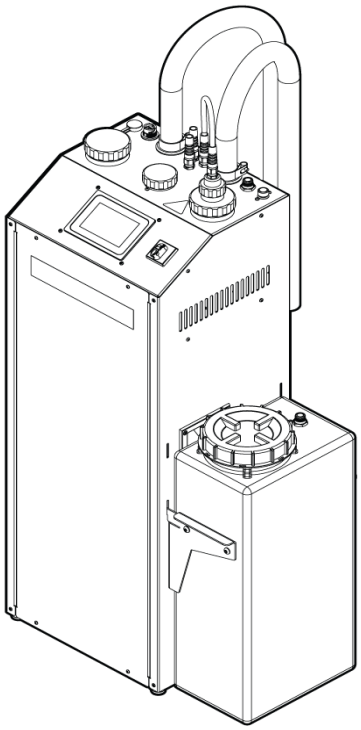
FluidWorker® 150

Installation, Operation and Service Manual



EN Original instructions

WALLENIUS WATER INNOVATION

Table Of Contents

1 General

Please read this manual carefully prior to installation and operation of the unit. Save these instructions for future use.

1.1 Disclaimer

Wallenius Water Innovation AB is not liable or bound by warranty if these instructions are not adhered to during installation, operation or service.

Wallenius Water Innovation AB reserve the right to make changes to components, specifications and modify the contents of the documentation without further notice.

Wallenius Water Innovation AB only guarantees correct function of the unit with original or specified components.

The FluidWorker 150 is designed to treat process fluid. Any other use is prohibited.

1.2 Warranty

Wallenius Water Innovation AB warrants that this product will be free from defects in material and workmanship for a period of one year from the date of delivery.

Within the warranty period Wallenius Water Innovation AB will repair or replace such products and component parts which are returned to Wallenius Water Innovation AB with shipping charges prepaid and which are determined by Wallenius Water Innovation AB to be defective.

This warranty will not apply to any product or component part which has been subjected to misuse, negligence or accident; or misapplied; or modified or repaired by unauthorized persons or not installed according to specification given in this manual.

Any attempt to change or modify existing equipment with non-original components invalidates the warranty.

Consumable products (UV lamp and quartz sleeve) have a warranty period of 3 months from delivery date.

Buyer shall inspect the product promptly after receipt and shall notify Wallenius Water Innovation head office in writing of claims, including claims of breach of warranty, within thirty days after the buyer discovers or should have discovered the facts upon which the claim is based.

Failure of the buyer to give written notice of a claim within the time period shall be deemed to be a waiver of such claim.

1.3 Manufacturer

Wallenius Water Innovation AB

www.walleniuswater.com

1.4 Service and Support

For any support issues, please contact Wallenius Water Innovation AB through:

e-mail: support@walleniuswater.com

telephone: +46 8 120 138 10 during office hours

1.5 Disposal

Always consult local rules and regulations for correct handling of each material:

- Used UV lamps can be handled and recycled in the same way as fluorescent lamps.

At end-of-life, the FluidWorker 150 must be disposed of according to local rules and regulations.

1.6 Validation

This installation and operation manual applies to FluidWorker 150 -V1 and V2 with software version 5.7 and onwards.

1.7 Acronyms and Abbreviations

LPS
Lamp Power Supply

HMI
Human Machine Interface.
This is the operation control, the touch display placed on top of the FluidWorker 150.

2 Safety

2.1 Warning, Caution, and Notes

Warning	**Indicates a potentially hazardous situation which could result in death or severe injury.**
CAUTION	**Indicates a potentially hazardous situation which could result in property damage.**
NOTE	A note is used to notify people of installation, operation or maintenance information which is important but not hazard related.

2.2 General Safety Rules

This chapter contains the safety instructions which you must follow when installing, operating and servicing the system. If ignored, physical injury or death may follow, or damage may occur to the drive, the motor or driven equipment.

 **Warning**	**UV-radiation can instantly harm eyes and skin, never look into a lit lamp! Always use necessary protective equipment (such as protective glasses and gloves) when working with the UV lamps.**
Warning	**Do not operate the FluidWorker 150 in explosive environments.**
 **Warning**	**Strong magnetic and RF fields can cause serious injury that may result in death of people with implanted or attached medical devices, such as pacemakers and prosthetic parts.**
CAUTION	**This equipment must be installed by authorized installation technicians and the installation must adhere to applicable local rules and regulations as well as these installation instructions.**

CAUTION	**Make sure the installation conditions meets the technical specification described in this manual (for example, electrical input).**
CAUTION	**Lifting the FluidWorker 150 requires two people. The system weighs 70 kg.**
CAUTION	**Do not operate the FluidWorker 150 without process fluid in the system.**
CAUTION	**UV lamp and quartz sleeve are fragile components, please handle these components with care.**

3 Transportation

The FluidWorker 150 is transported on a half euro-pallet.

When the FluidWorker 150 is shipped, it comes in one unit.

3.1 Unpacking

CAUTION	**Lifting the FluidWorker 150 requires two people. The system weighs 117 kg including pallet and pallet collar.**

Check that there are no transportation damages.

3.2 Delivery Inspection

CAUTION	**Do not touch the new lamp or sleeve with bare hands. Use protective gloves! Fingerprints on the lamp may impair the intensity of the light.**

Check the FluidWorker 150 in general for any damages. Especially check the UV lamp and quartz sleeve for damages, see "Inspection of UV Lamp and Quartz Sleeve".

Use the packing list and tick off accordingly.

If something is missing or if any part of the FluidWorker 150, the UV lamp or the quartz sleeve are damaged - contact your distributor.

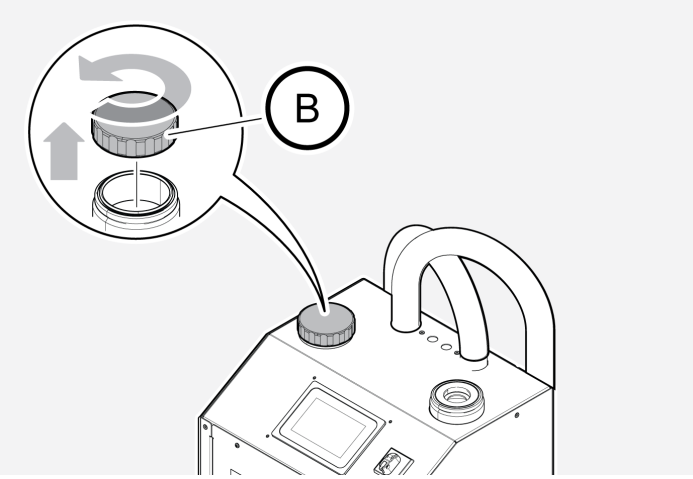
3.3 Inspection of UV Lamp and Quartz Sleeve

To visually inspect the UV lamp and quartz sleeve for any transport damages. Follow the instructions in chapter 7.2 Sleeve Inspection and Lamp Replacement on page 38

3.4 Uninstallation

CAUTION	**The water in the FluidWorker 150 must not freeze. Always drain the FluidWorker 150 before storage, transportation or when it is not in use.**

1. Turn off the system
2. Loosen the brackets holding the inlet and outlet pipes on the process fluid tank.
3. Raise the pipes over the fluid surface and tighten the brackets.
4. Turn on the system for 30 seconds.
   The action partly drains the system.
5. Turn off the system.
6. Unplug the mains plug.
7. Remove the primer tank lid (B).



8. Drain the system using a wet vacuum in the priming tank, approximately 6 liters of fluid.
9. Remount the priming tank lid.
10. Remove the tank bracket from the process fluid tank.
11. Remove the fluid level sensor and the fluid level sensor bracket from the fluid tank.
12. Drain the concentrate tank.
13. Handle the drained process fluid according to local legislation and company rules.

3.5 Shipping and packaging

CAUTION	**The water in the FluidWorker 150 must not freeze. Always drain the FluidWorker 150 before storage, transportation or when it is not in use.**

If the machine is to be shipped, pack it as following.

1. Uninstall the machine according to chapter 3.4 Uninstallation on page 6.
2. Place the FluidWorker on a pallet.
3. Strap the machine to the pallet so it can not tip in any direction.
4. Place pallet collars and lid to protect the machine.
5. Strap the collars and lid to the pallet.

4 System Description

4.1 Functional Description

FluidWorker 150 is based on a fluid treatment technology that imitates nature's own way of degrading microorganisms. When the process fluid passes FluidWorker 150, it is irradiated with UV-C. The light inactivates the bacteria’s DNA and makes the bacteria unable to reproduce.

FluidWorker 150 is a stand-alone fluid treatment product that includes a UV-reactor, a pump and a control system.

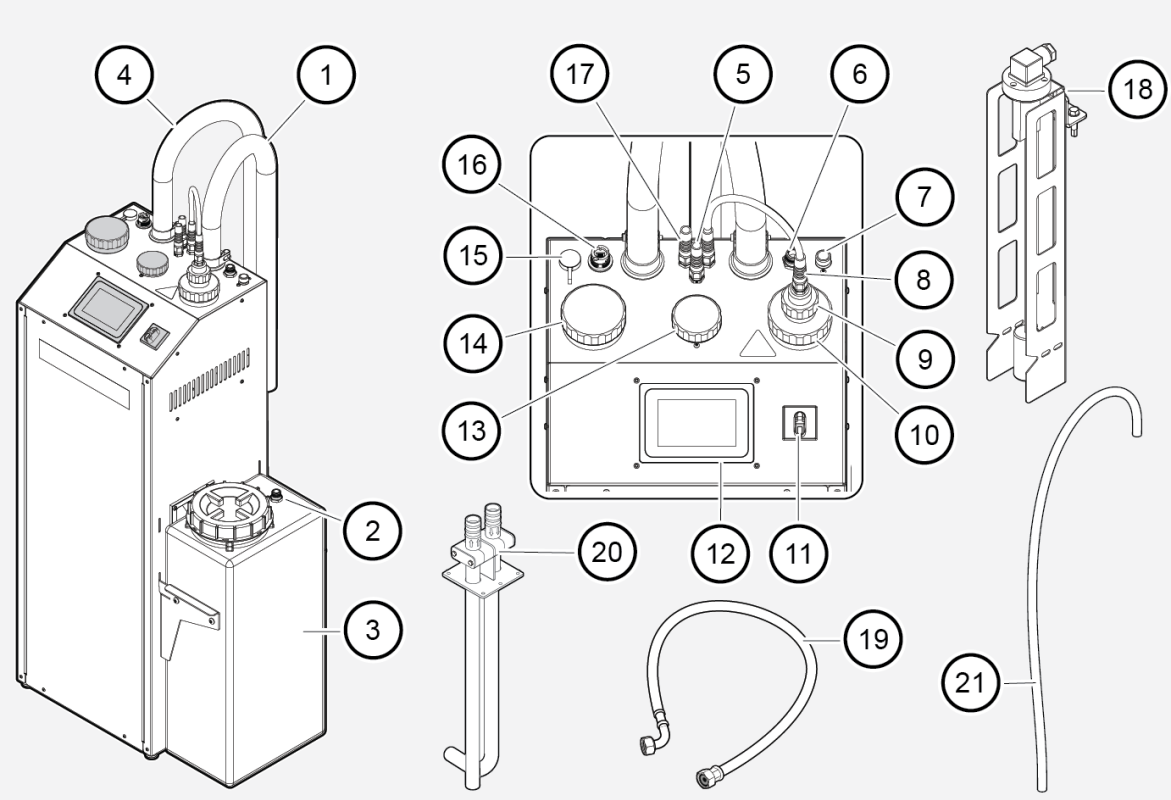
FluidWorker 150 monitors and controls the concentration of the fluid as well as the fluid level in the tank, by adding concentrate and water.

4.2 Control System

The control system monitors correct operation and triggers alarms if any fault occurrs. The FluidWorker 150 is managed through a 5” colour touch screen.

For more information regarding the control system, see 6.2 Automatic Control System on page 23.

4.3 System Overview



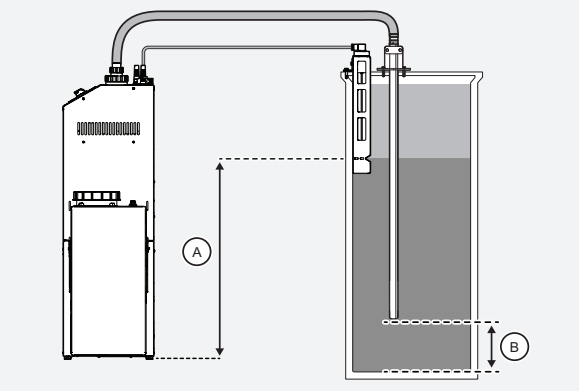
Position	Description	Position	Description
1	Outlet hose	12	Touch display. 5" colour touch screen (HMI)
2	Outlet from concentrate tank	13	Concentration sensor
3	Concentrate tank	14	Priming tank including strainer with magnetic filter
4	Inlet hose	15	USB port
5	Cable to fluid level sensor	16	RJ45-port for OPC-UA
6	Concentrate inlet	17	Power cord. Mains 230VAC
7	½" Fresh water inlet	18	Fluid level sensor
8	Lamp power cable	19	6520 Termopar Hose for water supply. To be connected to fresh water inlet (7)
9	Lamp top	20	Bracket
10	Quartz sleeve nut	21	Concentrate tube (delivered inside the concentration tank)
11	Main switch. The main power switch for the FluidWorker 150		

5 Installation

5.1 Before Installation

CAUTION

Read 10 Specifications on page 55 carefully before installation.

