Multisystem solar controller

IB – Tron 4000 SOL

With support for additional devices, two collectors areas, for central and water heating.

Products is C E marked

and has been produced in accordance with ISO 9001 standard

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Contents

IB-TRON 4000 SOL

BASIC INFORMATION

IB-Tron 4000SOL controller are used for control solar systems or any other heating system, which control is based on measuring difference of temperature in different places of system. IB-Tron 4000SOL controller enables full automation of these systems in a comfortable way and it ensures high efficiency of whole system.

FEATURES

☞ Control of 4 different expanded heating systems
☞ Independent control of two areas of solar collectors
☞ Loading of two tanks (eg fresh water tank and storage tank, fresh water tank and a swimming pool etc.)
☞ Ability to connect 7 temperature sensors (all sensors included)
☞ Ability to control 7 various devices (pumps, heaters, valves, boilers, etc.)
☞ Loading pumps of collectors with automatic dull range speed control for increasing efficiency of whole system. Speed of pumps is calculated in two ways (depends of user setting):
  » according to optimum temperature difference
  » according to optimal operating temperature of collector
☞ Full adjustable hysteresis for all parameters
☞ Anti-frost protection function for collectors
☞ Protection against high temperature of tanks (against overheating)
☞ Absolute protection against excessively high temperatures in system
☞ Legibly, large (4 „), backlit blue LCD display that shows all the necessary in-

formation (temperature, pumps, valves, heaters status etc.) and the current ideological view of instalation
☞ Power supply from building network - does not require batteries to operate
☞ Battery memory backup in the case of break of power supply.
☞ Extra heating busters independently for each tank
☞ Controls fresh water circulation pump by modes:
  » by temperature of circulation
  » by time program of work and break time
☞ Holiday function in two modes (depends of user setting):
  » Winter (heating building only,Fresh water tank is not heated at all by solar and other heating busters)
  » Summer (cooling tanks and extra heating busters not working at all)
☞ Bacteriological protection of fresh water tank
☞ GUARD function - protection devices from damage
☞ Reloading heat between tanks
☞ SMART START function, controller intelligently consider delay between real temperature and sensor measuring
☞ Independent calibration of each sensor
☞ Choice of how to load tanks:
  » Highest efficiency (system tries to collect as much energy as possible, both tanks are equivalent)
  » Fresh water tank prioryty (Fresh water tank is first loaded to the optimum temperature as priority and after that both tanks are loaded according to highest efficiency method)
☞ Manual test of all relays
☞ The ability to verify operation of the logic by temperature readings overwrite

FEATURES

☞ Mounting on DIN rail (10 modules) or on-wall mounting
☞ Easy and intuitive handling
☞ Aesthetic and modern look
☞ Network RS485 or Ethernet communication (optional)

AVAILABLE MODELS

☞ BL - blue backlight (backlight is activated when pressing any button and it is turned off after some delay)
☞ NW - controller for network (communication by RS - 485 or Ethernet)

TECHNICAL DATA

☞ Power consumption: <5W
☞ Power supply: 230V AC
☞ Accuracy: ±1 ºC
☞ Storage temperature: -10÷50 ºC
☞ Max load:
  » P0, P1: 1,5A (~300W)
  » P2, P3: 3A (~600W)
  » R1: 10A (~2000W)
  » H1, H2: 16A (~3500W)
☞ Plastic cover: ABS
☞ Display: LCD (4")
☞ Humidity: 5±90%
☞ Clock accuracy: ±100 s/month

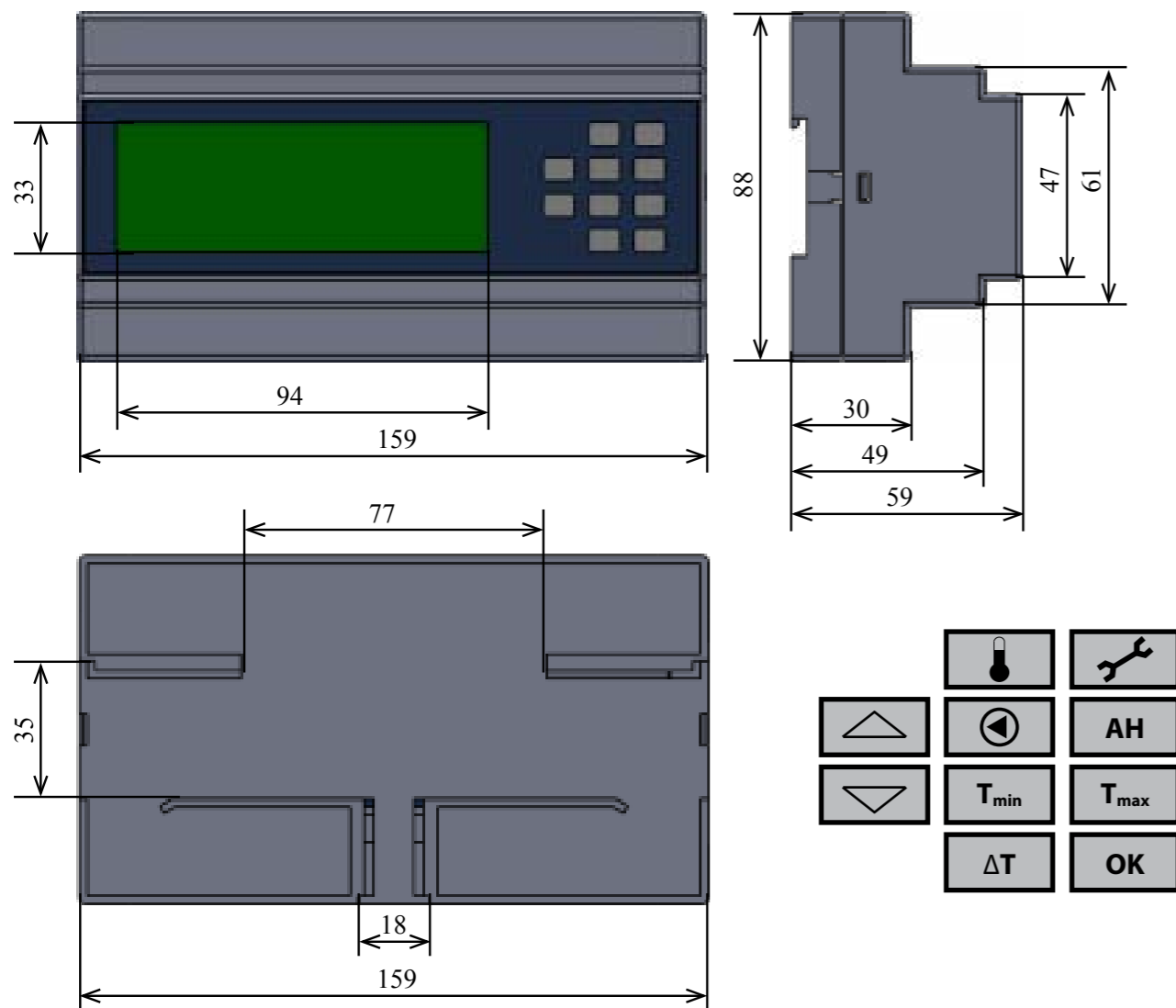## SUPPLY

☞ 1x Controller
☞ 2x Sensor PT1000
☞ 5x Sensor NTC10kOhm
☞ 1x This instruction
☞ 1x Instructions for network (only with NW model NW)

