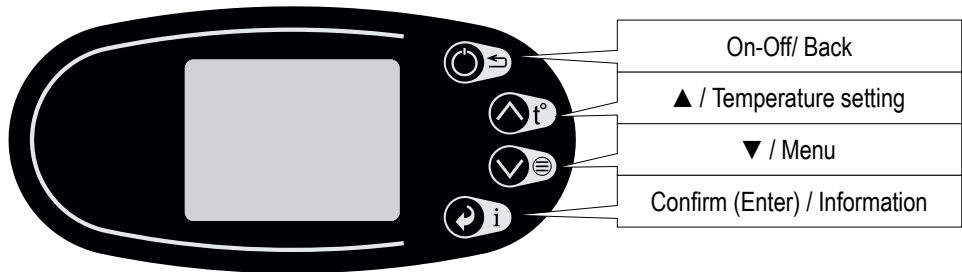# ELDOM INVEST Ltd.

www.eldominvest.com

TECHNICAL DESCRIPTION
MANUAL FOR OPERATION AND POWER CONNECTION
of
ELECTRONIC THERMOSTAT
NHC-H52M-1S / NHC-H52M-2

for control of utility storage water heaters with electric heater/s to 3 kW, 230 V~, single phase connection, designed for wall mounting

	On-Off/ Back
	▲ / Temperature setting
	▼ / Menu
	Confirm (Enter) / Information

WARNING! Read carefully this manual before using the device!

The present instruction is an integral part of the general installation and operation instruction attached to your water heater unit. All of the general instruction requirements concerning the water heater installation and connection to the water supply and electricity networks are absolutely in force. It is compulsory to follow the requirements listed in the general instruction other sections.

This manual explains the features and usage of the electronic control unit, which replaces the traditional thermostat and LED switch of the ordinary water heaters.

WARNING! This appliance may be used by children of age over 3 years old and persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, where they are under supervision or instructed about the safe use of the appliance and understand the dangers. Children must not be allowed to play with the unit! It is absolutely forbidden that children undertake cleaning or servicing of this appliance! Children aged from 3 to 8 years are only allowed to operate the tap connected to the water heater.

1. TECHNICAL DESCRIPTION

The electronic thermostat (hereinafter also the electronic unit) is designed for the management and control of high class utility storage water electric heaters. It has a 4 control buttons, graphic color LCD display, relay / relays to power the heater / heaters, temperature sensors. The software is provided with an algorithm to automatically reduce electricity costs. The electronic unit main tasks are to control your water heater heating process as efficiently as possible and to relieve you of all worries and concerns about it.

Depending on your selected water heater the electronic unit can be of a model and features as listed in Table 1. The technical data are listed in Table 2.

Table 1 - Models and features of the electronic units

NHC-H52M-1S	NHC-H52M-2
Thermostat control of the utility storage water electric heater / heaters.	
Control of the utility storage water electric heater additional heat source (boiler or solar collector *).	Control of two additional heat source for the utility storage water electric heaters (solar collector and boiler).
	Recommendation: the solar collector is connected to the bottom coil and the another heating source - to the upper one (boiler, fireplace, etc.).
Three probe panel. Two of them are designed to measure the temperature in the tank at different heights and one is for the additional heat source.	Five probe panel. Three of them are designed to measure the temperature in the tank at different heights. Two serve for the additional heat sources.
	Automatic ban to switch on the electric heater, if the water heater is heated enough.
Overheat protection of the solar collector if the solar collector temperature becomes higher than 90 ° C, the solar circulation pump will be switched on regardless of the set differential temperature. The pump will shut off only if the water temperature in the water heater exceeds 85 ° C.	
Protection from freezing of the solar collector. This protection removes heat from the water heater.	
Protection against freezing of the water heater. The electric heater is switched on at a measured water temperature below 3 ° C.	

	Two modes of boiler circulating pump - „**CH Priority"** and „**DHW Priority"** If the installation for heating the building has only one circulating pump that drives water not only from the boiler to the water heater but also to the entire heating system, and then you need to use the CH Priority mode. In such case, in order to activate the pump the boiler must be sufficiently hot. If you have separate pumps for the boiler and the heating system, you should use the DHW Priority mode. Then the pump will turn on only if there is necessary temperature difference between the boiler and the water heater.
Automatic switch to mode Anti-Legionella if the water heater has not been heated for seven days to a temperature above 70°C	
Capacity for backup power by UPS device.	
Automatic discharge system extracting heat from the water heater at night to prevent the heat source (solar collector) from overheating the next day, if you are away from home longer and not using enough hot water.	
Timers to setup intervals of four hours for intense heat by the electric heater. Each interval can be set in any day of the week to switch on and to what temperature water can be heated.	
Control of the solar collector circulation pump power depending on the temperature difference between the collector and the water heater.	
Selection option which thermal sensor can switch on the electric heater: The one that is down near the heater or the one in the middle of the water heater.	
Prevention of freezing for the water heater and the solar collector.	
Audible alarm.	
Diagnosis of all thermo-sensors and display an alarm for failure.	
Supports system time with date and hour.	
Ability to account for consumption in kWh in digital form separately for two tariff plans.	
Charts distributed by hours for the past three days providing information on electricity use in kWh and the boiler and/or solar collectors circulation pumps.	
Monitoring the heater condition and displays a message if the water is not heated.	
* For water heaters with one coil (lower) the electronic unit is factory configured with what additional heat source it may operate: solar collector or boiler.	

Table 2 - Technical data of the electronic units

Power supply voltage	95-255V AC 50/60Hz
Consumption in Standby mode	from 0.8 to 1.5W depending of display brightness.