- Make sure the general safety rules are applied.
  See 2 Safety on page 3 on General safety rules.
- Thoroughly clean the system, in which the FluidWorker 150 will be installed, to get the best result.
- Make sure that there is enough room for service and maintenance:
  - Ceiling height minimum 2.4 m.
- 

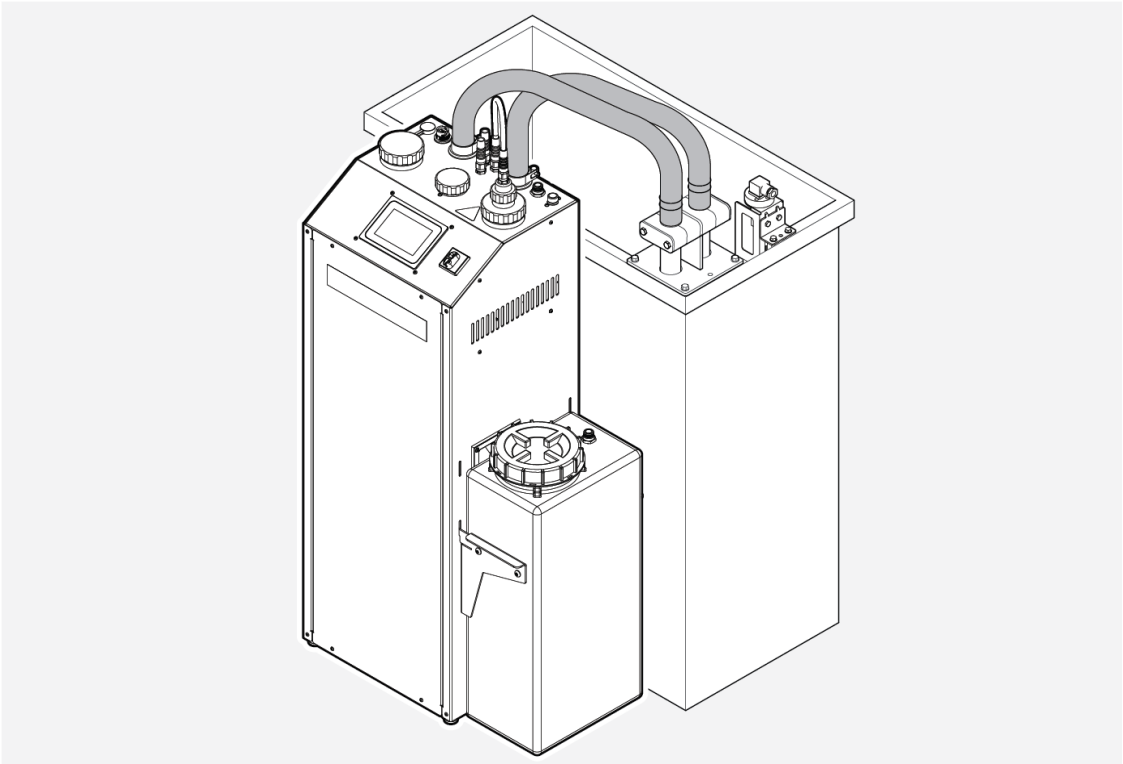
  Fluid surface must always be kept at a minimum of 100 mm up to 1000 mm (A) measured from machine base.
- The inlet pipe must be kept at a minimum of 50 mm (B) from the fluid tank bottom and 200 mm (B) is the recommended distance to avoid agitation of sediments. The inlet pipe must always be under the lowest fluid level.
- Use only the 6520 Termopar Hose for water supply. The hose acts as a protection for the valves. Never connect a fixed water connection directly to the machine. Due to maximum length of the hose, the FluidWorker 150 must also be placed within 2 m from a water outlet.
- The FluidWorker 150 is designed for permanent installation. Place the FluidWorker 150 close to the tank. Make sure that the hoses are fixed and secured to avoid interference with the surrounding work area or equipment.

- The tank is semi-attached to the product and has a size of 30L. You can choose whether it should be placed the right or left side of the product.
- The tank must be filled with concentrate. This is used to adjust the concentration of the liquid.

5.2 Tools and Materials

Description	Note
Wrench or socket bit	10 mm for tank bracket, hose clamp and fluid level sensor.
Torx key	T20 for removal of back and front cover.
Philips Pozidrive	PH2 for feet adjustment.

5.3 Mechanical Installation

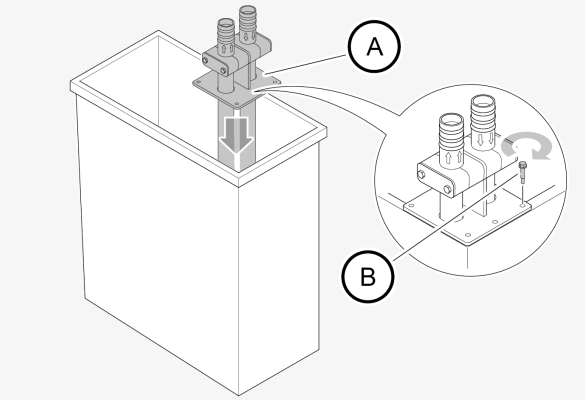


5.3.1 Installing the Tank Bracket

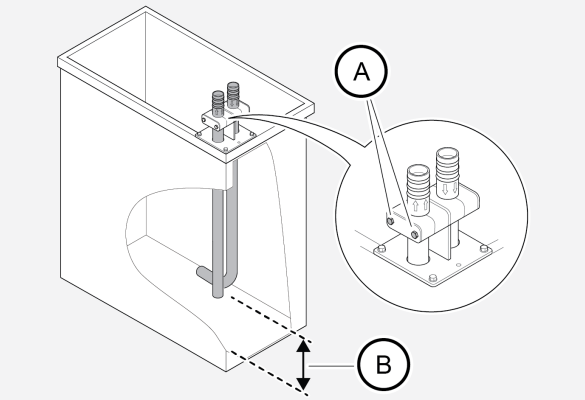
NOTE

The inlet pipe must be kept at a minimum of 50 mm (B) from the fluid tank bottom. 200 mm (B) is recommended to avoid agitation of sediments. The inlet pipe must always be under the lowest fluid level.

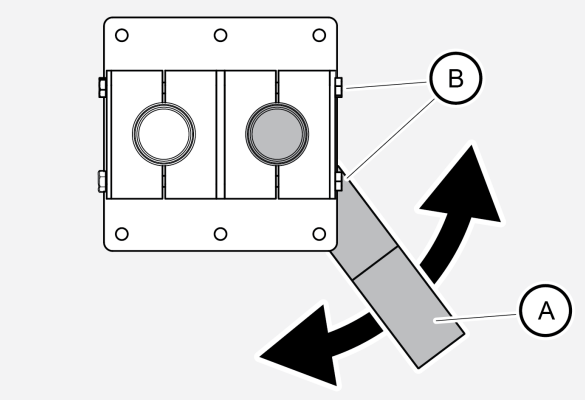
1. Install the tank bracket (A) on the inside of the process fluid tank. Use the supplied self-tapping screws (B).



2. Measure the process fluid tank depth. Loosen the two screws (A) on the clamping jaw slightly and adjust so that the ends of the pipes are kept at a minimum of 50 mm (B) from the fluid tank bottom. 200 mm (B) is recommended to avoid agitation of sediments. The inlet pipe must always be under the lowest fluid level.



3. Adjust the angle of the outlet pipe (A) to create a good circulation in the tank. The circulation is needed to avoid short-circuiting of the flow between the inlet and outlet pipe.



4. Tighten the screws (B) on the clamping jaw.

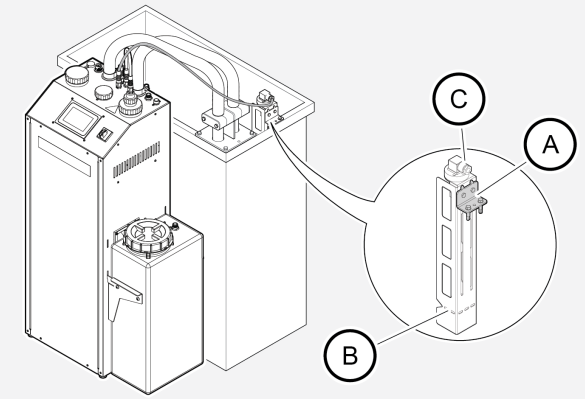
5.3.2 Installing the Fluid Level Sensor

NOTE	Make sure that the Fluid level sensor is in vertical direction to ensure correct level values.

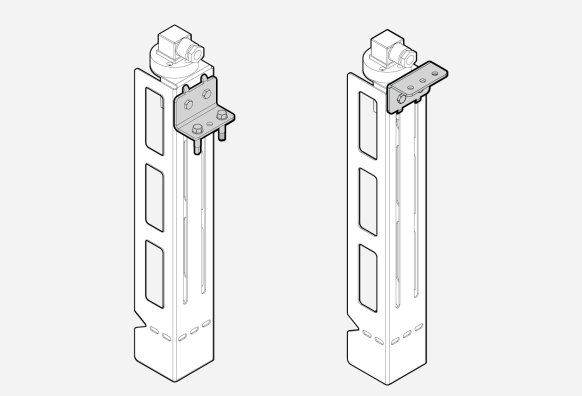
NOTE	Make sure that the float can move freely.

NOTE	If the process fluid tank level varies greatly, the fluid level must be set at the lowest fluid level in the tank.

1. Adjust the bracket (A) to align the marking (B) with the wanted fluid level in the tank.



For an additional range of fluid level, there is the option to reverse the bracket.

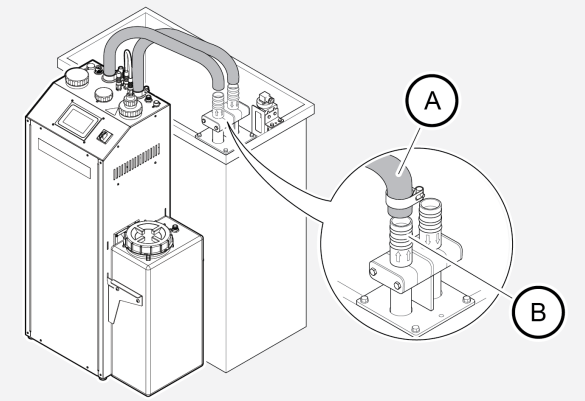


2. Connect the cable attached to the FluidWorker 150 to the contact (C) on the fluid level sensor.

5.3.3 Connecting the Hoses to the Tank Bracket

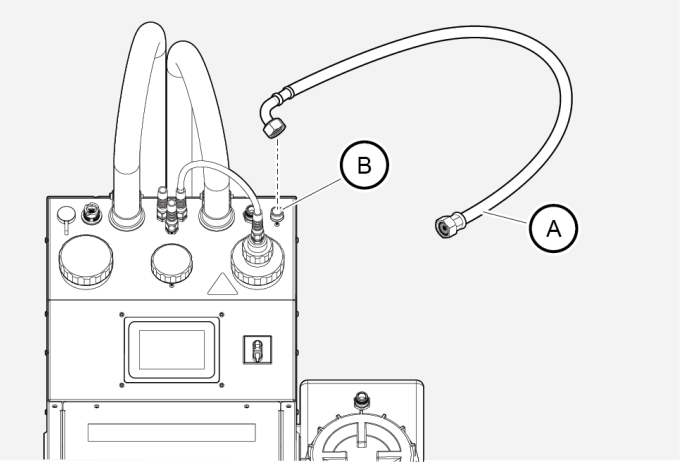
CAUTION	**Hoses must not be lengthened and flow must not be restricted in any way.**
NOTE	Make sure that the FluidWorker 150 is placed so that the hoses will not get entangled in machinery, equipment or people.
NOTE	Note the arrows on hoses and connection pipes to ensure correct direction of flow.

1. Fasten the hoses (A) to the inlet and outlet pipes (B) using the included hose clamps and ensure that there is no leakage.



5.3.4 Connecting the Water Supply

CAUTION	**Use only the water hose when connecting the FluidWorker 150 to a water supply. Never connect a fixed water connection directly to the FluidWorker 150.**
CAUTION	**Due to the maximum length of the water hose, the FluidWorker 150 must be installed within 2m from a water outlet.**
NOTE	It is important that the water has uninterrupted supply.



1. Connect and tighten by hand the water hose (A) to the water outlet.
2. Install and tighten by hand the water hose (A) to the fresh water inlet (B) on the FluidWorker 150.
3. Make sure that the water is on around the clock.

NOTE	The hose must be tightened by hand, not using any wrench tool since to high torque might damage the gasket.

5.3.5 Connecting the Concentrate Tank

NOTE

For systems with high consumption of concentrate, the FluidWorker can be connected to a 200 liter barrel instead of the included tank. In this case, follow the recommendations below:

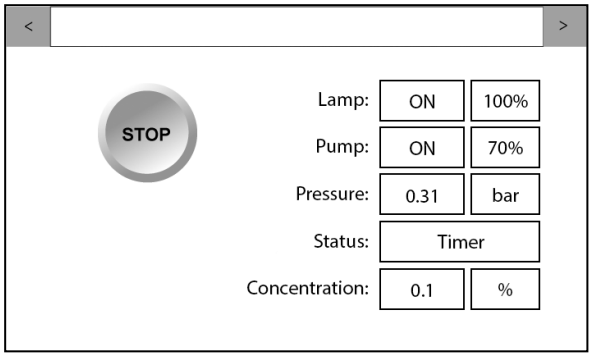
- Tube material PA (Nylon)
- Outside diameter 12 mm
- Inside diameter 10 mm
- Length < 3 m
- Use included strainer

1. Attach the concentrate tank to the left or right side of FluidWorker.
2. Connect the included tube from the outlet on the concentrate tank, to the inlet on top of the FluidWorker.

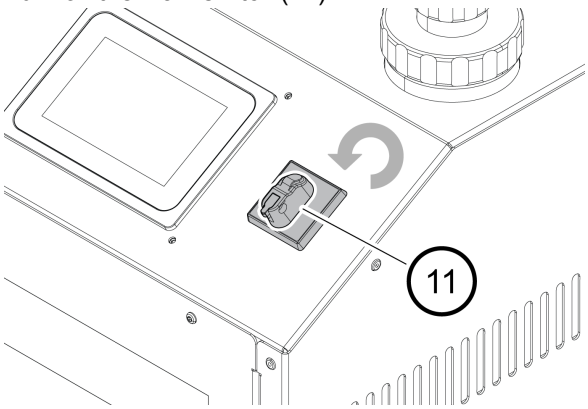
5.3.6 Priming the Pump FW 150 - V1

In order to secure that the pump does not run dry, the FluidWorker 150 -V1 must be primed before the system is taken in use. The FluidWorker 150 - V2 do not need to be primed. See 5.3.7 FW 150 - V2 on page 20. For info regarding V1 or V2 see info on label next to the touch screen.

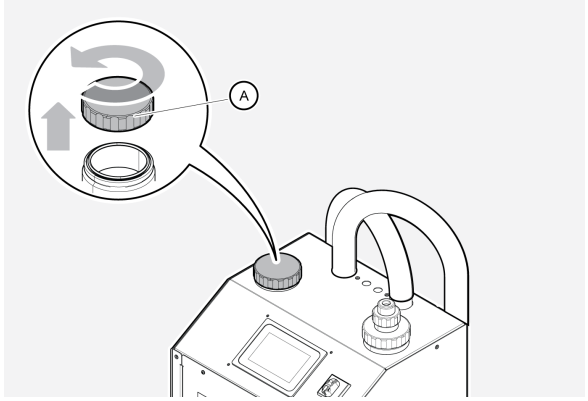
1. Press the *STOP* button on the touch display, the system will stop after a few seconds.



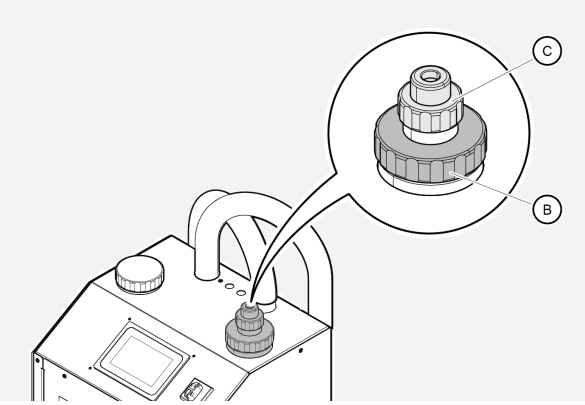
2. Turn off the main switch (11).



