

MA10VO, Series 31	2
MA10VO, Series 50/52/53	30

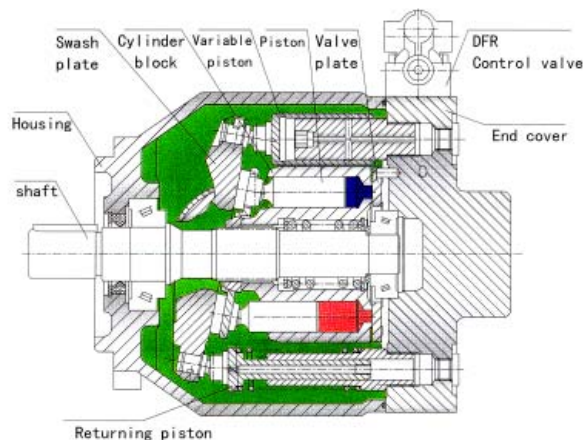
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Features

Axial piston pump MA10VO 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 output flow of the pump.



- Flange connections to SAE-UNC or SAE metric
- 2 case drain 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
- SAE & ISO mounting flanges available



Technical Data

1. Input Operating Pressure Range

Absolute pressure at port S (A)
 Pabs min0.8bar
 Pabs max30bar

2. Output Operating Pressure Range

Pressure at port B
 Nominal pressure P_N 280bar
 Peak pressure Pmax 350bar

3. Case Drain Pressure

The maximum pump case drain pressure measured at ports L, L1 is 7 PSI (0.5 Bar) higher than the input pressure at ports S, but not exceeding more than 30 PSI (2 Bar) absolute.

4. Direction of Flow

(S to B)

5. Table of values (theoretical values, without considering η_{mh} and η_v; values rounded)

Size				18	28	45	71	100
Displacement		Vgmax	cm ³	18	28	45	71	100
Max. speed	at Vgmax	nomax	rmp	3000	3000	2600	2200	2000
Max. flow	at nomax	Qomax	L/min	59.4	84	117	156	200
Max. power	at nomax	Pomax	kW	27.7	39	55	73	93
Max. torque	at Vgmax	Tmax	Nm	58.3	125	200	316	445
Weight (without fluid)		m	kg	26.5	15	21	33	45

Notes: Values shown are valid for an absolute pressure of 1 bar at suction port. If the flow is reduced or if the inlet pressure is increased the speed may be increased.

6. Determination of Size

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

Drive torque $T = \frac{1.59 \cdot V_g \cdot \Delta P}{100 \cdot \eta_{mh}}$ [N.m]

Drive power $P = \frac{2 \pi \cdot T \cdot n}{60000} = \frac{Q \cdot \Delta P}{600 \cdot \eta_t}$ [Kw]

V_g = geometric displacement [cm³] per rev.

ΔP = differential pressure [bar]

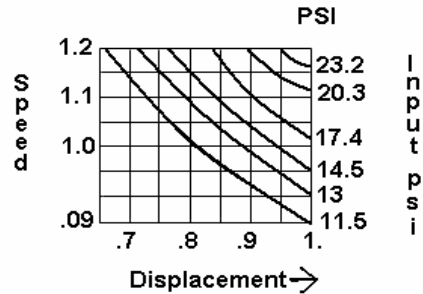
n = speed [rpm]

η_v = volumetric efficiency

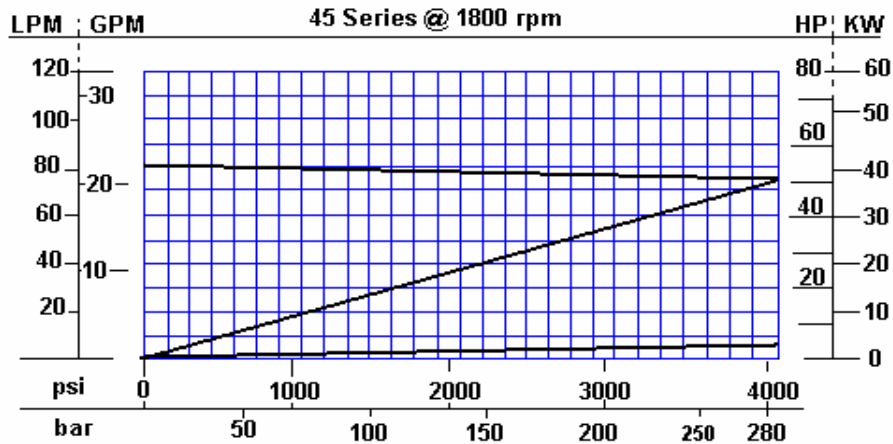
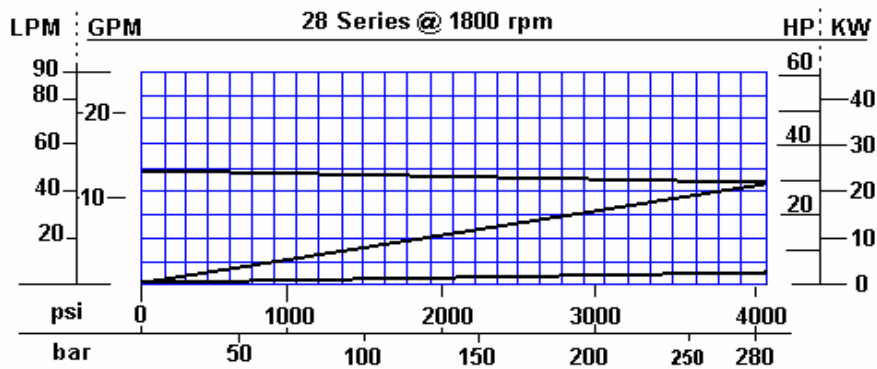
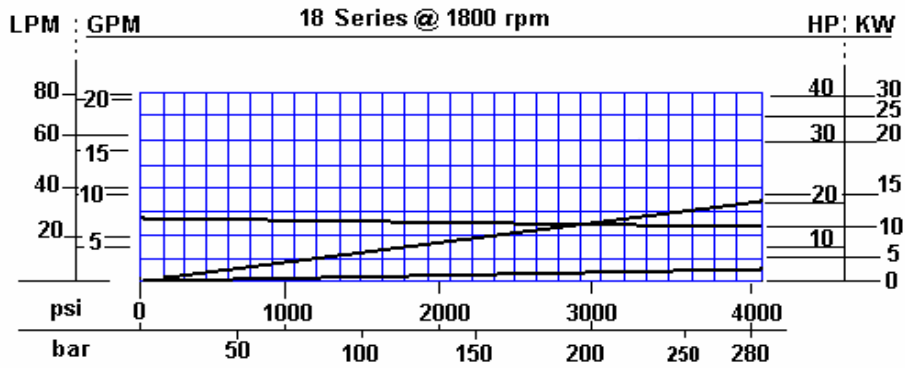
η_{mh} = mechanical-hydraulic efficiency

η_t = total efficiency (η_t= η_v · η_{mh})

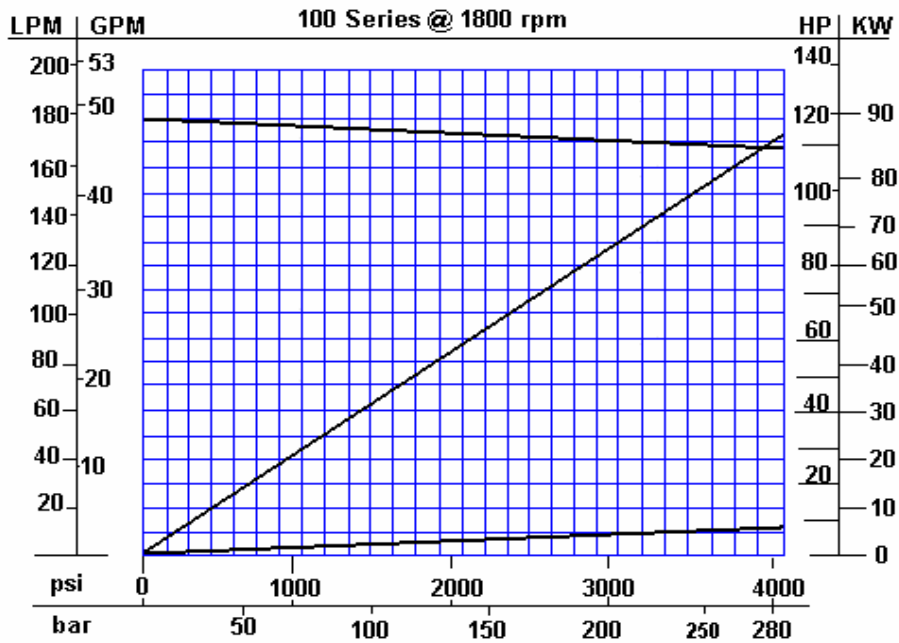
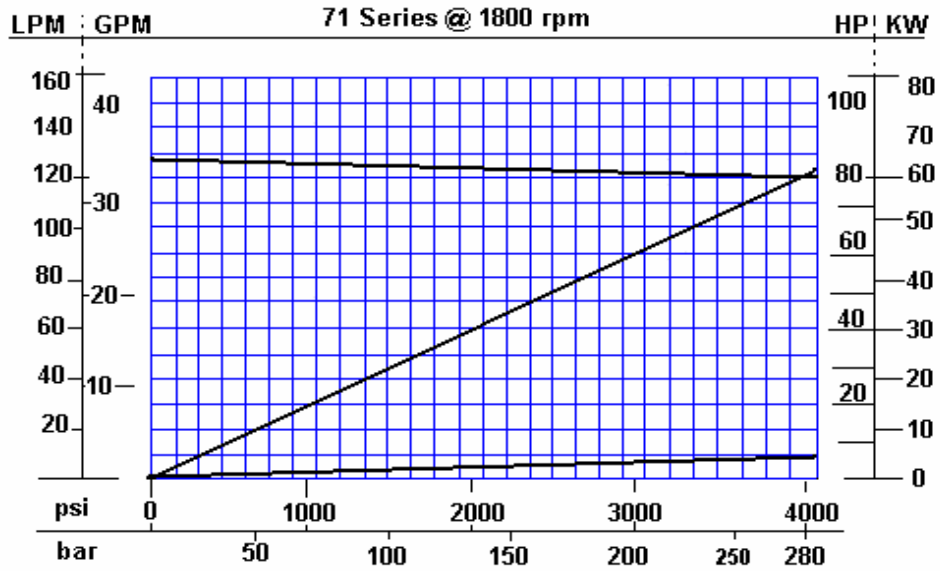
Determination of Input Pressure at Suction port.



Performance Information



Performance Information - *cont'd.*



Ordering Code

	MA10V	0	71	DR	31	R	P	S
Axial piston unit								
Swash plate variable pump	MA10V							
Swash plate variable pump, for industrial	MA10VS							
Modes of operation								
Pump, open circuit		●						
Size								
Displacement V _{gmax} (cm ³)	18	28	45	71	100			
Control devices								
Pressure control	●	●	●	●	●	DR		
G - Remote control	●	●	●	●	●	DRG		
Pressure and flow control, I-X channel closed	●	●	●	●	●	DFR DFR1		
Pressure flow and power control	—	●	●	●	●	DFLR		
Series								
Series					31			
Direction of rotation								
Viewed on drive shaft	clockwise					R		
	counter-clockwise					L		
Seals								
Buna-N (NBR per DIN ISO 1629) ;							P	
FPM (fluorocarbon)							V	
Shaft end								
SAE-splined shaft	●	●	●	●	●			S
SAE-splined shaft, reinforced (higher thru drive torques)	—	●	●	●	●			R
SAE-splined shaft, smaller size (not for pumps with thru drive)	●	—	●	—	●			U
SAE-splined shaft, reinforced U-type shaft	—	—	—	—	●			W
SAE-keyed shaft	●	●	●	●	●			K
parallel with key DIN 6885	●	●	●	●	●			P

Ordering Code

C	62	N00							
			Thru-drive	18	28	45	71	100	
			Without through drive	●	●	●	●	●	N00
			With thru-drive, pump with side port only	-	-	-	-	-	
			Mounting flange Shaft/coupling For the mounting of:	-	●	●	●	●	K04
			82-2 (SAE A) 16-4 (SAE A) G2, GC2/GC3-1X	-	●	●	●	●	K01
			101-2 (SAE B) 22-4 (SAE B) A10VO28 (shaft S), G	-	●	●	●	●	K02
			101-2 (SAE B) 22-4 (SAE B) A10VO28 (shaft S), G	-	●	●	●	●	K68
			127-2 (SAE C) 32-4 (SAE C) A10VO71 (shaft S)	-	-	-	●	●	K07
			Service ports						
			(Pressure port B and Suction port S)	18	28	45	71	100	
			(Rear ports, UNC Mounting screws)	●	●	●	●	-	61
			(Opposite side ports, UNC mounting screws)	●	●	●	●	●	62
			(Rear ports, metric mounting screws)	-	●	●	●	●	11
			(Opposite side ports, metric mounting screws)	●	●	●	●	●	12
			(Rear ports, UNC Mounting screws)	-	-	-	●	-	91
			(Opposite side ports, UNC mounting screws)	-	-	-	●	-	92
			(Rear ports, metric mounting screws)	-	-	-	●	-	41
			(Opposite side ports, metric mounting screws)	-	-	-	●	-	42
									Port pos. 61, 11, 91 and 41 only for version without through drive
			Mounting flange	18	28	45	71	100	
			SAE 2 hole	●	●	●	●	●	C
			ISO 2 hole	●	●	●	●	●	A
			SAE 4 hole	-	-	-	-	-	D

● = available

Multiple Pumps

1. If a second Metaris hydraulic 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: MA10VO71DR/31R-PSC62K02 + MA10VO28DR/31R-PSC62N00
2. If a gear pump is to be factory-mounted please contact us.

