Mounting - Connection - Handling

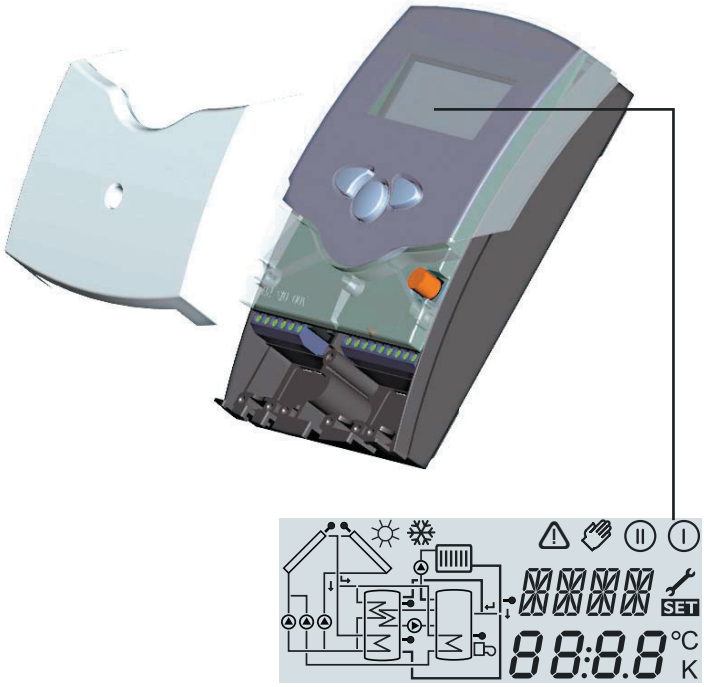
RESOL DeltaSol BS/3

Controller version PG68.30
Software version 1.04

EN
v 1.1

Contents

- system-monitoring-display
- up to 4 temperature sensors
- user-friendly operation by simple handling
- 1 or 2 relay-controlled loads
- solar ope-rating hours counter
- thermostat function
- heat balancing

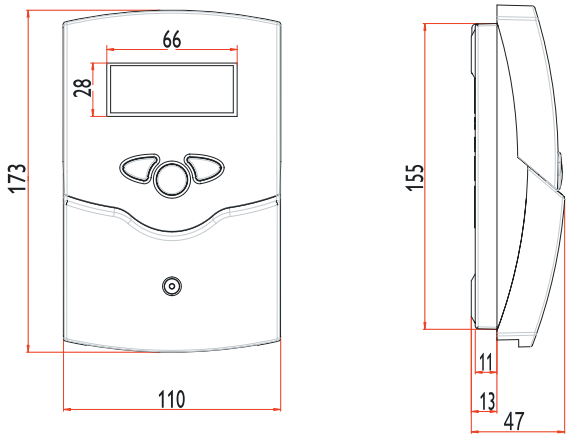


Scope of delivery:

1 x DeltaSol® BS

1 x accessory bag
- 1 x spare fuse T4A
- 2 x screws and dowels
- 4 x strain relief and screws
- 1 x condenser
- 1 x sensor FKP6 (S1 collector temperature)
- 2 x sensor FRP6 (S2 bottom of tank temperature)

Sold separately: sensor FRP6 (S3 top of tank temperature)



Technical data

Housing:
plastic, PC-ABS and PMMA

Protection type: IP 20 / DIN 40050

Ambient temp.: 0 ... 40 °C

Size: 172 x 110 x 46 mm

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

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

Operation: by 3 pushbuttons in the front of the housing

Functions: Temperature differential controller with optional add-on system functions. Function control, operating hours counter for solar pump, tube collector special function, as well as heat quantity balancing.

