DeltaSol® BS Plus

(Version 2)

Solar controller

Manual for the specialised craftsman

Installation
Operation
Functions and options
Troubleshooting

RESOL®

The cTUVus certification confirms that the controller is certified to UL 60730-1:2009 and CSA B60730.1:2002.

The Internet portal for easy and secure access to your system data – www.vbus.net

Thank you for buying this RESOL product.
Please read this manual carefully to get the best performance from this unit.
Please keep this manual safe.

Safety advice

Please pay attention to the following safety advice in order to avoid danger and damage to people and property.

Instructions

Attention must be paid to the valid local standards, regulations and directives!

Information about the product

Proper usage

The solar controller is designed for electronically controlling standard solar thermal systems in compliance with the technical data specified in this manual.

Improper use excludes all liability claims.

CE Declaration of conformity

The product complies with the relevant directives and is therefore la-belled with the CE mark. The Declaration of Conformity is available on request, please contact the manufacturer.

Note
Strong electromagnetic fields can impair the function of the device.
➔ Make sure the device as well as the system are not exposed to strong electromagnetic fields.

Target group

These instructions are exclusively addressed to authorised skilled personnel.

Only qualified electricians are allowed to carry out electrical works.

Initial commissioning must be effected by the system installer or qualified personnel named by the system installer.

Description of symbols

WARNING!   Warnings are indicated with a warning triangle!
➔ **They contain information on how to avoid the danger described.**

Signal words describe the danger that may occur, when it is not avoided.
• **WARNING** means that injury, possibly life-threatening injury, can occur.
• **ATTENTION** means that damage to the appliance can occur.

Note
Notes are indicated with an information symbol.

➔   Arrows indicate instruction steps that should be carried out.

Disposal

• Dispose of the packaging in an environmentally sound manner.
• At the end of its working life, the product must not be disposed of as urban waste. Old appliances must be disposed of by an authorised body in an environmentally sound manner. Upon request we will take back your old appliances bought from us and guarantee an environmentally sound disposal of the devices.

Subject to technical change. Errors excepted.

DeltaSol® BS Plus Solar controller

The DeltaSol® BS Plus is our most versatile controller for simple standard solar thermal and heating systems. The intuitive commissioning menu leads you through the initial configuration in only 6 steps.

The system selected is shown on the display, the status of the individual components is indicated by means of flashing codes.

Contents

1 Overview

- **10 basic systems to choose from**
- **Heat quantity measurement**
- **Function control**
- **Optional thermostat function (time-controlled), thermal disinfection function, drainback function**
- **Commissioning menu**
- **Unit °F and °C selectable**
- **HE pump control via adapter (see page 49)**
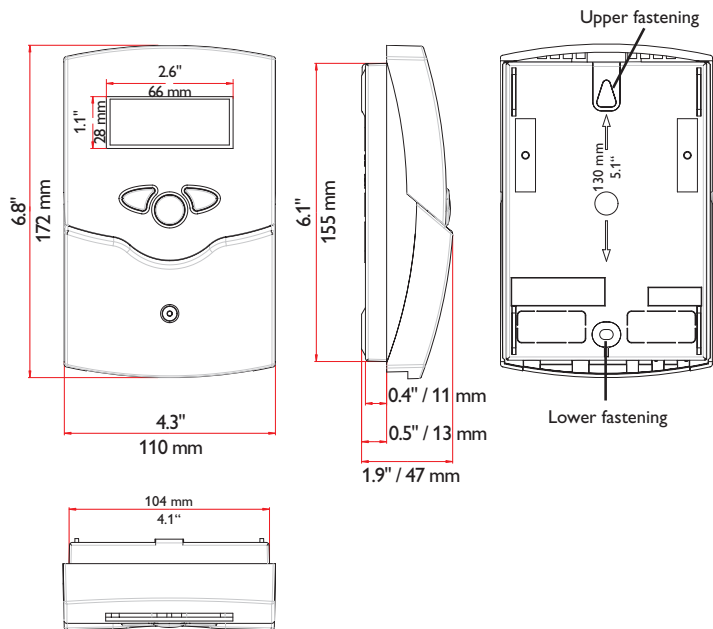
Technical data

Inputs: 4 Pt1000 temperature sensors

Outputs: 2 semiconductor relays

Switching capacity: 1 (1) A 240 V~ (semiconductor relay)

Total switching capacity: 2 A 240 V~

Power supply: 100 … 240 V~ (50 … 60 Hz)

Supply connection: type Y attachment

Standby: 0.38 W

Temperature controls class: I

Energy efficiency contribution: 1 %

Mode of operation: type 1.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: RESOL VBus®

VBus® current supply: 35 mA

Functions: function control, operating hours counter, tube collector function, thermostat function, speed control and heat quantity measurement

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, also suitable for mounting into patch panels

Indication / Display: System-Monitoring-Display for visualisation of systems, 16-segment and 7-segment display, 8 symbols for indication of system status and operating control LED

Operation: 3 push buttons at the front of the housing

Protection type: IP 20 / DIN EN 60529

Protection class: II

Ambient temperature: 0 … 40 °C [32 … 104 °F]

Degree of pollution: 2

Dimensions: 172 x 110 x 49 mm

Upper fastening

Lower fastening

2.6" / 66 mm
1.1" / 28 mm
6.8" / 172 mm
4.3" / 110 mm
6.1" / 155 mm
130 mm / 5.1"
0.4" / 11 mm
0.5" / 13 mm
1.9" / 47 mm
104 mm / 4.1"

2 Installation

2.1 Mounting

> **WARNING!** **Electric shock!**
>
> Upon opening the housing, live parts are exposed!
>
> ➔ **Always disconnect the device from power supply before opening the housing!**

> **i** **Note**
>
> Strong electromagnetic fields can impair the function of the device.
>
> ➔ Make sure the device as well as the system are not exposed to strong electromagnetic fields.

The device must only be located in dry interior rooms.

The controller must additionally be supplied from a double pole switch with contact gap of at least 3 mm.

Please pay attention to separate routing of sensor cables and mains cables.

In order to mount the device to the wall, carry out the following steps:

➔ Unscrew the crosshead screw from the cover and remove it along with the cover from the housing.

➔ Mark the upper fastening point on the wall. Drill and fasten the enclosed wall plug and screw leaving the head protruding.

➔ Hang the housing from the upper fastening point and mark the lower fastening point (centres 130 mm).

➔ Insert lower wall plug.

➔ Fasten the housing to the wall with the lower fastening screw and tighten.

➔ Carry out the electrical wiring in accordance with the terminal allocation (see page 6).

➔ Put the cover on the housing.

➔ Attach with the fastening screw.
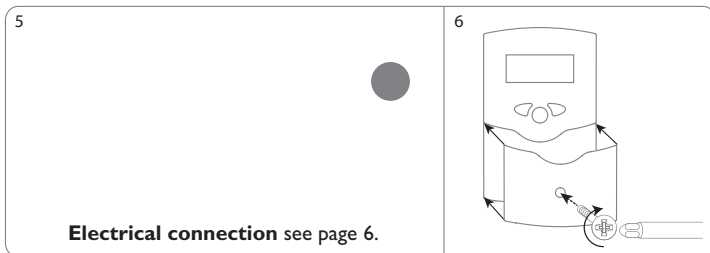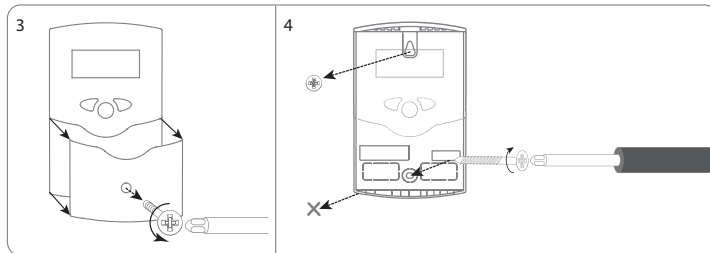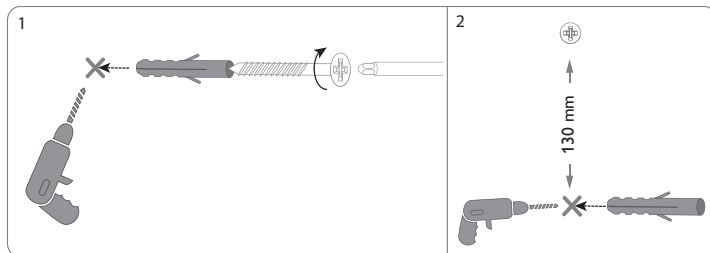
Electrical connection see page 6.

2.2 Electrical connection

WARNING! **Electric shock!**

Upon opening the housing, live parts are exposed!
➔ **Always disconnect the device from power supply before opening the housing!**

ATTENTION! **ESD damage!**

Electrostatic discharge can lead to damage to electronic components!
➔ **Take care to discharge properly before touching the inside of the device!**

Note
Connecting the device to the power supply must always be the last step of the installation!

Note
It must be possible to disconnect the device from the mains at any time.
➔ Install the mains plug such that it is accessible at any time.
➔ If this is not possible, install a switch that can be accessed.

Do not use the device if it is visibly damaged!

The power supply of the device must be 100 … 240 V~ (50 … 60 Hz). Attach flexible cables to the housing with the enclosed strain relief and the corresponding screws.

The controller is equipped with 2 semiconductor relays to which loads such as pumps, valves, etc. can be connected:

• Relay 1,
also designed for pump speed control
18 = Conductor R1
17 = Neutral conductor N
13 = Grounding terminal ⏚

• Relay 2,
also designed for pump speed control
16 = Conductor R2
15 = Neutral conductor N
14 = Grounding terminal ⏚

Note
If loads which are not speed-controlled (e.g. valves) are used, the speed must be set to 100 %.

Connect the **temperature sensors** (S1 to S4) to the following terminals with either polarity:
1 / 2 = Sensor 1 (e. g. collector sensor)
3 / 4 = Sensor 2 (e. g. store sensor)
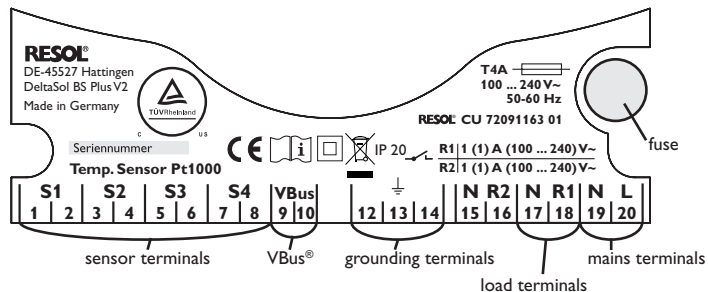5 / 6 = Sensor 3 (e. g. store sensor top)
7 / 8 = Sensor 4 (e. g. return sensor)

The **mains connection** is at the following terminals:
19 = Neutral conductor N
20 = Conductor L
12 = Grounding terminal ⏚

sensor terminals   VBus®   grounding terminals   load terminals   mains terminals

2.3 Data communication / Bus

The controller is equipped with the **RESOL VBus®** for data transfer and energy supply to external modules. The connection is to be carried out at the terminals marked **VBus** (any polarity).

One or more **RESOL VBus®** modules can be connected via this data bus, such as:
• RESOL DL2 Datalogger
• RESOL DL3 Datalogger
• VBus®/PWM interface adapter

Furthermore, the controller can be connected to a PC or integrated into a network via the RESOL VBus®/USB or VBus®/LAN interface adapter (not included). Different solutions for visualisation and remote parameterisation are available on the RESOL website www.resol.com.

Note
More accessories on page 54.

6

2.4 System overview
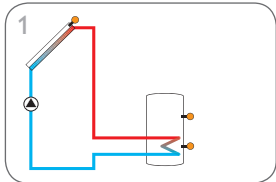
Standard solar system (page 8)
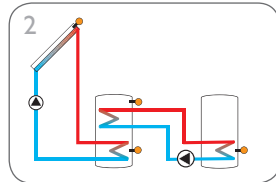
Solar system with heat exchange (page 10)
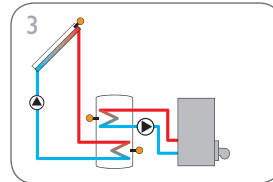
Solar system with afterheating (page 14)
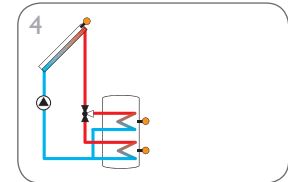
Solar system with store loading in layers (page 18)
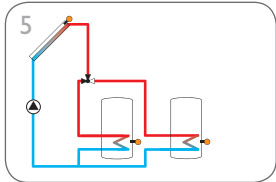
Solar system with 2 stores and valve logic (page 20)
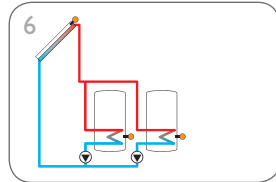
Solar system with 2 stores and pump logic (page 22)
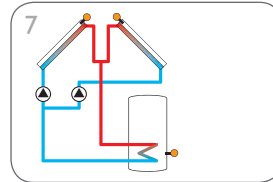
Solar system with east-/west collectors and 1 store (page 24)
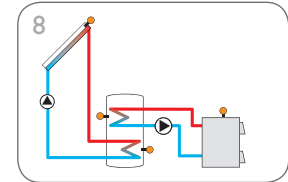
Solar system with afterheating by solid fuel boiler (page 26)
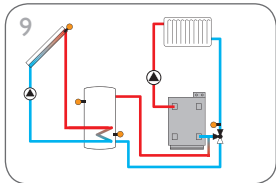
Solar system with heating circuit return preheating (page 30)
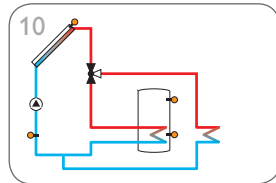
Standard solar system with heat dump (page 32)

2.5 Systems

Arrangement 1: Standard solar system

The controller calculates the temperature difference between collector sensor S1 and store sensor S2. If the difference is larger than or identical to the adjusted switch-on temperature difference (DT O), the solar pump will be activated by relay 1, and the store will be loaded until the switch-off temperature difference (DT F) or the maximum store temperature (S MX) is reached.

Sensors S3 and S4 can optionally be connected for measurement purposes. S3 can optionally be used as the reference sensor for the store emergency shutdown option (OSEM).

If heat quantity measurement (OHQM) is activated, S4 is to be used as the return sensor.

If the drainback option (ODB) is activated, relay 2 can be used for activating a booster pump. For this purpose, the booster function (OBST) has to be activated.

