

RESOL FlowCon C

Installation

Operation

Commissioning



48002500

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

FlowCon C

GB
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

- 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 electrical works.
- Initial installation must be effected by qualified personnel named by the manufacturer

Appropriate usage

The solar station with the integrated controller may only be used in the collector circuit of solar thermal systems in compliance with the technical data specified in these instructions.

Improper use excludes all liability claims.

Subject to changes. Errors excepted.

Scope of delivery:

- 1 x pump station FlowCon C with integrated controller DeltaSol® C/1
- 1 x flushing and filling unit (optional)
- 1 x collector sensor FKP6
- 2 x store sensor FRP6
- 1 x wall mounting bracket
- 1 x accessory bag
 - 2 x screw and dowl
 - 2 x strain relief

Table of contents

Safety advice	2
1. Pump station with integrated controller	3
Technical data station	4
2. Mounting the station	4
3. Commissioning	5
3.1 Flushing and filling the solar thermal system	5
3.2 Flushing the store for initial commissioning	5
3.3 Flushing and filling the solar thermal system	6
3.4 Emptying the solar thermal system	7
4. FlowCheck	7
5. AirStopp	7
6. Connection	8
7. Accessories for the station	8
8. Integrated controller DeltaSol® C/3	9
Technical data controller	9
9. Installation	10
10. Examples	10
11. Terminal allocation	10
11.1 Terminal Allocation Arrangement 1	10
11.2 Terminal Allocation Arrangement 2	11
12. Operation and function	11
12.1 Buttons for adjustment	11
12.2 System Monitoring Display	12
12.2.1 Channel display	12
12.2.2 Tool bar	12
12.2.3 System Screen	12
12.3 Flashing codes	13
13. Initial Commissioning	14
14. Control parameter and diaplay channels	15
14.1 Channel overview	15
14.2 Functions and options	16
15. Electrical connection	20
16. Troubleshooting	21
17. Accessories for the controller	24
Imprint	24

Declaration of conformity

We, RESOL Elektronische Regelungen GmbH, D-45527 Hattingen, declare under our sole responsibility that our product FlowCon C complies with the following standards:

EN 55 014-1

EN 60 730-1

According to the regulations of the above directives, the product is labelled with

CE:

89/336/EWG

73/ 23/EWG

Hattingen, 04.Juli 2007

RESOL Elektronische Regelungen GmbH,

ppa. 

ppa. Gerald Neuse

1. Pump station with integrated controller

- Integrated controller *DeltaSol*® C/3
- Outstanding design
- Safety assembly with safety valve and manometer
- High-quality casing for reduced heat losses
- FlowCheck



Scope of delivery:

- 1 x pump station FlowCon C with integrated controller *DeltaSol*® C/1
- 1 x flushing and filling unit (optional)
- 1 x collector sensor FKP6
- 2 x store sensor FRP6
- 1 x wall mounting bracket
- 1 x accessory bag
 - 2 x screw and dowel
 - 2 x strain relief

About this product

The pump station FlowCon C is a preinstalled and leak-tested group of fittings for transferring heat from the collector to the store. It contains important fittings and safety devices for the operation of the solar thermal system:

- Ball valves in flow and return in combination with check valves to prevent gravity circulation
- Airstopp for manual bleeding of the solar thermal system
- FlowCheck for displaying the flow rate
- Manometer for displaying the system pressure
- Safety valve to prevent inadmissible overpressure
- Flushing and filling unit (optional) for flushing, filling and emptying the solar thermal system

Safety instructions

The installation and commissioning of the solar station as well as the connection of electrical components requires technical knowledge commensurate with a recognised vocational qualification as a fitter for plumbing, heating and air conditioning technology, or a profession requiring a comparable level of knowledge. The following must be observed during installation and commissioning:

- the relevant regional and national regulations
- the accident prevention regulations of the trade association
- the technical and safety instructions of these instructions

Warning: Risk of scalding

There is a danger of steam emission with safety valves. Therefore a discharge pipe must be connected to the 3/4" internal thread of the safety assembly. Please observe the enclosed instructions regarding the safety valve when doing this.

Attention: Damage to property

The group of fittings must be installed with sufficient spacing to the collectors because temperatures in the vicinity of the collectors can be very high. An intermediate vessel may be necessary for installation in the attic.

Attention: Damage to property

It is imperative that you make sure the EPDM sealing elements of the solar station do not come into contact with substances containing mineral oil. Mineral oil products cause lasting damage to the material, whereby its sealant properties are lost.

If necessary, ask the manufacturer whether the solar fluid, fats or installation aids contain mineral oils.

We do not assume liability nor provide warranty for damage to property resulting from sealants damaged in this way.

Dimensions:

Height (with insulation): 417 mm

Width (with insulation): 374 mm

Depth (with insulation): 179 mm

Distance centre: 1600 mm

Distance axis/wall: 55 mm

Pipe connections: 3/4" IT**Connection for expansion vessel set:**

3/4" ET, flat sealing

Outlet safety valve: 3/4" IT

Equipment:

Safety valve: 6 bar

Manometer: 0 - 6 bar

Non-return valves:

Opening pressure 200 mm water column, openable

Material:

Fittings: brass

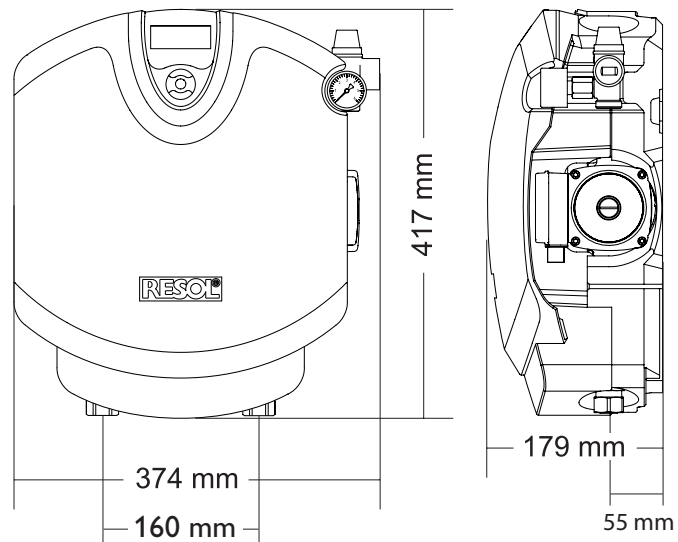
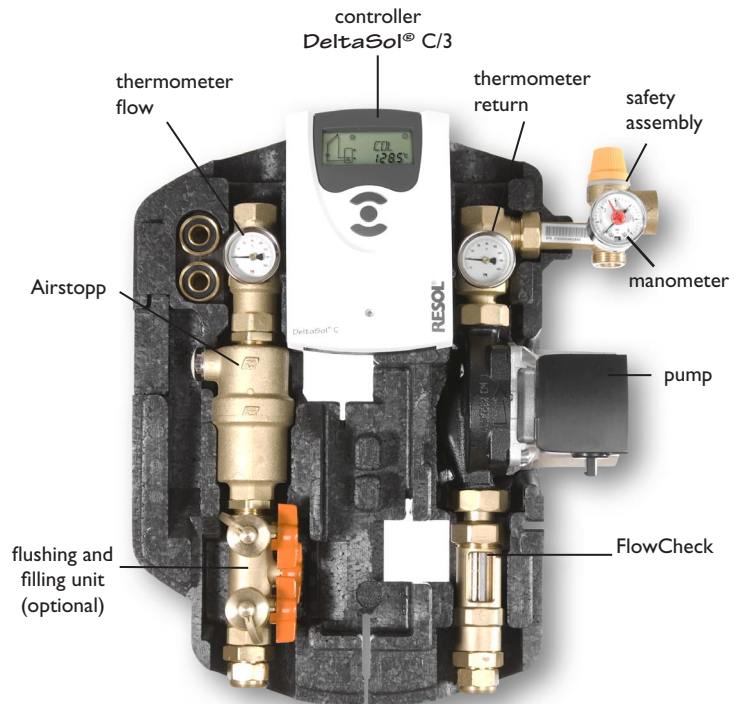
Seals: EPDM

