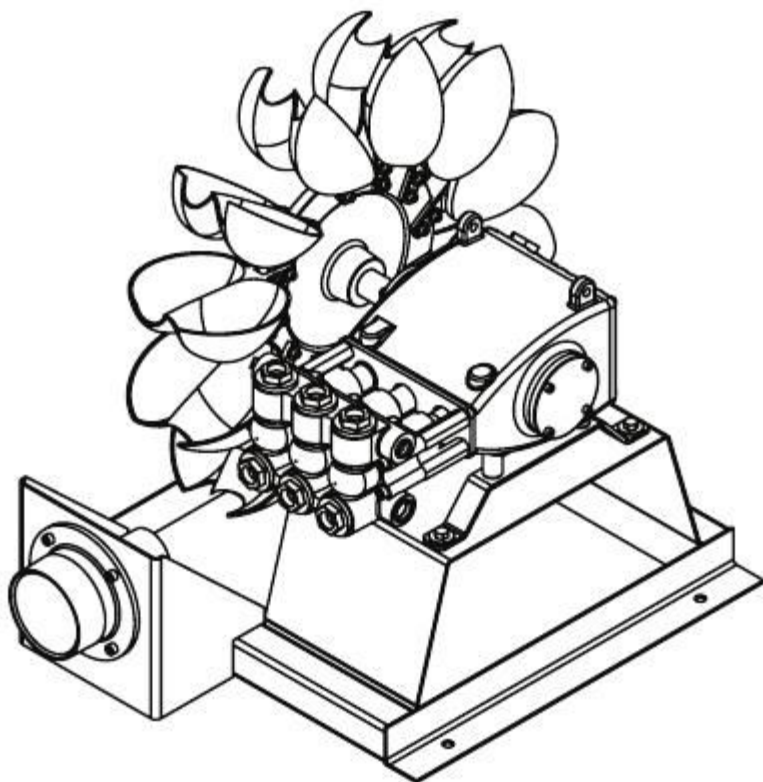


TURBO PUMP ZM TB 44

INSTRUCTION MANUAL



ATTENTION

**BEFORE USING THE
EQUIPMENT READ CAREFULLY
INSTRUCTIONS CONTAINED
THIS MANUAL.**

Thank you for purchasing the Turbo-Pump ZM, which has the objective provide you TRANQUILLITY AND SECURITY

water supply, simply this note some technical characteristics assembly that are quite simple and practical, but IMPORTANT.

ATTENTION

The data contained in this manual Should not be considered as standards for all facilities and are subject to change without notice. The ZM PUMPS,there is the provision of its customers for more technical information installation and maintenance of its products, by phone: 55- 44- 30280200 or by fax: 55- 44 3028-3700, or by e-mail: zmbombas@zmbombas.com. site www.zmbombas.com.br

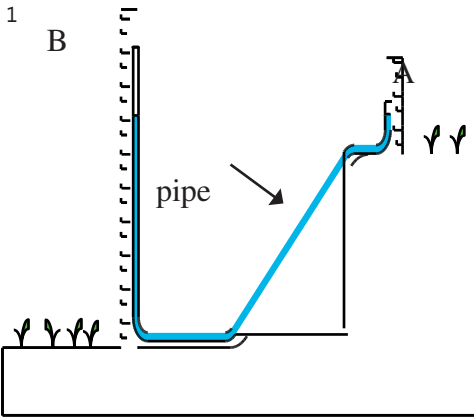
TURBO PUMP ZM TB 44

Turbo pump ZM TB 38 is a solution versatile tion in water pumping, It is easy to install and low maintenance with excellent cost / benefit. The use of the turbine directly coupled to the shaft provides high performance pumping as well as clearance transmission elements, making the most simple and reliable system. Its operation does not require electricity, because it is triggered by waterfalls 1.5 to 8.0 meters with flow rates from 1 to 8 liters / second.

POTENTIAL HYDRAULIC DRIVE

For the correct operation of the Turbo pump ZM TB 38 is necessary to evaluate The water power available on site installation, taking into consideration the following data:

- Drive Drop (Fall water meters).
- Available flow for the drive Turbo Pump (liters per second).
- Adduction tube length (meters).
- pumping height "Height vertical "(meters).
- pipe length to the reservoir (meters).
- slope measurement method actuation



1. Hold the ends of the hose transparent in measuring rods. 2. To Fill the hose with water so that it does not overflow. 3° Fasten the rod "A" in the upper terrain top, then follow with the stick "B" in the bottom point of the terrain caring lest he fall water lest he fall water. 4° When water levels equilibrate make reading rods in height "A" and "B" value obtained by subtracting the "A" rod.

5° If necessary repeat the operation until reaching the lowest point of the terrain (local Installation of TB 38). Make the sums heights recorded in the previous measurements to obtain the total drive slope

Note: This method is used when you do not GPS has

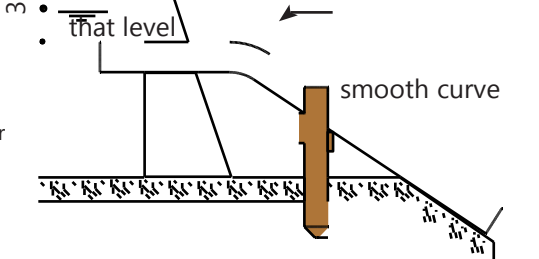
2 Adduction Tube

ZM pumps recommended in adduction water the use of PVC tubes the white light type. For the tube diameter selection, the following table.

