RESOL DeltaSol® DB

Mounting

Connection

Operation

Troubleshooting

Examples

48003770

Thank your for buying this RESOL product.
Read this manual carefully to get the best perfomance from this unit.

DeltaSol® DB

EN

Manual

www.resol.de

Safety advice

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

Instructions:

Attention should be paid to

- valid local regulations
- the statutory provisions for prevention of industrial accidents,
- the statutory provisions for environmental protection,
- the Health and Safety at Work Act 1974
- Part P of the Building Regulations 2005
- BS7671 Requirements for electrical installations and relevant safety regulations of DIN, EN, DVGW, TRGI, TRF and VDE.

These instructions are exclusively addressed to authorised skilled personnel.

- Only qualified electricians should carry out installation and maintenance work.
- Initial installation should be carried out by named qualified personnel

Table of contents

Subject to technical change. Errors excepted.

Description of symbols

WARNING!
Warnings are indicated with a warning triangle!

Signal words describe the danger that may occur, when it is not avoided.

- **Warning** means that injuries or even danger of life can occur.

Disposal

- Dispose of the packaging in an environmentally sound manner.
- Dispose of old appliances in an environmentally sound manner. Upon request we will take back your old appliances bought from us and guarantee environmentally-friendly disposal of the devices.

Information about the product

Appropriate usage

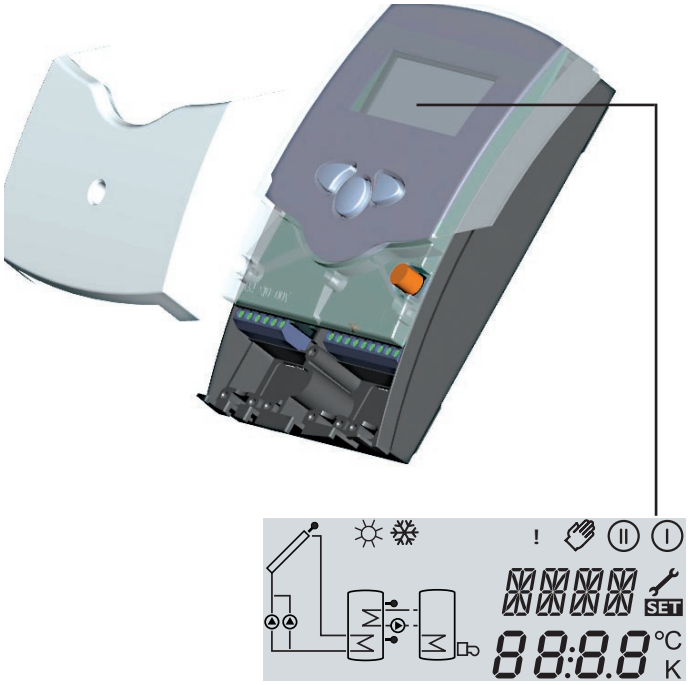
The controller is to be used in drainback solar thermal systems in compliance with the technical data specified in these instructions.

Improper use excludes all liability claims.

CE-Declaration of conformity

The product complies with the relevant directives and is therefore labelled with the CE mark. The Declaration of Conformity is available upon request, please contact RESOL.

- **System-Monitoring-Display**
- **Up to 4 temperature sensors Pt1000**
- **Heat quantity measurement**
- **RESOL VBus®**
- **Function control**
- **User-friendly operation**
- **Easy-to-mount housing with outstanding design**
- **optional pump speed control, operating hours counter and thermostat function**

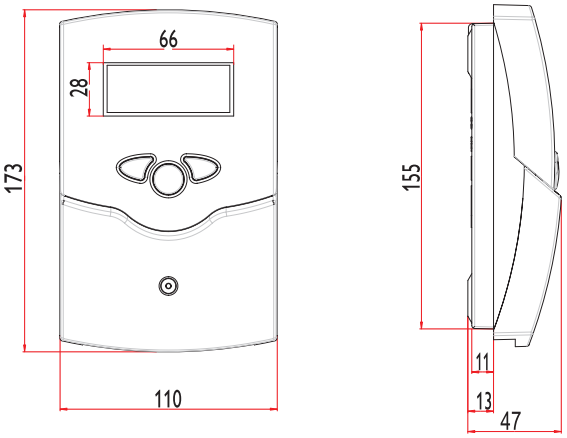


Included with the DeltaSol® DB:

1 x DeltaSol® DB

1 x accessory bag
- 1 x spare fuse T4A
- 2 x screw and dowel
- 4 x strain reflief and screw

Additionnally included in the accesory bag:
1 x sensor FKP6
2 x sensor FRP6



Controller version

Version	Semiconductor relay	Standard relay	Operating hours counter	Speed control	Thermostat- or booster function	Heat quantity measurement
DB1	0	1	yes	no	no	yes
DB2	1	0	yes	yes	no	yes
DB3	0	2	yes	no	yes	yes
DB4	1	1	yes	yes	yes	yes

Housing:
plastic, PC-ABS and PMMA

Protection type: IP 20 / DIN 40050

Ambient temp.: 0 ... 40 °C

Dimensions: 172 x 110 x 46 mm

Mounting: wall mounting, mounting into patch-panels is possible

Display: System screen for systems visualisation, 16-segment display, 7-segment display, 8 symbols for system status and operating control lamp

Operation: 3 push buttons at the front of the housing

Functions: Differential temperature controller with optional system functions. Function control, operating hours counter for solar pump, pump speed control and heat quantity measurement.

Inputs:
for 4 temperature sensors Pt1000

Outputs: depending on version, see above

Bus: RESOL VBus®

Power supply:
220 ... 240 V~, 50 ... 60 Hz

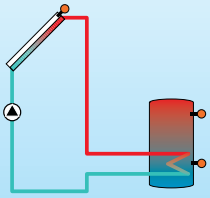
Total switching capacity:
4 (2) A (220 ... 240) V~

Mode of operation:
Type 1.b
Type 1.y

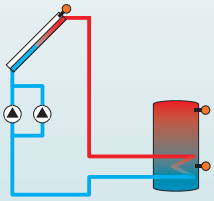
Switching capacity:
semiconductor relay:
1 (1) A (210 ... 220) V~
electromechanical relay:
2 (1) A (210 ... 220) V~

Examples DeltaSol® DB

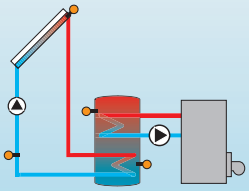
Standard drain back systems



Drain back systems with booster function



Drainback systems with afterheating



For further information on electrical connection, please see chapter 1.

