

In most countries in Africa 40 to 60% of the handpump are abandoned due to continuous maintenance problems. In areas with deep groundwater 70 to 80% of the handpumps are not functional. The reliable, easy and cheap to maintain Fairwater BluePump is a response to this serious problem for the communities.

The BluePump is rock-solid, simple & straight forward, all components are made from quality materials; therefore the BluePump is reliable, cheap & easy to maintain. The piston has NO rubber seal; there are no fast moving spare parts. Maintenance is limited to tightening nuts and bolts. In deep boreholes, especially in case the borehole is not vertical, the lower centralizers can wear out with time. However, they are double on each rod and can be turned around for a new life and switched with the upper centralizers. The BluePump is therefore the most sustainable and low-cost maintenance solution for rural water supply.

The BluePump is mounted on a solid concrete pedestal with 6 anchor bolts. In case of deep installations, the handle can have an additional counterweight to make pumping lighter. To avoid stress on the PVC pipes, the BluePump rising main pipes can be extended with a free moving bottom support system (BPS). Installation is extremely easy and can be done without specific tools by 2 persons. First the PVC pipes are installed with a rope, and after that the cylinder is lowered with the rods. The position of the cylinder must be at least 10m below the static water level. For inspection, the cylinder can always easily be taken out while the PVC pipes stay in the borehole.

For long term maintenance, we recommend the “**BlueZone Approach**” with local area mechanics that are trained and supported by the BluePump Country representative to assist communities in the unlikely case of a Murphy problem. A yearly check-up of all BluePumps provides monitoring and secures the water supply. With many BluePumps in a BlueZone, communities pay less than 50 US\$ per pump per year for assistance.

Rehabilitation of abandoned handpumps with the BluePump

In Africa many handpumps are not functional. However, the (expensive) borehole is still usable. Therefore it is cost-effective to rehabilitate abandoned handpumps with the durable BluePump, which fits directly on the 4 bolts of the pedestal of old India or Afridev handpump. Rehabilitation is easy and fast. FairWater rehabilitation projects use BluePumps in a BlueZone. We have partnerships in many African countries with the private sector for installation in a **BlueZone**.



Bluepump on rehabilitated borehole, Burkina Faso



BluePump installed at 60m. in Mozambique

Technical data

Rising mains	Ø 70/80 x 2000 mm, BOODE PVC, PVC glue sockets Ø 80/95 x 180 mm			
Rods	Ø 12mm INOX 304 A2 x 2000 mm, fully threaded, connected with M12 locknuts			
Rod Centralizers	Ø 68x15mm, HDPE high resistance, double use, floating.			
Bearings	Heavy duty, sealed, self adjusting, maintenance free			
Cylinder	Ø 53 / 57 x 1000 mm A2, BPS with double foot valve system			
Piston	Ø 53 x 380 mm (maintenance free, no rubber seals). Max stroke = 200mm.			
<u>Discharge</u>				
Water depth	10	25	50	80 meter
Discharge	30	25	20	15 (litre / minute)

