MERIBAH RAM PUMP©

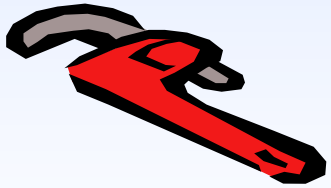
German Technology

MERIBAH© RAM PUMP
Installation & User Manual

Models: MRP© / MSFRP© / MPFRP©

Pumping Water
without common
power sources
like electricity
or gasoline

- No Running Costs
- Very Quiet Operation
- Steady Spare Part Supply
- Appropriate Technology
- Easy to Install
- Minimal Service Required



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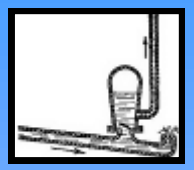
How a Ram Pump Work



The first Ram in History Montgolfier's Water Ram

The energy required to make a ram pump lift water to a higher elevation comes from water falling downhill due to gravity, as in all other water powered devices. But unlike a water wheel or turbine, a ram uses the inertia of moving water rather than water pressure, and operates in a cycle.

- When the waste valve is opened, water flows from the source (collection tank), through the water inlet pipe (drive pipe), and out of the waste valve.
- After a short time, the velocity of the flow is high enough to force the waste valve closed. The water, due to its inertia, wants to continue moving past the valve. The pressure inside the ram pump will rapidly increase enough to force the check valve open. This forces some water into the pressure vessel, compressing the vessel's air bubble. The pressurized bubble forces that water through the delivery pipe to the point of use. For example a ram pump pumping 20 liters per minute **(29.000 liters a day),** and cycling 60 times per minute, each cycle pumps about 330 ml. The compressed air in the pressure vessel helps smooth out the flow on the delivery pipe of the ram pump, so the flow tends to be more continuous, rather than a small spurt during each cycle of the ram pump
- Soon after the check valve has opened, the pressure surge (generated by the waste valve closing) is spent. Flow will try to start backwards, but the check valve will close, preventing this from happening.
- At about this time, the pressure in the drive pipe will be low enough so that the waste valve can open again, allowing water to start flowing from the source (collecting tank) to the ram pump, beginning a new cycle. The cycle that the ram pump goes through can occur 30 to 120 times per minute, depending upon conditions such as head, flow, and the size of the ram pump.

Abbreviation & Explanation

Shortcuts:

• **MRP©**	Meribah Ram Pump© (2“)
• **MSFRP©**	Meribah Steel Fitting Ram Pump© (1” & 2”)
• **MPFRP©**	Meribah PVC Fitting Ram Pump© (1”)
• **MPC©**	Meribah Pipe Clips© (1/2”, 1” & 2”)
• **Water source**	source of water redirected into the supply pipe
• **Supply Pipe**	pipe between the water source and the collection tank
• **Collection Tank**	reservoir filled from the supply pipe and flow off into the drive pipe
• **Consuming Tank**	tank for the delivered water
• **PL**	Drive Pipe / Drive Pipe Length (Propelling Length) pipe between collection tank and pump
• **H**	Head / Drive Pipe High high distance between the collection tank and the pump
• **DPL**	Delivery Pipe / Delivery Pipe Length pipe between the pump and the consuming tank
• **DH**	Delivery High high distance between the pump and the consuming tank
• **Gate Valve**	security valve to close the drive pipe (see page 17)
• **Stop Valve**	a useful valve to stop the pump for adjustment or in “case of need” (see also page 16)
• **Delivery Water**	the amount of water you get for the consumption
• **Waste Water**	is needed for the drive of the pump and could be ascribe back into a stream or something

Introduction

For proper operation, the Meribah Ram Pump© (MRP©) and the drive pipe (PL) must operate as one unit. The drive pipe (PL) and associated pipes **form half of the MRP©**. Successful operation depends upon you constructing a suitable drive pipe (PL) and correctly installing it.

The drive pipe (PL) determines the size of the **water hammer** effect to allow the best operation of the MRP© (water is uncompressible, like hydraulic oil; the interplay of forces like water and air made it possible to get a high pressure for the operation of the ram pump). The use of steel pipes is recommended wherever possible.

The MRP© comes fully assembled and with an Installation CD for all your needs. For the drive pipe (PL) connection we have a 30 degree angle and a flange. The default adjustment of the delivery pipe (DPL) is 45 degrees upwards. The waste valve bolt position is adjusted at around 10 mm opening distance. Inclusive is the basement fixation, spare parts and an in “case of need” package.

Ideally you are handy about working with concrete, pipes and fittings. We recommend for the MRP© installation an embankment with a supply pipe to feed the collection tank. After that you feed the MRP© with the drive pipe (PL) and deliver the water into an consuming tank with the delivery pipe (DPL).

MRP’s© are easy to install when instructions are followed closely. There are many different ways ram pumps can be installed, depending mainly on the lay and character of the ground and other local conditions. **If your conditions are different from those described here or elsewhere in this Installation Manual, please write/phone to us and giving full details and pictures of your conditions.** We will advise you in the proper method of installing the MRP©.

Required Data of Sizing the Pump Site

1. Witch kind of water source are available, especially in dry seasons.
2. Amount of the water source in **liter per minute** ?
3. What is the **difference of altitude** between the water source and the collection tank ?
4. How far is the **distance between** the water source to the collection tank ?
5. What fall **(H-head)** do you get from the collection tank to the place for the pump ?
6. What is the difference of altitude from the pump to the consuming tank **(DH-delivery high)** ?
7. How far is the distance between the pump and the consuming tank **(DPL-delivery pipe length)** ?

