

Operating Instructions

WPU Water Processing Unit

MANUAL

370 7490.01



HAEFELY 
HIPOTRONICS 

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Manager	M. Gamlin
Product account	M. Eckert
Authors	K. Gebauer, H.-P. Moser, M. Eckert
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Safety

Warnings



Please read this manual carefully before first use and understand the necessary procedures before putting the Water Processing Unit into operation!

Make sure that every person who is using the Water Processing Unit has been instructed in safety and operating procedures and has permanent access to this manual.



Do not use water with conductivity below 200 $\mu\text{S}/\text{cm}$ for impulse voltage testing. Use only water of high conductivity ($> 200 \mu\text{S}/\text{cm}$) for impulse voltage tests. Pay attention to the correct settings on the control panel. Water for LI mode will be taken from the cooling circuit.



Be careful while handling water in a high voltage environment! It is highly recommended that all electrical equipment be switched off, including the WPU, while connecting and disconnecting hoses, replacing deionization resin and filters or other water handling activities.

Grounding instructions

The water-conditioning unit (WPU) has to be grounded at the system ground of the test laboratory. A special ground termination is available on the WPU's base frame.



Figure 1: ground connection

Emergency switch OFF and Interlock

In an emergency situation, it is important to cut off the high voltage immediately.

For this reason, it is strongly advisable to connect the WPU to an interlock safety system. The interlock ensures an automatic deactivation of all connected HV equipment in case of a malfunction of the WPU or vice versa. See “Safety interlock circuit” on page 11.

In case a water leakage occurs, the WPU has to be immediately switched OFF by means of the emergency push button or the WPU main switch. The WPU has to remain disconnected from the power source, until the leakage has been repaired.

It is especially recommended when using the WPU-Remote option to integrate the power supply of the Water Processing Unit in the test field emergency circuit. Refer section “Emergency switch OFF” on page 12.

General information

Product description



Figure 2: Total view of the water-processing-unit

The water-processing unit WPU (see Figure 2) fulfills the following tasks:

AC-mode:

- Water conditioning process by means of a deionising resin in order to acquire a specified (low) conductivity for AC voltage testing
- Filling the termination tubes with processed water.
- Cooling the low conductivity processed water during the AC voltage testing and keeping the desired conductivity stable.
- Emptying the termination tubes after testing.

Impulse mode:

- Operating the cable test terminations with high conductivity water for impulse voltage (LI) testing
- Emptying the termination tubes after testing

For AC and LI each mode can be operated with one or two CTTs connected.

To obtain a constant voltage distribution along the terminations, the correct conductivity of the process water has to be chosen. For this reason the WPU is equipped with a conductivity control. The conductivity levels depend on the type of the cable test termination, the dimensions of the cable and the applied voltage. The corresponding “conductivity”-diagrams for the different cable test terminations can be found in the operation instructions for the Cable Test Terminations.

In order to avoid condensation on the termination tubes during circulating mode the cooling mode will not be activated until the maximum temperature of the terminations exceeds 30°C. For this purpose the water temperature in the backflow from each termination is detected. To avoid condensation please refer to “Appendix A – humidity” on page 57.

Scope of supply

- 1 Water Processing Unit
- 4 hoses 1” with a length of 12 m each
- 2 x 25 l of deionization resin
- 1 spare filter cartridge for main filter
- 1 spare parts case with gaskets and fuses
- 1 manual with schematics (English)

Options

- Remote control panel (Option WPU REM)
- SI extension (Option WPU SI)

Assembling, Installation, First-operation

Introduction

The water processing unit is shipped as a complete device together with four hoses, the resin bags and an accessories box.

Before taking the unit into operation, read this chapter carefully and follow the recommendations

Installation area

Make sure that the WPU system is installed or positioned in such a way that the water hoses are routed without tight bends in order to avoid a reduction in flow rate due to kinks in the hose. Furthermore, the hoses have to be kept clear of sharp edges or abrasive surfaces, which may cause damage. The hoses should not be extended longer than supplied length to ensure the proper function of the Water Processing Unit.

If no remote control is used (Option WPU REMOTE), it has to be ensured that the front panel of the control unit is clearly visible from the operator's position so that alarms are visible at all times.

Safety interlock circuit

The interlock is the safety circuit that encloses the high-voltage zone. When entering this zone, one must open the safety circuit. The high voltage is automatically cut off when this happens, and the grounding switch grounds the high-voltage installation. Use suitable connectors and contacts for this purpose. To keep interference out of the control system, use only shielded cables.

The high voltage can be switched off automatically at the occurrence of an error on the Water Processing Unit (e.g. too high conductivity, over temperature or low flow). Therefore the Water Processing Unit has to be integrated into the interlock circuit of the HV control. See the following schematic:



As long as at least one of the alarms "Termination 1 low flow", "Termination 2 low flow", "Emergency", "Over temp", "Conductivity trip" is active the interlock circuit will not be closed.

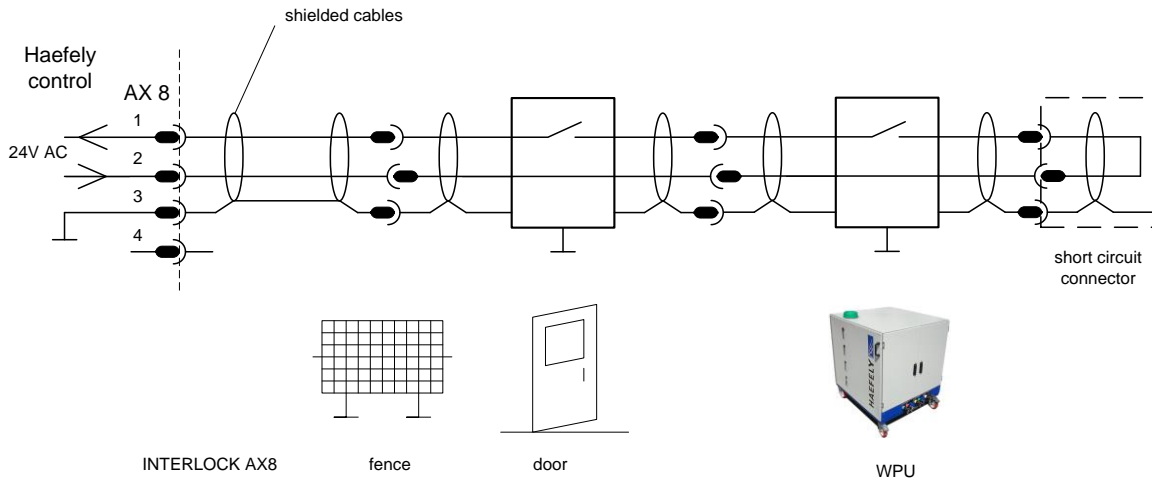


Figure 3: Schematic of a practical example for safety interlock circuit

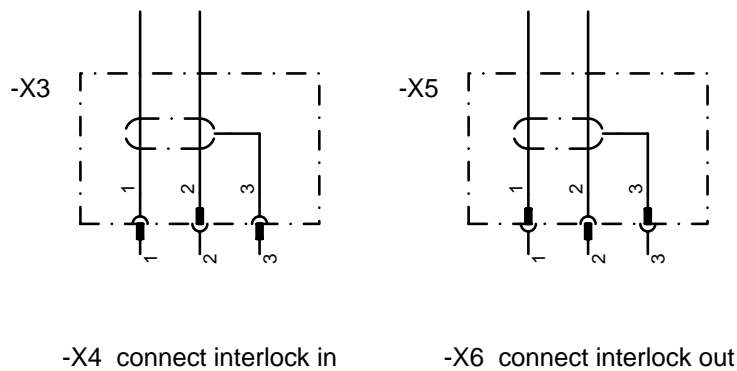


Figure 4: connection of the interlock to the WPU



For interlock connections shielded cables must be used. The cable shield must continue through the connectors. We recommend metal-enclosed connectors.

If the WPU is located at the end of the safety circuit, use a shorting plug at the WPU outlet.

Specifications of the safety interlock circuit:

Voltage:	24 V / AC
Fusing:	1 A fuse
Cable:	Two-wire, shielded (2 x [0.7 – 1.5] mm ²)

Emergency switch OFF

In emergency situations the pump, compressor and the valves can be switched off by pushing the emergency push button.

If the WPU is connected to a safety interlock circuit, the emergency push button also switches off the output of the connected HV system.



The control and the touch screen will not be turned off by pushing the emergency button. There will be still power in the control cabinet. Before opening the control cabinet, please switch OFF the power and unplug the main power connector to avoid electrical shock!

When using the WPU-Remote option it is recommended to integrate the power supply, of the Water Processing Unit, in the test field emergency circuit.

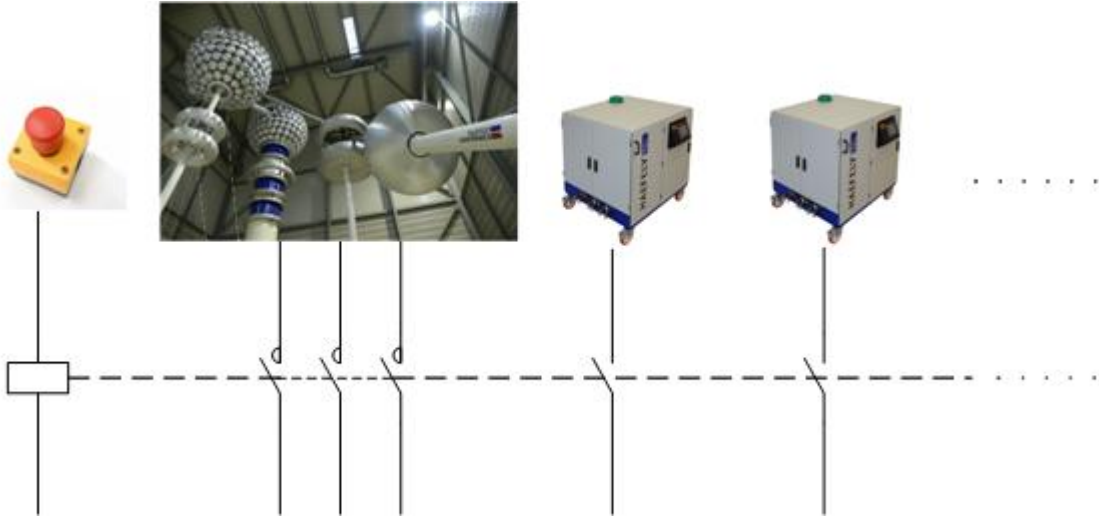


Figure 5: example for an emergency switch off

Packing material, assembling and first checks

Remove packaging and securing devices

After receipt of shipment, the packaging and securing devices have to be removed.



Figure 6: Remove the transport securing devices

Remove all packaging material and transport securing devices from the Water Processing Unit in particular the strap around the resin tank and foam dampers around the compressor inside the WPU.

For transport, the resin filter bags and the filter cartridges are stored in the resin tank. Open the tank to uncase them.

Assemble main filter

Assemble the main filter housing and insert the 20 µm filter cartridge. The main filter is located behind the right side of the double door (see also Figure 40 on page 43). Make sure that the marker at the filter head is pointing towards "filter".



Never use the setting "bypass" or "OFF" on the main filter while the pump is switched on. It may cause damage to the sensors in the system.



Figure 7: assemble the main filter

Check of piping

Check for visible damage especially to the pipe system.

Check and if necessary refasten every union join at the piping system by hand.

Check if all hose clamps are fastened properly.



This check should be repeated on a regular basis and after each relocation of the WPU.



Figure 8: Check union joints on tightness

Check the two line strainers (filters) at the CTT backflow terminals. They are located in the bottom behind the double door. Unscrew (towards the ground) and check if the screens are inserted and clean. In case the screens are not clean, wash them with clean water. Then reassemble.



Figure 9: Check on line strainers

Interface to operating environment

The following interfaces of the WPU are available (see Figure 10 and Figure 11):

- Four terminals for connecting the Cable Test Terminations by water hoses equipped with quick-release couplings (Kamlok™)
- Two terminals for connecting the external cooling circuit (in- and outlet), by Kamlok™ quick-release couplings (couplings supplied with WPU spare parts box)

- An industrial grade 230V / 16A plug connection for electrical power (coupling supplied with WPU spare parts box)
- Two AMP connectors for integration into an interlock loop (couplings supplied with WPU spare parts box)
- A pneumatic connection for external air supply
- An interface receptacle for optional SI extension (Option WPU SI)
- An interface plug for remote control (Option WPU REM)

Terminals

The Water Processing Unit has to be connected to the cable terminations by means of the supplied hoses. On the side of the WPU terminals, these hoses are equipped with 1" Kamlok™ quick-release couplings and on the termination side either with 1" Kamlok™ quick-release couplings or with standard GEKA hose connectors.



Figure 10: Water connections

The hose connectors on the WPU are color coded matching the color code on the Cable Test Terminations. WPU-OUT in blue and green, WPU-IN in red and yellow.

The input connector for the cooling water is color coded white, the output coded black.

The cooling circuit has to be connected to an external cooling water supply. The Kamlok™ quick-release couplings are supplied with WPU (spare part box) and have to be fitted to a hose on site (hose not included).

