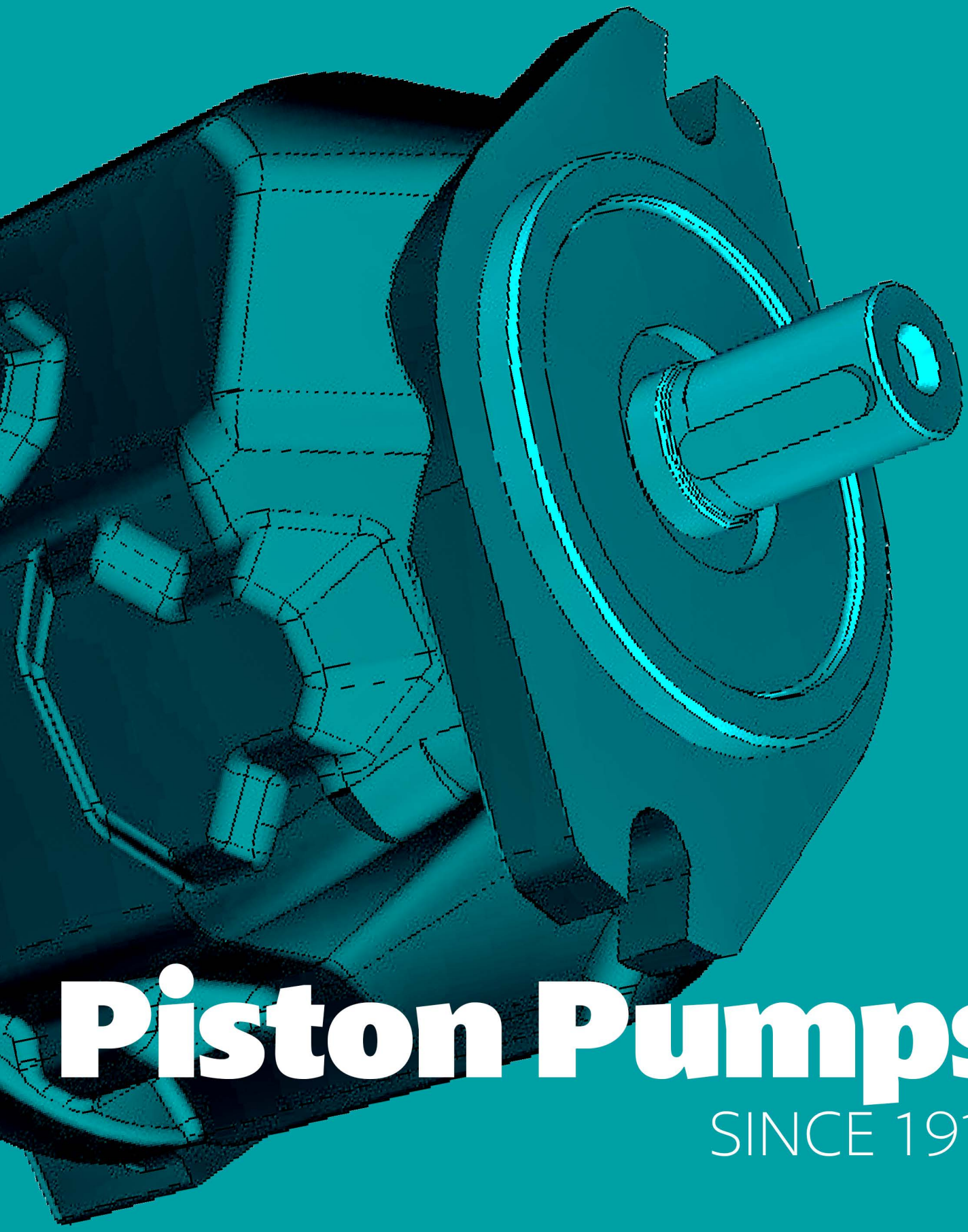
VINCKE



Piston Pumps

SINCE 1912

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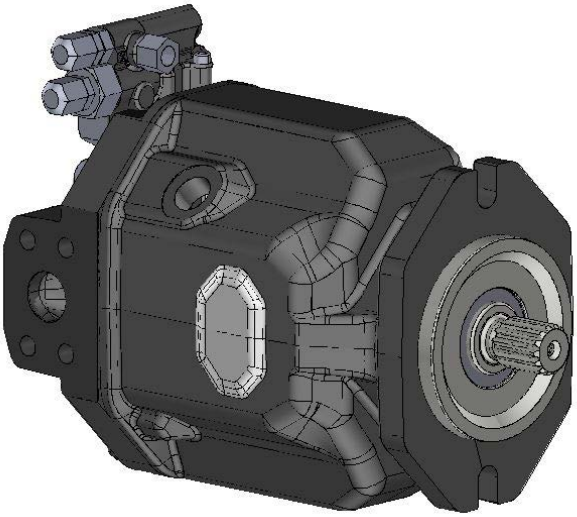
03

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Installation Dimension
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Features

Axial piston variable pump of swashplate design for open circuits

Through drive available for multi-circuit systems

Flow proportional to drive speed and displacement

Infinitely variable by adjusting angle of swashplate

Mounting flange according to ISO or SAE standard

Metric SAE flange connection or UNC fastening thread

Two case drain ports

Excellent suction characteristics

The drive shaft allows axial and radial loading

High power to weight ratio

Diverse control options, short control response time

Ordering Code

		A	B		E	H		J	K	M	N	P	Q		R
BA10V	O			/	3 1		-							-	

Axial piston unit

		18	28	45	71	100	110	140	
	Swashplate design, variable piston pump	▲	-	-	-	-	-	-	BA10VS
		-	▲	▲	▲	▲	▲	▲	BA10V

Operation

	Open circuit	O

Displacement

A	Geometric displacement, in mL/r	18	28	45	71	100	110	140	

Variable control method

					18	28	45	71	100	110	140	
B	Pressure control				▲	▲	▲	▲	▲	▲	▲	DR
		Remote pressure control	Hydraulic		▲	▲	▲	▲	▲	▲	▲	DRG
			Electric negative	U = 12V DC	△	△	△	△	△	△	△	ED71
				U = 24V DC	▲	▲	▲	▲	▲	▲	△	ED72
	Pressure/flow control (with damping hole in X-line)				▲	▲	▲	▲	▲	▲	▲	DFR
	Pressure/flow control (without damping hole in X-line)				▲	▲	▲	▲	▲	▲	▲	DFR1
	Pressure/flow control/power control				-	▲	▲	▲	▲	▲	▲	DFLR

Series

		18	28	45	71	100	110	140	
E	Series 31	▲	▲	▲	▲	▲	▲	▲	31

Directon rotation (viewed on shaft end)

		18	28	45	71	100	110	140	
H	CW	▲	▲	▲	▲	▲	▲	▲	R
	CCW	▲	▲	▲	▲	▲	▲	▲	L

Sealing material (DIN ISO 1629)

		18	28	45	71	100	110	140	
J	NBR (nitrile rubber)	▲	▲	▲	▲	▲	▲	▲	N
	NBR (nitrile rubber), shaft seal ring in FKM (fluorelastomer)	▲	▲	▲	▲	▲	▲	▲	P
	FKM (fluorelastomer)	▲	▲	▲	▲	▲	▲	▲	V

Ordering Code

		A	B		E	H		J	K	M	N	P	Q		R
BA10V	O			/	3 1		-							-	

Drive shaft

		18	28	45	71	100	110	140	
K	Parallel keyed shaft DIN 6885	▲	▲	▲	▲	▲	▲	▲	P
	Parallel kayed shaft SAE	▲	▲	▲	▲	▲	▲	▲	K
	Splined shaft SAE	3/4″	7/8″	1″	11/4″	11/2″	11/2″	13/4″	S
	Splined shaft SAE (high through-drive torque)	-	7/8″	1″	11/4″	-	-	-	R
	Splined shaft SAE (not applicable to through drive)	5/8″	-	7/8″	-	11/4″	11/4″	-	U

Mounting flange

		18	28	45	71	100	110	140	
M	ISO 2 hole	▲	▲	▲	▲	▲	▲	-	A
	ISO 4 hole	-	-	-	-	-	-	▲	B
	SAE 2 hole	▲	▲	▲	▲	▲	▲		C
	SAE 4 hole	-	-	-	-	-	-	▲	D

Working port

		18	28	45	71	100	110	140	
N	Pressure port B and suction port S in axial direction, SAE port flange, metric fastening thread	-	-	-	▲	-	-	-	11
	Pressure port B and suction port S at side, SAE port flange, metric fastening thread	▲	▲	▲	▲	▲	▲	▲	12
	Pressure port B and suction port S in axial direction, SAE port flange, UNC fastening thread	-	-	-	▲	-	-	-	61
	Pressure port B and suction port S at side, SAE port flange, UNC fastening thread	▲	▲	▲	▲	▲	▲	▲	62

Through drive

			18	28	45	71	100	110	140	
P	Without through drive		▲	▲	▲	▲	▲	▲	▲	N00
	Through drive	ISO 80 2-hole plined shaft 3/4" 19-4 (SAE A-B) BA10VSO 18 (shaft S or R)	-	▲	▲	▲	△	△	△	KB2
		ISO 80 2-hole parallel keyed shaft Ø18 BA10VSO 18 (shaft P)	-	▲	▲	▲	▲	▲	▲	K51
		ISO 100 2-hole splined shaft 7/8" 22-4 (SAE B) BA10VSO 28 (shaft S or R)	-	▲	▲	▲	▲	▲	▲	KB3
		ISO 100 2-hole parallel keyed shaft Ø22 BA10VSO 28 (shaft P)	-	▲	▲	▲	▲	▲	▲	K25
		ISO 100 2-hole splined shaft 1" 25-4 (SAE B-B) BA10VSO 45 (shaft S or R)	-	-	▲	▲	▲	▲	▲	KB4
		ISO 100 2-hole parallel keyed shaft Ø25 BA10VSO 45 (shaft P)	-	-	▲	▲	▲	▲	▲	K26
		ISO 125 2-hole splined shaft 1 1/4" 32-4 (SAE C) BA10VSO 71 (shaft S or R)	-	-	-	▲	▲	▲	▲	KB5
		ISO 125 2- hole parallel keyed shaft Ø32 BA10VSO 71 (shaft P)	-	-	-	▲	▲	▲	▲	K27
		ISO 125 2-hole splined shaft 1 1/2" 38-4 (SAE C-C) BA10VSO 100 (shaft S or R)	-	-	-	-	▲	▲	▲	KB6
		ISO 125 2-hole parallel keyed shaft Ø38 BA10VSO 100 (shaft P)	-	-	-	-	△	△	△	K37
		ISO 180 4-hole splined shaft 1 3/4" 44-4 (SAE D) BA10VSO 140 (shaft S)	-	-	-	-	-	-	▲	KB7
		ISO 180 4-hole parallel keyed shaft Ø45 BA10VSO 140 (shaft P)	-	-	-	-	-	-	△	K59
		82-2 (SAE A 2-hole) splined shaft 5/8" 16-4 (SAE A)	-	▲	▲	▲	▲	▲	▲	K01
		82-2 (SAE A 2-hole) splined shaft 3/4" 19-4 (SAE A-B) BA10VSO 18 (shaft S)	-	▲	▲	▲	▲	▲	▲	K52
		82-2 (SAE A 2-hole) parallel keyed shaft 19-1 (SAE A-B) BA10VSO 18 (shaft K)	-	△	△	△	△	△	△	K40
		101-2 (SAE B 2-hole) splined shaft 7/8" 22-4 (SAE B) Radial seal BA10VSO 28 (shaft S)	-	▲	▲	▲	▲	▲	▲	K02
		101-2 (SAE B 2-hole) splined shaft 7/8" 22-1 (SAE B) Radial seal BA10VSO 28 (shaft S)	-	▲	▲	▲	▲	▲	▲	K68
		101-2 (SAE B 2-hole) parallel keyed shaft 22-1 (SAE B) BA10VSO 28 (shaft K)	-	△	△	△	△	△	△	K03
		101-2 (SAE B 2-hole) splined shaft 1" 25-4 (SAE B-B) BA10VSO 45 (shaft S)	-	▲	▲	▲	▲	▲	▲	K04
		101-2 (SAE B 2-hole) parallel keyed shaft 25-1 (SAE B-B) BA10VSO 45 (shaft K)	-	-	△	△	△	△	△	K05
		127-2 (SAE C 2-hole) splined shaft 1 1/4" 32-4 (SAE C) BA10VSO 71 (shaft S)	-	-	-	▲	▲	▲	△	K07
		127-2 (SAE C 2-hole) parallel keyed shaft 32-1 (SAE C) BA10VSO 71 (shaft K)	-	-	-	△	△	△	△	K08
		127-2 (SAE C 2-hole) splined shaft 1 1/2" 38-4 (SAE C-C) BA10VSO 100 (shaft S)	-	-	-	-	▲	▲	▲	K24
		127-2 (SAE C 2-hole) parallel keyed shaft 38-1 (SAE C-C) BA10VSO 100 (shaft K)	-	-	-	-	△	△	△	K38
		152-4 (SAE D 4-hole) splined shaft 1 3/4" 44-4 (SAE D) BA10VSO 140 (shaft S)	-	-	-	-	-	-	▲	K17
		152-4 (SAE D 4-hole) parallel keyed shaft 44-1 (SAE D) BA10VSO 140 (shaft K)	-	-	-	-	-	-	△	K21

1) Not for new devices, but for small through-drive torques only

Ordering Code

		A	B		E	H		J	K	M	N	P	Q		R
BA10V	O			/	3 1		-							-	

Connector for solenoids

		18	28	45	71	100	110	140	
Q	Without connector (without solenid, only for hydraulic control, without code)	▲	▲	▲	▲	▲	▲	△	
	DEUTSCH DT04-2P; 2-pin plastic connector, without diode suppressor (for electric control)	▲	▲	▲	▲	▲	▲	△	P
	3-pin square connector	▲	▲	▲	▲	▲	▲	△	H
	DEUTSCH DT04-2P with cable	▲	▲	▲	▲	▲	▲	△	T

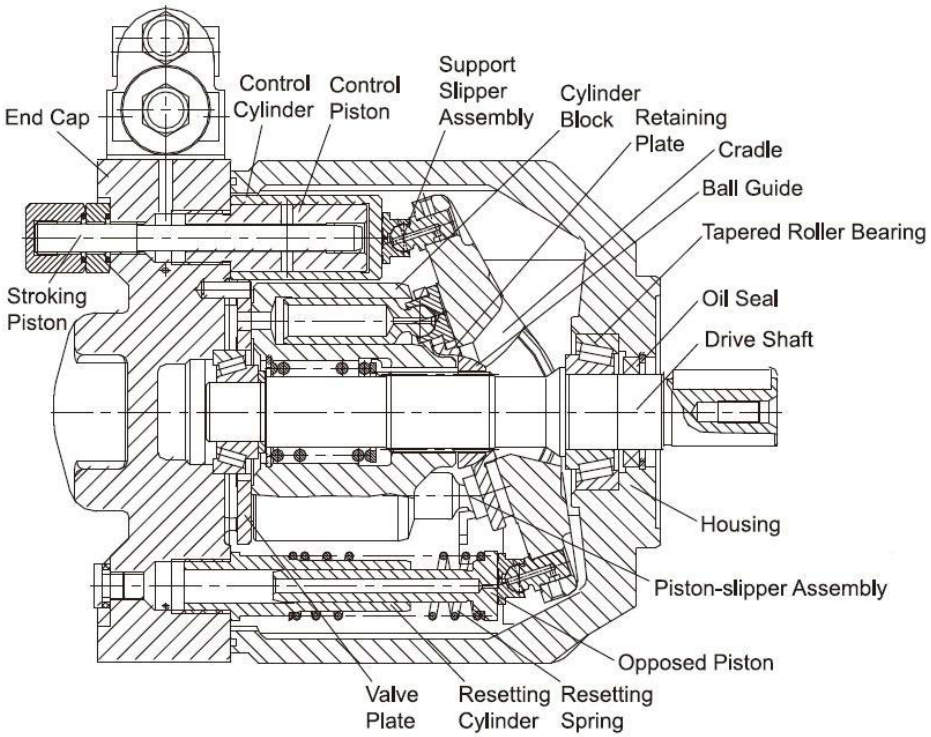
Special configuration

		18	28	45	71	100	110	140	
R	Without special configuration (without code)	▲	▲	▲	▲	▲	▲	▲	
	Special configuration	△	△	△	△	△	△	△	

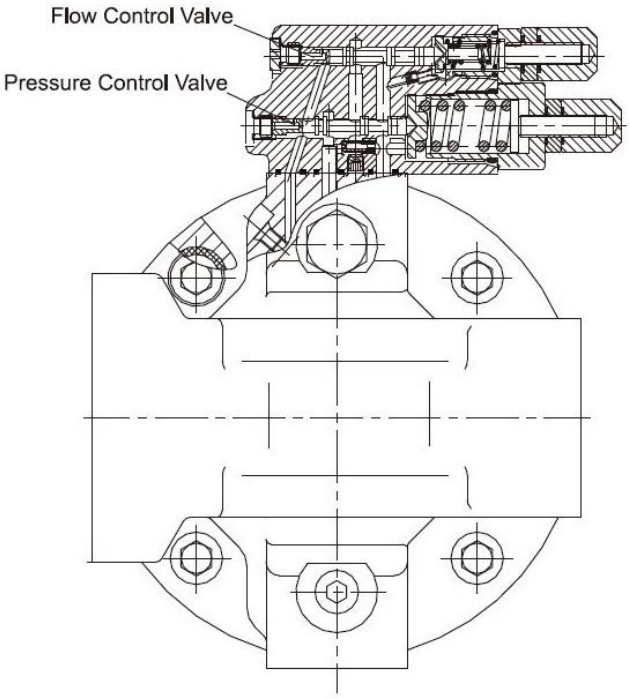
▲ Available △ On request - Not available

Combination pump: If two BA10VSO pumps are combined at our plant, connect their models with a "+".
Example: BA10VSO71DR/31R-PSA12KB4 + BA10VSO45DR/31R-PSA12N00

Profile


End Cap
Control Cylinder
Control Piston
Support Slipper Assembly
Cylinder Block
Retaining Plate
Cradle
Ball Guide
Tapered Roller Bearing
Oil Seal
Drive Shaft
Stroking Piston
Housing
Piston-slipper Assembly
Opposed Piston
Valve Plate
Resetting Cylinder
Resetting Spring

Top


Flow Control Valve
Pressure Control Valve

Hydraulic Fluid

Mineral oil

Working Viscosity

In order for the optimum efficiency and service life, it is recommended to select the working viscosity at working temperature within the range below:

V_{opt} = optimal working viscosity 16...36 mm^2/s
It is subject to the reservoir temperature of an open circuit.

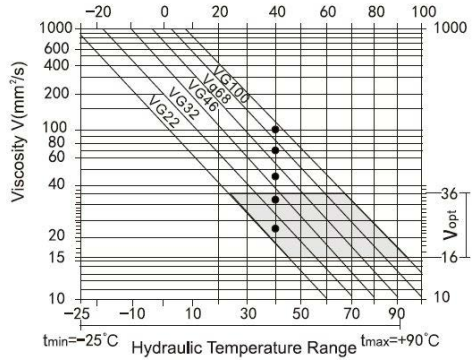
Limit Viscosity

Limit viscosity:
V_{min} = 10mm^2/s
Short-term operation, at permissible maxium leakage temperature of 90°C
V_{max} = 1000mm^2/s
Short-term operation, cold start

Temperature Range

t_{min} = -25°C
t_{max} = 90°C

Selection Diagram



Instructions on Selection of Hydraulic Fluid

To select the correct hydraulic fluid, we must know the relationship between the fluid working temperature in the reservoir (open circuit) and the ambient temperature.

The hydraulic fluid should be so selected that the working viscoity in the working range is within the optimum range (Vopt, the vshaded area on the selection diagram). The higher viscosity is recommended under the same conditions.

For example.
At an ambient temperature of X°C, the working temperature of the circuit is 60° C. The viscosity within te optimum range (Vopt, shaded area) is VG48 or VG68 and the letter should be selected.

Note:
The leakage (case drain) temperature depends in the pressure and speed of the pump, and it is always higher than the reservoir temperature. However, the maximum temperature at any point within the system should not exceed 90° C.

Filtration

Finer filtration improves the cleanliness level of the hydraulic fluid, this increasing the service life of axial piston unit.
To ensure normal operating of the axial piston unit, a cleanliness level of at:

NAS 1638,9 ISO/DIS 4406 18/15

Please contact us if the above clanliness level cannot be reached.