For the right understanding and dispose of the parameter use the graphic and the explanation shown on page 4 / 5 and page 9 / 10 / 13!

Methods Of Measurement Without Special Equipment

Water-filled tube method

- Use a clear hose, fill it complete with water.
- Take one end to the water source and the other end to the place you want to measure out.
- Use a measure stick or tape and level out the hose without overflowing.
- Mark the water level on your stick and you get the exact high difference between the water source and the place for the pump or collection tank.
- Repeat this method for longer distances.

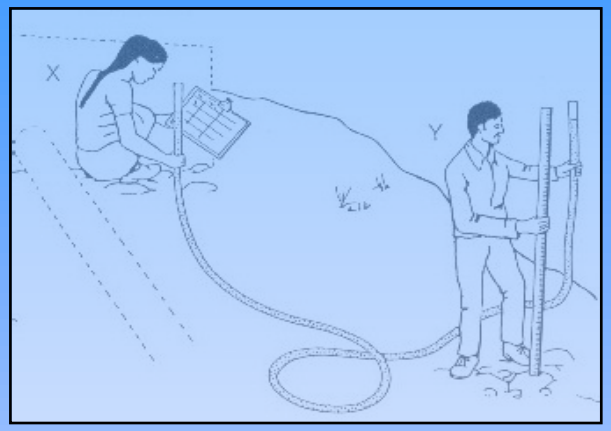
Plank (or string) and spirit level method

- For this method you need also measure tape or stick, a plank or string and a spirit level.
- Take the end of the plank on the position of the water source.
- Put the spirit level on top of the plank and level out a straight line to the measure stick.
- Then you have also a exact value of the high difference.
- If you have a long distance, mark every point you measure out and repeat the steps till you get the whole distance.

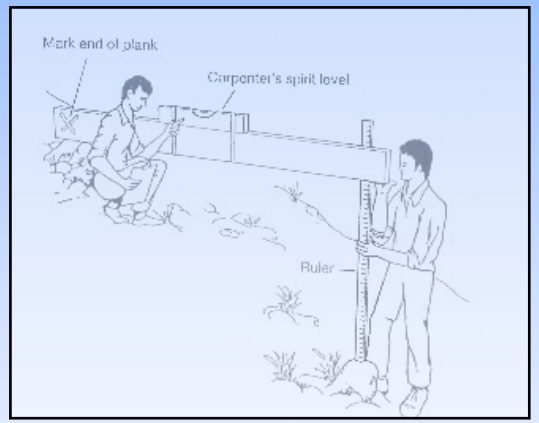
Sum the measurements to obtain

- At least count the values together you measured out.
- You get the complete available Head (H) or the Delivery High (DH) for operating the pump.
- This is an easy and cheap way for a exact site survey.
- Now measure out the length for the Drive Pipe (PL) and the Delivery Pip Length (DPL).
- Also required is the flow available at the water source.

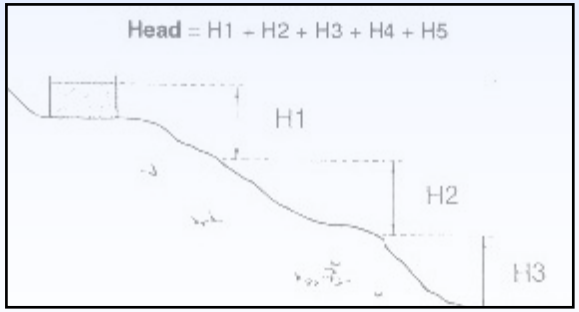
Water-filled tube method



Plank (or string) and spirit level method



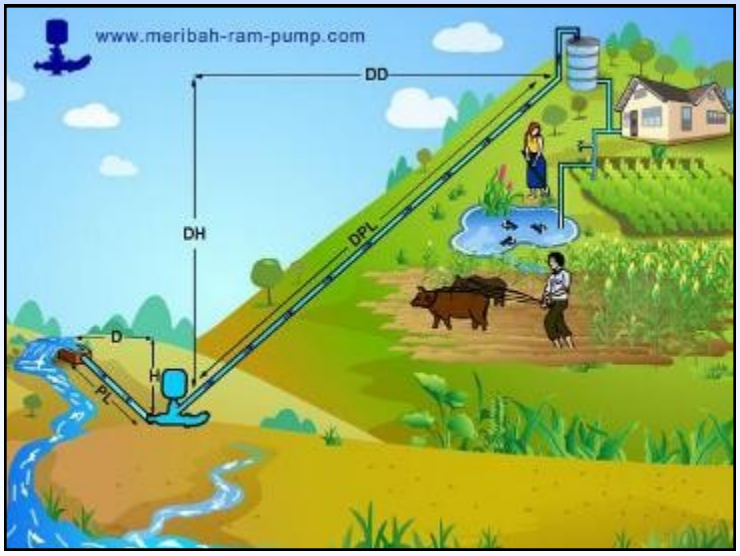
Sum the measurements to obtain



Site Survey & Measurement Details

The first step to do is a site survey to know if your pump site is qualified for the operation of our MRP©. Step two is to choose which Meribah Ram Pump© is required for your needs to get the best results.