3. Unscrew and remove the lid (A) on the top of the priming tank.



4. Unscrew the quartz sleeve nut (B) and lift the lamp assembly (C) slightly for 5 seconds to let air into the reactor. This will break any siphon in the outlet hose.



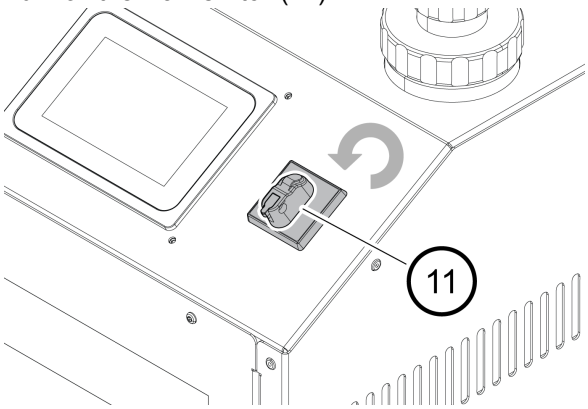
5. Fill the tank until it is almost full, <10 mm from the top, with process fluid or water.

6. Screw the lid (B) back on. Make sure the lid is tightly fastened.

5.3.7 FW 150 - V2

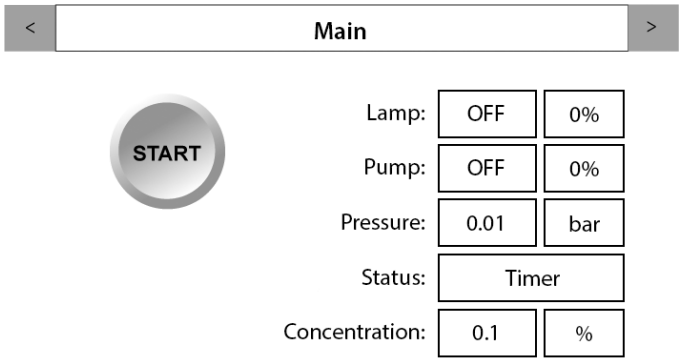
The FluidWorker 150 - V2 do not need to be primed before the system is taken in use.

1. Turn off the main switch (11).



2. Ensure that the water supply is correctly connected and the water is turned on, see 5.3.4 connecting the Water supply

3. Press the START button on the touch display, the system will start and fill the tank with 6 liters of water.



NOTE	The system fills the tank with 6 liters of water every time the START button is pressed. The process takes 90 seconds, the total time for starting up the unit is 180 seconds.

5.3.8 Filling the Concentrate Tank

1. Check that the process fluid is within specifications.

2. Fill the concentrate tank with concentrated process fluid.

5.4 Electrical Installation

Before connecting the FluidWorker 150 to main power, consider the following:

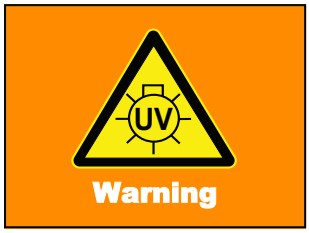
- The system requires a 10 A main fuse.
- The system consumes 2 A, maximum.
- The system is of the overvoltage category type II.

Note: Make sure that the fluid level connector is connected to the fluid level sensor.

The installation is now finished. Go to 6 Operation on page 22 and start to learn about how to use the FluidWorker 150.

6 Operation

6.1 Important Information



Risk of exposure to UV-C rays. UV-C rays are harmful to the eyes and the skin, never look into a lit lamp! Always use necessary protective equipment (such as protective glasses and gloves) when working with the quartz sleeve and UV lamp

CAUTION

Never operate the FluidWorker 150 without process fluid or water in it!

CAUTION

The water in the FluidWorker 150 must not freeze. Always drain the FluidWorker 150 before storage, transportation or when it is not in use.

If the FluidWorker 150 or the system to which it is installed are left unused for long periods of time (several weeks), cleaning of the entire system might be required.

The lamp power supply used in FluidWorker 150 is specifically validated to operate with the UV lamp provided with the unit. Using non-original components can damage the unit and the surrounding equipment.
Any attempt to change or modify existing equipment with non-original components invalidates the warranty.

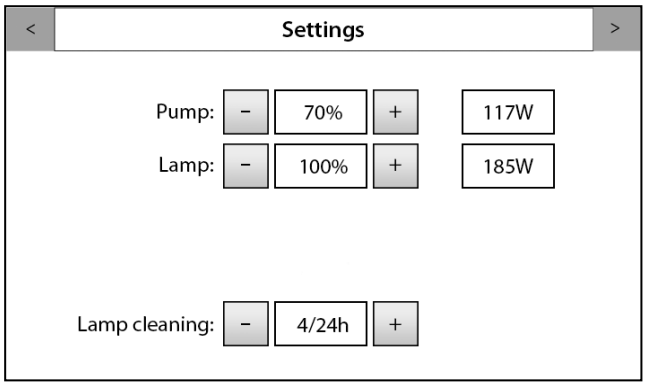
The FluidWorker 150 can be operated in Intermittent mode in order to save energy and reduce warming up the process fluid in small tanks. See 6.2 Automatic Control System on page 23

6.2 Automatic Control System

NOTE	Learn how the control system works and set the parameters to match your system.

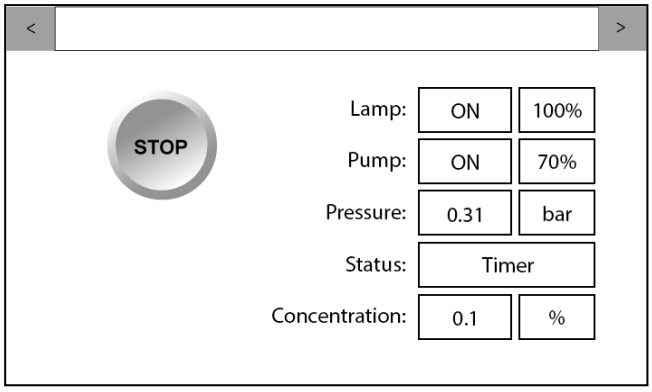
This chapter gives a basic understanding of the functions in the screen based control system of the FluidWorker 150.

6.2.1 Screens – General Functions



- Shows the title of the selected screen.
  This informs what function the screen has.
- The color of the title bar indicates the status of the machine:
  Green: everything is okay.
  Yellow: soft alarm, the machine will continue running but needs attending.
  Flashing red: hard alarm, the machine stops instantly.
- Use the arrows to navigate through the screens.
- On some screens it is possible to alter the settings on different parameters.
  Use the **- /+** buttons to reduce or increase the value.

6.2.2 Main screen



The Main Screen

"START"/"STOP" button: When the button has the text START, the FluidWorker 150 is ready to be started. If the button has the text STOP it can be stopped by the user.

"SERVICE" button: This button appears on the Main screen when an alarm occurs. Press the button to read more about the alarm on the “Alarm history” screen. See chapter 8 Troubleshooting on page 52 for more information about soft and hard alarms.

Lamp: *OFF* - lamp is OFF / *ON* - lamp is ON (*1) / *hh:mm:ss* – Lamp 100% timer / 0-100% - *Lamp Dimming*

Pump: *OFF* - the pump is not running / *ON* - the pump is running / 0-100% - *Pump Speed*

Pressure: Pump pressure after the pump.

Status: Shows the current status for the concentration control.

+ *Water 1* - Adding water

+ *Water 2* - Adding water

Mixing - Mixing process fluid

Measuring - Measuring concentration and temperature

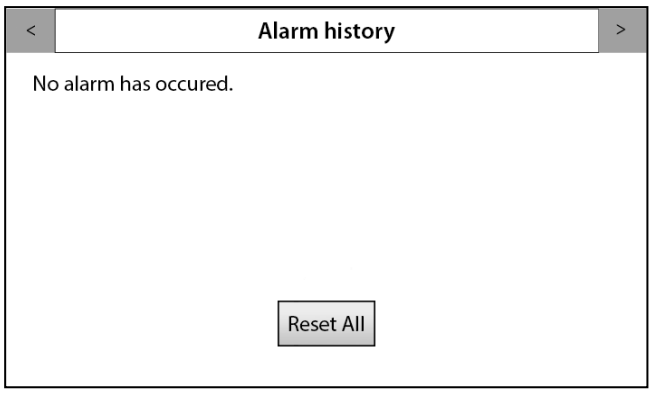
Cleaning 1 - Cleaning sensor

Timer - System idle

Concentration: Shows the value of the last concentration measurement of the fluid.

(*1): The lamp is activated after the priming cycle has completed (90 seconds)

6.2.3 Alarm History



Alarm history Screen

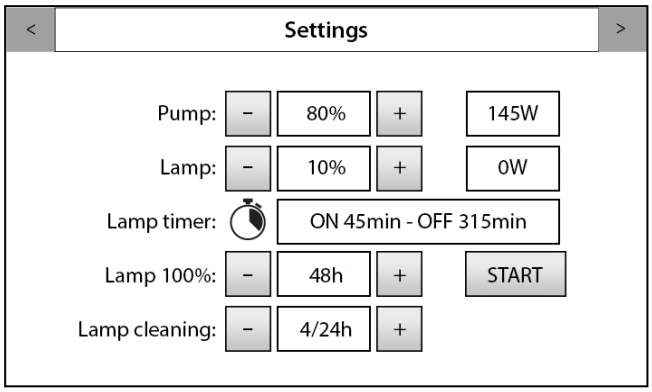
On this screen all detected alarms are shown. The normal procedure to handle alarms is:

1. Read the alarm text.
2. Correct the error that caused the alarm.
   See the 8 Troubleshooting on page 52
3. Press the *RESET ALL* button to reset the alarms.

6.2.4 Settings 1

NOTE

This screen looks different depending on lamp dimming settings. See 6.2 Automatic Control System on page 23.



Settings Screen

This screen shows:

- the current power consumption of the pump.
- the current power consumption of the lamp.

Pump control:

- Minus symbol decreases the pump speed in steps of 5% down to 70%.
- Plus symbol increases the pump speed in steps of 5% up to 100%.

Lamp control:

- Minus symbol reduces the lamp output in steps of 10% down to 0%.
- Plus symbol increases the lamp output in steps of 10% up to 100%.
- For lamp settings less than 80% the lamp switches to intermittent operation.

Lamp 100%:

- Minus symbol is decreasing the amount of hours the lamp works at 100%.
- Plus symbol is increasing the amount of hours the lamp works at 100%.
- When pressing start the lamp will work at 100%, the amount of hours that is chosen and then go back to set point.

Lamp cleaning:

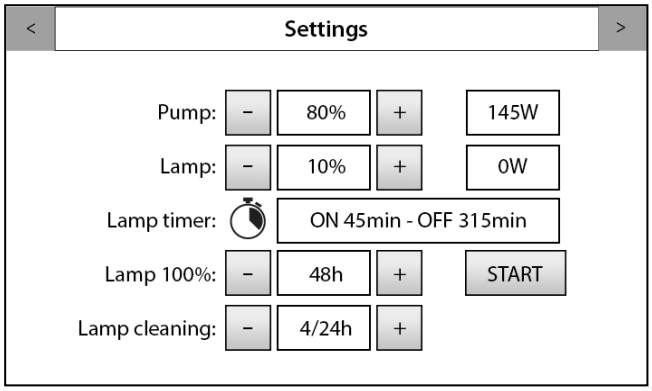
- The minus symbol steps down the number of wiper cycles/24h.
- The plus symbol steps up the number of wiper cycles/24h.

6.2.5 Intermittent Operation

For small systems or systems with small bacteria problems the lamp output can be ruduced to save power.

When setting the lamp settings <80% the lamp will operate in intermittent mode. The timing will be automatically selected according to the table below.

By running the system intermittently, the UV-dose will also be lowered.

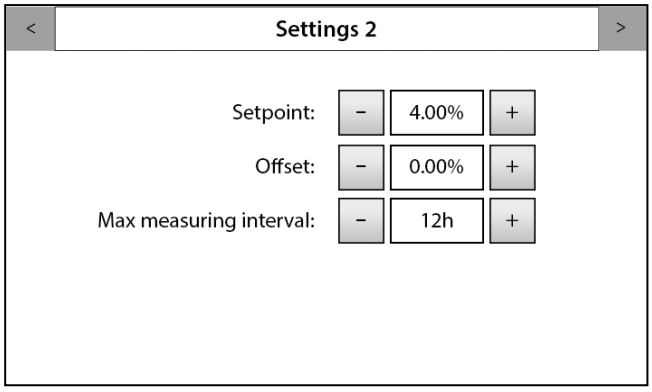


Settings Screen

User control of Lamp dimming in FW150

User setting of lamp	Lamp dimming value	Lamp on (min)	Lamp off (min)
100%	100%		
90%	80%		
80%	60%		
70%	80%	315	45
60%	80%	270	90
50%	80%	225	135
40%	80%	180	180
30%	80%	135	225
20%	80%	90	270
10%	80%	45	315

6.2.6 Settings 2



Settings 2 Screen

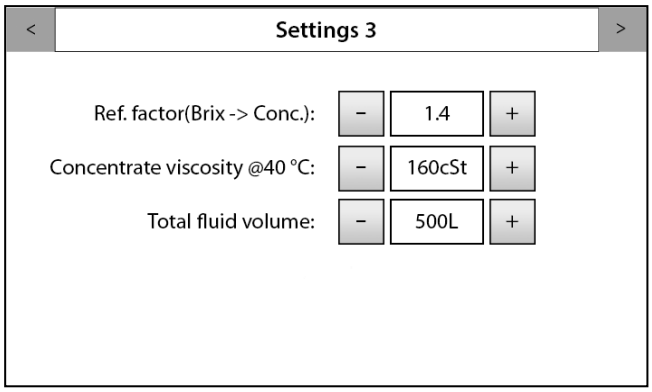
Setpoint: Set your desired fluid concentration.

Calibration: Can be used to offset the displayed concentration value in case your reference measures different. Adjust until concentration value on page main corresponds to the manual measurement (for example, If the FW150 shows 7% and your (refractometer value) times(*) (refractometer factor) gives you 8% you can set the "Calibration" value to +1.0 to have the values aligned).

Max measuring interval: The maximum time between each concentration measurement.
Note that a concentration measurement is done after every water fill. A low value will increase the wear and maintenance of the FluidWorker.

Default value is 24h. Values larger than 24h can be used for systems with extremely low concentrate consumption or when the production is idling.

6.2.7 Settings 3



Settings 3 Screen

Ref.factor(Brix ->Conc.): This value must be entered by the user. Refer to the manufacturer of the concentrate for the right value.

