solenoid. The corresponding female connector is not included. **Note:** The female connector is available as spare part P-N 3781939
- The threshold current of the 12 VDC solenoid is factory set at 400 mA; it is adjustable between 200 and 500 mA. The 24 VDC solenoid is factory set at 200 mA and is adjustable between 100 and 250 mA.
- When utilizing the full displacement range, the required modulating current (ΔI) is 0.6 and 0.3 A respectively. In order to minimize hysteresis, a pulse-width modulated control signal of 50 to 60 Hz should be provided.

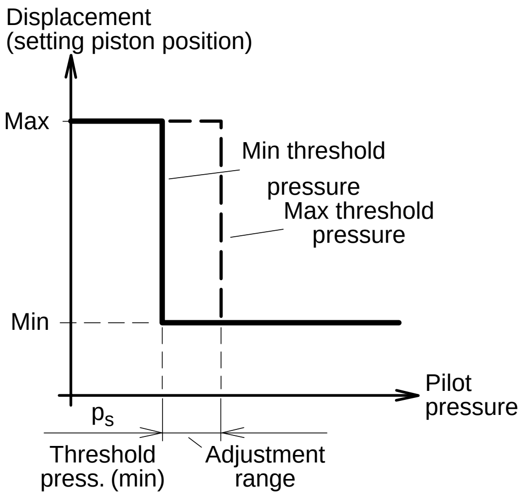
NOTE: The modulating current (ΔI) is not adjustable.



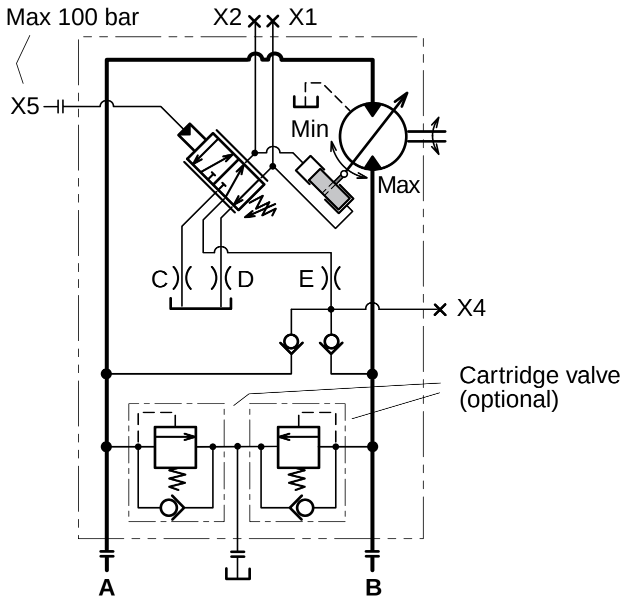
EP schematic (shown: non-activated solenoid; control moving towards max displacement).

HO hydraulic two-position control

- The two-position HO control is similar to the EO (page 50) but the control signal is hydraulic. The position of the servo piston is governed by the built-in servo valve (same as on all controls).
- When the applied pilot pressure (port X5) exceeds the pre-set threshold value, the piston moves from the max to the min displacement position.
- Positions between max and min cannot be obtained with this control.
- The threshold pressure is factory set at 10 bar but is adjustable between 5 and 25 bar.



HO diagram (displacement vs. pilot pressure).



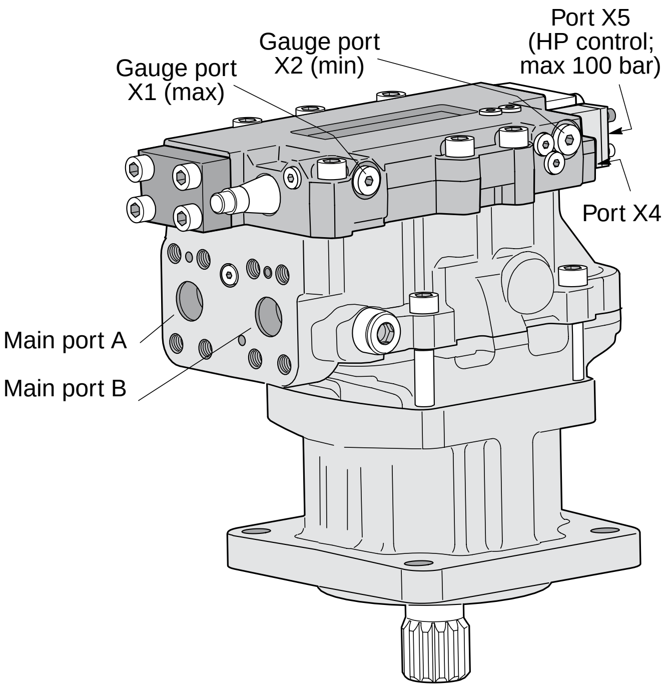
HO schematic (shown: port X5 not pressurized; control in max displ. position).

Gauge ports (HO and HP controls):

- X1 Setting piston pressure (decreasing displ.)
- X2 Setting piston pressure (increasing displ.)
- X4 Servo supply pressure (before orifice)
- X5 External pilot pressure (max 100 bar; HP control)

Port sizes:

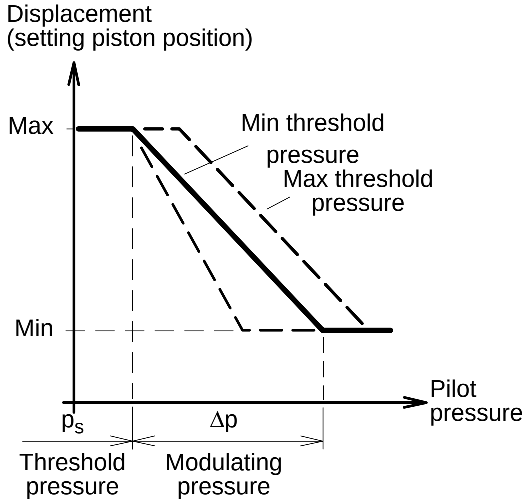
- M14x1.5 (ISO version)
- $^9/_{16}$"-18 O-ring boss (SAE version).



Port locations - V14-110 with HO or HP control.

HP hydraulic proportional control

- Like the EP described on page 50, the HP proportional control offers continuously variable displacement, but the controlling signal is hydraulic.
- Normally, the servo piston stays in the max displacement position. When a sufficiently high pilot pressure (p_S) is applied to port X5, the piston starts to move towards the min displacement position.



HP diagram (displacement vs. pilot pressure).

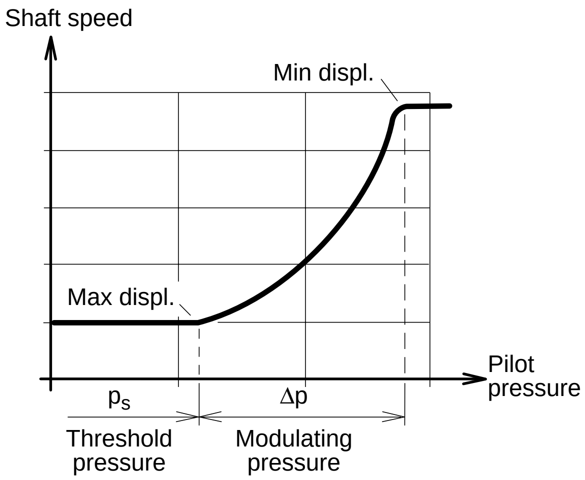
Gauge/pilot ports (HP control):

X1 Setting piston pressure (decreasing displ.)
X2 Setting piston pressure (increasing displ.)
X4 Servo supply pressure (before orifice)
X5 External pilot pressure (max 100 bar)

Port sizes:

– M14x1.5 (ISO version)
– $^9/_{16}$”-18 O-ring boss (SAE version).

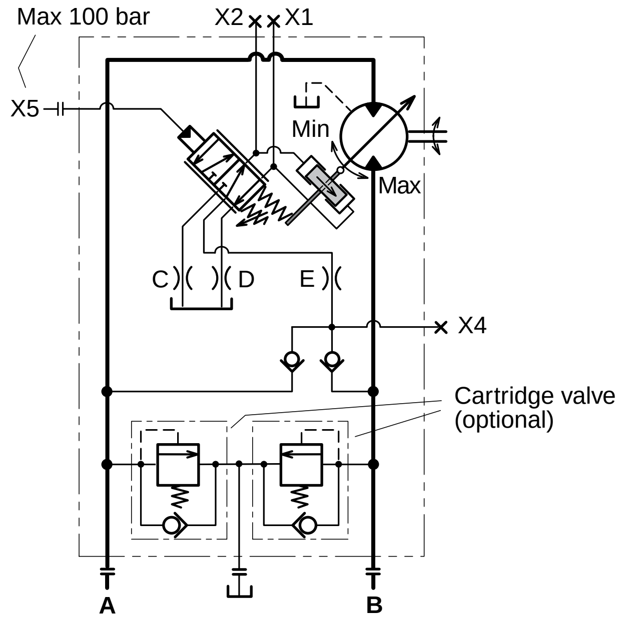
NOTE: Port locations are shown in the illustration on page 52.



Please note: The shaft speed is **not** proportional to the pilot pressure.

- As can be seen from the pilot pressure/displacement diagram below, the displacement changes in proportion to the applied modulating pressure.
- In contrast, the shaft speed is not proportional to the pilot pressure; refer to the bottom left diagram.
- The modulating pressure (Δp) is factory set at 15 bar; the threshold pressure (p_S) is set at 10 bar but is adjustable between 5 and 25 bar.

See also “Controls, Note” on page 37.



HP schematic (shown: port X5 not pressurized; control moving towards max displacement).

V14-110/-160

Valve options (overview)

- Brake valve and pressure relief valves (opt. **B**;)*
- Flushing valve (option **L**; below)
- Pressure relief valves (option **P**; page 56)

Sensor options (overview)

- Shaft speed sensor (option **P**; page 55)
- Setting piston position sensor (option **L**; page 57)

Flushing valve (option L)

The V14 is available with a flushing (or shuttle) valve that supplies the motor with a cooling flow through the case. Cooling the motor may be required when operating at high speeds and/or power levels.

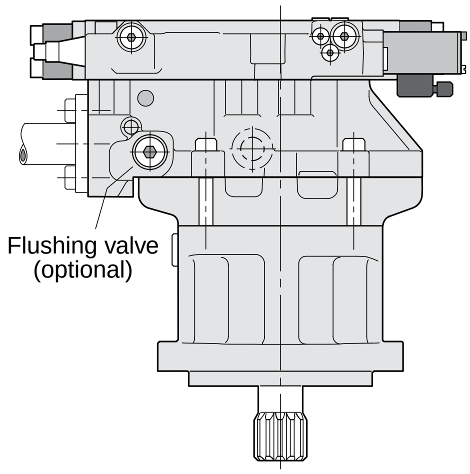
The flushing valve consists of a three-position, three-way spool valve built into the connection module. It con-nects the low pressure side of the main circuit to a nozzle (optional sizes below) that empties fluid into the motor case.

In a closed circuit transmission, the flushing valve re-moves part of the fluid in the main loop. The removed fluid is continuously being replaced by cool, filtered fluid from the low pressure charge pump on the main pump.

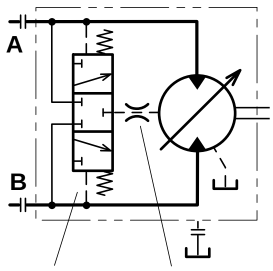
Available nozzles

Ordering code	Orifice size [mm]	Status
L 010	1.0	Optional
L 013	**1.3**	**Standard**
L 015	1.5	Optional
L 017	1.7	”
L 020	2.0	”
L030	3.0	”

* Note.
See information on page 55



V14-110 (EP control) with built-in flushing valve.



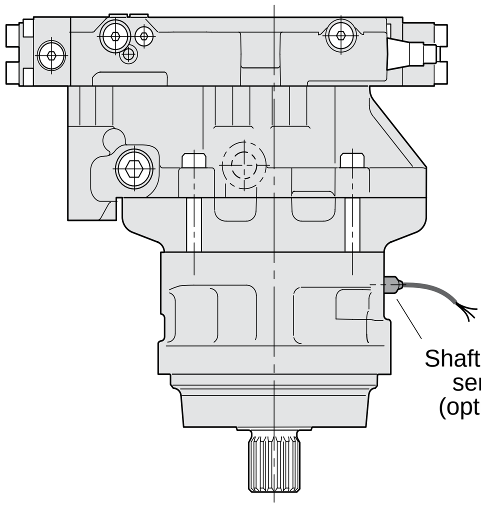
Hydraulic schematic - V14 with built-in flushing valve.

Shaft speed sensor (option P)

A speed sensor kit is available for the V14.

The ferrostat differential (Hall-effect) sensor installs in a separate, threaded hole in the V14 bearing housing.

The speed sensor is directed towards the V14 shaft flange and outputs a 2 phase shifted square wave signal within a frequency range of 0 Hz to 15 kHz. Number of pulses per shaft rev is 36 which, at 5 Hz, corresponds to approx. 8 rpm.



V14-160 (AC control) with speed sensor.

Ordering information

(refer to the ordering codes on pages 34-36)

N - None

C - Prepared for setting piston position and shaft speed sensors. To be ordered separate.

D - Setting piston position sensors and prepared for shaft speed sensor.

P - Prepared for shaft speed sensor. To be ordered separate.

NOTE: Additional information is provided in our publication HY30-8301/UK, ‘Speed sensor for series F11/F12 and V12/T12/V14’, available from Parker Hannifin.

How to order
Please order the speed sensor on a separate order line next to the product order line.

Part number for speed sensor is 3785190.

Brake valve

Contact Parker Hannifin for additional information

Pressure relief valves (option P)

To protect the motor (and the main hydraulic circuit) from unwanted, high pressure peaks, the V14 can be supplied with relief valve cartridges.

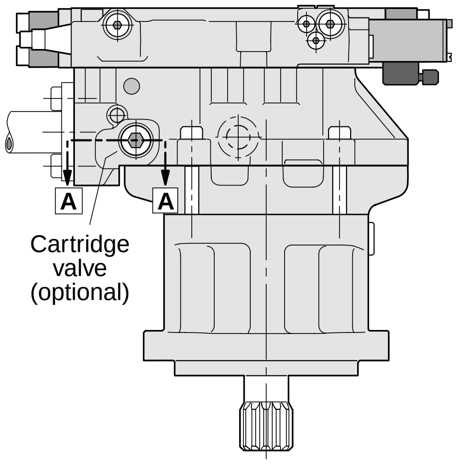
The individual cartridge (with integrated check valve function) has a non-adjustable, factory-set opening pressure, available in pressure settings shown below.

The cross section (below right) shows a situation, where the upper cartridge has opened because of high fluid pressure. This, in turn, forces the opposite cartridge to open to the low pressure area (this cartridge now acting as a check valve).

As shown, a small part of the flow may go directly to the reservoir.

PLEASE NOTE:

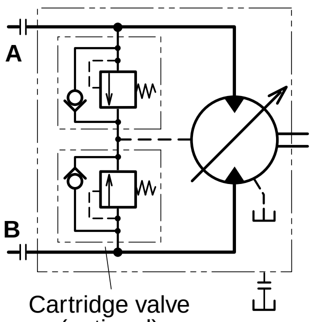
- The pressure relief cartridges should not be used as main pressure reliefs; in a motor application, they should only be relied on to limit short duration pressure peaks (or the temperature of the fluid which circulates through the motor will rapidly reach damaging high levels).
- The main pressure relief is usually installed in the main pump or in the directional control valve, or is line mounted between pump and motor.



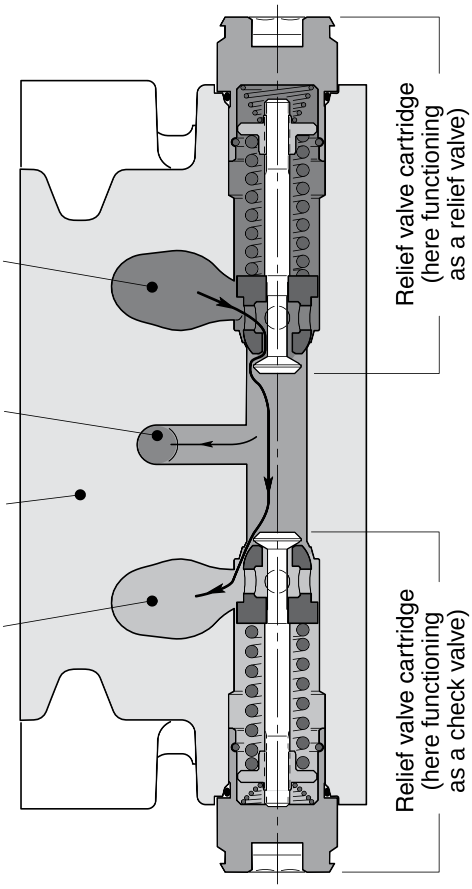
V14- 110 (EP control) with relief valve cartridges.

Available cartridges

Ordering code	Pressure setting [bar]	Part number
P250	250	3794614
P300	300	3794616
P350	350	3794618
P400	400	3794620
P420	420	3793529
P450	450	3794622



Hydraulic schematic - V14 with cartridge valves.



Section A-A (showing pressure relief cartridges).

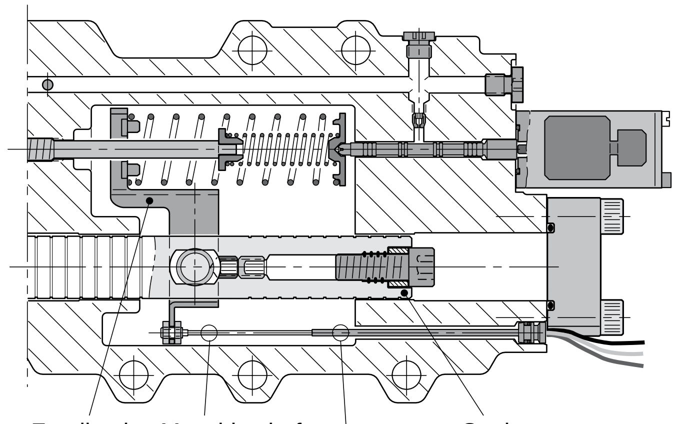
Setting piston position sensor (option L)

The setting piston position sensor, also referred to as a 'Sub-Miniature In-Cylinder Transducer', combines the best features associated with LVDT's (Linear Variable Differential Transformer) and potentiometers into one rugged, contactless, highly reliable position sensor.

The stationary part of the sensor, the sleeve, is provided with a flange that fits in a specially machined boring in the control module housing.

The movable shaft of the sensor is attached to the feedback arm as shown in the illustration to the right. When the sensor is properly connected to the electronic module (packed separately with an installation sheet), the produced output signal is proportional to the position of the setting piston.

In order to obtain the correct electrical max and min position settings, as determined by the utilized max and min displacements, the programming module (part of the electronic module, illustrated below right) must be adjusted; for further information please contact Parker Hannifin.

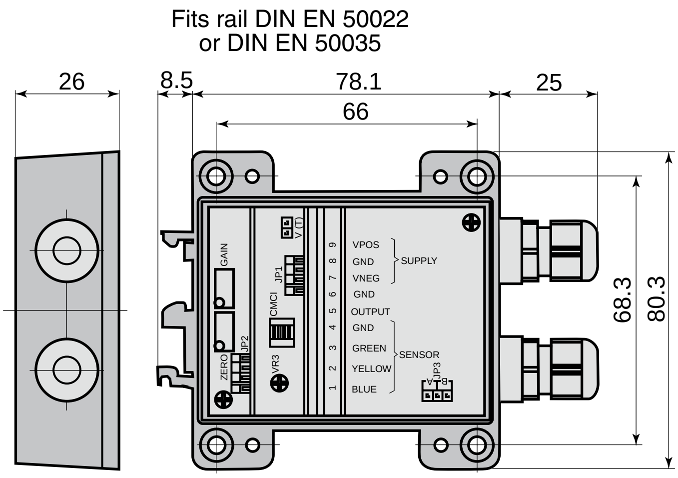


EP control section with setting piston position sensor.

Specifications

Supply voltage	10 to 60 VDC
Supply current	max 10 mA
Output voltage	0.5 to 4.5 VDC*
Output load	max 10 kΩ
Output current - shaft retracted	0.020 mA
- shaft extended	0.5 mA
Linearity	≤ 1% of stroke
Operational temperature	0 °C to +70 °C
Distance between sensor and electronic module	Max 30 m
Electrical wiring	PTFE insulated, heat shrink sleeved, 500 mm long leads
Weight	100 g

***** Other voltages can be selected; contact Parker Hannifin.



Electronic module (incl. internal programming module).

Ordering information (refer to 'Sensor options' in the ordering codes on pages 34-36)

Basic V14 configuration (ISO, cartridge or SAE; see pages 34-36) – [ ]

Sensor options

Code	Sensor options
N	None
C	Prepared for setting piston position and shaft speed sensors
D	Setting piston position sensors and prepared for shaft speed sensor.
L	Setting piston position sensor
P	Prepared for shaft speed sensor
T	Prepared for setting piston position sensor

T12

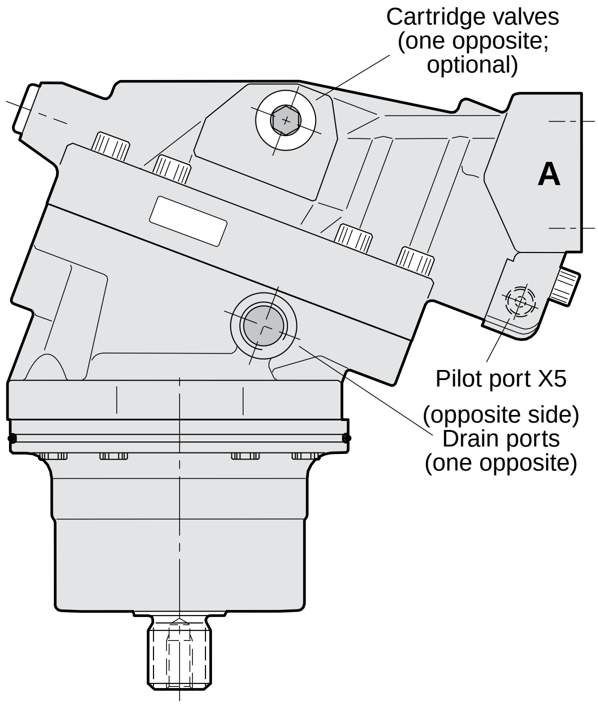
Content **Page**

Specifications

T12 frame size	**60**	**80**
Displacement [cm³/rev]		
- at 35° (max)	60	80
- at 10° (min)	18	24
Operating pressure [bar]		
- max intermittent1)	480	480
- max continuous	420	420
Operating speed [rpm]		
- max intermittent at 35°1)	4400	4000
- max continuous at 35°	3600	3100
- max intermittent at 10°1)	7000	6250
- max continuous at 10°	5600	5000
- min continuous	50	50
Flow [l/min]		
- max intermittent1)	265	320
- max continuous	215	250
Output torque [Nm]		
at 100 bar (theor.)	95.2	127.0
Output power [kW]		
- max intermittent1)	150	175
- max continuous	95	105
Corner power [kW]		
- intermittent1)	335	400
- continuous	235	280
Weight [kg]	26	30.5

1) Max 6 sec's in any one minute

Port and relief valve locations



4

Efficiency diagrams

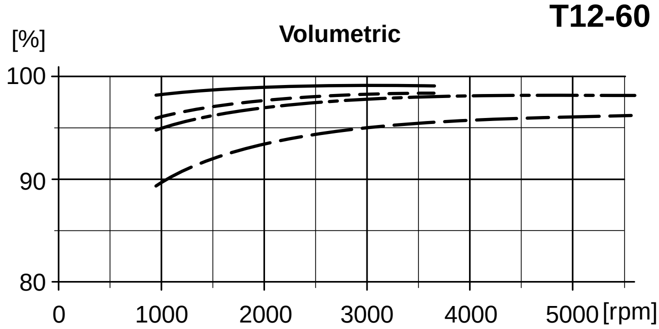
The following diagrams show volumetric and overall efficiencies versus shaft speed at 210 and 420 bar operating pressure, and at full (35°) and reduced (10°) displacements.

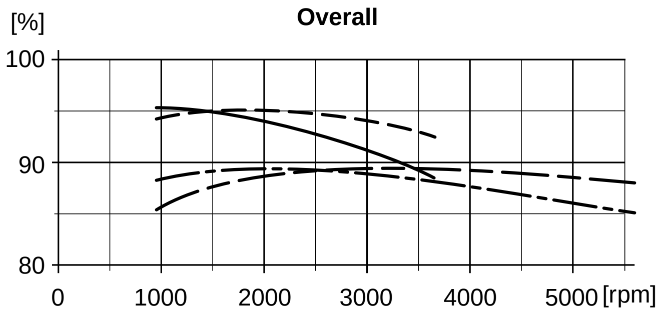
Information on efficiencies for a specific load condition can be made available from Parker Hannifin.

——— 210 bar at full displacement
– – – – 420 bar " " "

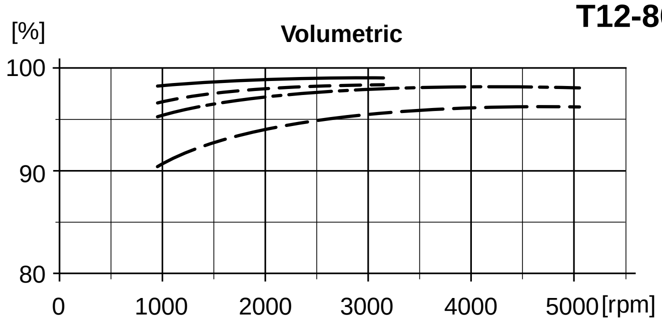
—·—·— 210 bar at reduced displacement
—– —– 420 bar " " "

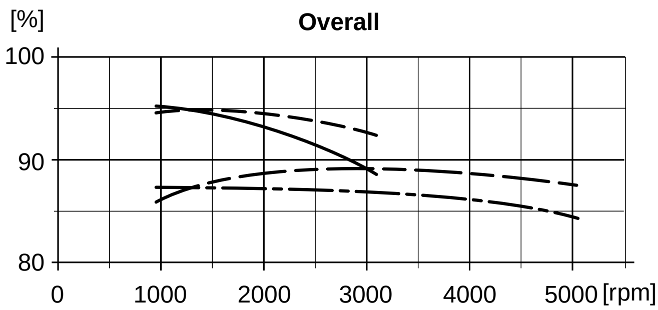
T12-60





T12-80





Ordering code

T12	-		-	M	T	-	C	V	-		-		-	A	-		-		/		-	HO	T	-		-	I	-	015	/	
Motor type		Frame size		Function	Main ports		Mounting flange	Shaft seal		Shaft end		Serial number		Status		Speed sensor		Max displacement		Min displacement		Control	Function		Control response		Servo supply		Tresh-old		Press. setting

Code	Frame size [cm^3/rev]
060	60
080	80

Code	Function
M	Motor; bi-directional

Code	Main ports
T	Metric threads

Code	Mounting flange
C	Cartridge flange

Code	Shaft seal
V	PPS

Code	Shaft end
C	Spline DIN 5480 (standard)
D	Spline DIN 5480

Serial number (assigned for special versions)

Technical status (factory assigned)

Max and min displacement
Specify in [cm^3/rev]

Code	Speed sensor **T12-060 CC only** (refer to page 31)
P	Prepared for speed sensor
O	None

Code	Control
HO	Hydraulic two-position

Code	Function
T	Track drive

Code	Control response
01	Fast (standard)
02	Slow (optional)

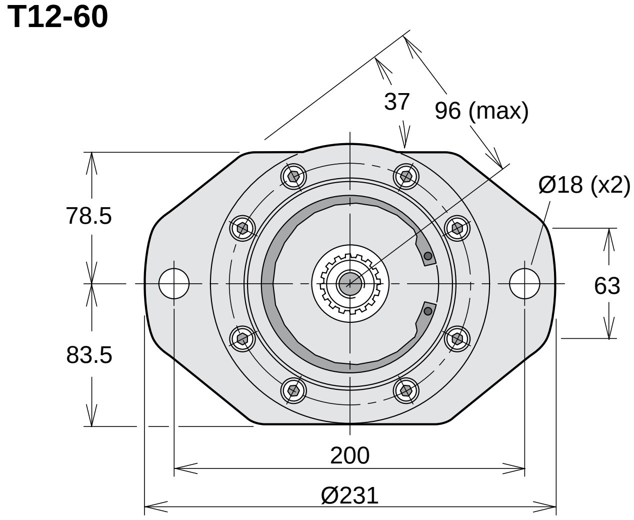
Code	Servo supply
I	Internal

Code	Threshold pressure
015	15 [bar] - standard

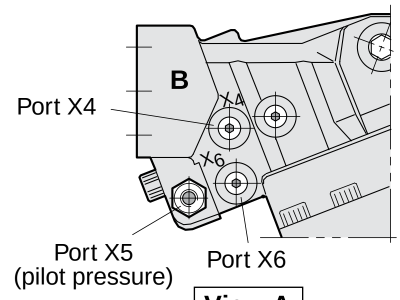
Code	Pressure relief valve setting [bar]
000	0 [bar] (standard)

Parker Hannifin
Pump and Motor Division
Trollhättan, Sweden

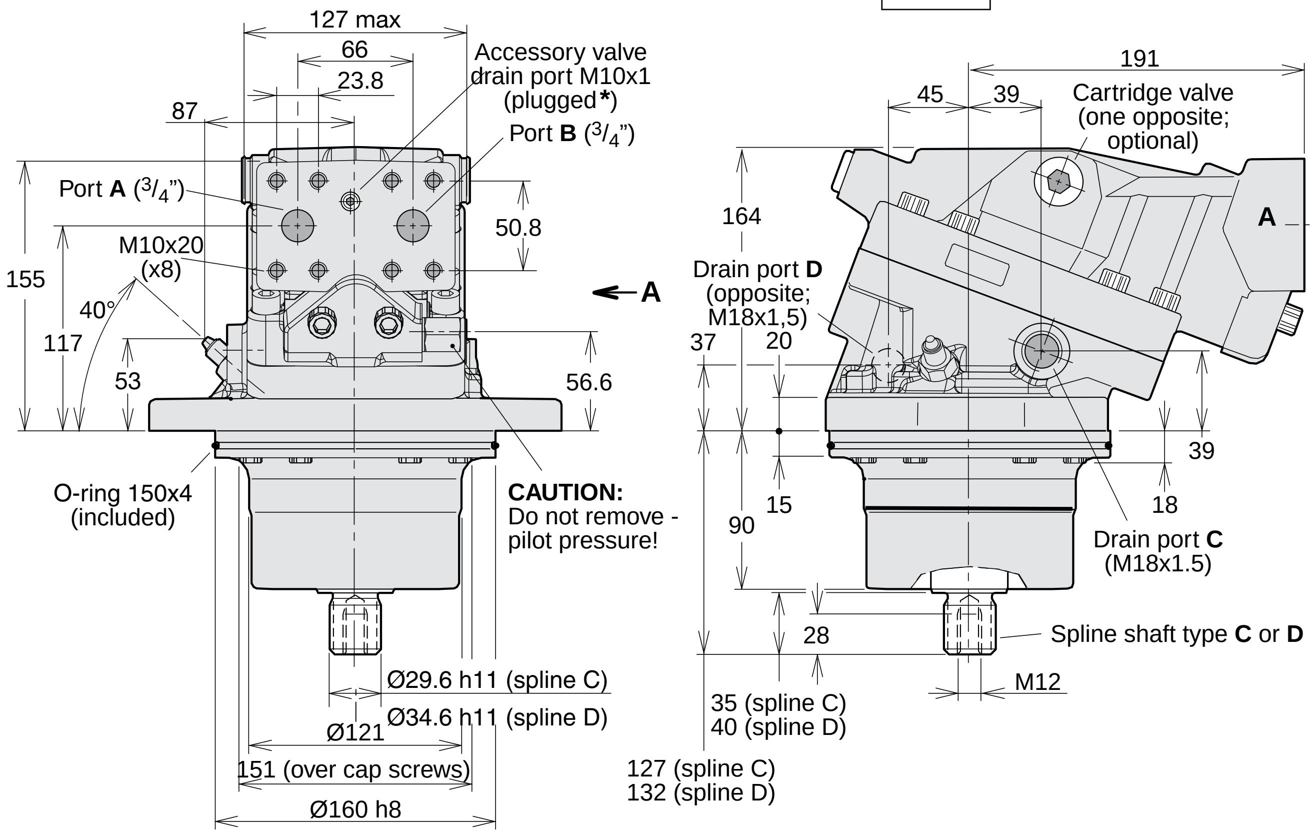
T12-60



Type **C** mounting flange



View A



*** NOTE:**

The accessory valve drain port plug **must be removed** before installing the following valve:

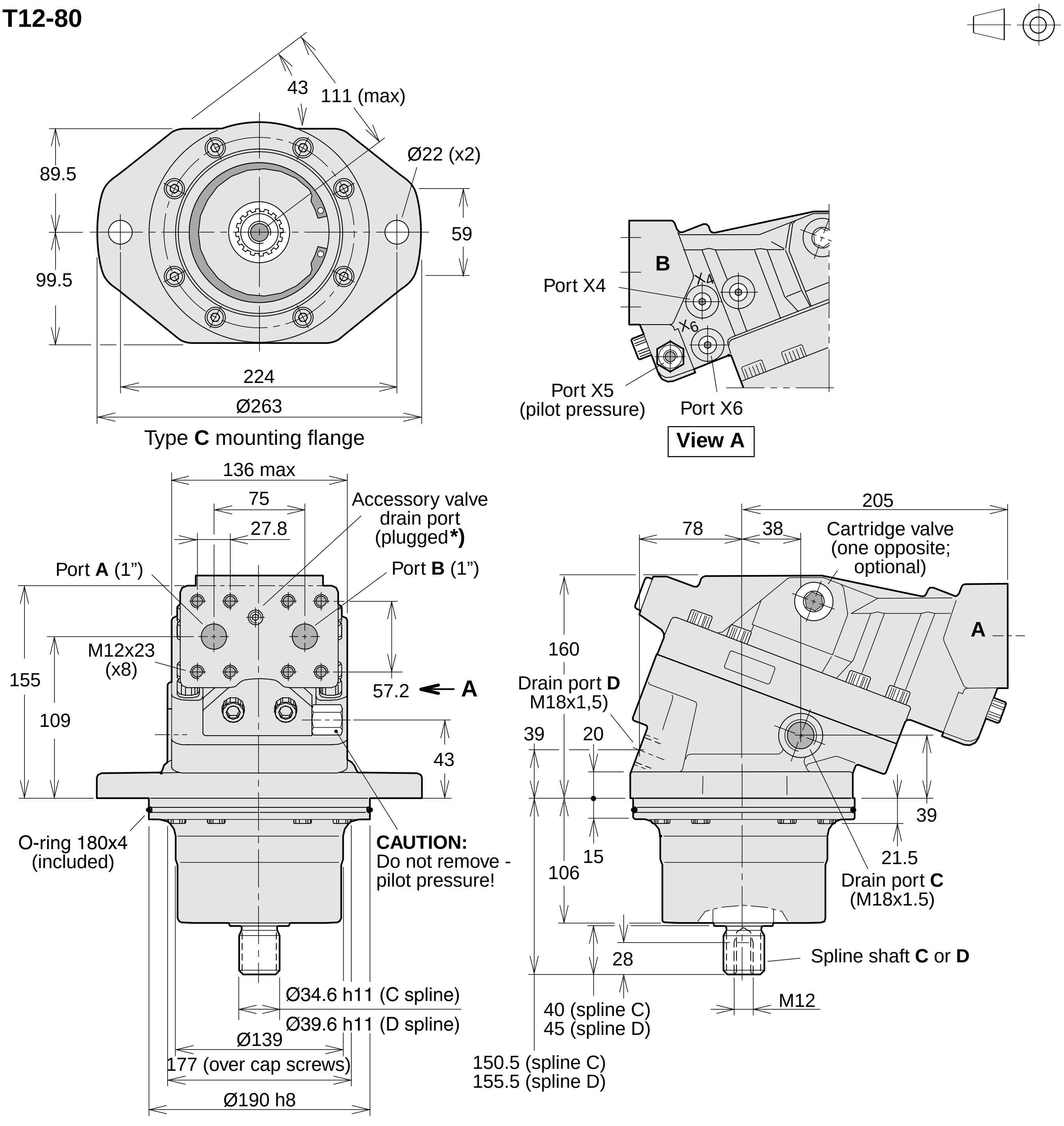
- **FV** flushing valve.

Spline[1]	**C** (standard)	**D** (optional)
T12-60	W30x2x14x9g	W35x2x16x9g

1) DIN 5480 ('30° involute spline, side fit').

4

T12-80



*** NOTE:**
The accessory valve drain port plug **must be removed** before installing the following valve:
- **FV** flushing valve.

Spline 1)	**C** (standard)	**D** (optional)
T12-80	W35x2x16x9g	W40x2x18x9g

1) DIN 5480 (‘30° involute spline, side fit’).

Two-position control (HO T _ _ I)

The displacement is controlled by means of pilot pressure in port X5. When this pressure exceeds the threshold pressure, 15 bar, the displacement is switched to min.

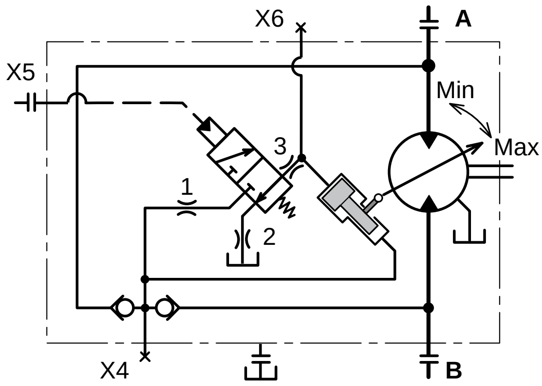
The T12 motor can be ordered with max and/or min displacement limiters.

The control is available in two versions:

- **HO T 01 I** (with standard nozzles) provides a 'fast' control response (max-to-min and min-to-max)
- **HO T 02 I** (optional) with 'slow' control response.

Gauge and pilot ports
X4 Servo supply (before nozzle)
X5 Pilot pressure (min 15 bar; standard)
X6 Setting piston pressure (decreasing displ.)
Port size
- M14x1.5 (all)

NOTE: '1', '2' and '3' are nozzles.

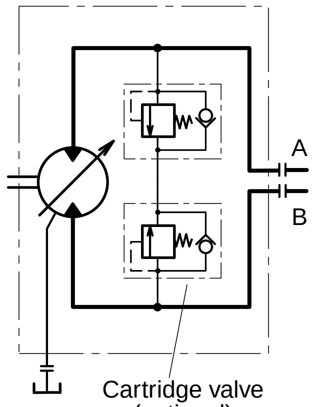


T12 schematic (no pilot pressure; the control is in max displacement position).

Pressure relief valves (optional)

As an option, T12 motors can be ordered with pressure relief valves, designed to protect the motor and the main hydraulic system from short duration pressure peaks.

The non-adjustable cartridge valves are integrated in the motor end cap and available with the following pressure settings:



T12 with cartridge valves.

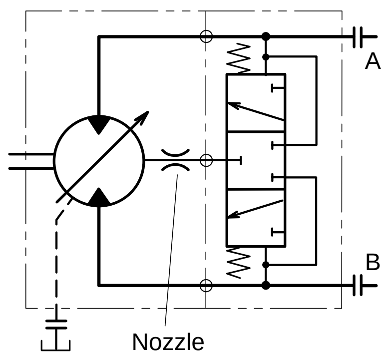
Available cartridges

Ordering code	Pressure setting [bar]	Part number
P250	250	3794614
P300	300	3794616
P350	350	3794618
P400	400	3794620
P420	420	3793529
P450	450	3794622

FV flushing valve block (optional)

The FV flushing valve supplies the T12 motor with a cooling flow usually required when the motor is operating at high speeds and/or high power levels.

The valve block mounts directly on the main port flange.



T12 with flushing valve block type FV.

Brake valve

Contact parker Hannifin for additional information

4

Parker Hannifin
Pump and Motor Division
Trollhättan, Sweden

V12

V14

T12

Content **Page**

Direction of rotation versus flow

NOTE: The V12, V14 and T12 motors are bi-directional.

V12 rotation:

- End cap position T (AC, AD and AH controls): When port B (open arrow) is pressurized, the motor rotates clockwise (right hand; R), and when port A (black arrow) is pressurized, the motor turns counter clockwise (left hand; L)
- End cap position M (EO, EP, HO and HP controls): A and B port positions interchange (A-to-B, B-to-A).

V14 rotation:

- Refer to the V14 illustration below right (valid for all compensators and controls).

T12 rotation:

- Refer to the V14 illustration below right.

NOTE: Before installing a V12, V14 or T12 motor in series (when both A and B ports can be subject to high pressures simultaneously) contact Parker Hannifin.

Filtration

Maximum motor sevice life is obtained when the fluid cleanlineness meets or exceeds ISO code 18/13 (ISO 4406).

A 10 µm (absolute) filter is recommended.

Case pressure

The lowest and highest recommended case pressure shaft seal type **V** at selected shaft speeds is shown in the table below.

The min pressure secures sufficient lubrication, and the max pressure nominal seal life.

Case pressure should be measured in the drain port.

NOTE: Contact Parker Hannifin for information when operating at high speeds.

Frame size	1500	3000	4000	5000	6000
V12-60	max 12	0.5–7	1–5.5	1.5–5	2–5
V12-80	max 12	0.5–7	1–5.5	1.5–5	2.5–5
V14-110	max 10	1–6	1.5–5	2–4.5	3–5
V14-160	max 10	1–6	2–5.5	2.5–5.5	-

Min and max case pressure [bar] vs. shaft speed [rpm].

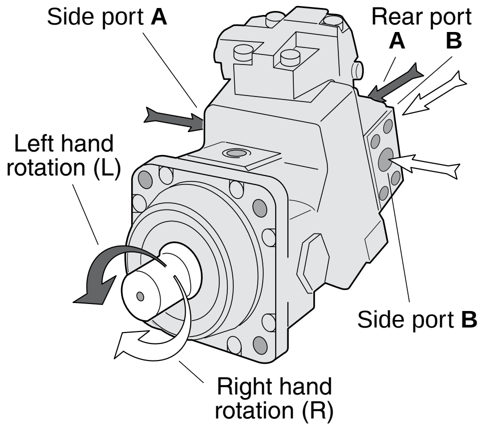
NOTE: Contact Parker Hannifin for information on other shaft seals.

Required inlet pressure

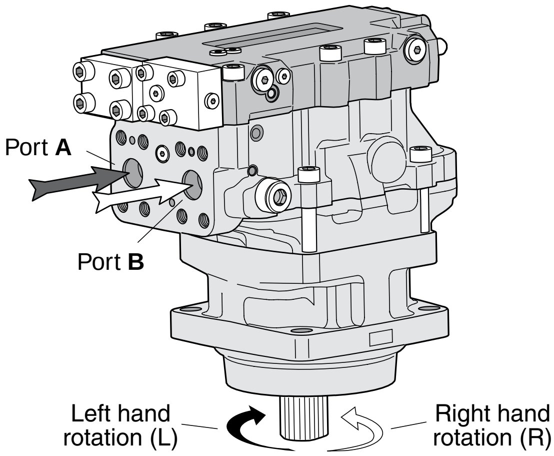
The motor may operate as a pump under certain conditions. When this occurs, a minimum pressure must be maintained at the inlet port; increased noise and gradually deteriorating performance due to cavitation may otherwise be experienced.

A 15 bar inlet pressure, measured at the motor inlet port, satisfies most operating conditions.

Contact Parker Hannifin for more specific information on inlet pressure requirements.



Direction of rotation vs. flow for the V12 motor (here shown with AC-compensator; end cap position T).



Direction of rotation vs. flow for the V14 motor (shown with AC-compensator).

5

Operating temperatures

The following temperatures should not be exceeded

Main circuit: 80 °C.

Drain fluid: 115 °C.

Continuous operation at high power levels usually requires case flushing in order for the fluid to stay above the minimum viscosity requirement. A flushing valve and restricting nozzle, available as an option, provide the necessary main circuit flushing flow.

Refer to fig. 1 (next page), and to:

- V12: 'Flushing valve', page 29.
- V14: 'Flushing valve', page 54.
- T12: 'Flushing valve block', page 61.

Drain ports

There are two drain ports on the V12, V14 and T12 motors. The uppermost drain port should always be utilized (see illustrations on the previous page).

In order to avoid excessively high case pressure, the drain line should be connected directly to the reservoir.

When the motor is operating, the case must be filled with fluid to at least 50%.

NOTE: - A spring loaded check valve in the drain line (shown in the V14 illustrations to the right) may have to be installed in order to prevent oil from being siphoned out of the motor case. This can otherwise happen if, e.g., the reservoir is located below the utilized motor drain port.

- 'High speed operation' available from Parker Hannifin.

Hydraulic fluids

Ratings and performance data for the motors are valid when a good quality, contamination-free, petroleum-based fluid is used in the hydraulic system.

Hydraulic fluids type HLP (DIN 51524), automatic trans-mission fluids type A, or API CD engine oils can be used.

When the hydraulic system has reached full operating temperature, the motor drain oil viscosity should be above 8 mm^2/s (cSt).

At start-up, the viscosity should not exceed 1500 mm^2/s.

The ideal operating range for the motor is 15 to 30 mm^2/s.

Fire resistant fluids, when used under modified operating conditions, and synthetic fluids are also suitable.

Contact Parker Hannifin for additional information about:

- Hydraulic fluid specifications
- Fire resistant fluids.

Before start-up

Make sure the motor case as well as the entire hydraulic system is filled with hydraulic fluid.

The internal leakage, especially at low operating pressures, is not sufficient to provide lubrication at start-up.

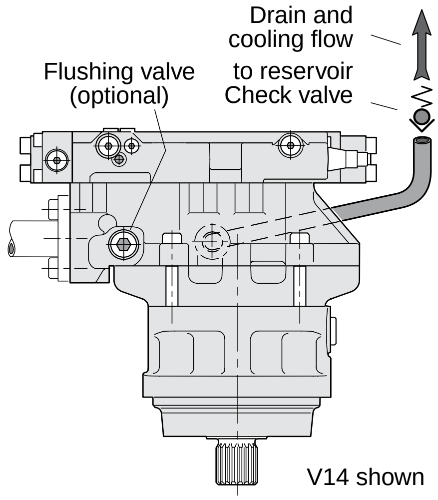


Fig. 1.

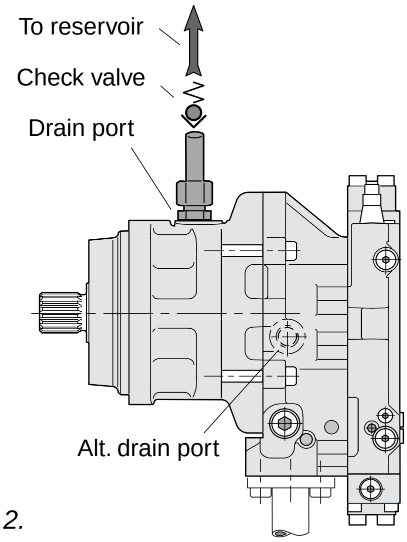


Fig. 2.

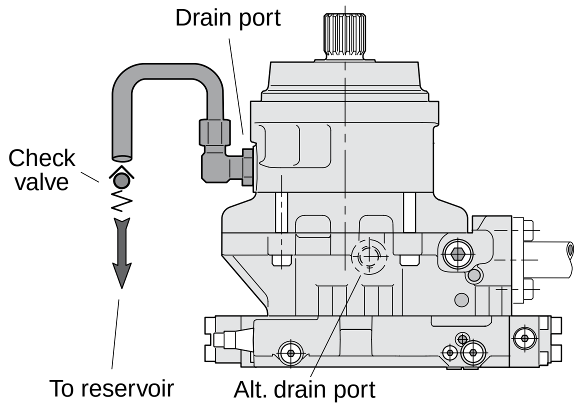
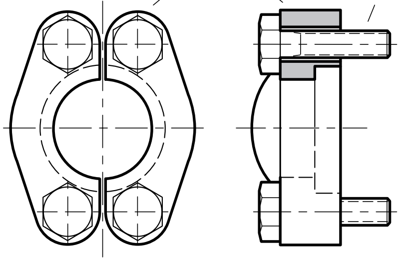


Fig. 3.

Split-flange kits

Metric split-flange kits, consisting of two split-flange halves and four mounting screws for use on V12 ISO and cartridge versions, are available from Parker Hannifin.



Part no.	SAE size	For	Screw size
3794405	3/4"	V12-60/-80	M10x35
3704329	1"	V14-110	M12x40
3704330	1 1/4"	V14-160	M14x45
3794405	3/4"	T12-60/-80	M10x35

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

RCOe 2401/01.05

DENISON CALZONI

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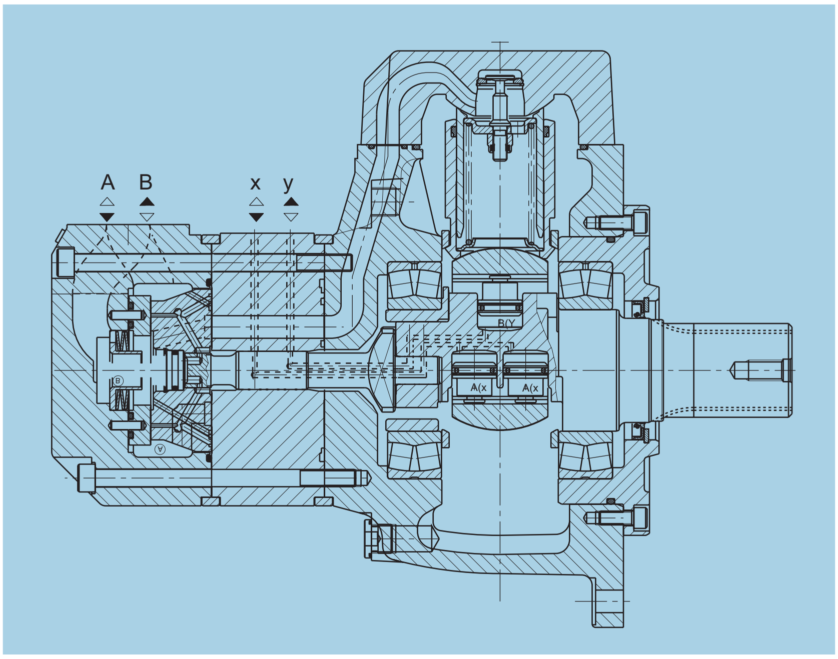
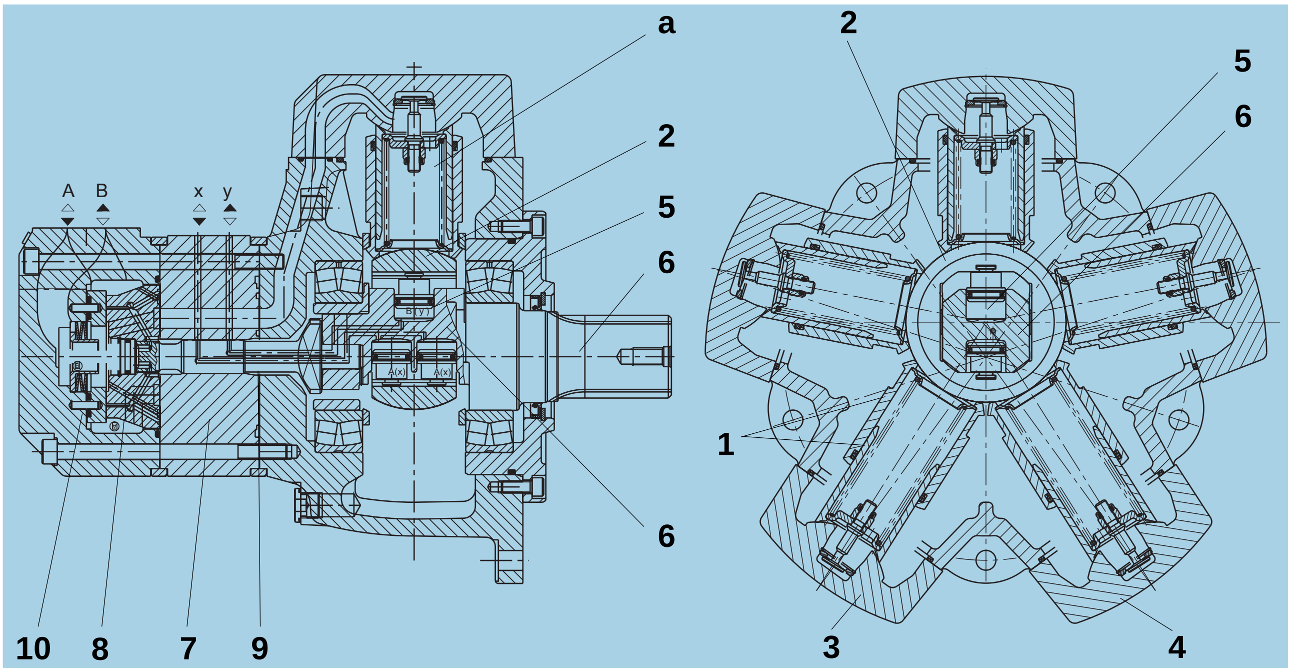
GENERAL CHARACTERISTICS



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 42)
MOUNTING POSITION	Any (please note the installation notes on page 46)
BEARING LIFE	See page 28
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 PARKER Calzoni



MRD-MRDE
FUNCTIONAL DESCRIPTION

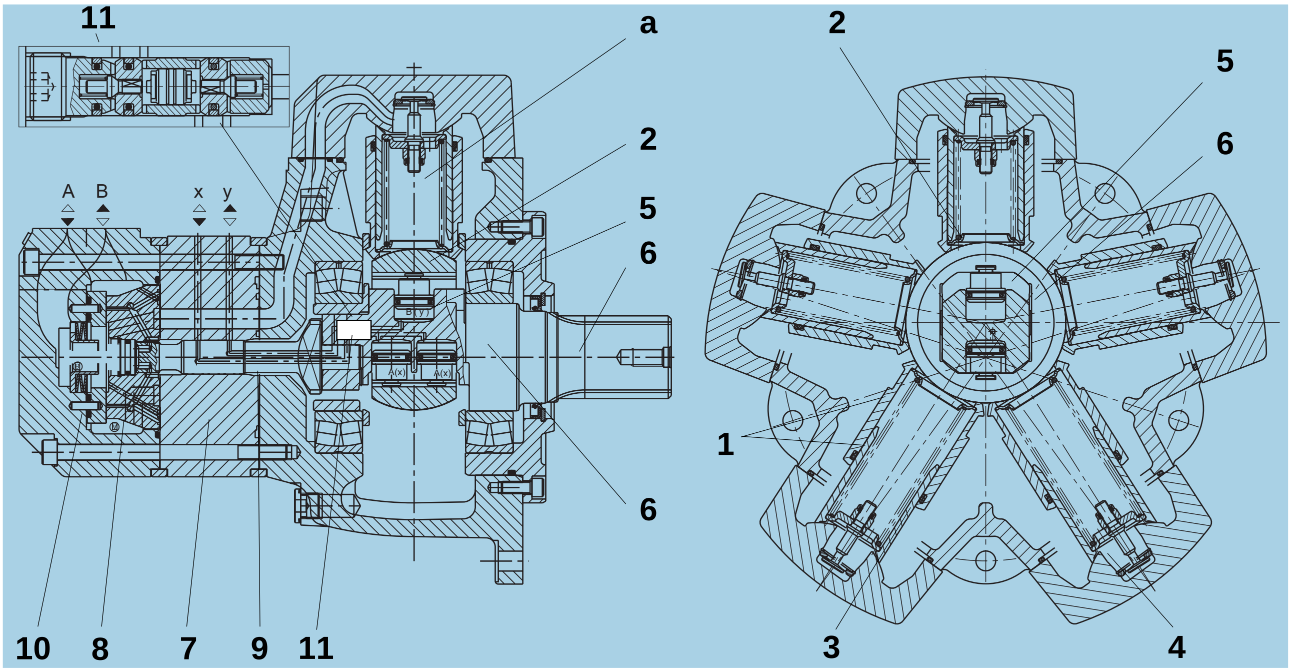
The outstanding performance of the motor is the result of an original and patented design. The principle is to transmit force to the driving shaft (2 and 6) by means of a pressurized column of oil (a) without any connecting rods, pistons, pads and pins.
This oil column is contained by a telescopic cylinder (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.



MRV-MRVE

FUNCTIONAL DESCRIPTION

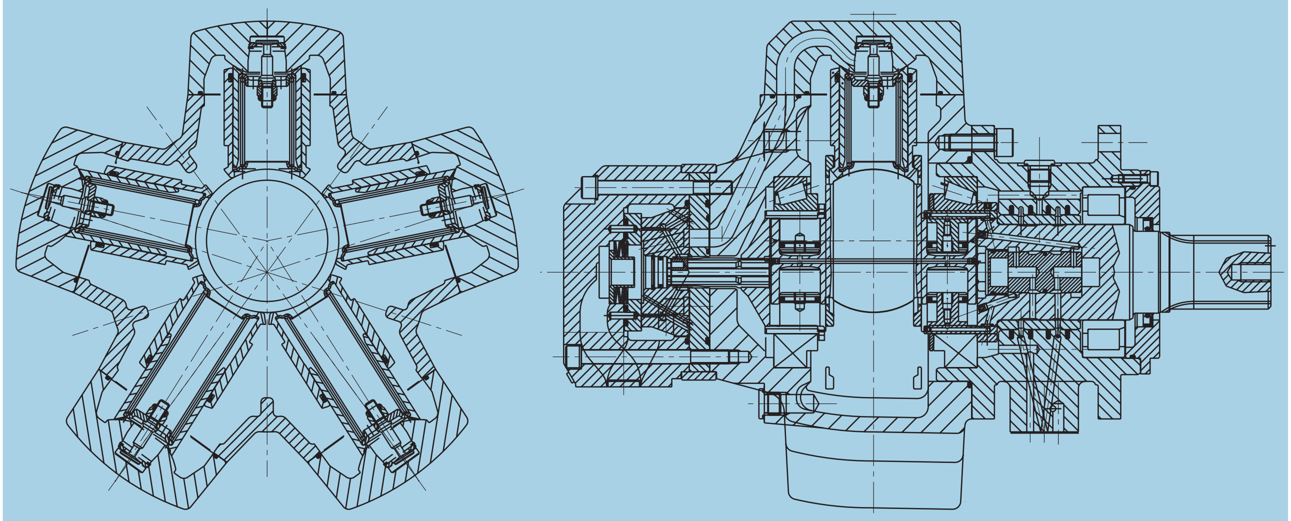
The outstanding performance of the motor is the result of an original and patented design. The principle is to transmit force to the driving shaft (2 and 6) by means of a pressurized column of oil (a) without any connecting rods, pistons, pads and pins.
This oil column is contained by a telescopic cylinder (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.



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.
A consequence of this novel design is a significant reduction in weight and overall size compared with other motors of the same basic capacity.
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 concentricity. 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.

Size Motor version			Displace-ment	Moment inertia of rotating parts	Theore-tical specific torquea	Min. start. torque / Theore-tical 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
			cm³	kg cm²	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	46	75	
MRV	450	Min.	133,5	185,50	2,11	-						1-1000	1-1000	22	35	110
		Max.	451,6	229,80	7,20	90						1-600	1-600	46	75	
MRD MRV	700	Min.	237,6	309,67	3.80	-						1-750	1-750	26	45	103
		Max.	706,9	358,40	11,30	90						1-500	1-500	65	97	
	1100	Min.	381,3	392,67	6,10	-						0,5-600	0,5-600	34	54	147
		Max.	1125,8	451,50	17,90	90						0,5-330	0,5-330	77	119	
	1800	Min.	603,2	752,89	9,6	-						0,5-450	0,5-450	46	69	209
		Max.	1809,6	854,10	28,80	90						0,5-250	0,5-250	103	157	
	2800	Min.	930,7	2622,99	14,8	-						0,5-120	0,5-320	52	80	337
		Max.	2792,0	2975,70	44,50	90						0,5-120	0,5-215	127	194	
	4500	Min.	1497,8	4420,44	23,9	-						0,5-100	0,5-280	55	85	520
		Max.	4502,7	5015,10	71,70	91						0,5-80	0,5-170	140	210	
	7000	Min.	2322,4	10149,53	36,98	-						0,5-100	0,5-210	82	125	812
		Max.	6967,2	11376,60	110,94	91						0,5-80	0,5-130	170	250	
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.	270,2	309,67	4,27	-						1-750	1-750	26	40	103
		Max.	804,2	358,40	12,81	90						1-450	1-450	65	93	
	1400	Min.	463,9	392,67	9,85	-						0,5-550	0,5-550	38	55	147
		Max.	1369,5	451,50	21,80	92						0,5-280	0,5-280	77	102	
	2100	Min.	697,0	752,89	16,65	-						0,5-420	0,5-420	46	72	226
		Max.	2091,2	854,10	33,30	91						0,5-250	0,5-250	100	148	
	3100	Min.	1034,6	2622,99	24,71	-						0,5-120	0,5-300	55	85	341
		Max.	3103,7	2975,70	49,40	91						0,5-120	0,5-215	125	190	
	5400	Min.	1800,4	4420,44	43,00	-						0,5-100	0,5-250	65	100	524
		Max.	5401,2	5015,10	86,01	92						0,5-80	0,5-160	140	210	
	8200	Min.	2742,1	10149,53	43,63	-						0,5-100	0,5-200	80	134	822
		Max.	8226,4	11376,60	130,90	91						0,5-90	0,5-120	170	250	

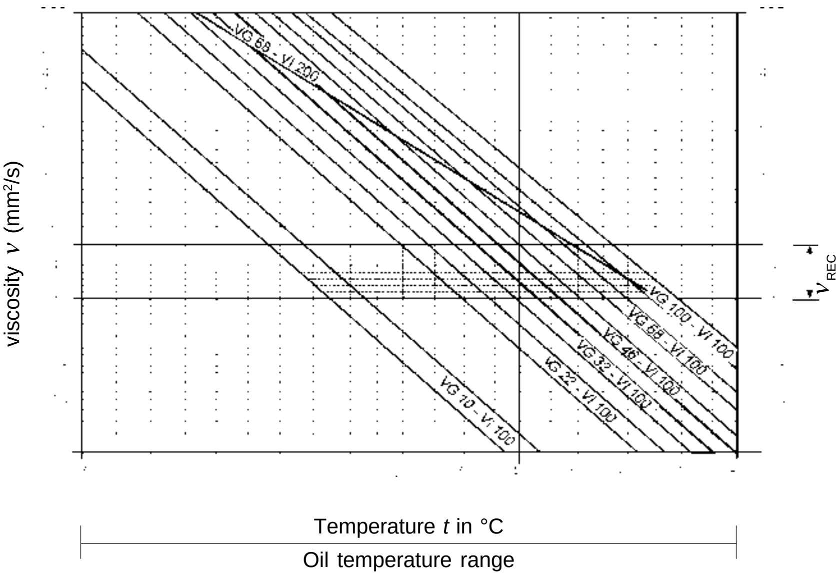
(*) Please consult PARKER Calzoni

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 PARKER Calzoni for confirmation.