Insulation: EPP, $\lambda = 0,041 \text{ W/(m}^*\text{K)}$ **Technical Data:**

Max. permitted pressure: 6 bar

Max. operating temperature: 120 °C

Flow rate: 1-20 l /min

**2. Mounting the station**

- Determine the mounting site of the station.
- Take the station out of the packing. Remove the front half of the insulation.
- Hold the enclosed wall mounting bracket against the wall and mark the fastening holes, drill holes and insert dowels
- Fasten the wall mounting bracket to the wall with the screws.
- Push the station against the wall mounting bracket. The station catches and is then attached to the wall.
- Connect the station to the solar thermal system.
- Check the inlet pressure of the expansion vessel and,

if necessary, adjust it to the local conditions ($P_{\text{inlet}}[\text{bar}] = 1 \text{ bar} + \Delta Th [\text{m}] * 1/10$ (ΔTh = height difference between collector and station))

- Connect the electrical components of the solar station: Attach the store and collector sensor and connect these to the controller. Plug the controller into a socket.
- Tighten all union nuts and screw connections.
- Attach the front half of the insulation to the station.

3. Commissioning

3.1 Flushing and filling the solar thermal system

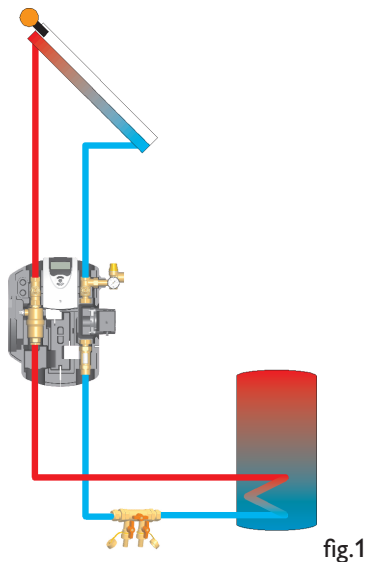
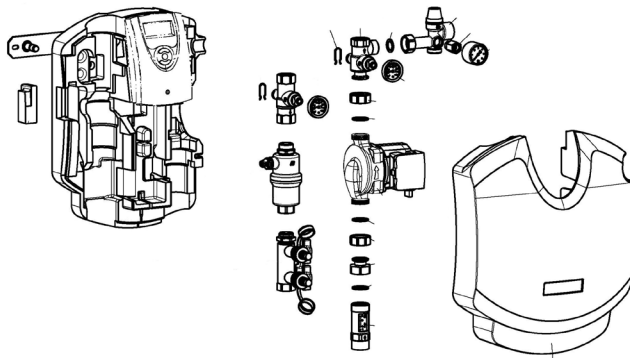


fig.1

3.2 Flushing the store for initial commissioning

Attention: Risk of scalding!

To prevent the solar fluid boiling in the collectors, the system should not be flushed or filled during periods of strong sunshine.

Attention: Risk of frost!

Solar thermal systems cannot be completely emptied after flushing. There is a danger of frost damage if water is used for flushing. Only use solar fluid to flush and fill the solar thermal system.

Use a water-propylene glycol mixture as a solar fluid (maximum 50% propylene glycol).

Instructions for initial commissioning:

The optionally enclosed flushing and filling unit can either be integrated into the station (below the AirStopp, mounted by 30° outwards, see fig.2) or installed horizontally at the lowest point of the solar circuit (see fig.1).

In both cases a filter must be installed between the store and the solar pump in order to prevent the flushed-out scale from re-entering the solar circuit.

If the flushing and filling unit is integrated in the solar station, we recommend an additional fill and drain ball valve at the lowest point of the solar circuit, to flush possible scale out.

This flushing process is described in “3.2 Flushing the store for initial commissioning”. Then continue as described in “3.3 Flushing and filling the solar thermal system”.

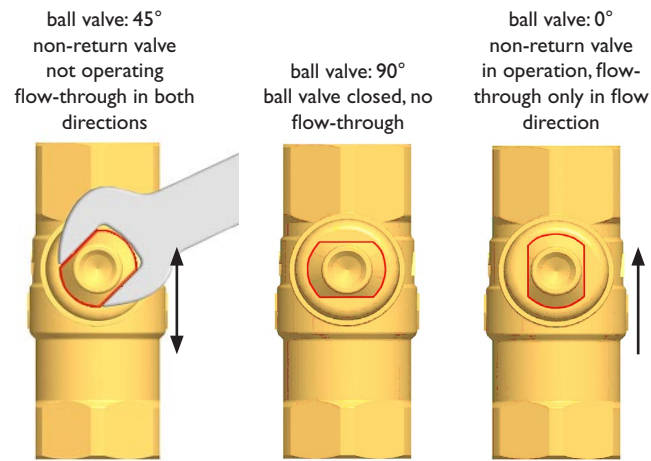
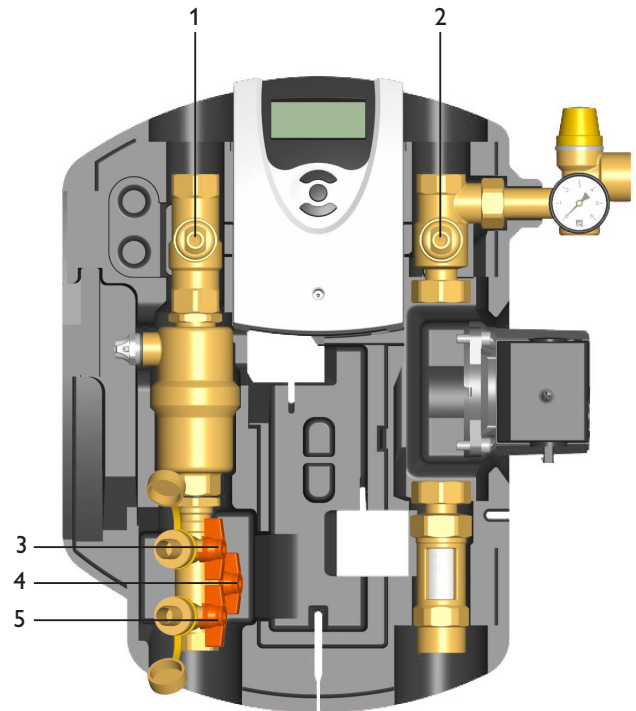


fig.2

- Connect the pressure hose of a flushing and filling station to the fill ball valve.
- Connect the flushing hose of a flushing and filling station to the fill and drain valve at the lowest point of the solar thermal system.
- Close the ball valve
- Open the fill ball valve (5) and the fill and drain valve at the lowest point of the solar thermal system.
- Flush the solar thermal system by means of the flushing and filling station until the discharged solar fluid is free of dirt particles.
- Switch off the filling pump
- Close the fill and drain valve at the lowest point of the solar thermal system.
- Remove the flushing hose from the fill and drain valve.
- Close the fill ball valve
- Connect the flushing hose to the drain ball valve.

