Variable Displacement Pump ATUS-A10VO

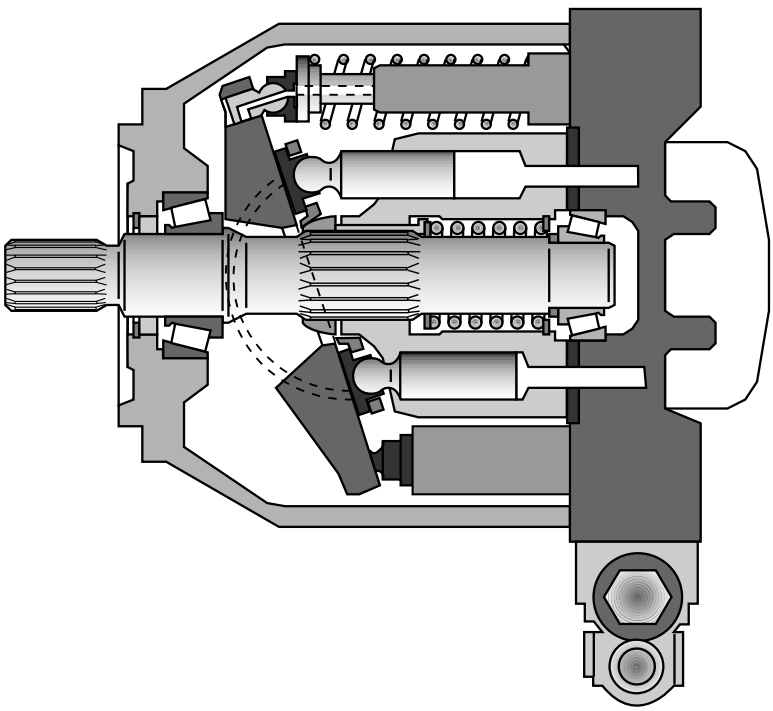
Series 31, for open loop circuits,
Axial piston, swashplate design

Sizes 28...140	Nominal pressure 280 bar	Peak pressure 350 bar

CE 92701

Axial piston pump ATUS-A10VO in swashplate design is used for hydrostatic transmissions in open loop circuits.
Flow is proportional to drive speed and displacement. By adjusting the position of the swashplate it is possible to smoothly vary the flow.

– Flange connections to SAE-UNC or SAE metric
– 2 leakage ports
– High permissible speeds
– Good suction characteristics
– Low noise level
– High power/weight ratio
– Long service life
– Short control times
– Axial and radial loading of drive shaft possible
– Wide range of controls
– Through drive option for multi-circuit system



Ordering code

Fluid

Mineral oil (no short code)	

Axial piston unit

Swashplate design, variable Nominal pressure 280 bar, peak pressure 350 bar	**A10V**

Operational mode

Pump, open loop circuit	**O**

Size

≙ Displacement $V_{g\,max}$ (cm^3)	**28**	**45**	**71***	**100**	**140**

Control devices

				28	45	71	100	140		
2-pos. adjustment, direct control	DG			●	●	●	●	●	**DG**	Page 20
Pressure control	DR			●	●	●	●	●	**DR**	Page 22
	DR	G		●	●	●	●	●	**DRG**	Page 24
Remote control										
Movable pressure control	DRT	1		○	●	○	○	○	**DRT1**	Page 26
for when required	DRT		2	○	●	○	○	○	**DRT2**	Page 26
i = 18,2 / i = 12,4										
Pressure and flow control	DFR			●	●	●	●	●	**DFR**	Page 28
	DFR	1		●	●	●	●	●	**DFR1**	Page 28
X port closed										
Pressure, flow and power control	DFLR			●	●	●	●	●	**DFLR**	Page 30
Pressure, flow and summ. power control	DFSR			●	●	●	●	●	**DFSR**	Page 32
Flow control, pilot pressure-dependent	FHD			●	●	●	●	●	**FHD**	Page 34
with pressure control										
Electronic flow control	FE1			●	●	●	●	●	**FE1**	Page 36
Electronic pressure and flow control	DFE1			●	●	●	●	●	**DFE1**	Page 36

Series

	31

Direction of rotation

Viewed on drive shaft	clockwise **R**
	anti-clockwise **L**

▭ = prefered program (with short delivery times)
(type list see page 44)

*** With size 71 please note the following when designing:**
Pressure port B consists of a multiple high pressure port
SAE 11/4" standard pressure range, 3000 psi, **for pressures of up to 250 bar**
SAE 1" standard pressure range, 5000 psi, **for pressures > 250 bar** (see page 14).
For **new applications high pressure port SAE 1" must be used.**

● = available
○ = in preparation
– = not available

A10V	O			/	31		–					

Axial piston pump

Operational mode

Size

Adjustment and control devices

Series

Direction of rotation

Seals

NBR (Nitrile rubber to DIN ISO 1629)	**P**
FPM (Fluoro rubber to DIN ISO 1629)	**V**

Shaft end

	28	45	71	100	140	
Splined shaft SAE	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	**S**
Splined shaft SAE (higher through drive torque)	7/8"	1"	1 1/4"	–	–	**R**
Splined shaft SAE (not suitable for through drive)	–	7/8"	–	1 1/4"	–	**U**

Mounting flange

	28	45	71	100	140	
SAE 2-hole	●	●	●	●	–	**C**
SAE 4-hole	–	–	–	–	●	**D**

Port for service lines

		28	45	71	100	140	
Pressure port B Suction port S	SAE at rear, fixing thread UNC	●	●	●	●	●	**61**
Pressure port B Suction port S	SAE on opposite sides, fixing thread UNC	●	●	●	●	●	**62**
Pressure port B Suction port S	SAE at rear, metric fixing thread	●	●	●	●	●	**11**
Pressure port B Suction port S	SAE on opposite sides, metric fixing thread	●	●	●	●	●	**12**

Port pos. 61 and 11 only for version without through drive

Through drive

			28	45	71	100	140	
Without through drive			●	●	●	●	●	**N00**
With through drive (port pos. 62, 12) for mounting AKM or ZRP								
Mounting flange	Shaft/coupling	For mounting:						
82-2(SAE A)	16-4(SAE A)	G2, GC2/GC3-1X	●	●	●	●	●	**K01**
82-2(SAE A)	19-4(SAE A-B)	ATUS-A10VSO 18 (shaft S)	●	●	●	●	●	**K52**
101-2(SAE B)	22-4(SAE B)	ATUS-A10VO 28 (shaft S), G3	●	●	●	●	●	**K02**
101-2(SAE B)	22-4(SAE B)	G4	●	●	●	●	●	**K68**
101-2(SAE B)	25-4(SAE B-B)	ATUS-A10VO 45 (shaft S), GC4-1X	–	●	●	●	○	**K04**
101-2(SAE B)	32-4(SAE C)	GC5-1X	–	●	●	●	○	**K06**
127-2(SAE C)	32-4(SAE C)	ATUS-A10VO 71 (shaft S)	–	–	●	●	●	**K07**
127-2(SAE C)	38-4(SAE C-C)	ATUS-A10VO 100 (shaft S), GC6-1X	–	–	–	●	●	**K24**
152-4(SAE D)	44-4(SAE D)	ATUS-A10VO 140 (shaft S)	–	–	–	–	●	**K17**

Multiple pumps

1. **If a second pump is to be factory-mounted, then both ordering codes are to be specified, combined with a "+" . Ordering code 1st pump + Ordering code 2nd pump Ordering example: ATUS-A10VO 100DR/31R-PSC62K07 + ATUS-A10VO 71DR/31R-PSC62N00**
2. **If a gear pump is to be factory-mounted please contact us**

Fluid

Prior to project design, please see our data sheets RE 90220 (mineral oil) and RE 90221 (ecologically acceptable fluids) for detailed information on fluids and application conditions.
When using ecologically acceptable fluids attention must be paid to possible limitations of the technical data. If necessary please contact us.

Operating viscosity range
For optimum efficiency and service life we recommend that the operating viscosity (at operating temperature) be selected in the range

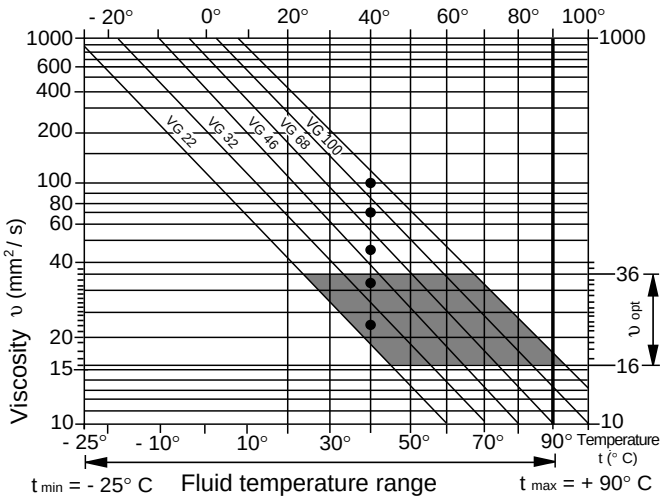
ν_{opt} = opt. operating viscosity 16...36 mm²/s

referred to tank temperature (open loop circuit).

Limits of viscosity range
The following values are valid for extreme operating conditions:
ν_{min} = 10 mm²/s
for short periods at max. leakage oil temperature of 90° C.
ν_{max} = 1000 mm²/s
for short periods upon cold start.

Temperature range (see selection diagram)
t_{min} = –25° C
t_{max} = +90° C

Selection diagram



Notes on the selection of fluid
For correct selection of the fluid it is assumed that the operating temperature in the tank is known (open loop circuits), in relation to the ambient temperature.
The fluid should be selected so that, within the operating temperature range, the operating viscosity lies within the optimum range (ν_{opt}), (see shaded section of selection diagram).
We recommend that the higher viscosity grade is selected in each case.
Example: At an ambient temperature of X° C the operating temperature in the tank will be 60° C. In the optimum operating viscosity range (ν_{opt}; shaded section) this corresponds to viscosity grade VG 46 or VG 68; VG 68 should be selected.
Important: The leakage oil temperature is influenced by pressure and speed and is always higher than the tank temperature. At no point in the system, however, may the temperature be higher than 90° C.
If it is not possible to comply with the above conditions because of extreme operating parameters or a high ambient temperature, please consult us.

Filtration
In order to ensure reliable operation of the axial piston unit, the operating fluid must be maintained to a cleanliness class of at least
9 to NAS 1638
6 to SAE
18/15 to ISO/DIS 4406.
This may be achieved, for example, with filter elements type...D 020...(see RE 31278).
This gives the following degree of separation:

$\beta_{20} \geq 100$

Technical data

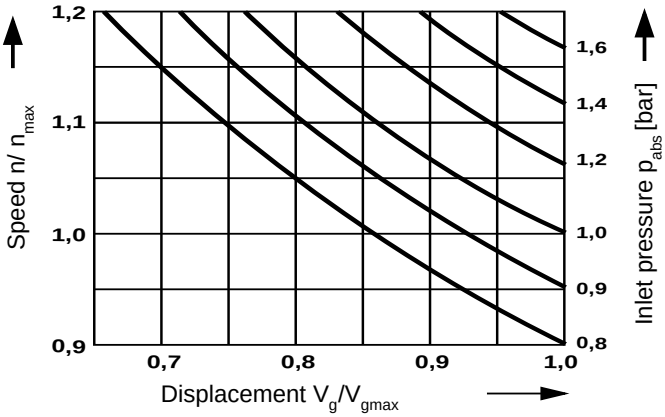
Inlet operating pressure range
Absolute pressure at port S (A)
$p_{abs\ min}$ ..... 0,8 bar
$p_{abs\ max}$ ..... 30 bar

Outlet operating pressure range
Pressure at port B
Nominal pressure p_N ..... 280 bar
Peak pressure p_{max} ..... 350 bar
(Pressure data to DIN 24312)
Applications with intermittent operating pressures of up to 315 bar at 10% duty cycle are permitted.

Case drain pressure
Maximum pressure of leakage fluid (at ports L, L_1):maximum 0,5 bar higher than input pressure at port S, but not exceeding 2 bar absolute.

Direction of flow
S to **B**

Determination of inlet pressure p_{abs} at suction port S, or reduction in flow for increasing speed.

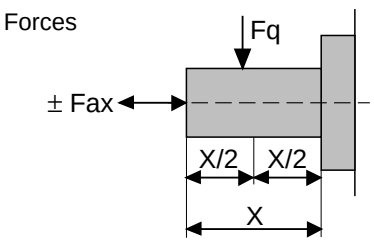


Tabulated data (theoretical values, without considering η_{mh} and η_v; approximate values)

Size				**28**	**45**	**71**	**100**	**140**
Displacement		$V_{g\ max}$	cm^3	28	45	71	100	140
Max. speed[1])	at $V_{g\ max}$	$n_{o\ max}$	rpm	3000	2600	2200	2000	1800
Max. flow	at $n_{o\ max}$	$Q_{o\ max}$	L/min	84	117	156	200	252
	at n_E = 1500 rpm		L/min	42	68	107	150	210
Max. power (Δp = 280 bar)	at $n_{o\ max}$	$P_{o\ max}$	kW	39	55	73	93	118
	at n_E = 1500 rpm		kW	20	32	50	70	98
Max. torque (Δp = 280 bar)	at $V_{g\ max}$	T_{max}	Nm	125	200	316	445	623
Torque (Δp = 100 bar)	bei $V_{g\ max}$	T	Nm	45	72	113	159	223
Moment of inertia at drive axis		J	kgm^2	0,0017	0,0033	0,0083	0,0167	0,0242
Filling capacity			L	0,7	1,0	1,6	2,2	3,0
Weight (without fluid)		m	kg	15	21	33	45	60
Permissible loading of drive shaft:								
Max. axial force		$F_{ax\ max}$	N	1000	1500	2400	4000	4800
Max. radial force [2])		$F_{q\ max}$	N	1200	1500	1900	2300	2800

[1]) Values shown are valid for an absolute pressure of 1 bar at suction port S.
If the flow is reduced or if the inlet pressure is increased the speed may be increased according to the diagram.

[2]) Please consult us for higher radial forces.



Determination of size

Flow $Q = \dfrac{V_g \cdot n \cdot \eta_v}{1000}$ [L/min]

Drive torque $T = \dfrac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}}$ [Nm]

Drive power $P = \dfrac{2\pi \cdot T \cdot n}{60000} = \dfrac{T \cdot n}{9549} = \dfrac{Q \cdot \Delta p}{600 \cdot \eta_t}$ [kW]

V_g = geometric displacement [cm^3] per rev.
Δp = differential pressure [bar]
n = speed [rpm]
η_v = volumetric efficiency
η_{mh} = mechanical-hydraulic efficiency
η_t = total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Installation notes

Optional installation position. The pump housing must be filled with fluid during commissioning and remain full when operating. In order to attain the lowest noise level, all connections (suction, pressure, case drain ports) must be linked by flexible couplings to tank.
Avoid placing a check valve in the case drain line.
This may, however, be permissible in individual cases, after consultation with us.

1. Vertical installation (shaft end upwards)
The following installation conditions must be taken into account:

1.1. Arrangement in tank
Before installation fill pump housing, keeping it in a horizontal position.

a) If the minimum fluid level is equal to or above the pump mounting surface leave ports “L”, "L_1" and “S” open (see Fig.1).

b) If the minimum fluid level is below the pump mounting surface pipe port “L_1”, and possibly “S” according to Fig. 2. Close port "L" with respect to conditions in 1.2.1.

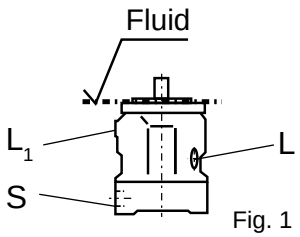


Fig. 1

1.2. Arrangement outside tank
Before installation fill pump housing, keeping it in a horizontal position. For mounting above tank see Fig. 2.

Limiting condition:
1.2.1. Minimum pump inlet pressure $p_{inlet\ min}$ = 0,8 bar under static and dynamic loading.
Note: Avoid mounting above tank wherever possible in order to attain a low noise level.

pressure loss, but may not be greater than h_{max} = 800 mm (immersion depth $h_{t\ min}$ = 200 mm).

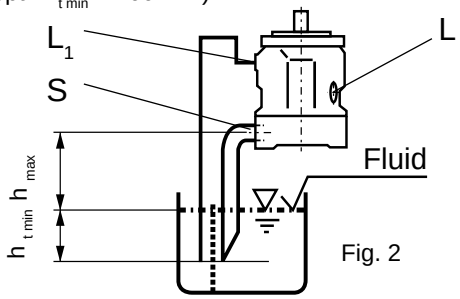


Fig. 2

The permissible suction height h is a result of the overall
Total pressure loss $\Delta p_{total} = \Delta p_1 + \Delta p_2 + \Delta p_3 \leq (1 - p_{inlet\ min}) = 0{,}2$ bar
Δp_1: Pressure loss in pipe due to accelerating column of fluid

$$\Delta p_1 = \frac{\rho \cdot l \cdot dv}{dt} \cdot 10^{-5} \text{ (bar)}$$

ρ = density (kg/m³)
l = pipe length (m)
dv/dt = change in rate of suction (m/s²)

Δp_2: Pressure loss due to static head
$\Delta p_2 = h \cdot \rho \cdot g \cdot 10^{-5}$ (bar)
h = height (m)
ρ = density (kg/m³)
g = acc. due to gravity. = 9,81 m/s²

Δp_3: Line losses (elbows etc.)

2. Horizontal installation
The pump must be installed so that either "L" or "L_1" is at the top.

2.1. Arrangement in tank
a) If the minimum fluid level is above the top of the pump leave ports "L", "L_1" and “S” open (see Fig. 3)

b) If the minimum fluid level is equal to or below the top of the pump pipe ports "L", "L_1" and possiby "S" according to Fig. 4. Conditions according to 1.2.1.

2.2. Arrangement outside tank

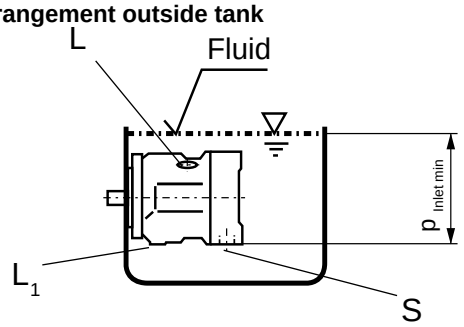


Fig. 3

Fill pump housing before commissioning.

Pipe port "S" and the higher of the two case drain ports "L" and "L_1".
a) For mounting above tank see Fig. 4.
Conditions according to 1.2.1.

b) Position below tank

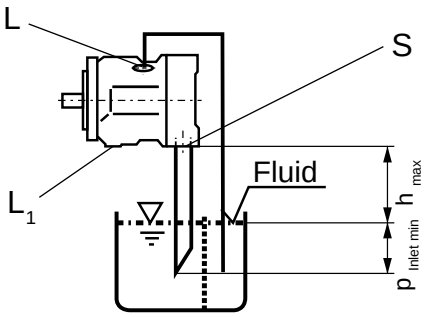


Fig. 4

Pipe ports "L" and “S” according to Fig. 5.

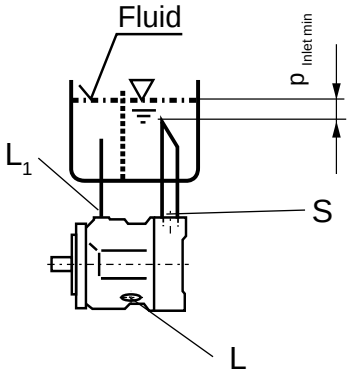


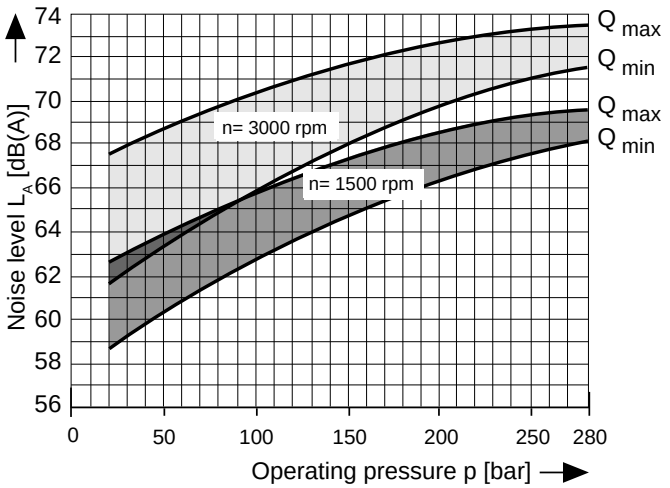
Fig. 5

Characteristics for pump with pressure control DR

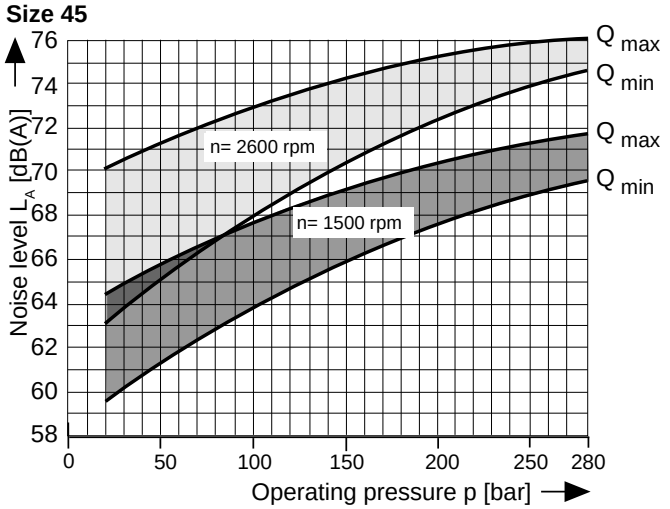
Noise characteristic

Measured in an anechoic chamber
Distance from microphone to pump = 1 m
Measurement tolerance: ± 2 dB (A)
(Fluid: hydraulic oil ISO VG 46 DIN 51519, t = 50° C)

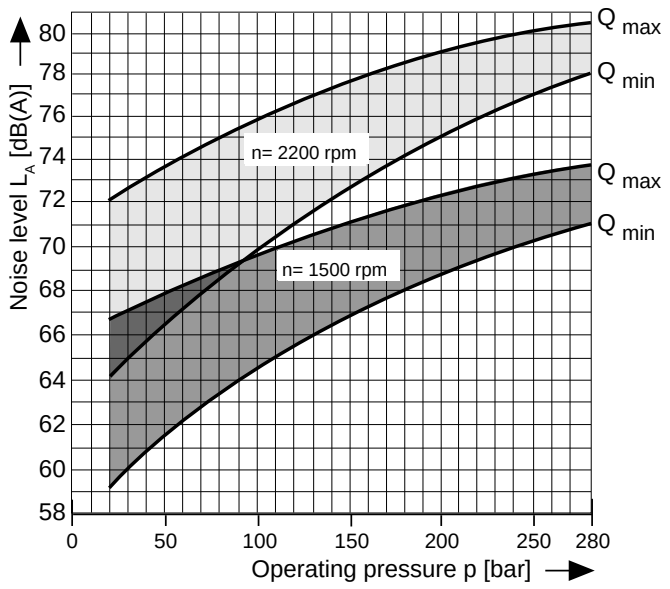
Size 28



Size 45



Size 71



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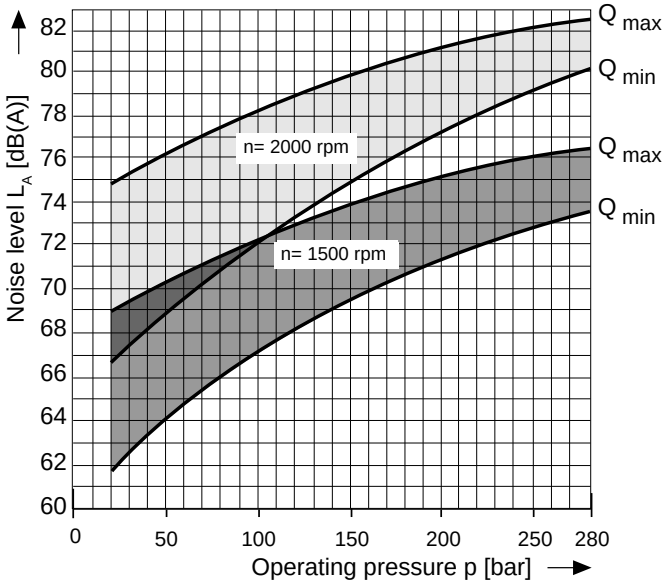
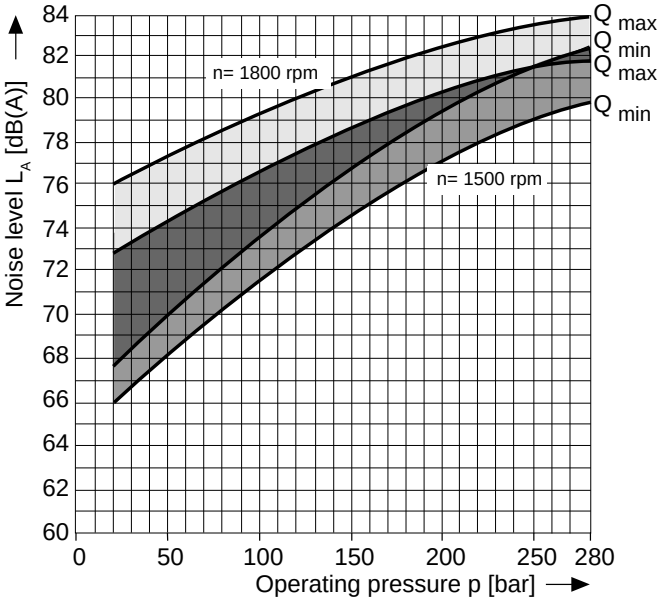


