HYDRAULIC PISTON PUMPS
BIC | COMPACT BENT AXIS PISTON PUMP
17cm³/rev. to 110cm³/rev.

High Efficiency
Robustness
High Pressure
Compact Design
Reversible

CTI BIC 2402 - 00

ABER HYDRAULICS S.A.
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General Information

BIC Series is a bent axis piston pump designed to be very compact and to use on mobile applications. They are available from 17 to 110 cm^3/rev. and with a nominal pressure of 400 bar. They can be assembled directly into the truck power take off (PTO). BIC series allows a change in the rotation way with an easy and safe procedure for all the pump components.

Contents

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Ordering Code

BIC	110	M	7				R
01	02	03	04	05	06	07	08

Series

01	Compact Bent Axis Piston Pump		BIC

Displacement

02	Displacement, cm³/rev.	17	25	30	40	50	60	82	110

Pump Size

03	Medium		M

Piston Number

04	5 Piston	●	●	●	●	●				5
	7 Piston						●	●	●	7

Mounting flange and drive Shaft

05	ISO 7653-1985, type D direct coupling – Splined DIN 5462, B8x32x36 with Ø8 bore on the Shaft	●	●	●	●	●	●	●	●	0

Line Ports

06	ISO DIN 228, G threads (BSP)	●	●	●	●	●	●	●	●	0

Seals

07	NBR Seals	●	●	●	●	●	●	●	●	0
	FKM Seals	○	○	○	○	○	○	○	○	V

Rotation sense

08	Viewed from drive shaft	Right (clockwise)	R
		Left (counterclockwise)	L

● Available version ○ Available under request

Other combinations can be made, for more information please consult ABER.

The options with the number 0 does not need to be included in the ordering code
Other combinations can be made, for more information please consult ABER.

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Technical Data

		17	25	30	40	50	60	82	110
Displacement	$cm^3/rev.$	17,5	26	32	42	50	60	82	107
Max. operating pressure	bar	400	400	400	400	400	400	400	400
Operating rotation (1)	rpm	2500	2500	2300	2300	2300	2000	1500	1500
Max. rotation without load (1)	rpm	3200	3200	2600	3000	3000	2600	2000	2000
Max. torque	N.m	111	168	190	255	335	390	522	680
Weight	kg	11,8	12	12,2	12,4	12,5	13	13,1	13,2
Recommended fluids		mineral oils type ISO HM or DIN 51524-2 HLP							
Recommended viscosity range		16 to 36 cSt (mm^2/s) at working temperature							
Limits viscosity range		10 to 400 cSt (mm^2/s)							
Start-up viscosity range, without load		400 to 1500 cSt (mm^2/s)							
Filtration requirements (3)		ISO 4406 19/17/14							
Ambient temperature		-40°C to +60°C							
Oil temperature		-25°C to +90°C							
Max. housing pressure		3 bar							
Min. inlet pressure		0.85 bar abs							

Data contained in this table are rounded, theoretical and without efficiency or tolerances.
(1) These values are valid at an absolute pressure of 1 bar in suction port when operating with a mineral oil at a viscosity of 30 mm^2/s (cSt) and max swash plate angle.
(3) 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.

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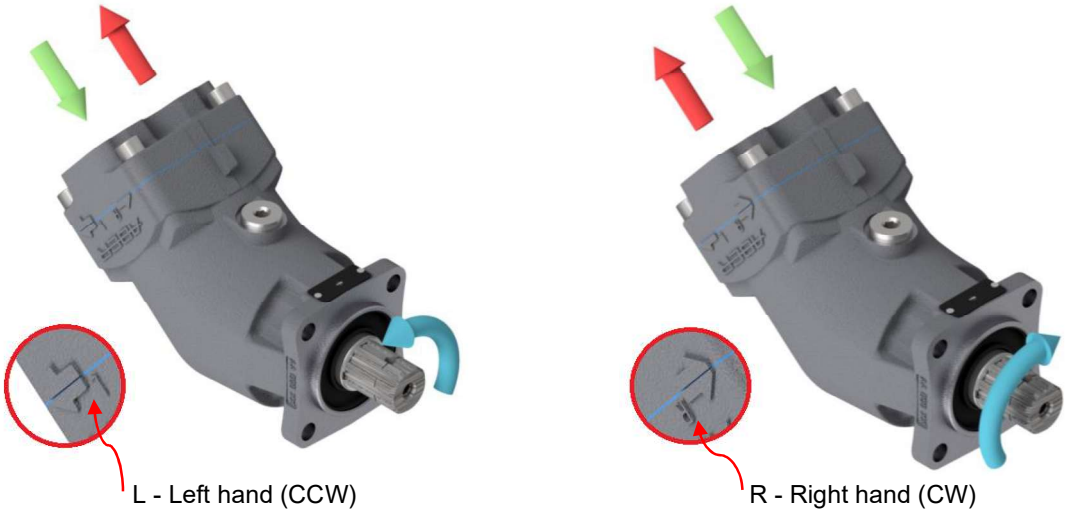
Rotation Sense

BIC Rotation Sense



Rotation sense is defined viewed from drive shaft. Pumps must be ordered CCW or CW, however it can be changed.

