



# 2PBA Series

Hydraulic Piston Pump

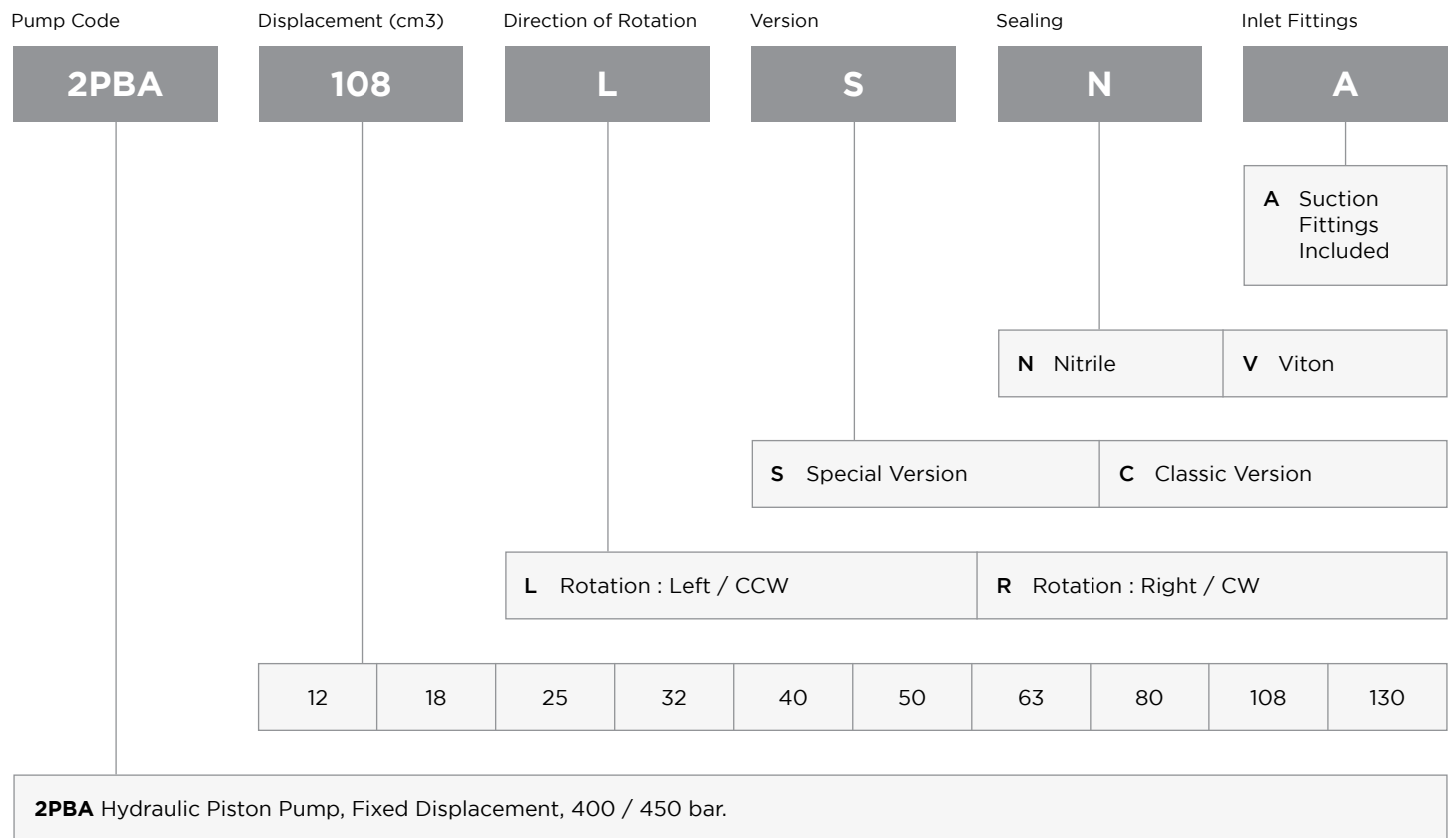


## 2PBA Hydraulic Piston Pump have the following advantages;

- Compact Design,
- Economical Conception,
- High Power Density,
- High Overall Efficiency,
- High Rotating Speeds,
- High Output Pressure,
- 400 bar Cont. Work. Pressure,
- 450 bar Peak Pressure,
- From 12cc to 130cc,
- Reduced Noise Level,
- Increased Reliability,
- No Drain Line Necessary,
- Smaller Installation Dimensions,
- One Piece Pistons with Piston Rings,
- Special Inlet Fittings & Accesories,
- Simple Change of Direction of Rotation

  ISO 9001:2015 - ISO 14001:2015

## Ordering Code of 2PBA Hydraulic Piston Pump



**Special Version; BRONZE EDITION**

Classic Version



Special Version



### Technical Data I

		12	18	25	32	40	50	63	80	108	130
<b>Displacement</b>	<b>cc</b>	12,00	18,00	25,00	32,00	40,20	50,00	63,00	80,00	108,4	130,0
<b>Theoretical oil flow l/min at pump speed</b>	<b>1000 rpm</b>	12,00	18,00	25,00	32,00	40,20	50,00	63,00	80,00	108,4	130,0
	<b>1500 rpm</b>	18,00	27,00	37,50	48,00	60,30	75,00	94,50	120,0	162,6	195,0

<b>Maximum Pump Speed</b>											
- Continuous	<b>rpm</b>	2300	2300	2300	2250	1900	1900	1900	1700	1700	1600
- Limited	<b>rpm</b>	3100	2900	2700	2700	2500	2500	2300	2100	1900	1750
<b>Max. Continuous Pressure</b>	<b>bar</b>	400	400	400	400	400	400	400	400	400	400
<b>Max. Intermit. Peak Pressure</b>	<b>bar</b>	450	450	450	450	450	450	450	450	450	450
<b>Max. Torque at 350 bar</b>	<b>Nm</b>	71	105	146	190	240	292	360	460	620	746

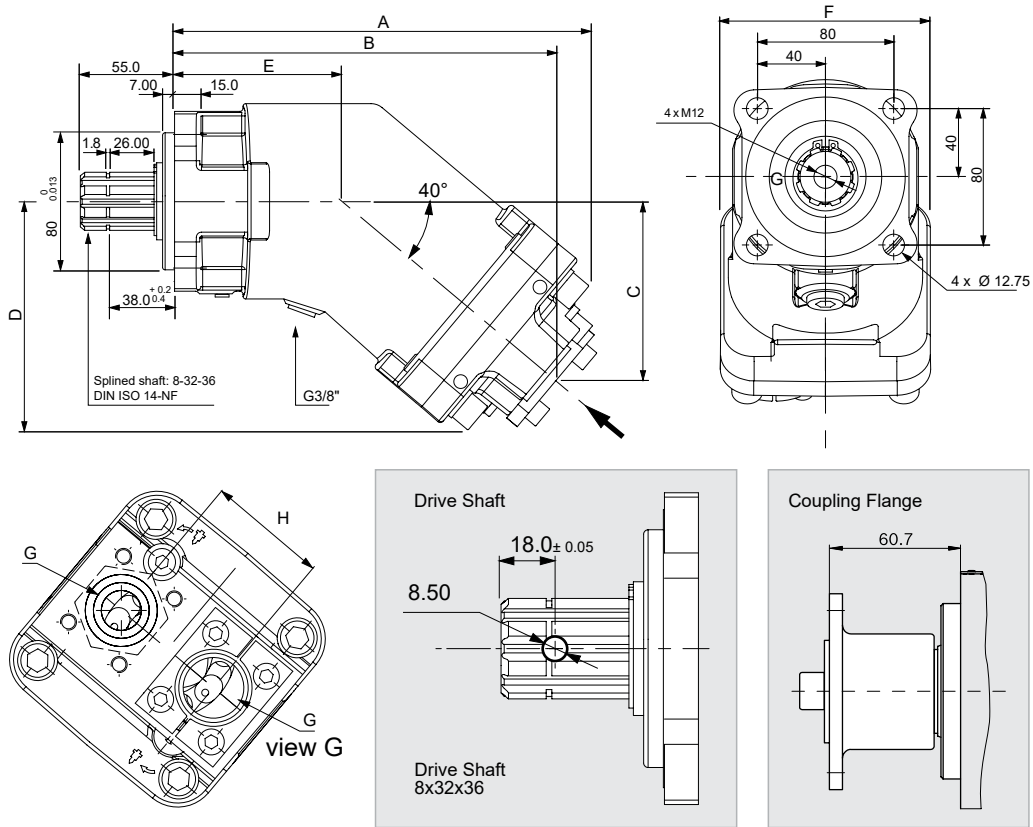
<b>Weight</b>											
- Without inlet fitting	<b>kg</b>	9,00	9,00	9,50	10,50	10,50	11,00	11,50	15,00	15,50	16,50
- With inlet fitting	<b>kg</b>	9,40	9,40	9,90	10,90	10,90	11,40	11,90	15,40	15,90	17,00

<b>Rotation</b>		CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW
<b>Fluid</b>		Mineral Based Hydraulic Oils									
<b>Inlet &amp; Outlet</b>		3/4"	3/4"	3/4"	1"	1"	1"	1"	1"	1"	1"

## 2PBA Series Hydraulic Piston Pump

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### Technical Data II



	12	18	25	32	40	50	63	80	108	130
cc	12,00	18,00	25,00	32,00	40,20	50,00	63,00	80,00	108,4	130,0
A	195,0	195,0	195,0	202,0	202,0	215,0	215,0	242,0	242,0	242,0
B	176,0	176,0	176,0	183,0	183,0	196,0	196,0	221,0	223,0	223,0
C	76,0	76,0	76,0	82,0	82,0	94,0	94,0	104,0	105,0	105,0
D	104,0	104,0	104,0	108,0	108,0	118,0	118,0	132,0	132,0	132,0
E	86,0	86,0	86,0	86,0	86,0	86,0	86,0	98,0	98,0	98,0
F	108,0	108,0	108,0	108,0	108,0	108,0	108,0	122,0	122,0	122,0
G	3/4"	3/4"	3/4"	1"	1"	1"	1"	1"	1"	1"
H	54	54	54	54	54	54	54	60	60	60

## Installation & User Guide

The 2PBA Hydraulic Piston Pump fitted with a rubber front seal.

### INSTALLATION

2PBA Hydraulic Piston Pump are direct mounting on the PTO.

Grease the splined shaft before installation. Do not tap the gear wheel/driver into position.

Remove any mounted screws on the pump.

The 2PBA was delivered with protective covers and plastic/threaded plugs.

It should be removed before of install. Please check seals and surfaces. If sealing or other surfaces damaged please contact your responsible Service Partner.

Start up and run the pump at medium speed (800 to 1000 rpm at the PTO) until the oil flowing out of the pump. ( There are no more air bubbles.)

### OIL SUPPLY

Oil and supply line should be clean, and the supply line is airtight.

### SUCTION LINE

Connect the suction line, tighten the suction connection bolts in diametric pairs.

Connect the pressure line.

### REPAIR

We offers a comprehensive range of services for the repair of our Hydraulic Piston Pump.

Repairs to the 2PBA Hydraulic Piston Pump may only be performed by authorized, skilled and instructed personnel.

Only use original and pre-installed our 2PBA spare parts from supplied to Manufacturer.

Tested and pre-installed 2PBA Hydraulic Piston Pump successful repair requiring only little time.

### SPARE PARTS

The spare parts list and the 2PBA Hydraulic Piston Pump order specific.

When ordering spare parts, quote the material and complete Ordering code number of the 2PBA Hydraulic Piston Pump as well as the right numbers of the spare parts.

