

Temperature difference controller MTDC-E

Installation and operating instructions



Read carefully before installation, commissioning and operation

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EU-Conformity

By affixing the CE mark to the unit the manufacturer declares that the MTDC-E conforms to the following relevant safety regulations:

- EU low voltage directive 2014/35/EU
- EU electromagnetic compatibility directive 2014/30/EU

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

General instructions

Please read carefully!

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 and understood completely by the installation technician/specialist and by the system user before installation, commissioning and operation of the unit.

This unit is an automatic, electrical Temperature difference controller. Install the unit only in dry areas and under the ambient conditions described in "Specifications".

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.

Under no circumstances does the unit replace any safety devices to be provided by the customer!

Installation, electrical connection, commissioning and maintenance of the device may only be carried out by an appropriately trained specialist. Users: Make sure that the specialist gives you detailed information on the function and operation of the unit. Always keep these instructions in the vicinity of the unit.

The manufacturer does not take over any liability for damage caused through improper usage or non-compliance of this manual!

Explanation of Symbols



Danger

Failure to observe these instructions can result in electrocution.



Danger

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



Caution

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



Caution

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

Changes to the Unit

- Changes, additions to or conversion of the unit are not permitted without 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, turn the Unit 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 described in these instructions may be set using the Unit.



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

Warranty and Liability

The Unit has been manufactured and tested with regard to high quality and safety requirements. 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.
- Use of the device for other than its intended purpose.
- Operation above or below the limit values listed in the 'Specifications' section.
- Force majeure.

Disposal and Pollutants

The unit conforms to the European RoHS 2011/65/EU for 2011/65/EU the restriction of the use of certain hazardous substances in electrical and electronic equipment.



Under no circumstances may the device be disposed of with the normal household waste. Dispose of the unit only at appropriate collection points or ship it back to the seller or manufacturer.

Specifications

Electrical specifications:

Power supply	100 - 240VAC, 50 - 60 Hz
Power consumption / standby	0,5 W - 2,5 W/ 0,5 W
Internal fuse	1 2A slow blow 250V
Protection Class	IP40
Protection Class	II
Overvoltage category	II
Degree of pollution category	II

Inputs/Outputs

Sensor inputs	4	Pt1000	-40 °C ... 300 °C
Outputs mechanical relay	2		
of relay potential free	R2	3000 VA für AC2 / 3000 W AC3	
mechanical relay	R1	460VA for AC1 / 460W for AC3	

Max. cable length

mechanical relay	<10m
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Permissible Ambient Conditions

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

Other Specifications and Dimensions

Housing Design	2-part, ABS plastic
Installation Methods	Wall installation, optionally panel installation
Overall dimensions	163 mm x 110 mm x 52 mm
Aperture installation dimensions	157 mm x 106 mm x 31 mm
Display	Fully graphical display, 128 x 64 pixel
Light diode	multicolour
Real Time Clock	RTC with 24 hour power reserve
Operation	4 entry keys

About the Controller

The Temperature difference controller MTDC-E facilitates efficient use and function control of your Solar system possible while its handling is intuitive. After every input step the suitable functions are matched to the keys and explained in a text above. In the menu 'measurement values and settings' are help text and graphics in addition to key words.

The MTDC-E can be used with different variants of installations, See "Hydraulic Variants" on page 8.

Important characteristics of the MTDC-E are:

- Depiction of graphics and texts using a lit display.
- Simple viewing of the current measurement values.
- Statistics and system monitoring by means of statistical graphics
- Extensive setting menus with explanations.
- Menu block can be activated to prevent unintentional setting changes.
- Resetting to previously selected values or factory settings.

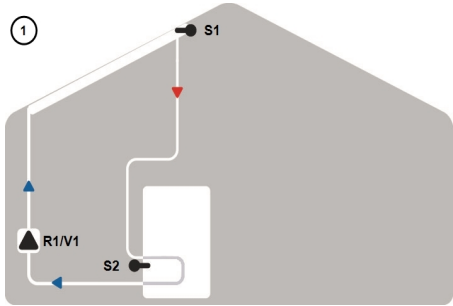
Scope of Supply

- Temperature difference controller
- 3 screws 3,5 x 35 mm and 3 plugs 6 mm for wall installation.
- MTDC-E Installation and operating instructions

Hydraulic Variants

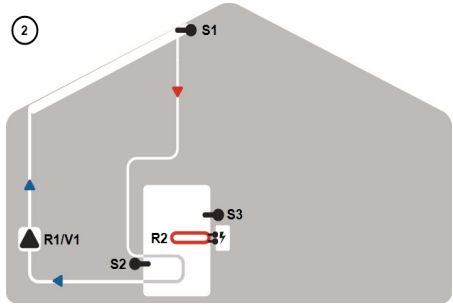


The following illustrations should be regarded only as schematic representations of the respective hydraulic systems and do not claim to be complete. Under no circumstances should the controller replace any safety devices. Depending on the specific application, additional system and safety components such as check valves, non-return valves, safety temperature limiters, scalding protectors, etc., may be required.