Size 140

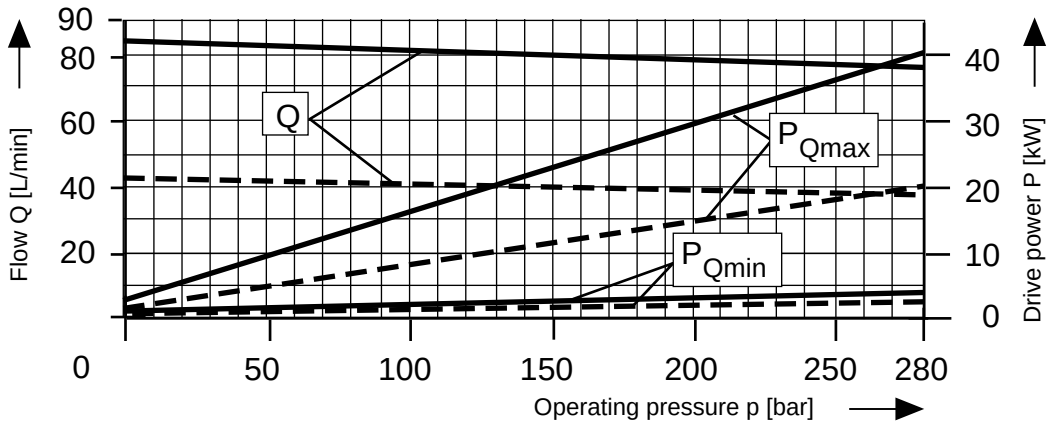


Drive power and flow

(Fluid: hydraulic oil ISO VG 46 DIN 51519, t = 50° C)

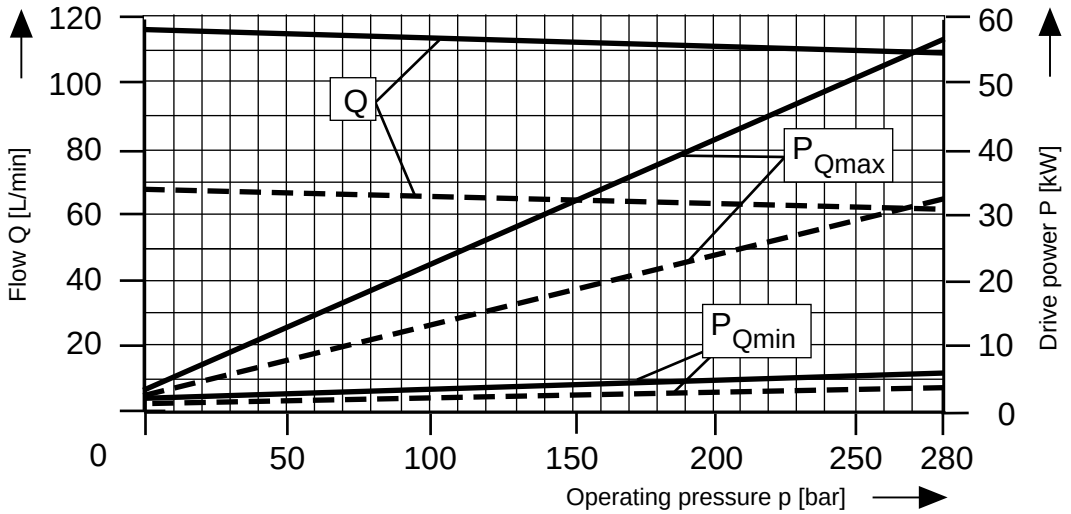
Size 28

– – – – n = 1500 rpm
——— n = 3000 rpm



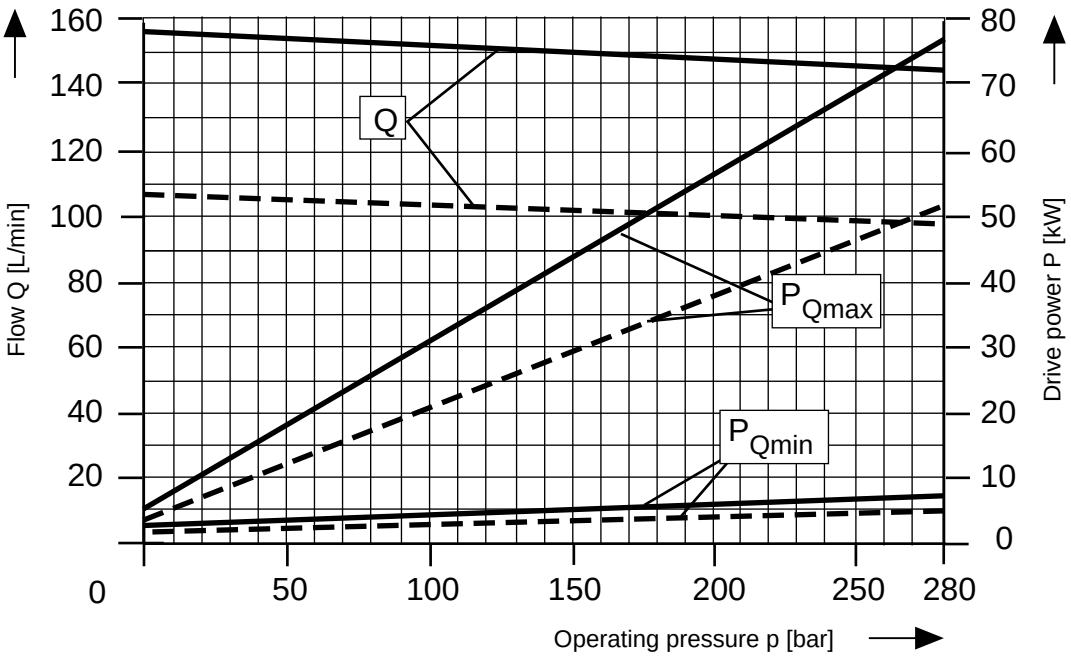
Size 45

– – – – n = 1500 rpm
——— n = 2600 rpm



Size 71

– – – – n = 1500 rpm
——— n = 2200 rpm



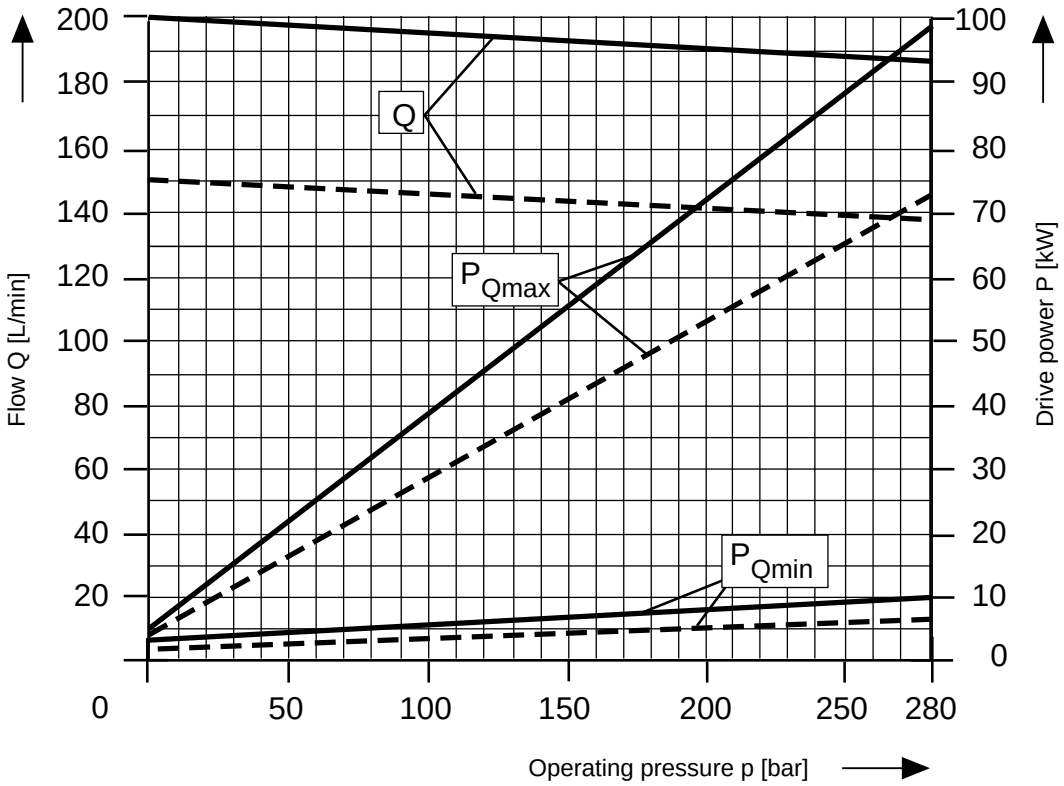
Drive power and flow

(Fluid: hydraulic oil ISO VG 46 DIN 51519, t = 50° C)

Size 100

– – – – n = 1500 rpm

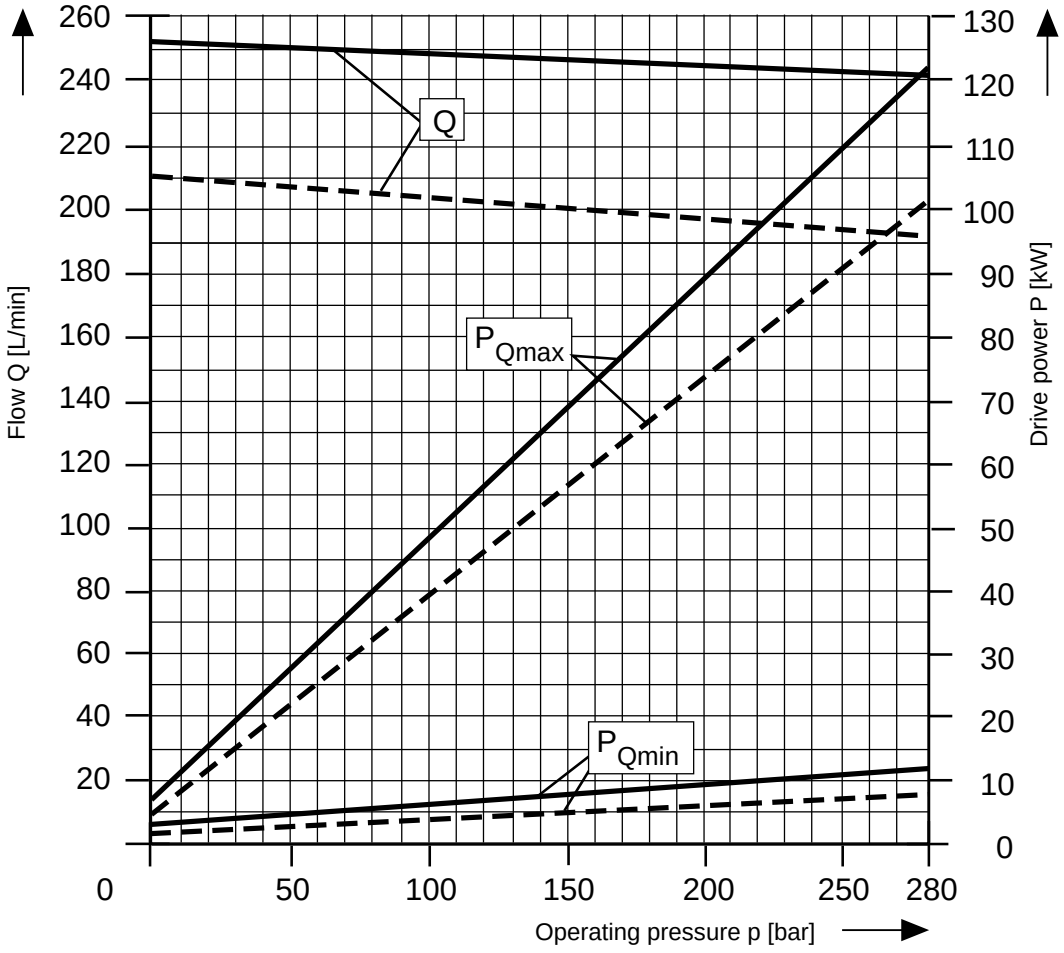
——— n = 2000 rpm



Size 140

– – – – n = 1500 rpm

——— n = 1800 rpm



Total efficiency:

$$\eta_t = \frac{Q \bullet p}{P_{Q\,max} \bullet 600}$$

Volumetric efficiency:

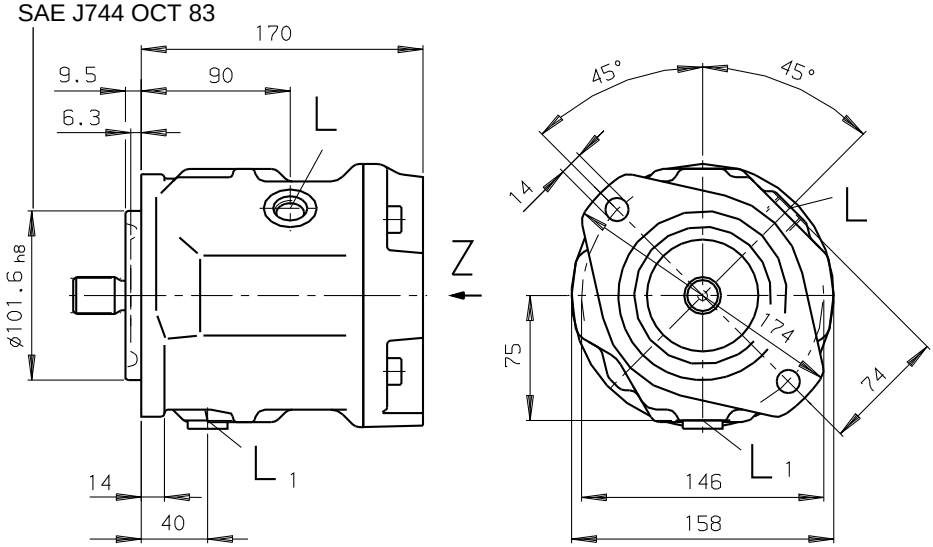
$$\eta_v = \frac{Q}{Q_{theor.}}$$

Unit dimensions, size 28

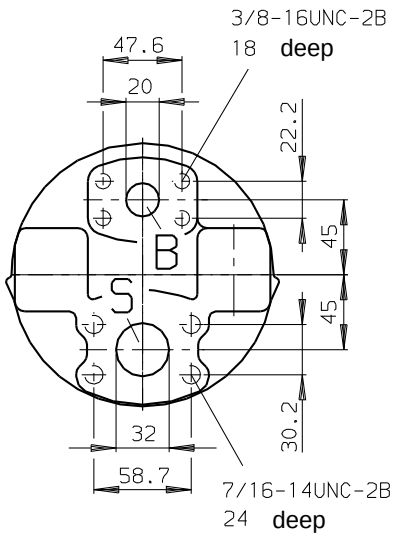
Service ports at rear, no through drive;
Model 61 N00

without considering adjustment

Flange 101-2
(SAE B; 2-hole)
SAE J744 OCT 83

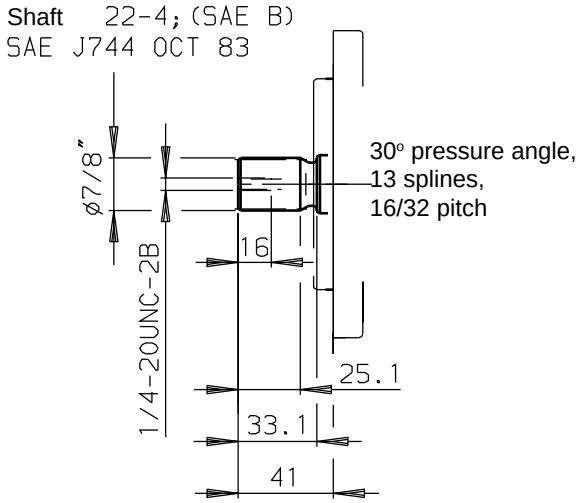


View Z



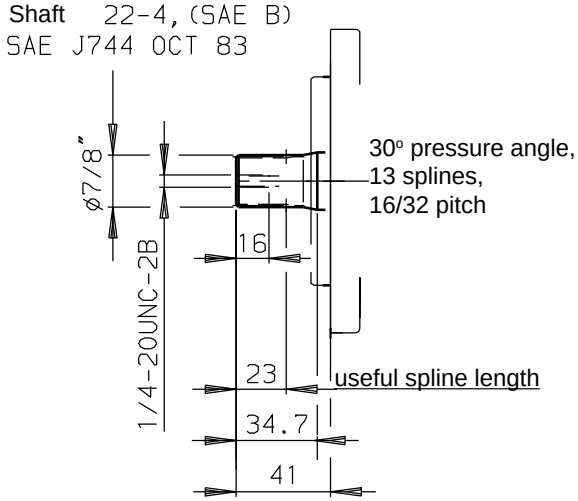
Shaft S

Shaft 22-4; (SAE B)
SAE J744 OCT 83



Shaft R

Shaft 22-4, (SAE B)
SAE J744 OCT 83

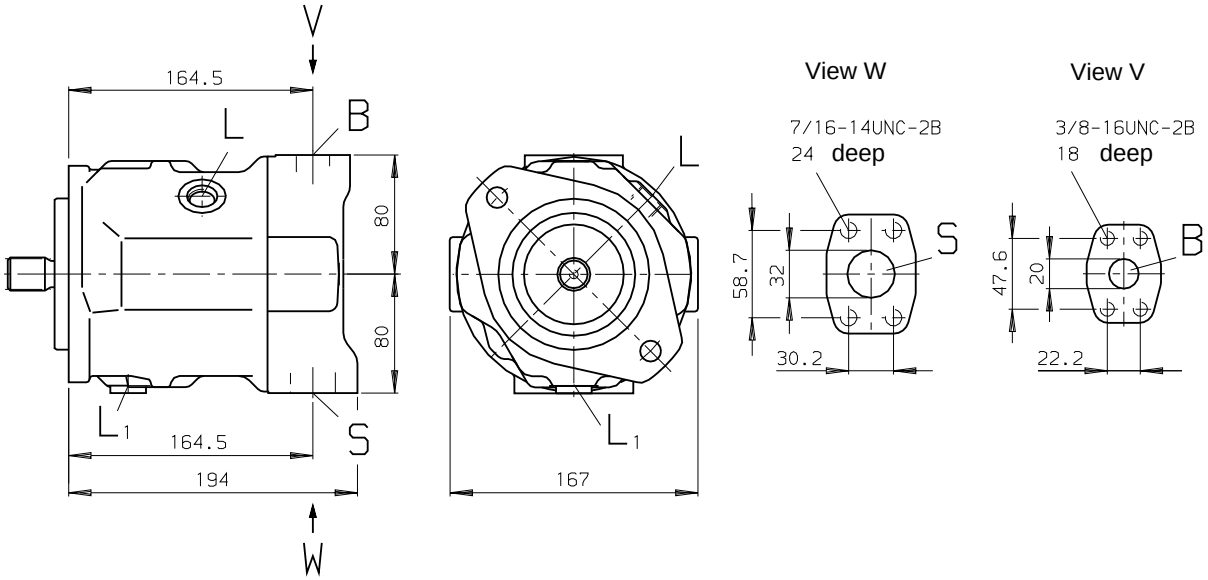


Ports

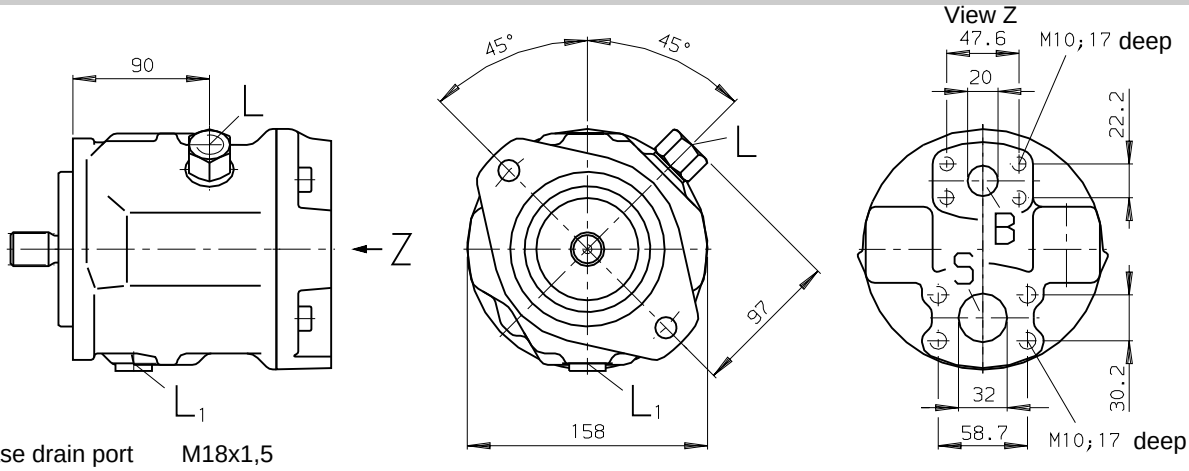
B	Pressure port	SAE 3/4"	(standard pressure series)
S	Suction port	SAE 1 1/4"	(standard pressure series)
L	Case drain port	3/4-16 UNF-2B	
L_1	Case drain port	3/4-16 UNF-2B	(sealed in factory)

Unit dimensions, size 28

Service ports on side, no through drive;
Model 62 N00



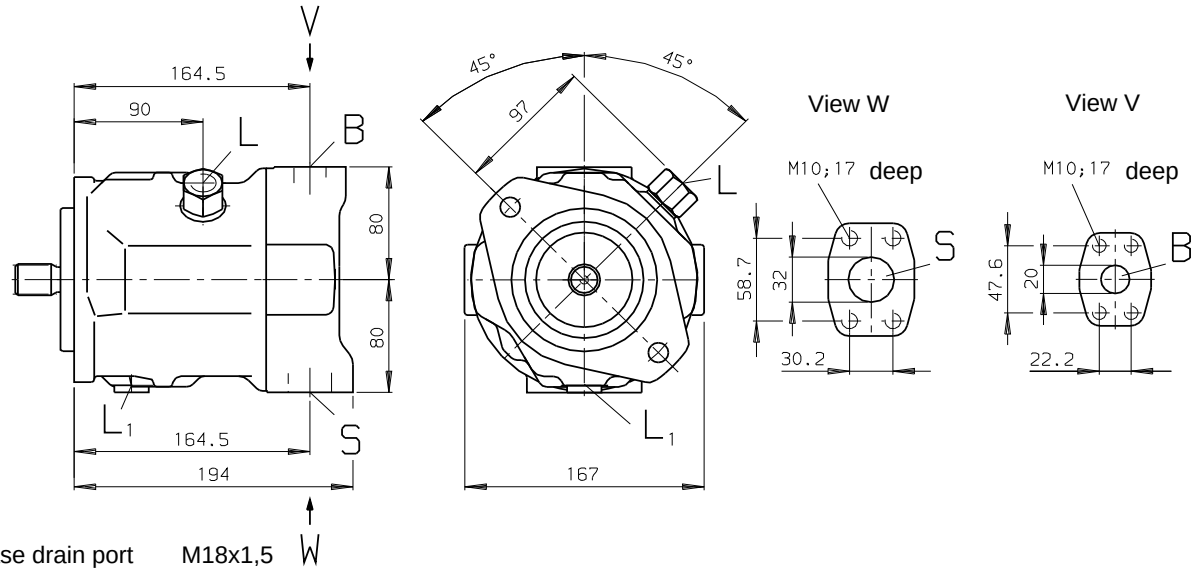
Service ports at rear, no through drive;
Model 11 N00