The water used for the cooling circuit may be from a water tap or a purpose built cooling water supply. Please note, that the cooling water also facilitates the injector for raising the conductivity of the process water. Thus, use only clean water for cooling! The conductivity of the cooling water should be approximately 100 µS/cm.

Electrical and pneumatical terminations:

- LAN: optical connection for WPU REM option (optional)
- EXT: connection for WPU SI option (for switching impulse testing)
- Interlock out and in connections
- External air supply
- Main power supply 230V, 50/60Hz, 16A



Figure 11: Electrical and pneumatical connections

The LAN - connector will be assembled and will be used if the WPU Remote option is ordered. Connect the optical data cable here. See also “Appendix B - WPU Remote” on page 59.

The EXT – connector will be used if the WPU SI option is ordered. Connect its control cable here. See the manual of the WPU SI for details.



It is highly recommended to integrate the WPU into the security interlock loop by means of the supplied AMP connectors. The interlock system ensures an instant emergency shutdown of all connected devices in case one of the units detects a failure. Consequently an interlock system improves safety and protects the devices. Refer to chapter “Safety interlock circuit” on page 11.

The WPU requires a 230 V / 16 A power source. It is equipped with an industrial grade 2P+PE plug. A corresponding coupling is supplied with the WPU, which has first to be configured with an appropriate cable and (wall-) plug (not included) in order to suit the infrastructure on site (230 V, 50/60 Hz, 16 A).



Figure 12: Ground termination

The Water Processing Unit is equipped with a clamp for copper foil grounding as found in most modern testing facilities. The cross section area of the copper foil should be at least 70 mm² to provide a suitable grounding.

Use copper foil instead of a wire to reduce the inductance of the connection.

In order to achieve a PD free operation, the Water Processing Unit uses pneumatic valves for operation. Accordingly, a supply of pressurized air is required. There are two ways for providing pressurized air to the Water Processing Unit:

1. External pneumatic connector (5 – 10 bar / 60 – 145 psi)
2. Internal compressor

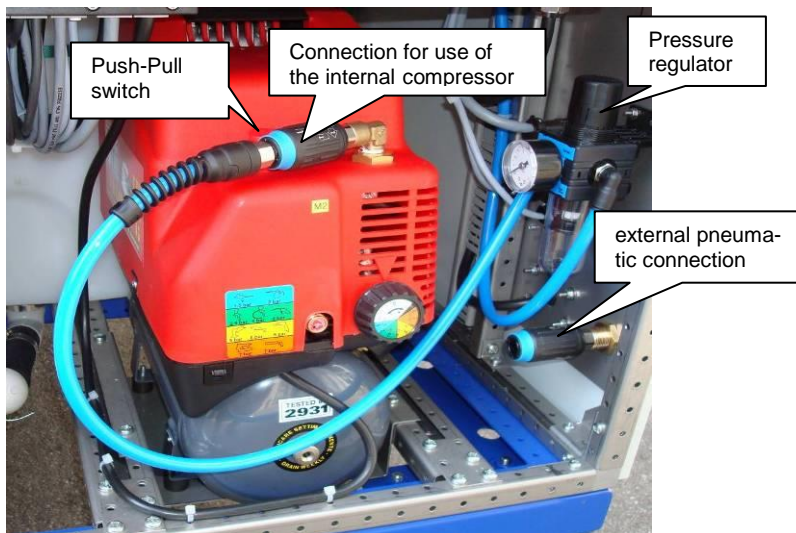


Figure 13: Pneumatic source selection

The selection which pressure source is used will be done by changing the internal pneumatic plug to the desired terminal.

For enhanced compatibility to existing infrastructure, the external connection can be exchanged by any other ¼" (external thread) pneumatic coupling system:



Figure 14: Changeable ¼" pneumatic plug



Note, that the two pneumatic sources can not be used simultaneously. Make sure the internal pneumatic connector is connected to the desired input.



In case the compressor is not used, it has to be deactivated by pushing its switch and vice versa.



Although the WPU operation is PD free, it is not entirely the case for the optional internal compressor. If the internal compressor is used, it emits for a very short period of time noticeable PD pulses during startup and shutdown. Use the external air supply if the effects prove to be too disturbing.

Preparation of the WPU for first use

Resin filling

Prior the first operation of the WPU the resin tank has to be filled by the deionization resin. The resin tank is located behind the left of the double service doors.

- Disconnect the tank's inlet and outlet hose from the pipe network. The inlet is the hose connected to the bottom of the resin tank and has to be detached at the PVC screw-joint above the tank. The outlet is detached by opening the union joint on the tank's lid.



Figure 15: Disconnecting left hose of the resin tank



Figure 16: Disconnecting top hose of the resin tank

- Open the tank by removing the eight bolts on the lid. Remember the orientation of the lid with respect to the coupling on top.
- Inside the tank are
 - One insert cylinder with cap
 - One resin filter bag with zipper
 - Two main filter cartridges (20 µm)
- Remove all items and follow the instructions on filling the resin tank as described in section “Replacement of the deionization resin” on page 38 of this manual.

Connect cooling circuit

Connect the cooling in- and outlet to the Water Processing Unit. Use 1” hoses (not supplied) and connect to the Kamlok™ couplings which you can find in the spare parts box.

Check and if necessary adjust the pressure regulating valve for the inflowing cooling water to 2.5 – 3 bar. The valve is located at the bottom behind the right side of the double doors.

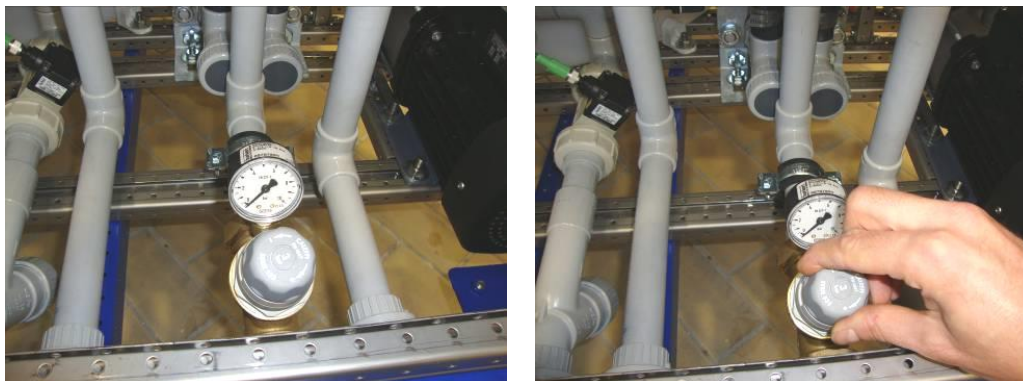


Figure 17: Check on pressure valve

Tank filling

Fill in about 300 ... 500 l of distilled water into the storage tank.



If distilled (or deionized) water is not available it is possible to fill in tap water. In case tap water is used instead, one or more charges of resin may be consumed for the initial deionising cycle. In order to conserve the deionising resin, it is strongly recommended to use distilled water.

The necessary volume depends on the terminations used and the following effects: A low water level (after terminations are filled) will result in faster adaption to the desired conductivity value but deteriorates temperature buffering effects and vice versa. Make sure, the end of the down-pipe in the tank is always well submerged, in order to avoid air bubbles. Bubbles may be the reason that the desired conductivity range cannot be reached, especially if the desired value very low.



It is strongly recommended to have at least 100 l of deionized water in the tank when the Cable Test Terminations are filled.

Connections

Make all electrical connections (earthing, power) and prepare all hoses as described above.

Last checks before first operation

- Check for leaks.
- Make sure all six external hose connectors (Kamlok™) are sealed with caps first.
- If external air is used for pneumatics, make sure it is connected and air is available.
- Check and if necessary adjust the pressure regulator for the pneumatics to 6 bar. It is located next to the compressor behind the single door below the control panel. (See Figure 13)
- Switch on the WPU and engage “conditioning mode” by the control panel. (See “Conditioning mode” on page 31) The compressor and pump should start. Keep this mode activated for at least 1 h in order to diminish all air bubbles in the system and condition the process water. During this process, do not leave the WPU unattended and check for leaks. The conductivity now should have the desired value (or less). If the conductivity did not reach the desired value let the Water Processing Unit run till such time that the conductivity reaches the desired value.



Longer time period may occur if the Water Processing Unit was filled with tap water or other high conductivity water.

- Stop conditioning mode
- For further use connect all hoses to its corresponding Kamlok™-connector.

Functional description of the system

Introduction

The Water Processing Unit is controlled by a PLC controller and operated by a touch panel. This allows a flexible handling of all test conditions. The PLC offers a LAN interface for remote control (Option WPU Remote).

The user interface consists of 4 screen tabs each with a different function

- “Main” screen the main operations of the WPU can be handled
- “Alarms” screen an alarm monitor is displayed
- “Setup” screen the operating mode can be set
- “Cooling” screen the cooling mode can be activated and observed manually

Switch ON procedure

To switch ON the Water Processing Unit turn on the main power by turning the main power switch to “1-ON”. Take care that the emergency push button is not activated (pushed) by turning the button in right direction.



If the internal air supply is used the compressor will start. It will stop automatically when its air tank is filled. It will start and stop depending on the air requested by the system as long as the main switch is on.

Switch OFF procedure

The Water Processing Unit can be switched off by turning the main power switch to “0-OFF”.

Main display

In the lower left area of the “Main” screen there are 3 touch buttons to activate conditioning mode, fill and operating mode and emptying mode. In the LI-mode (lightning impulse testing) the “conditioning” button is not available. The currently active mode is indicated by a corresponding highlighted touch button. Touching the button toggles the mode between active and inactive.

- During conditioning mode the process water will be circulated internally and its conductivity is regulated
- In fill and operating mode the water terminations will be filled, the conductivity and temperature of the process water will be controlled.
- In emptying mode the water terminations will be drained into the tank in AC mode or cooling out in LI mode. As soon as the terminations are empty the pump will automatically switch off.



For emptying the Cable Test Terminations it may be necessary to restart the emptying mode 2 ... 3 times after waiting some seconds to make sure that the terminations are completely emptied. The hoses may contain some process water!

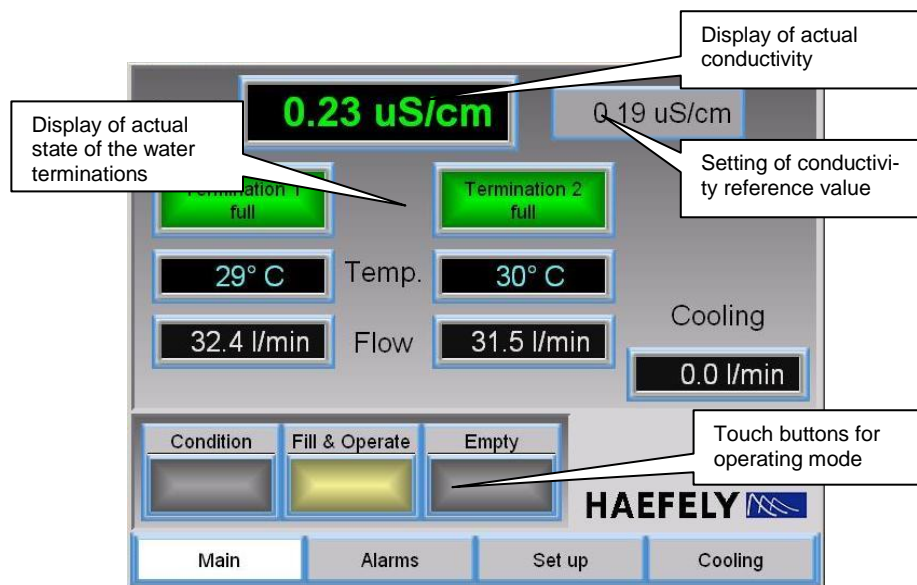


Figure 18: Main menu

The field for the setting of the conductivity reference value is touch sensitive. Touching this button opens a numeric input dialogue. In this dialogue the 3 digits of the reference value can be set.

There is no need to enter the floating point. Just the 3 digits of the value have to be entered.

