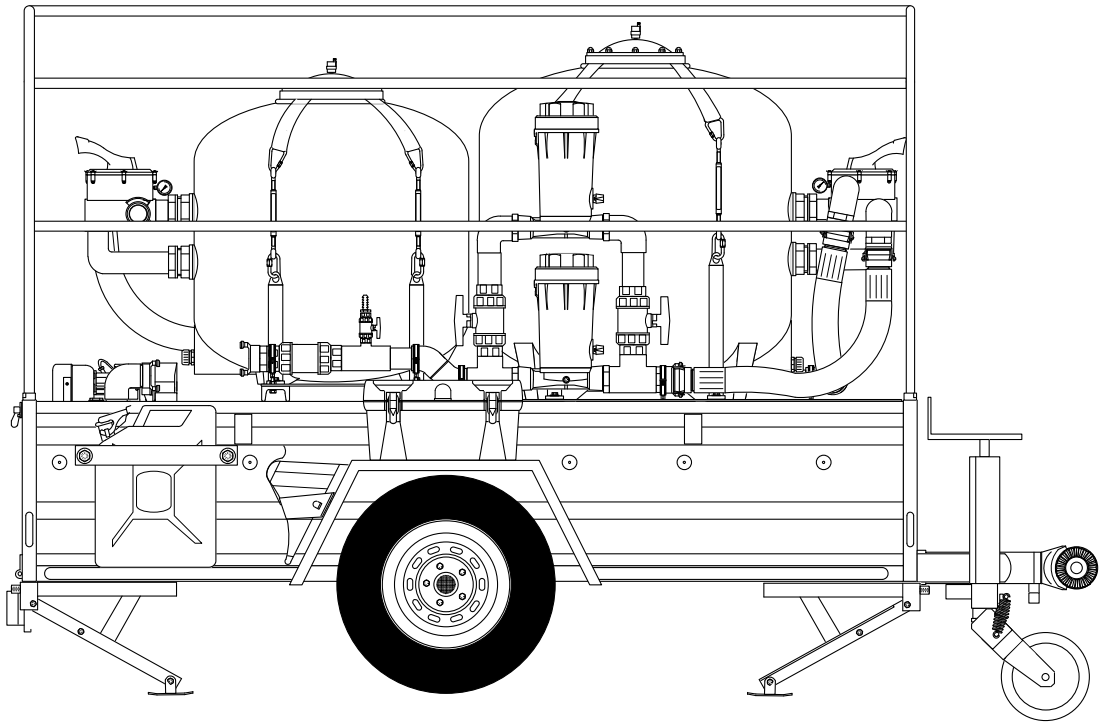
INSTRUCTION MANUAL

OX A3 & D3

MOBILE UNIT ON TRAILER

Diesel engine version



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Water all over the world

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USING INSTRUCTIONS
OX A3 / D3

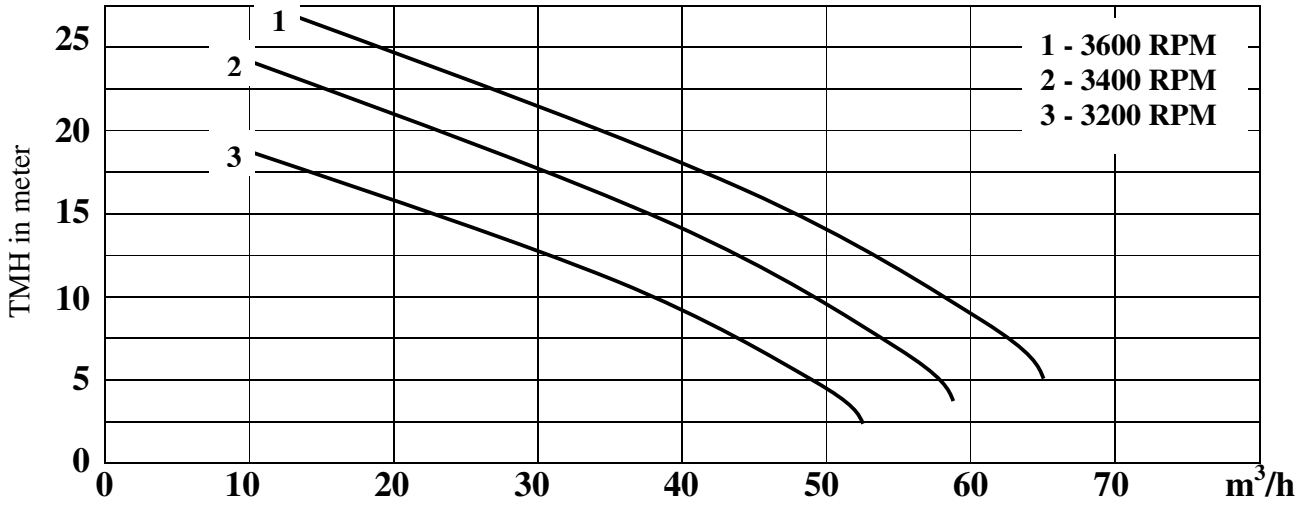
1. Technical features

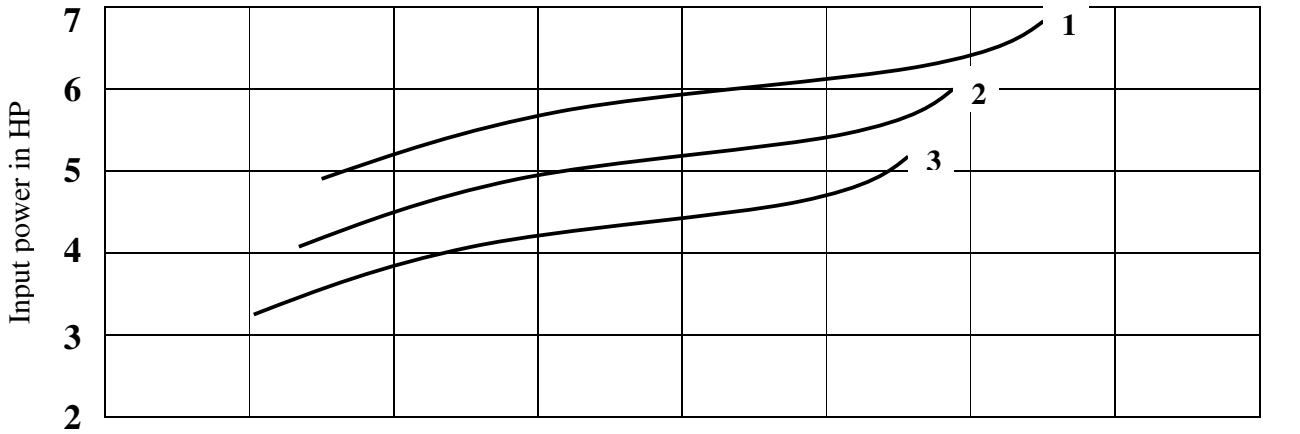
Unit

Model	Maxi cty [1] m^3/h	Diesel engine	Size L x l x H (m)	Weight [2] kg
OX A3	15	6,8 HP – 3600 RPM	3,1 x 2,04 x 2,1	1 500
OX D3	20	6,8 HP – 3600 RPM	3,1 x 2,04 x 2,1	1 600

[1] Maximum capacity depending on the physico-chemical features of the water to treat (turbidity, color, PH…).
[2] Drained filters and units without optional accessories (supply ramps, water tanks…).

Functioning line and pump input power





2. Description and functioning

General features

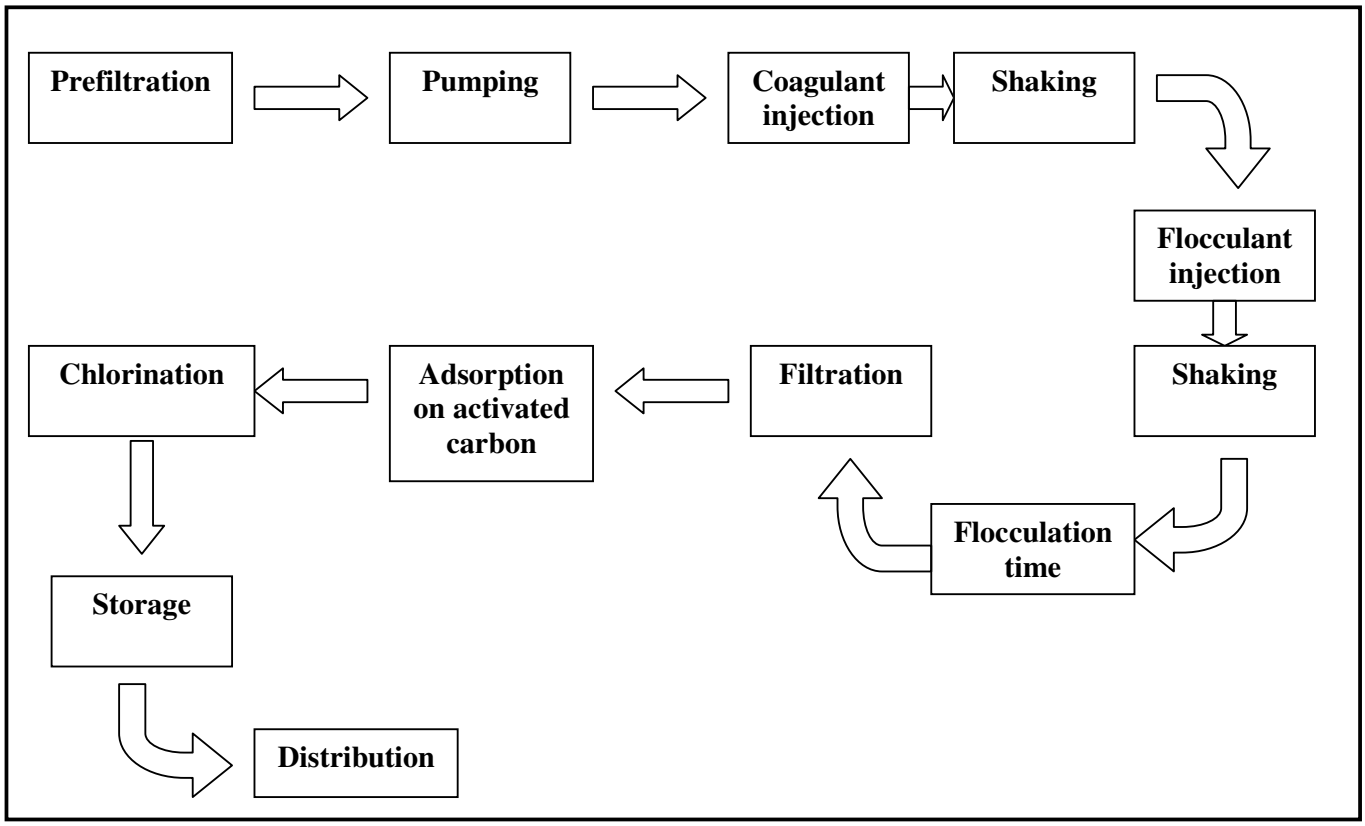
OX water treatment units are especially appropriate to sanitary emergencies situations and don't require any specific skills from the users. The principle used is a standard physico-chemical principle per coagulation – flocculation with filtration on thin sand, adsorption on activated carbon and disinfection with solid calcium hypochlorite (chlorine).

OX units are completely self-working and don't require any electrical feeding (except special version), as the only power used is diesel engine (or petrol and oil according to the pump model).

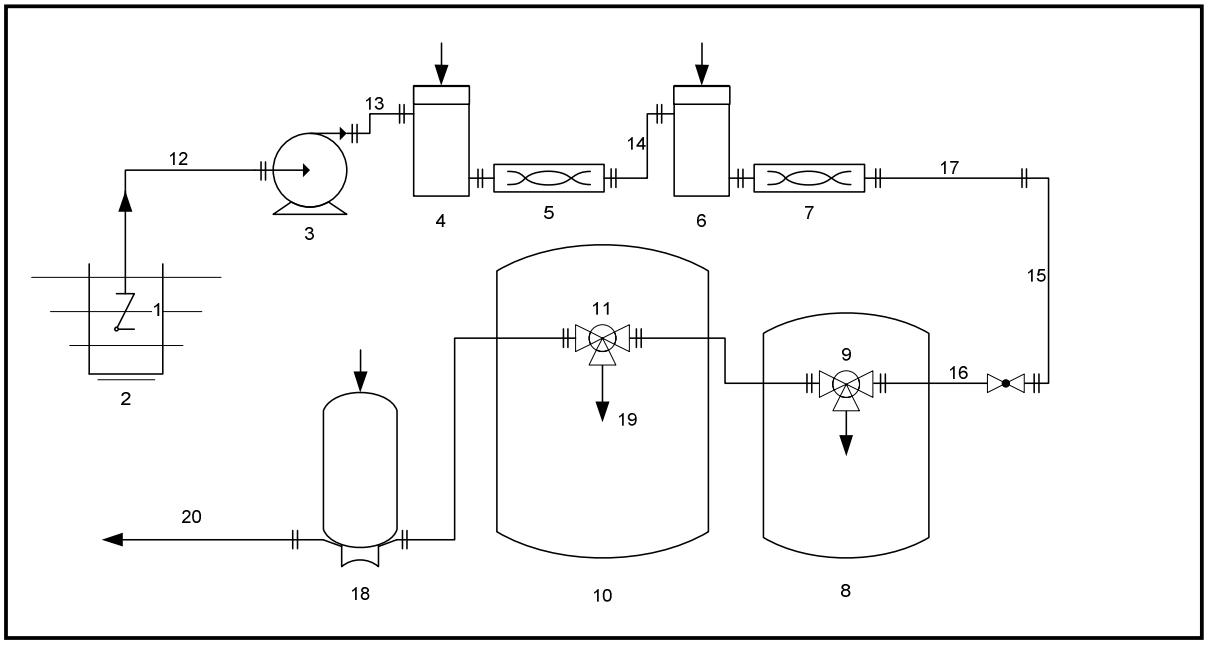
Thus, all the operations during the unit functioning are manual (no automation) or visual. The advantage of non automation (no electronic card, few corrosive parts…) is that you can use all this equipment in all kind of climates (warm, humid, tropical) without any risk of dysfunction and the maintenance is nearly non-existent.

The distinctive feature of these units is the injection of reagents (coagulants and flocculants) without using a flocculant preparation plant, a dosing pump and a stirrer. For this, we developed in collaboration with a French pharmaceutic laboratory, coagulant and flocculants tablets with slow dissolving in proportion to the capacity. To obtain the necessary quantity of reagents, you just have to put more or less tablets in a device (called coagulation or flocculation kit) especially made for this and to connect its outlet to a static mixer (supplied) to improve and speed up the reaction.

