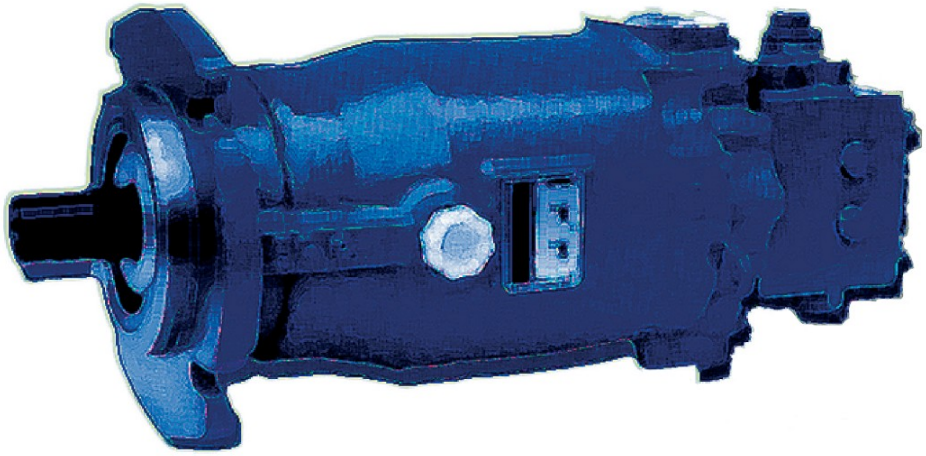
HP Engineering s.r.o.

AXIAL PISTON MOTORS

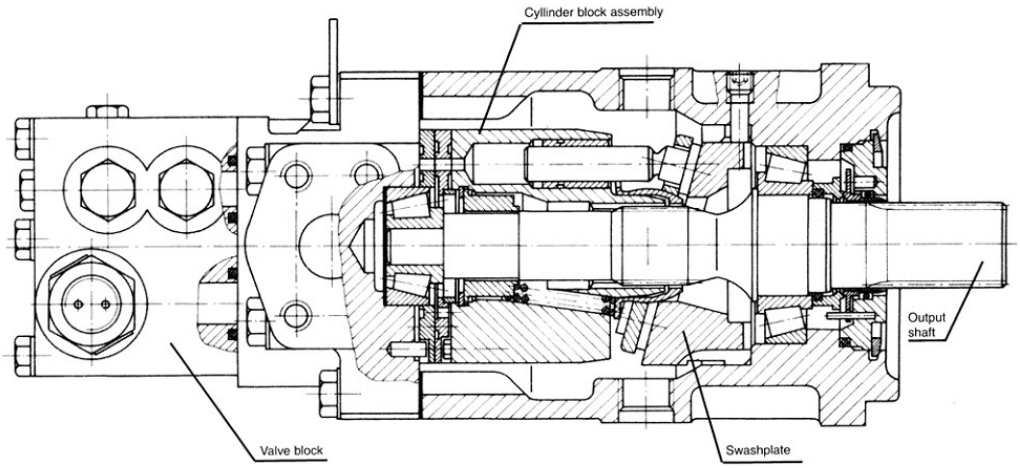


with fixed displacement

AXIAL PISTON MOTORS

General Description

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



Features

Axial piston fixed displacement motors, Series 20, are well-engineered and easy to handle.
The full-lenght shaft with a highly efficient tapered roller beraring arrangement offers a high loading capacity for external radila forces.
High case pressures can be archived without leakage even at the lowest temperature by using suitable shaft seals.
The modular construction of the unit simplifies the production of a wide variety of model options while limiting the number of different components involved.

Light weight, short version available on request.