Fluid

1. Hydraulic Fluid

The MA10V open loop pump in the standard design should be used with a good quality, petroleum based anti-wear hydraulic fluid.

2. Operating Viscosity Range

In order to obtain optimum efficiency we recommend that the operating viscosity be selected from within the range.

At operating temperature

Optimum viscosity (V_{opt}) \approx 80...170 SUS (16 / 36 mm² / s)

3. Limits of viscosity range

The following values are valid for extreme operating conditions:

V_{min} = 60 SUS (10 mm² / s)

for short periods at max. leakage oil temperature of 93° C

V_{max} = 4600SUS (1000 mm² / s)

1400 SUS (300 mm²/s) on short term cold start

4. Temperature Range

t_{min} = -15°C; t_{max} = +80°C.; t_{min} = -5°F; t_{max} = +175°F

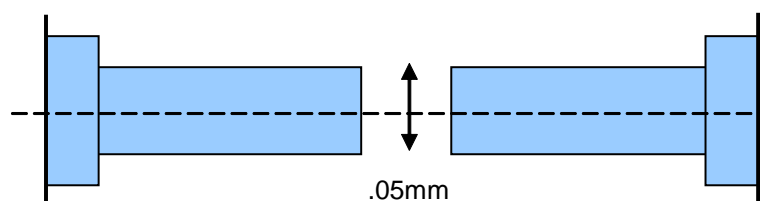
5. Filtration

In order to ensure reliable operation of the axial piston unit, the operating fluid must be maintained to a cleanliness class of 18/14 to ISO4406 or NAS 1638 class 9. As a guide the fluid cleanliness level may be achieved using a 10 micron filter.

Installation Information

The pump housing must be filled with clean hydraulic fluid prior to pump start up and remain full. The concentricity between the prime mover drive shaft and the pump shaft 0.05mm.

Installation Information - cont'd.

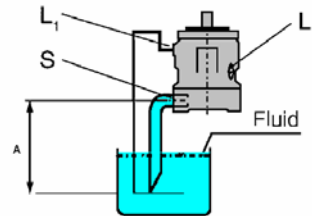
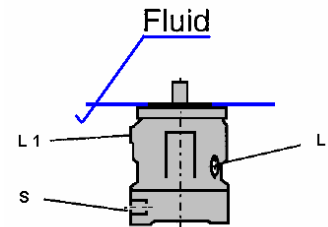


DR Pressure Control

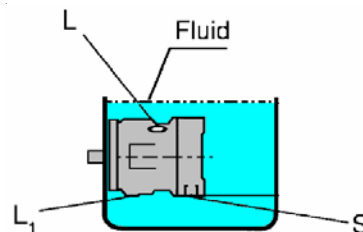
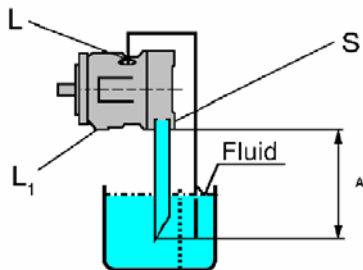
The installation position of the pump is optional.

The pump housing must be filled with fluid both when commissioning and in operation. In order to achieve low noise levels, all connecting lines (inlet, case drain) should be isolated from the tank by flexible lines.

1. Vertical installation the following conditions should be noted:
 - Before installing the pump inside a tank fill the pump case with fluid
 - Make sure the ports are below the oil level (L), (L1) & S
 - Avoid mounting above the tank whenever possible in order to maintain a low noise level
 - The permissible inlet height is a result of the overall pressure loss
"A" may not be greater than 32 inches (800 mm)

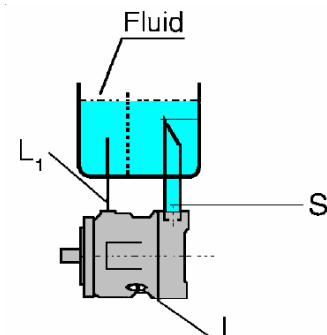


2. Horizontal Installation
 - The pumps must be install so (L) or (L1) the case drain is at the top of the pump
 - If the minimum fluid level is below the ports of the pump, pipe the ports L or L1 & S below the minimum oil level.
 - Avoid mounting above the tank whenever possible in order to maintain a low noise level.
 - The permissible inlet height (h) is a result of the overall pressure loss, may not be greater then 32 inches (800 mm).

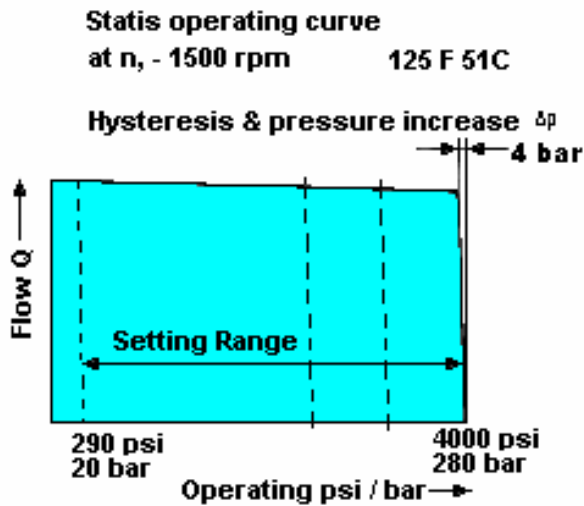
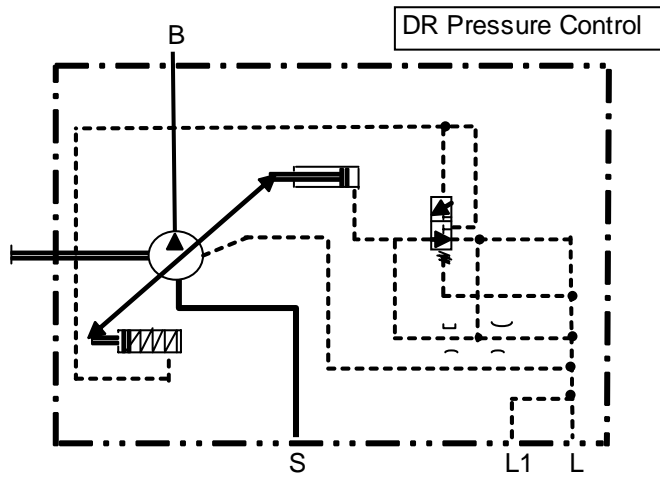


Below the tank position

- Pipe "L", "L1" and "S" must be mounted below the oil level



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.



Ports

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

Control Data

Hysteresis and repetitive accuracy Δp Max. 3 bar

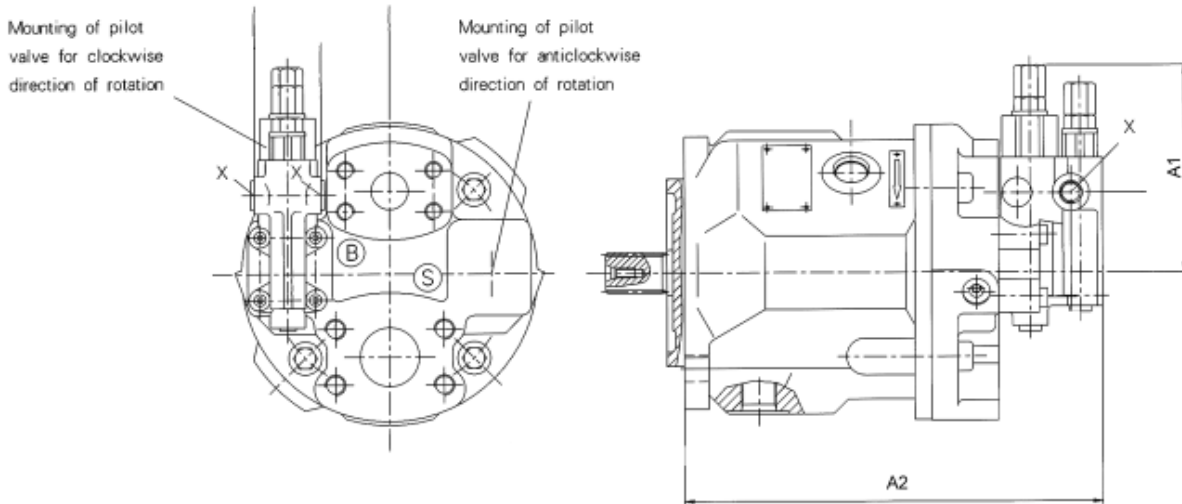
Max. Pressure Increase

Size		18	28	45	71
ΔP	Bar	2	4	6	8

Pilot oil consumptionmax. approx. 3 L/min

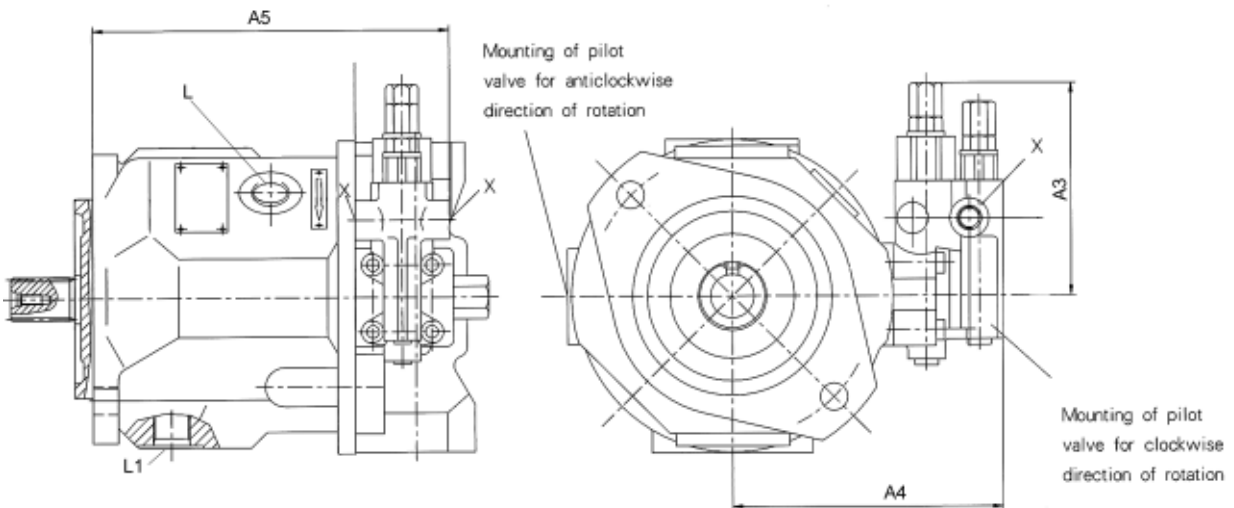
Unit dimensions DR
Service ports at rear; Models 61N00 and 11N00

Sizes 18 to 71



Unit dimensions DR
Service ports on sides; Models 62N00 and 12N00

Sizes 18 to 71



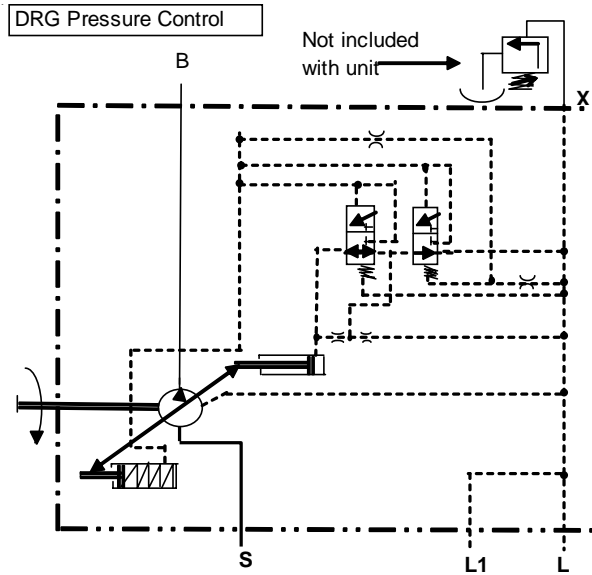
Sizes	A1	A2	A3	A4	A5	L	L1	Metric Adapter L & L1	X
18	108.5		108.5	129	195	9/16-18 UNF-2B		M16 X 1.5	7/16-20UNF-2B
28	108.5	226.2	108.5	136	194	3/4-16 UNF-2B		M18 X 1.5	7/16-20UNF-2B
45	108.5	245	108.5	146	219	7/8-14 UNF-2B		M22 X 1.5	7/16-20UNF-2B
71	106	279	108.5	160	257	7/8-14 UNF-2B		M22 X 1.5	7/16-20UNF-2B
100	108	344	108.5	158	317	1 1/16-12 UNB		M27 X 2	7/16-20UNF-2B

DRG Pressure Control, Remote Control

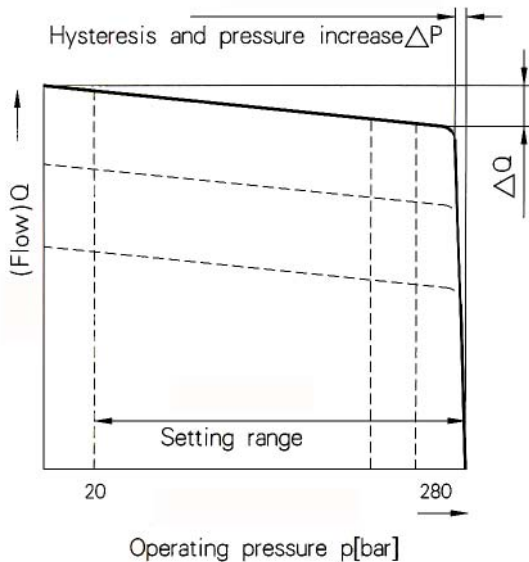
Function and design as for DR

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.



