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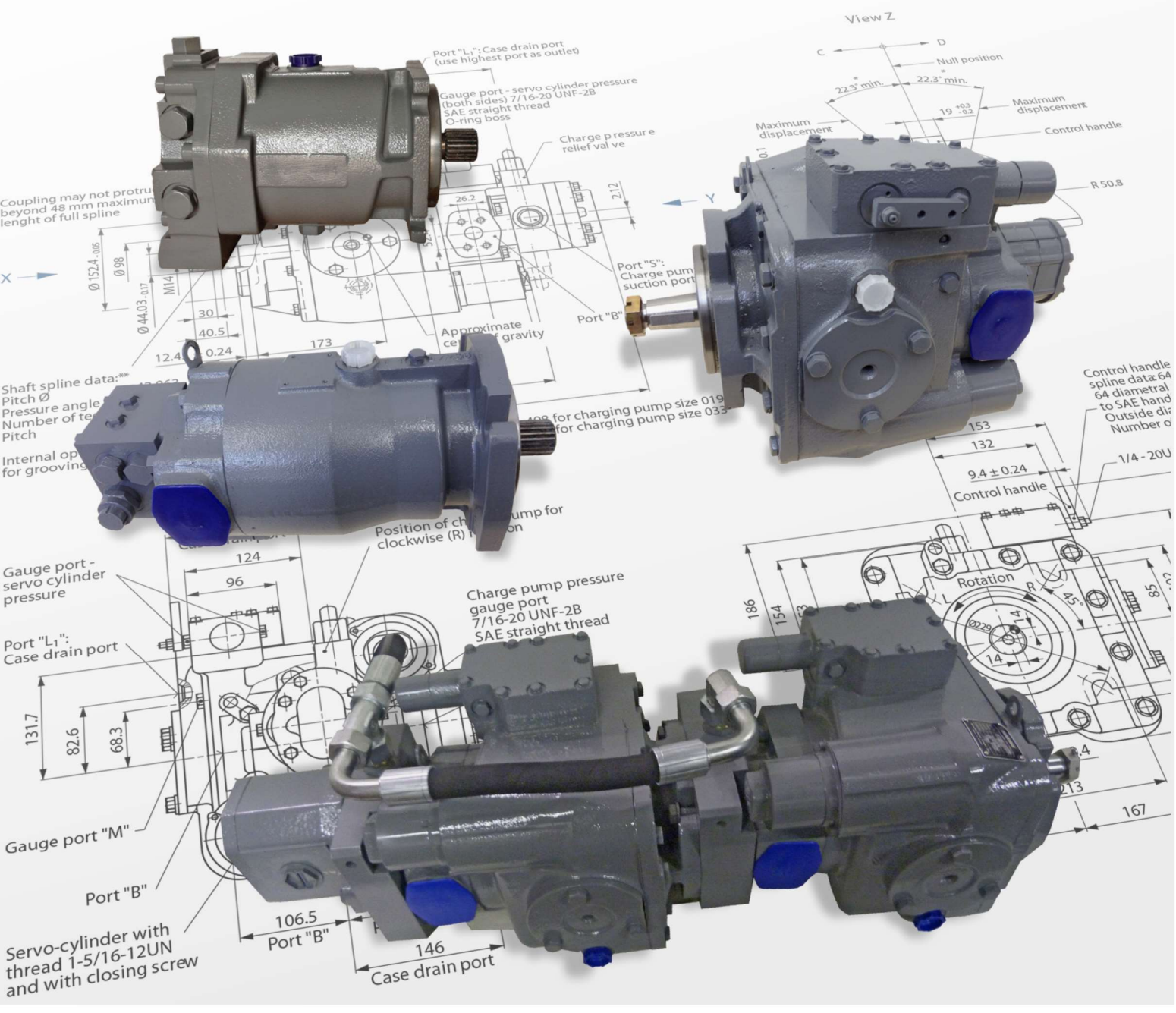
AXIAL PISTON PUMPS AND MOTORS SERIES 20

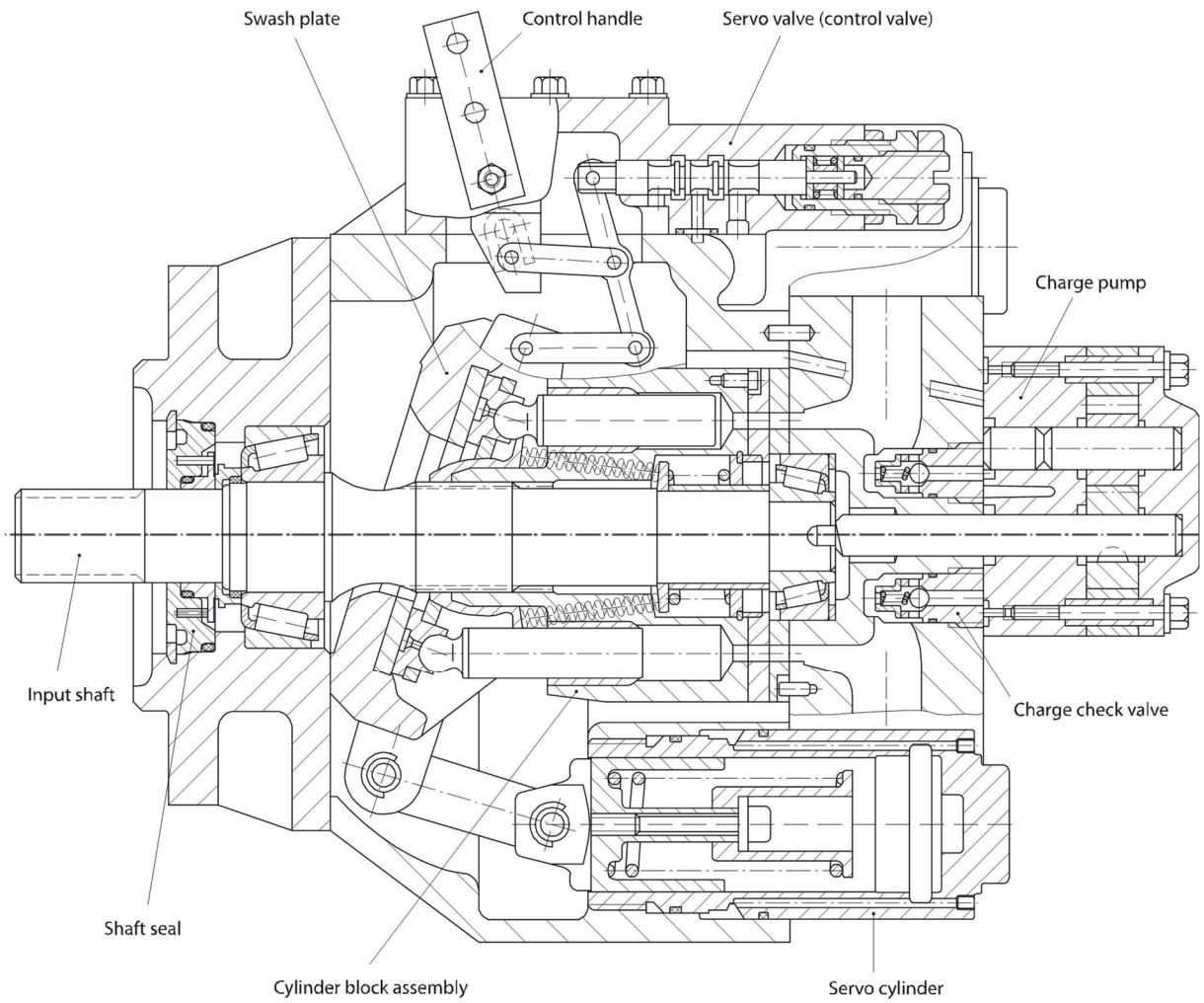


CONTENTS

GENERAL DESCRIPTION

Axial piston variable displacement pumps Series 20 are of swash plate construction with variable flow capability suitable for hydrostatic transmissions with closed circuit.
The flow rate is depending on the pump`s driven speed displacement, which is determined by swash plate angle. Tilting the swash plate to the opposite side of the neutral or zero displacement position reverses flow direction.

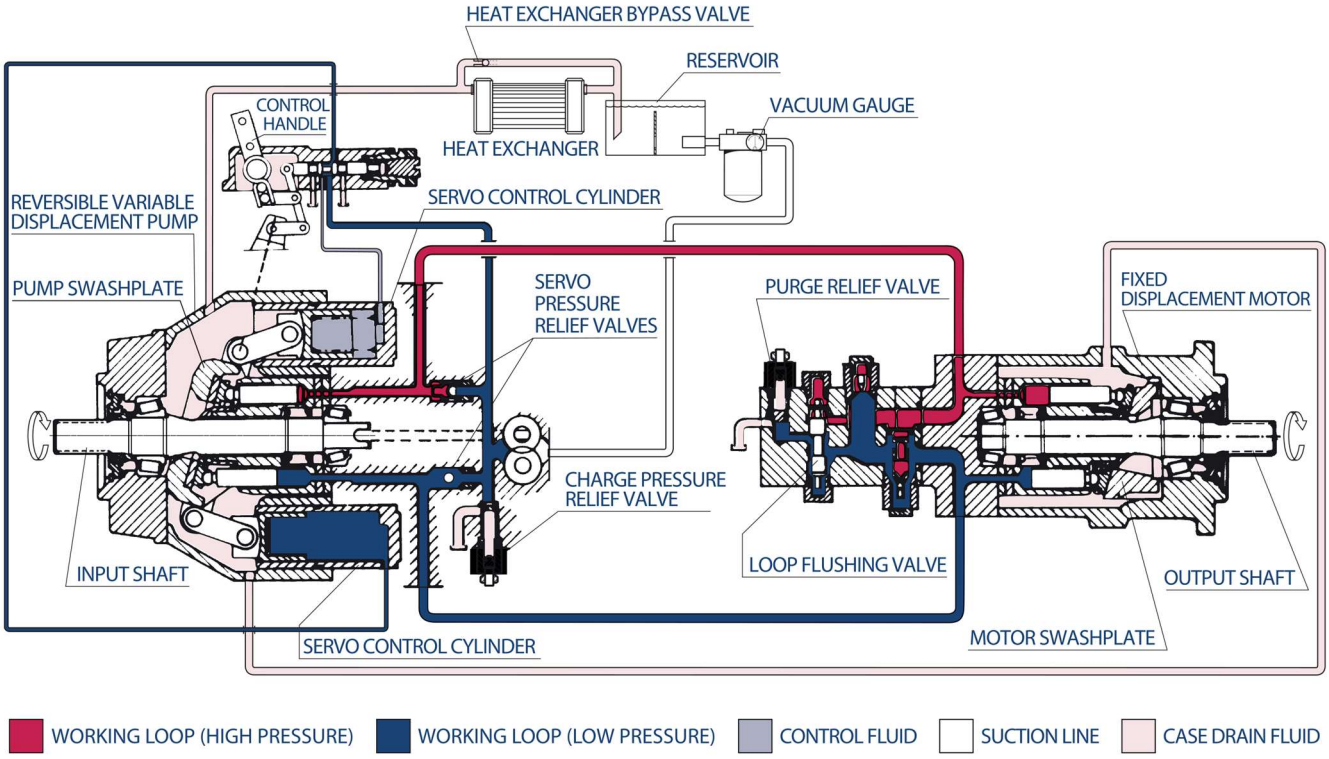
Figure 1:

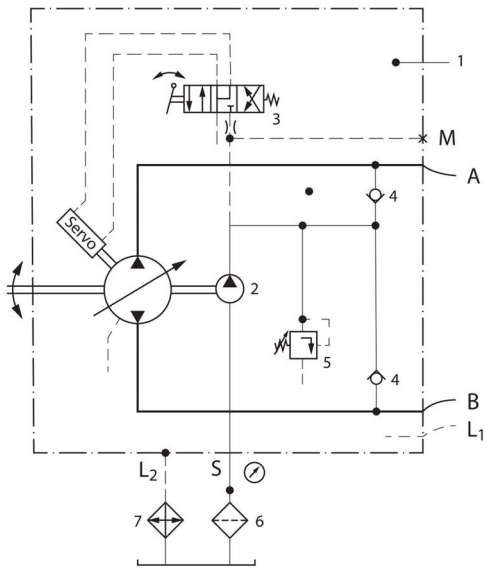


FEATURES

Axial piston variable displacement pumps Series 20 are well – engineered and easy handle. The full – length shaft with a highly efficient tapered roller bearing arrangement offers a high loading capacity for external radial forces. Additional pumps can be built on. The hydro – mechanical servo displacement control maintains the selected swash plate position and hence pumps displacement. Upon release of the control handle, the swash plate automatically returns to the null position and the flow becomes zero. High case pressures can be achieved without leakage even at the lowest temperatures by using suitable shaft seals. The servo valve arrangement offers the facility to incorporate function regulators and remote control systems. Axial piston units are designed for easy servicing, complete dismantling and disassembly can be carried out with standard hand tools, and all components or sub – assemblies are replaceable.

Figure 2 shows schematically the function of hydrostatic transmission using an axial piston variable displacement pump and fixed displacement motor.





Designation:
1 = Variable displacement pump
2 = Charge pump
3 = Servo control valve
4 = Charge check valve
5 = Charge relief valve
6 = Filter
7 = Heat exchanger

Ports:
A, B = Main pressure ports (working loop)
S = Suction port - charge pump

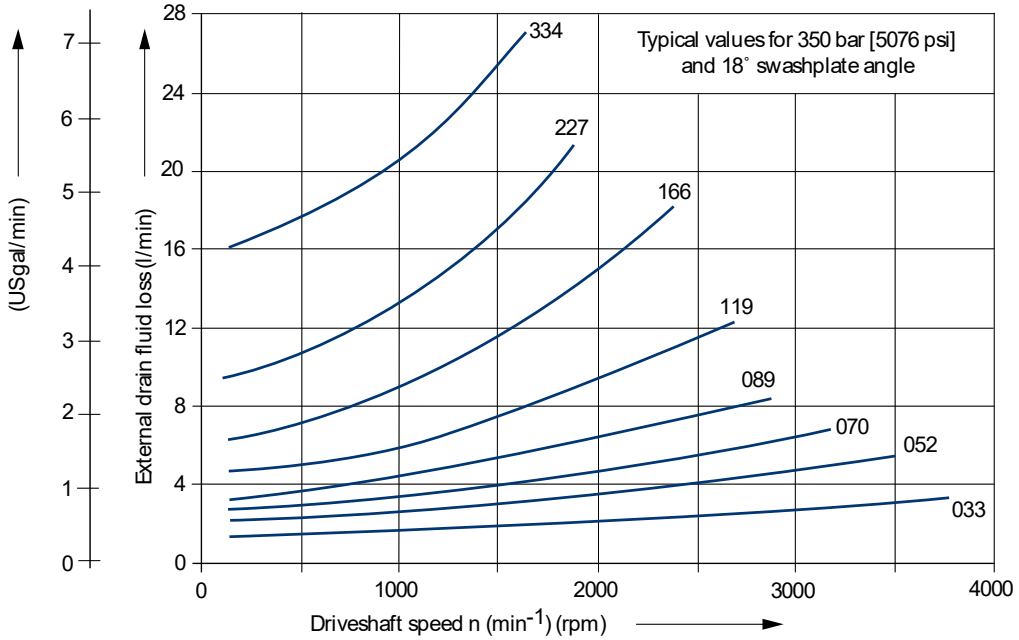
LI, L2 = Drain ports
M = Gauge port - charge pressure

TECHNICAL DATA

Table 1:

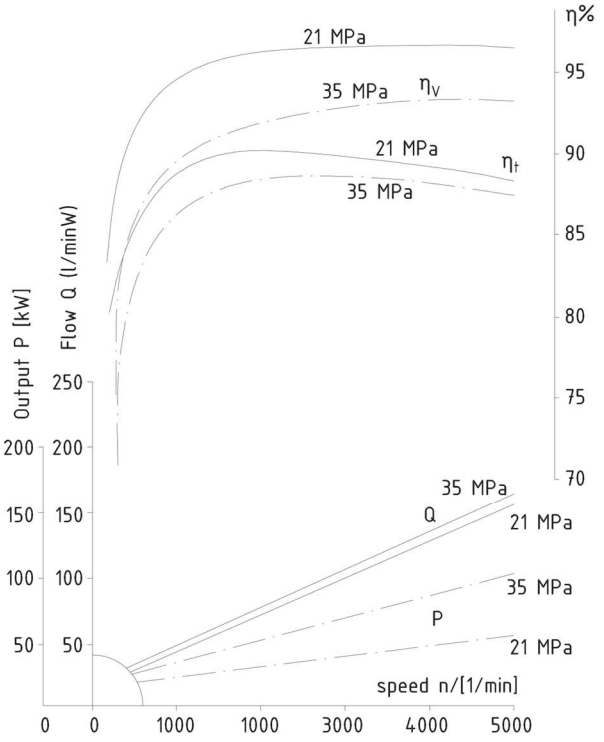
Parameter	Dimension	Frame size								
		20	21	22	23	112	24	25	26	27
Max. displacement per revolution of the variable displacement pump	cm^3	33,3	51,6	69,8	89,0	110,8	118,7	165,8	227,3	333,7
Max. flow	dm^3min^{-1}	119	160	196	230	288	279	348	429	557
Displacement per revolution of the charge pump	cm^3	12,30	12,30	18,03	18,03	18,03	32,80	32,80	32,80	65,50
Max. pressure	MPa	35 – 42								
Nominal pressure	MPa	21								
Max. pressure of control	MPa	3,5								
Charge pressure	MPa	0,8 - 2,0								
Max. pressure in case	MPa	0,25 continuous 0,5 intermittent								
Maximum speed	min^{-1}	3590	3100	2810	2600	2600	2350	2100	1890	1670
Minimum speed	min^{-1}	500								
Nominal speed	min^{-1}	1500								
Kinematic viscosity range of working fluid -starting -operating -optimum	mm^2s^{-1}	 1000 12-600 25-35								
Working fluid		mineral oil								
Operating temperature	°C	-40 to +50								
Max. temperature of working fluid in tank	°C	80								
Purity of working fluid	µm	10								
Direction of shaft rotation		clockwise or counter clockwise								
Maximum swash plate angle	°	±18°								
Weight	kg	51	61	63	80	80	124	164	212	270

Figure 3. External drain fl uid loss for frame sizes 20 – 27
Determination of nominal pump size

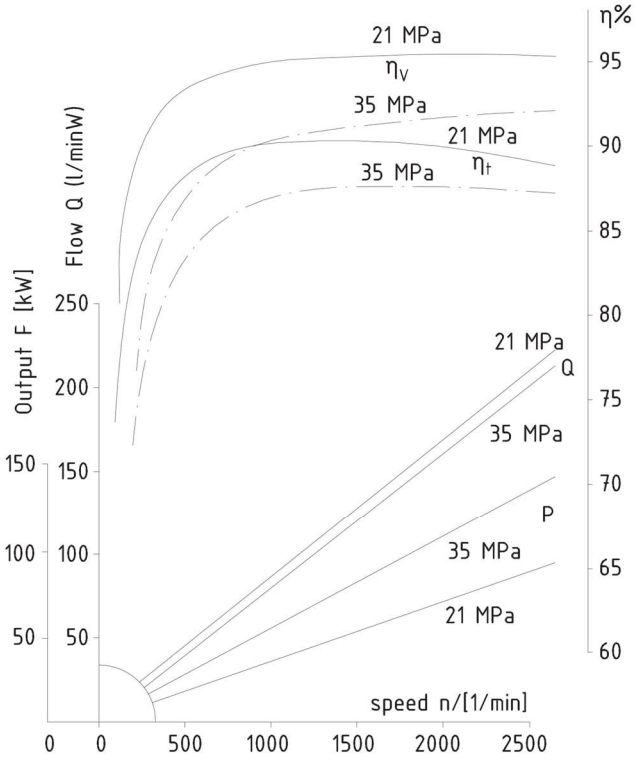


EXAMPLES OF CURVES DEPENDENCES OF EFFICIENCY FLOW AND OUTPUT ON THE SPEED
(for operating condition of 18º swash plate angle)

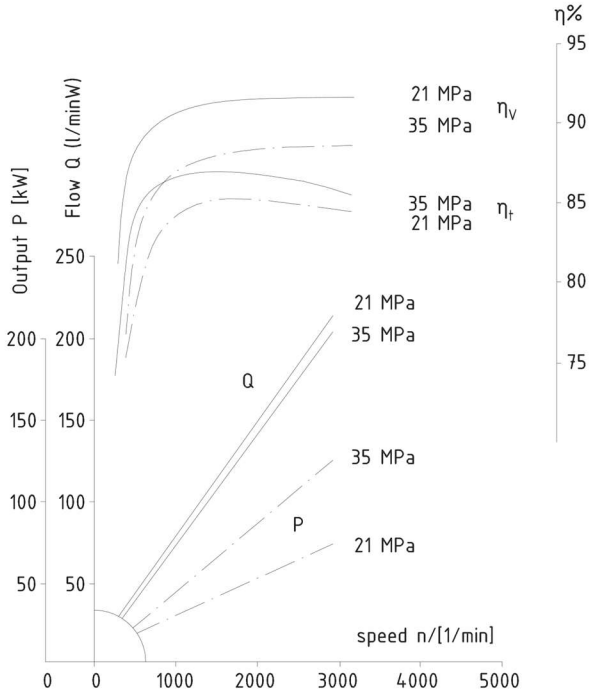
For frame size 20



For frame size 22



For frame size 23



pump output flow $Q_e = \frac{g \cdot n \cdot \eta_v}{1000}$ (l/min)