Principle scheme



Setting scheme



3. Unit composition

- Trailer entirely galvanized under heat appropriate to a cross country using
- Perforated pipe with filtering sock (Rep.2)
- 1 x Foot valve with EPDM diaphragm (Rep.1)
- Self-priming pump opening impeller with diesel engine 6.8 HP – 3600 RPM (Rep.3)
- 2 x polypropylene coagulation/flocculation kit (Rep.4 & 6)
- 2 x PVC static mixer with rings (Rep.5 & 7)
- Complete hose equipment for the connecting of the different elements including :
    - 2 x 6m hose[3)] with Guillemin fitting, one equipped with an outlet for the connection of the strainer (Rep.12 & 14)
    - 1 x 3m hose[3)] equipped with a Guillemin yellow fitting and a valve (Rep.16)
    - 1 x 3m hose[3)] equipped with a Guillemin fitting with a blue one (Rep. 20)
    - 1 x 3m hose[3)] equipped with a Guillemin fitting with a red one (Rep. 19)
    - 2 x 3m hose[3)] equipped with a Guillemin fitting (Rep.13 & 17)
    - 4 x 25m PVC flat hose equipped with a Guillemin fitting (Rep.15)
- 1 x filter (Rep.8) in alimentary HDPE resisting to abrasion including fine sand with 5% activated silica for the filter layer, 2 support layers with a different granulometry and equipped with a multiport valve (Rep. 9).
- 1 x filter (Rep.10) in alimentary HDPE resisting to abrasion including granular activated carbon (with high capacity of adsorption and with a lot of transport pores) and equipped with a multiport valve (Rep. 11)
- Proportional dosing devices of chlorine (Rep. 18) in line with anticorrosive material with Easylock cap and dosing valve.
- 1 x maintenance kit for the functioning and maintenance
- 2 x tool boxes
- Accessories for trailers (wheel wedge, cross wrench and spare wheel)
- Analysis kit for chlorine, PH, iron and aluminium control with reagents

[3)] PVC transparent hose resisting to abrasion and ozone, alimentary quality approved by IANESCO

4. Transport and storage advices

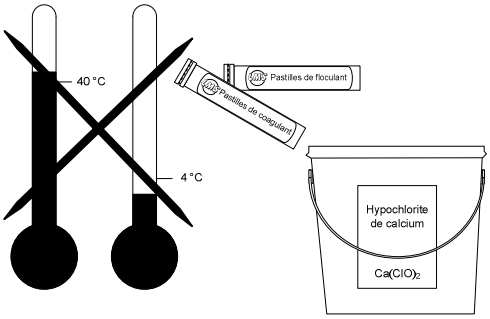
To avoid all unit damages during the transport or storage, please observe the following points:

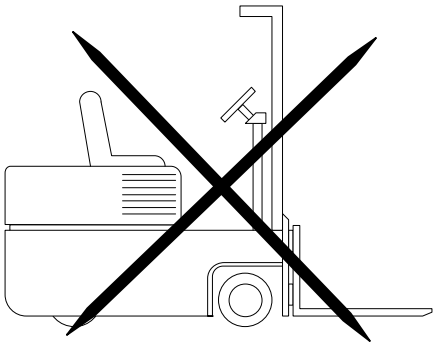
Transport – Handling:

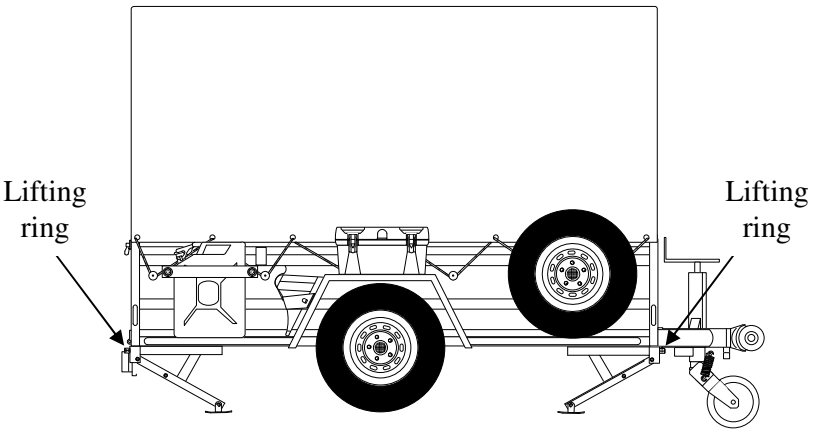
- Don't move a trailer before draining the two filters.
- Before towing, be sure that the retractable wheel was tipped up at the most, as well as the four retracting jacks.
- To use a vehicle able to tow a trailer with the weight of the model you have (§ 1.1)
- The lights connection meets the European standard and for a tension of 12 V DC, in some countries maybe you will have to change the wiring, and according to the vehicle to replace the 12 V DC bulbs by 24 V DC ones.
- Don't lift up the trailer with a fork-lift truck, to use a crosspiece or similar process.
- To check the wheels pressure (as well as the spare wheels).

Storage: (more than a 3 days period)

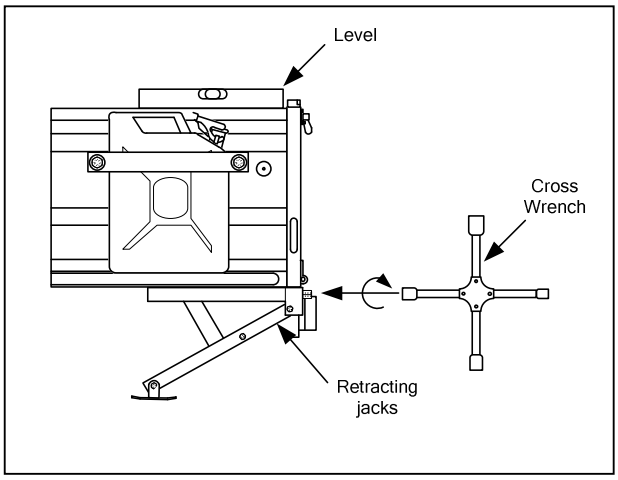
- Before all storage period, it is better to back-wash the sand filter with clean water and to drain the two filters entirely.
- To put off all calcium hypochlorite tablets from the chlorinator.
- Calcium hypochlorite tablets and coagulant/flocculants tubes must be stored in a dry place and within a temperature between 4 and 40°C.







It is better to choose a flat field to park the trailer before its using. After choosing the most appropriate place to put the water treatment unit (easy access, the most appropriate raw water quantity and quality…), pull the handbrake and to make the trailer level thanks to the retracting jacks.



The retracting jacks are only to make the trailer level and not to hold up the whole weight of this one.

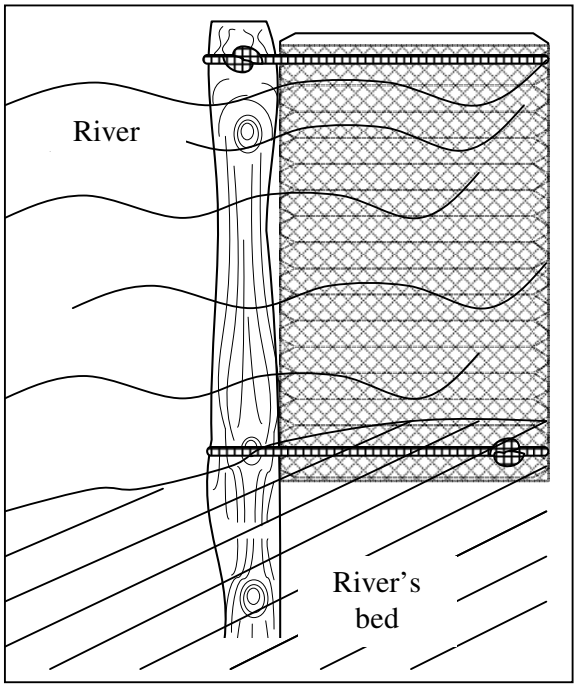
5.2 Connecting of the different elements

Prefiltration – Pumping zone

First, to put the perforated pipe with sock in the river (or lake, a pond …) and to maintain the whole thanks to a support (wood, metallic tube …) and the sock elastic which will be sunk in the bed of the river.

The water level must be at least at the ¾ of the black perforated pipe height.

Be careful not to make a hole in the filtrating sock.



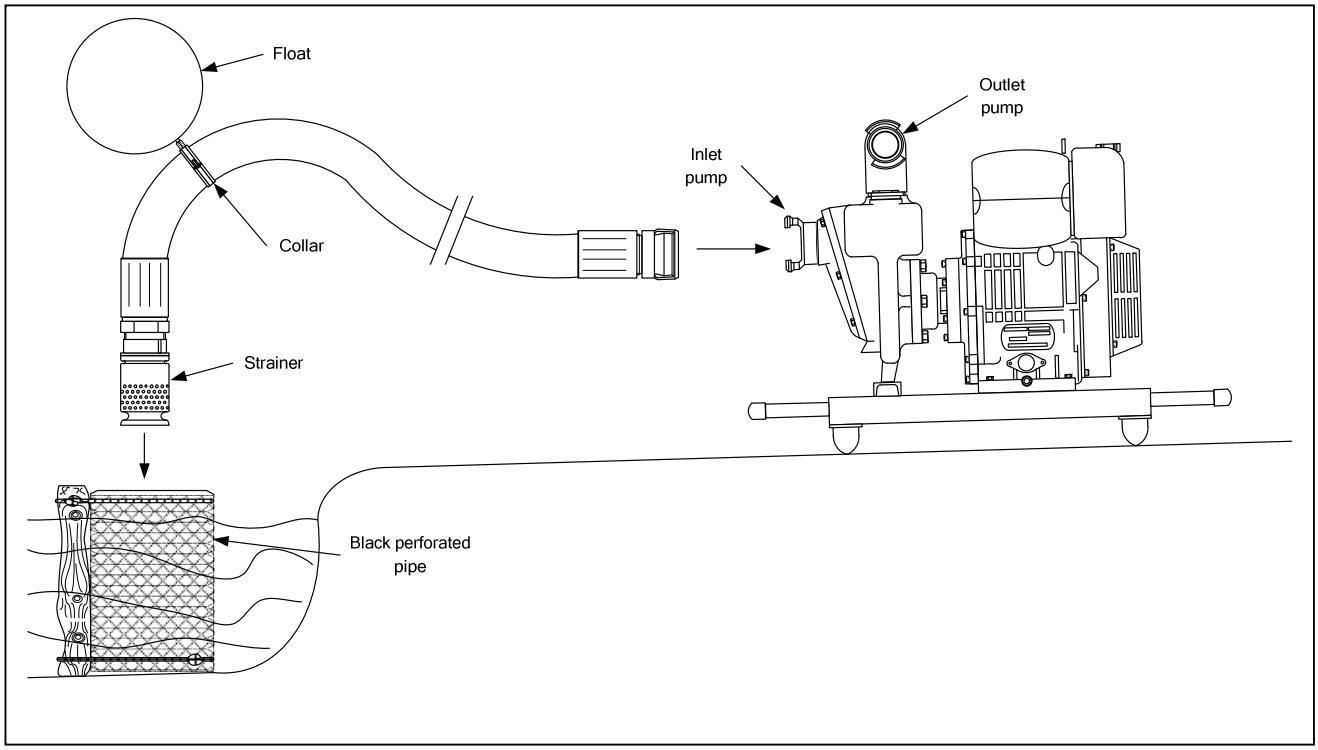
Pumping

To take the 6m hose equipped with the strainer and to put the float on it thanks to its collar. To adjust the float height to get the strainer bottom at 5 cm approximately of the perforated pipe bottom.

Then, to fill in the hose with raw water (with a watering can or a bucket) and to connect it on the pump inlet gasket.

To tighten the Guillemin fitting, we recommend to use 2 C-wrenches in order to avoid spinning round the stuck connectors (one wrench keeps the stuck connector fixed and the other tightens the lock).

To fill in the pump body with raw water at the maximum by the outlet port of this one.



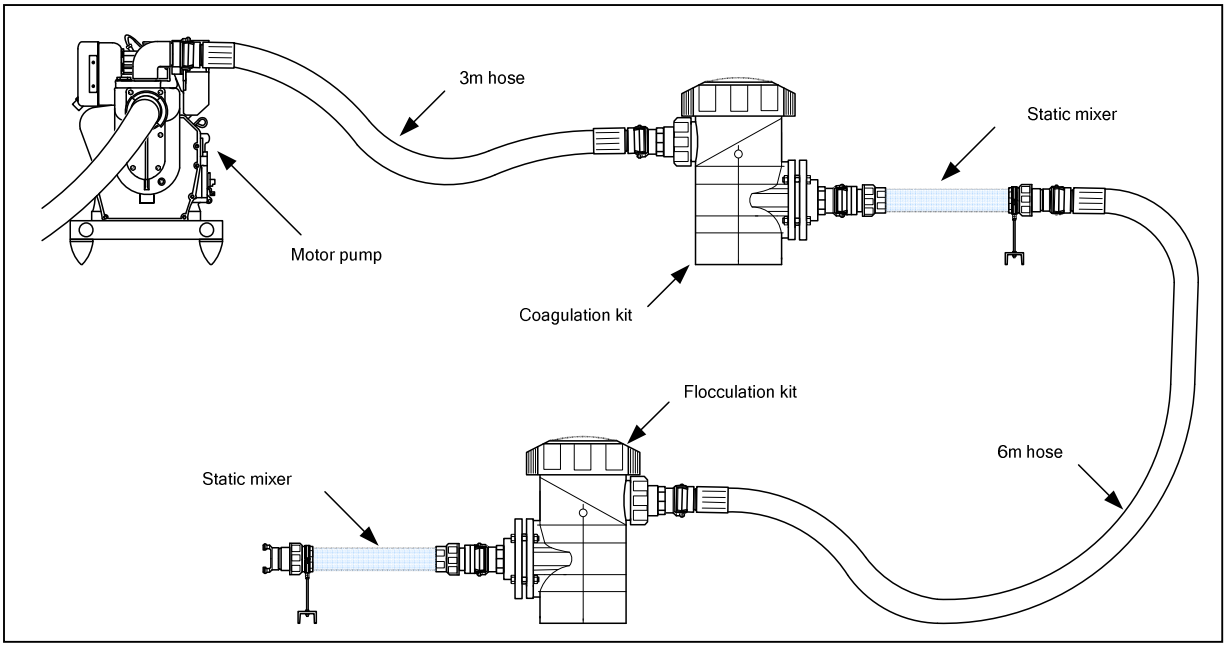
Coagulation – Flocculation

Thanks to a 3m uncoloured hose (raw aluminium), to connect the pump outlet to the coagulation kit inlet, then the outlet of this one to a static mixer.

Then, to use the 6m uncoloured hose to connect the static mixer outlet to the flocculation kit inlet where you will put the other static mixer.

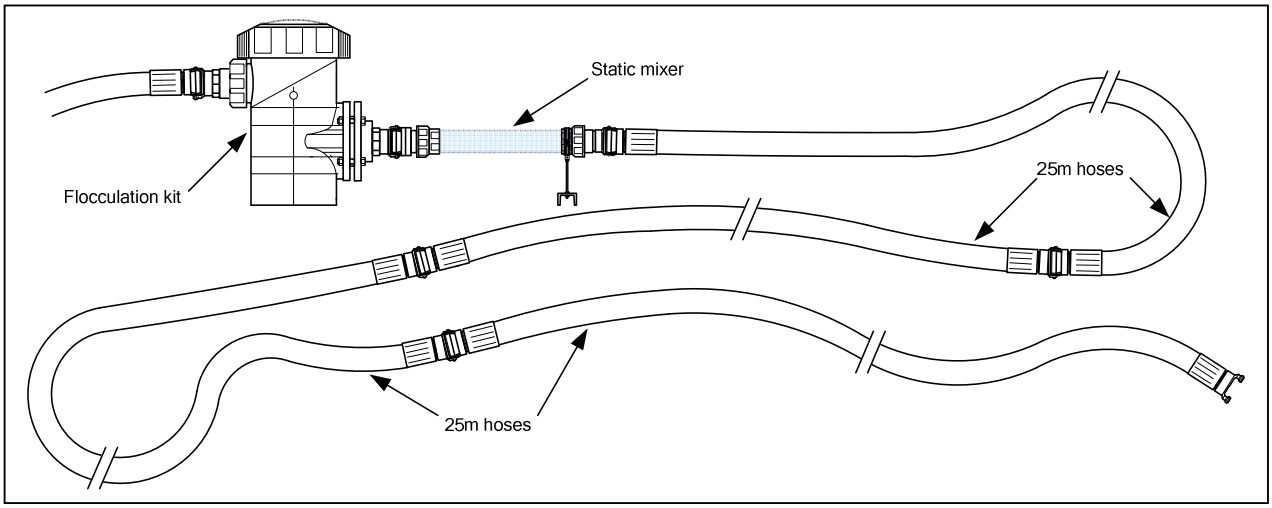
The static mixers are equipped with a collar interlinked with a fixed support. To put this support perpendicular to the mixer in order to consolidate the set coagulation (or flocculation) kit / static mixer.

The coagulation and flocculation kits are absolutely the same, as well as the static mixers, thus they are interchangeable.