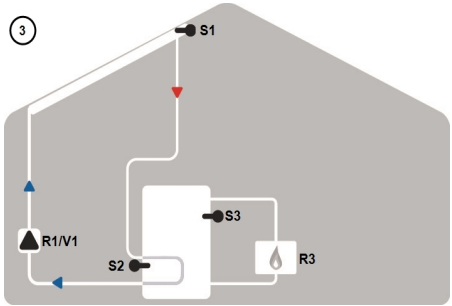
Solar with storage

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor		



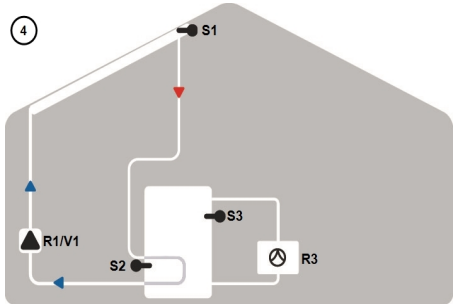
Solar with storage and immersion heater

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R2	Heating rod
S3	Storage sensor (top)		



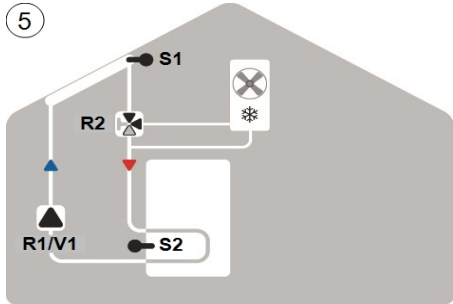
Solar with storage and burner

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R2	Burner
S3	Storage sensor (top)		



Solar with storage and heat pump


S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R2	Heat pump
S3	Storage sensor (top)		




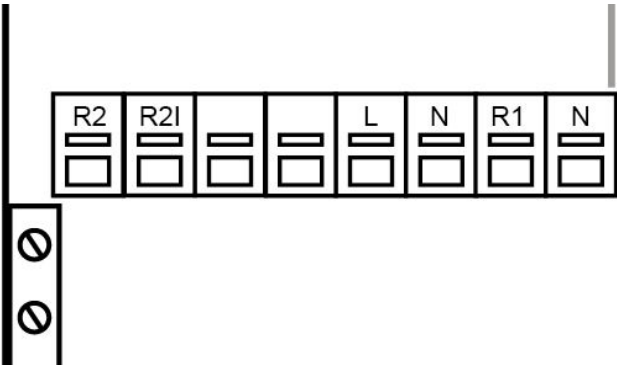
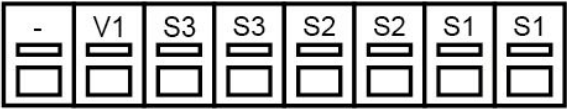
Solar with storage and cooling

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R2	Field cooling

Electrical Terminals

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

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

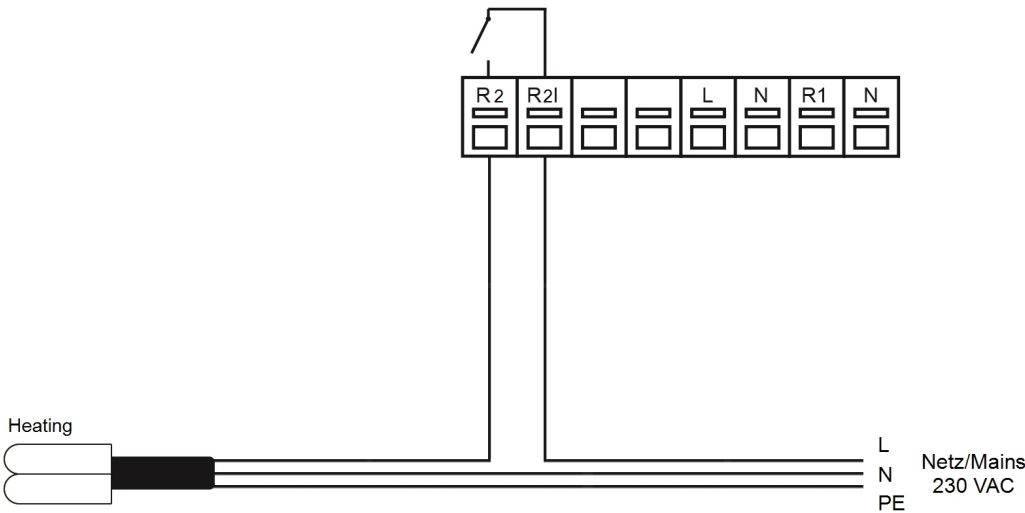


Terminal:	Connection for:
S1	Temperature Sensor 1
S1	(GND)
S2	Temperature Sensor 2
S2	(GND)
S3	Temperature Sensor 3
S3	(GND)
V1	speed controlled output for 0-10V / PWM high-efficiency pumps
-	(GND)

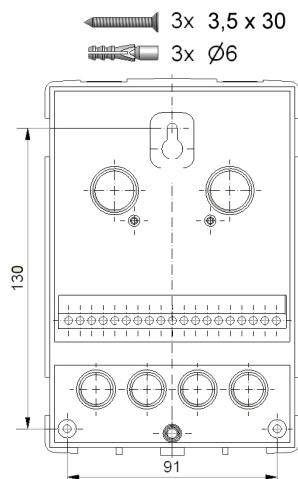
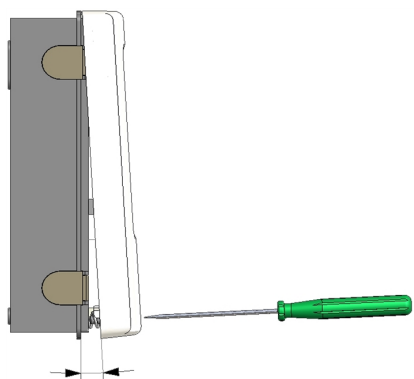
Terminal:	Connection for:
N	Neutral conductor N
R1	Relays 1
N	Network neutral conductor N
L	Network outer conductor L
R2I	Relays 2I
R2	Relays 2

