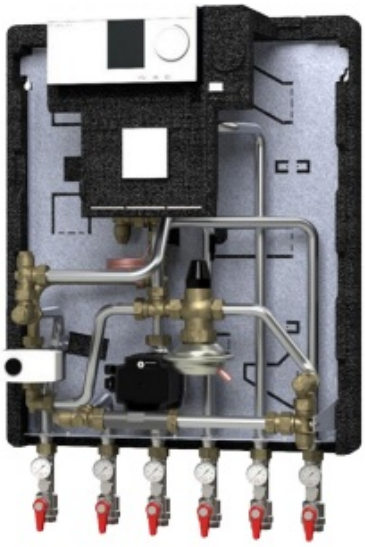
Danfoss Se Solo HWP Heating Controller User Guide

Contents

Danfoss Se Solo HWP Heating Controller



INSTALLATION INSTRUCTIONS, SAFETY AND HANDLING

Instructions

- Please read these instructions carefully before installing and commissioning 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 property damage.
- Exceeding the recommended operating parameters considerably increases the risk of personal injury and/or property damage.
- Installation, commissioning, and mainte-nance 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 the 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 16, page 20 for more detailed Guidelines for Water Quality in Dan-foss 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 lo-cal 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 near the substation.
- Warning of high pressure and high temperature
- The maximum supply temperature in the district heating network can be up to 90°C and the max. operating pressure is 16 bar. This may result in a risk of scalding from touching the substation and from out-flow of the medium (water/steam). Exceeding the

- substation design data and operating parameters for pressure and temperature carry 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 appropri-ate assistance.
- If the domestic hot water is discolored 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 result in loss of warranty.

Reach

- All products of the Akva Lux II Triple 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 that 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 elec- tri-cal 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 ac- accordance with the provisions 60364-4-41: 2007 and IEC 60364-5-54: 2011. The 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 the grounding symbol.

Disposal

- Dispose of the packaging following 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 following the applicable local regulations for the disposal of the individual components.

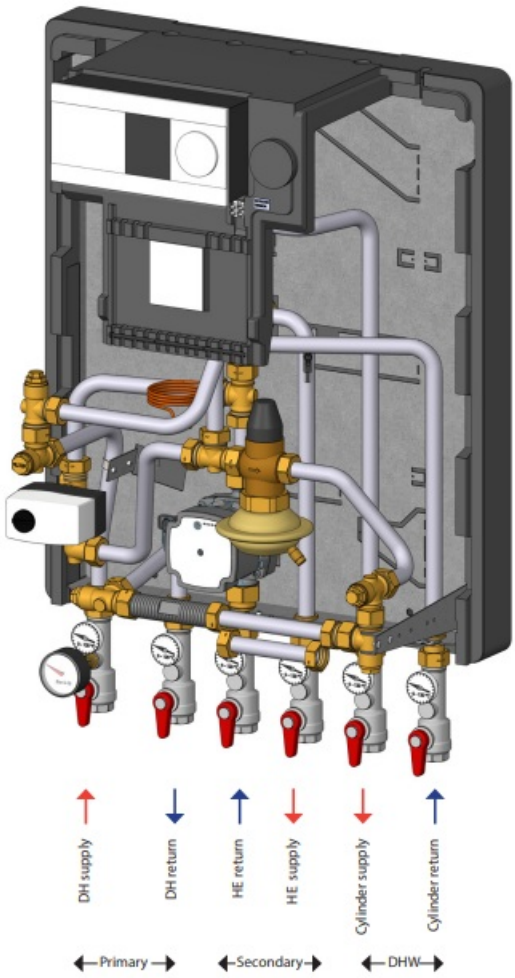
GETTING STARTED – QUICK GUIDE FOR EASY START-UP

Mounting

- The substation must be installed and connected by authorized service personnel only.
- Allow for adequate space around the substation for mounting and maintenance purposes.
- Prior to the substation installation, all substation pipes and connections should be cleaned and rinsed.
- Connect the substation to the household piping per the labeling at the bottom and/or follow 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 Se-Solo HWP

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. Open the ball valve and heat up the system.
6. Check the substation and the household piping thoroughly for leaks.
7. Pressure test the entire system for leaks following the applicable regulations.
8. Connect pump and automatic components, if any, to the electricity supply, but do not switch on the power.
9. Heat the system and vent the radiator circuit/heating side thoroughly on the radiators and the air valve, if any.
10. Connection Now switch on the pump and automatic components, if any.
11. Finish by adjusting the substation in accordance with the instructions manuals and remember to fill out the Commissioning Certificate



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!

