

Instructions

VX-Solo

District heating substation for indirect heating

VX-Solo

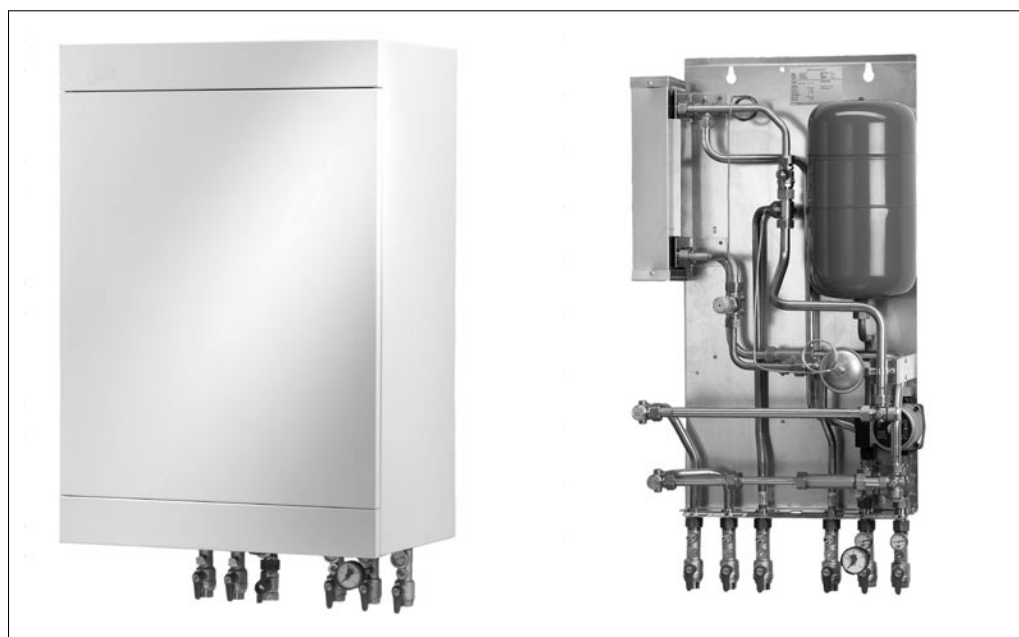


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Safety notes


Following instructions refer to the standard design of the VX-Solo substation. Special versions of substations are available on request.

The risk of persons being injured and equipment damaged increases considerably if the recommended permissible operating parameters are exceeded.

To avoid injury of persons and damages to the device, it is absolutely necessary to carefully read and observe these instructions.

The substation installation is equipped with safety valve and always in accordance with local regulations.

Necessary assembly, start-up and maintenance work must only be performed by qualified and authorized personnel.

Warning of hot surface

The substation has got hot surfaces, which can cause skin burns. Please be extremely cautious in close proximity to the substation.

Please comply with the instructions of the system manufacturer or system operator.

Warning of transport damage

Before installation of substation, please make sure that the substation has not been damaged during transport.

Unused connections and shut-off valves must be sealed with a plug. The plugs can be removed by an authorized service technician only.

Noise level

≤ 55 dB

Warning of high pressure and temperature

The maximum temperature of the flow medium in a substation is 110 °C.

Corrosion protection

All pipes and components are made of stainless steel and brass.

The maximum operating pressure of the substation is 16 bar.

Be aware of the installation's permissible system pressure and temperature.

Delivery

The VX-Solo substation is delivered with anthracite grey-lacquered frame and with slightly curved front panels in brushed or white-lacquered stainless steel as a standard.

- electronic temperature controller instead of self-acting thermostatic controller,
- thermostat with safety monitor (STW) for floor heating (available only with electronic control),
- without cover, or frame and front panels,
- with white-lacquered steel sheet cover.

Optional substation equipment:

- flexible fitting piece for heat meter, 1" instead of ¾" connections,
- additional fitting piece for heat meter in DH supply,

Transport and storage

If the substation is stored before installation in a warehouse or any other room, make sure that the place is dry and heated.

During transport of the substation to an installation place it is recommended to lift it with special straps attached to the bottom (by substation support construction).