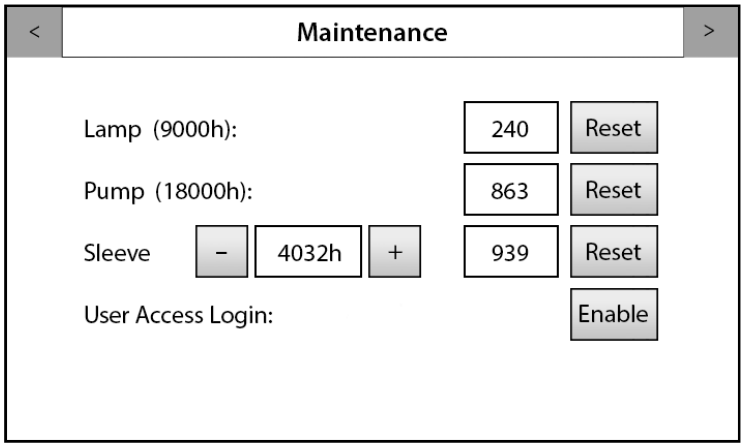
Concentrate viscosity @40 °C: This value must be entered by the user. Refer to the manufacturer of the concentrate for the right value.
To calculate viscosity from 20°C=>40°C use Visk@40°=visk@20°/2,6

CAUTION

It is important that the entered value for "total fluid volume" is fairly accurate (+-30%).
Entering the wrong "total fluid volume" may cause flooding of the process fluid tank.

Total fluid volume: The total volume of fluid in the system. This value must be entered by the user.

6.2.8 Maintenance



Maintenance Screen

This screen gives information about how many hours each component has been running.

When 1000 hours remains of end-of-life, a service message will appear in the alarm list.

For the pump, please refer to the pump manual.

Sleeve inspection timer, check that the quartz sleeve is clean.

NOTE

Pressing Reset is NOT REVERSIBLE.
The counter cannot be recovered.

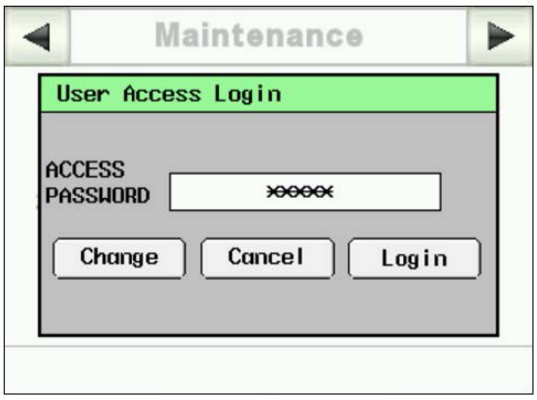
When the service is completed, the service timers for the lamp and wiper can be individually reset. Press the *RESET* button each time a component is replaced.

Maintenance and confirmation Screen

When the *RESET* button is pushed a pop up window for confirmation will show. In this example the reset button for Lamp has been pressed after lamp replacement.

The login function can be activated by pressing the enable button on the side. A new frame appears asking about the password.

6.2.9 Maintenance, User Access



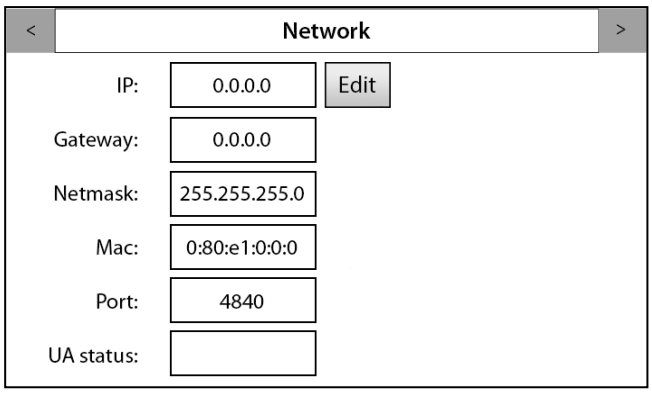
User Access Screen

When the user makes any change to the system, and the password is enabled, a login screen is shown.

Default password: 1234

After 10 minutes the user is automatically logged out.

6.2.10 Network



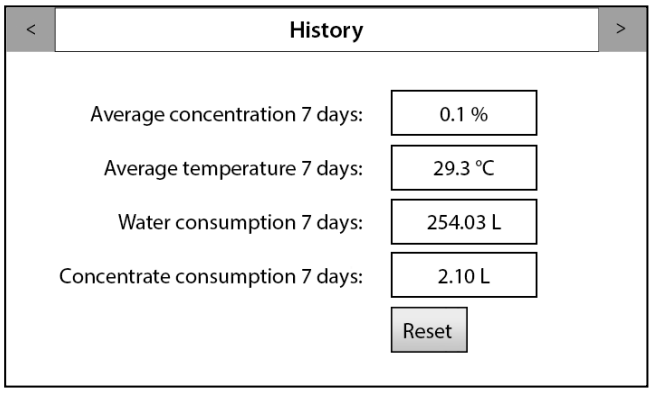
Network Screen

The screen shows a network that is not activated. Network parameters must be entered if the FluidWorker 150 is to be connected to a network.

UA Status code: Only after IP has been set.
Green - Network work connection good .

Red - Network work connection bad. Check entered IP settings and ethernet cable.

6.2.11 History



History Screen

Average concentration 7 days: Shows the average concentration for 7 days in percent

Average temperature 7 days: Shows the average temperature for 7 days in °Celsius

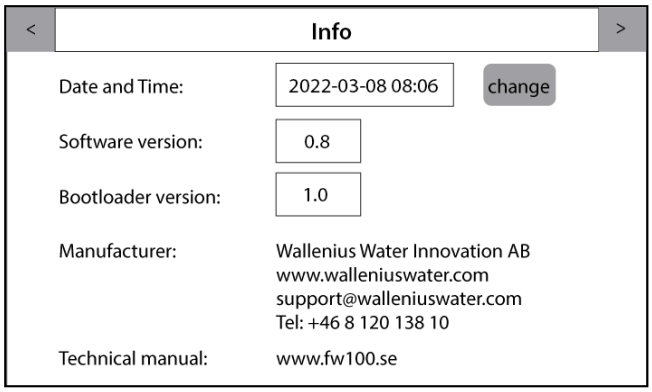
Water consumption 7 days: Shows the water consumption for 7 days in liters

Concentrate consumption 7 days: Shows the approximate concentrate consumption for 7 days in liters

6.2.12 Information

NOTE

Please note the version number on this screen for any communication for identification.



Information Screen

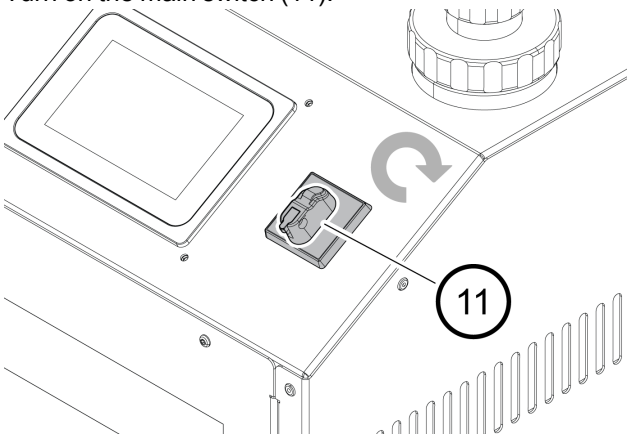
Here is information about software and firmware versions and manufacturer information.

The machine keeps the correct date for 3 days if the machine is powered off.

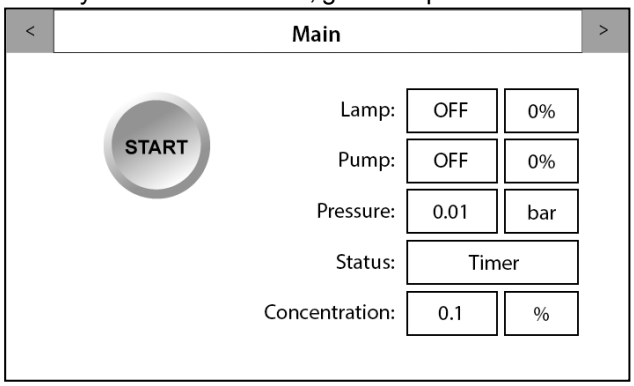
6.3 To start the FluidWorker 150

NOTE	If your FluidWorker version is FW 150 - V1 (see info on label next to the touch screen), make sure the FluidWorker 150 is primed before start. If not, go to 5.3.6 Priming the Pump FW 150 - V1 on page 18.
NOTE	Make sure the water is connected and turned on
CAUTION	**Make sure that you have set your desired parameters, if not go to 6.2 Automatic Control System on page 23.**

1. Turn on the main switch (11).



2. Press the *START* button on the touch display. The pump starts and the system is running after a few seconds.
   If the system does not start, go to chapter 8 Troubleshooting on page 52.

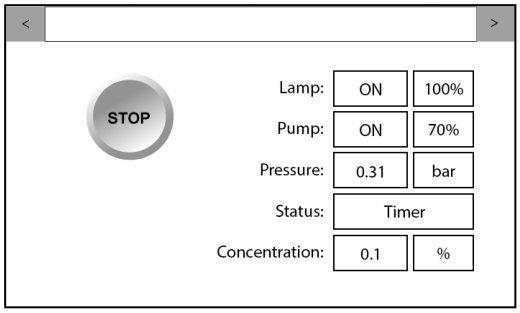


After start up, the machine will perform a 90s priming cycle, to evacuate air from the system. After the priming cycle the machine will continue with normal operation.

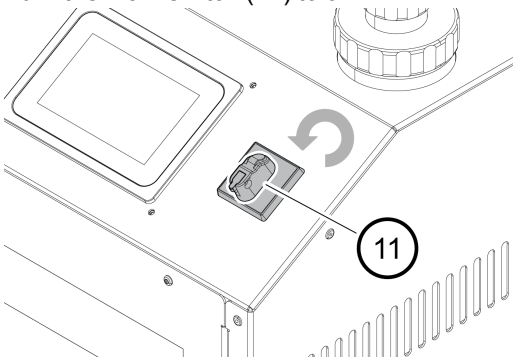
6.4 To stop the FluidWorker 150

NOTE	The clock symbol is only visible when lamp power setting is 70% or less.

1. Press the *STOP* button on the touch display, the system will stop after a few seconds.



2. Turn the main switch (11) to off.



7 Service and Maintenance

 **Warning**	**Risk of exposure to UV-C rays. UV-C rays are harmful to the eyes and the skin, never look into a lit lamp! Always use necessary protective equipment (such as protective glasses and gloves) when working with the quartz sleeve and UV lamp**
 **Warning**	**Strong magnetic and RF fields can cause serious injury that may result in death of people with implanted or attached medical devices, such as pacemakers and prosthetic parts.**
Warning	**The unit operates with electrical power. Electrical power can cause electrical chocks. Disconnect power before service and use a residual current device, RCD.**
CAUTION	**Do not touch the lamp with bare hands.** **Use protective gloves!** **Fingerprints may impair the intensity of the light.**
NOTE	Wallenius Water Innovation AB only guarantees correct function of the unit with original or specified components.

7.1 Service intervals

Description	Service interval
Lamp Replacement and Sleeve Inspection	9000h
Magnet filter inspection	2-4v*

*The filter cleaning interval varies greatly depending on the particle load. If a magnetic filter has not been used before, the interval can be very short (<24h), due to accumulated particles.

7.2 Sleeve Inspection and Lamp Replacement

Warning

Wait approximately 10 minutes, after the power is turned off, before working on the FluidWorker 150 in order to let the lamp cool off.

7.2.1 Tools and Materials

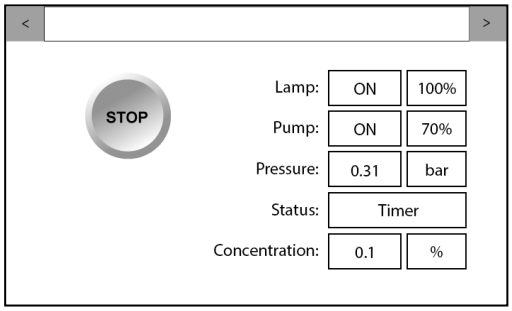
Description	Note
Protective gloves	Use clean protective gloves

7.2.2 Procedure

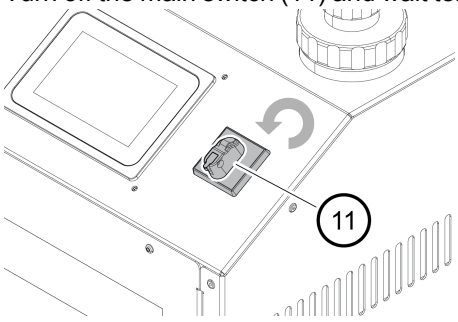
CAUTION

Do not use tools when replacing the lamp. The lamp is very sensitive to any form of contamination. Always use clean protective gloves when touching the lamp.

1. Press the *STOP* button on the touch display, the system will stop after a few seconds.

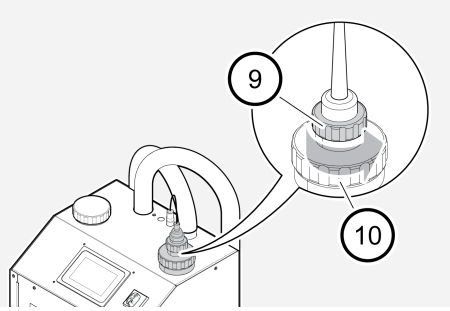


2. Turn off the main switch (11) and wait ten minutes.

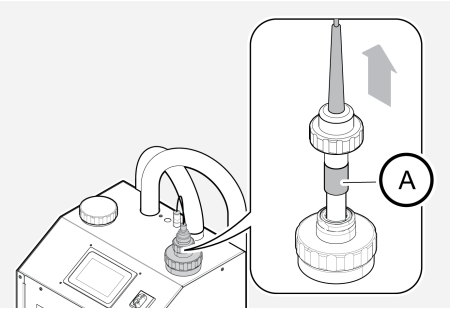


3. Disconnect the main power plug from the mains.

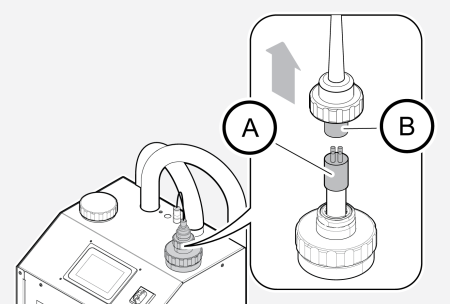
4. Disconnect the lamp from the power supply by removing the lamp lock nut (9) from the quartz sleeve lock nut (10).



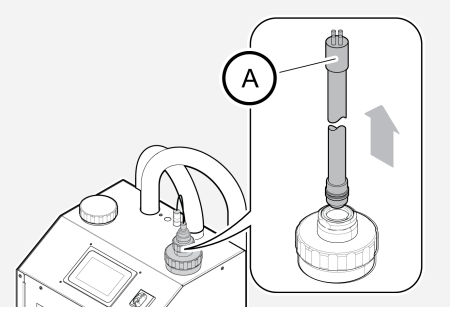
5. Pull out the lamp until the lamp socket (A) is visible. Carefully secure the lamp socket by a light grip during disconnection.