Order note

- **DB1: 1 standard relay, operating hours counter**
  RESOL DeltaSol® DB / 1 **115 425 63**
  RESOL DeltaSol® DB / 1 - full kit
  incl. 3 temperature sensors Pt1000 (1 x FKP6, 2 x FRP6) **115 425 73**

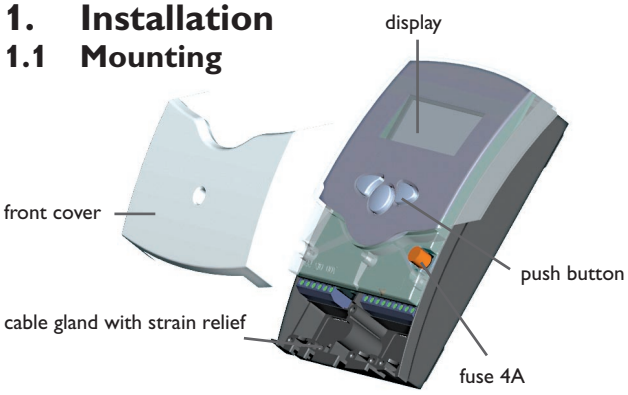
- **DB2: 1 semiconductor relay, speed control, operating hours counter**
  RESOL DeltaSol® DB / 2 **115 425 83**
  RESOL DeltaSol® DB / 2 - full kit
  incl. 3 temperature sensors Pt1000 (1 x FKP6, 2 x FRP6) **115 425 93**

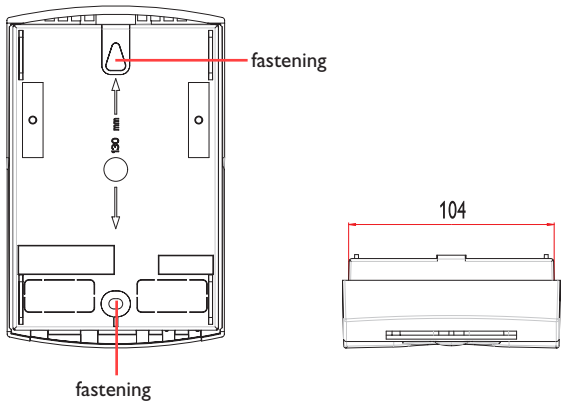
- **DB3: 2 standard relay, thermostat or booster function, operating hours counter**
  RESOL DeltaSol® DB / 3 **115 426 03**
  RESOL DeltaSol® DB / 3 - full kit
  incl. 3 temperature sensors Pt1000 (1 x FKP6, 2 x FRP6) **115 426 13**

- **DB4: 1 semiconductor relay,1 standard relay, speed control, operating hours counter, thermostat or booster function**
  RESOL DeltaSol® DB / 4 **115 426 23**
  RESOL DeltaSol® DB / 4 - full kit
  incl. 3 temperature sensors Pt1000 (1 x FKP6, 2 x FRP6) **115 426 33**

1. Installation

1.1 Mounting



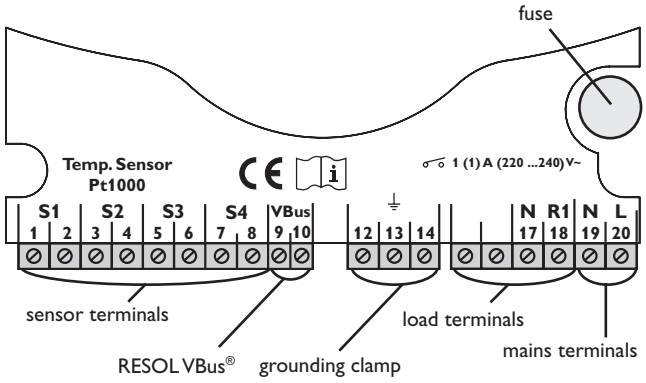


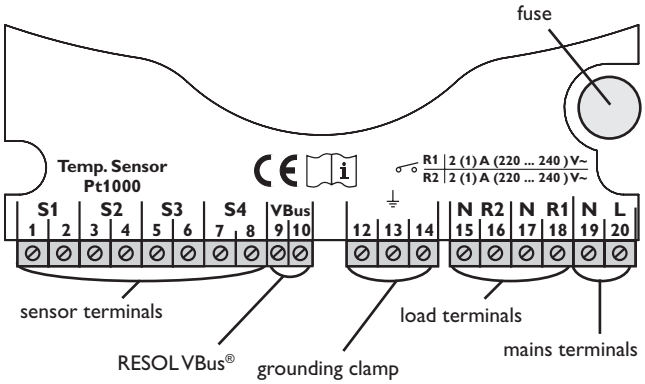
WARNING!
Always switch-off power supply and disconnect the controller from the power supply before opening the housing!

The unit must only be located in dry interior locations. It is not suitable for installation in hazardous locations and should not be placed close to any electromagnetic fields. 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.

1. Unscrew the cross-head screw from the cover and remove it along with the cover from the housing.
2. Mark the upper fastening point on the wall and drill and fasten the enclosed wall plug and screw leaving the head protruding.
3. Hang the housing from the upper fastening point and mark the lower fastening point through the hole in the terminal box (centers on 130 mm). Drill and insert the lower wall plug.
4. Fasten the housing to the wall with lower fastening screw and tighten.

1.2 Electrical connection





The power supply to the controller must be carried out via an external power switch (last step!) and the supply voltage must be 220 ... 240 V~ (50 ... 60 Hz). Flexible cables must be attached to the housing with the enclosed strain relief and the corresponding screws.

