New Tech Holding

JBS-600 Multi-zone Gas Controller

User Manual

ID: JBS-600

Manual P/N: 0101-1123

Revision 3

9 November 2023

Contents

1 Introduction

In order to ensure safe and proper operation of the JBS-600 multi-zone gas controller please read the original manual carefully and follow the instructions contained therein. Manual contains important information about system installation, operation and service.

1.1 Used Symbols

In this manual following symbols were used:

Warning

This symbol indicates a potential hazard associated with improper use of the device. It draws attention to a procedure, condition, etc., which, if not properly performed or met, could result in personal injury or death.

Warning

This symbol indicates a potential electric shock hazard. It draws attention to a procedure, condition, etc., which, if not properly performed or complied with, could result in personal injury or death.

Important

The use of this symbol draws attention to a procedure, condition, etc., which, if not properly performed or met, may cause the device malfunction, damage or warranty voidence.

1.2 Safety measures

Warning

The device can be connected and operated only after reading the content of this manual.

Warning

The manufacturer is not responsible for errors, damages or failures caused by incorrect operation, faulty installation or misunderstanding of the content of this document.

Warning

The use of non-original replacement parts is not allowed.

Warning

Self repair or modifications of the device are not allowed. The manufacturer is not responsible for their effects.

Warning

The use of damaged or incomplete device is unacceptable.

Warning

The devide was not designed for use in areas classified as hazardous (in particular ATEX explosion hazard zones). For your own safety, it should not be installed in the above-mentioned areas.

Warning

This device is not safety device. Some of the gases detected by this instrument may be flammable/explosive. A properly configured instrument is designed to alarm at concentrations lower than the lower explosiveness limit of the gas. As such, it is the buyer's responsibility to immediately plan their response to any gas leaks as soon as they are discovered. This device never should be used to measure or sample gases at or above their lower explosion limits.

Important

This device can operate at a voltage of 24VDC +/- 10%. The power consumption of the system is typically <30W. It is recommended that the system be connected directly to a DC power source, preferably to its own circuit with a UPS or surge protection.

Warning

Under no circumstances should the appliance be used without connection to protective grounding. Doing so poses a risk of electric shock and is a violation of the safety standards applicable to this type of equipment.

Warning

Under no circumstances should the device be operated in the presence of flammable liquids, vapours or aerosols. Operating in such an environment is a safety risk.

Warning

Accessing the interior of the appliance should be done with extreme caution. Only qualified personnel with the appropriate qualifications should make calls and make adjustments. Always disconnect the power supply before opening the appliance housing.

Warning

The appliance should not be used if there are any signs of malfunction or fault. In this case, disconnect the power supply and then contact the manufacturer's service.

Warning

Installation and connection of the appliance should be carried out by a technician with the appropriate qualifications and must comply with all applicable NEC/CEC standards and local safety regulations.

Warning

For device connection use prepared cable glands. Drilling the device housing is a serious violation of safety standards and will void the warranty.

Important

For cleaning exterior housing use dry cloth. Under no circumstances you should not use soap and/or water.

1.3 Product information

The device is an 8, 16 or 32-channel controller, in the basic version equipped with a 4-inch color display, designed to monitor and detect gas leaks. The system cooperates with gas detectors via Modbus RTU interface of the NET-Ex, C3-NET and JBS-410 series. In addition, it has the ability to control external devices (e.g. sirens, ventilation) using relays. JBS-600 Multi-zone Gas Controller is responsible for:

1. Power delivery for detectors.
2. Data readout via Modbus RTU.
3. Signaling of exceeding alarm thresholds.
4. Signaling malfunction of devices.
5. Controlling external devices using relays.
6. Providing master devices with information about the system status via the Modbus RTU and Modbus TCP protocols.
7. Control of the external shut-off valve.

The operation of the device requires only periodic calibration of the detectors and inspection of the control module of the external shut-off valve. JBS-600 Multi-zone Gas Controller is equipped with diagnostic functions that check the device for faults on an ongoing basis. A large, easy-to-read display provides the operator with an overview of important operating parameters at all times.

1.3.1 Detectors

The device can be equipped with up to 8, 16 or 32 (depending on version) detectors of the NET-Ex, C3-NET or JBS-410 series. The list of supported gases is available on the manufacturer's website.

1.3.2 Relay outputs

System is equiped with up to 16 relay outputs with switching capacity 15A (24VDC/240VAC). Everyone can be assigned to one or more events (exceeding the alarm threshold, detector failure, etc.).

1.3.3 External devices comunication

Device can work as a Modbus TCP Server and Modbus RTU Slave allowing read of basic work parameters (more information in futher sections).

1.4 Device specification

Table 1 shows device specifications. Do not exceed operating parameters listed therein.

1.5 Device marking

The following form of device marking is used:

JBS-600(/[1])-[2]-[3]-[4]

[1] optional field; custom production - modification for special order

[2] maximum number of supported detectors: **8D, 16D, 32D**

[3] relays count: **0..16R**

[4] solenoid valve control module presence: **0EZ**, **1EZ**

Example:

JBS-600/GSV-16D-10R-1EZ

Custom production device (“GSV”) supporting up to 16 detectors, equipped with 10 relays and a shut-off solenoid valve control module.

Rated power supply parameters		
1	Voltage	24VDC +/-10%
2	Power	<30W
Environmental conditions		
3	Operation temperature	0 - 40^{o}C
4	Relative humidity	20 - 70% RH
5	Altitude limit	1000m
Relay output parameters		
6	Relays K01 - K16	Contacts not protected 15A (24VDC/240VAC)
Parameters of the output controlling the external shut-off valve		
7	Closing voltage value	24VDC
8	Min. load resistance value	4Ω
9	Max. line resistance value	0,5Ω
10	Type of closing impulse	3 pulses 0,5s
Signalization		
11	Optical signalization	4" 480x320 display
Other parameters		
13	Electrical protection class	I or III
14	IP Protection Class	None
15	Number of cable entries	11 + RJ45 port
16	Maximum detector distance	200m
17	Dimensions LxWxH	225x174,8x79,75mm

Table 1: Device specifications

2 Installation

Warning

Risk of explosion! Do not install the device in an atmosphere containing flammable liquids, vapors or aerosols. The operation of any electrical equipment in such an environment poses a threat to health and life.

Important

Always disconnect the power supply before opening the device enclosure.

Warning

Drilling into the device casing may lead to irreversible damage and will void the warranty. Only use the cable glands provided for electrical connections.

Warning

The system contains sensitive electronic components that can be easily destroyed. Do not touch any of these items.

Important

The device has been tested prior to shipment, however it is recommended to re-inspect it prior to installation for any signs of damage.

2.1 Installation notes

The device should be installed exactly as follows:

1. Check the device for possible damage.
2. Choosing the right place and installing the device.
3. Connect detectors.
4. Connect relay outputs and solenoid valve if needed.
5. Connect Modbus TCP (Ethernet) output and/or Modbus RTU Slave output.
6. Connect 24VDC.

2.2 Device dimensions

Figure 1 shows the dimensions of the housing containing the electronics [mm].

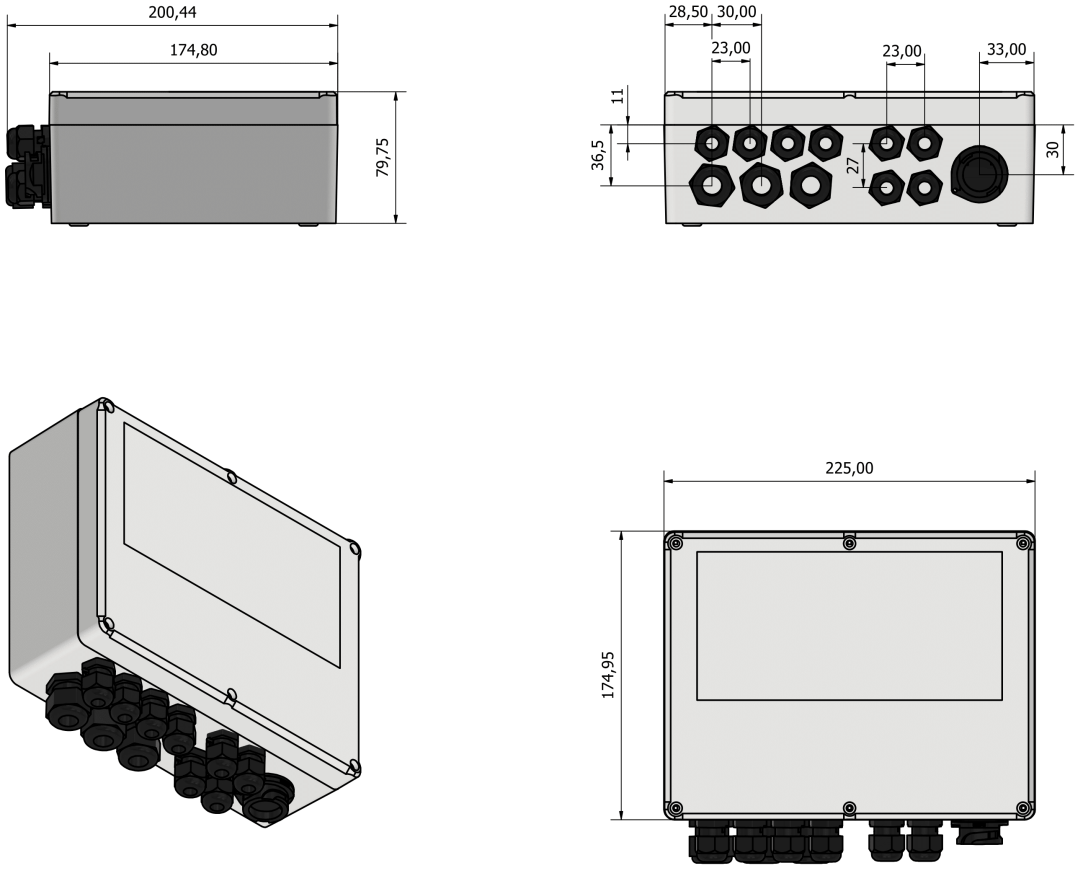

Figure 1: Housing dimensions

2.3 System components

The device has the following elements highlighted in Fig. 2:

