

## Operating Guide

# Termix BV-FI



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## Operating Guide Termix BV-FI

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### 2.0 Functional description

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**Instantaneous water heater with heat exchanger and automatic controls. Designed for wall-mounting.**

#### **Application**

The Termix BV-FI substation is an instantaneous water heater featuring superb heat extraction and high performance. The substation is delivered with automatic controls. The Termix BV-FI is suitable for large apartment houses, sports arenas and schools, where large amounts of hot water are needed. The hot water systems are available in 7 different sizes with an output from 56-195 kW.

#### **Domestic hot water (DHW)**

The substation is fitted with an efficient plate heat exchanger, which ensures the most favourable heat extraction and achieves optimum comfort and operating economy.

#### **Domestic hot water circulation**

The Termix BV-FI substation is supplied with connections for DHW circulation including circulation pump and a nonreturn valve as a standard.

#### **Flexible solution**

Pipe connection can be made from either the top or bottom, which makes this solution highly flexible. At the same time, both space and time are saved when installing.

#### **Minimal heat loss**

Complete insulation of the unit ensures minimal heat loss.

#### **Reliable and easy to install**

Termix BV-FI is operationally reliable. A quality product manufactured in Denmark, which is easy to install and quickly commissioned.

## Operating Guide Termix BV-FI

### 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 16 bar.

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.

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### 4.0 Mounting

#### 4.1 Mounting the Compactstation



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.

##### Connections:

1. District heating (DH) supply
2. District heating (DH) return
3. Domestic hot water (DHW)
4. Domestic cold water (DCW)
5. Hot water circulation (HWC)

##### Connection sizes:

DH + DHW + DCW: G 1" (int. thread)  
HWC: G 3/4" (int. thread)

##### Dimensions (mm):

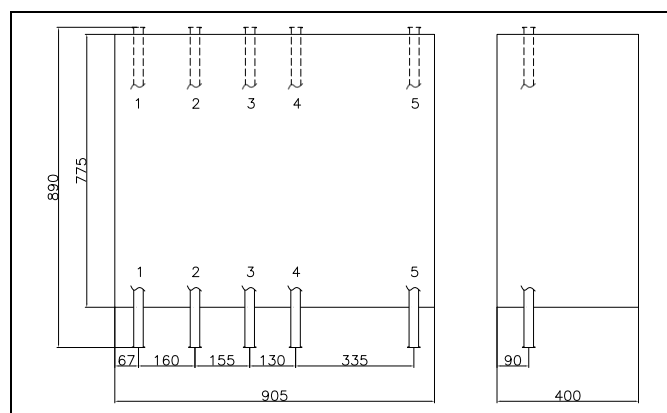
With insulation: H 890 x W 905 x D 400

**Weight (approx.):** 60 kg



##### Authorized personnel only

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



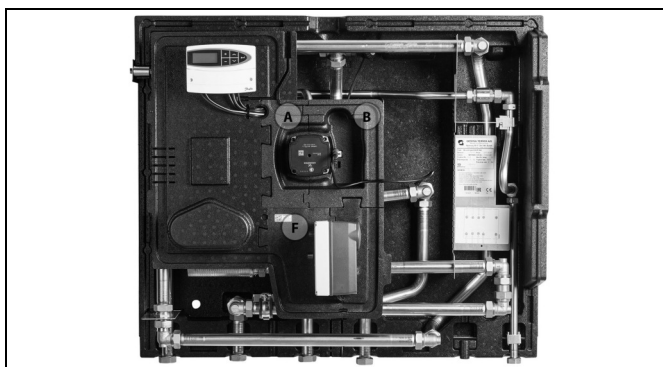
*The pipe placement can deviate from the shown drawing. Please note the markings on the station.*

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Remove the front.



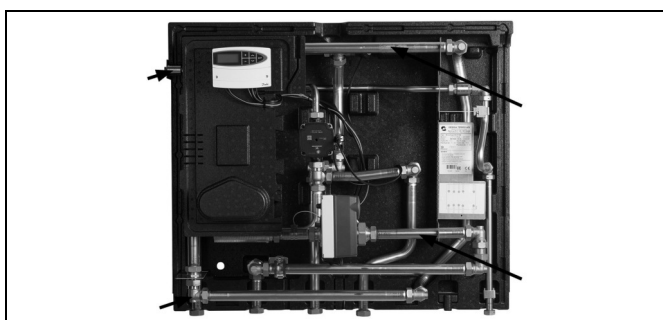
Remove other blocks.