GENERAL NOTES

More detailed information regarding the choice of the fluid can be requested to PARKER 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 PARKER 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 .

$\nu_{rec.}$ = 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

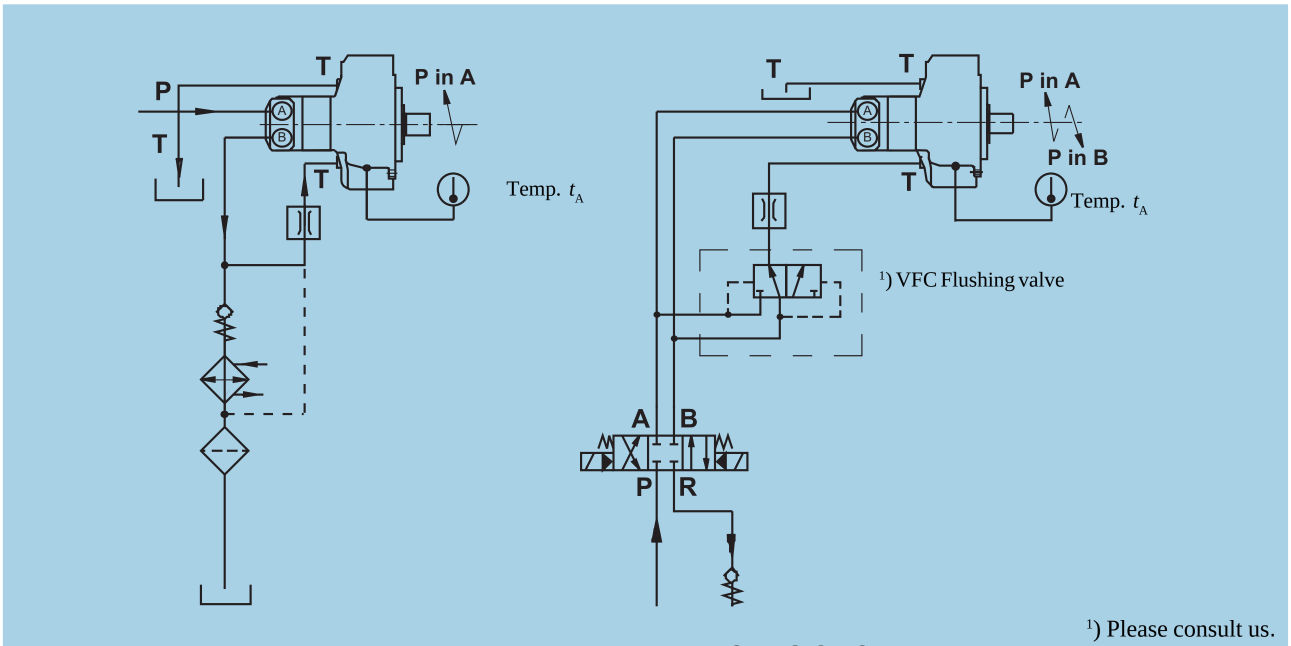
The lower the speed and the case drain pressure, the longer the life of the shaft seal. The maximum permissible housing pressure is

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 47, 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 47, Seals, Code "V1"). These "FPM" seals should be used with HFD fluids or when expressly required.



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 27), 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.

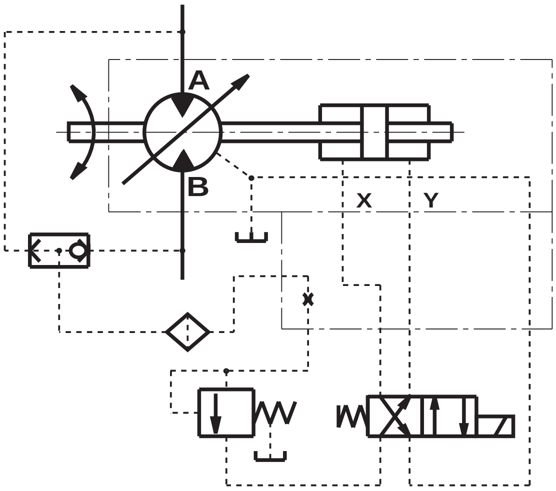
FLOW

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, 7000,8200	Q = 20 l/min

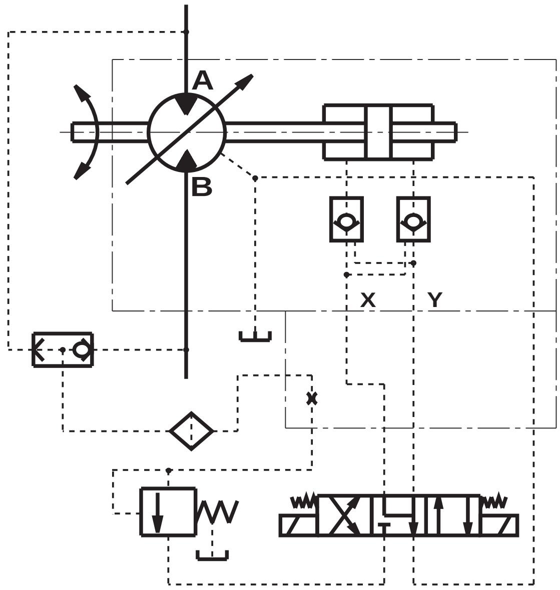
INTERNAL PILOTING

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

Internal piloting
Two displacement valve feeded
by motor pressure



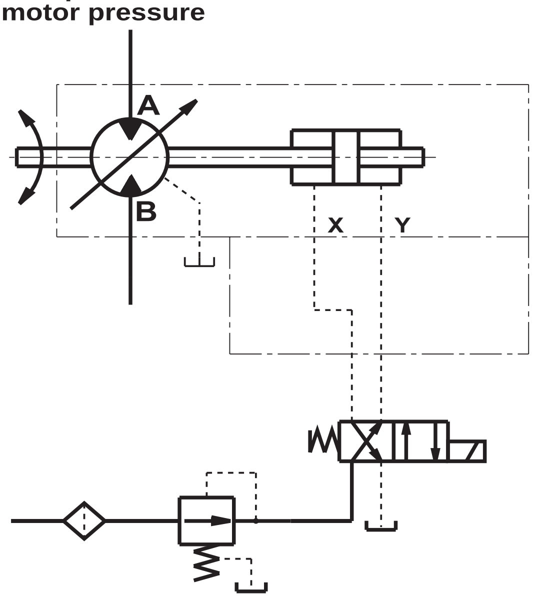
Internal piloting
Solenoid operated displacement control
valve feeded by motor pressure



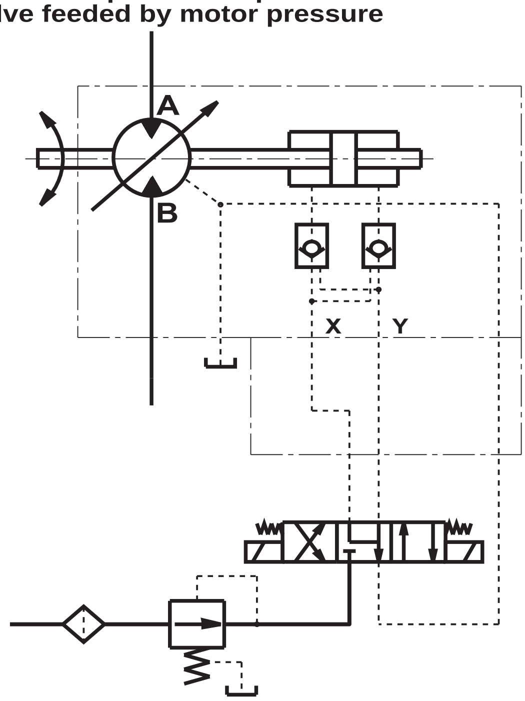
EXTERNAL PILOTING

External piloting pressure requested is 160 bars.

External piloting
Two displacement valve feeded
by motor pressure



External piloting
Solenoid operated displacement control
valve feeded by motor pressure



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

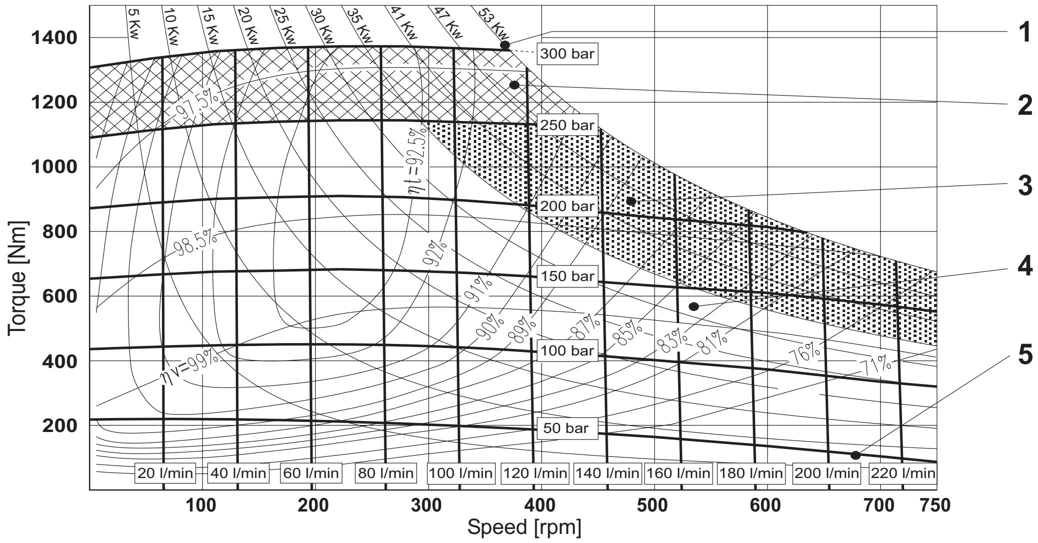
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRD 300

set to

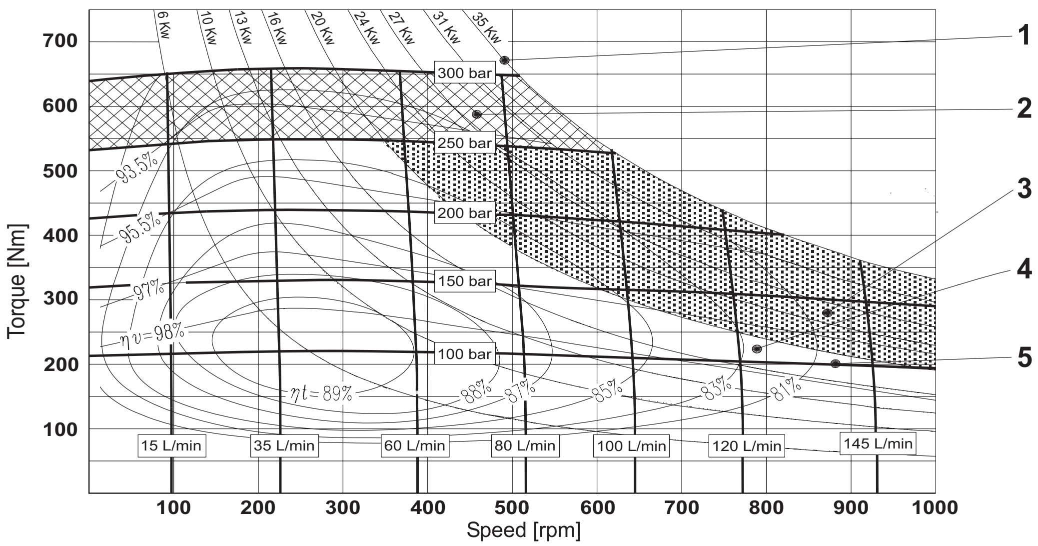
304 cm³



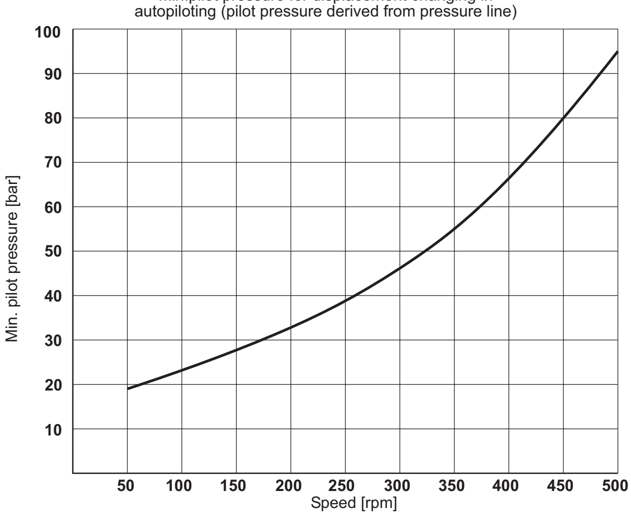
MRD 300

set to

152 cm³

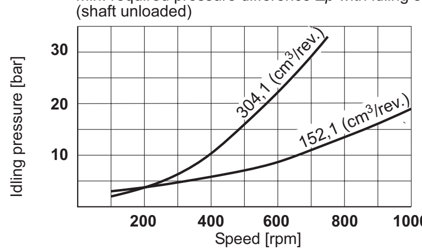


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

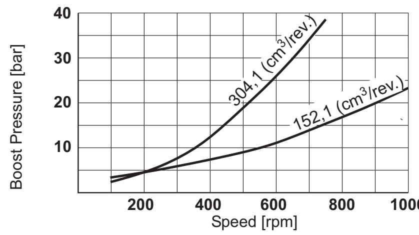


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult PARKER Calzoni

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



Min. required boost Pressure with pump operation



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

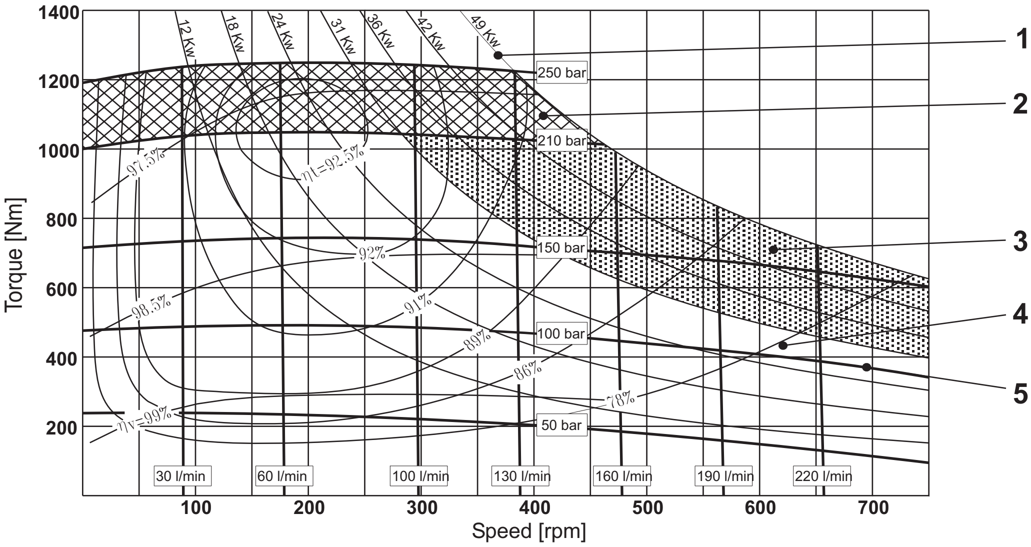
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRDE 330

set to

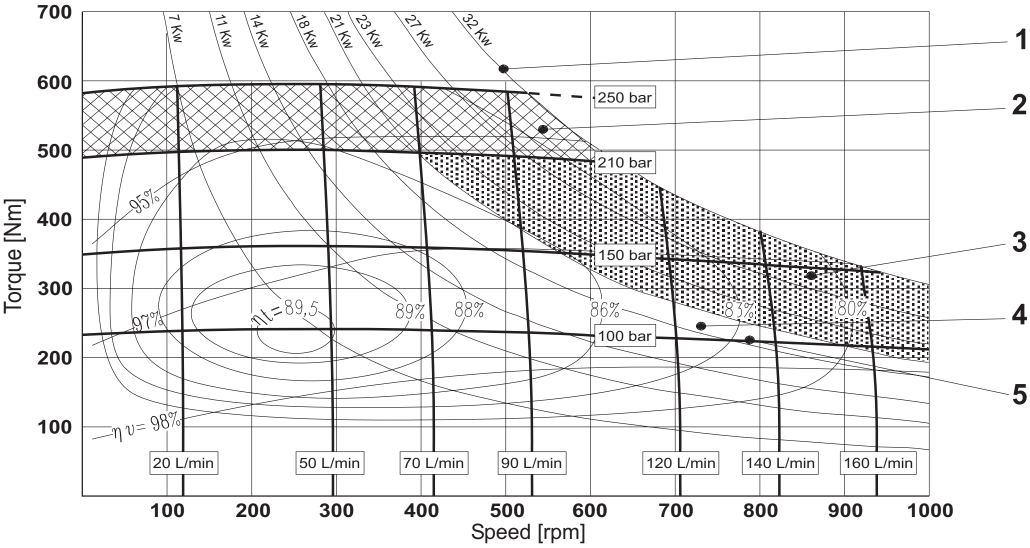
332 cm³

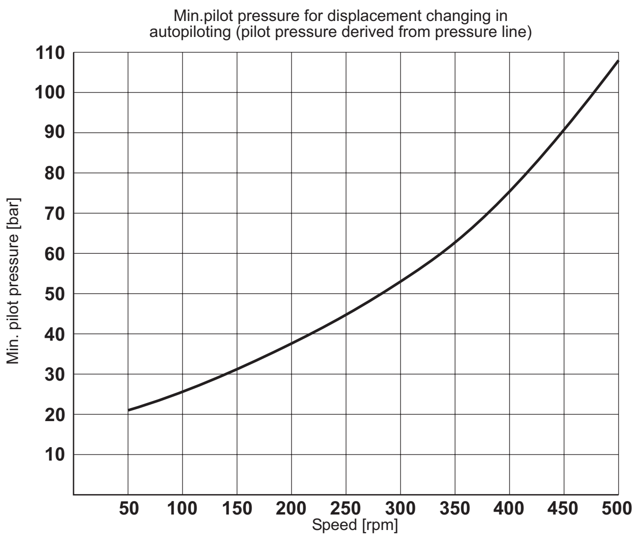


MRDE 330

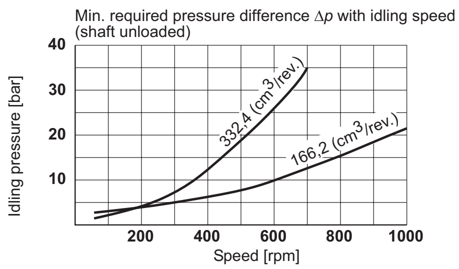
set to

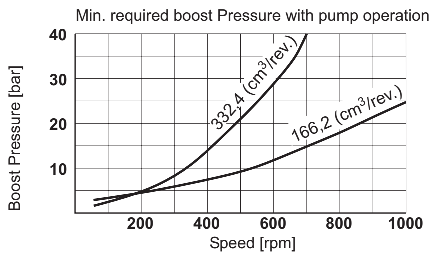
166 cm³





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





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

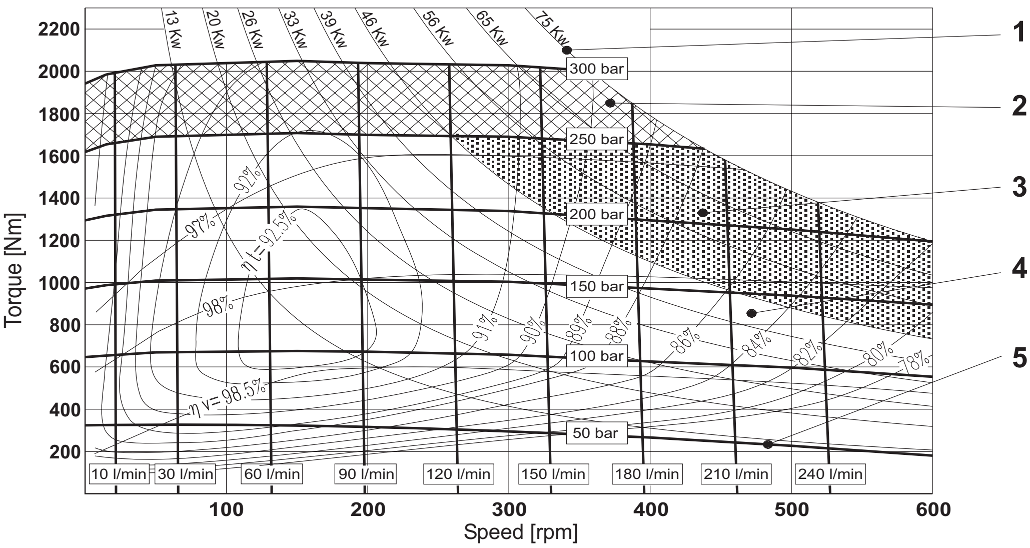
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRD 450

set to

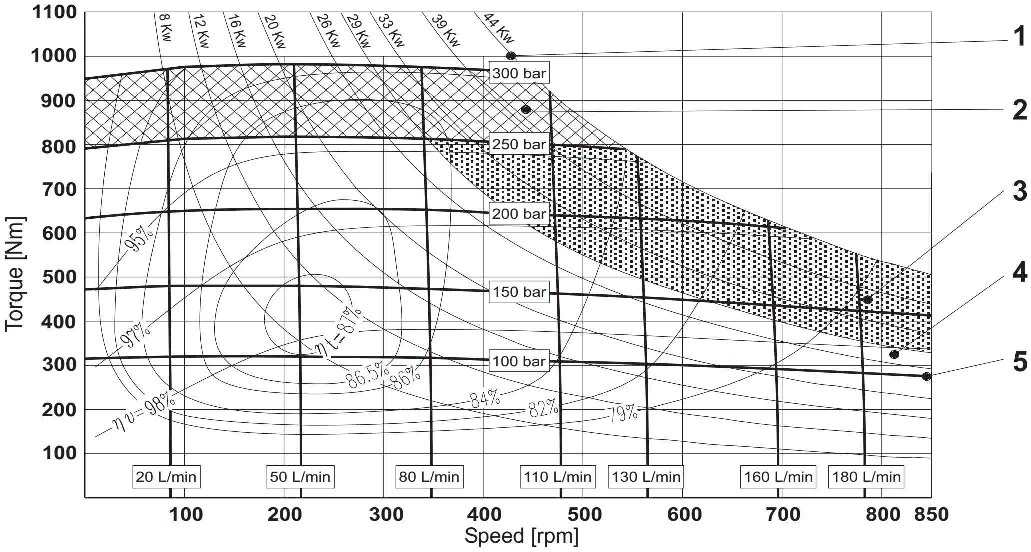
452 cm³

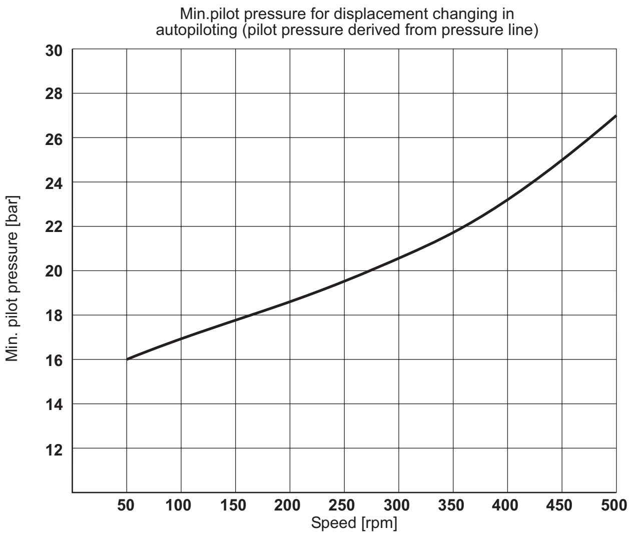


MRD 450

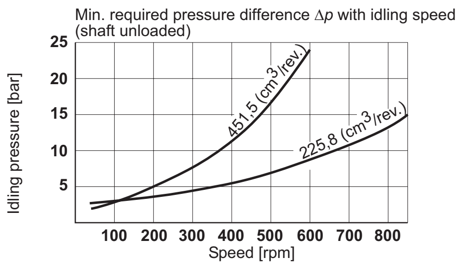
set to

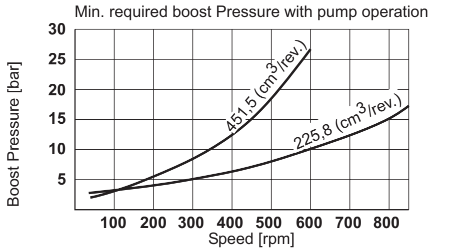
226 cm³





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





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

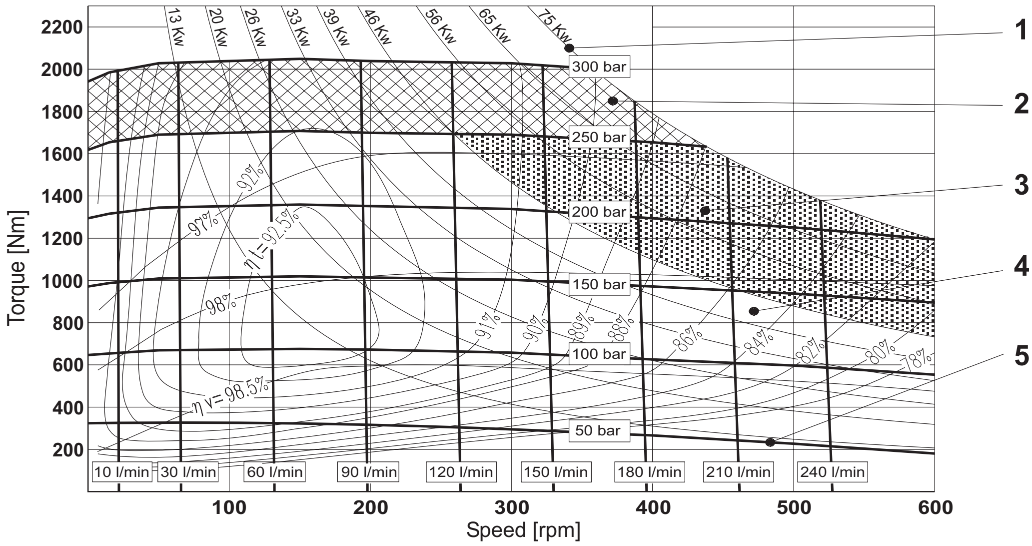
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

4 Continuous operating area **5** Inlet pressure $\boldsymbol{\eta t}$ Total efficiency $\boldsymbol{\eta v}$ Volumeter efficiency

MRV 450

set to

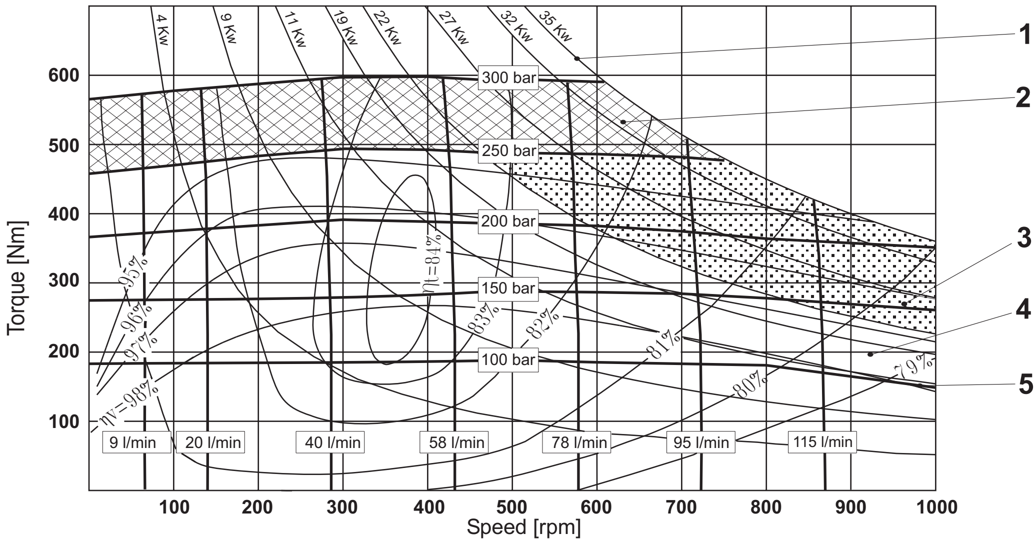
452 cm³



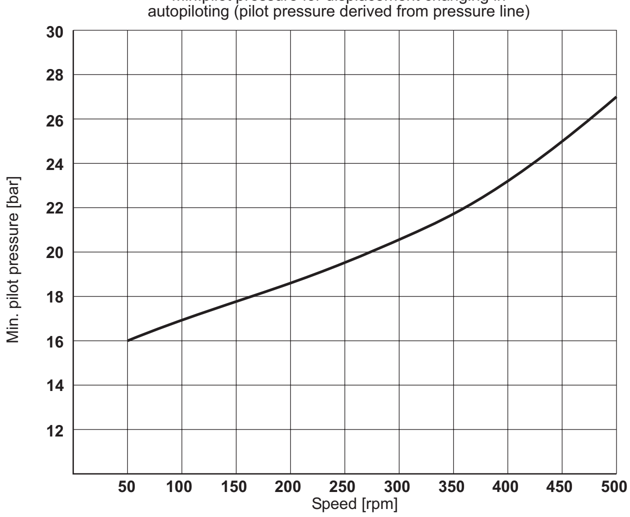
MRV 450

set to

134 cm³

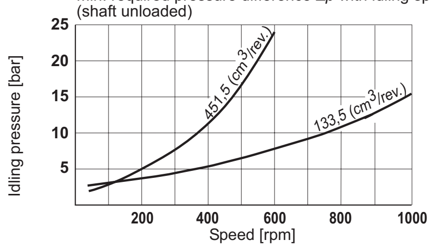


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

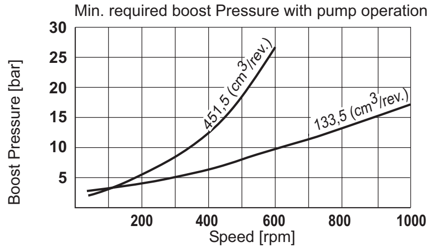


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult PARKER Calzoni

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



Min. required boost Pressure with pump operation



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

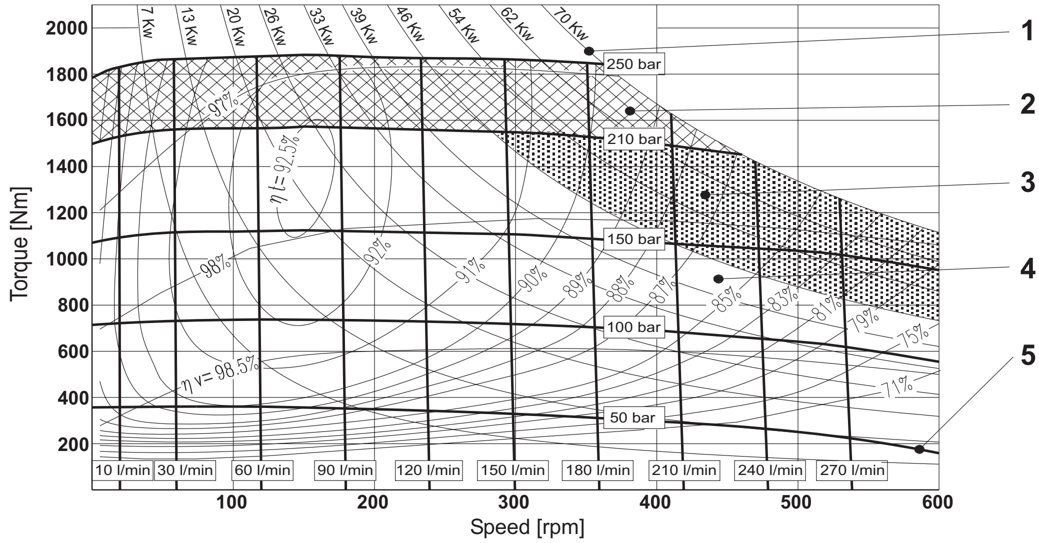
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRDE 500

set to

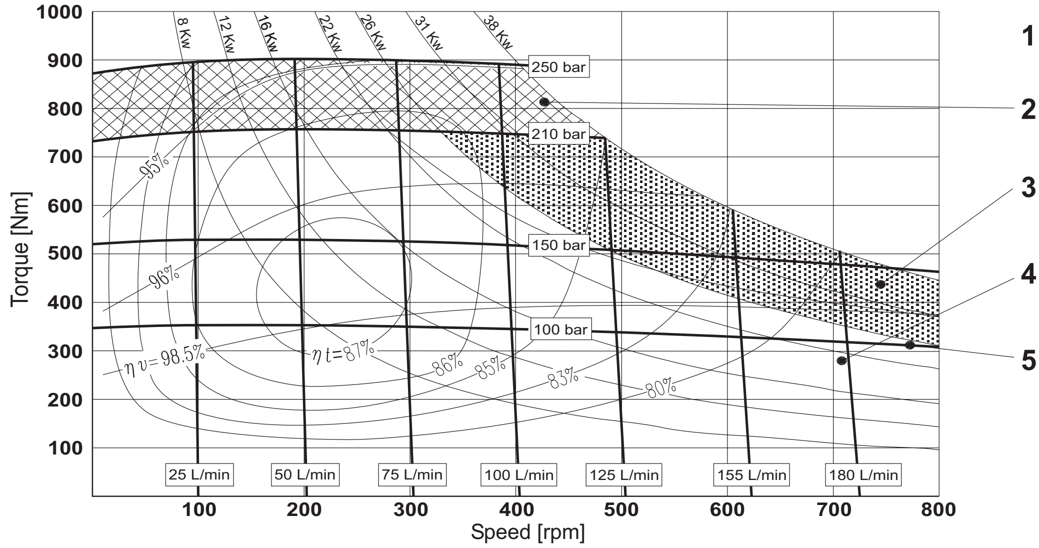
498 cm³

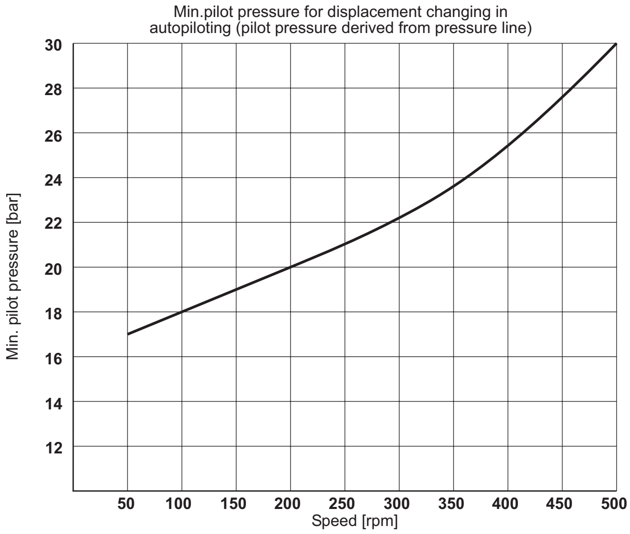


MRDE 500

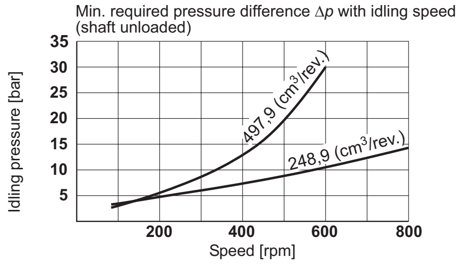
set to

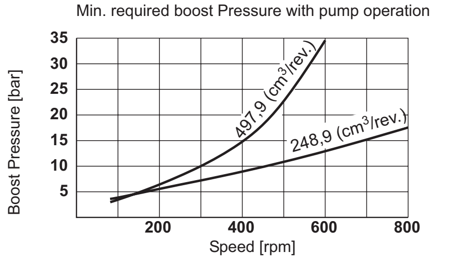
249 cm³





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





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

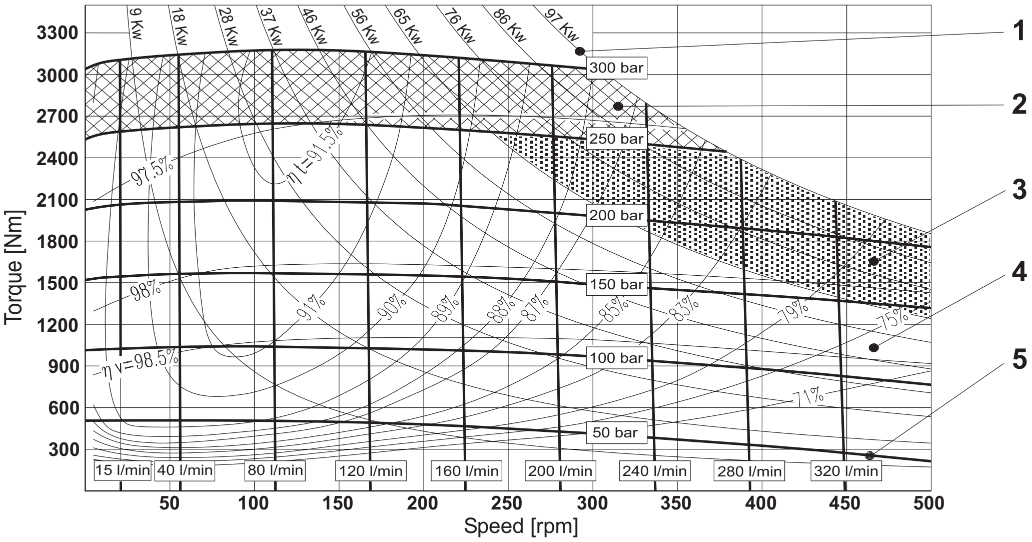
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRD 700
MRV 700

set to

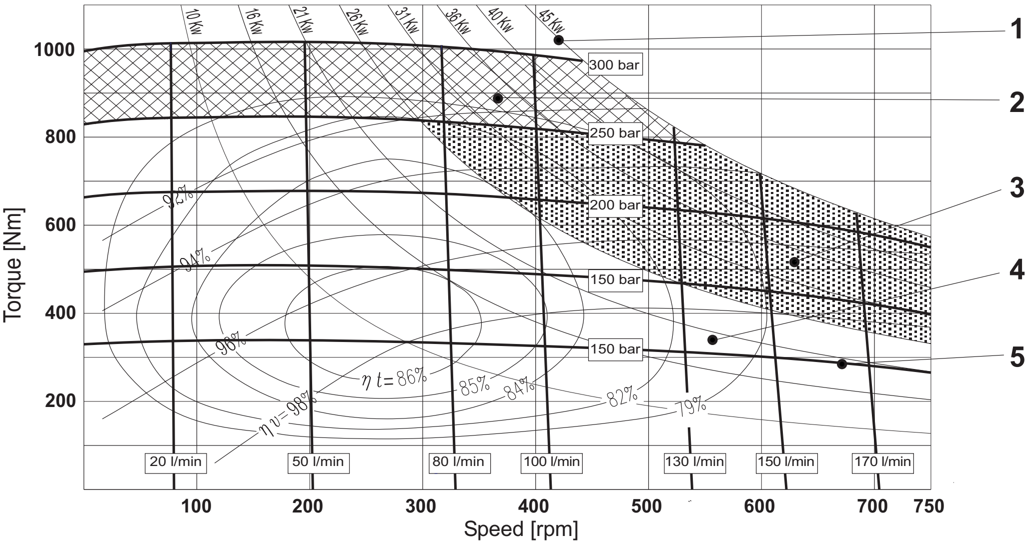
707 cm³



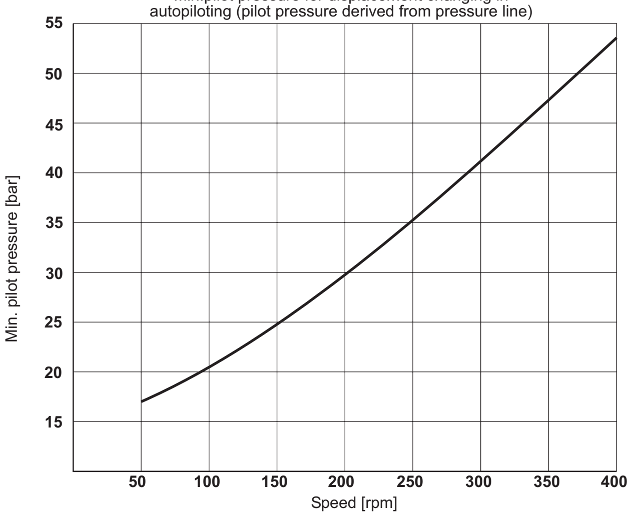
MRD 700
MRV 700

set to

238 cm³

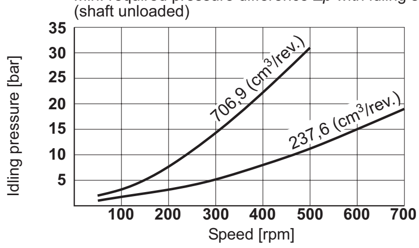


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

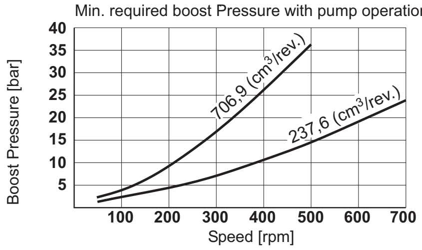


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult PARKER Calzoni

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



Min. required boost Pressure with pump operation



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

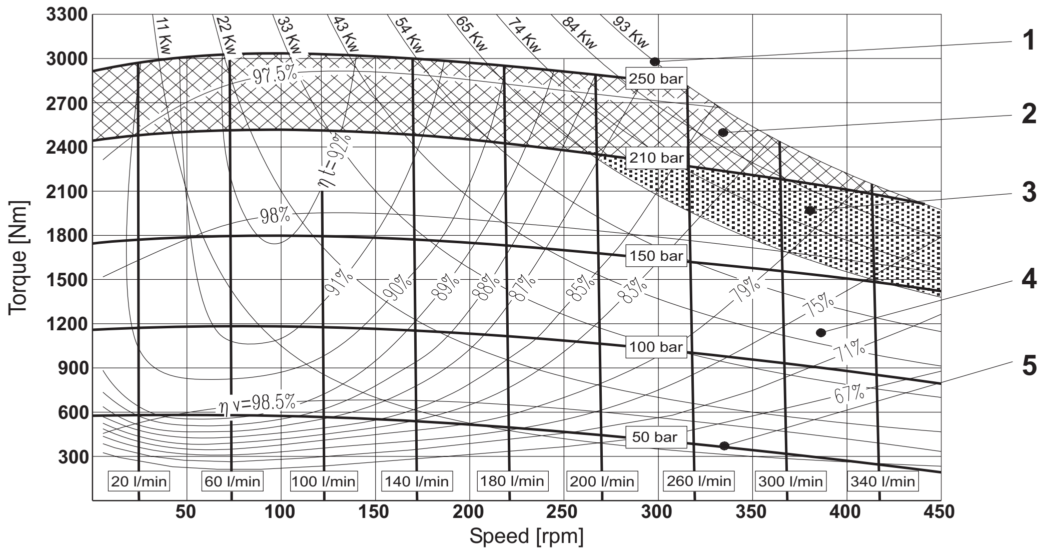
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRDE 800
MRVE 800

set to

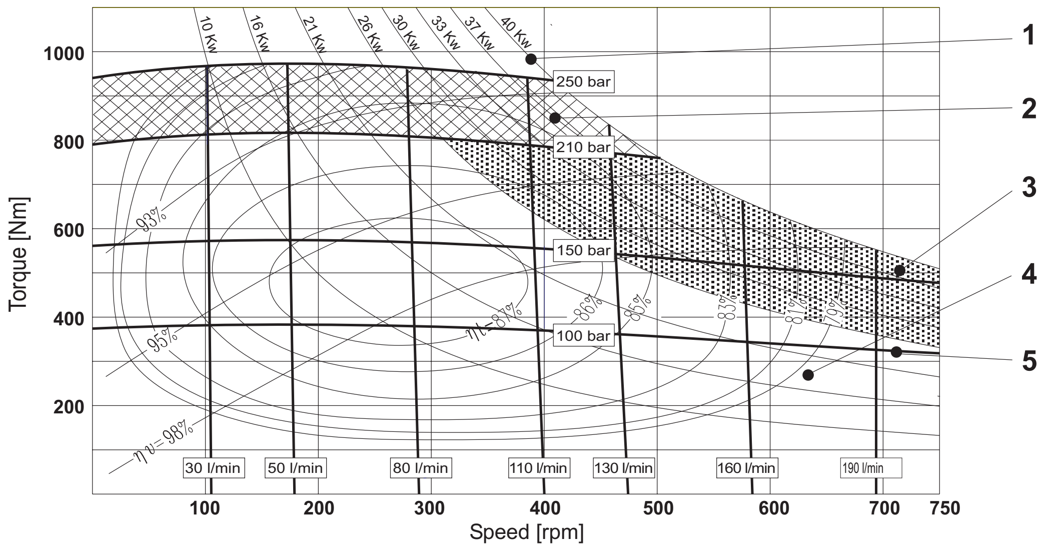
804 cm³

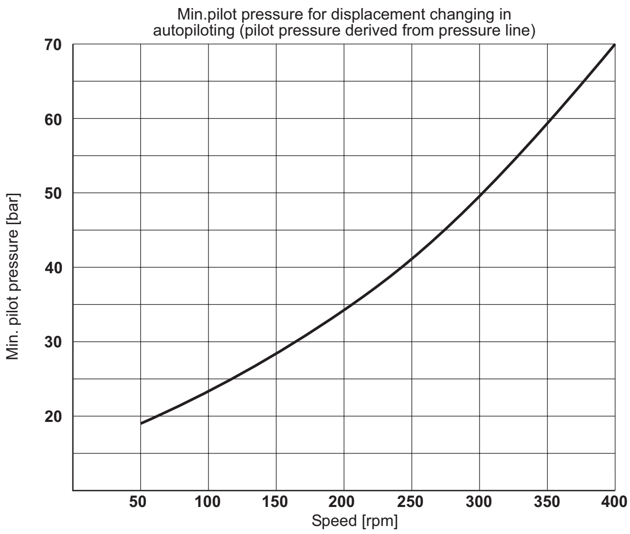


MRDE 800
MRVE 800

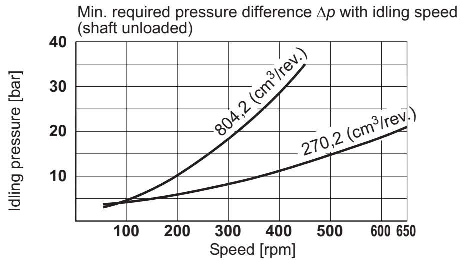
set to

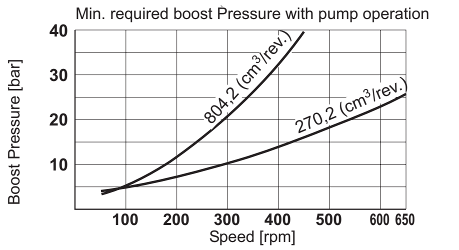
270 cm³





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





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

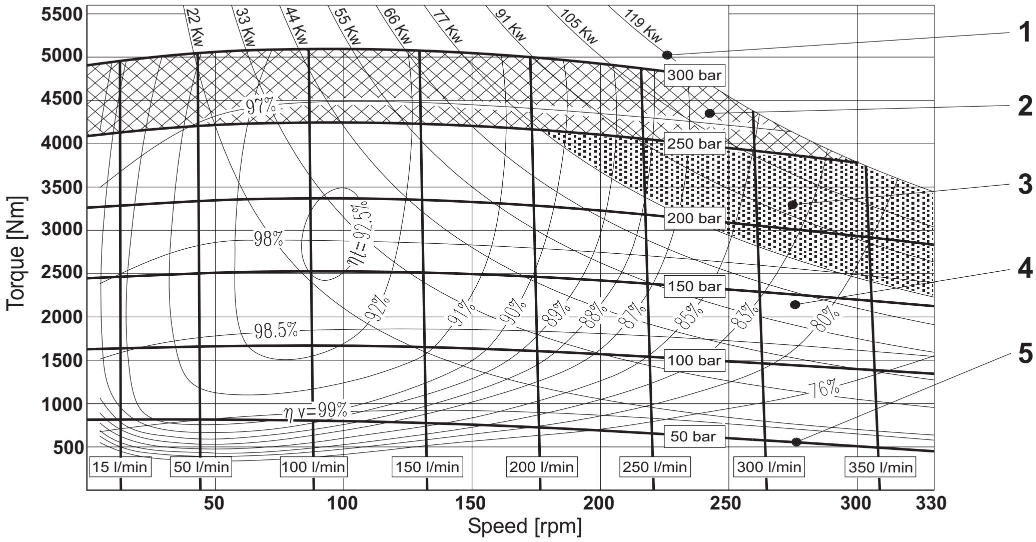
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRD 1100
MRV 1100

set to

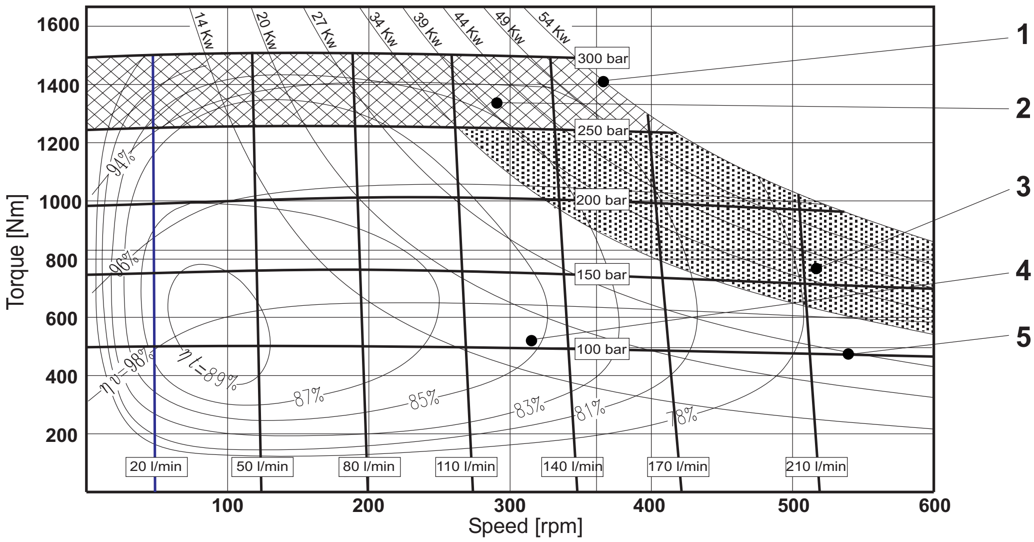
1126 cm³

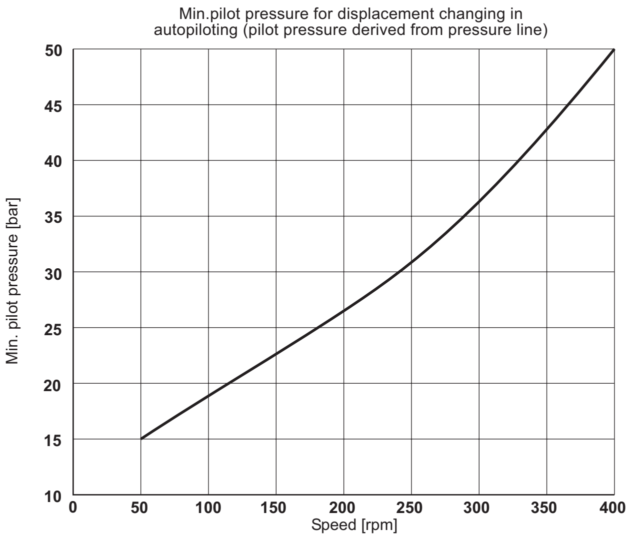


MRD 1100
MRV 1100

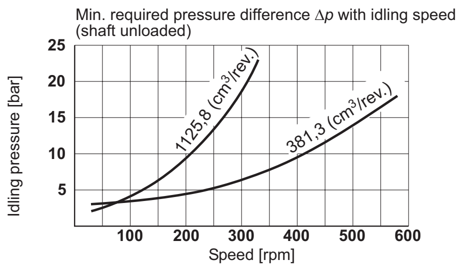
set to

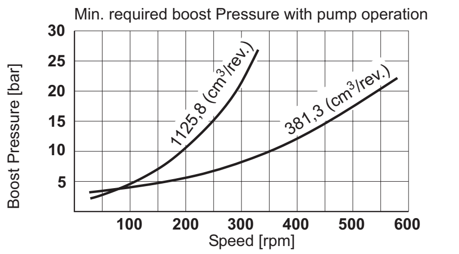
381 cm³





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





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

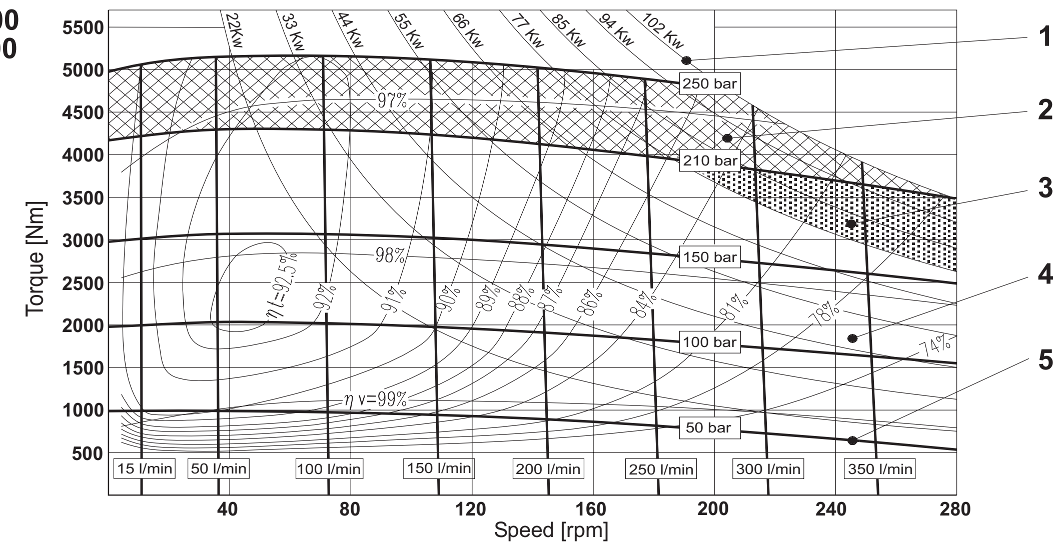
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRDE 1400
MRVE 1400

set to

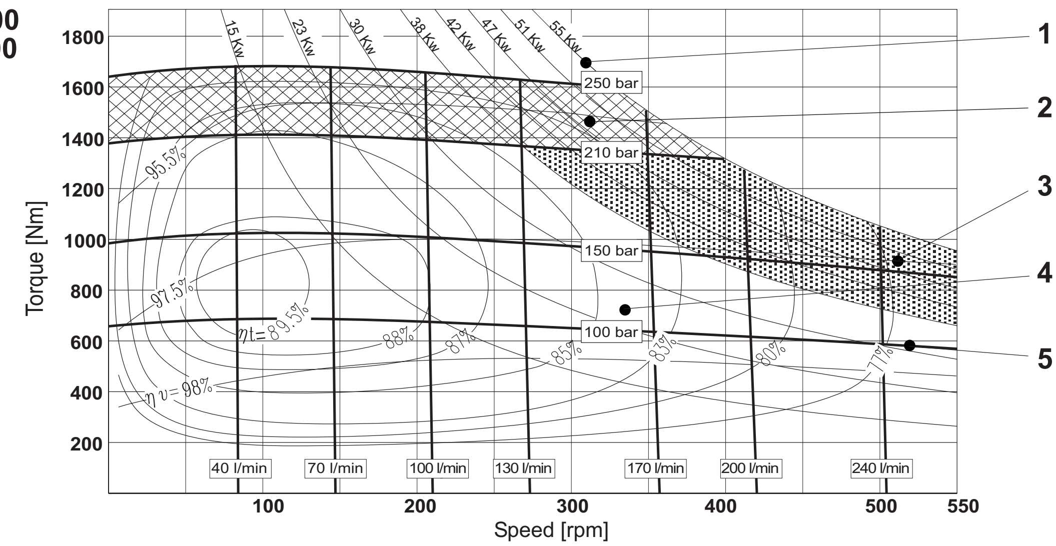
1370 cm³



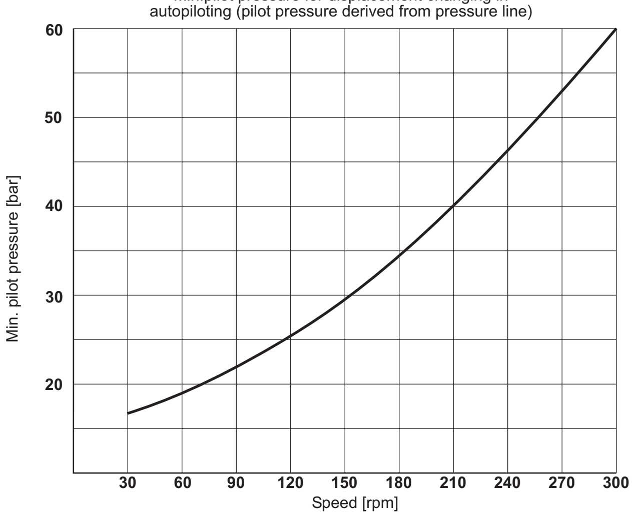
MRDE 1400
MRVE 1400

set to

464 cm³

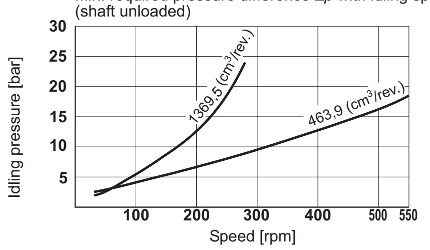


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

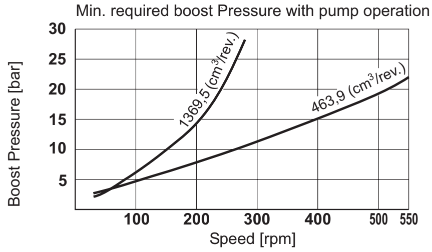


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult PARKER Calzoni

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



Min. required boost Pressure with pump operation



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

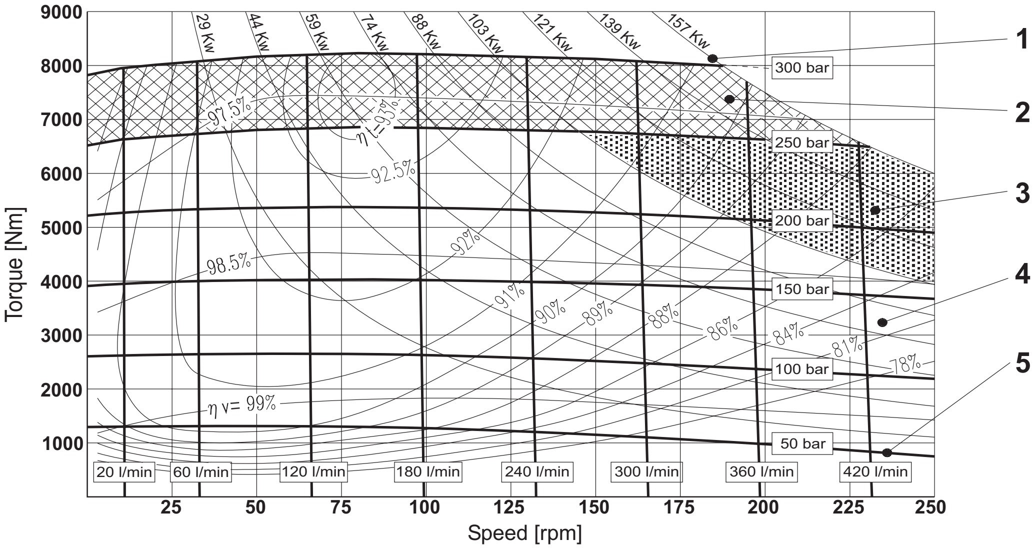
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRD 1800
MRV 1800