Depending on the version, the controller is equipped with either 1 relay or 2 relays to which **loads** such as pumps, valves, etc. can be connected:

- Relay 1
  18 = conductor R1
  17 = neutral conductor N
  13 = grounding clamp ⏚
- Relay 2
  16 = conductor R2
  15 = neutral conductor N
  14 = grounding clamp ⏚

Temperature sensors (S1 to S4) have to be connected to the following terminals (either polarity):

1 / 2 = sensor 1 (e.g. sensor collector 1)
3 / 4 = sensor 2 (e.g. sensor store 1)
5 / 6 = sensor 3 (e.g. store top sensor)
7 / 8 = sensor 4 (e.g. return temperature sensor)

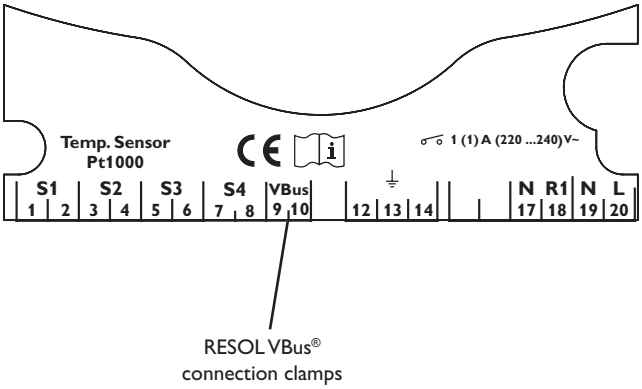
The **mains connection** has to be carried out at the following terminals:

19 = neutral conductor N
20 = conductor L
12 = grounding clamp ⏚

Electrostatic discharge can lead to damage to electronic components!

Dangerous voltage!

1.2.1 Data communication / Bus



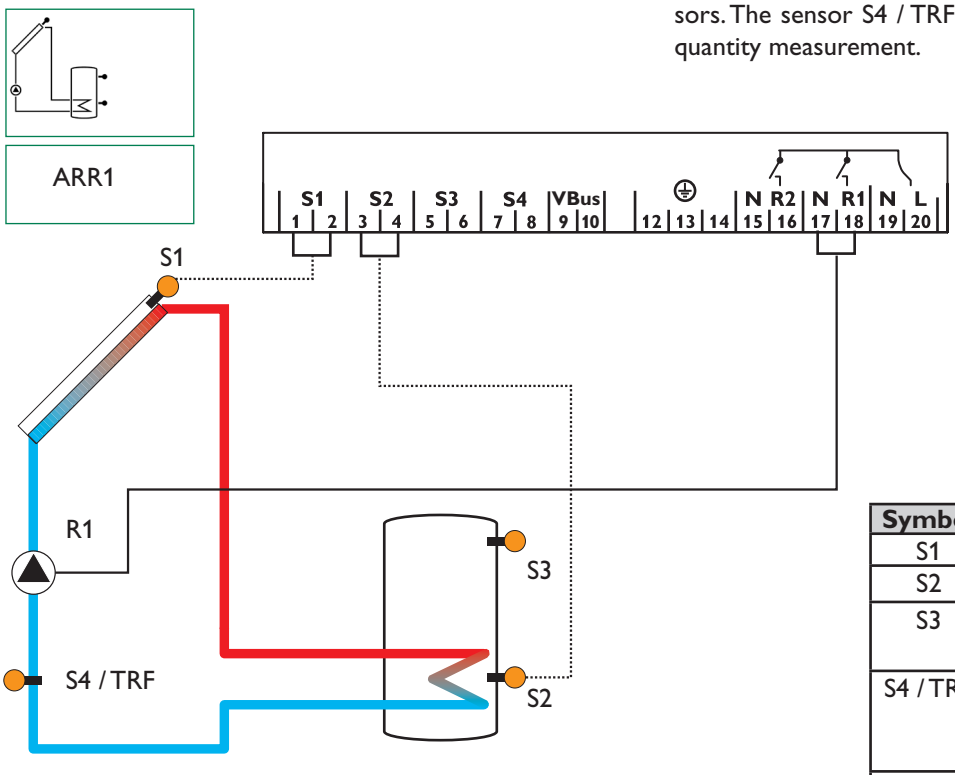
The controller comes with a RESOL **VBus®** for data communication and energy supply of external modules. The connection is effected with optional polarity at the clamps marked with „VBus". Via this data Bus you can install one or more RESOL VBus® modules, e.g.:

- RESOL large display GA3 / SD3
- RESOL Data logger, DL2
- RESOL Data teleindication

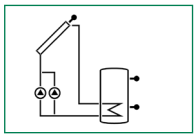
Additionaly, the controller can be connected to the PC with the help of a RESOL RS-COM adapter. With the RESOL ServiceCenter Software (RSC) the controller parameters can be changed, measurements can be read out, processed and visualised. The software enables an easy function control and adjustment of the system. A light Version of the software can be downloaded from www.resol.de for free.

1.2.2 Terminal allocation Arrangement 1

Standard solar system with 1 store, 1 pump and 3 sensors. The sensor S4 / TRF can be optionally used for heat quantity measurement.



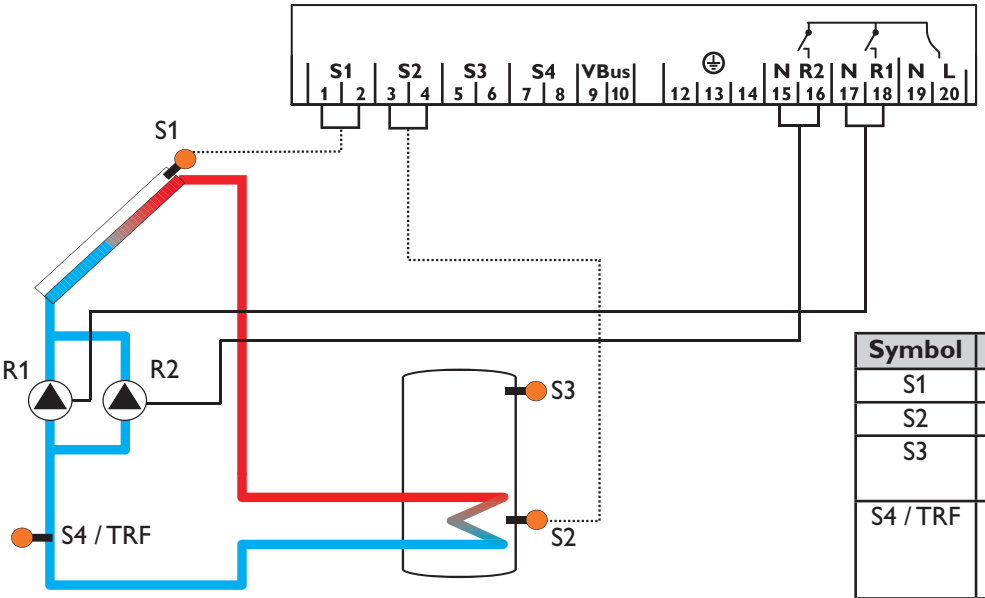
Symbol	Description
S1	collector sensor
S2	store sensor bottom
S3	store sensor top (optional)
S4 / TRL	sensor for heat quantity measurement (optional)
R1	solar pump



ARR1
with booster

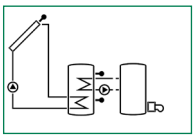
on DB3 and DB4 only

Standard solar system with booster function option with 1 store, 2 pumps and 3 sensors. The sensor S4 / TRF can be optionally used for heat quantity measurement.



