



STRAIGHT PISTON PUMPS RECOMMENDATIONS BEFORE START-UP



Manufacturer's Declaration

ABER ensures compliance of its products with the essential health and safety requirements of the harmonized standards EN ISO 12100:2010 and EN ISO 4413:2010.

ATTENTION

Make sure that the working speed of the pump does not exceed the max. allowed speed

General information

BH pumps are axial piston pumps with single and double fixed displacement. They are available from 14 to 110 cm³/rev and with a maximum pressure of 450 bar. They can be assembled directly into the PTO, with the exception of the PTO of two shafts without support.

Features:

- great performance
- maximum efficiency
- light weighted
- robust
- low noise
- continuous flow
- bidirectional
- wide range of flange and axle options

Hose selection

In order to avoid intense heat generation and cavitation phenomenon that causes noise and deterioration of the pump, ABER recommends the following speeds and dimensions of the hoses. Inlet pressure range is from 0,8 to 2 bar abs.

Admission line

0,5...1 m/s

Return line

2...3 m/s

Pressure line

P = 0...50 bar - 3,5 m/s

P = 50...100 bar - 3,5...4,5 m/s

P = 50...100 bar - 3,5...4,5 m/s

P = 150...200 bar - 5...5,5 m/s

P = 200...300 bar - 5,5...6 m/s

Pump selection

To ensure that the PTO will not be overloaded, and get the correct flow requirements with the speed of the engine chosen, it is important to use a pump with the right capacity. Pump capacity (D), expressed in cm³/rev, can be calculated using the following formula:

$$D = \frac{Q \times 1000}{N \times Z}$$

D-Pump displacement [cm³/rev]

Q-Flow required [l/min]

N-Engine speed [rpm]

Z-Engine to PTO ratio (see PTO technical sheet)

In order to not overload the PTO's mechanical units, it is important to calculate the torque and power consumed by the pumps. Torque and power are calculated with the following expressions:

$$M = \frac{D \times P_b}{63} \quad P = \frac{D \times N \times Z \times P_b}{600 \times 0,95 \times 1000}$$

M-Torque [Nm]

P_b-Pressure [bar]

P-Power [kW]

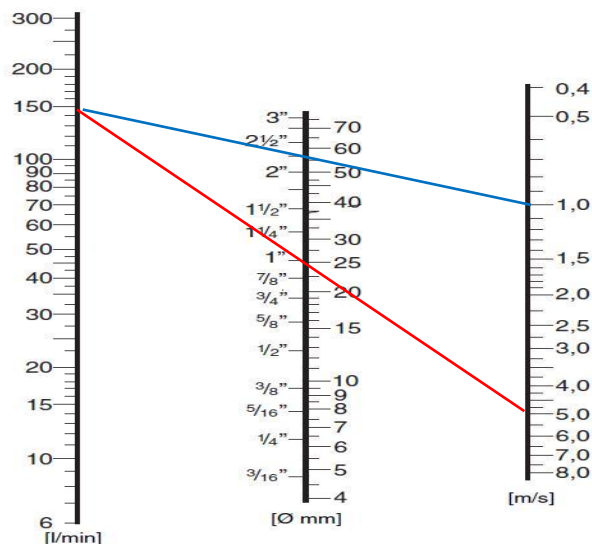
N-Engine speed [rpm]

Z-PTO ratio

0,95-Pump efficiency (can change from one pump to another)

ATTENTION

If the calculated load exceeds the maximum allowed for the PTO, a different combination should be selected.



ATTENTION

The recommended speeds and dimensions specified may not be enough when the temperatures are too low, the tank is below the level of the pump, the inlet hose is long or there are many valves and fittings in the inlet hosing. In these cases we recommend increasing the diameter of the hoses, keeping the suction hose as short and straight as possible and reducing the pump rotation speed.

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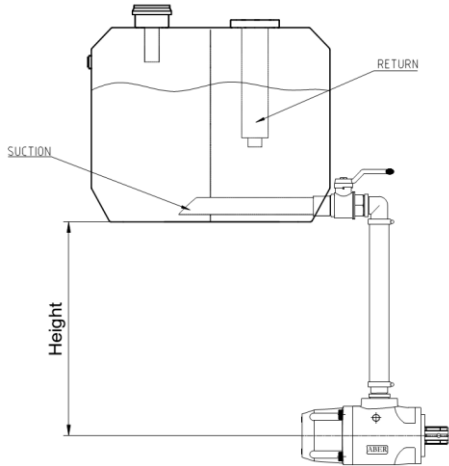
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Tank

The oil tank is a very important component in the hydraulic system and for the pump



ATTENTION

The tank must be always higher than the pump level.