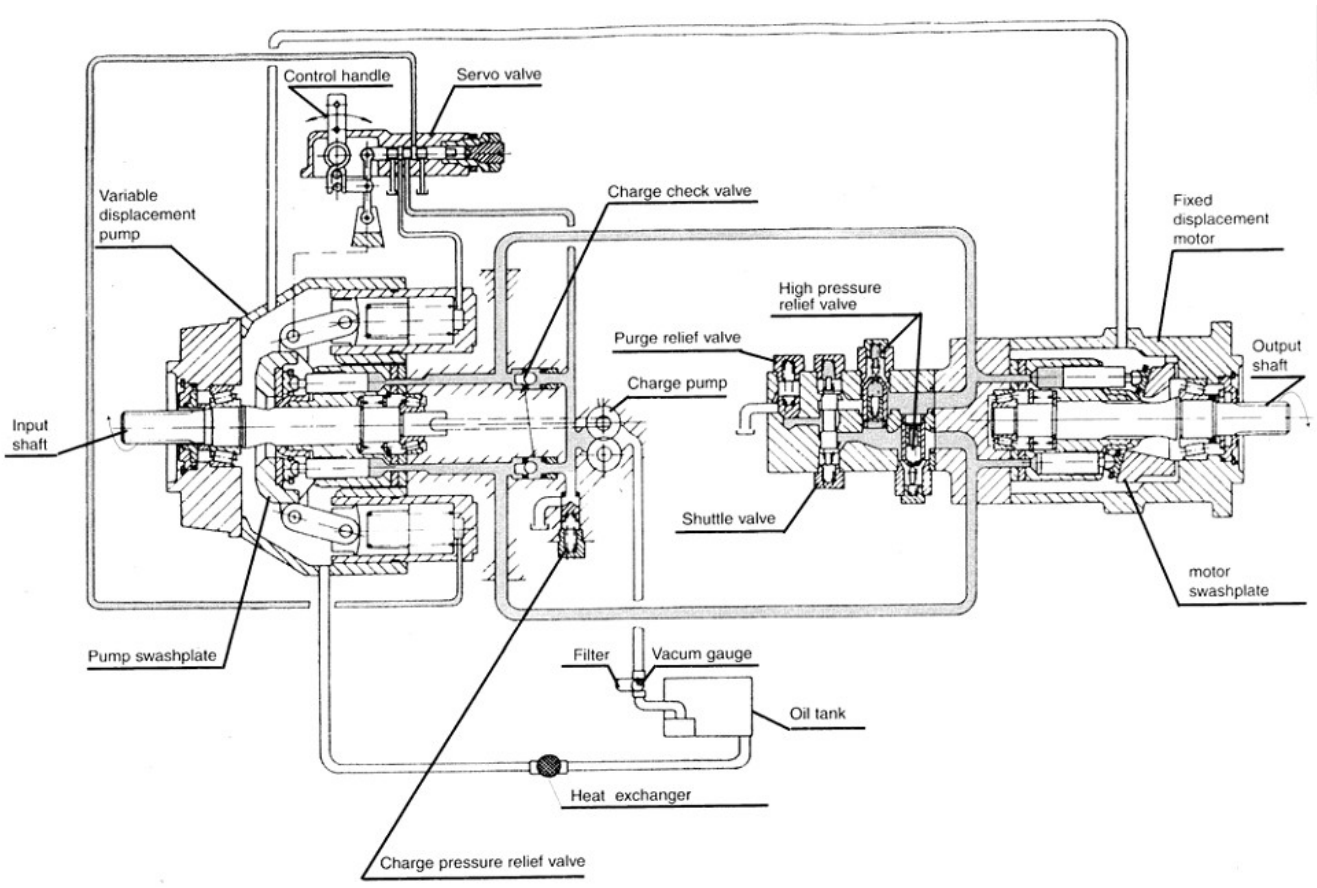


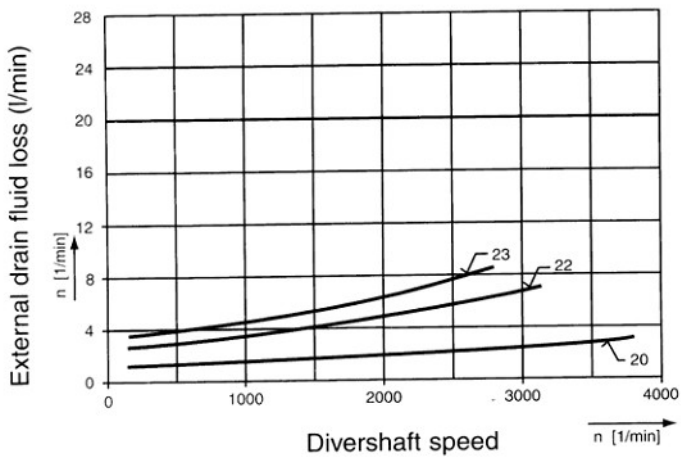
Figure 2 show schematically the function of a hydrostatic transmission using an axial piston variable displacement pump and a fixed displacement motor.