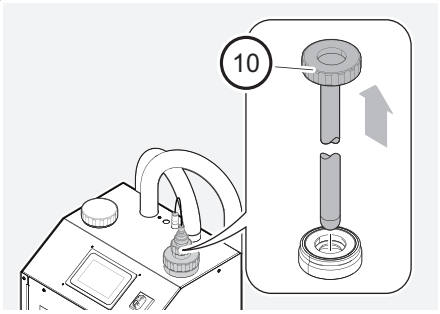
6. Hold the lamp firmly by the lamp socket (B) and disconnect it from the lamp (A).



7. Carefully pull out the lamp (A) from the quartz sleeve.



8. Unscrew the quartz sleeve lock nut (10) from the reactor. Gently lift the quartz sleeve and holder assembly from the reactor straight up until the full length of the quartz sleeve is outside the reactor.



9. Inspect the sleeve visually. If the sleeve is not clean then clean or change the quartz sleeve and replace the cleaning system. See 7.4 Replacement of Cleaning System Components on page 45.

10. Install the quartz sleeve and lamp by following step 3 to 8 above in opposite order. To avoid unnecessary leakage, lower the quartz sleeve the last bit slowly and gently.

11. Turn on the main switch (11).

12. Start up the system, see 6.3 To start the FluidWorker 150 on page 34.

13. Reset the lamp timer.

14. Make a note in the A.2 Maintenance Record on page 66 that the lamp has been replaced.

15. If the sleeve have been replaced make a note in the Appendix - A.2 Maintenance Record on page 66 that the quartz sleeves have been replaced.

    If any parts have been replaced, recycle the old parts.

7.3 Magnetic filter Inspection

Strong magnetic and RF fields can cause serious injury that may result in death of people with implanted or attached medical devices, such as pacemakers and prosthetic parts.

7.3.1 Tools and Materials

Description	Note
Brush	Use a clean brush
Protective gloves	Use protective gloves

7.3.2 Procedure

The strainer needs regular cleaning depending on the amount of particles in the fluid. Cleaning must be done on a regular basis. A general indication to clean the strainer is when system pressure has dropped 0.1 bar from the pressure of a clean system (measured at 100% pump setting).

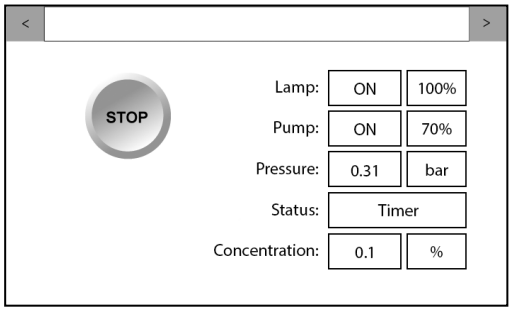
NOTE

Running the FluidWorker 150 with an obstructed strainer (>0.1 bar pressure drop) will cause poor system performance.

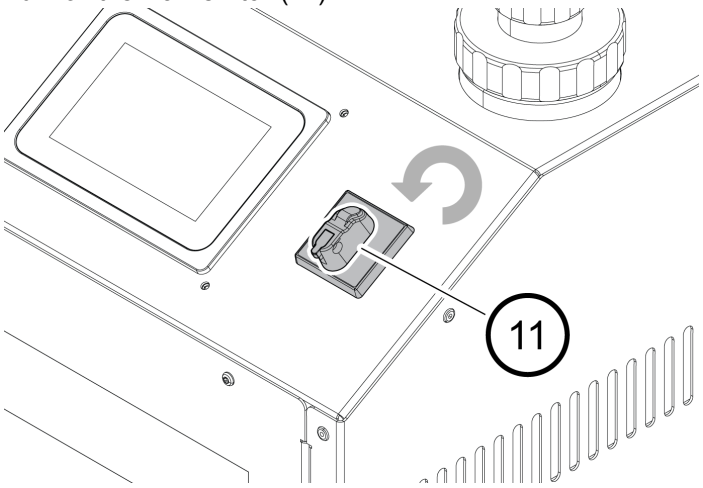
A fully obstructed strainer will trigger the system low pressure alarm and shut down the machine.

To clean the strainer, do the following:

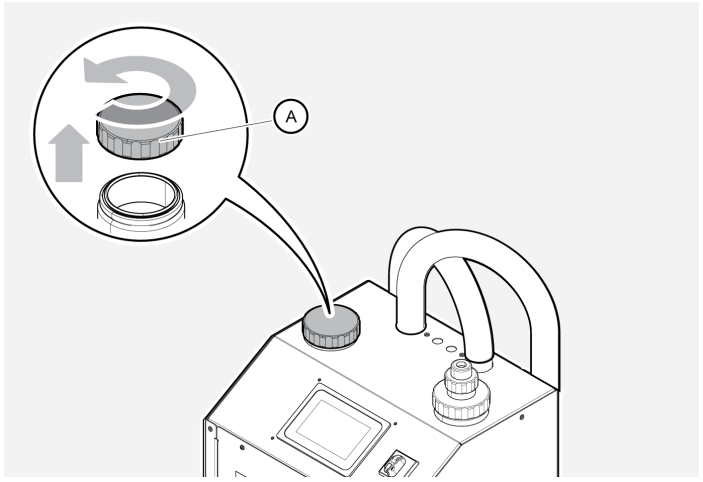
1. Press the *STOP* button on the touch display, the system will stop after a few seconds.



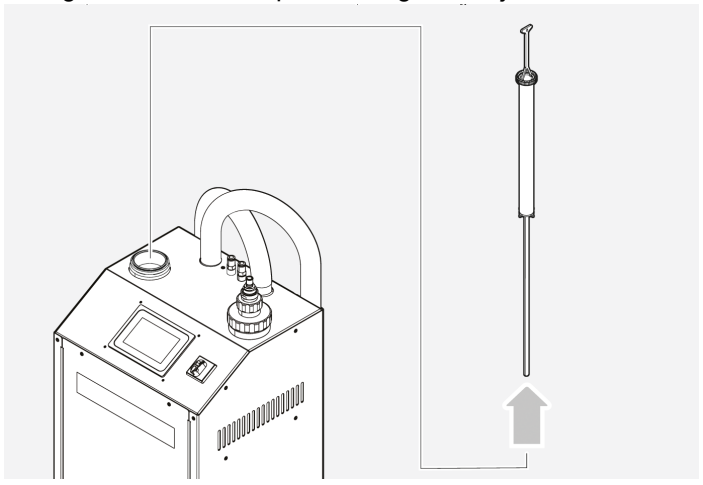
2. Turn off the main switch (11).



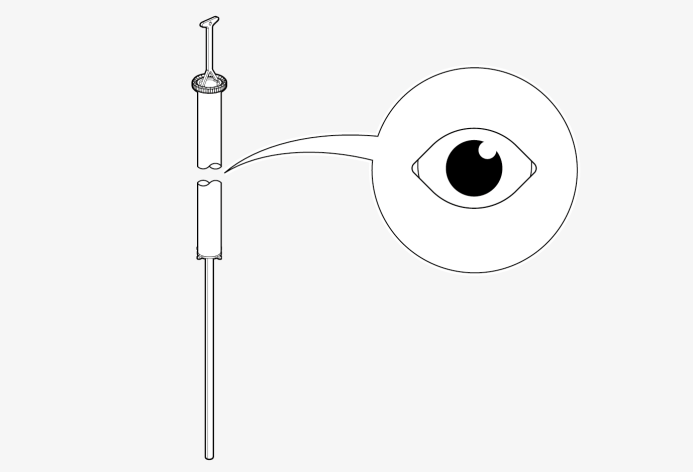
3. Unscrew and remove the lid (A) on top of the priming tank.



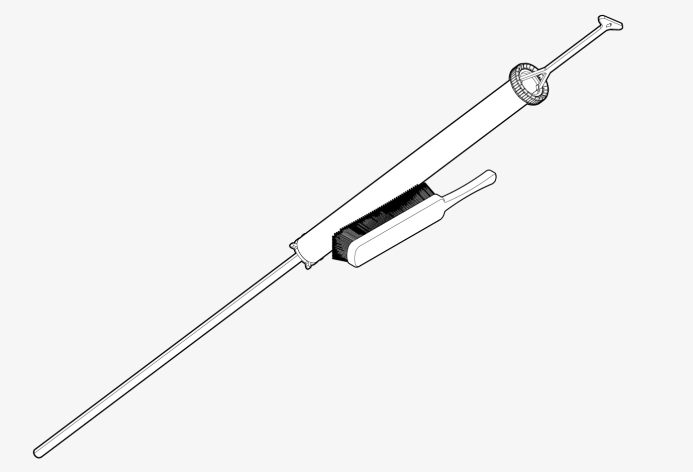
4. Gently lift the magnetic filter from the priming tank. Note that the magnet is very strong and should be kept from magnetic objects.



5. Inspect the strainer to ensure that it is clean.

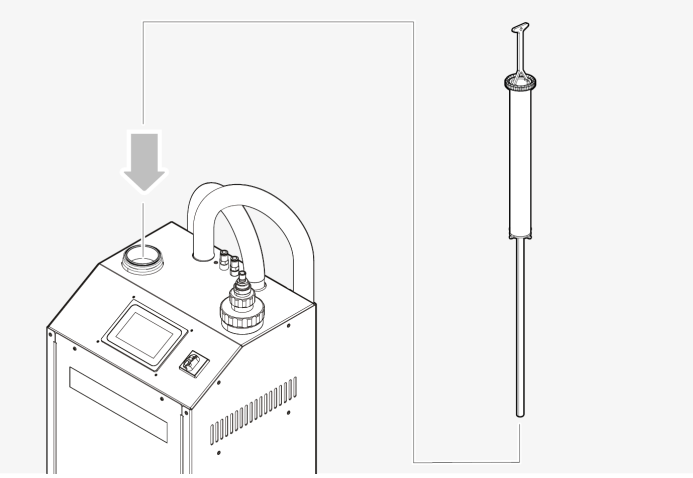


6. If necessary, use a brush and water < 80 °C to clean the strainer.



7. Remove all magnetic particles from the magnet.

8. Re-insert the strainer into the priming tank.



9. Prime the tank, see 5.3.6 on page 18
10. Close the lid and wipe away any fluid around the priming lid with a cloth.
11. Connect the main power plug to the mains.
12. Start up the system, see 6.3 To start the FluidWorker 150 on page 34

7.4 Replacement of Cleaning System Components

Warning

Wait approximately 10 minutes, after the power is turned off, before working on the FluidWorker 150 in order to let the lamp cool off.

The replcement can be done in one of the following ways:

a. Replacement of a complete inner reactor, skip steps 4-7 in the procedure.

b. Replacement of individual wiper cassettes (2 pcs).

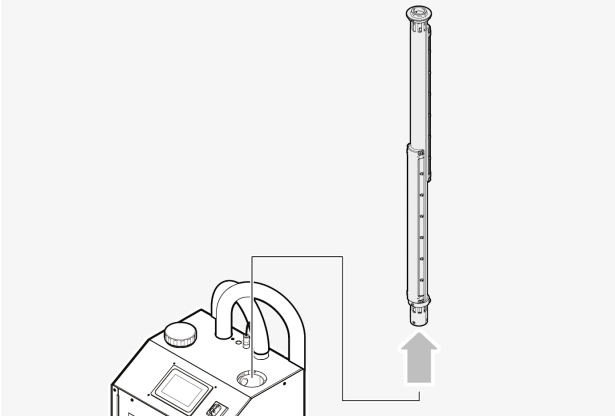
7.4.1 Tools and Materials

Description	Note
Torx key	T20 to remove the front cover and to disassemble wiper cassettes.

7.4.2 Procedure

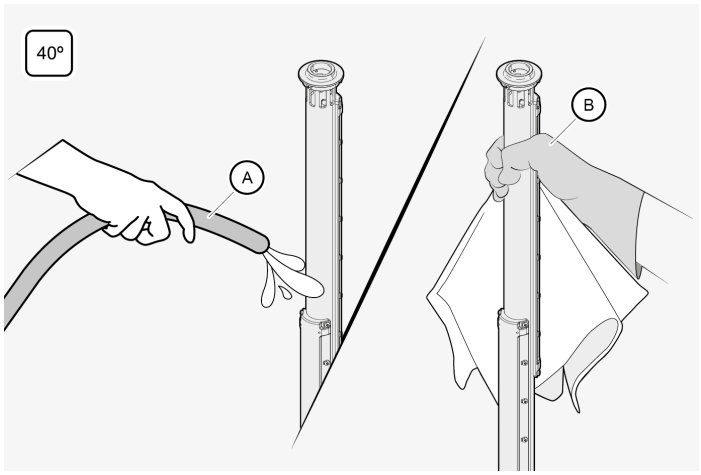
1. Follow steps 1 through 8 of the instructions in chapter 7.2 Sleeve Inspection and Lamp Replacement on page 38.

2. Gently lift the cleaning system from the reactor.

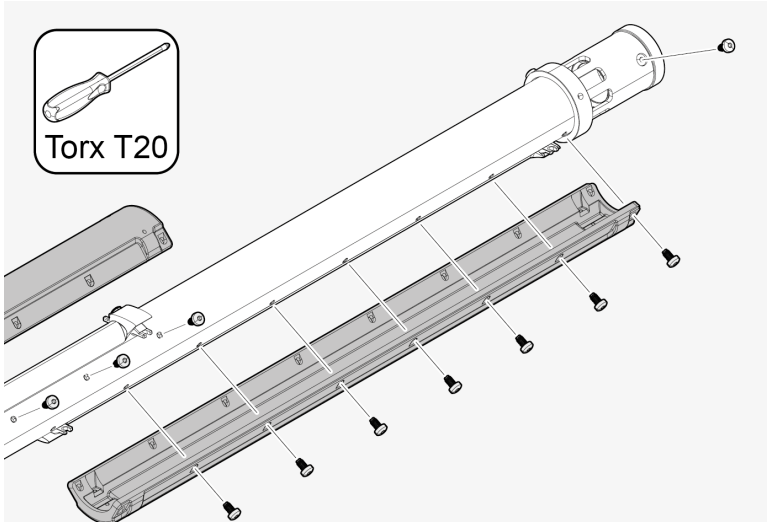


3. Allow a few seconds to let the cleaning system drain completely inside reactor before it is removed.

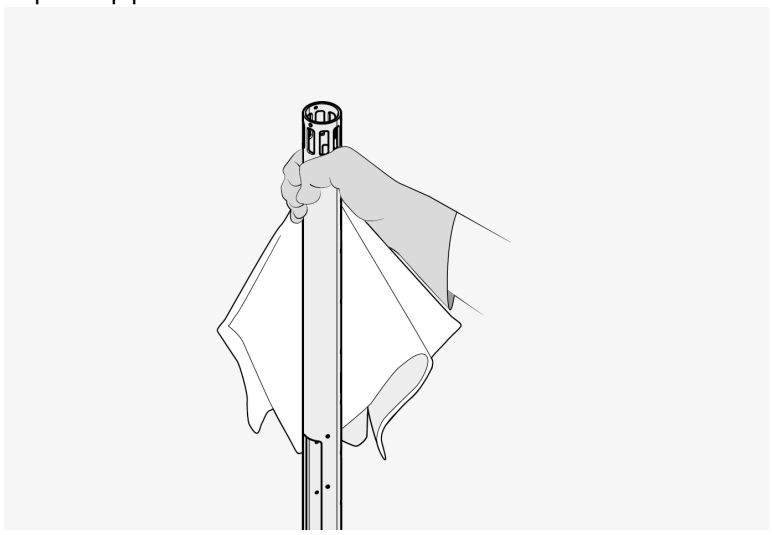
4. Rinse the cleaning system with 40 °C water to remove dirt and oil. Wipe dry with a cloth.



