MC/MCP Inverter Unit Control Application Manual

Application version - 1.0

IGLOO

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TECHNICAL DOCUMENTATION – ORIGINAL

READ CAREFULLY BEFORE USE

KEEP FOR FUTURE USE

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1. Introduction

This documentation applies only to applications (software) for the condensing unit equipped with a Miloo Optidrive. All information contained herein is software oriented. For additional comprehensive information on hardware configuration, please refer to the separate documentation of the Dixell iPG 108D controller manufacturer and Miloo Optidrive.

2. General description of the user interface

The picture above shows the user interface which is also the main console of the whole system. It is used to indicate measured values and operating states of individual elements of the device, to modify control parameters and to read out alarm states (the content of the screen in the picture is exemplary and is only for reference purposes). The buttons visible below the screen are assigned/programmed with the appropriate functionality, which is unchanged.

3. First controller start

First controller start requires entering the parameter settings related to the unit configuration. To do this, select the **"Login"** tab in the **Menu of parameters without passwords** (section 4.3 of this documentation) and follow the instructions in section above, logging in with the "Service" access level. After entering the correct password, the user name will change at the top of the screen according to the weight of the password. In addition, at the bottom of the screen you will see a message about the time remaining until the automatic logout. After logging in you can return to the Home Screen by pressing the T2 button ("ESC"). Enter the current date and time by going to the **"date and time"** tab and follow the instructions in **section 4.3**. After setting the date and time enter the **"Service"** tab, then **"Initialization"** and in the configuration menu of the unit **(Section 4.5d)** of this documentation**,** select the type of refrigerant with which the unit was filled and the type of expansion valves used in the receivers. If the expansion valves are selected as "thermostatic" or "mixed", the unit will try to maintain the set condensation pressure (default: 16 bar) throughout the year during the operation. If the expansion valves are selected as "electronic" – the unit will use the "LowBar Mode" function during the operation, which is based on the fact that the unit does not have a fixed condensation pressure setting, but it is automatically calculated in real time by the "LowBar Mode" algorithm, so that the unit continuously operates at the lowest possible condensation pressure, the level of which depends on the ambient conditions (the lower the condensation pressure, the cooler the outside), without generating a higher noise level of the condenser fan than during the standard operation. The LowBar function will reduce the condensation pressure as described above, depending on the prevailing external conditions, particularly effectively during winter and transitional periods, up to the value set in the parameter "**second condensation pressure set point**" (default: 7 bar). In practice, therefore, if the factory parameters are not changed, it will modulate the condensation pressure between 7 and 16 bar, depending on the possibilities offered by the prevailing climate conditions. This allows for very high energy savings for the unit. From the perspective of the energy it is therefore very beneficial to choose the "electronic expansion valves" option, but this can only be done safely if we are sure that all receivers connected to the unit have electronic expansion elements. After selecting the type of medium and expansion elements the unit is configured. Exit to the main menu by pressing the **"ESC"** button. After ensuring that the unit is connected to a tightly sealed installation filled with the medium, that the compressor transport lock has been unscrewed, that the refrigeration installation has been made according to the art with properly made siphoning and properly dimensioned piping, and that the unit has open ball valves, and the unit's communication with the receivers has been connected in accordance with diagram

no. 18, p. 48 of the document **"Igloo Inverter Aggregates O&MM"**, which supplements this document, it is possible to start up the unit for the operation. To do this, set the backlighted rocker switch next to the control panel to the **"1"** position, then from the main menu, enter the **"on/off"** tab and select **"ON".** The unit status will change to **"Waiting for load"**, and after counting down the protection times it will start with the leading parameter **"suction pressure setting"**.

To stop the unit, switch the rocker switch to the **"0"** position, or from the operator panel, go to the on/off tab and select **"OFF"**.

4. User interface structure

The entire user interface can be divided into 7 distinct function blocks:

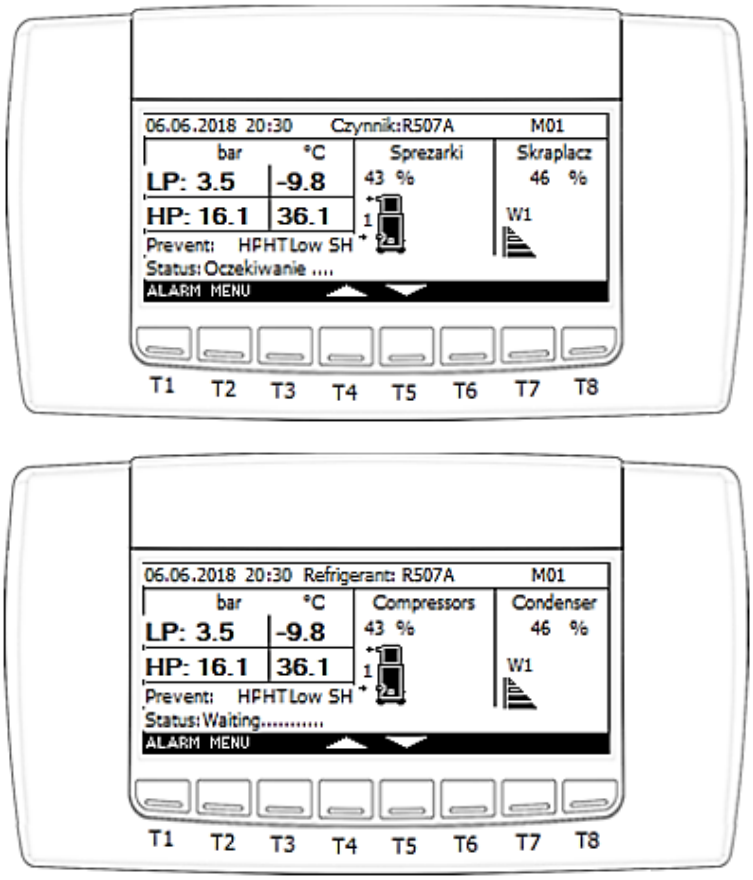
- ***Main status screens*** **(M)** – it is possible to view the current measured values and operating states of individual components of the unit;
- ***Main menu*** **(ME)** – used to navigate through the functionalities of the software;
- ***Menu of items available without passwords*** for any user – enables modification of the clock settings, reading of the I/O status, displaying information screens
- ***Recorder menu*** **(EX)**, where it is possible to export records stored in the controller memory;
- ***Service menu*** – allows access to higher-level parameters;
- ***Manufacturer's menu*** – the highest level of authorization, which guarantees access to all parameters of the program;
- ***Active alarm screens*** and alarm history.

For ease of navigation through the software components, each of the screens available in the user panel has its own identifier, which is located around the top right-hand corner of the active display area.

4.1. Main status screens

The **M01** is the first, but also the main screen of the entire user interface. From that screen you can read the current values of the low and high pressure side, the compressor and condenser fan stage and the

operating status of the unit. Information on the type of refrigerant and the current date and time is also displayed.



Possible values displayed in the “Status” field:

a) **Waiting ……**

The message is reported in the case of a countdown of the protective time needed to start work.

b) **Unit ON**

Indicates normal operation of the unit.

c) **OFF by keyboard**

Indicates that the unit is switched off from the keyboard of the operator panel.

d) **OFF by control switch**

The message is displayed when the unit is switched off by opening the DI1 digital input.

e) **OFF by BMS**

Indicates that the unit is switched off from the level of the superior surveillance system / BMS

f) **Unit OFF Manual mode. / Unit OFF. Manual mode active.**

Active state when the controller inputs / outputs are manually forced.

g) **Unit ON – waiting for load**

Indicates that the unit is waiting for load and that the minimum compressor downtime is counted down.

h) **Unit ON – oil recovery**

Information about the active oil recovery process.

i) **OFF by defrost start signal**

The message is displayed when the device is switched off by shorting the DI10 digital input, configured as a synchronized defrost signal.

j) **Braking….**

Information about the active shutdown process.

k) **Waiting for equalization of pressure**

The message indicates waiting for the pressure equalization before starting the compressor.

l) **OFF by alarm**

Indicates an active alarm that prevents the unit from operating.

m) **Unit ON – Emergency mode!**

This message reports the unit in emergency mode due to an active alarm.

The device will work with a limited, constant performance.

n) **Off – redundant operation mode**

Switch-off information due to redundant operation of networked devices.

The M01 screen also indicates active protection functions, such as:

a) **Prevent HP** – Active protection against excessive condensation pressure increase.

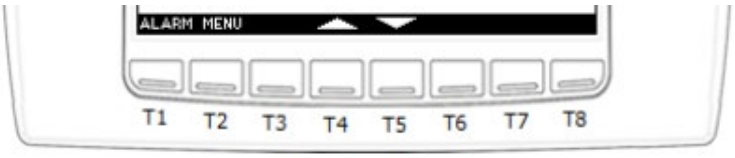
b) **Prevent HT** – Active protection against excessive discharge temperature increase.

c) **Prevent Low SH** – Active protection against too low an overheating on suction.

On each screen, right above the button section, there is an information bar suggesting the current function available for the given button.

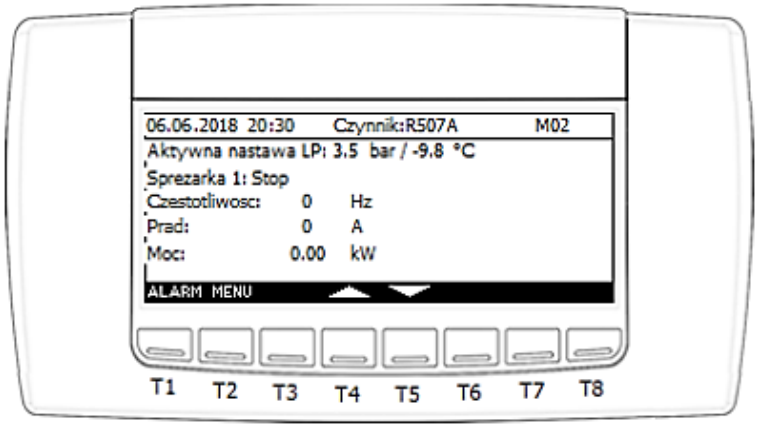
Caution!

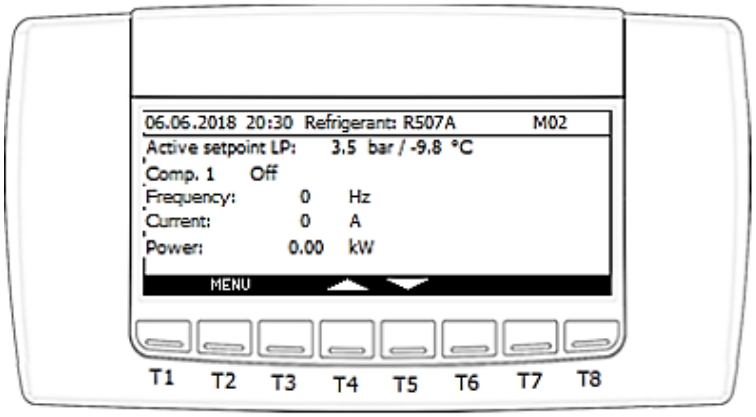
The symbols T1 to T8 used in this manual are for illustrative purposes only and are used for easier interpretation of the function of each button in a given section. There are no such prints on the physical panel.



So in this case, to move to the next available status screen, press the T5 button with a down arrow. Press T4 to return to the previous screen. The main menu can be accessed by pressing T2, while the alarm screen will be displayed by pressing T1.

Other status screens, available by pressing T5:

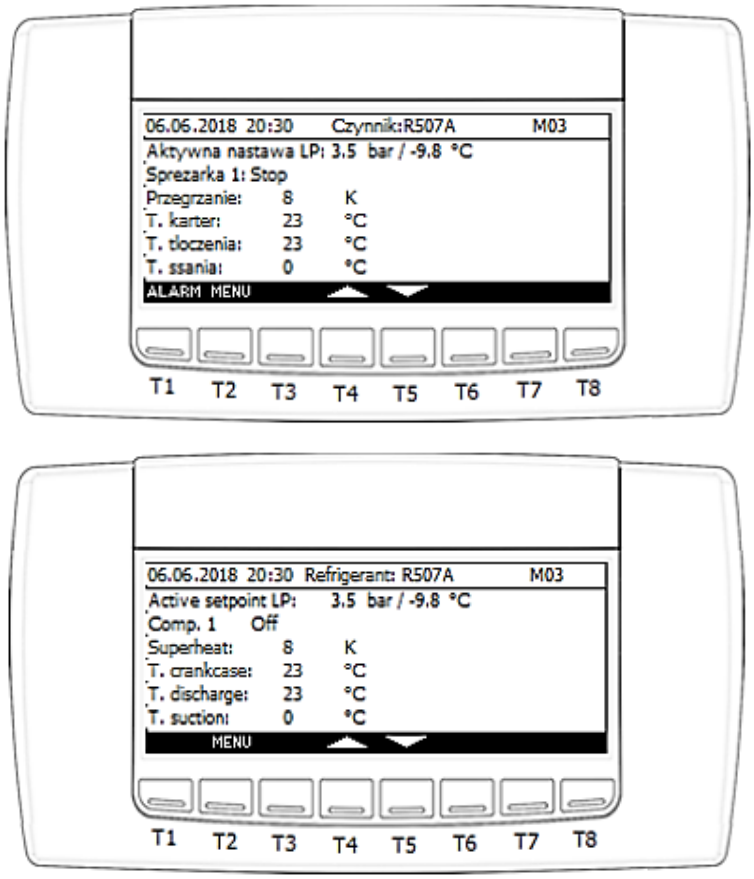




The **M02** screen displays the most important compressor status information, such as:

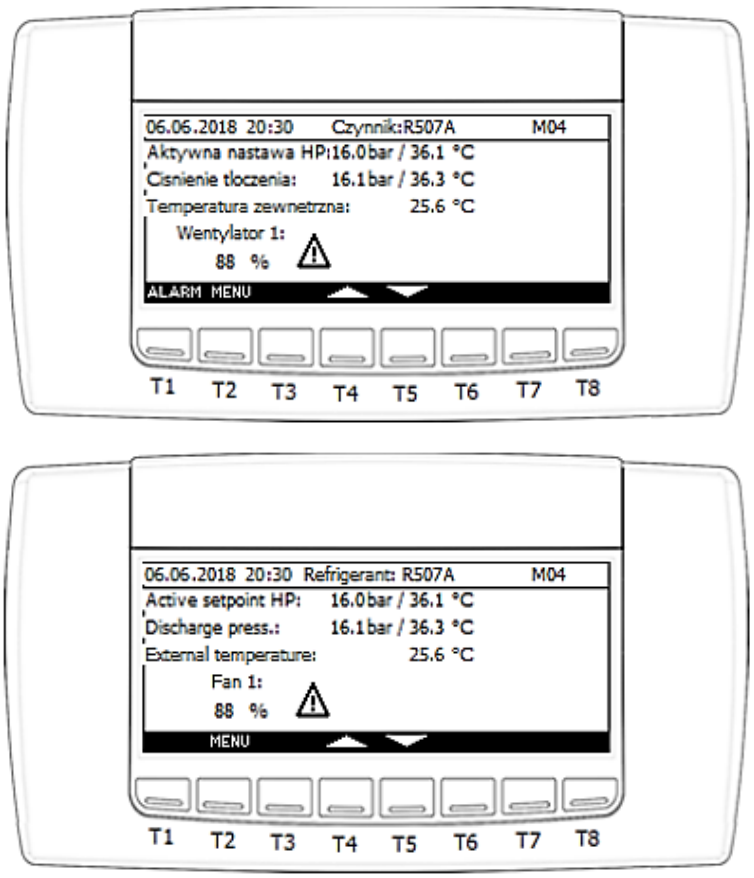
- Current suction pressure setting / Active setpoint LP
- Compressor operating status / Comp. 1. Possible options: (Stop, Operation, Oil heating, Alarm),
- Current output frequency / Frequency

- Current output current / Current
- Current output power / Power



The **M03** screen also displays information such as:

- current suction overheat value,
- compressor crankcase heater,
- discharge temperature,
- suction temperature.

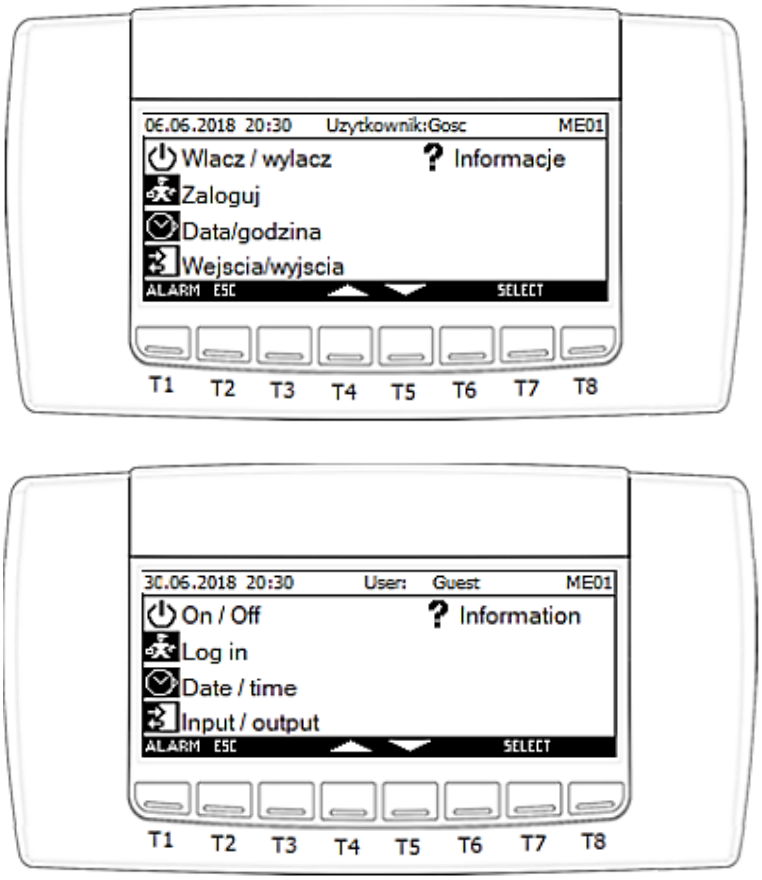


The **M04** screen displays the most important condenser status information, such as:

- current condensation pressure setting,
- current measured value of the condensation pressure,
- external/ambient temperature of the unit,
- fan control expressed in %.
- ⚠ 🔔 the symbols that flash alternately indicate an active alarm.

4.2. Main Menu

The Main Menu can be accessed by pressing the T2 (Menu) button on each screen of the "M0x" group. Then the **ME01** screen will be displayed:



Functions assigned to each button:

T1 – enter the alarm screen,

T2 – exit to the previous screen,

T4 – move the cursor to the field above in the Menu tree,

T5 – move the cursor to the field below in the Menu tree,

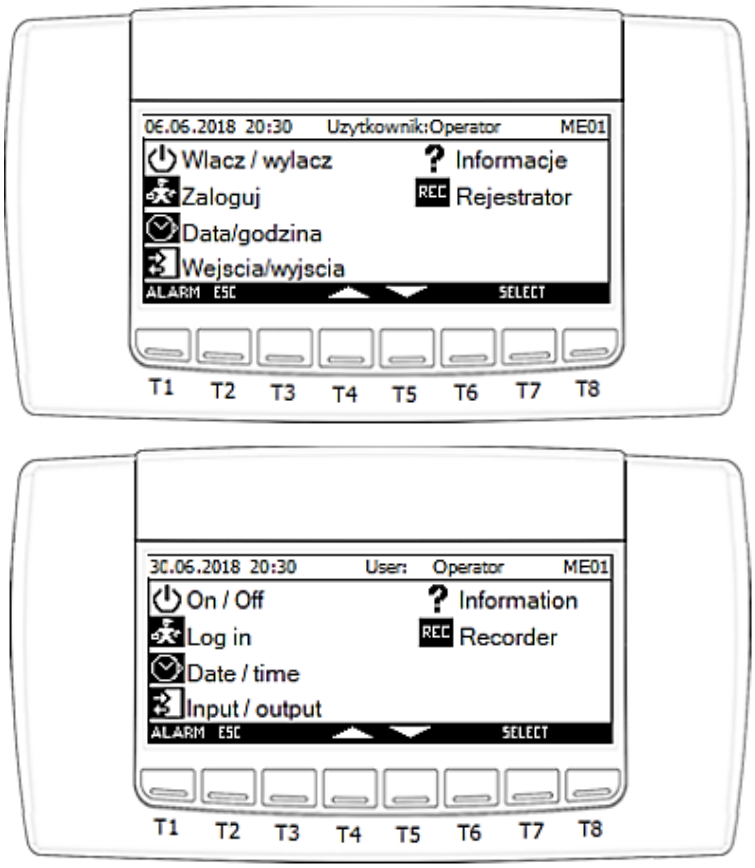
T7 – confirm the selection of the element highlighted by the cursor,

In addition to the date and time, the top bar of the screen also contains information about the current level of authorization. Below is a list of items available for the "Guest" permission level:

- ***"On / Off"*** – open the screenthat enables turning the unit on/off;
- ***"Log in"*** – opens the login screen;

- ***"Date / time"*** – opens the clock settings modification screen;
- ***"Input / output"*** – opens a group of screens indicating current states of physical inputs and outputs of the controller together with measurements of all measured temperatures;
- **"Information"** – opens a screen displaying basic information about the controller software.

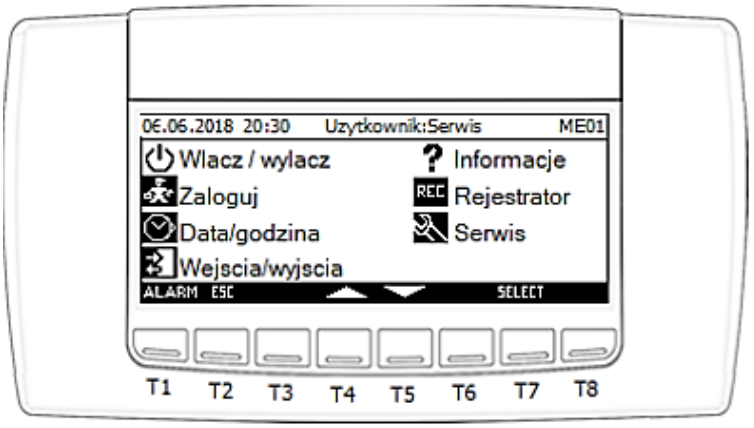
The following screen shows the active additional elements for the "Operator" account:

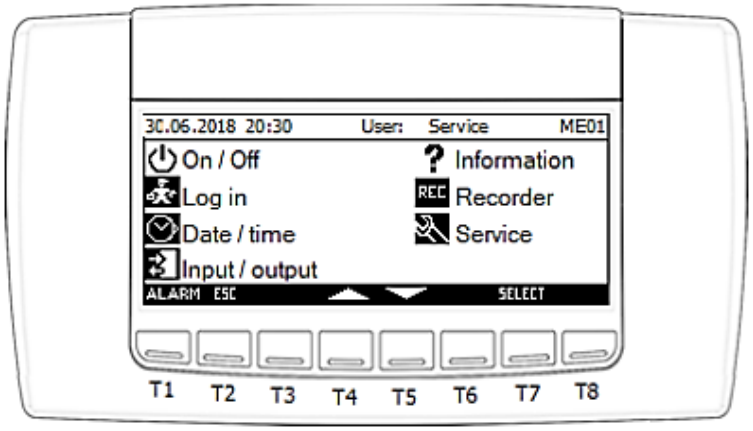


Functions like in the "Guest" account screen, extended by:

- ***"Recorder"*** – opens a screen that allows you to export temperature records to a USB stick.

The following screen shows the active additional elements for the "Service" account:

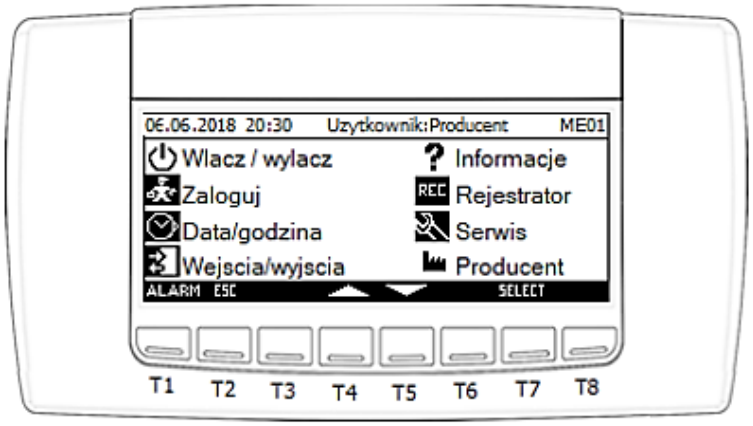


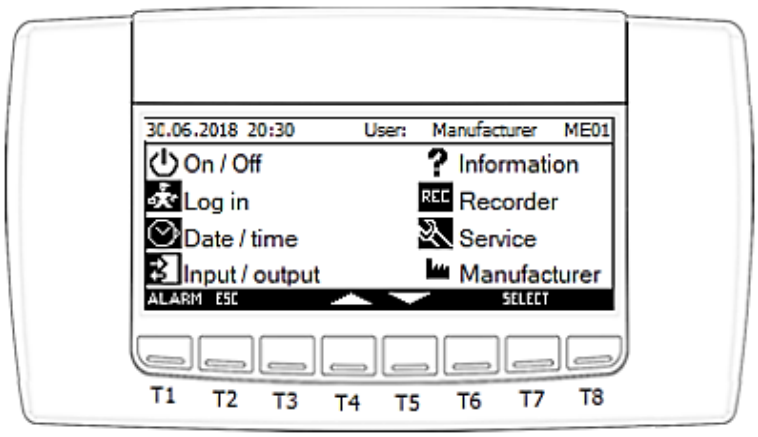


Functions like in the "Operator" account screen, extended by:

- ***"Service"*** – opens the service parameters screen.