DESCRIPTION / MAIN COMPONENTS / CONNECTIONS

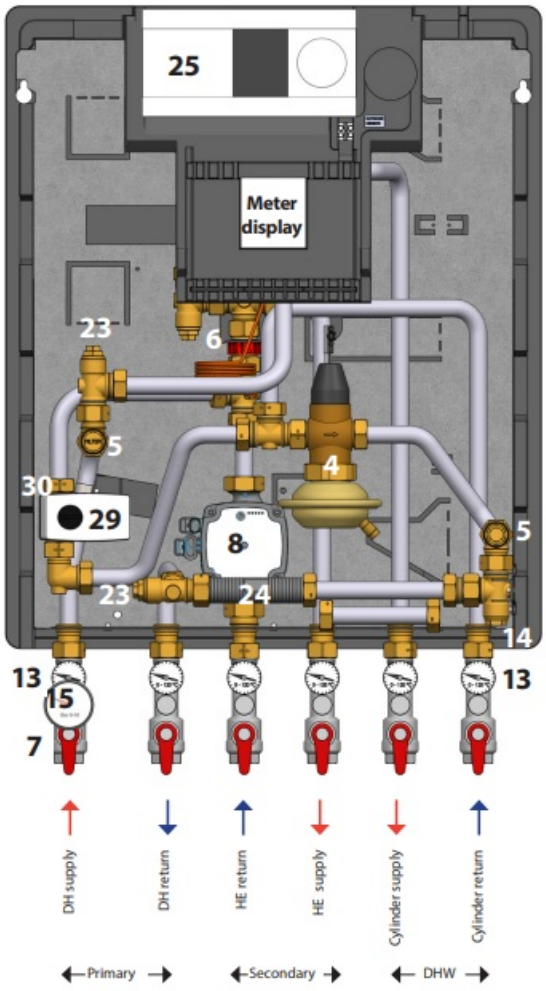
Description

- District heating substation for direct heating with mixing loop for single-family, semi-detached, and terraced houses as well as flats.
- With one heat-ing circuit and with connection pipes for the cylinder on the primary side. Designed for wall-mounting.
- The heating temperature is controlled by an electronic temperature controller Danfoss ECL with an outdoor temperature sensor.
- The substation is supplied witha mixing circuit. The task of the mixing circuit is to ensure a correct supply temperature for the heating circuit (to protect the heating circuit against too high temperatures) and to ensure, that the return water is cooled down to the required temperature before it flows back to the district heating plant. The mixing circuit temperature is controlled by an electronic temperature controller Danfoss ECL.

Se-Solo HWP – Main components

- Differential pressure controller, AVPB-F
- Strainer

- Non-return valve
- Ball valve
- Pump
- Thermometer
- Pocket for pressure gauge
- Manometer
- Air valve
- Sensor pocket for heat meter
- Fitting piece for heat meter ¾” x 110 mm
- Controller Danfoss ECL310
- Danfoss actuator AMV
- Control valve, VS2