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

Connection example electric heating rod



Wall Installation



1. Unscrew cover screw completely.
2. Carefully pull upper part of housing from lower part. During the removal, the brackets are released as well.
3. Set upper part of housing aside. Do not touch the electronics.
4. Hold the lower part of the housing up to the selected position and mark the three mounting holes. Make sure that the wall surface is as even as possible so that the housing does not become distorted when screwed on.
5. Using a drill and size 6 bit, drill three 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.

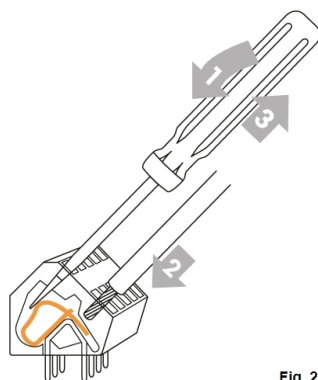
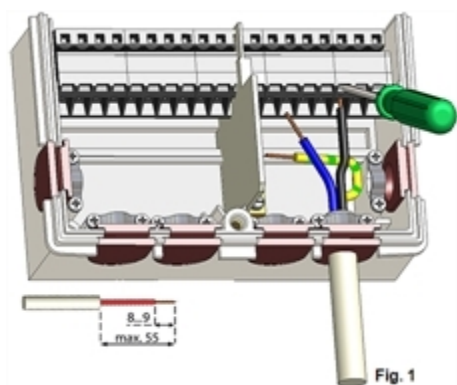


Fig. 2

Electrical Connection



Before working on the unit, switch off the power supply and secure it against being switched on again! Check that there is no power flowing! Electrical connections may only be made by a specialist and in compliance with the applicable regulations. The unit may not be put into operation if there is visible damage to the housing, e.g. cracks.



The unit may not be accessible from behind.



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. an emergency heating switch.



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

Installing the Temperature Sensors

The controller operates with Pt1000 temperature sensors which are accurate to 1 °C, ensuring optimal control of system functions.



If desired, the sensor cables can be extended to a maximum of 30 m using a cable with a cross-section of at least 0.75 mm². Ensure there is no contact resistance! Position the sensor precisely in the area to be measured! Only use immersion, pipe-mounted or flat-mounted sensors suitable for the specific area of application with the appropriate permissible temperature range.

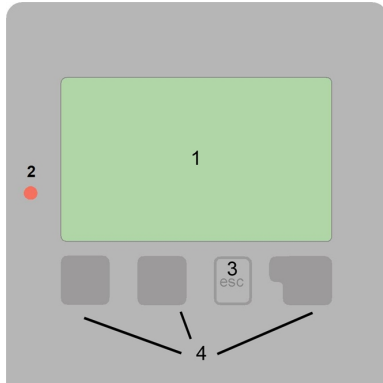


Low-voltage cables such as temperature sensor cables must be routed separately from mains voltage cables. Feed temperature sensor cables only into the left-hand side of the unit, and mains voltage cables only into the right-hand side.

Temperature Resistance Table for Pt1000 Sensors

°C	-20	-10	0	10	20	30	40	50	60	70	80	90	100
Ω	922	961	1000	1039	1077	1116	1155	1194	1232	1270	1308	1347	1385

Display and Input



Pump (rotates when active)



Valve (direction of flow black)



Flow sensor



Thermostat



Collector



Storage / buffer



Temperature Sensors

Further symbols can be found in the special functions

Examples for key settings:

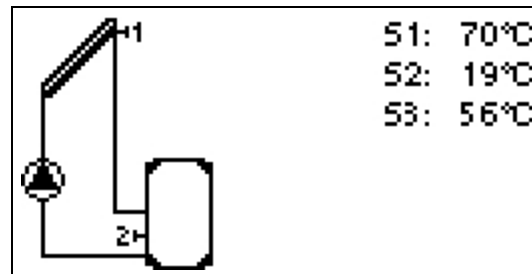
+/-	Increase / decrease values
▼/▲	Scroll menu down / up
Yes/No	agree / reject
About	further information
Back	to the previous display
Ok	Confirm selection
Confirm	Confirm setting

The display's (1), extensive text and graphical mode, enables simple, almost self-explanatory, operation of the controller.

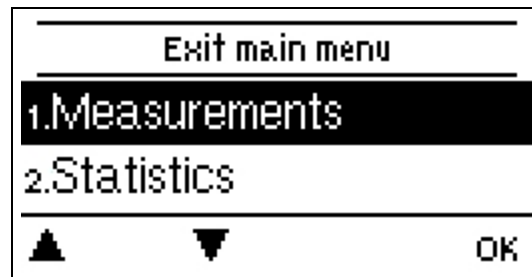
The LED (2) lights up green when the primary pump is switched on (automatic mode). The LED (2) lights up red when operating mode ,Off' is set. The LED (2) flashes quickly red when an error is present.