Static characteristic
(at $n_1=1500\text{rpm}$; $t_{oil}=125^\circ\text{F} / 51^\circ\text{C}$)



Ports

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

Control Data

Hysteresis and repetitive accuracy Δp Max. 3 bar

Max. Pressure Increase

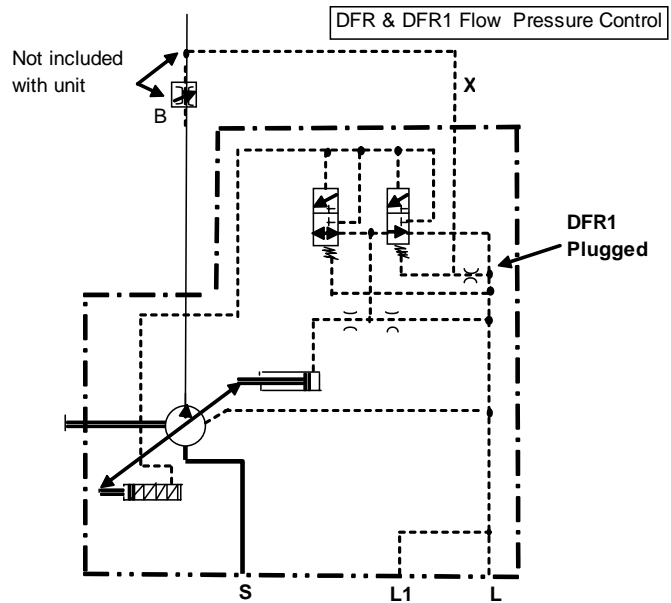
Size		18	28	45	71
ΔP	Bar	2	4	6	8

Pilot oil consumptionmax. approx. 4.5 L/min

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).

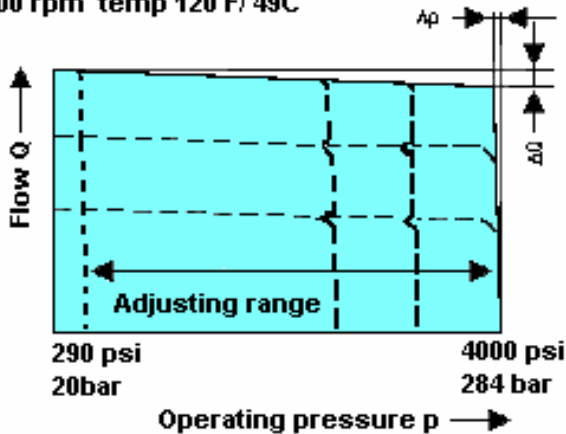
In model DFR1 the X orifice is plugged.



Ports

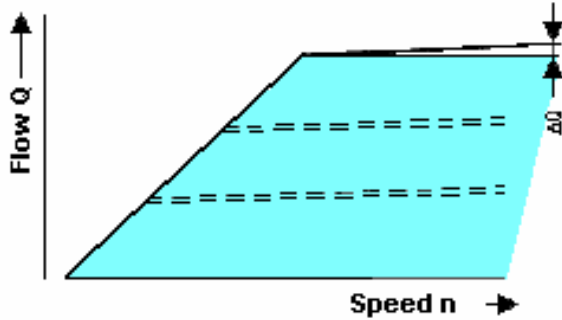
B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 sealed)
X	Pilot pressure port

Static curve at 1500 rpm temp 120 F/ 49C



DFR/DFR1 Pressure/Flow Control - *cont'd*

Static curve at variable rpm



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

$p = 18 \pm 2$ bar ("stand by") results.

Control Data

For pressure control technical data see DR Pressure control

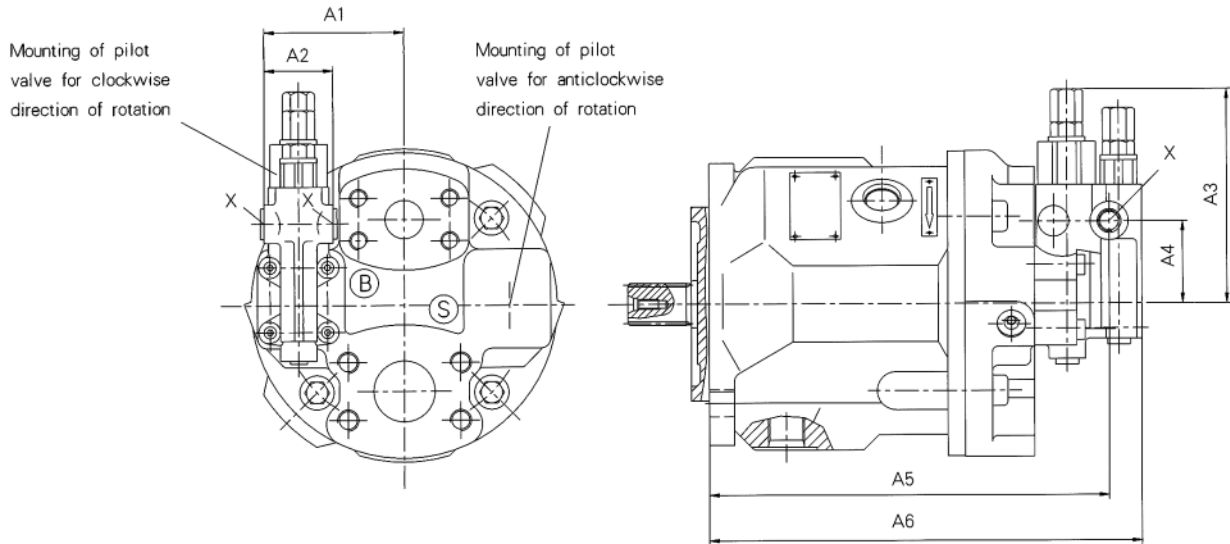
Max. flow deviation (hysteresis and increase) measured at drive speed $n = 1450$ rpm

Size		18	28	45	71
ΔQ_{max}	L/min	0.5	1	1.8	2.8

- DFR 3-4.5L/min
- Pilot oil consumption DFR max. approx. 3-4.5 L/min
- DFR1 3L/min
- Pilot oil consumption DFR1 max. approx. 3 L/min

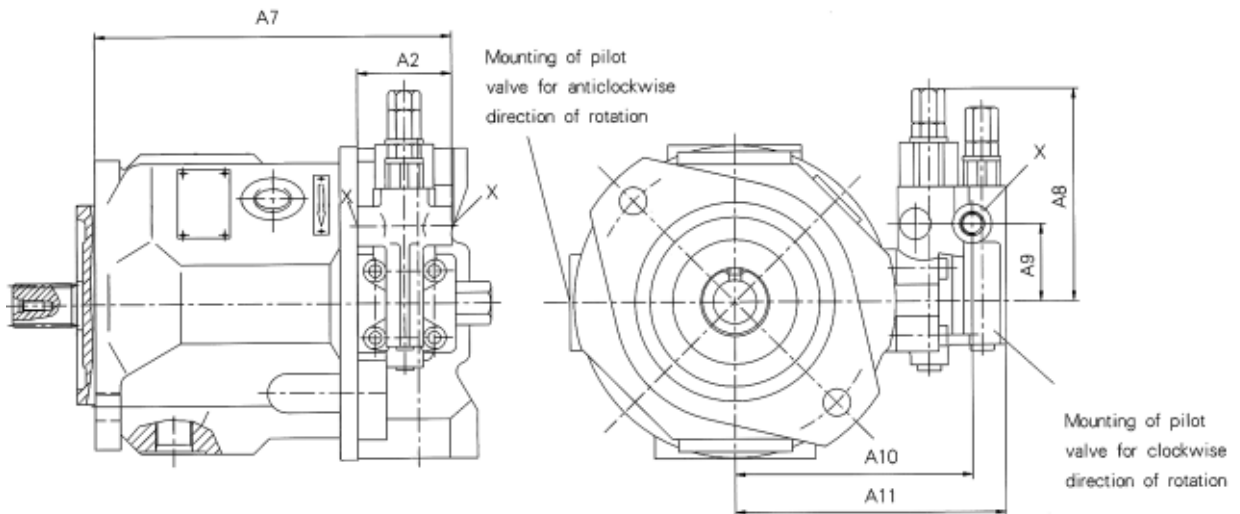
Unit dimensions DFR / DFR1 / DRG
Service ports at rear; Models 61N00 and 11N00

Sizes 18 to 100



Unit dimensions DFR / DFR1 / DRG
Service ports on sides; Models 62N00 and 12N00

Sizes 18 to 100

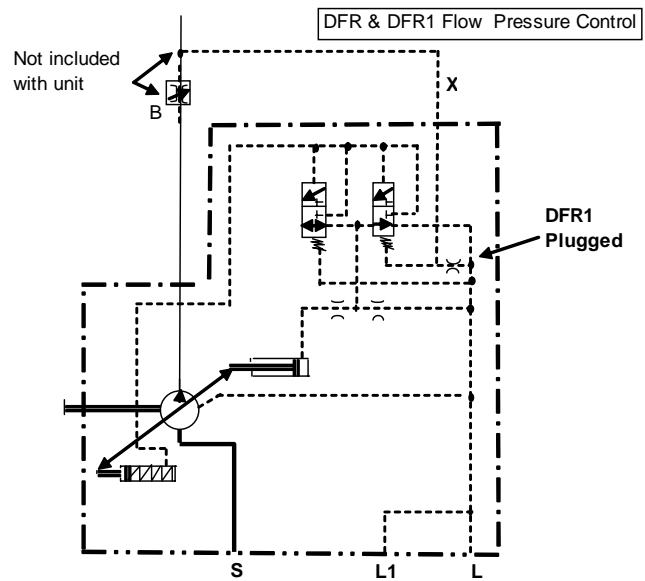
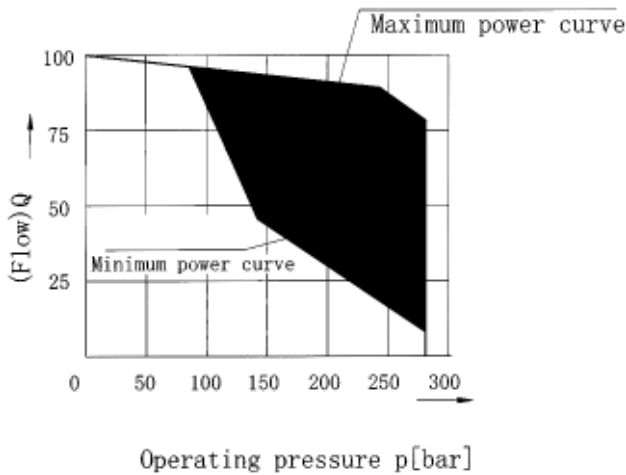


Sizes	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	X
18	62	36	105	40	198	226	160	100	35	115	126	7/16-20UNF-2B
28	73	36	108.5	40	209.2	226.2	176	108.5	40	119	136	7/16-20UNF-2B
45	82	36	108.5	40	229	245	191	108.5	40	129	146	7/16-20UNF-2B
71	91	36	106	40	262	279	218.8	108.5	40	143	160	7/16-20UNF-2B
100	99	36	106	40	327	344	287	108.5	40	141	158	7/16-20UNF-2B

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.



Ports

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

The power characteristic is factory-set, so please enter details in clear text, e.g. 20 kW at 1450 rpm.

Control data

For pressure control technical data see DR Pressure control.

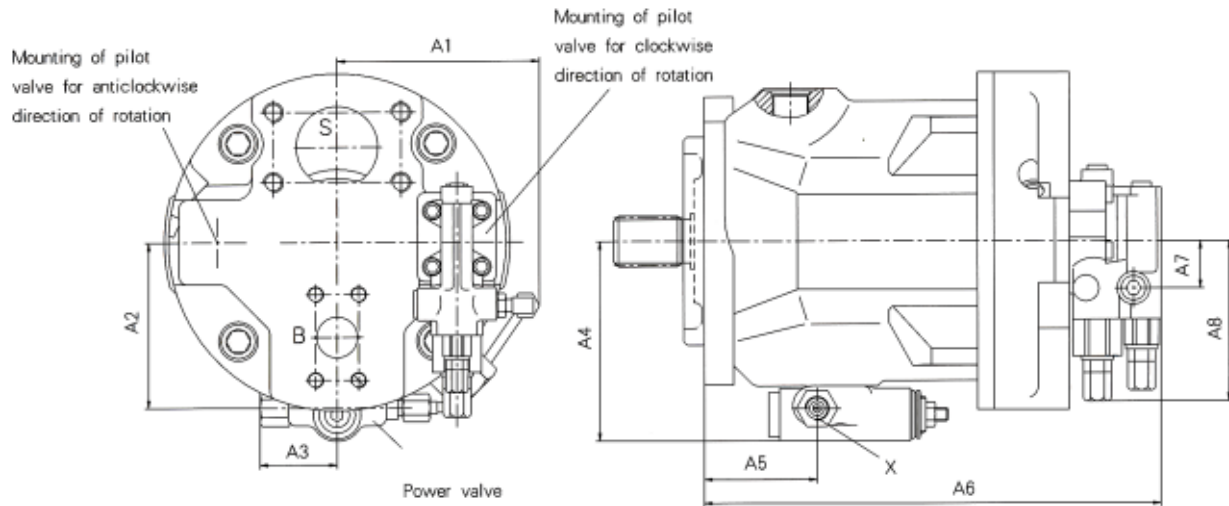
For flow control technical data see DFR control.