Symbol	Description
S1	collector sensor
S2	store sensor bottom
S3	store sensor top / thermostat sensor
S4 / TRF	sensor for heat quantity measurement (optional)
R1	solar pump
R2	booster pump

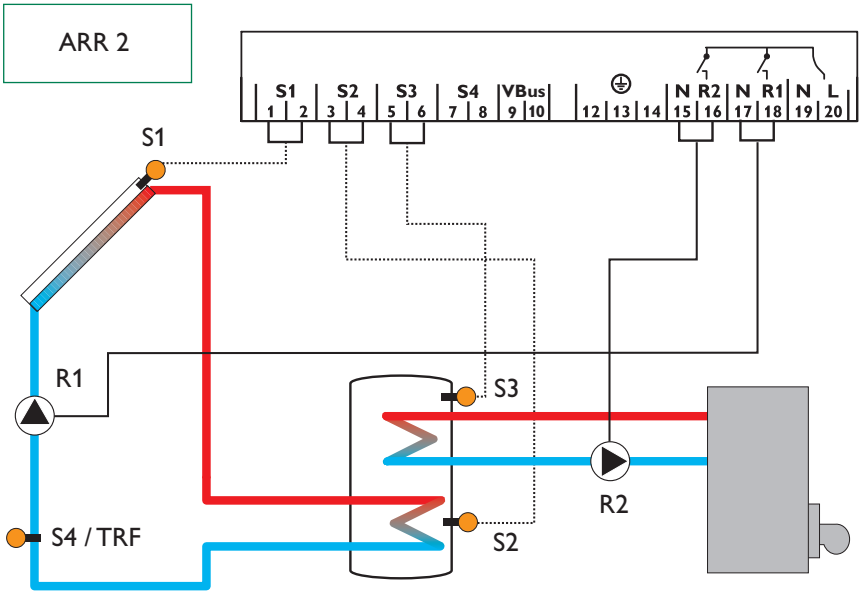
1.2.3 Terminal allocation Arrangement 2



ARR 2

on DB3 and DB4 only

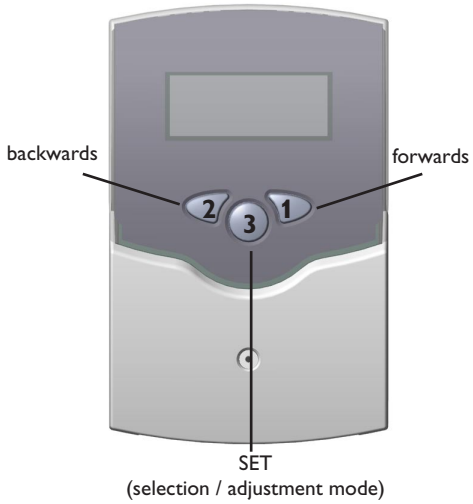
Solar system and backup heating with 1 store, 3 sensors and backup heating. The sensor S4 / TRF can be optionally used for heat quantity measurement.



Symbol	Specification
S1	collector sensor
S2	store sensor bottom
S3	store sensor top
S4 / TRF	sensor for heat quantity measurement (optional)
R1	solar pump
R2	pump for backup heating

2. Operation and function

2.1 Buttons for adjustment

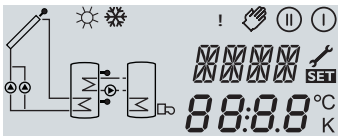


The controller is operated via the 3 push buttons below the display. The forward-button (1) is used for scrolling forward through the display menu or to increase the adjustment values. The backward-button (2) is similarly used for scrolling backwards and reducing values.

In order to access the adjustment mode, scroll down in the display menu and press the forward button (1) for approx. 2 seconds after you have reached the last display item. If an **adjustment value** is shown on the display, the „**SEt“** icon is displayed. Now, you can access the adjustment mode by using button 3.

- Press buttons 1 and 2 in order to select a channel
- Briefly press button 3, „SEt“ will flash
- Adjust the value by pressing buttons 1 and 2
- Briefly press buttons 3, so that „SEt“ permanently appears, the adjusted value will be saved.

2.2 System-Monitoring Display



Complete Monitoring-Display

The system monitoring display consists of 3 blocks: **channel display, tool bar** and **system screen** (active arrangement).

2.2.1 Channel display

channel display

The **channel display** consists of two lines. The upper line is an alpha-numeric 16-segment display (text display) for displaying channel names and menu items. In the lower 7-segment display, the channel values and the adjustment parameters are displayed.
Temperatures and temperature differences are indicated in°C or K respectively.

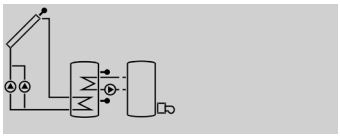
2.2.2 Tool bar

tool bar

The additional symbols in the **tool bar** indicate the actual system status.

