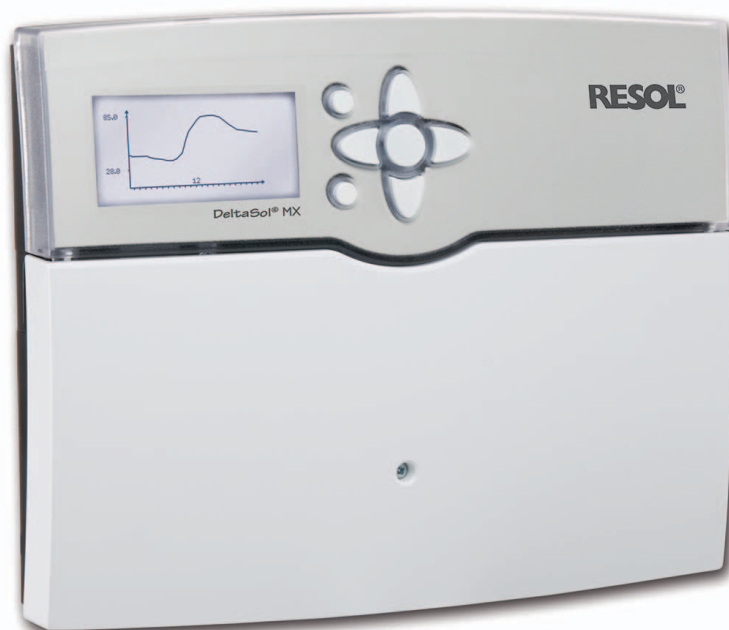


DeltaSol® MX

RESOL®

Supplemental manual for
firmware version 1.03 - 1.06



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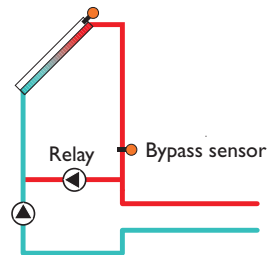
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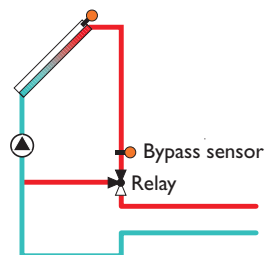
Bypass

Variant	
<input type="radio"/>	Valve
<input checked="" type="radio"/>	Pump

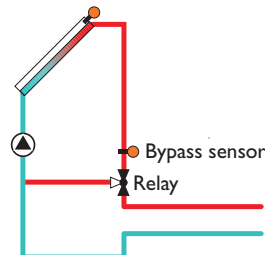
Variant pump:



Variant valve:



Variant valve (inverted):



Exemplary schematics for the bypass variants

Depending on whether the bypass is energised by a valve or by a second pump, a corresponding adjustment can be made in the menu item **Variant**. Depending on the variant, different control logics are applied:

Pump:

In this version, a bypass pump is placed in front of the collector pump.

The bypass pump is first activated when store loading is possible. If the switch-on condition is fulfilled, the bypass pump is switched off and the collector circuit pump is activated.

Valve:

A bypass valve is placed into the solar circuit.

The solar heat exchanger is first bypassed when store loading is possible. If the above-mentioned switch-on condition is fulfilled, the bypass relay switches the collector circuit via the heat exchanger.

When the valve variant is selected, the option **Inverted** is additionally available. When the Inverted option is activated and the bypass circuit becomes activated, the relay switches on. When solar loading starts, the relay switches off again (see figure).

Solar / Opt. functions / Add new function.../ Bypass

Adjustment channel	Description	Adjustment range / selection	Factory setting
Collector	Collector field	system dependent	system dependent
Relay	Bypass relay	system dependent	system dependent
Variant	Variant (pump or valve logic)	pump, valve	pump
Inverted	Valve logic inversion	Yes, No	No
Sensor	Bypass sensor	system dependent	system dependent
ΔT_{on}	Switch-on temperature difference	1.0 ... 20.0 K	6.0 K
ΔT_{off}	Switch-off temperature difference	0.5 ... 19.5 K	4.0 K
Funct.	Activation / Deactivation	Activ., Deactivated	Activ.

