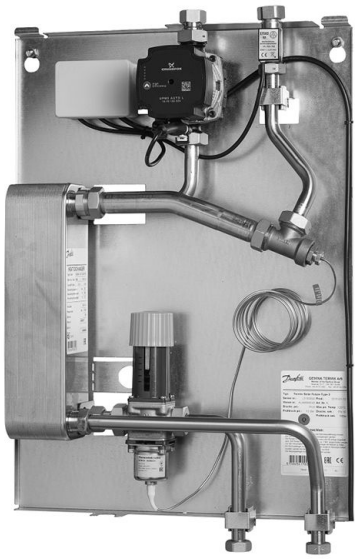
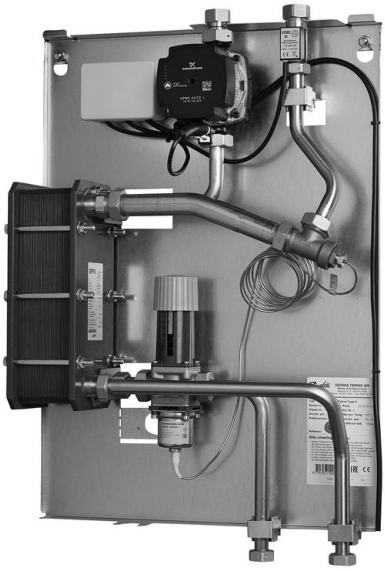
ENGINEERING TOMORROW

Operating Guide

Termix Solar A+/B+/S+

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2.0 Functional description

Domestic hot water module with heat exchanger and thermostatic control. Designed for wall-mounting.

Application
The Termix Solar A+/B+/S+ is an instantaneous water heater, featuring superb heat extraction and high performance. The Termix Solar A+/B+/S+ is applicable for heating systems with buffer accumulators, solar systems or for other heat sources, where a very low return temperature is preferred. The large heat exchanger cools out the water in the primary return line very efficiently, thereby creating a very good operation economy. A flow switch in the domestic hot water pipe is controlling the primary heating pump. An optional circulation pump together with a thermostat can maintain the circulating temperature at a desired temperature.

Domestic hot water (DHW)
The domestic hot water is prepared in the heat exchanger and the temperature is regulated with a thermostatic control valve. There is no additional pressure loss on the secondary side of the DHW heat exchanger with a thermostatic control. Therefore this type of regulation can be used by low pressure in the cold water mains.

3.0 Safety notes

3.1 Safety Notes – general

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

This operating manual should be read carefully before installation and start-up of the substation. The manufacturer accepts no liability for damage or faults that result from non-compliance with the operating manual. Please read and follow all the instructions carefully to prevent accidents, injury and damage to property. 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.

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.

Energy source
The substation is designed for district heating as the primary source of energy. However, also other energy sources can be used where the operating conditions allow it and always are comparable to district heating.

Application
The substation is designed to be connected to the house installation in a frost-free room, where the temperature does not exceed 50 °C and the humidity does not exceed 60%. Do not cover or wall up the substation or in any other way block the entrance to the station.

Choice of material
Choice of materials always in compliance with local legislation.

Safety valve(s)
We recommend mounting of safety valve(s), however, always in compliance with local regulations.

Connection
The substation must be equipped with features that ensure that the substation can be separated from all energy sources (also power supply).

Emergency
In case of danger or accidents - fire, leaks or other dangerous circumstances - interrupt all energy sources to the station if possible, and seek expert help.
In case of discoloured or bad-smelling domestic hot water, close all shut-off valves on the substation, inform the operating personnel and call for expert help immediately.

REACH
All Danfoss A/S products fulfill the requirements in REACH.
One of the obligations in REACH is to inform customers about presence of Candidate list substances if any, we hereby inform you about one substance on the candidate list: The product contains brass parts which contains lead (CAS no: 7439-92-1) in a concentration above 0.1% w/w.

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

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

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

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

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

The maximum operating pressure of the substation is 10 bar. PN 16 versions are available on enquiry.

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.

IMPORTANT - Tightening of connections
Due to vibrations during transport all flange connections, screw joints and electrical clamp and screw connections must be checked and tightened before water is added to the system. After water has been added to the system and the system has been put into operation, re-tighten ***ALL*** connections.