Flocculation time

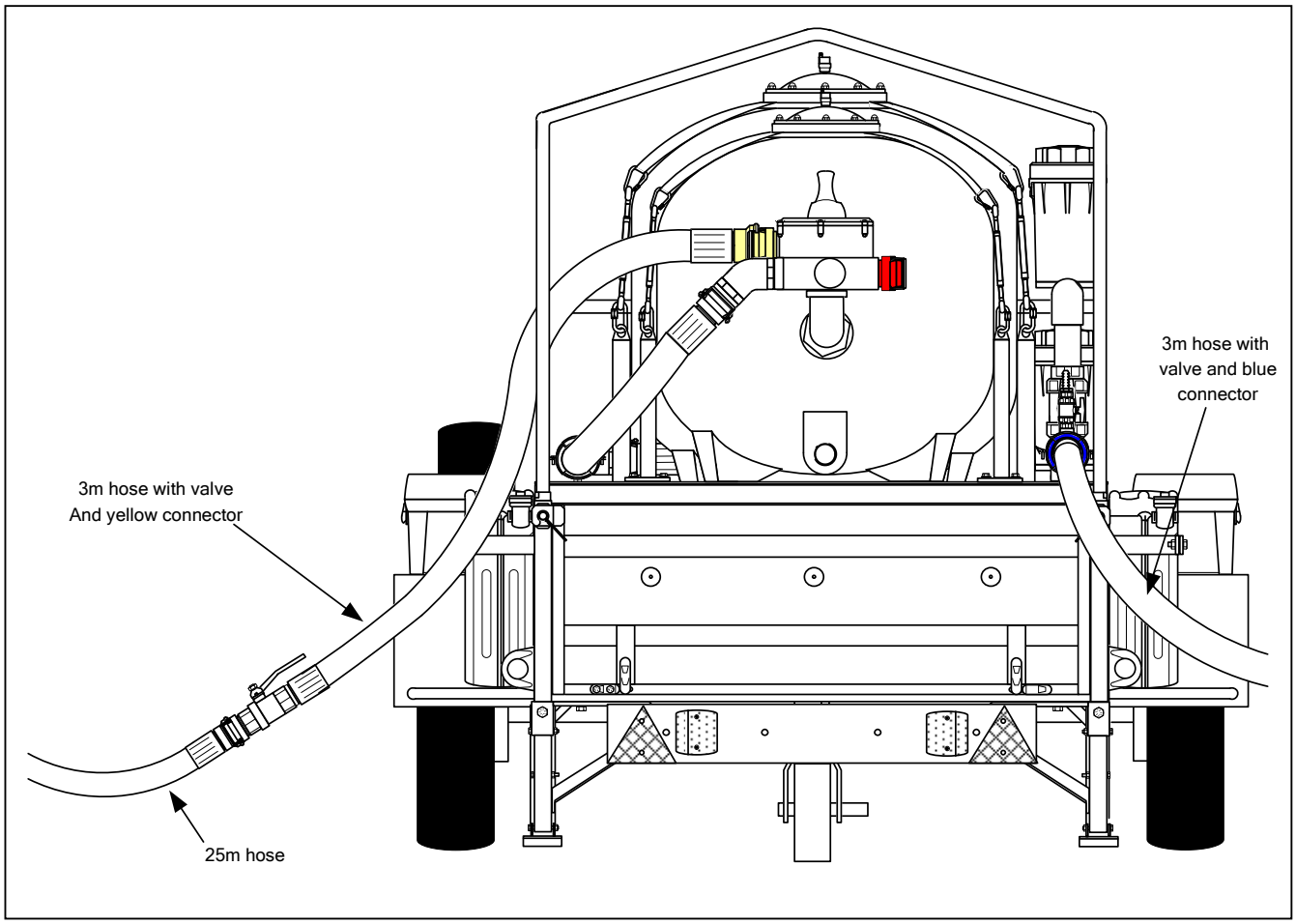
From the flocculation kit outlet and its static mixer to the treatment unit inlet, to set up the 4 x 25m hoses. The flocculation time required will be made inside these hoses.



Station

To use the 3m hose equipped with a valve and a yellow anodized Guillemin fitting to connect the outlet of the four 25m hoses to the inlet station (yellow fitting).

To connect the 3m hose equipped on one side with a blue Guillemin fitting to the station blue anodized fitting (outlet of the treated water).

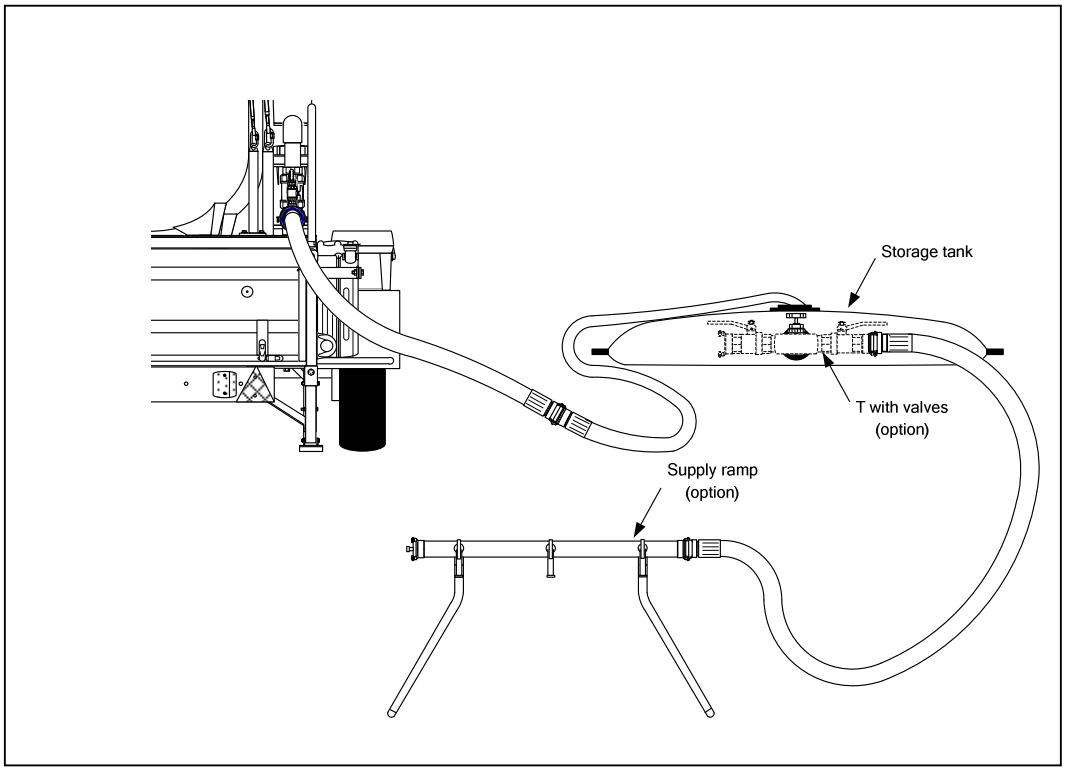


Supply with ramp and closed tanks (Option)

To connect the 3m hose outlet (Guillemin fitting - blue anodized on one side – aluminium on the other side) to the 10m hose equipped with a Guillemin fitting in aluminium on both sides (25m according to the model) to the tank filling aperture (to unscrew the cap at the top of the tank).

For the models equipped with several supply ramps, to connect the T equipped with 2 valves to the tank outlet, then to connect each T outlet to the supply ramps. As for models with only one supply ramp, to connect directly the tank outlet to the ramp.

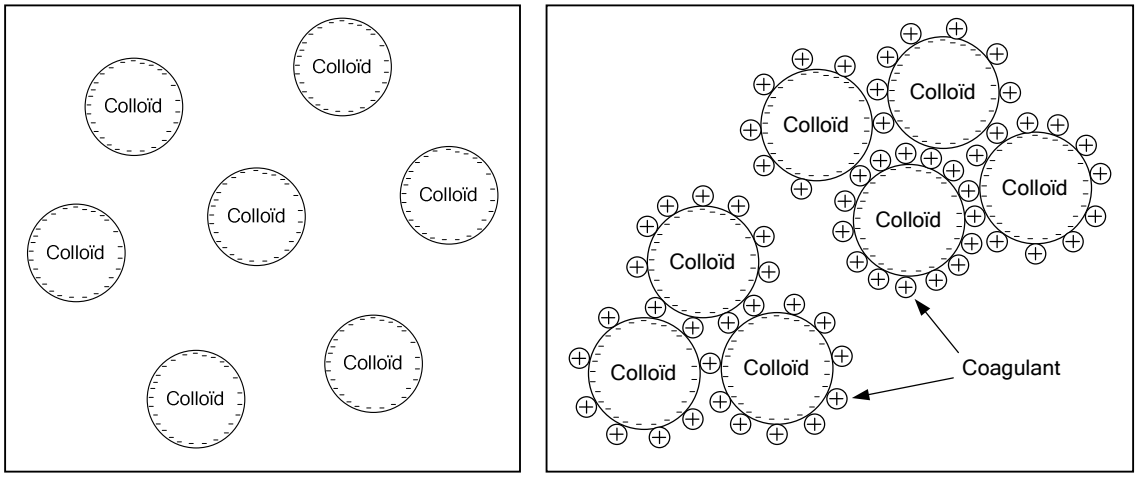
In order to feed properly the supply ramp (or ramps), the tank will have to be placed higher than the ramps with an altitude difference of 1 meter at least.

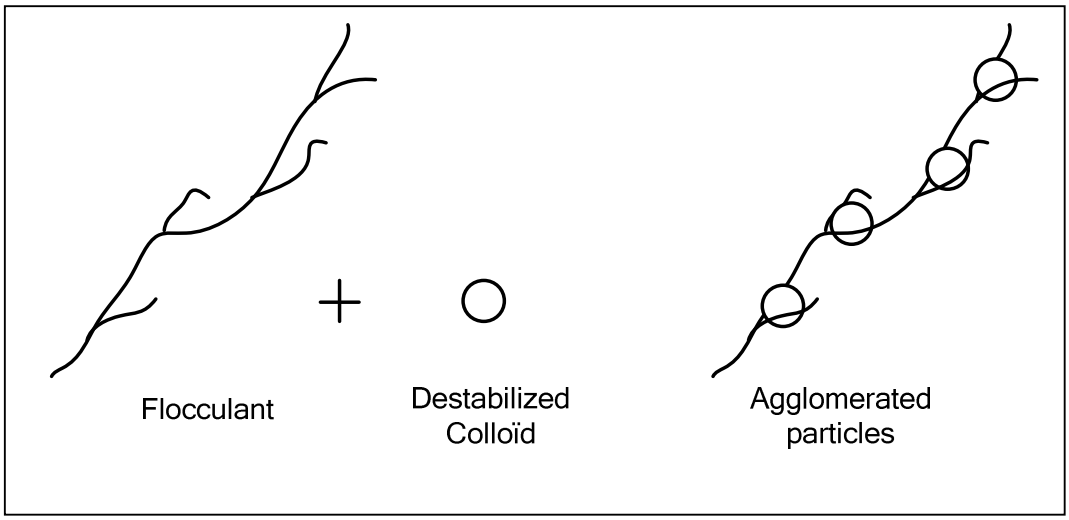


5.3 Coagulant and flocculant choice

In order to obtain the elimination of the very small suspended matters (<1µ), called colloïdal matters, by just a filtration on thin sand, the use of a coagulant is essential to neutralize the colloid upper negative charge and improve their agglomeration (micro-floc) even their decanting.

To speed up the agglomeration and to get bigger the micro-flocs size, we use a flocculant which has the feature to group these micro-flocs together to obtain flocs which will be filterable by an easy process (exp : sand filter).





Coagulant

We converted two kinds of coagulants in tablets with slow dissolving:

- Alufloc® : usual coagulant made with aluminium salts (sulphates) (Al^{3+})
- Ferufloc® : usual coagulant made with iron salts (sulphates) (Fe^{3+})

In most cases, the Alufloc coagulant will be used. This one has the advantage of not colouring the water, while the Ferufloc is inclined to give a slight yellow colour to the water. On the other hand, PH notion is an important parameter for the colloïd elimination. The iron sulphate (Ferufloc) is operating over a larger PH range (see diagram hereafter) and can be favoured for some kind of waters. But, if the iron content of the water to treat is closed to the acceptable maximum value, you will have to favour Aluminium sulphate (Alufloc) and conversely for a high presence of aluminium in the water.

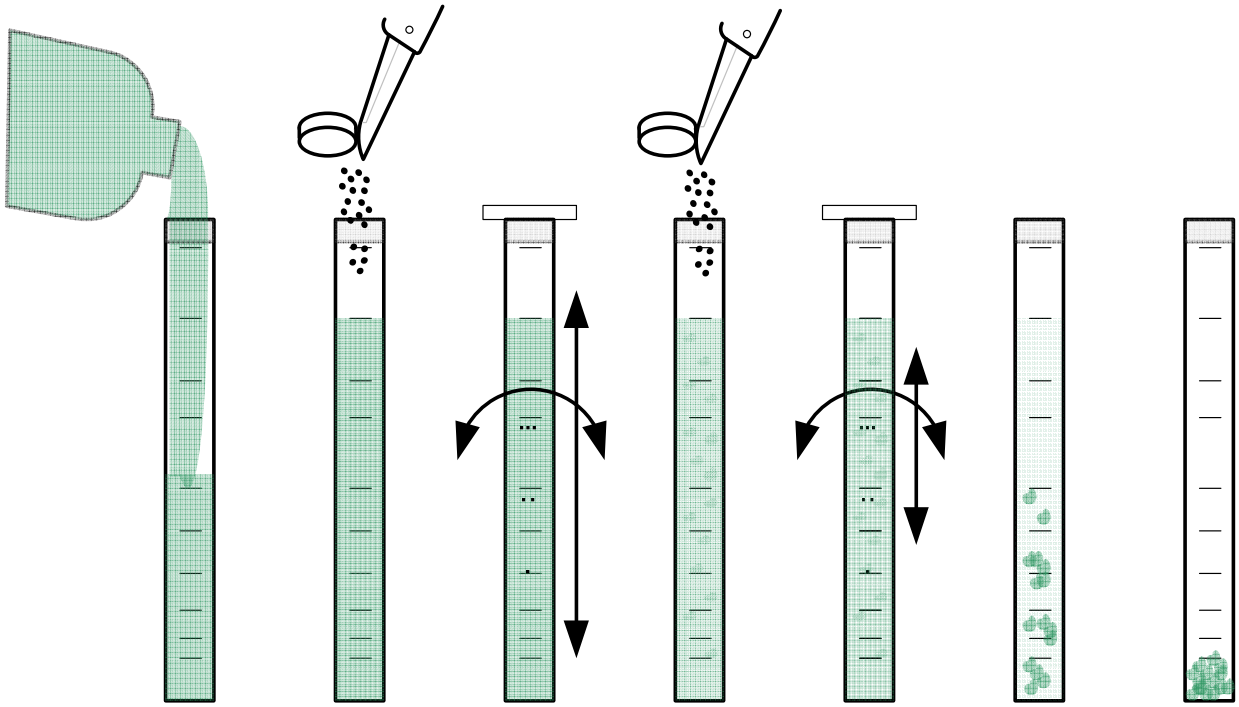
Flocculant

We converted two kinds of flocculants in tablets with slow dissolving:

- Aniofloc® : flocculant made with anionic polymer
- Catiofloc® : flocculant made with cationic polymer

These two kinds of flocculants are long chain macromolecule with electric charge. Unaware of the right composition of the water to treat, the choice of the polymer is made with successive manual tests (called Jar-test in laboratory).

As you don't have Jar-test on the field, you can either use plastic or glass bottles, or the turbidity tube supplied with the unit.



To fill in (1) with raw water the inferior part of the turbidity tube (blocked side with cross) then to add (2) a few scraps of Alufloc coagulant by slightly scratching the tablet side with a knife (or your nail for instance). To block out (3) the tube with a rag (or your hand) and shake (3) strongly in all sides during 30 seconds approx. so that maximum particles knock together and come into contact with the coagulant. In some cases, already you will be able to see the forming of micro-flocs (4).

To add (4) a few scraps of Aniofloc flocculant (to do the same for the coagulant, but be careful the flocculant tablets are crumbler) and shake (5) with less energy than before (high shaking then slower) during 30 seconds approx.

Repeat these operations by making different combinations (Ferufloc + Catiofloc ; Alufloc + Catiofloc ; Alufloc + Ferufloc + Aniofloc ; Alufloc + Ferufloc + Catiofloc …). After each test, to clean the tube inside with a brush (there might be flocculants marks from the latest test that may alter the results of the following tests). In some cases, the using of these two kinds of flocculants proves to be wise. Thus, we advise to put the combination Alufloc + Aniofloc in the coagulation kit, and in the flocculation kit the combination Ferufloc + Catiofloc. However, in most applications, the use of a coagulant with a flocculant will be enough. Also, you can have water (after flood in particular) only saturated with clay for instance. You will have to use only one flocculant without using a coagulation (however the addition of a coagulant will decrease the turbidity, but you have to take into account the water production cost which is fundamental).