Inputs: for 4 temperature sensors Pt1000

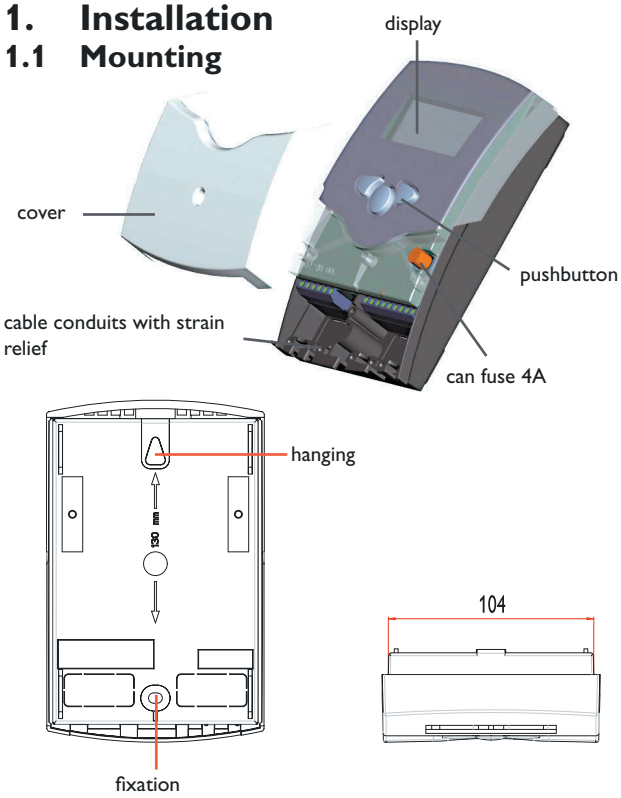
Outputs: 2 relay-controlled circulation pumps

Power supply: 220 ... 240 V~

Switching capacity:
2× electromechanical relay:2 (1) A (220 ... 240) V~

1. Installation

1.1 Mounting



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

The unit must only be located internally in a dry place. It should not be sited near to any electromagnetic fi eld. The controller must additionally be equipped with a circuit breaker according to the valid installaton regulations. Please pay attention to a separate laying of the cable lines and installation of ac power supply.

1. Unscrew the cross-recessed screw of the cover and remove it from the housing.

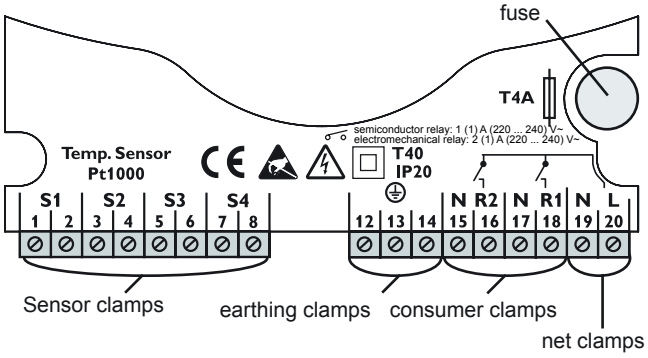
2. Mark the upper fastening point on the wall and premount the enclosed dowel and screw.

3. Hang up the housing at the upper fastening point and mark the lower fastening point on the underground (hole pitch 130 mm), afterwards put the lower dowel.

4. Fasten the housing at the underground.

1.2 Electrical wiring

PG 68.30 and 69.30



The power supply to the controller must only be made by an external power supply switch and the line voltage must be 220 ... 240 Volt (50...60 Hz). Flexible lines are to be fi xed at the housing by enclosed strain relief supports and screws.

The controller is equipped with 2 relays to which the consumers e.g. 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 up to S4) will be connected to the following terminals independently of the 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 TSPO)
6 / 7 = Sensor 4 (e.g. Sensor TRL)

