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Installation and Operating Manual

SR728C1 SOLAR CONTROLLER

For Split Pressurized Hot Water System



⚠ Read the instruction carefully please before operation!

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1. Safety information

1.1 Installation and commissioning

- When laying cables, please ensure that no damage occurs to any of the constructional fire safety measures presented in the building.
- The controller must not be installed in rooms where easily inflammable gas mixtures are present or may occur.
- The permissible environmental conditions can't be exceeded at the site of installation.
- Before connecting the device, make sure that the energy supply matches the specifications that controller requires.
- All devices connected to the controller must conform to the technical specifications of the controller.
- All operations on an open regulator are only to be conducted cleared from the power supply. All safety regulations for working on the power supply are valid.
- Connecting and /or all operations that require opening the regulator (e.g. changing the fuse) are only to be conducted by specialists.

1.2 About this manual

This manual describes the installation, function and operation of a solar thermal controller. When installing the remaining components e.g. the solar collectors, pump assemblies and the storage unit, are sure to observe the appropriate installation instructions provided by each manufacturer. Installation, electrical connection, commissioning and maintenance of the device may only be performed by trained professional personnel. The professional personnel must be familiar with this manual and follow the instructions contained herein.

1.3 Liability waiver

The manufacturer cannot monitor the compliance with these instructions or the circumstances and methods used for installation, operation, utilization and maintenance of this controller. Improper installation can cause damages to material and person. This is the reason why we do not take over responsibility and liability for losses, damages or cost that might arise due to improper installation, operation or wrong utilization and maintenance or that occurs in some connection with the aforementioned. The manufacturer preserves the right to put changes to product, technical data or installation and operation instructions without prior notice. As long as it becomes evident that safe operation is no longer possible (e.g. visible damage). Please immediately take the device out of operation.

Note: ensure that the device cannot be accidentally placed into operation.

1.4 Important remark

We have carefully checked the text and pictures of this manual and provided the best of our knowledge and ideas, however inevitable errors may exist. Please note that we cannot guarantee that this manual is given in the integrity of image and text, they are just some examples, and they apply only to our own system. Incorrect, incomplete and erroneous information and the resulting damage we do not take responsibility.

1.5 Description of symbols



Safety instruction:

The safety instructions in the manual are marked with a warning triangle. They indicate measures, which can lead to personal injury and safety risks.

Operation steps: small triangle "►" is used to indicate operation step.

Notes: Contains important information about operation or function.

1.6 Operation button description



On/off



Clock



Manual heating



Holiday



Set



Exit/Confirm



Up



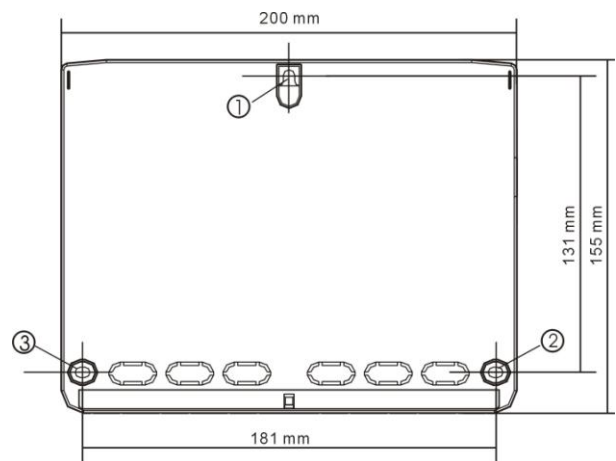
Next

2. Installation

2.1 Installing controller

Note: the controller can only be installed in an area having an adequate level of protection.

- ▶ choose a suitable place
- ▶ drill the top fix hole
- ▶ fasten the screw
- ▶ move the cover plate
- ▶ hang the bottom plate on position ①
- ▶ mark the position of bottom fix hole ② ③
- ▶ take away the bottom plate
- ▶ drill hole
- ▶ rehang the bottom plate on ①
- ▶ fasten the bottom screw on ② ③ position



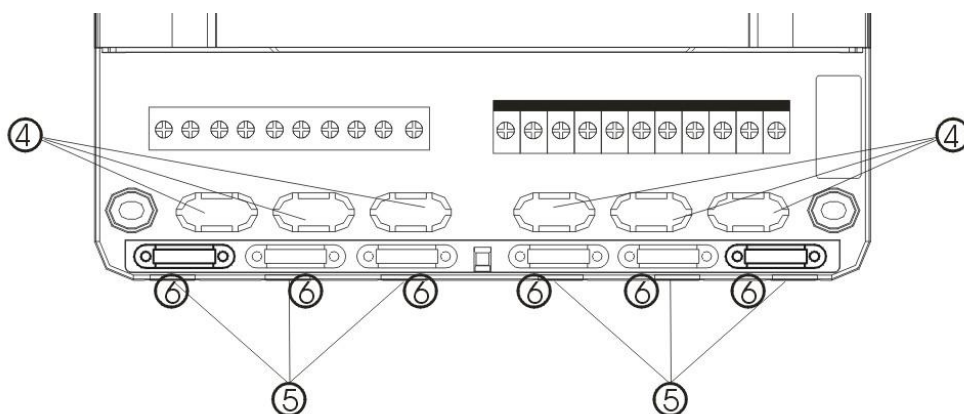
2.2 Wiring connection

Depending on the type of installation, the cables may enter the device through the rear hole of the case ④ or the lower side hole of the case ⑤

Cable come from the rear ④: remove the plastic flaps from the rear side of the case using an appropriate tool.

Cable come from the below ⑤: cut the left and right plastic flaps using an appropriate tool (e.g. knife) and break them out of the case.

Notes: the flexible wire must be fastened on the case using the clamps ⑥ provided

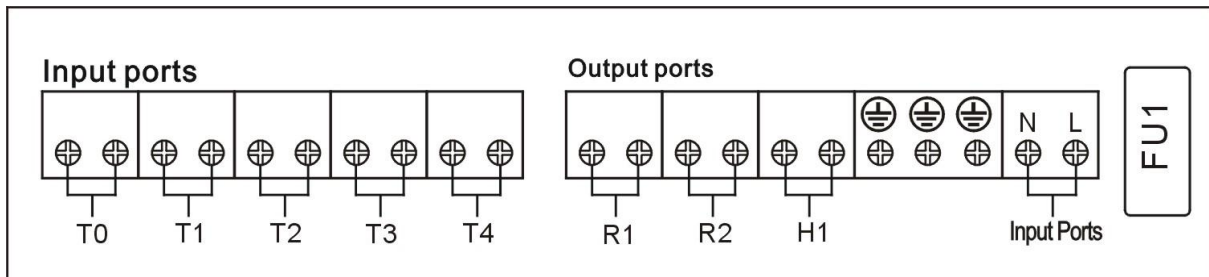


2.3 Terminal connection



Before to open the terminal, please be sure to switch-off the power supplier and pay attention to the local electricity supply rules.

- **Terminal layout**



- **Terminal function**

Terminal ports	Description
FU1	The fuse of controller, AC250V/6.3A.
Power connection ports	
Input Ports:	For power connection, L is live wire, N is naught wire.
Ground	
Inputs ports	
T0	PT1000 temperature sensor, for measuring the temperature of collector or temperature of return pipe
T1	PT1000 temperature sensor, for measuring the temperature of collector
T2 ~ T4	NTC10K, B=3950 temperature sensor, for measuring the temperature of storage tank and pipe
Output ports	
R1	Semiconductor relay (SCR relay), also suitable for RMP control, max. switching current 2A,
R2	Semiconductor relay (SCR relay), also suitable for RMP control, max. switching current 2A,
H1	Electromagnetic relay and max. Switching current 3.5A, for back-up device or 3-way electromagnetic valve.

- **Advice regarding the installation of temperature sensors:**

Only original factory equipped Pt1000 temperature sensors are approved for using on the collector, it is equipped with 1.5meter silicon cable and suitable for all weather conditions, the temperature sensor and cable are temperature resistant up to 280℃, not necessary to distinguish the positive and negative polarity of the sensor connection.

Only original factory equipped NTC10K,B=3950 temperature sensors are approved for using on tank and pipe, it is equipped with 3 meter PVC cable, and they are temperature resistant up to 105℃, not necessary to distinguish the positive and negative polarity of the sensor connection.

All sensor cables carry low voltage, and to avoid inductive effects, must not be laid close to 230 volt or

400-volt cables (minimum separation of 100mm)

If external inductive effects are existed, e.g. from heavy current cables, overhead train cables, transformer substations, radio and television devices, amateur radio stations, microwave devices etc, then the cables to the sensors must be adequately shielded.

Sensor cables may be extended to a maximum length of ca. 100 meter, when cable's length is up to 50m, and then 0.75mm² cable should be used. When cable's length is up to 100m, and then 1.5mm² cables should be used.


3. Commissioning



Connect the sensors, pumps or switching valves to the controller before you connect the power supply!

After switching on power to the controller, firstly it will ask to set the time, password and parameters of system.

3.1 Set time/week

►press  , time displays on screen, hour "00" blinks.


►Press   to adjust hour

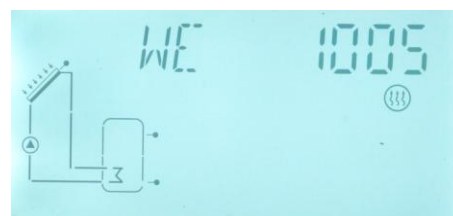
►Repress  , minute "00" blinks.

►Press   to adjust hour, then,

►Repress  , Week "MO"blinks

►Press   to adjust week



►Press  to exit programm, or waiting for 20 seconds to exit automatically. Time and week are saved automarically.




Code	Week
MO	Monday
TU	Tuesday
WE	Wednesday
TH	Thursday
FR	Friday
SA	Saturday
SU	Sunday



3.2 SCH system selection


Under standby status,



►Press  , and then press  "PWD 0000"displays and the left figure blinks, require to enter password.(factory set password :0000)


►Press   , to enter the first figure

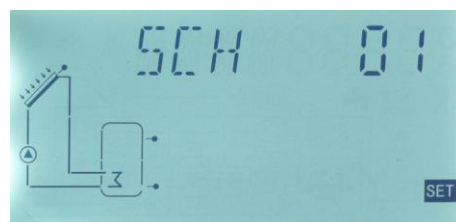
►Repress  , the second figure blinks

► Press   , to enter the second figure

►Repress  , the third figure blinks

►Press   , to enter the third figure

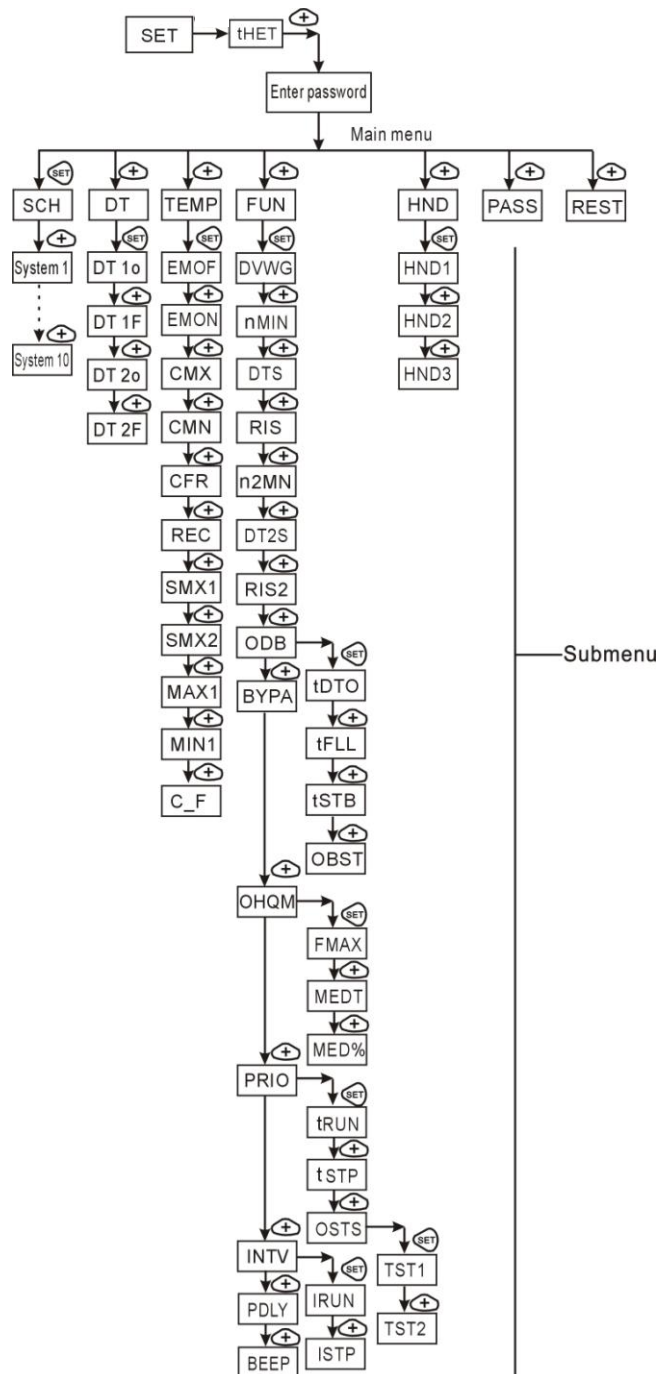
► Repress  ,the forth figure blinks



- Press **+** **-** to enter the forth figure
- Repress **SET** , access main menu, "SCH 01" displays on the screen
- Repress **SET** to enter selection program, "01"blinks, the first solar system displays on the screen
- Press **+** **-** , to select desired solar system (system 1-10 are available)
- Press **ESC** to exit programm, or waiting for 20 seconds to exit automatically. Selected system is saved automarically.

3.3 Menu structure and description

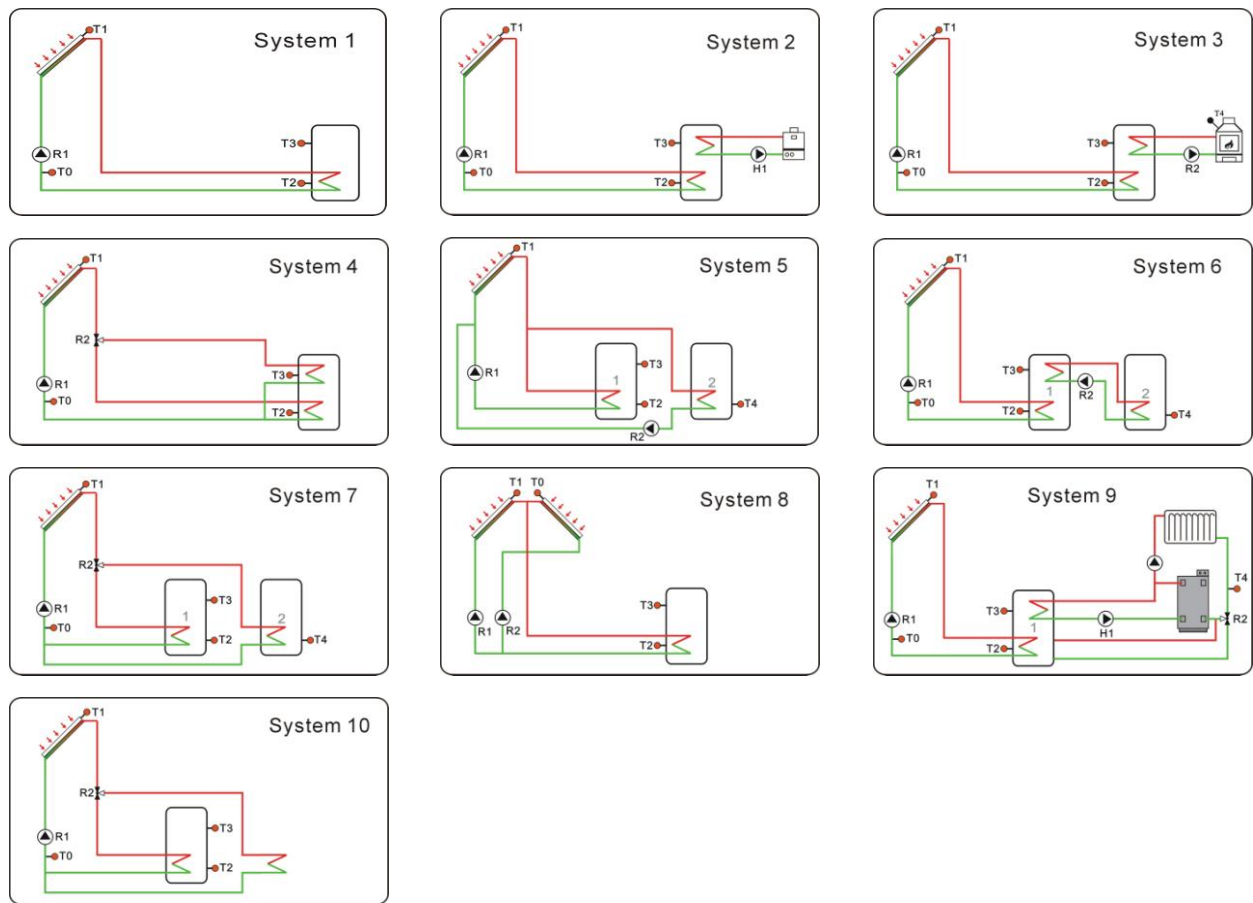
Menu structure



Submenu:

Through submenu, user can set the parameter as desired value, please check it carefully.