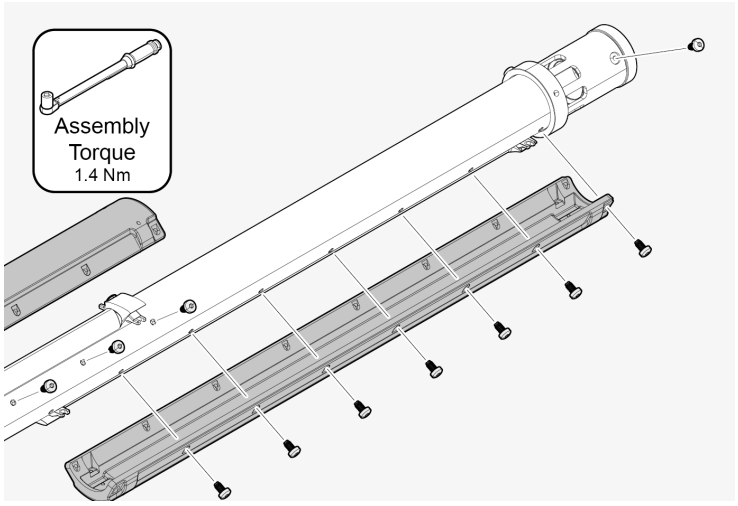
5. Disassemble both wiper cassettes with a Torx (T20) screwdriver.



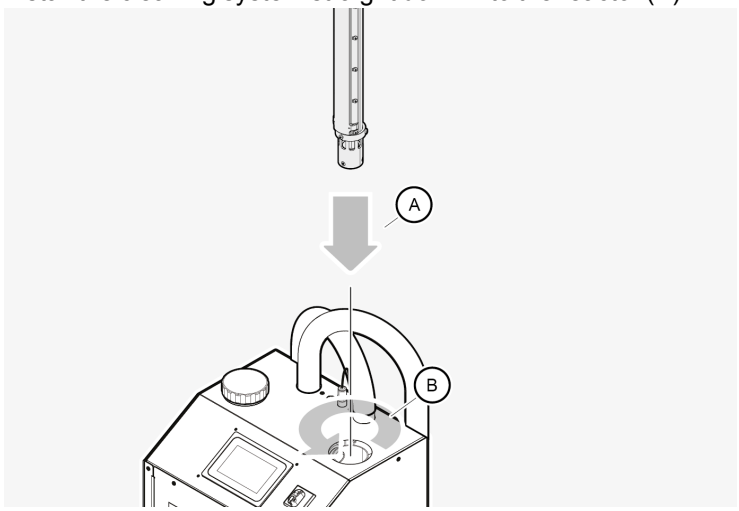
6. Wipe the pipe clean with a cloth.



7. Replace wiper cassettes. Use assembly torque of 1.4 Nm.
   Do NOT use electric screwdriver.



8. Install the cleaning system straight down into the reactor (A).

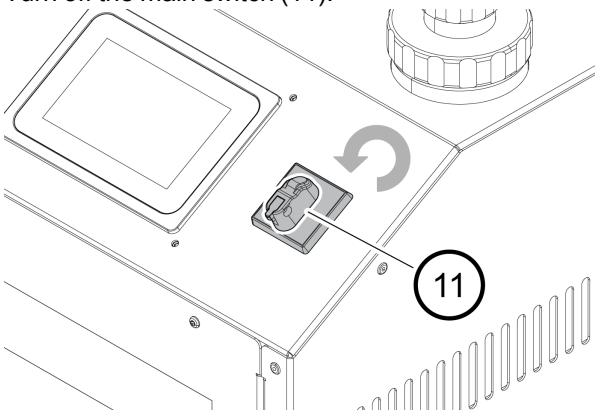


9. Rotate unit (B) until the drive pins engage to drive coupling in the bottom of the reactor.

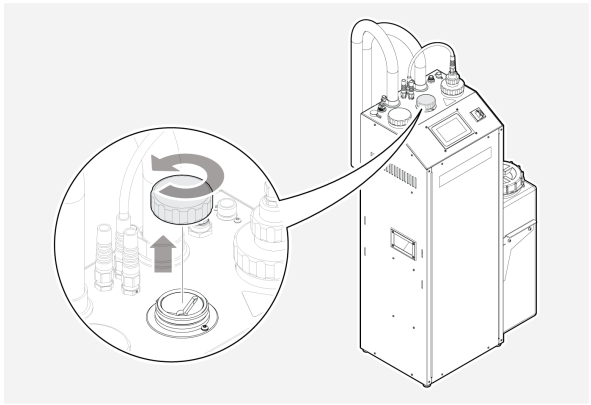
10. Re-assemble quartz sleeve and UV lamp as described in steps 10 through 15 of the instructions in 7.2 Sleeve Inspection and Lamp Replacement on page 38.

7.5 Inspection and cleaning of Concentration Sensor

1. Turn off the main switch (11).



2. Unscrew and remove the lid to the Concentration Sensor.



3. Wipe the Concentration Sensor clean with a dry cloth. It is essential that the round glass surface is absolutely clean.

NOTE	Use a clean cloth when cleaning the sensor to avoid damaging the surface.

4. Visually inspect the glass surface. Repeat cleaning if needed.

5. Screw the lid back on. Make sure the lid is tightly fastened.

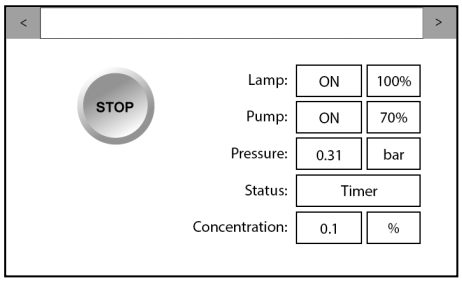
7.6 Software/Firmware Upgrade

If the software or firmware is subject for upgrade, you will receive an e-mail with the upgrade enclosed.

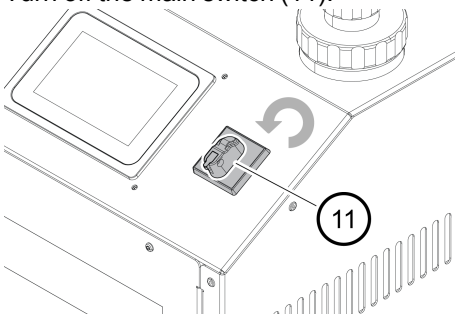
Use the original USB drive delivered with the FluidWorker. The USB is located in the USB-port on top of the machine. If the USB is missing replace with a formatted (FAT32) ultrafit USB stick (min 512 MB).

7.6.1 Procedure

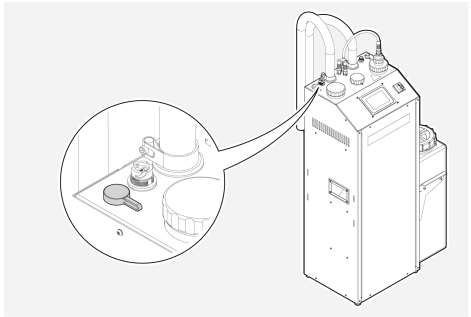
1. Put the upgrade file, into a new folder called "firmware", onto the USB-stick.
2. Press *STOP* to switch off the FluidWorker 150.



3. Turn off the main switch (11).

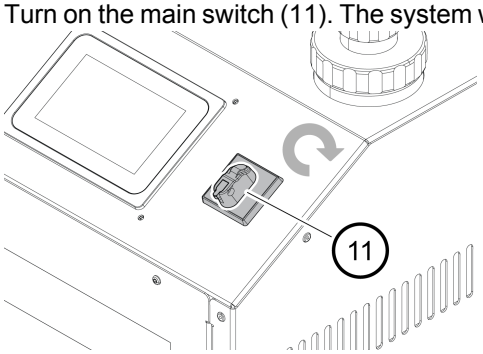


4. Remove the lid to access the USB-port.



5. Insert the USB-stick into the USB port.

6. Turn on the main switch (11). The system will automatically upgrade.



7. Wait until the system is upgraded.
   The upgrade takes less than 2min and includes a system reboot.

8. Remove the USB-stick.

9. Delete the "firmware" folder from the USB stick. Leaving firmware on the USB may lead to accidental downgrade of future software.

10. Insert the USB-stick into the USB port.

11. Make a note in the A.2 Maintenance Record on page 66 that the system is upgraded and to which revision.

8 Troubleshooting

8.1 Alarm List

NOTE

Hard alarms will shut down the FluidWorker 150.
Soft alarms will not shutdown the FluidWorker 150.

Soft alarms only informs that service is required.

8.2 Hard Alarms

Hard Alarms	Probable cause / solution
Concentration sensor not responding	The sensor is misconfigured or the cables are broken or has loosened. Do a check of the cable connectors. If no errors are found with the cable connections or the alarm still remains contact support see: 1 General on page 1
Fill concentrate tank and clean sensor 2	The concentration is more than 2% below set point and the alarm indicates a risk of corrosion caused by low concentration. 1. Switch off the system 2. Fill the concentration tank with concentrate 3. Check the concentrate tube and connections. No air must leak into the tube (negative pressure) 4. Clean the sensor 5. Switch on the system
Pump Error	1. Frequency converter high temperature. (FW150 can be restarted after wait/cooled down time). Check ambient and fluid temperature. 2. Pump is short-circuited. (FW150 cannot be restarted after wait/cooled down time).
No Level sensor	1. Check the connection to the level sensor. 2. Level sensor is broken.
Pump high current	1. Pump wrongly connected (one phase is disconnected). 2. The pump is broken.
Pump low current	Pump not properly connected.
System low pressure	1. The system has not been fully primed (dry running protection for the pump). See 5.3.6 Priming the Pump FW 150 - V1 on page 18 2. Check that the tank fluid level is within specifications and never goes below inlet pipe. 3. Pump broken or clogged. 4. Inlet or outlet pipe restricted. 5. Pump is running in the wrong direction. 6. Pressure sensor broken or blocked. 7. Full inlet strainer, make sure to empty the inlet strainer. 8. Check that the hose clamps are tightened to avoid any potential air intrusion.
System high pressure	1. The outlet pipe is blocked. 2. The reactor is blocked. 3. Pressure sensor broken.

Hard Alarms	Probable cause / solution
Stopped due to mains voltage or switch	During machine operation the FW150 mains was disconnected: 1. User turned off the unit using the units's power switch. 2. Mains failure on site (low voltage / spikes / power failure).
Water valve failures are too many	Broken water valve.
High water consumption	1. Check that the water supply to the system is turned on. 2. Check that the level sensor can move freely. 3. Broken water valve or level sensor.
Measurement errors	1. Can't measure concentration due to dirty sensor. Clean sensor. 2. Concentration sensor is broken

8.3 Soft Alarms

Soft Alarms	Probable cause / solution
Wiper low current	1. Wiper motor not connected. 2. Wiper motor broken.
Ballast error	1. The ballast is not connected. 2. The ballast is broken.
Check water supply	1. Check that the water supply to the system is turned on. 2. Dirty sensor. Clean sensor. 3. Broken water valve.
Preheat error	1. The UV lamp is broken. 2. One or more of the four wires between LPS and lamp is not connected and thereby preheat sequence is aborted.
Lamp life timer	Time to replace lamp
Lamp error	1. The UV lamp is broken. 2. The ballast Indicator signal is not connected.
Pump maintenance timer	Time to inspect the pump.
Sleeve inspection timer	Time to inspect sleeve.
No Brix sensor	1. Concentration sensor not connected. 2. Concentration sensor broken.
Fill concentrate tank and clean sensor 1	1. Fill the concentrate tank with concentrate. 2. Check the concentrate tube and connections. No air must leak into the tube (negative pressure). 3. Clean the sensor
Set Date and Time	Check that correct date and time is set on the unit.
Wiper high current	1. The wiper motor is stuck. 2. The wiper motor is broken.

9 Spare Parts/Consumables

All spare part orders must include the following information:

- the FluidWorker 150 serial number.
- the article number of the spare part if it is visible.
- the spare part description (name).
- ordered quantity.

The spare parts list below include the most commonly used and ordered items. For other parts, please contact your distributor.