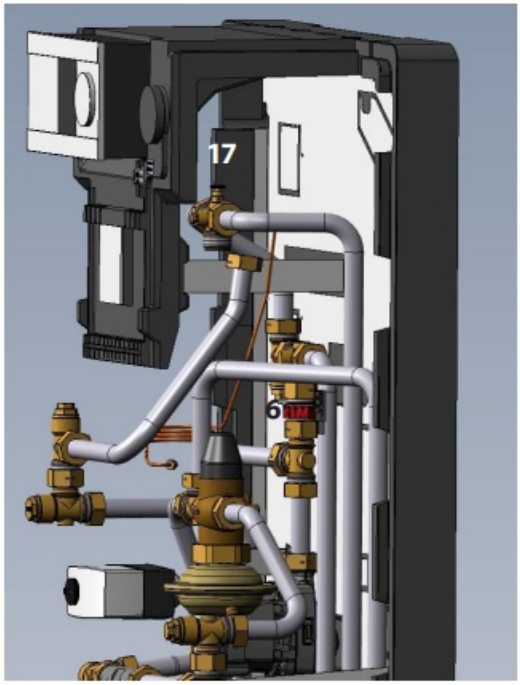
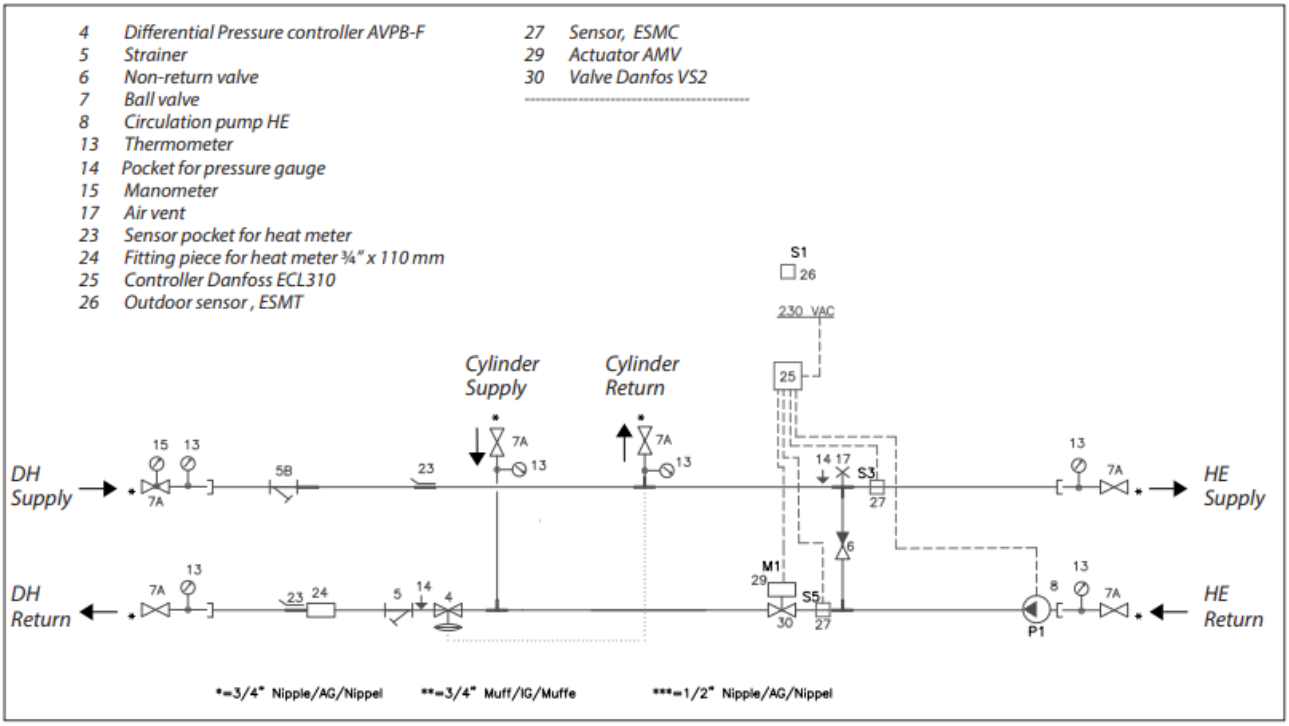
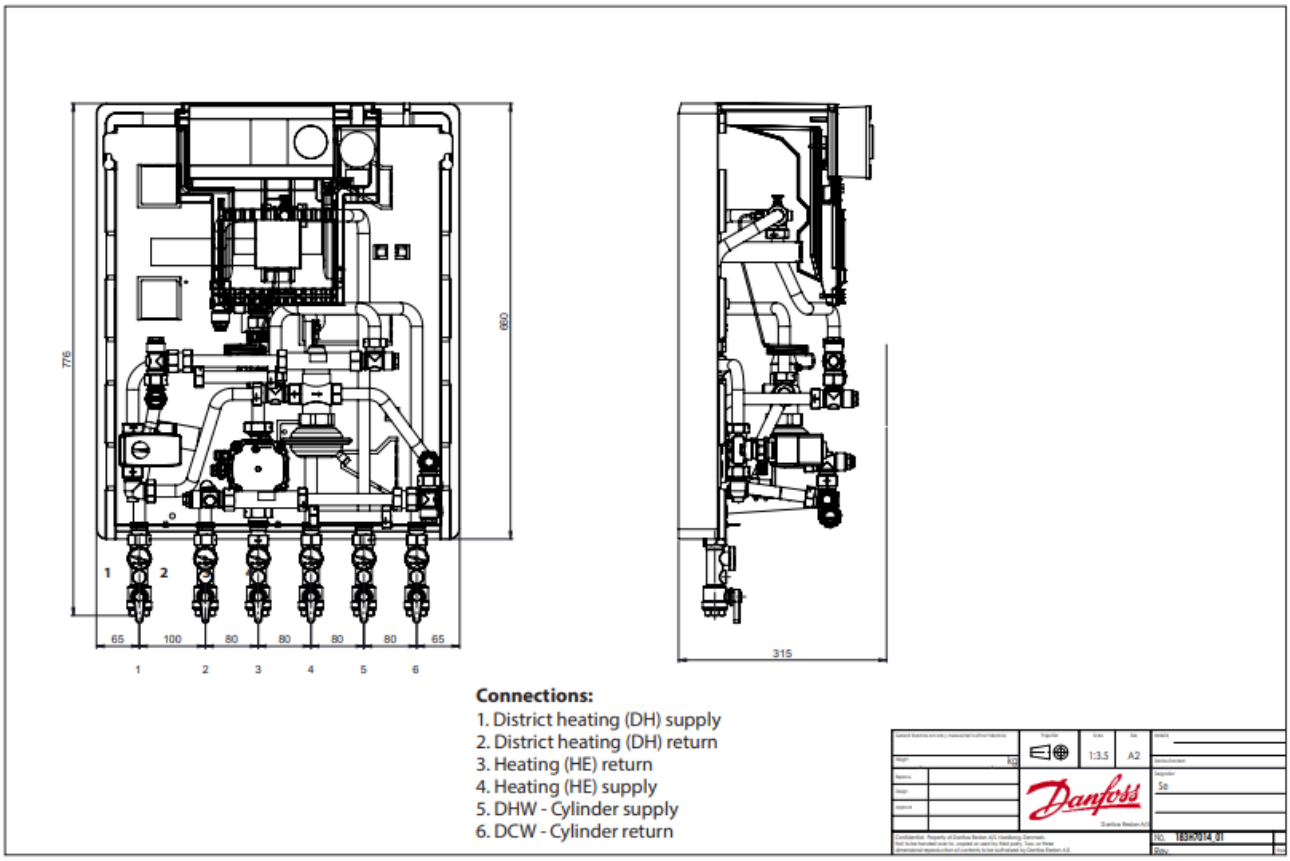


DIAGRAM & DIMENSIONAL SKETCH, EXAMPLE – Se-SOLO HWP





GENERAL, MOUNTING OF HEAT METER AND SAFETY VALVES

General

- The installation, connection, and maintenance of the substation must be performed by qualified and authorized personnel. Installation must always be performed following 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 under the labeling at the bottom and/or following the instructions in this manual.

