

RESOL DeltaSol[®] AX

Mounting

Connection

Operation

Application examples



reddot design award
winner 2005



48005520

Thank you for buying this RESOL product.
Please read this manual carefully in order to put this controller to the best possible use.

DeltaSol[®] AX

en-US/CA

manual

www.resol.com

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General

Safety advice


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

Instructions

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

Equipment to be installed and used in accordance with the rules of the National Electrical Code (NEC) or with Canadian Electrical Code (CEC), Part I.

Description of symbols

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

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

- **Warning** means that injury, possibly life-threatening injury, can occur.

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 an environmentally sound disposal of the devices.

Target group

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.

Information about the product

Proper usage

The solar controller is a temperature differential controller for use in solar, heating and air-conditioning systems in compliance with the technical data specified in this manual. Improper use excludes all liability claims.



Note

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

Subject to technical change. Errors excepted.

Included:

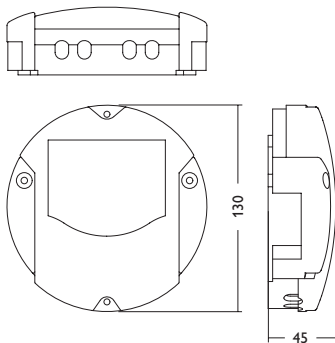
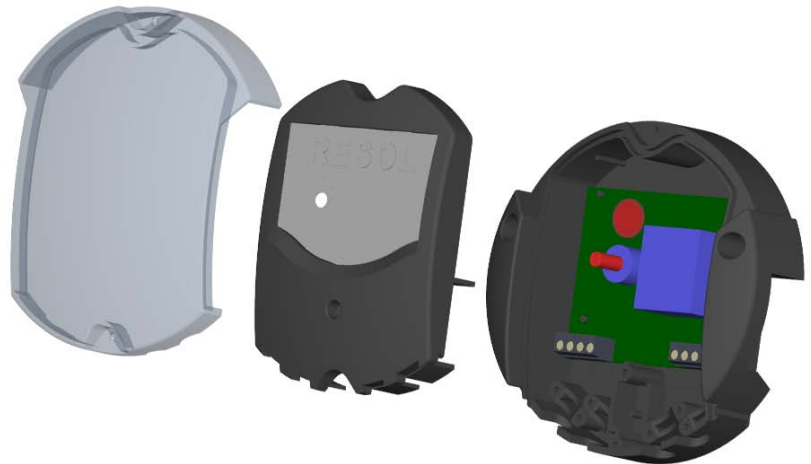
- controller *DeltaSol® AX* (full kit incl. 2 temperature sensors)
- spare fuse inside the housing
- accessory bag containing silicone sealing, fastening screws and wall plugs, strain relief clamp and screws
- manual

Technical data**Housing:**

plug-in plastic PC-ABS

Protection type: IP 20 / EN 60529**Ambient temp.:** 0 ... 40 °C / 32 ... 104 °F**Size:** Ø130 mm, 45 mm height,
Ø5.12", 1.77"**Mounting:** wall mounting**Display:** 1 function control lamp**Inputs:** 2 Pt1000 sensor inputs**Outputs:** 1 standard relay (change-over contact)**Switch-on difference:** ΔT 2 ... 16 K / 3.6 ... 28.8 °Ra adjustable**Switch-off difference:**

1,6 K / 2.8 °Ra below switch-on difference

Control range: -20 ... +150 °C / -4 ... 302 °F**Power consumption:** max. 4A**Power supply:** 115V~**DeltaSol® AX**

Due to its tough and deliberately simple design concept this low priced differential controller can be widely used in solar, heating and air conditioning systems. The large control range and adjustable temperature differences ensure that this unit can be used in almost all applications where switching processes are controlled by temperature differences.

The outer cover is available with an optional seal to protect the electronics against water ingress.

The controller checks a temperature difference ΔT measured by two temperature sensors by comparing this difference with a preadjusted switch-on difference (adjustable within the range of 2 ... 16 K / 3.6 ... 28.8 °Ra). The control of the system is effected by a standard relay (= changeover contact), to which several motors or electrical valves can be connected. The controller switches ON, if the adjusted temperature difference is exceeded; if this difference is underrun by 1,6 K / 2,8 °Ra, the controller switches OFF.