Spare parts

Part number	Description	Recommended service interval
39-01-0119	Lamp power supply (LPS)	On request
39-01-0120	FluidWorker 150 UV lamp including o-rings	Max 9 000h
39-01-0121	Quartz sleeve including holder/o-rings	On request
39-01-0126	Shaft/impeller for pump	On request
39-01-0127	Kit, shaft seal with O-rings kit for pump	On request
39-01-0123	Wiper cassete, complete	On request
39-01-0122	Inner reactor, complete	On request

10 Specifications

10.1 Technical Specification

Description	FluidWorker 150 Data
Flow, adjustable	3.9-5.6 m³/hour
Number of UV lamps	1
Power / Lamp power	160-500 W / 0-220 W
Max ambient and fluid operating temperature	45°C
Suitable tank volume (system and fluid dependent)	0.2-1.5 m³
Fluid concentration	2-15% BRIX
Concentrate viscosity @40°C	5-200cSt
Recommended fluids	Emulsions and micro emulsions
Lockable on/off switch	Yes
Pressure sensor	Yes
Service timer	Yes
Automatic cleaning system	Yes
On/off via external signal	No
Weekly data / consumption	Concentration, Temp / Water, Concentrate
UV-Boost timer	Yes
Inlet strainer / Magnetic filter	Included / Included
Material reactor, inlet and outlet pipe	Stainless steel EN 1.4301
Hose material, inside	NBR (fuel grade)
Sealings	FPM (Viton®)
IP-class	21
Chassi material	Painted steel (RAL7035)
Pump material	Epoxy coated cast iron
Power supply	230V 1-phase, 50 Hz
HMI	5” colour touch screen
Network	OPC-UA, Ethernet (RJ45)

Description	FluidWorker 150 Data
USB	Software update and log
Concentrate tank size	30L
Weight, including packing material	Approx. 70 kg
Inlet / outlet hose length	1.8 m
Water hose length (included)	2 m, ½” female
Electrical cable length	3.7 m
Max height over sea level for the system	2000 m
Max humidity during operation, storage, and transportation.	85% (no condensation)
Wiper holder material	PA12
Bearings material	PE1000
Pump impeller material	PES/PP 30% GF

10.2 Motor, Pump, Lamp, and Pressure Combinations

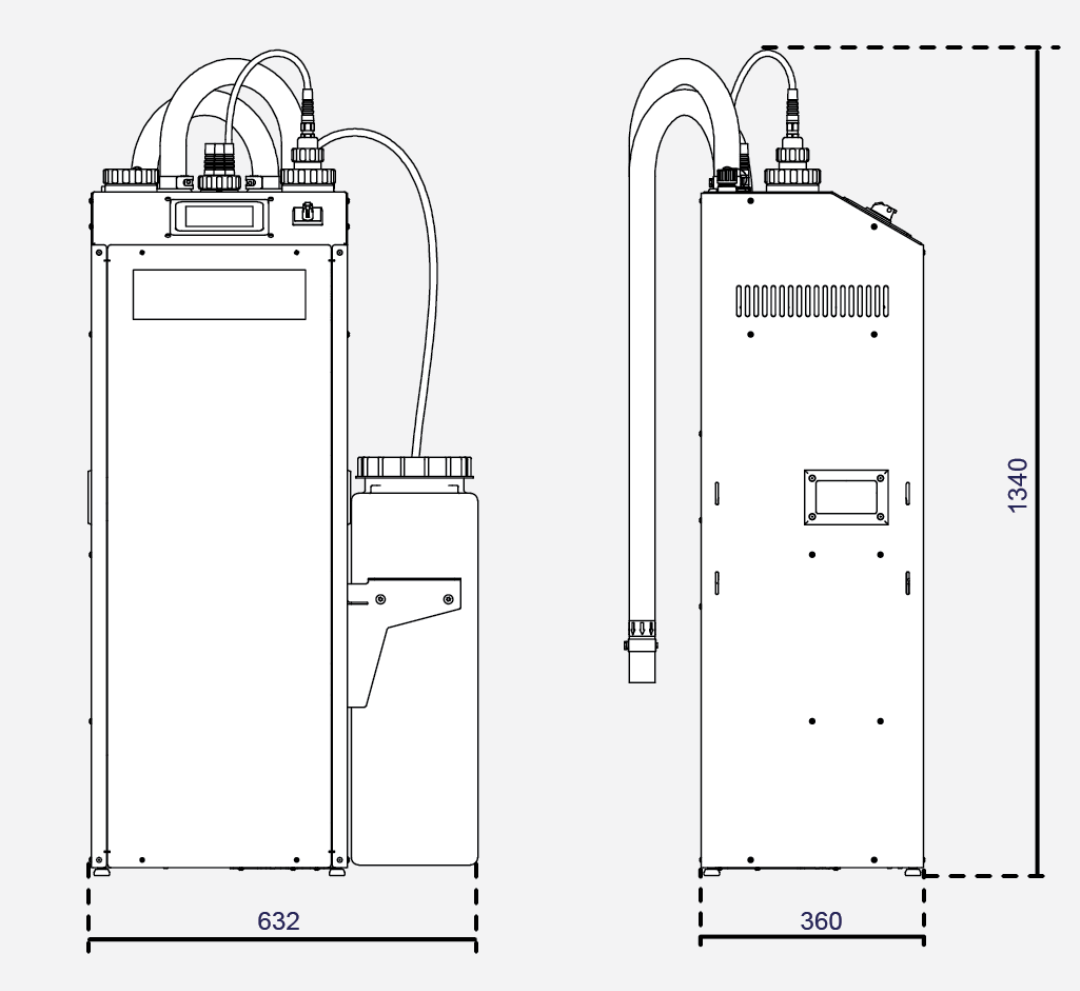
These values are only guidelines. The data is from a specific installation and can differ depending on the installation conditions.

Pump setting %	Lamp setting %	Flow (l/min)	Pump power (W)	Lamp power average (W)	Pump pressure (bar)
100	100	94	280	202	0.48
90	90	86	220	182	0.41
80	80	75	180	162	0.35
70	70	63	140	141	0.27
-	60	-	-	121	-
-	50	-	-	101	-
-	40	-	-	81	-
-	30	-	-	61	-
-	20	-	-	40	-
-	10	-	-	20	-
-	0	-	-	0	-

10.3 Dimensions

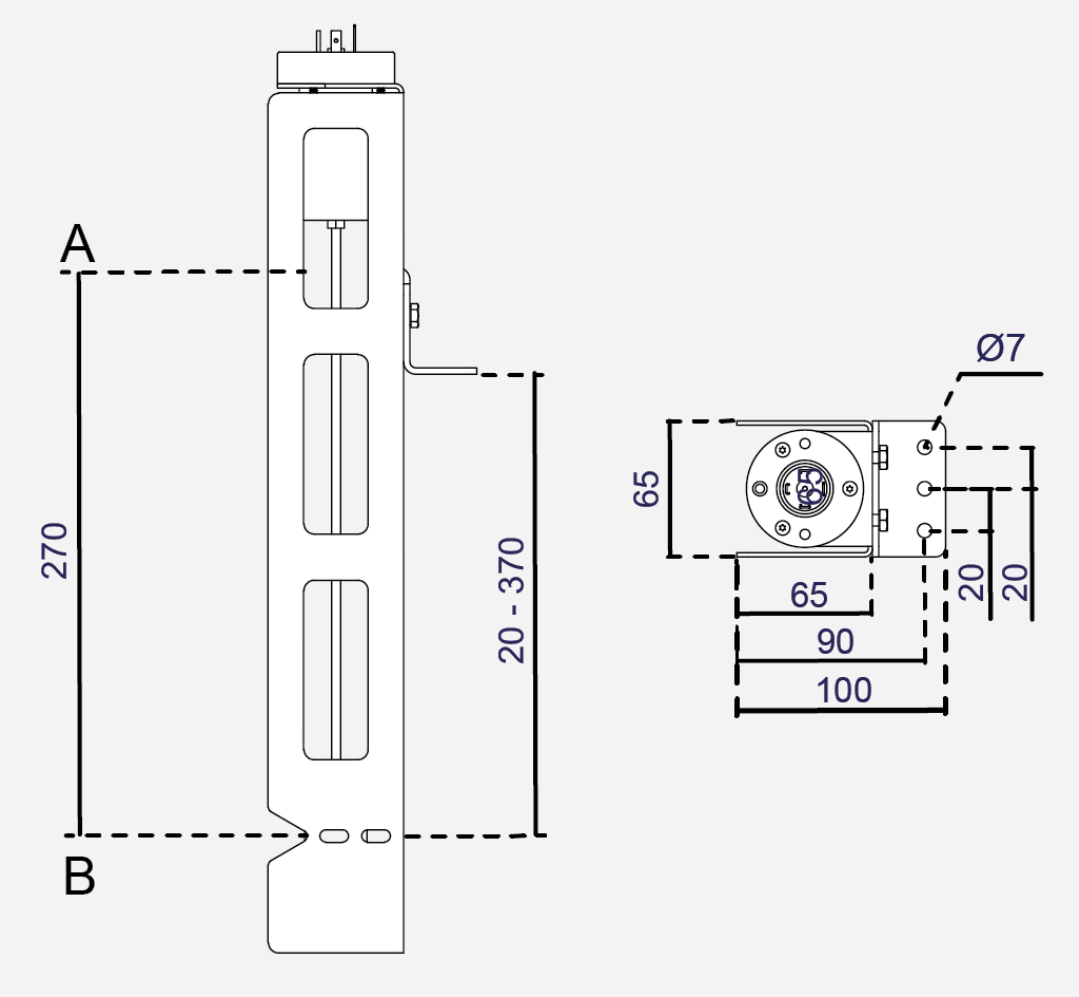
10.3.1 FluidWorker 150

NOTE	The dimensions below are in mm.



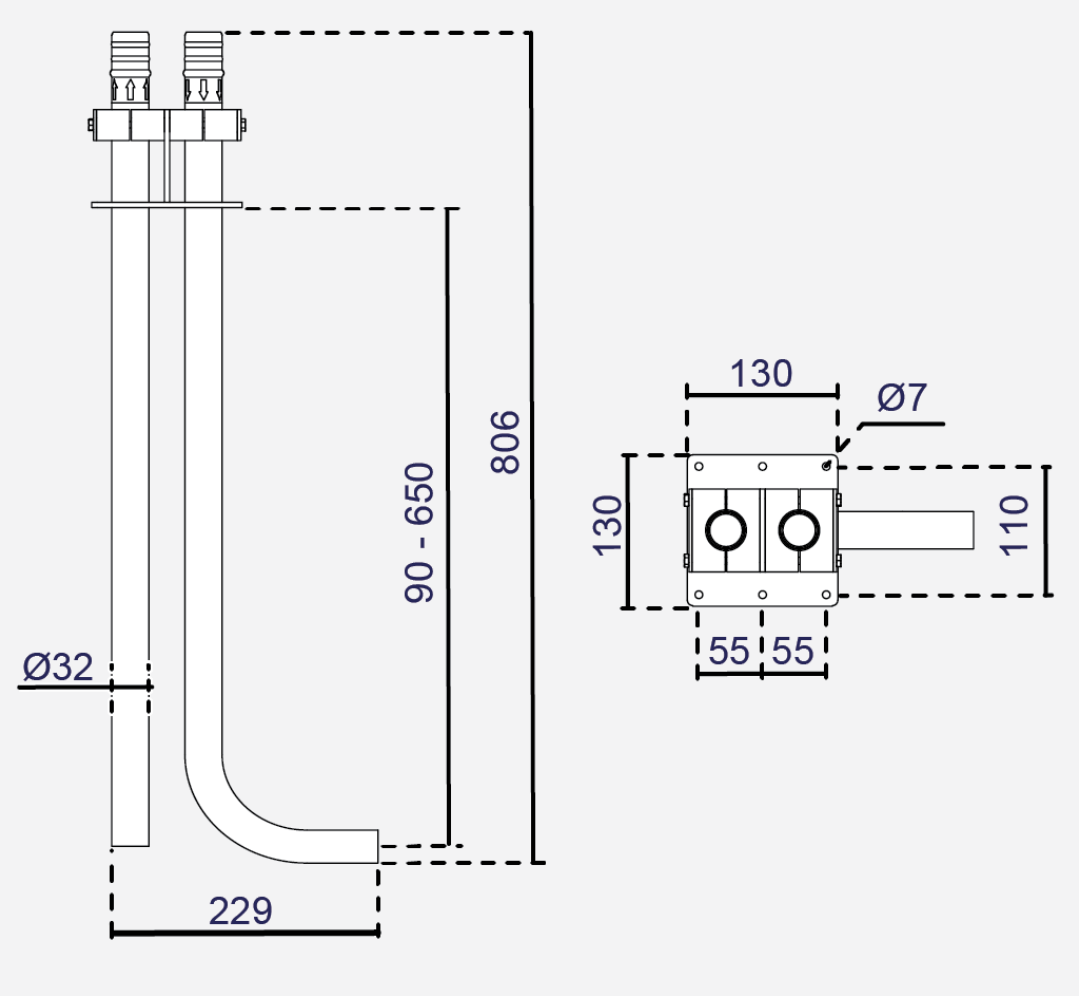
10.3.2 Fluid Level Sensor

NOTE	The dimensions below are in mm.
NOTE	The maximum fluid level (A) and minimum fluid level (B) for the level switch is shown in the image below.



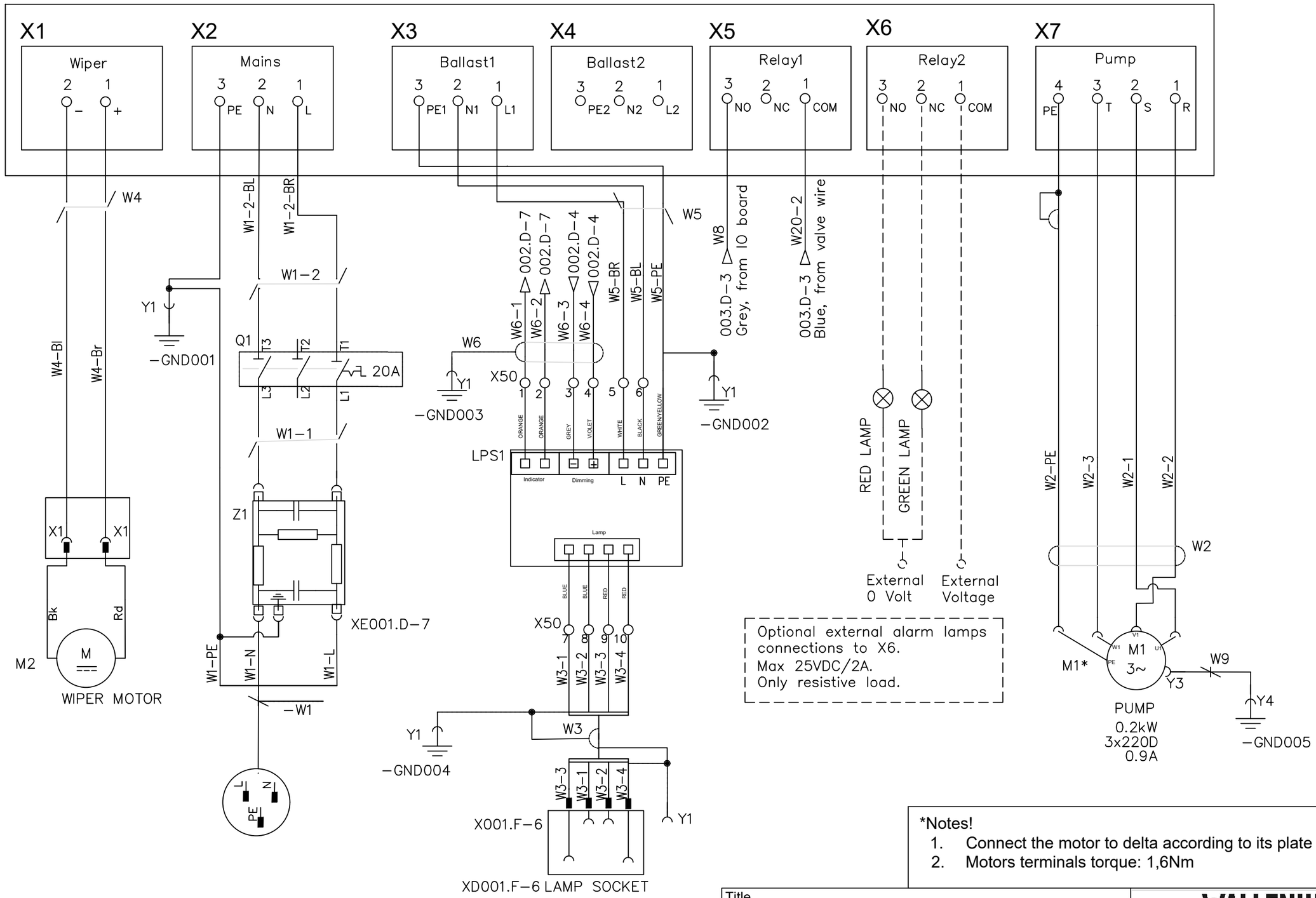
10.3.3 Tank Bracket with inlet and outlet pipes

NOTE	The dimensions below are in mm.