Characteristic Diagrams

Diagram
Flow - Speed

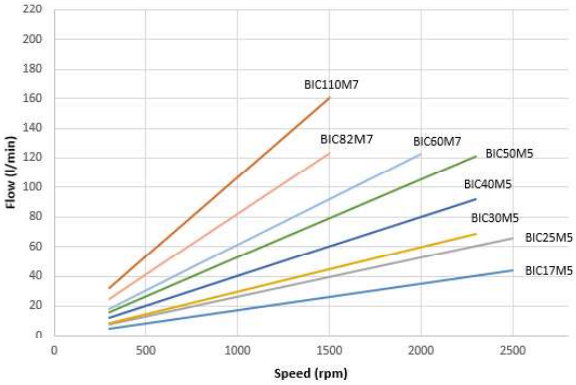
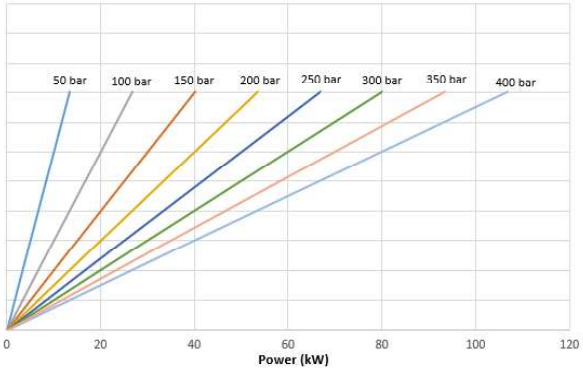


Diagram
Input Power - Flow – Pressure



These diagrams illustrates theoretical values when operating with max swash plate angle.

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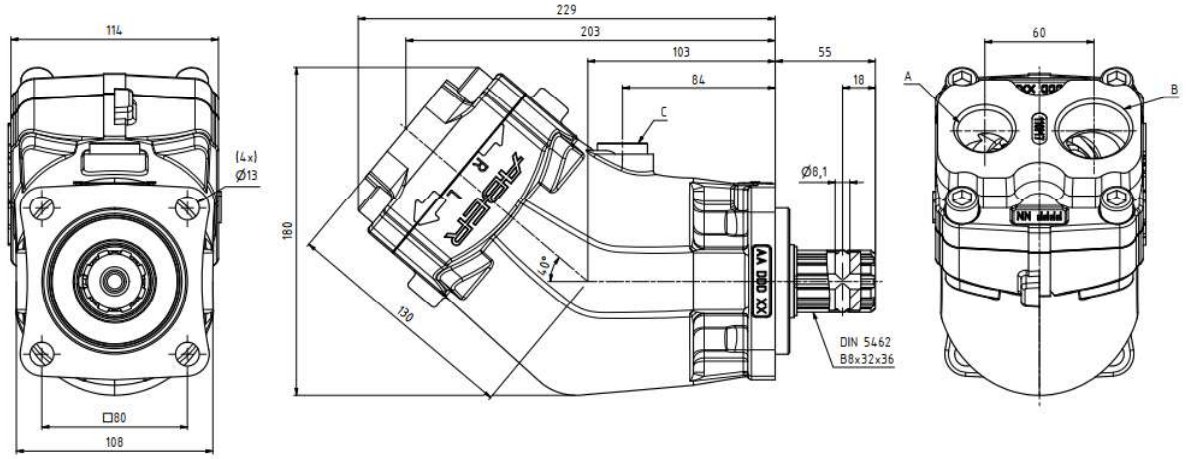
Dimensions

Standard version - Mounting flange ISO 7653-1985, type D direct coupling / Splined drive shaft DIN 5462, B8x32x36 / Line ports ISO DIN 228, G threads (BSP).
Dimensions in mm.

BIC 17 to 110



	17M5	25M5	30M5	40M5	50M5	60M7	82M7	110M7
A – Oil outlet (DIN ISO 228)	3/4'' BSP	3/4'' BSP	3/4'' BSP	3/4'' BSP	3/4'' BSP	3/4'' BSP	1'' BSP	1'' BSP
B – Oil intlet (DIN ISO 228)	1'' BSP	1'' BSP	1'' BSP	1'' BSP	1'' BSP	1'' BSP	1'' 1/4 BSP	1'' 1/4 BSP
C – Drain Hole	M22x1,5							

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Pump Selection

To ensure that the PTO will not be overloaded, and gets 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 $cm^3/rev.$, can be calculated using the following formula:

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

D-Pump displacement [cm^3/rev.]
Q-Flow required [l/min]
N-Motor speed
Z-Engine to PTO ratio

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:

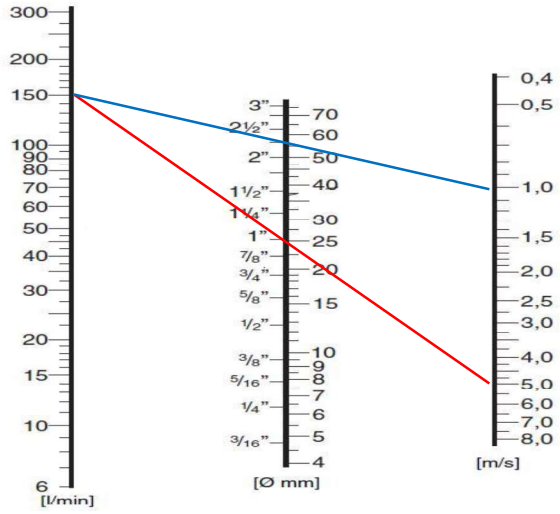
$$M = \frac{D \times Pb}{63} \qquad P = \frac{D \times N \times Z \times Pb}{600 \times 0{,}95 \times 1000}$$

M-Torque [Nm]
Pb-Pressure [bar]
P-Power [kW]
N-Motor speed [rpm]
Z-PTO ratio
0,95-Pump efficiency (can change from one pump to another)

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

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 must be always respected. LS line should be 10% of the pressure line. Drain line depends from the internal pump pressure it must be at least 15mm. All the hoses must be selected according the pressures.



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 = 100…150 bar - 4,5…5 m/s
P = 150...200 bar - 5…5,5 m/s
P = 200…300 bar - 5,5…6 m/s

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 and reducing the pump rotation speed.

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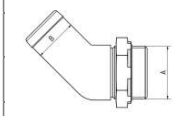
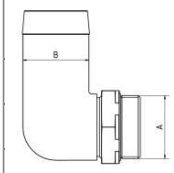
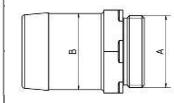
Recommended admission connector for rotations up to 1200rpm

	Reference	A	B (in)	17M5	25M5	30M5	40M5	50M5	60M7	82M7	110M7
	**A45100114**	1'' BSP	1'' 1/4	•	•						
	A45100112	1'' BSP	1'' 1/2			•	•				
	A45100200	1'' BSP	2''					•	•		
	A45114200	1'' 1/4 BSP	2''							•	•
	**A90100114**	1'' BSP	1'' 1/4	•	•						
	A90100112	1'' BSP	1'' 1/2			•	•				
	A90100200	1'' BSP	2''					•	•		
	A90114200	1'' 1/4 BSP	2''							•	•
	**AD100114**	1'' BSP	1'' 1/4	•	•						
	AD100112	1'' BSP	1'' 1/2			•	•				
	AD100200	1'' BSP	2''					•	•		
	AD114200	1'' 1/4 BSP	2''							•	•

[4] Consult nomogram for select admission connector size.
[5] For more informations please consult admission connector technical sheets.

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Changing the Rotation of Bent Axis Piston Pump

In order to change the rotation of the bent axis piston pump, it's necessary to follow all the instructions below, step by step:

1. Fully unscrew the four end cover screws

2. Turn the end cover 180º

ATTENTION Paper gasket between cover and body, do not damage it. If the gasket is damaged, please replace the gasket with using he same thickness as the one supplied. To order the gaskets or seals, use the code SKBIC.

3. Screw again the four screws:
Tightening torque M12 screws = 110Nm

Changing the direction of rotation can be done in the field (with the pump mounted on the PTO) without risking the pump becoming unsynchronized or internally disassembled.
During the rotation change process, make sure that no impurities get inside the pump.

Recommendations before start up

- Grease spline shaft with solid lubricant before installation. High efforts or shocks are not recommended during the installation. The motor 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 screw and locking fluid.
- Remove all protection covers from the threaded holes (inlet/outlet/drain line/flushing lines). Apply the inlet and outlet fittings into the motor (require the tightening information from the fittings manufacturer). Connect the outlet and the inlet pipes to the accessories.
- Before start-up, the housing volume must be filled at least at 50% with the same hydraulic fluid used in the system.
- The oil tank is a very important component hydraulic system and for the pump. Generally, oil level inside the tank must be higher than the pump. It is also recommended tht 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.

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Faults, causes and remedies

Faults	Causes	Remedies
No oil flow	1.Empty tank 2.Closed valve in inlet hose 3.Air in inlet hose 4.Wrong sense of rotation 5.Reversed hoses 6. PTO not engaged 7.Pump damaged	1.Fill tank with recommended fluid 2.Open valve 3.Put tank above the pump level 4.Change pump's rotation sense 5. Change inlet and pressure hoses 6. See "PTO Troubleshooting" 7.Replace pump
Equipment works with irregular movements	1.Air in housing 2.Air leakage in inlet hose 3.Low oil level 4.Pump damaged	1.Fill housing with recommended fluid 2.Repair air leakage 3.Fill tank with recommended fluid 4. Replace pump
Pump is noisy	1. Cavitation 2.Very thick oil 3.Air in inlet hose 4.Pump damaged	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.Replace for an oil with lower viscosity 3. Put tank above the pump level and check air pressure in the tank 4.Replace pump
Oil is too hot	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	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	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	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	1.From inlet/outlet lines 2.From below the nameplate 3.From body sections	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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