It is also recommended that the suction and return lines are separated and have a long distance between them, to prevent the oil in the return line from entering immediately in the suction line
In order to prevent the overheating of the system it is recommended a minimum oil volume of:

Type of work	Tank volume (minimum)
Short working cycles	Equal to oil flow (l/min)
Long working cycles	1.5 times the oil flow (l/min)
Continuous operation	2 times the oil flow (l/min)

ATTENTION

Regardless of the tank volume, the max. oil temperatures or viscosities values shall not be exceeded.

Installation instructions

1. Make sure that the assembly does not generate axial or radial load on the pump main shaft.
2. When the PTO contains an output shaft seal, grease spline shaft with heat-resistant grease before installation.
3. Connect the pump to the PTO (apply 80Nm torque in the tightening nuts).

ATTENTION

Check the tightness periodically.

Elevated efforts or shocks are not recommended during the installation. The pump must be connected without making use of any type of tool that forces its assembly. In driving gear application and couplings, use circlips and/ or washers with one M10 screw and locking fluid (70Nm).

4. Remove all protection covers from the threaded holes (inlet/outlet). Apply the inlet and outlet fittings into the pump (ask for the tightening information's from the fittings manufacturer). Connect the outlet and the inlet pipes to the accessories (always respect recommended hoses dimensions and thread dimensions). Be sure that all connections are robust and well-sealed.

5. Before start-up, the air must be bleeding by one of the two drain plugs in the pump housing. Re-fit drain plug.

The omission of this step may cause the damage of the pump.

ATTENTION

Fluids

Quality

-High quality mineral oil ISO type HM VG 38-68 or DIN 51524-2 HLP
The designation 32, 46, 68, etc. denotes the viscosity at 40°C of the oil
(It is possible to use other fluids but only after consulting and getting authorization from ABER)

Viscosity ranges:

- Recommend: 16 to 36mm²/s (cSt)
- Limits: 10 to 400mm²/s (cSt)
- Start-up viscosity range, without load: 400 to 1500mm²/s (cSt)

When choosing the oil, it is necessary to be aware of the low viscosity with the increase of the temperature.

Temperatures:

The maximum oil temperature allowed in the circuit is +75°C. We advise you to use an oil cooler when you verify that the system's temperature is higher than this value.

Oil changing

The oil must be replaced after 1000 working hours or at least once a year, so as filter elements.

Filtration

The filtration is extremely important and may influence or even determine the life of the equipment. ABER recommends the use of a return filter and an air filter with an absolute filtration degree of 10µm, as according to the ISO 4406 class 18/13. The first filter to be applied into the system must be replaced as soon as it reaches the 50 working hours; after the first replacement, it must be replaced along with the oil or when pressures out of the common are verified in the return.

ATTENTION

Be sure that the whole system is perfectly clean before filling it with oil. Never mix water or other liquids, different oil qualities, viscosities or brands with the oil in the system. If any oil leaks out from the pump, stop the system immediately to determine the cause of the leak and correct the problem source. Make sure that there is no gearbox contamination.

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Faults, causes and remedies

Faults	Causes	Remedies
No oil flow	<ol style="list-style-type: none"> 1. Empty tank 2. Closed valve in inlet hose 3. Air in inlet hose 4. Reversed hoses 5. PTO not engaged 6. Pump damaged 	<ol style="list-style-type: none"> 1. Fill tank with recommended fluid 2. Open valve 3. Put tank above the pump level (<u>always</u>) 4. Change inlet and pressure hoses 5. See "PTO Troubleshooting" 6. Replace pump
Equipment works with irregular movements	<ol style="list-style-type: none"> 1. Air in housing 2. Air leakage in inlet hose 3. Low oil level 4. Pump damaged 	<ol style="list-style-type: none"> 1. Fill housing with recommended fluid 2. Repair air leakage 3. Fill tank with recommended fluid 4. Replace pump
Pump is noisy	<ol style="list-style-type: none"> 1. Cavitation 2. High working speed 3. Very thick oil 4. Air in inlet hose 5. Pump damaged 	<ol style="list-style-type: none"> 1. Replace inlet hose for another with a larger diameter 1. Remove inlet restrictions 1. Check for clogged tank breather or clogged admission filter 2. Do not exceed the limits specified in the technical sheet 3. Replace for an oil with lower viscosity 4. Put tank above the pump level and check air pressure in the tank 5. Replace pump
Oil is too hot	<ol style="list-style-type: none"> 1. Small diameter or restrictions in pressure and return hoses 2. Low oil level 3. Small tank 4. Dirty oil 5. Relief valve improperly set 6. Relief valve stuck in open position 7. Very thin oil 8. Too much flow 9. High output power 	<ol style="list-style-type: none"> 1. Replace the hoses with a larger diameter and remove unnecessary restrictions 2. Fill tank with recommended fluid 3. Replace for a bigger tank 4. Replace oil and filter 5. Adjust to equipment specifications or replace if necessary 6. Clean and re-set to equipment specifications 7. Replace for an oil with higher viscosity 8. Reduce speed or replace for a smaller displacement pump 9. Fit an oil cooler
Equipment works very slow compared with the usual	<ol style="list-style-type: none"> 1. Small diameter suction in hose 2. Restriction in inlet hose 3. Relief valve improperly set 4. Relief valve stuck in open position 5. Pump damaged 	<ol style="list-style-type: none"> 1. Replace inlet hose for another with a larger diameter 2. Remove restrictions 3. Adjust to equipment specifications or replace if necessary 4. Clean and re-set to equipment specifications 5. Replace pump
Oil leakage	<ol style="list-style-type: none"> 1. From inlet/outlet lines 2. From below the assembly 3. From body sections 	<ol style="list-style-type: none"> 1. Tighten fittings and hoses or replace if necessary 2. Stop the system immediately to determine the cause of the leak and correct the problem source 3. Tighten bolts for specified torque, or replace damaged o'ring or body