Length of the drive tube (meters)					
Desnivel (m)	Até 10m	10 à 20m	20 à 75m	75 à 100m	Above in 100m
1,5	100mm	100mm	150mm	150mm	
2,0	100mm	100mm	150mm	150mm	
2,5	100mm	100mm	150mm	150mm	
3,0	100mm	100mm	150mm	150mm	
3,5	100mm	150mm	150mm	150mm	
4,0	100mm	150mm	150mm	150mm	
5,0	100mm	150mm	150mm	150mm	
6,0	100mm	150mm	150mm	200mm	
7,0	100mm	150mm	150mm	200mm	
8,0	100mm	150mm	150mm	200mm	

3 Captation water

Consider the lowest level of water in the dry

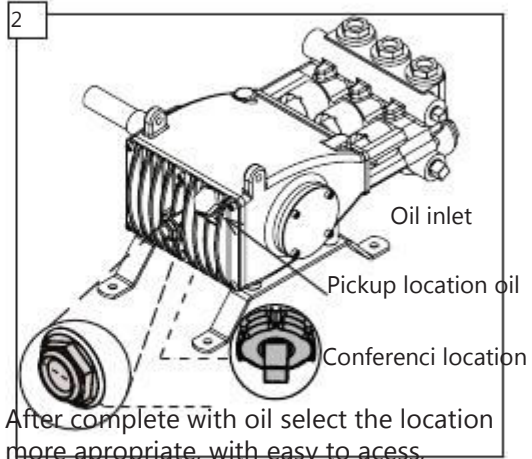
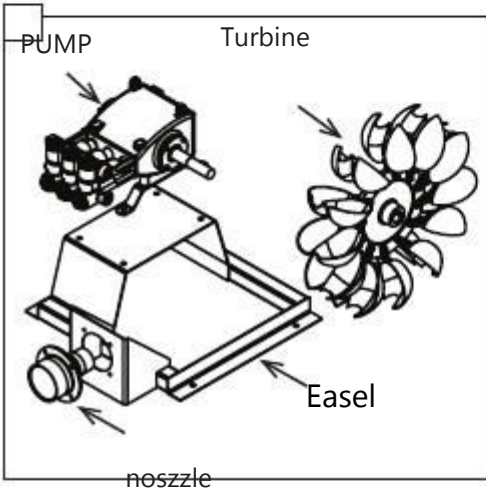


TURBO ZM PUMP TB 44 PUMP ASSEMBLY

In order to facilitate installation Turbo pump ZM TB 44, ZM Pumps, provides the complete unit.

Assembly parts:

- Turbo Pump ZM TB 44.
- Easel.
- Turbine.
- Reducing flow



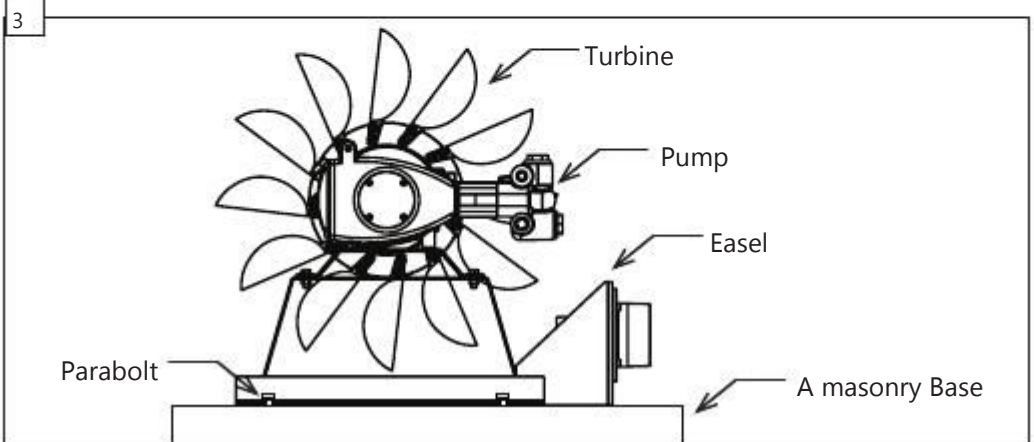
After complete with oil select the location more appropriate, with easy to access, easy uptake and suction the water to be pumped. Avoid the installation of the pump in locations subject to flooding or difficult to access.

Build a masonry base or similar for fixing the easel. It is recommended that the easel is fixed with parabol screws (or similar), according to the practicality maintenance or necessity of the replacement of same.

Before starting the operation of the turbo pump should be placed in the pump flat surface and complete with Carter lube oil SAE 20W40 type to the level indicated in the figure below.

Carter capacity 1,8 liters.

After the concrete cures secure the easel on the masonry base of the pump easel and turbine of the pump shaft.

