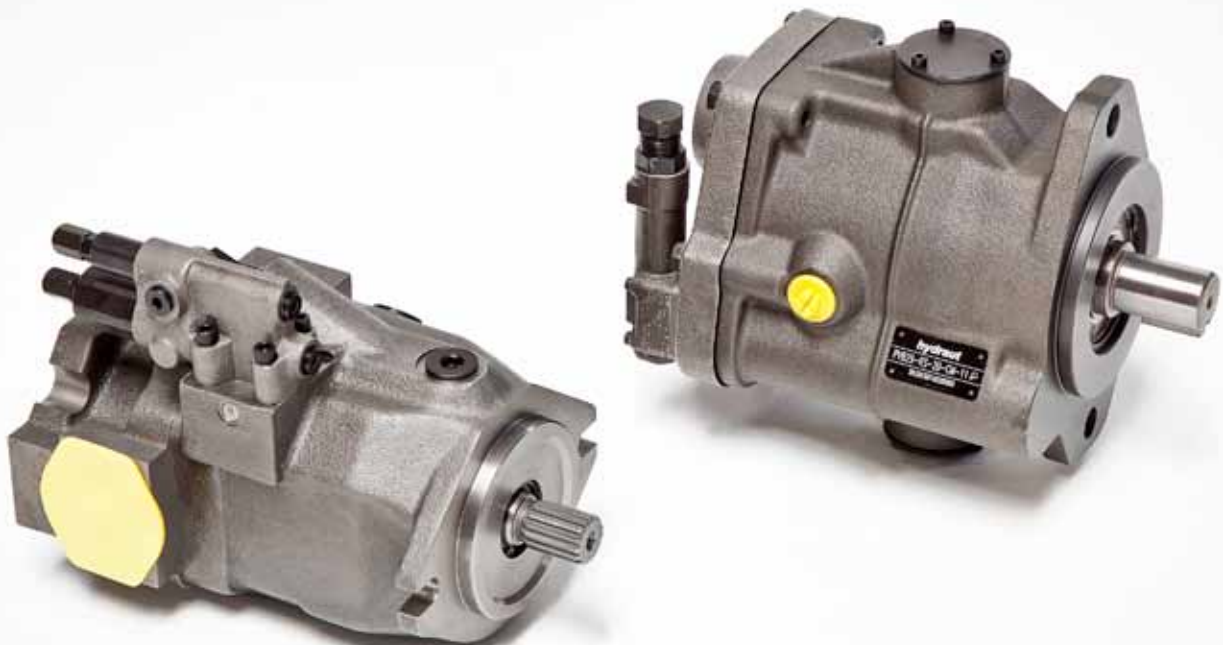# PISTON PUMP HSP10VO

SERIES 52

- Sizes 45cc, 60cc.
- Axial piston swashplate design.
- Nominal pressure: 250 bar.
- Peak pressure: 315 bar.
- Thru drive auxiliary mounting flange.
- Controllers available: Pressure, Pressure/Flow, Pressure/Flow/Power.

hydraut

VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52

FEATURES

Axial piston pump HSP-10VO in swashplate design is used 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.

- Port connections to SAE or metric
- 2 case drain ports
- Operating pressure 3625 psi (250 bar)
- 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 available
- SAE & ISO mounting flanges available
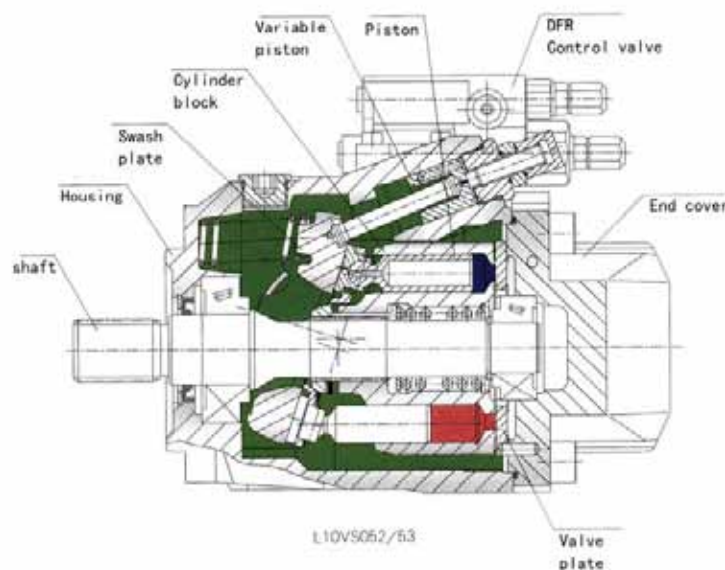
VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52