Entries are made using 4 keys (3+4), to which contextual functions are assigned. The ,esc' key (3) is used to cancel an entry or to exit a menu. If applicable, a request for confirmation appears to save the made changes.

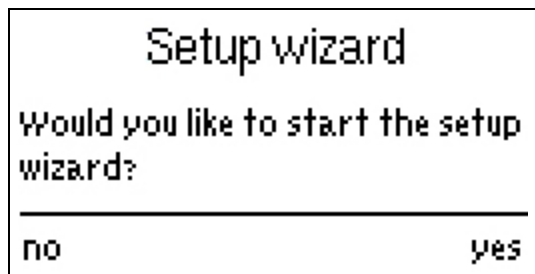
The function of the other 3 keys (4) is shown in the display right above the keys. The right-hand key generally has a confirmation and selection function.



The graphics mode appears if not key is pressed for 2 minutes or after exiting the main menu with 'esc'.



Hitting the "esc" key in the graphics mode takes you directly to the main menu.



1. Set language and time

2. Commissioning help / setup wizard

a) select or

b) skip.

The setup wizard guides through the necessary basic settings in the correct order. Every parameter is explained on the display of the controller. Pressing the „esc“ key takes you back to the previous setting.

b) With free commissioning the settings should be made in the following order:

- Menu 9. Language
- menu 3. Operating hours
- menu 4. Settings, all values
- menu 5. Protection Functions (if any adjustments necessary).
- menu 6. Special Functions (if any adjustments necessary).

3. In Menu operating mode "Manual", test the switch outputs with the consumers connected and check the sensor values for plausibility. Then set to automatic mode. See " Manual " on page 15

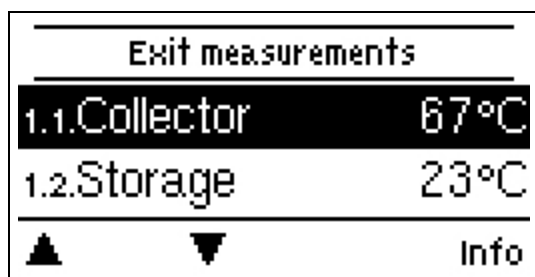


The setup wizard can be accessed in menu 6.9. at any time.



Consider the explanations for the individual parameters on the following pages and check if further settings are necessary for your application.

1. Measurement values



Serve to display the current measured temperatures.

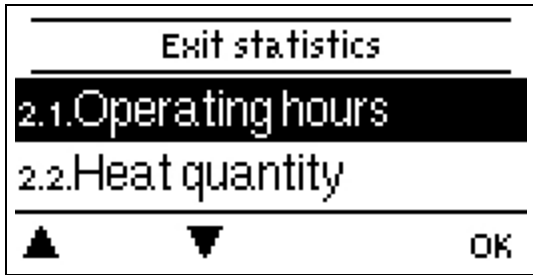


If ,error' appears on the display instead of the measurement value, there may be a defective or incorrect temperature sensor.



If the cables are too long or the sensors are not well-placed, small deviations in the measurement values may occur. In this case, the display values can be compensated by adjustments in the controller - see ,Sensor calibration'. The selected program, connected sensors and the specific model design determine which measurement values are displayed.

2. Statistics



Serve for function control and long-term monitoring of the system.



For time-dependent functions such as circulation and anti-legionella and the evaluation of system data, it is essential that the time is accurately set on the controller. Please note that the clock continues to run for about 24 hours if the mains voltage is interrupted, and afterward must be reset. Improper operation or an incorrect time may result in data being cleared, recorded incorrectly or overwritten. The manufacturer accepts no liability for the recorded data!

Operating hours

Display of the operating hours of the consumers connected to the controller (for example, solar pumps, valves etc.) whereby different time ranges (day-years) are available!

Heat quantity

Display of the consumed heat quantity from the system in kWh.



This is an indicative value.

Graphic overview

This results in a clear illustration of the data as a bar graph. Different time ranges are available for comparison. You can page through with the two left keys.

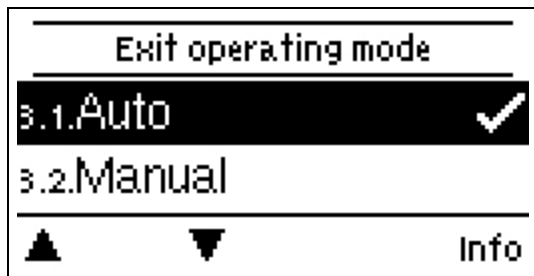
Notifications

Display of the last 20 errors in the system with indication of date and time.

Reset / Clear

Resetting and clearing the selected statistics. Selecting 'all statistics' clears everything except the messages.

3. Operating mode




Auto


The automatic mode is the normal mode of the controller. A correct controller function under consideration of the current temperatures and the set parameters is only present in automatic mode! After an interruption of the mains voltage, the controller automatically returns to the last operating mode selected.

Manual

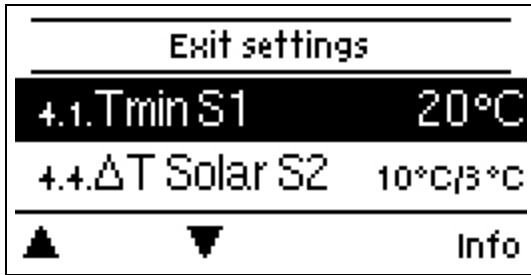
The individual relay outputs, v outputs and the connected consumers can be checked for proper functioning and correct assignment.