4.0 Mounting

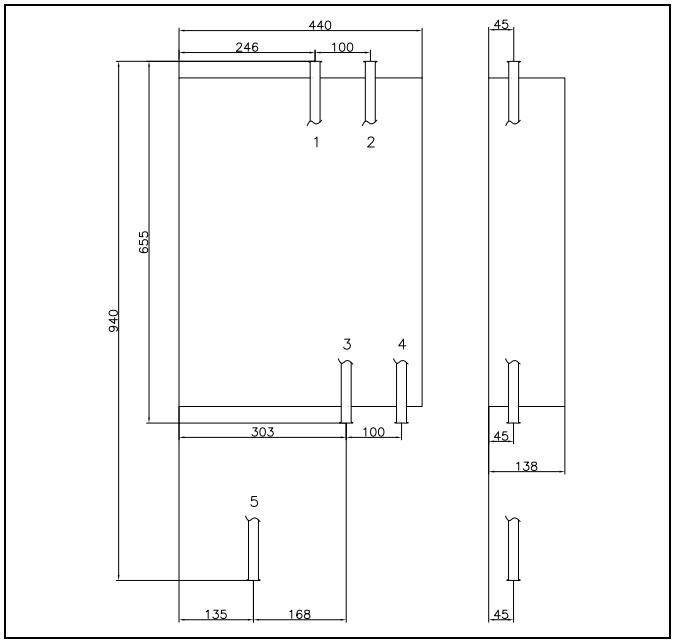
4.1 Mounting

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

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

Connections:

1. Buffer Tank (BT) supply
2. Domestic hot water (DHW)
3. Buffer Tank (BT) return
4. Domestic cold water (DCW)
5. *Hot water circulation (HWC) - (Optional)*



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

Connection sizes:

BT:	G ¾" (int. thread)
DCW + DHW + HWC:	G ¾" (int. thread)

Dimensions (mm):
Without circulation and cover:
H655 x W 440 x D 138
Without circulation and with cover:
H 715 x W 450 x D 150
With circulation and without cover:
H 940 x W 440 x D 138
With circulation and cover:
H 940 x W 450 x D 150

Weight (approx.):

Brazed HEX (A+/S+):	14 kg
Gasketed HEX (B+):	17 kg

4.1.1 Installation

Mounting:

Adequate space
Please allow adequate space around the substation for mounting and maintenance purposes.

Orientation
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.

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

Labelling
Each connection on the substation is labelled.

Before installation:

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

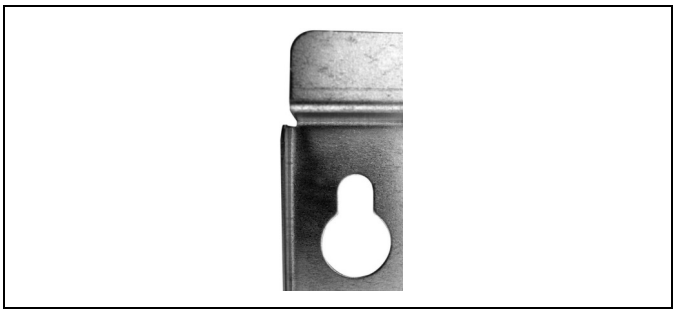
Tightening
Due to vibration during transport, all substation connections must be checked and tightened before installation.

Unused connections
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.

Installation:

Strainer
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.

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



Keyhole for mounting.

4.2 Electrical connections

Before making electrical connections, please note the following:

Safety notes
Please read the relevant parts of the safety notes.

230 V
The substation must be connected to 230 V AC and earth.

Potential bonding
Potential bonding should be carried out according to 60364-4-41:2007 and IEC 60364-5-54:2011.
Bonding point on the mounting plate below right corner marked with earth symbol.

Disconnection
The substation must be electrically connected so that it can be disconnected for repairs.

Outdoor temperature sensor
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.

The outdoor sensor must be connected to the station on the terminal block under the electronic control.

Authorized electrician
Electrical connections must be made by an authorized electrician only.

Local standards
Electrical connections must be made in accordance with current regulations and local standards.