GENERAL REMARKS

⚡ During the installation of controller power supply should be cut off. This product should be installed by a qualified electrician.
⚡ Controller should be placed away from showers, bathtubs, washbasins, etc. to prevent direct flooding of controller.
⚡ Controller is designed for installation in electric distribution box with standard DIN rails. It can be also mounted on-wall by special mounting holes.

CONSTRUCTION

WIRING

POWER		H1		H2		P0		P1		P2		P3		R1		T0	T1	T2	T3	T4	T5	T6
⏚	N	L	N	L	N	L	N	L	N	L	N	L	N	ON	OFF							

☞ Connection terminals are located under front panel. To connect wiring please remove front panel and disconnect wiring cable from main board.

☞ POWER - Power supply

☞ Connection various devices and sensors depends of chosen system of work. Some devices or sensors may be not connected. All connected devices must have the same power supply like controller.

☞ R1 - Controlling terminal of 3-way valve. Controller gives voltage at ON output when it want to load tank 2 (buffer), and gives the voltage at OFF output when it want to load tank 1 (fresh water tank)

DISPLAY
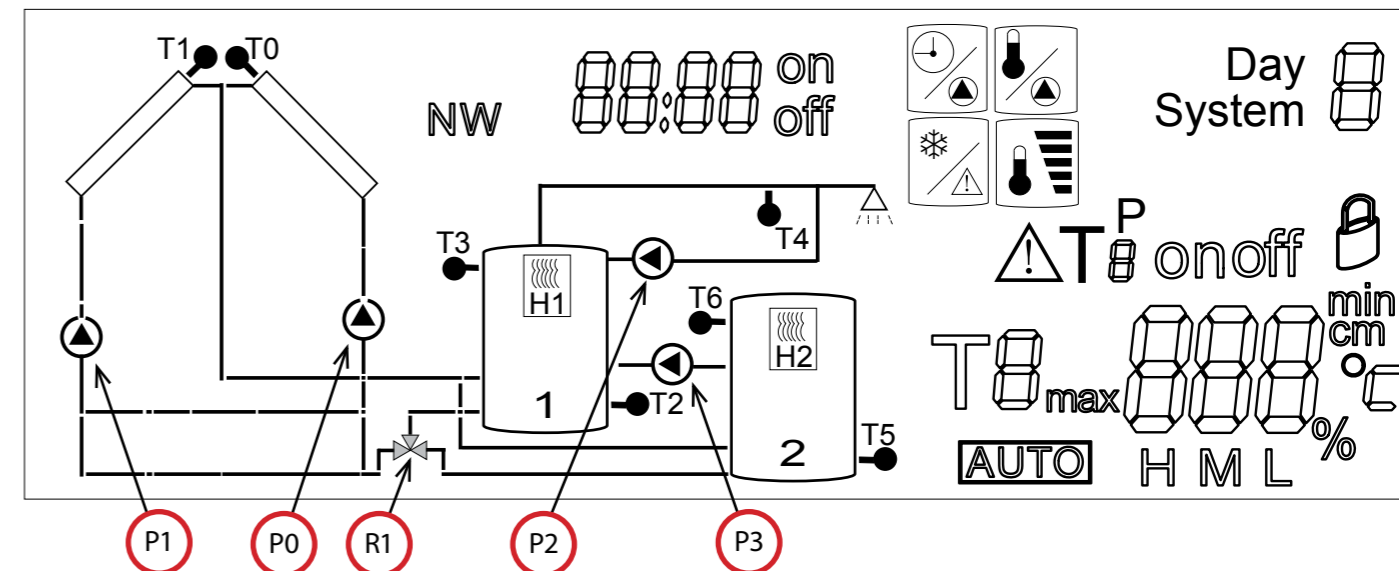
☞ The appearance of display depending of chosen system of work. Some items may not be visible.

☞ Flashing pump symbol means that this pump works at the moment. If the symbol is not flashing means that pump does not work now.

TEMPERATURE SENSORS

⚠ With controller are provided follow sensors:
» 2x PT1000 Sensors (connected to T0 and T1)
» 5x NTC10kOhm Sensors (connected to T2, T3, T4, T5 i T6)

⚠ The sensors can be extended to any length, but it must be remembered that the extension above 10m may cause deviation of temperature measurement, so for a distance above 10m controller should be calibrated. Sensor wires must be extended by cables:

» to 50m $\qquad$ 2x 0,75 mm^2
» above 50m $\qquad$ 2x 1,50 mm^2

☞ Controller is compatible with NTC 10kΩ sensors witch follow characteristic:

Temperature [ºC]	Resistance [Ω]
-50	687 803
-40	346 405
-30	181 628
-20	99 084
-10	56 140
0	32 960
10	20 000
20	12 510
25	10 000
30	8 047
40	5 310
50	3 588
60	2 476
70	1 743
80	1 249
90	911
100	647

TEMPERATURE SENSORS

☞ Controller is compatible with PT1000 sensors witch follow characteristic:

Temperature [ºC]	Resistance [Ω]
-30	862
-20	902
-10	944
0	1 000
10	1 057
20	1 097
30	1 136
40	1 175
50	1 215
60	1 254
70	1 292
80	1 331
90	1 370
100	1 408
110	1 447
120	1 485
130	1 523
140	1 561
150	1 599
160	1 597
170	1 645
180	1 712
190	1 750
200	1 787
210	1 774
220	1 810
230	1 847
240	1 875
250	1 912
260	2 008
270	2 045
280	2 081

TEMPERATURE SENSORS

☞ Sensors cables are low-voltage, so as not to interfere with the measurements, sensor wires should not be conducted in the vicinity of high voltage cables (the distance of at least 100mm).

☞ The sensors can operate in all weather conditions.