CS bypass

CS bypass	
▶ Collector	1,2
Irrad.	200 W/m ²
Delay	120 s

The CS bypass function is a different possibility to activate the collector circuit. To enable the use of the CS bypass function, a CS10 irradiation sensor has to be connected.

When the CS bypass function is activated, the irradiation value is the switch-on condition for the collector circuit.

The relay remains switched on if the irradiation value

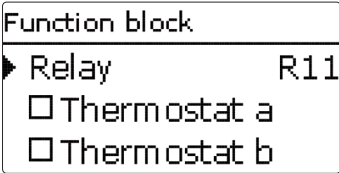
is exceeded for the delay time. When solar loading begins or the irradiation value remains below the switch-on value for the delay time, the relay is switched off.

When the **Stmax off** option is activated, collector circuit activation is suppressed as long as all store temperatures are above their respective maximum temperatures.

Solar / Opt. functions / Add new function.../ CS bypass

Adjustment channel	Description	Adjustment range / selection	Factory setting
Collector	Collector field	system dependent	system dependent
Irrad.	Switch-on irradiation	100 ... 500 W / m ²	200 W / m ²
Delay	Delay time	10 ... 300 s	120 s
Stmax off	Stmax switch-on suppression	Yes, No	Yes
Funct.	Activation / Deactivation	Activ., Deactivated	Deactivated

Function block



In addition to the pre-defined optional functions, function blocks consisting of thermostat functions, timer and differential functions are available. With the help of these function blocks, further components, resp. functions can be controlled.

To each function block, sensors and free relays can be allocated. Sensors already in use can be allocated again without impeding their control functions.

Within a function block the functions are interconnected (AND gate). This means that the conditions of all the activated functions have to be fulfilled (e. g. thermostat and timer) for switching the allocated relay. As soon as one condition is not fulfilled, the relay is switched off.

Function	Function block 1
Relay	3
Thermostat	Thermostat a- S3
	Thermostat b- S4
Differential function ΔT	Sen. 1
	Sen. 2
Timer	Timer

Thermostat function

The relay allocated to the function block is switched on, when the adjusted switch-on temperature ($Th(x)_{on}$) is reached. It is switched off when the adjusted switch-off temperature ($Th(x)_{off}$) is reached. The switching conditions of all other activated functions of the function block have to be fulfilled as well.

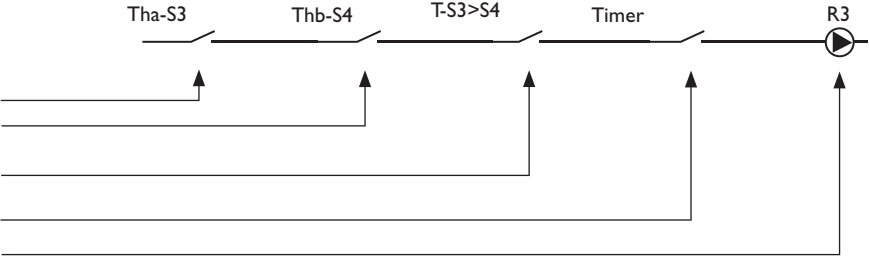
Allocate the reference sensor in the **Sensor** channel.

Adjust the maximum temperature limitation with $Th(x)_{off} > Th(x)_{on}$ and the minimum temperature limitation with $Th(x)_{on} > Th(x)_{off}$. The temperatures cannot be set to an identical value.

ΔT function

The relay allocated to the function block is switched on as soon as the adjusted switch-on temperature difference ($\Delta Th(x)_{on}$) is reached. It is switched off as soon as the adjusted switch-off temperature difference ($\Delta Th(x)_{off}$) is reached. The switching conditions of all other activated functions of the function block have to be fulfilled as well.

