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Boost Unit

Series BLA



ENGINEERING YOUR SUCCESS.

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The BLA boost unit simplifies the building of closed or semi-closed hydrostatic transmissions.

Main features are:

- Replaces conventional charge pump and corresponding valves in many applications
- Allows pump speeds above normal selfpriming speed.
- Suitable for system flow rates to 400 l/min
- Includes filter
- Simple construction - no moving/wear parts
- Cost-effective installation
- Small tank size
- Helps in building a low-cost hydrostatic transmission.

Description

In a closed circuit hydrostatic transmission, a charge pump is normally included with the main pump, providing make-up fluid which replaces pump and motor volumetric losses. It also maintains sufficient pump inlet pressure to avoid cavitation.

The BLA boost unit replaces the charge pump in many applications, when the following conditions are met:

- The max-to-min pump flow ratio does not exceed 2:1
- System pressure changes gradually without frequent and pronounced pressure peaks
- The line length between pump and boost unit is relatively short.

There are two basic sizes of the BLA boost unit:

- BLA 4 (to 160 l/min pump flow)
- BLA 6 (to 400 l/min).

The main part of the unit is an aluminium housing with a built-in nozzle and an injector; refer to the cross section to the right.

When fluid flows from the motor outlet port through the unit and to the pump inlet port, the increased fluid velocity between the nozzle and injector creates a low pressure zone causing additional fluid to be drawn from tank into the main circuit.

Also, pressure increases after the injector, allowing the pump to be operated at speeds higher than the self-priming speed. The 'boost pressure' increases with flow as shown in the diagrams (fig. 4, page 5).

The housing includes ports that should be connected to the pump and motor drain ports respectively.

An additional bleed-off nozzle diverts approx. 10% of the main flow through the cartridge filter before being directed to the tank.

Typical applications:

- Fan drives
- Propeller drives
- Generator drives
- Pump drives.

Oil cooling

An oil cooler is usually required in the hydraulic system, in order to remove the heat that is generated in the main circuit. A full-flow oil cooler should be installed in the return line between the motor and the boost unit; refer to fig. 3, page 4.

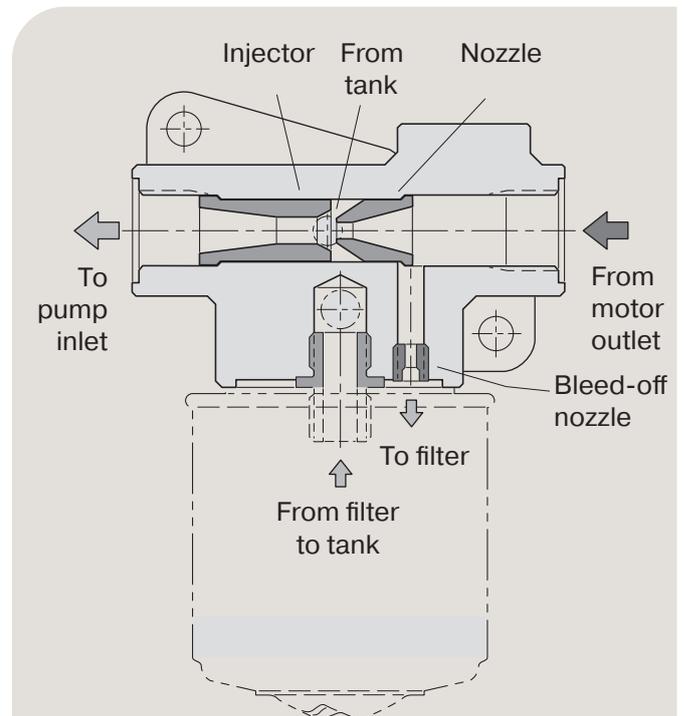


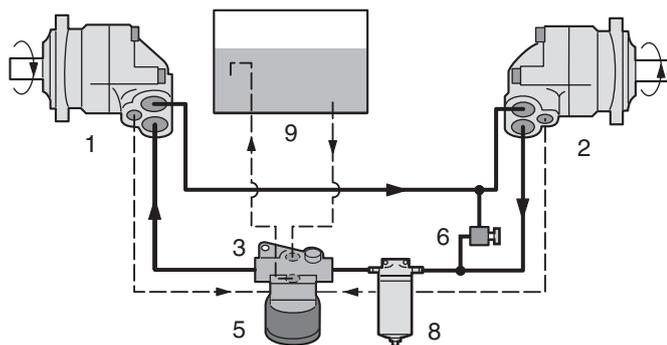
Fig. 1. BLA boost unit cross section.

Filter

The BLA boost unit is supplied with a standard spin-on cartridge filter. The paper insert provides a 20 µm nominal filtration (³ 50 µm absolute filtration).

Cartridges are available as spare parts (page 6).

For continuous operation, an additional full-flow return filter is usually required. It should be installed upstream of the BLA unit; refer to the top schematic to the right.



