Thank you for buying this RESOL product.
Please read this manual carefully, to get the best performance from this unit.
Safety advice
Please pay attention to the following safety advice in order to avoid danger and damage to people and property.

Appropriate usage
This product is to be used in simple solar thermal systems in compliance with the technical data specified in these instructions.

Improper use excludes all liability claims

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.

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</tbody>
</table>

Subject to change. Errors excepted

Declaration of conformity
We, RESOL Elektronische Regelungen GmbH, D-45527 Hattingen, declare under our sole responsibility that our product DeltaSol® 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, 07.October 2007
RESOL Elektronische Regelungen GmbH,

ppa. Gerald Neuse
Overview of functions

• System-Monitoring display
• up to 4 temperature sensors Pt1000
• heat quantity measurement
• function control
• user-friendly operation through easy handling
• easy-to-mount housing with outstanding design
• speed control, solar operating hours counter, thermostat function
• RESOL VBus®
• real time clock

Scope of delivery:
1 x DeltaSol® C/4
1 x accessory bag
   1 x spare fuse T2A
   2 x screws and dowels
   4 x strain relief and screw
Additionally contained in the full kit:
   1 x sensor FKP6
   2 x sensor FRP6

Technical Data

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, also suitable for mounting into patch panels
Display: System-Monitor for system visualisation, 16-segment display, 7-segment display, pictograms
Operation: 3 push buttons at the front of the housing
Functions: Temperature differential controller with optional add-on functions, function control according to BAW-guidelines, operating hours counter, tube collector function, speed control and heat quantity measurement
Inputs: for 4 temperature sensors Pt1000
Outputs: 1 semiconductor relay, 1 standard relay
Bus: RESOL VBus®
Power supply: 100 ... 240V~

Total switching capacity:
3 (2) A (100 ... 240) V~
Mode of operation:
Type 1.y
Switching capacity per relay:
Semiconductor relay:
1 (1) A (100 ... 240) V~
Electromechanical relay:
2 (1) A (100 ... 240) V~
**Examples DeltaSol® C/4**

- Standard solar system
- Solar system with afterheating

**Order note**

RESOL DeltaSol® C / 4
RESOL DeltaSol® C / 4 - full kit
incl. 3 temperature sensors Pt1000 (1 x FKP6, 2 x FRP6)

---

**1. Installation**

**1.1 Mounting**

1. **WARNING!** Always disconnect the controller from 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 (centres 130 mm). Drill and insert the lower wall plug.
   4. Hang the housing from the upper fastening point and tighten lower fastening screw.
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 100...240 V~ (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 relays to which loads such as pumps, valves etc. can be connected:
- Relay 1
  18 = conductor R1
  17 = neutral conductor N
  13 = ground clamp
- Relay 2
  16 = conductor R2
  15 = neutral conductor N
  14 = ground clamp

The 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 (temperature sensor S3)
- 7 / 8 = sensor 4 (e.g. sensor store TRF)

The mains connection is carried out at the following terminals:
- 19 = neutral conductor N
- 20 = conductor L
- 12 = ground clamp

Attention: The minimum pump speed must be set to 100% when auxiliary relays or valves are connected.

1.2.1 Terminal allocation Arr1

The controller is equipped with the RESOL VBus\textsuperscript{®} for data transfer with and energy supply to external modules. The connection is carried out at the two terminals 9 and 10 marked “VBus”\textsuperscript{TM} (either polarity). One or more RESOL VBus\textsuperscript{®} modules can be connected via this data bus:
- RESOL calorimeter
- RESOL large display / Smart Display
- RESOL datalogger

Standard solar system with 1 store, 1 pump and 3 sensors. Sensor S4 / TRF can optionally be used for heat quantity measurement.
1.2.2 Terminal allocation Arr 2

Solar system with afterheating with 1 store, 3 sensors and afterheating. Sensor S4 / TRF can be optionally used for heat quantity measurement.