Mounting


The substation must be installed and connected by authorized service personnel.

Installation must be in compliance with the local standards and regulations.

Allow for adequate space around the substation for mounting and maintenance purposes.

Prior to the VX-Solo installation all substation pipes and connections should be cleaned and rinsed.

Due to vibrations during transport all connections must be checked and tightened before the substation is installed.

Heat meter assembly, flexible fitting piece

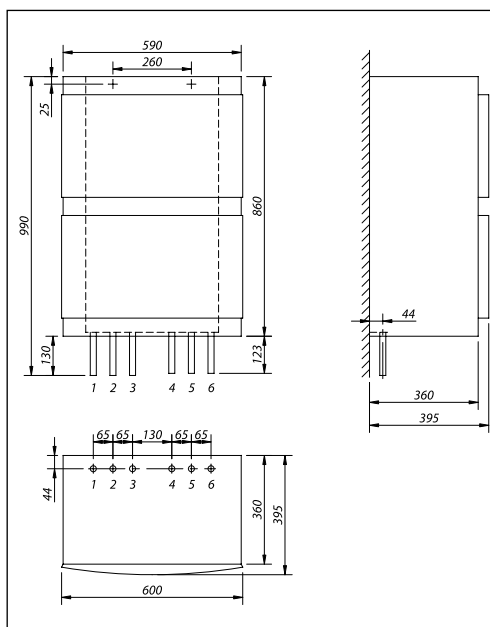
The substation is equipped with a flexible fitting piece for insertion of heat meter. Possible insertion length ranges from 110 to 190 mm.

Assembly of heat meter:

Loosen nuts on fitting piece, remove fitting piece and replace with heat meter (size 110 mm). If heat meter size exceeds 110 mm loosen nut in the middle of the flexible pipe. Adjust size of flexible pipe according to actual heat meter size and insert heat meter. Tighten up the nut in the middle of the flexible pipe.



Mount the heat meter according to the medium flow direction. After each mounting of heat meter remember to check all threaded connections.

Pipes connections


Internal installation and district heating* pipes connections must be made by means of threaded or welded connections.

Connections:

- 1 District heating (DH) supply
- 2 District heating (DH) return
- 3 Boiler (DHW) supply
- 4 Boiler (DHW) return
- 5 Heating (HE) supply
- 6 Heating (HE) return

Connection sizes:

DH + DHW boiler: G 3/4" (ext. thread)
 HE: G 3/4" (int. thread)

Dimensions (mm):

Without frame and front panels:
 H 990 x W 560 x D 350
 With frame and front panels:
 H 990 x W 600 x D 395

* District heating (DH) - In the following DH is specified as the heat source for the substations. However, also other heat sources such as an oil or gas boiler or solar heating etc. could be used as the primary supply for the fitted substations, enabling the Danfoss Redan substations to be used in numerous schemes with different energy sources, depending on the local operating conditions. In order to simplify we have decided to use DH as designation for the primary supply.

Instructions

VX-Solo - district heating substation for indirect HE

Electrical connection

Standard substation:

Connect pump to main supply (1x230 V) according to local standards.

Substation equipped with electronic controller:

The electronic controller is electronically connected to the actuator, sensors and the pump, - ending up in a CEE-plug connection for main supply (1x230V) and earth grounding.

Filling, start-up

Prior to the VX-Solo installation all its pipes and connections should be cleaned and rinsed.

The heat exchanger must be filled with water so that the pressure slowly reaches the working pressure.

Before starting-up, check if:

- pipes are connected according to the circuit diagram,
- release valves are shut-off,
- threaded connections are tightened.

After that the shut-off valves should be opened and the operation of the heat exchanger must be observed (e.g. temperatures, pressure, thermal expansion, leakages). If the heat exchanger operates unproblematically, it can be taken into continuous use.



All Danfoss heat exchangers and substations have been pressure tested prior to delivery.

Control



1. Differential pressure controller

The differential pressure controller reduces the fluctuating pressure in the district heating network to a small and invariable operating pressure in the substation. The differential pressure controller is preset from factory and **should not be** adjusted afterwards. The required room temperature is controlled on your radiator thermostats (fixed setting throughout the year). It is recommended that **all** radiators are opened a little in each room.