- Most important on the pump site you choose there must be a slope from the water source to the ram pump.
- After that, check the amount of water from the source (check the flow rate in liters per minute
- The high difference between water source and the place of the pump (this should be precisely in meters).
- The length from the water source to the pump (also in meters). How high is the point of your storage tank you want to pump up
  the water?
- How far is the distance to the storage tank?
- Also important is the amount of water you want to get for your collection tank.



Site Survey Data

check list	data we need for the right pump and site calculation
water available for the MRP© operation	____in liters per minute
high difference between the water source and the pump (H)	____in meters
length between water source and the pump (PL)	____in meters
high difference between the pump and the storage tank (DPL)	____in meters
length between the pump and the storage tank (DH)	____in meters
amount of water you need	____in liters per minute

Pipe Length Chart

The **drive pipe** connection at the MRP© has an **angle with 30 °** for choosing the pipe length.

H Head	**PL** Propelling Length
1 m	2 m
2 m	4 m
3 m	6 m
4 m	8 m
5 m	10 m
6 m	12 m
7 m	14 m
8 m	16 m
9 m	18 m
10 m	20 m
11 m	22 m
12 m	24 m
13 m	26 m
14 m	28 m
15 m	30 m
16 m	32 m
17 m	34 m
18 m	36 m
19 m	38 m
20 m	40 m

For the **delivery pipe** connection at the MRP© we estimate an **angle of 30°** for choosing the pipe length.

DH Delivery High	**DPL** Delivery Pipe Length
20 m	40 m
30 m	60 m
40 m	80 m
50 m	100 m
60 m	120 m
70 m	140 m
80 m	160 m
90 m	180 m
100 m	200 m
125 m	250 m
150 m	300 m
175 m	350 m
200 m	400 m
300 m	600 m
400 m	800 m

Liters Per Day Chart

LPM liters per minute	**LPD** liters per day
1	1440
2	2880
3	4320
4	5760
5	7200
6	8640
7	10080
8	11520
9	12960
10	14400
11	15840
12	17280
13	18720
14	20160
15	21600
20	28800
30	43200
40	57600

Site Survey

The most important step in deciding if a MRP© is for you, is a site survey. Normally you have done this step before you get our MRP©. This will ensure that you have the flow and head required to operate a MRP©. Once this has been determined, build the MRP© to supply the water. With our MRP© there's no reason not to use one, if you have a location that meets the requirements.

