

Termix VVX-B

District heating substation for indirect heating and instantaneous domestic hot water

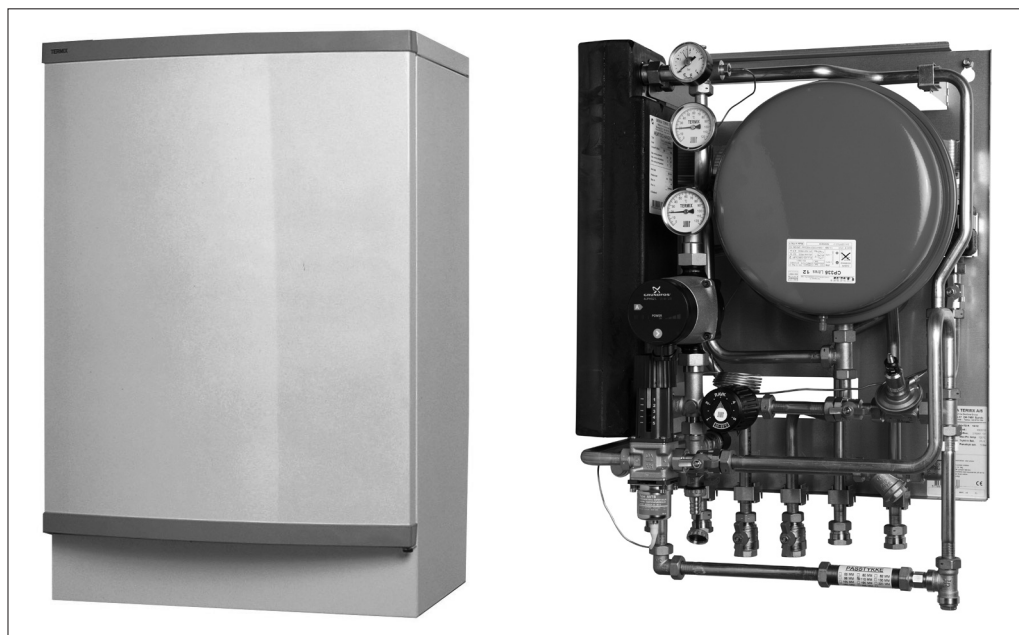


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Declaration of conformity

Declaration of compliance

We

Gemina Termix A/S
Member of the Danfoss Group
Navervej 15-17
DK-7451 Sunds

Do hereby on our own responsibility declare that the following products:

Termix Substations

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

EU Directives:**Machinery Directive 2006/42/EEC**

EN ISO 14121-1 Safety of machinery - Risk assessment

EN 60204-1-Safety of machinery - Electrical equipment of machines

EMC Directive 2004/108/EEC

EN 61000-6-2 2007 Electromagnetic compatibility- Generic standard: Immunity industry

EN 61000-6-3 2007 Electromagnetic compatibility- Generic standard: Emission for residential, commercial and light industry

PED Directive 97/23/EEC

All substations that falls under Article 3.3 and category 1 shall not be CE-marked according to this directive, however all essential safety requirements from the PED Directive 97/23/EEC are followed to ensure hydraulic safety

This declaration is immediately annulled, if the product is interfered with in any way, which interferes with the above mentioned directives and standards, with out the written consent from Gemina Termix A/S.

2010.01.05 - Sunds

Time and place

Lars Ginnerup
Responsible for quality

Safety notes


The following instructions refer to the standard design of substation. Special versions of substations are available on request.

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

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

Please comply with the instructions issued by the system manufacturer or system operator.

Unused connections and shut-off valves must be sealed with a plug. Should the plugs require removal, this must only be done by an authorized service technician.

Warning of high pressure and temperature

The maximum temperature of the flow medium in a substation is 120 °C.

The maximum operating pressure of the substation is 10 bar.*

* PN 16 versions are available on enquiry

The heat exchangers test pressure is 30 bar.

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

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

The substation installation must be equipped with safety valves, however, always in accordance with local regulations.

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.

Power failure can result in the motor valves being stuck in open position. The surfaces of the substation can get hot, which can cause skin burns. The ball valves on district heating supply and return should be closed.