### RISK OF DAMAGE!

Do not touch the drive shaft of the 2PBA Hydraulic Piston Pump

Do not touch sensor, valves and fittings

Do not touch sealing surfaces.

Weight												
- Without inlet fitting	kg	9,00	9,00	9,50	10,50	10,50	11,00	11,50	15,00	15,50	16,50	
- With inlet fitting	kg	9,40	9,40	9,90	10,90	10,90	11,40	11,90	15,40	15,90	17,00	

Address all questions regarding spare parts to your responsible Our Service Partner or the technical service department of the manufacture's plant / factory for the 2PBA Hydraulic Piston Pump.

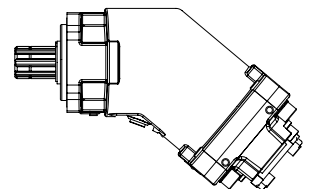
### CELEBI HIDROCEL OTOM. SAN. TIC. LTD. STI.

Fevzicakmak Mh. Aslım Cd. Kobisan San. Sit. H Blok No: 67J

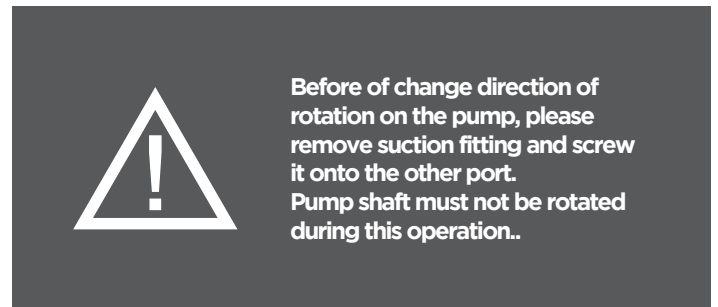
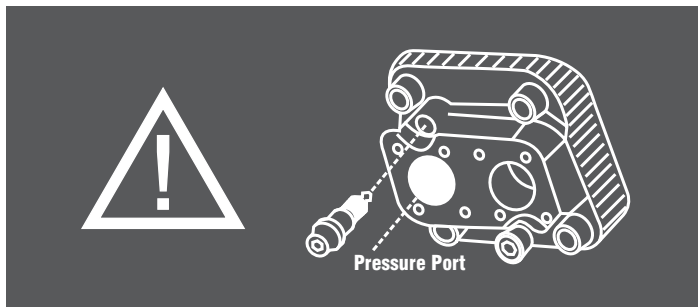
42050 Karatay - Konya / TURKEY

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## Changing the Direction of Rotation



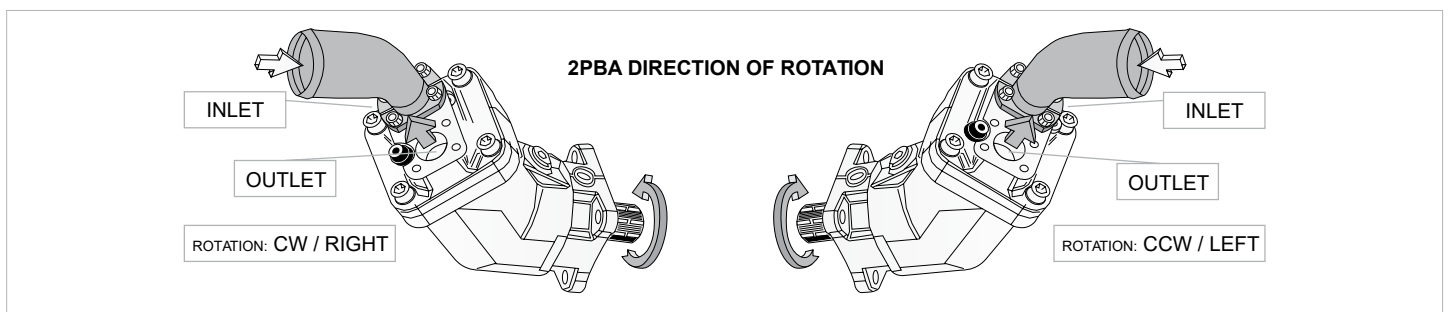
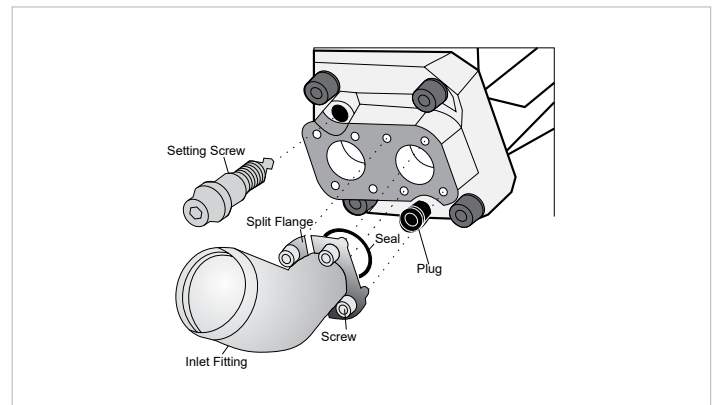
!! CHECK THE ROTATION FROM THE POWER TAKE OFF

!! THE ROTATION DIRECTION OF THE PUMP

Left  
Default delivered.                      Right  
Change rotation.

HOW TO CHANGE ROTATION OF THE 2PBA HYDRAULIC PISTON PUMP;


- » Remove the inlet fitting with split flange,
- » Remove the setting screw,
- » Remove the plug,
  
- » Put the setting screw where the plug was,
- » Put the plug where the setting screw was,
- » Put seal on the inlet fitting, then the inlet fitting on the side where the plug is, and fix with the split flange,
- » Tighten with the screws.



**NOTE I**  
The Inlet Fitting is pre-assembled on delivery and must be tightened to the torque specified for the thread size before installation.

**NOTE II**  
To change the direction of rotation of the 2PBA Hydraulic Piston Pump, you must change the pressure connection from to right port to the left port.

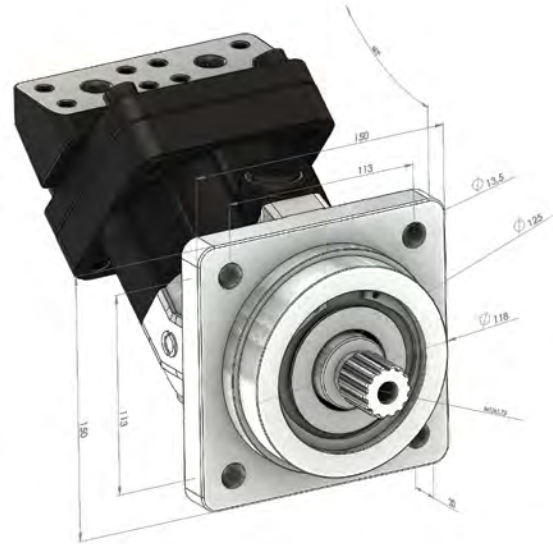
**NOTE III**  
If the pump drive shaft moves while making the change, the 2PBA Hydraulic Piston Pump may be damaged. After unscrewing the pressure connection, do not turn the drive shaft of the pump!

FLUID		
Please check the following recommendations: Mineral oil		
<b>Viscosity</b>	20 to 40 cSt	
<b>Min. viscosity</b>	5 cSt	
<b>Viscosity for correct operation</b>	10 to 400 cSt	
<b>Recommended filtration</b>	10Q absolute class 9 NAS 1638 class 6 SAE class 18/15 ISO	
<b>Max temp.</b>	100 oC	

For detailed information about 2PBA Hydraulic Piston Pump, please contact with Technical Department !!!



# 2PS Series

Hydraulic Piston Pump ISO



## 2PS Hydraulic Piston Pump have the following advantages;

- Compact Design,
- Economical Conception,
- High Power Density,
- High Overall Efficiency,
- High Rotating Speeds,
- High Output Pressure,
- From 12cc to 130cc,
- One Piece Pistons with Piston Rings,
- Special Inlet Fittings & Accesories,
- Simple Change of Direction of Rotation,
- For Industrial & Mobile Market.
- Splined or Keyed Shaft

  ISO 9001:2015 - ISO 14001:2015

## 2PS Series Hydraulic Piston Pump

### Ordering Code of 2PS Hydraulic Piston Pump

Motor Code	Displacement (cm <sup>3</sup> )	Drive Shafts	Mounting Flange	Inlet & Outlet Port	Direction of Rotation	Sealing																																																										
<b>2PS</b>	<b>108</b>	<b>K2</b>	<b>A</b>	<b>12</b>	<b>R</b>	<b>H</b>																																																										
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<b>2PS Hydraulic Piston Pump - ISO, Fixed Displacement.</b>																																																																

## Technical Data

		12	18	25	32	40	50	63	80	108	130
<b>Displacement</b>	cc	12,00	18,00	25,00	32,00	40,20	50,00	63,00	80,00	108,4	130,0
<b>Theoretical oil flow l/min at pump speed</b>	1000 rpm	12,00	18,00	25,00	32,00	40,20	50,00	63,00	80,00	108,4	130,0
	1500 rpm	18,00	27,00	37,50	48,00	60,30	75,00	94,50	120,0	162,6	195,0

<b>Maximum Speed</b>											
- Continuous	rpm	3100	3100	2500	2500	2300	2300	2300	2300	2000	1900
<b>Max. Continuous Pressure</b>	bar	400	400	400	400	400	400	400	400	400	400
<b>Max. Peak Pressure</b>	bar	450	450	450	450	450	450	450	450	450	450
<b>Torque at 350 bar</b>	m.N	66	98	141	174	225	280	350	445	600	726
<b>Max. Flow</b>	l/mn.	37,20	55,80	62,50	80	92,46	115,0	144,9	184,0	216,0	247,0

<b>Weight</b>											
- Without accessories	kg	6,00	6,00	11,50	11,50	11,50	17,50	18,00	22,00	22,50	23,50
- With accessories	kg	6,20	6,20	11,80	11,90	11,90	18,00	18,50	22,50	23,00	24,00

<b>Pump Temperature</b>											
- Minimum	°C	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
- Maximum	°C	110	110	110	110	110	110	110	110	110	110

<b>Rotation</b>		cw,ccw	cw,ccw	cw,ccw	cw,ccw	cw,ccw	cw,ccw	cw,ccw	cw,ccw	cw,ccw	cw,ccw

### Quick Calculation

Q = flow, l/min  
 T = torque, N•m  
 N = power, kW  
 $V_g$  = displacement, ccm/rev  
 n = shaft speed, rpm  
 $\Delta P$  = pressure difference, bar  
 $\eta_v$  = volume efficiency  
 $\eta_{mh}$  = hydraulic mechanical efficiency  
 $\eta_{te} = \eta_v \cdot \eta_{mh}$  = full efficiency coefficient

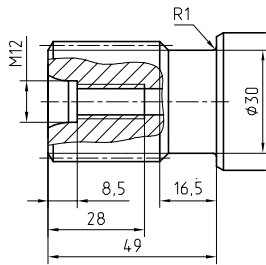
$\text{Flow } Q = \frac{V_g \cdot n \cdot \eta_v}{1000} \text{ l/min}$	$\text{Torque } T = \frac{V_g \cdot \Delta P}{20 \cdot \pi \cdot \eta_{mh}} \text{ N.m}$	$\text{Power } N = \frac{Q \cdot \Delta P}{612 \cdot \eta_t} \text{ kW}$
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## 2PS Series Hydraulic Piston Pump

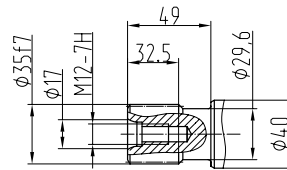
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### Special Shaft Drive & Special Back Cover