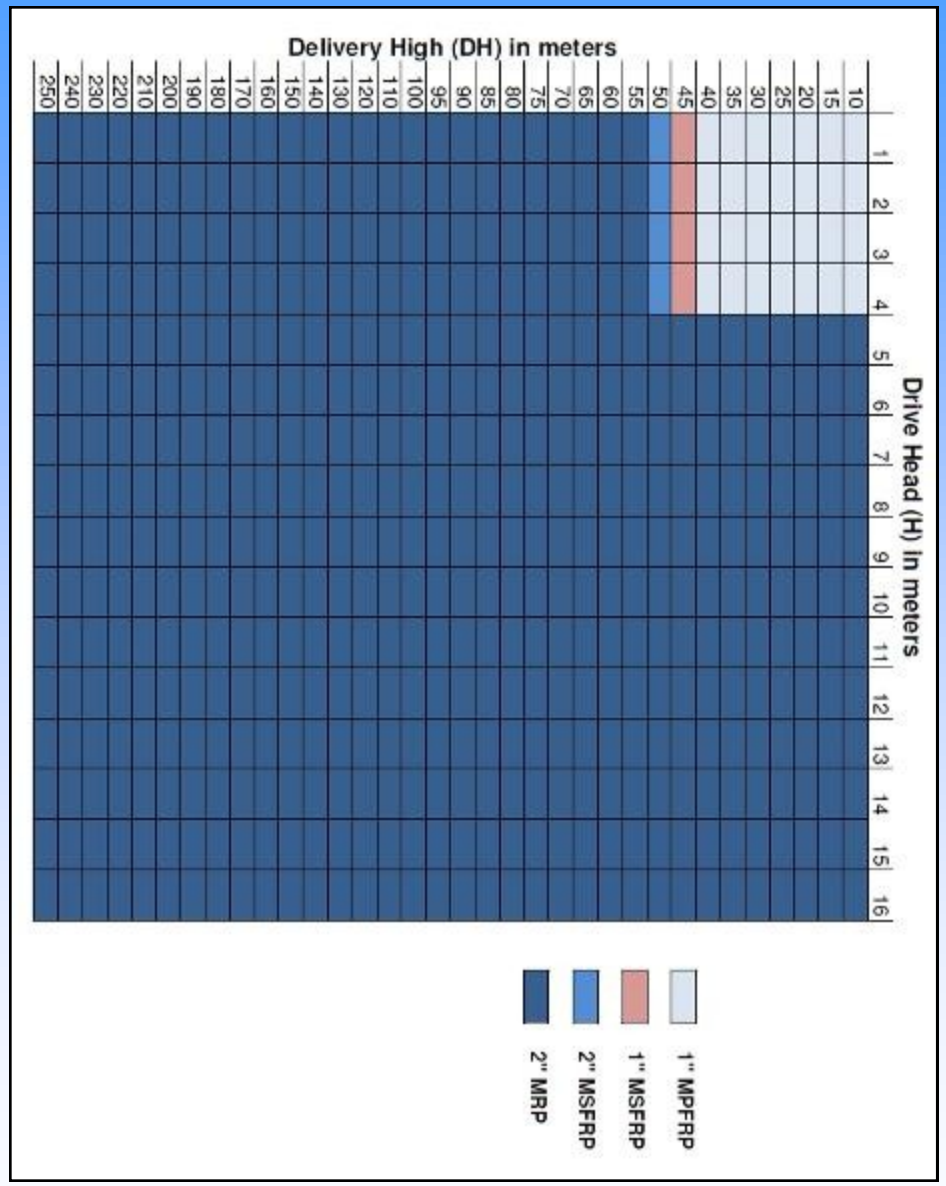





Water Source

Usually the water source is a stream or a river. The water from a stream can be diverted into a supply pipe (see first picture below) or a channel, or a supply pipe can be placed in the stream. Ideally you built a small **embankment** (see second & third picture below) to force water into the pipe. The supply pipe is used to get water to a suitable height above the pump, for example following around the bank above the stream. Supply pipes must be **large enough** to carry sufficient water with little loss of high, for example for the 1 inch models use a PVC supply pipe not smaller than 2 inch, for the 2 inch MRP© use a PVC supply pipe not smaller than 4 inch. It is also recommended to **use a strainer** (see fourth picture below) at the source end to keep out refuse from the supply pipe.

Ram Pump Selection Chart



Additional Parts for the Installation

These listing should give you some support for your MRP© installation but it is roughly calculate because of the several requirements and the different environments everywhere.

Embankment:

If you built an embankment, you will need some concrete, sand, stones, steel for reinforced concrete and some planks for the shuttering framework. Also don't miss to fix your required supply pipe connection into the embankment. A 2" PVC pipe for the 1" ram pumps and a 4" PVC pipe for the 2" MRP©.

Supply pipe:

Your supply pipe could be PVC (or any pipe which is cheap and supply sufficient water) and you just need some glue, a saw and a spirit level to **get a little incline before** you reach the collection tank.

Collection tank:

You will need some concrete, sand, stones, steel for reinforced concrete and some planks for the shuttering framework for the basement of the collection tank. And also a minimum of 2 cement rings (see Page 12) with a diameter of about 1.20 meters (47 inch) and a high of about 0.50 meters (20 inch) to be fixed on top of the basement.

Foundation for the pump:

The foundation for the MRP© should be made also of steel reinforced concrete. Screw the delivered stand onto the pump and fix the PL with the MRP©. After that you have a good control of the correct position of the basement. Use a spirit level to **align the pump even** on the ground. Now build the framework and fill it up with concrete until the bottom of the MRP©.

Drive Pipe (PL):

Up to your site and to the store you buy the PL (1" steel pipes for the 1 inch ram pumps & 2 " steel pipes for the 2 inch MRP©) you will need the full length from the collection tank to the pump. Think about the fittings for the pipes and the valves (gate valve & drain valve). To fix the pipes we recommend the **Meribah Pipe Clips© (MPC©)** and you will also need some concrete, sand, steel and practically some planks for the framework.

Delivery pipe (DPL):

For the DPL we will start from the MRP©. It is recommended to install the Valve Combination (see page 16). After that up to your pump site a 45 degree bow, a double nipple and for about the **first 20 percent** (up to your DH) of the complete DPL steel pipes (1/2 " pipes for the 1 inch ram pumps & 1 " pipes for the 2 inch MRP©). Then you normally could use PVC pipes and you need additional a steel fitting and a PVC fitting with male thread to connect the steel pipe with the PVC pipe. Hereafter just the remaining length to the consuming tank 1/2 " / 1 " PVC pipes (up to your MRP©), the right amount of fittings and some glue. And like before we recommend the **MPC©** some concrete, sand and so on to fix the pipes.

Consuming tank:

For the consuming tank we haven't any special advices except for protecting against dirt, leaves and so on.

One thing more to do is to fix the DPL **on top of your consuming tank** for a better performance of the MRP©.

Helpful tools you may need:

- Teflon
- PVC glue
- Pipe claws (1" & 2")
- Open-end wrenches SW 27
- Parts for mixing concrete
- Spirit level
- Hammer
- Nails
- Wooden planks
- A shovel

Collection Tank

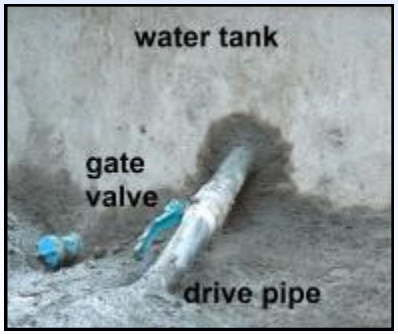
The easiest way is building a **basement of concrete** (see first pictures below). After drying use at least 2 standard cement rings with a diameter of about 1.20 meters (47 inch) and a high of about 0.50 meters (20 inch) each (see second picture below). A **drain valve** hole on the ground for drain the tank is also needed as well as a **hole** for the **PL** (see third picture below) and additional one **hole** for the **overflow** (see fourth picture below). Be sure all is leak proof done. At least cover the collection tank to protect against leafs and dirt.

Foundation for the MRP©

A concrete **basement** (see first and second picture below) or a large flat rock provides a good solid foundation on which to set the MRP©. The best procedure is to put in a concrete slab as a foundation, slightly sloping towards the rear where the unused water will be carried away. It is very important to get the right position of the MRP© **in line with the PL**. Provide that the standard accessory stand (see third picture below) is **aligned correct** (see fourth picture below) before fixing the foundation completely with concrete.

