



TDZGroup

Radial Piston Pumps

DESCRIPTION

The BHE radial piston pump range is made up of six basic models with 2, 4, 6, 8, 10 and 12 pistons. All of them are characterized by :

- High performance from very low speed.

Therefore they are ideal for applications such as truck hydraulic drives (tipping, cranes, etc.) or agricultural machinery, where other pumps give a very reduced performance due to the low rotation speed.

- High maximum pressure.

350 Bar intermittent maximum pressure (250 Bar in BHE-2)

- Great resistance to oil contamination.

Specifically designed for this, these pumps resist dirty oil better than practically any other pump on the market.

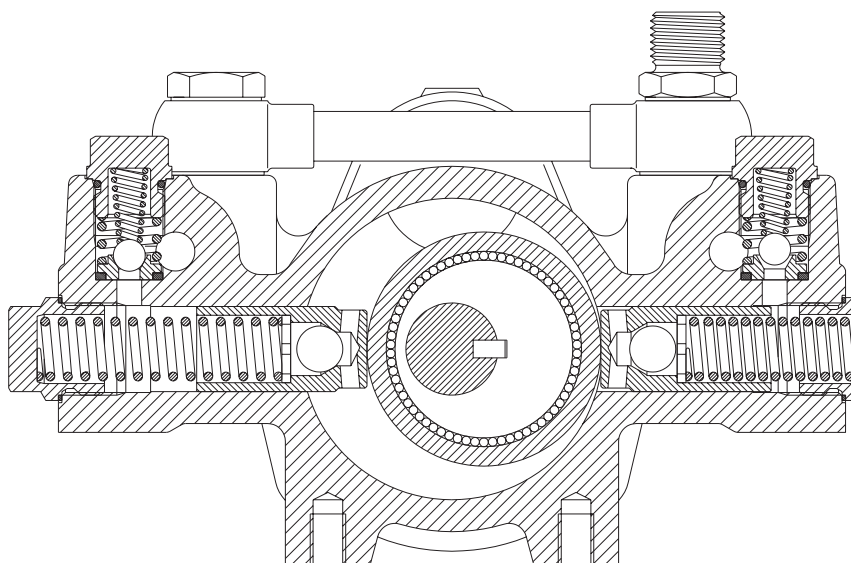
-Great strength.

Due to their original and experimented design, careful manufacture and high quality of the materials used.

-Large amount of accessories and options.

The price of each pump includes a pressure limiting valve incorporated, the outlet raccord and the oil inlet tube assem.

Other accessories and options are over the price given in section 1.03.





Radial Piston Pumps Description and Characteristics

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TECHNICAL CHARACTERISTICS

Flow volumes :

BHE-4	: 32 cc./rev.
BHE-6	: 48 cc./rev.
BHE-8	: 64 cc./rev.
BHE-10	: 80 cc./rev.
BHE-12	: 96 cc./rev.

There are versions with reduced flow volume which give approximately half the normal flow volumes.

Pressures :

Continuous maximum pressure : 300 Bar
Intermittent maximum pressure : 350 Bar
Standard setting pressure of the safety valve : 350 Bar
It is possible to set the valve at other pressures.

Speeds :

Minimum speed : 100 R.P.M.
Maximum speed : 800 R.P.M.
Indifferent rotation direction.

Weight:

BHE-4	: 12 kg.
BHE-6	: 14.5 kg.
BHE-8	: 17.5 kg.
BHE-10	: 20.5 kg.
BHE-12	: 23.5 kg.

Assembly and drive :

Standard : Drive with cardan transmission or elastic coupling. Consult for drive with pulleys.
Optional : Flange and shaft according with ISO 7653 standard for direct mounting on truck's P.T.O. (See page 1.03.06)
Indifferent assembly position (for vertical assembly see page 1.03.02)

Oil :

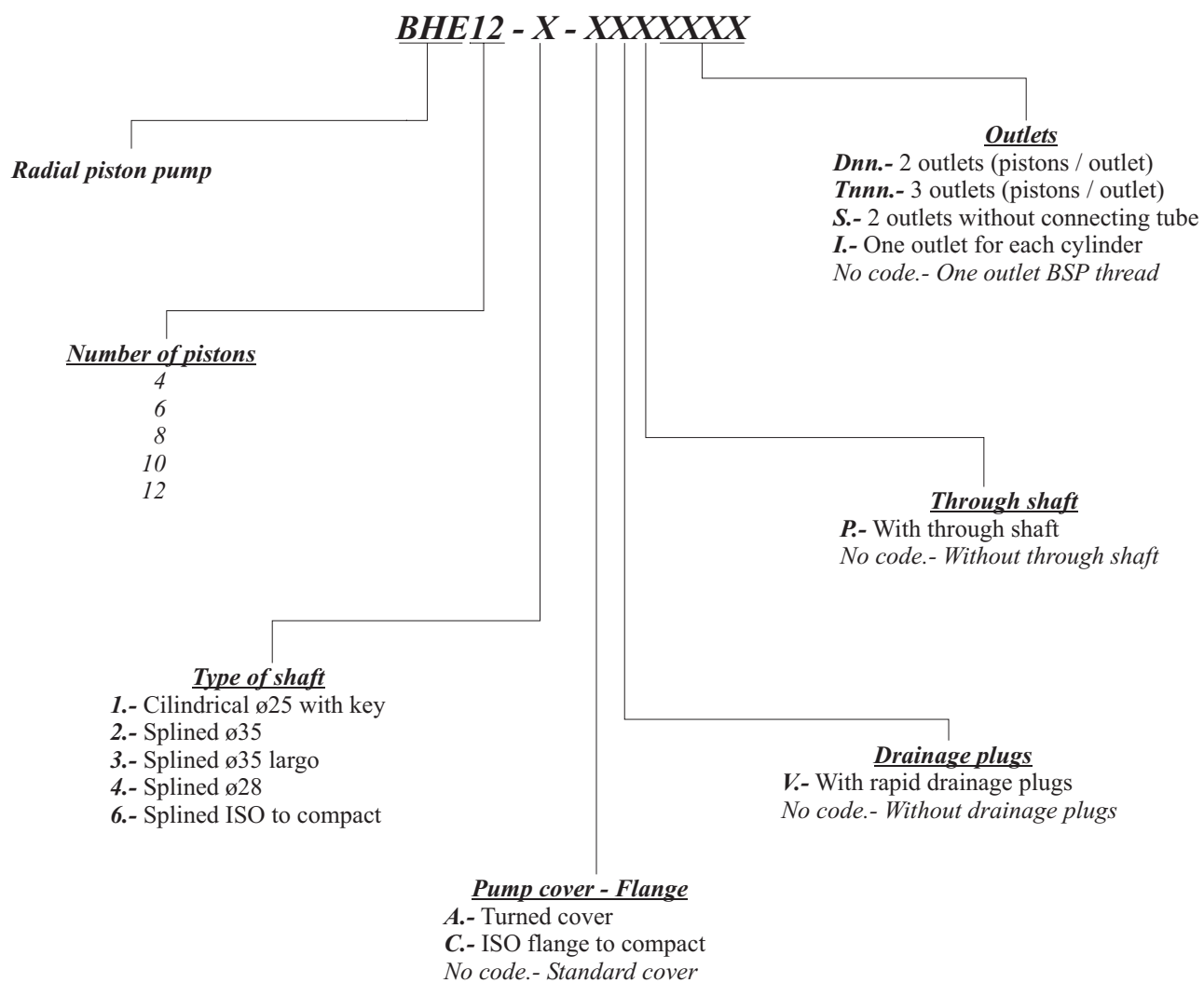
Use good quality mineral hydraulic oil, with viscosity at working temperature between 2 and 4°E (12 and 30 cSt.). Maximum viscosity in cold start : 50°E (400 cSt.). Other fluids (even little lubricating ones) are possible, consult.

Filtering :

The BHE pumps are very resistant to oil contamination, but a good filtering will prolong their life and that of the other circuit components. We recommend a 40 micron return filter or smaller.



Radial Piston Pumps Codification



Examples:

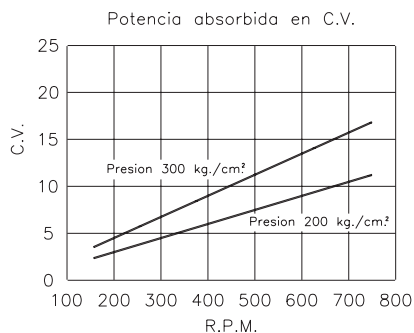
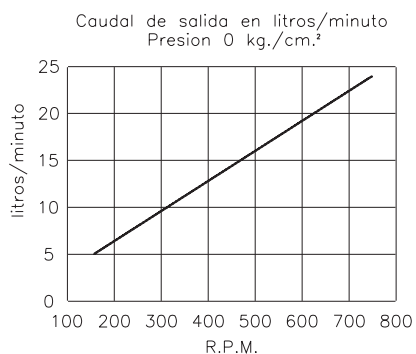
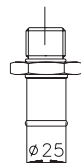
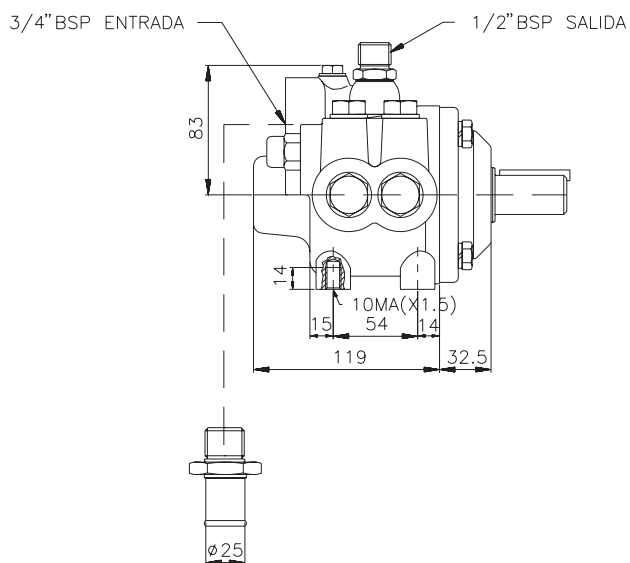
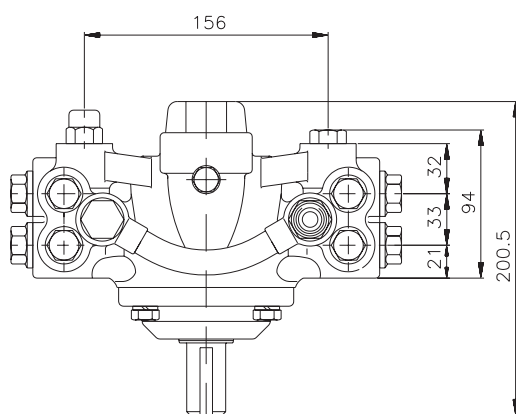
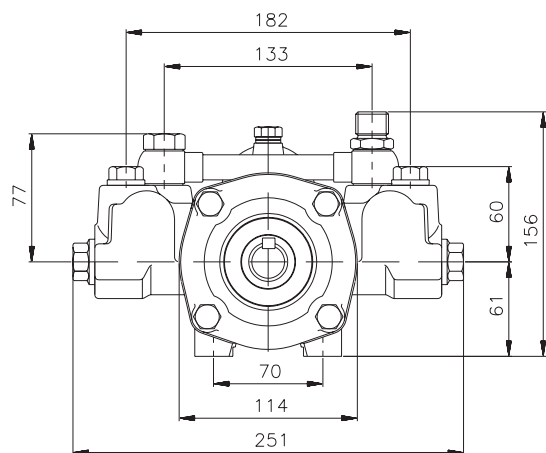
BHE4-1: Pump BHE of 4 pistons with shaft n°1.

BHE12-2-PD84: Pump BHE of 12 pistons with shaft n° 2, through shaft and 2 outlets with 8 & 4 pistons per outlet.