The following screen shows the active additional elements for the "Manufacturer" and "Super User" accounts:





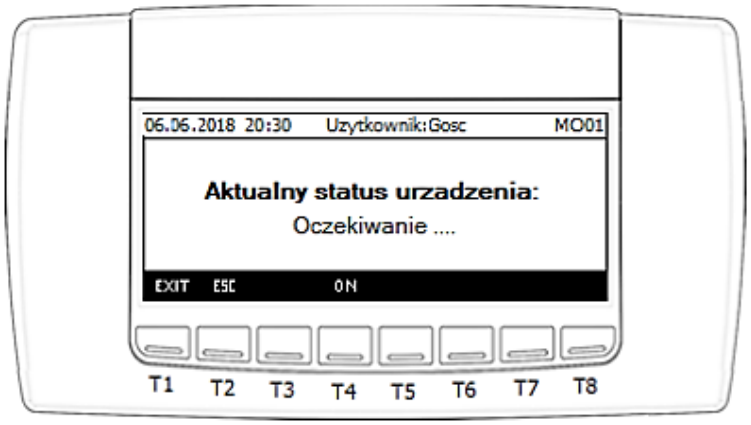
Functions like in the “Service” account screen, extended by:

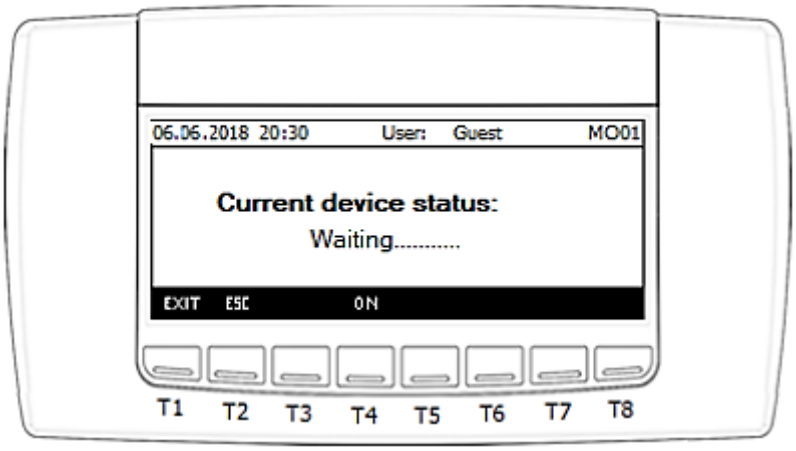
- **“Manufacturer”** – opens a parameter screen accessible only to the device manufacturer.

Navigation between the available options is carried out using the T4 and T5 buttons. The selected item is accessed via the T7 button (“Select”). You can return to the Home Screen by pressing the T2 button (“ESC”). Pressing T1 (“Alarm”) will activate the alarm screen.

4.3. Menu of items available without passwords

When “On / Off” is activated from the **ME01** screen, the **MO01** screen will be displayed to change the current operating status of the unit.





Functions assigned to each button:

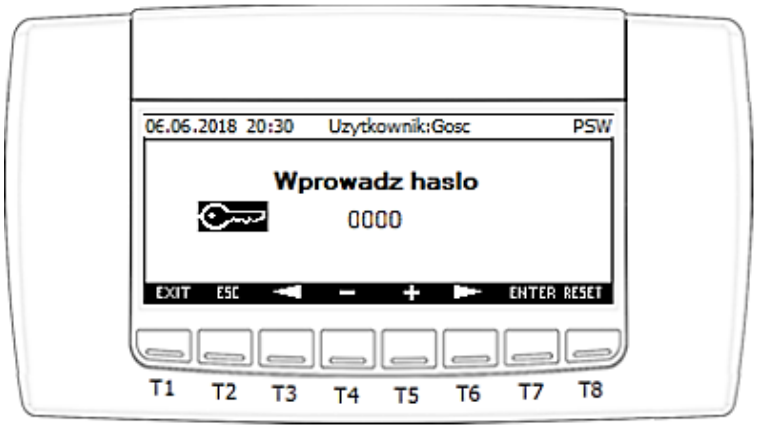
T1 – exit to the main screen,

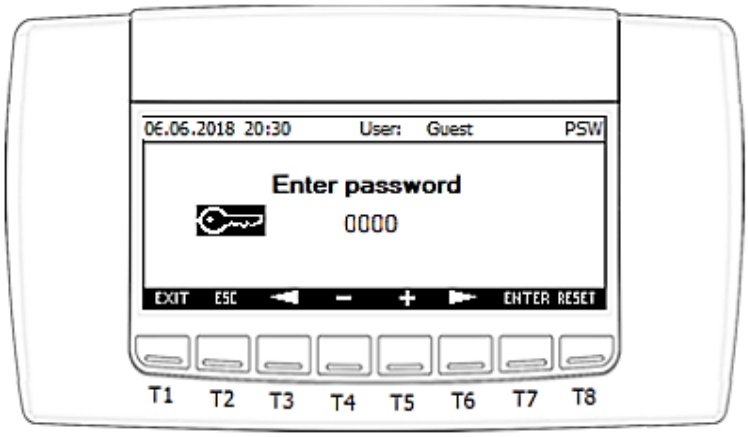
T2 – exit to the previous screen,

T4 – turn on the unit, disabled from the screen level,

T5 – turn off the unit.

When “Log in” option is activated, the **PSW** screen will be displayed to change the current access level:





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – move the cursor to the left,

T4 – decrease the value of the field with the cursor,

T5 – increase the value of the field with the cursor,

T6 – move the cursor to the right,

T7 – confirm the entered number with the password,

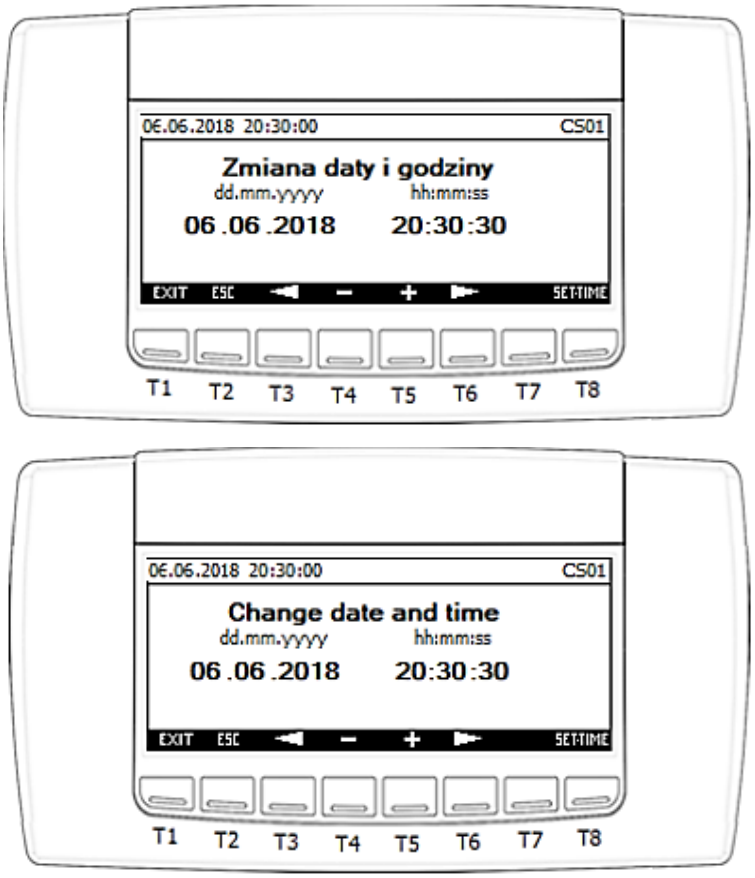
T8 – log off to the “Guest” level.

The following passwords are assigned for each access level:

- Operator = 0022,
- Service = 2016.

If you enter the wrong password, a message with content will be displayed at the bottom of the screen: **“Wrong Password !!!”**. When the correct password is entered, the user name will change at the top of the screen according to the password weight. In addition, at the bottom of the screen you will see a message about the time remaining until the automatic logout.

When the **“Date/Time”** option is activated, the **CS01** screen will be displayed to change the current date and time:



Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – move the cursor to the left,

T4 – decrease the value of the field with the cursor,

T5 – increase the value of the field with the cursor,

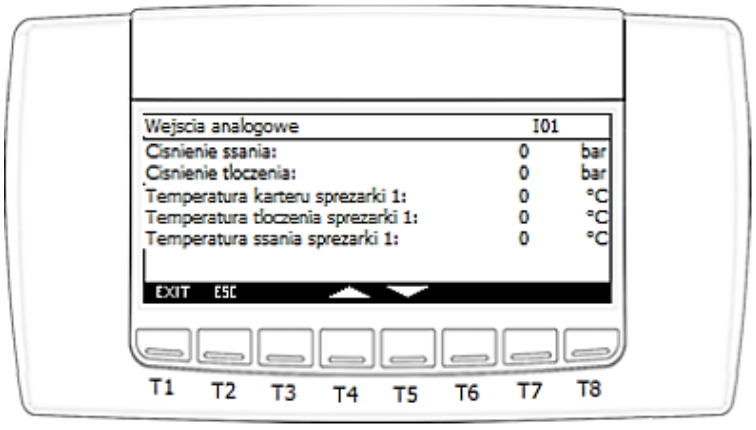
T6 – move the cursor to the right,

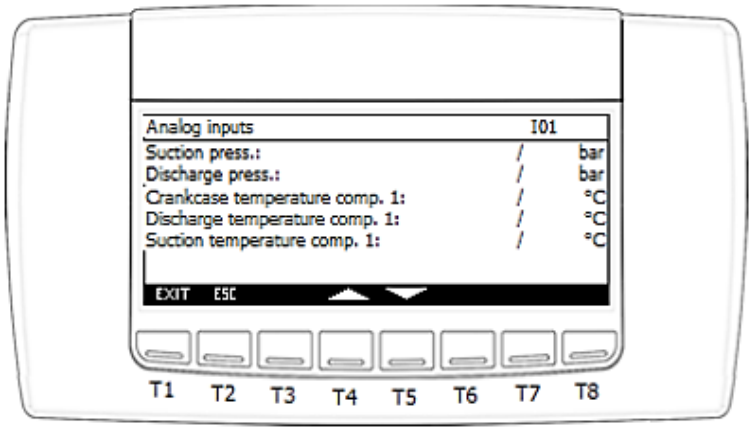
T8 – confirm entering of the new clock values.

Note!

The setting of the current clock values is important, because they are used to build logs and alarms, as well as to activate the quiet night operation of the unit if the type of activation from the RTC clock is selected.

When the “Input / Output” option is activated, a group of screens **“I0x”** starting with **I01** will be displayed, which allows to view measured values and states of individual physical inputs and outputs of the controller.





Functions assigned to each button:

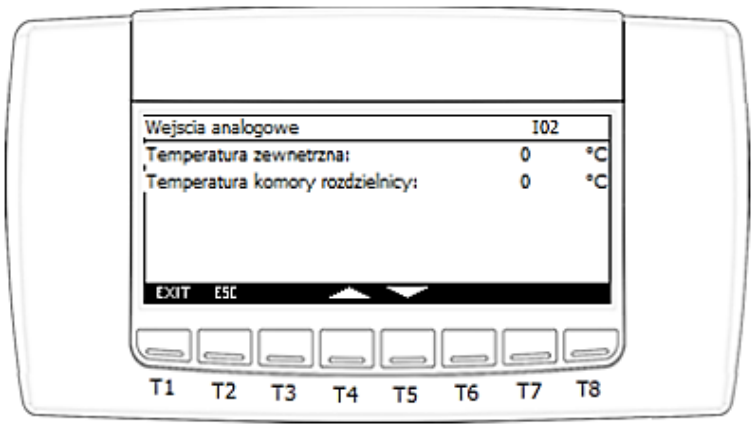
T1 – exit to the main screen,

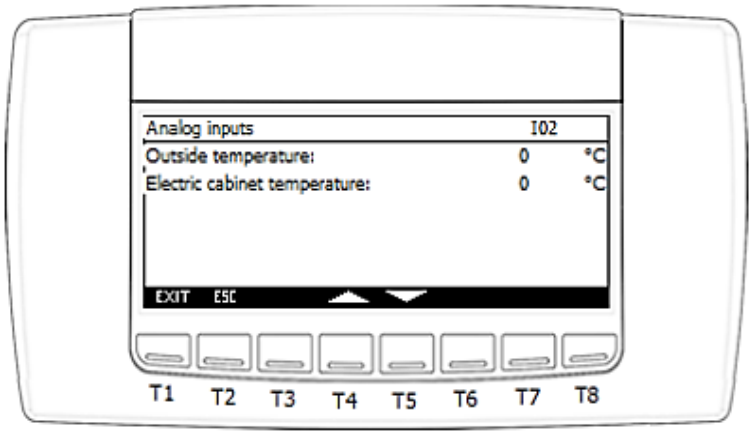
T2 – exit to the previous screen,

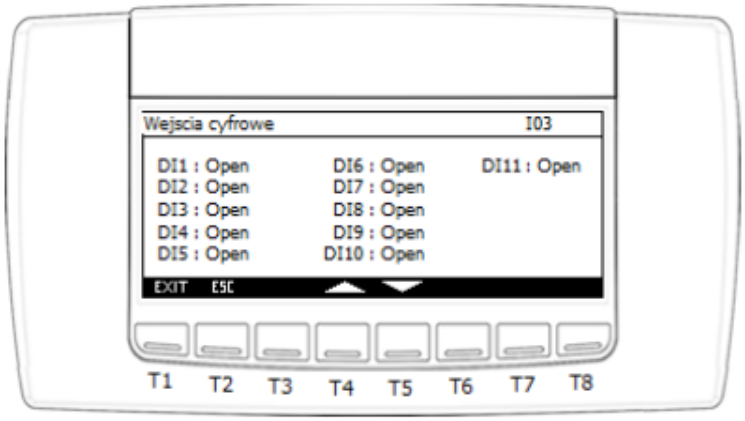
T4 – display the previous screen in a group,

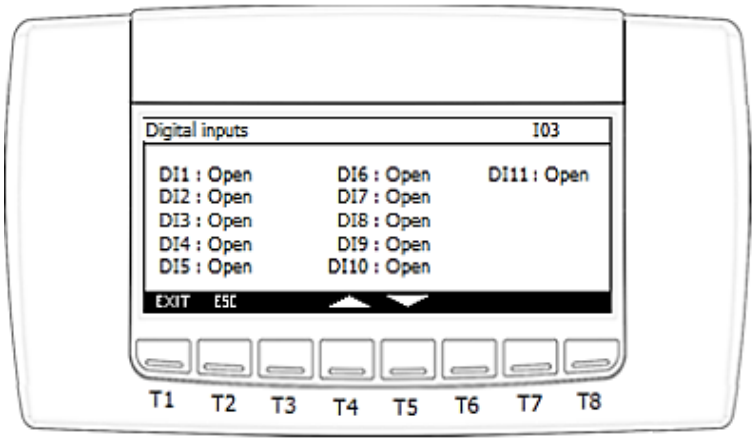
T5 – display the next screen in a group,

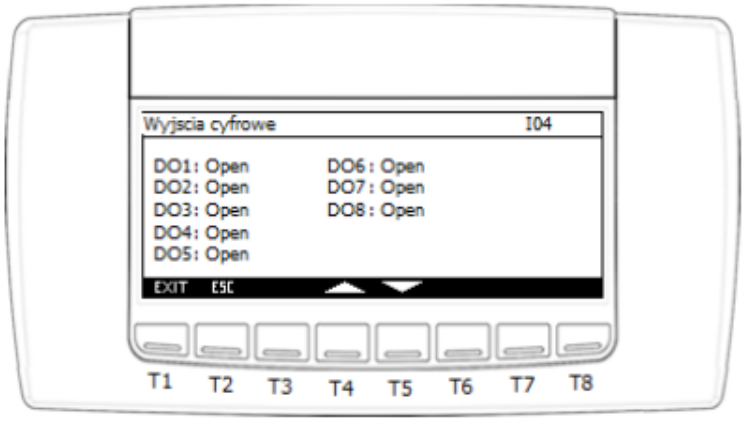
Next screens in the group:

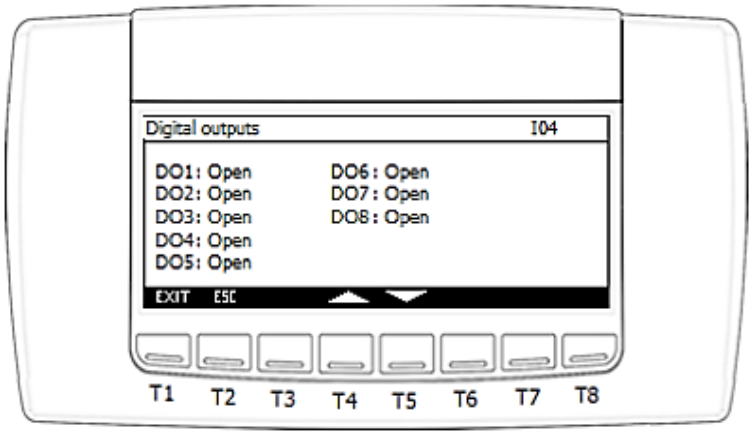

Wejscia analogowe I02
Temperatura zewnetrzna: 0 °C
Temperatura komory rozdzielnicy: 0 °C
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8

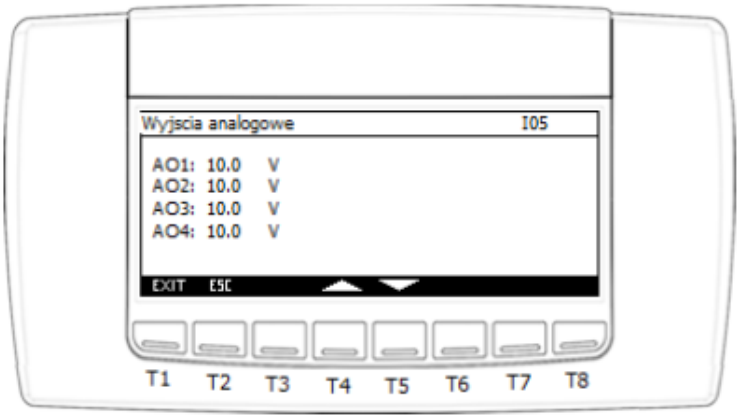

Analog inputs I02
Outside temperature: 0 °C
Electric cabinet temperature: 0 °C
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8

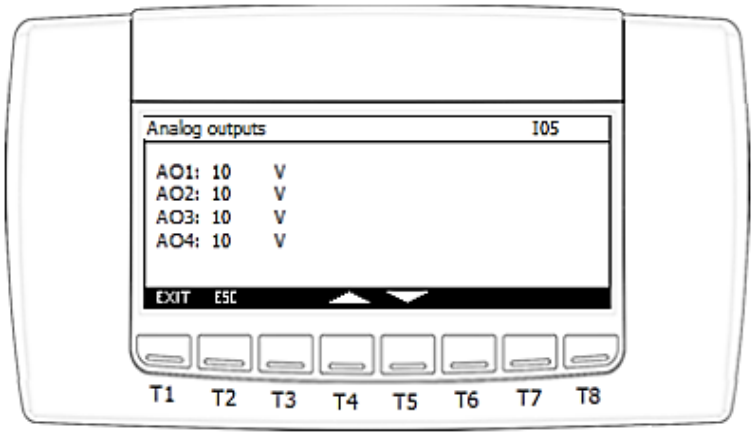

Wejscia cyfrowe I03
DI1 : Open
DI2 : Open
DI3 : Open
DI4 : Open
DI5 : Open
DI6 : Open
DI7 : Open
DI8 : Open
DI9 : Open
DI10 : Open
DI11 : Open
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8


Digital inputs I03
DI1 : Open
DI2 : Open
DI3 : Open
DI4 : Open
DI5 : Open
DI6 : Open
DI7 : Open
DI8 : Open
DI9 : Open
DI10 : Open
DI11 : Open
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8

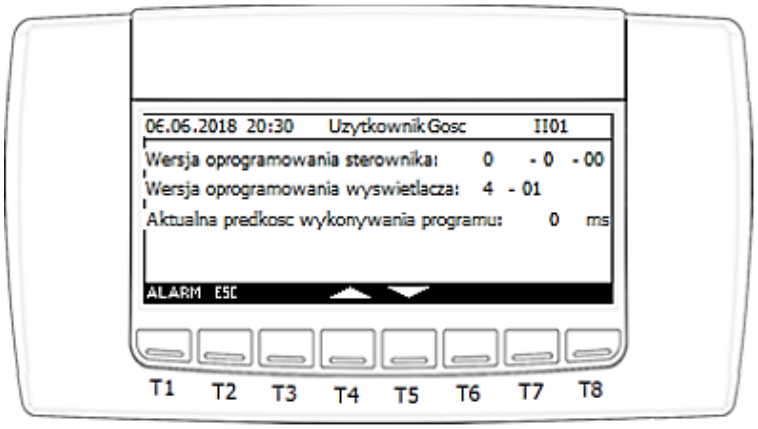

Wyjscia cyfrowe I04
DO1: Open
DO2: Open
DO3: Open
DO4: Open
DO5: Open
DO6 : Open
DO7 : Open
DO8 : Open
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8

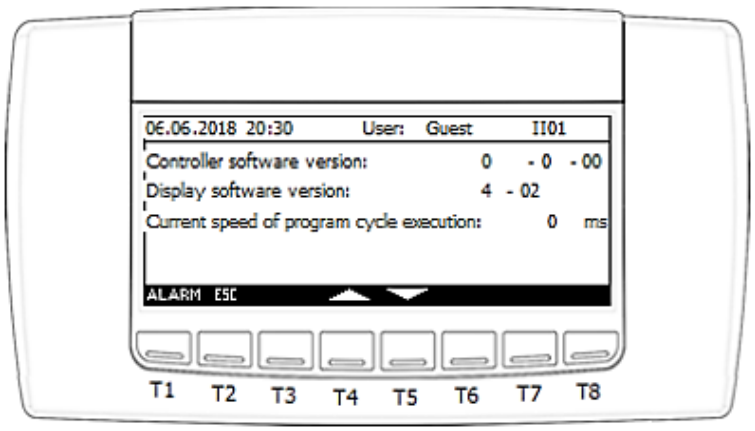

Digital outputs I04
DO1: Open
DO2: Open
DO3: Open
DO4: Open
DO5: Open
DO6 : Open
DO7 : Open
DO8 : Open
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8





After selecting the "Information" option, a group of screens **"II0x"** starting from **II01** will be displayed, which allows you to view the controller's software version, program run time, information about the current configuration of the IP address, RS485 port and indication of operating hours counters.





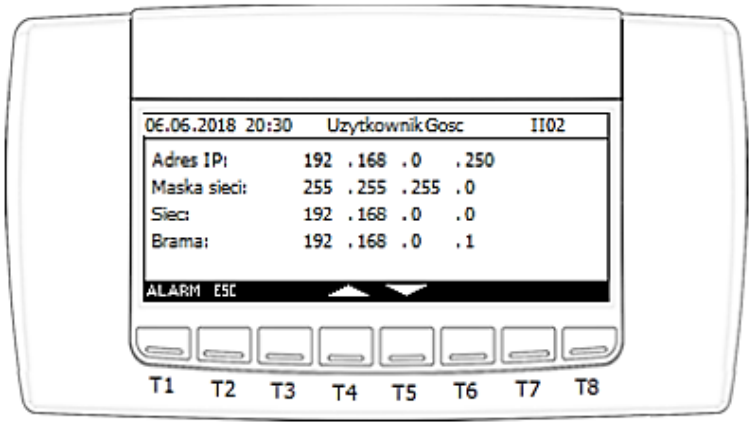
Functions assigned to each button:

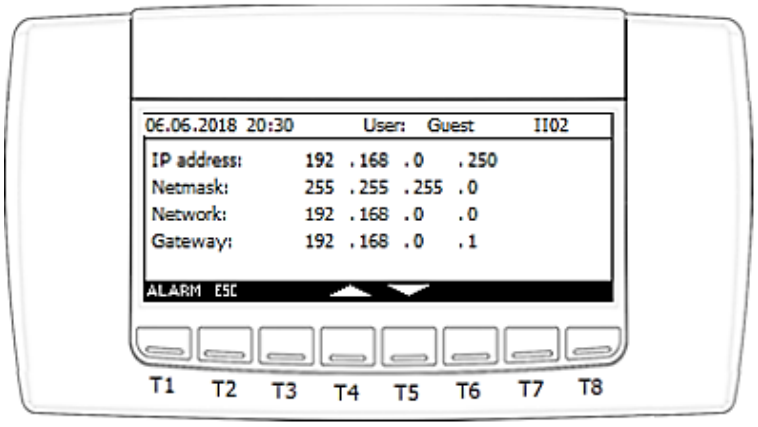
T1 – exit to the main screen,

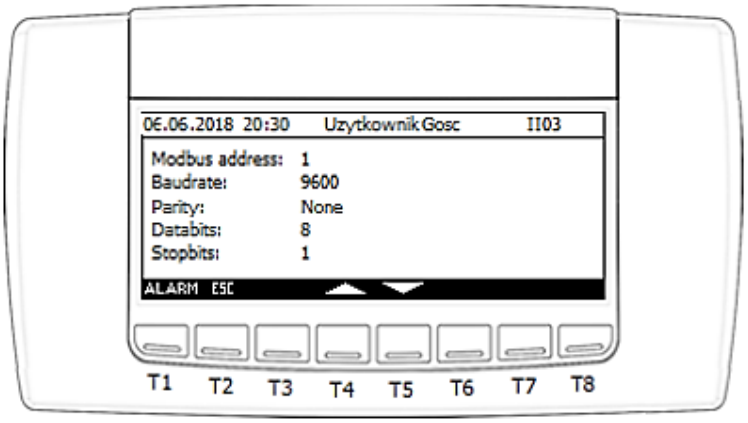
T2 – exit to the previous screen,

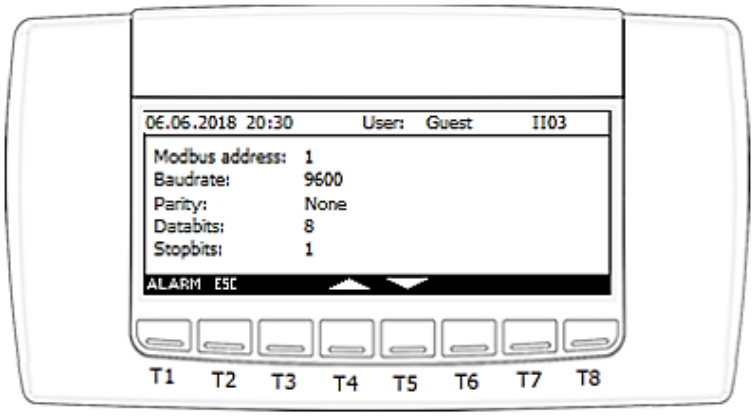
T4 – display the previous screen in a group,

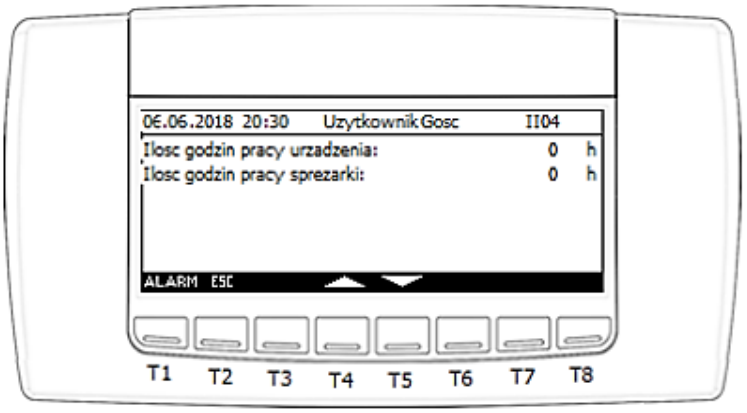
T5 – display the next screen in a group.