3.4 System overview



System Code	System description
SCH1	Standard solar system
SCH2	Solar system with gas boiler as backup
SCH3	Solar system with solid fuel boiler as backup
SCH4	Solar system with tank layered heated
SCH5	Solar system with 2 storages controlled by circuit pump
SCH6	Solar system with external heat exchanger
SCH7	Solar system with 2 storages controlled by valve
SCH8	Solar system with east/west collector array and 1 storage
SCH9	Solar system with heating return rise function
SCH10	Standard solar system with heat transferring function

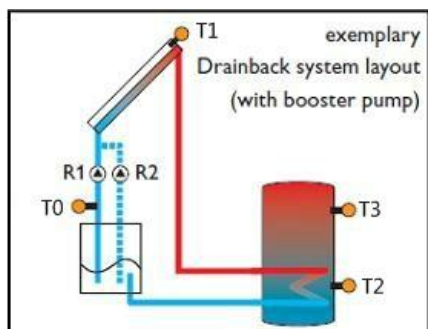
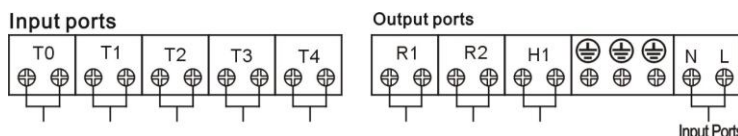
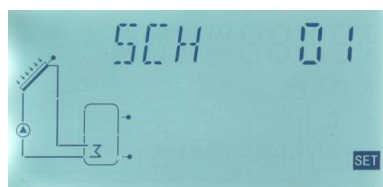
3.5 System Description

3.5.1 System 1 (SCH 01) : Standard solar system - 1 tank

Description:

The solar circuit pump (R1) is switched on as soon as the switch-on temperature difference (DT 1O) between the collector array (T1) and the storage tank (T2) is reached. If the temperature difference between the collector array (T1) and storage tank (T2) drops below the switch-off temperature difference (DT 1F), or the temperature of storage tank reaches the preset maximum storage temperature (SMX1), then the solar circuit pump (R1) is switched off.

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Example: Diagram of drain back system with extra pump (detailed see § 6.3.8)



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	R1	For Solar circuit pump R1
T1	Tem.sensor on collector		
T2	Tem.Sensor on bottom of tank	H1	For back-up heating device
T3	Tem.Sensor on top of tank (option sensor)		

List of assistant functions can be used in this system (can select in FUN menu)

Sensor inputs	Description	Relay outputs	Description
		R2	Option: (OBST) : Back-up pump (BYP) : to control high temperature by- pass valve

Above assistant functions can be activated in menu FUN.

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40℃	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45℃	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50℃	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55℃	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50℃	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55℃	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference	8℃	
DT1 F	X	Switch-off temperature difference	4℃	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130℃	
	X*	Emergency switch-off temperature Collector if ODB drain-back function is activated.	95℃	
EMON	X	Emergency exit temperature collector	120℃	
	X*	Emergency exit temperature collector if ODB drain-back function is activated.	85℃	
CMX	X	Maximum temperature of collector	110℃	
CMN	X	Minimum temperature of collector	10℃	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature of tank	70℃	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	℃	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump speed adjusting (RPM control)	100%	
DTS	X	Nominal temperature difference	8℃	
RIS	X	Gain for circulation pump	1℃	
ODB	X	Drain-back initialization active (option)	OFF	
tDTO	X*	ODB Drain-back switch-on condition - time period	60s	
tFLL	X*	ODB Drain-back filling time	5.0min	
tSTB	X*	ODB Drain-back stabilization time	2.0min	
OBST	S*	Back-up pump function(option)	OFF	
BYPR	S	High temperature by-pass	OFF	
OHQM	X	Thermal energy measuring function (option)	OFF	
FMAX	X*	Maximum flow rate	2.0L	
MEDT	X*	Type of anti-freezing liquid	1	
MED%	X*	Concentrate of anti-freezing liquid	40%	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	

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ISTP	X*	Standstill time of pump	30min	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

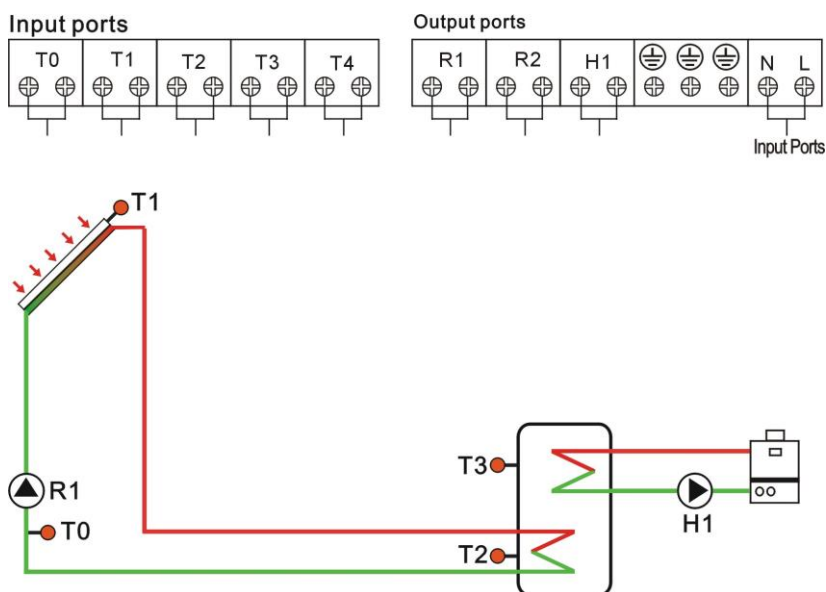
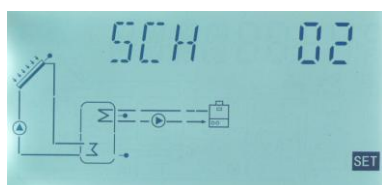
Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

3.5.2 System 2 (SCH 02) : Solar system with gas boiler as back-up

Description:

The solar circuit pump (R1) is switched on as soon as the switch-on temperature difference (DT 1O) between the collector array (T1) and the storage tank (T2) is reached. If the temperature difference between the collector array (T1) and storage tank (T2) drops below the switch-off temperature difference (DT 1F), or the temperature of storage tank reaches the preset maximum storage temperature (SMX1), then the solar circuit pump (R1) is switched off.

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	R1	For Solar circuit pump R1
T1	Tem.sensor on collector		
T2	Tem.Sensor on bottom of tank	H1	For back-up heating device
T3	Tem.Sensor on top of tank (option sensor)		

List of assistant functions can be used in this system (can select in FUN menu)

Sensor inputs	Description	Relay outputs	Description
		R2	Option: (OBST) : Back-up pump (BYPA): to control high temperature by- pass valve

Above assistant functions can be activated in menu FUN.

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40°C	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45°C	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50°C	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55°C	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50°C	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55°C	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference	8°C	
DT1 F	X	Switch-off temperature difference	4°C	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130°C	
	X*	Emergency switch-off temperature Collector if ODB drain-back function is activated.	95°C	
EMON	X	Emergency exit temperature collector	120°C	
	X*	Emergency exit temperature collector if ODB drain-back function is activated.	85°C	
CMX	X	Maximum temperature of collector	110°C	
CMN	X	Minimum temperature of collector	10°C	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature of tank	70°C	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	°C	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump speed adjusting (RPM control)	100%	
DTS	X	Nominal temperature difference	8°C	
RIS	X	Gain for circulation pump	1°C	
ODB	X	Drain-back initialisation active (option)	OFF	
tDTO	X*	ODB Drain-back switch-on condition - time period	60s	
tFLL	X*	ODB Drain-back filling time	5.0min	
tSTB	X*	ODB Drain-back stabilization time	2.0min	
OBST	S*	Back-up pump function(option)	OFF	
BYPR	S	High temperature by-pass	OFF	
OHQM	X	Thermal energy measuring function (option)	OFF	
FMAX	X*	Maximum flow rate	2.0L	
MEDT	X*	Type of anti-freezing liquid	1	
MED%	X*	Concentrate of anti-freezing liquid	40%	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	

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ISTP	X*	Standstill time of pump	30min	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

3.5.3 System 3 (SCH 03) : Solar system with solid fuel boiler as back-up

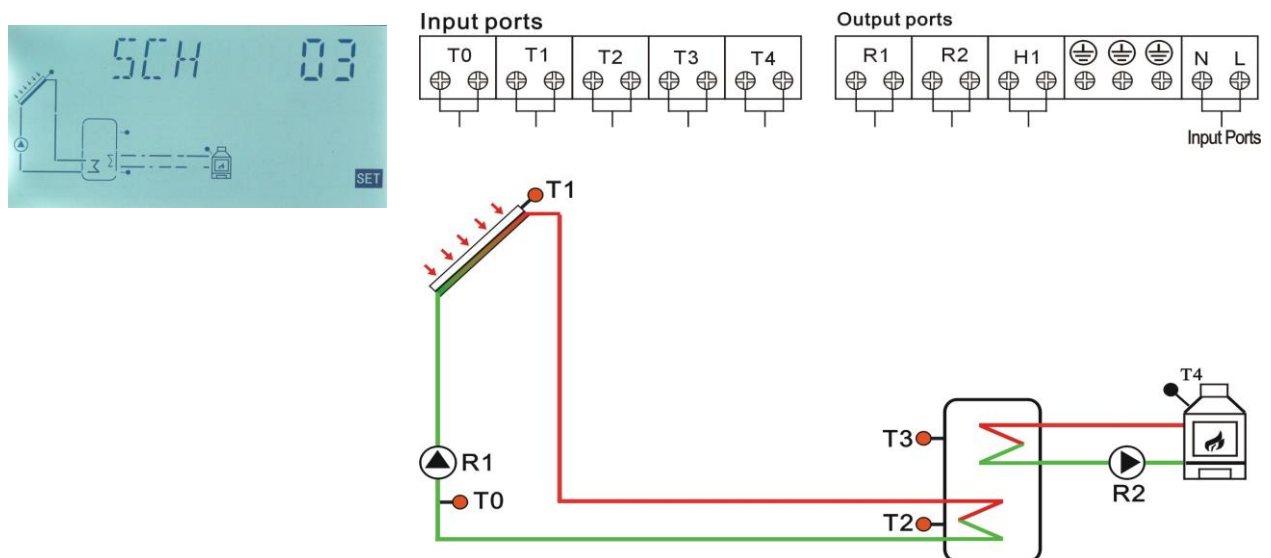
Description:

The solar circuit pump (R1) is switched on as soon as the switch-on temperature difference (DT 1O) between the collector array (T1) and the storage tank (T2) is reached. If the temperature difference between the collector array (T1) and storage tank (T2) drops below the switch-off temperature difference (DT 1F), or the temperature of storage tank reaches the preset maximum storage temperature (SMX1), then the solar circuit pump (R1) is switched off.

Solid fuel boiler function:

Solar fuel boiler is controlled by output relay R2, if the temperature difference between solid fuel boiler T4 and storage tank T3 meets the switch-on DT condition (DT2O), relay R2 is triggered. When this temperature difference drops below the switch-off DT condition (DT2F), or the temperature of solid fuel boiler T4 drops and it is 5 °C below its minimum switch-on temperature (MIN1), or the temperature of storage tank reaches the preset maximum storage temperature (MAX1), then the solar circuit pump (R2) is switched off.

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	R1	For Solar circuit pump R1
T1	Tem.sensor on collector	R2	For solid fuel boiler pump R2
T2	Tem.Sensor on bottom of tank	H1	For back-up heating device
T3	Tem.Sensor on top of tank (option sensor)		
T4	Tem. Sensor on the solid fuel boiler		

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40°C	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45°C	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50°C	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55°C	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50°C	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55°C	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference 1	8°C	
DT1 F	X	Switch-off temperature difference 1	4°C	
DT2 O	S	Switch-on temperature difference 2	8°C	
DT2 F	S	Switch-off temperature difference 2	4°C	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130°C	
	X*	Emergency switch-off temperature Collector if ODB drain-back function is activated.	95°C	
EMON	X	Emergency exit temperature collector	120°C	
	X*	Emergency exit temperature collector if ODB drain-back function is activated.	85°C	
CMX	X	Maximum temperature of collector	110°C	
CMN	X	Minimum temperature of collector	10°C	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature of tank	70°C	
MAX1	S	Maximum switch-off temperature	60°C	
MIN1	S	Minimum switch-on temperature	30°C	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	°C	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump R1 speed adjusting (RPM control)	100%	
DTS	X	Nominal temperature difference 1	8°C	
RIS	X	Gain for circulation pump R1	1°C	
n2MN	X	Pump R2 speed adjusting (RPM control)	100%	
DT2S	X	Nominal temperature difference 2	8°C	
RIS2	X	Gain for circulation pump R2	1°C	
ODB	X	Drain-back initialisation active (option)	OFF	
tDTO	X*	ODB Drain-back switch-on condition - time period	60s	
tFLL	X*	ODB Drain-back filling time	5.0min	
tSTB	X*	ODB Drain-back stabilization time	2.0min	

OHQM	X	Thermal energy measuring function (option)	OFF	
FMAX	X*	Maximum flow rate	2.0L	
MEDT	X*	Type of anti-freezing liquid	1	
MED%	X*	Concentrate of anti-freezing liquid	40%	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	
ISTP	X*	Standstill time of pump	30min	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

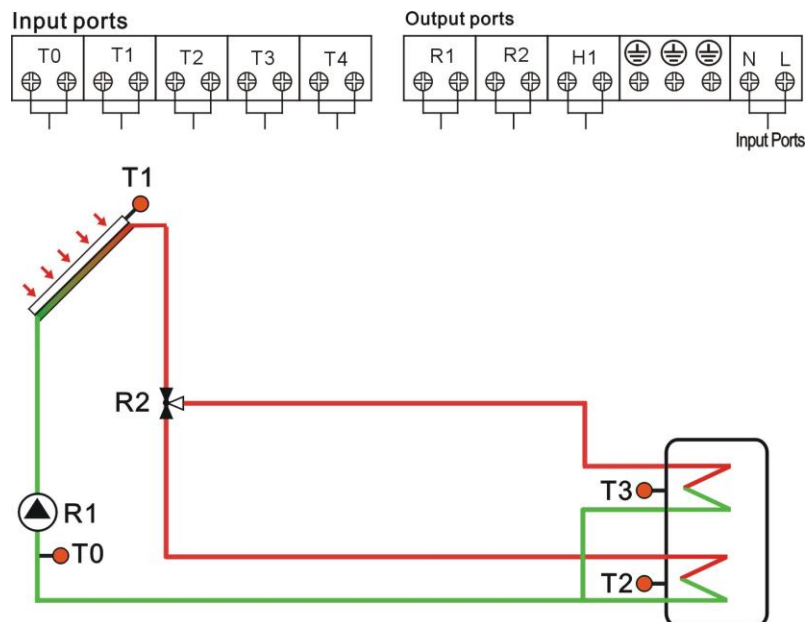
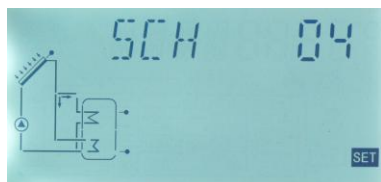
3.5.4 System 4 (SCH04): Solar system with tank layered heated

Description:

The solar circuit pump (R1) is switched on as soon as the switch-on temperature difference (DT 1O) between the collector array (T1) and the storage tank (T2) is reached. If the temperature difference between the collector array (T1) and storage tank (T2) drops below the switch-off temperature difference (DT 1F), or the temperature of storage tank reaches the preset maximum storage temperature (SMX1), then the solar circuit pump (R1) is switched off.