 The operating mode 'Manual' may only be used by specialists for brief function tests, e.g. during commissioning! Function in manual mode: The relays and thus the connected consumers are switched on and off by pressing a key, with no regard to the current temperatures and set parameters. At the same time, the current measurement values of temperature sensors are also shown in the display for the purposes of function control.

Off

 If the operating mode "off" is enabled, all control functions are turned off. The measured temperatures are displayed for the overview.

4. Settings



By no means does the controller replace the safety appliances on site!

Tmin S1

Enable/start temperature at sensor 1:

If this value on the sensor 1 (collector sensor) is exceeded and the other conditions are not fulfilled, the controller will turn on the affiliated pump or the valve. If the temperature on the sensor 1 falls 5 °C below this value, the pump or the valve will be turned off again.

ΔT Solar S(X)

Switch-on/switch-off temperature difference for sensor X: If the temperature difference ΔT solar between the reference sensors is exceeded and the other conditions are fulfilled, the controller will turn on the pump/valve on the corresponding relay. If the temperature difference falls to ΔT Off, the pump/valve will be turned off again.



If the set temperature difference is too small, this may lead to ineffective operation depending on the system and sensor positioning. For speed regulation (See " Speed control " on page 20), special switch conditions apply!

Tmax S2

Switch off temperature at sensor 2:

If this value is exceeded on the sensor 2, the controller turn off the affiliated pump or the valve. If this value on the sensor 2 is undershot and the other conditions are fulfilled, the controller will turn on the pump or the valve.



Temperature values which are set too high can lead to scalding or damage to the system. Scalding protection must be provided by the customer!

In multiple storage systems, if the shut-down temperature S2 is exceeded, a downstream installed storage or storage area is switched to.

Auxiliary heating

All required settings for the auxiliary heating are done here.

Tset

If this value is fallen below at the sensor of the function, the controller switches on the auxiliary heating. The auxiliary heating is switched off if this value is exceeded by the set hysteresis.



Temperature values which are set too high can lead to scalding or damage to the system. Scalding protection must be provided by the customer!



Other values, for example, Teco, apply in economy mode.

Hysteresis

The hysteresis can be used to determine the heating of the storage. If the value Tset at sensor (e.g. S3) is exceeded by the set hysteresis, the controller switches off the additional heating.

Sensor auxiliary heating

sensor

The reference sensor for the auxiliary heating can be changed here.

Sensor 2 auxiliary heating

Optional sensor 2

The optional sensor for auxiliary heating can be set here.



If an optional sensor is set for the function, then "**sensor**" is the switch-on sensor and "**sensor 2**" is the switch-off sensor.

Procedure: If Tset is fallen below at the defined **sensor** of the function, the function starts until **Tset + hysteresis** at **sensor 2** is exceeded.

Teco

For a solar charge, Teco is used instead of Tsoll for the auxiliary heating.

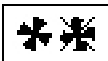
Energy Saving Mode

In economy mode, the setpoint for the auxiliary heating is set to **Teco** during a solar charge in order to delay the activation of the auxiliary heating.

Periods

The desired time periods in which the auxiliary heating is enabled are set here. For each weekday, three times can be specified, furthermore, you can copy individual day to other days. Outside the set times the auxiliary heating is disabled.

Field cooling



This function controls an external cooling unit to cool down the collector.

Tmax field

If this temperature is exceeded at the reference sensor of the field cooling, the relay is switched on.

Hys min

When the temperature at the reference sensor of the field cooling falls below Tmax field +Hys min, the relay is switched off.

Hys max

To protect the cooling unit itself from damage, the relay is switched off as soon as the temperature at the reference sensor of the field cooling reaches Tmax field + Hys max.

Field cooling sensor

Reference sensor of the field cooling function.



This function does not activate the solar pump to cool the collector via the storage. Therefore, please activate the collector protection in the protection functions.

5. Protective Functions



The 'Protective functions' can be used by specialists to activate and set various protective functions.



By no means does the controller replace the safety appliances on site!

Anti Legionella

With the help of the anti legionella function (hereinafter referred to as: AL), the system can be heated up at selected times in order to free it of legionella.



In the delivery state, the anti legionella function is switched off.



As soon as it has heated up with "AL" turned on, information with the date will be shown in the display.



This anti legionella function does not offer any secure protection against legionella, because the controller requires an adequate added amount of energy and the temperatures cannot be monitored in the entire storage area and the connected pipe system.



During the operation of the anti legionella function, if applicable, the storage is heated above the set value "Tmax", which may lead to scalding and system damage.

AL Tset

For a successful heating, this temperature has to be reached at the AL sensor(s) for the exposure time period.

AL residence time

For this period of time the AL Tsettemperatures at the activated AL-sensors have to be reached for a successful heating.

Last AL heat

This displays when the last successful heating has occurred.

AL sensor 1

On this sensor, the temperature of the AL function is measured.

AL Sensor 2

Optional AL sensor

If this sensor is set for a successful heating Tset AL have to be achieved at this sensor too for the action time.

AL-times

During this periods the AL heat up is attempted. If within the defined period, the AL-condition is met (Tset at the defined sensors for the exposure time period), the heating is completed and logged as "Last AL heating".