Radial Piston Pumps BHE - 4 General Dimensions

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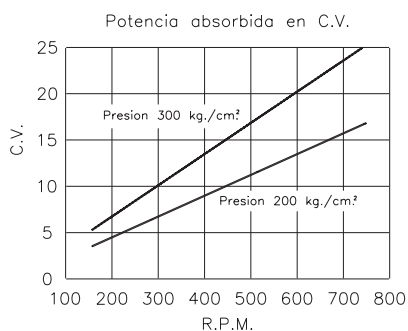
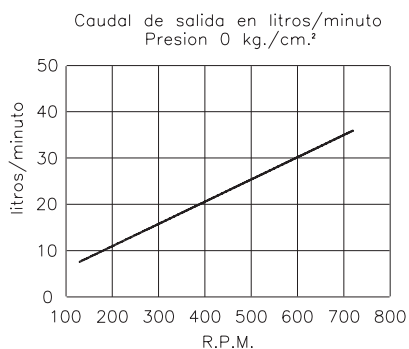
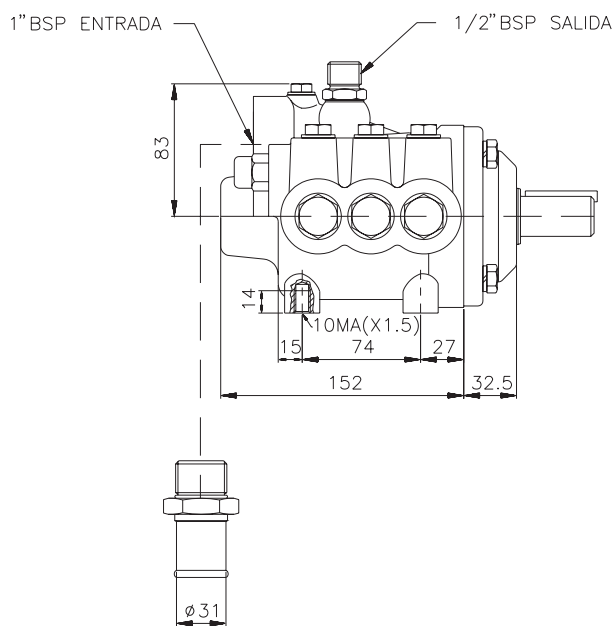
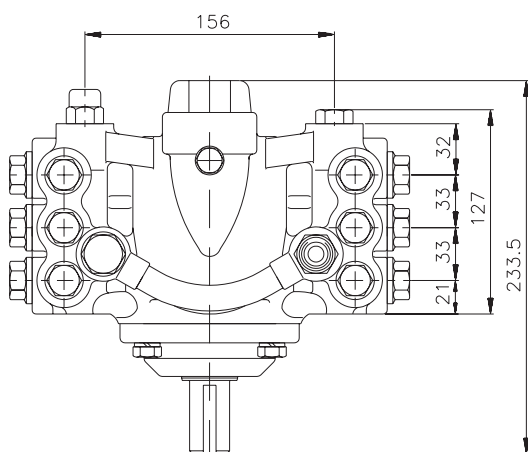
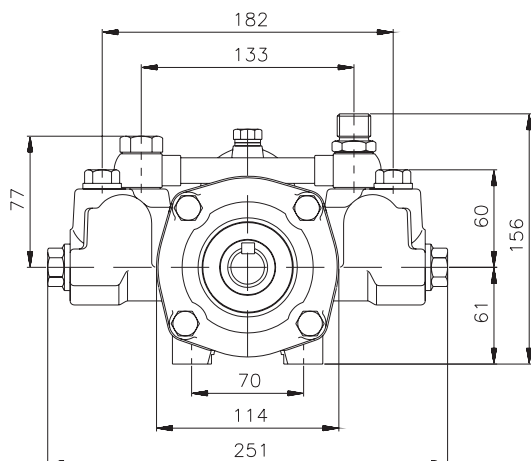


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Radial Piston Pumps BHE - 6 General Dimensions

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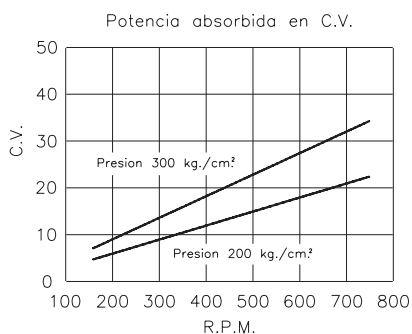
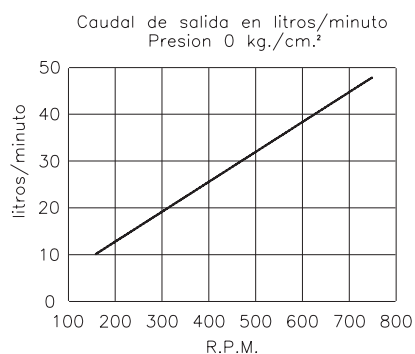
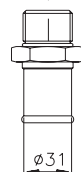
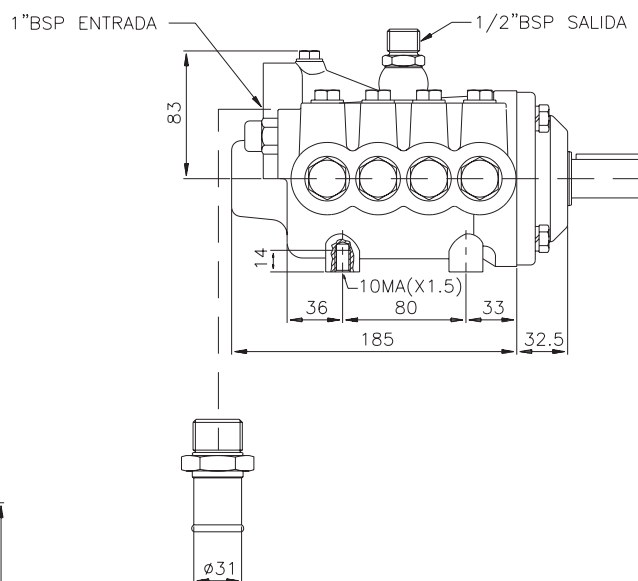
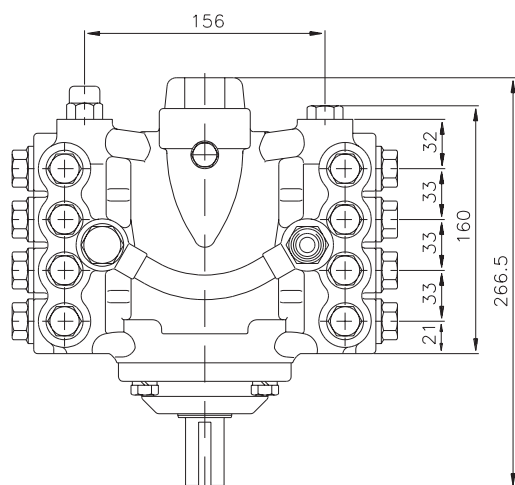
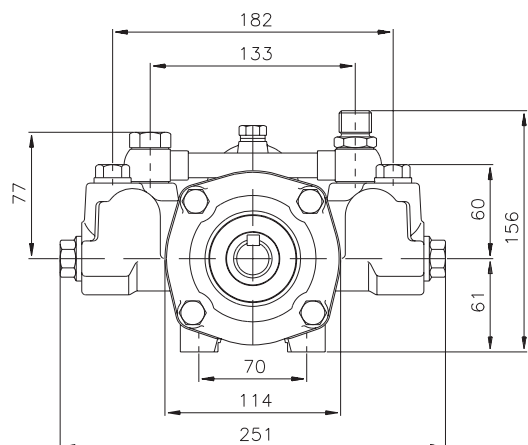


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Radial Piston Pumps BHE - 8 General Dimensions

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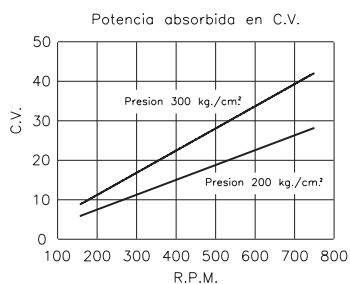
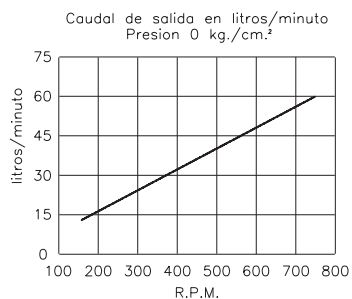
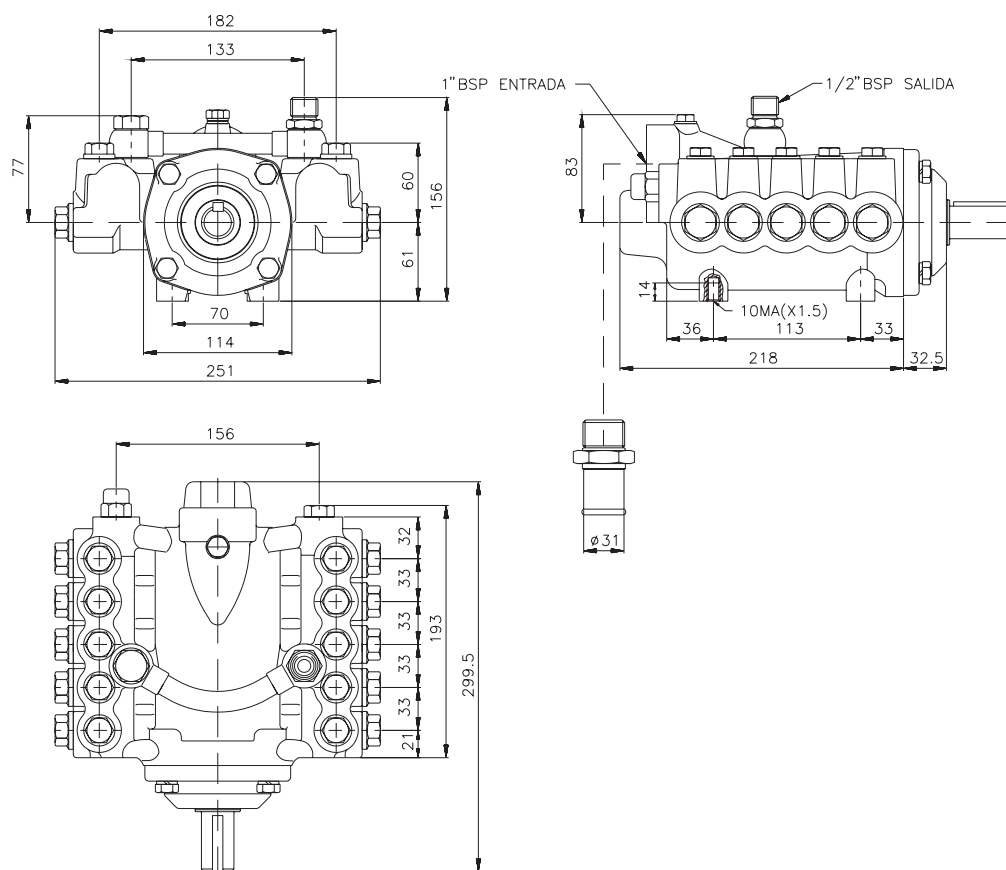


1.02.03



Radial Piston Pumps BHE - 10 General Dimensions

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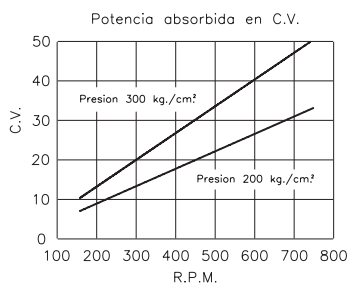
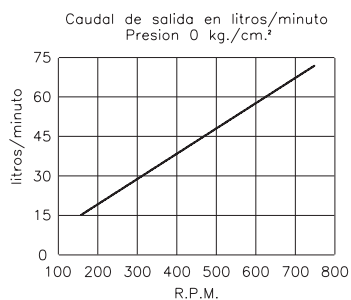
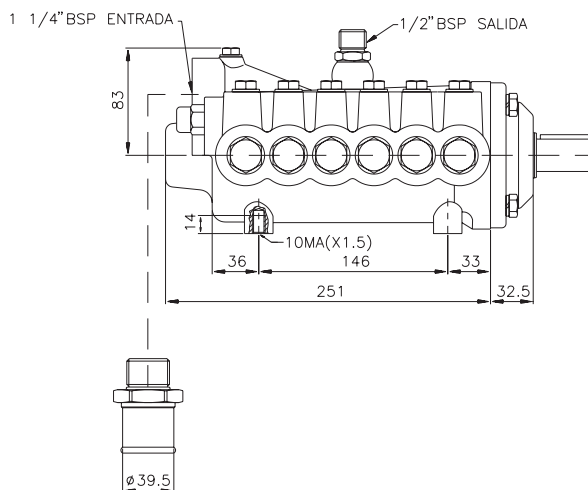
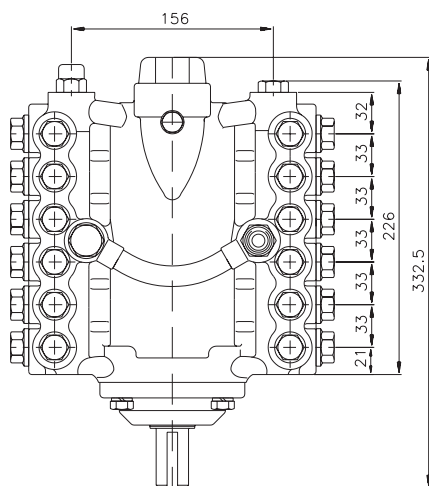
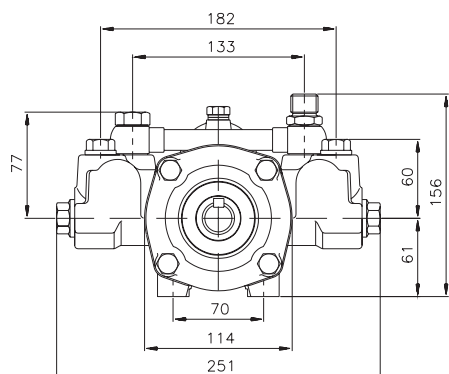


1.02.04



Radial Piston Pumps BHE - 12 General Dimensions

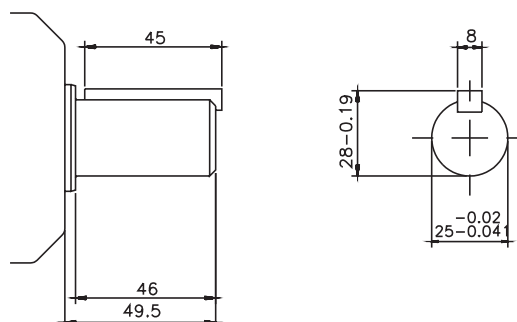
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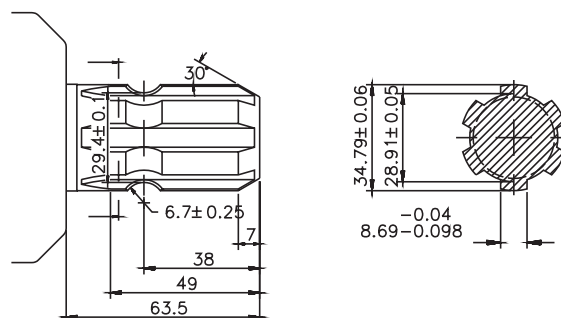
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The following types of shaft are normally available in stock.
Other types of special shafts can be manufactured if the amounts to be supplied justify this.