3.3 Flushing and filling the solar thermal system

- Disconnect the expansion vessel from the solar thermal system.
- Connect the pressure hose of a flushing and filling station to the fill ball valve (5) of the flushing and filling unit.
- Connect the flushing hose of a flushing and filling station to the drain ball valve (3) of the flushing and filling unit.
- Close the ball valve (4) in the centre of the flushing and filling unit
- Turn the ball valves in flow (1) and in return (2) with an open-ended spanner (wrench width 14) to a 45° position. The non-return valves in the ball valves are now open.
- Open the fill and drain ball valves (3 and 5).
- Flush the solar thermal system using the flushing and filling station for at least 15 minutes to remove all air from the system.
- During flushing, bleed the solar thermal system several times at the Airstopp until the discharged solar fluid is free of air bubbles.
- Close the drain ball valve (3) of the flushing and filling unit with the filling pump running and increase the system pressure to approx. 5 bar. The system pressure can be read from the manometer
- Close the fill ball valve (5) and switch off the pump of the flushing and filling station.
- Check the manometer to see whether the system pressure reduces and eliminate leaks where necessary.
- Reconnect the expansion vessel to the other components of the solar thermal system.



If it is necessary to set the pressure, observe the following step:

- Set the operating pressure of the solar thermal system by means of the flushing and filling station (0.3-0.5 bar higher than the inlet pressure of the expansion vessel).
- If you have put the flushing and filling station into operation to set the operating pressure, switch off the filling pump.
- Close the fill and drain ball valves and open the ball valve.
- Remove the hoses of the flushing and filling station and screw the caps onto the fill and drain ball valves.
- Put the non-return valves in flow and return in operating position by opening the ball valves with an open-

ended spanner (wrench width 14).

- Manually put the solar thermal pump in operation at the highest RPM level (see controller manual) and let it circulate for at least 15 minutes
- During flushing, bleed the solar thermal system several times at the Airstopp, until the discharged solar fluid is free of air bubbles and increase, if required, the system pressure to the operating pressure.

3.4 Emptying the solar thermal system

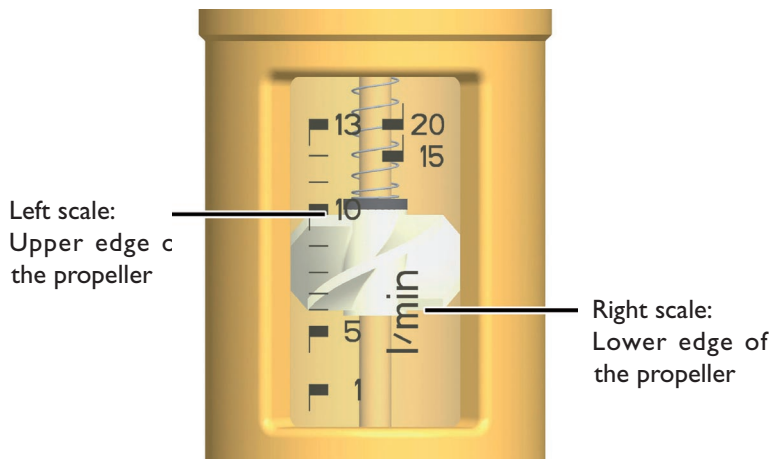
WARNING!

Risk of injury. The discharged fluid can have very high temperatures. Place the collection container so that people standing near by are not endangered when the solar thermal system is being emptied.

- Open the non-return valves in the ball valves in flow and return by turning the ball valves to a 45° position with an open-ended spanner.
- Place a temperature-resistant collection container under the drain ball valve at the lowest point of the solar thermal system.
- Open the drain ball valve at the lowest point of the solar thermal system.
- Open the bleeding devices at the highest point of the solar thermal system, where available
- Dispose of the solar fluid in observance of local regulations.

4. FlowCheck

The FlowCheck is for measurement and display of the flow rate of 1-20 l/min. In order to guarantee the flawless function of the measuring device the system must be flushed and free from foreign substances.



5. Airstopp

The Airstopp (manual bleed valve) is for bleeding the solar fluid in the solar thermal system. The air precipitated from the solar fluid gathers in the upper area of the manual bleed valve (see diagram) and can, if required, be discharged at the bleeding valve. To guarantee faultless bleeding of the collector circuit the flow rate in the flow must be at least 0.3 m/s.

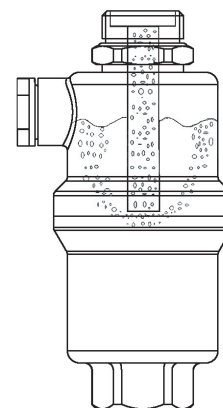
Check the system pressure after bleeding and if necessary increase it to the specified operating pressure.

WARNING:

Risk of injury caused by very high temperatures. During bleeding the escaping air and solar fluid can reach temperatures of over 100 °C.

Bleeding the solar thermal system directly after commissioning

At first you should bleed the solar thermal system daily and then weekly or monthly, depending on the volume of discharged air, in order to achieve optimal efficiency.



Information for operators of solar thermal systems

Bleed the solar thermal system half-yearly with the manual bleed valve to achieve optimal efficiency.

6. Connection



WARNING!

Always disconnect the controller from power supply before opening the housing!

The controller is already integrated in the station and ready to plug in. In the case of maintenance or service work, the controller is to be taken out from the station. Please pay attention to the following steps:

- switch off the system, disconnect plug from the mains
- remove the front half of the insulation
- unscrew the cross-recessed screw off the front cover and remove it by pulling it upwards
- unscrew the lower cross-recessed screw, push the controller upwards and remove it.

Mounting of the controller has to be carried out in reverse order.

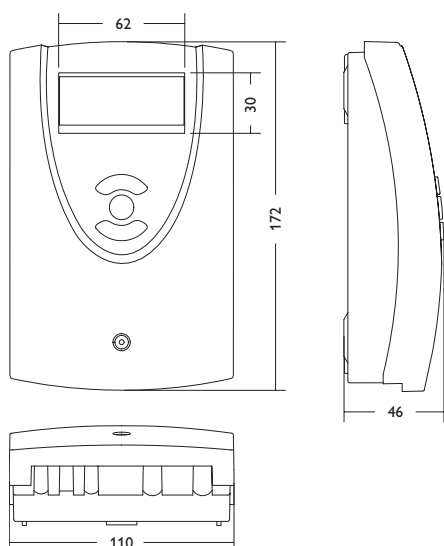
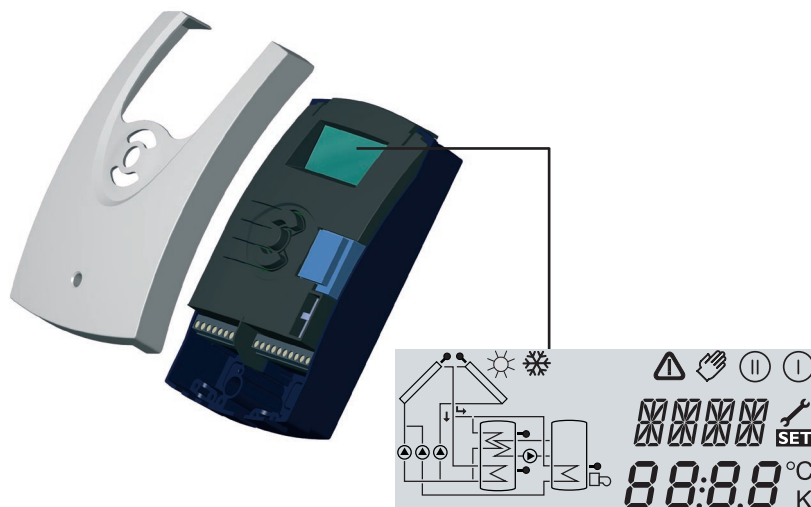
For further information on electrical connection, of the controller, please see chapter 15.