» Sensors cables are resistant to temperature:

» PT1000: -50÷140 ºC, temporary to 200 ºC

» NTC 10kΩ: -50÷100 ºC, temporary to 120 ºC

CALIBRATION

After properly connecting controller is ready to work. Controller is factory-calibrated to work with standard sensors. However after extension temperature displayed by controller may be different from actual.

In that case, you can calibrate the device. Each sensor is calibrated separately:

Tmin **ΔT** Press and hold two buttons simultaneously. On display start flashing current calibration settings and number of sensor.

By repeatedly pressing button you can change calibrated sensor.

Calibrate sensor by setting the appropriate value settings.

OK Confirm set data.

TEMPERATURES OVERVIEW

To see a specific temperature sensor, press button. Repeated pressing of this button will switch to the next sensor indications. If current temperature sensor is last available sensor, another button press will switch to the first available sensor.

To be able to easily find out where specific sensor is located, all sensors have been symbolically marked on the display and next to it is number of sensor.

☞ If sensor is not connected or damaged and it is not important for controller operation on display you can see „- - -" value

⚠ If sensor is not connected or damaged and it is important for controller operation on display you can see warning symbol

BASIC SETTINGS

First of all you need to set an appropriate system of work, which will correspond to actual installation of hydraulic connecting.

Controller supports 4 heating systems:

1. One collector area and one tank
2. Two collector areas and one tank
3. One collector area and two tanks
4. Two collector areas and two tanks

⚠ In fact, areas of collectors may be any other device that generates heat in a similar way to a collector (eg, heating fireplace). A similar situation is with the

BASIC SETTINGS

tank, which in fact may be, for example swimming pool.

To select an appropriate system please:

Press the button. On display there will be flashing system number in the right upper corner.

Select desired system (during the selection display will be updated automatically).

Press the button. On display there will be flashing hour.

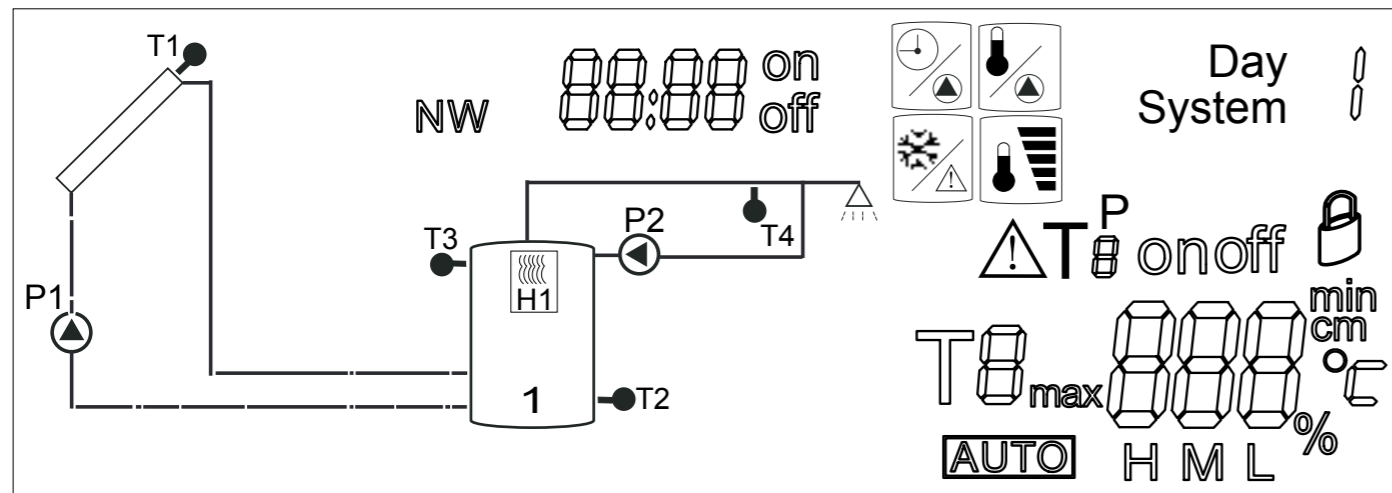Set current hour. Longer holding the button will change settings faster.

Press the button. On display there will be flashing day of the week (number 1÷7).

Set current day of the week.

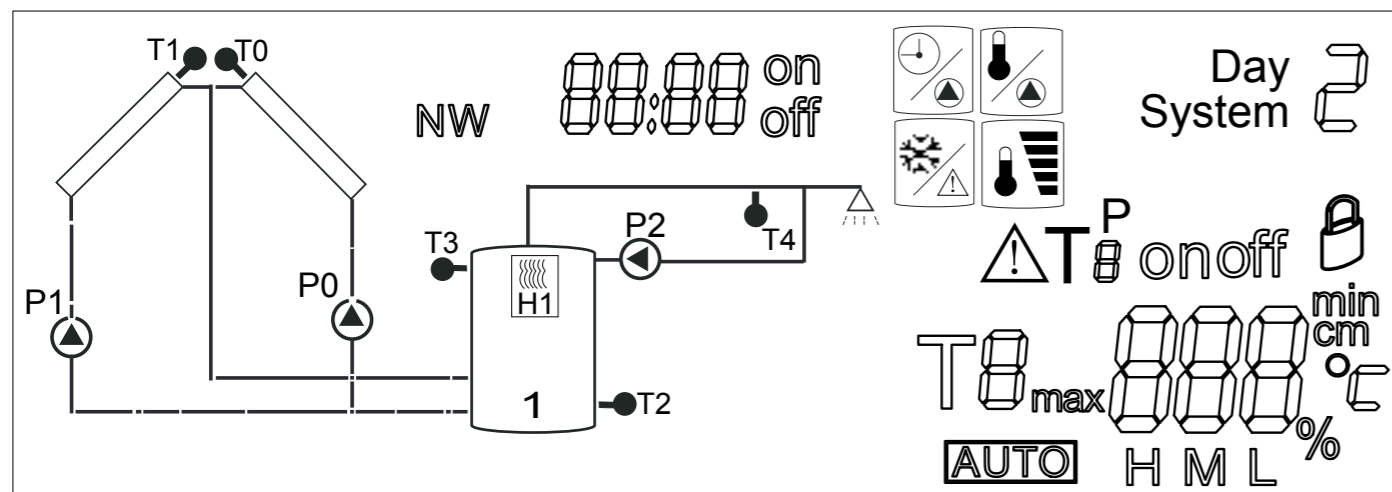## FIRST SYSTEM - ONE COLLECTORS AREA AND ONE TANK

The circulation pump of collectors area (P1) is started when temperature difference of collectors area (T1) and tank temperature (T2) reaches the set value of switching on. The pump is turned off when temperature difference of T1 and T2 falls below the set value of switching off or temperature in the tank (T2) reaches the set maximum value. The pump of the collectors is controlled with continuously speed adjustment.