Temperature measurement accuracy	1% + +/-1°
Temperature measurement units	degrees Celsius
Voltage output: „Circulation pump 1" and „Circulation pump 2"	95-255V AC 50/60Hz outputs switching on when passing through 0V.
Maximum permissible current through the outputs: „Circulation pump 1" and „Circulation pump 2"	0.9A AC
Maximum permissible power for each connected to the thermostat circulating pump	150W
Maximum permissible current through the contacts of each relay	16A AC at 230V
Permissible ambient air temperature when working with switched on relays for three-phase electric heater	-10 to +65ºC
Maximum dimensions	120x60x55

2. WATER HEATER CONNECTION TO THE POWER SUPPLY NETWORK

Only qualified persons are entitled to connect the water heater to the mains and to check its functionality!
WARNING! Do not proceed to connect the water heater to the power supply network unless you have made sure that its water tank is full with water! CHECK!
The accumulating water heaters have an electrocution degree of protection Class I.
The electric power supply of the water heaters should be performed by a separate current circuit of insulated three-core supply cable with a cross-section of each of the wires of 2,5 mm^2 (phase, neutral and earthing). If the built into the wall cable is a two-wire cable it shall be necessary a competent and qualified person to pass an additional protective conductor that never should be interrupted and / or connected on the layout from the electric panel to the tank. Otherwise the appliance shall not be correctly earthed and it shall reduce its safety!
IT IS COMPULSORY to insert in each phase line a 16A fuse when the heater is 3 kW
WARNING! IT IS COMPULSORY that in the electric circuit feeding the heater is installed such a device which in the conditions of over voltage category III provides full disconnection of all poles. The conductors between the circuit and the device incoming electrical terminals must not be interrupted by any circuit breaker or fuse. If the utility storage water heater is installed in a premise with likelihood of splashing water, the switching on/off unit must be located outside.
WARNING! Failure to comply with the requirements concerning connection to the mains shall impede the appliance safety, in which it is prohibited to use. Such consequences are not within the scope of manufacturer or seller warranty liabilities and shall be at the expense of the party, which has not observed the present manual instructions.
ATTENTION! The connection of the cables from the mains switchboard to the unit terminals shall be carried out after carefully removing the plastic cover so that the electrical wiring in the unit does not disengage.
After connecting and attaching the power cable, put the plastic cover into place and secure it with screws, taking care for free deployment of electric cables, thermal sensors and the thermostat capillary tube.

The water heaters models electric circuit schema are shown on Fig. 1 and Fig. 2, the number indications are provided in Table 3.

2.1 Connecting to UPS

The manufacturer has installed the tank so that it will work without an UPS device. In case of necessity to supply power with an UPS device, it is necessary to use the column terminal labeled 2 in Fig. 1 and Fig. 2 in order to remove the wires (bridges) connecting terminals L to UPS with L from UPS and N to UPS with N from UPS, indicated by a dotted line. To the terminals thus empties connect the UPS device. The UPS power cable is connected to the terminals L to UPS (phase) and N to UPS (zero). The UPS output is connected to the terminals L from UPS (phase) and N from UPS (zero).

IMPORTANT! It is obligatory to connect correctly the output cable of the UPS to the right terminal in the unit, i.e. compliance with phase and zero!

When removing the power supply from the UPS device the wires must be reconnected to the column bridge terminal 2, respectively L to UPS to L from UPS and N to UPS to N from UPS.

ATTENTION! In case of improper connection of UPS or improper recovery of the bridging wires, the electronic unit will not work and it is very possible to damage it and increase the risk of electric shock!

It is necessary to secure the power cord to the power circuit of the water heater and the power cord from the UPS to the electronic unit against displacement by using the cable clamp located next to the hole for the cable in the plastic cap.

Table 3 - Indications and terminals of the electronic unit components* in Figures 1-2

№	Functions	Installation / Purpose
1	Unit power supply	
2	UPS terminal	
3	Thermal sensor NTC 10K, 2m, PVC	It is installed in the middle part of the water heater above the lower heat exchanger (coil-pipe). Measures the temperature - t5
4	Thermal sensor NTC 10K, 0.5m, PVC	It is installed in the lower part of the water heater next to the electric heater, Measures the temperature - t1
5	Circulation pump 1	Controls circulation pump 1
6	Circulation pump 2	Controls circulation pump 2
7	Thermal sensor NTC 10K, 2m, PVC	It is installed in the upper part of the water heater above the top heat exchanger (coil-pipe). Measures the temperature - t2
8	Thermal sensor pt1000, 0.5m, Teflon	It is installed in the solar collector. Measures the temperature - t3
9	Thermal sensor NTC 10K, 2m, silicone	It is installed in a boiler, fireplace or other. Measures the temperature - t4.
10	Magnesium anode	Not available in water tanks made of chrome-nickel steel.
11	Heaters	

12	Thermal cut-out
13	Terminal for external wires
14	Serial interface
15	Flange clamp

* Depending of your water heater model not all components on the electronic unit may be available. Please observe the places for sensors installation!

2.2 Single-phase connection of the power supply wires in water heaters designed for wall mounting with one heat exchanger (Fig. 1) and with two heat exchangers (Fig. 2)

The power cord phase conductor connects to the thermal cut-out terminal labeled A1 (or L depending on the model), the neutral to the thermal cut-out terminal labeled B1 (or N), and the protective - to the protective terminal (screw or pin) of the flange clamp marked for protective grounding.
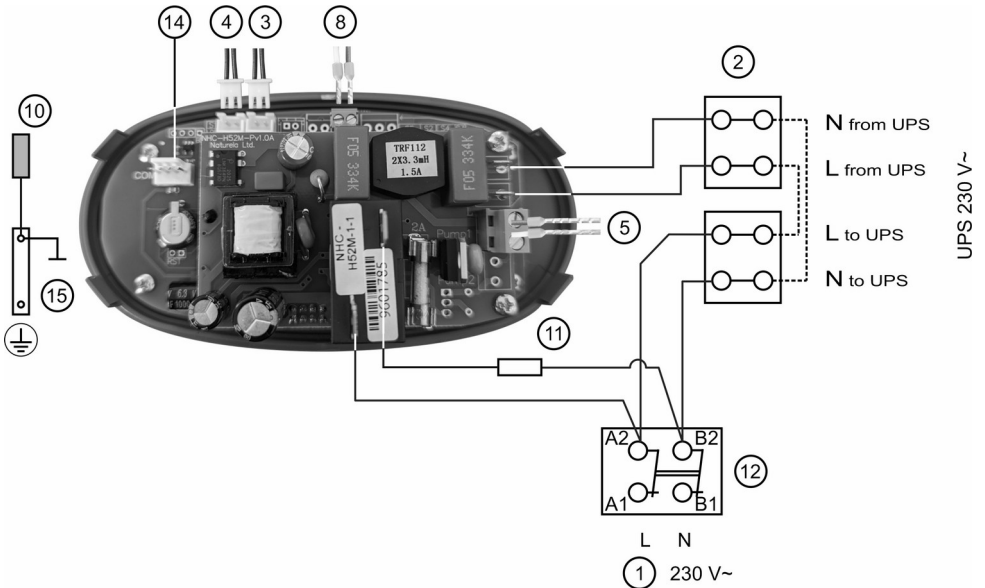