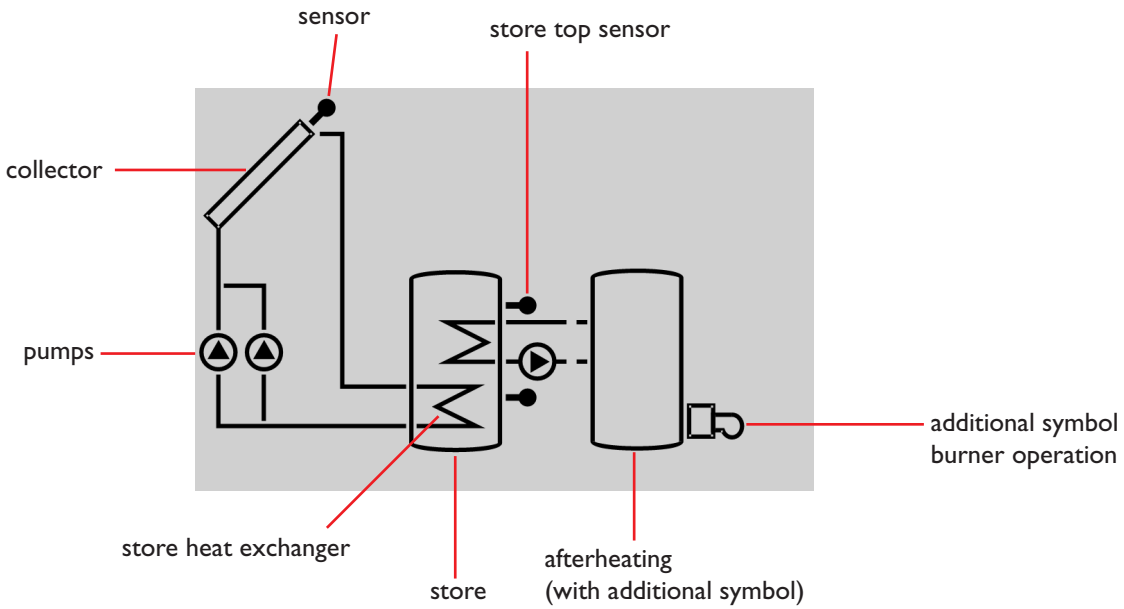
Symbol	standard	flashing
⏽	relay 1 active	
⏾	relay 2 active	
☼	store maximum limitation active / maximum store temperature exceeded	collector cooling function or recooling function active
⚠		collector emergency shutdown or store emergency shutdown active
⚠ + 🔧		sensor defective
⚠ + ✋		manual operation active
SET		SET-mode, change of adjustment value is possible

2.2.3 System-Screen



System-Screen

The system screen (active arrangement) shows the scheme which has been selected. The screen consists of several system component symbols, which are - depending on the current status of the system - either flashing, permanently shown or „hidden“.

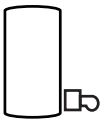


collector
with collector sensor

temperature sensor

pump

store 1
with heat exchanger



afterheating
with burner symbol

2.3 Flashing codes

2.3.1 System screen codes

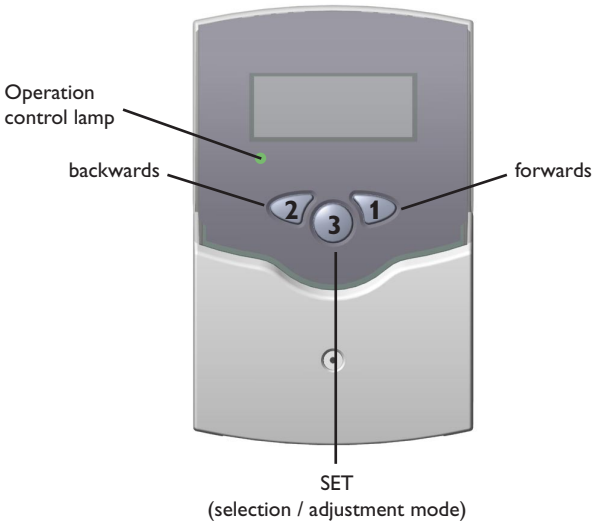
- Pump symbols are flashing during initialization phase
- Sensor symbols are flashing if the corresponding sensor display channel is selected.
- Sensor symbols are flashing in the case of a sensor fault.
- Burner symbol is flashing if the afterheating is active

2.3.2 LED flashing codes

green:	everything OK
red/green flashing:	initialisation phase manual operation
red flashing:	sensor fault (sensor symbol is flashing quickly)

3. Commissioning

When the controller is commissionend for the first time, the arrangement has to be selected first



1. Switch on power supply. During the initialization phase, the operating control lamp flashes red and green. The version number and the language selection menu are displayed.

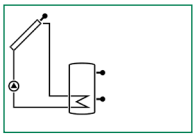
During initial commissioning, the language has to be selected.

2. - Select the adjustment channel LANG
   - Change to the SET-mode (vgl. 2.1)
   - Select your language
   - Save the adjustment by pressing the SET button

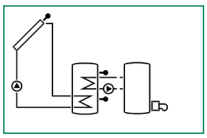
After initialisation, the controller is in the automatic mode with typical settings. The pre-programmed system scheme is Arr 1*.

3. - Select adjustment channel Arr
   - Change to the SET-mode (see 2.1)
   - Select the arrangement via the Arr-index number
   - Save the adjustment by pressing the SET button

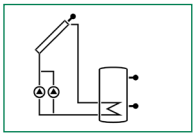
Now the controller is ready for operation with typical settings to suit that system and normally the factory settings will give close to optimum operation.



ARR 1



ARR 2



ARR 1
with booster

Overview of arrangements:

ARR 1* : standard solar sytem (with booster function option)
ARR 2 : solar system with afterheating

* The channel ARR and the booster function are not available on DB1 and DB2.

4. Control parameters and display channels

4.1 Overview of channels

Legend:

x

Corresponding channel is available.

x*

Corresponding channel is available when the corresponding option is enabled

Please note:
Only if temperature sensors are connected, will S3 and S4 be displayed.

①

Only if the option heat quantity measurement is **activated** (OHQM), will the corresponding channel be available.

②

Only if the option heat quantity measurement is **deactivated** (OHQM), will the corresponding channel be available.

MEDT

Only if an antifreeze (MEDT) other than **water or Tyfocor LS / G-LS (MEDT 0 or 3)** is used, will the channel antifreeze concentration (MED%) be displayed.

channel	ARR		description	page
	1	2*		
INIT	x	x	time period - switch-on conditions active	12
FLL	x	x	time period - filling time active	12
STAB**	x	x	time period - stabilisation active	12
COL	x	x	temperature collector	12
TST	x		Temperature store	12
TSTL		x	temperature store base	12
TSTU		x	temperature store top	12
S3	x		temperature sensor 3	12
TRF	①	①	temperature return sensor	12
S4	②	②	temperature sensor 4	12
n %	x		speed relay 1	12
n1 %		x	speed relay 1	12
h P	x		operating hours relay 1	13
h P1		x	operating hours relay 1	13
h P2		x	operating hours relay 2	13
kWh	①	①	heat quantity kWh	15
MWh	①	①	heat quantity MWh	15
ARR	1-2		Arrangement	
DT O	x	x	Switch-on temperature difference	13
DT F	x	x	Switch-off temperature difference	13
DT S	x	x	Sset temperature difference	13
RIS	x	x	Rise	13
tDTO	x	x	time period - switch-on conditions	13
tFLL	x	x	filling time	13
tSTB	x	x	time period - stabilisation	14
OBST***	x		booster function option	14
S MX	x	x	maximum temperature store 1	14
EM	x	x	emergency shutdown collector 1	15

channel	ARR		description	page
	1	2		
OCN	x	x	option collector minimum limitation	15
CMN	x*	x*	minimum collector temperature	15
TH O		x	switch-on temp. thermostat	16
TH F		x	switch-off temp. thermostat	16
OHQM		x	HQM option	14
FMAX	①	①	maximum flow rate	14
MEDT	①	①	antifreeze type	14
MED%	MEDT	MEDT	antifreeze concentration	14
n1MN		x	minimum speed relay 1	16
HND	x	x	manual mode relay 1	16
HND1	x	x	manual mode relay 1	16
HND2	x	x	manual mode relay 2	16
LANG	x	x	language	16
Db x	XX.XX			