External power supply (H1), which may be a electric heater, gas stove or components of automation (pump, valve) is controlled on the basis of respectively set parameters of the controller, which are described later in this manual and temperature reading of sensor (T3) in the upper part of the tank. Circulation pump of hot water (P2) is controlled on the basis of respectively set parameters of the controller, which are described later in this manual and temperature reading of sensor (T4) of hot water circulation.

Above remarks connected with external heat source and hot water circulation pump concern to all supported systems.

SECOND SYSTEM - TWO COLLECTORS AREA AND ONE TANK

Circulation pump of the first collectors area (P1) is started when temperature difference of the first collectors area (T1) and temperature in the tank (T2) reaches the set value of switching on. 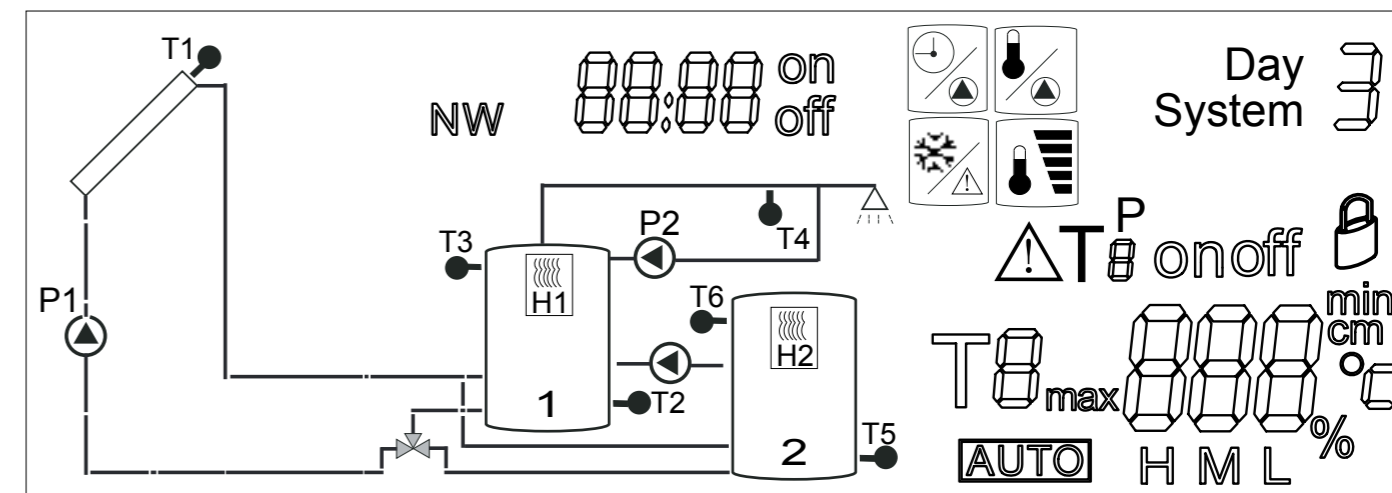Similarly, circulation pump of the second collectors area (P0) is started when temperature difference of the second collectors area (T0) and temperature in the tank (T2) reaches the set value of switching on. Circulation pumps (P1 and P0) are working independently from each other - the pumps may work simultaneously, don't work at all or one pump works. Suitable pump is turned off when temperature difference between the suitable collectors area and the tank falls below the set value of switching off or temperature in the tank (T2) reaches the set maximum value. Pumps of collectors are controlled with continuously speed adjustment.

This system is recommended when areas of the collectors are working independently for each other (east-west layout with a low slope, there may be a case when two collectors are-as are working simultaneously).

In fact, the second collectors area may be respectively hydraulically connected another device which produces thermal energy for example: heating fireplace.

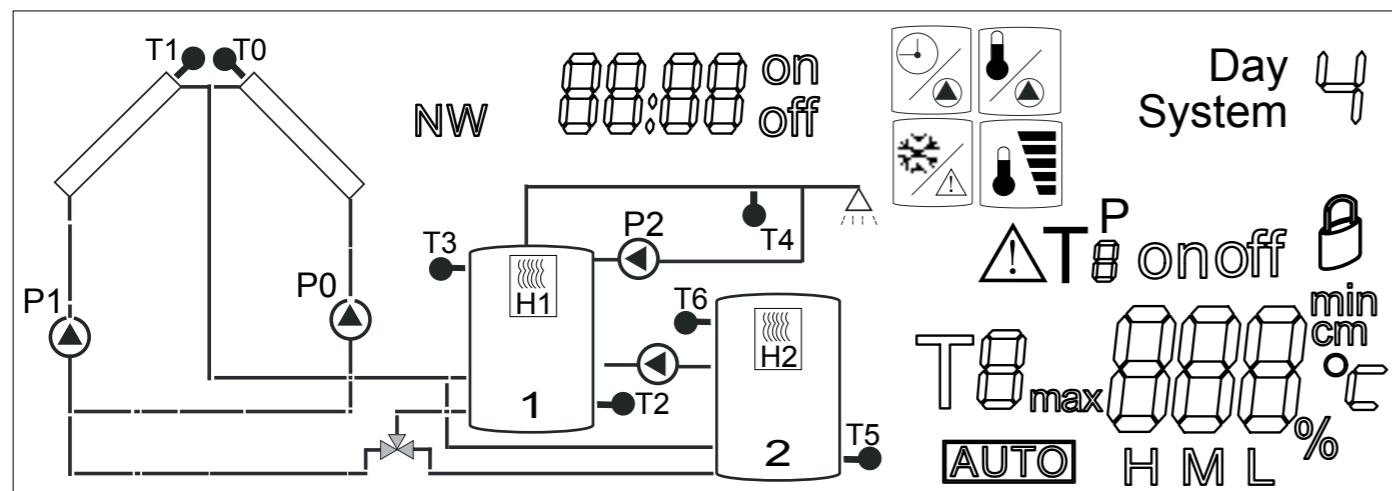## THIRD SYSTEM - ONE COLLECTORS AREA AND TWO TANKS

The circulation pump of collectors area (P1) is started when temperature difference of collectors area (T1) and temperature in the target tank (T2 or T5) reaches the set value of switching on and three-way valve is set in the position to load appropriate tank. Tanks are loaded according to the selected priority (description is later in this manual). The loading pump (P1) is turned off when temperature difference between collectors area and loaded tank falls below the set value of switching off or temperature in the tank (T2 or T5) reaches the set maximum value. The pump of the collectors is controlled with continuously speed adjustment.

There is a posibility to pump heat between tanks (description is later in this manual).