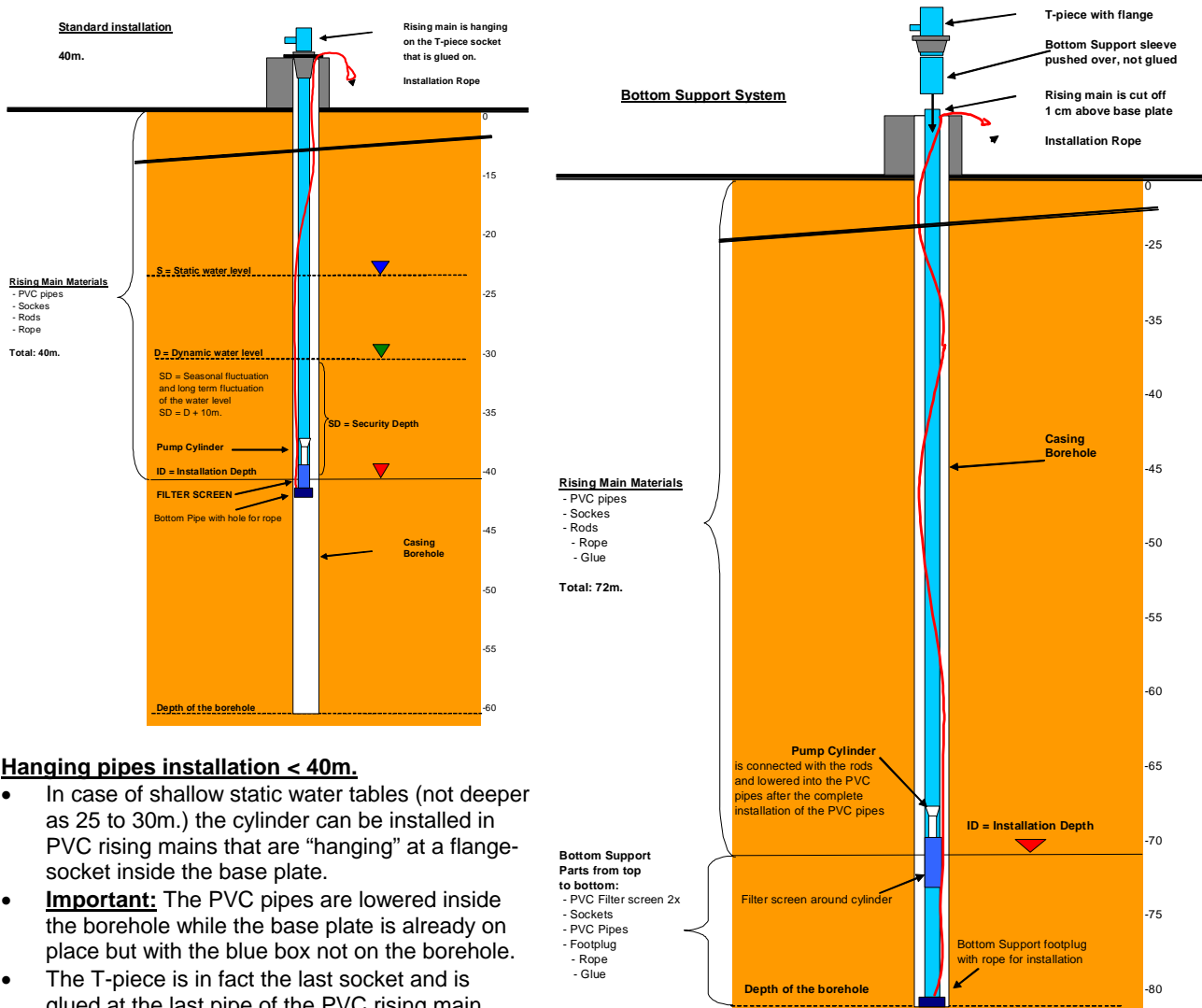
Available with FairWater partners in:

Angola, Burkina Faso, Cameroun, Congo, DRC, Central African Republic, Cote d'Ivoir, Ethiopia, Niger, Malawi, Mozambique, The Gambia, Kenya, South Africa, Tanzania, Uganda, South Sudan, Swaziland.

For info: www.fairwater.org or www.bluepump.nl

contact: info@fairwater.org

Schematic installation with hanging pipes and with Bottom Support pipes



Hanging pipes installation < 40m.

- In case of shallow static water tables (not deeper as 25 to 30m.) the cylinder can be installed in PVC rising mains that are “hanging” at a flange-socket inside the base plate.
- **Important:** The PVC pipes are lowered inside the borehole while the base plate is already on place but with the blue box not on the borehole.
- The T-piece is in fact the last socket and is glued at the last pipe of the PVC rising main.
- When all pipes are installed, the blue box is put on the base plate and secured with 6 bolts.
- In case the pipes may accidentally drop, the installation rope will provide additional security to help to get the PVC pipes out again.

Note: PVC pipes are ideal for handpumps; They are relatively light, not expensive and easy to work with. They do not rust and can resist even brackish groundwater.

However, with pipe length over 40m. even the strongest PVC pipes will stretch during pumping which can cause leaks.

A Bottom Support is therefore recommended for PVC installations deeper as 40m.