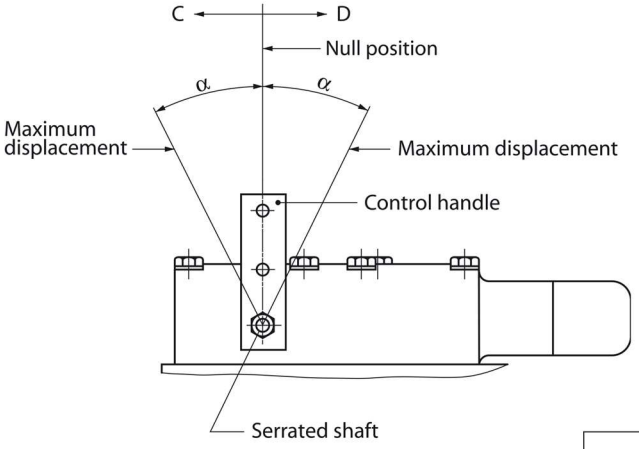
Input torque $M_e = \frac{15{,}9 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}}$ (Nm)

Input power $P_e = \frac{M_g \cdot n}{9550} = \frac{Q_e \cdot \Delta p}{600\ \eta_t}$ (kW)

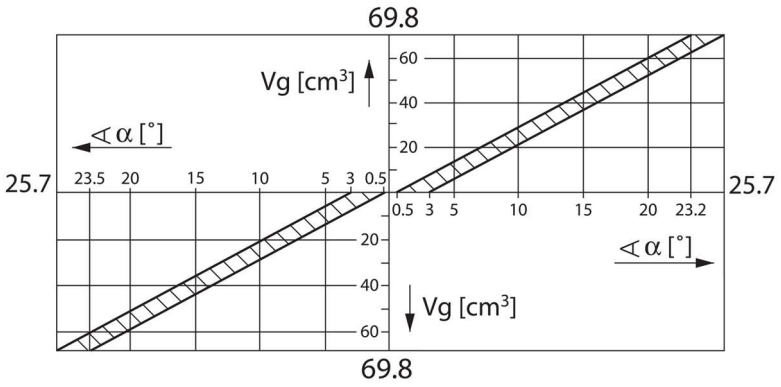
V_m - displacement (cm^3) per revolution
Δ_p - difference high and low pressure (MPa)
n - speed (min^{-1})
η_v - volumetric efficiency
η_{mh} - mechanical – hydraulic efficiency
η_t - total efficiency

SERVO DISPLACEMENT CONTROL (linear response)

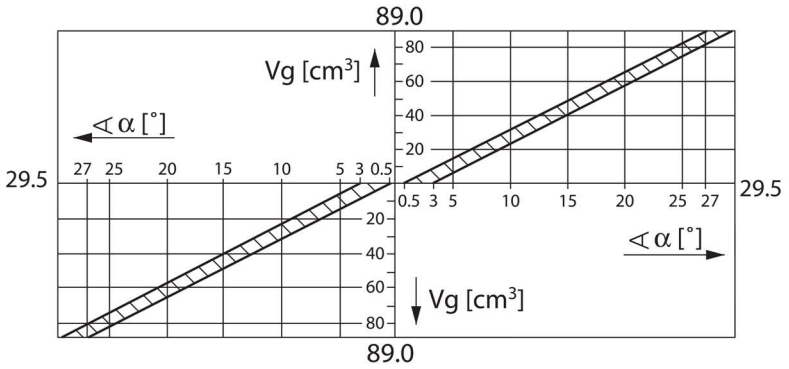
Regulated by the control handle on the servo valve, the swash plate can be infinitely varied in both directions with the help of the servo system.
The pump displacement resulting from any control handle position can be established using figures as showed bellow.
The angle of the control handle for stroke initiation and for the final position of the stroke can vary from unit to unit within the range of the tolerance.



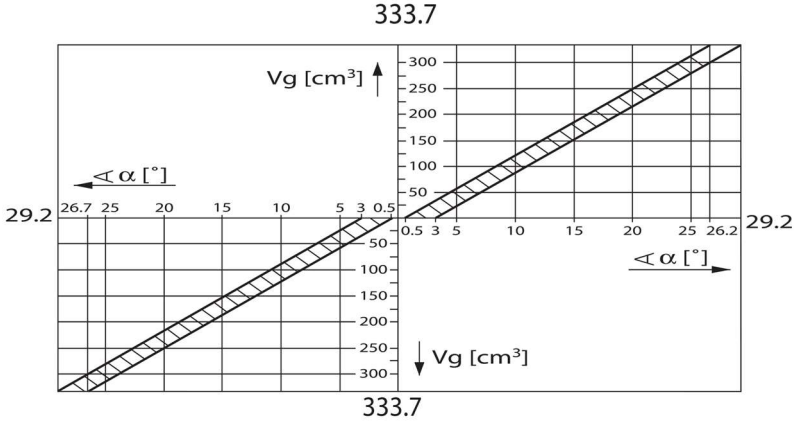
Frame size 20



Frame size 22



Frame size 23



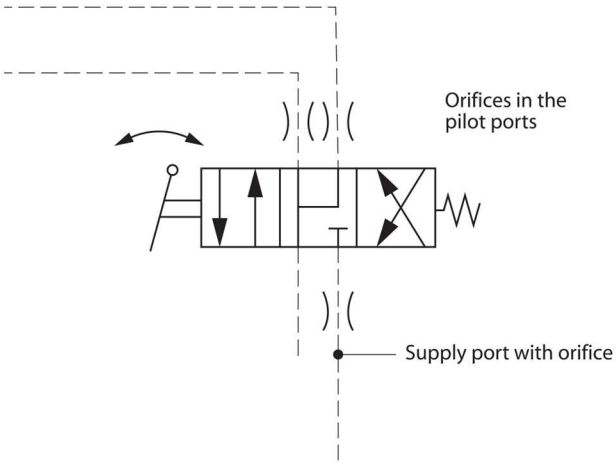
REVERSING TIME

Time for the directional change of the flow from Q max across 0 to Q max depending on the size of the control orifice fitted in the supply port to the servo valve.

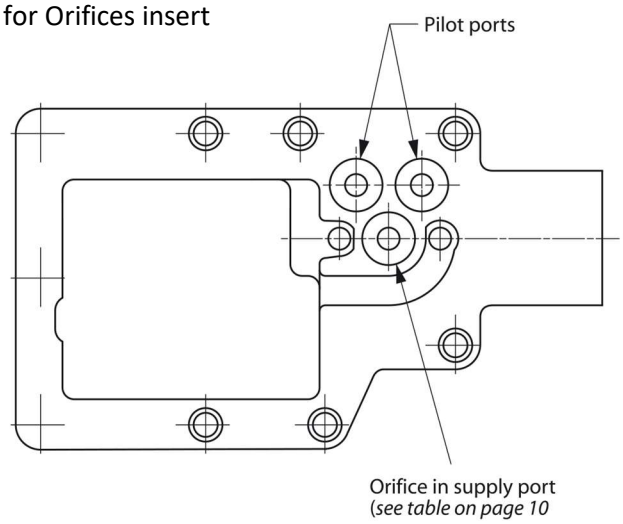
The values given assume movement of the control handle directly from one end position to other.

Adjustment time of handle: < minimum reversing time
Operating pressure: 21 MPa
Speed: 1450 min^{-1}
Viscosity: 35 $mm^2.s^{-1}$

Schematic diagram of servovalve with Alternative orifice position



Servo valve counterbored recessed for Orifices insert



The reversing time in one flow direction can be extended by inserting an orifice in one of the pilot ports only.

Frame size	Diameter of orifice (mm)	Reversing time (s)
20	0,76 1,05 1,60 without orifice	3,78 2,16 1,14 0,60
21	0,76 1,05 1,60 without orifice	4,14 2,34 1,20 0,66
22	0,76 1,05 1,60 without orifice	6,06 3,42 1,74 0,96
23 and 112	0,76 1,05 1,60 without orifice	6,24 3,54 1,80 1,02

Frame size	Diameter of orifice (mm)	Reversing time (s)
24	0,76 1,05 1,60 without orifice	10,20 5,82 2,88 1,68
25	0,76 1,05 1,60 without orifice	11,58 5,92 3,12 1,86
26	0,76 1,05 1,60 without orifice	29,70 16,20 7,50 3,78
27	0,76 1,05 1,60 without orifice	30,90 15,72 7,80 5,64

DIMENSIONS

Table 3: Dimensions (mm)

Frame size	A	A_1	B	B_1	B_2	B_3	C	D	D_3	D_4	D_5	E	F +-0,4	G
20	190	146	47,6	112,7	100	122	56	162	$127^{0,005}$	84	25,4	56	15	163
21	191	146	48	124	110	131						70	15	172
22	194	194	48	133	113	135						83	15	172
23 and 112	194	194	49	150,8	123,8	146						90	15	190,4
24	213	204	70	167	132	153	75	229	152,4	98		133	21,3	213
25	286	254	80	174	142	162	77	317,5	165,1	98		160	21,3	260
26	285	240	81	197	153	174		317,5	165,1	110		180	21,3	287,4
27	300	274	86	212	172	193		350	177,8	114		208	27,7	317,4

Frame size	G1	H	H_1	H_2	H_3	L	L1	L_2	S	M	N	R_1	S_1
20	81,03	340	270	284	352	224	161,2	93,7	$19^{-0,25}$	94,7	55,6	68	100
21	86	358	282	301	367	246	174	106		108,7	65	68	107
22	86	381	311	314	381	256	188	119		112,7	68,3	68,3	111
23 and 112	95,2	395	320	327	395	270	194	127		127,6	77,8	68,3	117
24	106,5	498	377	412	510	318	239	169		146	87,3	76	148
25	130	560	423	457	560	366	264	196		153,7	97	76	171
26	143,7	584	451	486	614	388	283	215		170,3	108	76	162
27	158,7	656	475	578	656	433	311	244		187,2	127	76	198

Frame size	T	U	V	V_1	V_3	X	Y	Z	W	d	d_1	f
20	$9,4^{+0,2}$	19	152	113	115,9	159	3	3	3/8-16 UNC-2B	$34,5^{-0,17}$	M10-5 H	16
21			160	122	128,6	152	6,35	6,35				
22			165	123	128,6	146	9,5	9,5				
23 and 112			171	134	139,8	140	12,7	12,7		$37,68^{-0,18}$		17,5
24		21	186	154	152,3	173	14	14		44,03	M14-5 H	23,5
25			199	175	165,1	219	16	16	5/8-11 UNC-2B			
26			201	214	167,4	235	14,3	16,3				
27			225	216	190,5	246	17,5	17,5		64,66	M16	25

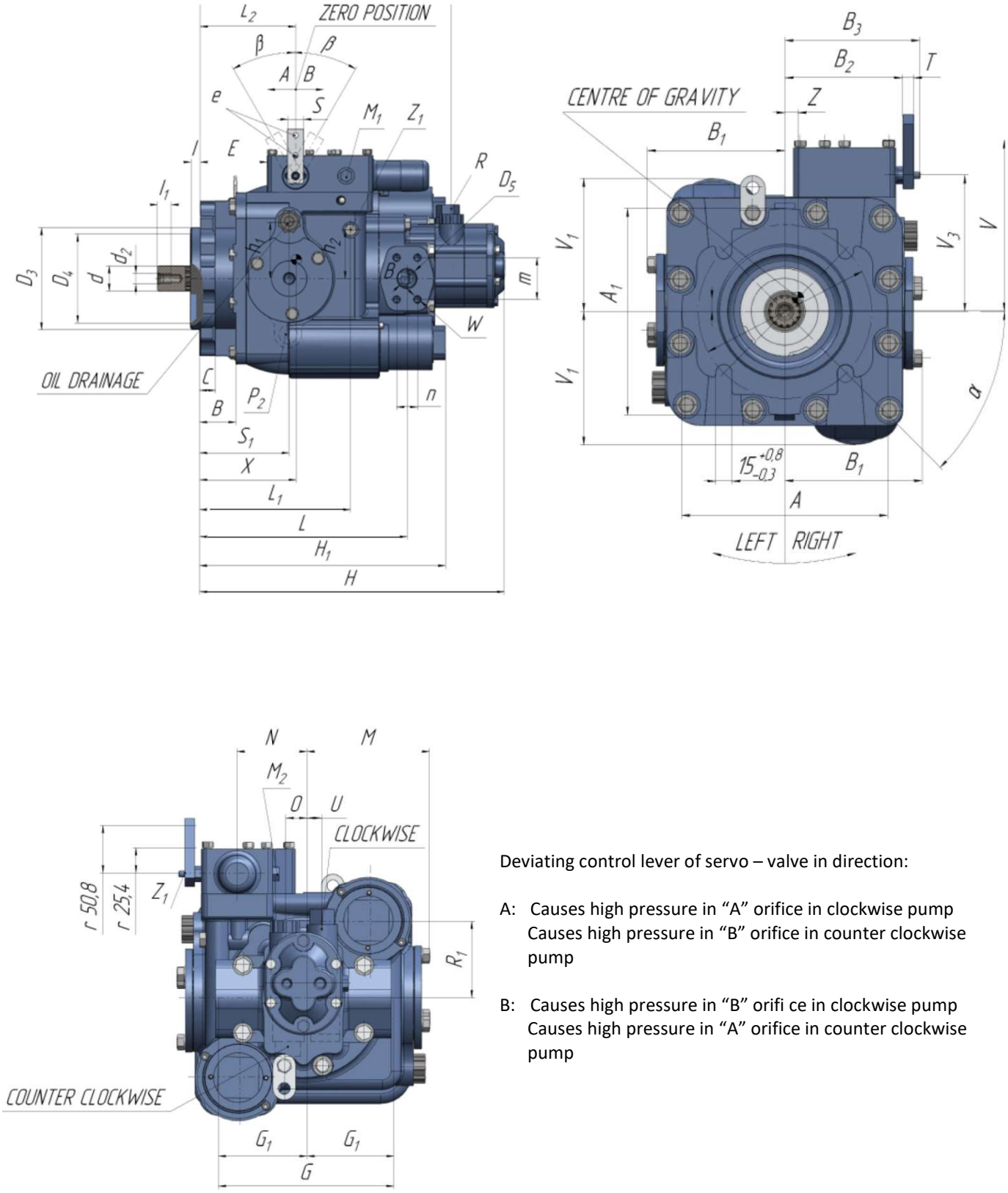
Frame size	e	h1	h2	k	l	l1	α	m	n
20	6,73	62	51,16	48	12,5	min20	45°	52,4	26,2
21		68	54						
22		71,4	60,5						
23 and 112		77,7	65						
24		88,5	68,2	67	12,45	30			
25		98	74		15,6	30		79,4	36,5
26		100	79,4			36,7			
27		116	95,3			30			

H – with charge pump:
12-18 cm^3 (sizes 20-23),
33 cm^3 (size25)

H3 – with charge pump:
18 cm^3 (sizes 20-23)
33 cm^3 (size 24)
66 cm^3 (size 25)

Frame size	Port A and B	$P_{1,2}$ drain	Port R gear pump	M_1, M_2, Z_1
20 - 24	SAE flange, 5000 psi 4 threads, 3/8´´-16 UNC-2B, 18 deep	7/8 - 14 UNF-2B	7/8 - 14 UNF-2B	7/16-20 UNF-2B SAE straight thread „O“-ring boss
25	SAE flange, size $1^{1/2''}$ 4 threads, 6000 psi, 5/8-11 UNC-2B, 35 deep	$1^{5/16}$ – 12 UN-2B	$1^{5/16}$ – 12 UN-2B	
26		$1^{7/8}$ - 12 UNF-2B SAE straight threads „O“ ring boss	$1^{5/16}$ – 12 UN-2B	
27			SAE flange,size $1^{1/4}$ 3000 psi, 4 threads 7/16-14 UNC-2B	

Figure 8: Outline drawing for axial piston variable displacement pumps Series 20,frame size 20-23.

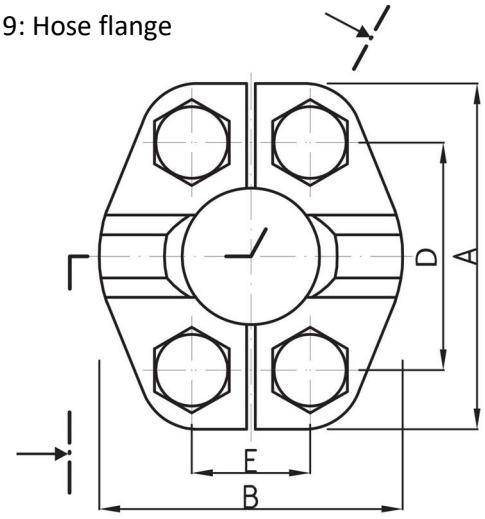


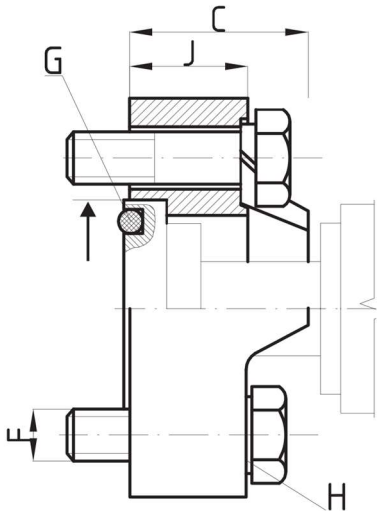
Deviating control lever of servo – valve in direction:

A: Causes high pressure in “A” orifice in clockwise pump
Causes high pressure in “B” orifice in counter clockwise pump

B: Causes high pressure in “B” orifi ce in clockwise pump
Causes high pressure in “A” orifice in counter clockwise pump

Figure 9: Hose flange

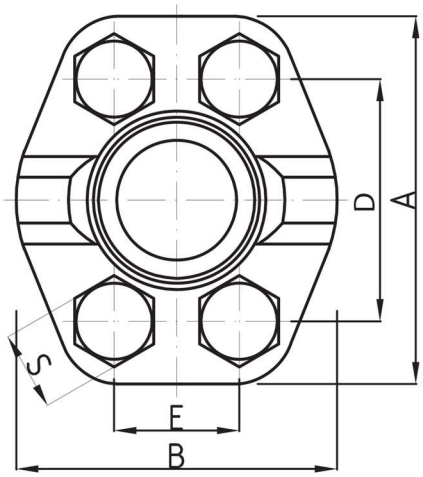


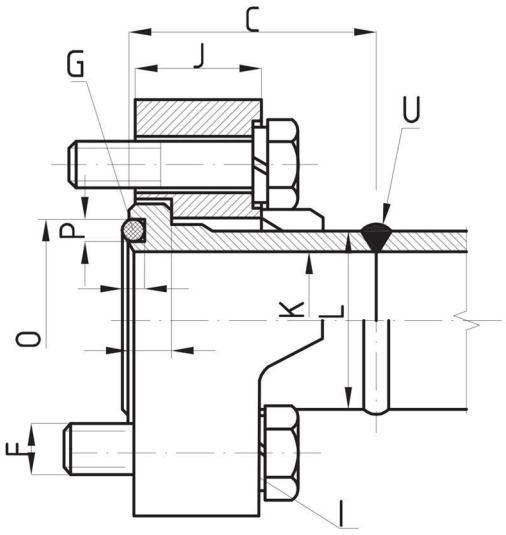


Dimensions (mm)

Frame size	PSI	A	B	C	D-0,1	E-0,1	F	H	J
20-24	5.000 PSI (code B)	81	70	35	52,40	26,20	3/8-16 UNC-2A	Washer 10,20	22,50
20-24	6.000 PSI (code A)	81	70	35	56,37	27,94	7/16-14 UNC-2B	Washer 13,20	22,50
25-27	6.000 PSI	112	95	46	79,40	36,50	5/8-11 UNC-2A	Washer 16,00	30,00

Pipe flange





Dimensions (mm)