- | | |
|--|-------------------------------------|
| 1. Pump | 6. Pressure relief valve |
| 2. Motor | 8. Full-flow filter (when required) |
| 3. Boost unit (with injector and nozzle) | 9. Reservoir |
| 5. Filter cartridge | |

Fig. 2. Boost unit installation (example).

Boost unit selection

The BLA 4 is available in four sizes with a max recommended flow of 40, 63, 100, and 160 l/min. A filter is included.

The BLA 6 is available in the following sizes: 250, 350 and 400 l/min; it also includes a filter.

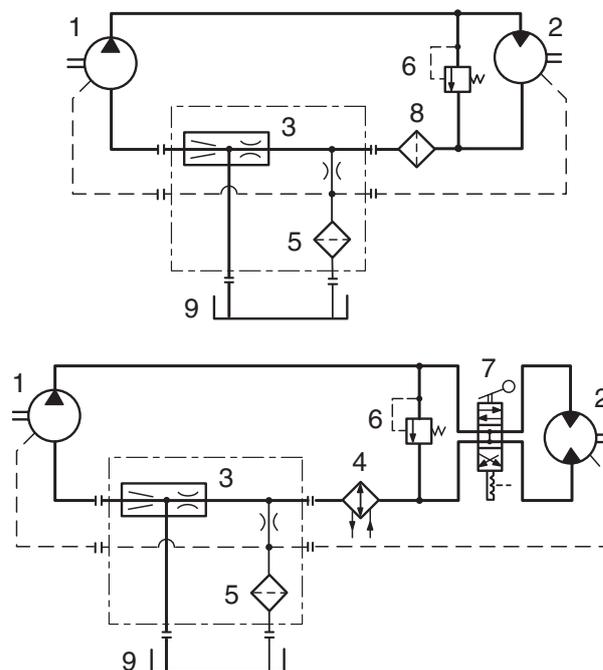
Example

Select a suitable boost unit for a closed loop hydrostatic transmission that utilizes an F11-19 pump at 4000 rpm; nominal flow is approx. 76 l/min.

According to the F11/F12 brochure, the required inlet pressure for an F11-19, operating as a pump at 4000 rpm, is 0.9 bar absolute.

The BLA 4-100 is selected (refer to the middle diagram, fig. 4). It will supply about 1.7 bar boost pressure at approx. 76 l/min, providing a margin for line losses between the boost unit and the pump.

NOTE: The boost pressure (after the unit) is approx. half the pressure before the unit.
 As an example, the up-stream pressure of a BLA 4-100 at max. flow (100 l/min) is about 6.5 bar.



- | | |
|--|-------------------------------------|
| 1. Pump | 5. Filter cartridge |
| 2. Motor | 6. Pressure relief valve |
| 3. Boost unit (with injector and nozzle) | 7. Directional control valve |
| 4. Oil cooler (when required) | 8. Full-flow filter (when required) |
| | 9. Reservoir |

Fig. 3. Circuit schematics (examples).

Boost pressure

The diagrams in fig. 4 show max outlet pressure versus flow through the various boost units. The pressure increase obtained at higher flows usually corresponds to the additional pump inlet pressure required at elevated shaft speeds.

To avoid pump cavitation, the boost unit should be installed as close to the pump as possible. The pressure at the pump inlet must not, under any operating condition, drop below the required pressure at a particular pump speed.

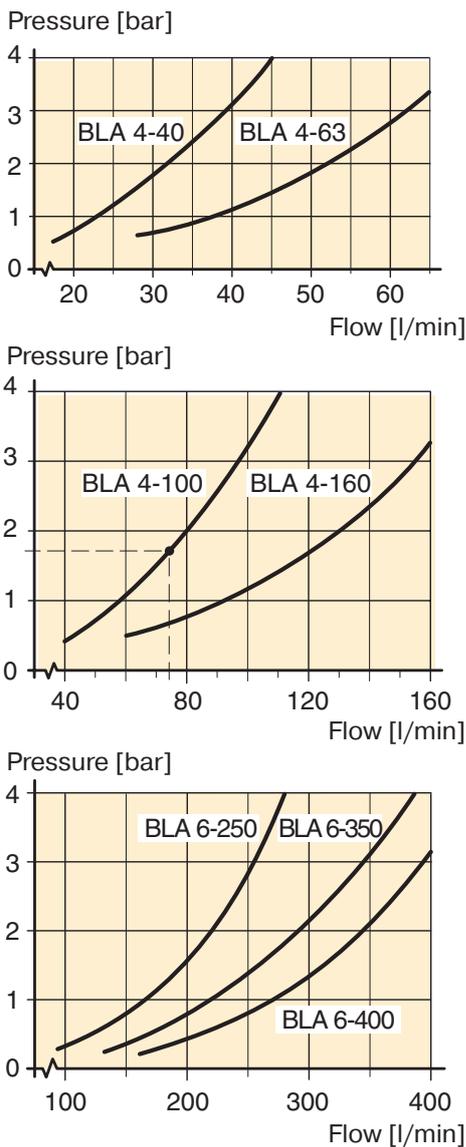


Fig. 4. BLA pressure/flow diagrams.