Controller monitors the temperature of collector T1 and storage tank T3, if this temperature difference rises up to the switch-on temperature difference (DT2O), then Pump R1 is triggered, and at the same time, T-valve R2 is triggered too, tank is heated until the temperature difference between the collector array (T1) and storage tank (T3) drops below the switch-off temperature difference (DT 2F), or the temperature of storage tank reaches the preset maximum storage temperature (SMX2), then the solar circuit pump R1, R2 are switched off.

Priority function is default to heat the upper part of tank firstly. T-Valve is controlled by output R2, (Priority logic detailed see 6.3.11 section)



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	R1	For Solar circuit pump R1
T1	Tem.sensor on collector	R2	For T-valve to heat upper part of tank
T2	Tem.Sensor on bottom of tank	H1	For back-up heating device
T3	Tem.Sensor on top of tank		

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40°C	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45°C	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50°C	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55°C	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50°C	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55°C	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference 1	8°C	
DT1 F	X	Switch-off temperature difference 1	4°C	
DT2 O	S	Switch-on temperature difference 2	8°C	
DT2 F	S	Switch-off temperature difference 2	4°C	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130°C	
EMON	X	Emergency exit temperature collector	120°C	
CMX	X	Maximum temperature of collector	110°C	
CMN	X	Minimum temperature of collector	10°C	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	S	Maximum temperature of bottom part of tank	70°C	
SMX2	S	Maximum temperature of upper part of tank	70°C	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	°C	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump R1 speed adjusting (RPM control)	100%	
DTS	X	Nominal temperature difference	8°C	
RIS	X	Gain for circulation pump R1	1°C	
OHQM	X	Thermal energy measuring function (option)	OFF	
FMAX	X*	Maximum flow rate	2.0L	
MEDT	X*	Type of anti-freezing liquid	1	
MED%	X*	Concentrate of anti-freezing liquid	40%	
PRIO	S	Tank priority function	02	
tRUN	S*	Pulse heating running time	15min	
tSTP	S*	Pulse heating standstill time	02min	
OSTS	S	Tank setup function	OFF	
TST1	S*	Temperature bottom part of tank	45°C	
TST2	S*	Temperature upper part of tank	45°C	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	
ISTP	X*	Standstill time of pump	30min	

PDLY	S	Run-on of circulation pump	OFF	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

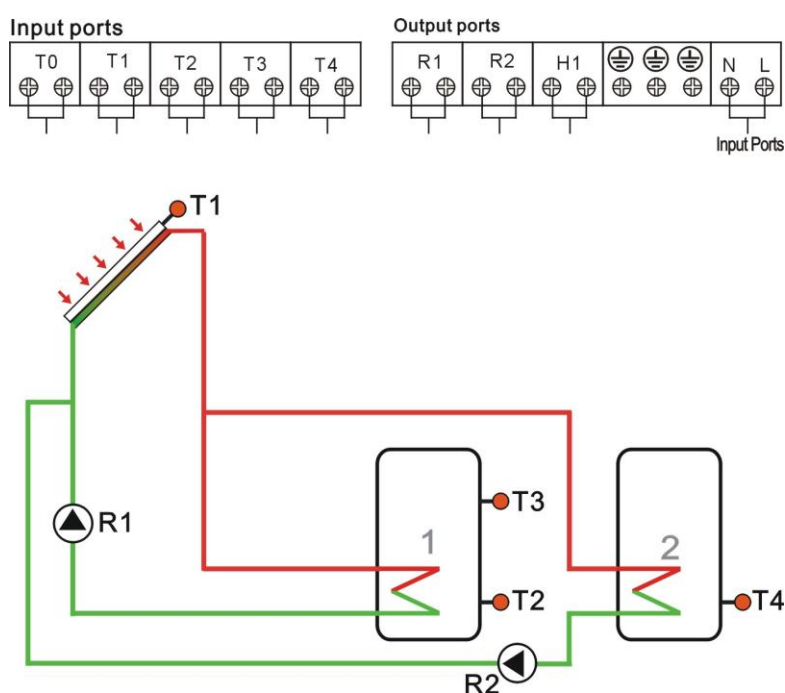
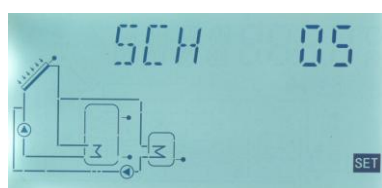
3.5.5 System5 (SCH05): Solar system with 2 storages controlled by circuit pump

Description:

Controller monitors the temperature of collector T1 and storage tank T2,T4, if this temperature difference rises up to the switch-on temperature difference DT1O (T1,T2); DT2O (T1,T4), then Pump R1 or R2 is triggered, corresponding tank is heated until the temperature difference drops to the switch-on DT (DT1F, DT2F), or the temperature of storage tank reaches the preset maximum storage temperature (SMX1, SMX2), then the solar circuit pump R1, R2 are switched off.

Priority function is default to heat the priority tank firstly. But if parameter PRIO is set with value of 00, then 2 tanks can be heated at the same time. (Priority logic detailed see 6.3.11 section)

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Sensor inputs	Description	Relay outputs	Description
T1	Tem.sensor on collector	R1	For Solar circuit pump R1
T2	Tem.Sensor on bottom of tank1	R2	For Solar circuit pump R2
T3	Tem.Sensor on top of tank1 (option sensor)	H1	For back-up heating device
T4	Tem.Sensor on bottom of tank2		

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40°C	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45°C	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50°C	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55°C	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50°C	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55°C	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference 1	8°C	
DT1 F	X	Switch-off temperature difference 1	4°C	
DT2 O	S	Switch-on temperature difference 2	8°C	
DT2 F	S	Switch-off temperature difference 2	4°C	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130°C	
EMON	X	Emergency exit temperature collector	120°C	
CMX	X	Maximum temperature of collector	110°C	
CMN	X	Minimum temperature of collector	10°C	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature tank 1	70°C	
SMX2	S	Maximum temperature tank 2	70°C	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	°C	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump R1 speed adjusting (RPM control)	100%	
DTS	X	Nominal temperature difference 1	8°C	
RIS	X	Gain for circulation pump R1	1°C	
n2MN	X	Pump R2 speed adjusting (RPM control)	100%	
DT2S	X	Nominal temperature difference 2	8°C	
RIS2	X	Gain for circulation pump R2	1°C	
PRIO	S	Tank priority function	02	
tRUN	S*	Pulse heating running time	15min	
tSTP	S*	Pulse heating standstill time	02min	
OSTS	S	Tank setup function	OFF	
TST1	S*	Temperature of tank 1	45°C	
TST2	S*	Temperature of tank 2	45°C	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	
ISTP	X*	Standstill time of pump	30min	
BEEP	X	Temperature sensor fault alarm	OFF	

HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

3.5.6 System 6 (SCH06): Solar system with heat transferring between tanks

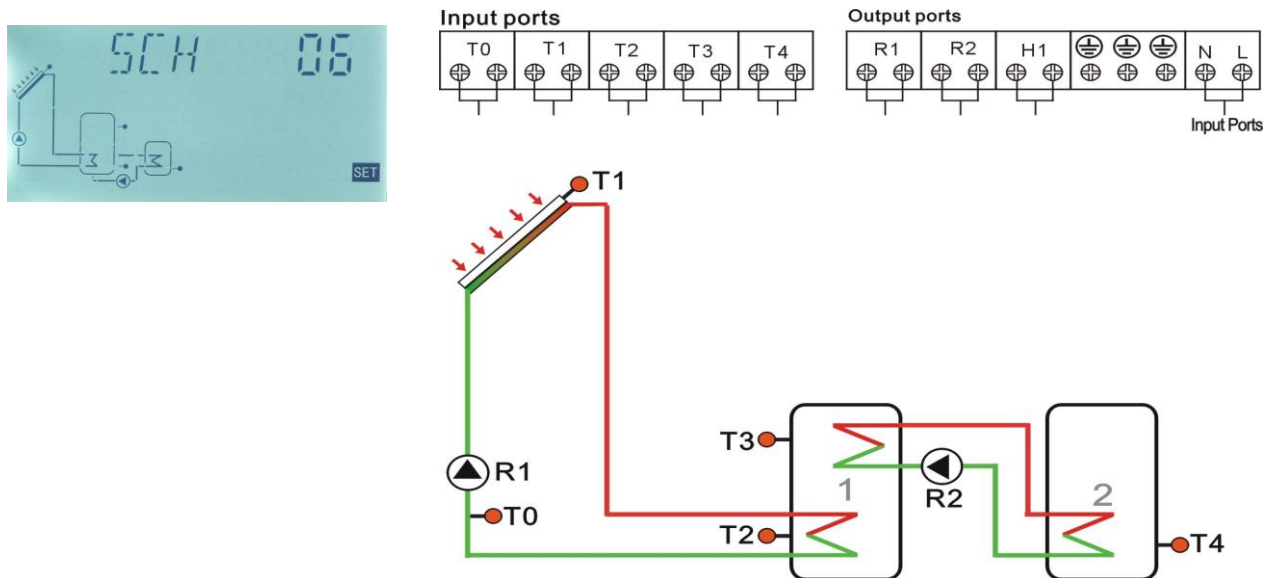
Description:

The solar circuit pump (R1) is switched on as soon as the switch-on temperature difference (DT 1O) between the collector array (T1) and the storage tank (T2) is reached. If the temperature difference between the collector array (T1) and storage tank (T2) drops below the switch-off temperature difference (DT 1F), or the temperature of storage tank reaches the preset maximum storage temperature (SMX1), then the solar circuit pump (R1) is switched off.

Heat transferring function:

Thermal energy stored in tank can be transferred from tank 1 to tank 2 by a circuit pump R2, temperature difference between tank 1 (T3) and tank 2 (T4) will control the output R2, when T3 and T4 reaches the switch-on DT (DT2O), pump R2 is triggered. When T3 and T4 drops to the switch-off DT (DT2F), or when T3 drops and it is 5°C below the minimum switch-on temperature (MIN1), or tank 2 (T4) rises to its maximum temperature (MAX1), R2 is ceased.

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	R1	For Solar circuit pump R1
T1	Tem.sensor on collector	R2	For Heat transfer pump R2
T2	Tem.Sensor on bottom of tank 1	H1	For back-up heating device
T3	Tem.Sensor on top of tank 1 (option sensor)		
T4	Tem.Sensor on tank 2		

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40°C	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45°C	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50°C	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55°C	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50°C	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55°C	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference 1	8°C	
DT1 F	X	Switch-off temperature difference 1	4°C	
DT2 O	S	Switch-on temperature difference 2	8°C	
DT2 F	S	Switch-off temperature difference 2	4°C	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130°C	
	X*	Emergency switch-off temperature Collector if ODB drain-back function is activated.	95°C	
EMON	X	Emergency exit temperature collector	120°C	
	X*	Emergency exit temperature collector if ODB drain-back function is activated.	85°C	
CMX	X	Maximum temperature of collector	110°C	
CMN	X	Minimum temperature of collector	10°C	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature tank 1	70°C	
MAX1	S	Maximum switch-off temperature	60°C	
MIN1	S	Minimum switch-on temperature	30°C	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	°C	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump R1 speed adjusting (RPM control)	30%	
DTS	X	Nominal temperature difference 1	8°C	
RIS	X	Gain for circulation pump R1	1°C	
n2MN	X	Pump R2 speed adjusting (RPM control)	100%	
DT2S	X	Nominal temperature difference 2	8°C	
RIS2	X	Gain for circulation pump R2	1°C	
ODB	X	Drain-back initialisation active (option)	OFF	
tDTO	X*	ODB Drain-back switch-on condition - time period	60s	

tFLL	X*	ODB Drain-back filling time	5.0min	
tSTB	X*	ODB Drain-back stabilization time	2.0min	
OHQM	X	Thermal energy measuring function (option)	OFF	
FMAX	X*	Maximum flow rate	2.0L	
MEDT	X*	Type of anti-freezing liquid	1	
MED%	X*	Concentrate of anti-freezing liquid	40%	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	
ISTP	X*	Standstill time of pump	30min	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

3.5.7 System7(SCH07): Solar system with 2 storages controlled by valve

Description:

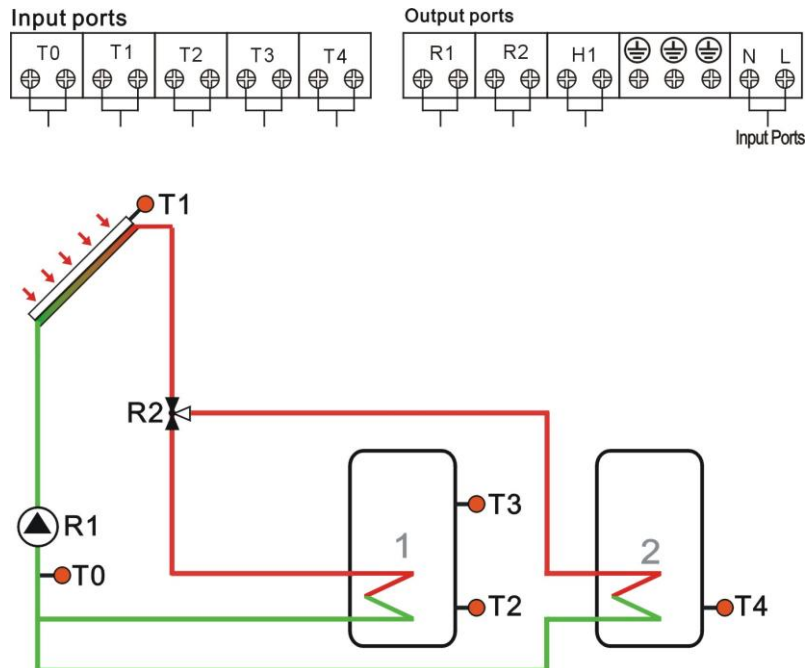
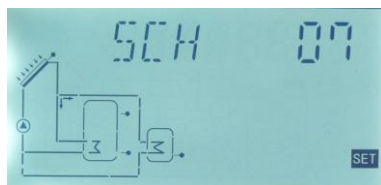
The solar circuit pump (R1) is switched on as soon as the switch-on temperature difference (DT 1O) between the collector array (T1) and the storage tank (T2) is reached. If the temperature difference between the collector array (T1) and storage tank (T2) drops below the switch-off temperature difference (DT 1F), or the temperature of storage tank reaches the preset maximum storage temperature (SMX1), then the solar circuit pump (R1) is switched off.

Heat transferring function:

Controller also monitors the temperature difference between T1 and T4, when T1 and T4 reaches the switch-on DT (DT2O), pump R1 is triggered , and at the same time T-valve R2 is also connected, tank 2 is heated until T3 and T4 drops to the switch-off DT (DT2F), or tank 2 (T4) rises to its maximum temperature(SMX2), R2 is ceased.

