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Elephant Fluid Power

大象流体动力有限公司

About Us

Elephant Fluid Power is located in Lianmeng Street, Shijiazhuang City, Hebei, China. It is a professional manufacturer and seller of high-end hydraulic components. The company has strong strength and advanced equipment.

Our company has excellent testing equipment, including imported stator and rotor high-precision grinding machines, double-sided grinding machines from South Korea AM, machining centers produced by Taiwan Youjia and other companies, and CNC vertical lathes. The company is people-oriented, has gathered a group of senior technical personnel, has a professional and professional R & D team, and continues to carry out product design and development. The company currently produces more than 20,000 sets of hydraulic pumps per year.

The hydraulic Piston pump brands manufactured and sold by the company are: Rexroth, Liebherr, Komatsu, Hitachi, Kawasaki, Carter, Linde, Hawe, Parker, Kubota, Toshiba, Sauer and other brands and models; and commonly used walking Motor and swing motor series.

Hydraulic piston pumps can be widely used in engineering machinery, agricultural machinery, road machinery, mining machinery, medical machinery, metallurgical machinery, ships, machine tools and many other fields. After years of research and development, the products manufactured by the company can replace imported original parts and are exported to many countries and regions around the world, which are fully recognized by customers.

The company adheres to the principle of product quality pursuing perfection, finished product prices tending to the lowest, and service quality ensuring customer satisfaction. We will serve you wholeheartedly with the tenet of "using the best products and providing users with the best service"!

关于我们

大象流体动力地处中国河北省石家庄市新华区联盟街道，是专业制造和销售高端液压元件的现代化企业，公司实力雄厚,设备先进。

我司检测设备优良，拥有进口定子和转子高精度磨床,韩国AM公司双面磨，台湾友佳等公司生产的加工中心及数控立式车床等。公司以人为本，汇聚了一批高级技术人才,拥有专业的专业的研发团队,不断进行产品的设计研发,公司目前年产液压泵2万多套。

公司制造、销售的液压柱塞泵品牌有:力士乐、利勃海尔、小松、日立、川崎、卡特、林德、哈威、派克、久保田、东芝、萨澳等多品牌多型号;以及常用的行走马达和回转马达系列。

液压柱塞泵可广泛应用在工程机械、农业机械、路面机械、矿山机械、医疗机械、冶金机械、船舶、机床等众多领域。公司经过多年的研发，制造出的产品可替代进口原装件，并出口到全球多个国家和地区，获得客户的充分认可。

公司秉承产品质量追求完美，成品价格趋于最低,服务质量确保用户满意的原则。我们将本着“用最好的产品，为用户提供最好的服务”为宗旨，竭诚为您服务!

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Series of swash plate axial piston pump

EFP-A10VSO Series

sample

specifications：Size 10, series 52、Size 18, series 31、
Size 28~140, series 31
The rated pressure：P_N=28MPa
The peak pressure：P_{max}=35MPa

CONTENTS

NOTES

The variable displacement axial piston pump in swashplate design for open circuit hydrostatic drives. The pump flow is proportional to the input drive speed and displacement, by adjusting the swashplate, it is possible to infinitely vary the flow.

Flange joint SAE-UNC or SAE- with two drain port, high speed, good oil absorb, low noise, high power/weight ratio, variable displacement (constant pressure, power/flow), multi-circuit through drive.

Widely applied for hydraulic drive of metallurgy, mining, engineering machine, shipping, civil aviation facility etc.

Attention

Please read this manual carefully of high efficiently operation of the hydraulic system.

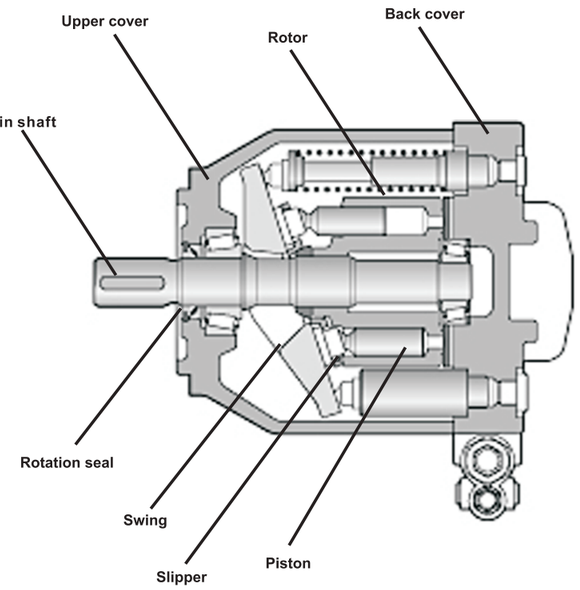
Maintenance

Only qualified personnel who are familiar with the machine function and safety operation are allowed to maintain the machine.

Regular Check

- Check the following regularly:
- Oil level in the tank
- Working temperature ≤60℃
- Hydraulic oil（color and smell）
  Had been equipped with auto electrical monitoring; check it regulary
- Working pressure
- Accumulator filling pressure
- Leakage of pump, valve and pipe
- Filtering parts cleanliness
- Hose

A10VSO structure



Ordering code/standard range

Size 10, series 52

EFP	A10VS	O	10		/	52		–	P				N00

Hydraulic Fluid

Mineral oil (no code)	

Axial piston unit

Variable pump, swashplate, Nominal pressure: 250bar, peak pressure: 315bar	A10VS

Operating mode

Pump, open circuit	O

Size

△Displacement $V_{g\,max}$ (cm^3)	10

Control mechanism

Pressure control	DR
Remotely	DRG
Pressure/flow control	DFR1

Sires

	52

Direction of rotation

Viewed on shaft end	clockwise	R
	counter clockwise	L

Seal

NBR (Nitrile rubber to DIN ISO 1629)	P

Shaft end	**SAE**	**DIN**	
Slide key circular shaft(SAE A-B)	●	–	K
Slide key circular shaf DIN 6885	–	●	P
Splined key 19-4(SAE A-B,3/4")	●	–	S
Splined key 16-4(SAE A,5/8")	●	–	U

Mounting flange

SAE 2 BOLT	●	–	C
ISO 2 BOLT	–	●	A

Working Port		**SAE**	**DIN**	
Pressure oil mouth B / Oil inlet S	UNF-The back of the screw thread,	●	–	64
Pressure oil mouth B / Oil inlet S	Metric thread, behind	–	●	14

Through drive

Without through drive	N00

= **Optimal scheme (shorter delivery time)**

● = available
– = not available

Technical data

Size 10, series 52

Fluid

Please contact Elephant Fluid Power before designing for details of fluid performance and application conditions.

For environmental friendly fluid and HF fluid, contact Elephant Fluid Power.

Viscosity range

In order to obtain optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected in the range below:

V_{opt} = optimum operating viscosity16…36mm²/s

Referred to tank temperature (open circuit).

Limit of viscosity range

Peak value:

V_{min}=10mm²/s

For short periods at max. permissible leakage oil temperature 90° C.

V_{max}=1000mm²/s

Cold start

Temperature range (see diagram)

t_{min}= -25° C

t_{max}=+90° C

Notes:

In order to select the correct fluid, it is necessary to know the operating temperature in the tank (open circuit), in relation to the ambient temperature.

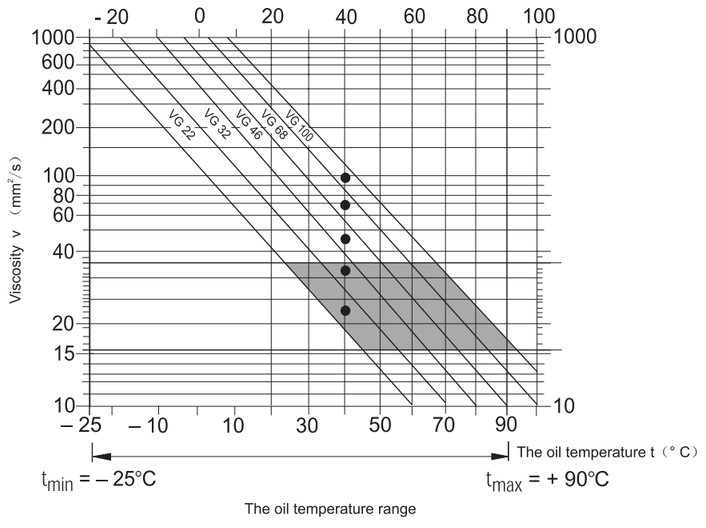
The hydraulic fluid should be selected such that, within the operating temperature range, the operating viscosity lies within the optimum range (v_{opt}), see shaded section of selection diagram. We recommend that the higher viscosity grade is selected in each case.

Example: At an ambient temperature of X° C, the operating temperature in the tank is 60° C. Within the operating viscosity range (v_{opt}; shaded area), this corresponds to viscosity range VG 46 or VG 68. VG 68 should be selected.

Notes: The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the tank temperature. However, at no point in the circuit may the temperature exceed 90° C.

If condition above unavailable when using in extreme condition or too high ambient temperature, please contact Elepheant Fluid Power.

Selection diagram



The oil temperature range

Fluid filtration

In order to ensure correct functioning of the axial piston unit, a minimum level of cleanliness class:

NAS 1638, 9 or

18/15 of ISO/DIS4406

Technical data

Size 10, series 52

Port S (inlet) absolute pressure

$P_{abs\,min}$ ——— 0.8bar

$P_{abs\,max}$ ——— 30bar

Work pressure range——outlet

Port B pressure

Nominal pressure P_N ——— 250bar

Peak pressure P_{max} ——— 315bar

(Conform to DIN 24312)

Flow direction: S to B

Case drain pressure

The max. permissible drain pressure (ports L, L_1): 0.5bar higher than port S, but not higher than absolute pressure 2bar.

Graph, showing permissible speed with increased inlet pressure at port S (pwabs) resp. reduced displacement(Vg < Vg max).

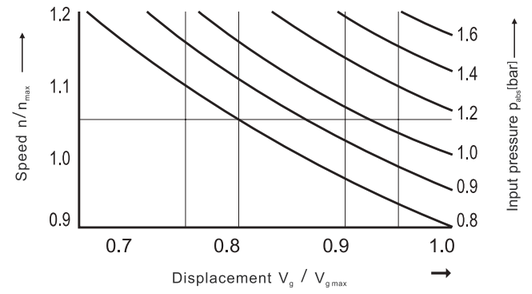


Table of values (theorectical values, without considering η_{mh} and η_v; values rounded off)

Nominal size				10
Displacement		$V_{g\,max}$	cm³	10.5
Max. speed[1] with V_{gmax}		$n_{o\,max}$	r/min	3600
Max. speed (peak speed)	Inlet pressure paba increase or $V_g < V_{g\,max}$	$n_{o\,max\,zul}$	r/min	4300
Max. volume flow	$n_{o\,max}$	$q_{v\,max}$	L/min	37
	n_E=1450r/min		L/min	15
Max. power (△p=250bar)	$n_{o\,max}$	$p_{o\,max}$	kW	16
	n_E=1450r/min		kW	6.5
Max. torque (△p=250bar)	$V_{g\,max}$	T_{max}	Nm	42
Moment of inertia about drive axis		J	kgm²	0.0006
Case volume			L	0.2
Weight (no fluid)		m	kg	8
Permissible axial force		$F_{ax\,max}$	N	400
Permissible radial force		$F_{q\,max}$	N	250

1) Data above at port S is absolute pressure valid at 1bar. If the displacement lowered or inlet pressure increased, the speed can be increased to peak (sea diagram).

Size determination

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

Torque of drive $T = \frac{1.59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}}$ [Nm]

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

V_g = Displacement per revolution in in³ (cm³)
Δp = Differential pressure in bar
n = Speed in r/min
η_v = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Total efficiency($\eta_t = \eta_v \cdot \eta_{mh}$)

Technical data

Size 10, series 52

Installation position is optional. The pump casing must be filled with fluid during commissioning and remain full when operating.
In order to reduce noise output, all connecting lines (suction, pressure and case drain lines) must be de-coupled from the tank using flexible elements.
The use of check valves in the case drain line has to be avoided.
Exceptions may be possible after consultations with us.

1. Vertical installation (shaft end pointing upwards)
The following installation conditions are to be taken into account:
1.1 Installation in a tank
Full the pump and keep it level before installation.
a) When the minimum fluid level is the same as or is above the pump flange area then: ports L, L_1 and S are open (see fig. 1).
b) If the minimum fluid level lies under the pump flange area then: ports L_1 and possibly S have to be piped as shown in fig. 2. Port L closed, as stated in section 1.2.1

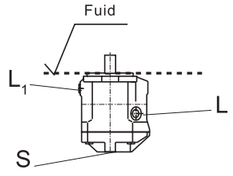


fig. 1

1.2 Installation outside of a tank
Fill the pump casing with the pump lying horizontal before installation. (See fig.2)
Extreme condition:
1.2.1 Conditions: A minimum pump inlet pressure (suction pressure)
$P_{in\,min}$=0.8bar.
Notes: Avoid mounting the pump above the tank if low noise operation is required.
Permitted oil lift h is related to total pressure loss, and not higher than h_{max}=800mm (pipe submerging depth $h_{d\,min}$=200mm)

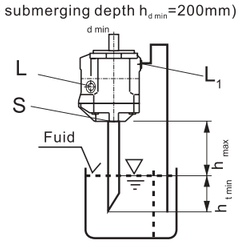


fig. 2

Total pressure loss=

$$\Delta p_{total} = \Delta p_1 + \Delta p_2 + \Delta p_3 \le (1 - p_{in,\,min}) = 0.2\ bar$$

Δp_1: pressure loss caused by hydraulic accelerating inside pipe

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

ρ = fluid density (kg/m³)
l = pipe length (m)
dv/dt = fluid speed change rate (m/s²)

Δp_2 : pressure loss caused by static press

$\Delta p_2 = h \cdot \rho \cdot g \cdot 10^{-5}$ (bar)

h = lift range (m)
ρ = fluid density (kg/m³)
g = gravity accelerating =9.81 (m/s²)

Δp_3: pipe loss (elbow etc)

2. Horizontal installation
Ports L or L_1 is atop the pump for horizontal installation.
2.1 Installation in a tank
a) When the minimum fluid level is the same as or lies above the upper edge of the pump then: drain port L or L_1 and port S are open (see fig. 3).
b) When the minimum fluid level lies under the pump upper edge then: drain port L_1, L and possibly port S has to be piped, see fig. 4. Conditions are as per in section 1.2.1.

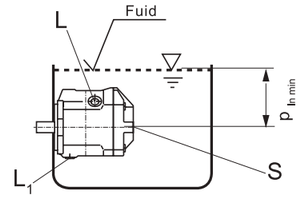


fig. 3

2.2 Installation outside a tank
Fill the pump housing before commissioning.
Connect pipe for drain port S and port L or L_1.
a) For installation above a tank see fig. 4.
Conditions are as per section 1.2.1.

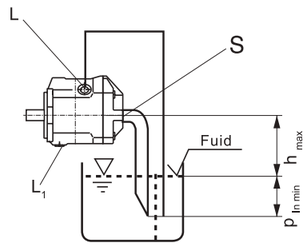


fig. 4

b) For installation under the tank
Connect pipe drain port L and S as per fig. 5.

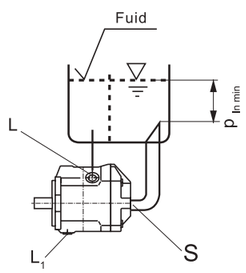


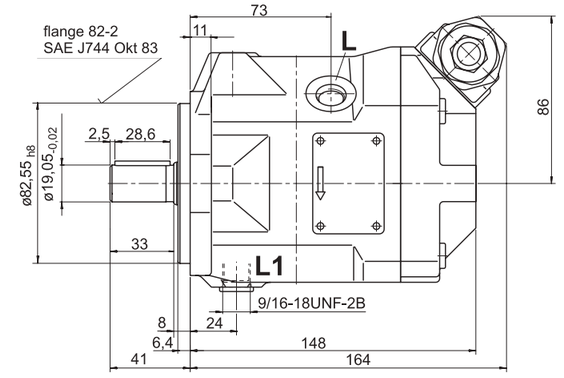
fig. 5

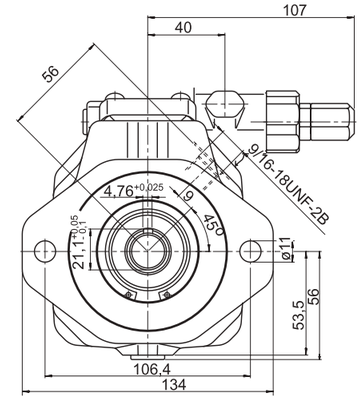
Sizes

Size 10, series 52

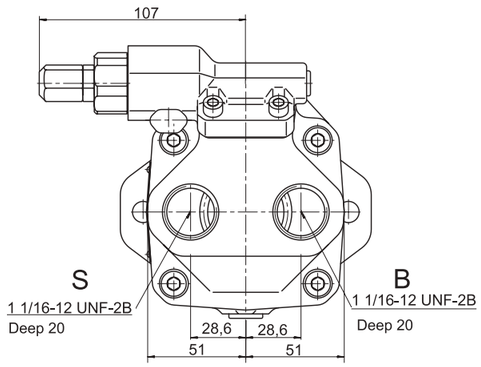
SIZE A10VSO 10 **DR**/52 **R-XKC64N00** (**S** / **L U**)

Shaft end "K"

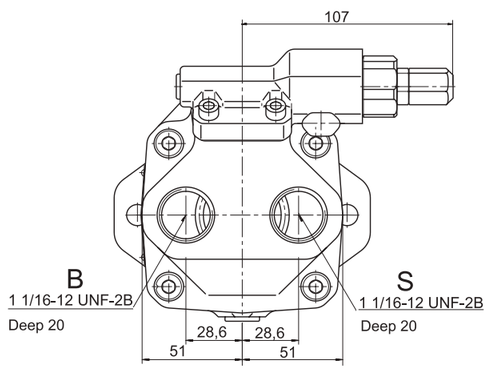




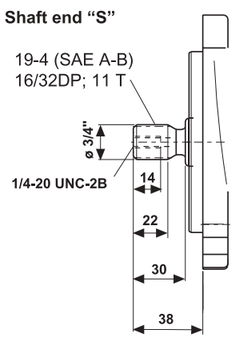
Y View
Clockwise rotation



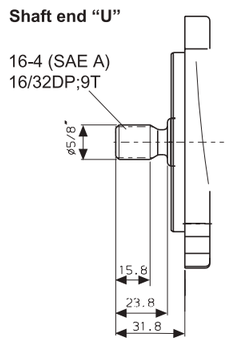
Y View
Anticlockwise rotation



Shaft end "S"



Shaft end "U"



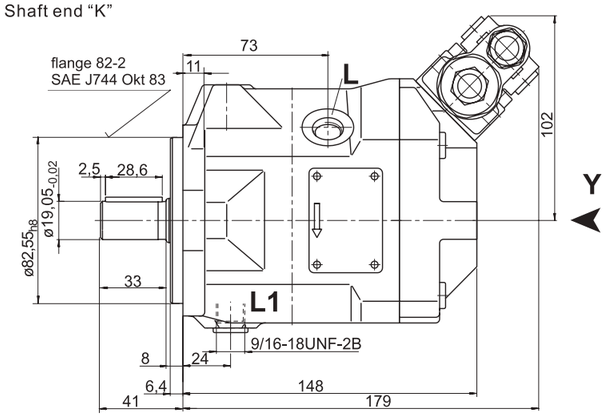
Ports

B	Pressure port	1 1/16-12UNF-2B
S	Inlet port	1 1/16-12UNF-2B
L/L1	Drain port (L1 closed)	9/16-18UNF-2B

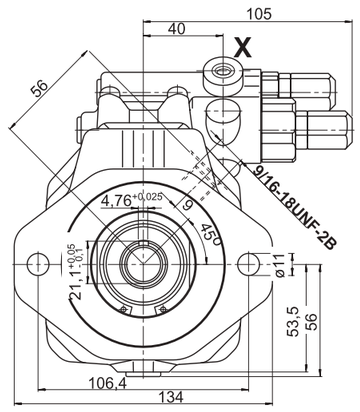
Sizes

SIZE A10VSO 10 **DRG**/52 **R-PKC64N**00
DFR1 **S** **L** **U**

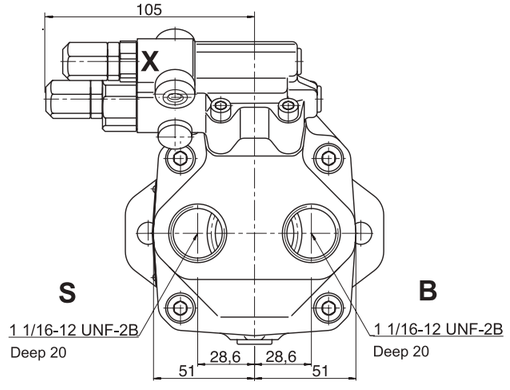
Shaft end “K”



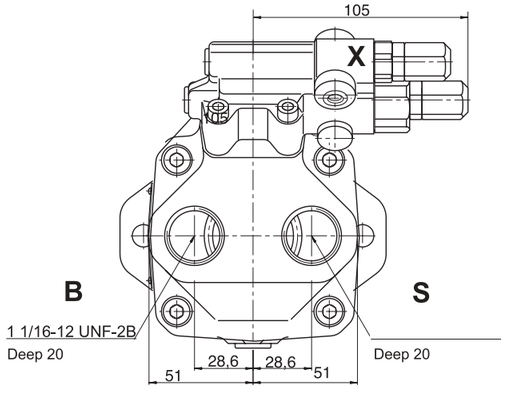
Size 10, series 52



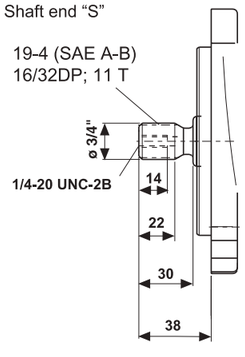
Y view
Clockwise rotation



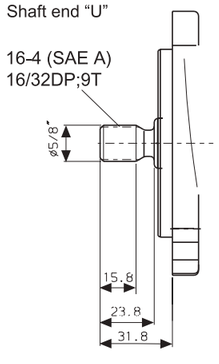
Y view
Anticlockwise rotation



Shaft end “S”