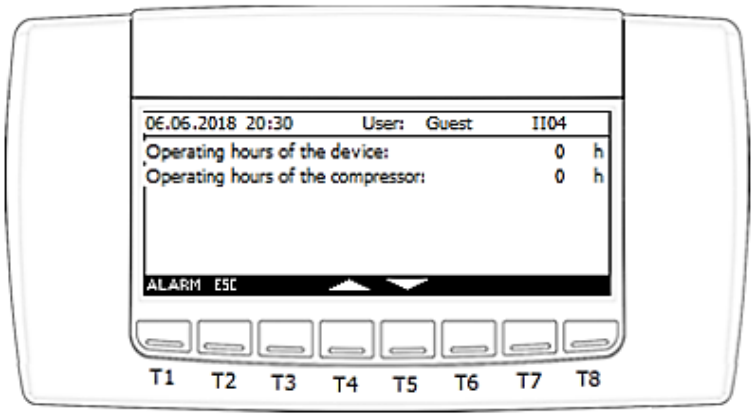





06.06.2018 20:30 Uzytkownik Gosc II03
Modbus address: 1
Baudrate: 9600
Parity: None
Databits: 8
Stopbits: 1
ALARM ESC
T1 T2 T3 T4 T5 T6 T7 T8


06.06.2018 20:30 User: Guest II03
Modbus address: 1
Baudrate: 9600
Parity: None
Databits: 8
Stopbits: 1
ALARM ESC
T1 T2 T3 T4 T5 T6 T7 T8

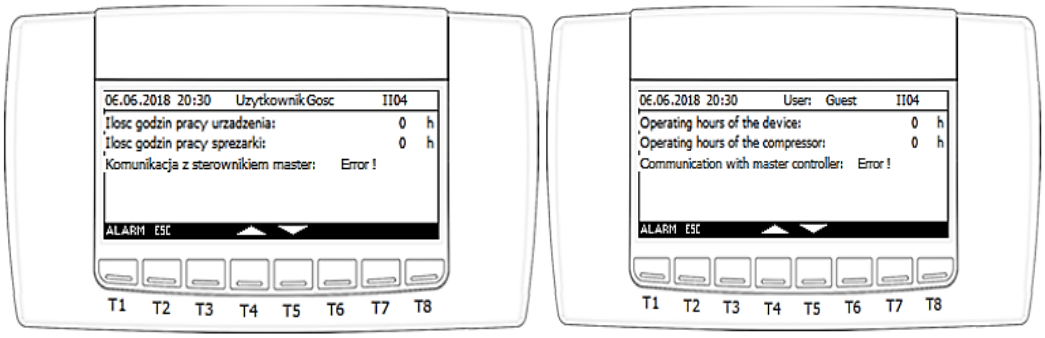

06.06.2018 20:30 Uzytkownik Gosc II04
Ilosc godzin pracy urzadzenia: 0 h
Ilosc godzin pracy sprezarki: 0 h
ALARM ESC
T1 T2 T3 T4 T5 T6 T7 T8



Caution!

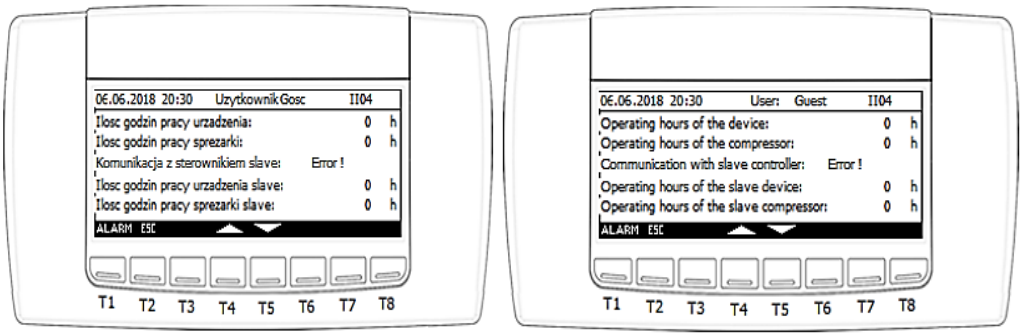
For a device with configured redundant operation, additional information will be displayed on screen II04 to diagnose the communication between the units.

For the slave unit:



The visible field “Communication with master controller” can take the value “Error!”, which means no communication and “OK”, which means correct communication. The field has a built-in 5-second filter.

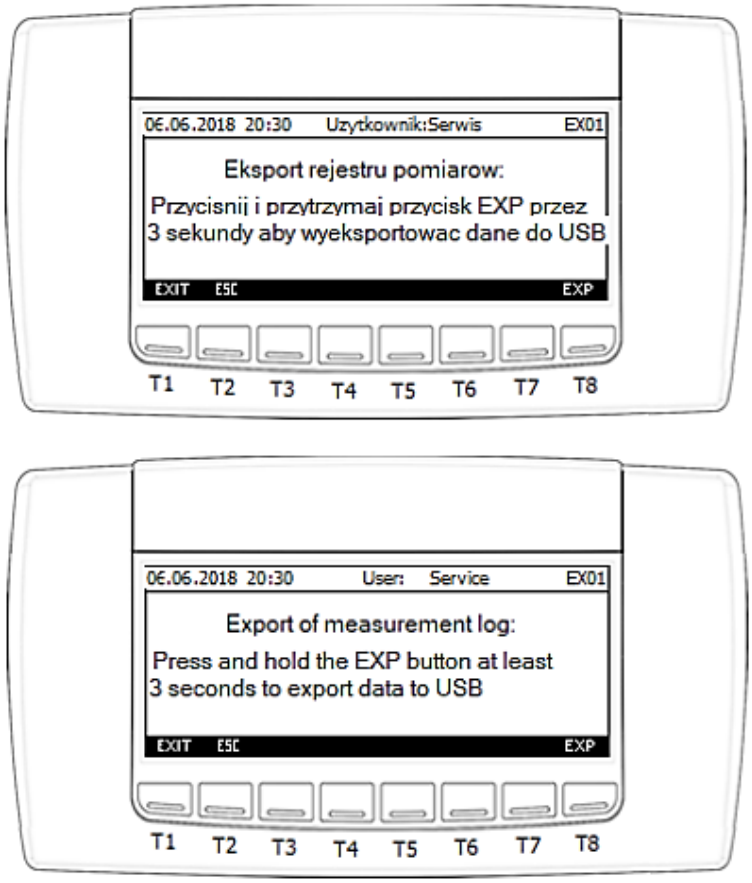
For the master unit:



The unit configured as “master” is also able to read the operating hour meters of the unit configured as “slave”.

4.4. Recorder menu

When “Recorder” option is activated, “EX01” screen will be displayed , which allows you to export data stored in the driver's memory to the USB drive.



Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T8 – held for about 3 seconds will start the data export procedure.

When the export procedure is started, a message will appear at the bottom of the screen indicating whether the procedure was successful or not.

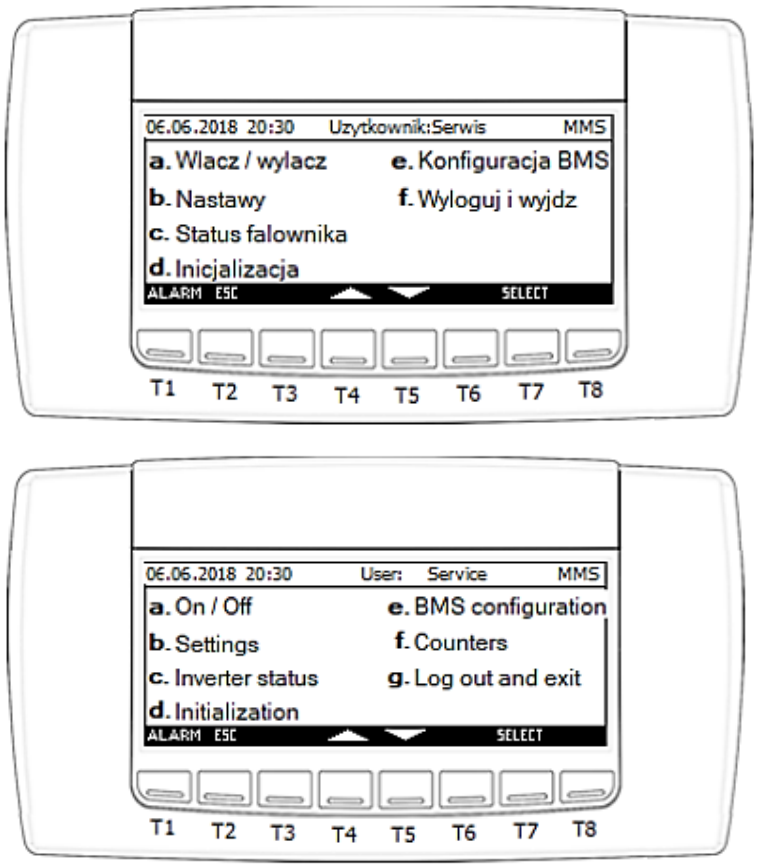
Possible messages:

EXPORT ERROR – export error. Check if a portable drive is inserted in the USB port of the controller and if it is not write-protected or full;

EXPORT FINISHED – export completed correctly. The file named "Data_Record" has been saved on a portable drive.

4.5. Service menu

When the "Service" option is activated, the "MMS" screen will appear, which is also the main Service menu.



Functions assigned to each button:

T1 – enter the alarm screen,

T2 – exit to the previous screen,

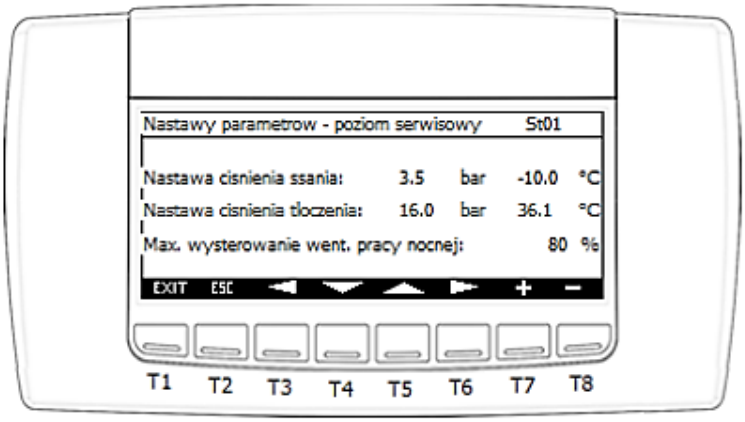
T4 – move the cursor to the field above in the Menu tree,

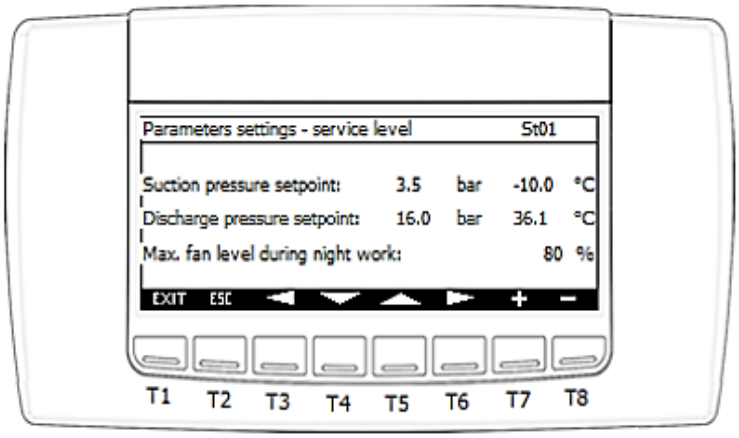
T5 – move the cursor to the field below in the Menu tree,

T7 – confirm the selection of the element highlighted by the cursor,

a) Selecting the “On/Off” field takes you to the “MO01” screen, with the same functionality as in the Main Menu.

b) When the “Settings” option is activated, the screen group “St0x” will be displayed, starting from screen St01:





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – return to the previous screen inside the “St0x” screen section,

T4 – move the cursor to the next field,

T5 – move the cursor to the previous field,

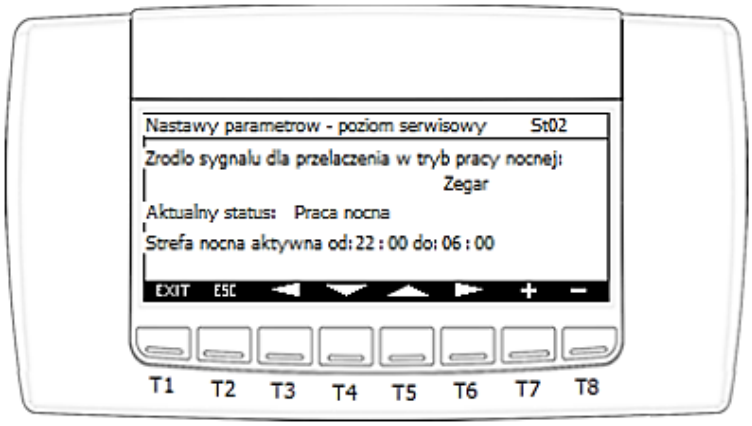
T6 – move to the next screen inside the “St0x” screen section,

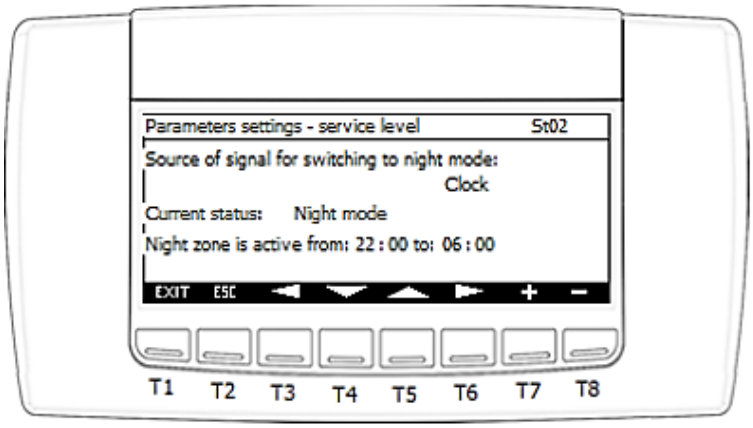
T7 – increase the value of the field with the active cursor,

T8 – decrease the value of the field with the active cursor.

St01 screen parameters:

- Suction pressure setpoint
- Discharge pressure setpoint
- Max. fan level during night work





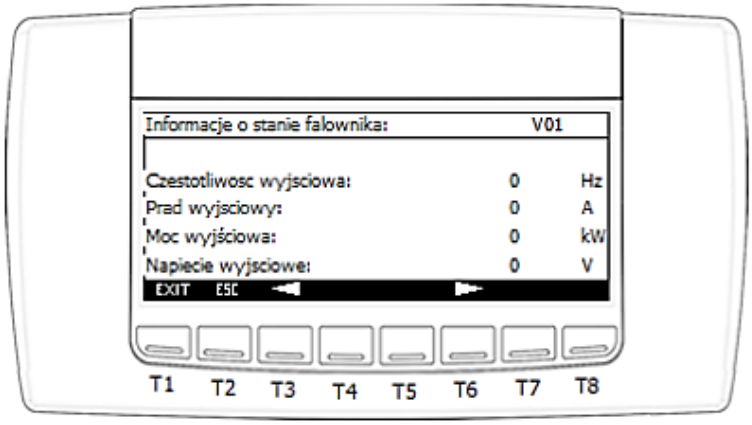
St02 screen parameters:

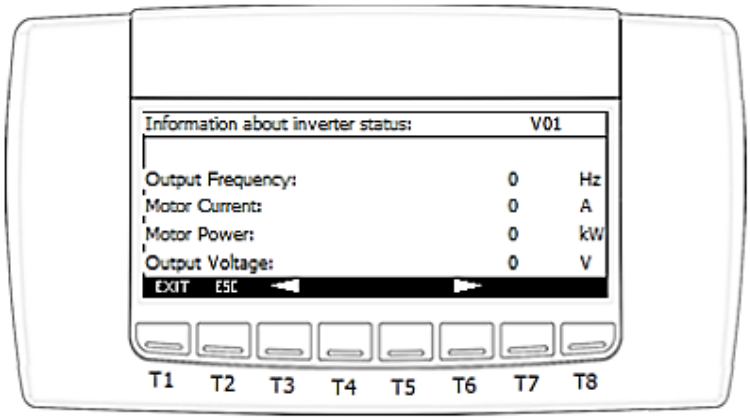
- Source of signal for switching to night mode
  - Digital input – digital input of Di6 controller
  - Clock – locally configured time zones
  - BMS – calling the night-time operation from the surveillance system /BMS
- Information on the current status of the night-time function:
  - Normal mode

- Night mode

- Night zone is active from … to …: - Local configuration of night time zones in relation to the controller's clock indications.

c) When you select the “Inverter status” option, a group of screens “V0x” is displayed starting with V01 screen containing information read directly from the communication registers of the inverter:





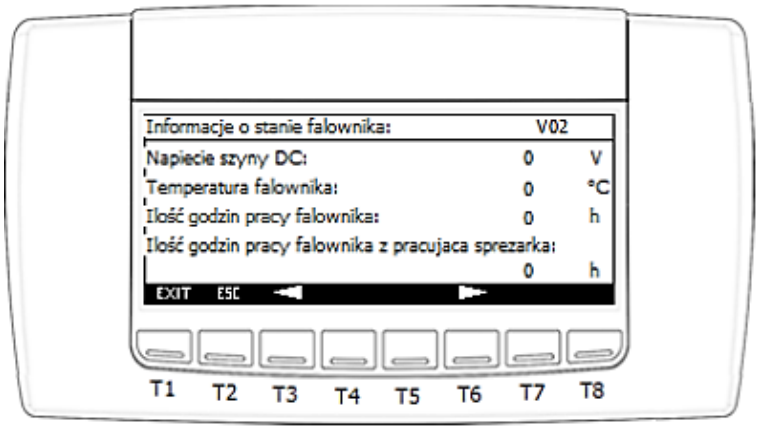
Functions assigned to each button:

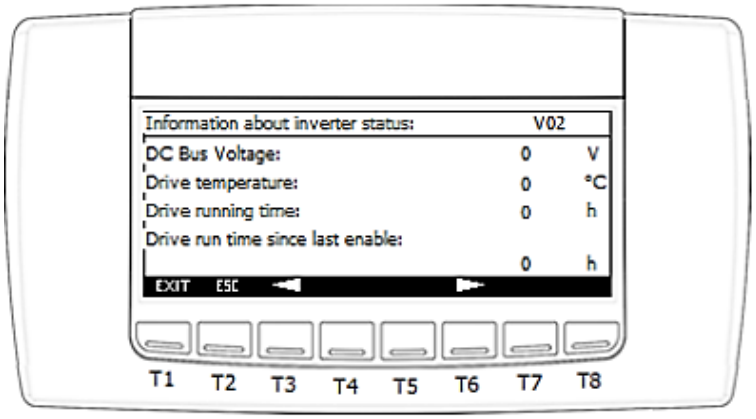
T1 – exit to the main screen,

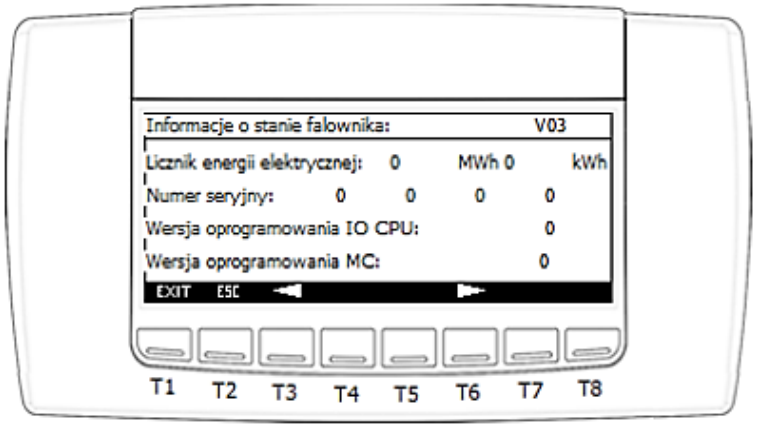
T2 – exit to the previous screen,

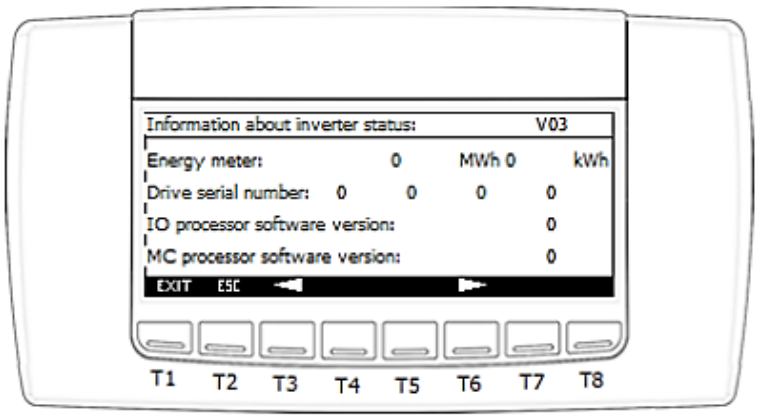
T3 – return to the previous screen inside the “V0x” screen section,

T6 – move to the next screen inside the “V0x” screen section,

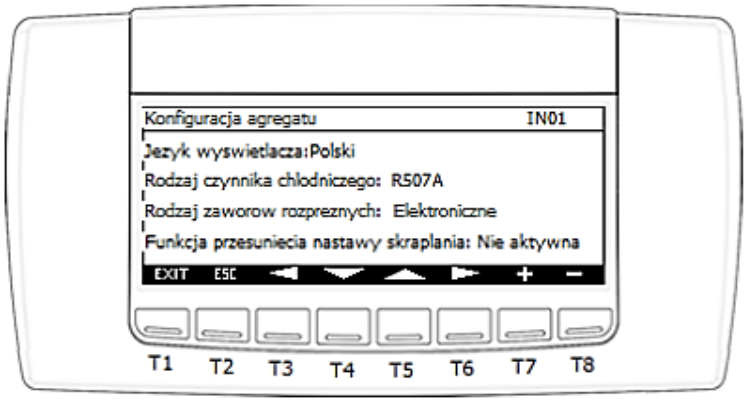

Informacje o stanie falownika: V02
Napiecie szyny DC: 0 V
Temperatura falownika: 0 °C
Ilość godzin pracy falownika: 0 h
Ilość godzin pracy falownika z pracujaca sprezarka:
0 h
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8

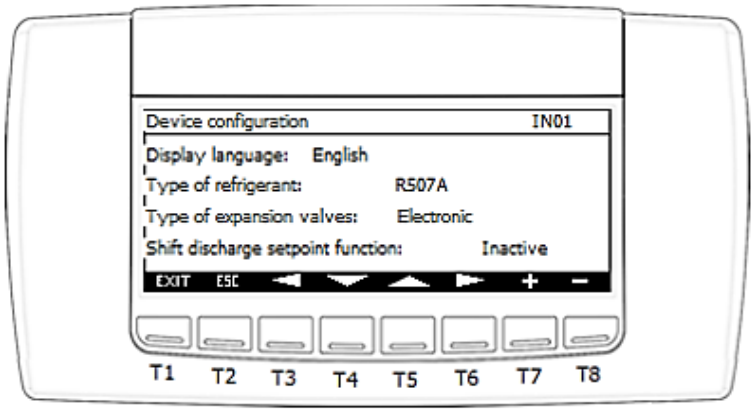

Information about inverter status: V02
DC Bus Voltage: 0 V
Drive temperature: 0 °C
Drive running time: 0 h
Drive run time since last enable:
0 h
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8


Informacje o stanie falownika: V03
Licznik energii elektrycznej: 0 MWh 0 kWh
Numer seryjny: 0 0 0 0
Wersja oprogramowania IO CPU: 0
Wersja oprogramowania MC: 0
EXIT ESC
T1 T2 T3 T4 T5 T6 T7 T8



d) When the "Initialization" option is selected, a group of screens "IN0x" starting with screen IN01 will be displayed, responsible for basic unit configuration.





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – return to the previous screen inside the “IN0x” screen section,

T4 – move the cursor to the next field,

T5 – move the cursor to the previous field,

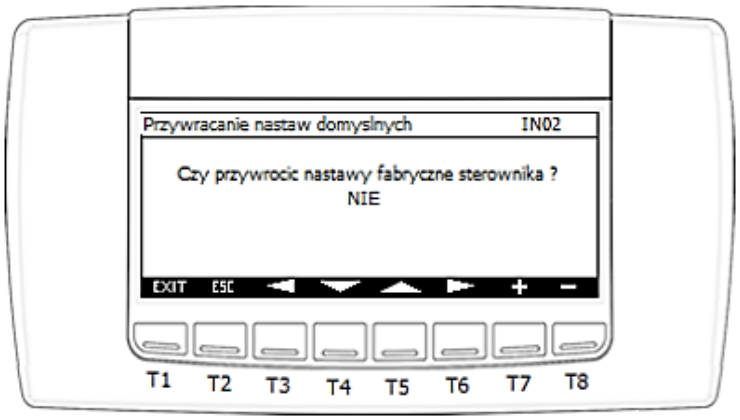
T6 – move to the next screen inside the “IN0x” screen section,

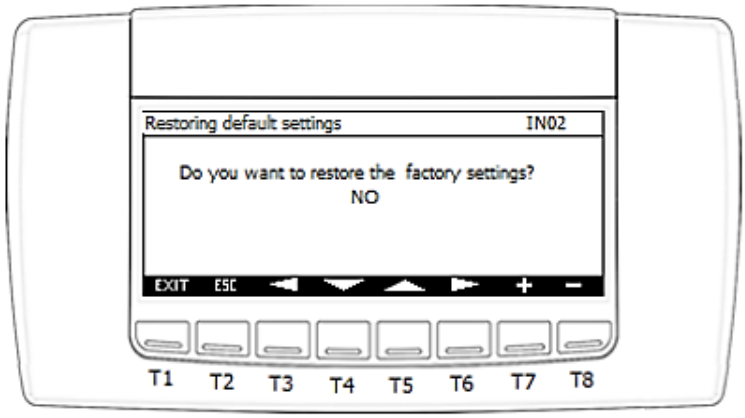
T7 – increase the value of the field with the active cursor,

T8 – decrease the value of the field with the active cursor.