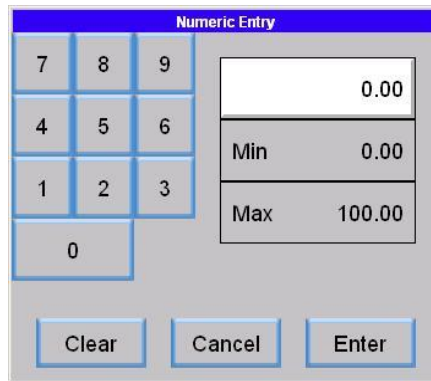


Figure 19: Setting of conductivity reference value

During operation the actual state of each water termination is controlled and displayed:

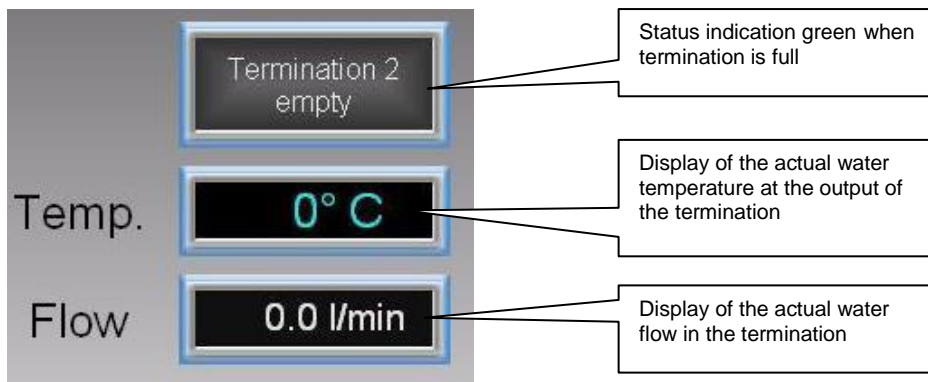


Figure 20: Termination information

Alarms display

In the alarms display all pending alarms are displayed in red:

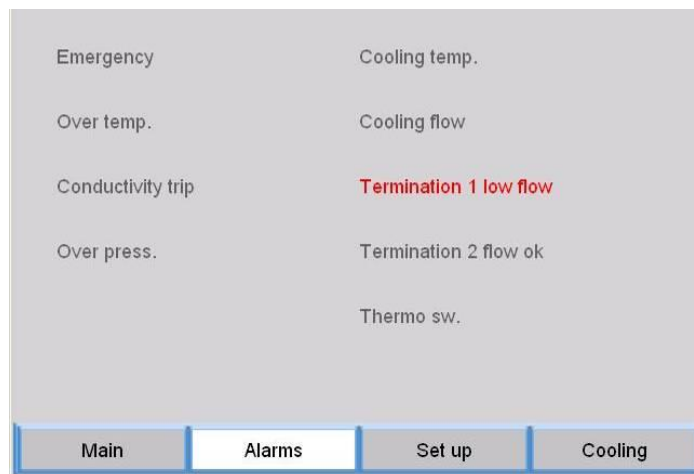


Figure 21: Alarms menu



As long as at least one of the alarms “Termination 1 low flow”, “Termination 2 low flow”, “Emergency”, “Over temp”, “Conductivity trip” is active the interlock circuit will not be closed

Following alarms will be displayed:

Emergency

The emergency push button has been pressed.

Over temp.

The water temperature in the terminations is higher than 60° C.

Conductivity trip

The actual conductivity value is higher than the preset trip value set in the set up screen.

Over press.

The system pressure is higher than 6.0 bar.

Cooling temp.

The temperature of the cooling water flowing in is higher than 20° C.

Cooling flow

The cooling flow is lower than 20 l/min. while cooling is active.

Termination 1 flow

Water flow in termination 1 is lower than 30 l/min.

Termination 2 flow

Water flow in termination 2 is lower than 30 l/min.

Thermo switch

The water pump has been overloaded and its thermo switch has tripped.

Set up display

In the setup display the different operating modes for AC or impulse testing (LI). Single termination mode or draining of the water tank can be set.

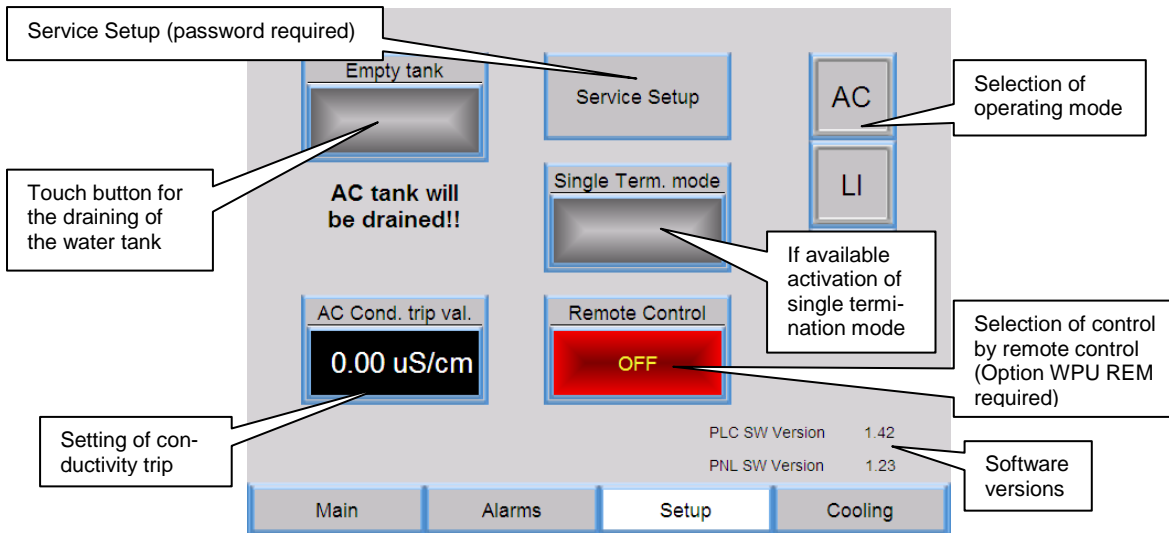


Figure 22: Setup Menu

Empty tank

The water tank can be drained automatically. The water is pumped out of the tank into the drain of the cooling water (cooling out). If the button <Empty tank> is touched a second button will be displayed that has to be pressed to confirm the intention to empty the water tank before the activity really starts.



Figure 23: Empty tank command has to be confirmed by a second button



In this mode, there is no water flow measurement available. Therefore the water pump will **not** be switched off automatically when the tank is empty. The operator has to stop the pump manually by switching off the “empty tank” mode as soon as the tank is empty (see Figure 23).

AC cond. trip val.

The maximum conductivity for the test can be set here. When the actual conductivity exceeds this value the system opens the interlock contactor. This will switch off the test voltage as long as the Water Processing Unit is integrated into the interlock circuit of the HV source.

Single term. mode

If activated, the system can be connected to one Cable Test Termination in the “single termination mode”. Only one termination is operated and therefore only one pair of the 2 water termination connectors is used. It doesn't matter which pair is used. The unused pair has to be blocked by the supplied Kamlok™ caps.

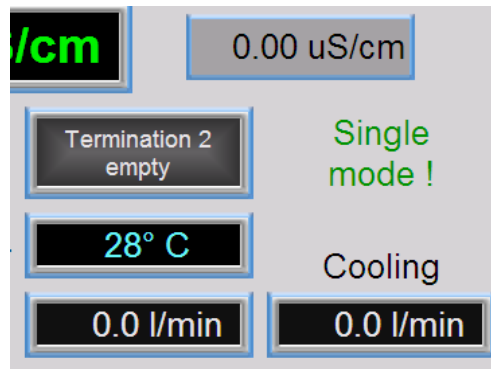


Figure 24: Single mode will be displayed in main menu

Remote Control (Option)

If the option WPU Remote is implemented you'll see a <Remote Control> button. Tapping this button will toggle the control screen between Remote and WPU's touch screen. For more information refer to chapter “Appendix B - WPU Remote” on page 59.

AC, LI mode

The WPU can be operated in 2 different modes. For AC testing the water terminations are operated with very low conductivity water out of the tank of the process water and for LI mode (lightning impulse) the water terminations will be filled with cooling water (tap water) with a certain high conductivity. The value of this conductivity is highly dependent on the local water supply. Acquire knowledge about its value!

Service Setup

To get into the service setup menu you have to press the Service Setup Button in the Setup menu. You'll be asked for a password. Use **123 as password** and press enter.

You have the following setup options:

Cooling temperature

The cooling process starts if Cable Test Termination's temperature exceeds this value. (Default value 30°C)

Stab Range

If the conductivity exceeds or drops below half value of Stab Range, the conductivity regulating process starts. (Default value 0.04µS/cm)

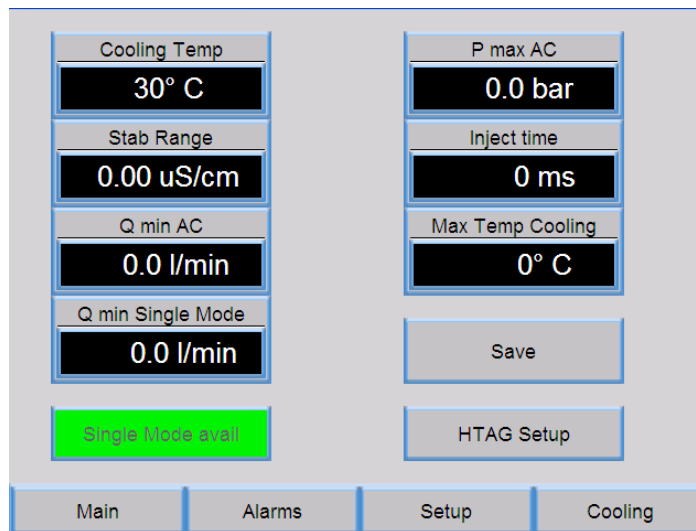



Figure 25: Single mode will be displayed in main menu


Q_{min} AC

Q_{min} AC is the value of minimal flow through the Cable Test Terminations for AC mode using 2 terminations. (Default value 20...25l/min)

 Don't set value Q_{min} AC too low, Overheat may damage the tubes

Q_{min} Single Mode

Q_{min} Single Mode is the value of the minimal flow through the Cable Test Terminations for AC mode using 1 termination. (Default value 45...50l/min)

 Don't set value Q_{min} Single Mode too low, Overheat may damage the tubes

P_{max} AC

Maximum allowed system pressure. (Default value 6bar)

Inject time

This value defines the time of injection of cooling water into the water system to increase conductivity. Increase this value if conductivity of cooling water is low, decrease this value if conductivity of cooling water is high. (Default value 20ms)

Max Temp Cooling:

This is the value of maximum allowed temperature of cooling water input. (Default value 20°C)



For efficient cooling, don't set value of Max Temp Cooling too high, Overheat may damage the tubes

Save

After changing one of the above values press the <Save> button to save the settings.

Single Mode avail

If (sometimes) only 1 Cable Test Termination is to be used, activate this button. Single Termination Mode button in Setup menu will be shown. (See also "Set up display" on page 25)

HTAG Setup

This button leads to a menu for maintenance which made by Haefely support. It is secured by a password.

Cooling display

In the cooling display the characteristic data about the external cooling and the system pressure is displayed. A forced cooling can be switched on manually.

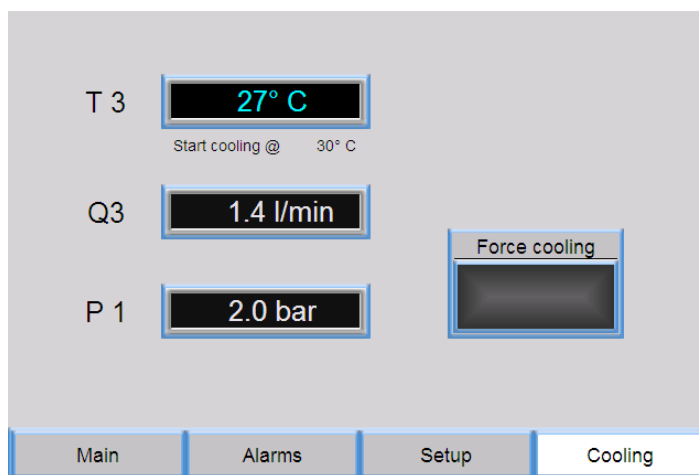


Figure 26: Cooling menu

T3 and Q3

T3 and Q3 display the temperature and flow of the external cooling water.



As long as cooling is not active, these values are not correct.

P1

P1 displays the system pressure of the water entering into the water terminations.

Force cooling

“Force cooling” activates cooling manually. This function overrides the automatic cooling function when activated.



If forced cooling is activated throughout the test time, the temperature in the water terminations can drop low enough to enable humidity to condensate on the surface of the water terminations. This can lead to a flashover along the surface of the termination.

Working with the WPU

Cooling considering dew point

The cooling circuit will be activated by default at a backflow temperature (T1 / T2) above 30°C (resp. value set in Service menu). As mentioned before, too low temperatures might cause condensation on the outer tube of the cable test terminations which may damage the equipment by a flashover along the surface. In most conditions, the threshold of 30°C is considered safe. However, in areas with very high humidity a different value may be necessary. The graphs in Appendix A – humidity, page 57, show the dependencies of ambient temperature and dew point at different humidity, as well as the relation between humidity and difference in temperature at different ambient temperatures (Tu). The threshold value can be adjusted in the setup menu. In case of doubt, please contact Haefely Service.



Haefely-Hipotronics is not responsible for potential damage to equipment if an unsuitable value is used as cooling threshold!

Testing with AC voltage



Operation in AC Mode will use water of low conductivity!



*When the Water Processing Unit is used in the **Impulse** mode (indicator “LI” is lightning setup menu) before an AC test the termination tubes have to be emptied first. Therefore see chapter „Emptying mode” on page 36.*

To avoid mixing water of high conductivity with water of low conductivity it is strongly recommended not to change the operation mode to “AC” before the termination tubes are completely empty

Conditioning mode

Description

In the conditioning mode the process water will be internally conditioned through the deionising resin into the storage tank (valve V1, V2, V11, V5) (see schematic

3707570, page 1). This brings the conductivity of the process water to the desired value.



For the conditioning mode there is no need for the terminations to be connected.