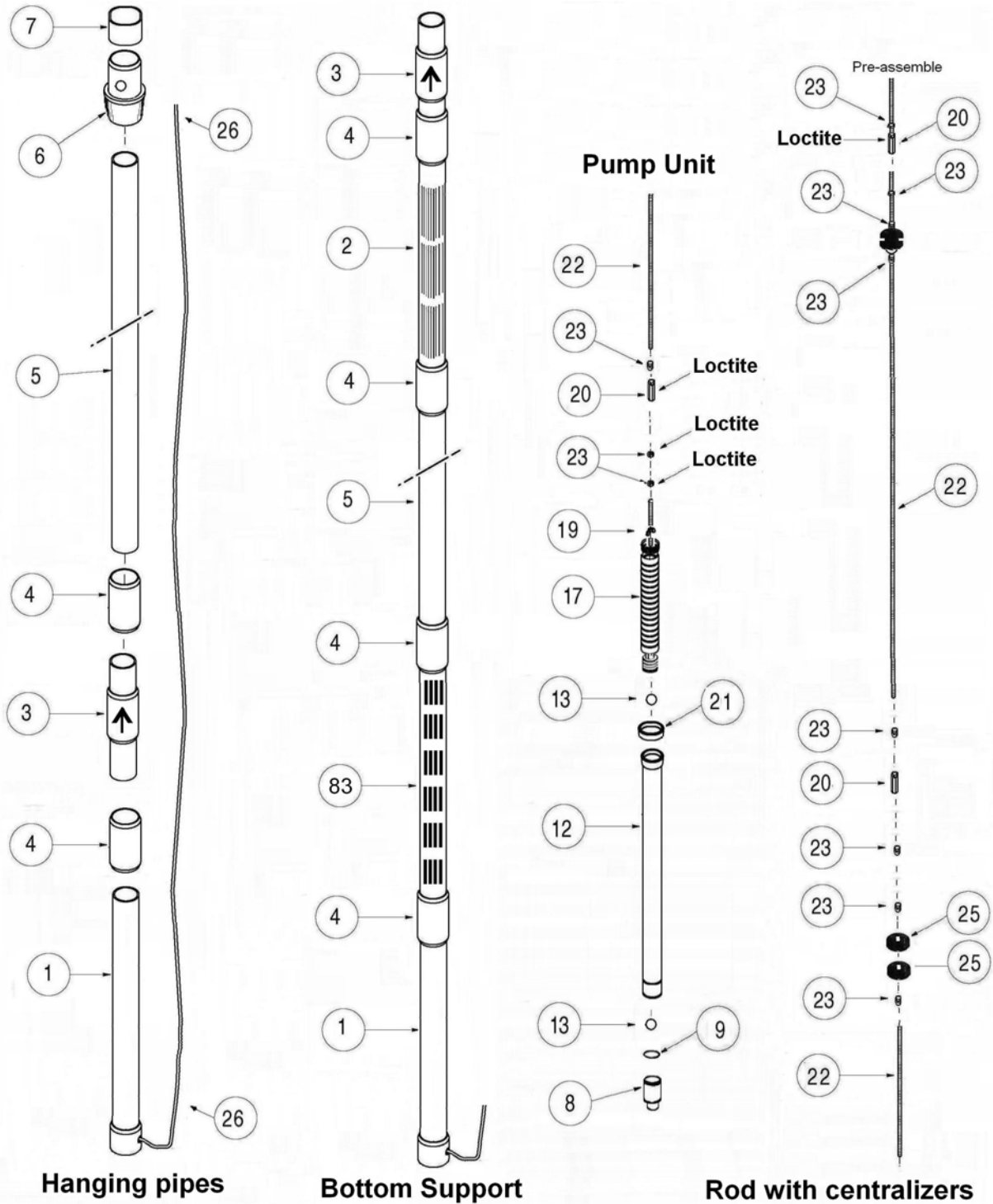
Bottom Support Installation >40m.

- The bottom support pipes with the rope attached to the foot plug will enter first in the borehole.
- The top part of the bottom support pipes must have one or two BOODE screens to allow the water of the borehole to enter in the bottom support pipes.
- The conical seat is factory glued inside the PVC pipes to be installed directly above the screen (-55m. deep in example above).
- At the surface the upper (last) PVC pipes is cut 1 cm. above the level of the base plate.
- The T-piece has an extension **and is not glued** to the rising main, but has a tight fit and is pushed over the upper part of the PVC pipes using Vaseline, not glue.
- Old boreholes may have silt accumulated on the bottom and the PVC pipes may slowly sink 10 to 20 cm. in the first months. To compensate for this, the rods as well as the rising main need to be extended with the same length.

For a sustainable operation, the correct calculation of the depth of the cylinder (installation depth) is important. Due to the pumping and seasonal and long term fluctuations, the cylinder needs to be installed **at least 10m.** below the calculated dynamic water level.