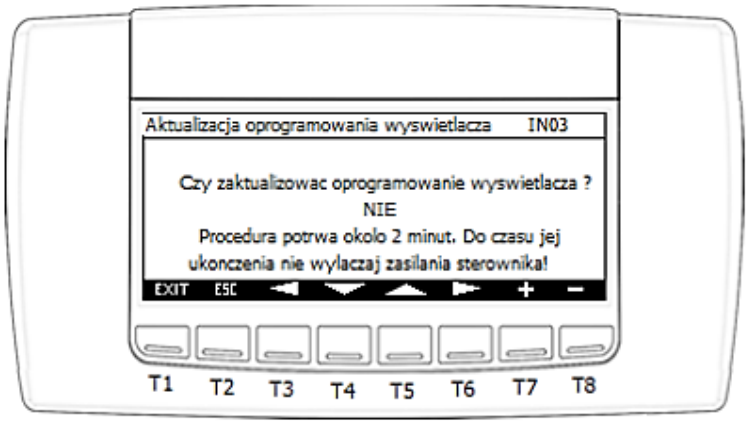
IN01 screen parameters:

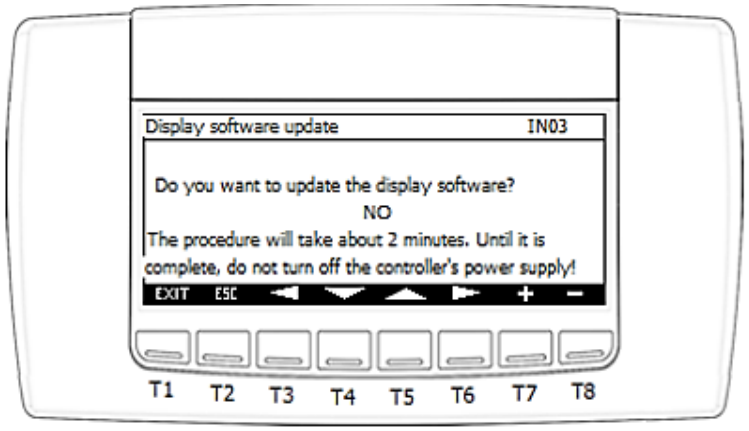
- Display language – allows you to change the language of the display text labels.
- Type of refrigerant – select the refrigerant from the list available for the type and configuration of the unit.
- Type of expansion valves – select the valve type from the list:
  - Thermostatic,
  - Electronic,
  - Mixed,
- Shift discharge setpoint function – select: “Inactive” or “Active”.





Screen IN02 responsible for resetting user parameters to factory settings. Parameters from the manufacturer level will not be modified in this case. The communication port configuration will not be modified.

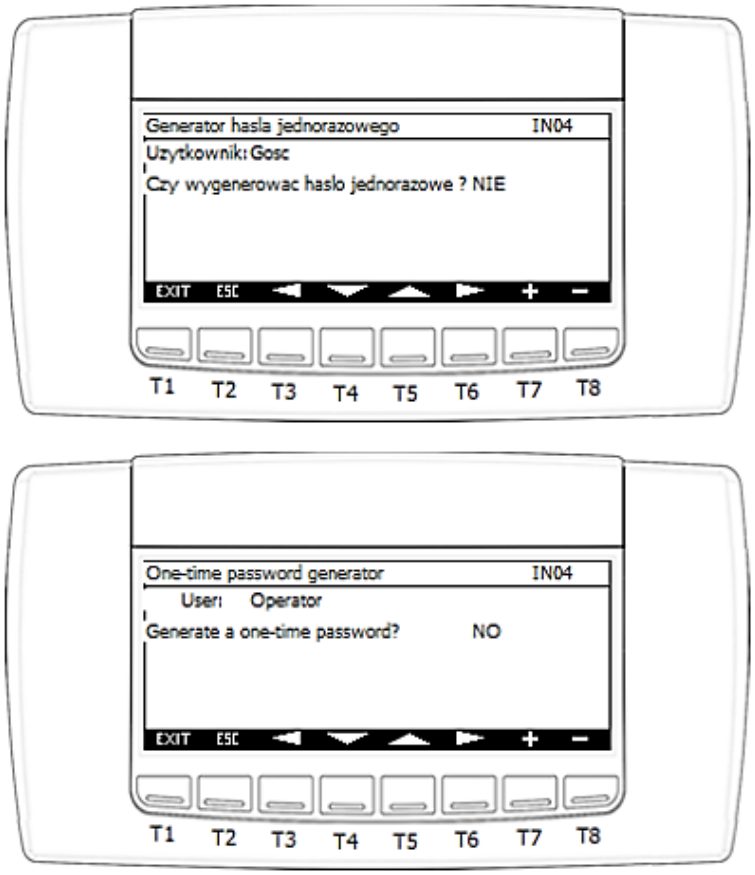




Screen IN03 is responsible for updating the display software from the driver's memory or USB drive.

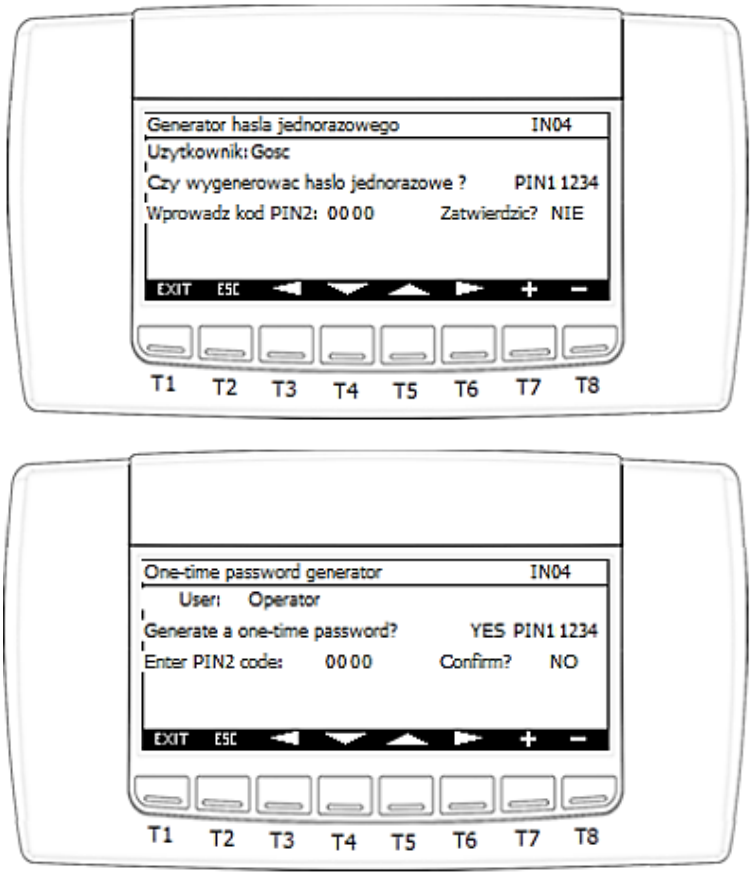
CAUTION!

During the display software update procedure, care must be taken to ensure that the controller power supply is not switched off. This may result in the need to send the display to a service center to restore the original factory program image.



Screen IN04 is responsible for generating a one-time access password to the “Manufacturer” level.

When you move the cursor to the check box and change from **NO** to **YES**, PIN1 will be generated and displayed as follows:

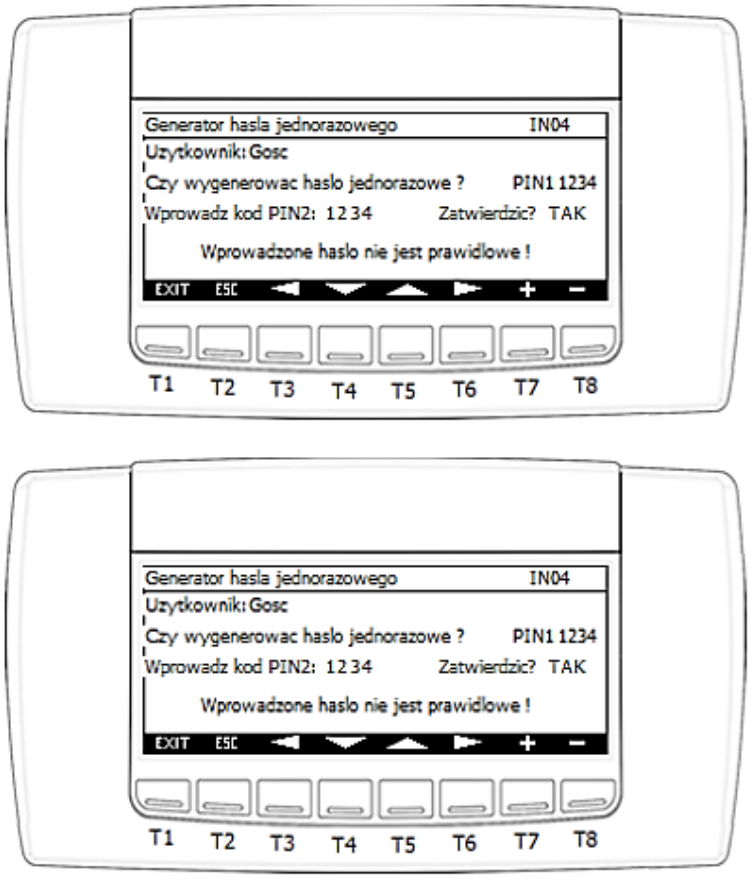


Enter the PIN2 code and confirm in the “Confirm” field by changing from **NO** to **YES**.

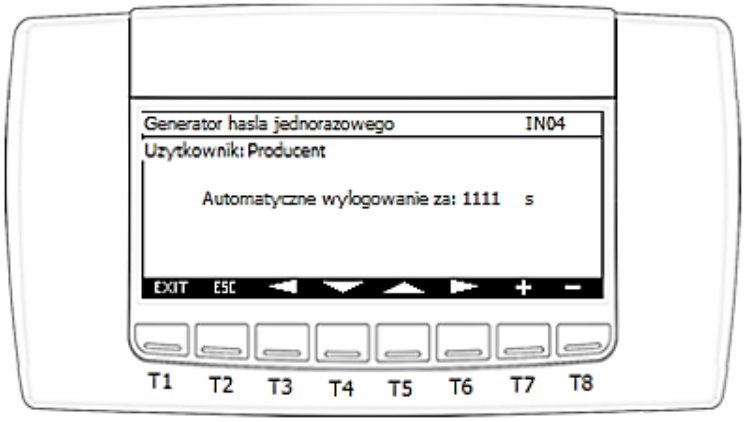
CAUTION!

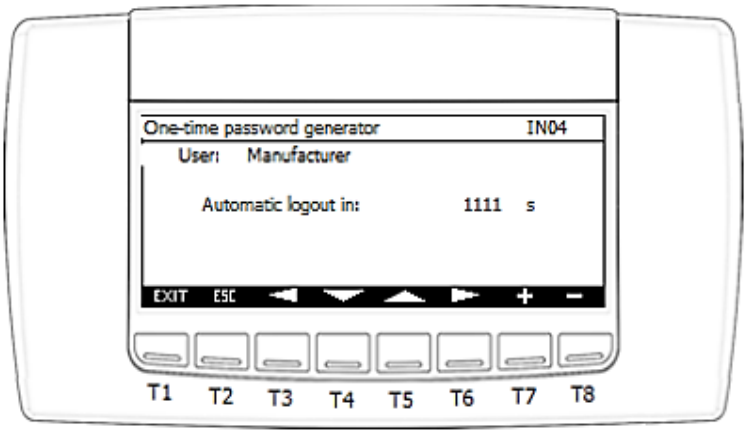
The PIN2 code should be obtained from the manufacturer (IGLOO) after contacting the service department by phone and entered as PIN 2.

If you enter an incorrect code, the following message will be displayed:

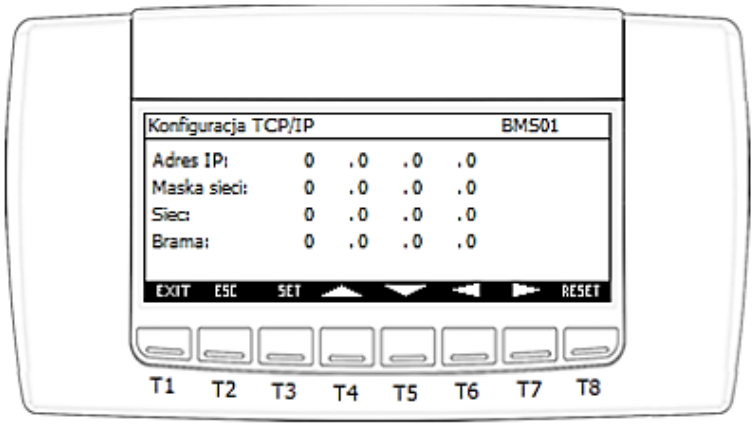


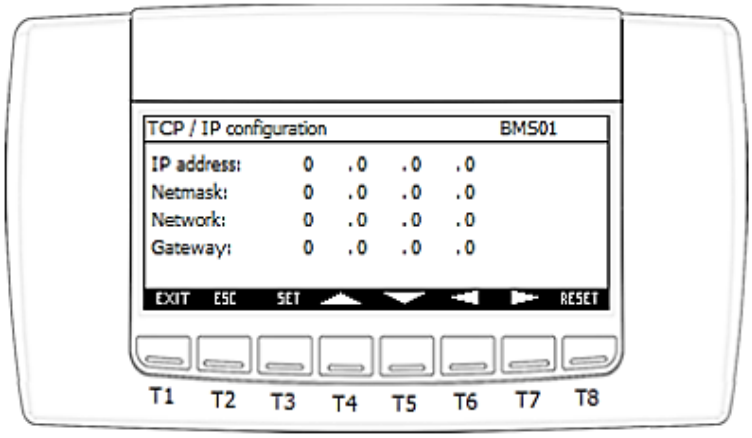
After entering the correct code, a message will be displayed about the time remaining until the automatic logout, and the user name will be changed to SUPER USER, and the manufacturer's parameters will be accessed.





e) When “BMS Configuration” option is activated, a group of “BMS0x” screens will be displayed starting with BMS01, responsible for the configuration of communication ports and support for the parent system / BMS.





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – edit the value of the field with the cursor,

T4 – move the cursor to the next field and increase the value of the field with the cursor,

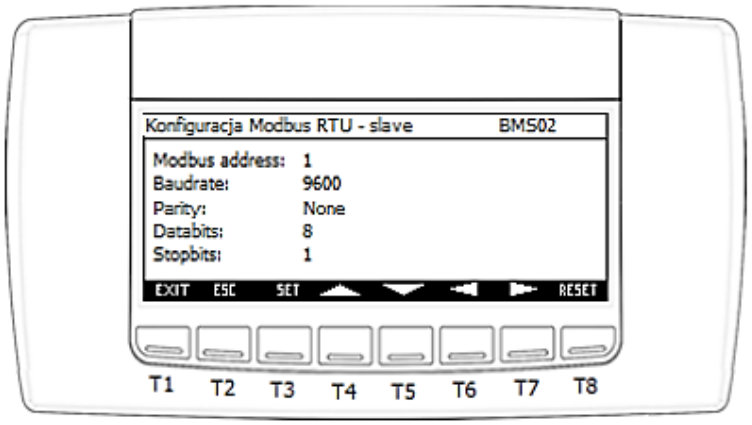
T5 – move the cursor to the previous field and decrease the value of the field with the cursor,

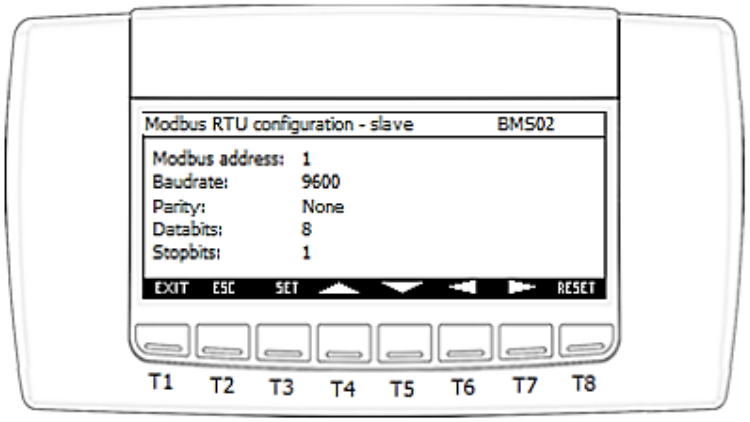
T6 – return to the previous screen inside the “BMS0x” screen section,

T7 – move to the next screen inside the “BMS0x” screen section,

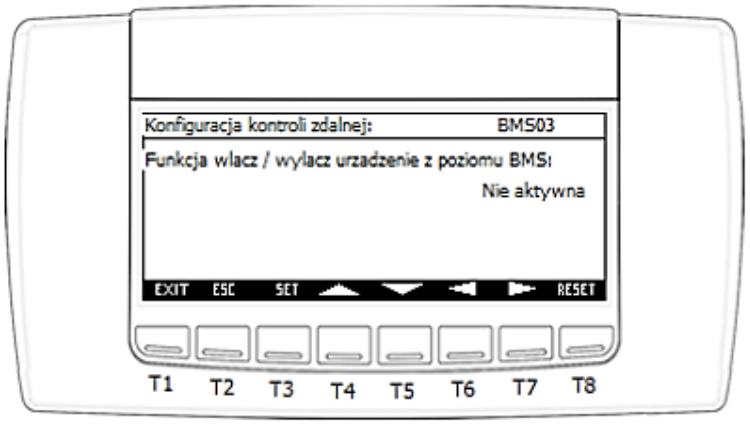
T8 – restart the controller.

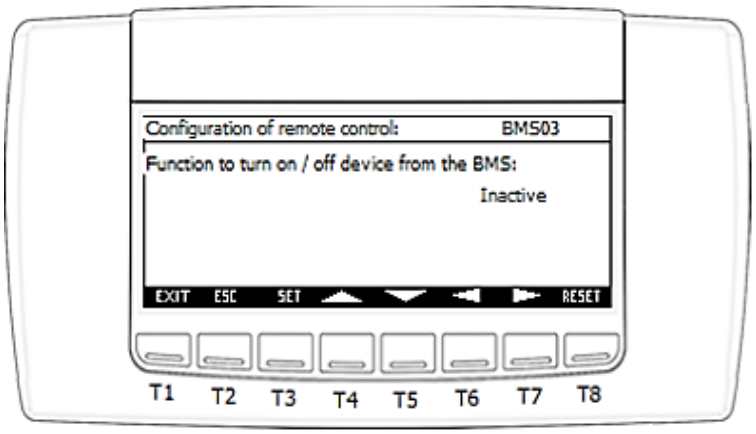
Screen BMS01 is responsible for the address setting for the TCP/IP network card that supports Modbus TCP/IP.





Screen BMS02 is responsible for setting the address of the RS485 slave port, responsible for communication over the Modbus RTU protocol.

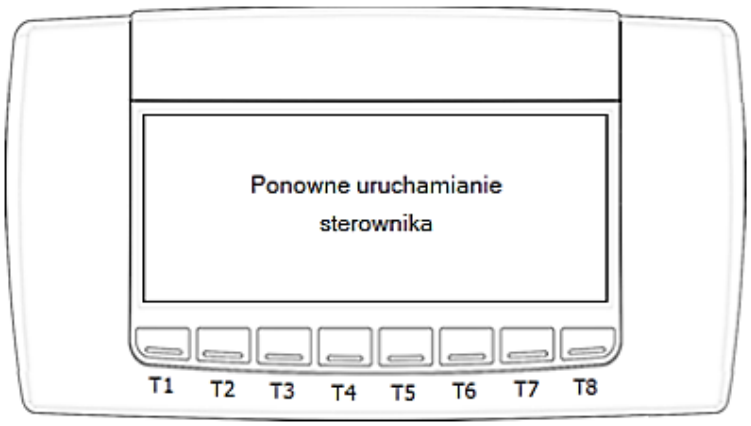


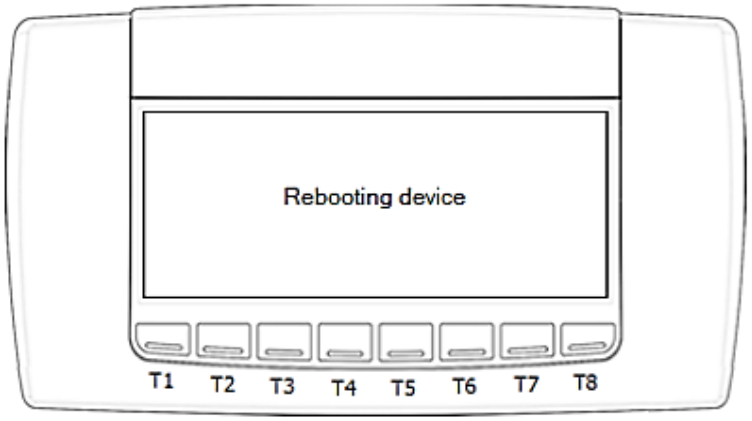


Screen BMS03 is responsible for activating / deactivating the functionality of activating / deactivating the device through the supervision system / BMS.

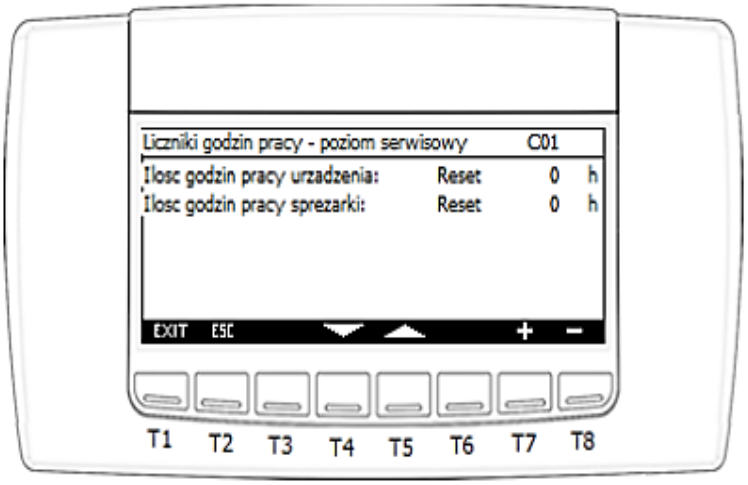
CAUTION!

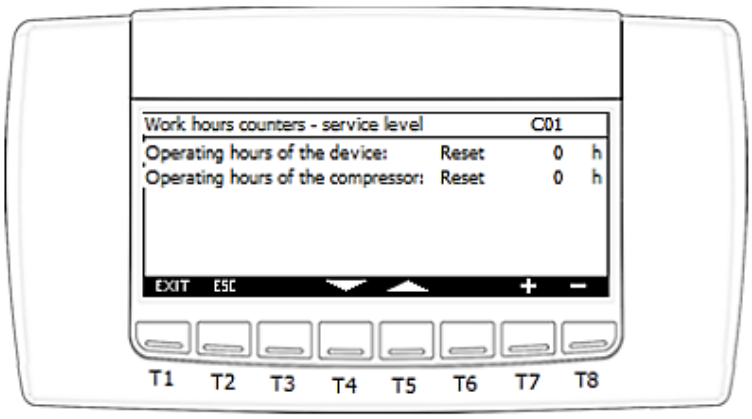
After each change of any parameter from the BMS section, it is required to restart the controller. This can be done automatically, because after changing the parameter, the time of 5 minutes to restart the controller is automatically counted down, or manually, via the T8 button. The following screen will then appear:





f) The selection of the “Counters” field takes you to the “CO1” screen, which provides information on the current status of the operating hour meters with the possibility of resetting their indications.





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T4 – move the cursor to the next,

T5 – move the cursor to the previous,

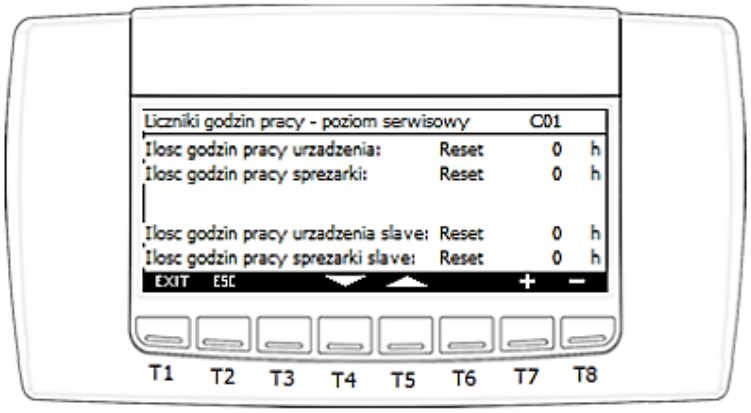
T7 – edit the value of the field with the cursor

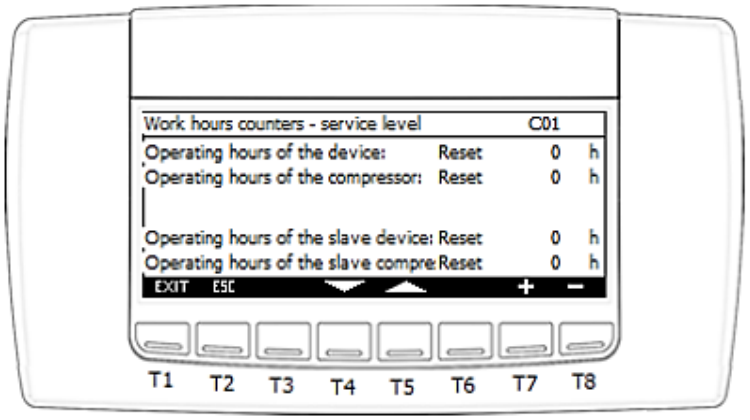
T8 – edit the value of the field with the cursor

Caution!

