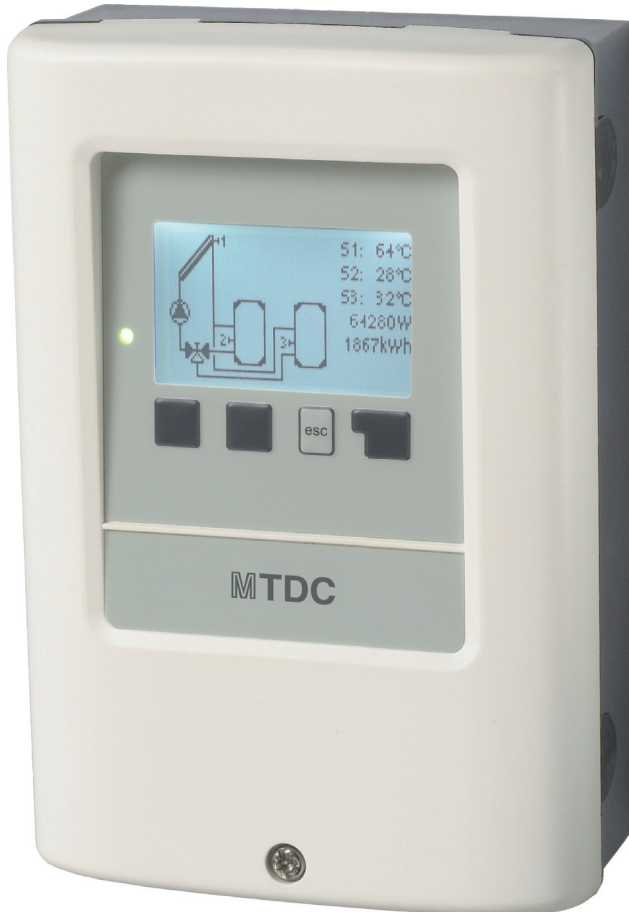


# Temperature Difference Controller MTDC

## Installation and operating instructions



**Read carefully before installation, commissioning and operation**

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**This manual applies to the following hardware versions:**

**Version 1**

2 mechanical relays on/off

**Version 2**

1 mechanical relays on/off  
1 electronic relay

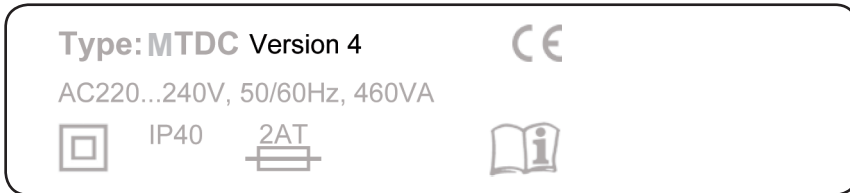
**Version 3**

2 mechanical relays on/off  
1 PWM / 0-10V for high efficiency pumps

**Version 4**

1 mechanical relay on/off  
1 electronic relay  
for speed control of standard pumps  
1 PWM / 0-10V for high efficiency pumps

**When you are unsure which version you have, check the type label on the side of the controller.**



**If the version is not readable here, open the controller's "Service values" menu. The version is shown in the first line of the service values.**

# Safety instructions

## A.1 EC declaration of conformity

By affixing the CE mark to the unit the manufacturer declares that the Temperature-Difference-Controller MTDC, conforms to the following relevant safety regulations:

- EC low voltage directive 2006/95/EC
- EC electromagnetic compatibility directive 2004/108/EC

Conformity has been verified and the corresponding documentation and the EC declaration of conformity are kept on file by the manufacturer.

## A.2 General instructions

**It is essential that you read this!**

These installation and operating instructions contain basic instructions and important information regarding safety, installation, commissioning, maintenance and the optimal use of the unit. Therefore these instructions must be read completely and understood by the installation technician/specialist and by the system user before installation, commissioning and operation of the unit.

The valid accident prevention regulations, VDE regulations, the regulations of the local power utility, the applicable DIN-EN standards and the installation and operating instruction of the additional system components must also be observed. The controller does not under any circumstances replace any safety devices to be provided by the customer!