Ports

L	Case drain port	M18x1,5

Service ports on side, no through drive;
Model 12 N00



Ports

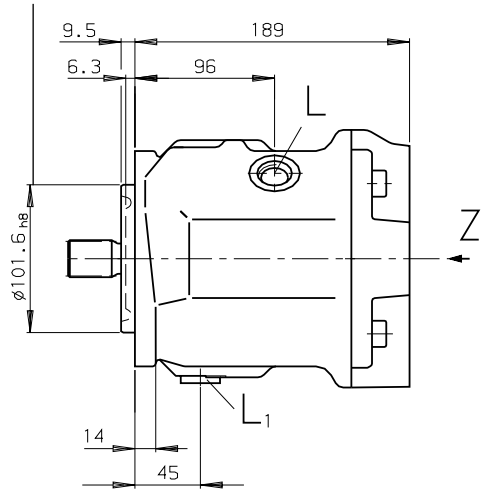
L	Case drain port	M18x1,5

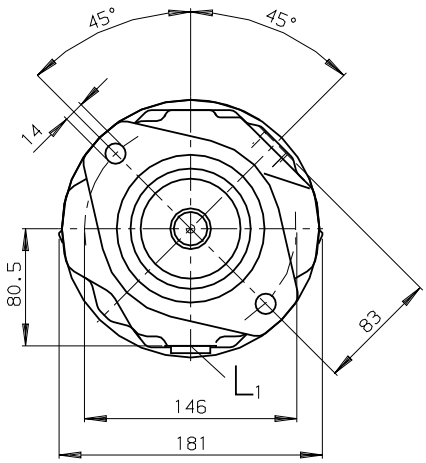
Unit dimensions, size 45

Service ports at rear, no through drive;
Model 61 N00

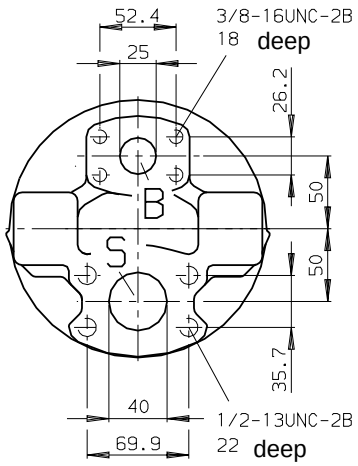
without considering adjustment

Flange 101-2
(SAE B; 2-hole)
SAE J744 OCT 83



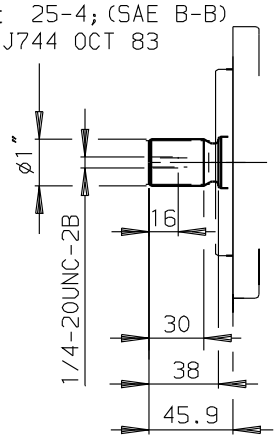


View Z



Shaft S

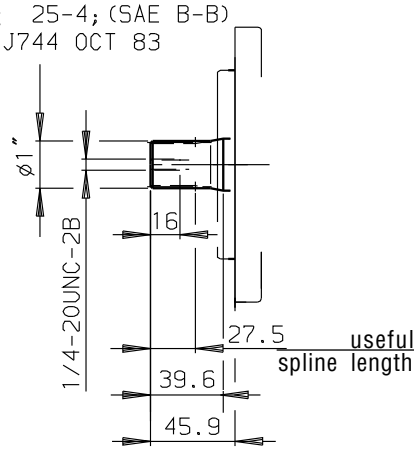
Shaft 25-4; (SAE B-B)
SAE J744 OCT 83



30° pressure angle,
15 splines,
16/32 pitch

Shaft R

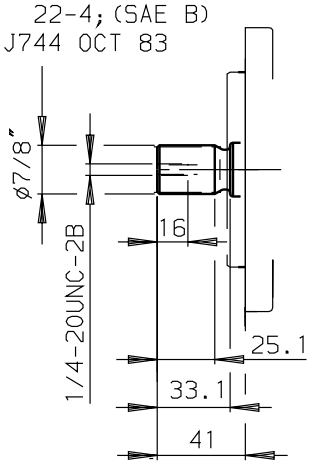
Shaft 25-4; (SAE B-B)
SAE J744 OCT 83



30° pressure angle,
15 splines,
16/32 pitch

Shaft U

Shaft 22-4; (SAE B)
SAE J744 OCT 83



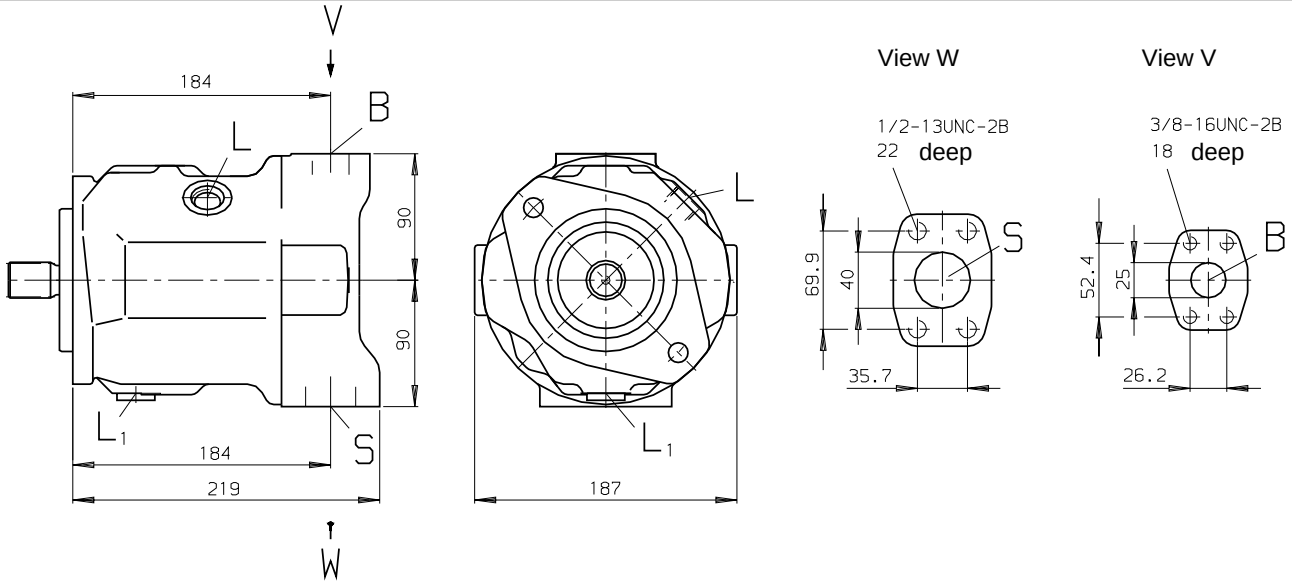
30° pressure angle,
13 splines,
16/32 pitch

Ports

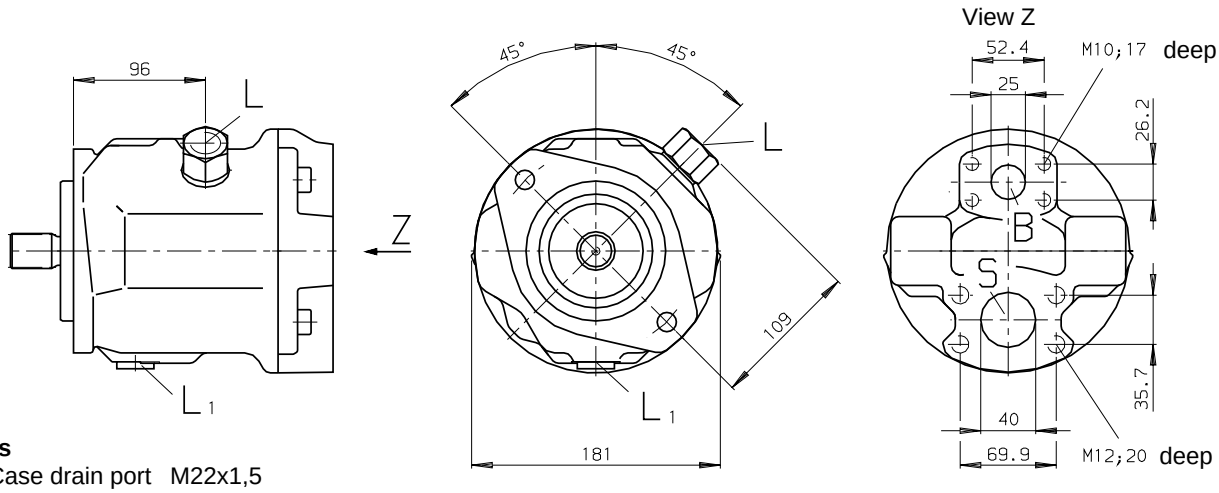
B	Pressure port	SAE 1"	(standard pressure series)
S	Suction port	SAE 1 1/2"	(standard pressure series)
L	Case drain port	7/8-14 UNF-2B	
L_1	Case drain port	7/8-14 UNF-2B	(sealed in factory)

Unit dimensions, size 45

Service ports on sides, no through drive;
Model 62 N00

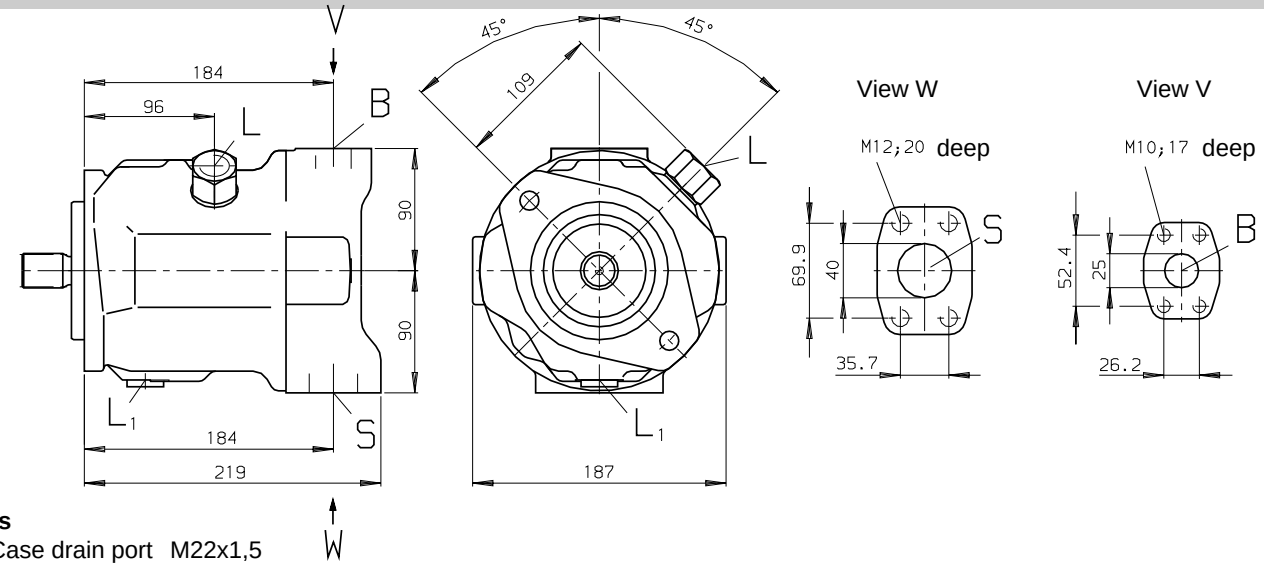


Service ports at rear, no through drive;
Model 11 N00



Ports
L Case drain port M22x1,5

Service ports on sides, no through drive;
Model 12 N00

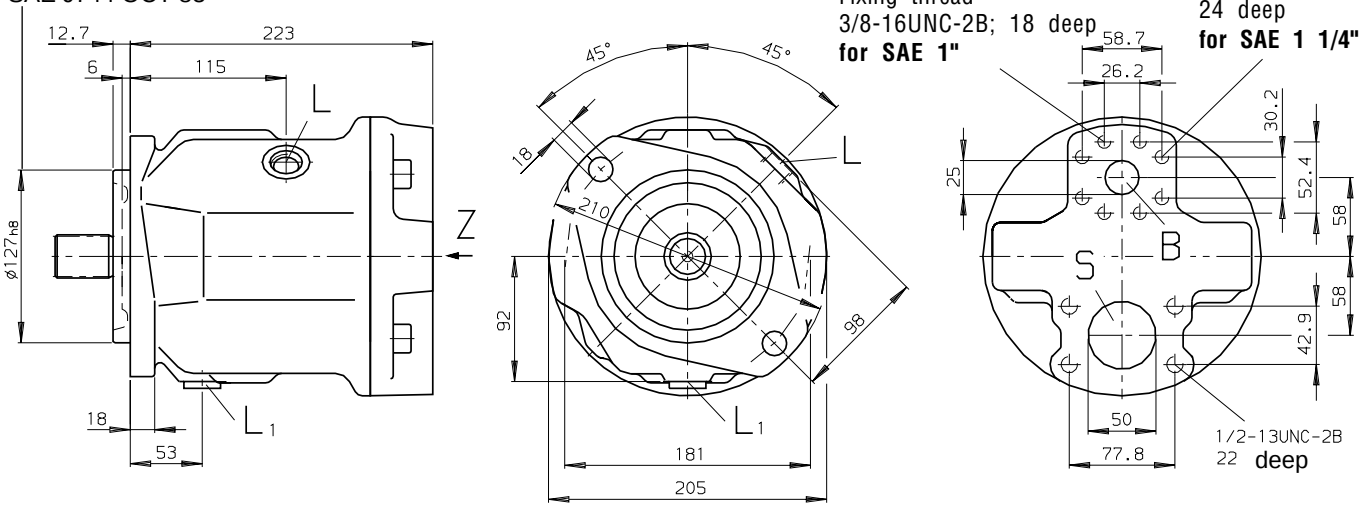


Ports
L Case drain port M22x1,5

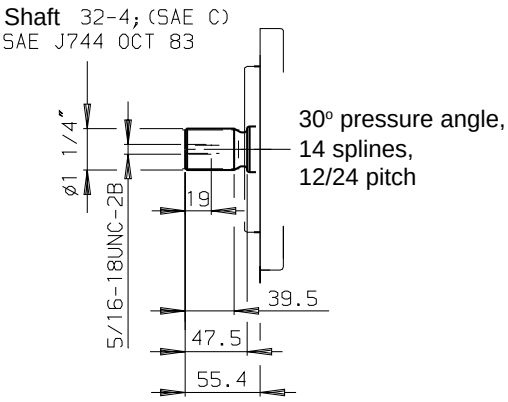
Unit dimensions, size 71

Service ports at rear, no through drive;
Model 61 N00

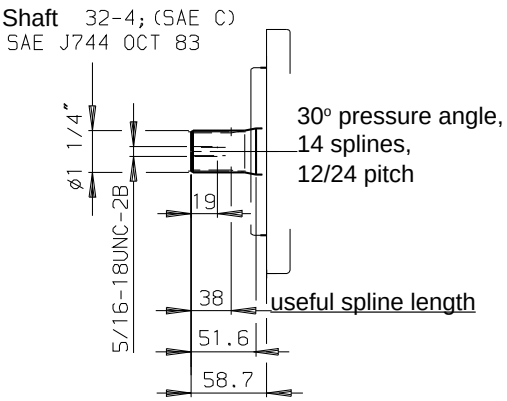
without considering adjustment
Flange 127-2
(SAE C; 2-hole)
SAE J744 OCT 83



Shaft S



Shaft R

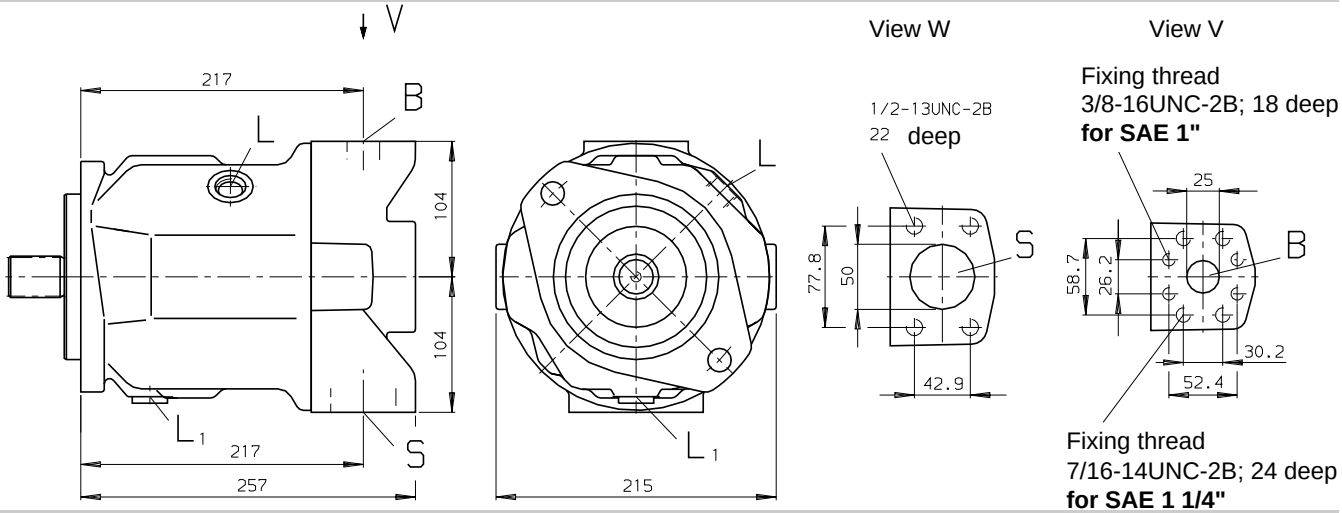


Please note the following when designing:
For pressure port B there are two SAE mounting positions, set at 90° to each other.
SAE 11/4" standard pressure series, 3000 psi, **for pressures of up to 250 bar** or
SAE 1" standard pressure series, 5000 psi, **for pressures above 250 bar**
For operating pressures greater than 250 bar or with new applications pressure flange SAE 1" must be used.

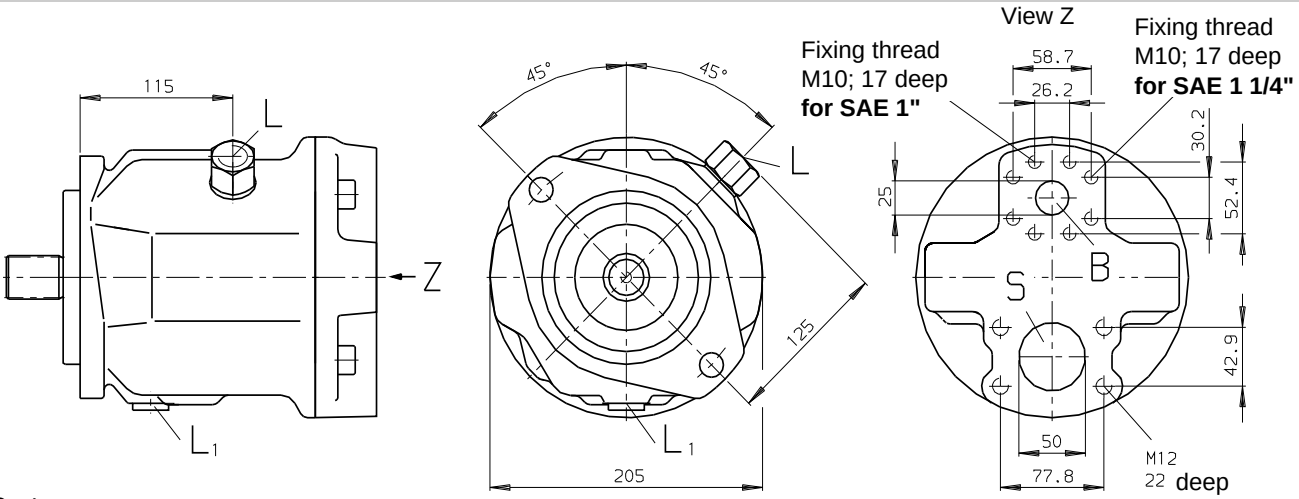
Ports

B	Pressure port	**SAE 1"**	(standard pressure series) fixing thread optionally to SAE 1" or SAE 1 1/4"
S	Suction port	SAE 2"	(standard pressure series)
L	Case drain port	7/8-14 UNF-2B	
L_1	Case drain port	7/8-14 UNF-2B	(sealed in factory)

Service ports on sides, no through drive;
Model 62 N00



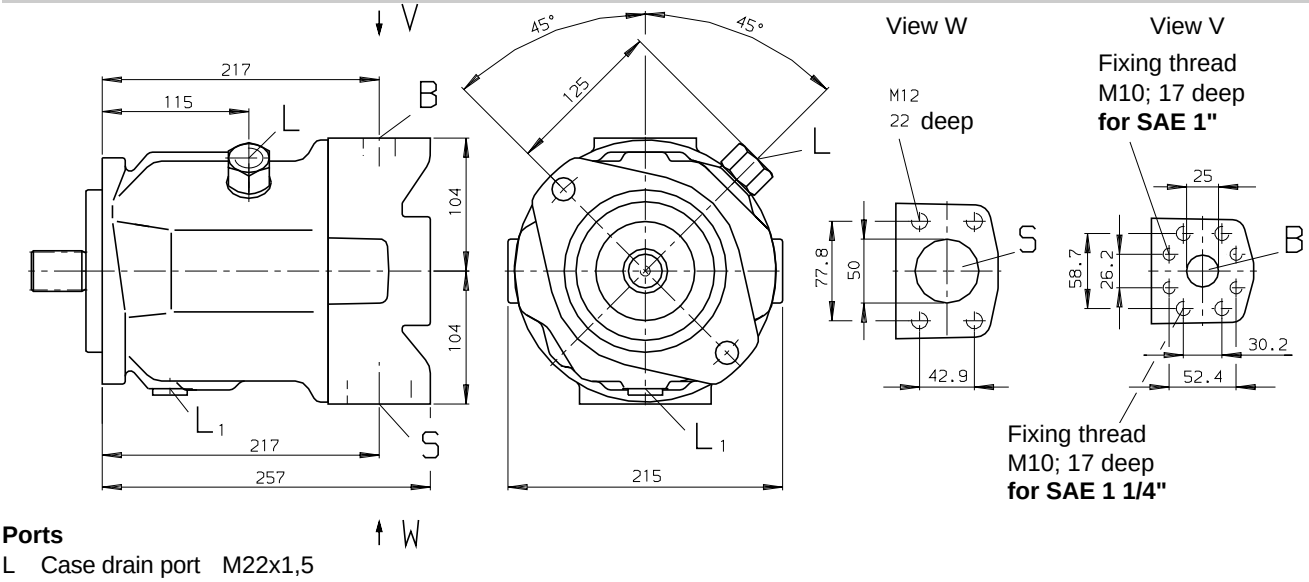
Service ports at rear, no through drive;
Model 11 N00



Ports

L	Case drain port	M22x1,5

Service ports on sides, no through drive;
Model 12 N00



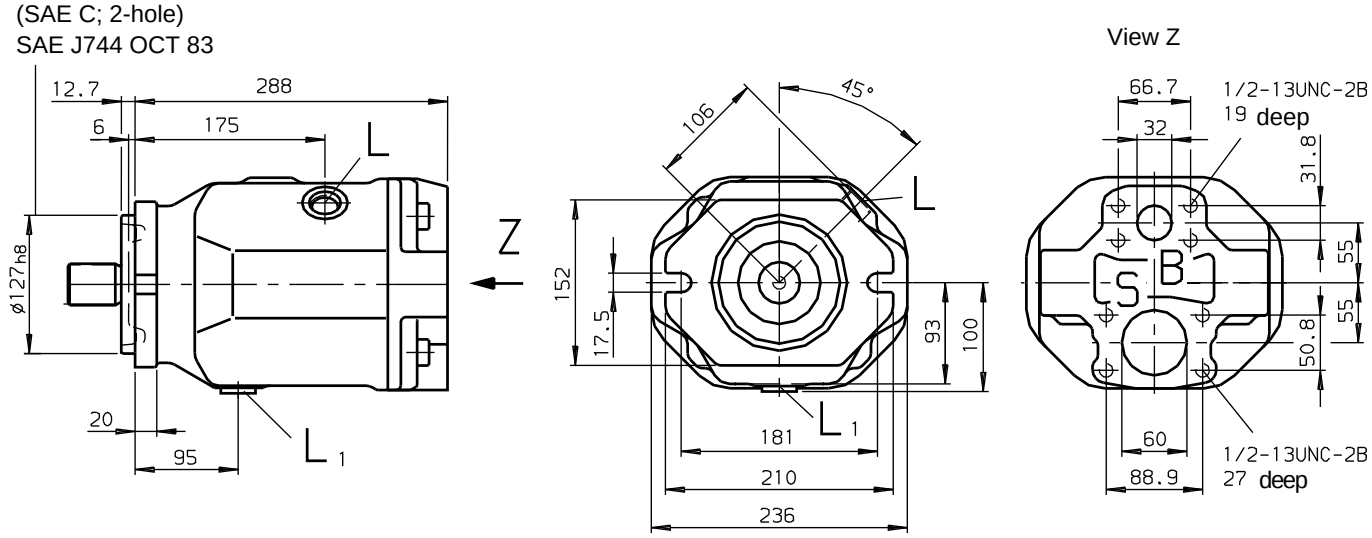
Ports

L	Case drain port	M22x1,5

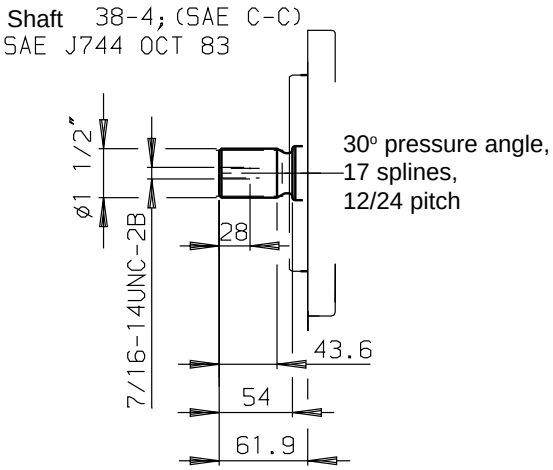
Unit dimensions, size 100

Service ports at rear, no through drive;
Model **61 N00**
without considering adjustment

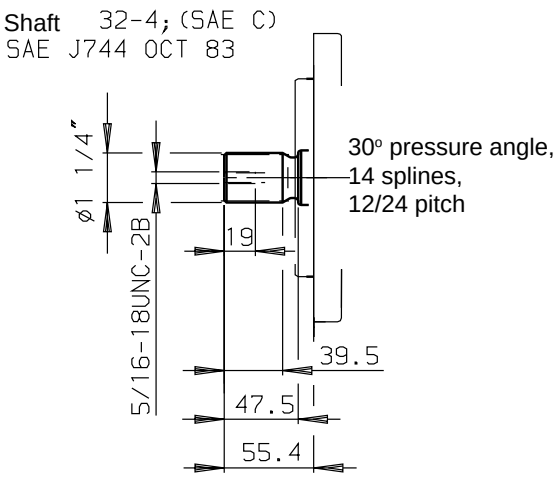
Flange 127-2
(SAE C; 2-hole)
SAE J744 OCT 83