For fully insulated systems

- The insulation front panel on the Se Solo HWP 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 a pressure test for leaks. After heating the system, check all the connec-tions and retighten if necessary.
- Please note that the connections may feature EPDM rubber gaskets! Therefore, you mustn't 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 the heat meter on the district heating return line. (Measurement: 3/4" x 110 mm).

Fitting of heat meters

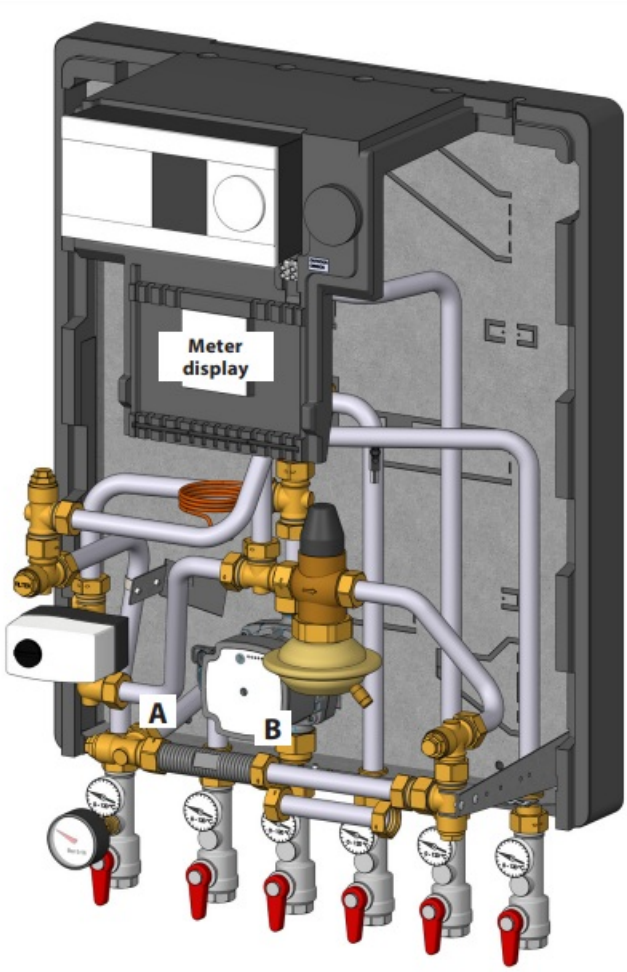
- Close the four-ball valves on the district heating and the heating sides.
- Loosen the union nuts at both ends of the thing piece (A + B) and remove it.
- Fit the heat meter, – remember to insert gaskets.
- Mount sensor, – remember to insert gaskets.
- Mount temperature sensors in sensor pockets (according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

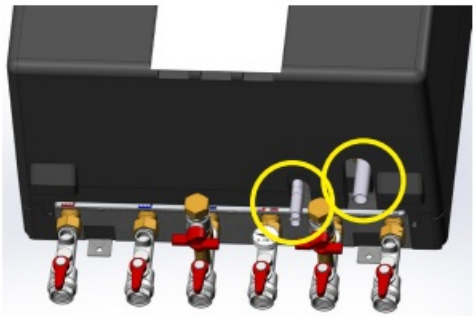
Meter display (reading unit)

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

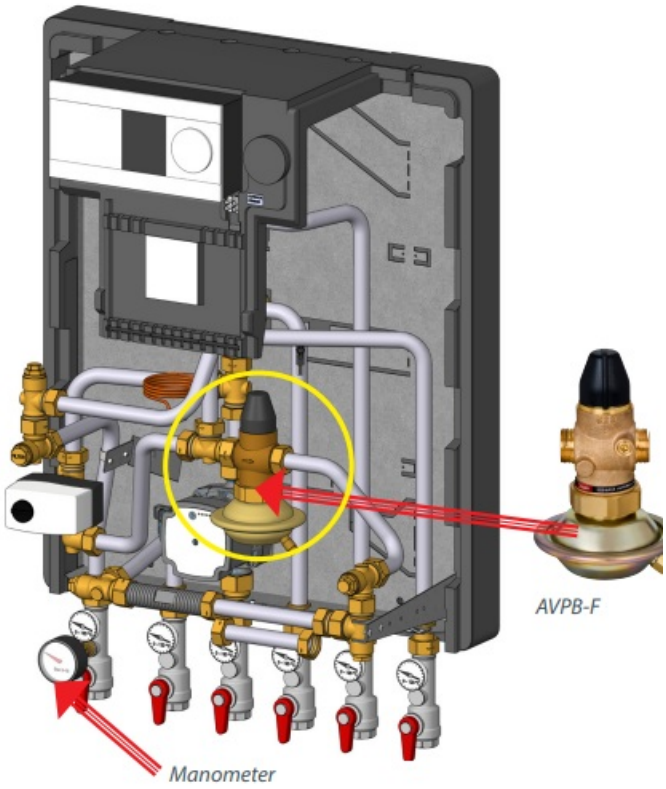
Safety valve(s), if any

- Always lead the blow-o pipe from the safety valve to a drain following 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





ADJUSTMENT AND COMMISSIONING



General information

- PLEASE NOTE! Some models may have a slightly different appearance, but the control function is in principle the same as described below.

Commissioning

- Commission the substation following the instruction manual.