Order indications

RESOL DeltaSol AX **115 211 77**

RESOL DeltaSol AX - full kit **115 211 87**

incl. 2 Pt1000 temperature sensors (1 x FKP6, 1 x FRP6)

Accessory**Overvoltage protection**

In order to avoid overvoltage damage at collector sensors (e.g. caused by local lightning storms), we recommend installing the overvoltage protection **RESOL SP10**. **180 110 70**



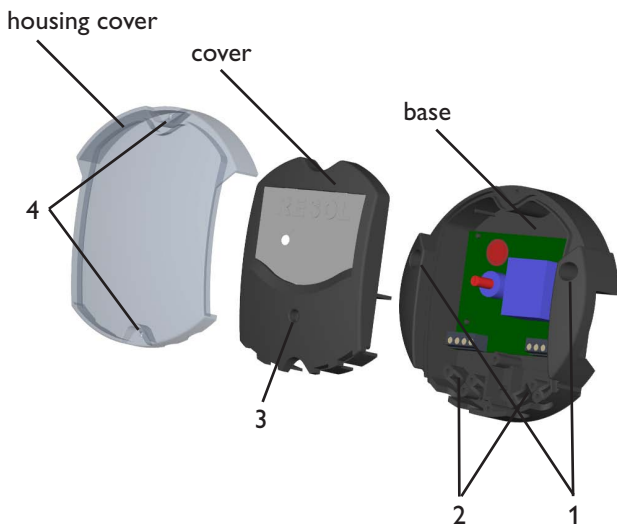
Electrostatical discharges can lead to damages of electronic components!



Dangerous voltage on contact!



1. Installation

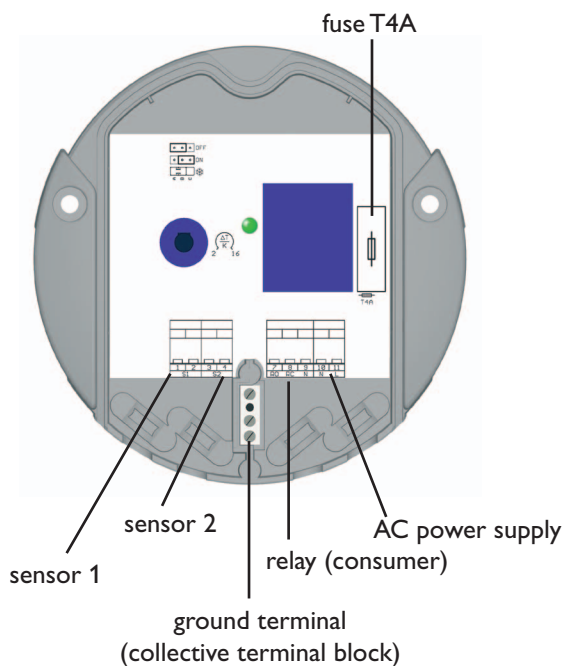


WARNING!
Switch-off power supply before opening the housing.

The unit must only be located in dry interior locations. It is not suitable for installation in hazardous locations and should not be located near to any electromagnetic fields. Please ensure sensor cables and AC power supply routed separately.

1. Choose a location, drill two holes of $\varnothing 6$ mm/0.24" side by side with a distance of 113 mm/4.45" and fit in the enclosed wall plugs.
2. Mount the controller by means of the enclosed screws (4 x 40 mm/1.57") (pos. 1).
3. The electrical connection must be effected now. Power supply of the controller (115 V~) must be effected by external power switch.

1.2 Electrical connection



Connection of the sensors at the terminals:

- 1 / 2 = sensor 1 (e. g. collector sensor)
- 3 / 4 = sensor 2 (e. g. tank sensor)

Connection of the consumer to the terminals:

- 7 = normally open contact relay (RO)
- 8 = break contact relay (RC)
- 9 = neutral contact relay (N)

ground terminal \oplus (**collective terminal block**)

AC power supply to the terminals:

- 10 = neutral conductor N
 - 11 = conductor L
- ground terminal \oplus (**collective terminal block**)

The guides of the required insertion channels must be broken away at the bottom side of the cover.

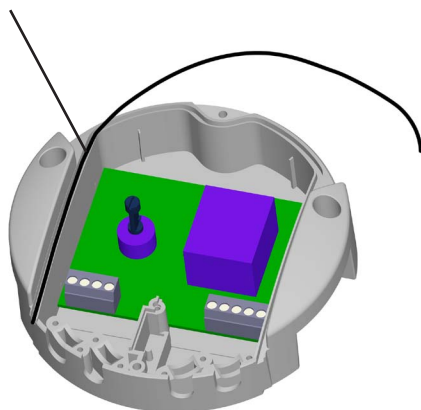
The cables are to be attached to the housing by enclosed strain relief supports and screws (pos.2).

If necessary, activate anti-freeze function by jumper. If protection against dripping water is required insert the silicone sealing ring into the groove on the base plate. Do not stretch it.

Put on the cover and fasten the screw (pos. 3). If necessary, adjust temperature difference ΔT .

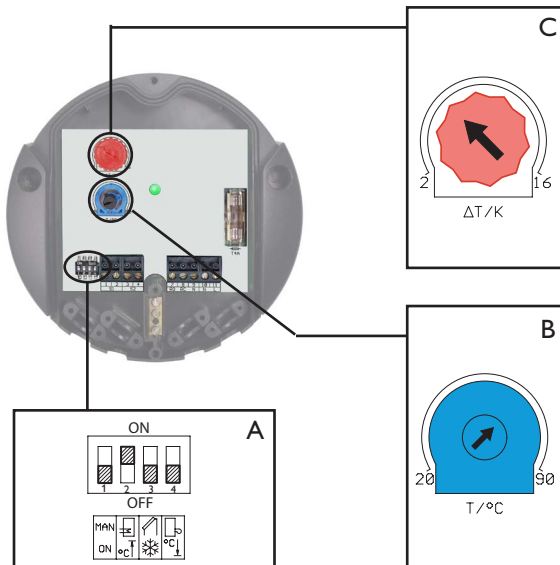
Put on the housing cover and fasten the screw (pos. 4).