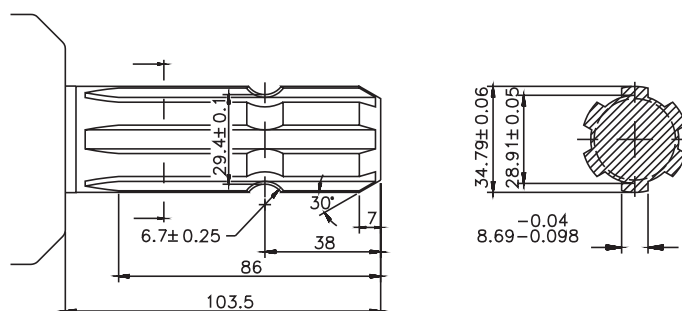
Shaft n°1



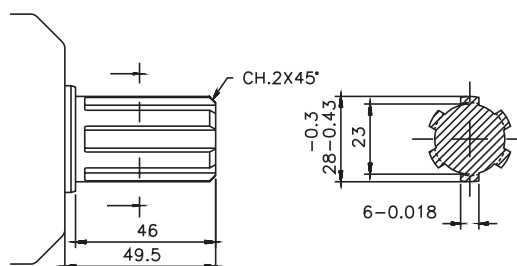
Shaft n°2



Shaft n°3



Shaft n°4



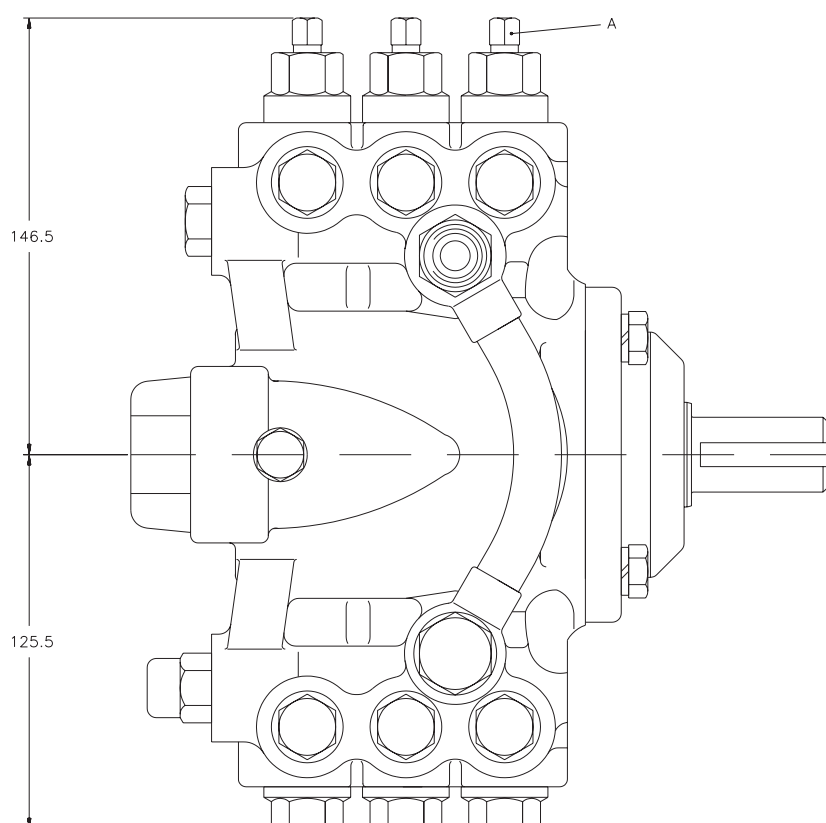


Radial Piston Pumps Options Rapid drainage plugs

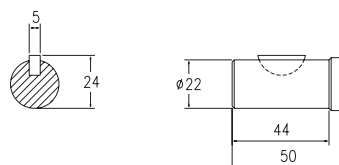
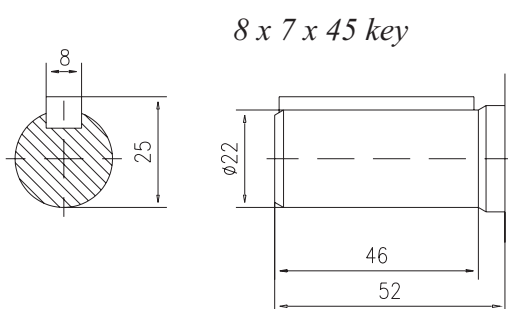
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The BHE pumps can operate both in horizontal and vertical position. However, when mounted in vertical position, it may be difficult to drain out the air retained in the upper part of the body, during the initial start up.

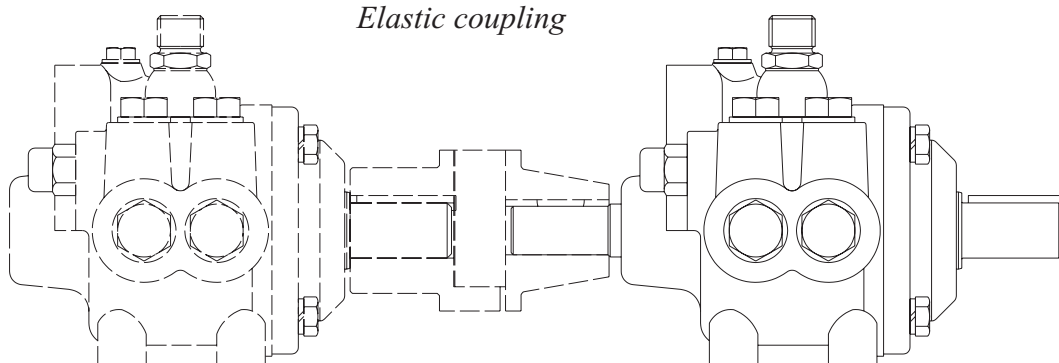
In these cases the rapid drainage plugs mounted on the upper cylinder are very useful. It will only be necessary to slightly unscrew the small (A) plugs with the pump in operation, until the air comes out. The drainage will be immediate even with the oil tank below the pump level.



The BHE pumps can be supplied with passing-thru shaft to move another BHE pump or any other device. Consult with Hidraulica Fher Technical Department to find out the maximum transmissible couple in function of the different types of pumps and conditions of use.



Elastic coupling





Radial Piston Pumps Options Double and Triple Pumps



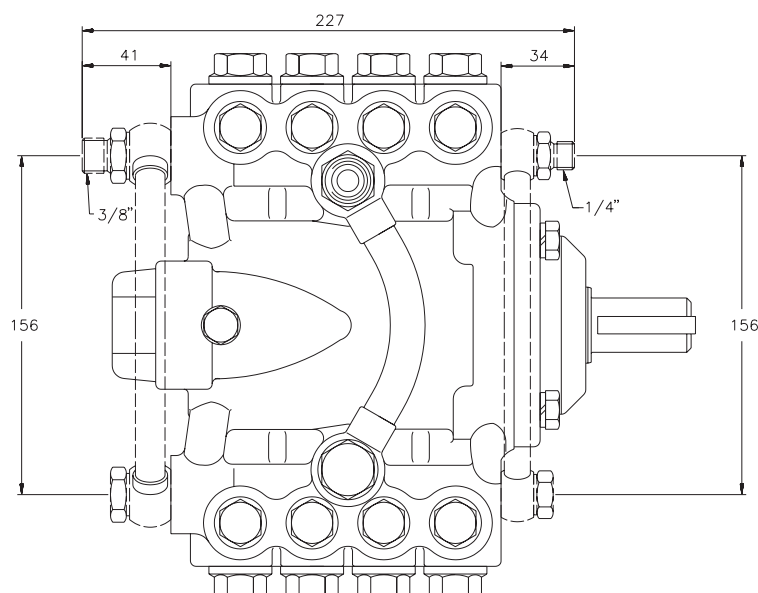
On order, Hidráulica Fher can supply BHE pumps shaped as double or triple pumps. These pumps only have one oil intake and two or three independent outlets to supply the same amount of separate circuits.

Depending on the customer's needs, the pumps can be shaped with different numbers of cylinders for each outlet.

For example, with a double 12 cylinder pump the following combinations can be made :

OUTLET 1		OUTLET 2	
Number of cylinders	Flow vol (cc./rev.)	Number of cylinders	Flow vol (cc./rev.)
4	32	8	64
6	48	6	48
10	80	2	16

In the double pumps, one of the outlets will be protected by the pressure limiting valve of the pump. In triple pumps it will be necessary to get rid of this valve.



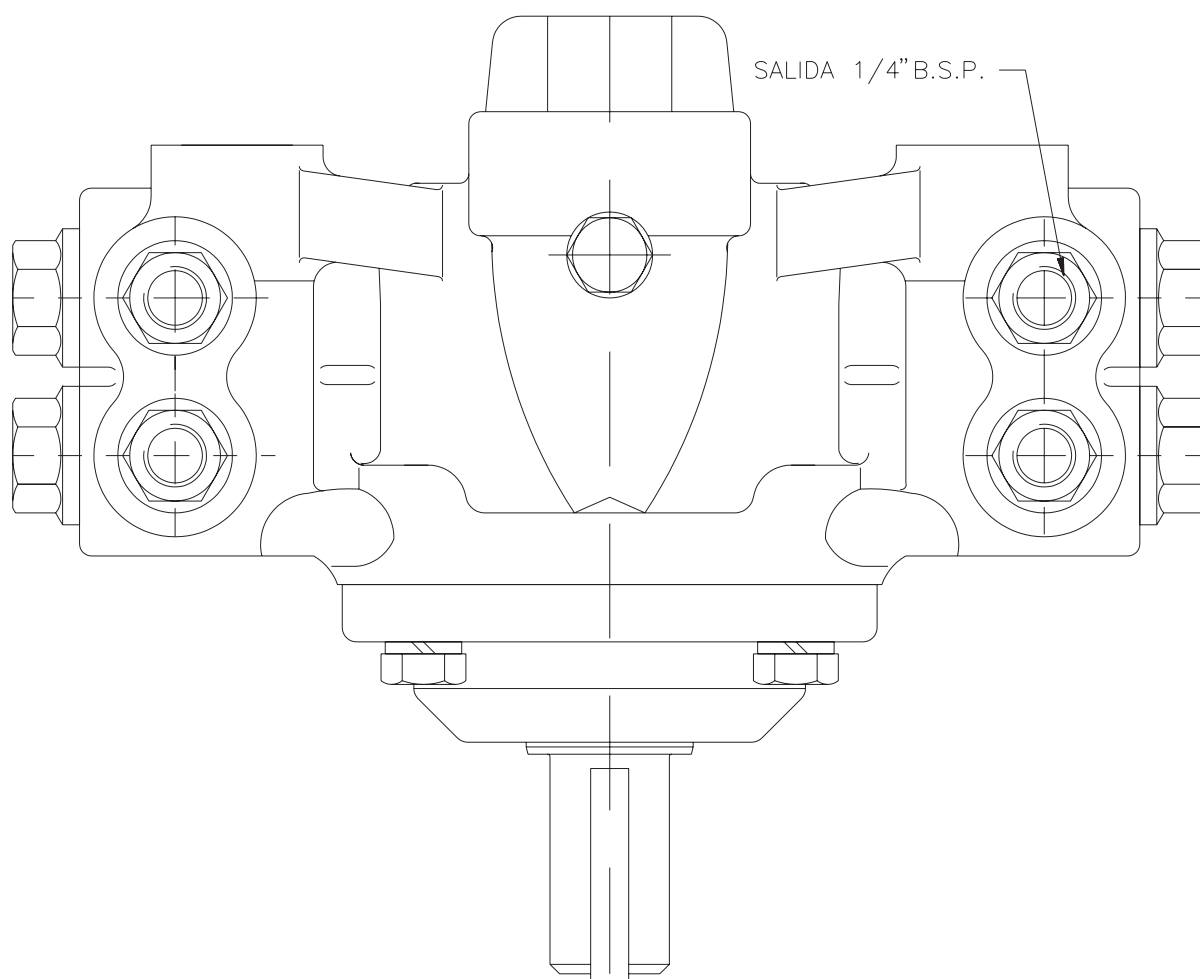
Sizes of the outlets : 1/2" BSP for the first, to be chosen between 1/4" BSP and 3/8" BSP for the second and third.