Attach the mounting rail to the wall.



Lift the station.

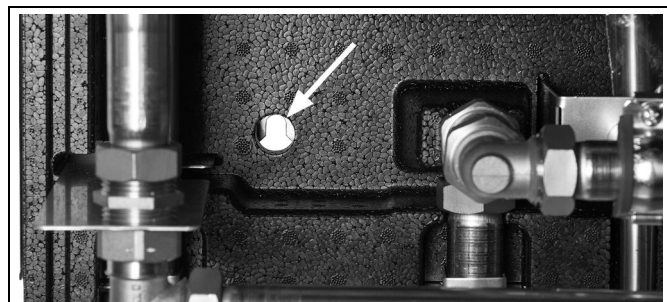


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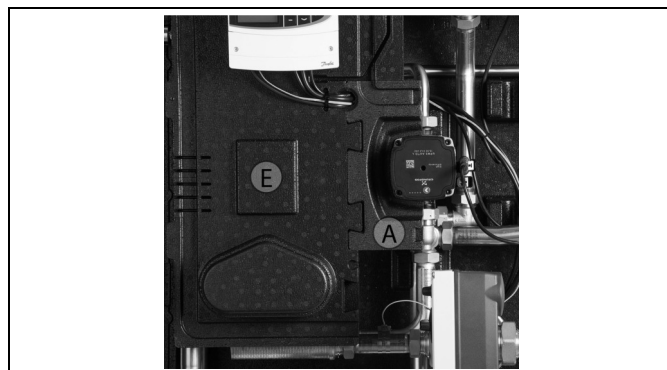
Mount the station on the mounting rail.



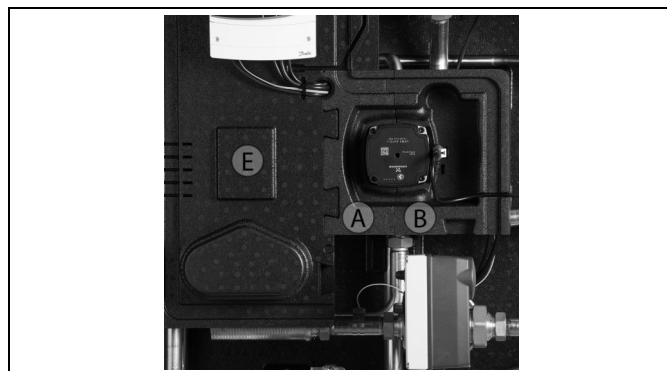
Attach the station to the wall in the holes on the mounting plate.



Mount block A on the left-hand side of the pump. Attach block E to block A, and attach it to the pipe above the pump by clicking it in place.

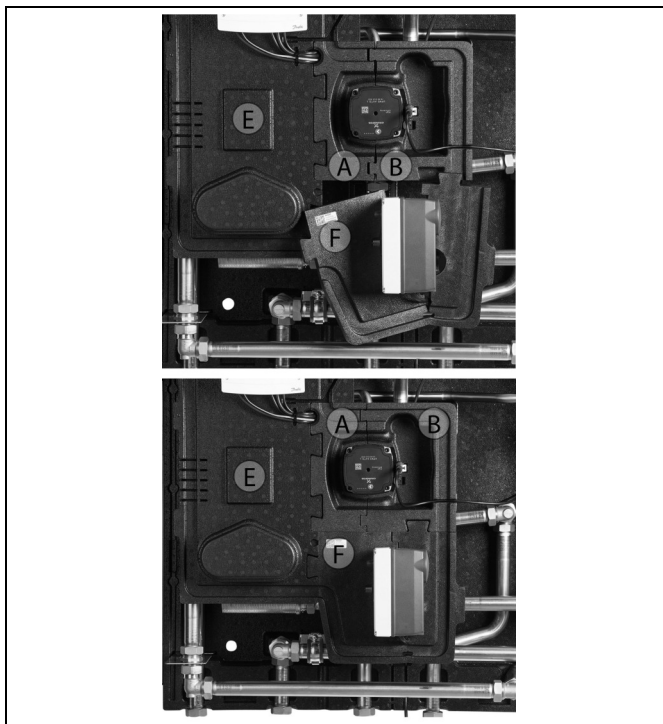


Mount block B on the right-hand side of the pump.