Drive Pipe (PL)

We recommend for the PL **steel pipes**, (usually steam pipe). The pipe should be encased in concrete with our **MPC's© every 2 meters** (see first and third picture below), especially directly **behind the MRP** (see second picture below) and in **front of the collection tank** (see fourth picture below). In some cases people have successfully used well-anchored PVC pipes. However, for trouble-free operation we recommend that the PL should be steam pipes. It should be **straight as possible without elbows**, and normally the same pipe size as the intake of the MRP©. The PL itself must be of the correct length and nearly a 30˚ angle to the MRP©. Use the following **guideline** for the PL : - 2 times the length of the vertical fall (H) of the PL. It should be watertight and rigidly anchored. A **gate valve** on the PL (see fourth picture below) will also facilitate the cleaning that is required on the collection tank itself.



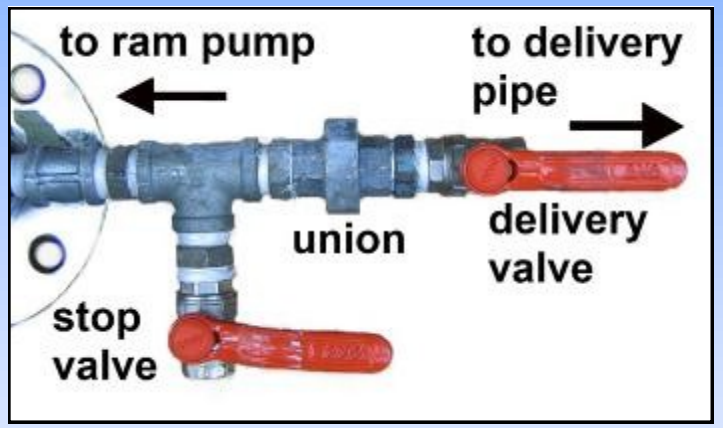
Delivery Pipe (DPL)

The correct sized DPL should match the dimension given for each particular size of MRP. **Do not** install a DPL smaller or larger than that is specified. By doing so you increase the amount of friction lost, consequently reducing the amount of water delivered. **Avoid right-angled elbows** wherever possible. This will minimize friction loss. Do not fill the dam until the MRP© is started and in operation. That way, leaks can be easily located and stopped before water covers the DPL. Up to your parameters mostly we use for about the **first 20%** of the DPL galvanized steel (1/2 " for the 1 inch ram pumps & 1 " for the 2 inch MRP©), after that use PVC pipes (see third and fourth picture below). It is recommended to **encase the pipe** also with our MPC© and concrete the first 20% every 4 meters and then every 10 to 15 meters (see first and second picture below) to prevent movement and **provide damages.**

Valve Combination

The installation of a **valve and union combination** (see picture below) after the pressure vessel from the MRP©, for the DPL, is a great convenience for cutting off the water when it is necessary to adjust the efficiency or **stop the pump** for cleaning the tanks.

Parts for the Valve Combination (included with the 2" MRP)



1 inch MRP©	2 inch MRP©	Amount
1/2 inch bow 45°	1 inch bow 45°	1
1/2 double nipple	1 inch double nipple	4
1/2 t-junction	1 inch t-junction	1
1/2 ball valve	1 inch ball valve	2
1/2 union	1 inch union	1
1/2 fitting	1 inch fitting	1

For the **MSFRP©** you need one more double nipple in the size of the delivery pipe. In case of the **MPFRP©** all could be PVC and additional a 1/2 " fitting with male thread.

Start & Restart the MRP©

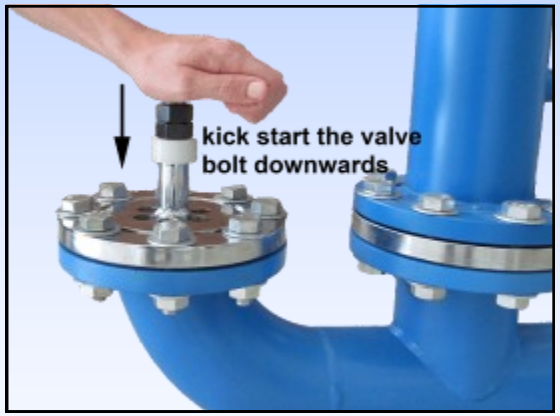
Start / Restart:

1. Close the stop valve (see picture page 22)
2. Open the delivery valve (see picture page 22)
3. Open the gate valve (see picture No.1)
4. Kick-start the bolt down and hold it (waste valve) until all air is flushed out (see picture No.2)
5. If necessary repeat kick-start several times till the pump is working

If you stop the pump:

1. Close the gate valve (see picture No. 1)
2. Open the stop valve (see picture page 22)
3. Close the delivery valve (see picture page 22)

No. 1



No. 2

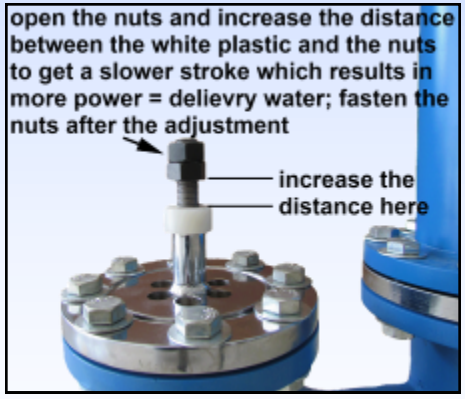
Power & Efficiency Adjustment

The MRP© is assembled with the medium adjustment to pump water on top of your mountain or at a far distance. If you have to adjust the pump follow the steps below.