- ✓ A piston pump should be mounted by qualified personnel;
- ✓ When the pump is working, never touch or pull hoses or intermediate shaft when applied. When intermediate shaft is applied take into account that parts can be ejected;
- ✓ To install a piston pump or perform maintenance, the vehicle must be parked on a flat surface with the engine off and parking brake applied;

- ✓ Ensure that there are no leaks and that everything is properly tightened before starting;
- ✓ For the assembly of the cardan shaft, it is necessary to use all the precautions and protections set out by the current regulation on safety in the workplace;
- ✓ The pumps may attain high very temperatures after prolonged use. It is therefore necessary to take all the necessary measure to prevent burns or wait for the mechanical parts to cool down to temperatures appropriate for skin contact;
- ✓ The application of the pumps must follow all the instructions hereby mentioned in order to assure the safety of all personal working with the equipment including its surroundings, assure a long lifespan of the product and preserve the warranty of the brand. All applications that do not follow the hereby instruction are solely the user's responsibility. If the equipment has any malfunctioning, it is strictly forbidden the disassembly of the product except if it is being made by a qualified technician of the brand or if there is a special authorization to do so. If this specification is not followed, warranty can be lost.

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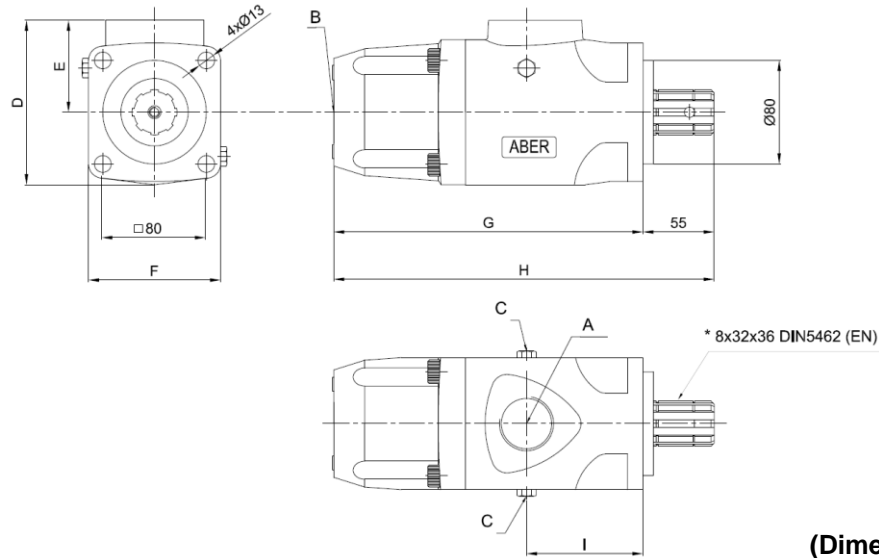
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OIL-HYDRAULIC PUMP AXIAL PISTONS

Ref. BHV_EN

Main Dimensions



(Dimensions in mm)

Main Data

Pumps BHV_EN	21313	21316	21416	21516	21616	21716	21816	211113	25913
Cylinder capacity (cm ³ /rot.)	14	19	25	32	40	45	60	80	86
Output at max. rotation (l/min)	35	38	50	64	80	90	96	128	129
Operating pressure (bar) (up to)	350	320	320	320	320	320	400	400	320
Peak pressure (bar)	400	370	370	370	370	370	450	450	370
Rotation mín. (rpm)	200	200	200	200	200	200	200	200	200
Rotation máx. (rpm)	2500	2000	2000	2000	2000	2000	1600	1600	1500
Weight (kg)	12.0	12.0	12.0	12.0	12.0	12.0	16.0	21.5	21.5
Sense of Rotation	Bi-directional								
A-Oil inlet (BSP)	1"1/4	1"1/4	1"1/4	1"1/4	1"1/4	1"1/4	1"1/2	2"	2"
B-Oil Outlet (BSP)	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"	1"
C	Oil drain plug								
D	125	125	125	125	125	125	148	152	152
E	69	69	69	69	69	69	72	80	80
F	102	102	102	102	102	102	118	142	142
G	240	240	240	240	240	240	259	270	270
H	295	295	295	295	295	295	314	325	325
I	90	90	90	90	90	90	118	134	134