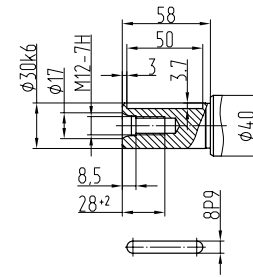
Splined shaft  
35xf7x2x9g GOST 6033-80



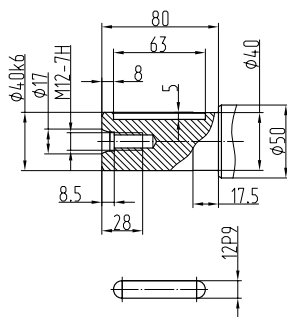
35xf7x2x9g GOST6033



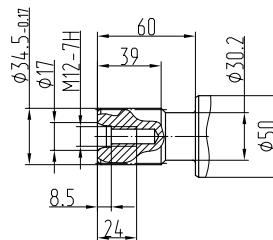
Parallel keyed shafts



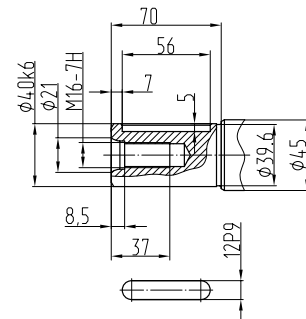
Parallel keyed shafts



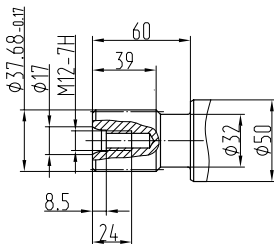
1 3/8' 21T 16/32DP ANSI B92



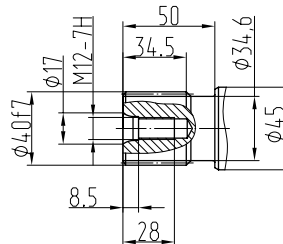
Parallel keyed shafts



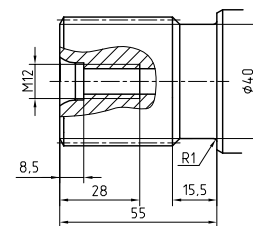
1 1/2' 23T 16/32DP ANSI B92



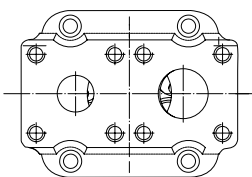
40xf7x2x9g GOST6033



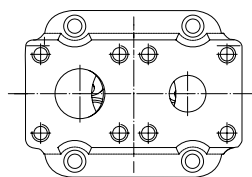
45xh8x2x9g GOST 6033-80



Special Cover / Rotation : LEFT



Special Cover / Rotation : RIGHT

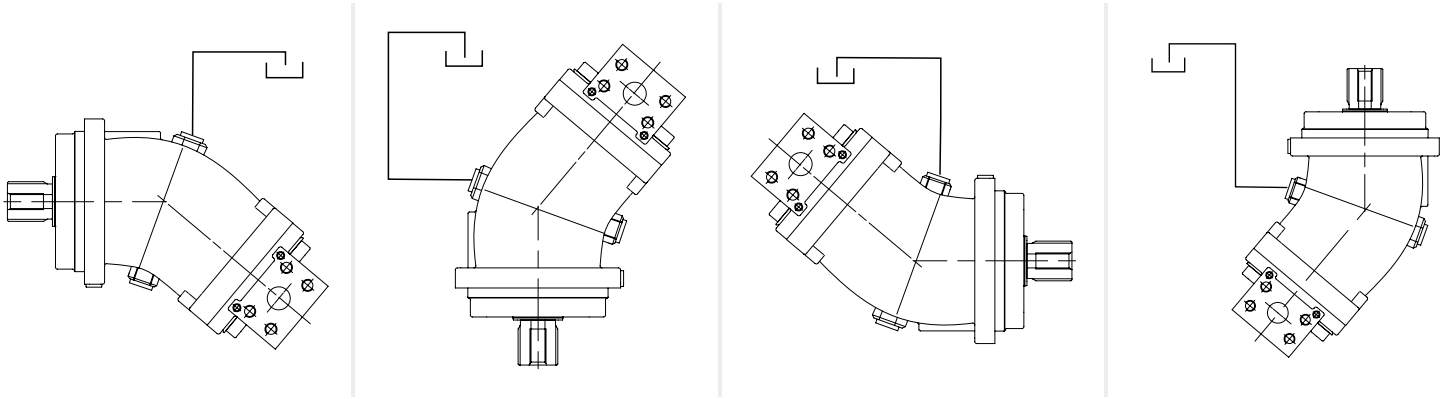


## 2PS Series Hydraulic Piston Pump

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### Installation

The 2PS Pumps can be operate any position.  
See following examples.



#### OIL SUPPLY

Oil and supply line should be clean, and the supply line is airtight.

#### SUCTION LINE

Connect the suction line, tighten the suction connection bolts in diametric pairs.  
Connect the pressure line.

#### REPAIR

We offers a comprehensive range of services for the repair of our Hydraulic Piston Pump.  
Repairs to the 2PS Hydraulic Piston Pump may only be performed by authorized, skilled and instructed personnel.  
Only use original and pre-installed our 2PS spare parts from supplied to Manufacturer..  
Tested and pre-installed 2PS pumps successful repair requiring only little time.

#### SPARE PARTS

The spare parts list and the 2PS pump order specific.  
When ordering spare parts, quote the material and complete Ordering code number of the 2PS Hydraulic Piston Pump as well as the right numbers of the spare parts.

#### RISK OF DAMAGE!

Do not touch the drive shaft of the 2PS Hydraulic Piston Pump  
Do not touch sensor, valves and fittings  
Do not touch sealing surfaces.

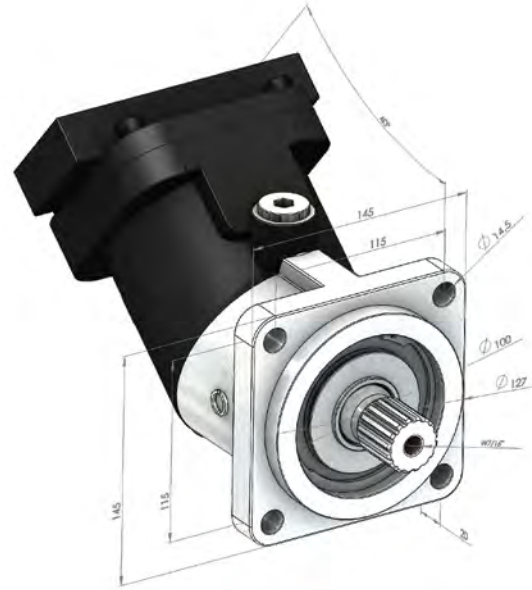
Address all questions regarding spare parts to your responsible Our Service Partner or the technical service department of the manufacture's plant / factory for the 2PS Hydraulic Piston Pump.

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Phone : +90 (332) 345 13 70 - +90 (332) 345 13 71  
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## 2PE Series

Hydraulic Piston Pump SAE

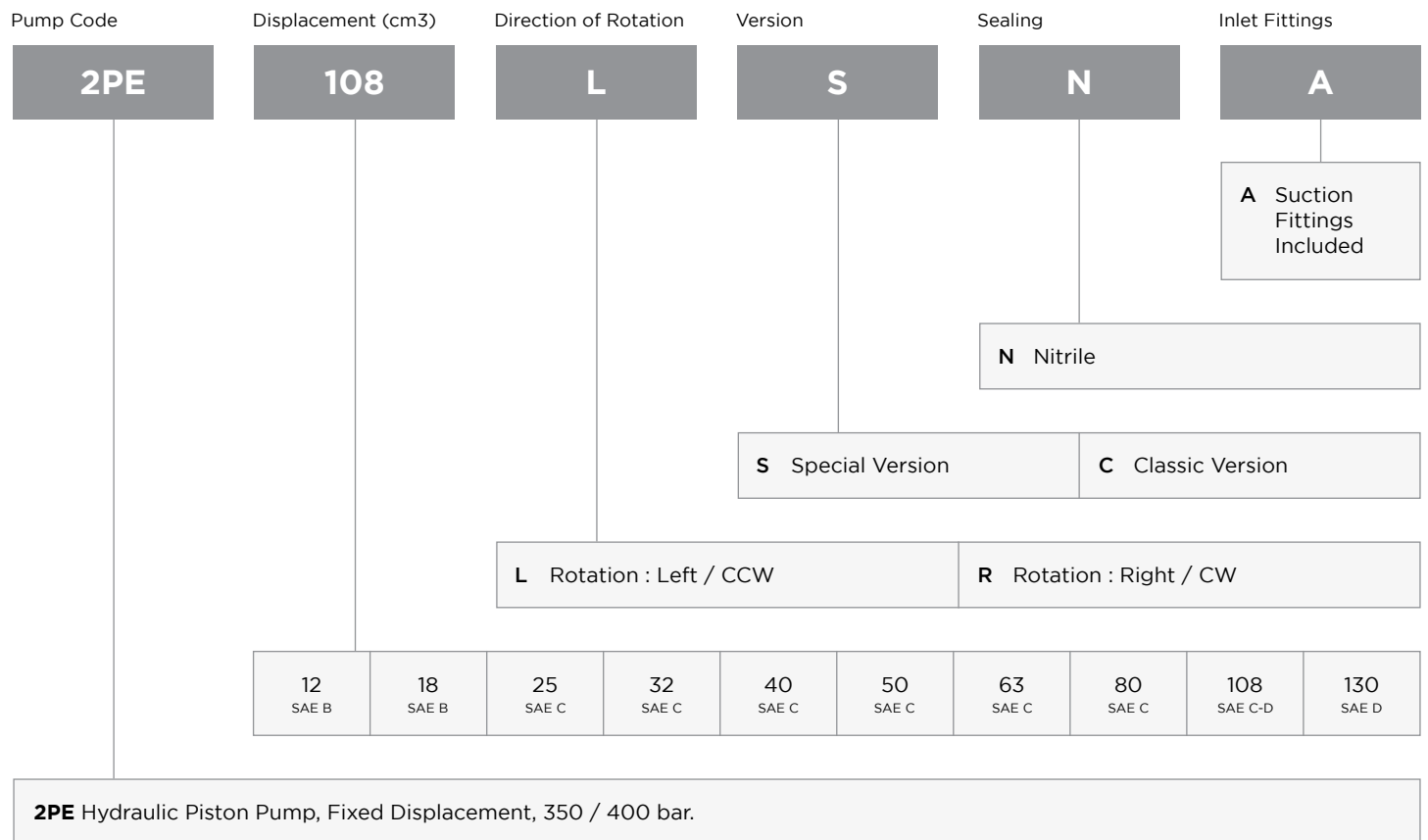


### 2PE Hydraulic Piston Pump have the following advantages;

- Compact Design,
- Economical Conception,
- High Power Density,
- High Overall Efficiency,
- High Rotating Speeds,
- High Output Pressure,
- 350 bar Cont. Work. Pressure,
- 400 bar Peak Pressure,
- From 12cc to 130cc,
- Reduced Noise Level,
- Increased Reliability,
- No Drain Line Necessary,
- Smaller Installation Dimensions,
- One Piece Pistons with Piston Rings,
- Special Inlet Fittings & Accesories,
- Simple Change of Direction of Rotation