Mechanical Displacement Limiter

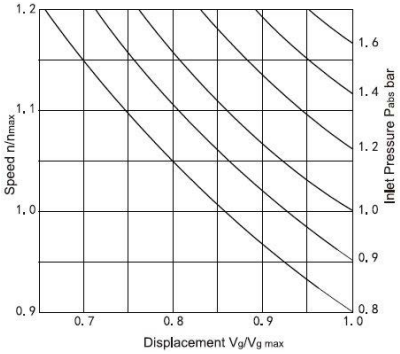
The mechanical displacement limiter is available for 12/62N00 series piston pumps without through drive and it realizes free adjustment of maxium dispacement between 100% ↔ 50%.

Working Pressure Range

Input

Absoulute pressure at port S
P_{abs} min.....0.8 bar
P_{abs} max----------30 bar

It determines the decrease in dispacement with increase in inlet pressure P_{abs} at port S or rotational speed.



Output

Absoulute pressure at port B
P_n----------280 bar
P_{max}----------350 bar

The pressure may reach 315 bar at 10% load time during intermittent operation.

Case Drain Pressure

Maximum permissible pressure at drain port (L, L1)
Maximum 0.5 bar higher than inlet pressure at port S
No higher than 2 bar absolute pressure.

Flow Direction

From port S to B

Size			Unit	18	28	45	71	100	110	140
Displacement		$V_{g\,max}$	mL/r	18	28	45	71	100	110	140
Speed		n_{omax}	r/min	3300	3000	2600	2200	2000	2000	1800
	Max. speed (continuous) nζ at increase in inlet pressure P_{abs} and $V_g < V_{gmax}$	n_{omax}	r/min	3900	3600	3100	2600	2400	2400	2100
Flow	At nomax	$q_{v\,omax}$	L/min	59.4	84	117	156	200	220	252
	At nζ = 1500min^{-1}		L/min	27	42	68	107	150	165	210
Power ΔP = 28MPa	At nomax	P_{omax}	KW	27.7	39	55	73	93	106	118
	At nζ = 1500min^{-1}		KW	12.6	20	32	50	70	77	98
Max. torque at V_{gmax} (Δp=28MPa)		T_{max}	Nm	80.1	125	200	316	445	507	623
Max. torque at V_{gmax} (Δp=10MPa)		T	Nm	28.6	45	72	113	159	176	223
Moment of inertia of drive shaft		J	kgm^2	0.00093	0.0017	0.0033	0.0083	0.0167	0.0167	0.0242
Case volume		L		0.4	0.7	1.0	1.6	2.2	2.2	3.0
Weight		m	kg	12	15	21	33	45	45	60

The above data is valid only when the inlet pressure at port S is 0.1 MPa absoulte pressure.
The speed may increase as the displacement decreasses or the inlet pressure increases.

Specification Calculation

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

Torque $$T = \frac{V_g \cdot \Delta p}{2 \cdot \pi \cdot \eta_{mh}}$$ [Nm]

Power $$P = \frac{2\pi \cdot T \cdot n}{60000} = \frac{q_v \cdot \Delta p}{60 \cdot \eta_t}$$ [KW]

V_g = Displacement, mL/r

Δp = Differential presure, MPa

n = Speed, rpm

η_v = Volumentric efficiency

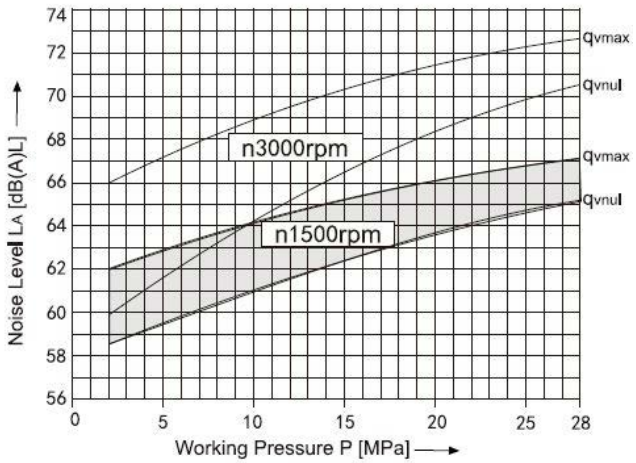
η_{mh} = Mechanical-hydraulic efficiency

η_t = Total efficiency

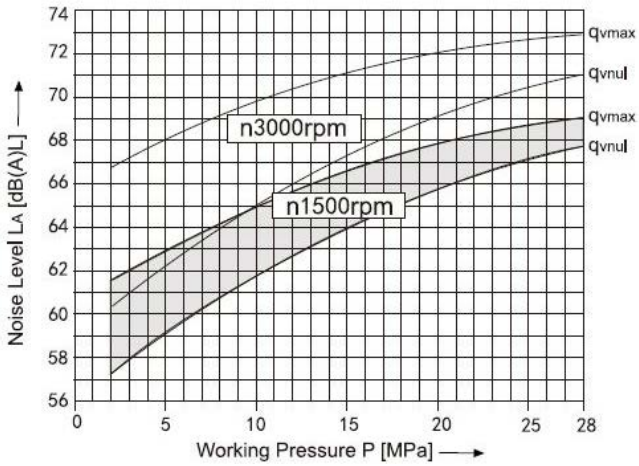
Characteristic Curve

Measured indoor without echo
Distance from sound measuring device to the pump = 1m
Max. measuring error ±2dB (A) (working medium: hydraulic fluid ISO VG46 DIN 51519, t = 50°C)

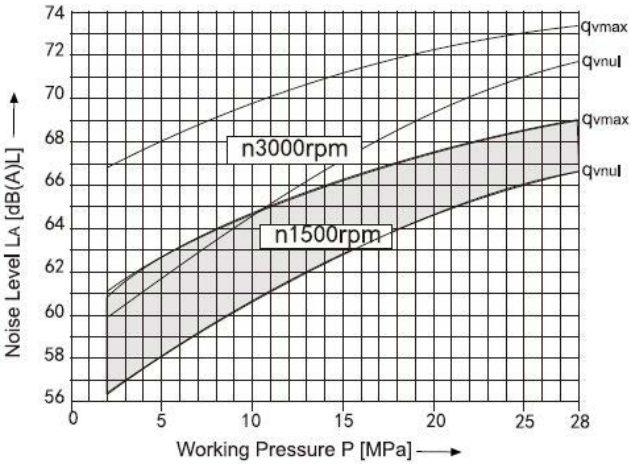
Size 18



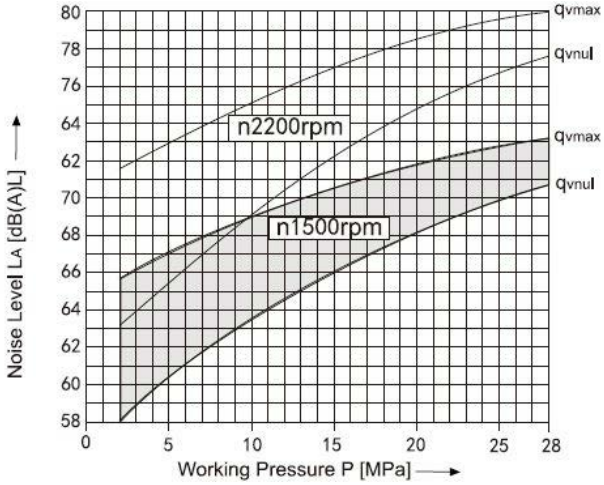
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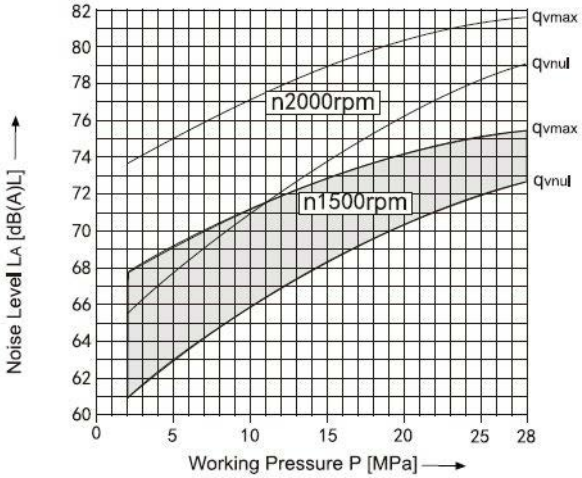
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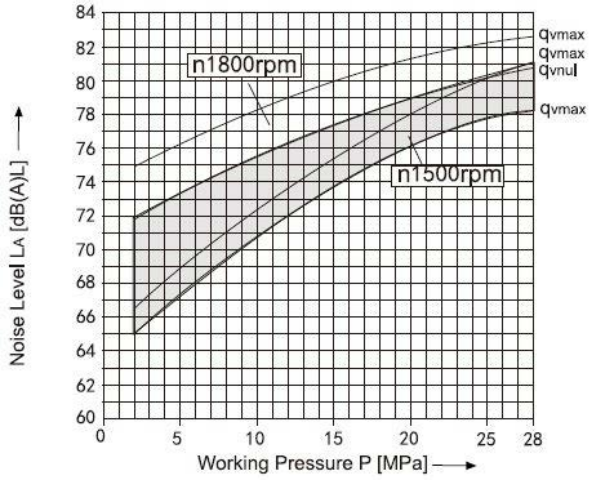
Size 71



Size 100/110



Size 140

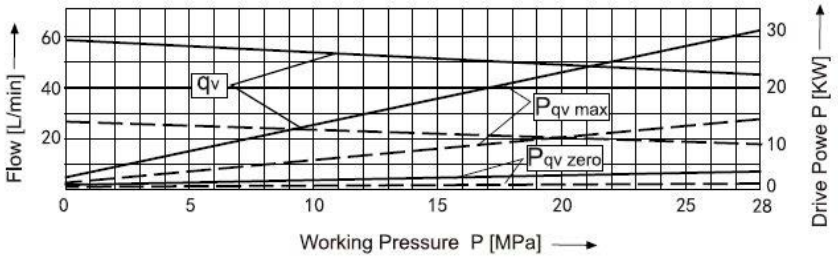


Drive Power and Flow

Working medium : hydraulic fluid ISO VG46 DIN 51519, t = 50°C

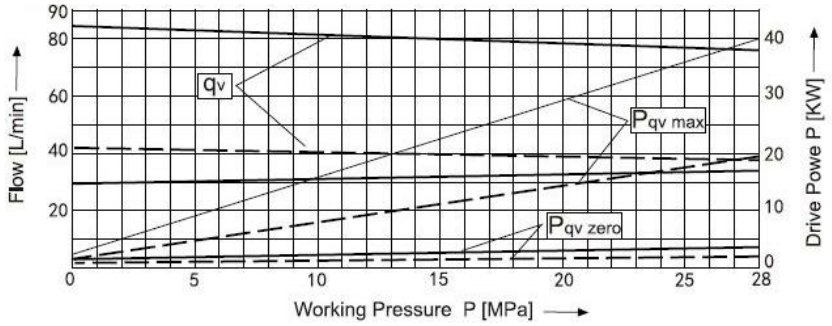
Size 18

n = 3300rpm ———
n = 1500rpm – – – –



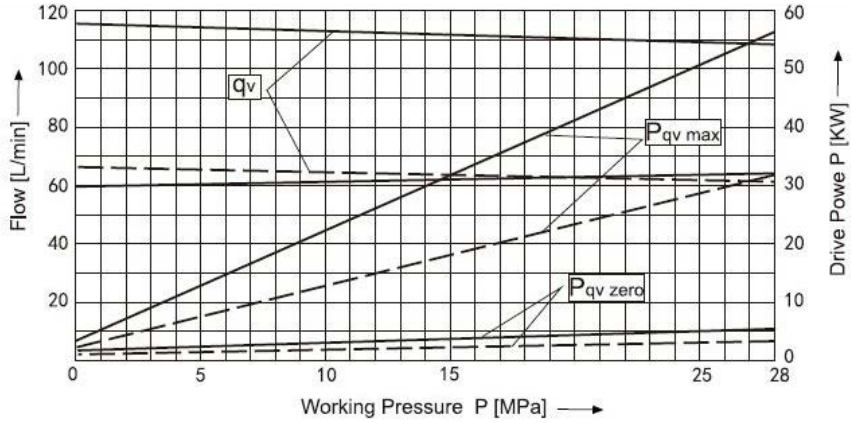
Size 28

n = 3300rpm ———
n = 1500rpm – – – –



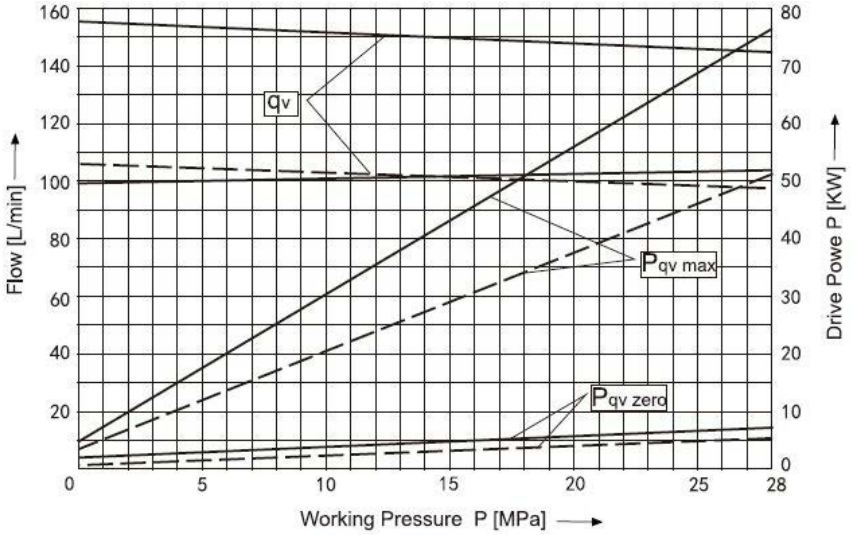
Size 45

n = 2600rpm ———
n = 1500rpm – – – –



Size 71

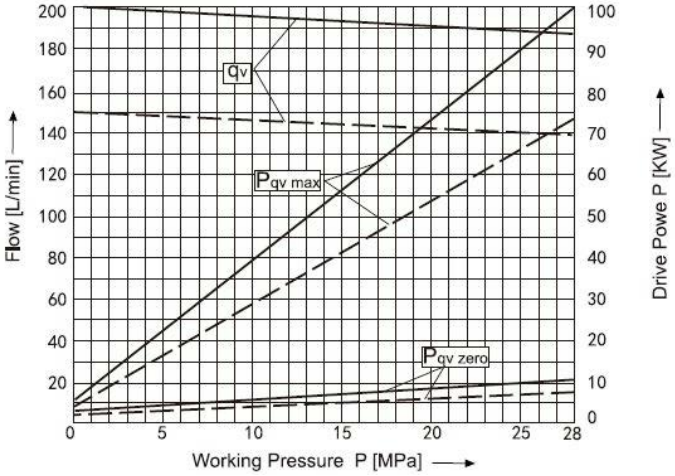
n = 2200rpm ———
n = 1500rpm – – – –



Drive Power and Flow

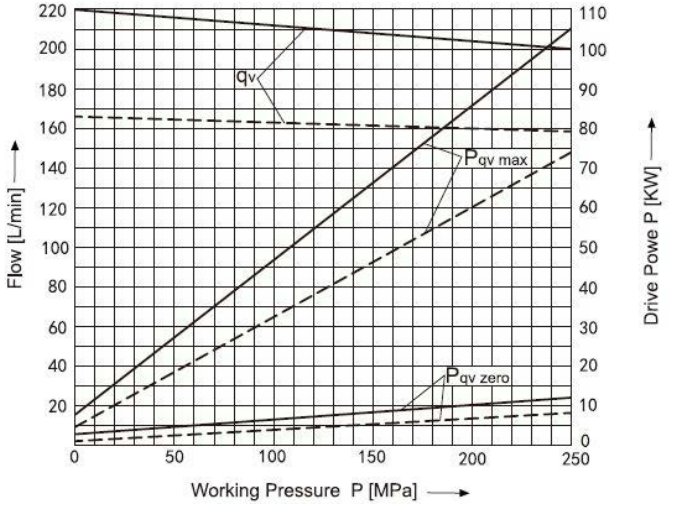
Size 100

n = 2000rpm ———
n = 1500rpm – – – –



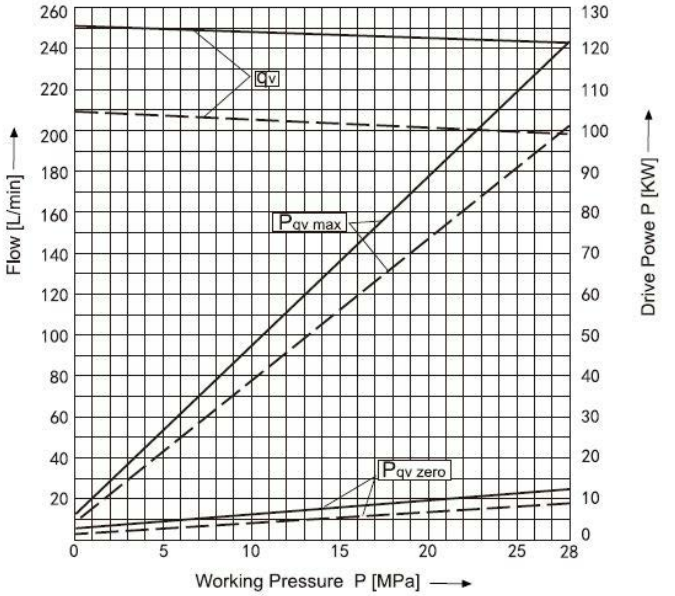
Size 110

n = 2000rpm ———
n = 1500rpm – – – –



Size 140

n = 1800rpm ———
n = 1500rpm – – – –

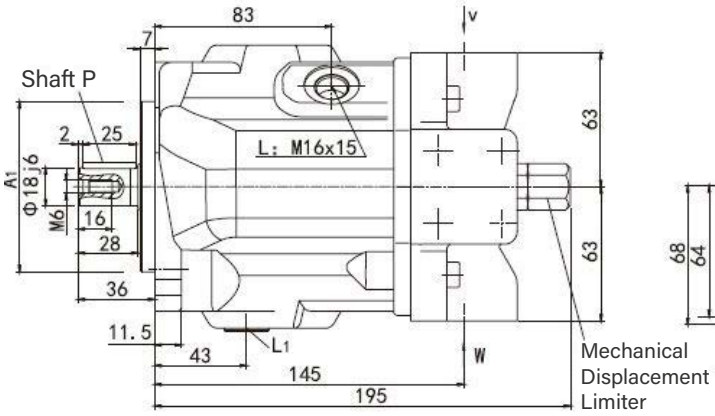


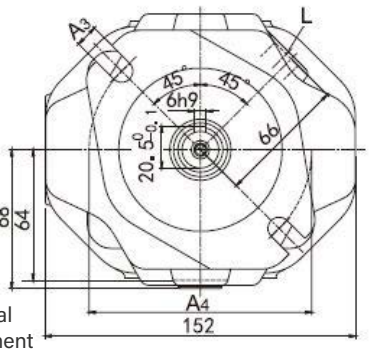
Total eficiency $\eta_t = \frac{q_v \cdot \rho}{P_{qv\ max} \cdot 600}$