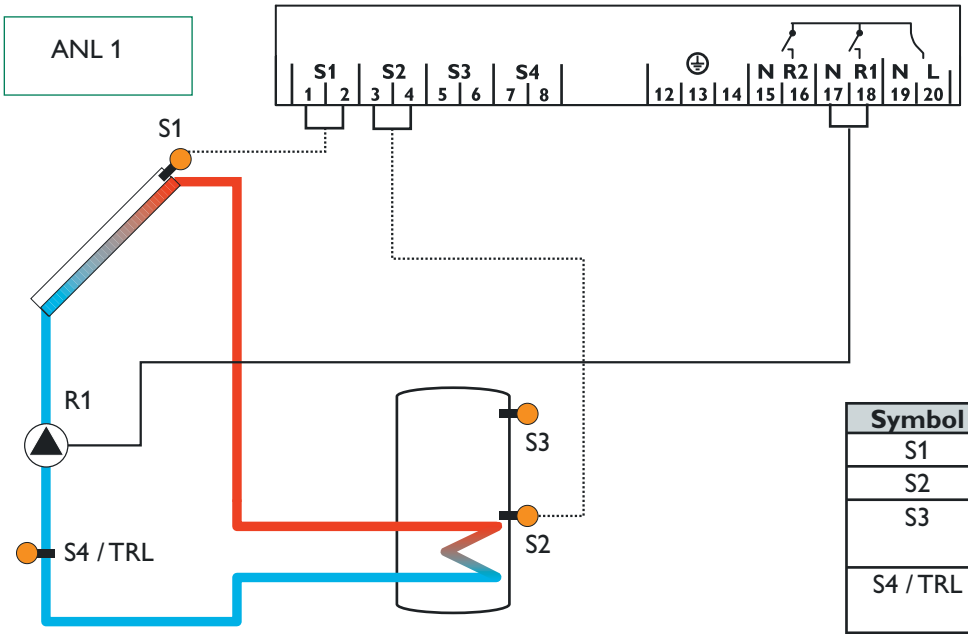
The **power supply** is effected to the clamps:

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

Electrostatic discharge can lead to damages of electronic components!

1.2.1 Allocation of clamps for system Arr 1

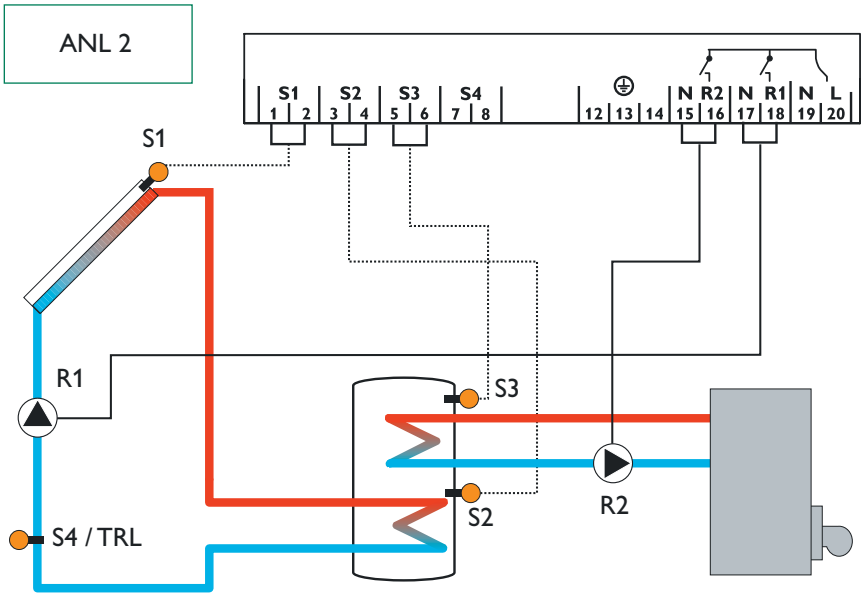
Standard solar system with 1 store, 1 pump and 2 sensors. The sensor S4 / TRL can optionally be used for heat quantity balancing.