Shaft end “U”

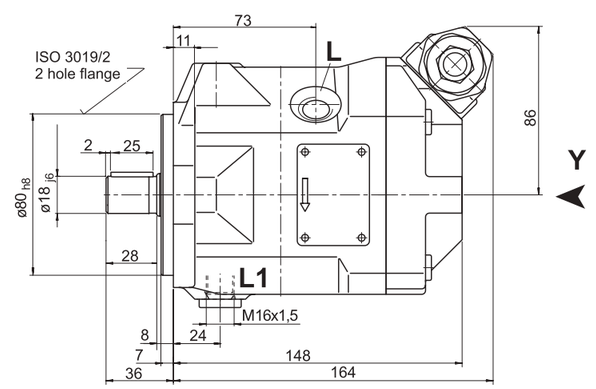


Ports

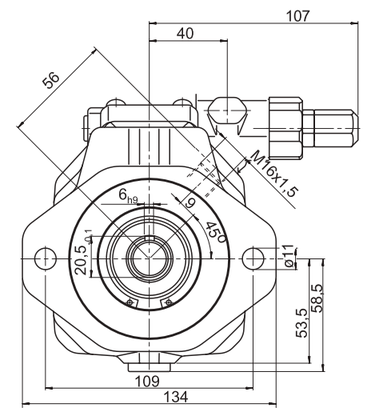
B	Pressure port	1 1/16-12UNF-2B
S	Inlet port	1 1/16-12UNF-2B
L/L1	Drain port (L1 closed)	9/16-18UNF-2B
X	Pilot pressure port	7/16-20UNF-2B

Sizes

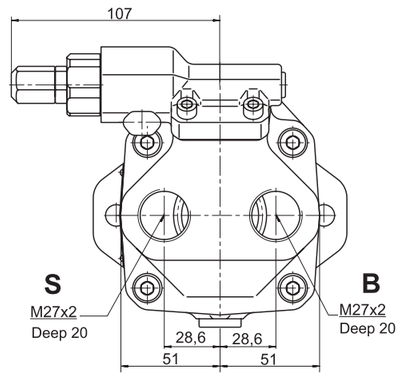
SIZE A10VSO 10 **DR**/52 **R-XPA14N00**
L



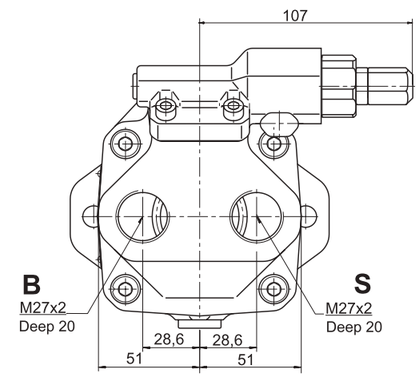
Size 10, series 52



Y view
Clockwise rotation



Y view
Anticlockwise rotation



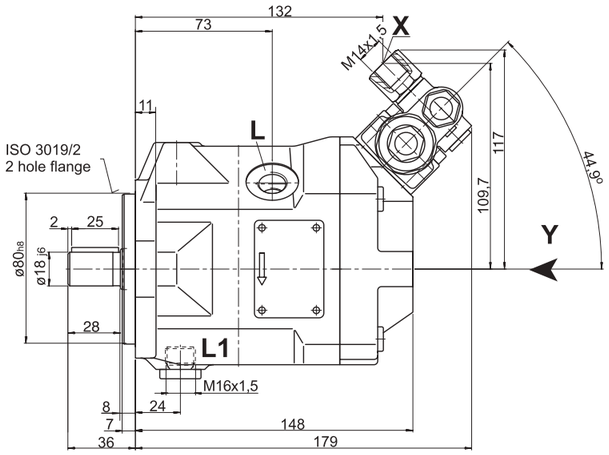
Ports

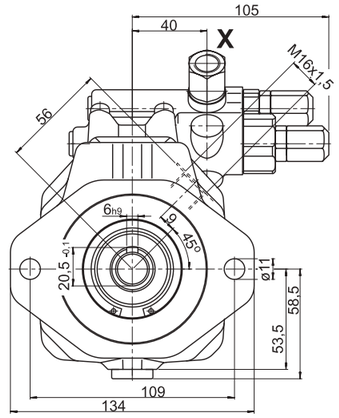
B	Pressure port	M27x2
S	Inlet port	M27x2
L/L1	Drain port (L1 closed)	M16x1. 5

Sizes

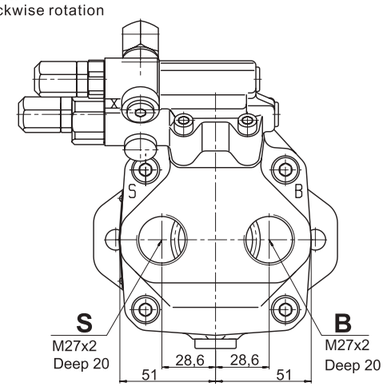
Size 10, series 52

SIZE A10VSO 10 **DRG**/52 **R-XPA14N00**
DFR1 L

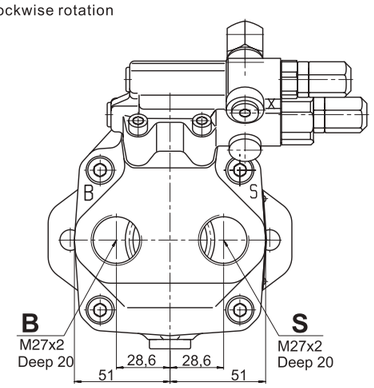




Y view
Clockwise rotation



Y view
Anticlockwise rotation



Ports

B	Pressure port	M27x2
S	Inlet port	M27x2
L/L1	Drain port (L1 closed)	M16x1. 5
X	Pilot pressure port	M14x1. 5

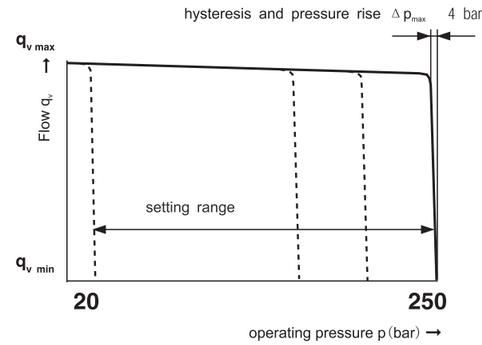
Pressure control DR

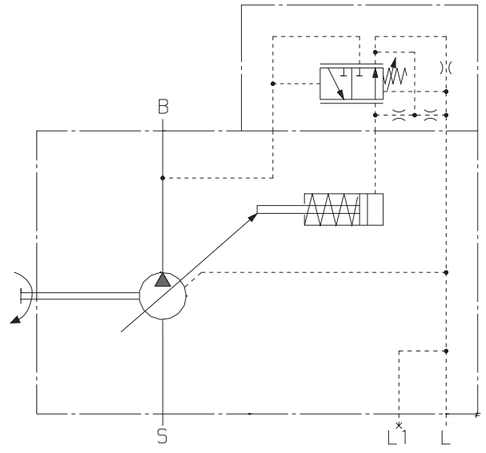
Size 10, series 52

This control maintains a constant pressure of the system. The pump supplies the fluid for the system operating, which pressure is infinitely adjustable via control valve.

Static characteristic curve

(at n_1 = 1500 r/min; t_{oil} = 50°C)





Pressure control DRG, remote control

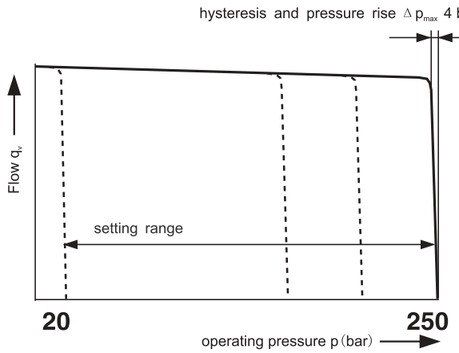
Size 10, series 52

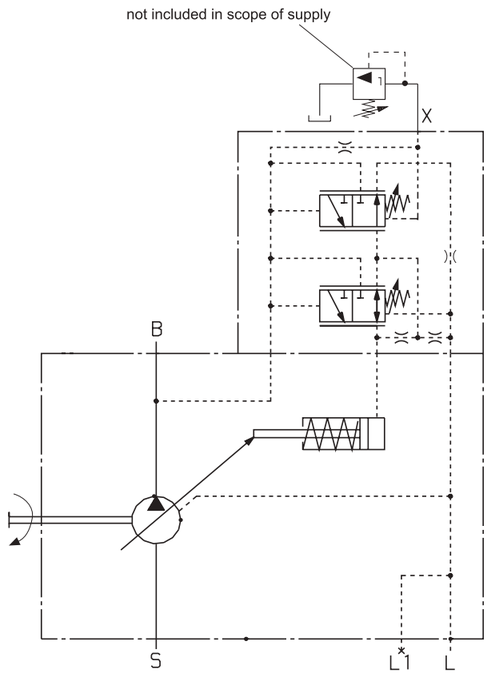
DR structure and function

Overflow valve used for remote control at port X; the overflow valve is excluded from the scope of supply for DRG control.
Pilot valve nominal pressure difference is 20bar, which control flow is 1.5L/min. Please describe the value needed (range (10-20)bar) in the ordering file.

Overflow valve below is recommended:
DBDH6 (hydraulic)
Φ0.8 nozzle at P of DBETR-SO 437 (electrical).
Pipe max. length: 2m.
Static working curve

(at n_1 = 1500 r/min; t_{oil} = 50°C)





Please see page 7 and 9

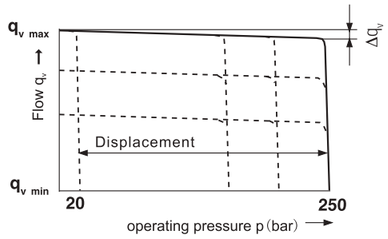
Pressure/flow control DFR1

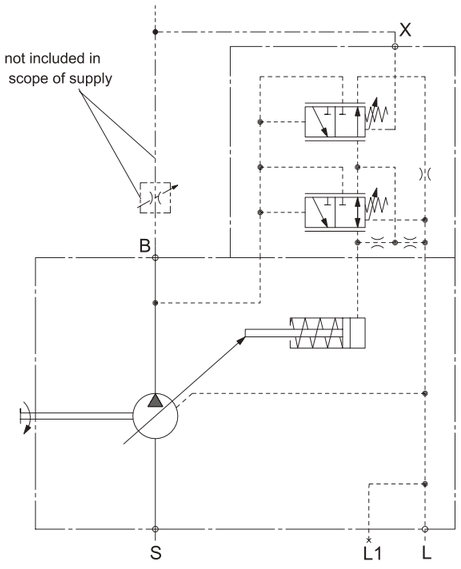
Size 10, series 52

Besides via pressure control, the pump flow is changeable via pressure difference with operating unit (e.g. orifice, excluded in the scope of supply), the pump flow is equal to the operating unit flow.
DFR1 valve at X port disconnected with the tank.

Static characteristic curve

(at n_1 = 1500 r/min ; t_{oil} = 50°C)





Ordering code/standards

Size 18, series 31

EFP	A10VS	O	18		/	31		–					

Hydraulic Fluid

Mineral oil (no code)

Axial piston unit

Variable pump, swashplate, Nominal pressure: 280bar, peak pressure: 350bar	A10VS

Operating mode

Pump, open circuit	O

Size

△Displacement $V_{g\,max}$ (cm^3)	18

Control device

Pressure control	DR		●	DR
	DR	G	●	DRG
Remotely				
Pressure/flow control	DFR		●	DFR
	DFR	1	●	DFR1
X channel closed				
Electronic pressure and flow controller	DFE1		❍	DFE1

Series

	31

Direction of rotation

Viewed on shaft end	clockwise	R
	counter clockwise	L

Seal

Nitrile rubber (shaft seal ring with fluorine rubber)	P
Fluorine rubber	V

Shaft extension

		DIN	SAE	
With key rachis	DIN 6885	●		P
With key rachis	19-1 (SAE A-B)		●	K
Spline shaft	19-4 (SAE A-B, 3/4")		●	S
Spline shaft	16-4 (SAE A, 5/8", Not suitable for drive shaft)		●	U

Mounting flange

ISO 2 holes	●		A
The SAE 2 holes		●	C

Working oil mouth

Pressure oil mouth B Oil inlet S	Relative to SAE oil mouth on both sides Fixed metric thread		12
Pressure oil mouth B Oil inlet S	Relative to SAE oil mouth on both sides UNC fixed screw thread		62

Through drive

Without through drive			N00
Used for with adding axial piston pump or pump shaft drive			
Installation of flange	Axis/collar	Used to install	
82-2 (SAE A)	Spline shaft 16-4 (SAE A; 5/8")	G2	K01
82-2 (SAE A)	Spline shaft 19-4 (SAE A-B; 3/4")	A10VSO 18	K52

● = available
❍ = in preparation
– = not available

Technical data

Size 18, series 31

Fluid

Before designing, please contact us for extensive information on the selection of hydraulic fluids and application conditions. When operating with environmental friendly fluids and HF fluids, please contact us for limitations to the technical data.

Operating viscosity range

In order to obtain optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected in the range:

V_{opt} = optimum operating viscosity16…36mm^2/s

referred to tank temperature (open circuit).

Limit of viscosity range

$V_{min} = 10\ mm^2/s$,

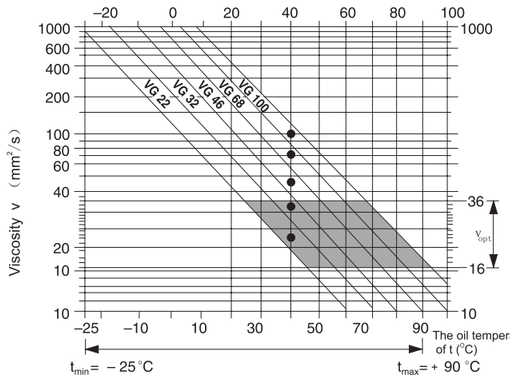
for short periods at max. permissible leakage oil temperature 90° C.

$V_{max} = 1000\ mm^2/s$

Temperature range (see selection diagram)

t_{min} = -25 °C
t_{max} = +90 °C

Selection daigram



The oil temperature range

Comments on the selection of the hydraulic fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the tank (open circuit), in relation to the ambient temperature.

The hydraulic fluid should be selected such that, within the operating temperature range, the operating viscosity lies within the optimum range (v_{opt}), see shaded section of selection diagram.

We recommend that the higher viscosity grade is selected in each case.

Example: At an ambient temperature of X° C, the operating temperature in the tank is 60° C. Within the operating viscosity range (v_{opt}; shaded area), this corresponds to viscosity range VG 46 or VG 68. VG 68 should be selected.

Notes: The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the tank temperature. However, at no point in the circuit may the temperature exceed 90° C.

If condition above unavailable when using in extreme condition or too high ambient temperature, please contact Elephant Fluid Power.

Filtration of fluids

In order to ensure correct functioning of the axial piston unit, a minimum level of cleanliness class

9 of NAS1638

SAE,ASTM,AIA or 18/15 of ISO/DIS 4406 is required.···D020··· filter is used, which filtration coefficient is

$\beta_{20} \geqslant 100$

Mechanical flow limiter

Not applied for through drive.

Standard, no through drive.

Q_{max}: range from $V_{g\,max}$ to 50%$V_{g\,max}$

Technical data

Size 18, series 31

Operating pressure range — inlet

Port S (inlet) absolute pressure

$P_{abs\ min}$ ——————————— 0.8bar

$P_{abs\ max}$ ——————————— 30bar

Working pressure range — outlet

Port B pressure

Nominal pressure Pn ——————— 280bar

Peak pressure Pmax ——————— 350bar

(pressure conform to DIN 24312)

10% intermission operating with loading pressure up to 315bar.

Case drain pressure

The max. permissible drain pressure (ports L, L_1): 0.5bar higher than port S, but not higher than absolute pressure 2bar.

Flow direction

S to B.

Graph, showing permissible speed with increased inlet pressure
at port S (pwabs) resp. reduced displacement(Vg < Vg max).

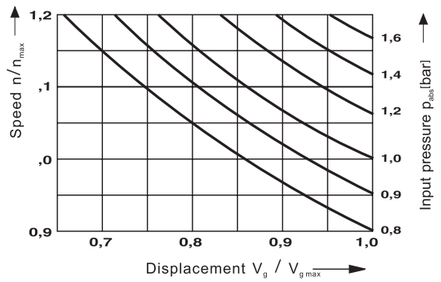


Table of values (theorectical values, without considering η_{mh} and η_v; values rounded off)

Size				18
Displacement				18
Max. speed [1] at V_{gmax}	$V_{g\ max}$	$V_{g\ max}$	cm^3	18
Max. speed (limit) with inlet pressure p_{abs}		$n_{o\ max}$	r/min	3300
increased or $V_g < V_{g\ max}$		$n_{o\ max\ zul}$	r/min	3900
	$n_{o\ max}$			
Max. volume flow	n_E=1500 r/min	$Q_{o\ max}$	L/min	59.4
	$n_{o\ max}$		L/min	27
Max. power (△ ρ =280bar)	n_E=1500 r/min	$p_{o\ max}$	kW	27.7
			kW	12.6
Max. torque with $V_{g\ max}$ (△ ρ =280bar)		M_{max}	Nm	80.1
Max. torque with $V_{g\ max}$ (△ ρ =100bar)		M	Nm	28.6
Moment of inertia on drive axis		J	kgm^2	0.00093
Case filled volume			L	0.4
Weight (without fluid)		m	kg	12
Permissible axial force on drive shaft		$F_{ax\ max}$	N	700
Permissible radial force [2] on drive shaft		$F_{q\ max}$	N	350

[1] Conditions above valid at port S absolute pressure 1bar.

[2] Contact KEDA for the higher radial force.

Size determination

Volume flow

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

Torque of drive

$$M = \frac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}} \quad [Nm]$$

Drive power

$$P = \frac{2\pi \cdot M \cdot n}{60000} = \frac{M \cdot n}{9549} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} \quad [kW]$$

V_g = Displacement per revolution in in^3 (cm^3)
Δp = Differential pressure in bar
n = Speed in r/min
η_v = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Total efficiency($\eta_t = \eta_v \cdot \eta_{mh}$)

Technical data
Size 18, series 31

Install the matters needing attention

Installation position is optional. The pump casing must be filled with fluid during commissioning and remain full when operating.

In order to reduce noise output, all connecting lines (suction, pressure and case drain lines) must be de-coupled from the tank using flexible elements.

The use of check valves in the case drain line has to be avoided.

Exceptions may be possible after consultations with us.

