

# User manual FirePLC BM-1000

## 1 Introduction

FirePLC BM-1000 is a programmable controller dedicated to fire ventilation, allowing the control of devices based on an algorithm stored in the device's memory. FirePLC modules can be installed in fire ventilation control panels that meet the PN-EN 12101-6 standard.

### 1.1 Technical Parameters

PARAMETER	VALUE
Supply Voltage	24 V DC $\pm$ 15%
Current usage	typ. 60 mA, $I_{MAX} < 130$ mA
Communication	Digital, Modbus RTU
Operating temperature	From $-25^{\circ}\text{C}$ to $+50^{\circ}\text{C}$
Storage temperature	From $-25^{\circ}\text{C}$ to $+70^{\circ}\text{C}$
Humidity	$<90\%$ RH, without condensation
Environmental Class	2
Output	Relays
Inputs	Digital
Case protection class	IP20
Dimensions	108 x 90 x 62 mm
Weight	270 g
Altitude above sea level	$<2000$ m AMSL
Mounting Type	TH35 Rail

### 1.2 Device description

The BM-1000 controller is equipped with twelve digital inputs with continuity control and six relay outputs, with the option to increase their quantity using expansion cards. On the front of the device, there are LED indicators indicating the status of inputs and outputs. Using a dedicated cable, it is possible to connect a computer with a configuration application to the controller for configuration or status checking purposes. Control is carried out using relays, whose status changes based on the controller's input states and the stored algorithm. Modules can be interconnected using a communication bus, up to 6 units in a single control panel of the system. Additional expansion cards extend the device's capabilities with digital inputs and outputs, analog input and output, and communication via RS485 interface with external devices from the FirePLC or BMS family. The device is designed for mounting on a TH35 rail.

## 2 Installation and startup

Before starting up the controller, make sure it does not exhibit any visible damage, and the installation has been carried out in accordance with the recommendations provided in this manual.

### 2.1 Installation recommendation

The device dimensions are presented in figure 1. The controller should be mounted on a TH35 rail according to figure 2. The housing in which the controller is mounted must provide a stable temperature, protection against sunlight, and humidity.

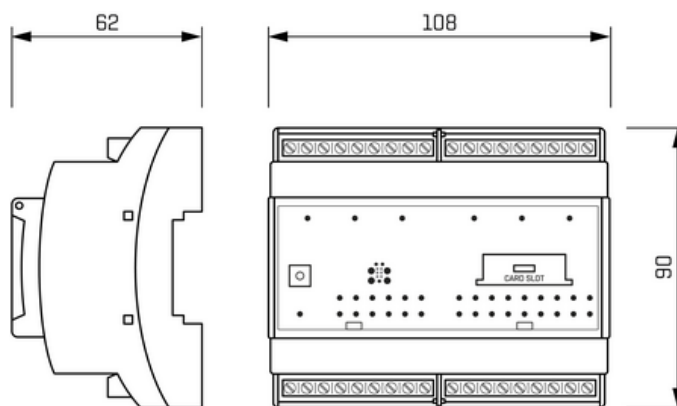


Fig. 1: Device dimensions in mm

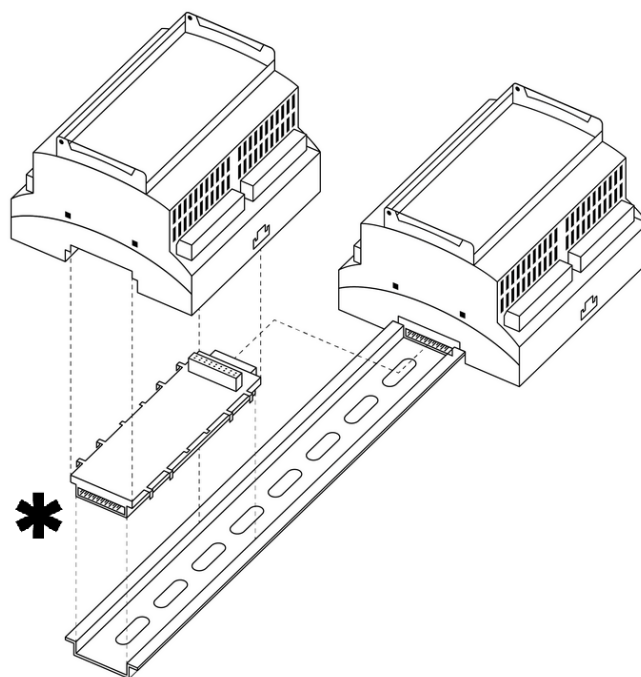


Fig. 2: Installation scheme

\* Communication bus sold separately.

#### Notes on safety!

- Before the first startup, carefully read this user manual.
- Neglecting to observe warnings and recommendations can result in electric shock, serious bodily injury, or fire.
- All connections and changes should be made with the power disconnected on all poles.

**Notes on safety!**

- Ensure proper operating conditions in accordance with the technical requirements of the device. Check the supply voltage, current output of the power source, and environmental conditions.
- Incorrectly connected controller may become damaged.
- Only qualified individuals (after familiarizing themselves with this user manual) are allowed to connect the controller and perform wiring.
- The responsibility for proper installation lies with the installer. Ensure that all guidelines and standards applicable in the given country are met.
- The controller may be installed in a location accessible only to adults.
- Any attempts to make unauthorized changes to the controller or self-repairs result in warranty voidance.