1. 3-pin plug for connecting the power supply: +24VDC, 0V, PE
2. 2-pin plug for connecting the solenoid valve: +24VDC, 0V
3. 5-pin plug for connecting power supply and detector communication: +24VDC, 0V, A, B, PE
4. 3-pin plug for connecting the master device via the Modbus RTU protocol: A, B, PE
5. 3-pin plugs for connecting the output from relays (K1..16): NO, COM, NC
6. Złącze taśmowe do podłączenia panelu czołowego
7. Space for battery installation (CR2032)
8. RJ45 port for connecting a master device via the Modbus TCP protocol

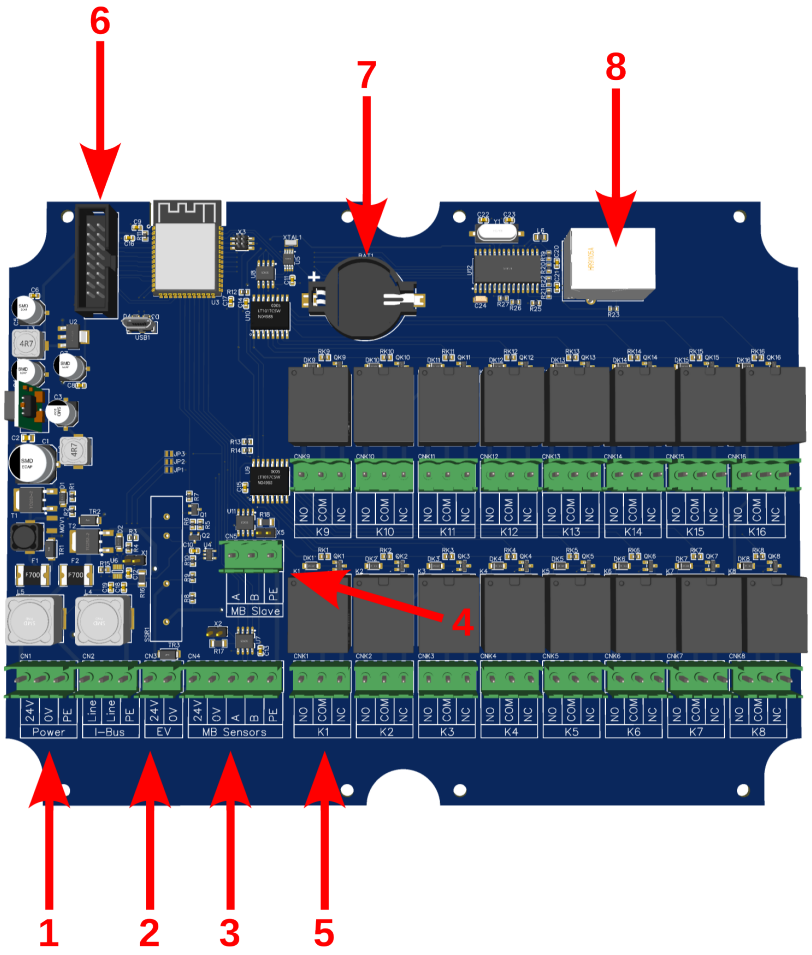

Figure 2: Motherboard

2.4 Cable glands

The device has the following cable entries:

1. 8 x M16x15
2. 3 x M20x1,5
3. 1 x RJ45 port

2.5 Installation

Dirt, grease and oil may adversely affect the operation of the system. JBS-600 Multi-zone Gas Controller should be installed away from direct sunlight in a clean, dry place. It is also recommended to choose a mounting location that is easily accessible for visual monitoring and servicing. The system must be installed using the supplied mounting hardware. Drilling into the housing is strictly prohibited and will void the warranty. The manufacturer has provided 4 ϕ5mm mounting holes with a spacing of 212.15x145.15mm.

2.6 Detectors connection

NET-Ex, C3-NET or JBS-410 series detectors should be connected to the connector marked with number 3 in Fig. 2, creating a bus topology with branches no longer than 1 m. Three examples of a valid Modbus RTU network topology are shown in Fig. 3. The first and last device in the network should be terminated with a 120Ω resistor. When connecting next detectors to the bus, keep in mind the process of registering detectors in the system, described in more detail in the 5.1 section.

It is recommended to use shielded cables with paired conductors, e.g. LiYCY 2x2x1.0. The selection of cables should take into account the supply voltage drop. In addition, one pair of wires should be dedicated to powering the detectors and one pair of wires for Modbus RTU communication. Under no circumstances should pairs be mixed!

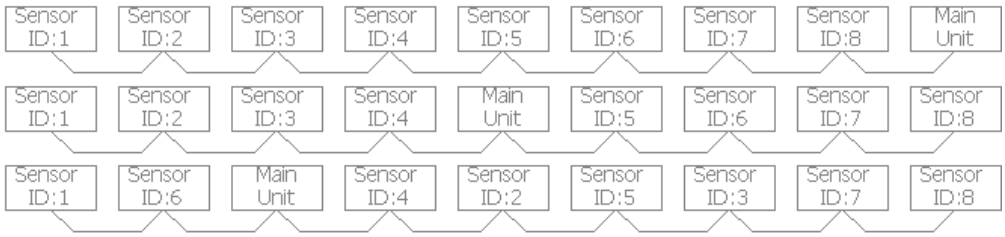

Figure 3: Examples of Modbus RTU network topologies

2.7 Relays connection

ddConnecting the relays should start with installing cable glands in the holes provided for this purpose. Then, route the cables through the glands and connect them to the appropriate K01..K16 relays.

Important

When connecting relays, take into account their maximum switching parameters: 15A (24VDC/240VAC).

Warning

When starting JBS-600 Multi-zone Gas Controller , it may take several seconds for the relays to be in their proper state.

2.8 Power connection

The 3 wires should be connected with a plug to connector no. 1 (fig. 2) in according order: +24V, 0V, PE. To connect the power supply, use wires with a cross-section of at least 1.5mm^2.

Warning

Do not connect the device without a PE.

2.9 Ethernet Connection

The device can operate as a Modbus TCP Server. For this purpose use an RJ45 connector located in the lower plane of the device. To connect to the network, unscrew the RJ45 connector cover and then connect the Ethernet cable.

2.9.1 Modbus TCP

The device can work as a Modbus TCP Server. The 2 table contains a list of supported registers.

Default device configuration for Modbus TCP Server:

- Address IP: 192.168.2.100/24
- Port: 502

2.9.2 Modbus RTU

The device can work as Modbus RTU Slave. The 2 table contains a list of supported registers.

Default device configuration for Modbus RTU Slave:

- node id: 1
- baudrate: 9600
- parity: none

No.	Address	Length (byte)	Data type	Description
Input register				
1	0x0000	2	uint16	Controller error register - see section 3.6
2	0x0001	2	uint16	Controller warning register - see section 3.7
3	0x0002	2	uint16	Life counter
4	0x1000 + 0x10*n for detector n=1..32	4	float	Gas concentration
5	0x1002 + 0x10*n for detector n=1..32	2	uint16	Detector error register For JBS-410 - see section 3.9 For NET-Ex,C3-NET - see section 3.8
6	0x1003 + 0x10*n for detector n=1..32	2	uint16	Sensor error register - see section 3.11 (only for JBS-410)
7	0x1004 + 0x10*n for detector n=1..32	2	uint16	Sensor status register - see section 3.10 (only for JBS-410)
8	0x1005 + 0x10*n high for detector n=1..32	1	uint8	Status: Bit 0 - Heating Bit 1 - Alarm 1 Bit 2 - Alarm 2 Bit 3 - Overrange Bit 4 - Error Bit 5 - No communication Bit 6 - Service mode
9	0x1005 + 0x10*n low for detector n=1..32	1	uint8	Detector type: 0 - Not connected 1 - JBS-410 2 - NET-Ex or C3-NET

Table 2: Modbus TCP/RTU registers

3 Operation description

3.1 Introduction

Integrated touch screen is basic user interface of JBS-600 Multi-zone Gas Controller . It provides access to current operating parameters (gas concentration, sensor status, etc.), alarms and detetector configuration.