Filling the system/operating pressure

- Fill the unit with water according to the instructions on page 16. 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, the 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.
- Se-Solo HPW is supplied with an AVPB-F differential pressure con-troller, which is preset from the factory and should not be adjusted afterward.
- The controller has a control valve with aan adjustable flow restrictor and flow setting is being done by the

adjustment of the flow restrictor position. We suggest that you contact your local plumber for assistance.

ELECTRICAL CONNECTION

Electrical connection
The electrical connection of the substation must be performed by a qualified and authorized 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 under 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 Se-Solo HWP is delivered with Danfoss ECL Comfort 310 controllers from the 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 mm²
- For ECL 310:
  Connect the cable ends to the ECL controller in the common ground terminal and in terminal 29.

Access to ECL base part

- Access to the base part for connection of the 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

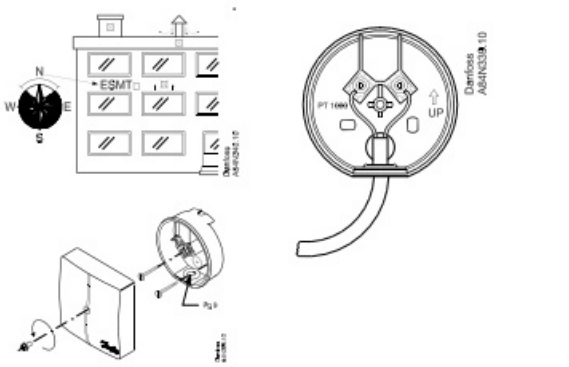
- Voltage range: 207 to 244 V a.c. (IEC 60038)
- Power consumption: 5 VA
- Load on relay outputs: 4(2) A – 230 V a.c
- Load on triac outputs: 0,2 A – 230 V a.c.

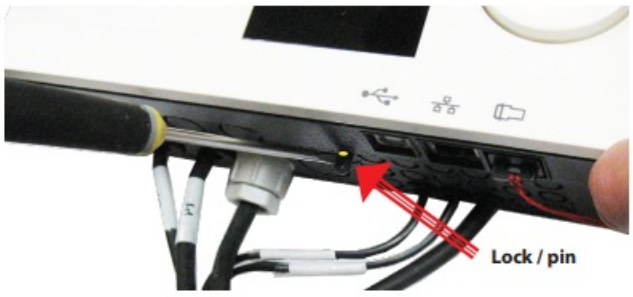
Actuator AMV 150 / AMV 13

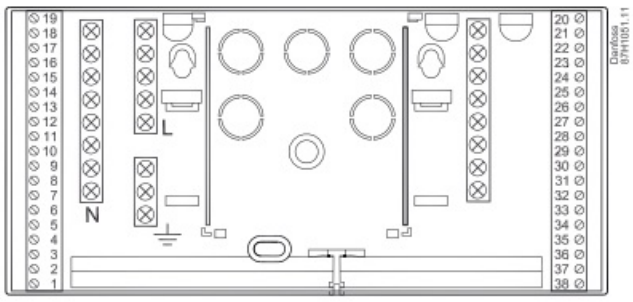
- Supply voltage: 230 V a.c. – 50 Hz
- Power consumption: 2 / 8 VA
- For further information please see the enclosed instruction manual.

Pumpe UPM3 AUTO

- 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.







HEATING CIRCUIT, DANFOSS ECL 310 AUTOMATICS

Weather-compensated control of the heating circuit\ Danfoss ECL 310

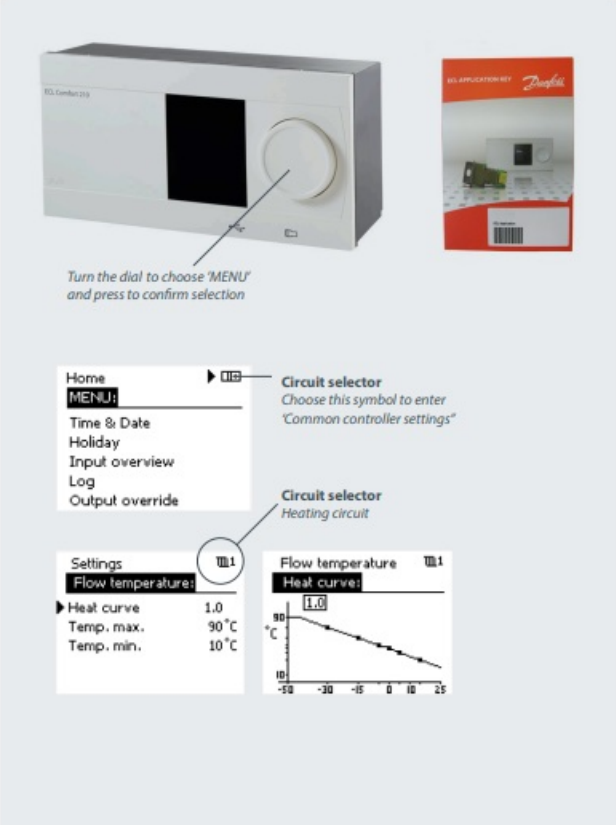
- The temperature for the heating circuit is controlled electronically by the Danfoss ECL controller. The supply temperature ist calculated by the controller on basis of the outdoor temperature.
- The ECL Comfort controller is loaded with a selected application by means of an ECL Application Key (Plug-&-Play).
- The Application Key contains information about applications, 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,
- The operating mode of the controller = Comfort “Sun” Symbol,
- Application type = A230
- 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:

- Connect the controller and switch it on,
- 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).
- Turn dial to select time and date, Push the dial to confirm the selection
- Select time and date,
- The controller is now ready for use. Set heat curve and\ temp. max. according to the procedure described below.