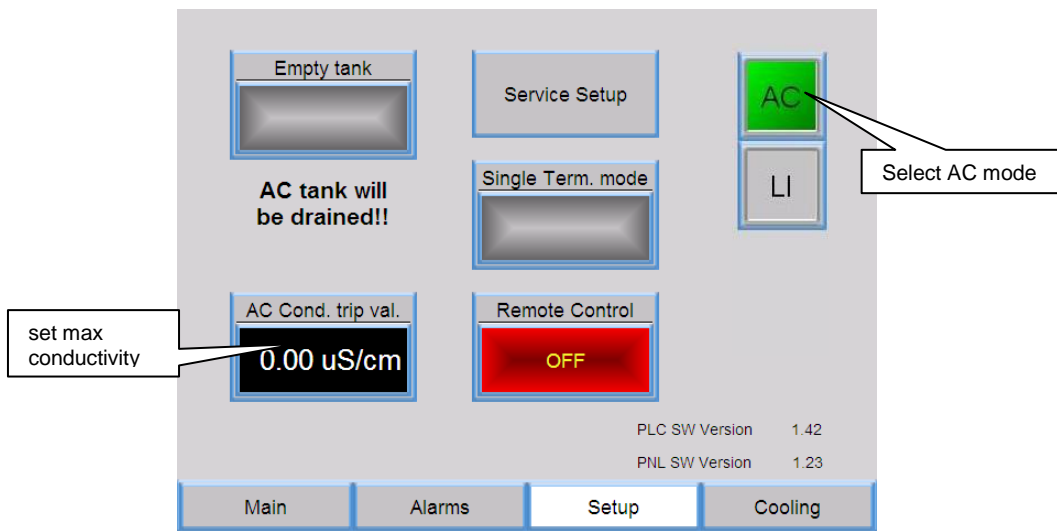


Figure 27: AC testing: Setup menu

Procedure

To activate AC mode select AC mode in the Setup menu by pressing the <AC> touch button (Figure 27).

If desired, a maximum value for the conductivity can be set as a limit (“AC Cond. trip val.”). If the conductivity exceeds this value, the Water Processing Unit opens the switch of the interlock output. This will determine the high voltage to be switched OFF as long the Water Processing Unit is included in the HV-interlock circuit.

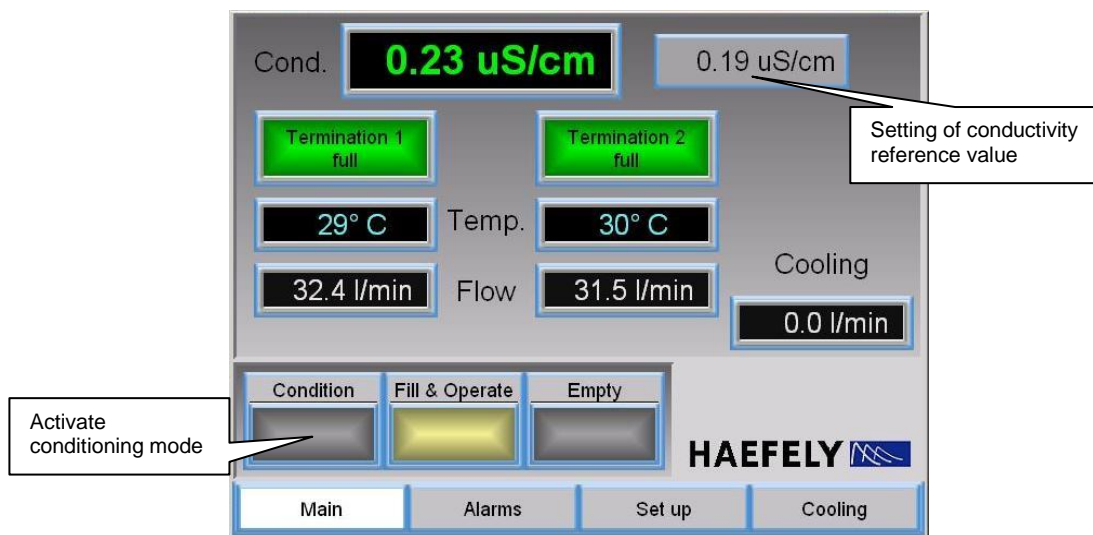


Figure 28: AC testing Main menu

Choose the desired conductivity according the CTT's manual in the Main menu and start conditioning by pressing the <Condition> touch button. Now the corresponding valves will be opened, the pump starts and the system regulates to the set conductivity value (Figure 28).

Filling and operation mode

In this mode the process water is pumped through the terminations the heat exchanger and the deionising resin into the storage tank (valve V1, V3, V4, V5, V11) (see schematic 3707570, page 2). The conductivity and temperature will be regulated permanently. AC tests can be performed with this mode.

Procedure

- Connect the terminations to the water-conditioning unit.
- Activate AC mode by pressing the <AC> touch button (Figure 27).
- If desired, a maximum value for the conductivity can be set as a limit ("AC Cond. trip val."). If the conductivity exceeds this value, the Water Processing Unit opens the switch of the interlock output. This will ensure that the high voltage will be switched OFF as long the Water Processing Unit is included in the HV-interlock circuit.
- Choose the desired conductivity according to the CTT's manual in the Main menu and start conditioning by pressing the <Fill & Operate> touch button. Now the corresponding valves will be opened, the pump starts, the termination tubes will be filled and the system regulates to the set conductivity value (Figure 28). At the terminations you can hear a fizzling at the air valve in top termination. As soon as the termination tubes are completely filled with water, the status indication of the termination will change from grey to green light and the security circuit will be closed. The system regulates the temperature and set conductivity value.



Do not start the HV-test before the required conductivity is reached! Damage can occur.

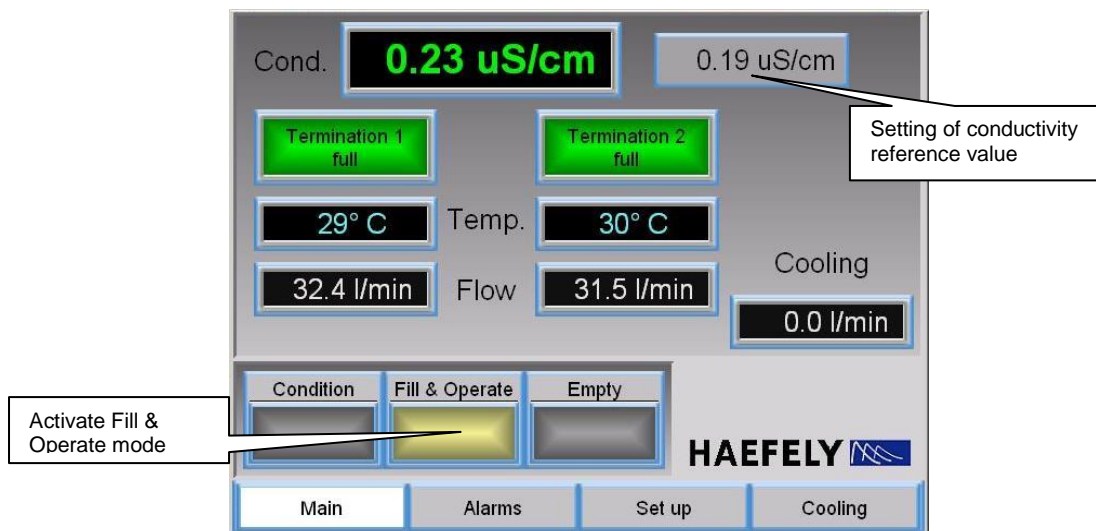


Figure 29: AC testing: fill & operate

Emptying mode

Description

The cable test terminations will be emptied. The pump fills the water from the termination tubes into the storage tank (valve V2, V7 V11, V12) (see schematic 3707570, page 3).

Procedure

- Empty the termination tubes by pushing the <Empty> button in the main menu. Now the water is pumped out of the termination tubes and back into the water tank. A fizzing at the air valve in top termination of the CTTs can be heard.
- When the water flow drops at the flow switch S1 the pump will be switched off automatically.



For emptying the Cable Test Terminations it may be necessary to restart the emptying mode 2 ... 3 times after waiting some seconds each time to make sure that the terminations are completely emptied. The hoses may contain some process water!

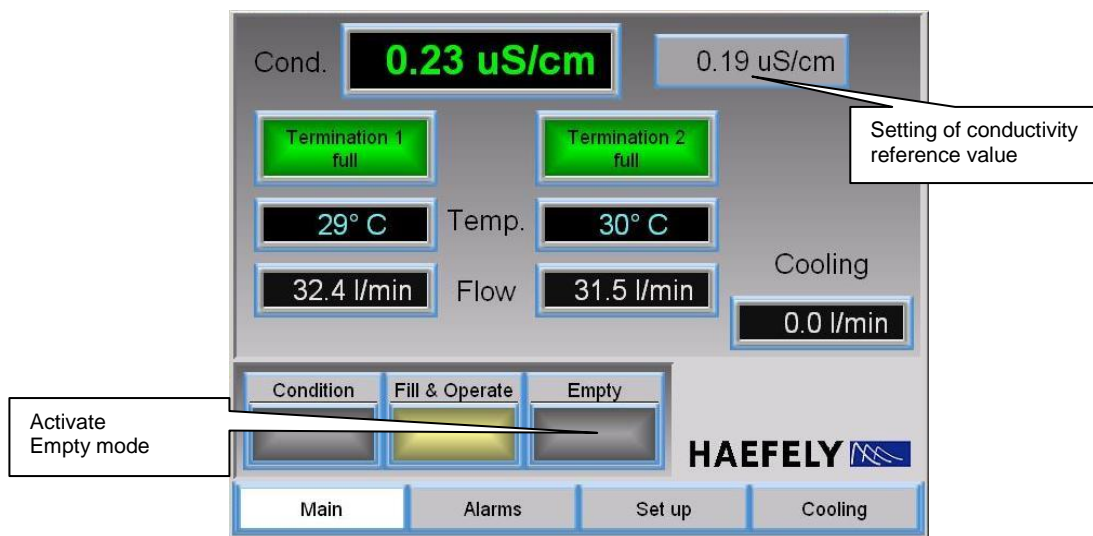


Figure 30: AC testing: Emptying terminations

Testing with Impulse Voltage



Before switching the operating mode from AC to Impulse the termination tubes have to be completely emptied, see chapter „Emptying mode“, page 34. Else wise deionized water is pumped out of the system.



Operation with water of high conductivity! (Approx. 100...200 $\mu\text{S}/\text{cm}$)

Filling and operation

Description

In this mode water of the cooling circuit flows from the “cooling in” through the terminations to the “cooling out” (valve V3, V8, V9) (see schematic 3707570, page 4).

It is possible to choose between two operating modes:

Operation with flowing water in the terminations

In this mode the security circuit of the conditioning unit is integrated into the security circuit of the high voltage equipment.

Operation with water standing still in the terminations

In this mode the security circuit of the conditioning unit is not integrated into the security circuit of the high voltage equipment. The safety interlock plug at the conditioning unit has to be removed and shorted.

Procedure

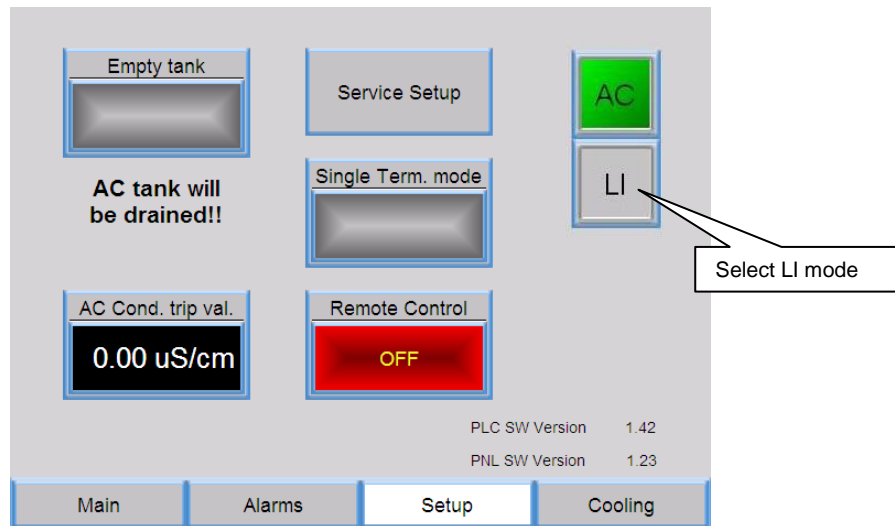


Figure 31: LI testing: Setup menu

- If an AC voltage test was carried out before the impulse voltage tests make sure the termination tubes have been emptied completely. (See chapter „Emptying mode“, page 34) Ensure that the operation mode "Impulse" is chosen (touch button in the Setup menu is highlighted green).
- Depending on the two possibilities which can be chosen („Operation with flowing water in the terminations“, or “Operation with water standing in the terminations“), the security interlock circuit of the water-conditioning unit has to be integrated into the high voltage security circuit or not (see above).
- Ensure that the termination tubes are connected to the water conditioning unit.
- Push the <Fill & Operate> button in the “Main” menu. The Cable Test Termination tubes will be filled with tap water. A fizzling at the air valve in top termination of the CTTs can be heard. As soon as the tubes are filled completely, the status indication of the termination will change from grey to green light. The security circuit will be closed and the system is ready for operation with flowing water.