Installation, electrical connection, commissioning and maintenance of the unit may only be carried out by specialists who possess the appropriate training.

For the user: Make sure that the specialist gives you detailed information on the function and operation of the controller. Always keep these instructions in the vicinity of the controller.

## A.3 Explanation of symbols



Failure to observe these instructions can result in danger to life from electric voltage.



Failure to observe these instructions can result in serious damage to health such as scalding, or even life-threatening injuries.



Failure to observe these instructions can result in destruction of the unit or the system, or damage to the environment.



Information which is especially important for the function and optimal use of the unit and the system.

# Safety instructions

## A.4 Changes to the unit



Changes to the unit can compromise the safety and function of the unit or the entire system.

- Changes, additions to or conversion of the unit are not permitted without the written permission from the manufacturer
- It is likewise forbidden to install additional components that have not been tested together with the unit
- If it becomes clear that safe operation of the unit is no longer possible, for example because of damage to the housing, then turn the controller off immediately
- Any parts of the unit or accessories that are not in perfect condition must be exchanged immediately
- Use only original spare parts and accessories from the manufacturer.
- Markings made on the unit at the factory must not be altered, removed or made illegible
- Only the settings actually described in these instructions may be made on the controller

## A.5 Warranty and liability

The controller has been manufactured and tested with regard to high quality and safety requirements. The unit is subject to the statutory guarantee period of two years from the date of sale.

The warranty and liability shall not include, however, any injury to persons or material damage that is attributable to one or more of the following causes:

- Failure to observe these installation and operating instructions
- Improper installation, commissioning, maintenance and operation
- Improperly executed repairs
- Unauthorised structural changes to the unit
- Installation of additional components that have not been tested together with the unit
- Any damage resulting from continued use of the unit despite an obvious defect
- Failure to use original spare parts and accessories
- Use of the device for other than its intended purpose
- Operation above or below the limit values listed in the specifications
- Force majeure

# Description of controller

## B.1 Specifications

### Electrical specifications:

Mains voltage	230VAC +/- 10%
Mains frequency	50 - 60Hz
Power consumption	1,5W - 2,3W

Internal fuse T2A / 250V slow blow

Protection category	IP40
Protection class	II
Overvoltage Category	II
Degree of Pollution Category	II

	Vers.1	Vers.2	Vers.3	Vers.4
mechanical relay 460VA for AC1 / 460W for AC3	2 (R1-R2)	1 (R2)	2 (R1 - R2)	1 (R2)
electronic relay min.5W...max.120W for AC3	-	1 (R1)	-	1(R1)
0-10V output, tolerance 10%, 10 k Ω load or PWM output freq. 1 kHz, level 10 V	-	-	1	1
PT1000 sensor input measuring range -40°C to 300°C	3	3	3	3

### Permissible cable length of sensors and appliances:

Collector and outdoor sensor	<30m
other PT1000 sensors	<10m
PWM / 0...10V	<3m
electronic relay	<3m
mechanical relay	<10m

**Real Time Clock** RTC with 24 hour power reserve

### Permissible ambient conditions:

Ambient temperature	
for controller operation	0°C...40°C
for transport/storage	0°C...60°C
Air humidity	
for controller operation	max. 85% rel. humidity at 25°C
for transport/storage	no moisture condensation permitted

### Other specifications and dimensions

Housing design	3-part, ABS plastic
Installation methods	Wall installation, optionally panel installation
Overall dimensions	163mm x 110mm x 52mm
Aperture installation dimensions	157mm x 106mm x 31mm
Display	Fully graphical display, 128 x 128 dots
Light diode	Multicolor red/green
Operation	4 entry keys

°C	0	10	20	30	40	50	60	70	80	90	100
Ω	1000	1039	1077	1116	1155	1194	1232	1270	1308	1347	1385

# Description of controller

## B.2 About the controller

The Temperature Difference Controller MTDC facilitates efficient use and function control of your solar or heating system. The device is impressive most of all for its functionality and simple, almost self-explanatory operation. For each step in the input process the individual entry keys are assigned to appropriate functions and explained. The controller menu contains headwords for the measured values and settings, as well as help texts or clearly-structured graphics.