Start of control from 80 bar

Pilot oil consumption max. approx. 5.5 L/min

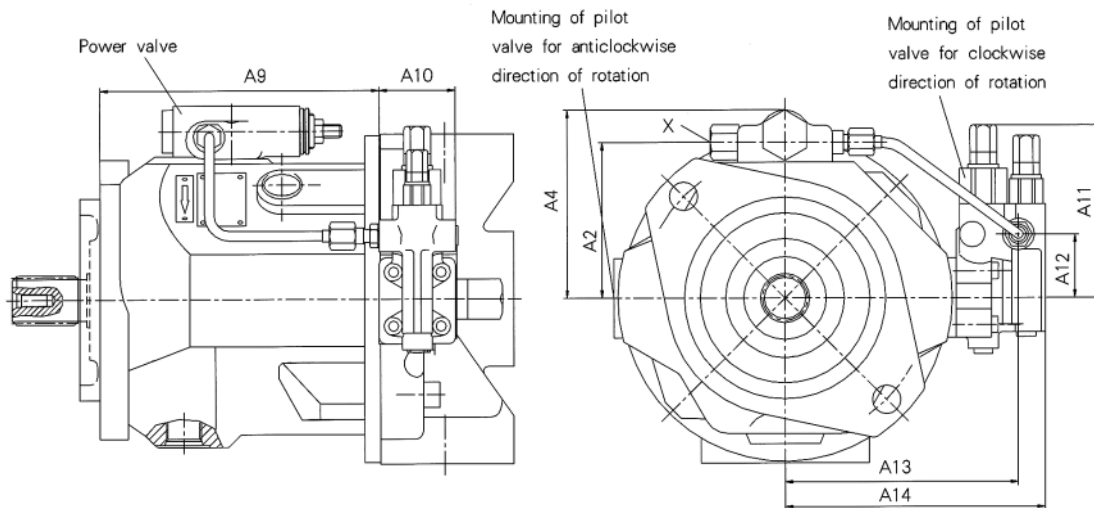
Unit dimensions DFLR
Service ports at rear; Models 61N00 and 11N00

Sizes 18 to 100



Unit dimensions DFLR
Service ports on sides; Models 62N00 and 12N00

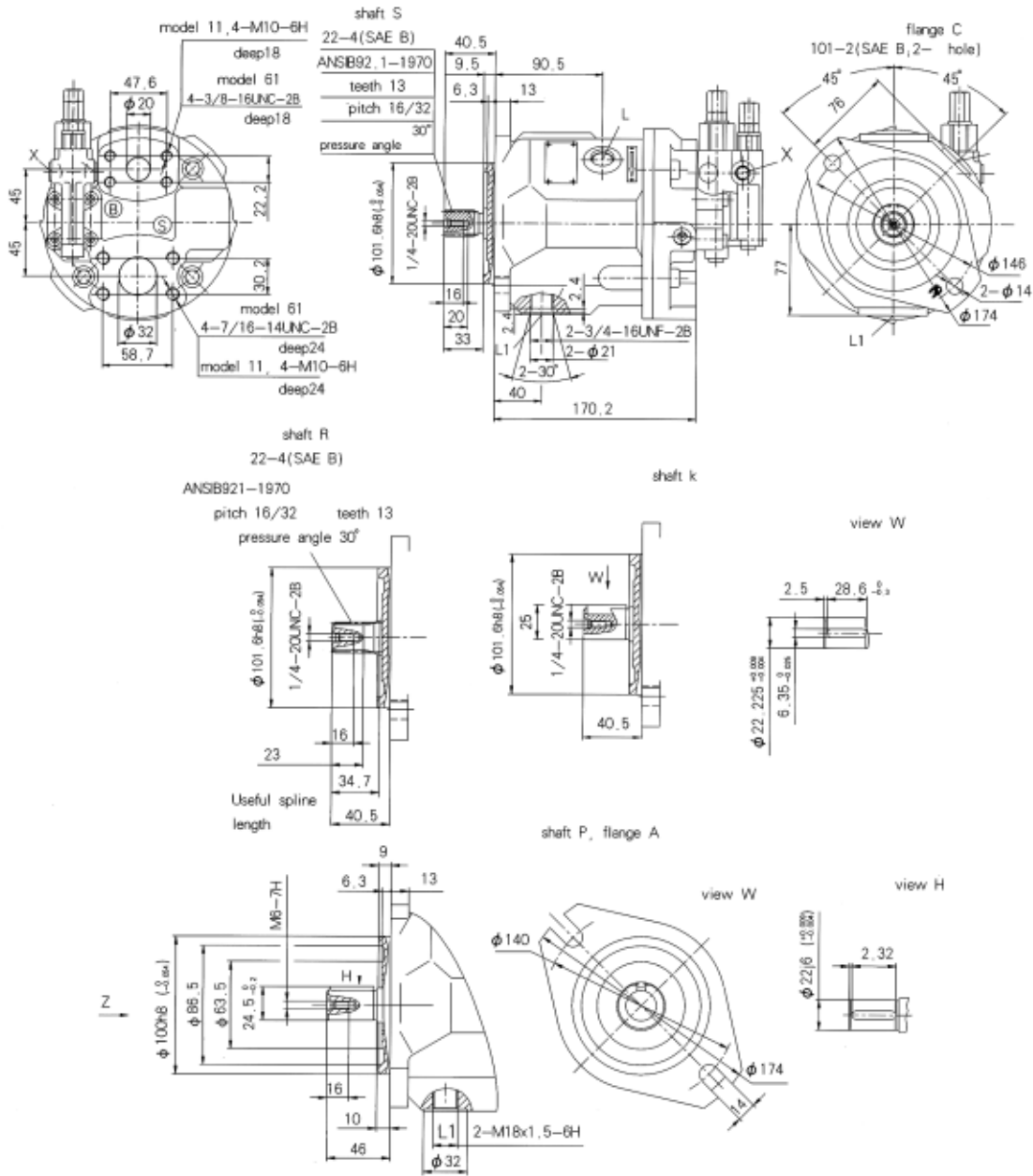
Sizes 18 to 100



Sizes	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	X
18	-	-	-	-	-	226	40	105	130	50	100	35	115	126	
28	120	86	48	107	48	226	40	108	140	50	108.5	40	119	136	7/16-20UNF-2B
45	129	91.5	48	112	54	245	40	108	155	50	108	40	129	146	7/16-20UNF-2B
71	139	103.5	48	124	69	279	40	106	183	50	108.5	40	143	160	7/16-20UNF-2B
100	145	108.5	48	129	111	344	40	106	250	50	108.5	40	141	158	M14 x 1.5-6H

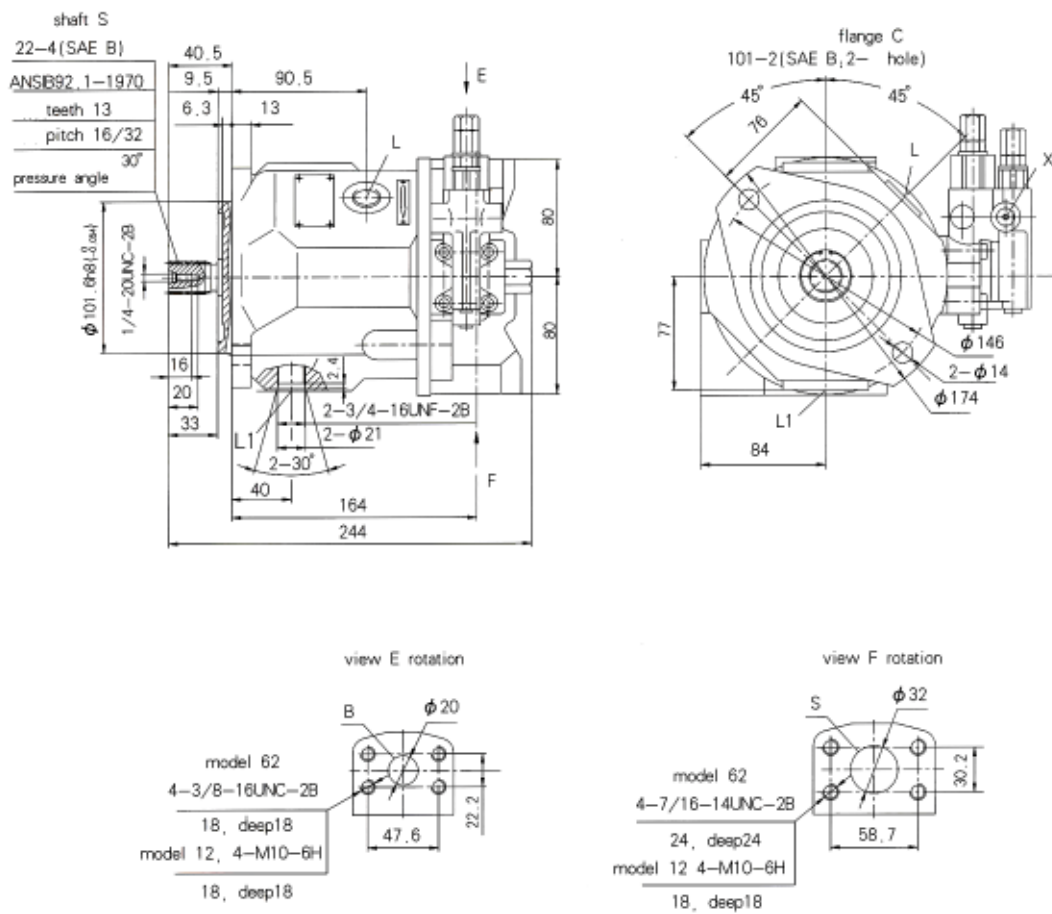
Mounting Dimension, Sizes 28

Service ports at rear; no through drive
Models 61N00 and 11N00



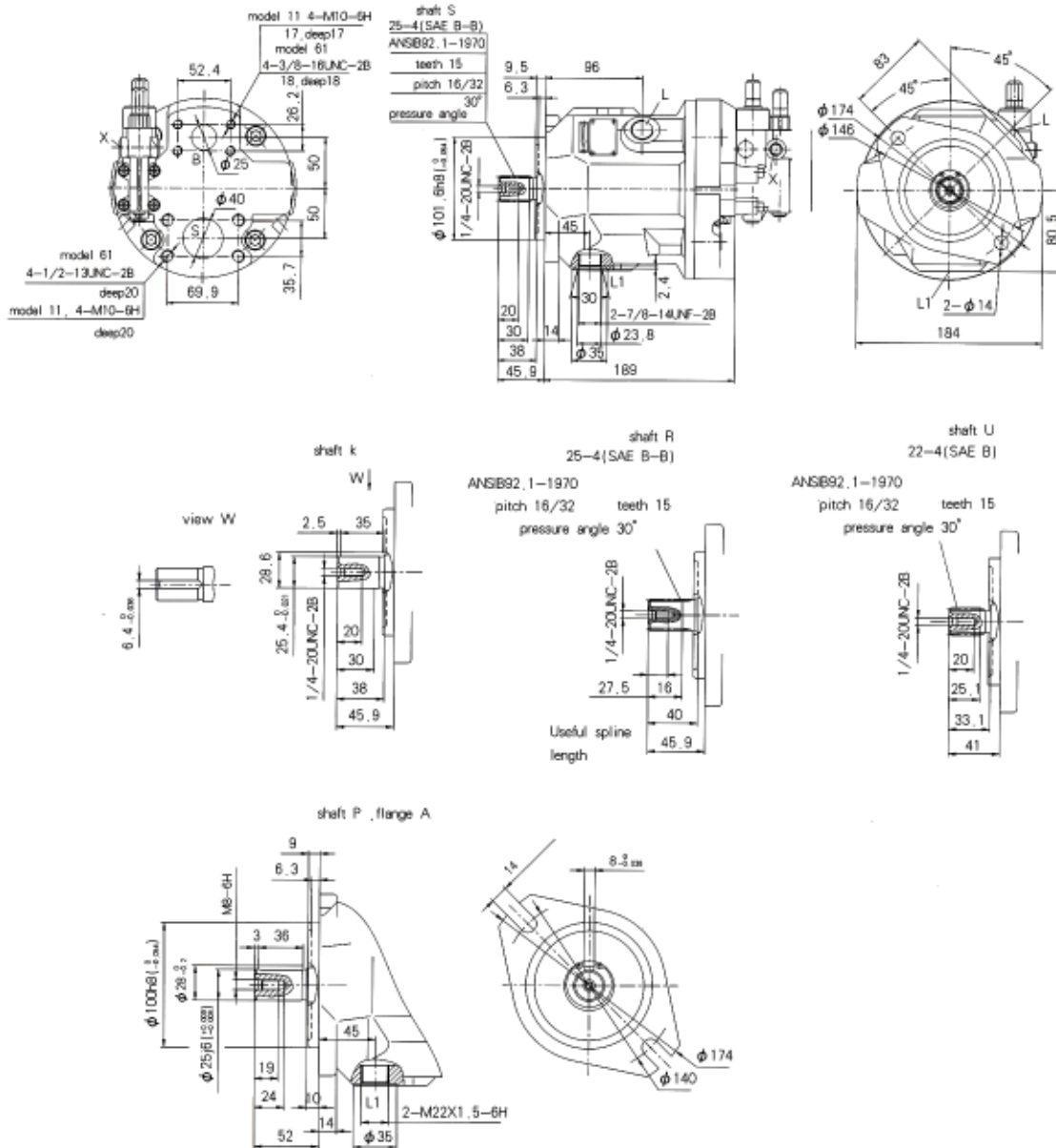
Mounting Dimension, Sizes 28

Service ports on side;
no through drive, Models 62N00 and 12N00



Mounting Dimension, Sizes 45

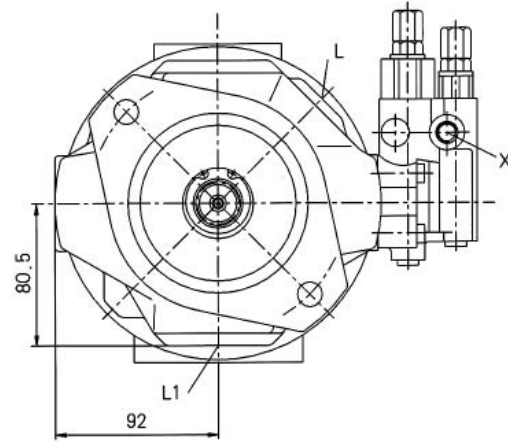
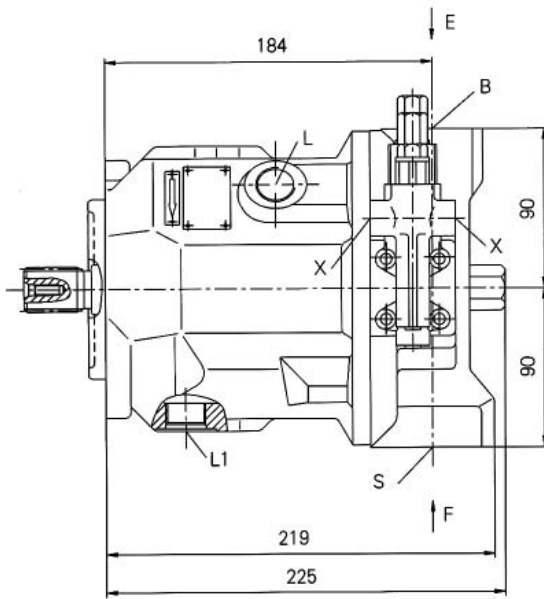
Service ports at rear;
no through drive, Models 61N00 and 11N00