How to order:

Example: Pump 19cm³, operating pressure up to 320 bar; peak pressure 370 bar, ref. BHV_EN
 → BHV21316EN

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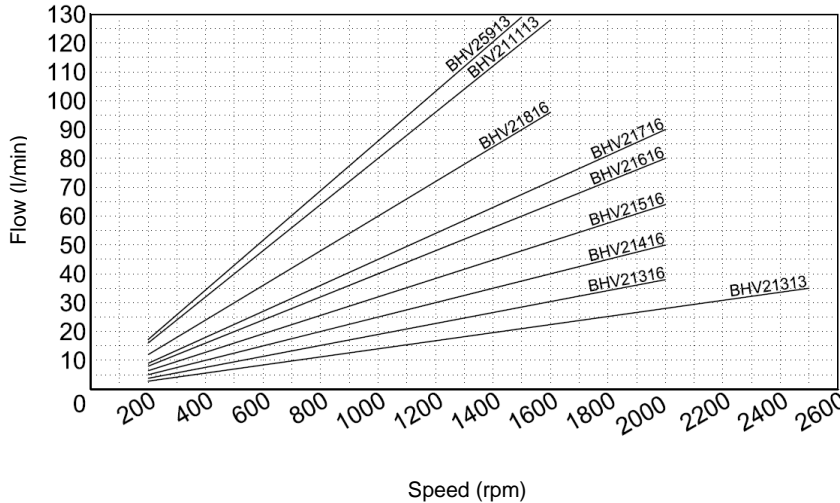
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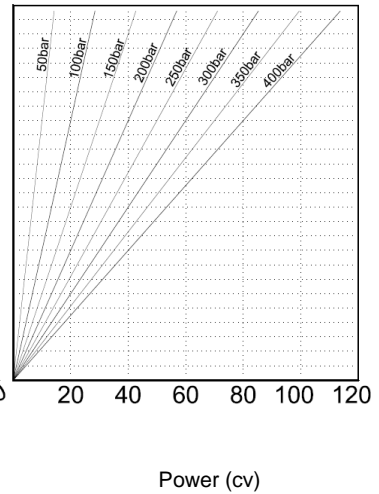
OIL-HYDRAULIC PUMP AXIAL PISTONS

Ref. BHV_EN

**Diagram
Flow - Speed**



**Diagram
Input Power - Flow – Pressure**



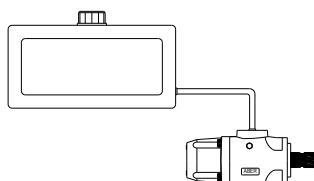
Hose dimensions

Inlet Hose	
Flow (l/min)	Internal pipe diameter (inch)
30-40	1"1/4
50-60	1"1/2
70-90	1"3/4
100-120	2"
130-150	2"1/4

Outlet Hose					
Flow (l/min)	Internal pipe diameter (inch)				
	30	1/2"	1/2"	1/2"	1/2"
40	5/8"	1/2"	1/2"	1/2"	1/2"
50	5/8"	5/8"	5/8"	1/2"	1/2"
60	3/4"	5/8"	5/8"	5/8"	5/8"
70	1"	3/4"	3/4"	5/8"	5/8"
80	1"	3/4"	3/4"	3/4"	3/4"
90	1"	1"	1"	3/4"	3/4"
100	1"	1"	1"	1"	3/4"
110	1"	1"	1"	1"	1"
120	1"	1"	1"	1"	1"
130	1"	1"	1"	1"	1"
	50-100	100-150	150-200	200-300	300-400
	P (bar)				

IMPORTANT NOTES:

- ✓ Other axis available, please consult "Axel options"
- ✓ Diameter of inlet pipes lower than indicated in our technical catalogues as well as a poor sealing can cause cavitation phenomenon to occur, thereby deteriorating the pump
- ✓ Keep up the deposit above pump level
- ✓ Used always return filters. We recommend filters with mesh equal to or lower than 25 µm
- ✓ The connection of inlet pipes in the pump, can be done by threading or flange and the sealing by orring
- ✓ Use a good quality mineral hydraulic oil with viscosity at operating temperature between 20 and 46 cSt
- ✓ Fill the oil tank to 85% of its maximum capacity (the remainder 15% must not have oil)



Keep up the deposit above pump level

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