Symbol	Specification
S1	Collector sensor
S2	Store sensor below
S3	Store sensor at the top (optionally)
S4 / TRL	Sensor for heat quantity measurement (optionally)
R1	Solar pump

1.2.2 Allocation of clamps for system Arr 2

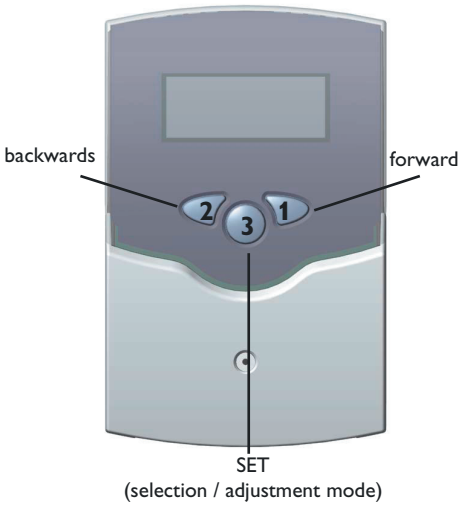
Solar system and after-heating with 1 store, 3 sensors and after-heating. The sensor S4 / TRL can optionally be used for heat quantity balancing.



Symbol	Specification
S1	collector sensor
S2	store sensor below
S3	store sensor at the top
S4 / TRL	sensor for heat quantity balancing (optionally)
R1	solar pump
R2	pump for heat exchange

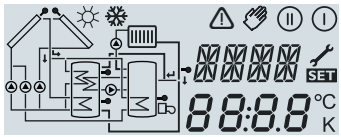
2. Operation and function

2.1 Pushbuttons for adjustment



The controller is operated by 3 pushbuttons below the display. The forward-key (1) is used for scrolling forward through the indication menu or to increase the adjustment values. The backwards-key (2) is accordingly used for the reverse function.

2.2 System monitoring display



Complete Monitoring-Display

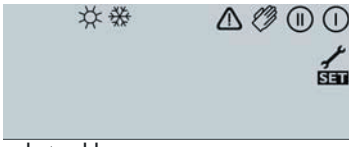
The system monitoring display consists of 3 blocks: **indication of the channel, tool bar** and **system screen** (active system scheme).

2.2.1 Channel indication

only channel indication

The **indication channel** consists of two lines. The upper line is an alphanumeric 16-segment indication, in which mainly the channel names / menu items are shown. In the lower 7-segment indication, the channel values and the adjustment parameter are indicated.
Temperatures and temperature differences are indicated in °C or K.

2.2.2 Tool bar

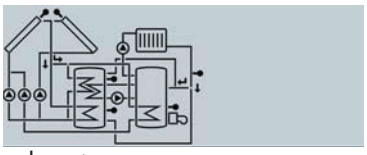


only tool bar

The additional symbols of the **tool bar** indicate the current system status.

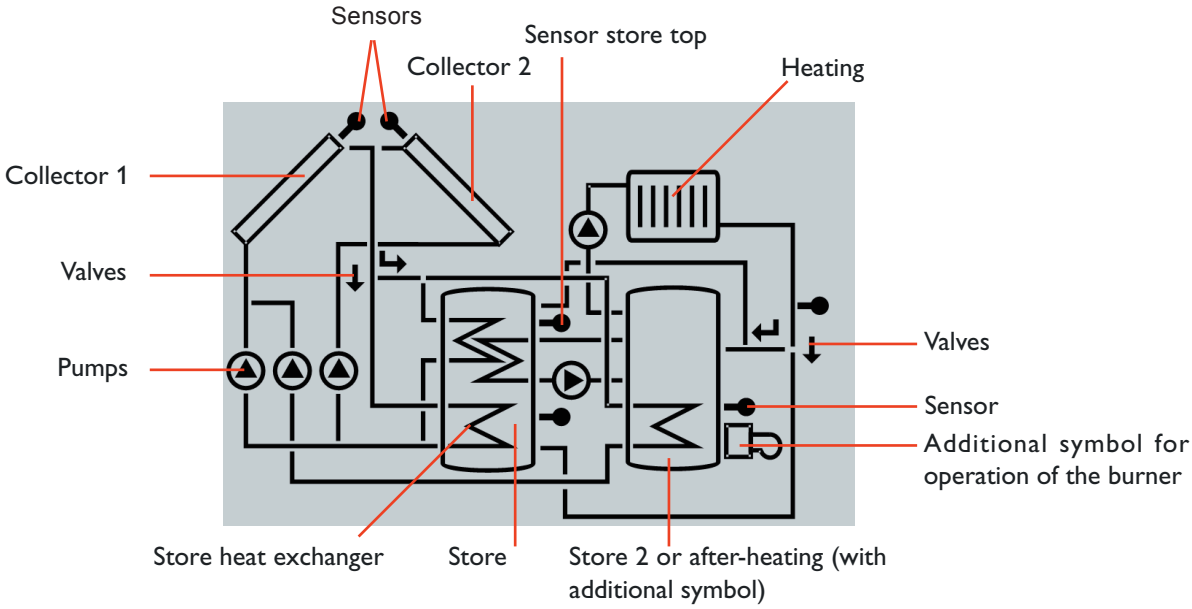
Symbol	standard	flashing
⏻	relay 1 active	
⏸	relay 2 active	
☼	maximum store limitation active / maximum store temperature exceeded	collector cooling function or reccoling function active
❄		collector security shutdown or store security shutdown active
⚠		collector security shutdown
⚠ + 🔧		sensor defect
⚠ + ✋		manual operation active
SET		an adjustment channel is changed SET-mode