System protection

Priority protection function

The system protection should prevent an overheating of the components installed in the system through the forced shut down of the solar circulation pump. If the value "AS Ton" on the collector has been exceeded for 1 Min. the pump will be turned off and not turn on again in order to protect the collector, for example, from steam. The pump will only be switched on again, when the collector temperature falls below "SP Toff".




With the system protection (on), there are increased standstill temperatures in the solar collector and therefore an increased pressure in the system. The operating manuals from the system components must be observed.

Collector protection


Priority protection function

The collector protection prevents the collector from overheating. A forced switching of the pump makes sure that the collector is cooled through the storage. If the value "KS Ton" is exceeded on the collector, the pump will be turned on in order to cool the collector. The pump is shut down if the value "KS Toff" on the collector is not met or the value "KS Tmax Sp." on the storage or KS SB Max on the pool is exceeded.

 System protection has priority over collector protection! Even if the switch requirements for the collector protection are present, the solar circulation pump is turned off once “AS T on” is reached. Normally the values from the system protection (depending on the maximum temperature of the storage or other components) are higher than the collector protection.


Recooling

In the system hydraulics with solar, excess energy is guided from the storage back to the collector with an activated return cooling function. This only occurs if the temperature in the storage is greater than the value “Return cooling Tref” and the collector is at least 20 °C colder than the storage and until the storage temperature has fallen below the value “Return cooling Tref”. For multi-storage systems, the return cooling applies to all storage.

 Energy is lost through the collector through this function! The recooling should only be activated in cases of exception, with low heat acceptance, for example, during vacation.

Frost Protection

A 2-level frost protection function can be activated. In level 1, the controller turns on the pump every hour for 1 minute if the collector temperature is below the set value “Frost Level 1”. If the collector temperature continues to decrease to the set value “Frost Level 2”, the controller will turn on the pump without disruption. If the collector temperature exceeds the value “Frost level 2” by 2 °C, the pump will turn off again.

 Energy is lost through the collector through this function! It is normally not activated for solar systems with antifreeze. The operating manuals from the other system components must be observed.

Seizing Protection

If the anti-seizing protection is activated, the controller switches the heat pump and the mixer on/off at 12:00 noon or weekly on Sundays at 12:00 for 5 seconds to prevent seizing of the pump/valve after long periods of inactivity.


Collector alarm

If this temperature at the collector sensor is exceeded when the solar pump is turned on, a warning or error notification is triggered. There is a corresponding warning in the display.

6. Special Functions




Used to set basic items and expanded functions.

 The settings in this menu should only be changed by a specialist.

Program selection

Here the hydraulic variation fitting to the respective use case is selected and set.

 The program selection normally occurs only once during the first entry into service by a specialist. An incorrect program selection may lead to unpredictable errors.

Pump settings / Signal V1

In this menu, the settings for the speed controlled output V1 are executed.

Type of pump/ Type of signal

The type of speed controlled pump used can be set here.

0-10V: Control of special pumps (e.g. high efficiency pumps) through a 0-10V signal.

PWM: Control of special pumps (e.g. high efficiency pumps) through a PWM signal.

Pump/ Profile

In this menu, the preset profiles for the pump can be selected or under "manual" all settings can be done personally. The settings can still be changed after a profile has been selected.

Output Signal

In this menu, the type of pump is set: heating pumps have the greatest output with a small input signal, solar pumps in contrast have very little output with a small input signal. Solar = normal, heating = inverted.

PWM / 0-10V off

This signal / this voltage is emitted if the pump is turned off (pumps with cable break detection require a minimal voltage / a minimum signal).

PWM / 0-10V on

This voltage / this signal requires the pump in order to turn on and to run at a minimum speed.

PWM / 0-10V max.

With this value, the maximum voltage level / maximum frequency can be specified for the highest speed of the energy saving pump, which is used, for example, during the flushing or manual operation.

Show signal

Represents the set pump signal in a graphic and text overview.

Speed control

If the speed control is activated, itMTDC-E offers the possibility through a special internal electronic system to change the speed of pumps depending on the process.



This function should only be activated by a technician. Depending on the pump being used and the pump level, the minimum speed may not be set too small, because the pump or the system may be damaged. The specifications from the affected manufacturer must be observed for this! When in doubt, the min. speed and the pump level should be set too high instead of too low.

Variant

The following speed variants are available here:

Off: There is no speed regulation. The connected pump is only turned on or off with full speed.

Mode M1: The controller changes to the set max. speed after the purging time. If the temperature difference ΔT between the reference sensors is below the set switch on temperature difference ΔT Solar, the speed will be reduced. If the temperature difference between the reference sensors is above the set switch on temperature difference ΔT Solar, the speed will be increased. If the controller has decreased the speed of the pump to the smallest level and the ΔT between the reference sensors is still only ΔT_{off} , the pump will be turned off.

Mode M2: The controller changes to the set min. speed after the Speed. If the temperature difference ΔT between the reference sensors is above the set switch on temperature difference ΔT Solar, the speed will be increased. If the temperature difference ΔT between the reference sensors is below the set switch on temperature difference ΔT Solar, the speed will be reduced. If the controller has decreased the speed of the pump to the smallest level and the ΔT between the reference sensors is still only ΔT_{off} , the pump will be turned off.

Mode M3: The controller changes to the set min. speed after the Speed. If the temperature on the reference sensors is above the set value to be set in the following, the speed will be increased. If the temperature on the reference sensors is below the set value to be set in the following, the speed will be reduced.