Example
Drainback system
(with booster pump)

Display channels

Channel		Description	Connection terminal	Page
INIT	x*	ODB initialisation active	-	38
FLL	x*	ODB filling time active	-	38
STAB	x*	ODB stabilisation in progress	-	38
COL	x	Temperature collector	S1	38
TST	x	Temperature store	S2	38
S3	x	Temperature sensor 3	S3	39
TSTT	x*	Temperature store top	S3	38
S4	x	Temperature sensor 4	S4	39
TR	x*	Temperature return sensor	S4	38
n %	x	Speed R1	R1	39
hP	x	Operating hours R1	R1	40
hP1	x*	Operating hours R1 (if OBST is activated)	R1	40
hP2	x*	Operating hours R2 (if OBST is activated)	R2	40
kWh	x*	Heat quantity in kWh	-	39
MWh	x*	Heat quantity in MWh	-	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	1	41
DT O	x	Switch-on temperature difference	6.0 K [12.0 °Ra]	41
DT F	x	Switch-off temperature difference	4.0 K [8.0 °Ra]	41
DT S	x	Set temperature difference	10.0 K [20.0 °Ra]	42
RIS	x	Rise R1	2 K [4 °Ra]	42
nMN	x	Minimum speed	30 %	42
S MX	x	Maximum store temperature	60 °C [140 °F]	42
OSEM	x	Store emergency shutdown option	OFF	43
EM	x	Collector emergency temperature	130 °C [270 °F]	43
		Collector emergency temperature, if OBST is activated:	95 °C [200 °F]	43
OCC	x	Collector cooling option	OFF	43
CMX	x*	Maximum collector temperature	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44

Adjustment channels

Channel		Description	Factory setting	Page
OCN	x	Collector minimum limitation option	OFF	45
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45
OCF	x	Antifreeze option	OFF	45
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
OHQM	x	Heat quantity measurement option	OFF	47
FMAX	x*	Maximum flow rate	6.0 l	47
MEDT	x*	Heat transfer fluid / Antifreeze type	1	48
MED%	x*	Antifreeze concentration (only if MEDT = propylene or ethylene)	45 %	48
ODB	x	Drainback option	OFF	48
tDTO	x*	ODB switch-on condition - time period	60 s	48
tFLL	x*	ODB filling time	5.0 min	49
tSTB	x*	ODB stabilisation time	2.0 min	49
OBST	s*	Option booster function	OFF	49
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

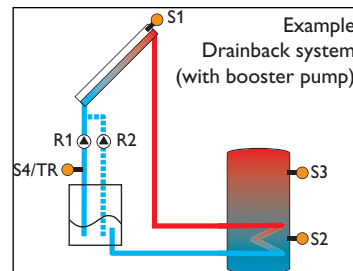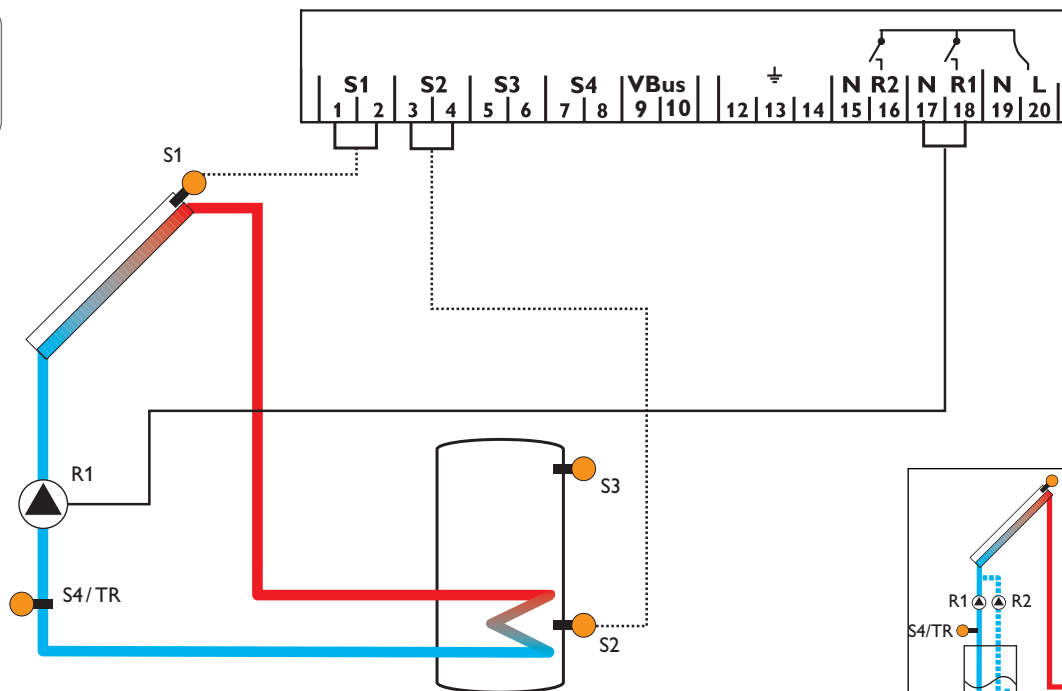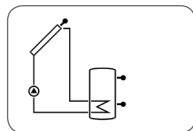| Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.
s*	System-specific channel, only available if the corresponding option is activated

Arrangement 2: Solar system with heat exchange

The controller calculates the temperature difference between collector sensor S1 and store sensor S2. If the difference is larger than or identical to the adjusted switch-on temperature difference (DT O), the solar pump will be activated by relay 1, and the store will be loaded until the switch-off temperature difference (DT F) or the maximum store temperature (S MX) is reached.

Heat exchange from store 1 to store 2 will be operated by relay 2, if the temperature difference between sensors S3 and S4 is larger than or identical to the adjusted switch-on temperature difference (DT3O), until the adjusted minimum (MN3O) and maximum (MX3O) temperature thresholds of the respective stores are reached. S3 can optionally be used as the reference sensor for the store emergency shutdown option (OSEM).

Display channels

Channel		Description	Connection terminal	Page
INIT	x*	ODB initialisation active	-	38
FLL	x*	ODB filling time active	-	38
STAB	x*	ODB stabilisation in progress	-	38
COL	x	Temperature collector	S1	38
TST1	x	Temperature store 1 base	S2	38
TSTT	x	Temperature store 1 top	S3	38
TST2	x	Temperature store 2 base	S4	38
n1 %	x	Speed R1	R1	39
n2 %	x	Speed R2	R2	39
h P1	x	Operating hours R1	R1	40
h P2	x	Operating hours R2	R2	40
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	2	41
DT O	x	Switch-on temperature difference	6.0 K [12.0 °Ra]	41
DT F	x	Switch-off temperature difference	4.0 K [8.0 °Ra]	41
DT S	x	Set temperature difference	10.0 K [20.0 °Ra]	42
RIS	x	Rise R1	2 K [4 °Ra]	42
n1MN	x	Minimum speed R1	30 %	42
S MX	x	Maximum store temperature	60 °C [140 °F]	42
OSEM	x	Store emergency shutdown option	OFF	43
n2MN	s	Minimum speed R2	30 %	42
EM	x	Collector emergency temperature	130 °C [270 °F]	43
		Collector emergency temperature, if OBST is activated:	95 °C [200 °F]	43
OCC	x	Collector cooling option	OFF	43
CMX	x*	Maximum collector temperature	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44
OCN	x	Collector minimum limitation option	OFF	45
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45
OCF	x	Antifreeze option	OFF	45

Adjustment channels

Channel		Description	Factory setting	Page
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
DT3O	s	Switch-on temperature difference 3	6.0 K [12.0 °Ra]	41
DT3F	s	Switch-off temperature difference 3	4.0 K [8.0 °Ra]	41
DT3S	s	Set temperature difference 3	10.0 K [20.0 °Ra]	42
RIS3	s	Rise R2	2 K [4 °Ra]	42
MX3O	s	Switch-on threshold for maximum temperature	60.0 °C [140.0 °F]	29
MX3F	s	Switch-off threshold for maximum temperature	58.0 °C [136.0 °F]	29
MN3O	s	Switch-on threshold for minimum temperature	5.0 °C [40.0 °F]	29
MN3F	s	Switch-off threshold for minimum temperature	10.0 °C [50.0 °F]	29
ODB	x	Drainback option	OFF	48
tDTO	x*	ODB switch-on condition - time period	60 s	48
tFLL	x*	ODB filling time	5.0 min	49
tSTB	x*	ODB stabilisation time	2.0 min	49
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
ADA2	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.
s*	System-specific channel, only available if the corresponding option is activated

System-specific functions

The following adjustments are used for the specific functions in system 2.

ΔT control for the heat exchange between 2 stores

DT3O SET
6.0

DT3F SET
4.0

DT3O
Switch-on temperature difference
Adjustment range:
1.0 … 20.0 K [2.0 … 40.0 °Ra]
Factory setting: 6.0 K [12.0 °Ra]

DT3F
Switch-off temperature difference
Adjustment range:
0.5 … 19.5 K [1.0 … 39.0 °Ra]
Factory setting: 4.0 K [8.0 °Ra]

S3 and S4 are used as the reference sensors for this function.

In system 2 the controller is equipped with an additional differential control for heat exchange between two stores. The basic differential function is adjusted using the switch-on (**DT3O**) and switch-off (**DT3F**) temperature differences.
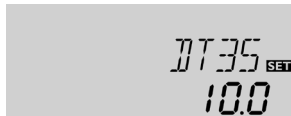
When the temperature difference exceeds the adjusted switch-on temperature difference, relay 2 switches on. When the temperature difference falls below the adjusted switch-off temperature difference, relay 2 switches off.

i **Note**
The switch-on temperature difference must be at least 0.5 K [1 °Ra] higher than the switch-off temperature difference.

Speed control

DT3S SET
10.0

RIS3 SET
2

DT3S
Set temperature difference
Adjustment range:
1.5 … 30.0 K [3.0 … 60.0 °Ra]
Factory setting: 10.0 K [20.0 °Ra]

RIS3
Rise
Adjustment range: 1 … 20 K [2 … 40 °Ra]
Factory setting: 2 K [4 °Ra]

If the temperature difference reaches or exceeds the switch-on temperature difference, the pump switches on at 100 % speed for 10 s. Then, the speed is reduced to the minimum pump speed value.

If the temperature difference reaches the adjusted set value, the pump speed increases by one step (10 %). The response of the controller can be adapted via the parameter Rise. Each time the difference increases by the adjustable rise value, the pump speed increases by 10 % until the maximum pump speed of 100 % is reached. If the temperature difference decreases by the adjustable rise value, pump speed will be decreased by one step.
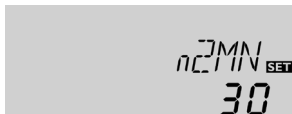
i **Note**
For pump speed control of the heat exchange pump, the operating mode of relay 2 must be set to **Auto** in the adjustment channel **MAN2**.

i **Note**
The set temperature difference must be at least 0.5 K [1 °Ra] higher than the switch-on temperature difference.

Minimum speed

n2MN SET
30

n2MN
Minimum speed
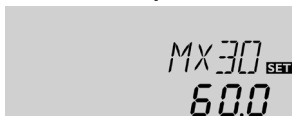Adjustment range: 30 … 100 %
Factory setting: 30 %

In the adjustment channel **n2MIN** a relative minimum speed for a pump connected can be allocated to the output R2.

i **Note**
When loads which are not speed-controlled (e. g. valves) are used, the value **n2MN** must be set to 100 % to deactivate pump speed control.

Maximum temperature limitation heat exchange

MX3O SET
60.0

MX3F SET
58.0

MX3O   **MX3F**
Maximum temperature limitation
Adjustment range: 0.0 … 95.0 °C [30.0 … 200.0 °F]
Factory setting:
MX3O: 60.0 °C [140.0 °F]   MX3F: 58.0 °C [136.0 °F]

Minimum and maximum temperature limits can be set for the heat exchange function.

S4 is used as the reference sensor for the maximum temperature limitation.

The maximum temperature limitation function provides a maximum temperature setting, usually to reduce scald risk in a store. If **MX3O** is exceeded, relay 2 is switched off until the temperature at sensor 4 falls below **MX3F**.

Minimum temperature limitation heat exchange

MN3O SET
5.0

MN3F SET
10.0

MN3O   **MN3F**
Minimum temperature limitation
Adjustment range: 0.0 … 90.0 °C [30.0 … 190.0 °F]
Factory setting: (only if Arr = 2):
MN3O: 5.0 °C [40.0 °F]   MN3F: 10.0 °C [50.0 °F]

S3 is used as the reference sensor for the minimum temperature limitation.

The minimum temperature limitation function provides a minimum temperature setting for the heat source in system 2. If the temperature at sensor 3 falls below **MN3O**, relay 2 is switched off until the temperature at sensor 3 exceeds **MN3F**.

Both switch-on and switch-off temperature differences **DT3O** and **DT3F** are valid for the maximum and minimum temperature limitation.

Arrangement 3: Solar system with afterheating

The controller calculates the temperature difference between collector sensor S1 and store sensor S2. If the difference is larger than or identical to the adjusted switch-on temperature difference (DT O), the solar pump will be activated by relay 1, and the store will be loaded until the switch-off temperature difference (DT F) or the maximum store temperature (S MX) is reached.

Sensor S3 is used for a thermostat function, which operates relay 2 for afterheating or heat dump purposes, when the adjusted thermostat switch-on temperature (AH O) is reached. This function can optionally be combined with up to three adjustable time frames.

Sensor S3 can optionally be used as the reference sensor for the thermal disinfection function (OTD) or the store emergency shutdown option (OSEM).

Sensor S4 can optionally be connected for measurement purposes. If heat quantity measurement (OHQM) is activated, S4 is to be used as the return sensor.

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Display channels

Channel		Description	Connection terminal	Page
INIT	x*	ODB initialisation active	-	38
FLL	x*	ODB filling time active	-	38
STAB	x*	ODB stabilisation in progress	-	38
COL	x	Temperature collector	S1	38
TSTB	x	Temperature store 1 base	S2	38
TSTT	x	Temperature store 1 top	S3	38
TDIS	s*	Thermal disinfection temperature (thermal disinfection)	S3	17
S4	x	Temperature sensor 4	S4	39
TR	x*	Temperature return sensor	S4	38
n1 %	x	Speed R1	R1	39
h P1	x	Operating hours R1	R1	40
h P2	x	Operating hours R2	R2	40
kWh	x*	Heat quantity in kWh	-	39
MWh	x*	Heat quantity in MWh	-	39
CDIS	s*	Countdown of monitoring period (thermal disinfection)	-	40
SDIS	s*	Starting time display (thermal disinfection)	-	39
DDIS	s*	Heating period display (thermal disinfection)	-	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	3	41
DT O	x	Switch-on temperature difference	6.0 K [12.0 °Ra]	41
DT F	x	Switch-off temperature difference	4.0 K [8.0 °Ra]	41
DT S	x	Set temperature difference	10.0 K [20.0 °Ra]	42
RIS	x	Rise R1	2 K [4 °Ra]	42
n1MN	x	Minimum speed R1	30 %	42
S MX	x	Maximum store temperature	60 °C [140 °F]	42
OSEM	x	Store emergency shutdown option	OFF	43
EM	x	Collector emergency temperature	130 °C [270 °F]	43
EM	x	Collector emergency temperature, if OBST is activated:	95 °C [200 °F]	43
OCC	x	Collector cooling option	OFF	43
CMX	x*	Maximum collector temperature	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44

Adjustment channels

| Channel		Description	Factory setting	Page
OCN	x	Collector minimum limitation option	OFF	45
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45
OCF	x	Antifreeze option	OFF	45
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
OHQM	x	Heat quantity measurement option	OFF	47
FMAX	x*	Maximum flow rate	6.0 l	47
MEDT	x*	Heat transfer fluid/Antifreeze type	1	48
MED%	x*	Antifreeze concentration	45 %	48
AH O	s	Switch-on temperature for thermostat 1	40 °C [110 °F]	16
AH F	s	Switch-off temperature for thermostat 1	45 °C [120 °F]	16
t1 O	s	Thermostat switch-on time 1	00:00	16
t1 F	s	Thermostat switch-off time 1	00:00	16
t2 O	s	Thermostat switch-on time 2	00:00	16
t2 F	s	Thermostat switch-off time 2	00:00	16
t3 O	s	Thermostat switch-on time 3	00:00	16
t3 F	s	Thermostat switch-off time 3	00:00	16
ODB	x	Drainback option	OFF	48
tDTO	x*	ODB switch-on condition - time period	60 s	48
tFLL	x*	ODB filling time	5.0 min	49
tSTB	x*	ODB stabilisation time	2.0 min	49
OTD	s	Thermal disinfection option	OFF	17
PDIS	s*	Monitoring period	01:00	17
DDIS	s*	Heating period	01:00	17
TDIS	s*	Disinfection temperature	60 °C [140 °F]	17
SDIS	s*	Starting time	00:00	17
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

| Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated
s	System-specific channel
s*	System-specific channel, only available if the corresponding option is activated

System-specific functions

The following adjustments are used for the specific functions in system 3. The channels described are not available in any other system.