Volumetric eficiency $\eta_v = \frac{q_v}{P_{qvthear}}$

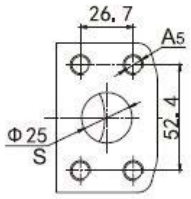
Size 18
N00
Without control valve

Shaft P

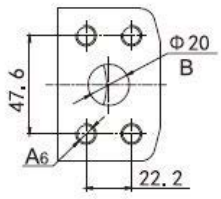




Detail W

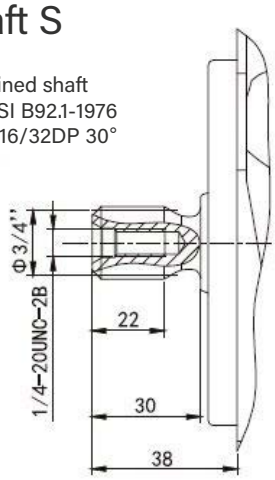


Detail V



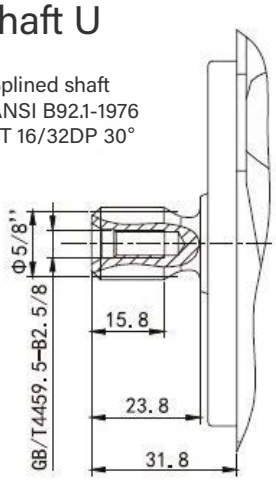
Shaft S

Splined shaft
ANSI B92.1-1976
11T 16/32DP 30°

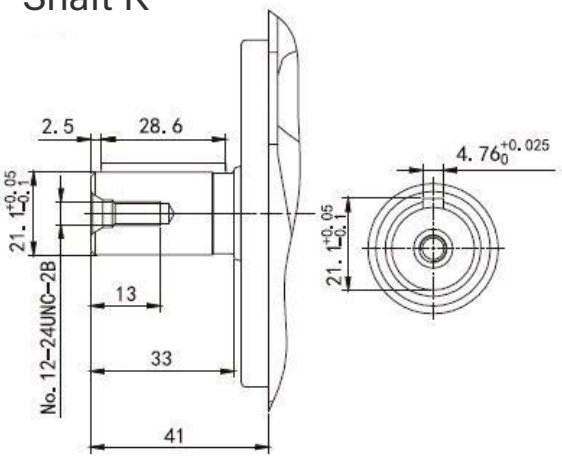


Shaft U

Splined shaft
ANSI B92.1-1976
9T 16/32DP 30°



Shaft K

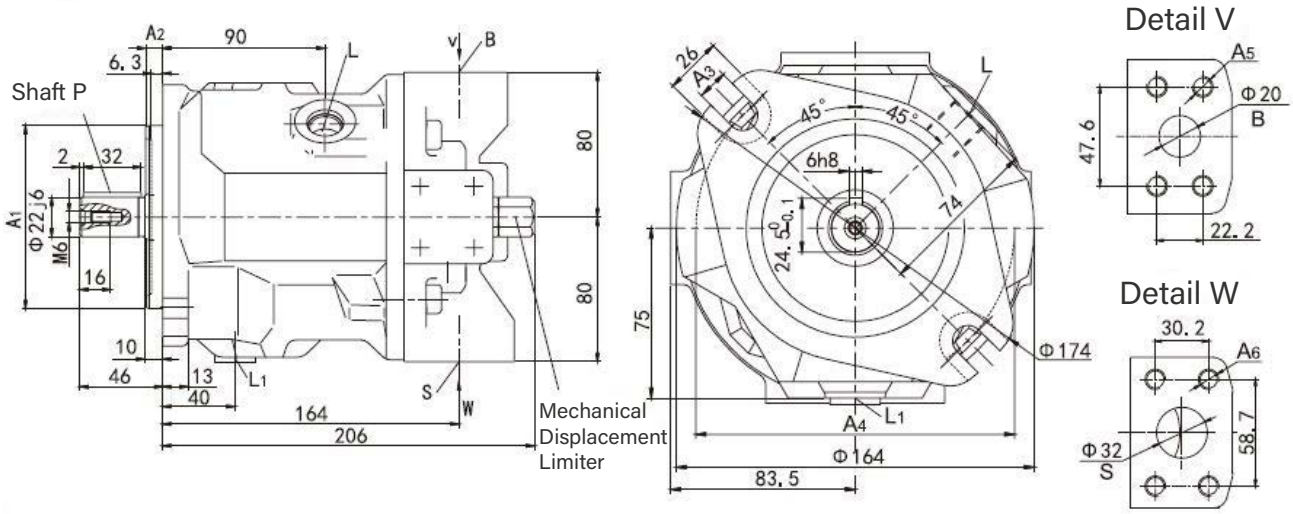


B----------pressure port SAE3/4" (standard pressure range)
S----------inlet port SAE1" (standard pressure range)
L/L1----------case drain port (L1 plugged before delivery)

Size	A1	A2	A3	A4	A5	A6	Port L/L1
18 ISO	ϕ80h8	7	11	ϕ109	4-M10, 17 deep	4-M10, 17 deep	M16 x 1.5
18 SAE	ϕ82.55h8	6.3	11	ϕ109	4-3/8-16UNC-2B, 20 deep	4-3/8-16UNC-2B, 20 deep	9/16-18UNF-2B

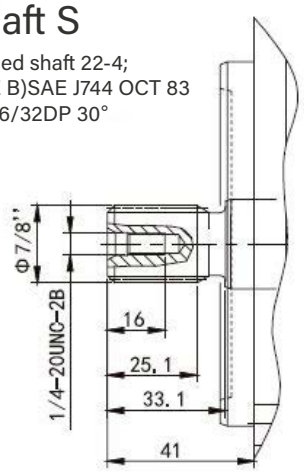
Size 28
N00
Without control valve

Shaft P



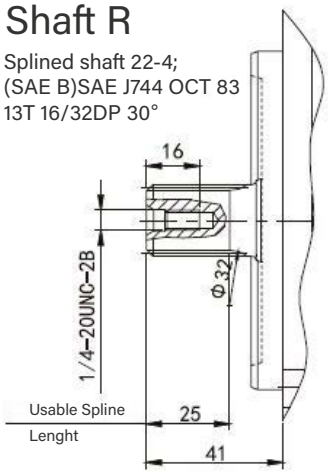
Shaft S

Splined shaft 22-4;
(SAE B)SAE J744 OCT 83
13T 16/32DP 30°



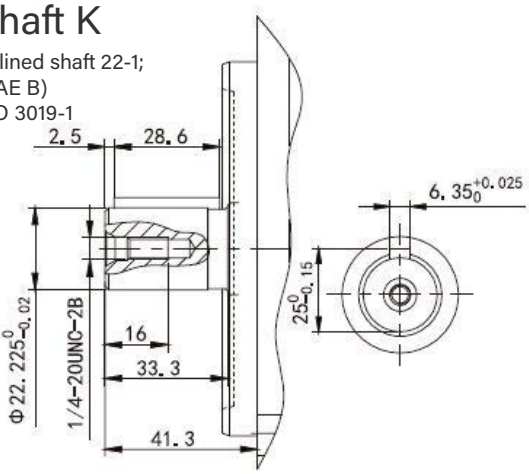
Shaft R

Splined shaft 22-4;
(SAE B)SAE J744 OCT 83
13T 16/32DP 30°



Shaft K

Splined shaft 22-1;
(SAE B)
ISO 3019-1



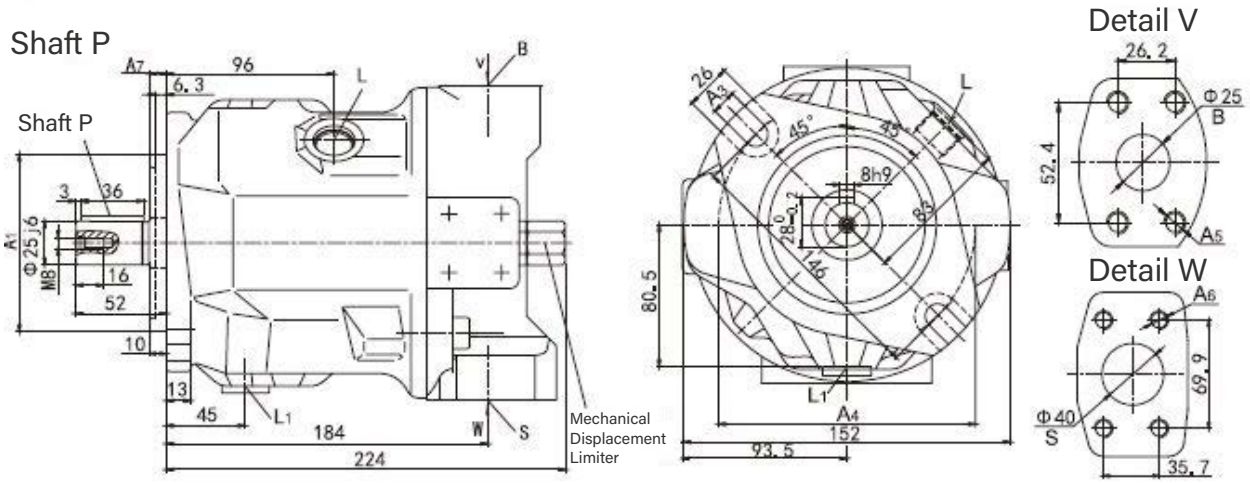
B----------pressure port SAE3/4" (standard pressure range)
S----------inlet port SAE1" (standard pressure range)
L/L1----------case drain port (L1 plugged before delivery)

Size	A1	A2	A3	A4	A5	A6	Port L/L1
28 ISO	ϕ100h8	9	14	ϕ140	4-M10, 17 deep	4-M10, 17 deep	M18 x 1.5
28 SAE	ϕ101.6h8	9.5	14	ϕ146	4-3/8-16UNC-2B, 18 deep	4-3/8-16UNC-2B, 24 deep	3/4-16UNF-2B

Installation Dimensions

Size 45
N00
Without control valve

Shaft P



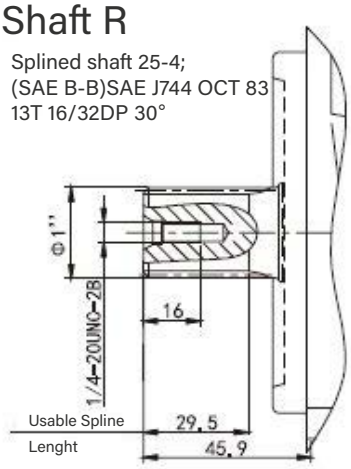
Shaft S

Splined shaft 25-4;
(SAE B-B)SAE J744 OCT 83
15T 16/32DP 30°



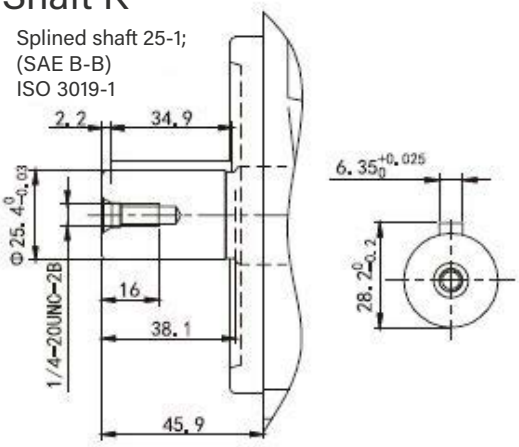
Shaft R

Splined shaft 25-4;
(SAE B-B)SAE J744 OCT 83
13T 16/32DP 30°



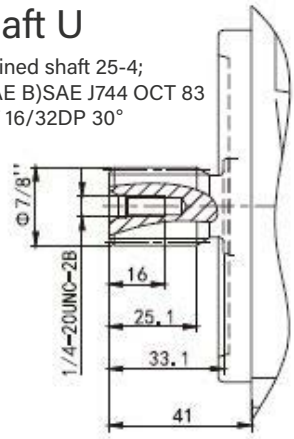
Shaft K

Splined shaft 25-1;
(SAE B-B)
ISO 3019-1



Shaft U

Splined shaft 25-4;
(SAE B)SAE J744 OCT 83
13T 16/32DP 30°

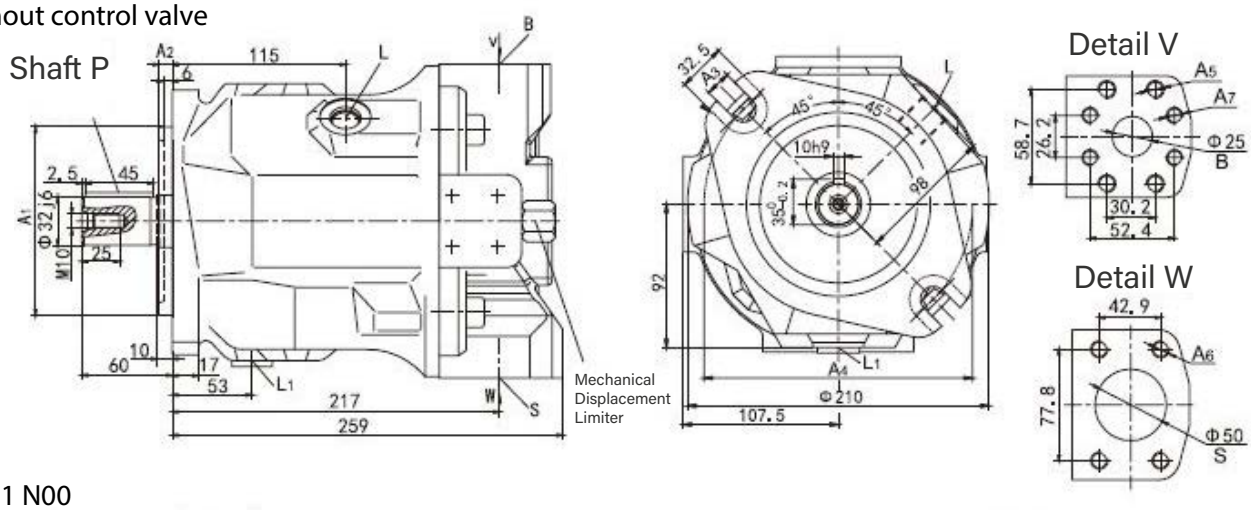


B----------pressure port SAE3/4" (standard pressure range)
S----------inlet port SAE 1 1/4 " (standard pressure range)
L/L1----------case drain port (L1 plugged before delivery)

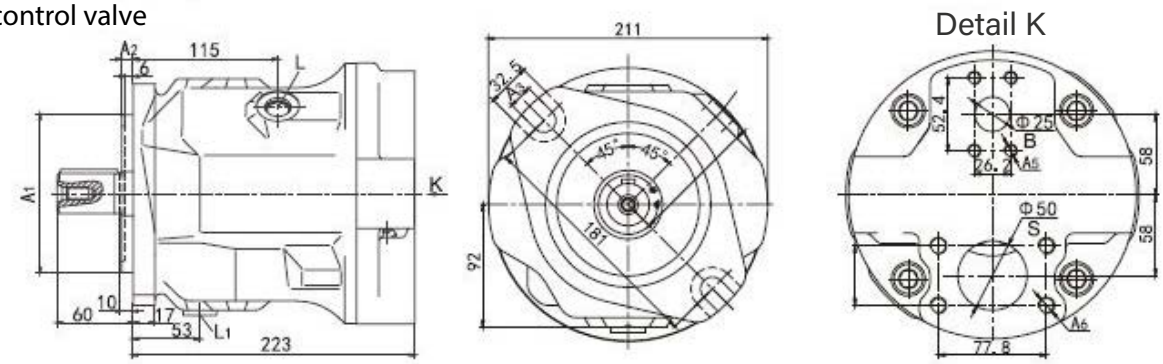
Size	A1	A2	A3	A4	A5	A6	Port L/L1
45 ISO	ϕ100h8	9	14	ϕ140	4-M10, 17 deep	4-M10, 20 deep	M22 x 1.5
45 SAE	ϕ101.6h8	9.5	14	ϕ146	4-3/8-16UNC-2B, 18 deep	4-1/2-13UNC-2B, 22 deep	7/8-14UNF-2B

Installation Dimensions

Size 71
12/62 N00
Without control valve

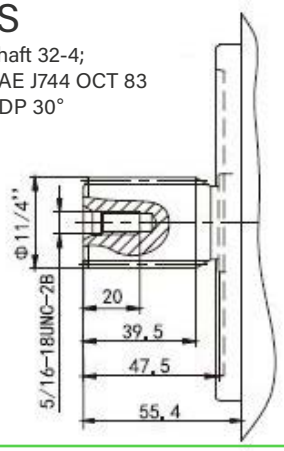


11/61 N00
Without control valve



Shaft S

Splined shaft 32-4;
(SAE C)SAE J744 OCT 83
14T 12/24DP 30°



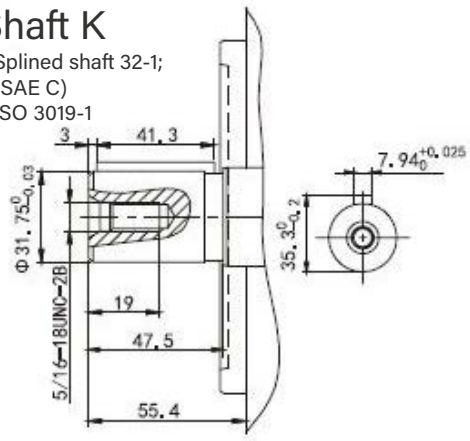
Shaft R

Splined shaft 32-4;
(SAE C)SAE J744 OCT 83
14T 12/24DP 30°



Shaft K

Splined shaft 32-1;
(SAE C)
ISO 3019-1



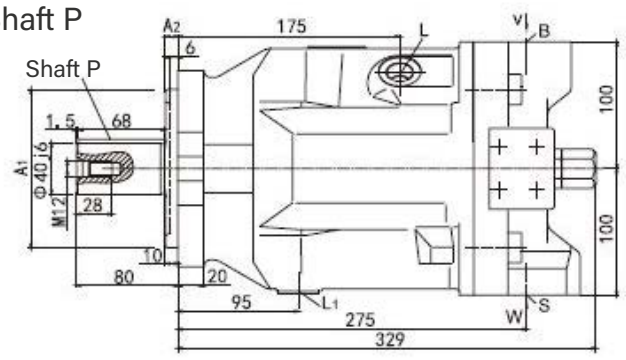
B----------pressure port SAE 1/4 - 1 1/4 " (standard pressure range)
S----------inlet port SAE1 2 " (standard pressure range)
L/L1----------case drain port (L1 plugged before delivery)

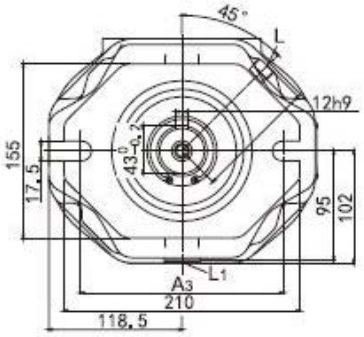
Size	A1	A2	A3	A4	A5(A7)	A6	Port L/L1
71 ISO	ϕ125h8	9	18	ϕ140	8-M10, 17 deep	4-M10, 20 deep	M22 x 1.5
71 SAE	ϕ127h8	12.7	18	ϕ146	4-3/8-16UNC-2B, 18 deep 4-7/16-14UNC2B, 24 deep	4-1/2-13UNC-2B, 22 deep	7/8-14UNF-2B

Installation Dimensions

Size 100/110
N00
Without control valve

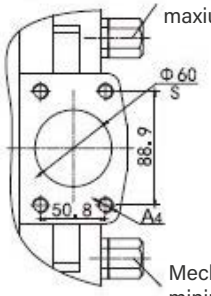
Shaft P





Detail W

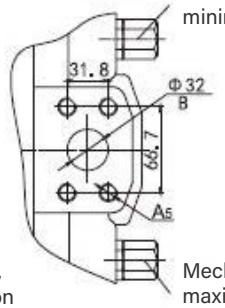
Mechanical displacement limiter, maxium displacement regulation



Mechanical displacement limiter, minimum displacement regulation

Detail V

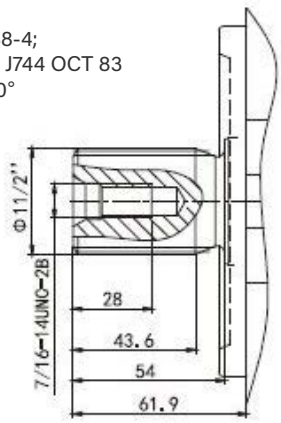
Mechanical displacement limiter, minimum displacement regulation



Mechanical displacement limiter, maxium displacement regulation

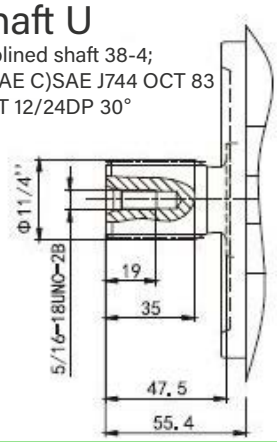
Shaft S

Splined shaft 38-4;
(SAE C-C)SAE J744 OCT 83
17T 12/24DP 30°



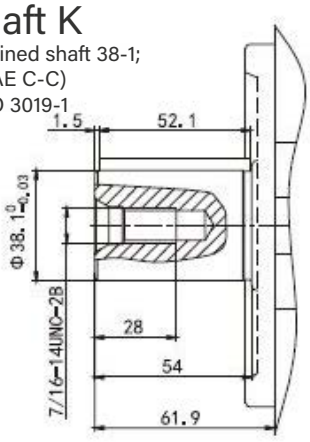
Shaft U

Splined shaft 38-4;
(SAE C)SAE J744 OCT 83
14T 12/24DP 30°



Shaft K

Splined shaft 38-1;
(SAE C-C)
ISO 3019-1

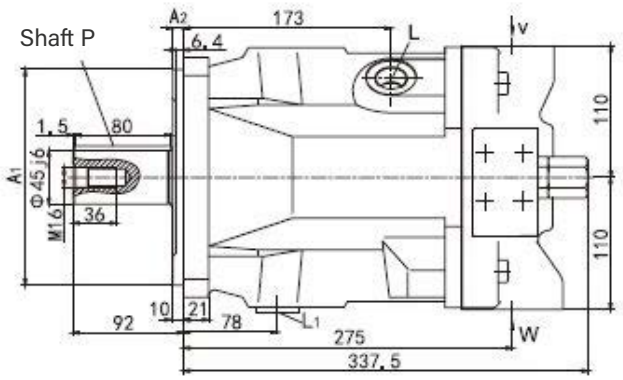


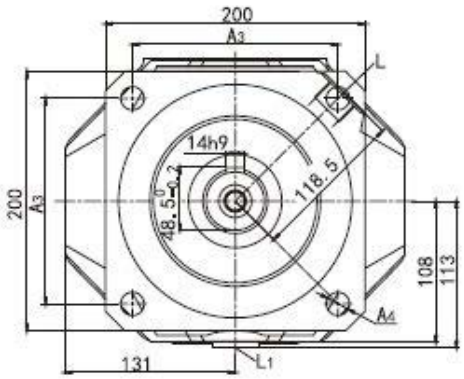
B----------pressure port SAE1 1/4" (standard pressure range)
S----------inlet port SAE2 1/4 " (standard pressure range)
L/L1----------case drain port (L1 plugged before delivery)