3.2 System start

When JBS-600 Multi-zone Gas Controller is connected to power, diagnostic tests will be performed and then the main screen will be displayed. The sensors warm up for the first 2 - 7 minutes depending on the type. During this time, their status changes to "Heating" and the yellow indicator light comes on. At this time, the detectors do not measure gas concentration.

3.3 Duty cycle

The typical operating cycle of the device is based on sequential data exchange between the controller unit and subsequent detectors: a query is sent to detector No. 1, the response is analyzed, a query is sent to detector No. 2, the response is analyzed, etc. Regardless of the number of registered detectors, the device each time goes thorugh the entire detectors cycle. The JBS-600 Multi-zone Gas Controller device, depending on the response of the appropriate detector, changes the values on the main screen: gas concentration, status (exceeding alarm thresholds, device error, heating, etc.) and indicators.

3.4 Navigation

To navigate through the screens, tabs, etc. listed below, the manufacturer has provided 2 options:

1. Touch screen that allows you to navigate the system using the included stylus.
2. Navigation keyboard equipped with the following buttons:
    - << - previous (switch tab to the left)
    - >> - next (switch tab to the right)
    - Λ - up
    - V - down
    - < - left
    - > - right
    - OK - ok
    - ESC - back

3.5 SD card

There is event recording on an SD card (16GB) sufficient for approximately 5 years. Available only through the manufacturer.

Important

Removing or replacing the SD card while the unit is in operation is not recommended.

3.6 Error register

The JBS-600 Multi-zone Gas Controller error register is read from the position of the master via Modbus RTU protocol (section 2.9.2) and Modbus TCP (section 2.9.1). If the error register is not empty, the corresponding entry will also appear in the "Alarms" tab (see section 4.2).
Error register description:

- Bit 0 - Modbus RTU master inicialization error
- Bit 1 - Modbus RTU slave inicialization error
- Bit 2 - Modbus TCP Server inicialization error
- Bit 3 - Real-time clock inicialization error
- Bit 4 - Relay (1-8) inicialization error
- Bit 5 - Relay (9-16) inicialization error
- Bit 6 - Navigation keyboard inicialization error
- Bit 7 - Eeprom memory inicialization error
- Bit 8 - Analog-to-digital converter error
- Bit 9 - Real-time operating system error
- Bit 10 - Watchdog Error
- Bit 11 - Other error

Important

It is not possible to clear the error from this register. These errors are of critical type and clearing them is possible only by restarting the device.

3.7 Warning register

The JBS-600 Multi-zone Gas Controller warning register is read from the position of the master via Modbus RTU protocol (section 2.9.2) and Modbus TCP (section 2.9.1). If the warning register is not empty, the corresponding entry will also appear in the "Alarms" tab (see section 4.2).
Warning register description:

- Bit 0 - Reading from the analog-to-digital converter
- Bit 1 - Writing to relays (1-8)
- Bit 2 - Writing to relays (9-16)

- Bit 3 - Reading from navigation keyboard
- Bit 4 - Writing/reading to eeprom memory
- Bit 5 - Real-time operating system warning
- Bit 6 - Writing to SD card
- Bit 7 - Modbus RTU Master Reading
- Bit 8 - Connecting the Ethernet interface
- Bit 9 - Electro-valve actuation
- Bit 10 - Other warning

Important

Errors belonging to the warning register are self-clearing, i.e., the next time a particular activity occurs correctly, the error disappears.

3.8 Detector error register for NET-Ex or C3-NET

The error register of NET-Ex and C3-NET detectors consists of an error register (first 8 bits) and a warning register (last 8 bits). It can be read from the position of the master via the Modbus RTU protocol (section 2.9.2) and Modbus TCP (section 2.9.1). It is also available from the position of the configuration screen (section 5.2.1).
Description of the NET-Ex and C3-NET error register:

- 0x00 - No errors
- 0x01 - Heating
- 0x02 - Eeprom error
- 0x03 - Flash memory error
- 0x04 - Ram memory error
- 0x05 - Supply voltage (VCC) error
- 0x08 - Ground error (VGND)
- 0x0A - eeprom checksum error
- 0x0B - Sensor error (replace sensor)
- 0x0C - Analog output error (4..20mA)
- 0x0D - Virtual mass error
- 0x0E - Analog-to-digital converter error

Description of the NET-Ex and C3-NET detectors warning register:

- bit 0 - Fault
- bit 1 - Exceeding the 1st alarm threshold

- bit 2 - Exceeding the 2nd alarm threshold
- bit 3 - Exceeding the 3rd alarm threshold
- bit 4 - Exceeding the detector's gas range
- bit 5 - For internal use only
- bit 6 - For internal use only
- bit 7 - For internal use only

Example:
The NET-Ex detector register is 0x0B06. The value of the error register is 0x0B, which means a sensor error (the sensor should be replaced), and the warning register is 0x06 (active bit 1 and bit 2), which means exceeding the first and second alarm thresholds.

3.9 Detector error register JBS-410

The error register of the JBS-410 detector can be read from the master device via the Modbus RTU protocol (section 2.9.2) and Modbus TCP (section 2.9.1). It is also available from the configuration screen (section 5.2.1).

Description of the JBS-410 detector error register:

- bit 0 - Eeprom error
- bit 1 - Analog-to-digital converter error
- bit 2 - Temperature measurement error
- bit 3 - BLE error
- bit 4 - Modbus error
- bit 5 - Modbus configuration error
- bit 8 - Critical flash error
- bit 9 - Critical WDT error
- bit 10 - Critical real-time system error
- bit 11 - Critical modbus error
- bit 12 - Critical eeprom error
- bit 13 - Critical I2C error
- bit 14 - Critical BLE error
- bit 15 - Other error

3.10 JBS-410 Sensor status register

The JBS-410 sensor status register can be read from the position of the master device via the Modbus RTU protocol (section 2.9.2) and Modbus TCP (section 2.9.1).

Description of the JBS-410 sensor status register:

- bit 0 - Error
- bit 1 - Heationg
- bit 2 - Exceeding the 1st alarm threshold
- bit 3 - Exceeding the 2nd alarm threshold
- bit 4 - Exceeding the 3rd alarm threshold
- bit 5 - Alarm direction

3.11 JBS-410 Sensor error register

The JBS-410 sensor error register is read from the position of the master device via the Modbus RTU protocol (section 2.9.2) and Modbus TCP (section 2.9.1). It is also available from the configuration screen (section 5.2.1). Description of the JBS-410 sensor error register:

- bit 0 - Zero calibration error
- bit 1 - Span calibration error
- bit 2 - Alarm setting error
- bit 3 - Gas concentration below the range
- bit 4 - Gas concentration above the range
- bit 5 - No reading from the sensor
- bit 6 - The sensor needs to be replaced

4 Main Screen

4.1 Data tab

The "Data" tab on the main screen (fig. 4) contains basic information that allows you to determine the status of a given detector:

- Label - a string allowing to uniquely identify a given detector.
  By default it is "Detector: n".
- Type of gas being measured
- Gas concentration - current measured gas concentration value.
- Status - current status of a given detector, e.g. heating, unplugged, error, ok.
- Indicators - three indicator lights corresponding to the LEDs of the gas detector. They allow for a quick assessment of the condition.

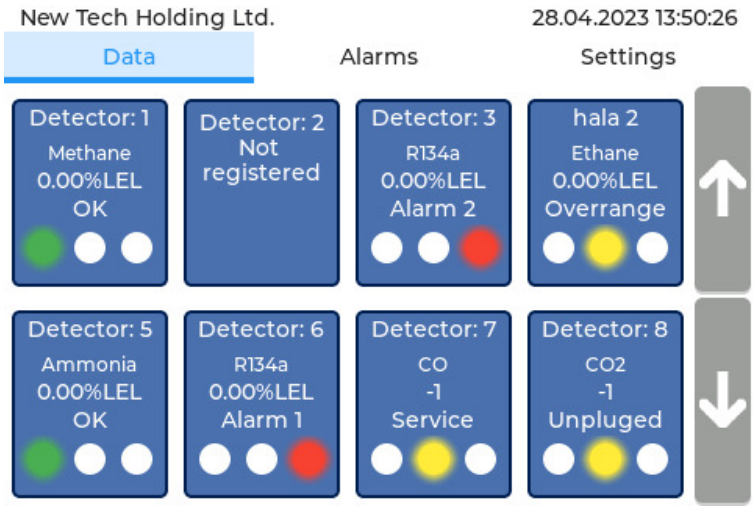

Figure 4: Main screen

4.1.1 Gas concentration

The gas concentration of a given detector is read at intervals lasting one device operation cycle (<60s). If the sensor reports an error or is heating up, the gas concentration is set to "-1" and its status changes accordingly. In other cases, the gas concentration is set to the value measured by the detector.

4.1.2 Sensor states

Detectors can carry a number of different states. Depending on them, the status of a given sensor changes and the according indicators light up. This is shown in the 3 table.