Thermostat function

Afterheating
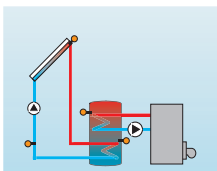
Use of surplus energy
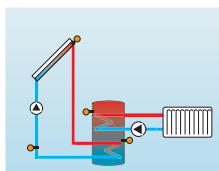
The thermostat function works independently from the solar operation and can be used for using surplus energy or for afterheating.

- **AH O < AH F**
  thermostat function for afterheating

- **AH O > AH F**
  thermostat function for using surplus energy

The symbol ⒫ will be shown on the display, if the second relay output is activated.

S3 is used as the reference sensor for the thermostat function.

AH O
Thermostat switch-on temperature
Adjustment range:
0.0 … 95.0 °C [30.0 … 200.0 °F]
Factory setting: 40.0 °C [110.0°F]

AH F
Thermostat switch-off temperature
Adjustment range:
0.0 … 95.0 °C [30.0 … 200.0 °F]
Factory setting: 45.0 °C [120.0 °F]
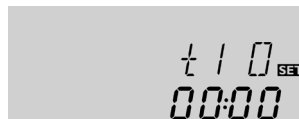
t1 O, t2 O, t3 O
Thermostat switch-on time
Adjustment range: 00:00 … 23:45
Factory setting: 00:00

t1 F, t2 F, t3 F
Thermostat switch-off time
Adjustment range: 00:00 … 23:45
Factory setting: 00:00

In order to block the thermostat function for a certain period, there are 3 time frames t1 … t3.

If the thermostat function is supposed to run from 06:00 a.m. to 09:00 a.m. only, adjust **t1 O** to 06:00 a.m. and **t1 F** to 09:00 a.m.

If the switch-on and switch-off times of a time frame are set to an identical value, the time frame will be inactive. If all time frames are set to 00:00, the thermostat function is solely temperature dependent (factory setting).
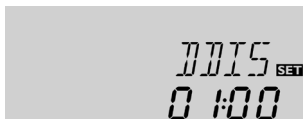
Thermal disinfection of the upper DHW zone

```
OtD  SET
 OFF
```

OTD
Therm. disinfection function
Adjustment range: OFF / ON
Factory setting: OFF

```
PDIS  SET
 01:00
```

PDIS
Monitoring period
Adjustment range:
0 … 30:0 … 24 h (dd:hh)
Factory setting: 01:00

```
DDIS  SET
 01:00
```

DDIS
Disinfection period
Adjustment range: 0:00 … 23:59 (hh:mm)
Factory setting: 01:00

```
TDIS  SET
  60
```

TDIS
Disinfection temperature
Adjustment range:
0 … 95 °C [30 … 200 °F]
Factory setting: 60 °C [140 °F]

**Reference sensor for this function is S3.**

This function helps to contain the spread of Legionella in DHW stores by systematically activating the afterheating.

For thermal disinfection, the temperature at the reference sensor will be monitored. Protection is ensured when, during the monitoring period, the disinfection temperature is continuously exceeded for the entire disinfection period.

The monitoring period starts as soon as the temperature at the reference sensor falls below the disinfection temperature. When the monitoring period ends, the allocated reference relay activates the afterheating. The disinfection period starts, if the temperature at the allocated sensor exceeds the disinfection temperature.

Thermal disinfection can only be completed when the disinfection temperature is exceeded for the duration of the disinfection period without any interruption.

Starting time delay

```
SDIS  SET
 00:00
```
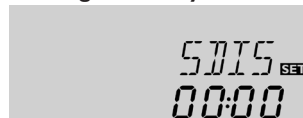
SDIS
Starting time
Adjustment range: 0:00 … 24:00 (time)
Factory setting: 00:00

If the starting delay option is activated, a starting time for the thermal disinfection with starting delay can be adjusted. The activation of the afterheating is then delayed until that starting time after the monitoring period has ended.

If the monitoring period ends, for example, at 12:00 o'clock, and the starting time has been set to 18:00, the reference relay will be energised with a delay of 6 hours at 18:00 instead of 12:00 o'clock.

ℹ Note
If the thermal disinfection option is activated, the display channels **TDIS**, **CDIS**, **SDIS** and **DDIS** will be displayed.

Arrangement 4: Solar system with store loading in layers

The controller calculates the temperature difference between collector sensor S1 and store sensors S2 and S3. If the difference is larger than or identical to the corresponding adjusted switch-on temperature differences (DT1O/DT2O), the solar pump will be activated by relay 1, and the corresponding store zone will be loaded until the switch-off temperature difference (DT1F/DT2F) or the maximum store temperature (S1MX/S2MX) is reached. The priority logic causes priority loading of the upper store zone, if possible. In that case, the 3-port valve will be operated by relay 2.

Sensor S4 can optionally be connected for measurement purposes.

If heat quantity measurement (OHQM) is activated, S4 is to be used as the return sensor.
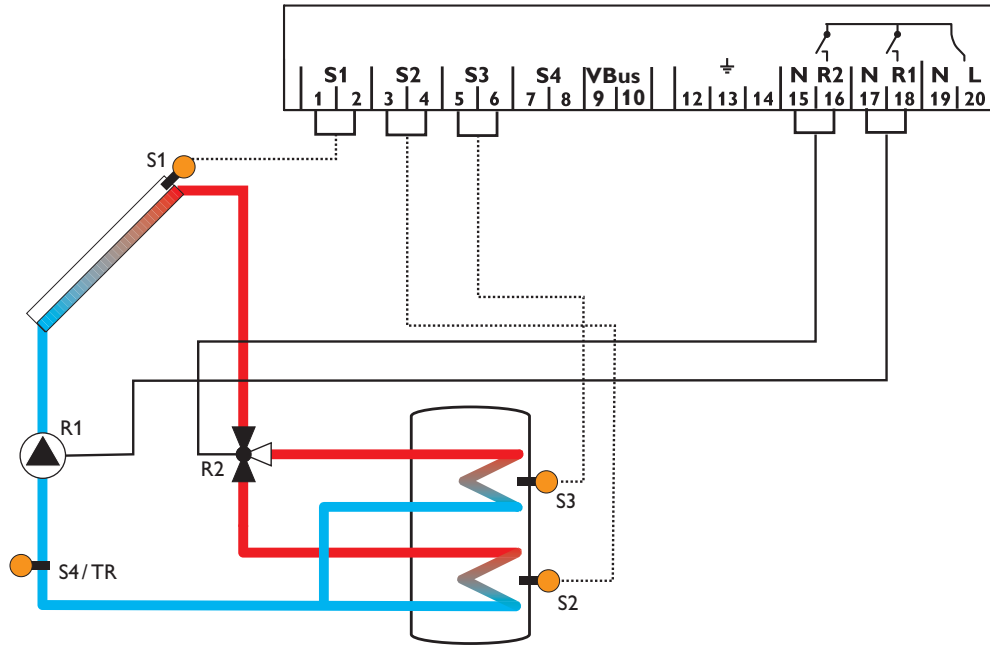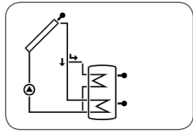
Display channels

Channel		Description	Connection terminal	Page
COL	x	Temperature collector	S1	38
TSTB	x	Temperature store 1 base	S2	38
TSTT	x	Temperature store 1 top	S3	38
S4	x	Temperature sensor 4	S4	39
TR	x*	Temperature return sensor	S4	38
n %	x	Speed relay	R1	39
hP1	x	Operating hours R1	R1	40
hP2	x	Operating hours R2	R2	40
kWh	x*	Heat quantity in kWh	-	39
MWh	x*	Heat quantity in MWh	-	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	4	41
nMN	x	Minimum speed	30 %	42
DT1O	x	Switch-on temperature difference 1	6.0 K [12.0 °Ra]	41
DT1F	x	Switch-off temperature difference 1	4.0 K [8.0 °Ra]	41
DT1S	x	Set temperature difference 1	10.0 K [20.0 °Ra]	42
RIS1	x	Rise R1	2 K [4 °Ra]	42
S1 MX	x	Maximum store temperature 1	60 °C [140 °F]	42
DT2O	x	Switch-on temperature difference 2	6.0 K [12.0 °Ra]	41
DT2F	x	Switch-off temperature difference 2	4.0 K [8.0 °Ra]	41
DT2S	x	Set temperature difference 2	10.0 K [20.0 °Ra]	42
RIS3	x	Rise R2	2 K [4 °Ra]	42
S2MX	x	Maximum store temperature 2	60 °C [140 °F]	42
EM	x	Collector emergency temperature	130 °C [270 °F]	43
OCC	x	Collector cooling option	OFF	43
CMX	x*	Maximum collector temperature	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44
OCN	x	Collector minimum limitation option	OFF	45
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45

Adjustment channels

Channel		Description	Factory setting	Page
OCF	x	Antifreeze option	OFF	45
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
PRIO	x	Priority	2	46
tLB	x	Loading break (store sequence control)	2 min	46
tRUN	x	Circulation time (store sequence control)	15 min	46
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
OHQM	x	Heat quantity measurement option	OFF	47
FMAX	x*	Maximum flow rate	6.0 l	47
MEDT	x*	Heat transfer fluid/Antifreeze type	1	48
MED%	x*	Antifreeze concentration (only if MEDT = propylene or ethylene)	45 %	48
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

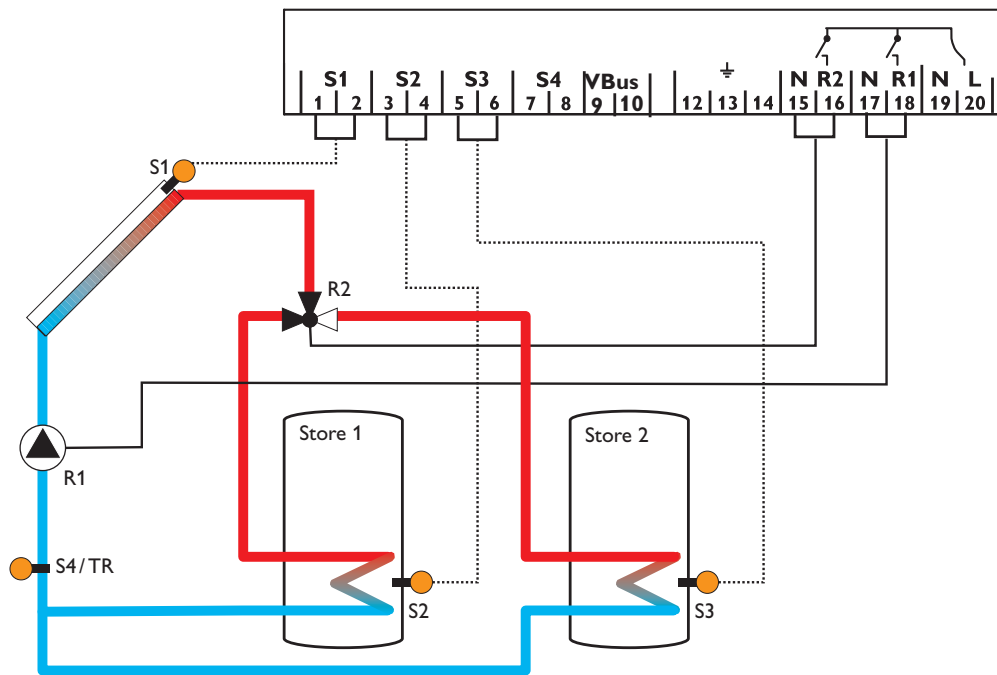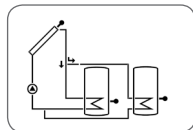| Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.

Arrangement 5: Solar system with 2 stores and valve logic

The controller calculates the temperature difference between collector sensor S1 and store sensors S2 and S3. If the difference is larger than or identical to the corresponding adjusted switch-on temperature differences (DT1O / DT2O), the solar pump will be activated by relay 1, and the corresponding store will be loaded until the switch-off temperature difference (DT1F / DT2F) or the maximum store temperature (S1MX / S2MX) is reached. The priority logic causes priority loading of store 1. If store 2 is being loaded, relay 2 switches the 3-port valve.

Sensor S4 can optionally be connected for measurement purposes.

If heat quantity measurement (OHQM) is activated, S4 is to be used as the return sensor.

Display channels

Channel		Description	Connection terminal	Page
COL	x	Temperature collector	S1	38
TST1	x	Temperature store 1 base	S2	38
TST2	x	Temperature store 2 base	S3	38
S4	x	Temperature sensor 4	S4	39
TR	x*	Temperature return sensor	S4	38
n %	x	Speed relay	R1	39
hP1	x	Operating hours R1	R1	40
hP2	x	Operating hours R2	R2	40
kWh	x*	Heat quantity in kWh	-	39
MWh	x*	Heat quantity in MWh	-	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	5	41
nMN	x	Minimum speed	30%	42
DT1O	x	Switch-on temperature difference 1	6.0 K [12.0 °Ra]	41
DT1F	x	Switch-off temperature difference 1	4.0 K [8.0 °Ra]	41
DT1S	x	Set temperature difference 1	10.0 K [20.0 °Ra]	42
RIS1	x	Rise R1	2 K [4 °Ra]	42
S1 MX	x	Maximum store temperature 1	60 °C [140 °F]	42
DT2O	x	Switch-on temperature difference 2	6.0 K [12.0 °Ra]	41
DT2F	x	Switch-off temperature difference 2	4.0 K [8.0 °Ra]	41
DT2S	x	Set temperature difference 2	10.0 K [20.0 °Ra]	42
RIS2	x	Rise R2	2 K [4 °Ra]	42
S2MX	x	Maximum store temperature 2	60 °C [140 °F]	42
EM	x	Collector emergency temperature	130 °C [270 °F]	43
OCC	x	Collector cooling option	OFF	43
CMX	x*	Maximum collector temperature	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44
OCN	x	Collector minimum limitation option	OFF	45
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45

Adjustment channels

Channel		Description	Factory setting	Page
OCF	x	Antifreeze option	OFF	45
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
PRIO	x	Priority	1	46
tLB	x	Loading break (store sequence control)	2 min	46
tRUN	x	Circulation time (store sequence control)	15 min	46
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
OHQM	x	Heat quantity measurement option	OFF	47
FMAX	x*	Maximum flow rate	6.0 l	47
MEDT	x*	Heat transfer fluid/Antifreeze type	1	48
MED%	x*	Antifreeze concentration (only if MEDT = propylene or ethylene glycol)	45%	48
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.

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Arrangement 6: Solar system with 2 stores and pump logic

The controller calculates the temperature difference between collector sensor S1 and store sensors S2 and S3. If the difference is larger than or identical to the corresponding adjusted switch-on temperature differences (DT1O/DT2O), one or both solar pumps will be activated by relay 1 and/or relay 2, and the corresponding store will be loaded until the switch-off temperature difference (DT1F/DT2F) or the maximum store temperature (S1MX/S2MX) is reached. The priority logic causes priority loading of the store selected in the PRIO channel, if possible.

If PRIO = 0, both stores will be loaded simultaneously.

Sensor S4 can optionally be used for measurement purposes or as the reference sensor for the store emergency shutdown option (OSEM).