External power supply (H2), which may be electric heater, gas stove or components of automation (pump, valve) is controlled on the basis of respectively set parameters of the controller, which are described later in this manual and temperature reading of sensor (T6) in the upper part of the buffer tank.

In fact, the second tank may be respectively hydraulically connected swimming pool.

FOURTH SYSTEM - TWO COLLECTORS AREAS AND TWO TANKS

Circulation pump of the first collectors area (P1) is started when temperature difference of the first collectors area (T1) and temperature in the target tank (T2 or T5) reaches the set value of switching on. Similarly, circulation pump of the second collectors area (P0) is started when temperature difference of the second collectors area (T0) and temperature in the target tank (T2 or T5) reaches the set value of switching on. Circulation pumps (P1 and P0) are working independently from each other - the pumps may work simultaneously, don't work at all or one pump works. Three-way valve (R2) is set in the position to load appropriate tank. Tanks are loaded according to the selected priority (description is later in this manual). Suitable loading pump is turned off when temperature difference between the suitable collectors area and the loaded tank falls below the set value of switching off or temperature in the tank (T2 or T5) reaches the set maximum value. The Pump of collectors is controlled with continuously speed adjustment.

There is a posibility to pump heat between tanks (description is later in this manual).

This system is recommended when areas of the collectors are working independently for each other (east-west layout with a low slope,

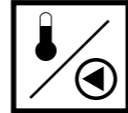there may be a case when two collectors areas are working simultaneously).

External power supply (H2) works as in the third system.

In fact, the second collectors area may be respectively hydraulically connected another device which produces thermal energy for example: heating fireplace.
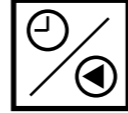
In fact, the second tank may be respectively hydraulically connected swimming pool.

FRESH WATER CIRCULATION PUMP

Controller is equipped with a fresh water circulating pump control function (**P2 pump**). Control of fresh water circulating pump can be done in two ways:

1. Control based on return temperature of fresh water circulation. If fresh water pump control is by this method, special symbol is visible on display. **T4** sensor must be connected to use this control method. Fresh water circulation pump is turned on when temperature on **T4** sensor drops below set value. It is recommended that **T4** sensor be placed on return pipe of fresh water circulation or just before last fresh water receiver. To this place, fresh hot water will be pushed and then fresh water pump will be turned off. Just as water pipe in the circulating pump will cool down, fresh water circulation pump will be turned on.

    Attention. If the temperature in the upper part of tank No 1 (T3) is too low to warm T4 sensor to desired temperature, the circulation pump will not be turned on.

2. Control based on time periods. f fresh water pump control is by this method, special symbol is visible on display. Controller controls fresh water pump according to periods of time: **work time** and **break time**. E.g. Circulation pump is turned on every 20 min for 3 min. Both periods are adjustable.

☞ If on display is not showed any of above symbols, this means that fresh water circulation pump is not controlled by con-

FRESH WATER CIRCULATION PUMP

troller at all.

☞ If fresh water circulation pump is working **P2** symbol on display is flashing.

☞ Fresh water circulation pump is controlled only in set daily periods of time (only between beginning and end of the period). Often there is no need for circulation pump control during the night or when no one is in the building. Apart from these periods circulation pump never turns on.

To choose method of control of fresh water circulation pump please:

Repeatedly press the button.

After selecting control method, you can set the parameters of control function. Depending on selected control method there are different parameters settings. To adjust parameters of function please:

Press and hold button.

Repeatedly press the button to set further parameters:

T4on - Value of temperature [°C] below which fresh water circulation pump is turned on (parameter adjustment available only for first method of control)

T4off - Hysteresis between turning on and turning off fresh water circulation pump (parameter adjustment only for first method of control)

on - Work time period [min] - how long the pump has to work in one cycle (parameter adjustment available only for second method of control)

FRESH WATER CIRCULATION PUMP

off - Break time period [min] - ever this time period circulation pump will be turned on (parameter adjustment available only for second method of control)

P1 on - Beginning of first period of work

P1 off - End of first period of work

P2 on - Beginning of second period of work

P2 off - End of second period of work

Set desired value of the parameter.

OK Confirm set data.

BACTERIOLOGICAL PROTECTION

Caring for health of user, the controller is equipped with bacteriological protection of fresh water tank, this feature prevents the tank before legionell bacteria (legionnaires).

Optimal temperature for growth of the Legionella pneumophila bacteria in the laboratory is 37ºC. At higher temperatures these micro-organisms proliferation decreases, at 46ºC it stops. Bacteria can survive at higher temperatures, but decreases survival time of several hours at 50ºC and of few minutes at 60ºC. At 70ºC bacteria is killed instantly.

Controller controls maximum temperature which was in fresh water tank within 7 days. If at that time temperature in fresh water tank remained at low level there is a risk of bacteria appearance. Therefore, if such a situation occurs (temperature in fresh water tank for 7

BACTERIOLOGICAL PROTECTION

days, will not increase above the set protect value), controller is turning on an additional source of heat (extra heating buster) **H1** and remains turned on until protection temperature will be achieved.

Bacteriological protection function is recommended in all cases, but you can disable it if necessary.

To enable / disable bacteriological protection function please:

Press and hold button.

select temperature protection value (recommended value is 70 ºC) or turn **OFF** protection function.

OK Confirm set data.

HYSTERESIS

Controller allows full adjustment of hysteresis for multiple functions.

Hysteresis is delay between turning on/off of device Higher value of hysteresis means less cycles of controlled device (e.g. pumps) and thus increases the vitality of the device.

In normal conditions it is recommended to set hysteresis value to 2 ºC (for liquid). Value setting of hysteresis depends on where the measurement is.

EXTRA HEATING BUSTERS

Controller is equipped with additional, independent, strong relays **H1** and **H2**, into which you can connect an additional source of heat (extra heating busters). This source of heat may be e.g. electric heater, gas boiler heating

EXTRA HEATING BUSTERS

water in tanks (directly or by exchange coil), etc.

Please note that the maximum load of **H1** and **H2** can not exceed values given in technical data of this manual. For bigger loads of extra heating busters please use additional external relays of adequate power.

Controller is designed for extra heating busters located in upper parts of tanks so that it does not heat whole tank just top part of it.

If temperature in upper part of first tank (**T3**) drops below comfortable set value (for specific period of time) **H1** device will be turned on until it reach desired comfortable temperature (including hysteresis value).

Similarly **H2** deviece is turned on when temperature in upper part of second tank (**T6**) drops below comfortable set value.

For each tank can be set two independent periods of time (for a day) in which extra heating busters are controlled (outside this periods extra heating busters are never turned on).