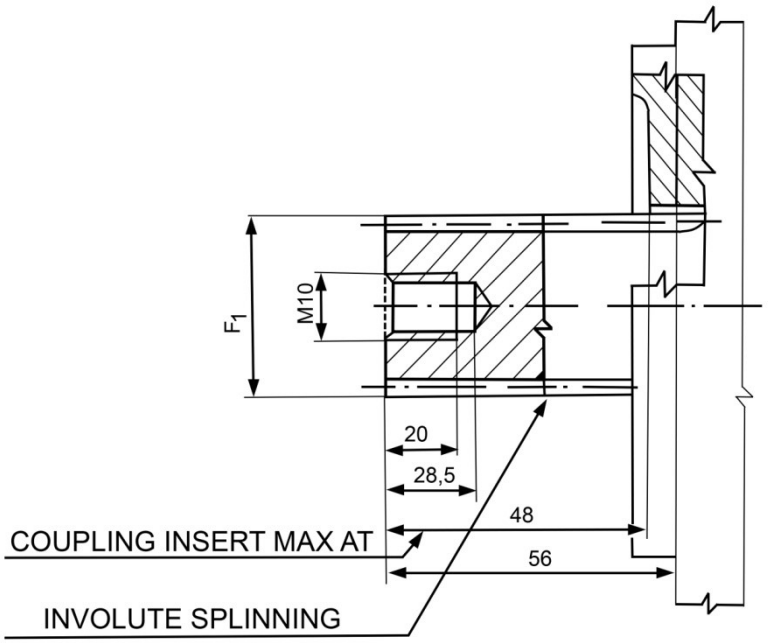
Frame size	PSI	A	B	C	D-0,1	E-0,1	F	H	J
20-24	5.000 PSI (code B)	81	70	40	52,40	26,20	3/8-16 UNC-2A	Washer 10,00	22,50
20-24	6.000 PSI (code A)	81	70	35	56,37	27,94	7/16-14 UNC-2B	Washer 13,20	22,50
25-27	6.000 PSI	112	95	46	79,40	36,50	5/8-11 UNC-2A	Washer 16,00	30,00

Frame size	PSI	K	L	M-0,1	N-0,1	O	P+0,2	U
20-24	5.000 PSI (code B)	28	38	8,00	2,80	39,7 ± 0,05	4	V5-104
20-24	6.000 PSI (code A)	28	38	8,00	2,80	39,7 ± 0,05	4	V5-104
25-27	6.000 PSI	38	50	12,60	2,80	53,9 ± 0,01	4	V6-158

Note:
Flange according to SAE J 518 c
Frame size 20 – 24: size 1, 5000 psi, torque for screw tightening 3/8 – 16 UNC2A: 37 – 42 Nm
Frame size 25 – 27: size 1 1/2, 6000 psi, torque for screw tightening 5/8 – 11 UNC2A: 158 – 181 Nm

Input shaft details for sizes 20,21,22,23 and 112

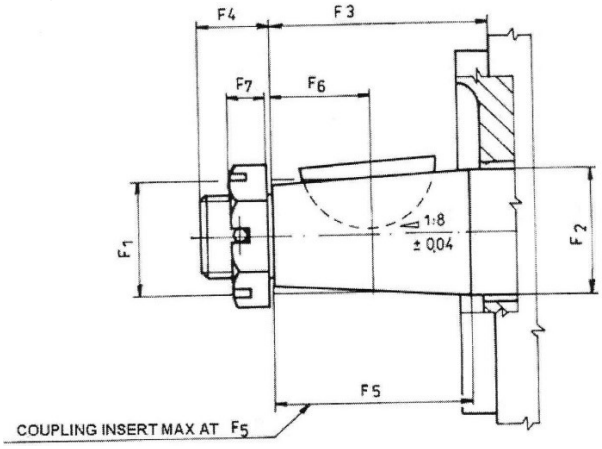
Teeth splined shafts



Profile angle – 30°
F_2 - pitch
F_3 - number of teeth
F_4 - teeth modul

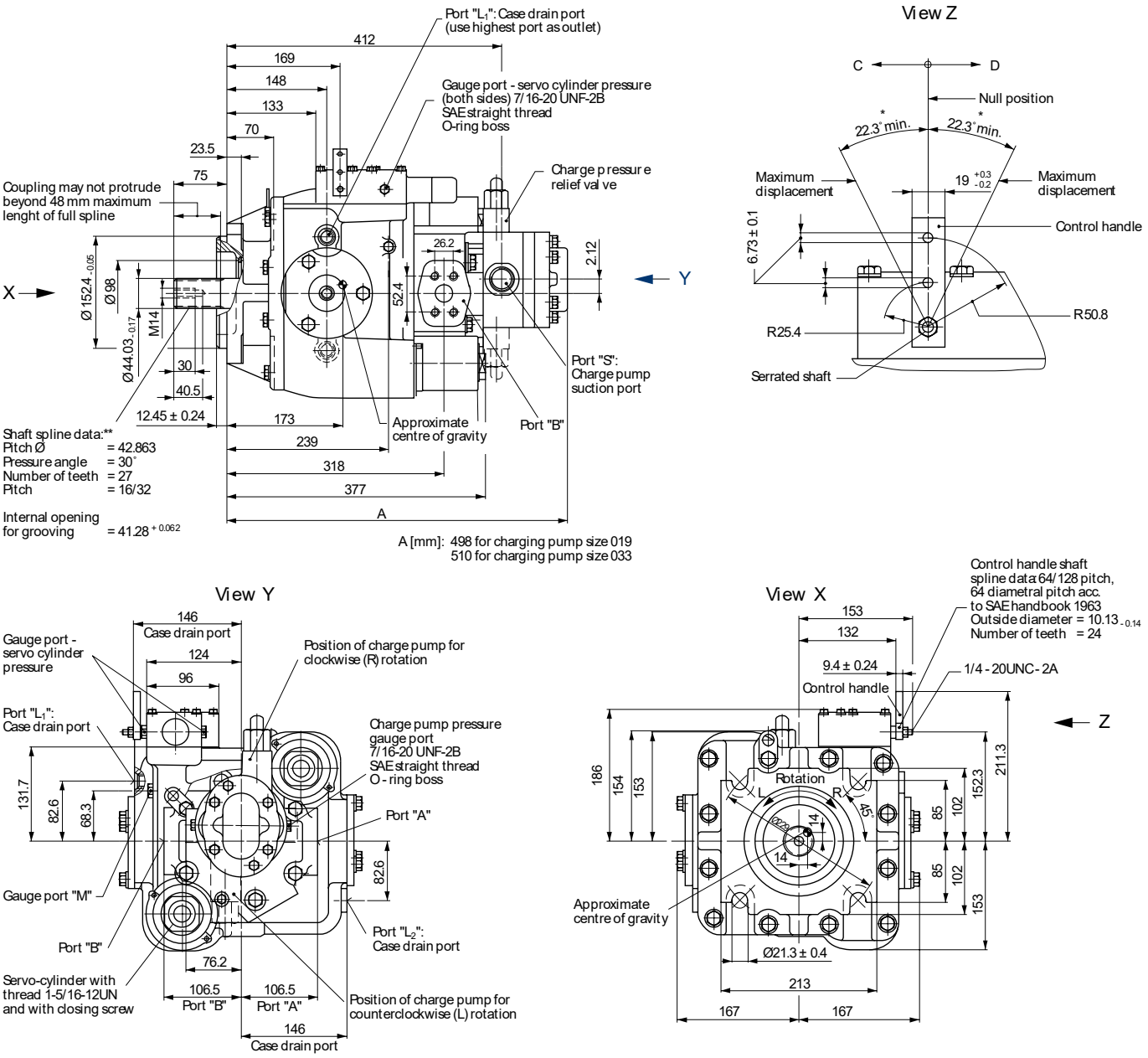
Shaft type	Size available	Dimensions			
		F_1	F_2	F_3	F_4
A	20,21,22,23	31,22	29,634	14	12/24
B	20,21,22,23	31,75	30,163	19	16/32
C	20,21,22,23	34,5	33,338	21	16/32
D	23	37,68	36,512	23	16/32
E	23	44,03	42,863	27	16/32
G	23	43,71	41,275	13	8/16
I	20,21,22,23	32,91	31,75	20	16/32

Type K (Tapered key shaft, cone 1:8)



Shaft type	Size	F_1	F_2	F_3	F_4	F_5	F_6	F_7
K	20,21,22,23	31,75	34,94	57,3	19,1	47,8	22,4	12,7
J	23	41,275	44,45	66,5	22,1	53,8	28,45	15,7

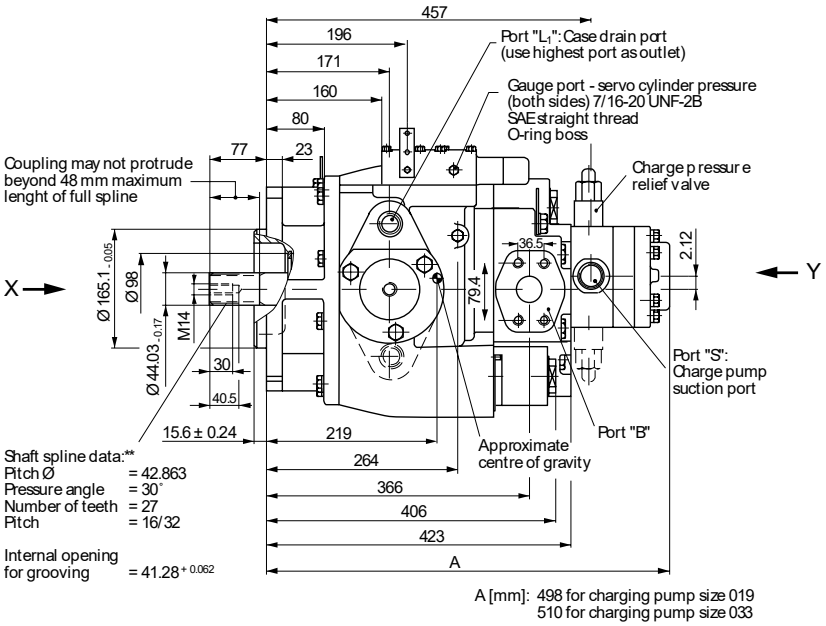
AXIAL PISTON VARIABLE PUMP PV24

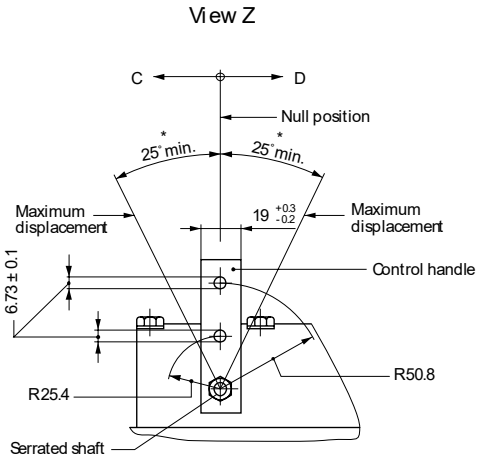


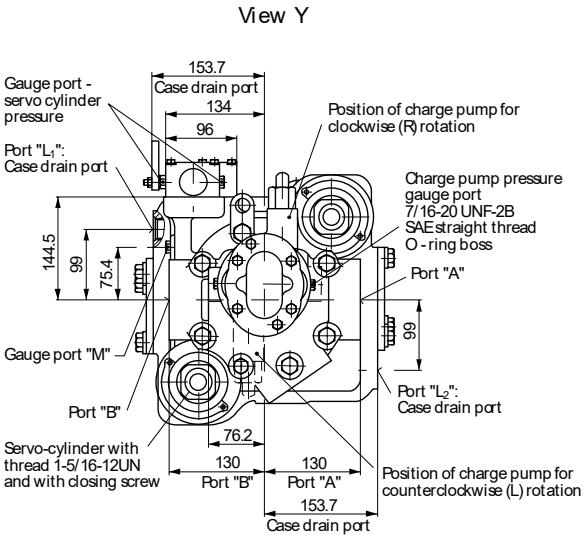
Frame size	Port A and B	Port L_1 and L_2	Port S	Port M	Input Shafts
119 cm3	SAE flange, size 1 SAE split flange boss 5000 psi, 4 threads 3/8-16 UNC-2B 18 deep	7/8-14 UNF-2B SAE straight thread O-ring boss	1 5/16-12 UNF-2B SAE straight thread O-ring boss	7/16-20 UNF-2B SAE straight thread O-ring boss	13 teeth 27 teeth Cylindrical

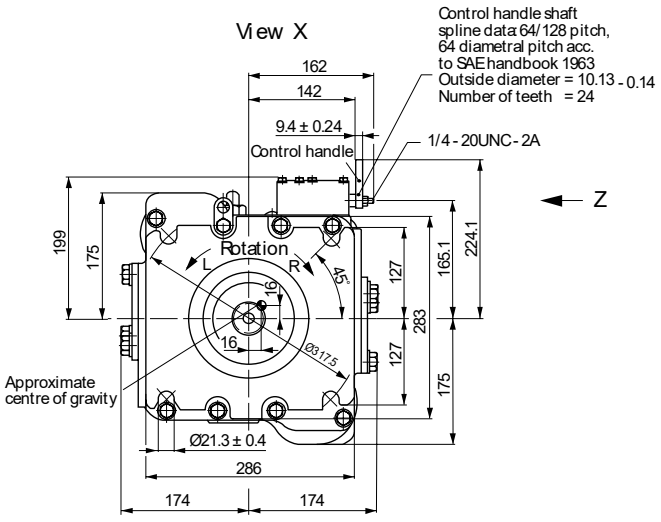
Notice – PV24 diplacement can be increased to 125,0 cm3

AXIAL PISTON VARIABLE PUMP PV25



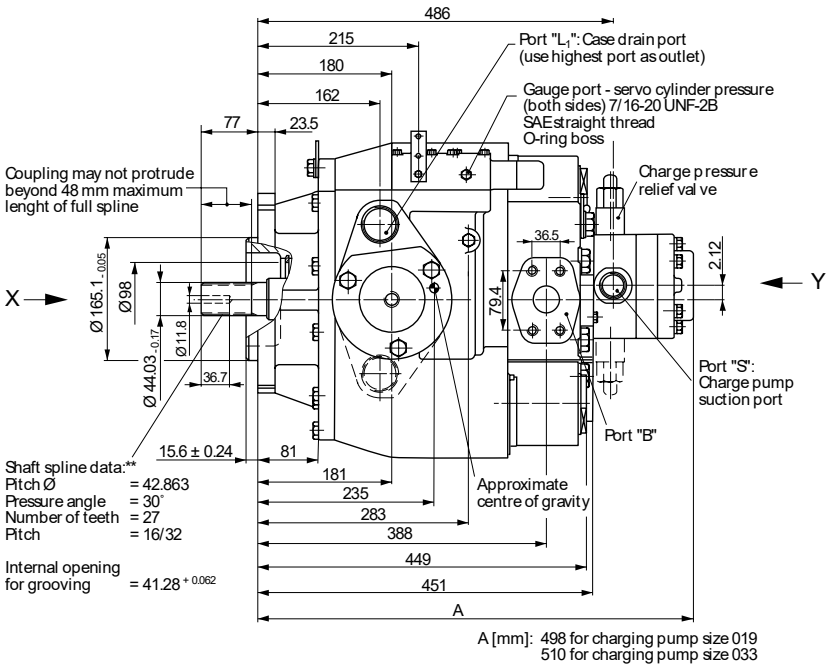


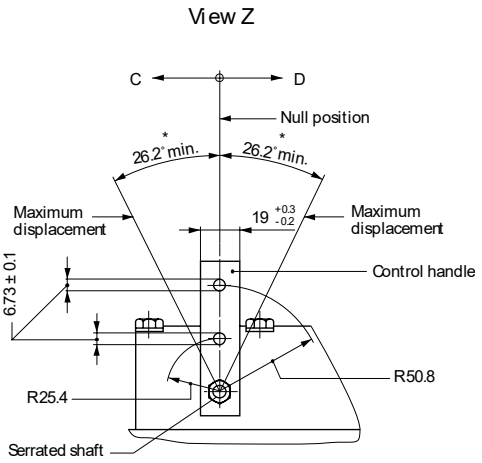


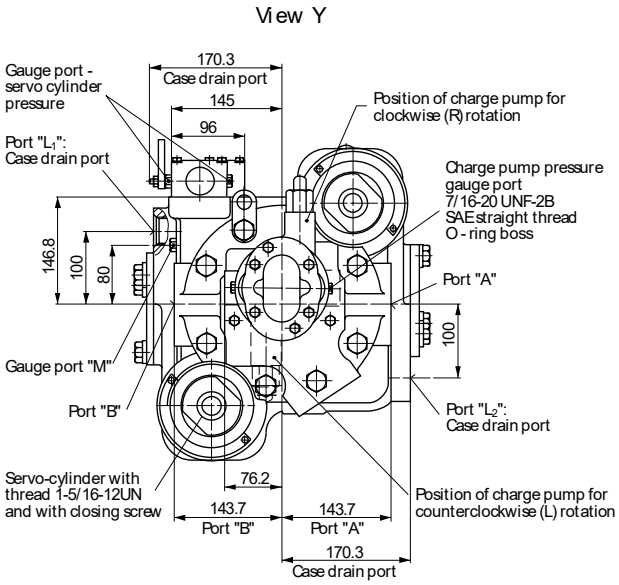


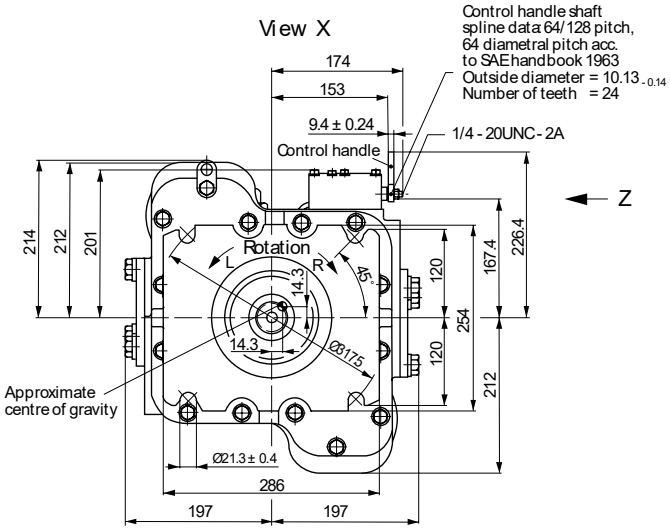
Frame size	Port A and B	Port L_1 and L_2	Port S	Port M	Input Shafts
166 cm3	SAE flange, size 1 1/2 SAE split flange boss 6000 psi, 4 threads 5/8-11 UNC-2B 35 deep	1 5/16-12 UNF-2B SAE straight thread O-ring boss	1 5/16-12 UNF-2B SAE straight thread O-ring boss	7/16-20 UNF-2B SAE straight thread O-ring boss	13 teeth 27 teeth Cylindrical

AXIAL PISTON VARIABLE PUMP PV26



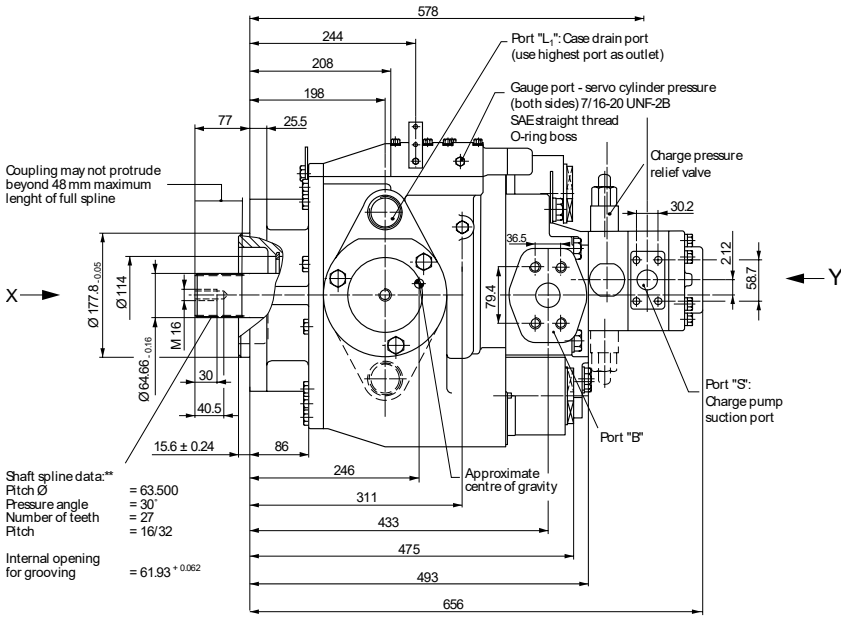


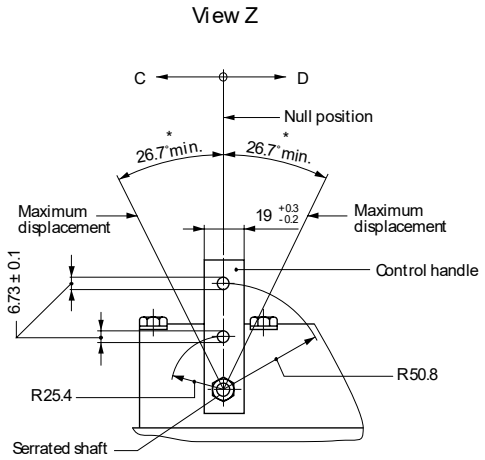


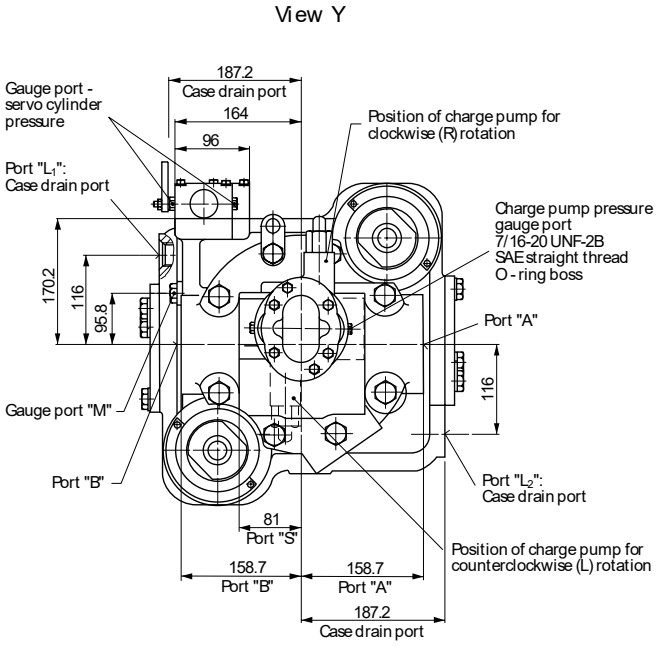


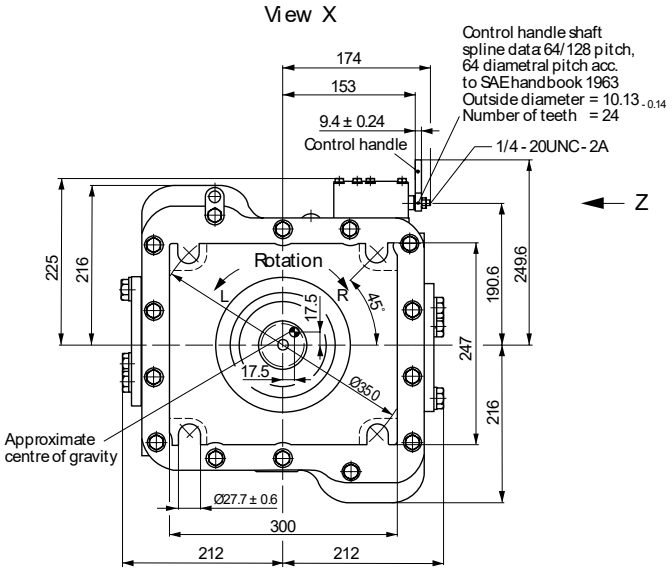
Frame size	Port A and B	Port L_1 and L_2	Port S	Port M	Input Shafts
227 cm3	SAE flange, size 1 1/2 SAE split flange boss 6000 psi, 4 threads 5/8-14 UNC-2B 35 deep	1 7/8-12 UNF-2B SAE straight thread O-ring boss	1 5/16-12 UNF-2B SAE straight thread O-ring boss	7/16-20 UNF-2B SAE straight thread O-ring boss	13 teeth 27 teeth Cylindrical

AXIAL PISTON VARIABLE PUMP PV27









Frame size	Port A and B	Port L_1 and L_2	Port S	Port M	Input Shafts
334 cm3	SAE flange, size 1 1/2 SAE split flange boss 6000 psi, 4 threads 5/8-11 UNC-2B 35 deep	1 7/8-12 UNF-2B SAE straight thread O-ring boss	SAE flange, size 1 1/4 SAE split flange boss 3000 psi, 4 threads 7/16-14 UNC-2B 28 deep	7/16-20 UNF-2B SAE straight thread O-ring boss	15 teeth 40 teeth Cylindrical

TYPE DESIGNATION

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
PV	XX	XXX	X	X	X	X	X	XX	XX	XXX

1.