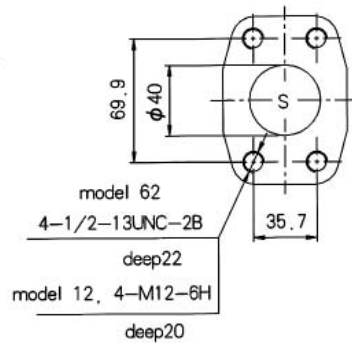
Mounting Dimension, Sizes 45

Service ports on side;
no through drive, Models 62N00 and 12N00

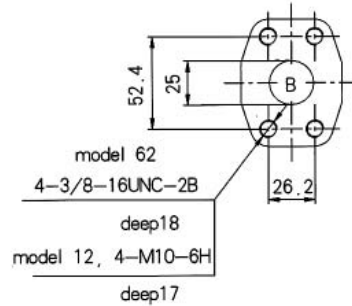
Without considering adjustment



view F rotation

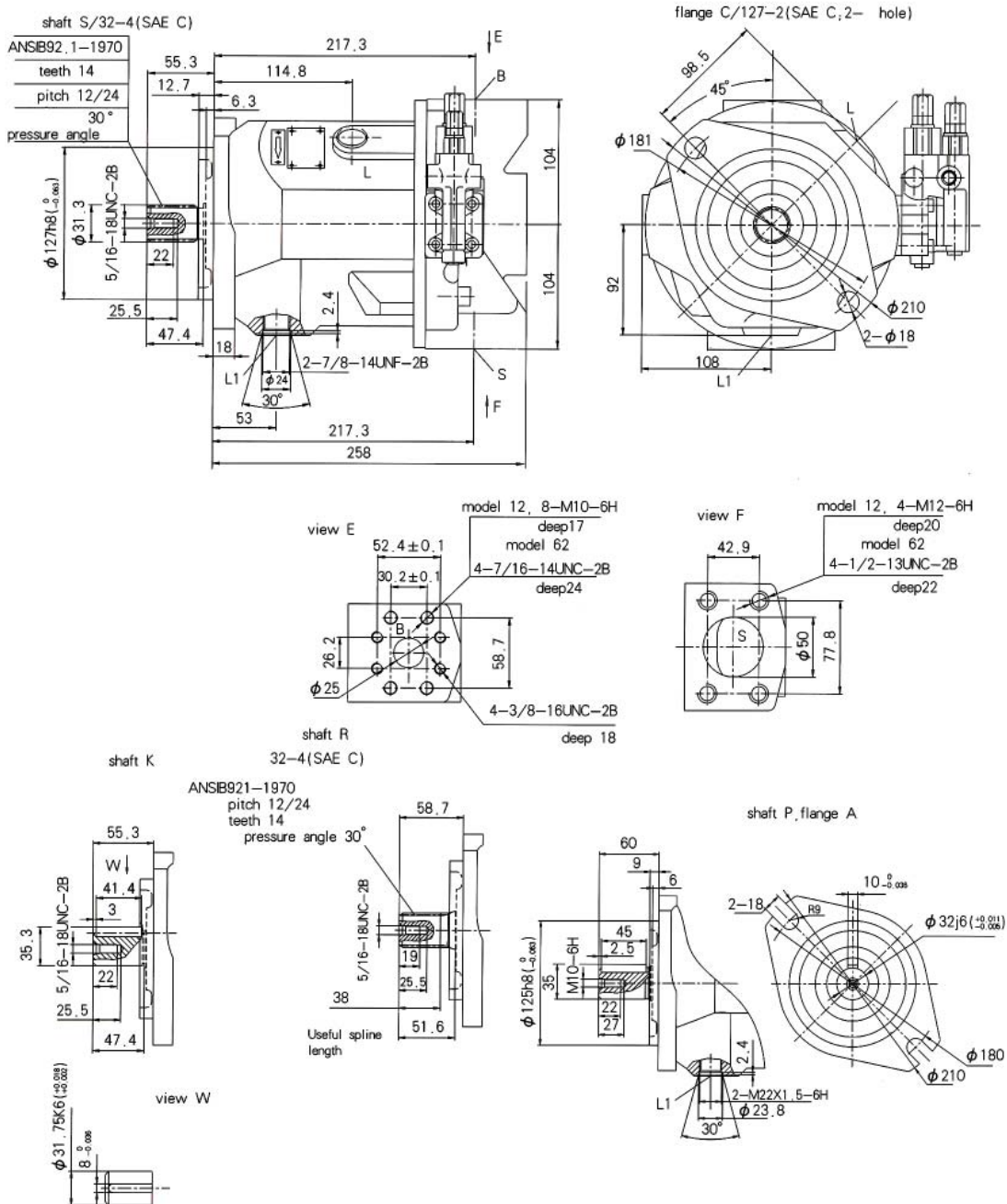


view E rotation



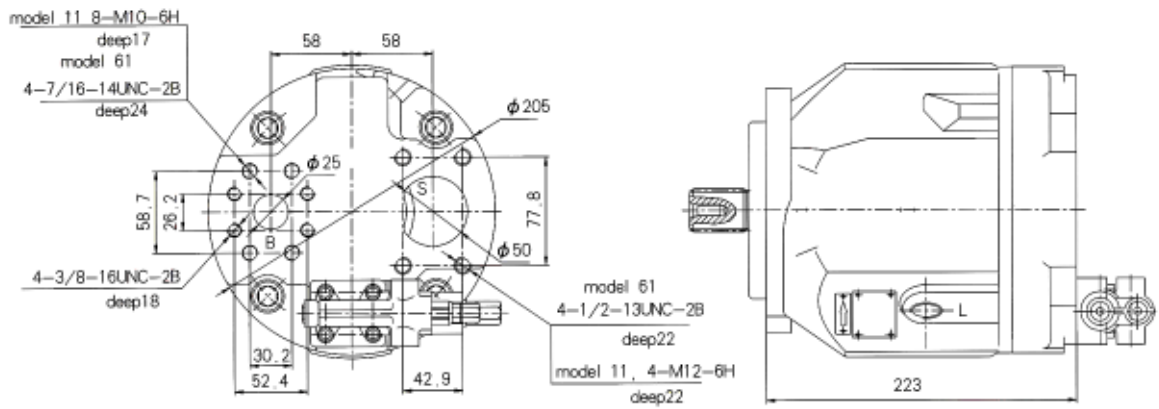
Mounting Dimension, Sizes 71

Service ports on sides;
no through drive, Models 62N00 and 12N00



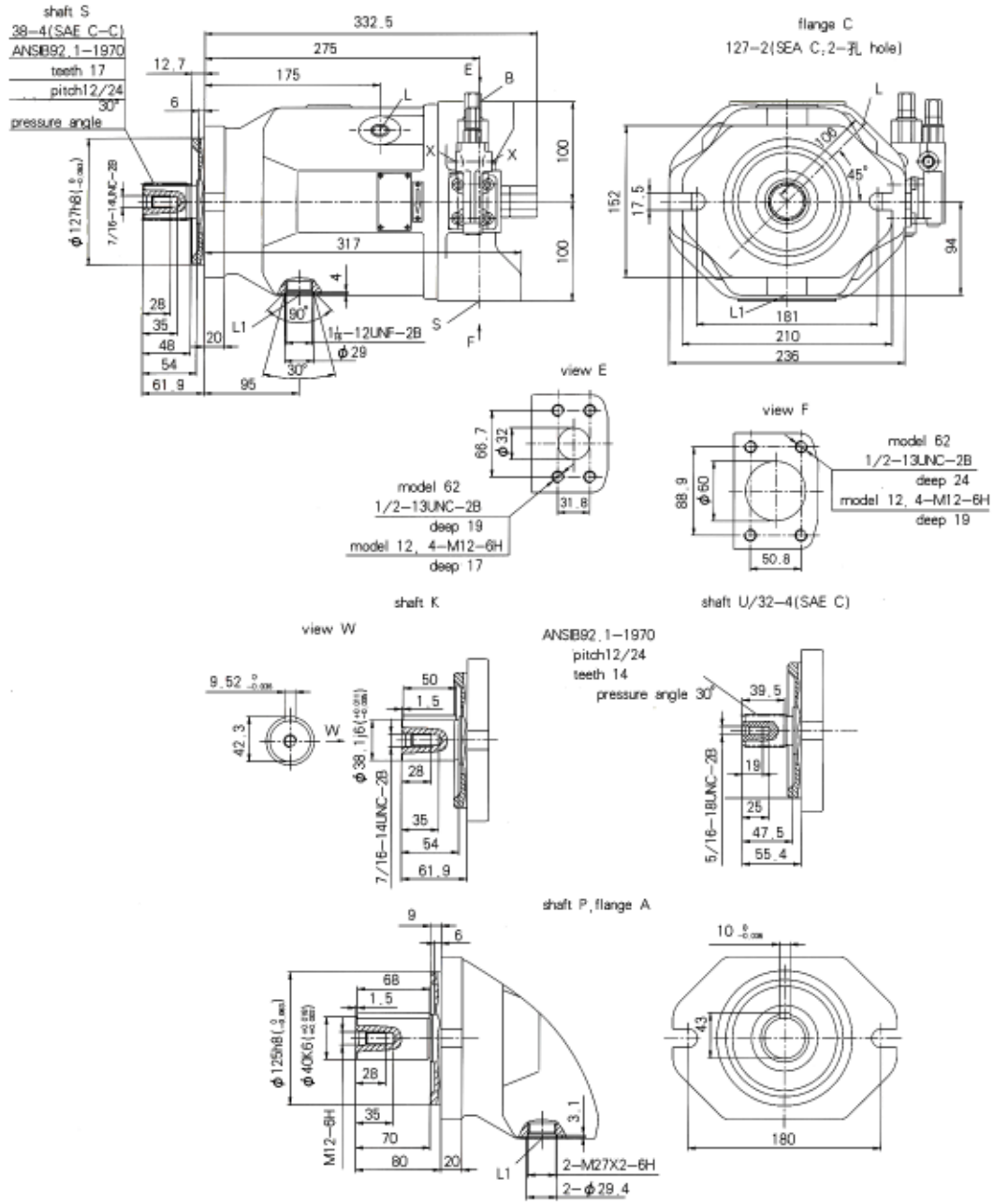
Mounting Dimension, Sizes 71

Service ports at rear;
no through drive, Models 61N00 and 11N00

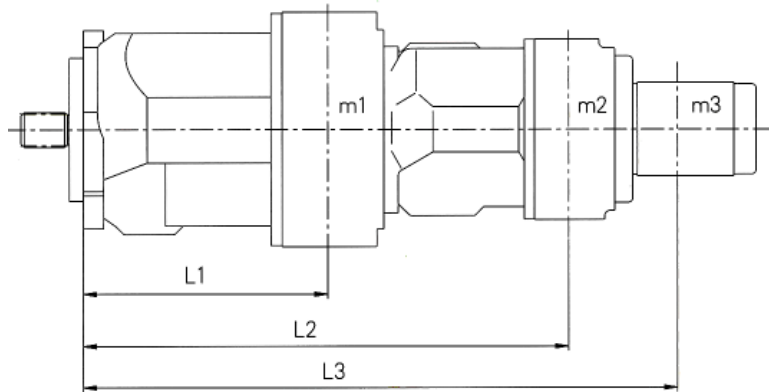


Mounting Dimension, Sizes 100

Service ports on sides;
no through drive, Models 62N00 and 12N00



Permissible moment of inertia



M1, m2, m3 [Kg] Mass of pump
 L1, L2, L3 [mm] Distance between centres of gravity
 $Mm=(m1 \cdot m2 \cdot L2 + m3 \cdot L3) \cdot 1/102$ [Nm]

Sizes		28	45	71	100
Mm	Nm	88	137	216	300
m1	kg	15	21	33	45
L1	mm	110	130	150	160

Through Drive

Axial piston unit MA10VO can be supplied with a through drive, as shown in the ordering code on page 4.

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, seals and if necessary a sandwich flange.