Display channels

Channel		Description	Connection terminal	Page
COL	x	Temperature collector	S1	38
TST1	x	Temperature store 1 base	S2	38
TST2	x	Temperature store 2 base	S3	38
S4	x	Temperature sensor 4	S4	39
TSTT	x*	Temperature store top	S4	38
n1 %	x	Speed R1	R1	39
n2 %	x	Speed R2	R2	39
h P1	x	Operating hours R1	R1	39
h P2	x	Operating hours R2	R2	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	6	41
DT1O	x	Switch-on temperature difference 1	6.0 K [12.0 °Ra]	41
DT1F	x	Switch-off temperature difference 1	4.0 K [8.0 °Ra]	41
DT1S	x	Set temperature difference 1	10.0 K [20.0 °Ra]	42
RIS1	x	Rise R1	2 K [4 °Ra]	42
n1MN	x	Minimum speed R1	30 %	42
S1 MX	x	Maximum store temperature 1	60 °C [140 °F]	42
OSEM	x	Store emergency shutdown option	OFF	42
DT2O	x	Switch-on temperature difference 2	6.0 K [12.0 °Ra]	41
DT2F	x	Switch-off temperature difference 2	4.0 K [8.0 °Ra]	41
DT2S	x	Set temperature difference 2	10.0 K [20.0 °Ra]	42
RIS2	x	Rise R2	2 K [4 °Ra]	42
n2MN	x	Minimum speed R2	30 %	42
S2MX	x	Maximum store temperature 2	60 °C [140 °F]	42
EM	x	Collector emergency temperature	130 °C [270 °F]	43
OCC	x	Collector cooling option	OFF	43
CMX	x*	Maximum collector temperature	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44
OCN	x	Collector minimum limitation option	OFF	45

Adjustment channels

Channel		Description	Factory setting	Page
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45
OCF	x	Antifreeze option	OFF	45
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
PRIO	x	Priority	1	46
tLB	x	Loading break (store sequence control)	2 min	46
tRUN	x	Circulation time (store sequence control)	15 min	46
DTSE	x*	Spread temperature difference	40 K [70 °Ra]	46
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
ADA2	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.

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Arrangement 7: Solar system with east-/west collectors and 1 store

The controller calculates the temperature difference between collector sensors S1 and S3 and store sensor S2. If the differences are larger than or identical to the adjusted switch-on temperature difference (DT O), one or both pumps will be activated by relay 1 and / or relay 2, and the store will be loaded until the switch-off temperature difference (DT F) or the maximum store temperature (S MX) is reached.

Sensor S4 can optionally be used for measurement purposes or as the reference sensor for the store emergency shutdown option (OSEM).
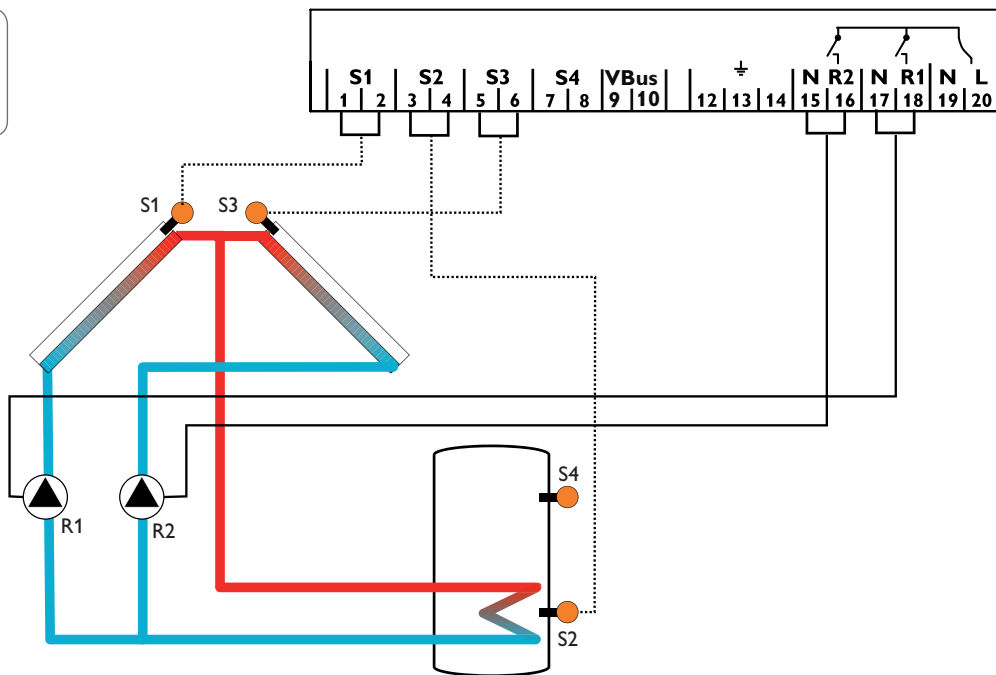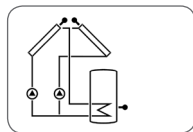
Display channels

Channel		Description	Connection terminal	Page
COL1	x	Temperature collector 1	S1	38
TST	x	Temperature store	S2	38
COL2	x	Temperature collector 2	S3	38
S4	x	Temperature sensor 4	S4	39
TSTT	x*	Temperature store top	S4	38
n1 %	x	Speed R1	R1	39
n2 %	x	Speed R2	R2	39
h P1	x	Operating hours R1	R1	39
h P2	x	Operating hours R2	R2	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	7	41
DT O	x	Switch-on temperature difference	6.0 K [12.0 °Ra]	41
DT F	x	Switch-off temperature difference	4.0 K [8.0 °Ra]	41
DT S	x	Set temperature difference	10.0 K [20.0 °Ra]	42
RIS	x	Rise R1 / R2	2 K [4 °Ra]	42
n1MN	x	Minimum speed R1	30 %	42
S MX	x	Maximum store temperature	60 °C [140 °F]	42
OSEM	x	Store emergency shutdown option	OFF	43
n2MN	x	Minimum speed R2	30 %	42
EM1	x	Collector emergency temperature 1	130 °C [270 °F]	43
EM2	x	Collector emergency temperature 2	130 °C [270 °F]	43
OCC1	x	Collector cooling option collector 1	OFF	43
CMX1	x*	Maximum collector temperature 1	110 °C [230 °F]	43
OCC2	x	Collector cooling option collector 2	OFF	43
CMX2	x*	Maximum collector temperature 2	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44
OKN1	x	Collector minimum limitation collector 1	OFF	45
CMN1	x*	Minimum collector temperature 1	10 °C [50 °F]	45
OCN2	x	Collector minimum limitation collector 2	OFF	45

Adjustment channels

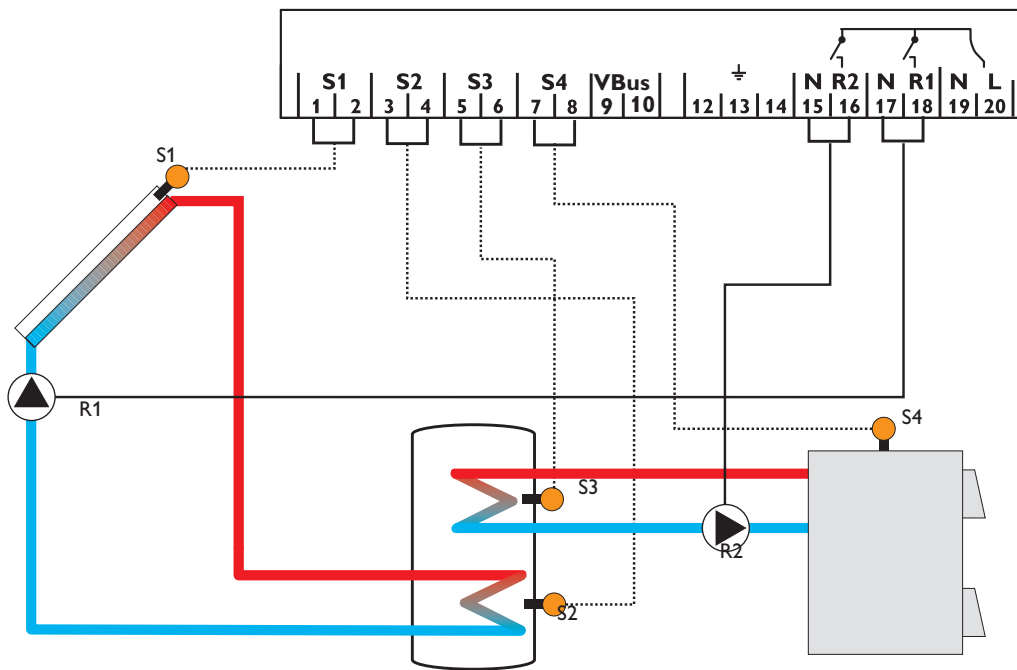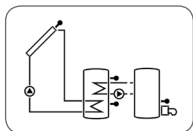| Channel		Description	Factory setting	Page
CMN2	x*	Minimum collector temperature 2	10 °C [50 °F]	45
OCF1	x	Antifreeze option collector 1	OFF	45
CFR1	x*	Antifreeze temperature collector 1	4.0 °C [40.0 °F]	45
OCF2	x	Antifreeze option collector 2	OFF	45
CFR2	x*	Antifreeze temperature collector 2	4.0 °C [40.0 °F]	45
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
ADA2	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.

Arrangement 8: Solar system with afterheating by solid fuel boiler

The controller calculates the temperature difference between collector sensor S1 and store sensor S2. If the difference is larger than or identical to the adjusted switch-on temperature difference (DT O), the solar pump will be activated by relay 1, and the store will be loaded until the switch-off temperature difference (DT F) or the maximum store temperature (S MX) is reached.

A solid fuel boiler will be controlled by relay 2, if the temperature difference between sensors S4 and S3 is larger than or identical to the adjusted switch-on temperature difference (DT3O), until the adjusted minimum (MN3O) and maximum (MX3O) temperature thresholds of the solid fuel boiler and the store are reached. S3 can optionally be used as the reference sensor for the store emergency shut-down option (OSEM).

Display channels

Channel		Description	Connection terminal	Page
INIT	x*	ODB initialisation active	-	38
FLL	x*	ODB filling time active	-	38
STAB	x*	ODB stabilisation in progress	-	38
COL	x	Temperature collector	S1	38
TSTB	x	Temperature store 1 base	S2	38
TSTT	x	Temperature store 1 top	S3	38
TSFB	x	Temperature solid fuel boiler	S4	38
n1 %	x	Speed R1	R1	39
n2 %	x	Speed R2	R2	39
h P1	x	Operating hours R1	R1	39
h P2	x	Operating hours R2	R2	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	8	41
DT O	x	Switch-on temperature difference	6.0 K [12.0 °Ra]	41
DT F	x	Switch-off temperature difference	4.0 K [8.0 °Ra]	41
DT S	x	Set temperature difference	10.0 K [20.0 °Ra]	42
RIS	x	Rise R1	2 K [4 °Ra]	42
n1MN	x	Minimum speed R1	30 %	42
S MX	x	Maximum store temperature	60 °C [140 °F]	42
OSEM	x	Store emergency shutdown option	OFF	43
n2MN	s	Minimum speed R2	30 %	42
EM	x	Collector emergency temperature	130 °C [270 °F]	43
		Collector emergency temperature (if OBST is activated):	95 °C [200 °F]	43
OCC	x	Collector cooling option	OFF	43
CMX	x*	Maximum collector temperature	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44
OCN	x	Collector minimum limitation option	OFF	45
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45
OCF	x	Antifreeze option	OFF	45

Adjustment channels

Channel		Description	Factory setting	Page
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
DT3O	s	Switch-on temperature difference 3	6.0 K [12.0 °Ra]	41
DT3F	s	Switch-off temperature difference 3	4.0 K [8.0 °Ra]	41
DT3S	s	Set temperature difference 3	10.0 K [20.0 °Ra]	42
RIS3	s	Rise R2	2 K [4 °Ra]	42
MX3O	s	Switch-on threshold for maximum temperature	60.0 °C [140.0 °F]	29
MX3F	s	Switch-off threshold for maximum temperature	58.0 °C [136.0 °F]	29
MN3O	s	Switch-on threshold for minimum temperature	60.0 °C [140.0 °F]	29
MN3F	s	Switch-off threshold for minimum temperature	65.0 °C [150.0 °F]	29
ODB	x	Drainback option	OFF	48
tDTO	x*	ODB switch-on condition - time period	60 s	48
tFLL	x*	ODB filling time	5.0 min	49
tSTB	x*	ODB stabilisation time	2.0 min	49
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
ADA2	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.

System-specific functions

The following adjustments are used for the specific functions in system 8.

∆T control for the afterheating by a solid fuel boiler / biomass boiler

DT3O
Switch-on temperature difference
Adjustment range:
1.0 … 20.0 K [2.0 … 40.0 °Ra]
Factory setting: 6.0 K [12.0 °Ra]

DT3F
Switch-off temperature difference
Adjustment range:
0.5 … 19.5 K [1.0 … 39.0 °Ra]
Factory setting: 4.0 K [8.0 °Ra]

S4 and S3 are used as the reference sensors for this function.

In system 8 the controller is equipped with an additional differential control for heat exchange from a solid fuel boiler (e. g. pellet stove). The basic differential function is adjusted using the switch-on (**DT3O**) and switch-off (**DT3F**) temperature differences.

When the temperature difference exceeds the adjusted switch-on temperature difference, relay 2 switches on. When the temperature difference falls below the adjusted switch-off temperature difference, relay 2 switches off.

ℹ️ **Note**
The switch-on temperature difference must be at least 0.5 K [1 °Ra] higher than the switch-off temperature difference.

Speed control

DT3S
Set temperature difference
Adjustment range:
1.5 … 30.0 K [3.0 … 60.0 °Ra]
Factory setting: 10.0 K [20.0 °Ra]

RIS3
Rise
Adjustment range: 1 … 20 K [2 … 40 °Ra]
Factory setting: 2 K [4 °Ra]

If the temperature difference reaches or exceeds the switch-on temperature difference, the pump switches on at 100 % speed for 10 s. Then, the speed is reduced to the minimum pump speed value.

If the temperature difference reaches the adjusted nominal value, the pump speed increases by one step (10 %). The response of the controller can be adapted via the parameter Rise. Each time the difference increases by the adjustable rise value, the pump speed increases by 10 % until the maximum pump speed of 100 % is reached. If the temperature difference decreases by the adjustable rise value, pump speed will be decreased by one step.

ℹ️ **Note**
For pump speed control of the heat exchange pump, the operating mode of relay 2 must be set to **Auto** in the adjustment channel **MAN2**.

ℹ️ **Note**
The set temperature difference must be at least 0.5 K [1 °Ra] higher than the switch-on temperature difference.

Minimum speed

```
n2MN SET
    30
```

n2MN
Minimum speed
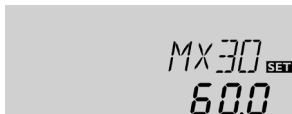Adjustment range: 30 … 100 %
Factory setting: 30 %

In the adjustment channel **n2MIN** a relative minimum speed for a pump connected can be allocated to the output R2.

> **i** **Note**
> When loads which are not speed-controlled (e. g. valves) are used, the value **n2MN** must be set to 100 % to deactivate pump speed control.
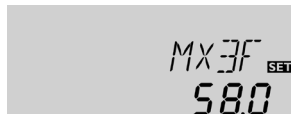
Maximum temperature limitation

```
MX3O SET          MX3F SET
  60.0              58.0
```

MX3O   MX3F
Maximum temperature limitation
Adjustment range: 0.0 … 95.0 °C [30.0 … 200.0 °F]
Factory setting:
MX3O: 60.0 °C [140.0 °F]   MX3F: 58.0 °C [136.0 °F]

Minimum and maximum temperature limits can be set for the solid fuel boiler.

S3 is used as the reference sensor for the maximum temperature limitation.

The maximum temperature limitation function provides a maximum temperature setting, usually to reduce scald risk in a store. If **MX3O** is exceeded, relay 2 is switched off until the temperature at sensor 3 falls below **MX3F**.

Minimum temperature limitation

```
MN3O SET          MN3F SET
  60.0              65.0
```

MN3O   MN3F
Minimum temperature limitation
Adjustment range: 0.0 … 90.0 °C [30.0 … 190.0 °F]
Factory setting: (only if Arr = 8):
MN3O: 60.0 °C [140.0 °F]   MN3F: 65.0 °C [150.0 °F]

S4 is used as the reference sensor for the minimum temperature limitation.

The minimum temperature limitation function provides a minimum temperature setting for the solid fuel boiler in system 8. If the temperature at sensor 4 falls below **MN3O**, relay 2 is switched off until the temperature at sensor 4 exceeds **MN3F**.

Both switch-on and switch-off temperature differences **DT3O** and **DT3F** are valid for the maximum and minimum temperature limitation.