PV	Axial Piston Pump with Variable Displacement

2.

Displacement Vg_{max} [cm^3]	
20	33,3
21	51,6
22	69,8
23	89
112	110,8
24	118,7
25	165,8
26	227,3
27	333,7

3.

XXX	Control – see second page

4.

Shaft seal type	
1	Standard spring type
2	Lip seal

5.

Direction of shaft rotation	
R	Clockwise (CW)
L	Counter clockwise(CCW)

6.

Dimension of the input shaft	
A	14 teeth, 12/24 PITCH, Ø 31,20
B	19 teeth, 16/32 PITCH, Ø 31,75
C	21 teeth, 16/32 PITCH, Ø 34,50
D	23 teeth, 16/32 PITCH, Ø 37,68
E	27 teeth 16/32 PITCH,Ø 44,O3
G	13 teeth, 8/16 PITCH, Ø 43,71
I	20 teeth, 16/32 PITCH, Ø 32,91
J	cone 1:8, SAE J501, Ø 41,27
K	cone 1:8, SAE J501, Ø 31,75
L	parallel with key Ø 34,925;
M	parallel with key Ø 44,45;
P	15 teeth, 16/ 32 PITCH, Ø 25,40
R	13 teeth, 16/32 PITCH, Ø 21,80

7.

Dimension of high pressure ports		Thread	
A	SAEJ518c,code 62,size 1", 6000PSI	7/16"-14 UNC-2A	**o**
B	SAEJ518c,code 61,size 1", 5000PSI	3/8"-16 UNC-2A	•
C	ISO 6162,DN25, type II, 42 MPa	M12	**o**

8.

Charge gear pump	
	Vg
A	8,2 cm^3
B	12,3 cm^3 (PV20, PV21)
C	18,03 cm^3 (PV21, PV22, PV23)
D	18,85 cm^3 (PV24)
E	32,8 cm^3 (PV24, PV25)
F	65,5 cm^3 (PV26, PV27)
NN	without charge pump
AA	8,2 + 8,2 cm^3
BA	12,3 +8,2 cm^3
CA	18,03+ 8,2 cm^3
XX	Special on request

9.

Pressure setting of gear pump		
18	18 bar/ 1.8 MPa (1,8 ±0,05 MPa at 3,8 $dm^3.min^{-1}$)	•
XX	Other setting	**o**
00	without charge pump	**o**

10.

Orifice		
A	Ø 0,76 mm	**o**
B	Ø 0,91 mm	**o**
C	Ø 1,05 mm	•
D	Ø 1,36 mm	**o**
E	Ø l,6 mm	**o**
N	without orifice	**o**
1	orifice in channel "P"	•
2	orifice in channel "A", "B"	**o**
3	orifice in channel "P","A", "B"	**o**
4	orifice in channel "A"	**o**
5	orifice in channel "B"	**o**
6	orifice in channel "P", "A"	**o**
7	orifice in channel "P", "B"	**o**
0	without orifice	**o**

11.

000	Standard	•
XXX	Special production number	**o**

- • standard design
- **o** available

TYPES OF CONTROLS

WITHOUT CONTROL DEVICE

AAA	with top cover only

MECHANICAL-HYDRAULIC

MH	mechanical-hydraulic servovalve
MC	mechanical-hydraulic servovalve with a pressure override valve (POR)

ELECTRO-HYDRAULIC

EPxx	Proportional electric valve
12	electric control; voltage 12 V
24	electric control; voltage 24 V
ERx	three-positional distributor
1	electric control; voltage 12 V, D_n 6mm
2	electric control; voltage 24 V, D_n 6mm
3	electric control; voltage 12 V, D_n 4mm
4	electric control; voltage 24 V, D_n 4mm

HYDRAULIC

PH	direct hydraulic control (joystick)
HDC	hydraulic proportional control (HDC hydraulic valve)
HDC POR	hydraulic proportional control with POR valve

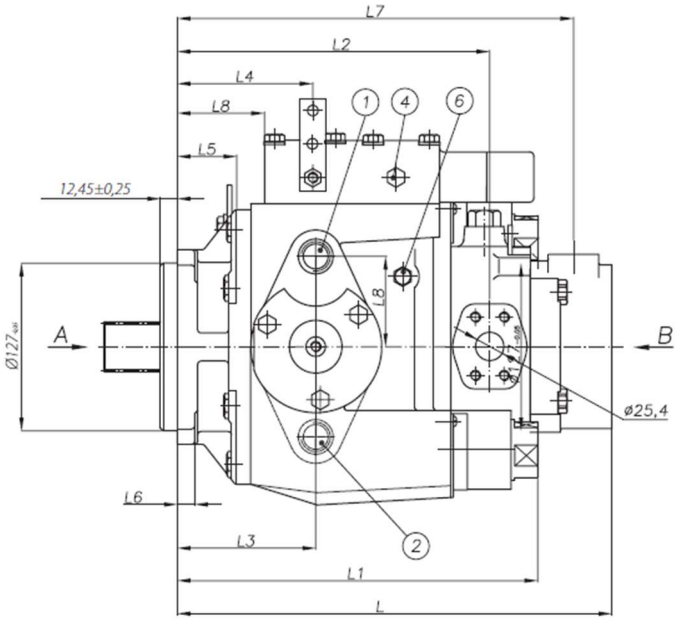
Ordering example :

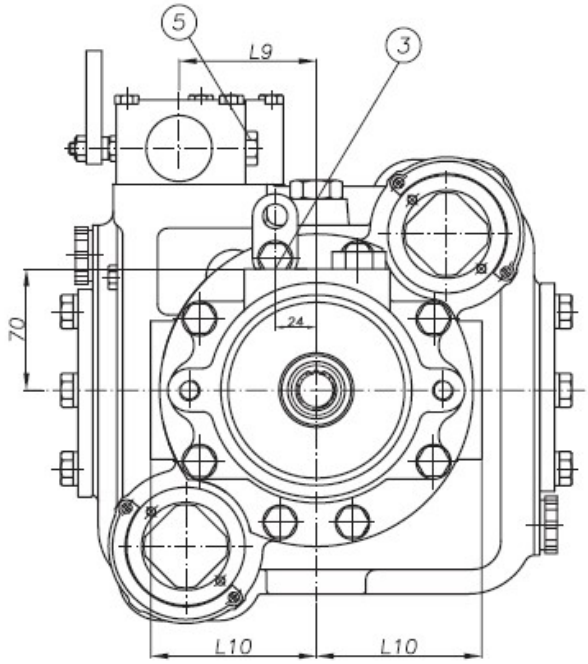
PV23 MH 2 R D B C 18 C1 000
Type of pump – **PV23**
Control – **MH** - mechanical servovale
Shaft seal type – **2** - lip seal
Rotation – **R** – CW, (right)
Shaft – **D** – splined type, 23 teeth
High pressure port – **B** - 5000 psi
Charge pump – **C** - gear pump 18,05 cm^3
Charge pump pressure setting – **18** - 18 bar
Orifice – **C1** - 1,05 mm in channel P
Special – **000** – none

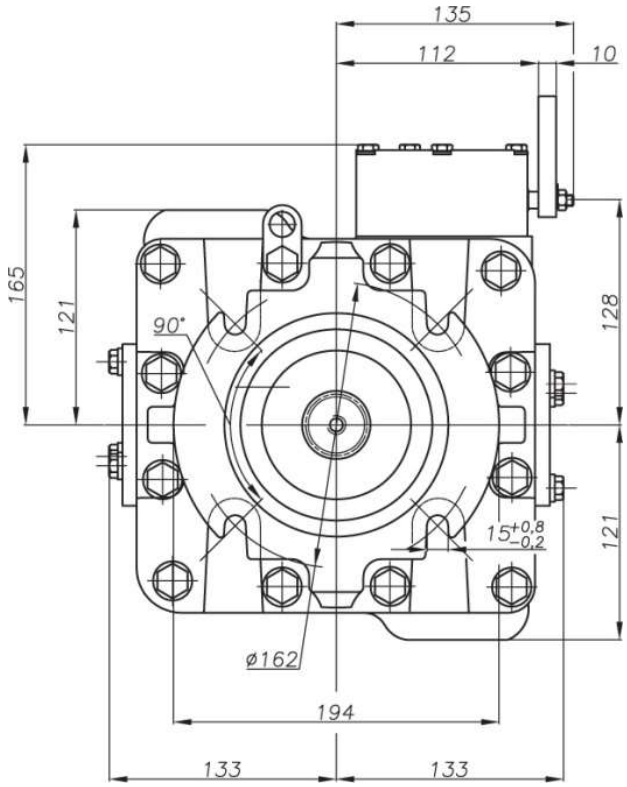
Axial piston variable displacement pumps **PVS series (short version)** are developed from classic 20 series SPV pumps using gerotor type charge pump and thru drive for connecting with additional gear pumps or tandems.

Basic dimensions :

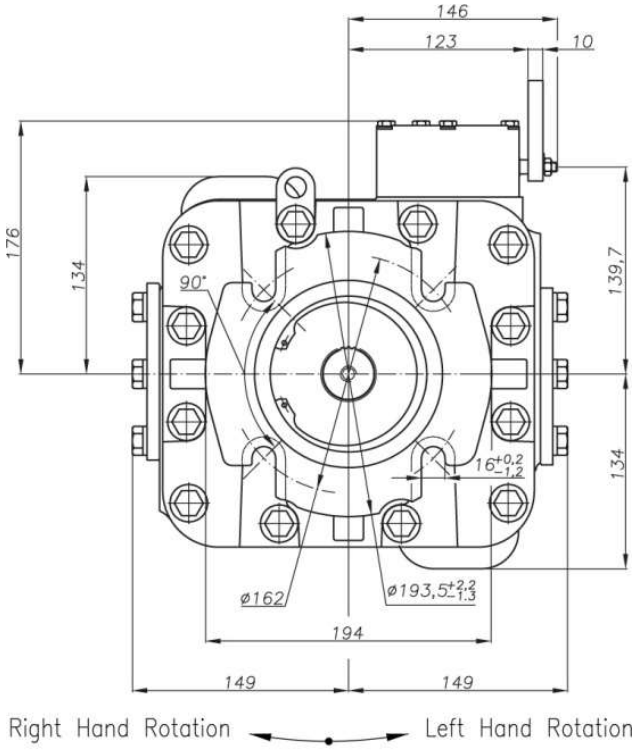
Frame size	Dimensions (mm)										
	L	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}
PVS 22	356	311	259	111	119	48	16	327	71,4	68	85,8
PVS 23	364	320	270	118	127	49	17,5	335	77,8	77,8	95,25
PVS 112											







PVS 22



PVS 23, PVS 112

PVS (short pump with thru drive) - TYPE DESIGNATION

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
PVS	XX	XXX	X	X	X	XX	XX	XX	X	X	XXX

1.

PVS	Axial Piston Pump with Variable Displacement

2. Displacement Vg_{max} [cm^3]

22	69,8
23	89
112	110,8

3.

XXX	Type of control
MH	mechanical-hydraulic servovalve
ER	electrical 3 positional
HDC	hydraulic proportional
EP12	electric proportional 12 V
EP24	electric proportional 24 V

4.

Direction of shaft rotation	
R	Clockwise (CW)
L	Counter clockwise(CCW)

5.

Dimension of the input shaft	
A	14 teeth, 12/24 PITCH, Ø 31,20
B	19 teeth, 16/32 PITCH, Ø 31,75
C	21 teeth, 16/32 PITCH, Ø 34,50
D	23 teeth, 16/32 PITCH, Ø 37,68
I	20 teeth, 16/32 PITCH, Ø 32,91
K	cone 1:8, SAE J501, Ø 31,75
L	parallel with key Ø 34,925;
M	parallel with key Ø 44,45;

6.

Dimension of high pressure ports		Thread	
A	SAEJ518c,code 62,size 1", 6000PSI	7/16"-14 UNC-2A	o
B	SAEJ518c,code 61,size 1", 5000PSI	3/8"-16 UNC-2A	•
C	ISO 6162,DN25, type II,40 MPa	M12	o
D	SAEJ518c,code 62,size 3/4", 6000PSI	7/16"-14 UNC-2B	o
E	SAEJ518c,code 61,size 3/4", 5000PSI	3/8"-16 UNC-2B	o
F	ISO 6162,DN25, type II,40 MPa	M10	o

7.

Charge pump (gerotor type)		
A	19 cm^3	•
B	22 cm^3	o

8.

High pressure relief valve setting		
N	No relief valve	•
26	26 Mpa	o
30	30 Mpa	o
35	35 Mpa	o
42	42 Mpa	o

9.

Pressure setting of charge pump		
18	18 bar/ 1.8 MPa (1,8 ±0,05 MPa at 3,8 $dm^3.min^{-1}$)	•
XX	Other setting	o
00	without charge pump	o

10.

Orifice		
A	Ø 0,76 mm	o
B	Ø 0,91 mm	o
C	Ø 1,05 mm	•
D	Ø 1,36 mm	o
E	Ø 1,6 mm	o
N	without orifice	o
1	orifice in channel "P"	•
2	orifice in channel "A", "B"	o
3	orifice in channel "P","A", "B"	o
4	orifice in channel "A"	o
5	orifice in channel "B"	o
6	orifice in channel "P", "A"	o
7	orifice in channel "P", "B"	o
0	without orifice	o

11.

	Thru drive for gear pump connection
1	SAE J744c A (82,55 mm, 9 teeth)
2	SAE J744c AA (82,55 mm, 11 teeth)
3	SAE J744c A (82,55 mm, D-6x13x16H9x3,5D10)
4	SAE J744c B (101,6 mm, 13 teeth)
5	SAE J744c B (101,6 mm, 14 teeth)
6	SAE J744c B (101,6 mm, D-6x18x22H9x5D9)

12.

000	Standard	•
XXX	Special number	o

- • standard design
- **o** avaiable

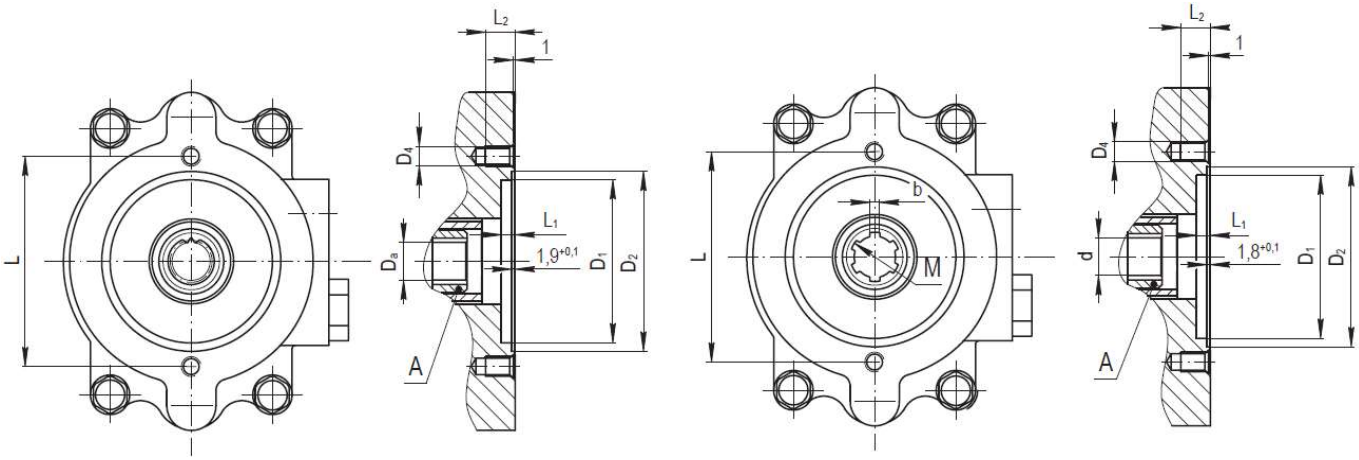
Ordering example :

PVS 23 MH R D B A N 18 C1 4 000

Type of pump – PVS 23 (displacement 89 cm^3)
Control – MH (mechanical servovalve)
Rotation – R (right)
Shaft – D (splined, 23 teeth)
High pressure port – B (5000 psi)
Charge pump – A (gerotor type 19 cm^3)
High pressure relief valve – N (no relief valve)
Charge pump pressure setting – 18 (18 bar)
Orifice – C1 (1,05 mm in channel P)
Thru drive for gear pump connection – 4 (13 teeth, SAE B)
Special – 000 (none)

Mounting Dimensions for Gear Pumps

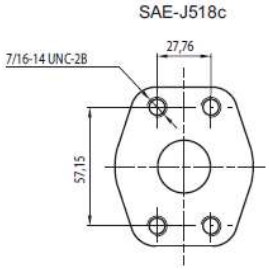
Code	Connect. type	Teeth no.	Dimensions (mm)									
			D_a	M	d	b	D_1	D_2	L	L_1	D_4	L_2
1	SAE A	9	$12{,}926^{+0.11}$	-	-	-	$82{,}57^{+0.04}$	$91^{+0.22}$	106,4	7,5	M10-7H	15min
2	SAE AA	11	$16{,}017^{+0.11}$									
3	SAE J744c A	-	-	D 6x13x16H9x3.5D10	$13^{+0.11}$	$3{,}5^{+0{,}078}$						
4	SAE B	13	$19{,}133^{+0.11}$	-	-	-	$101{,}62^{+0.04}$	$110^{+0.22}$	146,1	10	M12-7H	25min
5	SAE B	14	$28^{+0.13}$									
6	SAE J744cB	-	-	D 6x18x22H9x5D9	$18^{+0.11}$	$5^{+0{,}078}$	$101{,}62^{+0.04}$	$110^{+0.22}$	146,1	10	M12-7H	25min



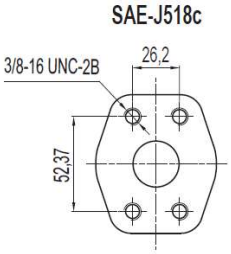
Drain port size	Ports	
	1, 2, 3	4, 5 , 6
all PVS sizes	7/8-14 UNF-2B	7/16-20 UNF-2B