TECHNICAL DATA

1. **Input Operating Pressure Range**
   Absolute pressure at port S (A)
   Pabs min .... 11.6 PSI or (0.8 Bar)
   Pabs max .... 435 PSI or (30 Bar)

2. **Output Operating Pressure Range**
   Pressure at port B
   Nominal pressure .... P_N 3625 PSI or (250 Bar)
   Peak pressure .... Pmax 4500 PSI or (315 Bar)

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" inlet port to "B" pressure port)

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

Size				45	60
Displacement		V_{gmax}	cm^3	45	60
Max. Speed	at V_{gmax}	n_{omax}	rmp	2600	2700
Max. flow	at n_{omax}	Q_{omax}	L/min	117	162
Max. power	at n_{omax}	P_{omax}	kW	49	68
Max. torque	at V_{gmax}	T_{max}	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.

HYDRAULIC FORMULA

1. **Determination of Size**

	Imperial	Metric

Flow $\quad Q = \dfrac{V_g \bullet n \bullet \eta_v}{231}$ gpm $\qquad \dfrac{V_g \bullet n \bullet \eta_v}{1000}$ L/min

Torque $\quad T = \dfrac{V_g \bullet \Delta p}{24 \bullet \pi \bullet \eta_{mh}}$ lb-ft $\qquad \dfrac{V_g \bullet \Delta p}{20 \bullet \pi \bullet \eta_{mh}}$ Nm

Power $\quad P = \dfrac{Q \bullet \Delta p}{1714 \bullet \eta_t}$ HP $\qquad \dfrac{Q \bullet \Delta p}{600 \bullet \eta_t}$ kW

V_g = geometric displacement cu.in. or [cm^3] per rev.

Δp = differential pressure PSI or (Bar)

n = speed [rpm]

η_v = volumetric efficiency

η_{mh} = mechanical-hydraulic efficiency

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

Q = Flow (gpm) or (L/min.)

VARIABLE DISPLACEMENT PUMP HSP10VO

SERIES 52

ORDERING CODE

	HSP-10V	0	45	DFR	52	R	P	S
Axial piston unit								
Swash plate variable pump	HSP10VS							
Modes of operation								
Pump, open circuit		●						
Size								
Displacement Vgmax (cm³)		**45**	**60**					
Control devices								
Pressure control		●	●	DR				
G - Remote control				DRG				
Pressure and flow control, X channel plugged		●	●	DFR DFR1				
Series								
Series Consult the factory for other series 50/53					52			
Direction of rotation								

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

VARIABLE DISPLACEMENT PUMP HSP10VO

SERIES 52

ORDERING CODE

C	62	N00

		45	60	
	Without through drive	●	●	N00
	Thru-drive pump with side ports only			
	82-2 SAE A 16-4 SAE A	●	●	K01
	101-2 SAE B 22-4 SAE B	●	●	K02 & K04

Service ports				
(Pressure port B and Suction port S)		**45**	**60**	
(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
(SAE-theaded rear)		●	–	64

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

Mounting flange	**45**	**60**	
SAE 2 Bolt hole	●	●	C
SAE 4 Bolt hole	–	●	D

●	= available

VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52

FLUID

1. **Hydraulic Fluid**
   The HSP-10V 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 by selected from within the range.

   At operating temperature
   Optimum viscosity (v opt) _80...170 SUS (16 / 36 mm^2/s)

Limits of viscosity range

The following values are valid for extreme operating conditions:

v min = 60 SUS (10 mm^2/s)
   for short periods at max. leakage oil temperature of 93° C

v max = 4600SUS (1000 mm^2/s)
   1400 SUS (300 mm^2/s) on short term cold start

3. **Temperature Range**

   tmin = -15°C; tmax = +80°C.; tmin

4. **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.

