ENGINEERING
TOMORROW

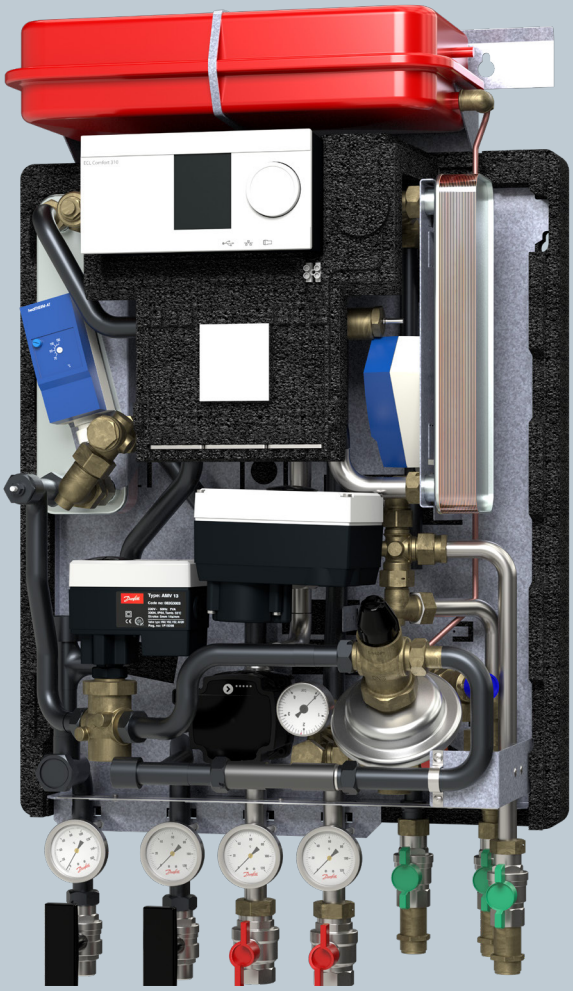
Instructions for installation and use

Indirect, fully insulated district heating substation Akva Lux II VXe HT

Indirect district heating substation for heating and domestic hot water.

VXe

Fully insulated for very low heat losses.



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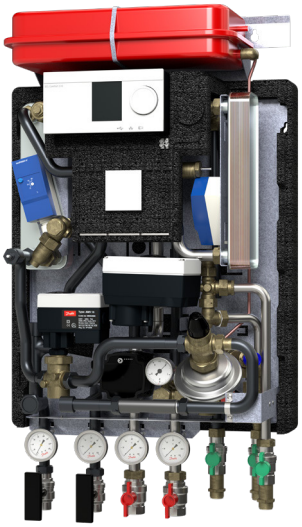

Akva Lux II VXe HT
ECL 310/A266

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2. INSTALLATION INSTRUCTIONS, SAFETY AND HANDLING

Instructions
Please read these instructions carefully before installing and comissioning this substation. The manufacturer accepts no liability for loss or damage resulting from failure to comply with these instructions for use. Read and follow these instructions carefully to prevent the risk of physical injury and/or damage to peroperty. Exceeding the recommended operating parameters considerably increases the risk of personal injury and/or damage to property. Installation, commissioning and maintenance must be carried out by qualified and authorized personnel in compliance with the local safety regulations.

Once the station has been installed and is operating, there is *normally* no need to alter the settings or other functions. The district heating substation is very reliable and easy to operate.

Energy source
The substation is primarily designed for connection to district heating. Alternative energy sources can be used if the operating conditions are equivalent to district heating at all times.

Application
The substation is designed only to operate with water and other heating media may not be used.
The substation is to be connected to the household piping in a frost-free room, where the temperature does not exceed 50 °C and the relative humidity is not higher than 80%. The substation must no be covered, bricked in or otherwise cut off from access.

Choise of materials
Only use materials, that comply with local regulations.

Corrosion protection
The risk of equipment corrosion increases considerably if recommended permissible chloride compounds are exceeded.
All pipes are made of min. AISI 304 (heating) and min. AISI 316 (domestic water) stainless steel as well as brass. Components for domestic water, however, primarily in dezincification-resistant brass. Heat exchangers are made of stainless steel and are copper-soldered or steel-soldered.
Surfaces in contact with water can be subject to two problems, limescale formation and corrosion.
The nature of the water will be of great importance in this context, where the pH value, chlorides, gases, etc., have a decisive effect on how much lime is deposited and how aggressive the water is.
The temperature also has a great influence in this context. For example the corrosion rate increases by a factor of 2 to 3 for every 10° C temperature rise.
With knowledge of the chemical water composition and operating conditions of a heating system, the risk of scaling and corrosion can be assessed. Based on that, recommendations can be made to avoid scaling and/or corrosion problems in the components.

See item 19, page 24 for more detailed Guidelines for Water Quality in Danfoss brazed heat exchangers and recommended Chloride concentration to avoid Stress Corrosion Cracking.

Safety valve(s)
Installation of safety valve(s) must always be in compliance with local regulations.

Noise level.
≤ 55 dB.

Storage
Before installation, the units must be stored in a dry, heated (i.e. frost-free) room.
(Relative humidity max. 80% and storage temperature 5-70 °C).

The units must not be stacked higher than the limit at the factory (max. 8 layers) Units supplied in cardboard packaging must be lifted using the handles incorporated in the packaging. Units must be placed on pallets for transport/moving across large distances.

As far as possible, do not lift the substation by the pipes. Lifting by the pipes may cause leaks. REMEMBER to retighten.

Connection
It must be possible to cut off all energy sources to the unit - including electrical connections - at all times. The unit must be connected to an electrical equalizer connection.

Warning! Hot surfaces
Parts of the substation may be very hot and can cause burn injuries. Be very careful when you are in the immediate vicinity of the substation.

Warning of high pressure and high temperature
The maximum supply temperature in the district heating network can be up to 130 °C and operating pressure cn be up to 25 bar. This may result in a risk of scalding from touching the substation and from outflow of the medium (water/steam). Exceeding the substation design data and operating parameters for pressure and temperature carries an appreciable risk of personal injury and/or damage to property.

Emergencies
In the event of fire, leaks or other hazards, immediately shut off all sources of energy to the substation, if possible and call for appropriate assistance.
If the domestic hot water is discoloured or malodorous, shut off all ball valves on the substation, notify all users and call for professional assistance immediately.

Warning of damage during transport
On reception of the substation, and before installing it, check for any evidence of damage during transport.
The substation must be handled and moved with the greatest care and attention.

IMPORTANT - Tightening of connections
Before adding water to the system, ALL pipe connections MUST be retightened, as vibrations during transport may have caused leaks. Once the substation has been filled and the system has been put into operation, ALL pipe connections MUST be tightened once more.
(Do not overtighten! - See page 8, Test and Connections)

Handling
We recommend that you wear suitable safety footwear while handling and installing the substation.

NOTE: Interventions/rework on our components results in loss of warranty.

2. INSTALLATION INSTRUCTIONS, SAFETY AND HANDLING

Reach
All products of the Akva Lux II Triiiple series comply with the provisions of the REACH regulation.
We are therefore obliged to inform our customers about the presence of substances according to the SVHC candidate list, if they are present.
We hereby inform you: This product contains brass parts containing lead (CAS 7439-92-1) in a concentration above 1% (w/w).

Potential equalization / grounding
Equipotential bonding is understood as all measures for eliminating electrical potential differences (contact voltages), which can occur between eg two pipelines. Equipotential bonding is an important measure for protection against electric shock. Equipotential bonding reduces corrosion in the heat exchanger, instantaneous water heaters, district heating stations and plumbing installations. Equipotential bonding should be in accordance with the provisions 60364-4-41: 2007 and IEC 60364-5-54: 2011. Binding point is marked with a grounding symbol on the bottom right corner of the mounting plate and there is a hole in the mounting plate and a label with grounding symbol.