7. Accessories for the station

For installation screw connections are required, which are not included in the scope of delivery. Self-sealing double nipples, solder nipples or clamp-ring connections can be used. For further information, please see product catalogue.

8. Integrated controller *DeltaSol*® C/3

- System-Monitoring-Display
- up to 4 temperature sensors Pt1000
- heat quantity measurement
- function control
- user-friendly operation through simple handling
- solar operating hours counter and thermostat function
- RESOL VBus®
- Real time clock



The controller *DeltaSol*® C/3 is integrated into the pump station FlowCon C standard solar thermal systems and ready to plug in.



Technical data controller

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: integrated in the pump station FlowCon C

Display: system monitor for system visualisation, 16-segment display, 7-segment display, pictograms

Operation: 3 push buttons at the front of the housing

Functions: Differential temperature controller with optional add-on system

functions. Function control according to BAW-guidelines, operating hours counter, tube collector function, thermostat function and heat quantity measurement

Inputs: for 4 temperature sensors Pt1000

Outputs: 2 standard relays

Bus: RESOL VBus®

Power supply: 220 ... 240 V~

Total switching capacity:

4 (2) A (220 ... 240) V~

Mode of operation: Type 1.b

Switching capacity per relay:

Electromechanical relay:

2 (1) A (220 ... 240) V~



High-voltage components.



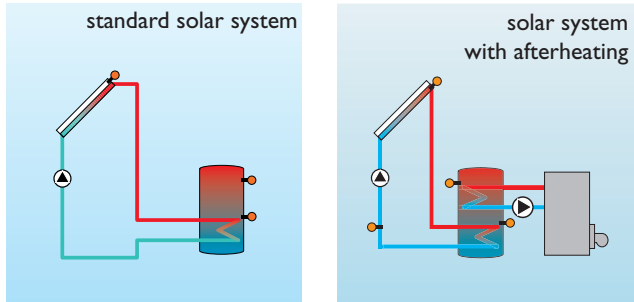
Electrostatic discharge can cause damage to electronic components.

9. Installation

Note:

The controller is already integrated in the station and ready to plug in. In the case of maintenance work and repair, pay attention to chapter 14 ,Electrical connection'!

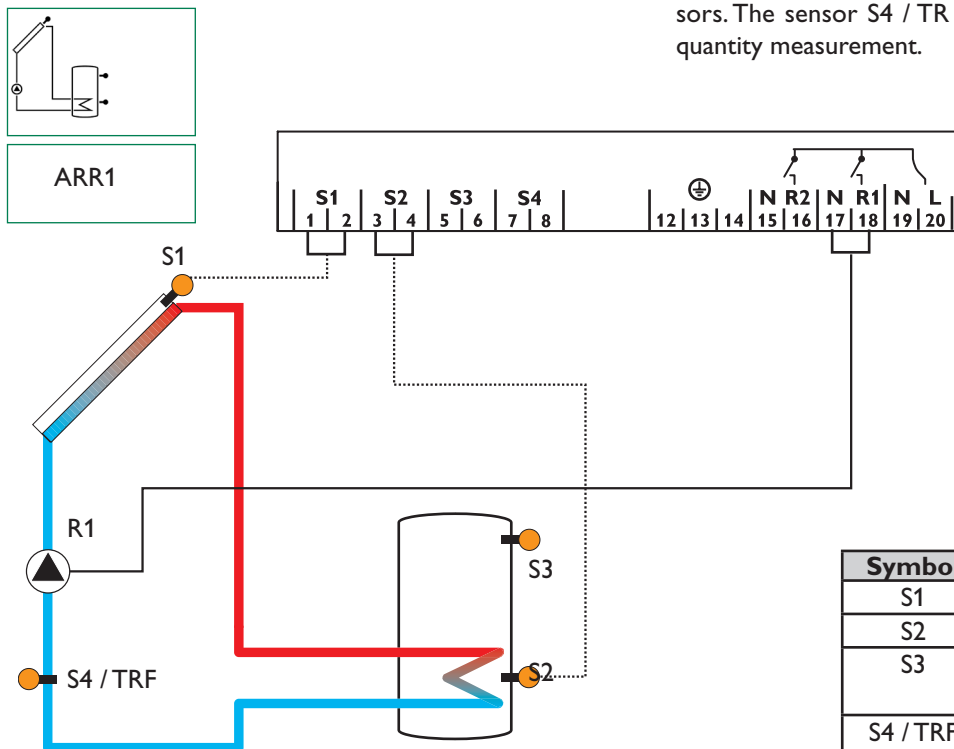
10. Examples DeltaSol® C/3



11. Terminal allocation

11.2. Terminal allocation Arr 1

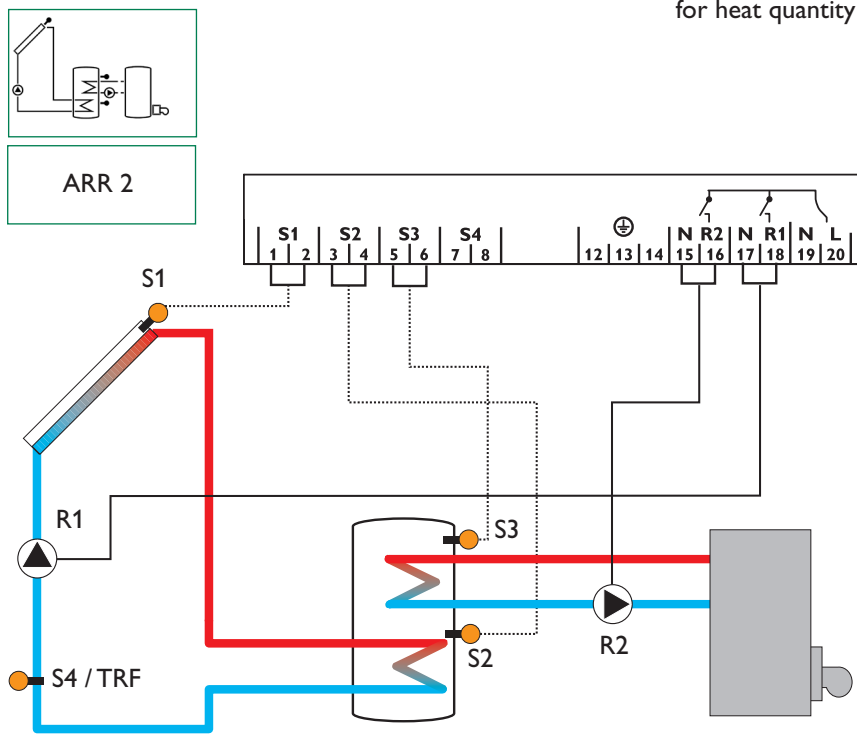
Standard solar system with 1 store, 1 pump and 3 sensors. The sensor S4 / TR can be optionally used for heat quantity measurement.



Symbol	Specification
S1	collector sensor
S2	store base sensor
S3	store top sensor, (optional)
S4 / TRF	sensor for heat quantity measurement (optional)
R1	solar pump

11.2 Clamp allocation Arr 2

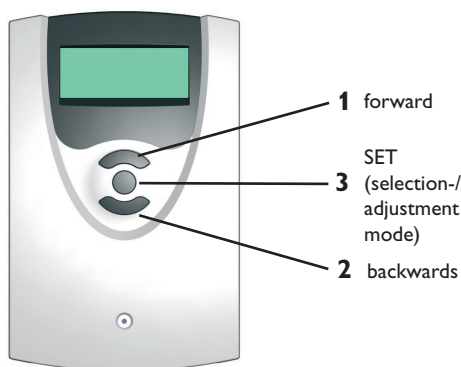
Solar system and after-heating with 1 store, 3 sensors and after-heating. The sensor S4 / TRF can be optionally used for heat quantity balancing.