Installation

For proper functioning, the boost unit must be installed well below the lowest oil level in the reservoir.

The BLA can either be bolted directly to the reservoir side wall as shown below or connected separately with piping or hoses.

An adapter plate, with mounting face and hole pattern corresponding to that of the boost unit housing, should be fabricated and welded in place. The sealing is accomplished with seal washers.

The filtered oil flow from the boost unit must enter the reservoir as far away as possible from the inlet, and the pipe must always be well below the lowest oil level.

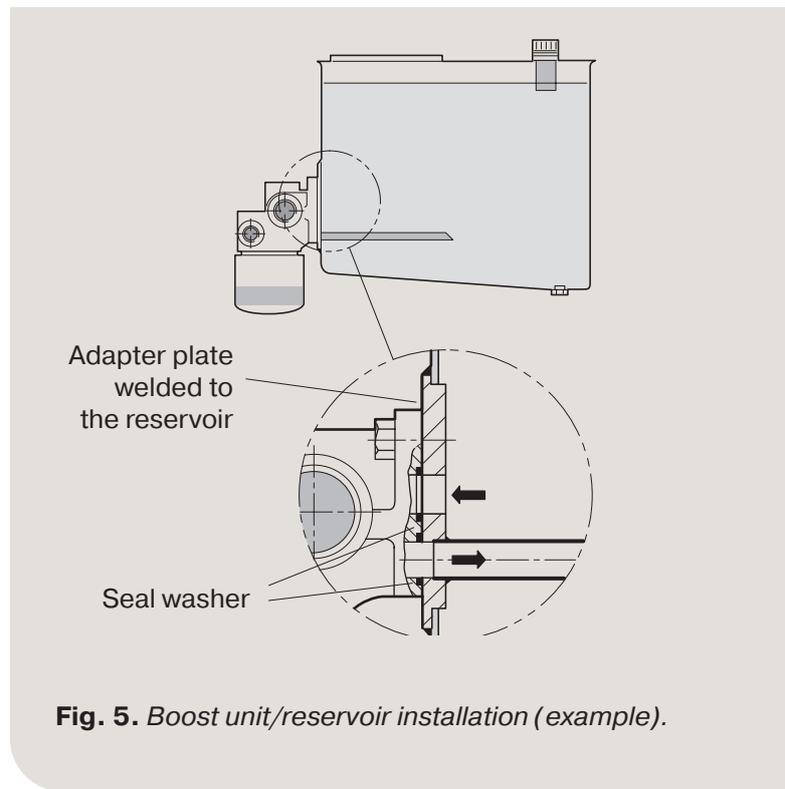


Fig. 5. Boost unit/reservoir installation (example).

Line connection

When the boost unit is connected to the reservoir with piping or hoses, line length should not exceed 0.5 m, and the inner diameter should equal or exceed 13 mm ($\frac{1}{2}$ ").

To avoid large pressure losses between the boost unit and the pump inlet, the line should be as straight as possible, not to exceed 0.5 m in length.

The recommended, minimum inner diameter of the line is shown in the following table.

BLA 4 size	Inner dia. [mm]	BLA 6 size	Inner dia. [mm]
-40	13	-250	32
-63	20	-350	38
100	20	-400	38
-160	25		

Reservoir

The reservoir should be large enough to allow the oil to be turned over in 1.5 to 2 min. The oil will then be sufficiently de-aerated. The size of the reservoir normally corresponds to 15 – 20 % of the pump flow.

As an example, a pump flow of 75 l/min requires a reservoir of 10 to 15 l.

Valves

A system pressure relief valve or directional control valve should be connected as shown in figure 3 (page 4).

The valve return must be connected to the boost unit inlet (not directly to the reservoir).

NOTE: The drain lines from the pump and the motor are also connected to the boost unit; refer to the schematics and installation drawings on page 4.

Ordering information

Example: **BLA 6 - 250**
 Type: BLA 4 or 6
 Size: BLA 4: **40, 63, 100** or **160**
 BLA 6: **250, 350** or **400**

Available versions

Version	Part no.
BLA 4-40	73186
BLA 4-63	73061
BLA 4-100	73062
BLA 4-160	73159
BLA 6-250	73311
BLA 6-350	3701097
BLA 6-400	73312

Filter cartridges

Version	Part no.
BLA 4-40, -63, -100	3782814
BLA 4-160	73194
BLA 6-250	73308
BLA 6-350, -400	73309

Seal washers (for ports PE and PF)

Version	Part no.	Washer size
BLA 4 (alle)	943908	$\frac{1}{2}$ "
BLA 6-250	944252	$\frac{3}{4}$ "
BLA 6-350, -400	944498	1"

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