You will have to choose the test after the one you get the higher clearness (6 & 7), which means in general, the test which has the bigger and higher quantity of flocs.

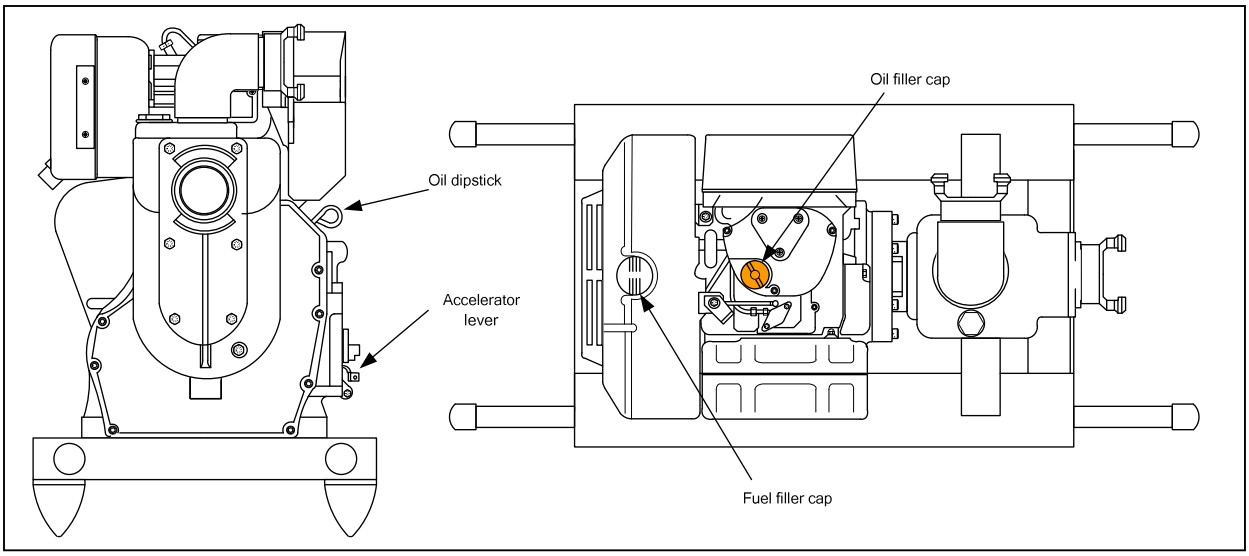
Usually, Aniofloc flocculant is used for clayey waters, pond sludge, lakes and rivers, whereas Catiofloc flocculant is used for waters composed by organic fragments (plants decomposition, alga, water purification plant biomass…). This remains purely theoretical, only Jar-tests will give the best combination to use.

5.4 Installation - Functioning

Motor-pump

Motor-pump engine is supplied without fill up of oil and fuel. For the first using, to top up oil with the 5 liters can and the funnel supplied. The filling cap (orange coloured) is at the top of the engine and oil dipstick (oil capacity : 1,2 L) on the right side (pump side view).

Then, to top up fuel (diesel oil for the standard model), and to put the accelerator lever in middle position and you will just have to pull up very rapidly on the power take to start the engine.



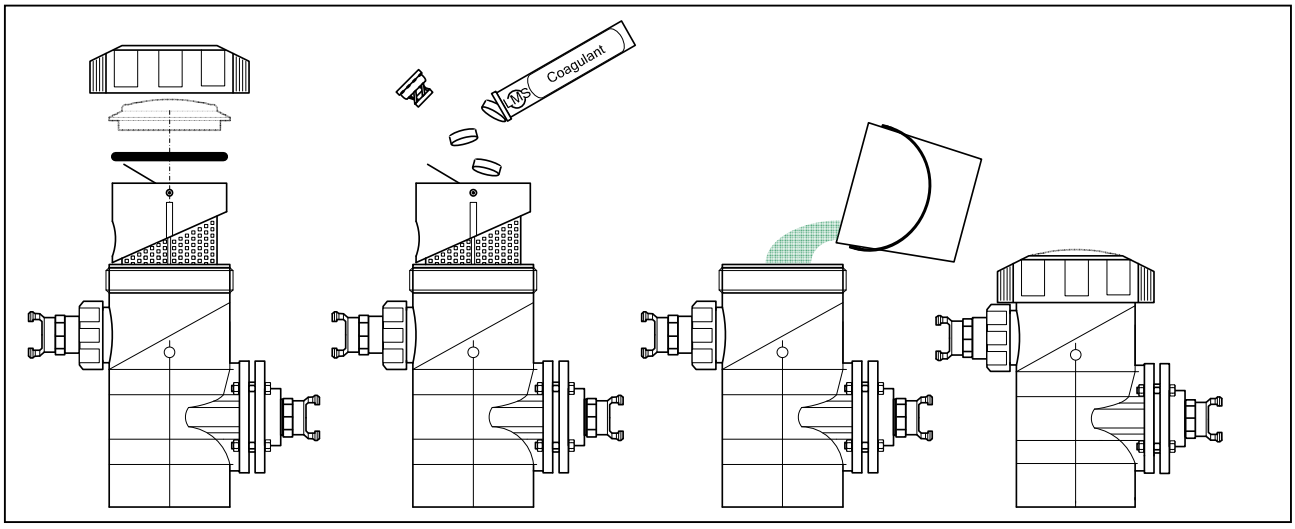
The pump is self-priming but not for a dry starting (suction hose without water), to help for the pump priming, to process as described at the 5.2.2. paragraph and before starting the motor-pump to wait for the end of the 5.4.5 paragraph.

Coagulant – Flocculant

After choosing the appropriate coagulant and flocculant to the water to treat, to put 10 coagulant tablets in the coagulation kit basket and 5 flocculant tablets in the flocculation kit basket.

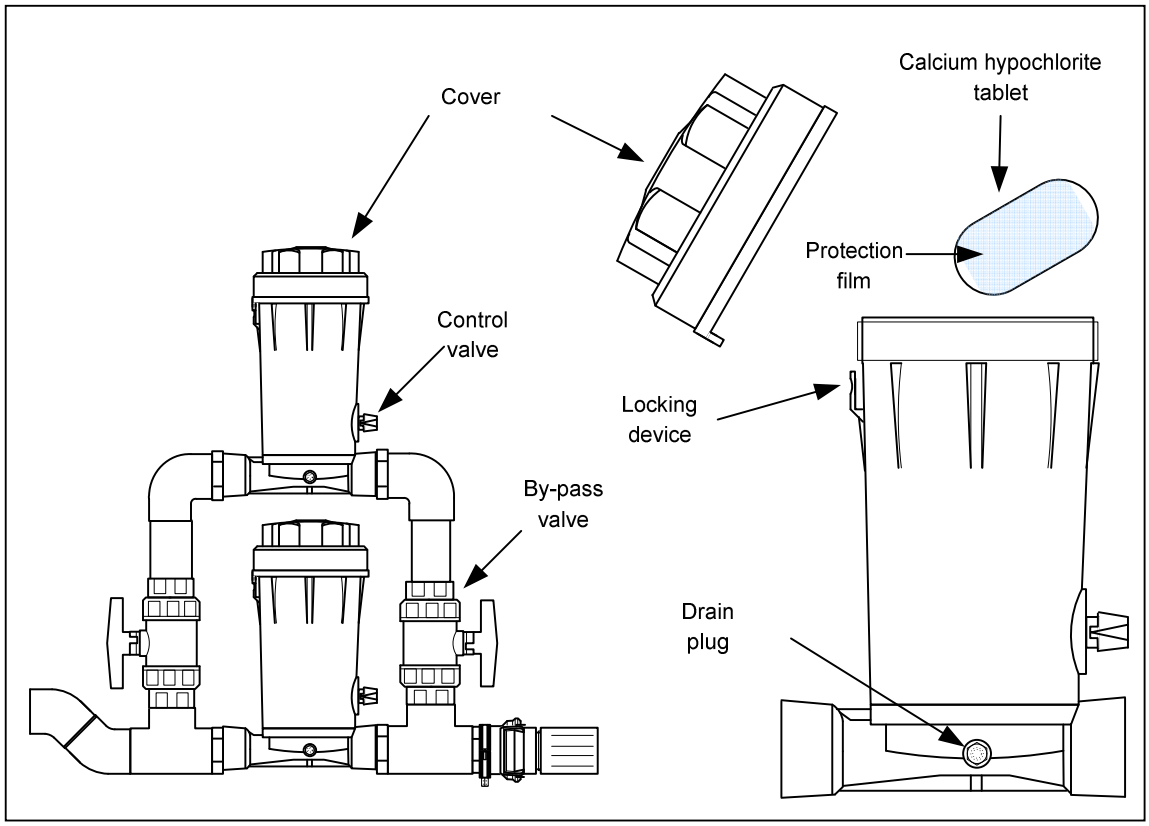
For this, to follow the procedure hereafter :

- To loosen the coagulation kit nut and to take out the cap and the gasket. To pull up a part of the basket and get the coagulant tablets in. To fill in the kit with raw water up to the inlet port, to replace the gasket in its groove (to check if there is no impurity on the gasket and in the groove), the cap and to tighten the nut.
- To process as the same way for the flocculant by observing a waiting time of 10 minutes approximately (required time for the forming of a gelatinous mass making the flocculant proportional injection) before the water treatment unit operating.



Chlorination

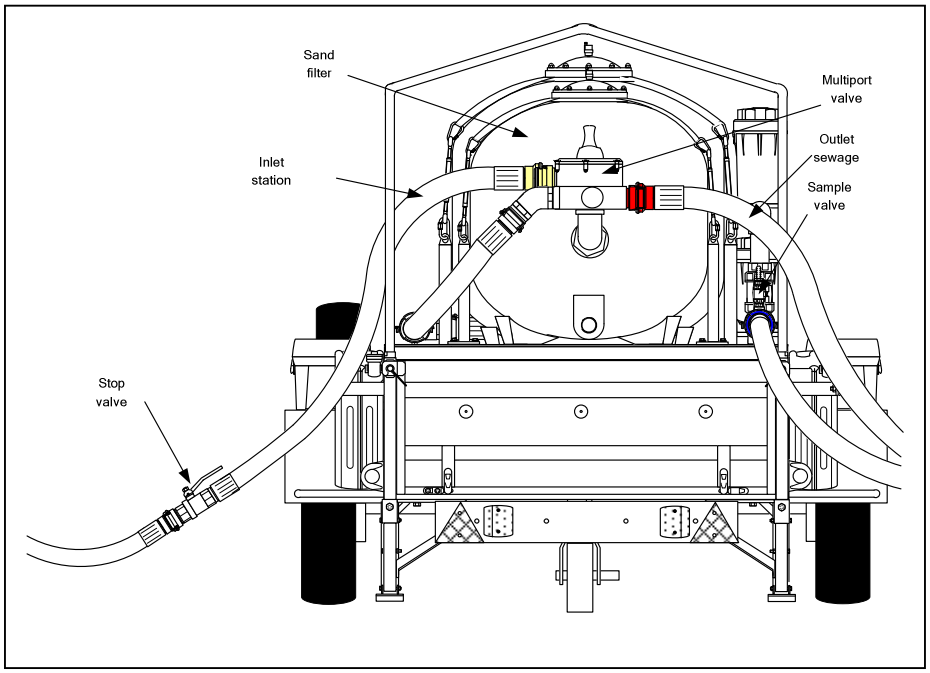
To open the covers of both chlorinators (to push on the releasing button of the Easylock device and to unscrew the cap) and to put in (a protection film wraps up each tablet allowing a riskless handling) 3 x 300 g calcium hypochlorite tablet with slow dissolving (never use tablets with fast dissolving in these devices. To check then that the by By-Pass valves are opened and to put the injection checking valves on position 2. To screw back both covers without forcing up to the « click ».

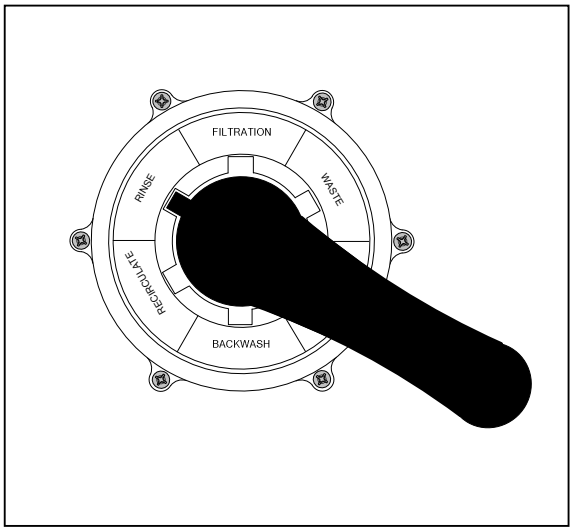


Starting

To connect on the draining outlet (red fitting) of the sand filter valve the 3m hose equipped on one side with a red Guillemin fitting. To put this valve on rinse position and to check if the valve on the 3m hose equipped with a yellow fitting (station inlet) is opened. You can start now the motor-pump by checking that all the previous stages were carried out :

- Coagulant and flocculant tablets placed in their respective kit (§ 5.4.2)
- Chlorine tablets in place and valves in position (§ 5.4.3)
- Motor-pump ready for starting (§ 5.2.2 & 5.4.1) and appropriate to geographic conditions (§ 1.2)
- Appropriate trailer position (§ 5.1)

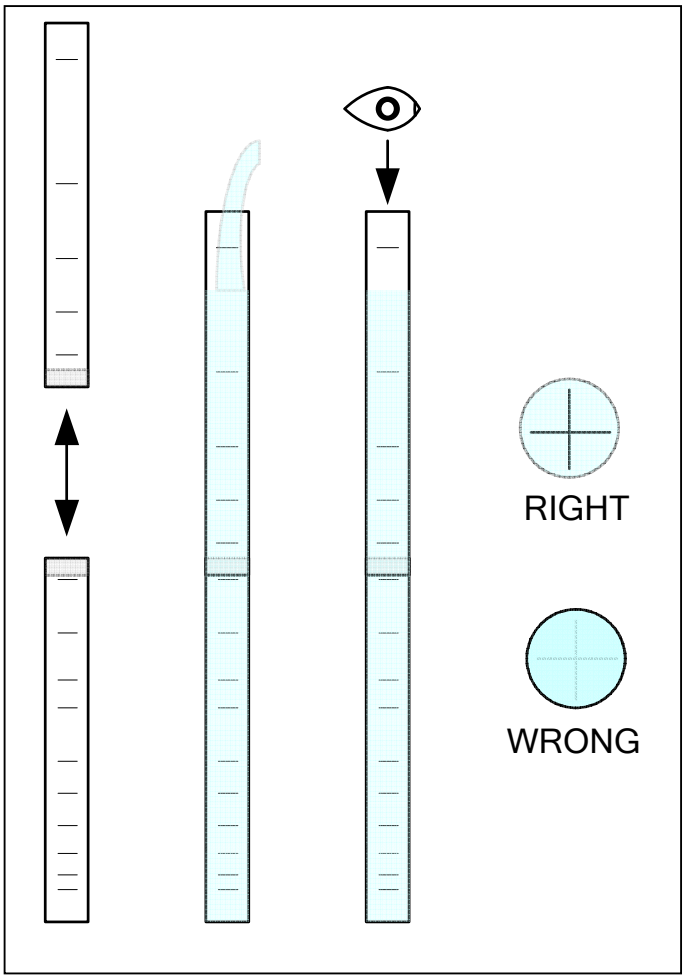




When the valve is in rinse position, the filter inlet is the yellow fitting, then the water is going through the filtering mass, as in filtration, but the filter outlet will be the red fitting. The advantage is to control a good coagulation / flocculation / filtration without any risk of clogging of the carbon filter if dysfunction. Let it run 5-10 minutes and fill up the 10L bucket. To control the sample turbidity thanks to the turbidity tube. To fill this one at the maximum, to hold it perpendicular to the ground and try to visualize the cross to the bottom.

- If the cross clearly appears, the turbidity is in accordance with WHO standards and you can now run the unit (§ 5.4.6)

Be careful : never handle a multiport valve under pressure, to stop or to run the engine at the minimum or to close the stop valve (on the hose equipped with the yellow fitting).