Symbol	Specification
S1	collector sensor
S2	store base sensor
S3	store top sensor / thermostat sensor
S4 / TRF	sensor for heat quantity measurement (optional)
R1	solar pump
R2	pump for afterheating

12. Operation and function

12.1 Buttons for adjustment



When the hydraulic system is filled and ready for operation, connect the controller to the mains.

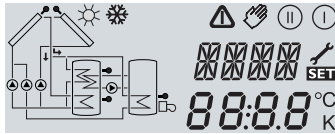
Switch on power supply. After initialisation, the controller is in the automatic mode with typical settings. Now the controller is ready for operation with typical settings to suit that system and normally the factory settings will give close to optimum operation

The controller is operated by means of the 3 push buttons below the display. Button 1 is used for scrolling forward through the menu or to increase the adjustment values. Button 2 is similarly used for scrolling backwards and reducing values. Button 3 is used for selection of the menu lines and for confirmation.

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 (**SET**-mode)
- Adjust the value by pressing buttons 1 and 2
- Briefly press buttons 3, so that **SET** permanently appears, the adjusted value will be saved.

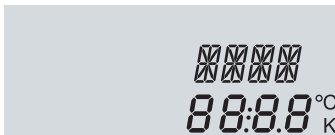
12.2 System-Monitoring display



Complete Monitoring-Display

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

12.2.1 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.

12.2.2 Tool bar

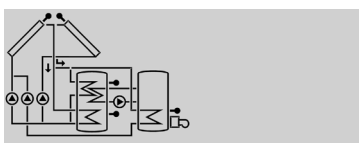


tool bar

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

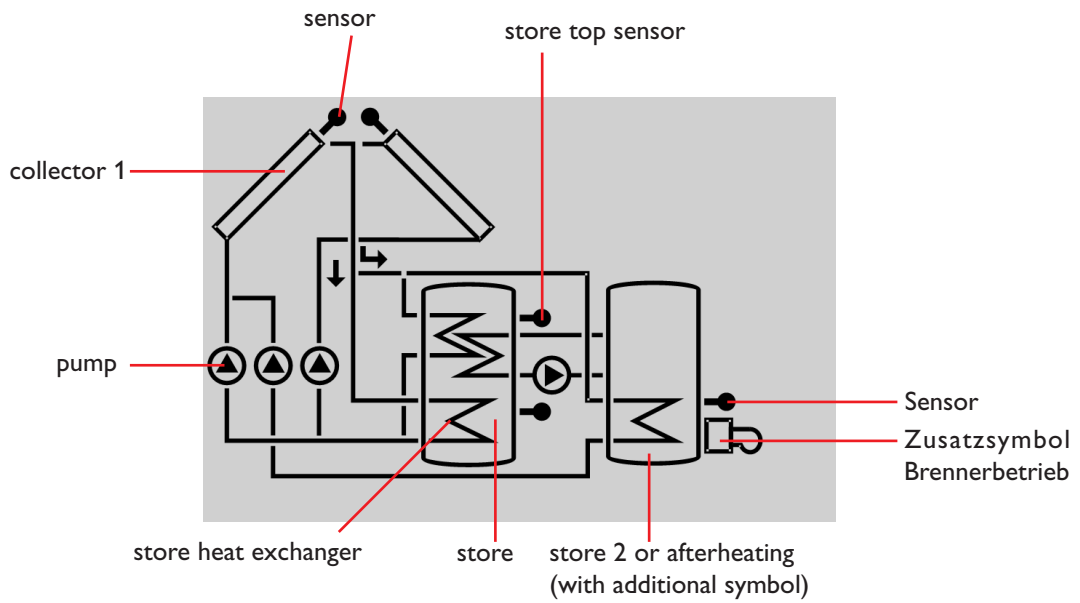
Symbol	standard	flashing
ⓘ	relay 1 active	
Ⓜ	relay 2 active	
☀	store maximum limitation active / maximum store temperature exceeded	collector cooling function or recooling function active
❄	antifreeze- function activated	collector minimum limitation or antifreeze function active
⚠		collector emergency shutdown or store emergency shutdown active
⚠ + 🔧		sensor defect
⚠ + ✋		manual operation active
SET		SET-mode, change of adjustment value is possible

12.2.3 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



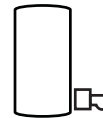
Store 1
with heat exchanger



Temperature sensors



Pumps



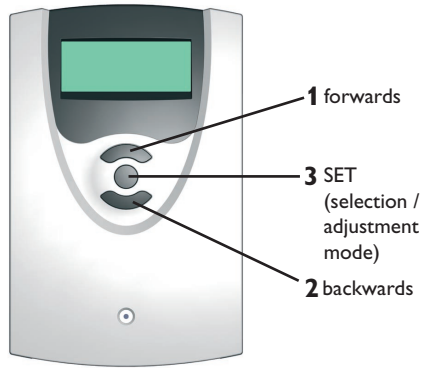
Afterheating
mit Brennersymbol

12.3 Flashing codes

- Pump symbols are flashing during initialisation 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 after-heating is active

13. Commissioning

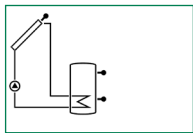
When the controller is commissioned for the first time, the arrangement has to be selected first



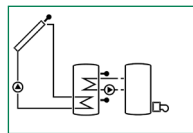
1. Switch on power supply. After initialisation, the controller is in the automatic mode with typical settings. The pre-programmed system scheme is Arr 1.

- 2. - 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

Overview of arrangements:

Arr 1 : standard solar system

Arr 2 : solar system with after-heating

14. Control parameters and display channels

14.1 Overview of channels

Legend:

x

Corresponding channel is available.

x*

Corresponding channel is available when the corresponding option is enabled

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.

Please note:

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

channel	Arr		description	page
	1	2*		
COL	x	x	Temperature collector 1	16
TST	x		Temperature store 1	16
TSTL		x	Temperature store 1 base	16
TSTU		x	Temperature store 1 top	16
S3	x		Temperature sensor 3	16
TRF	①	①	Temperature return sensor	16
S4	②	②	Temperature sensor 4	16
h P	x		Operating hours relay 1	16
h P1		x	Operating hours relay 1	16
h P2		x	Operating hours relay 2	16
kWh	①	①	Heat quantity kWh	17
MWh	①	①	Heat quantity MWh	17
time			clock time	16
Arr	1-2		Arrangement	
DT O	x	x	Switch-on temperature difference	17
DT F	x	x	Switch-off temperature difference	17
S MX	x	x	Maximum temperature store 1	18
EM	x	x	Emergency temperature collector 1	18

channel	Arr		description	page
	1	2		
OCX	x	x	Option collector cooling collector 1	18
CMX	x*	x*	Maximum temperature collector 1	18
OCN	x	x	Option minimum limitation collector 1	18
CMN	x*	x*	Minimum temperature collector 1	18
OCF	x	x	Option antifreeze collector 1	19
CFR	x*	x*	Antifreeze temperature collector 1	19
OREC	x	x	Option recooling	19
OTC	x	x	Option tube collector	19
AH O		x	Switch-on temp. for thermostat 1	19
AH F		x	Switch-off temp. for thermostat 1	19
t1O		x	Switch-on time 1 thermostat	19
t1F		x	Switch-off time 1 thermostat	19
t2O		x	Switch-on time 2 thermostat	19
t2F		x	Switch-off time 2 thermostat	19
t3O		x	Switch-on time 3 thermostat	19
t3F		x	Switch-off time 3 thermostat	19
OHQM		x	Option heat quantity measurement	17
FMAX	①	①	Maximum flowrate	17
MEDT	①	①	Antifreeze type	17
MED%	MEDT	MEDT	Antifreeze concentration	17
HND1	x	x	Manual operation relay 1	20
HND2	x	x	Manual operation relay 2	20
LANG	x	x	Language	20
PROG	XX.XX		Program number	
VERS	X.XX		Version number	

14.2 Functions and options

Collector temperature

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

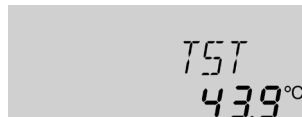


Display of the current collector temperature.