Combination pumps

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

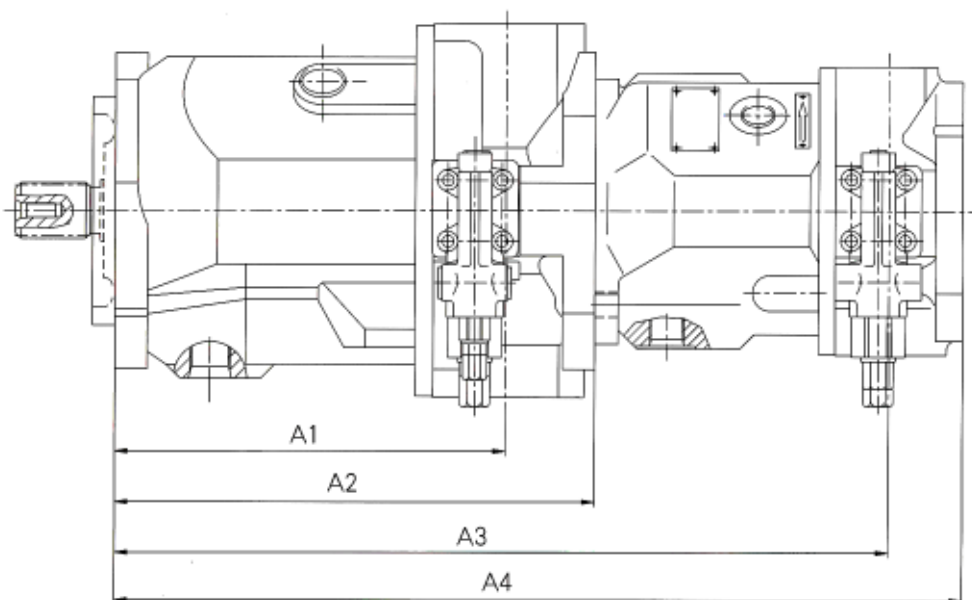
1. If the combination pump consists of 2 MA10VO pumps and if these are to be delivered ready assembled, then the two type codes are to be combined with a “+”.

Ordering example: MA10VO71DR/31R-PSC62K02 + MA10VO28DR/31R-PSC62N00

2. If a gear pump or radial piston pump is to be mounted in the factory as a second pump, it contains a list of the various pump combinations together with the type code of the first pump.

Unit Dimensions of Combination Pumps

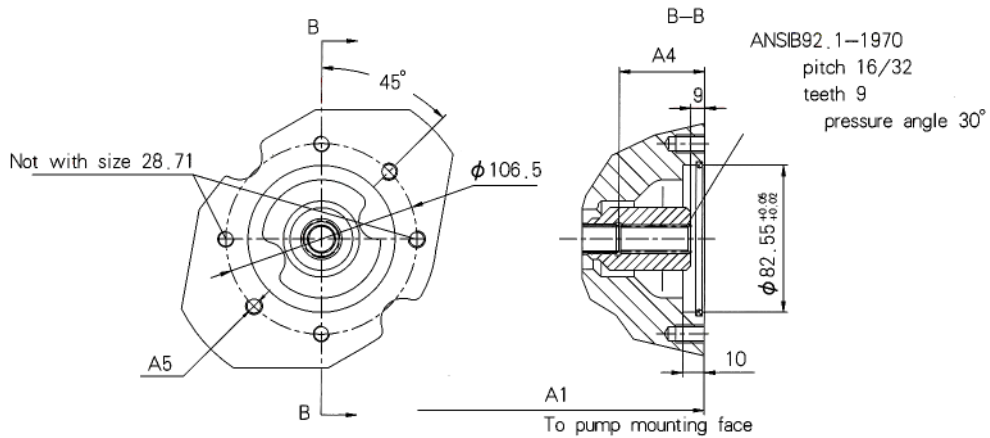
MA10VO + MA10VO



Pump 1 Pump 2	MA10VO28				MA10VO45				MA10VO71				MA10VO100			
	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4
MA10VO28	165	204	369	408	184	229	394	423	217	267	432	461	275	338	503	532
MA10VO45	-	-	-	-	184	229	413	458	217	267	451	486	275	338	522	557
MA10VO71	-	-	-	-	-	-	-	-	217	267	484	534	275	338	555	605
MA10VO100	-	-	-	-	-	-	-	-	-	-	-	-	275	338	613	676

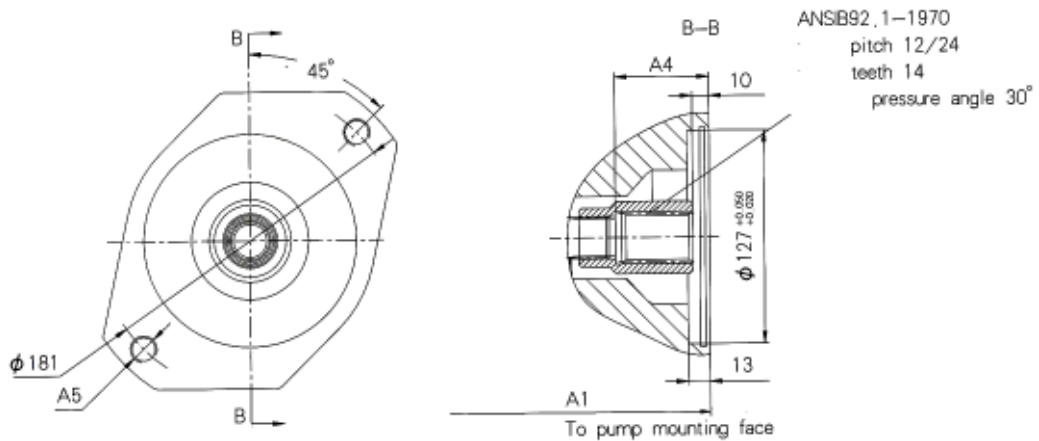
Dimensions of Through Drives

Flange SAE 82-2 (SAE A, 2-hole) for mounting of external pump. Ordering code K01



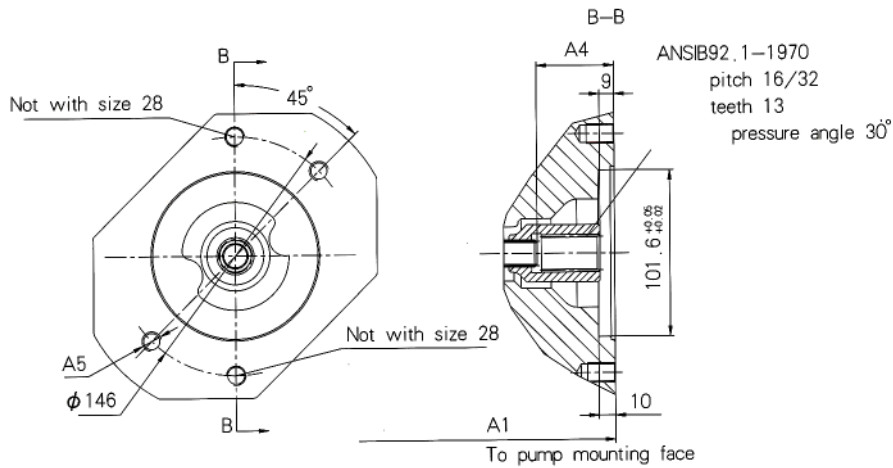
Sizes	A1	A4	A5
28	204	47	4-M10-6H, (16 deep)
45	229	53	6-M10-6H, (16 deep)
71	267	60	4-M10-6H, (20 deep)
100	338	65	6-M10-6H, (20 deep)

Flange SAE 101-2 (SAE B, 2-hole) for mounting of external pump or MA10VO28 (shaft S); Ordering code K02



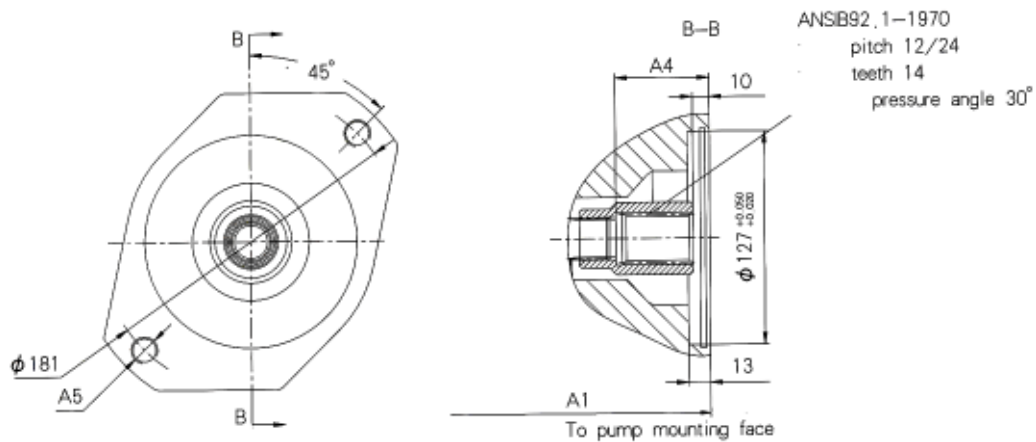
Sizes	A1	A4	A5
28	204	47	2-M12-6H, (15 deep)
45	229	53	4-M12-6H, (18 deep)
71	267	60	4-M12-6H, (20 deep)
100	338	65	4-M12-6H, (20 deep)

Flange SAE 101-2 (SAE B, 2-hole) for mounting of external pump or MA10VO28 (shaft S); Ordering code K68



Sizes	A1	A4	A5
28	204	47	2-M12-6H, (15 deep)
45	229	53	4-M12-6H, (18 deep)
71	267	60	4-M12-6H, (20 deep)
100	338	65	4-M12-6H, (20 deep)

Flange SAE 127-2 (SAE C, 2-hole) for mounting of external pump or MA10VO71 (shaft S); Ordering code K07



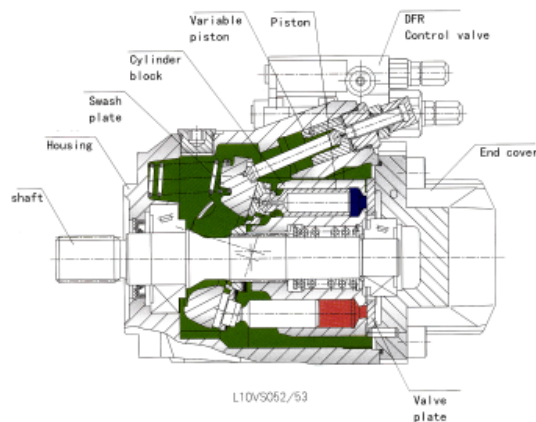
Sizes	A1	A4	A5
71	267	60	2-M16-6H, (18 deep)
100	338	65	2-M16-6H, (25 deep)

Features



Axial piston pump MA10VSO 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 case drain 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



Technical Data

1. Absolute Pressure at Port S (A)

Pabs min 0.8 bar
 Pabs max 30 bar

2. Output Operating Pressure Range

Pressure at port B
 Nominal pressure PN250 bar
 Peak pressure Pmax 315 bar

3. Case Drain Pressure

Maximum pressure of leakage fluid (at ports L, L1), Maximum 7 psi (0.5 bar) higher than input pressure at port S. but not higher than 30 psi (2 bar) absolute.

4. Direction of Flow

(S to B)

5. Table of values (theoretical values, without considering η_{mh} and η_v ; values rounded)

Size				45	60
Displacement		Vgmax	cm ³	45	60
Max. speed	at Vgmax	nomax	rmp	2600	2700
Max. flow	at nomax	Qomax	L/min	117	162
Max. power	at nomax	Pomax	kW	49	68
Max. torque	at Vgmax	Tmax	Nm	179	238
Weight (without fluid)		m	kg	18	22

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

6. Determination of Size

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

V_g = geometric displacement [cm³] per rev.

ΔP = differential pressure [bar]

Drive torque $T = \frac{1.59 \cdot V_g \cdot \Delta P}{100 \cdot \eta_{mh}}$ [N.m]

n = speed [rpm]

η_v = volumetric efficiency

Drive power $P = \frac{2 \pi \cdot T \cdot n}{60000} = \frac{Q \cdot \Delta P}{600 \cdot \eta_t}$ [Kw]

η_{mh} = mechanical-hydraulic efficiency

η_t = total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Ordering Code

	MA10VS	0	45	DFR	52/53	R	P	S
Axial piston unit								
Swash plate variable pump	MA10VS							
Modes of operation								
Pump, open circuit		●						
Size								
Displacement Vgmax (cm ³)		45	60					
Control devices								
Pressure control		●	●	DR				
G - Remote control				DRG				
Pressure and flow control, I-X X channel closed		●	●	DFR DFR1				
Series								
Series					52/53			
Direction of rotation								
Viewed on drive shaft	clockwise					R		
	counter-clockwise					L		
Seals								
Buna-N (NBR per DIN ISO 1629) ;							P	
FPM (fluorocarbon)							V	
Shaft end						45	60	
SAE-splined shaft		●	●					S
SAE-splined shaft, smaller size (not for pumps with thru drive)		●	●					U
SAE-splined shaft, reinforced U-type shaft		—	—					W
SAE-keyed shaft		●	●					K
parallel with key DIN 6885		●	●					P

Ordering Code

C	62	N00			
			45	60	
			Without through drive	●	●
			With thru-drive, pump with side port only	-	-
			Mounting flange Shaft/coupling For the mounting of:	-	-
			Service ports		
			(Pressure port B and Suction port S)		
			45	60	
			(Rear ports, UNC Mounting screws)	●	●
			(Opposite side ports, UNC mounting screws)	●	●
			(Rear ports, metric mounting screws)	●	●
			(Opposite side ports, metric mounting screws)	-	-
			(SAE-theaded rear)	-	-
					Port pos. 61, 11, 91 and 41 only for version without through drive
				61	
				62	
				11	
				12	
				64	
			Mounting flange		
			45	60	
			SAE 2 hole	●	●
			ISO 2 hole	●	●
			SAE 4 hole	●	●
					C
					A
					D

●	= available
---	-------------

Fluid

1. Hydraulic Fluid

The MA10V open loop pump in the standard design should be used with a good quality, petroleum based anti-wear hydraulic fluid.