No.	Indicators			Status	Description
1	✓	✗	✗	OK	The device works normally. No alarm or error occurred. Gas concentration monitoring mode.
2	✗	✗	★	Alarm 1	The first alarm threshold has been exceeded.
3	✗	✗	✓	Alarm 2	The second alarm threshold has been exceeded.
4	✗	✓	✗	Error	The device does not measure gas concentration. A critical sensor head error has occurred. Please contact the manufacturer's service.
5	✗	✓	✗	Overrange	The measurement value is outside the range. Action identical to Error status.
6	✗	✓	✗	Heating	The device does not measure gas concentration. Sensor is still heating.
7	✗	✓	✗	Unpluged	No communication with detector.
8	✗	★	✗	Service	Service mode.

Table 3: Possible sensor state: ✓- indicator light on, ✗- indicator light off ★ - indicator flashing

4.2 Alarms

The second important tab of the device is "Alarms" (fig. 5). It is responsible for displaying and managing alarms. Each alarm consists of 4 sections, respectively: date and time of alarm appearance, alarm source, error type, status.
Possible alarm sources and types:

1. Detector n - nth detector alarm
   (a) "Treshold 1" - exceeding the first alarm threshold
   (b) "Treshold 2" - exceeding the second alarm threshold
   (c) "Error" - internal error or lack of communication with the detector
2. Controller - controller alarm
   (a) "Error" - controller internal error (the status field displays the current controller error register described in the 3.6 section)
   (b) "Warning" - internal warning of the controller, unable to acknowledge the alarm. (the status field displays the current controller warning register described in the section 3.6)
3. Electro Valve - solenoid valve control alarm
   (a) "Error" - the alarm appears when the solenoid valve is set to be triggered without its presence or when an attempt to trigger the solenoid valve fails (no solenoid valve, wire break, damaged coil). Confirming an alarm will remove it from the list in any event. The alarm may appear multiple times with each attempt of triggering the solenoid valve.

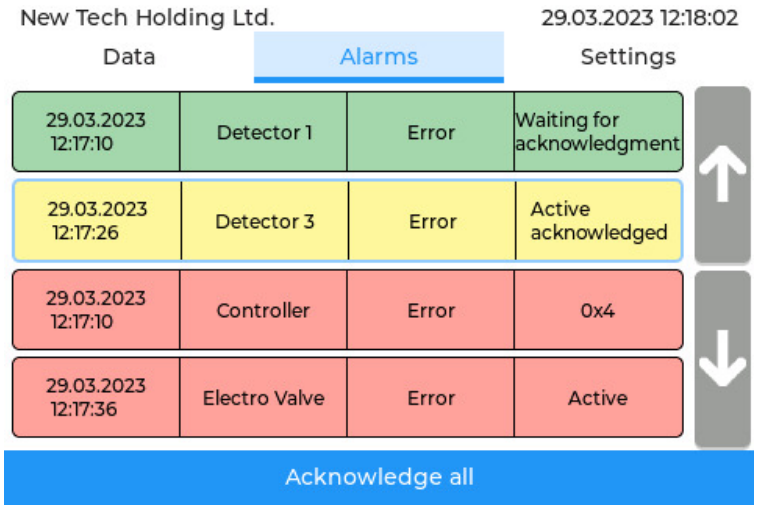

Figure 5: Event screen "Alarms"

Each of the previously mentioned alarms can have one of the following statuses:

- Active (color red).
- Active, Acknowledged - alarm is active, but was acknowledged by operator - this state turns off the alarm-related calls, e.g. relays (color yellow).
- Waiting for confirmation - historical information - the alarm is no longer active, acknowledgment removes it from the list (color green).

To acknowledge a specific alarm, click on it and confirm the action by clicking the "OK" button displayed in dialog box. It is also possible to acknowledge all possible alarms by clicking the "Acnowledge all" button at the bottom of the screen.

4.3 Settings

4.3.1 Introductory information

The "Settings" tab is password protected (fig. 6). The default password is "0000".

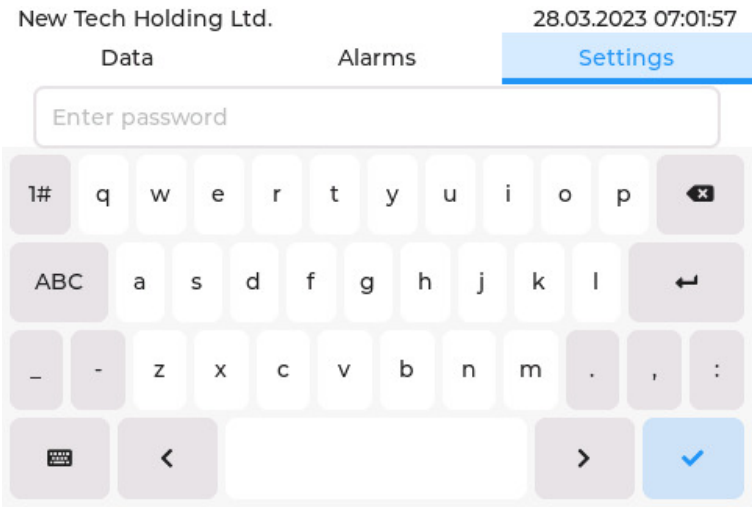

Figure 6: "Settings" tab

4.3.2 Log out

After entering the Settings tab, there is a logout button on the first panel (Fig. 7).

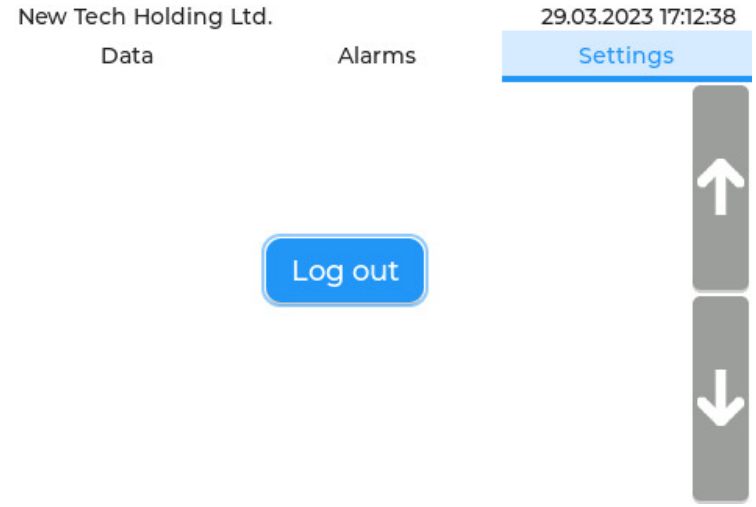

Figure 7: "Settings" - log out panel

Important

After 15min user will be automatically logged out.

4.3.3 Detectors configuration

After clicking the "Enter" button (Fig. 8), we will be taken to the detector configuration screen (Fig. 19) described in the section 5.

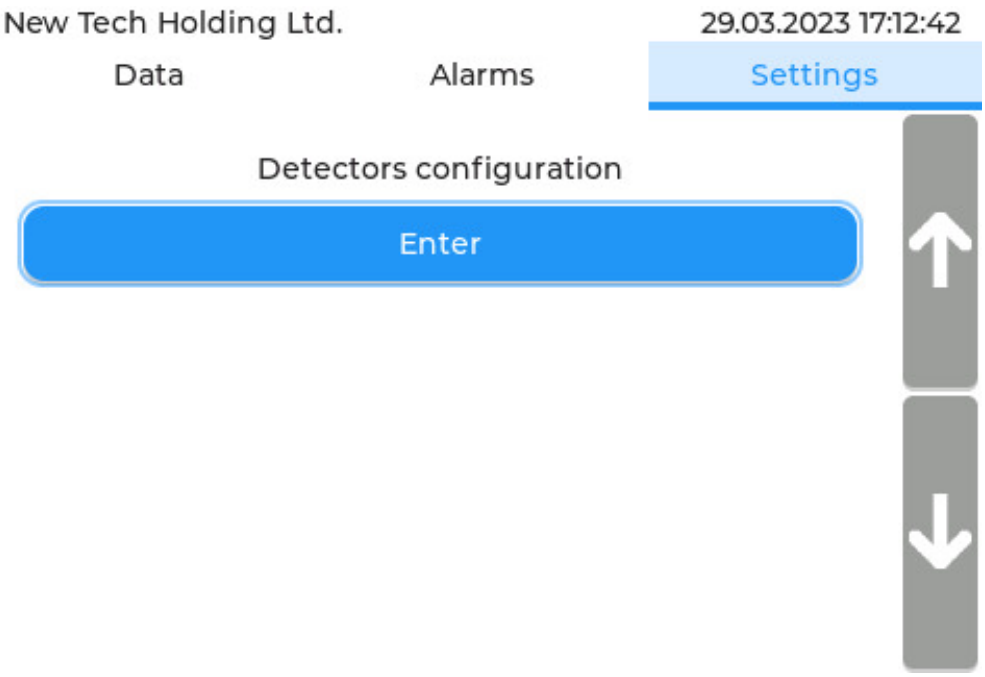

Figure 8: "Settings" tab - access panel for detector configuration

4.3.4 Change password

The "Change password" panel (Fig. 9) allows you to change the access password. Enter the current password in the "Current password" field. Enter a new password in the "New password" field. If the password entered in the "Current password" field is correct and the user confirms this operation in the displayed dialog box, the password will be changed.