Setting/change of factory settings:

- 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),
- 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.”,
- 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 the ECL Application Key Box with ECL Comfort 210/310 user guide and mounting guide, for further information.

CONTROL OF HEATING CIRCUIT

For controlling the heating circuit the Se-Solo HWP is supplied with a Danfoss AMV 150 or AMV 13 actuator and a Danfoss two-way motorized contral valve VS 2, placed on the primary return flow line. The AMV actuator is electrically wired to the controller from factory.

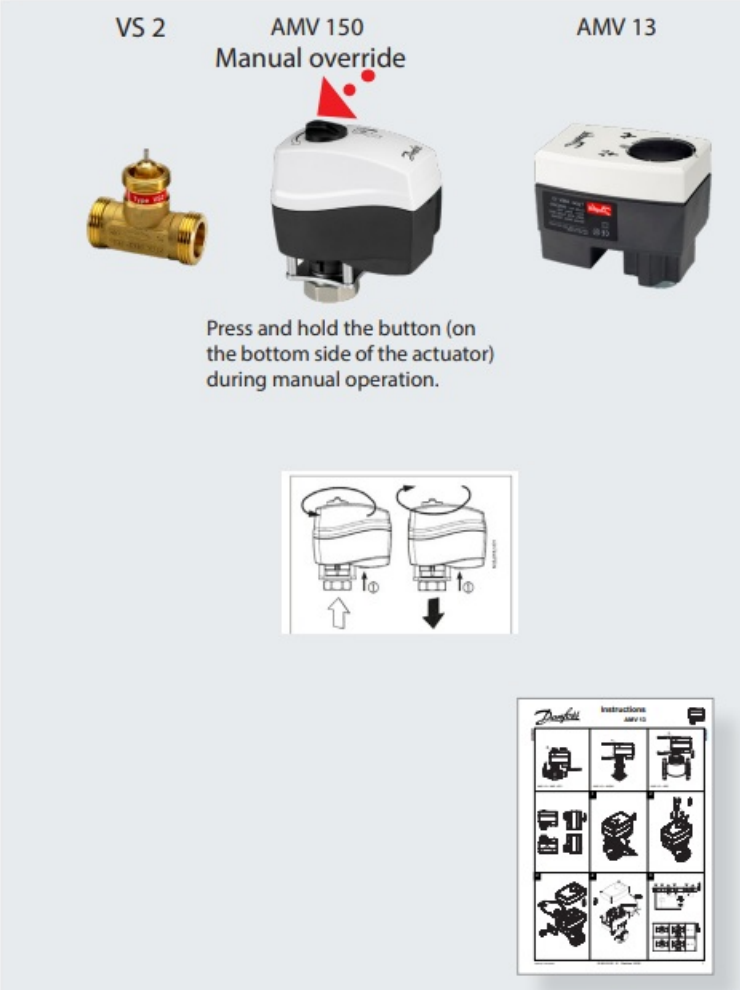
The actuator has undergone a functional test and is preset from the factory.

AMV 150

- In the event of operating disturbances, the AMV 150 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 ff.

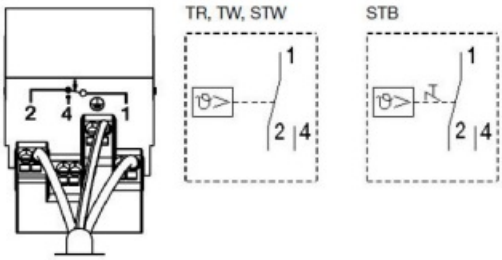


For additional information see manuals for: Electronic Actuator AMV 150 Electronic Actuator AMV 13 Danfoss Valve VS 2

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 diagram



HEATING CIRCUIT, PUMP

Grundfos Pump UPM3 AUTO
Grundfos UPM3 Auto has 12 optional settings, which can be select-ed with the push-button. See fig. 1 – User interface. The pump is set from factory to Proportionaldruck Pressure 2 .

The user interface shows:

- performance view (during operation)
- operation status
- alarm status
- settings view (after pressing the button)

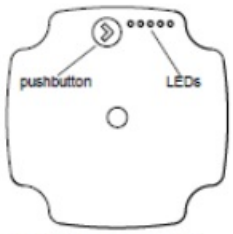


Abb. 1. Bedienfeld
mit einer Drucktaste und fünf LED´s

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.

Fig. 2. Performance view

Performance % of P_1 max.					
0% (standby)	●				
0 - 25%	●	●			
25 - 50%	●	●	●		
50 - 75%	●	●	●	●	
75 - 100 %	●	●	●	●	●

HEATING CIRCUIT, PUMP

- Check the pump setting by pressing the button once (one constant pressure).
- The LEDs will briefly (2 sec.) show the pump setting before changing back to show the power consumption. See fig. 3 – Pump setting view.
- If the pump setting does not give the desired distribu-tion of heat in the rooms of the house, change the pump setting.
- See fig. 3 – Pump setting view.
- Before starting the setting, make clear what the display should show for the new setting (see fig. 3).
- To change the pump set, choose the setting you want (see fig. 3), 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 show the desired setting. The LEDs flash and when they

stop the new setting is saved. The LEDs return to show power consumption.