5.0 Design

5.1 Design

5.1.1 Design Termix Solar A+/B+/S+

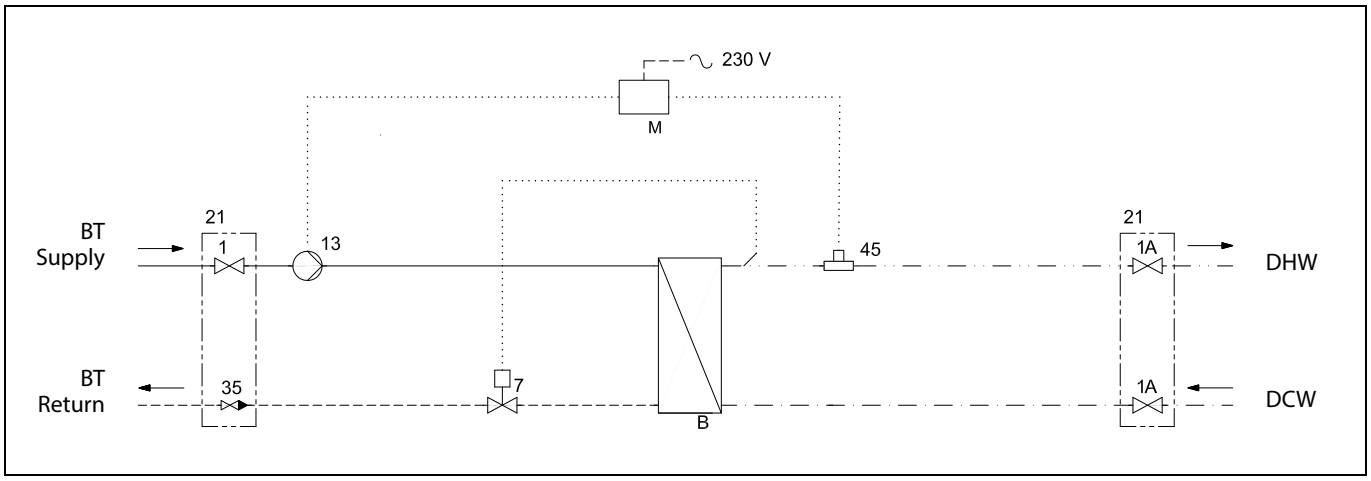
Your substation might look different than the substation shown.

Design description

B Heat exchanger, DHW
M Electrical wiring box
7 Thermostatic controller, DHW
13 Charging pump
21 To be ordered separately
35 Ball valve/non-return valve
45 Flow switch

5.2 Schematic diagram

5.2.1 Schematic diagram Termix Solar A+/B+/S+



Your substation might look different than the schematic diagram shown.