  ISO 9001:2015 - ISO 14001:2015

## Ordering Code of 2PE Hydraulic Piston Pump



Special Version; **BLACK COVER, DRIVE SHAFT, MOUNTING FLANGE**

### Technical Data

		12	18	25	32	40	50	63	80	108	130
<b>Displacement</b>	<b>cc</b>	12,00	18,00	25,00	32,00	40,20	50,00	63,00	80,00	108,4	130,0
<b>Theoretical oil flow l/min at pump speed</b>	<b>1000 rpm</b>	12,00	18,00	25,00	32,00	40,20	50,00	63,00	80,00	108,4	130,0
	<b>1500 rpm</b>	18,00	27,00	37,50	48,00	60,30	75,00	94,50	120,0	162,6	195,0

<b>Maximum Pump Speed</b>											
- Continuous	<b>rpm</b>	2300	2300	2300	2250	1900	1900	1900	1700	1700	1600
- Limited	<b>rpm</b>	3100	2900	2700	2700	2500	2500	2300	2100	1900	1750
<b>Max. Continuous Pressure</b>	<b>bar</b>	350	350	350	350	350	350	350	350	350	350
<b>Max. Intermit. Peak Pressure</b>	<b>bar</b>	400	400	400	400	400	400	400	400	400	400
<b>Max. Torque at 350 bar</b>	<b>Nm</b>	71	105	146	190	240	292	360	460	620	746

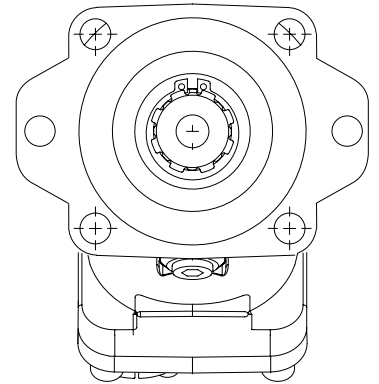
<b>Weight</b>											
- Without inlet fitting	<b>kg</b>	10,00	10,00	10,50	11,50	11,50	1200	12,50	16,00	16,50	21,50
- With inlet fitting	<b>kg</b>	10,40	10,40	10,90	11,90	11,90	12,40	12,90	16,40	16,90	22,00

<b>Rotation</b>		CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW	CW,CCW

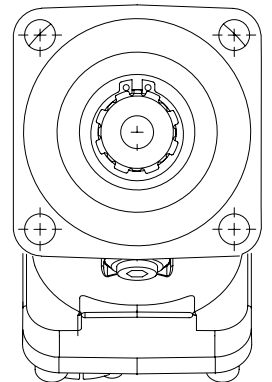
**Special Mounting Flanges**

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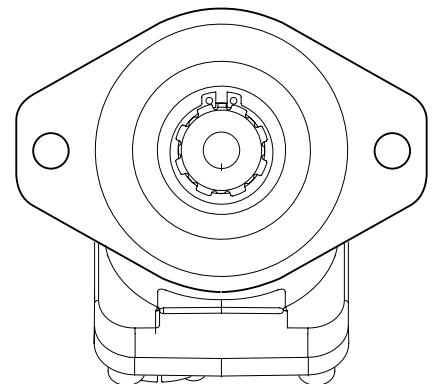
**6 BOLT  
Mounting Flange**



**SAE B4 BOLT  
(SAE J744)**



**SAE B2 BOLT  
(SAE J744)**



### Installation & User Guide

The 2PE Hydraulic Piston Pump fitted with a rubber front seal.

#### INSTALLATION

2PE Hydraulic Piston Pump are direct mounting on the PTO.

Grease the splined shaft before installation. Do not tap the gear wheel/driver into position.

Remove any mounted screws on the pump.

The 2PE was delivered with protective covers and plastic/threaded plugs.

It should be removed before of install. Please check seals and surfaces. If sealing or other surfaces damaged please contact your responsible Service Partner.

Start up and run the pump at medium speed (800 to 1000 rpm at the PTO) until the oil flowing out of the pump. ( There are no more air bubbles.)

#### OIL SUPPLY

Oil and supply line should be clean, and the supply line is airtight.

#### SUCTION LINE

Connect the suction line, tighten the suction connection bolts in diametric pairs.

Connect the pressure line.

#### REPAIR

We offers a comprehensive range of services for the repair of our Hydraulic Piston Pump.

Repairs to the 2PE Hydraulic Piston Pump may only be performed by authorized, skilled and instructed personnel.

Only use original and pre-installed our 2PE spare parts from supplied to Manufacturer.

Tested and pre-installed 2PE Hydraulic Piston Pump successful repair requiring only little time.

#### SPARE PARTS

The spare parts list and the 2PE Hydraulic Piston Pump order specific.

When ordering spare parts, quote the material and complete Ordering code number of the 2PE Hydraulic Piston Pump as well as the right numbers of the spare parts.

#### RISK OF DAMAGE!

Do not touch the drive shaft of the 2PE Hydraulic Piston Pump

Do not touch sensor, valves and fittings

Do not touch sealing surfaces.

Weight												
- Without inlet fitting	kg	10,00	10,00	10,50	11,50	11,50	1200	12,50	16,00	16,50	21,50	
- With inlet fitting	kg	10,40	10,40	10,90	11,90	11,90	12,40	12,90	16,40	16,90	22,00	

Address all questions regarding spare parts to your responsible Our Service Partner or the technical service department of the manufacture's plant / factory for the 2PE Hydraulic Piston Pump.

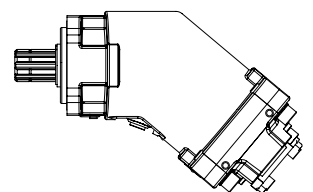
#### CELEBI HIDROCEL OTOM. SAN. TIC. LTD. STI.

Fevzicakmak Mh. Aslım Cd. Kobisan San. Sit. H Blok No: 67J

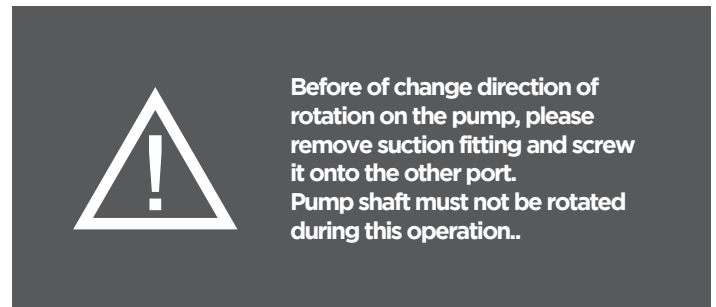
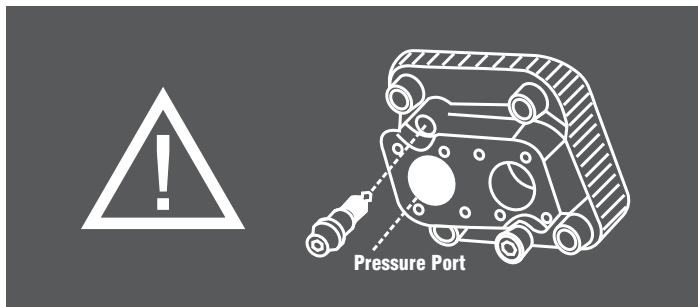
42050 Karatay - Konya / TURKEY

Phone : +90 (332) 345 13 70 - +90 (332) 345 13 71

hidrocel@hidrocel.com.tr



## Changing the Direction of Rotation



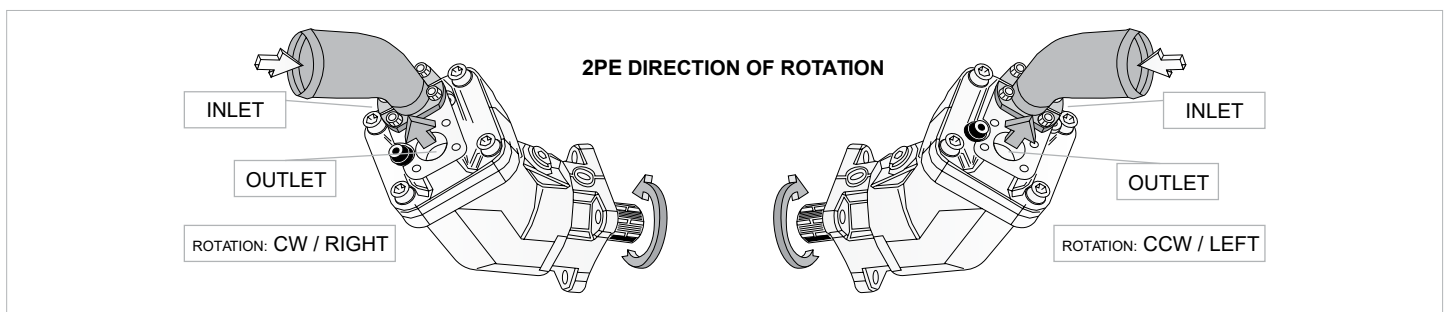
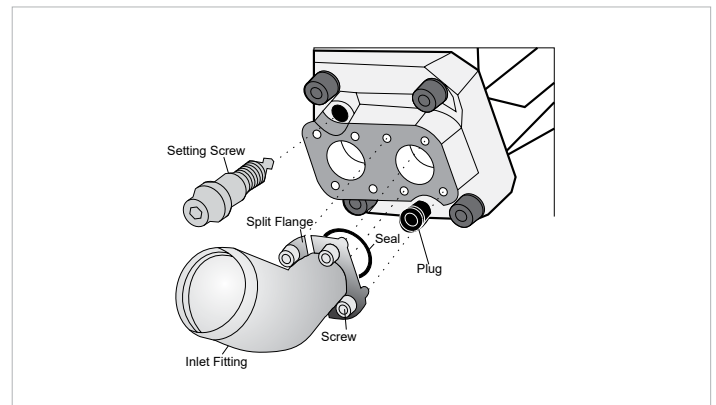
!! CHECK THE ROTATION FROM THE POWER TAKE OFF

!! THE ROTATION DIRECTION OF THE PUMP

Left  
Default delivered.                      Right  
Change rotation.

**HOW TO CHANGE ROTATION OF THE 2PE HYDRAULIC PISTON PUMP;**


- » Remove the inlet fitting with split flange,
- » Remove the setting screw,
- » Remove the plug,
  
- » Put the setting screw where the plug was,
- » Put the plug where the setting screw was,
- » Put seal on the inlet fitting, then the inlet fitting on the side where the plug is, and fix with the split flange,
- » Tighten with the screws.



**NOTE I**  
The Inlet Fitting is pre-assembled on delivery and must be tightened to the torque specified for the thread size before installation.

**NOTE II**  
To change the direction of rotation of the 2PE Hydraulic Piston Pump, you must change the pressure connection from to right port to the left port.

**NOTE III**  
If the pump drive shaft moves while making the change, the 2PE Hydraulic Piston Pump may be damaged. After unscrewing the pressure connection, do not turn the drive shaft of the pump!

FLUID		
Please check the following recommendations: Mineral oil		
<b>Viscosity</b>	20 to 40 cSt	
<b>Min. viscosity</b>	5 cSt	
<b>Viscosity for correct operation</b>	10 to 400 cSt	
<b>Recommended filtration</b>	10Q absolute class 9 NAS 1638 class 6 SAE class 18/15 ISO	
<b>Max temp.</b>	100 oC	

**For detailed information about 2PE Hydraulic Piston Pump, please contact with Technical Department !!!**



## A10V(S)O Series 31

More **Power**, less limits.

- Energy Efficiency,
- Excellent Suction Performance,
- Quiet Operation,
- Flexible Mounting,
- Through-Drive Capability,
- Durability,



# A10V(S)O Series 31

Variable Hydraulic Piston Pump



## A10V(S)O Series 31 – Compact Power, Maximum Flexibility

A proven standard for your open circuit hydraulic systems: A10V(S)O Series 31. This variable displacement pump with swashplate design is the ideal solution for those looking to optimize system costs without compromising on performance.