set to

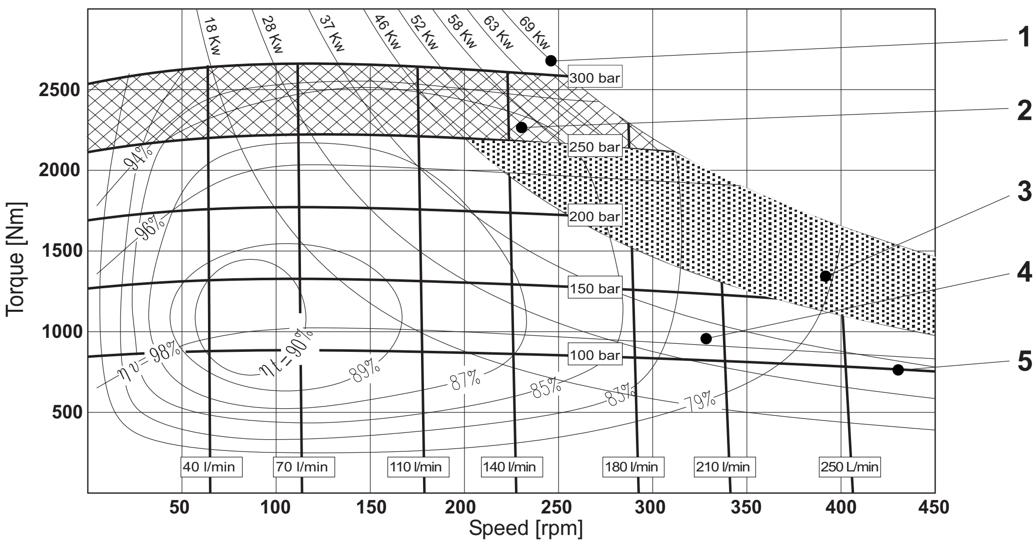
1810 cm³

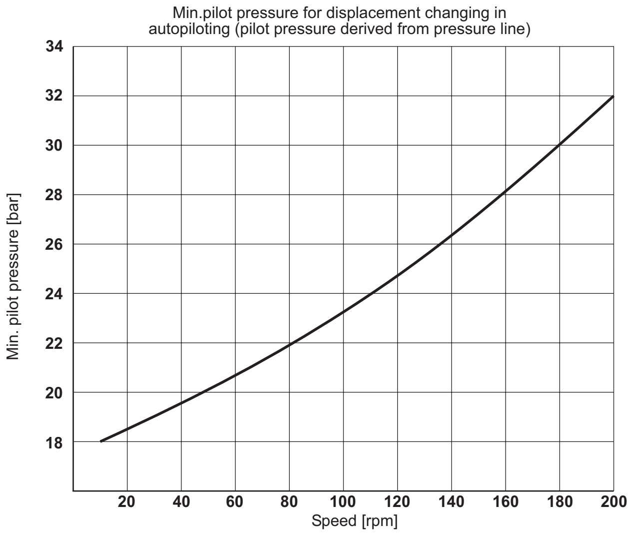


MRD 1800
MRV 1800

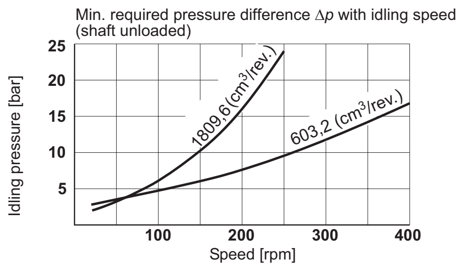
set to

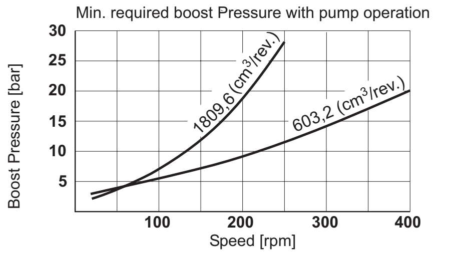
603 cm³





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





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

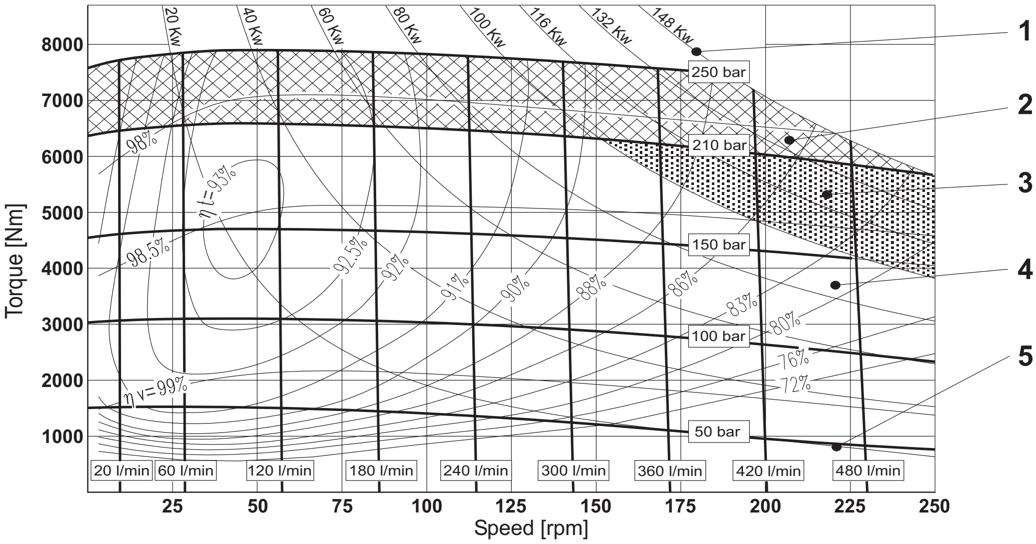
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRDE 2100
MRVE 2100

set to

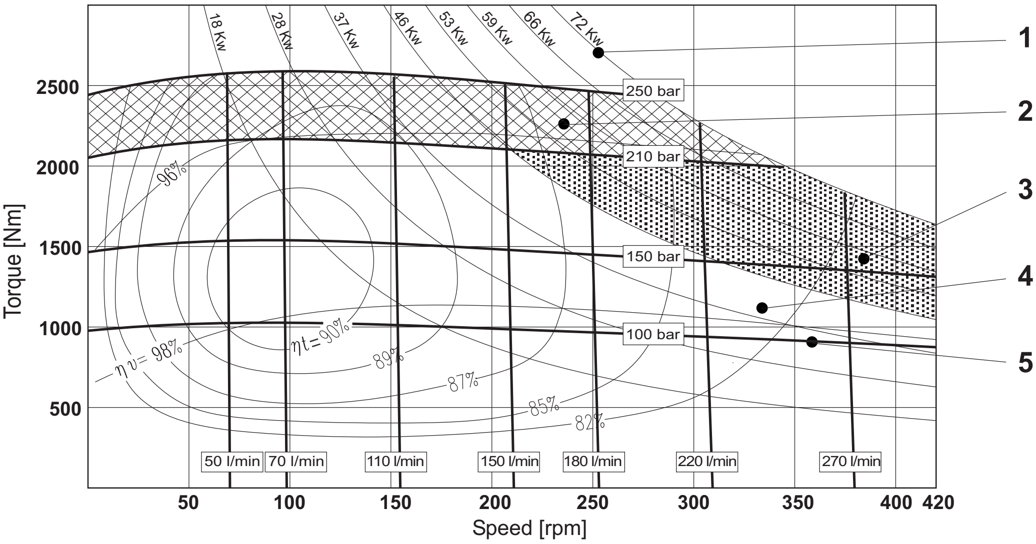
2091 cm³

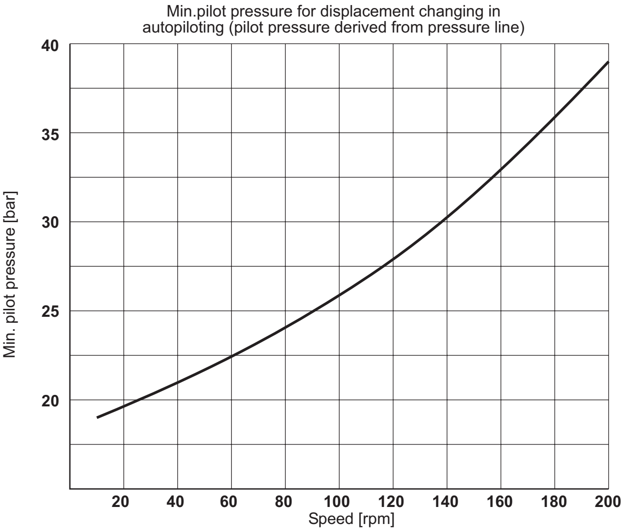


MRDE 2100
MRVE 2100

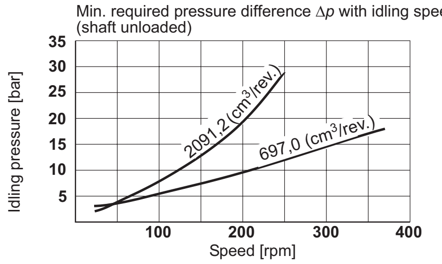
set to

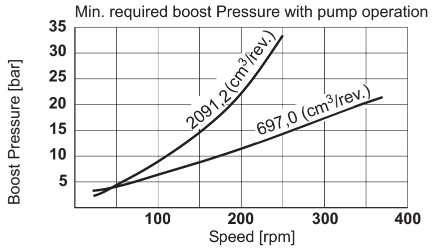
697 cm³





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





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

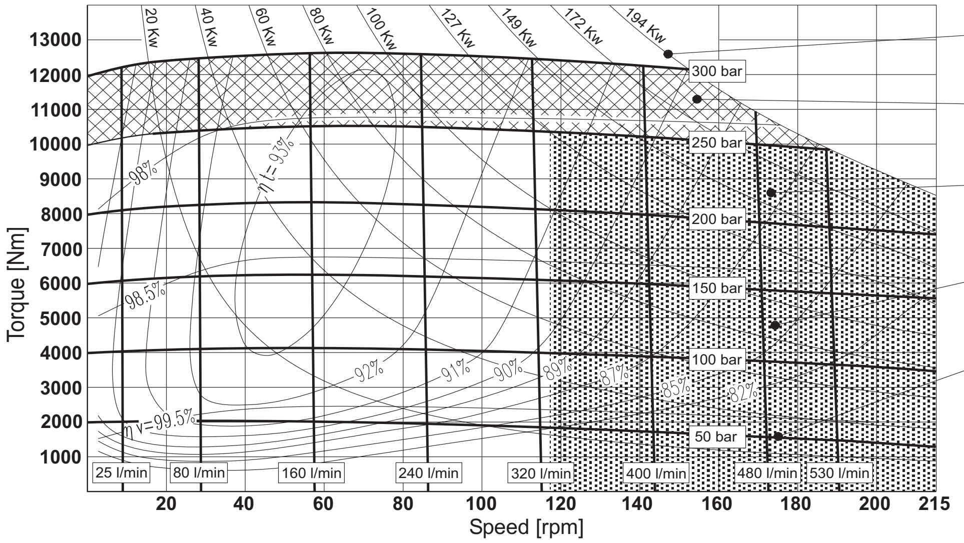
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRD 2800
MRV 2800

set to

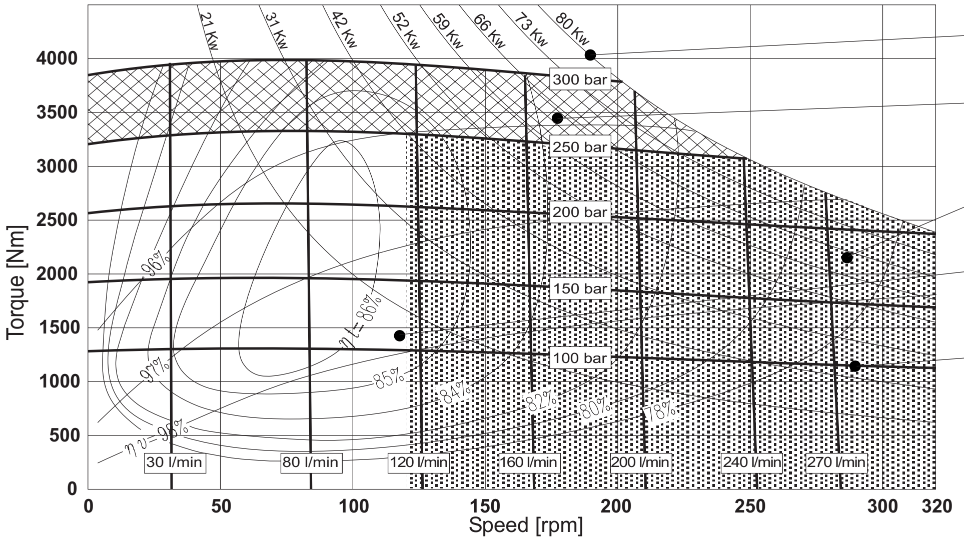
2792 cm³



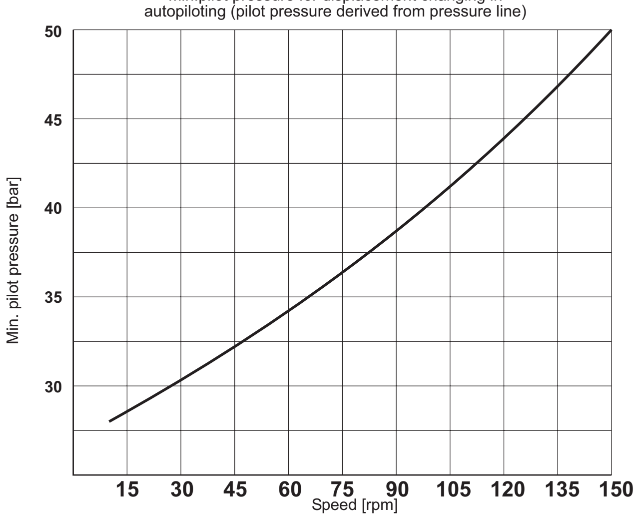
MRD 2800
MRV 2800

set to

931 cm³

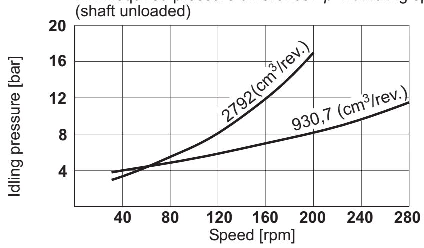


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

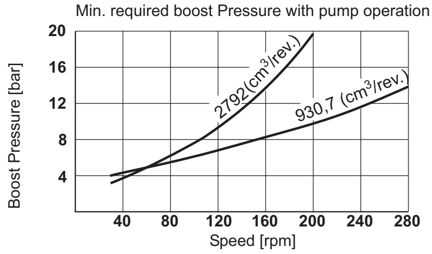


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult PARKER Calzoni

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



Min. required boost Pressure with pump operation



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

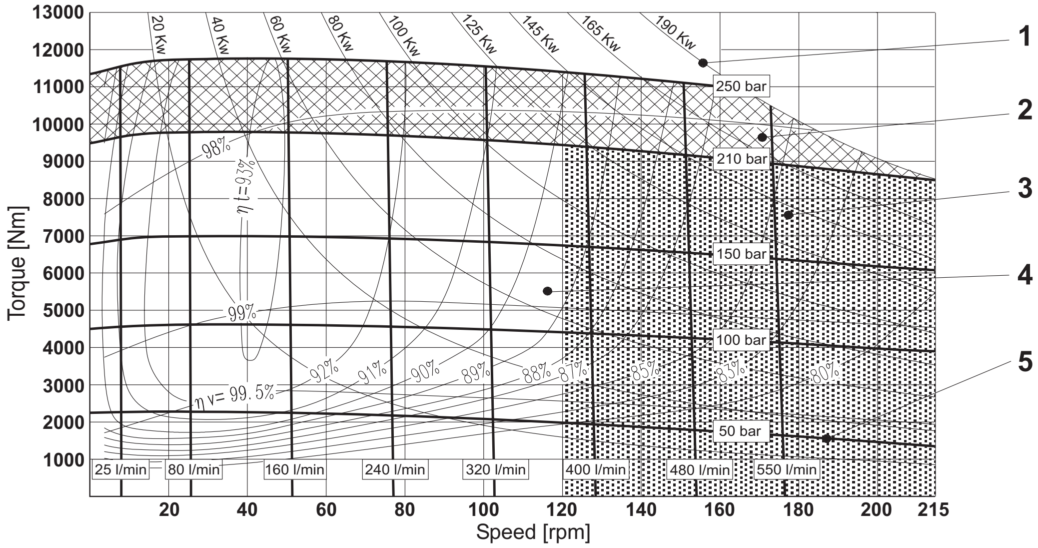
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRDE 3100
MRVE 3100

set to

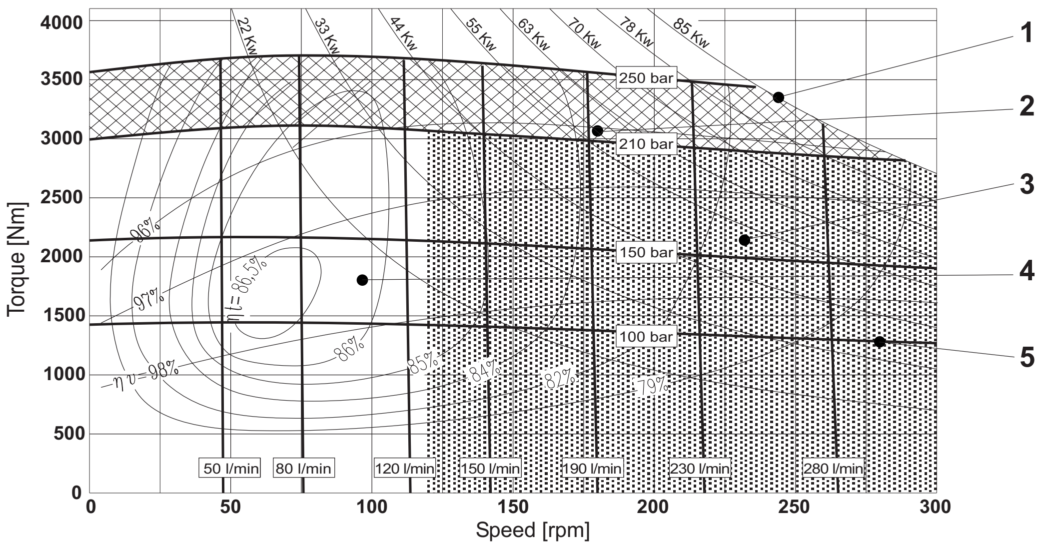
3104 cm³

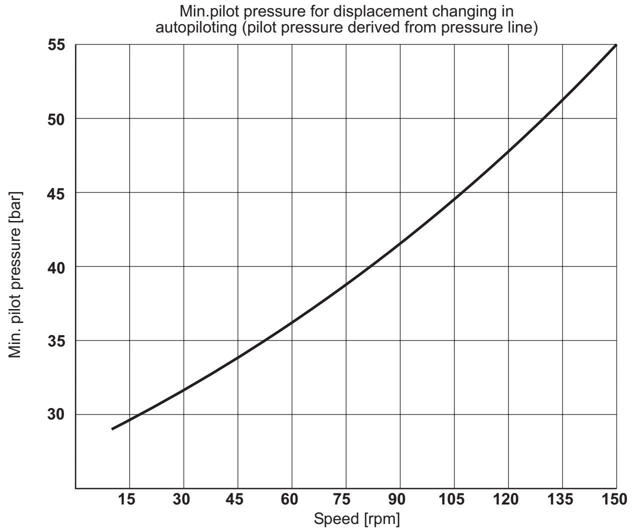


MRDE 3100
MRVE 3100

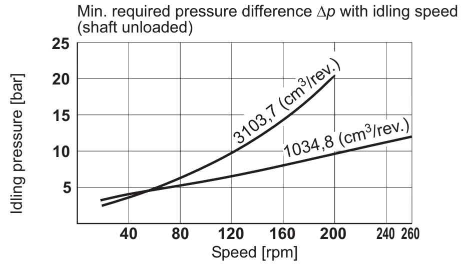
set to

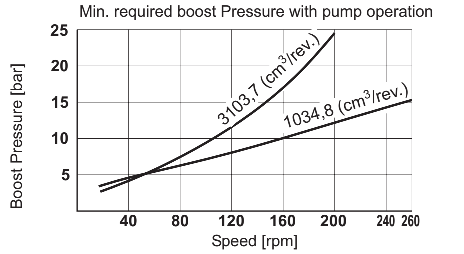
1035 cm³





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





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

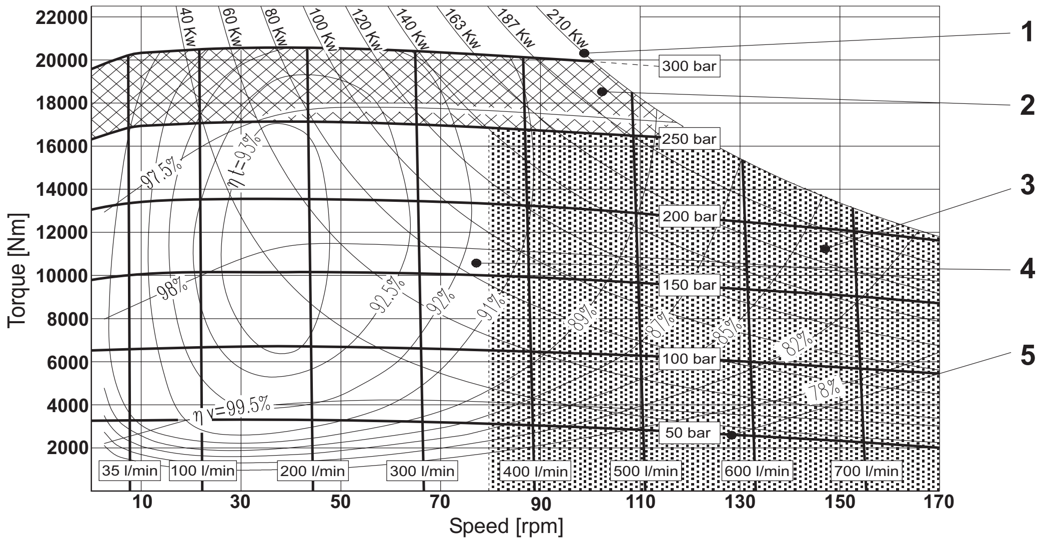
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRD 4500
MRV 4500

set to

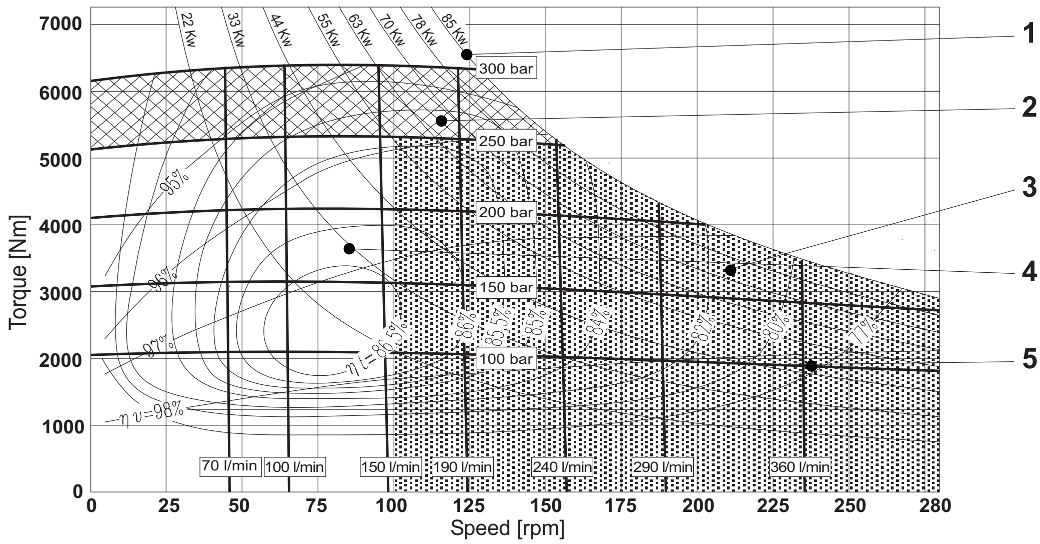
4502 cm³



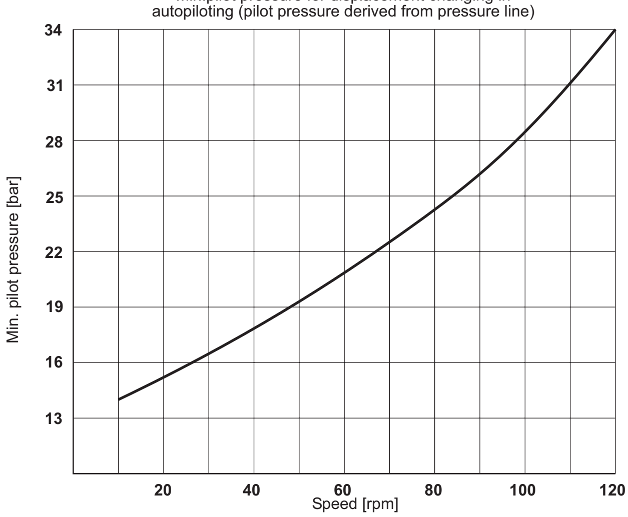
MRD 4500
MRV 4500

set to

1498 cm³

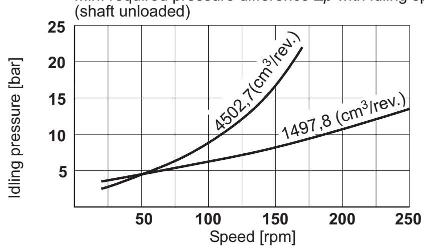


Min.pilot pressure for displacement changing in autopiloting (pilot pressure derived from pressure line)

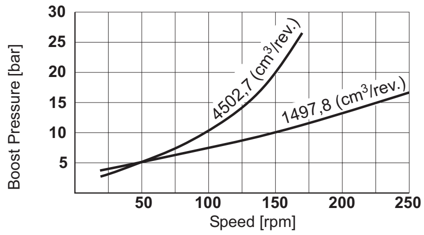


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult PARKER Calzoni

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



Min. required boost Pressure with pump operation



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

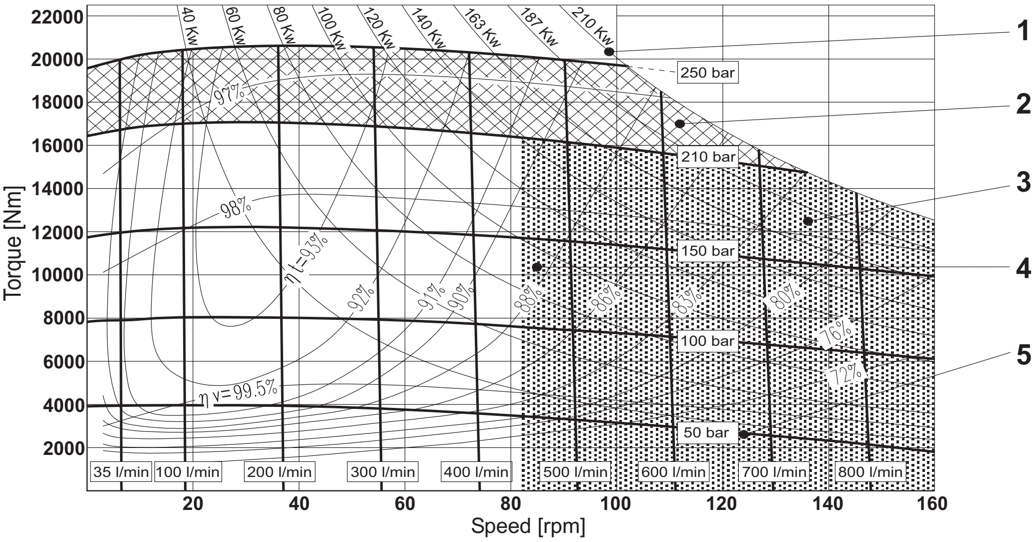
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRDE 5400
MRVE 5400

set to

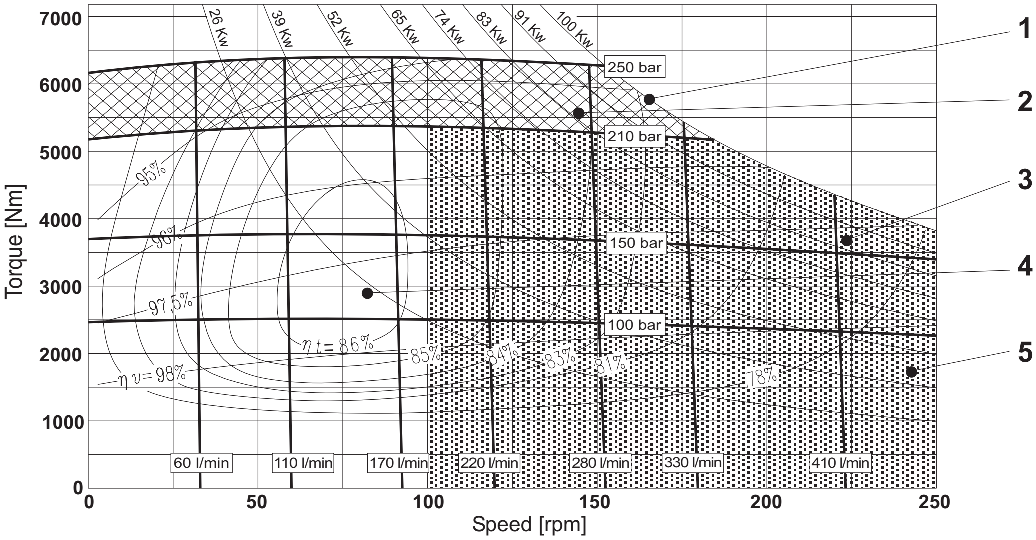
5401 cm³



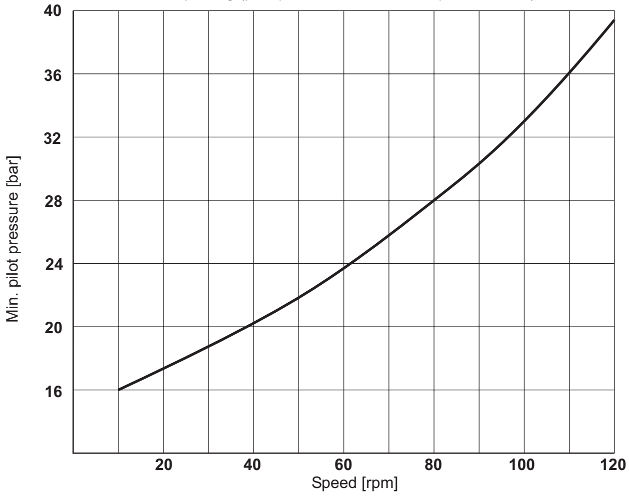
MRDE 5400
MRVE 5400

set to

1800 cm³

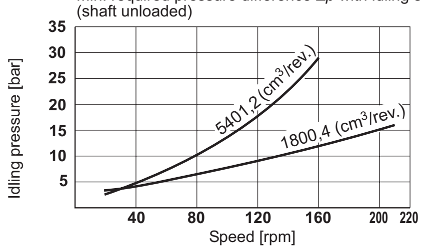


Min.pilot pressure for displacement changing in
autopiloting (pilot pressure derived from pressure line)

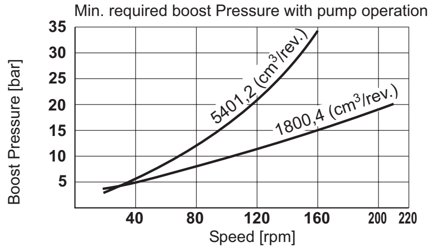


Valid for back pressure up to 50 bar, drain pressure up to 5 bar.
For other working conditions please consult PARKER Calzoni

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



Min. required boost Pressure with pump operation



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

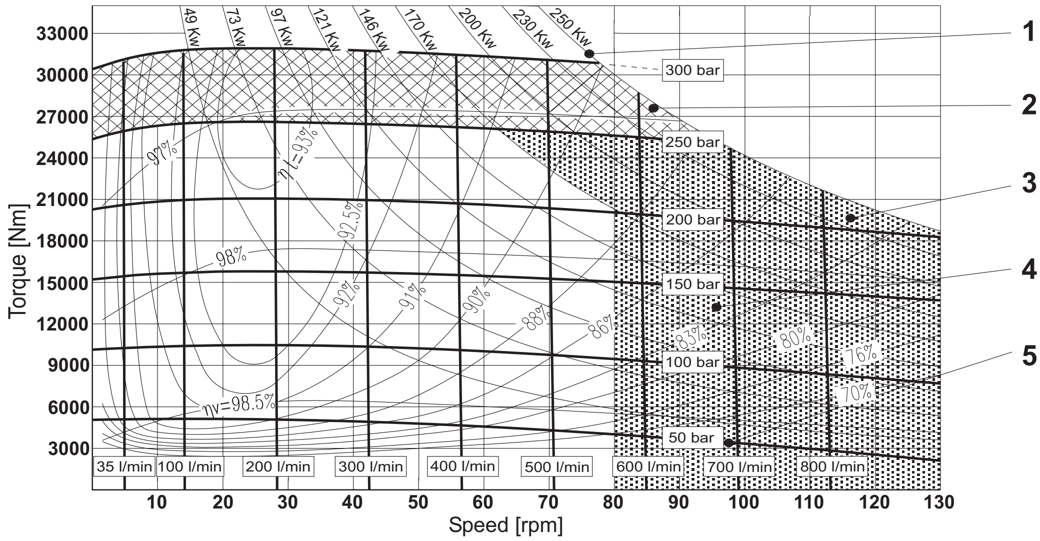
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRD 7000
MRV 7000

set to

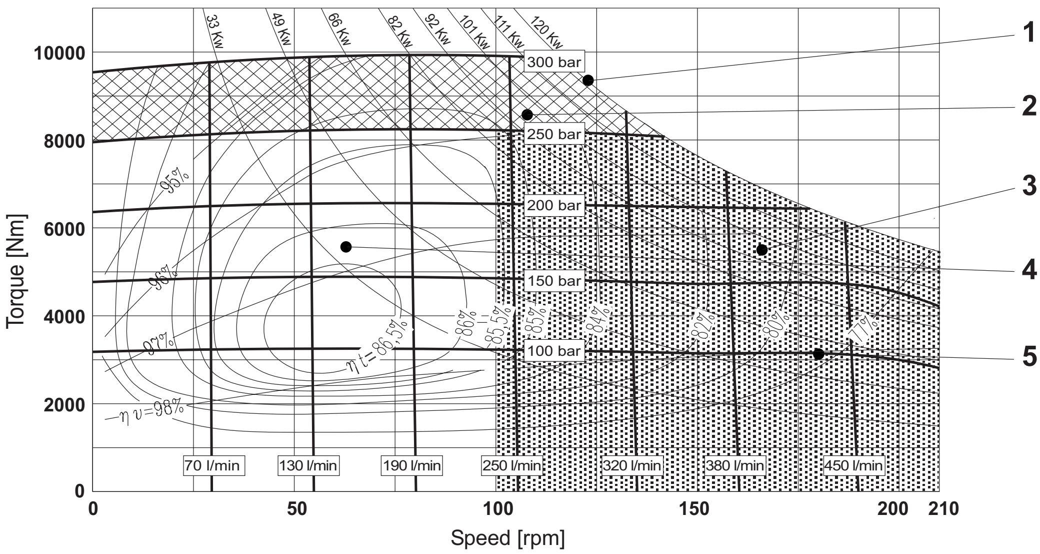
6967 cm³

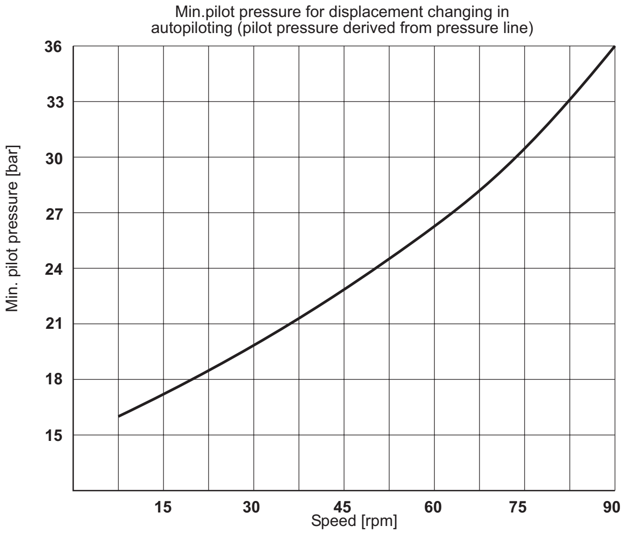


MRD 7000
MRV 7000

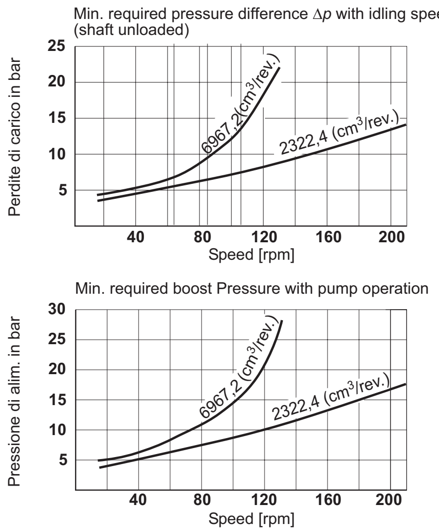
set to

2322 cm³





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



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

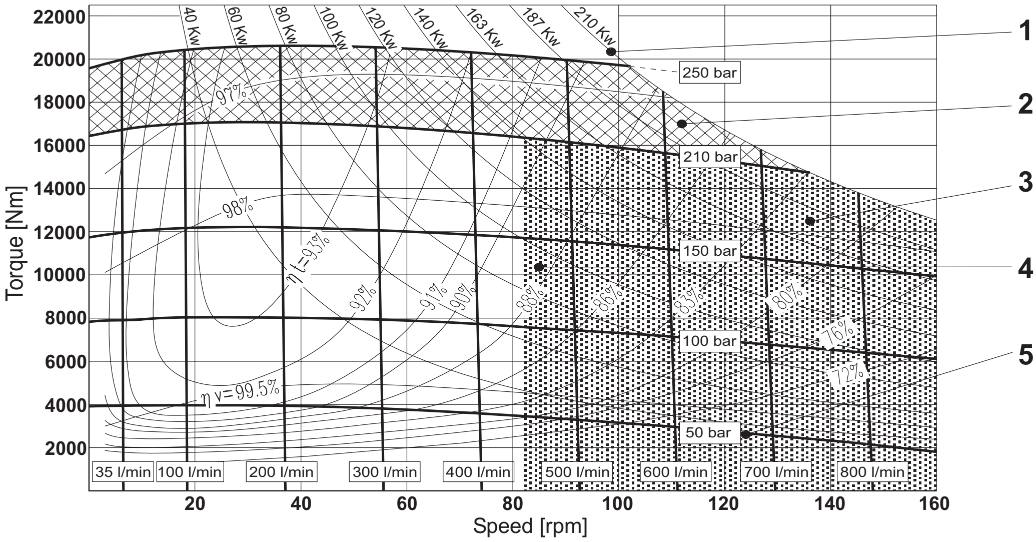
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MRDE 8200
MRVE 8200

set to

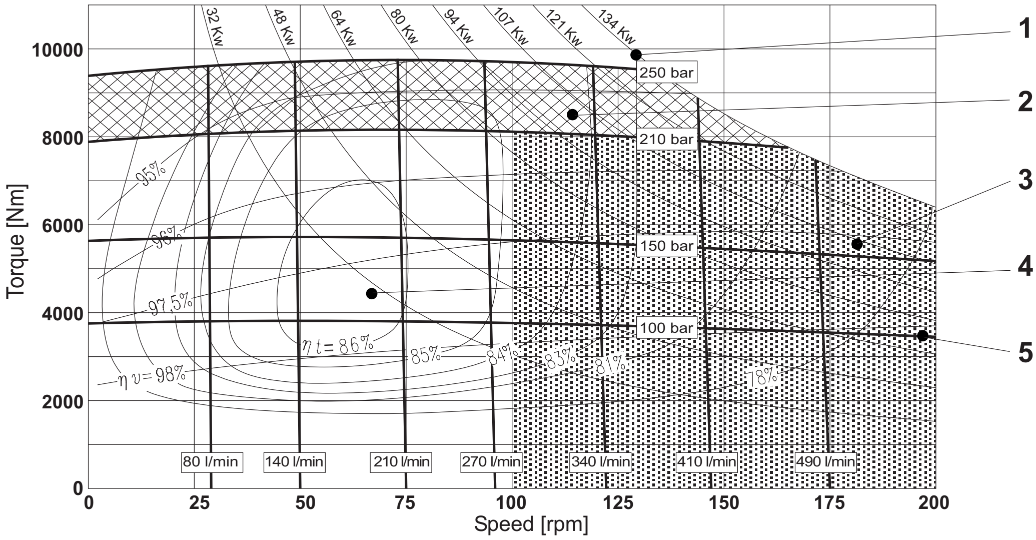
8226 cm³

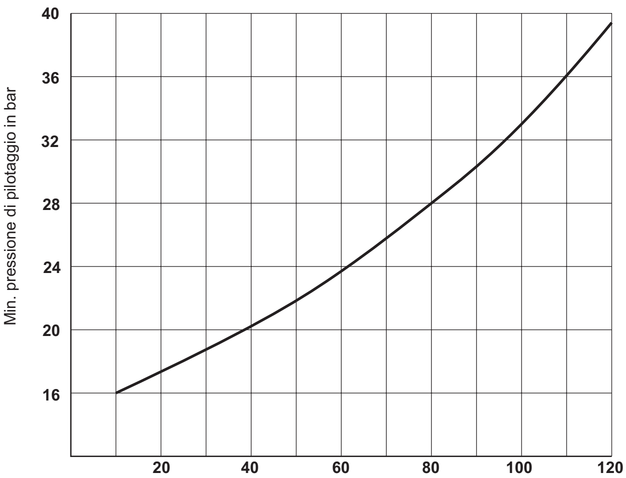


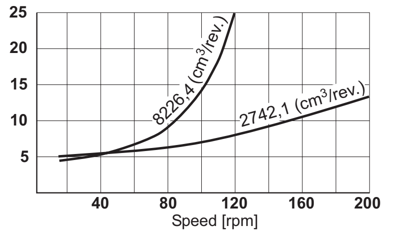
MRDE 8200
MRVE 8200

set to

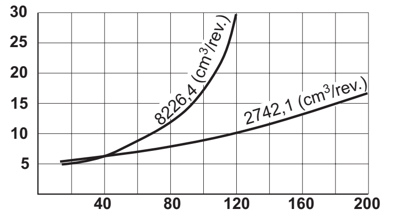
2742 cm³





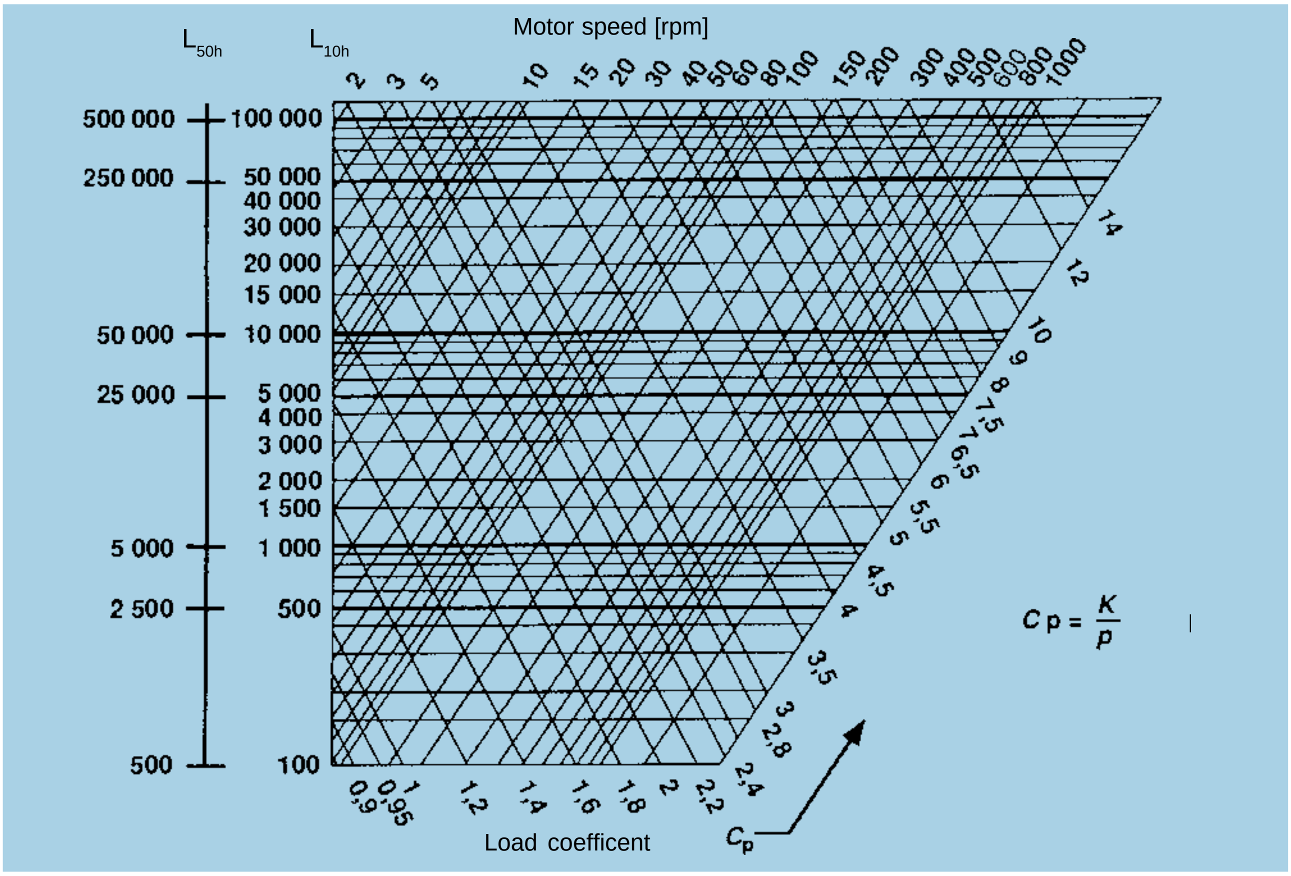


Min. required boost Pressure with pump operation



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

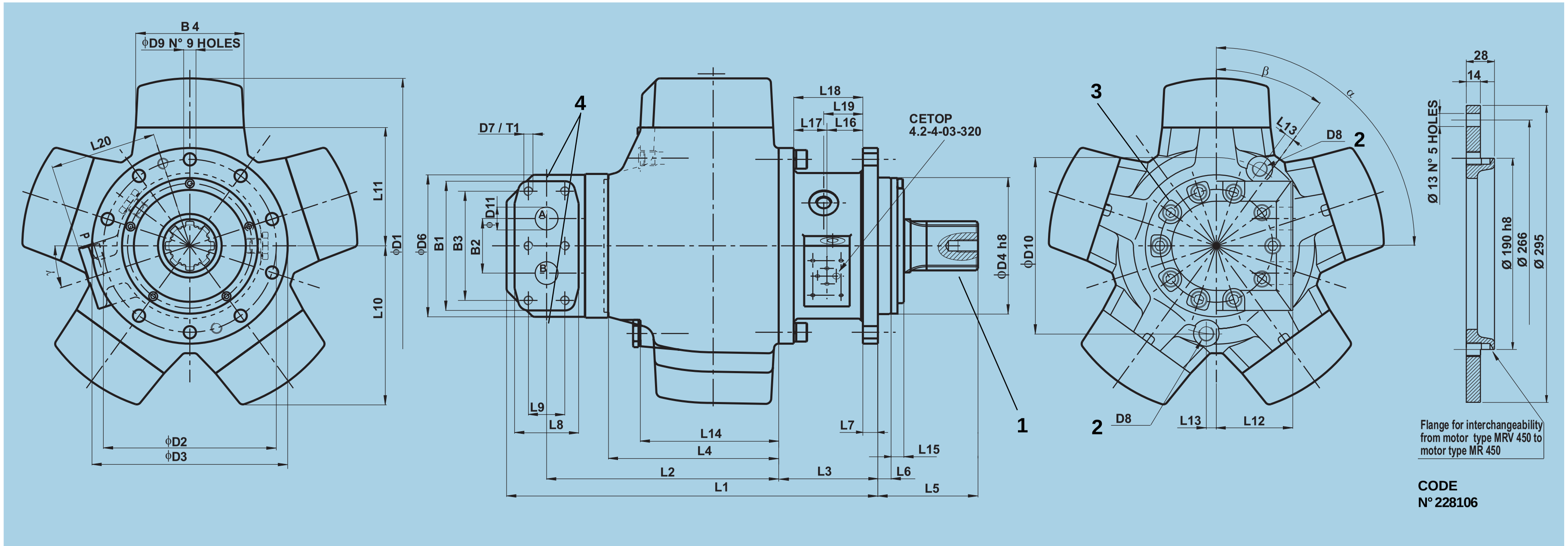
BEARING LIFE



***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	1120	**MRDE 1400**	840	**MRV 4500**	880
MRDE 330	1000	**MRVE 1400**	840	**MRDE 5400**	730
MRD 450	1340	**MRD 1800**	920	**MRVE 5400**	730
MRV 450	1340	**MRV 1800**	920	**MRD 7000**	880
MRDE 500	1215	**MRDE 2100**	800	**MRV 7000**	880
MRD 700	1080	**MRVE 2100**	800	**MRDE 8200**	680
MRV 700	1080	**MRD 2800**	1020	**MRVE 8200**	680
MRDE 800	950	**MRV 2800**	1020		
MRVE 800	950	**MRDE 3100**	920		
MRD 1100	1020	**MRVE 3100**	920		
MRV 1100	1020	**MRD 4500**	880		



1 Splined shaft with flank contact
(for dimension see page 32)
Ordering code "N1"
(for further shaft ends see page 32 - 33)

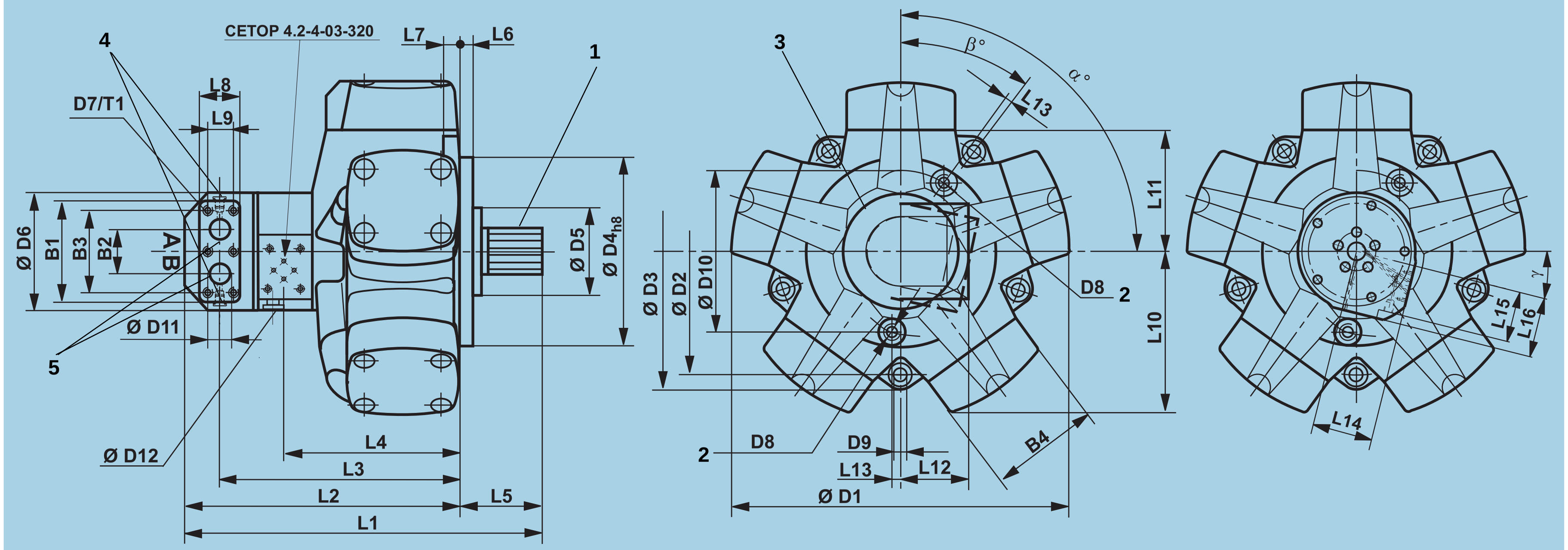
2 Case drain port
BSP threads to ISO 228/1

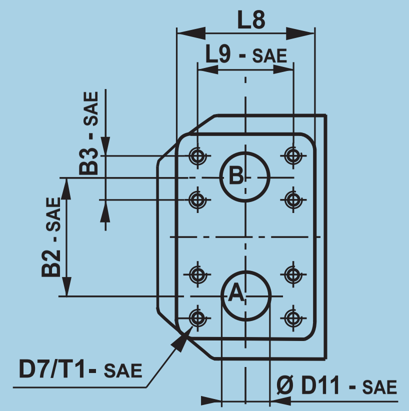
3 On request the port flange can be rotated by 36°

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°





1. Splined shaft with flank contact (for dimension see page 32)
   Ordering code "N1"
   (for further shaft ends see page 32 - 33)
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,
   MRV 700, MRDE 800 ,MRVE 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.
5. Rotary valve housing with BSP threads (from MRD 2800 to MRDE 8200) available on request, please contact Parker Calzoni.

Dir. of Rotation (Viewed on shaft end)	Port inlet	ordering code (see page47)
clockwise	A	"N"
anti-clockwise	B	
clockwise	B	"S"
anti-clockwise	A	

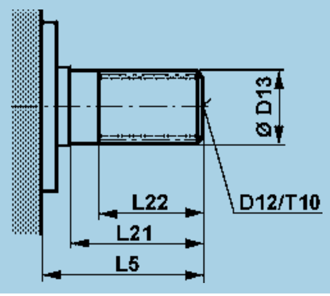
MOTOR TYPE	L1	L2	L3	L4	L5	L6	L7	L8	L9	L9 - SAE		L10	L11	L12	L13	L14	L15	L16	α	β	γ
										*LOW PRESSURE	*HIGH PRESSURE										
MRD 300 MRDE 330	363	282	244	173	81	15	16	54	34	--		153,5	119	72	7,5	70	65	65	90°	36°	0°
MRD 450 MRDE 500	426	329	285	202	97	15	18	70,4	40	--		174,5	130	84	9,5	79	70	78	90°	36°	0°
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	90°	36°	0°
MRD 1100 MRDE 1400 MRV 1100 MRVE 1400	518	401	353	235	117	20	22	82	50	--	--	223	165	105	9	88	75	88	104°	36°	14°
MRD 1800 MRDE 2100 MRV 1800 MRVE 2100	566	434	386	268	132	21	24	82	50	--	--	264	197	105	11	88	75	88	90°	36°	14°
MRD 2800 MRDE 3100 MRV 2800 MRVE 3100	679	526	452	317	153	24	26	135	62	69,85	79,4	303	221	123	15	108	84	108	90°	36°	18°
MRD 4500 MRDE 5400 MRV 4500 MRVE 5400	759,5	549,5	478,5	340,5	210	34	28	135	68	77,77	96,82	359,5	255	123	19	108	84	108	108°	36°	18°
MRD 7000 MRDE 8200 MRV 7000 MRVE 8200	856	626	555	417	230	37	30	135	68	77,77	96,82	407,3	310	123	21	108	84	108	108°	36°	18°

* FOR PRESSURE VALUES PLEASE REFER TO PAG.42 "SAE CONNECTION FLANGES" "SAE PSI" VALUES. -- ALSO AVILABLE UNC THREAD, PLEASE CONSULT PARKER Calzoni

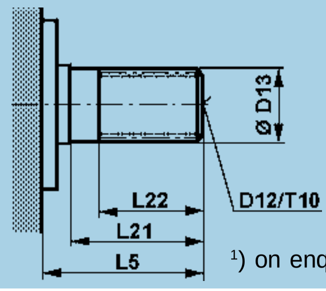
MOTOR TYPE	B1	B2	B2 - SAE		B3	B3 - SAE		B4	Ø D1	Ø D2	Ø D3	Ø $D4_{h8}$**	Ø D5	Ø D6	D7-T1	D7-T1 - SAE		D8	D9	Ø D10	Ø D11	Ø D11 - SAE		Ø D12
			* LOW PRESSURE	* HIGH PRESSURE		* LOW PRESSURE	* HIGH PRESSURE									* LOW PRESSURE	* HIGH PRESSURE					* LOW PRESSURE	* HIGH PRESSURE	
MRD 300 MRDE 330	120	50	--		100	--		100	328	232	256	175	90	129	M8-15	--		G 3/8	11	162	20	--		G 1/4
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
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
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
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
MRD 2800 MRDE 3100 MRV 2800 MRVE 3100	233	86	86	101	180	35,7	36,5	190	642	440	494	335	140	215	M14-28	M12-30	M16-35	G 1/2	19	314	37	37	37	G 1/4
MRD 4500 MRDE 5400 MRV 4500 MRVE 5400	233	116	116	116	200	42,88	44,45	240	766	540	597	400 $D4_{h7}$**	-	215	M16-28	M12-30	M20-34	G 1/2	23	380	38	50	50	G 1/4
MRD 7000 MRDE 8200 MRV 7000 MRVE 8200	233	116	116	116	200	42,88	44,45	264	864	600	658,6	450 $D4_{h7}$**	190	215	M16-28	M12-30	M20-34	G 1/2	25	450	38	50	50	G 1/4

* FOR PRESSURE VALUES PLEASE REFER TO PAG.42 "SAE CONNECTION FLANGES" "SAE PSI" VALUES. Ñ ALSO AVILABLE UNC THREAD, PLEASE CONSULT PARKER Calzoni

Code N 1 (Standard)

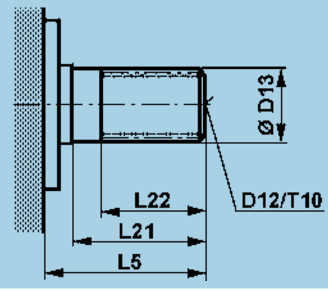


Code B 1 - BS 3550 - [1])



[1]) on enquiry

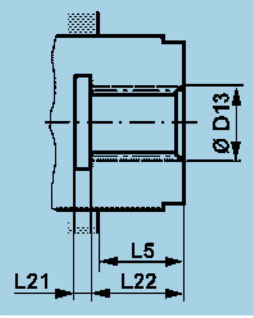
Code D 1 - DIN 5480



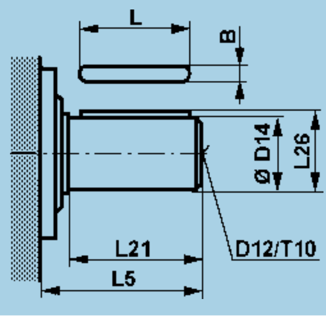
Version	N1						B1						D1					
TYPE	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**
MRD 300 **MRDE 330**	81	60	46	M12	25	B8x42x48	81	60	45	M12	25	12/24-21	81	60	46	M12	25	W48x2x22-8e
MRD 450 **MRDE 500**	97	74	56,5	M12	25	B8x46x54	97	74	61	M12	25	8/16-17	97	74	60	M12	25	W55x3x17-8e
MRV 450 (see page 29)	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
MRD 7000 **MRDE 8200** **MRV 7000** **MRVE 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 PARKER Calzoni.

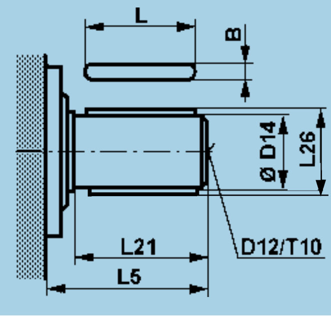
Code F 1 - DIN 5480



Code P 1



Code P 1 *



Only MRD 7000, MRV 7000, MRDE 8200, MRVE 8200

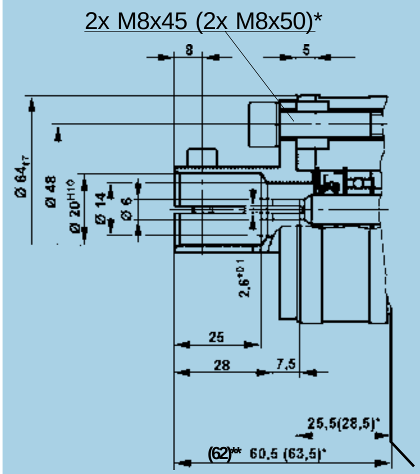
Version	F1				P1							
Type	L5	L21	L22	ØD13 DIN 5480	L5	L21	L26	D12	T10	ØD14	Key L x B	Transmitted torque (Nm)
MRD 300 **MRDE 330**	27	5	36	N40x2x18-9H	81	60	53,5	M12	25	50 k6	56 x 14	897
MRD 450 **MRDE 500**	28	5	38	N47x2x22-9H	97	74	59	M12	25	55 k6	70 x 16	1413
MRV 450 (see page 29)	33	5	38	N47x2x22-9H	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
MRD 7000 **MRDE 8200** **MRV 7000** **MRVE 8200**	50	14	76	N110x3x35-9H	230	188	138 *	M12	25	124 b8	N°2 180 x 32	28270

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

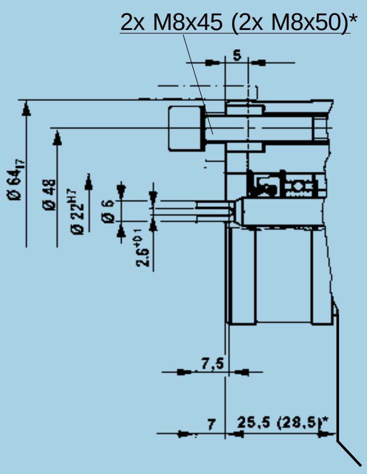
NOTE: the threaded holes (D12/T10) for the shaft versions "P1" must be considered as service holes. In case the holes dimensions required by the application are different from the ones listed here above, plese contact PARKER Calzoni.
*This dimension includes two keys

MECHANICAL TACHOMETER DRIVE	TACHOGENERATOR DRIVE	ENCODER DRIVE

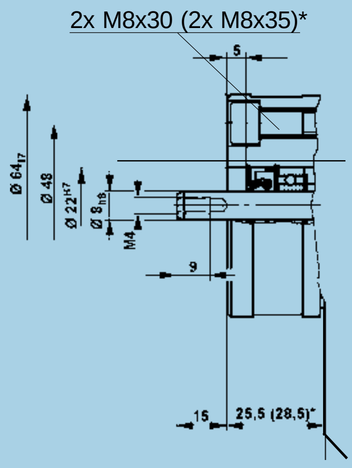
Code "C1"



Code "T1"

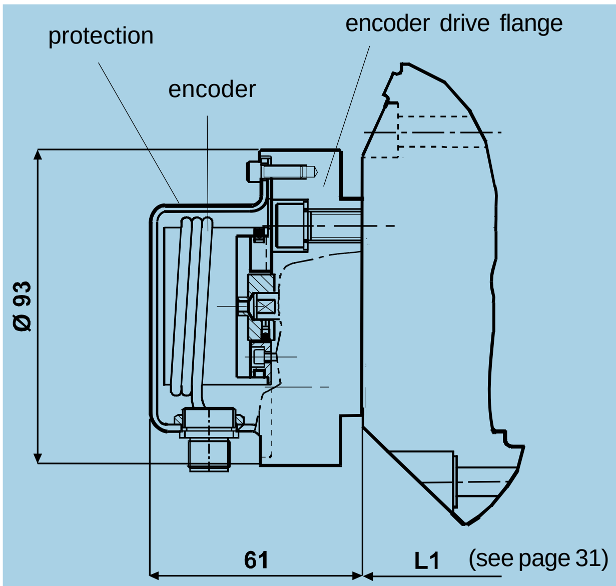


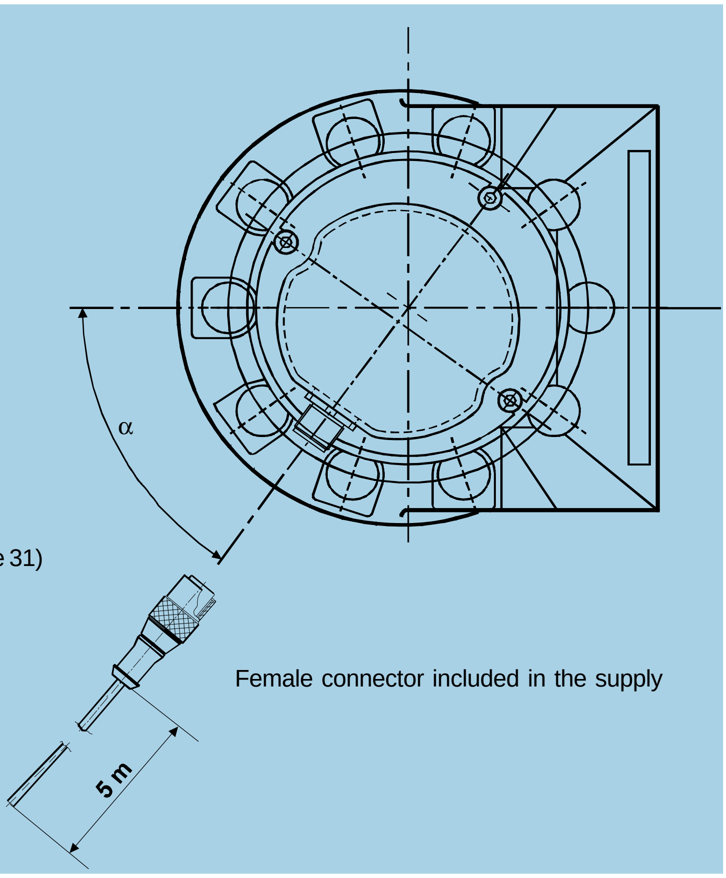
Code "Q1"



( ) * Motor MRD 300, MRDE 330

INCREMENTAL ENCODER DIMENSIONS



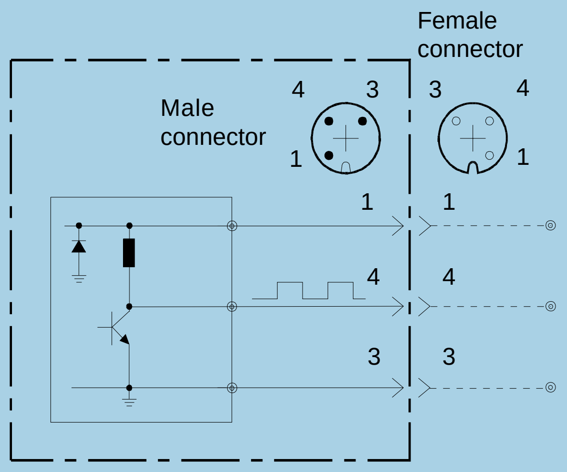


α = 54° for the motor types MRD 300, MRDE 330

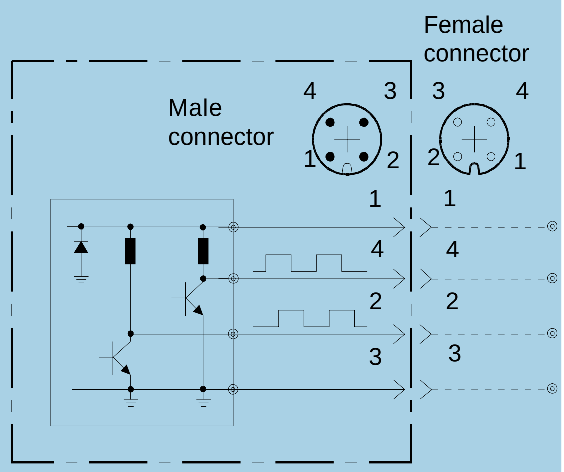
α =45° for the other types

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.