- If the cross is difficult to see, or not visible at all, to take off water of the tube gradually until it becomes visible. To note the value according to the tube graduations. If the turbidity is :

  - < 10 NTU : to slow slightly the engine speed.

  - 10 NTU < Value < 40 NTU : to increase the coagulant injection (§ 5.4.5) and maybe flocculant by working on the capacity at the same time (engine speed or to close slightly the stop valve).

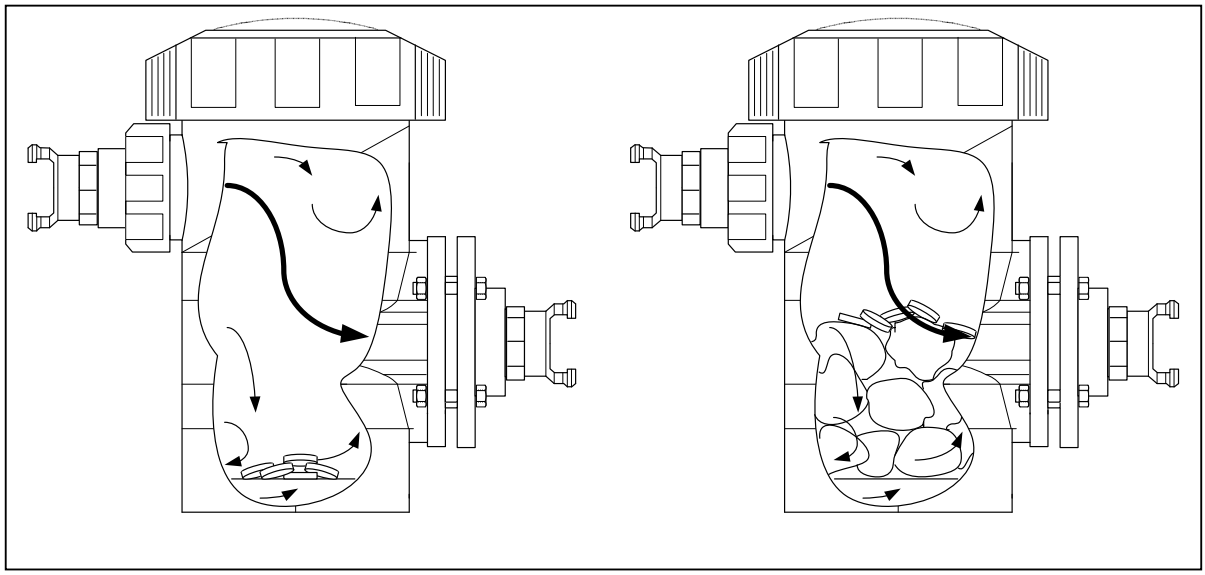
  - > 40 NTU : to check if you have chosen the proper coagulant and/or flocculant (§ 5.3)

How increasing the coagulant and flocculant injection

According to the colloïdal charge kind and quantity of the water to treat, it can turn out that the quantity of tablets in each kit is not enough. In that case, there are different possibilities to increase the injection :

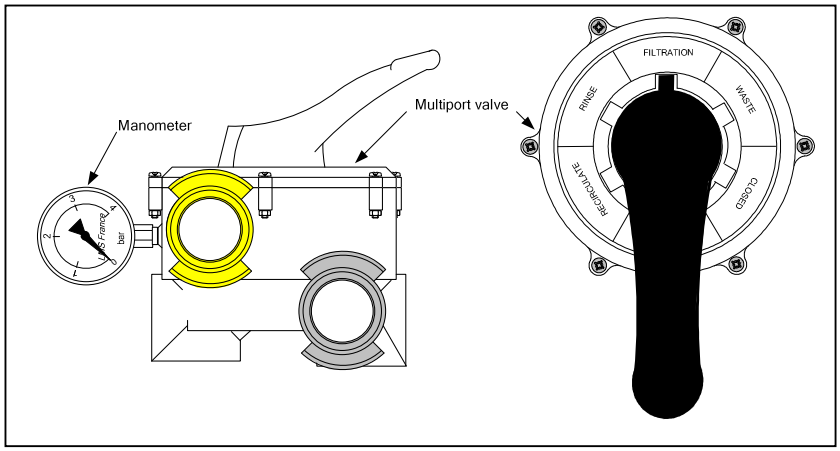
- To put more coagulant and flocculant tablets but be careful not to exceed the current rates (§ 5.4.10) in particular for iron and aluminium.

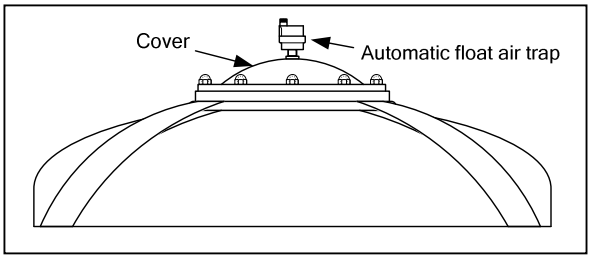
- To increase the height of the tablets inside the basket. As the water main flow is between the coagulation (or flocculation) kit inlet and outlet port, by moving the tablets between these two ports, you will inject more reagents than if you leave them at the bottom of the basket. For this, to use non polluting solid elements with a size of 3 to 5 cm approximately (stones for example).



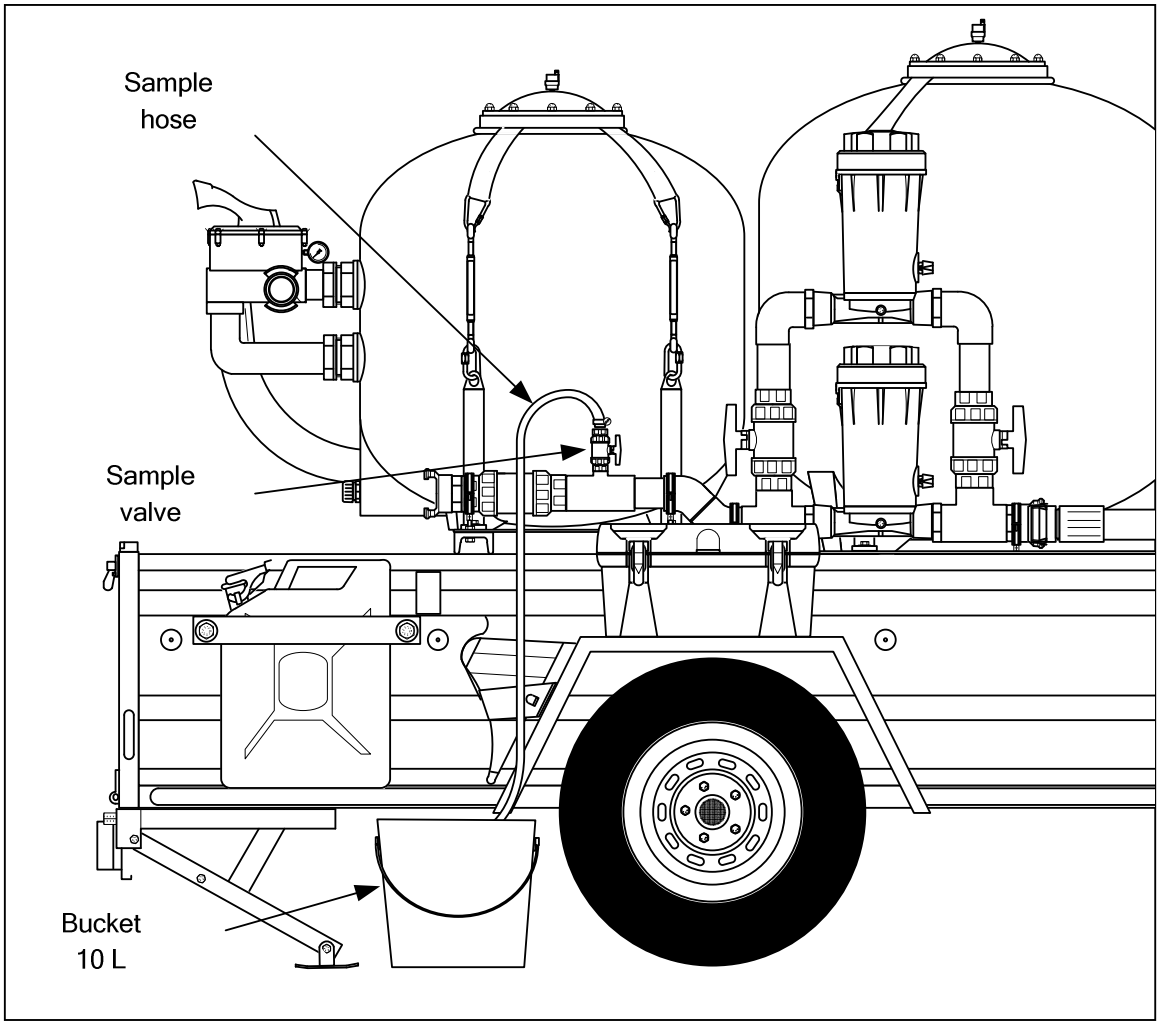
Filtration

To put the multiport valves (sand filter and carbon filter) on filtration position by taking care to check the lack of pressure on the manometers (stop valve closed or motor-pump closed) To connect the outlet (blue fitting) to the storage device (§ 5.2.6). To open the automatic float air trap at the top of the filters. To start the engine (or open the valve) and to check the pressure on the multiport valve manometer (equipped with the yellow fitting) of the sand filter. The pointed out value must be around 0,3 – 0,5 bars and at the carbon filter inlet, it must be 0,2 – 0,3 bars. To check if the drainings are driving the air out of the filters (hearing control).





A few minutes after the complete filters draining, to take a sample (to fill the 10L bucket) thanks to the PVC valve at the chlorinators outlet. To check the turbidity again thanks to the tube and to make chlorine, pH, iron and aluminium test (§ 5.4.9).



- If everything meets the standards, to keep on working like this during 30 minutes then make a turbidity analysis of the chlorine lever less (§ 5.4.9) at the storage device outlet. The turbidity must be imperatively less than 5 and the chlorine lever less slightly more or equal to 0,5 mg/l (guarantees the virus and bacteria destruction).

- If the chlorine lever less is slightly less or more than 0,5 mg/l, to increase or to drop the valves adjustment on the chlorinator to get the good rate. If the rate is really more than the good value, to close bypass valves and to make the adjustment with a single measure.

- If the aluminium rate is slightly more than WHO standards, to slow the engine speed. If this rate is really more, to replace a part of Alufloc tablets by Ferufloc tablets (inversely for a high iron rate).

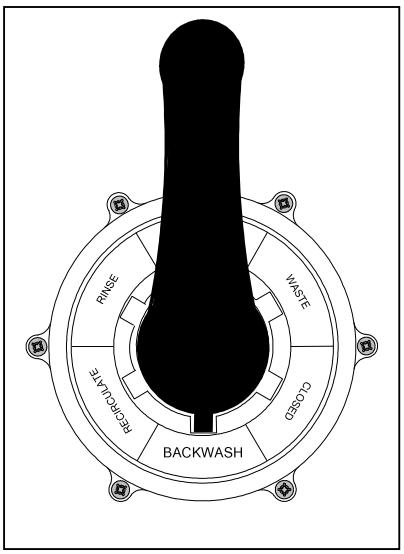
- PH must be between 6,5 and 8,5 (optimal pH 7). If pH is slightly more than the limit value, you can try to increase the coagulant dose by controlling aluminium and iron rate at the same time or the chlorine dose (in both cases, the injection is following by the release of acidity) and inversely for a lower value. If pH is really less than 6,5, we advise you to choose another water source to treat (our units are made for urgency situations and pH regulation requires products whose handling is delicate, we made easier the using and faster the operation).

Back-wash and rinsing

After a using time (depending on the treated water quality), the sand filter which will have held the whole flocs (forming of a cake at the surface) will fill in itself gradually (increasing back pressure at the filter inlet) and the pressure shown by the filter pressure manometer will increase. When the pressure reaches 2 bars, you must stop the water production and begin the "Back-Wash" process to eliminate the compressed particles at the sand surface.

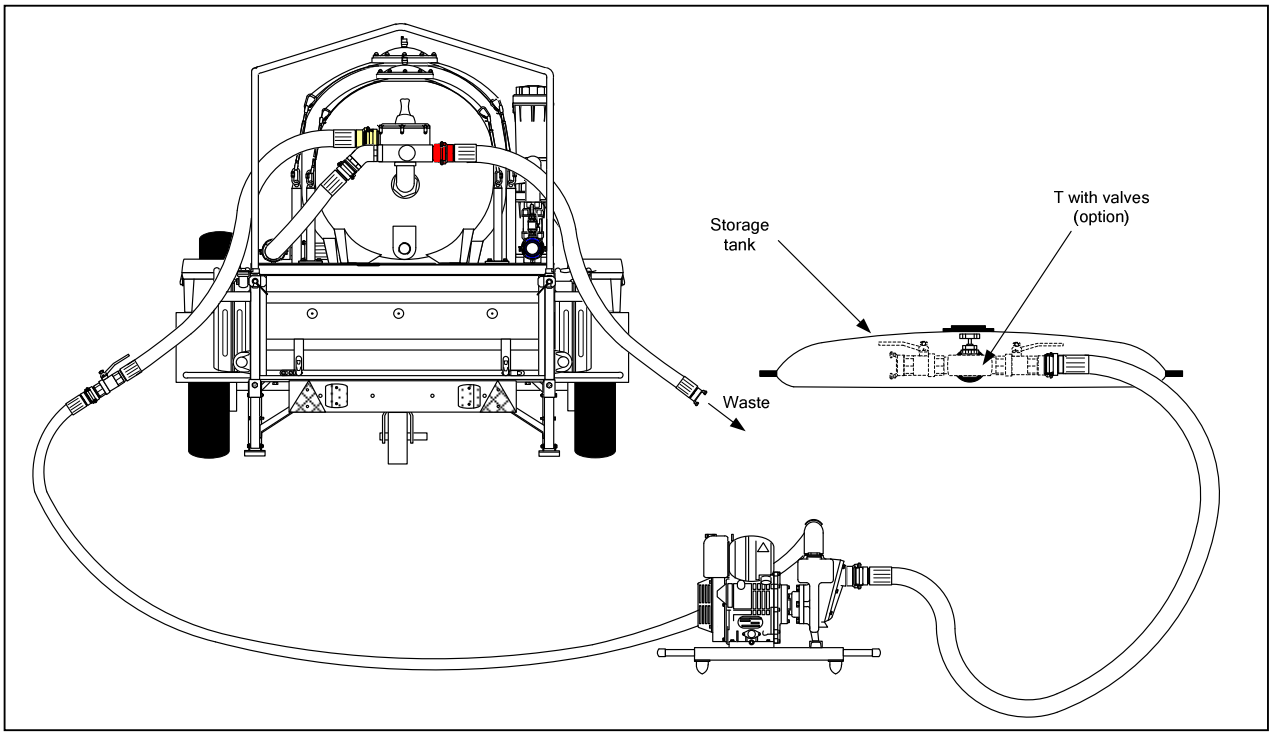
For this, to proceed as follows :

- To stop the engine and to put the sand filter valve on back-wash position.