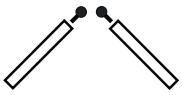
2.2.3 System screen



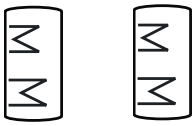
only system screen

The system screen shows one of the 2 system schemes selected on the controller. It consists of several system component symbols, which are - depending on the current status of the system - either fl ashing, permanently shown or hidden.





Collectors
with collector sensor



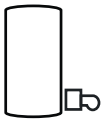
Store 1 and 2
with heat exchanger

3-way-valves
The flow direction or the current bre-aking capacity are always shown.

Temperature sensor

Heating circuit

Pump



After-heating
with burner symbol

2.3 Blinking codes

2.3.1 System screen blinking codes

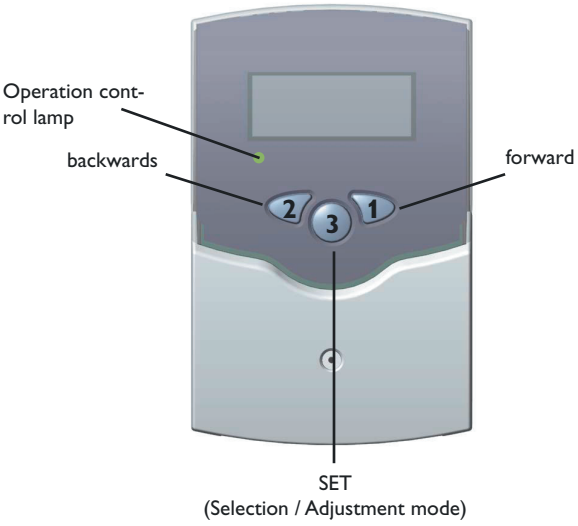
- Pumps are blinking during starting phase
- Sensors are blinking if the respective sensor-indication channel is selected.
- Sensors are quickly blinking in case of sensor defect.
- Burner symbol is blinking if after-heating is activated.

2.3.2 LED blinking codes

Constantly green:	everything all right
Red/green blinking:	initialisation phase manual operation
Red blinking:	sensor defect (sensor symbol is quickly blinking)

3. Commissioning

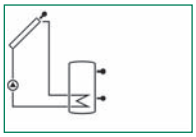
On commissioning you have to adjust primarily the matching system



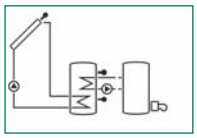
1. Ac power supply must be activated. The controller passes an initialisation phase in which the operating control lamp fl ashes red and green. After having fi nished the initialisation, the controller is in automatic operation with factory settings. The preadjusted system scheme is Arr 1.

2. Setting the system scheme to Arr2:
Press pushbutton 1 and hold for more than 2s, this will switch the controller to service level.
Select Arr channel by pushbuttons 1 or 2
Press pushbutton 3 shortly, SET will start flashing on display.
Set the Arr2 value by pushbutton 2
Press pushbutton 3 shortly, SET will remain on display, the value set is thus stored.