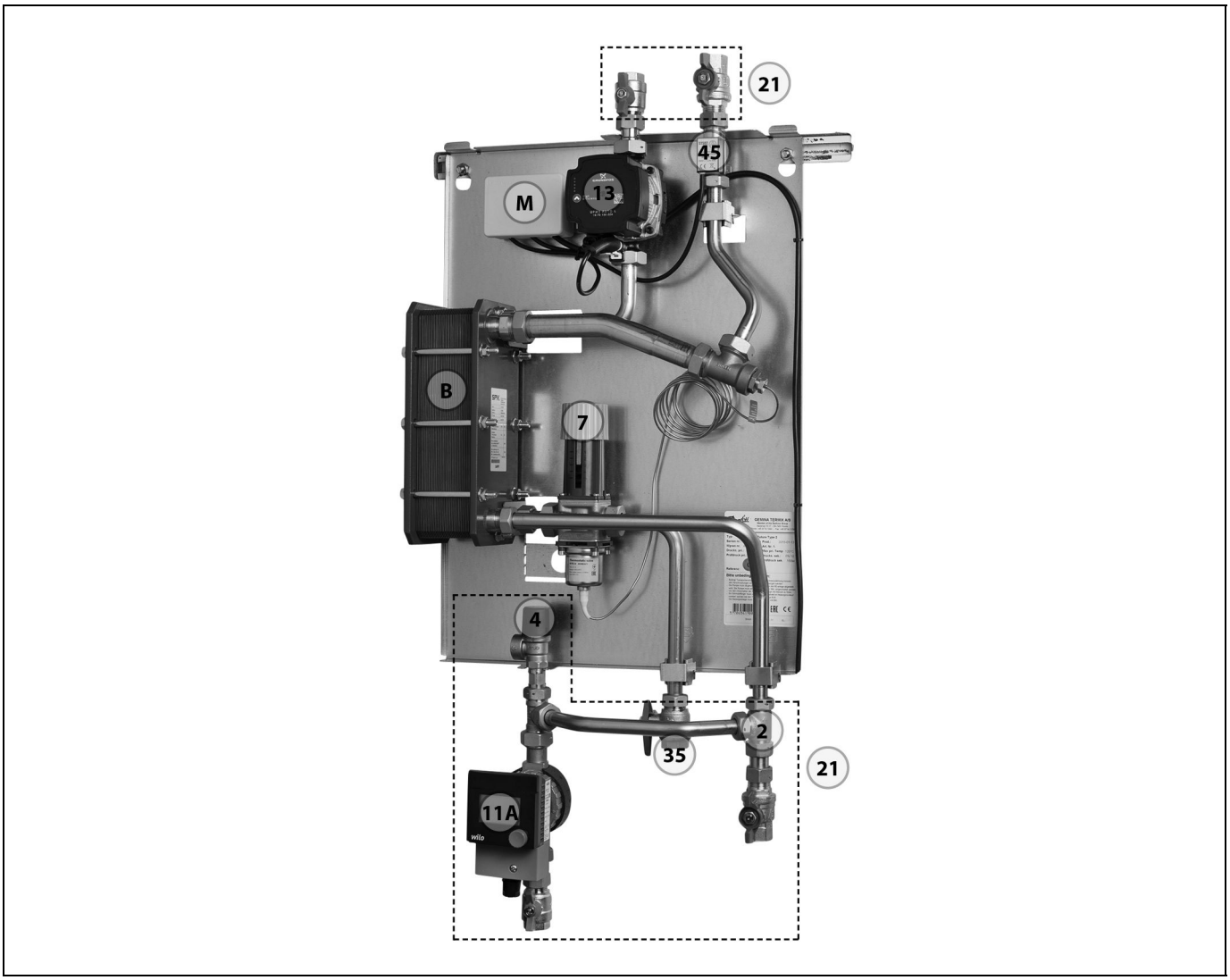
Schematic description without circulation

B	Heat exchanger, DHW	1A	Ball valve, DVGW	21	To be ordered separately
M	Electrical wiring box	7	Thermostatic valve	35	Ball valve/non-return valve
1	Ball valve	13	Charging pump	45	Flow switch

DHW: Domestic Hot Water
DCW: Domestic Cold Water
BT Supply: Buffer tank supply
BT Return: Buffer tank return

5.3 Design

5.3.1 Design Termix Solar A+/B+/S+ with circulation



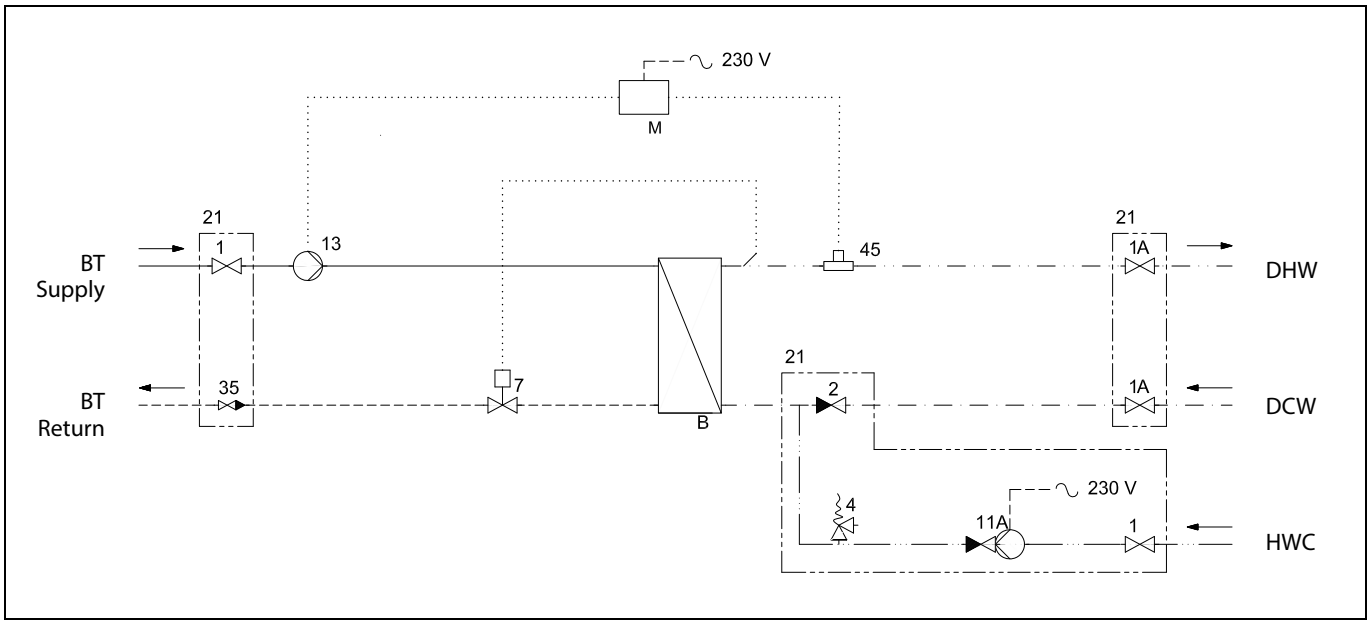
Your substation might look different than the substation shown.