Prime mover drive shaft   Pump shaft

.05mm
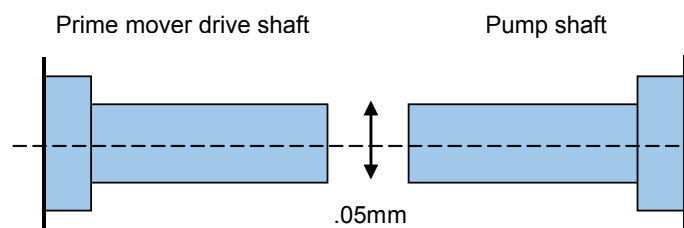
VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52

INSTALLATION INFORMATION

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, "A" may not be greater then 32 inches (800 mm).
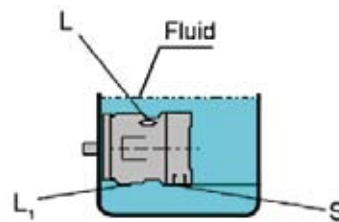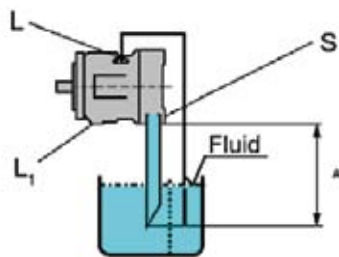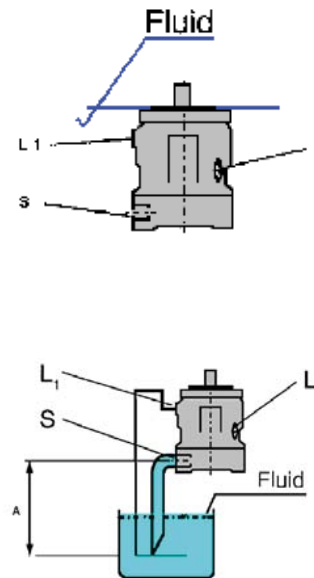
Below the tank position
    -   Pipe "L", "L1" and "S" must be mounted below the oil level
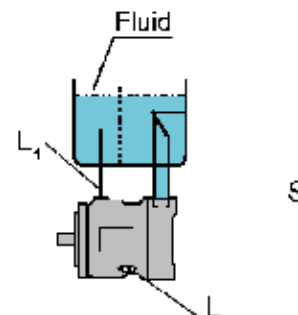
VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52

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.
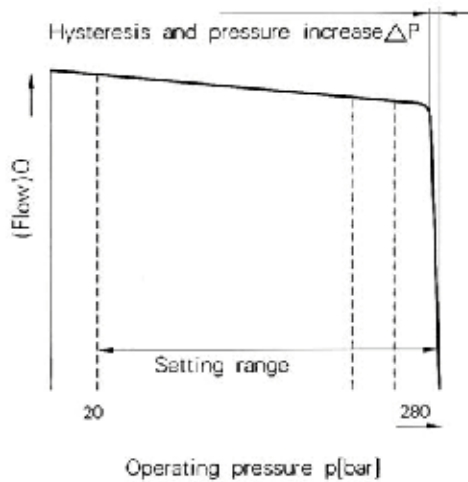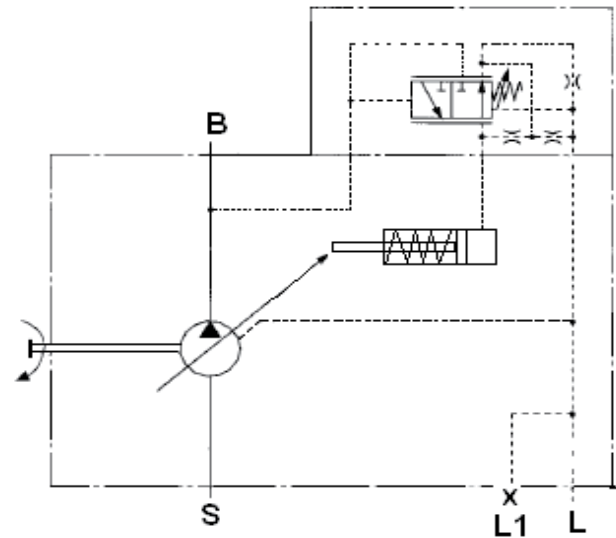
PORTS