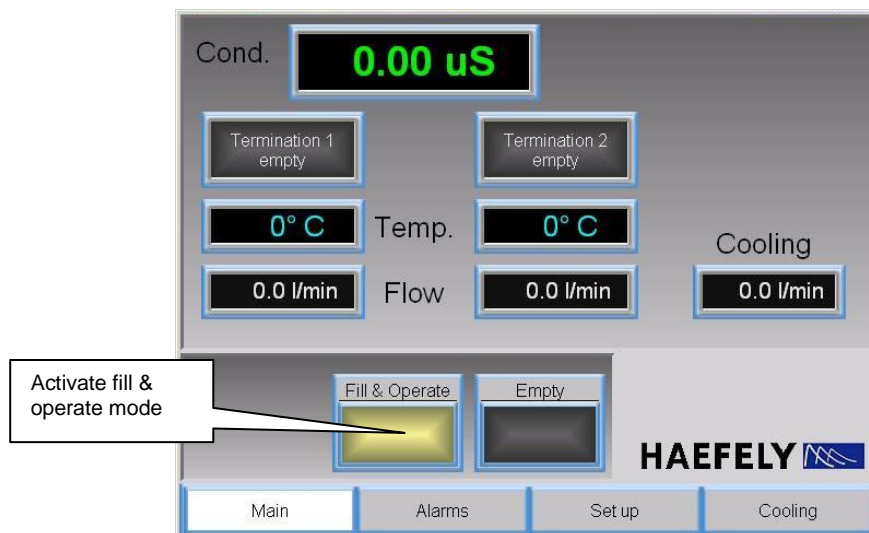


Figure 32: LI testing: Main menu fill and operate

- Operation with water standing still in the terminations:
To stop the water from flowing and keep it stock still inside the termination tubes, push the <Fill & Operate> button. This closes all the valves and blocks the water flow.

Emptying mode

Description

The cable test terminations will be emptied. The water is pumped into the discharge conduit of the external cooling side (valve V2, V4, V7, V8, V12). (See schematic 3707570, page 5).

Procedure

- Empty the termination tubes by pushing the <Empty> button in the Main menu. Now the water is pumped out of the termination tubes into the discharge conduit of

the external cooling side. At the terminations you can hear a fizzling at the air valve in top termination.

- When the water flow drops at the flow switch S1 the terminations are empty and the pump will be switched off automatically.



For emptying the Cable Test Terminations it may be necessary to restart the emptying mode 2 ... 3 times after waiting some seconds after each time to make sure that the terminations are completely emptied. The hoses may contain some process water!

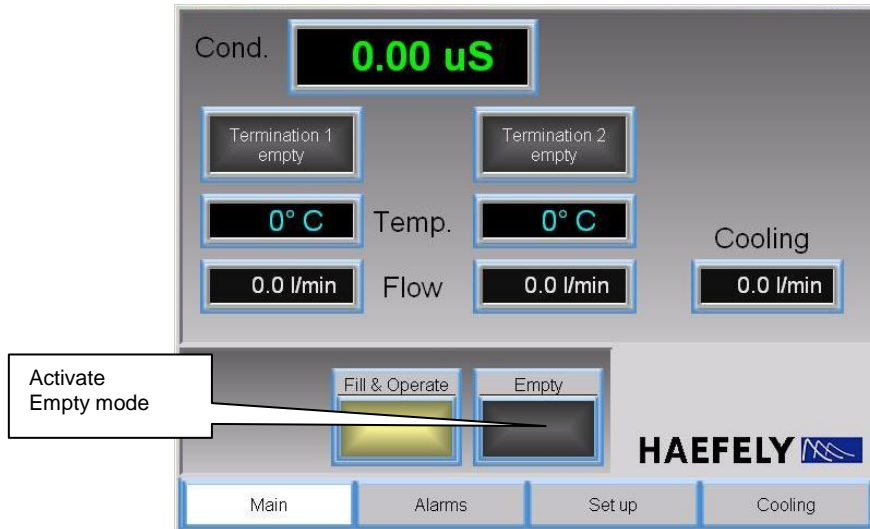


Figure 33: LI testing: Main menu emptying

Maintenance

Consumable materials

Deionising resin type Amberlite MB20 or equivalent (Option WPU MB). Two batches of resin are delivered with the equipment.

Filter bags for resin (Option WPU FB) for replacement.

Filter cartridge for main water filter (Option WPU FC) for replacement. One spare filter is delivered with the equipment.

A limited number of replacement parts like gaskets or fuses are delivered with the system.

Execute the maintenance

Replacement of the deionization resin

Depending on the intensity of use the resin will be exhausted after some time.



Don't let open resin bags or filled filter bags have contact to the air for longer time, this will exhaust the resin. Store resin in air tight bags or put the filter bags in water filled containers.

Please note that the described process applies for replacing the saturated resin. If the resin is installed for the first time, some of the following steps may be skipped.

The first step after the steel vessel has been identified is to disconnect it from the hoses:

- For this purpose keep a water container at hand to collect spill water. This container should be able to hold at least 20 liters of water and be placed on the floor directly in front of the resin tank.



The spill water collected by the water container should be poured away in order to avoid contamination of the process water.

- Open the venting valve (handle 0° to valves orientation) located in the water tank, just below the lid. This allows the water to drain from the resin tank in the successive steps.

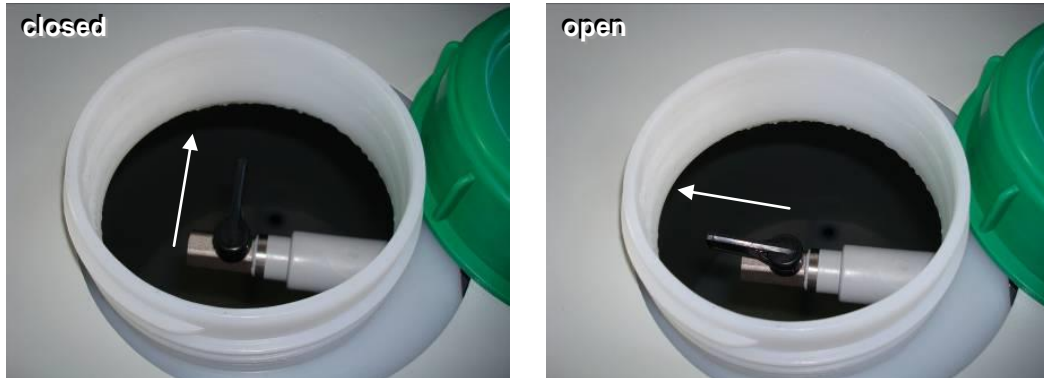


Figure 34: Opening and closing of the venting valve

- Now, the left hose can be disconnected by unscrewing the PVC union nut at top. Quickly bend the tube downwards into the prepared water container. Keep it as low as possible in order to drain most of the water out of the resin tank. (Venting valve in the water tank must be open, take care of the o-ring)



Figure 35: Disconnecting left hose of the resin tank

- Disconnect the Kamlok™ connector located on top of the tank's lid. If necessary, bend the tube a bit until the coupling is clear.



When the WPU is set into operation for the first time, there will be no water in the system. Hence, the procedure of disconnecting the resin container can be undertaken without the drainage procedure.



Figure 36: Disconnecting top hose of the resin tank

In the second step the resin tank is opened and the insert cylinder is removed.

- Gently tilt the whole tank forward until it rests on the buffer at an angle of approximately 45 degrees. It will stop automatically at the bumper.
- Remove the lid by unscrewing all eight bolts. Remember the position of the lid with respect to the connector. It is orientated 1/8 rotation counter clockwise from the back-center position. Keep the gasket and sealing surfaces clear of any dirt!



Figure 37: Opening the resin tank

- Remove the insert cylinder from the tank. Therefore remove the cap of the insert and pull it clear of the steel vessel by means of the two holes in the cylinder. Keep in mind that there will still drip some water out of the spent resin, thus place it in a suitable container.

The third step involved in replacing the resin is to remove it from the filter bag.

- Remove the filter bag with the resin from the insert cylinder. Alternatively, the filter bag may remain in the insert cylinder if desired.



The filter bag is intended for multiple uses. In case a bag needs to be replaced, please contact a sales manager at Haefely Test AG.

- Open the filter bag by undoing the hook & loop tape as well as the zipper
- Dump the resin into a suitable bag or container. In the process, the resin might block the opening, which then has to be repetitively unclogged. The exhausted resin can in theory be regenerated, but since it is a mixed bed resin, it has to undergo a special treatment, which is not a service of Haefely Test AG.
- Clean the bag on the outside from any spilled resin grains.



Figure 38: Closing the resin tank after filling up the filter bag and put in the plastic cap with the perforated side down

Accordingly the new resin has to be filled into the filter bag and the resin tank has to be reassembled and reconnected:

- Put the empty filter bag into the insert cylinder
- Cut a corner of the plastic bag containing the new resin, in order to funnel the granules through the opening into the filter bag. A second person or a clamp tool might be useful to keep the filter bag in position during the filling process. Alternatively a funnel can be made out of cardboard to ease this process.
- If the bag appears to be full while not all of the 25 l of resin are filled into it stamp the whole insert cylinder gently on the floor to compact the resin.
- When all of the 25 l are filled into the bag the zipper and hook & loop tape have to be closed.
- Clean the filled bag/cylinder of all left over resin grains in order to prevent clogging of the filters
- Next the insert cylinder has to be placed into the steel resin tank. In case the cylinder does not slide all the way down (it must be completely immersed into the tank) rotate it until it goes into position. This is due to the fact that the inlet tube at the bottom of the tank has to fit into one of the notches at the bottom of the insert cylinder.
- Place the plastic cap **with the perforated side down** on the filter bag. When closing the steel lid, it should tightly clamp onto the resin bag.



Even when the zipper and hook & loop tape are firmly closed, it may occur that resin can escape through the endpoint of the zipper. In order to prevent this from happening, the top part of the filter bag with the zipper and hook & loop tape should be folded over its length until the opening faces down. It should be fixed into position by clamping it with the cap.



Make sure the plastic cap with the perforated side down. Otherwise the flow of the conditioning circuit will be too low.

- Screw the bolts which fasten the steel lid and the rubber gasket into place. Pay attention to the right orientation of the lid with respect to the connector (one bolt offset counter clock wise to the middle-center position).
- Put the tank into an upright position and reconnect the two hoses. Do not forget the gaskets of the upper screw joint.
- Close the venting valve (handle 90° to valve's orientation) located in the water tank, just below the lid. (see Figure 34)



The resin is very slippery if spilled on flat surfaces. Make sure that unwanted leftovers are removed immediately in order to prevent accidents.

Maintenance of pneumatics

Over a period of time condensate might accumulate in the pressure regulator and the compressor. The transparent cone of the pressure regulator clearly indicates if condensate has been gathered. The necessary interval depends on the humidity and intensity of use. At intensive use a check should be performed at least every month. The regulator is located behind the single door below the control panel. By pressing the vent at the lower tip of the regulator the condensate will be released. Verify that the regulator is set to 6 bar.

The internal compressor is equipped with an air tank which has to be drained of condensate from time to time. A decrease of the interval between compression phases is an indication for an accumulation of condensate in the tank since the condensate decreases the volume available for the storage of pressurized air.

The compressor is located behind the single door below the control panel. To drain the tank, remove the screw at the center of the air tank and let it completely depressurize. Refasten the screw (by hand). Make sure that the pressure stat of the compressor is set to maximum (+).



Drain condensate on a weekly interval.



Figure 39: Draining condensate from pneumatics

Inspection and replacement / cleaning of filters and valves

The WPU utilizes 4 filters resp. screens:

- 1 pc. primary filter 10" / 20 μ m
- 2 pcs. line strainers with 0.5 mm screens
- 1 pc. 0.5 mm screen incorporated in the pressure valve



Clean the filters in a half year interval. If particularly contaminated, clean when required.

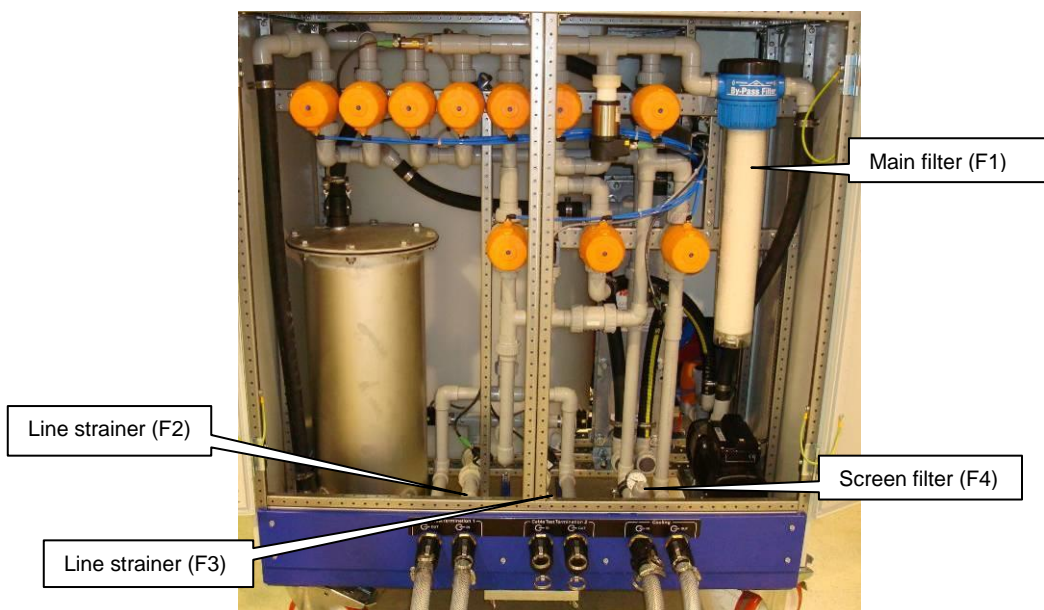


Figure 40: Location of the filters

Primary Filter (F1)

The primary filter is a 10 inch cartridge filter with a 20 µm PP filter. It is located directly downstream to the pump. It has an adjustable head with three functions “bypass”, „stop” and “filter”. The setting “stop” or “bypass” can be used to reduce water spillage during filter maintenance. Make sure that during normal operation the filter head is always set to “filter”.