Disposal
The station consists of materials that must not be disposed of with household waste. Disconnect the entire energy supply and disassemble the product for disassembly and dispose of it in accordance with local regulations.

Disposal
Dispose of the packaging in accordance with the local regulations for disposal of used packaging materials.

The substation is made of materials that cannot be disposed of together with household waste.
Close all energy sources and disconnect all connection pipes. Disconnect and dismantle the product for disposal in accordance with the applicable local regulations for the disposal of the individual components.

3. GETTING STARTED - QUICK GUIDE FOR EASY START-UP

Mounting
Connect the substation to the household piping in accordance with the labelling at the bottom and/or in accordance with the instructions in this manual.

GETTING STARTED is a quick guide and some details in connection with installation and commissioning may require additional information, which can be found elsewhere in this instruction manual.

GETTING STARTED Akva Lux II VXe HT

1. Mount the substation on a solid wall using two sturdy bolts (max. 8 mm), screws, expansion bolts or similar.

2. Tighten all pipe connections, as they may have loosened during transport and handling.

3. Mount the district heating meter (see page 8).

4. On systems that feature a safety valve, establish a drain connection in compliance with the applicable legislation.

5. Fill the heat exchanger / the system with water according to the instructions on page 9.

6. Open the ball valve for the HE supply and return flow, as well as the DHW outlet and heat up the system.

7. Check the substation and the household piping thoroughly for leaks.

8. Pressure test the entire system for leaks in accordance with the applicable regulations.

9. Connect pump and automatic components to the electricity supply, but do not switch on the power.

10. Heat the system and vent the radiator circuit/heating side thoroughly on the radiators and the air valve, if any.

11. Connection
Now switch on the pump and automatic components, if any.

12. Finish by adjusting the substation in accordance with the instruction manuals and remember to fill out the Commissioning Certificate page 23.

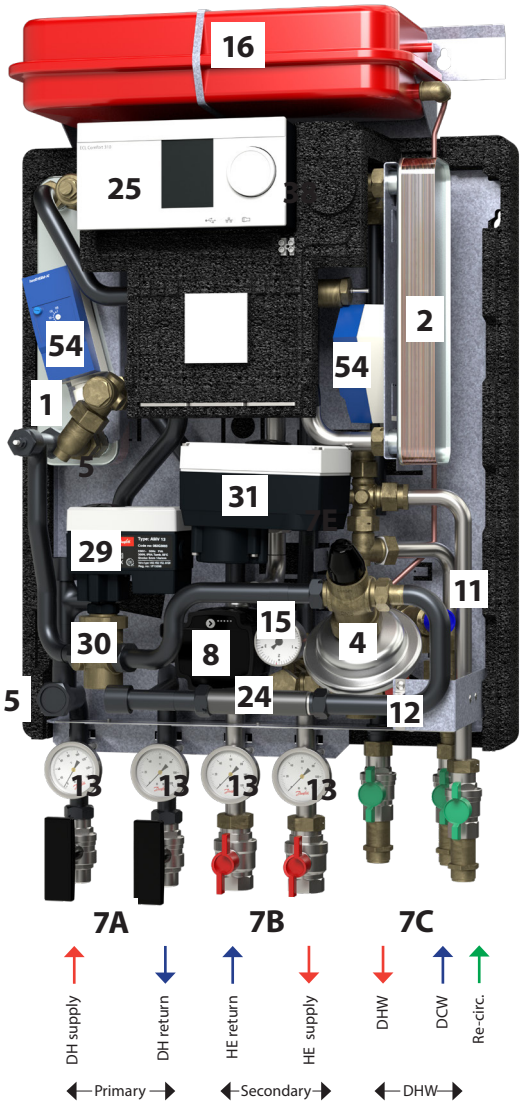
Note!
Heating and cooling the substation may cause leaks. Therefore it may be necessary to retighten the connections in the period after commissioning.

Note!
Never lift the station by its front insulation cover!