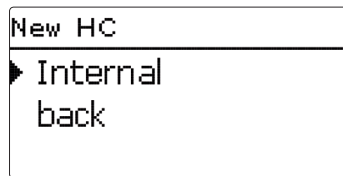
The ΔT function is equipped with a speed control function. A set temperature difference and a minimum speed can be adjusted. The non-adjustable rise value is set to 2 K.



Arrangement / Opt. functions / Add new function.../ Function block

Adjustment channel	Description	Adjustment range / selection	Factory setting
Relay	Relay selection	system dependent	system dependent
Thermostat a	Thermostat a	Yes, No	No
Th-a on	Switch-on temperature Thermostat a	-40 ... 250 °C	40 °C
Th-a off	Switch-off temperature Thermostat a	-40 ... 250 °C	45 °C
Sensor	Sensor thermostat a	system dependent	system dependent
Thermostat b	Thermostat b	Yes, No	No
Th-b on	Switch-on temperature Thermostat b	-40 ... 250 °C	40 °C
Th-b off	Switch-off temperature Thermostat b	-40 ... 250 °C	45 °C
Sensor	Sensor thermostat b	system dependent	system dependent
ΔT function	Differential function	Yes, No	No
ΔT_{on}	Switch-on temperature difference	1.0 ... 50.0 K	5.0 K
ΔT_{off}	Switch-off temperature difference	0.5 ... 49.5 K	3.0 K
ΔT_{set}	Set temperature difference	3 ... 100 K	10 K
Min. speed	Minimum speed	30 ... 100 %	30 %
Sen. Source	Heat source sensor	system dependent	system dependent
Sen. Sink	Heat sink sensor	system dependent	system dependent
Timer	Timer	-	-
Days of the week	Day selection	All days, Monday ... Sunday, Continue	-
Timer	Time frame adjustment	00:00 ... 23:45	-
Funct.	Activation / Deactivation	Activ., Deactivated	Deactivated

Heating circuits



The controller has two internal, weather-compensated heating circuits and is able to control up to 5 external heating circuits by means of extension modules.

In the menu appearing when **New heating circuit** is selected, it is possible to choose between the internal heating circuits and, if available, registered modules.

If one or more extension modules are connected, they have to be registered with the controller. Only registered modules are available in the heating circuit selection.

Extension modules can be registered in the In-/Outputs / Modules menu (see controller manual). If an internal or external heating circuit has been selected, a new menu opens. In this menu, all sensors and relays required for the heating circuit can be allocated, and all adjustments can be made.

The controller calculates the set flow temperature for each heating circuit by means of the outdoor temperature and the selected heating curve. If the measured flow temperature deviates from the set flow temperature, the mixer is activated in order to adjust the flow temperature correspondingly.

If the outdoor temperature falls below the point where the calculated set flow temperature would exceed the maximum flow temperature, the maximum flow temperature is treated as the set temperature for as long as the condition remains.

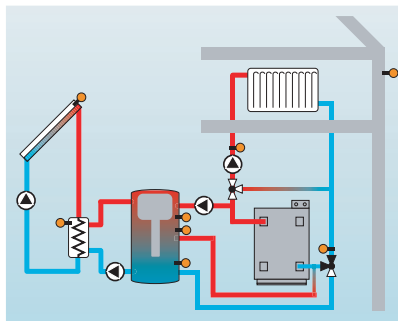
If the outdoor temperature sensor is defective, an

error message is indicated. For the duration of this condition, the maximum flow temperature -5 K is assumed as set flow temperature.

With the timer, the day / night operation can be adjusted. During day phases, the set flow temperature is increased by the adjusted day correction value, during night phases it is decreased by the night correction value (night setback).

Summer mode

The Mode channel adjustment determines how the heating circuit is set to summer mode:



Summer off: The summer mode becomes active when the outdoor temperature exceeds the adjusted summer temperature T_{Summer}.