The MTDC can be used as a temperature difference controller for the various system variants illustrated and explained under B.5.

Important characteristics of the MTDC:

- Depiction of graphics and texts in a lighted display
- Simple viewing of the current measurement values
- Analysis and monitoring of the system by means of statistical graphics, etc.
- Extensive setting menus with explanations
- Menu block can be activated to prevent unintentional setting changes
- Resetting to factory settings
- A wide range of additional functions are available.

## B.3 Scope of supply

- Temperature Difference Controller MTDC
- 3 screws 3,5x35mm and 3 plugs 6mm for wall installation
- 6 strain relief clips with 12 screws, replacement fuse 2A slow-blow
- Installation and operating instructions MTDC

Optionally contained depending on design/order:

- 2-3 PT1000 temperature sensors and immersion sleeves

Additionally available:

- Pt1000 temperature sensor, immersion sleeves, overvoltage protection,
- Various additional functions by means of supplementary circuit boards

## B.4 Disposal and pollutants

The unit conforms to the European RoHS directive 2002/95/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment.



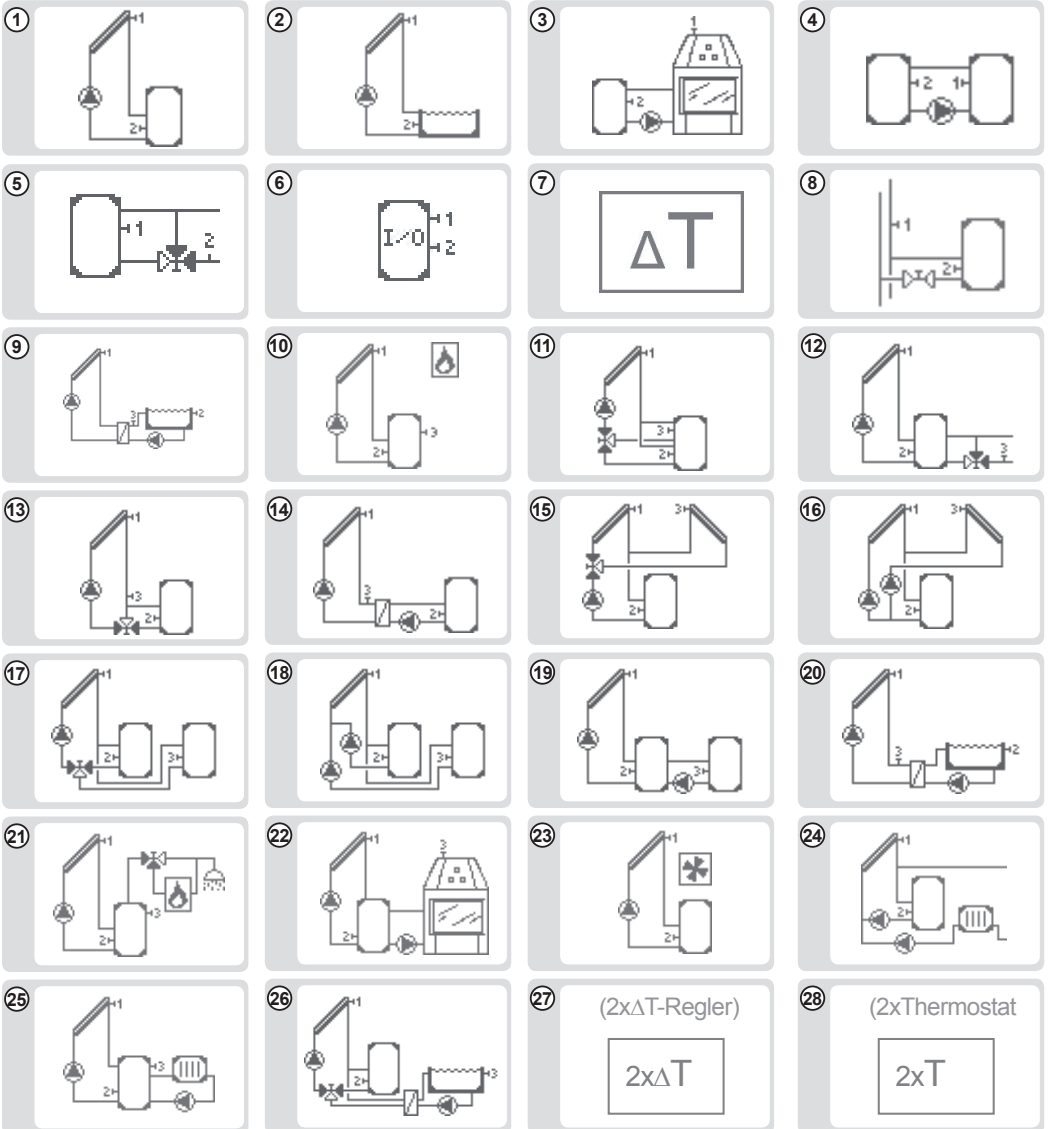
The unit must not under any circumstances be disposed of with ordinary household refuse. Dispose of the unit only at appropriate collection points or ship it back to the seller or manufacturer.