To adjust parameters of the function please:

AH Repeatedly press the button to set further parameters:

T3 on - **T3** comfortable temperature - up to this temperature first tank is heated by **H1**

T3off - Hysteresis for **H1** - applicable for **T3**

T3 P1 on - First period of **H1**: beginning of period

T3 P1 off - First period of **H1**: end of period

T3 P2 on - Second period of **H1**:

EXTRA HEATING BUSTERS

beginning of period

T3 P2 off - Second period of **H1**: end of period

T6 on - **T6** comfortable temperature - up to this temperature second tank is heated by **H2** (only for systems with two tanks)

T6 off - Hysteresis for **H2** - applicable for **T6** (only for systems with two tanks)

T6 P1 on - First period of **H2**: beginning of period (only for systems with two tanks)

T6 P1 off - First period of **H2**: end of period (only for systems with two tanks)

T6 P2 on - Second period of **H2**: beginning of period (only for systems with two tanks)

T6 P2 off - Second period of **H2**: end of period (only for systems with two tanks)

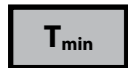Set desired value of the parameter.

OK Confirm set data.

⚠ In some heating systems, it is desirable that temperature at top of buffer tank (tank 2) was variable and dependent on outside temperature (colder outside - higher required temperature **T6**, warmer outside - lower required temperature **T6**). This effect can be achieved by additional linear weather compensator. Such controllers are available in our offer.

FROST PROTECTION

If controller finds that temperature in the collectors (**T0** or **T1**) drops below safe frost limit, it will turn on loading pump (**P0** or **P1**) with maximum speed, to protect collector from damage.

To adjust this function please:

| **T_{min}** | Repeatedly press the button to set appropriate collectors area. |

Set desired protection value (safe frost limit) or turn **OFF** protection function.

| **OK** | Confirm set data. |

☞ Setting range of safe frost limit is 5 ÷ -30ºC

☞ Safe frost limit value should be responsible for freezing level of used liquid (e.g. if it is glycol of freeze level -15ºC, safe frost limit value should be at this or higher value).

☞ If solar system uses completely non-freeze liquid, you can disable this function (for only one or two areas).

⚠ If frost protection function is current activated on display warning symbol appears.

HIGH TEMPERATURE PROTECTION

Controller is equipped with tanks and entire system protection against high temperatures.

If **T0** or **T1** temperature exceeds set safety temperature, respectively, **P0** or **P1** pump is turned off as priority, so high temperature,

HIGH TEMPERATURE PROTECTION

which may appear don't damaged components mounted on installation. These values should be set at level which instantaneous resistance to high temperature has on the weakest part of solar installation.

If **T2** or **T5** temperature exceeds set safety temperature, the corresponding tank is not loading anymore (until temperature drops) because of safety. These values should be lower than maximum allowable temperature for tank (this information should be given by manufacturer of tank).

All of these security features may be disabled. However for safety reasons, it is strongly not recommended.

To adjust this functions please:

| **T_{max}** | Repeatedly press the button to choose temperature sensor for protection function setting. |

select temperature protection value or turn **OFF** protection function for choosen senso.

| **OK** | Confirm set data. |

⚠ If frost protection function is current activated on display warning symbol appears.

CHOICE OF TANK

The issue concerned for two tank systems (**3** and **4**).

Controller selects which tank is loaded in two ways (method of selection is determined by user choice):

1. First tank priority method. As long as first tank (sensor **T2**) did not reach desired optimal temperature, second tank is not loaded (exception is case when controller determines that there is no chance to load first tank to desired optimal temperature). When first tank is loaded to optimal temperature, both tanks are loaded by most efficiency method.

2. Most efficiency method. First and second tank have equal rights. Controller loading tank which will provide greatest yield of energy in whole system (**NOTE!** Please do not confuse energy with temperature!)

To adjust parameters of this function please:

| **AH** | Press and hold button. |

| **AH** | Repeatedly press the button to set further parameters: |

1. Optimal **T2** temperature (for first method of choice)
2. Method of tank choice (by former description)

Set desired value of the parameter.

| **OK** | Confirm set data. |

CHOICE OF TANK

⚠ Display symbolically show valve position and in addition some parts of installation are flashing. In this way, in clear and unambiguous way user gets information that what tank is being loaded now.

LOADING PUMPS

Generally speaking, controller loads tanks where temperature is higher than in destination tank (with appropriate modifications to respective systems).

For all collectors areas (**T0** or **T1**) you can set turn on/off temperature difference of pump **P0** or **P1**. Analyzed difference refers to appropriate collector area and destination tank (This may be **T2** or **T5** depending on which tank controller decides to load). Values of these parameters should be set individually to each installation.

According to a simplified method turn on temperature difference should be:

Temperature losses arising on installation (in standard conditions of heating) on distance between the analyzed collector area and farthest tank and this value increased by 4 ºC.

Conversely, turn off temperature difference of the same collector area should not be less than above temperature losses.

For example, losses between collector and tank are 4 ºC. Turn on temperature difference should be 8ºC and turn off temperature difference should be 4ºC.

Controller has been additionally equipped with control of re-loating pump **P3**. This feature is very necessary in many cases, an example of this may be the typical situation:

LOADING PUMPS

Solar system for whole day heat both tanks completely (1 and 2). First tank is fresh water tank. At evening residents of building cool first tank (hey used hot water). Normally, at this point extra heating buster should be turned on to heat fresh water tank (such as electric heater – extra heating buster feature has been previously described in this manual). However, when second tank is still collected by solar energy, this energy is re-loaded from second tank to first fresh water tank (for example by upper coil exchanger in fresh water tank or by external exchanger). This feature allows maximum solar energy use in whole system. When re-loading process is active **H1** extra heating buster is turned off.

Control of **P3** re-loading pump is in same way like **P0** and **P1** pumps, but for calculation controller using temperatures in the upper parts of both tanks (difference between **T6** and **T3**).

⚠ **P0** and **P1** pump working with variable speed. This speed is calculated by controller (more details later in this manual). **P3** pump works as turn on/off with constant speed.

⚠ If any pump is working its symbol on display is flashing.

To adjust parameters of this function please:

| ΔT | Repeatedly press the button to set further parameters: |

1. Turn on difference for **P0**
2. Turn off difference for **P0**
3. Turn on difference for **P1**
4. Turn off difference for **P1**
5. Turn on difference for **P3**
6. Turn off difference for **P3**

LOADING PUMPS

| △ ▽ | Set desired value of the parameter. |

| OK | Confirm set data. |

P0 AND P1 PUMP SPEED

As you know the speed of fluid flow through the collector is not neutral. If flow speed is too high, the collector will not be operated with maximum efficiency. If too low, the collector may fall within the zone of steam.Set of flow speed at a constant level is only simple solution because this flow speed is optimal for conditions that were at the time of flow speed adjustment. If intensity of solar radiation will change, collector return temperature will changes automatically also other parameter will change, after that optimal flow speed (at which collector has highest efficiency and produces the most energy for current situation) is very different than one previously set.