Considered a benchmark in applications requiring medium and high pressure with a nominal operating pressure of 280 bar, Series 31 offers high power density in a compact housing.

## A10V(S)O Series 31 Variable Hydraulic Piston Pump

### Why A10V(S)O Series 31?

---

- **Energy Efficiency:** Controllers with short response times (DR, DFR, DFL) prevent energy waste by adjusting flow and pressure according to the system's instantaneous needs.
- **Excellent Suction Performance:** The optimized suction line design minimizes the risk of cavitation while ensuring the pump operates with high performance even in cold weather or harsh conditions.
- **Quiet Operation:** Thanks to optimized flow channels, it has one of the lowest noise levels in its class.
- **Flexible Mounting:** The through-drive feature offered as standard simplifies complex systems by allowing additional pumps to be connected in series.
- **Through-Drive Capability:** The A10V(S)O allows for the attachment of gear pumps or another axial piston pump to the rear with 100% torque transmission. This enables the setup of multi-circuit systems via a single drive shaft, saving installation space.
- **Durability:** The high-quality bearing system and reinforced shaft structure offer a long service life and low maintenance costs.

Whether in mobile machinery or your industrial machinery; the A10VO Series 31 guarantees the precision and durability required to keep power under control.

01	02	03	04	05	06	07	08	09	10	11	12	13
	<b>A10V(S)</b>	<b>O</b>			<b>/</b>	<b>31</b>		<b>-</b>	<b>V</b>			

<b>Version</b>										<b>18</b>	<b>28</b>	<b>45</b>	<b>71</b>	<b>88</b>	<b>100</b>	<b>140</b>
<b>01</b>	Standard version (without code)							•	•	•	•	•	•	•		
	High-speed version (external dimensions are the same as the standard version)							-	-	•	•	-	•	•	<b>H</b>	

**Axial piston unit**

<b>02</b>	Swashplate design, variable, nominal pressure 280 bar, maximum pressure 350 bar							•	-	-	-	-	-	-	<b>A10VS</b>
								-	•	•	•	•	•	•	<b>A10V</b>

**Operating mode**

<b>03</b>	Pump, open circuit											<b>O</b>
-----------	--------------------	--	--	--	--	--	--	--	--	--	--	----------

**Size (NG)**

<b>04</b>	Geometric displacement, see table of values on pages 6 and 7							<b>18</b>	<b>28</b>	<b>45</b>	<b>71</b>	<b>88</b>	<b>100</b>	<b>140</b>
-----------	--	--	--	--	--	--	--	-----------	-----------	-----------	-----------	-----------	------------	------------

**Control device**

<b>05</b>	Two-point control, direct operated							•	•	•	•	•	•	•	<b>DG</b>
	Pressure controller	hydraulic					•	•	•	•	•	•	•	<b>DR</b>	
	with flow controller	hydraulic	X-T open				•	•	•	•	•	•	•	<b>DFR</b>	
			X-T plugged with flushing function				•	•	•	•	•	•	•	<b>DFR1</b>	
			X-T plugged without flushing function				•	•	•	•	•	•	•	<b>DRSC</b>	
	with flow and differential pressure control, electrically variable							•	•	•	•	•	•	•	<b>EF<sup>1)</sup></b>
	with pressure cut-off	hydraulic	remote controlled				•	•	•	•	•	•	•	<b>DRG</b>	
			electrical	negative control	U = 12 V		•	•	•	•	•	•	•	•	<b>ED71</b>
		U = 24 V			•	•	•	•	•	•	•	•	•	<b>ED72</b>	
		electrical	positive control	U = 12 V		•	•	•	•	•	•	•	•	<b>ER71</b>	
				U = 24 V		•	•	•	•	•	•	•	•	•	<b>ER72</b>
	Pressure-flow power control							-	•	•	•	•	•	•	<b>DFLR</b>

**Series**

<b>06</b>	Series 3, index 1											<b>31</b>
-----------	-------------------	--	--	--	--	--	--	--	--	--	--	-----------

**Direction of rotation**

<b>07</b>	Viewed on drive shaft		clockwise								<b>R</b>
			counter-clockwise								<b>L</b>

**Sealing material**

<b>08</b>	FKM (fluoroelastomer)											<b>V</b>
-----------	-----------------------	--	--	--	--	--	--	--	--	--	--	----------

**Drive shaft**

<b>09</b>	Splined shaft ANSI B92.1a	standard shaft					•	•	•	•	•	•	•	<b>S</b>
		similar to shaft "S" however for higher input torque					•	•	•	•	•	-	-	<b>R</b>
		reduced diameter, limited suitability for through drive (see table of values, page 9)					•	•	•	•	•	•	○	<b>U</b>
		same as "U", higher torque; limited suitability for through drive (see table of values, page 9)					-	•	•	•	•	•	•	<b>W</b>

**Mounting flange**

<b>10</b>	ISO 3019-1 (SAE)		2-hole				•	•	•	•	•	•	•	<b>S</b>
			4-hole				•	•	•	•	•	-	-	<b>R</b>

01	02	03	04	05	06	07	08	09	10	11	12	13
	<b>A10V(S)</b>	<b>O</b>			<b>/</b>	<b>31</b>		<b>-</b>	<b>V</b>			

**Working port**

				18	28	45	71	88	100	140	
<b>11</b>	SAE flange ports according to J518 Working ports metric	Fastening thread metric; rear	not for through drive	-	•	•	-	-	•	•	<b>11</b>
				-	-	-	•	•	-	-	<b>41</b>
		Fastening thread metric; lateral top bottom	for through drive	•	•	•	-	-	•	•	<b>12</b>
				-	-	-	•	•	-	-	<b>42</b>
	SAE flange ports according to J518 Working ports UNF	Fastening thread UNF; rear	not for through drive	-	•	•	-	-	•	•	<b>61</b>
				-	-	-	•	•	-	-	<b>91</b>
		Fastening thread UNF; lateral top bottom	for through drive	•	•	•	-	-	•	•	<b>62</b>
				-	-	-	•	•	-	-	<b>92</b>

**Through drive**

			18	28	45	71	88	100	140		
<b>12</b>	Flange ISO 3019-1 Diameter	Hub for splined shaft Diameter									
	without through drive		•	•	•	•	•	•	•	<b>N00</b>	
	82-2 (A)	5/8 in	9T 16/32DP	•	•	•	•	•	•	<b>K01</b>	
		3/4 in	11T 16/32DP	•	•	•	•	•	•	<b>K52</b>	
	101-2 (B)	7/8 in	13T 16/32DP	-	•	•	•	•	•	<b>K68</b>	
		1 in	15T 16/32DP	-	-	•	•	•	•	<b>K04</b>	
	127-2 (C)	1 1/4 in	14T 12/24DP	-	-	-	•	•	•	<b>K07</b>	
		1 1/2 in	17T 12/24DP	-	-	-	-	-	•	•	<b>K24</b>
	152-4 (D)	1 3/4 in	13T 8/16DP	-	-	-	-	-	-	•	<b>K17</b>

**Connectors for solenoids**

<b>13</b>	Without connector (without solenoid, with hydraulic control only, without code)	•	•	•	•	•	•	•	
	DEUTSCH - molded connector, 2-pin, without suppressor diode	•	•	•	•	•	•	•	<b>P</b>

• = Available    ◦ = On request    - = Not available

### Hydraulic fluids

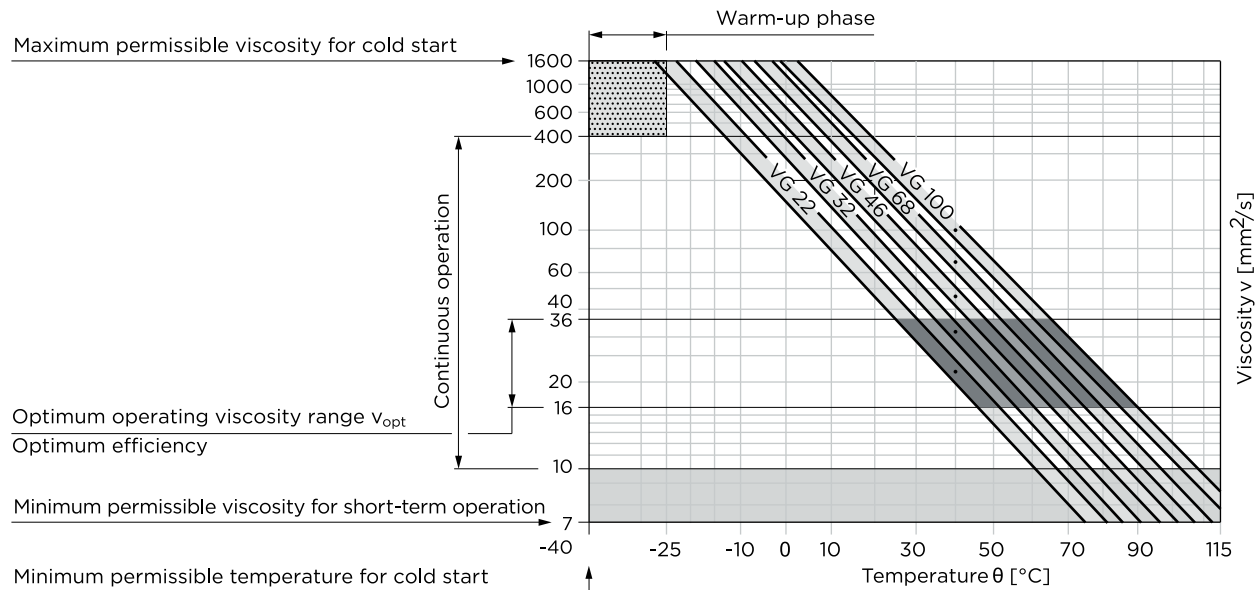
The A10V(S)O variable pump is designed for operation with HLP mineral oil according to DIN 51524. Application instructions and requirements for hydraulic fluids should be taken from the following data sheets before the start of project planning.

### Notes on selection of hydraulic fluid

The hydraulic fluid should be selected such that the operating viscosity in the operating temperature range is within the optimum range (v<sub>opt</sub> see selection diagram).