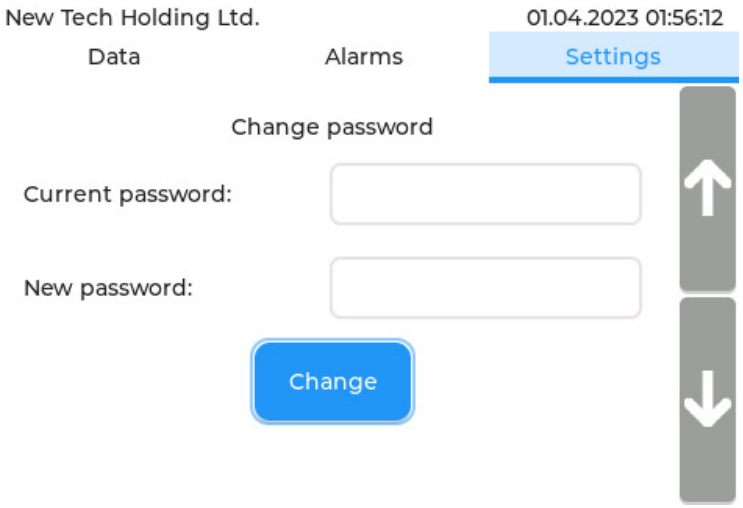

Figure 9: "Settings" tab - Change password panel

Warning

Changing the password is irreversible even by the device manufacturer.

4.3.5 Configuration of controller error calls

The "Controller error" panel (fig. 10) allows you to assign relay calls to controller errors. The call is active when the given button is blue.

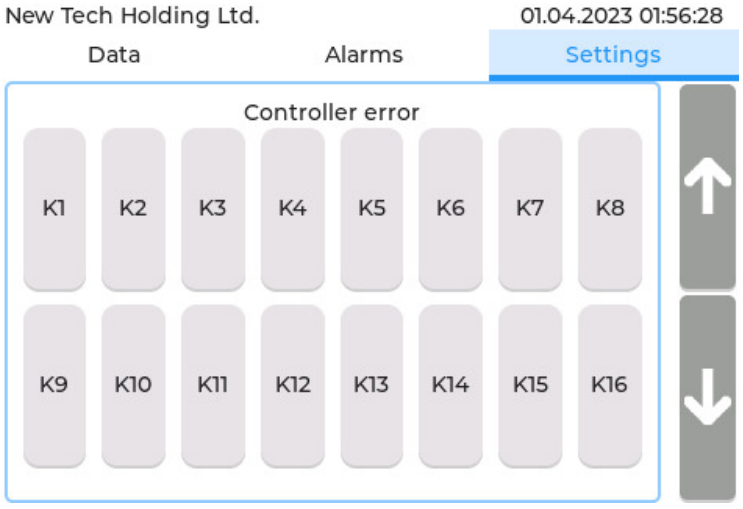

Figure 10: "Settings" tab - Configuration of controller error calls panel

4.3.6 Relays polarization

"Relays polarization" panel (fig. 11), after selecting the appropriate relay (blue relay color), its operating logic will be reversed: during normal operation, the relay will be switched on, but it will be disconnected during an alarm or failure.

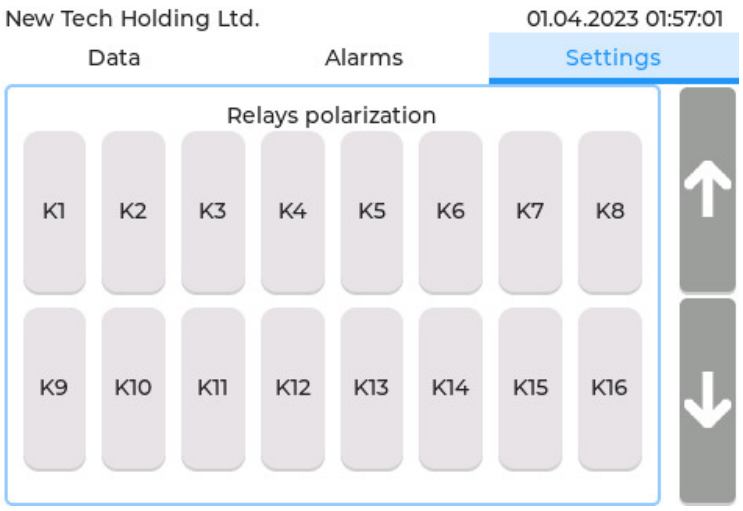

Figure 11: "Settings" tab - Relays polarization panel

4.3.7 Relays off delay

This device is equipped with the ability to program the time to keep the relays on after the alarm call stops. In the "Relays off delay" panel (Fig. 12) we can set this hold time by setting the value expressed in minutes for a specific relay and then clicking the "Update" button. To see the current values, press the "Reset" button. Entering the value "0" turns off the relay immediately after the alarms call stops.
For example:

- The K03 relay is configured to be activated when the first alarm threshold of detector number 1 is exceeded.
- In the Configuration of relays off delay panel, the K03 relay is set to 10 minutes.
- If detector number 1 detects exceeding the 1st alarm threshold, relay K03 will be activated. This relay will be active for an additional 10 minutes after the 1st alarm threshold stops.

Important

Time value time must be between 0 min and 60 min. Otherwise, the value 60min will be assigned.

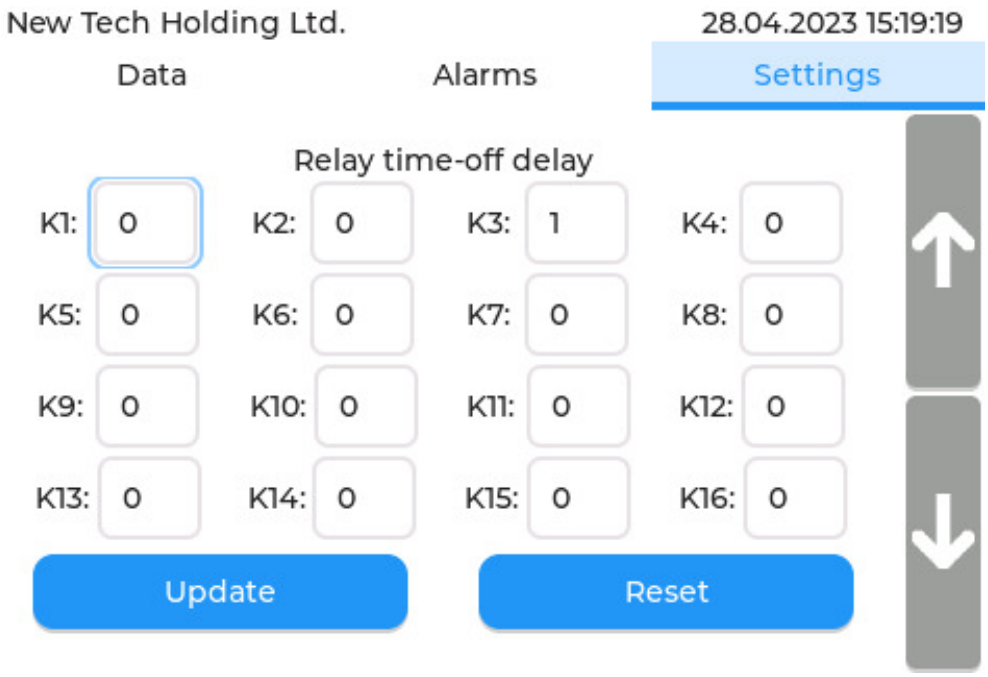

Figure 12: "Settings" tab - Relays off delay panel

4.3.8 Modbus TCP Slave settings

The "Modbus TCP Slave settings" panel (Fig. 13) allows you to configure communication parameters for Modbus TCP. The settings include: port, controller IP address, subnet mask and IP gateway. By clicking on individual fields, a keyboard will appear in which you should enter the desired value. After setting the improved values, press the "Update" button. To see the current values, press the "Reset" button.

Important

The "Update" button will not perform its action if incorrect values are set that do not comply with the TCP/IP standard.

Warning

Each change in Modbus TCP Slave parameters must result in a restart of the controller.