# Description of controller

## B.5 Hydraulic variants



The following illustrations should be viewed only as schematic diagrams showing the respective hydraulic systems, and do not claim to be complete. The controller does not replace safety devices under any circumstances. Depending on the specific application, additional system components and safety components may be mandatory, such as check valves, non-return valves, safety temperature limiters, scalding protectors, etc., and must therefore be provided.





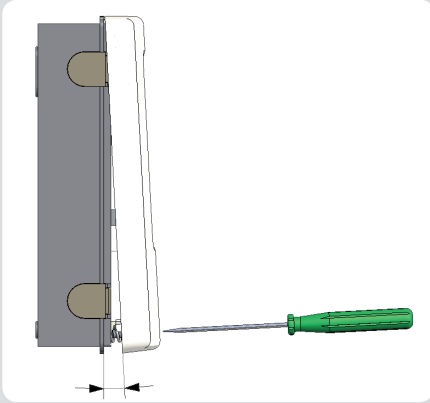
# Installation

## C.1 Wall installation



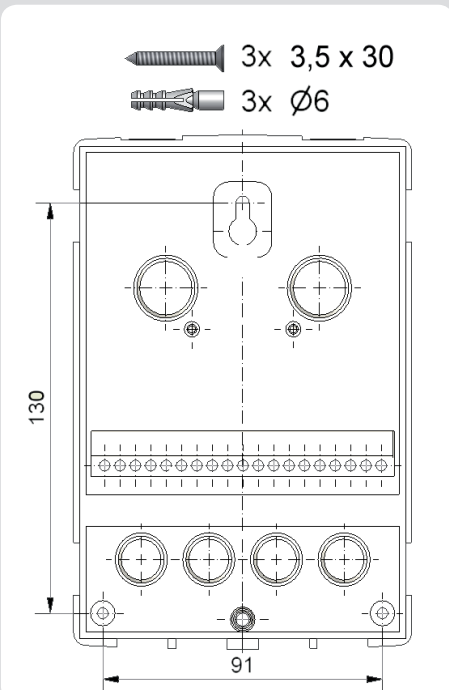
Install the controller only in dry areas and under the ambient conditions described under B.1 "Specifications". Carry out the following steps 1-8.

### C.1.1



1. Unscrew cover screw completely
2. Carefully pull upper part of housing from lower part.
3. Set upper part of housing aside, being sure not to touch the electronics when doing so.
4. Hold the lower part of the housing up to the selected position and mark the 3 mounting holes. Make sure that the wall surface is as even as possible so that the housing does not become distorted when it is screwed on.

### C.1.2



5. Using a drill and size 6 bit, drill 3 holes at the points marked on the wall and push in the plugs.
6. Insert the upper screw and screw it in slightly.
7. Fit the upper part of the housing and insert the other two screws.
8. Align the housing and tighten the three screws.

# Installation

## C.2 Electrical connection



Before working on the unit, switch off the power supply and secure it against being switched on again! Check for the absence of power! Electrical connections may only be made by a specialist and in compliance with the applicable regulations.  
Do not use the controller if the housing shows visible damage.