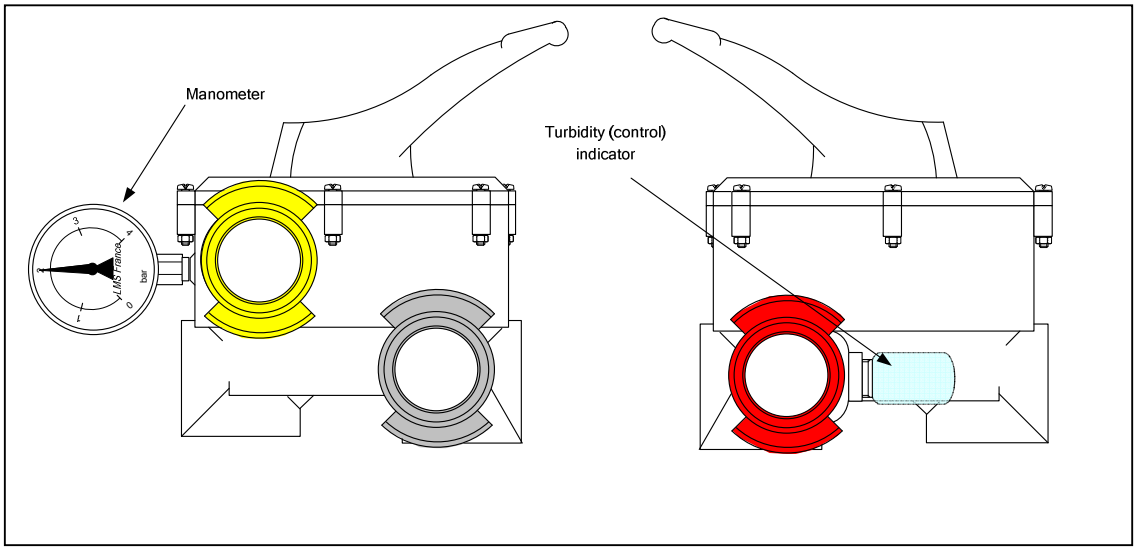


- To connect the pump inlet to the storage tank thanks to the 6m hose and to connect the hose outlet equipped with the stop valve which keeps connected to the multiport valve yellow fitting.

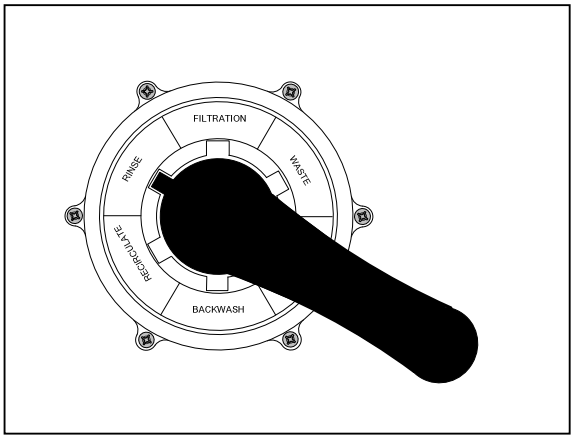
- To connect the sewerage outlet of the multiport valve (red colour) to the hose equipped with a red fitting. The flow inside the filter is reversed (up and down). The cleaning water outlet will go out of this hose.



- To start the engine increasing slightly the speed for a short time (filter mass moving off) then to adjust the engine speed in order that no sand appears in the turbidity light but only flocculated particles.



- When there are no more particles in the turbidity light, to stop the engine and to put the multiport valve (to stop the engine or to close the stop valve) on rinsing position.



- To start up the engine again (or to open the valve) and let it run 30 seconds approximately to put back the filter mass in its proper place (to check before the end of this stage if there are no particles in the water through the turbidity light).

- Now you can put back the multiport valve in filtration position and start again the water production.

In some cases, to use the treated water to back-wash the sand filter can be impossible (too little water in the storage tank, treated water needs equal or more than the produced water). Anyway, you can make a back-wash with raw water.

For this, to proceed as follows :

- To stop the pump and put off the baskets from the coagulation/flocculation kits.

- To proceed the same way as before for back-wash.

- For rinsing, to put the baskets back in their respective kits and rinse the filter until the water is free of particles visible to the naked eye.

- You can now put back the multiport valve in filtration position and start again the water production.

Following a bad coagulation and/or a bad flocculation, the carbon filter may hold back a few flocs and fill in itself (pressure more than 1,5 bars on the multiport valve pressure manometer of this filter). Also, you can back-wash this filter.

For this, to proceed as follows:

- To let the unit in filtration (coagulation, flocculation, sand filtration).
- To put the carbon filter multiport valve (to respect the zero pressure procedure) in back-wash position and to adjust the engine speed in order not to see carbon particles in the turbidity light. To go on like this until you obtain clear water in this light.
- Then to come directly to the production (filtration position).

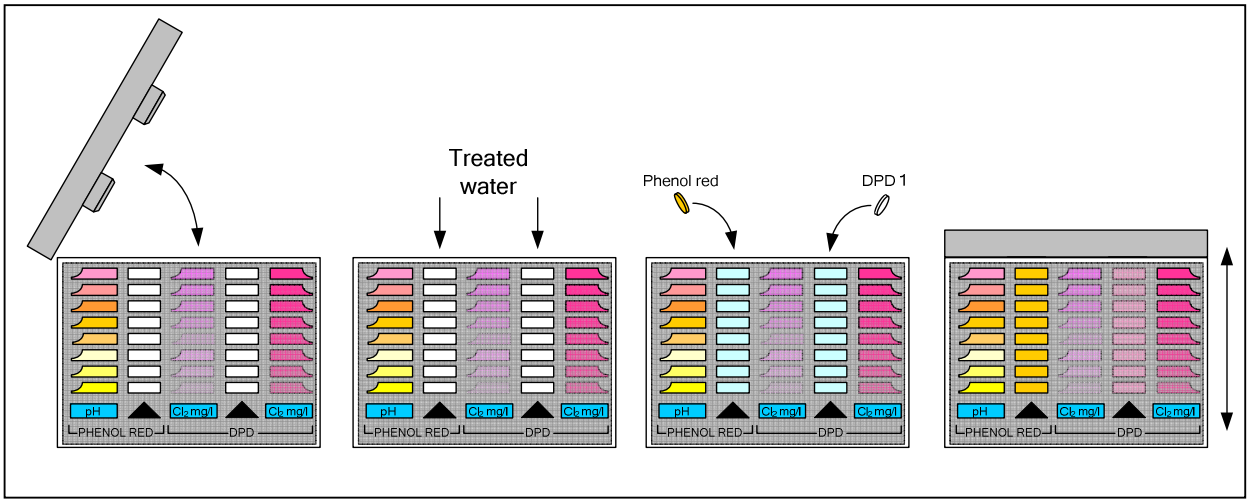
Periodic control

Regularly (twice per day) you will have to make basic tests at the storage tank outlet thanks to analysis check-kits for chlorine, pH, iron and aluminium, and the turbidity tube (these two are in option).

- Turbidity test : to fill in the tube at the maximum, the cross at the bottom must be clear (§ 5.4.4).

- Chlorine control :

  - To rinse the check-kit and its cap with treated water.
  - To fill in both parts entirely with treated water.
  - To put in the left part a PHENOL RED tablet and in the right one a DPD1 tablet.
  - To close the cap and shake up to a complete tablets dissolution.
  - To compare the left sample colour with the graduated scale for pH.
  - To compare the right sample colour with the graduated scale for chlorine.
  - To rinse the analyser with treated water at the end of the tests.



- Iron and aluminium control :

  - To proceed as the same way as pH and chlorine tests using the check kit and the appropriate tablets.

We advise you to write down a board the different values you obtained after each test, the number and life of coagulant and flocculant tablets, and life of calcium hypochlorite tablets.

You can use for example the board at the end of the manual (§ 8) or to make your own board.

Iron removal of sinking water

In most sinking waters (particularly in Africa), the iron content is highly exceeding the rate shown by WHO standards, on the other hand the turbidity is rather low. Thanks to your water treatment unit you can remove this iron with an oxidation, oxygenation and filtration process.

For this, to proceed as follows :

- If the well is equipped with an electrical sinking pump and if the outlet pressure doesn't exceed 2,5 bars, you can connect directly the sinking outlet to the station inlet. On the other hand, if the pressure is more (or not really precise), you will have to use an additional tank and to draw from this tank with your station pump.

- If the turbidity of the sinking water is less than 5 NTU, to connect directly the raw water inflow to the station inlet, without using the coagulation and flocculation kits. To connect the station outlet (blue connector) to a 5 or 10 cu. m opened tank (self-supporting for instance).

- To put the station on filtration (sand filter and carbon filter) then for chlorination to process as for surface water (§ 5.4.3) by putting the injection regulating valves at the maximum. The objective is to obtain a chlorine level less between 1,5 and 2 mg/l (to adjust afterwards) at the chlorinators outlet (sample valve).

- Let it settle between 30 minutes and one hour (according to the former iron rate) in the opened tank. Then, to connect the pump (supplied with the unit) to the opened tank and to connect the outlet of this one to the unit inlet (hose with yellow valve and fitting).

- To proceed now as a standard filtration (valves in filtration, chlorine level less than 0,5 mg/l after 30 minutes) by connecting the unit outlet to the drinking water storage tank.

Coupling to other treatment units

If you have another kind of water treatment unit (ultra filtration, reverse osmosis), you can use this unit in prefiltration.

For example, for brackish water close to an estuary, the turbidity can reach 60 or 100 NTU while the reverse osmosis membranes don't allow more than 1 NTU at the inlet. Those ones usually linked to a micronic prefiltration to avoid a too fast filling of the filters, your station (used as for sweet water) will fit particularly this application.

We managed for example with our line treatment system (without settling) to lower the turbidity from a river in spate during floods (south of France in 2002) from 1500 to 10 NTU.

We propose also some models equipped in option with a micronic filter with centrifugal separations or ultrafiltration membrane.

5.5 WHO standards extract, water intended for human consumption

Organoleptic parameters :

Parameters	Units	WHO guide value
Colour	Mg/l platinum	15
Turbidity	Jackson unit	5
Smell - Flavour	-	-

Physico-chemical parameters

Parameters	Units	WHO guide value
Conductivity	µS/cm to 20°C	-
Temperature	°C	-
pH	Unit pH	6,5 to 8,5
Chlorides	mg/l (Cl)	250
Sulphates	mg/l (SO_4)	400
Calcium	mg/l (Ca)	-
Magnesium	mg/l (Mg)	50
Sodium	mg/l (Na)	150
Potassium	mg/l (K)	12
Aluminium	mg/l (Al)	0,2
Dissolved Oxygen	Saturation %	-
Total hardness	°F	50
Dry residues	mg/l (to 180°C)	1000

Parameters regarding undesirable matters :

Parameters	Units	WHO value guide
Nitrates	mg/l (NO_3)	50
Nitrites	mg/l (NO_2)	3
Ammonium	mg/l (NH_4)	-
Hydrogen sulphide	µg/l (S)	0,05
Dissolved Hydrocarbon	µg/l	-
Phenols	µg/l (C_6H_5OH)	-
Iron	µg/l (Fe)	300
Manganese	µg/l (Mn)	500
Copper	mg/l (Cu)	1
Zinc	mg/l (Zn)	3
Phosphate	mg/l (P_2O_5)	-
Fluorine	mg/l (F)	1,5

Parameters regarding toxic substances :

Parameters	Units	WHO guide value
Arsenic	µg/l (As)	10
Cadmium	µg/l (Cd)	3
Cyanides	µg/l (CN)	70
Total Chromium	µg/l (Cr)	50
Mercury	µg/l (Hg)	1
Nickel	µg/l (Ni)	20
Lead	µg/l (Pb)	10
Antimony	µg/l (Sb)	5
Selenium	mg/l (Se)	10

Microbiological parameters

Parameters	Units	WHO guide value
Total Coliform	N / 100 ml	0
Faecal Coliform	N / 100 ml	0
Faecal Streptococcus	N / 100 ml	0

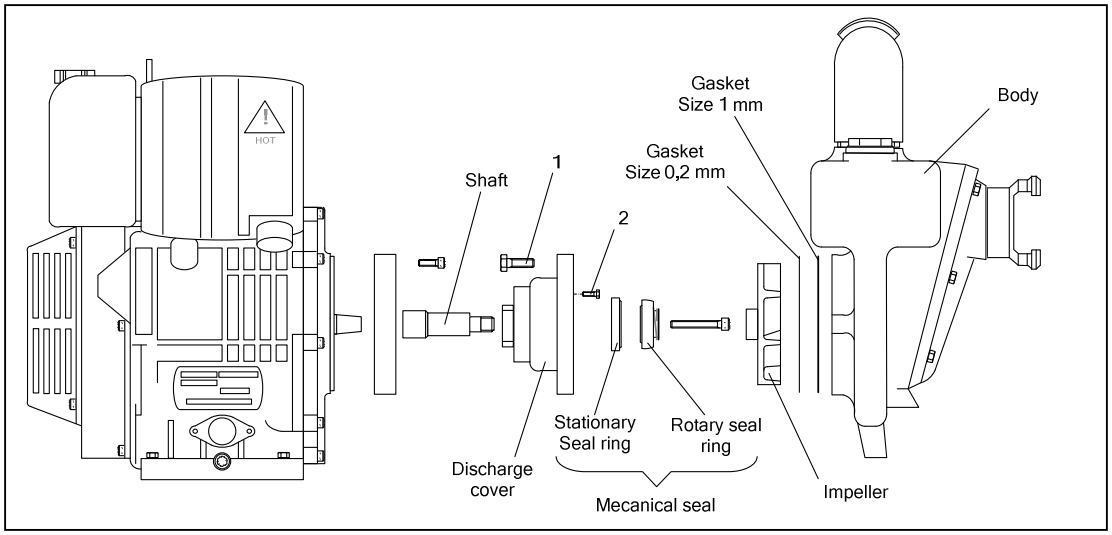
6. Maintenance

Our units don't require any specific maintenance. The only wearing and moving parts are the ones of the motor pump.

- For the engine, to follow the instructions described in the manufacturer manual.
- For the pump, this one doesn't have bearing (use of the engine bearing), the only wearing part is the mechanical seal. To replace it, to follow the following stages :

➢ To loosen the four motor-pump body screws (Rep.1) thanks to a 17 open-end wrench.
➢ To put off the gaskets (2 different thicknesses 0,2 mm and 1 mm).
➢ To unscrew the impeller (anticlockwise).
➢ To put off the rotary seal ring.
➢ To put off the discharge cover by unscrewing the four screws (Rep.2) thanks to a 13 open-end wrench.
➢ To get out the stationary seal ring.
➢ To put in the new stationary part taking care to clean the place and to grease slightly the gasket with alimentary silicone grease (or with soapy water) without putting any grease on the friction side.
➢ To put in the new rotary part by greasing the gasket (interior part) with the same grease that you used for the stationary part.
➢ Caution : do not touch with the fingers and do not scratch the mechanical seal friction sides.
➢ To put back the discharge cover by adding a drop of thread locker on each four screw thread (13 wrench).
➢ To screw the impeller handly going over one or two compressive strength.
➢ To put a 1 mm gasket on the discharge cover.
➢ To add a 0,2 mm gasket.
➢ To put the pump body and to fix it thanks to the four screws (17 wrench) and to tighten crosswise (to begin to screw in the following way : left, right, top, and bottom, then always in that way to tighten with equal strength the four screws without overtightening completely.
➢ To try to run the engine very slowly thanks to the rope.

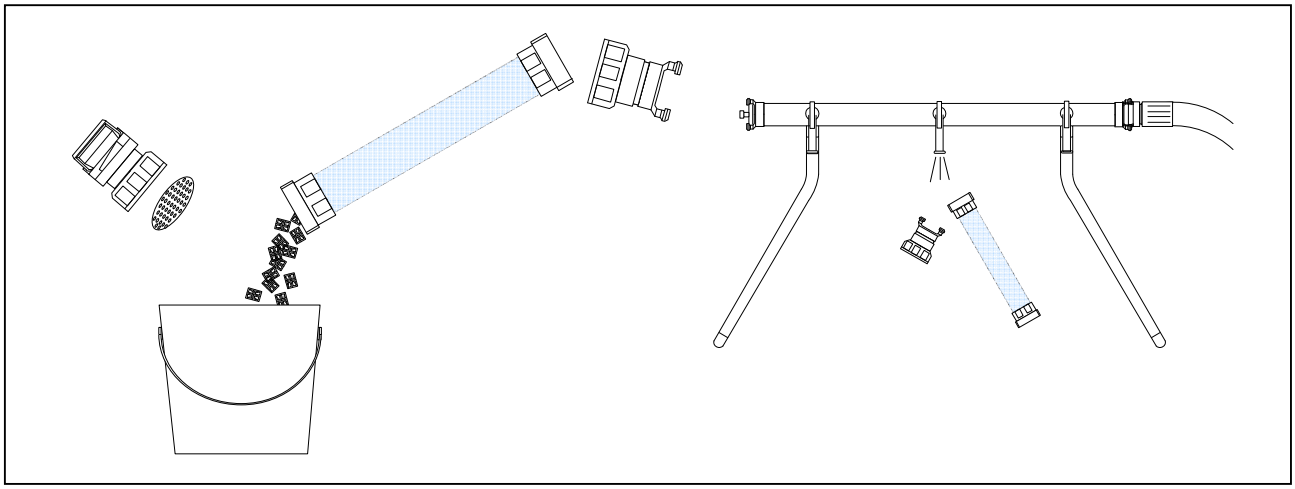
- If there is no resistance (except the engine compression), the mechanical seals replacement is over.
- If you hear a scraping noise between the impeller and the body pump, to strip down the body and to add a 0,2 mm gasket. To tighten again and check the lack of scraping (to proceed like this up to obtain the less space between the impeller and the body).