If the static water level is deeper as 30m. the installation depth of the cylinder will normally be below 40m. In these cases it is strongly advised for sustainable operation of all handpumps with PVC pipes to install bottom support pipes to avoid tensional stress on the PVC pipes during pumping.

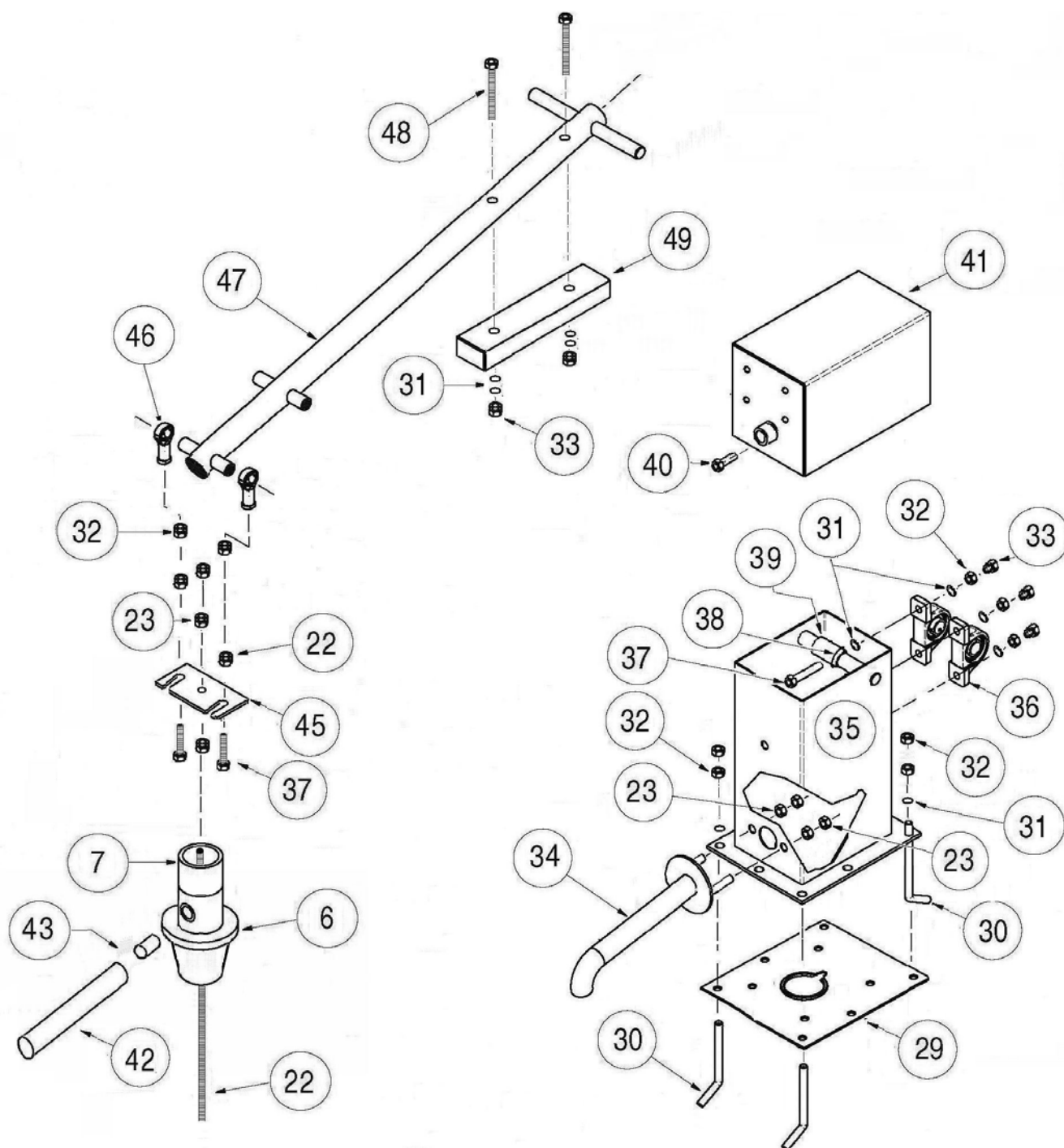
The pump system



Ref.	Description
1	Bottom Pipe PVC, hole for rope, 1m.
2	Filter pipe below conical seat 0,7mm 2m.
3	Conical seat socket, pre-glued
4	Socket PVC Ø 95 x 180 mm
5	PVC pipe Ø 70/80 x 2850 mm
6	Flange with T-piece, PVC
7	T-piece top extension, PVC
8	Second footvalve seat
9	Footvalve seal, rubber
12	Cylinder body with footvalve, A2

Ref.	Description
13	Valve stainless steel ball, 3x
17	POM piston with grooves and seal
19	Wing nut, A4
20	Rod Connecting nut, each rod: 1x
21	Cylinder cap, POM
22	Pumping rod, full thread, A2, 2m long
23	Locknut A4, each rod: 4x
25	Centralizer, each rod: 2x
26	Installation / security rope
83	Bottom Support sump pipe. Slot 5mm. 2m.