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

CONTROL DATA

Hysteresis and repetitive accuracy Δp ……………… Max. 3 bar

Max. Pressure Increase

Size		45	60
ΔP	BAR	6	8

Pilot oil consumption …………………..max. approx. 3 L/min

For other controls DRG and DFR see page 13 & 14

VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52

MOUNTING DIMENSION, SIZES 45 Pressure

control DR

Version HSP-10VSO45DR/52R - XXC62/12NOO
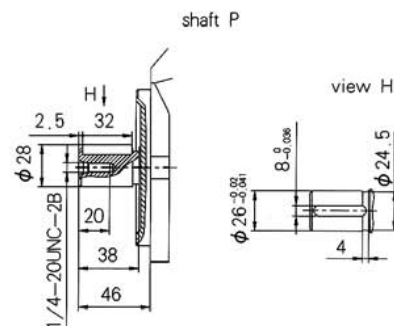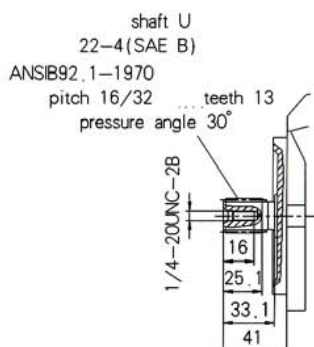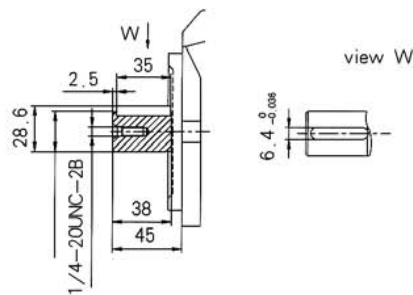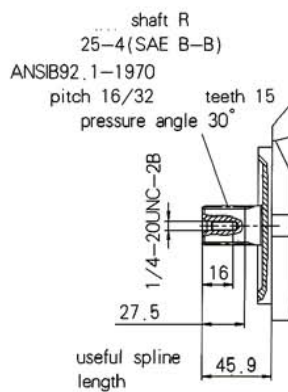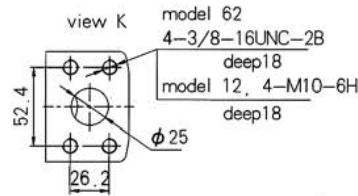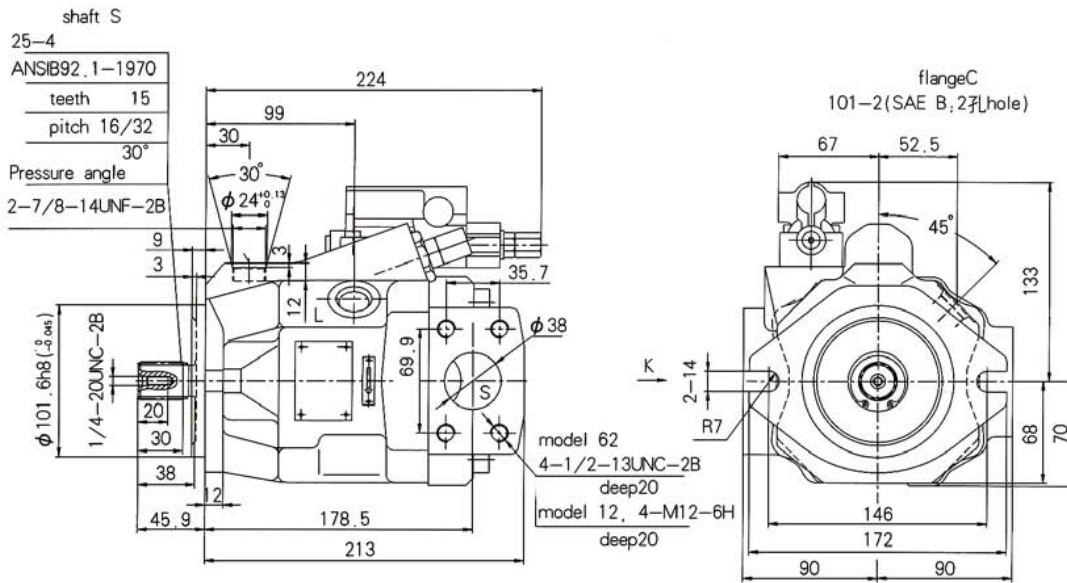
VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52
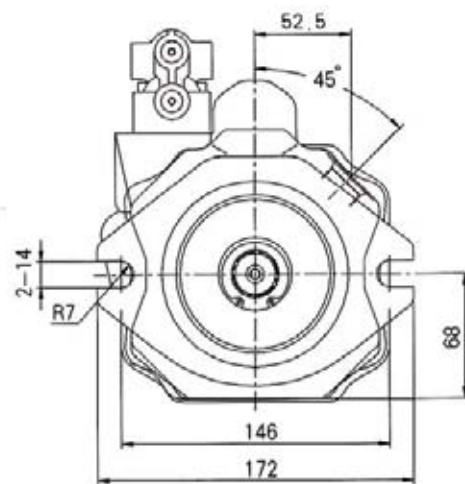
MOUNTING DIMENSION, SIZES 45
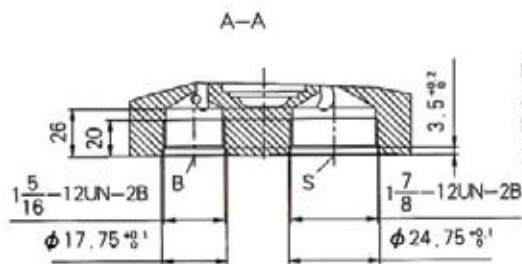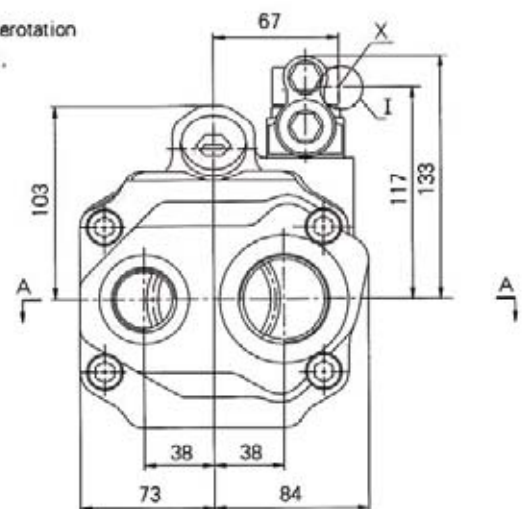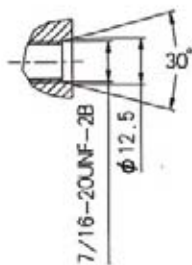
Version HSP-10VSO45