2. HE temperature control

The temperature of the heating supply is controlled by the thermostat.

The temperature of the heating flow is indicated by thermometer mounted in secondary side.

Approximate thermostat scale setting:

| | |
|----------|----------|
| 1 = 20°C | 4 = 50°C |
| 2 = 30°C | 5 = 60°C |
| 3 = 40°C | 6 = 70°C |

The room temperature is controlled by radiator thermostats. It is recommended to set the minimum thermostat setting in each room.

The control of substations equipped with **electronic controller with outdoor temperature sensor** should be done in accordance with producer instructions for the mounted controller.



3. Operation in summer and winter season, circulation pump, substation start-up, maintenance

Summer season, circulation pump

In summer season the circulation pump should be switched off and simultaneously the shut-off valve of HE supply should be closed (ball-valve placed on vertical pipe beside expansion vessel).

It is recommended to start-up the circulation pump (for a few minutes) once a month during the summer period; the shut-off valve of the HE supply must be shut.

Winter season, substation start-up

- open shut-off valves,
- set the pump at highest speed of rotation before start-up,
- switch-off the pump and vent the installation after the radiators have been warmed,
- set the pump at lowest speed of rotation in consideration of electricity consumption and heating comfort.

Normally the change-over switch is set in the centre position (default), however for systems with floor-heating or one-pipe systems it may be necessary to turn the change-over switch upwards (clockwise).

Higher speed of rotation is used only if the heating requirement increases.



4. Limiting flow controller (DH return)

Additional substation equipment is mounted on district heating company request. Limiting flow controller should be set to the required maximum return temperature, in compliance with the local demands.

Approximate thermostat scale setting:

| | |
|-----------|-----------|
| 1 = 10 °C | 1 = 20 °C |
| 2 = 30 °C | 3 = 40 °C |
| 4 = 45 °C | 5 = 50 °C |
| 6 = 60 °C | 7 = 65 °C |
| 8 = 70 °C | 1 = 80 °C |

To ensure sufficient cooling and proper operation the HE return temperature (thermometer indication on secondary return) must be lower than the temperature set on the flow controller.



5. HE manometer

The HE manometer indicates the pressure value in HE system.

The pressure during operation should be 1-1,5 bar. If the pressure drops below 1 bar, water must be added to the system.

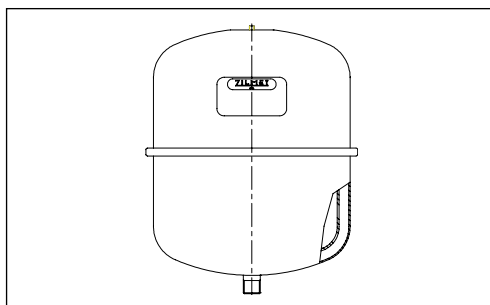
The operating pressure should never exceed 1,5 bar.


6. Safety valve

The safety valve's task is to protect the substation from pressures exceeding the permissible pressure. The blow-off pipe of the safety valve must not be closed. The blow-off pipe outlet should be placed so that it provides safety relief and it is possible to observe water dropping from the safety valve. It is advisable to check the operation of the safety valve by turning the valve head into the indicated direction, every six months.

7. Filters

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


8. Expansion vessel

Expansion vessels are designed for operation in self-contained heating and cooling systems. When water in the system is heated it will expand and the task of the expansion vessel is to accommodate the increased volume of water, as well as to limit the pressure increase to defined maximum value. During decrease in temperature the task of the expansion vessel is to ensure pressure compensation by supplying previously accommodated water to the installation.

For information about regulation or maintenance please refer to instructions for installed expansion vessel.

Maintenance

It is necessary to check and maintain the substation on a regular basis in order to keep it in good operating condition.

The frequency of the maintenance and service inspections should be according to system manufacturer specifications and local legislation. However, maintenance inspections should take place at least twice each year (before and after the heating season).