Technical data
Table 1:

	Dimension	Frame Size		
		20	22	23
Max. displacement per revolution of the motor	cm^3	33,3	69,8	89
Max. pressure	Mpa		35	
Nominal pressure	Mpa		21	
Charging pressure	Mpa		0,8 – 2,0	
Max. pressure in a case	Mpa		maximum constant 0,25, intermittent 0,5	
Torque at 35 Mpa	Nm	176	369	471
Maximum speed +	min^{-1}	3590	2810	2590
Minimum speed	min-1		500	
Nominal speed	min-1		1500	
Kinematic viskosity range of working fluid - starting - operating - optimum Kind of working fluid	mm ². s-1		1000 12 – 600 25 – 35 mineral oil	
Operating temperature	°C (K)		-40 to + 50 (233 – 323)	
Max. temperature of working in tank	°C (K)		80 (353)	
Purity of working fluid	ų m		10	
Sense of rotation of the shaft			reversible	
Maximum swash plate angle	Degrees		± 18 ∞	
Weight	kg	30	40	47

+ For higher speed contact our Application department

Figure 3 External drain fluid loss for frame size 20 – 23



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

$$M_o = \frac{15{,}9 . V_g . \Delta_p . \eta_{mh}}{100} \text{ [Nm]} \quad \text{(Output forque)}$$

$$P_e = \frac{M_e . n}{9550} = \frac{Q_e . \Delta_p . \eta_t}{600} \text{ [kW]} \quad \text{(Output power)}$$

V_g - Displacemant [cm^3] per revolution
Δ_p - High pressure minus low pressure [MPa]
n - Speed [1/min]
η_v - Volumetric efficiency
η_{mh} - Mechanical - hydraulic efficiency
η_t - Total efficiency