Symbol | Description
--- | ---
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 afterheating

2. Operation and function

2.1 Buttons for adjustment

Connect the controller to the mains. The controller is in an initialisation phase. After this phase, the controller is in automatic operation with factory settings.

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

The controller is operated via the 3 push buttons below the display. The forward-button (1) is used for scrolling forward through the 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 appears (flashing) (SET-mode)
— adjust the requested value by pressing the buttons 1 and 2
— Briefly press button 3, so that SET permanently appears, the adjusted value will be saved.
2.2 System-Monitoring display

The system monitoring display consists of 3 ranges: The channel display, the toolbar and the system-screen (active arrangement).

2.2.1 Channel display

The channel display consists of 2 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.

2.2.2 Symbolleiste

The additional symbols in the toolbar indicate the actual system status.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>normal</th>
<th>flashing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

2.2.3 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“.
2.3 Flashing codes

- Pump symbols are flashing during the initialisation phase.
- Sensor symbols are flashing when the corresponding sensor display channel is selected.
- Sensor symbols are flashing in the case of a sensor fault.
- Burner symbol is flashing when the after-heating is active.
3. 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 the 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.

Overview of arrangements:
Arr 1: standard solar system
Arr 2: solar system with after-heating
4. Control parameters and display channels

4.1 Overview of channels

Legend:
- \( \times \) Corresponding channel is available.
- \( \times^* \) Corresponding channel is available when the corresponding option is enabled.

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

### Legend:

- \( \times \) Corresponding channel is available.
- \( \times^* \) Corresponding channel is available when the corresponding option is enabled.

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

#### Channel ARR Description Page

<table>
<thead>
<tr>
<th>Channel</th>
<th>ARR</th>
<th>Description</th>
<th>Page</th>
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<tbody>
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<td>x</td>
<td>temperature collector 1</td>
<td>11</td>
</tr>
<tr>
<td>TST</td>
<td>x</td>
<td>temperature store 1</td>
<td>11</td>
</tr>
<tr>
<td>TSTL</td>
<td>x</td>
<td>temperature store 1 base</td>
<td>11</td>
</tr>
<tr>
<td>TSTU</td>
<td>x</td>
<td>temperature store 1 top</td>
<td>11</td>
</tr>
<tr>
<td>S3</td>
<td>x</td>
<td>temperature sensor 3</td>
<td>11</td>
</tr>
<tr>
<td>TRF</td>
<td>x</td>
<td>temperature return sensor</td>
<td>11</td>
</tr>
<tr>
<td>S4</td>
<td>x</td>
<td>temperature sensor 4</td>
<td>11</td>
</tr>
<tr>
<td>n %</td>
<td>x</td>
<td>speed relay 1</td>
<td>11</td>
</tr>
<tr>
<td>n1 %</td>
<td>x</td>
<td>speed relay 1</td>
<td>11</td>
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<tr>
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<td>x</td>
<td>operating hours relay 1</td>
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<td>x</td>
<td>operating hours relay 1</td>
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</tr>
<tr>
<td>h P2</td>
<td>x</td>
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<td>MWh</td>
<td>x</td>
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<td>1-2</td>
<td>arrangement</td>
<td>11</td>
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<td>DT O</td>
<td>x</td>
<td>switch-on temperature difference</td>
<td>12</td>
</tr>
<tr>
<td>DT F</td>
<td>x</td>
<td>switch-off temperature difference</td>
<td>12</td>
</tr>
<tr>
<td>DT S</td>
<td>x</td>
<td>set temperature difference</td>
<td>13</td>
</tr>
<tr>
<td>RIS</td>
<td>x</td>
<td>rise</td>
<td>13</td>
</tr>
<tr>
<td>S MX</td>
<td>x</td>
<td>maximum temperature store 1</td>
<td>13</td>
</tr>
<tr>
<td>EM</td>
<td>x</td>
<td>emergency temperature collector 1</td>
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</table>