Priority function is default to heat the priority tank 1 firstly. T-valve is controlled by output R2 to heat tank. (Priority logic detailed see 6.3.11 section)

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	R1	For Solar circuit pump R1
T1	Tem.sensor on collector	R2	For T-valve tank 1/2 switch
T2	Tem.Sensor on bottom of tank 1	H1	For back-up heating device
T3	Tem.Sensor on top of tank 1 (option sensor)		
T4	Tem.Sensor on tank 2		

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40°C	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45°C	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50°C	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55°C	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50°C	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55°C	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference 1	8°C	
DT1 F	X	Switch-off temperature difference 1	4°C	
DT2 O	S	Switch-on temperature difference 2	8°C	
DT2 F	S	Switch-off temperature difference 2	4°C	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130°C	
EMON	X	Emergency exit temperature collector	120°C	
CMX	X	Maximum temperature of collector	110°C	
CMN	X	Minimum temperature of collector	10°C	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature tank 1	70°C	
SMX2	S	Maximum temperature tank 2	70°C	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	°C	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump R1 speed adjusting (RPM control)	30%	
DTS	X	Nominal temperature difference 1	8°C	
RIS	X	Gain for circulation pump R1	1°C	
OHQM	X	Thermal energy measuring function (option)	OFF	
FMAX	X*	Maximum flow rate	2.0L	
MEDT	X*	Type of anti-freezing liquid	1	
MED%	X*	Concentrate of anti-freezing liquid	40%	
PRIO	S	Tank priority function	01	
tRUN	S*	Pulse heating running time	15min	
tSTP	S*	Pulse heating standstill time	02min	
OSTS	S	Tank setup function	OFF	
TST1	S*	Temperature of tank 1	45°C	
TST2	S*	Temperature of tank 2	45°C	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	
ISTP	X*	Standstill time of pump	30min	

PDLY	S	Run-on of circulation pump	OFF	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

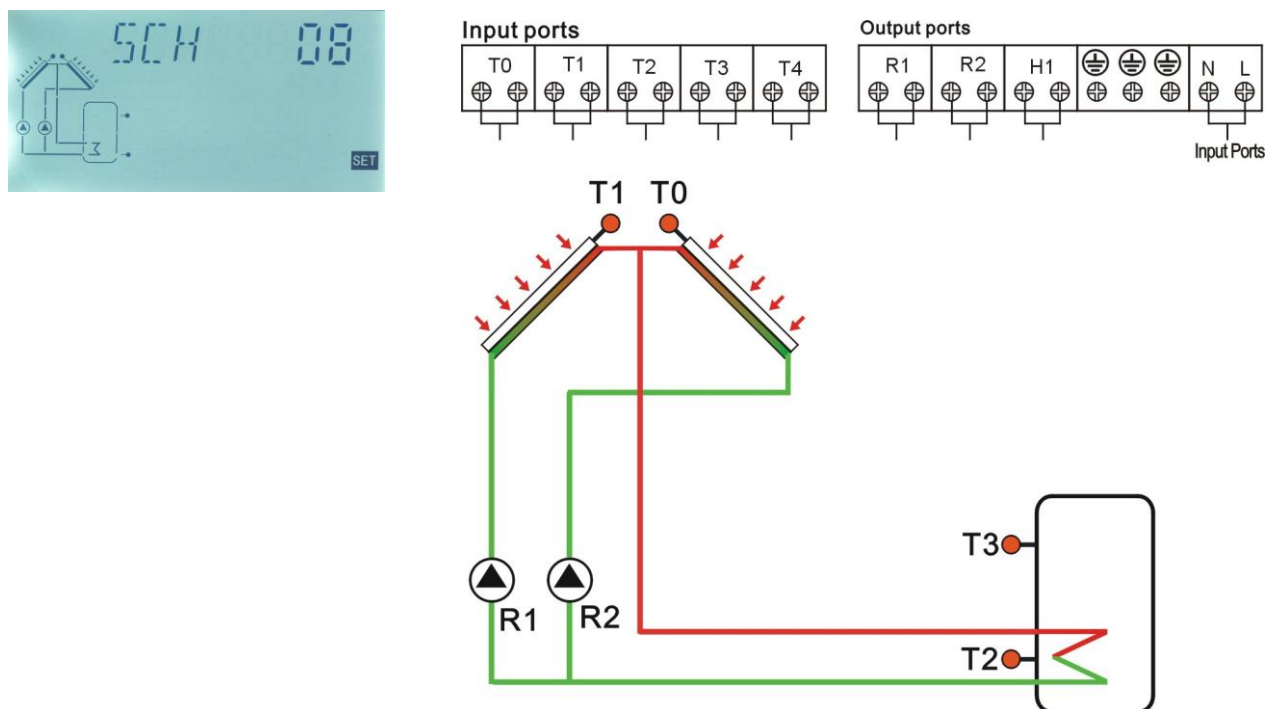
Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

3.5.8 System 8 (SCH08): Solar system with east/west collector arrays and 1 storage

Description:

Controller monitors the temperature difference between T1,T0 and T2, when any temperature difference meets the switch-on DT (DT1O), pump R1,R2 will be triggered , tank is heated until the temperature difference drops to the switch-off DT (DT1F), or tank rises to its maximum temperature(SMX1), R1 or R2 is ceased.

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector 2	R1	For Solar circuit pump R1
T1	Tem.sensor on collector 1	R2	For Solar circuit pump R2
T2	Tem.Sensor on bottom of tank	H1	For back-up heating device
T3	Tem.Sensor on top of tank (option sensor)		

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40℃	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45℃	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50℃	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55℃	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50℃	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55℃	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference 1	8℃	
DT1 F	X	Switch-off temperature difference 1	4℃	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130℃	
EMON	X	Emergency exit temperature collector	120℃	
CMX	X	Maximum temperature of collector	110℃	
CMN	X	Minimum temperature of collector	10℃	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature tank	70℃	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	℃	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump R1 speed adjusting (RPM control)	30%	
DTS	X	Nominal temperature difference 1	8℃	
RIS	X	Gain for circulation pump R1	1℃	
n2MN	X	Pump R2 speed adjusting (RPM control)	100%	
DT2S	X	Nominal temperature difference 2	8℃	
RIS2	X	Gain for circulation pump R2	1℃	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	
ISTP	X*	Standstill time of pump	30min	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		

REST	X	Recovery to factory default set		
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Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

3.5.9 System 9 (SCH09): Solar system with heating return rise function

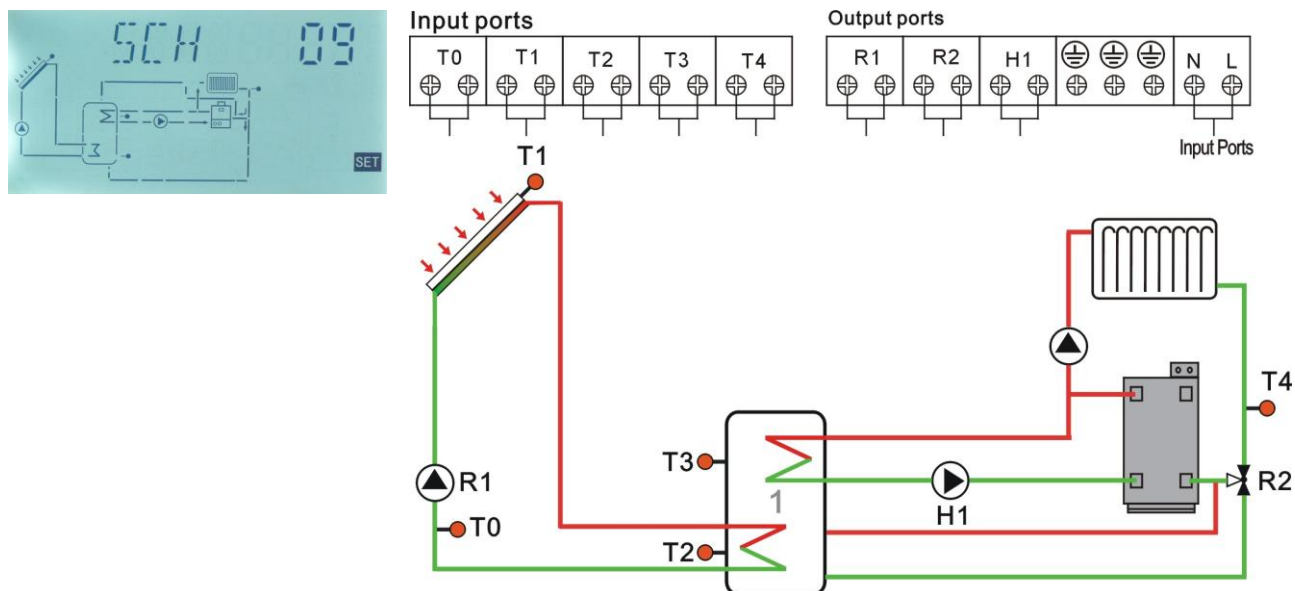
Description:

Controller monitors the temperature difference between T1 and T2, when its temperature difference meets the switch-on DT (DT1O), pump R1 will be triggered, tank is heated until the temperature difference drops to the switch-off DT (DT1F), or tank rises to its maximum temperature(SMX1), R1 is ceased.

Heating return rise function:

If the temperature difference between tank T3 and heating return T4 meets the switch-on DT (DT2O), then T-valve will be switched to the tank direction; heating return flows through tank and heated by tank. When the temperature difference between tank T3 and heating return T4 drops to the switch-off DT (DT2F) or when T3 drops and it is 5°C below the minimum switch-on temperature (MIN1), or heating return T4 rises to its maximum temperature(MAX1), R2 is ceased.

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	R1	For Solar circuit pump R1
T1	Tem.sensor on collector	R2	For T-valve switch heating return
T2	Tem.Sensor on bottom of tank	H1	For back-up heating device
T3	Tem.Sensor on top of tank (option sensor)		
T4	Tem.Sensor on heating return pipe		

Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40°C	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45°C	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50°C	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55°C	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50°C	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55°C	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference 1	8°C	
DT1 F	X	Switch-off temperature difference 1	4°C	
DT2 O	S	Switch-on temperature difference 2	8°C	
DT2 F	S	Switch-off temperature difference 2	4°C	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130°C	
	X*	Emergency switch-off temperature Collector if ODB drain-back function is activated.	95°C	
EMON	X	Emergency exit temperature collector	120°C	
	X*	Emergency exit temperature collector if ODB drain-back function is activated.	85°C	
CMX	X	Maximum temperature of collector	110°C	
CMN	X	Minimum temperature of collector	10°C	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature tank 1	70°C	
MAX1	S	Maximum switch-off temperature	60°C	
MIN1	S	Minimum switch-on temperature	30°C	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	°C	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump R1 speed adjusting (RPM control)	30%	
DTS	X	Nominal temperature difference 1	8°C	
RIS	X	Gain for circulation pump R1	1°C	
ODB	X	Drain-back initialisation active (option)	OFF	
tDTO	X*	ODB Drain-back switch-on condition - time period	60s	
tFLL	X*	ODB Drain-back filling time	5.0min	
tSTB	X*	ODB Drain-back stabilization time	2.0min	
OHQM	X	Thermal energy measuring function (option)	OFF	
FMAX	X*	Maximum flow rate	2.0L	

MEDT	X*	Type of anti-freezing liquid	1	
MED%	X*	Concentrate of anti-freezing liquid	40%	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	
ISTP	X*	Standstill time of pump	30min	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		
PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

3.5.10 System 10 (SCH10): Standard solar system with heat transferring function

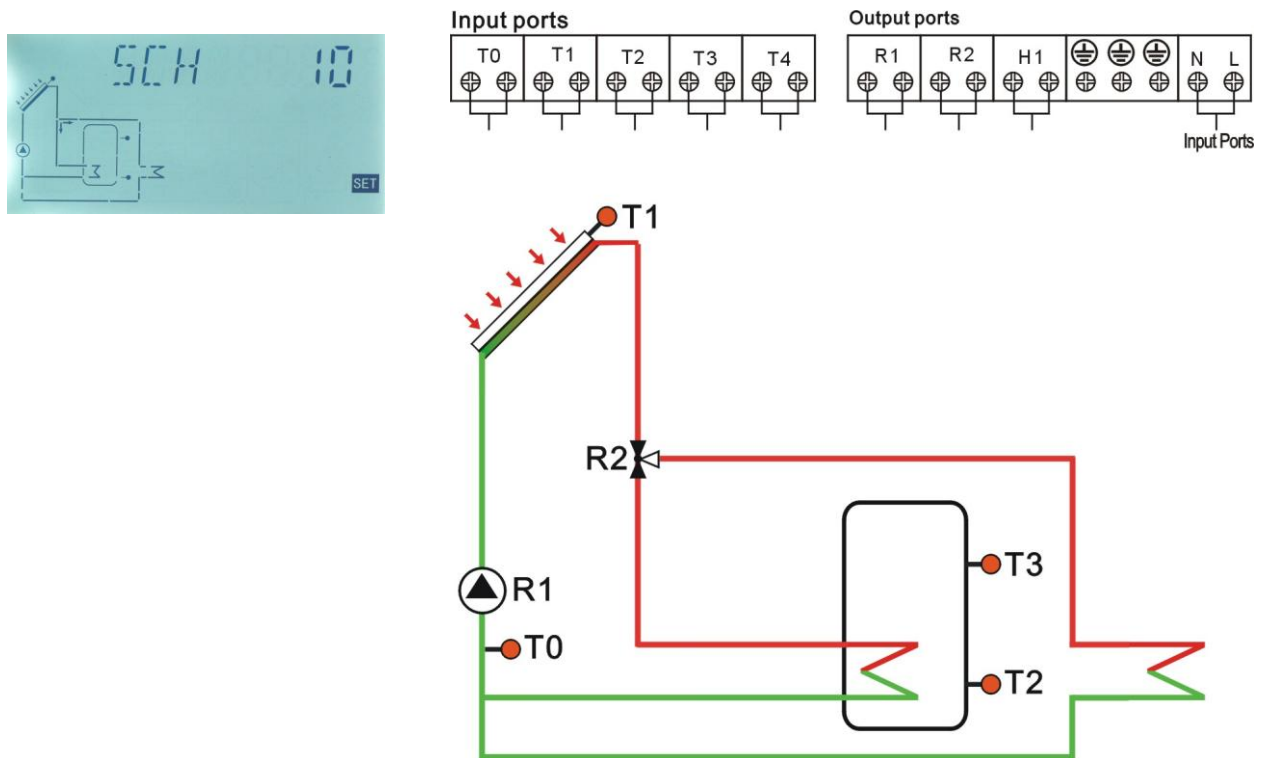
Description:

Controller monitors the temperature difference between T1 and T2, when its temperature difference meets the switch-on DT (DT1O), pump R1 will be triggered, tank is heated until the temperature difference drops to the switch-off DT (DT1F), or tank rises to its maximum temperature (SMX1), R1 is ceased.

Thermal energy transferring function:

After tank reaches its maximum temperature (SMX1), if collector temperature T1 still rises up to the maximum collector temperature CMX, then solar pump is triggered, and at the same time, T-Valve R2 is connected to transfer the energy to the heating circuit system. Considering the safety of heating system, this function is available only when the tank temperature is below the no-adjustable tank emergency temperature of 95°C.

Note: tank temperature sensor T3 is a optional sensor, when T3 isn't installed in the system, controller will take the value of sensor T2 to control the back-up heating or solar circuit pump (T2 is used as T3 function).



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	R1	For Solar circuit pump R1
T1	Tem.sensor on collector	R2	For T-valve switch heating system
T2	Tem.Sensor on bottom of tank	H1	For back-up heating device
T3	Tem.Sensor on top of tank (option sensor)		

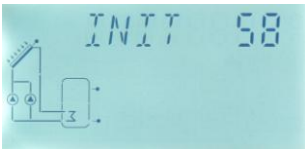
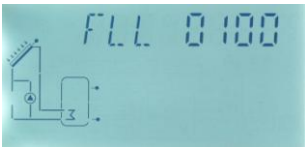
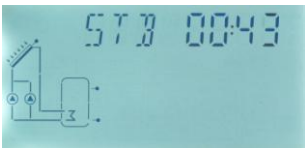
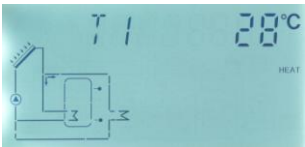
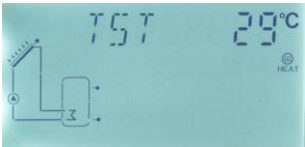
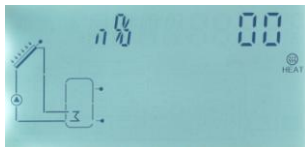
Adjust channel				
Menu		Description	Default value	Page
tHET	X	Timing heating		
tHET1O	X	Switch-on time of the 1 st time section of timing heating	4: 00	
		Switch-on temperature of the 1 st time section of timing heating	40°C	
tHET1F	X	Switch-off time of the 1 st time section of timing heating	5: 00	
		Switch-off temperature of the 1 st time section of timing heating	45°C	
tHET2O	X	Switch-on time of the 2 nd time section of timing heating	10: 00	
		Switch-on temperature of the 2 nd time section of timing heating	50°C	
tHET2F	X	Switch-off time of the 2 nd time section of timing heating	10: 00	
		Switch-off temperature of the 2 nd time section of timing heating	55°C	
tHET3O	X	Switch-on time of the 3 rd time section of timing heating	17: 00	
		Switch-on temperature of the 3 rd time section of timing heating	50°C	
tHET3F	X	Switch-off time of the 3 rd time section of timing heating	22: 00	
		Switch-off temperature of the 3 rd time section of timing heating	55°C	
PWD	X	Enter password	0000	
SCH	X	Select system	01	
DT1 O	X	Switch-on temperature difference	8°C	
DT1 F	X	Switch-off temperature difference	4°C	
TEMP	X	Temperature main menu		
EMOF	X	Emergency switch-off temperature Collector	130°C	
EMON	X	Emergency exit temperature collector	120°C	
CMX	X	Maximum temperature of collector	110°C	
CMN	X	Minimum temperature of collector	10°C	
CFR	X	Frost protection collector	OFF	
REC	X	Tank recooling function	OFF	
SMX1	X	Maximum temperature tank 1	70°C	
C_F	X	Temperature unit switch between Celsius and Fahrenheit	°C	
FUN	X	Main menu of auxiliary functions		
DVWG	X	Anti-legionelle function	OFF	
nMIN	X	Pump R1 speed adjusting (RPM control)	30%	
DTS	X	Nominal temperature difference 1	8°C	
RIS	X	Gain for circulation pump R1	1°C	
OHQM	X	Thermal energy measuring function (option)	OFF	
FMAX	X*	Maximum flow rate	2.0L	
MEDT	X*	Type of anti-freezing liquid	1	
MED%	X*	Concentrate of anti-freezing liquid	40%	
INTV	X	Pump pulse function	OFF	
IRUN	X*	Running time of pump	15s	
ISTP	X*	Standstill time of pump	30min	
PDLY	S	Run-on of circulation pump	OFF	
BEEP	X	Temperature sensor fault alarm	OFF	
HND	X	Manual control		
HND1	X*	Manual operate output R1	OFF	
HND2	X*	Manual operate output R2	OFF	
HND3	X*	Manual operate output H1	OFF	
PASS	X	Password set		
PWDC	X*	Enter old password		
PWDN	X*	Enter new password		
PWDG	X*	Reenter new password		