Never engage the pump when the filter is set to “bypass” or “stop”, this might cause damage to the sensors and/or the pump!

A visual inspection can give an indication of the filter’s state. While a fresh filter cartridge shines bright white, a polluted filter will show shades of gray or orange (an orange shade indicates a contamination with deionization resin). It should be replaced if signs of contamination are clearly visible and/or the flow rate becomes too low (check other filters/strainers as well).

For replacing the filter cartridge the following steps apply:

- Make sure the WPU is completely switched off
- Set the indicator at the top to “stop”
- Unscrew the blue union nut and separate the transparent filter cone from the top housing
- Keep a containment within reach to drain the filter cone, spill away the containing water
- Remove the cartridge and flush the cone with some fresh water to remove any solid residues
- Insert the new filter cartridge and reassemble the filter
- Set the indicator at the top to “filter”



Even though the pump located below the filter has a protection rating of IP 55 (protection against water jets from any direction), avoid water spillage if possible.

Line strainers (F2 and F3)

The two line strainers are located directly downstream to the terminals for the return flow from the Cable Test Terminations and can be found at the bottom behind the double doors. They have to be unscrewed downwards and serve as a protection for sensors down stream by retaining larger dirt particles (> 0.5 mm) coming from the terminations.

A potential contamination of (one of) the strainers can be indicated by obvious differences in flow rate between the two Cable Test Terminations (differences in flow rate might also have other reasons, like buckles in one of the hoses to a Cable Test Termination).

Put a flat container (5 ... 10 l) beneath the in- and outlets of the Cable Test Terminations and under the line strainers.

Inspection of the line strainers:

- Make sure that the terminations are emptied

- Make sure the WPU is completely switched off
- Remove the hoses and caps from all four Cable Test Termination connectors (Kamlok™) this will drain the relevant piping, use the container to trap the spillage
- Unscrew cap (downwards), be prepared for some water spillage
- Remove the cylindrical screen
- Inspect the screen for accumulated dirt and, if necessary, flush it with clear water until it is clean
- Reassemble the line strainer
- Reconnect Cable Test Terminations

Screen incorporated in the pressure valve (F4)

Located in the pressure valve which is placed in the cooling water inlet is a screen to prevent large particles from entering the cooling circuit and blocking the injection valve. The screen is not meant for replacement.

A potential contamination of the screen can be indicated by an obvious reduction in cooling water flow.

Inspection of the valve's screen

The screen may be cleared by backwashing:

- For this purpose empty Cable Test Terminations and switch to LI mode
- Disconnect all hoses
- Connect the connection of fresh and clean water to one of the Cable Test Termination Out connectors
- Connect a hose which is lead to a sink on Cooling In connector
- Put on the Kamlok-Caps on the other connectors
- Switch ON LI <Fill & Operate> mode
- Backwash for some minutes
- Switch OFF LI <Fill & Operate> mode
- Change the two hoses and wash the circuit again for one minute by switching ON LI <Fill & Operate> mode
- Switch OFF <Fill & Operate> mode. Change back to AC mode if necessary
- Reconnect the hoses to its right connection

Alternative if the first procedure was not successful:

- Make sure the WPU is completely switched OFF
- Remove the hose or cap from the corresponding connector (Kamlok™), this will drain the relevant piping
- The complete valve can be removed from the WPU in order to be inspected elsewhere. To do so undo the two metal union nuts keep the gaskets and remove the valve
- Unscrew the plastic top part from the brass housing. Use appropriate tools! Remove the mechanism from the housing and clean the screen



It is recommended to let this procedure be done by a Haefely's specialist. Haefely is not responsible for damage which is caused by improper handling.

Valves

The connection between the bonnet and valve body should be checked for tightness at regular intervals.

We recommend checking the functionality of diaphragm valves which are kept permanently opened or closed. This can be done by pneumatically unseating the diaphragm 1 to 2 times a year.



Medium can exit uncontrollably, if piping system is opened under pressure. Injury or damage may occur!

If it is necessary to open a valve due to pollution or damage we recommend contacting Haefely's Service department.

Cleaning

For external cleaning use a wet cloth.

In case, dirt (e.g. resin) has accumulated in the tank remove the union nut at V1 and drain the tank directly via the connecting hose. Remaining dirt may be flushed out by hosing down the internals of the tank.



Don't use soap!

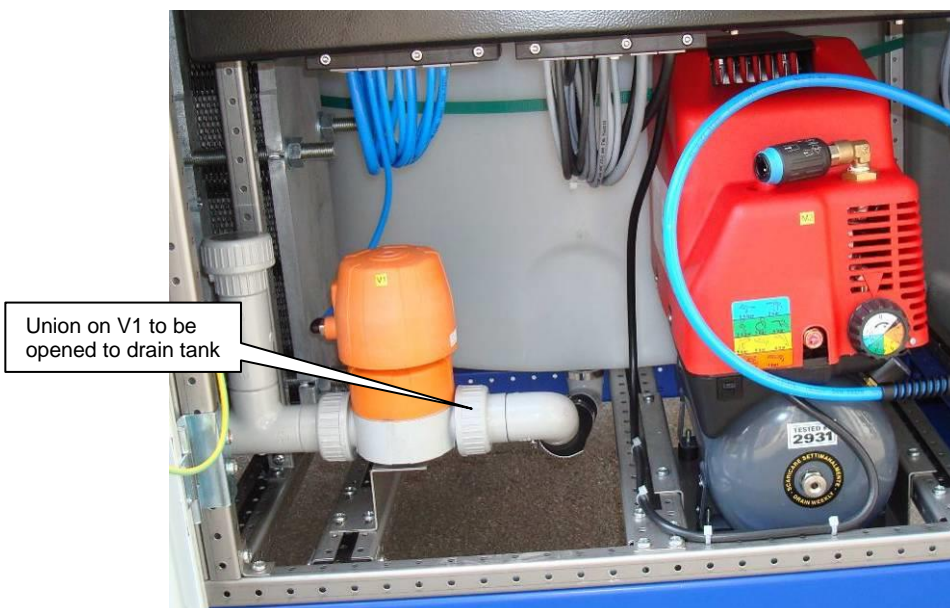


Figure 41: Draining the tank by opening the union on V1

Draining

If the unit has to be shipped or stored for a prolonged time or if it has to be cleaned, it has to be drained. Therefore follow the procedure accordingly:

- The tank can be emptied by the “Empty Tank” mode at the control panel. The water will be routed to the “cooling out” terminal at the front of the WPU.

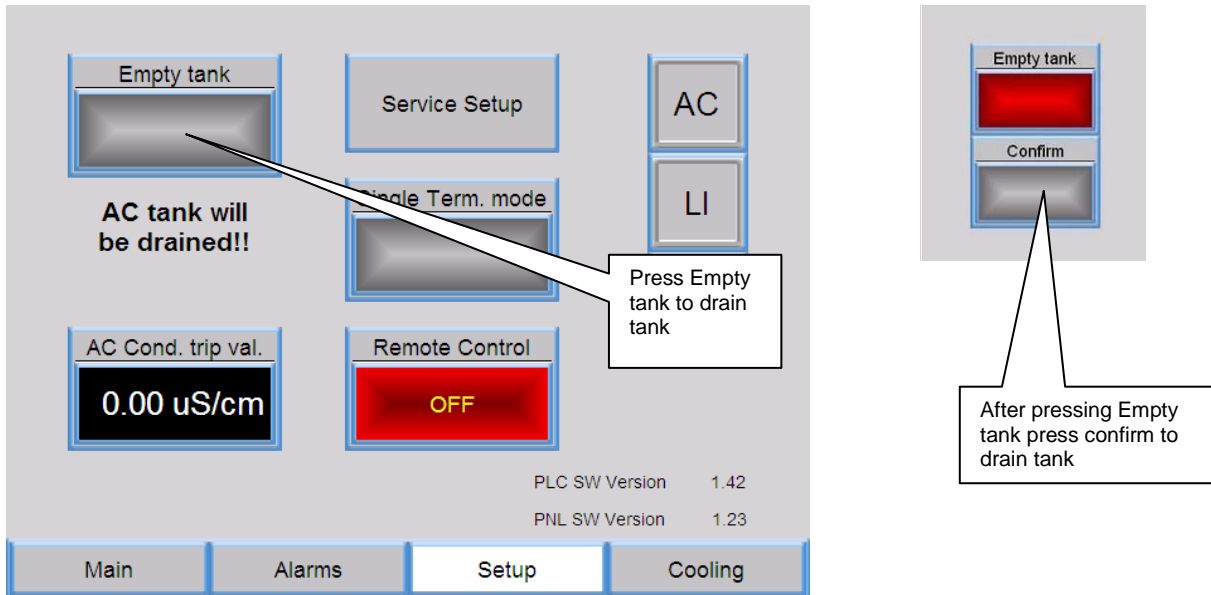


Figure 42: Draining the tank by opening the union on V1

- After the tank is emptied, all six water terminals at the front should be opened
- Open all valves at the same time manually by the pneumatic control unit in the control cabinet (this can be done without an electrical connection only pneumatic pressure is required). At the pneumatic control, turn the red switches for each valve to the right. Remember to turn them back after the process!
- Unscrew the union nuts at the bottom of the heat exchanger in order to drain it. Remember to fasten the nuts afterwards!
- Drain the resin tank according to the procedure for exchanging the resin. (See “Replacement of the deionization resin”, page 38)
- Remove the resin and all left over water. Store the resin in a water filled container
- Unscrew the filters F1, F2, F3 and drain them. Clean them and reassemble
- Set V1 to open position (if not already open) and unscrew the union nut at the connection between V1 and the water tank
- Drain the tank and refasten the union nut at the connection between V1 and the water tank

Water connections

All connections and hoses should be inspected periodically for leaks or deterioration of hose material. Retighten screws on hose clamps if necessary.



Inspection every 6 month.

Cable connections

All cable connections including internal cables should be inspected for damage periodically. Damaged cables have to be exchanged by a specialist of Haefely Test AG or by a person authorized by Haefely Test AG.



Inspection every 6 month.

Conductivity meter

For inspection and cleaning disassemble the conductivity meter by opening its union and disassembling its electrical connector. Make sure that the Water Processing Unit is turned off and there is no pressure in the system. Water can spill out.



Make sure that there is no water spilling into the electrical connections. This may damage the sensor!

- Always use a cleaning product compatible with the materials the device is made of.
- When cleaning the electrode, ensure that their surface is not scratched.
- Flush the electrode in a beaker of clean water.
- Avoid dry storage of graphite electrodes during long interruptions in measurement in order not to increase the response time when they are used next.



Inspection every 6 month.

Repairs

Generally only a specialist of Haefely Test AG or by a person authorized by Haefely Test AG has to do repairs on the WPU.

Because the action of repair has to be coordinated with Haefely Test AG, call Haefely's customer support department.



To warrant adequate servicing, no general instructions for repair can be given!

Spare parts

WPU MB	Deionization resin (non-regenerable), 2 x 25 liter
WPU FB	replacement filter bag for resin
WPU FC	replacement filter cartridge for main filter, 2 pcs

If other components or parts of the piping have to be replaced, please contact customer support at Haefely Test AG (support@haefely.com).

Onward transfers

Resale

Haefely Test AG has to be informed if the test equipment will be sold to a third company. In case of a resale the equipment has to be sold complete including all operating instructions etc.

If the equipment is resold without information to Haefely Test AG, Haefely Test AG rejects any warranty, liability and claims.

Disposal

The exhausted resin can in theory be regenerated, but since it is a mixed bed resin, it has to undergo a special treatment, which is not a service of Haefely Test AG. The resin can be disposed of with the normal waste disposal, unless it was used for deionising wastewater and would then contain heavy metal.

Please refer to the national/local disposal and recycling regulations for a correct disposal of the unit as a whole or parts of it.

Taking back

The question of taking back has to be discussed individually. Please contact the customer support of Haefely Test AG.

Training, Education

Training

Only trained personnel should operate the Water Processing Unit and the Cable Test Terminations. It is important that the correct conductivity of the process water is chosen before testing.

Education

An introductory course given by a specialist from Haefely Test AG is recommended before first putting in to operation of the system.