Installation

Operation and function

Commissioning

Indications, functions and options

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Arrangement 9: Solar system with heating-circuit return preheating

The controller calculates the temperature difference between collector sensor S1 and store sensor S2. If the difference is larger than or identical to the adjusted switch-on temperature difference (DT O), the solar pump will be activated by relay 1, and the store will be loaded until the switch-off temperature difference (DT F) or the maximum store temperature (S MX) is reached.

Heating-circuit return preheating will be activated by relay 2, if the temperature difference between sensors S3 and S4 is larger or identical to the adjusted switch-on temperature difference (DT3O). For this purpose, relay 2 controls the 3-port valve. S3 can optionally be used as the reference sensor for the store emergency shut-down option (OSEM).

Display channels

Channel		Description	Connection terminal	Page
INIT	x*	ODB initialisation active	-	38
FLL	x*	ODB filling time active	-	38
STAB	x*	ODB stabilisation in progress	-	38
COL	x	Temperature collector	S1	38
TSTB	x	Temperature store 1 base	S2	38
TSTT	x	Temperature store 1 top	S3	38
TRET	x	Heating circuit temperature	S4	38
n %	x	Speed relay	R1	39
hP1	x	Operating hours R1	R1	39
hP2	x	Operating hours R2	R2	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	9	41
DT O	x	Switch-on temperature difference	6.0 K [12.0 °Ra]	41
DT F	x	Switch-off temperature difference	4.0 K [8.0 °Ra]	41
DT S	x	Set temperature difference	10.0 K [20.0 °Ra]	42
RIS	x	Rise R1	2 K [4 °Ra]	42
nMN	x	Minimum speed	30 %	42
S MX	x	Maximum store temperature	60 °C [140 °F]	42
OSEM	x	Store emergency shutdown option	OFF	43
EM	x	Collector emergency temperature	130 °C [270 °F]	43
		Collector emergency temperature, if OBST is activated:	95 °C [200 °F]	43
OCC	x	Collector cooling option	OFF	43
CMX	x*	Maximum collector temperature	110 °C [230 °F]	43
OSYC	x	System cooling option	OFF	44
DTCO	x*	Switch-on temperature difference cooling	20.0 K [40.0 °Ra]	44
DTCF	x*	Switch-off temperature difference cooling	15.0 K [30.0 °Ra]	44
OSTC	x	Store cooling option	OFF	44
OHOL	x*	Holiday cooling option	OFF	44
THOL	x*	Holiday cooling temperature	40 °C [110 °F]	44
OCN	x	Collector minimum limitation option	OFF	45
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45
OCF	x	Antifreeze option	OFF	45
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
OTC	x	Tube collector option	OFF	47

Adjustment channels

Channel		Description	Factory setting	Page
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
DT3O	s	Switch-on temperature difference 3	6.0 K [12.0 °Ra]	41
DT3F	s	Switch-off temperature difference 3	4.0 K [8.0 °Ra]	41
ODB	x	Drainback option	OFF	48
tDTO	x*	ODB switch-on condition - time period	60 s	48
tFLL	x*	ODB filling time	5.0 min	49
tSTB	x*	ODB stabilisation time	2.0 min	49
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.
s*	System-specific channel, only available if the corresponding option is activated

en
Installation
Operation and function
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Messages

Arrangement 10: Standard solar system with heat dump

The controller calculates the temperature difference between collector sensor S1 and store sensor S2. If the difference is larger than or identical to the adjusted switch-on temperature difference (DT O), the solar pump will be activated by relay 1, and the store will be loaded until the switch-off temperature difference (DT F) or the maximum store temperature (S MX) is reached.

If the collector maximum temperature (CMAX) is reached, the solar pump will be activated by R1 and the 3-port valve by R2 in order to divert excess heat to a heat sink. For safety reasons, excess heat dump will only take place as long as the store temperature is below the non-adjustable shutdown temperature of 95 °C [200 °F].

Sensors S3 and S4 can optionally be connected for measurement purposes. S3 can optionally be used as the reference sensor for the store emergency shutdown option (OSEM).

If heat quantity measurement (OHQM) is activated, S4 is to be used as the return sensor.
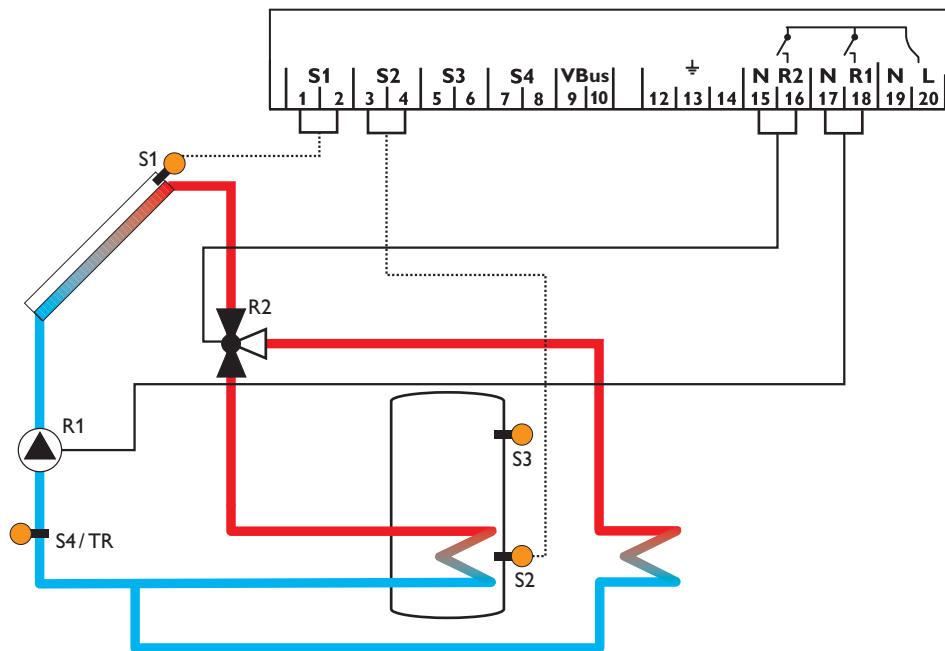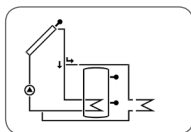
Display channels

Channel		Description	Connection terminal	Page
COL	x	Temperature collector	S1	38
TST	x	Temperature store	S2	38
S3	x	Temperature sensor 3	S3	39
TSTT	x*	Temperature store top	S3	38
S4	x	Temperature sensor 4	S4	39
TR	x*	Temperature return sensor	S4	39
n %	x	Speed relay	R1	39
h P1	x	Operating hours R1	R1	40
h P2	x	Operating hours R2	R2	40
kWh	x*	Heat quantity in kWh	-	39
MWh	x*	Heat quantity in MWh	-	39
TIME	x	Time	-	40

Adjustment channels

Channel		Description	Factory setting	Page
Arr	x	System	10	41
DT O	x	Switch-on temperature difference	6.0 K [12.0 °Ra]	41
DT F	x	Switch-off temperature difference	4.0 K [8.0 °Ra]	41
DT S	x	Set temperature difference	10.0 K [20.0 °Ra]	42
RIS	x	Rise R1	2 K [4 °Ra]	42
nMN	x	Minimum speed	30 %	42
S MX	x	Maximum store temperature	60 °C [140 °F]	42
OSEM	x	Store emergency shutdown option	OFF	43
EM	x	Collector emergency temperature	130 °C [270 °F]	43
CMX	s	Maximum collector temperature	110 °C [230 °F]	43
OCN	x	Collector minimum limitation option	OFF	45
CMN	x*	Collector minimum temperature	10 °C [50 °F]	45
OCF	x	Antifreeze option	OFF	45
CFR	x*	Antifreeze temperature	4.0 °C [40.0 °F]	45
OTC	x	Tube collector option	OFF	47
TCST	x*	OTC starting time	07:00	47
TCEN	x*	OTC ending time	19:00	47
TCRU	x*	OTC runtime	30 s	47
TCIN	x*	OTC standstill interval	30 min	47
OHQM	x	Heat quantity measurement option	OFF	47
FMAX	x*	Maximum flow rate	6.0 l	47
MEDT	x*	Heat transfer fluid/Antifreeze type	1	48
MED%	x*	Antifreeze concentration (only if MEDT = propylene or ethylene glycol)	45 %	48
MAN1	x	Manual mode R1	Auto	49
MAN2	x	Manual mode R2	Auto	49
ADA1	x	HE pump control	OFF	49
LANG	x	Language	dE	50
UNIT	x	Temperature unit	°C	50
RESE	x	Reset - back to factory settings		50
########		Version number		

Legend:

Symbol	Description
x	Channel is available
x*	Channel is available, if the corresponding option is activated.
s*	System-specific channel, only available if the corresponding option is activated

3 Operation and function

3.1 Buttons

Operating control LED

1 forwards (+)
2 backwards (-)
3 SET (selection /
     confirmation)
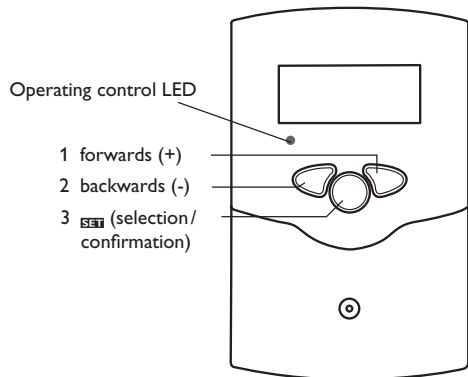
The controller is operated via the 3 push buttons below the display.

Button 1 (+):   Scrolling forwards, increasing adjustment values
Button 2 (-):   Scrolling backwards, reducing adjustment values
Button 3 (OK / SET):   confirming / selecting

During normal operation, display channels will be displayed.

➔ In order to scroll between display channels, press buttons 1 and 2.

Access to adjustment channels

➔ Use button 1 in order to scroll to the last display channel, then press and hold
    down button 1 for approx. 2 s.

If an **adjustment channel** is shown on the screen, SET will be displayed on the
right-hand side next to the channel name.

➔ Press button 3 in order to select an adjustment channel.

SET starts flashing.

➔ Adjust the desired value with buttons 1 and 2.

➔ Briefly press button 3.

SET permanently appears, the adjusted value has been saved.

4 System-Monitoring-Display

System-Monitoring-Display
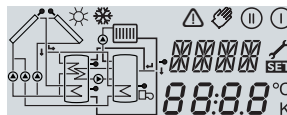
The System-Monitoring-Display consists of 3 blocks: **channel display**, **tool bar**
and **system screen**.

Channel display
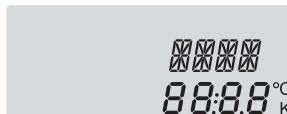
The **channel display** consists of 2 lines. The upper display line is an alphanumeric
16-segment display. In this line, mainly channel names and menu items are displayed.
In the lower 16-segment display, values are displayed.

Tool bar
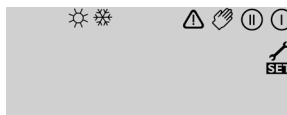
The additional symbols in the **tool bar** indicate the current system state.

4.1 System screen

The system selected is indicated in the System-Monitoring-Display. It consists of several system component symbols which are – depending on the current status of the system – either flashing, permanently shown or not indicated.
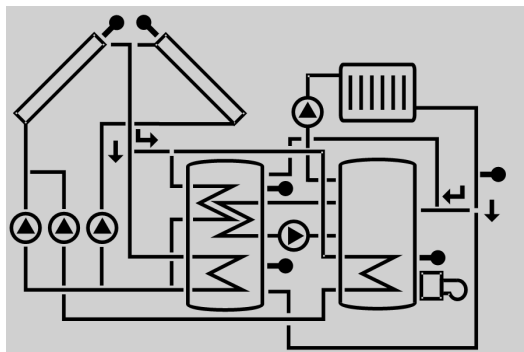
Collector
with collector sensor
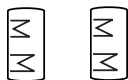
Stores 1 and 2
with heat exchangers

3-port valve
Only the flow direction or current switching position is indicated.

Temperature sensor

Heating circuit

Pump

Afterheating
with burner symbol

4.2 Other indications
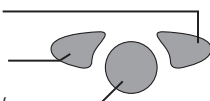
System screen
• Pumps are flashing when the corresponding relay is switched on.
• Sensor symbols are flashing, if the corresponding sensor display channel is selected.
• Sensors are flashing quickly in the case of a sensor fault.
• Burner symbol is flashing if the afterheating is active.

Operating control LED

Green:	Everything OK
Red/green flashing:	Initialisation active
Red flashing:	Manual mode
	Sensor fault (sensor symbol is flashing quickly)

Permanently shown	Flashing	Status indications:
Ⓘ		Relay 1 on
ⒾⒾ		Relay 2 on
☼		Maximum store temperature exceeded
	⚠ + ☼	Store emergency shutdown active
	⚠	Collector emergency shutdown active
Ⓘ	☼	Collector cooling active
Ⓘ	☼	System cooling active
Ⓘ + ☼		Store cooling active
☼	⚠	Holiday cooling option activated
Ⓘ + ☼	⚠	Holiday cooling option active
	❄	Collector minimum limitation active
❄		Antifreeze function activated
Ⓘ/ⒾⒾ	❄	Antifreeze function active
✋ + Ⓘ	⚠	Manual mode relay 1 ON
✋ + ⒾⒾ	⚠	Manual mode relay 2 ON
✋	⚠	Manual mode relay 1/2 OFF
🔧	⚠	Sensor fault

5   Commissioning

1   forwards (+)

2   backwards (-)

3   **SET** (selection /
   confirmation)

→   Connect the device to the mains.

The controller runs an initialisation phase in which the operating control LED flashes red / green.

When the controller is commissioned or when it is reset, it will run a commissioning menu. The commissioning menu leads the user through the most important adjustment channels needed for operating the system.

Operation

3   Adjustment mode   -**SET**- flashing

2 1   Changing a value   -**SET**- flashing

3   Confirming a value   **SET**   not flashing

2 1   to the next
   parameter
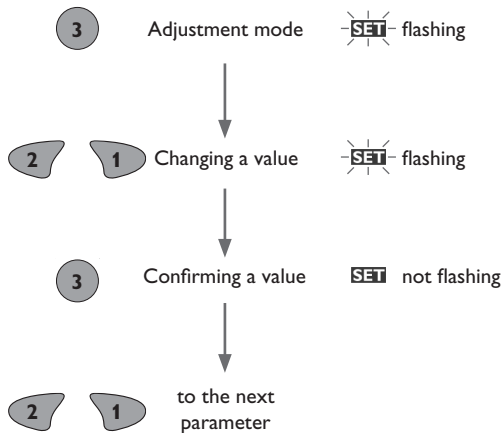
1. Language

→   Adjust the desired menu language.

LANG
Language selection
Selection: dE, En, Fr
Factory setting: dE

2. Temperature unit

→   Adjust the desired menu language.

UNIT
Temperature unit
Selection: °F, °C
Factory setting: °C

3. Time

→   Adjust the clock time.

First of all adjust the hours, then the minutes.

TIME
Real time clock

4.   Arrangement

→   Adjust the desired system.

For a detailed description of the systems to choose from, see page 8.

Arr
System selection
Adjustment range: 1 … 10
Factory setting: 1

If the system selection is changed later on, any previous adjustments which have been made in the other channels will be lost. Therefore, changing the system is always followed by a security enquiry.

LANG **SET**
En

UNIT **SET**
°C

TIME **SET**
00:00

Arr **SET**
1
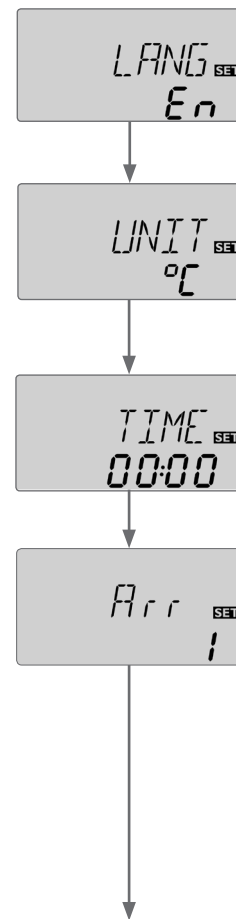
Only confirm the security enquiry if you are sure that you wish to change the system selection.