Now the controller is ready for operation and should enable an optimum operation of the solar system by the factory settings made.



Arr 1



Arr 2

System survey:

Arr 1 : standard solar system

Arr 2 : solar system with after-heating

4. Controller parameter and indication channels

4.1 Channel-overview

Legend:

x

Corresponding channel is available.

x*

Corresponding channel is available if the appropriate option is activated.

Please note:
S3 and S4 are only indicated if sensors are connected.

①

Corresponding channel is only available if the option heat quantity measurement is **activated** (OWMZ).

②

Corresponding channel is only available if the option heat quantity measurement is **deactivated** (OWMZ).

MEDT

The channel antifreeze content (MED%) is only shown if a medium other than **water or Tyfocor LS / G-LS (MEDT 0 or 3)** is used. The adjustment is only appropriate when using other types of antifreeze.

channel	Arr		specification	page
	1	2*		
COL	x	x	Temperature collector 1	10
TST	x		Temperature store 1	10
TSTL		x	Temperature store 1 below	10
TSTU		x	Temperature store 1 above	10
S3	x		Temperature sensor 3	10
TRF	①	①	Temperature return sensor	10
S4	②	②	Temperature sensor 4	10
h P	x		Operating hours relay 1	10
h P1		x	Operating hours relay 1	10
h P2		x	Operating hours relay 2	10
kWh	①	①	Heat quantity kWh	14
MWh	①	①	Heat quantity MWh	14
Arr	1-2		System	8
DT O	x	x	Switch-on temperature difference	11
DT F	x	x	Switch-off temperature difference	11
S MX	x	x	Maximum temperature store 1	11
EM	x	x	emergency temperature collector 1	12

channel	ARR		specification	page
	1	2		
OCX	x	x	Option collector cooling collector 1	12
CMX	x*	x*	Maximum temperature collector 1	12
OCN	x	x	Option minimum limitation collector 1	12
CMN	x*	x*	Minimun temperature collector 1	12
OCF	x	x	Option antifreeze collector 1	12
CFR	x*	x*	Antifreeze temperature collector 1	12
OREC	x	x	Option reccoling	13
O TC	x	x	Option tube collector	13
AH O		x	Switch-on temp. for thermostat 1	13
AH F		x	Switch-off temp. for thermostat 1	13
OHQM		x	Option WMZ	14
FMAX	①	①	Maximum flow	14
MEDT	①	①	Antifreeze type	14
MED%	MEDT	MEDT	Antifreeze content	14
HND	x	x	Manual operation relay 1	15
HND2	x	x	Manual operation relay 2	15
LANG	x	x	Language	15
PROG	XX.XX		Program number	
VERS	X.XX		Version number	

4.1.1 Indicataion of collector temperatures

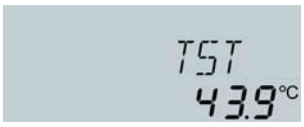
COL:
Collector temperature
display range: -40...+250 °C

Shows the current collector temperature.

- COL : collector temperature (1-collector-system)

4.1.2 Indication of store temperatures

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

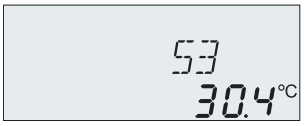


Shows the current store temperature.

- TST : store temperature (1-store-system)
- TSTL : store temperature lower
- TSTU : store temperature upper

4.1.3 Indication of sensor 3 and sensor 4

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



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

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

Please note:
S3 and S4 are only indicated if the temperature sensors are connected (shown).

4.1.4 Indication of other temperatures

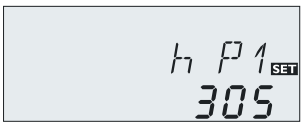
TRF:
other measured temperatures
Display range: -40...+250 °C

Shows the current temperature of the sensor.

- TRF : temperature return flow

4.1.5 Operating hours counter

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



The operating hours counter adds up the solar operating hours of the respective relay (**h P** / **h P1** / **hP2**). Full hours are shown on the display.