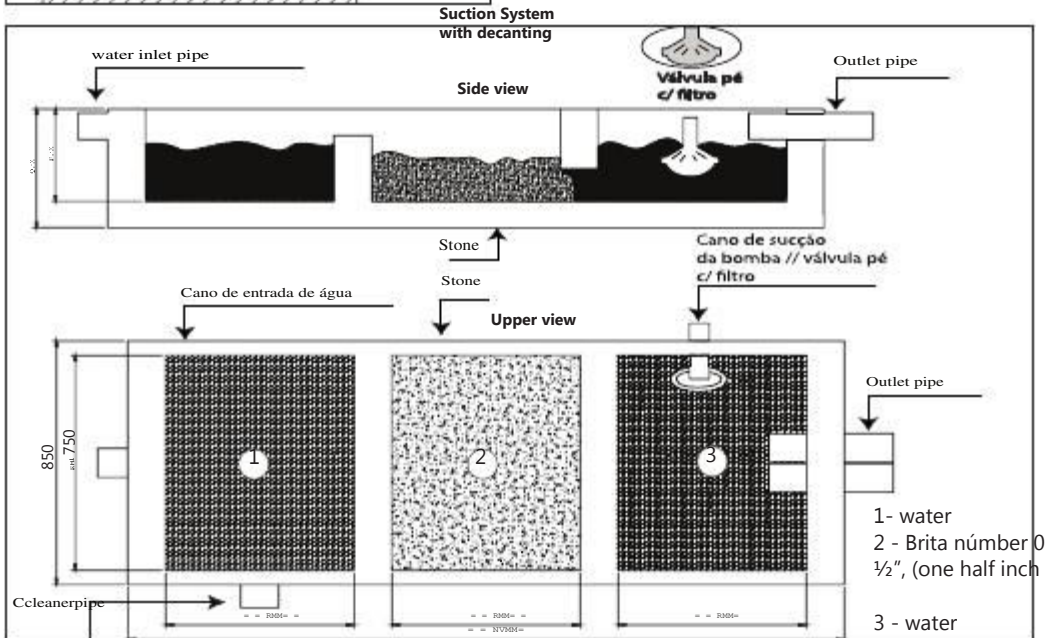
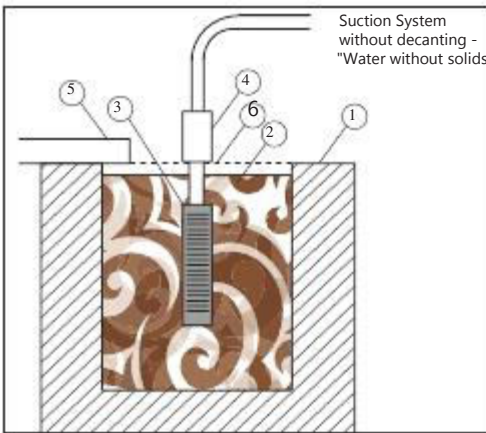


TURBO ZM PUMP TB 44 WATER CAPTURE SYSTEM (SUCTION)

Important: The quality of the water to be suctioned directly affects the life the pumping system (leather and cylinder). There will be excessive wear when water contains sand, drastically reducing the life of the system theme. If the system frayed excessive will not have warranty coverage. It is recommended to install a deposit or drum plastic for water abstraction with capacity of at least 200 liters.

- 01- concrete tank or plastic drum - minimum capacity of 200 liters.
- 02- Brita number 0 - ½ "(one half inch).
- 03- suction filter ZM. 04- vertical check valve.
- 05- the water supply pipe. 06- protection screen.

IMPORTANT: Regardless of the type of suction, it is recommended to periodically made inspection in the feedback system of water, it must be as cleaned possible, with the end of pumping drinking water and offer the best condition to pumping system, ensuring "greater life and improved hydraulic performance" Turbo Pump



- 1- water
- 2 - Brita número 0 ½", (one half inch)
- 3 - water

PUMP INSTALLATION

PUMP SUCTION CAPACITY

ZM TB Turbo Pump 38 suction water in a depth of 7 meters (vertical height) in areas which are at most 305 meters in relation the sea level. Above this altitude the suction capacity of the pump is much lower when the altitude is higher.

Equivalence distânci versus depth up to 305 meters in relation to sea level

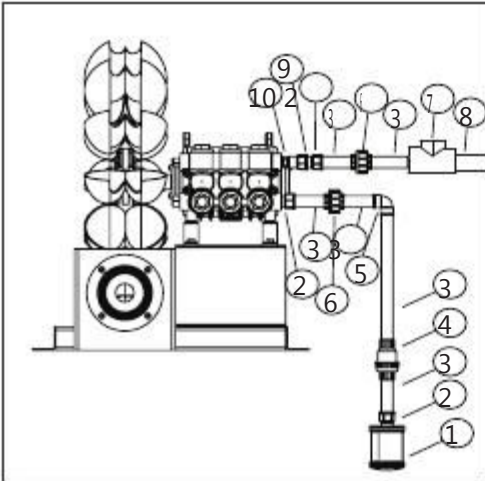
Distânci of suction (m)	A t é 10	11 a 20	21 a 30	31 a 40	41 a 50	51 a 60
Depth maximun suction	6m	5m	4m	3m	2m	1m