Size	A1	A2	A3	A4	A5	Port L/L1
100/110 ISO	ϕ125h8	9	ϕ180	4-M12, 17 deep	4-M14, 19 deep	M27 x 2
100/110 SAE	ϕ127h8	12.7	ϕ181	4-1/2-13UNC-2B, 19 deep	4-1/2-13UNC-2B, 22 deep	11/16-12UNF-2B

Size 140
N00
Without control valve

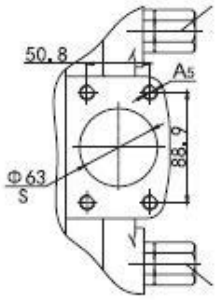
Shaft P





Detail W

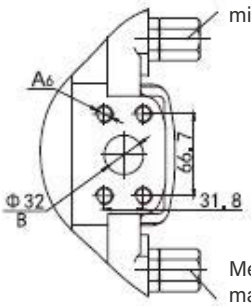
Mechanical displacement limiter, maxium displacement regulation



Mechanical displacement limiter, minimum displacement regulation

Detail V

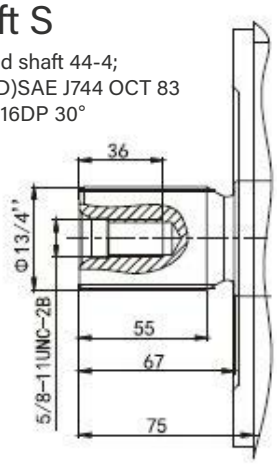
Mechanical displacement limiter, minimum displacement regulation



Mechanical displacement limiter, maxium displacement regulation

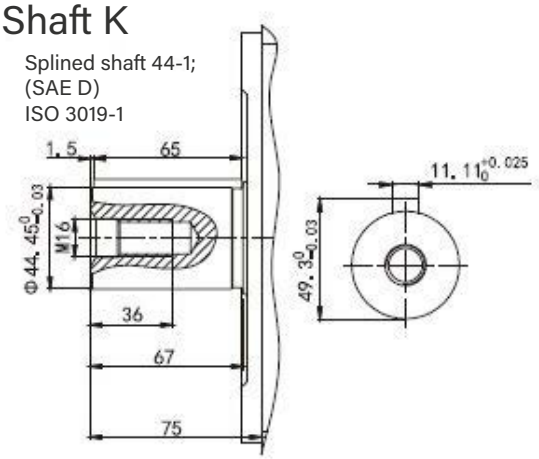
Shaft S

Splined shaft 44-4;
(SAE D)SAE J744 OCT 83
13T 8/16DP 30°



Shaft K

Splined shaft 44-1;
(SAE D)
ISO 3019-1

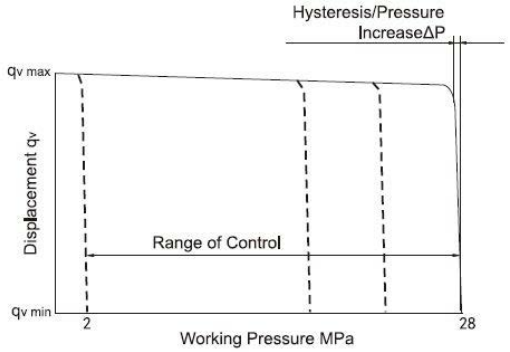


B----------pressure port SAE1 1/4" (standard pressure range)
S----------inlet port SAE2 1/2" (standard pressure range)
L/L1----------case drain port (L1 plugged before delivery)

Size	A1	A2	A3	A4	A5 (A7)	A6	Port L/L1
140 ISO	ϕ180h8	9	158.4	4-ϕ18	8-M12, 17 deep	4-M14, 19 deep	M27 x 2
140 SAE	ϕ152.4h8	12.7	161.6	4-ϕ20	4-1/2-13UNC-2B, 27 deep	4-1/2-12UNC-2B, 19 deep	11/16-14UNF-2B

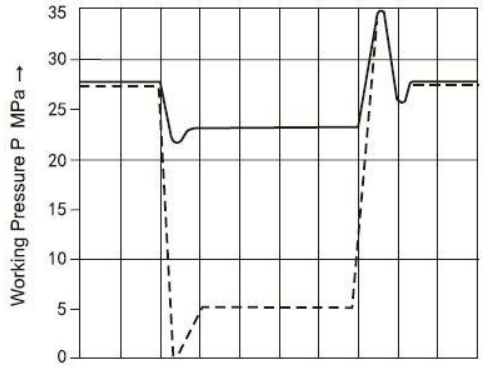
The pressure control is used to maintain a constant pressure of the hydraulic system within the control range. As the pump supplies only as much hydraulic fluid as required by the system, the pressure may be continually regulated by the control valve.

Static operating curve (n1=15000rpm, toil = 50°C)

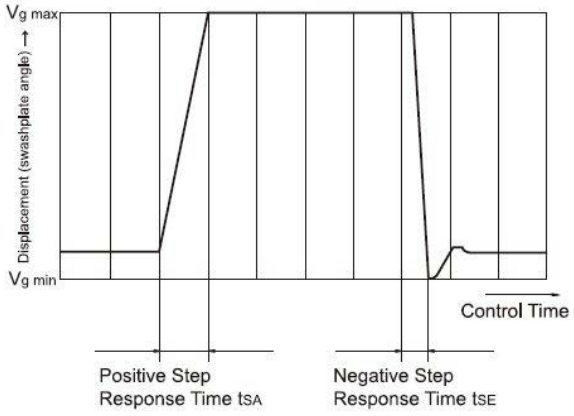


Dynamic operating curve

This curve indicates the average measurement in test conditions with the pump installed un the tank.
Working conditions: n = 1500rpm
toil = 50°C
Setting of main pressure relief valve 35MPa
Pump loaded with pressure relief valve which is 1m from outlet flange of the pump.
Load step realized by suddenly switching on and off the pressure line.



Dynamic flow control curve



Controller data

Hysteresis and repeatability Δp----------max. 0.3MPa

Maximum pressure increase

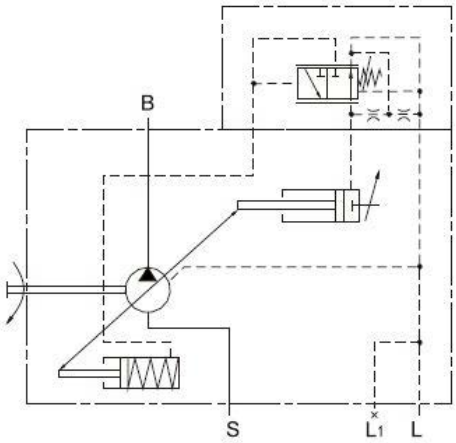
Size	18	28	45	71	100	110	140
Δp MPa	0.4	0.4	0.6	0.8	1.0	1.0	1.2

Pilot fluid consumption----------max. 3L/min

Controller time

Size	tSA(ms) at 5MPa	tSA(ms) at 22MPa	tSA(ms) at 28MPa
18	50	20	20
28	60	30	20
45	80	40	20
71	100	50	25
100	125	90	30
110	125	90	30
140	130	110	30

Hydraulic Schematic Diagram



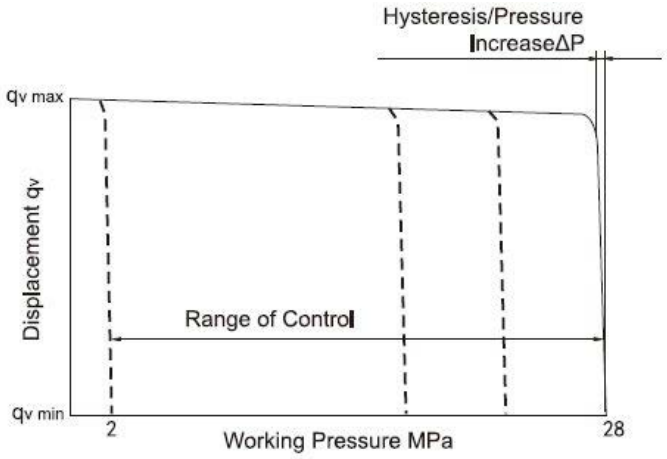
Ports

B----------pressure port
S----------inlet port
L/L1----------case drain port (L1 plugged)

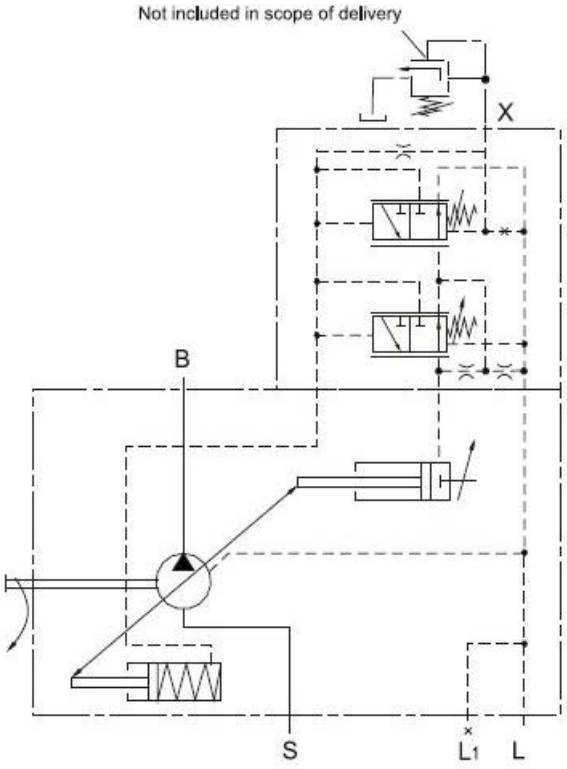
DRG- Pressure/Remotely Control

DR functions and device
A pressure relief valve may be connected to port X for remote control and the valve is not within the scope of delivery of DRG contoller.
The standard differential pressure od the control valve is 2MPa and the required pilot control flow is 1.5L/min.
For other settings (within the reange of 1 to 2 MPa), please specify when ordering.

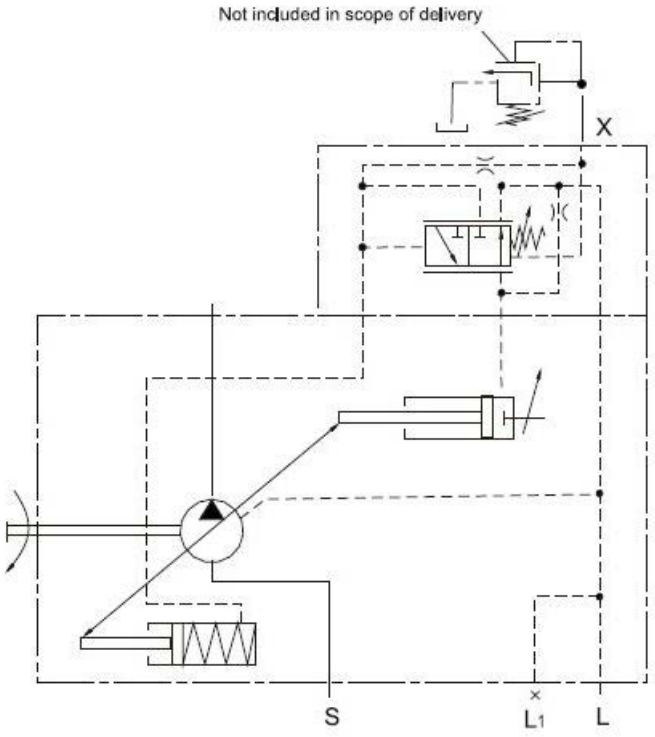
Static operating curve (n1 = 1500rpm, toil = 50°C)



Hydraulic Schematic Diagram (Size 18-110)



Hydraulic Schematic Diagram (Size 140)



Controller data

Hysteresis Δp----------max.0.3MPa

Maximum pressure increase

Size	18	28	45	71	100	110	140
Δp MPa	0.4	0.4	0.6	0.8	1.0	1.0	1.2

Pilot fluid consumption----------approx. 4.5L/min

Ports

B----------pressure port
S----------inlet port
L/L1----------case drain port (L1 plugged)
X----------pilot pressure port

The maxium output pressure of the pump depends on the current of solenids.
The pump displacement increases to increase the flow and satisfy sysytem requeriment if the pump presure falls below the set pressure.
When it reaches the set pressure, the pump will attain the desired flow by regulating its displacement.
The maxium system pressure may be continuallly adjusted by changing the solenoid current. In reversely proportional control, the pump is in stanby state at maximum solenoid current and it has the maximum output pressure at zero current (fail safe function for fun drive).
The ajustable hydraulic-mechanical setting at the maximum pressure takes precendence over the current signal.
The maximum output pressure for hydraulic-mechanical setting takes priority over electric signal setting.

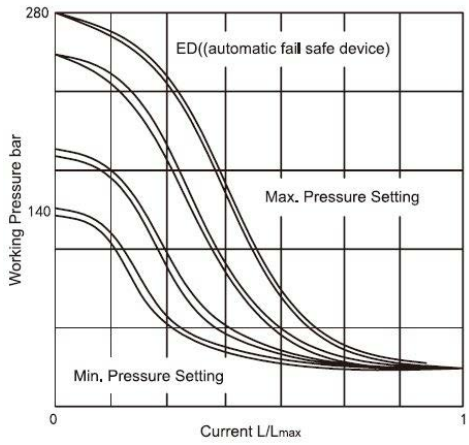
Model	ED71	ED72
Working voltage	12V± 20%	24V± 20%
Start of pressure control p_{max}	100mA	50mA
End of pressure control p_{min}	1200mA	600mA
Nominal resistance at 20°C (R20)	5.5Ω	22.7Ω
Limit current at U_{max}	1.54A	0.77A
Maximum duty cycle	100%	
Temperature range	-20°C to + 115°C	
Dither frequency	100-200Hz	
Solenoid material grade	H(T_{max}=180°C)	

Resistance calculation equation

at T>20°C $$R_W = \frac{R_{20} \times (235+T)}{255}$$

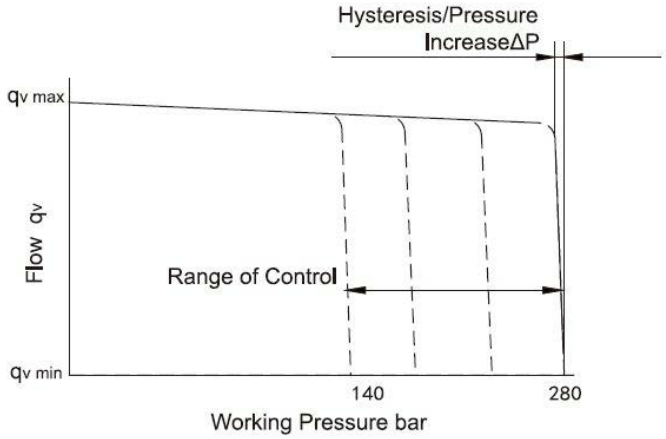
Note: Take protective actions as the valve is very hot during operaton and immediately sfter stop!

Static current - pressure characteristic (inversely proportional control)
(measured with pump at zero stroke)



Hysteresis static current-pressure characteristic----------<3 bar

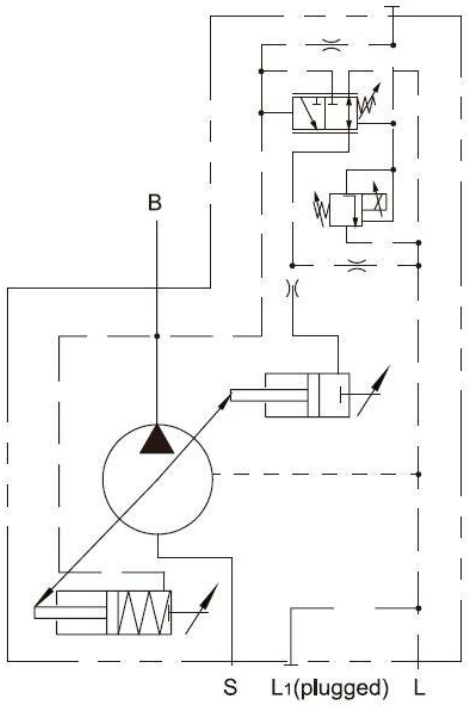
Static operating curve (n = 1500min^{-1}, t_{oil} = 50°C)



Contoller

Stanby standard pressure setting 20bar (range 14-22 bar)
Hysteresis/pressure increase Δp----------<4bar

Hydraulic Schematic Diagram

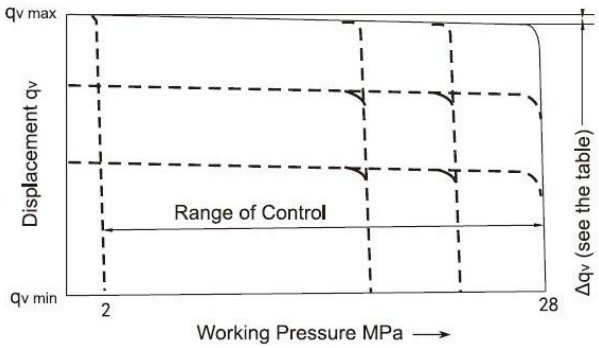


Ports

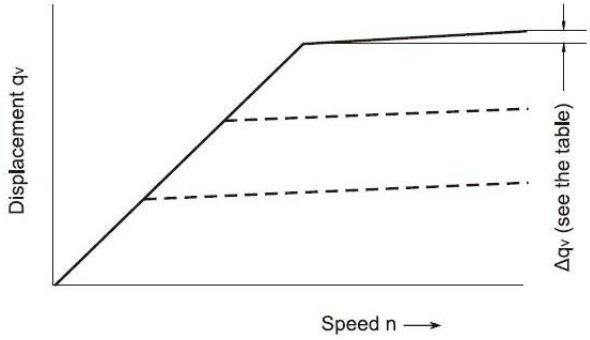
B----------presure port
S----------inlet port
L/L1----------case drain port (L1plugged)
Pilot fluid consumption----------3-4.5L/min

In addition to pressure contoller functions, it can also change pump flow by the aid of the differential pressure of a load (e.g. a small hole). The pump supplies only the actual flow of the actuator.
For DFR1, there is no connection between port X and the reservoir.
For pressure controller functions see DR control.