- Please note that if the LEDs do not flash after 2 sec-onds, 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. 3. Pump setting view

Funktion	Application	Pump mode				
PROPORTIONAL PRESSURE AUTO ADAPT	- Two-pipe systems	●				
CONSTANT PRESSURE AUTO ADAPT	- One-pipe systems - Floor heating		●			
PROPORTIONAL PRESSURE 1	- Two-pipe systems *small systems*	●		●		
PROPORTIONAL PRESSURE 2	- Two-pipe systems *middle-sized system*	●		●	●	
PROPORTIONAL PRESSURE 3	- Two-pipe systems *large systems*	●		●	●	●
CONSTANT PRESSURE 1	- One-pipe systems - Floor heating *small systems*		●	●		
CONSTANT PRESSURE 2	- One-pipe systems - Floor heating *middlesized- systems*		●	●	●	
CONSTANT PRESSURE 3 - MAX.	- Floor heating - One-pipe systems *large systems*		●	●	●	●
CONSTANT CURVE 1	- One-pipe systems - Charging systems *small systems*			●		
CONSTANT CURVE 2	- One-pipe systems - Charging systems *middle-sized systems*			●	●	
CONSTANT CURVE 3 - MAX.	- One-pipe systems - Charging systems - Venting of installation *large systems*			●	●	●

Alarm status
In case the 1st LED is red the pump has detected one or more alarms.
See fig. 4 – Alarm status.
When there is no active alarm anymore the user inter-face switches back to operation mode shortly and then showing power consumption.

Fig. 4. Alarm status

Fig. 4. Alarm status

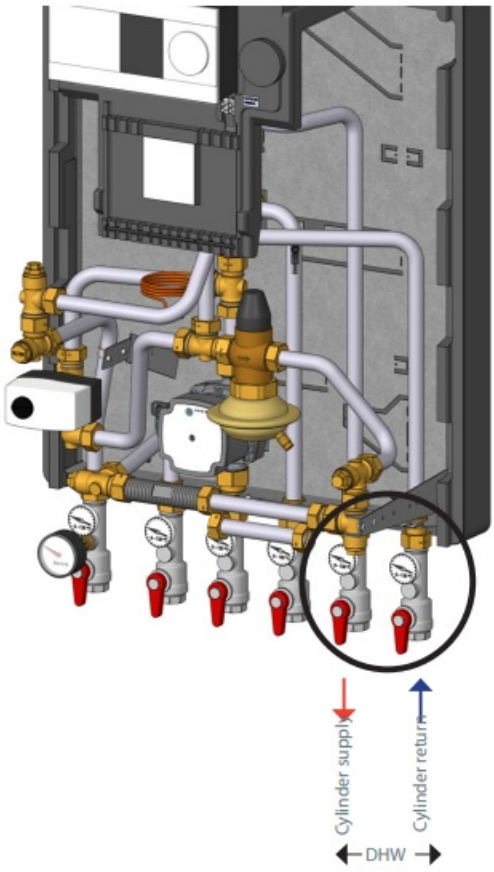
Function					
Blocked	●				●
Supply voltage low	●			●	
Electrical error	●		●		

DOMESTIC HOT WATER

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

General

- The Se Solo HWP is supplied with connection pipes for the cylinder on the primary side.
- Please note that domestic hot water cylinder control is not included in the standard delivery.
- For temperature regulation of the DHW cylinder,the Se Solo HWP can, as an option, be equipped with a RAVK self-acting thermo-stat and a 2-way valve VMA – for installation outside the system. The controller closes when the temperature rises.



MAINTENANCE

Maintenance work

- Is only to be carried out by qualified and authorized personnel.

Maintenance

- The substation requires little monitoring, apart from routine checks and cleaning of strainers. To ensure the best operating conditions regular inspection of the substation and a check of all relevant op-erating parameters are recommended, for example in
- connection with the meter reading.

Inspection

- The unit should be checked regularly by authorized 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 lter on the controller, all pipe connections must be tightened and the safety valve must be function tested by turning the lever.

Meter reading

- We recommend that you read your meter regularly and that you write down the meter read.
- Cooling / Return temperature reading
- The cooling, i.e. the temperature difference between district heating supply and district heating return is of great importance for the total heat economy. It is therefore very important to observe the supply and return temperatures.

Cleaning

- All strainers should be checked and cleaned at least once every year, typically in connection with the start-up of the heating system.

Tightening of connections

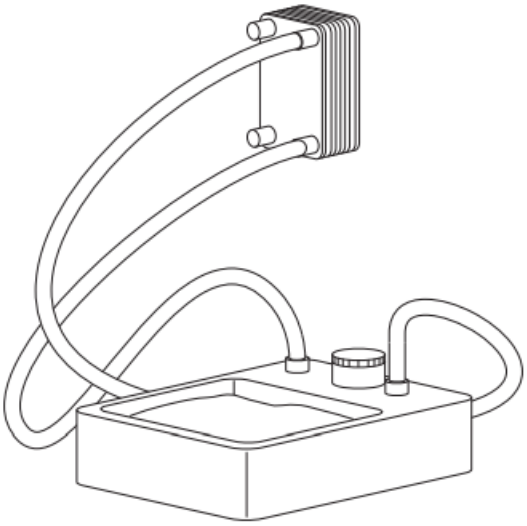
- All threaded and flanged connections should be checked and tightened in connection with the meter reading. All threaded and flanged connections should be tightened regularly and especially in connec-tion with start-up after the summer period.