For altitude above 305 meters in relation to sea level, the suction capacity varies as demonstrated in the table below

Altitude (m)	0	305	457	610	1220	1830	2440	3050	4570
Elevation theoritical (m)	10,3	10	9,8	9,6	8,9	8,3	7,7	7,1	5,9
Elevation relating (m)	8,2	8	7,84	7,68	7,12	6,64	6,16	5,68	4,78

CONEXÕES

PARA A SUÇÃO E RECALQUE DA BOMBA



Lista de conexões de sucção e recalque		
Ítem	Qtd.	Descrição
1	1	Filtro Zm (3/4")
2	3	Adaptador Soldável LR (25 x 3/4")
3	6	Tubo Soldável PVC (25mm) - Comprimento variável
4	1	Válvula de Retenção (25mm)
5	1	Joelho 90° Soldável (25mm)
6	2	União Soldável (25 mm)
7	1	Válvula de retenção horizontal (25mm)
8	1	Tubo de recalque (25mm) - Comprimento variável
9	1	Luva de redução roscável 3/4" x 1/2"
10	1	Nípel roscável 1/2"

IMPORTANTE: A tubulação de sucção a ser instalada deve ser rígida e com diâmetro igual ao do bocal de sucção da bomba (3/4" BSP).

PUMP SYSTEM INSTALLATION DELIVERY

For the installation of the delivery pipe you need to consider:

- A - The gauge of the pipe shall be equal diameter of the delivery outlet of the flask. In situations where the distance is above 1000 meters is suited to install pipes with superior gauge the output gauge delivery of the balloon. When used hose gauge must be greater than Balloon output depending on internal splices that are smaller in diameter.
- B - The pipe must have resistance compatible with the manometric height the pump will pump.
- C- It is recommended to install gauntlet of union and check valve at the beginning of the discharge pipe, the purpose of retaining the water is in the pipe when the the need for perform maintenance.
- D - It is recommended that the pipe is buried at a depth of 30 centimeters. **BURY ONLY AFTER WATERBEING PUMPED TO THE RESERVOIR, CHECKING LEAKS IN CONNECTIONS ALONG THE PIPE.**

Precautions

- A. Under no circumstances stop the turbine with pieces of wood, iron or other objects;
- B. Do not lubricate the leather with grease, oil or other lubrication products, use only Vaseline;
- C. Change pump oil every 12 months;
- D. When changing the oil at the Carter, check the amount (volume) mentioned in manual;
- E. The pump can not work up its maximum speed (400 rpm)
- F. Do not reuse leathers;
- G. When performing maintenance on the pump, never do with the same functioning.

- H.Observe the location of avoiding installation that the rains and floods take your pump or damage some component;
- I. Install the filter suction pumps ZM to avoid the sand suction or other solid.
- J. If you have installed record in the delivery pipe instead of valve retention in the act of performing maintenance, make sure that this is open before to put into operation the pump.
- K. The maximum working pressure can not exceed the pressure of 280 m.c.a (Meters water column);
- L. When installing the pump should be installed in the balloon output with a manometer measure scale accordance with model Pump. The pressure gauge must be installed prior to registration
- M. Is recommended to put a "T" on output and put a log for removal of the air.

Actuation sequence of Turbo Pump ZM

1° Open up the inlet pipe log water in the catchment system. (Await the water fills the entire system).

2° Open up registry placed in the nozzle, releasing water to activate the Turbo Pump. Note: Make sure that the registry on the pump outlet pipe is open.

3° Functioning assessment.

In the operation start of the Turbo Pump shall present high rotation bringing down as the delivery pipe is filled with water.

4° When the turbo pump is working is probable that water in the system reduce uptake level, so it is necessary to increase the flow opening up more the registration until the return of the normal level.

5 Is necessary to monitor the level of water in the catchment system by checking the adduction tube is flooded.

If not ride on the nozzle flow reducer accompanying the Turbo ZM pump 44 TB.

PREVENTIVE MAINTENANCE

It is advisable to preventive maintenance for maintaining the pump in perfect working order, and enable longer life.

CARTER OIL CHANGE

ZM TB Turbo Pump 38 is lubricated by an oil bath, maintain full dynamic mechanical system lubricated. The first oil change shall be effected in late of the sixth month that the pump is in operation. Subsequent changes should be made to every 12 months. Check the oil level every 30 days. When replacing the oil store the same in suitable container NOT THROW THE OIL USED IN NATURE.

For oil changes follow the instructions:

A - Stop the pump retaining the water flow over the turbine.