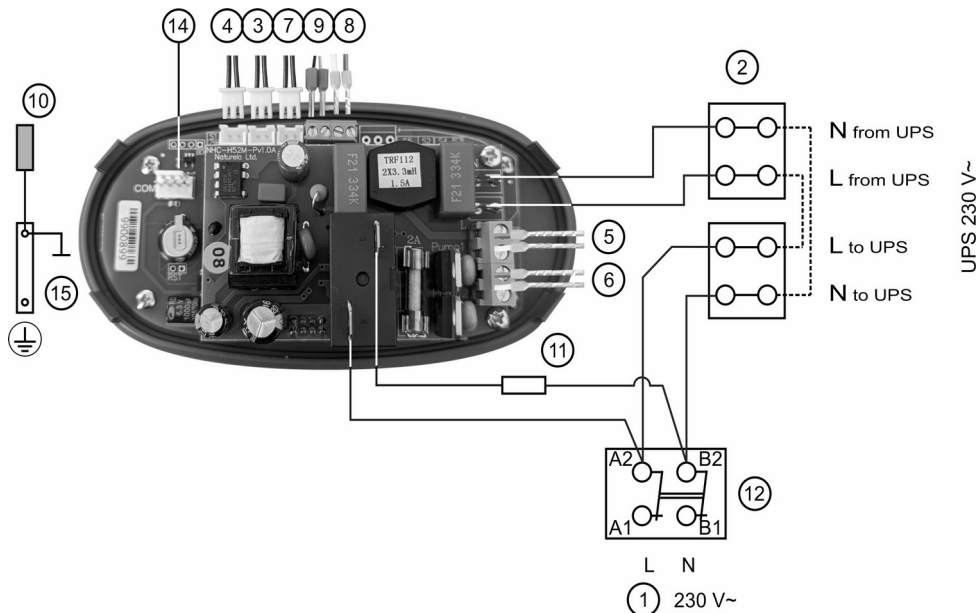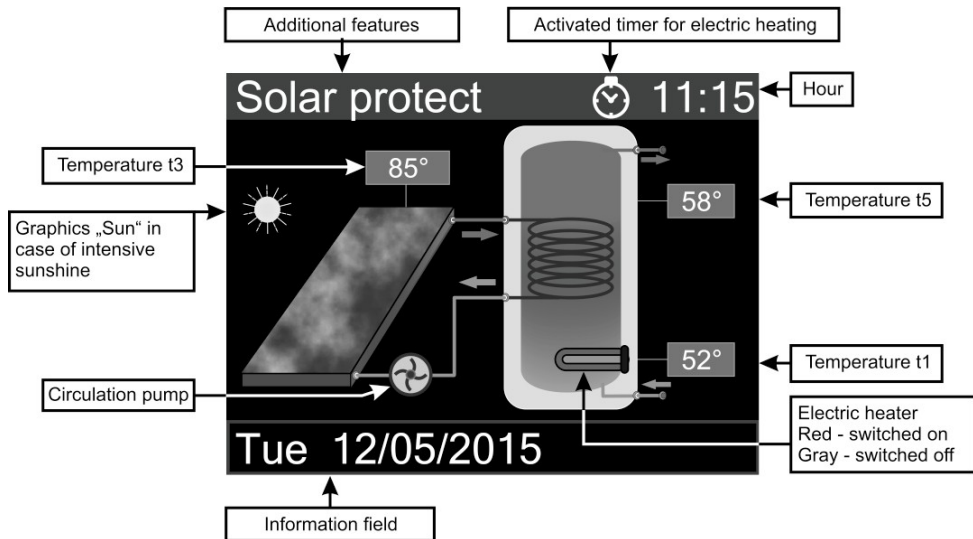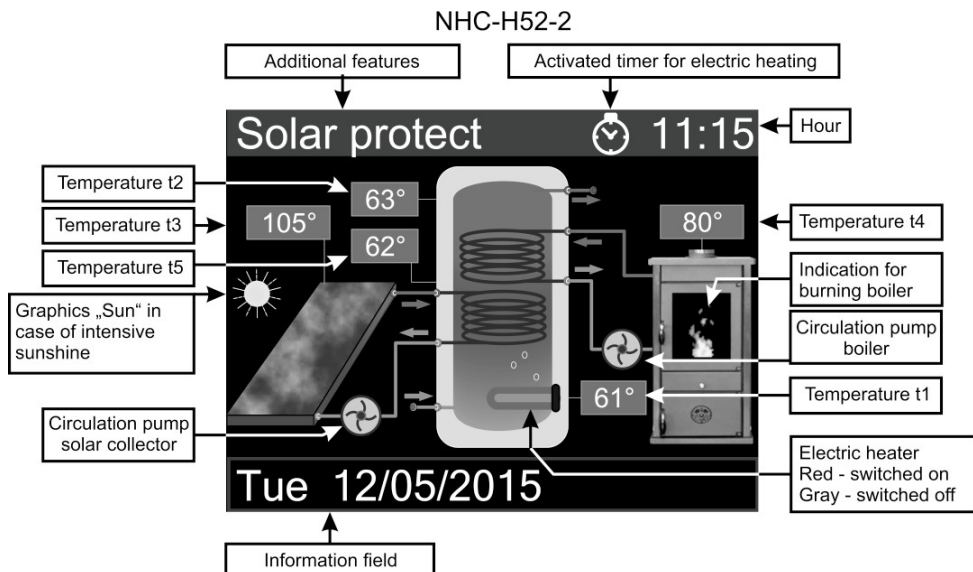**Fig. 1 Single-phase connection of water heaters with one heat exchanger NHC-H52M-1S**

Fig. 2 Single-phase connection of water heaters with two heat exchangers NHC-H52M-2

3. DISPLAYS. SETTINGS. MENUS

3.1 Main display - graphics and indications - Fig. 3

NHC-H52-1

Additional features

Activated timer for electric heating

Solar protect   11:15   Hour

Temperature t3   85°

Graphics „Sun" in case of intensive sunshine

Temperature t5   58°

Circulation pump

Temperature t1   52°

Electric heater
Red - switched on
Gray - switched off

Tue 12/05/2015

Information field

Additional features

Activated timer for electric heating

Solar protect ⊙ 11:15

Hour

Temperature t2

Temperature t3

Temperature t5

Graphics „Sun" in case of intensive sunshine

Circulation pump solar collector

Temperature t4

Indication for burning boiler

Circulation pump boiler

Temperature t1

Electric heater
Red - switched on
Gray - switched off

Information field

Fig. 3 - Display for electronic units NHC-H52M-1S / NHC-H52M-2

I**MPORTANT!** The temperature indications are listed in Table 3

3.2 Settings of all operating parameters

To select the required settings menu you have to press the button **"down"** while in the main screen of the unit. First appears the selection menu - **"Settings"**. By pressing the arrow button **"up"** or **"down"** scroll the lines for selecting sub-menus. With the **Enter** key you access the marked with red submenu. If after the last line there is an arrow down or before the first line is up arrow it means that there are more lines after or before the visible part of the screen. By pressing the arrow up or down will move the screen up or down, to display next lines.