Venting of system

- Always vent the radiators and the substation before the heating season.

Strainer

- Strainers should frequently be cleaned from sediments by authorized personnel, according to the producer's instructions and dependent on the substation's operating conditions.



Please note
Use of other types of packaging, than the ones, with which the unit is delivered, will lead to the loss of warranty.

TROUBLESHOOTING HE

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

- the substation is connected to electricity.
- the dirt strainer in the district heating supply pipe is clean
- the district heating supply temperature is at its normal level (summer, at least 60 °C, winter at least 70 °C).
- the differential pressure is higher than or equal to the normal (local) differential pressure in the district heating network. Ask your district heating plant, if in doubt.
- there is pressure on the system.

Problem	Possible cause	Solution
	Strainer clogged in DH or HE circuit (radiator circuit).	Clean strainer(s).
	The filter in the energy meter on DH circuit clogged.	Clean the filter (after consulting the DH plant operator).
	Defective or improperly adjusted dif fe- rential pressure controller	Check the operation of the differenti al pressure controller – clean the va lve seat if required.
	Defective actuator	Check the functioning of the actuat or.

No heat	2-way control valve defective or possible dirt in the valve housing	Check the functioning of the valve – clean valve seat if required.
	Automatic controls wrongly set or defective – possibly power failure.	Check if the setting of the controller is correct – see separate instructions. Check the power supply.
	Pump out of operation.	Check if the pump is receiving power and that it turns. Check if there is air trapped in the pump housing – see pump manual.
	The pump is set at too low a speed of rotation.	Set the pump at a higher speed of rotation.
	Air pockets in the system.	Vent the installation thoroughly.
Uneven heat distribution.	Air pockets in the system.	Vent the installation thoroughly.
DH supply temperature too high.	Wrong setting of automatic controls.	Adjust automatic controls, see instructions for automatic controls.
	Defective controller. The controller does not react as it should according to the instructions.	Call in the automatic controls manufacturer or replace the controller.
	Wrong setting of automatic controls.	Adjust automatic controls – see instructions for automatic controls.
DH supply temperature too low.	Defective controller. The controller does not react as it should according to the instructions.	Call in the automatic controls manufacturer or replace the controller.
	Wrong placement/fitting of the outdoor temperature sensor.	Place / fit the outdoor temperature sensor correctly.
	Strainer clogged.	Clean strainer(s).

Poor cooling	Too small heating surface/too small radiators compared to the total heat ing requirement of the building.	Increase total heating surface.
	Poor utilization of existing heating s urface.	Make sure the heat is distributed ev enly across the full heating surface – open all radiators and keep the ra diators in the system from heating u p at the bottom. It is ex- extremely i mportant to keep the supply temper ature to the radiators as low as possible, while maintaining a reaso nable level of comfort.
	The system is single pipe loop.	It is extremely important to keep the supply temperature to the radiators as low as possible, while maintain- i ng a reasonable level of comfort.

Disposal

This product should be dismantled and its components sorted, if possible, in various groups before recycling or disposal. Always follow the local disposal regulations.

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 a pressure test for leaks.
- The dirt strainers must be cleaned and the substation must be adjusted under 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 overtightening 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

GUIDELINES FOR WATER QUALITY IN DANFOSS BRAZED HEAT EXCHANGERS

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.№ 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 (NH3, NH 4+)	mg/l	<2	+	+	+	+
		2 – 20	+	o	o	+
		>20	+			+
Alkalinity (HCO3)	mg/l	<60	+	+	+	+
		60 – 300	+	+	+	+
		>300	+	o	+	+
Sulphate (SO42)	mg/l	<100	+	+	+	+
		100 – 300	+	o/	o	+
		>300	+			+
HCO3 / SO42	mg/l	>1 5	+	+	+	+
		<1 5	+	o/	o	+
Nitrate (NO3)	mg/l	<100	+	+	+	+
		>100	+	o	+	+
Manganese (Mn)	mg/l	<0 1	+	+	+	+
		>0 1	+	o	o	+
ron (Fe)	mg/l	<0 2	+	+	+	+
		>0 2	+	o	+	+
* Hardness ratio [Ca 2+, Mg2+J/[HCO3 J	/	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 ratio limits defined per experience and internal tests in the 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

Danfoss A/S | Danfoss BU HEX LIC Kamnik Slovenia

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For moror more info information please fiction please follow low this w this linklink:
https://assets.danfoss.com/documents/192075/

Documents / Resources

	Danfoss Se Solo HWP Heating Controller [pdf] User Guide AQ496946681588en-010101, Se Solo HWP Heating Controller, HWP Heating Controller, Heating Controller, Controller

References

- Engineering Tomorrow | Danfoss
- Danfoss – Engineering Tomorrow | Danfoss
- User Manual