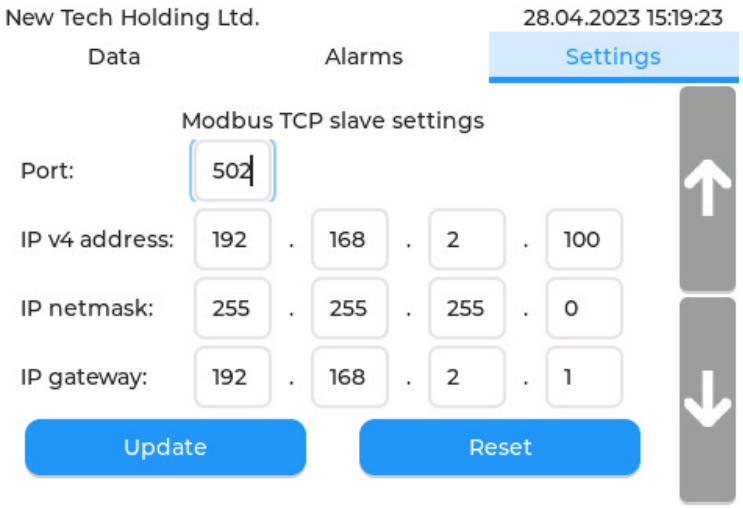

Figure 13: "Settings" tab - Modbus TCP Slave setting panel

4.3.9 Modbus RTU Slave settings

The "Modbus RTU Slave settings" panel (Fig. 14) allows you to configure Modbus RTU communication parameters. The settings include: id, parity (None, Even, Odd), baudrate (1200, 2400, 4800, 9600, 19200, 28400). By clicking on individual fields, a keyboard will appear in which you should enter the desired value or a drop-down list with individual options to choose from. After setting the improved values, press the "Update" button. To see the current values, press the "Reset" button.

Important

The "Update" button will not perform its action if incorrect values are set, e.g. ID outside the range 1-255.

Warning

Each change in Modbus RTU parameters must result in a restart of the controller.

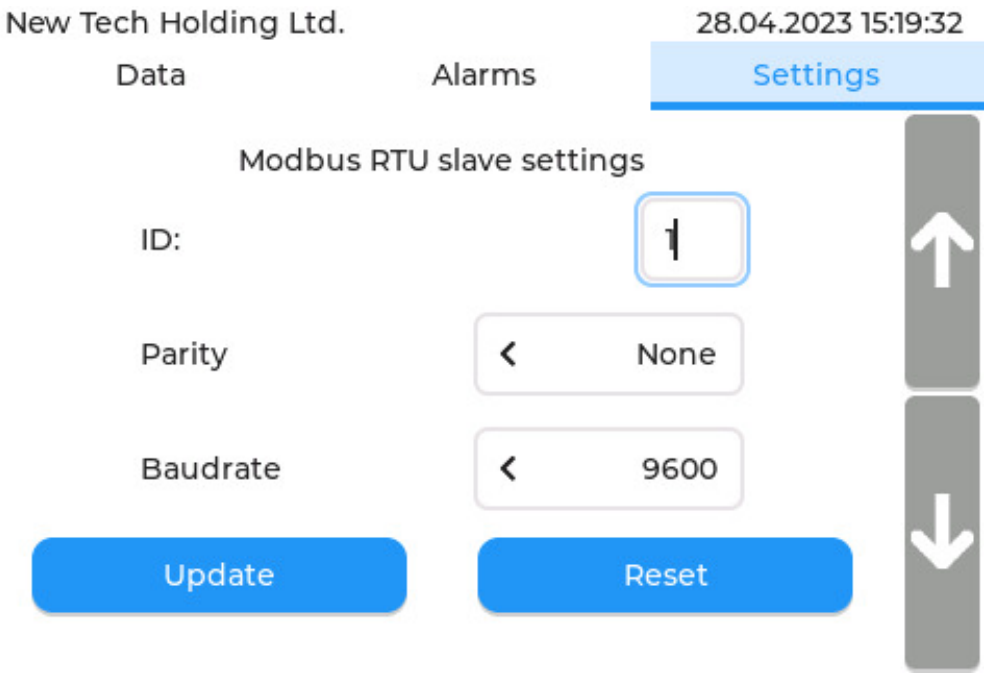

Figure 14: "Settings" - Modbus RTU Slave settings panel

4.4 Format SD card

The SD card format panel (Fig. 15) allows you to format the SD card. This process may take several minutes.

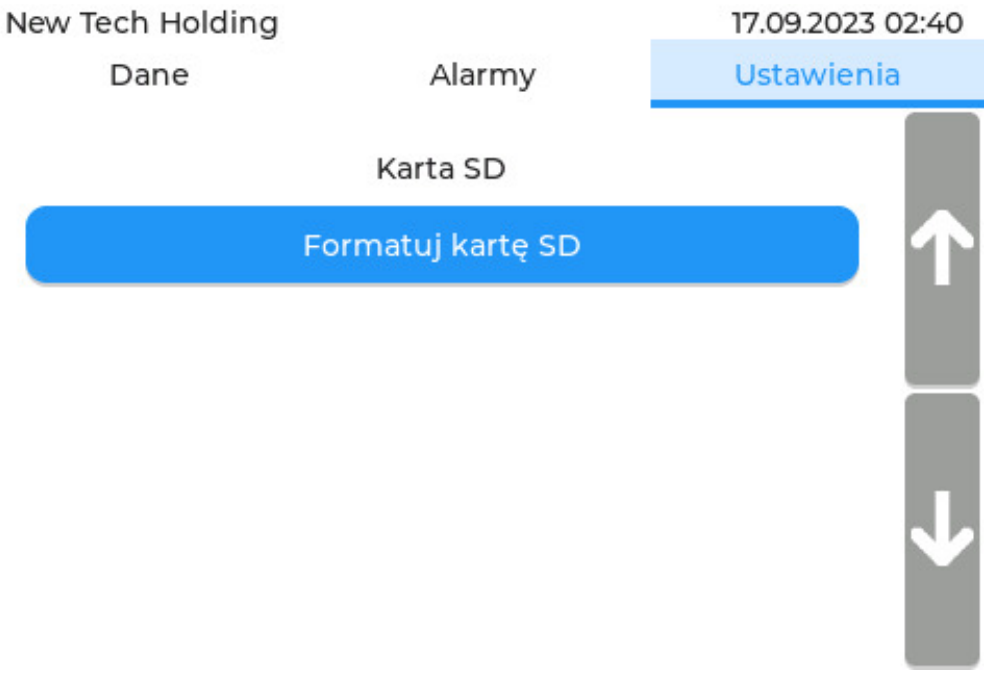

Figure 15: "Settings" tab - Format SD card panel

4.4.1 Time configuration

The "Clock" panel (Fig. 16) is used to change the current date and time of the internal RTC clock. On the left there are three "rollers" with "+" and "-" buttons responsible for changing: hours, minutes, seconds. There is a calendar on the right. At the top there are two buttons "<" and ">" responsible for changing the month, and below there are days. Click on the day you are interested in. After setting the improved values, press the "Update" button, which will result in updating the RTC clock.

Warning

For the correct operation of the RTC clock, a battery is required (section 2.3), which maintains the current time during a power outage.

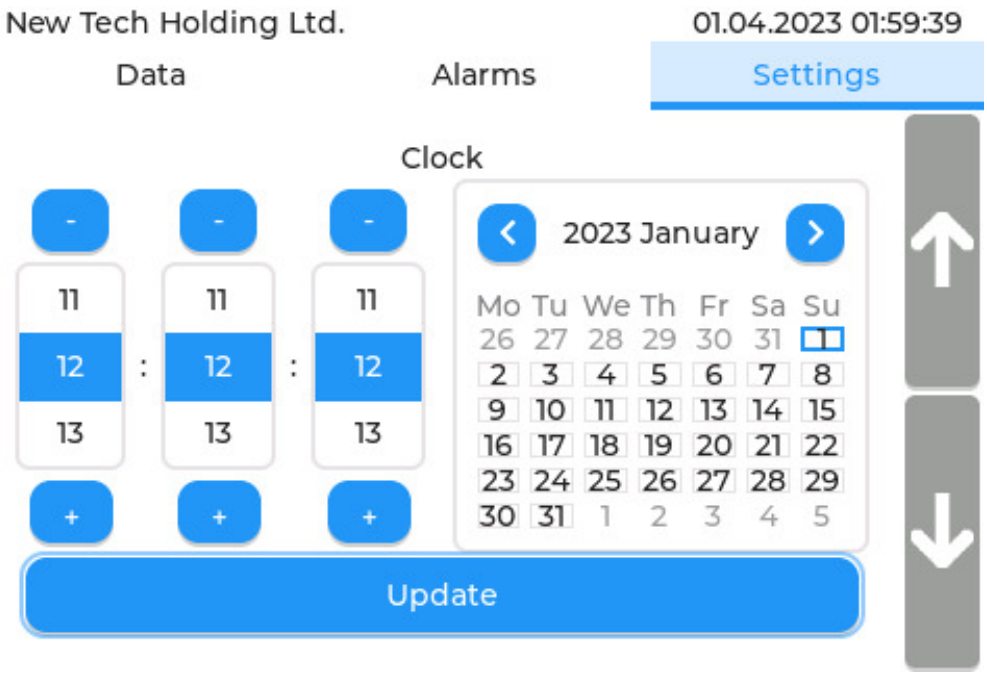

Figure 16: "Settings" tab - Clock panel

4.5 Language change

The language change panel (Fig. 17) allows you to select the operating language of the control panel. Currently available languages are:

- English
- Polish

Warning

Each language change must result in a restart of the control panel.