Insert sealing ring without strain into the groove



2. Functions and settings

2.1 Micro-switch and potentiometer



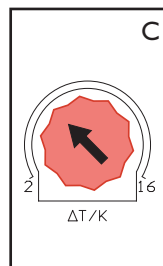
The micro-switch (A) activates (ON) or deactivates (OFF) the following functions:

- Manual operation (micro-switch 1)
- Maximum temperature limitation (micro-switch 2)
- Anti-freeze protection (micro-switch 3)
- Minimum temperature limitation (micro-switch 4)

Potentiometer (B) adjusts the temperature for the maximum or minimum temperature limitation in °C.

Potentiometer (C) adjusts the switch-on temperature in K.

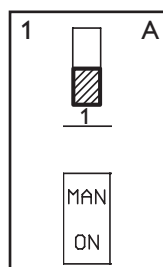
2.2 Switch-on temperature difference



The controller checks the existing temperature difference between temperature sensor S1 and temperature sensor S2 with the adjusted temperature difference ΔT at the potentiometer (C). The controller operates the relay as soon as the temperature reaches the adjusted nominal value, the operating control lamp flashes green. If the set value is under-run by a difference of 1.6 K / 2.88 °Ra (hysteresis, cannot be changed) the controller operates the relay again.

The factory setting for the switch-on temperature difference is preadjusted to 6 K / 10.8 °Ra. Adjustable temperature difference within a range of 2 ... 16 K / 3.6 ... 28.8 °Ra

2.3 Manual operation mode

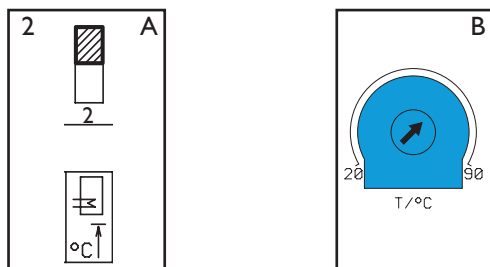


During commissioning and maintenance the relay can be switched on manually.

The manual operation mode is activated and deactivated with the micro-switch. When the manual operation mode is activated, the operating control lamp flashes green.

The factory setting for the manual operation mode is deactivated (micro-switch in OFF-position), the controller is in automatic operation.

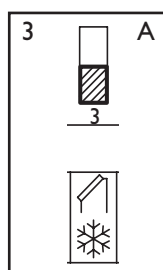
2.4 Maximum temperature limitation



Micro-switch 2 activates the temperature limitation as a maximum temperature limitation. The temperature for the temperature sensor mounted on terminal S2 is adjusted as a limiting value at the potentiometer (B). If the adjusted maximum temperature is exceeded, the relay is operated and prevents e.g. further tank loading (protection against overheating). If the maximum tank temperature is exceeded, the operating control lamp flashes red.

The factory setting for the maximum temperature limitation is activated (micro-switch in ON-position), the temperature limitation is preadjusted to 60 °C / 140 °F. The temperature difference is adjustable within a range of 20 ... 90 °C / 68 ... 194 °F.

2.5 Anti-freeze protection

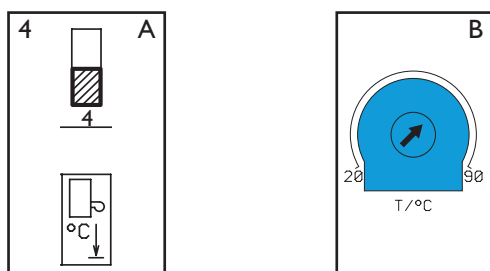


Micro-switch 3 activates an anti-freeze protection function. The anti-freeze protection function reacts to the temperature of sensor S1 (e.g. a collector sensor). As soon as this sensor measures a temperature below +4 °C / +39.2 °F, hotter water is pumped from the tank to the collector to prevent damage to the collector; in the course of this the operating control lamp flashes green. As soon as a temperature of +5 °C / +41 °F is reached, the pump switches off again.

Please note: As there is only a limited heat quantity of the tank available for this function, the anti-freeze function should only be used in regions with few days of temperatures around freezing point.

The factory setting for the anti-freeze function is deactivated. (micro-switch in OFF-position).

2.6 Minimum temperature limitation



Micro-switch 4 activates the temperature limitation as a minimum temperature limitation. The temperature is adjusted as a limiting value for the sensor mounted on the terminals S1 at the potentiometer „temperature limitation“. The relay will not be operated until the adjusted temperature is reached. This function should preferably be used in combination with a solid fuel boiler in order to avoid flue gas condensation within the boiler. By maintaining a minimum temperature limitation in the heat generator, a flue gas condensation on the boiler walls is avoided. If the minimum temperature is underrun, the operating control lamp flashes red.