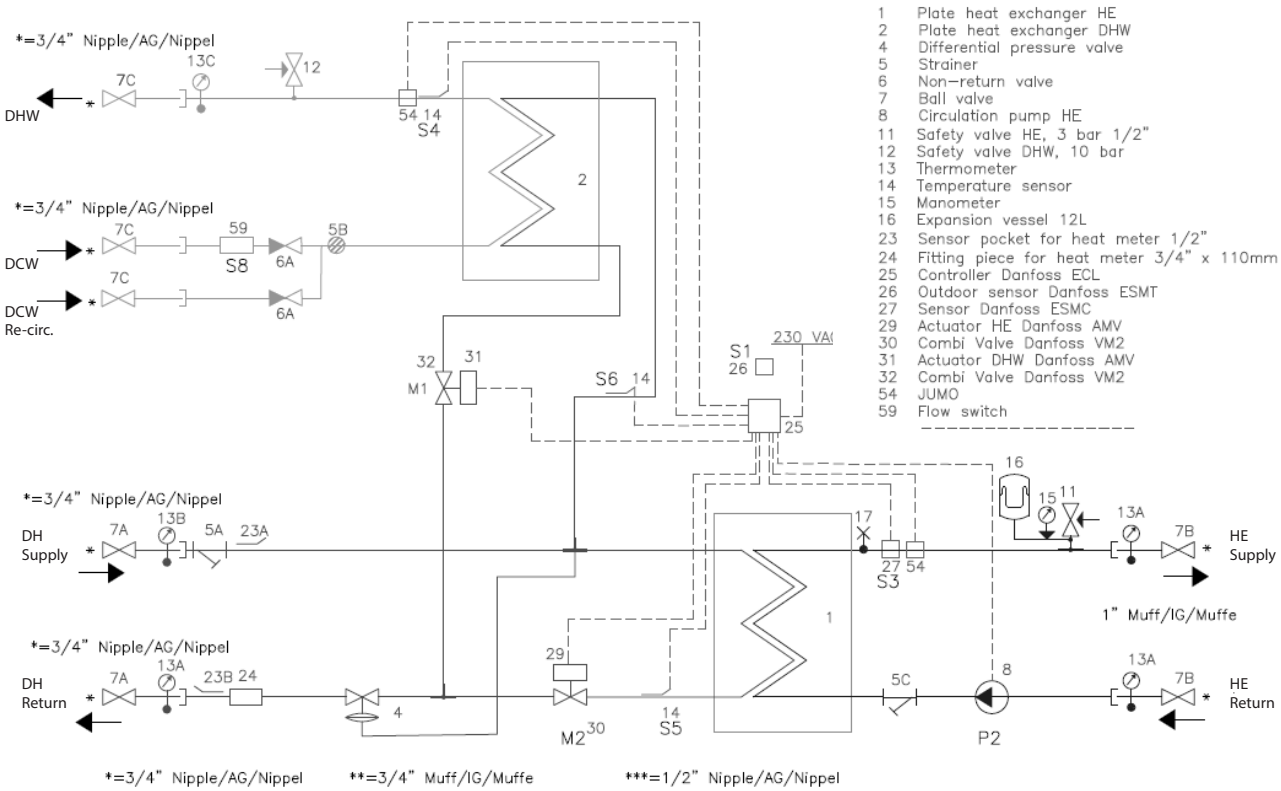
4. MAIN COMPONENTS / CONNECTION- AKVA LUX II VXE HT ECL 310/A266, STW

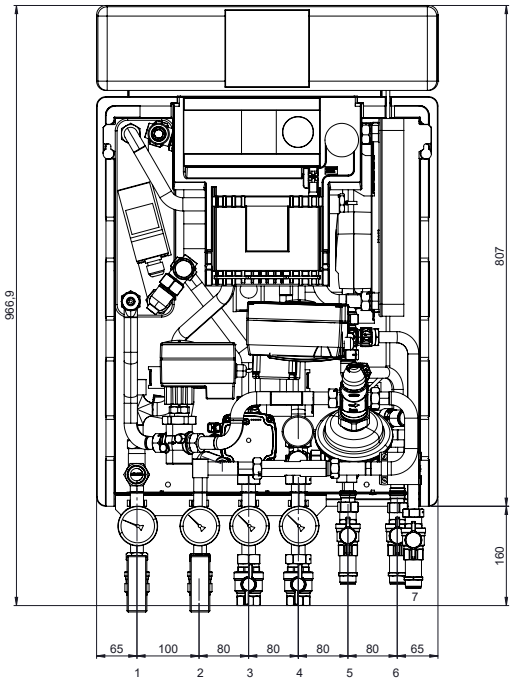
Akva Lux II VXe HT, ECL 310/A266, STW

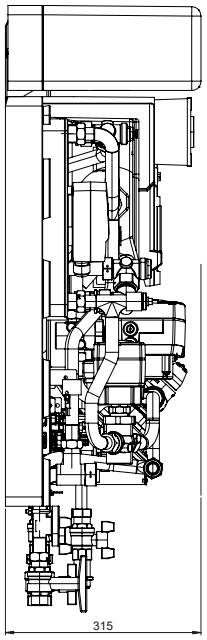
1. Plate heat exchanger HE
2. Plate heat exchanger DHW
4. Differential pressure controller
5. Strainer
6. Non-return valve
7. Ball valve
8. Circulation pump HE
11. Safety valve HE, ½", 3 bar
12. Safety valve DHW, 10 bar
13. Thermometer
14. Temperature sensor
15. Manometer
16. Expansion vessel 12L
23. Sensor pocket for heat meter ½"
24. Fitting piece for heat meter ¾" x 110mm
25. Danfoss controller ECL
26. Outdoor sensor ESMT
27. Danfoss sensor ESMC
29. Danfoss actuator AMV, HE
30. Danfoss control valve VM2, HE
31. Danfoss actuator AMV, DHW
32. Danfoss control valve VM2, DHW
54. Safety thermostat/Temperature Controller, JUMO
59. Flow switch



5. DIAGRAM & DIMENSIONAL SKETCH, EXAMPLE - AKVA LUX II VXE HT A266





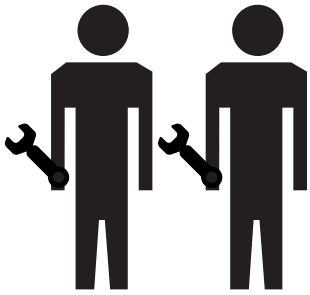


Connections:

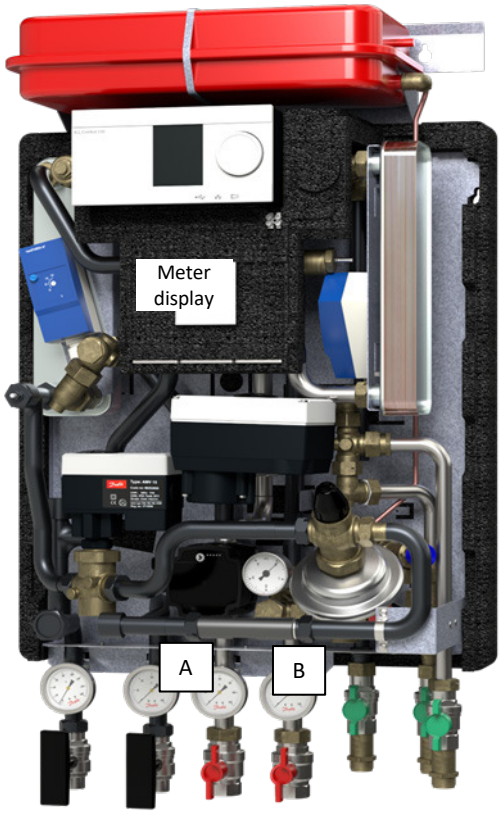
1. District heating (DH) supply
2. District heating (DH) return
3. Heating (HE) return
4. Heating (HE) supply
5. Domestic hot water (DHW)
6. Domestic kold water (DCW)
7. DCW re-circulation

6. GENERAL, MOUNTING OF HEAT METER AND SAFETY VALVES

General
The installation, connection and maintenance of the substation must be performed by qualified and authorised personnel.
Installation must always be performed in accordance with the applicable legislation and in compliance with these instructions.
The substation must be installed so that it is freely accessible and can be maintained without unnecessary disruption. Lift the substation by its mounting plate/rear section and secure it to a solid wall using 4 sturdy bolts (max. 8 mm), screws or expansion bolts positioned in the four keyholes.
Before commissioning, rinse all the pipes in the household piping system thoroughly to remove any impurities, and check and clean the dirt strainers in the substation.
Connect the substation to the household piping in accordance with the labelling at the bottom and/or in accordance with the instructions in this manual.



For fully insulated systems
The insulation front panel on the VXe substations can be removed without using tools. Take hold of the air duct in the top and bottom of the front insulation section and pull carefully forward until the front insulation section releases from the rear section. Then pull gently until the front section is free from the components.



Test and connections
Before filling the system with water, retighten all the pipe connections because vibrations and shocks during transport and handling may have caused leaks. Once the system has been filled with water, tighten all the pipe connections once more before performing pressure test for leaks. After heating of the system, check all the connections and retighten if necessary.
Please note that the connections may feature EPDM rubber gaskets! Therefore, it is important that you **DO NOT OVERTIGHTEN** the union nuts. Overtightening may result in leaks. Leaks caused by overtightening or failure to retighten connections are not covered by the warranty.

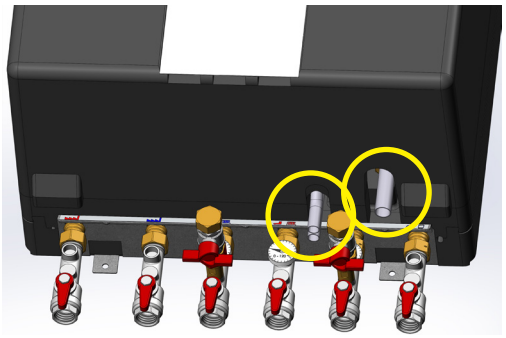
Heat meter, fitting pieces.
The substation is equipped with fitting pieces for heat meter on the district heating return line. (Measurement: 3/4" x 110 mm).

Fitting of heat meters
- Close the four ball valves on the district heating and the heating sides.
- Loosen the union nuts at both ends of the fitting piece (A + B) and remove it.
- Fit the heat meter, - remember to insert gaskets.
- Mount sensor, - remember to insert gaskets.
- Mount temperature sensors in sensorpockets (according to heat meter instructions.
- After mounting of heat meter remember to check and tighten all pipe connections before commissioning the substation.

Meter display (reading unit)
The meter reading unit is placed on the console together with the ECL regulator, as shown in the photo to the right, so that reading of the meter can be done without removing the insulation cover.

Safety valve(s)
Always lead the blow-off pipe from the safety valve to a drain in accordance with applicable legislation.

The insulation cover is be prepared for this and blow-off pipe from the safety valves are led through the slit in the insulating cover as shown in the photo to the right.



7. FILLING THE SYSTEM WITH WATER

Test and connections
Before filling the system with water, retighten all the pipe connections because vibrations and shocks during transport and handling may have caused leaks. Once the system has been filled with water, tighten all the pipe connections once more before performing pressure test for leaks. After heating of the system, check all the connections and retighten if necessary.
Please note that the connections feature EPDM rubber gaskets! Therefore, it is important that you DO NOT OVERTIGHTEN the union nuts. Over-tightening may result in leaks. Leaks caused by over-tightening or failure to retighten connections are not covered by the warranty.