IMPORTANT! If you do not make any changes for a longer period (between 20 seconds and 5 minutes, depending on the settings menu) you will automatically exit the selected menu without saving any changes made. The only exception is the menu **"EL Set Temperature"** which shall save the changes made! This menu is displayed by pressing **"up"** from the main screen.

3.3 Setting the system date and time

A blue marking framework is displayed. Using the arrows position the frame marking on the parameter you want to edit. Then by pressing the button **Enter** a mode to adjust the parameter is accessed. The blue frame turns red which indicates that the parameter can be changed with the **"up"** and **"down"** arrows. Subsequent pressing of **Enter** confirms the parameter change and leaves the edit mode. Return to the previous screen by pressing **On-Off / Back**

The time is in 23:59 format and the date - dd/mm/yy. The weekday is obtained automatically after entering the correct

Set Time & Date

Time: 11 : 53
Date: 12 / 05 / 15 Tue
dd/mm/yy
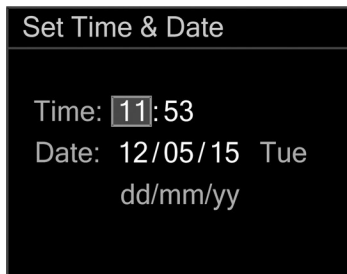
date. If you change the hour and minute and then exit this menu, the seconds will automatically reset. When changing only the date, the seconds are not reset.

3.4 Language selection for menus
By pressing the arrow **"up"** or **"down"** you can scroll through lines for selection of languages. Press the Enter key to select the highlighted with red tape language and exit from the choice of language.

3.5 Turn On / Off the water heater. Operative modes
Press **On-Off / Back** button. The selection menus shall appear on the right, Select the action with the arrows **up/down** and press **Enter** to confirm it.
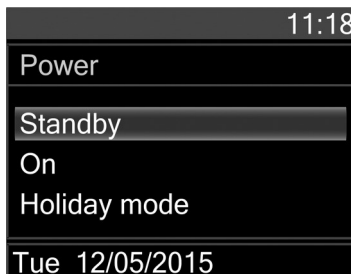
3.5.1 Standby
Electric heater and the boiler pump shall not be switched on. The solar system continues to operate normally in order to avoid overheating the solar collector. The protection modes continue normal operation: the water tank and solar collector anti-freeze protection and the protection against overheating of the solar collector by automatically switching to **Holiday mode** to discharge the stored energy.


```
                                    11:18
Power

Standby
On
Holiday mode

Tue  12/05/2015
```

3.5.2 On
All authorized heat sources shall be switched on (see menu **"Heating Installation"**) if all their conditions are satisfied for heat discharge as listed in Table 4

Table 4 - Conditions for heat discharge (operation)

Installation	Application	Description
Solar collector	NHC-H52M-1S NHC-H52M-2	Δ**t1** is the difference between the temperature in the collector (t3) and the temperature in the middle of the water heater (t5). The solar collector pump shall be switched on if Δ**t1** is higher than the one set in the menu „**Pumps control**", line „**Solar Δt1**" , column „**On**". The pump shall work until Δ**t1** is lower or equal to the temperature set on the same line but in column „**Off**". When this pump works the circulating pump on the image of the solar installation on the display will rotate. To protect the water tank from overheating, the circulation pump of the solar installation shall switch off when the temperature in the middle sensor turns higher than 85 degrees!

Electric (EL) heater	NHC-H52M-1S	The heater will turn on when the temperature measured by the sensor set for inclusion in the menu „EL Heating Settings" falls below the value of the parameter „Heater On Temp." of the same menu. It will switch off when the temperature measured by the thermo-sensor t1 (at the bottom of the water heater) reaches the temperature set. If the electric heater is turned off because the water temperature has not dropped below the temperature in the menu „Heater On Temp." and the button „up" is pressed and held for more than 2 seconds the water heater shall switch on. It will switch off when the temperature set at the bottom of the water tank is reached. If there is a time interval activated in the menu „EL Boost Timers", then the heater will be turned on if the temperature t1 of the water measured at the bottom of the water tank is lower than the temperature set for that hour interval minus 5 degrees. It will turn off when reaching the temperature set for the same time interval.
	NHC-H52M-2	Besides the described working conditions for the electric heater of electronic units NHC-H52M-1-1 and NHC-H52M-2-1 it shall switch off and will not work three minutes after the temperature in the boiler turns higher than the one set and the boiler pump is running.
Boiler	NHC-H52M-2	Mode „Boiler DHW prior." – Δt2 is the difference between the temperature of the boiler t4 and temperature at the top of the boiler t2. The boiler circulation pump shall switch on if Δt2 is higher than the one set in the menu „Pumps control" line „Boiler DHW prior. Δt2", column „On". The pump shall work until Δt2 is lower than the temperature set on the same line but in column „Off" on the same line. When this pump works the circulating pump on the image of the boiler on the display will rotate. To protect the water tank from overheating, the circulation pump of the boiler shall switch off when the temperature in the top sensor (t2) turns higher than 80 degrees! Mode „CH prior" – boiler circulating pump will turn on if the boiler temperature (t4) is higher than the temperature set in the menu „Pumps control", line „CH prior t4", in column „On". Accordingly, the pump shall switch off when the temperature t4 falls below the one set for switch off in the same menu. When this pump works the circulating pump on the image of the boiler on the display will rotate. To protect the water tank from overheating, the circulation pump of the boiler shall switch off when the temperature in the top sensor (t2) turns higher than 80 degrees!

When you have enabled a time interval in the field „El heater boost" on the screen „Information" you can see what action is pending - Start or Stop, and the time and day of the week when it will happen.

When selecting the differential temperatures for switching on and off the circulation pumps it is good to keep in mind the following:

- It is a good idea to keep the temperature difference for switching off the pump greater than 5 degrees, because when the difference is lower the pump will work too long, since the heat exchangers start to release more inefficiently the heat. Furthermore, there may be losses and lowering the temperature on the location of the sensor in the solar collector to the water heater, which further reduces the differential difference at the heat exchanger.

- The temperature difference for switch on should be such as to compensate for heat losses between the solar collector and heat exchanger and sufficiently much greater than the switch off temperature.