Pump curve with DR pressure controller

Noise level

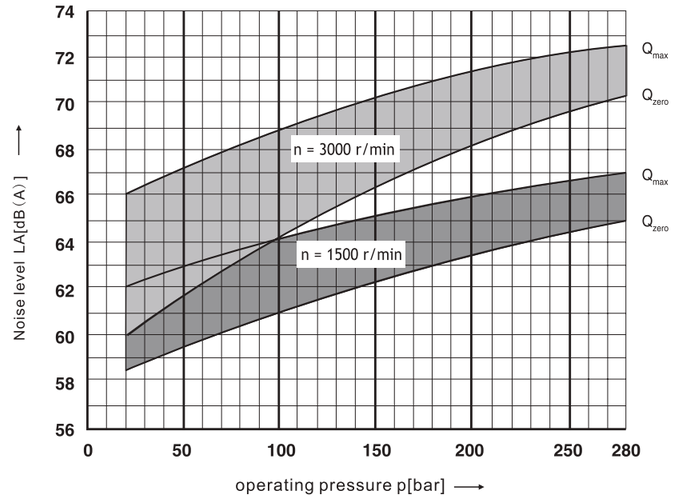
Measured in isolation booth

Distance from measurer to pump =1m

Error "±2dB (A)

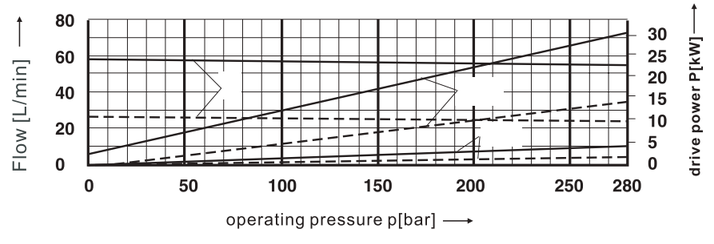
(fluid: conform to ISO VG46 DIN 51519 hydraulic oil, t=50℃)

Size 18



Drive power and output flow

(fluid: hydraulic oil ISO VG46 DIN 51519, t=50℃)



Size 18

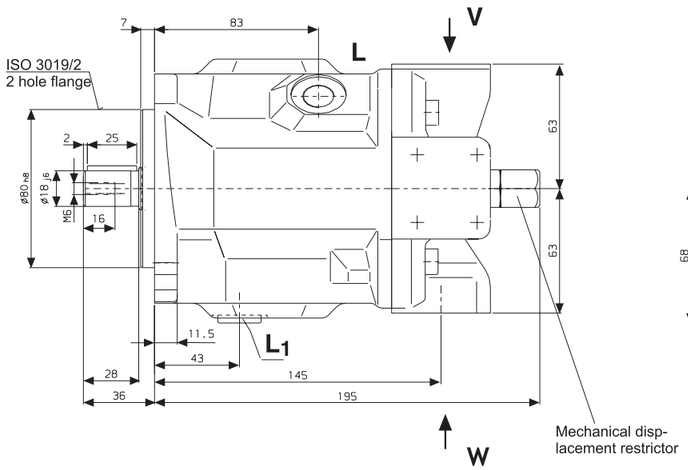
— — — n=1500 r/min

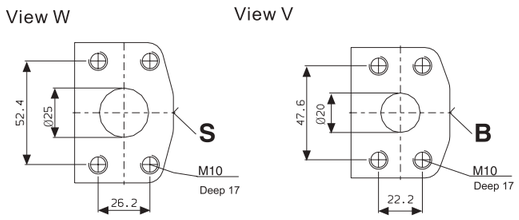
——— n=3300 r/min

Sizes

Size 18, series 31

ISO pump with key shaft PA12
Through drive type N00 (no splined)
Control excluded





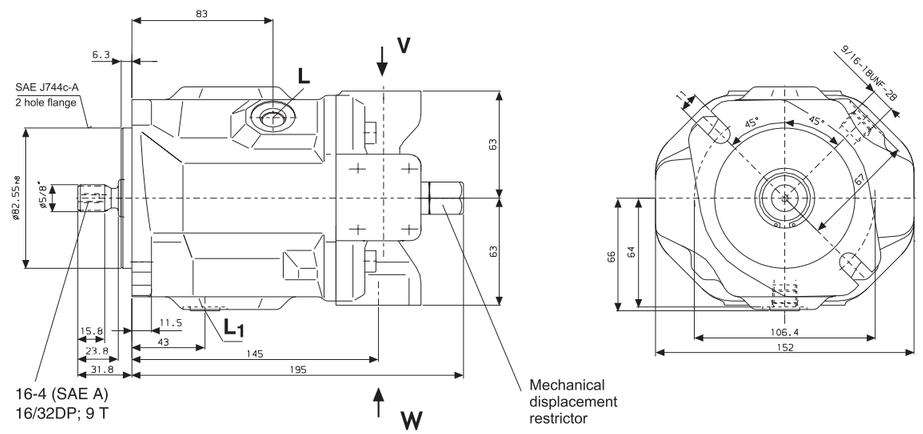
Ports

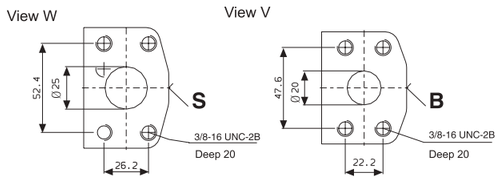
B	Pressure port	SAE 3/4″	(Standard pressure series)
S	Inlet port	SAE 1″	(Standard pressure series)
L/L1	Drain port (L1 closed)	M16x1. 5	(L, bunged up in a factory)

Sizes

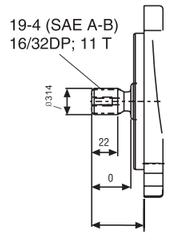
Size 18, series 31

SAE pump with key shaft UC62
Through drive type N00 (no splined)
Control excluded

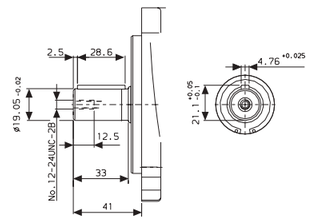




Shaft extension “S”



Shaft extension “K”



Ports

B	Pressure port	SAE 3/4″	(Standard pressure series)
S	Inlet port	SAE 1″	(Standard pressure series)
L/L1	Drain port (L1 closed)	9/16-18 UNF-2B	(L, bunged up in a factory)

DR Control mode

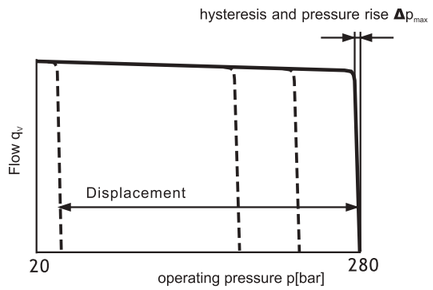
Size 18, series 31

DR Control mode

Constant pressure control maintains stable pressure of the hydraulic system. The pump supply fluid of the system needed, and which pressure is adjustable infinitely by the pilot valve.

Static operating curve

(at n_1 = 1500 r/min; t_{oil} = 50°C)

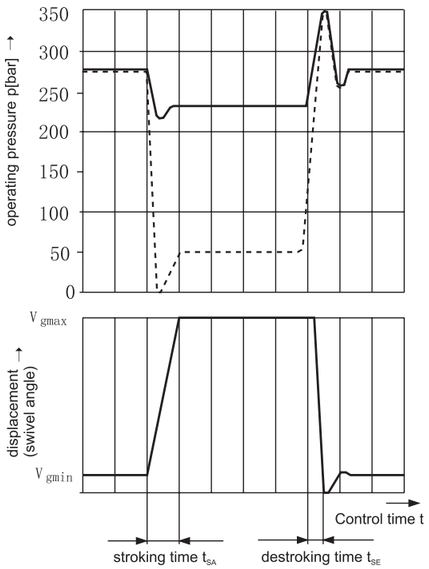


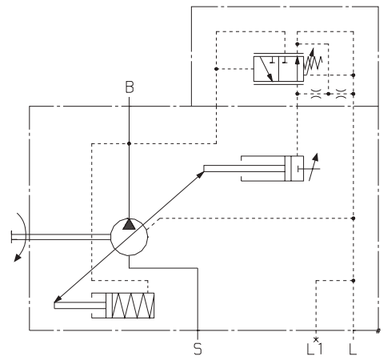
Dynamic characteristic

The opening curves are mean values measured under test conditions with the unit mounted inside the tank.

Conditions: n = 1500 r/min
t_{oil} = 50°C
Main relief set at 350 bar

Stepped loading by suddenly opening or closing the pressure line using a pressure relief valve at 3.3 ft (1 m) downstream from the pump pressure outlet.





Ports

B	Pressure port
S	Inlet port
L,L1	Case drain port (L1 plugged)

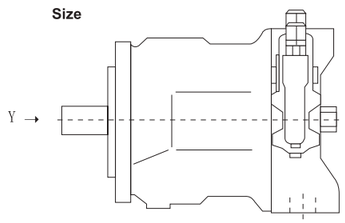
Controller data

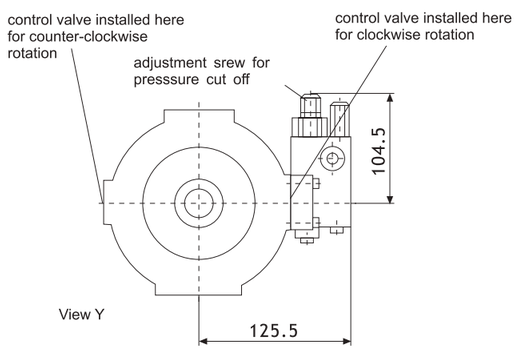
Hysteresis and repetitive accuracy Δp _____ max.3 bar
Pilot oil consumption max. approx 0.8 gpm (3 L/min)
Flow loss at Q_{vmax} see pages 5.

Control times

Size	t_{SA}[ms] against 50 bar	t_{SA}[ms] against 220 bar	t_{SA}[ms] Zero stroke 280 bar
18	50	25	20

Size





DFR valve, flow controller manufacturers jams and shown by the test

DRG Control mode

Size 18, series 31

Function & device of DR control

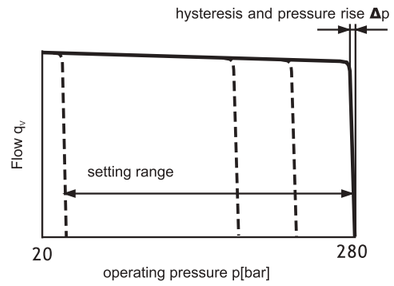
Overflow valve can be connected at port X for remote control; the overflow valve not included in scope of supply.

Pilot valve standard pressure difference is 20bar, control flow is 1.5L/min.

Please note in the ordering file for additional setting (range: 10~20bar)

Static characteristic

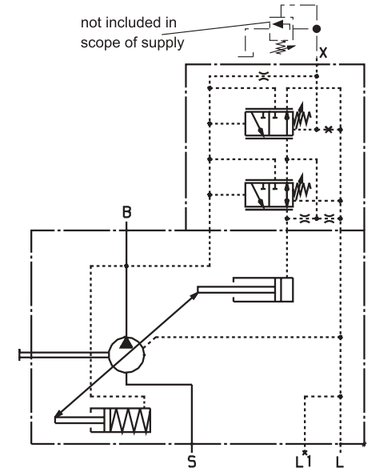
(at n_1=1500r/min;t_{oil}=50°C)



Controller data

Hysteresis and repetitive accuracy Δp _____ max. 4 bar
Pilot oil consumption max. (4.5 L/min)
Flow loss at Q_{vmax} see pages 5.

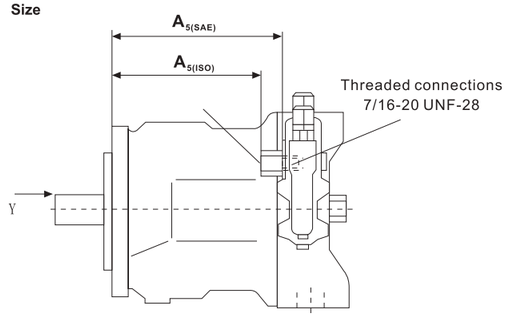
Size	A_1	A_2	A_3	A_4	A_5	Ports X	
18_{ISO}	104,5	125,5	109	40	109	M14x1,5	D12
18_{SAE}	104,5	125,5	109	40	130	7/16-20 UNF-2B;	D10

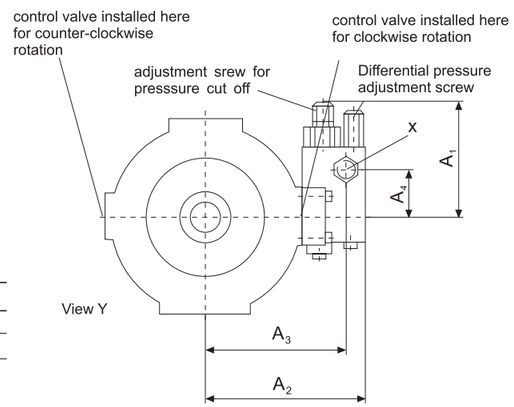


Ports

B	Pressure port
S	Inlet port
L,L1	Case drain port (L1 plugged)
X	Pilot pressure port

Size





DFR/DFR1 pressure/flow control — Size 18, series 31

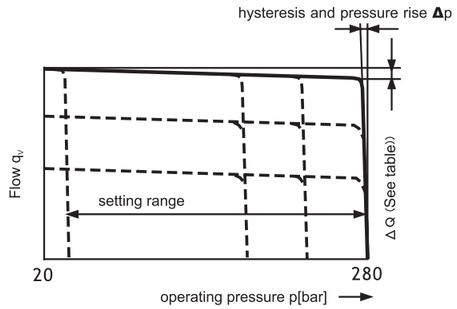
DFR/DFR1 pressure/flow control

Besides pressure control, the pump flow can be set via pressure difference change by actuator (e.g. throttle hole).

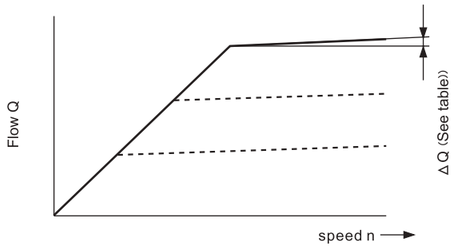
DFR1 is plugged at port X.

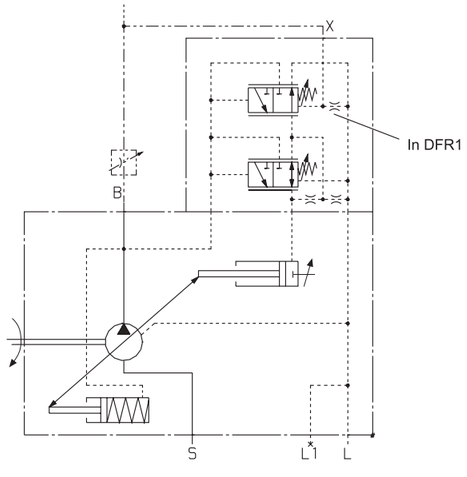
Static operating curve

(at n_1 = 1500 r/min; t_{oil} = 50°C)



Static characteristic at variable speed



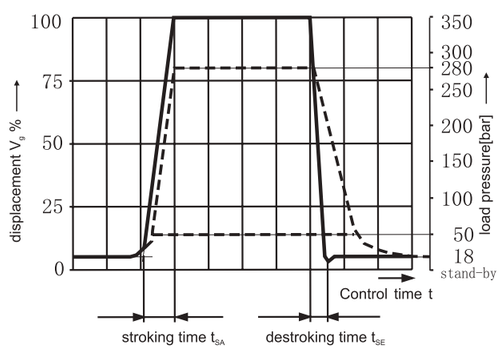


Ports

B	Pressure port
S	Inlet port
L,L_1	Case drain port (L_1 plugged)
X	Pilot pressure port

Dynamic characteristic operating curve

This pump is installed in the tank experiment condition curve is measured average



Size	t_{SA}[ms] against 280 bar	t_{SA}[ms] against 280 bar	t_{SA}[ms] against 50 bar
18	40	15	40

Pressure difference △P:

Range: 10~ 20bar (higher available if needed).

Standard: 14bar. Note the additional setting in the ordering file if needed.

When port X connected with oil tank, unloading pressure is:

P=18±2bar (“standby”)。

ontroller data

Max. flow error at drive speed n:1500r/min (hysteresis and rise)

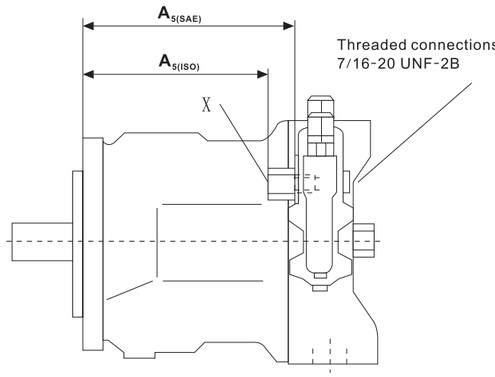
Size		18
Δq_{vmax}	L/min	0,9

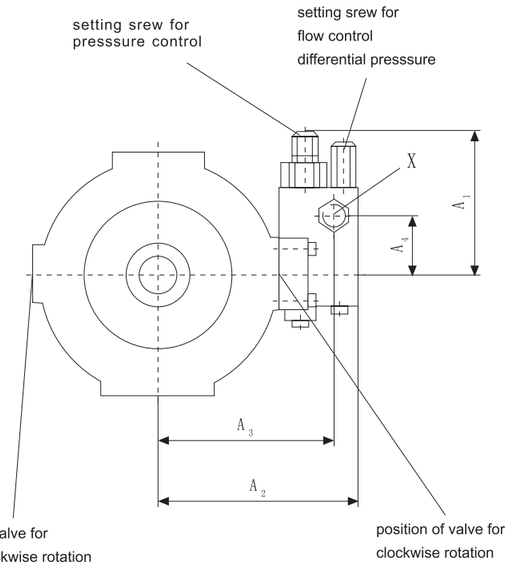
Pressure hysteresis and rise △P —— max. 5bar

DFR pilot oil —— max. about 3…4,5L/min

DFR1 pilot oil —— max. about 3L/min

Sizes — Size 18, series 31





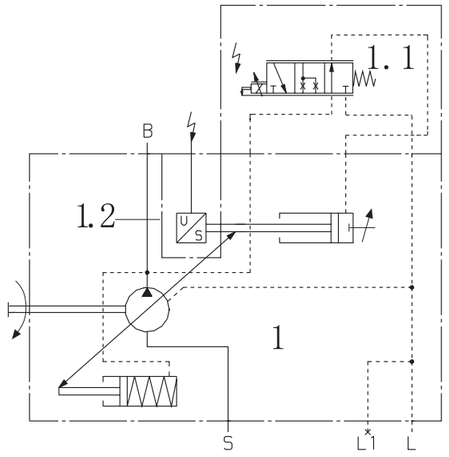
Size	A_1	A_2	A_3	A_4	A_5	Ports X
18_{ISO}	104,5	125,5	109	40	109	M14x1.5； D12
18_{SAE}	104,5	125,5	109	40	130	7/16-20 UNF-2B；D10

DFE1 electronic valve pressure/flow control — Size 18, series 31

DFE1 electronic valve pressure/flow control

The pump flow and pressure is controlled by electro hydraulic valve. By adjusting the swashplate, it is possible to vary the flow, but the flow control is unrelated to speed variation (e.g. internal-combustion engine speed). The pump pressure and variable mechanism position are transferred electrical signal by pressure and displacement sensor and input amplifying plate for closed loop control.

Pump DFE1, suitable for VT 5041 analog amplifier operation.
Place another order for the amplifying plate and pressure sensor separately.
Take safety into account, overflow valve should be mounted besides pressure controller to keep the operating pressure not exceed max. permissible pressure.



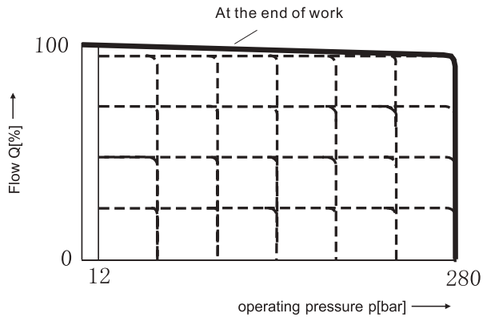
Ports

B	Pressure port
S	Inlet port
L,L$_1$	Case drain port (L$_1$ plugged)

Components

1 A10VSO pump with hydraulic setting device
1.2 Inductance displacement sensor
Pressure sensor and control electric appliance excluded.

Static operating curve

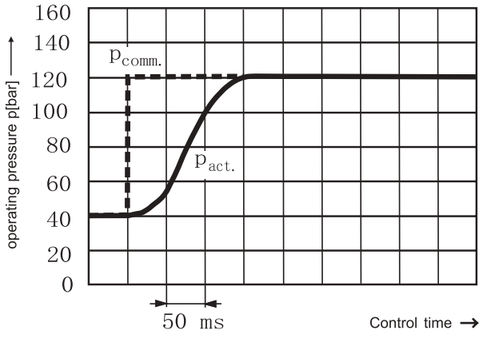


Control data

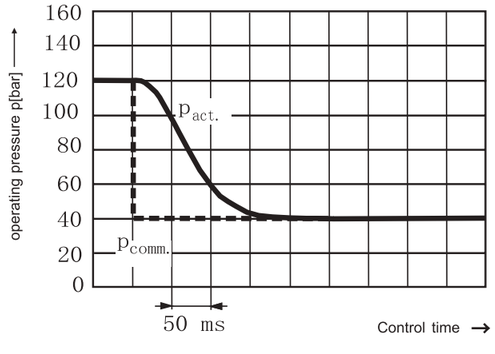
Hysteresis ——— ＜1%of $V_{g\,max}$
Repetitive error ——— ＜1%
Pilot fluid needed ——— max. about 2.5L/min

Dynamic curves

Pressure phase step value: 40bar-120bar
DFE1 45 fluid volume: (5L)

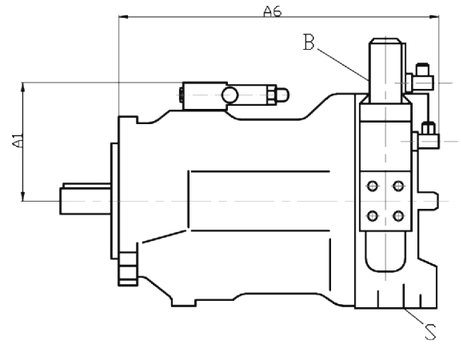


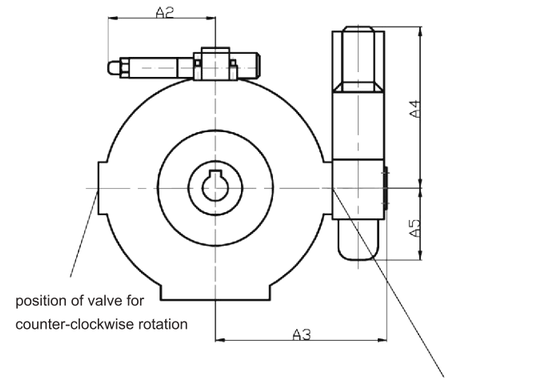
Pressure phase step value: 120bar-40bar
DFE1 45 fluid volume: (5L)



Sizes — Size 18, series 31

DFE1 size (with electronic valve pressure and flow controller)





Size	A_1	A_2	A_3	A_4	A_5	A_6
18	97	106.5	118	158	63	216

Through drive

Size 18, series 31

Through drive

Drive coding as (KXX)

Included within the scope of supply are:

Coupling, fixing screws, seals and, where applicable, an adaptor flange.

Combination pumps

Independent circuits are available for the user when further pumps are built-on.

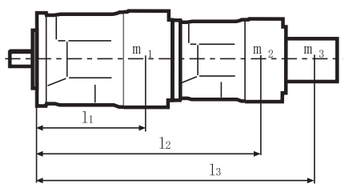
1. If the combination cosists of 2 Brueninghaus units and if this is to be factory fitted, both pump codes should be quoted, joined by "+".