- COL : collector temperature (1-collector system)

Store temperatures

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

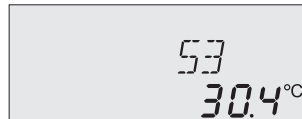


Display of the current store temperature.

- TST : store temperature (1-store system)
- TSTL : store base temperature,
- TSTU : store top temperature

Sensor 3 and sensor 4

S3, S4:
Temperatures at the sensors
S3 and S4
Display range: -40...+250 °C



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

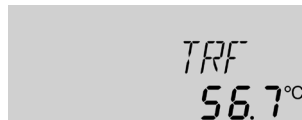
- S3 : temperature - sensor 3
- S4 : temperature - sensor 4

Please note:

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

Other temperatures

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

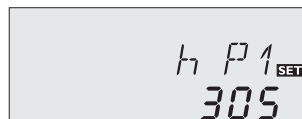


Display of the current temperature at the sensor.

- TRF : temperature - return

Operating hours counter

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

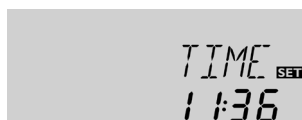


The operating hours counter accumulates the solar operating hours of the respective relay (**h P / h P1 / h P2**). Full hours are displayed.

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. 2 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.

Time



In this channel the current time is indicated.

Press button **SET** for 2 seconds, the hours will then be displayed. Press the button again, the minutes will then be displayed (flashin). The time can be set using buttons 1 and 2 and saved by pressing the **SET** button.

Heat quantity measurement option**OHQM:** Heat quantity measurement

Adjustment range: OFF...ON

Factory setting: OFF

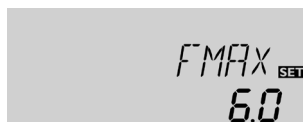
**FMAX:**

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

**kWh/MWh:** Heat quantity

in kWh / MWh

Display channel



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

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.

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.

ΔT-regulation**DT O:**

Switch-on temperature diff.

Adjustment range: 1,0...20,0 K

Factory setting: 6.0

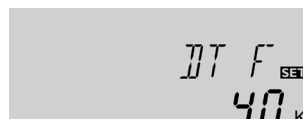
**DT F:**

Switch-off temperature diff.

Adjustment range

0,5 ... 19,5 K

Factory setting 4.0 K



This function is a standard differential control. If the switch-on differential is reached (**DT O**), the pump is operated. If the temperature difference falls below the adjusted switch-off temperature difference (**DT F**), the controller switches off.

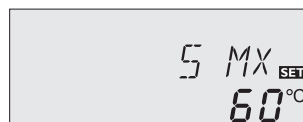
Please note: Switch-on temperature difference DO must be at least 1 K higher than the switch-off temperature-difference DF.

Maximum store temperature**S MX:**

Maximum store temp.

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.

Collector emergency shutdown temperature

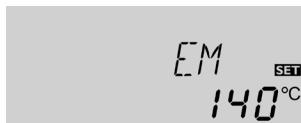
EM:

Collector emergency shutdown temperature

Adjustment range:

110 ... 200 °C

Factory setting: 140 °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 factory setting is 140 °C but it can be changed within the adjustment range of 110...200 °C. Δ (flashing) is displayed.

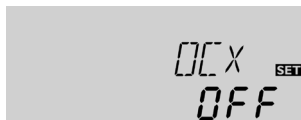
System cooling

OCX:

System cooling option

Adjustment range: OFF ... ON

Factory setting: OFF



When the adjusted maximum store temperature is reached, the system stagnates. If the collector temperature increases to the adjusted maximum collector temperature (**CMX**), the solar pump is activated until the collector temperature falls below the maximum collector temperature. The store temperature may increase (subordinate active maximum store temperature), but only up to 95 °C (emergency shutdown of the store).

CMX:

Collector maximum temp.

Adjustment range:

100...190 °C

Factory setting: 120 °C



If **OREC** is additionally enabled:

If the store temperature is higher than the maximum store temperature (**SMX**) and if the collector temperature is at least 5 K below the store temperature, the solar system remains activated until the store is cooled down below the adjusted maximum temperature (**S MX**) via the collector and the pipework.

If the system cooling function is enabled, \star (flashing) is shown on the display. Due to the cooling function, the system will have a longer operation time on hot summer days and guarantees thermal relief of the collector field and the heat transfer fluid.

Minimum collector function

OCN:

Minimum collector function

Adjustment range: OFF / ON

Factory setting: OFF



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, \star (flashing) is shown on the display.

CMN:

Minimum collector temperature

Adjustment range: 10 ... 90 °C

Factory setting: 10 °C



Antifreeze function

OCF:

Antifreeze function

Adjustment range: OFF / ON

Factory setting: OFF



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 °C, the loading circuit will be deactivated.

CFR:

Antifreeze temperature

Adjustment range: -10 ... 10 °C

Factory setting: 4,0 °C



Please note:

Since this function uses the limited heat quantity of the store, the antifreeze function should be used in regions with few days of temperatures around the freezing point.

Recooling function

OREC:

recooling function option

Adjustment range:

OFF...ON

Factory setting: OFF



If the adjusted maximum store temperature (**S MX**) is reached, the controller keeps the solar pump running in order to prevent the collector from being overheated. The store temperature may increase but only up to 95 °C (emergency shutdown of the store).

The solar pump is switched on once the collector temperature is lower than the store temperature. It is switched off when the store is cooled down to the adjusted maximum temperature via the collector and the pipework.

Tube collector function

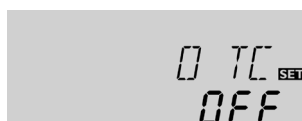
OTC:

Tube collector function

Adjustment range:

OFF...ON

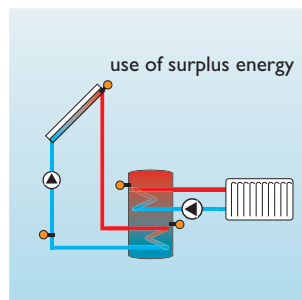
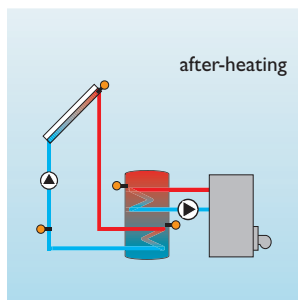
Factory setting: OFF



If the controller detects an increase in collector temperature by 2 K compared to the previously stored collector temperature, the solar pump will be switched-on for about 30 seconds in order to detect the fluid temperature. The current collector temperature will be saved as a new reference value. If the measured temperature (new reference value) is exceeded by 2 K, the solar pump will run for 30 seconds. If the switch-on difference between the collector and the store is exceeded during the runtime of the solar pump or the standstill of the system, the controller will automatically switch to solar loading.

If the collector temperature decreases by 2 K during standstill, the switch-on value for the tube collector function will be recalculated.