**Radial Piston Pumps
Options
Double and Triple Pumps**

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All the BHE pumps can be supplied with an independent outlet for each cylinder.



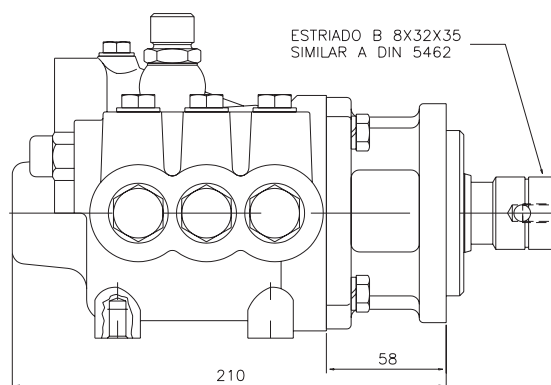
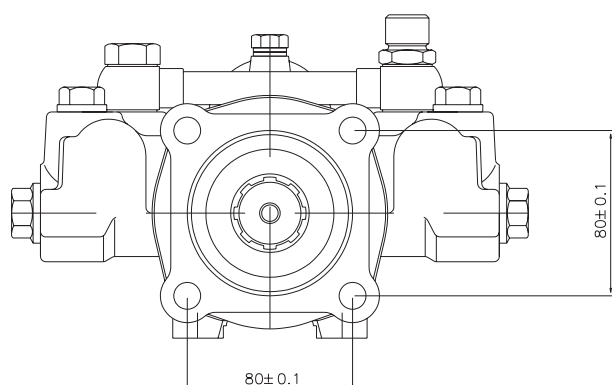
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Radial Piston Pumps Options Double and Triple Pumps



By using the flange and shaft according with the I.S.O. 7653 standard, the BHE pumps can be mounted directly on the power take off (P.T.O.), resulting in a compact assembly.



Depending on the space available, the pump can be mounted horizontally or vertically, the operation being identical in both cases. Only for the air drainage in the first start up, when the assembly is vertical, is it recommendable to use rapid drainage plugs (see page 1.03.02).

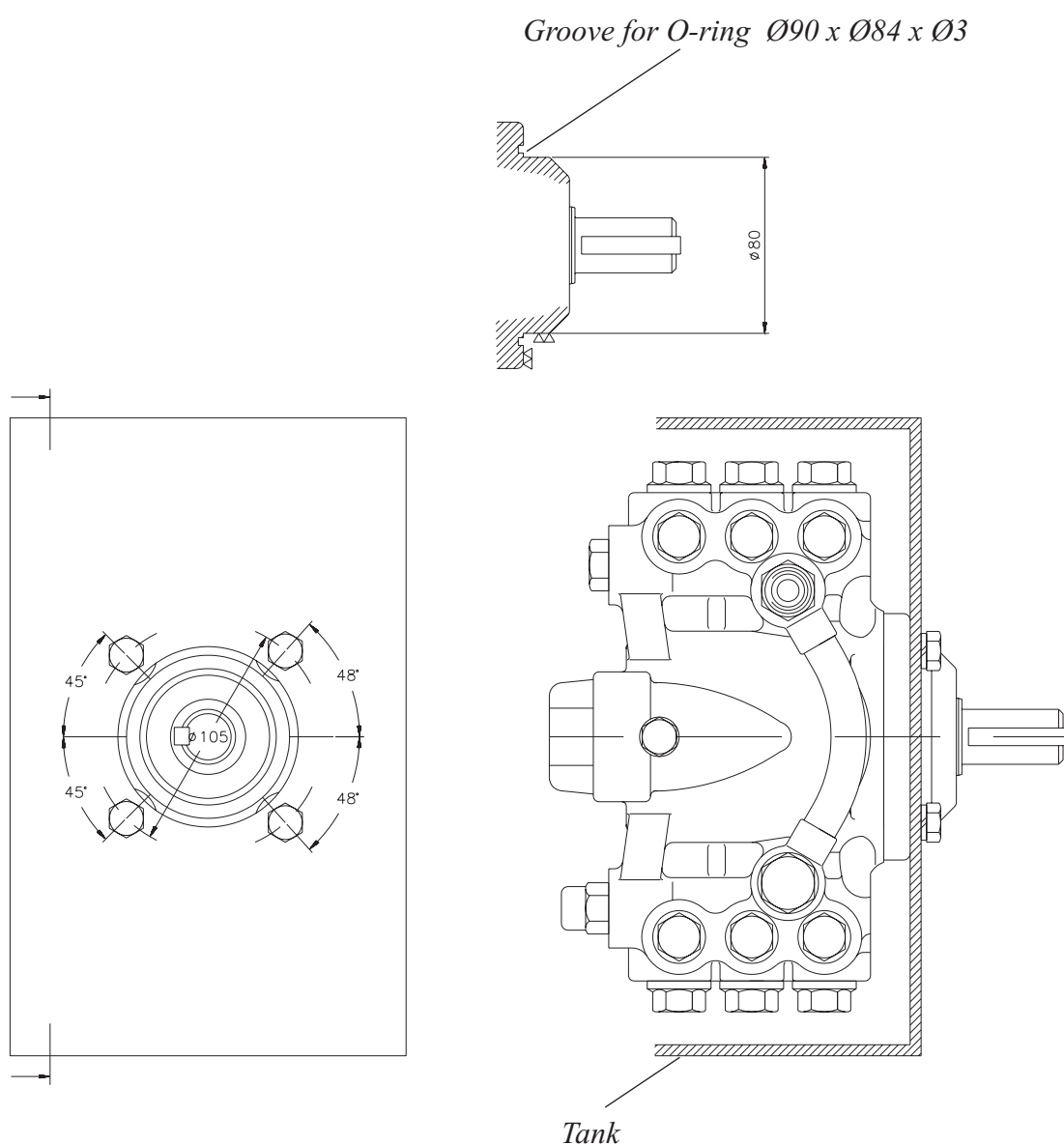


Radial Piston Pumps Options Double and Triple Pumps

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The BHE pumps can be mounted submerged on the inside of the oil tank.
In this case, the pump can be supplied with the lid turned to guarantee watertightness and centering.

The watertightness of the O-ring will be conditioned by the flatness of the inner surface of the tank. If this cannot be guaranteed, other watertightness systems must be used.



1.03.07



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Axial Piston Pumps

DESCRIPTION

This new generation of products combines the use of advanced materials, thermal treatments, and manufacturing processes, with a sophisticated computer assisted design.

The result is a pump specifically designed to be truck mounted, with the following advantages :

-Minimum Size.

Thanks to its design with inclined plate and pistons parallel to the shaft, and its reduced number of parts. For you to never have assembly problems.

-Maximum Reliability.

The new BA Pumps inherit the fame of sturdiness from their ancestors the BHE Pumps. For this they have a purified design with the minimum amount of components, which means minimum probability of trouble. In addition, highly resistant materials have been used in the necessary places to ensure a long working life without problems. We have also used advanced thermal treatments which produce very great hardness on the surfaces most exposed to wear, especially with dirty oils. And if this were not enough, we have installed in the pump itself a safety valves, so that not even accidental overloads can cause trouble.

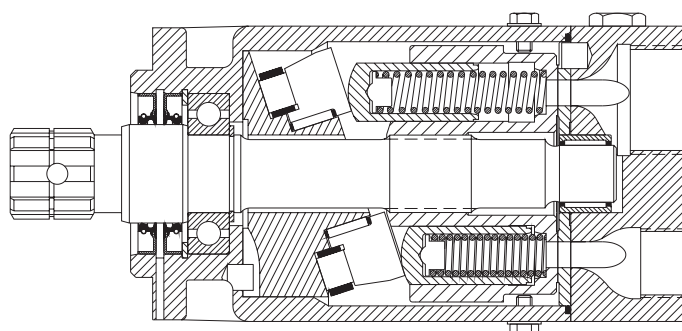
-High performances.

350 Bar maximum pressure, 1500-1800 R.P.M. and high efficiency in the whole speed range. For your truck to stand up to everything.

-Accessories.

The pump includes as standard accessories without excess price, a suction nozzle and a pressure limiting valve incorporated.

Other accessories with over-price include outlet raccord, check valve (see section 9.) and power take-off (see section 4.).





Axial Piston Pumps Description and Characteristics



TECHNICAL CHARACTERISTICS

Flow :

Initially available in five flow volumes : 20, 30, 40, 50 and 60 litres/min. at 1000 R.P.M.

In the near future we will introduce models of 80 and 110 litres/min..

Pressure :

Maximun continuous pressure : 250 Bar.

Maximun intermitent pressure : 350 Bar.

Speed :

Maximun continuous speed : 1500 R.P.M.

Maximun intermitent speed : 1800 R.P.M.

Rotation :

This can be modified, the cover rotating 180°, with a safety system which prevents the inner parts from moving. Two half arrows on body and cover indicate the rotation direction.

Assembly :

Direct on power take off, by standard coupling of 4 holes and splined shaft. Assembly position indifferent.

Oil :

Use top quality mineral hydraulic oil, with viscosity at working temperature between 3 and 5°E (20 and 37 cSt.).
Maximun viscosity in cold start : 50°E (400 cSt.).

Filtering :

Good filtering will prolong the life of the pump decreasing wear. A 25 Micron return filter is recommended or finer.

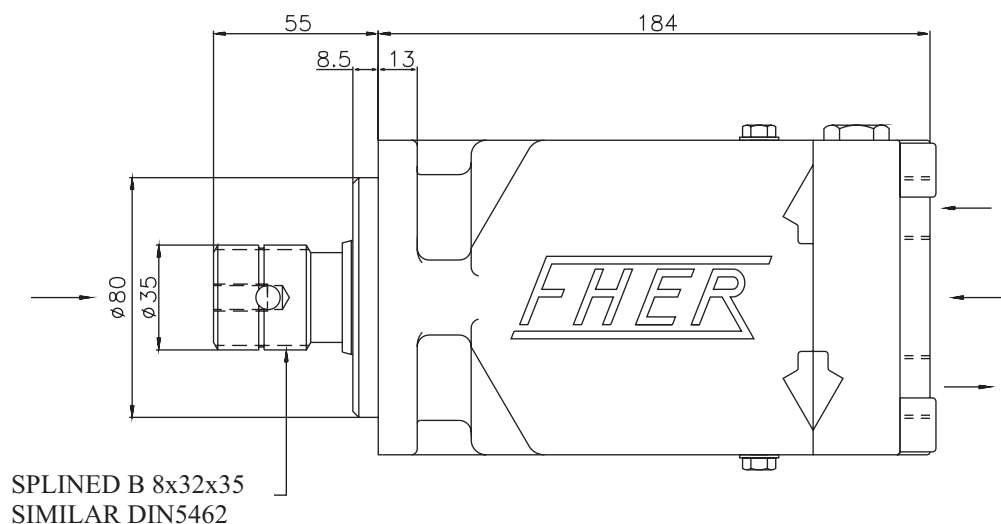
Start up :

The BA pumps are self-aspirating, so the first start up does not pose difficulties, even with the tank lower than the pump. In extreme cases, it may be necessary to slightly loosen the outlet piping to permit the air to be released.