The sample order:

EFP-A10VSO 18 DR/31 R-PSC12K52+
EFP-A10VSO 18 DR/31 L-PSC12N00

2. If a gear or radial piston pump is to be fitted in the factory, please consult us.

Allow the bending moment



m_1, m_2 [kg] Pump heavy
l_1, l_2 [mm] Center distance

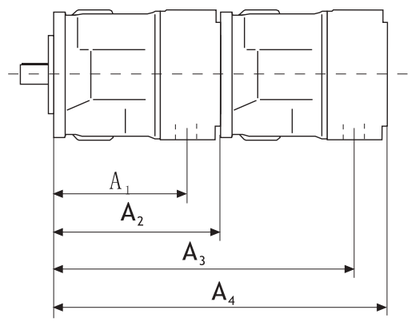
$$M_m = (m_1 \times l_1 + m_2 \times l_2 + m_3 \times l_3) \cdot \frac{1}{102} \quad [Nm]$$

			18
Allow the bay from	M_{mzl}	Nm	50
Weight	m	kg	12
The distance to the center of gravity	l_1	mm	90

Allow the shaft torque

Size			18
Shaft "S" on the maximum allowable total shaft torque, pump 1 (pumps 1 + 2)	$M_{Ges\ max}$	Nm	80
1 Allow the shaft torque	M_{D1max}	Nm	80
	M_{D2max}	Nm	0
2 Allow the shaft torque	M_{D1max}	Nm	0
	M_{D2max}	Nm	80

Combination pumps size：A10VSO+A10VSO

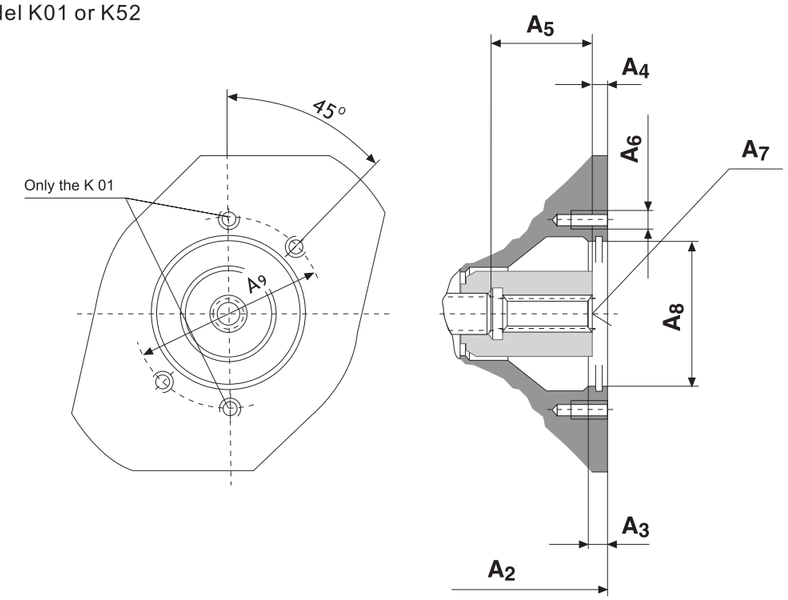


The main pump / 2 pump	A10VSO 18				A10VSO 28				A10VSO 45				A10VSO 71				A10VSO 100				A10VSO 140			
	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4
A10VSO 18	164	204	349	399	164	204	349	399	184	229	374	424	217	267	412	462	275	338	483	533	275	350	495	545

Sizes

Size 18, series 31

Add A10VSO 18
Ordering model K01 or K52



Install the distance to the pump

Size	A_2	A_3	A_4	A_5	A_6	A_7			A_8	A_9
K01	182	10	9	43, 3	M10:D16	Splined key SAE A_1	5/8″;	16/32DP; 9T	φ82, 55	106, 5
K52	182	10	9	43, 3	M10:D16	Splined key SAE $A-B_1$	3/4″;	16/32DP; 11T	φ82, 55	106, 5

The preferred solution (shorter delivery time)		
Identification number	**model**	
947666	A10VSO 18 DFR	/31L-PSC62N00
940520	A10VSO 18 DFR	/31R-PPA12N00
945178	A10VSO 18 DFR1	/31R-PPA12N00
942503	A10VSO 18 DR	/31R-PPA12N00

Ordering code/standard

Size 28-140, series 31

Operating fluid/type

	28...100	140	
Mineral oil and HFD (no code)	●	●	
Fluid HFA, HFB and HFC (Skydrol excluded)	●	●	E
High speed	–	●	H

Axial piston unit

Variable pump, swashplate, for industrial drive Nominal pressure: 280bar, peak pressure: 350bar	A10VS

Operating mode

Pump, open circuit	O

Size

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

Control devices

			28	45	71	100	140	
Two-position control directly	DG		●	●	●	●	●	DG
Pressure control	DR		●	●	●	●	●	DR
remotely	DR	G	●	●	●	●	●	DRG
Pressure/flow control	DFR		●	●	●	●	●	DFR
No orifice on oil circuit X	DFR	1	●	●	●	●	●	DFR1
Pressure/flow/power control			●	●	●	●	●	DFLR
Flow control, related to pilot pressure With pressure control			●	●	●	●	●	FHD
Flow control			●	●	●	●	❍	FE1**
Pressure/flow electrical control			❍	❍	❍	❍	❍	DFE1**
Electro hydraulic pressure control			❍	❍	❍	❍	❍	ED

Series

	31

Rotation direction

View from shaft end	clockwise	R
	counter clockwise	L

Seal

NBR (Nitrile rubber to DIN ISO 1629) with shaft seal FKM	P
FKM ((Fluorine rubber to DIN ISO 1629)	V

Shaft end	28	45	71	100	140	
Keyed shaft DIN 6885	●	●	●	●	●	P
Splined key SAE	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	S
Splined key SAE (higher through drive torque)	7/8"	1"	1 1/4"	–	–	R

*Notes for size 71
Pressure oil port B, including a high pressure combination port
SAE11/4” standard pressure range, 3000psi, max. pressure up to 250bar
Sae1” standard pressure range, 5000pai, max. pressure exceed 250bar
High pressure oil port SAE1 applied for new site.

Ordering code/standard

Size 28-140, series 31

EFP– A10VS O / 31 – 12

Operating fluid/type
Axial piston unit
Operating mode
Size
Control devices
Series
Rotation direction
Seal
Shaft end

Mounting flange

	28	45	71	100	140	
ISO 2 holes	●	●	●	●	–	A
ISO 4 holes	–	–	–	❍	●	B

Working oil mouth

Pressure oil mouth B Oil inlet S	Pressure oil port B opposite, SAE port. Pressure oil port S Fixing screw	12

Through drive

	28	45	71	100	140	
No splined shaft drive	●	●	●	●	●	N00

Through drive with axial pump, gear pump or radial piston pump.

Mounting flange	Axis/collar	To mount						
ISO 80,2 holes	spline shaft 3/4”19-4(SAE A-B)	A10VSO 10, 18 (shaft S/R)	●	●	●	❍	❍	KB2
ISO 80,2 holes	With bond axis Ø 18	A10VSO 18	●	●	●	●	●	K51*
ISO 100,2 holes	spline shaft 7/8”22-4(SAE B)	A10VSO 28 (shaft S/R)	●	❍	●	●	●	KB3
ISO 100,2 holes	With bond axis Ø 22	A10VSO 28	●	●	●	●	●	K25*
ISO 100,2 holes	spline shaft 1”25-4(SAE B-B)	A10VSO 45 (shaft S/R)	–	●	●	●	●	KB4
ISO 100,2 holes	With bond axis Ø 25	A10VSO 45	–	●	●	●	●	K26*
ISO 125,2 holes	spline shaft 1 1/4”32-4(SAE C)	A10VSO 71 (shaft S/R)	–	–	●	●	●	KB5
ISO 125,2 holes	With bond axis Ø 32	A10VSO 71	–	–	●	●	●	K27*
ISO 125,2 holes	spline shaft 1 1/2”38-4(SAE C-C)	A10VSO 100 (shaft S)	–	–	–	●	●	KB6
ISO 125,2 holes	With bond axis Ø 40	A10VSO 100	–	–	–	●	●	K37*
ISO 180,4 holes	spline shaft 1 3/4”44-4(SAE D)	A10VSO 140 (shaft S)	–	–	–	–	●	KB7
ISO 180,4 holes	With bond axis Ø 45	A10VSO 140	–	–	–	–	●	K59*
82-2(SAE A 2holes)	spline shaft 1 5/8”16-4(SAE A)	1 PF2G2 PGF2	●	●	●	●	●	K01
82-2(SAE A 2holes)	spline shaft 3/4”19-4(SAE A-B)	A10VSO 10, 18 (shaft S)	●	●	●	●	●	K52
101-2(SAE B 2holes)	spline shaft 7/8”22-4(SAE B)	1 PF2G3	●	●	●	●	●	K02
101-2(SAE B)	spline shaft 22-4(SAE B)	PGF3 A10VSO 28 (shaft S)	●	●	❍	●	●	K68
101-2(SAE B)	spline shaft 25-4(SAE B-B)	PGH4 A10VSO 45 (shaft S)	●	●	●	●	●	K04
127-2(SAE C)	spline shaft 32-4(SAE C)	A10VSO 71 (shaft S)	–	–	●	●	❍	K07
127-2(SAE C)	Spline shaft 38-4 (SAE C - C)	A10VSO 100 (shaft S)PGH5	–	–	–	●	●	K24
152-4(SAE D)	spline shaft 44-4(SAE D)	A10VSO 140 (shaft S)	–	–	–	–	●	K17
Ø63, metric, 4holes	With bond axis Ø 25	R4	●	●	●	●	●	K57

* Only for pump with smaller through drive torque.

Combination pumps

1. If the second pump is Brueninghaus and to be factory fitted, both pump codes should be quoted, joined by "+".
Ordering example:A10VSO 100DR/31R-PPA12KB5 + A10VSO 71DFR/31R - PSA12N00
2. If a gear or radial piston pump is to be combined with the pump in the factory, please consult us.

Technical data

Size 28-140, series 31

Fluid

Before designing, please contact us for extensive information on the selection of hydraulic fluids and application conditions.
When operating with environmental friendly fluids and HF fluids, please contact us for limitations to the technical data.

Operating viscosity range

In order to obtain optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected in the range:

V_{opt} = optimum operating viscosity16…36mm²/s

referred to tank temperature (open circuit).

Limit of viscosity range

The viscosity of the limit

V_{min}=10mm²/s

for short periods at max. permissible leakage oil temperature 90° C.

V_{max}=1000mm²/s

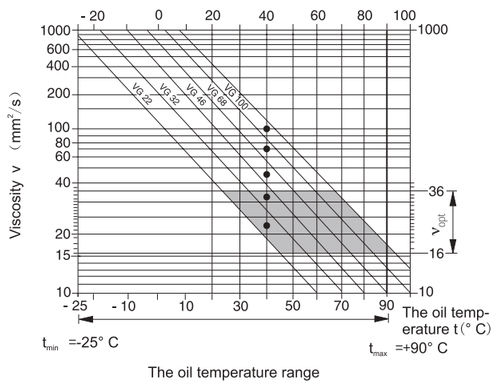
Cold start

Temperature range (see selection diagram)

t_{min} = -25° C

t_{max} = +90° C

Selection diagram



The oil temperature range

Comments on the selection of the hydraulic fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the tank (open circuit), in relation to the ambient temperature.
The hydraulic fluid should be selected such that, within the operating temperature range, the operating viscosity lies within the optimum range (v_{opt}), see shaded section of selection diagram.
We recommend that the higher viscosity grade is selected in each case.
Example: At an ambient temperature of X° C, the operating temperature in the tank is 60° C. Within the operating viscosity range (v_{opt}; shaded area), this corresponds to viscosity range VG 46 or VG 68. VG 68 should be selected.
Notes: The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the tank temperature. However, at no point in the circuit may the temperature exceed 90° C.
If condition above unavailable when using in extreme condition or too high ambient temperature, please contact Elephant Fluid Power.

Filtration of fluids

In order to ensure correct functioning of the axial piston unit, a minimum level of cleanliness class
NAS1638,9 Level
ISO/DIS 4406 the 18/15
If the fluid quality above is unavailable, please contact us.

High speed version

Size 140 1s optional. Higher speed (output flow more) is permissible for max. displacement of same size pump

Mechanical displacement limiter

Only valid for N00 series pump.

$V_{g\,max}$: for sizes 28 to 140
Setting range from 50% to $V_{g\,max}$ stepless
$V_{g\,min}$: for sizes 100 to 140
Setting rang from zero to 50% of $V_{g\,max}$ stepless

Technical data

Size 28-140, series 31

Operating pressure range — inlet

Port S (inlet) absolute pressure

$P_{abs\,min}$ ——— 0.8bar

$P_{abs\,max}$ ——— 30bar

Working pressure range — outlet

Port B pressure

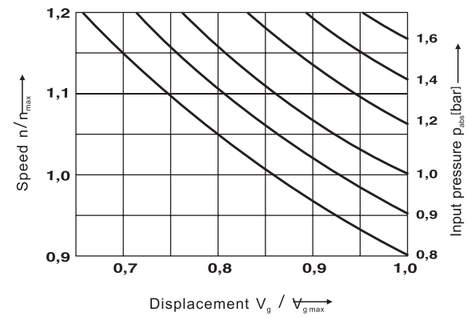
Nominal pressure P_n ——— 280bar

Peak pressure P_{max} ——— 350bar

(pressure conform to DIN 24312)

10% intermission operating with loading pressure up to 315bar.

Graph, showing permissible speed with increased inlet pressure at port S (pwabs) resp. reduced displacement(Vg < Vg max).



Case drain pressure

The max. permissible drain pressure (ports L, L_1): 0.5bar higher than port S, but not higher than absolute pressure 2bar.

Flow direction

S to B.

Table of values (theorectical values, without considering ηmh and ηv; values rounded off)

Nominal size				28	45	71	100	140/High-S*
Displacement	$V_{g\,max}$	cm^3		28	45	71	100	140/140
Max. speed 1) at $V_{g\,max}$		$n_{o\,max}$	r/min	3000	2600	2200	2000	1800/2050
Max. speed (limit) with inlet pressure pabs increased or $V_g < V_{g\,max}$		$n_{o\,max}$	r/min	3600	3100	2600	2400	2100/2200
Max. volume flow	$n_{o\,max}$	$q_{vo\,max}$	L/min	84	117	156	200	252/287
	n_E=1500 r/min		L/min	42	68	107	150	210
Max. power (△ ρ =280bar)	$n_{o\,max}$	$P_{o\,max}$	kW	39	55	73	93	118/134
	n_E=1500 r/min		kW	20	32	50	70	98
Max. torque with $V_{g\,max}$ (△p =280bar)		T_{max}	Nm	125	200	316	445	623
$V_{g\,Max}$ torque (Δp = 100 bar)		T	Nm	45	72	113	159	223
Moment of inertia on drive axis		J	kgm^2	0,0017	0,0033	0,0083	0,0167	0,0242
Case filled volume			L	0,7	1,0	1,6	2,2	3,0
Weight (without fluid)		m	kg	15	12	33	45	60
Permissible axial force on drive shaft		$F_{ax\,max}$	N	1000	1500	2400	4000	4800
Permissible radial force 2) on drive shaft		$F_{q\,max}$	N	1200	1500	1900	2300	2800

***=High speed version**

1)Data above at port S is absolute pressure valid at 1bar. If the displacement lowered or inlet pressure increased, the speed can be increased to peak (sea diagram).

2) Contact Elephant Fluid Power for the higher radial force.

Determination of size

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

Torque $T = \frac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}} = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}}$ [Nm]

Power $P = \frac{T \cdot n}{9549} = \frac{2\pi \cdot T \cdot n}{60\,000} = \frac{q_v \cdot \Delta p}{600 \cdot \eta_t}$ [kW]

V_g = Displacement per revolution in in^3 (cm^3)
Δp = Differential pressure in bar
n = Speed in r/min
η_v = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Total efficiency($\eta_t = \eta_v \cdot \eta_{mh}$)

Technical data

Size 28-140, series 31

Installation position is optional. The pump casing must be filled with fluid during commissioning and remain full when operating.
In order to reduce noise output, all connecting lines (suction, pressure and case drain lines) must be de-coupled from the tank using flexible elements.
The use of check valves in the case drain line has to be avoided.
Exceptions may be possible after consultations with us.

1. Vertical installation (shaft end pointing upwards)
The following installation conditions are to be taken into account:
1.1 Installation in a tank
Full the pump and keep it level before installation.
a) When the minimum fluid level is the same as or is above the pump flange area then: ports L, L_1 and S are open (see fig. 1).
b) If the minimum fluid level lies under the pump flange area then: ports L_1 and possibly S have to be piped as shown in fig. 2. Port L closed, as stated in section 1.2.1

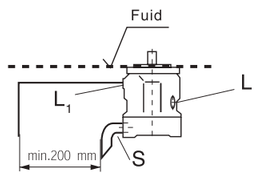


fig. 1

1.2 Installation outside of a tank
Fill the pump casing with the pump lying horizontal before installation. (See fig.2)
Extreme condition:
1.2.1 Conditions: A minimum pump inlet pressure (suction pressure)
$P_{in\,min}$=0.8bar.
Notes: Avoid mounting the pump above the tank if low noise operation is required.
Permitted oil lift h is related to total pressure loss, and not higher than h_{max}=800mm (pipe submerging depth $h_{d\,min}$=200mm)

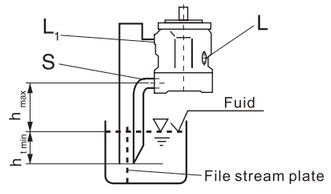


fig. 2

Total pressure loss=

$$\Delta p_{total} = \Delta p_1 + \Delta p_2 + \Delta p_3 \le (1 - p_{in,\,min}) = 0.2\ bar$$

Δp_1 : pressure loss caused by hydraulic accelerating inside pipe

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

ρ = fluid density (kg/m³)
l = pipe length (m)
dv/dt = fluid speed change rate (m/s²)

Δp_2 : pressure loss caused by static press
$\Delta p_2 = h \cdot \rho \cdot g \cdot 10^{-5}$ (bar)

h = lift range (m)
ρ = fluid density (kg/m³)
g = gravity accelerating =9.81 (m/s²)

Δp_3: pipe loss (elbow etc)

Size 28-140, series 31

2. Horizontal installation
Ports L or L_1 is atop the pump for horizontal installation.
2.1 Installation in a tank
a) When the minimum fluid level is the same as or lies above the upper edge of the pump then: drain port L or L_1 and port S are open (see fig. 3).
b) When the minimum fluid level lies under the pump upper edge then: drain port L_1, L and possibly port S has to be piped, see fig. 4. Conditions are as per in section 1.2.1.

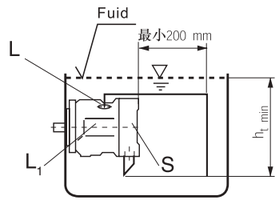


fig. 3

2.2 Installation outside a tank
Fill the pump housing before commissioning.
Connect pipe for drain port S and port L or L_1.
a) For installation above a tank see fig. 4.
Conditions are as per section 1.2.1.

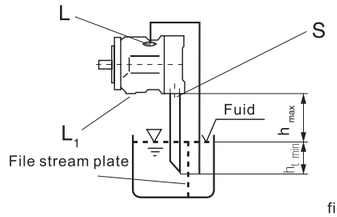


fig. 4

b) For installation under the tank
Connect pipe drain port L and S as per fig. 5.

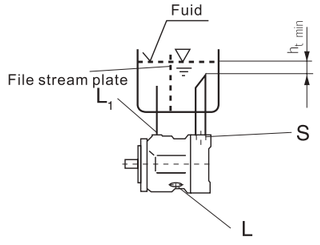


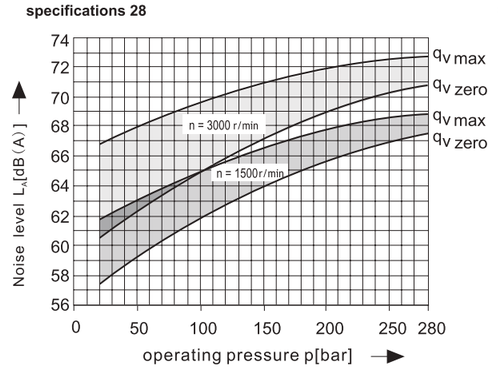
fig. 5

Technical data

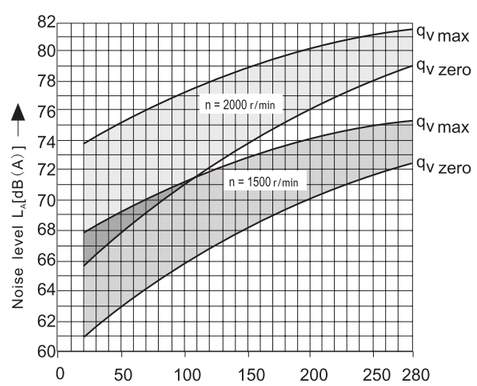
Size 28-140, series 31

Noise level
Measured in an anechoic chamber
Distance from microphone to pump = 3.3 ft (1 m)
Measuring error: + 2 dB(A)
Fluid: Hydraulic oil to ISO VG 46 DIN 51519, t = 122 °F (50 °C)

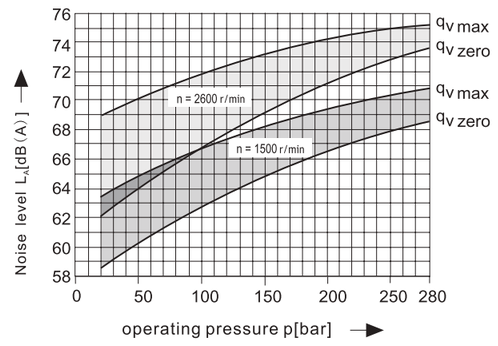
specifications 28



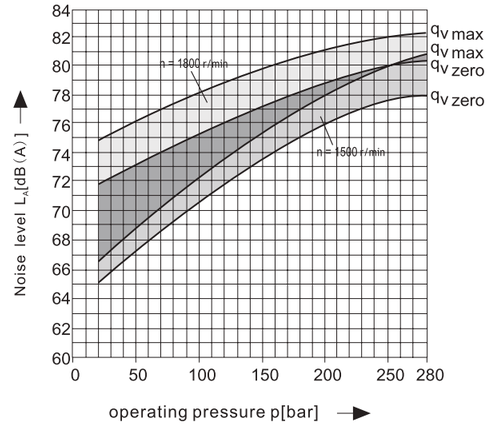
specifications 100



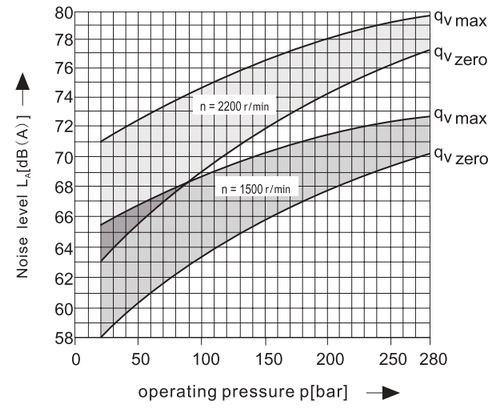
specifications 45



specifications 140



specifications 71



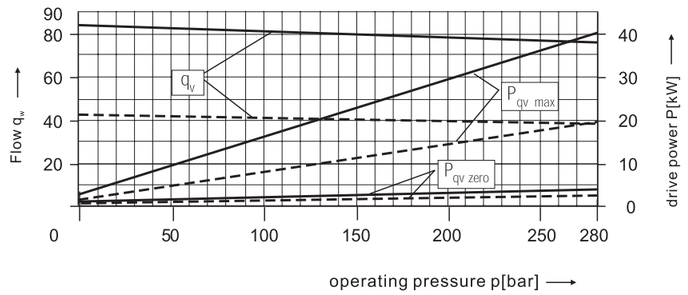
Technical data

Size 28-140, series 31

Fluid: Hydraulic oil to ISO VG 46 DIN 51519, t = 122 °F (50 °C)