Main A,B ports options

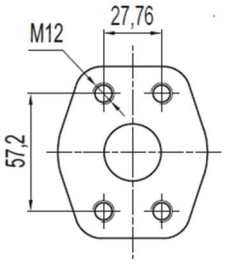
A – 6000 psi



B – 5000 psi

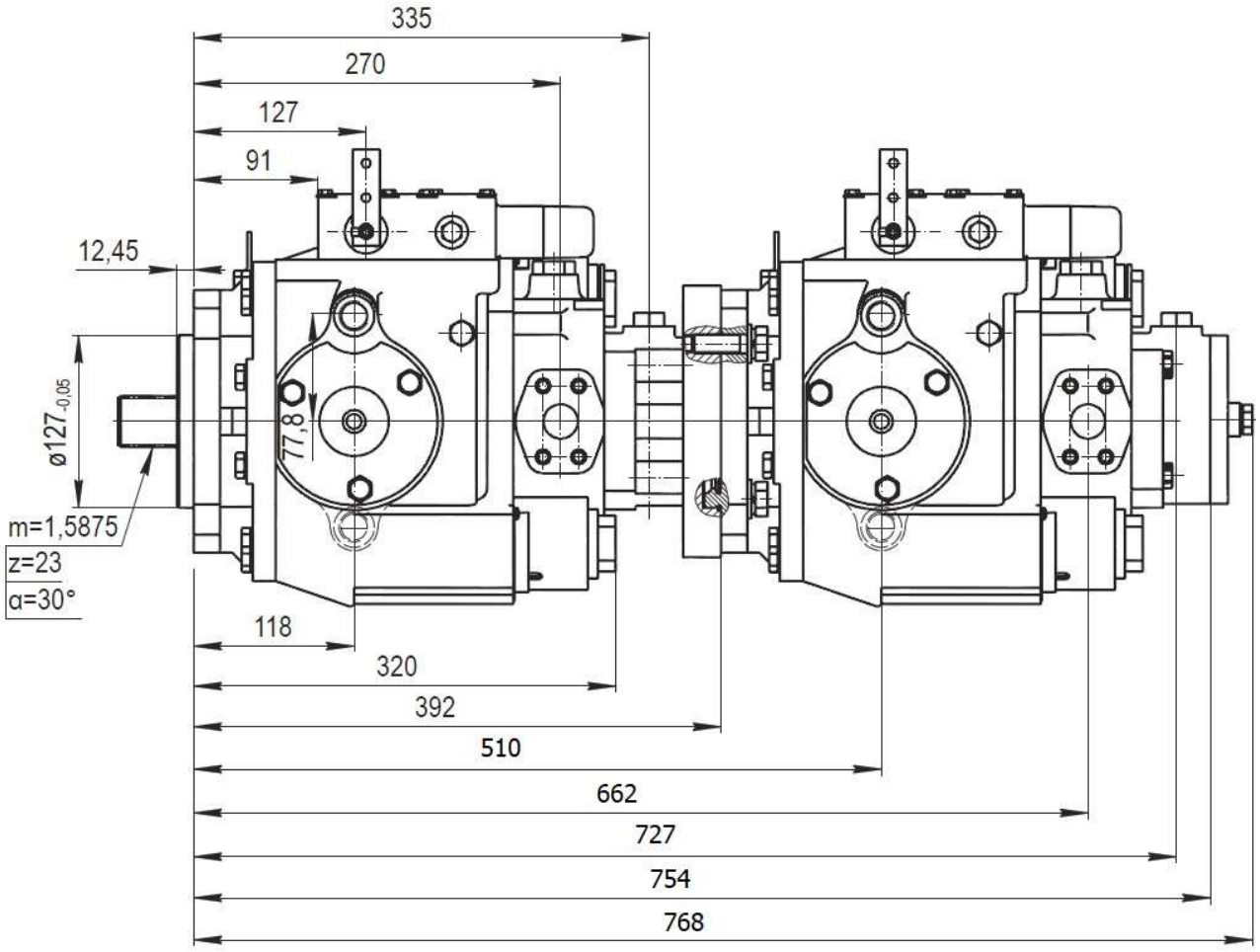


C – M12, ISO

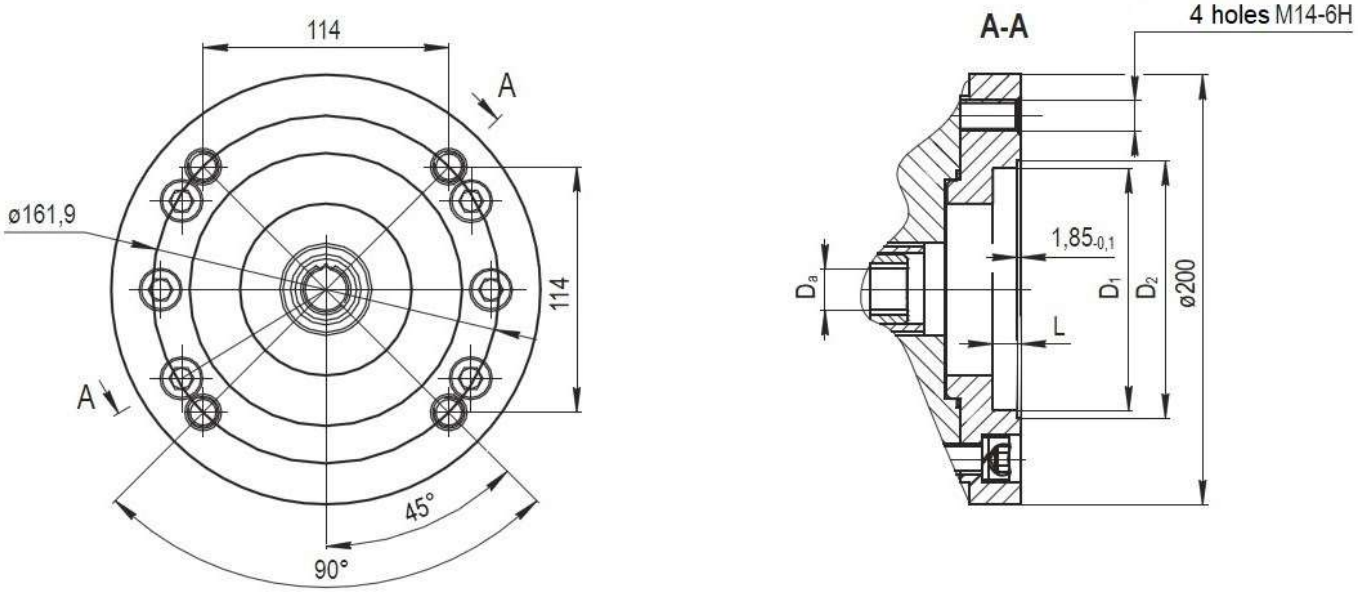


Tandem pumps PVS – are designed from standard 20 series, connected together into tandem version with special intermediate piece and using gerotor charge pumps.
Second stage can be equipped with thru drive (SAE-A or SAE-B) for gear pump connection.
Available in sizes - 23 and 112 with combinations 23-23, 23-112, 112-112, 112-23.

Dimensions :

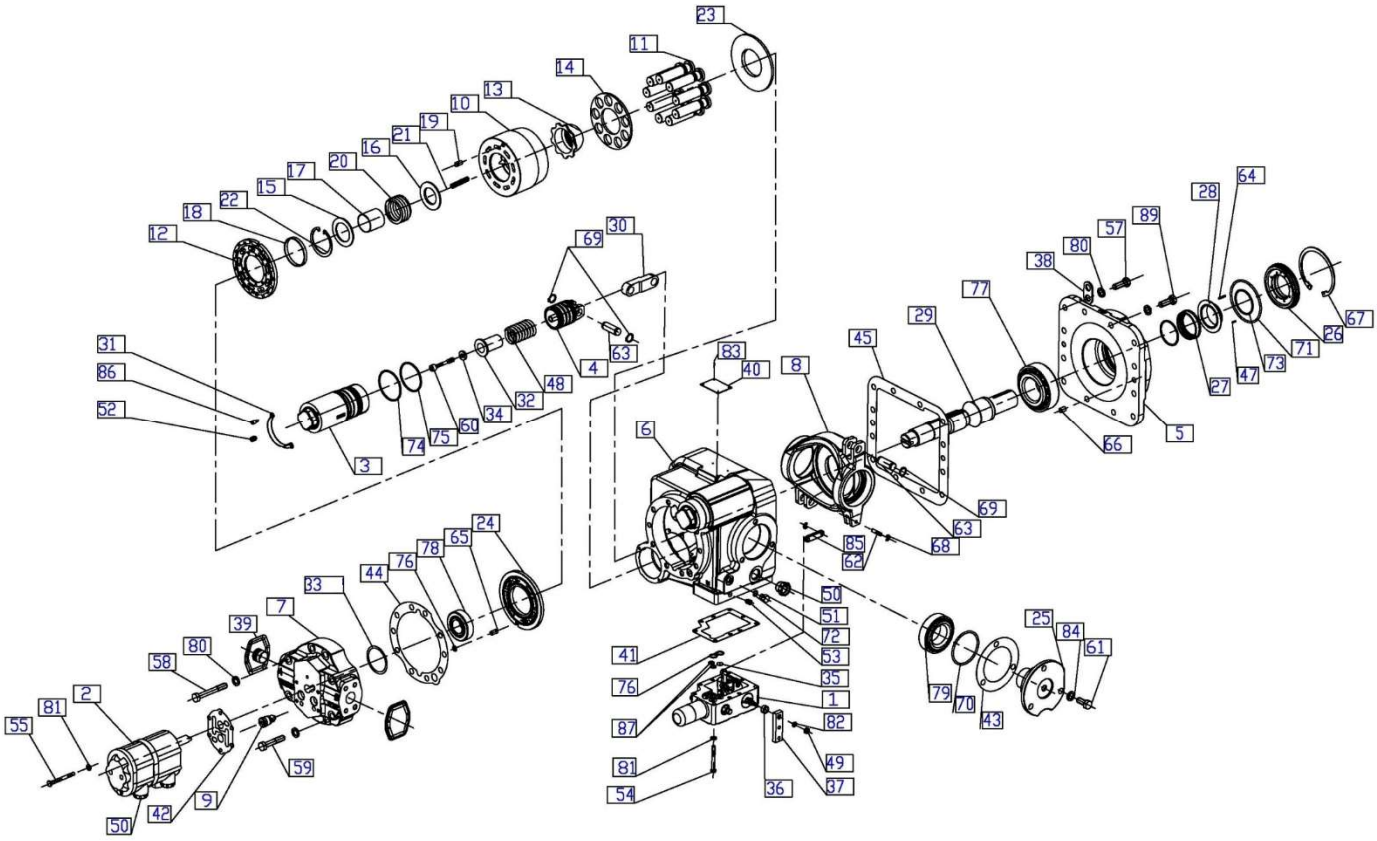


Mounting dimensions for tandem connection



Ordering codes for each stage are identical with our PVS model code.

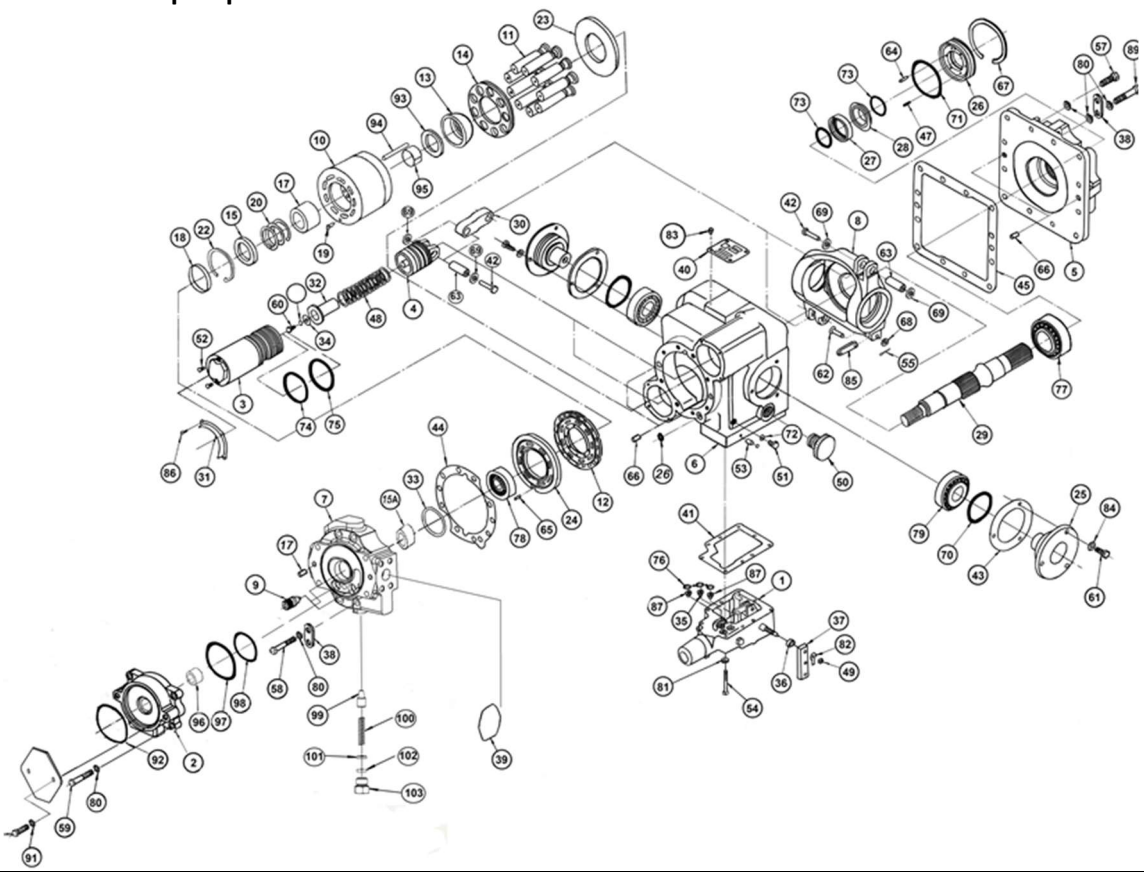
SPARE PARTS FOR PV pumps



Item	Pcs	Name	Item	Pcs	Name	Item	Pcs	Name
1	1	Servovalve Assembly	**31**	2	Sleeve Retainer	**63**	4	Pin
2	1	Charge Pump CW, CCW	**32**	2	Spring Guide	**64**	1	Drive Screw
3	2	Servo Cylinder	**33**	1	Shim	**65**	1	Pin
4	2	Servo Piston	**34**	2	Washer	**66**	4	Pin
5	1	Front Cover	**35**	1	Orifice	**67**	1	Retaining Ring
6	1	Pump Housing	**36**	1	Spacer	**68**	2	Retaining Ring
7	1	End Cap	**37**	1	Control Handle	**69**	8	Retaining Ring
8	1	Swash Plate	**38**	3	Loop	**70**	2	O-Ring
9	2	Check Valve	**39**	2	Cap	**71**	1	O-Ring
10	1	Cylinder Barrel Housing	**40**	1	Brand plate	**72**	1	O-Ring
11	9	Piston Assembly	**41**	1	Control Valve Gasket	**73**	2	O-Ring
12	1	Bearing Plate	**42**	1	Charge Pump Gasket	**74**	2	O-Ring
13	1	Retainer Guide	**43**	2	Shim Pack	**75**	2	O-Ring
14	1	Slipper Retainer	**44**	1	End Cap Gasket	**76**	4	O-Ring
15	1	Spring Retainer	**45**	1	Front Cover Gasket	**77**	1	Main shaft bearing
16	1	Spring Seat	**47**	6/8	Seal Spring	**78**	1	Shaft bearing
17	1	Spring Guide	**48**	2	Servo Spring	**79**	2	Swashplate bearing
18	1	Bearing Plate Pilot	**49**	1	Nut	**80**	20	Washer
19	1	Pin	**50**	3	Plastic Plug	**81**	13	Washer
20	1	Cylinder Barrel Spring	**51**	1	Plug	**82**	1	Washer
21	6	Retainer Spring	**52**	4	Expander 05	**83**	4	Drive Screw
22	1	Retaining Ring	**53**	1	Expander 09	**84**	6	Washer
23	1	Thrust Plate	**54**	9	Hex Head Screw	**85**	1	Link Swahsplate
24	1	Valve Plate CW, CCW	**55**	4	Hex Head Screw	**86**	4	Socket Head Screw
25	2	Trunnion	**57**	8	Hex Head Screw	**87**	2	O-Ring
26	1	Seal Retainer	**58**	3	End Cap Screw	**89**	4	Hex Head Screw
27	1	Rotating Seal	**59**	5	End Cap Screw			
28	1	Stationary Seal	**60**	2	Screw	**set**	1	Cylinder barrel set
29	1	Drive Shaft	**61**	6	Hex Head Screw	**set**	1	Set of gaskets
30	2	Servo Link	**62**	1	Pin	**set**	1	Shaft sealings set

To enquiry for spare parts, please specify the following :
- position number according to explosion view
- name of the part
- size of pump or motor (PV or MF 20, 21, 22, 23, 24, 25, 26, 27)
- quantity required

SPARE PARTS FOR PVS pumps



Item	Pcs	Name	Item	Pcs	Name	Item	Pcs	Name
1	1	Servovalve Assembly	**35**	1	Orifice	**71**	1	O-Ring
2	1	Charge Pump CW, CCW	**36**	1	Spacer	**72**	1	O-Ring
3	2	Servo Cylinder	**37**	1	Control Handle	**73**	2	O-Ring
4	2	Servo Piston	**38**	3	Loop	**74**	2	O-Ring
5	1	Front Cover	**39**	2	Cap	**75**	2	O-Ring
6	1	Pump Housing	**40**	1	Brand plate	**76**	4	O-Ring
7	1	End Cap	**41**	1	Control Valve Gasket	**77**	1	Main shaft bearing
8	1	Swash Plate	**42**	1	Charge Pump Gasket	**78**	1	Shaft bearing
9	2	Check Valve	**43**	2	Shim Pack	**79**	2	Swashplate bearing
10	1	Cylinder Barrel Housing	**44**	1	End Cap Gasket	**80**	20	Washer
11	9	Piston Assembly	**45**	1	Front Cover Gasket	**81**	13	Washer
12	1	Bearing Plate	**47**	6/8	Seal Spring	**82**	1	Washer
13	1	Retainer Guide	**48**	2	Servo Spring	**83**	4	Drive Screw
14	1	Slipper Retainer	**49**	1	Nut	**84**	6	Washer
15	1	Spring Retainer	**50**	3	Plastic Plug	**85**	1	Link Swahsplate
16	1	Spring Seat	**51**	1	Plug	**86**	4	Socket Head Screw
17	1	Spring Guide	**52**	4	Expander 05	**87**	2	O-Ring
18	1	Bearing Plate Pilot	**53**	1	Expander 09	**89**	4	Hex Head Screw
19	1	Pin	**54**	9	Hex Head Screw	**90**	2	Cover Screw
20	1	Cylinder Barrel Spring	**55**	4	Hex Head Screw	**91**	2	Cover Washer
21	6	Retainer Spring	**57**	8	Hex Head Screw	**92**	1	O ring
22	1	Retaining Ring	**58**	3	End Cap Screw	**93**	1	Retainer Guide Washer
23	1	Thrust Plate	**59**	5	End Cap Screw	**94**	3	Pin
24	1	Valve Plate CW, CCW	**60**	2	Screw	**95**	1	Bush
25	2	Trunnion	**61**	6	Hex Head Screw	**96**	1	Bush
26	1	Seal Retainer	**62**	1	Pin	**97**	1	O ring
27	1	Rotating Seal	**63**	4	Pin	**98**	1	O ring
28	1	Stationary Seal	**64**	1	Drive Screw	**99**	1	Valve
29	1	Drive Shaft	**65**	1	Pin	**100**	1	Spring
30	2	Servo Link	**66**	4	Pin	**101**	1	Washer
31	2	Sleeve Retainer	**67**	1	Retaining Ring	**102**	1	Ring
32	2	Spring Guide	**68**	2	Retaining Ring	**103**	1	Plug
33	1	Shim	**69**	8	Retaining Ring			
34	2	Washer	**70**	2	O-Ring	**set**	1	Rotary group assy

MF MOTORS - GENERAL DESCRIPTION

Axial piston fixed displacement motors Series 20 are of swash plate construction and are intended for closed circuit operation. The output speed is responding to the flow rate of the input fluid.
The output torque is proportional to the differential between high and low pressure sides of the fluid cirucit.
The direction of motor (output) shaft rotation depends upon which port the fluid enters the motor.