Ext. switch: A switch is connected to a selected sensor input. If the switch is operated, the heating circuit is set to summer mode regardless of the outdoor temperature.

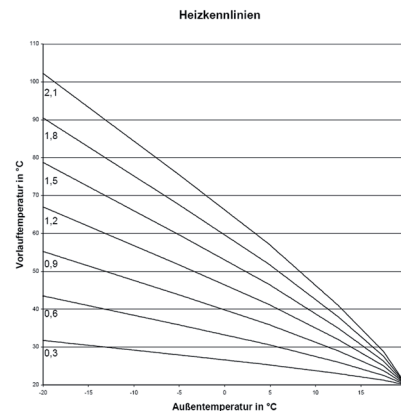
Both: As long as the switch is not operated, summer mode control works as described for Summer off.

Summer mode is activated regardless of the outdoor temperature when the switch is operated.

Summer temperature

If **Summer off** or **Both** has been selected in the **Mode** channel, the summer temperature T_{Summer} can be adjusted. If the outdoor temperature exceeds the value adjusted in T_{Summer}, the heating circuit pump is switched off.

For the summer temperature, a daytime time frame can be adjusted with the channels **Daytime on** and **Daytime off**. Outside this time frame, the adjustable temperature T_{Night} replaces T_{Summer}.



With the **Room thermostat** option, up to 5 room thermostats can be integrated into the control logic.

To each room thermostat, a sensor input can be allocated. The temperature at the allocated sensor is monitored. If the measured temperature exceeds the adjusted **Room temperature** value at all activated

room thermostats, the heating circuit pump is deactivated and the mixer remains in its current position.

Common room thermostats with potential-free outputs can be used alternatively. In this case, **Switch** must be adjusted in the **Type** channel. Before adjusting the type, the corresponding input must also be set to **Switch** in the Inputs / Outputs menu (see main controller manual). Only inputs set to **Switch** will be displayed in the **Sen. RTH** channel as possible inputs for a switch type room thermostat.

If the **Timer RTH** option is activated, time frames can be set for the room thermostats (for information on how to adjust the timer see below). During these time frames, the adjusted room temperature is decreased by the **Correction** value.

To each room thermostat, an additional relay can be allocated. That relay will operate when the temperature at the allocated sensor falls below the adjusted room temperature. This way, the room in question can be excluded from the heating circuit via a valve as long as the desired room temperature is reached.

In the channel **RTH**, the room thermostat can be temporarily deactivated or re-activated respectively. All adjustments remain stored.

When the **Timer** option is activated, a timer is indicated in which time frames for the function can be adjusted.

First of all, an overview of the current adjustments is

displayed. For each day of the week there is an overview display. The display can be switched back and forth between the different days by pressing buttons **2** or **4**.

In order to adjust the timer, press button **5**.

First the individual days of the week or all days of the week can be selected. The last menu item after the list of days is **Continue**. If **Continue** is selected, the **Edit timer** menu opens, in which the time frames can be adjusted.

The time frames can be adjusted in steps of 15 minutes. The cursor can be moved along the time line by pressing buttons **2** or **4**. The beginning of a time frame can be determined by pressing button **1**. The end of a time frame can be determined by pressing button **3**.