DFR

DFR1/52L - XXC64N00

DRG

A—A
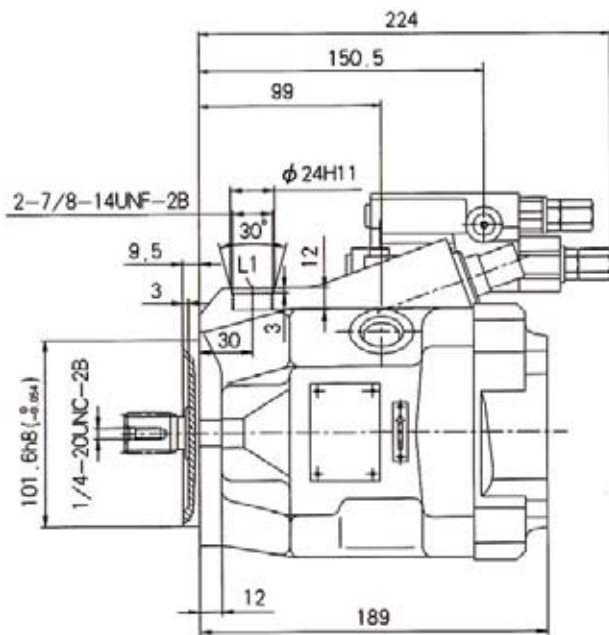
Port plate 64
shown is anticlockwiserotation
For clockwise rotation,
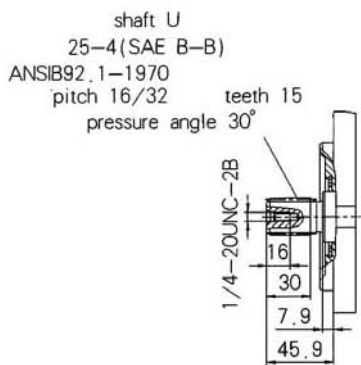turn port plate 180°
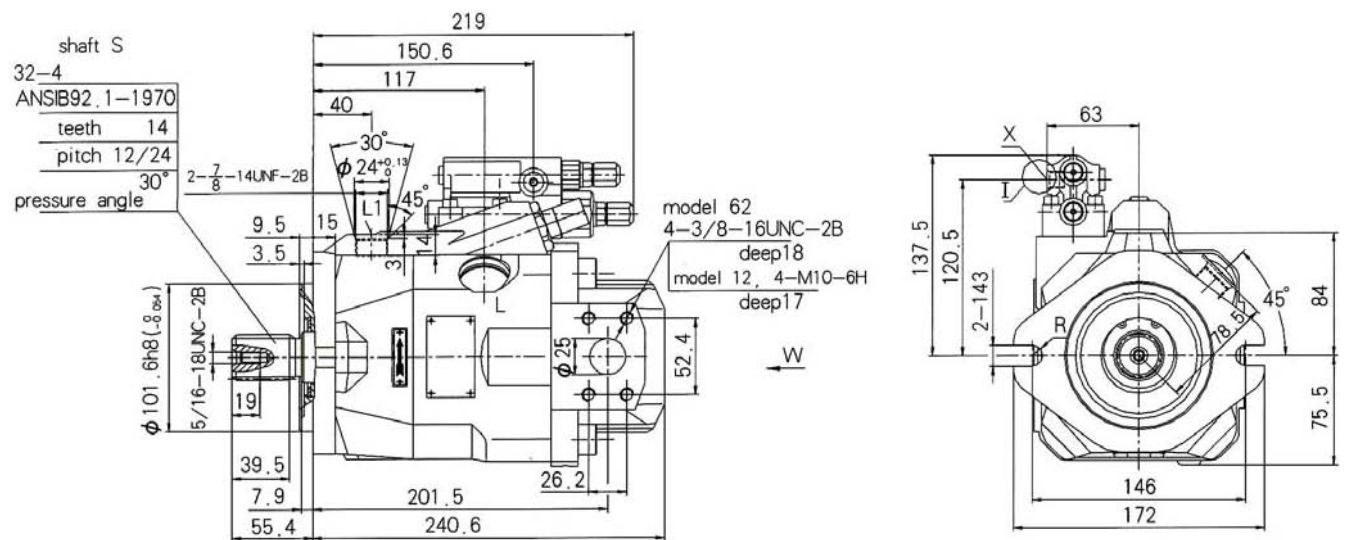
W(a); view W