When using the heat from the solar system, the limitation of the temperature to which the water heater will be heated is 85 degrees measured from the sensor 5 (t5). When using the heat from the boiler, the restriction on the temperature to which the heater will be heated is 80 degrees measured from the sensor 2 (t2). Above this limit the circulation pumps shall be switched off in order not to transfer more heat to the water heater.

3.6 Operation of the thermostat

Depending of the model of your electronic thermostat some features may not be available.

When the water heater is turned on, it chooses the most suitable heat source. Priority is given to the use of the solar collector and the boiler.

If the temperature difference concerning the solar collector **Δt1 = t3 – t5** gets greater than the limit set in the menu **„Pumps control"**, row **„Solar Δt1"**, column **„On"**, the solar collector pump shall be turned on to transfer its heat to the water heater. When the solar pump is turned on but the temperature difference **Δt1** falls below the limit set on the same line column **„Off"**, the pump shall switch off.

When the boiler is set from the menu **„Heating Installation"** row **„Boiler Pump Mode"**, to operate in mode **„DHW priority"** and if the temperature associated with it **Δt2 = t4 – t2** gets greater than the limit set in the menu **„Pumps control"**, row **„DHW priority Δt2"**, column **„On"**, the boiler circulation pump shall switch on in order to transfer its heat to the water heater. When the solar collector pump is turned on but the temperature difference **Δt2** falls below the limit set on the same line column **„Off"**, the pump shall switch off.

There is one more operation mode for the boiler pump set from the menu **„Heating Installation"** row **„Boiler Pump Mode"** - **„CH Priority"**. When this mode is activated in the menu **„Pumps control"** shall be used the temperatures set in row **„CH prior. t4"**, where is set the boiler temperature limit when the boiler pump switches on and the temperature to which it may fall before turning off. In this mode differential temperatures are not used in order to avoid during heating of the water heater to turn off the pump and stop heating if using one and only circulating pump both for heating and domestic hot water (DHW).

In order to support the external heat sources when there is not enough heating power, the water heater may use its electric heater. It is controlled by a process aiming to use electricity as a last resort.

There are two specific solutions to limit the use of the electric heater:
- Such setting can be made so that the heater switches on when the temperature of the thermo-sensor **t5**. falls below the limit set in the menu **„EL Heating Settings"** field **„Heater On Temp."** and to turn off when it reaches the desired temperature at the thermo-sensor **t1**. Thanks to this approach, with a small consumption of hot water, the temperature at the bottom of the tank may fall quickly, but in the upper part of it will remain higher. If meanwhile, the solar installation operates it shall continue to heat water and may never get to use electricity.
- Furthermore, the temperature that must be reached by heating with electric power is set and the temperature below which turns the heater on. This helps to provide additional tolerance of the falling water temperature before using electricity for heating it. Thus the solar installation shall have more time to heat the water if there is enough energy.

3.7 Changing the set temperature when working with electrical heater.

From the main screen, press **„up"** to enter the fast mode to change the temperature set in menu **„EL Set Temperature"**. Next pressing of the arrows **„up"** or **„down"** changes the value. If one of the buttons **„up"** or **„down"** remains pressed more than 0.8 sec., the value of the set temperature starts automatically to increase or decrease accordingly at a rate of 4 units per second. The new set temperature will be saved by pressing Enter or by not pressing any buttons for 5 seconds:

```
                                    11:39
EL Set Temperature


              60°


Tue  12/05/2015
```

The temperature set is used only when heated with an electric heater!

The temperature limits are set between 20 and 75°C.

It is better to use the **„EL Heating Settings"** menu because through it can be controlled not only the temperature for switching off the heater, but also for switching on.
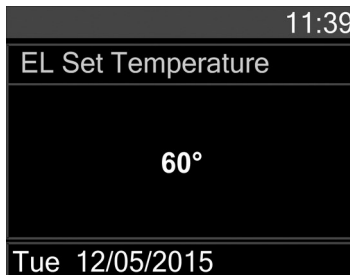
3.8 Setting the timer for additional heating with electric heater (menus „EL Boost Timer 1" and „EL Boost Timer 2")

Setting the hour intervals allowed for additional heating of water by electric heater. When a timer is active and time is currently in its range, the electric heater will switch on to heat the water, and shall use the temperature in the column **"Temp"** as set temperature and it will switch on if the temperature of the lower thermo-sensor t1 drops by 5 degrees less than the temperature set in **"Temp"**. The timer allows exclusion of certain days of the week during which he will not act. It happens by darkening the glowing green LEDs.

```
EL Boost Timers
        Begin    End   Temp
  ☑  03 : 00  06 : 00   70°
     ● ● ● ● ● ● ●  ●

  ☐  00 : 00  00 : 00   65°
     ● ● ● ● ● ● ●  ●
     MO TU WE TH FR SA SU
```

Note that the time in the column **"Begin"** can not be later than the time in column **"End"**! The setting of such values is impossible and therefore you may first need to change the time in the column **"End"** and thereafter in the column "**Begin**"!

You can set very low temperatures in the electric heater menu **"EL Heating Settings"** and only when you expect that you need hot water by turning on the timer you can force the electric heater to switch on. If by then the solar system or boiler is warmed enough the water, the electric heater will not turn on and you will save electricity costs. Meanwhile, if the sunlight was not enough, the heater will turn on and you will not run out of hot water!
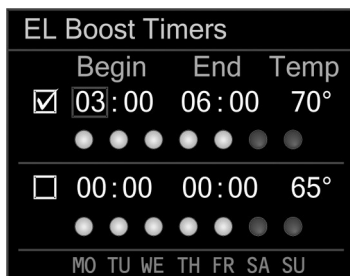
3.9 Setting electric heating (EL Heating Settings)

The temperature to which the water in the tank is heated with electric heater is **"El Setting temp."**, and the temperature below which it is compulsory to switch on the electric heater is **"Heater On temp."** and which sensor to take into account the temperature for switch on the heater **"Bottom sensor t1"** or **"Middle sensor t5"**. Keep in mind that the temperature set to which the water in the tank is

```
EL Heating Settings
    EL Setting temp.  60°
    Heater On temp.  40°
  Sensor for On

    Middle sensor t5
       Auto Control  ☐
```
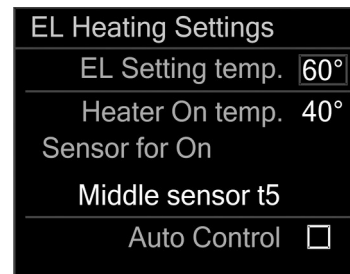
heated is accounted by the lower thermo-sensor (t1). When the water temperature is lower than the one set and the higher than the switch on temperature the water heater will maintain its last state, i.e. if it has been switched off it will stay off if it was switched on it will stay on. This rule is not observed only if you change the temperature set, then the heater will turn on and will work to reach the temperature set.