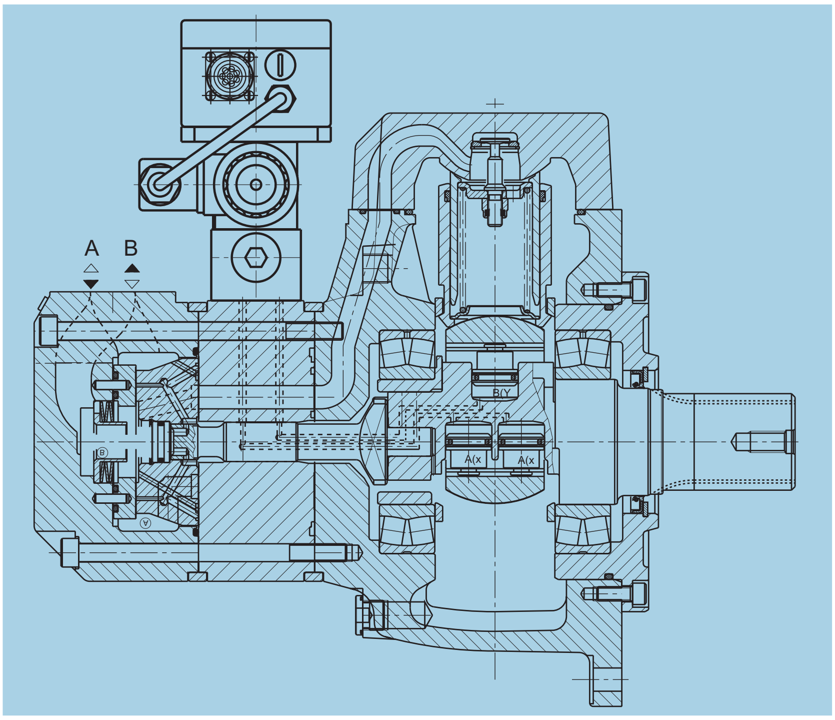
RCE

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

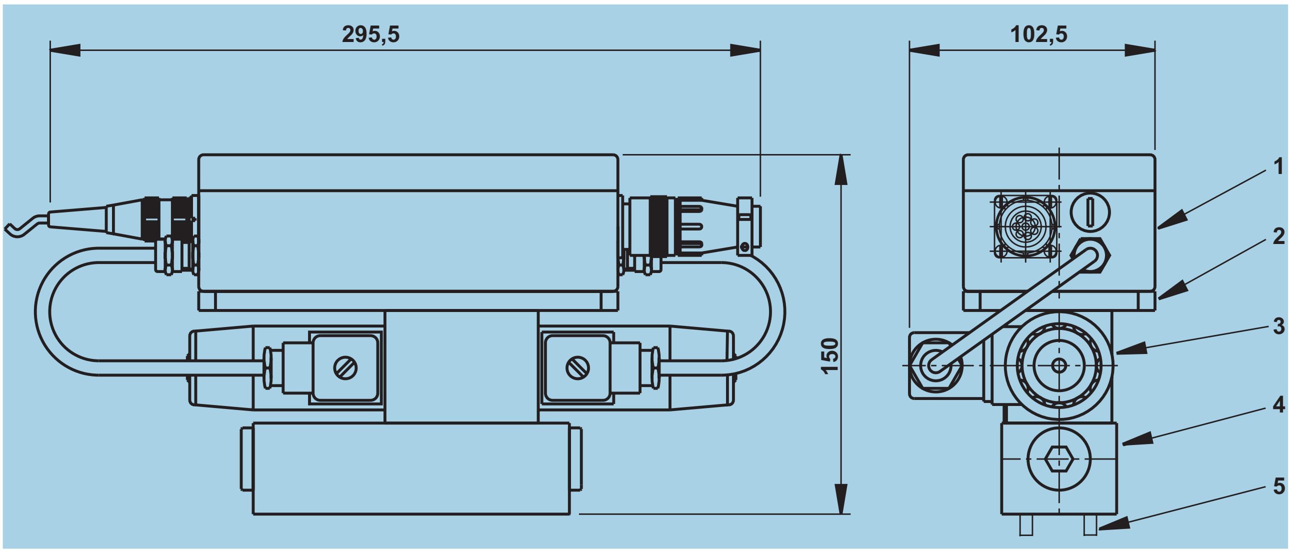
Output power with self proofed MOSFET

IP 64 protection

Complying with standard CEE

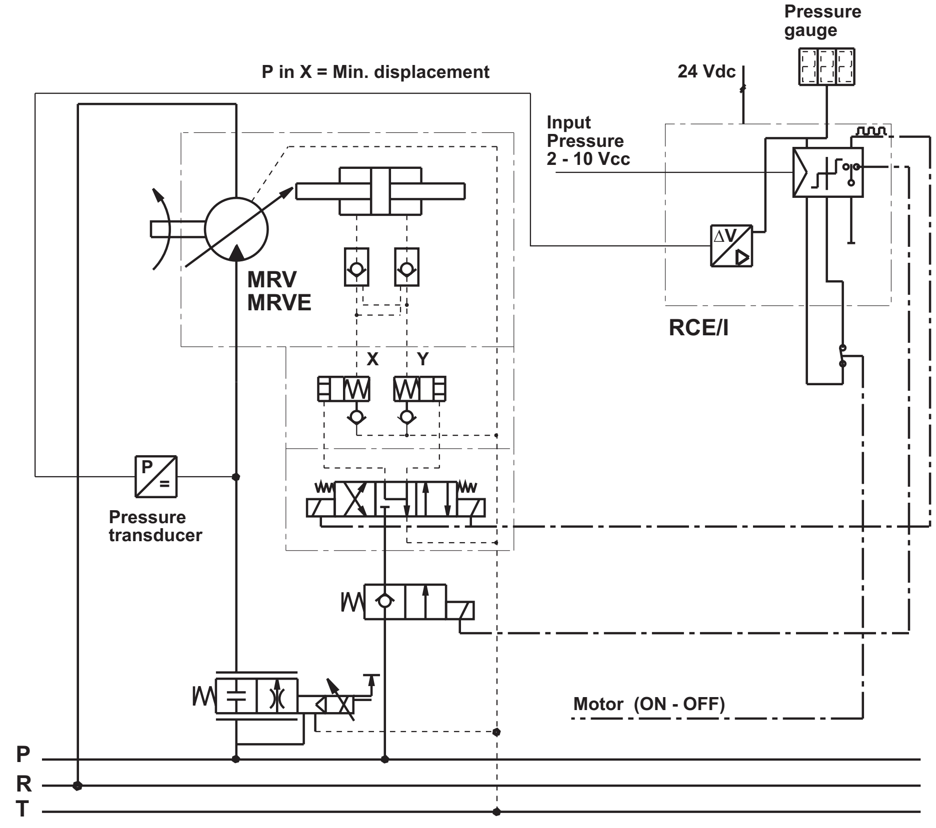
DIMENSION and Data

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



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

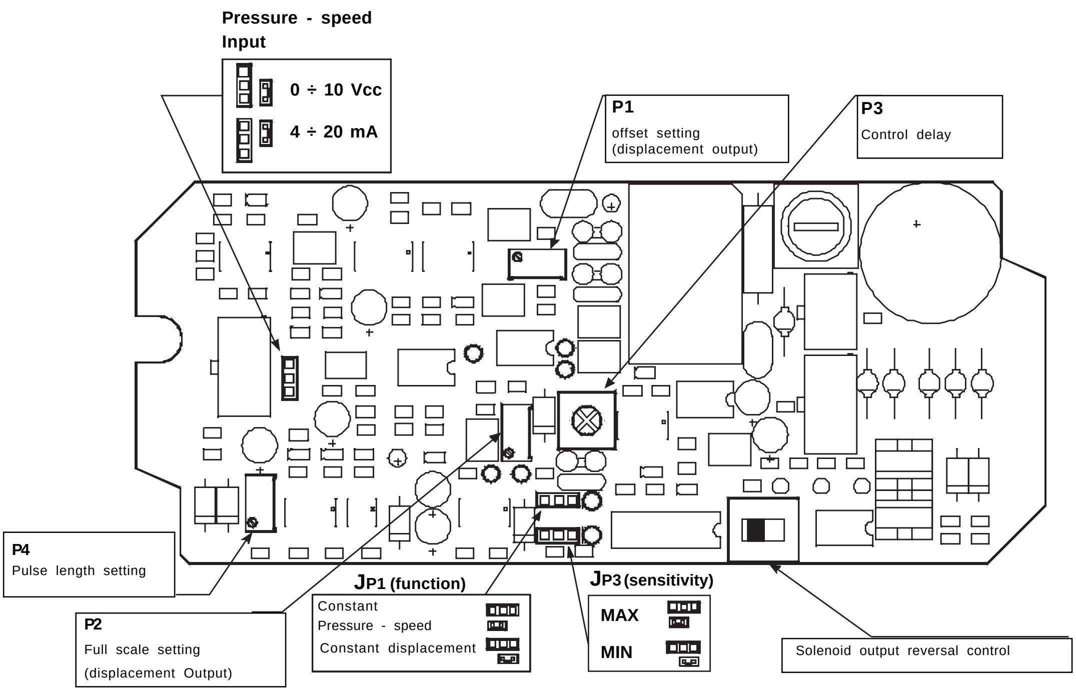
The hydraulic motor is equipped with an inductive (TEC) displacement transducer powered by the regulator, which statically reads and saves the current displacement position at each motor revolution.
Through special built-in valves, the motor keeps the set displacement position constant. Due to an intrinsic 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.

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

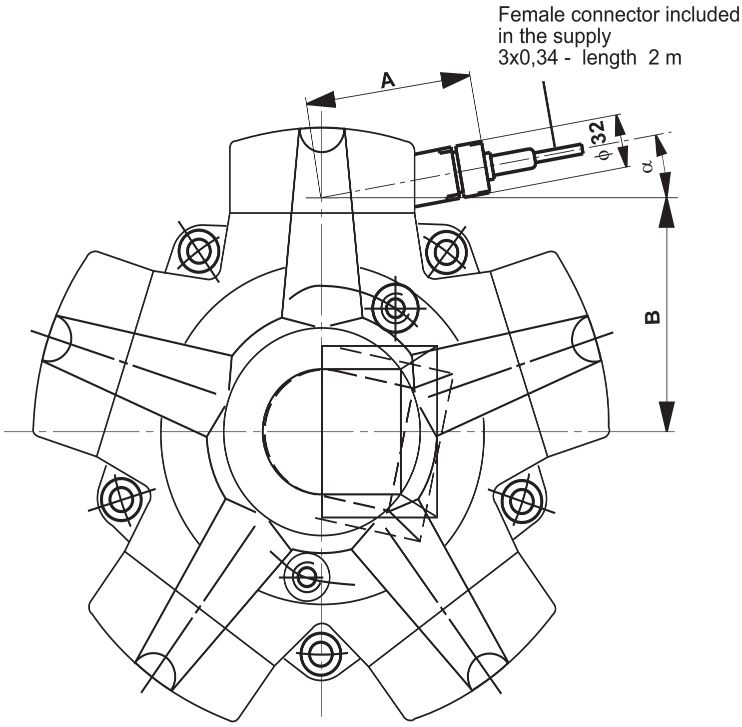
If multi-stage fixed displacement pumps are used to drive the motor, in certain conditions it is necessary to drain off the excess delivery in relation to the set motor speed.
In order to avoid this dissipation, it is possible to use a variable-displacement motor which would absorb the excess delivery 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 (< 2sec). 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.

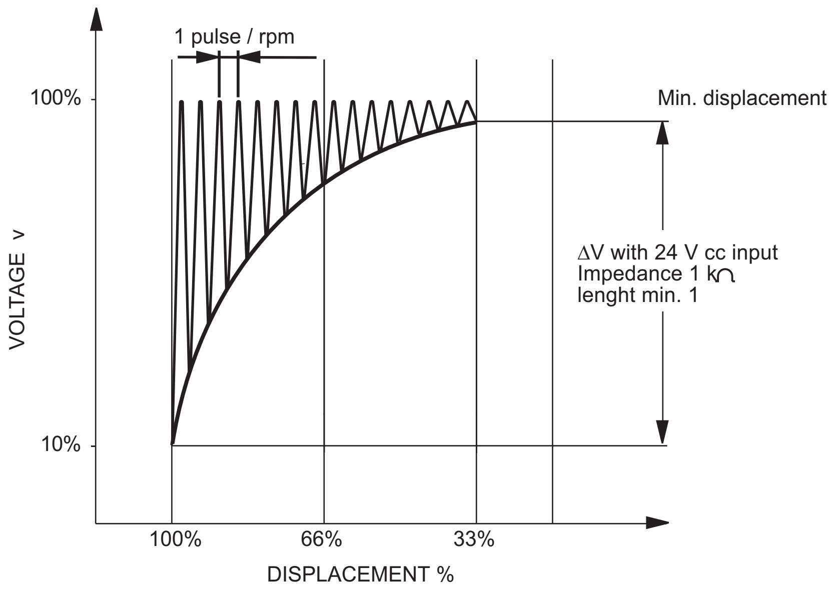


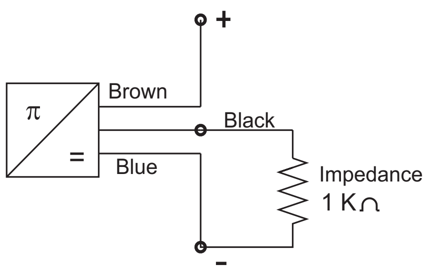
ELECTRONIC DISPLACEMENT TRANSDUCER

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°
MRV 7000 MRVE 8200	200	262	6° 30'

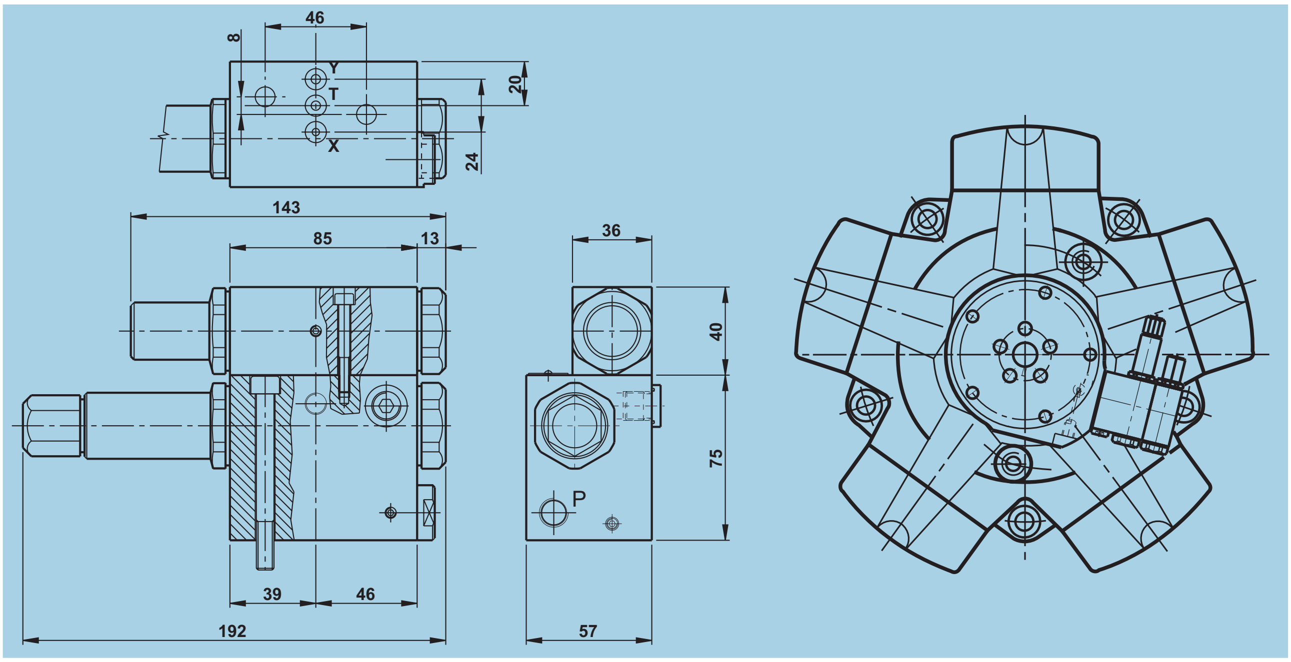






ELECTRONIC DISPLACEMENT TRANSDUCER TECHNICAL DATA

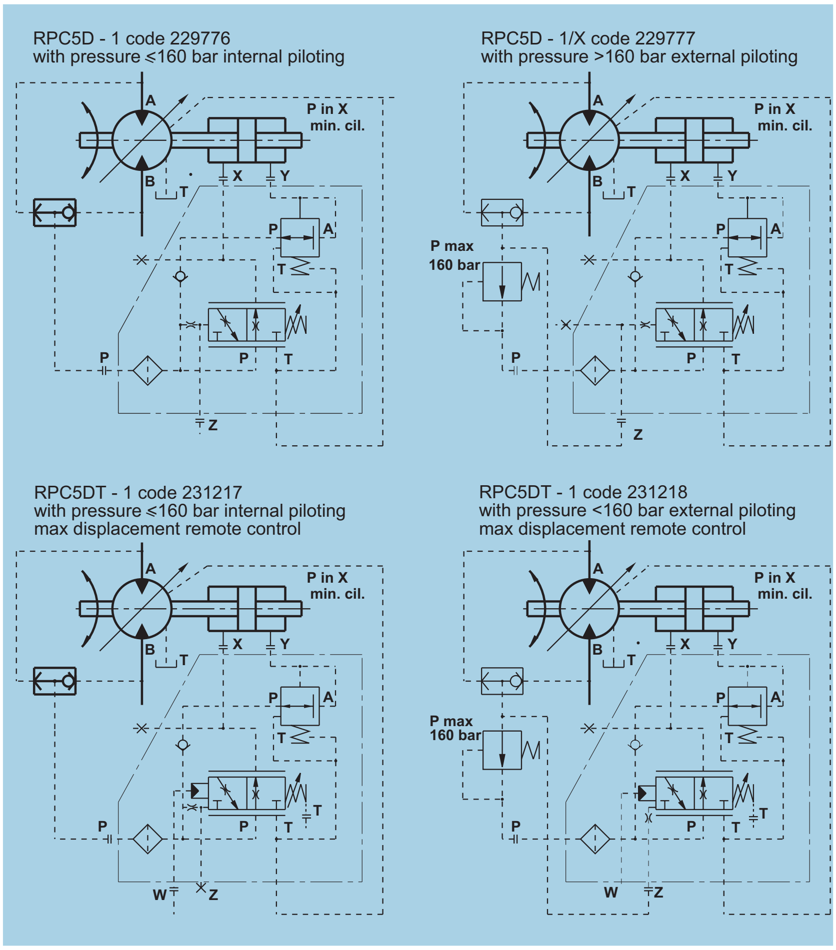
Max cont. pressure:	**2,5 bar**
Supply voltage:	**18 - 24 Vdc - stab. ± 0,5%**
Current consuption:	**10 mA**
Output current:	**1 - 6 mA**
Working temperature range:	**da 0 a 60°C**
Load impedance:	**1 KΩ**
Reading displacement range:	**1:3**
protection degree:	**IP 68**
Precision F.S.	**± 1%**



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

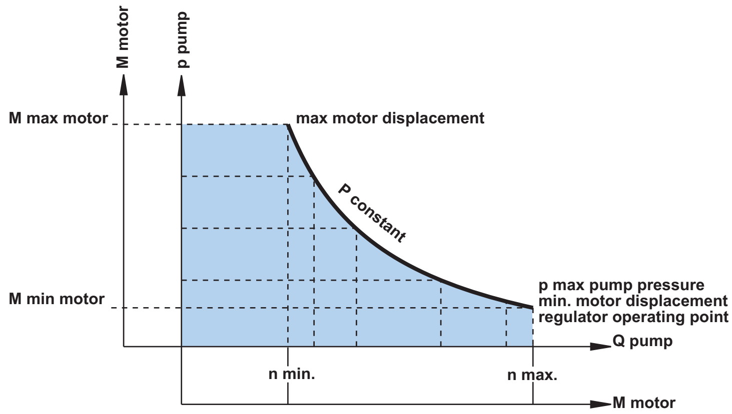


RPC

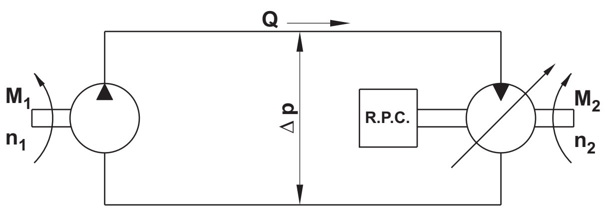
USING GENERALITIES

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

REGULATION SCHEME



HYDRAULIC CIRCUIT



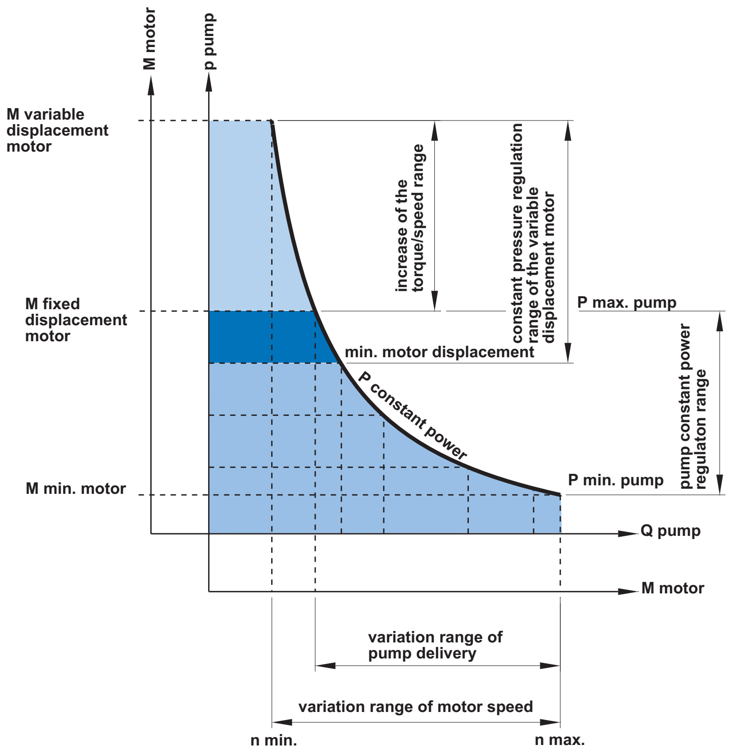
RPC = motor constant pressure regulator
P = Q x p max = constant
$M_1 \times n_1 = M_2 \times n_2$ = constant

RPC

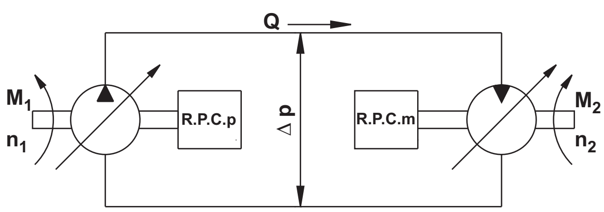
USING GENERALITIES

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

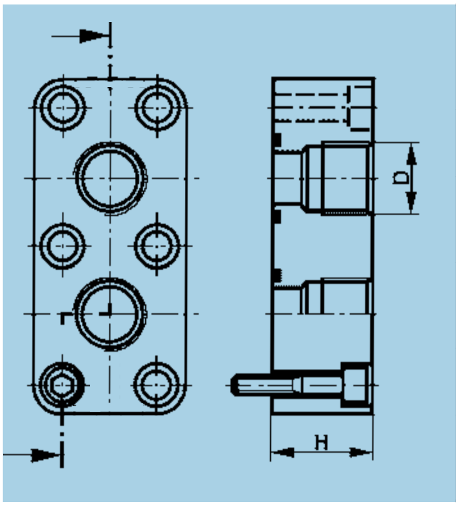


HYDRAULIC CIRCUIT



RPCp = pump constant power regulator
RPCm = motor constant pressure regulator
$P = M_1 \times n_1 = M_2 \times n_2$ = constant

STANDARD CONNECTION FLANGE
Code “C1“



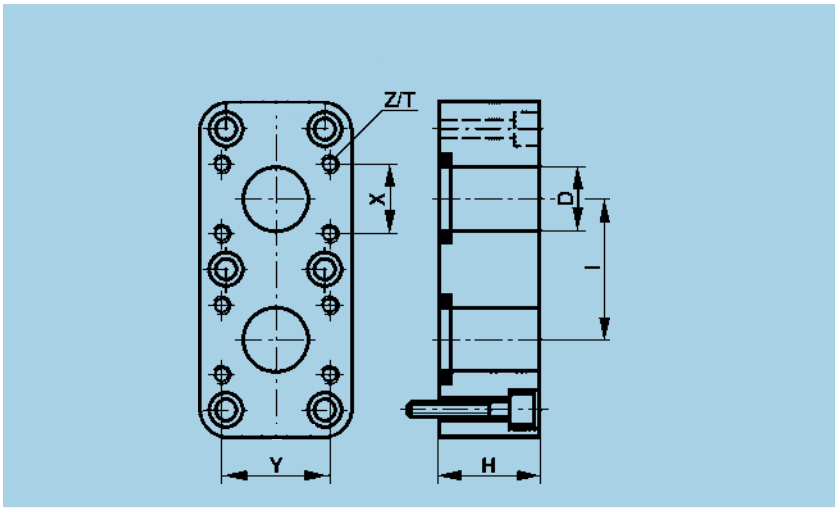
Flange is supplied complete with screws and seals.

MRD - MRDE MRV - MRVE	D (BSP)	H	ORDERING CODE NBR	ORDERING CODE FPM
300 - 330	3/4"	38	262 098	229 394
450 - 500 700 - 800	1 1/4"	39	262 089	229 395
1100 - 1400 1800 - 2100	1 1/2"	45	262 093	229 396
2800 - 3100	1 1/2"	59	264 572	229 397
4500 - 5400 7000 - 8200	2"	58	272 724	229 398

BSP threads to ISO 228/1

Permitted up to 6000 PSI

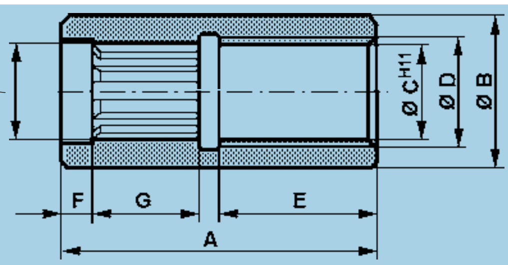
SAE CONNECTION FLANGE
Code “S1“
Code “T1“
Code “G1“
Code “L1“



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	ORDERING CODE NBR	Z	T	ORDERING CODE NBR
300 - 330	5000	3/4"	19	38	55	22,2	47,6	M10/25	277 295	3/8"- 16	25	223 335
450 - 500 700 - 800	5000	1"	25	39	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	59	86	35,7	69,8	M12/30	277 301	1/2"- 13	30	223 338
	6000	1 1/2"	37	59	100	36,5	79,4	M16/30	230 168	5/8"- 11	35	349068
4500 - 5400 7000 - 8200	3000	2"	50	58	112	42,9	77,8	M12/30	277 303	1/2"- 13	30	223 339
	6000	2"	50	58	116	44,45	96,82	M20/35	230 170	3/4"- 10	38	342 547

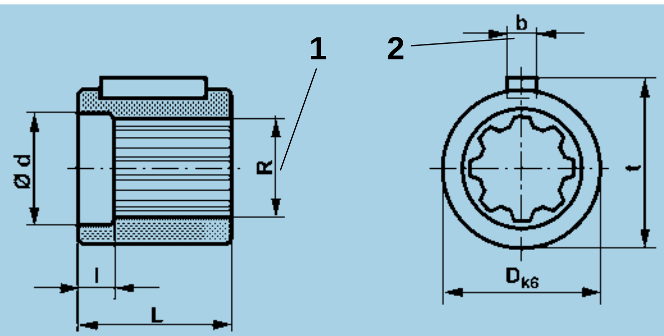
COUPLINGS



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
7000 - 8200	422 544	390	195	126	140	185	38	147

ADAPTERS WITH KEY

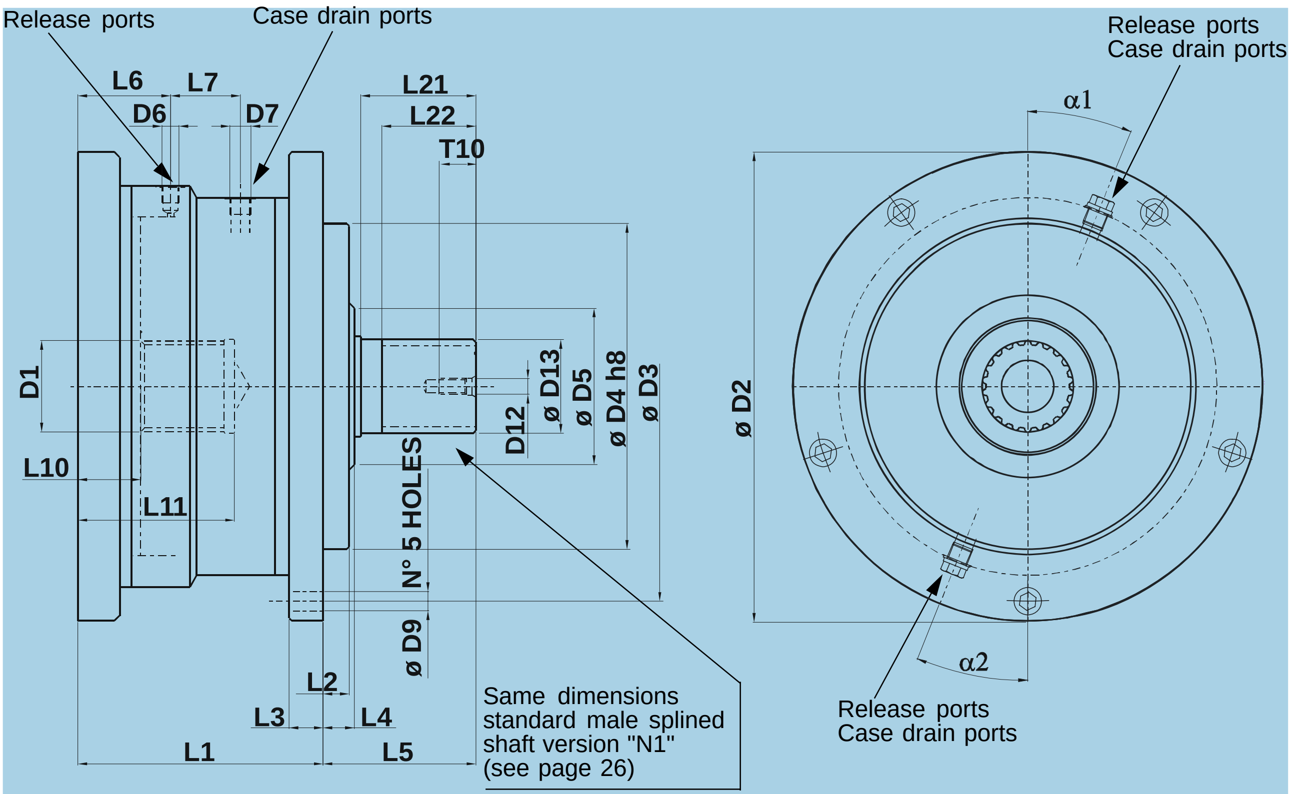


1 For standard male splined shaft version "N1" (see page 26).
2 Key to DIN 6885

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	29	130	148	25	135	25x14x140
4500 - 5400	272 719	A10x102x112	112,3	30	160	188	28	166	28x16x180
7000 - 8200	223 476	A10x112x125	125,6	38	185	188	45	195	45x25x180

HOLDING BRAKE UNIT DIMENSIONS - MOTOR TYPE MRD - MRDE - MRV - MRVE

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	see page 32 compatible code N1 D1	256	232	175	-	G1/4"	G3/8'	10,5	M12	see page 32 - 33 code N1 - D1 - F1	28	22°30'	22°30'
B 450	147	-	27	15	97	49,5	36	24	100	74	56,5		296	266	190	-	G1/4"	G3/8'	13,5	M12		28	22°30'	22°30'
B 700	172	-	28	15	101	55	46	25	105	78	62		320	290	220	-	G1/4"	G3/8'	13,5	M12		28	22°30'	22°30'
B 1100	188	20	26	24	117	71	53,5	48	120	88	72		360	330	250	120	G1/4"	G1/2'	15	M12		28	0°	0°
B 1800	216	-	28	21	132	63,5	58,5	34	135	100	79		423	380	290	-	G1/4"	G1/2'	17,5	M12		28	22°30'	22°30'
B 2800	263	-	30	24	153	87	67	42,5	165	120	99		494	440	335	-	G1/4"	G1/2'	19	M12		28	22°30'	22°30'

TECHNICAL DATA (For operation outside these parameters, please consult **PARKER 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	Kgm²	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 N1 V1 **

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

BRAKE TYPE

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** N1 V1 **

OUTPUT SHAFT

N1	Spline ex DIN 5463 (see page30)
D1 *	Spline DIN 5480 (see page 30)
F1 *	Female spline DIN 5480 (see page 31)
*** please contact PARKER Calzoni**	

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

INPUT SHAFT

N1	Hollow shaft for motor type N1 (see page 30)
D1	Hollow shaft for motor type D1 (see page 30)

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

SEALS

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

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

SPECIAL

**	Space reserved to PARKER Calzoni

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

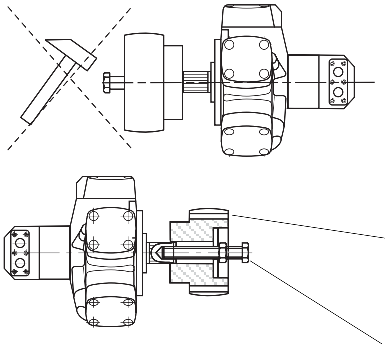
Pipes, pipe connections

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

Curved tooth coupling hub

Screw to remove the coupling hub

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

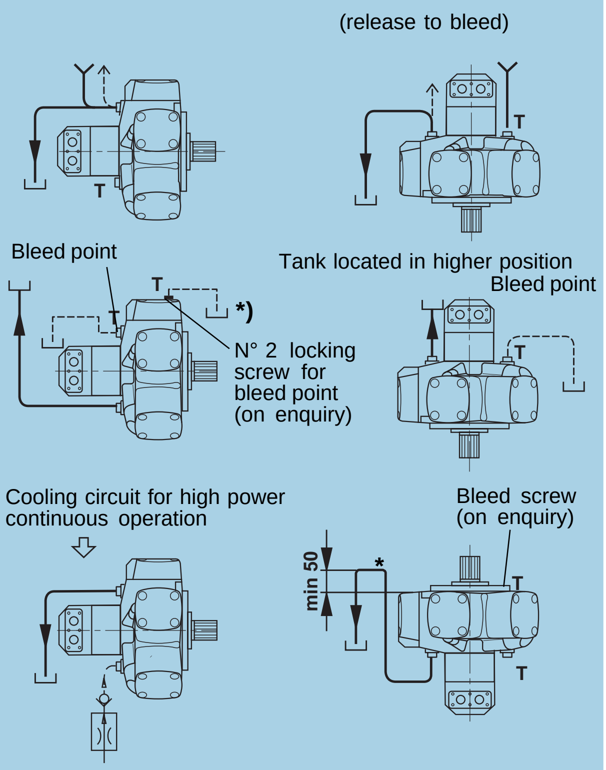
DRAIN AND FLUSHING LINK INSTALLATION EXAMPLES

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.

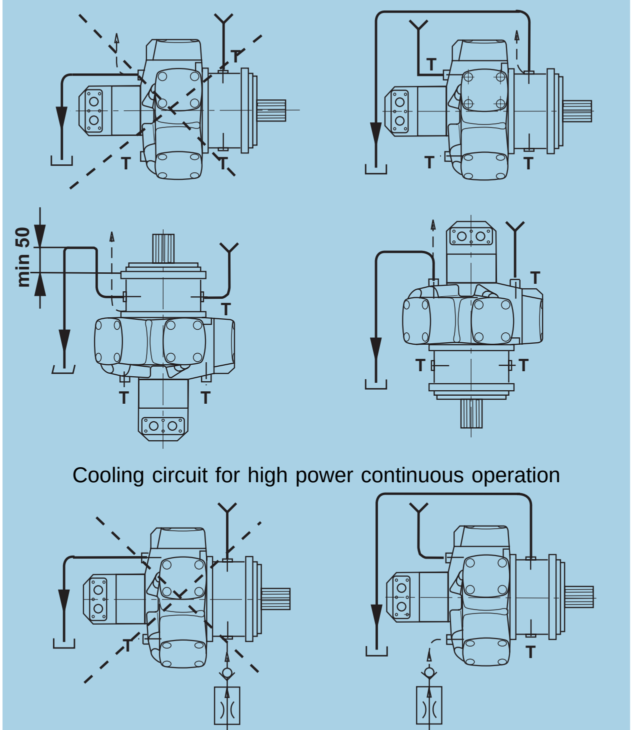


Flushing *p* max= 5 bar

***)** 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

CODE

Example: MRD 700 F 240 N1 M1 F1 N1 N **

1. **MRD** 700 F 240 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 240** N1 M1 F1 N1 N **

SIZE & DISPLACEMENT

D	code	**MRD 300 D 150**		**MRDE 330 D 165**					
	Cm³	304,1	152,1	332,4	166,2				
E	code	**MRD 450 E 225**		**MRDE 500 E 250**		**MRV 450 E 133**			
	Cm³	451,6	225,8	497,9	248,9	451,6	133.5		
F	code	**MRD 700 F 240**		**MRDE 800 F 270**		**MRV 700 F 240**		**MRVE 800 F 270**	
	Cm³	706,9	237,6	804,2	270,2	706,9	237,6	804,2	270,2
G	code	**MRD 1100 G380**		**MRDE 1400 G 470**		**MRV 1100 G 380**		**MRVE 1400 G 470**	
	Cm³	1125,8	381,3	1369,5	463,9	1125,8	381,3	1369,5	463,9
H	code	**MRD 1800 H 600**		**MRDE 2100 H 700**		**MRV 1800 H 600**		**MRVE 2100 H 700**	
	Cm³	1809,6	603,2	2091,2	697,0	1809,6	603,2	2091,2	697,0
I	code	**MRD 2800 I 930**		**MRDE 3100 I 1030**		**MRV 2800 I 930**		**MRVE 3100 I 1030**	
	Cm³	2792,0	930,7	3103,7	1034,6	2792,0	930,7	3103,7	1034,6
L	code	**MRD 4500 L 1500**		**MRDE 5400 L 1800**		**MRV 4500 L 1500**		**MRVE 5400 L 1800**	
	Cm³	4502,7	1497,8	5401,2	1800,4	4502,7	1497,8	5401,2	1800,4
M	code	**MRD 7000 M 2320**		**MRDE 8200 M 2750**		**MRV 7000 M 2320**		**MRVE 8200 M 2750**	
	Cm³	6967,2	2322,4	8226,4	2742,1	6967,2	2322,4	8226,4	2742,1

3. MRD 700 F 240 **N1** M1 F1 N1 N **

SHAFT

N1	spline ex DIN 5463 (see page 32)
D1	spline DIN 5480 ((see page 32)
F1	female spline DIN 5480 (see page 33)
P1	shaft with key (see page 33)
B1	spline B.S. 3550 (see page 32)

4. MRD 700 F 240 N1 **M1** F1 N1 N **

SPEED SENSOR OPTION

N1	none	
Q1	encoder drive (see page 34)	
C1	mechanical tachometer drive (see page 34)	
T1	tachogenerator drive (see page 34)	
M1	incremental Elcis encoder (500 pulse/rev) (see page 34)	Uni-directional
B1		Bi-directional

5. MRD 700 F 240 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 240 N1 M1 F1 **N1** N **

CONNECTION FLANGE

N1	none
C1	standard PARKER Calzoni (see page 42)
S1	standard SAE metric (see page 42)
T1	standard SAE UNC (see page 42)
G1	SAE 6000 psi metric (see page 42)
L1	SAE 6000 psi UNC (see page 42)
S3	standard SAE metric motor integrated (see page 31)
G3	SAE 6000 psi metric motor integrated (see page 31)

7. MRD 700 F 240 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 240 N1 M1 F1 N1 N ******

SPECIAL

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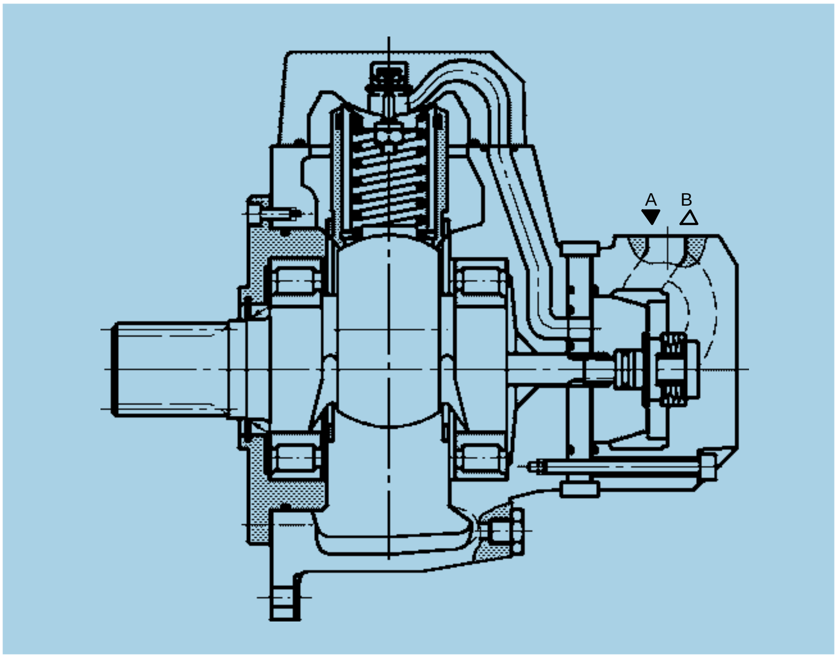
PARKER CALZONI
Radial Piston Motor
Type MR, MRE

RCOe 1806/09.05

CALZONI

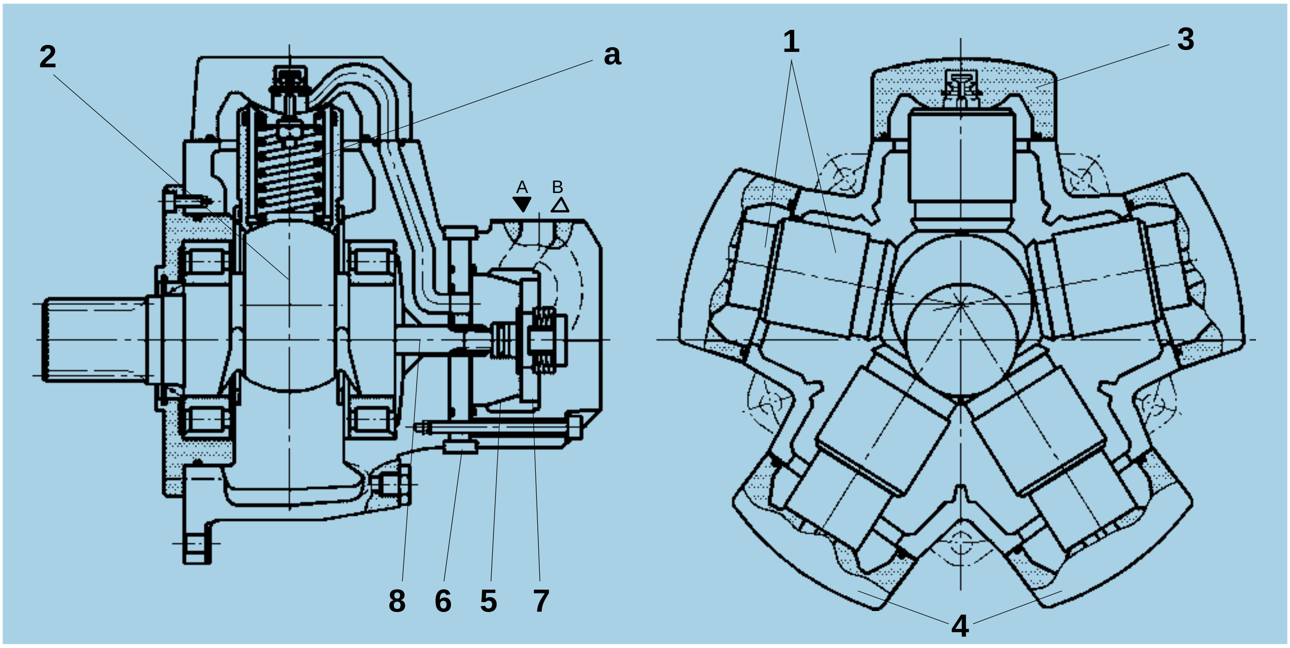
CONTENTS PAG.

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)]	ν 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 $ß_{10}$ > 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 $ß_5$ >100.

1) For different valves of viscosity please contact PARKER Calzoni



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.

Size Motor version		Displace-ment	Moment inertia of rotating parts	Theore-tical specific torque	Min. start. torque / Theore-tical 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
		cm³	kg cm²	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	322
	2800	2792,0	2975,70	44,50	90						0,5-215	0,5-215	127	194	322
	3600	3636,8	4851,40	57,90	90						0,5-150	0,5-180	123	185	505
	4500	4502,7	5015,10	71,70	91						0,5-130	0,5-170	140	210	505
	6500	6460,5	11376,6	103,57	91						0,5-110	0,5-130	165	240	797
	7000	6967,2	11376,6	111,39	91						0,5-100	0,5-130	170	250	797
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	326
	5400	5401,2	5015,10	86,01	92						0,5-120	0,5-160	140	210	509
	8200	8226,4	11376,6	130,90	92						0,5-90	0,5-120	170	250	807
LARGER DISPLACEMENTS ARE AVAILABLE IN THE MRT - MRTE - MRTF MOTOR SERIES															

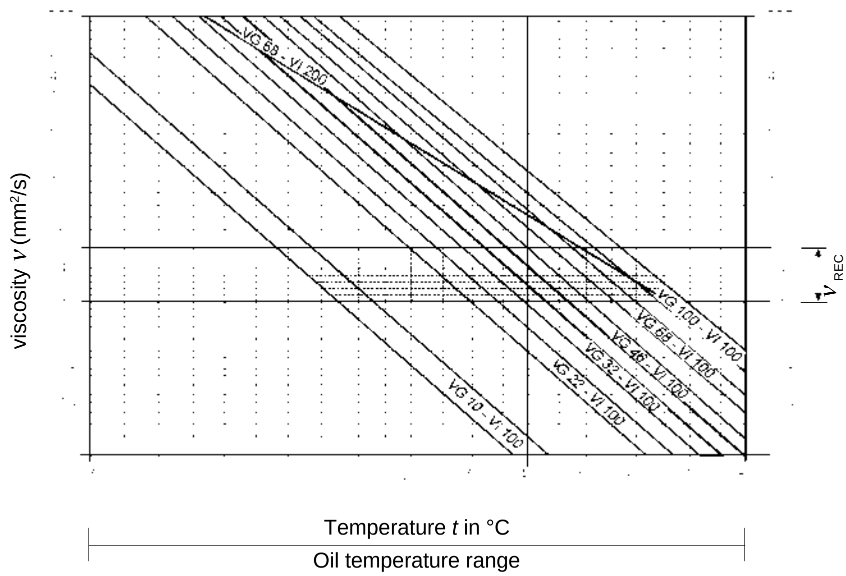
(*) Please consult PARKER Calzoni

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 PARKER Calzoni for confirmation.



GENERAL NOTES

More detailed information regarding the choice of the fluid can be requested to PARKER 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 PARKER 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 PARKER 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

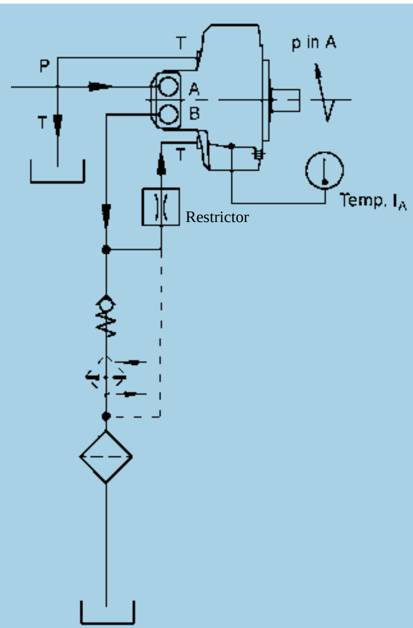
The lower the speed and the case drain pressure, the longer the life of the shaft seal. The maximum permissible housing pressure is

p_{max} = 5 bar

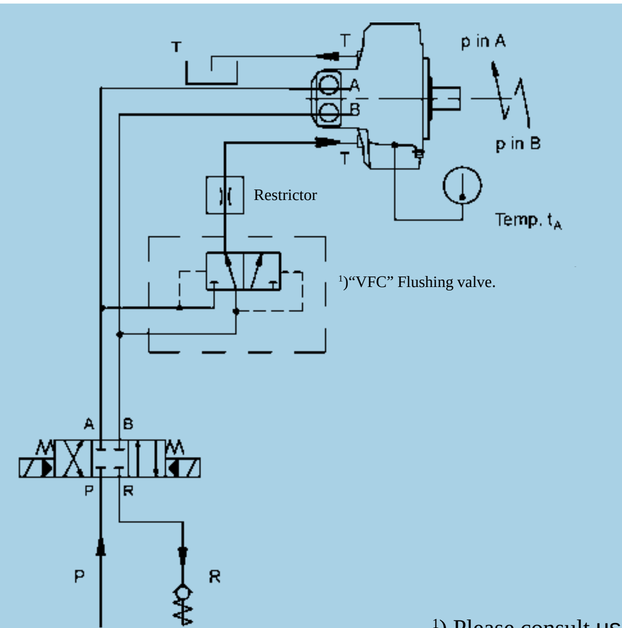
If the case drain pressure is higher than 5 bar it is possible to use a special 15 bar shaft seal (see page 35, Seals, Code"F1").

"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.



FLUSHING CIRCUIT
(MONO-DIRECTIONAL ROTATION)



FLUSHING CIRCUIT
(BI-DIRECTIONAL ROTATION)

[1]) Please consult us.