Filling, start-up
Before filling the system with water, retighten all the pipe connections. Once the system has been filled with water, tighten all the pipe connections once more before performing pressure test for leaks. Before filling the system with water and starting-up, check if:

- pipes are connected according to the circuit diagram,
- expansion vessel is connected,
- heat meter is mounted,
- shut-off valves are closed,
- threaded and flanged connections are tightened,
- recirculation, if any, has been established.

Filling the heat exchanger / the system with water:

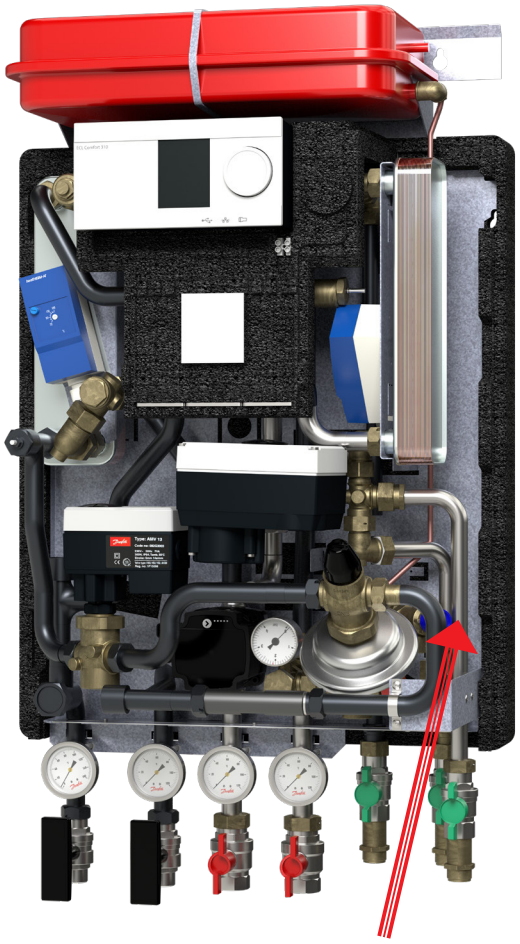
- The pump must be switched off when filling the system with water.
- Open the ball valves for the HE supply and return flow and fill the system with water and at the same time venting the system.
- Fill the heat exchanger / the system with water until the manometer shows a working pressure, which corresponds to the system height + approx. 5 m (approx. 1.2 - 1.5 bar).
- Finally open the remaining ball valves and heat up the system.
- After filling and heat-up of the system it should be vented by means of the air vents on the substation, if any and on the radiators.
- Then switch on the pump.

* **Note**: There is no filling valve inside the station. For refilling use a refill hose, customary for heating systems. **Filling of water to the heating system must be done outside the substation, typically by connection to a cold water supply in the household installation.**

8. RECIRCULATION

Re-circulation set factory installed in Akva Lux VXe HT.

NOTE!
Remember always to mount circulation pump on the circulation pipe.
This not part of the circulation set.



9. ELECTRICAL CONNECTION

Electrical connection
The electrical connection of the substation must be performed by a qualified and authorised electrician in compliance with all applicable rules and regulations.
The station should be connected to a 230 V AC power supply.
The power supply / connection must be carried out in accordance with the applicable regulations and instructions.

The station must be wired and connected to an external main switch so that it can be disconnected during maintenance, cleaning and repairs or in the event of an emergency.

Do not forget to establish potential equalization.

The Akva Lux II VXe HT are delivered with Danfoss ECL Comfort 310 controllers from factory.
The actuator and sensors are mounted in the station. The controller is built into the console at the top of the station.

The station is wired and tested in the factory.
Electrical connections between the controller, pump(s), sensor and actuator(s) are made.

Mounting of outdoor temperature sensor (ESMT)
The outdoor temperature sensor is delivered separately and must be mounted on site according to the enclosed illustrations.

The outdoor sensor is always to be mounted on the coldest side of the property, where it is less likely o exposed to direct sunshine (normally the north side of the property).
The sensor must not be exposed to the morning sun, and should not be placed above windows, doors, air vents or other heat sources, and not under balconies and roof eaves.

Mounting height approx. 2.5 m above ground.

Temperature range: -50 to 50° C.

Electrical connections
The cables can be connected to the sensor in any order.
Connection cable: 2 x 0.4 - 1.5 mm^2

For ECL 310:
Connect the cable ends to ECL controller in common ground terminal and in terminal 29.

Access to ECL base part
Access to the base part for connection of outdoor sensor or the like is obtained by pulling the lock (pin) down with a screwdriver until a yellow line is visible on the lock. Then, the front piece can easily be removed. Lock by pressing the lock (pin) up.

Controller ECL Comfort 310

Supply voltage:	230 V a.c. - 50 Hz
Voltage range:	207 bis 244 V a.c. (IEC 60038)
Power consumption:	5 VA
Load on relay outputs:	4(2) A - 230 V a.c
Load on triac outputs:	0,2 A - 230 V a.c.

Actuator AMV 10 / AMV 13

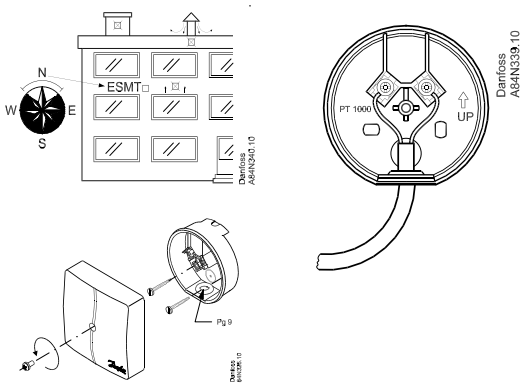
Supply voltage:	230 V a.c. - 50 Hz
Power consumption:	2 / 8 VA

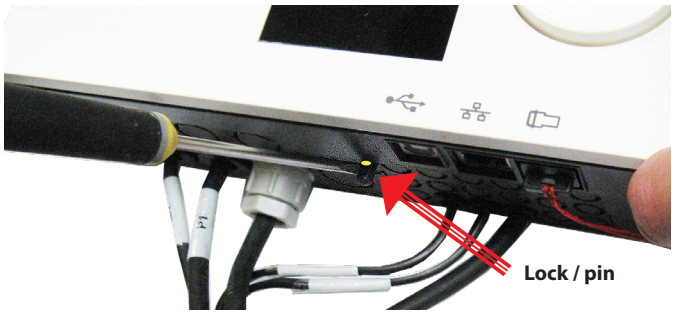
For further information please see enclosed instruction manual.

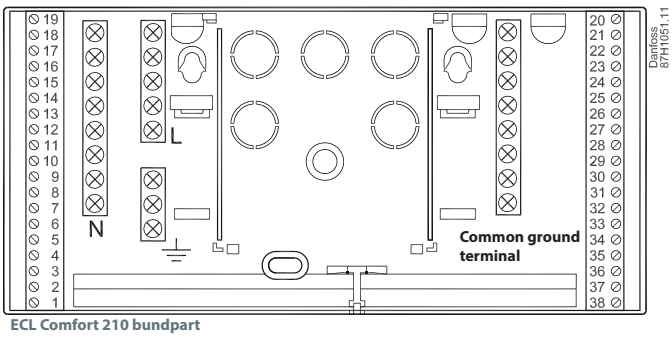
Pumpe UPM3 AUTO/UPM3 FLEX

Supply voltage:	230 V a.c. - 50 Hz
Protection class:	IP44
Power consumption:	Max. 52 Watt

For further information please refer to the enclosed instructions for the circulation pumps.