#### Channel ARR Description Page

<table>
<thead>
<tr>
<th>Channel</th>
<th>ARR</th>
<th>Description</th>
<th>Page</th>
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</thead>
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<td>x</td>
<td>option collector cooling collector 1</td>
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<td>x^*</td>
<td>maximum temperature collector 1</td>
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<td>OCN</td>
<td>x</td>
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<td>CMN</td>
<td>x^*</td>
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<td>OTC</td>
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<td>option tube collector</td>
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<td>x</td>
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<td>t3F</td>
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<tr>
<td>VERS</td>
<td>XXX</td>
<td>version number</td>
<td></td>
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</tbody>
</table>
4.1.1 Collector temperature

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

Displays the actual collector temperature.
- COL: collector temperature

4.1.2 Store temperatures

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

Displays the actual store temperature.
- TST: store temperature
- TSPL: store temperature base
- TSPU: store temperature top

4.1.3 Sensors 3 and 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

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

4.1.4 Other temperatures

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

Display of the current temperature at the sensor.
- TRF: temperature - return

4.1.5 Pump speed

n %, n1 %:
Actual pump speed
Display range: 30...100 %

Display of the actual pump speed.
- n %: actual pump speed (1-pump system)
- n1 %: actual pump speed pump 1

4.1.6 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.

4.1.7 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 (flashing). The time can be set using buttons 1 and 2 and saved by pressing the SET button.
4.1.8 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 in (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

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 operating hours can be set back to zero. As soon as one of the display channels of the heat quantity 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 heat quantity value 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, no button should be pressed for about 5 seconds. The display returns to the display mode.

4.1.9 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

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

This function is a standard differential control. If the switch-on differential is reached (**DT O**), the pump is operated. The pump runs at 100% speed for 10 seconds. After this period, the pump runs at minimum pump speed (nMN = 30 %). If the temperature difference reaches the adjusted set value (**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.
4.1.10 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, **(flashing)** is shown on the display.

**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.

4.1.11 Collector-limit 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 factoring setting is 140 °C but it can be changed within the adjustment range of 110...200°C. If the temperature is exceeded, **(flashing)** is shown on the display.

4.1.12 System cooling

**OCX**: Option system cooling
Adjustment range: OFF ... ON
Factory setting: OFF

If **OCX** is additionnally enabled:

**CMX**: Maximum collector temperature
Adjustment range: 100 ... 190 °C
Factory setting: 120 °C

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).

If the store temperature is higher than the maximum store temperature **(S MX)** 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, **(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.
4.1.13 Minimum collector function option

**OCN:** Minimum collector function
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.

4.1.14 Antifreeze function

**OCF:** Antifreeze function
Adjustment range: OFF / ON
Factory setting: OFF

**CFR:** Antifreeze temperature
Adjustment range: -10 ... 10 °C
Factory setting: 4,0 °C

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.

**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.

4.1.15 Recooling function

**OREC:** Recooling
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 as soon as possible (depending on weather conditions). It is switched off when the store is cooled down to the adjusted maximum temperature via the collector and the pipework.

4.1.16 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. After this, 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.
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, ⊙ is displayed.

**4.1.17 Thermostat function**

(ARR = 2)

- **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

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).

**4.1.18 Pump speed control**

- **nMN**: 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 nMN.

**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.

**4.1.19 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 (blinkend) + ⊙
5. Troubleshooting

If a malfunction occurs, a notification is given on the display of the controller:

On the display appears the symbol ⚠️ and the symbol ⬤.

Sensor defect. An error code is shown on the relevant sensor indication channel instead of a temperature.

- 88.8

Line break. Check the line.

Short-circuit. Check the line.

Pt1000-temperature sensors pinched off can be checked with an ohmmeter. In the following the resistance values corresponding to different temperatures are listed.