Figure 4
Outline drawing motor configuration with valve block

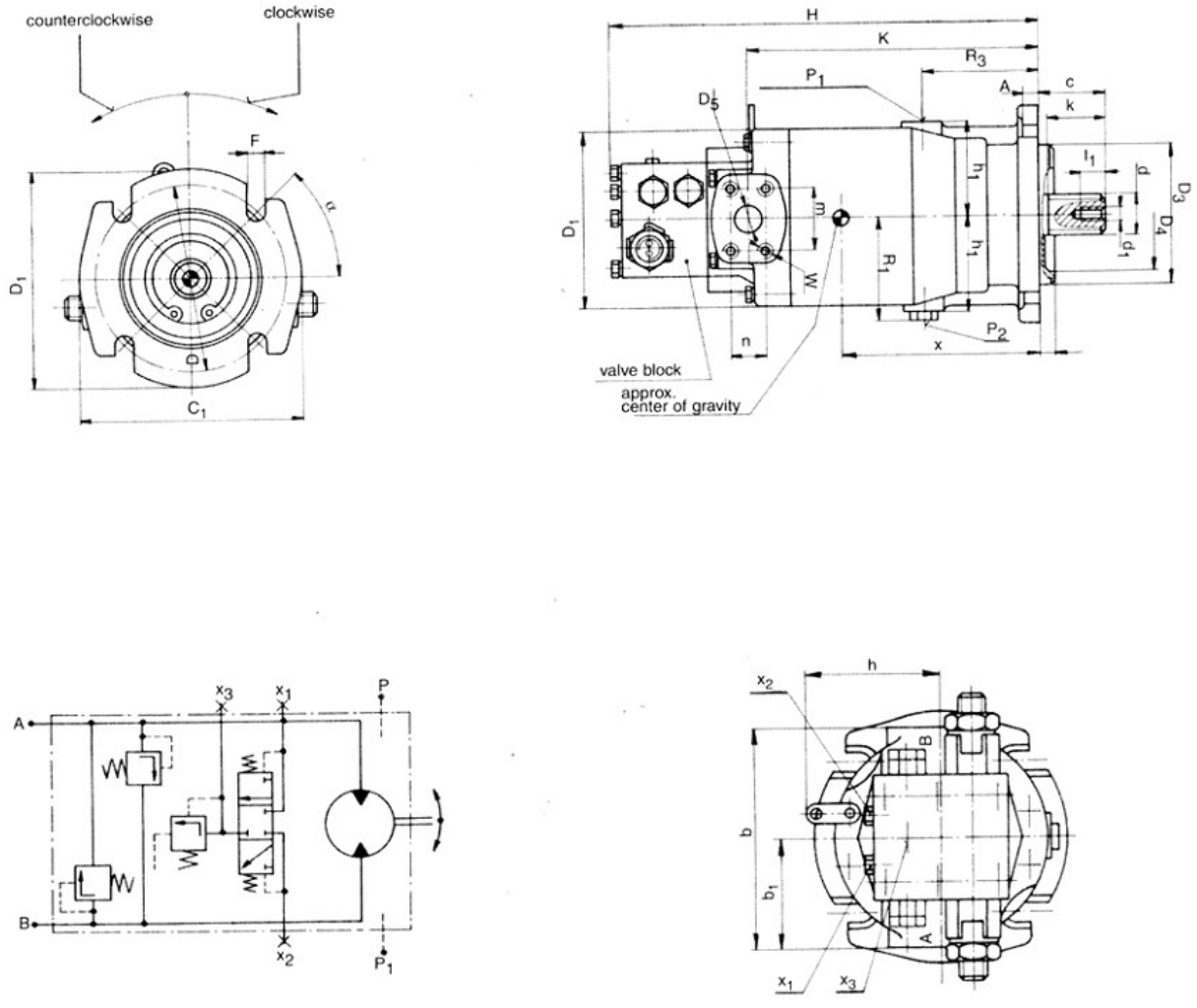


Table 2: Dimensions (mm)

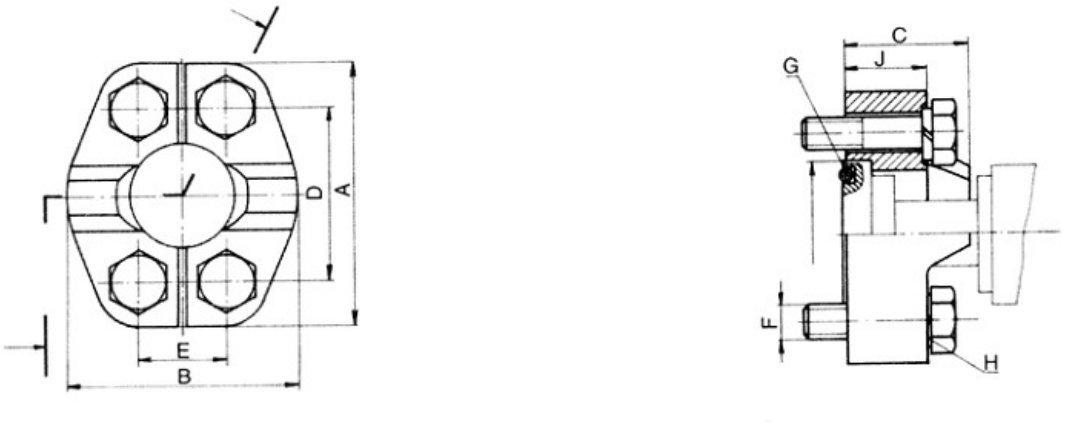
Frame size	A	C	C1	D	D1	D2	D3	D4	D5	F	H
20	15,7 ±1,5	56	190	162	146	140	127-0,05	108	25,4	15±0,8-0,3	340
22	15,7 ±1,5	56	194	162	194	161	127-0,05	180	25,4	15±0,8-0,3	380
23	17,2±1,5	56	194	162	194	180	127-0,05	180	25,4	15±0,8-0,3	395

Frame size	H	H2	H3	H4	H5	H6	K	P1,P2,P3	R	R1	R2	U
20	36	252	315	277	11	25	214	7/8 – 14 UNF – 2B	88,7	96	18	19
22	36	291	382	315	12	30	255,3		108	103	18	19
23	36	306	400	331	6	44	272,3		117	112	18	19