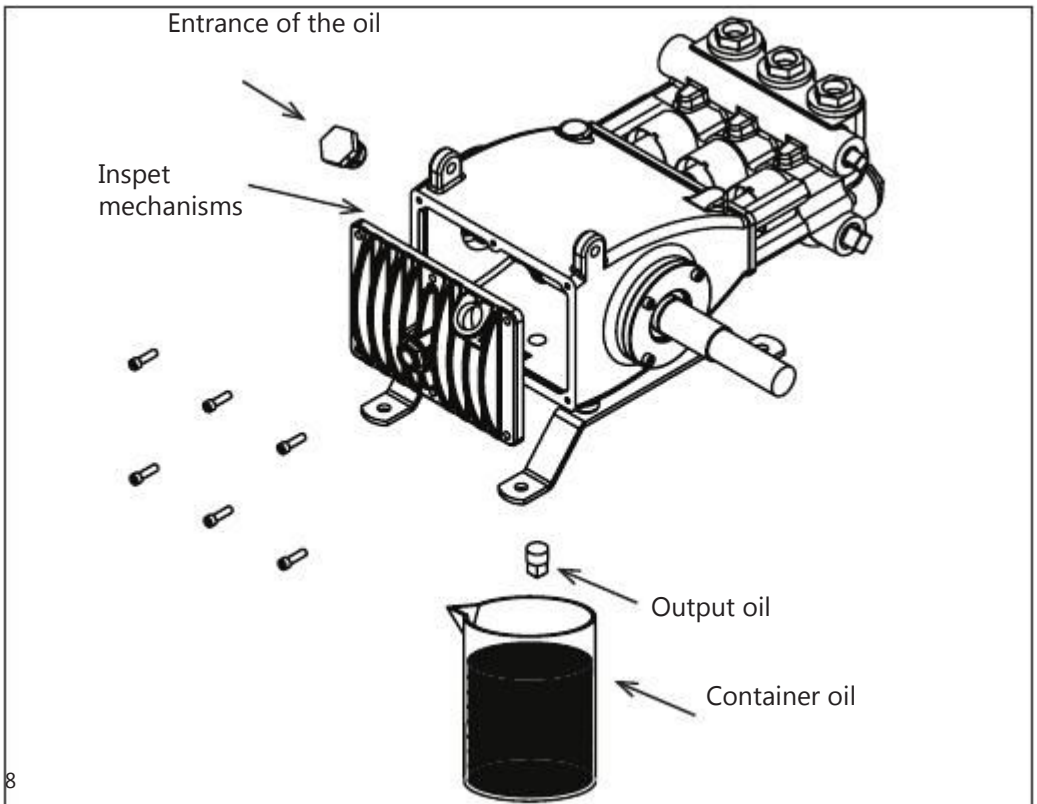
B - Remove the oil outlet plug, leaving the leak out in suitable container.

C - Remove the carter cap and do it the inspection if the mechanisms are in perfect condition.

D - Reattach the carter lid with the sealing ring as well as the outlet cap from the oil.

E - Remove the oil inlet cover that on the bearing and put the oil in the amount indicated (1.2 liters - Oil SAE 20W40)

F - Release the flow of water over the wheel.



SYSTEM MAINTENANCE PUMPING (LEATHERS)

The useful life of leathers depend upon the quality of water to be pumped, being possible to lodge durability for 6 to 12 months. The replacement of the same must be carried when the hidraulic yield (pumped water volume) is not satisfactory. To replace leathers follow the instructions:

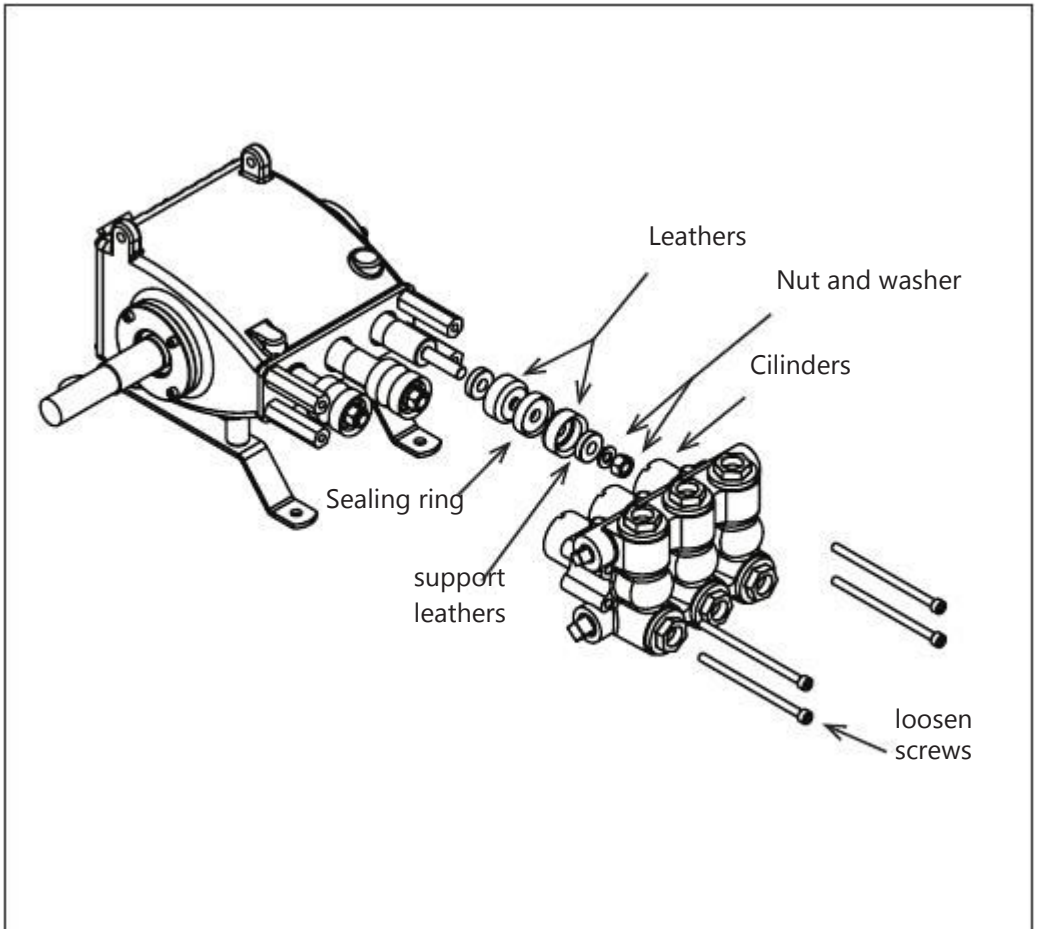
A - Loosen the separator retaining bolts to the headstock, pull up the set balloon and head.