Warning of transport damage

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

Sound level

≤ 55 dB

Corrosion protection

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

The maximum chloride compounds of the flow medium should not be higher than 150 mg/l.

The risk of equipment corrosion increases considerably if the recommended level of permissible chloride compounds is exceeded.

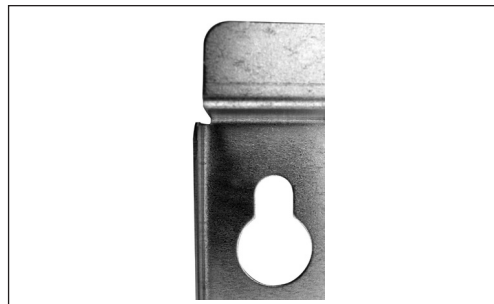
Storage

Any storage of the substation which may be necessary prior to installation should be in conditions which are dry and heated.

Disposal


This product consists of materials which must not be disposed of together with domestic waste. Dismantle the product and sort the components in various groups before disposal. Observe the disposal rules of the local legislation.

Mounting



The substation must be installed and connected by authorized service personnel. Installation must be in compliance with local standards and regulations. Allow adequate space around the substation for mounting and maintenance purposes.

The station must be mounted so that components, keyholes and labels are placed correctly. If you wish to mount the station differently please contact your supplier.

Prior to installation, all substation pipes and connections should be cleaned and rinsed.

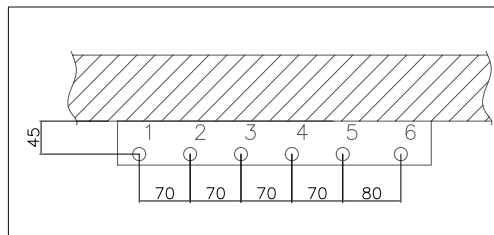
Due to vibration during transport, all substation connections must be checked and tightened before installation.

Where substations are to be wall-mounted, drillings are provided in the back mounting plate. Floor mounted units have support.

Each connection on the substation is labelled.

If a strainer is supplied with the station it must be fitted according to schematic diagram. Please note that the strainer may be supplied loose.

Pipe connections



The pipe placement can deviate from the shown drawing. Please note the markings on the station.

Internal installation and district heating pipes connections must be made using threaded, flanged or welded connections.

District heating (DH) - In the following sections, DH refers to the heat source which supplies the substations. A variety of energy sources, such as oil, gas or solar power, could be used as the primary supply to Danfoss substations. For the sake of simplicity, DH can be taken to mean the primary supply.

Connections:

1. District heating (DH) supply
2. District heating (DH) return
3. Heating (HE) supply
4. Heating (HE) return
5. Domestic hot water (DHW)
6. Domestic cold water (DCW)

Connections sizes:

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

Dimensions (mm):

Without cover:
 H 750 x W 500 x D 360
 With cover:
 H 800 x W 540 x D 430

Weight (approx.): 40 kg

Instructions**Termix VVX-B - district heating substation for indirect HE and DHW**

Electrical connection



Electrical connections must be made by an authorised electrician only.
Electrical connections must be made in accordance with current regulations and local standards.

Before making electrical connections, please note the following:

- Please read the relevant parts of safety notes.
- The substation must be connected to 230 V AC and earth.
- The substation must be electrically connected so that it can be disconnected for repairs.

Filling, start-up

Prior to installation, all substation pipes and connections should be cleaned and rinsed.

Before start-up, check that:

- pipes are connected according to the circuit diagram,
- threaded connections are tightened.