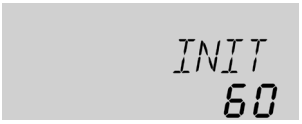
* ARR2 is available on DB3 and DB4 only

** not available on DB1

*** not available on DB1 and DB2

4.1.1 Initialisation

INIT:
Initialization active



Indicates the time adjusted in tDTE, running backwards.

- INIT : Initialisation

4.1.2 Filling time

FLL:
Filling time active

Indicates the time adjusted in tFLL, running backwards.

- FLL : filling time

4.1.3 Stabilisation

STAB:
Stabilization

Indicates the time adjusted in tSTB, running backwards.

- STAB : Stabilisation

4.1.4 Collector temperature

COL:
Collector temperature
Display range: -40 ...+250 °C

Indicates the collector temperature.

- COL : Collector temperature

4.1.5 Store temperatures

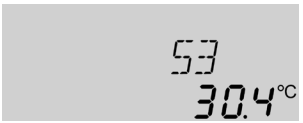
TST TSTL, TSTU:
Store temperatures
Display range: -40 ...+250 °C

Indicates the store temperature.

- TSP : store temperature
- TSPU : store temperature bottom
- TSPO : store temperature top

4.1.6 Sensor 3 and Sensor 4

S3, S4:
Sensor temperatures
Display range: -40 ...+250 °C



Display of the current temperature at the corresponding additional sensor (without control function).

- S3 : temperature - sensor 3
- S4 : temperature - sensor 4

Please note:
Only if the temperature sensors are connected (displayed), will S3 and S4 be displayed.

4.1.7 Other temperatures

TRF:
Other measured temperatures
Display range: -40 ...+250 °C

Display of the current temperature at the sensor.

- TRF : temperature - return

4.1.8 Pump speed

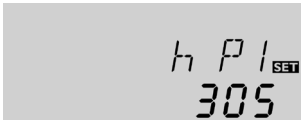
n %, n1 %:
Pump speed
Display range: 30 ...100 %

Display of the current pump speed of the corresponding pump (on DB2 and DB4 only).

- n % : current pump speed (1-pump system)
- n1 % : current pump speed pump 1

4.1.9 Operating hours counter

h P / h P1 / h P2:
Operating hours counter
Display channel



The operating hours counter accumulates the solar operating hours of the respective relay (**h P** / **h P1** / **hP2**). Full hours are displayed.

The accumulated operating hours can be set back to zero. As soon as one operating hours channel is selected, the symbol SET is displayed. Press the SET (3) button for approx. 3 seconds in order to access the RESET-mode of the counter. The display symbol SET will flash and the operating hours will be set to 0. Confirm the reset with the SET button in order to finish the reset.

In order to interrupt the RESET-process, do not press a button for about 5 seconds. The display returns to the display mode.

4.1.10 ΔT-regulation

DT O:
Switch-on temperature diff.
Adjustment range: 1,0...20,0 K
Factory setting: 10.0

When the switch-on difference (**DT O**) is continuously exceeded during the **t DTO** period, the pump is switched on. When the temperature difference falls below the adjusted switch-off difference (**DT A**), the controller switches off.

DT F:
Switch-off temperature diff.
Adjustment range: 0,5 ... 19,5 K
Factory setting 4.0 K

Please note: The switch-on temperature difference must be at least 0,5 K higher than the switch-off temperature difference.

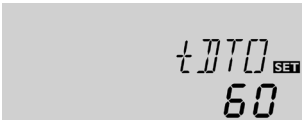
DT S:
Set temperature difference
Adjustment range: 1,5..30,0 K
Factory setting: 15.0 K

RIS:
Rise
Adjustment range: 1 ... 20 K
Factory setting: 2 K

If the temperature difference reaches the adjusted set values (**DT S**), pump speed will increase by one step (10 %). If the difference increases by 2 K (**RIS**), pump speed will increase by 10 % respectively until the maximum pump speed of 100 % is reached. The response of the controller can be adapted via the parameter „Rise". If the temperature difference falls below the adjusted switch-off temperature difference (**DT F**), the controller switches off.
(on DB2 and DB4 only)

4.1.11 Time period - switch-on conditions

tDT O:
Time periode -
switch-on conditions
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 permanentely fulfilled.

4.1.12 Filling time

tFLL:
Filling time
Adjustment range: 1 ... 30 min
Factory setting: 5 min

The filling time can be adjusted using the parameter **tFLL**. During this period, the pump runs at 100% speed and the booster pump is additionally switched-on (DB3 and DB4 only).

4.1.13 Stabilisation

tSTB:
Stabilisation
Adjustment range: 1 ... 15 min
Factory setting: 2 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.

On the versions DB2-4, the stabilisation phase **tSTB** starts after the filling time has ended. If the switch-off difference is still reached after tSTB has ended, R1 will be switched-off.

If, on DB2 and DB4, the switch-on difference is still met or reached during tSTB after the filling time has ended, the pump will be controlled depending on the temperature difference. If the switch-on difference is reached during the filling time, pump speed will be kept to 30 % or to the minimum respectively. If the switch-off condition is still met after the filling time has ended, R1 will be switched off.

4.1.14 Booster function option

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

This function is used for switching on a second pump during filling the solar system. When solar loading starts, R2 is energized in parallel to R1. After the filling time (**tFLL**) has ended, R2 is switched off.

This function is available on DB3 and DB4 and INST1 only.