If redundant operation is activated and the local controller function is set as master, C01 will also start indicating the slave hour meters.

This data is the basis for the rotation of units based on operating hours meters.

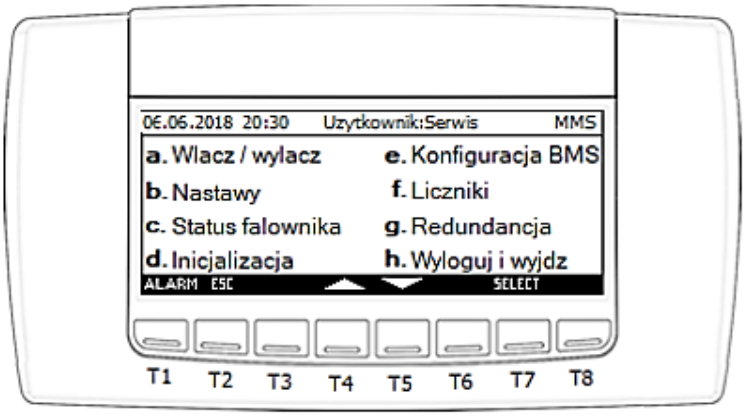


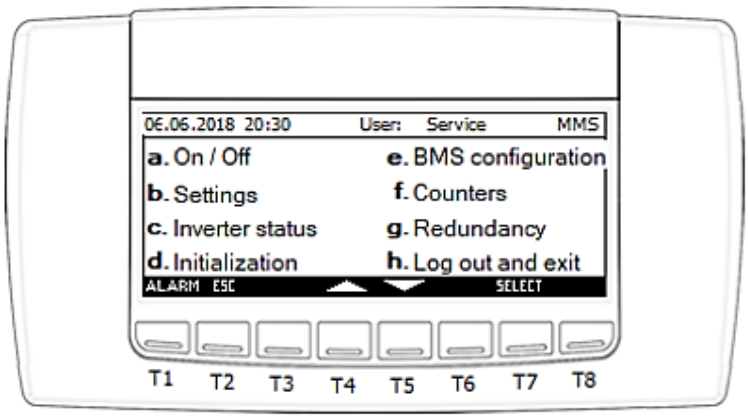


g) When the “Log out and exit” option is selected, the controller will automatically change the authorization level to “Guest” and exit to the main Menu screen.

Caution!

In the case of a unit with activated redundancy configuration, the field marked “h” changes its purpose, as described below.

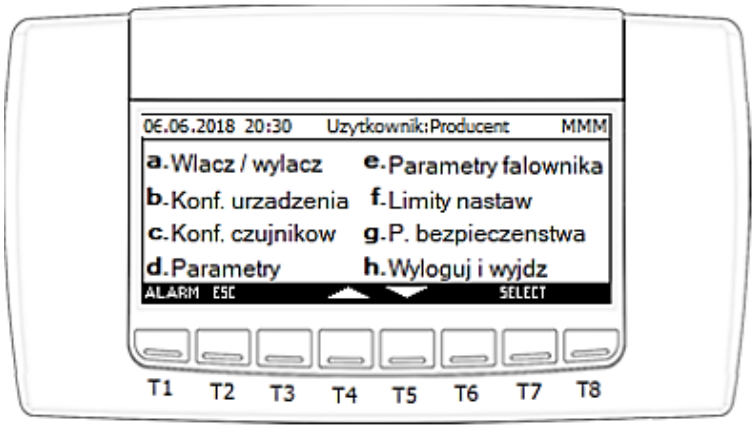


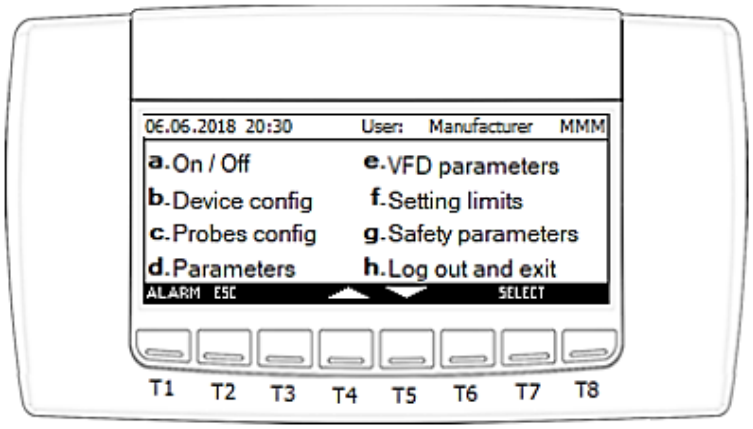


If there is no unit with no redundancy configuration, section “h” is not visible, its functionality is taken over by section “g”.

4.6. Manufacturer's menu (only available after entering PIN 2)

When the “Manufacturer” option is activated, the “MMM” screen will appear, which is also the main Manufacturer’s menu.





Functions assigned to each button:

T1 – enter the alarm screen,

T2 – exit to the previous screen,

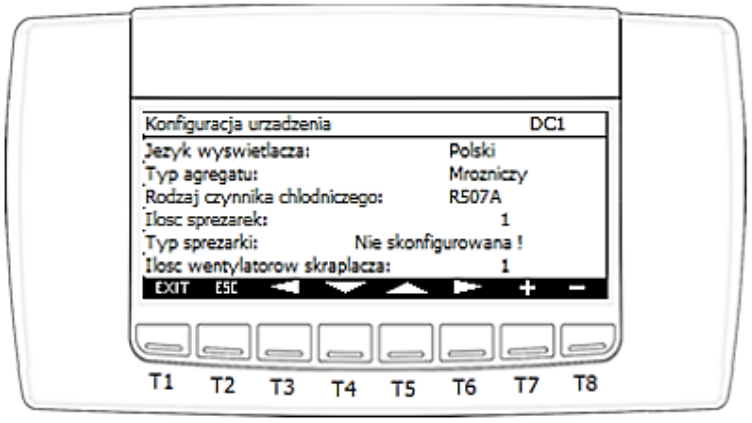
T4 – move the cursor to the field above in the Menu tree,

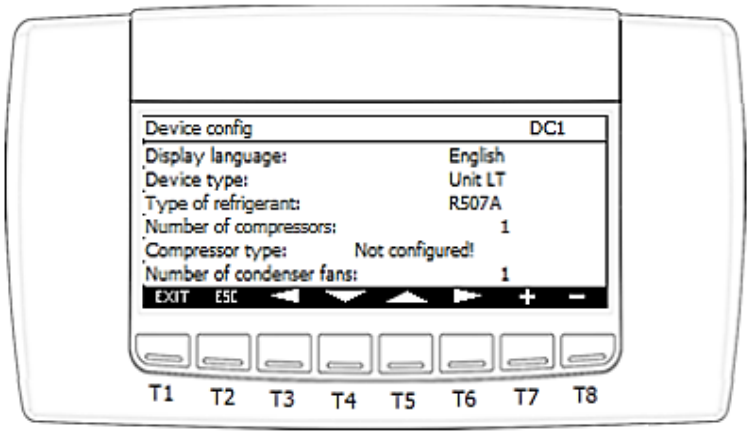
T5 – move the cursor to the field below in the Menu tree,

T7 – confirm the selection of the element highlighted by the cursor,

a) Selecting the “On/Off” field takes you to the “MO01” screen, with the same functionality as in the Main Menu.

b) When the “Device config.” option is selected, the “DCx” screen group will be displayed starting from screen DC1:





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – return to the previous screen inside the “DCx” screen section,

T4 – move the cursor to the next field,

T5 – move the cursor to the previous field,

T6 – move to the next screen inside the “DCx” screen section,

T7 – increase the value of the field with the active cursor,

T8 – decrease the value of the field with the active cursor.

DC1 screen parameters:

- Display language – allows you to change the language of the display text labels.
- Device type – configuration of the aggregate type, choose from:
    - Freezing / Unit LT
    - Cooling / Unit MT
    - Air-conditioning
- Type of refrigerant. The field is for testing the unit only. The final value is entered from the Service Menu.
- Number of Compressors
- Compressor type. Configuration of the compressor model, choose from:
    - Not configured!
    - MS300DHV
    - MS400DHV

- MS500DHV
- XPV0382E-4X9
- Number of condenser fans.

The inverter unit control application allows you to activate the option: Seven segment display – 4x7 seg display, Akytec brand, SMI 2 or other compatible model. This functionality is only available for selected units.

The seven-segment display is responsible for displaying various types of messages concerning the operation of the unit. Possible messages programmed for the display:

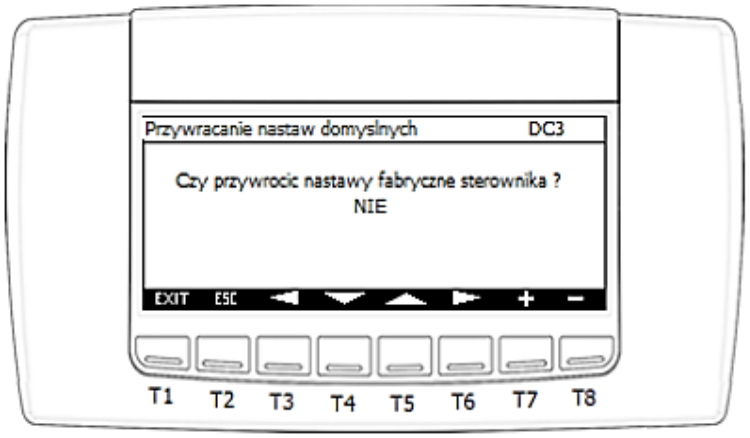
I. Unit ON

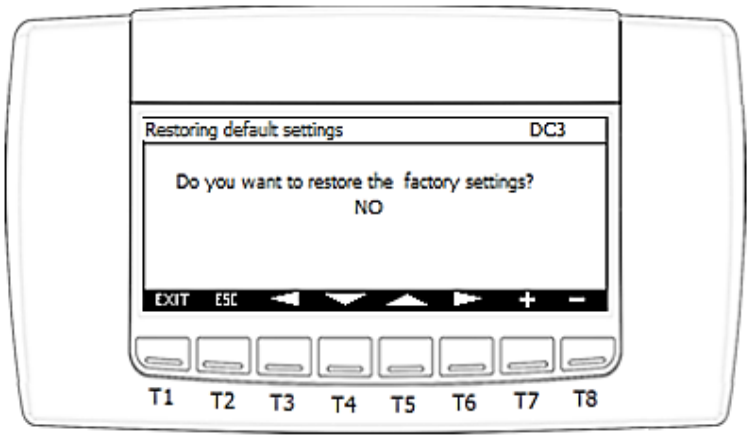
II. Unit OFF

III. The unit operates in emergency mode

IV. Unit disabled by alarm

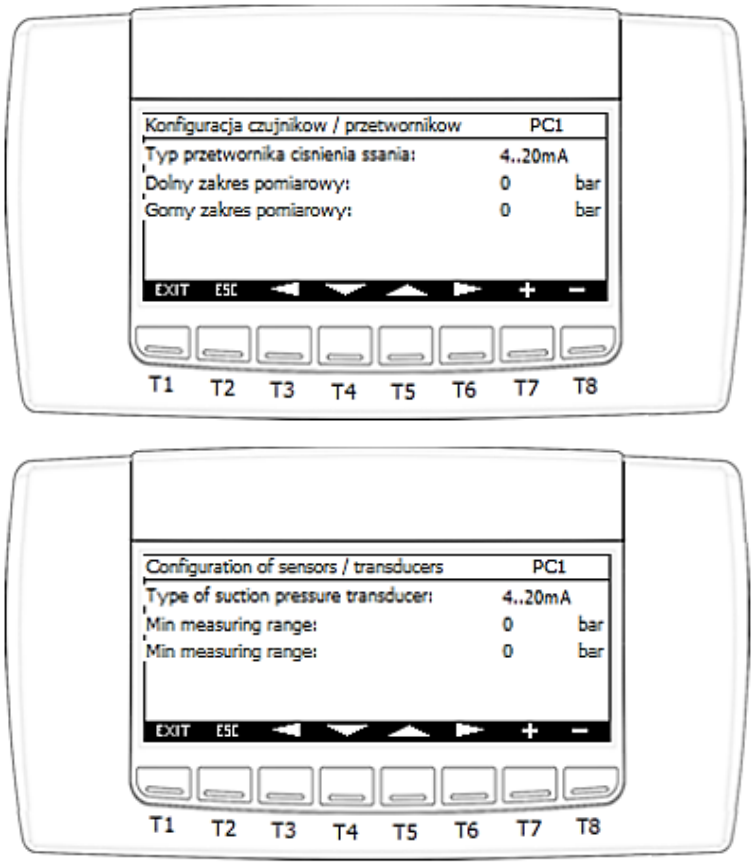
V. Active alarm code. The flashing “AL.” header indicates the presence of more than one alarm. They will be displayed sequentially, alternating with the current operating status of the unit.





Screen DC3 is responsible for resetting all parameters to factory settings. All Service and Manufacturer level parameters will be overwritten. The communication port configuration will not be modified.

c) When “Probes config.” option is selected, a group of “PCx” screens will be displayed, starting with PC1, responsible for the configuration and calibration of measurements:



Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – return to the previous screen inside the “PCx” screen section,

T4 – move the cursor to the next field,

T5 – move the cursor to the previous field,

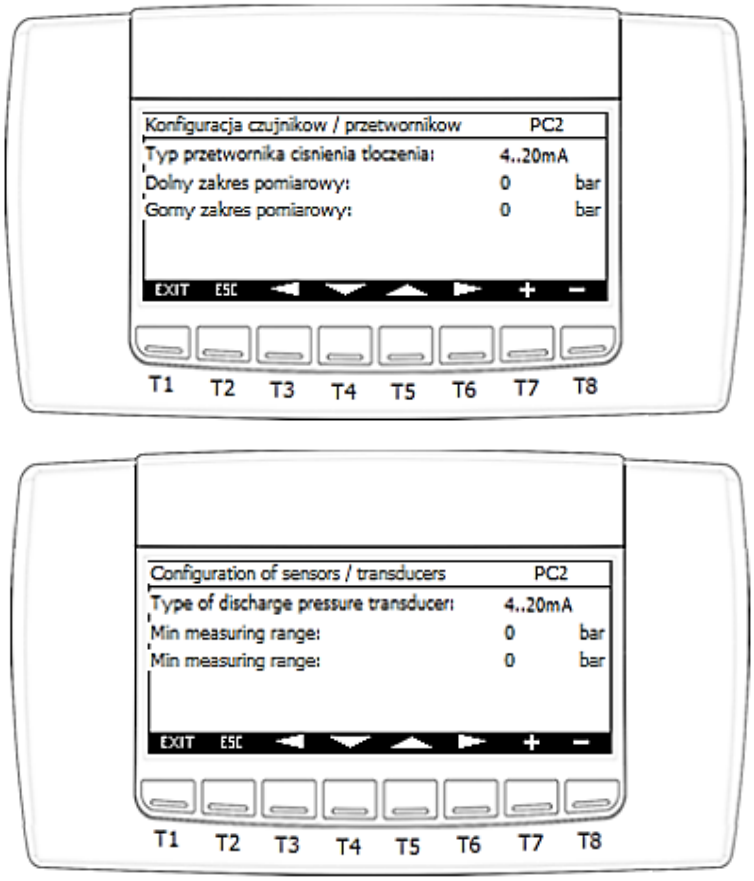
T6 – move to the next screen inside the “PCx” screen section,

T7 – increase the value of the field with the active cursor,

T8 – decrease the value of the field with the active cursor.

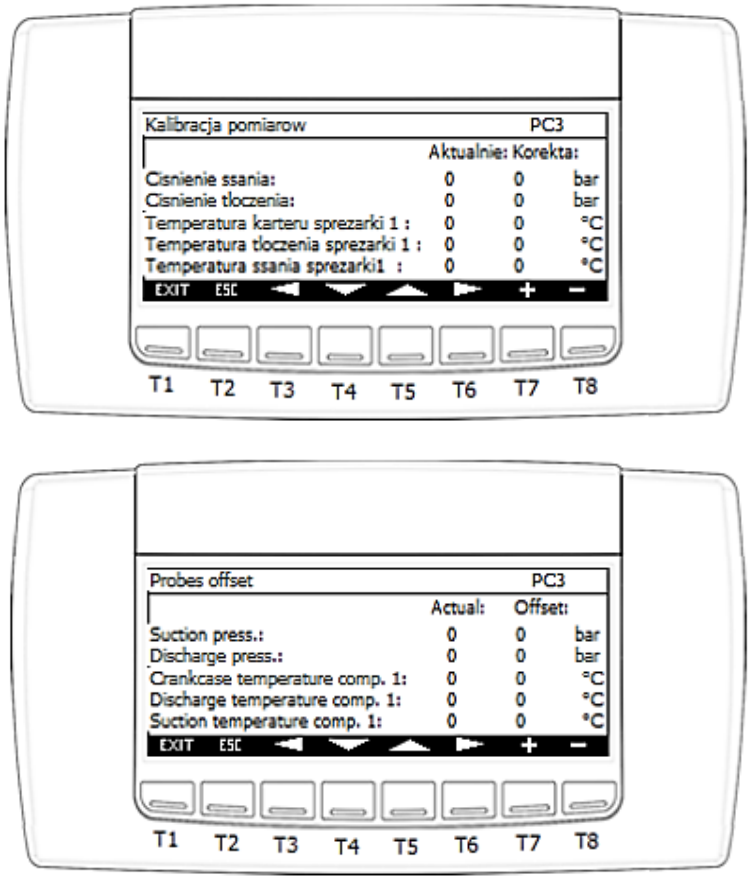
PC1 screen parameters:

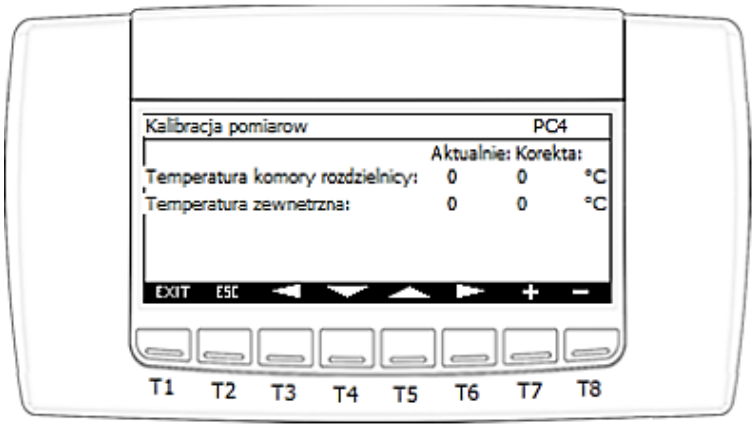
- Type of suction pressure transducer – configuration of transmitter type, selection from among:
  - 4..20mA
  - 0..10V
  - 0..1V
  - 0..5V
- Min. measuring range.
- Max. measuring range.

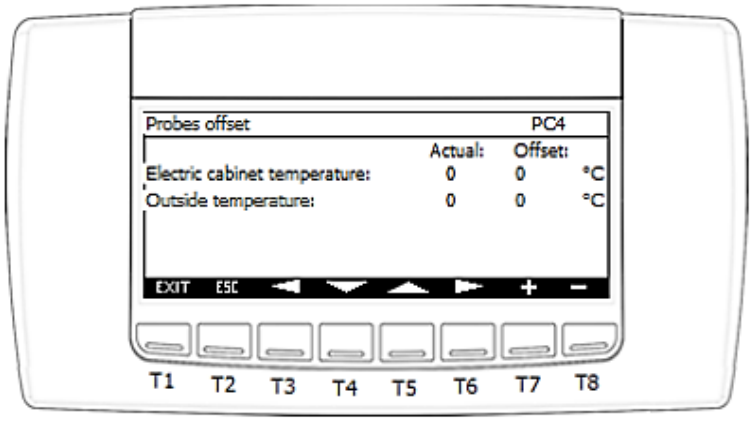


PC2 screen parameters:

- Type of discharge pressure transducer – configuration of transmitter type, selection from among:
    - 4..20mA
    - 0..10V
    - 0..1V
    - 0..5V
- Min. measuring range.
- Max. measuring range.

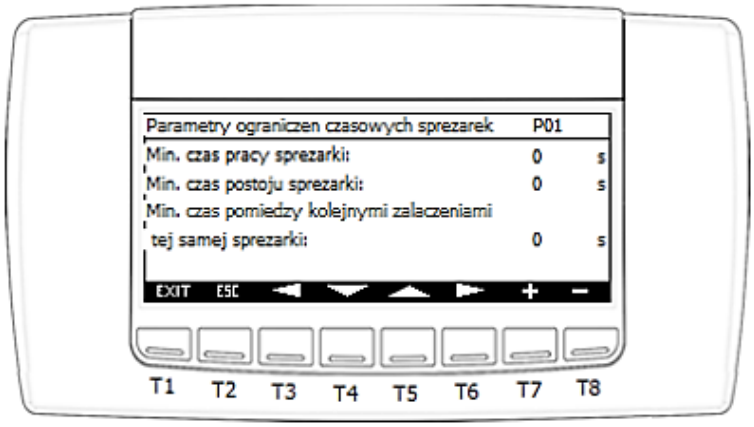


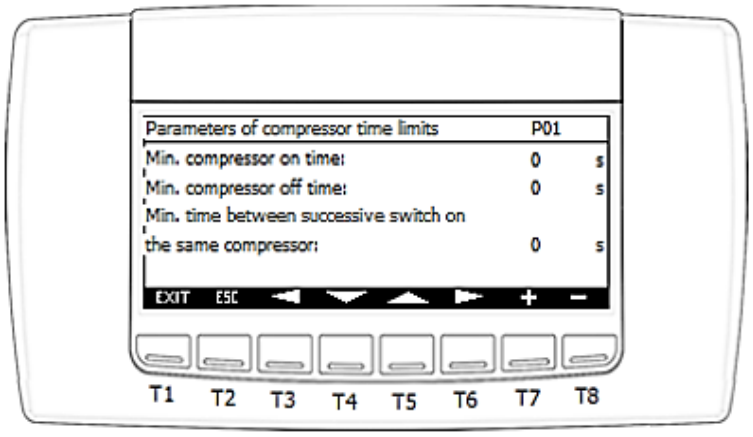




Screens PC3 and PC4 are used to enter the desired measurement offset and display the value including the entered offset.

d) After selecting the "Parameters" option, a group of screens "P0x" will be displayed starting from screen P01, which is responsible for the parameters of the most important controllers.





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – return to the previous screen inside the “P0x” screen section,

T4 – move the cursor to the next field,

T5 – move the cursor to the previous field,

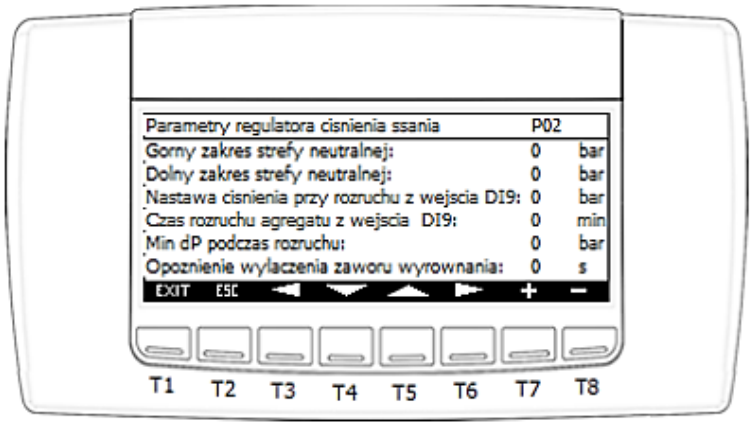
T6 – move to the next screen inside the “P0x” screen section,

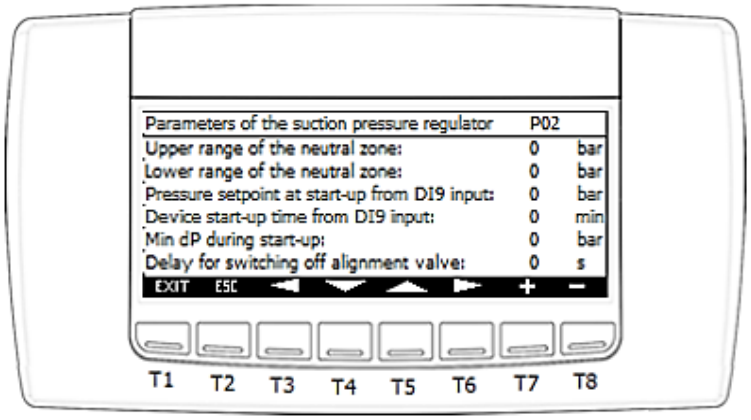
T7 – increase the value of the field with the active cursor,

T8 – decrease the value of the field with the active cursor.