Frame size	U1	W	b	b1	d1	d1	h	h1	k
20	7/8 – 14 UNF – 2B	3/8 – 16 UNC – 2B	162	82,5	34,5-0,17	M10		71	48
22			172	86	34,5-0,17	M10	100,6	87	48
23			192	96	37,68-0,18	M10	115	96	48

Frame size	l	l1	x	z	α	m	n	x1, x2, xn
20	12,5±0,2	min. 20	156	7/8 – 14 UNF – 2B	45 °	52,4	26,2	7/16 – 20 UNF – 2B
22	12,5±0,2	min. 20	165		45 °	52,4	26,2	
23	12,5±0,2	min. 20	170		45 °	52,4	26,2	

Figure 5
Hose flange



Dimensions (mm)

Frame size	A	B	C	D – 0,1	E – 0,1	F	G/order No./	H	J
20-23	81	70	35	52,4	26,2	3/8-16 UNC 2A	40187	Washer 10.2	22,5

Figure 6
Flange for piping

Dimensions (mm)

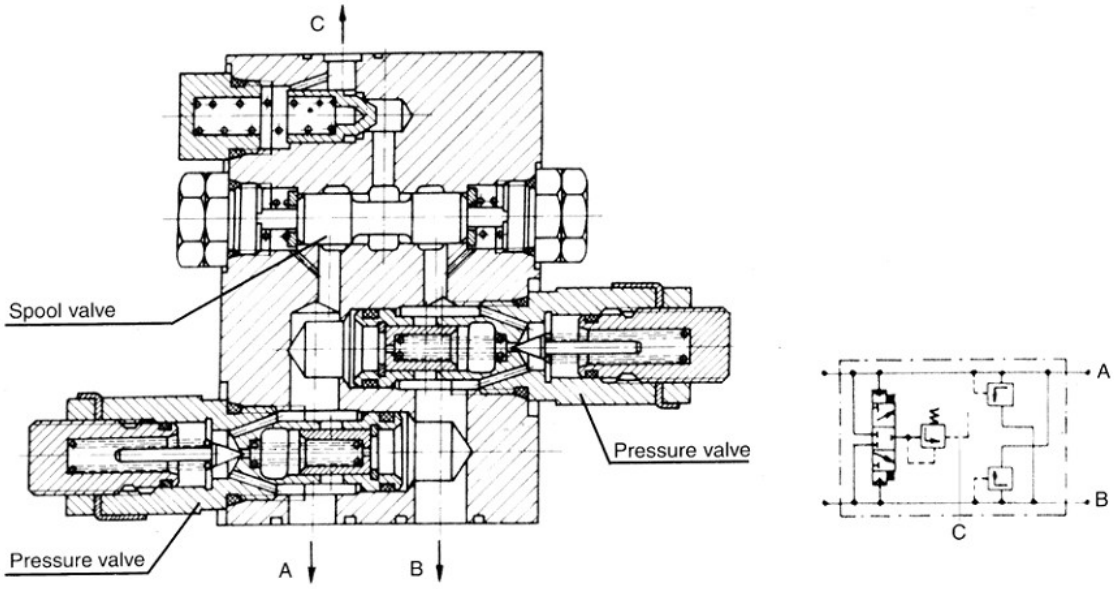
Frame size	A	B	C	D – 0,1	E – 0,1	F	G/order No./	H	J
20-23	81	70	40	52,4	26,2	3/8-16 UNC 2A	40187	Washer 10	22,5

Frame size	K	L	M-0,1	N-0,1	O	P±0,2	U
20-23	28	38	8	2,8	39,7±0,05	4	V5-104

Note:
Flange according to SAE J 518 c
Frame size 20 – 23: size 1, 5000 psi, torque for screw tightenning 3/8 – 16 UNC 2A: 37 – 42 Nm