VARIABLE DISPLACEMENT PUMP HSP-10VO

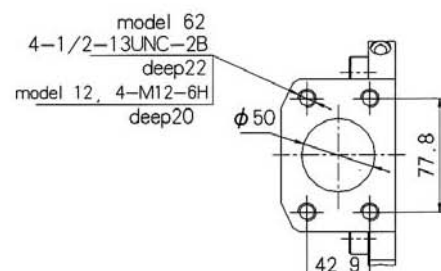## SERIES 52

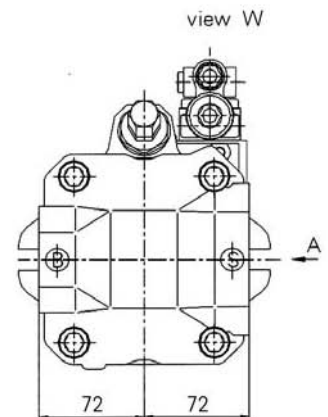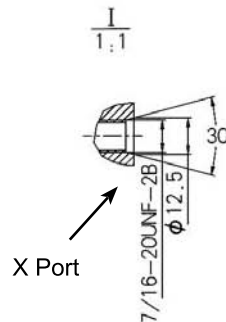**MOUNTING DIMENSION, SIZES 60**

Version HSP10VSO60

DFR

DFR1/52L - XXC62/12N00

DRG

shaft S
32—4
ANSIB92.1—1970
teeth 14
pitch 12/24
pressure angle 30°

2-7/8—14UNF—2B
φ24 +0.13
30°
45°

model 62
4-3/8—16UNC—2B
deep18
model 12, 4—M10—6H
deep17

shaft U
25—4(SAE B—B)
ANSIB92.1—1970
pitch 16/32   teeth 15
pressure angle 30°

1/4—20UNC—2B

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

I
1:1

30°
7/16—20UNF—2B
φ12.5

X Port

view W

view A

model 62
4-1/2—13UNC—2B
deep22
model 12, 4—M12—6H
deep20
φ50

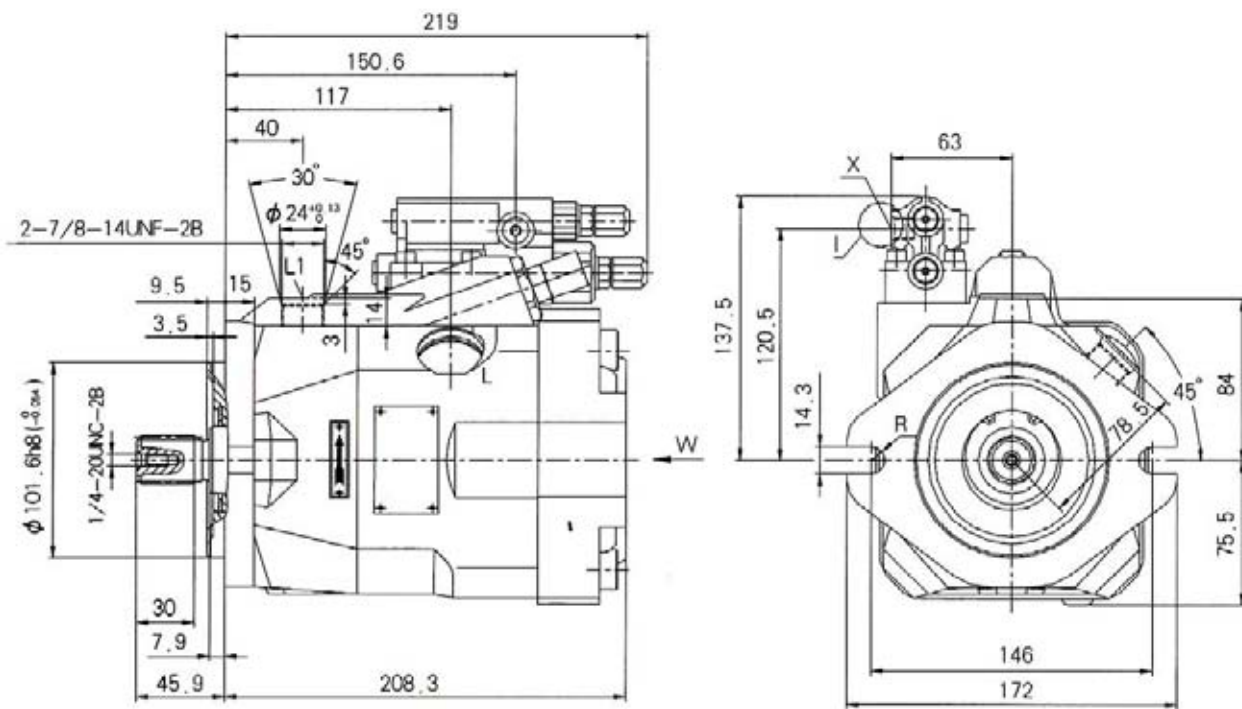# VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52