A Appendix

A.1 Electrical Drawings



*Notes!
1. Connect the motor to delta according to its plate
2. Motors terminals torque: 1,6Nm

Rev	Revised	Date	Description	Approved
6	owstpr	2023-11-10	Changed wrong sheet reference from 002 to 003 for W8 and W2.	owhefe

Title
Fluidworker 150
Display unit : Power Board
Power connections

WALLENIUS WATER INNOVATION

Drawing Type
Circuit Diagram

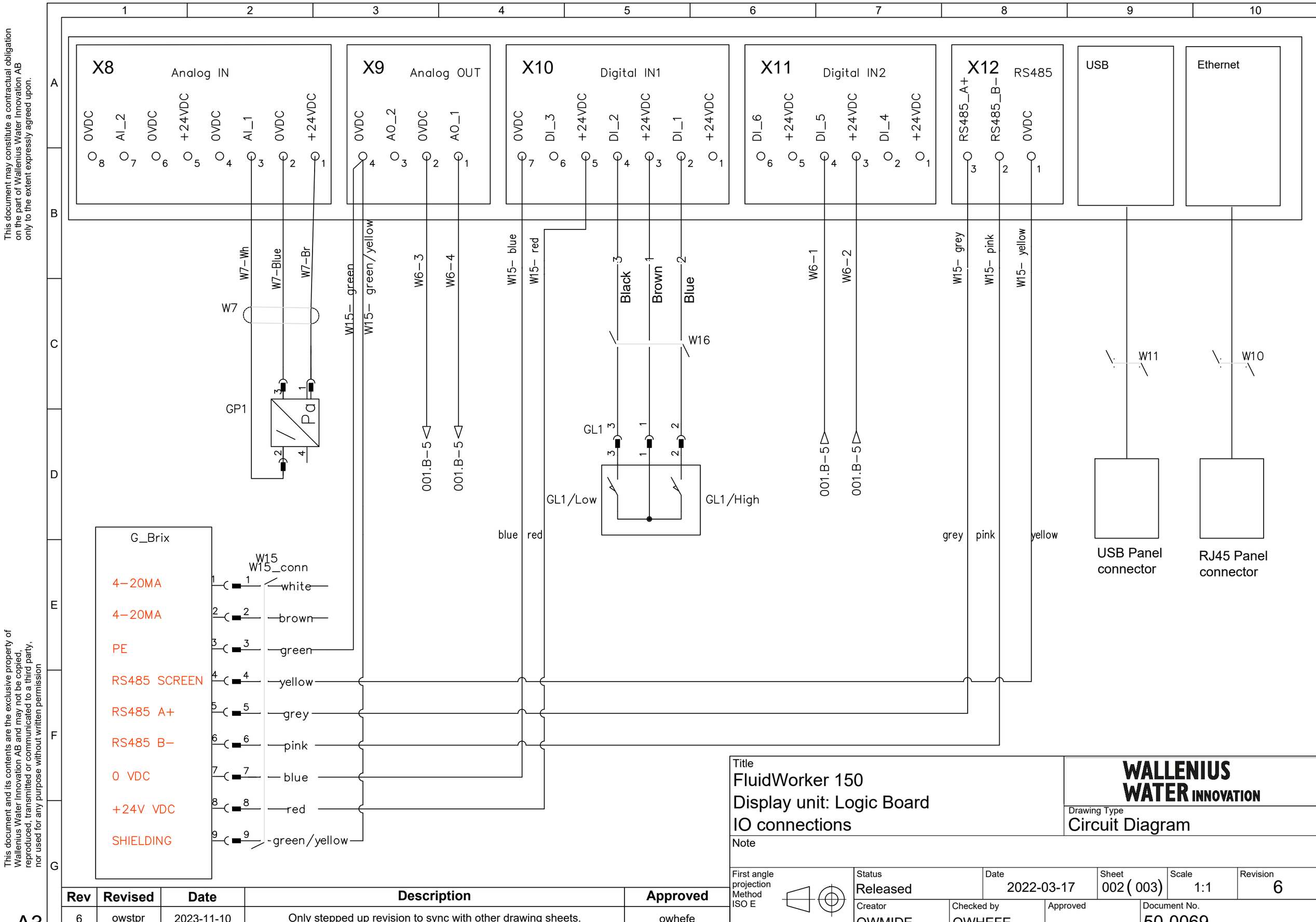
Note

First angle projection Method ISO E

Status	Date	Sheet	Scale	Revision
Released	2022-03-17	001 (003)	1:1	6

Creator	Checked by	Approved	Document No.
OWMIDE	OWHEFE		50-0069

A3



Rev	Revised	Date	Description	Approved
6	owstpr	2023-11-10	Only stepped up revision to sync with other drawing sheets.	owhefe

Title
FluidWorker 150
Display unit: Logic Board
IO connections

WALLENIUS WATER INNOVATION

Drawing Type
Circuit Diagram

Note

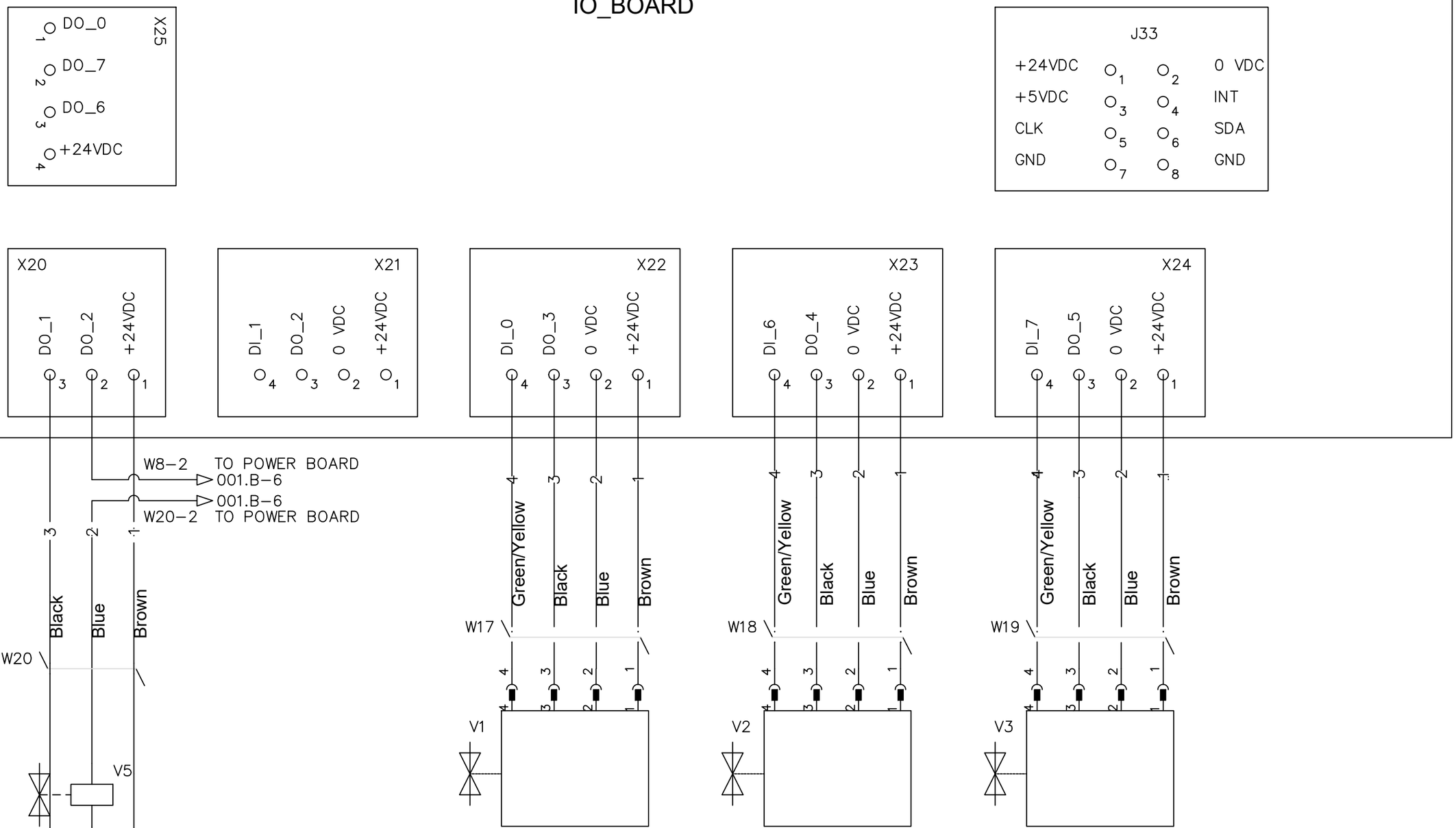
First angle projection Method ISO E

Status	Date	Sheet	Scale	Revision
Released	2022-03-17	002 (003)	1:1	6

Creator	Checked by	Approved	Document No.
OWMIDE	OWHEFE		50-0069

A3

IO_BOARD



Rev	Revised	Date	Description	Approved
6	owstpr	2023-11-10	Changed wrong board reference from IO to POWER for W8 and W20.	owhefe

Title
FluidWorker 150
Display unit: I/O Board
IO connections

WALLENIUS WATER INNOVATION

Drawing Type
Circuit Diagram

Note

First angle projection Method ISO E	Status	Date	Sheet	Scale	Revision
	Released	2022-03-17	003 (003)	1:1	6
	Creator	Checked by	Approved	Document No.	
	OWMIDE	OWHEFE		50-0069	

A3

A.2 Maintenance Record

Date	By	Action	Comments/Notes

A.3 Exporting data via OPC UA

To enable the FW150 in a OPC UA network:

1. Set up the addresses (Example “192.168.250.11”) and port setting (Example “4840”) using the FW150 HMI page named “Network”.
2. Verify the network connection by pinging the FW150 from a computer.
3. Ensure endpoint URL in the factory system (Example “opc.tcp://192.168.250.11:4840/”).

Description of available OPC UA parameters in FW150.

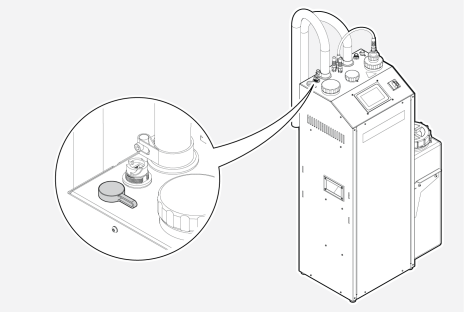
FW150 OPC UA parameters			
Name	**Type**	**Range**	**Description**
A. Last_Measurement			
A1. Concentration	String	0-46.5	Latest measured concentration value (%). **Example:** “10.3 %”. (Identifier: FW_D1_ Concentration) Concentration = Brix * Ref_factor
A2. Temperature	String	5.0-55.0	Latest measured temperature value (degree Celsius). **Example:** “34.2 C”. (Identifier: FW_D1_ Temperature)
B. Average_Measurements			
B1. Concentrate Consumption	String	0 - 999999999	7-day average concentrate consumption (litres). **Example:** “NNN L”. (Identifier: Concentrate_ Consumption)
B2. Concentration	String	0-46.5	7-day average concentration (%). **Example:** “6.3 %”. (Identifier: Average_ Concentration)

FW150 OPC UA parameters			
B3. Temperature	String	5.0-55.0	7-day average (degree Celsius). **Example:** “34.2 C”. (Identifier: Average_ Temperature)
B4. Water Consumption	String	0.0 – 99999999999999	7-day average water consumption (litres). **Example:** “50.3 L”. (Identifier: Water_ Consumption)
C. Alarms			
C1. Hard alarm	String	true/false	If the unit has a hard alarm, this value is “true”. A hard alarm will stop the unit. (Identifier: Hard_ Alarm)
C2. Soft Alarm	String	true/false	If the unit has a soft alarm this value is “true”. A soft alarm will not stop the unit, but inspection is needed. (Identifier: Soft_ Alarm)
D. UnitInformation			
D1. Status		ON/OFF	**Example:** “ON” (the ON button has been pushed on the FW150 – it is running). **Example:** “OFF” (the OFF button has been pushed on the FW150 the system is not running). (Identifier: System_ Status)
D2. FirmwareVersion		N.NN	Firmware version **Example:** “0.08” (Identifier: 50229)
D3. UnitTime		NA	Time setting on the FW150 unit. **Example:** “2022-03-08T14:23:07.000Z” (Identifier: 50230)

A.4 Exporting data via USB

This instruction assumes that the original USB drive is inserted into the FluidWorker as it was delivered.

1. Press STOP on the FluidWorker.
2. Turn off the main switch and wait 10 seconds.
3. Turn on the main switch.
4. Wait for 60 seconds while the logs are written to the USB drive.
5. Remove the lid to access the USB port.



6. Remove the USB drive and copy the files from the folder LOGFILES to a computer.
7. Reinsert the USB drive.
8. Press START on the FluidWorker.

A.5 External alarm

The unit is equipped with a relay that is activated by both hard and soft alarms. The relay terminal X6 (see electrical drawing) can be used as an alarm relay to control a light based on the alarms from the unit.

The relay has 3 connections:

1. Common
2. NC- Normally closed
3. NO -Normally open

The alarm light should be connected to the 1 and 3 terminals.
An additional light can be used to show that the unit is running without any alarms, this light should be connected between terminal 2 and 3.
Both light voltages should be connected to terminal 1.
Max voltage for the relay is 25V DC and max current is 2A, only resistive load is allowed to be used.

WALLENIUS WATER INNOVATION

DECLARATION OF CONFORMITY

We,

Wallenius Water Innovation AB

Franzéngatan 3
SE-112 51 STOCKHOLM
SWEDEN

declare under our sole responsibility that the products:

- FluidWorker 150, Part no: 15-01-0118

to which this declaration relates is in conformity with the following laws, standards or other named normative documents:

Low Voltage Directive (LVD) 2014/35/EU:

EN 60204-1:2006	Safety of machinery - Electrical equipment of machines
EN 60204-A1:2009	Safety of machinery - General requirement

Directive of Electromagnetic Compatibility 2014/30/EU:

EN 61000-6-2:2019	Immunity for industrial environments
EN 61000-6-4:2019	Emission standard for industrial environments

Machinery Directive 2006/42/EC:

EN ISO 12100:2010	Safety of machinery - General principles for design
EN 60204-1:2007+ C1:2010	Safety of machinery - Electrical equipment of machines
EN ISO 13849-1:2008/AC:2009	Safety of machinery - Safety-related parts of control systems

Place and date of signature: Stockholm 2022-06-27

Signature of authorized person:
Ulf Arbeus, MD