Note that **"El Setting temp."** must be 5 degrees higher than **"Heater On temp."** It is not possible to set the temperatures unless that condition is satisfied!

RECOMMENDATION! Even if you have good solar installation and the season is suitable for using solar energy for hot water, we recommend the following options: **"Heater On temp."** can be set to a lower value such as 20 degrees and be measured by **"Middle sensor t5"**. So even if there is no sun, the water in the tank will not be colder than the tolerable 20 degrees. The heat exchanger for the solar collector (bottom) shall heat the water in the measurement of the middle thermo-sensor t5 and if the day is with sufficient sun radiation the temperature measured by this sensor is unlikely to drop more than 20 degrees and the electric heater will not switch on. We recommend that you set **"El Setting temp."** at 40-45 degrees, because if there is no sun the water heater will be heated by the electric heater to such a temperature that can be used for any household needs, but at the same time if there is a strong sun it can take as well its heat.

3.10 Pumps control
Temperature settings for switching on and off the pumps of the solar collector and / or boiler. The parameters are as follows:

Solar $\triangle$t1 (NHC-H52M-1S / NHC-H52M-2)
The differential temperature between the solar collector and the water heater for switching on and off of the pump. In case of temperature difference over the value in the column **"On"** the pump will switch on and run until the difference falls less than the value set in the column **"Off"**

Pumps Control		
Pump	On	Off
Solar $\triangle$t1	08°	04°
Boiler		
DHW prior. $\triangle$t2	06°	04°
CH prior. t4	55°	48°

Boiler DHW prior. $\triangle$t2 (NHC-H52M-2)
The differential temperature between boiler and the water heater for switching on and off the pump in mode with priority for heating the water heater for domestic hot water (DHW). In case of temperature difference over the value in the column **"On"** the pump will switch on and run until the difference falls less than the value set in the column **"Off"**

CH prior. t4 (NHC-H52M-2)
Adjust the temperature for switching on/off of the boiler circulating pump in heating priority mode for the heating installation. When the temperature measured by the probe panel in the boiler (t4) is higher than or equal to the temperature set in the column **"On"** the boiler pump shall switch on. When this temperature falls below the value in the column **"Off"**, the pump will turn off.

Heating Installation	
EL Heater	☑
Solar Collector	☑
Boiler	☑
Boiler Pump Mode	
CH Priority	

3.11 Heating Installation
Check any heat source that works with the water heater. If you still do not have systems for boiler or solar collector, you can disable the service from this menu. Furthermore, in

order not to consume more electricity by the electric heater you can deactivate it in this menu. **"Boiler pump mode"** (for **NHC-H52M-2**) determines the operation of the boiler circulating pump which instalation has higher priority: CH or DHW.

IMPORTANT! If you deactivate the solar collector you will stop as well protective regimes against freezing or overheating!

3.12 Initiating Night/Day tariff

Setting the beginning of the day and night tariff. This is important information for the proper accounting of consumed electricity!

```
EL Rates Start Time
  Rate 1 Starts at 06 : 00
  Rate 2 Starts at 22 : 00
```

3.13 Solar protection

Setup Menu protection regimes of the solar system. Settings parameters:

Auto Holiday mode (NHC-H52M-1S / NHC-H52M-2)

When this field is checked automatic start mode for discharging heat from the water heater at night is allowed - **"Holiday"** Thanks to this discharge the solar system will be protected from overheating under strong sunlight the next day by transferring heat to already chilled water in the water heater.

```
Solar Protection
  Auto Holiday mode    ☑
     Tank min temp.   45°
    Use boiler pump    ☐
     Solar anti-frost  ☐
     Anti-frost temp. 03°
  Solar overheating   95°
```

Tank min temp. (NHC-H52M-1S / NHC-H52M-2)

If heat discharge is activated for the accumulated heat in the water tank when you activate Holiday mode, the temperature will be reduced to the value set in this field.

Use boiler pump (NHC-H52M-2)

When this field is checked the discharge of the heat from the water heater will happen not only with the circulation pump of the solar system but with the boiler system too.

Solar anti-frost (NHC-H52M-1S / NHC-H52M-2)

Activating the mode for Anti-freeze protection of the solar collector.

Anti-frost temp (NHC-H52M-1S / NHC-H52M-2)

Below what temperature to switch on the mode to protect the solar collector from freezing.

Solar overheating (NHC-H52M-1S / NHC-H52M-2)

Over what temperature an alarm for overheating of the solar collector switches on.

3.14 System Settings

From the field **"Light"** adjust the brightness of the display. Enter here information for the power the heater through the field **"El. Power"**. By default the parameters saved are for water heater with a power of 3kW heater and availability of anode protection. If your water heater has the same specifications you do not need additional customization. Select **"Anti-Legionella"** mode if you want to activate it. When this mode is enabled if the water in the water heater is not heated to more than 70° C for one week, it will

```
System Settings
     Light  9
  El. Power  3KW
         Anti-Legionella ☑
     Solar pump adjust ☐
  Test pump on
     Solar ☐     Boiler ☐
```

switch on the electric heater to heat the water to 70 degrees. This is done in order to prevent the development of "legionella" bacteria in the water container. The electric heater shall switch on when night electricity tariff is active. From this menu you can run test pumps for both installations by fields **"Solar"** (for NHC-H52M-1S and NHC-H52M-2) and **"Boiler"** (for NHC-H52M-2). If you want to adjust the power of the solar pump depending on the differential temperature, you must mark the box on the line **"Solar pump adjust"**. From this menu you can run the test pump of the solar installation via the **"Solar"** field. In this field, the power at which the pump can be tested can be selected: 0-off, P1-low power and P2-maximum power.

We recommend that you turn on the power pump P1 after checking the solar collector installation for the first time to check if it works. If it does not work at this power, you must turn off the power control.

IMPORTANT! If you do not perform other settings, when activating one of the pumps, it will work 5 minutes after which the screen will automatically close and the pumps will switch to the normal automatic control!

ATTENTION! Turning on and off the heater from the apartment electricity panel does not change the temperature set and its mode of operation left before its last switch off.

If the unit is left in a switched on state when shutdown and then switched on again it will have the same temperature settings.

ATTENTION! When for long periods you do not use hot water and the sun is strong enough, do not disconnect the water heater from the apartment electricity panel. This can damage the standing outdoor on direct sunlight collector.