Low-voltage cables such as temperature sensor cables must be routed separately from mains voltage cables. Feed temperature sensor cables only into the left-hand side of the unit, and mains voltage cables only into the right-hand side.



The customer must provide an all-pole disconnecting device, e.g. a heating emergency switch.



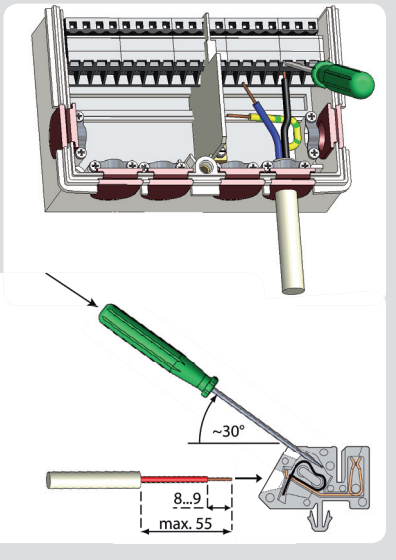
The cables being connected to the unit must not be stripped by more than 55mm, and the cable jacket must reach into the housing just to the other side of the strain relief.



With hydraulic variant D1 - D8 relays R1 and R2 are switched on simultaneously to allow the connection of another load at R2.  
If in D1 speed control is active, R2 is switched on during purging time.

# Installation

## C.2.1



1. Select necessary program/hydraulics (Fig. B5 resp. D.1 - D.20)
2. Open controller as described under C.1.
3. Strip cables by 55mm max., insert, fit the strain relief devices, strip the last 8-9mm of the wires (Fig. C.2.1)
4. Open the terminals using a suitable screwdriver (Fig. C.2.1) and make electrical connections on the controller (s. D.1 - D.20)
5. Refit upper part of housing and fasten with screw.
6. Switch on mains voltage and place controller in operation.

## C.3 Installing the temperature sensors

The controller operates with Pt1000 temperature sensors which are accurate to the degree, thus ensuring optimal control of system functions.



Caution

If desired the sensor cables can be extended to a maximum of 30m using a cable with a cross-section of at least 0.75mm<sup>2</sup>. Make sure that there is no contact resistance!

Position the sensor precisely in the area to be measured!

Only use immersion, pipe-mounted or flat-mounted sensor suitable for the specific area of application with the appropriate permissible temperature range.



Caution

The temperature sensor cables must be routed separately from mains voltage cables, and must not, for example, be routed in the same cable duct!

# Installation

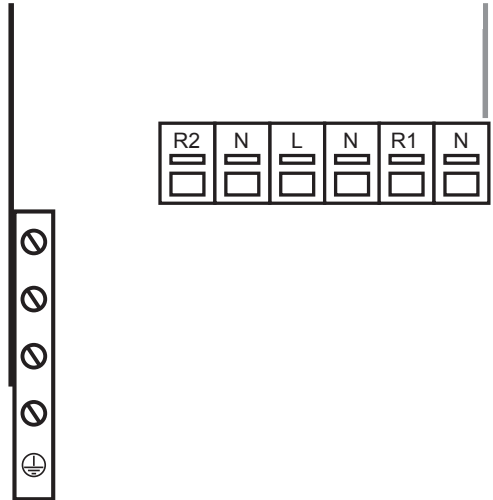
## D. - Terminal connection diagram

Low voltage



Relays

Mains



max. 12V

Achtung

**Low voltage** max. 12VAC/DC

Terminal: Connection for:

S1 (2x) Sensor 1

S2 (2x) Sensor 2

S3 (2x) Sensor 3

MTDC V3 + V4:

V1 speed controlled  
output for High efficiency pumps

- speed controlled  
output for High efficiency pumps



Netzseite

Gefahr

230VAC

**Mains voltage** 230VAC 50-60Hz

Terminal: Connection for:

R1 Relay 1

N Neutral conductor N

R2 Relay 2

N Neutral conductor N

L Mains phase conductor L

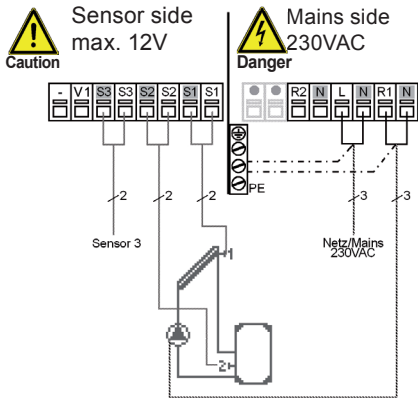
N Mains neutral conductor N

The PE protective conductor must be connected to the PE metal terminal block!