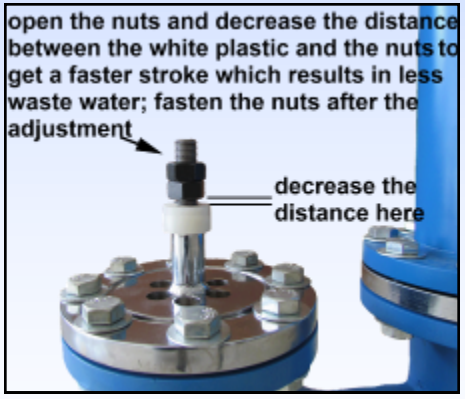
This adjustment is NOT designed for MSFRP© / MPFRP©.

How to do:

- Count the strokes with the initial adjustment per minute (the pump is pre-adjusted with around 10 mm opening distance) Stop the MRP© and close the gate valve (see page 23) Kick start the MRP© once more till all water is out of the PL
- To **increase** (see picture No.1) the delivery volume (and delivery height) open the nuts on top of the bolt with the delivered screw wrenches and turn them upwards to increase the opening distance inside the valve tighten the nuts properly
- To **decrease** (see picture No.2) the waste water volume, open the nuts on top of the bolt and turn them downwards to decrease the opening distance inside the valve, tighten the nuts properly
- The final distance (adjustment) could be measured by counting the strokes per minute or measure the distance from the nut to the bolt guide in mm. Now you can start the MRP© again (see page 23) and measure the delivery and waste water for the efficiency calculation.



No. 1



No. 2

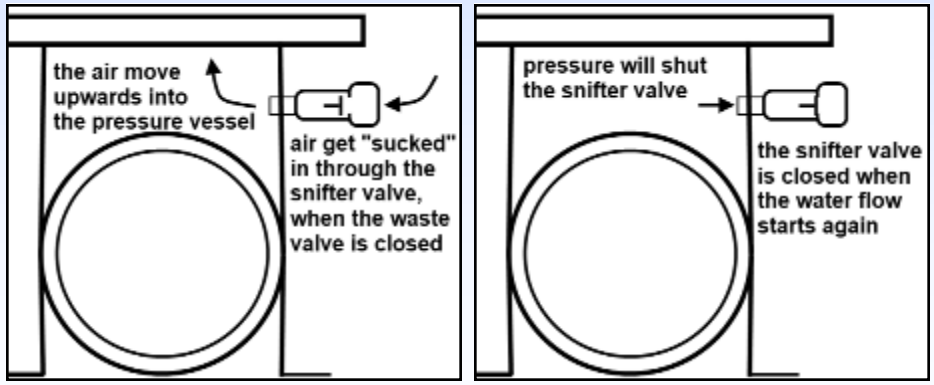
Snifting Valve

The pressure vessel is really important for improving the efficiency of the process by allowing delivery water flow to continue after the delivery valve has closed, it is also essential to cushion the shocks of the water hammer (over pressure).

If the air chamber fills with water completely the efficiency decrease but what is even more dangerous, the ram pump body, the drive pipe or the pressure vessel itself can be damaged by the resulting water hammer. Since water can dissolve air, especially under pressure, there is a tendency for the air in the pressure vessel to be depleted by being carried away with the delivery flow.

Different ram pump designs overcome this problem in different ways. The simplest solution requires the user to stop the ram pump occasionally and drain the pressure vessel by opening two taps, one to admit air and the other to release water.

To avoiding such damages and to make it more simple is, to include a so-called snifting valve which automatically allows air to be drawn into the base of the pressure vessel when the water pressure momentarily drops below atmospheric pressure. Its position is usually on the side of the t-junction towards the pressure vessel. It is **important** to make an occasional check to see that the snifting valve has **not become clogged** with dirt and is working properly.



FAQ

- **The MRP© stops after a few hours / days :** Check if the supply water is sufficient enough for the MRP© operation.

- **You didn't get enough supply water after installing the MRP© :** You should adjust the waste valve bolt with the nuts of the MRP© (see page 24).

- **The MRP© works only a few strokes:** Check if enough water is supplied in the supply tank, all valves are in the right position and all connections are waterproofed tightened.

- **You have sufficient water, but the waste valve will not close :** check if the gate valve is complete opened. And maybe there are some leaves or dirt in the drive pipe (PL) and the MRP©. Try to flush out the MRP© (see page 23).

- **Air bubbles in the delivery pipe (DPL) :** In case the DPL goes over the top of a hill and down into a valley on its way from the MRP© to the consuming tank, a small Air Release Valve or Pet Cock should be installed in the DPL at the highest point to release accumulations of air from time to time. Otherwise, accumulated air will restrict the free flow of the water.

- **The delivery water is less then it used to be :** investigate the H, the DH and DPL and compare it with the details on our webpage. Also check about elbows in the DPL.

- **If the MRP© just don't work after you check the instructions above :** investigate the correct construction in this Manual of the MRP©.

To Do Manual & Cleaning

One of the most important things to do to guarantee a trouble free operating of the pump is keep the piping system clean and in proper conditions.

Especially **after heavy rain** there is a checkup **recommended**. Otherwise the regular **check up** should be done **once a week**.