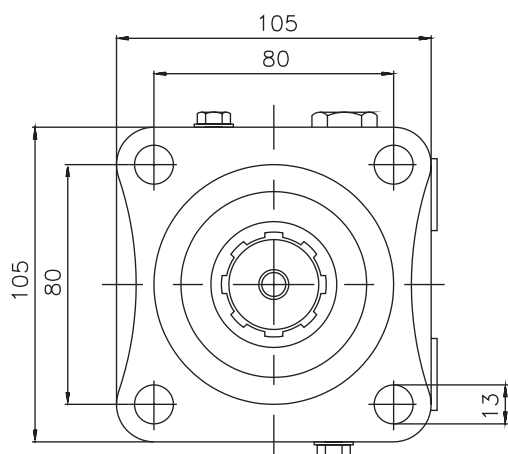


Axial Piston Pumps BA-40, BA-30, BA-20 General Dimensions

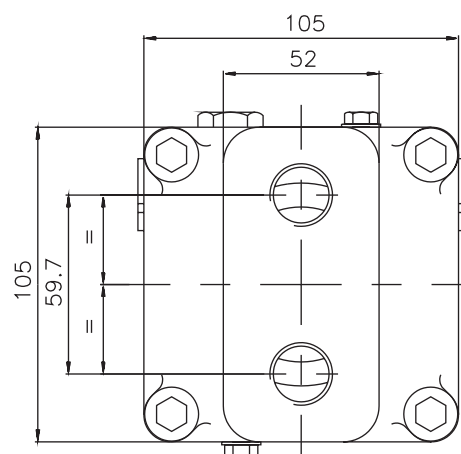
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VIEW FROM Y



VIEW FROM X



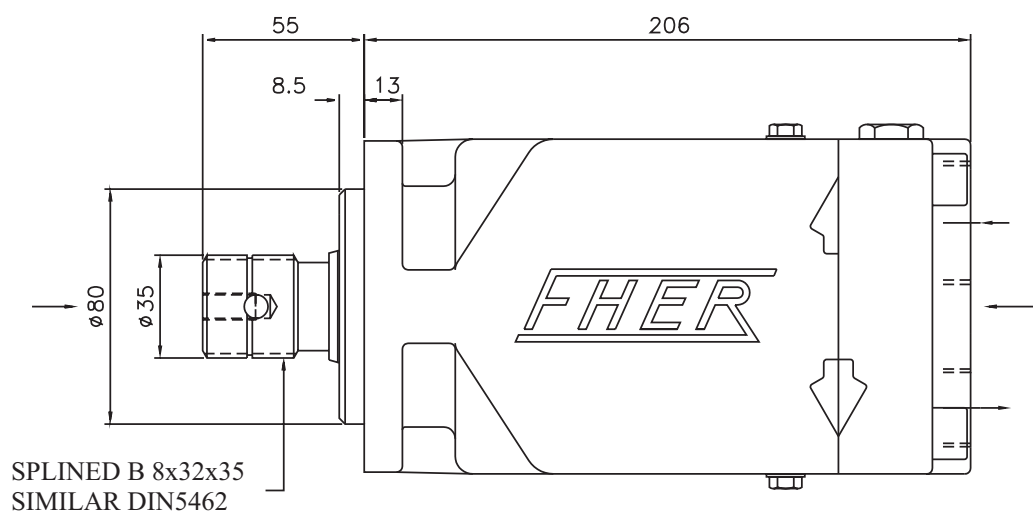
MODEL	FLOW VOLUME at 1000 rpm.	ENTRY (E)	OUTLET (S)
BA-20	20 l./min.	1"BSP	1/2"BSP
BA-30	30 l./min.	1"BSP	1/2"BSP
BA-40	40 l./min.	1"BSP	1/2"BSP

2.02.01

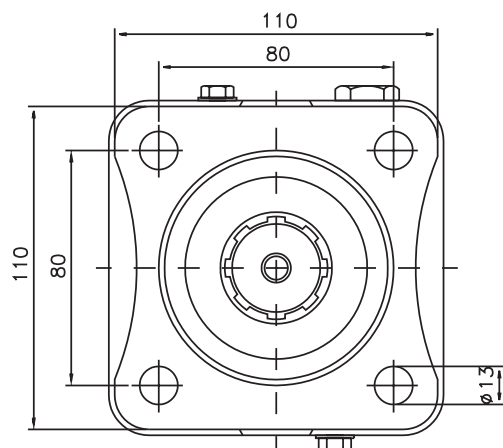


Axial Piston Pumps BA-60, BA-50 General Dimensions

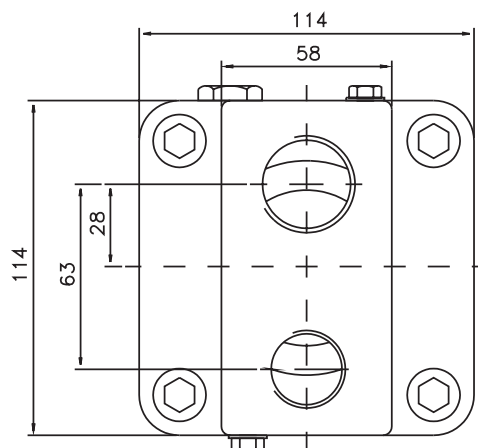
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VIEW FROM Y



VIEW FROM X



MODEL	FLOW VOLUME at 1000 rpm.	ENTRY (E)	OUTLET (S)
BA-50	50 l./min.	1 1/4"BSP	3/4"BSP
BA-60	60 l./min.	1 1/4"BSP	3/4"BSP



TDZGroup

**“BB” Axial piston pumps
&
“MB” Axial piston motors**



**“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR**



“BB” AXIAL PISTON PUMP and “MB” AXIAL PISTON

Series BB is a further development of our well known pumps and motors for truck applications. Hidraulica FHER piston pumps have been in production for more than 50 years and have distinguished themselves by their outstanding reliability and high output in hundreds of applications.

The BB offer additional advantages compared with our classical BA or BHE piston pumps that have been operating during decades.

Series BB "bent-axis" axial piston pumps and motors are designed to meet all operational requirements such as high rate of flow , high pressure, low weight, compactness, direct connection to truck power take-offs and easy and inexpensive mounting installation.

Operators of cranes, dumpers, hook loaders, forest cranes or similar truck applications will find a very efficient pump.

Main BB and MB advantages:

- High Speeds
- Low noise level
- Operating pressure to 350 bar
- Small installation dimensions
- Low weight
- High volumetric and mechanical efficiencies
- Wide range of flows, (from 20c.c./rev. to 110 c.c./rev.)

Main BB and MB technical achievements:

- Spherical pistons allowing high speeds
- 40°, (20° in BB20 and BB30) bent-axis angle
- Optimal inlet port geometry
- Laminated piston rings allowing low leakage
- Tolerates low and high temperature changes
- Possibility of installation above the oil tank level
- Mounting flange and shaft meet the ISO standard
- MB axial piston motor allows high torque and acceleration



**“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR**

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INSTALLATION AND TECHNICAL DATA

INSTALLATION AND START UP

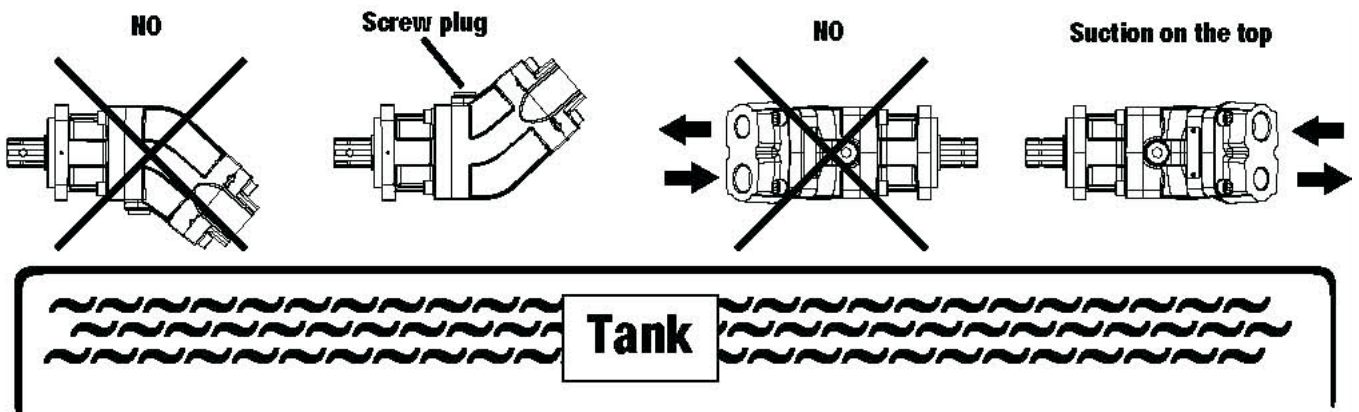
All pumps have shaft end and 4-hole mounting flange according ISO 7653 for direct mounting to the PTO. BB pumps can be driven by the PTO of the truck, an electric motor, diesel engine (with an elastic coupling) or cardan shaft. If a V-Belt is to be used, please consult us. Mounting position: the drive shaft should be horizontal.

If pump is mounted above the tank level, special measures should be taken to assure that the pump will be full of oil under all circumstances.

Initial start up:

Clean all the hydraulic system before filling with oil. Fill the pump with oil thru the suction and pressure orifices.

If the pump is mounted above the tank, fill also thru the screw plug in the housing. BB pumps are self bleeding and self priming. Start without pressure at a moderate speed (500 r.p.m.). If no oil flow is detected after 15 seconds, stop and check that the suction line is open and the direction of rotation is correct.



HYDRAULIC FLUID

Use mineral based oils for hydraulic systems.

To select the correct viscosity, the operating temperature of the oil, measured in the tank should be considered.

At operating temperature, the viscosity of the oil should be within the range of 20-35 cSt.

The oil in the housing of the pump (leakage oil) is typically at a higher temperature than the tank temperature. Maximum temperature at any point in the system must be less than 90°C.

If this temperature is exceeded in the housing of the pump, special shaft seals should be used. (Add option «F» to the ordering code).

Please, use the following guidelines to choose the correct oil grade.

20-40 ° C : VG 22 - VG 32.

40-60 ° C : VG 32 - VG 46.

60-90 ° C : VG 68 - VG 100.

FILTRATION

The finer the filtration, the better the achieved purity grade of the fluid, and the longer the life of the pump. Purity grades of 18/13 (ISO 4406) or 9 (NAS 1638) should be guaranteed by the filtration system.

We suggest a return filter, (avoid a filter in the suction line) with a mesh from 10 µm (high pressure and/or contaminated environment) to 25 µm (low pressure and clean environment).

The flow capacity of the filter should be at least twice the pump flow under the operating conditions.

3.01.02

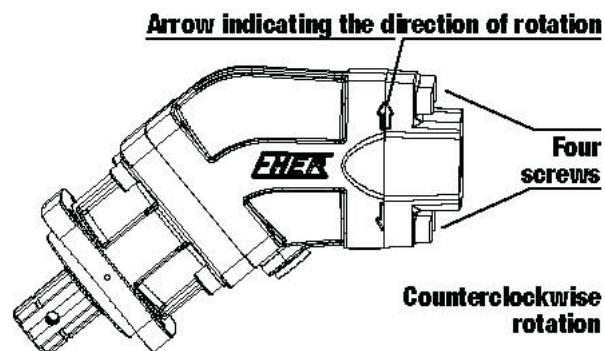


**“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR**

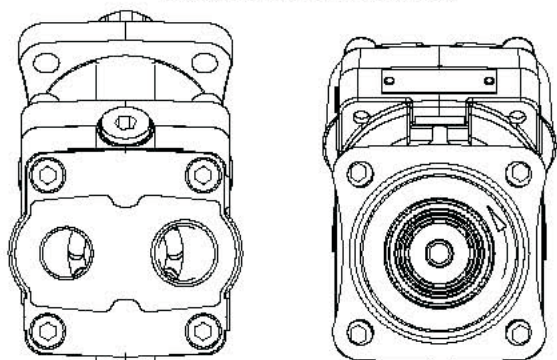
T D Z Group

ROTATION

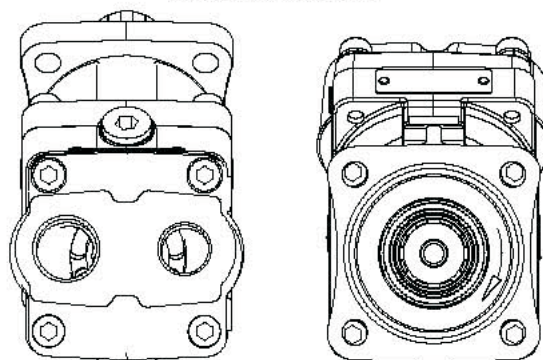
Direction of rotation of the pump can be changed removing the four screws of the iron cover, to rotate it 180°. An arrow is drawn up in both housing and cover indicating the direction of rotation. With no other indication of the customer, all the pumps are supplied with clockwise rotation.



Counterclockwise rotation



Clockwise rotation



DRAIN LINE

The BB pumps are internally drained. A drain line is therefore not necessary.

WORKING PRESSURE

Inlet side: Min. 0,8 Bar (absolute). Max. 2 Bar (absolute).

Outlet side: Constant pressure 300 Bar, peak pressure 350 Bar.

Ordering code

***B / 60 / F / 2 / S / R**

Rotation: R= Righthand (clockwise), L=Left (counterclockwise).

S: Special mounting flange. Not used with standard flange ISO 7653.