Purging time


For this time, the pump runs with its full speed (100%) in order to guarantee a secure start-up. Only after expiration of this purging time will the pump have a controlled speed and will switch, depending on the set variant, to the max. or min. speed. Speed.

Sweep time

With the control time, the inertia of the speed control is determined in order to prevent strong temperature deviations as much as possible. The timespan is entered here, which is needed for a complete cycle from minimum speed to maximum speed.


Max. Speed

The maximum speed of the pump is determined here in %. During the setting, the pump runs in the respective speed and the flow can be determined.

 The specified percentages are variables, which may deviate more or less strongly depending on the system, pump and pump level. 100% is the maximum possible power of the controller.

Min. Speed

The minimum speed of the pump is determined here. During the setting, the pump runs in the respective speed and the flow can be determined.


 The specified percentages are variables, which may deviate more or less strongly depending on the system, pump and pump level. 100% is the maximum possible power of the controller.

Heat quantity

Constant flow

If "Constant flow" is activated as the type of heat quantity metering, the approximate heat from the manually entered values for anti-freeze, its concentration and the flow from the system and the measured sensor values from the collector and storage are calculated. Additional information about antifreeze, its concentration and the flow of the system is required. Additionally through the setting offset ΔT , a correction factor can be set for the heat quantity collection. Since the collector temperature and the storage temperature can be used for the heat quantity metering, depending on the system, there may be deviations from the displayed collected temperature to the actual previous temperature or the displayed storage temperature to the actual return temperature. Through the setting Offset ΔT , this deviation can be corrected.

Example: displayed collector temperature 40°C, read previous temperature 39°C, displayed storage temperature 30°C, read return temperature 31° means a setting of -20% (displayed ΔT 10K, actual ΔT 8K => -20% correction value)

 The heat quantity data in the "Constant flow" mode only consists of calculated values for the functional inspection of the system.

Flow temperature sensor (X)

In this menu, it is set which sensor is used to measure the return flow temperature.

Return flow sensor

In this menu, you can set which sensor is used to measure the return flow temperature.

Glycol type

In this menu, the antifreeze used is set. If none is used, please set glycol proportion to 0.

Glycol percentage

The percentage of antifreeze in the medium.

Flow rate supply flow (X)

Nominal system flow.

The flow of the system in liters per minute, which is used as calculation basis for heat metering.

Offset ΔT

Correction factor for the temperature difference for heat metering

Since the collector temperature and the storage temperature can be used for the heat quantity metering, depending on the system, there may be deviations from the displayed collected temperature to the actual previous temperature or the displayed storage temperature to the actual return temperature. This deviation can be corrected with the adjustment value Offset ΔT

Example: displayed collector temperature 40°C, read previous temperature 39°C, displayed storage temperature 30°C, read return temperature 31° means a setting of -20% (displayed ΔT 10K, actual ΔT 8K => -20% correction value)

Sensor Calibration

Deviations in the temperature values displayed, for example. due to cables which are too long or sensors which are not positioned optimally can be compensated for manually here. The settings can be made for each individual sensor in steps of 0.5 °C.



Settings are only necessary in special cases at the time of initial commissioning by the specialist. Incorrect measurement values can lead to unpredictable errors.

Commissioning

Starting commissioning help guides you in the correct order through the basic settings necessary for commissioning, and provides brief descriptions of each parameter in the display. Pressing the ,esc' key takes you back to the previous value so you can look at the selected setting again or adjust it if desired. Pressing ,esc' more than once takes you back to the selection mode, thus cancelling the commissioning help (See " Commissioning help " on page 13).



May only be started by a specialist during commissioning! Observe the explanations for the individual parameters in these instructions, and check whether further settings are necessary for your application.

Factory Settings

All settings can be reset, returning the controller to its delivery state.



All of the controller's parametrization, statistics, etc. will be lost irrevocably. The controller must then be commissioned once again.

Starting aid

For some solar systems, in particular for vacuum tube collectors, the measurement recording on the collector sensors may be too slow or imprecise, because the sensor is often not on the warmest spot. With an activated starting aid, the following procedure occurs: If the temperature on the collector sensor increases within a minute by the value defined under "increase", the solar circulation pump will be turned on for the set "purging time" so that the medium to be measured is transported to the collector sensor. If there is still no normal switching condition through this, there will be a 5 minute block time for the start wizard function.



This function should only be activated by a technician if problems occur with the measurement recording. Observe in particular the instructions from the collector manufacturer.

The menus "Purging time" and "Increase" are only displayed when the starting aid function is set to "On".

Purging time


If the temperature on the collector sensor increases within a minute by the value defined under "increase", the solar circulation pump will be turned on for the set "purging time" so that the medium to be measured is transported to the collector sensor. If the set ΔT is not reached, a 5-minute circulation pause time for the starting aid function will apply.

Increase

If the temperature at the collector reaches within a minute the value defined, the solar pump is turned on for the duration of the purging time.

Time & Date

Serve to set the current time and date.

 For time-dependent functions such as circulation and anti-legionella and the evaluation of system data, it is essential that the time is accurately set on the controller. Please note that the clock continues to run for about 24 hours if the mains voltage is interrupted, and afterward must be reset. Improper operation or an incorrect time may result in data being cleared, recorded incorrectly or overwritten. The manufacturer accepts no liability for the recorded data!