2. Operating Viscosity Range

In order to obtain optimum efficiency we recommend that the operating viscosity be selected from within the range.

At operating temperature

Optimum viscosity (V_{opt}) \approx 80...170 SUS (16 / 36 mm² / s)

3. Limits of viscosity range

The following values are valid for extreme operating conditions:

V_{min} = 60 SUS (10 mm² / s)

for short periods at max. leakage oil temperature of 93° C

V_{max} = 4600SUS (1000 mm² / s)

1400 SUS (300 mm²/s) on short term cold start

4. Temperature Range

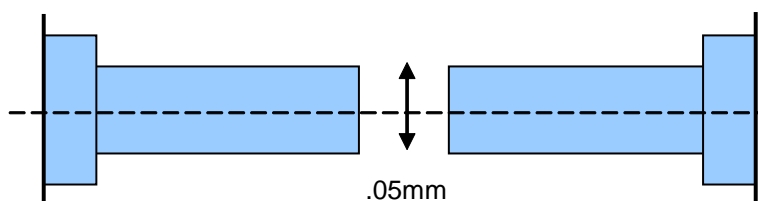
t_{min} = -15°C; t_{max} = +80°C.

5. Filtration

In order to ensure reliable operation of the axial piston unit, the operating fluid must be maintained to a cleanliness class of 18/14 to ISO4406 or NAS 1638 class 9. As a guide the fluid cleanliness level may be achieved using a 10 micron filter.

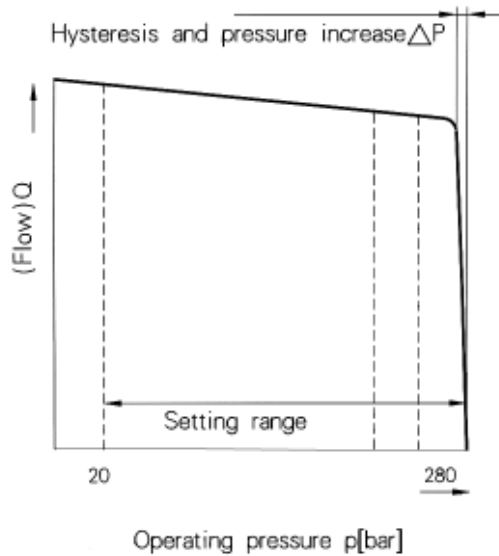
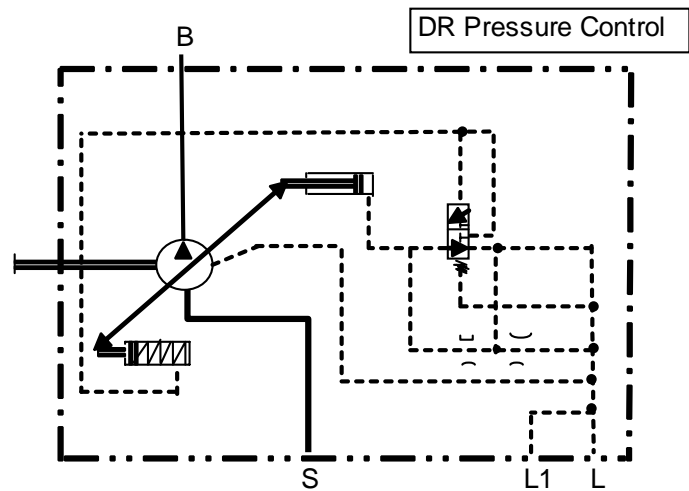
Installation Information

The pump housing must be filled with clean hydraulic fluid prior to pump start up and remain full. The concentricity between the prime mover drive shaft and the pump shaft 0.05mm.



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.



Ports

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

Control Data

Hysteresis and repetitive accuracy Δp Max. 3 bar

Size		45	60
ΔP	Bar	6	8

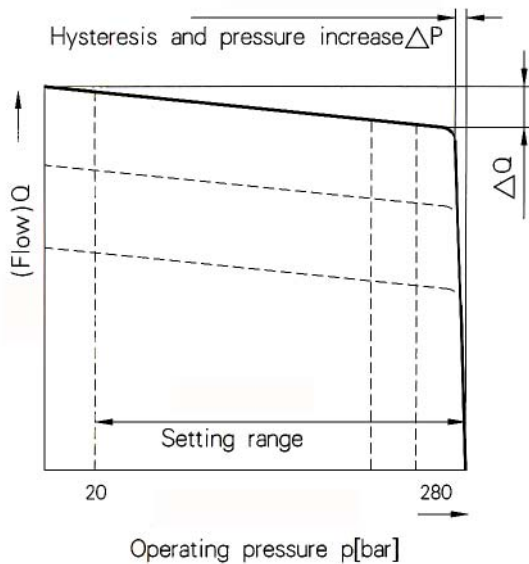
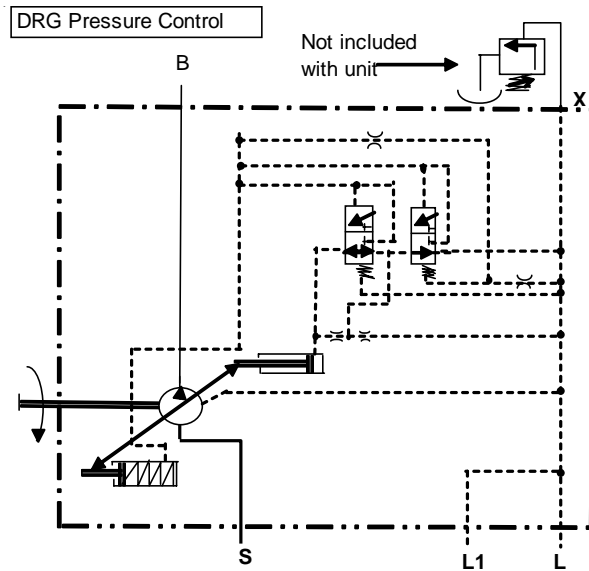
Pilot oil consumptionmax. approx. 3 L/min

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.



Ports

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

Control Data

Hysteresis and repetitive accuracy Δp max. 3 bar

Max. pressure increase

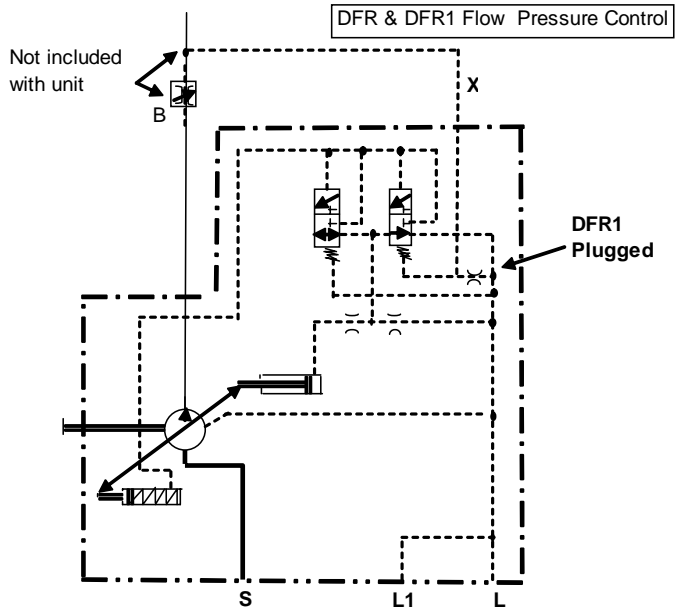
Size		45	60
ΔP	Bar	6	8

Pilot oil consumption max. approx. 4.5 L/min

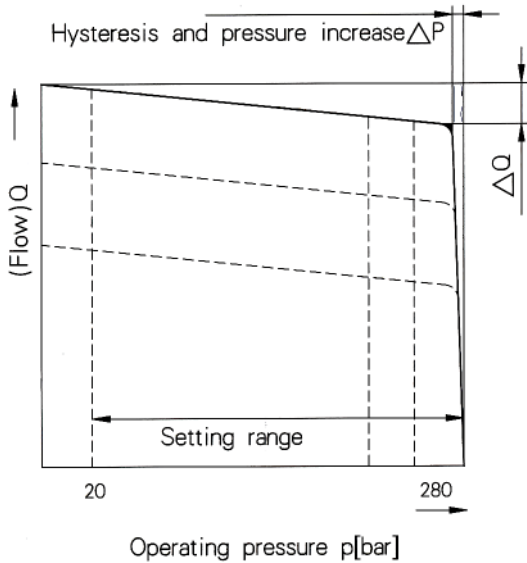
DFR / DFR1 Pressure/Flow Control

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.



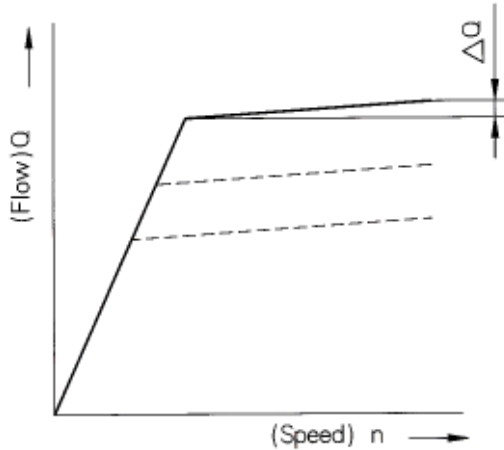
Static characteristic
(at $n_1=1450\text{rpm}$; $t_{oil}=50^\circ\text{C}$)



Ports

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

Static characteristic at variable speed



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.

Control Data

For pressure control technical data see DR Pressure control

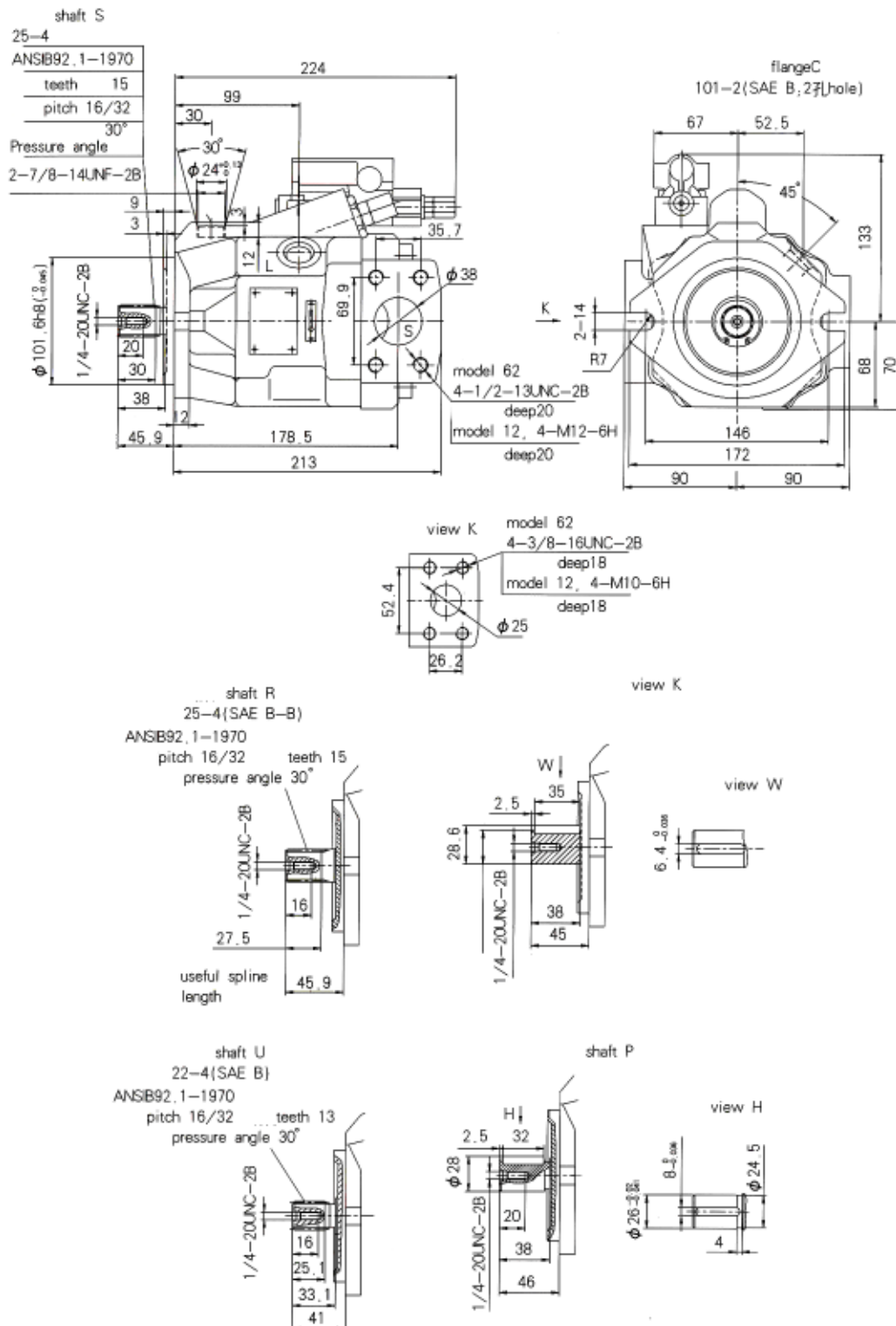
Max. flow deviation (hysteresis and increase) measured at drive speed $n = 1450$ rpm