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

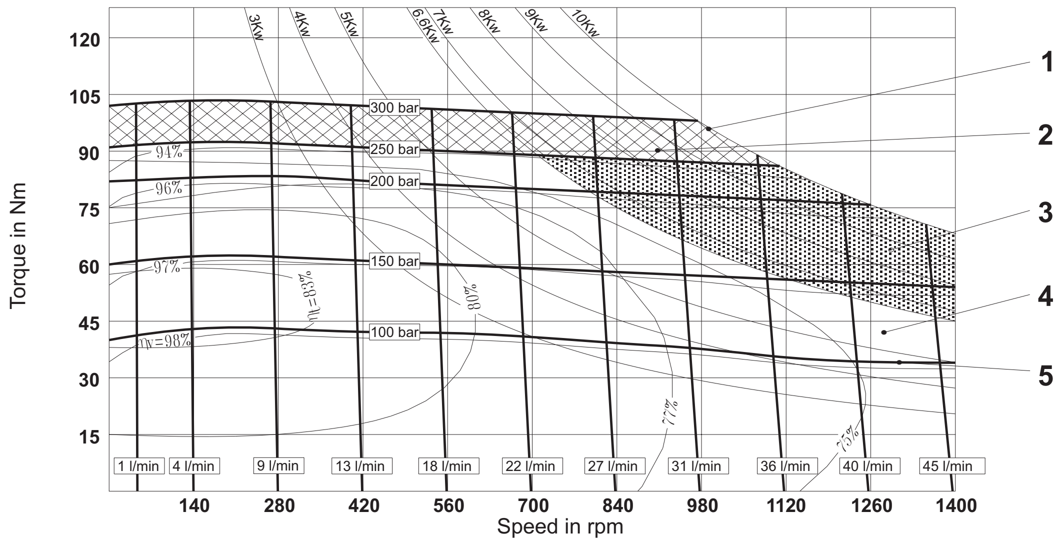
TYPE	MOTOR VERSION	FLUSHING FLOW
MR	33, 57, 73, 93, 110	Q = 5 l/min
MR - MRE	125, 160, 190, 200, 250, 300, 330	Q = 6 l/min
MR - MRE	350, 450, 500	Q = 8 l/min
MR - MRE	600, 700, 800, 1100, 1400	Q = 10 l/min
MR - MRE	1600,1800, 2100	Q = 15 l/min
MR - MRE	2400, 2800, 3100, 3600, 4500, 5400, 6500, 7000,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

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

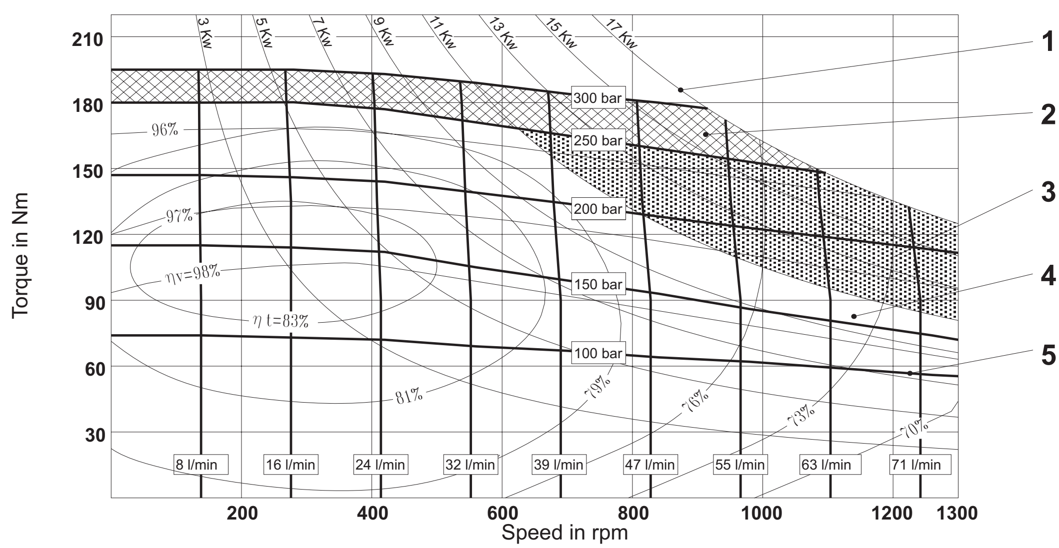
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

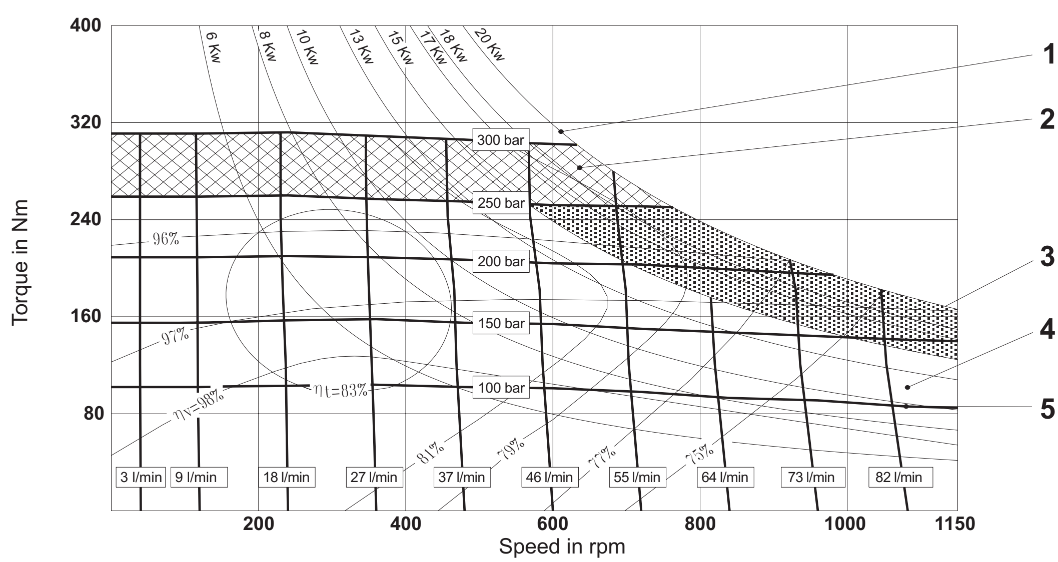
MR 33



MR 57



MR 73

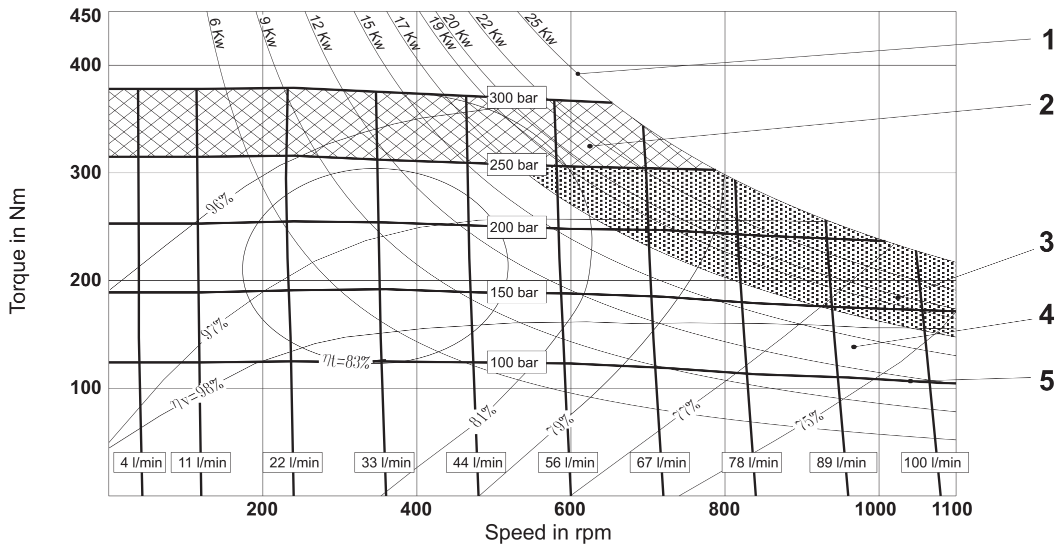


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

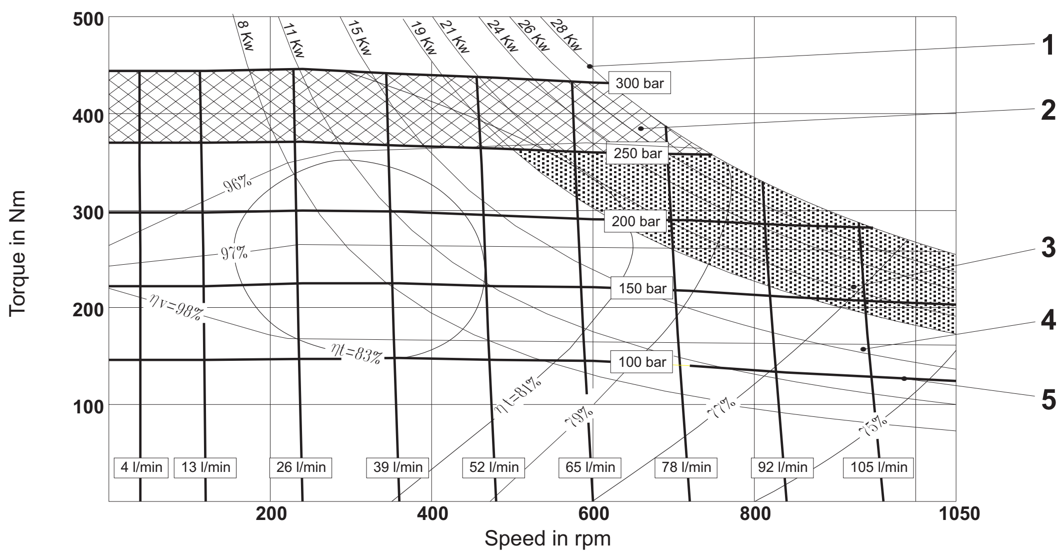
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

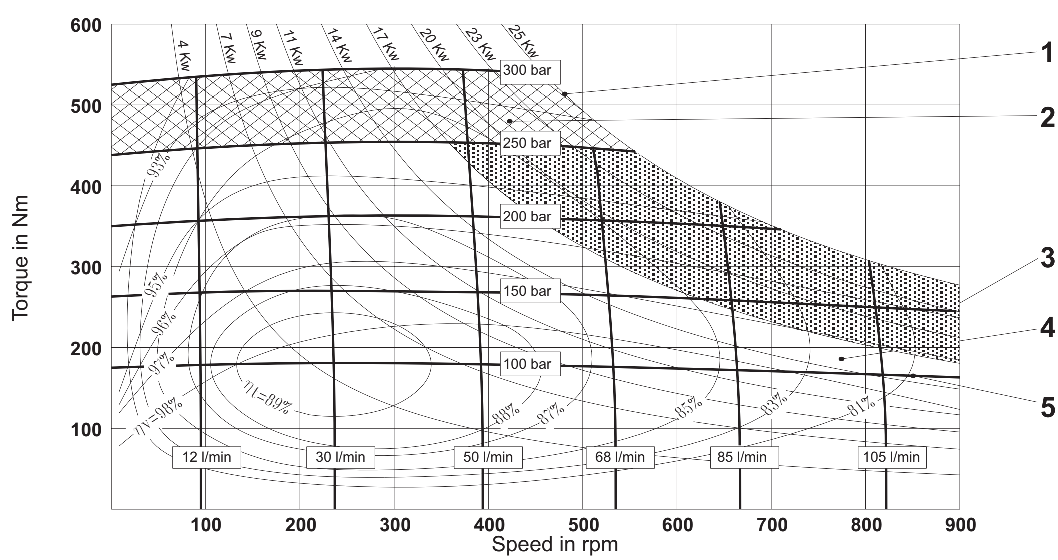
MR 93



MR 110



MR 125

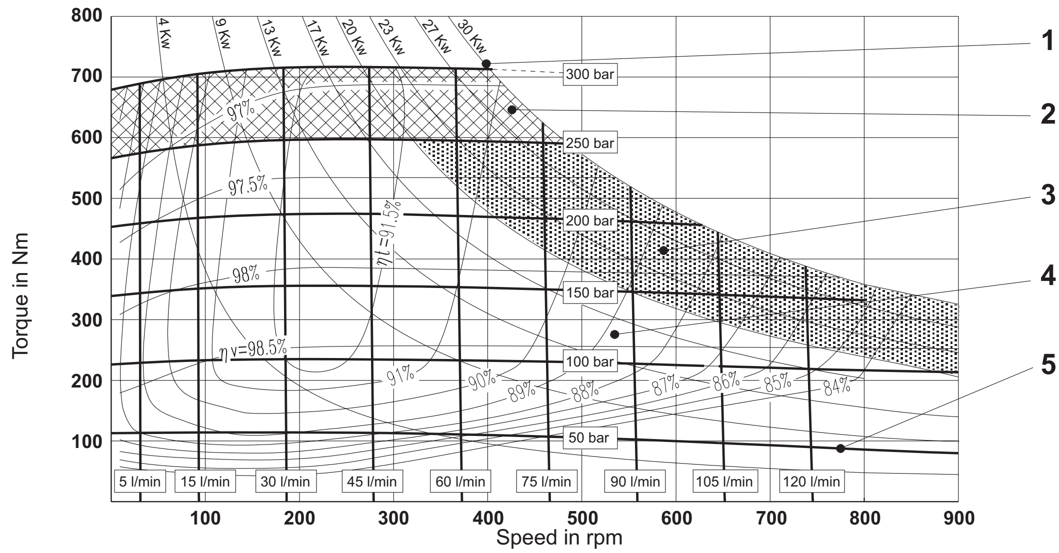


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

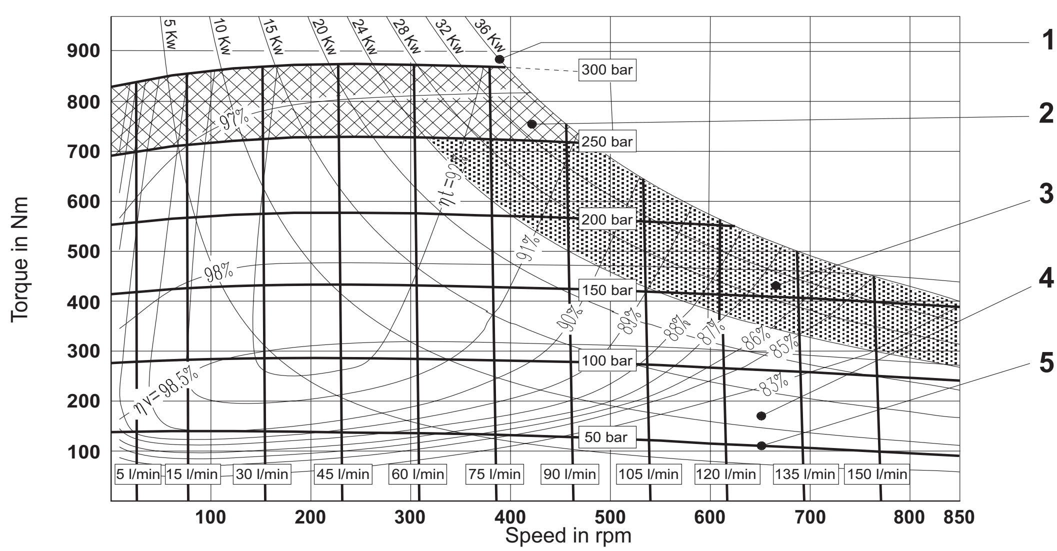
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

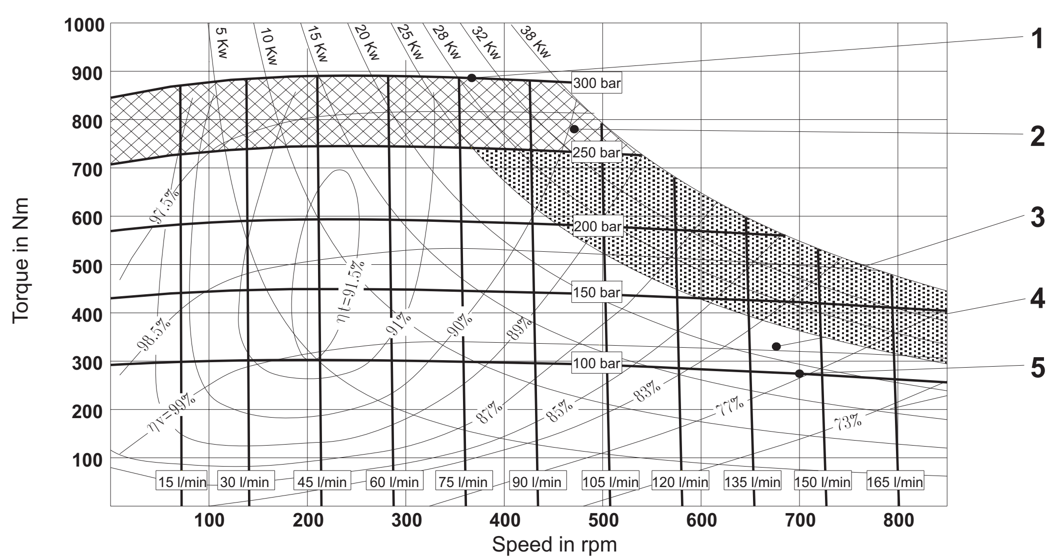
MR 160



MR 190



MR 200

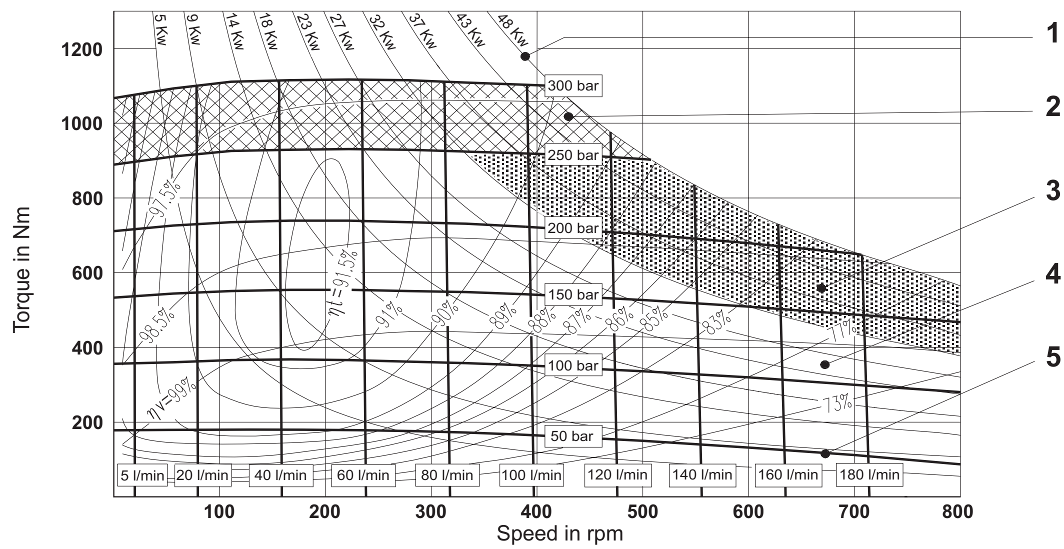


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

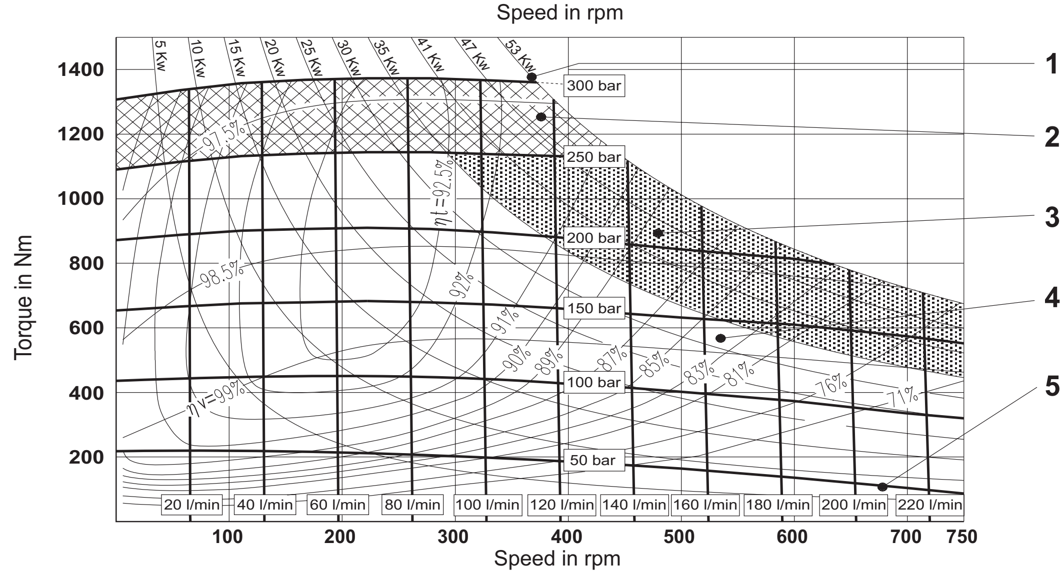
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

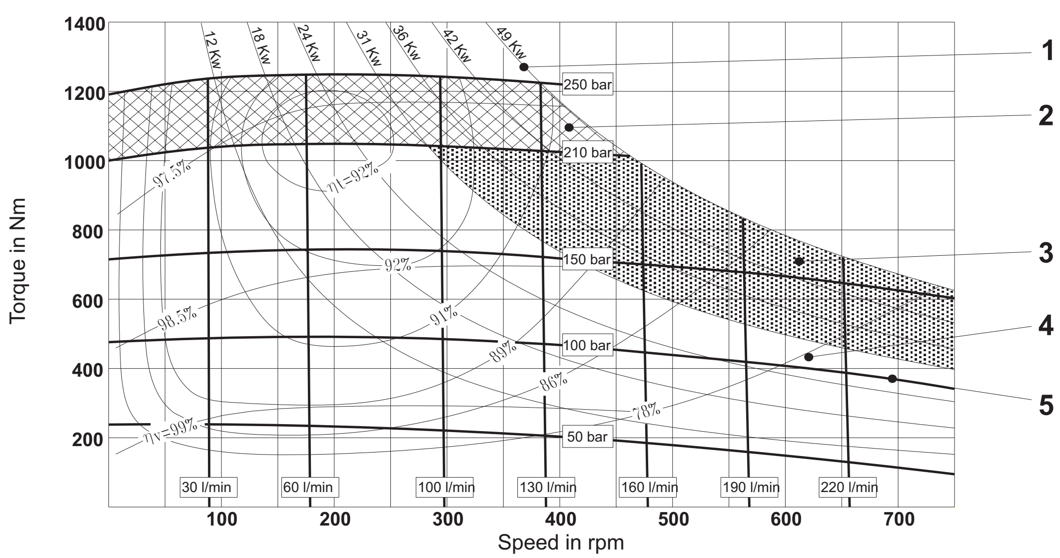
MR 250



MR 300



MRE 330

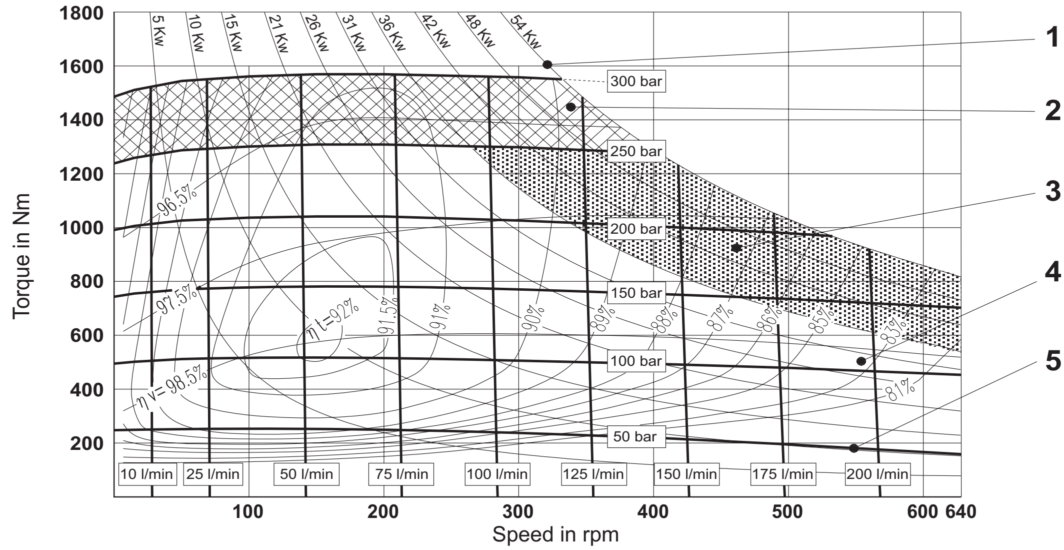


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

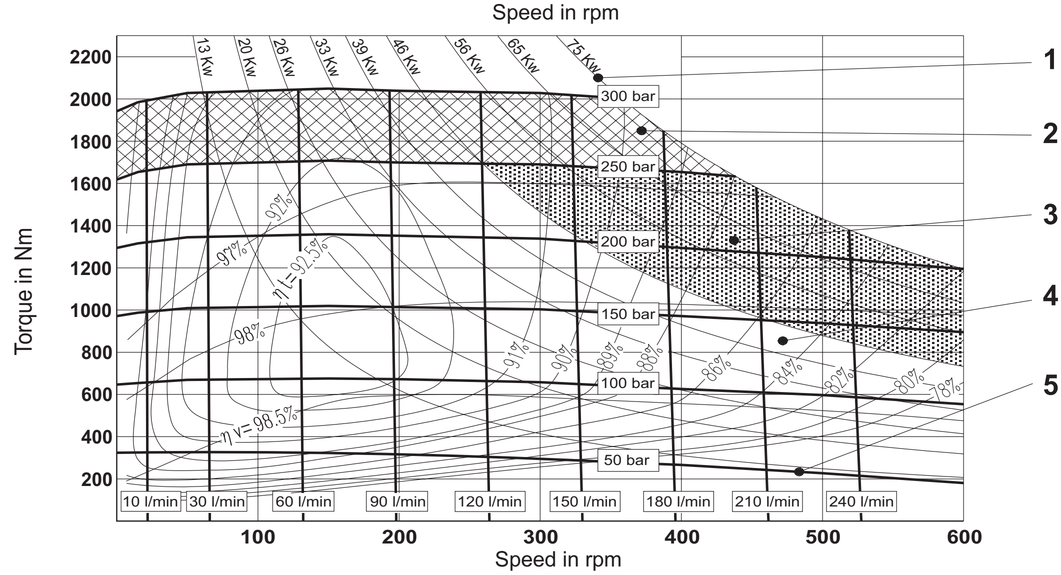
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

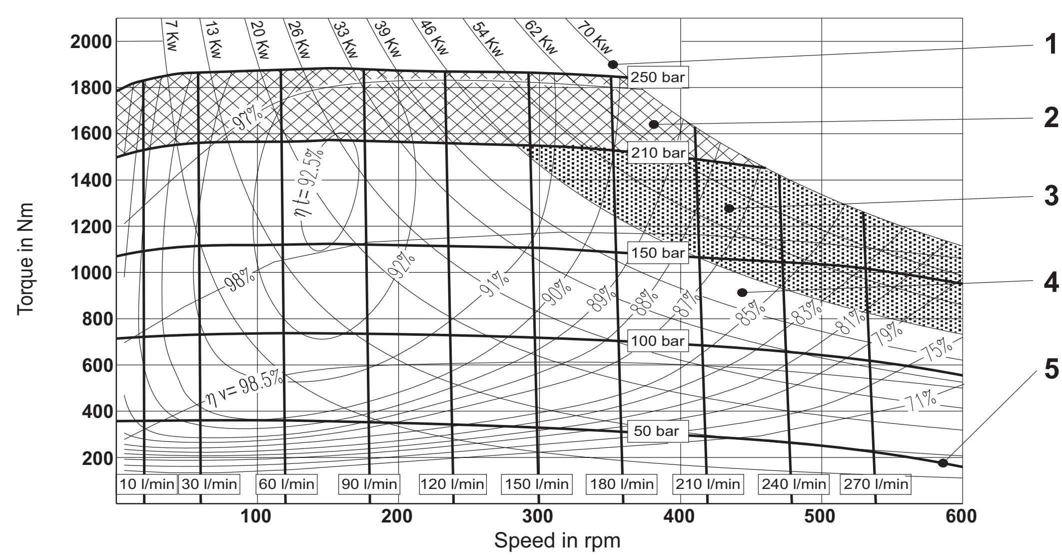
MR 350



MR 450



MRE 500

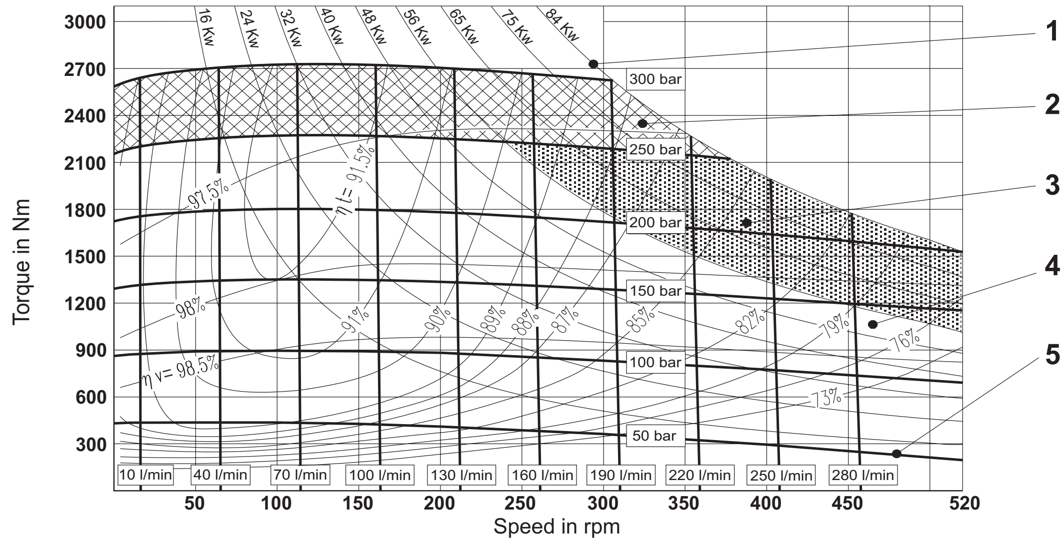


OPERATINGDIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

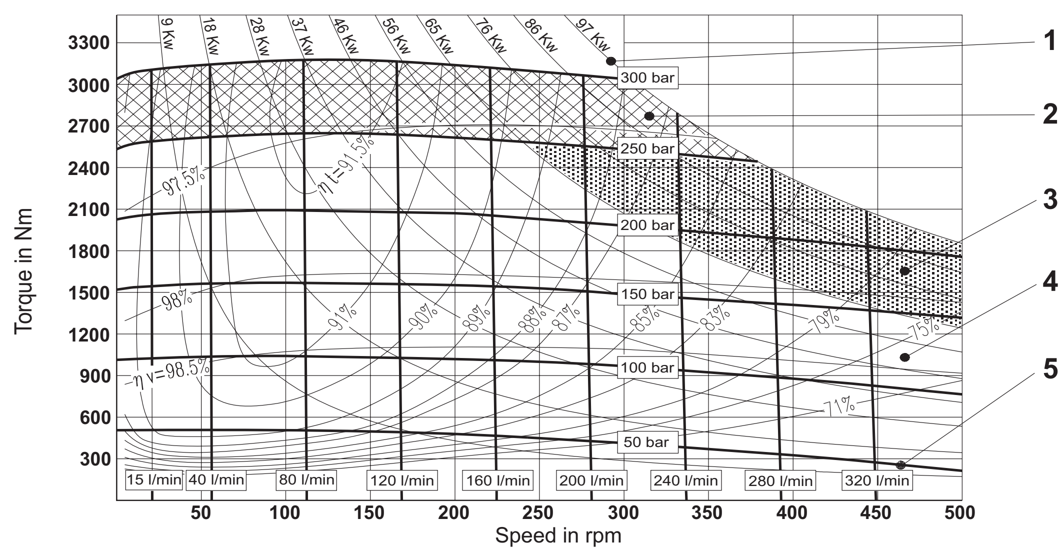
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

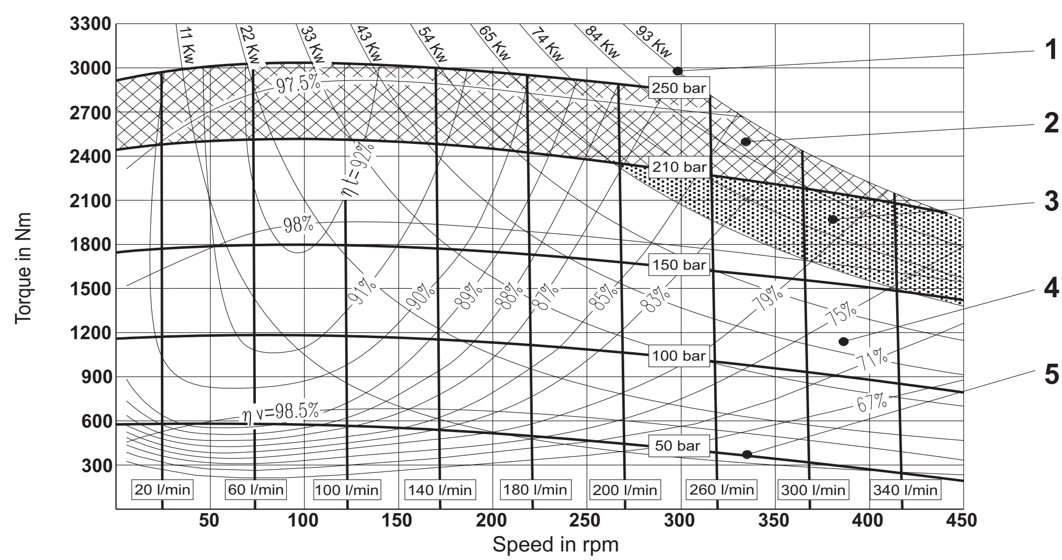
MR 600



MR 700



MRE 800

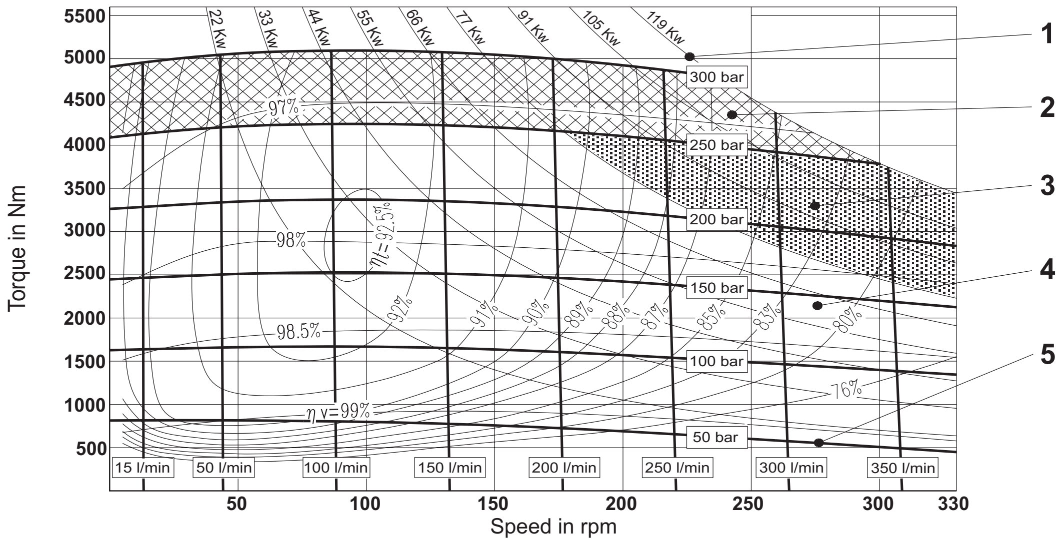


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

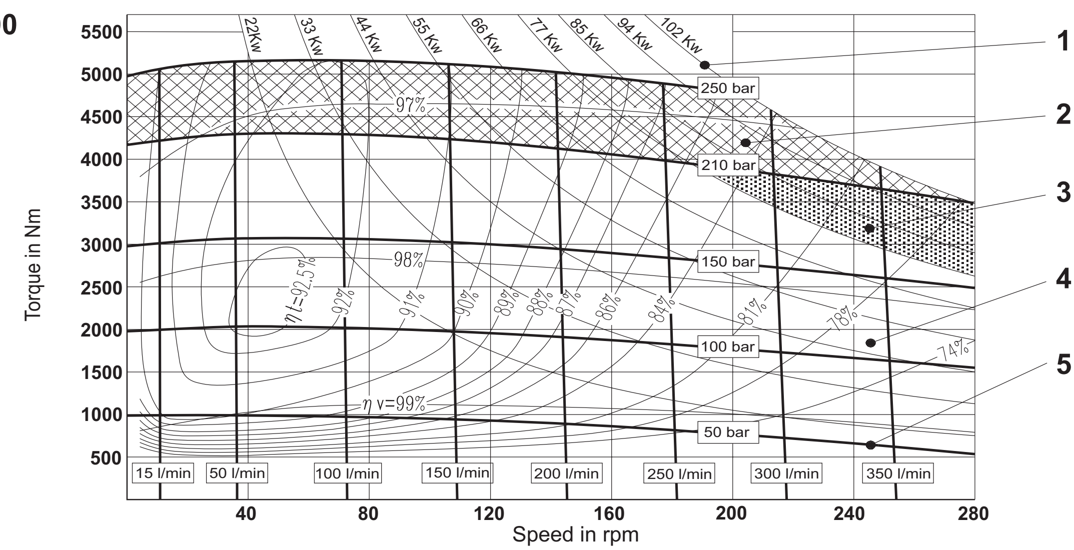
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

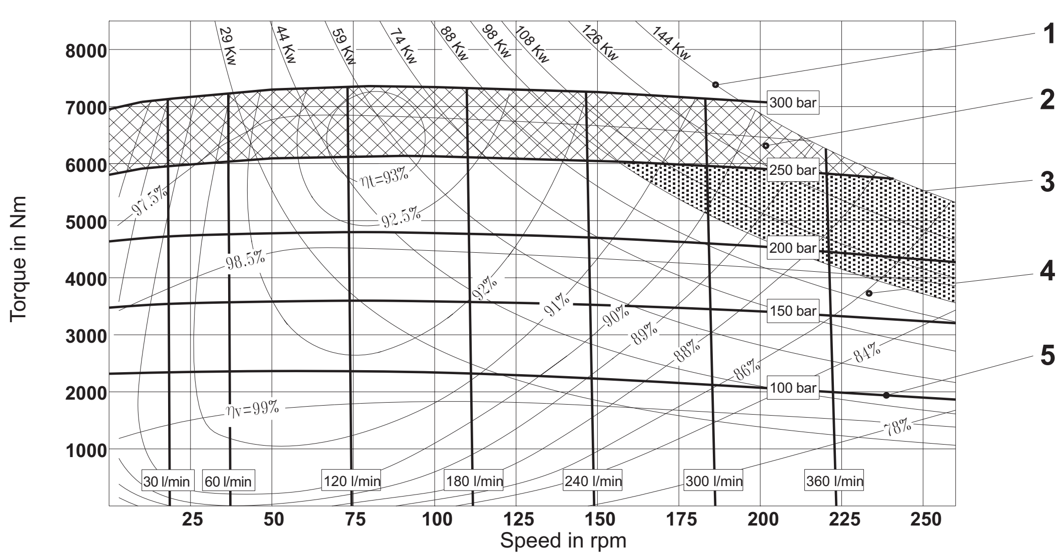
MR 1100



MRE 1400



MR 1600

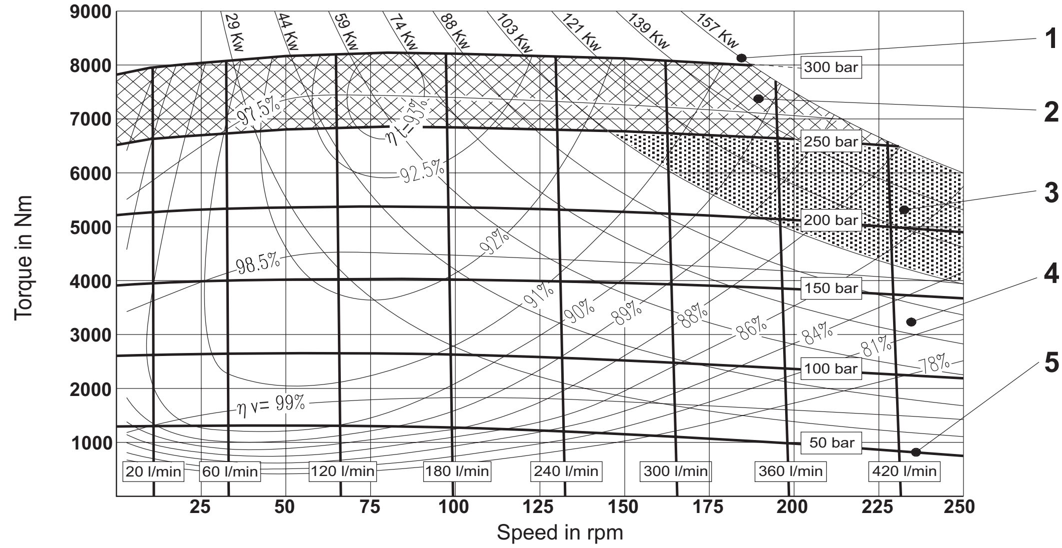


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

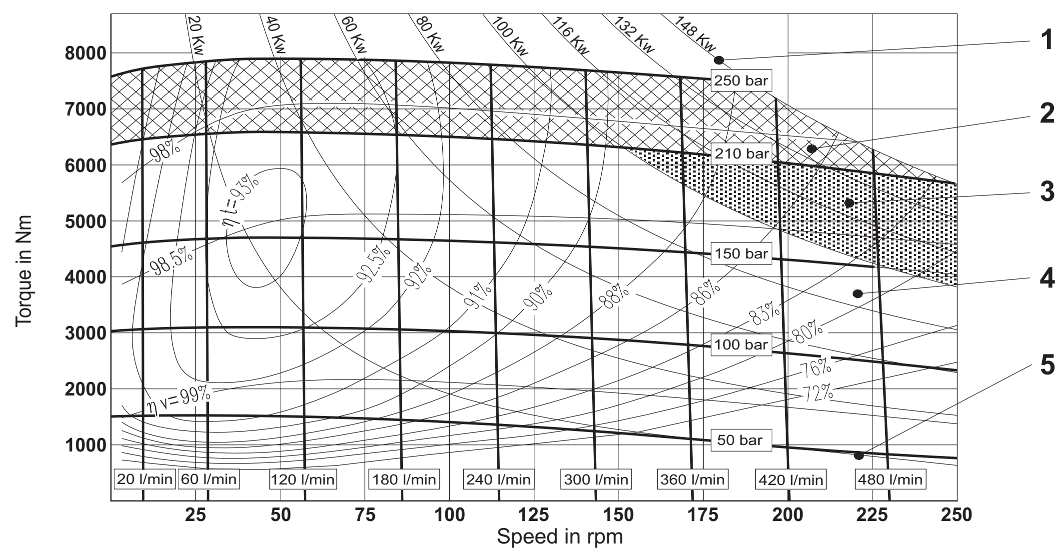
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

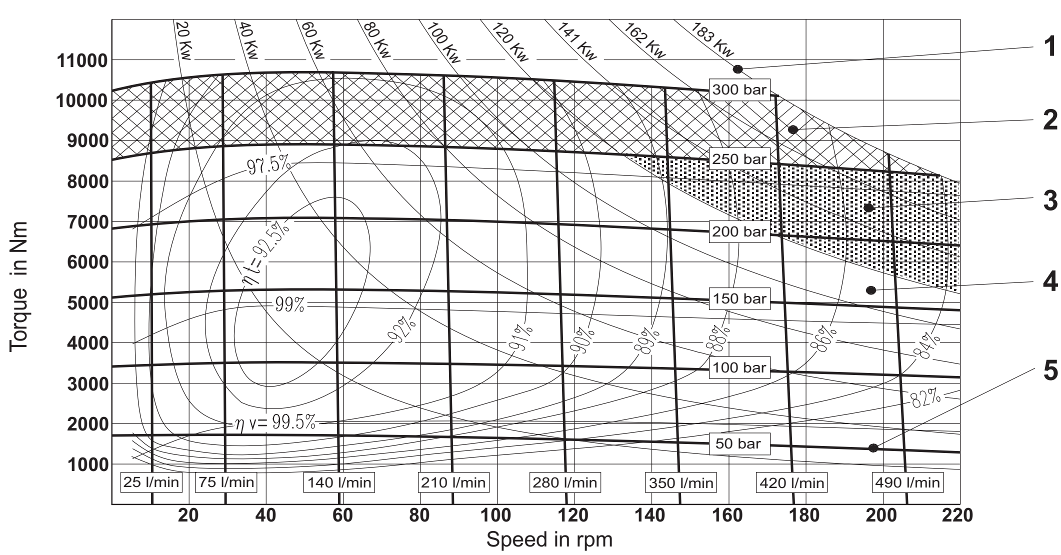
MR 1800



MRE 2100



MR 2400

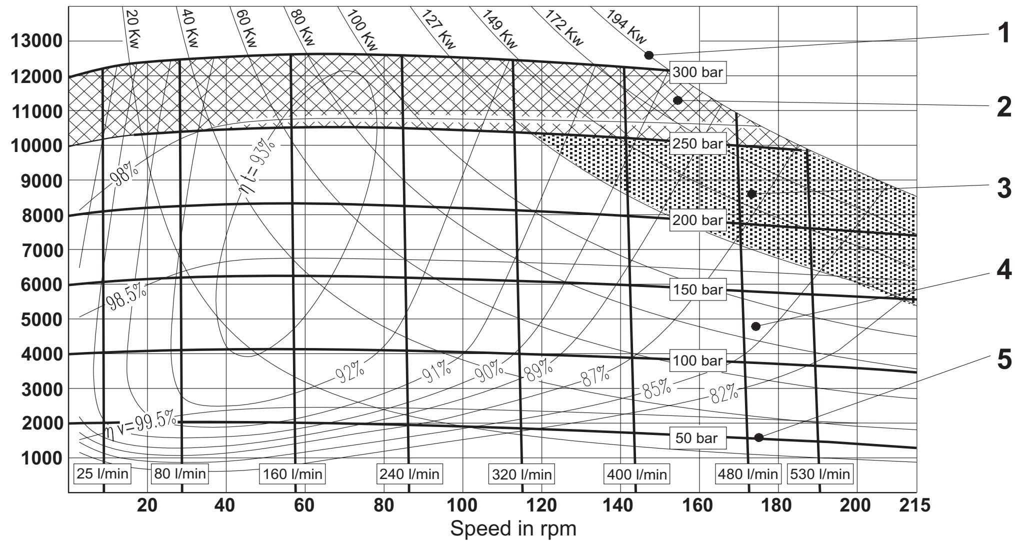


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

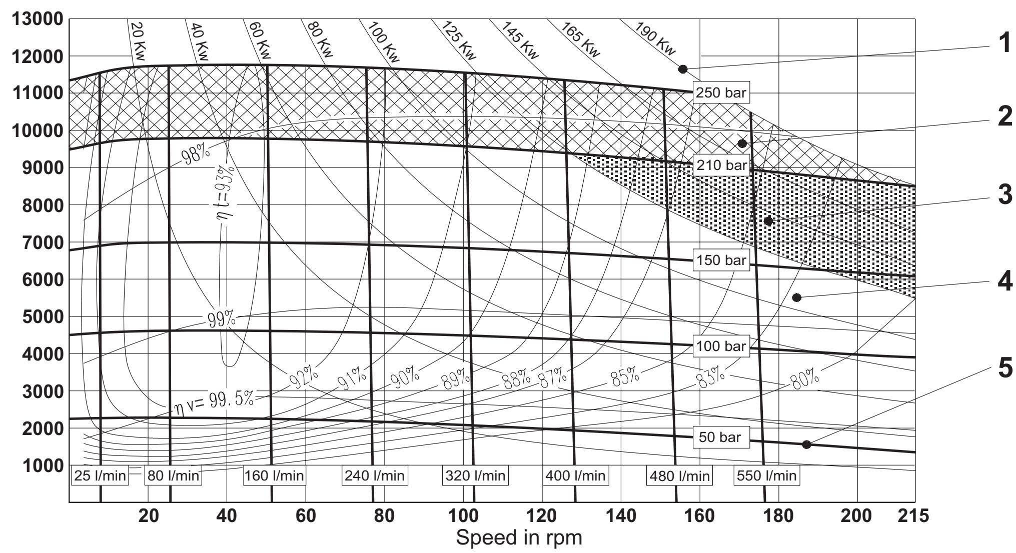
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

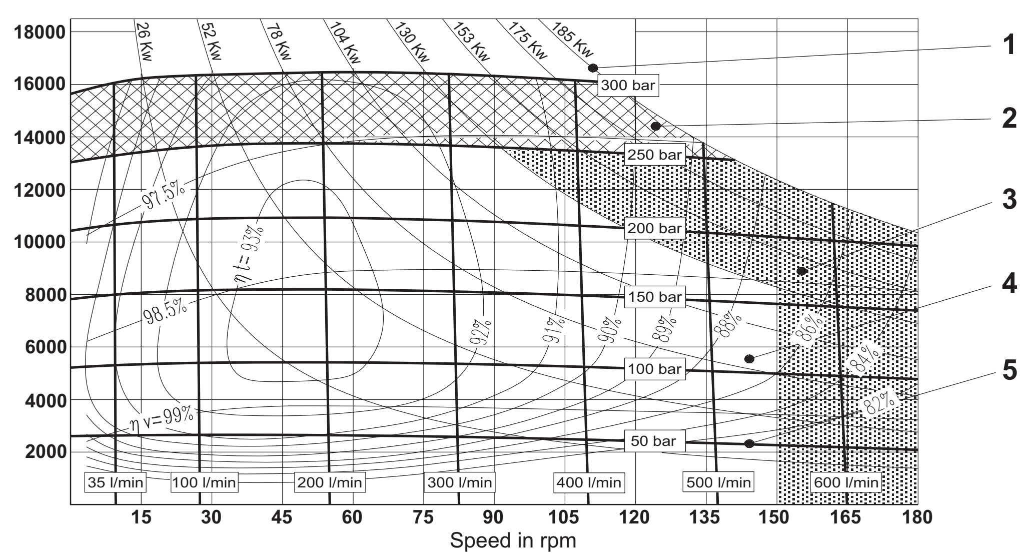
MR 2800



MRE 3100



MR 3600

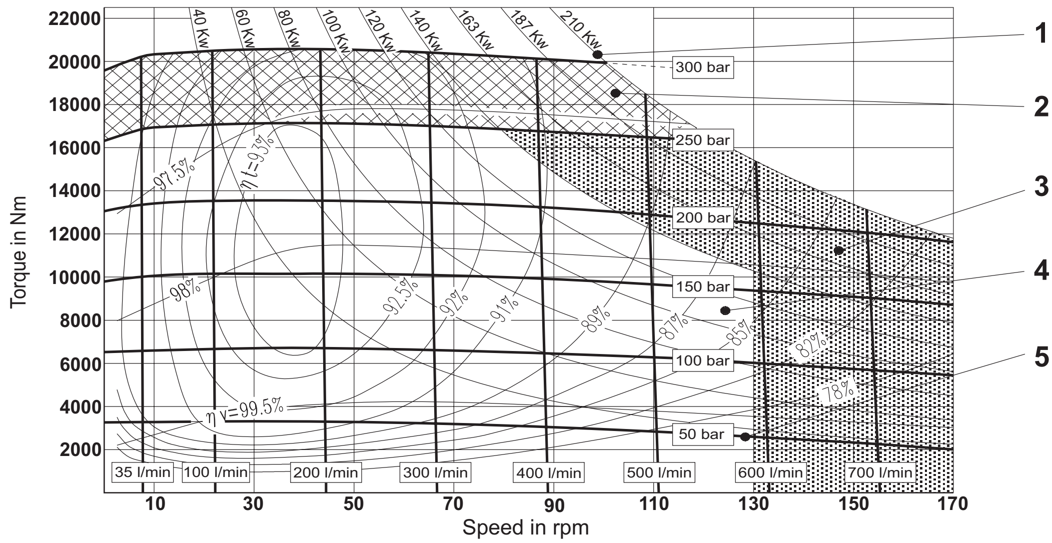


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

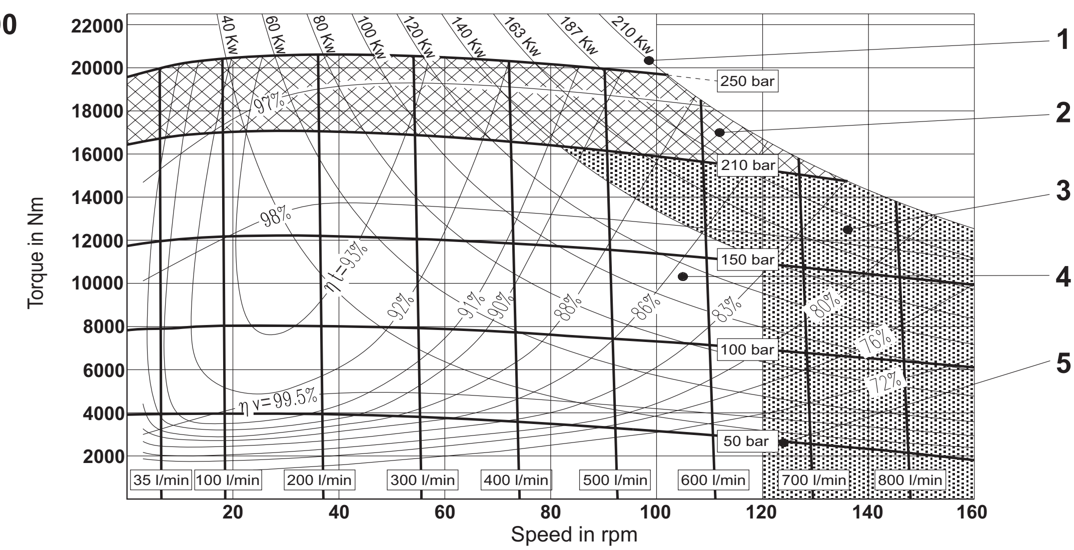
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

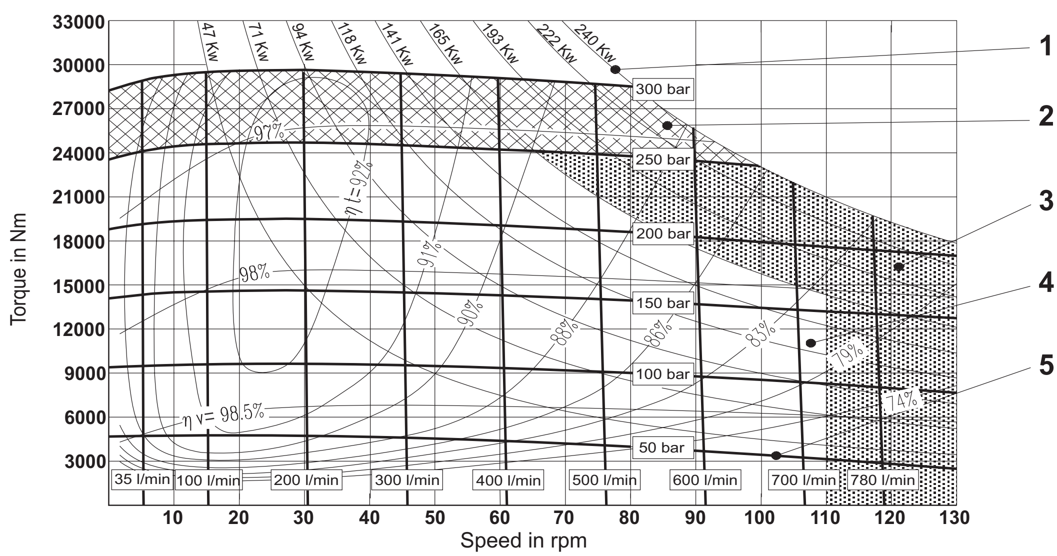
MR 4500



MRE 5400



MR 6500

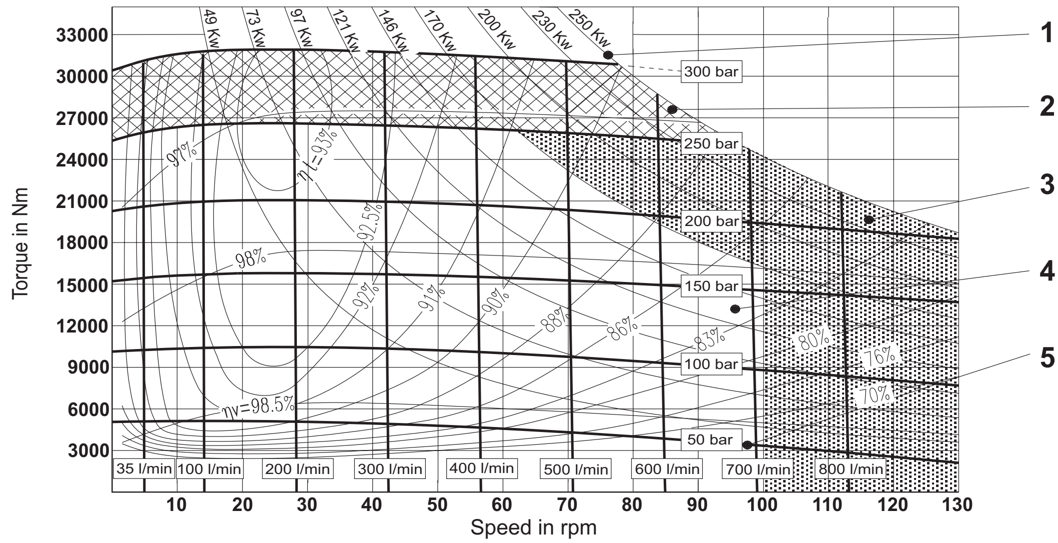


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

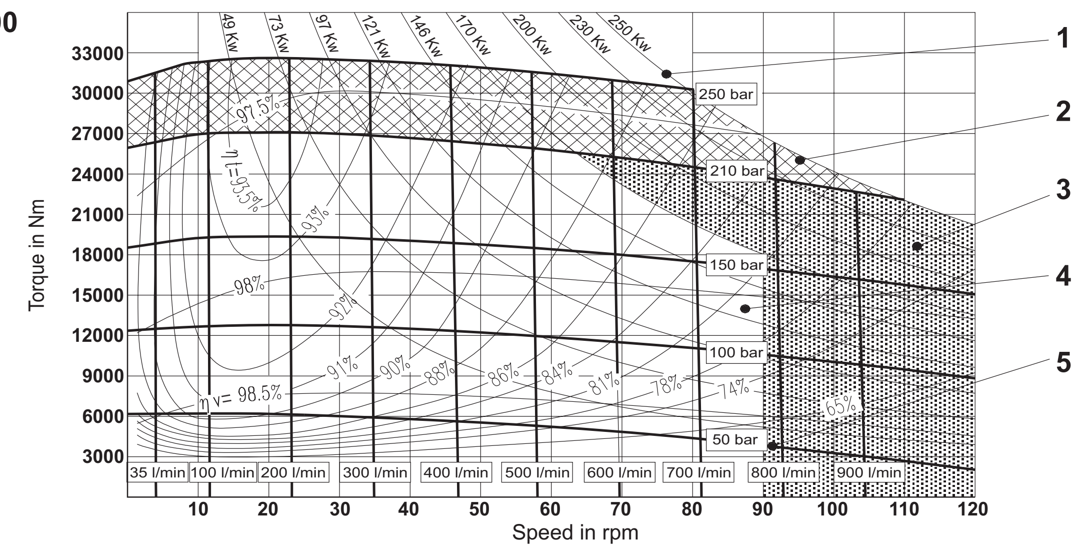
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

MR 7000



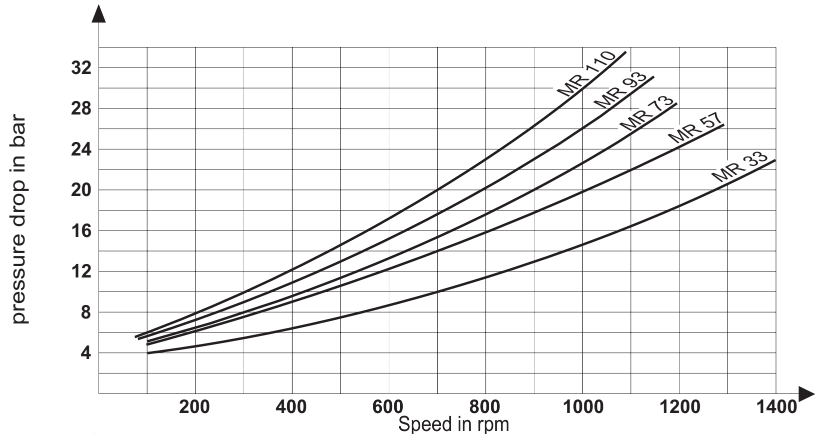
MRE 8200



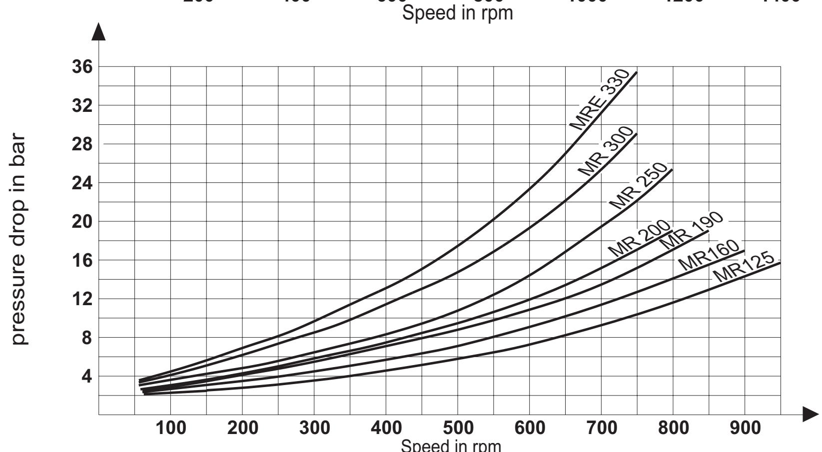
OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

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

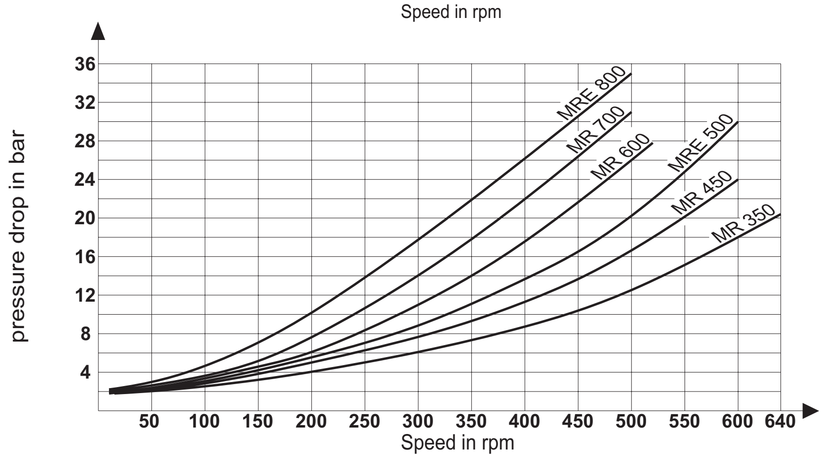
MR
33 - 110



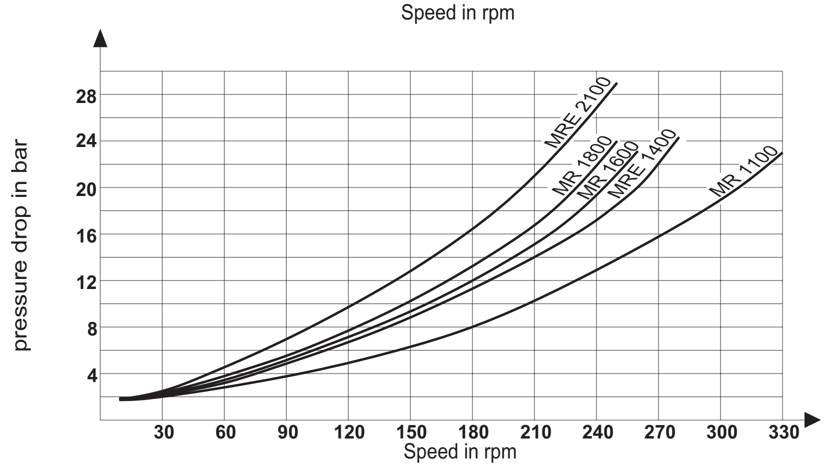
MR - MRE
125 - 330



MR - MRE
350 - 800



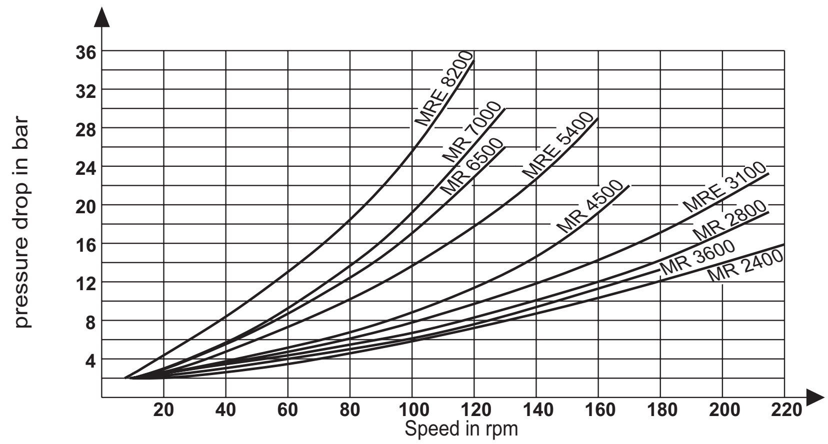
MR - MRE
1100 - 2100



OPERATING DIAGRAM (average values) measured at ν = 36 mm^2/s; t = 45° C; p_{outlet} = 0 bar

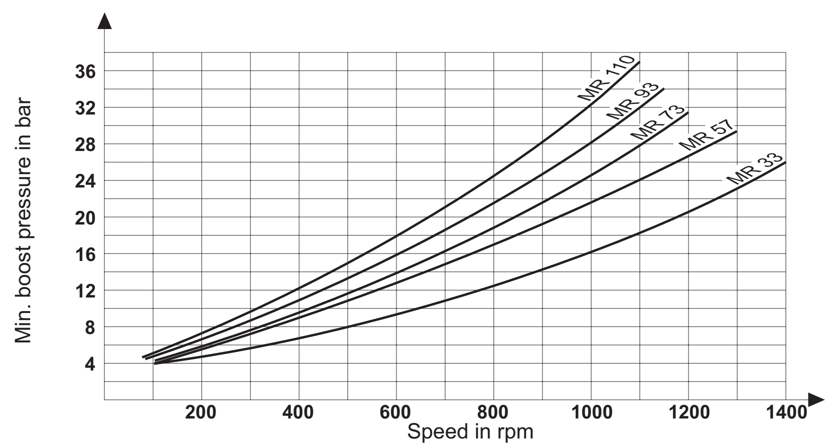
Min. required pressure difference Δp with idling speed (shaft unloaded)

MR - MRE
2400 - 8200

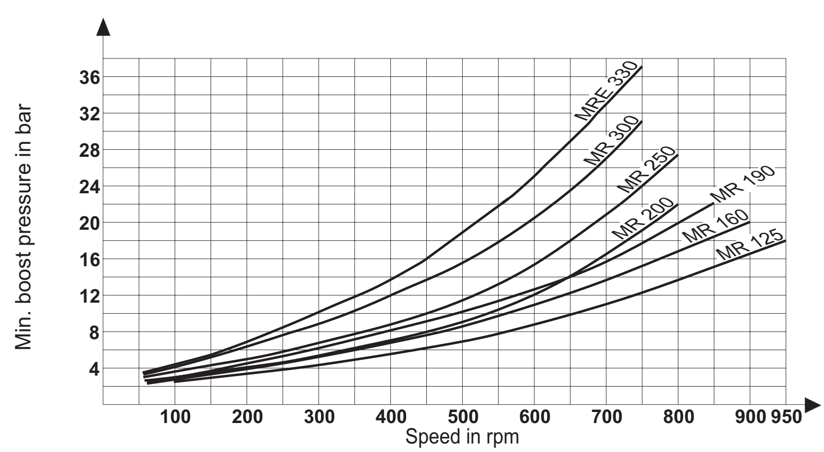


Minimum boost pressure during pump operation

MR
33 - 110



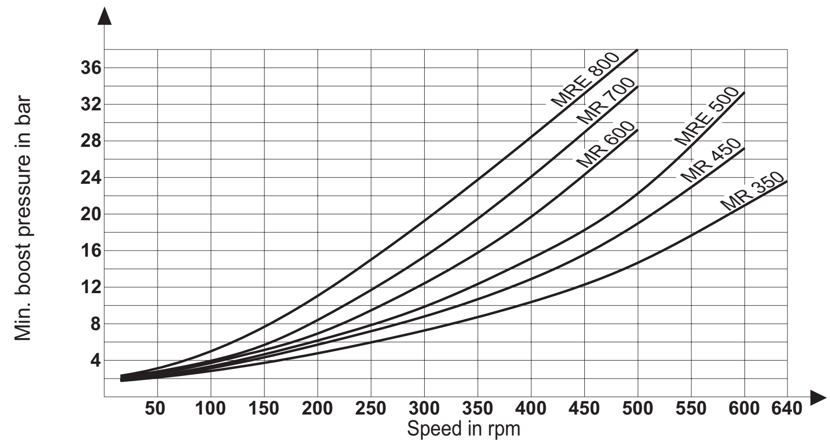
MR - MRE
125 - 330



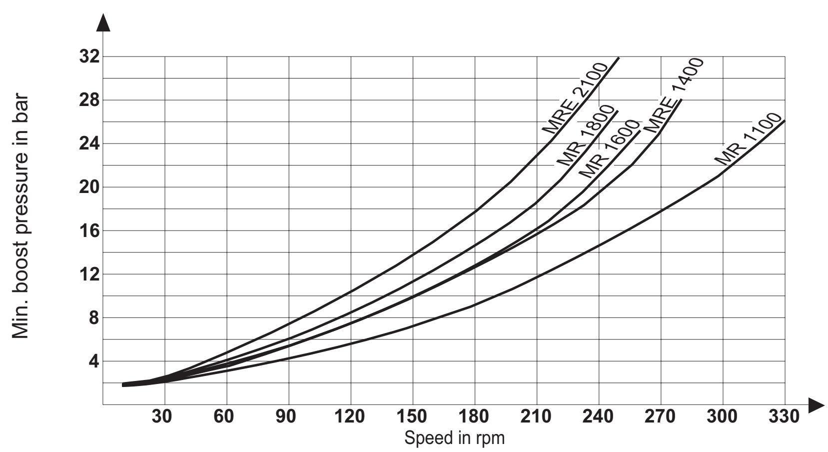
OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