ECL Comfort 210 bundpart

10. ADJUSTMENT AND COMMISSIONING

General information
PLEASE NOTE! Some models may have a slightly different ap-pear¬ance, but the control function is in principle the same as described below.

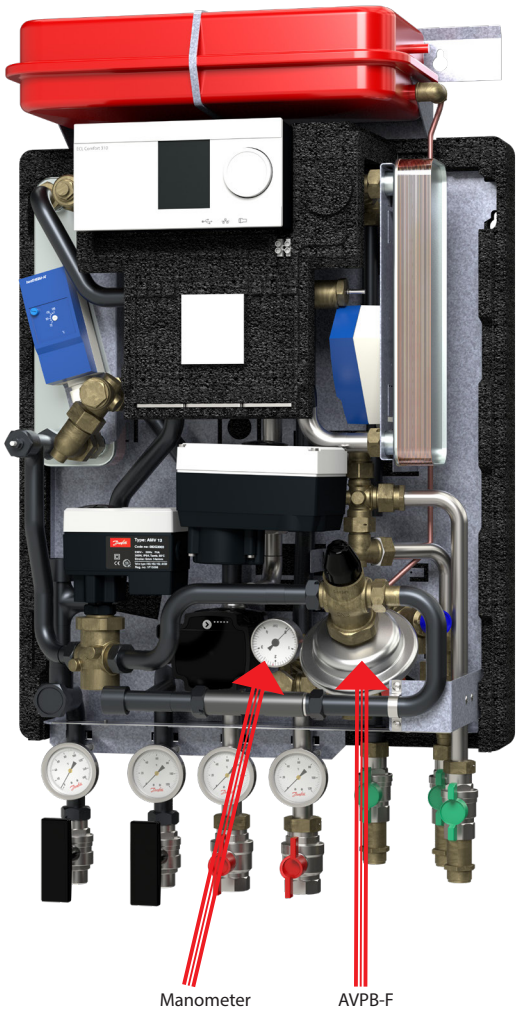
Commissioning
Commission the substation in accordance with the instruction manual.

Filling the system / operating pressure
Fill the unit with water according to the instructions on page 9.
If the pressure drops below 1 bar, water must be added to the sys¬tem.
The operating pressure should never exceed 1.5 bar.
(The safety valve opens at 2,5 bar).

The pressure is read on the manometer.

If system pressure drops dramatically within a short time, heating system should be examined for leakage, - this includes checking the factory set pressure of the expansion vessel, which is normally 0,5 bar.

Differential pressure controller
The differential pressure controller reduces the high, fluctuating pressure in the district heating network to a constant operating pressure.
Akva Lux VXe HT is supplied with an AVPB-F differential pressure controller, which is preset from factory and should not be adjusted afterwards. The controller has a control valve with adjustable flow restrictor and flow setting is being done by the adjustment of the flow restrictor position. Please see relevant instruction manual.



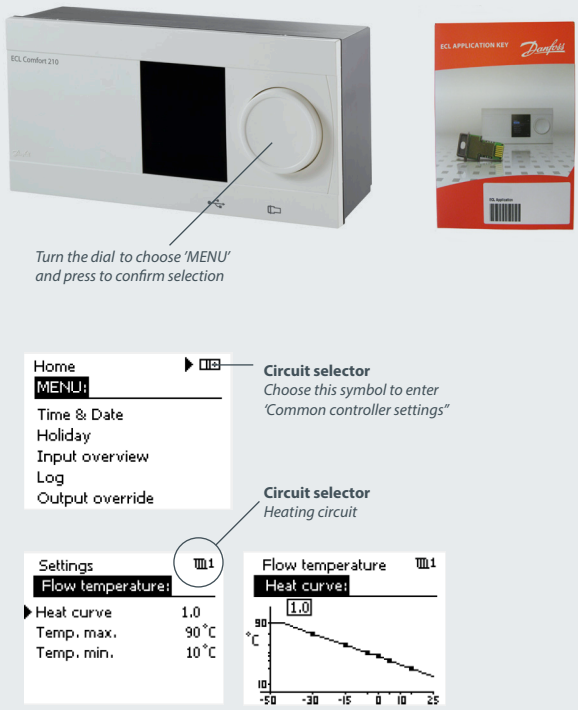
11. HEATING CIRCUIT, DANFOSS ECL 310 AUTOMATICS

Weather-compensated control of the heating circuit Danfoss ECL 310

The temperature for the heating circuit is controlled electronically by the Danfoss ECL controller. The supply temperature ist calculated by the controller on basis of the outdoor temperature.

The ECL Comfort controller is loaded with a selected application by means of an ECL Application Key (Plug-&-Play). The Application Key contains information about application, languages and factory settings. Various applications can be loaded by means of the ECL Application Key, and it is possible to update the controller with new application software.

The controller is factory preset to turn off the heating automatically in the summer period. The controller settings can be changed in accordance with the enclosed producer instructions for the mounted controller.



The controller is pre-programmed (normally) with the following factory settings:

- Language = English,
- Operating mode of the controller = Comfort "Sun" Symbol,
- Application type = A266

Motor speed and motor protection is set and the controller is functional is functionally tested, so it's ready for use.

Start-up of ECL 310 (easy start-up)

When the outside temperature sensor is properly installed and electrically connected to the controller as described in the instructions on page 15, proceed as follows:

1. Connect the controller and switch it on,
2. Choose 'MENU' in any circuit - Confirm and turn the dial and choose 'Common controller settings' in the circuit selector at the top right corner in the display,
   (You navigate in the controller by turning the dial left or right to the desired position. The position indicator in the display (▶) will always show you where you are).
3. Turn dial to select time and date,
   Push the dial to confirm the selection
4. Select time and date,
5. The controller is now ready for use. Set heat curve and temp. max. according to the procedure described below.

Setting / change of factory settings:

6. Choose 'MENU' in any circuit - Confirm and turn the dial and choose' Heating circuit' in the circuit selector at the top right corner in the display (radiator symbol),
7. Then turn the diall and choose 'Settings' and confirm by pushing the dial. Then choose 'Flow temperature' and here you set 'Heat curve' (value), according to the actual system type, including "Temp. max.",
8. Typical setting ranges:

Heating circuit	one-string	two-string	Floor heating
Temp. max.	70-90°C	55-65°C	35-40°C
Heat curve	1,0 - 1,75	0,8 - 1,0	0,1 - 0,5

Note; in systems that feature only floor heating the max. supply temperature must be changed according to the above mentioned information.

If increased heat demand occurs during the heating period, the controller settings can be changed

See ECL Application Key Box with ECL Comfort 210/310 user guide and mounting guide, for further information.

12. CONTROL OF HEATING CIRCUIT

For controlling the heating circuit, the Akva Lux II VXe HT is supplied with a Danfoss AMV 10 / AMV 13 actuator and a Danfoss two-way-motorized control valve VM 2, placed on the primary return flow line. The AMV actuator is electrically wired to the controller from factory. The actuator has undergone a functional test and is preset from factory.

AMV 10
In the event of operating disturbances, the actuator can be shut off manually by turning the manual override knob on top of the actuator clockwise. Please note that the knob can be "tight" to turn.

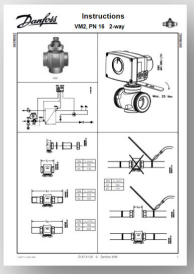
AMV 13
Depending on the selected setting of the safety function, the AMV 13 valve is fully opened or closed when the voltage supply is switched off.