Static operating curve (n1 = 1500rpm, toil = 50°C)

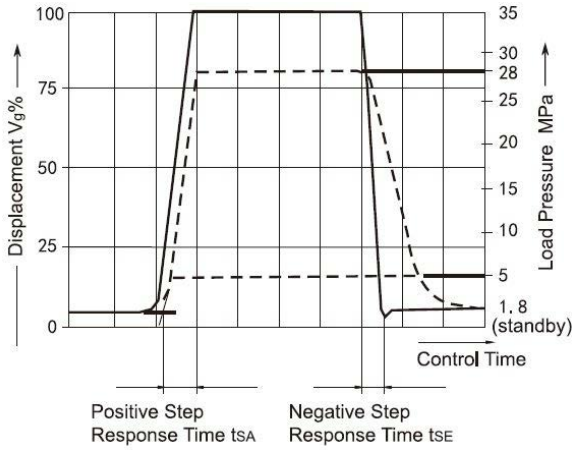


Operating curve at variable speed



Dynamic flow operating curve

This curve indicates the average measurement in test conditions with the pump intalled in the tank



Contoller time

Size	tSA(ms) at 28MPa	tSE(ms) at 28MPa	tSE(ms) at 5MPa
18	40	15	40
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
110	120	60	120
140	130	60	130

Contoller data

For controller data, see DR control.
Maximum flow deviation measured at drive speed n = 1500rpm (Hysteresis and increase)

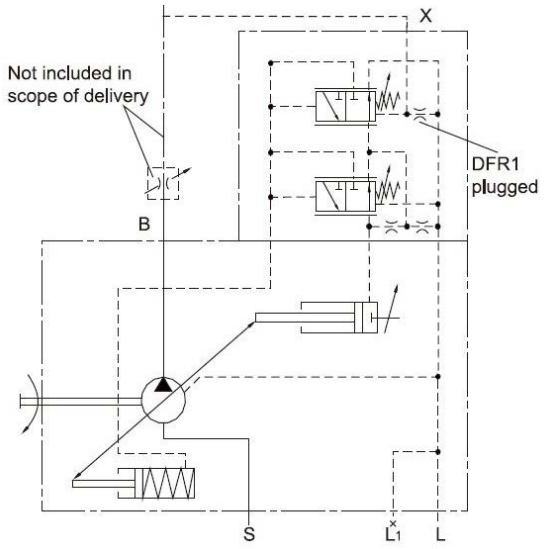
Size	18	28	45	71	100	110	140
Δq_{vmax} L/min	0.5	1.0	1.8	2.8	4.0	4.0	6.0

DFR pilot fluid consumption------Max.3-4.5 L/min
DRF1 pilot fluid consumption----Max.3L/min

Diferential pressure Δp

Between 1 and 2 MPa (it may set higher as required).
Standard setting: 1.4MPa. For different settings, please specify when ordering.
Relieving the load on port X to the reservoir results in a zero stroke pressure P=1.8±0.2MPa (standby) (dependent on Δp).

Hydraulic Schematic Diagram

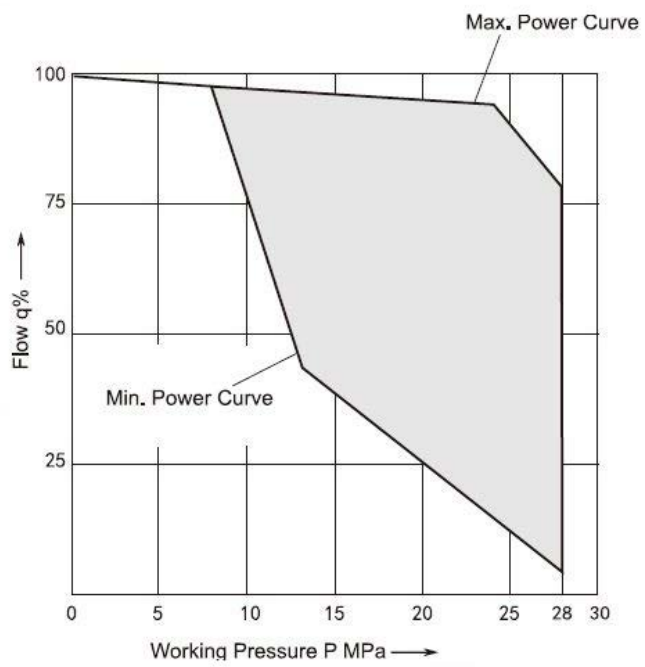


Ports

B----------pressure port
S----------inlet port
L/L1----------case drain port (L1 plugged)
X----------pilot pressure port

To obtain a constant drive torque with varying working pressures, the swivel angle and flow of the axial piston pump are varied so that the product of pressure and flow remains constant.
Flow control is possible below the constant power control curve.

Static operating curve



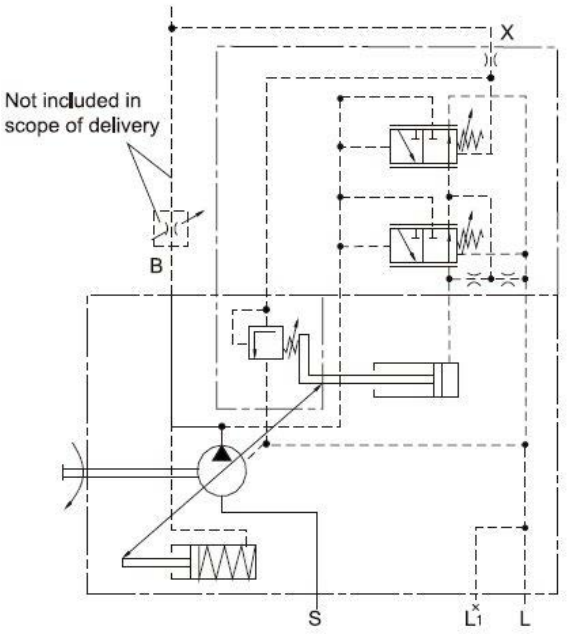
Power characteristic curves are factory set. Please describe in detail in plain text.
For example, 20kW at 1500min^{-1}.

Contoller data

For technical data pressure controller, see DR control.
For technical data of flow controller, see DFR/DFR1 control.

Start of control----------from 8MPa
Control fluid consumption----------Max.5.5L/min
For flow loss at Q_{max}, see drive power and flow page.

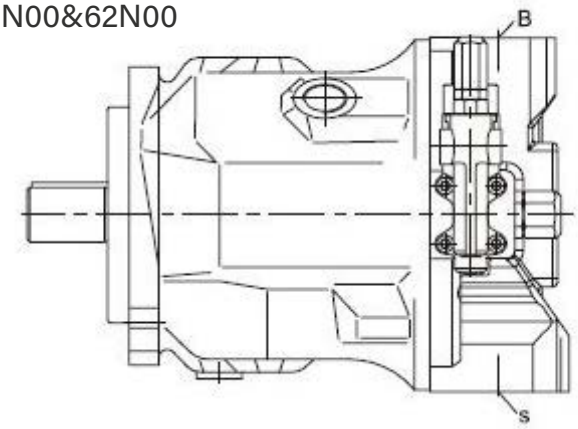
Hydraulic Schematic Design

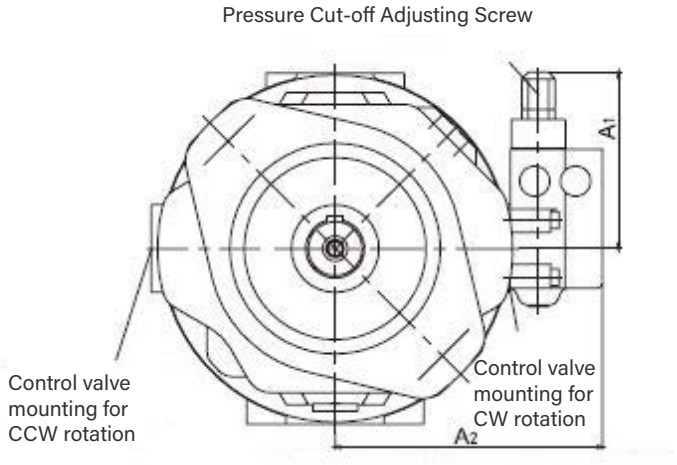


Ports

B----------pressure port
S----------inlet port
L/L1---------- case drain port (L1 plugged)
X----------pilot pressure port

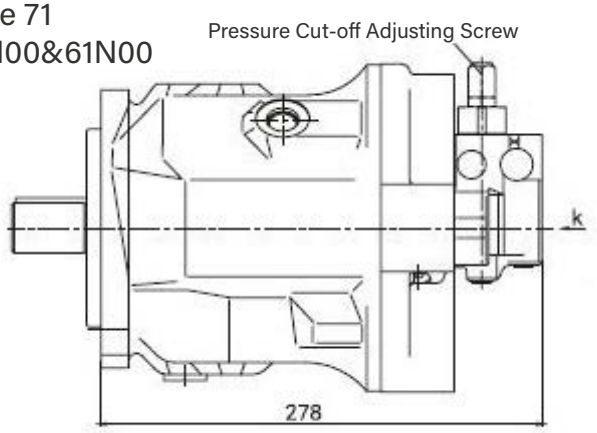
Size 18-110
12N00&62N00

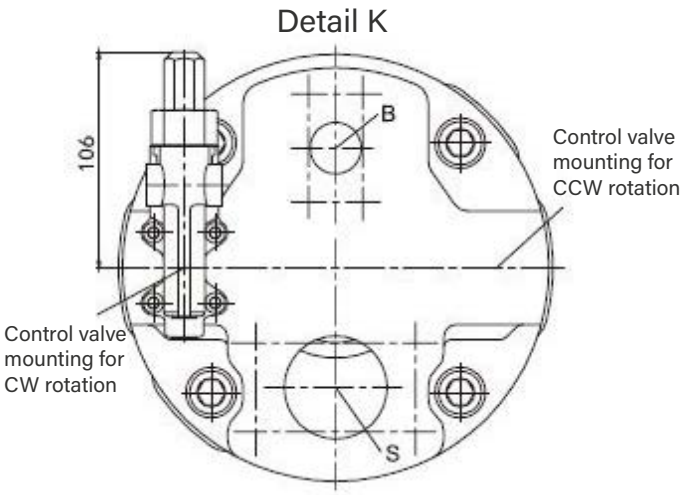




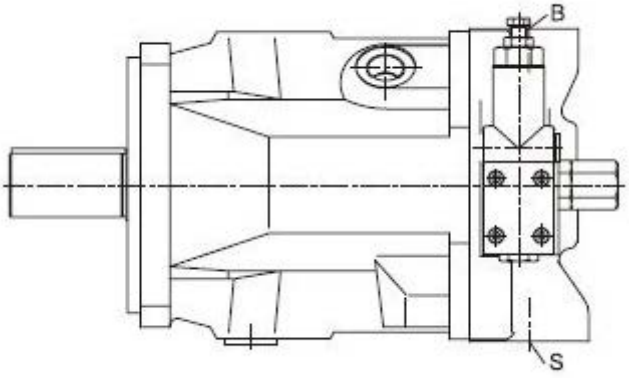
For sizes 18 to 110, the DFR valve is supplied with an untested flow control valve when leaving the factory

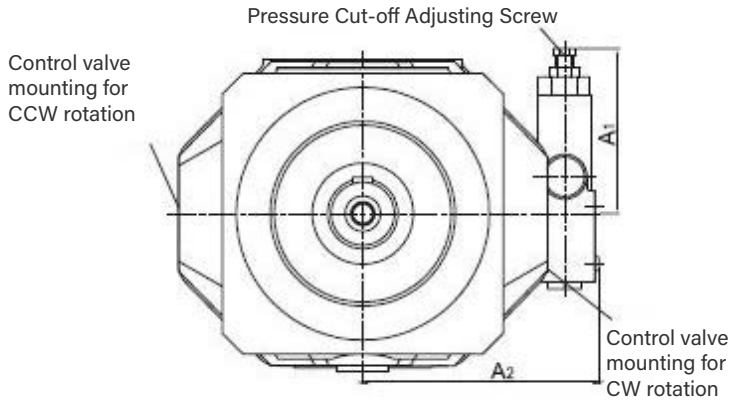
Size 71
11N00&61N00





Size 140



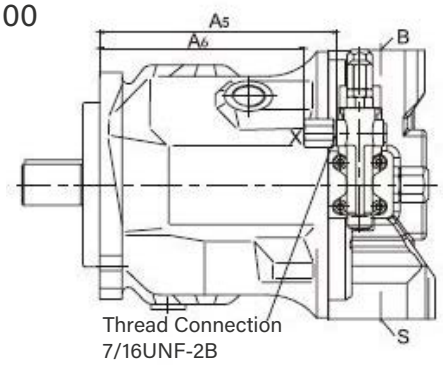


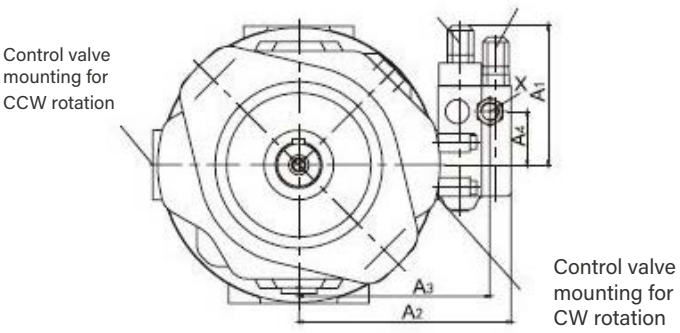
Size	A1	A2	Size	A1	A2
18	104.5	125.5	100	106	165
28	106	136	110	106	165
45	106	146	140	127	169
71	106	160			

Installation Dimensions-
DRG Pressure/Remotely Control

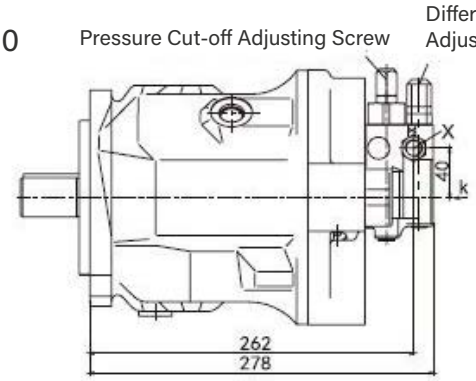
VINCKE

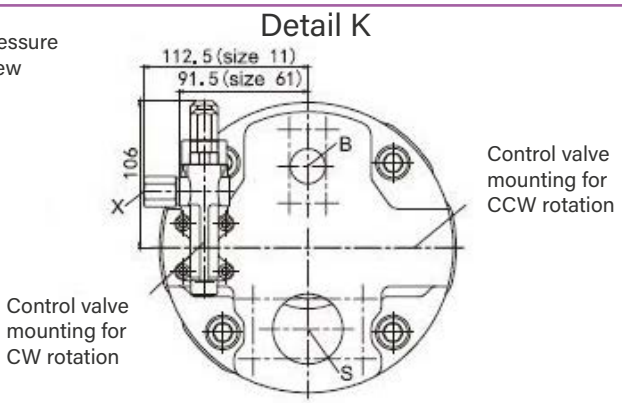
Size 18-110
12N00&62N00



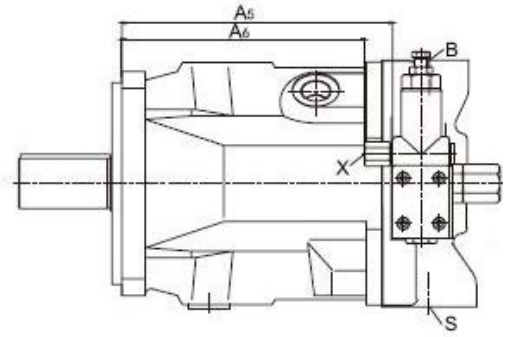


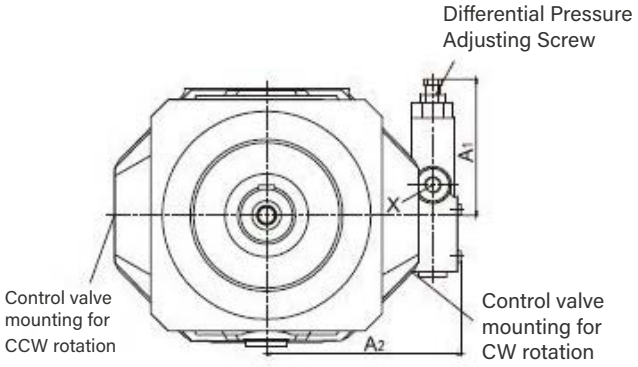
Size 71
11N00&61N00





Size 140

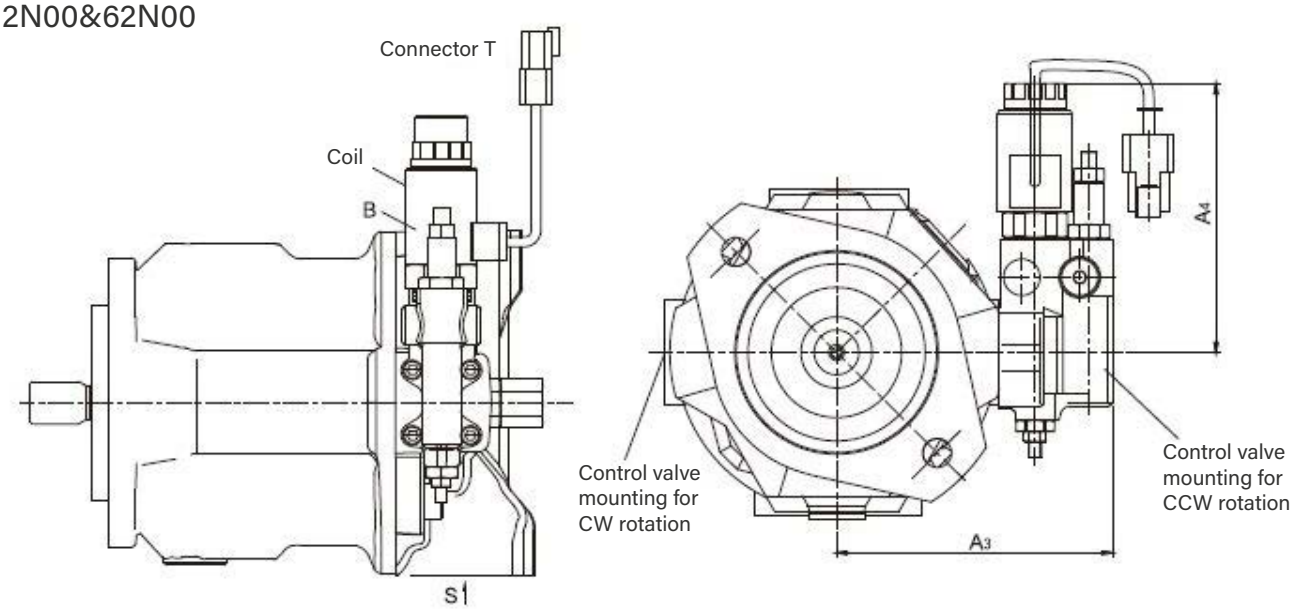




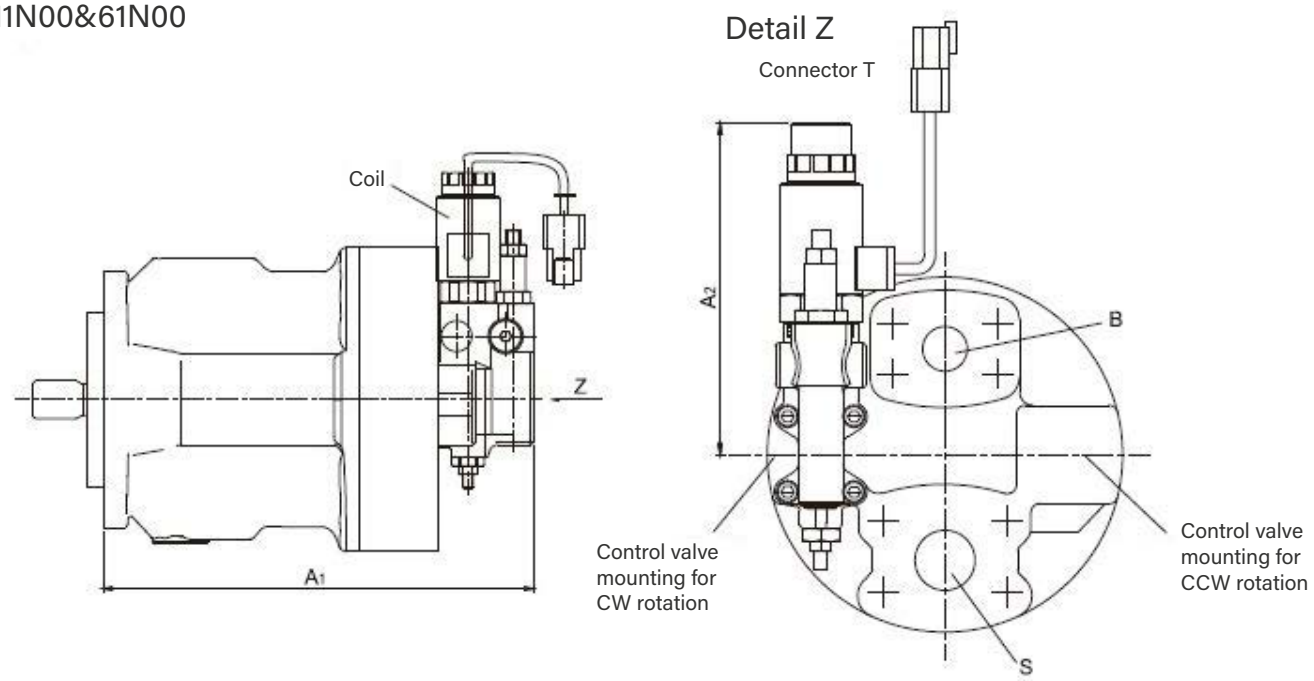
Size	A1	A2	A3	A4	A5	A6	Port X
18 ISO	104.5	125.5	109	40	-	109	M14 x 1.5, 12 deep With pipe join
18 SAE	104.5	125.5	109	40	130	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
28 ISO	106	136	119	40	-	119	M14 x 1.5, 12 deep With pipe joint
28 SAE	106	136	119	40	138	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
45 ISO	106	146	129	40	-	134	M14 x 1.5, 12 deep With pipe joint
45 SAE	106	146	129	40	153	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
71 ISO	106	160	143	40	-	162	M14 x 1.5, 12 deep With pipe joint
71 SAE	106	160	143	40	181	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
100/110 ISO	106	165	148	40	-	229	M14 x 1.5, 12 deep With pipe joint
100/110 SAE	106	165	148	40	248	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
140 ISO	127	169	143	27	244	-	M14 x 1.5, 12 deep Without pipe joint
140 SAE	127	169	143	27	-	222	9/16-18UNF-2B, 13 deep Without pipe joint