	Viscosity	Temperature	Comment
Cold start	$v_{max} \leq 1600 \text{ mm}^2/\text{s}$	$\theta_{St} \geq -40 \text{ }^\circ\text{C}$	$t \leq 1 \text{ min}$ , without load ( $p \leq 30 \text{ bar}$ ), $n \leq 1000 \text{ rpm}$
Permissible temperature difference		$\Delta T \leq 25 \text{ K}$	between axial piston unit and hydraulic fluid
Warm-up phase	$v = 1600 \text{ to } 400 \text{ mm}^2/\text{s}$	$\theta = -40 \text{ }^\circ\text{C to } -25 \text{ }^\circ\text{C}$	Note the detailed information on operation with low temperatures, see data sheet 90300-03-B
Continuous operation	$v = 400 \text{ to } 10 \text{ mm}^2/\text{s}$		this corresponds, for VG 46 for example, to a temperature range of $+5 \text{ }^\circ\text{C to } +85 \text{ }^\circ\text{C}$ (see selection diagram)
		$\theta = -25 \text{ }^\circ\text{C to } +110 \text{ }^\circ\text{C}$	measured at port L <sub>1</sub> observe the permissible temperature range of the shaft seal ( $\Delta T = \text{approx. } 5 \text{ K}$ between the bearing/shaft seal and port L <sub>1</sub> )
	$v_{opt} = 36 \text{ to } 16 \text{ mm}^2/\text{s}$		Range of optimum operating viscosity and efficiency
Short-term operation	$v_{min} \geq 7 \text{ mm}^2/\text{s}$		$t < 1 \text{ min}$ , $p < 0.3 \cdot p_{nom}$

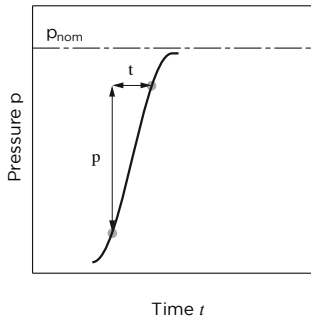
### Selection diagram



**Working pressure range**

Pressure at working port B		Definition
Nominal pressure $p_{nom}$	280 bar	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure $p_{max}$	350 bar	The maximum pressure corresponds to the maximum working pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.
Single operating period	2 ms	
Total operating period	300 h	
Minimum pressure $p_{B abs}$ (high-pressure side)	10 bar	Minimum pressure on the high-pressure side (B) which is required in order to prevent damage to the axial piston unit.
Rate of pressure change $RA_{max}$	16000 bar/s	Maximum permissible speed of pressure build-up and reduction during a pressure change across the entire pressure range.
Pressure at suction port S (inlet)		
Minimum pressure $p_{S min}$ Standard	0.8 bar absolute	Minimum pressure at suction port S (inlet) that is required in order to avoid damage to the axial piston unit. The minimum pressure depends on the rotational speed and displacement of the axial piston unit.
Maximum pressure $p_{S max}$	10 bar absolute	
Leakage pressure at port L, $L_1$		
Maximum pressure $p_{L max}$	2 bar absolute	Maximum 0.5 bar higher than inlet pressure at port S, but not higher than $p_{L max}$ . A case drain line to the reservoir is required.

**Rate of pressure change  $RA_{max}$**

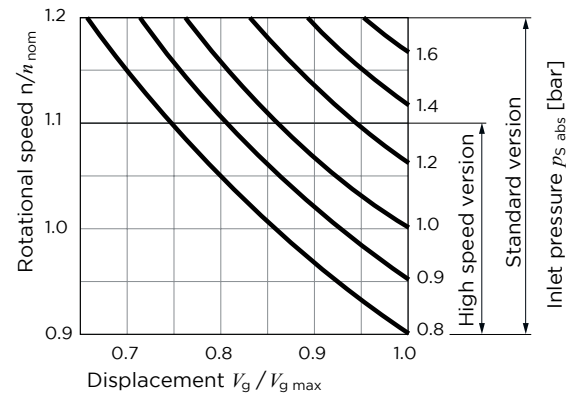
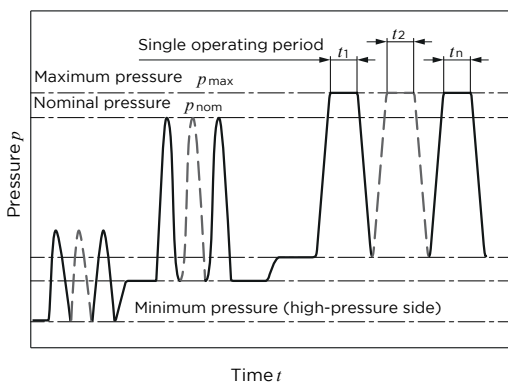


**Notice**

Working pressure range valid when using hydraulic fluids based on mineral oils. Please contact us for values for other hydraulic fluids.

**Minimum permissible inlet pressure at suction port S with speed increase** In order to avoid damage to the pump (cavitation), a minimum inlet pressure must be guaranteed at suction port S. The minimum inlet pressure level depends on the rotational speed and the displacement of the variable pump.

**Pressure definition**



**Technical data, standard unit**

Size	NG		18	28	45	71	88	100	140	
<b>Displacement, geometric, per revolution</b>	$V_g \text{ max}$	cm <sup>3</sup>	18	28	45	71	88	100	140	
<b>Rotational speed maximum)</b>	at $V_g \text{ max}$	$n_{\text{nom}}$	rpm	3300	3000	2600	2200	2100	2000	1800
	at $V_g < V_g \text{ max}^2$ )	$n_{\text{max perm}}$	rpm	3900	3600	3100	2600	2500	2400	2100
<b>Flow</b>	at $n_{\text{nom}}$ and $V_g \text{ max}$	$q_v \text{ max}$	l/min	59	84	117	156	185	200	252
	at $n_E = 1500 \text{ rpm}$ and $V_g \text{ max}$	$q_{vE \text{ max}}$	l/min	27	42	68	107	132	150	210
<b>Power at <math>\Delta p = 280 \text{ bar}</math></b>	at $n_{\text{nom}}$ , $V_g \text{ max}$	$P_{\text{max}}$	kW	28	39	55	73	86	93	118
	at $n_E = 1500 \text{ rpm}$ and $V_g \text{ max}$	$P_{E \text{ max}}$	kW	12.6	20	32	50	62	70	98
<b>Torque at <math>V_g \text{ max}</math> and</b>	$\Delta p = 280 \text{ bar}$	$T_{\text{max}}$	Nm	80	125	200	316	392	445	623
	$\Delta p = 100 \text{ bar}$	$T$	Nm	30	45	72	113	140	159	223
<b>Rotary stiffness of drive shaft</b>	S	$c$	Nm/rad	11087	22317	37500	71884	71884	121142	169437
	R	$c$	Nm/rad	14850	26360	41025	76545	76545	-	-
	U	$c$	Nm/rad	8090	16695	30077	52779	52779	91093	-
	W	$c$	Nm/rad	-	19898	34463	57460	57460	101847	165594
<b>Moment of inertia for rotary group</b>	$J_{\text{rw}}$	kgm <sup>2</sup>	0.00093	0.0017	0.0033	0.0083	0.0083	0.0167	0.0242	
<b>Maximum angular acceleration)</b>	$\alpha$	rad/s <sup>2</sup>	6800	5500	4000	2900	2600	2400	2000	
<b>Case volume</b>	$V$	l	0.4	0.7	1.0	1.6	1.6	2.2	3.0	
<b>Weight without through drive (approx.)</b>	$m$	kg	12.9	18	23.5	35.2	35.2	49.5	65.4	
<b>Weight with through drive (approx.)</b>			13.8	19.3	25.1	38	38	55.4	74.4	

Determining the operating characteristics		
Flow	$q_v = \frac{V_g \times n \times \eta_v}{1000}$	[l/min]
Torque	$q_v = \frac{V_g \times \Delta p}{20 \times \pi \times \eta_{\text{mh}}}$	[Nm]
Power	$q_v = \frac{2 \pi \times T \times \eta}{60000} = \frac{q_v \times \Delta p}{600 \times \eta_t}$	[kW]
<b>Key</b>		
$V_g$ Displacement per revolution [cm <sup>3</sup> ]		
$\Delta p$ Differential pressure [bar]		
$n$ Rotational speed [rpm]		
$\eta_v$ Volumetric efficiency		
$\eta_{\text{mh}}$ Hydraulic-mechanical efficiency		
$\eta_t$ Total efficiency ( $\eta_t = \eta_v \times \eta_{\text{mh}}$ )		

**Notice**

» Theoretical values, without efficiency and tolerances; values rounded

» Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit.





## A10V(S)O Series 52 & 53

More **Power**, less limits.

- Superior Power-to-Weight Ratio,
- Advanced Suction Capability,
- Rapid Control Response,
- Low Noise Levels,
- System Flexibility,



# A10V(S)O Series 52 & 53

Variable Hydraulic Piston Pump



## A10V(S)O Series 52 & 53 – Compact Power, Maximum Flexibility

In modern machine design, performance, speed, and space management require a critical balance. The A10V(S)O Series 52 and 53 are axial piston variable displacement pumps optimized to provide this balance in open-circuit hydraulic systems. Developed with advanced swashplate technology, these series set the standard in applications where installation space is limited but high response speed is essential.

**Engineering and Operational Advantages** The A10V(S)O series precisely manages flow rate in perfect harmony with drive speed and displacement. The variable displacement mechanism minimizes energy losses by accurately adjusting the flow according to the instantaneous demand of the system.

## A10V(S)O Series 52 & 53 Variable Hydraulic Piston Pump

### Why A10V(S)O Series 52 & 53?

---

- **Superior Power-to-Weight Ratio:** Thanks to their optimized housing designs, Series 52 and 53 are among the lightest and most compact solutions in their segment. This advantage facilitates installation and contributes to significant fuel savings in mobile vehicles.
- **Advanced Suction Capability:** Specialized port designs and rotating group geometry allow the pump to exhibit stable suction performance even at high speeds, staying well clear of cavitation risks.
- **Rapid Control Response:** A wide range of controller options—including pressure, flow, and power control (such as Load Sensing)—responds to sudden load changes within milliseconds, enhancing both operational safety and overall efficiency.
- **Low Noise Levels:** Through integrated noise-damping technology within the flow channels, these pumps maintain maximum operator comfort, particularly in installations close to the cabin.
- **System Flexibility:** The through-drive capability allows for multiple pump configurations from a single drive point, reducing the complexity of the hydraulic circuit and saving valuable space.

Application Areas The A10V(S)O Series 52/53 is a reliable, long-lasting, and economical power source for all open-circuit systems requiring high rotational speeds and compact dimensions, such as agricultural machinery, compact construction equipment, and municipal service vehicles.

01	02	03	04	05	06	07	08	09	10	11	12	13
A10V(S)	O		/	52	-		V					

**Axial piston unit**
**10 28 45 60 85**

01	Swashplate design, variable, nominal pressure 250 bar, maximum pressure 315 bar	•	-	-	-	-	A10VS
		-	•	•	•	•	A10V

**Operation mode**

02	Pump, open circuit	O
----	--------------------	---

**Size (NG)**

03	Geometric displacement, see table of values on page 10	10	28	45	60	85
----	--	----	----	----	----	----

**Control devices**

04	Pressure controller with flow controller	hydraulic	hydraulic		•	•	•	•	•	DR
			X-T open		•	•	•	•	•	DFR
			X-T plugged with flushing function		•	•	•	•	•	DFR1
			X-T plugged without flushing function		-	•	•	•	•	DRSC
	with pressure cut-off	hydraulic	remotely operated		•	•	•	•	•	DRG
			electric	negative control	U = 12 V	-	•	•	•	•
		U = 24 V			-	•	•	•	•	ED72
		electric	positive control	U = 12 V	-	•	•	•	•	ER71
				U = 24 V	-	•	•	•	•	ER72
		Pressure-flow power control		electric control (negative control)		-	o	o	o	•

**Series**
**10 28 45 60 85**

05	Series 5, Index 2	•	•	•	•	•	52
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**Direction of rotation**

06	View on drive shaft	clockwise	R
		counter-clockwise	L

**Sealing material**

07	FKM (fluor-caoutchouc)	V
----	------------------------	---

**Drive shaft**

08	Splined shaft ANSI B92.1a	standard shaft		•	•	•	•	•	S
		similar to shaft "S" however for higher input torque		-	•	•	•	•	R
		reduced diameter, limited suitability for through drive		•	•	•	•	•	U
		similar to shaft "U", however for higher torque		-	•	•	•	•	W
	Parallel keyed shaft DIN 6885 limited suitability for through drive		•	-	-	-	-	P	

**Mounting flange**

09	ISO 3019-2 (ISO)	2-hole	•	-	-	-	-	A
	ISO 3019-1 (SAE)	2-hole	•	•	•	•	•	C
		4-hole	-	-	-	•	-	D

01	02	03	04	05	06	07	08	09	10	11	12	13
A10V(S)	O		/	52		-	V					

**Working port**

									10	28	45	60	85	
10	SAE flange port fastening thread, metric	rear	not for through drive	-	•	•	•	•						11
		at side, opposite	for through drive	-	•	•	•	•						12
		at side, offset 90°	not for through drive; available only for counter-clockwise direction of rotation	-	-	•	-	-						13
	Threaded port, metric	rear	not for through drive	•	-	-	-	-						14