Minimum boost pressure during pump operation

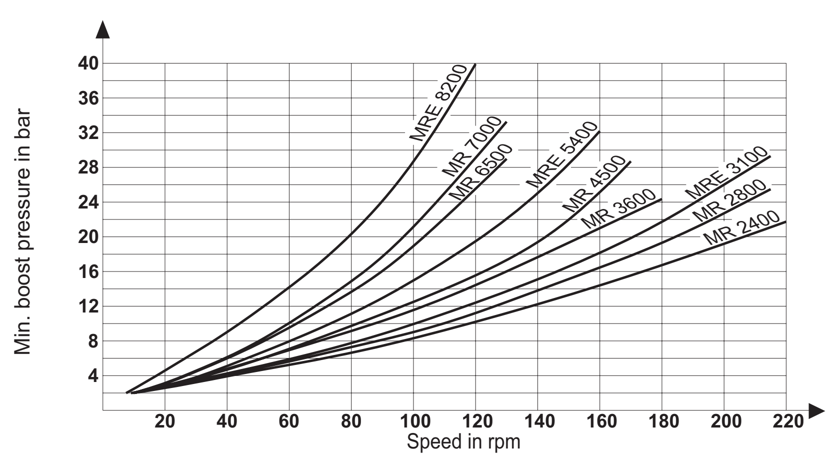
MR - MRE
350 - 800



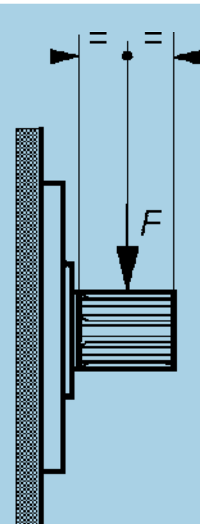
MR - MRE
1100 - 2100



MR - MRE
2400 - 8200



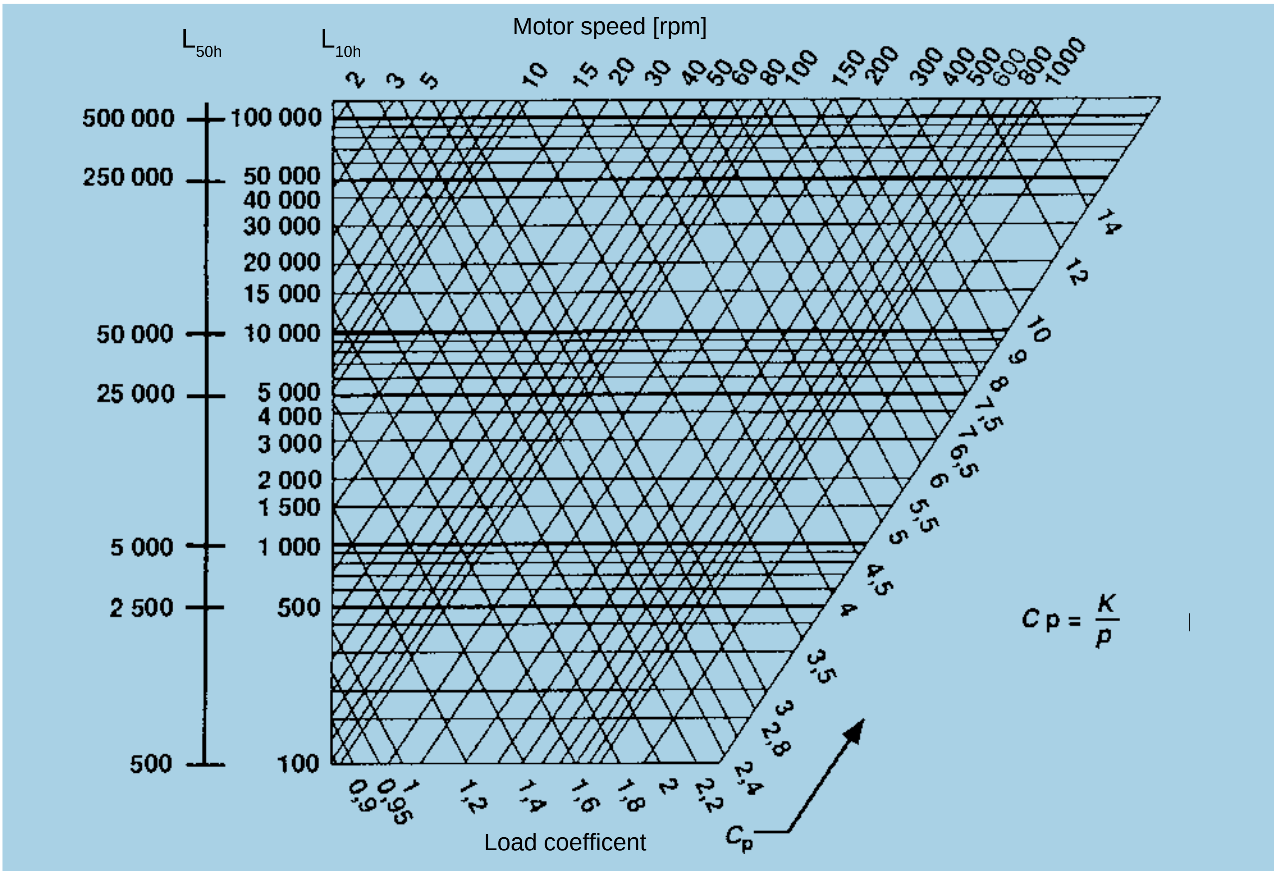
RADIAL LOAD



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"

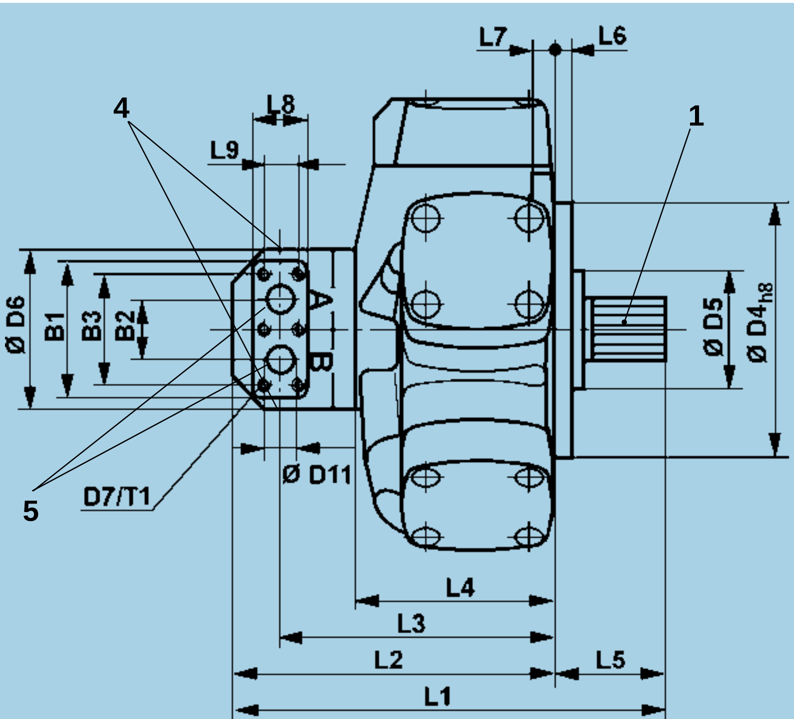
BEARING LIFE

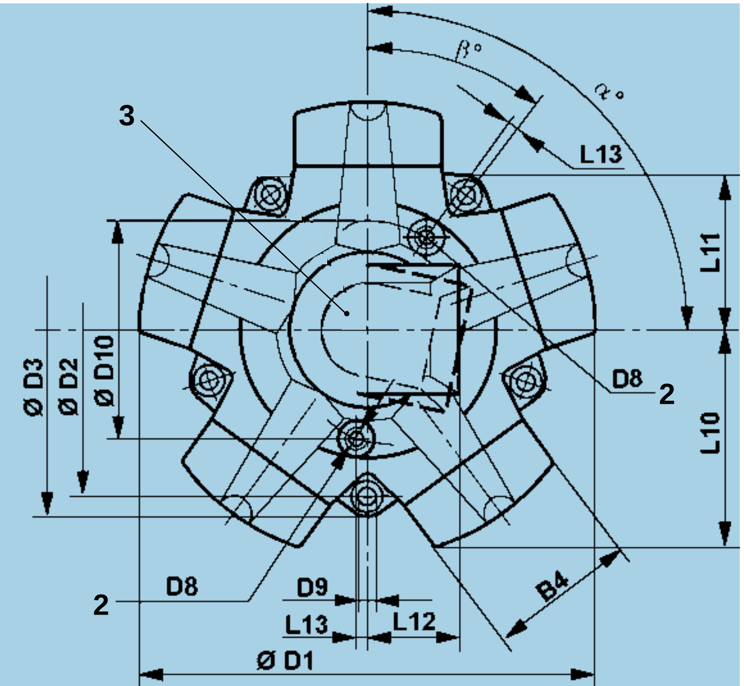


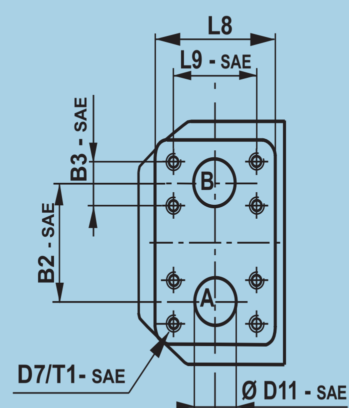
C p = Load coefficent
K = Sevice life coefficent for standard bearing
p = operating pressure in bar

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	2600	**MRE 330**	1000	**MRE 2100**	800
MR 57	2600	**MR 350**	1340	**MR 2400**	1020
MR 73	1540	**MR 450**	1340	**MR 2800**	1020
MR 93	1540	**MRE 500**	1215	**MRE 3100**	920
MR 110	1540	**MR 600**	1080	**MR 3600**	880
MR 125	1120	**MR 700**	1080	**MR 4500**	880
MR 160	1120	**MRE 800**	950	**MRE 5400**	730
MR 190	1120	**MR 1100**	1020	**MR 6500**	880
MR 200	1120	**MRE 1400**	840	**MR 7000**	880
MR 250	1120	**MR 1600**	920	**MRE 8200**	680
MR 300	1120	**MR 1800**	920		







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.

5 Rotary valve housing with BSP threads (from MR 2400 to MRE 8200) available on request, please contact Parker Calzoni.

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	

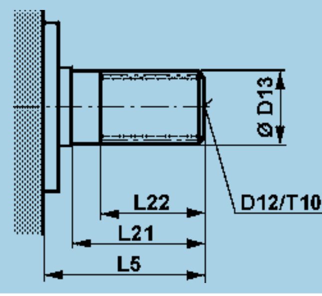
MOTOR TYPE	L1	L2	L3	L4	L5	L6	L7	L8	L9	L9 - SAE		L10	L11	L12	L13	α	β
										* low pressure	* high pressure						
MR 33 MR 57	253,5	196	148	107	57,2	14	19	70	--	52,4		110,2	78,5	70	19,7	108°	36°
MR 73 MR 93 MR 110	297	228,5	190,5	131,5	68,5	17	20	54	34	--		119,8	94	72	-	90°	36°
MR 125 MR 160 MR 190	309	242	204	145	67	14	16	54	34	--		147,5	103	72	6,5	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	90°	36°
MR 350 MR 450 MRE 500	376	279	235	167	97	15	18	70,4	40	--		174,5	130	84	9,5	90°	36°
MR 600 MR 700 MRE 800	400	299	255	187	101	15	20	70,4	40	--		192	143	84	8	90°	36°
MR 1100 MRE 1400	458	341	293	203	117	20	22	82	50	--	--	223	165	105	9	104°	36°
MR 1600 MR 1800 MRE 2100	506	374	326	236	132	21	24	82	50	--	--	264	197	105	11	90°	36°
MR 2400 MR 2800 MRE 3100	619	466	392	285	153	24	26	135	62	69,85	79,4	303	221	123	15	90°	36°
MR 3600 MR 4500 MRE 5400	699,5	489,5	418,5	307,5	210	34	28	135	68	77,77	96,82	359,5	247	123	19	108°	36°
MR 6500 MR 7000 MRE 8200	796	566	495	384	230	37	30	135	68	77,77	96,82	407,3	247	123	21	108°	36°

* FOR PRESSURE VALUES PLEASE REFER TO PAG.42 "SAE CONNECTION FLANGES" "SAE PSI" VALUES -- ALSO AVAILABLE UNC THREAD, PLEASE CONSULT PARKER Calzoni

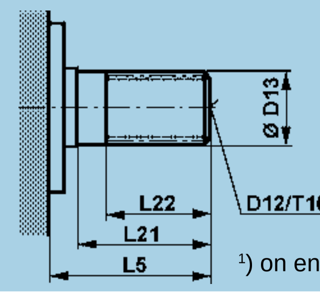
MOTOR TYPE	B1	B2	B2 - SAE		B3	B4	B4 - SAE		Ø D1	Ø D2	Ø D3	Ø $D4_{h8}$**	Ø D5	Ø D6	D7-T1	D7-T1 - SAE		D8	D9	Ø D10	Ø D11	ØD11 - SAE	
			* LOW PRESS.	* HIGH PRESS.			* LOW PRESS.	* HIGH PRESS.								* LOW PRESS.	* HIGH PRESS.					* LOW PRESS.	* HIGH PRESS.
MR 33 MR 57	124	--	65		26,2	--	69,4		235,4	160	180	125	-	120	-	M10-25		G1/4	9	97	--	25	
MR 73 MR 93 MR 110	120	50	--		100	90	--		250	204	224,4	145	-	129	M8-15	--		G3/8	11	-	20	--	
MR 125 MR 160 MR 190	120	50	--		100	100	--		313,2	225	249	160	-	129	M8-15	--		G 3/8	11	160	20	--	
MR 200 MR 250 MR 300 MRE 330	120	50	--		100	100	--		328	232	256	175	90	129	M8-15	--		G 3/8	11	162	20	--	
MR 350 MR 450 MRE 500	142	60	--		120	119	--		368	266	296	190	96	156	M10-18	--		G 3/8	13	194	25	--	
MR 600 MR 700 MRE 800	142	60	--		120	133	--		405	290	320	220	102	156	M10-18	-		G 3/8	13	207	25	-	
MR 1100 MRE 1400	162	73	--	--	136	148	--	--	470	330	367	250	120	172	M12-21	--	--	G 1/2	15	228	31	--	--
MR 1600 MR 1800 MRE 2100	162	73	--	--	136	168	--	--	558	380	423	290	148	172	M12-21	--	--	G 1/2	17	266	31	--	--
MR 2400 MR 2800 MRE 3100	233	86	86	101	180	190	35,7	36,5	642	440	494	335	140	215	M14-28	M12-30	M16-35	G 1/2	19	314	37	37	37
MR 3600 MR 4500 MRE 5400	233	116	116	116	200	240	42,88	44,45	766	540	597	400 $D4_{h7}$**	-	215	M16-28	M12-30	M20-34	G 1/2	23	380	38	50	50
MR 6500 MR 7000 MRE 8200	233	116	116	116	200	264	42,88	44,45	864	600	658,6	450 $D4_{h7}$**	190	215	M16-28	M12-30	M20-34	G 1/2	25	450	38	50	50

* FOR PRESSURE VALUES PLEASE REFER TO PAG.42 "SAE CONNECTION FLANGES" "SAE PSI" VALUES, ALSO AVAILABLE UNC THREAD, PLEASE CONSULT PARKER Calzoni

Code N 1 (Standard)

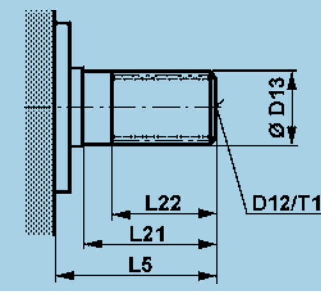


Code B 1 - BS 3550 - [1])



[1]) on enquiry

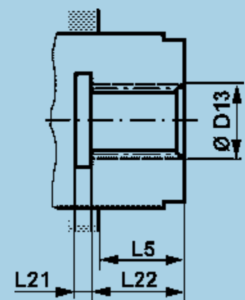
Code D 1 - DIN 5480



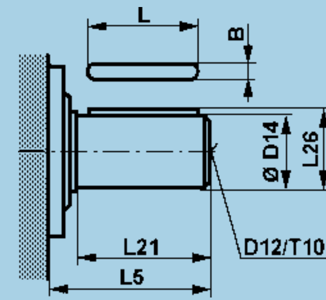
Version	N1						B1						D1					
TYPE	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**	**L5**	**L21**	**L22**	**D12**	**T10**	**ØD13**
MR 33 MR 57	57	40	28	-	-	B6x26x32	-	-	-	-	-	-	57	40	28	-	-	W32x1,5x20-8e
MR 73 MR 93 MR 110	68,5	44,8	31,5	M12	-	B6x28x34	-	-	-	-	-	-	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 PARKER Calzoni.
MR 200 * only code "F1"

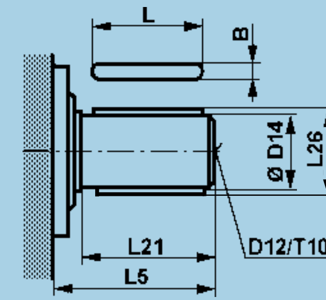
Code F 1 - DIN 5480 -



Code P 1



Code P 1 **



Only MR 6500, MR 7000, MRE 8200

Version	F1				P1								
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 **PARKER Calzoni**i
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	

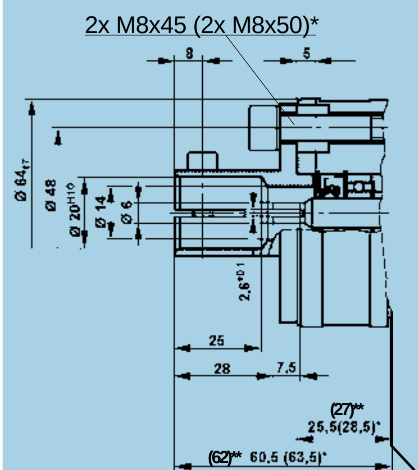
NOTE: the threaded holes (D12/T10) for the shaft versions "P1" must be considered as service holes. In case the holes dimensions required by the application are different from the ones listed here above, plese contact PARKER Calzoni.
MR 200 * only code "F1"
**This dimension includes two keys

MECHANICAL TACHOMETER DRIVE

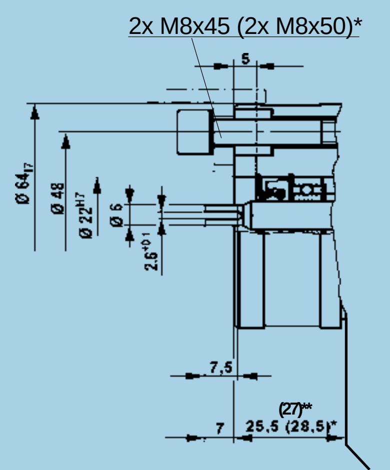
TACHOGENERATOR DRIVE

ENCODER DRIVE

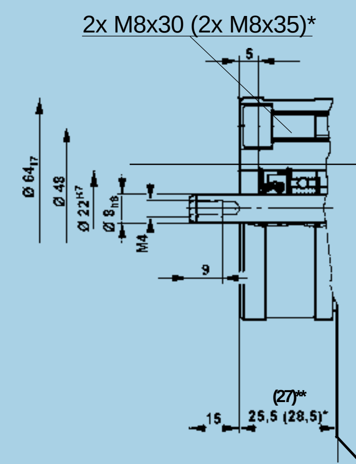
Code "C1"



Code "T1"

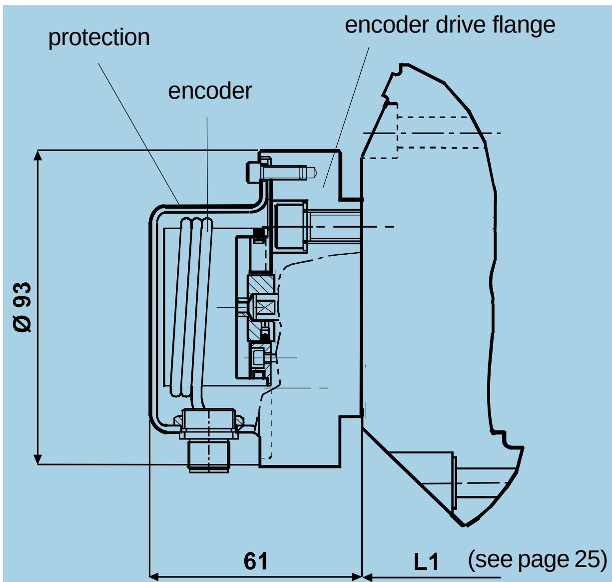


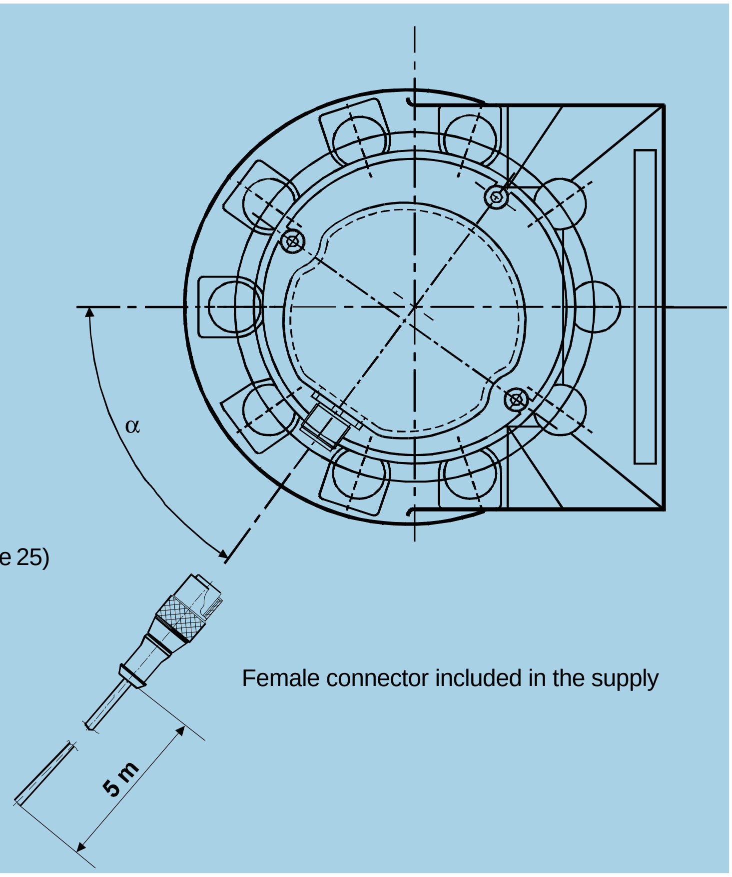
Code "Q1"



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

INCREMENTAL ENCODER DIMENSIONS





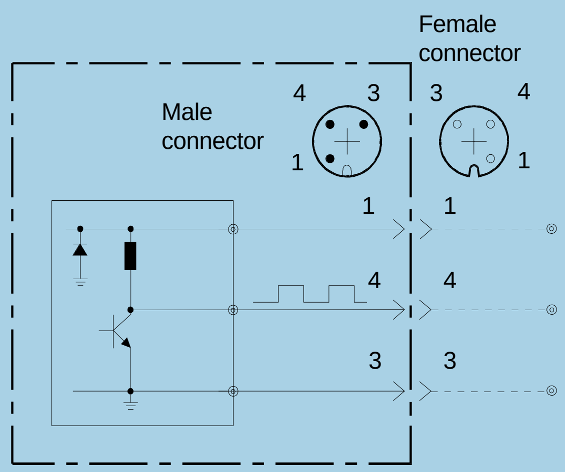
α = 126° for the motor types MR 33-57

α = 54° for the motor types MR 73-93-110-125-160-190-200-250-300 MRE 330

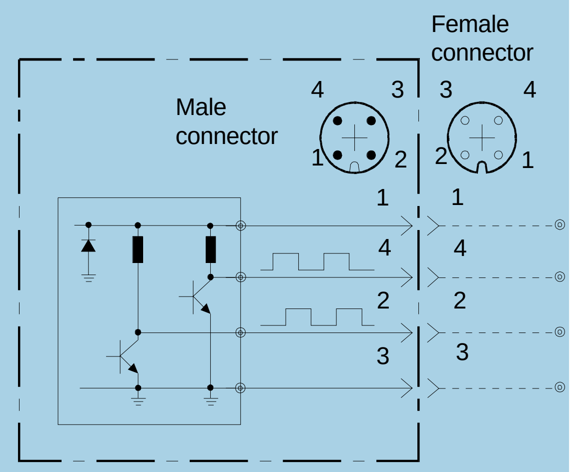
α =45° for the other types

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

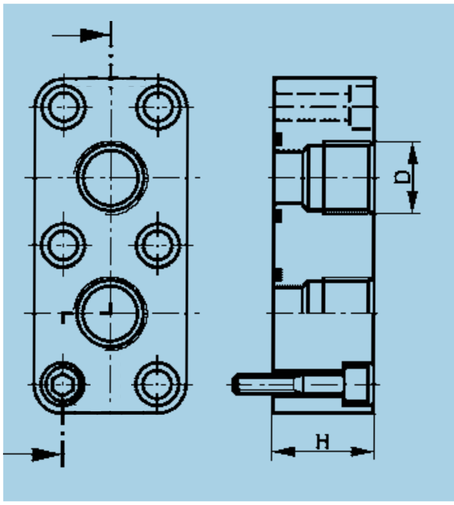
Encoder type:	**ELCIS mod. 478**
Supply voltage:	**8 to 24 Vcc**
Current consumption:	**120 mA max**
Current output:	**10 mA max**
Output signal:	**A phase- MONODIRECTIONAL A and B phase BIDIRECTIONAL**
Response frequency:	**100 KHz max**
Number of pulses:	**500 (others on request - max 2540)**
Slew 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.

STANDARD CONNECTION FLANGE
Code “C1“



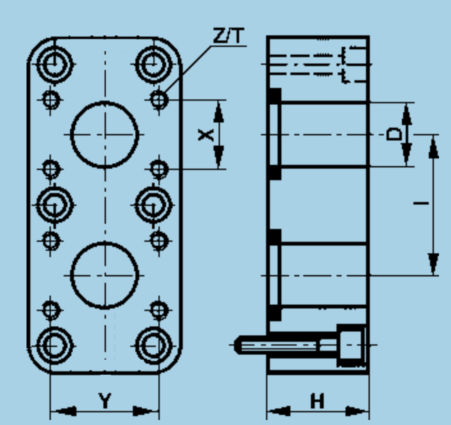
Flange is supplied complete with screws and seals.

MR MRE	D (BSP)	H	ORDERING CODE NBR	ORDERING CODE FPM
73 - 93 - 110 125 - 160 - 190 200 - 250 300 - 330	3/4"	38	262 098	229 394
350 - 450 500 600 - 700 800	1 1/4"	39	262 089	229 395
1100 - 1400 1600 - 1800 2100	1 1/2"	45	262 093	229 396
2400 - 2800 3100	1 1/2"	59	264 572	229 397
3600 - 4500 5400 6500 - 7000 8200	2"	58	272 724	229 398

BSP threads to ISO 228/1

Permitted up to 6000 PSI

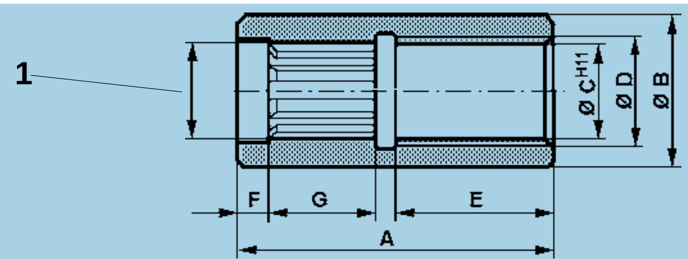
SAE CONNECTION FLANGE
Codice “S1“
Codice “T1“
Codice “G1“
Codice “L1“



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	ORDERING CODE NBR	Z (")	T	ORDERING NBR
73 - 93 - 110 125 - 160 - 190 200 - 250 300 - 330	5000	3/4"	19	38	55	22,2	47,6	M10/25	277 295	3/8"- 16	25	223 335
350 - 450 500 600 - 700 800	5000	1"	25	39	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	59	86	35,7	69,8	M12/30	277 301	1/2"- 13	30	223 338
	6000	1 1/2"	37	59	100	36,5	79,4	M16/30	230 168	5/8"- 11	35	349068
3600 - 4500 5400 6500 - 7000 8200	3000	2"	50	58	112	42,9	77,8	M12/30	277 303	1/2"- 13	30	223 339
	6000	2"	50	58	116	44,45	96,82	M20/35	230 170	3/4"- 10	38	342 547

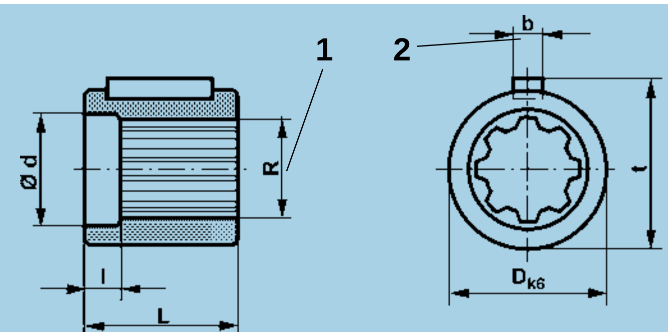
COUPLINGS



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

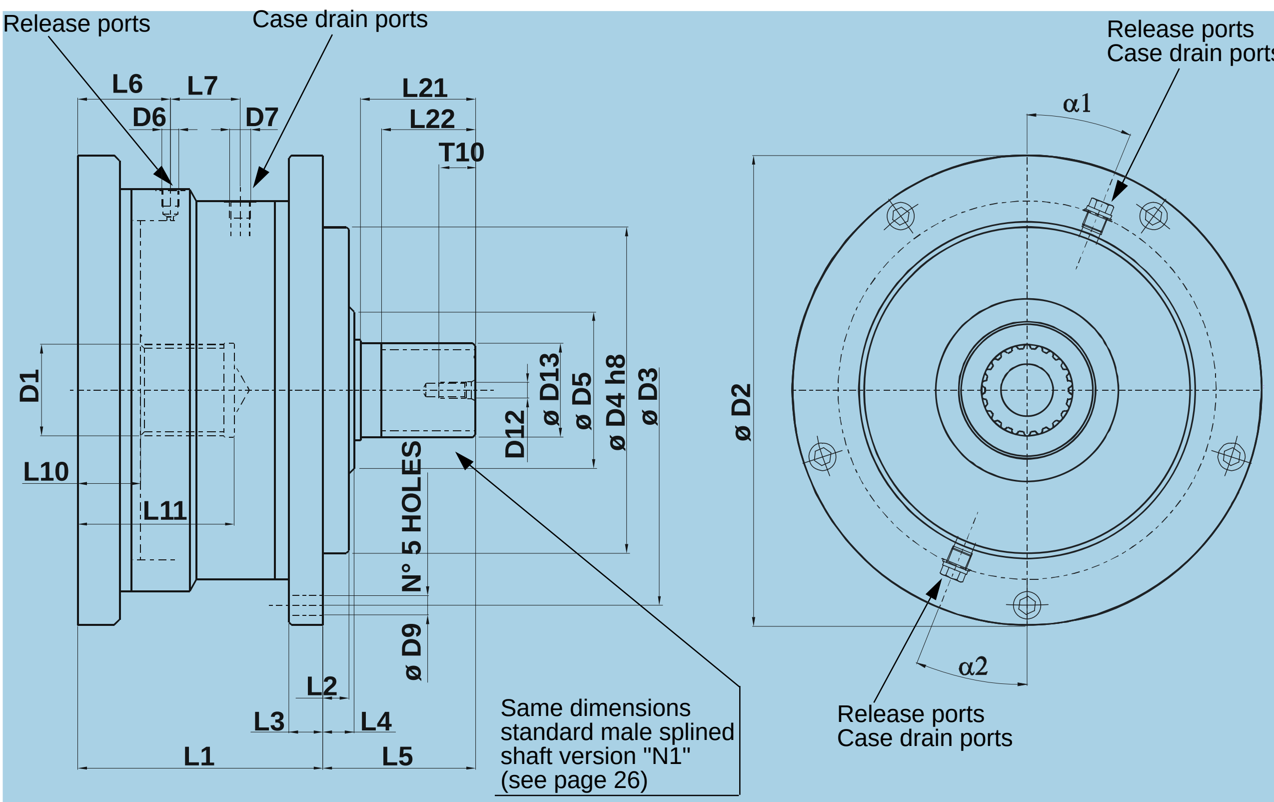
ADAPTERS WITH KEY



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	29	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	125,6	38	185	188	45	195	45x25x180

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	α 1	α 2
B 190	121	-	22	14	67	41	29,3	20	72	50	35,5		250	225	160	-	G1/4"	G3/8'	10,5	M12		28	22°30'	22°30'
B 300	136	-	25	15	81	42	39,5	21	86	60	46		256	232	175	-	G1/4"	G3/8'	10,5	M12		28	22°30'	22°30'
B 450	147	-	27	15	97	49,5	36	24	100	74	56,5		296	266	190	-	G1/4"	G3/8'	13,5	M12		28	22°30'	22°30'
B 700	172	-	28	15	101	55	46	25	105	78	62	see page 26 compatible code N1 D1	320	290	220	-	G1/4"	G3/8'	13,5	M12	see page 26-27 code N1- D1- F1	28	22°30'	22°30'
B 1100	188	20	26	24	117	71	53,5	48	120	88	72		360	330	250	120	G1/4"	G1/2'	15	M12		28	0°	0°
B 1800	216	-	28	21	132	63,5	58,5	34	135	100	79		423	380	290	-	G1/4"	G1/2'	17,5	M12		28	22°30'	22°30'
B 2800	263	-	30	24	153	87	67	42,5	165	120	99		494	440	335	-	G1/4"	G1/2'	19	M12		28	22°30'	22°30'

TECHNICAL DATA (For operation outside these parameters, please consult **PARKER 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 N1 V1 **

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

OUTPUT 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 PARKER Calzoni**	

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

INPUT SHAFT

N1	Hollow shaft for motor type N1 (see page 26)
D1	Hollow shaft for motor type D1 (see page 26)

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

SEALS

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

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

SPECIAL

**	Space reserved to PARKER Calzoni

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

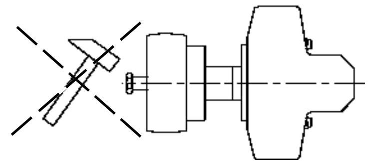
Pipes, pipe connections

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

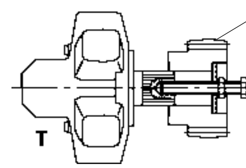
Choose pipes and hoses suitable for the installation
- Please note manufacturing data!

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



Curved tooth coupling hub

Screw to remove the coupling hub

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

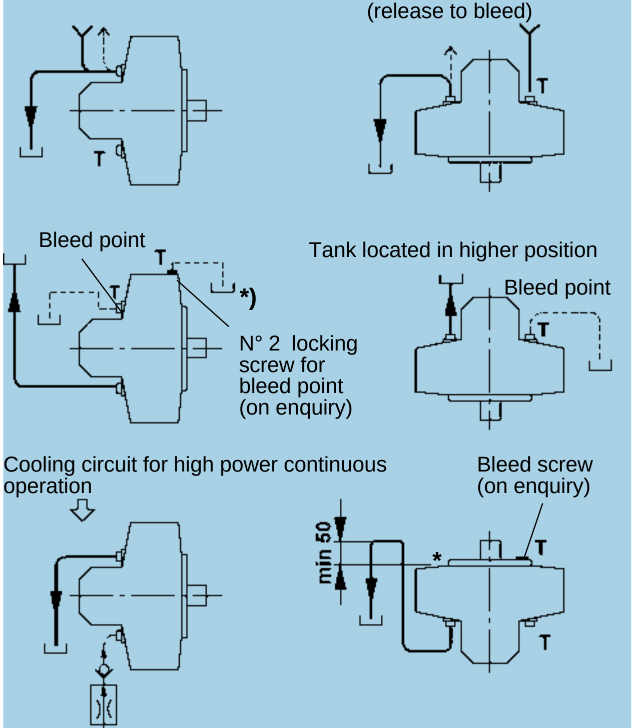
DRAIN AND FLUSHING LINK INSTALLATION EXAMPLES

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.

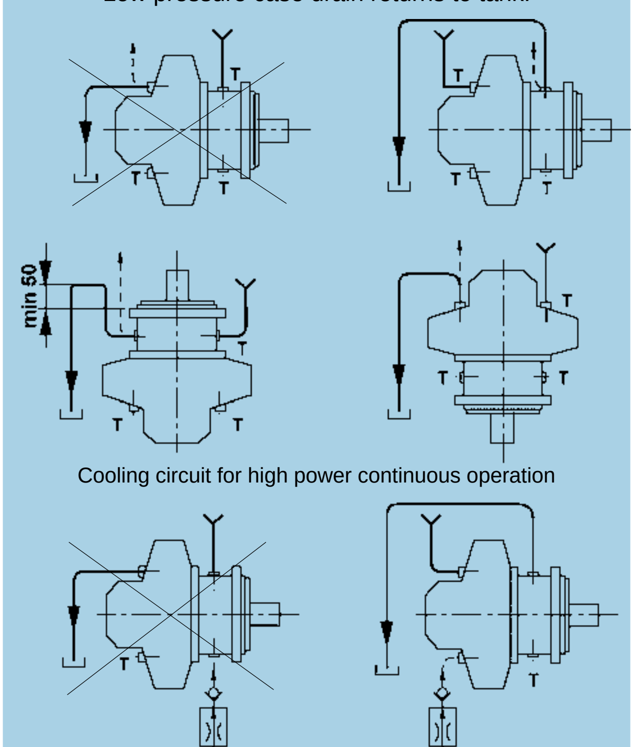


Flushing *p* max= 5 bar

***)** 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

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 (MR 33 - MR57 see page 24)
C1	standard PARKER 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)
S3	standard SAE metric motor integrated (see page 25)
G3	SAE 6000 psi metric motor integrated (see page 25)

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 PARKER Calzoni

Parker

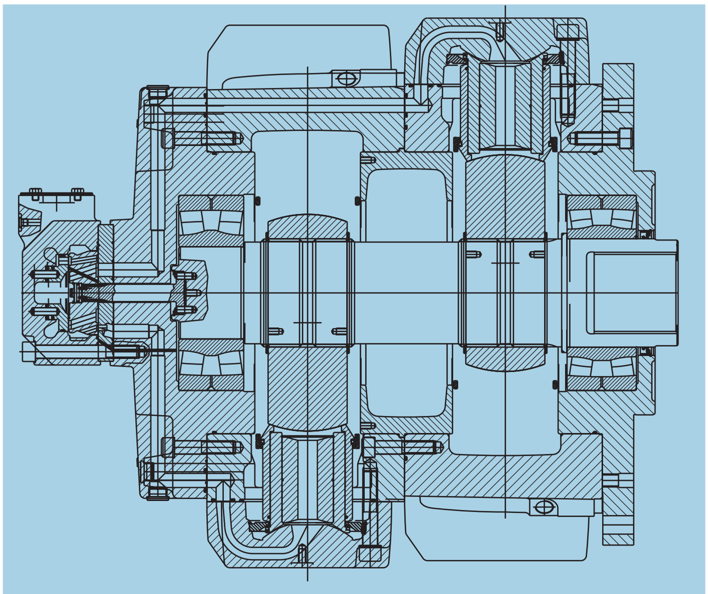
PARKER CALZONI
Radial Piston Motor
Type MRT, MRTE, MRTF

RCOe 2301/10.04

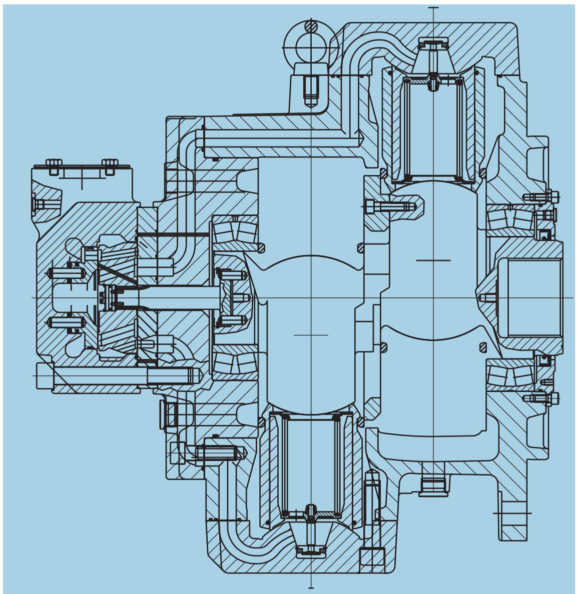
DENISON CALZONI

CONTENS PAG.

GENERAL CHARACTERISTICS



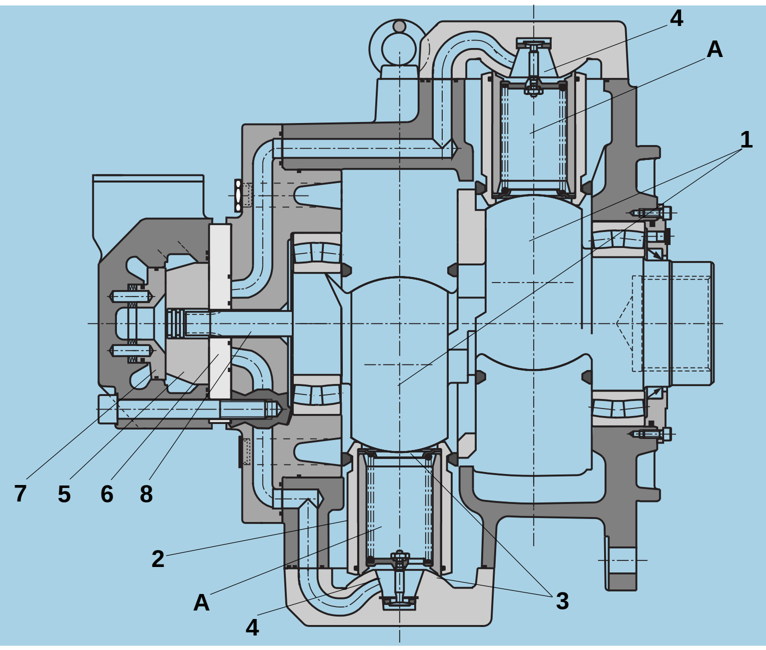
14 PISTONS MOTOR VERSION



10 PISTONS MOTOR VERSION

CONTRUCTION	Fixed displacement radial piston motor
TYPE	MRT, MRTE, MRTF
MOUNTING	Front flange mounting
CONNECTION	Connection flange
MOUNTING POSITION	Any (please note the installation notes on page 22)
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° a + 80°
VISCOSITY RANGE [1)]	ν mm²/s 18 to 1000: Recommended operating range 30 to 50 mm²/s (see fliud 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 PARKER Calzoni



FUNCTIONAL DESCRIPTION

The outstanding performance, which is already known in our MR - MRE series motors, is the result of an original and patented design. The principle is to transmit the effort from the stator to the rotating shaft (1) 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 (2) with a mechanical connection at the lips at each end which seal against the spherical surfaces (3) of the cylinder-heads (4) and the spherical surface of the rotating shaft (1). 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 as a 10 piston motor is the significant reduction in dimensions. Especially the diameter is limitated to a value of motors with half of its capacity. Performances reached by this motor type are improved with reference to other motors of same diplacement. Another advantage stems from the geometrical arrangement of the 10 - 14 pistons, that results in a static balance of the motor shaft and in a great reduction of the reaction forces on the bearings with consequent large extension of their life time.

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. The motor sizes from MRTE 16500 to MRTE 23000 are available with large timing system option that allows higher motor power performances as well as the possibility to have a throughhollow shaft (see pages 5, 18-19).

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.

STANDARD TIMING TECHINICAL DATA

Size Motor version	Displace-ment	Moment inertia of rotating parts	Theore-tical specific torque	Min. start. torque % Theore-tical torque	Maximun 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
	cm³	kg m²	Nm/bar		bar	bar	bar	bar	bar	rpm	rpm	kW	kW	kg
MRT 7100	7104,4	0,82	113,1	91	250	300	420	400	5 (15 bar with "F1" shaft seal)	0,5-75	0,5-150	226	330	920
MRTF 7800	7808,4	0,82	124,3	91	210	250	350	400		0,5-70	0,5-130	191	280	920
MRTE 8500	8517,3	0,82	135,6	91	210	250	350	400		0,5-60	0,5-120	198	290	920
MRT 9000	9005,5	1,32	143,4	91	250	300	420	400		0,5-70	0,5-130	253	370	920
MRTF 9900	9903,9	1,32	157,7	91	210	250	350	400		0,5-60	0,5-120	205	300	920
MRTE 10800	10802,4	1,32	172,0	91	210	250	350	400		0,5-65	0,5-110	212	310	920
MRT 14000	14010	126	223,0	91	250	300	420	400		0,5-50	0,5-80	238	355	3100
MRTF 15500	15277	126	243,1	91	210	250	350	400		0,5-40	0,5-75	204	305	3115
MRTE 16500	16543	126	263,3	91	210	250	350	400		0,5-40	0,5-70	206	308	3130
MRT 17000	16759	126	266,7	91	250	300	420	400		0,5-40	0,5-70	248	371	3100
MRTF 18000	18025	126	286,8	91	210	250	350	400		0,5-40	0,5-65	215	320	3115
MRT 19500	19508	126	310,5	91	250	300	420	400		0,5-35	0,5-60	248	371	3100
MRTE 20000	19788	126	314,9	91	210	250	350	400		0,5-35	0,5-60	212	316	3130
MRTF 21500	21271	126	338,5	91	210	250	350	400		0,5-30	0,5-55	209	311	3115
MRTE 23000	23034	126	366,6	91	210	250	350	400		0,5-30	0,5-50	205	306	3100

SPECIAL TIMING TECHINICAL DATA (please contact PARKER Calzoni)

Size Motor version	Displace-ment	Moment inertia of rotating parts	Theore-tical specific torque	Min. start. torque % Theore-tical torque	Maximun Pressure					Speed range		Maximum output power		Weig-ht
					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
	cm³	kg m²	Nm/bar		bar	bar	bar	bar	bar	rpm	rpm	kW	kW	kg
MRTE 16500	16543	126	263,3	91	210	250	350	400	5 (15 bar with "F1" shaft seal)	0,5-50	0,5-80	236	352	3130
MRT 17000	16759	126	266,7	91	250	300	420	400		0,5-50	0,5-80	284	425	3100
MRTF 18000	18025	126	286,8	91	210	250	350	400		0,5-50	0,5-80	248	370	3115
MRT 19500	19508	126	310,5	91	250	300	420	400		0,5-50	0,5-80	331	494	3100
MRTE 20000	19788	126	314,9	91	210	250	350	400		0,5-45	0,5-75	265	395	3130
MRTF 21500	21271	126	338,5	91	210	250	350	400		0,5-45	0,5-75	284	425	3115
MRTE 23000	23034	126	366,6	91	210	250	350	400		0,5-45	0,5-75	308	460	3100

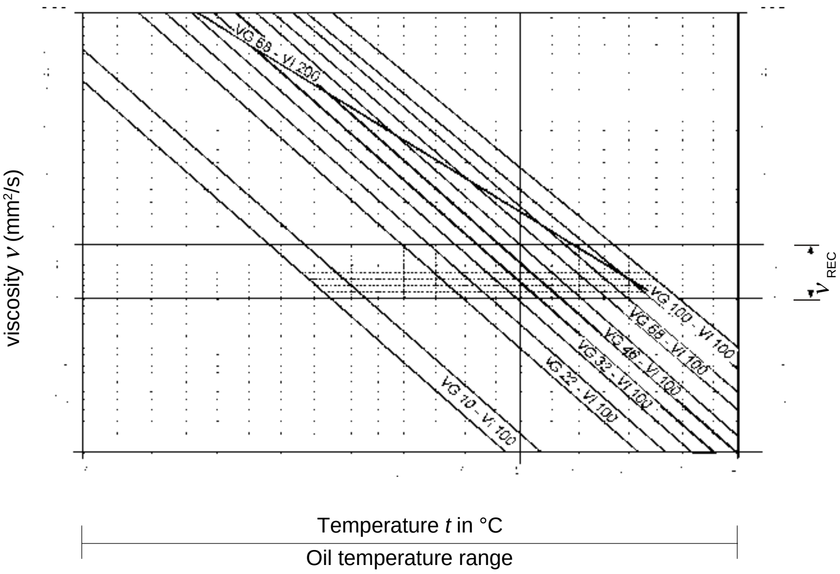
(*) Please consult PARKER Calzoni

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 PARKER Calzoni for confirmation.



GENERAL NOTES

More detailed information regarding the choice of the fluid can be requested to PARKER 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 PARKER 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 PARKER Calzoni.

$v_{rec.}$ = 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:

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

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

$v_{max.}$ = 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.

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

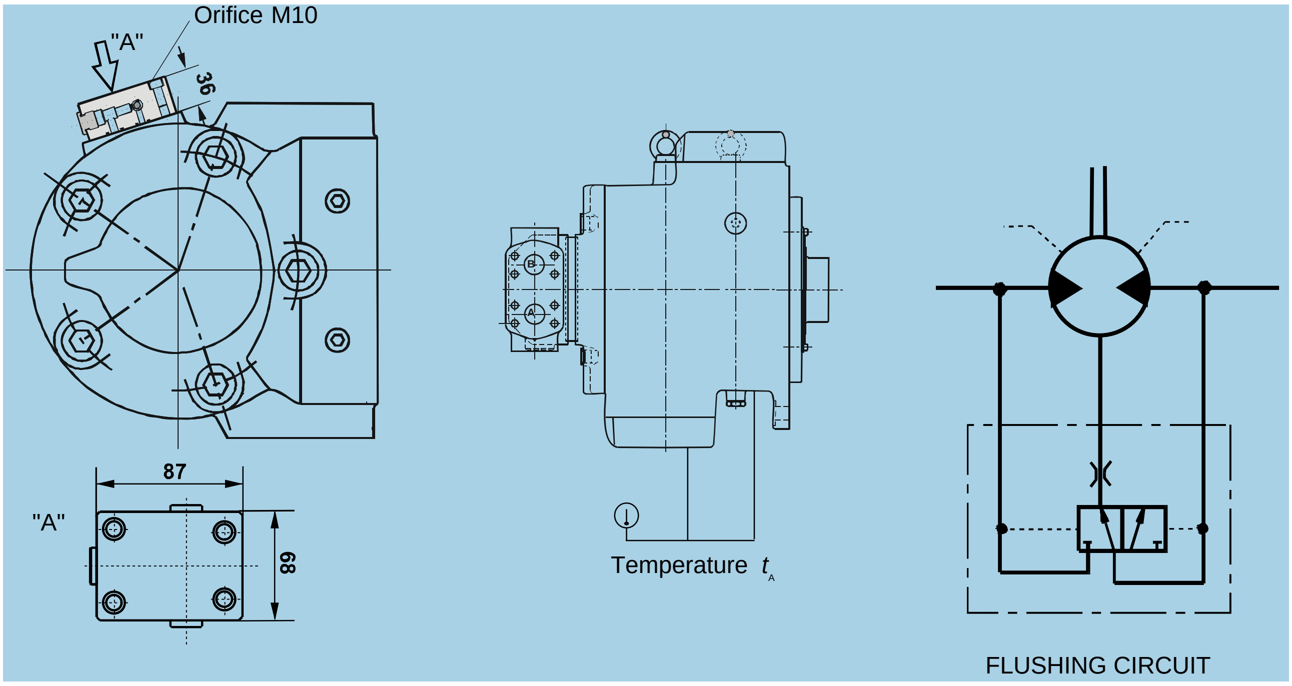
The lower the speed and the case drain pressure, the longer the life of the shaft seal. The maximum permissible housing pressure is

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 23, 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 23, Seals, Code "V1"). These "FPM" seals should be used with HFD fluids.



FLUSHING PROCEDURE

In order to achieve the maximum continuous performance values the flushing of the housing is necessary (see diagrams pages 8 to 12).
Under special conditions, in order to achieve the recommended operating viscosity of 30 - 50 mm^2/s in the motor housing, the flushing of the motor may be necessary also in the "operating area without flushing" see page 6 and the "operating diagram" page 7 to12.

NOTE1:

The oil temperature inside the motor housing is obtainable by adding 3° C to the motor housing surface temperature, measured between two cylinders (t_A , see figures).

FUNCTION:

The flushing valve takes the flushing flow always from the low pressure line of the motor.
The diameter of the orifice has to be chosen in order to supply the recommended quantity of flushing flow of 23 l/min.

BACK PRESSURE (bar)	ORIFICE DIAMETER (mm)
3	4,8
6	4,0
9	3,6
15	3,2
20	3,0
25	2,9
30	2,8

NOTE2:

The flushing valve is delivered with a "closed" orifice.

Caution:

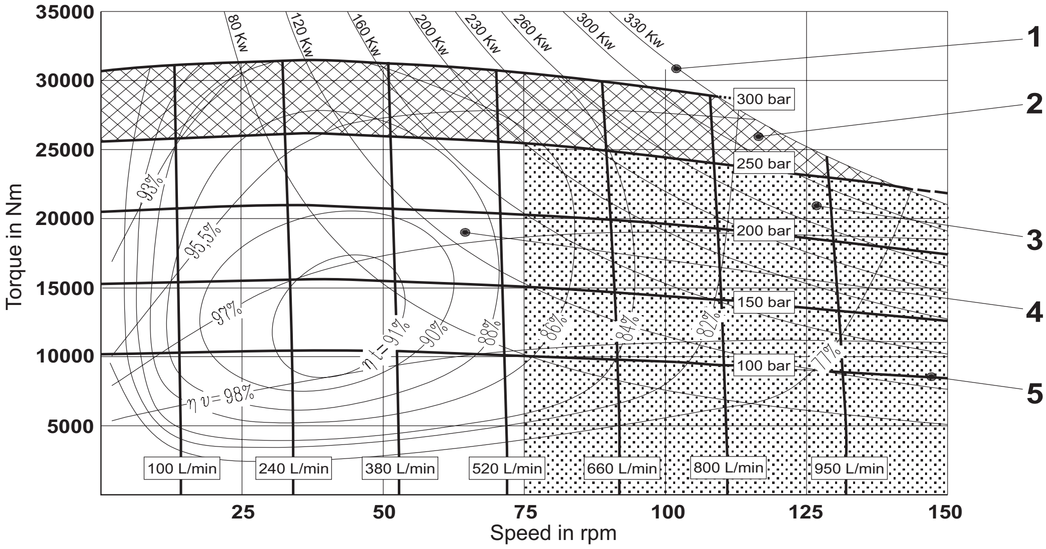
Flushing does not work until the "closed" orifice is replaced by the proper one.