Shaft S



Shaft U

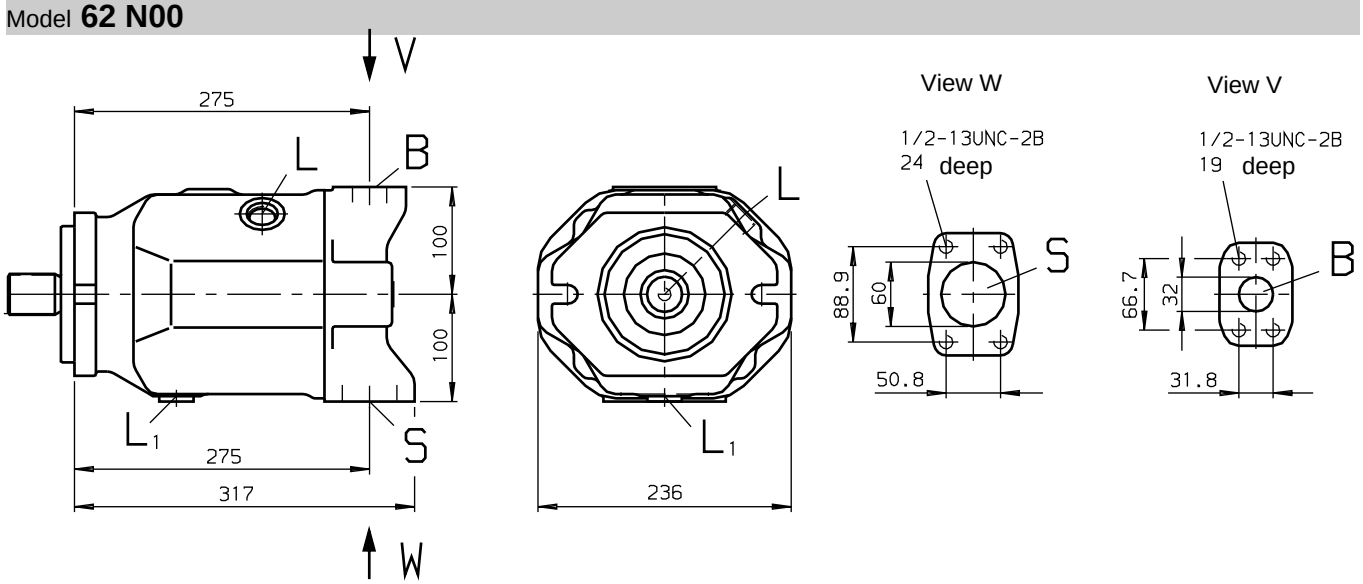


Ports

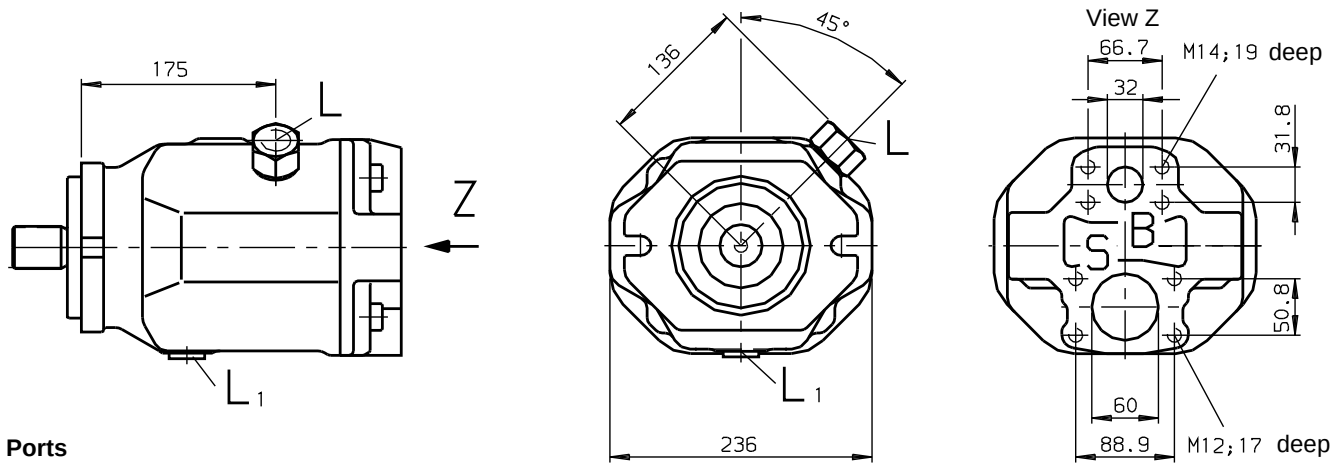
B	Pressure port	SAE 1 1/4"	(high pressure series)
S	Suction port	SAE 2 1/2"	(standard pressure series)
L	Case drain port	1 1/16-12 UN-2B	
L_1	Case drain port	1 1/16-12 UN-2B	(sealed in factory)

Unit dimensions, size 100

Service ports on sides, no through drive;
Model **62 N00**



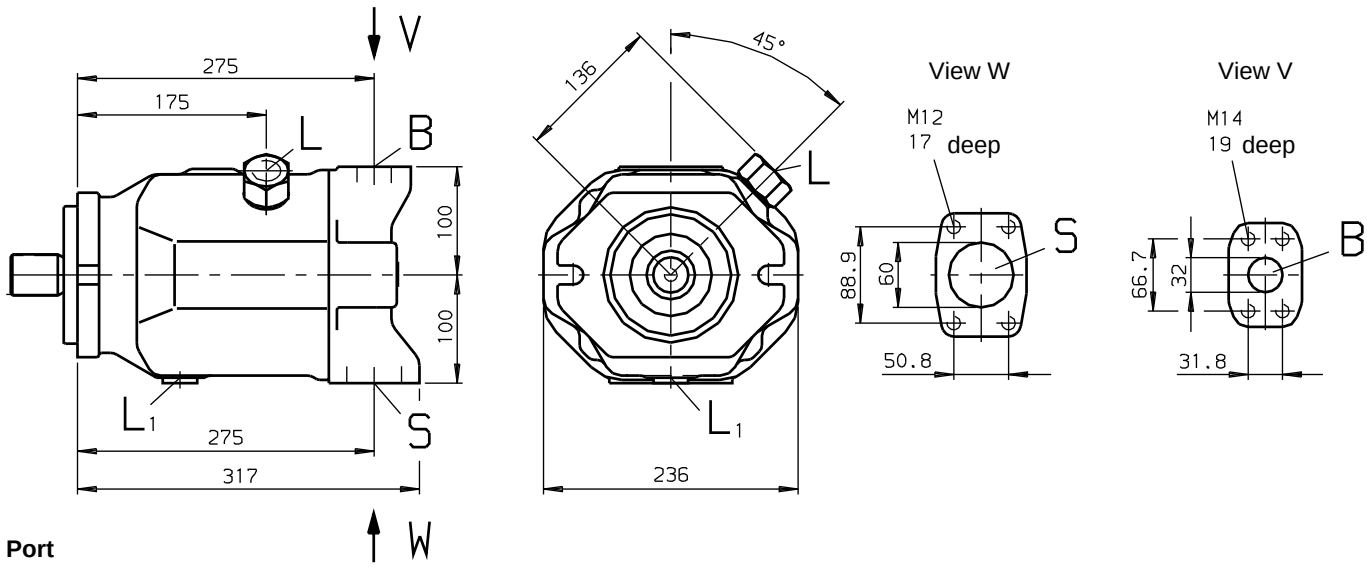
Service ports at rear, no through drive;
Model **11 N00**



Ports

L	Case drain oil	M27x2

Service ports on sides, no through drive;
Model **12 N00**



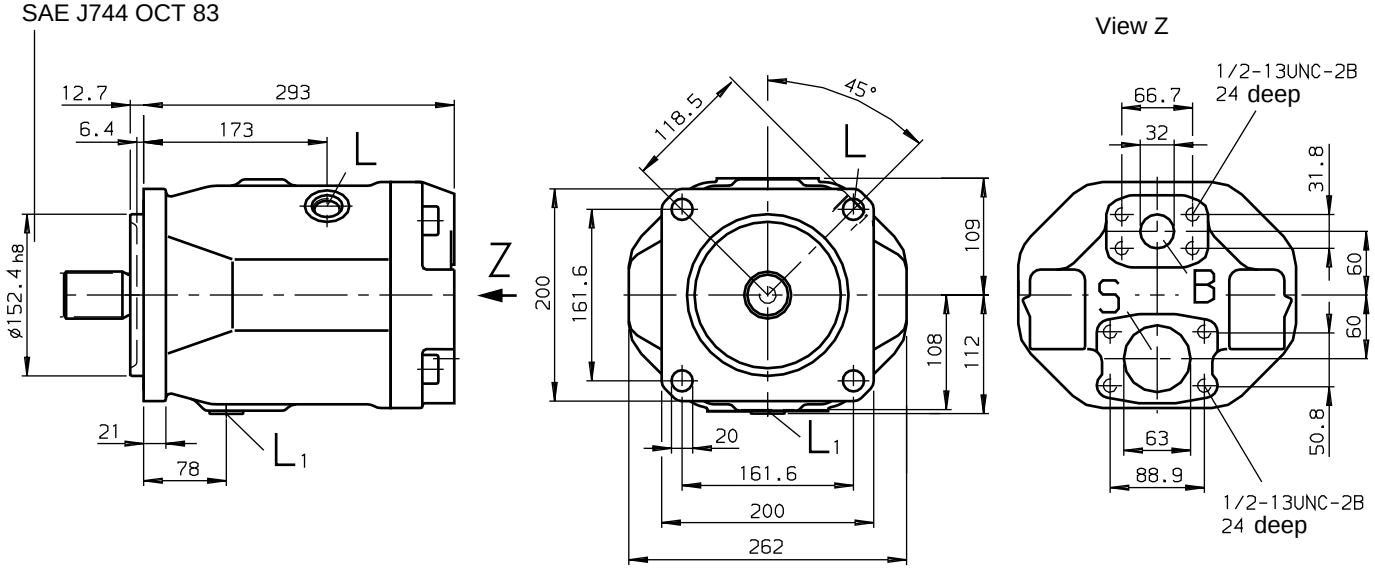
Port

L	Case drain port	M27x2

Unit dimensions, size 140

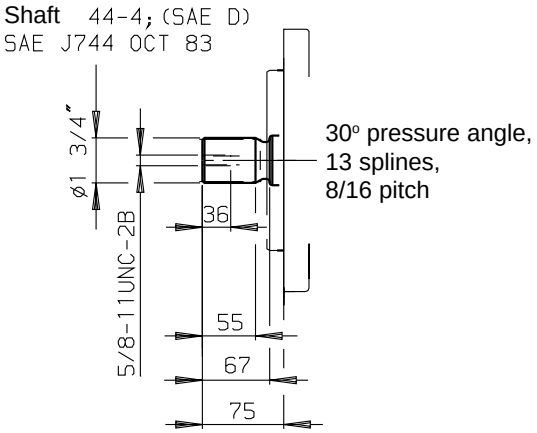
Service ports at rear, no through drive;
Model **61 N00**
without considering adjustment

Flange 152-4
(SAE D; 4-hole)
SAE J744 OCT 83



Shaft S

Shaft 44-4; (SAE D)
SAE J744 OCT 83



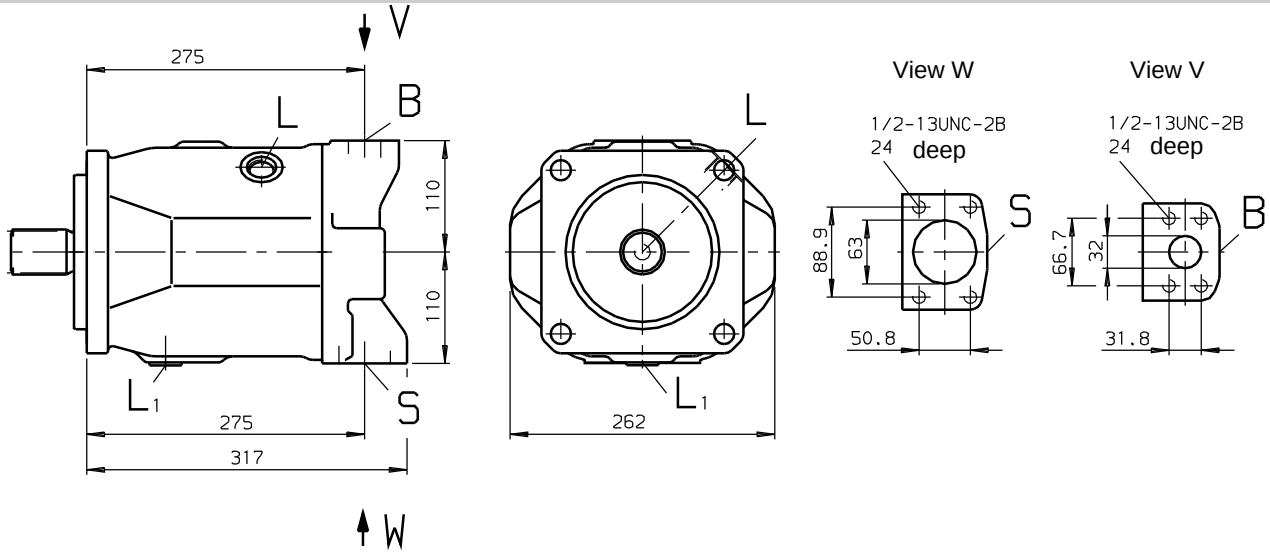
30° pressure angle,
13 splines,
8/16 pitch

Ports

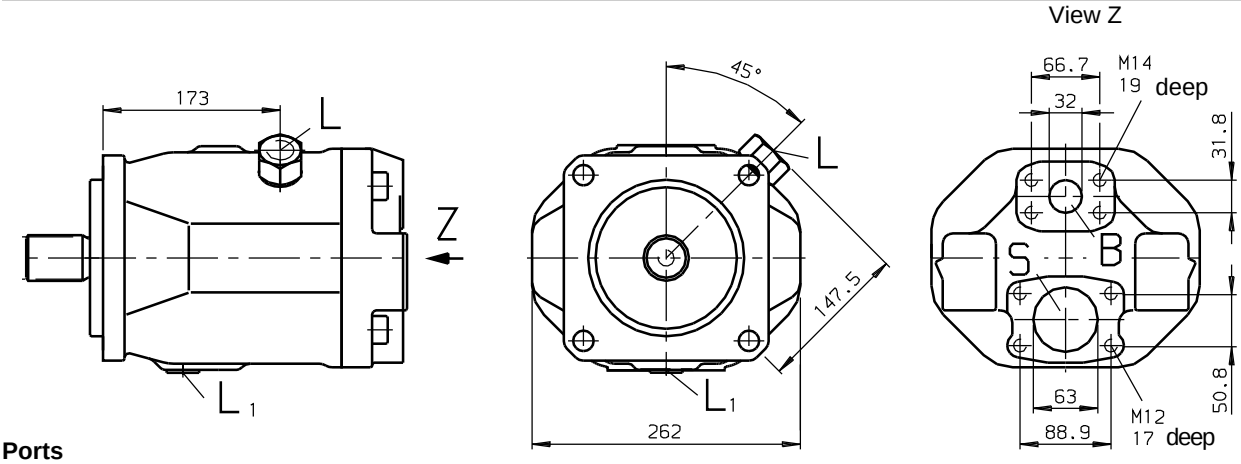
B (A)	Pressure port	SAE 1 1/4"	(high pressure series)
S	Suction port	SAE 2 1/2"	(standard pressure series)
L	Case drain port	1 1/16-12 UN-2B	
L_1	Case drain port	1 1/16-12 UN-2B	(sealed in factory)

Unit dimensions, size 140

Service ports on sides, no through drive;
Model **62 N00**



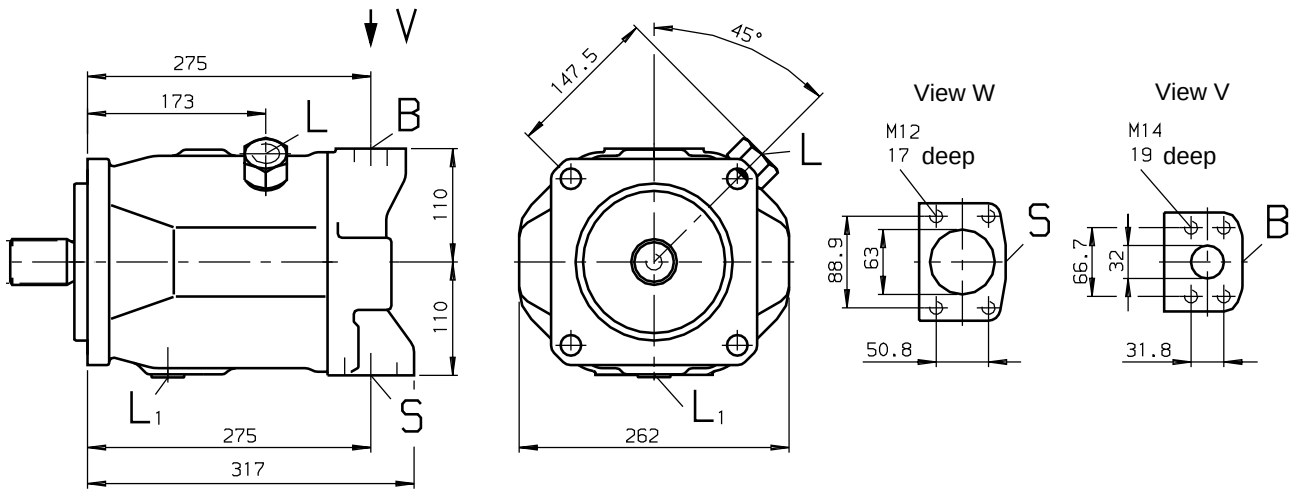
Service ports at rear, no through drive;
Model **11 N00**



Ports

L	Case drain port	M27x2

Service ports on sides, no through drive;
Model **12 N00**



Ports

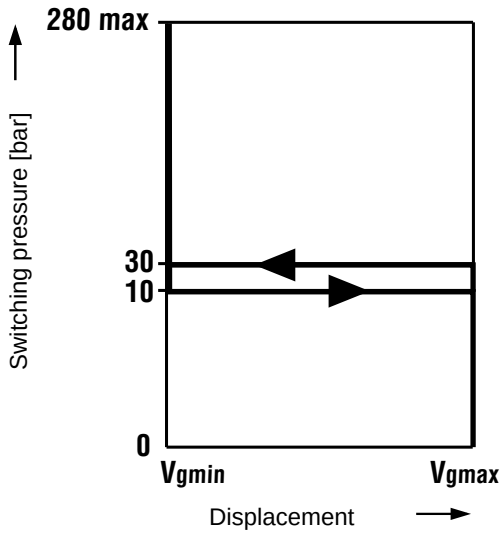
L	Case drain port	M27x2	W

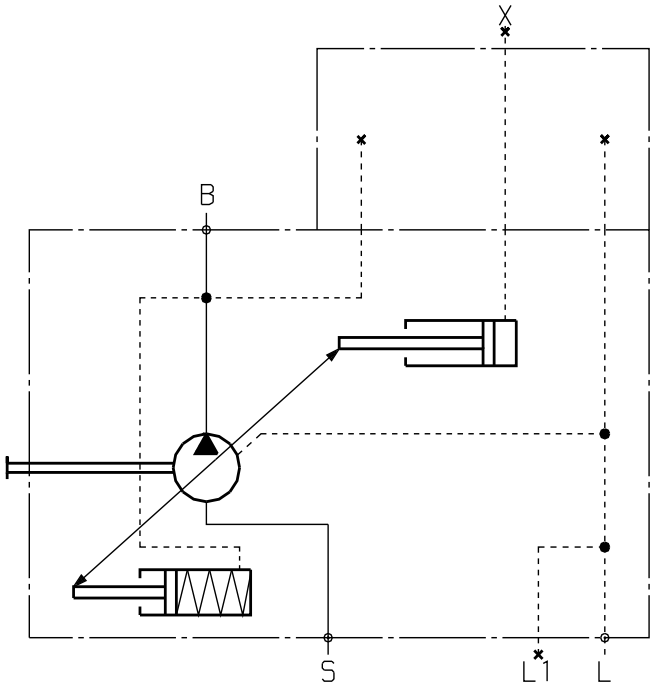
DG 2-position adjustment, direct control

The pump can be set to a minimum swivel angle by connecting an external switching pressure to port X.
This will supply the piston direct with oil, a minimum setting pressure of $p_{St} \geq 30$ bar being required.

The pump can only be switched between V_{gmax} or V_{gmin}.

Static characteristic





Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)
X	Pilot pressure port (sealed)

Switching pressure in X = 0 bar = V_{gmax}
Switching pressure in X ≥ 30 bar = V_{gmin}

Control data

Min. switching pressure	30 bar
Max. perm. switching pressure	280 bar

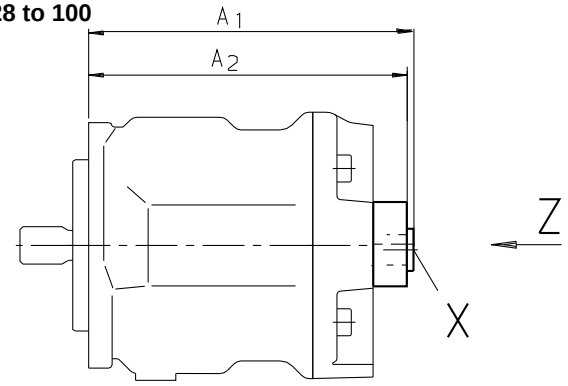
Unit dimensions

Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	**X** (sealed)	
28	193,5	190	0	55	158	100	103,5	3	R 1/4"	
45	212,5	209	3	63,5	173	110	113,5	3	R 1/4"	for all models
71	246,5	242,5	3	73,5	201	123,5	127,5	3	R 1/4"	
100	311,5	307,5	3	81	268	128,5	132,5	3	R 1/4"	
140	338	334	3	94	268	150,5	155	3	R 1/4"	

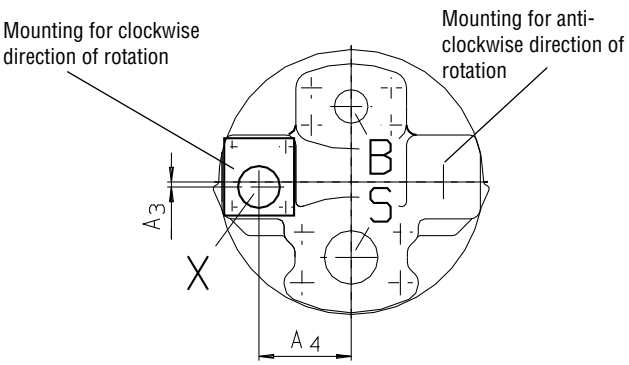
Unit dimensions DG

Service ports at rear; Models **61N00** and **11N00**

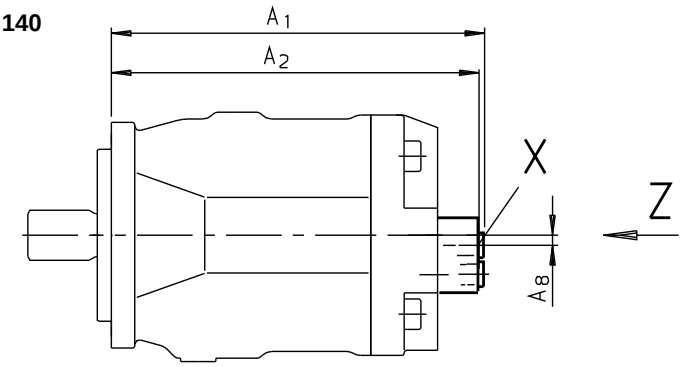
Sizes 28 to 100



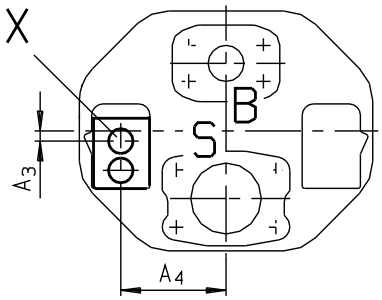
View Z



Size 140



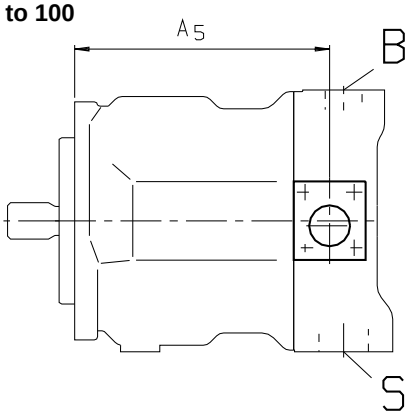
View Z

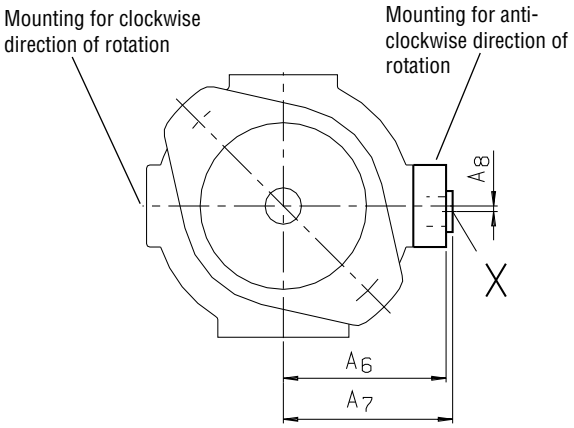


Unit dimensions DG

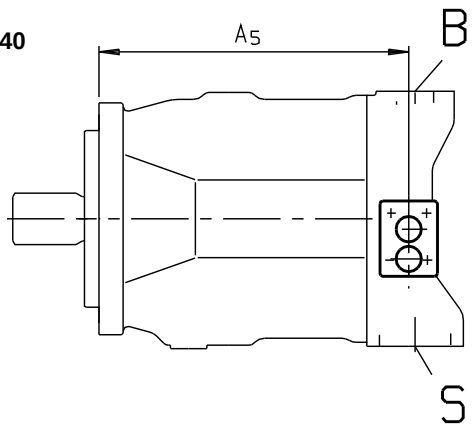
Service ports on sides; Models **62** and **12**

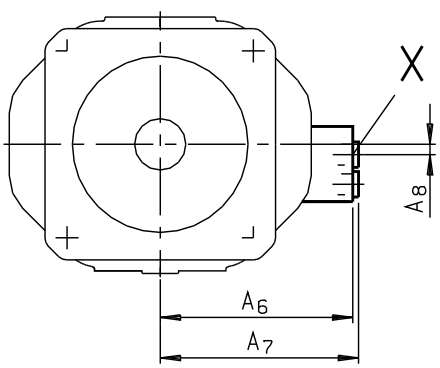
Sizes 28 to 100





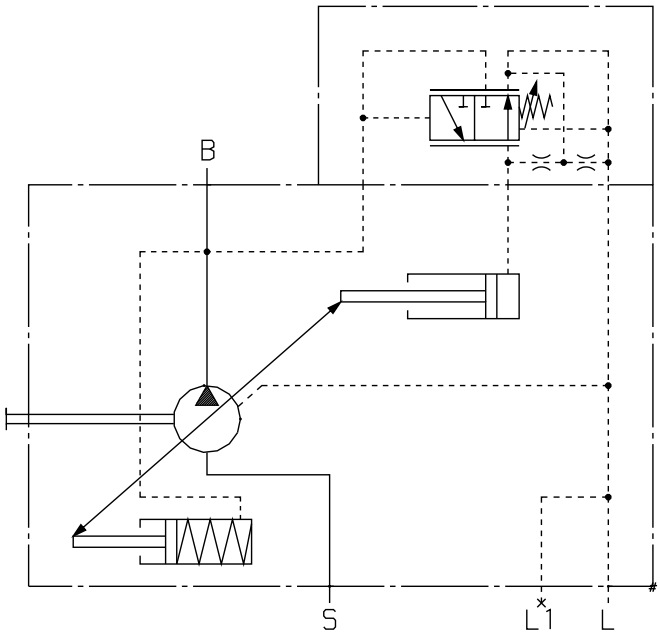
Size 140



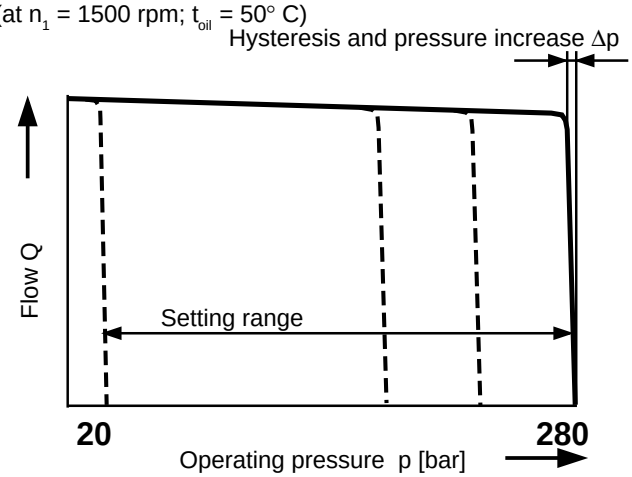


DR Pressure control

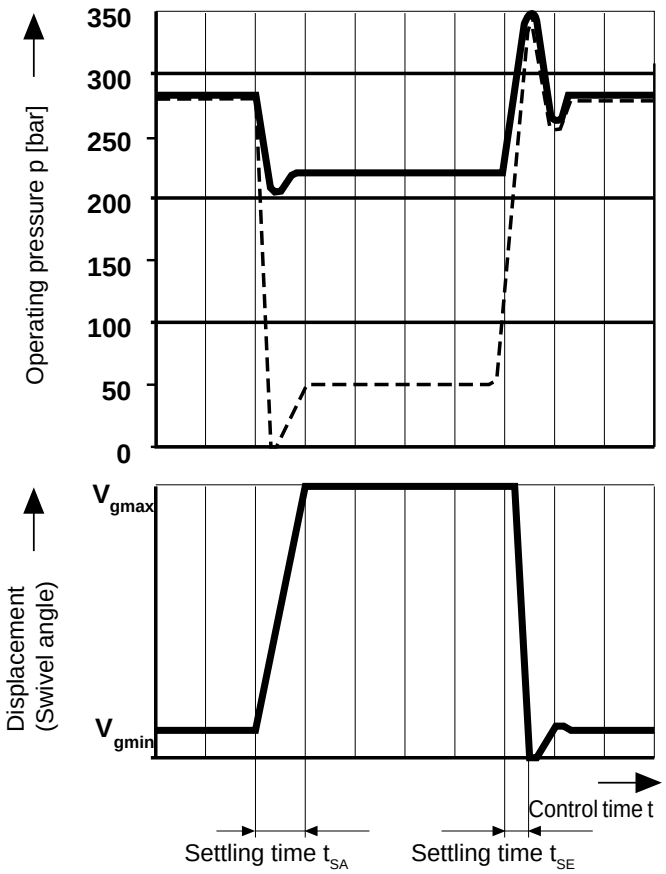
The pressure control serves to maintain a constant pressure in the hydraulic system, within the control range of the pump. The pump therefore supplies only the amount of hydraulic fluid required by the actuators. Pressure may be smoothly set at the pilot valve.