Design description

B Heat exchanger, DHW
M Electrical wiring box
2 Single check valve
4 Safety valve
7 Thermostatic controller, DHW
11A DHW pump, with built in check valve
13 Charging pump
21 To be ordered separately
35 Ball valve/non-return valve
45 Flow switch

5.4 Schematic diagram

5.4.1 Schematic diagram Termix Solar A+/B+/S+ with circulation



Your substation might look different than the schematic diagram shown.

Schematic description with circulation

B	Heat exchanger, DHW	2	Single check valve	13	Charging pump
M	Electrical wiring box	4	Safety valve	21	To be ordered separately
1	Ball valve	7	Thermostatic valve	35	Ball valve/non-return valve
1A	Ball valve, DVGW	11A	DHW pump, with built in check valve	45	Flow switch

DHW: Domestic Hot Water
DCW: Domestic Cold Water
HWC: Hot Water Circulation
BT Supply: Buffer tank supply
BT Return: Buffer tank return

5.4.2 Technical parameters

Technical parameters

Nominal pressure:	PN 10
Max. DH supply temperature:	120 °C
Min. DCW static pressure:	0.5 bar
Brazed HEX (A+):	
Brazing material (HEX):	Copper
Heat exchangers test pressure:	30 bar
Gasketed HEX (B+):	
Gasket material (HEX):	EPDM per.
Heat exchangers test pressure:	13 bar
Brazed HEX (S+):	
Brazing material (HEX):	Stainless steel
Heat exchangers test pressure:	24 bar
Sound level:	≤ 55 dB

6.0 Controls

6.1 DHW temperature control

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.

6.1.1 AVTB controller (20–60 °)

The temperature setting is as follows:
1 = 20 °C
2 = 35 °C
3 = 50 °C
4 = 60 °C
5 = 70 °C
The values are intended as a guide.

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

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.

6.1.2 Circulator pump UPM3

UPM3 Pumps can be controlled in constant pressure, proportional pressure or constant speed mode defined by the means of a smart user interface.
The variable speed modulating modes allow the pump to match its performance to the system requirements, helping to reduce noise when thermostatic valves are closing down.
Energy labelling class A

6.1.3 Grundfos UPM3 AUTO instructions

Control mode
Each push on the button switches to the next program setting. The choice of operation mode depends on the type of heating system and the pressure loss in the system.

Settings

Function:	Recommended for:	Green	Green	Yellow	Yellow	Yellow
Proportional pressure Auto adapt		✪				
Constant pressure Auto adapt			✪			
Proportional pressure 1		✪		✪		
Proportional pressure 2	2-pipe systems	✪		✪	✪	
Proportional pressure 3 — MAX		✪		✪	✪	✪
Constant pressure 1	1-pipe systems		✪	✪		
Constant pressure 2	Under floor heating		✪	✪	✪	
Constant pressure 3 — MAX			✪	✪	✪	✪
Constant Curve 1				✪		
Constant Curve 2				✪	✪	
Constant Curve 3 — MAX				✪	✪	✪

Alarm status

Function:	Recommended for:	Red	Green	Yellow	Yellow	Yellow
Power Supply failure						
Blocked		✪				✪
Supply voltage low		✪			✪	
Electrical error		✪		✪		

6.1.4 Domestic hot water pump

The domestic hot water pump can be programmed with the desired time programme.