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

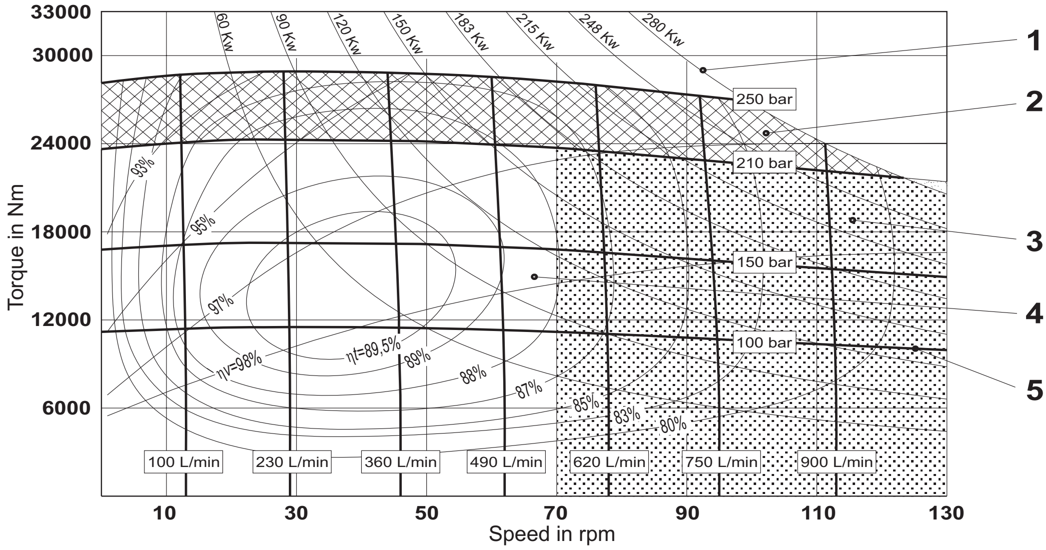
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

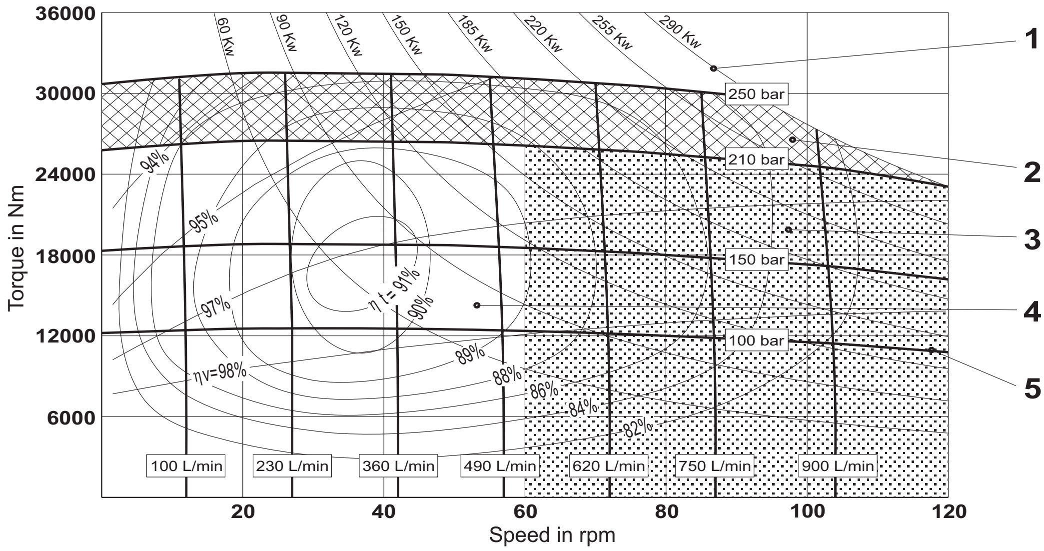
MRT 7100



MRTF 7800



MRTE 8500

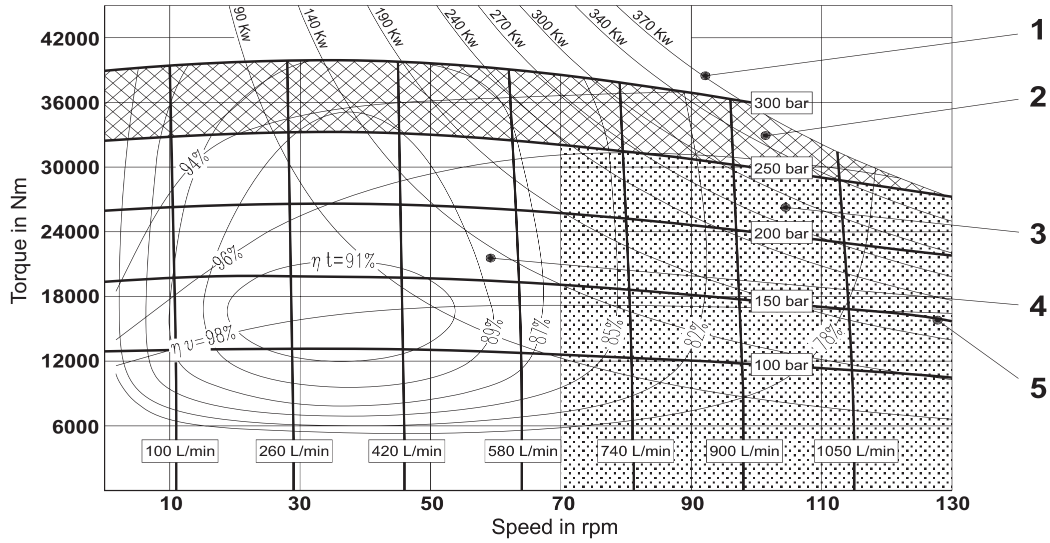


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

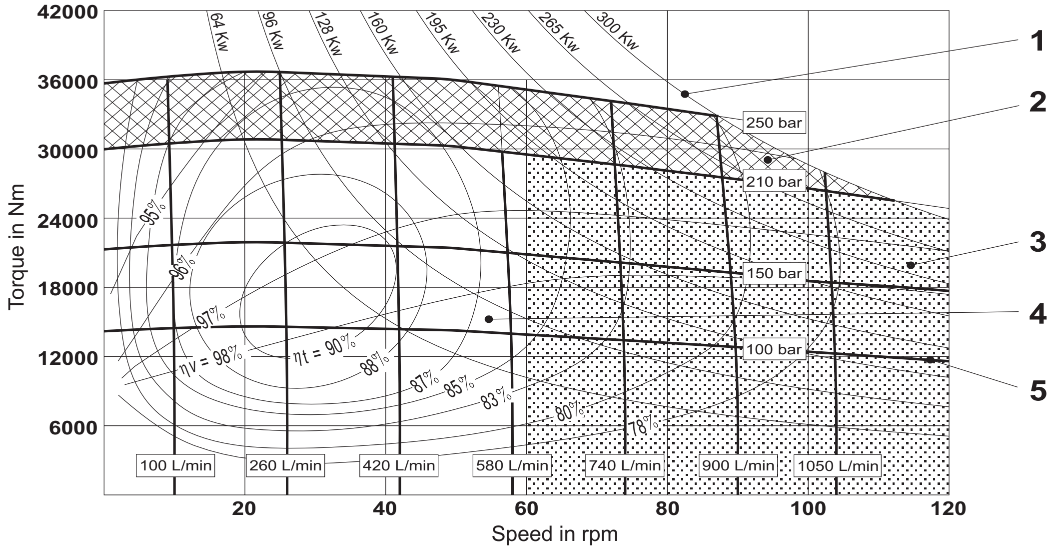
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

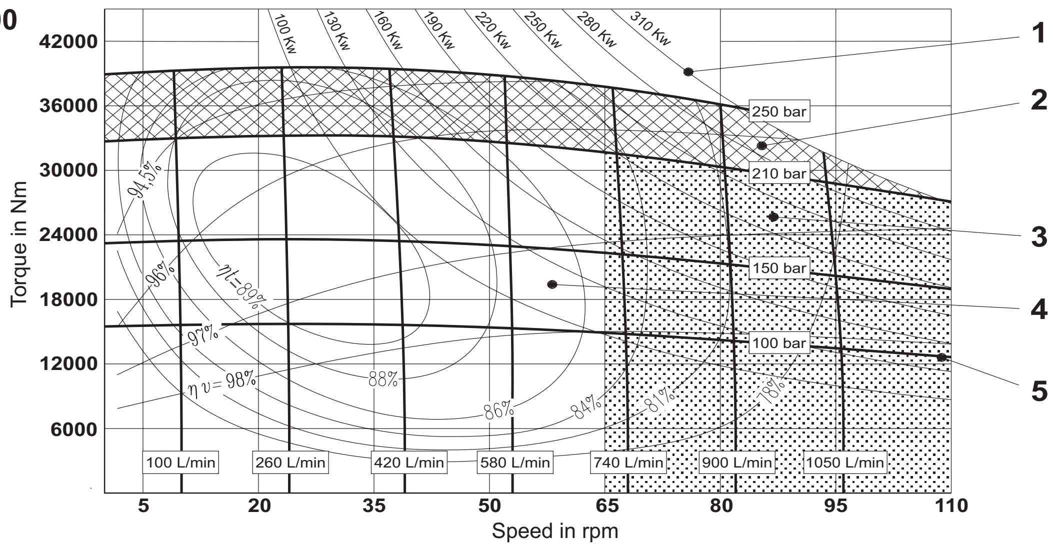
MRT 9000



MRTF 9900



MRTE 10800

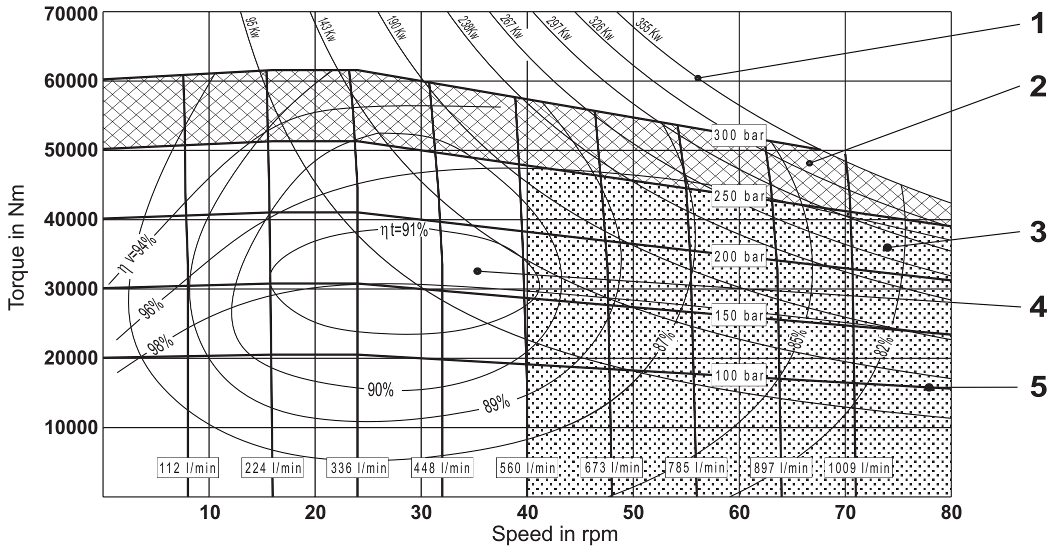


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

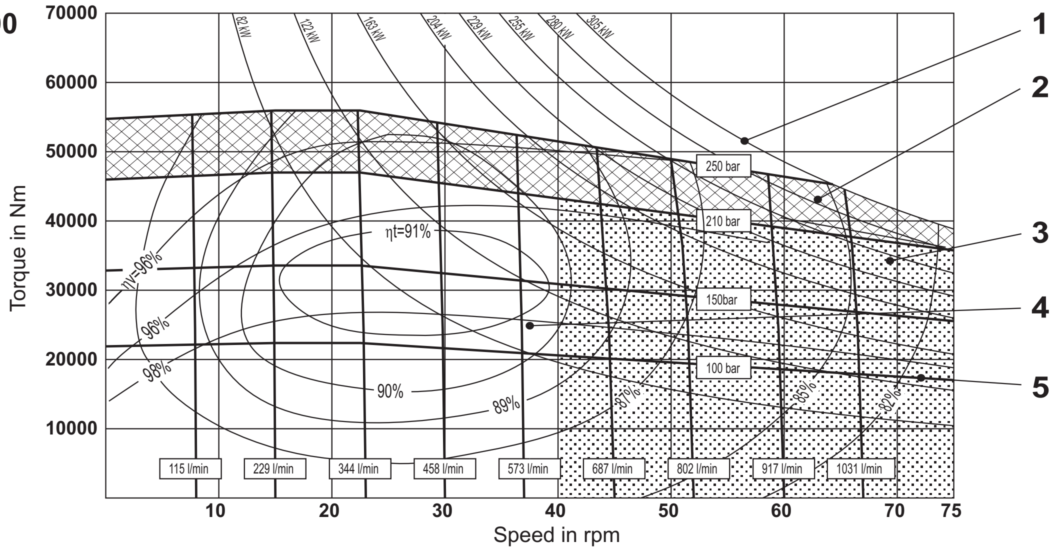
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

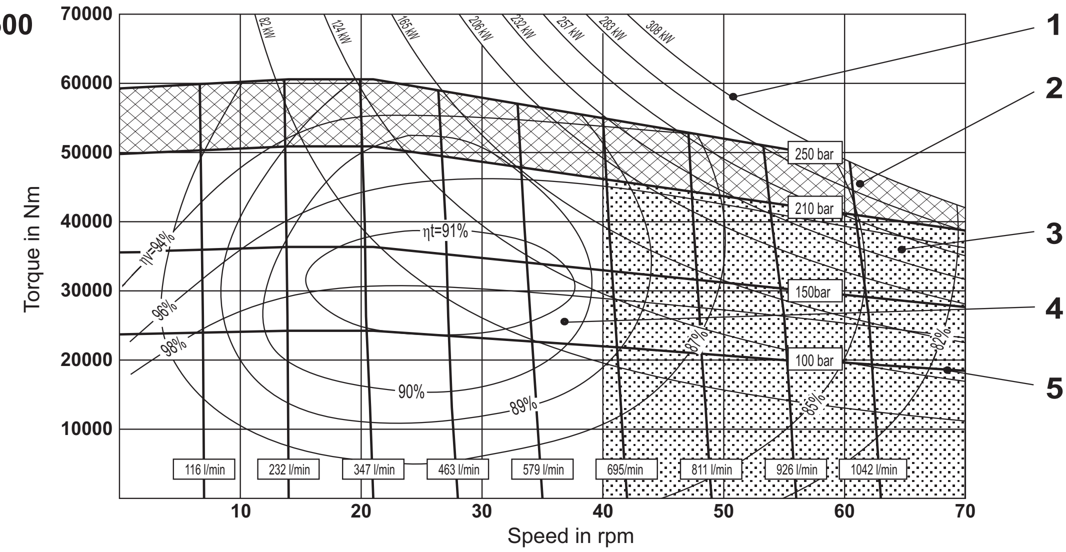
MRT 14000



MRTF 15500



MRTE 16500

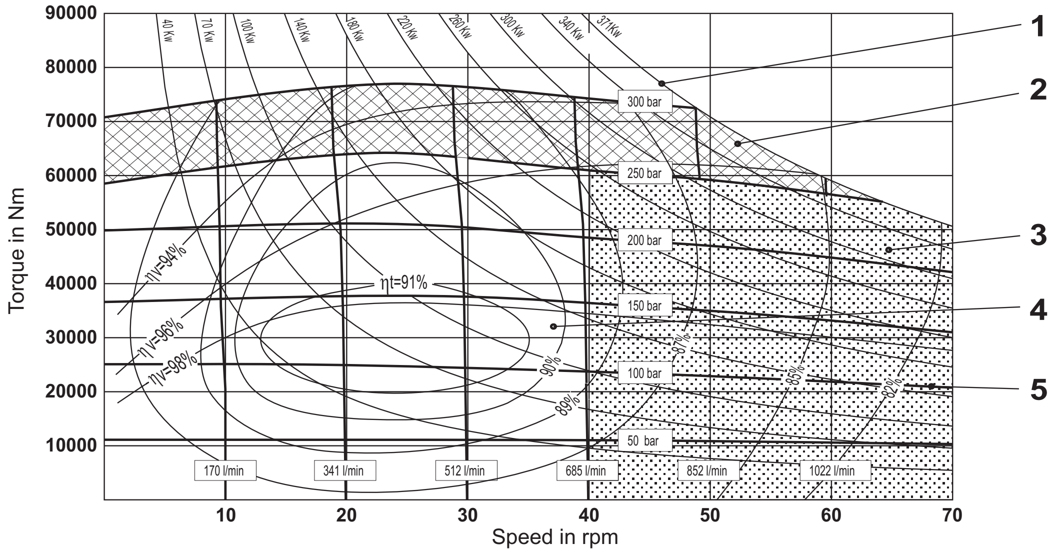


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

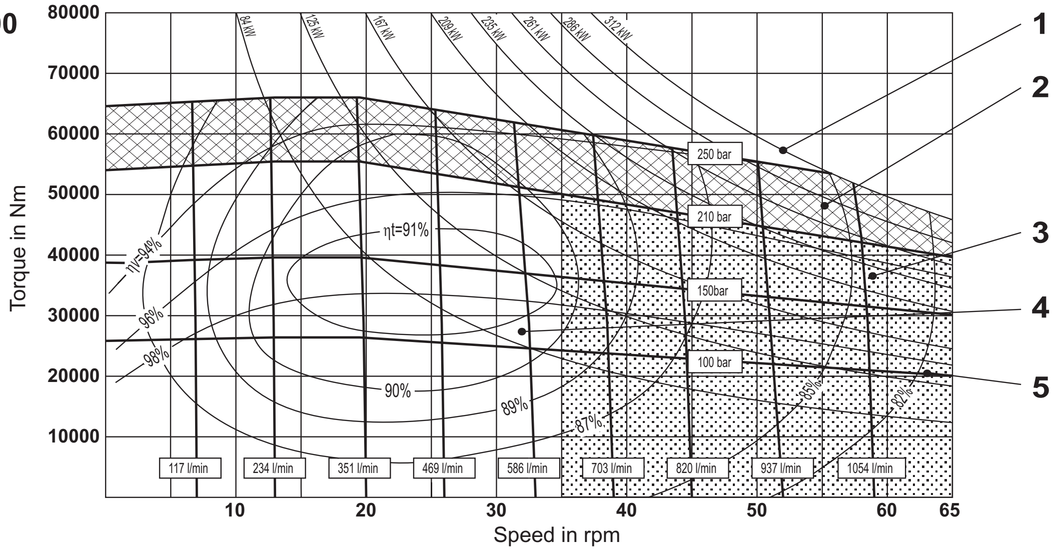
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

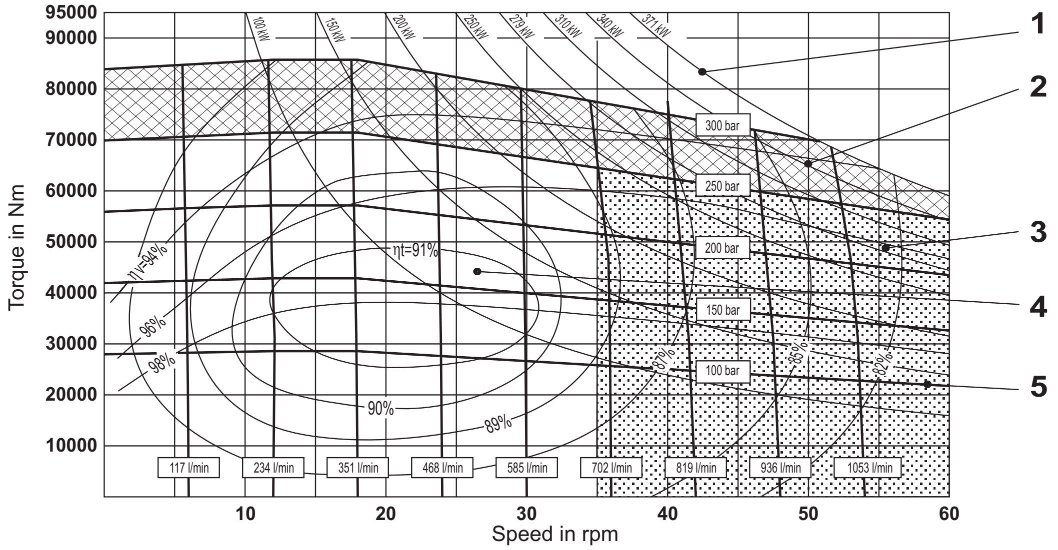
MRT 17000



MRTF 18000



MRT 19500

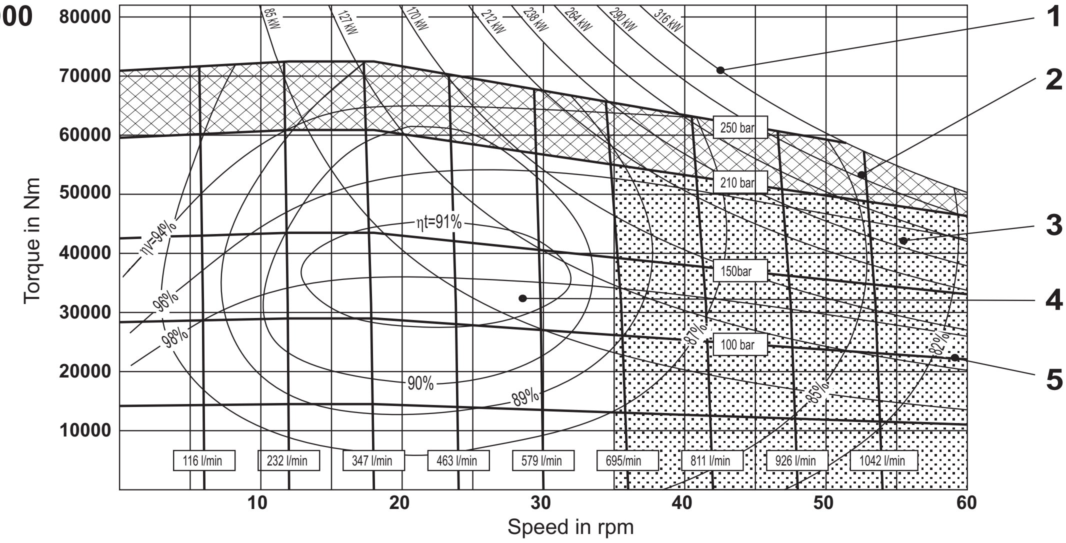


OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

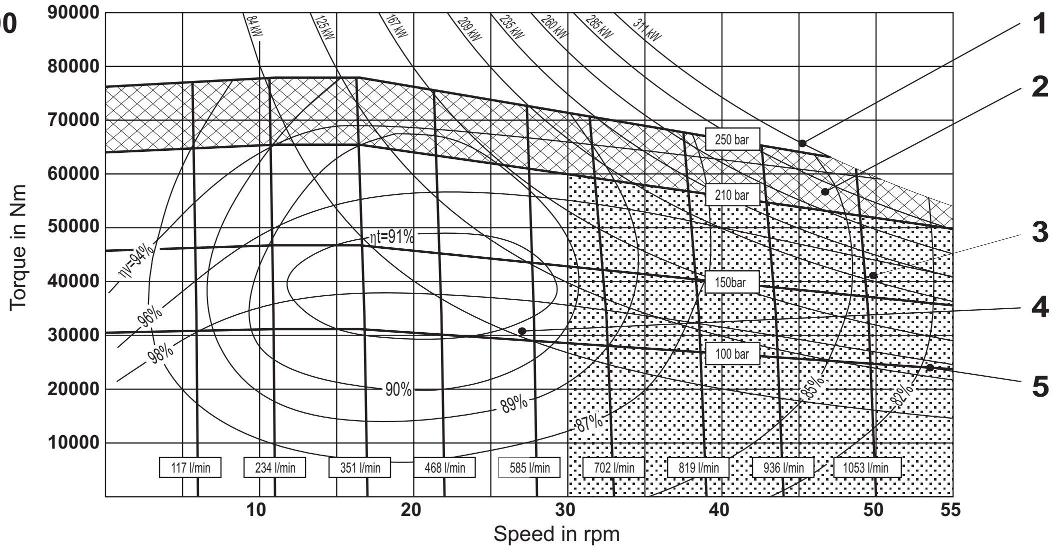
1 Output power **2** Intermittent operating area **3** Continuous operating area with flushing

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

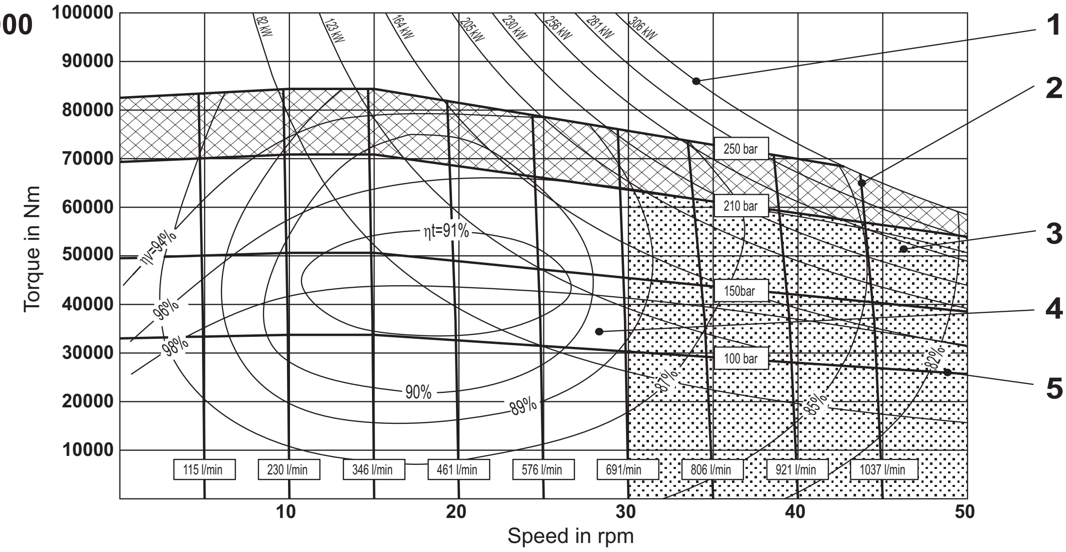
MRTE 20000



MRTF 21500



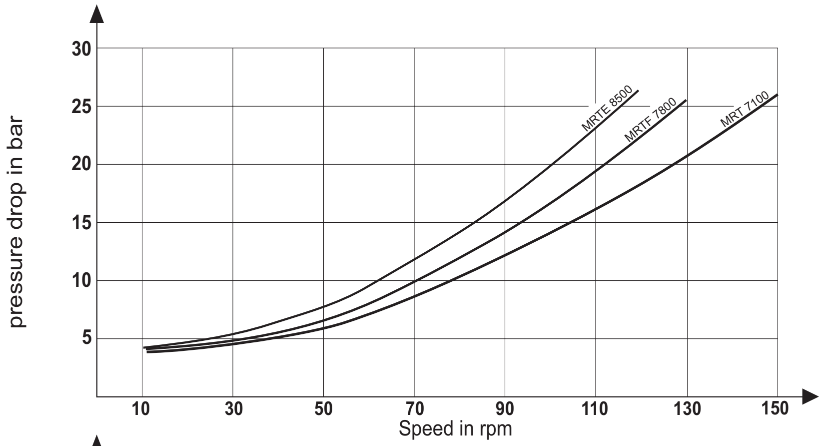
MRTE 23000



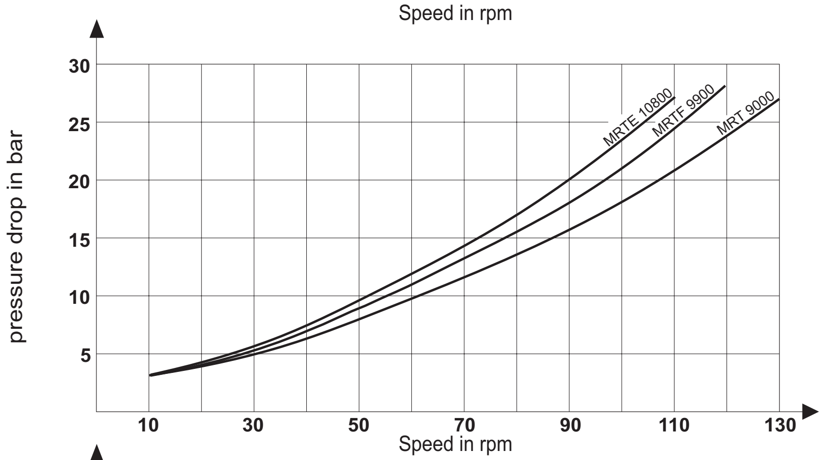
OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

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

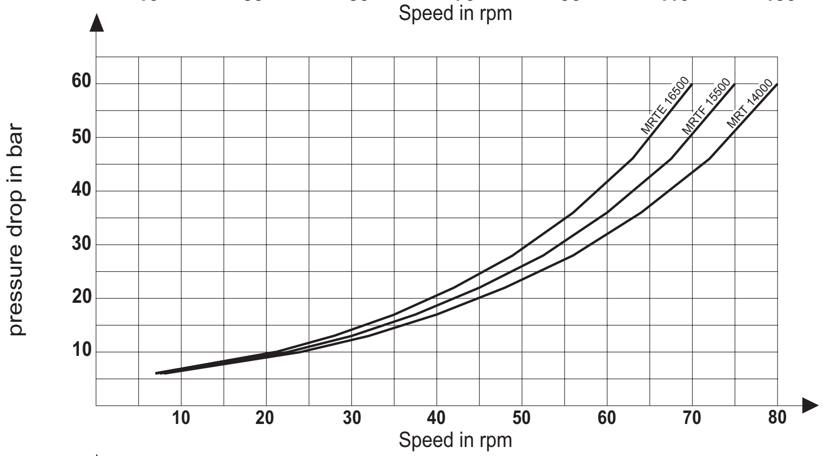
MRT - MRTE - MRTF 7100 - 8500



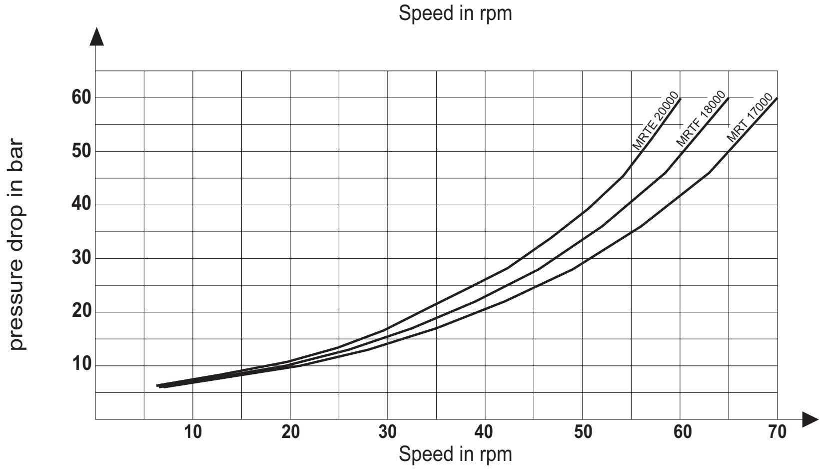
MRT - MRTE - MRTF 9000 - 10800



MRT - MRTE - MRTF 14000 - 16500



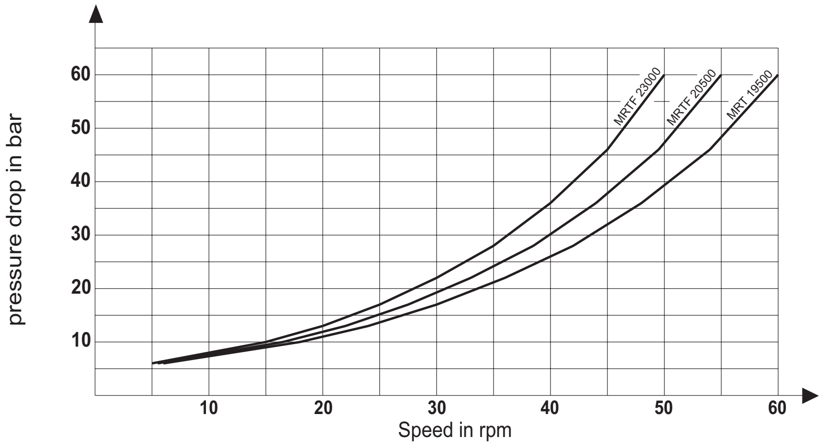
MRT - MRTE - MRTF 17000 - 20000



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

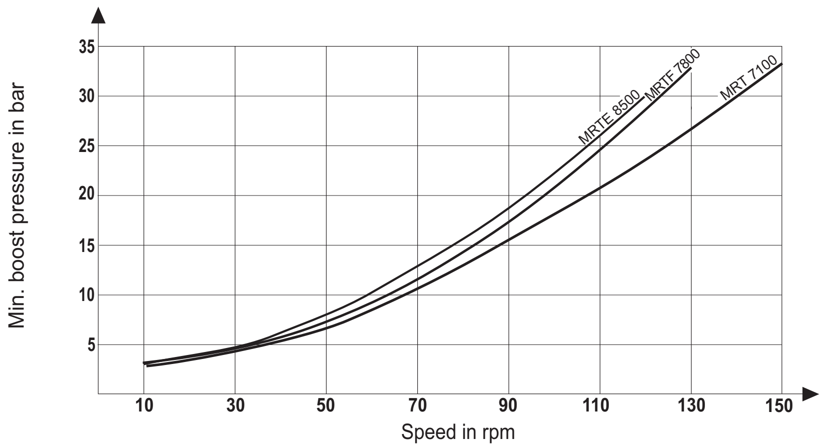
Min. required pressure difference Δp with idling speed (shaft unloaded)

MRT - MRTE - MRTF
19500 - 23000

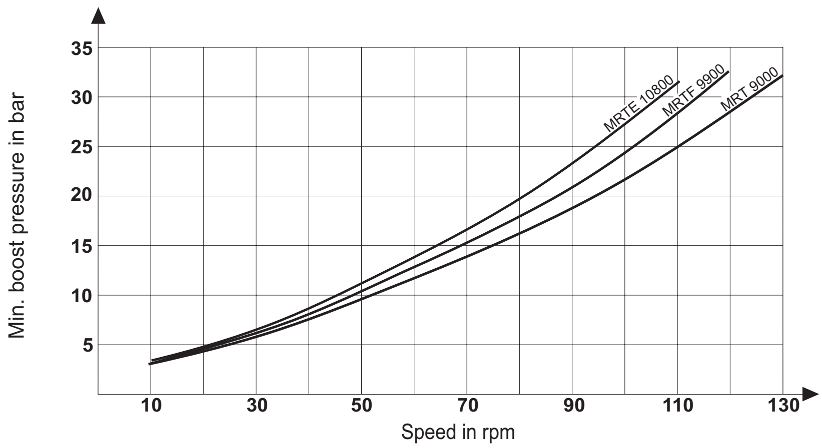


Minimum boost pressure during pump operation

MRT - MRTE - MRTF
7100 - 8500



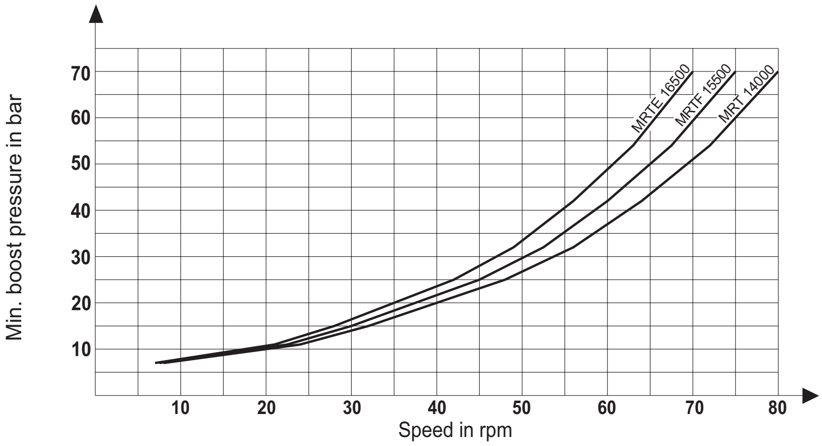
MRT - MRTE - MRTF
9000 -10800



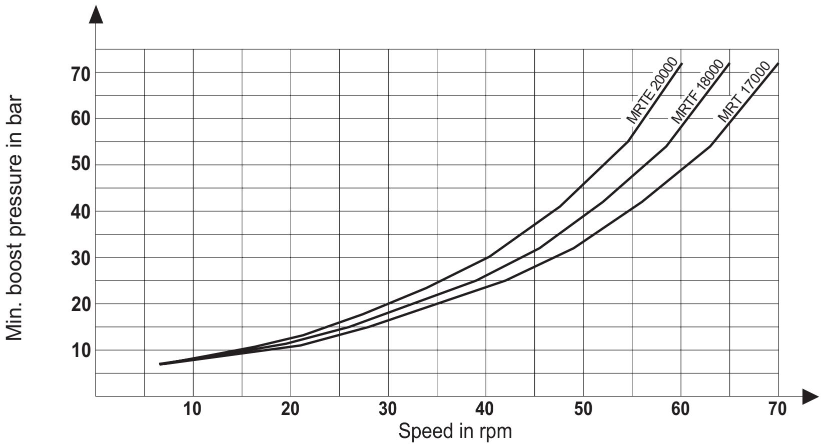
OPERATING DIAGRAM (average values) measured at ν = 36 mm²/s; t = 45° C; p_{outlet} = 0 bar

Minimum boost pressure during pump operation

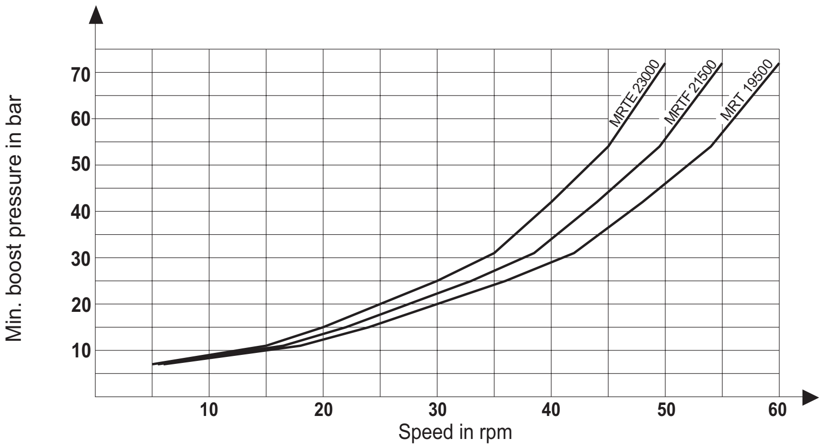
MRT - MRTE - MRTF 14000 - 16500

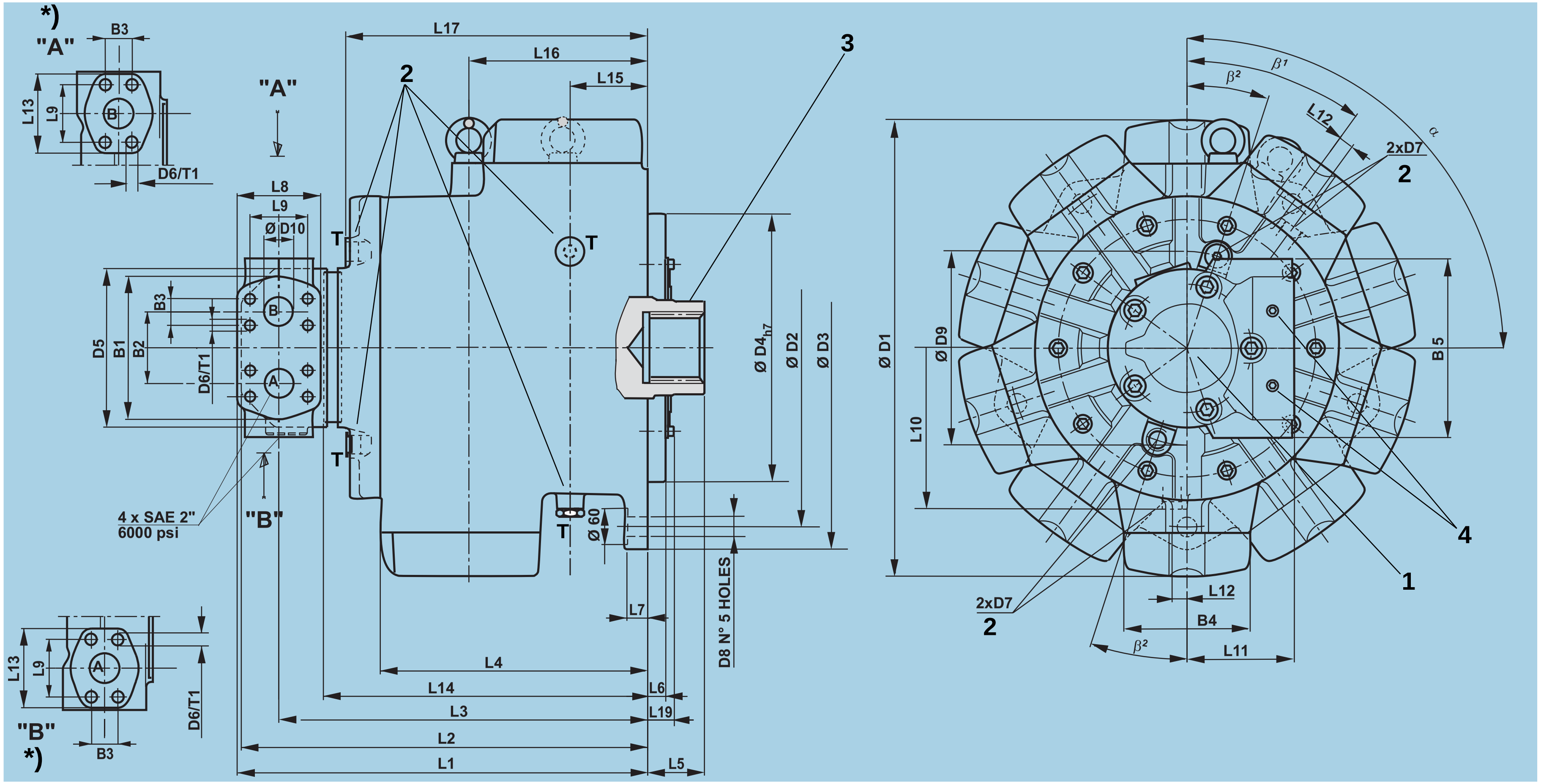


MRT - MRTE - MRTF 17000 - 20000



MRT - MRTE - MRTF 19500 - 23000





1 On request port flange can be rotated by 72°

*) These SAE ports are present only in the MRT 9000P, MRTF 9900P, MRTE 10800P, MRT 14000Q, MTRF15500Q, MRTE16500, MRT 17000Q, MRTF 18000Q, MRT 19500Q, MRTE 20000Q, MRTF 21500Q e MRTE 23000Q

2 Case drain port BSP threads to ISO 228/1

3 See dimensions at page 17

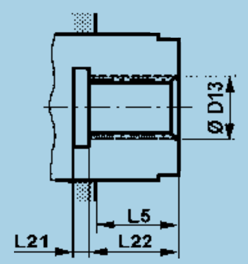
4 Port 1/4“ BSP threads to ISO 228/1 for pressure reading.

Dir. of Rotation (Viewed on shaft end)	Port inlet	ordering code (see page23)
clockwise	A	"N"
anti-clockwise	B	
clockwise	B	"S"
anti-clockwise	A	

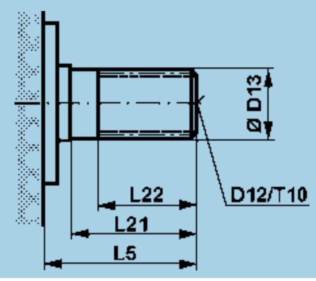
MOTOR TYPE	L1	L2	L3	L4	L6	L7	L8	L9		L10	L11	L12	L13	L14	L15	L16	L17	L19	B1	B2	B3		B4	B5
								SAE 3000 psi	SAE 6000 psi												SAE 3000 psi	SAE 6000 psi		
MRT 7100 MRTF 7800 MRTE 8500 MRT 9000 MRTF 9900 MRTE 10800	688,5	681,5	618,5	448,5	30	35	140	77,77	96,8	270	180	25	133	541,5	130	300	503,5	44	240	120	42,88	44,4	212	300

MOTOR TYPE	Ø D1	Ø D2	Ø D3	Ø $D4_{h7}$	Ø D5	D6		T1		D7	Ø D8	Ø D9	Ø D10	α	β^1	β^2
						SAE 3000 psi	SAE 6000 psi	SAE 3000 psi	SAE 6000 psi							
MRT 7100 MRTF 7800 MRTE 8500 MRT 9000 MRTF 9900 MRTE 10800	766	600	676	450	266	M12	M20	28	40	G1"	33 (x5)	325	50	90°	36°	18°

Code F 1 - DIN 5480

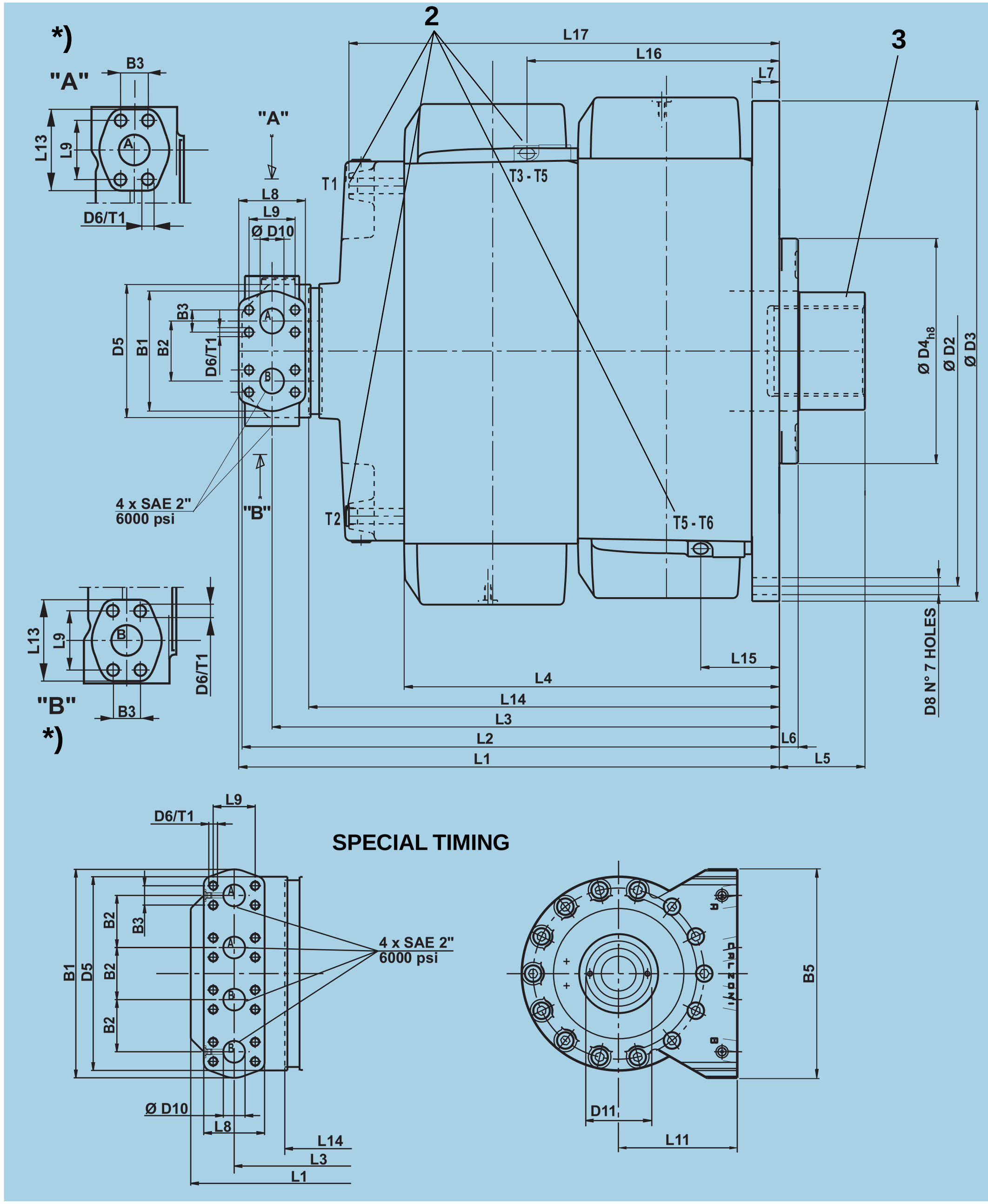


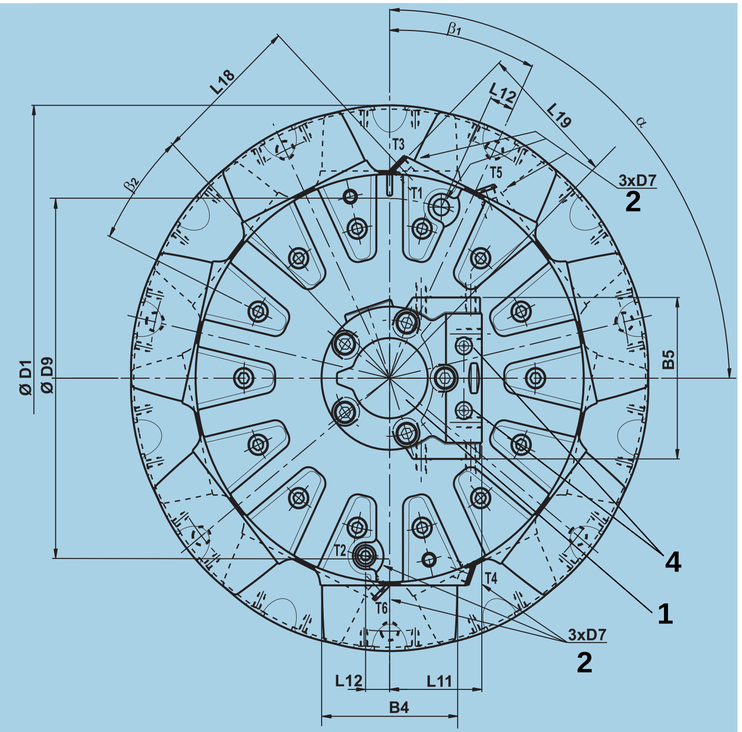
Code D 1 - DIN 5480



MOTOR TYPE	F1				D1					
	L5	L21	L22	Ø D13 DIN 5480	L5	L21	L22	Ø D13 DIN 5480	D12	T10
MRT 7100 MRTF 7800 MRTE 8500	50	14	76	N 110x3x35 - 9H	--	--	--	--	--	--
MRT 9000 MRTF 9900 MRTE 10800	95	14	86	N 120x4x28 - 9H	250	205	167	W 140x5x26 - 8f	M12	25

NOTE: the threaded holes (D12/T10) for the shaft versions ""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 PARKER Calzoni.





1 On request port flange can be rotated by 72°

*) These SAE ports are present only in the MRT 14000Q, MTRF15500Q, MRTE16500, MRT 17000Q, MRTF 18000Q, MRT 19500Q, MRTE 20000Q, MRTF 21500Q e MRTE 23000Q

2 Case drain port BSP threads to ISO 228/1

3 See dimensions at page 19

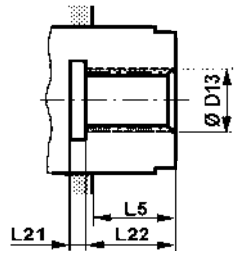
4 Port 1/4“ BSP threads to ISO 228/1 for pressure reading.

Dir. of Rotation (Viewed on shaft end)	Port inlet	ordering code (see page23)
clockwise	A	"N"
anti-clockwise	B	
clockwise	B	"S"
anti-clockwise	A	

MOTOR TYPE	L1	L2	L3	L4	L5	L6	L7	L8	L9		L11	L12	L13	L14	L15	L16	L17	L18	L19	B1	B2	B3		B4	B5	α	β_1	β_2
									SAE 3000 psi	SAE 6000 psi												SAE 3000 psi	SAE 6000 psi					
MRT 14000 MRTF 15500 MRTE 16500 MRT 17000 MRTF 18000 MRT 19500 MRTE 20000 MRTF 21500 MRTE 23000	1135,5	1128,5	1065,5	788	80	39,5	58	140	77,77	96,8	180	47	133	988,5	165	530	904	289	270	240	120	42,88	44,4	270	300	90°	25°41'	20°

MOTOR TYPE	Ø D1	Ø D2	Ø D3	Ø $D4_{h7}$	Ø D5	D6		T1		D7	Ø D8	Ø D9	Ø D10	F1			
						SAE 3000 psi	SAE 6000 psi	SAE 3000 psi	SAE 6000 psi					L5	L21	L22	Ø D13 DIN 5480
MRT 14000 MRTF 15500 MRTE 16500 MRT 17000 MRTF 18000 MRT 19500 MRTE 20000 MRTF 21500 MRTE 23000	1014	856	930,5	450	266	M12	M20	28	40	G1"	34 (x7)	666,6	50	80	14	155	N 150x4x36 - 9H

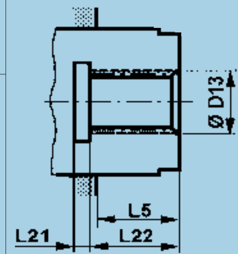
Code F 1 - DIN 5480



SPECIAL TIMING DIMENSIONS (please contact DENISON Calzoni)

Tipo e MOTOR TYPE	L1	L3	L5	L8	L9		L11	L14	B1	B2	B3		B5	D6		T1		D7	Ø D9	Ø D10	Ø D11	F1			
					SAE 3000 psi	SAE 6000 psi					SAE 3000 psi	SAE 6000 psi		SAE 3000 psi	SAE 6000 psi	SAE 3000 psi	SAE 6000 psi					L5	L21	L22	Ø D13 DIN 5480
MRTE 16500 MRT 17000 MRTF 18000 MRT 19500 MRTE 20000 MRTF 21500 MRTE 23000	1177	1077	82	140	77,77	968	273	960,5	480	120	42,88	44,4	446	M12	M20	28	40	G1"	666,6	50	80	82	14	155	N 150x4x36 - 9H

Code F 1 - DIN 5480

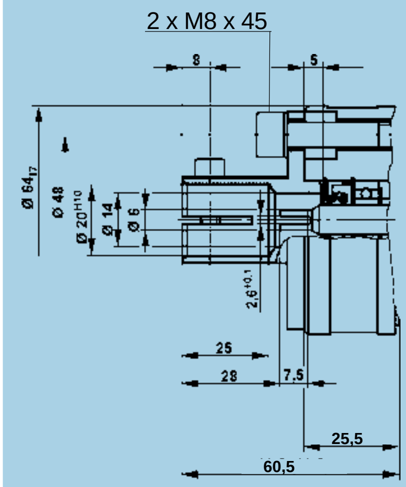


MECHANICAL TACHOMETER DRIVE

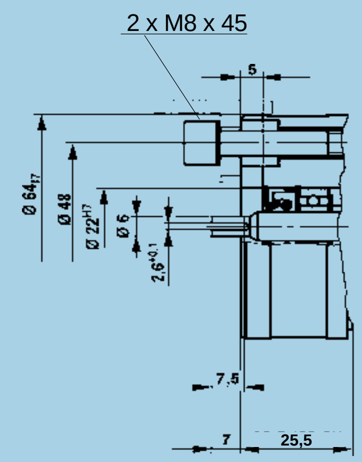
TACHOGENERATOR DRIVE

ENCODER DRIVE

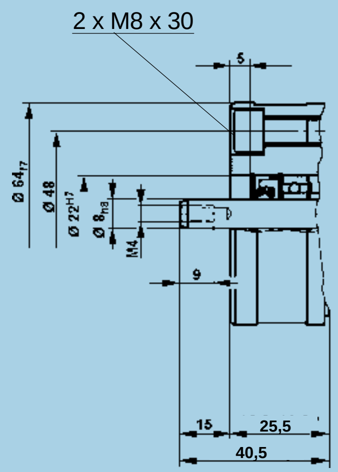
Code "C1"



Code "T1"

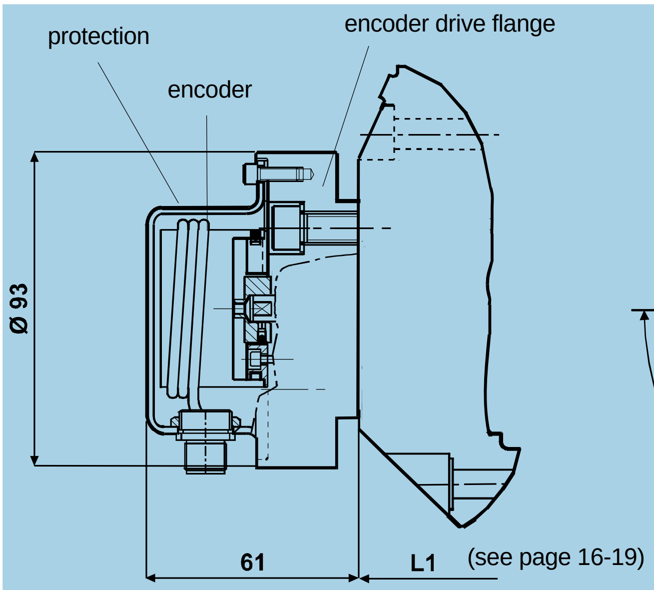


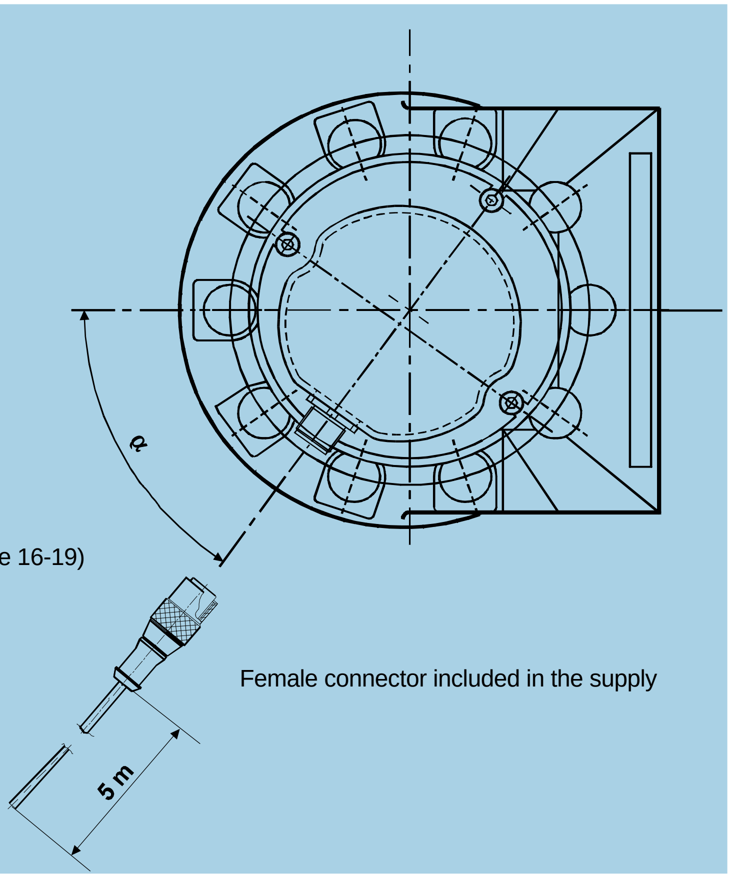
Code "Q1"



Timing standard

INCREMENTAL ENCODER DIMENSIONS



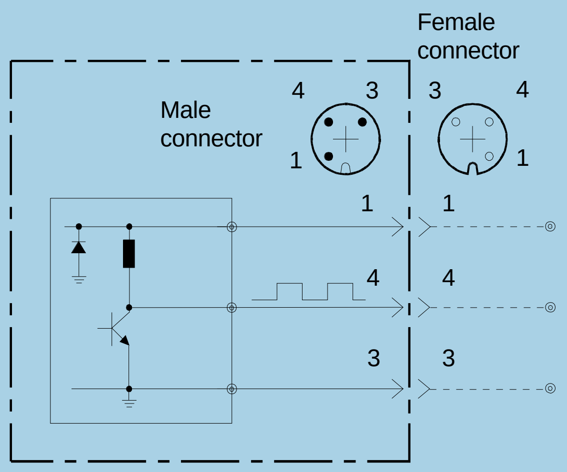


α = 45°

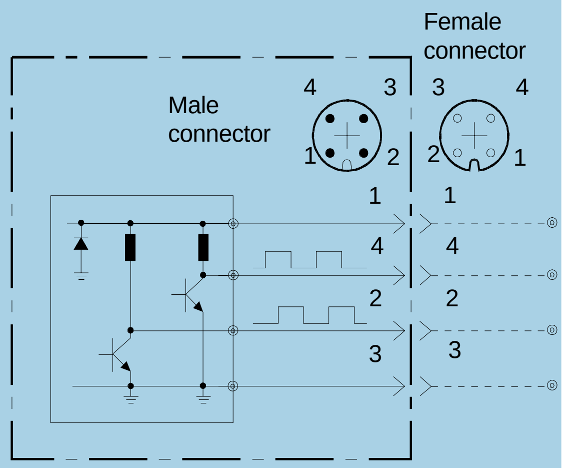
Timing standard

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.

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

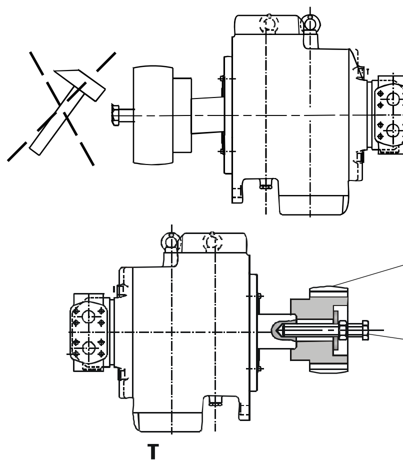
Pipes, pipe connections

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



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

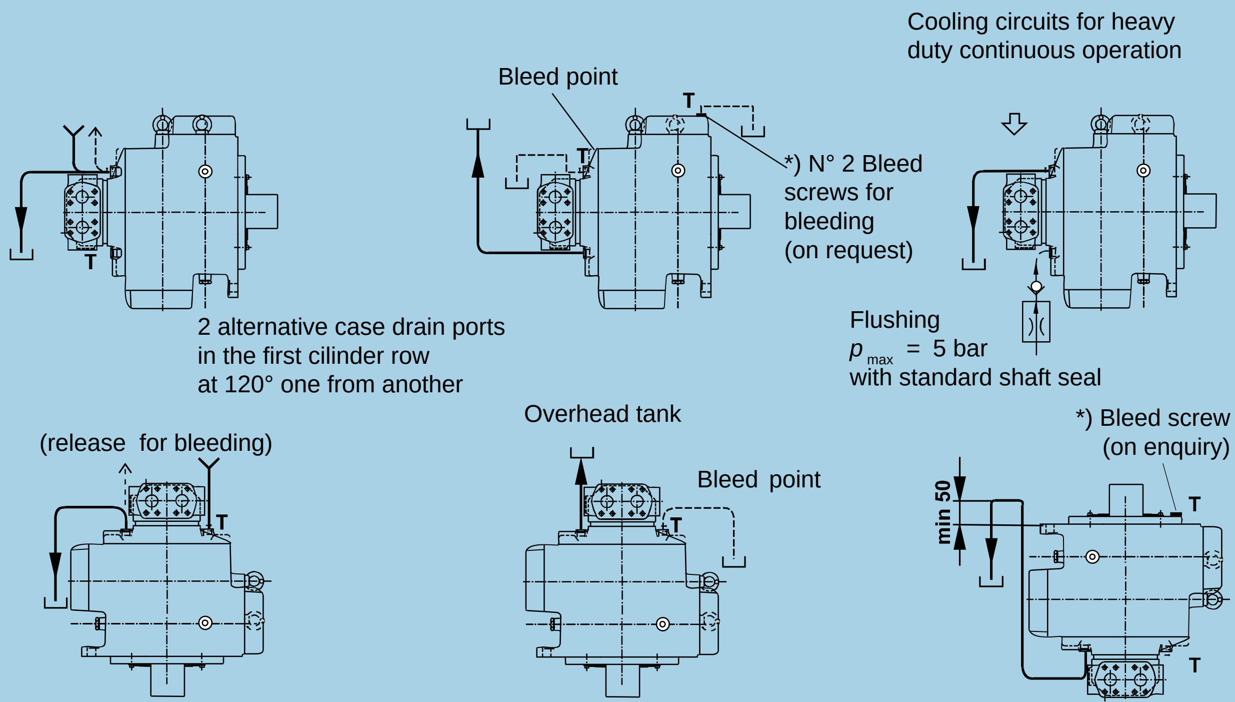
DRAIN AND FLUSHING LINK INSTALLATION EXAMPLES

Note: Install leakage line in such a way that motor **cannot** run empty.

T = Seal
Y = Motor housing feeding point
← = Bleed

Note: Install leakage line in such a way that motor **cannot** run empty.

Low pressure case drain returns to tank



Choose drain port in order to allow the complete filling of the housing with hydraulic fluid.

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

CODE

Example: MRT 7100P - D1 M1 F1 S1 N **

1. **MRT** 7100P - D1 M1 F1 S1 N **
SERIES

MRT	standard 250 bar max. continuous
MRTF - MRTE	expanded 210 bar max. continuous

2. MRT **7100P** - D1 M1 F1 S1 N **
SIZE & DISPLACEMENT

P	code	**MRT 7100 P**	**MRTF 7800 P**	**MRTE 8500 P**
	Cm³	7100,4	7808,8	8517,3
	code	**MRT 9000 P**	**MRTF 9900 P**	**MRTE 10800 P**
	Cm³	9005,5	9903,9	10802,4
Q	code	**MRT 14000 Q**	**MRTF 15500 Q**	**MRTE 16500 Q**
	Cm³	14010	15277	16543
	code	**MRT 17000 Q**	**MRTF 18000 Q**	**MRT 19500 Q**
	Cm³	16759	18025	19508
	code	**MRTE 20000 Q**	**MRTF 21500 Q**	**MRTE 23000 Q**
	Cm³	19788	21271	23034

3. MRT 7100P - **D1** M1 F1 S1 N **
SHAFT

D1	spline DIN 5480 (see page 17)
F1	female spline DIN 5480 (see page 17-19)

4. MRT 7100P - D1 **M1** F1 S1 N **
SPEED SENSOR OPTION

N1	none	
Q1	encoder drive (see page 20)	
C1	mechanical tachometer drive (see page 20)	
T1	tachogenerator drive (see page 20)	
M1	incremental Elcis encoder (500 pulse/rev) (see page 20)	Uni-directional
B1		Bi-directional

5. MRT 7100P - D1 M1 **F1** S1 N **
SEALS

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

6. MRT 7100P - D1 M1 F1 **S1** N **
CONNECTION FLANGE

S1	SAE metric (see page 16-19)
G1	standard SAE 6000 psi metric (see page 16-19)
M1	SAE 6000 psi metric special timing (see page 18-19)

7. MRT - 7100P - D1 M1 F1 S1 **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. MRT 7100P - D1 M1 F1 S1 N ******
SPECIAL

**	space reserved to PARKER Calzoni

FOR INFORMATION ABOUT SALES AND SERVICE LOCATIONS PLEASE CONTACT:

Parker Calzoni S.r.l.
Via caduti di sabbiuno 15/17
40011 Anzola dell'Emilia
Bologna – Italy
Tel. +39.051.6501611
Fax. +39.051.736221
e-mail: infocalzoni@parker.com

or visit the websites:

www.parker.com

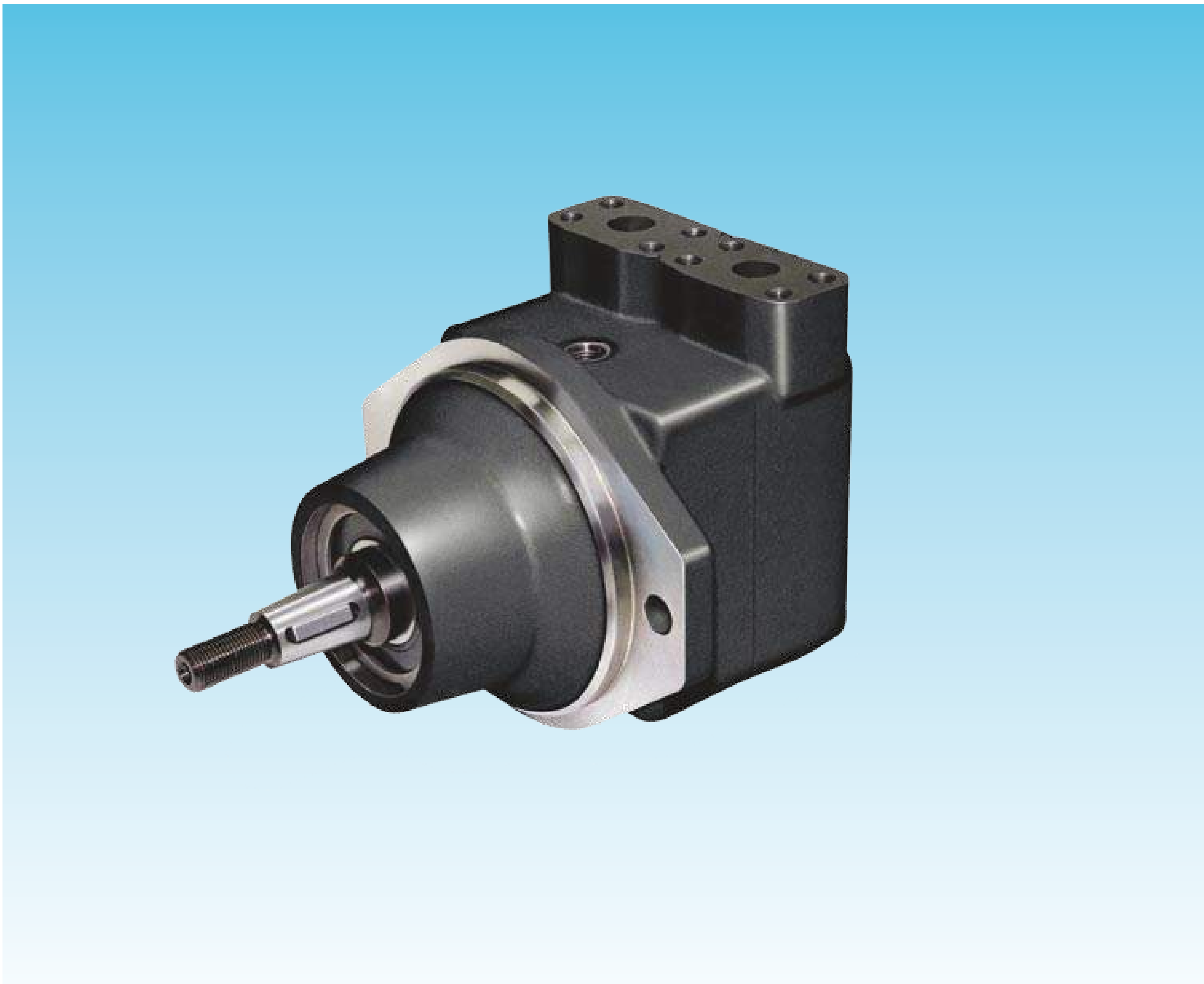
www.denisonhydraulics.com

YOUR LOCAL **PARKER CALZONI** REPRESENTATIVE

Hydraulic Motor
M5A*/M5B* Series
Vane Motors

Pressure up to 320 bar
Fixed Displacement from 6 to 45 ml/rev.