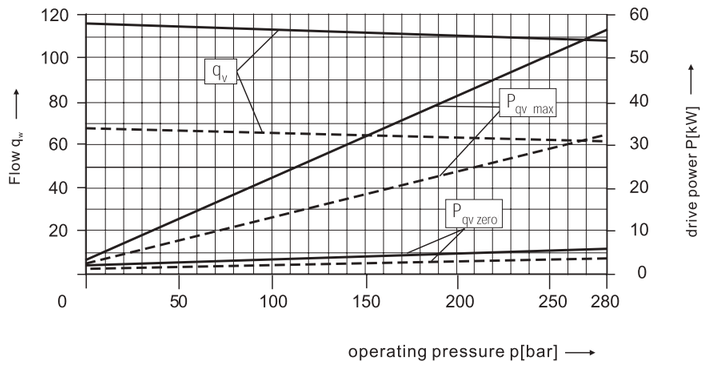
Size 28

- n = 1500 r/min
- n = 3300 r/min



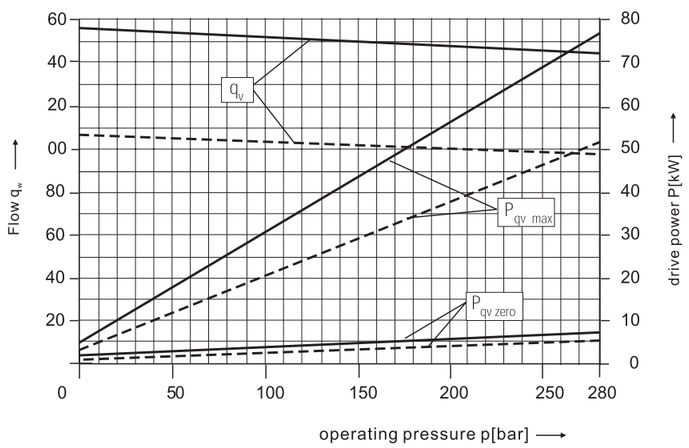
Size 45

- n = 1500 r/min
- n = 2600 r/min



Size 71

- n = 1500 r/min
- n = 2200 r/min



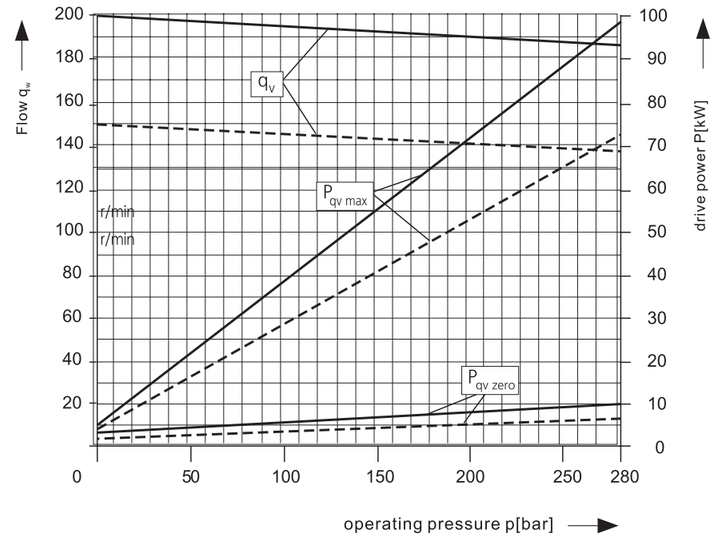
Technical data

Size 28-140, series 31

Fluid: Hydraulic oil to ISO VG 46 DIN 51519, t = 122 °F (50 °C)

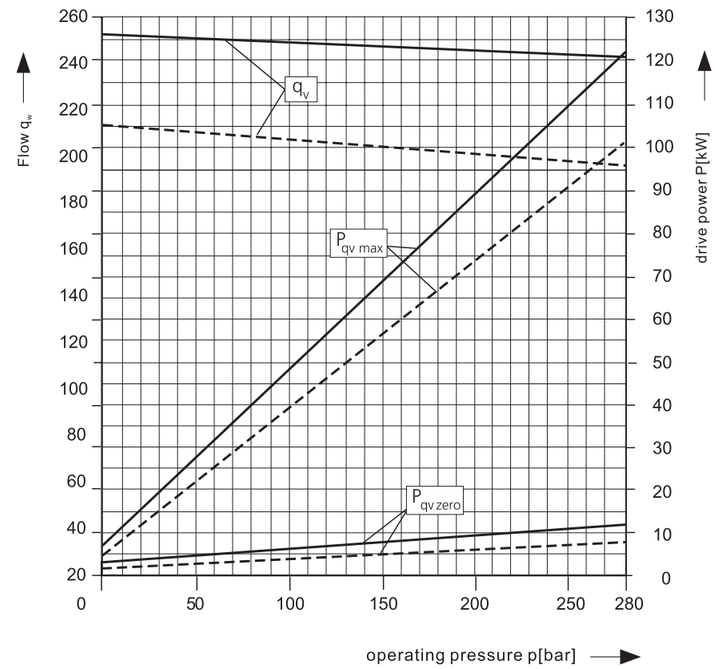
Size 100

- n = 1500 r/min
- n = 2000 r/min



Size 145

- n = 1500 r/min
- n = 1800 r/min



Overall efficiency

$$\eta_t = \frac{q_v \cdot p}{P_{qv\ max} \cdot 600}$$

Volumetric efficiency

$$\eta_v = \frac{q_v}{q_{v\ theor.}}$$

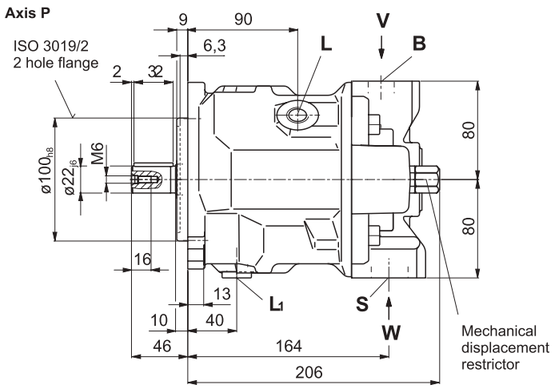
Sizes

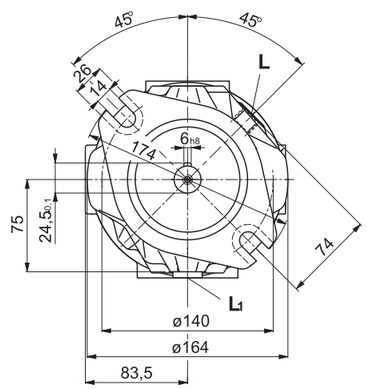
Size 28, series 31

N00 type (no sense axis)

There is no control valve

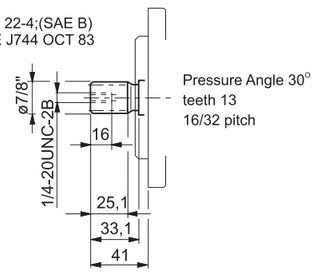
Axis P



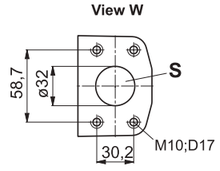


Axis S

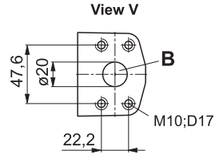
Axis 22-4;(SAE B)
SAE J744 OCT 83



View W

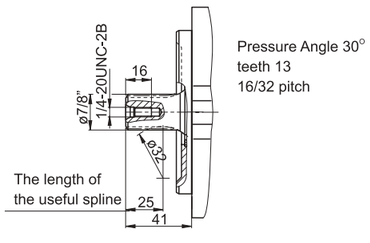


View V



Axis R

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



B	Pressure port	SAE 3/4″	(Standard pressure series)
S	Inlet port	SAE 1 1/4″	(Standard pressure series)
L,L1	Drain port (L1 closed)	M18x1. 5	(L, bunged up in a factory)

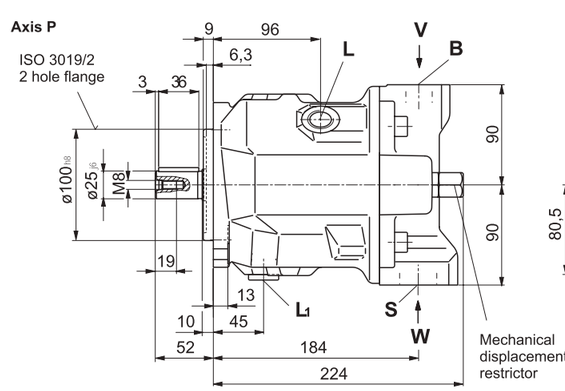
Sizes

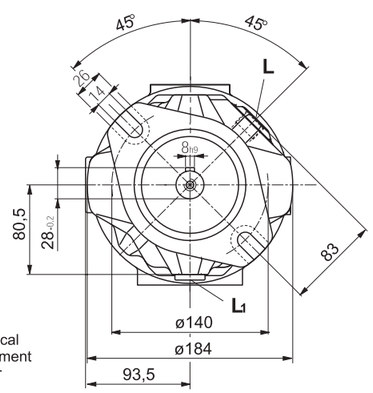
Size 45, series 31

N00 type (no sense axis)

There is no control valve

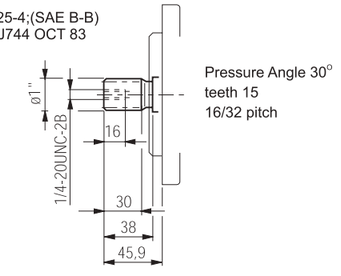
Axis P



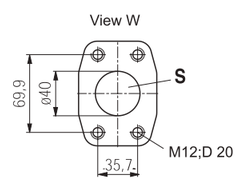


Axis S

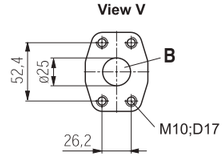
Axis 25-4;(SAE B-B)
SAE J744 OCT 83



View W

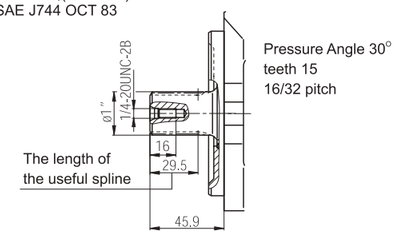


View V



Axis R

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



B	Pressure port	SAE 1″	(Standard pressure series)
S	Inlet port	SAE 1 1/2″	(Standard pressure series)
L,L1	Drain port (L1 closed)	M22x1. 5	(L, bunged up in a factory)

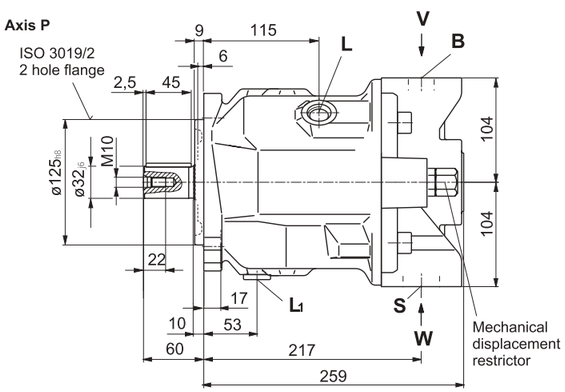
Sizes

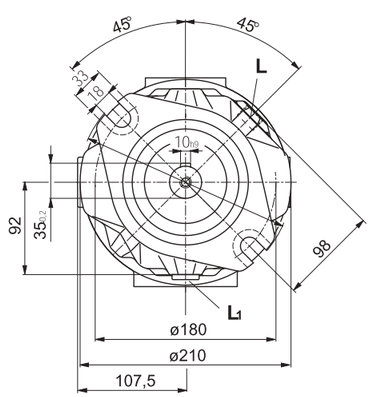
Size 71, series 31

N00 type (no sense axis)

There is no control valve

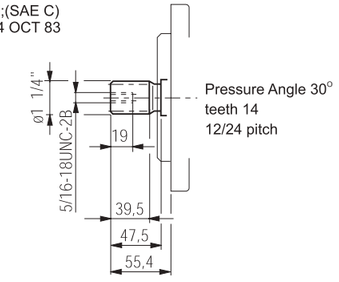
Axis P



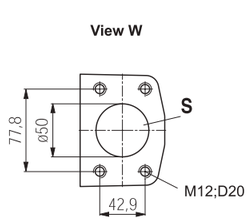


Axis S

Axis 32-4;(SAE C)
SAE J744 OCT 83

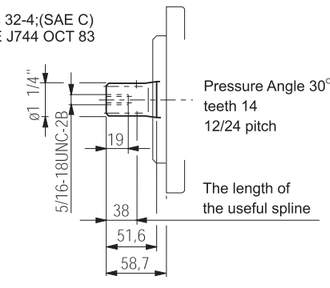


View W

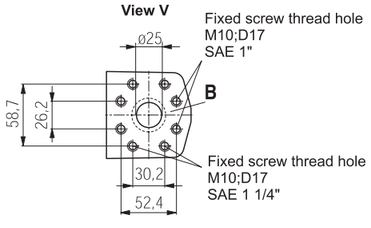


Axis R

Axis 32-4;(SAE C)
SAE J744 OCT 83



View V



Note:
The pressure oil mouth B has two SAE optional installation, stagger the 90° to each other. The SAE standard pressure fan Wai, 3000 psi, available to 250 bar or SAE 1 sigma standard pressure range, 5000 psi,Available to more than 250 bar. To more than 250 bar or work pressure for new project,Application of SAE 1 ".

B	Pressure port	SAE 1″	(Standard pressure series) Screw thread hole, the SAE 1 “SAE or 1 1/4" (optional)
S	Inlet port	SAE 2″	(Standard pressure series)
L,L1	Drain port (L1 closed)	M22x1. 5	(L, bunged up in a factory)

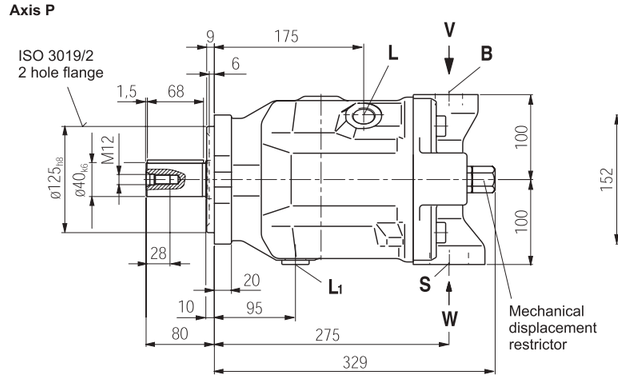
Sizes

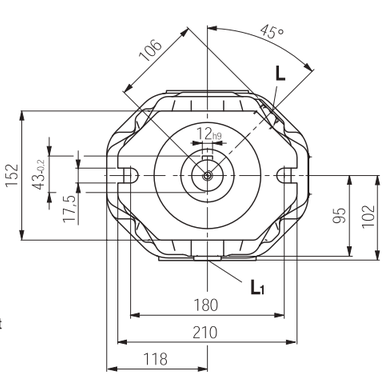
Size 100, series 31

N00 type (no sense axis)

There is no control valve

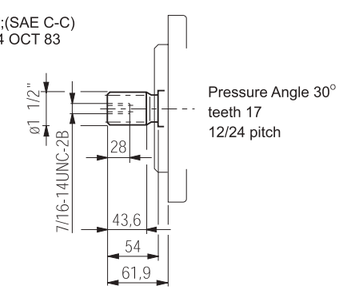
Axis P



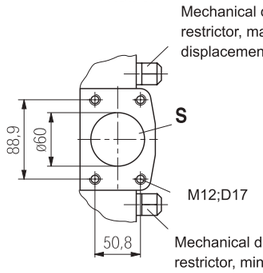


Axis S

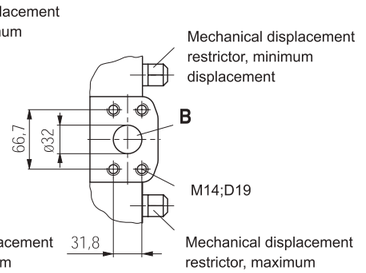
Axis 38-4;(SAE C-C)
SAE J744 OCT 83



View W



View V



B	Pressure port	SAE 1 1/4″	(Standard pressure series)
S	Inlet port	SAE 2 1/2″	(Standard pressure series)
L,L1	Drain port (L1 closed)	M27x2	(L, bunged up in a factory)

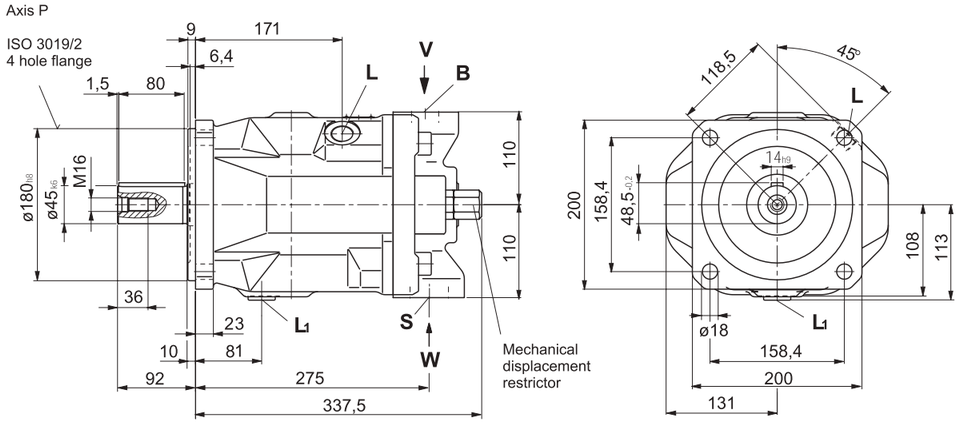
Sizes

Size 140, series 31

N00 type (no sense axis)

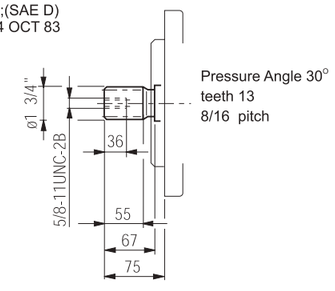
There is no control valve

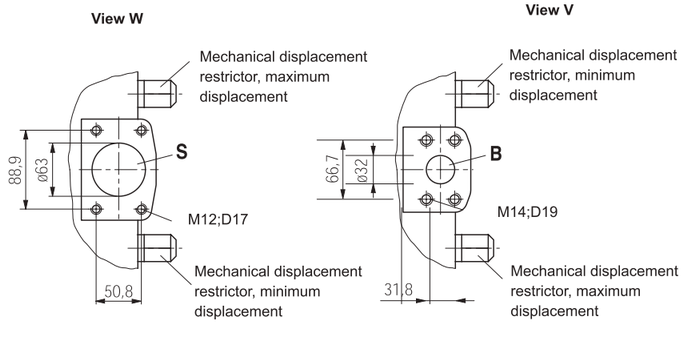
Axis P



Axis S

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





B	Pressure port	SAE 1 1/4″	(Standard pressure series)
S	Inlet port	SAE 2 1/2″	(Standard pressure series)
L,L1	Drain port (L1 closed)	M27x2	(L_1 bunged up in a factory)

DG 2-position directly control

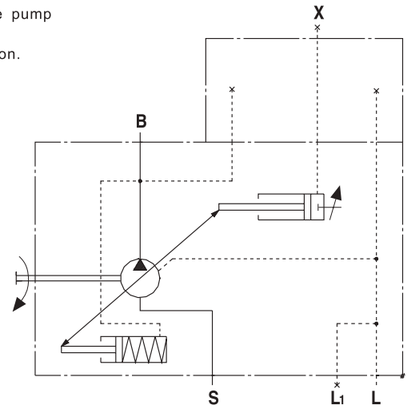
Size 28-140, series 31

With the help of exterior switchover pressure connected with port X, the pump swashplate is set at max. angle.
At least 30bar pressure is needed for the pressure function on the variable piston.
The pump displacement switch over between $V_{g\ max}$ and $V_{g\ min}$.