Static characteristic
(at n_1 = 1500 rpm; t_{oil} = 50° C)



Dynamic characteristics
The curves show average measured values under test conditions, with the unit within the tank.
Conditions: n = 1500 rpm
t_{oil} = 50° C
Pressure cut-off at 350 bar
Stepped loading by suddenly opening or closing the pressure line using a pressure relief valve set at 1m downstream from the axial piston unit.



Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)

Control data
Hysteresis and repetitive accuracy Δp ..... max. 3 bar
Max. pressure increase

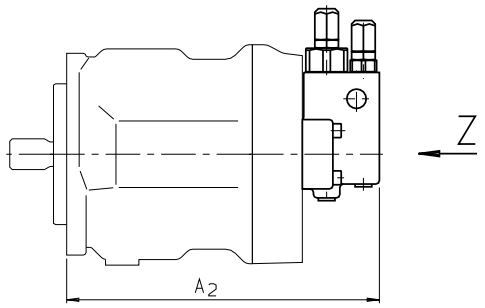
Size		28	45	71	100	140
Δp	bar	4	6	8	10	12

Pilot oil consumption ..... max. approx. 3 L/min
Flow loss at Q_{max} see pages 8 and 9.

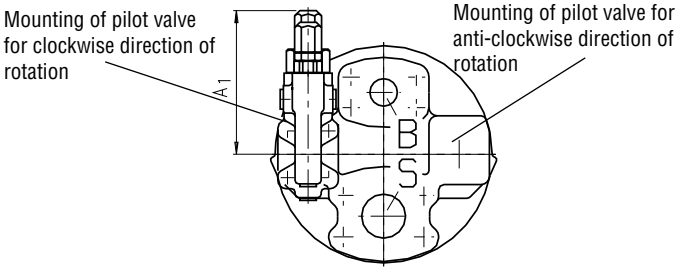
Size	t_{SA} (ms) against 50 bar	t_{SA} (ms) against 220 bar	t_{SE} (ms) zero stroke 280 bar
28	60	30	20
45	80	40	20
71	100	50	25
100	125	90	30
140	130	110	30

Unit dimensions DR
Service ports at rear; Models **61N00** and **11N00**

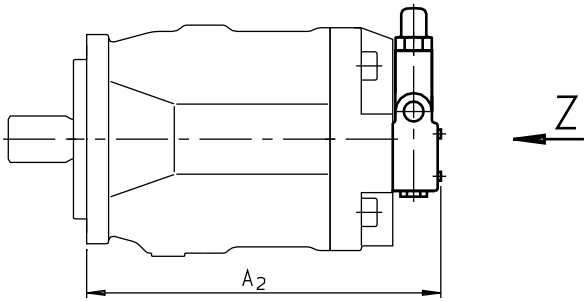
Sizes 28 to 100



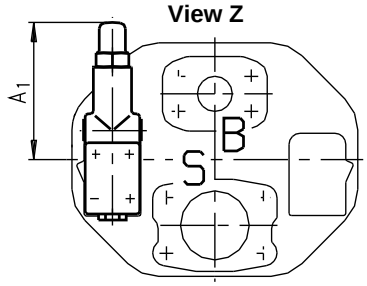
View Z



Size 140

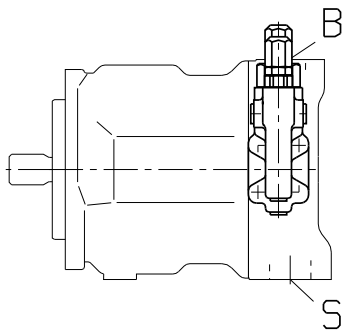


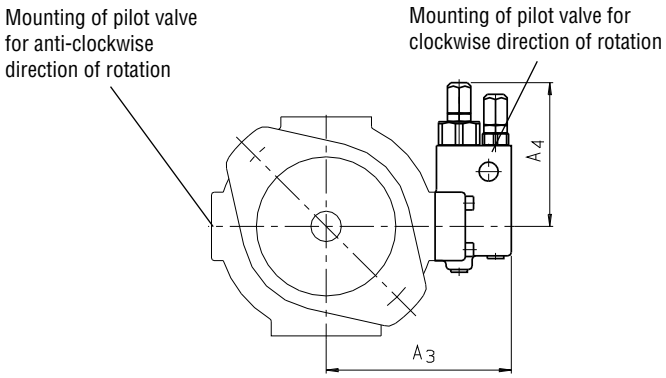
View Z



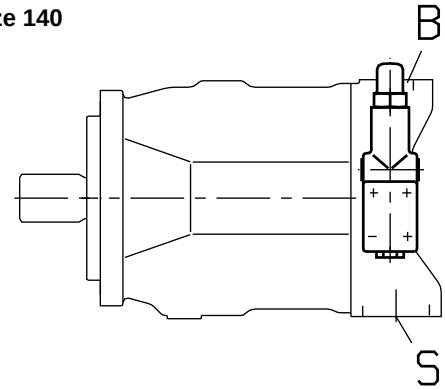
Unit dimensions DR
Service ports on sides; Models **62** and **12**

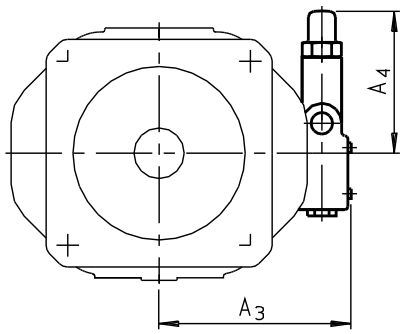
Sizes 28 to 100





Size 140





Size	A_1	A_2	A_3	A_4
28	109	225	136	106
45	106	244	146	106
71	106	278	160	106
100	106	344	165	106
140	127	339	169	127

For sizes 28 to 100 the DFR valve is used, whereby the flow control is sealed in the factory and not tested.

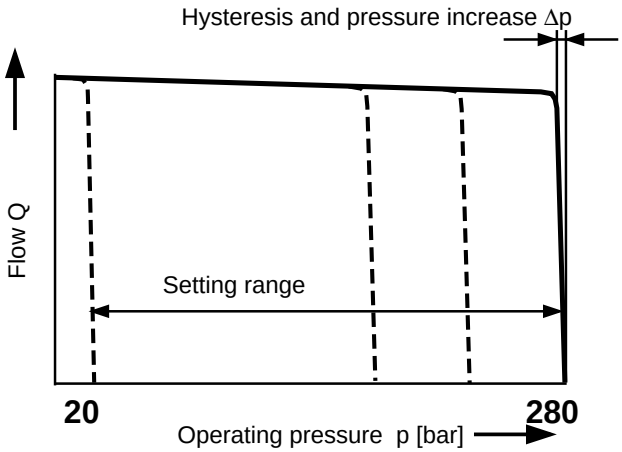
DRG Pressure control, remote control

Function and design as for DR.

A pressure relief valve may be externally piped to port X for remote control purposes. It is not, however, included with the DRG control.
The differential pressure at the pilot valve is set as standard to 20 bar and this results in a pilot flow of 1,5 L/min. If another setting is required (in the range 10 – 22 bar), please state this in clear text.

We recommend that one of the following is used as the separate pressure relief valve:
DBDH 6 (hydraulic) to RE 25402,
DBEC-3X (electrical) to RE 29142 or
DBETR-SO 381 with 0,8mm dia. nozzle in P (electrical) to RE 29166.
The length of piping must not exceed 2m.

Static characteristic
(at n_1 = 1500 rpm; t_{oil} = 50° C)



Control data
Hysteresis and repetitive accuracy Δp ..... max. 3 bar
Max. pressure increase

Size		28	45	71	100	140
Δp	bar	4	6	8	10	12

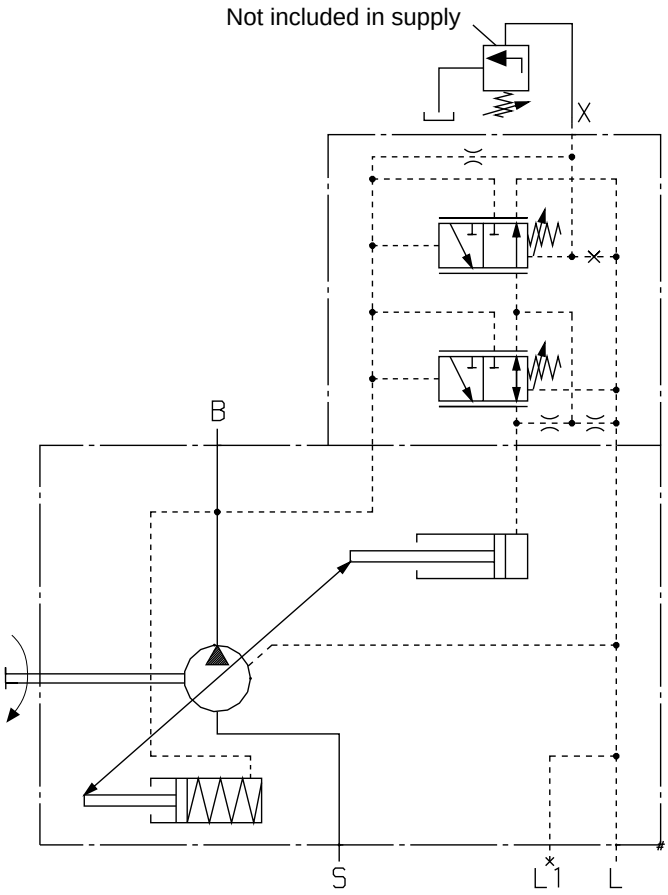
Pilot oil consumption ..... approx. 4,5 L/min
Flow loss at Q_{max} see pages 8 and 9.

Ports

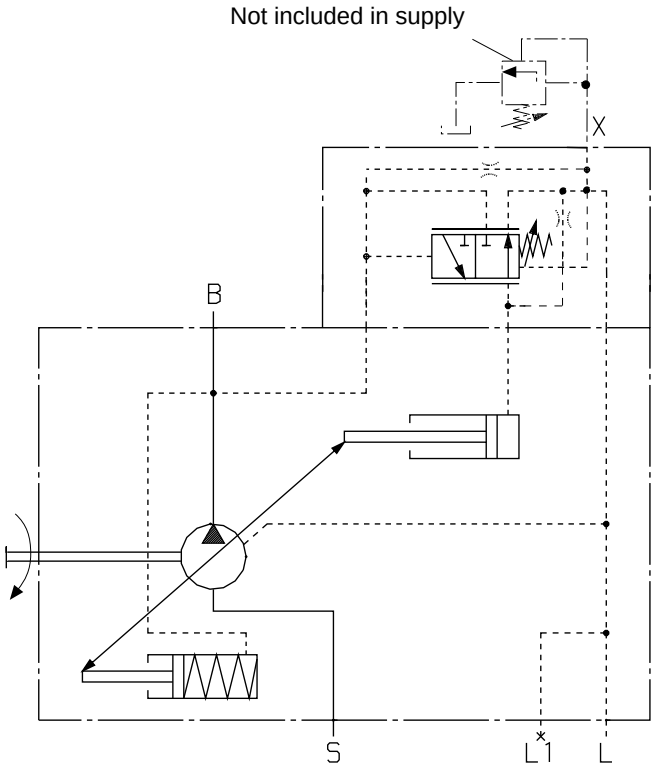
B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)

X	**Pilot pressure port**		
	Model	Sizes 28-100	Size 140
	61 and 62	without adaptor	with adaptor
	11 and 12	with adaptor	without adaptor

Sizes 28...100

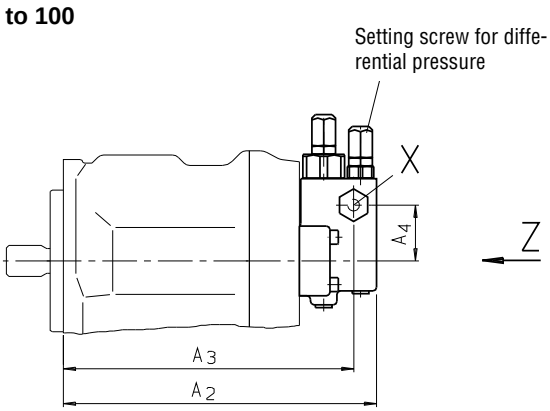


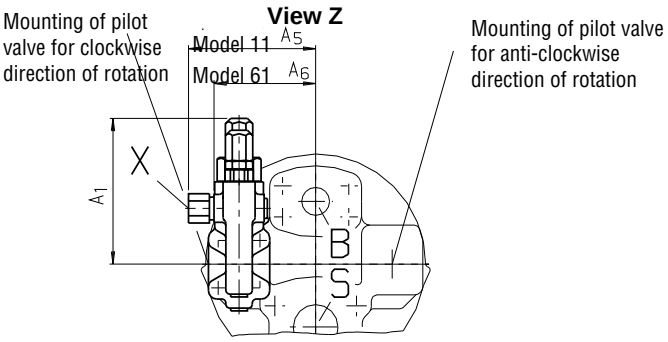
Size 140



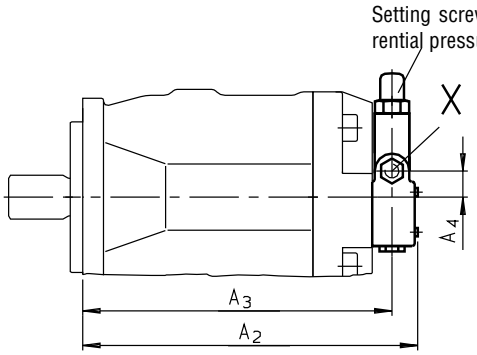
Unit dimensions DRG
Service ports at rear; Models **61N00 and 11 N00**

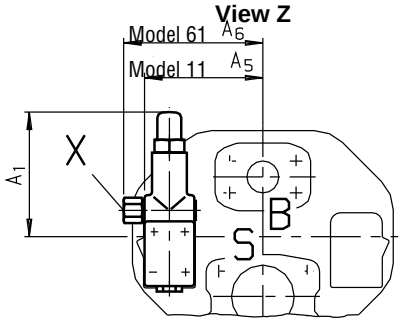
Sizes 28 to 100





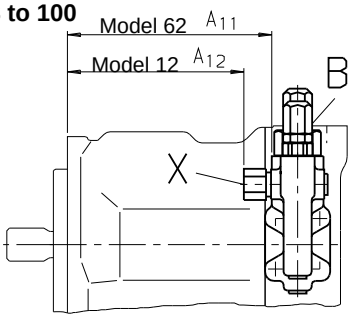
Size 140

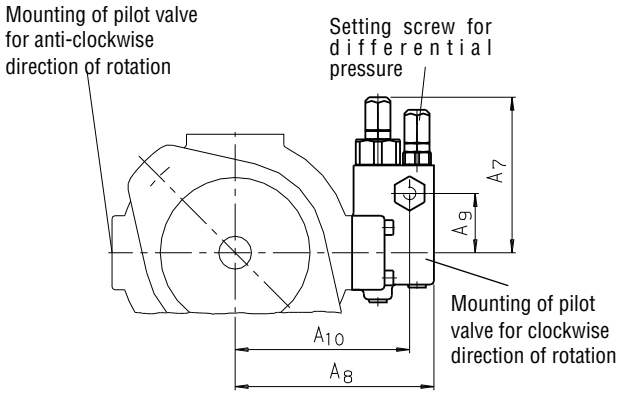




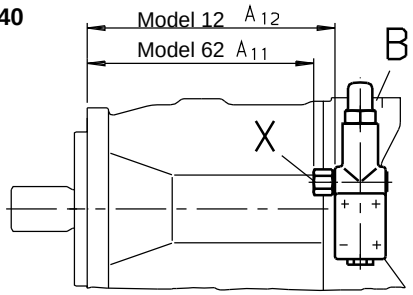
Unit dimensions DRG
Service ports on sides; Models **62 and 12**

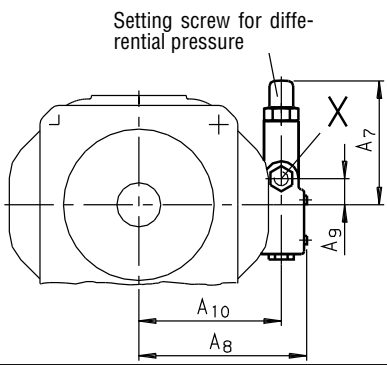
Sizes 28 to 100





Size 140





Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	**Port X** Models 61, 62	**Port X** Models 11,12
28	109	225	209	43	94	73	106	136	40	119	140	119	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
45	106	244	228	40	102,5	81,5	106	146	40	129	155	134	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
71	106	278	262	40	112,5	91,5	106	160	40	143	183	162	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
100	106	344	327	40	120	99	106	165	40	148	250	229	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
140	127	339	313	27	118	140	127	169	27	143	222	244	9/16-18 UNF-2B; 13 deep	M14x1,5; 12 deep

DRT1/2 Offsettable pilot pressure control for load pressure control

DRT1/2 is a pressure control offsettable by means of pilot pressure.

Without pilot pressure the pump is on stand-by (approx. 25 bar).

With pilot pressure the pump pressure is increased, according to the transmission factor of either the DRT1 or DRT2 (see Static characteristic).

This control is designed especially for load pressure control.

It is used in mobile machinery applications.

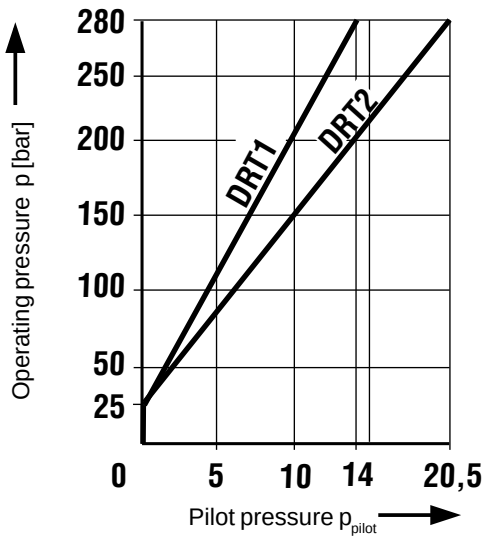
In this system the main spool is hydraulically actuated and the pump pressure selected by means of the pilot transmitter.

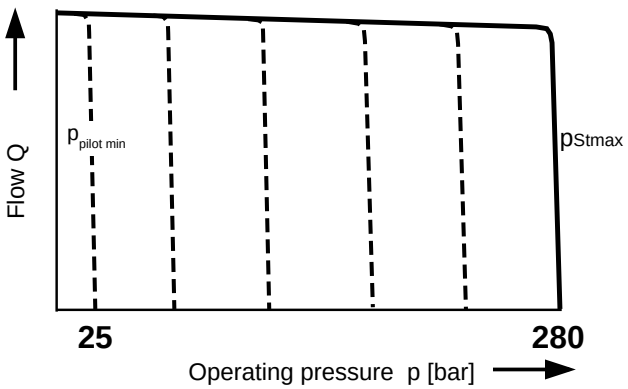
We recommend that a separate 4/3 way directional valve e.g. M1-16 to RE 64263 be used.

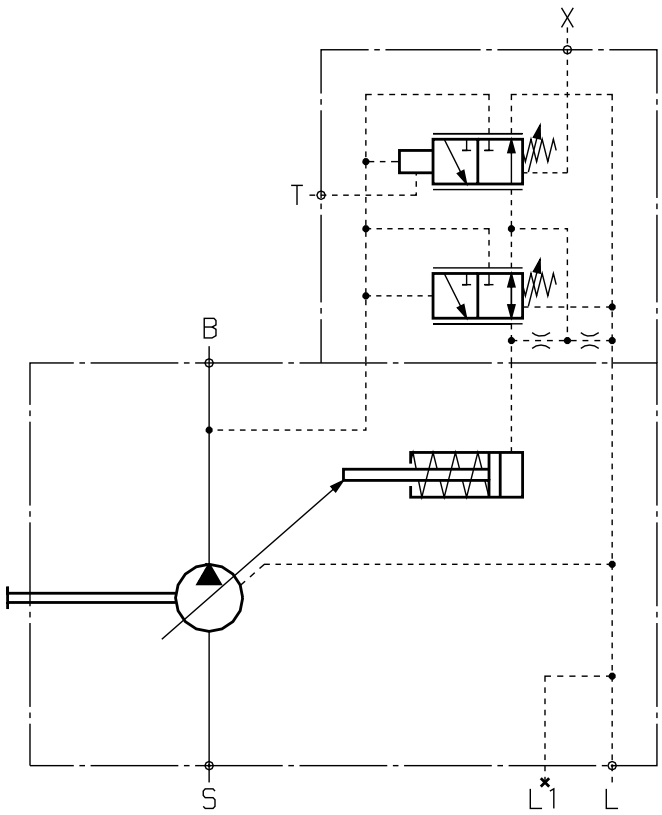
Transmission factors

DRT1 i = 18,2
DRT2 i = 12,4

Static characteristics







Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)
T	Case drain port (pipe separately to tank)
X	**Pilot pressure port**

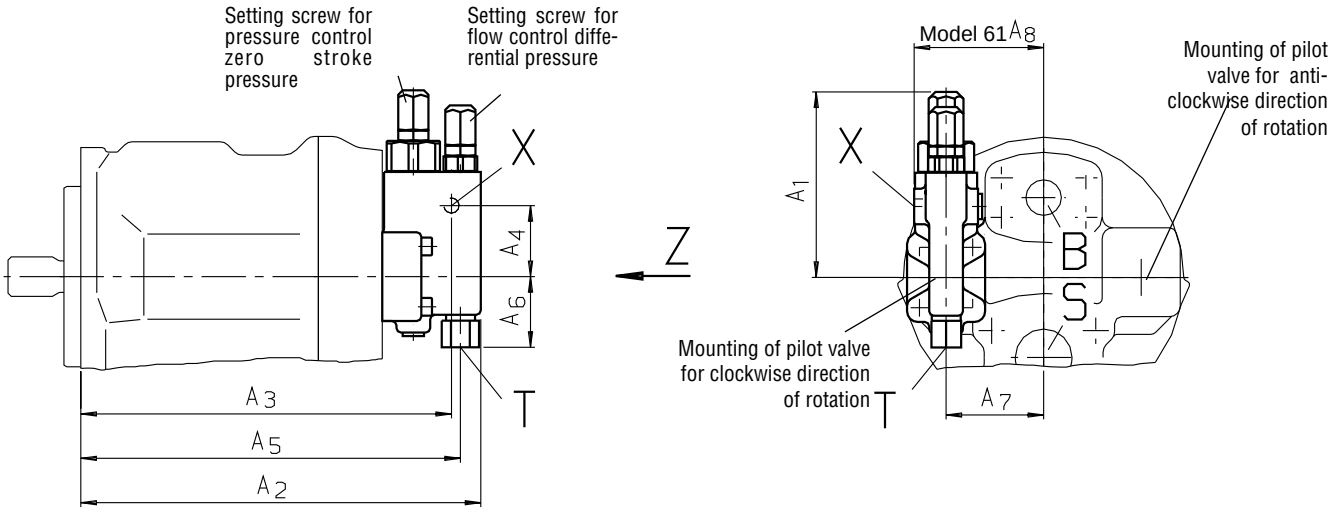
Control data

Pilot oil consumption ..... approx. 4,5 L/min

Flow loss at Q_{max} see pages 8 and 9.