4.1.15 Maximum store temperature

S MX:
Maximum store temperature
Adjustment range: 2 ... 95 °C
Factory setting: 60 °C

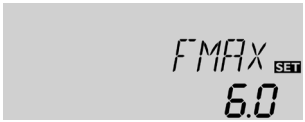
If the adjusted maximum temperature is exceeded, the store will no longer be loaded in order to avoid damage caused by overheating. If the maximum store temperature is exceeded, ☀ will be shown.

Please note: The controller is equipped with a store emergency shutdown function, which prevents the store from being loaded when the store temperature exceeds 95 °C.

4.1.16 Heat quantity measurement

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

FMAX:
Flow rate in l/min
Adjustment range: 0 ... 20
in 0,1-steps
Factory setting: 6,0



MEDT: Antifreeze type
Adjustment range: 0 ...3
Factory setting: 1

MED%: Antifreeze concentration (Vol-) %
When MEDT 0 or 3 is used, the parameter MED% is ‚hidden'.
Adjustment range: 20 ...70
Factory setting: 45

Heat quantity measurement is possible if a flowmeter is used. For this purpose, the heat quantity measurement option (**OHQM**) has to be enabled.

The flow rate should be read from the flowmeter (l/min) and has to be adjusted in the channel **FMAX**. Antifreeze type and concentration of the heat transfer medium have to be adjusted in the channels **MEDT** and **MED%.**

Antifreeze type:
0 : water
1 : propylene glycol
2 : ethylene glycol
3 : Tyfocor® LS / G-LS

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

The flow rate as well as the reference sensors S1 (flow) and S4 (return) are used for calculating the heat quantity supplied. It is shown in kWh in the channel **kWh** and in MWh in the channel **MWh**. The overall heat quantity results from the sum of both values (please pay attention to the units!).

Example: 123 kWh + 123 MWh = 123.123 kWh

The accumulated heat quantity can be reset. As soon as one of the display channels of the heat quantity is selected, the symbol SET is permanently shown on the display. Press button SET (3) for about 2 seconds in order to access the RESET mode of the counter. The display symbol SET will flash and the heat quantity value will be set to 0. In order to finish this process, press the SET button to confirm.

In order to interrupt the RESET process, no button should be pressed for about 5 seconds. The controller automatically returns to the display mode.

4.1.17 Collector emergency temperature Collector emergency shutdown

EM:
Collector emergeny shutdown temperature
Adjustment range: 85 ... 140 °C
Factory setting: 95 °C

If the adjusted collector emergency shutdown temperature (**EM**) is exceeded, the controller will switch off the solar pump (R1) in order to protect the system against overheating (collector emergency shutdown). The factoring setting is 140 °C but it can be changed within the adjustment range of 110 ...200 °C. ⚠ (flashing) is displayed.

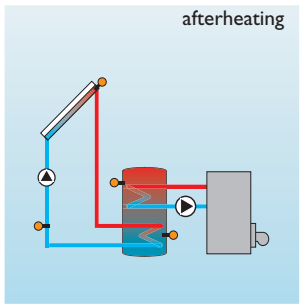
4.1.18 Collector minimum limitation option

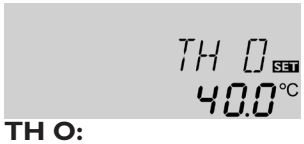
OCN:
Collector minimum limitation
Adjustment range: OFF / ON
Factory setting: OFF

CMN:
Collector minimum temperature
Adjustment range: 10 ... 90 °C
Factory setting: 10 °C

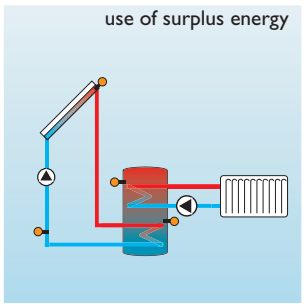
The minimum collector temperature is the minimum temperature which must be exceeded for the solar pump (R1) to switch on. The minimum temperature prevents the pump from being switched on too often at low collector temperatures. If the temperature falls below the minimum temperature, ❄ (flashing) is shown on the display.

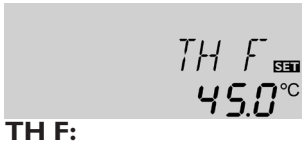
4.1.19 Thermostat function (ARR = 2)





TH O:
Thermostat switch-on temperature
Adjustment range:
0,0 ...95,0 °C
Factory setting: 40,0 °C





TH F:
Thermostat switch-off temperature
Adjustment range:
0,0 ...95,0 °C
Factory setting: 45,0 °C

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

- **TH O < TH F**
  thermostat function for afterheating
- **TH O > TH F**
  thermostat function for using surplus energy

When the 2nd relay output is active, ⓘ is displayed. (On DB3 and DB4 only.)

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 of time, there are 3 time frames t1 ...t3. If the function should be activated only between e.g. 6:00 and 9:00, set **t1 O** to 6:00 and **t1 F** to 09:00. The thermostat function is continuously activated (factory setting).
If all time frames are set to 00:00, the thermostat function is continuously activated (factory setting).

4.1.20 Pump speed control

n1MN:
Pump speed control
Adjustment range: 30...100
Factory setting: 30

A relative minimum pump speed is allocated to the output R1 via the adjustment channel **n1MN** (on DB 2 and DB4 only).

Attention:

When loads which are not speed controlled (e.g. valves) are used, the value must be changed to 100% in order to deactivate pump speed control.

4.1.21 Operating mode

HAND / HND1 / HND2:
Operating mode
Adjustment range:
OFF, AUTO, ON
Factory setting: AUTO

For control and service work, the operating mode of the controller can be manually adjusted. For this purpose, select the adjustment value HAND / HND1 / HND2. The following adjustments can be carried out:

- **HAND / HND1 / HND2**
  Operating mode
  OFF : relay off ⚠ (flashing) + ✋
  AUTO : relay in automatic operation
  ON : relay on ⚠ (flashing) + ✋

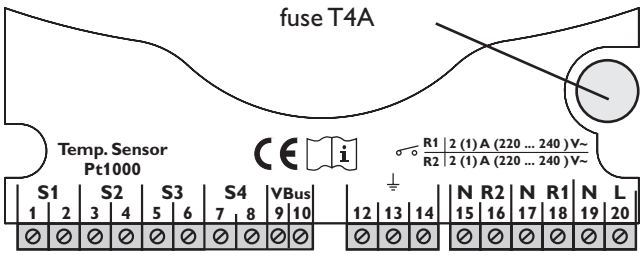
4.1.22 Language (LANG)

LANG:
Language choice
Adjustment range:
dE, En, It, Fr
Factory setting: En

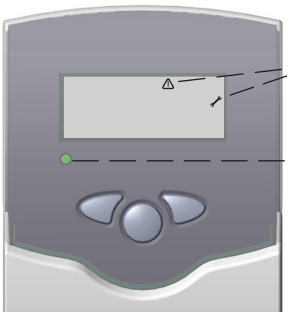
In this channel, different languages are available.