TO DO :

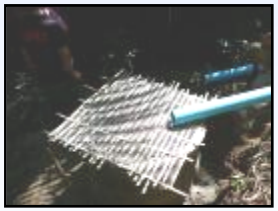
Check if the basin of the **dam is free of stones, branches, leaves and other dirt**. If not clean it up and ensure that the water could flow unobstructed through the supply pipe to the tank. Keep the basin deep enough to provide the flow.

The collection tank should be **covered** with a fine net to protect it from leaves and other stuff. Open the drain pipe or drain valve on the bottom of the tank. If mud is coming out you should stop the pump, close the gate valve and open the cover. **Clean the tank** from the sediments through the **drain** pipe. After that close the valve and the cover. Then start the pump (see on page 23 “start & restart”)

After starting the pump again have a look at the delivery pipe and its connections. If there is any **leak in the system**, if so, stop the pump again, fix the leaks and ensure also that the fixation is right in place. Start the pump and check if all your work was well done.

The last step to do is **control** where the delivery **pipe is connected with your consuming tank**. The pipe should be on top of the tank to provide a free flow. Also the fixation must be in a position that nobody could accidently break it.

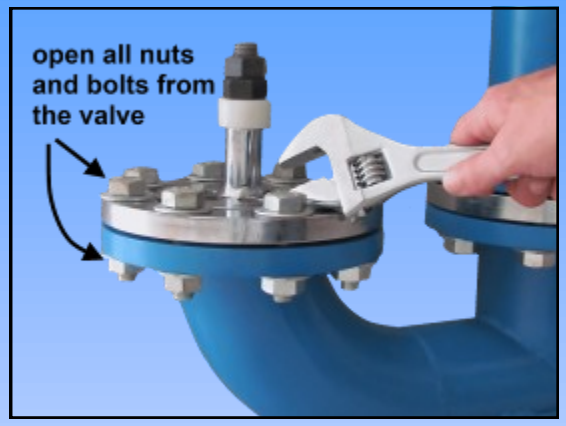
If there are any further questions or anything else we can do, please contact us and let us know.

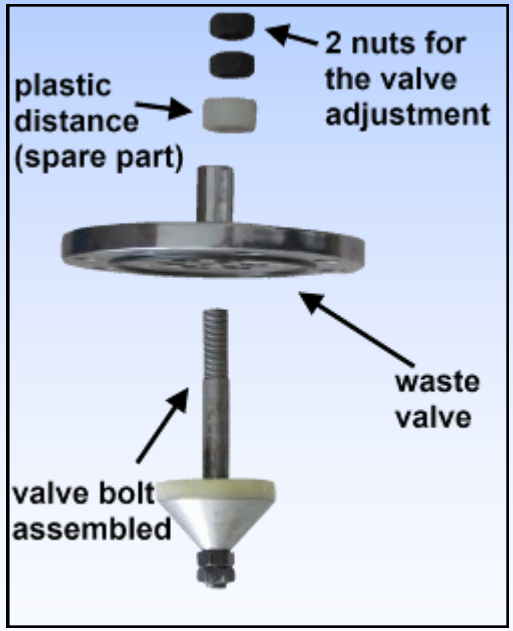

Maintenance (Waste Valve)

WASTE VALVE

- Open all 8 bolts and nuts from the waste valve
- Remove the waste valve from the pump

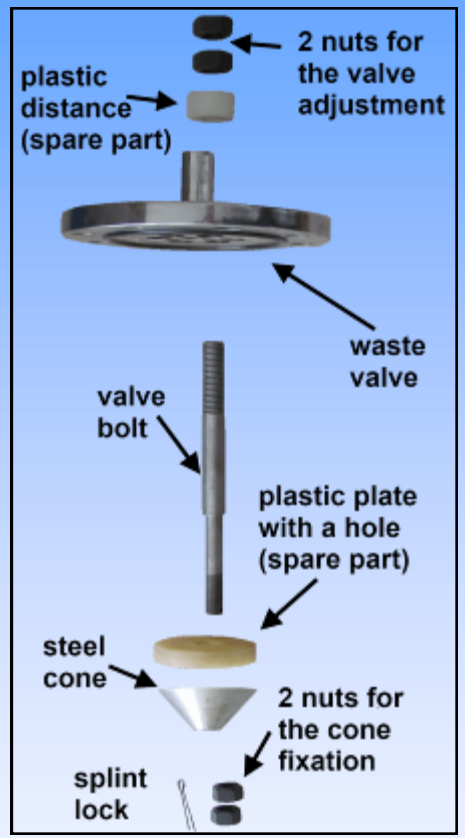


- Open the 2 nuts on the top
- Take of the plastic distance and check it for wear and tear (if necessary replace it)
- Now remove the assembled valve bolt downwards from the waste valve



Maintenance (Waste Valve)

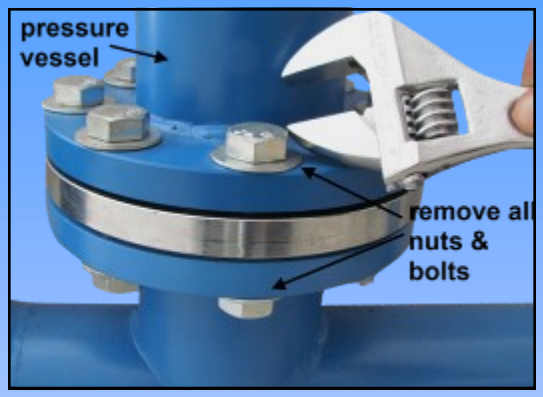
- Remove the splint below the 2 nuts from the valve plate fixation
- Unlock the 2 nuts
- Remove the steel cone
- Check the plastic valve plate for wear and tear and if necessary replace it
- Now reassemble the valve bolt
- First with the plastic plate, then the steel cone, the 2 nuts which has to be fixed properly and then secure it with the splint
- Put the valve bolt back in place
- Don't forget the plastic distance on top
- Then adjust the valve to the old adjustment
- Put the whole waste valve back to the pump
- Lock the 8 bolts and nuts properly