Figure 1:

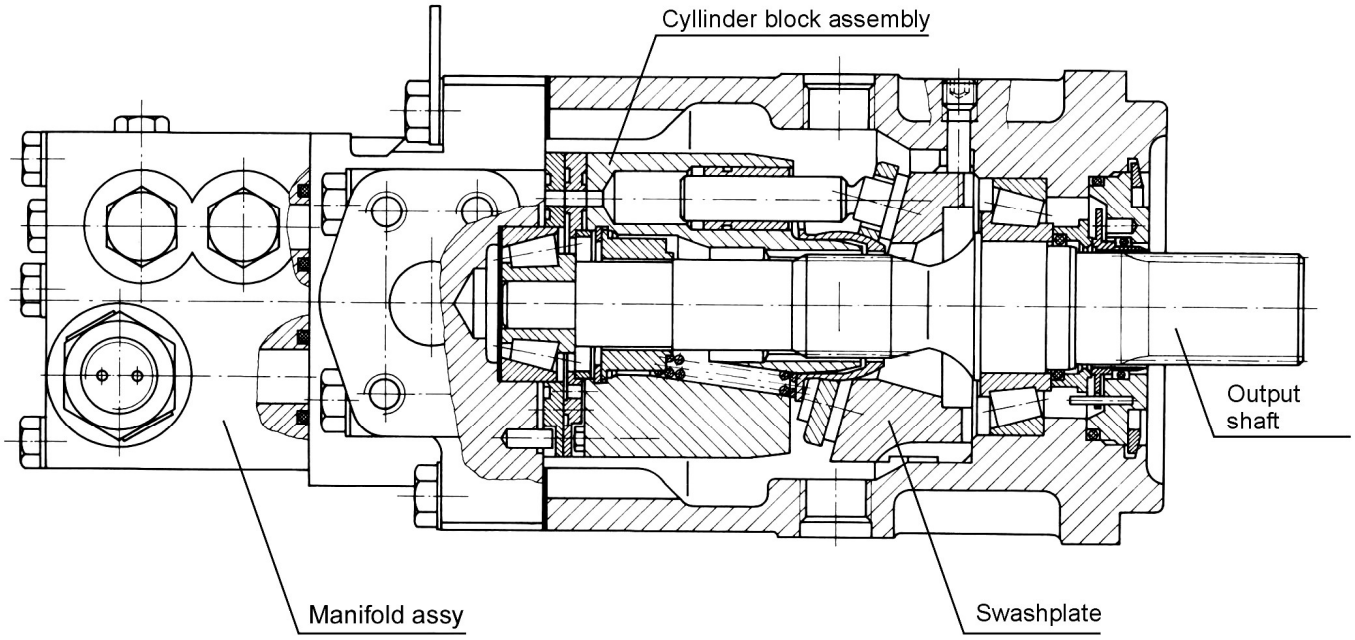
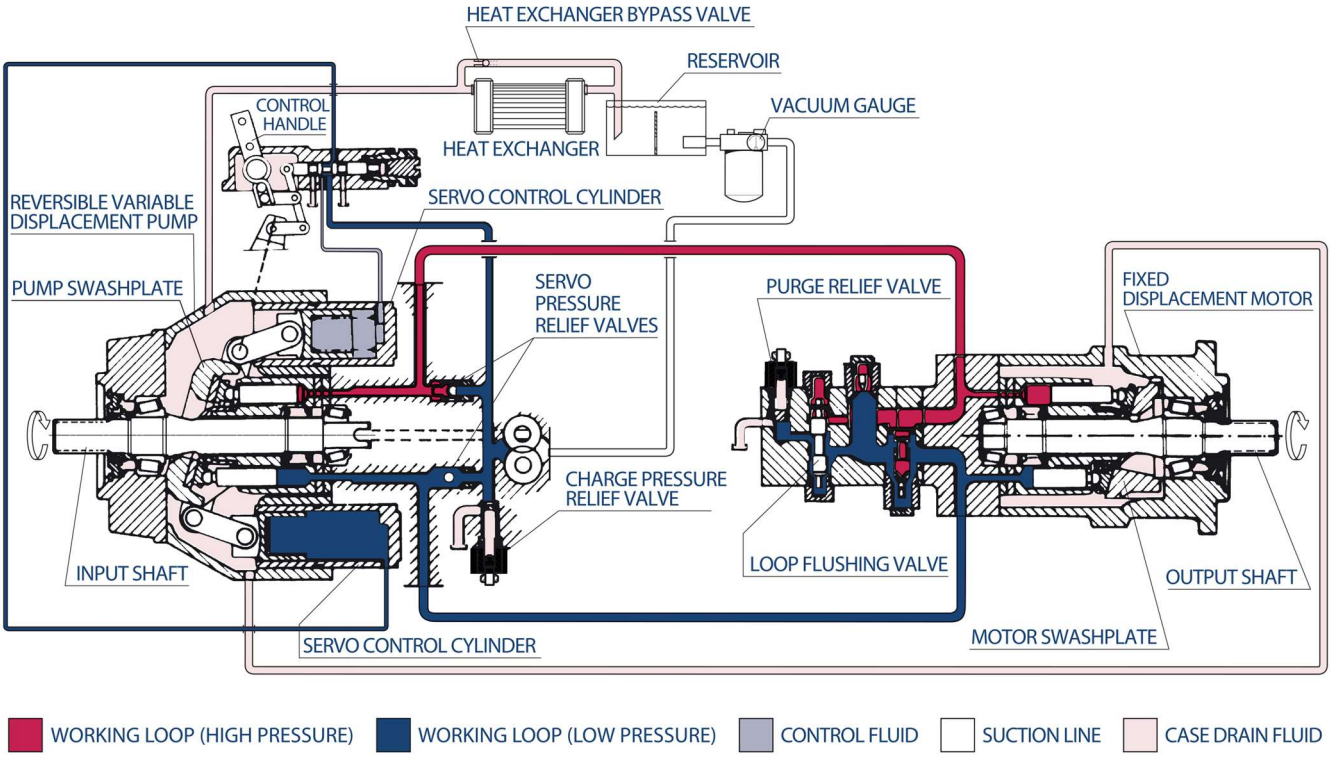


Figure 2 - the function of hydrostatic transmission using axial piston variable displacement pump and fixed displacement motor.



TECHNICAL DATA

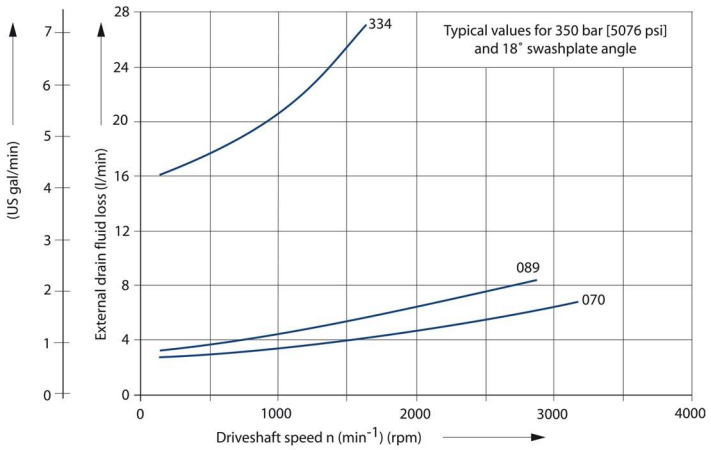
Table 1:

Parameter	Dimension	Frame size								
		20	21	22	23	112	24	25	26	27
Max. displacement per revolution	cm^3	33,3	51,6	69,8	89,0	111,0	118,7	165,8	227,3	333,7
Max. flow	dm^3min^{-1}	119,5	160,0	196,1	230,5	277,0	278,9	348,2	429,6	557,3
Max. toque	Nm	203	314	425	542	675				
Max. pressure	MPa	42								
Nominal pressure	MPa	21								
Max. pressure of control	MPa	3,5								
Max. pressure in case	MPa	0,25 continuous 0,5 intermittent								
Maximum speed +	min^{-1}	3590	3100	2810	2600	2600	2350	2100	1890	1670
Minimum speed	min^{-1}	500								
Nominal speed	min^{-1}	1500								
Kinematic viscosity range of working fluid -starting -operating -optimum	mm^2s^{-1}	1000 12-600 25-35								
Kind of working fluid		mineral oil								
Operating outside temperature	ºC	-40 to +50								
Max. temperature of working fluid in tank	ºC	80								
Purity of working fluid	µm	10								
Direction of shaft rotation		reversible								
Maximum swash plate angle	º	±18º								
Weight	kg	30	35	40	47	50	70	124	152	197

+ for higher speeds contact our Application department

Figure 3. External drain fluid loss for frame sizes 20 – 23

Determination of nominal pump size



$$Q_e = \frac{V_g \cdot n \cdot \eta_v}{1000} \text{ (l/min)} \quad \text{Motor input flow}$$

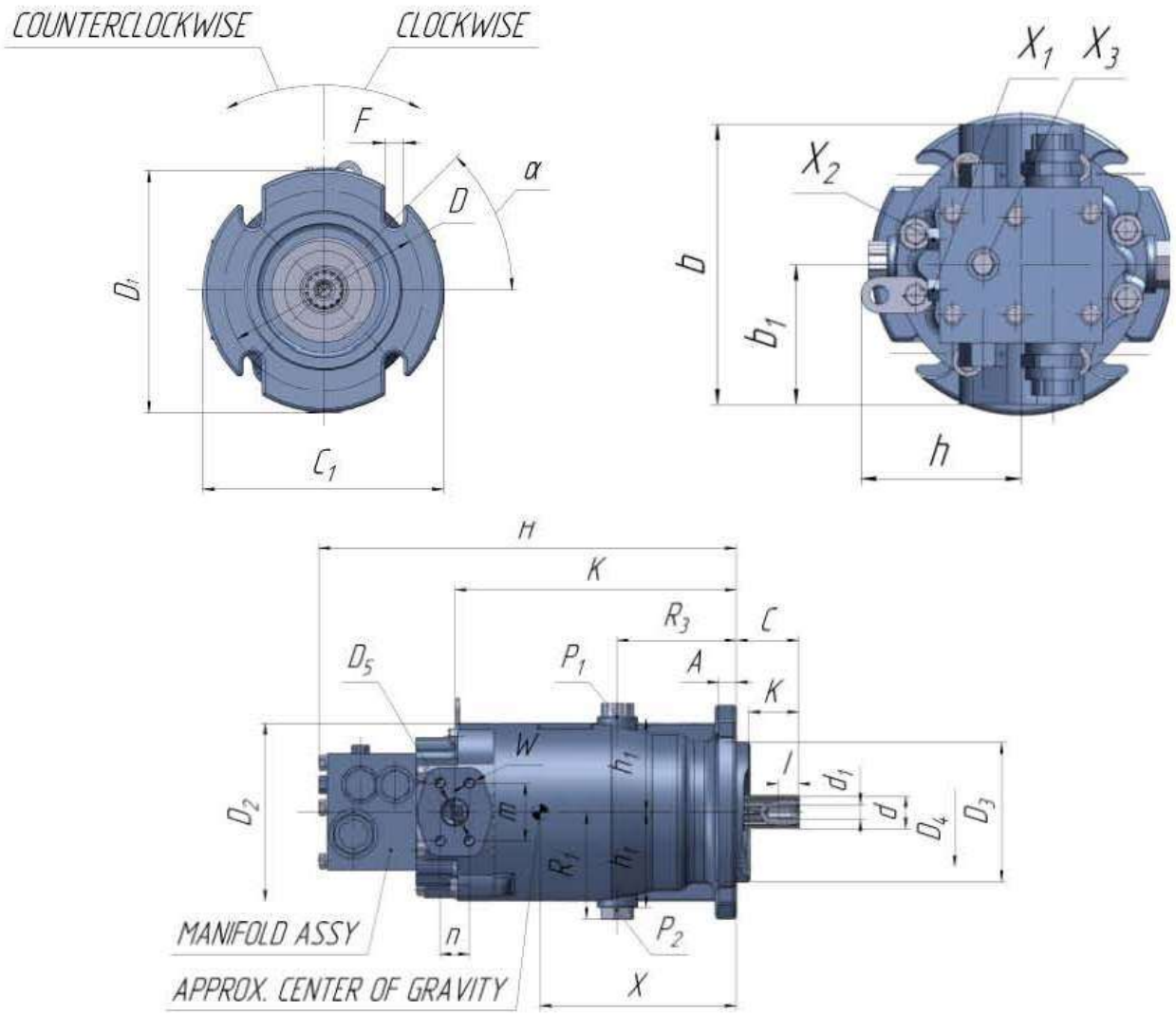
$$M_e = \frac{15{,}9 \cdot V_M \cdot \Delta p \cdot \eta_{mh}}{100} \text{ (Nm)} \quad \text{output torque}$$

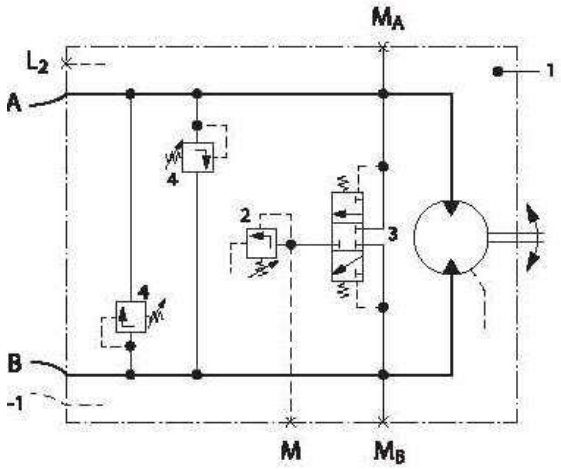
$$P_e = \frac{M_g \cdot n}{9550} = \frac{Q_e \cdot \Delta p \ \ \eta_t}{600} \text{ (kW)} \quad \text{output power}$$

V_m - displacement (cm^3) per revolution
Δ_p - difference high and low pressure (MPa)
n - speed (min^{-1})
η_v - volumetric efficiency
η_{mh} - mechanical – hydraulic efficiency
η_t - total efficncy

DIMENSIONS

Figure 4: Outline drawing motor configuration sizes 20,21,22,23 and 112 with manifold assy.





Designation :
1 - Fixed Displacement Motor MF
2 - Purge Relief Valve
3 - Shutle Valve
4 - High Pressure Relief Valve

A, B - Main Pressure Ports
L1, L2 - Drain Ports
M - Gauge for Charge Pressure Port
MA, MB - Gauge Ports for A, B

Table 3: Dimensions (mm)

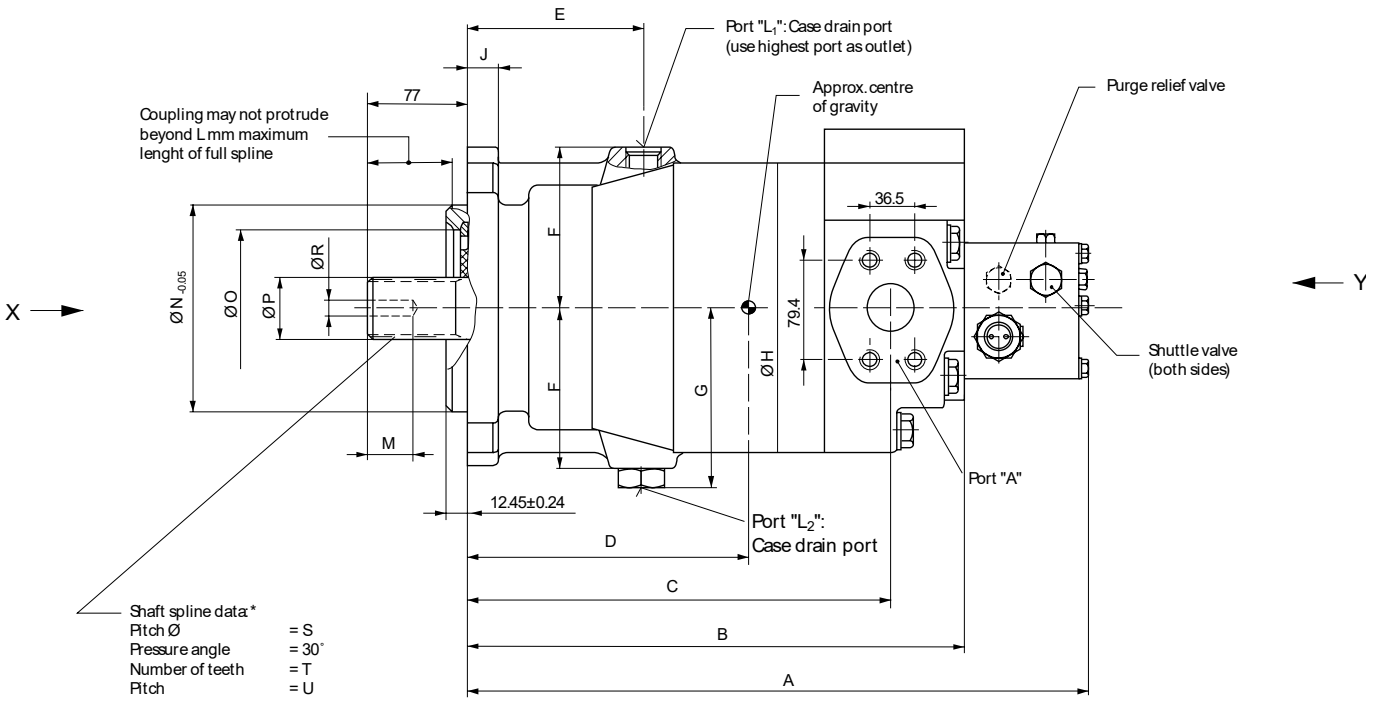
Frame size	A	C	C1	D	D1	D2	D3	D4	D5	F	H
20	15,7 ±1,5	56	190	162	146	140	127 -0,05	108	25,4	15 +0,8 -0,3	340
21	15,7 ±1,5	56	190	162	147	154	127 -0,05	108	25,4	15 +0,8 -0,3	360
22	15,7 ±1,5	56	194	162	194	161	127 -0,05	108	25,4	15 + 0,8 -0,3	380
23/112	17,2 ±1,5	56	194	162	194	180	127 -0,05	108	25,4	15 +0,8 -0,3	395
24	25	75	214	229	204	200	152,4 -0,05	121	25,4	21,3 +0,8-0,3	442
25	25	77	285	317,5	254	230	165,1 -0,05	127	36,5	20,5 + 0,8-0,3	542
26	27	77	281	317,5	273	271,5	165,1 -0,05	127	36,5	20,6 +0,8-0,3	572
27	38	77	298	350	298	292	177,8 -0,05	140	36,5	27	603

Frame size	H1	H2	H3	H4	H5	H6	K	P1,P2,P3	R	R1	R2	U2
20	36	252	315	277	11	25	214	7/8-14 UNF-2B	88,7	82	18	19
21	36	270	354	295	9	32	235		97	88	18	19
22	36	291	382	315	12	30	255,3		108	98	18	19
23/112	36	306	400	331	6	44	272,3		117	107	18	19
24		362	481	388,7			305		125	109		21
25		387	524	442,5			330		136,5	136		21
26		410	547				346		139,7	152		21
27		447	588	483,5			387		154	161		21

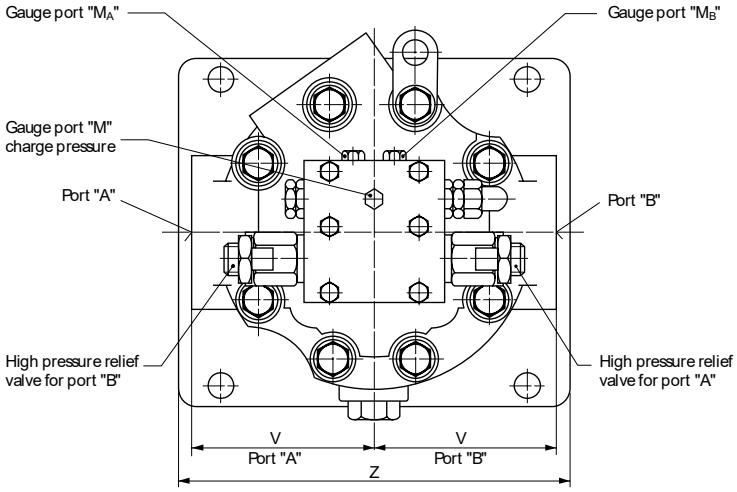
Frame size	U1	W	b	B1	d	d1	h	H1	k
20	7/8-14UNF-2B	3/8-16UNC-2B	162	82,5	34,5-0,17	M10		71	48
21			171	85,8	34,5-0,17	M10	103	76	48
22			172	86	34,5-0,17	M10	100,6	87	48
23/112			192	96	37,68-0,18	M10	115	96	48
24			214	107	44-0,18	M14		100	67
25		5/8-11UNC-2B	260	130	44-0,18	M14		124	67
26			292	146	44-0,18	M14	170	138	67
27			317	159	64,7-0,18	M16	183	146	67

Frame size	l		l1	X	P1,P2		m	n	X1, X2, X3
20	12,5	0,2	min.20	156	7/8-14UNF-2B	45^0	52,4	26,2	7/16-20 UNF -2B
21	12,5	0,2	min.20	160		45^0	52,4	26,2	
22	12,5	0,2	min.20	165		45^0	52,4	26,2	
23/112	12,5	0,2	min.20	170		45^0	52,4	26,2	
24	12,5	0,2	min.30	175		45^0	52,4	26,2	
25	16	0,2	min.30	219	15/16-12UN-2B	45^0	79,4	36,5	
26	16	0,2	min.30	228,5		45^0	79,4	36,5	
27	16	0,2	min.40	278		45^0	79,4	36,5	