Timer: Monday



Weekdays

- ▶ All days
- ☐ Monday
- ☐ Tuesday

Edit timer



Heating / Heating circuits / New heating circuit / Internal

Adjustment channel	Description	Adjustment range / selection	Factory setting
HC pump	Heating circuit pump	system dependent	system dependent
Mixer open	Relay selection mixer open	system dependent	system dependent
Mixer closed	Relay selection mixer closed	system dependent	system dependent
Flow sensor	Flow sensor selection	system dependent	system dependent
Sen. Outd.	Outdoor sensor selection	system dependent	system dependent
Heating curve	Heating curve	0.3 ... 3.0	1.0
Day correction	Day correction	-5 ... +45 K	0 K
Tflowmax	Maximum flow temperature	10 ... 100 °C	50 °C
Mode	Operation mode	Summer off, Ext. switch, both	Summer off
TSummer	Summer temperature day	0 ... 40 °C	20 °C
Daytime on	Daytime on	00:00 ... 23:45	00:00
Daytime Off	Daytime Off	00:00 ... 23:45	00:00
Tnight	Summer temperature night	0 ... 40 °C	14 °C
Ext. switch	External switch sensor input selection	system dependent	system dependent
Remote control	Remote control option	Yes, No	No
Sen. Rem.control	Remote control sensor input selection	system dependent	system dependent
Timer	Timer option	Yes, No	No
Mode	Timer mode	Day / Night, Day / Off	Day / Night
Night corr.	Night correction	-20 ... +30 K	-5 K
Timer	Timer	-	-
Days of the week	Day selection	All days, Monday ... Sunday, Continue	-
Timer	Time frame adjustment	00:00 ... 23:45	-
Room therm. 1 ... 5	Room thermostat option (1 ... 5)	Yes, No	No
Type	Room thermostat type selection	Sensor, Switch	Sensor
Sen. RTH	RTH sensor input selection	system dependent	system dependent
Troom	Room temperature	10 ... 30 °C	18 °C
Timer	RTH timer	Yes, No, Inactive	No

Adjustment channel	Description	Adjustment range / selection	Factory setting
Days of the week	Day selection	All days, Monday ... Sunday, Continue	-
Timer	Time frame adjustment	00:00 ... 23:45	-
Correction	Correction	1 ... 20 K	5 K
Relay	RTH relay selection	system dependent	system dependent
RTH	Room thermostat	Activ., Deactivated	Deactivated
Afterheating	Afterheating option	Yes, No	No
Mode	Afterheating mode	Therm., Boiler	Therm.
Relay	Afterheating relay selection	system dependent	system dependent
Sensor 1	Afterheating sensor 1 selection	system dependent	system dependent
Sensor 2	Afterheating sensor 2 selection	system dependent	system dependent
Loading pump	Loading pump option	Yes, No	No
Relay	Loading pump relay selection	system dependent	system dependent
Overrun time	Loading pump overrun time	0 ... 300 s	60 s
Activ.	Activation / Deactivation	Activ., Deactivated	Deactivated
ΔTon	Switch-on temperature difference	-15.0 ... +44.5 K	+5.0 K
ΔToff	Switch-off temperature difference	-14.5 ... +45.0 K	+15.0 K
Function	Function activated / deactivated	Activ., Deactivated	Deactivated
Interval	Mixer interval	1 ... 20 s	4 s
Runtime	Mixer runtime	10 ... 600 s	240 s
Offset	Automatic adaption of the mixer runtime	-	-
Time	Adjustment time	00:00 ... 23:45	23:30
Chimney sweeper	Chimney sweeper function	Yes, No	No
Frost protection	Antifreeze option	Yes, No	Yes
Sensor	Antifreeze option sensor	Flow, Outdoor	Flow
Antifr. temp.	Antifreeze temperature	-20 ... +10 °C	+4 °C
Flow set	Set flow temperature	10 ... 50 °C	20 °C
Runtime	Antifreeze runtime	15 ... 240 min	30 min
DHW priority	DHW priority option	Yes, No	No
Funct.	Activation / Deactivation	Activ., Deactivated	Deactivated

Chimney sweeper function

The chimney sweeper function can be used for enabling a quick access to measurement conditions without menu operation for the chimney sweeper.

If the chimney sweeper function is activated, the chimney sweeper mode can be accessed by pressing button **6** for 5 seconds.

In the chimney sweeper mode, the heating circuit mixer closes, the loading pump and the afterheating contact are activated. While the chimney sweeper mode is active, the directional pad is illuminated. Additionally, **Chimney sweeper** and a countdown of 30 minutes are indicated on the display.

When the countdown has elapsed, the chimney sweeper mode is automatically deactivated. If, during the countdown, button **6** is again pressed for more than 10 seconds, the countdown starts again.