Technical data

Maximum air humidity (non condensing)	
• Storage in rain-protected room	95 %
• Operation	90 %
Minimum ambient temperature	
• Storage in rain-protected room	+ 5 °C
• Operation	+ 3 °C
Maximum ambient temperature	
• Storage in rain-protected room	+ 35 °C
• Operation	+ 35 °C
Requirement of electrical power supply	
• voltage	230 V
• current (fuse)	16 A
• Frequency (see type plate)	50 or 60 Hz
Requirement of water supply for cooling at 120 kW:	
• Maximum temperature of cooling water	20 °C
• Minimum water flow	85 l/min
• Minimum water pressure	2.5 bar
Connection for external cooling and termination terminations	1 inch
Minimum volume of water in storage tank during operation	100 l
Maximum volume of storage tank	500 l
Maximum cooling power	120 kW
Conductivity control resolution	0.01 µS/cm
Conductivity control range (AC)	0.1 ... 20 µS/cm
Conductivity control range (LI)	none
Typical water flow through one termination (single mode)	55 ... 70 l/min
Typical water flow through one termination (dual mode)	28 ... 35 l/min
Weight (empty tank)	380 kg
Length:	1.2 m
Height:	1.7 m
Width:	1.4 m

Documentation

Test Reports

The tests are carried out during the normal quality control procedure. No separate test report is written.

Diagrams, Drawings

The electrical and hydraulic circuits are shown on the following schematic diagrams which are part of this manual:

3707250	electrical layout: control unit
3707251	electrical layout: component and sensor wiring
3707252	electrical layout: component wiring CAB
3707570	hydraulic layout diagram
If option WPU REM is ordered:	
3711287	WPU remote control (optional)
3711290	WPU Extension for WPU REM (optional)

Trouble shooting

Errors and Disturbances

Failure	Solution
Display black, WPU not working	<ul style="list-style-type: none"> ○ Check power supply, ○ check if main switch is ON ○ check if fuse F4 to F5 are disconnected (red lamp in fuse on) ➔ replace fuse (type: named value)
Display black, Compressor in WPU is working	<ul style="list-style-type: none"> ○ check if F3 is OFF ○ check if F4 is OFF (red lamp in fuse on) ➔ replace fuse (type: named value)
F3 can't be activated	<ul style="list-style-type: none"> ○ Check if value of F3 corresponds with value in schematics
Display on, but no function	<ul style="list-style-type: none"> ○ check if F5 is OFF (red lamp in fuse on) ➔ replace fuse (type: named value) ○ Run mode switch on PLC not in "Run" position. ➔ switch to "Run" mode
WPU not working, display active, shows attention signal Alarm menu shows: <ul style="list-style-type: none"> ○ Emergency alarm ○ Interlock alarm 	<ul style="list-style-type: none"> ○ go to Alarm menu ○ Deactivate emergency push button by turning it into right direction / pulling it ○ Make sure, that none of the alarms "Termination 1 low flow", "Termination 2 low flow", "Emergency", "Over temp", "Conductivity trip" is active.
Display active, Pump is not working	<ul style="list-style-type: none"> ○ Check if F1 is OFF
F1 can't be activated	<ul style="list-style-type: none"> ○ Check if value of F1 corresponds with value in schematics
Display active, pump working, no valve active, various lights at valve distribution in control cabinet are on.	<ul style="list-style-type: none"> ○ Check air supply: <ul style="list-style-type: none"> ○ Connection to external/internal air supply correct? ○ Check pressure at regulator set to 5 bar

Failure	Solution
Compressor is not working	<ul style="list-style-type: none"> ○ Check if F2 is OFF ○ Check if pull-push switch on compressor is in pulled position
F2 can't be activated	<ul style="list-style-type: none"> ○ Check if value of F2 corresponds with value in schematics
One (or more) values are not shown on display in working mode.	<ul style="list-style-type: none"> ○ Check connectors X10 to X26 in control cabinet ○ Check connectors at sensors
One or more valves are permanently working	<ul style="list-style-type: none"> ○ Check if red switch on valve distribution is set to automatic (not to "1")
Valve is permanently on or permanently off	<ul style="list-style-type: none"> ○ The valve is blocked by a particle. The valve has to be cleaned.
The indicated conductivity is too high and the desired conductivity cannot be obtained even after prolonged circulation of the water.	<ul style="list-style-type: none"> ○ The deionising resin has to be replaced ○ Air bubbles have a negative effect on low conductivities (< 0.3 µS/cm). Check if the water level in the tank is > 100 l and the venting valve in the tank is closed.
The indicated conductivity is too low. Measure the resistance of one termination and with the aid of the diagrams determines the conductivity (see manual "CTT Cable Test Terminations").	<ul style="list-style-type: none"> ○ The conductivity probe has to be cleaned.
The flow volume is too low.	<ul style="list-style-type: none"> ○ Hoses have to be routed in such a way that no sharp bends occur. ○ The filters, especially F1 have to be cleaned. Refer to the chapter maintenance
The flow volume is too low. And the pump sounds strange.	<ul style="list-style-type: none"> ○ There is air in the system. Open valve V1 by setting the red switch on valve distribution to 1. Open carefully the union between V1 and pump. Close as soon as water is spilling out. Set switch on valve distribution back to automatic.
The flow volume of the two connected cable test terminations is different.	<ul style="list-style-type: none"> ○ A difference in flow within a tolerance of 3 – 4 l/min is considered acceptable. If any higher differences occur, check the routing of the hoses and the screen filters F2 and F3.
In emptying mode, the pump switches off before the cable test terminations are completely drained.	<ul style="list-style-type: none"> ○ In case other than Haefely-Test-made CTTs are used, it has to be made sure, that the air valves of the CTTs provide enough flow. Wait a few seconds and retry.

Minimum data for reporting a malfunction

If an error or a disturbance cannot be located or solved, despite of all actions listed in the manual, contact Haefely's customer support.



For an efficient work, the customer support needs the following system specific information:

- *KA-number (see type plate)*
- *Customer's name*
- *Description of the last actions, before the error or the disturbance occurred. Eventually description of last test made with the system.*
- *Detailed description of how the error showed itself.*

Haefely Support

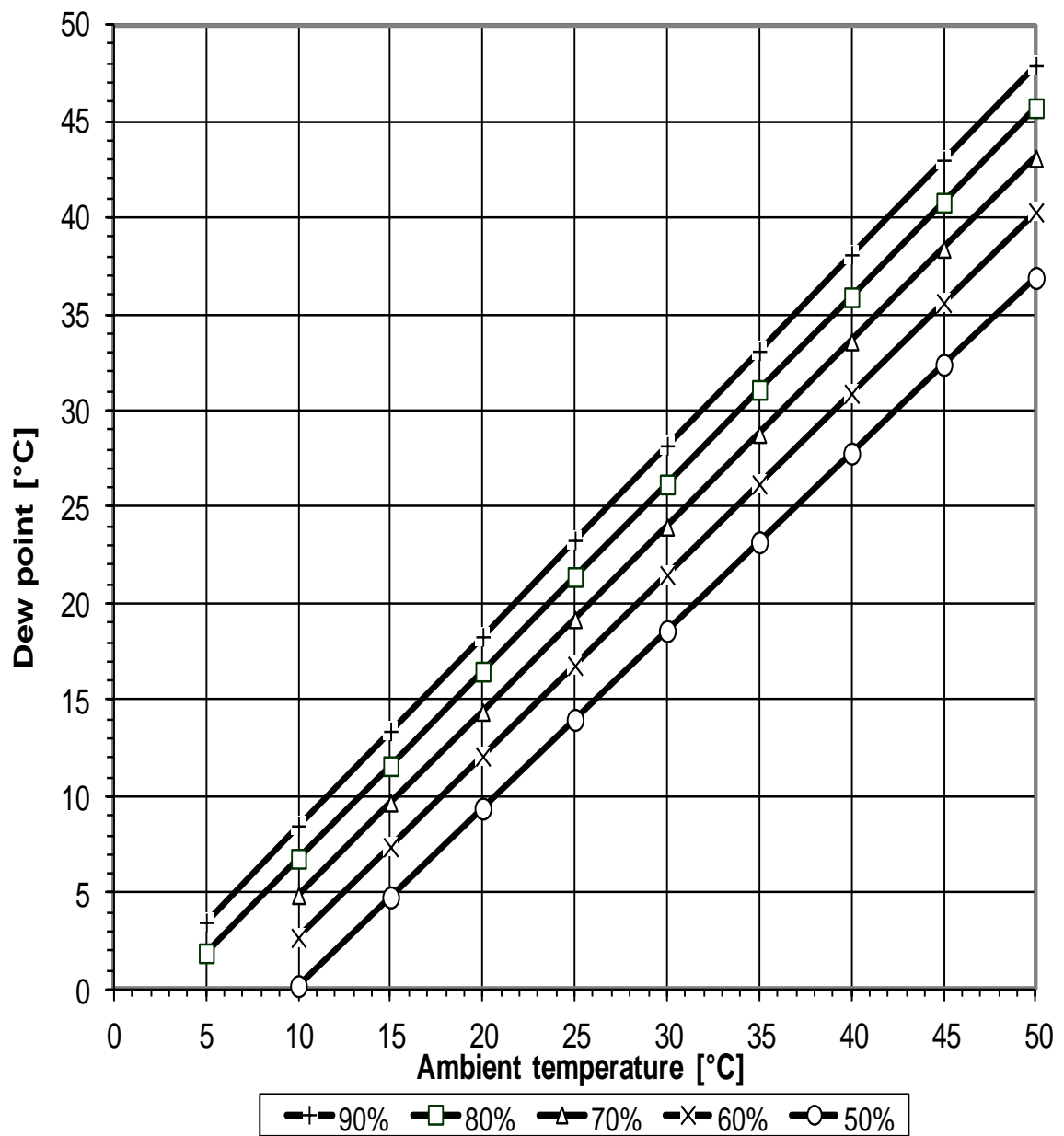
Haefely Test AG
Customer Support
Birsstrasse 300
CH-4052 Basel
Switzerland

E-mail: support@haefely.com

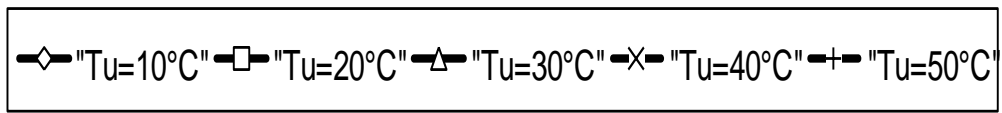
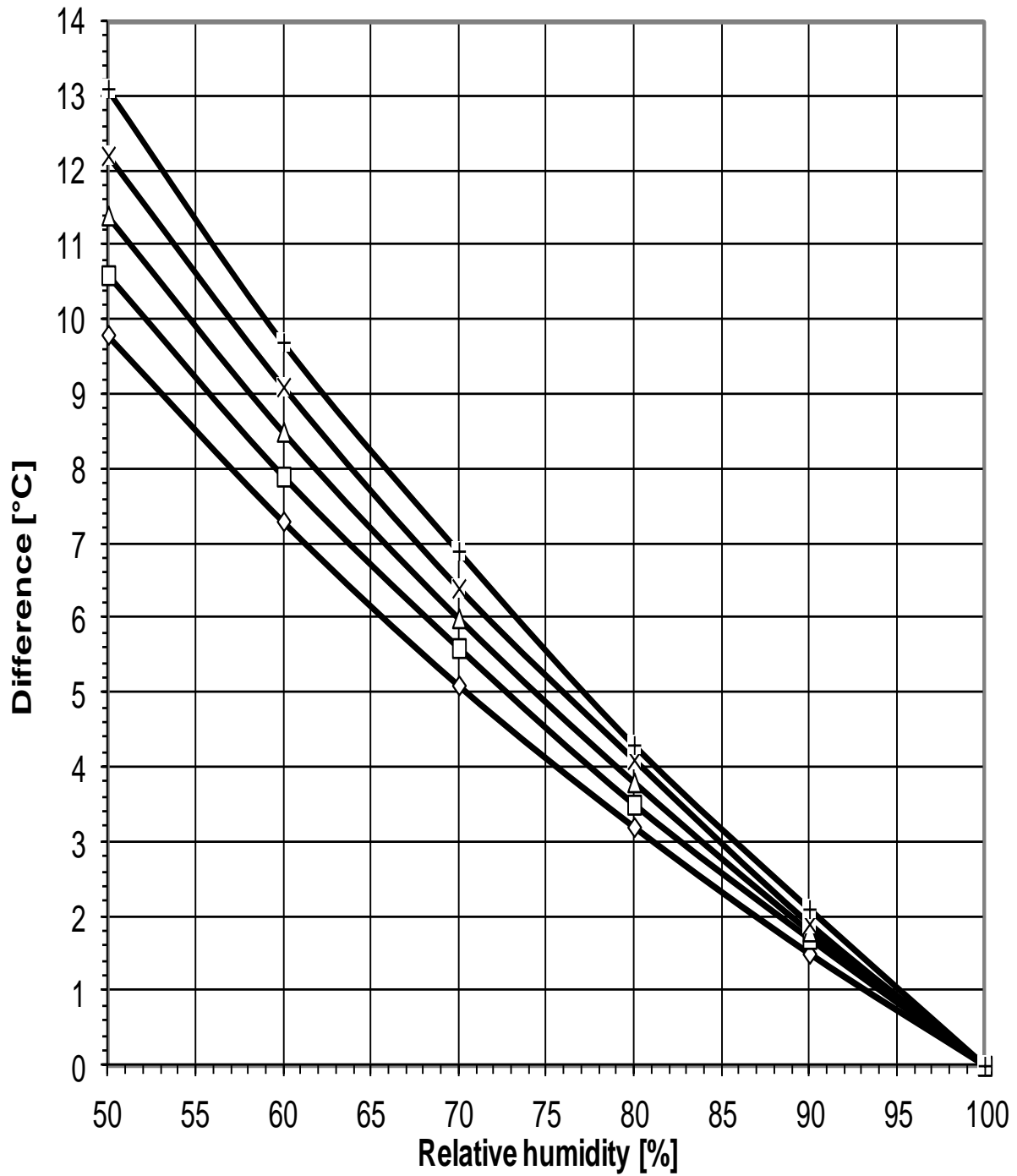
Phone: +41 61 373 4444

Appendix A – humidity

Dew point as function of the ambient temperature
(parameter: relative humidity)



Difference between ambient temperature T_u and dew point



Appendix B - WPU Remote

General

The WPU Remote is an option and can be ordered at any time. Please contact Haefely's support for further questions (see Haefely Support on page 56).