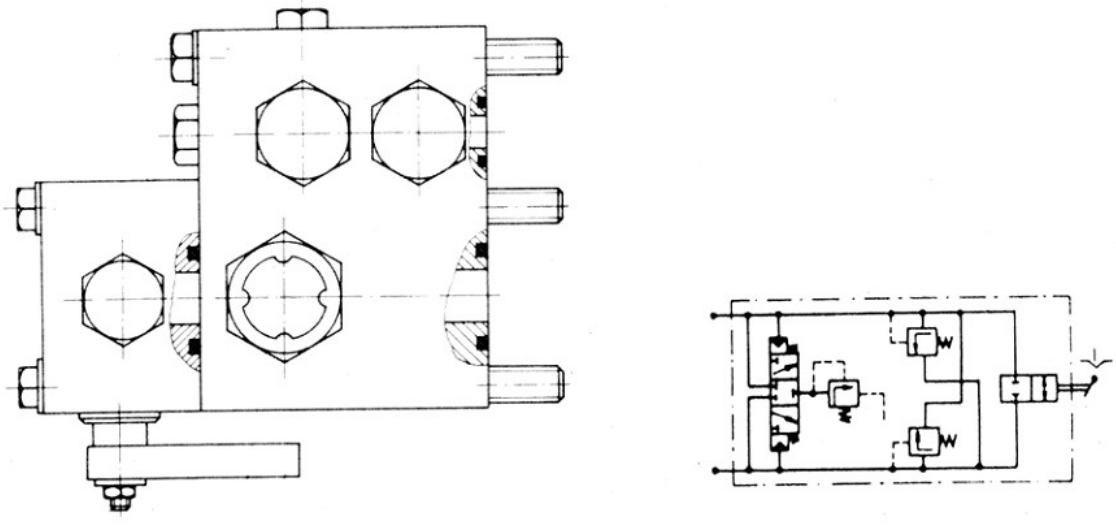
Valve Block

Valve block consist of control elements that serve to restrict working pressure in the high pressure hydrostatic circuit, to exchange the heat working fluid in closed hydrostatic circuit, to charge the volume losses in closed hydrostatic circuit, to charge the volume losses hydrostatic circuit as well to secure rising of transmision case.



Valve Block with by-pass vlave

Valve block with by-pass valve secure all the functions as valve block. On the back side there is a built-in by-pass valve designed for interconection of high pressure lines on closed hydrostatic circuit.



TYPE DESIGNATION AND ORDER CODE:

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

1. Type: **MF - Axial Piston Fixed Displacement Motor**
for hydrostatic transmissions with closed loop circuit, Serie 20

2. Size:

Frame Size	Displacement per revolution
20	33,3 cm3
	51,6 cm3
22	68,9 cm^3
23	89,0 cm3

3. Shaft End:

- **A** = 14 teeth, 12/24 pitch, ϕ 31,2
- **B** = 19 teeth, 16/32 pitch, ϕ 31,75
- **C** = 21 teeth, 16/32 pitch, ϕ 34,5
- **D** = 23 teeth, 16/32 pitch, ϕ 37,68
- **K** = cone 1: 8, SAE J 501, ϕ 31,75
- **L** = cylindrical ϕ 34,925 spring - valid for size 20, 21, 22
- **M** = cylindrical ϕ 44,45 , spring - valid for size 23

4. Pressure and Inlet Ports "A","B", "C":

- **A:** SAE J 518, 1", 6 000 PSI
- **B:** SAE J 518, 1", 5 000 PSI
- **C:** ISO 6162, 1", 40 Mpa, metric

5 Pressure and Inlet Ports "A", "B":

- A - with bypass valve
- B - without bypass valve

6. Identification for charge pressure ΔPp:

- **12** - 1,2 Mpa
- **13** - 1,3 Mpa
- **14** - 1,4 Mpa
- **16** - 1,6 Mpa
- **00** - without purge relief valve

7. Identification for required relief valve setting on side A

- **11** - 11 Mpa
- **14** - 14 Mpa
- **21** - 21 Mpa
- **28** - 28 Mpa
- **35** - 35 Mpa
- **42** - 42 Mpa
- **00** - without high pressure relief valve

8. Identification for required relief valve setting on side B

- **11** - 11 Mpa
- **14** - 14 Mpa
- **21** - 21 Mpa
- **28** - 28 Mpa
- **35** - 35 Mpa
- **42** - 42 Mpa
- **00** - without high pressure relief valve

10. No of special modification:

Determined in factory according to the special requirement of the client.