MOUNTING DIMENSION, SIZES 60

Version HSP-10VSO60

DFR
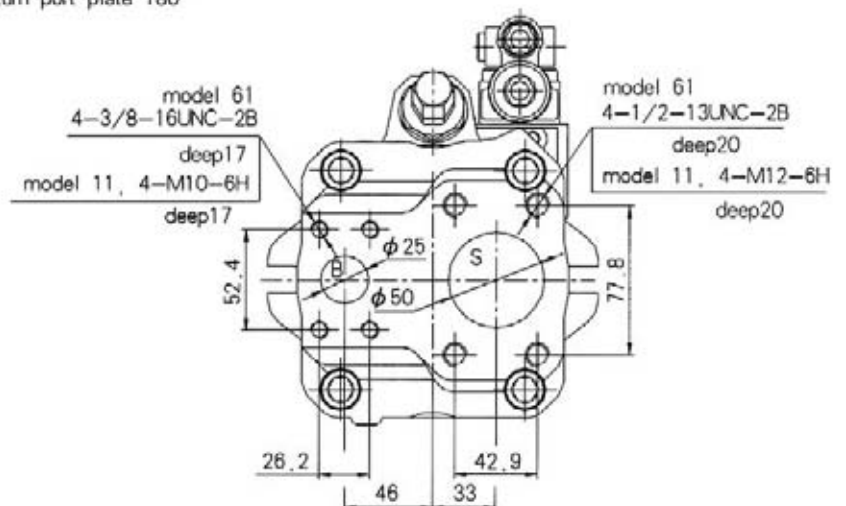
DFR1/52L - XXC61/11N00

DRG

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

view W

model 61
4-3/8-16UNC-2B
deep17
model 11, 4-M10-6H
deep17

model 61
4-1/2-13UNC-2B
deep20
model 11, 4-M12-6H
deep20

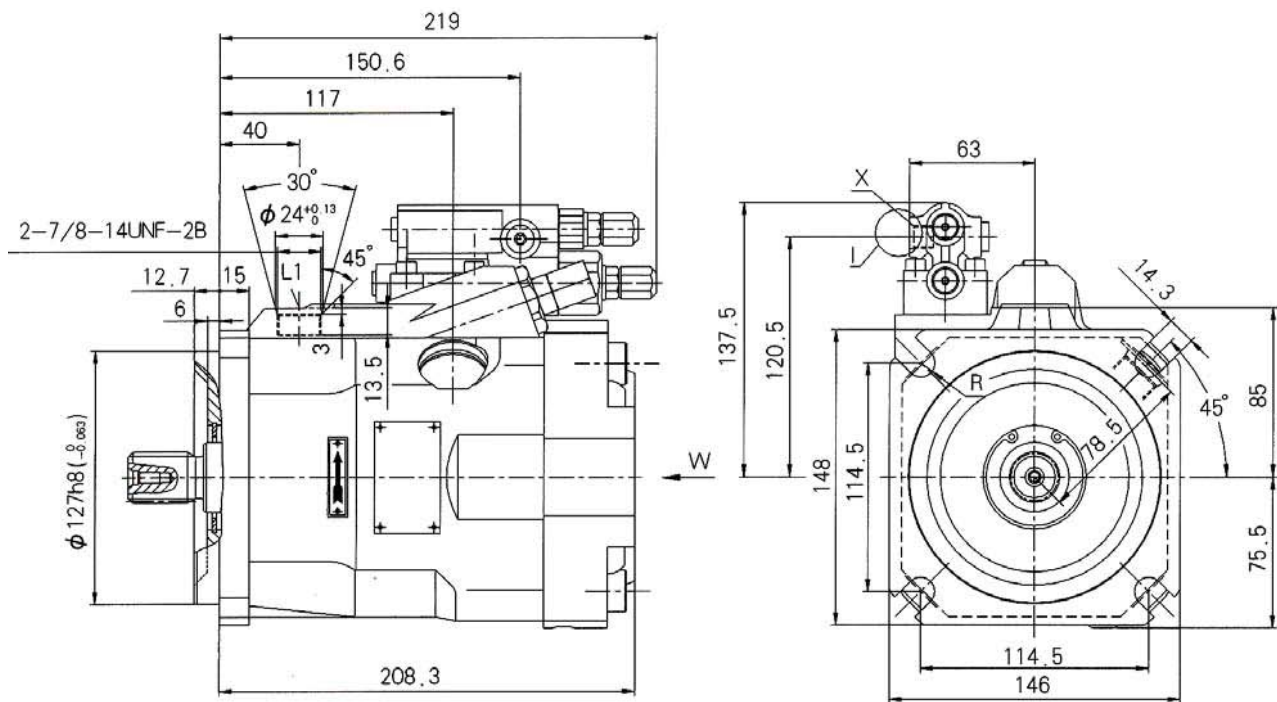# VARIABLE DISPLACEMENT PUMP HSP-10VO