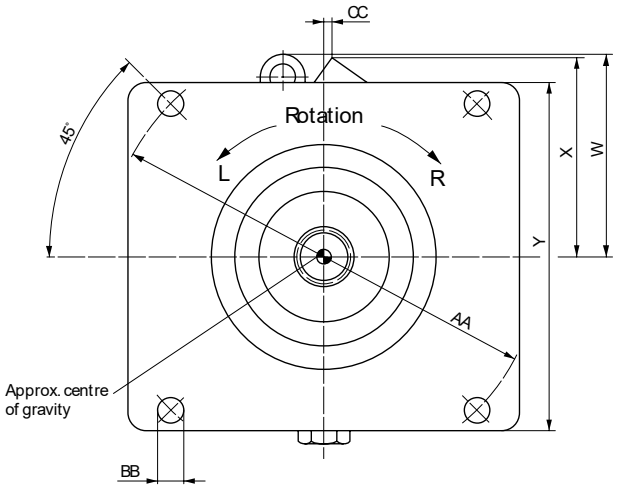
AXIAL PISTON FIXED MOTOR MF 25, 26, 27



View Y



View X



Frame size	Port A and B	Port L_1 and L_2	Port M_A and M_B	Port M
MF 25 / 166 cm³	SAE flange, size 1 1/2 SAE split flange boss 6000 psi, 4 threads 5/8-11 UNC-2B 35 deep	7/16-12 UN-2B SAE straight thread O-ring boss	M 20 x 1,5	
MF 26 / 227 cm³		1 7/8-12 UNF-2B SAE straight thread O-ring boss		
MF 27 / 334 cm³				

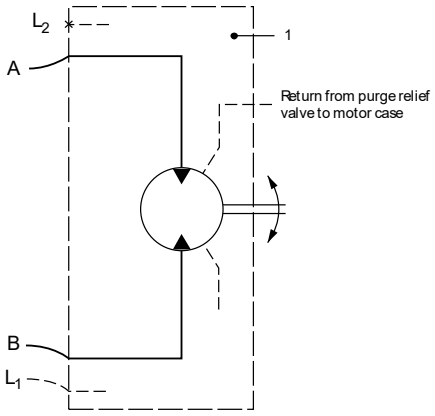
Available shafts :

MF24, MF25 – 13 teeth, 27 teeth, cylindrical
MF26 – 13 teeth, 27 teeth
MF27 - 15 teeth, 40 teeth, cylindrical

DIMENSIONS

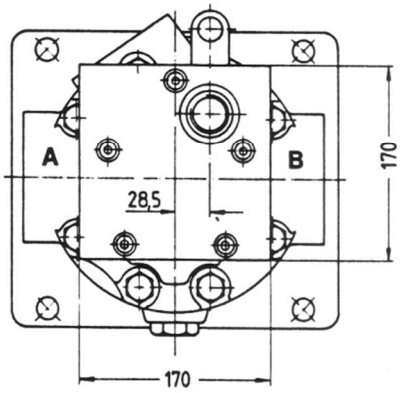
Frame size	A	B	C	D	E	F	G	Ø H	J
166	541	388	331	219	136,5	122,2	136	229	24
227	563	410	346	228.5	139,7	134,9	152	264	27
334	602	449	389	278	154	143,5	161	292	38
Frame size	**M**	**Ø N**	**Ø O**	**Ø P**	**Ø R**	**Ø S**	**T**	**U**	**V**
166	38,4	165,1	98	$44{,}03_{-0.17}$	11,80	42,863	27	16/32	130,0
227	38,4	165,1	110	$44{,}03_{-0.17}$	11,80	42,863	27	16/32	143,7
334	46,2	177,8	114	$64{,}66_{-0.16}$	14,35	63,500	40	16/32	158,7
Frame size	**W**	**X**	**Y**	**Z**	**AA**	**BB**	**CC**	**Diameter for shaft**	**Weight (kg)**
166	148	145	254	285	317,5	$20.6 \pm 0{,}4$	6	$41{,}28^{+0{,}062}$	124
227	156	160	265	265	317,5	$20.6 \pm 0{,}4$	13	$41{,}28^{+0{,}062}$	152
334	176	174	298	298	350,0	$27.0^{+0{,}5}_{-0{,}1}$	18	$41{,}28^{+0{,}074}$	197

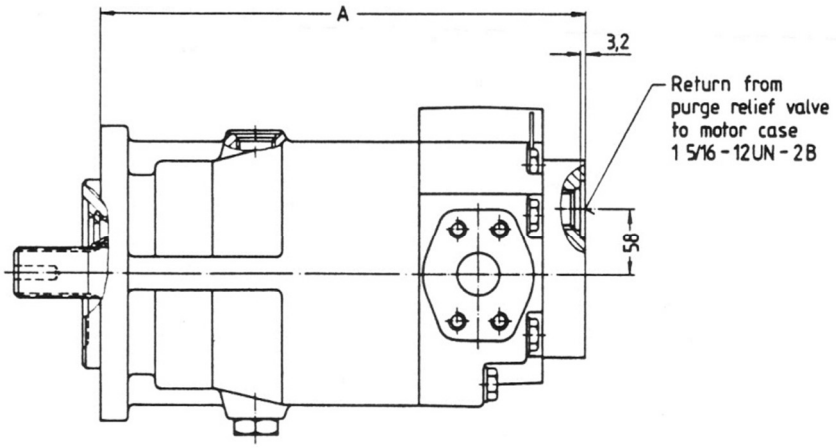
MOTOR CONFIGURATION



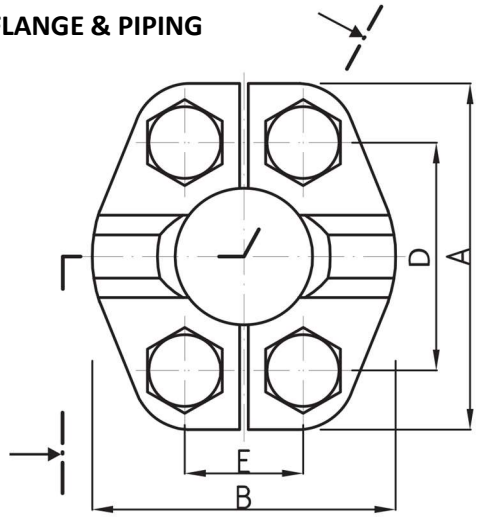
Designation:
1 = Fixed displacement motor

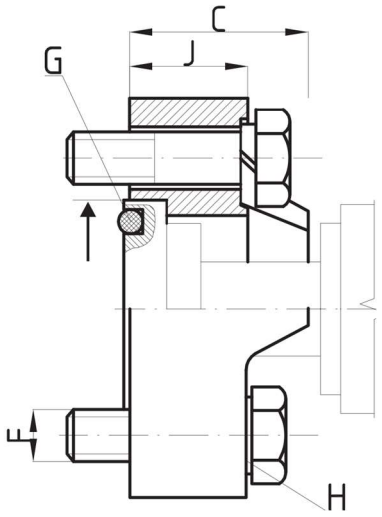
Ports:
A,B=Main pressure ports
(working loop) L1, L2 = Drain ports





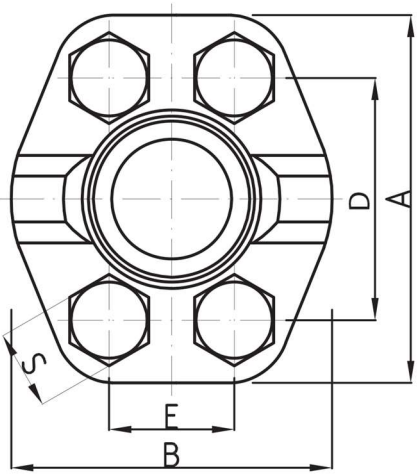
HOSE FLANGE & PIPING

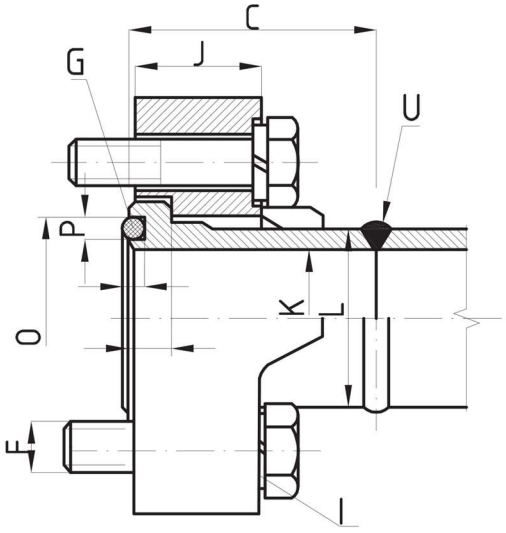




Dimensions (mm)

Frame size	PSI	A	B	C	D-0,1	E-0,1	F	H	J
20-24	5.000 PSI-(Code B)	81	70	35	52,40	26,20	3/8-16 UNC-2A	Washer 10,20	22,50
20-24	6.000 PSI-(Code A)	81	70	35	56,37	27,94	7/16-14 UNC-2B	Washer 13,20	22,50
25-27	6.000 PSI	112	95	46	79,40	36,50	5/8-11 UNC-2A	Washer 16,00	30,00





Dimensions (mm)

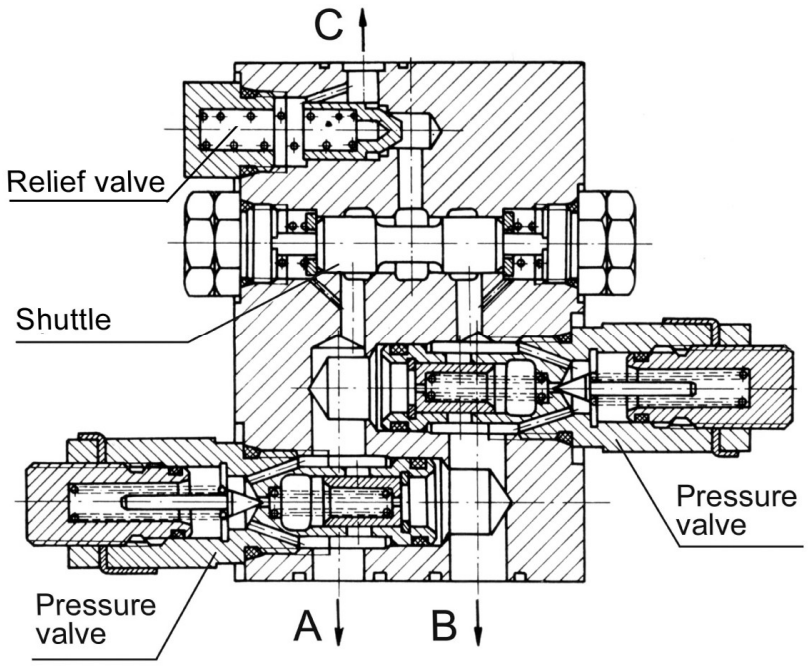
Frame size	PSI	A	B	C	D-0,1	E-0,1	F	H	J
20-24	5.000 PSI-(Code B)	81	70	40	52,40	26,20	3/8-16 UNC-2A	Washer 10,00	22,50
20-24	6.000 PSI-(Code A)	81	70	35	56,37	27,94	7/16-14 UNC-2B	Washer 13,20	22,50
25-27	6.000 PSI	112	95	46	79,40	36,50	5/8-11 UNC-2A	Washer 16,00	30,00

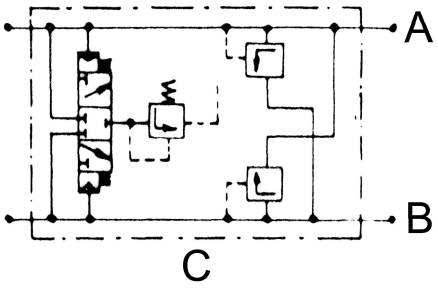
Frame size	PSI	K	L	M-0,1	N-0,1	O	P+0,2	U
20-24	5.000 PSI-(Code B)	28	38	8,00	2,80	39,7 ± 0,05	4	V5-104
20-24	6.000 PSI-(Code A)	28	38	8,00	2,80	39,7 ± 0,05	4	V5-104
25-27	6.000 PSI	38	50	12,60	2,80	53,9 ± 0,01	4	V6-158

Note:
Flange according to SAE J 518 c
Frame size 20 – 24: size 1, 5000 psi, torque for screw tightening 3/8 – 16 UNC2A: 37 – 42 Nm
Frame size 25 – 27: size 1 1/2, 6000 psi, torque for screw tightening 5/8 – 11 UNC2A: 158 – 181 Nm

MANIFOLD ASSEMBLY

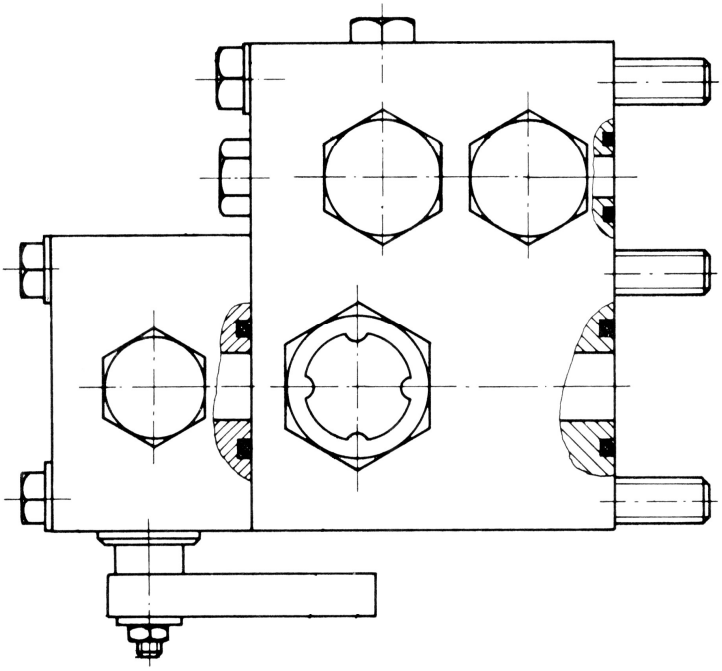
Manifold assembly consists of control elements that serve to restrict working pressure in the high pressure hydrostatic circuit, to exchange the heated working fluid in closed hydrostatic circuit, to charge the volume losses in closed hydrostatic circuit as well as to secure flushing in the transmission case.

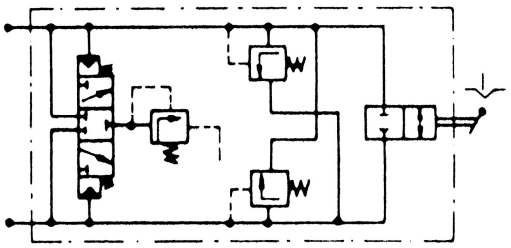




MANIFOLD ASSY WITH BY-PASS VALVE

Manifold assy with by-pass valve provides all the functions as manifold assy. On the back side there is a built-in by-pass valve designed for interconnection of high-pressure channels in closed hydrostatic circuit.





TYPE DESIGNATION OF MF - FIXED MOTORS

1.	2.	3.	4.	5.	6.	7.	8.	9.
MF	XX	XXX	X	X	X	XX	XX	XX

1.

MF	Axial Piston Motor Fixed

2.

Displacement Vg_{max} [cm³]	
20	33,3
21	51,6
22	69,8
23	89
112	112
24	118,7
25	165,8
26	227,3
27	333,7

3.

Dimension of the input shaft	
A	14 teeth, 12/24 PITCH, Ø 31,20
B	19 teeth, 16/32 PITCH, Ø 31,75
C	21 teeth, 16/32 PITCH, Ø 34,50
D	23 teeth, 16/32 PITCH, Ø 37,68
E	27 teeth 16/32 PITCH,Ø 44,O3
G	13 teeth, 8/16 PITCH, Ø 43,71
I	20 teeth, 16/32 PITCH, Ø 32,91
J	cone 1:8, SAE J501, Ø 41,27
K	cone 1:8, SAE J501, Ø 31,75
L	parallel with key Ø 34,925;
M	parallel with key Ø 44,45;
P	15 teeth, 16/ 32 PITCH, Ø 25,40
R	13 teeth, 16/32 PITCH, Ø 21,80

4.

Dimension of high pressure ports		Thread	
A	SAEJ518c,code 62,size 1", 6000PSI	7/16"-14 UNC-2A	**o**
B	SAEJ518c,code 61,size 1", 5000PSI	3/8"-16 UNC-2A	•
C	ISO 6162,DN25, type II, 42 MPa	M12	**o**

5.

Manifold assy		
A	Manifold assy with by-pass valve	**o**
B	Manifold assy without by-pass valve	•
C	Without manifold assy with cover plate	**o**
D	Without manifold assy with by-pass valve	**o**
N	Without manifold assy	**o**

6.

Pressure setting of low-pressure valve in the manifold assy		
11	11 bars/1,1 MPa	**o**
13	13 bars/1,3 MPa	**o**
15	15 bars/1,5 MPa (1,5 ± 0,05 MPa at 3,8 $dm^3.min^{-1}$)	•
XX	Other setting	**o**
00	Without manifold	**o**

7.

Pressure setting in port A		
11	11 MPa	**o**
14	14 MPa	**o**
35	35 MPa	•
40	40 MPa	**o**
42	42 MPa	**o**
00	Without pressure valve	**o**

8.

Pressure setting in port B		
11	11 MPa	**o**
14	14 MPa	**o**
35	35 MPa	•
40	40 MPa	**o**
42	42 MPa	**o**
00	Without pressure valve	**o**

9.

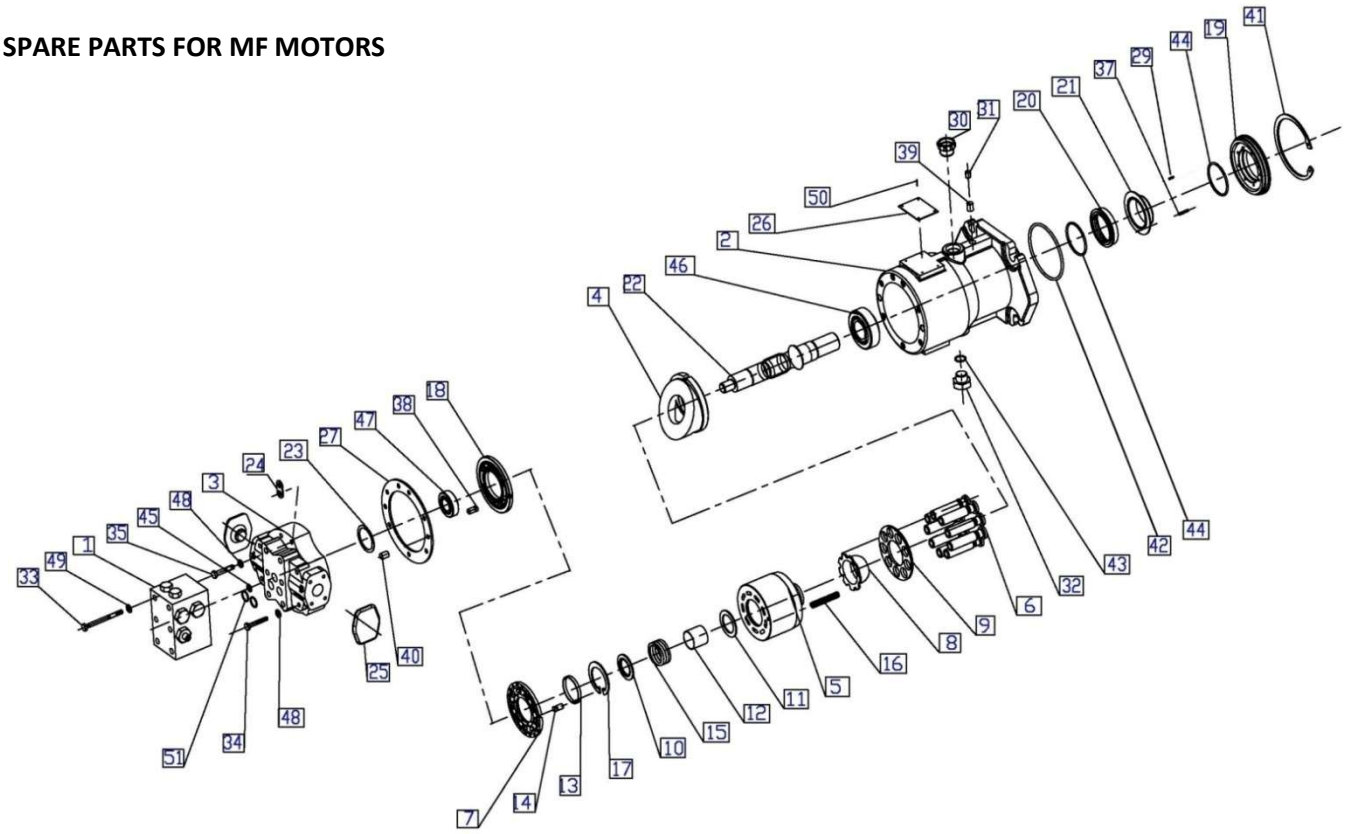
000	Standard	•
XXX	Special production number	**o**

Ordering example : MF23 DBB153535000

Fixed motor, 23 teeth splined shaft, pressure ports 5000 psi, manifold without by-pass, low pressure valve on 15 bars, high pressure valves on 350 bars, no special code