Blue box parts



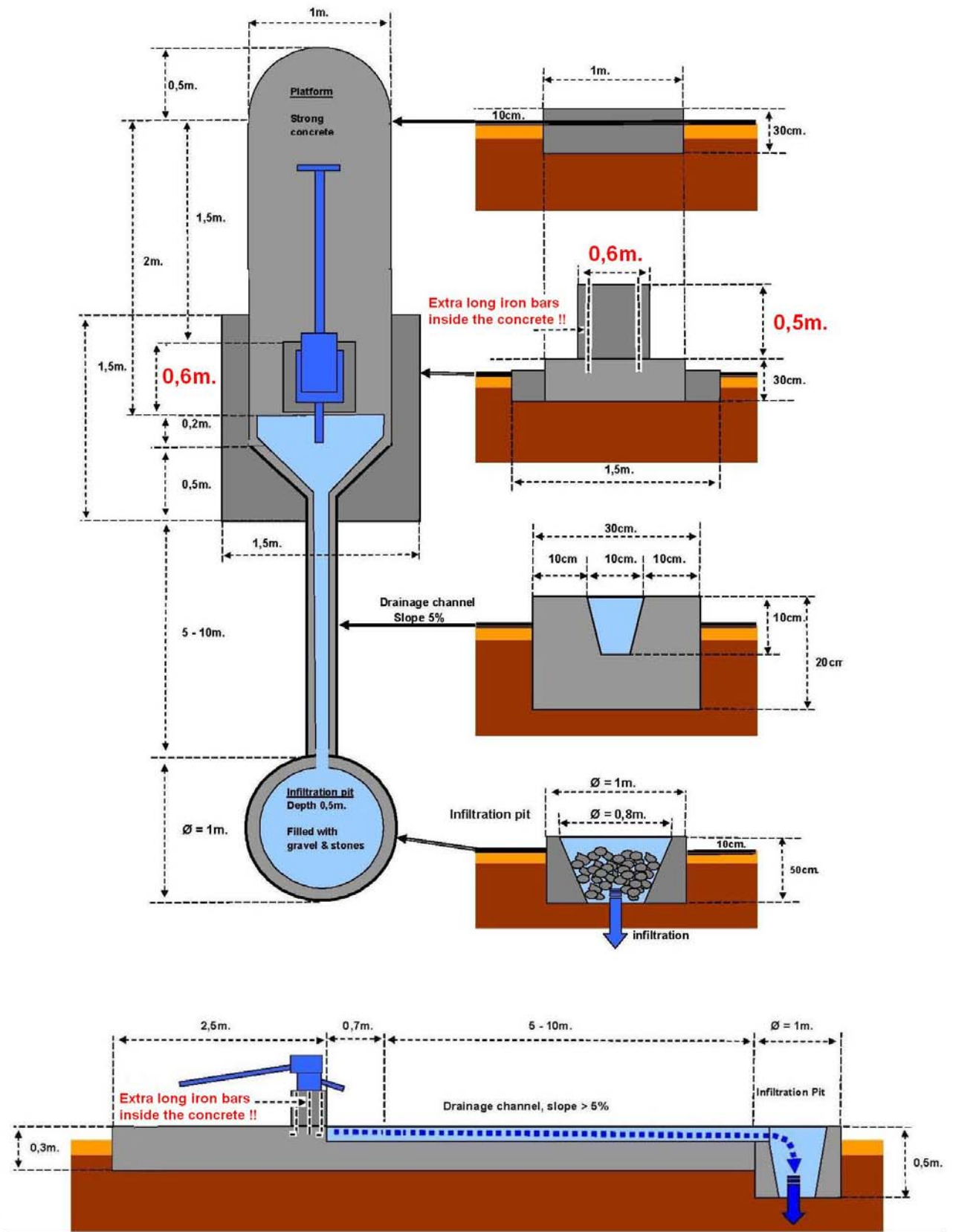
Ref. Description

- 6 PVC Flange, integrated socket, 1x
- 7 T-piece top part, 1x
- 22 Pumping rod, A2, threaded
- 23 Lock Nut, M12 A2, 5x
- 29 Base plate, in 2 parts, galvanized
- 30 Anchor bolt M16, 6x
- 31 Washer M16, 24x
- 32 Nut M16 A2, 24x
- 33 Lock Nut M16 A2, 10x
- 34 Spout with 2 bolts M12
- 35 Steel box, coated, blue
- 36 Ball pillow bearings Ø 30, 2x