Security enquiry:

➔ In order to confirm the security enquiry, press button 3.

5. Maximum store temperature

➔ Adjust the maximum store temperature.

S MX / S1MX / S2MX

Adjustment range: 4 … 95 °C [40 … 200 °F]

Arr 10: 4 … 90 °C [40 … 190 °F]

Factory setting: 60 °C [140 °F]

ℹ️ **Note**

The controller is also equipped with a non-adjustable emergency shutdown, deactivating the system if the store reaches 95 °C [200 °F].

6. Minimum speed

➔ Adjust the minimum speed for the corresponding pump.

nMN, n1MN, n2MN

Speed control

Adjustment range: 30 … 100 %

Factory setting: 30

ℹ️ **Note**

If loads which are not speed-controlled (e. g. valves) are used, the speed must be set to 100 %.

SAVE ☐SET
YES

S MX ☐SET
60°C

nMN ☐SET
30
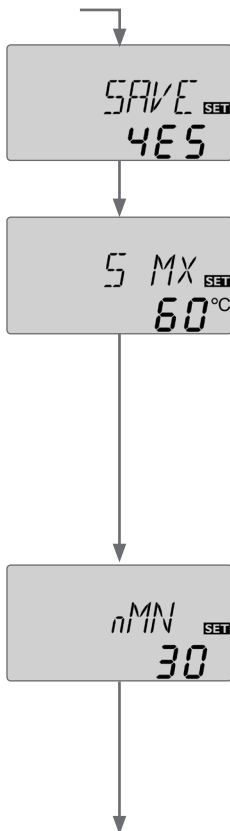
Confirmation

Completing the commissioning menu

After the last channel of the commissioning menu has been adjusted and confirmed, the controller asks for confirmation of the adjustments.

➔ In order to confirm the adjustments made in the commissioning menu, press button 3.

The controller is then ready for operation and normally the factory settings will give close to optimum operation.

ℹ️ **Note**

The adjustments carried out during commissioning can be changed anytime in the corresponding adjustment channel. Additional functions and options can also be activated or deactivated (see page 41).

OK ☐SET
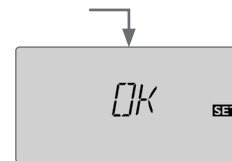
6   Channel overview

6.1   Display channels

> **i** **Note**
> The display and adjustment channels as well as the adjustment ranges depend on the system selected, the functions and options as well as on the system components connected to the controller.

Display of drainback time periods

Initialisation

INIT
60

INIT
ODB initialisation active
Indicates the time adjusted in **tDTO**, running backwards.

Filling time

FLL
05:00

FLL
ODB filling time active
Indicates the time adjusted in **tFLL**, running backwards.

Stabilisation

STAB
02:00

STAB
ODB stabilisation in progress
Indicates the time adjusted in **tSTB**, running backwards.

Display of collector temperatures

COL
185.0

COL
Collector temperature
Display range: -40 … +260 °C [-40 … +500 °F]
Indicates the collector temperature.

- COL : Collector temperature (1-collector system)
- COL2: Collector temperature 2 (2-collector system)

Display of store temperatures

TST
140.0

TST, TSTB, TSTT, TST1, TST2, TDIS
Store temperatures
Display range: -40 … +260 °C [-40 … +500 °F]
Indicates the store temperatures.

- TST   : Store temperature (1-store system)
- TSTB : Store temperature base
- TSTT : Store temperature top
- TST1 : Temperature store 1 (2-store system)
- TST2 : Temperature store 2 (2-store system)
- TDIS : Thermal disinfection temperature

  (Arr = 3 only; replaces TSTT if, during thermal disinfection, the heating period DDIS is active)

Indication of sensors 3 and 4

```
  53
    30.4℃
```
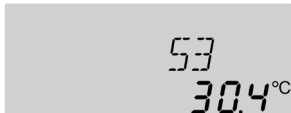
S3, S4

Sensor temperatures
Display range: -40 … +260 °C [-40 … +500 °F]
Indicates the current temperature at the corresponding additional sensor (without control function).
• S3: Temperature at sensor 3
• S4: Temperature at sensor 4

ℹ Note
S3 and S4 will only be indicated if the temperature sensors are connected to the corresponding terminals.

Display of further temperatures

```
  TSFB
    134.6
```
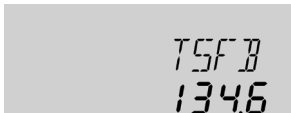
TFSB, TRET, TR

Other measured temperatures
Display range: -40 … +260 °C [-40 … +500 °F]
Indicates the current temperature at the corresponding sensors.
• TFSB : Temperature solid fuel boiler
• TRET : Temperature heating return preheating
• TR   : Temperature return

Indication of current pump speed

```
  n %
    100
```
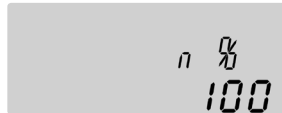
n %, n1 %, n2 %

Current pump speed
Display range: 30 … 100 %
Indicates the current pump speed of the corresponding pump.
• n % : Current pump speed (1-pump system)
• n1 % : Current pump speed pump 1
• n2 % : Current pump speed pump 2

Display of heat quantity

```
  KWh  SET
       51
```
```
  MWh  SET
       12
```

kWh   **MWh**
Heat quantity in kWh / MWh
Display channel

Indicates the heat quantity produced in the system. For this purpose, the heat quantity measurement option has to be enabled. The flow rate as well as the values of the reference sensors flow and return are used for calculating the heat quantity supplied. It is shown in kWh in the **kWh** channel and in MWh in the **MWh** channel. The overall heat quantity results from the sum of both values. The accumulated heat quantity can be set back to zero. As soon as one of the display channels of the heat quantity is selected, the **SET** symbol permanently appears.
➔ In order to access the reset mode of the counter, press button 3 for approx. 2 s.
SET starts flashing and the heat quantity value will be set back to zero.
➔ In order to finish the reset process, press button 3.
In order to interrupt the reset process, do not press any button for about 5 s. The display returns to the display mode.

Indication of thermal disinfection

```
CDIS
01:00
```

CDIS

Countdown monitoring period
Display range: 0 … 30:0 … 24 (dd:hh)

If the thermal disinfection option (**OTD**) is activated and the monitoring period is in progress, the remaining time is displayed as **CDIS** (in hours and minutes), counting backwards.
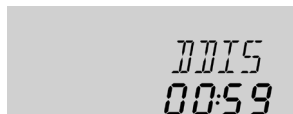
```
SDIS
17:30
```
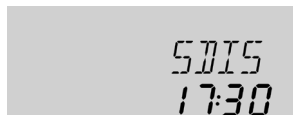
SDIS

Display of starting time
Display range: 00:00 … 24:00 (hh:mm)

If the thermal disinfection option (**OTD**) is activated and a starting delay time has been adjusted, the adjusted starting time is displayed as **SDIS** (flashing).

```
DDIS
00:59
```

DDIS

Indication of heating period
Display range: 00:00 … 24:00 (hh:mm)

If the thermal disinfection option (**OTD**) is activated and the heating period is in progress, the remaining time is displayed as **CDIS** (in hours and minutes), counting backwards.

Display of time

```
TIME [SET]
11:36
```
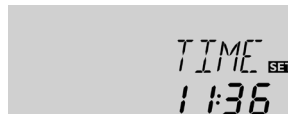
TIME

Indicates the current clock time.

→ In order to adjust the hours, press button 3 for approx. 2 s.
→ Set the hours by pressing buttons 1 and 2.
→ In order to adjust the minutes, press button 3.
→ Set the minutes by pressing buttons 1 and 2.
→ In order to save the adjustments, press button 3.

Operating hours counter

```
h P1 [SET]
305
```
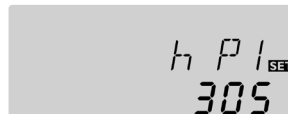
h P / h P1 / h P2

Operating hours counter
Display channel

The operating hours counter accumulates the operating hours of the corresponding relays (**h P / h P1 / h P2**). Full hours are displayed.

The accumulated operating hours can be set back to zero. As soon as an operating hours channel is selected, the [SET] symbol permanently appears.

→ In order to access the reset mode of the counter, press button 3 for approx. 2 s.
[SET] starts flashing and the operating hours value will be set back to zero.

→ In order to finish the reset process, press button 3.

In order to interrupt the reset process, do not press any button for about 5 s. The display returns to the display mode.

6.2 Adjustment channels

Access to adjustment channels

➔ Use button 1 in order to scroll to the last display channel, then press and hold down button 1 for approx. 2 s.

System selection
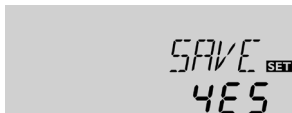
$$Arr \quad \text{SET}$$
$$1$$

Arr
System selection
Adjustment range: 1 … 10
Factory setting: 1

In this channel, a pre-defined system can be selected. Each system has a set of pre-programmed settings that can be individually changed.

If the system selection is changed later on, any previous adjustments, which have been made in the other channels, will be lost. Therefore, changing the system is always followed by a security enquiry.

Only confirm the security enquiry if you are sure that you wish to change the system selection.

$$SAVE \quad \text{SET}$$
$$YES$$

Security enquiry:

➔ In order to confirm the security enquiry, press button 3.

∆T control

$$DT \ O \quad \text{SET}$$
$$6.0$$

DT O / DT1 O / DT2 O / DT3 O
Switch-on temperature difference
Adjustment range: 1.0 … 20.0 K [2.0 … 40.0 °Ra]
Factory setting: 6.0 K [12.0 °Ra]

The controller works as a standard differential controller. If the temperature reaches or exceeds the switch-on temperature difference, the pump switches on.

When the temperature difference reaches or falls below the adjusted switch-off temperature difference, the respective relay switches off.

i	**Note**
	The switch-on temperature difference must be at least 0.5 K [1 °Ra] higher than the switch-off temperature difference.

$$DT \ F \quad \text{SET}$$
$$4.0$$

DT F / DT1 F / DT2 F / DT3 F
Switch-off temperature difference
Adjustment range: 0.5 … 19.5 K [1.0 … 39.0 °Ra]
Factory setting: 4.0 K [8.0 °Ra]

i	**Note**
	If the drainback option **ODB** is activated, the values of the parameters **DT O, DT F** and **DT S** will be adapted to values suiting drainback systems:
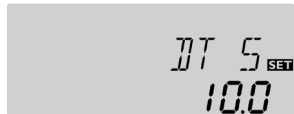DT E = 10 K [20 °Ra]
DT A = 4 K [8 °Ra]
DT S = 15 K [30 °Ra]
Adjustments that have been previously made in these channels will be overridden and have to be entered again if **ODB** is deactivated later on.

Speed control

DT S **SET**
10.0

DT S / DT1S / DT2S / DT3S
Set temperature difference
Adjustment range: 1.5 … 30.0 K [3.0 … 60.0 °Ra]
Factory setting: 10.0 K [20.0 °Ra]

i **Note**
For pump speed control, the operating mode of the corresponding relay must be set to **Auto** (adjustment channel **MAN1 / MAN2**).

RIS **SET**
2

RIS / RIS1 / RIS2 / RIS3
Rise
Adjustment range: 1 … 20 K [2 … 40 °Ra]
Factory setting: 2 K [4 °Ra]

If the temperature difference reaches or exceeds the switch-on temperature difference, the pump switches on at 100 % speed for 10 s. Then, the speed is reduced to the minimum pump speed value.

If the temperature difference reaches the adjusted nominal value, the pump speed increases by one step (10 %). The response of the controller can be adapted via the parameter Rise. Each time the difference increases by the adjustable rise value, the pump speed increases by 10 % until the maximum pump speed of 100 % is reached. If the temperature difference decreases by the adjustable rise value, pump speed will be decreased by one step.

i **Note**
The set temperature difference must be at least 0.5 K [1 °Ra] higher than the switch-on temperature difference.

Minimum speed

nMN **SET**
30

nMN, n1MN, n2MN
Minimum speed
Adjustment range: 30 … 100 %
Factory setting: 30 %
If ODB is activated: 50 %

A relative minimum pump speed can be allocated to the outputs R1 and R2 via the adjustment channels **nMN**, **n1MN** and **n2MN**.

i **Note**
If loads which are not speed-controlled (e.g. valves) are used, the speed must be set to 100 %.

Maximum store temperature

S MX **SET**
60 °C

S MX / S1MX / S2MX
Maximum store temperature
Adjustment range: 4 … 95 °C [40 … 200 °F]
Arr 10: 4 … 90 °C [40 … 190 °F]
Factory setting: 60 °C [140 °F]

If the store temperature reaches the adjusted maximum temperature, the store will no longer be loaded in order to avoid damage caused by overheating. A hysteresis of 2 K [4 °Ra] is set for the maximum store temperature.

If the maximum store temperature is exceeded, ☼ is displayed.

i **Note**
If the collector cooling or the system cooling function is activated, the adjusted maximum store temperature may be exceeded. In order to prevent system damage, the controller is also equipped with an integrated store emergency shutdown, deactivating the system if the store reaches 95 °C [200 °F].

Store emergency shutdown

```
OSEM [SET]
OFF
```
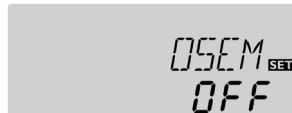
OSEM

Store emergency shutdown option
Adjustment range: ON, OFF
Factory setting: OFF

This option is used for activating the internal store emergency shutdown for an upper store sensor. If the temperature at the reference sensor exceeds 95 °C [200 °F], store 1 will be blocked and loading will be stopped until the temperature falls below 90 °C [190 °F].

> **i Note**
> Sensor S3 is used as the reference sensor in system 1, 2, 3, 8, 9 and 10. In the system 6 and 7, sensor S4 is used as the reference sensor. This option is not available in systems 4 and 5.

Collector emergency shutdown / collector limit temperature

```
EM [SET]
130
```

EM / EM1 / EM2

Collector emergency temperature
Adjustment range: 80 … 200 °C [170 … 390 °F]
Factory setting: 130 °C [270 °F]

When the collector temperature exceeds the adjusted collector limit temperature, the solar pump (R1 / R2) switches off in order to protect the system components against overheating (collector emergency shutdown). A hysteresis of 10 K [20 °Ra] is set for the collector temperature limitation. If the collector limit temperature is exceeded, ⚠ is displayed.

> **i Note**
> If the drainback option **ODB** is activated, the adjustment range of **EM** is changed to 80 … 120 °C [170 … 250 °F]. The factory setting in that case is 95 °C [200 °F].

Cooling functions

In the following the 3 cooling functions – collector cooling, system cooling and store cooling – are described in detail. The following notes are valid for all 3 cooling functions:

> **i Note**
> The cooling functions will not become active as long as solar loading is possible.

> **i Note**
> In 2-store-systems, the cooling functions will only affect store 1, or the base area of the store respectively (such as in Arr = 4).

Collector cooling

```
OCC [SET]          CMX [SET]
OFF               110
```

OCC / OCC1 / OCC2

Collector cooling option
Adjustment range: OFF / ON
Factory setting: OFF

CMX

Collector maximum temperature
Adjustment range:
70 … 160 °C [150 … 320 °F]
Factory setting: 110 °C [230 °F]

The collector cooling function keeps the collector temperature within the operating range by heating the store. If the store temperature reaches 95 °C [200 °F] the function will switch off for safety reasons. If the store temperature exceeds the adjusted maximum store temperature, the solar system is switched off. If the collector temperature increases to the adjusted maximum collector temperature, the solar pump is activated until the collector temperature falls below the maximum collector temperature. The store temperature may then exceed the maximum store temperature, but only up to 95°C [200 °F] (emergency shutdown of the store).