Figure 43: WPU Remote

Safety

Warnings



The housing of the WPU-Remote is made of metal. Always use power supply with phase, neutral and ground.



Read this and the WPU manual carefully and understand the necessary procedures before putting the WPU into operation!

Grounding instructions

The remote control for the Haefely Water Processing Unit (WPU-Remote) has to be grounded via the power supply cable to avoid electrical shock in case of failure in the WPU Remote.

Emergency switch OFF

In an emergency situation it is important to cut off the high voltage immediately.

The WPU Remote doesn't provide an emergency button. It is recommended to integrate the power supply in an emergency circuit which disconnects the whole test lab. (See "Emergency switch OFF" on page 12 for further information)

Switch ON/OFF procedure

Switch on the WPU and switch on the WPU Remote with its switch on the rear side. After systems are initialized they are ready for use.

Switch off the WPU Remote control panel and if not used, switch off main switch on WPU, too.

Product description

The WPU-Remote (see Figure 43) fulfills the following tasks:

- Control and display the main functions as the touch panel of the WPU except of some functions of the Setup menu. Those have to be controlled at the WPU.
- Control can be taken over from the WPU. Its display will be signaling "Remote mode enabled". WPU can take back control, WPU Remote will be signaling "Remote Mode disabled".

Scope of supply

- WPU Remote control panel
- Power cable (type depends on country)
- Fiber optic data link cable
- WPU extension set (already built in WPU when ordered together with a WPU)
- WPU Remote manual

Packing material, Transportation, Storage

After shipment, the packaging and securing devices should be removed. Check for visible damage.

Place the WPU Remote control panel on a flat and stable place. Take care that the touch screen display will not be damaged by for example sharp or pointy objects.



Never lay the WPU Remote control panel on its touch screen side.

Getting started

- Arrange the fiber optic cable between the control room where the WPU Remote will be placed and the WPU. Although this cable is very robust it should be arranged in a mechanically protected manner.

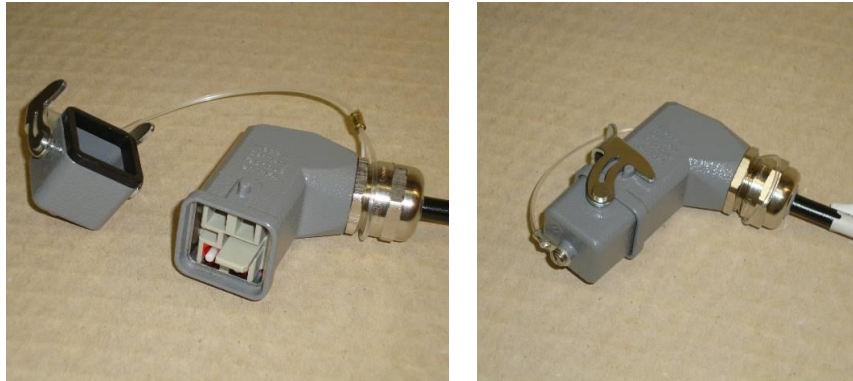


Figure 44: Fiber optic cable



If the cable is not plugged in, always put on the supplied cap to prevent the sensitive optical coupling from dust and damage.

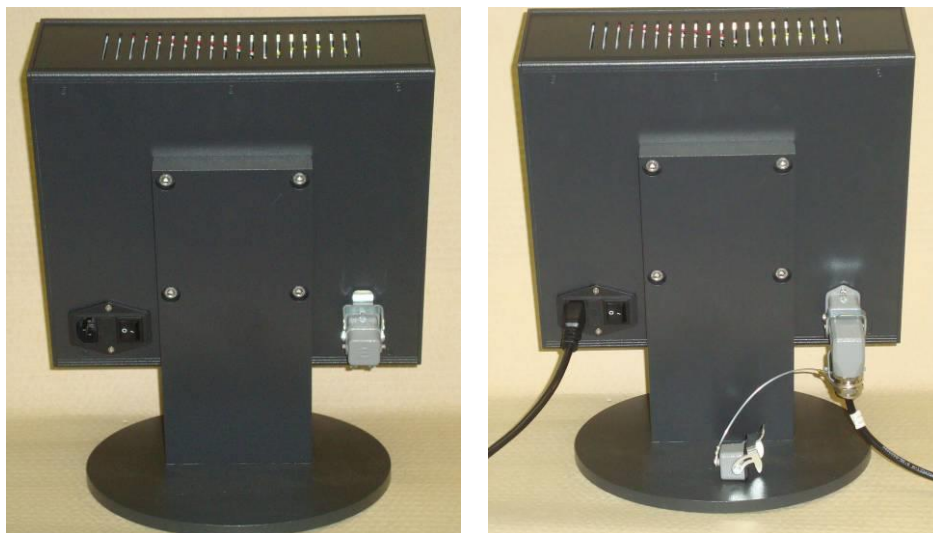


Figure 45: Connections of WPU Remote

- Connect the fiber optic cable to WPU
- Place the WPU Remote control panel on a flat and stable place like a desk.
- Connect the fiber optic cable on the backside of WPU Remote control panel
- Plug in the power cable into the connector on the backside of the WPU Remote control panel.

- Find a power supply (110 ... 250 V AC/ 50/60 Hz) and connect the power cable.
- Switch on the WPU
- Switch on the WPU Remote control panel
- A description of the functions you'll get in the following chapter.

Functional description of the system

Introduction

The WPU Remote has almost the same functions as the WPU itself. Only the functions which have to be operated directly at the WPU are not activated. For these functions there is the need to do another action directly at the WPU.

The deactivated functions are:

- Empty tank (draining the tank has to be done locally)
- Changing test Mode (LI, AC) requires actions on the Water Processing Unit and the Cable Test Terminations.
- HTAG setup is only accessible by Haefely Service and requires actions on the Water Processing Unit.

All other functions are identical to the control panel on the WPU.

Working with the WPU Remote

Getting or release control can be defined by the Remote Control button in the Setup menu. The other display will get a message accordingly.

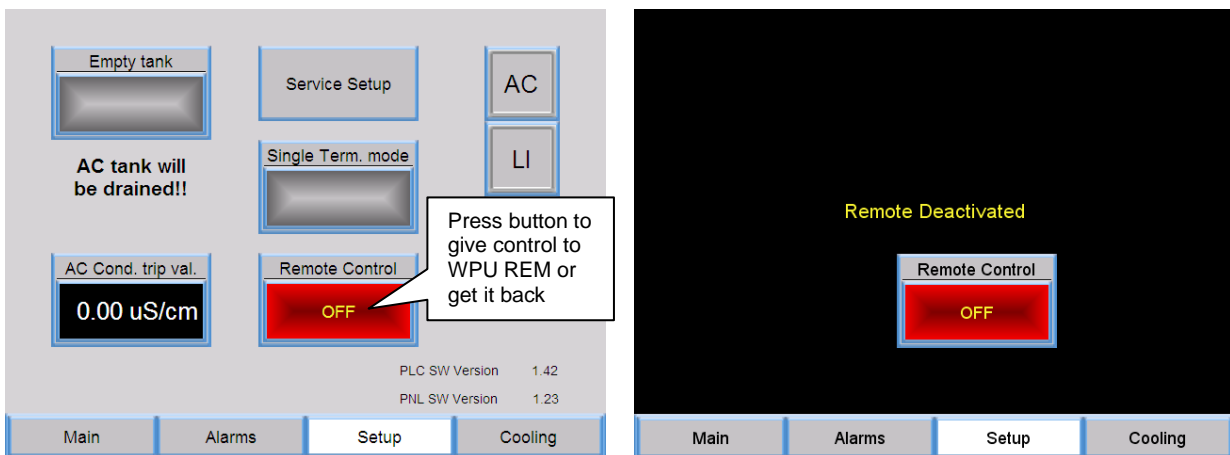


Figure 46: getting or release control (left: Setup menu of WPU, right: Setup menu of WPU REM while WPU is in control mode)

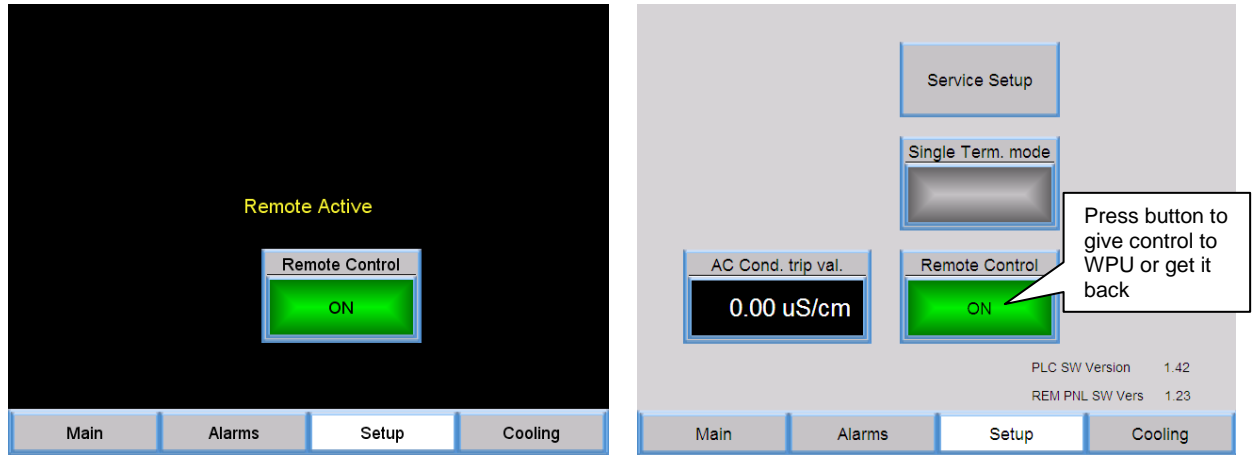


Figure 47: getting or release control (left: Setup menu of WPU, right: Setup menu of WPU REM while WPU REM is in control mode)

Troubleshooting

Failure	Solution
WPU REM displays a connection error in the top area of the display	<ul style="list-style-type: none"> ○ Check cable connection ○ Maybe fiber optic connection is defective check with flashlight
WPU REM is not starting up	<ul style="list-style-type: none"> ○ check if power is available ○ check fuses on WPU REM's receptacle

Minimum data for reporting a malfunction

If an error or a disturbance cannot be located or solved, despite of all actions listed in the manual, contact Haefely's customer support.



For an efficient work, the customer support needs the following system specific information:

- *KA-number (see type plate)*
- *Customers name*
- *Description of the last actions, before the error or the disturbance occurred. Eventually description of last test made with the system.*
- *Detailed description of how the error showed itself.*

Haefely Support

Haefely Test AG
Customer Support
Birsstrasse 300
CH-4052 Basel
Switzerland

E-mail: support@haefely.com

Phone: +41 61 373 4444

Resale

Haefely Test AG has to be informed if the test equipment will be sold to a third company. In case of a resale the equipment has to be sold complete including all operating instructions, test reports etc.

If the equipment is resold without information to Haefely Test AG, Haefely Test AG rejects any warranty, liability and claims.

Disposal

Please refer to the national/local disposal and recycling regulations for a correct disposal of the unit as a whole or parts of it.

Taking back

The question of taking back has to be discussed individually. Please contact the customer support of Haefely Test AG (support@haefely.com).

Training

Only trained personnel should operate the water processing unit (with or without WPU Remote) and the cable test terminations. It is important, that the correct conductivity of the water is chosen before testing.

Education

An introductory course given by a specialist from Haefely Test AG is recommended before first putting in to operation of the system.

Diagrams, Drawings

The electrical and hydraulic circuits are shown on four schematic diagrams which are part of this manual (Option WPU REM):

3711287	electrical layout: WPU Remote control panel
3711290	electrical layout: WPU extension

Test Reports

The tests are carried out during the normal quality control procedure. No separate test report is written.

Technical data

Width:	0.30 m
Height:	0.39 m
Depth:	0.25 m