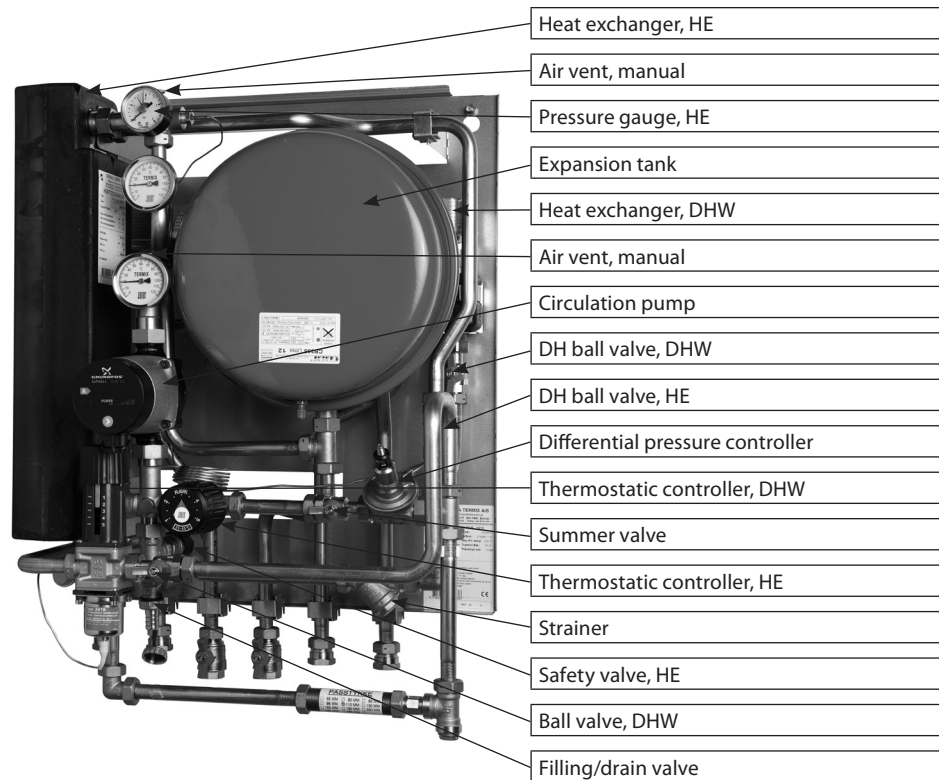
When carrying out first fill, the heat exchanger must be slowly filled with water until it reaches working pressure.

The shut-off valves should then be opened and the unit observed as it enters service. Visual checking should confirm temperatures, pressures, acceptable thermal expansion and absence of leakage. If the heat exchanger operates in accordance with design, it can be put to regular use.



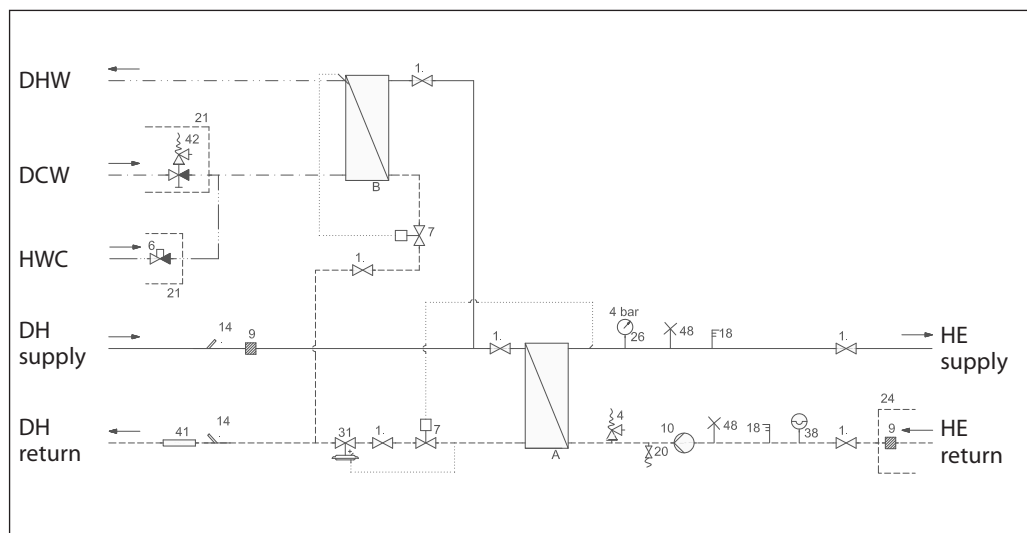
All Danfoss heat exchangers and substations are pressure tested prior to delivery.

Design



Your substation might look different than the substation shown.

Schematic diagram (example)



Substations as supplied may be different to those shown on Danfoss literature.