Installation Dimensions-
ED Electro Proportional Remote Pressure Control

Size 18-110
12N00&62N00



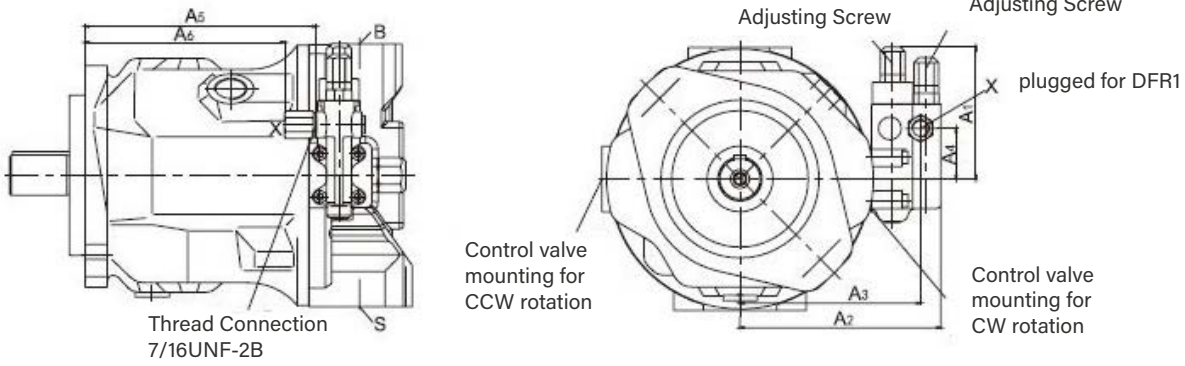
Size 71
11N00&61N00



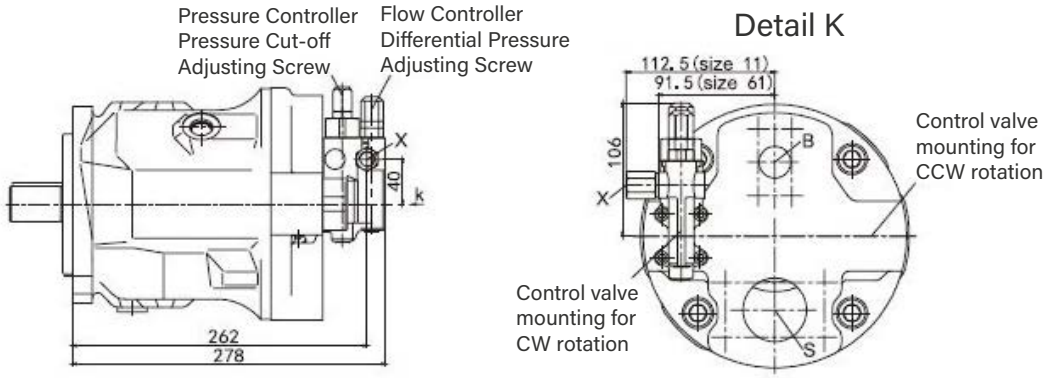
Size	A1	A2	A3	A4
18	-	-	126	140
28	-	-	136	140
45	-	-	146	140
71	278	140	160	140
100/110	-	-	165	140

Installation Dimensions- DFR/DFR1 Pressure/Flow Control

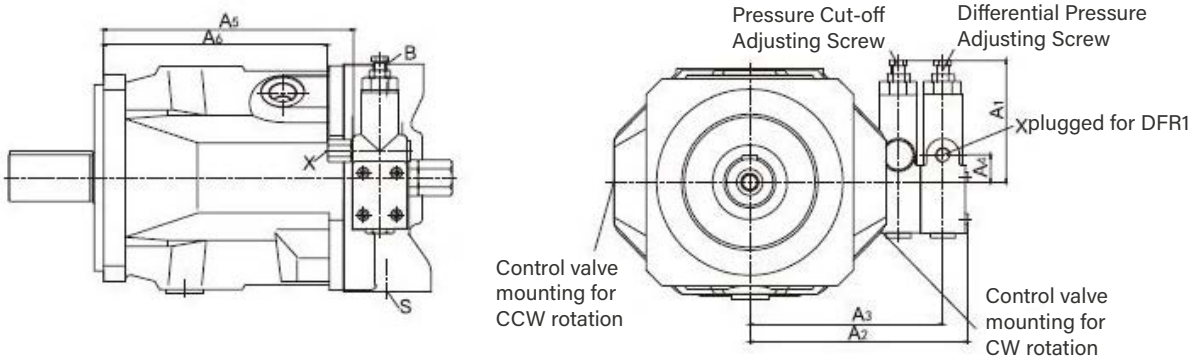
Size 18-110
12N00&62N00



Size 71
11N00&61N00



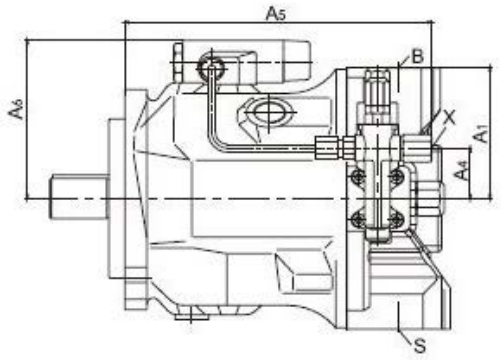
Size 140

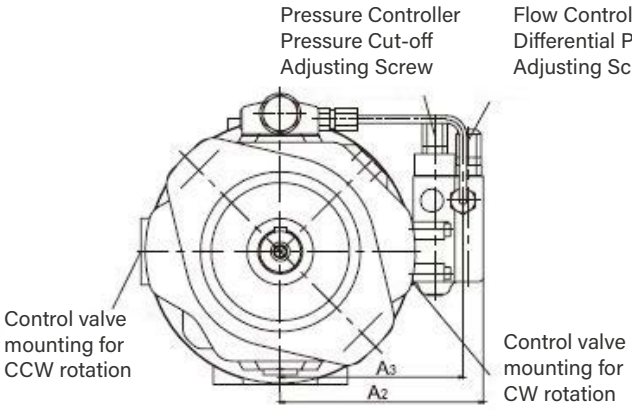


Size	A1	A2	A3	A4	A5	A6	Port X
18 ISO	104.5	125.5	109	40	-	109	M14 x 1.5, 12 deep With pipe join
18 SAE	104.5	125.5	109	40	130	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
28 ISO	106	136	119	40	-	119	M14 x 1.5, 12 deep With pipe joint
28 SAE	106	136	119	40	138	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
45 ISO	106	146	129	40	-	134	M14 x 1.5, 12 deep With pipe joint
45 SAE	106	146	129	40	153	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
71 ISO	106	160	143	40	-	162	M14 x 1.5, 12 deep With pipe joint
71 SAE	106	160	143	40	181	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
100/110 ISO	106	165	148	40	-	229	M14 x 1.5, 12 deep With pipe joint
100/110 SAE	106	165	148	40	248	-	7/16-20UNF-2B, 11.5 deep Without pipe joint
140 ISO	127	209	183	27	244	-	M14 x 1.5, 12 deep Without pipe joint
140 SAE	127	209	183	27	-	222	9/16-18UNF-2B, 13 deep Without pipe joint

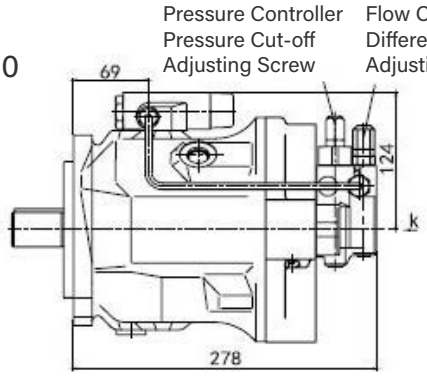
Installation Dimensions-
DFLR Pressure/Flow/Constant Power Control

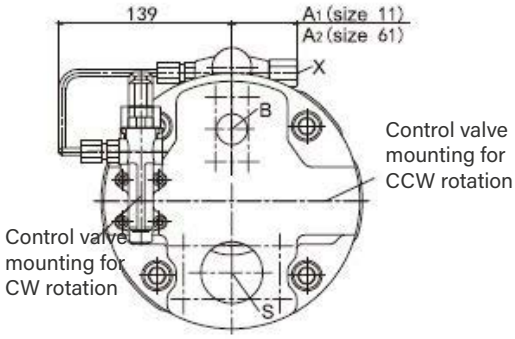
Size 18-110
12N00&62N00



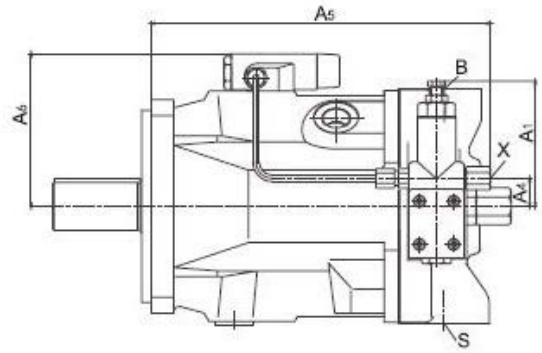


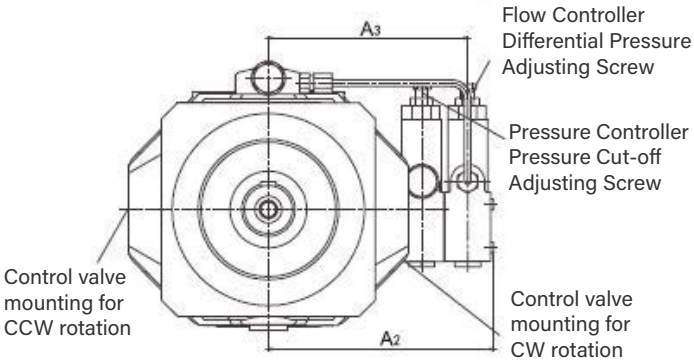
Size 71
11N00&61N00





Size 140





Size	A1	A2	A3	A4	A5	A6	Port X
28 ISO	106	136	119	40	197	107	M14 x 1.5, 12 deep
28 SAE	106	136	119	40	194	107	7/16-20UNF-2B, 11.5 deep
45 ISO	106	146	129	40	212	112	M14 x 1.5, 12 deep
45 SAE	106	146	129	40	209	112	7/16-20UNF-2B, 11.5 deep
71 ISO	106	51	143	40	240	124	M14 x 1.5, 12 deep
71 SAE	48	160	143	40	237	124	7/16-20UNF-2B, 11.5 deep
100/110 ISO	106	165	148	40	307	129	M14 x 1.5, 12 deep
100/110 SAE	106	165	148	40	304	129	7/16-20UNF-2B, 11.5 deep
140 ISO	127	209	183	26	314	140	M14 x 1.5, 12 deep
140 SAE	127	209	183	26	314	140	9/16-18UNF-2B, 13 deep

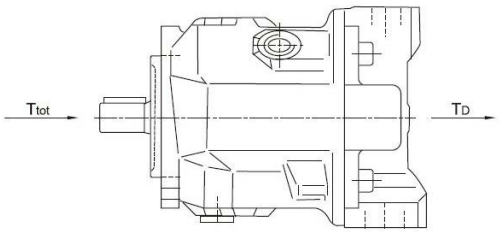
BA10VSO pumps are supplies with through drives based on the model code ont the through drive classification code page.
The type of through drive is indicated with a code (KB2-K21).
A single code is enough if the manufacturer provides no additional pump.
Shipping package includes: Shaft hub, fastering screws, seals and if necessary, connection flange.

Combined pump

The combination of several pumps may form independent circuits: When ordering combination pumps that include BA10VSO and require delivery in assembled state, the two items code musrt be joined by a "+".

Order example:
BA10VSO 71 DR/31 L-PPA12KB3 + BA10VSO 28 DR/31 L-PSA12NOO

Max.Permissible Input and Through Drive Torques



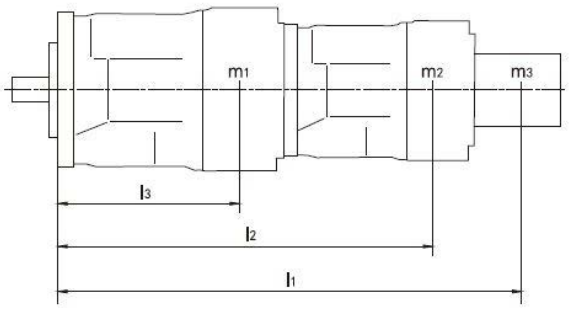
Torque distribution between pumps 1 and 2 is optional.
The maximum permissible input torque Ttot and the maximum permissible through drive torque TD shall not exceed the specified values.

Size		28	45	71	100	110	140
Max. permissible input torque on shaft P of pump 1							
T_{tot}	Nm	137	200	439	857	857	1206
Max. permissible through drive torque							
T_D	Nm	137	200	439	778	778	1206
T_{Dkeyed}	Nm	112	179	283	398	398	557

Size		18	28	45	71	100	110	140
Max. permissible input torque on shaft S of pump 1								
T_{tot}	Nm	80	137	319	626	1104	1104	1620
Max. permissible through drive torque								
T_D	Nm	80	160	319	492	778	778	1206
T_{Dkeyed}	Nm	80	112	179	283	398	398	557

Size		28	45	71	100	110	140
Max. permissible input torque on shaft P of pump 1							
T_{tot}	Nm	225	400	644	-	-	-
Max. permissible through drive torque							
T_D	Nm	176	365	548	-	-	-
T_{Dkeyed}	Nm	112	179	283	-	-	-

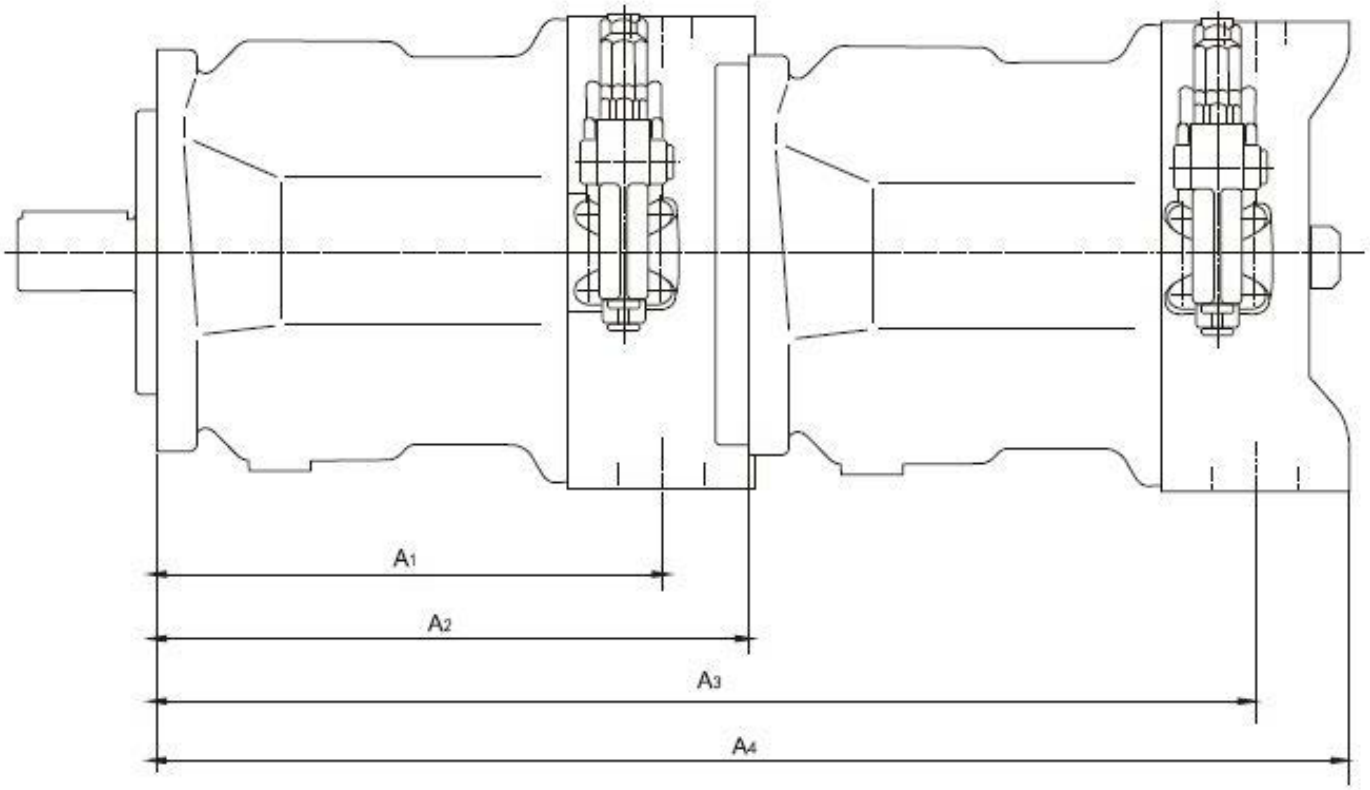
Permissible Moment of Inertia



Size		18	28	45	71	100	110	140
Permissible bending moment								
T_m	Nm	580	880	1370	2160	3000	3000	4500
Permissible moment of inertia at 10g Δ98.1m/s²								
T_m	Nm	50	88	137	216	300	300	450
mass								
m_1	kg	12	16	21	33	45	45	60
Distance to center of gravity								
l_1	mm	90	110	130	150	160	160	160

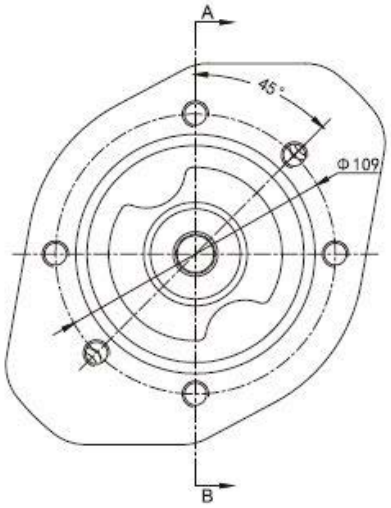
Ttot = max. permissible input torque of pump 1
Td = max. permissible though-drive torque on through drive and splined shaft
Tdkeyed = max. permissible through-drive torque on through drive and keyed shaft

BA10VSO + BA10VSO

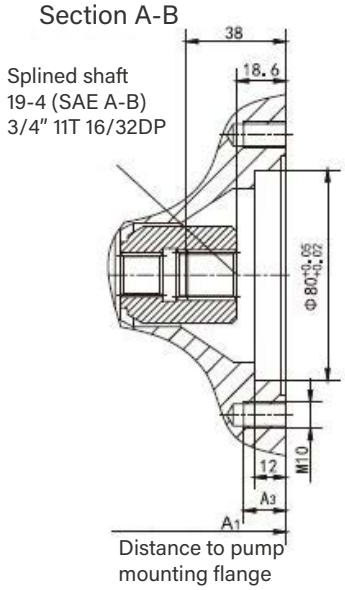


main pump / auxiliary pump	BA10VSO18				BA10VSO28				BA10VSO45				BA10VSO71				BA10VSO100/110				BA10VSO140			
	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4
BA10VSO18	164	204	349	399	164	204	349	399	184	229	374	424	217	267	412	462	275	338	483	533	275	350	495	545
BA10VSO28	-	-	-	-	164	204	368.5	410	184	229	374	434	217	267	431.5	431.5	275	338	502.5	544	275	350	514	556
BA10VSO45	-	-	-	-	-	-	-	-	184	229	393.5	453	217	267	491	491	275	388	522	562	275	350	534	574
BA10VSO71	-	-	-	-	-	-	-	-	-	-	-	-	217	267	524	524	275	388	555	595	275	350	567	609
BA10VSO100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275	388	613	664	275	350	625	679
BA10VSO110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275	350	625	679
BA10VSO140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275	350	625	688