Daylight saving time

If this function is activated, the controller automatically changes to winter time or summer time (DST, Daylight Savings Time).

Eco Display Mode

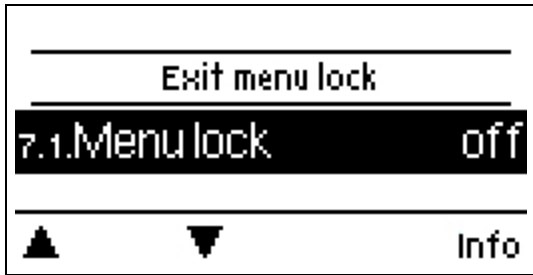
In Eco Display Mode the backlight of the display is switched off if no buttons are pushed for 2 minutes.

 If a message exists, the backlight does not switch off until the message has been scanned by the user.

Temperature unit

In this menu you can select between the temperature units °C and °F.

7. Menu Lock



Secure the controller against unintentional changing and compromise of basic functions.

Menu lock active = "On"

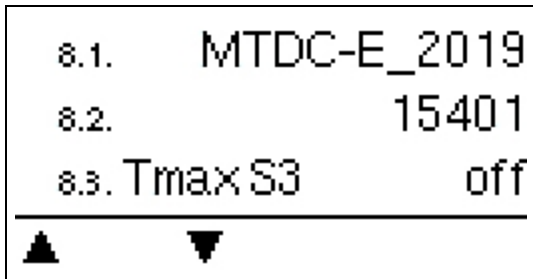
Menu lock off = "Off"

In addition, the "Simple" menu view can be used to hide menu items that are not necessary for the daily use of the controller after commissioning. The menu item "Menu lock on/off" is also hidden when the "Simple" menu view is selected!

The menus listed below remain completely accessible despite the menu lock being activated, and can be used to make adjustments if necessary:

1. Measurement values
2. Statistics
4. Settings
6. Special Functions
7. Menu lock
9. Language

8. Service Values



Serve for remote diagnosis by a specialist or the manufacturer in the event of errors, etc.



Enter the values into the table when an error occurs.


9. Language




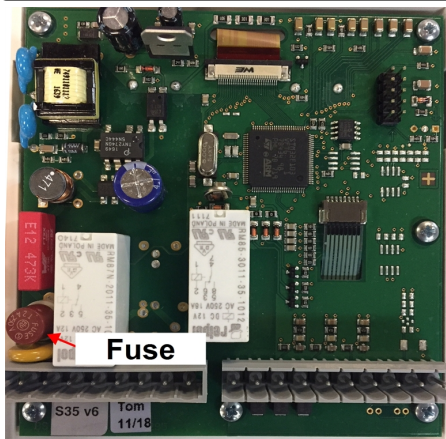
To select the menu language. During initial commissioning and longer power interruptions, the query is made automatically.

Malfunctions/Maintenance

Replacing the Fuse

 Repairs and maintenance may only be performed by a specialist. Before working on the unit, switch off the power supply and secure it against being switched on again! Check that there is no power flowing!

 Only use the included safeguard or a similar safeguard with the following specifications: T2A / 250 V.




If the mains voltage is switched on and the controller still does not function or display anything, then the internal device fuse may be defective. First find the external fault source (e.g. pump), replace it and then check the device fuse.

To replace the device fuse, open the device as described under "See " Wall Installation " on page 10", remove the old fuse, check it and replace if necessary.

Then first recommission the controller and check the function of the switch outputs in manual mode as described.

Maintenance

 In the course of the general annual maintenance of your heating system, the functions of the controller should also be checked by a specialist and the settings should be optimized if necessary.

Performing maintenance:

- Check the date and time See " Time & Date " on page 22
- Assess/check plausibility of statistics See " Statistics " on page 14
- Check the error memory See " Notifications " on page 14
- Verify/check plausibility of the current measurement values See " Measurement values " on page 13
- Check the switch outputs/consumers in manual mode See " Manual " on page 15
- Possible optimization of the parameters setting (**only on customers request**)

Possible error messages

Possible error messages	Notes for the specialist
Sensor x defective	Means that either the sensor, sensor entrance on the controller or the connecting wire was defective (See " Temperature Resistance Table for Pt1000 Sensors " on page 11).
Collector alarm	Means that the temperature on the collector set under "Collector protection" was exceeded.
Restart	Means that the controller was restarted, for example, due to a power outage. Check date & time!
Time & Date	This display appears automatically after a longer network disruption, because the time & date must be examined and, if applicable, adjusted.

Tips



The service values include not only current measurement values and operating states, but also all of the settings for the controller. Write the service values down just once after commissioning has been successfully completed.



In the event of uncertainty as to the control response or malfunctions the service values are a proven and successful method for remote diagnosis. Write the service values down at the time that the suspected malfunction occurs. Send the service value table by fax or e-mail with a brief description of the error to the specialist or manufacturer.



To protect against loss of data, record any statistics and data of particular importance at regular intervals.

Final Declaration

Although these instructions have been created with the greatest possible care, the possibility of incorrect or incomplete information cannot be excluded. Subject as a basic principle to errors and technical changes.

Date and time of installation:

Name of installation company:

Space for notes:

Your specialist dealer:

Manufacturer:

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Version: 28.02.2021