Your water heater will automatically enter in **Holiday mode** at night to discharge the accumulated heat and so it can store new heat the next day and protect the solar system from overheating.

4. ADDITIONAL FEATURES AND INFORMATION FIELDS

4.1 Additional features field (Fig. 3)
Displays the information when the water heater performs any of its specific additional features or is off. The messages in this field are listed in Table 5:

Table 5 - Messages in the field Additional features

Message	Description
Anti-Legionella	Currently, the water heater shall be heated by the electric heater to 70°C for killing the dangerous Legionella bacteria.
Heat discharge	This procedure shall discharge the accumulated heat in the water heater in order to allow the next day to discharge the heat from the solar collector without overheating the water.
El heater boost	Currently one of the timers adjusted in the menu „EL Boost Timers" is active. In this situation, if the electric heater is not switched off from the menu „**Heating Installation**" shall turn on to reach the temperature set by this timer. The thermo-sensor measuring the temperature at which the heater shall turn on or off, it **t1**. The hysteresis (the difference between the temperature of switching the heater on and off) is 5 degrees.
Anti-frost	Prevention of freezing for the water heater and the solar collector. Switching on the

(Freezing protection)	electric heater it warms the water in the tank to avoid freezing while the solar pump discharges the heat from the water heater, in order to protect the solar collector as well.
Solar protection	Prevents eventual overheating of the solar collector. If the solar collector thermo-sensor (t3) is not operating (not working), the solar pump shall be turned on constantly to avoid any possible overheating.
Holiday	The water heater is in manually activated **Holiday mode**, which aims unloading the accumulated heat during the night so that the next day when reheated by the sun overheating of the solar collector is prevented.
Standby	The electric heater is switched off.

4.2 Information field (Fig. 3)

Basically in this field is displayed the date starting with the day of the week in the following format: DD/MM/YYYY. Upon registration of a failure of the self-test system, in the bottom line field shall alternate the date and the (error) message while a clear sound shall be audible as well. The (error) messages are listed in Table 6:

Table 6 - Information field messages

Message	Description
No information!	At the moment there is no information concerning new issues or errors
Switch on Holiday mode	Switched on mode for discharge of the heating energy collected in the water heater during the day. (Holiday mode).
Solar anti-frost	Switched on mode for protecting the solar collector against freezing.
Freezing protection of the boiler	Switched on mode for protecting the water heater from freezing.
Error reading image	Error during downloading an image from the schematic diagram of the heating system to the main screen.
Disconnected S1	Failure of the bottom thermal sensor of the water heater (t1). It may be either interrupted/disconnected or switched off.
S1 in short-circuit	Failure of the bottom thermal sensor of the water heater (t1). It is in short-circuit.
Disconnected S2	Failure of the bottom thermal sensor of the water heater (t2). It may be either interrupted/disconnected or switched off.
S2 in short-circuit	Failure of the top thermal sensor of the water heater (t2). It is in short-circuit.
Disconnected S3	Failure of the solar collector thermal sensor (t3). It may be either interrupted/disconnected or switched off. Only the modes with electric and boiler heating shall be operative. **In this situation the solar installation circulation pump will work continuously to protect the solar collector from overheating!**
S3 in short-circuit	Failure of the solar collector thermal sensor (t3). It is in short-circuit. Only the modes with electric and boiler heating shall be operative. **In this situation the solar installation circulation pump will work continuously to protect the solar collector from overheating!**

Disconnected S5	Failure of the middle thermal sensor of the water heater (t5). It may be either interrupted/disconnected or switched off.
S5 in short-circuit	Failure of the middle thermal sensor of the water heater (t5). It is in short-circuit.
Frozen boiler	When switching on the power the water in the water heater has negative temperature and may be frozen. You need to check the integrity of the water container and only then switch on the power again.
Solar unprotected	The solar installation is switched off from the menu „**Heating Installation**" and if it is installed it may be damaged either by overheating or by freezing.
Off all heaters!	All heating sources are switched off from the menu „**Heating Installation**". If the solar installation is installed it may be damaged either by overheating or by freezing. The same is true for switching off the water heater freezing protection mode.
Solar overheating	Solar collector overheating shall be registered when the t3 temperature exceeds the temperature in the field „**Solar overheating**" from the menu „**Solar protection**"
Error reading image	The test for reading the images displayed on the screen is not passed.
Anti-Legionella	Activated mode for destroying the Legionella bacteria by heating the water with electric heater to 70 degrees.
Power supply off *	Latest time and date to when the thermostat is working before you interrupted power supply.
Power supply on*	Time and date when the power supply is restored.
* These messages will be registered only if the system clock has been set.	

4.3 Delete alarms (triggered by errors)
When one of any registered issues (errors) causing activation of the alarm is fine, the message that was about it, disappears from the information field.

If all error messages disappear stops and alarm. Exceptions are issues as „**Solar overheating**" and „**Boiler overheating**", to erase error messages and signals for alarm should be deleted from the diagnostics thermostat display. To do this you must first press the key Enter twice from the main display to enter the display „**Diagnostics**". Then again press and hold the Enter key for over 3 seconds to erase all messages concerning issues.

If any of the heating sources is not activated from the **„Heating Installation"** menu it shall be displayed dimmed and the corresponding field for the temperature measured shall not be displayed. If the electric heater is not activated, it will not be visible.

If the clock is not set, it will be displayed with hyphens: --:--. The thermostat has a battery that supports the timing of short-term power failure. The maximum time for time support is 48 hours, then the clock shall turn off and shall need your re-verification.

If in the middle part of the display there is not the image of Fig. 4 we recommend to reset the thermostat by turning off power to the boiler, and then turn it on again!