# Installation

## D Terminal connection diagrams

### D.1 Solar with storage tank



Relay R1 and R2 are both switched on in this variant, so e.g. a pump can be connected to R2.

**Low voltage** max. 12VAC/DC connection in the left-hand terminal compartment!

Terminal:Connection for:

S1 (2x) Sensor 1 collector

S2 (2x) Sensor 2 storage tank

S3 (2x) Sensor 3 (optional)

The polarity of the sensors is freely selectable.

V1 / - 0-10V or PWM +/- (MTDC Version 3+4)

**Mains voltages** 230 VAC 50-60Hz Connection in the right-hand terminal compartment!

Terminal:Connection for:

L Mains phase conductor L

N Mains neutral conductor N

R1 Pump L

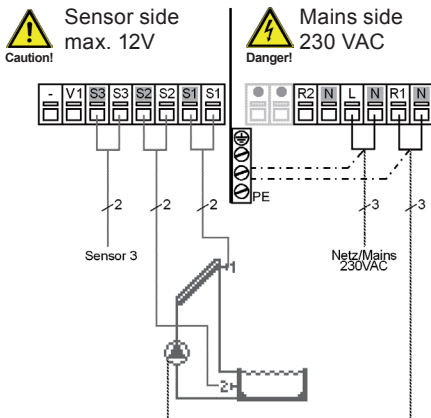
N Pump N

R2 Pump L

N Pump N

The PE protective conductor must be connected to the PE metal terminal block!

### D.2 Solar with swimming pool



**Low voltage** max. 12VAC/DC connection in the left-hand terminal compartment!

Terminal:Connection for:

S1 (2x) Sensor 1 collector

S2 (2x) Sensor 2 pool

S3 (2x) Sensor 3 (optional)

The polarity of the sensors is freely selectable.

V1 / - 0-10V or PWM +/- (MTDC Version 3+4)

**Mains voltages** 230 VAC 50-60Hz

Connection in the right-hand terminal compartment!

Terminal:Connection for:

R2 not used

N not used

L Mains phase conductor L

N Mains neutral conductor N

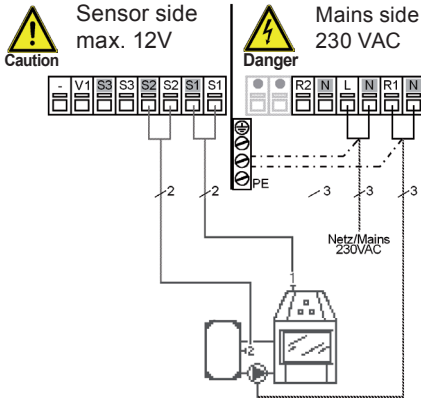
R1 Pump phase conductor L

N Pump neutral conductor N

The PE protective conductor must be connected to the PE metal terminal block!

# Installation

## D.3 Solid fuel boiler



**Low voltage** max. 12VAC/DC connection in the left-hand terminal compartment!

Terminal: Connection for:

S1 (2x) Fühler 1 solid fuel boiler

S2 (2x) Fühler 2 storage tank

S3 (2x) Fühler 3 (optional)

The polarity of the sensors is freely selectable.