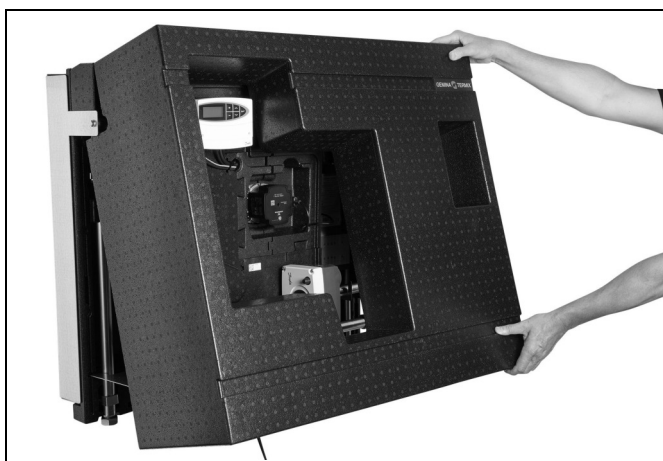


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Mount block F. The block is hinged and can be drawn around the valve. Attach the block to block B and E.



Mount the front cover.





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### 4.1.1 Installing the Compactstation

#### Mounting:

##### Adequate space

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

##### Orientation

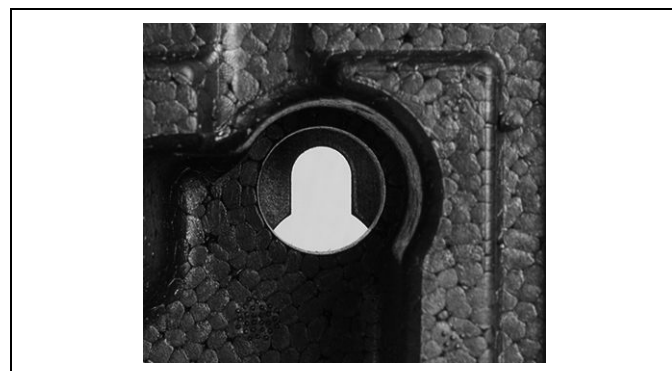
The station must be mounted so that components, keyholes and labels are placed correctly. If you wish to mount the station differently please contact your supplier.

##### 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.



*Keyhole for mounting.*

#### 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

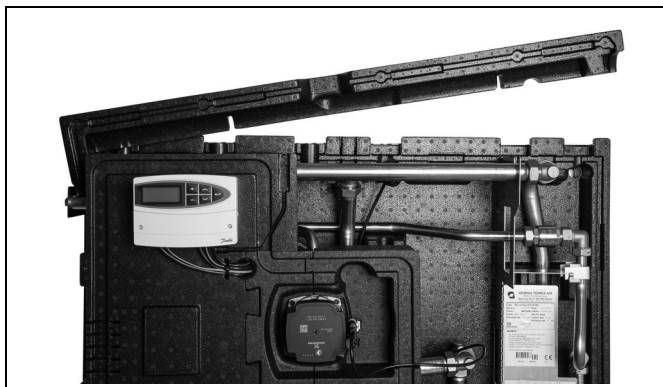
Internal installation and district heating pipes connections must be made using threaded, flanged or welded connections.

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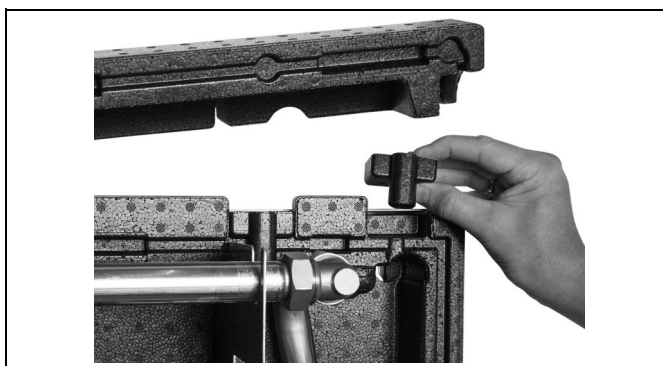
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### 4.1.2 Pipe connections up