B - Remove the cylinder together with the sealing ring.

C - Loosen the jam nut and remove the washers, leathers support, leathers separator.

NOTE: When replacing the leather check internally if this shirt in good condition, unlike replace.

D - For the assembly of leather, sequentially enter the bottom leather, the separator leather, upper leather (check the position), the support of leather, flat washer, and finally tighten the nut. Note: it is recommended to use original leather "PUMPS ZM" poor quality leathers may crash the system.



MAINTENANCE - CLEANING OF VALVES

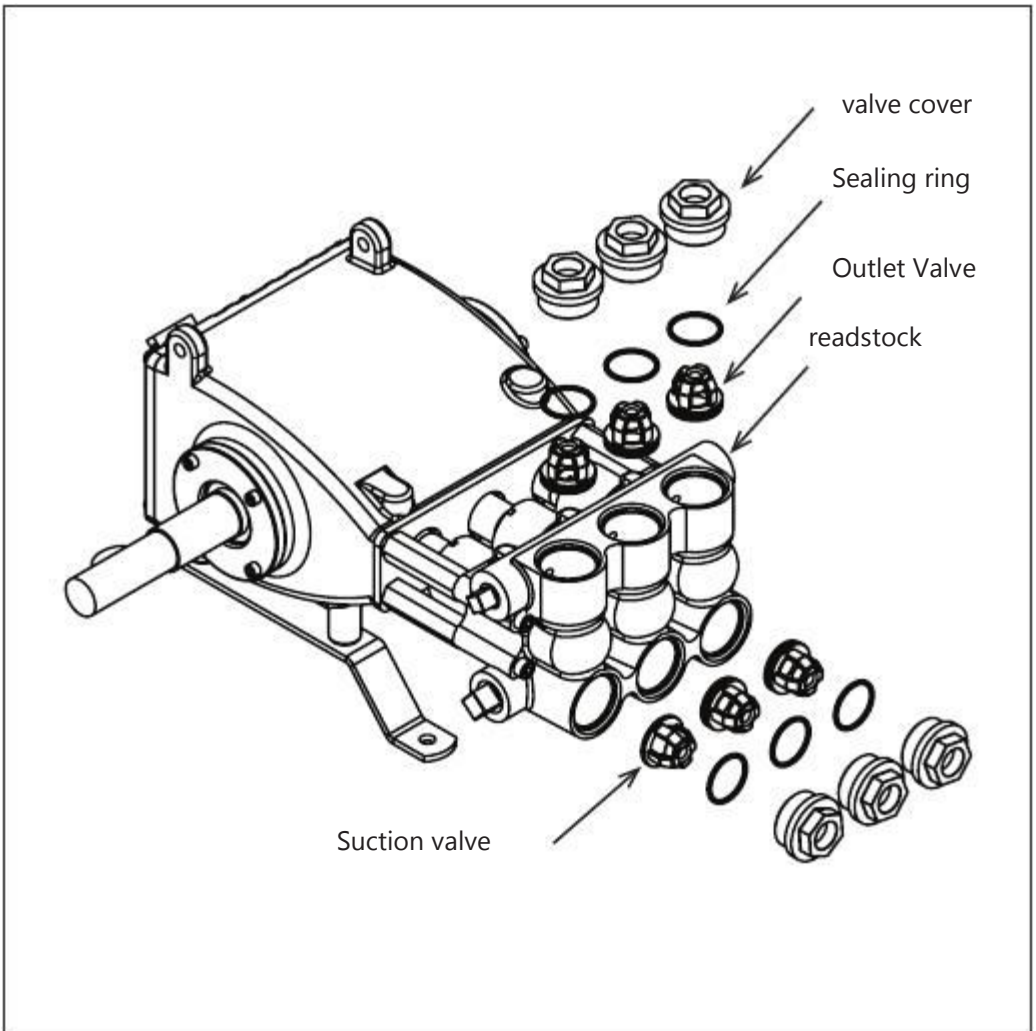
The cleaning of the valves is only necessary when the hydraulic performance (pumped water volume) is not satisfactory. When cleaning the check valves whether the same are sealing perfectly, unlike replace. To make the cleaning or replacement of the valves follow the instructions:

A - Remove the balloon and the Inbox to access the valves.