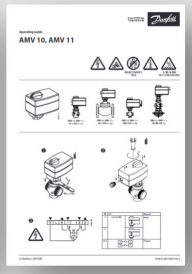
For additional information see manuals for:
Motorized control valve VM2
Electronic actuator AMV 10
Electronic actuator AMV 13

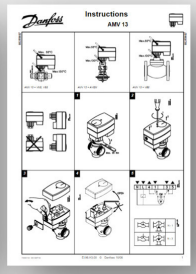

VM2


AMV 10


AMV 13





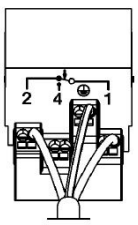


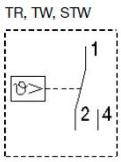
Safety function, Jumo AT
The heating circuit(s) can be supplied with a safety thermostat Jumo AT for protection against overheating.

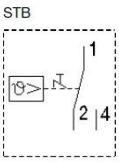
From factory the Jumo AT safety thermostat is pre-wired to the Danfoss ECL controller with a 2 m cable, enabling the thermostat housing to be mounted in any mounting position on the household piping (HE supply) on site.

For additional information see the enclosed manuals for:
Jumo AT

Wiring diagrams







13. HEATING CIRCUIT, PUMP

Grundfos Pump UPM3 FLEX A/S

Grundfos UPM3 Flex AS has various optional settings, which can be selected with the push-botton. **See fig. 1 - User interface.**

The pump is set from factory to Proportional Pressure 2.

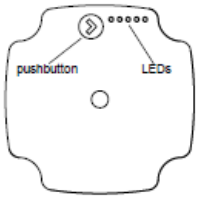


Fig. 1. Control panel with a push button and five LED´s

The user interface shows:
* performance view (during operation)
  - operation status
  - alarm status
* settings view (after pressing the button)

During operation, the display shows the performance of the pump. By pressing the button, the display changes status or you can change settings.

Fig. 2. Performance view

The LEDs show the power consumption for the pump. When the pump is running, LED 1 is green. The four yellow LEDs indicate the current power consumption.

See fig. 2 - Performance view.

Performance % of P1 max.	LED 1	LED 2	LED 3	LED 4	LED 5
0% (standby)	●				
0 - 25%	●	●			
25 - 50%	●	●	●		
50 - 75%	●	●	●	●	
75 - 100 %	●	●	●	●	●

Alarm status
In case the 1st LED is red the pump has detected one or more alarms.

See fig. 3 - Alarm status.

When there is no active alarm anymore the user interface switches back to operation mode shortly and then showing power consumption.

Fig. 3. Alarm status

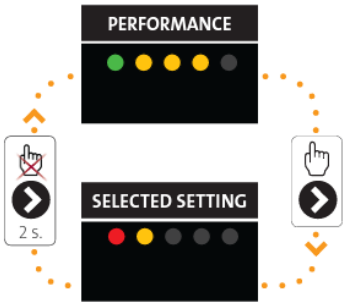
Alarm Status	LED 1	LED 2	LED 3	LED 4	LED 5
Blocked	●				●
Supply voltage low	●			●	
Electrical error	●		●		

13. HEATING CIRCUIT, PUMP

Selected Setting view
You can switch from the performance view to the selected settings view by pressing the push button. The LEDs indicate the actual setting. The settings view shows which mode controls the circulator. You cannot change settings at this stage. After 2 seconds, the display switches back to performance view.

If LED 1 is green, it indicates operation or internal control.
If LED 1 is red, it indicates alarm or external control.
LED 2 and 3 indicate the different control modes and LED 4 and 5 indicate the different curves.

Fig. 4. Selected setting view



Note:
As appears in fig. 4, the example of "performance" and "selected setting" shows:
• "performance" - medium/high performance 50 % ≤ P1 ≤ 75 %
• "selected setting"- PWM A profile

Setting the control mode
Check the pump setting by pressing the button once (one constant pessure). The LEDs will briefly (2 sec.) show the pump setting before changing back to showing the power consumption.
See fig. 5 - Pump setting view.

If the pump setting does not give the desired distribution of heat in
the rooms of the house, change the pump setting.
See fig. 5 - Pump setting view.

Before starting the setting, make clear what the display should show for the new setting (**see fig. 5**).

To change the pump setting, choose the setting you want (see fig. 5), press the button down for more than 2 seconds (less than 10) and the pump switches to setting selection, the LEDs start flashing and display the current setting. Then press the button until the LEDs shows the desired setting. The LEDs flash and when they stop the new setting is saved. The LEDs return to show power cunstumption.

Please note that if the LEDs do not flash after 2 seconds, possibly the pump setting is locked. To unlock, press the button down for more than 10 seconds. LEDs will flash and the pump is unlocked. To lock the pump, repeat the procedure.

For more information, se enclosed Grundfos instructions.

Fig. 5. Pump setting view

	LED 1	LED 2	LED 3	LED 4	LED 5
PWM profile A	●	●			
Curve 1					
Curve 2				●	
Curve 3				●	●

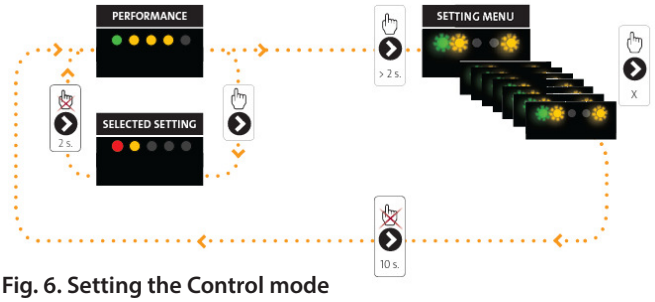


Fig. 6. Setting the Control mode

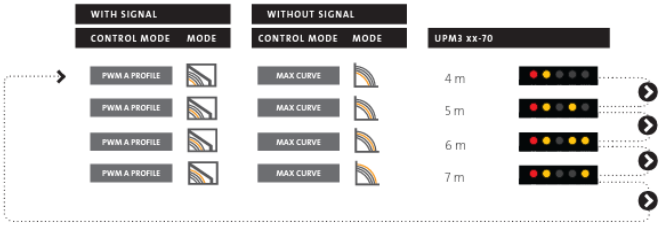


Abb. 7. Toggling the settings of UPM3 FLEX AS

14. DOMESTIC HOT WATER

For controlling the Domestic Hot Water circuit, the Akva Lux II VXe HT is supplied with a Danfoss AMV 30 / AMV 33 actuator and a Danfoss two-way motorized control valve VM2, placed on the primary return flow line.
The AMV actuator is electrically wired to the controller from factory. The actuator has undergone a functional test and is preset from factory.

AMV 30
In the event of operating disturbances, the actuator can be shut off manually by turning the manual override knob on top of the actuator clockwise. Please note that the knob can be "tight" to turn.

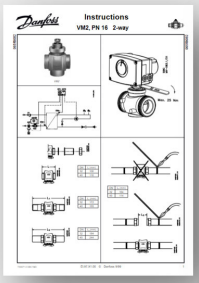
AMV 33
Depending on the selected setting of the safety function, the AMV 13 valve is fully opened or closed when the voltage supply is switched off.

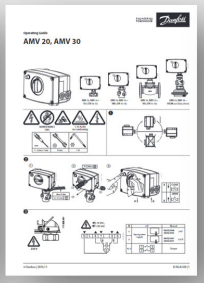
For additional information see manuals for:
Motorized control valve VM2
Electronic actuator AMV 30
Electronic actuator AMV 33
.