- | | |
|---------------------------------|-------------------------------------|
| A Plate heat exchanger HE | 20 Filling/drain valve |
| B Plate heat exchanger DHW | 21 To be ordered separately |
| 1 Ball valve | 24 Delivered loose with unit |
| 4 Safety valve | 26 Pressure gauge |
| 6 Thermostatic/non-return valve | 31 Differential pressure controller |
| 7 Thermostatic valve | 38 Expansion tank |
| 9 Strainer | 41 Fitting piece, heat meter |
| 10 Circulation pump | 42 Safety valve/non-return valve |
| 14 Sensor pocket, heat meter | 48 Air vent, manual |
| 18 Thermometer | |

Control



Differential pressure controller

The differential pressure controller smooths out the fluctuations in pressure arriving from the district heating network. The operating pressure in the substation is thus held steady.

HE temperature control

The HE flow temperature in the heating circuit is controlled by the HE temperature controller.

Thermostatic control

The temperature of the HE flow line is adjusted as follows:

To increase temperature, turn the handle on the thermostatic controller to select a higher number.

To decrease temperature, turn the handle on the thermostatic controller to select a lower number.



RAVK controller (25-65 °C)

The temperature setting is as follows:

- 1 = 25 °C 4 = 55 °C
- 2 = 35 °C 5 = 65 °C
- 3 = 45 °C

The values are intended as a guide.

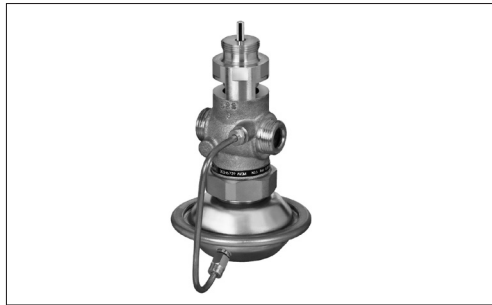


AVTB controller (30-100 °C)

The temperature setting is as follows:

- 1 = 35 °C 4 = 95 °C
- 2 = 55 °C 5 = 100 °C
- 3 = 75 °C

The values are intended as a guide.



Flow controller with integrated control valve
 The controller is a self-acting flow controller with integrated control valve. The controller closes when set max. flow is exceeded and can be used in combination with Danfoss electrical actuators with or without safety function. Spring return motor can be used as safety function by power failure.



Electronic control
 Substations with electronic control must be set in accordance with manufacturer's instructions.

Where room temperature is controlled by radiator thermostats, it is recommended that thermostats be set for minimum temperature in each room.



Outdoor temperature sensor (ESMT)
 Outdoor sensors should be mounted so as to avoid exposure to direct sunlight. They should not be placed close to doors, windows or ventilation outlets.



TP7000
 TP7000 electronic 7 day programmable room thermostat. Signals from this can be used to control zone valves.


Operation in summer and winter, circulation pump, substation start-up, maintenance
Summer operation, circulation pump:

In summer the circulation pump should be switched off and the shut-off valve of HE supply closed. It is recommended to start up the circulation pump (for 2 minutes) once a month in summer; the shut-off valve of the HE supply must be shut. Most electronic controllers will start up the pump automatically (please note manufacturer's instructions).

Winter operation, substation start-up

- open shut-off valves,
- set the pump to highest speed before start-up,
- start the pump and heat through the system,
- switch off the pump and vent the installation after the radiators have been warmed,
- set the pump to the lowest speed consistent with comfort and electricity consumption.

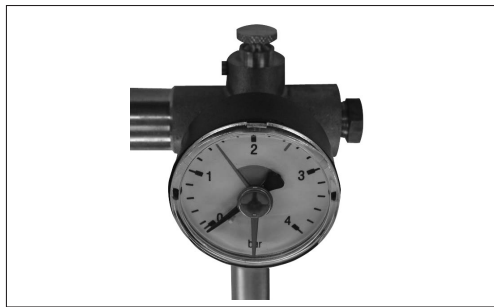
Normally the change-over switch is set in the mid position (default). However for systems with underfloor heating or single pipe loop systems, it may be necessary to turn the change-over switch upwards.

Higher pump speeds are only used if the heating requirement increases.

Floor heating

If the substation is used in connection with floor heating, the circulation pump must be connected to the pump stop function in the floor heating controller. The pump must be stopped if all floor heating circuits are closed.