SERIES 52

MOUNTING DIMENSION, SIZES 60

Version HSP-10VSO60

DFR
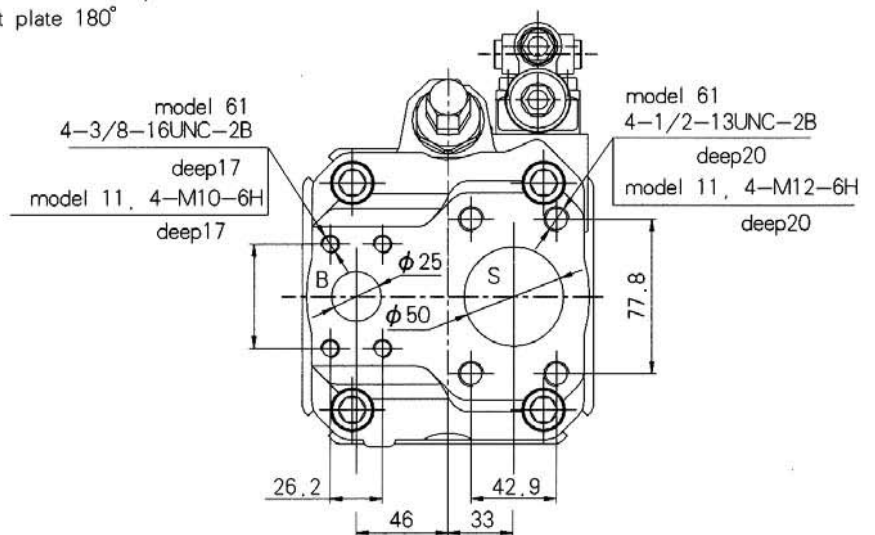
DFR1/52L - XXC61/11N00

DRG

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

view W

model 61
4-3/8-16UNC-2B
deep17
model 11, 4-M10-6H
deep17

model 61
4-1/2-13UNC-2B
deep20
model 11, 4-M12-6H
deep20

hydraut