In addition to the check of the substation as to its functionality, it is also recommended to check if the following system parameters are compliant with the requirements of the system manufacturer and local regulations:

- no leakages,
- correct temperatures in the distribution network,
- stable district heating supply and return temperatures,
- correct cooling of the district heating supply,

- DHW temperature (requested temperature should be in accordance with the local regulations),
- pressure drops in filtering and water conditioning plants (filters, sludgers etc.),
- pressure drops in the heat exchanger (primary and secondary side of heat exchanger).

The substation operator should consider the above parameters and prepare written maintenance reports.



Service inspections by authorized personnel are usually more precise (complex) than user maintenance inspections and the intervals between them are longer.

Troubleshooting HE



If operating disturbances occur, the following basic features should be checked before carrying out actual troubleshooting:

- the substation is connected to electricity (applies only to stations with room thermostat),
- the strainer on the district heating supply pipe is clean,
- the supply temperature of the district heating is at the 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 – in doubt, ask the district heating plant,
- there is pressure on the system.

| Problem | Possible cause | Solution | |
|---------------------------------|---|---|--|
| No heat | Strainer clogged on DH or HE side (radiator circuit). | ▶ Clean gate/strainer. | |
| | The filter in the district heating meter clogged. | ▶ Clean the filter (after consulting the district heating plant). | |
| | Defective or wrongly adjusted differential pressure controller. | ▶ Check the operation of the differential pressure controller – clean the valve seat if required. | |
| | Sensor defective – or possibly dirt in the valve housing. | ▶ Check the operation of the thermostat - clean the valve seat if required. | |
| No heat | Automatic controls, if any, wrongly set or defective - possibly power failure. | ▶ Check if the setting of the controller is correct – see separate instructions. Check the power supply. Temporary setting of motor to “manual” control – see instructions on automatic controls. | |
| | Pump out of operation. | ▶ Check if the pump is receiving power and that it runs. Check if there is air trapped in the pump housing - see pump manual. Set the pump at higher speed of rotation. | |
| No heat | The pump is set at too low speed of rotation. | ▶ Set the pump at higher speed of rotation. | |
| | Pressure drop - the manometer on the radiator circuit shows lower than recommended operating pressure. | ▶ Fill water on the system and check the functioning of the pressure expansion vessel if required. | |
| | Air pockets in the system. | ▶ Air the installation thoroughly. | |
| Uneven heat distribution. | ▷ Air pockets in the system. | ▷ Air the installation thoroughly. | |
| DH supply temperature too high. | Wrong setting of thermostat or of automatic controls, if any. | ▶ Adjust automatic controls, - see instructions for automatic controls. | |
| | Defective controller. The controller does not react as it should in accordance with the instructions. Defective sensor on self-acting thermostat. | ▶ Call automatic controls manufacturer or replace the regulator. ▶ Replace thermostat, - or sensor only. | |
| Supply temperature too low. | Wrong setting of automatic controls, if any. | ▷ Adjust automatic controls – see instructions for automatic controls. | |
| | Defective controller. The controller does not react as it should in accordance with the instructions. | ▷ Call in automatic controls manufacturer or replace regulator | |
| | Defective sensor on self-acting thermostat. | ▷ Replace thermostat - or sensor only. | |
| | Wrong placement/fitting of outdoor temperature sensor. | ▷ Place/fit an outdoor temperature sensor correctly. | |
| Supply temperature too low. | Strainer clogged | ▷ Clean gate/strainer. | |
| | Poor cooling | Too small heating surface/too small radiators in relation to the total heating requirement of the building. | ▶ Increase total heating surface. |
| | | Poor utilization of existing heating surface. Defective sensor on self-acting thermostat. | ▶ Make sure the heat is distributed evenly across the full heating surface – open all radiators and keep the radiators in the system from heating up at the bottom. It is extremely important too keep the supply temperature to the radiators as low as ever possible, while maintaining a reasonable level of comfort. |
| Poor cooling | The system is single-pipe. | ▶ The system should feature electronic controls as well as return sensors. Replace thermostat - or sensor only. | |
| | Defective self-acting thermostat on the district heating side. | ▶ Replace thermostat - or sensor only. | |

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