If this is not possible, then flow must be continued through the by-pass. Failing this, the pump would be at risk of seizure and any remaining warranty would be withdrawn.


HE pressure gauge. Refilling water on the HE circuit.
HE pressure gauge

The HE pressure gauge indicates the pressure of the HE system. This instruction must be followed strictly, to avoid dangerous situations.

A ball valve with plug is installed in the HE return line. To fill the system, the ball valve must first be closed, the plug removed and a supply hose connected. On re-opening the ball valve, system fill can commence. When filling the system with water, the pressure gauge should be observed closely. The expansion vessel is supplied pre-pressurised to 0.5 bar. The pre-pressure required at each substation will depend on system head (the distance between the lowest and highest point in the system), for example:

Height [m]	Pressure [bar]
0 - 5	0,5
5 - 10	1,0
10 - 15	1,5
15 - 20	2,0

Filling must stop when the pressure gauge shows a pressure approximately 1-2 bar higher than the pre-pressure setting. The ball valve is then closed, the hose removed and the plug put back in.



The pump must be switched off during system fill.

DHW temperature control

There are various types of DHW temperature control used in Danfoss substations.

DHW temperature should be adjusted to 45-50 °C, as this provides optimal utilisation of DH water. At DHW temperatures above 55 °C, the possibility of lime scale deposits increases significantly.

Thermostatic control

DHW temperature is adjusted as follows:

To increase temperature, turn the handle on the thermostatic controller to select a higher number.

To decrease temperature, turn the handle on the thermostatic controller to select a lower number.

AVTB controller (20-60 °C)

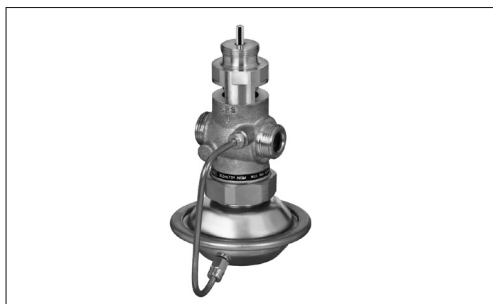
The temperature setting is as follows:

1 = 20 °C	4 = 60 °C
2 = 35 °C	5 = 70 °C
3 = 50 °C	

The AVTB operates at its best at DH supply temperatures of up to 90°C.

The values are intended as a guide.





Flow controller with integrated control valve

The controller is a self-acting flow controller with integrated control valve. The controller closes when set max. flow is exceeded and can be used in combination with Danfoss electrical actuators with or without safety function. Spring return motor can be used as safety function by power failure.



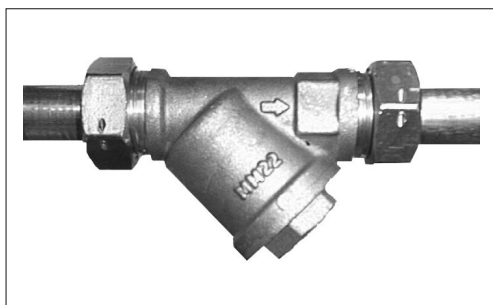
Electric 2-way motorized valve

Actuators with or without safety function are available for 3-point controls. Spring-return actuators can be used to provide safety shut-off in the event of power failure.



Safety valve

The purpose of the safety valve is to protect the substation from excessive pressure. The blow-off pipe from the safety valve must not be closed. The blow-off pipe outlet should be placed so that it discharges freely and it is possible to observe any dripping from the safety valve. It is recommended to check the operation of safety valves at intervals of 6 months. This is done by turning the valve head in direction indicated.



Strainer

Strainers should be cleaned regularly by authorized personnel. The frequency of cleaning would depend on operating conditions and the manufacturer's instructions.



GTU Pressure Equalizer

The GTU Pressure Equalizer absorbs the expansion on the secondary side of the Termix water heaters and can be used as a substitute to the safety valve. Furthermore the pressure equalizer absorbs a possible increase in pressure, so a discharge outlet is omitted. The GTU Pressure Equalizer may not be applied in systems with hot water circulation.