**Through drive**

11	Flange ISO 3019-1 Diameter	Hub for splined shaft Diameter												
	without through drive				•	•	•	•	•					N00
	82-2 (A)	5/8 in	9T 16/32DP	-	•	•	•	•	•					K01
		3/4 in	11T 16/32DP	-	•	•	•	•	•					K52
	101-2 (B)	7/8 in	13T 16/32DP	-	•	•	•	•	•					K68
		1 in	15T 16/32DP	-	-	•	•	•	•					K04
	127-4 (C)	1 1/4 in	14T 12/24DP	-	-	-	•	•	•					K15
		1 1/2 in	17T 12/24DP	-	-	-	-	•	•					K16
	127-2 (C)	1 1/4 in	14T12/24DP	-	-	-	-	•	•					K07
		1 1/2 in	17T 12/24DP	-	-	-	-	•	•					K24

**Connectors for solenoids**

12	Without connector (without solenoid, with hydraulic control only, without code)	•	•	•	•	•							
	DEUTSCH - molded connector, 2-pin - without suppressor diode (for electric controls)	-	•	•	•	•							P

• = Available    ◦ = On request    - = Not available

01	02	03	04	05	06	07	08	09	10	11	12	13
A10V	O		/	53	-		V					

**Axial piston unit**

18 28 45 63 72 85 100

01	Swashplate design, variable, nominal pressure 250 bar, maximum pressure 315 bar			-	•	•	•	•	A10V
----	---	--	--	---	---	---	---	---	------

**Operation mode**

02	Pump, open circuit								O
----	--------------------	--	--	--	--	--	--	--	---

**Size (NG)**

03	Geometric displacement, see table of values on page 10	18	28	45	63	72	85	100
----	--	----	----	----	----	----	----	-----

**Control devices**

04	Pressure controller	hydraulic		•	•	•	•	•	•	DR		
	with flow controller	hydraulic	X-T open	•	•	•	•	•	•	DRF		
			X-T plugged with flushing function	•	•	•	•	•	•	DRS		
			X-T plugged without flushing function	•	•	•	•	•	•	DRSC		
			with pressure cut-off	hydraulic	remotely operated	•	•	•	•	•	•	DRG
	with pressure cut-off	electric	negative control	U = 12 V	-	•	-	•	•	•	ED71	
				U = 24 V	-	•	-	•	•	•	ED72	
		electric	positive control	U = 12 V	-	•	-	•	•	•	ER71	
				U = 24 V	-	•	-	•	•	•	ER72	
	Pressure-flow power control		electric control (negative control)	○	○	○	○	○	•	•	EF..	
	Power control with pressure cut-off	hydraulic	start of control from	10 to 35 bar	•	•	•	•	•	•	•	LA5D
				36 to 70 bar	•	•	•	•	•	•	•	LA6D
				71 to 105 bar	•	•	•	•	•	•	•	LA7D
				106 to 140 bar	•	•	•	•	•	•	•	LA8D
				141 to 230 bar	•	•	•	•	•	•	•	LA9D
	remotely operated	hydraulic	start of control	see LA.D	•	•	•	•	•	•	LA.DG	
	flow control, X-T plugged	hydraulic	start of control	see LA.D	•	•	•	•	•	•	•	LA.DS
		electrically overridable (negative control)	start of control	see LA.D	•	•	•	•	•	•	•	LA.S
	Electro-proportional control		positive control									
	with pressure control			U = 12 V	•	•	•	•	•	•	•	EP1D
U = 24 V				•	•	•	•	•	•	•	EP2D	
with pressure and flow control (load-sensing)		X-T open	U = 12 V	•	•	•	•	•	•	•	EP1DF	
			U = 24 V	•	•	•	•	•	•	•	EP2DF	
with pressure and flow control (load-sensing)		X-T plugged	U = 12 V	•	•	•	•	•	•	•	EP1DS	
			U = 24 V	•	•	•	•	•	•	•	EP2DS	
with electro-hydraulic pressure control			U = 12 V	•	•	•	•	•	•	•	EP1ED	
			U = 24 V	•	•	•	•	•	•	•	EP2ED	

01	02	03	04	05	06	07	08	09	10	11	12	13
A10V	O		/	53		-		V				

**Control devices**

18 28 45 63 72 85 100

04	Electro-proportional control	positive control										
	with pressure control		U = 12 V	•	•	•	•	•	•	•	•	EK1D
			U = 24 V	•	•	•	•	•	•	•	•	EK2D
	with pressure and flow control (load-sensing)	X-T open	U = 12 V	•	•	•	•	•	•	•	•	EK1DF
			U = 24 V	•	•	•	•	•	•	•	•	EP2DF
	with pressure and flow control (load-sensing)	X-T plugged	U = 12 V	•	•	•	•	•	•	•	•	EP1DS
			U = 24 V	•	•	•	•	•	•	•	•	EP2DS
	electro-hydraulic pressure control with controller cut-off		U = 12 V	•	•	•	•	•	•	•	•	EP1ED
U = 24 V			•	•	•	•	•	•	•	•	EP2ED	

**Series**

05	Series 5, index 3	•	•	•	•	•	•	•	•	•	•	53
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**Direction of rotation**

06	View on drive shaft	clockwise										R
		counter-clockwise										L

**Sealing material**

07	FKM (fluor-caoutchouc)											V
----	------------------------	--	--	--	--	--	--	--	--	--	--	---

**Drive shaft**

08	Splined shaft ANSI B92.1a	standard shaft	•	•	•	•	•	•	•	•	•	S
		similar to shaft "S" however for higher input torque	•	•	•	•	•	•	•	•	•	R
		reduced diameter, limited suitability for through drive	•	•	•	•	•	•	•	•	•	U
		similar to shaft "U", however for higher torque	-	•	•	•	•	•	•	•	•	W

**Mounting flange**

09	ISO 3019-1 (SAE)	2-hole	•	•	•	•	•	•	•	•	•	C
		4-hole	-	-	-	•	•	•	•	•	•	D

**Working port**

10	SAE flange port fastening thread, metric	rear	not for through drive	•	•	•	•	•	•	•	•	11
		at side, opposite	for through drive	•	•	•	•	•	•	•	•	12
		at side, offset 90°	not for through drive; available only for counter-clockwise direction of rotation	-	-	•	-	-	-	-	-	13

01	02	03	04	05	06	07	08	09	10	11	12	13
<b>A10V</b>	<b>O</b>			<b>/</b>	<b>53</b>		<b>-</b>	<b>V</b>				

**Through drive**

11	Flange ISO 3019-1 Diameter	Hub for splined shaft Diameter								
			18	28	45	63	72	85	100	
	without through drive		•	•	•	•	•	•	•	N00
82-2 (A)	5/8 in	9T 16/32DP	•	•	•	•	•	•	•	K01
		11T 16/32DP	•	•	•	•	•	•	•	K52
101-2 (B)	7/8 in	13T 16/32DP	-	•	•	•	•	•	•	K68
	1 in	15T 16/32DP	-	-	•	•	•	•	•	K04
127-4 (C)	1 1/4 in	14T 12/24DP	-	-	-	•	•	•	•	K15
	1 1/2 in	17T 12/24DP	-	-	-	-	-	•	•	K16
127-2 (C)	1 1/4 in	14T12/24DP	-	-	-	-	-	•	•	K07
	1 1/2 in	17T 12/24DP	-	-	-	-	-	•	•	K24

**Connectors for solenoids**

12	Without connector (without solenoid, with hydraulic control only, without code)	•	•	•	•	•	•	•	
	DEUTSCH - molded connector, 2-pin - without suppressor diode (for electric controls)	•	•	•	•	•	•	•	P

• = Available    ◦ = On request    - = Not available

### Hydraulic fluids

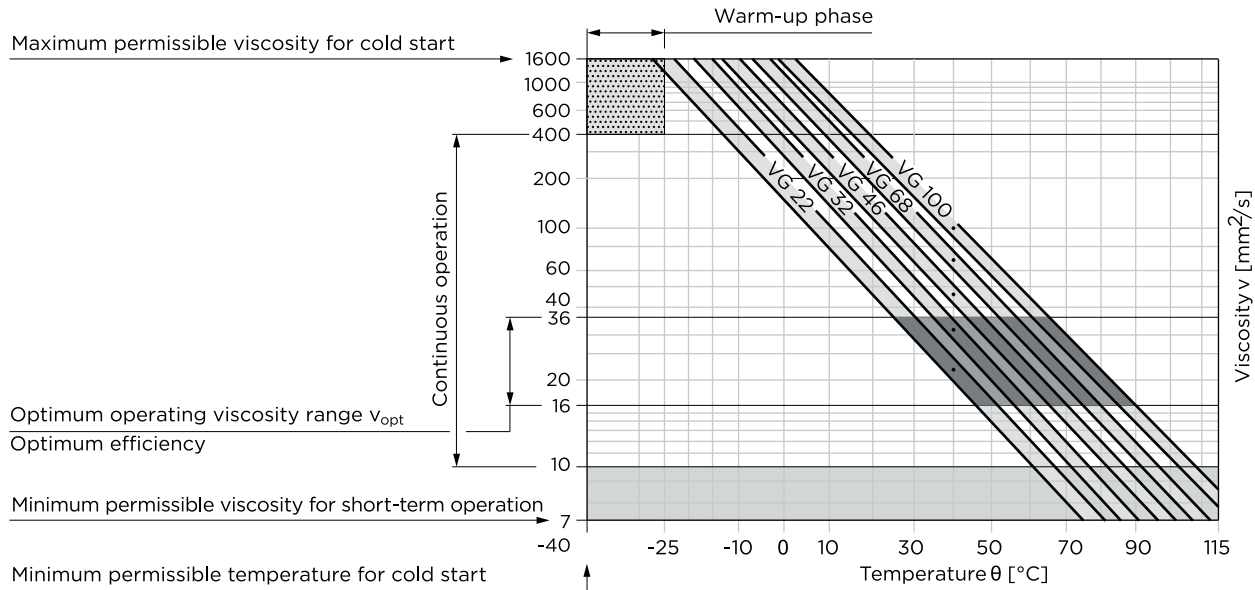
The A10V(S)O variable pump is designed for operation with HLP mineral oil according to DIN 51524. Application instructions and requirements for hydraulic fluids should be taken from the following data sheets before the start of project planning.

### Notes on selection of hydraulic fluid

The hydraulic fluid should be selected such that the operating viscosity in the operating temperature range is within the optimum range (v<sub>opt</sub> see selection diagram).