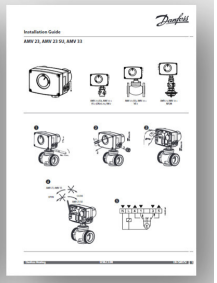
VM2

AMV 30

AMV 33





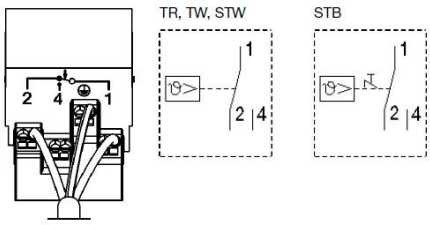


Safety function with temperature controller, Jumo AT
The DHW circuit can be supplied with a safety function with temperature controller, Jumo AT, for protection against overheating.

From factory the Jumo AT safety thermostat is pre-wired to the Danfoss ECL controller with a 2 m cable, enabling the thermostat housing to be mounted in any mounting position on the household piping on site.

For additional information see the enclosed manuals for:
Jumo AT

Wiring diagrams

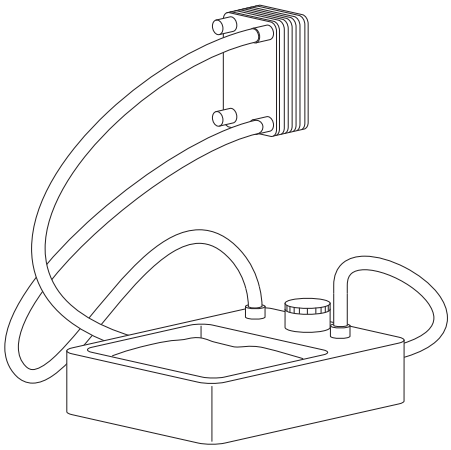


15. MAINTENANCE

Maintenance work
Is only to be carried out by qualified and authorised personnel.

Inspection
The water heater should be checked regularly by authorised personnel. Any necessary maintenance must be performed in accordance with the instructions in this manual and other sets of instructions. During service the dirt strainers are to be cleaned – including the filter on the controller, all pipe connections must be tightened and the safety valve must be function tested by turning the lever.

Rinsing/cleaning of plate heat exchanger
To clean the plate heat exchanger, rinse it by running clean water through the exchanger at high speed and in the opposite direction to the normal flow. This will remove any dirt deposits that may have built up in the exchanger. If rinsing with clean water is not sufficient, the exchanger can also be cleaned by circulating a cleaning agent approved by Danfoss (e.g. Kaloxi or Radiner FI cleaning fluid) through the exchanger. Both these cleaning fluids are environmentally friendly and can be disposed off through the standard sewer system. After use of a cleaning fluid, the plate heat exchanger must be rinsed thoroughly with clean water.



Acidification of brazed plate heat exchanger
As a starting point, we do not recommend acidification of the exchanger. Deposits of limescale may build up in plate heat exchangers for domestic hot water on account of the large temperature fluctuations, and because aerated water is used on the secondary side. If it becomes necessary to clean the exchanger with acid, this can be done as shown on the drawing to the right. Brazed plate heat exchangers can withstand rinsing with a dilute acid solution - e.g. 5% formic, acetic or phosphoric acid).

Measures after maintenance work
After maintenance work and before commissioning:
- Check that all screwed connections are tight.
- Check that all safety features, covers, that were removed, have been replaced properly.
- Clean the working area and remove any spilled materials.
- Clear all tools, materials and other equipment from the working area.
- Connect to energy supply and check for leaks.
- Vent the system.
- Carry out any necessary adjustment again.
- Make sure that all safety features on the device and the system work properly.

Meter reading
The caretaker/owner must perform visual checking and reading of the district heating meter at short, regular intervals. (The meter is not a part of the delivery from Danfoss).
Service procedures must only be performed by trained, authorised personnel.
NB! Excessive consumption for whatever reason is not covered by the Danfoss warranty.

Cooling / Return temperature reading
Cooling – i.e. the difference between the supply and return temperature of the district heating water – has a significant effect on overall energy economy. Therefore, it is important to focus on the supply and return temperature in the heating system. The difference should typically be 30–35°C. Please note that a low district heating return temperature is directly related to the return temperature from the heating circuit and the return temperature of the circulation water. It is therefore important to focus on these return temperatures.

15. MAINTENANCE SCHEDULE (recommendations)

Interval	Maintenance work	Comments
At least once a year	Check all connections for leaks	If you identify a leak, replace the gaskets and retighten the pipe connections
	Check that the safety valve on the cold water supply is functioning correctly.	Check the functionality by turning the lever on the safety valves
	Check that all components are intact and functioning as intended	In the event of irregularities, lack of functionality or visible faults and defects in a component, replace the component in questionn
	Clean all dirt filters/strainers in the substation	Replace any filters that are not intact
	Check that any electrical cables are in serviceable condition and that it is possible to disconnect the electrical power supply to the substation	Visual check. Check whether it is possible to disconnect the current to the substation.
	Check the pipes and exchanger for signs of corrosion	Visual check
	Check that the insulation cover is intact	Make sure that the insulation cover encloses the substation tightly
	Check that the temperature regulators are set in accordance with the instructions in this manual	Follow the instructions in the present manual
	Check the functions of all shut-off valves	Check that the ball valves open and close as they should

*)Enduser/caretaker.

Note! After maintenance work has been carried out all gaskets HAVE to be replaced.

16. TROUBLE SHOOTING - HEATING

Fundamental

In the event of disruptions to operation, you should fundamentally - before commencing the actual troubleshooting - check whether:

- the system is correctly connected
- the district heating supply temperature is at its normal level
- the differential pressure is at its normal level. Ask your district heating supplier if necessary
- there is a power supply to the system - pump and automatics
- the dirt strainer in the district heating supply pipe is clean
- there is air in the system (if the system is vented)

Problem	Possible cause	Solution
No heat	Dirt strainer in the district heating or heating return line clogged.	Clean the filter/dirt strainer.
	Filter in district heating meter clogged.	Cean the filter (in consultation with the district heating plant).
	Defective or incorrectly set differential pressure controller.	Check the functions of the differential pressure controller - if necessary, clean the valve seat.
	Air pockets in the system.	Vent the system thoroughly - see the instructions.
Uneven distribution of heat	Air pockets in the system.	Vent the system thoroughly - see the instructions.
Poor cooling	Insufficient heating surface / radiators too small compared to the total heating requirement of the building.	Increase total heating surface.
	Poor utilisation of the existing heating sursurface.	Turn on all radiators and prevent the radiators in the system from becoming warm at the bottom.
No heat	Defective thermostat (sensor).	Replace sensor.
	Defective actuator - or possibly dirt in the valve housing.	Check that the actor is functioning correctly - clean the valve seat if necessary.
	Automatic components/controller incorrectly adjusted or defective - or possibly power outage.	Check that the controller setting is correct - see the separate instructions for the controller. Check the power supply. Temporarily set the actuator to “manual” control - see the instructions for the heating system.
	The pump is not working.	Check that there is a power supply for the pump, and that it is operating. Check that there is no air in the pump housing - see pump manual.
	The pump is set at too low speed of rotation (not all system types).	Set the pump to a higher speed - see the instructions for the heating system.
	Air pockets in the system.	Vent the installation thoroughly - see the instructions.