In order to abort the countdown and thus deactivate the chimney sweeper mode, briefly press button **6**.

Antifreeze option

The antifreeze option of the heating circuit can be used to temporarily activate an inactive heating circuit during sudden temperature drops in order to protect it from frost damage.

When the antifreeze option is activated, the temperature at the allocated sensor is monitored. If the temperature falls below the adjusted **antifreeze temperature**, the heating circuit is activated for the adjusted runtime. Antifreeze operation has its own set flow temperature which can be changed in the **Flow set** channel.

Inputs

S1	
Type	Pt1000
Offset	0.0 K
back	

In this submenu, the type of the sensor connected can be adjusted for each individual input. The following types can be selected:

- Switch
- KTY
- Pt500
- RTA11-M
- Pt1000
- None

ATTENTION! System damage!



Selecting the wrong sensor type will lead to unwanted controller actions. In the worst case, system damage can occur!

→ **Make sure that the right sensor type is selected!**

If KTY, Pt500 or Pt1000 are selected, the channel Offset appears, in which an individual offset can be adjusted for each sensor:

→ In order to select a sensor for the offset adjustment, select the corresponding menu item by pressing button (5)

Offset	
0.0 K	
-15.0	▲ = 0.0
15.0	

→ To adjust the sensor offset, select the desired value by pressing buttons (2) or (4), then confirm by pressing button (5)

In- / Outputs / Inputs

Adjustment channel	Description	Adjustment range / selection	Factory setting
S1 ... S12	Sensor input selection	-	-
Type	Selecting the sensor type	Switch, KTY, Pt500, RTA11-M, Pt1000, None	Pt1000
Offset	Sensor offset	-15.0 ... +15.0 K	0.0 K
Imp. 1 ... 3	Impulse input selection	-	-
Type	Selecting the sensor type	Impulse, Switch, KTY, Pt500, RTA11-M, Pt1000, None	Impulse
Vol./Imp.	Impulse rate	0.1 ... 100.0	1.0
CS10	CS10 input	-	-
Type	CS type	A ... K	E
Offset	Delete offset	Yes, No	No
Ga1, 2	Analog Grundfos Direct Sensor™	-	-
Type	Grundfos Direct Sensor™ type	RPS, VFS, None	None
Min.	Minimum pressure (if Type = RPS)	0.0 ... 0.5 bar	0.0 bar
Max.	Maximum pressure (if Type = RPS)	0.1 ... 16.0 bar	0.6 bar
Min.	Minimum flow rate (if Type = VFS)	1 ... 39 l/min	2 l/min
Max.	Maximum flow rate (if Type = VFS)	2 ... 400 l/min	40 l/min
Gd1, 2	Digital Grundfos Direct Sensor™	-	-
Type	Grundfos Direct Sensor™ type	RPD, VFD, None	None
	if Type = VFD: Measuring range selection	10-200 l/min, 5-100 l/min, 2-40 l/min, 2-40 l/min (fast), 1-20 l/min, 1-12 l/min*	1-12 l/min

* For the Inputs Gd1 and Gd2, the following sensor combinations are possible:

- 1 x RPD, 1 x VFD
- 2 x VFD, but with different measuring ranges only

CS sensor offset

If a CS10 irradiation sensor is to be connected, an offset has to be carried out before the connection is made.

To carry out the offset, proceed as follows:

- Adjust the CS type in the Type channel
- Select the Offset channel

- Confirm the reset enquiry with Yes
- Select back to return to the Inputs menu, then connect the CS sensor



Note:

When Grundfos Direct Sensors™ are used, the sensor ground common terminal block must be connected to PE (see controller manual).

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.com

info@resol.com

Important note

The texts and drawings in this manual are correct to the best of our knowledge. As faults can never be excluded, please note:

Your own calculations and plans, under consideration of the current standards and directions should only be basis for your projects. We do not 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.

Note

The design and the specifications can be changed without notice.

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