6.2 Maintenance

The substation requires little monitoring, apart from routine checks. It is recommended to read the energy meter at regular intervals, and to write down the meter readings.

Regular inspections of the substation according to this Instruction are recommended, which should include:

Strainers
Cleaning of strainers.

Meters
Checking of all operating parameters such as meter readings.

Temperatures
Checking of all temperatures, such as DH supply temperature and DHW temperature.

Connections
Checking all connections for leakages.

Safety valves
The operation of the safety valves should be checked by turning the valve head in the indicated direction.

Venting
Checking that the system is thoroughly vented.

Inspections should be carried out minimum every two years.

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

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

7.0 Troubleshooting

7.1 Troubleshooting in general

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

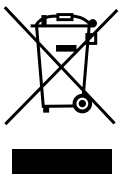
- the substation is connected to electricity,
- the strainer on the DH supply pipe is clean,
- the supply temperature of the DH is at the normal level (summer, at least 60 °C - winter, at least 70 °C),
- the differential pressure is equal to or higher than the normal (local) differential pressure in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

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

7.2 Troubleshooting DHW

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 too low setting.	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.
	Defective controller.	Check – replace.
Hot water in some taps but not in all.	DCW is being mixed with the DHW, e.g. in a defective thermostatic mixing valve.	Check – replace.
	Defective or clogged non-return valve on circulation valve.	Replace – clean.
Tap temperature too high; DHW tap load too high.	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.
Thermostatic control valve does not close	Temperature difference between DH supply and DHW set point too low.	Lower the set point temperature or increase the DH supply temperature.

7.3 Disposal



Disposal note

This symbol on the product indicates that it may not be disposed of as household waste..

It must be handed over to the applicable take-back scheme for the recycling of electrical and electronic equipment.

- Dispose of the product through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

8.0 Declaration

8.1 Declaration of conformity

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EU DECLARATION OF CONFORMITY

Danfoss A/S

Danfoss District Energy Division

Declares under our sole responsibility that the:

Product category: Small substations

Type designations:

Ø18:	HD	BTD	VMTD mini mix	KST-I	One Solar A+/B+	
		BVX	VMTD mix	KST-M	One Solar	Mixing loop
		BV	VMTD F mix	KST-L	FLS	Measuring Unit
				VX	VVX	BL
C28:	CS 28 HD	CS 28 BV	CS 28 VMTD	CS 28 VX	CS 28 VVX	CS 28 BL
C32:	CS 32 HD	CS 32 BV	CS 32 VMTD	CS 32 VX	CS 32 VVX	CS 28 BL
C40:	CS 40 HD	CS 40 BV	CS 40 VMTD	CS 40 VX	CS 40 VVX	CS 40 BL

Covered by this declaration is in conformity with the following directives, standards or other normative documents, provided that the product is used in accordance with our instructions.

Machinery Directive 2006/42/EC

EN ISO 12100:2011
Safety of machinery – General principles for design – Risk assessment and risk reduction

EN 60204-1:2018
Safety of machinery – Electrical equipment of machines – Part 1: General requirements

RoHS Directive 2011/65/EU
Including amendment 2015/863

EN IEC 63000:2018
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

EMC Directive – 2014/30/EU

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

EN 61000-6-2:2005
Electromagnetic compatibility (EMC) – Part 6-2:
Generic standards – Immunity for industrial environments

EN 61000-6-3:2007 + A1:2011
Electromagnetic compatibility (EMC) – Part 6-3:
Generic standards – Emission standard for residential, commercial and light-industrial environments

Date: 2021.07.20 **Place of issue:** DK-7451 Sunds	**Issued by:** Claus G. Mortensen **Signature:** **Name:** Claus G. Mortensen **Title:** Quality Manager	**Date:** 2021.07.20 **Place of issue:** DK-7451 Sunds	**Approved by:** Karina Friis Skov. **Signature:** **Name:** Karina Friis Skov **Title:** Director, Engineering

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