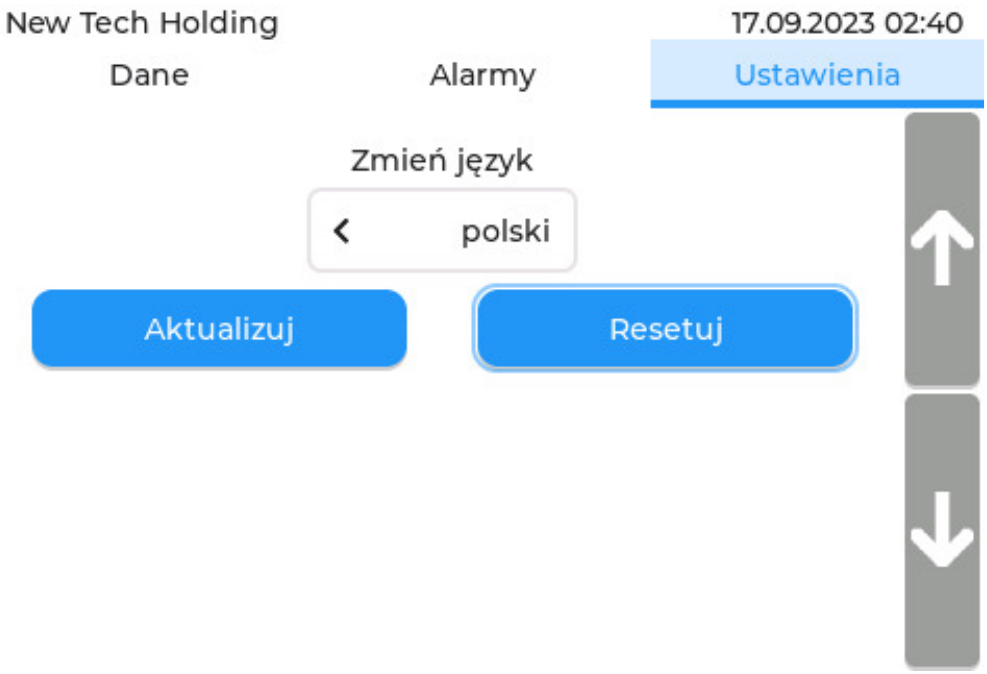

Figure 17: "Settings" tab - Language change panel

4.5.1 Information

The information panel (Fig. 18) contains the device serial number, hardware version and firmware version.

Figure 18: "Settings" tab - information panel

5 Detector configuration screen

The navigation arrows at the top of the screen (Fig. 19) are responsible for changing the detector (**<**, **>**). The "Go back" button allows you to return to the main screen.

5.1 Registering the detector

The gas detectors together with the JBS-600 Multi-zone Gas Controller device operate in the internal Modbus RTU network based on the RS485 bus, in which the "Master" role is played by the measurement controller. To better understand the operation of the system, it is recommended to read the documentation for the Modbus RTU protocol. When "out of the box" the detectors are unregistered, i.e. they have default ID=100.

Warning

Connecting detectors with the same ID to the controller (e.g. simultaneous connection of 2 unregistered detectors) will result in critical errors in readings or their complete absence. You should connect a maximum of one sensor to the system and then perform the registration procedure.

Important

Detectors with an ID within the range supported by the specific JBS-600 Multi-zone Gas Controller (max 32) will be automatically registered during the main read loop.

When starting the device for the first time, when there are no detectors registered, follow the procedure detailed in table 4.

By clicking the "Register detector" button (Fig. 19), the registration procedure begins.

No.	Description	Detector ID
1	Connect the first detector	Unregistered: 100
2	Go to the "Detector:1" tab and press the "Register detector" button	100 -> 1
3	Check whether the detector status has changed	1
4	Connect second detector	Unregistered: 100
5	Go to the "Detector:2" tab and press the "Register detector" button	100 -> 2
6	Check whether the detector status has changed	2
7	Repeat for additional detectors	

Table 4: Detector registration procedure

Figure 19: Configuration screen - Register detector panel

5.2 Configuration of the registered detector

After correctly registering the detector, an extensive information and configuration screen will appear.

Warning

While in this tab, JBS-600 Multi-zone Gas Controller reads only data from the currently configured detector.

Warning

The figures below show information for the NET-Ex series detector. For other types of detectors, the "General" and "Calibration" tabs may be slightly different.

5.2.1 General tab

The "General" tab (Fig. 20) displays basic information read from the detector.

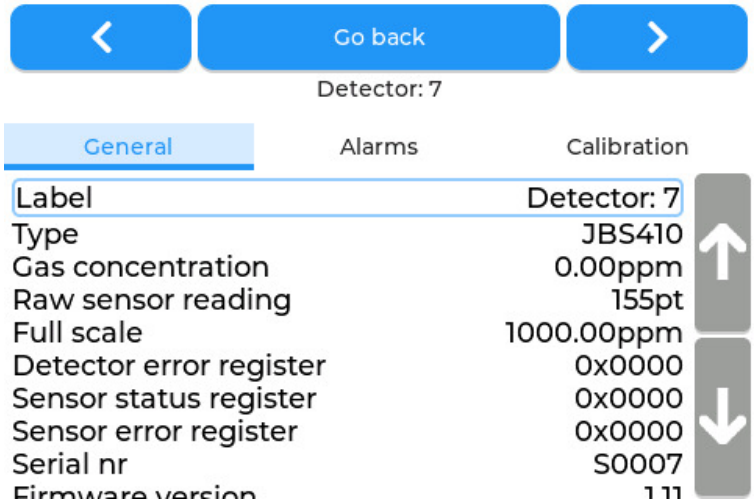

Figure 20: Configuration screen - "General" tab

5.2.1.1 Changing the detector label

To change the detector label ("Detector:n" by default), click the "Label:" field. After this action, a keyboard will be displayed where we can set a new label.

5.2.1.2 Procedure for deregistering a detector from the system

In order to remove, replace, etc. a detector, it must first be unregistered from the system. To unregister a detector, locate the "Unregister" button at the bottom of the "General" tab of the detector you are interested in (fig. 21). After clicking this button and confirming the action in the dialog box, the detector should be deregistered (i.e. the detector ID will be changed to the default ID=100), its memory will be cleared, and it will no longer be displayed on the main screen.

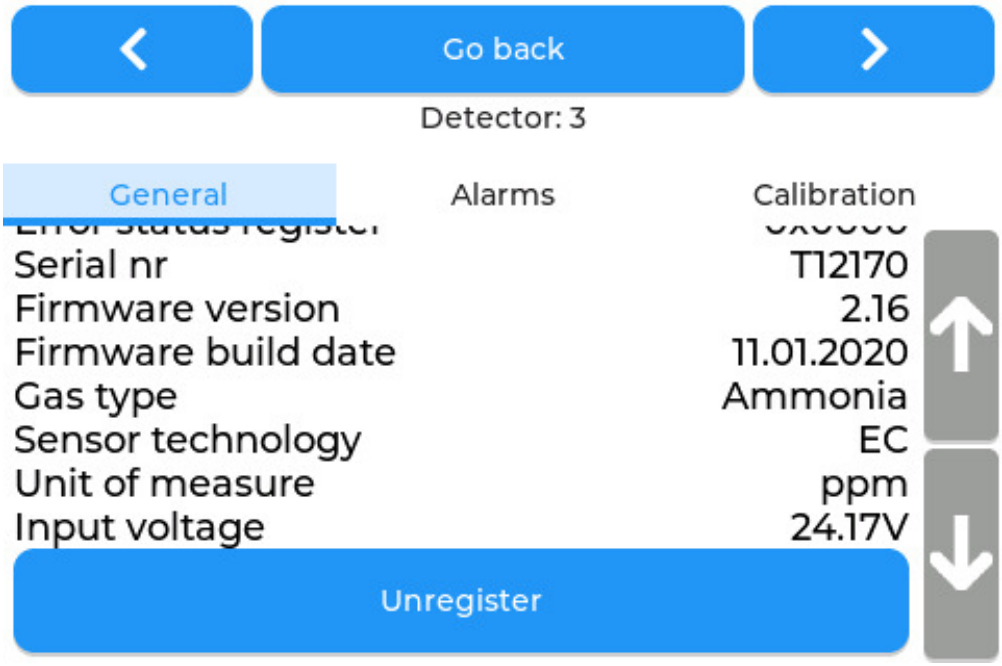

Figure 21: Configuration screen - "General" tab - second part

5.2.2 "Alarms" tab

In the "Alarms" tab (Fig. 22) There are 3 panels with a series of buttons responsible for configuring calls.

Figure 22: Configuration screen - "Alarms" tab

Figure 23: Configuration screen - "Alarms" tab

Figure 24: Configuration screen - "Alarms" tab

5.2.2.1 Calls configuration

It is possible to configure the calls for exceeding the 1st alarm threshold, exceeding the 2nd alarm threshold, as well as for an internal detector error. The individual panel allows you to set relay action and control the solenoid valve for a specific event (exceeding the 1st alarm threshold, exceeding the 2nd alarm threshold or detector error). Each relay has 2 states.

- Blue state - continuous activation of the relay during the call.
- Orange state - interval switching of the relay. The relay is turned on and off in 1 second intervals during the call.

The first press of the button responsible for triggering the relay will assign it a continuous state, the next press will assign it an interval state. The button responsible for the solenoid valve ("EV") only has a continuous state.