PWOK	X*	Password reset OK		
REST	X	Recovery to factory default set		

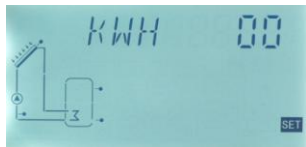
Symbol	Description
X	Menu is available
X*	Menu is available if the corresponding function is activated
S	Menu is specifically available in this system layout
S*	System-specific menu, only available if the corresponding function is activated

4. Display menu

ODB Drain-back switch-on condition - time period
ODB Drain-back filling time
ODB Drain-back stabilization time

<p>Display the time section of drain back operation</p> <p>INIT: the switch on time of drain-back</p>  <p>FLL : the filling time of drain -back</p>  <p>STB: the stabilization time of drain-back</p>  <p>T1 display the temperature of collector Display range: -10°C ~ +200°C</p>  <p>TST: display the temperature of storage Display range: 0°C ~ +110°C</p>  <p>n%, n2%: display current speed of pump display range: 30 ...100%</p> 	<p>Note: Depending on the selected system and selected functions, the display and parameters can be set are different.</p> <p>Countdown indicate the rest time of time which is set in menu (tDTO)</p> <p>Countdown indicate the rest time of time which is set in menu (tFLL)</p> <p>Countdown indicate the rest time of time which is set in menu (tSTB)</p> <p>Indicate the current temperature of collector</p> <p>Indicate the current temperature of storage tank (press ESC button to display the TST temperature) TST indicates the T3 temperature, if T3 sensor isn't connected, then display the T2 temperature.</p> <p>Display the current speed of pump n%: Pump 1's current speed n2%: Pump 2's current speed</p>
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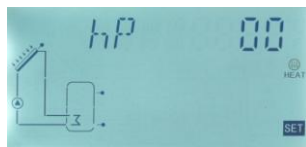
KWH/MWH: display the thermal energy in unit of KWH or MWH



Time: current time and week



hP: accumulative operation hours



Display the thermal energy got from sun, it only appears when thermal energy measuring function is selected.

Controller measures the flow rate and reference temperature of sensors T1(flow pipe) and T0 (return pipe) to calculated the thermal energy, and display it in unit of KWH or MWH. The total energy is the sum of value of KWH and MWH.

DKWH: the accumulative thermal energy of current day.

KWH: thermal energy in unit of KWH

MWH: thermal energy in unit of MWH



















Display the time and current week

Accumulative operation hours of pump R1, display the hours.


5. Access the menu and set (tHET) the parameters of timing heating function (user grade)

5.1 Access main menu

Under standby status, doing like following to access main menu.









- ▶ press  button and then press , "PWD 0000" appears on the screen, the left first digital blinks, ask for entering password, factory default set password is "0000"
- ▶ Repress  button, the first digital blinks
- ▶ Press   button to enter first digital of password
- ▶ Repress  button, the second digital blinks
- ▶ Repress   button, to enter second digital of password.
- ▶ Repeat press  button, the third digital blinks
- ▶ Repress   button, to enter third digital of password.
- ▶ Repeat press  button, the forth digital blinks
- ▶ Repress   button, to enter forth digital of password.
- ▶ Repress  button, to access the main menu.
- ▶ Press   button, select any menu you wanted.
- ▶ Press  button, you can exit main menu.



Note: default factory set password is "0000", if don't set new password, then press  five times, then you can access main menu interface.

5.2 Access submenu

After selecting main menu, doing like following to access submenu

- ▶ Press  button, to access submenu interface.
- ▶ Press   button to select submenu.
- ▶ Repress  button, to enter submenu.
- ▶ Press   button, to adjust parameter.
- ▶ Press  button, to exit submenu.
- ▶ then repress  button to exit main menu.



(example)

5.3 Main menu - tHET timing heating

Description:

Electrical heater, gas boiler or oil boiler can be integrated into solar system used as back-up of solar system, and they can be triggered automatically at preset time by preset temperature. Within a preset time section, when the temperature (T3) on top part of tank drops below the preset switching-on temperature of this function, back-up heating starts to work, when T3 rises up to the preset turning off temperature, back-up heating is stopped. Within 24 hours, three time sections can be set with this controller.

Factory set:

The first time section: back-up heating function starts at 4:00 and ends at 5:00 am. Within this time section, switch-on temperature is 40°C (104°F); switch-off temperature is 45°C (113°F).

The second time section: from 10:00 to 10:00 am, it means there is no back-up heating in this time section.

The third time section: back-up heating function starts at 17:00 and ends at 22:00 pm. Within this time section, the switch-on temperature is 50°C (122°F); switch-off temperature is 55°C (131°F).

The switch-on temperature adjustable range: 10 °C ~ 78 °C (50°F ~ 170°F)

The switch-off temperature adjustable range: 12 °C ~ 80 °C (55°F ~ 176°F)

If you want to shut off one timing heating, then you can set the turning on time and turning off time same value (for example, the second time section no this function, then you can set turning on/off time is 10:00 ~ 10:00)


When time is outside of the preset time section, back-up heating doesn't work automatically even when the tank temperature reaches the switch –on temperature of heating.

Note:


- When there is no sensor installed on the top part of tank (no T3 sensor), controller will take the signal of T2 (sensor on bottom of tank) automatically to control this function.
- The time format in this controller is 24 hours, when you set time section, the switch-off time of heating should be larger than switch-on time. For example: if you set the switch-on time of heating is at 17:00, but switch-off time of heating is 6:00, then this setting doesn't take effect, that means within this time section, heating function doesn't work. The correct set is like flowing: it should be divided into two time sections, one time section is from 17:00 to 23:59, the other time section is from 00:00 to 06:00.

Setup steps:


Under standby status, following steps describe in paragraph 5.1 to access main menu tHET

► Press  button, to access main menu interface, "tHET" appears on the screen.




► Press  button, access tHET program to set parameter, "tH 10 04:00" displays on screen, the switch-on time and temperature for the first time section of heating function can be set






► Repress  button, "04" of hour time blinks on screen

► Press   button to adjust hour of time


►Repress  button again, "00" of minute time blinks on screen


►Press   button to adjust minute of time

►Repress  button again, "40°C" of temperature blinks on screen


►Press   button to adjust switch-on temperature teaming heating.

►Press  button to exit setting.


►Press  button, "tH 1F 05:00" displays on screen, the switch-off time and temperature for the first time section of heating function can be set.



►Repress  button, "05" of hour time blinks on screen


►Press   button to adjust hour of time


►Repress  button again, "00" of minute time blinks on screen


►Press   button to adjust minute of time



►Repress  button again, "45°C" of temperature blinks on screen


►Press   button to adjust switch-off temperature teaming heating.

►Press  button to exit setting. Parameters are saved automatically.


►Press  button, "tH 2o 10:00" displays on screen, the switch-on time and temperature for the second time section of heating function can be set



►Repress  button, "10" of hour time blinks on screen

►Press   button to adjust hour of time


►Repress  button again, "00" of minute time blinks on screen


►Press   button to adjust minute of time

►Repress  button again, "50°C" of temperature blinks on screen

►Press   button to adjust switch-on temperature teaming heating.


►Press  button to exit setting.

►Press  button, "tH 2F 10:00" displays on screen, the switch-off time and temperature for the second time section of heating function can be set.


►Repress  button, "10" of hour time blinks on screen



►Press   button to adjust hour of time




►Repress  button again, "00" of minute time blinks on screen


►Press   button to adjust minute of time


►Repress  button again, "55°C" of temperature blinks on screen

►Press   button to adjust switch-off temperature teaming heating.


►Press  button to exit setting. Parameters are saved automatically.




►Press  button, "tH 3o 17:00" displays on screen, the switch-on time and temperature for the third time section of heating function can be set



►Repress  button, "17" of hour time blinks on screen

►Press   button to adjust hour of time


►Repress  button again, "00" of minute time blinks on screen


►Press   button to adjust minute of time

►Repress  button again, "50°C" of temperature blinks on screen


►Press   button to adjust switch-on temperature teaming heating.

►Press  button to exit setting.


►Press  button, "tH 3F 22:00" displays on screen, the switch-off time and temperature for the third time section of heating function can be set.



►Repress  button, "22" of hour time blinks on screen


►Press   button to adjust hour of time

►Repress  button again, "00" of minute time blinks on screen


►Press   button to adjust minute of time

►Repress  button again, "55°C" of temperature blinks on screen

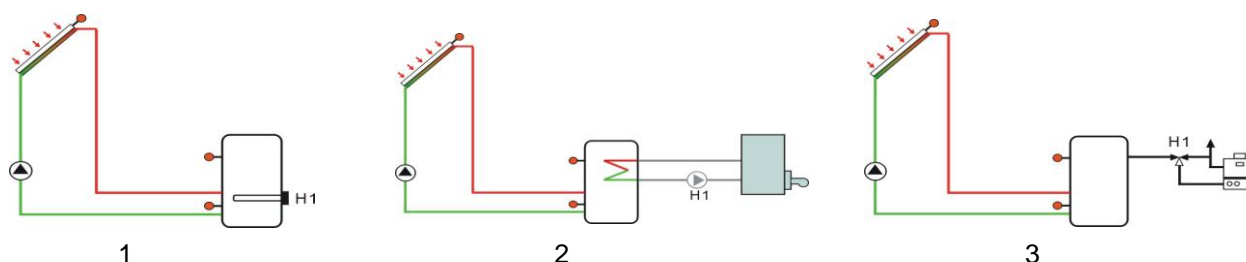
►Press   button to adjust switch-off temperature teaming heating.

►Press  button to exit setting, or waiting for 20 seconds to exit this menu and save parameters automatically.



Note: when no gas or oil boiler is installed in system, electrical heater can be installed as back-up device, when electrical heater is in operation status, signal  blinks on screen.

Application example:



If customer use electrical heater as back-up, please according to the power of electrical heater to equip corresponding safety devices like contactor and breaker with this controller, we strongly recommend equipping with SR802 device with this controller, (SR802 detailed technical data see paragraph spare parts)

6. Function operation and parameter setup (experts grade)

6.1 Main menu - DT Temperature difference

Description:

Solar circuit pump R1/R2 is triggered by the temperature difference function, so long as the temperature difference between collector and tank reaches the switch-on DT, solar circuit pump is triggered.

For example: the switch-on DT is 8°C, switch-off DT is 4°C, if the temperature on the bottom part of tank is 20°C, then just when collector temperature rises up to 28°C, pump is triggered, and when collector temperature drops to 24°C, pump is ceased.

Note: the switch-on/off DT of 8 °C and 4 °C are standard system setting according to many years' experience, only in special application cases it needs to be changed, (e.g. far distance heat transferring), normally it is recommend using default set. Switch-on and switch-off DT are alternating set. To avoid mistake the minimum difference between two temperature differences (DTon –DToff) is set as 2 °C.

When drain-back system is selected and is activated, the default switch-on temperature difference is set as 10°C; the default switch-off temperature difference is set as 4°C.

Setup temperature difference:

Under standby status, following steps descript in paragraph 5.1 to access main menu DT

► Press **SET** button, to access settings program of main menu DT, "DT 1o 08 °C" displays on screen, "08 °C" blinks, the first switch-on temperature difference can be set.



► Press **+** **-** button, to adjust the value of switch-on DT, adjustable range 2 °C ~ 20 °C (4°F ~ 36°F), factory setting is 8 °C (14°F)


► Press **ESC** button to exit this setting, parameter is saved automatically.

► Press **+** button, "DT 1F 04 °C" displays on screen, the first switch-off temperature difference can be set.

► Press **SET** button, "04 °C" blinks



► Press   button to adjust the value of switch-off DT, adjustable range 0 °C ~ 18 °C (0°F~34°F), factory set is 4 °C(7°F).

► Press  to exit menu, or wait for 20 seconds to exit automatically, the setup parameters are saved automatically.

Note: As every system is different to each other, maximum 2 sets of temperature difference (DT1o, DT1F) (DT2o, DT2F) can be set, setting steps are same like above description.

6.2 Main menu - TEMP Temperature

For every system, the factory set parameters are for the best operation condition, which is fully integrated into the entire solar system. But these parameters can also be set individually to cater the special requirements, please carefully observe the operation data of system components after setting.

Note:

- Parameters that can be set rely on the selected system, not all the parameters can be adjusted in every solar system.
- Because of different of system, the content of following submenus is also different.

Following submenu can be access though TEMP main menu.

Paragraph	Tem. Code	Function of temperature	Adjustable range	Factory set	Function exit tem.
6.2.1	EMOF	Collector maximum switch-off temperature	83 °C~200 °C	130 °C	
6.2.2	EMON	Collector maximum switch-on temperature	80 °C~197 °C	120 °C	
6.2.3	CMX	Maximum limited collector temperature (collector cooling function)	60 °C~190 °C	110 °C	107 °C
6.2.4	CMN	low temperature protection of collector	0 °C~90 °C	OFF	
6.2.5	CFR	frost protection of collector	-10 °C~10 °C	OFF	
6.2.6	REC	Tank re-cooling function		OFF	
6.2.7	SMX1	Maximum temperature of tank 1	2 °C~95 °C	70 °C	68 °C
6.2.8	SMX2	Maximum temperature of tank 2	2 °C~95 °C	70 °C	68 °C
6.2.9	MAX1	Maximum switch-off temperature	(MIN1+2 °C) ~95 °C	60 °C	
6.2.10	MIN1	Minimum switch-on temperature	10°~ (MAX1-2 °C)	30 °C	
6.2.11	C_F	Temperature unit switched between Celsius and Fahrenheit		°C	

6.2.1 EMOF Collector maximum switch-off temperature

Function description:


When collector temperature rises up to this maximum switch-off limited temperature (EM), this function is activated, solar circulation pump is stopped to avoid the damage of system other components caused by high temperature. The adjustable range of EMOF temperature is (83 °C~200 °C), factory set is 130 °C. If



the temperature of collector rises up to EMOF limited temperature, solar circuit pump is ceased, but when collector temperature drops to the collector maximum switch-on temperature EMON (factory set is 120°C), solar circuit pump will be reset, and this function is deactivated.


Note: for drain-back system, the default EMOF temperature is set as 95°C, the default EMON temperature is set as 85°C, adjustable range is defined as 80°C ~ 120°C.


Setup steps:

To access main menu TEMP, then select submenu EMOF (see 5.1 and 5.2), “EMOF 130°C” displays on screen

► Press  button, parameter “130 °C” blinks.

► Press   button, to adjust this maximum switch-off temperature, adjust range 83 °C ~ 200 °C (176°F ~ 386°F), factory set is 130 °C (266°F)

► Repress  button to activate and deactivate this function, if deactivate the function, “EMOF - - -” displays on screen.


► Press  button to exit menu or wait for 20 seconds to exit automatically, set parameters are saved automatically.






6.2.2 EMON Collector maximum switch-on temperature


Setup steps:

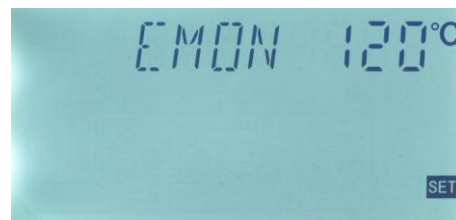
To access main menu TEMP, then select submenu EMON (see 5.1 and 5.2), “EMON 120°C” displays on screen

► Press  button, parameter “120 °C” blinks.

► Press   button, to adjust this maximum switch-on temperature, adjust range 80 °C ~ 200 °C (181°F ~ 392°F), factory set is 120 °C (248°F) .

► Repress  button to activate and deactivate this function, if deactivate the function, “EMON - - -” displays on screen.

► Press  button to exit menu or wait for 20 seconds to exit automatically, set parameters are saved automatically.