Ref. Description

- 37 Bearing bolt M16x60, 6x
- 38 Hose clips, 2x
- 39 Shock absorber on handle, 4x
- 40 Key bolt, M16, 1x
- 41 Cap steel box, coated, blue
- 42 Outflow tube
- 43 T-piece outflow pipe Ø 40, blue
- 45 Connection plate
- 46 Hanger bearing rods, 2x
- 47 Handle with T-piece
- 48 Bolt M16x160, 2x
- 49 Counter weight, optional

BluePump Platform Lay-out





BluePumps are especially good for rehabilitation



Make the base stronger with additional iron bars



Connect the handle bearings inside out



Be sure the rods move free all the way up

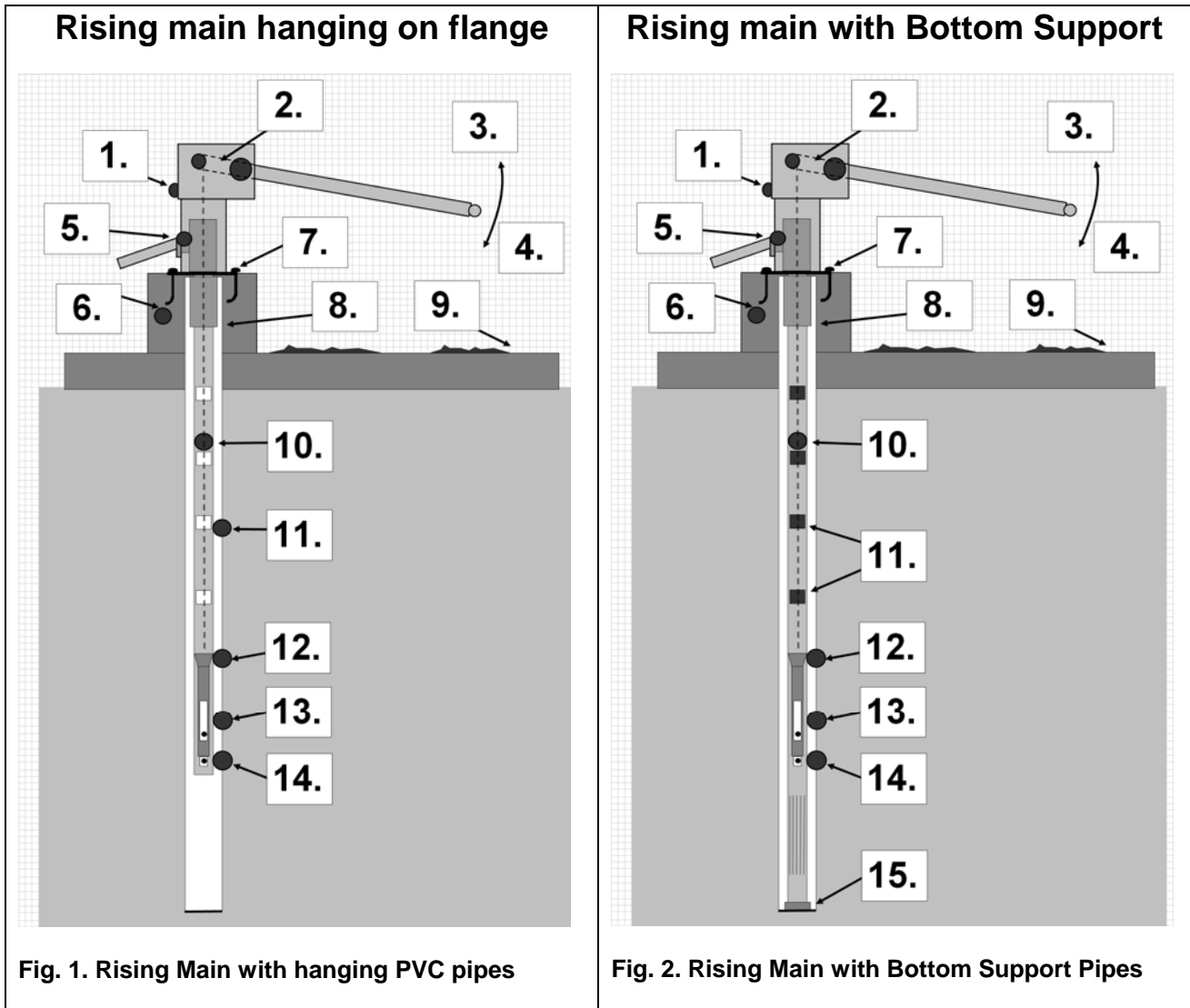


Finish the platform with strong concrete



Another sustainable rehabilitated water point

Operation & Maintenance of the FairWater BluePump



Spare Parts needed for a Regional BlueZone Support Point (40 to 100 BluePumps)

	<u>List of spare Parts:</u>		<u>Installation & Repair Tools:</u>
1.	Set of PVC Glue and Cleaner; > 2 Liter	1.	Flat rope; > 100m.
2.	Complete set of PVC rising main; > 5x	2.	PVC pipe clamp
3.	Complete set of pump rods; >5x	3.	Rod clamp
4.	Extra PVC pipe sockets; >10x	4.	Fishing tool PVC Pipes
5.	Complete set of handle bearings; >1x	5.	Fishing Tool Rods