Unit dimensions DRT1/2
Service ports at rear; Model **61N00**

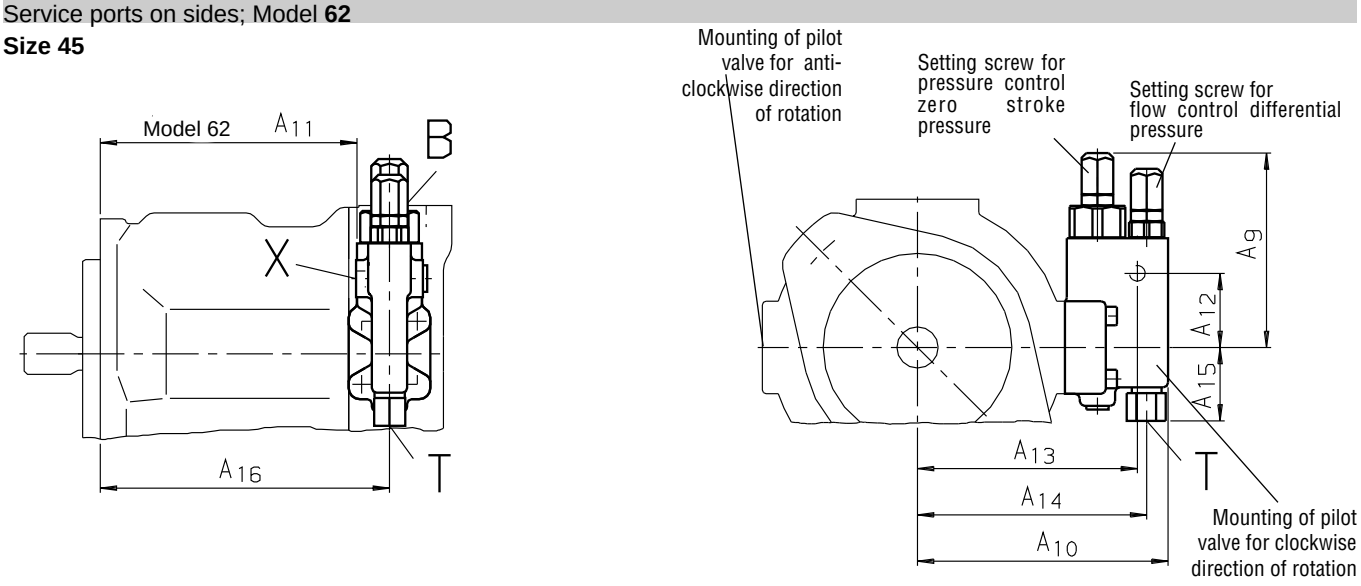
Size 45



Metric model 11 N00 on request

Unit dimensions DRT1/2
Service ports on sides; Model **62**

Size 45



Metric model 12 on request

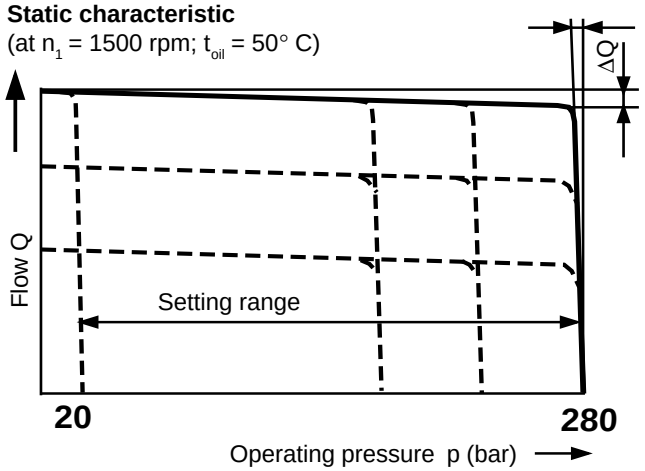
Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}	**Port X, T** Models 61, 62
45	109	244	228	40	233	36,5	64	81,5	106	146	155	40	129	155	134	7/16-20 UNF-2B; 10 deep

DFR/DFR1 Pressure/flow control

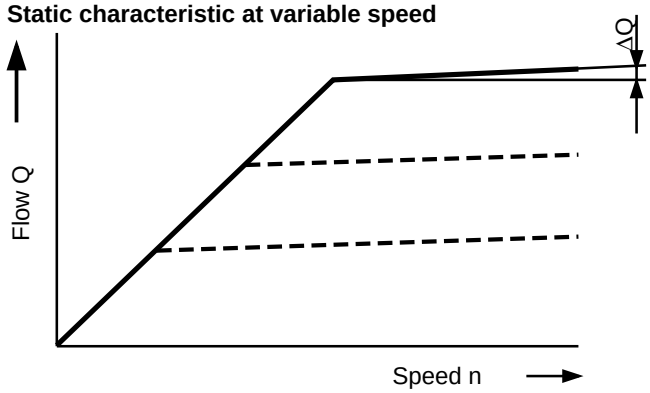
In addition to the pressure control function, the pump flow may be varied by means of a differential pressure at the actuator (e.g. an orifice).
In model DFR1 the X orifice is plugged.

For function and fittings see pages 22/ 23.

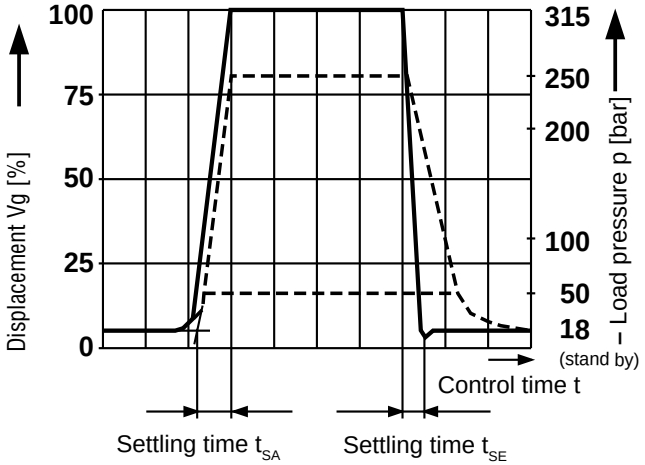
Static characteristic
(at n_1 = 1500 rpm; t_{oil} = 50° C)



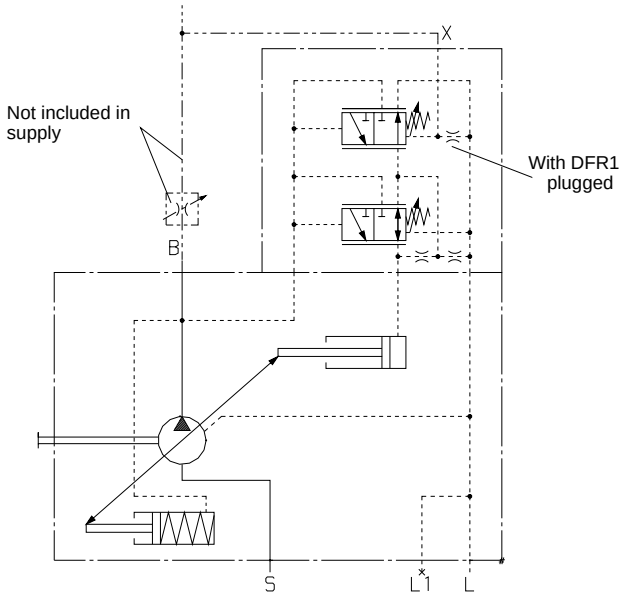
Static characteristic at variable speed



Dynamic characteristic of flow control
The curves shown are measured average values under test conditions, with the unit within the tank.



Size	t_{SA} (ms) stand by–250 bar	t_{SE} (ms) 250 bar–stand by	t_{SE} 50 bar–stand by
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
140	130	60	130



Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)

X	**Pilot pressure port**		
	Model	Sizes 28-100	Size 140
	61 and 62	without adaptor	with adaptor
	11 and 12	with adaptor	without adaptor

Control data
For pressure control technical data see page 22.
Max. flow deviation (hysteresis and increase)
measured at drive speed n = 1500 rpm

Size		28	45	71	100	140
ΔQ_{max}	L/min	1,0	1,8	2,8	4,0	6,0

Pilot oil consumption DFR ..... max. approx. 3 - 4,5 L/min
Pilot oil consumption DFR1 ..... max. approx. 3 L/min
Flow loss at Q_{max} see pages 8 and 9.

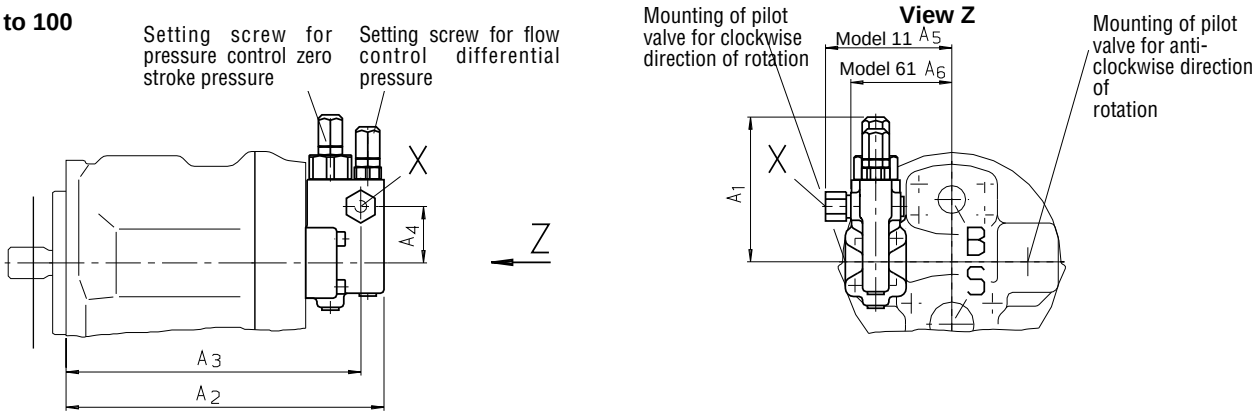
Flow control/differential pressure Δp:
Adjustable between 10 and 22 bar (higher values on request)
Standard setting: 14 bar. If a different setting is required, please state in clear text.
When port X is unloaded to tank, a zero stroke pressure of p = 18 ± 2 bar ("stand by") results.

Optional valves at port B
(not included in supply)
Mobile valve blocks SP 12 (RE 64145)
Mobile valve blocks SP 18 (RE 64148)
Mobile valve blocks MP 18 (RE 64594)
Mobile valve blocks MP 22 (RE 64598)
Proportional directional valves 4WRE (RE 29060)

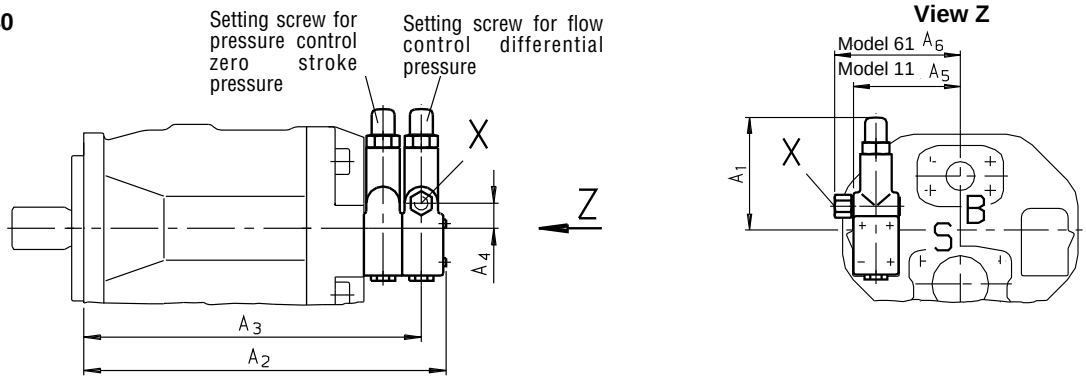
Unit dimensions DFR

Service ports at rear; Models **61N00 and 11 N00**

Sizes 28 to 100



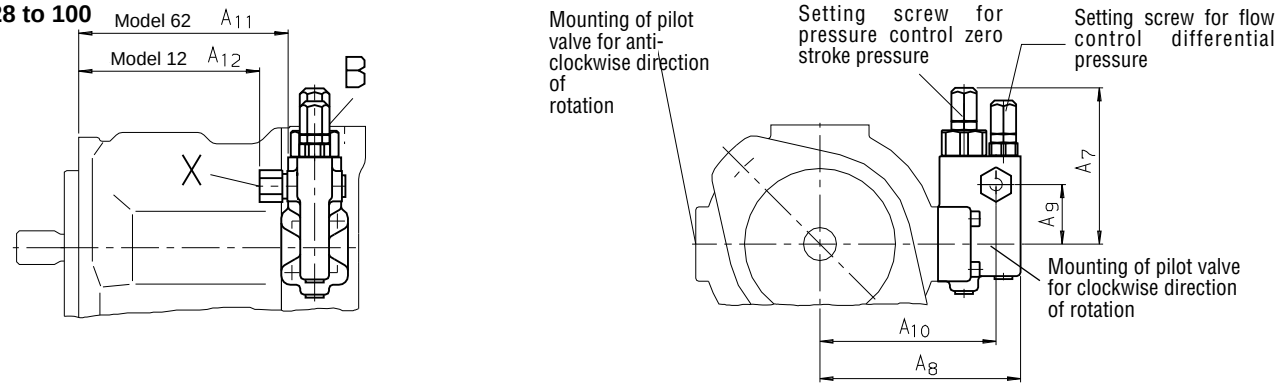
Size 140



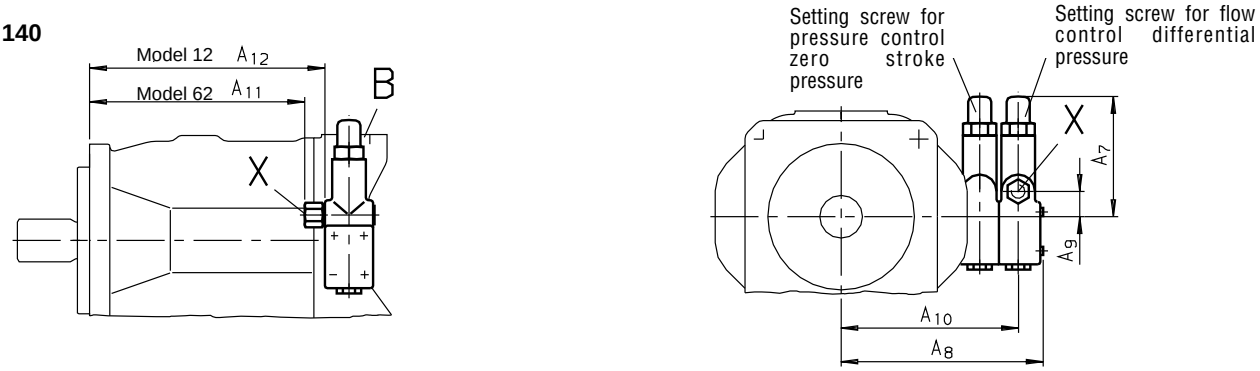
Unit dimensions DFR

Service ports on sides; Models **62 and 12**

Sizes 28 to 100



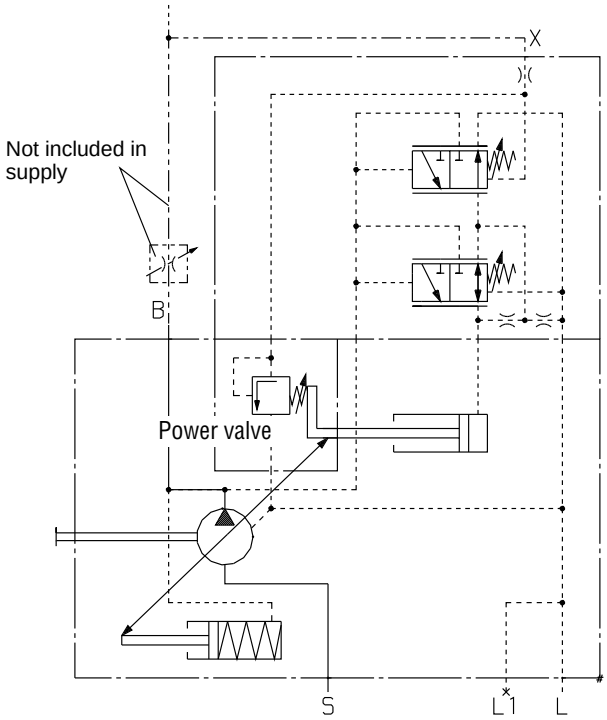
Size 140



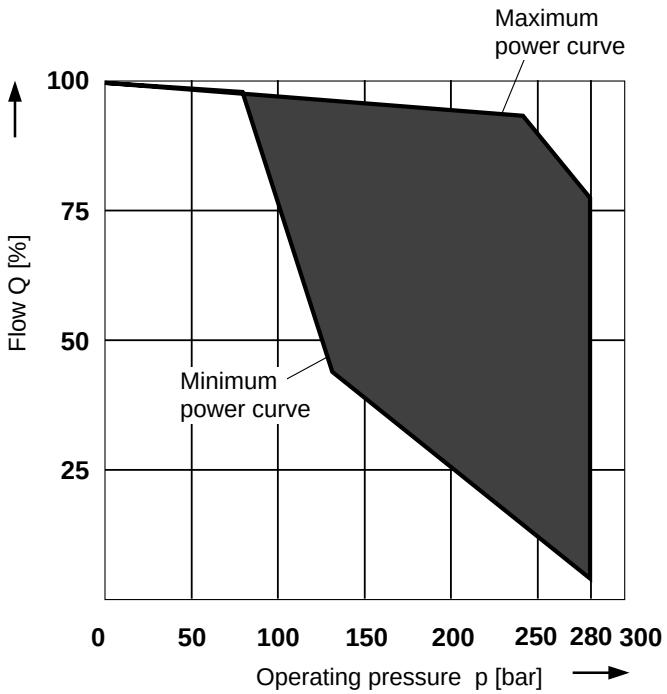
Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	**Port X** Models 61, 62	**Port X** Models 11,12
28	109	225	209	43	94	73	106	136	40	119	140	119	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
45	106	244	228	40	102,5	81,5	106	146	40	129	155	134	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
71	106	278	262	40	112,5	91,5	106	160	40	143	183	162	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
100	106	344	327	40	120	99	106	165	40	148	250	229	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
140	127	379	353	27	118	140	127	209	27	183	222	244	9/16-18 UNF-2B; 13 deep	M14x1,5; 12 deep

DFLR Pressure/flow/power control

In order to achieve a constant drive torque with a varying operating pressure, the swivel angle and with it the output flow from the axial piston unit is varied so that the product of flow and pressure remain constant.
Flow control is possible below the limit of the power curve.



Static characteristic



The power characteristic is factory-set, so please enter details in clear text, e.g. 20 kW at 1500 rpm.

Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)
X	Pilot pressure port

Control data

For pressure control technical data see page 22.

For flow control technical data see page 28.

Start of control ..... from 80 bar

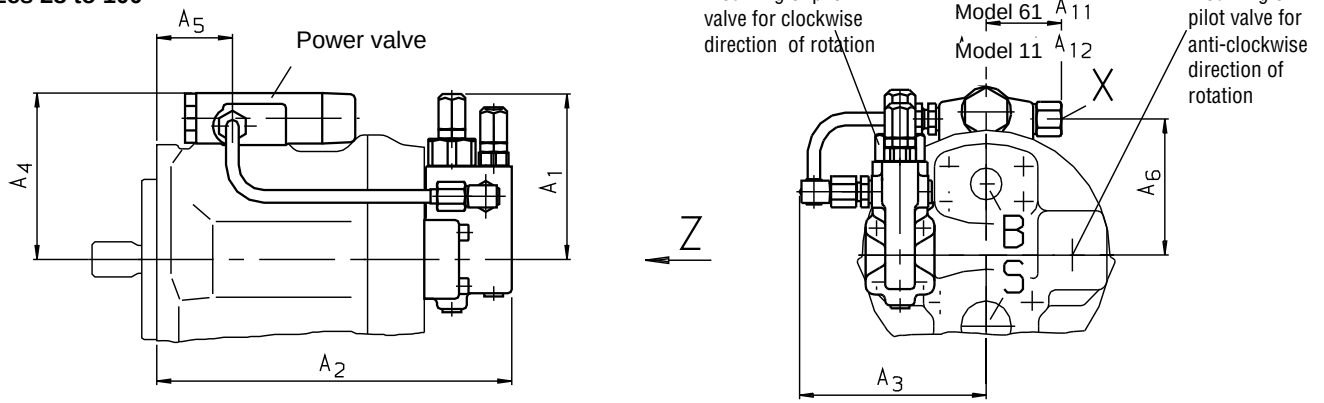
Pilot oil consumption ..... max. approx. 5,5 L/min

Flow loss at Q_{max} see pages 8 and 9.

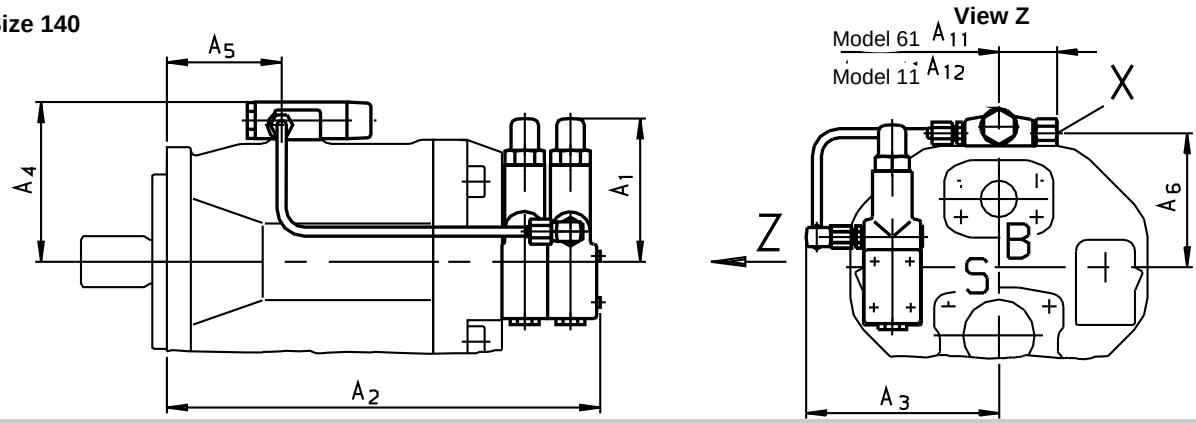
Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	A_{13}	A_{14}	**Port X** Models 61, 62	**Port X** Models 11,12
28	109	225	120	107	48	86	106	136	40	119	48	51	194	197	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
45	106	244	129	112	54	91,5	106	146	40	129	48	51	209	212	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
71	106	278	139	124	69	103,5	106	160	40	143	48	51	237	240	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
100	106	344	145	129	111	108,5	106	165	40	148	48	51	304	307	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
140	127	379	148	140	99	123,5	127	209	26	183	48	51	314	314	7/16-20 UNF-2B; 10 t.(Mod.**61**)	M14x1,5;
140															9/16-18 UNF-2B; 13 t.(Mod.**62**)	

Unit dimensions DFLR
Service ports at rear; Models **61N00 and 11 N00**

Sizes 28 to 100

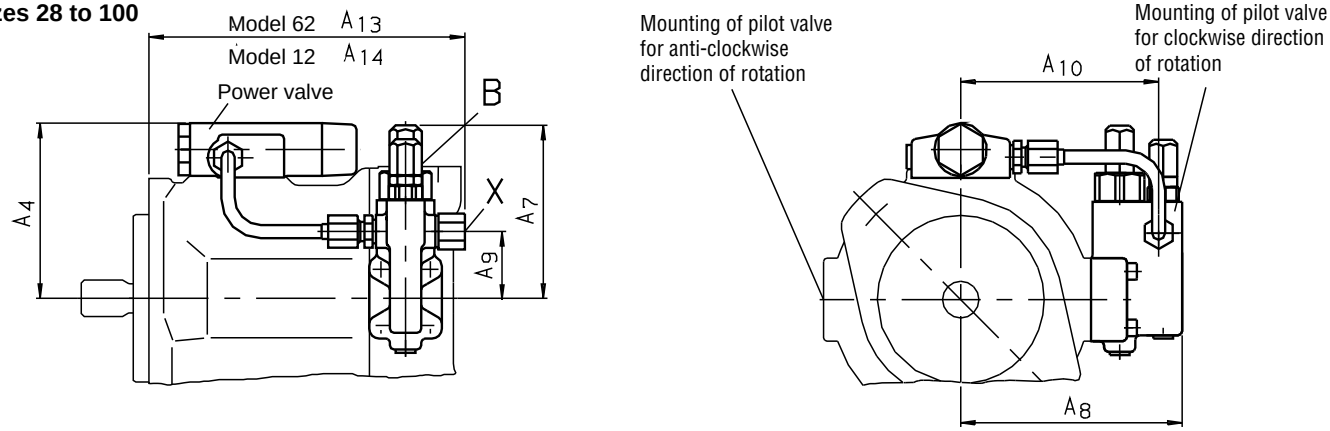


Size 140

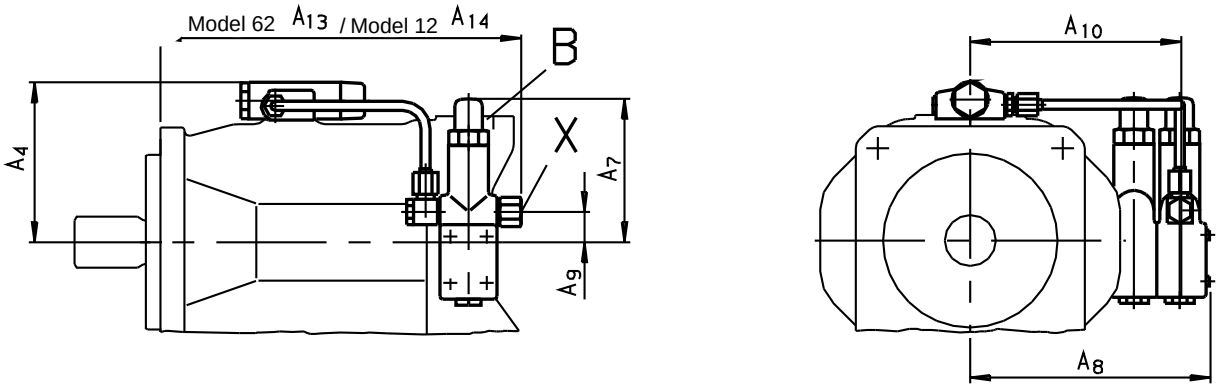


Unit dimensions DFLR
Service ports on sides; Models **62 and 12**

Sizes 28 to 100



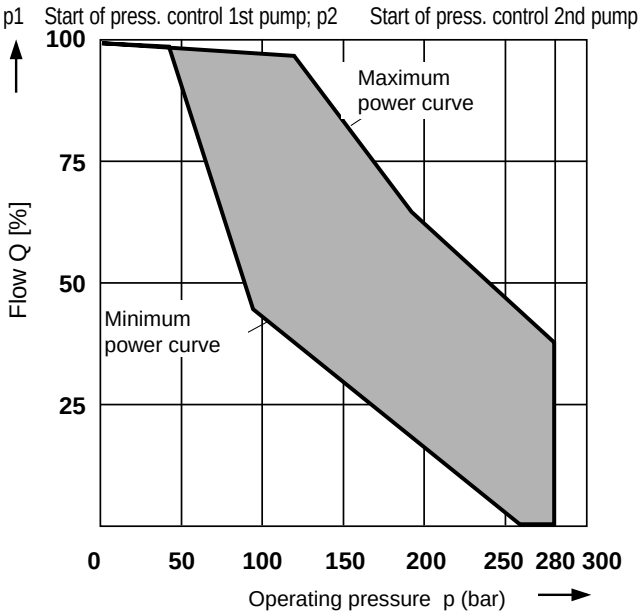
Size 140



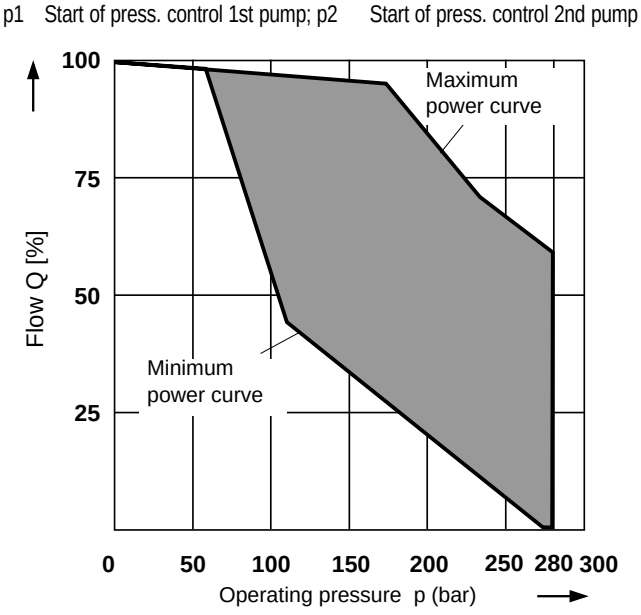
DFSR Pressure/flow/summation control

The summated input to the A10 control pump and a second pump is limited.
There are two overload ratios 70 : 30 and 50 : 50, the former relating to the A10 and the latter to the second pump. Example:
ATUS-A10VO 45 DFSR + G2 19
gives an area ratio 45 : 19 $\triangleq$ 70 : 30
If this is the first design please consult the relevant project office.
Flow control is possible below the limit of the power curve.