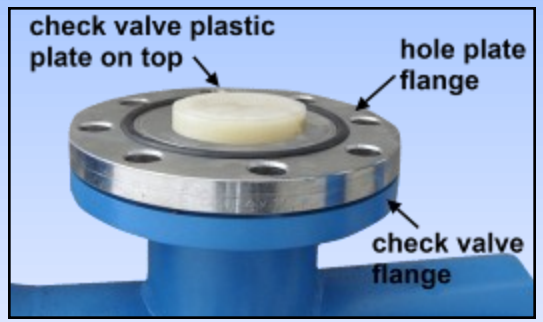
Maintenance (Check Valve)

CHECK VALVE

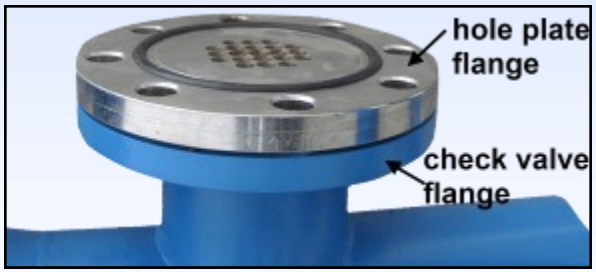
- Open all 8 bolts and nut from the check valve
- Remove the pressure vessel from the valve plate



- On top of the chrome hole plate flange you will see the plastic valve plate
- Check the plastic valve plate for wear and tear and if necessary replace it



- After the plastic plate is back in place put the pressure vessel on top
- Be sure the o-ring is in place and the plastic plate is in the middle

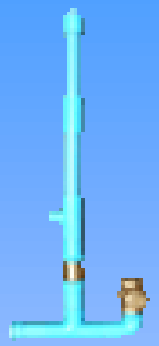


Our Products

2 “ MRP©

2 inch Meribah Ram Pump© with a 2 “ drive pipe
and a 1 “ delivery pipe

Our Products



1 “ MPFRP©

1 inch Meribah PVC Fitting Ram Pump with a 1 “ drive pipe and a 1/2 “ delivery pipe

1 “ MSFRP©

1 inch Meribah Steel Fitting Ram Pump with a 1 “ drive pipe and a 1/2 “ delivery pipe

2 “ MSFRP©

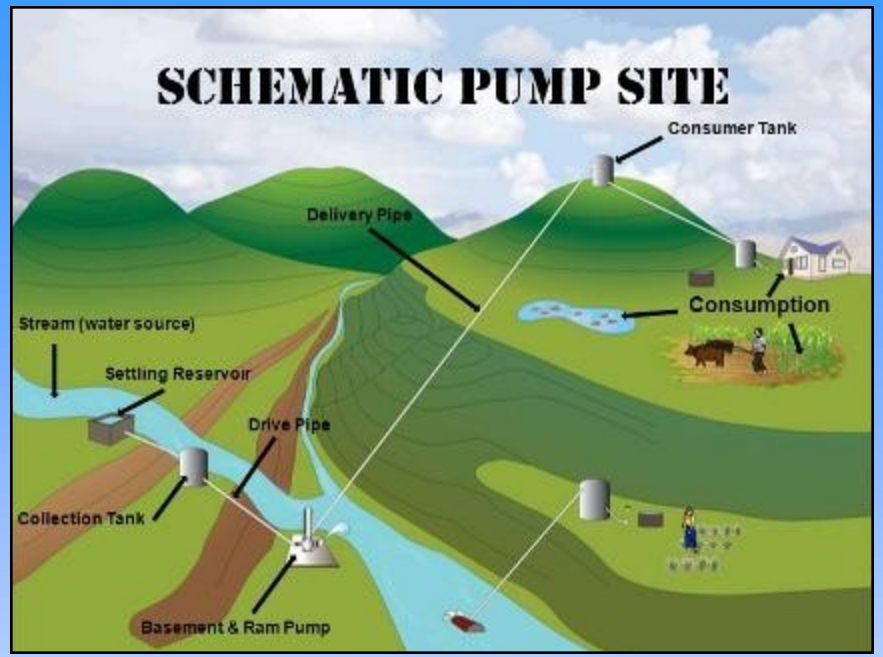
2 inch Meribah Steel Fitting Ram Pump with a 2 “ drive pipe and a 1 “ delivery pipe

Our Products

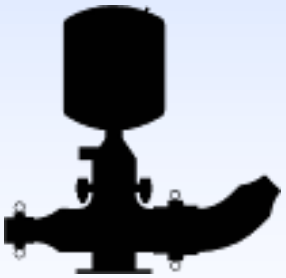
MBSF

The Meribah Bio Sand Filter for daily use and up to 80 liters drinking water. Easy to use, self contained maintenance and developed over 20 years. The lifetime is at least 10 years.

Filters are available with your own logo of your company, club or any individual.



Your partner for appropriate water pumping solutions !



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