	Viscosity	Temperature	Comment
Cold start	$v_{max} \leq 1600 \text{ mm}^2/\text{s}$	$\theta_{St} \geq -40 \text{ }^\circ\text{C}$	$t \leq 1 \text{ min}$ , without load ( $p \leq 30 \text{ bar}$ ), $n \leq 1000 \text{ rpm}$
Permissible temperature difference		$\Delta T \leq 25 \text{ K}$	between axial piston unit and hydraulic fluid
Warm-up phase	$v = 1600 \text{ to } 400 \text{ mm}^2/\text{s}$	$\theta = -40 \text{ }^\circ\text{C} \text{ to } -25 \text{ }^\circ\text{C}$	Note the detailed information on operation with low temperatures, see data sheet 90300-03-B
Continuous operation	$v = 400 \text{ to } 10 \text{ mm}^2/\text{s}$		this corresponds, for VG 46 for example, to a temperature range of $+5 \text{ }^\circ\text{C}$ to $+85 \text{ }^\circ\text{C}$ (see selection diagram)
		$\theta = -25 \text{ }^\circ\text{C} \text{ to } +110 \text{ }^\circ\text{C}$	measured at port L, observe the permissible temperature range of the shaft seal ( $\Delta T = \text{approx. } 5 \text{ K}$ between the bearing/shaft seal and port L)
	$v_{opt} = 36 \text{ to } 16 \text{ mm}^2/\text{s}$		Range of optimum operating viscosity and efficiency
Short-term operation	$v_{min} \geq 7 \text{ mm}^2/\text{s}$		$t < 1 \text{ min}$ , $p < 0.3 \cdot p_{nom}$

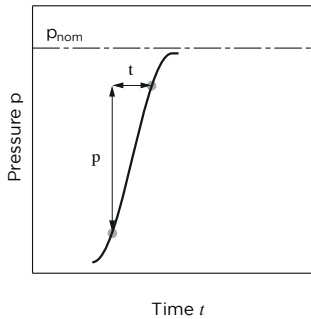
### Selection diagram



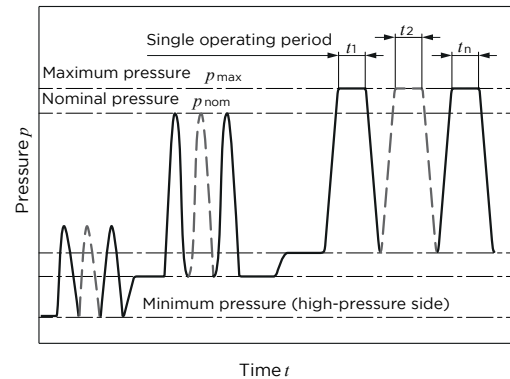
### Working pressure range

Pressure at working port B		Definition
Nominal pressure $p_{nom}$	250 bar absolute	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure $p_{max}$	315 bar absolute	The maximum pressure corresponds the maximum working pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.
Single operating period	2.5 ms	
Total operating period	300 h	
Minimum pressure $p_{B abs}$ (high-pressure side)	10 bar absolute	Minimum pressure on the high-pressure side (B) which is required in order to prevent damage to the axial piston unit.
Rate of pressure change $RA_{max}$	16000 bar/s	Maximum permissible rate of pressure rise and reduction during a pressure change over the entire pressure range.
Pressure at suction port S (inlet)		
Minimum pressure $p_{s min}$ Standard	0.8 bar absolute	Minimum pressure at suction port S (inlet) that is required in order to avoid damage to the axial piston unit. The minimum pressure depends on the speed and displacement of the axial piston unit.
Maximum pressure $p_{s max}$	5 bar absolute	
Leakage pressure at port L <sub>1</sub> L <sub>2</sub>		
Maximum pressure $p_{L max}$	2 bar absolute	Maximum 0.5 bar higher than inlet pressure at port S, but not higher than $p_{L max}$ . A case drain line to the reservoir is required.

### Rate of pressure change $RA_{max}$

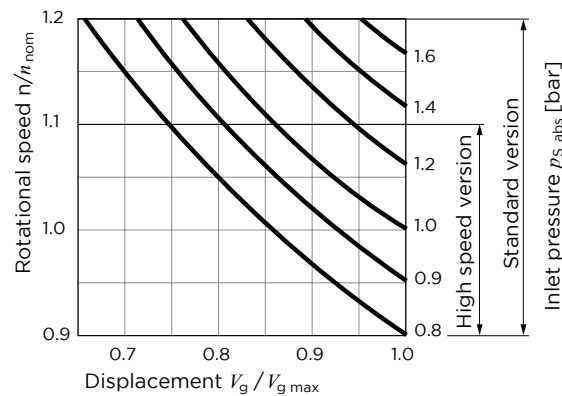


### Pressure definition



### Maximum permissible speed (limit speed)

Permissible speed by increasing inlet pressure  $p_{abs}$  at suction opening S or at  $V_g \leq V_{g max}$



### Technical data, standard unit

Size	NG		10	18	28	45	60	63	72	85	100	
<b>Displacement, geometric, per revolution</b>	$V_{g \max}$	cm <sup>3</sup>	10.5	18	28	45	60	63	72	85	100	
<b>Speed maximum</b>	at $V_{g \max}$	$n_{\text{nom}}$	rpm	3600	3300	3000	2600	2700	2600	2600	2500	2300
	at $V_g < V_{g \max}$	$n_{\text{max perm}}$	rpm	4320	3960	3600	3120	3140	3140	3140	3000	2500
<b>Flow</b>	at $n_{\text{nom}}$ and $V_{g \max}$	$q_{v \max}$	l/min	37	59	84	117	162	163	187	212	230
	at $n_E = 1500$ rpm	$q_{vE \max}$	l/min	15	27	42	68	90	95	108	128	150
<b>Power</b>	at $n_{\text{nom}}$ , $V_{g \max}$ $\Delta p = 250$ bar	$P_{\max}$	kW	16	25	35	49	65	68	77	89	96
	at $n_E = 1500$ rpm	$P_{E \max}$	kW	7	11	18	28	37	39	45	53	62
<b>Torque</b>	at $V_{g \max}$ $\Delta p = 250$ bar	$T_{\max}$	Nm	42	71	111	179	238	250	286	338	398
	at $V_{g \max}$ $\Delta p = 100$ bar	$T$	Nm	17	29	45	72	95	100	114	135	159
<b>Rotary stiffness of drive shaft</b>	S	$c$	Nm/rad	9200	11000	22300	37500	65500	65500	65500	143000	143000
	R	$c$	Nm/rad	-	14800	26300	41000	69400	69400	69400	152900	-
	U	$c$	Nm/rad	6800	8000	16700	30000	49200	49200	49200	102900	102900
	W	$c$	Nm/rad	-	-	19900	34400	54000	54000	54000	117900	117900
	P	$c$	Nm/rad	10700	-	-	-	-	-	-	-	-
<b>Moment of inertia for rotary group</b>	$J_{rw}$	kgm <sup>2</sup>	0.0006	0.0009	0.0017	0.003	0.0056	0.0056	0.0056	0,012	0,012	
<b>Maximum angular acceleration</b>	$\alpha$	rad/s <sup>2</sup>	8000	6800	5500	4000	3300	3300	3300	2700	2700	
<b>Case volume</b>	$V$	l	0.2	0.25	0.3	0.5	0.8	0.8	0.8	1	1	
<b>Weight without through drive (approx.)</b>	$m$	kg	8	11.5	15	18	22	22	22	36	36	
<b>Weight with through drive (approx.)</b>			-	13	18	24	28	28	28	45	45	

Determining the operating characteristics		
Flow	$q_v = \frac{V_g \times n \times \eta_v}{1000}$	[l/min]
Torque	$T = \frac{V_g \times \Delta p}{20 \times \pi \times \eta_{mh}}$	[Nm]
Power	$P = \frac{2 \pi \times T \times \eta}{60000} = \frac{q_v \times \Delta p}{600 \times \eta_t}$	[kW]
<b>Key</b>		
$V_g$ Displacement per revolution [cm <sup>3</sup> ]		
$\Delta p$ Differential pressure [bar]		
$n$ Rotational speed [rpm]		
$\eta_v$ Volumetric efficiency		
$\eta_{mh}$ Hydraulic-mechanical efficiency		
$\eta_t$ Total efficiency ( $\eta_t = \eta_v \times \eta_{mh}$ )		

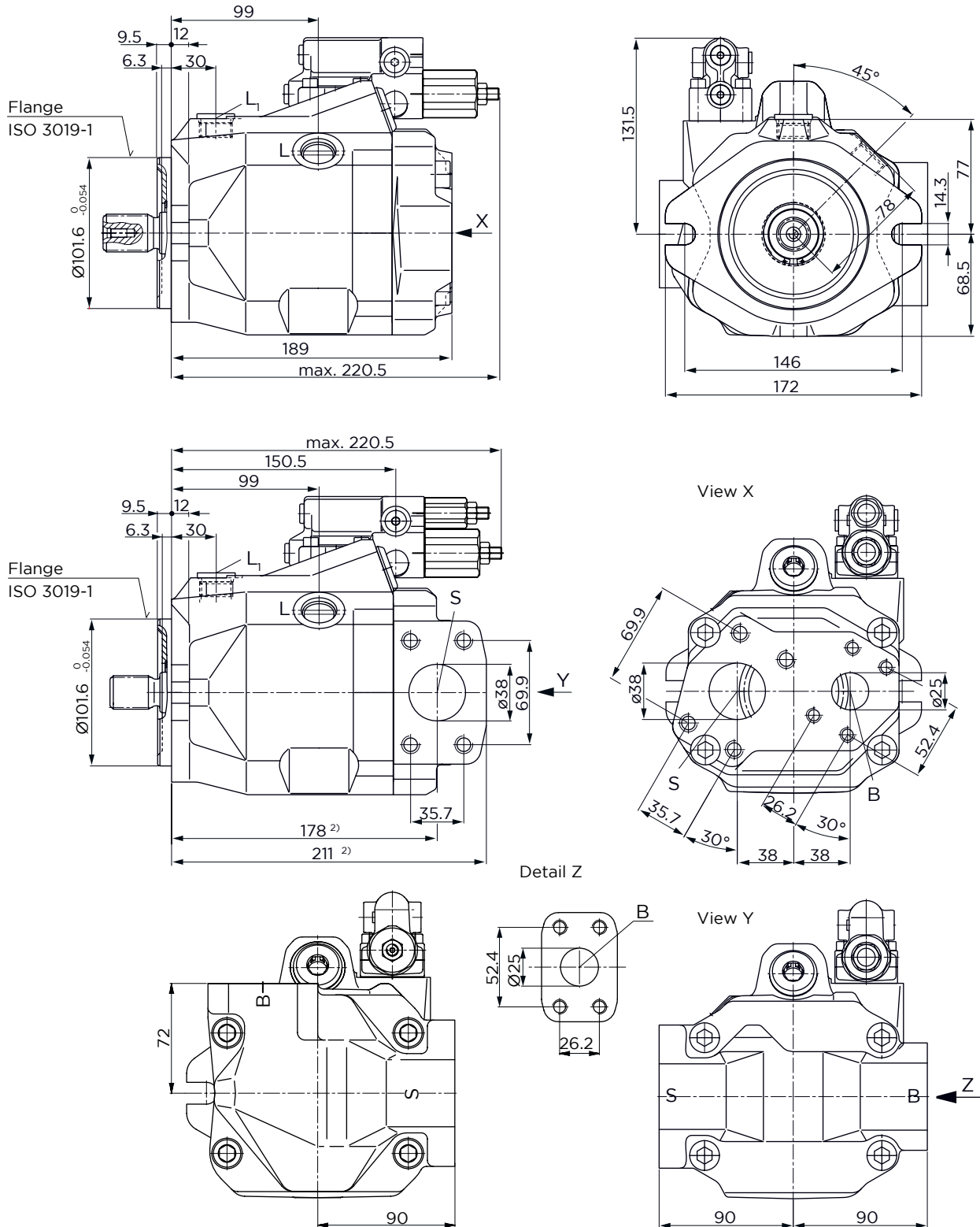
#### Notice

» Theoretical values, without efficiency and tolerances; values rounded

» Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. Bosch Rexroth recommends testing the load by means of experiment or calculation / simulation and comparison with the permissible values.

**Dimensions, size 45**

DR - Hydraulic pressure controller, clockwise rotation, series 52





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