Only solution to this problem is automatic control and ability to change flow speed of liquid through collector. **IB-Tron 4000SOL** controller it is equipped with such a possibility. Controller controls loading pumps speed in proportional way so solar collectors are always working with its highest efficiency.

In addition, due to fact that on market there are many types of solar controllers (and other equipment working on a similar principle) calculation of optimal speed can be in two methods:

1. Based on optimal operating temperature of collector. Speed of pump is calculatet that supply temperatu-

re (**T0** or **T1**) was always at constant optimal level (eg 80ºC)

2. Based on optimal temperature difference between supply and return. Speed of the pump is calculated that difference of temperature at collector (**T0** or **T1**) and destination tank (**T2** or **T5**) Was always at constant optimal level (optimal growth of temperature for example 20ºC)

To properly determine how speed should be calculated please ask manufacturer of collectors. At time of writing this manual, InsBud vacuum tube collector (classic and SHCMV) have optimal performance with method 2 and value of difference with 20ºC. These values are default settings of controller.

⚠ Controller controls of pump speed, which only has an impact on flow speed. Therefore first of all please set optimal flow speed for 80% speed of pump by suitable balance valve placed just before pump.

⚠ Controller has been designed to control classic pumps currently available on market. Due to variety of available pumps we recommend using original IB-Pump xx-60. By using this pump we guarantee valid proportional control of speed. Using other pumps (eg with different strength, different type of engine), you must reckon with possibility that pump will be regulated in steps (not proportional) or not extent as provided for in controller algorithm.

Controller allows to adjust minimal speed of **P0** i **P1** pump. This means that a suitable pump will never work with lower speed than set value. Setting minimal value for 100%
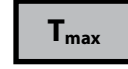
P0 AND P1 PUMP SPEED

means that pump is only turned on and off (no speed control).

Minimal speed value of pump is default set to 10%. This value should be changed only in two cases:

☞ Pump with minimal speed makes vibration and loud voice in system (very specific situation for hydraulic installation). Then gradually increase the minimum speed of the pump until vibration stops.

☞ Controlled pump is an advanced electronic pump, dynamically changing its own speed by its own built-in controller. In this case, set minimum speed value to 100% and for safety of pump and its controller we recommend to connect to it by separated external relay.

To adjust parameters of this function please:

| Tmax | Press and hold button. |

| Tmax | Repeatedly press the button to set further parameters: |

1. Speed control method (method common to both loading pumps according to above description)
2. Optimal operating temperature (for first method)
3. Optimal temperature difference (for second method)
4. Minimal speed for **P0**
5. Minimal speed for **P1**

| △ ▽ | Set desired value of the parameter. |

| OK | Confirm set data. |

P0 AND P1 PUMP SPEED

⚠ To see current speed of the pump please:

Press and hold two buttons simultaneously. On display you will see current speed of **P0** pump.

Press and hold two buttons simultaneously. On display you will see current speed of **P1** pump.

SMART START

Distribution of temperature in collector is not linear and also sensor in collector is not physically placed in theoretical ideal place. Therefore in fact often happens that collector, could start work earlier few minutes than this happened in practice. While in days with high solar radiation this energy losses arising from this delay is negligible, but in winter days with lower solar radiation there is quite a lot of this energy losses.

To solve this problem and increase energy output **IB-Tron 4000SOL** controller is equipped with a special algorithm which analyze in dynamic, long term way behavior of individual collectors areas. If controller comes to conclusion that above situation may occurred following several attempts to „push" heat to sensor (with minimum speed loading pump is turned on for short period of time), each reaction is further studied by controller. If action do not occur valid result (which means that there is no conditions for load heat) controller cease testing for other period of time (this period is dynamic changeable).

Thanks to **SMART START** function significantly increases system efficiency. For each collector area this function is implemented

SMART START

separately.

SMART START function May be disabled if needed.

GUARD

Some of devices in whole system does not work all year round. If the valve or pump is not working for a long period of time it may be damaged. Therefore it is important that each device was periodically turned on even when there is no need of it by logic of whole system point of view.

This protective function of the fully is **GUARD** function. It monitors work of all devices connected to the controller.If any device was not turned on for two weeks GUARD function turn it on for one minute (in case of valve is a full cycle of closing and opening).

GUARD function May be disabled if needed.

HOLIDAYS

In case of leaving building for a longer period of time, it is desirable to set controller in special holiday mode, which modifies principle of system operation. Holiday function starts and stops in manual way (after arrival from holidays this function must be manually disable). If you enable holiday function you can see information about this on display.

Controller is equipped with two holiday function methods, which can be selected depending on situation:

1. Summer holidays. Extra heating busters **H1** and **H2** are strictly turned off (never will be turned on). If temperature in any tank exceeds 40ºC **P2** and

HOLIDAYS

P3 pump is turned on (to cool tanks)

2. Winter holidays. Excluded from operation is only the first tank (fresh water tank). It will be not heated by solar system. Re-loading **P3** pump and fresh water circulation **P2** pump never turn on. The same with **H1** extra heating buster. Second tank (buffer tank) Works normally so solar energy is available for use in central heating process. **H2** extra heating buster również działa wg podstawowych kryteriów, Also works normally to not disrupt process of building heating .

ADDITIONAL FUNCTIONS SETTING

To adjust parameters of additional functions (**SMART START**, **GUARD**, **HOLIDAYS**) please:

ΔT Press and hold button.

ΔT Repeatedly press the button to set further parameters:

1. **SMART START** for **P0**
2. **SMART START** for **P1**
3. **GUARD** function
4. **HOLIDAY** function (method of work according to above description).

Set desired value of the parameter.

OK Confirm set data.

KEYBOARD LOCK

After properly setting of controller it is possible to lock keyboard to prevent setting modification. When controller is locked it does not respond to keyboard pressing and on display is visible symbol of lock. To lock/unlock keyboard please:

ΔT Press and hold two buttons simultaneously.

OK

FACTORY SETTINGS

To reset controller and go back to factory settings please:

Press and hold two buttons simultaneously.

TEST FUNCTIONS

Controller has a relays test function. Each relay can be manually turned on/off and for **P0** and **P1** pump it is possible to set test speed.

To activate relay test function please:

◀ Press and hold two buttons simultaneously.

AH

By repeatedly pressing button you can change testing relay.

Set relay status.

OK Confirm set data.