• standard design
o available

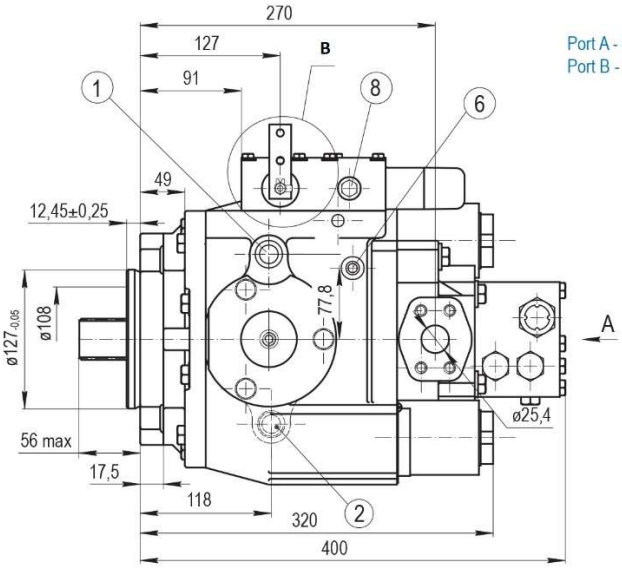
SPARE PARTS FOR MF MOTORS



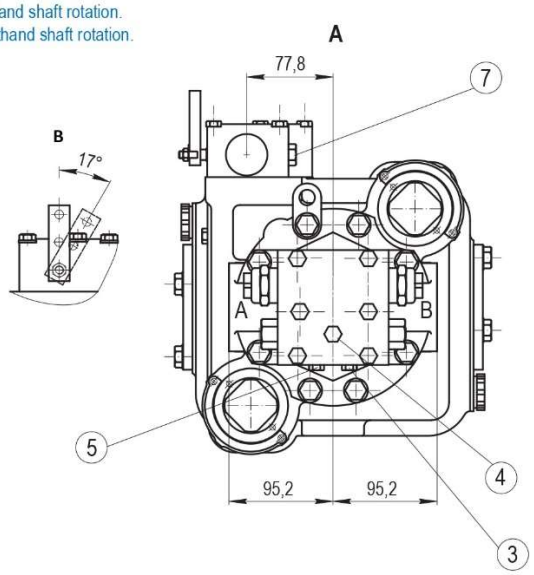
Item	Pcs	Name	Item	Pcs	Name
1.	1	Manifold Assy 35 MPa	**29.**	6	Seal Spring
2.	1	Motor Housing	**30.**	1	Plug
3.	1	End Cap	**31.**	1	Plug
4.	1	Swash Plate	**32.**	1	Hex Head Plug
5.	1	Cylinder Barrel Housing	**33.**	6	Hex Head Screw
6.	9	Piston Assembly	**34.**	4	End Cap Screw
7.	1	Bearing Plate	**35.**	3	Hex Head Screw
8.	1	Retainer Guide	**36.**		Not used
9.	1	Slipper Retainer	**37.**	1	Drive Screw
10.	1	Spring Retainer	**38.**	1	Pin
11.	1	Spring Seat	**39.**	1	Pin
12.	1	Spring Guide	**40.**	2	Pin
13.	1	Bearing Plate Pilot	**41.**	1	Retaining Ring
14.	1	Pin	**42.**	1	O-Ring
15.	1	Cylinder Barrel Spring	**43.**	1	O-Ring
16.	6	Retainer Spring	**44.**	2	O-Ring
17.	1	Retainer Ring	**45.**	1	O-Ring
18.	1	Valve Plate	**46.**	1	Bearing
19.	1	Seal Retainer	**47.**	1	Bearing
20.	1	Rotaling Seal	**48.**	8	Washer
21.	1	Stationary Seal	**49.**	6	Washer
22.	1	Drive Shaft	**50.**	4	Drive Screw
23.	1	Shim	**51.**	2	O-Ring
24.	1	Loop			
25.	2	Cap	**set**	1	Cylinder barrel assy - rotating group
26.	1	Not used	**set**	1	Set of gaskets
27.	1	End Cap Gasket	**set**	1	Shaft sealings set

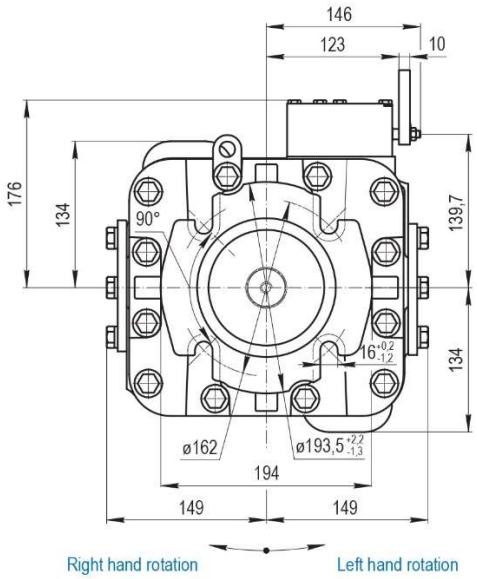
VARIABLE MOTORS MV

Parameter		MV23	MV112
Displacement	cm^3	89,0	111,0
Minimum swashplate angle/displacement :			
7°	cm^3	33,6	41,8
9°	cm^3	43,4	53,9
10°	cm^3	48,3	60,0
11°	cm^3	53,2	66,2
13°	cm^3	63,3	78,7
Max. pressure	bar	450	
Rated pressure	bar	420	
Max. drain pressure	bar	2,5	
Max. torque	Nm	542	675
Max. speed at minimum swashplate angle	min^{-1}	3720	
Minimum speed	min^{-1}	500	
Rated power	kW	125,6	156,4
Weight	kg	82	84

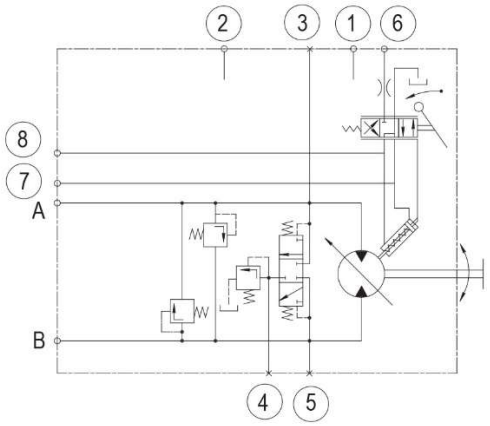


Port A - lefthand shaft rotation.
Port B - righthand shaft rotation.





Right hand rotation Left hand rotation



VARIABLE MOTORS MODEL CODE

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
MV	XX	XXX	X	X	X	X	XX	XX	XX	XX	XX	XXX

1.

MV	Axial Piston Motor Variable

2.

Displacement Vg_{max} [cm³]	
20	33,3
22	69,8
23	89

3.

Type of control		
MH	mechanical -hydraulic servo valve	•
XX	for other type see page no. 16	o

4.

Shaft seal type	
1	Standard spring type
2	Lip seal

5.

Dimension of the input shaft		20	22	23
A	14 teeth, 12/24 PITCH, Ø 31,20	o	o	-
B	19 teeth, 16/32 PITCH, Ø 31,75	o	o	o
C	21 teeth, 16/32 PITCH, Ø 34,50	•	•	o
D	23 teeth, 16/32 PITCH, Ø 37,68	-	-	•
E	27 teeth 16/32 PITCH,Ø 44,O3	-	-	o
F	13 teeth 16/32 PITCH,Ø 21,805	o	-	-
G	13 teeth, 8/16 PITCH, Ø 43,71	-	-	o
I	20 teeth, 16/32 PITCH, Ø 33,91	o	o	-
J	cone 1:8, SAE J501, Ø 41,27	-	-	o
K	cone 1:8, SAE J501, Ø 31,75	o	o	o
L	parallel with key Ø 34,925;	o	o	-
M	parallel with key Ø 44,45;	-	-	o
P	15 teeth, 16/ 32 PITCH, Ø 25,40	o	o	-

6.

Dimension of high pressure ports		Thread	20	22	23
A	SAEJ518c,code 62,size 1", 6000PSI	7/16"-14 UNC-2A	o	o	o
B	SAEJ518c,code 61,size 1", 5000PSI	3/8"-16 UNC-2A	•	•	•
C	ISO 6162,DN25, type II,40 MPa	M12	o	o	o

7.

Manifold assy		
A	Manifold assy with by-pass valve	o
B	Manifold assy without by-pass valve	•

8.

The minimum inclination angle of the swashplate			Frame size 20	22	23
			Displacement in cm³		
07	•	7°	12,45	26,38	33,59
08	o	8°	14,26	30,15	38,51
09	o	9°	16,06	34,09	43,26
10	o	10°	18,03	37,85	48,18
11	o	11°	19,83	41,79	53,26
12	o	12°	21,63	45,72	58,17
13	o	13°	23,60	49,65	63,25
14	o	14°	25,40	53,59	68,17

9.

Pressure setting of low-pressure valve in the manifold assy		
11	1,1 MPa (1,1 ±0,05 MPa at 3,8 dm³.min⁻¹)	o
13	1,3 MPa (1,3 ±0,05 MPa at 3,8 dm³.min⁻¹)	o
15	1,5 MPa (1,5 ±0,05 MPa at 3,8 dm³.min⁻¹)	•
00	without manifold assy	o
XX	other	o

10.

Pressure setting in port A		
21	21 MPa	o
28	28 MPa	o
35	35 MPa	•
40	40 MPa	o
42	42 MPa	o

11.

Pressure setting in port B		
21	21 MPa	o
28	28 MPa	o
35	35 MPa	•
40	40 MPa	o
42	42 MPa	o

12.

Orifice		
A	Ø 0,76 mm	o
B	Ø 0,91 mm	o
C	Ø 1,05 mm	•
D	Ø 1,36 mm	o
E	Ø l,6 mm	o
N	without orifice	o
1	orifice in channel "P"	•
2	orifice in channel "A", "B"	o
3	orifice in channel "P","A", "B"	o
4	orifice in channel "A"	o
5	orifice in channel "B"	o
6	orifice in channel "P", "A"	o
7	orifice in channel "P", "B"	o
0	without orifice	o

13. Special production number

• standard design **o** available

Ordering example : MV23 MH2DBB07153535000

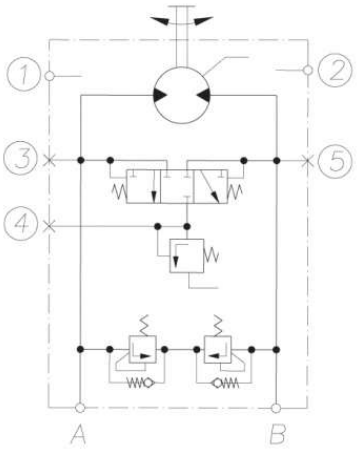
Variable motor, 23 teeth shaft, lip shaft seal, standard manual displ.control, 5000 psi, manifold without by-pass, low pressure valve on 15 bars, high pressure valves on 350 bars, no special code

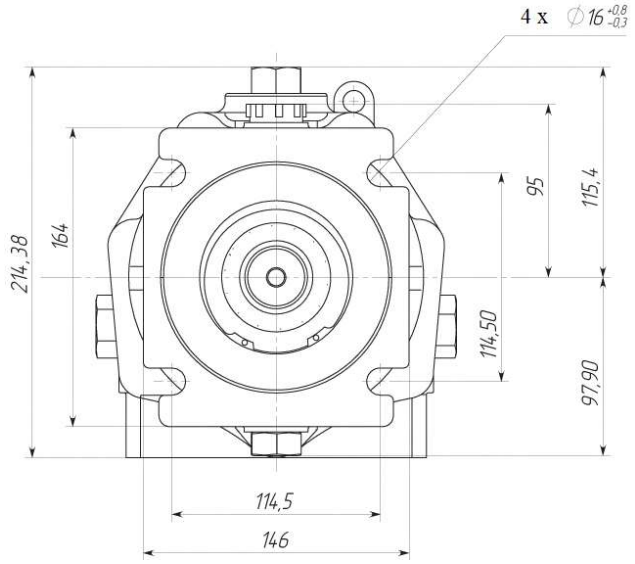
Axial piston fixed motors MFS – short version of MF fixed motors, wit all valve integrated into rear cover

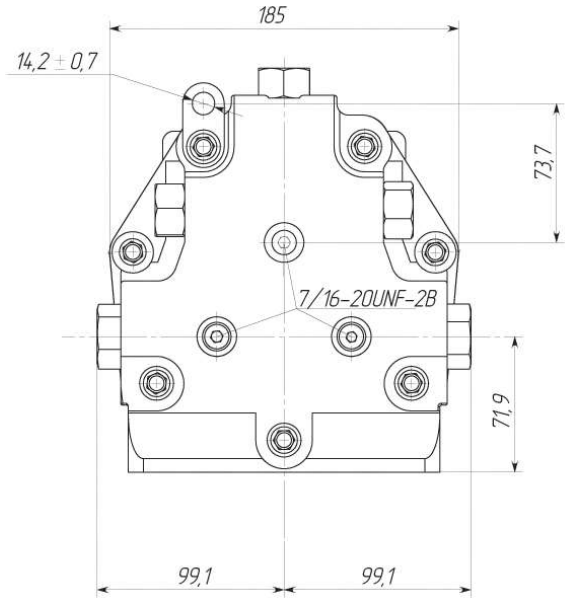
Technical data :

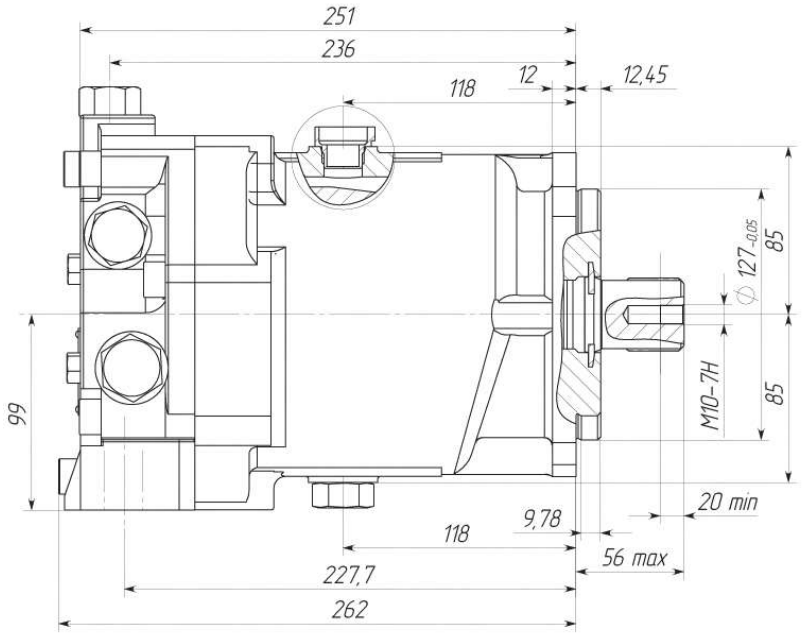
Parameter	MFS 22	MFS 23	MFS112
Displacement (cm3)	69,8	89	110,8
Max. pressure (bar)	450		
Working pressure (bar)	420		
Drain pressure (bar)	2,5		
Max. torque (Nm)	433	543	675
Max. rpm	2900		
Minim. Rpm	50		
Nominal output (kW)	96	126	157
Weight (kg)	35	35	37

Hydraulic scheme :









SHORT MOTORS MFS MODEL CODE

MFS	XX	X	X	X	X	X	XX	XX	XXX
1	2	3	4	5	6	7	8	9	10

1.

MFS	Axial Piston Fixed Motor Short Version

2.

Displacement Vg_{max} [cm³]	
22	69,8
23	89
112	110,8

3.

Dimension of the input shaft		22	23	112
A	14 teeth, 12/24 PITCH, Ø 31,20	o	o	o
B	19 teeth, 16/32 PITCH, Ø 31,75	o	o	o
C	21 teeth, 16/32 PITCH, Ø 34,50	•	•	•
D	23 teeth, 16/32 PITCH, Ø 37,68	o	o	o
G	27 teeth, 16/32 PITCH, Ø 44,03	-	o	o

4.

Dimension of high pressure ports		Thread	
A	SAEJ518c,code 62,size 1", 6000PSI	7/16"-14 UNC-2A	o
B	SAEJ518c,code 61,size 1", 5000PSI	3/8"-16 UNC-2A	•
C	ISO 6162,DN25, type II, 42 MPa	M12	o

5.

A, B main ports location		
1	Opposite position	o
2	One side	•

6.

High pressure relief valves		
A	No valves	o
B	In end cap	•
C	In manifold block	o

7.

Relief valve setting		
11	11 bar (1,1 MPa)	o
15	15 bar (1,5 MPa)	•
20	20 bar (2,0 MPa)	o

8.

Pressure setting in port A		
35	35 MPa	•
40	40 MPa	o
42	42 MPa	o
00	Without pressure valve	o

9.

Pressure setting in port B		
35	35 MPa	•
40	40 MPa	o
42	42 MPa	o
00	Without pressure valve	o

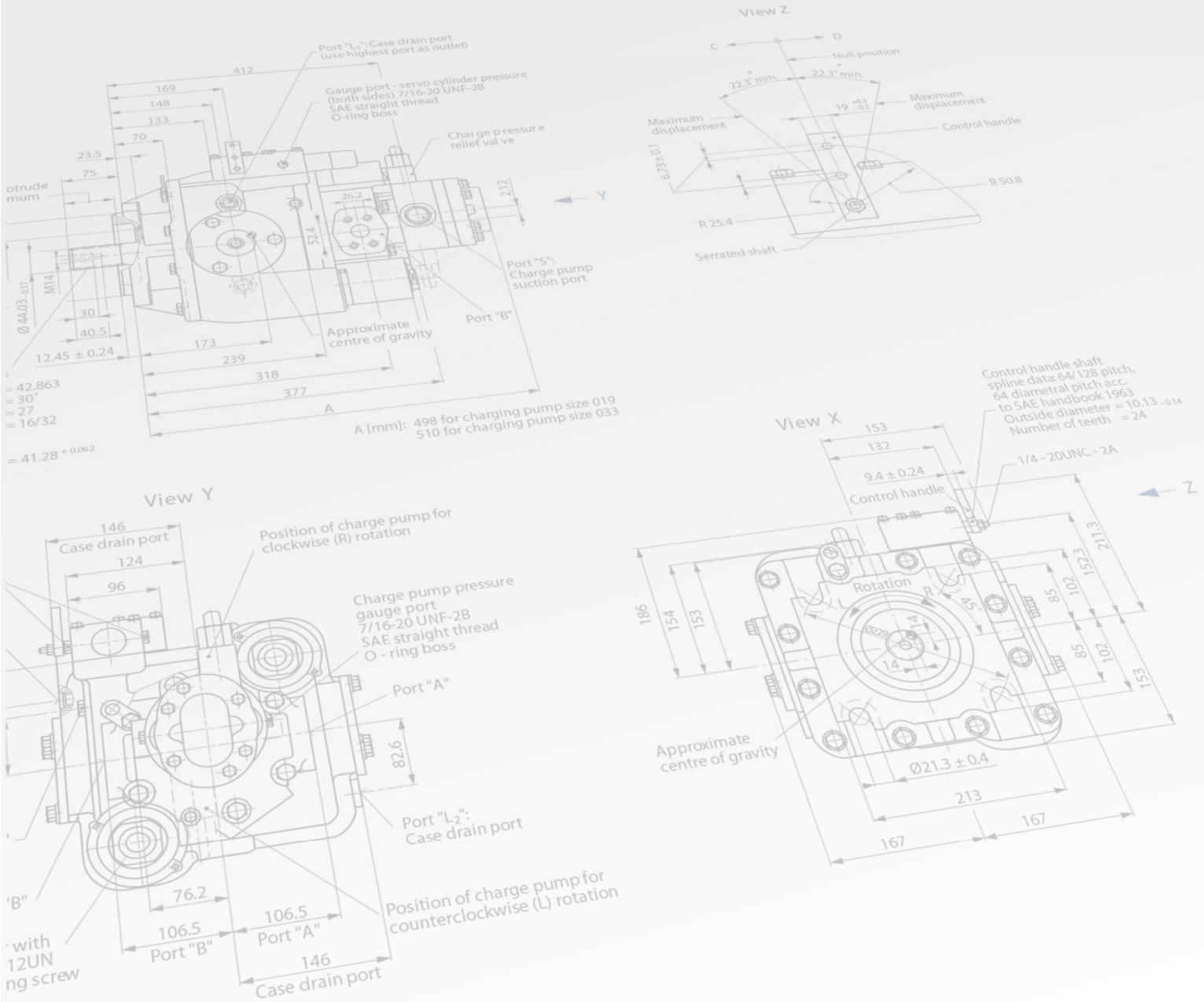
10.

Special Number		
000	Standard	•
XXX	Special	o

- • standard design
- **o** available

Ordering example : MFS 23 CB2B153535000 (standard transit mixer drive motor)

- Short motor with displacement 89 cm3
- 21 teeth shaft
- Pressure ports 5000 PSI on one side
- Relief valve adjusted to 15 bar
- High pressure valves in end cap adjusted to 35 MPa



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