2: Special shaft number. Not used with standard splined shaft 8x32x36 DIN 5462.

F: FPM seals. For housing temperatures higher than 90°C, or non mineral fluids.

Not used with standard NBR seals.

Size, (C.C. /Rev.): 20, 30, 40, 60, 78 (peak pressure 300 Bar.), 80 and 110.

BB: Fix displacement axial piston pump, bent axis design. Peak pressure 350 Bar.

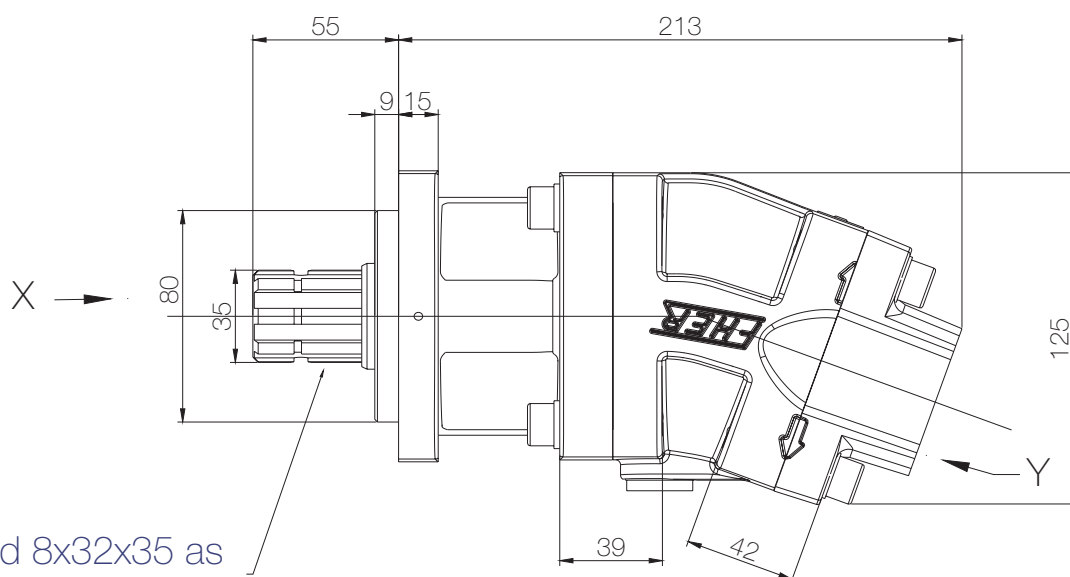
MB: Fix displacement axial piston motor, bent axis design. Peak pressure 300 Bar.



**“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR**

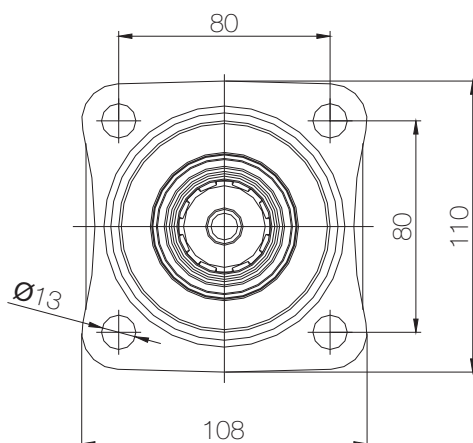
T D Z Group

**Piston Pump BB20 - BB30
Piston Motor MB20 - MB30**

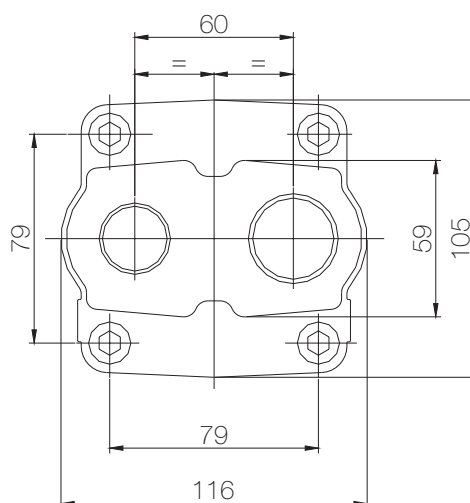


Splined 8x32x35 as
per DIN Standar 5462

View per X



View per Y



SPECIFICATIONS

Model	Flow at 1.000 r.p.m.	Continuous pressure	Peak pressure	Continuous speed	Peak speed	Inlet E	Outlet S	Weight
BB20	21 ltrs./min.	300 Bar	350 Bar	2.300 rpm	3.000 rpm	1" BSP	3/4" BSP	8,1 Kgs.
BB30	30 ltrs./min.	300 Bar	350 Bar	2.000 rpm	2.700 rpm	1" BSP	3/4" BSP	8,1 Kgs.
MB20	21 ltrs./min.	250 Bar	300 Bar	2.300 rpm	3.000 rpm	3/4" BSP	3/4" BSP	8,1 Kgs.
MB30	30 ltrs./min.	250 Bar	350 Bar	2.000 rpm	2.700 rpm	3/4" BSP	3/4" BSP	8,1 Kgs.

3.02.01

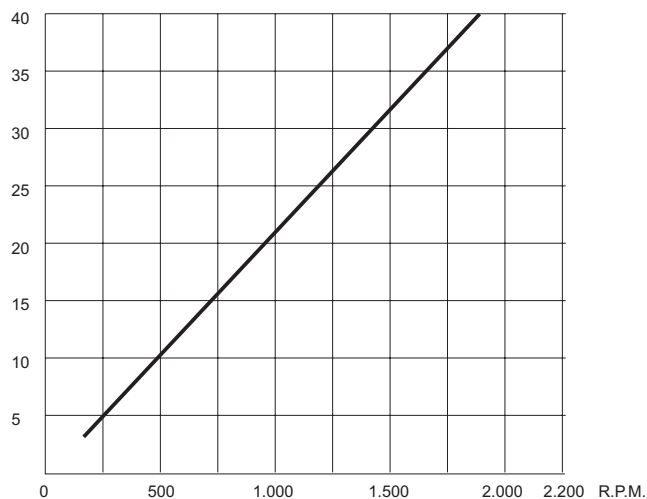


“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR

T D Z Group

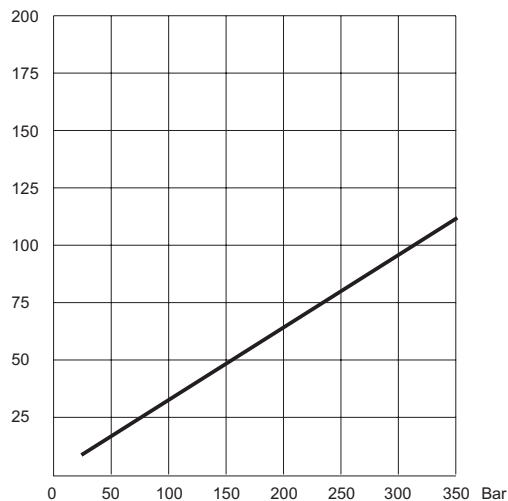
FLOW
(lts./min)

BB20



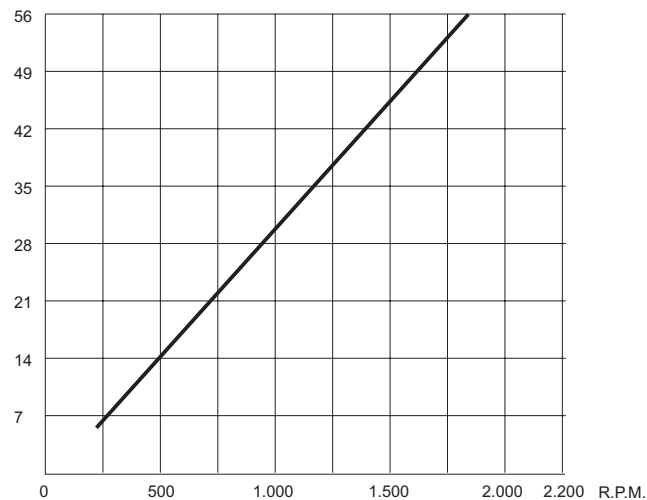
TORQUE
(Nw.m)

BB20



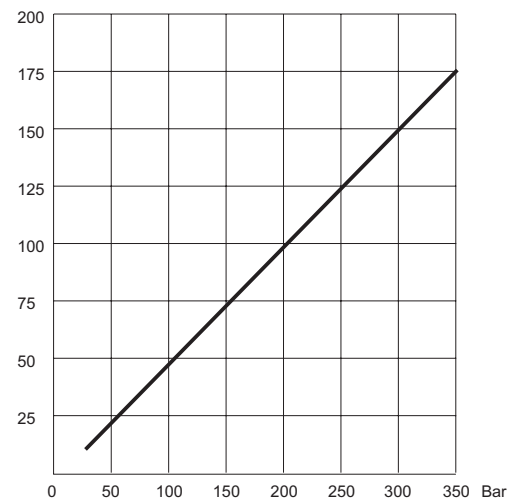
FLOW
(lts./min)

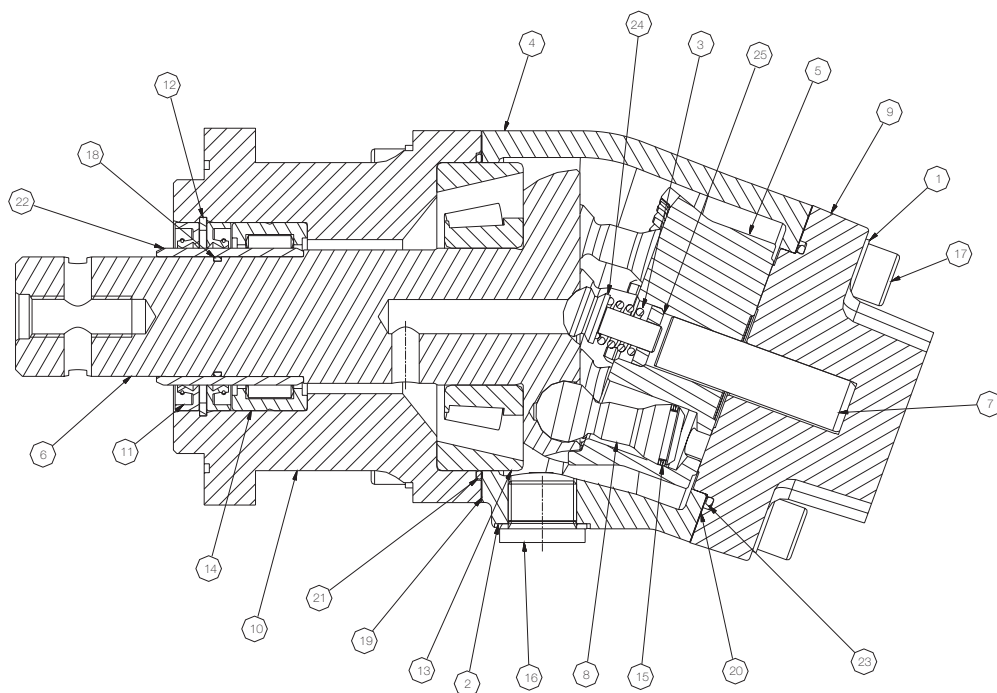
BB30



TORQUE
(Nw.m)