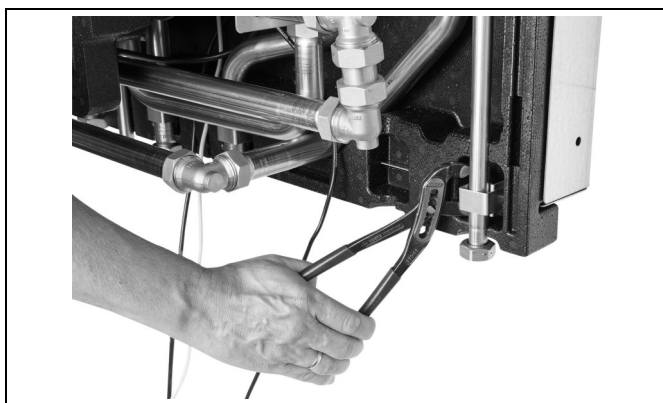
Remove the top block.



Remove the pipe plugs at the top of the station.

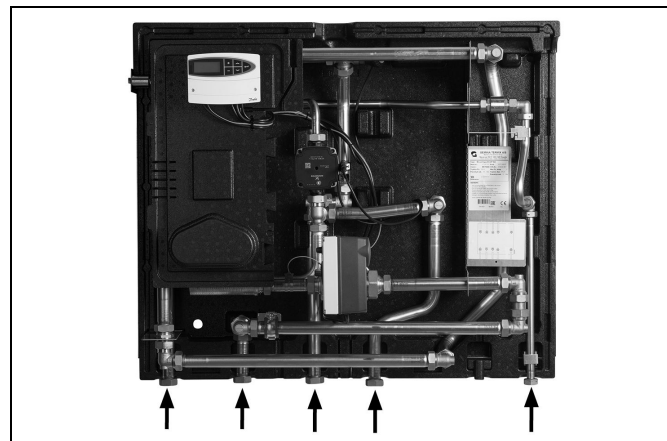


Remove U-clamps.

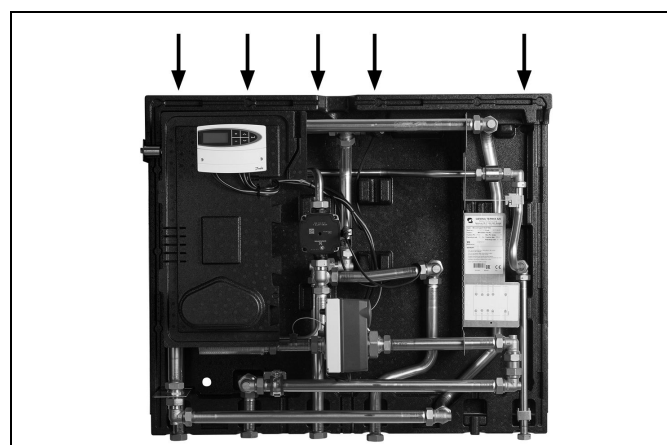


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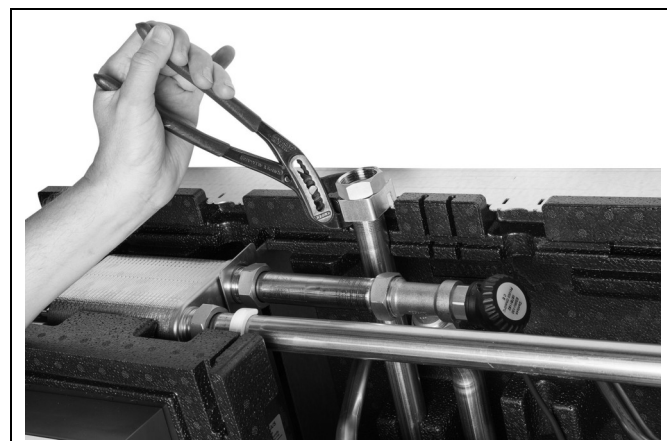
Remove pipes. Angles and tees are turned so that pipes can be installed from above.



Install the pipes. District heating supply pipes to be interchanged.