When these two signals of EM blink on the screen, it indicates this function is in activated, and at this moment temperature of tanks reaches to its maximum limited temperature



When only this signal of EM blinks on the screen, it indicates this function is also activated, but temperature of tank doesn't reach to its maximum limited temperature

6.2.3 CMX Maximum limited collector temperature (collector cooling function)

Function description:

If hot water in tank isn't used for long time, then the capacity that solar system absorbs solar irradiation reduces, when tank temperature rises to its preset maximal temperature, solar circuit pump is ceased

compulsively even the temperature difference is satisfied. then when more solar irradiation shines in, as a result collector temperature will rise continuously, temperature of collector maybe rise up to the evaporated temperature of heat fluid, this phenomenon names collector - overheat, it should be avoided. Through set the maximum limited collector temperature (collector cooling function) it can delay the vaporization of the heat transfer fluid. Shortly before reaching the maximum temperature of the collector, the solar pump starts working to cool down the heat transfer fluid using the heat losses occurring in pipelines and storage cylinder.



When collector temperature rises up to its maximal temperature, solar pump will be triggered again even at the case that tank temperature is already to its maximal temperature. And solar pump works until the temperature of collector drops because of this reversed circulation or when tank temperature rises its emergency temperature (95°C).


When ☀ displays, and ⚠ blinks on the screen, it indicates that tank emergency temperature reaches, tank temperature is $\geq 95^{\circ}\text{C}$


Setup steps:

To access main menu TEMP, then select submenu CMX (see 5.1 and 5.2) , "CMX 110 °C" displays on screen

► Press  button, "110 °C" blinks.

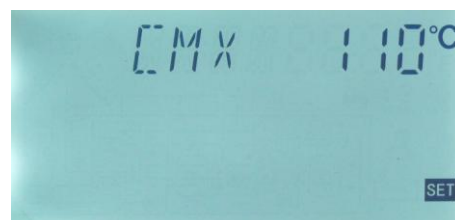
► Press   button to adjust collector limited maximum temperature ,adjust range : (60 °C ~ 190 °C) (158°F ~ 374°F) , Factory set is 110 °C (230°F) .

► Press  button to activate and deactivate this function, if deactivate the function, "CMX - - -" displays on screen.

► Press  button to exit menu or wait for 20 seconds to exit automatically, set parameters are saved automatically.



CMX signal displays on screen, it indicates that this function is in activated.




6.2.4 CMN low temperature protection of collector

Description:



When the temperature of collector is below preset CMN temperature, solar circuit pump is ceased, even when the temperature difference between collector and tank exceeds switch-on temperature difference, solar pump doesn't work yet. When temperature of collector is 3°C higher than the preset CMN temperature, solar circuit pump is restarted, controller exits this program.

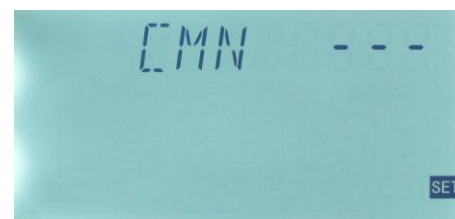
Setup steps:


To access main menu TEMP, then select submenu CMX (see 5.1 and 5.2) , "CMN - - -" displays on screen, default set is OFF.

► Press  button, default off signal "- - -" blinks on screen.

► Repress  button to activate and deactivate this function

► Press   button to adjust the low protection temperature of collector CMN, adjustable range (00 °C ~ 90 °C) (32°F ~ 194°F); after activating the function, factory set is 10 °C (50°F).



► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



CMN signal displays on screen, it indicates that this function is in activated.

6.2.5 CFR frost protection of collector


Description:

In winter when the temperature of collector is below the preset frost protection temperature (factory set is 4 °C), Solar circuit pump is triggered to transfer hot water from tank to collector and heat collector. Besides when tank temperature (T2) drops to 6 °C, electrical heater is triggered automatically and it is in operation until tank temperature T2 raises up to 20 °C or it is stopped when program of CFR is exited. When collector temperature rises up to 7 °C, solar circuit pump is ceased, program of CFR exits automatically.



This function is used in system, which water is used as heat transfer liquid, to avoid the freezing of solar heat transfer fluid.


Setup steps:

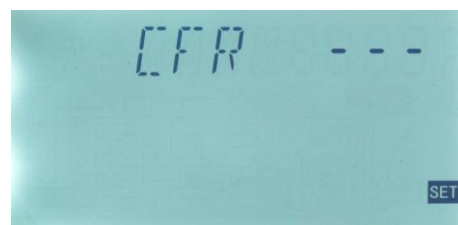
To access main menu TEMP, then select submenu CFR (see 5.1 and 5.2), “CFR ----” displays on screen, default set is off.

► Press  button, default off “- - -” blinks.

► Repress  button to activate or deactivate this function

► Press   button to adjust the temperature of frost protection function, adjustable range is (-10 °C~10 °C) (14°F ~ 50°F) , after function activated, default set is 4 °C (39°F) .

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



CFR signal displays on screen, it indicates that this function is in activated.

Note: this function is only available in special solar system which using no-anti-freezing liquid; this kind of system is only suitable in area where the ambient temperature is near to 0°C only few days. For high level safety requirement, then the anti-freezing liquid is necessary, we suggest using suitable anti-freezing liquid to avoid frost problem.

6.2.6 REC Tank re-cooling function


Description:


If tank temperature rises up to tank's maximum temperature, and at the same time, collector temperature is 5°C lower than tank temperature, then solar pump can be triggered, through this reversed circulation, tank temperature is reduced by heat loss occurs in collector, solar pump keeps in working until tank temperature drops below its maximum temperature.


Setup steps:

To access main menu TEMP, then select submenu REC, (see 5.1 and 5.2) , “REC OFF” displays on screen, default set is off.

► Press  button, parameter “OFF” blinks on screen

► Repress  button to activate or deactivate this function, after function activated; factory set is "REC ON"

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

 REC signal displays on screen, it indicates that this function is in activated.




6.2.7 SMX1 Maximum temperature of tank 1



Description:


When the DT between collector T1 and Tank T2 caters the switch-on DT of circulation, solar pump is triggered, but in order to avoid the high temperature inside tank, controller will check whether the temperature (T3) of top part of tank is higher than maximum temperature of tank, when T3 is higher than the preset maximum tank temperature SMX, solar pump is ceased even at the case that DT caters condition. When tank temperature drops T3 drops and is 2°C below the SMX temperature, solar pump restarts when DT caters condition.


Setup steps:


To access main menu TEMP, then select submenu SMX1, (see 5.1 and 5.2) "SMX1 70°C" displays on screen.

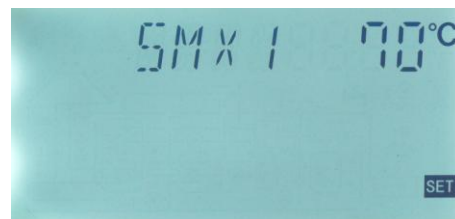
► Press  button, parameter "70°C" blinks

► Press   button to adjust the value of maximum temperature of tank1, adjustable range is (2°C ~ 95°C) (35°F ~ 203°F), default set is 70°C (158°F).

► Repress  button to activate and deactivate this function, if function deactivated, "SMX1 - -" displays on the screen.

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.


 SMX signal displays on screen, it indicates that this function is in activated.






6.2.8 SMX2 Maximum temperature of tank 2

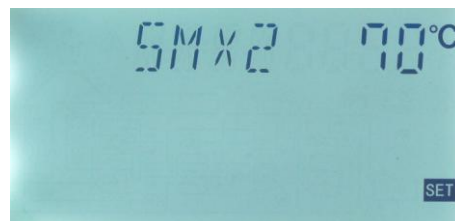
Setup steps:

To access main menu TEMP, then select submenu SMX2, (see 5.1 and 5.2) "SMX2 70°C" displays on screen.

► Press  button, parameter "70°C" blinks

► Press   button to adjust the value of maximum temperature of tank1, adjustable range is (2°C ~ 95°C) (35°F ~ 203°F), default set is 70°C (158°F).

► Repress  button to activate and deactivate this function, if function deactivated, "SMX2 - -" displays on the screen.



► Press **ESC** button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

6.2.9 MAX1 Maximum switch-off temperature

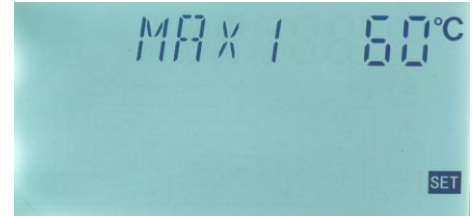
Setup steps:

To access main menu TEMP, then select submenu MAX1, (see 5.1 and 5.2) "MAX1 60 °C" displays on screen.

► Press **SET** button, parameter "60 °C" blinks

► Press **+** **-** button to adjust the value of maximum switch-off temperature, adjustable range is (MIN1+ 2 °C) ~ 95 °C (53°F ~ 203°F), default set is 60 °C (140°F)

► Press **ESC** button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.2.10 MIN1 Minimum switch-on temperature

Setup steps:

To access main menu TEMP, then select submenu MIN1, (see 5.1 and 5.2) "MIN1 30 °C" displays on screen.

► Press **SET** button, parameter "30 °C" blinks

► Press **+** **-** button to adjust the value of maximum switch-off temperature, adjustable range is 10°C ~ (MAX1 - 2 °C) (50°F ~ 199°F), default set is 30 °C (86°F)

► Press **ESC** button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.2.11 C_F Temperature unit switched between Celsius degree and Fahrenheit

Setup steps:

To access main menu TEMP, then select submenu C_F, (see 5.1 and 5.2) "°C" displays on screen.

► Press **SET** button, parameter "°C" blinks

► Press **+** **-** button to switch temperature unit default set is °C.

► Press **ESC** button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3 Main Menu - FUN Auxiliary functions

The auxiliary functions of this controller can be set under "FUN" menu; it is possible to activate several auxiliary functions at the same time.

Note:

Sometimes, your selected function needs an extra signal input port to be used for connecting temperature

sensor or an extra output port to be used for controlling the pump or electromagnetic valve. When all inputs and outputs have been occupied, function you selected may not be available for activating. In such case, you can't see the submenu options. For different system, activated or deactivated statuses of following auxiliary functions showed in the submenu are different.

Following submenu can be accessed through menu "FUN"

Submenu below Fun	Description	Paragraph
DVWG	Anti legionnaires' function	6.3.1
nMIN	Speed adjusting of circulation pump R1 (pump R1 RPM controlling)	6.3.2
DTS	Nominal temperature difference for circulation pump R1 (speed adjusting)	6.3.3
RIS	Gain for circulation pump R1 (speed adjusting)	6.3.4
n2MN	Speed adjusting of circulation pump R2 (pump R2 RPM controlling)	6.3.5
DT2S	Nominal temperature difference for circulation pump R2 (speed adjusting)	6.3.6
RIS2	Gain for circulation pump R2 (speed adjusting)	6.3.7
ODB	Drain-back initialisation function	6.3.8
	tDTO	Drain-back switch-on condition - time period
	tFLL	Drain-back filling time
	tSTB	Drain-back stabilization time
	OBST	Back-up pump option
BYPA	Bypass (high temperature)	6.3.9
OHQM	Thermal energy measuring	6.3.10
	FMAX	Flow rate
	MEDT	Type of heat transfer liquid
	MED%	Concentration of heat transfer liquid
PRIO	Tank priority	6.3.11
	tRUN	Pulse heating running time
	tSTP	Pulse heating standstill time
	OSTS	Tank setup option
INTV	Pump pulse function	6.3.12
	IRUN	Running time of pump
	ISTP	Standstill time of pump
	OSTS	
PDLY	Run-on of circulation pump	6.3.13
BEEP	Temperature sensor fault alarm	6.3.14
HDN	Manual control	6.3.15
PASS	Password set	6.3.16
REST	Recovery to factory set	6.3.17

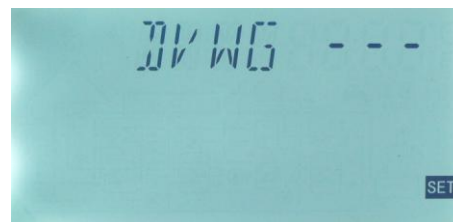
6.3.1 DVWG Anti legionnaires' function

Description:

In order to avoid occurring bacteria in water tank when the temperature of tank is lower for a long time, controller will check the temperature of tank every 7 days in a period automatically, if the temperature of tank is never over 70°C during this period, then at the factory default time of 01:00 on the seventh day of the period auxiliary heating system is triggered automatically to heat water until it rises up to 70°C, bacteria is killed by high temperature, thereafter function is deactivated.

Setup steps:

To access main menu FUN, then select submenu DVWG, (see 5.1 and 5.2) "DVWG ----" displays on screen. Default set is "OFF".



► Press **SET** button, parameter "-----" blinks on the screen.

► Repress **SET** button, "70°C" blinks on the screen, function is triggered.

► Press **+** **-** buttons to adjust desired heating temperature, adjustable range: 5°C ~ 95°C (41°F ~ 203 °F), default set is 70°C (158°F) .

► Press **ESC** button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

6.3.2 nMIN Speed adjusting of circulation pump R1 (pump R1 RPM controlling)

Description:

R1 output can be configured to function either as RPM controlled output or as simple switch output.

When nMIN is set as 30-90%, R1 output is used as RPM output.

When nMIN is set as 100%, it means R1 output is used as switch output(e.g. to control valve or to control the pump with a internal PRM Controller)

Normal switch output: circuit pump speed control (RPM) is deactivated, pump is operated with a fixed speed, and flow rate is not changed.

RPM control output: (speed control is activated), the control system attempts to maintain a constant temperature difference between collector and tank. The pump performance is continuously adjusted, the flow rate of pump is increased or reduced based on the temperature difference.

Note: when drain-back function is activated, R1 pump speed is default reduced to 50%.

Setup steps:

To access main menu FUN, then select submenu nMIN (see 5.1 and 5.2) "nMIN 100" displays on screen.

► Press **SET** button, parameter "100" blinks on the screen.

► Repress **+** **-** button, to adjust pump speed. Adjustable range: (30~100%) , factory set is 100%.

► Press **ESC** button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.3 DTS Standard temperature difference for circulation pump R1 (R1speed adjusting)

Description:





This controller has preset default minimum pump speed of R1 is 30%. When the switch-on temperature difference (DT 10) reaches, solar pump R1 is triggered, and then within following 20 seconds, pump speed reaches to its minimum speed (30%). Thereafter, controller checks temperature continuously, when the standard temperature difference (DTS) reaches, the speed of pump increases one grade (10%), temperature difference RIS increases every 1°C, speed of pump increases 10% until it reaches to its maximum speed 100%. Through setting the gain of temperature difference (RIS) can achieve the controlling of pump speed. If temperature difference drops to the switch-off temperature difference (DT 1F),

circuit pump is ceased.

Note: when drain-back function is activated, DTS (standard temperature difference of circuit pump R1) default set as 15°C.

Setup steps:

To access main menu FUN, then select submenu DTS (see 5.1 and 5.2) "DTS 08 °C" displays on screen.





- ▶ Press  button, parameter "08°C" blinks on the screen.
- ▶ Press   button, to adjust standard DTS, adjustable range (2 °C~30 °C) (3 °F~54 °F), factory set is 08°C (14°F).
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.4 RIS Gain for circulation pump R1 (R1 speed adjusting)

Setup steps:

To access main menu FUN, then select submenu RIS (see 5.1 and 5.2) "RIS 01 °C" displays on screen.

- ▶ Press  button, parameter "01°C" blinks on the screen
- ▶ Press   button, to adjust standard RIS, adjustable range (1 °C~20 °C) (3 °F ~36 °F), factory set is 1°C (1°F)
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.5 n2MN Speed adjusting of circulation pump R2 (pump R2 RPM controlling)

Description:

R2 output can be configured to function either as RPM controlled output or as simple switch output.

When nMIN is set as 30-90%, R2 output is used as RPM output.

When nMIN is set as 100%, it means R2 output is used as switch output(e.g. to control valve or to control the pump with a internal PRM Controller)




Normal switch output: circuit pump speed control (RPM) is deactivated, pump is operated with a fixed speed, and flow rate is not changed.

RPM control output: (speed control is activated), the control system attempts to maintain a constant temperature difference between collector and tank. The pump performance is continuously adjusted, the flow rate of pump is increased or reduced based on the temperature difference.


Note: when drain-back function is activated, R1 pump speed is default reduced to 50%.

Setup steps:

To access main menu FUN, then select submenu n2MN (see 5.1 and 5.2) "n2MN 100" displays on screen.

- ▶ Press  button, parameter "100" blinks on the screen.
- ▶ Repress   button, to adjust pump speed. Adjustable range: (30~100%) , factory set is 100%.



► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

6.3.6 DT2S Standard temperature difference for circulation pump R2 (R2 speed adjusting)



Description:


This controller has preset default minimum pump speed of R2 is 30%. When the switch-on temperature difference (DT 2O) reaches, solar pump R2 is triggered, and then within following 20 seconds, pump speed reaches to its minimum speed (30%). Thereafter, controller checks temperature continuously, when the standard temperature difference (DT2S) reaches, the speed of pump increases one grade (10%), temperature difference RIS2 increases every 1°C, speed of pump increases 10% until it reaches to its maximum speed 100%. Through setting the gain of temperature difference (RIS2) can achieve the controlling of pump speed. If temperature difference drops to the switch-off temperature difference (DT 2F), circuit pump is ceased.

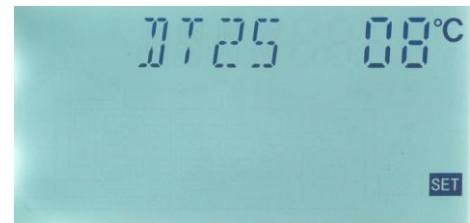
Setup steps:

To access main menu FUN, then select submenu DTS (see 5.1 and 5.2) “DT2S 08°C” displays on screen.

► Press  button, parameter “08°C” blinks on the screen.

► Press   button, to adjust standard DT2S, adjustable range (2°C~30°C) (3°F~54°F), factory set is 08°C (14°F).

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.






6.3.7 RIS2 Gain for circulation pump R2 (R2 speed adjusting)

Setup steps:

To access main menu FUN, then select submenu RIS2 (see 5.1 and 5.2) “RIS2 01°C” displays on screen.

► Press  button, parameter “01 °C” blinks on the screen

► Press   button, to adjust standard RIS, adjustable range (1°C~20°C) (3°F ~ 36°F), factory set is 1°C (1°F)

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.






6.3.8 ODB Drain-back initialisation function

Description:

When it is no sunshine, drain-back function can make heat transfer liquid to flow back to the storage tank. When solar irradiation is enough for heating, drain-back function will trigger liquid filling process.

When drain-back function is triggered, pump will run at 100% speed to pump heat transfer liquid from storage tank to collector within a preset filling time section (tFLL). When the filling time is finished, pump speed will reduce to the preset minimum pump speed nMIN. Within the standby time section (tSTB), the switch-off condition of pump is overridden to avoid early closing the system.


Note:


- An extra device is needed in the drain-back system, for example, a storage tank. Only when all devices of a drain-back system are installed, drain-back function just can be triggered.
- Drain-back function can only be used in the system with 1 tank and 1 collector array (system 1,2,3,6,9)
- When drain-back function is activated, parameter DT1O, DT1F, DTS, nMIN all will be set as a fixed value (DT1O=10°C, DT1F=4°C, DTS=15°C, nMIN=50%). Besides, the adjustable range and factory default value of collector emergency switch-off temperature EM function will be changed(EMOF=95°C, EMON=85°C, adjustable range=80-120°C) (see detailed menu description). The parameter values set previously will be replaced by the value which set in ODB function, and when ODB function is deactivated later, it is necessary to reset those parameters.
- When drain-back function is activated, then cooling functions like CMX, CFR, REC and holiday function will be closed, even in the case that drain-back function is closed, those functions are still in close status.
- OBST back-up pump function (option): this option function is used to trigger the second back-up pump when system is filling. When solar system starts to run, R2 and R1 pumps are parallel triggered, when the filling time is finished, pump R2 is stopped. In the case that OBST function is activated, the R2 output used in other functions is closed (for example high temperature bypass function BYPR).
- When drain-back function (ODB) is activated, press   or  button to check the switch-on time (INIT), filling time (FLL) and countdown of standstill time(STB)


ODB Drain-back function, its default set: OFF.

Setup steps:

To access main menu FUN, then select submenu ODB, “ODB OFF” displays on the screen.

► Press  button, parameter “ODB OFF” blinks on the screen

► Repress  button to activate this function, “ODB ON” displays.

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.






6.3.8.1 tDTO Drain-back switch-on condition - time period

Setup steps:

To access main menu FUN, then select submenu tDTO, “tDTO 60” displays on the screen, to set the switch-on time section.

► Press  button, parameter “60” blinks on the screen

► Press   button to adjust the time, adjustable range : 1~100S, default set: 60S.

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.





6.3.8.2 tFLL Drain-back filling time


Setup steps:

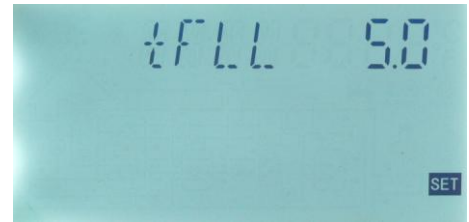
To access main menu FUN, then select submenu tFLL, “tFLL 5.0” displays on the screen, to set the

switch-on time section.

► Press  button, parameter “5.0” blinks on the screen

► Press   button to adjust the time, adjustable range: 1~30 min, default set: 5.0min. (Note: 0.5min change only every time)

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.






6.3.8.3 tSTB Drain-back stabilization time

Setup steps:

To access main menu FUN, then select submenu tSTB, “tSTB 2.0” displays on the screen, to set the switch-on time section.

► Press  button, parameter “2.0” blinks on the screen

► Press   button to adjust the time, adjustable range: 1~15 min, default set: 2.0min.


► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.





6.3.8.4 OBST Back-up pump option

Setup steps:

To access main menu FUN, then select submenu OBST, “OBST OFF” displays on the screen. To set back-up pump function.

► Press  button, parameter “OBST OFF” blinks on the screen

► Repress  button to activate this function, “OBST ON” displays.

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.9 BYPR Bypass (high temperature)

Description:






High-temperature bypass function is independent of the solar system's operation; the extra thermal energy of tank can be transferred to other application through this function, as a result the constant tank temperature can be kept. In order to transfer the extra energy, it needs an extra pump or electromagnetic valve. (Connect to output port R2).

For example:

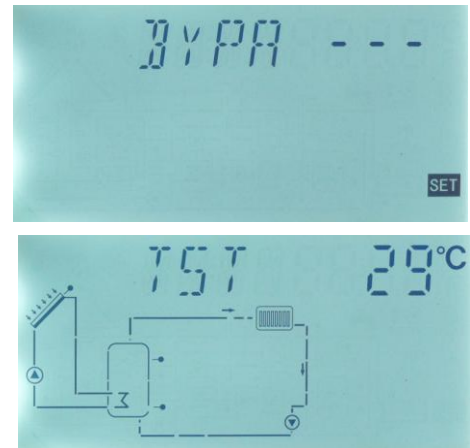
If we set the temperature of bypass is 85°C, then when tank temperature (T2) rises up to 85°C, this by-pass function is triggered, electromagnetic valve or circuit pump (R2) will be triggered. When tank temperature (T2) drops to 82°C, electromagnetic valve or circuit pump (R2) will be ceased.

Setup steps:

To access main menu FUN, then select submenu BYPR, “BYPR-----” displays on screen.

- ▶ Press  button, “- - -”blinks on screen, default set is “OFF”
- ▶ Repress  button, to activate by-pass function, “BYPR 85 °C” displays on the screen, (“85 °C” blinks)
- ▶ Press   button to adjust this parameter, adjustable range (5 °C~120 °C) (41°F ~ 248°C).
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

For example: In this picture, radiator circuit is used to release the extra energy of tank; pump is triggered by bypass function.



6.3.10 OHQM Thermal energy measuring

Description:


Controller has function for measuring the thermal energy; it can measure the energy which is transferred from collector to tank. For the sake of measuring, the temperature on flow and return pipe should be checked, and an extra mechanical flow meter should be installed on the circulation pipe, it is used for measuring the flow rate.


The thermal energy transferred by solar system is calculated with measured parameters flow rate and the temperature T0 on return pipe. Thermal energy got in the current day displays in DKWh, accumulative thermal energy displays in KWh or MWh. The amount of 2 values is the total energy output.


Note: when T0 input is used, (for example, in system 8), OHQM thermal energy measuring function option is off.

Setup steps: Factory set of OHQM is off.

To access main menu FUN, then select submenu OHQM, (see 5.1 and 5.2) “OHQM OFF” displays on screen,

- ▶ Press  button, parameter “OHQM OFF” blinks on the screen




- ▶ Repress  button to activate this function, “OHQM ON” appears on the screen



- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.





Thermal energy got in current day, accumulative thermal energy and operation time of pump can be reset, doing like following.


Operation steps: under standby status,

- ▶ Press   button, select the thermal energy of current day, “DKWH XX” “SET” displays on the screen.
- ▶ Press  button for 3 seconds, buzzer makes 3 times “du-----”, the daily thermal energy is cleared, and daily thermal energy is reset to “00”.

► Press   button, select to check accumulative thermal energy, “KWH XX” or “MWH XX” “SET” displays on the screen.

► Press  button for 3 seconds, buzzer makes 3 times “du-----”, the sum thermal energy is cleared, and accumulative thermal energy is reset to “00”.

► Press   button, select the operation time of pump, “hP XX” “SET” displays on the screen.

► Press  button for 3 seconds, buzzer makes 3 times “du-----”, the operation time of pump is cleared, and it is reset to “00”.

Note: Only when the thermal energy measuring function is activated, then the operation time of circulation pump function just can be triggered.



6.3.10.1 FMAX Flow rate


FAMX: Flow rate L/min. adjustable range: (0.1~20) L/min, increase rate 0.1L per time, factory set is 2.0L/min

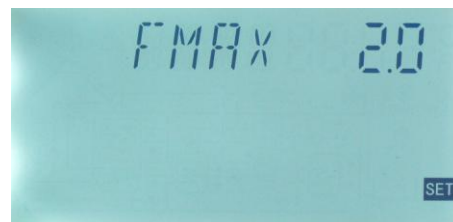
Setup steps:

To access main menu FUN, then select submenu FMAX (see 5.1 and 5.2), “FMAX 2.0” displays on screen.

► Press  button, parameter “2.0” blinks on the screen

► Press   button to adjust parameter of flow rate.
Adjustable range (0.1~20)

► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.10.2 MEDT Type of heat transfer liquid

MEDT: type of heat transfer liquid, adjustable range (00~03), factory set:01

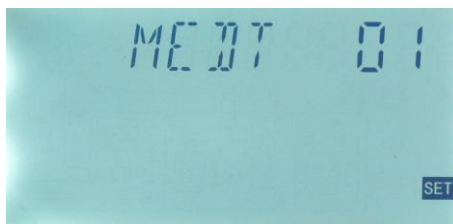
Type of heat transfer liquid:

00: Water

01: Propylene glycol

02: Glycol



03: Tyfocor LS/G-LS




Setup steps:

To access main menu FUN, then select submenu MEDT, “MEDT 01” displays on screen.

► Press  button, parameter “01” blinks on the screen

► Press   button, to adjust type of heat transfer liquid, adjustable range (00~03)





► Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

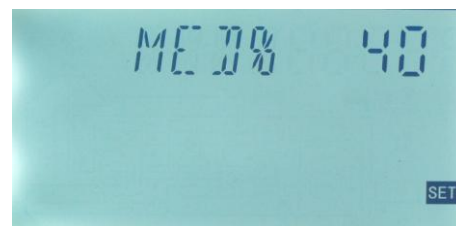
6.3.10.3 MED% Concentration of heat transfer liquid

MED% Concentration of heat transfer liquid (volume percentage %), depending on the type of heat transfer liquid, adjustable range (20 ~70), factory set 40%

Setup steps:

To access main menu FUN, then select submenu MED%, “MED% 40” displays on screen.

- ▶ Press  button, parameter “40” blinks on the screen
- ▶ Press   button to adjust concentration, adjustable range (20~70)
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.11 PRIO Tank priority





Description:

If set “PRIO 01” or “PRIO 02” priority option, then corresponding tank will be prior to heated. If priority tank doesn’t meet the switch-on condition, controller will check next tank in turn, if it meets the switch-on condition, then it is heated provisionally, the heating duration is decided by parameter pulse heating running time tRUN, within tRUN time, circuit pump works, tank is heated, duration runs out, then process is shifted to pulse heating standstill time (tSTP), circuit pump stops, if during tSTP duration, priority tank meets the switch-on condition, then priority tank is heated. If temperature of priority tank rises up to its maximum tank temperature, in turn, the next tank is heated, and this time its heating is no more temporary.

Tank priority function and parameter are available in system with several tanks. If priority option is set as 00, that means tank priority function is deactivate, then tanks can be heated at the same time. (01 indicates tank 1 is priority tank, 02 indicates tank 2 is priority one).

Setup steps:

To access main menu FUN, then select submenu PRIO, “PRIO 02” displays on screen.

- ▶ Press  button, parameter “02” blinks on the screen
- ▶ Press   button to adjust tank priority, adjustable range: (00~02), SU1, SU2
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



	Default set	Adjustable range
Priority tank (PRIO)	01	00 ~ 02, SU1, SU2
Pulse heating standstill time (tSTP)	2 minute	01-30 minute
Pulse heating running time (tRUN)	15 minute	01-30 minute





6.3.11.1 tRUN Pulse heating running time

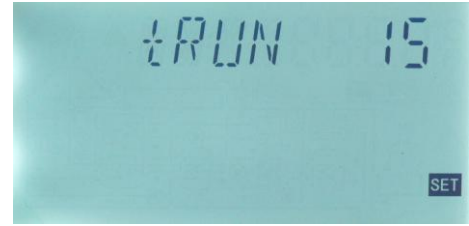
Description:

Pulse heating standstill time (tSTP), Pulse heating running time (tRUN), with the temperature rising of collector, controller is monitoring whether the temperature difference between collector and tank meets the switch-on temperature difference, if DT of the priority tank isn’t enough, then check next tank, if DT for next tank meets condition, then it is heated, but the heating duration is controlled by Pulse heating running time (tRUN). tRUN is out, and then heating is broken off. The process is shifted to Pulse heating standstill time (tSTP), controller keeps on checking temperature of collector, if DT of the priority tank is still not enough, and then continue to heat next tank. If DT of the priority tank meets the switch-on condition. Then priority tank is heated. Pulse heating is no more available.

Setup steps:

To access main menu FUN, then select submenu tRUN, "tRUN 15" displays on screen.





- ▶ Press  button, parameter "15" blinks on the screen
- ▶ Press   button to adjust heating time, adjustable range (01~30), factory set is 15
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.11.2 tSTP Pulse heating standstill time (tSTP)

Setup steps:

To access main menu FUN, then select submenu tSTP, "tSTP 02" displays on screen.

- ▶ Press  button, parameter "02" blinks on the screen
- ▶ Press   button to adjust heating switch-off time, adjustable range (01~30), factory set is 02
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.11.3 OSTs tank setup option









Description:

If the priority tank reaches to its desired temperature (Tank1 corresponding to TST1, tank 2 corresponding to TST2), then the next tank will be heated until to its desired temperature. After that, The priority tank will be heated to its maximum temperature, and then the next tank can be heated continuously.






Note: this function only appears when priority function is activated (PRIO01, PRIO02).

Setup steps:

To access main menu FUN, then select submenu OSTs, "OSTs OFF" displays on screen.

- ▶ Press  button, "OSTs OFF" blinks on the screen
- ▶ Repress  button, "OSTs ON" appears to activate this function
- ▶ Press  button, to exit and confirm the setting.
- ▶ Press  button, "TST1 45°C" displays on the screen, then you can adjust the temperature of tank1
- ▶ Press  button, "45°C" blinks on the screen
- ▶ Press   button to adjust parameter, adjustable range 4°C ~ 85°C (39°F ~ 185°F), factory set is 45°C (113°F)
- ▶ Press  button, to exit and confirm the setting.



- ▶ Press  button, "TST2 45°C" displays on the screen, then you can adjust the temperature of tank 2
- ▶ Press  button, "45°C" blinks on the screen
- ▶ Press   button to adjust parameter, adjustable range 4°C ~ 85°C (39°F ~ 185°F), factory set is 45°C (113°F)
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

6.3.12 INTV Pump pulse function

Description:




This function is useful when collector sensor isn't installed on collector (sensor installed on the outlet pipe of collector). In order to measure the actual temperature of collector, within the preset interval, solar pump is triggered like pulse, so that the hot water inside collector can flow to the pipe, where sensor is mounted, as the result, the actual temperature of collector is measured. It is unnecessary to activate this function in all time, you can use it within a preset time section, default set time is 06:00 ~20:00.