Switchover pressure P_{st} is relation to the pump output pressure by ratio of 1:4.

$$p_{St} = \frac{p}{4}$$

V



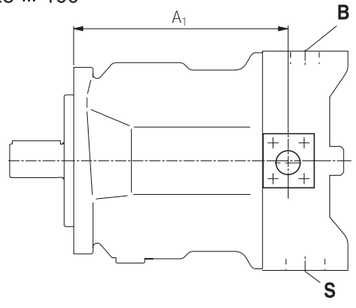
Switchover pressure at port X: P_{st}=0bar $\triangleq V_{gmax}$

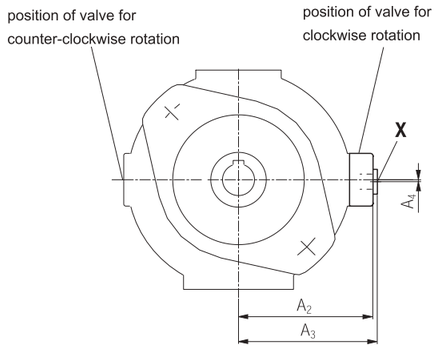
Switchover pressure at port X: $P_{st} \geqslant$ 30bar or $\frac{p}{4} \triangleq V_{gmin}$

Controller data

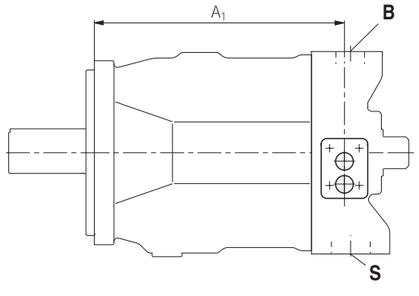
Min. switchover pressure	30 bar
Max. switchover pressure	280 bar

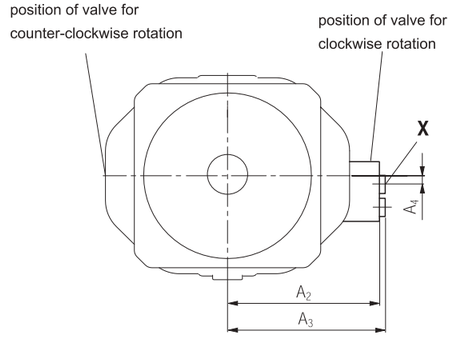
Size 28 ... 100





Size 140





Size

Size	A_1	A_2	A_3	A_4	X（plugged）
28	158	100	103,5	3	R1/4"
45	173	110	113,5	3	R1/4"
71	201	123,5	127,5	3	R1/4"
100	268	128,5	132,5	3	R1/4"
140	268	153	158	4,6	M14x1,5

Ports

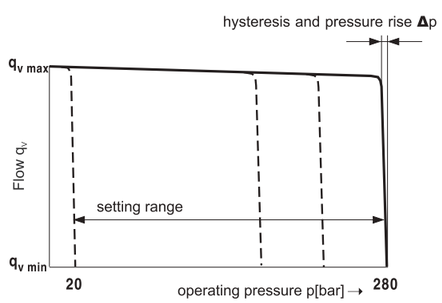
B	Pressure port
S	Inlet port
L,L1	Drain port (L1 closed)
X	Pilot pressure port

DR - Pressure control

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

Static characteristic

（at n_1=1500r/min;t_{oil}=50°C）

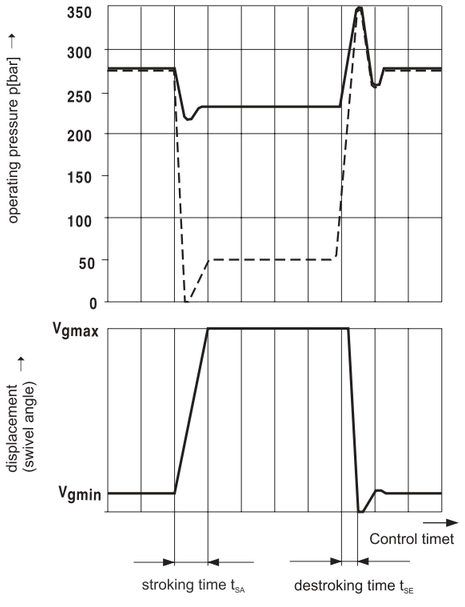


Dynamic characteristic

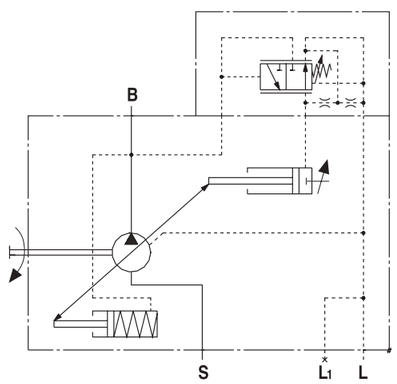
The opening curves are mean values measured under test conditions with the unit mounted inside the tank.
Conditions: n = 1500 r/min
t_{oil} = 50 °C
Main relief set at 350 bar

Pump with relief valve loaded. The overflow valve from the pump outlet flange 1 m. With a sudden switch pressure oil to meet the load step.

from the pump pressure outlte.



Size 28-140, series 31



Ports

B	Pressure port
S	Inlet port
L,L_1	Case drain port (L_1 plugged)

Controller data

Hysteresis and repetitive accureacy Δp _____ max.3bar
Maximum pressure rise

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

Pilot oil consumption max. approx 3 L/min

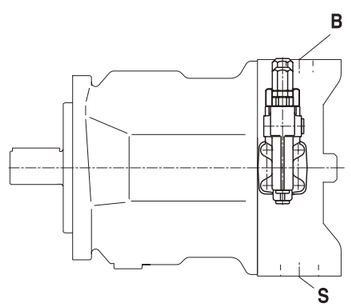
Control times

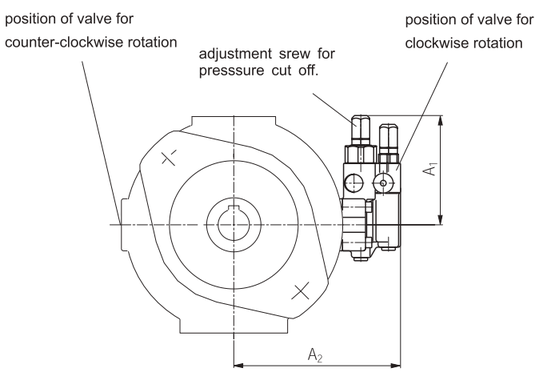
Size	t_{SA} (ms) 50 bar	t_{SA} (ms) 220 bar	t_{SE} (ms) 280 bar
28	60	30	20
45	80	40	20
71	100	50	25
100	125	90	30
140	130	110	30

The size of the DR pressure control

Size 28-140, series 31

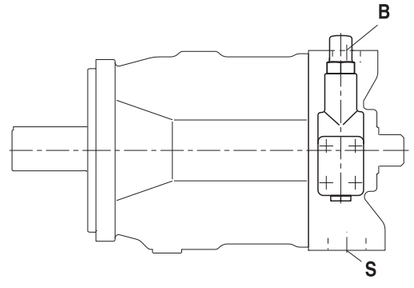
Size28…100

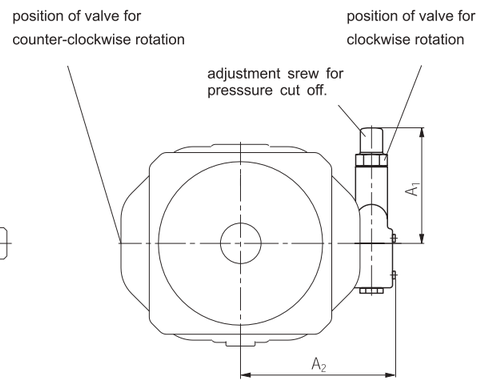




On sizes 28 to 100 the DFR valve is used. The flow control spool is blocked and not tested.

Size140





Size	A_1	A_2
28	109	136
45	106	146
71	106	160
100	106	165
140	127	169

DRG - Pressure control, remotely operated

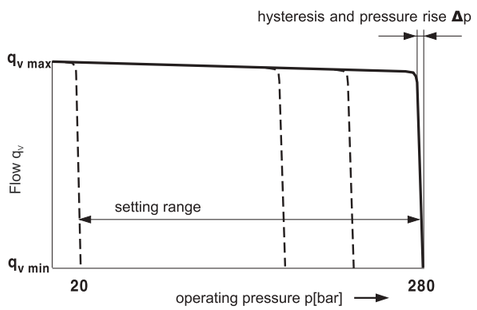
Size 28-140, series 31

Function and design same as DR.

A pressure relief valve may be extemally piped to port X for remote control purposes. However it is not included in the scope of supply with DRG control.
Control valve differential pressure of 20 bar. Pilot control flow rate of 1.5 L/min. If you need other Settings (range in 10 to 20 bar), in the order document, please.
We recommend that one of the following is used as the seperate pressure reliel valve.
DBDH 6 /hydraulic) to RC 25402 or DBETR·SO 381 with orifice DIA 0.03 in (0.8mm) in P(electric) to RA 29166
Max,Pipe shall not exceed 2 m.

Dynamic characteristic

（at n_1=1500r/min ; t_{oil}=50°C）



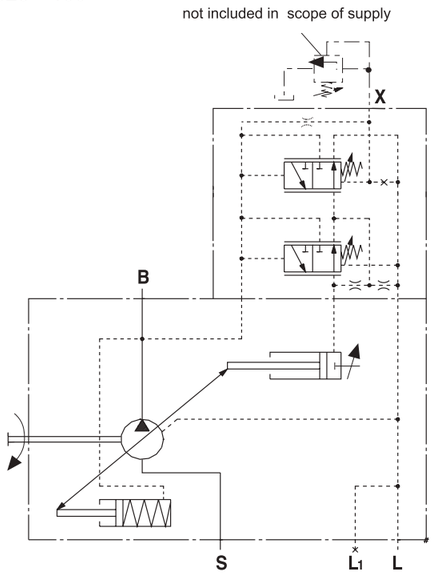
Controller data

Hysteresis Δp _____ max.3bar
Maximum pressure rise

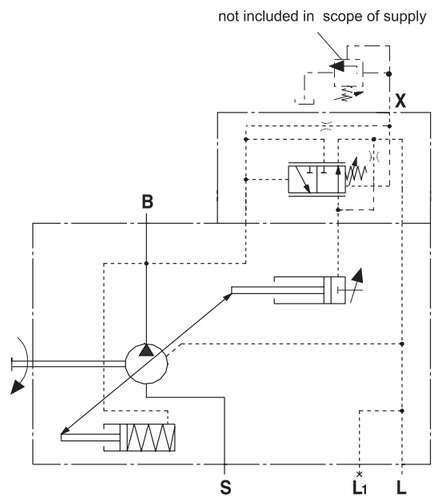
Size		28	45	71	100	140
Δp	bar	4	6	8	10	12

Pilot oil consumption _____ approx 4.5 L/min

Size28…100



Size140



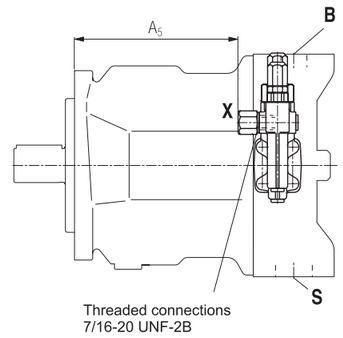
Ports

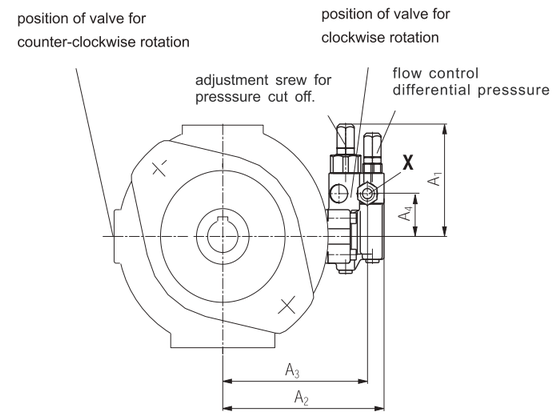
B	Pressure port
S	Inlet port
L,L_1	Case drain port (L_1 plugged)
X	Pilot pressure port

Take the DRG remote pressure control pressure controller components size

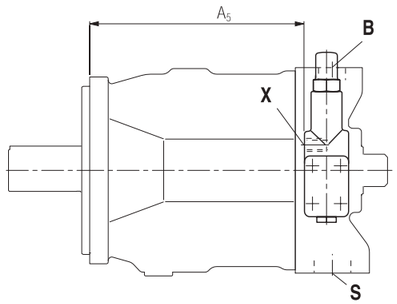
Size 28-140, series 31

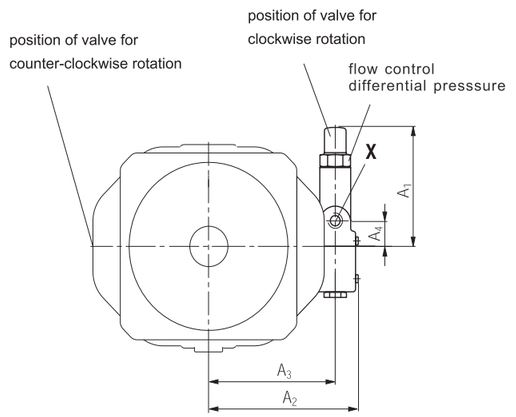
Size28…100





Size140





Size	A_1	A_2	A_3	A_4	A_5	X mouth	
28	109	136	119	40	119	M14x1.5;deep12	With pipe joint
45	106	146	129	40	134	M14x1.5;deep12	
71	106	160	143	40	162	M14x1.5;deep12	
100	106	165	148	40	229	M14x1.5;deep12	
140	127	169	143	27	244	M14x1.5;deep12	No pipe joint

DFR / DFR1 - Pressure flow control

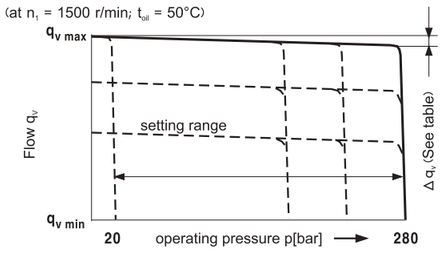
Size 28-140, series 31

Besides via pressure control, the pump flow is changeable via pressure difference with operating unit (e.g. orifice, excluded in the scope of supply), the pump flow is equal to the operating unit flow.

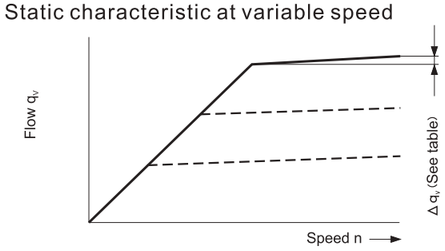
DFR1 valve at X port disconnected with the tank.

Static operating curve

(at n_1 = 1500 r/min; t_{oil} = 50°C)

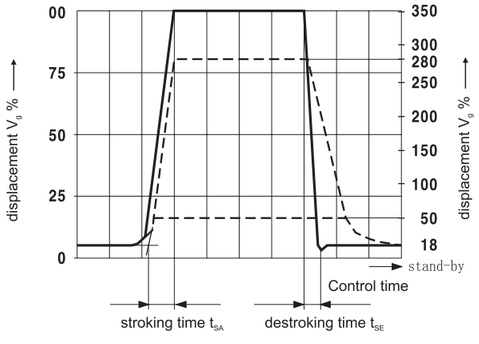


Static characteristic at variable speed

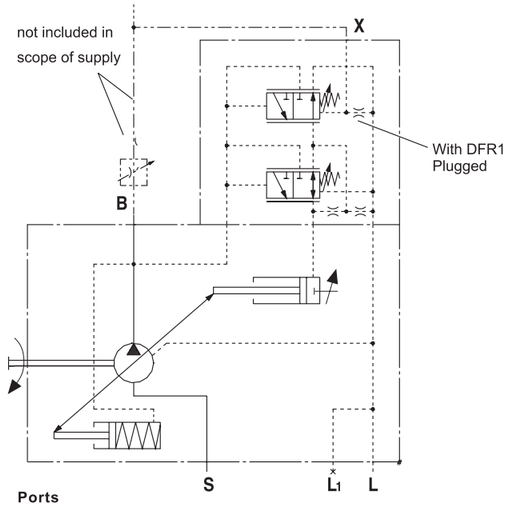


Dynamic characteristic operating curve

This pump is installed in the tank experiment condition curve is measured average.



Size	t_{SA} [ms] 280 bar	t_{SE} [ms] 280 bar	t_{SE} [ms] 50 bar
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
140	130	60	130



Ports

B	Pressure port
S	Inlet port
L,L_1	Case drain port (L_1 plugged)
X	Pilot pressure port

Pressure difference △P:

Range: 10~ 20bar (higher available if needed).

Standard: 14bar. Note the additional setting in the ordering file if needed.

When port X connected with oil tank, Working pressure for the zero schedule pressure P=18±2bar (“standby”)。Results (related to △P)

Control data

Max. flow error at drive speed n=1500r/min (hysteresis and rise)

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

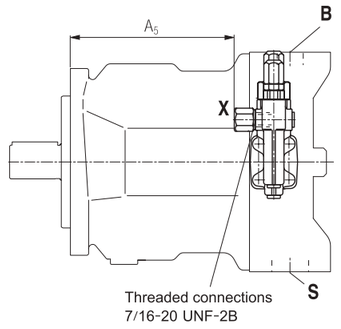
DFR pilot oil consumption _____ max.l approx. 3……4.5 L/min

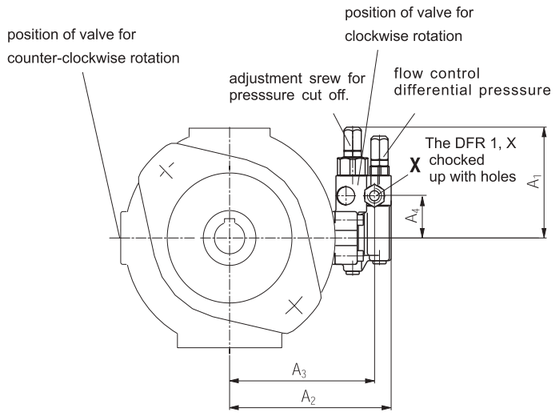
DFR1 pilot oil consumption _____ max. approx. 3 L/min

pressure and flow control element size DFR/DFR1

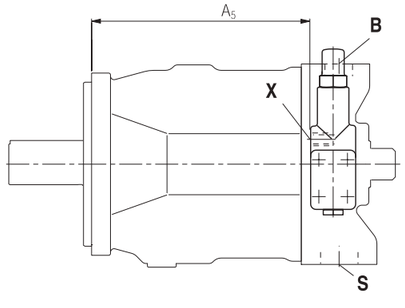
Size 28-140, series 31

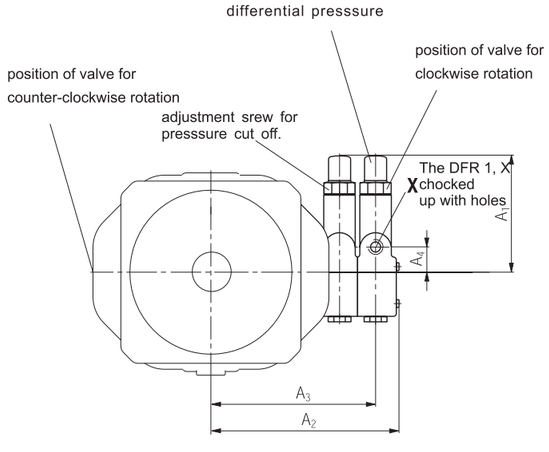
Size28…100





Size140

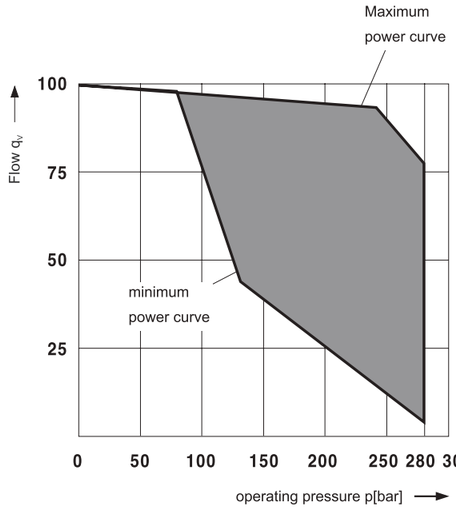


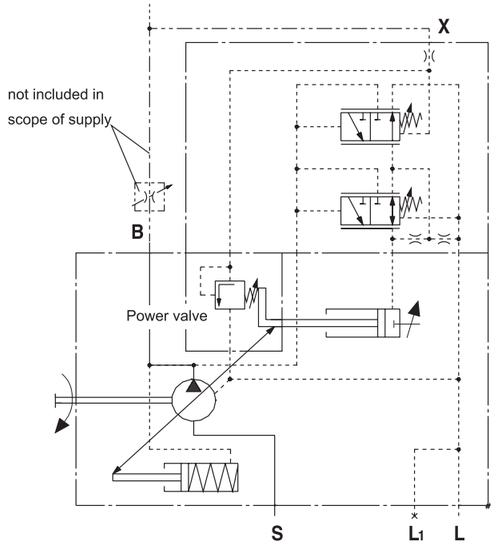


Size	A_1	A_2	A_3	A_4	A_5	X mouth	
28	109	136	119	40	119	M14x1.5;deep12	With pipe joint
45	106	146	129	40	134	M14x1.5;deep12	
71	106	160	143	40	162	M14x1.5;deep12	
100	106	165	148	40	229	M14x1.5;deep12	
140	127	209	183	27	244	M14x1.5;deep12	No pipe joint

Pressure/flow/Power control DFLR　　Size 28-140, series 31

In order to maintain constant torque even under variable operating pressure, by adjusting the swashplate of axial piston pump, the flow output variation maintain constant product of flow multiply pressure.