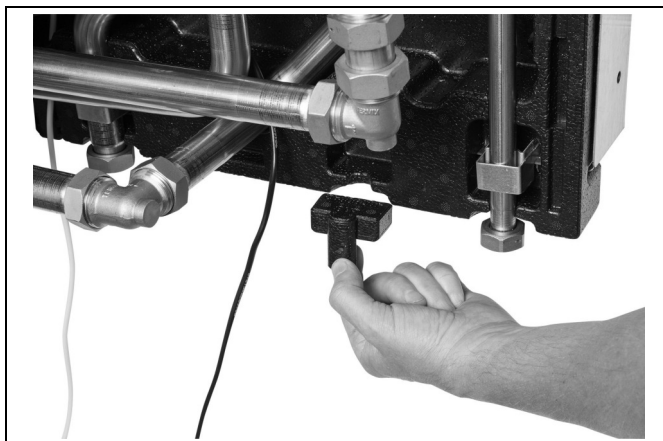
Fit U-clamps.



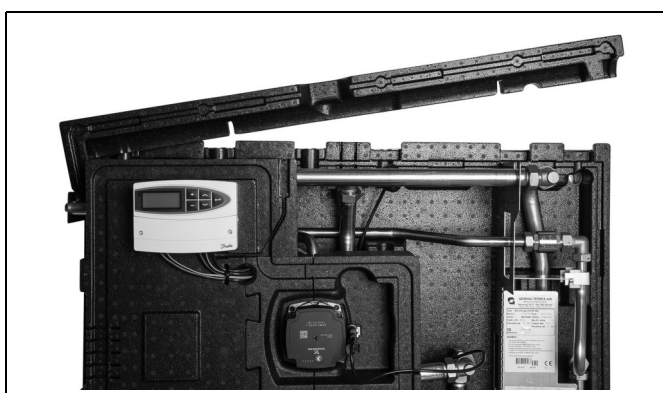
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Fit the pipe plugs at the bottom of the station.



Fit the top block.



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### 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.

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### 5.0 Design

#### 5.1 Design



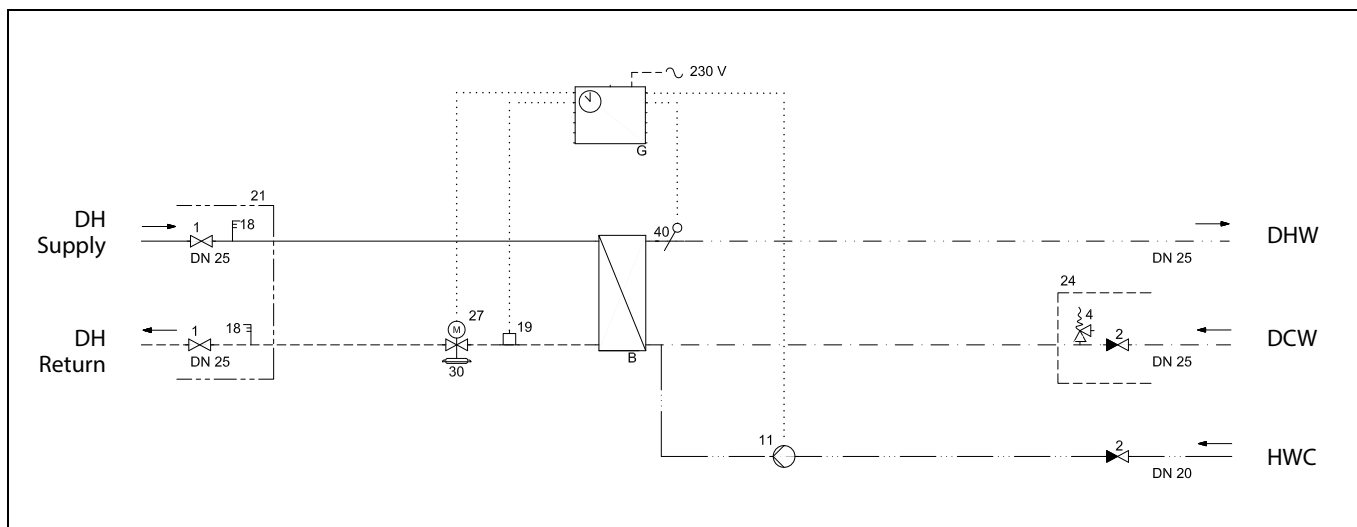
Your substation might look different than the substation shown.

#### Design description

|   |                           |    |                                 |
|---|---------------------------|----|---------------------------------|
| B | Heat exchanger, DHW       | 11 | Domestic hot water pump         |
| G | Electronic controller DHW | 27 | Actuator                        |
| 2 | Single check valve        | 30 | Flow control with control valve |

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### 5.2 Schematic diagram



Your substation might look different than the schematic diagram shown.