- dE : German
- En : English
- It : Italiano
- Fr : French

5. Troubleshooting



If a malfunction occurs, a message is displayed in the display of the controller:



Operating control lamp flashes red. The symbol and the ⚠ are shown.

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

888.8 — Cable is broken. Check the cable.

- 88.8 — Short-circuit. Check the cable.

Disconnected Pt1000 temperature sensors can be checked with an ohmmeter. In the following table, the resistance values corresponding to different temperatures are listed.

°C	Ω	°C	Ω
-10	961	55	1213
-5	980	60	1232
0	1000	65	1252
5	1019	70	1271
10	1039	75	1290
15	1058	80	1309
20	1078	85	1328
25	1097	90	1347
30	1117	95	1366
35	1136	100	1385
40	1155	105	1404
45	1175	110	1423
50	1194	115	1442

Resistance values of the Pt1000-sensors

Operating control lamp off

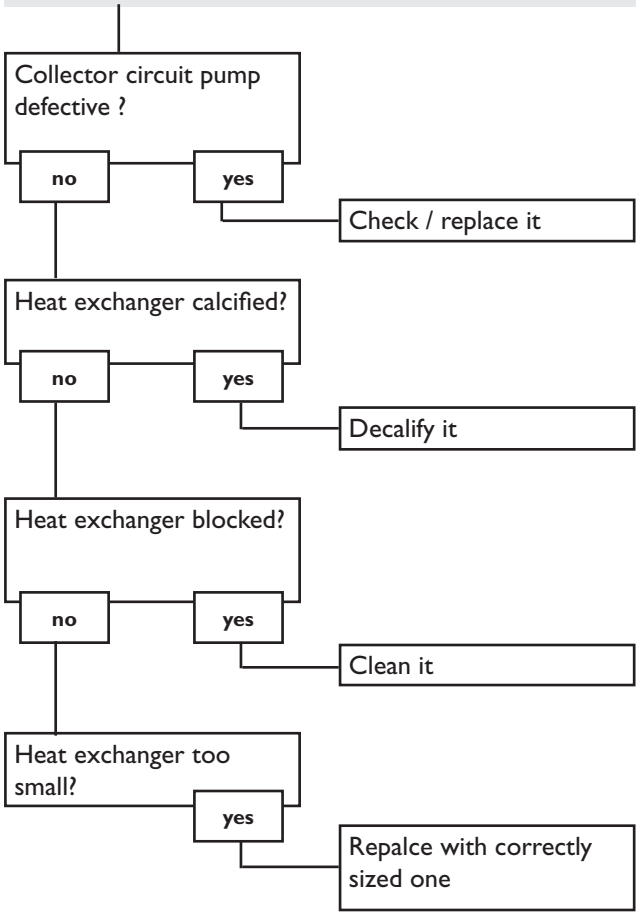
Check the power supply

o.k.

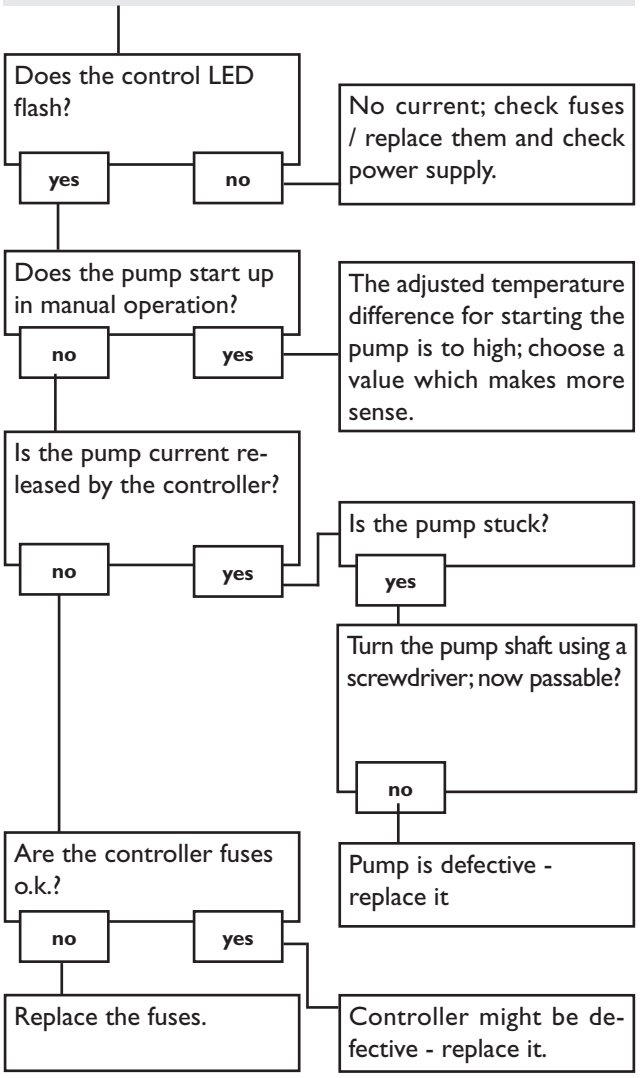
The fuse of the controller could be blown. It can be replaced after the front cover has been removed (spare fuse is enclosed in the accessory bag).

5.1 Various:

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



The solar circuit pump does not run although the collector is significantly warmer than the store.



Notes

6. Accessory

Sensors

Our product range includes high-precision platinum temperature sensors, flatscrew sensors, outdoor temperature sensors, indoor temperature sensors, cylindrical clip-on sensors and irradiation sensors, also as complete sensors with immersion sleeves.

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 SP1.

Flowmeter

If you wish to carry out a heat quantity measurement, you need a flowmeter for measuring the flow rate in your system.

Distributed by:

RESOL - Elektronische Regelungen GmbH
Heiskampstraße 10
45527 Hattingen / Germany
Tel.: +49 (0) 23 24 / 96 48 - 0
Fax: +49 (0) 23 24 / 96 48 - 755
www.resol.de
info@resol.de

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The design and the specifications can be changed without prior notice.
The illustrations may differ from the original product.