P01 screen parameters:

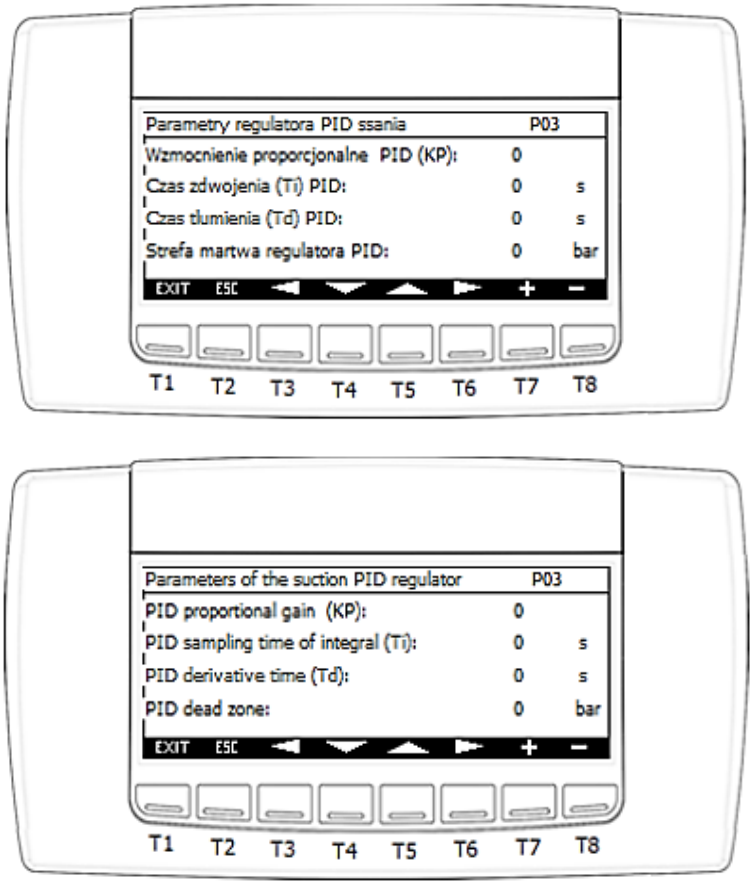
- Min. compressor on time
- Min. compressor off time
- Min. time between successive switch on





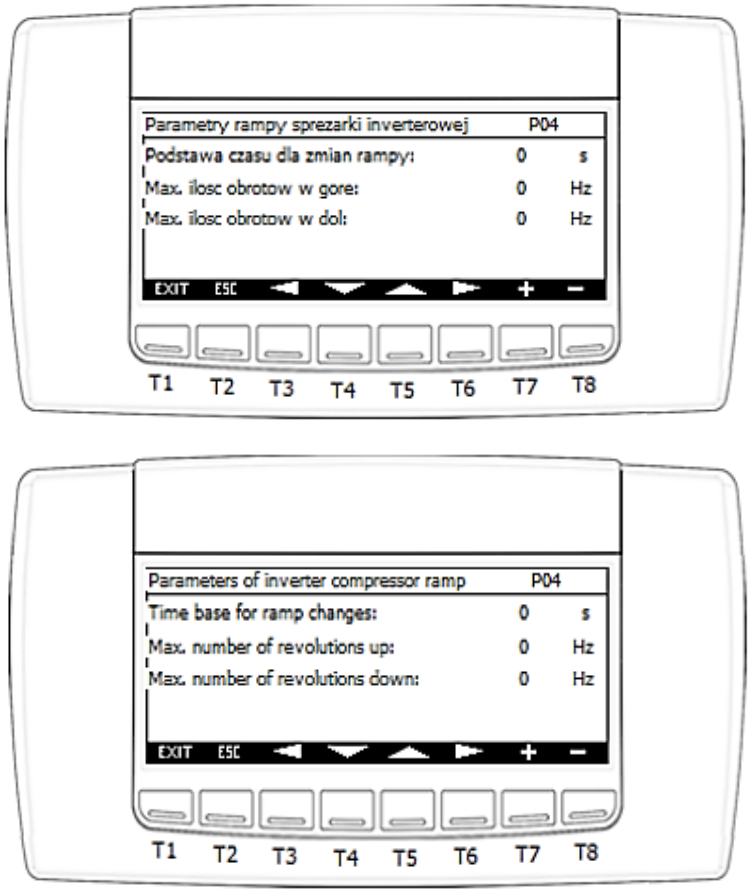
P02 screen parameters:

- Upper range of the neutral zone
- Lower range of the neutral zone
- Pressure setpoint at start-up from DI9 input
- Device start-up time from DI9 input
- Min dP during start-up
- Delay for switching off alignment valve



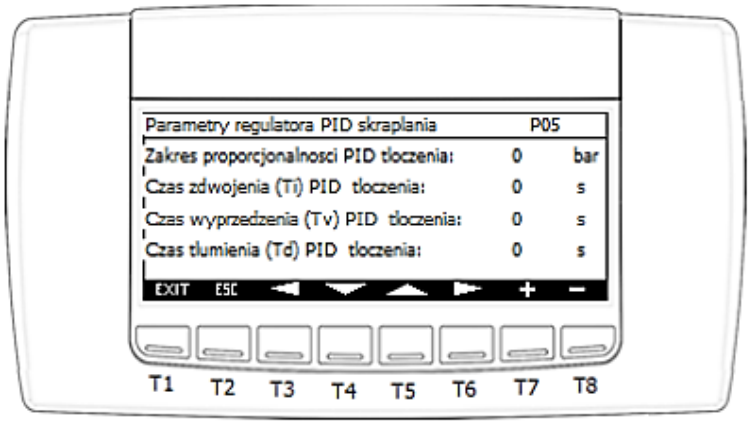
P03 screen parameters:

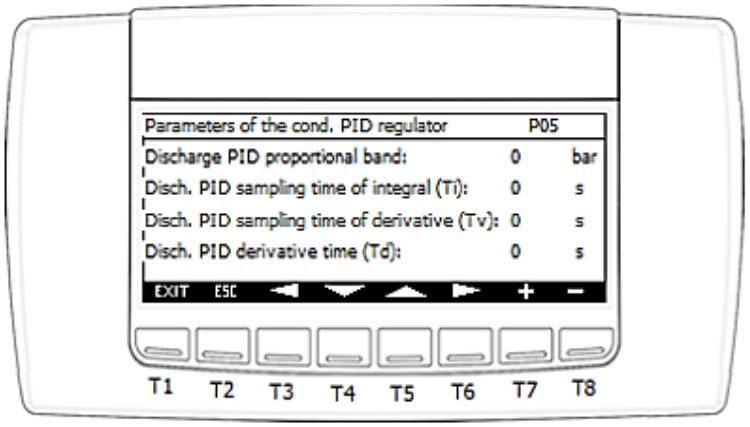
- PID proportional gain (KP)
- PID sampling time of integral (Ti)
- PID derivative time (Td)
- PID dead zone



P04 screen parameters:

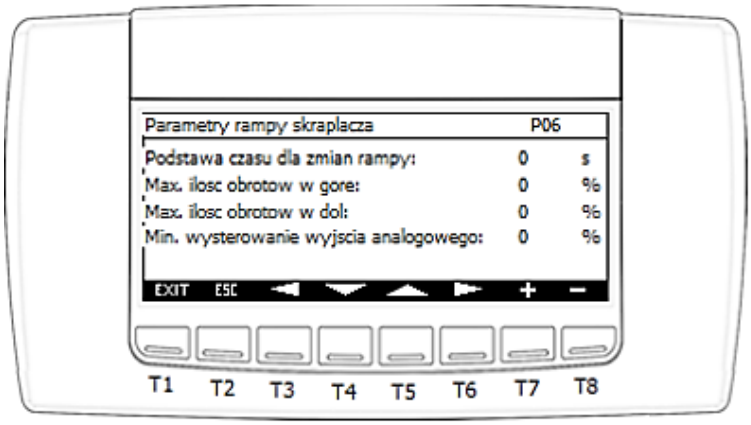
- Time base for ramp changes
- Max. number of revolution up
- Max number of revolution down

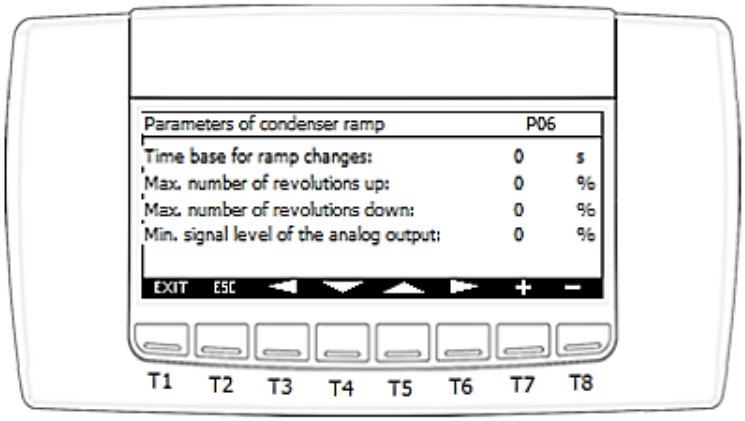




P05 screen parameters:

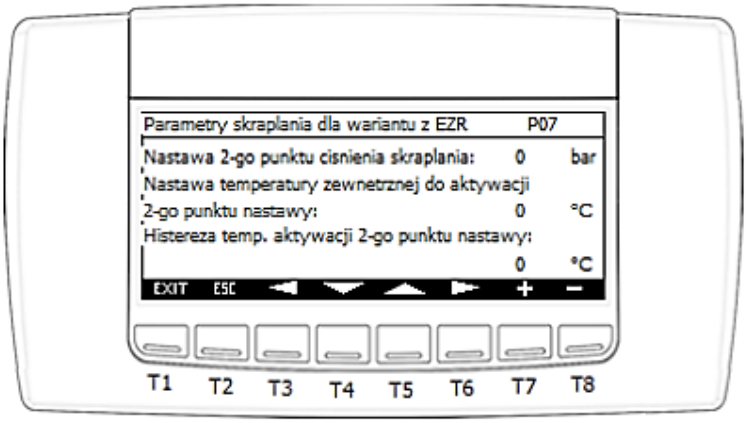
- Discharge PID proportional band
- Disch. PID sampling time of integral (Ti)
- Disch. PID sampling time of derivative (Tv)
- Disch. PID derivative time (Td)

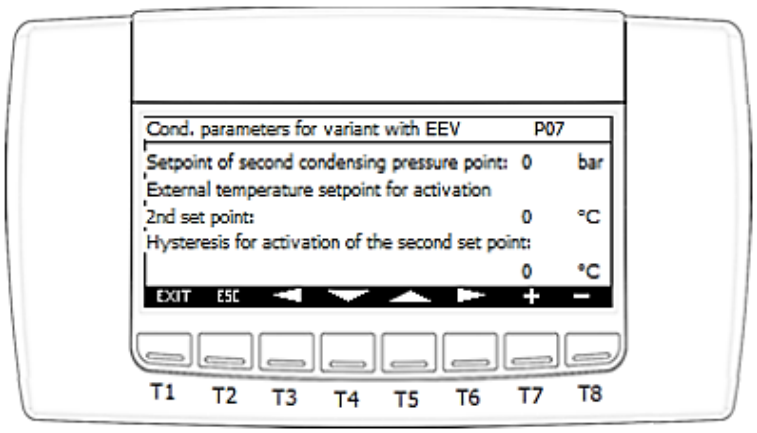




P06 screen parameters:

- Time base for ramp changes
- Max. number of revolution up
- Max number of revolution down
- Min. signal level of the analog output

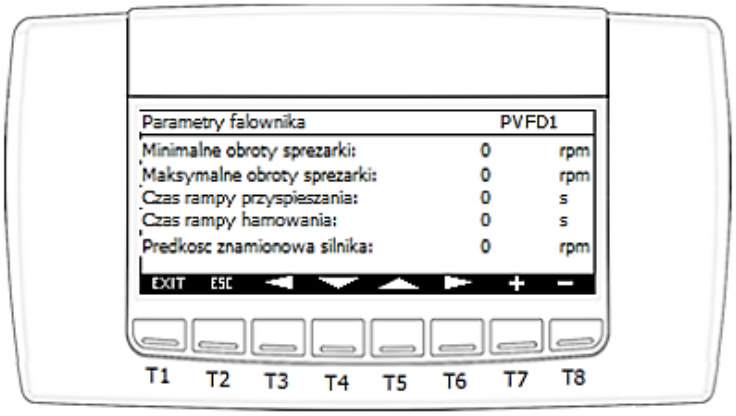


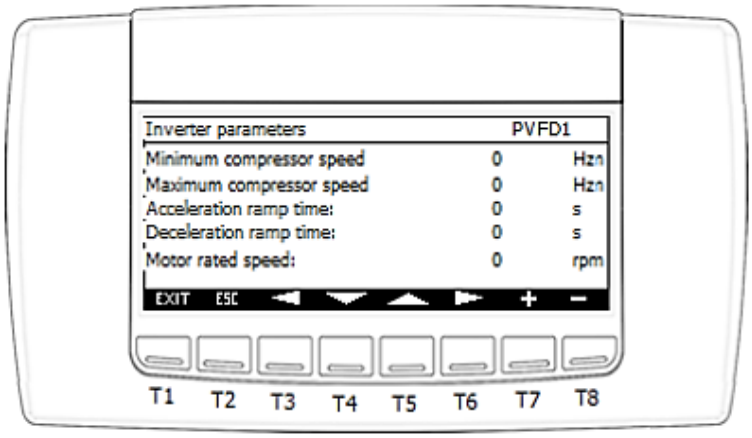


P07 screen parameters:

- Setpoint of second condensing pressure point
- External temperature setpoint for activation 2nd set point
- Hysteresis for activation of the second set point

e) When the "VFD parameters" option is activated, the "PVFDx" screen group starting with the PVFD1 screen is displayed, which is responsible for the compressor drive control parameters.





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – return to the previous screen inside the “PVFDx” screen section,

T4 – move the cursor to the next field,

T5 – move the cursor to the previous field,

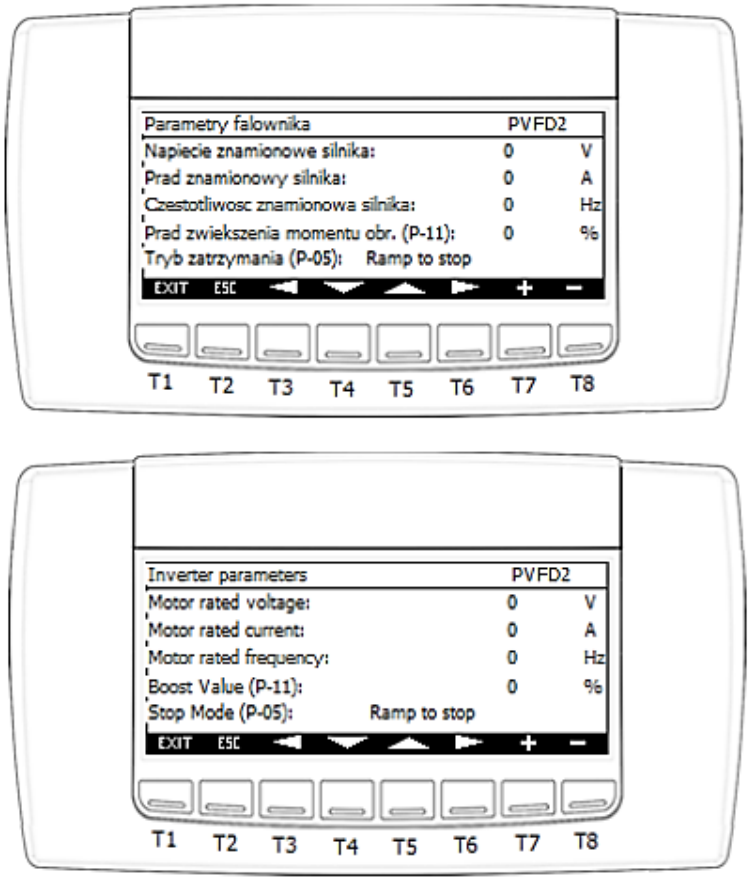
T6 – move to the next screen inside the “PVFDx” screen section,

T7 – increase the value of the field with the active cursor,

T8 – decrease the value of the field with the active cursor.

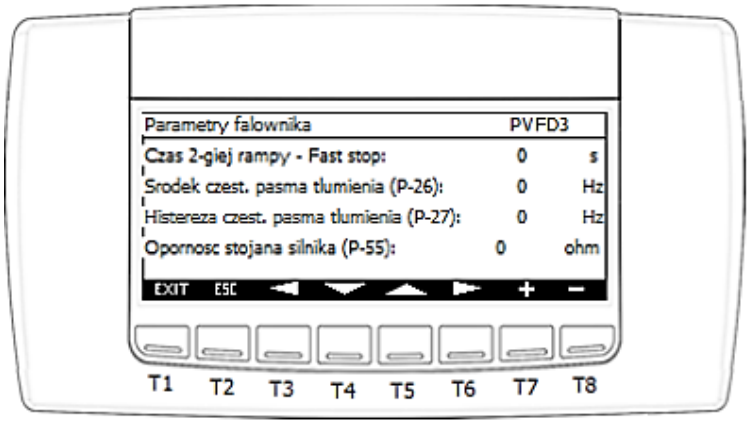
PVFD1 screen parameters:

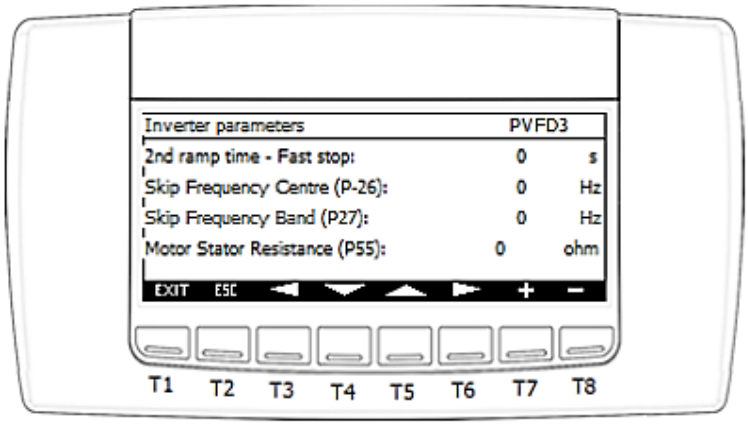
- Minimum compressor speed. For Toshiba brand compressors, values are expressed in Hz, for compressors with BLDC motors – in rpm.
- Maximum compressor speed. For Toshiba brand compressors, values are expressed in Hz, for compressors with BLDC motors – in rpm.
- Acceleration ramp time.
- Deceleration ramp time.
- Motor rated speed. Parameter visible only for compressors with BLDC motors.



PVFD2 screen parameters:

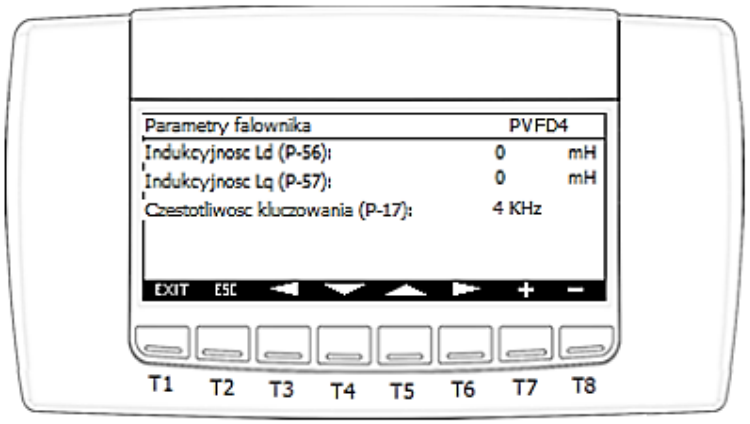
- Motor rated voltage.
- Motor rated current.
- Motor rated frequency.
- Boost value.
- Stop mode. Functionality according to Miloo E3 inverter documentation, parameter P-05.

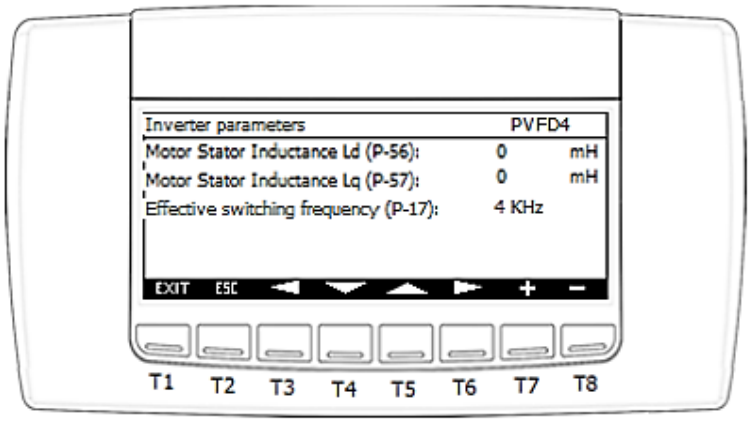




PVFD3 screen parameters:

- 2nd ramp time
- Skip Frequency Centre
- Skip Frequency Band
- Motor Stator Resistance

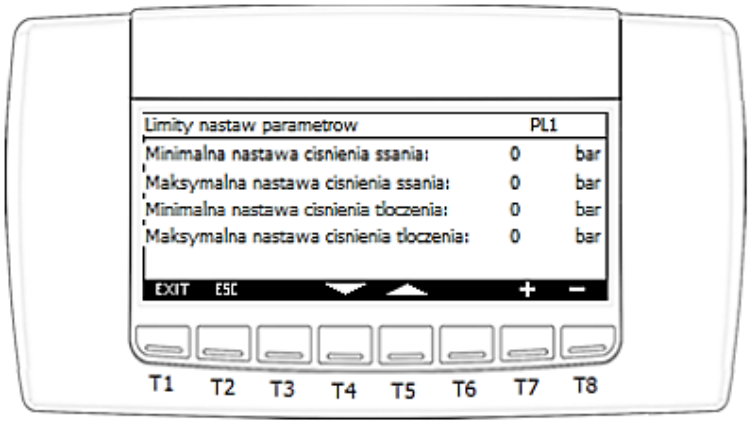


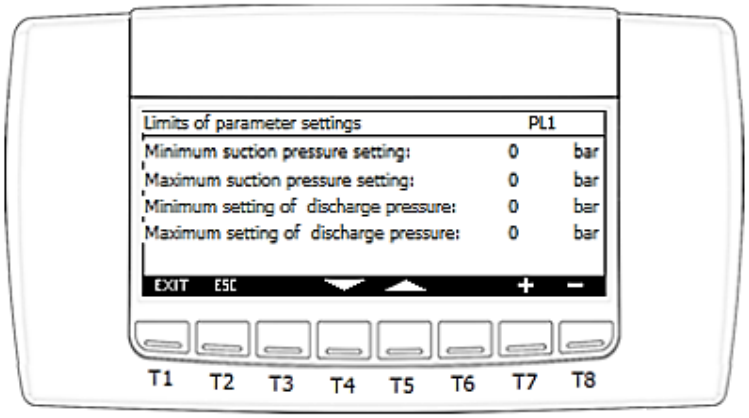


PVFD4 screen parameters:

- Motor Stator Inductance Ld
- Motor Stator Inductance Lq
- Effective switching frequency

f) When the “Setting limits” option is selected, the “PL1” screen will be displayed, which is responsible for the limits of setting the basic parameters available in the Service Menu.





Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T4 – move the cursor to the next field,

T5 – move the cursor to the previous field,

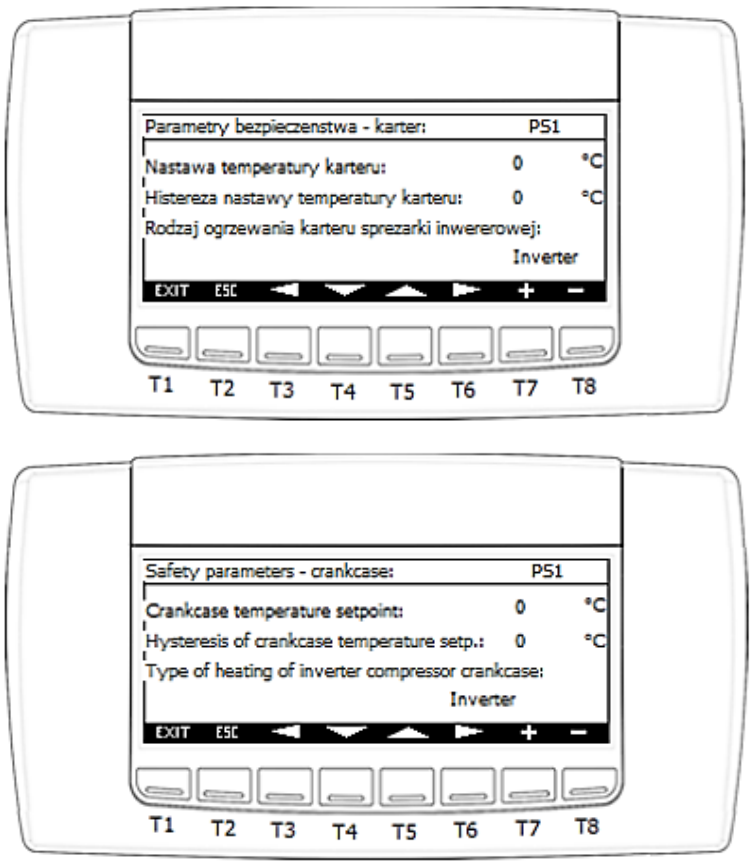
T7 – increase the value of the field with the active cursor,

T8 – decrease the value of the field with the active cursor.

PL1 screen parameters:

- Minimum suction pressure setting
- Maximum suction pressure setting
- Minimum setting of discharge pressure
- Maximum setting of discharge pressure

g) When the “Safety parameters” option is selected, a group of “PSx” screens will be displayed starting from the PS1 screen, responsible for the compressor safety parameters and protection functions.



Functions assigned to each button:

T1 – exit to the main screen,

T2 – exit to the previous screen,

T3 – return to the previous screen inside the “PSx” screen section,

T4 – move the cursor to the next field,

T5 – move the cursor to the previous field,

T6 – move to the next screen inside the “PSx” screen section,

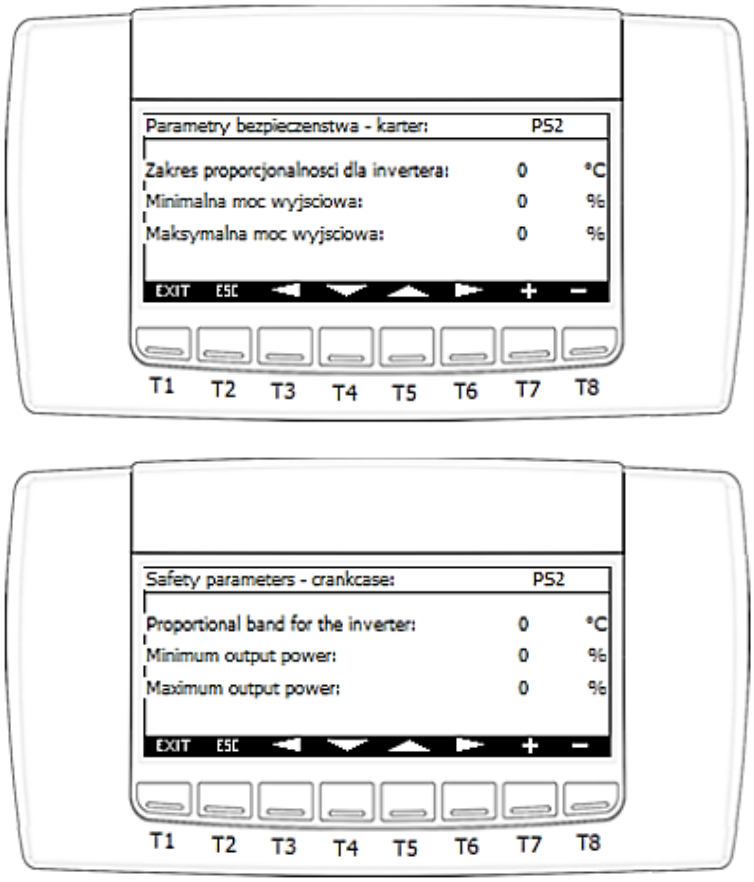
T7 – increase the value of the field with the active cursor,

T8 – decrease the value of the field with the active cursor.