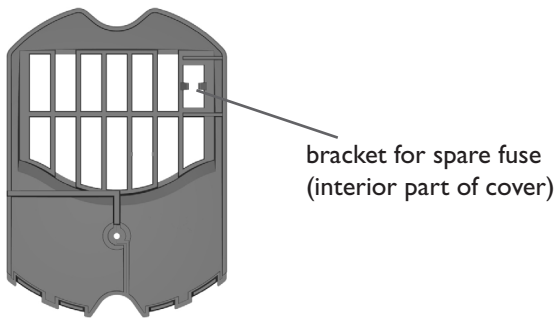
The factory setting for the minimum temperature limitation is deactivated (micro-switch in OFF-position). When activated, a temperature limitation of 60 °C / 140 °F is preadjusted.

2.7 Flashing codes

Ready for use	red
Relay active	green
Manual mode active	green (flashing)
Maximum temperature exceeded	red (flashing)
Anti-freeze protection active	green (flashing)
Minimum temperature under-run	red (flashing)

The LED shows the actual operating status of the controller.

3. Troubleshooting



If the controller does not work faultlessly, please check the following items:

If the controller does not switch on when it is supplied with power please check the fuse. The controller is protected by a T4A fuse, which can be replaced after having removed the housing and the cover. A spare fuse is enclosed on the backside of the cover.

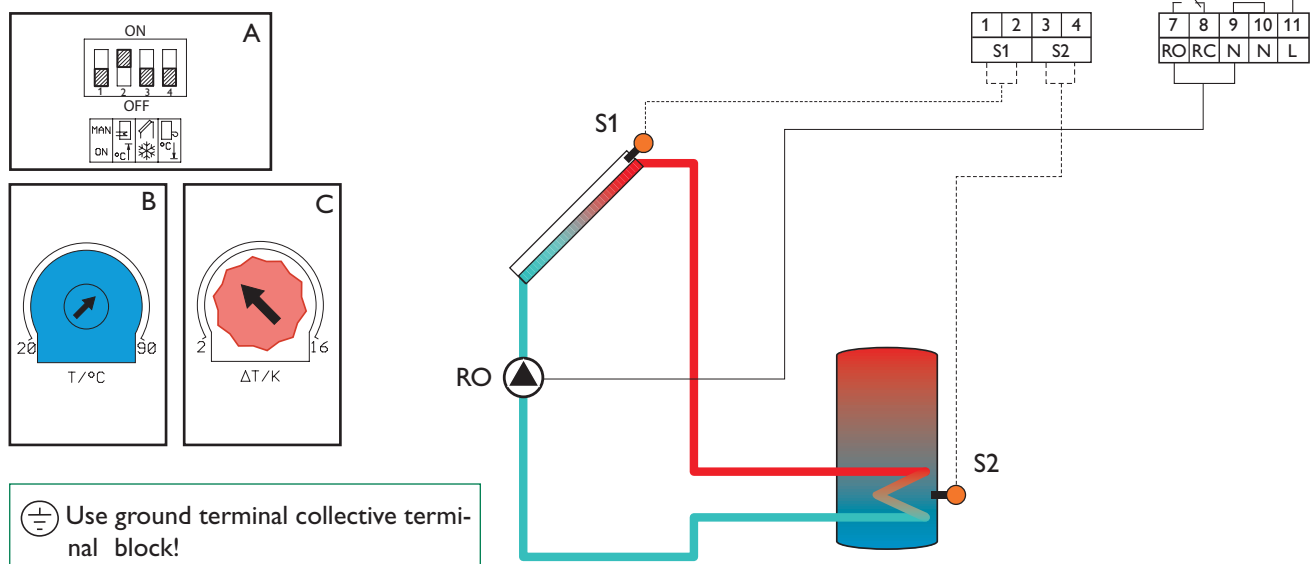
Please check the sensors. Sensors which are not connected, must have following resistance values depending on the given temperature.

°F	14	23	32	41	50	59	68	77	86
°C	-10	-5	0	5	10	15	20	25	30
Ω	961	980	1000	1019	1039	1058	1078	1097	1117
°F	95	104	113	112	131	140	149	158	167
°C	35	40	45	50	55	60	65	70	75
Ω	1136	1155	1175	1194	1213	1232	1252	1271	1290
°F	176	185	194	203	100	105	230	239	
°C	80	85	90	95	100	212	110	115	
Ω	1309	1328	1347	1366	1385	1404	1423	1442	

Resistance values of the Pt1000 sensors

4. Application examples

Standard solar system with 1 tank



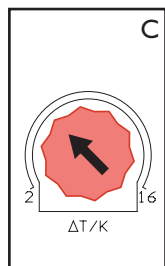
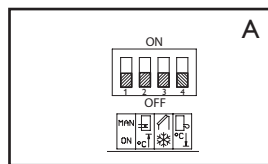
If the current temperature difference ΔT between collector sensor S1 and tank sensor S2 exceeds the temperature difference adjusted at the controller, the solar pump is switched-on. Heat is transported from the collector to the tank; in the course of this the temperature difference is reduced. If the adjusted temperature difference is underrun by a difference of 1.6 K / 2.88 °Ra (hysteresis, cannot be changed), the pump is switched off again.