Instructions**Termix VVX-B - district heating substation for indirect HE and DHW**

Maintenance

Each substation requires little monitoring, apart from routine checks and cleaning of strainers. Regular inspections of the substation according to this Instruction are recommended, which should include checks of all operating parameters such as meter readings.

Spare parts can be ordered from Danfoss. Please ensure that any enquiry includes the substation serial number.

Troubleshooting DHW


We recommend that troubleshooting be carried out only by authorized personnel.

In the event of operating disturbances, the following basic features should be checked before carrying out actual troubleshooting:

- the substation is connected to electricity,

- the strainer on the DH supply pipe is clean,
- the supply temperature of the DH is at the normal level (summer, at least 60 °C - winter, at least 70 °C),
- the differential pressure is equal to or higher than the normal (local) differential pressure in the DH network – if in doubt, ask the DH plant supervisor,
- pressure on the system - check the HE pressure gauge.

Problem	Possible cause	Solution
Too little or no DHW	Strainer in supply or return line clogged.	Clean strainer(s).
	DHW circulation pump out of order or with setting too low.	Check circulation pump.
	Defective or clogged non-return valve.	Replace – clean.
	No electricity.	Check.
	Wrong setting of automatic controls, if any.	To adjust an electronic controller for DHW, pls. note enclosed instructions for electronic controller.
	Scaling of the plate heat exchanger.	Replace – rinse out.
	Defective motorized valve.	Check (use manual function) - replace.
	Defective temperature sensors.	Check – replace.
Hot water in some taps but not in all.	Defective controller.	Check – replace.
	DCW is being mixed with the DHW, e.g. in a defective thermostatic mixing valve or non	Check – replace.
Tap temperature too high; DHW tap load too high.	Defective or clogged non-return valve on circulation valve.	Replace – clean.
	Thermostatic valve adjusted to a too high level.	Check - set
Temperature drop during tapping.	Scaling of the plate heat exchanger.	Replace – rinse out.
	Larger DHW flow than the substation has been designed for.	Reduce DHW flow.

Troubleshooting HE


Problem	Possible cause	Solution
Too little or no heat.	Strainer clogged in DH or HE circuit (radiator circuit).	Clean gate/strainer.
	The filter in the heat meter on DH circuit clogged.	Clean the filter (after consulting the DH plant operator).
	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.
	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 turns. Check if there is air trapped in the pump housing - see pump manual.
	The pump is set at too low speed of rotation.	Set the pump at higher speed of rotation.
	Pressure drop – the pressure drop 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.	Vent the installation thoroughly.
	Limiting of the return temperature adjusted too low.	Adjust according to instructions.
	Defective radiator valves.	Check – replace.
	Uneven heat distribution in building because of incorrectly set balancing valves, or because there are no balancing valves.	Adjust/install balancing valves.
Diameter of pipe to substation too small or branch pipe too long.	Check pipe dimensions.	
Uneven heat distribution.	Air pockets in the system.	Vent 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 according to the instructions.	Call automatic controls manufacturer or replace the regulator.
	Defective sensor on self-acting thermostat.	Replace thermostat, - or sensor only.
DH 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 according to the instructions.	Call in automatic controls manufacturer or replace controller.
	Defective sensor on self-acting thermostat.	Replace thermostat - or sensor only.
	Wrong placement/fitting of outdoor temperature sensor.	Adjust location of outdoor temperature sensor.
	Strainer clogged.	Clean gate/strainer.

Problem	Possible cause	Solution
Poor cooling.	Too small heating surface/too small radiators compared 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 to keep the supply temperature to the radiators as low as ever possible, while maintaining a reasonable level of comfort.
	The system is single pipe loop.	The system should feature electronic controls as well as return sensors.
	Pump pressure too high.	Adjust pump to a lower level.
	Air in system.	Vent the system.
	Defective or incorrectly set radiator valve(s). Single pipe loop systems require special one-pipe radiator valves.	Check – set/replace.
	Dirt in the motorized valve or in the differential pressure controller.	Check – clean out.
	Defective motorized valve, sensor or automatic controller.	Check – replace.
Electronic controller not adjusted correctly.	Adjust according to instructions.	
Noise in system.	Pump pressure too high.	Adjust pump to a lower level.
Heat load too high.	Defective motorized valve, sensor or electronic controller	Check – replace.

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