Flange ISO 80, 2-hole, for connection of another BA10VSO18 pump (splined saft S or R)
Ordering model KB2

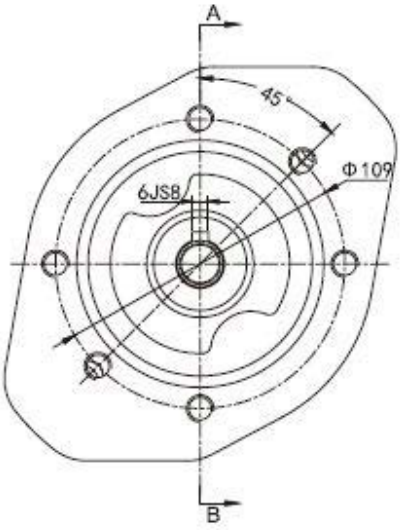


Section A-B

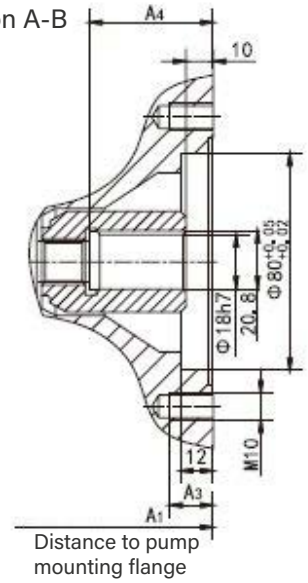


Main Pump Size	A1	A3	A4
28	204	16	41.6
45	229	16	46.1
71	267	20	52.1

Flang ISO 80, 2-hole, for connection of another BA19VSO18 pump (keyed shaft P)
Ordering model K51

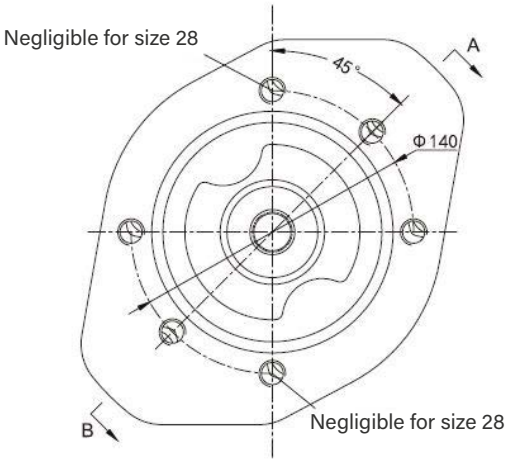


Section A-B

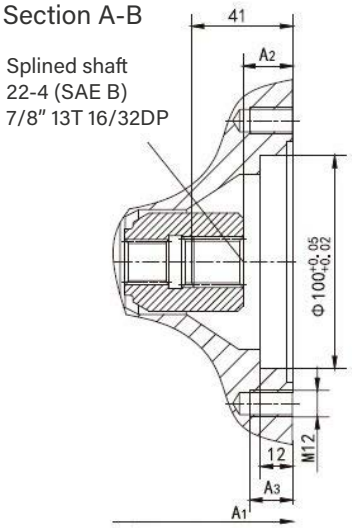


Main Pump Size	A1	A3	A4
28	204	16	37
45	229	16	43
71	267	20	51
100	338	20	55
110	338	20	55
140	350	20	67

Flange ISO 100, 2-hole, for connection of another BA10VSO28 pump (splined shaft S or R)
Ordering model KB3

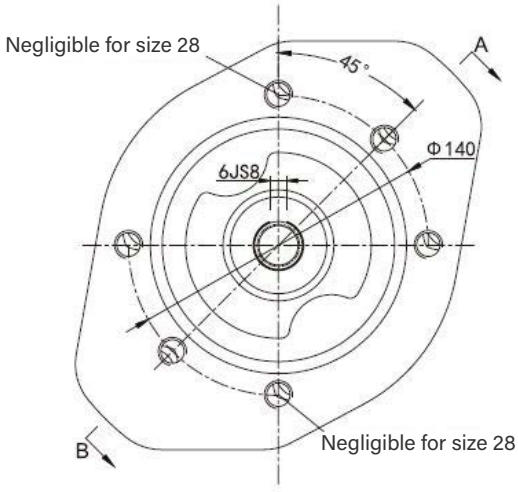


Section A-B

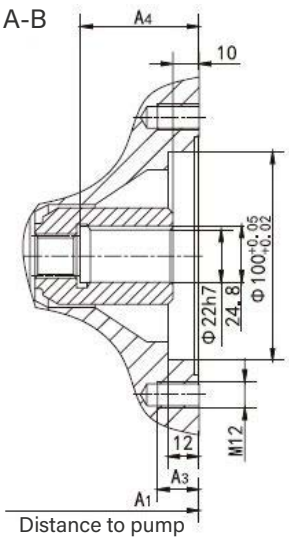


Main Pump Size	A1	A2	A3
28	204	19.2	14
45	229	16.5	15
71	267	16.5	18
100	338	17.6	18
110	338	17.6	18
140	350	18.2	24

Flange ISO 100, 2-hole, for connection of another BA10VSO28 pump (keyed shaft P)
Ordering model K25

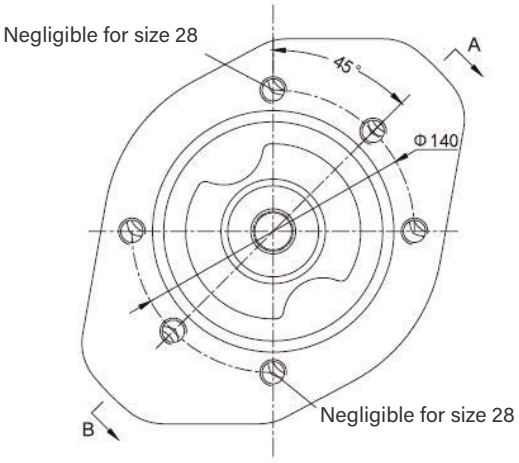


Section A-B

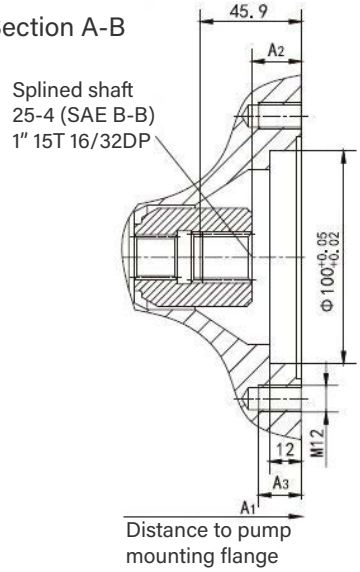


Main Pump Size	A1	A3	A4
28	204	14	37
45	229	14	43
71	267	23	51
100	338	20	55
110	338	20	55
140	350	24	62

Flange ISO 100, 2-hole, for connection of another BA10VSO45 pump (splined shaft S or R)
Ordering model KB4



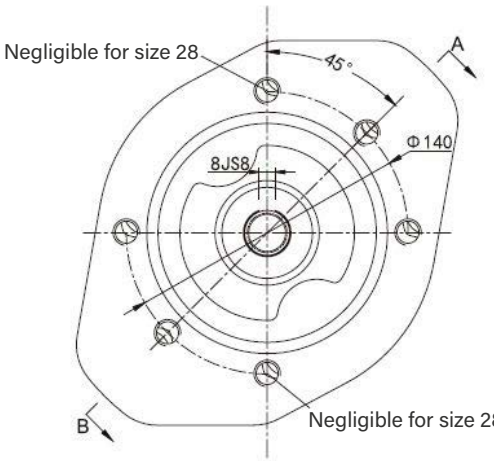
Section A-B

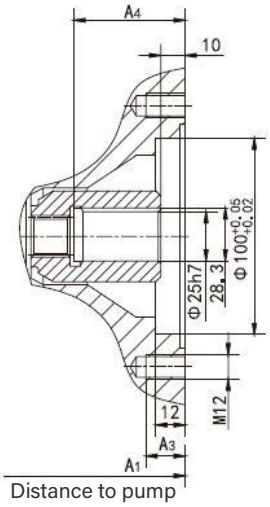


Main Pump Size	A1	A2	A3
45	229	17.2	14
71	267	17.2	18
100	338	18.2	20
110	338	18.2	20
140	350	18.2	24

Flange ISO 100, 2-hole, for connection of another BA10VSO45 pump (keyed shaft P)
Ordering model K26

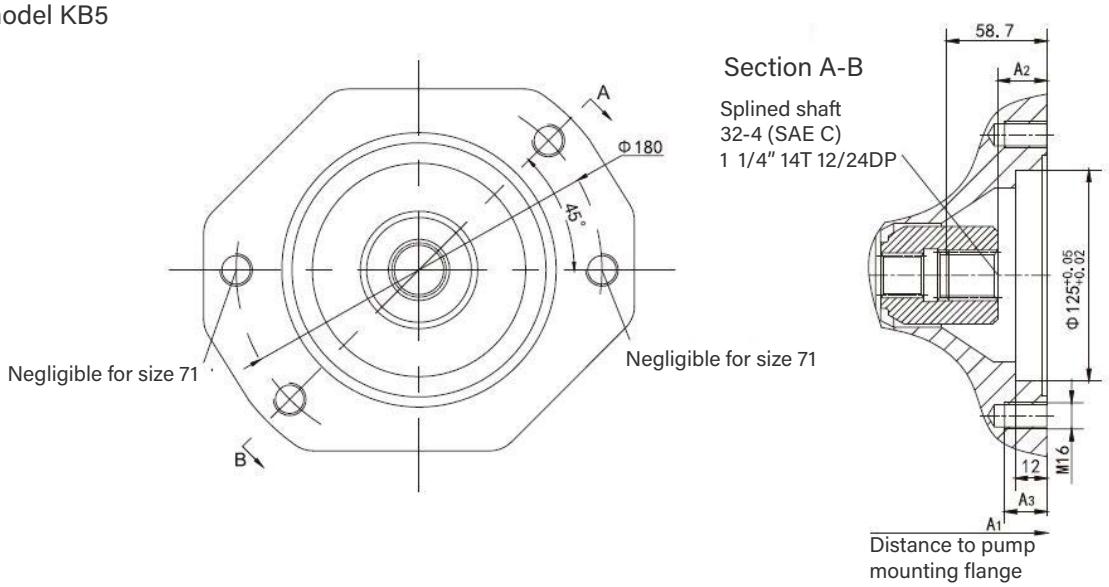
Section A-B





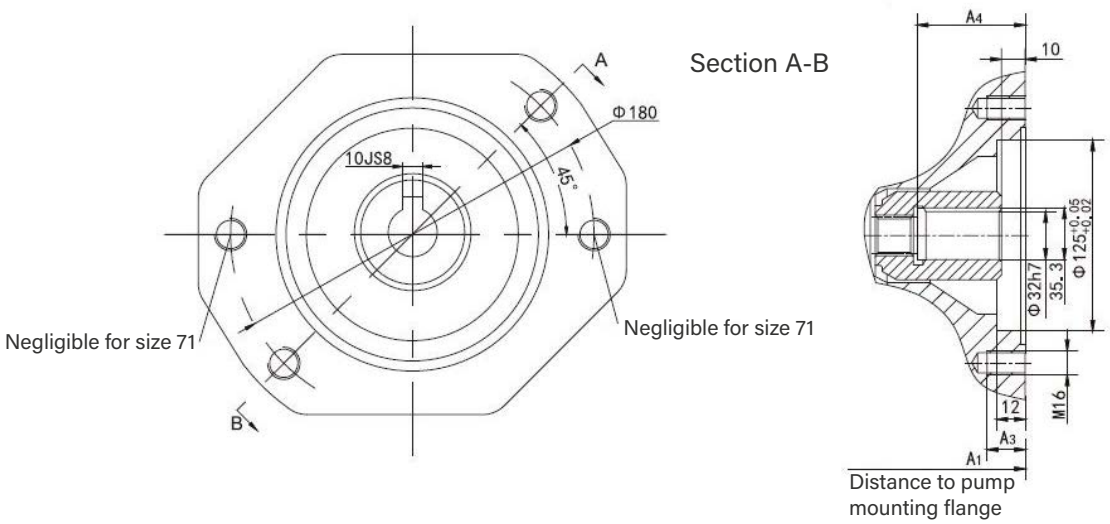
Main Pump Size	A1	A3	A4
45	229	14	43
71	267	23	51
100	338	20	56
110	338	20	56
140	350	24	67

Flange ISO 125, 2-hole, for connection of another BA10VSO71 pump (splines shaft S or R)
Ordering model KB5



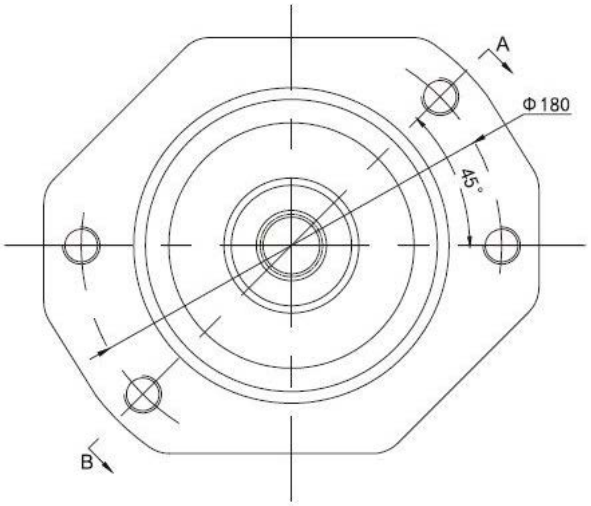
Main Pump Size	A1	A2	A3
71	267	20	18.5
100	338	20	25
110	338	20	25
140	350	21	32

Flange ISO 125, 2-hole, for connection of another BA10VSO71 (keyed shaft P)
Ordering model K27

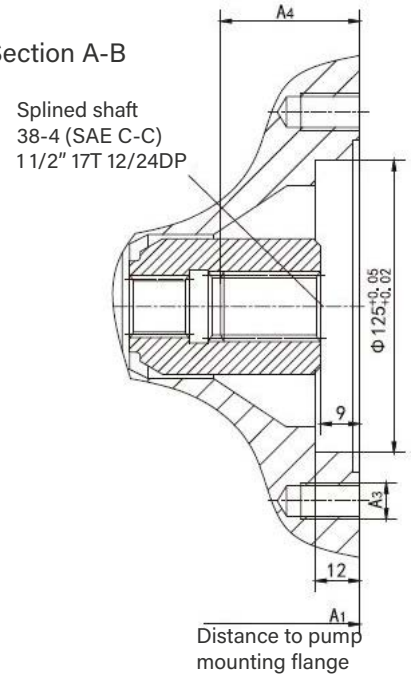


Main Pump Size	A1	A3	A4
71	267	18	51
100	338	20	54
110	338	20	54
140	350	24	63

Flange ISO 125, 2-hole, for connection of another BA10VSO100 pump (splined shaft S)
Ordering mpdel KB6

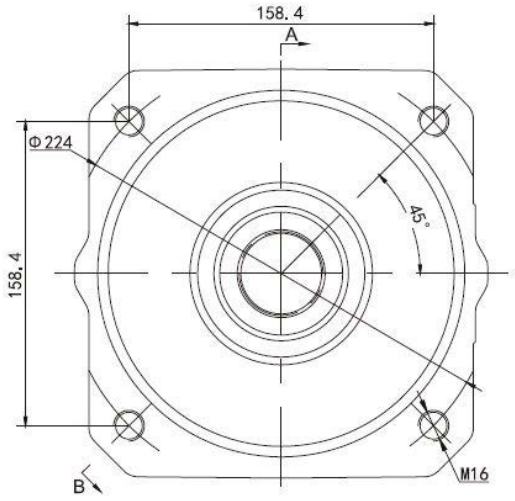


Section A-B

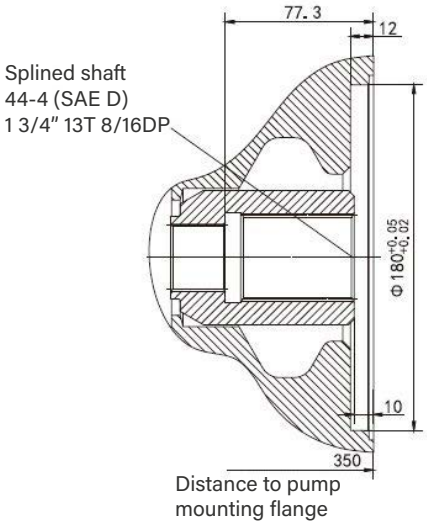


Main Pump Size	A1	A3	A4
100	338	M16, 25 deep	65
110	338	M16, 25 deep	65
140	350	M16, 32deep	77.3

Flange ISO 180, 4-hole, for connection of another BA10VSO140 pump (splined shaft S)
Ordering model KB7
Main Pump Size BA10VSO140

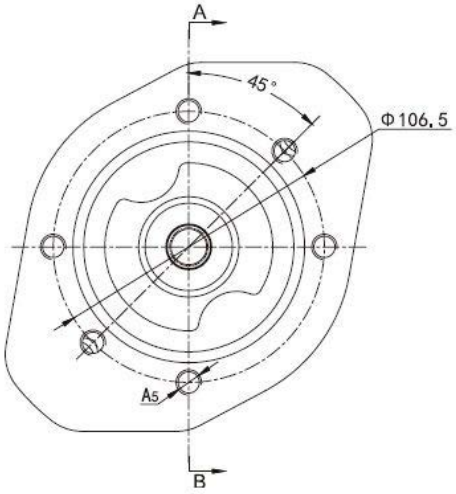


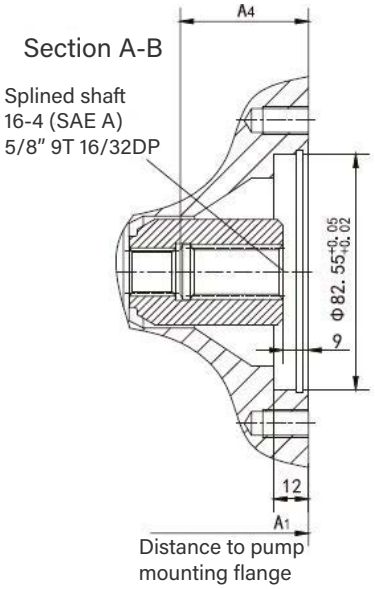
Section A-B



Installation Dimensions- Through Drive

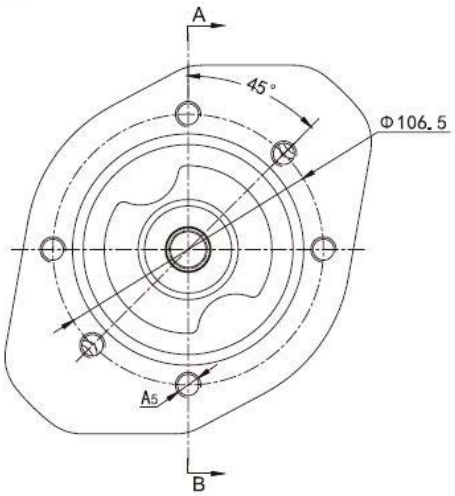
Flange SAE 82-2(SAE A, 2-hole)
Ordering model K01

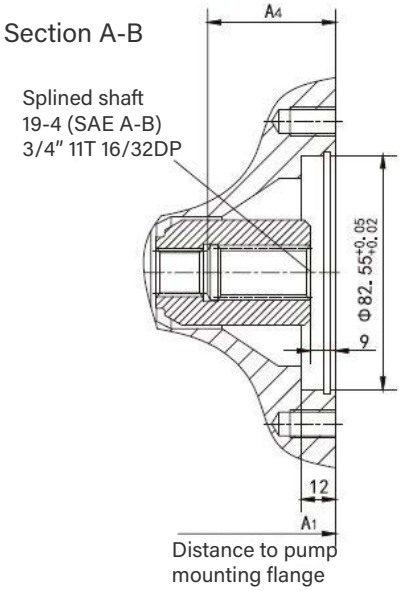




Main Pump Size	A1	A4	A5
28	204	47	M10, 16 deep
45	229	53	M10, 16 deep
71	267	61	M10, 20 deep
100	338	65	M10, 20 deep
110	338	65	M10, 20 deep
140	350	77	M10, 20 deep