S1 = collector sensor

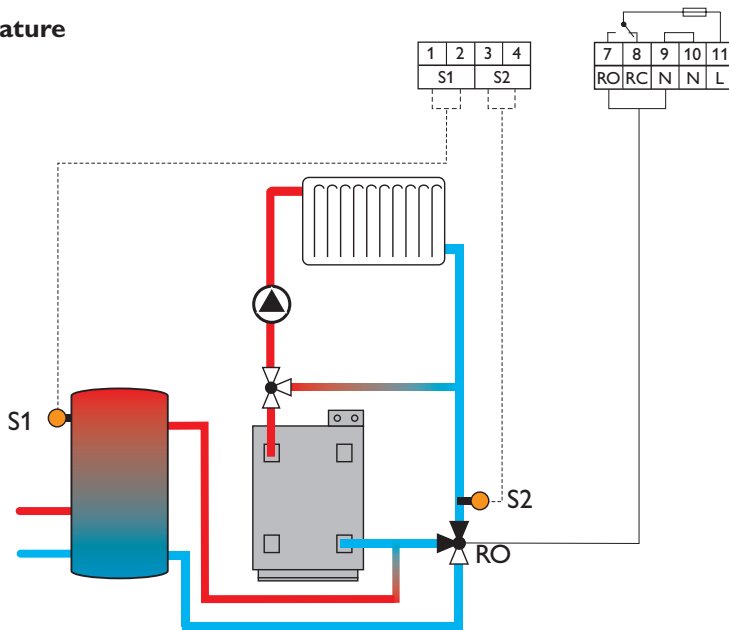
S2 = tank sensor

RO = solar pump

Heating circuit - raising the return temperature



⊕ Use ground terminal collective terminal block

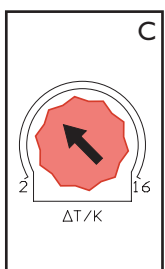
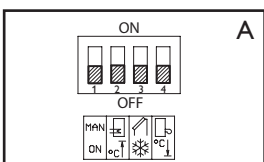


If the temperature difference ΔT between tank sensor S1 and heating circuit return sensor S2 exceeds the temperature difference adjusted at the controller, the 3-way-valve is switched-over. The return temperature of the heating circuit is raised by the heat of the tank so that less conventional energy is necessary to reach the required flow temperature; in the course of this the temperature difference is reduced.

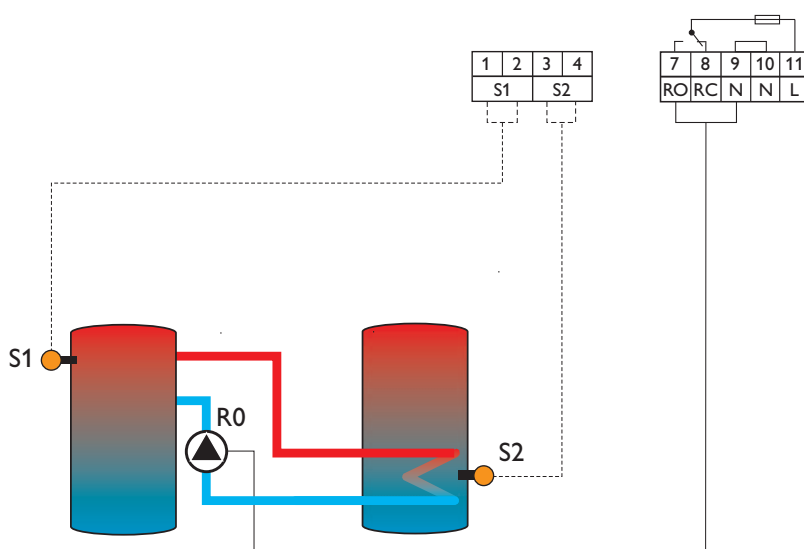
If the adjusted temperature difference is underrun by a difference of 1.6K/2.88 °Ra (hysteresis, cannot be changed), the valve is switched to initial position.

- S1 = tank sensor
- S2 = heating circuit reverse sensor
- RO = 3-way-valve

Heat exchange
(between two tanks)



⊕ Use ground terminal collective terminal block

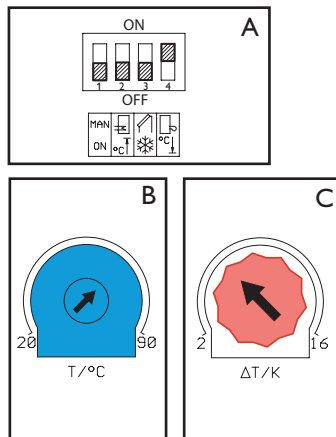


If the temperature difference ΔT between tank (1)- sensor S1 and tank (2)- sensor S2 exceeds the temperature adjusted at the controller, the circulation pump is switched-on. Heat is transported from the tank (1) into tank (2); in the course of this the temperature difference is the reduced.