4.4 Data displays

Statistics by the hours – By pressing the button Confirm (Enter), when the thermostat is in **„Main display"** you may proceed to consideration of the additional data screens. First you shall see displayed the graphics of consumed power and the work of pumps for the last three days. You may scroll these graphics with the arrow keys **„up"** and **„down"**. The display may happen with the entire histogram on the screen. The coordinate system is with a horizontal axis with the hours of the day and a vertical axis to energy consumption in kW/h or a cumulative operating time in minutes of each circulating pump. On the top of the screen is the date concerning the information displayed, while at the bottom is provided a summary for the day.
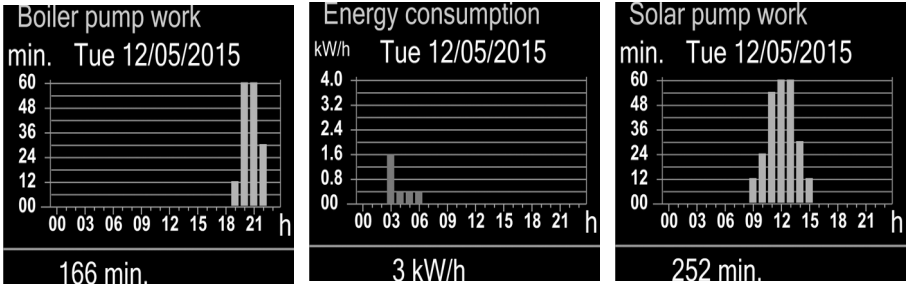
4.5 Information

By pressing the button Enter after the state „Statistics by the hours", shall be passed to the screen „Information"
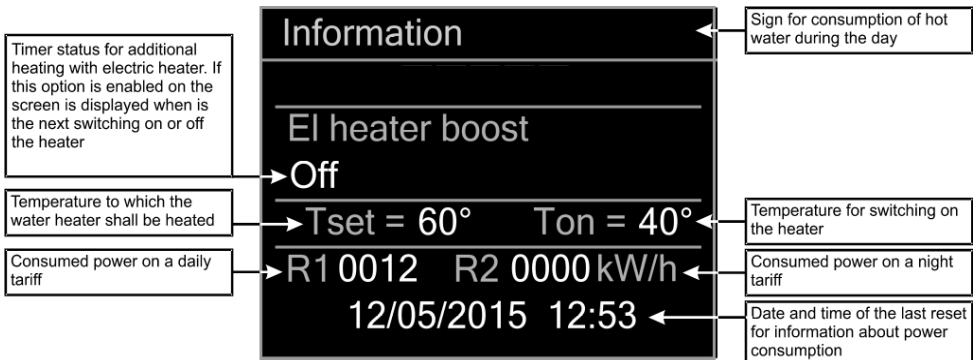
By holding the Enter key for over 2 seconds the readings for the day and night electricity consumption shall be reset. Furthermore, the unit shall remember the date and time of this reset, thanks to which you will have information on how long is your cumulated electricity consumption.

4.6 WiFi connection

The state of the Internet connection is displayed on screen **„Information"** after pressing the down arrow you pass to the screen with information about the communication module with Internet.

If there is no WiFi modem connected to the electronic bloc, there will be a message **„No WiFi modem!"**
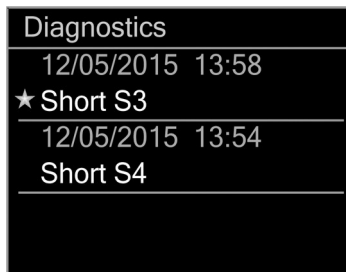
Using the water heater via a WiFi connection is possible only with provided by the producer WiFi modem. For further information contact the manufacturer / supplier of your water heater.

4.6a Controller version
Once the arrow „down" is pressed from the screen „WiFi connection", proceed to the information screen with the version of the controller and software in it.

4.7 Diagnostics
Next pressing of the Enter button shall display the last information screen **„Diagnostics"**, which consists of a list of information about every registered problem and the exact time and date of its occurrence. If these are more than three with the arrows „down" and „up" shall be displayed the next page. By holding the Enter key for over two seconds the accumulated diagnostic information shall be cleared. The symbol „star" marks both the latest and the newest registered issue. The messages that you can see on this screen are the same as reports of failures and errors listed in Table 6.

```
Diagnostics
 12/05/2015  13:58
★ Short S3
 12/05/2015  13:54
 Short S4
```

5. UNIT MODES

5.1 Protection modes
The protection modes are designed to protect the installations of the boiler, the solar collector and the water heater in case of extreme operative conditions. Whether the water heater is on or off and notwithstanding in which mode it works, the thermostat shall continuously monitor the temperature as the water in the water tank and the solar collector. If necessary, the protection mode shall be switched on for:

- **Anti-freezing protection of the solar collector (NHC-H52M-1S / NHC-H52M-2)**. This protection brings heat from the water heater to protect the solar collector from freezing. It activates when the temperature measured in the collector falls below **„Solar protection"** limit on row **„Anti-frost temp."**. This function may be switched off from the same menu line **„Solar anti-frost"**.
- **Protection from freezing of the water tank** (**NHC-H52M-1S / NHC-H52M-2**). The electric heater is activated if the temperature in the water tank falls below 3 degrees.
- **Protection against overheating of the solar collector (NHC-H52M-1S / NHC-H52M-2).** If the temperature of the solar collector gets above 90 degrees, the circulation pump of the solar shall switch on regardless of the temperature difference. The pump will switch off if the water temperature in the tank gets above 85 degrees.
- **Protection against overheating of the water tank** (**NHC-H52M-2**). For available and activated heating system. If the water temperature in the middle of the water heater (measured by t5) exceeds 80 degrees and the water temperature in the boiler is below 50 degrees will turn on the heating system pump for release of the accumulated heat. The pump will operate until the temperature falls to 76 degrees on the same thermo-sensor or

the water temperature in the boiler exceeds 50 degrees.

- **Automatically activated Holiday mode** (**NHC-H52M-1S / NHC-H52M-2**). Serves to discharge the accumulated heat in the water tank. This option is activated by marking from the menu **„Solar protection"**, line **„Auto Holiday mode"**. If after 21 o'clock the water temperature in the middle of the water heater (measured by t5) is over 77 degrees in the absence of hot water consumption, the temperature gets above 60 degrees, will prepare switching on to this mode. Consequently, in the interval between 00:00 and 5:00 the system shall switch on the solar and the boiler pumps if this is allowed. The purpose is to begin the transfer of heat from the water heater to the solar and due to existing energy losses through the pipes and into the solar collector when there is no sun, to cool off the water in the water heater. Thus again the next day will have the opportunity to accumulate a new heat in order to discharge the solar collector. The pump will operate until the temperature in the tank falls below the temperature set in **„Solar protection"**, line **„Tank min temp."**. This mode is indicated with caption **„Heat release"** in the field **„Additional features"** on the screen. For faster discharge of heat from the heater possible use in parallel and the boiler pump, which is activated by marking menu **„Solar protection"**, line **„Use boiler pump"**.

IMPORTANT! When there is danger from temperature fall or overheating of the collector, it is recommended to keep the water heater connected to the mains!

5.2. Holiday mode
Only the solar installation and the protective regimes shall remain active. Besides the normal operation of the solar during the day it will include a compulsory regime for discharging heat from the heater at night. This mode will be particularly useful if you know that you will be away from home for long and there will be no demand for hot water. In this situation the tank can not accumulate infinite heat and will need periodically to discharge in order to cool the solar during the day.