If the collector cooling function is active, ① and ☼ are displayed (flashing).

> **i Note**
> This function will only be available if the system cooling function (**OSYC**) is deactivated.

> **i Note**
> In system 10, the parameter **CMX** is available without the **OCC** function. In system 10, **CMX** is used for setting the activation temperature for the heat dump function. No other switch-on condition is needed in that case.

System cooling

OSYC
SET
OFF

OSYC
System cooling option
Adjustment range: OFF / ON
Factory setting: OFF

DTCO
SET
20.0

DTCO
Switch-on temperature difference
Adjustment range:
1.0 … 30.0 K [2.0 … 60.0 °Ra]
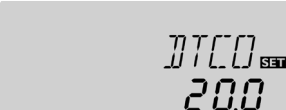Factory setting: 20.0 K [40.0 °Ra]

DTCF
SET
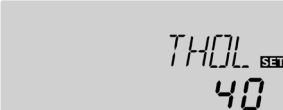15.0

DTCF
Switch-off temperature difference
Adjustment range: 0.5 … 29.5 K [1.0 … 59.0 °Ra]
Factory setting: 15.0 K [30.0 °Ra]

The system cooling function aims to keep the solar system operational for a longer time. The function overrides the maximum store temperature to provide thermal relief of the collector field and the heat transfer fluid on hot days. If the store temperature is higher than the adjusted maximum store temperature and the switch-on temperature difference **DTCO** is reached, the solar pump remains switched on or will be switched on. Solar loading is continued until the temperature difference falls below the adjusted value **DTCF** or the collector limit temperature **EM** is reached

If the system cooling function is active, ① and ☼ are displayed (flashing).

ℹ **Note**
This function will only be available, if the collector cooling function (**OCC**) is deactivated.

Store cooling

OSTC
SET
OFF

OSTC
Store cooling option
Adjustment range: OFF / ON
Factory setting: OFF

OHOL
SET
OFF

OHOL
Holiday cooling option
Adjustment range: OFF / ON
Factory setting: OFF

THOL
SET
40

THOL
Holiday cooling temperature
Adjustment range: 20 … 80 °C [70 … 175 °F]
Factory setting: 40 °C [110 °F]

When the store cooling function is activated, the controller aims to cool down the store during the night in order to prepare it for solar loading on the following day.

If the adjusted maximum store temperature **SMX / S1MX** is exceeded and the collector temperature falls below the store temperature, the system will be reactivated in order to cool down the store.

Cooling will continue until the store temperature has fallen below the adjusted maximum store temperature (**SMX / S1MX**) again. A hysteresis of 2 K [4 °Ra] is set for the store cooling function.

Reference threshold temperature differences for the store cooling function are **DTO** and **DTF**.

If no DHW consumption is expected for a longer period of time, the additional holiday cooling option **OHOL** can be activated in order to extend the store cooling function. The adjustable temperature **THOL** then replaces the maximum store temperature (**SMX / S1MX**) as the switch-off temperature for the store cooling function.

When the holiday cooling function is activated, ☼ and ⚠ (flashing) are shown on the display.

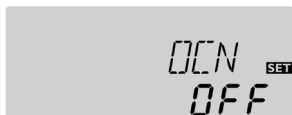If the holiday cooling function is active, ①, ☼ and ⚠ are displayed (flashing).

Minimum collector limitation

OCN / OCN1 / OCN2
Collector minimum limitation option
Adjustment range: OFF / ON
Factory setting: OFF

CMN
Minimum collector temperature
Adjustment range:
10.0 … 90.0 °C [50.0 … 190.0 °F]
Factory setting: 10.0 °C [50.0 °F]

If the collector minimum limitation option is activated, the pump (R1 / R2) will only be switched on, if the adjustable collector minimum temperature is exceeded. The minimum temperature prevents the pump from being switched on too often at low collector temperatures. A hysteresis of 5 K [10 °Ra] is set for this function.

If the collector minimum limitation is active, ❄ is displayed (flashing).

> **ℹ Note**
> If **OSTC** or **OCF** is active, the collector minimum limitation will be over-ridden. In that case, the collector temperature may fall below **CMN**.

Antifreeze function
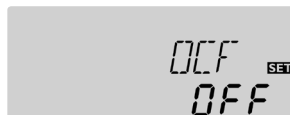
OCF / OCF1 / OCF2
Antifreeze option
Adjustment range: OFF / ON
Factory setting: OFF

CFR / CFR1 / CFR2
Antifreeze temperature
Adjustment range:
-40.0 … +10.0 °C [-40.0 … +50.0 °F]
Factory setting: +4.0 °C [+40.0 °F]

The antifreeze function activates the loading circuit between the collector and the store when the temperature falls below the adjusted antifreeze temperature. This will protect the fluid against freezing or coagulating. If the adjusted antifreeze temperature is exceeded by 1 K [2 °Ra], the loading circuit will be deactivated.

If the antifreeze function is activated, ❄ is displayed. If the antifreeze function is active, ① and ❄ are displayed (flashing).

> **ℹ Note**
> Since this function uses the limited heat quantity of the store, the antifreeze function should only be used in regions with few days of temperatures around the freezing point.
> The antifreeze function will be suppressed if the store temperature falls below 5 °C [40 °F] in order to protect the store from frost damage.

Priority logic

```
PRIO SET
        1
```

PRIO
Priority
Adjustment range: SE 1, SE 2, Su 1, Su 2, 0, 1, 2
Factory setting: Arr 4: 2; Arr 5, 6: 1
If a 2-store system has been selected, the priority logic determines how the heat is divided between the stores. Different types of priority logic are adjustable:
• SE 1 / SE 2: Spreaded loading
• Su 1 / Su 2: Successive loading
• 0 : Parallel loading
• 1 / 2: Store sequence control

If priority **PRIO SE 1** or **SE 2** (only available in Arr 6) is adjusted, the subordinate store will be loaded in parallel to the priority store if the temperature difference between the collector and the priority store (store 1 for SE 1, store 2 for SE 2) exceeds the adjusted value **DTSE** and the subordinate store has not reached its maximum temperature.

Parallel loading will stop as soon as the temperature difference between the collector and the priority store falls by 2 K [4 °Ra] below **DTSE** or the subordinate store reaches its maximum temperature.

If priority **PRIO Su 1** or **Su 2** is adjusted, the stores are loaded successively. The subordinate store will only be loaded if the priority store (store 1 for Su 1, store 2 for Su 2) has reached its adjusted maximum temperature (**S1MX** or **S2MX**).

ℹ️ **Note**
Priority logic can be used in 2-store system only (Arr = 4, 5, 6).

ℹ️ **Note**
If the priority is set to PRIO Su 1 or Su 2, solar loading of the subordinate store will be stopped at once if the temperature in the priority store (store 1 for Su 1, store 2 for Su 2) falls below the adjusted maximum temperature. If, in that case, the temperature difference between the priority store and the collector is not sufficiently high, solar loading will be stopped completely.

Spreaded loading temperature difference
(only available if PRIO is set to SE 1 or SE 2)

```
DTSE SET
        40
```
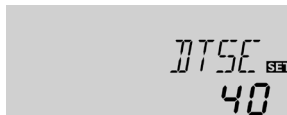
DTSE
Spread temperature difference
Adjustment range: 20 … 90 K [40 … 160 °Ra]
in steps of: 1 K [1 °Ra]
Factory setting: 40 K [70 °Ra]
If priority **PRIO 0** is adjusted and the switch-on conditions for both stores are fulfilled, the stores are loaded in parallel (Arr 6) or in store sequence control (Arr 4, 5) respectively, beginning with the store with the lowest temperature. In store sequence control, solar loading will switch from one store to the other in steps of 5 K [10 °Ra] temperature difference between the stores.

If **PRIO 1 / 2** is adjusted, store sequence control will be activated (see below) with the corresponding store as the priority store.

Store sequence control
(only available if priority is set to PRIO SE 1, SE 2, 1 or 2)
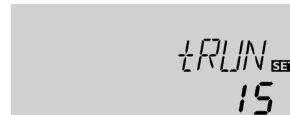
```
tLB SET
       2
```

```
tRUN SET
        15
```
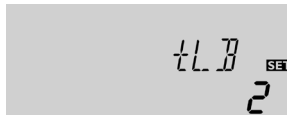
tLB
Loading break store sequence control
Adjustment range: 1 … 30 min
Factory setting: 2 min

tRUN
Circulation time store sequence control
Adjustment range: 1 … 30 min
Factory setting: 15 min

Store sequence control will be activated when **PRIO** is set to SE 1, SE 2, 1 or 2.

If the priority store cannot be loaded, the subordinate store will be checked. If useful heat can be added to the subordinate store, it will be loaded for the circulation time (**tRUN** – factory setting 15 min). After this, the loading process stops and the controller monitors the increase in collector temperature during the loading break time **tLB**. If it increases by 2 K [4 °Ra], the break time starts again to allow the collector to gain more heat. If the collector temperature does not increase sufficiently, the subordinate store will be loaded again for the **tRUN** runtime as before.

As soon as the switch-on condition of the priority store is fulfilled, it will be loaded. If the switch-on condition of the priority store is not fulfilled, loading of the subordinate store will be continued. If the priority store reaches its maximum temperature, store sequence control will not be carried out.

If store sequence control is active and the system switches to load the priority store, the parameter **tLB** also acts as a stabilisation time, during which the switch-off condition **DTF** is ignored while the system operation is stabilising.

Tube collector function

OTC
Tube collector option
Adjustment range: OFF / ON
Factory setting: OFF

TCST
Tube collector function starting time
Adjustment range: 00:00 … 23:45
Factory setting: 07:00

TCEN
Tube collector function ending time
Adjustment range: 00:00 … 23:45
Factory setting: 19:00

TCRU
Tube collector function runtime
Adjustment range: 5 … 500 s
Factory setting: 30 s

TCIN
Tube collector function standstill interval
Adjustment range: 1 … 60 min
Factory setting: 30 min

This function is used for improving the switch-on behaviour in systems with non-ideal sensor positions (e. g. with some tube collectors). This function operates within an adjusted time frame. It activates the collector circuit pump for an adjustable runtime between adjustable standstill intervals in order to compensate for the delayed temperature measurement. If the runtime is set to more than 10 seconds, the pump will be run at 100 % for the first 10 s of the runtime. For the remaining runtime, the pump will be run at the adjusted minimum speed. If the collector sensor is defective or the collector is blocked, this function is suppressed or switched off.

In system 7 (Arr = 7) both collectors are operated independently from each other by means of this function. If the store is being loaded by one collector, the other one is nevertheless operated.

> **i** **Note**
> If the drainback option **ODB** is activated, **TRCU** will not be available. In that case, the runtime will be determined by the parameters **tFLL** and **tSTB**.

Heat quantity measurement

OHQM
Heat quantity measurement
Adjustment range: OFF / ON
Factory setting: OFF

FMAX
Flow rate in l/min
Adjustment range: 0.5 … 100.0
Factory setting: 6.0

MEDT
Heat transfer fluid
Adjustment range: 0 … 3
Factory setting: 1
Heat transfer fluid:
0: Water
1: Propylene glycol
2: Ethylene glycol
3: Tyfocor® LS / G-LS

MED%

Antifreeze concentration
in Vol-% (MED% is not indicated when MEDT 0 or 3 is used.)
Adjustment range: 20 … 70 %
Factory setting: 45 %

Heat quantity measurement is possible in systems 1, 3, 4, 5 and 10. The heat quantity balancing (estimation) uses the difference between the flow and return temperatures and the entered flow rate (at 100 % pump speed).

➔ Read the flow rate (l/min) and adjust it in the **FMAX** channel.

➔ Adjust the antifreeze type and concentration of the heat transfer fluid in the channels MEDT and MED%.

Note
If the system 10 has been selected and **OHQM** is activated, heat quantity measurement will be interrupted when the 3-port valve switches to the heat dump.

Drainback option

In a drainback system, the heat transfer fluid will flow into a holding tank if solar loading does not take place. The drainback option initiates the filling process if solar loading is about to start. If the drainback option is activated, the following adjustment can be made.

Note
A drainback system requires additional components such as a holding tank. The drainback option should only be activated if all components required are properly installed.

Note
The drainback option is only available in system with one store and one collector (Arr 1, 2, 3, 8 and 9).

ODB
Drainback option
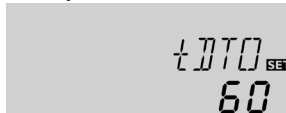Adjustment range: OFF / ON
Factory setting: OFF

Note
If the drainback option is activated, the cooling functions and the antifreeze function will not be available. If one or more than one of these functions have been activated before, they will be deactivated again as soon as **ODB** is activated. They will remain deactivated, even if **ODB** is deactivated later on.

Note
When the drainback option **ODB** is activated, the factory settings of the parameters **nMN / n1MN**, **DTO**, **DTF** and **DTS** will be adapted to values suiting drainback systems:
nMN / n1MN = 50 %
DTO   = 10 K
DT F   = 4 K
DTS   = 15 K
Additionally, the adjustment range and the factory setting of the collector emergency shutdown will change. Adjustments previously made in these channels will be overridden and have to be entered again if the drainback option is deactivated later on.

Time period – switch-on condition

tDTO
Time period – switch-on condition
Adjustment range: 1 … 100 s
Factory setting: 60 s

The parameter **tDTO** is used for adjusting the time period during which the switch-on condition must be permanently fulfilled.
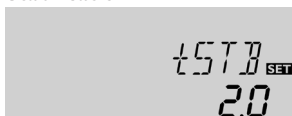
Filling time

```
tFLL SET
  5.0
```

tFLL
Filling time
Adjustment range: 1.0 … 30.0 min
Factory setting: 5.0 min

The filling time can be adjusted using the parameter **tFLL**. During this period, the pump runs at 100 % speed.
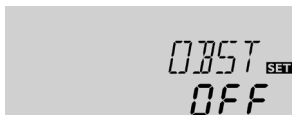
Stabilisation

```
tSTB SET
  2.0
```

tSTB
Stabilisation
Adjustment range: 1.0 … 15.0 min
Factory setting: 2.0 min

The parameter **tSTB** is used for adjusting the time period during which the switch-off condition will be ignored after the filling time has ended.

Booster function

```
OBST SET
  OFF
```

OBST
Booster function
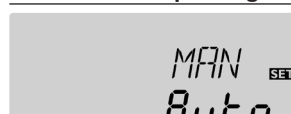Adjustment range: ON / OFF
Factory setting: OFF

This function is used for switching on a second pump when filling the solar system. When solar loading starts, R2 is energised in parallel to R1. After the filling time has elapsed, R2 switches off.

> **i** **Note**
> The booster function is available in system 1 only. The booster function will only be available if the drainback option has been activated.

Manual mode / Operating mode

```
MAN SET
Auto
```

MAN1 / MAN2
Operating mode
Adjustment range: OFF, Auto, ON
Factory setting: Auto

For control and service work, the operating mode of the relays can be manually adjusted. For this purpose, select the adjustment value **MAN1** (for R1) or **MAN2** (for R2) in which the following adjustments can be made:

- **MAN1 / MAN2**
  Operating mode
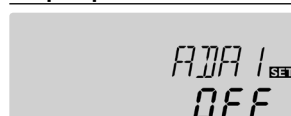 OFF : Relay off ⚠ (flashing) + ⬰
  Auto : Relay in automatic operation
  ON : Relay on ⚠ (flashing) + ⬰ + ①/⑪

> **i** **Note**
> Always adjust the operating mode back to **Auto** when the control and service work is completed. Normal operation is not possible in manual mode.