5.2.3 "Calibration" tab

The "Calibration" tab (Fig. 25) contains several basic parameters to facilitate calibration.

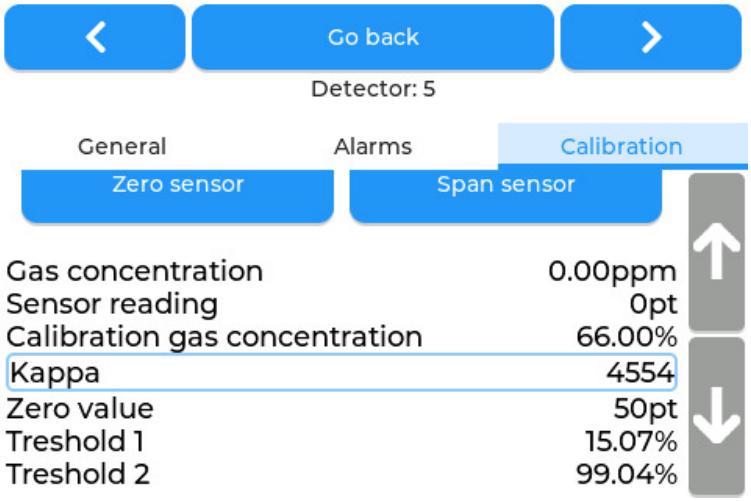

Figure 25: Calibration screen - "Calibration" tab 1

5.2.3.1 Setting the calibration gas concentration

The "Calibration gas concetration" field (fig. 25) is configurable, i.e. after clicking, you will be able to enter a new value.

5.2.3.2 Setting alarm thresholds

The Alarm "Threshold 1" and Alarm "Threshold 2" fields (fig. 25) are configurable, i.e. after clicking, you will be able to enter a new value.

Important

The value of the first alarm threshold cannot be set above the value of the second alarm threshold.

5.2.3.3 Service mode

At the top of the "Calibration" tab there is a button that activates the service mode ("Service mode: OFF") (fig. 25), which, when clicked, will put the detector into service mode. Clicking again exits this mode. Enabling the service mode allows you to conveniently configure and calibrate a given detector without triggering alarms and their events.

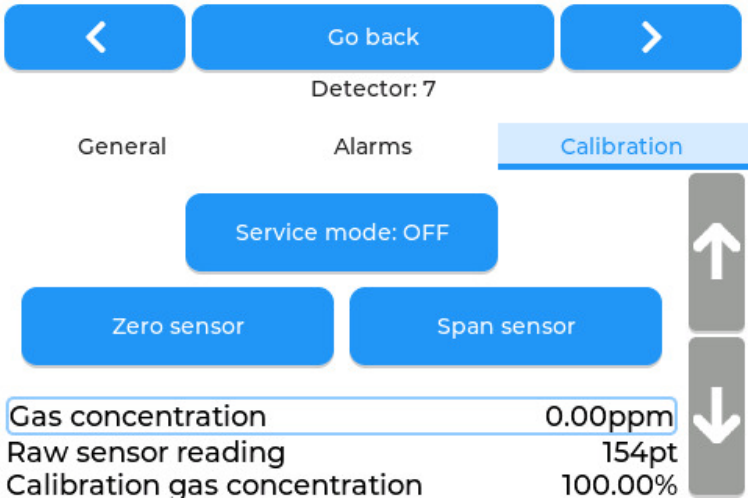

Figure 26: Calibration screen - "Calibration" tab 2

Important

Please note that calibration mode will not activate while the detector is heating or an internal error occurs.

Warning

The service mode function is not an internal option of the JBS410 series detectors, so after the controller restart, the service mode may be disabled.

5.2.3.4 Detector calibration

The detector calibration procedure is described in detail in the 6.2 and 6.3 sections.

6 Calibration

Gas detector calibration is a two-step process:

1. Zero calibration
2. Span calibration

Warning

Each calibration requires a two-step sequence: zero calibration followed by span calibration.

Warning

The span calibration procedure must always follow the zero calibration procedure.

6.1 Introduction

Sensors installed in NET-Ex, C3-NET or JBS-410 gas sensors are subject to the aging process and lose their properties. Due to this, periodic calibration of the sensors is required. It is based on matching the predicted sensor characteristic curve to the actual characteristic curve. This is done by setting two parameters:

1. Zero point - placing the sensor in an atmosphere that does not contain the measured gas.
2. Span factor - placing the sensor in an atmosphere containing a known concentration of the measured gas - this is done by feeding the test gas directly to the sensor head.

6.2 Zero calibration

Setting the zero point is done by:

1. Go to the "Settings" configuration screen (section 4.3.3).
2. Selecting the detector to be calibrated and then going to the "Calibration" tab.
3. Placing the sensor in an atmosphere that does not contain the gas to be measured or supplying synthetic air to the sensor input.
4. Wait until the "Raw sensor reading" reading stabilizes.
5. Enable service mode, if required (section 5.2.3.3).
6. Press the "Zero sensor" button.
7. Verification by checking for:
    - JBS-410 - whether the value from the "Raw zero value" position is the same as "Raw sensor reading".
    - NET-Ex, C3-NET -whether the value from the "Zero value" position is the same as "Sensor reading".

Important

Zero calibration is not possible while the detector is heating or an internal error occurs.

6.3 Span calibration

Span calibration is performed by:

1. Go to the "Settings" configuration screen (chapter 4.3.3).
2. Selecting the detector to be calibrated and then going to the "Calibration" tab.
3. Pressing on the "calibration gas concentration" field and entering the concentration value of the test gas we have.
4. Enable service mode if required (section 5.2.3.3).
5. Applying test gas to the sensor head.
6. Wait until the gas concentration reading stabilizes (approximately 3 - 5 minutes).
7. Press the span calibration button ("Span sensor").
8. Verify that the reading shows a concentration equal to the calibration gas concentration.
9. Verification whether for:
    - JBS-410 - the value of "raw span value" has changed.
    - NET-Ex, C3-NET - the value of "Kappa" has changed.
10. Stoping the supply of test gas, turn off the service mode and exit the configuration screen.

Important

Span calibration is not possible while the detector is heating or an internal error occurs.

6.4 Gas feeding process

The calibration procedure requires the application of test gas as follows:

1. Screw the flowmeter onto the test gas cylinder by hand.
2. Unscrew the air filter in the case of C3-NET sensors.
3. Connect the flowmeter output to the sensor input.
4. Open the gas flow.

After completing the gas supply: close the air flow, disconnect the flowmeter output from the sensor, screw on the filter and screw the flowmeter off the test gas cylinder.

Warning

The flowmeter is very delicate - do not use any tools to assemble it.

After correctly performing the calibration procedure, the current gas concentration reading should match the test gas concentration. Only after verifying this condition can the gas supply be completed and the calibration procedure considered successful.

Warning

If the gas concentration value read by the sensor 3 minutes after begining of the test gas does not reach 50% of the test gas concentration value, the calibration procedure should be interrupted and the sensor replaced.

7 Maintenance

Warning

Shock hazard! Always disconnect the power supply before opening the device casing.

Warning

The protective earth cable must be connected to the system. Under no circumstances should the device be operated without PE. Doing so creates a potential risk of electric shock and is a violation of safety standards applicable to this type of equipment.

Warning

Installation and connection of the device should be performed by a certified technician and must comply with all applicable NEC/CEC standards and local safety regulations.

Warning

It is not allowed to use spare parts other than those indicated by New Tech Holding.

Important

The system contains sensitive electronic components that can be easily destroyed. Do not touch any of these items.

7.1 Sensor calibration

Sensors, depending on type, should be calibrated:

- at least once a year (every six months is recommended) for sensors with an Electrochemical or NDIR sensor,
- at least twice a year (recommended every three months) for sensors with a catalytic sensor.

Additionally, calibration should be performed each time the gas concentration is recorded at 100% of the device's range or higher. Calibration may be performed more frequently if required by the user's internal regulations.

The calibration procedure is described in section 6.

7.2 Spare parts list

Name	P/N	Description
Control board	0102-0423	The main control board of the device
Navigation panel	0103-0423	Front navigation panel
2-pin connector	0104-0423	2-pin connector, detachable pitch = 5mm
3-pin connector	0105-0423	3-pin connector, detachable pitch = 5mm
5-pin connector	0106-0423	5-pin connector, detachable pitch = 5mm
Patchcord	0107-0423	Patchcord RJ45, 20cm
Battery CR2032	0108-0423	CR2032 battery to maintain the real-time clock
Ribbon cable	0109-0423	Ribbon cable, control board - navigation panel, 16-pin
Gland M16x1,5	0110-0423	Gland M16x1,5
Gland M20x1,5	0111-0423	Gland M20x1,5
RJ45 socket	0112-0423	RJ45 panel socket
Test gas	0113-0221	Calibration gas cylinder 110l
Flow regulator	0108-0221	Flow regulator 0.5l/min.

Table 5: List of spare parts and accessories

Number	Date	Description
Revision 1	02.04.2023	Creation
Revision 2	15.09.2023	2 states of buttons responsible for calling relays, casing visualization

Table 6: Revision table