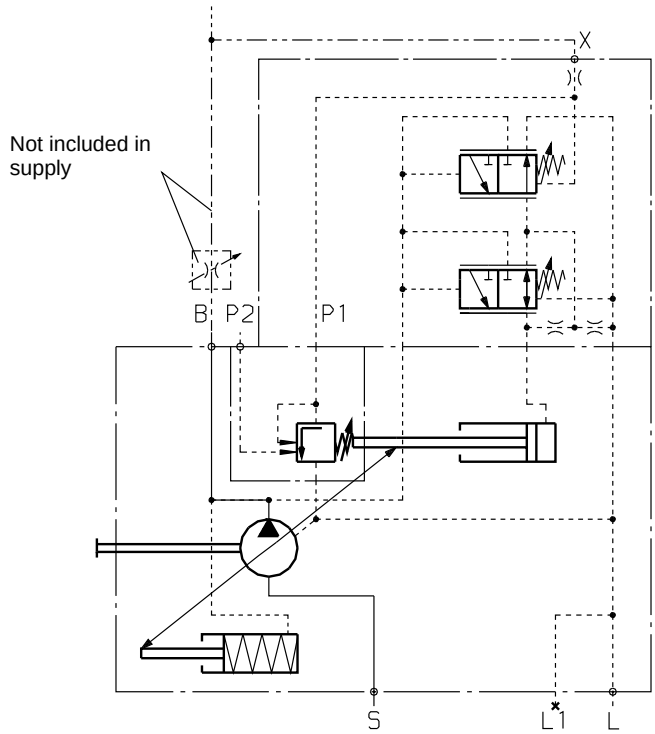
Static characteristic pressure transfer ratio 50:50 for equal pressures p1= p2



Static characteristic pressure transfer ratio 70:30 for equal pressures p1= p2



The power characteristic is factory-set, so please enter details in clear text, e.g. Size 71; 20 kW at 1500 rpm; 70:30



Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)
P2	Pressure port pump 2
X	Pilot pressure port

Control data

For pressure control technical data see page 22.

For flow control technical data see page 28.

Pilot oil consumption ..... max. approx. 5,5 L/min

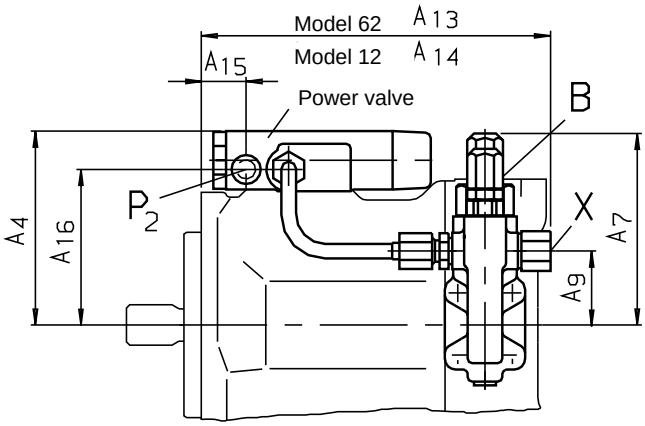
Flow loss at Q_{max} see pages 8 and 9.

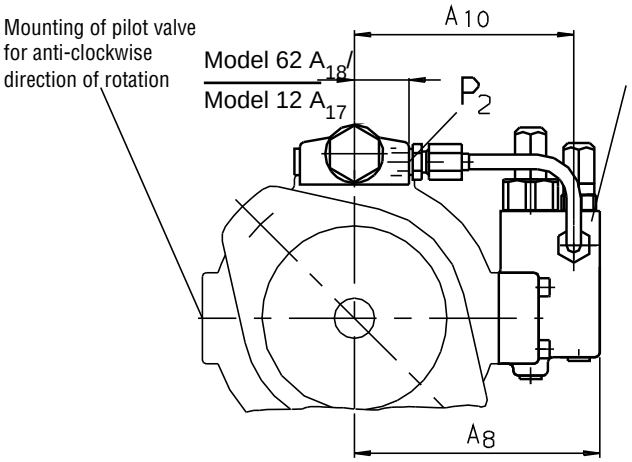
For Models 61 N00 and 11 N00 this is not applicable, as the second pump is usually flanged onto the through drive.

Unit dimensions DFSR
Service ports on sides; Models **62 and 12**

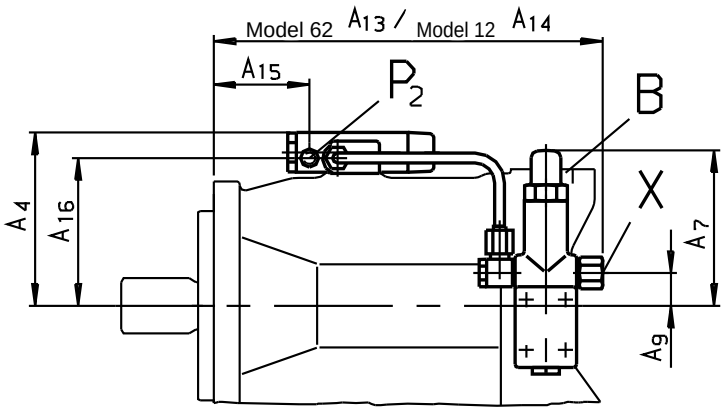
Sizes 28 to 100

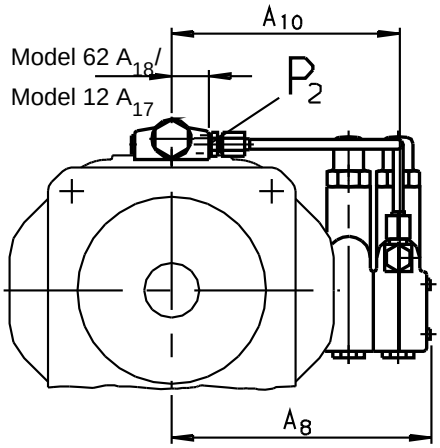
Mounting of pilot valve for clockwise direction of rotation





Size 140

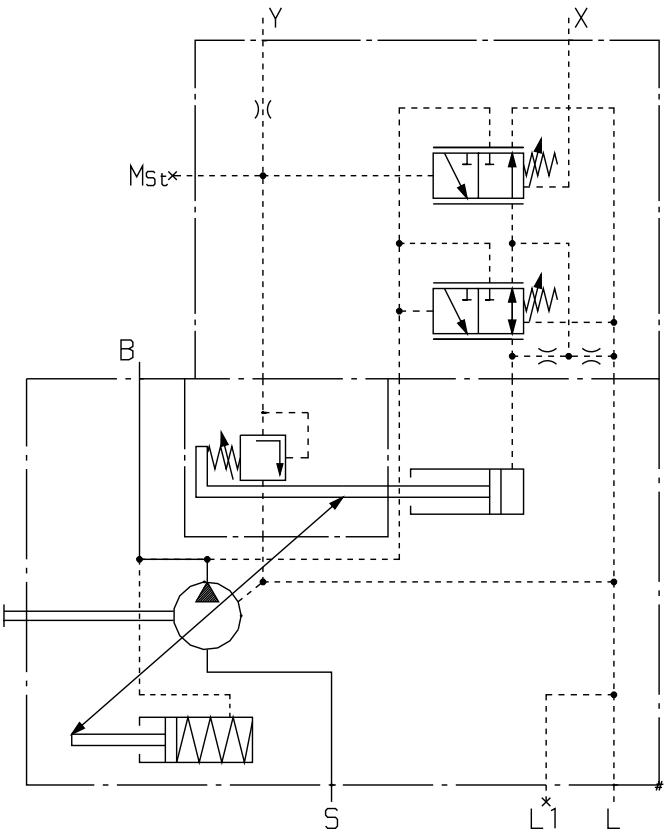




Size	A_4	A_7	A_8	A_9	A_{10}	A_{13}	A_{14}	A_{15}	A_{16}	A_{17}	A_{18}	**Port P2**-Model 62	**Port X**-Model 62	**Port P2 and X**-Model 12
28	107	106	136	40	119	194	197	24	86	51	28,5	7/16-20 UNF-2B; 10 deep	7/16-20 UNF-2B	M14x1,5
45	112	106	146	40	129	209	212	30	91,5	51	28,5	7/16-20 UNF-2B; 10 deep	7/16-20 UNF-2B	M14x1,5
71	124	106	160	40	143	237	240	45	103,5	51	29,5	7/16-20 UNF-2B; 10 deep	7/16-20 UNF-2B	M14x1,5
100	129	106	165	40	148	304	307	87	109	51	28,5	7/16-20 UNF-2B; 10 deep	7/16-20 UNF-2B	M14x1,5
140	140	127	209	27	183	314	314	75	123,5	51	28,5	7/16-20 UNF-2B; 10 deep	9/16-18 UNF-2B	M14x1,5

FHD Flow control, dependent on pilot pressure with pressure control

The swivel angle of the pump, and hence the displacement or flow, is dependent on the pilot pressure $P_{pilot\ X}$ in port X.
A constant pressure of p_y = 35 bar must be fed to port Y. There is integral pressure control which may be smoothly varied at the pilot valve.
(Please state setting values in clear text).



Control data

Hysteresis ±2 % of $V_{g\ max}$

Ext. pilot oil consumption in Y ..... max. approx 3 ... 4,5 L/min

Pressure increase Δp .....max. 4 bar

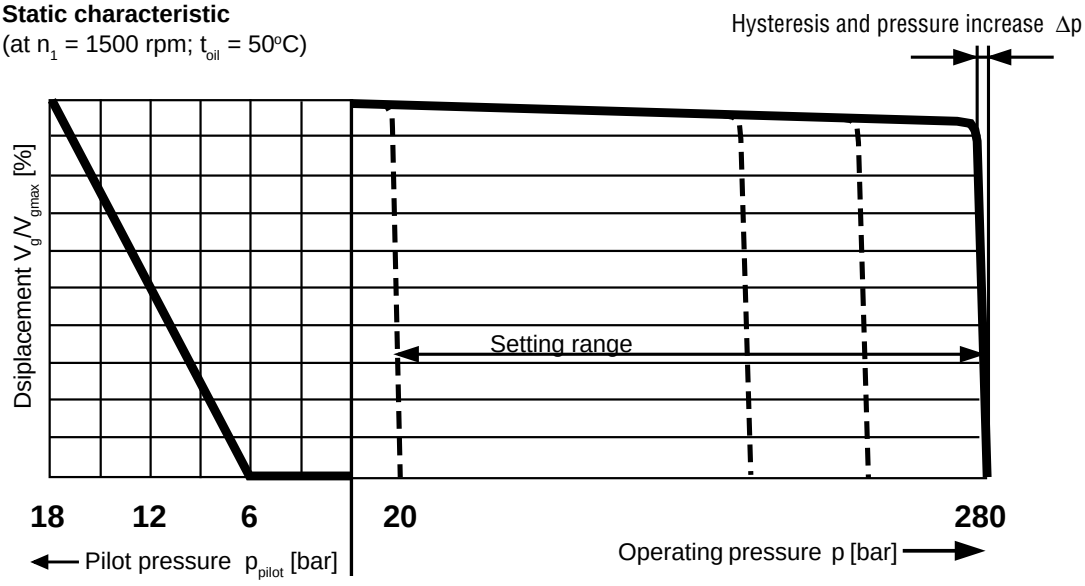
Flow loss at Q_{max} see pages 8 and 9.

Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)
X, Y	Pilot pressure port
MSt	Measurement port

Static characteristic

(at n_1 = 1500 rpm; t_{oil} = 50°C)



Unit dimensions

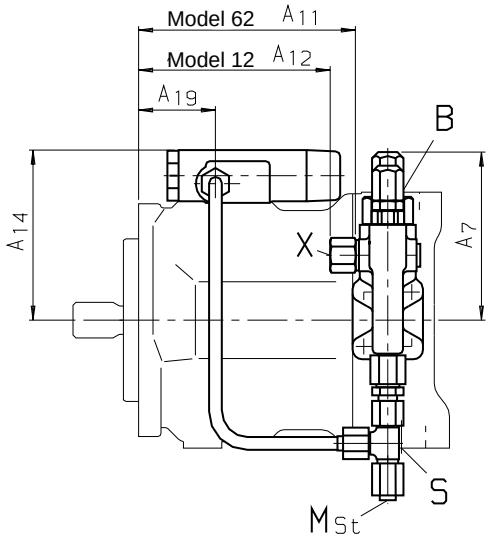
Size	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	A_{14}	A_{16}	A_{17}	A_{18}	A_{19}	A_{20}	Ports X, Y	Ports X, Y
28	106	136	40	119	140	119	107	48	51	86	48	113	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
45	106	146	40	129	155	134	112	48	51	91,5	54	113	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
71	106	160	40	143	183	162	124	48	51	103,5	69	113	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
100	106	165	40	148	250	229	129	48	51	108,5	111	113	7/16-20 UNF-2B; 10 deep	M14x1,5; 12 deep
140	127	209	27	183	222	244	140	48	51	119	99	150	9/16-18 UNF-2B; 13 t.**(X)** 7/16-20 UNF-2B; 10 t.**(Y)**	M14x1,5; 12 deep

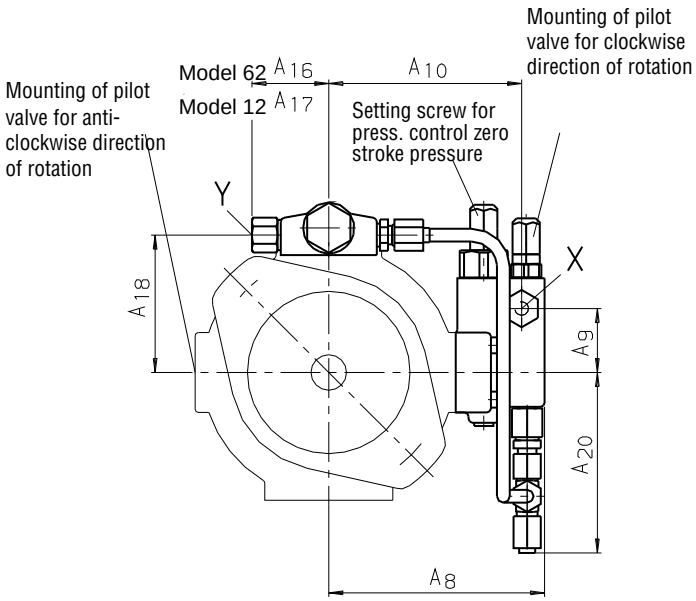
Unit dimensions FHD
Service ports at rear; Models **61N00 and 11 N00**

On request

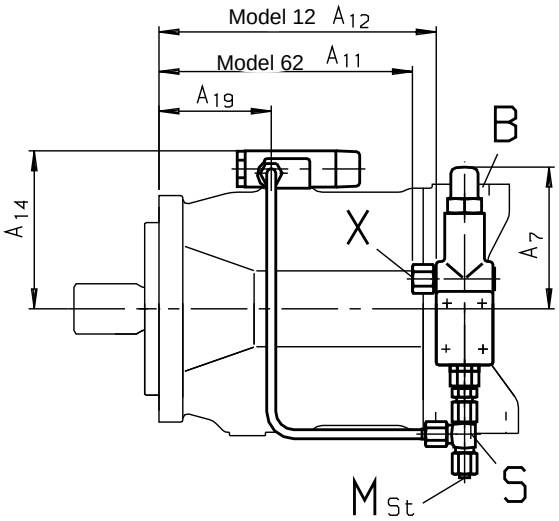
Unit dimensions FHD
Service ports on sides; Models **62 and 12**

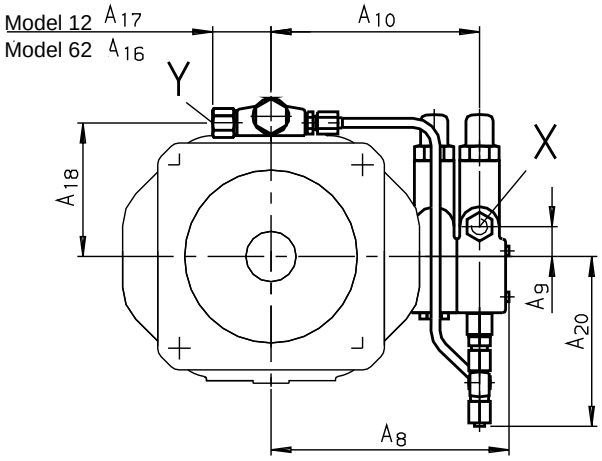
Sizes 28 to 100





Size 140





FE1 Electronic flow control

The FE1 control is used for the electro-hydraulic swivel angle control of the ATUS-A10VO variable displacement pump.
The FE1 model pump is suitable for use with analogue amplifier card VT 5041.
The amplifier card is to be ordered separately.

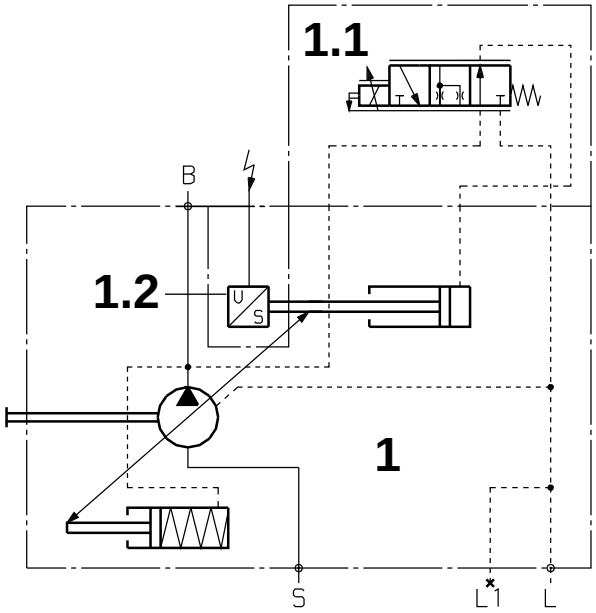
For further information see RE 30022.

Control data

Hysteresis	< 1% of $V_{g\,max}$
Repetitive accuracy	< 1%
Pilot oil consumption	max. approx. 1 L/min

Flow loss at Q_{max} see pages 8 and 9.

Components
1 ATUS-A10VO with hydraulic control device
1.1 Proportional valve STW 0063
1.2 Inductive positional transducer IW9–03–01
control electronics (order separately in accordance with RE 30022).



Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)

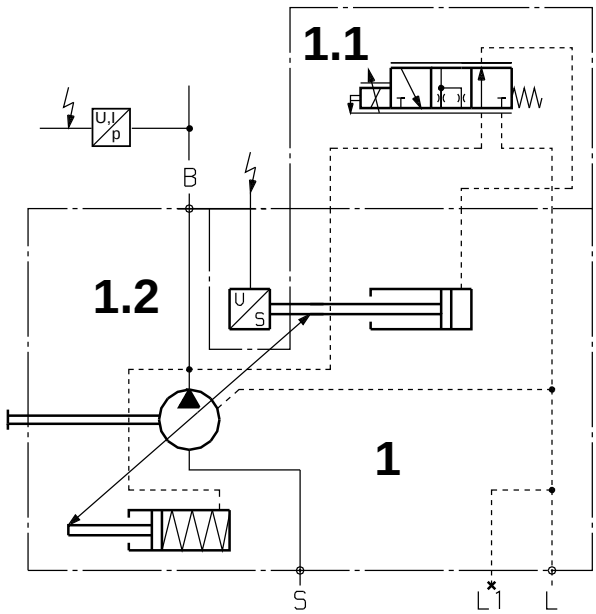
DFE1 Pressure and flow control

Pressure and flow control of the pump are carried out by an electrically controlled proportional valve. Flow control is by means of the variable pump swivel angle, any variation in drive speed – e. g. caused by the diesel motor – is not adjusted. Pump pressure and pump position are registered by means of a pressure sensor and inductive positional transducer to the relevant amplifier card.
The DFE1 model pump is suitable for use with analogue amplifier card VT 5041.

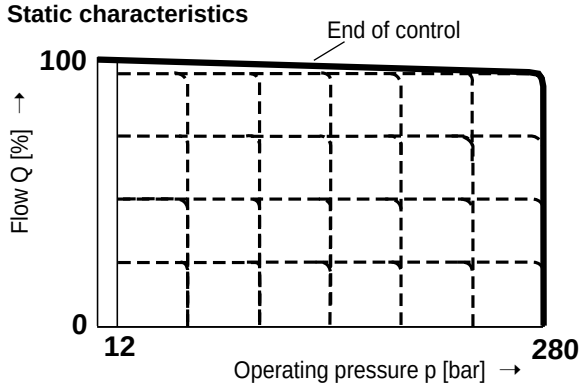
Both amplifier card and pressure sensor are to be ordered separately.

For reasons of safety a pressure relief valve should be mounted in addition to the pump pressure control. This ensures that the maximum permissible operating pressure is not exceeded.

For further information and application examples see RE 30022 and RE 98090.



Static characteristics



Control data

Hysteresis	< 1% of $V_{g\,max}$
Repetitive accuracy	< 1%
Pilot oil consumption	max.approx. 1 L/min

Flow loss at Q_{max} see pages 8 and 9.

Ports

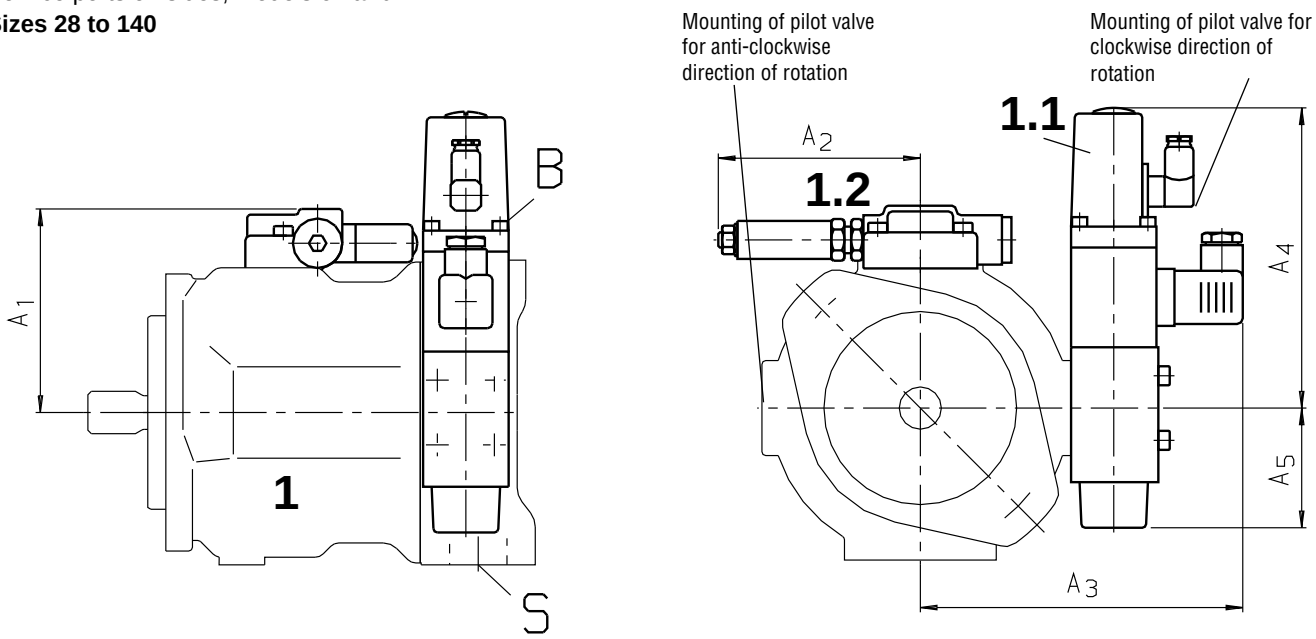
B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)

Components
1 ATUS-A10VO with hydraulic control device
1.1 Proportional valve STW 0063
1.2 Inductive positional transducer IW9–03–01
Pressure sensor and control electronics VT 5041-2X are separate components (to be ordered separately in accordance with RE 30022).