6.	Cylinder with conical seat pipe; >1x	6.	Tool Box Complete
7.	Bottom Support Flange Pipe; >2x		
8.	Set of Nuts & Bolts M12; > 25x		
9.	Spout; >1x		
10.	Piston and foot valve; >5x		

Spare Parts used by the BluePump:

Under normal conditions, the BluePump does not need any spare parts for the first 3 to 5 years. The first parts that may wear out a little bit with heavy use are the centralizers, but mainly in boreholes deeper as 40m. that are not vertical. Centralizers can be turned around 180 degrees to be re-used, or to be switched by centralizers in the same pump. The bearings will last for 5 years to over 10 years. Other parts that may wear out slowly are the piston and foot valve after 5 to 10 years with heavy use. With a yearly inspection these items must be checked for wear and replaced when needed.

The BluePump is reliable and will function for many years. However, FairWater recommends to do an Annual BluePump Check-up (ABC) to verify the correct functioning of the pump system.

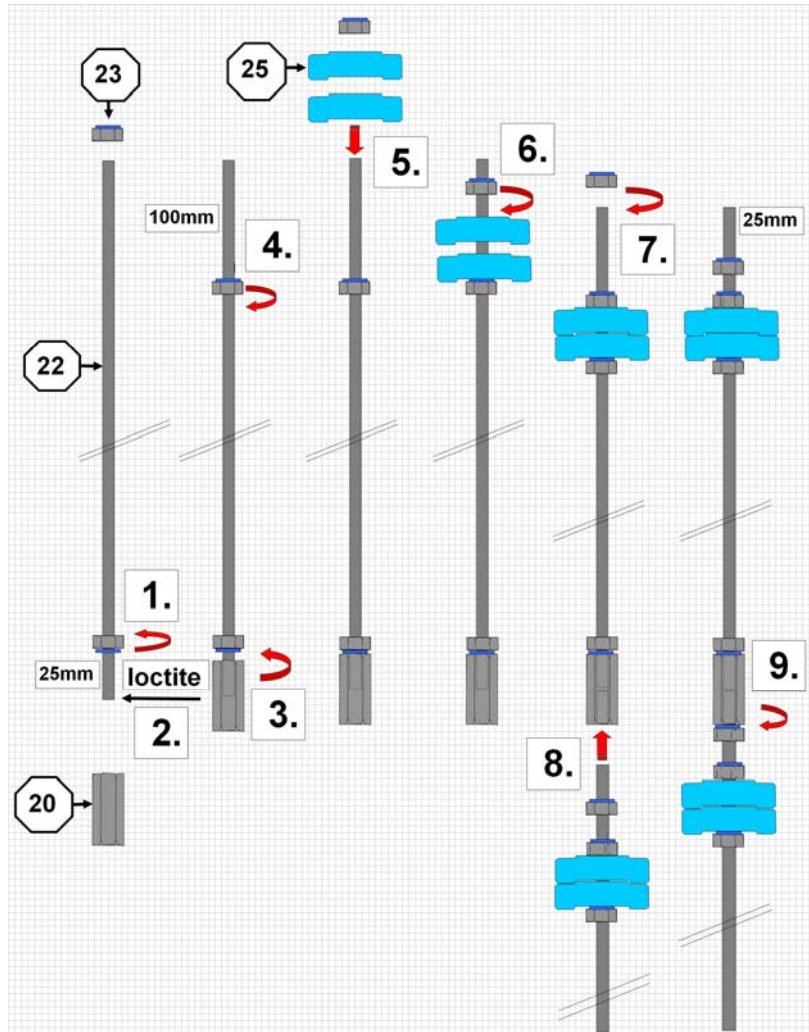
For the “hanging”PVC rising main system, the following 14 items must be checked, fig. 1.