The operating hours added up can be reset. As soon as one operating hours channel is selected, the symbol SET in permanently shown on the display. The button SET (3) must pressed for approx. 2 seconds in order to get back into the RESET-mode of the counter. The display-symbol SET is flashing and the operating hours will be set to 0. In order to finish the RESET-procedure, the button SET must be pressed in order to confirm.

In order to interrupt the RESET-procedure, no button should be pressed for about 5 seconds. The controller returns automatically into the indicaton mode.

4.1.6 T-regulation

DT O:
Switch-on temperature
Adjustment range 1,0...20,0 K
Factory setting 6.0

Primarily the controller works in the same way as a standard differential controller. If the switch-on difference **(DT O)** is reached, the pump is activated. If the adjusted switch-off temperature is underrun **(DT F)**, the controller switches-off.

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

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

DT S:
Nominal temperature difference
Adjustment range 1,5..30,0 K
Factory setting 10.0
(PG 67.30 and 69.30)

RIS:
Raise
Adjustment range 1 ... 20 K
Factory setting 2 K
(PG 67.30 and PG 69.30)

4.1.7 Maximum store temperature

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

If the adjusted maximum temperature is exceeded, a further loading of the store is stopped so that a damaging overheating can be avoided. If the maximum store temperature is exceeded, on the display is shown and ☀.

Please note: The controller is equipped with a security-switch-off of the store, which avoids a further loading of the store if 95 °C are reached at the store.

4.1.8 Limit collector temperature Collector emergency shutdown

EM:
Limit collector temperature
Adjustment range
110 ... 200 °C,
Factory setting 140 °C

If the adjusted collector limit temperature (**EM**) is exceeded, the solar pump (R1/R2) is deactivated in order to avoid a damaging overheating of the solar components (collector emergency shutdown). The limit temperature is set to 140 °C by RESOL but it can be changed within the adjustment range of 110 ... 200 °C. In the display is shown ⚠ (flashing).

4.1.9 System cooling

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

CMX:
Maximum collector temp.
Adjustment range
100 ... 190 °C
Factory setting120 °C

If the adjusted maximum store temperature is reached, the solar system switches-off. If now the collector temperature raises to the adjusted maximum collector temperature (**CMX**), the solar pump remains activated until this limit temperature value is again underrun. The store temperature might continue to raise (subordinated active maximum store temperature), but only until 95 °C (emergency shutdown of the store). If the store temperature is higher than the maximum store temperature (**S MX**) and the collector temperature is lower by at least 5 K than the store temperature, the solar system remains activated until the store is again cooled down by the collector and the tubes under the adjusted maximum temperature (**S MX**).
In case of active system cooling on the display is shown ☀ (flashing). Due to the cooling function the solar system can be kept operable for a longer period on hot summer days and a thermal release of the collector and the heat transfer medium is ensured as well.

4.1.10 Option minimum collector limitation

OCN:
Mimimum collector limitation
Adjustment range OFF / ON
Factory setting OFF

CMN:
Minimum collector temperature Adjustment range
-10 ... 90 °C
Factory setting 10 °C

The minimum collector temperature is a minimum switching temperature, which must be exceeded so that the solar pump is switched-on. The minimum temperature shall avoid a steady starting-up of the solar pump (or solid fuel boiler charging pumps) for low collector temperatures. If the minimum temperature is underrun, in the display is shown ❄ (flashing).

4.1.11 Option 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 collector and store if the adjusted antifreeze function is underrun in order to protect the medium that it will not freeze or „get thick". If the adjusted antifreeze temperature is exceeded by 1 °C, the loading circuit will be deactivated.

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

4.1.12 Recooling function

OREC:
option recooling
adjustment range
OFF...ON
Factory setting: OFF

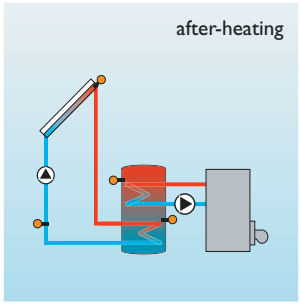
If the adjustem maximum store temperature (**S MX**) is reached, the solar pump remains activated in order to avoid an overheating of the collector. The store temperature might continue to increase but only up to 95 °C (emergency shutdown of the store).
In the evening the solar system continues running until the store is cooled down to the adjusted maximum store temperature via collector and pipes.