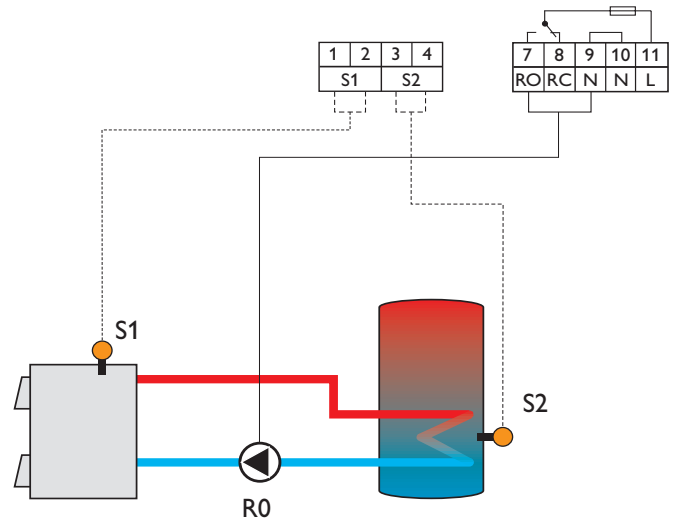
If the adjusted temperature difference is underrun by a difference of 1.6K/2.88 °Ra (hysteresis, cannot be changed), the pump is switched-off again.

- S1 = tank (1) sensor
- S2 = tank (2) sensor
- RO = circulation pump

Tank charge



⊖ Use ground terminal collective terminal block



The controller compares the temperature at the sensor of the solid fuel boiler or boiler inserted in stove (S1) with the temperature at the sensor at tank (S2). If the detected temperature difference is higher than or equals to the preadjusted value ΔT , the pump (RO) is switched-on when simultaneously the given minimum temperature is reached or exceeded. The temperature difference is reduced.

If the difference $1.6\text{ K}/2.88\text{ °Ra}$ (hysteresis, can difference is reduced, cannot be changed) underruns the adjusted temperature difference, the pump is switched off again.