Ports

B	Pressure port
S	Inlet port
L,L1	Drain port (L1 closed)
X	Pilot pressure port

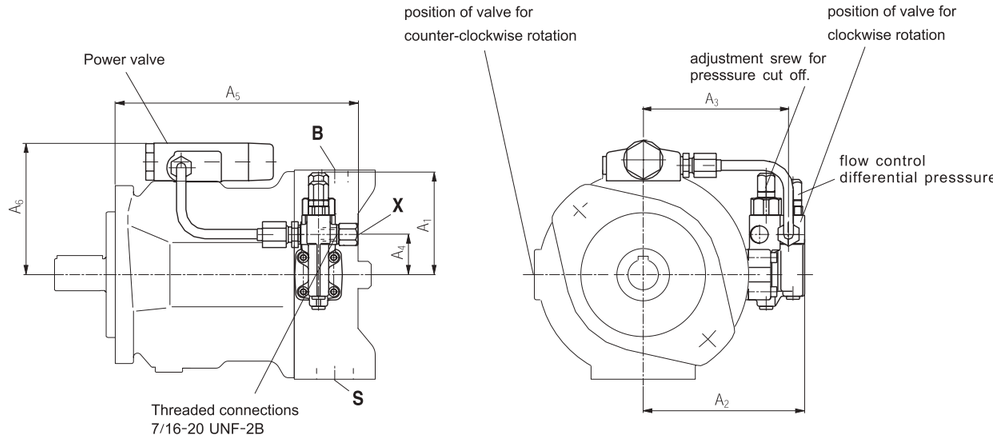
Flow is controlled under constant power curve.
Power curve is set before delivery, please note your requirement in ordering. E.g. 20kW for 1500r/min

Control start _____ absolute pressure 80bar

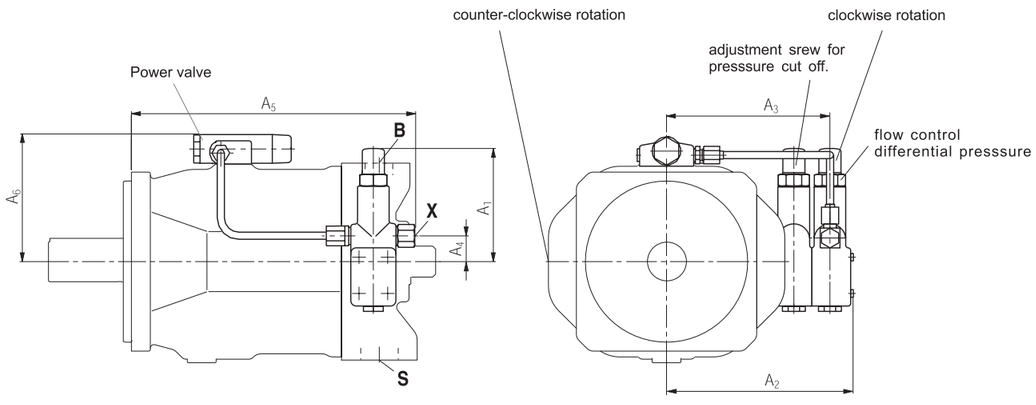
Pilot oil volume _____ max. about 5.5L/min

Pressure/flow/Power control element size DFLR　　Size 28-140, series 31

Size28…100



Size140

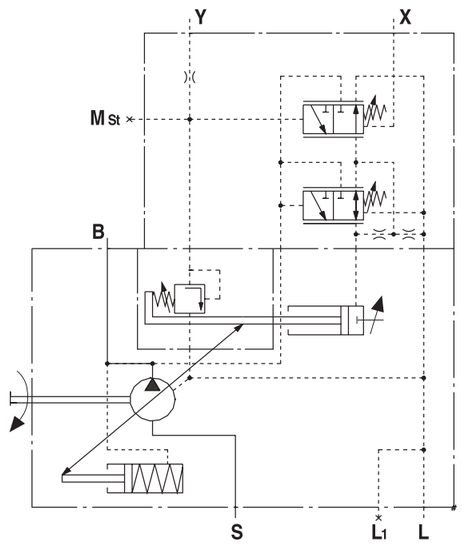


Size	A_1	A_2	A_3	A_4	A_5	A_6	X mouth
28	109	136	119	40	197	107	M14x1.5;deep12
45	106	146	129	40	212	112	M14x1.5;deep12
71	106	160	143	40	240	124	M14x1.5;deep12
100	106	165	148	40	307	129	M14x1.5;deep12
140	127	209	183	27	314	140	M14x1.5;deep12

FDH Flow control, Proportional to the pilot pressure Size 28-140, series 31

The pump swashplate, for the displacement, is rest with the pilot pressure P_{st} x at port X. constant pressure P_y=35bar should be supplied to Port Y, and the pressure here is infinitely adjustable.

（Please note the set value needed in the ordering file).



Controller data

Hysteresis is ±2% of $V_{g\,max}$

Port Y exterior pilot oil consumption——— max. about 3…4.5L/min

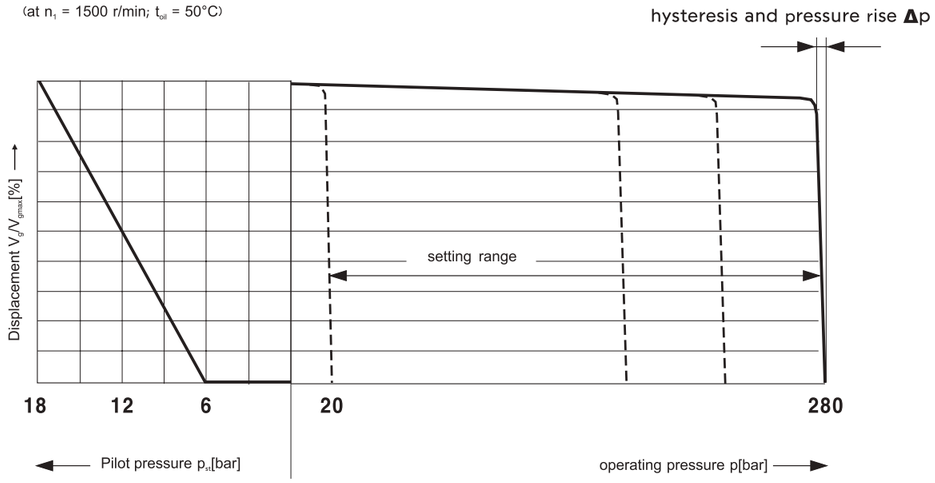
Pressure rise $p\Delta$ ——————————— max.4bar

Ports

B	Pressure port
S	Inlet port
L,L1	Drain port (L1 closed)
X	Pilot pressure port
MSt	test port

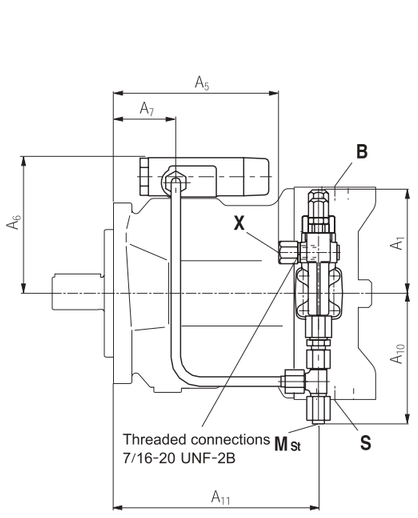
Static operating curve

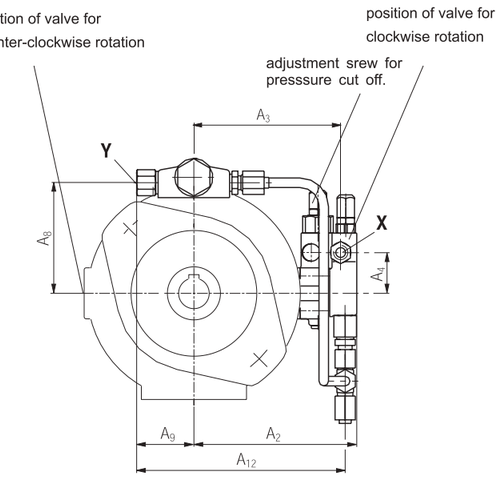
(at n_1 = 1500 r/min; t_{oil} = 50°C)



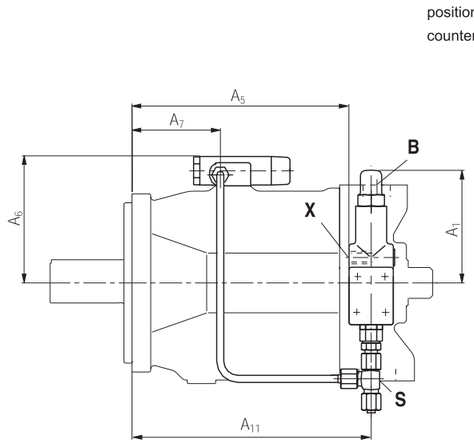
Size Size 28-140, series 31

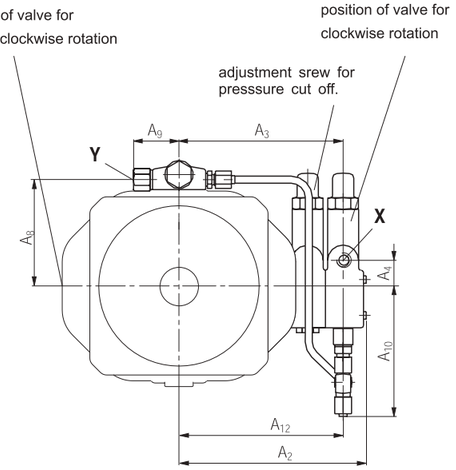
Size28…100





Size140





Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	X mouth	Y mouth	M_{St}
28	109	136	119	40	119	107	48	86	51	113	158	124	M14x1,5	M14x1,5	Pipe diameterØ8x1,5 DIN 2391
45	106	146	129	40	134	112	54	91,5	51	113	173	134	M14x1,5	M14x1,5	Pipe diameterØ8x1,5 DIN 2391
71	106	160	143	40	162	124	69	103,5	51	113	201	148	M14x1,5	M14x1,5	Pipe diameterØ8x1,5 DIN 2391
100	106	165	148	40	229	129	111	108,5	51	113	268	153	M14x1,5	M14x1,5	Pipe diameterØ8x1,5 DIN 2391
140	127	209	183	27	244	140	99	119	51	150	268	183	M14x1,5	M14x1,5	Pipe diameterØ8x1,5 DIN 2391

Through drive

Through drive for A10VSO pump is as per code on page 109.
The through is coding as (KB2-K57). Single model is permitted.

The scope of supply are:
Coupling, fixing screws, seals and, where applicable, an adaptor flange.

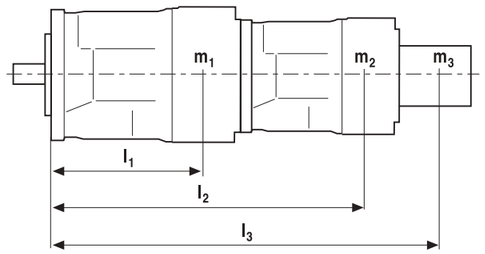
Combination pump
For combination pumps, independent circuit is available.

1. If the combination pump consists of 2 A10VSO pumps and be fitted, both pump codes should be quoted, joined by "+".
   A10VSO 71 DR/31 L-PPA12KB3+
   A10VSO 28 DR/31 L-PSA12N00

2. If a gear or radial piston pump is to be fitted in the factory as the combination pump, please consult us.

Size 28-140, series 31

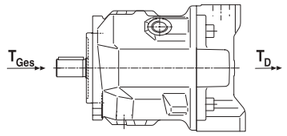
Allow the moment of inertia



m_1, m_2, m_3 [kg] Pump heavy
l_1, l_2, l_3 [mm] Distance from the center of gravity
$T_m = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{102}$ [Nm]

Size			28	45	71	100	140
Allow the bending moment	T_m	Nm	880	1370	2160	3000	4500
In the dynamic quality of accelerating 10g ≅Allow the moment of inertia of 98.1 m/s² 450	T_m	Nm	88	137	216	300	450
quality	m_1	kg	15	21	33	45	60
The distance to the center of gravity	l_1	mm	110	130	150	160	160

Maximum allowable input shaft torque



Torque distribution between pump 1 and pump 2 are optional, max. permissible input torque T_{tol} and max. permissible through drive torque T_D not exceed nominal value.

Size			28	45	71	100	140
The shaft of pump 1 "P" on the maximum allowable input torque	T_{tot}	Nm	137	200	439	857	1206
The maximum allowed shaft torque	T_D	Nm	137	200	439	778	1206
	$T_{D\ Key\ shaft}$	Nm	112	179	283	398	557

Size			28	45	71	100	140
The shaft of pump 1 "S" on the maximum allowable input torque	T_{tot}	Nm	198	319	626	1104	1620
The maximum allowed shaft torque	T_D	Nm	160	319	492	778	1266
	$T_{D\ Key\ shaft}$	Nm	112	179	283	398	557

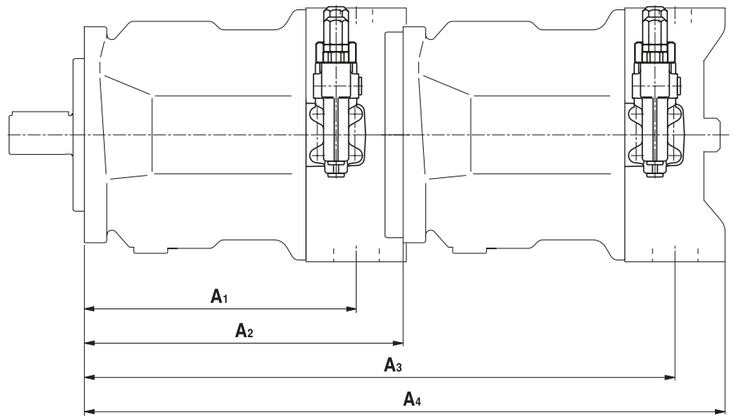
Size			28	45	71	100	140
The shaft of pump 1 "R" on the maximum allowable input torque	T_{tot}	Nm	225	400	644	–	–
The maximum allowed shaft torque	T_D	Nm	176	365	548	–	–
	$T_{D\ Key\ shaft}$	Nm	112	179	283	–	–

T_{tot} = in the maximum allowable input torque of pump 1
T_D = in the shaft, the maximum allowed on the spline shaft drive shaft torque
$T_{D\ key\ shaft}$ = in shaft, with the maximum allowed on the bondaxis drive shaft torque

Combination of the pump element size

Size 28-140, series 31

EFP-A10VSO + EFP-A10VSO



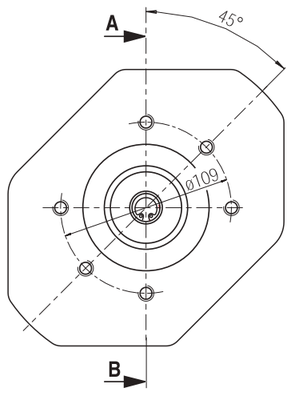
The main pump / Add the pump	KD-A10VSO 28				KD-A10VSO 45				KD-A10VSO 71				KD-A10VSO 100				KD-A10VSO 140			
	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4	A_1	A_2	A_3	A_4
A10VSO 18	164	204	349	399	184	229	374	424	217	267	412	462	275	338	483	533	275	350	495	545
A10VSO 28	164	204	368,5	410	184	229	393,5	435	217	267	431,5	473	275	338	502,5	544	275	350	514	556
A10VSO 45	–	–	–	–	184	229	413	453	217	267	451	491	275	338	522	562	275	350	534	574
A10VSO 71	–	–	–	–	–	–	–	–	217	267	484	524	275	338	555	595	275	350	567	609
A10VSO 100*	–	–	–	–	–	–	–	–	–	–	–	–	275	338	613	664	275	350	625	679
A10VSO 140*	—		–	–	—		–	–	–	—			–	–	—		275	350	625	688

∗ shaft KB6 or KB7 (spline shaft).

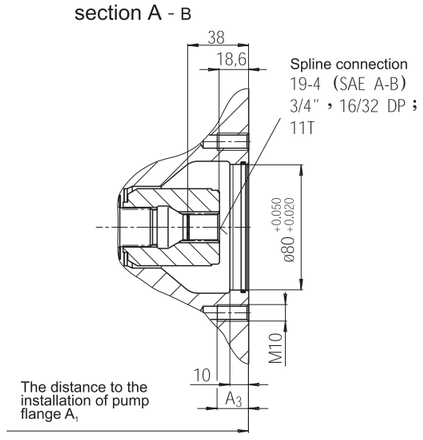
Through drive KB2 and K51 size

Size 28-140, series 31

Flange ISO 80, 2-hole, for mounting an A10VSO 10 pump (splined shaft S) or A10VSO 18 (splined shaft S or R, mounting flange A)
Ordering code KB2

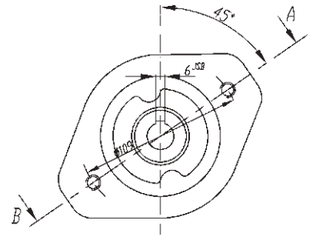


section A - B

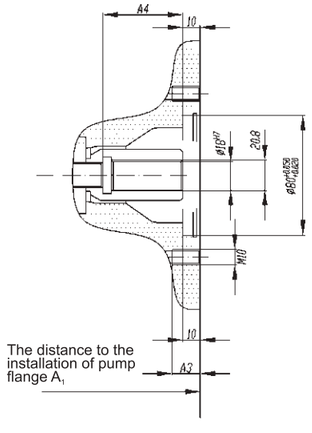


Size	A_1	A_3
18	182	14,5
28	204	16
45	229	16
71	267	20

Flange ISO 80, 2-hole, for mounting an A10VSO 10 pump (splined shaft P, To install A) or A10VSO 18 (splined shaft P, mounting flange A)
Ordering code K51*



section A -B



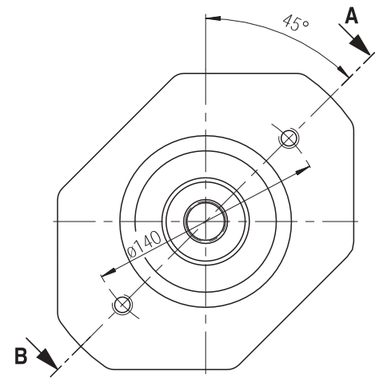
Size	A_1	A_3	A_4
18	182	14,5	33
28	204	16	37
45	229	16	43
71	267	20	51
100	338	20	55
140	350	20	67

∗ cannot be used for new applications, only allowed to drive to reduce the drive shaft torque

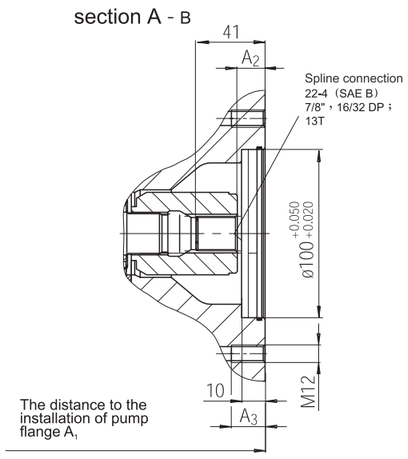
Through drive KB3 and K25 size

Size 28-140, series 31

Flange ISO 100, 2-hole, for mounting an A10VSO 28 pump (splined shaft S or R)
Ordering code KB3

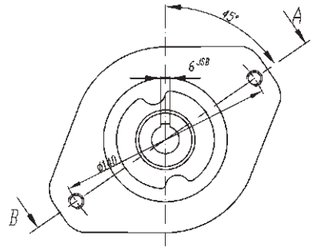


section A - B

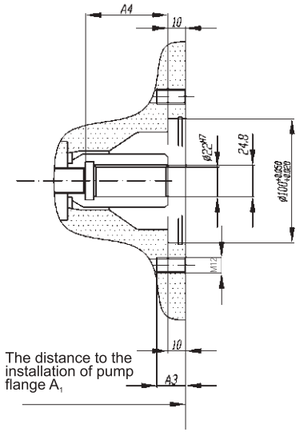


Size	A_1	A_2	A_3
28	204	19,2	14
71	267	16,5	18
100	338	17,6	18
140	350	18,2	24

Flange ISO 100, 2-hole, for mounting an A10VSO 28 pump (splined shaft P)
Ordering code K25*



section A-B

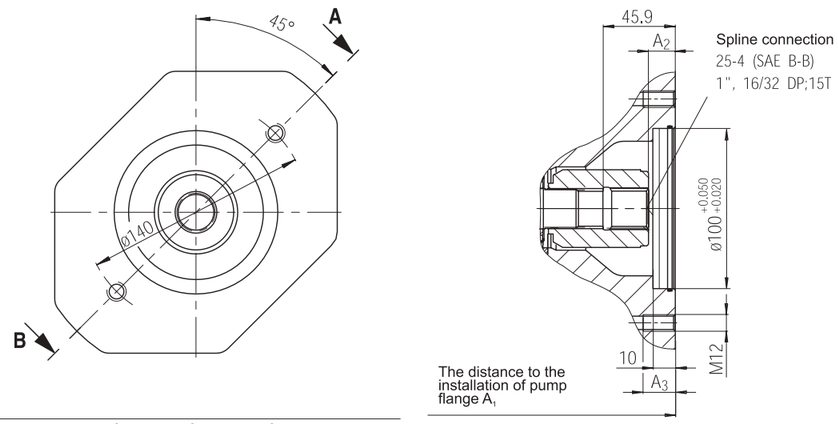


Size	A_1	A_3	A_4
28	204	14	37
45	229	14	43
71	267	23	51
100	338	20	55
140	350	24	62

∗ cannot be used for new applications, only allowed to drive to reduce the drive shaft torque

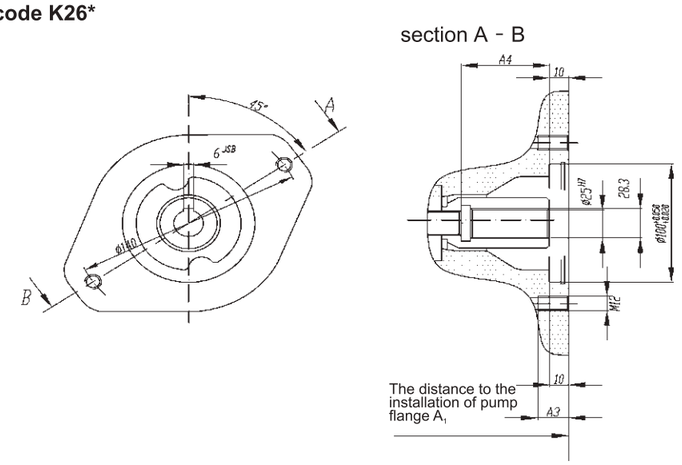
Through drive KB4 and K26 size — Size 28-140, series 31