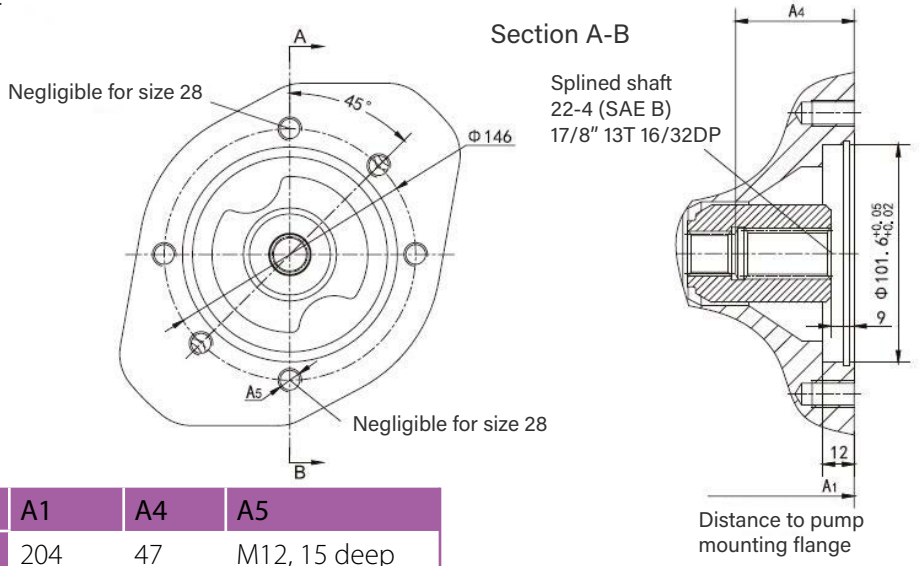
Flange SAE 82-2 (SAE A, 2-hole), for connection of another BA10VSO18 pump (splined shaft S)
Ordering model K52





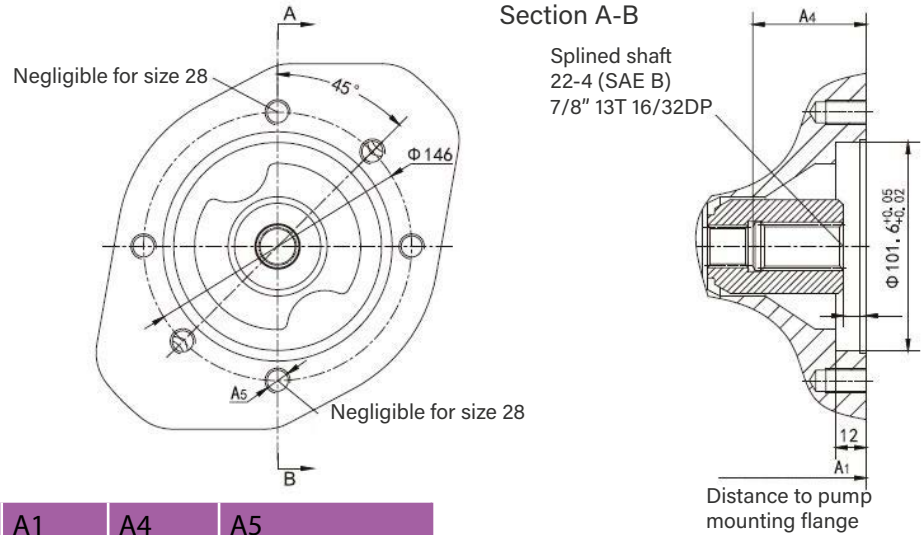
Main Pump Size	A1	A4	A5
28	204	47	M10, 16 deep
45	229	53	M10, 16 deep
71	267	61	M10, 20 deep
100	338	65	M10, 20 deep
110	338	65	M10, 20 deep
140	350	77	M10, 20 deep

Flange SAE 101-2 (SAE B, 2-hole), for connection of another BA10VSO28 pump (splined shaft S)
Ordering model K02



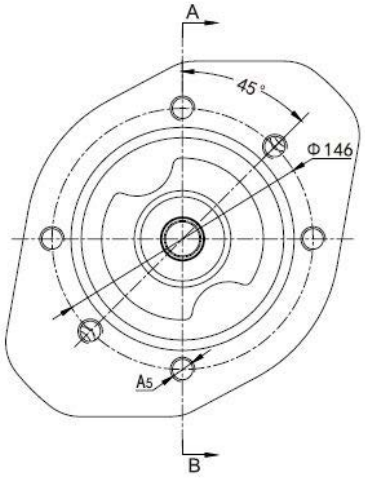
Main Pump Size	A1	A4	A5
28	204	47	M12, 15 deep
45	229	53	M12, 18 deep
71	267	61	M12, 20 deep
100	338	65	M12, 20 deep
110	338	65	M12, 20 deep
140	350	77	M12, 20 deep

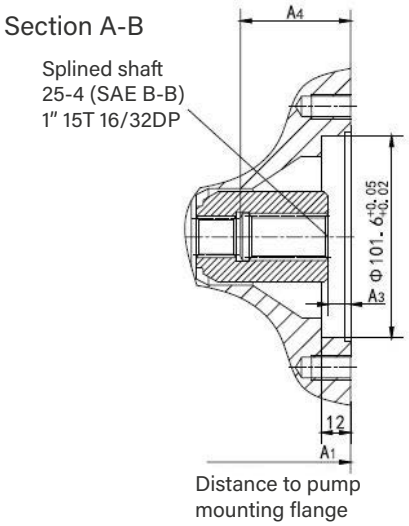
Flange SAE 101-2 (SAE B, 2-hole), for connection of another BA10VSO28 pump (splined shaft S)
Ordering model K68



Main Pump Size	A1	A4	A5
28	204	47	M12, 15 deep
45	229	53	M12, 18 deep
71	267	61	M12, 20 deep
100	338	65	M12, 20 deep
110	338	65	M12, 20 deep
140	350	77	M12, 20 deep

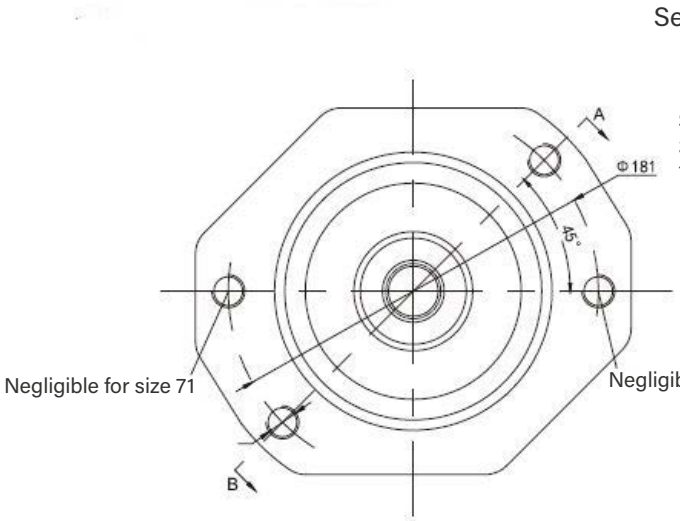
Flange SAE 101-2 (SAE B, 2-hole), for connection of another BA10VSO45 ump (splined shaft S)
Ordering model K04

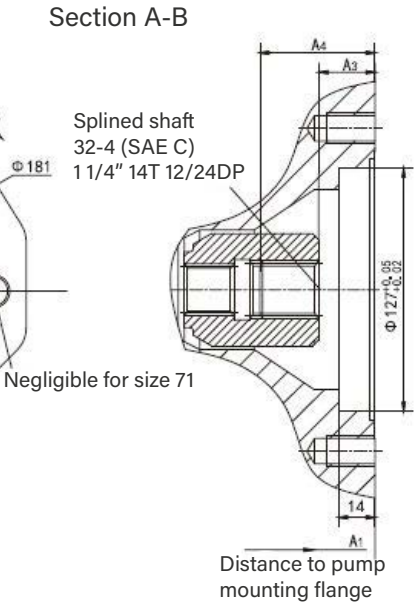




Main Pump Size	A1	A3	A4	A5
28	204	9	47	M12, 15 deep
45	229	9	53.4	M12, 18 deep
71	267	9	61.3	M12, 20 deep
100	338	10	65	M12, 20 deep
110	338	10	65	M12, 20 deep
140	350	8	77.3	M12, 20 deep

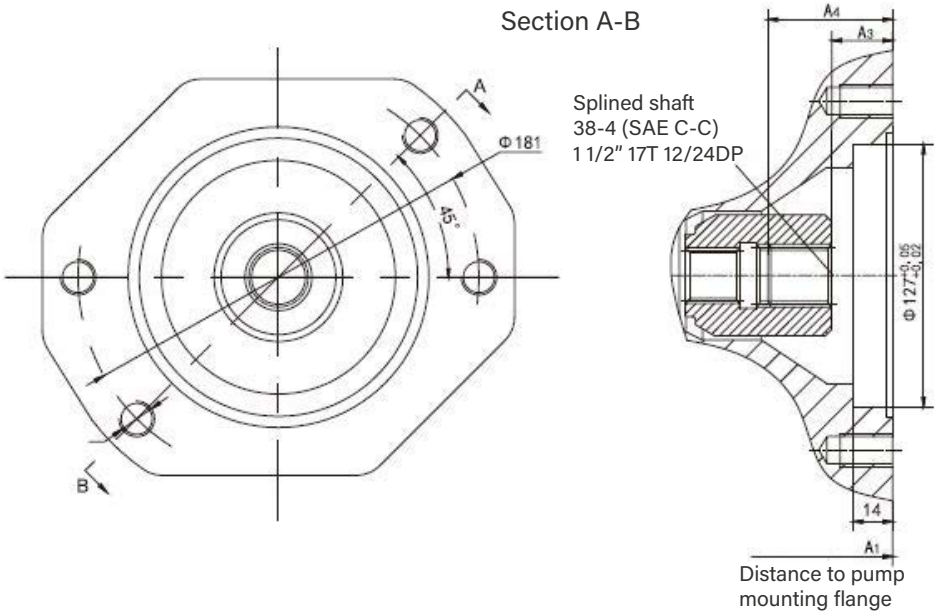
Flange SAE 127-2 (SAE C, 2-hole), for connection of antoher BA10VSO71 pump (splined shaft S)
Ordering model K07





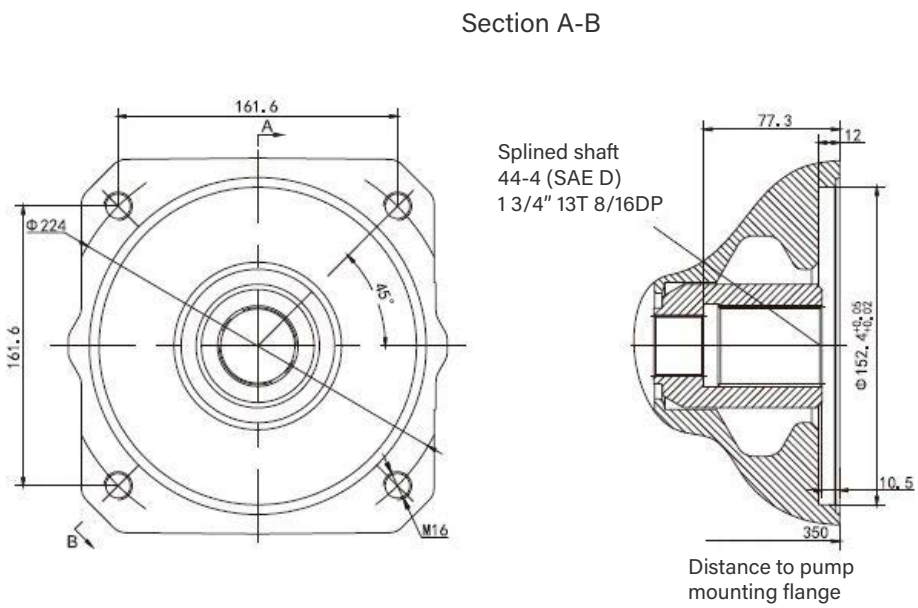
Main Pump Size	A1	A3	A4	A5
71	267	10	61.3	M16, 18 deep
100	338	9	65	M16, 20 deep
110	338	9	65	M16, 20 deep

Flange SAE 127-2 (SAE C, 2-hole), for connection of antoher BA10VSO100 pump (plined shaft S)
Ordering model K24



Main Pump Size	A1	A3	A4	A5
100	338	8	65	M16, 20 deep
110	338	8	65	M16, 20 deep
140	350	9	77.3	M16, 32 deep

Flange SAE 152-4 (SAE D, 4-hole), for connection of another BA10VSO140 pump (splined shaft S)
Ordering model K17
Main Pump Size BA10VSO140



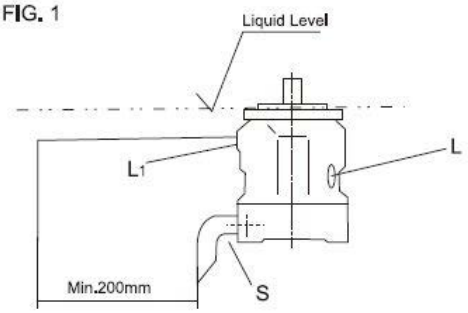
Any position you prefer.
The pump must be filled with hydraulic fluid during commissioning and operation.
To reduce noise, all connecting lines (inlet line, pressure line and case drain line) must be isolated from the reservoir with flexible components. Do not install any check valve in the case drain line.
You must consult us before implementation in special cases.

Vertical installation (drive shaft upwards)

The installation below is for your reference:
A. Inside-reservoir installation
Fill the pump and lay in horizontal before installation.
a) If the minimum fluid level of the reservoir is equal to or higher than the mounting flange surface of the pump, plug port L, and open ports L1 and S; connect pipes to ports L1 and S as shown in FIG.1.

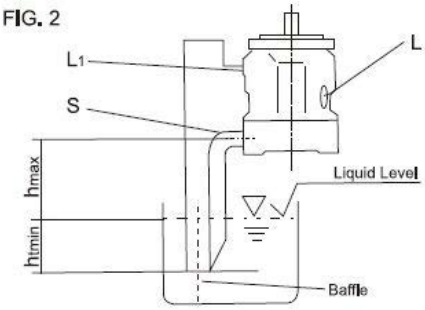
b) If the minimum fluid level of the reservoir is below the mounting flange surface of the pump, connect pipes to ports L1 and S as showing in FIG.2.

FIG. 1



B. Outside-reservoir installation
Fill the pump and lay it horizontal before installation. See FIG. 2 for above-reservoir installation.

FIG. 2



Restriction: Minimum inlet pressure under static and dynamic conditions
P_{absmin} = 0.8bar
Note: Do not install the pump above the reservoir as far as possible to reduce noise.
The permissible suction height h results from the total pressure loss, but it should not exceed
h_{max} = 800mm (pipe immersion depth h_{min} = 200mm)

Total pressure loss

$\Delta p_{tot} = \Delta p_1 + \Delta p_2 + \Delta p_3 \leq (1 - P_{absmin}) = 0.2bar$
Δp_1: pipe pressure loss from fluid column acceleration

$$\Delta p_1 = \frac{\rho \cdot l \cdot d_v}{d_t} \cdot 10^{-6}(MPa)$$

Δp_2: pressure loss from hydrostatic head

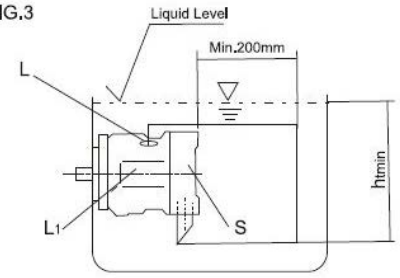
$$\Delta p2 = h \cdot \rho \cdot g \; 10^{-6}(MPa)$$

Δp_3: pipe loss (elbow, etc.)
ρ= viscosity(kg/m²) l = pipe length (m)
dv/dt = rate of change in fluid velocity (m/s²) h = height (m)
g = acceleration of gravity = 9.81 m/s²

Horizontal Installation

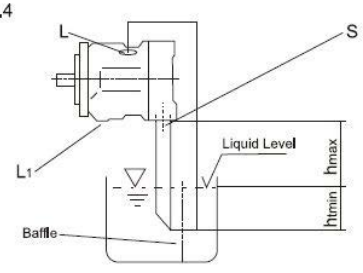
For horizontal installation, set port L or L1 on the top.
the intallation below id for you reference:
A. Inside-reservoir intallation
a) If the minimum fluid level of the reservoir is above the top of the pump, plug port L1; ypu may open ports L and S, and connect pipes to the two ports (as show in FIG.3).
b) If the minimum fluid level of the reservoir is below the top of the pump, plug port L1; see FIG. 4 for pipe connection of port L and possibly port S.

FIG.3



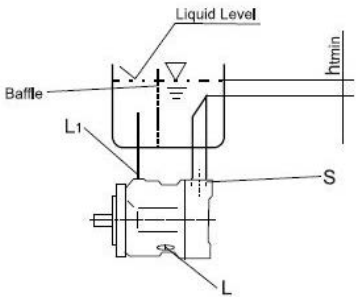
B. Outside-redervoir installation
Fill the pump before commissioning.
Connect pipes to port S and the top port L or L1.
a) See FIG.4 for above-reservoir installation.

FIG.4

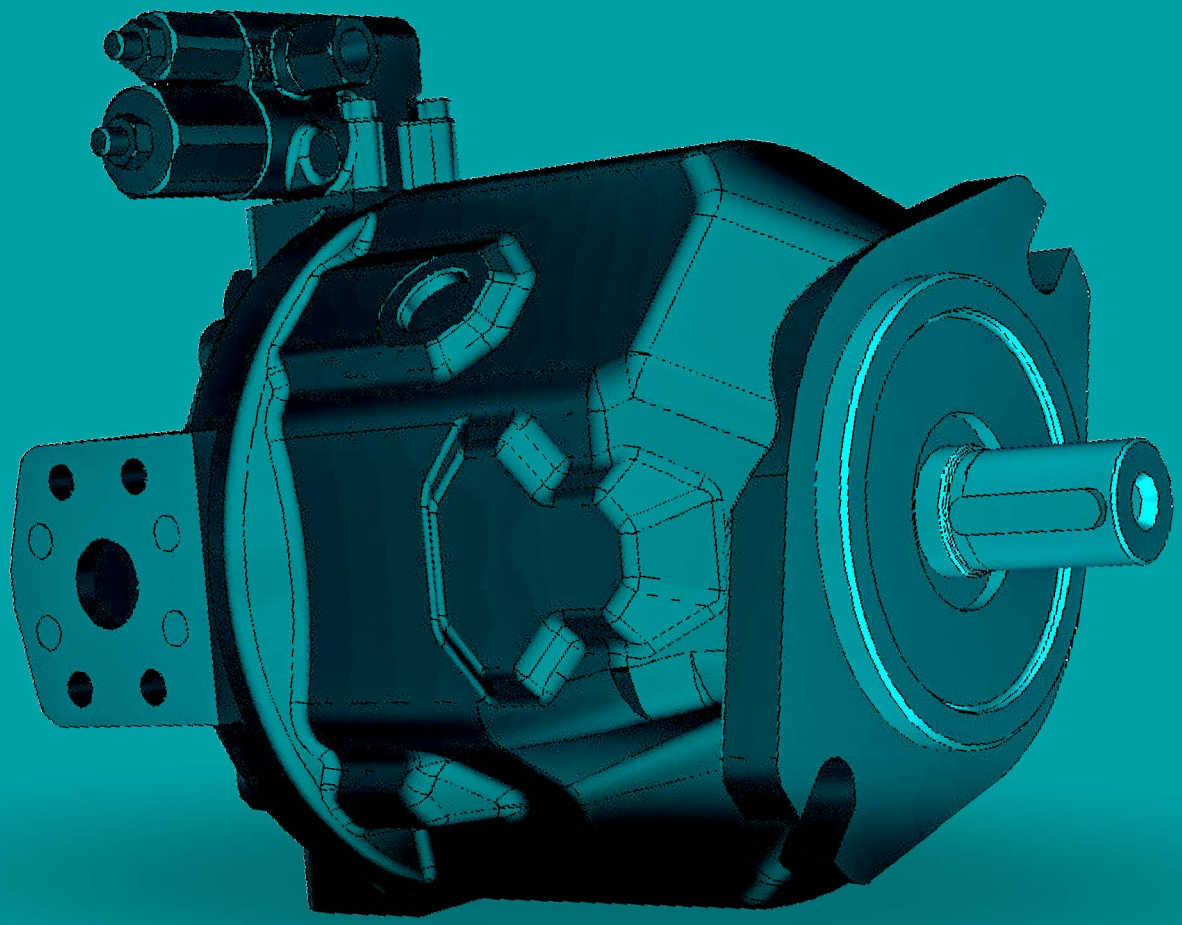


b) Below-reservoir intallation
See FIG.5 for ipe connection of ports L1 and S. Port L is plugged.

FIG.5



Piston Pumps



VINCKE