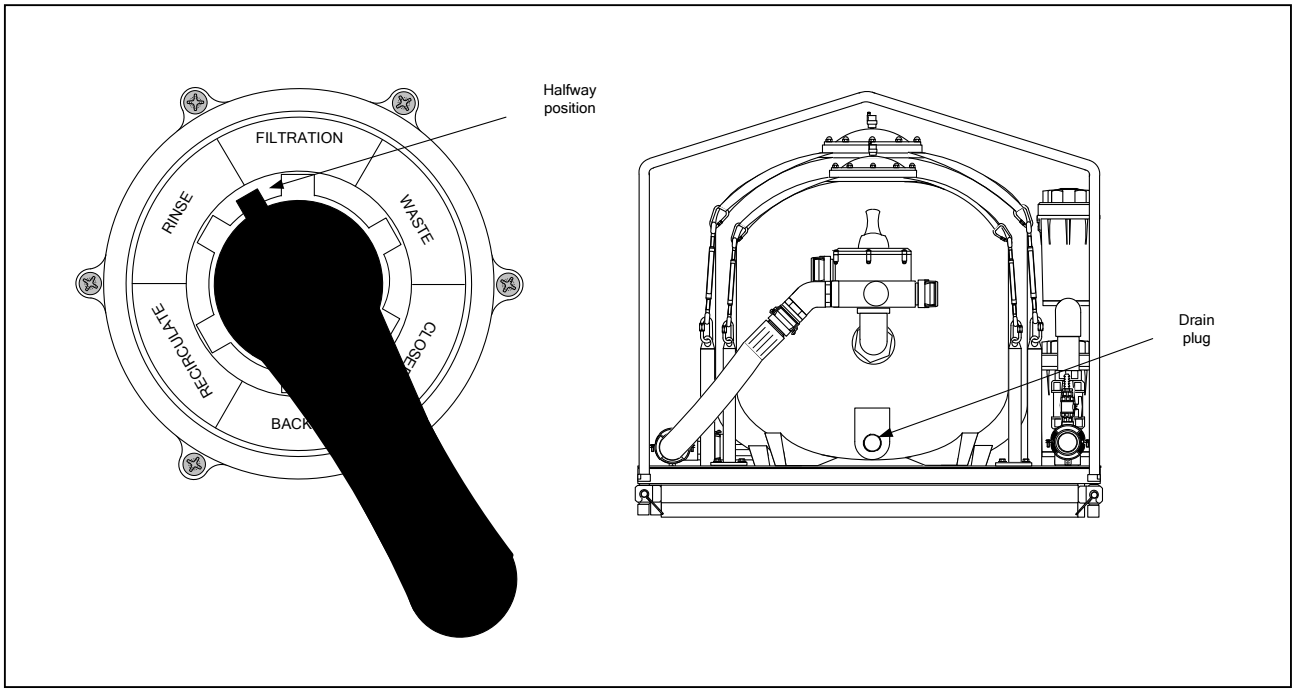
- After several hours of working, the static mixers can hold back particles flocculated on their rings.

To clean them, to proceed as follows :

- To separate the static mixer from all other parts (coagulation or flocculation kit, bearing collar, and hose).
- To unscrew the union pipe fitting to each end taking care not to lose the o-ring.
- On one side, the stainless steel perforated grid is included in the union pipe fitting, thus you can release the mixer rings of the transparent PVC tube.
- To fill in the bucket with treated water and to empty all the rings.
- To hand-wash the rings in the bucket and rinse all the other components of the static mixer under a tap.
- To put the rings back in the tube and screw back again both union pipe fitting.

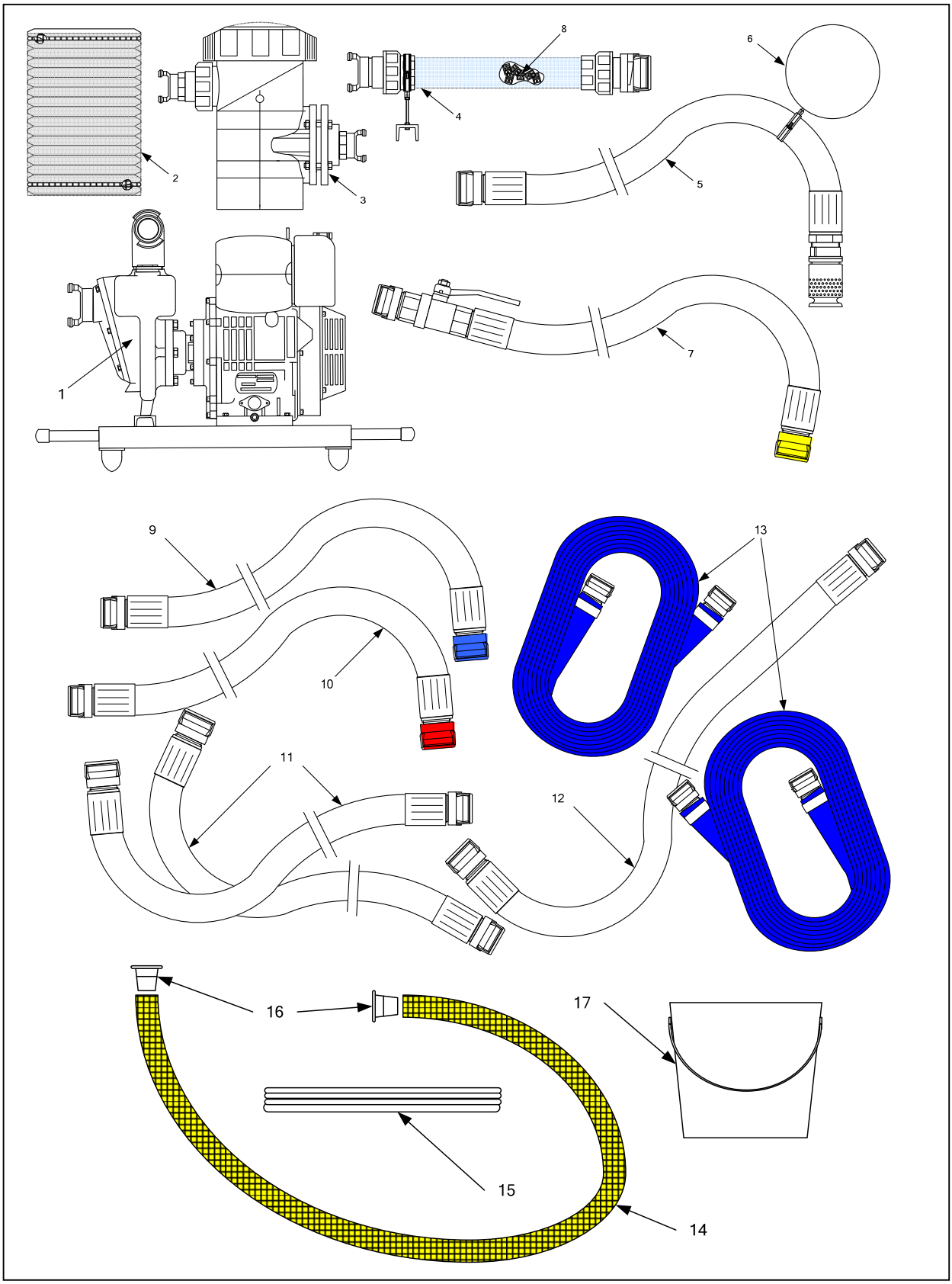


- To drain the filters after each use and after back-washing with treated water. You just have to open each filter draining gasket and to put the multiport valve on halfway position (air inlet).