Flange ISO 100, 2-hole, for mounting an A10VSO 45 pump (splined shaft S or R)
Ordering code KB4



Size	A_1	A_2	A_3
45	229	17.2	14
71	267	17.2	18
100	338	18.2	20
140	350	18.2	24

Flange ISO 100, 2-hole, for mounting an A10VSO 45 pump (splined shaft P)
Ordering code K26*

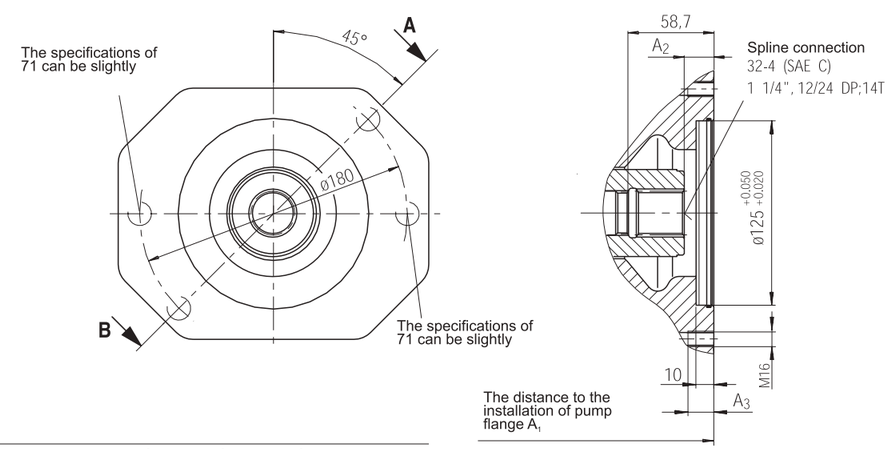


Size	A_1	A_3	A_4
45	229	14	43
71	267	23	51
100	338	20	56
140	350	24	67

* cannot be used for new applications, only allowed to drive to reduce the drive shaft torque

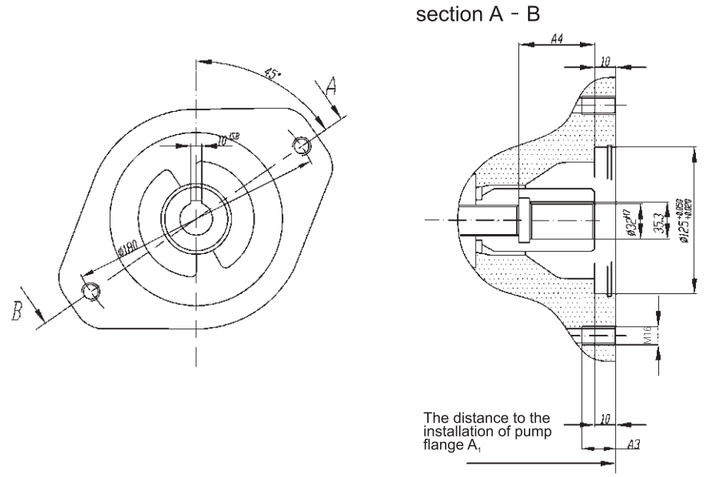
Through drive KB5 and K27 size — Size 28-140, series 31

Flange ISO 125, 2-hole, for mounting an A10VSO 71 pump (splined shaft S or R)
Ordering code KB5



Size	A_1	A_2	A_3
71	267	20	18,5
100	338	20	25
140	350	21	32

Flange ISO 100, 2-hole, for mounting an A10VSO 71 pump (splined shaft P)
Ordering code K27*

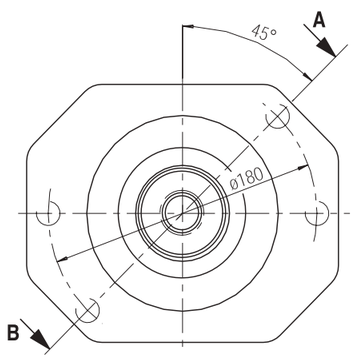


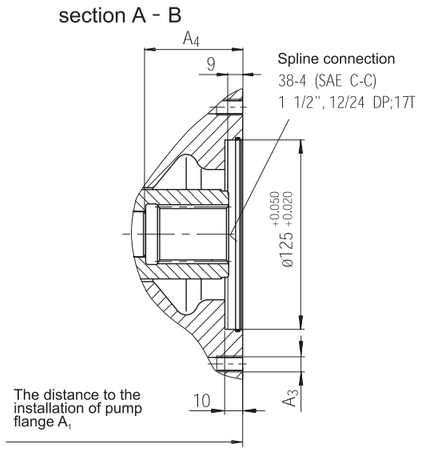
Size	A_1	A_3	A_4
71	267	18	51
100	338	20	54
140	350	24	63

* cannot be used for new applications, only allowed to drive to reduce the drive shaft torque

Through drive KB6 and K37 size — Size 28-140, series 31

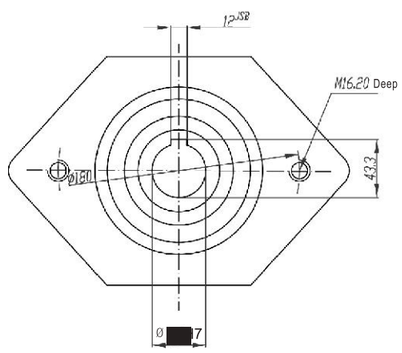
Flange ISO 125, 2-hole, for mounting an A10VSO 100 pump (splined shaft S)
Ordering code KB6

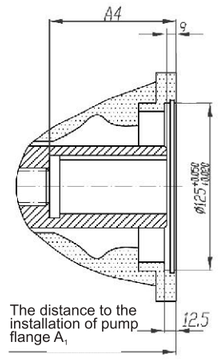




Size	A_1	A_3	A_4
100	338	M16; D 25	65
140	350	M16; D 32	77,3

Flange ISO 125, 2-hole, for mounting an A10VSO 100 pump (splined shaft P)
Ordering code K37*





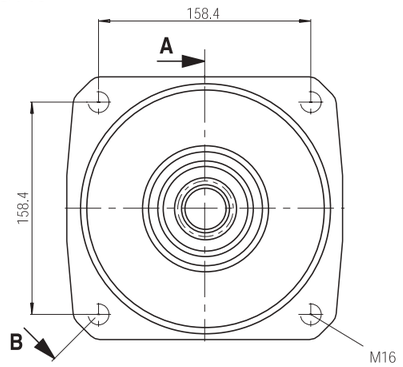
Size	A_1	A_4
100	356	71
140	368	80

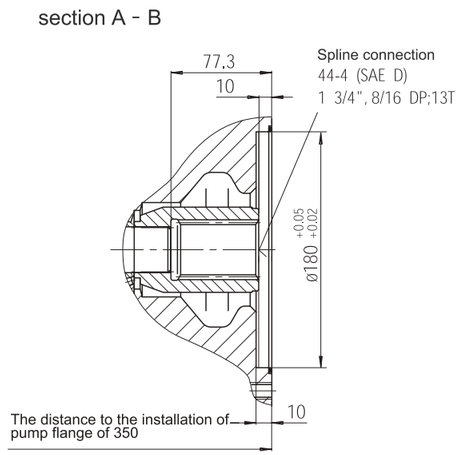
* cannot be used for new applications, only allowed to drive to reduce the drive shaft torque

Through drive KB7 and K59 size — Size 28-140, series 31

Flange ISO 180, 4-hole, for mounting an A10VSO 140 pump (splined shaft S)
Ordering code KB7

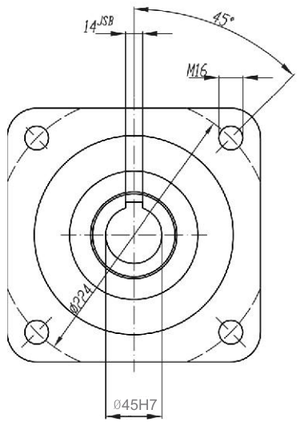
Size NG140

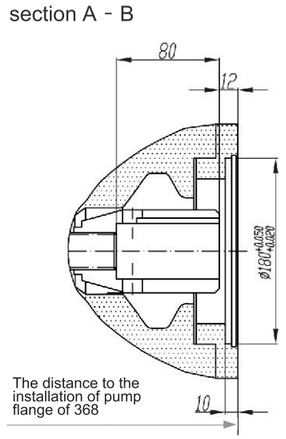




Flange ISO 150, 4-hole, for mounting an A10VSO 140 pump (splined shaft P)
Ordering code K59*

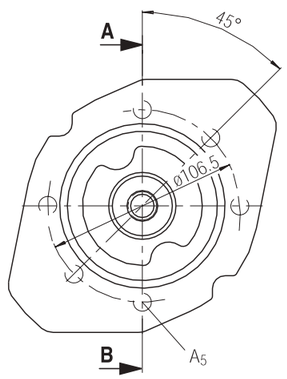
Size NG140

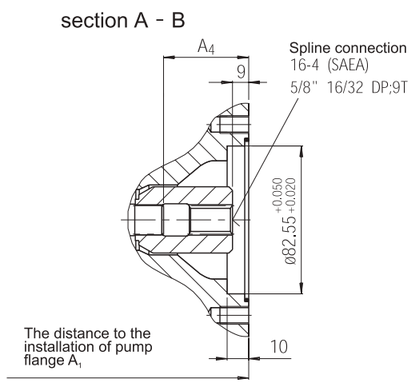




Through drive K01and K52 size — Size 28-140, series 31

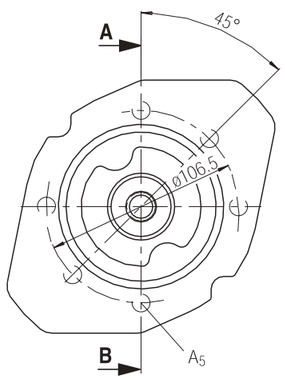
Flange SAE 82-2, (SAE A, 2 holes), used to add external gear pump 1 PF2G2
or internal gear pump PGF2 (see the shaft J, flange U2)
Ordering code K01

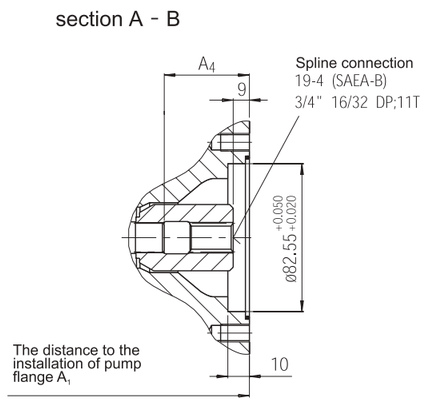




Size	A_1	A_4	A_5
28	204	47	M10;deep16
45	229	53	M10;deep16
71	267	61	M10;deep20
100	338	65	M10;deep20
140	350	77	M10;deep20

Flange SAE 82-2, (SAE A, 2 holes), used to add A10VSO 10 pump (see the shaft S, flange C,)
or A10VSO 18 (see the shaft S, flange C)
Ordering code K52

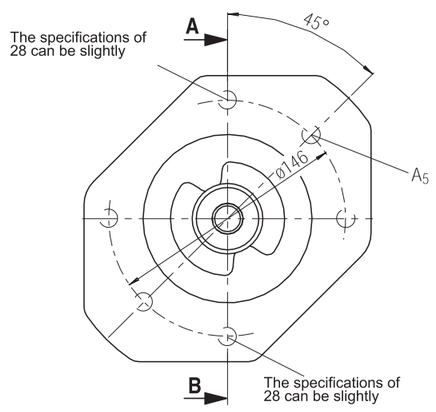


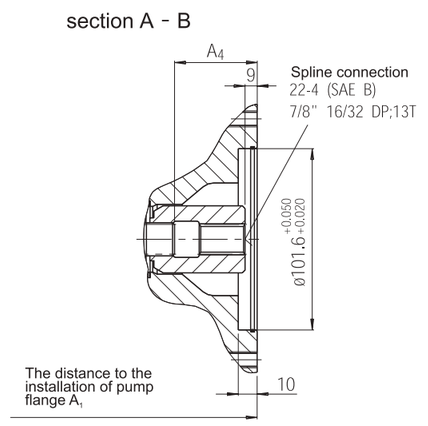


Size	A_1	A_4	A_5
28	206	47,3	M10;deep16
45	229	53,4	M10;deep16
71	267	61,3	M10;deep20
100	338	65	M10;deep20
140	350	77	M10;deep20

Through drive K02 and K68 size — Size 28-140, series 31

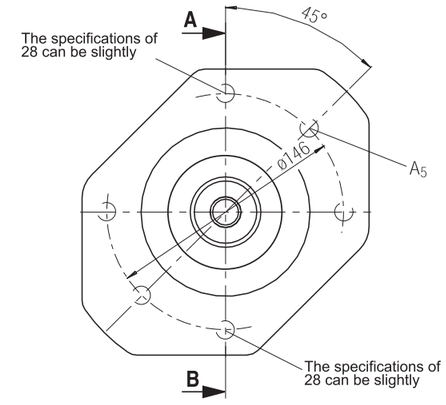
Flange SAE 101-2, (SAE B, 2 holes), used to add external gear pump 1 PF2G3
Ordering code K02

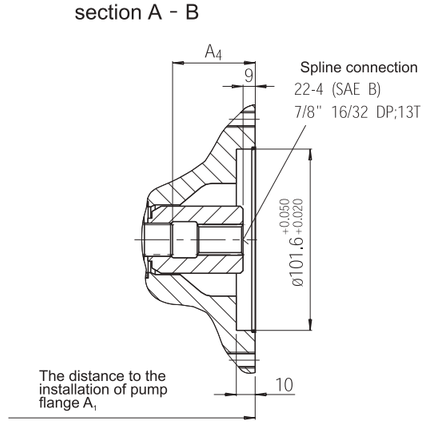




Size	A_1	A_4	A_5
28	204	47	M12;deep15
45	229	53	M12;deep18
71	267	61	M12;deep20
100	338	65	M12;deep20
140	350	77	M12;deep20

Flange SAE 101-2, (SAEB, 2 holes), used to add A10VO 28(shaft S) pump
or internal gear pump PGF3 (see U2 shaft J, flanges, RC, 10213)
Ordering code K68

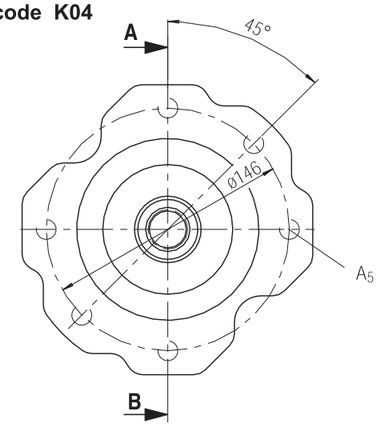




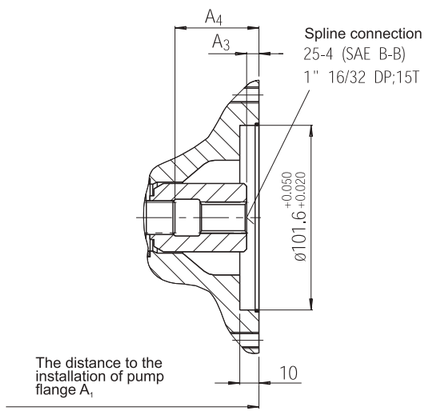
Size	A_1	A_4	A_5
28	204	47	M12;deep15
45	229	53	M12;deep18
71	267	61	M12;deep20
100	338	65	M12;deep20
140	350	80,8	M12;deep20

Through drive K04 and K07 size — Size 28-140, series 31

Flange SAE 101-2, (SAE B, 2 holes), used to add A10VO 45 (shaft S) , or internal gear pump PGH4 (R, flange U2)
Ordering code K04



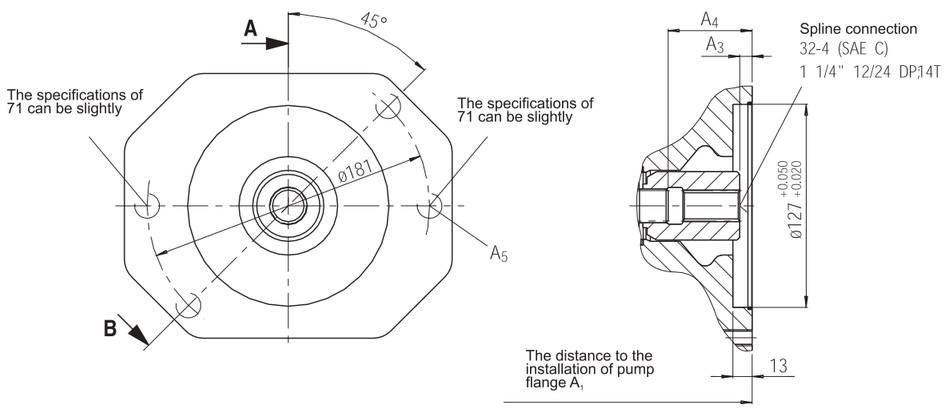
section A - B



Size	A_1	A_3	A_4	A_5
28	204	9	47	M12;deep15
45	229	9	53,4	M12;deep18
71	267	9	61,3	M12;deep20
100	338	10	65	M12;deep20
140	350	8	77,3	M12;deep20

Flange SAE 127-2 C (SAE C) for adding A10VO 71 (shaft S)
Ordering code K07

section A - B

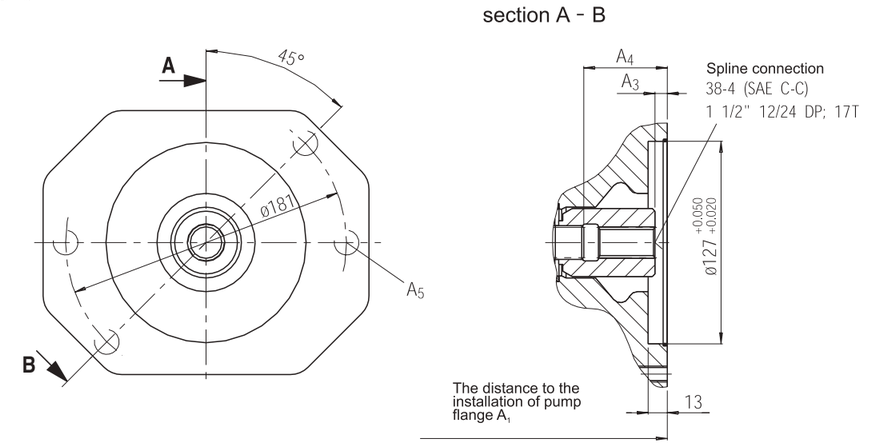


Size	A_1	A_3	A_4	A_5
71	267	10	61,3	M16;deep18
100	339	9	65	M16;deep20

Through drive K24 and K17 size — Size 28-140, series 31

Flange SAE 127-2 (SAE C) for adding A10VSO 100 (shaft S) , or Internal gear pump PGH5
Ordering code K24

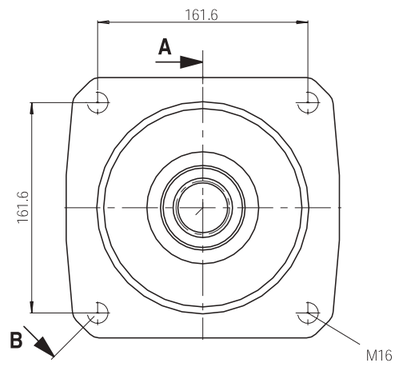
section A - B



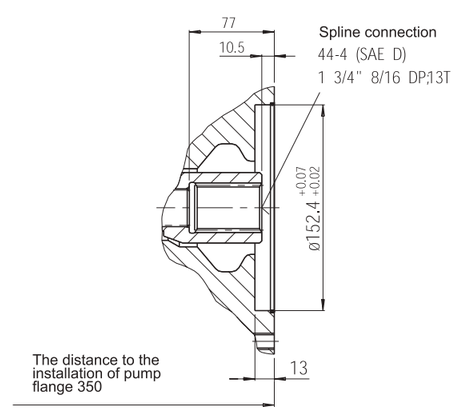
Size	A_1	A_3	A_4	A_5
100	338	8	65	M16;deep20
140	350	9	77,3	M16;deep32

Flange SAE 152-4 (SAE D) for adding A10VSO 140 (shaft S)
Ordering code K17

Size NG140



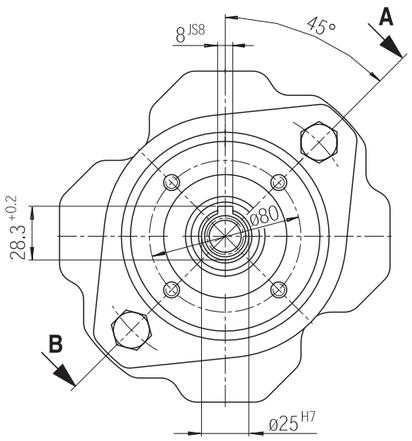
section A - B



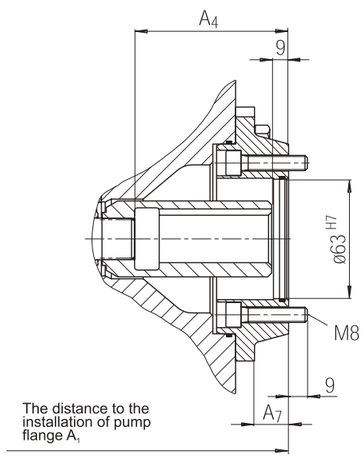
Through drive K57 size

Size 28-140, series 31

Metric flange, 4 hole, used to add the radial piston pump R4
Ordering code K57



section A - B



Size	A_1	A_4	A_7
28	233	47	8
45	258	71,5	8
71	283	68	8
100	354	70,5	8
140	366	84	8