Unit dimensions
FE1 Flow control, pressure and DFE1 electronic flow control

Unit dimensions FE1 and DFE1
Service ports on sides; Models **61 and 11**
on request

Unit dimensions FE1 and DFE1
Service ports on sides; Models **62 and 12**
Sizes 28 to 140



Size	A_1	A_2	A_3	A_4	A_5
28	106	107	171	158	63
45	112	107	181	158	63
71	124	107	195	158	63
100	129	107	200	158	63
140	140	107	238	143	78

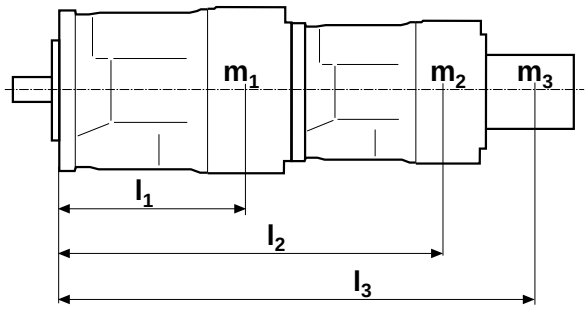
Through drive

Axial piston unit ATUS-A10VO can be supplied with a through drive, as shown in the ordering code on page 3.
The type of through drive is determined by codes (K01–K17).
If the combination pump is not mounted in the factory, the simple type code is sufficient.
Included in this case are:
coupling sleeve, fixing screws, seals and if necessary a sandwich flange.

Combination pumps
By mounting combination pumps circuits independent of each other are available for use.

1. If the combination pump consists of **2 ATUS-A10VO** pumps and if these are to be **delivered ready assembled**, then the two type codes are to be combined with a "+".
   Ordering example:
   ATUS-A10VO 71 DR/31 R–PSC62K02 **+**
   ATUS-A10VO 28 DR/31 R–PSC62N00
2. If a **gear pump or radial piston pump** is to be **mounted in the factory** as a second pump, please refer to RE 90139 (in preparation). It contains a list of the various pump combinations together with the type code of the first pump.

Permissible moment of inertia

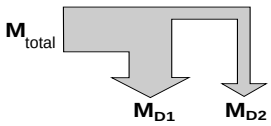


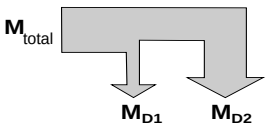
m_1, m_2 [kg] Mass of pump
l_1, l_2 [mm] Distance between centres of gravity

$$M_m = (m_1 \bullet l_1 + m_2 \bullet l_2 + m_3 \bullet l_3) \bullet \frac{1}{102} \quad [Nm]$$

Size			28	45	71	100	140
Perm. moment of inertia	M_m	Nm	88	137	216	300	450
Mass	m_1	kg	15	21	33	45	60
Dist. betw. centr. of gravity	l_1	mm	110	130	150	160	160

Permissible through drive torque

1 

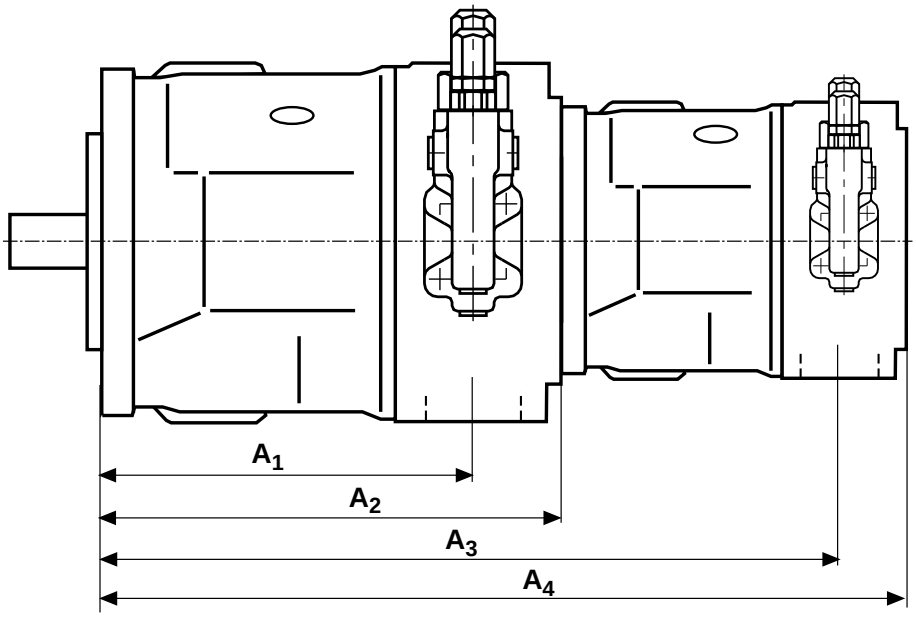
2 

Size				28	45	71	100	140
Max. perm. total through drive torque at shaft **"S"** pump 1 (Pump 1 + Pump 2)		$M_{total\ max}$	Nm	180	300	500	890	1246
1 Perm. thru. drive tor.		M_{D1max}	Nm	125	200	316	445	623
		M_{D2max}	Nm	55	100	184	445	623
2 Perm. thru. drive tor.		M_{D1max}	Nm	55	100	184	445	623
		M_{D2max}	Nm	125	200	316	445	623

Size				28	45	71	100	140
Max. perm. total through drive torque at shaft **"R"** pump 1 (Pump 1 + Pump 2)		$M_{total\ max}$	Nm	223	400	632	–	–
1 Perm. thru. drive tor.		M_{D1max}	Nm	125	200	316	–	–
		M_{D2max}	Nm	98	200	316	–	–
2 Perm. thru. drive tor.		M_{D1max}	Nm	98	200	316	–	–
		M_{D2max}	Nm	125	200	316	–	–

Unit dimensions of the combination pump

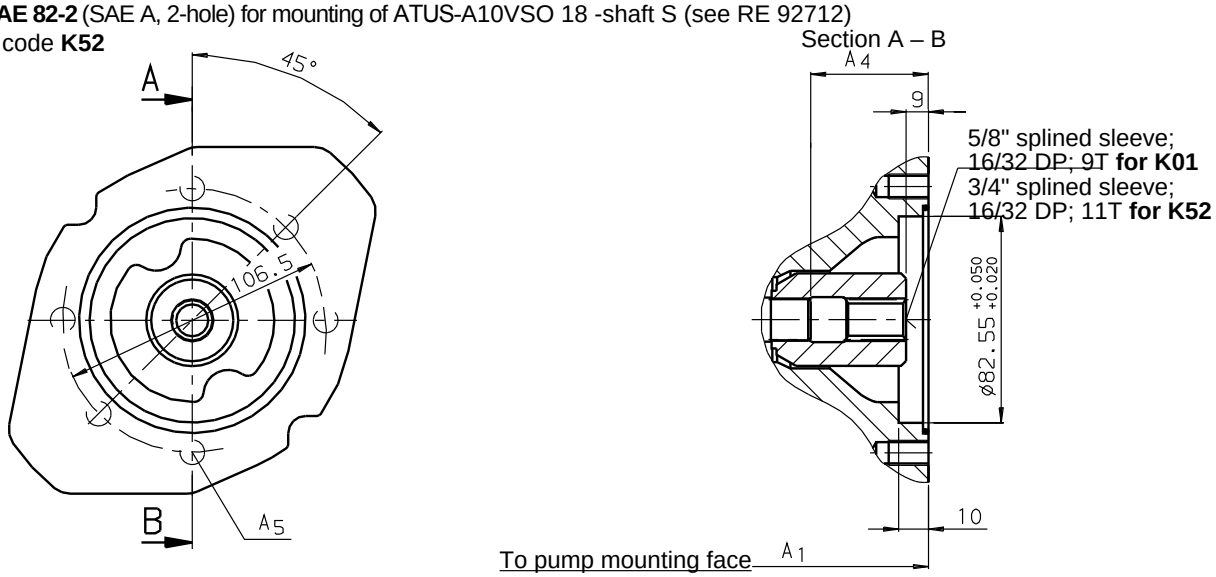
ATUS-A10VO + ATUS-A10VO



Pump 1 / Pump 2	ATUS-A10VO 28				ATUS-A10VO 45				ATUS-A10VO 71				ATUS-A10VO 100				ATUS-A10VO 140			
	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4
A10VSO 18	165	204	349	399	184	229	374	424	217	267	412	462	275	338	483	533	275	350	495	545
A10VO 28	165	204	369	398	184	229	394	423	217	267	432	461	275	338	503	532	275	350	515	544
A10VO 45	–	–	–	–	184	229	413	448	217	267	451	486	275	338	522	557	275	350	534	569
A10VO 71	–	–	–	–	–	–	–	–	217	267	484	524	275	338	555	595	275	350	567	607
A10VO 100	–	–	–	–	–	–	–	–	–	–	–	–	275	356	631	673	275	368	643	685
A10VO 140	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	275	368	643	685

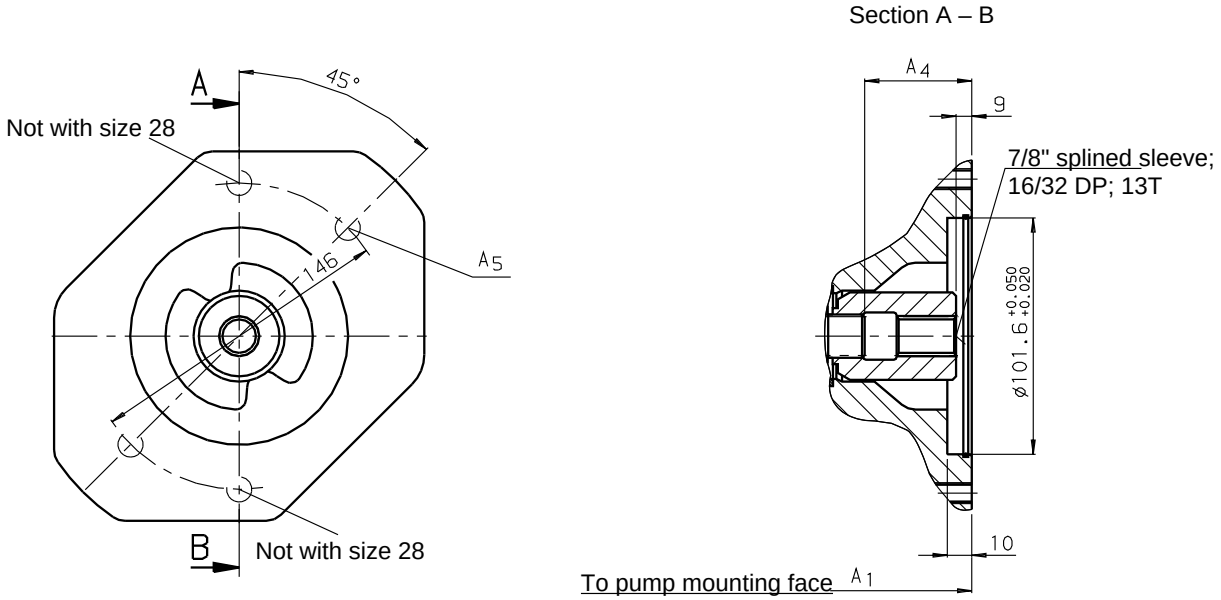
Dimensions of through drives

Flange SAE 82-2 (SAE A, 2-hole) for mounting of external gear pump G2 (see RE 10030) or internal gear pump ATUS-1 PF2GC2/3-1X/XXXXR07MU2 (see RE 10215)
Ordering code **K01**
Flange SAE 82-2 (SAE A, 2-hole) for mounting of ATUS-A10VSO 18 -shaft S (see RE 92712)
Ordering code **K52**



Size	A_1	A_4	A_5
28	204	47	M 10; 16 deep
45	229	53	M 10; 16 deep
71	267	61	M 10; 20 deep
100	338	65	M 10; 20 deep
140	350	77	M 10; 20 deep

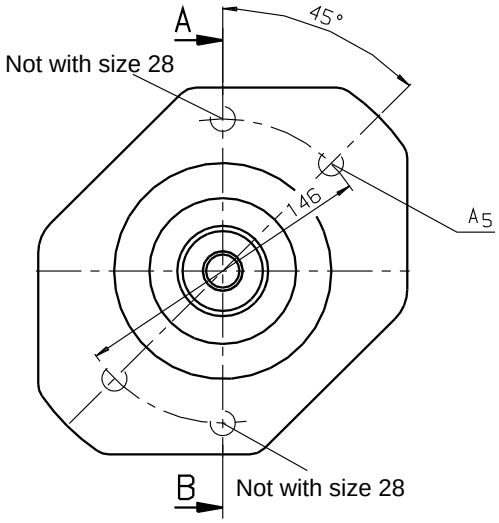
Flange SAE 101-2 (SAE B, 2-hole) for mounting of external gear pump G3 (see RE 10039) or ATUS-A10VO 28 (shaft S)
Ordering code **K02**



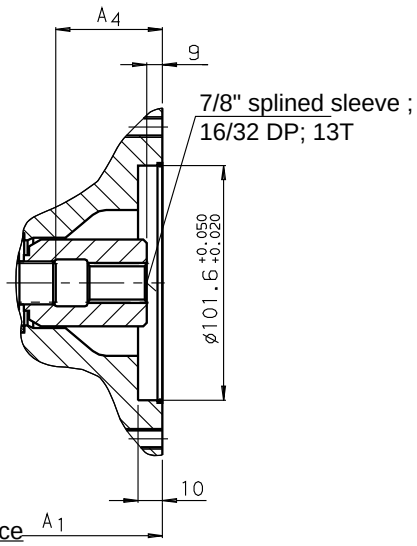
Size	A_1	A_4	A_5
28	204	47	M 12; 15 deep
45	229	53	M 12; 18 deep
71	267	61	M 12; 20 deep
100	338	65	M 12; 20 deep
140	350	77	M 12; 20 deep

With size 28 gear pump G3 may only be mounted rotated at 45°.

Flange SAE 101-2 (SAE B, 2-hole) for mounting of G4 (see RE 10042);
Ordering code **K68**



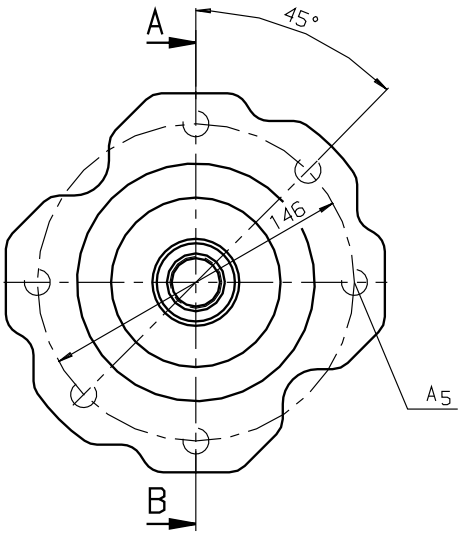
Section A – B



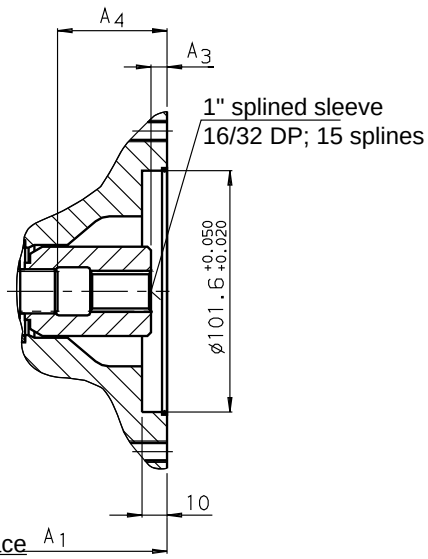
Size	A_1	A_4	A_5
28	204	47	M 12; 15 deep
45	229	53	M 12; 18 deep
71	267	61	M 12; 20 deep
100	338	65	M 12; 20 deep
140	350	77	M 12; 20 deep

With size 28 gear pump G4 may only be mounted rotated at 45°.

Flange SAE 101-2 (SAE B, 2-hole) for mounting of ATUS-A10VO 45-shaft S or internal gear pump ATUS-1PF2GC4-1X/0XXXR07MU2 (see RE 10215) Ordering code **K04**

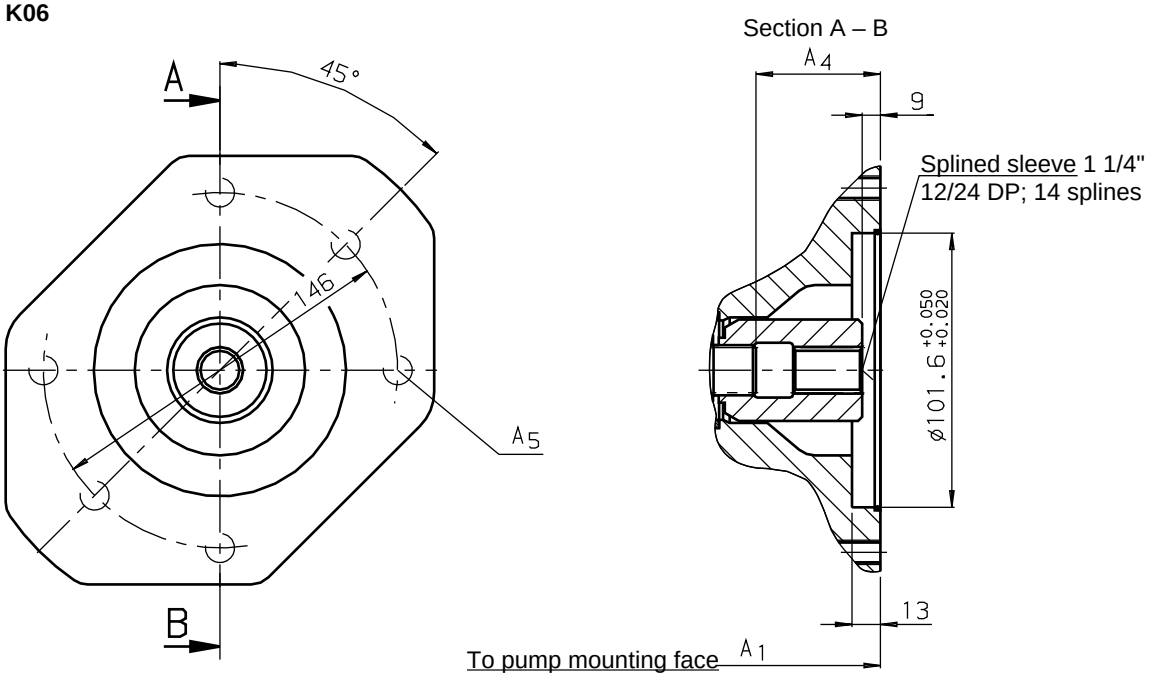


Section A – B



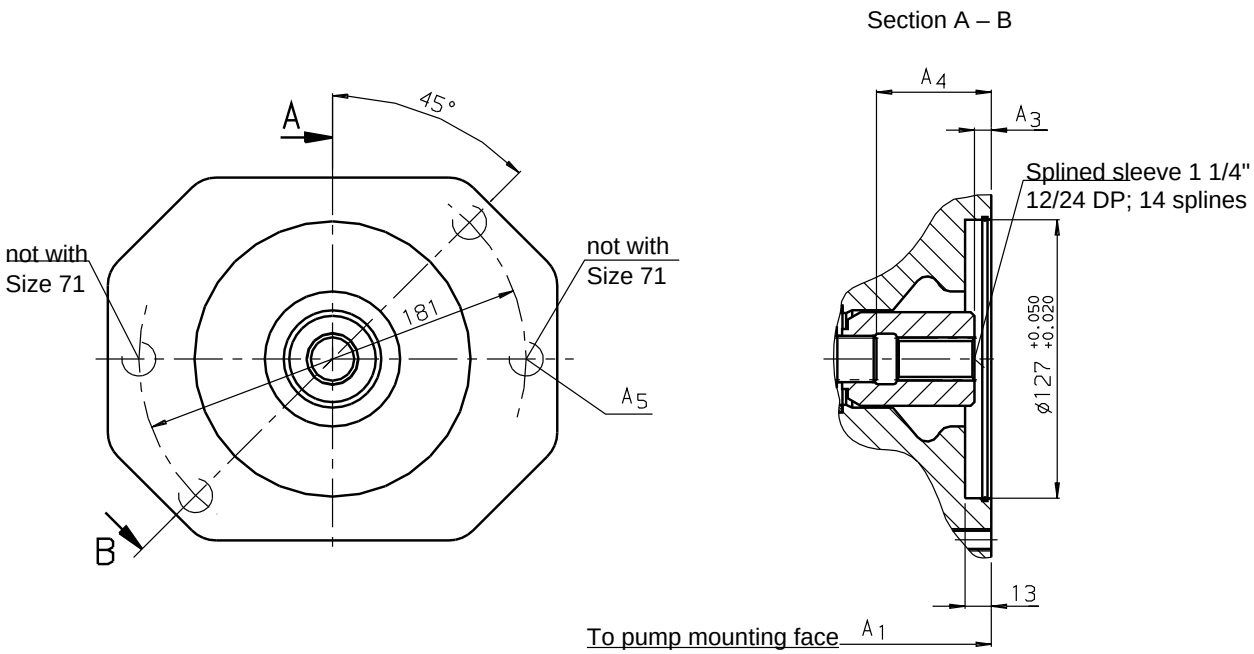
Size	A_1	A_3	A_4	A_5
45	229	9	53	M 12; 18 deep
71	267	8	61	M 12; 20 deep
100	338	10	65	M 12; 20 deep

Flange SAE 101-2 (SAE B, 2-hole) for mounting internal gear pump ATUS-1PF2GC5-1X/ 0XXXR07MU2 (see RE 10215)
Ordering code **K06**



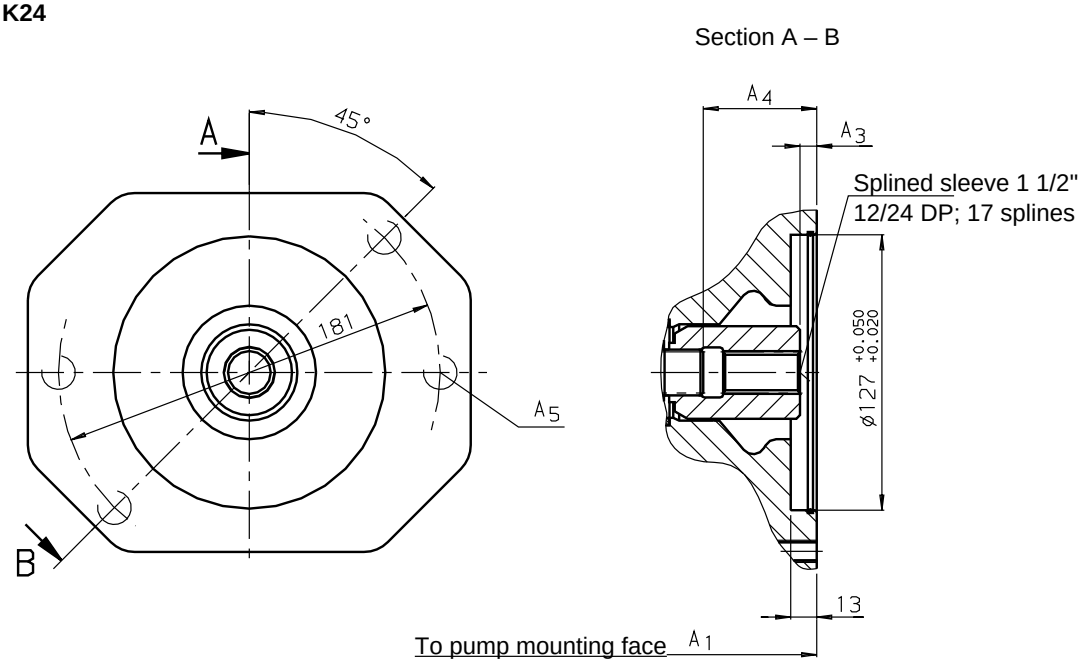
Size	A_1	A_4	A_5
45	244	53	M 12
71	267	61	M 12; 20 deep and partly through
100	338	65	M 12; 20 deep

Flange SAE 127-2 (SAE C) for mounting of ATUS-A10VO 71 (shaft S); Ordering code **K07**



Size	A_1	A_3	A_4	A_5
71	267	10	61	M 16; 18 deep
100	338	8	65	M 16; 25 deep
140	350	9	77	M 16; 32 deep

Flange SAE 127-2 (SAE C) for mounting of ATUS-A10VO 100 (shaft S) or internal gear pump ATUS-1PF2GC6-1X/XXXXR07MU2; Ordering code **K24**



Size	A_1	A_3	A_4	A_5
100	338	8	65	M 16; 25 deep
140	350	10	77	M 16; 25 deep

Flange SAE 152-4 (SAE D) for mounting of ATUS-A10VO 140 (shaft S); Ordering code **K17**