Catalogue HY29-0018/UK
December 2006



Content

GENERAL

M5AF / M5AF1

M5B / M5BS

M5BF / M5BF1

⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin, its subsidiaries, sales offices and authorized distributors provide product or system options for further investigation by users having technical expertise. Before you select or use any product or system it is important that you analyse all aspects of your application and review the information concerning the product or system in the current product catalogue. Due to the variety of operating conditions and applications for these products or systems, the user, through his own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance and safety requirements of the application are met.
The products are subject to change by Parker Hannifin at any time without notice.

Offer of Sale

Please contact your Parker representation for a detailed ''Offer of Sale''.

LOW NOISE MOTOR

12 vanes and a patented cartridge design allows a very low noise level, whatever the speed.

HIGH PERFORMANCE MOTOR

The M5B series have been designed especially for severe duty applications wich require high pressure , high speed and low fluid lubricity.
Max. pressure (intermittent)
M5A* 006 to 018 .... : 300 bar
M5A* 023 - 025 .... : 280 bar
M5B* 012 to 036 .... : 320 bar
M5B* 045 .... : 280 bar

Max. speed (intermittent, low loaded cond.)
M5A* 006 to 018 .... : 4000 RPM
M5A* 023 - 025 .... : 3000 RPM
M5B* 012 - 018 .... : 6000 RPM
M5B* 023 - 028 - 036 .... : 4000 RPM
M5B* 045 .... : 3000 RPM

HIGH EFFICIENCY

Up to 90 % overall at 300 bar for M5A* and 320 bar for M5B*.
Vane motors begin life with a high volumetric efficiency, and maintain that efficiency throughout their operating life.
Vane pin holdout design improves the mechanical efficiency at low pressure.

HIGH STARTING TORQUE

The high starting torque efficiency of the vane type motors allows them to start under high load without pressure overshoots, jerks and high instantaneous horsepower loads.

LOW TORQUE RIPPLE

This 12 vane type motor exhibits a very low torque ripple (typical ± 1,5%), even at low speeds.

HIGH LIFETIME

The vane, rotor and cam ring are pressure balanced to increase life over the full speed range. Double lip vanes reduce the sensitivity to fluid pollution.

INTERCHANGEABLE ROTATING GROUPS

Our precise manufacturing allows any component to be interchangeable. Rotating groups may be easily replaced to renew the motor or change the displacement to suit altered requirements for speed or torque.

ROTATION AND DRAIN

The M5B-M5BS are bi-directional motors, externally drained.
The M5AF and M5BF, externally drained, are available in three types of rotation : bi-directional, clockwise, counter-clockwise.
The M5AF1 and M5BF1, internally drained, are available in two types of rotation : clockwise, and counter-clockwise.

CROSS PORT CHECK VALVE

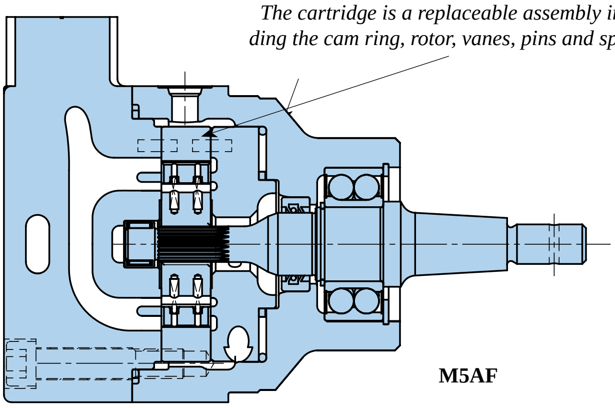
The uni-directional M5AF, M5AF1, M5BF and M5BF1 are designed with an internal valve that allows smooth dynamic braking, with a very simple hydraulic circuit and without risk of motor cavitation.

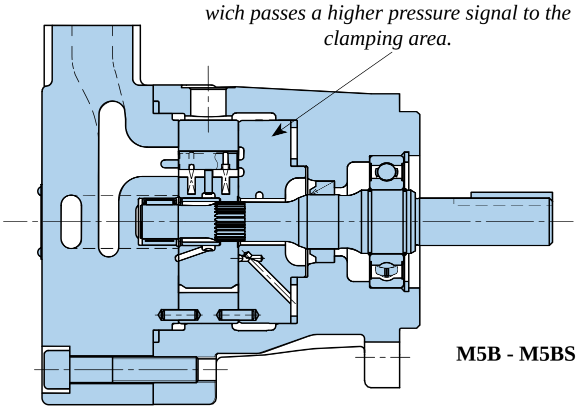
MOUNTING

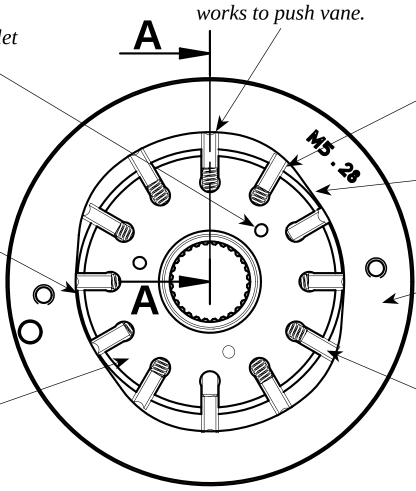
M5B - M5BS : Cylindrical keyed or splined shaft according to SAE J744, ISO 3019-2 or J498.
These products are designed primarily for coaxial drives which do not impose axial or side loading on the shaft.

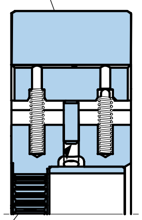
M5AF - M5AF1 : Cylindrical keyed or taper shaft, and a high load capacity double ball bearing allows the direct mounting on shaft (fan, ...).

M5BF : A stiff taper or cylindrical keyed shaft and a high load capacity double ball bearing allow the direct mounting on shaft (fan, ...).









Section A-A

OPERATION - SINGLE CARTRIDGE

- The motor shaft is driven by the rotor. Vanes, closely fitted into the rotor slots move radially to seal against the cam ring. The ring has two major and two minor radial sections joined by transitional sections called ramps. These contours and the pressures exposed to them are balanced diametrically.

- Hydraulic pins and light springs urge the vanes radially against the cam contour assuring a seal at zero speed so that the motor can develop starting torque. The springs and pins are assisted by centrifugal force at higher speeds. Radial grooves and holes through the vanes equalize radial hydraulic forces on the vanes at all times. Fluid enters and leaves the motor cartridge through opening in the side plates at the ramps. Each motor port connects to two diametrically opposed ramps. Pressurized fluid entering at Port A torques the rotor clockwise. The rotor transports it to the ramp openings wich connect to Port B from wich it returns to the low pressure side of the system. Pressure at Port B torques the rotor counter-clockwise.

- The rotor is separated axially from the sideplate surface by the fluid film. The front sideplate is clamped against the cam ring by the pressure, maintains optimum clearance as dimensions change with temperature and pressure. A 3-way shuttle valve in the sideplate causes clamping pressure in Port A or B, whichever is the highest.

- Materials are chosen for long life efficiency. The vanes, rotor and cam ring are made out of hardened high alloy steels. Cast semi-steel sideplates are chemically etched to have a fine crystalline surface for good lubrification at start-up.

EXTERNAL DRAIN MOTOR

This motor may be alternately pressurizes on ports A and B to 300 bar max. int. (280 bar for 025) for M5AF and 320 bar max. int. (280 bar for 045) for M5BF. Whichever port is at low pressure, it should not be subjected to more than 60% of the high pressure, eg. for M5B* : When 320 bar in A, B is limited to 200 bar.
This motor must have a drain line connected to the center housing drain connection of sufficient size to prevent back pressure in excess of 3,5 bar, and returned to the reservoir below the surface of the oil as far away as possible from the suction pipe of the pump.

INTERNAL DRAIN MOTOR

This unidirectional motor may be pressurized only on the port corresponding to its rotation type.
The outlet pressure must not be higher than 3,5 bar.

RECOMMENDED FLUIDS

Petroleum base anti-wear R & O fluids (covered by DENISON HF-0 and HF-2 specifications).
Maximum catalog ratings and performance data are based on operation with these fluids.

FIRE RESISTANT FLUIDS

They are easily used in the M5A* and M5B* motors. These include phosphate or organic ester fluids and blends, water-glycol solutions and water-oil invert emulsions.

ACCEPTABLE ALTERNATE FLUIDS

The use of fluids other than petroleum base anti-wear R & O fluids requires that the maximum ratings of the motor will be reduced. In some cases, the minimum replenishment pressure must be increased.

HF-1 : non antiwear petroleum base.
HF-3 : water in oil invert emulsion.
HF-4 : water glycols solutions.
HF-5 : synthetic fluids.

Model of motor	Maximum speed	Maximum pressure			
		HF-1, HF-4, HF-5		HF-3	
		Int.	Cont.	Int.	Cont.
	RPM	bar	bar	bar	bar
M5A*	1500	225	195	165	130
M5B*	1800	240	210	175	140

VISCOSITY

Max. (cold start, low speed and pressure)	860 mm^2/s (cSt)
Max. (full speed and pressure)	100 mm^2/s (cSt)
Optimum (max. lifetime)	30 mm^2/s (cSt)
Min. (full speed and pressure, HF-1 fluid)	18 mm^2/s (cSt)
Min. (full speed and pressure, HF-0 & HF-2 fluids)	10 mm^2/s (cSt)

For cold starts, the motor should operate at low speed and pressure until fluid warms up to an acceptable viscosity for full power operation.

VISCOSITY INDEX

90 min.
Higher values extend the range of operating temperatures and lifetime.

TEMPERATURE

Max. fluid temperature (HF-0, HF-1 & HF-2)	+ 100° C
Min. fluid temperature (HF-0, HF-1 & HF-2)	- 18° C

FLUID CLEANLINESS

The fluid must be cleaned before and during operation to maintain a contamination level of NAS 1638 class 8 (or ISO 18/14) or better. Filters with 25 micron (or better, $\beta 10 \geqslant 100$) nominal ratings may be adequate but do not guarantee the required cleanliness levels.

WATER CONTAMINATION IN FLUID

Maximum acceptable content of water is :
• 0,10 % for mineral base fluids.
• 0,05 % for synthetic fluids, crankcase oils, biodegradable fluids.
If amount of water is higher, then it should be drained off the circuit.

Motor performances required
Torque.................. T [Nm.] 110
Speed.................. n [RPM] 1500
Pump available data
Flow .... q_{Ve} [l/min] 55
Pressure............... P [bar] 280

Check if available power is greater than required power (0.85 estimated overall efficiency).

$$0.85 \times \frac{q_{Ve} \times p}{600} \geqslant \frac{T \times \pi \times n}{30 \times 1000} \qquad 0.85 \times \frac{55 \times 280}{600} \geqslant \frac{110 \times \pi \times 1500}{30 \times 1000}$$

21,8 > 17,3 kW

<u>Two ways of calculation :</u> Calculate V_i from T required torque, or from q_{Ve} available flow.

2a.	**2b.**
$Vi = \frac{20 \times \pi \times T}{p} = \frac{20 \times \pi \times 110}{280} = 28{,}0$ ml/rev.	$Vi = \frac{1000 \times q_{Ve}}{n} = \frac{1000 \times 55}{1500} = 36{,}7$ ml/rev.
***3a.** Choose motor from Vi immediately greater* *M5B* 028 : V_i = 28,0 ml/rev.*	***3a.** Choose motor from Vi immediately smaller* *M5B* 036 : V_i = 36,0 ml/rev.*
***4a.** Check theoretical motor pressure*	***4a.** Check theoretical motor pressure with T = 110 Nm.*
$p = \frac{20 \times \pi \times T}{V_i} = \frac{20 \times \pi \times 110}{28{,}0} = 247$ bar	$p = \frac{20 \times \pi \times T}{V_i} = \frac{20 \times \pi \times 110}{36{,}0} = 192$ bar
Torque loss at this pressure = 9,5 Nm *(See page 12)* *Calculate real pressure*	*Torque loss at this pressure = 8,0 Nm* *(See page 12)* *Calculate real pressure*
$p = \frac{20 \times \pi \times (T + Tl)}{V_i} = \frac{20 \times \pi \times 119{,}5}{28{,}0} = 268$ bar	$p = \frac{20 \times \pi \times (T + Tl)}{V_i} = \frac{20 \times \pi \times 118}{36{,}0} = 206$ bar
***5a.** Flow loss at this pressure : 5 l/min* *(See page 12)* *Real flow used by the motor :* *55 - 5 = 50 l/min*	***5a.** Flow loss at this pressure : 4 l/min* *(See page 12)* *Real flow used by the motor :* *55 - 4 = 51 l/min*
***6a.** Real speed of the motor :*	***6a.** Real speed of the motor :*
$n = \frac{q_V \times 1000}{V_i} = \frac{50 \times 1000}{28{,}0} = 1785$ RPM	$n = \frac{q_V \times 1000}{V_i} = \frac{50 \times 1000}{36{,}0} = 1416$ RPM
Real performances *V_i = 28,0 ml/rev.* *n = 1785 RPM* *T = 110 Nm.* *p = 268 bar*	*Real performances* *V_i = 36,0 ml/rev.* *n = 1416 RPM* *T = 110 Nm.* *p = 206 bar*

In each case always choose the smallest motor wich will operate at the highest speed and pressure, and will offer the most efficient solution.

FLUID POWER FORMULAS

Volumetric efficiency		$\dfrac{1}{1 + \dfrac{\text{total leakage} \times 1000}{\text{speed} \times \text{displacement}}}$
Mechanical efficiency		$1 - \dfrac{\text{torque loss} \times 20 \times \pi}{\Delta\ \text{pressure} \times \text{displacement}}$
Fluid motor speed	*rpm*	$\dfrac{1000 \times \text{flow rate} \times \text{volumetric eff.}}{\text{displacement}}$
Fluid motor torque	*N.m*	$\dfrac{\Delta\ \text{pressure} \times \text{displacement} \times \text{mech. eff.}}{20 \times \pi}$
Fluid motor power	*kW*	$\dfrac{\text{speed} \times \text{displacement} \times \Delta\ \text{pressure} \times \text{overall eff.}}{600\,000}$
	kW	$\dfrac{\text{torque} \times \text{speed} \times 20 \times \pi}{600\,000}$

Speed	*[tr/min]*
Displacement	*[cm^3/tr]*
pressure	*[bar]*
Flow rate	*[l/min]*
Leakage	*[l/min]*
Torque	*[Nm]*
Torque loss	*[Nm]*

<table>
<tr><th></th><th>Mounting flange</th><th>Ports</th><th>Drain</th><th>Shaft ends</th></tr>
<tr><td>M5AF</td><td rowspan="2">Special mounting
(2 bolts - Ø 120)</td><td rowspan="2">SAE 3/4” - 4 bolts UNC
or
SAE 3/4” - 4 bolts metric
(ISO/DIS 6162 - SAE J518)
or
SAE 12 1”1/16 - 12 UNF-2B J1926
or
ISO 6149 - M22 x 1,5)</td><td>ISO 6149 - M12 x 1,5
or
SAE 6 - J1926 - SAE 9/16”</td><td rowspan="2">Keyed taper non SAE
Keyed non SAE</td></tr>
<tr><td>M5AF1</td><td>No drain connection</td></tr>
<tr><td>M5B</td><td>ISO 3019-2
100 A2/B4 HW
(2/4 bolts - Ø 100)</td><td rowspan="3">SAE 3/4” - 4 bolts UNC
or
SAE 3/4” - 4 bolts metric
(ISO/DIS 6162 SAE J518)</td><td>M18 x 1,5</td><td rowspan="2">Keyed cyl. SAE “B”
Keyed cyl. ISO E 25M
Splined SAE “B”
Splined SAE “BB”</td></tr>
<tr><td>M5BS</td><td>SAE “B” J744
(2/4 bolts - Ø 101,6)</td><td rowspan="2">M18 x 1,5
or
SAE 9/16”</td></tr>
<tr><td>M5BF</td><td rowspan="2">Special mounting
(2 bolts - Ø 135)</td><td rowspan="2">Keyed taper non SAE
Keyed cyl. SAE “C”
Keyed cyl. ISO G32N</td></tr>
<tr><td>M5BF1</td><td>SAE 3/4” - 4 bolts metric
(ISO/DIS 6162 SAE J518)</td><td>No drain connection</td></tr>
</table>

Series	Theoretical displacement	Theoretical torque	Theoretical power at 100 RPM	Typical data 2000 RPM - 300 bar	
	ml/rev	N.m/bar	kW/bar	N.m	kW
M5A*	6,3	0,100	0,0011	26,1	5,5
	10,0	0,159	0,0017	43,7	9,2
	12,5	0,199	0,0021	55,7	11,7
	16,0	0,255	0,0027	72,4	15,2
	18,0	0,286	0,0030	81,2	17,0
	23,0	0,366	0,0038	102,5[1)]	21,5[1)]
	25,0	0,398	0,0042	107,4[1)]	22,5[1)]

[1)] 023 - 025 = 280 bar max.

Series	Theoretical displacement	Theoretical torque	Theoretical power at 100 RPM	Typical data 2000 RPM - 320 bar	
	ml/rev	N.m/bar	kW/bar	N.m	kW
M5B*	12,0	0,191	0,0020	50,6	10,6
	18,0	0,286	0,0030	81,2	17,0
	23,0	0,366	0,0038	117,1	24,5
	28,0	0,446	0,0047	132,1	27,7
	36,0	0,572	0,0060	172,8	36,2
	45,0	0,716	0,0075	190,0[1)]	39,8[1)]

[1)] 045 = 280 bar max.

STARTING PERFORMANCES

Typical data at 24 cSt / 45° C

		M5A*	M5B*
Maximum cross-flow	100 bar :	0,6 l/min	1,8 l/min
	200 bar :	7,4 l/min	7,8 l/min
	320 bar :	10,7 l/min[1)]	12,5 l/min

[1)] 300 bar

Minimum stalled torque efficiency for M5B* only 100 bar : 78,3 %
200 bar : 81,0 %
320 bar : 80,8 %

PERMISSIBLE AXIAL AND RADIAL LOADS

1 - Max. axial load : Fa max. = 6 000 N

2 - Max. radial load cylindrical shaft : Fr max. = 8 000 N

taper shaft : Fr max. = 5 500 N

3 - Theoretical lifetime [hour] : $L_{10H}\ [\text{hour}] = \dfrac{16\ 666}{N\ [\text{rpm}]} \times L_{10}$

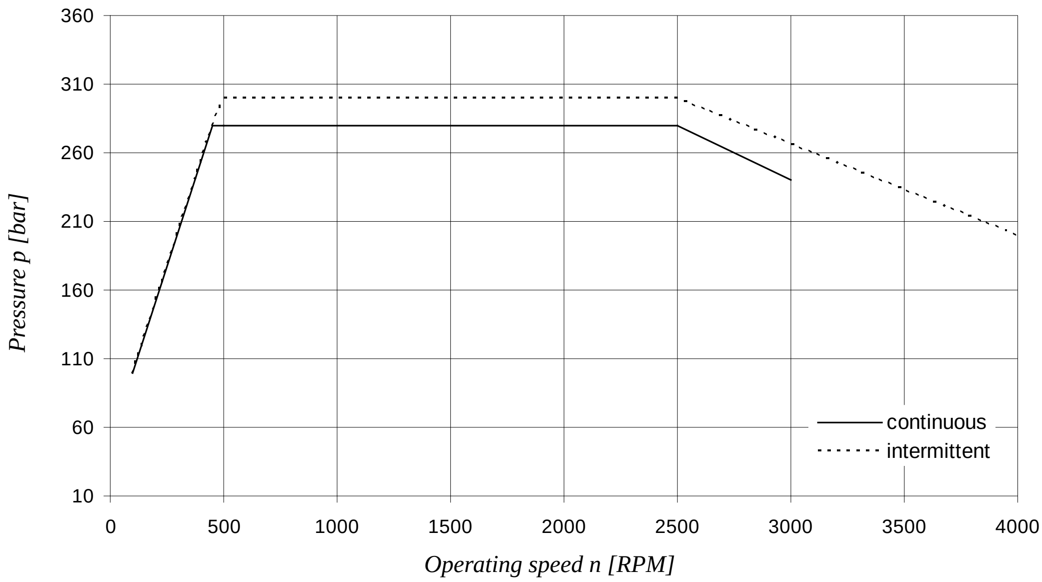
4 - Theoretical lifetime [10^6 rev] : L_{10}

5 - Eg of theoretical life time calculation

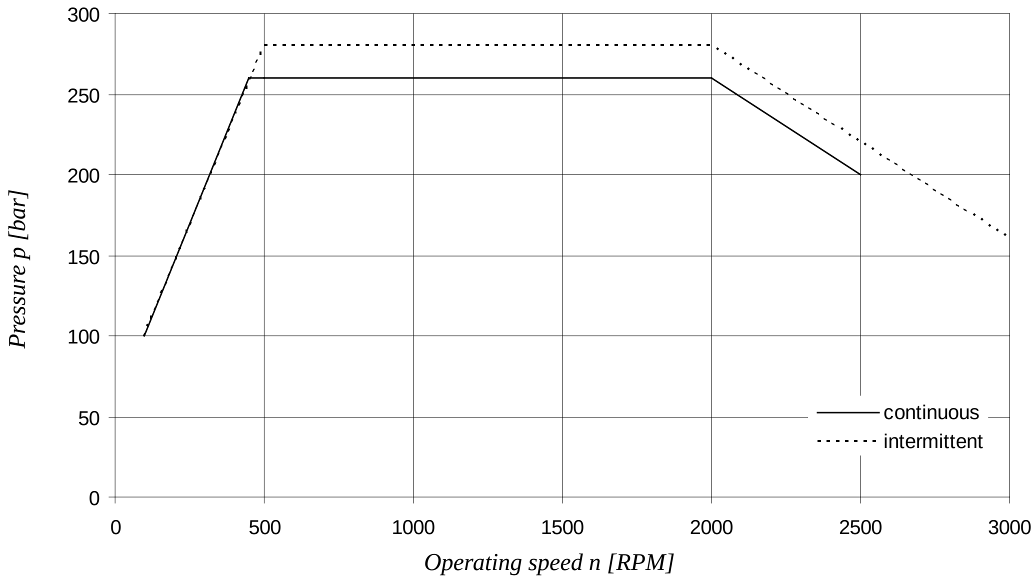
Axial load Fa = 2000 N
Radial load Fr = 1000 N
Operating speed N = 2000 RPM
L10 = 2000 [10^6 rev] (see on curve page)

$L_{10H} = \dfrac{16\ 666}{2000} \times 2000$ $\quad L_{10H}$ = 16 666 hours.

006 - 010 - 012 - 016 - 018

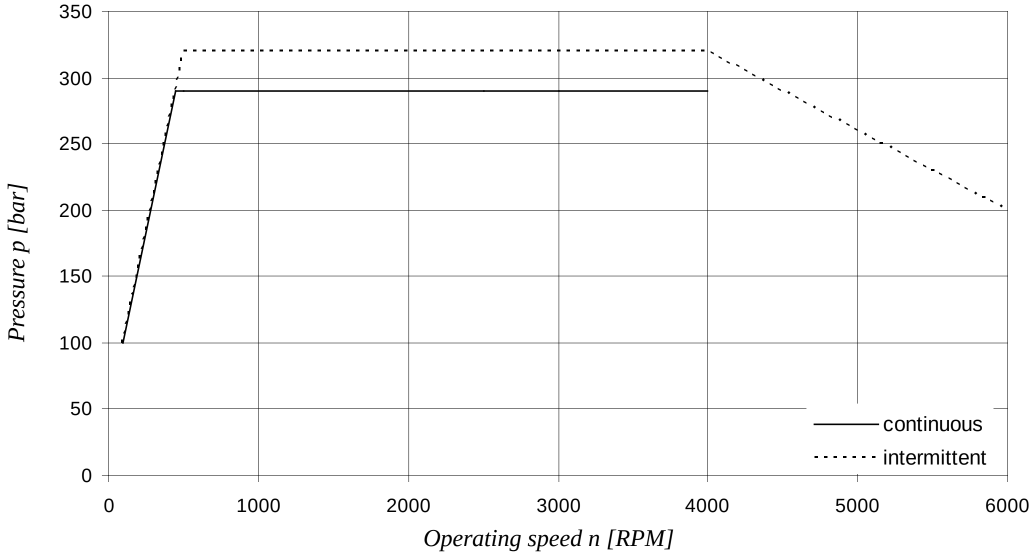


023 - 025

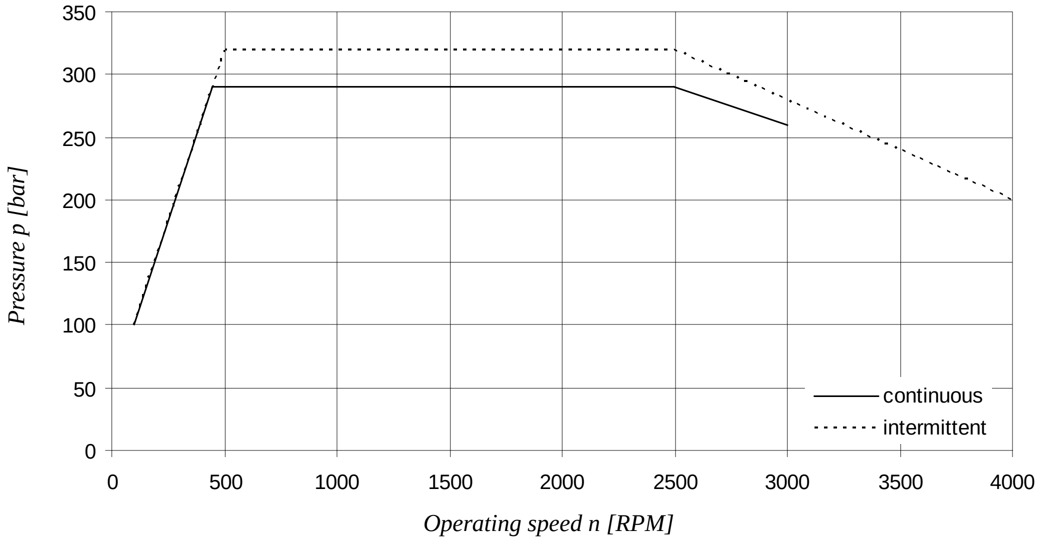


- These are running condition limits; for starting performances see page 7.
- Intermittent conditions : do not exceed 6seconds per minute of rotation.
- Typical curves, at 24 cSt 45° C.
- For higher specifications or for operating speed under 100 RPM, please consult our technical department.

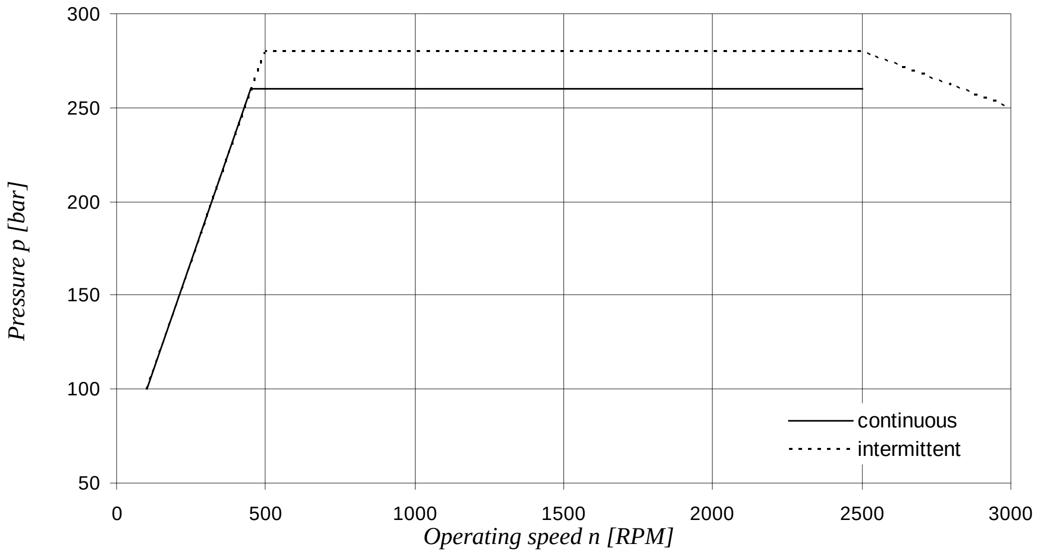
012 - 018



023 - 028 - 036



045



- These are running condition limits; for starting performances see page 7.
- Intermittent conditions : do not exceed 6seconds per minute of rotation.
- Typical curves, at 24 cSt 45° C.
- For higher specifications or for operating speed under 100 RPM, please consult our technical department.

Model No. M5AF1 - 018 - 1 N 02 - B 1 - M 3 - AP21

Series External drain
Series Internal drain

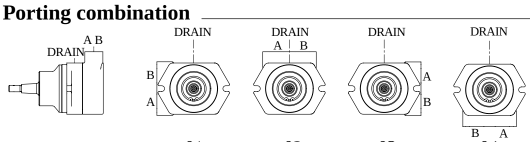
Displacement
Volumetric displacement (ml/rev.)

006 = 6,3	018 = 18,0
010 = 10,0	023 = 23,0
012 = 12,5	025 = 25,0
016 = 16,0	

Type of shaft
1 = taper (non SAE)
2 = keyed (non SAE)

Direction of rotation (view on shaft end) - M5AF - M5AF1
R = Clockwise
L = Counter-clockwise
Direction of rotation (view on shaft end) - M5AF
N = Bi-rotational

Porting combination



Modifications or special option
Ex. : AP21 = Anti-starve valve + proportional pressure relief valve set at 210 bar.
For a flow above 75 l/min a special cap is needed, please consult Parker Denison.

Drain variables - M5AF
2 = 9/16” 18 - SAE drain
3 = M12 x 1,5 metric drain
Drain variables - M5AF1
X = no drain connection

End cap variables - All motors except with proportional pressure relief valve [1)]
M = 3/4" - 4 bolts SAE flange J518 - Metric thread
0 = 3/4" - 4 bolts SAE flange J518 - UNC thread
Y[2)] = Metric threaded ports (ISO 6149) - M22 x 1,5
W[2)] = SAE str. threaded ports - 1”1/16-12 UNF-2B

Design letter

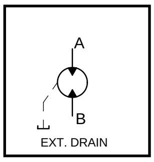
Seal class
1 = S1 BUNA N 5 = S5 - VITON

[1)] For other end cap variables, please contact Parker Denison.
[2)] Anti-starve valve not available.

ROTATION = BI-ROTATIONAL (N)

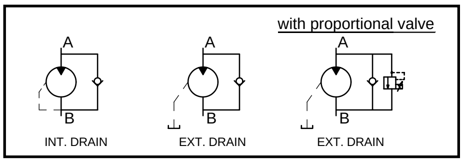
View from shaft end :

CW rotation	A = inlet
	B = outlet
CCW rotation	A = outlet
	B = inlet

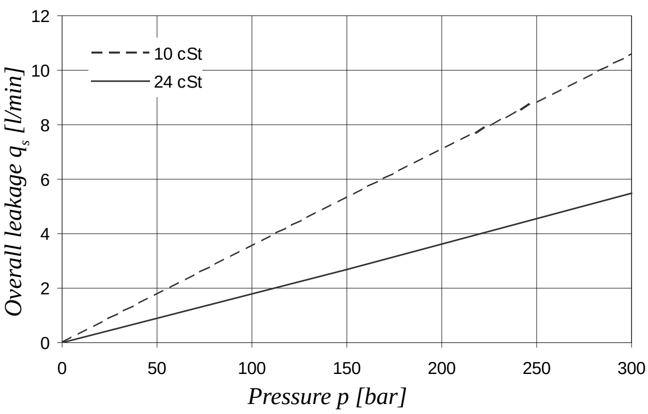


R OR L ROTATION **(New rotation concept - patent pending)[3)]**

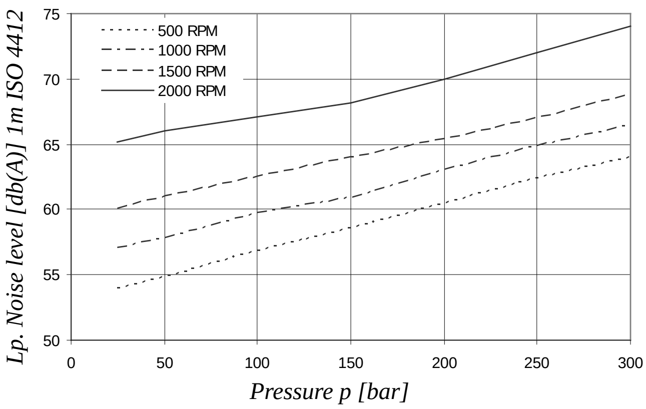
View from shaft end :
CW & CCW rotations
A = inlet
B = outlet



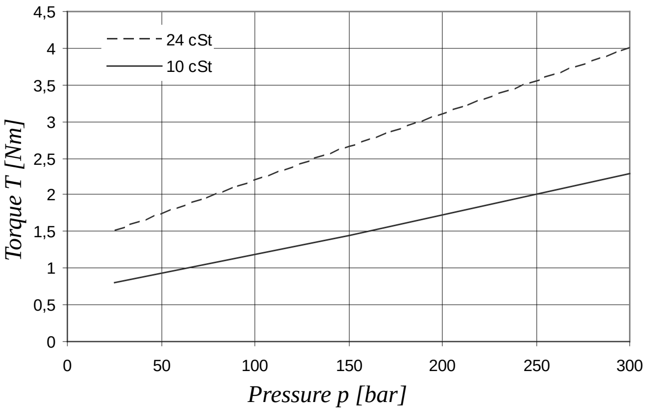
OVERALL LEAKAGE (internal + external)



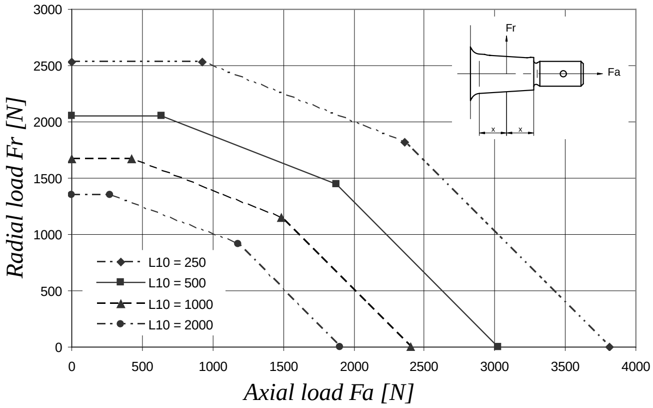
NOISE LEVEL - M5AF 025



TORQUE LOSS



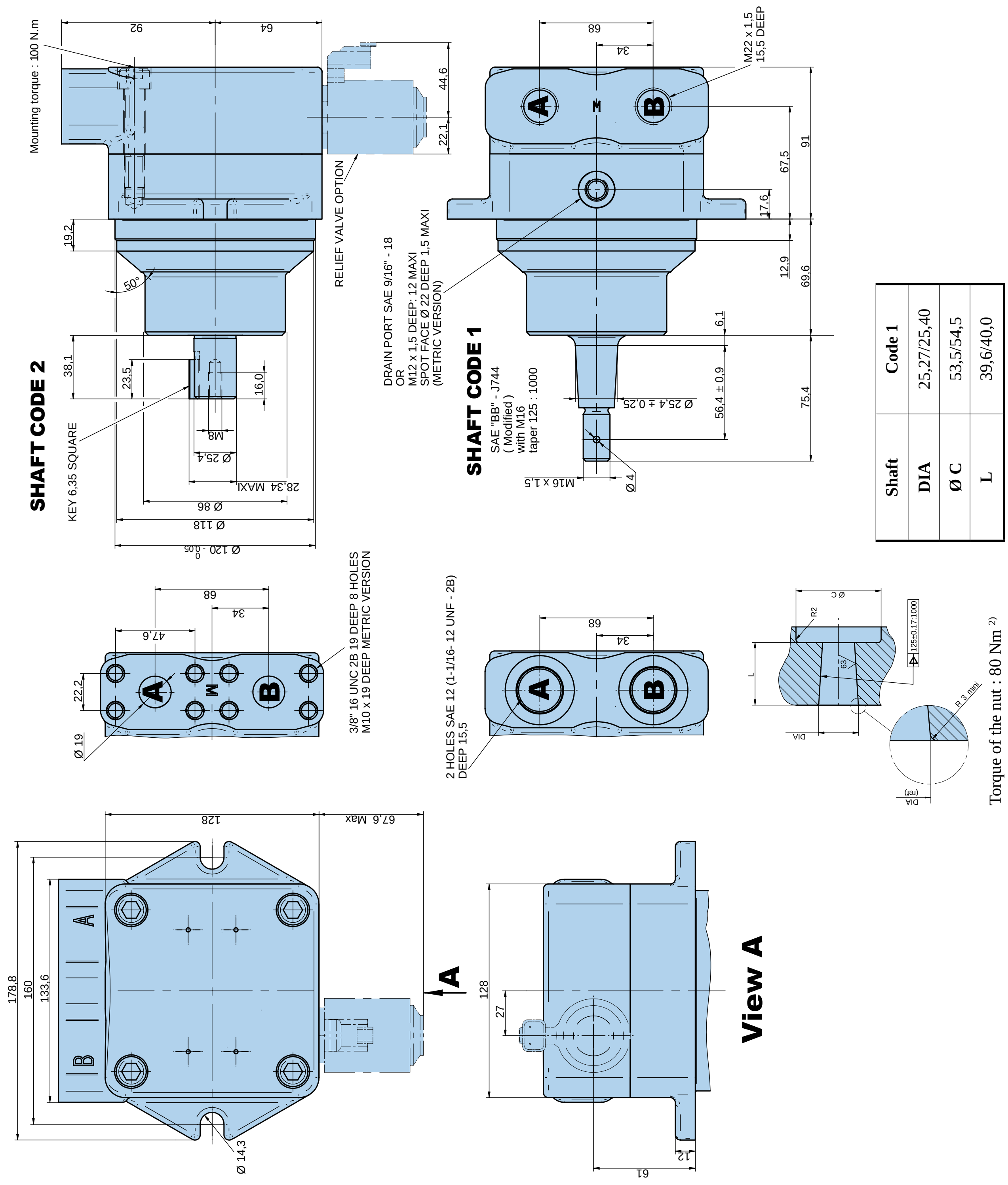
PERMISSIBLE AXIAL AND RADIAL LOADS



[3)] L or R rotation is a new internal concept : A is always «in» and B always «out».

L10 = Theoretical lifetime [10^6 rev.]

M5AF - Dimensions - Weight : 15 kg



Shaft	Code 1
DIA	25,27/25,40
Ø C	53,5/54,5
L	39,6/40,0

PERFORMANCES : PRESSURE & SPEED

Displacement	006	010	012	016	018	023	025
Pressure max (bar)	300						280
Speed max (RPM)	4000						2500

MINIMUM REPLENISHMENT PRESSURE (BAR ABSOLUTE AT THE B PORT) for M5AF with an internal check valve [1)]

Flow (l/min)	5	10	20	30	40	50	60
Min pressure (bar)	1,3	1,8	2,5	3,0	4,2	6,2	9,0

1) 60 l/min is the maximum flow allowed through the internal check valve.

2) This torque is for a steel coupling and a nut of at least grade 8.8 quality. It is compulsory to install a castle nut and cotter pin for right-hand rotation - bi-rotational.

Model No. **M5BS - 036 - 1 N 02 - B 1 - M 3 - ..**

Series External drain
ISO 3019-2 - 100 A2/B4 HW

Series External drain
SAE B - J744

Displacement
Volumetric displacement (ml/rev.)

012 = 12,0	028 = 28,0
018 = 18,0	036 = 36,0
023 = 23,0	045 = 45,0

Type of shaft
1 = taper (SAE B)
2 = keyed (ISO E25M)
3 = splined (SAE B)
4 = splined (SAE BB)

Direction of rotation (view on shaft end)
N = Bi-rotational

Modifications

Drain variables - M5BS
2 = 9/16” 18 SAE drain
3 = M18 x 1,5 metric drain

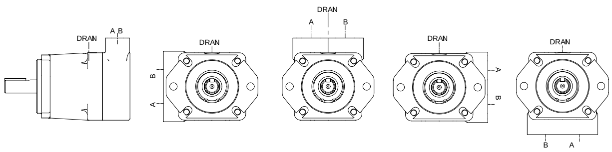
Drain variables - M5B
3 = M18 x 1,5 metric drain

End cap variables
M = 3/4” - 4 bolts SAE flange J518 - Metric thread
0 = 3/4” - 4 bolts SAE flange J518 - UNC thread

Seal class
1 = S1 - BUNA N
5 = S5 - VITON

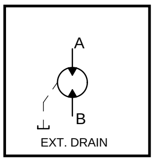
Design letter

Porting combination



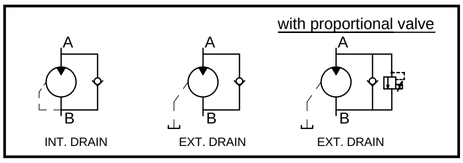
ROTATION = BI-ROTATIONAL (N)

View from shaft end :
CW rotation A = inlet
B = outlet
CCW rotation A = outlet
B = inlet

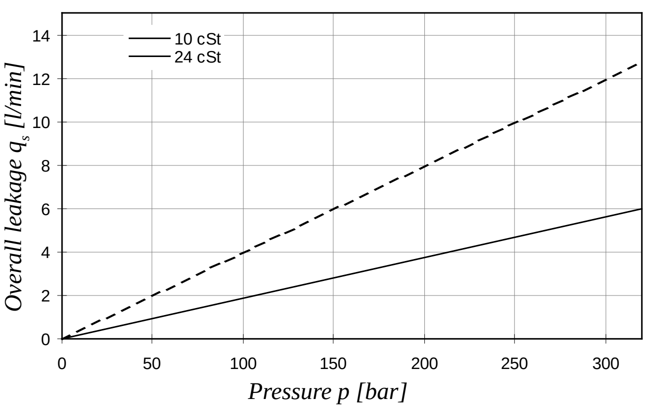


R OR L ROTATION **(New rotation concept - patent pending)[3)]**

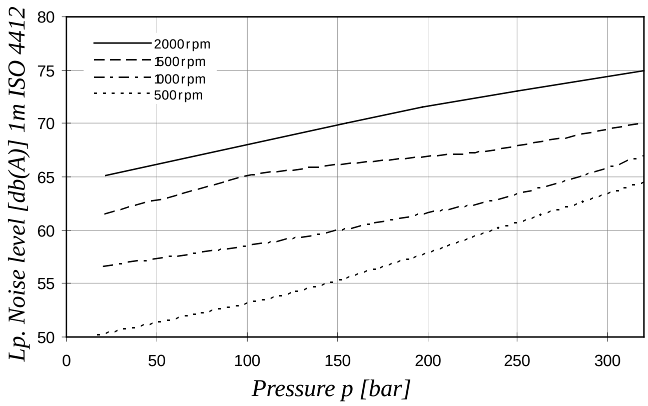
View from shaft end :
CW & CCW rotations
A = inlet
B = outlet



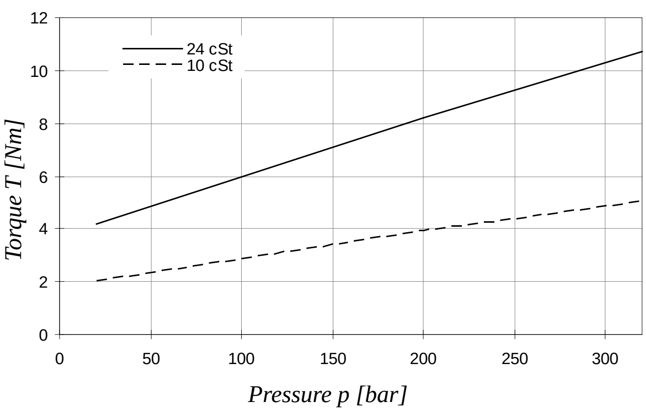
OVERALL LEAKAGE (internal + external)



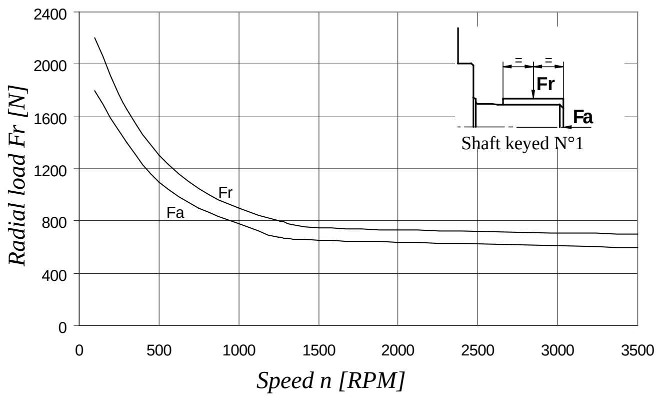
NOISE LEVEL - M5BF - 036



TORQUE LOSS



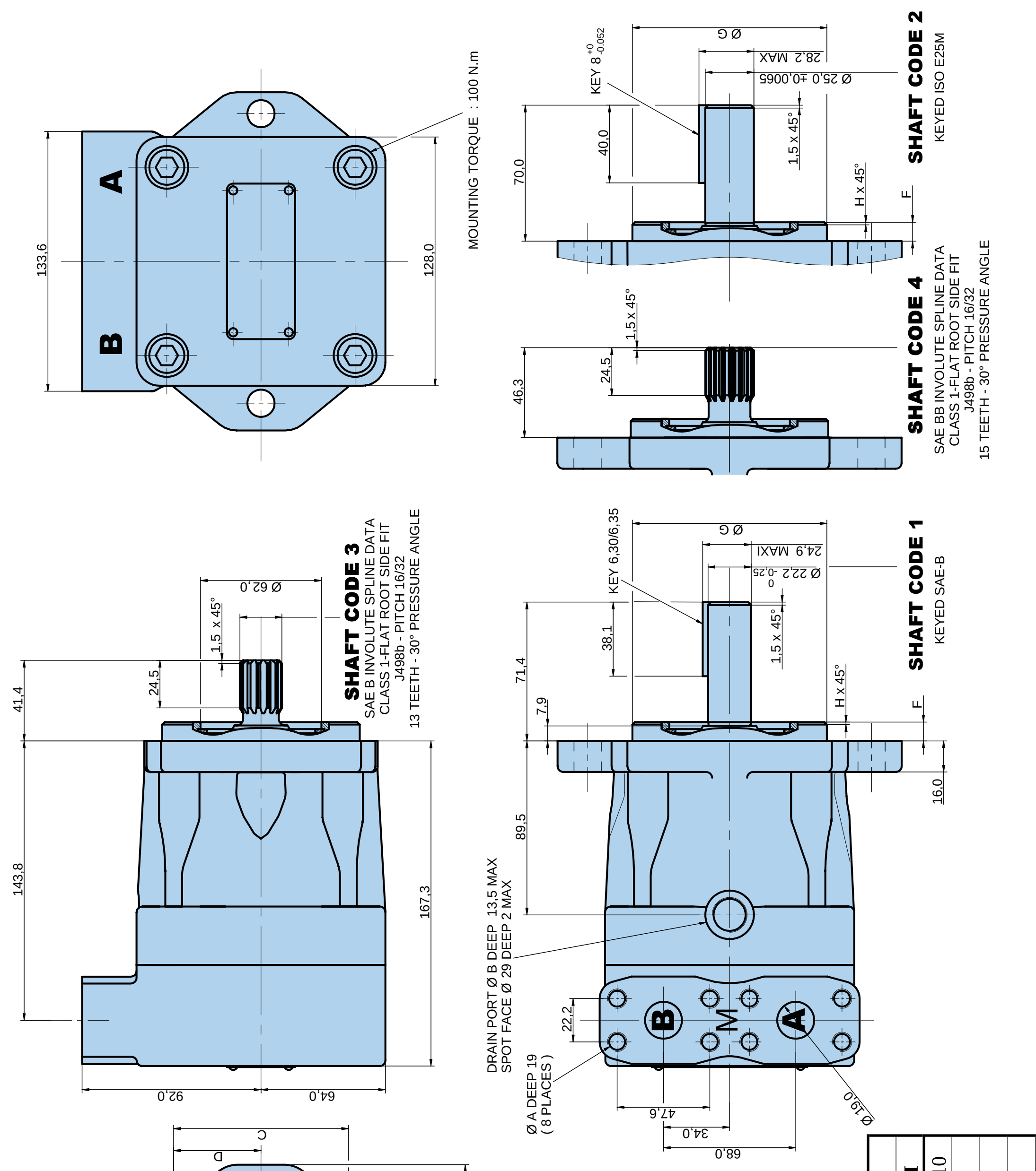
PERMISSIBLE AXIAL AND RADIAL LOADS

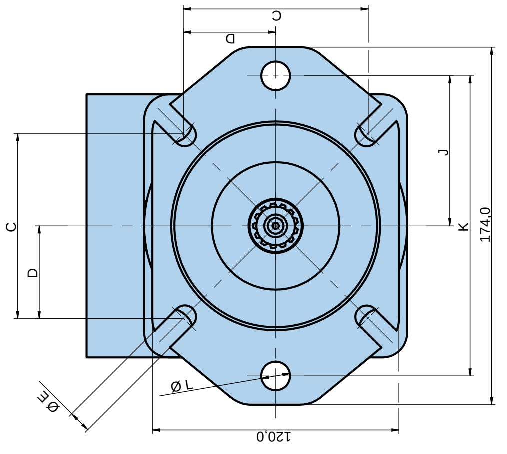


3) *L or R rotation is a new internal concept : A is always «in» and B always «out».*

L10 = Theoretical lifetime [10^6 rev.]

M5B / M5BS - Dimensions - Weight : 18,5 kg





Port code	M5BS 0	M5BS M	M5B 0	M5B M
Ø A	3/8'' - 16 UNC	M10	3/8'' - 16 UNC	M10
Drain code	2	3	3	
Ø B	SAE 9/16'' - 18	M18 x 1,5	M18 x 1,5	
C	88,9		88,4	
D	44,9		44,2	
Ø E	14,3		11,0	
F	9,7		9,0	
Ø G	101,6		100,0	
H	1,5		2,0	
J	73,0		70,0	
K	146,0		140,0	
Ø L	14,3		14,0	

Model No. **M5BF1 - 036 - 1 N 02 - B 1 - M 3 - AP21**

Series External drain
Series Internal drain

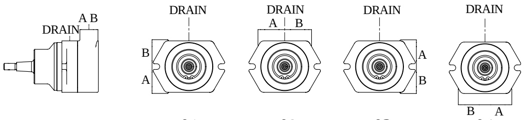
Displacement
Volumetric displacement (ml/rev.)

012 = 12,0	028 = 28,0
018 = 18,0	036 = 36,0
023 = 23,0	045 = 45,0

Type of shaft
1 = keyed taper (non SAE)
2 = keyed (SAE C)
W = keyed (ISO G32N)

Direction of rotation (view on shaft end) - M5BF - M5BF1
R = Clockwise
L = Counter-clockwise
Direction of rotation (view on shaft end) - M5BF
N = Bi-rotational

Porting combination



Modifications or special option
Ex. : AP21 = Anti-starve valve + proportional pressure relief valve set at 210 bar.
For a flow above 75 l/min a special cap is needed, please consult Parker Denison.

Drain variables - M5BF
2 = 9/16" 18 SAE drain
3 = M18 x 1,5 metric drain
Drain variables - M5BF1
x = no drain connection

End cap variables M5BF
M = 3/4" - 4 bolts SAE flange J518 - Metric thread
0 = 3/4" - 4 bolts SAE flange J518 - UNC thread
End cap variables M5BF1
M = 3/4" - 4 bolts SAE flange J518 - Metric thread

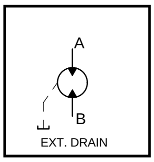
Seal class
1 = S1 - BUNA N
5 = S5 - VITON

Design letter

ROTATION = BI-ROTATIONAL (N)

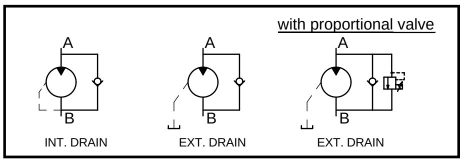
View from shaft end :

CW rotation	A = inlet
	B = outlet
CCW rotation	A = outlet
	B = inlet

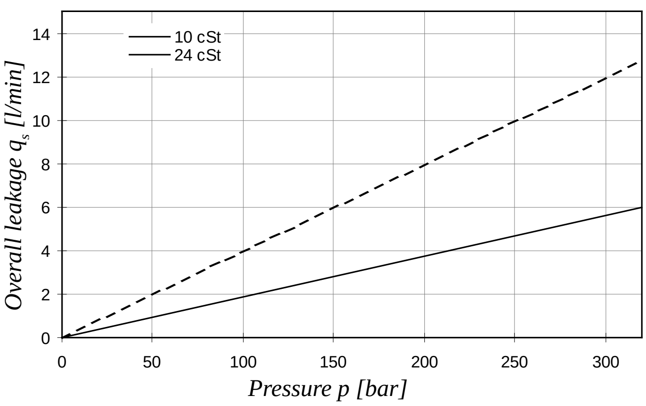


R OR L ROTATION (New rotation concept - patent pending)[1)]

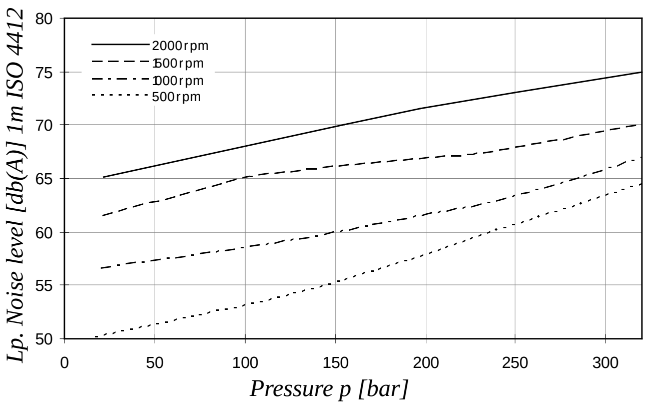
View from shaft end :
CW & CCW rotations
A = inlet
B = outlet



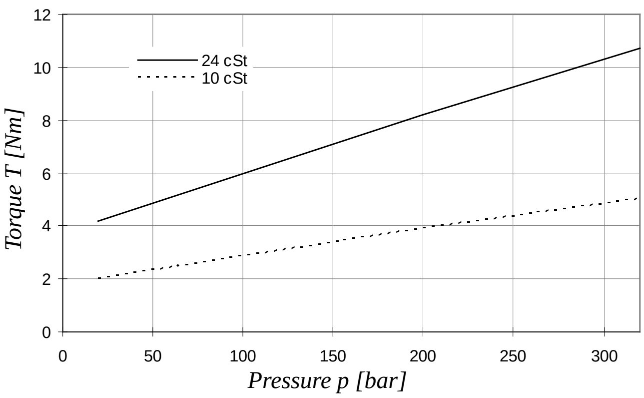
OVERALL LEAKAGE (internal + external)



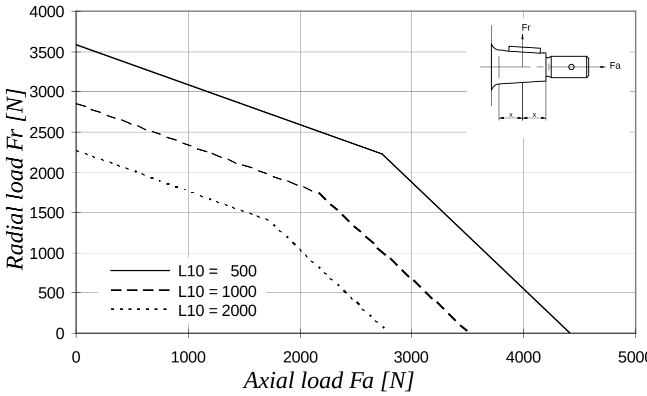
NOISE LEVEL - M5BF - 036



TORQUE LOSS



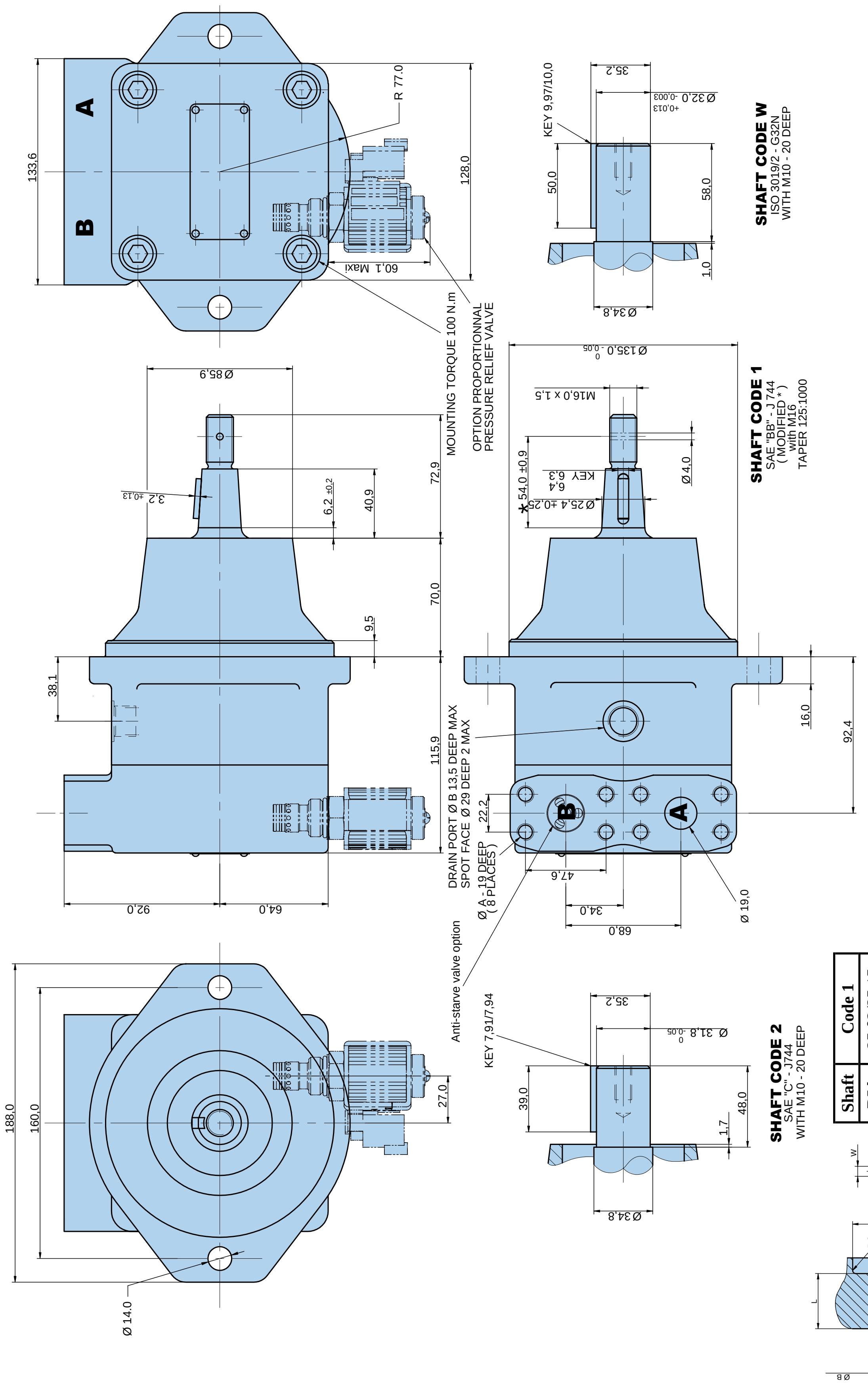
PERMISSIBLE AXIAL AND RADIAL LOADS



1) L or R rotation is a new internal concept : A is always "in" and B always "out".

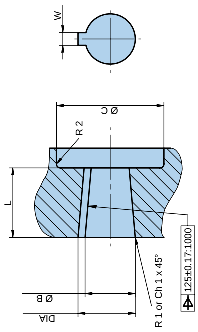
L10 = Theoretical lifetime [10^6 rev.]

M5BF/M5BF1 - Dimensions - Weight : 18,5 kg M5A* / M5B*



Port code	0	M	M
	M5BF		M5BF1
Ø A	3/8'' - 16 UNC	M10	M10
Drain code	2	3	X
Ø B	SAE 9/16'' - 18	M18 x 1,5	No drain connection

Shaft	Code 1
DIA	25,02/25,15
W	6,36/6,31
B	28,70/28,95
Ø C	52,5/53,5
L	35,2/35,45



Torque of the nut : 80 Nm [1)]

1) This torque is for a steel coupling and a nut of at least grade 8.8 quality.
It is compulsory to install a castle nut and cotter pin for right-hand rotation - bi-rotational.

Parker Hannifin
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