BB30





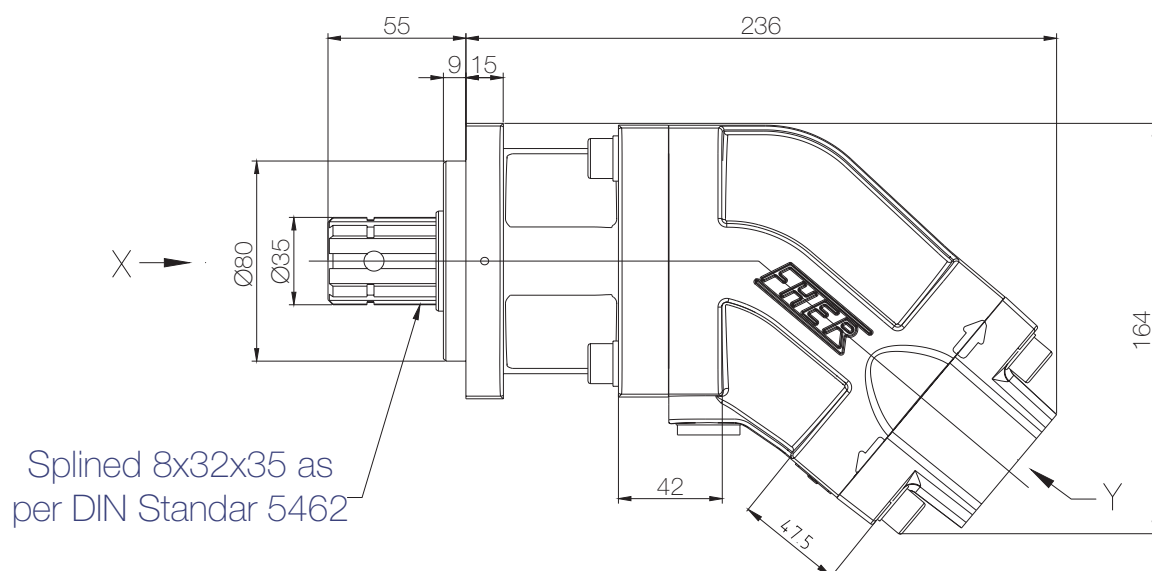
ELE	DESCRIPCIÓN	DESCRIPTION
1	Arandela Grower	Grower washer
2	Junta USIT	USIT seal
3	Muelle	Spring
4	Cuerpo acodado Aluminio	Body
5	Tambor	Barrel
6	Eje bomba	Pump shaft
7	Eje tambor	Barrel shaft
8	Piston	Piston
9	Tapa bomba	Pump cover
10	Cuerpo de rodamientos	Bearings's body
11	Reten	Shaft seal
12	Grupilla	Retaining ring
13	Rodamiento de rodillos conicos	Roller bearing
14	Rodamiento de agujas	Needle rollerbearing
15	Segmento	Piston ring
16	Tapon roscado	Screw plug
17	Tornillo de cabeza cilindrica	Cylindrical-head screw
18	Junta Torica del eje	Shaft O-ring seal
19	Junta cuerpo-cuerpo	Body-body seal
20	Junta tapa-cuerpo	Cover-body seal
21	Junta torica cuerpo de rodamientos	Bearings's body O-ring seal
22	Casquillo para retenes y rodamiento	Bushing for oil seal and bearing
23	Junta torica tapa	Cover O-ring seal
24	Rotula apoyo muelle	Thrust ball
25	Tope muelle	Spring top



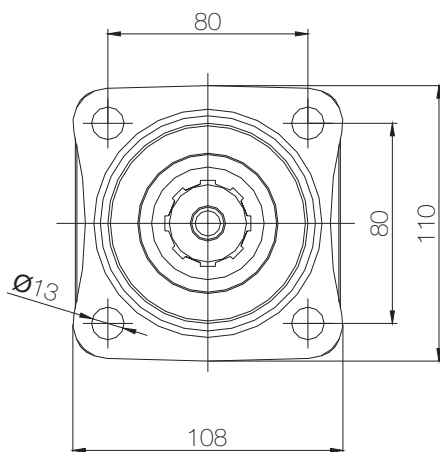
**“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR**

T D Z Group

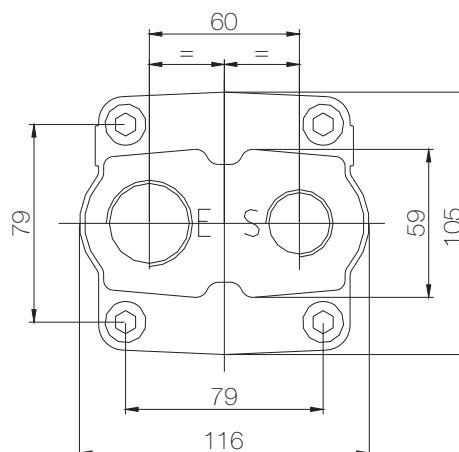
**Piston Pump BB40 - BB30 - BB78
Piston Motor MB40 - MB60 - MB78**



View per X



View per Y



SPECIFICATIONS

Model	Flow at 1.000 r.p.m.	Continuous pressure	Peak pressure	Continuous speed	Peak speed	Inlet E	Outlet S	Weight
BB40	45 ltrs./min.	300 Bar	350 Bar	1.500 rpm	2.200 rpm	1" BSP	3/4" BSP	9,8 Kgs.
BB60	63 ltrs./min.	300 Bar	350 Bar	1.500 rpm	2.200 rpm	1" BSP	3/4" BSP	9,8 Kgs.
BB78	78 ltrs./min.	225 Bar	300 Bar	1.500 rpm	2.000 rpm	1" 1/4 BSP	1" BSP	9,8 Kgs.
MB40	45 ltrs./min.	300 Bar	350 Bar	1.500 rpm	2.200 rpm	3/4" BSP	3/4" BSP	9,8 Kgs.
MB60	63 ltrs./min.	300 Bar	350 Bar	1.500 rpm	2.200 rpm	3/4" BSP	3/4" BSP	9,8 Kgs.
MB78	78 ltrs./min.	225 Bar	300 Bar	1.500 rpm	2.000 rpm	3/4" BSP	1" BSP	9,8 Kgs.

3.02.04

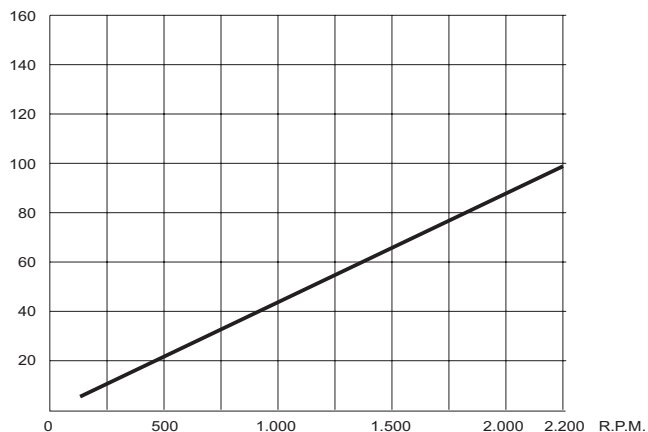


“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR

T D Z Group

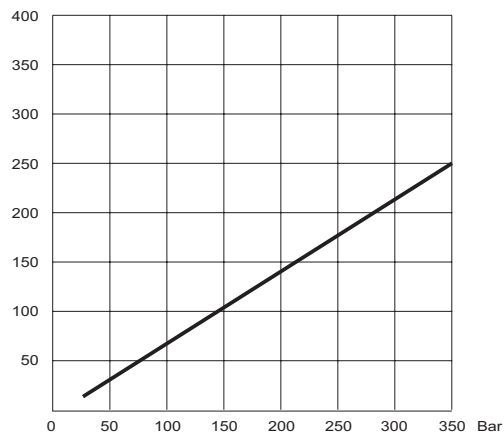
FLOW
(lts./min)

BB40



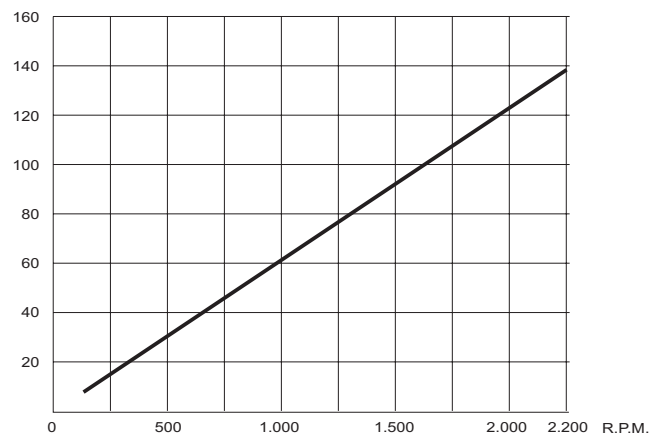
TORQUE
(Nw.m)

BB40



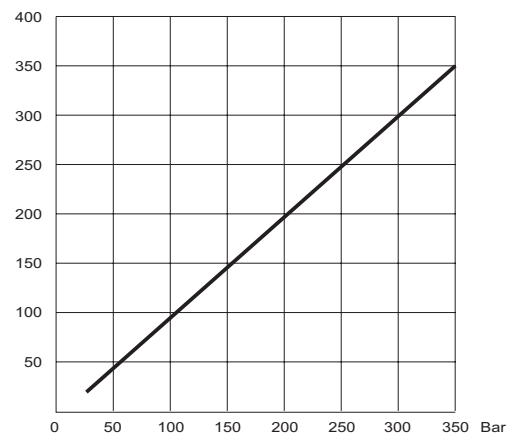
FLOW
(lts./min)

BB60



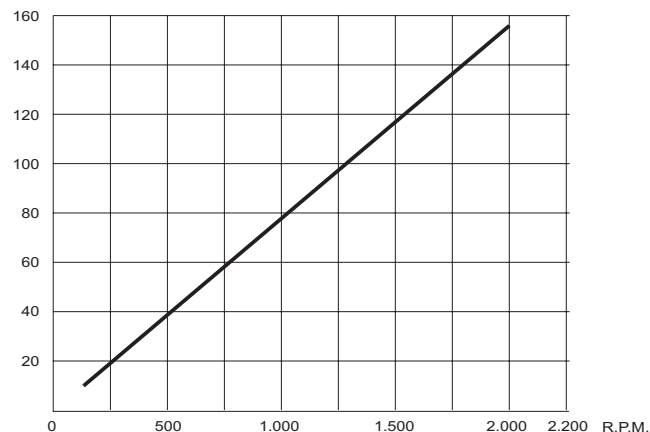
TORQUE
(Nw.m)

BB60



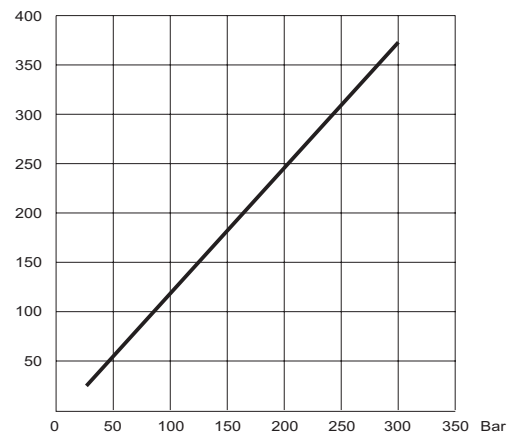
FLOW
(lts./min)

BB78

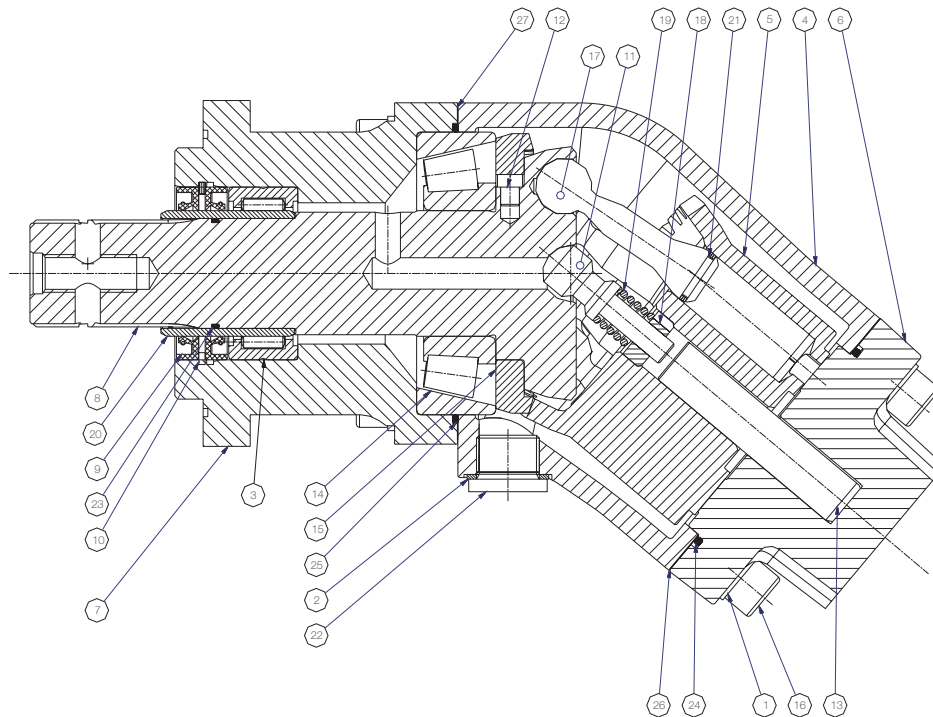


TORQUE
(Nw.m)