PS1 screen parameters:

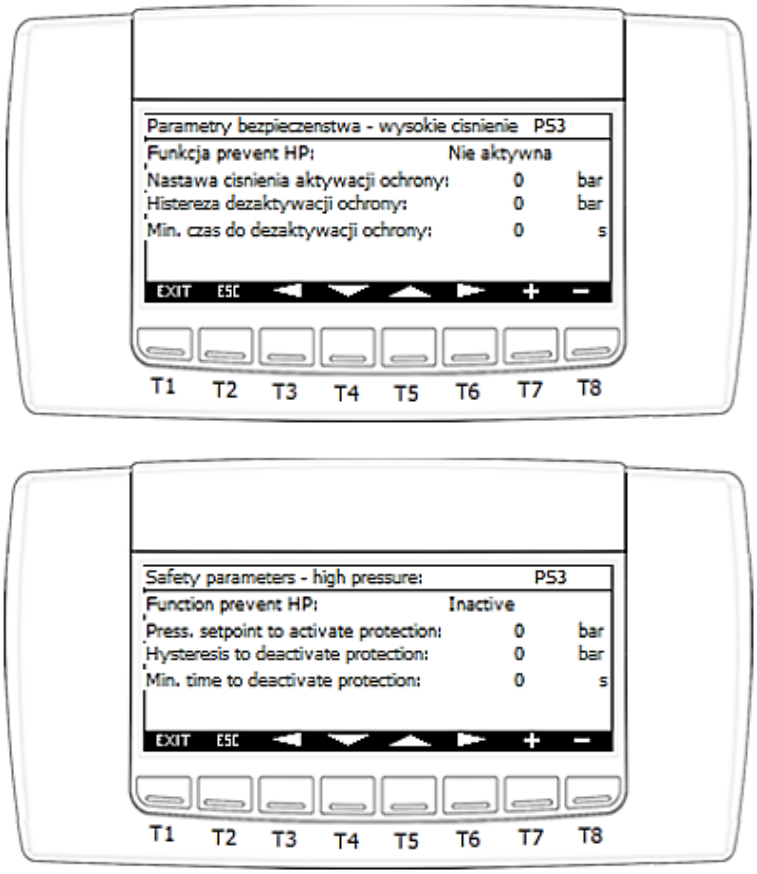
- Crankcase temperature setpoint
- Hysteresis of crankcase temperature setp.

- Type of heating of inverter compressor crankcase. Possible options:
    - Inverter
    - Electric heater



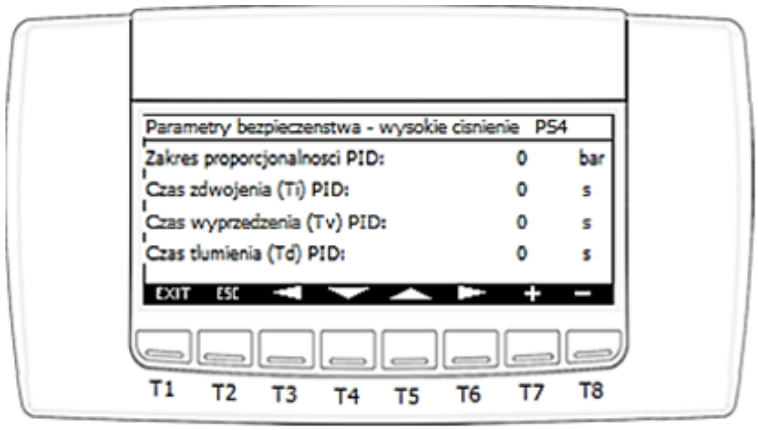
PS2 screen parameters (Functions only relevant for Inverter heating):

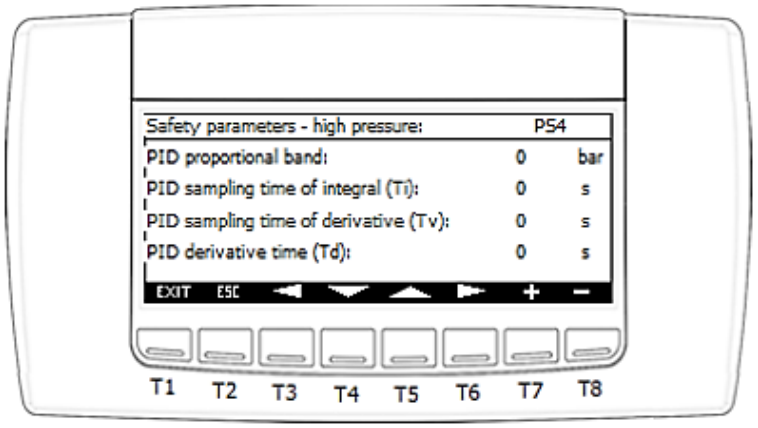
- Proportional band for the inverter
- Minimum output power
- Maximum output power



PS3 screen parameters:

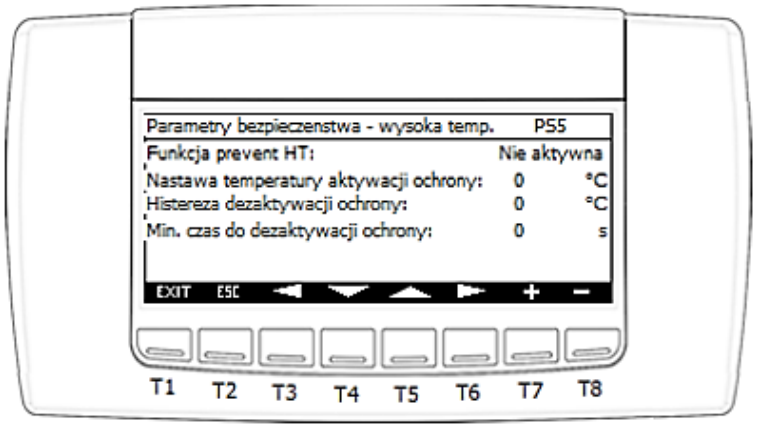
- Function prevent HP. Possible options:
  - Active
  - Inactive
- Press. setpoint to activate protection
- Hysteresis to deactivate protection
- Min. time to deactivate protection

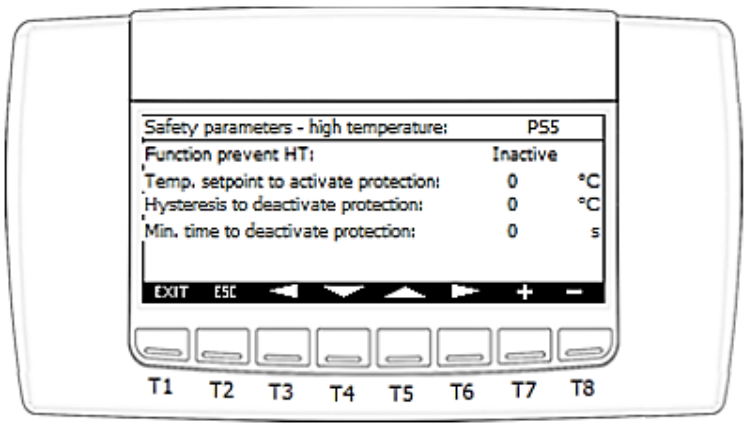




PS4 screen parameters:

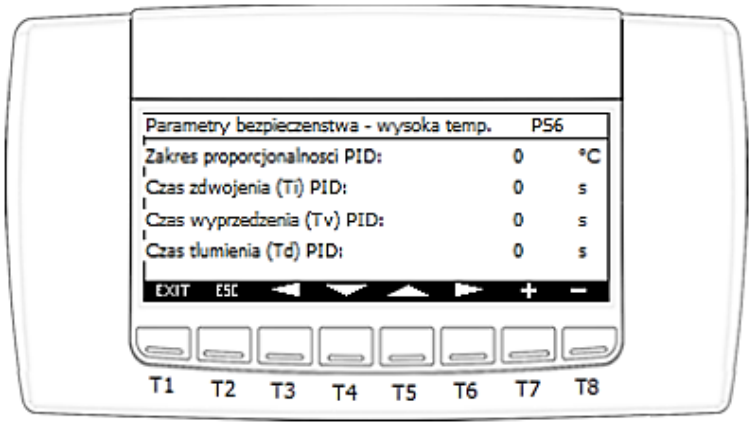
- PID proportional band
- PID sampling time of integral (Ti)
- PID sampling time to derivative (Tv)
- PID derivative time (Td)

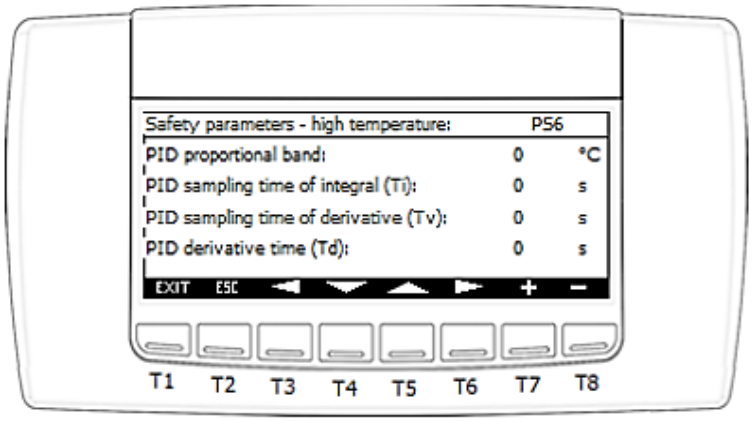




PS5 screen parameters:

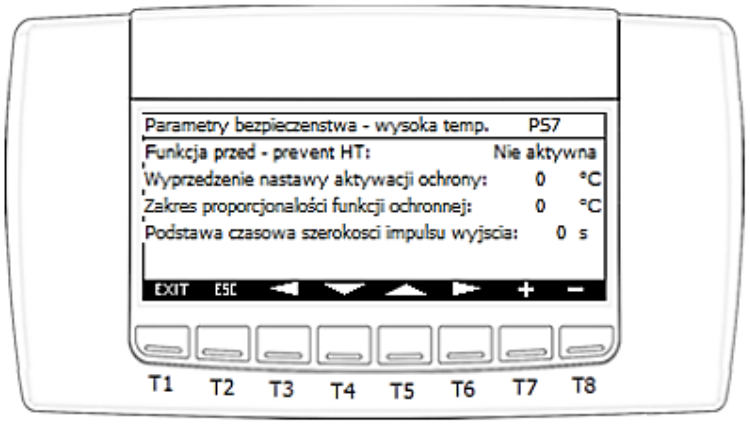
- Function prevent HP. Possible options:
    - Active
    - Inactive
- Temp. setpoint to activate protection
- Hysteresis to deactivate protection
- Min. time to deactivate protection

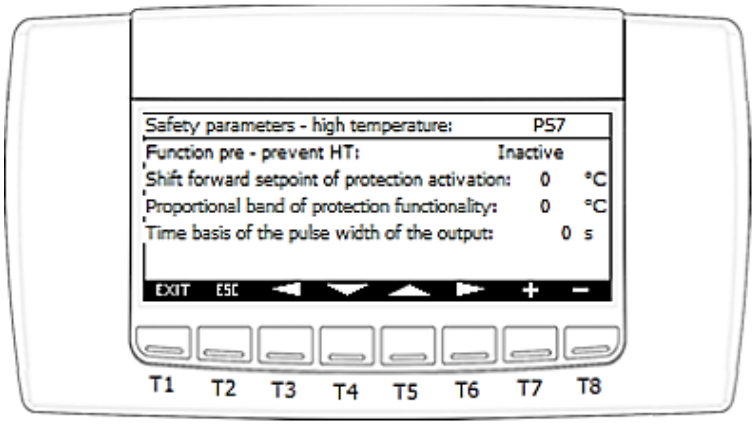




PS6 screen parameters:

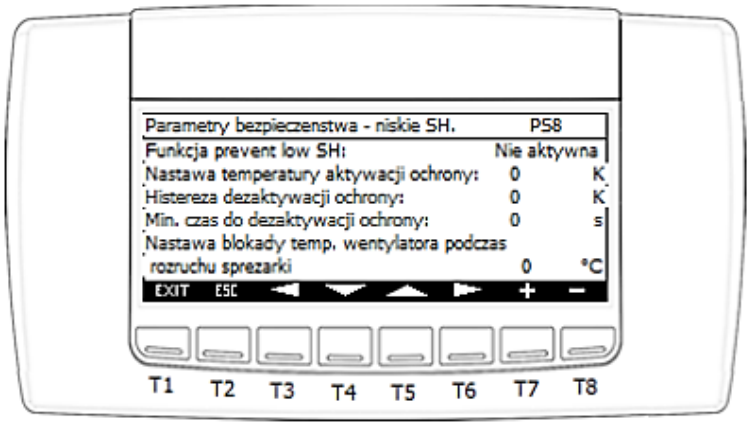
- PID proportional band
- PID sampling time of integral (Ti)
- PID sampling time of derivative (Tv)
- PID derivative time (Td)

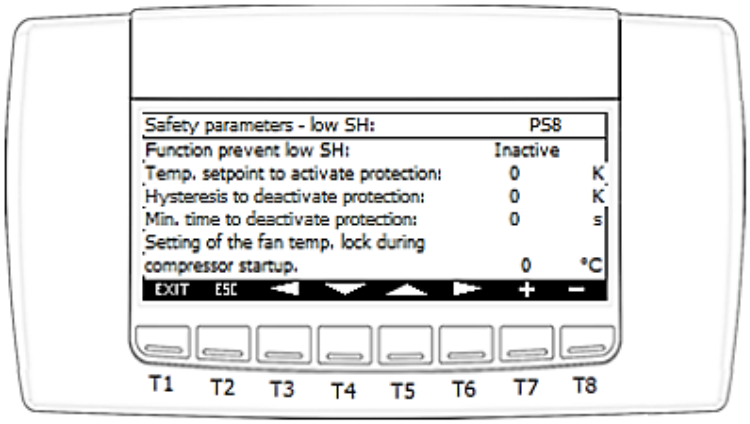




PS7 screen parameters:

- Function pre - prevent HT. Possible options:
    - Active
    - Inactive
- Shift forward setpoint of protection activation
- Proportional band of protection functionality
- Time basis of the pulse width of the output

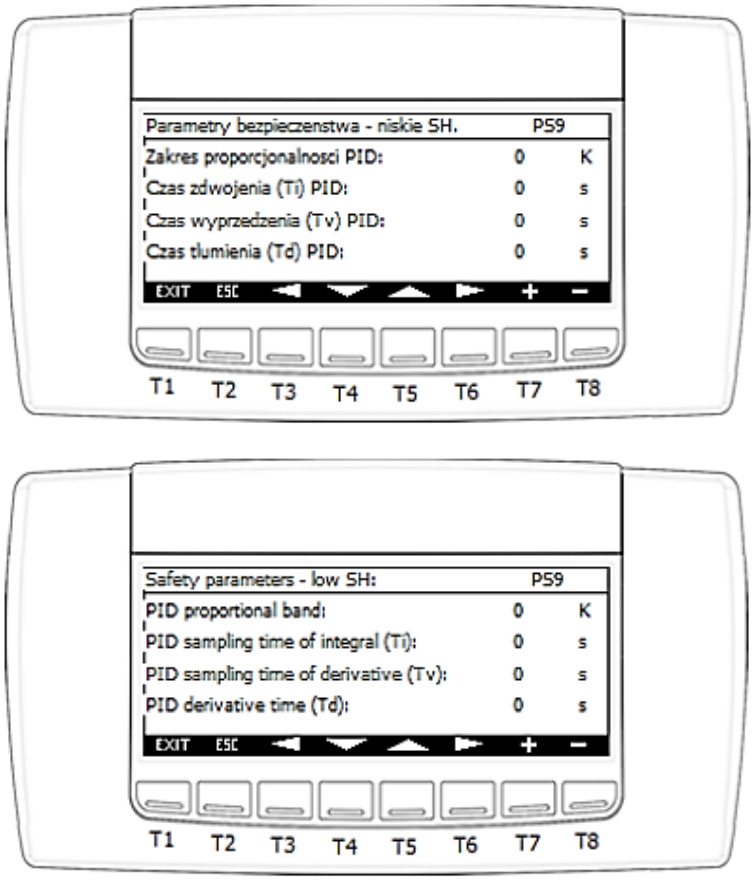




PS8 screen parameters:

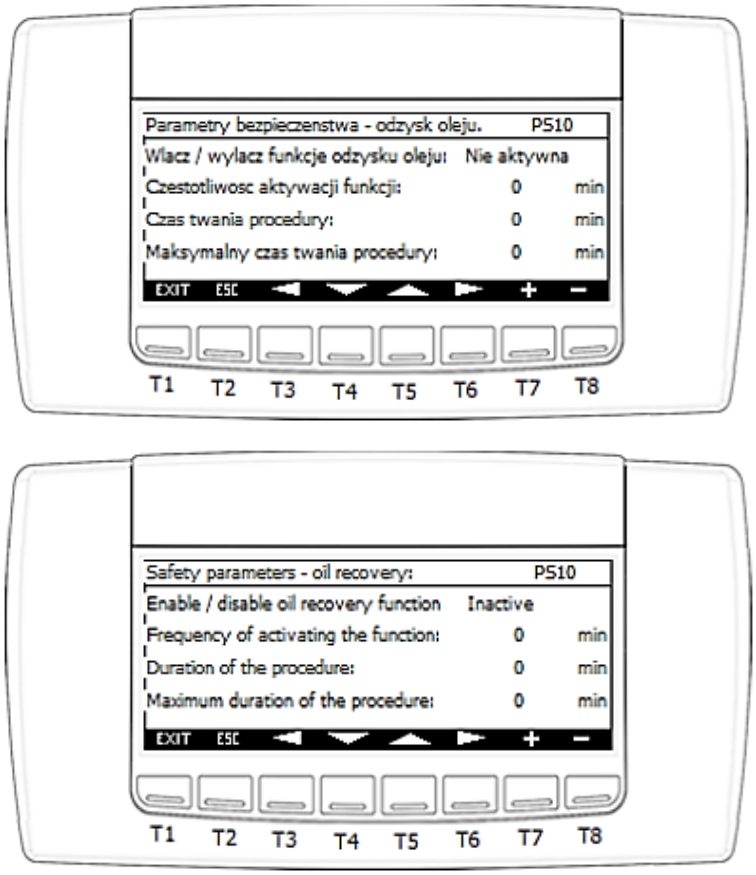
- Function prevent low SH. Possible options:
    - Active
    - Inactive
- Temp. setpoint to activate protection
- Hysteresis to deactivate protection
- Min. time to deactivate protection

- Setting of the fan temp. lock during compressor startup



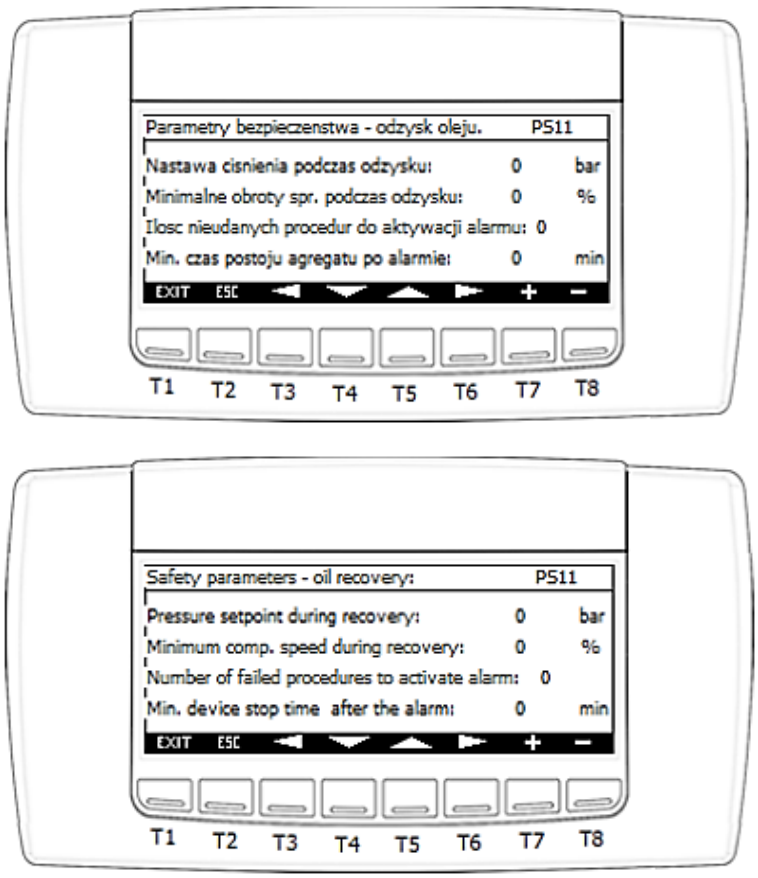
PS9 screen parameters:

- PID proportional band
- PID sampling time of integral (Ti)
- PID sampling time of derivative (Tv)
- PID derivative time (Td)



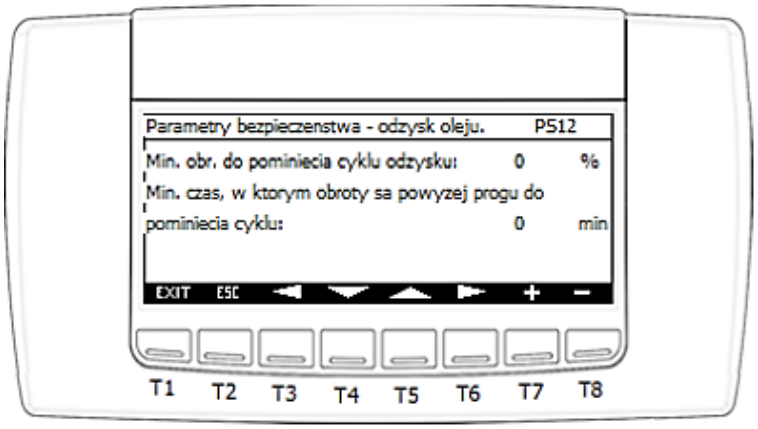
PS10 screen parameters:

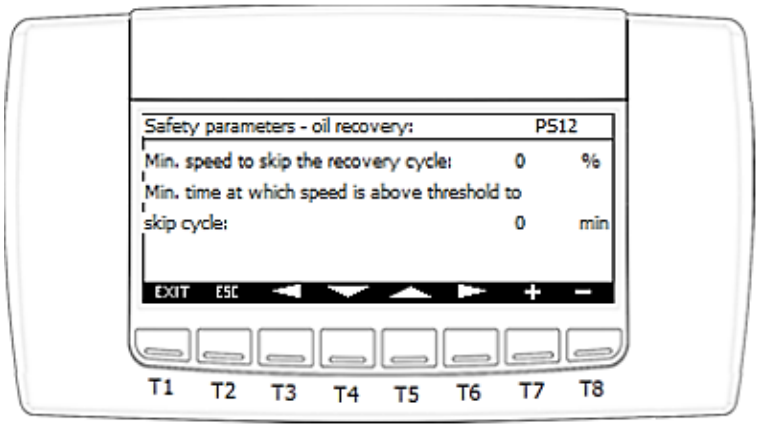
- Enable/disable oil recovery function. Possible options:
    - Active
    - Inactive
- Frequency of activating the function
- Duration of the procedure
- Maximum duration of the procedure



PS11 screen parameters:

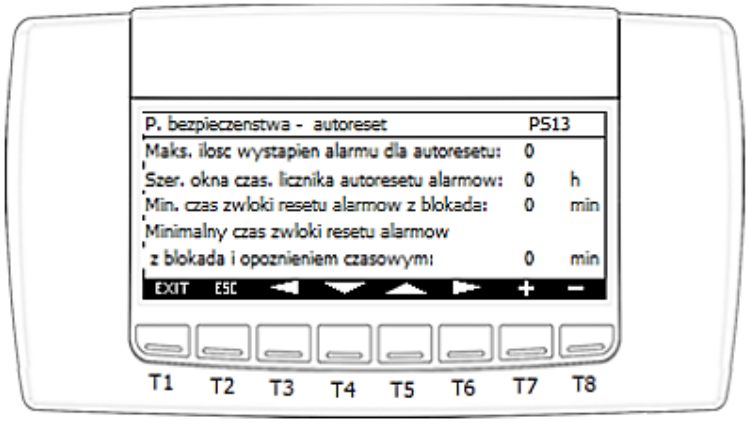
- Pressure setpoint during recovery
- Minimum comp. speed during recovery
- Number of failed procedures to activate alarm
- Min. device stop time after the alarm

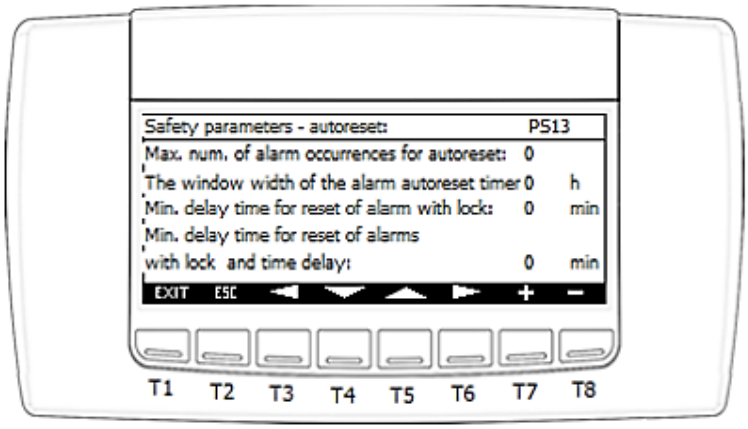




PS12 screen parameters:

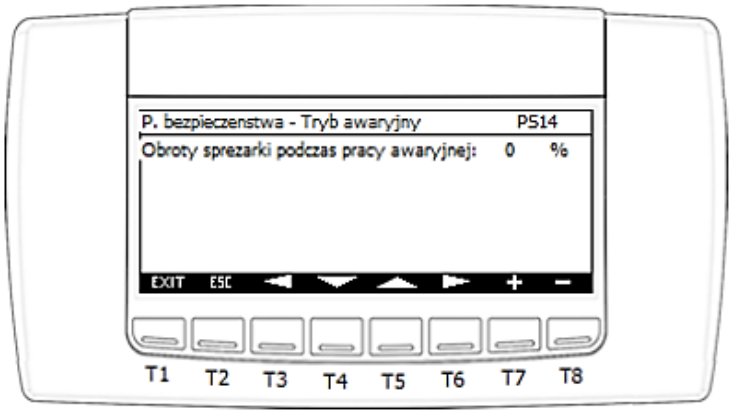
- Min. speed to skip the recovery cycle
- Min. time at which speed is above threshold to skip cycle

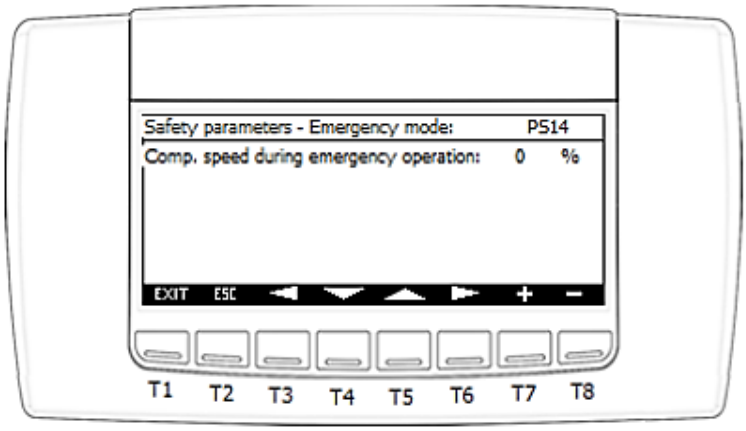




PS13 screen parameters:

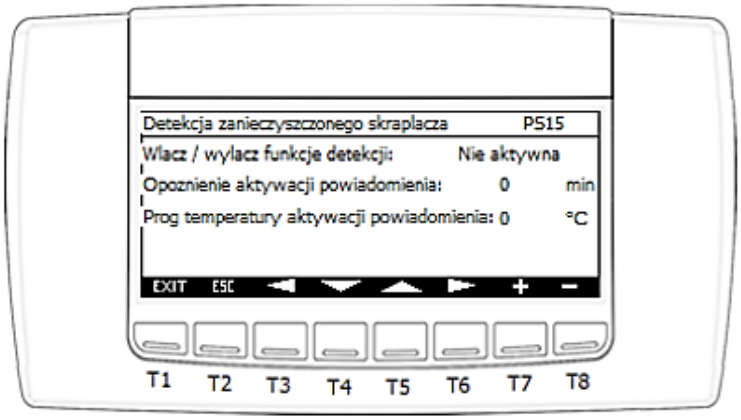
- Max. num. of alarm occurrences for autoreset. Applies to alarms with an auto-reset and a lock of the number of occurrences of a given alarm / time window width.
- The window width of the alarm autoreset timer
- Min. delay time for reset of alarm with lock
- Min. delay time for reset of alarms with lock and time delay

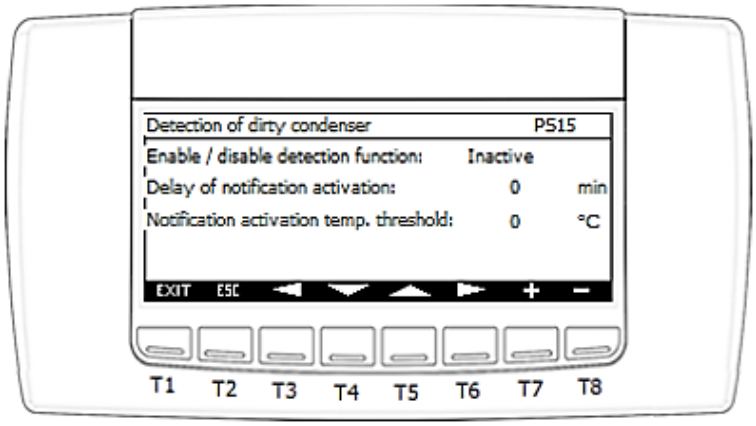




PS14 screen parameters:

- Comp. speed during emergency operation



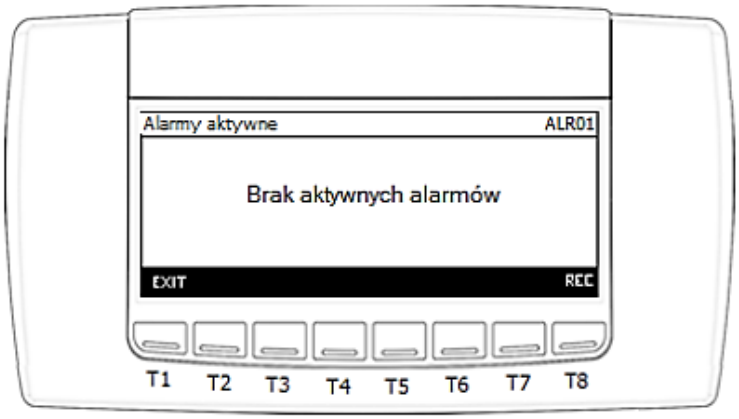


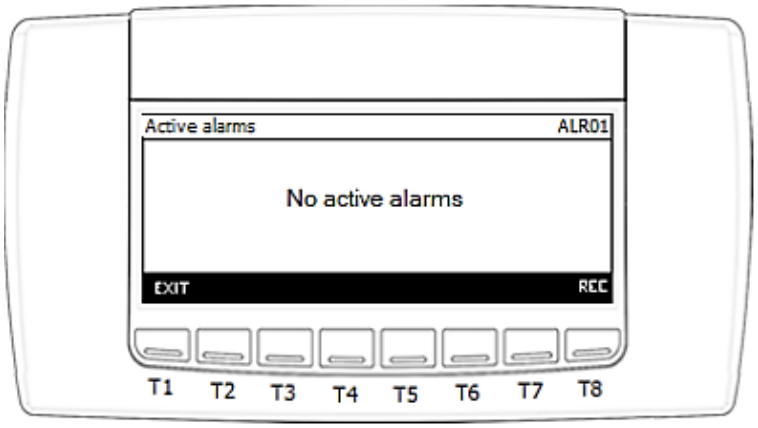
PS15 screen parameters:

- Enable/disable detection function. Possible options:
  - Active
  - Inactive
- Delay of notification activation
- Notification activation temp. threshold

4.7. Alarm screens

When the “Alarm” button (T1) is pressed in the screens where this button is active, the **ALR01** alarm window will display information about active alarms. Additionally, it is possible to go to the alarm history screen.





Functions assigned to each button:

T1 – exit to the main screen,

T2 – export to USB. The button is active and only visible when at least

1 alarm is active.

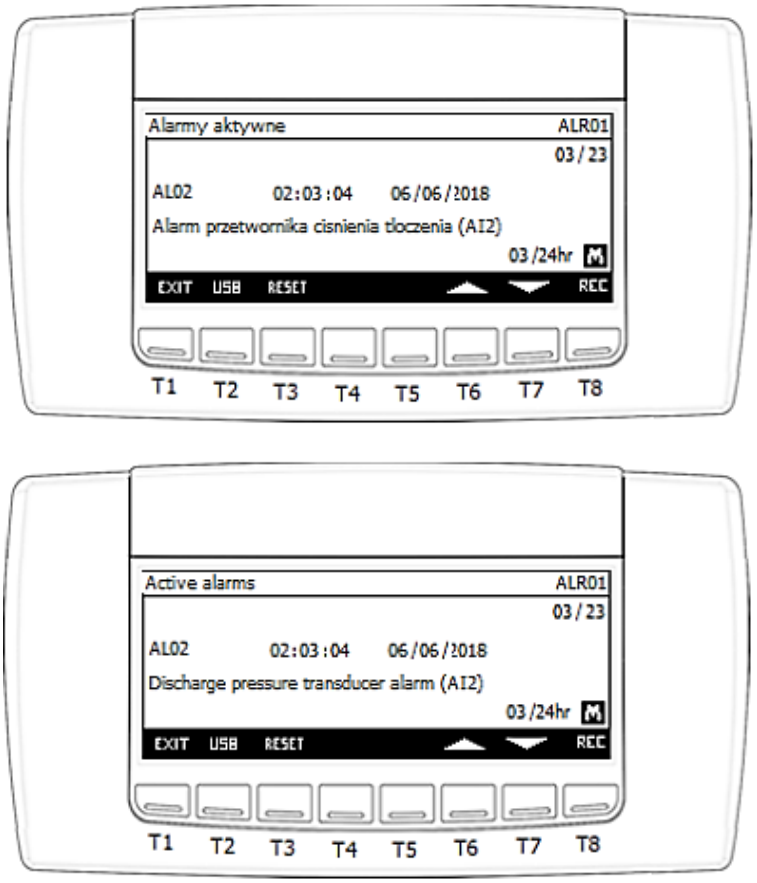
T3 – alarm reset. The button is active and only visible when at least

1 alarm is active.

T6 – previous alarm message. The button is active and only visible when more than 1 alarm is active.

T7 – next alarm message. The button is active and only visible when more than 1 alarm is active.

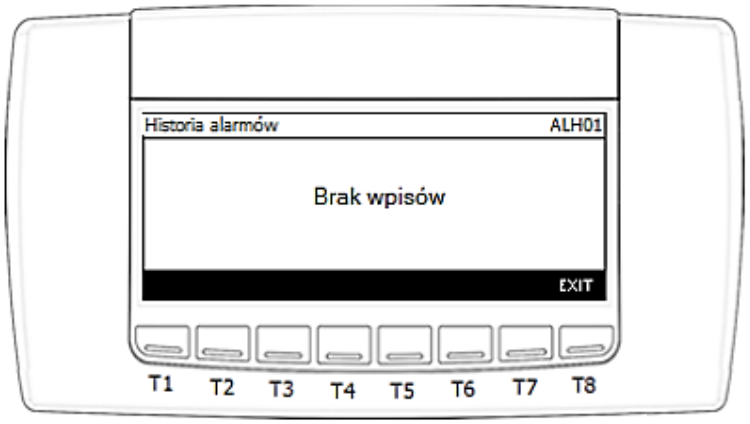
T8 – enter the alarm history screen.

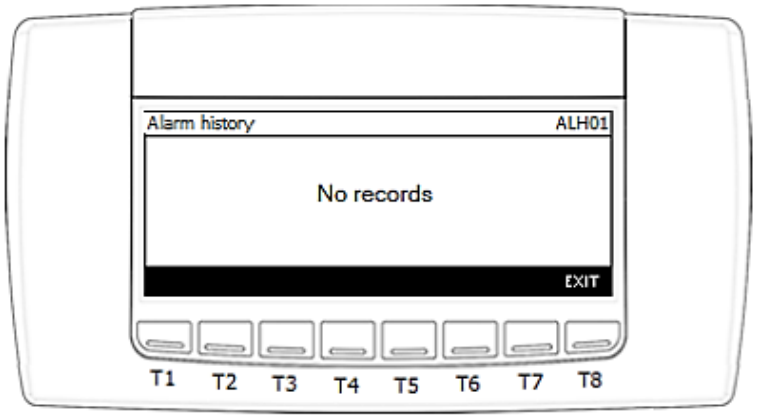


Each alarm message is assigned to a code, date and time. Additionally, the controller counts how many times during the last day a given alarm occurred.

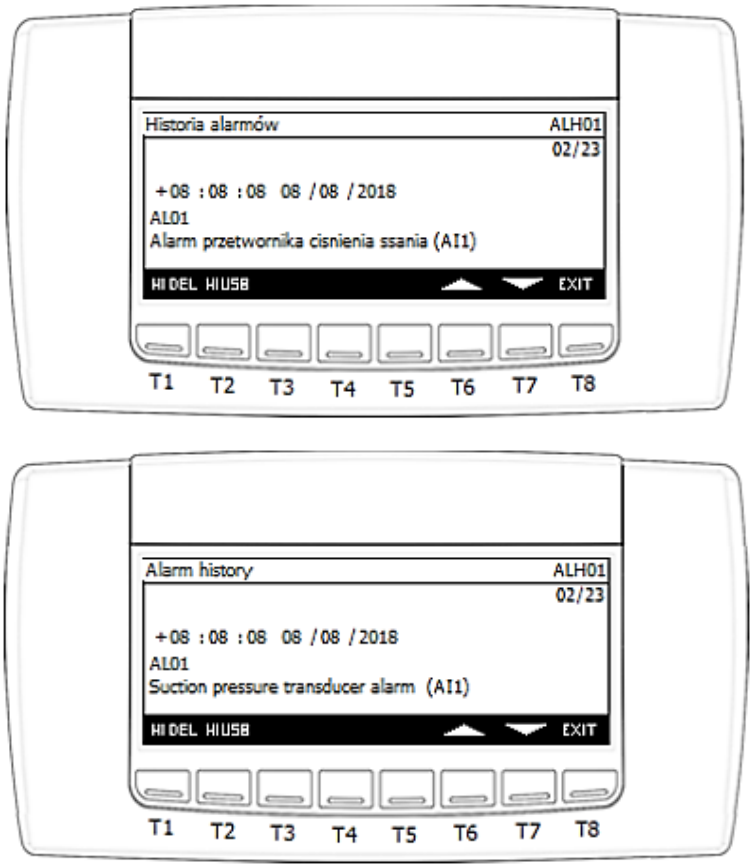
Alarm history screen:

– No register entries, or the history has been deleted.





– If there is any entry in the register the driver will display the following information:
  - alarm number rising and their total number,
  - the date and time of the event:
    - a “+” before the date indicates an alarm condition,
    - a “-” before the date indicates ending of the alarm condition,
  - alarm code according to the alarm table;
– Content of the alarm.



Functions assigned to each button:

T1 – when held down for about 3 seconds it will delete the alarm history (the alarm log will remain in the controller).

T2 – when held down for about 1 second, it will export the alarm history to your USB flash drive.

T6 – previous alarm message. The button is active and only visible when at least 1 alarm is recorded in the history.

T7 – next alarm message. The button is active and only visible when at least 1 alarm is recorded in the history.

T8 – enter the alarm screen.

4.8. Unit messages readable from the service panel

Table of possible alarms and their codes:

AL01	Suction pressure transmitter alarm (AI1) Suction pressure transducer alarm (AI1)
AL02	Discharge pressure transducer alarm (AI2) Discharge pressure transducer alarm (AI2)
AL03	Compressor 1 crankcase temperature probe alarm (AI3) Compressor 1 crankcase temperature probe alarm (AI3)
AL04	Compressor 1 discharge temperature probe alarm (AI4) Compressor 1 discharge temperature probe alarm (AI4)
AL05	Compressor 1 suction temperature probe alarm (AI5) Compressor 1 suction temperature probe alarm (AI5)
AL06	Outside temperature probe alarm (AI6) Outside temperature probe alarm (AI6)
AL07	Low pressure switch alarm (DI2) Low pressure switch alarm (DI2)
AL08	High pressure switch alarm (DI3) High pressure switch alarm (DI3)
AL09	Compressor 1 thermal overload (DI4) Compressor 1 thermal overload (DI4)
AL10	Compressor 2 thermal overload (DI5) Compressor 2 thermal overload (DI5)
AL11	Condenser fan 1 alarm (DI7) Condenser fan1 alarm (DI7)
AL12	Condenser fan 2 alarm (DI8) Condenser fan 2 alarm (DI8)
AL13	Alarm from power sup. asymmetry/seq. monitor (DI11) Alarm from power sup. asymmetry/seq. monitor (DI11)
AL14	Brake channel over current (01) Brake channel over current (01)
AL15	Brake resistor overload (02) Brake resistor overload (02)
AL16	Software Instantaneous over current (03) Software Instantaneous over current (03)
AL17	Motor Thermal Overload (04) Motor Thermal Overload (04)
AL18	Power stage trip (05) Power stage trip (05)
AL19	Over voltage on DC bus (06) Over voltage on DC bus (06)
AL20	Under voltage on DC bus (07) Under voltage on DC bus (07)
AL21	Heatsink over temperature (08) Heatsink over temperature (08)
AL22	Under temperature (09) Under temperature (09)
AL23	Factory Default parameters have been loaded (10) Factory Default parameters have been loaded (10)
AL24	External trip (11) External trip (11)

AL25	DC bus ripple too high (13) DC bus ripple too high (13)
AL26	Input phase loss trip (14) Input phase loss trip (14)
AL27	Hardware Instantaneous over current (15) Hardware Instantaneous over current (15)
AL28	Faulty thermistor on heatsink (16) Faulty thermistor on heatsink (16)
AL29	Internal memory fault - IO (17) Internal memory fault - IO (17)
AL30	4-20mA Signal Lost (18) 4-20mA Signal Lost (18)
AL31	Internal memory fault - DSP (19) Internal memory fault - DSP (19)
AL32	User parameter default (20) User parameter default (20)
AL33	Motor PTC thermistor trip (21) Motor PTC thermistor trip (21)
AL34	Cooling Fan Fault (22) Cooling Fan Fault (22)
AL35	Drive internal temperature too high (23) Drive internal temperature too high (23)
AL36	Drive output fault (26) Drive output fault (26)
AL37	STO circuit fault (29) STO circuit fault (29)
AL38	Measured motor stator resistance varies (40) Measured motor stator resistance varies (40)
AL39	Measured motor stator resistance is too large (41) Measured motor stator resistance is too large (41)
AL40	Measured motor inductance is too low (42) Measured motor inductance is too low (42)
AL41	Measured motor inductance is too large (43) Measured motor inductance is too large (43)
AL42	Measured motor parameters not convergent (44) Measured motor parameters not convergent (44)
AL43	Modbus comms loss fault (50) Modbus comms loss fault (50)
AL44	No communication with compressor VFD No communication with compressor VFD
AL45	Oil recovery alarm Oil recovery alarm
AL46	No inverter compressor configuration No inverter compressor configuration
AL47	Dirty condenser Dirty condenser - alarm
AL48	Electric cabinet temperature probe alarm (AI7) Electric cabinet temperature probe alarm (AI7)

AL49	Master controller offline Master controller offline
AL50	Slave controller offline Slave controller offline
AL51	EEPROM memory error

5. Data configuration for surveillance systems / BMS

The device supports communication in Modbus RTU 2W standard (through the built-in port), and communication in Modbus TCP/IP standard through an optional USB/Ethernet converter connected to the USB port. The communication is configured via the Service menu on the BMS0x screens.

Modbus RTU operating modes available:

Transmission speed: 9600 bps, 19200 bps.

Parity control: None, Even, Odd.

Data bits: 7.8.

Stop bit: 1.2.

The entire data space is available as a “Holding register”, and supports: 3,6,16.

CAUTION!

All indices below relating to temperature and pressure values are represented by the INT variable. So a reading of e.g.: a temperature of 256 actually means 25.6°C and, analogically, a value of -111 means -11.1°C

Variable name	R/W	Physical address (dec)	uom	Min	Max	Comment
Condition of the unit	R	1	On/Off	0	1	0- Unit OFF 1- Unit ON
Status of the unit	R	2		0	13	0 – waiting, 1- ON, 2- OFF by keyboard 3- OFF by control switch, 4- OFF by BMS, 5- OFF. Manual mode, 6 - no function - reserve 7- operation - waiting for the load, 8- operation – oil recovery, 9- disabled by defrost start signal, 10- stopping, 11- waiting for pressure equalization, 12- OFF by alarm, 13- operation - emergency mode.
Suction pressure	R	3	bar	-1.0	45.0	Data must be formatted
Discharge pressure	R	4	bar	-1.0	45.0	Data must be formatted
Compressor crankcase heater	R	5	°C	-40.0	110.0	Data must be formatted
Discharge temperature	R	6	°C	-40.0	110.0	Data must be formatted
Suction temperature	R	7	°C	-40.0	110.0	Data must be formatted
External temperature	R	8	°C	-40.0	110.0	Data must be formatted
Switchgear chamber temperature	R	9	°C	-40.0	110.0	Data must be formatted
Suction temperature calculated from pressure	R	10	°C	-80.0	130.0	Data must be formatted

Discharge temperature calculated from pressure	R	11	°C	-80.0	130.0	Data must be formatted
Suction pressure setting	R	12	bar	-1.0	45.0	Data must be formatted
Suction temperature setting calculated from pressure	R	13	°C	-80.0	130.0	Data must be formatted
Discharge pressure setting	R	14	bar	-1.0	45.0	Data must be formatted
Discharge temperature setpoint calculated from pressure	R	15	°C	-80.0	130.0	Data must be formatted
Current suction overheating	R	16	K	-60.0	60.0	Data must be formatted
State of the protective function against excessive discharge pressure	R	17	On/Off	0	1	0 – Inactive, 1 – Active
Status of the protective function against too high a discharge temperature	R	18	On/Off	0	1	0 – Inactive, 1 – Active
Status of the protective function against too low an overheating on suction	R	19	On/Off	0	1	0 – Inactive, 1 – Active
Status of the oil recovery function	R	20	On/Off	0	1	0 – Inactive, 1 – Active
Alarm presence flag	R	21	On/Off	0	1	0 – Inactive, 1 – Active
Alarm reset	R/W	22	On/Off	0	1	0 – No reset, 1 – Reset
Remote on/off by BMS	R/W	23	On/Off	0	1	0- OFF by BMS, 1- ON by BMS,
Activation of night mode by BMS	R/W	24	On/Off	0	1	0- OFF by BMS, 1- ON by BMS,
Current night mode status	R	25	On/Off	0	1	0 – Inactive, 1 – Active
Compressor operating command	R	26	On/Off	0	1	0 – Inactive, 1 – Active
Compressor control	R	30	%	0	100	
Controlling the 1st condenser fan	R	31	%	0	100	
Controlling the 2nd condenser	R	32	%	0	100	

fan						
Inverter output current	R	50	A	0	100.0	Data must be formatted. One decimal place.
Inverter output power	R	51	kW	0	100.0	Data must be formatted. Two decimal places.
Inverter output voltage	R	52	V	0	500	
Inverter output frequency	R	53	Hz	0	500.0	Data must be formatted. One decimal place.
DC bus voltage of the inverter	R	54	V	0	600	
Energy supply to the compressor	R	55	kWh	0	9,999	Data must be formatted. One decimal place.
Energy supply to the compressor	R	56	MWh	0	U16	
Inverter power module temperature	R	57	°C	-10	150	Data should not be formatted. Read 50 = 50°C
Type of refrigerant	R	90		0	39	0-R22 1-R134A 2-R404A 3-R407C 4-R410A 5-R507A 6-R290 7-R600 8-R600A 9-R717 10-R744 11-R728 12-R1270 13-R417A 14-R422D 15-R413A 16-R422A 17-R423A 18-R407A 19-R427A 20-R245FA 21-R407F 22-R32

						23-HTR01 24-HTR02 25-R23 26-HFO1234yf 27-HFO1234ze 28-R455A 29-R170 30-R442A 31-R447A 32-R448A 33-R449A 34-R450A 35-R452A 36-R508B 37-R452B 38-R513A 39-R454B
Controller software version, the most significant part	R	91				
Controller software version, the least significant part	R	92				
Controller software version, middle part, compressor model code.	R	93		0	7	0-Not configured 1-Hitachi MS300DHV 2- Hitachi MS400DHV 3- Hitachi MS500DHV 5- Emerson XPV0382E-4X9

Alarm registers table - read only:

Group name	Physical address (dec)	Bit number	Description
Alarm code registry - 1 group	120	0	Suction pressure transmitter alarm (AI1)
		1	Discharge pressure transducer alarm (AI2)
		2	Compressor 1 crankcase temperature probe alarm (AI3)
		3	Compressor 1 discharge temperature probe alarm (AI4)
		4	Compressor 1 suction temperature probe alarm (AI5)
		5	Outside temperature probe alarm (AI6)

		6	Electric cabinet temperature probe alarm (AI7)
		7	Reserve
		8	Condenser fan 1 alarm (DI7)
		9	Condenser fan 2 alarm (DI8)
		10	Alarm from power sup. asymmetry/seq. monitor (DI11)
		11	Reserve
		12	High pressure switch alarm (DI3)
		13	Compressor 1 thermal overload (DI4)
		14	Oil recovery alarm
Alarm code registry - 2 group	121	0	No communication with compressor VFD
			No communication with the master controller
			No communication with the slave controller
Alarm code registry - 3 group	122		Reserve
Alarm code registry - 4 group	123	0	Brake channel over current (01)
		1	Brake resistor overload (02)
		2	Software Instantaneous over current (03)
		3	Motor Thermal Overload (04)
		4	Power stage trip (05)
		5	Over voltage on DC bus (06)
		6	Under voltage on DC bus (07)
		7	Heatsink over temperature (08)
		8	Under temperature (09)
		9	Factory Default parameters have been loaded (10)
		10	No inverter compressor configuration
		11	DC bus ripple too high (13)
		12	Input phase loss trip (14)
		13	Hardware Instantaneous over current (15)
		14	Faulty thermistor on heatsink (16)
Alarm code registry - 5 group	124	0	Internal memory fault - IO (17)
		1	Dirty condenser
		2	Internal memory fault - DSP (19)
		3	User parameter default (20)

		4	Motor PTC thermistor trip (21)
		5	Cooling Fan Fault (22)
		6	Drive internal temperature too high (23)
		7	Drive output fault (26)
		8	Reserve
		9	Measured motor stator resistance varies (40)
		10	Measured motor stator resistance is too large (41)
		11	Measured motor inductance is too low (42)
		12	Measured motor inductance is too large (43)
		13	Measured motor parameters not convergent (44)
		14	Reserve
Alarm code registry - 6 group	125		Reserve