B - Do the cleaning or replacement of the valve and replaces them observe the positioning of the same, as well as the placement of the sealing rings.

C - Replace the balloon, inbox and fasten them to.

D - Place the pump and check its functionality, if the pump will not operate properly, review the maintenance of valves observing this not missing No component of primarily sealing rings.



PRODUCTION TABLE

Production Turbo Pump TB 44			
waterfall actuation (m))	drive flow (Liters / second	slope of pumping (M)	maximum flow pumped (Liters / day
1,5	6,6	10	Up to 16.000
		20	Up to 11.100
		30	Up to 6.300
2	7,6	10	Up to 21.700
		20	Up to 17.800
		30	Up to 14.100
		40	Up to 10.400
2,5	8,5	10	Up to 27.500
		20	Up to 24.300
		30	Up to 21.200
		40	Up to 17.600
		50	Up to 14.200
3	9,3	10	Up to 32.700
		20	Up to 29.600
		30	Up to 26.600
		40	Up to 23.500
		50	Up to 20.400
		60	Up to 17.200
		70	Up to 14.100
3,5	10,1	10	Up to 37.400
		20	Up to 34.600
		30	Up to 31.100
		40	Up to 28.900
		50	Up to 26.600
		60	Up to 23.200
		70	Up to 20.700
		80	Up to 17.500
		90	Up to 14.100

PRODUCTION TABLE

Production Turbo Pump TB 44			
waterfall actuation (m)	drive flow (Liters / second)	slope of pumping (M)	maximum flow pumped (Liters / day)
4,0	10,8	10	Up to 39.700
		20	Up to 37.100
		30	Up to 34.700
		40	Up to 32.000
		50	Up to 29.600
		60	Up to 27.000
		70	Up to 24.500
		80	Up to 22.000
		90	Up to 19.500
		100	Up to 16.800
4,5	11,4	10	Up to 41.900
		20	Up to 39.700
		30	Up to 36.900
		40	Up to 35.300
		50	Up to 33.200
		60	Up to 30.800
		70	Up to 29.200
		80	Up to 26.400
		90	Up to 24.600
		100	Up to 22.000
		110	Up to 19.800
		120	Up to 17.100
5,0	12,0	20	Up to 42.000
		30	Up to 39.900
		40	Up to 37.800
		50	Up to 35.800
		60	Up to 33.800
		70	Up to 31.600
		80	Up to 29.500
		90	Up to 27.500
		100	Up to 25.400
		110	Up to 23.100
		120	Up to 21.100
		130	Up to 19.000

PRODUCTION TABLE

Production Turbo Pump TB 44			
waterfall actuation (m)	drive flow (Liters / second)	slope of pumping (M)	maximum flow pumped (Liters / day)
5,5	12,6	20	Up to 44.150
		30	Up to 41.300
		40	Up to 40.200
		50	Up to 38.300
		60	Up to 36.400
		70	Up to 35.300
		80	Up to 32.500
		90	Up to 30.600
		100	Up to 28.600
		110	Up to 26.700
		120	Up to 26.000
		130	Up to 22800
		140	Up to 20.900
		150	Up to 17.800
6,0	13,2	30	Up to 44.100
		40	Up to 42.200
		50	Up to 40.600
		60	Up to 38.700
		70	Up to 37.000
		80	Up to 35.000
		90	Up to 33.400
		100	Up to 31.500
		110	Up to 29.700
		120	Up to 27.900
		130	Up to 26.100
		140	Up to 24.400
150	Up to 22.500		

PRODUCTION TABLE

Production Turbo Pump TB 44			
waterfall actuation (m)	drive flow (Liters / second)	slope of pumping (M)	maximum flow pumped (Liters / day)
7,0	14,3	30	Up to 47.200
		40	Up to 45.700
		50	Up to 44.200
		60	Up to 42.700
		70	Up to 41.100
		80	Up to 39.800
		90	Up to 38.100
		100	Up to 36.600
		110	Up to 35.000
		120	Up to 33.500
		130	Up to 32.100
		140	Up to 30.500
		150	Up to 29.000
		160	Up to 27.300
8,0	15,3	30	Up to 49.500
		40	Up to 48.300
		50	Up to 47.000
		60	Up to 45.800
		70	Up to 44.400
		80	Up to 43.300
		90	Up to 42.000
		100	Up to 40.800
		110	Up to 39.600
		120	Up to 38.500
		130	Up to 37.100
		140	Up to 35.800
		150	Up to 34.600
		160	Up to 33.300
170	Up to 31.300		

PRODUCTION TABLE

Production Turbo Pump TB 44			
waterfall actuation (m)	drive flow (Liters / second)	slope of pumping (M)	maximum flow pumped (Liters / day)
9,0	16,7	40	Up to 55.400
		50	Up to 54.900
		60	Up to 54.000
		70	Up to 52.800
		80	Up to 51.500
		90	Up to 50.100
		100	Up to 48.600
		110	Up to 47.200
		120	Up to 45.700
		130	Up to 44.200
		140	Up to 42.700
		150	Up to 41.200
		160	Up to 39.700
		170	Up to 38.200
		180	Up to 36.700
190	Up to 35.200		
200	Up to 33.600		