BB78



3.02.05



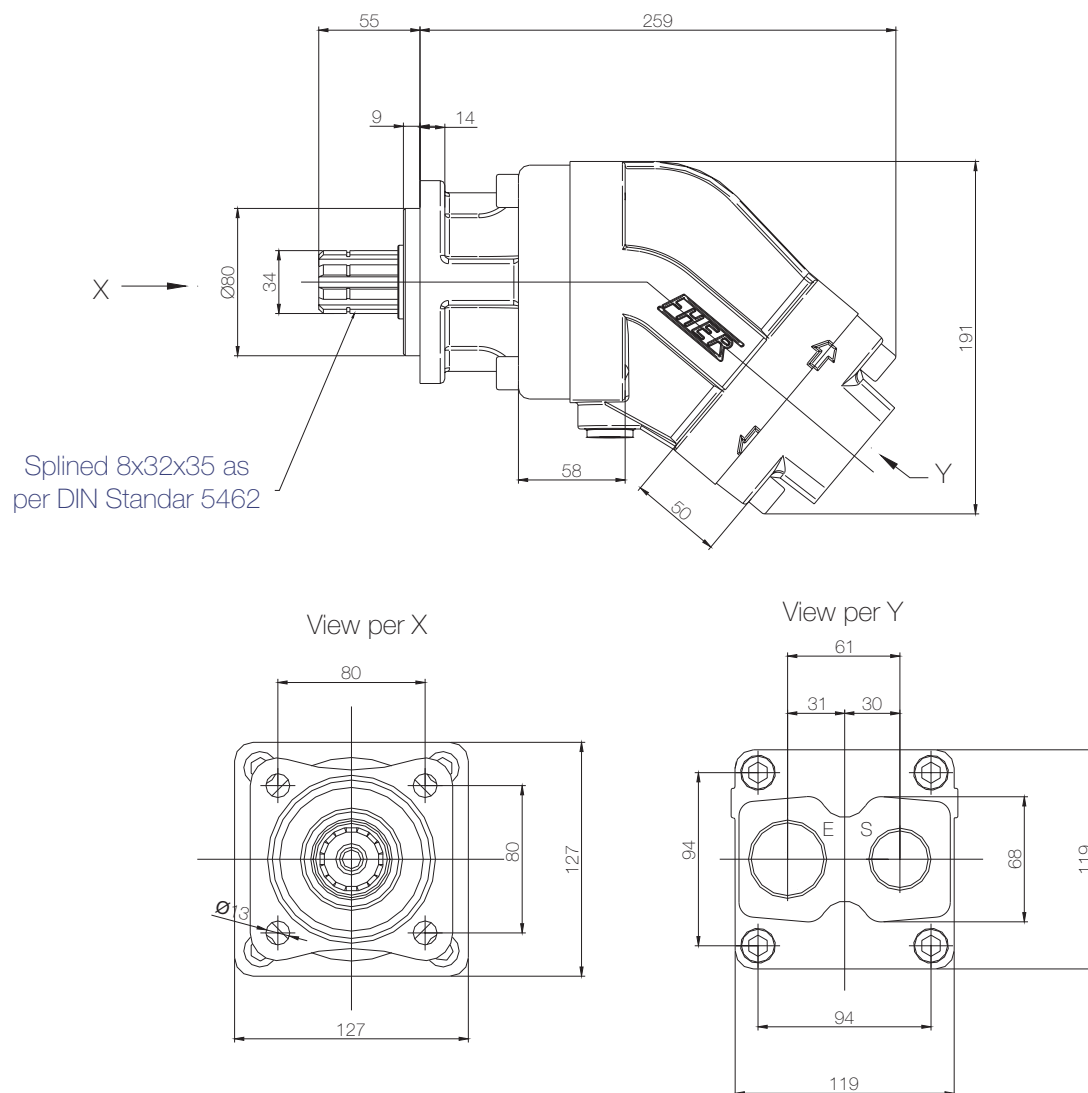
ELE	DESCRIPCIÓN	DESCRIPTION
1	Arandela Grower	Grower washer
2	Junta USIT	USIT seal
3	Rodamiento de agujas	Needle rollerbearing
4	Cuerpo acodado Aluminio	Body
5	Tambor	Barrel
6	Tapa bomba	Pump cover
7	Cuerpo de rodamientos	Bearings's body
8	Eje bomba	Pump shaft
9	Reten	Shaft seal
10	Grupilla	Retaining ring
11	Rotula apoyo muelle	Thrust ball
12	Chaveta	Key
13	Eje tambor	Barrel shaft
14	Rodamiento de rodillos conicos	Roller bearing
15	Corona	Timing gear
16	Tornillo de cabeza cilíndrica	Cylindrical-head screw
17	Piston	Piston
18	Muelle	Spring
19	Tope muelle	Spring top
20	Casquillo para retenes y rodamiento	Bushing for oil seal and bearing
21	Segmento	Piston ring
22	Tapon roscado	Screw plug
23	Junta Torica del eje	Shaft O-ring seal
24	Junta torica tapa	Cover O-ring seal
25	Junta torica cuerpo de rodamientos	Bearings's body O-ring seal
26	Junta tapa-cuerpo	Cover-body seal
27	Junta cuerpo-cuerpo	Body-body seal



**“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR**

T D Z Group

**Piston Pump BB80 - BB110
Piston Motor MB80 - MB110**



SPECIFICATIONS

Model	Flow at 1.000 r.p.m.	Continuous pressure	Peak pressure	Continuous speed	Peak speed	Inlet E	Outlet S	Weight
BB80	80 ltrs./min.	300 Bar	350 Bar	1.500 rpm	2.000 rpm	1"1/4 BSP	1" BSP	14,2 Kgs.
BB110	112 ltrs./min.	300 Bar	350 Bar	1.500 rpm	1.800 rpm	1"1/4 BSP	1" BSP	14,2 Kgs.
MB80	80 ltrs./min.	300 Bar	350 Bar	1.500 rpm	2.000 rpm	1" BSP	1" BSP	14,2 Kgs.
MB110	112 ltrs./min.	300 Bar	350 Bar	1.500 rpm	1.800 rpm	1" BSP	1" BSP	14,2 Kgs.

3.02.07

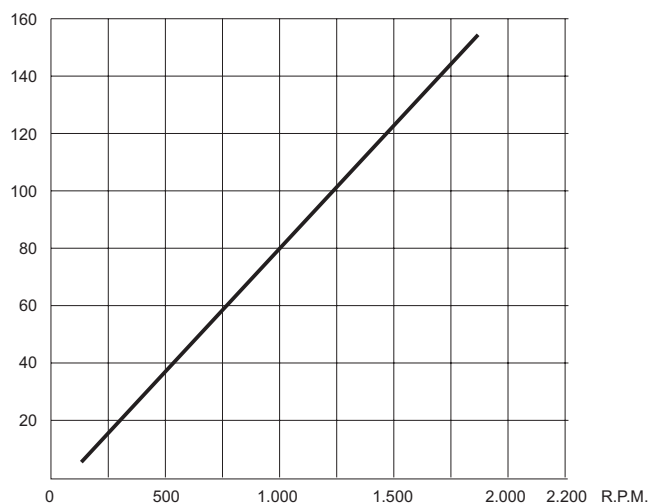


“BB” AXIAL PISTON PUMP and
“MB” AXIAL PISTON MOTOR

T D Z Group

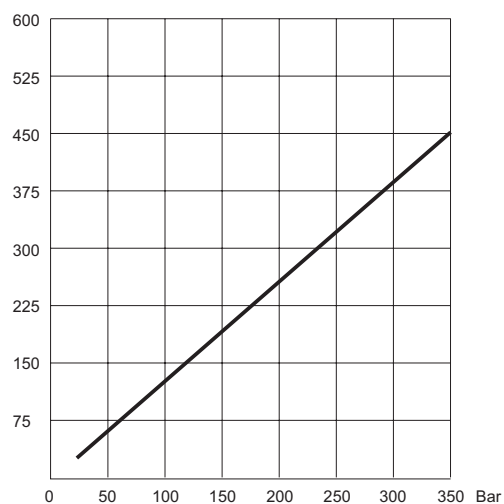
FLOW
(lts./min)

BB80



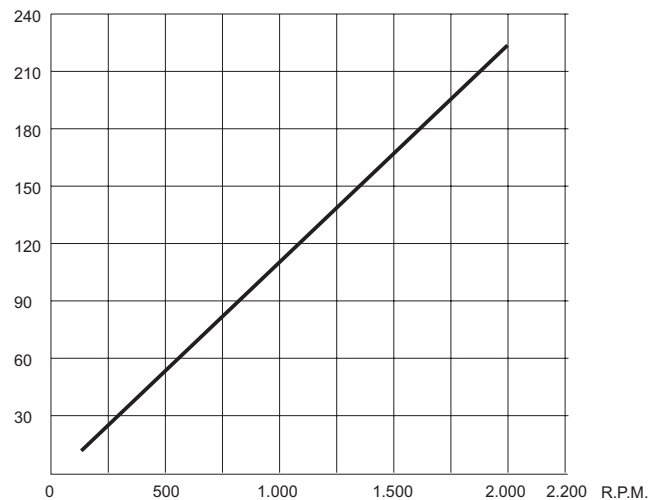
TORQUE
(Nw.m)

BB80



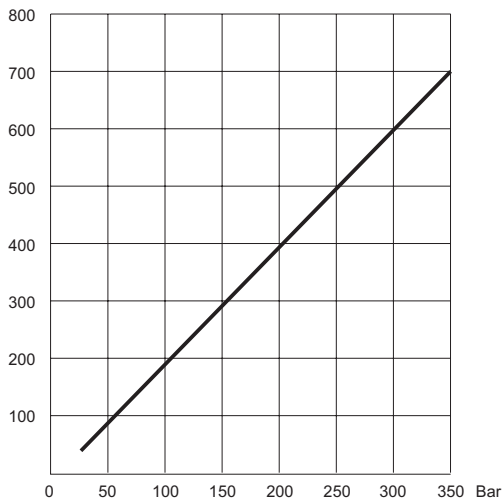
FLOW
(lts./min)

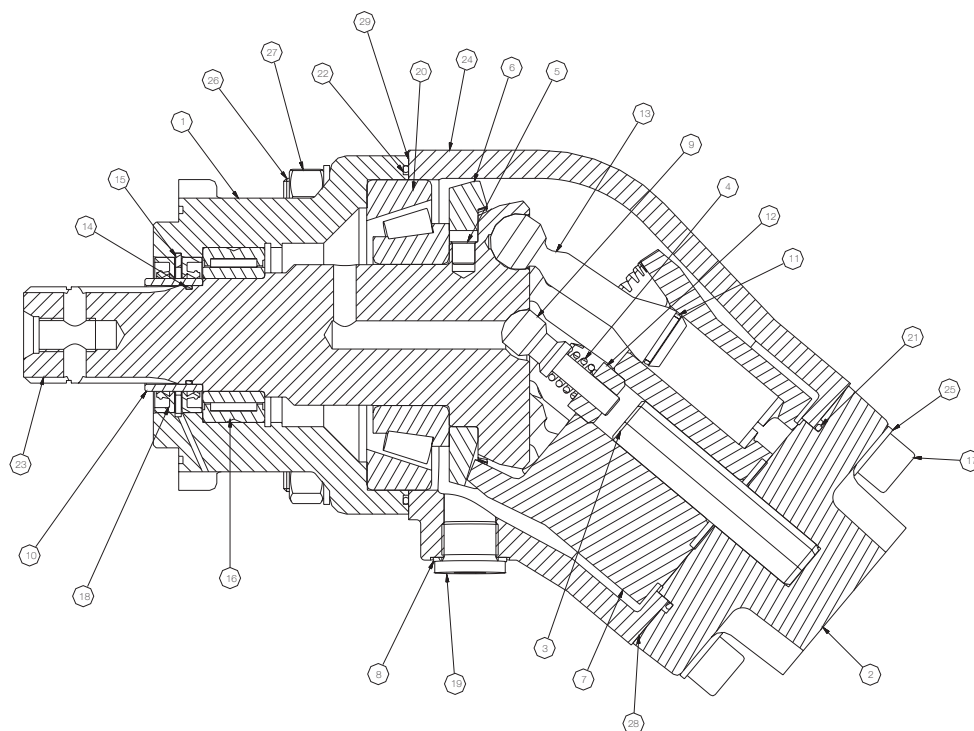
BB110



TORQUE
(Nw.m)

BB110





ELE	DESCRIPCIÓN	DESCRIPTION
1	Cuerpo de rodamientos	Bearings's body
2	Tapa bomba	Pump cover
3	Eje tambor	Barrel shaft
4	Muelle	Spring
5	Chaveta	Key
6	Corona	Timing gear
7	Tambor	Barrel
8	Junta USIT	USIT seal
9	Rotula apoyo muelle	Thrust ball
10	Casquillo para retenes y rodamiento	Bushing for oil seal and bearing
11	Segmento	Piston ring
12	Tope muelle	Spring top
13	Piston	Piston
14	Junta Torica del eje	Shaft O-ring seal
15	Grupilla	Retaining ring
16	Rodamiento de agujas	Needle rollerbearing
17	Tornillo de cabeza cilindrica	Cylindrical-head screw
18	Reten	Shaft seal
19	Tapon roscado	Screw plug
20	Rodamiento de rodillos conicos	Roller bearing
21	Junta torica tapa	Cover O-ring seal
22	Junta torica cuerpo de rodamientos	Bearings's body O-ring seal
23	Eje bomba	Pump shaft
24	Cuerpo acodado Aluminio	Body
25	Arandela Grower	Grower washer
26	Varilla roscada M12	Stud
27	Tuerca M12	Nut
28	Junta tapa-cuerpo	Cover-body seal
29	Junta cuerpo-cuerpo	Body-body seal