1. Open the Cap with the Allen Key (Nr. 40);
2. Check if the inside of the box is dry and clean. If there is any water, check where it comes from and modify where needed;
3. The movement of the handle must without any strange noises of resistance. Therefore slowly move the handle to its lowest position and feel if the handle touches without obstruction the bottom stopper;
4. In a similar way, move the handle to the lowest position and feel if the handle moves normally, check visually the free movement of the handle inside the box;
5. Check inside the box, if the 2 M12 Nuts that hold the spout are tight;
6. Check the surface of the concrete pedestal for irregularities and plan a repair where needed;
7. Check if the 6 anchor bolts are all tight, tighten those that need tightening;
8. Take the box off, in case of a “Bottom Support” installation; check if the PVC rising main is still connected to the T-piece. If the rising main has sunk a little inside the borehole, adjust the length of the rising main;
9. Check the condition concrete of the plate-form, plan repair with concrete to fill up any small holes of irregularities;
10. Start taking out the rods one by one and verify while doing this, if all rod connections are still tight enough. Place the rods in a logic order on the round close to the BluePump.
11. While taking out the rods, check the condition of the centralizers for excessive wear and tear on one side. If this is the case, plan to replace them. Normally, the deeper centralizers wear out faster compared to the less deep centralizers, so you can change the used deeper centralizers for the less used shallow centralizers. The new Blue Centralizers come in a set of 2. In case one side is used up, one of the two can be turned 180 degrees to make a new complete round set again;
12. Take out the cylinder, this may need some force to lift the cylinder out of the conical seat;
13. Open the cylinder by unscrewing the white top part. Take the piston out and check the piston for wear and tear on the outside. Check the valve inside the piston for proper functioning and replace when needed.
14. Check the proper functioning of the double foot valve system; replace one or two valves if the do not close properly anymore.

For the “Bottom Support”PVC rising main system, these 15 items must be checked, fig. 2.

1. Open the Cap with the Allen Key (Nr. 40);
2. Check if the inside of the box is dry and clean. If there is any water, check where it comes from and modify where needed;
3. The movement of the handle must without any strange noises of resistance. Therefore slowly move the handle to its lowest position and feel if the handle touches without obstruction the bottom stopper;
4. In a similar way, move the handle to the lowest position and feel if the handle moves normally, check visually the free movement of the handle inside the box;
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6. Check the surface of the concrete pedestal for irregularities and plan a repair where needed;
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14. Check the proper functioning of the double foot valve system; replace one or two valves if the do not close properly anymore.
15. The foot pipe of the rising main is often forgotten, heck this for proper functioning.

Annexe 1. Preparation & installation of Rods with centralizers



Preparation procedure:

1. Put the first locknut (Nr. 23) about 25 mm over the rod (Nr. 22);
2. Apply loctite metal glue at the end of the rod;
3. Put connection nut (Nr. 20) over loctite and tight it to the locknut;
4. Put on the second locknut (Nr. 23) about 100mm. over the rod on top;
5. Put 2 Blue Centralizers (Nr. 25) over the rod;
6. Put the third locknut over the rod and tighten the centralizers;
7. Put the fourth locknut (Nr. 23) about 25 mm. over the rod;

Rods are now ready to go to the field.

**Important: keep sand and dust away from the rods, otherwise nuts may block!
Before putting the rods together, clean both ends of the rod with clean water, as well as the inside of the nuts!**

8. Connect the rods together;
9. Tighten the locknut (Nr. 23) firmly to the connection nut (Nr. 20), using two spanners, or the installation tool and one spanner.