Size		45	60
ΔQ_{max}	L/min	1.8	2.5

- DFR 3-4.5L/min
- Pilot oil consumption DFR max. approx. 3-4.5 L/min
- DFR1 3L/min
- Pilot oil consumption DFR1 max. approx. 3 L/min

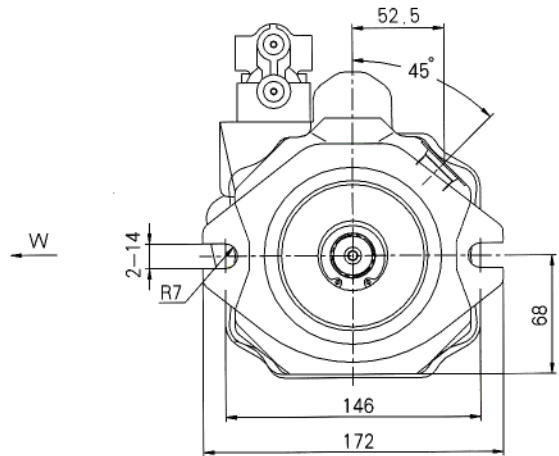
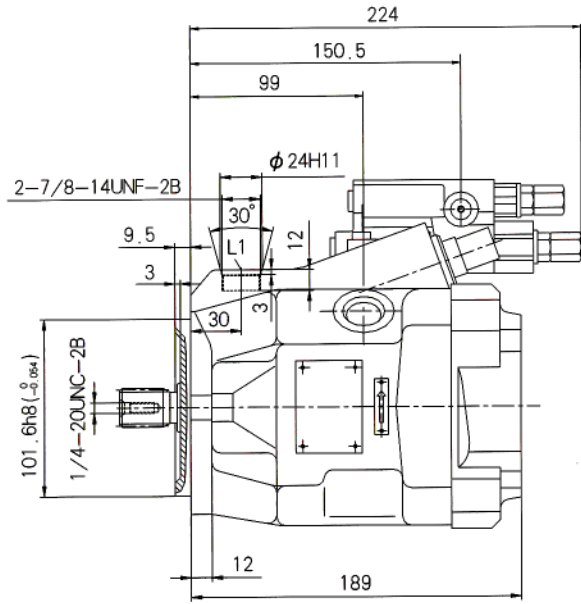
Mounting Dimension, Sizes 45

Pressure control DR
Version MA10VSO45DR/52R-XXC62/12N00

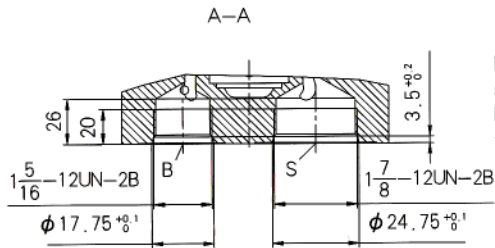


Mounting Dimension, Sizes 45

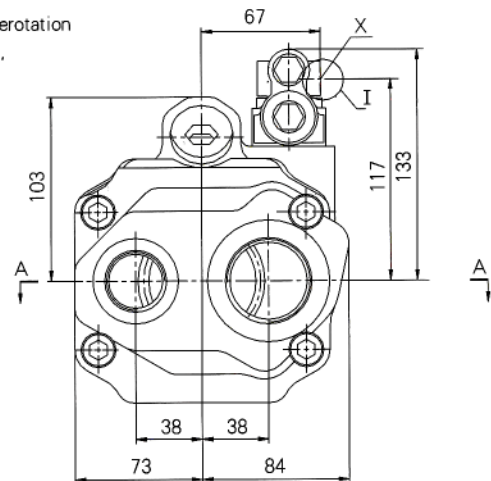
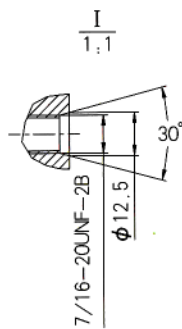
DFR
 Version MA10VSO45 DFR1 /52L-XXC64N00
 DRG



W向; view W

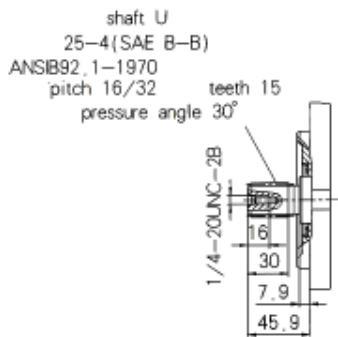
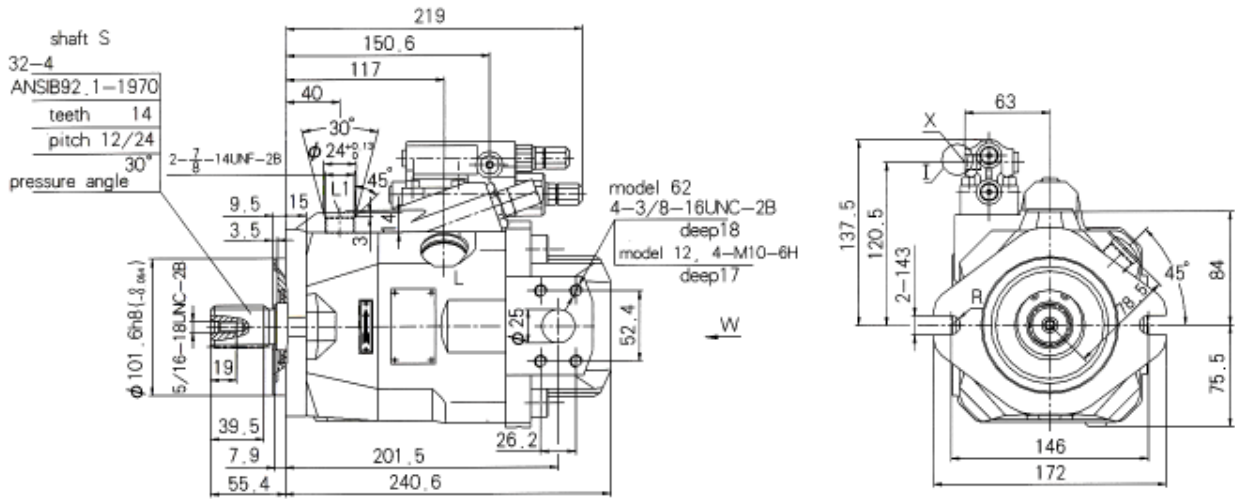


Port plate 64 shown is anticlockwise rotation. For clockwise rotation, turn port plate 180°

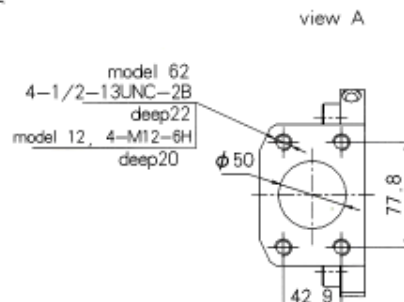
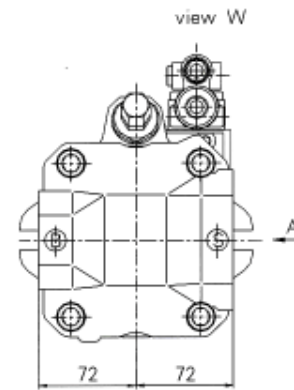
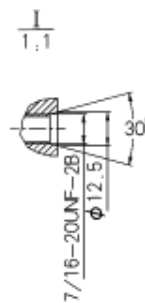


Mounting Dimension, Sizes 60

DFR
 Version MA10VSO60 DFR1 /53L-XXC62 /12N00
 DRG

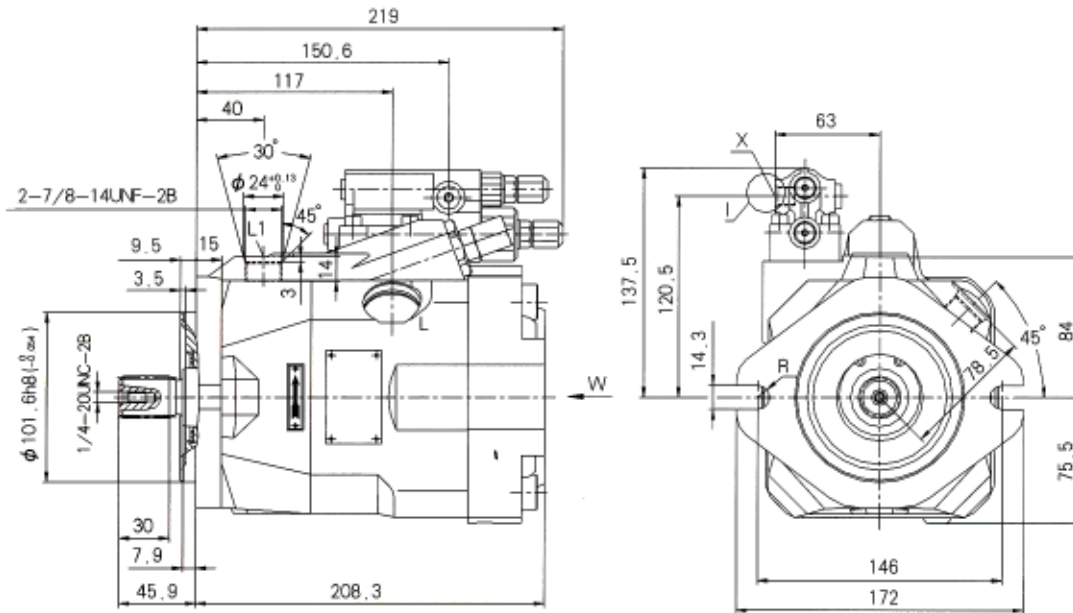


Port plate 62/12
 shown is anticlockwise rotation
 For clockwise rotation,
 turn port plate 180°



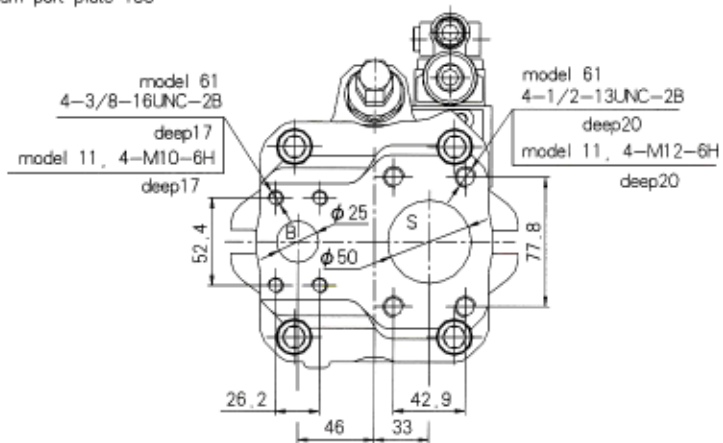
Mounting Dimension, Sizes 60

DFR
 Version MA10VSO60 DFR1 /53L-XXC61 /11N00
 DRG



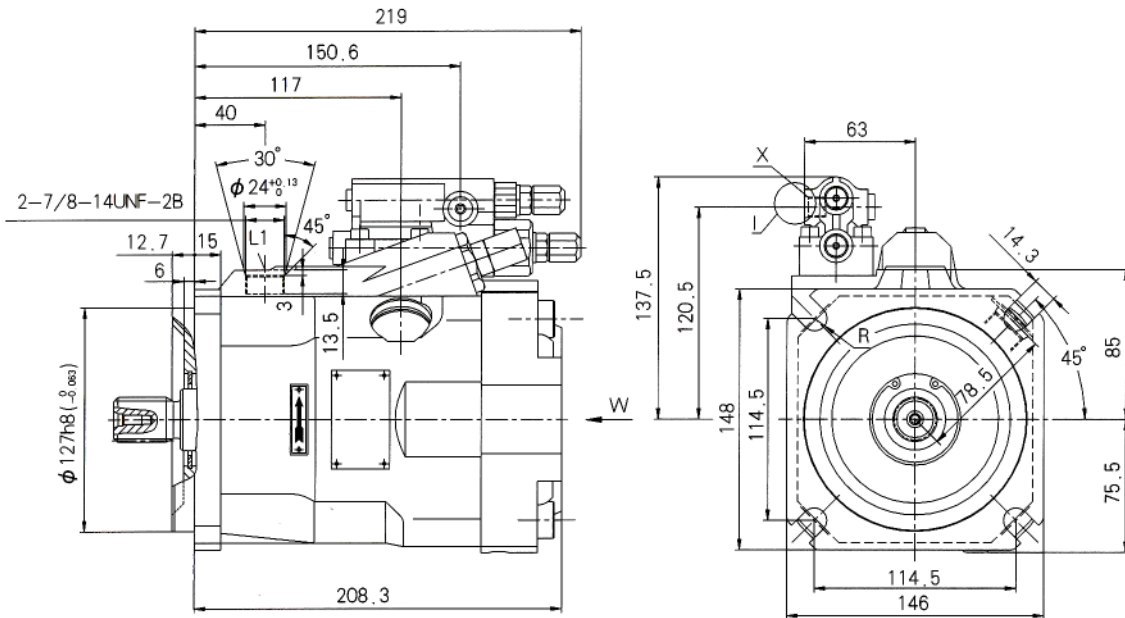
Port plate 61/11
 shown is anticlockwise rotation
 For clockwise rotation,
 turn port plate 180°

view W



Mounting Dimension, Sizes 60

Version MA10VSO60 DFR
 DFR1 /53L-XXD61 /11N00
 DRG



Port plate 61/11
 shown is anticlockwise rotation
 For clockwise rotation,
 turn port plate 180°