PRODUCTION TABLE

Production Turbo Pump TB 44			
waterfall actuation (m)	drive flow (Liters / second)	slope of pumping (M)	maximum flow pumped (Liters /day)
10	17,6	40	Up to 61.300
		50	Up to 60.800
		60	Up to 59.900
		70	Up to 58.800
		80	Up to 57.600
		90	Up to 56.200
		100	Up to 54.900
		110	Up to 53.500
		120	Up to 52.100
		130	Up to 50.700
		140	Up to 49.200
		150	Up to 47.800
		160	Up to 46.400
		170	Up to 45.000
		180	Up to 43.500
		190	Up to 42.100
		200	Up to 40.700
210	Up to 39.200		
220	Up to 37.800		
230	Up to 36.400		
240	Up to 34.900		

PRODUCTION TABLE

Production Turbo Pump TB 44			
waterfall actuation (m)	drive flow (Liters / second)	slope of pumping (M)	maximum flow pumped (Liters / day)
11	18,5	40	Up to 66.800
		50	Up to 66.300
		60	Up to 65.500
		70	Up to 64.400
		80	Up to 63.200
		90	Up to 62.000
		100	Up to 60.000
		110	Up to 59.300
		120	Up to 58.000
		130	Up to 56.700
		140	Up to 55.300
		150	Up to 53.900
		160	Up to 52.600
		170	Up to 51.200
		180	Up to 49.800
		190	Up to 48.500
		200	Up to 47.100
		210	Up to 45.700
		220	Up to 44.400
		230	Up to 43.000
240	Up to 41.600		
250	Up to 40.300		
260	Up to 38.900		
270	Up to 37.600		
280	Up to 36.200		

POSSIBLE PROBLEMS, CAUSES AND SOLUTIONS

When the pumping system has any non-compliance Follow the prompts as cited below:

Problems	Causes	Solutions
The turbine rotate and for	<ol style="list-style-type: none"> 1 Low water flow to moving the turbine. 2- Height higher pumping. 3- Low drop in supply pipe. 4 air inlet in the pipe the turbine power. 	<ol style="list-style-type: none"> 1 - Increase the volume of water to move the turbine. 2 - checking whether the pumping slope is above the pump capacity. 3 - Check if you can increase the level fall water. 4 Increase the level of water on the feed tube.
Pump shaft rotates, but the pump does not throw water	<ol style="list-style-type: none"> 1. Dirt in the valves. 2- Input air. 	<ol style="list-style-type: none"> 1-Clean the suction hose and install the sand filter ZM pumps; 2 - Clean the valves. 3 - Remove air intake in the suction, checking connections. 4 - Make the adjustment of leather, opening the sides of leathers or exchanging them.
The pump suction water	<ol style="list-style-type: none"> 1 - Level difference between Pump and the water to be suctioned exceeding 7 meters. 2 - Problems with valves. 3 - frayed leathers. 	<ol style="list-style-type: none"> 1 - put vertical check valve and fill the water pipe prior to the operation. 2 - Check dirt in the valves or valve prey. 3 - Perform exchange of leathers.
The pump playing intermittent water	<ol style="list-style-type: none"> 1 - Problems in the valves. (Only on one side). 2 - Leather deformed 	<ol style="list-style-type: none"> 1 - Check the valves dirt or prey valves. 2 - Perform the adjustment of leather, opening the same, or exchange of leather and cylinders.
production of insufficient pump	<ol style="list-style-type: none"> 1 - frayed leathers. 2 - Low water flow in turbine. 3 - Valves frayed. 4 - spring water production (mina) Insufficient 	<ol style="list-style-type: none"> 1 - Exchange of leathers. 2 - Check that the water production is compatible with the rotation of the turbine. If positive, production will only increase with the increase of water flow in the turbine.

WARRANTY TERM

ZM PUMPS guarantee the equipment identified in the manual, forcing to repairing or replace parts and components that, in normal use and service, according to the technical recommendations, show DEFECTS OF MANUFACTURE OR RAW MATERIAL, observing the following criteria:

WARRANTY PERIOD: 90 days after the issuance of the invoice from the distributor to the user sale. The additional warranty is nine months totaling 12 months (1 year) from the user to use the product in accordance with the manual's recommendations.

ITEMS EXCLUDED FROM THE WARRANTY: The following items cited by its characteristics not are covered by the warranty: Parts considered as normal maintenance such as filter elements, leather pistons, O-rings, valves, cylinders, bearings, etc., as well as routine maintenance, adjustments, retightening, lubricants, etc. Parts that are worn or natural fatigue when using UNLESS PRESENT DEFECTS

MANUFACTURE, ASSEMBLY OR RAW MATERIAL; Defects resulting from accidents; oils hydraulic, lubricants, greases and the like; personal nature of damage or user material owner or third parties; Travel and freight of equipment, parts and components to guarantee not granted; Displacement and detention of people and vehicles.

NOTE:

Warranty does not cover shipping cost, whether the client to the assistant or to HYDRO company METALLURGICAL ZM LTDA.

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