<table>
<thead>
<tr>
<th>°C</th>
<th>Ω</th>
<th>°C</th>
<th>Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>961</td>
<td>55</td>
<td>1213</td>
</tr>
<tr>
<td>-5</td>
<td>980</td>
<td>60</td>
<td>1232</td>
</tr>
<tr>
<td>0</td>
<td>1000</td>
<td>65</td>
<td>1252</td>
</tr>
<tr>
<td>5</td>
<td>1019</td>
<td>70</td>
<td>1271</td>
</tr>
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<td>10</td>
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<tr>
<td>50</td>
<td>1194</td>
<td>115</td>
<td>1442</td>
</tr>
</tbody>
</table>

Resistance values of the Pt1000-sensors
5.1 Various

Pump is overheated, but no heat transfer from collector to the store, feed flow and return flow are equally warm, perhaps also bubble in the lines.

Air in the system?

- no
- yes

Is the collector circuit plugged at the dirt trap?

- yes
- no

Exhaust the system; increase system pressure to at least static primary pressure plus 0.5 bar; if necessary continue to increase, switch the pump for a short time off and on.

Clean the dirt trap

Pump starts up very late and soon stops working soon.

Switch-on-temperature difference $\Delta T_{on}$ too large?

- no
- yes

Collector sensor unfavourable placed (e.g. contact sensor instead of immersion sleeve sensor?)

- yes
- no

If necessary activate tube collector function.

Collector circuit pump defect?

- no
- yes

Change $\Delta T_{on}$ and $\Delta T_{off}$ accordingly.

Control / replace

Heat exchanger calcified?

- no
- yes

Decalification

Heat exchanger plugged?

- no
- yes

Cleaning

Heat exchanger too small?

- yes
- no

Replace with correctly sized one.

Pump starts for a short moment, switches-off, switches-on again, etc. (‘controller hunting’)

Is the temperature difference at the controller too small?

- no
- yes

Wrong placing of the collector sensor?

- no
- yes

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

Plausibility control of the option tube collector special function?

O.k.

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

Is the switch-on-temperature difference $\Delta T_{on}$ too large?

- no
- yes

Collector circuit pump defect?

- no
- yes

Control / replace

Heat exchanger calcified?

- no
- yes

Decalification

Heat exchanger plugged?

- no
- yes

Cleaning

Heat exchanger too small?

- yes
- no

Replace with correctly sized one.
Stores are cooled during the night.

**Does collector circuit pump run during the night?**
- no
- yes

**Collector temperature is at night higher than ambient temperature.**
- no
- yes

**Is store insulation sufficient?**
- yes
- no

**Is store insulation close enough to the store?**
- yes
- no

**Are the store connections insulated?**
- yes
- no

**Warm water outflow upwards?**
- no
- yes

**Does warm water circulation run for a very long time?**
- no
- yes

**Switch-off the circulation pump and the blocking valve for 1 night; less store losses?**
- yes
- no

**Control the return flow preventer in warm water circulation - o.k.**
- yes
- no

**The gravitation circulation in the circulation line is too strong; insert a stronger return flow preventer or an electrical 2-way valve behind the circulation pump; the 2-way valve is open in pump operation, otherwise it is closed, connect pump and 2-way valve in parallel; activate the circulation again!**

**The solar circuit pump does not work although the collector is obviously warmer than the store.**

**Does the pump start up in manual operation?**
- no
- yes

**The adjusted temperature difference for starting the pump is too high; choose an matching setting**

**Is the current of the pump released by the controller?**
- yes
- no

**Turn the pump shaft using a screwdriver; is it passable now?**
- no
- yes

**Are the fuses of the controller o.k.?**
- yes
- no

**Replace the fuses.**

**Controller might be defective - replace it.**

**Please also check further pumps which are connected to the solar store.**

**Check the pumps of the after-heating circuit according to nightly run and defect return flow preventer; problem solved?**
- no
- yes

**Cleaning or replacement.**
6. Accessory

Sensors
Our product range includes high-precision platin temperature sensors, flatscrew sensors, ambient temperature sensors, indoor temperature sensors, cylindrical clip-on sensors and irradiation sensors, also to be used as full sensors with sensor pocket.

Overvoltage protection
We highly recommend to install the RESOL overvoltage protection in order to avoid overvoltage damages at the collector (e.g. by lightening).
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 the resulting damages.

Please note:
The design and the specifications are to be changed without notice. The illustrations may differ from the original product.