#### Schematic description

|   |                           |    |                          |    |                                 |
|---|---------------------------|----|--------------------------|----|---------------------------------|
| B | Heat exchanger, DHW       | 11 | Domestic hot water pump  | 27 | Actuator                        |
| G | Electronic controller DHW | 18 | Thermometer              | 30 | Flow control with control valve |
| 1 | Ball valve                | 19 | Surface sensor           | 40 | Immersion sensor                |
| 2 | Single check valve        | 21 | To be ordered separately |    |                                 |

**DHW:** Domestic hot water  
**DCW:** Domestic cold water  
**HWC:** Hot water circulation  
**DH Supply:** District heating flow  
**DH Return:** District heating return

#### 5.2.1 Technical parameters

##### Technical parameters

|                                |         |
|--------------------------------|---------|
| Nominal pressure:              | PN 16   |
| Max. DH supply temperature:    | 110 °C  |
| Min. DCW static pressure:      | 0.5 bar |
| Brazing material (HEX):        | Copper  |
| Heat exchangers test pressure: | 30 bar  |
| Sound level:                   | ≤ 55 dB |

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### 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 Electronic control

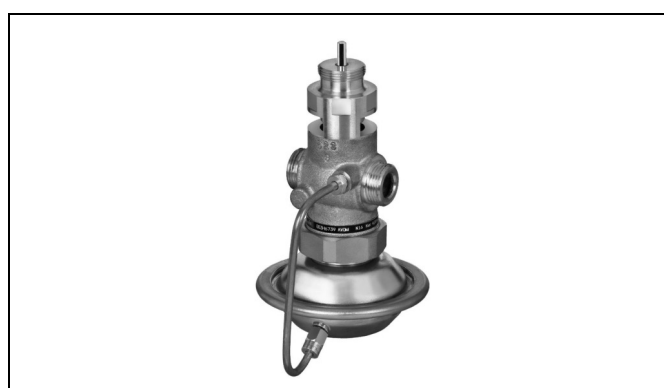
Substations with electronic control must be set in accordance with manufacturer's instructions.

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



##### 6.1.2 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.





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### 6.1.3 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.



### 6.1.4 Domestic hot water pump

#### **Important!**

It is necessary to mount a domestic hot water circulation pump on the water heater to avoid regulation problems. The circulation pump can not be switched off, since this will result in regulation problems. (no flow at the sensor).



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### 6.2 Other

#### 6.2.1 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.



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### 6.3 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.



#### **Authorized personnel only**

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

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### 7.0 Troubleshooting

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#### 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.


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### 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

|   |   |
|---|---|
|  | <p><b>Disposal note</b></p> <p>This symbol on the product indicates that it may not be disposed of as household waste..</p> <p>It must be handed over to the applicable take-back scheme for the recycling of electrical and electronic equipment.</p> <ul style="list-style-type: none"> <li>• Dispose of the product through channels provided for this purpose.</li> <li>• Comply with all local and currently applicable laws and regulations.</li> </ul> |
|---|---|

## 8.0 Declaration

### 8.1 Declaration of conformity

ENGINEERING  
TOMORROW



#### Danfoss A/S

6430 Nordborg  
Denmark  
CVR nr.: 20 16 57 15

Telephone: +45 7488 2222  
Fax: +45 7449 0949

## 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

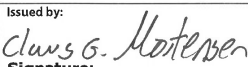
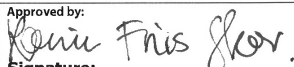
Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity residential, commercial and light-industrial environments

##### 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

|   |   |   |   |
|---|---|---|---|
| <b>Date:</b><br>2021.07.20<br><br><b>Place of Issue:</b><br>DK-7451 Sunds | <b>Issued by:</b><br><br><b>Signature:</b><br><b>Name:</b> Claus G. Mortensen<br><b>Title:</b> Quality Manager | <b>Date:</b><br>2021.07.20<br><br><b>Place of Issue:</b><br>DK-7451 Sunds | <b>Approved by:</b><br><br><b>Signature:</b><br><b>Name:</b> Karina Friis Skov<br><b>Title:</b> Director, Engineering |
|---|---|---|---|

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

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