HE pump control

```
ADA1 SET
  OFF
```

ADA1 / ADA2
HE pump control via adapter (see accessories page 56)
Adjustment range: ON, OFF
Factory setting: OFF

This option is used for controlling high-efficiency pumps via a VBus® / PWM adapter. The power supply of the pump(s) is carried out via the semiconductor relay(s). For pump speed control with activated **ADA1** / **ADA2** option, the relay is switched on or off (no burst control). Temperature dependent speed information is transmitted via the VBus®. The relay will remain deactivated for 1 hour after its switch-off conditions have been fulfilled (pump protection).

Language

LANG **SET**
En

LANG
Language selection
Selection: dE, En, Fr
Factory setting: dE

In this adjustment channel the menu language can be selected.
• dE : German
• En : English
• Fr : French

Unit

UNIT **SET**
°C

UNIT
Temperature unit selection
Selection: °F, °C
Factory setting: °C
In this adjustment channel, the display unit for temperatures and temperature differences can be selected. The unit can be switched between °C / K and °F / °Ra during operation.
Temperatures and temperature differences in °F and °Ra are displayed without units. If the indication is set to °C, the units are displayed with the values.

Reset

RESE **SET**

RESE
Reset function
By means of the reset function, all adjustments can be set back to their factory settings.
➔ In order to carry out a reset, press button 3
All adjustments that have previously been made will be lost! For this reason, a security enquiry will appear after the reset function has been selected.
Only confirm the security enquiry if you are sure you want to set back all adjustment to the factory setting.

Security enquiry

SAVE **SET**
YES
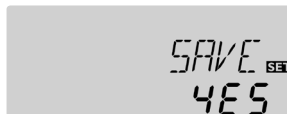
➔ In order to confirm the security enquiry, press button 3.

i **Note**
After a reset, the commissioning menu will start again (see page36).

7 Troubleshooting

WARNING! **Electric shock!**

Upon opening the housing, live parts are exposed!
➔ **Always disconnect the device from power supply before opening the housing!**

The controller is protected by a fuse. The fuse holder (which also holds the spare fuse) becomes accessible when the cover is removed. To replace the fuse, pull the fuse holder from the base.

If a malfunction occurs, the display symbols will indicate an error code.
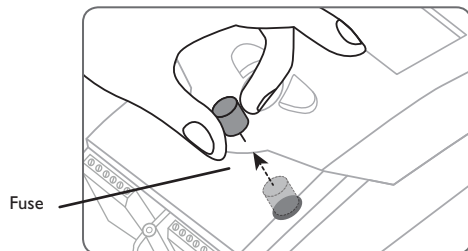
Fuse

Operating control LED is permanently off.

If the display is off, check the power supply of the controller. Is it disconnected?

no	yes

The fuse of the controller could be blown. The fuse holder (which holds the spare fuse) becomes accessible when the cover is removed. The fuse can then be replaced.

Check the supply line and recon-nect it.

The symbol ⚲ is indicated on the display and the symbol ⚠ flashes.

Sensor fault. An error code instead of a temperature is shown on the sensor display channel.

888.8	- 88.8

Cable is broken. Check the cable.

Short circuit. Check the cable.

Disconnected Pt1000 temperature sensors can be checked with an ohmmeter. Please check the resistance values correspond with the table.

°C	°F	Ω	°C	°F	Ω
-10	14	961	55	131	1213
-5	23	980	60	140	1232
0	32	1000	65	149	1252
5	41	1019	70	158	1271
10	50	1039	75	167	1290
15	59	1058	80	176	1309
20	68	1078	85	185	1328
25	77	1097	90	194	1347
30	86	1117	95	203	1366
35	95	1136	100	212	1385
40	104	1155	105	221	1404
45	113	1175	110	230	1423
50	122	1194	115	239	1442

Resistance values of Pt1000 sensors

Note
For answers to frequently asked questions (FAQ) see www.resol.com.

Pump is overheated, but no heat transfer from the collector to the store, flow and return have the same temperature; perhaps also bubbling in the lines.

Air or gas bubbles in the system?
no / yes

Vent the system; increase the system pressure to a static primary pressure of at least plus 0.5 bar [7.25 psi]; if necessary continue to increase the pressure; switch the pump on and off for a short time.

Are the valves or the non-return valves defective or is the dirt trap blocked?
yes

Clean the dirt trap or replace defective component.

Pump starts up very late.

Switch-on temperature difference ΔTon too large?
no / yes

Change ΔTon and $\Delta Toff$ correspondingly.

Non-ideal position of the collector sensor (e. g. flatscrew sensor instead of sensor in immersion sleeves).
no / yes

Minimum limitation active.

Put the solar pump (R1) into the manual mode On for a short time during irradiation. Check whether the collector temperature significantly increases.
o.k.

Pump starts for a short moment, switches off, switches on again, etc.

Temperature difference at the controller too small?
no / yes

Change ΔTon and $\Delta Toff$ correspondingly.
no / o.k.

Wrong position of collector sensors?
no / yes

Plausibility control of the option tube collector function.

Mount the collector sensor at solar flow (warmest collector output); use immersion sleeve of the respective collector.

The temperature difference between store and collector increases enormously during operation; the collector circuit cannot dissipate the heat.

Collector circuit pump/zone valve defective?
no / yes

Check or replace, if necessary.

Heat exchanger calcified?
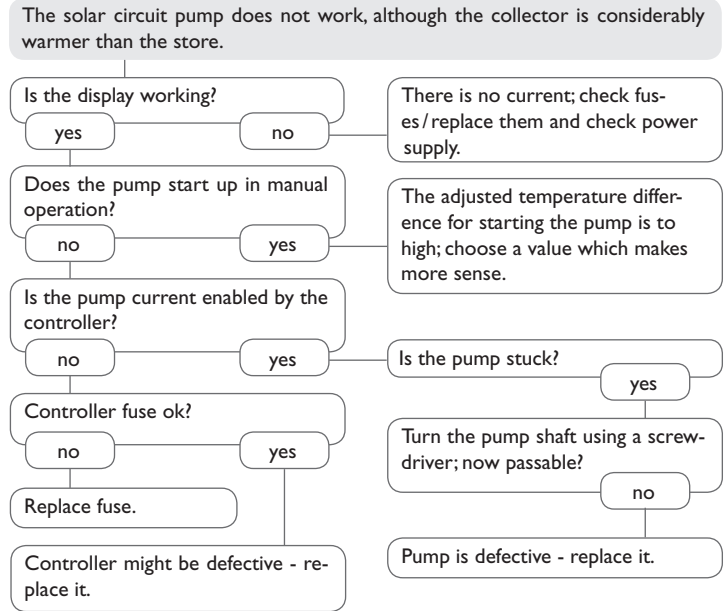no / yes
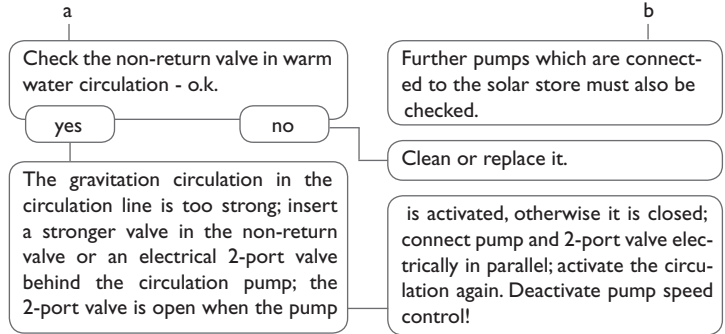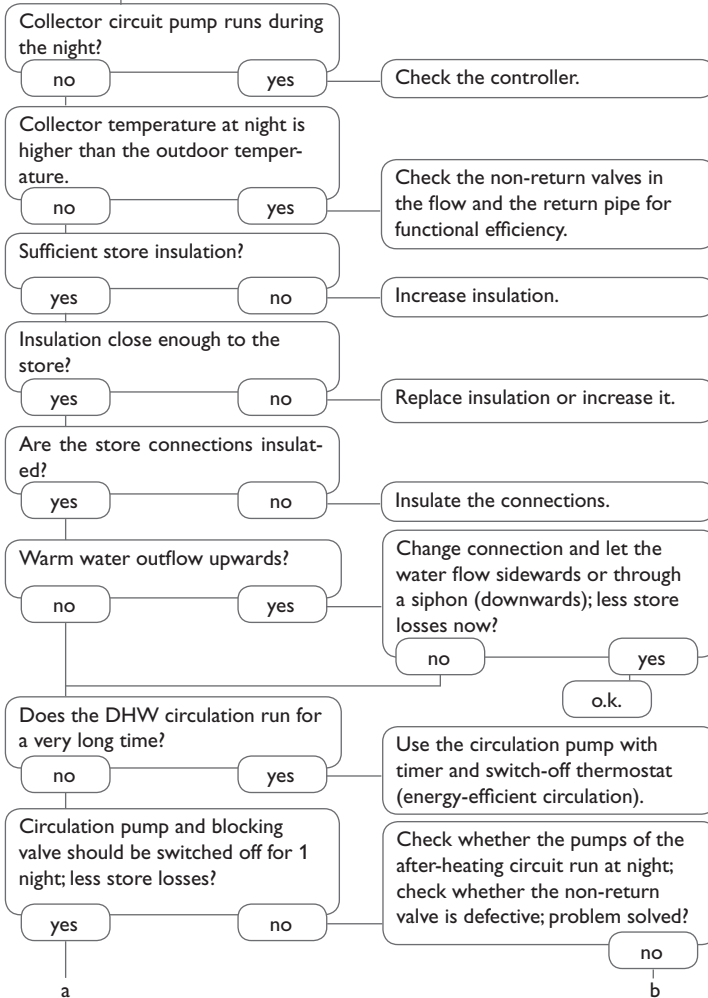
Decalcify it.

Heat exchanger blocked?
no / yes

Clean it.

Heat exchanger too small?
yes

Replace with correctly sized one.

Stores cool down at night.

Collector circuit pump runs during the night?
- no
- yes → Check the controller.

Collector temperature at night is higher than the outdoor temperature.
- no
- yes → Check the non-return valves in the flow and the return pipe for functional efficiency.

Sufficient store insulation?
- yes
- no → Increase insulation.

Insulation close enough to the store?
- yes
- no → Replace insulation or increase it.

Are the store connections insulated?
- yes
- no → Insulate the connections.

Warm water outflow upwards?
- no
- yes → Change connection and let the water flow sidewards or through a siphon (downwards); less store losses now?
  - no
  - yes → o.k.

Does the DHW circulation run for a very long time?
- no
- yes → Use the circulation pump with timer and switch-off thermostat (energy-efficient circulation).

Circulation pump and blocking valve should be switched off for 1 night; less store losses?
- yes → a
- no → Check whether the pumps of the after-heating circuit run at night; check whether the non-return valve is defective; problem solved?
  - no → b

a

Check the non-return valve in warm water circulation - o.k.
- yes
- no → Clean or replace it.

The gravitation circulation in the circulation line is too strong; insert a stronger valve in the non-return valve or an electrical 2-port valve behind the circulation pump; the 2-port valve is open when the pump

b

Further pumps which are connected to the solar store must also be checked.

is activated, otherwise it is closed; connect pump and 2-port valve electrically in parallel; activate the circulation again. Deactivate pump speed control!

The solar circuit pump does not work, although the collector is considerably warmer than the store.

Is the display working?
- yes
- no → There is no current; check fuses / replace them and check power supply.

Does the pump start up in manual operation?
- no
- yes → The adjusted temperature difference for starting the pump is to high; choose a value which makes more sense.

Is the pump current enabled by the controller?
- no
- yes → Is the pump stuck?
  - yes → Turn the pump shaft using a screwdriver; now passable?
    - no → Pump is defective - replace it.

Controller fuse ok?
- no → Replace fuse.
- yes → Controller might be defective - replace it.

8 Accessories

Moisture-proof housing

Sensors

Overvoltage protection device

VBus®/LAN, VBus®/PWM & VBus®/USB interface adapters

VBus.net

SD3 Smart Display/ GA3 Large Display

AM1 Alarm Module

KM1 Communication module

DL2 Datalogger

DL3 Datalogger

8.1 Sensors and measuring instruments

Temperature sensors

The product range includes high-precision platinum temperature sensors, flatscrew sensors, outdoor temperature sensors, indoor temperature sensors, cylindrical clip-on sensors, also as complete sensors with immersion sleeve.

Overvoltage protection device

In order to avoid overvoltage damage at collector sensors (e. g. caused by local lightning storms), we recommend installing the overvoltage protection RESOL SP10.

8.2 VBus® accessories

SD3 Smart Display

The RESOL Smart Display is designed for simple connection to RESOL controllers with RESOL VBus®. It is used for visualising data issued by the controller: collector temperature, store temperature and energy yield of the solar thermal system. The use of high-efficiency LEDs and filter glass assures a high optical brilliance. An additional power supply is not required.

GA3 Large display module

The GA3 is a completely mounted large display module for visualisation of collector- and store temperatures as well as the heat quantity yield of the solar system via one 6-digit and two 4-digit 7-segment-displays. An easy connection to all controllers with RESOL VBus® is possible. The front plate is made of antireflective filterglass and is printed with a light-resistant UV-lacquering. The universal RESOL VBus® allows the parallel connection of 8 large displays as well as additional VBus® modules.

AM1 Alarm Module

The AM1 Alarm Module is designed to signal system failures. It is to be connected to the VBus® of the controller and issues an optical signal via the red LED if a failure has occurred. The AM1 also has a relay output, which can e. g. be connected to a building management system (BMS). Thus, a collective error message can be issued in the case of a system failure.
The AM1 Alarm module ensures that occurring failures can be immediately recognised and repaired, even if the system and the controller are difficult to access or located in a remote place. Thus, the reliability and the stable yield of the system are ensured.

KM1 Communication module

The KM1 Communication module is the network connection for solar and heating systems, especially suited for technicians managing large systems, heating installers and home owners who like to keep a close eye on their system. The system can be parameterised over the Internet. VBus.net enables e. g. controlling the system yield in a comprehensive system scheme image.

DL2 Datalogger

This additional module enables the acquisition and storage of large amounts of data (such as measuring and balance values of the solar system) over a long period of time. The DL2 can be configured and read-out with a standard Internet browser via its integrated web interface. For transmission of the data stored in the internal memory of the DL2 to a PC, an SD card can be used. The DL2 is appropriate for all controllers with RESOL VBus®. It can be connected directly to a PC or router for remote access and thus enables comfortable system monitoring for yield monitoring or for diagnostics of faults.

DL3 Datalogger

Be it solar thermal, heating or DHW heat exchange controllers – with the DL3 you can easily and conveniently log system data of up to 6 RESOL controllers. Get a comprehensive overview of all controllers connected with the large full graphic display. Transfer data with an SD memory card, or use the LAN interface to view and process data on your PC.

VBus.net

The Internet portal for easy and secure access to your system data.
VBus.net is all about the data of your RESOL controller. Live data of your system, customized filter settings and much more await you.

8.3 Interface adapters

VBus®/LAN interface adapter

The VBus®/LAN interface adapter is designed for the direct connection of the controller to a PC or router. It enables easy access to the controller via the local network of the owner. Thus, controller access, data charting and system parameterisation can be effected from every workstation of the network. The VBus®/LAN interface adapter is suitable for all controllers equipped with a RESOL VBus®. The RESOL ServiceCenter software is included.

VBus®/PWM interface adapter

The VBus®/PWM interface adapter enables the speed control of two high-efficiency pumps even without an integrated PWM output on the system controller. The adapter is installed between the VBus® output of the controller and the PWM input of the high-efficiency pump, where it transforms the VBus® data packets into a 0-10 V and/or a PWM signal.

VBus®/USB interface adapter

The VBus®/USB interface adapter is the interface between the controller and a personal computer. With its standard mini USB port it enables a fast transmission of system data for processing, visualising and archiving as well as the parametrisation of the controller via the VBus®. The RESOL ServiceCenter software is included.

8.4 Accessories

Moisture-proof housing

Moisture-proof housing for controller installation outdoors or in highly humid locations.

9 Index

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