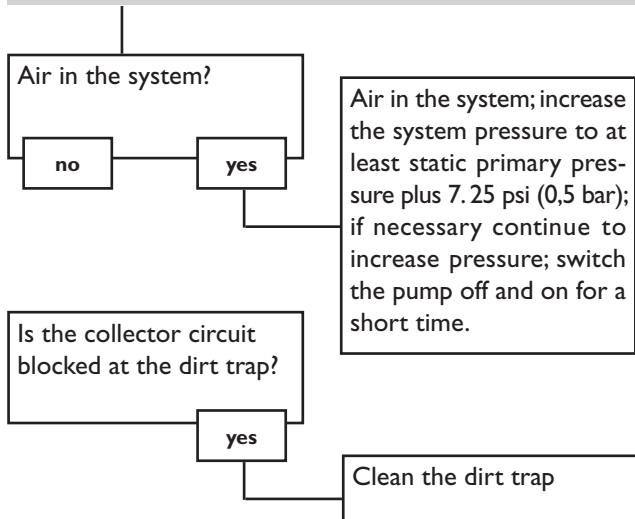
S1 = boiler sensor

S2 = tank sensor

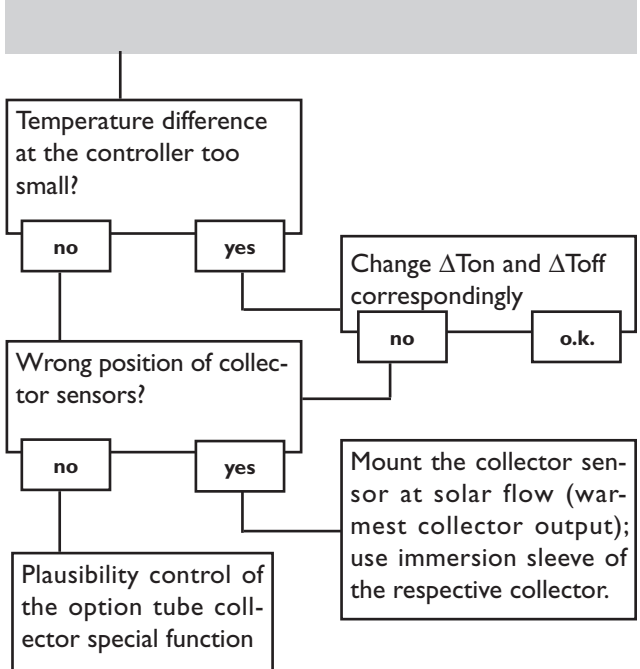
RO = circulation pump

5. Annex: Troubleshooting

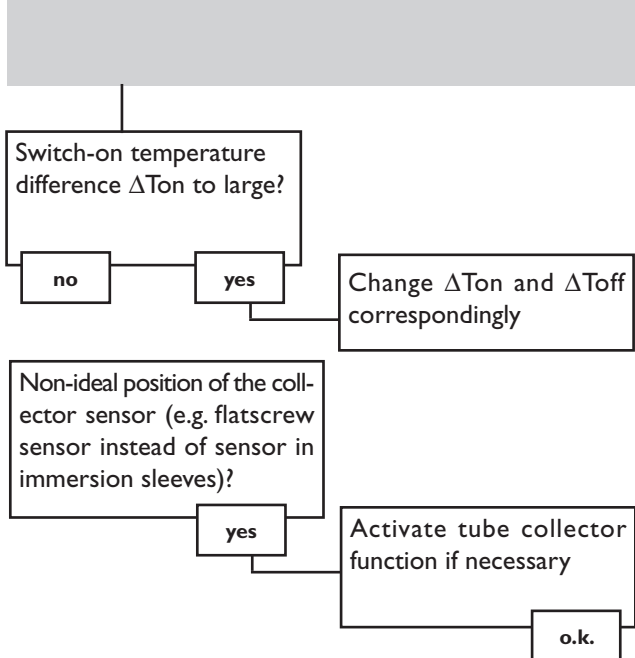
Pump is overheated, but no heat transfer from the collector to the tank, flow and return have the same temperature; perhaps also bubble in the lines.



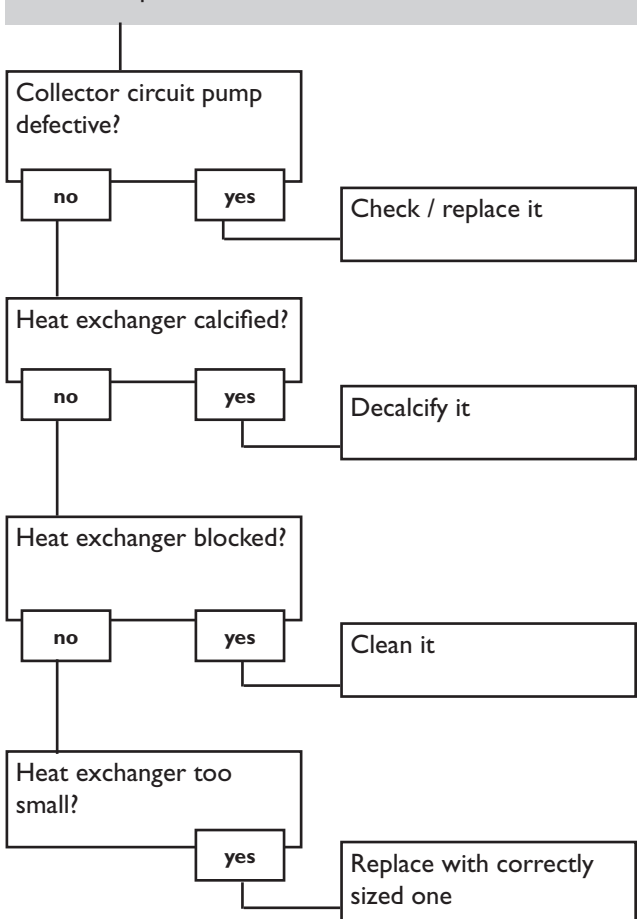
Pump starts for a short moment, switches-off, switches-on again, etc.