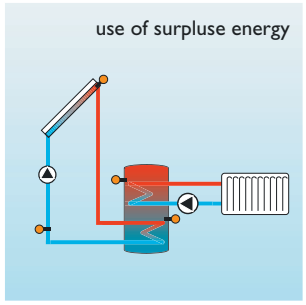
4.1.13 Tube collector special function

O TC:
Tube collector special function
Adjustment range:
OFF...ON
Factory setting: OFF

If the controller measures an increase of 2 K compared to the collector temperature stored at last, the solar pump is switched-on for about 30 seconds. After expiration of the solar pump runtime the current collector temperature is stored as new reference value. If the measured temperature (new reference value) is again exceeded by 2 K, the solar pump again switches-on for 30 seconds. If the switch-on difference between collector and store is again exceeded during runtime of the solar pump or the standstil of the system, the controller automatically switches over to solar charging.
If the collector temperature drops by 2 K during standstill, the switch-on value for the special tube collector function will be recalculated.

4.1.14 Thermostat function
(**Arr** = 2)





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

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

The thermostat function works independently from the solar operation and can e.g. be used for use of surplus energy or an after-heating.

- **AH O** < **AH F**
  the thermostat function is used for after-heating
- **AH O** > **AH F**
  the thermostat function is used for use of surplus energy

4.1.15 Heat quantity balancing

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

FMAX:
Volume flow in l/min
Adjustment range 0... 20 in steps of 0,1
Factory setting 6,0

MEDT: Type of antifreeze
Adjustment range 0...3
Factory setting 1

MED%: Concentration of antifreeze in (Vol-) %
MED% is blinded out by MEDT 0 and 3.
Adjustment range 20...70
Factory setting 45

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

A heat quantity balancing is possible for all systems in conjunction with a flowmeter. You just have to activate the option heat quantity balancing in the channel **OHQM**.

The volume flow readable at the flowmeter (l/min) must be adjusted in the channel **FMAX**. Antifreeze type and concentration of the heat transfer medium are indicated on the channels **MEDT** and **MED%.**

Type of antifreeze:
0 : water
1 : propylene glycol
2 : ethylene glycol
3 : Tyfocor® LS / G-LS

The heat quantity transported is measured by the indication of the volume flow and the reference sensor of feed flow S1 and return flow S4. It is shown in kWh-parts in the indication channel **kWh** and in MWh-parts in the indication channel **MWh**. The sum of both channels form the total heat output.

The heat quantity added up 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. The button SET (3) must be pressed for approx. 2 seconds in order to get back into the RESET-mode of the counter. The display-symbol **SET** is flashing and the value for heat quantity will be set to 0. In order to finish the RESET-procedure, the button **SET** must be pressed for confirmation.

In order to interrupt the RESET-procedure, no button should be pressed for about 5 seconds. The controller returns automatically into indication mode.

4.1.16 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 by selecting the adjustment value MM, in which the following adjustments can be made:

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

4.1.17 Language

LANG:
Adjustment of language
Adjustment range: dE,En
Factory setting: En

The menu language can be adjusted in this channel.

- dE : German
- En : English

WARRANTY CERTIFICATE

DeltaSol BS/3

WARRANTY CONDITIONS

1. The warranty period is 24 months from the date of purchase.
2. When claiming warranty, this Warranty Card must be submitted together with the purchase receipt.
3. The warranty is valid only when the technical conditions set by the Manufacturer are maintained.
4. The warranty does not cover defects caused by tampering, improper handling, using the product to other purposes than designed for, installing the appliance in unsiutable environment, or by a natural disaster.
5. Your claim will be dealt with by your seller at the address shown.

Date of Purchase:.....

Rubber stamp print and signature of the seller:

06/2009

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E-mail: sales@regulus.cz