Thermostat function (Arr = 2)



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

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

When the 2nd relay output is active, II is displayed.



AH O:

Thermostat switch-on temp.

Adjustment range:

0,0...95,0 °C

Factory setting: 40,0 °C



AH F:

Thermostat switch-off temp.

Adjustment range:

0,0...95,0 °C

Factory setting: 45,0 °C



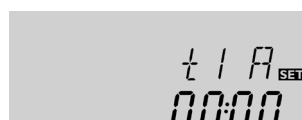
t1 E, t2 E, t3 E:

Thermostat switch-on time

Adjustment range:

00:00...23:45

Factory setting: 00:00



t1 A, t2 A, t3 A:

Thermostat switch-off time

Adjustment range:

00:00...23:45

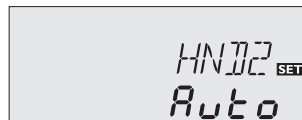
Factory setting: 00:00

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 E** to 6:00 and **t1 A** to 06:00. The thermostat function is continuously activated (factory setting).

If all time frames are set to 00:00 o' clock, the thermostat function is continuously activated (factory setting).

Operating mode

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 HND1 / HND2. The following adjustments can be carried out:

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

Language

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



In this channel, different languages are available.

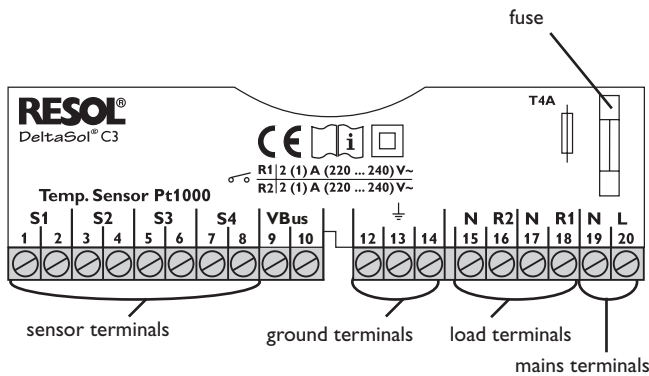
- dE : German
- En : English
- It : Italiano
- Fr : French

15. Electrical connection

WARNING!



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



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

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

- Relay 1
 18 = conductor R1
 17 = neutral conductor N
 13 = ground clamp ⊕
- Relais 2
 16 = conductor R2
 15 = neutral conductor N
 14 = ground 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. sensor S3)
- 7 / 8 = Sensor 4 (e. g. sensor TRF)

The **mains connection** is at the terminals:

- 19 = neutral conductor N
- 20 = phase L
- 12 = ground clamp ⊕

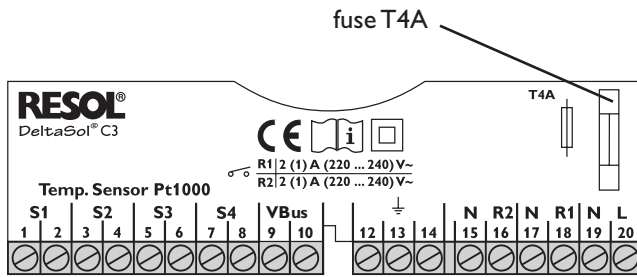


Electrostatic discharge can lead to damage to electronic components!



Dangerous voltage!

16. Troubleshooting



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



The symbol and the are shown.

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.

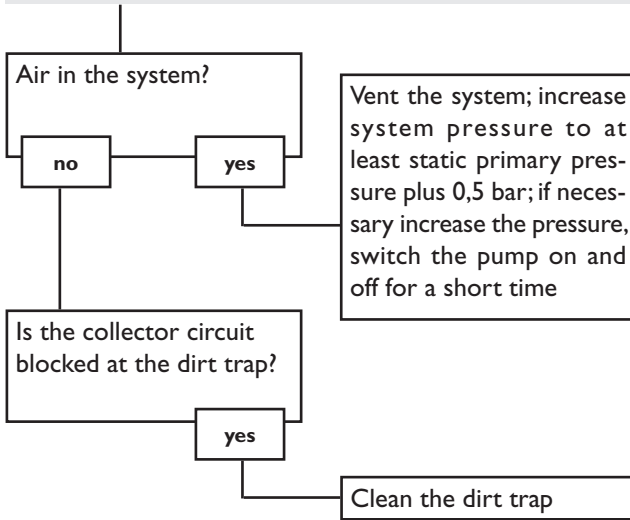
Disconnected Pt1000 temperature sensors can be checked with an ohmmeter. In the following table, the resistance values corresponding to different temperatures are listed.

°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

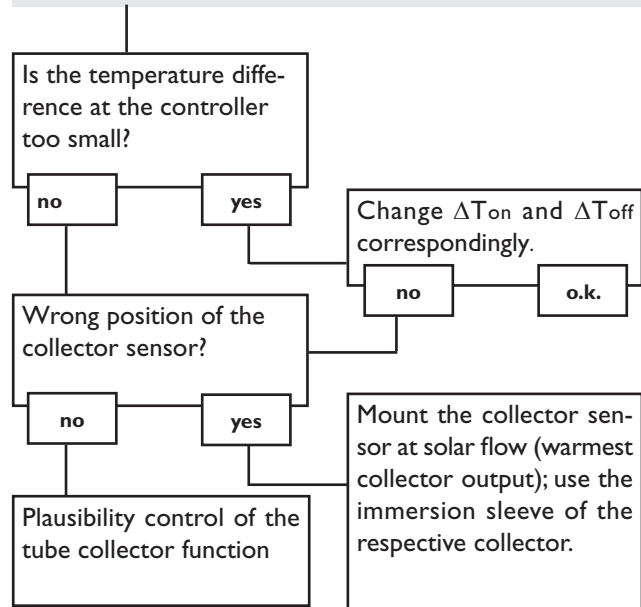
Resistance values of the Pt1000-sensors

5.1 Various:

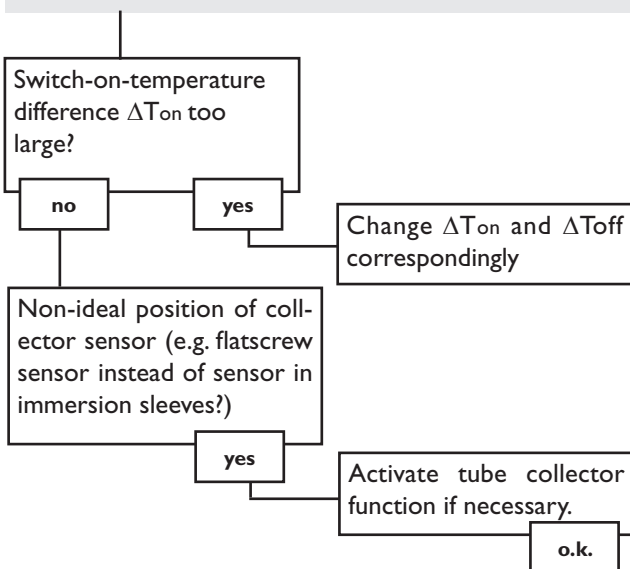
Pump is overheated, but no heat transfer from the collector to the store, flow and return have the same temperature; perhaps also bubble in the lines