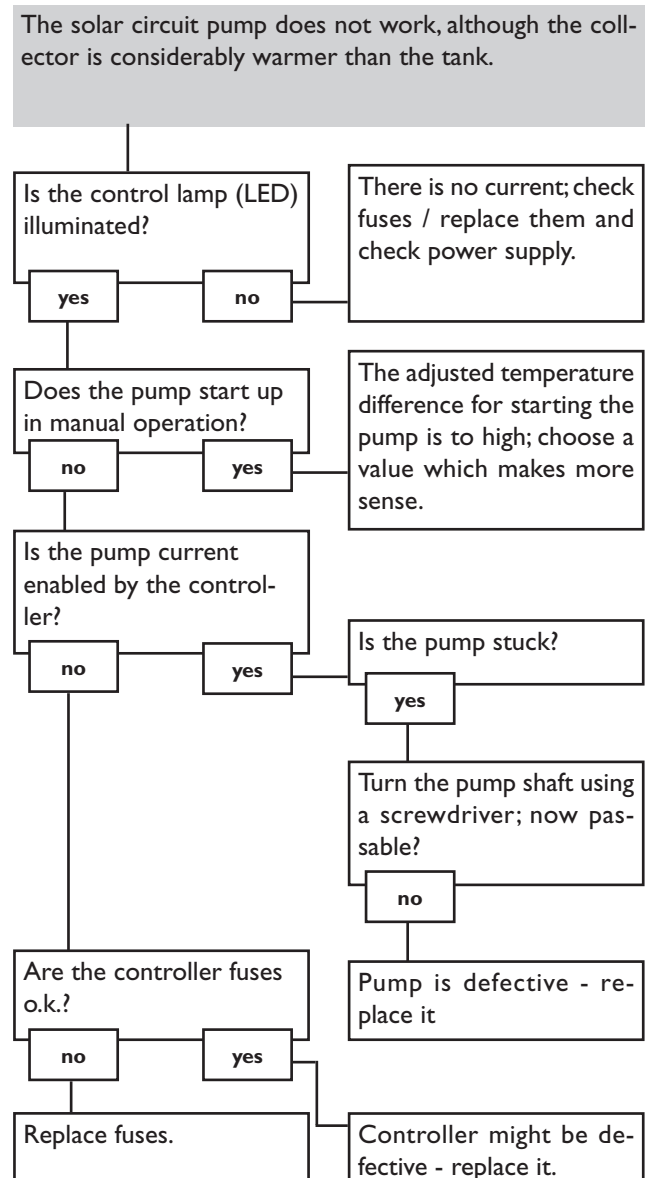
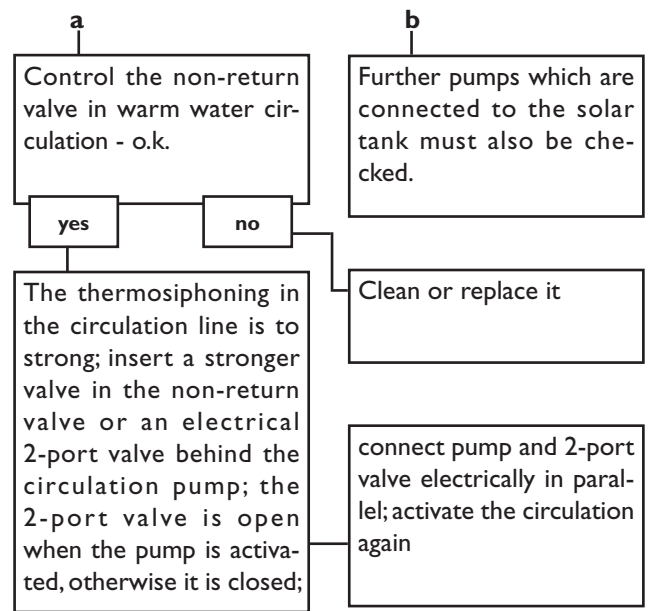
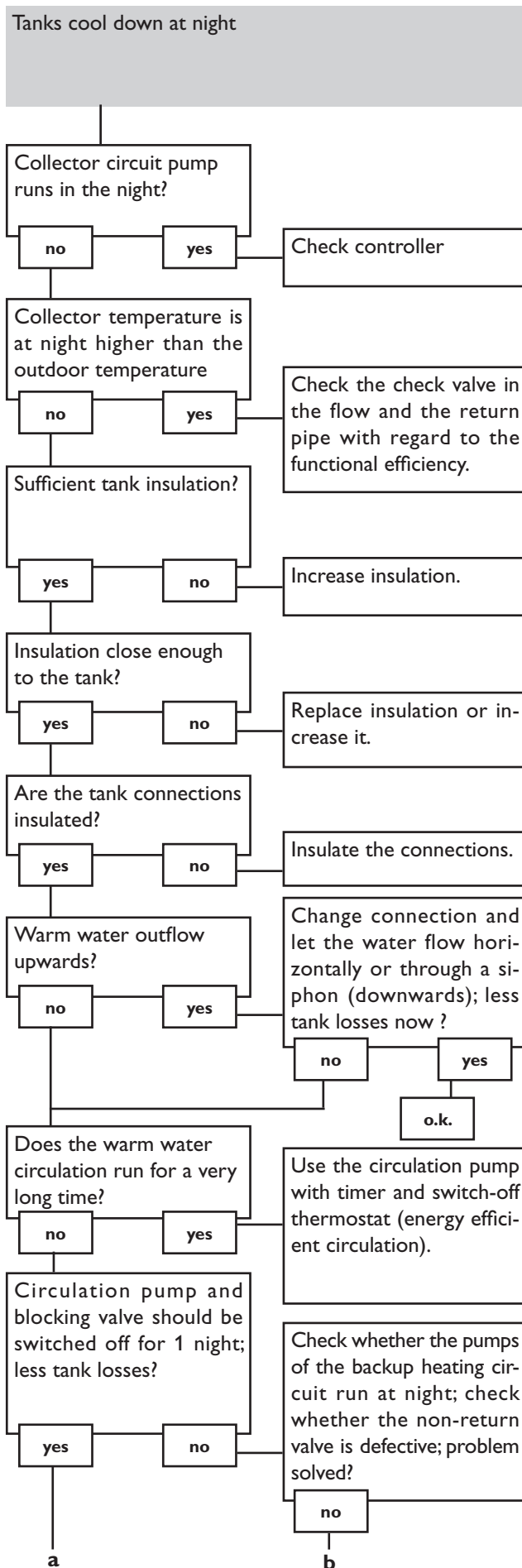


Pump starts up very late



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





Notes

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www.resol.cominfo@resol.com**Important notice:**

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