TEST FUNCTIONS

In addition, there is possible to test logic of system work by sensor test function. When this function is on, sensors no longer making real measurement user are able to simulate absolute values from controller keyboard controller (simulate value of sensor).

To activate sensor test function please:

Press and hold two buttons simultaneously.
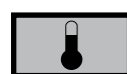
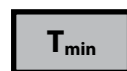By repeatedly pressing button you can change testing sensor.

Set sensor status.

OK Confirm set data.

TEMPERATURE UNITS

Controller supports two temperature units: ºC and ºF.

To change temperature units please:

T min / **T max** Press and hold two buttons simultaneously.

NETWORK

Controller is also available in versions designed to work in network.

There are versions based on RS-485 or Ethernet communication.

Issues relating to network communication are contained in separate manual for **IBS** system.

SOFTWARE VERSION

InsBud company supports policy of development. Thats why rights to making changes and improvements in products and manuals without prior notice reserved!

Our company is open to all suggestions to improve our controllers. If you have any idea to add new features or require unusual solutions, please contact us.

This manual applies to controller with software version number

011

If your controller has other software version in operation and functionality may be different from information contained in this manual.

To check software version please:
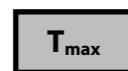
T max / **OK** Press and hold two buttons simultaneously.

If you want update your controller to newer version please contact us or one of our partners.

ERRORS

On display may appear such symbols that's means:

☞ LO -temperature at current sensor is below lowest measuring range.

☞ HI - temperature at current sensor is above highest measuring range.

☞ --- - current sensor is not connected or is damaged.

⚠ In an error occurs on display you will warning sign.

SHORT MANUAL

T min / **ΔT** Calibration. Press and hold two buttons simultaneously.
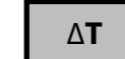
By repeatedly pressing button you can change calibrated sensor.

◄ **Fresh water circulation pump parameters.** Press and hold button.

◄ Repeatedly press the button to set further parameters:

1. Circulation pump turn on temperature (method 1)
2. Work time for **P2** [min] (method 2)
3. Break time for **P2** [min] (method 2)
4. Beginning of first period of work
5. End of first period of work
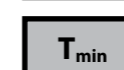6. Beginning of second period of work
7. End of second period of work

SHORT MANUAL

Bacteriological protection. Press and hold button.

△ / ▽ Select temperature protection value.

T min **Frost protection**. Repeatedly press the button to set appropriate collectors area.

T max **High temperature protection.** Repeatedly press the button to choose temperature sensor for protection function setting.

AH **Extra heating busters.** Repeatedly press the button to set further parameters:

1. Comfortable temp. **T3**
2. Hysteresis for **H1**
3. 1-st period **H1**: beginning
4. 1-st period **H1**: end
5. 2-nd period **H1**: beginning
6. 2-nd period **H1**: end
7. Comfortable temp. **T6**
8. Hysteresis for **H2**
9. 1-st period **H2**: beginning
10. 1-st period **H2**: end
11. 2-nd period **H2**: beginning
12. 2-nd period **H2**: end
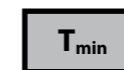
T min / **T max** **Temperature units.** Press and hold two buttons simultaneously.
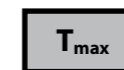
T max / **OK** **Software version.** Press and hold two buttons simultaneously.

SHORT MANUAL

| AH | **Choice of tank.** Press and hold button. |

| AH | Repeatedly press the button to set further parameters: |

☞ optimal **T2** temperature (for 1 method)

☞ Method of choice:
1. 1-st tank priority
2. Most efficiency

| ∆T | **Loading pumps.** Repeatedly press the button to set further parameters: |

1. Turn on difference for **P0**
2. Turn off difference for **P0**
3. Turn on difference for **P1**
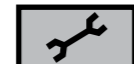4. Turn off difference for **P1**
5. Turn on difference for **P3**
6. Turn off difference for **P3**

| T$_{max}$ | **Pump speed.** Press and hold button. |

| T$_{max}$ | Repeatedly press the button to set further parameters: |

1. Method of speed control (1 - based on optimal work temperature; 2 – based on optimal temperature difference)
2. Optimal work temperature (1-th method)
3. Optimal temperature difference (2-nd method)
4. Minimal **P0** speed
5. Minimal **P1** speed

SHORT MANUAL

Pump speed view:

| 🌡 | P0 | | 🔧 | P1 |
| ◀ | | | AH | |

| ∆T | Additional functions. Press and hold button. |

| ∆T | Repeatedly press the button to set further parameters |

1. **SMART START** for **P0**
2. **SMART START** for **P1**
3. **GUARD**
4. **HOLIDAY** (1 – summer holidays; 2 – winter holidays)

| ∆T |
| OK | **Keyboard lock.** Press and hold two buttons simultaneously. |

| △ |
| ▽ | **Factory settings.** Press and hold two buttons simultaneously. |

| ◀ |
| AH | **Relay test.** Press and hold two buttons simultaneously. |

| 🌡 | By repeatedly pressing button you can change testing relay. |

| 🌡 |
| 🔧 | **Logic test.** Press and hold two buttons simultaneously. |

| 🌡 | By repeatedly pressing button you can change testing sensor. |

WARRANTY

☞ Warranty is given for 24 months from date of purchase of goods.

☞ Any defect disclosed in warranty period will be removed within 21 working days, counting from date of adoption of goods for service.

☞ In need of import goods or parts from abroad, repair time is extended by time required for their transportation.

☞ Customer provides product to service at their own cost.

☞ At time of repair service will not provide buyer replacement product

☞ Warranty repairs will be made upon presentation of properly and legibly filled your hardware warranty card, signed by guarantor and with sale document

☞ Warranty covers only defects arising from causes inherent in goods. They are not covered damage resulting from external causes such as: mechanical injury, pollution, flooding, weather, improper installation or improper wiring and operations. Warranty does not apply in case customer's unauthorized repairs, changes in software (firmware) and device formatting.

☞ Due to natural material use, some of them are not covered by warranty (for example: cables, battery, charger, micro switches, buttons).

☞ In event of unjustified claims for warranty repair, all additional cost are on customer's side.

☞ Service has right to refuse to perform warranty repairs for following: differences between documents and goods marks, make repairs on their own by customer, changes in product construction without authorization. This case warranty is not valid anymore.

☞ If it is not possible to test product be-

WARRANTY

fore its purchase (sale at distance), it is possible to return goods within 10 days. Returned goods cannot bear signs of exploitation, it must contain all elements with which it was delivered.

☞ In the case of return of purchased goods all shipping costs are on buyer side. Before return of goods please contact with seller.

☞ Terms of warranty may be changed by local InsBud company partner.