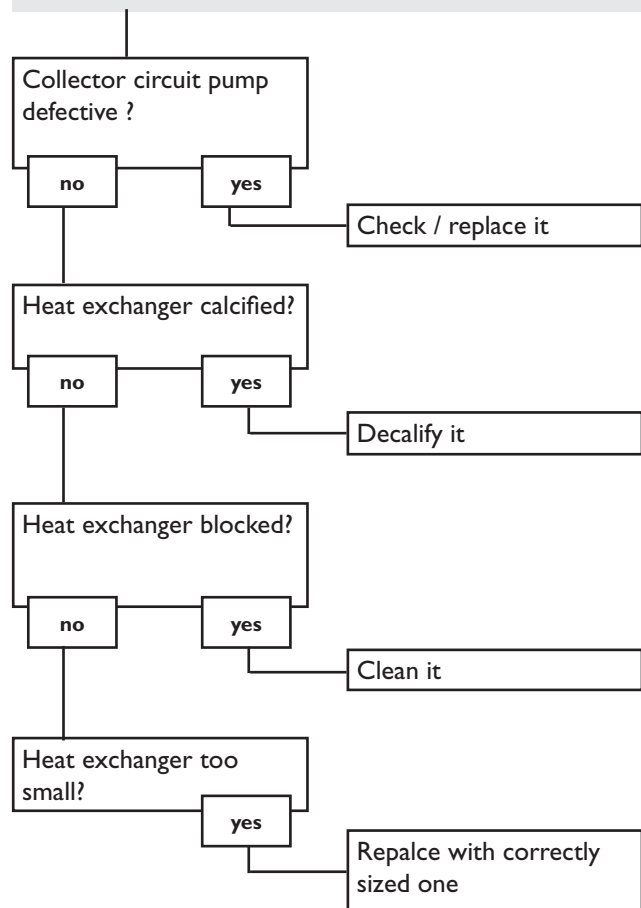
Pump starts for a short moment, switches-on/off again, etc.

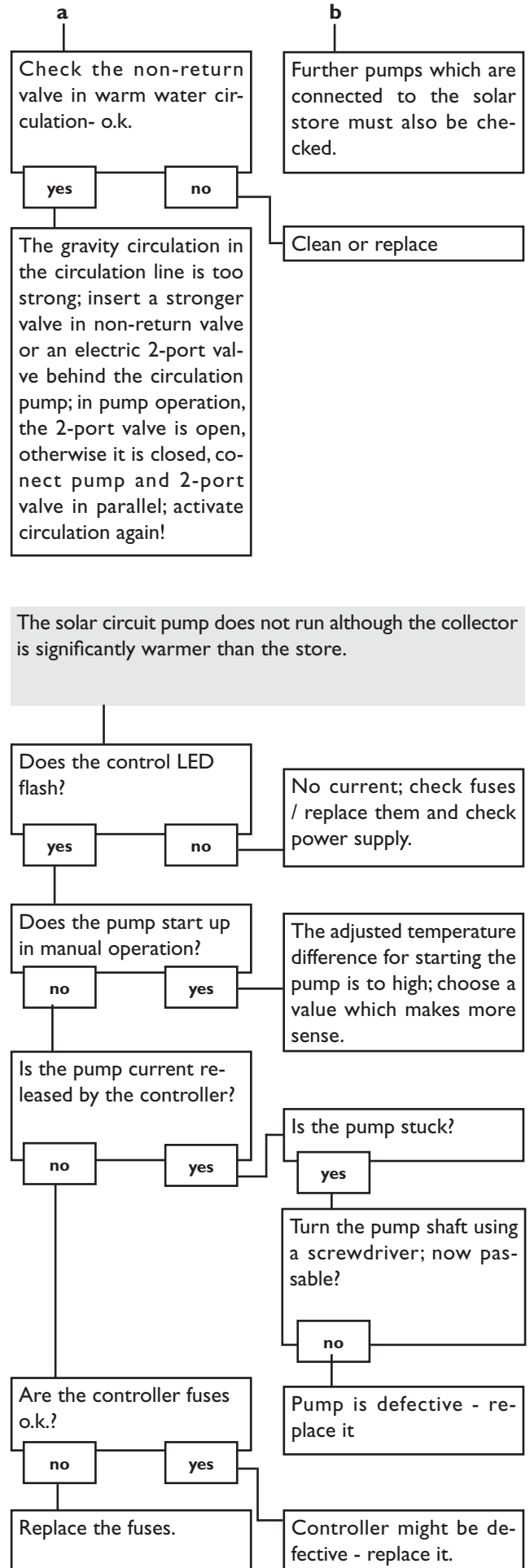
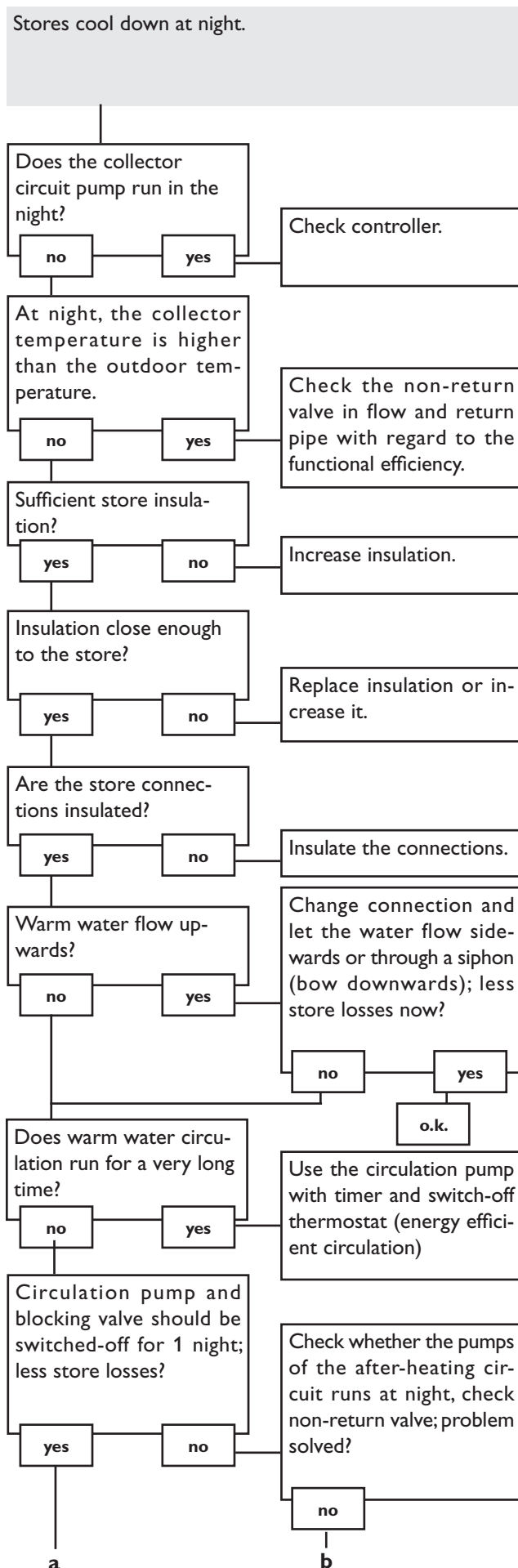


Pump starts up very late..



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





17. Accessories for the controller

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 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 SP1.



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

Important notice:

We took a lot of care with the texts and drawings of this manual and to the best of our knowledge and consent. As faults can never be excluded, please note: Your own calculations and plans, under consideration of the current standards and DIN-directions should only be basis for your projects. We don't offer a guarantee for the completeness of the drawings and texts of this manual - they only represent some examples. They can only be used at your own risk. No liability is assumed for incorrect, incomplete or false information and / or any resulting damages.

Reprinting / copying

This mounting- and operation manual including all parts is copyrighted. Another use outside the copyright requires the approval of RESOL - Elektronische Regelungen GmbH. This especially applies for copies, translations, micro films and the storage into electronic systems.
Editor: RESOL - Elektronische Regelungen GmbH

Please note:

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