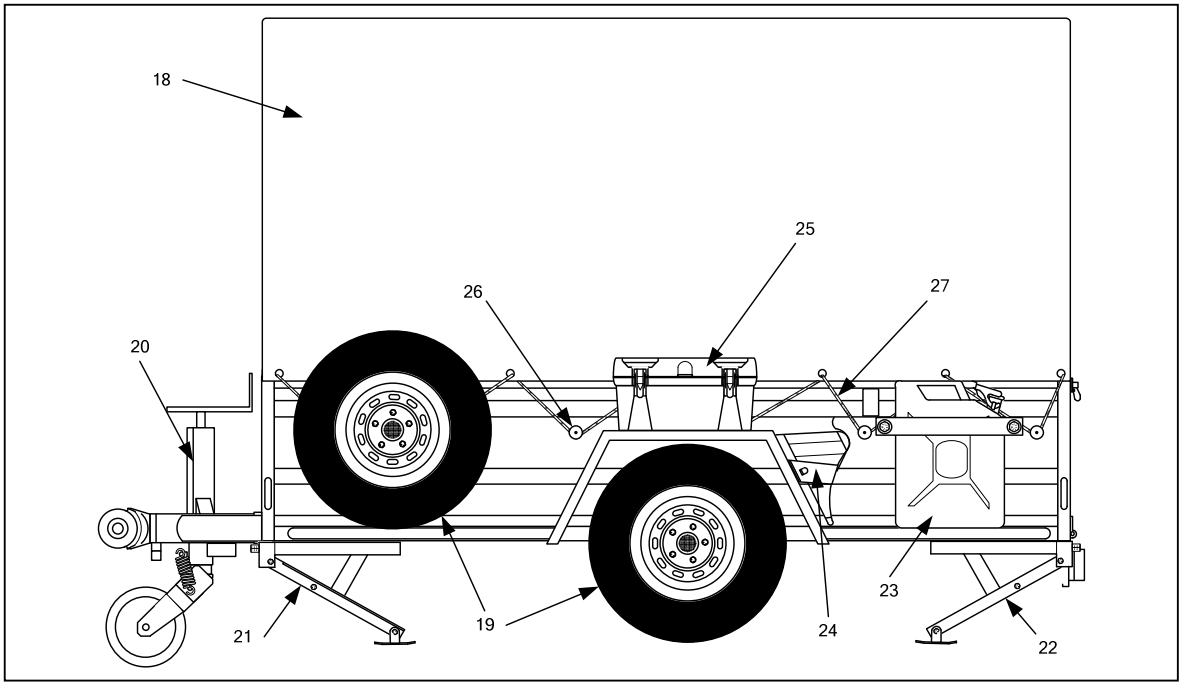


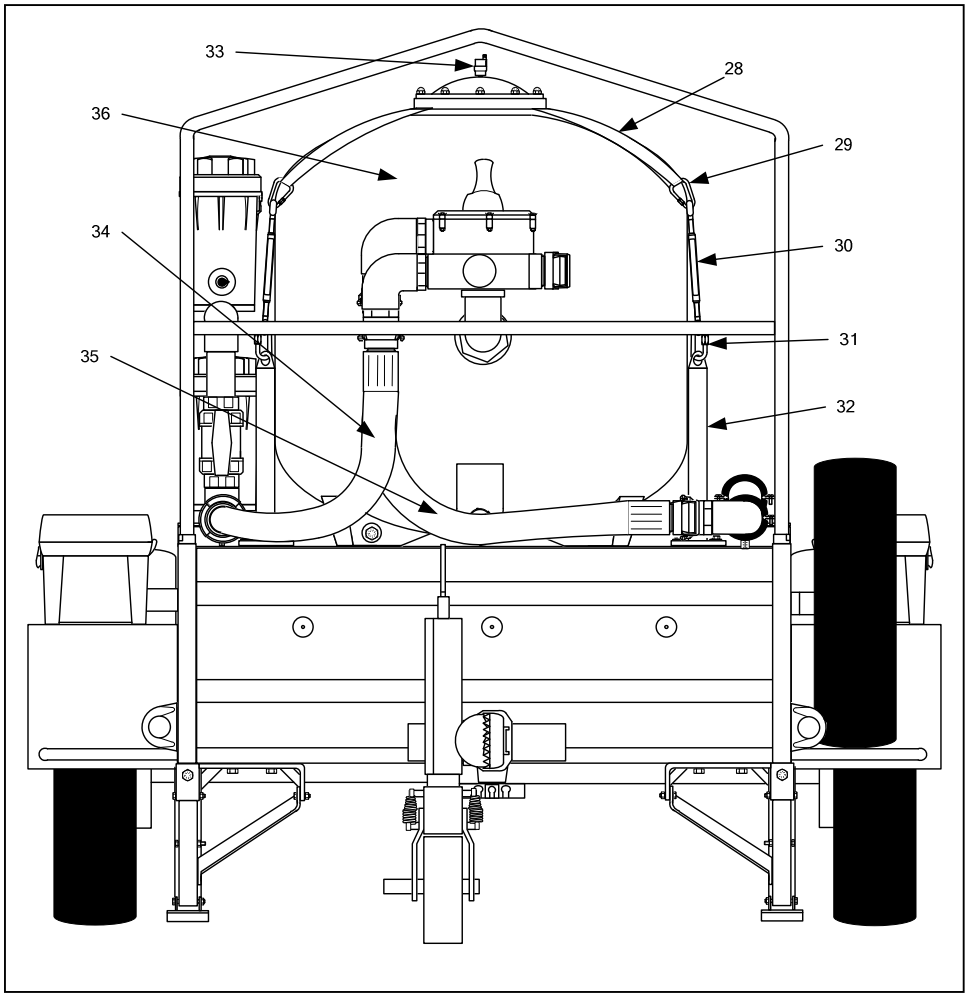
7. Plan and spare parts

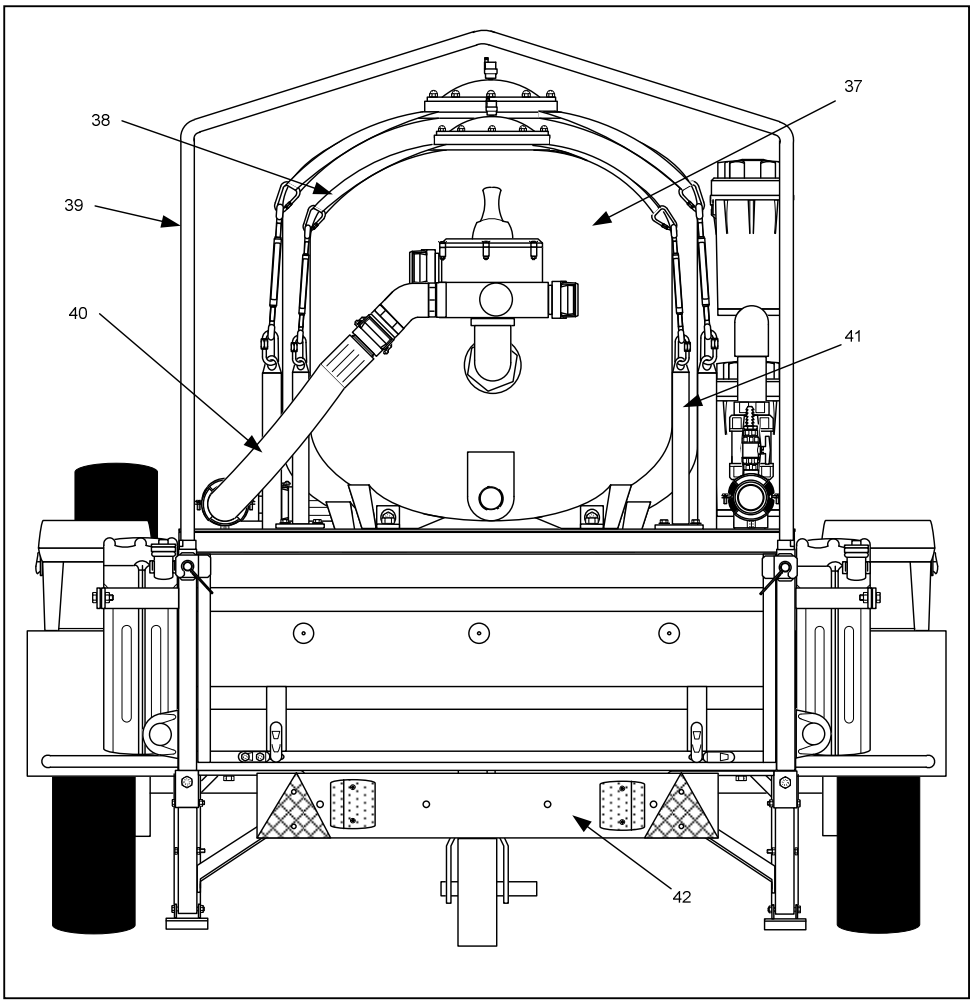
7.1 Accessories



7.2 Station



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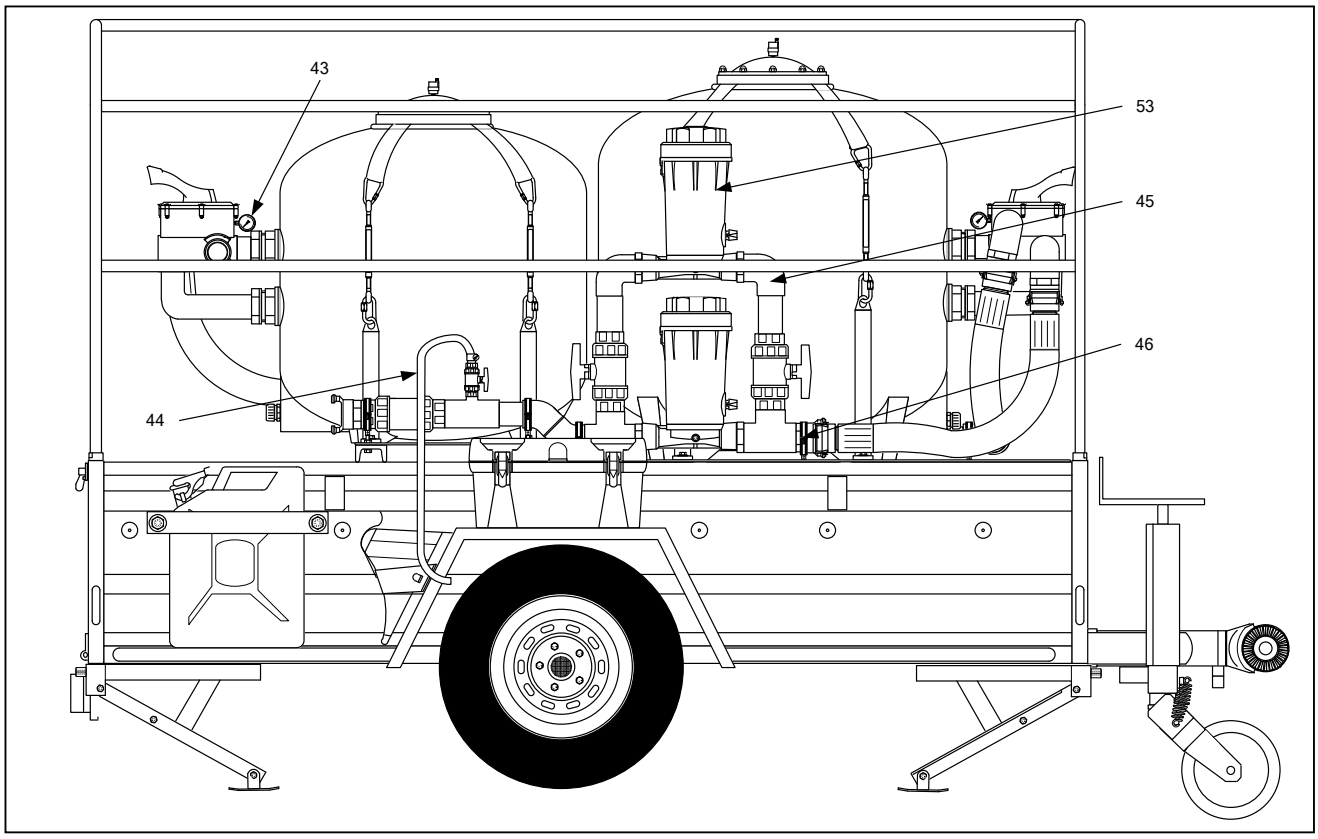
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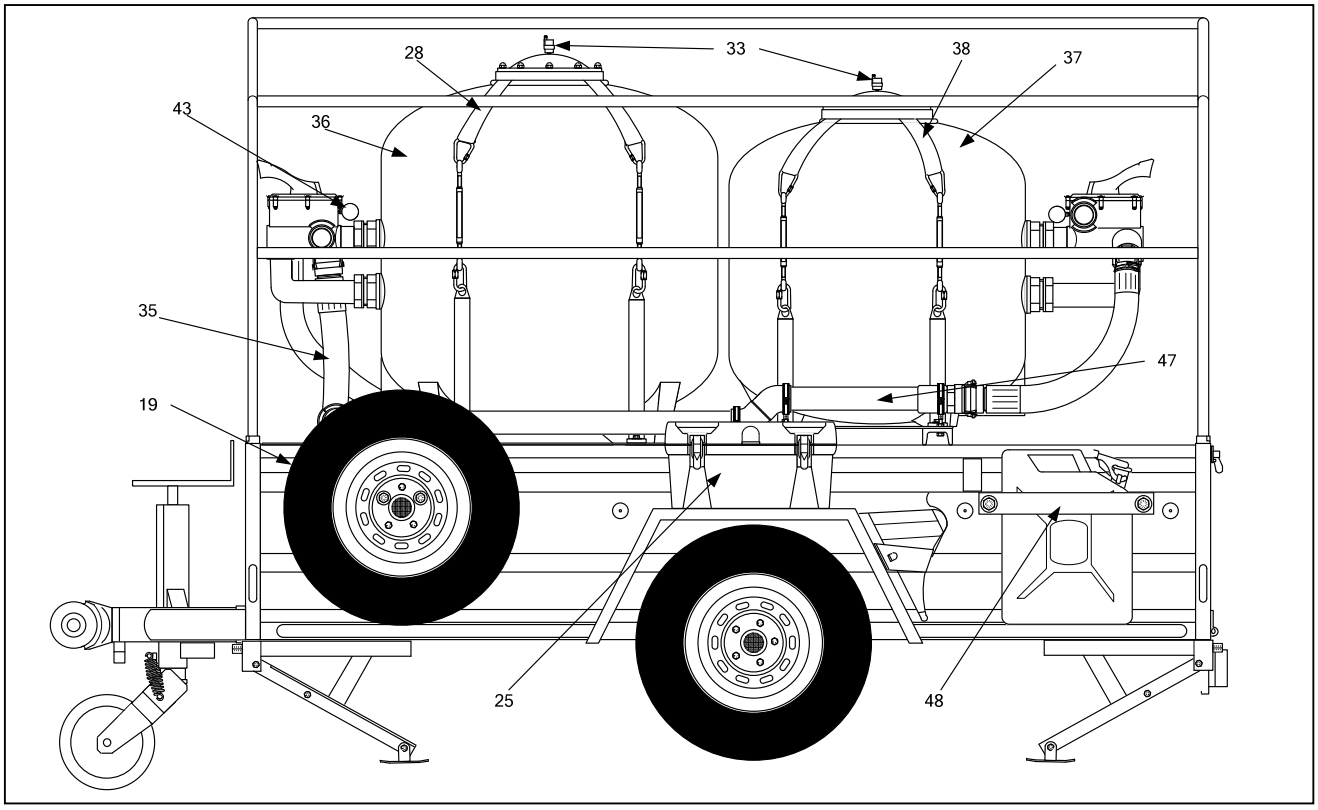
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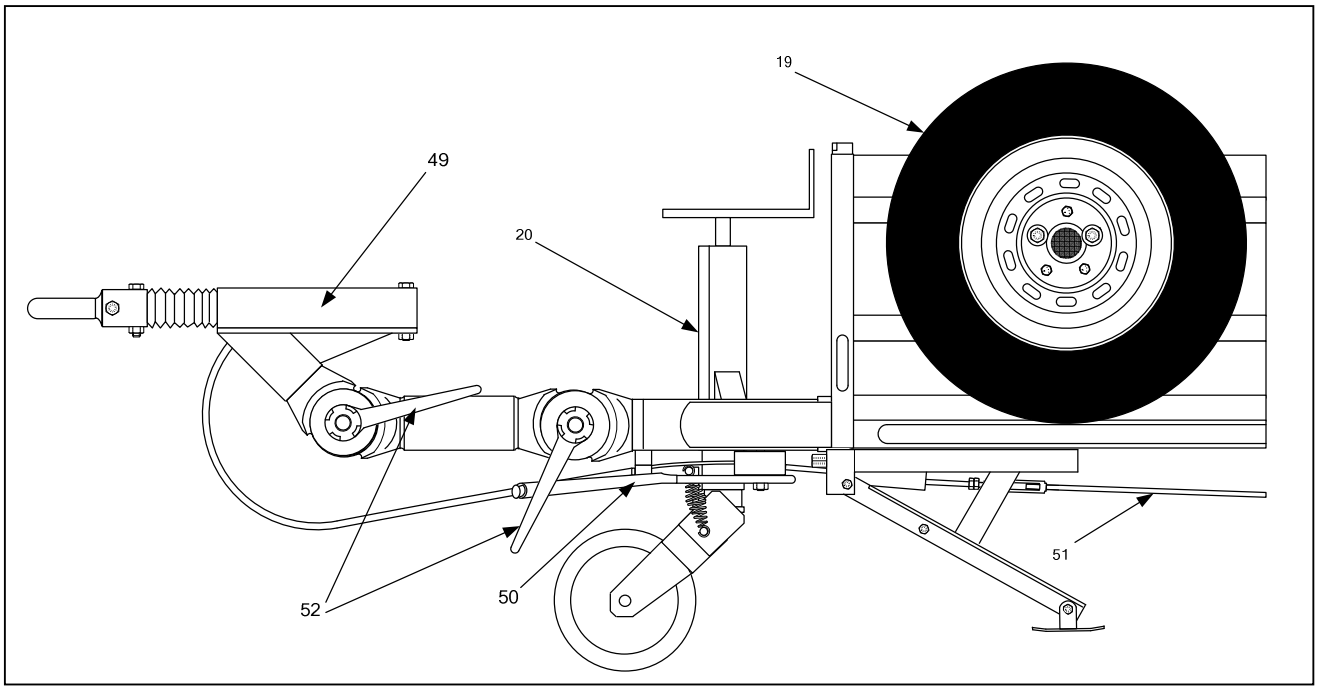
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REP	DESIGNATION	REF OX A3	REF OX D3	QU
1	Diesel motor pump	GMP350B3KCN	GMP350B3KCN	1
2	Perforated pipe	DATPC	DATPC	1
3	Coagulation – Flocculation kit	KITFLOC/COAG	KITFLOC/COAG	2
4	Static mixer with support	MEL_STAT	MEL_STAT	2
5	6m hose with strainer	TU6000CR	TU6000CR	1
6	Float with collar	FL220COL	FL220COL	1
7	Hose with yellow fitting and valve	TU6000JV	TU6000JV	1
8	Mixed ring	RALU-15	RALU-15	-
9	3m hose with blue fitting	TU3000-51SBS	TU3000-51SBS	1
10	3m hose with red fitting	TU3000-51SRS	TU3000-51SRS	1
11	3m hose with Guillemin fitting	TU3000-51SS	TU3000-51SS	2
12	6m hose with Guillemin fitting	TU6000-51SS	TU6000-51SS	1
13	25m flat hose with Guillemin fitting	TU25000-51SS	TU25000-51SS	4
14	6m perforated pipe DN50	DAJ50	DAJ50	1
15	6m geotextile membrane	MG-0.5/50	MG-0.5/50	1
16	Top for perforated pipe	BDAJ45	BDAJ45	2
17	Bucket (11 L)	SP11L	SP11L	1
18	Tarpaulin	BA-A3/D3	BA-A3/D3	1
19	Complete wheel	R195R14C	R215R14C	3
20	Jockey wheel	RJ	RJ	1
21	Right jack	VSAD	VSAD	2
22	Left jack	VSAG	VSAG	2
23	Jerry can (20 L)	JM20L	JM20L	2
24	Wheel wedge with support	CAR/SUCAR	CAR/SUCAR	2
25	Tool box	COP19	COP19	2
26	Pulley	PO	PO	15
27	Sandow	SAND8MM	SAND8MM	-
28	Clamping strap	SAD315L355	SAD315L355	1
29	Triangular claps	MRDD8	MRDD8	8
30	Tensioner	TG2OD10	TG2OD10	8

REP	DESIGNATION	REF OX A3	REF OX D3	QU
31	Oval claps	MROD8	MROD8	8
32	Filter support	PD440	PD440	4
33	Automatic float air trap	PURO-3/8	PURO-3/8	2
34	0.78m hose with Guillemin fitting	TU780-51SS	TU780-51SS	1
35	0.98m hose with Guillemin fitting	TU980-51SS	TU980-51SS	1
36	HDPE filter with multiport valve	FPE980S	FPE980S	1
37	HDPE filter with multiport valve	FPE740S	FPE840S	1
38	Clamping strap	SAD315L205	SAD315L305	4
39	Galvanised roof support	TOIT_OXA3/D3	TOIT_OXA3/D3	1
40	0.78m hose with Guillemin fitting	TU780-51SS	TU780-51SS	1
41	Filter support	PD340	PD340	4
42	Light ramp	PFG1M/ALI4M	PFG1M/ALI4M	1
43	Manometer 0-4 bars	MGILMS-50	MGILMS-50	2
44	Sample pipe	TUFIL1218	TUFIL1218	1
45	PVC chlorination pipe	TUCL-A3/D3	TUCL-A3/D3	1
46	Collar	CI74-78/2.5	CI74-78/2.5	8
47	Connected pipe PVC-FSFC	TUFSFC	TUFSFC	1
48	Jerry can support	SJR	SJR	2
49	Articulated drawbar	TIFA2/68X42	TIFA2.5/68X42	1
50	Hand brake	FAMRT	FAMRT	1
51	Threaded rod	TF10/1000	TF10/1000	1
52	Axle and lever	AM/FA	AM/FA	2
53	Chlorinator	CHCL200	CHCL200	2

For all order of spare parts, please specify the water treatment unit model and serial number engraved on its chassis.

7.3 Consumables

DESIGNATION REFERENCE	OX A3	OX D3
Coagulant tube of iron sulphate FERUFLOC	100	
Coagulant tube of aluminium sulphate ALUFLOC	100	
Tube of anionic flocculant ANIOFLOC	20	
Tube of cationic flocculant CATIOFLOC	20	
Calcium hypochlorite pots 4,8 kg CL4800	6	6
Oil can (5L) BHD20W40/5L	1	1

7.4 Maintenance and tools kit

DESIGNATION REFERENCE	OX A3	OX D3
Air filter FA/315/350/400	4	4
Gasoil filter FG/315/350/400	4	4
Oil filter FH/315/350/400	4	4
Mechanical seal GMB2B3	1	1
Injector INJ/315/350/400	1	1
Drain joint JBV	1	1
Cylinder head gasket 1 JC1/315/350/400	1	1

DESIGNATION REFERENCE	OX A3	OX D3
Cylinder head gasket 2 JC2/315/350/400	1	1
Wedge gasket 0,2 JP0.2	1	1
Wedge gasket 1 JP	1	1
Set of joint (motor) PJ/315/350/400	1	1
Paste of sealing LOC5331	1	1
Teflon roll RT-12/12/0.075	6	6
Thread locker 5ml FFN243-5ML	1	1
Alimentary silicone grease 50g GRSIL50G	1	1
Complete tool kit TOC1	1	1
Cross wrench CC17/23	1	1

8. Periodic control board

Week :
Starting hour :

DAY	HOUR	TURBIDITY	pH	Cl_2 (mg/l)	Al (mg/l)	Fe (mg/l)
Monday	9h00					
	11h00					
	13h00					
	15h00					
	17h00					
Tuesday	9h00					
	11h00					
	13h00					
	15h00					
	17h00					
Wednesday	9h00					
	11h00					
	13h00					
	15h00					
	17h00					
Thursday	9h00					
	11h00					
	13h00					
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	17h00					
Friday	9h00					
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