16. TROUBLE SHOOTING - DOMESTIC HOT WATER

Fundamental

In the event of disruptions to operation, you should fundamentally - before commencing the actual troubleshooting - check whether:

- the system is correctly connected
- the district heating supply temperature is at its normal level
- the differential pressure is at its normal level. Ask your district heating supplier if necessary
- there is a power supply to the system - pump and automatics
- the dirt strainer in the district heating supply pipe is clean
- there is air in the system (if the system is vented)

Problem	Possible cause	Solution
DHW*, no hot water	Non-return valve in the circulation pipe defective (leads to mixing - the circulation water pipes become cold during tapping).	Replace the non-return valve.
Temperature too low / variations in temperature	Non-return valve in thermostatic mixer in the bathroom defective - results in hot and cold water mixing. Please note that fluctuating temperatures may occur at other tapping points in the system! NB, Check all mixers in the house for faults/defects!	Replace the mixer or perhaps only the non-return valve.
Lack of hot water pressure	Clogged strainer in the cold water meter or possibly in the cold water supply in the unit. Califed heat exchanger.	Clean the strainer (cold water meter, in consultation with the water supply company). Replace the heat exchanger.
Long wait for hot water	Circulation pump out of order.	Check whether the pump is running - and whether there is a power supply to the pump. Make sure that there is no air in the pump housing.
No hot water	Dirt strainer in the district heating supply line clogged. Defective sensor. Defective actuator - or possibly dirt in the valve housing. Automatic components/controller incorrectly adjusted or defective – or possibly power outage.	Clean the dirt strainer. Replace sensor. Check that the actuator is functioning correct – clean the valve if necessary. Check that the controller setting is correct – see the separate instructions for the controller. Check the power supply. Temporary set the actuator to “manual” control – see the instructions for the Domestic Hot Water system.
Hot water temeperature too low	As above. Non-return valve in the circulation pipe defective (leads to mixing - the circulation water pipes become cold during).	As above. Replace non-return valve.
Hot water temperature too high	Defective sensor. Electronic controller incorrectly adjusted	Replace sensor. Check that the controller setting is correct – see the separate instructions for the controller.
Temperature falls during tapping (lack	Califed plate heat exchanger.	Replace the plate heat exchanger.

17. EU DECLARATION OF CONFORMITY

ENGINEERING TOMORROW

Danfoss A/S
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Denmark
CVR nr.: 20 16 57 15

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EU DECLARATION OF CONFORMITY

Danfoss A/S

Danfoss Redan

declares under our sole responsibility that the

Product category:

Small indirect substations with electrical equipment

Type designation(s):

VXe Solo H OP HT ECL310 Type x	VXe Solo H OP HT ECL310 Type x with safety function
VXe Solo H HT ECL310/A237 Type x	VXe Solo H HT ECL310/A237 Type x with safety function
VXe Solo HWP HT ECL310/337 Type x	VXe Solo HWP HT ECL310/337 Type x with safety function for heating
VXe Solo HWS HT ECL310/A237 Type x	VXe Solo HWS HT ECL310/A237 Type x with safety function for heating
Akva Lux II VXe HT Type x HE + Type y DHW fully insulated	Akva Lux II VXe HT Type x HE + Type y DHW fully insulated safety function

Where x and y = 1-3

Covered by this declaration is in conformity with the following directive(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.

EMC Directive (2014/30/EU)

EN 61000-6-1:2007. Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments

EN 61000-6-3:2007 + A1:2011. Electromagnetic compatibility – Generic standard: Emission for residential, commercial & light industry.

Date: 2023.06.28 Place of issue: DK-8600 Silkeborg	Issued by **Signature:** **Name:** Jan Bennetsen **Title:** Engineering Specialist	Date: 2023.06.28 Place of issue: DK-8600 Silkeborg	Approved by **Signature:** **Name:** Claus Thusgaard **Title:** Director, Operations

Danfoss only vouches for the correctness of the English version of this declaration. In the event of the declaration being translated into any other language, the translator concerned shall be liable for the correctness of the translation

ID No: DHEU00E003 Revision No:

Page 1 of 4

18. COMMISSIONING CERTIFICATE

The substation is the direct link between the district heating supply network and the household piping system. All supply pipes and the pipes in the household piping system must be checked and rinsed before commissioning. Once the system has been filled with water, all pipe connections must be retightened before performing pressure test for leaks. The dirt strainers must be cleaned and the substation must be adjusted in accordance with the instructions in this manual.

It is important to comply with all technical regulations and the applicable legislation in every respect.

Installation and commissioning must only be performed by trained, authorised personnel.

The substation is checked in the factory for leaks before delivery. Leaks are however possible due to vibrations caused by transport, handling and heating of the system and therefore it is important to check all connections and to retighten if necessarys before commissioning. Please note that the connections may feature EPDM gaskets! **Therefore it is important that you DO NOT OVER-TIGHTEN the connections.** Over-tightening may result in leaks. Leaks caused by ove-rtightening or failure to retighten connections are not covered by the warranty.

To be filled-out by the installer

This substation has been retightened, adjusted and commissioned

on the: _____ Date/Year

by installer: _____ Company name (stamp)

19. GUIDELINES FOR WATER QUALITY IN DANFOSS BRAZED HEAT EXCHANGERS

ENGINEERING TOMORROW

Danfoss A/S
Danfoss Heating Segment - DEN
BU HEX - Local Inspection Center Kamnik Slovenia

Guidelines for water quality in Danfoss brazed heat exchangers with plates of EN 1.4404 ~ AISI 316L

Danfoss has prepared this guideline for the water quality of tap water and district heating water used in plate heat exchangers of stainless steel (EN 1.4404 ~ AISI 316L) brazed with pure copper (Cu), copper -nickel (CuNi) or Stainless Steel (StS). It is important to point out that the water specification is not a guarantee against corrosion, but it must be considered as a tool to avoid the most critical water applications.

			Plate	Brazing material		
Parameter	**Unit**	**Value or concentration**	**AISI 316L W.Nr. 1.4404**	**Cu**	**CuNi**	**StS**
pH		< 6.0	o	-	-	o
		6,0 – 7.5	+	o/-	o	+
		7.5 – 10.5	+	+	+	+
		>10.5	+	o	o	+
Conductivity	µS/cm	<10	+	+	+	+
		10 – 500	+	+	+	+
		500 – 1000	+	o	+	+
		>1000	+	-	o	+
Free Chlorine	mg/l	<0.5	+	+	+	+
		0.5 – 1	o	+	+	+
		1 – 5	-	o	o	o
		>5	-	-	-	-
Ammonia (NH_3, NH_4^+)	mg/l	<2	+	+	+	+
		2 – 20	+	o	o	+
		>20	+	-	-	+
Alkalinity (HCO_3^-)	mg/l	<60	+	+	+	+
		60 – 300	+	+	+	+
		>300	+	o	+	+
Sulphate (SO_4^{2-})	mg/l	<100	+	+	+	+
		100 – 300	+	o/-	o	+
		>300	+	-	-	+
HCO_3^- / SO_4^{2-}	mg/l	>1.5	+	+	+	+
		<1.5	+	o/-	o	+
Nitrate (NO_3)	mg/l	<100	+	+	+	+
		>100	+	o	+	+
Manganese (Mn)	mg/l	<0.1	+	+	+	+
		>0.1	+	o	o	+
Iron (Fe)	mg/l	<0.2	+	+	+	+
		>0.2	+	o	+	+
* Hardness ratio $[Ca^{2+}, Mg^{2+}]/[HCO_3^-]$	/	0 – 0.3	+	-	-	+
		0.3 – 0.5	+	o/-	+	+
		>0.5	+	+	+	+

+	**Good corrosion resistance**
o	****Corrosion could happen when more parameters are evaluated with o**
o/-	**Risk of corrosion**
-	**Use is not recommended**

* Hardness ration limits defined per experience and internal tests in Danfoss laboratory
** In case of three or more parameters evaluated with o consultancy is needed with Consultant for Corrosion & Microbiology or BU HHE Representative

Recommended Chloride concentration to avoid Stress Corrosion Cracking (SCC) in the stainless-steel plates:

Application temperature	Chloride concentration
at T ≤ 20°C	max 1000 mg/l
at T ≤ 50°C	max 400 mg/l
at T ≤ 80°C	max 200 mg/l
at T ≥ 100°C	max 100 mg/l

For more information please follow this link:
https://assets.danfoss.com/documents/192075/

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