V1 / - 0-10V or PWM +/- (MTDC Version 3+4)

**Mains voltages** 230VAC 50-60Hz Connection in the right-hand terminal compartment!

Terminal: Connection for:

L Mains phase conductor L

N Mains neutral conductor N

R1 Pump L

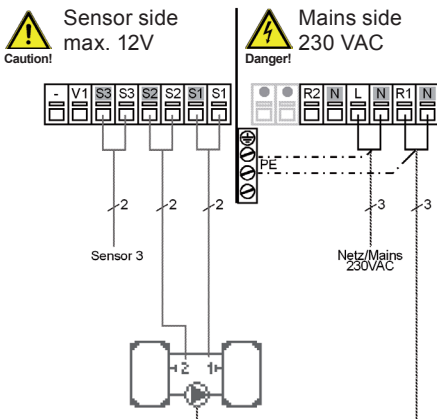
N Pump N

R2 -

N -

The PE protective conductor must be connected to the PE metal terminal block!

## D.4 Storage transfer



**Low voltage** max. 12VAC/DC connection in the left-hand terminal compartment!

Terminal: Connection for:

S1 (2x) Sensor 1 storage

S2 (2x) Sensor 2 storage

S3 (2x) Sensor 3 (optional)

The polarity of the sensors is freely selectable.

V1 / - 0-10V or PWM +/- (MTDC Version 3+4)

**Mains voltages** 230VAC 50-60Hz

Connection in the right-hand terminal compartment!

Terminal: Connection for:

R2 not used

N not used

L Mains phase conductor L

N Mains neutral conductor N

R1 Pump phase conductor L

N Pump neutral conductor N

The PE protective conductor must be connected to the PE metal terminal block!

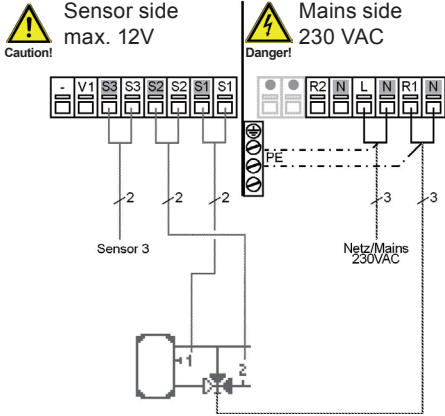


The heat is transferred from storage 1 to storage 2

Caution

# Installation

## D.5 Raising of heat circuit



**Caution!** Actuating direction of valve:  
R1 on/valve on = direction through the storage tank

**Low voltage** max. 12VAC/DC connection in the left-hand terminal compartment!

Terminal: Connection for:

- S1 (2x) Sensor 1 storage
- S2 (2x) Sensor 2 backward flow
- S3 (2x) Sensor 3 (optional)

The polarity of the sensors is freely selectable.  
V1 / - 0-10V or PWM +/- (MTDC Version 3+4)

**Mains voltages** 230VAC 50-60Hz

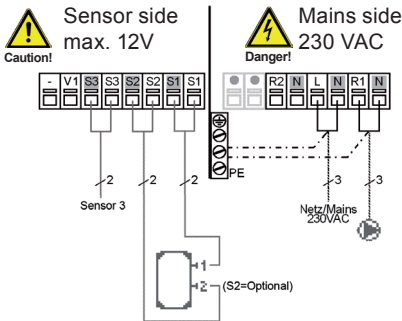
Connection in the right-hand terminal compartment!

Terminal: Connection for:

- R2 not used
- N not used
- L Mains phase conductor L
- N Mains neutral conductor N
- R1 Pump phase conductor L
- N Pump neutral conductor N

The PE protective conductor must be connected to the PE metal terminal block!

## D.6 Thermostat



**Caution!** When S2 is installed = S1 is switch on sensor and S2 switch off sensor.

**Low voltage** max. 12VAC/DC connection in the left-hand terminal compartment!

Terminal: Connection for:

- S1 (2x) Sensor 1 storage
- S2 (2x) Sensor 2 (optional)
- S3 (2x) Sensor 3 (optional)

The polarity of the sensors is freely selectable.  
V1 / - 0-10V or PWM +/- (MTDC Version 3+4)

**Mains voltages** 230 VAC 50-60Hz

Connection in the right-hand terminal compartment!

Terminal: Connection for:

- R2 not used
- N not used
- L Mains phase conductor L
- N Mains neutral conductor N
- R1 Pump phase conductor L
- N Pump neutral conductor N

The PE protective conductor must be connected to the PE metal terminal block!