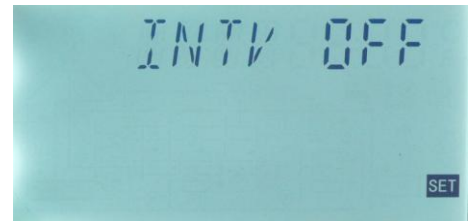
During the period that solar pump is running (the duration of running can be set by parameter "IRUN"), controller check the temperature signal of sensor, if the temperature increases less than 1°C, then solar pump is ceased automatically. After the break time (interval can be set by parameter "ISTP"), same process repeats.

During the period that solar pump is running, if measured temperature increases over 1°C, then the next interval is omitted, this omitting repeats when it meets condition and until the switch-on temperature difference is catered or no more temperature can be measured. After that, pump interval function recovers to pulse rate-controlled mode.

Setup steps:

To access main menu FUN, then select submenu INTV, "INTV OFF" displays on screen.





- ▶ Press  button, parameter "OFF" displays and blinks, factory set is "OFF"
- ▶ Press  button, to activate this function, "INTV ON" displays on the screen.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



6.3.12.1 IRUN Running time of pump

Setup steps:

To access main menu FUN, then select submenu IRUN, "IRUN 15" displays on screen.

- ▶ Press  button, parameter "15" displays and blinks, factory set is "15 second"
- ▶ Press   button, to adjust time, adjustable range 5~ 120 seconds.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved







automatically.

6.3.12.2 ISTP Standstill time of pump

Setup steps:

To access main menu FUN, then select submenu ISTP, "ISTP 30" displays on screen.

- ▶ Press  button, parameter "30" displays and blinks, factory set is "30 minute"
- ▶ Press   button, to adjust time, adjustable range 2~ 60 minutes.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.






6.3.13 PDLY Run-on of circulation pump

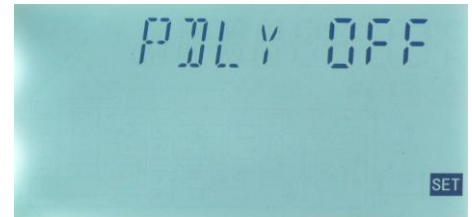
Description:

Considering the startup time of three way valve, pump is delayed to switch on. If this function is activated, the corresponding valve will start firstly, after 20 seconds delay, pump is switched on.

Setup steps:

To access main menu FUN, then select submenu PDLY, "PDLY OFF" displays on screen.

- ▶ Press  button, parameter "OFF" displays and blinks, factory set is "OFF"
- ▶ Press  button to activate this function, "PDLY ON" displays on the screen.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



Note: PDELA Pump run-on function is only available in the system with the valve control.




6.3.14 BEEP Temperature sensor fault alarm

Description:

After this function is activated, when sensor is fault, buzzer will alarm, press ESC button to cancel the buzzer.

Setup steps:

To access main menu FUN, then select submenu BEEP, "BEEP OFF" displays on screen.

- ▶ Press  button, parameter "OFF" displays and blinks, factory set is "OFF"
- ▶ Press  button to activate this function, "BEEP ON" displays on the screen.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.





6.3.15 HND Manual control


When using this controller first time or when debugging this controller, outputs of this controller (R1, R2, H1) can be triggered manually, "ON, OFF" control.


Setup steps:

To access main menu HND,


► Press  button, "HND1 off" displays on the screen, R1 output manually set


► Repress  button, "HND1 on" displays on the screen, R1 output is switched-on


► Repress  again, "HND1 off" displays, R1 output is switched-off


► Press  to exit R1 set program




► Press  button, "HND2 off" displays on the screen, R2 output manually set


► Repress  button, "HND2 on" displays on the screen, R2 output is switched-on


► Repress  again, "HND2 off" displays, R2 output is switched-off


► Press  to exit R2 set program



► Press  button, "HND3 off" displays on the screen, H1 output manually set

► Repress  button, "HND3 on" displays on the screen, H1 output is switched-on

► Repress  again, "HND3 off" displays, H1 output is switched-off

► Press  to exit H1 set program




Note: when manual control function is activated,  displays. Manual running lasts 15 minutes, then the outputs are closed automatically, and control exits the manual control status.

6.3.16 PASS Password set













Setup steps:

To access main menu PASS,

► Press  button, "PWDC 0000" appears, the left digital blinks, ask for entering current password, factory set is "0000"

► Press   button to enter the first digital





- ▶ Repress  button, the second digital blinks
- ▶ Press   button to enter the second digital
- ▶ Repress  button, the third digital blinks
- ▶ Press   button to enter the third digital
- ▶ Repress  button, the fourth digital blinks
- ▶ Press   button to enter the fourth digital
- ▶ Press  button, "PWDN 0000" displays on the screen, ask for entering a new password, doing like above to enter the new password
- ▶ Press  button, "PWDG 0000" displays on the screen, ask for reentering the new password, doing like above to reenter the new password, "PWOK" displays on the screen to indicate reentering password successfully.
- ▶ Press  button to exit set program or wait for 20 seconds to exit automatically.



Warning





If the password is forgot, it is not possible to recover, but you can recover the password to factory set, then you can reenter a new password like above descript steps, doing like following to recover to factory set.

- ▶ Switch-off the power of controller firstly,
- ▶ Press  and hold down, then recover the power supply.
- ▶ Buzzer makes "du-----" 3 times, then release  button. Controller recovers to factory set (0000), a new password can be reset now.

6.3.17 REST Recovery to the factory set

Setup steps:


To access main menu REST,


- ▶ Press  button, "YES" displays on the screen.
- ▶ Hold down  button, buzzer makes "du-----" 3 times, then release  button. Controller recovers to factory set, new paramters can be reset now.
- ▶ Press  button to exit set program or wait for 20 seconds to exit automatically.



6.4 On/OFF button

Under the standby status,

- ▶ Press  button for 3 seconds; controller is switched off, "OFF" displays on the screen.

►Repress  button, controller is switched-on again.

6.5 Holiday function

Description:


This function activates in night, solar liquid will flow from storage tank to collector to cool the tank, and therefore to prevent overheating problem of the solar system due to completely heated storage tank. The function is activated at night between 10 pm and 6 am, when the temperature of collector is 8 °C below the storage tank temperature (T2), solar circuit pump starts to work until the temperature of collector is 2 °C below the tank temperature, and then solar circuit pump is ceased.

Activate this function if:

- You intend to be absent for an extended period (holiday)
- No hot water is required for an extended period.

Note: The function is deactivated when the temperature on bottom of tank is below 35 °C.

Activate/ deactivate this function:

►Press  button for a long time until the signal of holiday function displays on the screen, and then holiday function is activated.

►Repress  button, signal disappears, holiday function is deactivated.

Note:

This function is only activated when you are not at home for long time, when you come back; please make sure to deactivate it.


6.6 Manual heating



Description:

Electrical heater, gas or oil boiler can be as back-up devices in a solar system, this controller can achieve constant temperature controlling, when temperature of top part tank (T3) is 3 °C below the preset switch-on temperature, back-up heating will be triggered. When the temperature on the top part tank (T3) rises up to the preset temperature, then heating is ceased.


Conditions for triggering manual heating function: the preset switch-on temperature of this function should be 3 °C higher than tank temperature.

Activate/deactivate the function:

►Press  button, temperature "60 °C" blinks on the screen.

►Press   button to adjust switch-on temperature, adjustable range 10 °C~80 °C, factory set is 60 °C.



After 20 seconds, this function is activated, signal  displays on the screen, and heating signal  blinks also.


►Press  button again, to switch-off manual heating function.


Note: manual heating can only heat tank one time, after manual heating is triggered, when temperature of tank rises up to the preset temperature, manual heating ceases, and manual heating function will be deactivated automatically, if customer wants to heat again, you need redo according to above steps.




6.7 Temperature query function

Under standby status,

► Press   button, you can check the value of temperature sensors T0~ T4, speed of pump 1 (n%), speed of pump 2 (n2%), accumulative operation time of circuit pump (hP), daily thermal energy (DKWH), accumulative thermal energy (KWH) or (MWH), week and time.

When checking temperature, T0 – T4 displays one by one, corresponding sensor signal  blinks. TST means the temperature of tank 1.

► Press  button, TST: tank 1 temperature displays.

After Drain-Back function (ODB) is activated, press   or  to check the running time (INIT), Filling time (FLL) and countdown of Standby time (STB)

Note:

- Since the difference of selected system, the values you can check are different.
- Daily thermal energy (DKWH) and accumulative thermal energy (KWH) or (MWH) can only be checked after triggering of OHQM thermal energy measuring function.

7. Protection function

7.1 Memory protection



In case that power failure occurs, controller keeps the parameter settings unchanged.





7.2 Screen protection







When no any press on button for 3 minutes, screen protection is activated automatically, and then LCD lighting lamp is switched-off. Through press any button to light LCD lamp again.



8. Trouble shooting

8.1 Trouble protection

When there is a break or short circuit between the connection of temperature sensors, controller switches off the corresponding functions and no more output signals are given, at the same time error signals   are showed on the display. If control unit does not work correctly, please check following indications.




► Press   button to check error code,   signal blinks on the LCD screen

Error message on LCD screen	Meaning	Cause of error	Error rectification
  T0 ---	T0 sensor fault	Sensor wiring short or open	Check resistance value or replace
	Thermal measuring function is triggered	T0 not connected	Connect T0 or switch-off function (OHQM)
  T1 ---	T1 sensor fault	Sensor wiring short or open	Check resistance value or replace
  T2 ---	T2 sensor fault	Sensor wiring short or open	Check resistance value or replace

 T3 - - -	T3 sensor fault	Sensor wiring short or open	Check resistance value or replace (only in system 4)
 T4 - - -	T4 sensor fault	Sensor wiring short or open	Check resistance value or replace

8.2 Trouble checking

The controller is a qualified product, which is conceived for years of continuous trouble-free operation. If a problem occurs, the most of causes is from the peripheral components but no relation with controller itself. The following description of some well-known problems should help the installer and operator to isolate the problem, so that the system can be put into operation as quickly as possible and to avoid unnecessary costs. Of course, not all possible problems can be listed here. However, most of the normal problems encountered with the controller can be found in the list below, only return the controller to seller when you are absolutely sure that none of the problems listed below is responsible for the fault.

Phenomenon	Secondary phenomenon	Possible cause	Procedure
Controller does not appear to function at all	Display shows nothing, no display illumination	Controller power supply is interrupted or program is out of work	Check the controller power cable Press reset button
The solar pump doesn't operate, despite the fact that switch-on conditions are satisfied	The pump symbol in the display blinks	Pump power supply is interrupted	Check the pump power cable
Pump doesn't operate	The pump symbol in the display doesn't blink.  lighted or  blinked	The maximum storage tank temperature (SMX1) has been reached The maximum collector temperature (EM) has been reached.	No fault
	 T1 - - - Error message displays on the screen	Sensor fault (short circuit or open circuit)	Check values of every connected sensor; replace all defective sensors and /or cabling.
The solar pumps operated, despite the fact that the switch-on conditions are not satisfied	The pump symbol in the display blinks.	Holiday function or Frost protection function or tank re-cooling function is activated.	No problem, it is normal. If necessary to deactivate the corresponding functions.
One function can't be activated	no function selected in submenu	All inputs and outputs are used; inputs and outputs can't be used doubly.	No fault on controller



Warning !

Remove the device from the mains supply before opening the case. A potentially defective sensor can be checked using an ohmmeter. To do this, the sensor must be disconnected, and then measure its resistance, and compare the measured value with the figures in the table below, small deviation ($\pm 1\%$) is acceptable,

PT1000 resistance value

°C	0	10	20	30	40	50	60	70	80	90	100	110	120
Ω	1000	1039	1077	1116	1155	1194	1232	1270	1309	1347	1385	1422	1460

NTC 10K B=3950 resistance value

°C	0	10	20	30	40	50	60	70	80	90	100	110	120
Ω	33620	20174	12535	8037	5301	3588	2486	1759	1270	933	697	529	407

9. Quality Guarantee

Manufacturer provides following quality responsibilities to end-users: within the period of quality responsibilities, manufacturer will exclude the failure caused by production and material selection. A correct installation will not lead to failure. When a user takes incorrect handling way, incorrect installation, improper or crud handling, wrong connection of sensor in system and incorrect operation, the quality responsibility is invalid for them.

The warrantee expires within 24 months after the date of purchasing the controller.

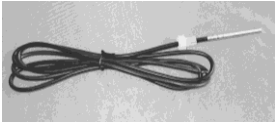
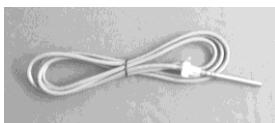


10. Technical data

Specification	SR728C1
Size of controller	200mm×155mm×45mm
Power supply	AC230V±10%
Power consumption	< 3W
Accuracy of temperature measuring	±2°C
Range of collector sensor measuring	-10~220°C
Range of tank sensor measuring	0~100°C
Suitable power of pump	3 pumps, ≤ 200W
Inputs	2 x Pt1000 sensor (≤500°C) for collector (silicon cable≤280°C), 3 x NTC10K, B3950 sensor (≤ 135°C) for tank or pipe, (PVC cable ≤105°C),
Outputs	2 relays for circulation pumps or 3-way electromagnetic valve 1 relay for electrical heater
Ambient temperature	-10~50 °C
Water proof grade	IP40

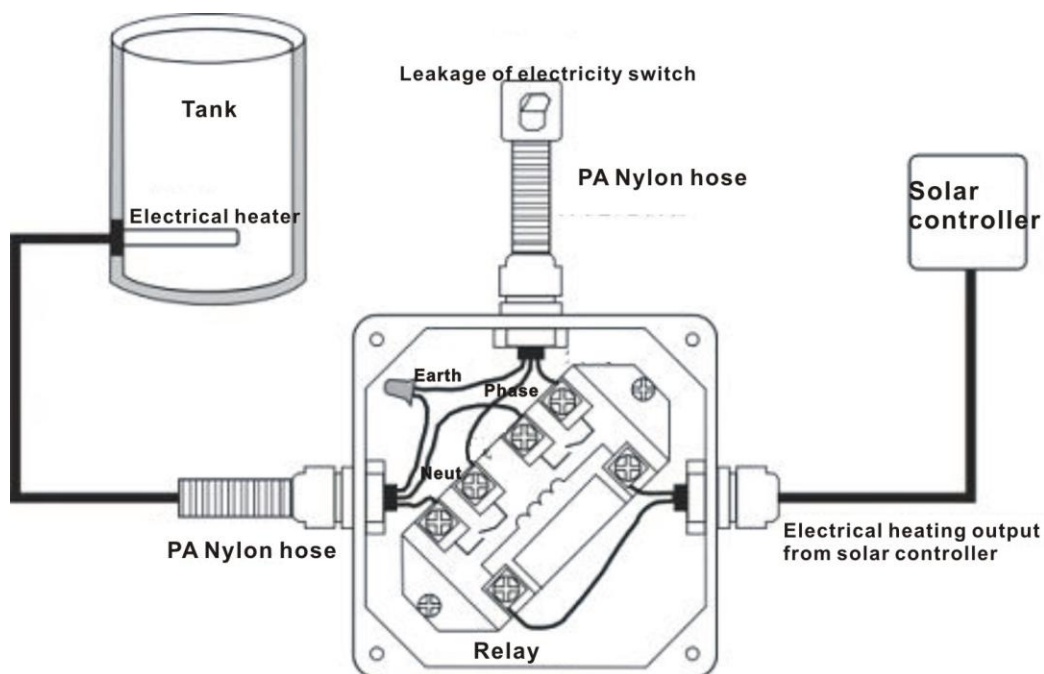
11. Delivery scope

Lists	Amount
Controller	1
Operation manual	1
PT1000 sensor (size: Φ6*50mm,cable1.5m)	2
NTC10K (size: Φ6*50mm,cable 3m)	4
Plastic expansion screw	3
Screw	3
Strain-relief clamp	1

12. Device matchable to this controller

<p>Sensor for collector: high accuracy PT1000 sensor(A01) Parameter: PT1000, Φ6X50mm,1.5m cable</p>	
<p>Sensor for tank: high accuracy NTC 10K sensor (A02) Parameter: NTC10K,B=3950, Φ6X50mm, 3m cable</p>	
<p>Thermowell of sensor: stainless thermowell (A05) Parameter: 1/2" male thread, Φ8X200mm.</p>	
<p>Contactor unit of high power: SR802 When user selects electrical heater as back-up device, we recommend using SR802 unit connecting controller and electrical heater. Technical data of SR802 Dimension: 100*100*65mm Power supply:180V~264V/AC 50/60Hz Suitable power: ≤ 4000W Available ambient temperature: -10 ~ 50°C Water proof grade: IP43</p>	

SR802 CONNECTION DIAGRAM:



Note: open the case of SR802 should be done by qualified person, and switch-off the power.