**2.2 Controller connection**

**2.2.1 Electric connection**

**Caution!**

The connection of the device must be carried out by authorized personnel. Any installations should be performed with the power turned off on all power supply poles. The device must be installed in the same building where the wiring connected to its connectors is done. All wires connected to the device must comply with the IEC 60332 standard.

The power connection should be made according to the diagram 3. The minimum cross-sectional area of the power cable is 0.5 mm<sup>2</sup>. Connect the power cable to terminals 1 and 2 of the controller, paying attention to the power polarization.

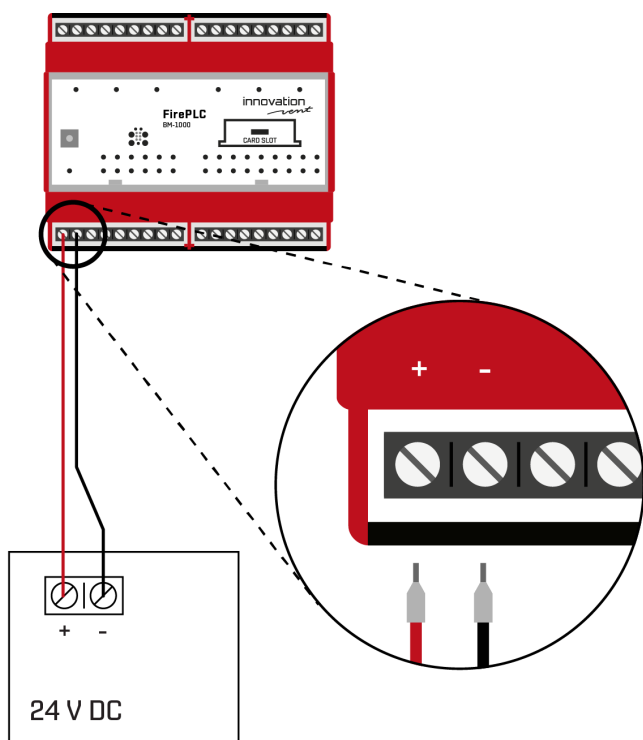


Fig. 3: Supply connection

**2.2.2 Input Connection**

The BM-1000 is equipped with twelve inputs that can cooperate with potential-free outputs. The connection should be made using wires with a cross-section not greater than 1.5 mm<sup>2</sup> and connect them to connectors 0-11 and the CM connector. The cable must not exceed 3 meters in length. The inputs recognize three states: short-circuit, open-circuit, and a resistance of 10 kΩ. Active inputs should be terminated with a 10 kΩ resistor. The absence of a mounted resistor and an open circuit will result in a fault indication. Based on the input states, the device makes decisions related to controlling the outputs and signaling the operation of devices. Thanks to the inputs, the following actions are possible:

- Running algorithms.
- Monitoring the status of external devices.
- Monitoring the operation of external devices.
- Blocking the operation of outputs in the FirePLC module.
- Initiating a reset procedure.
- Initiating a testing procedure.

The connection method is shown in 4.

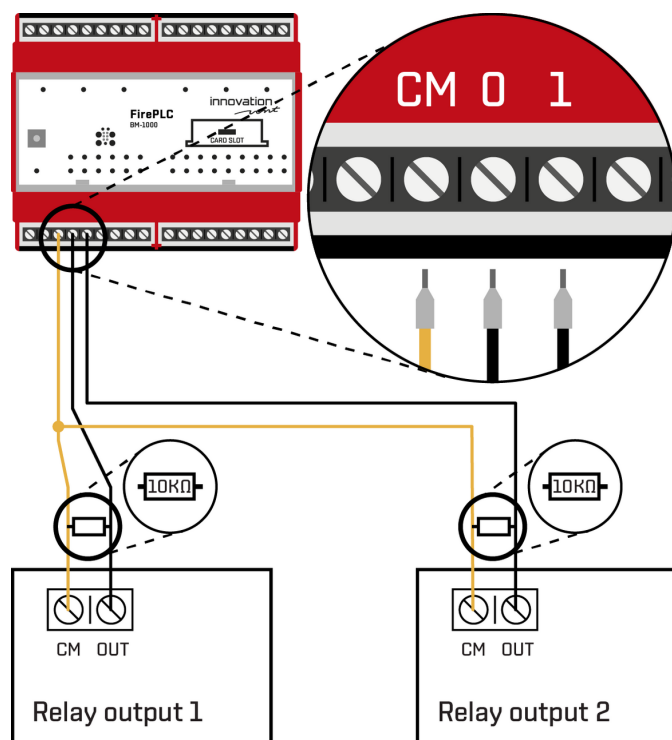


Fig. 4: Input Connection

### 2.2.3 Actuator Connection

The device allows monitoring the input states depending on the state of the outputs it is associated with, using the appropriate controller configuration. An example is controlling an actuator with a return spring or an actuator without a return spring. Actuator control is done using the controller's relay. After triggering the output, the BM-1000 automatically checks the state of the inputs to which end position monitoring contacts of the actuator are connected. Figure 5 shows the connection of an actuator without a return spring.

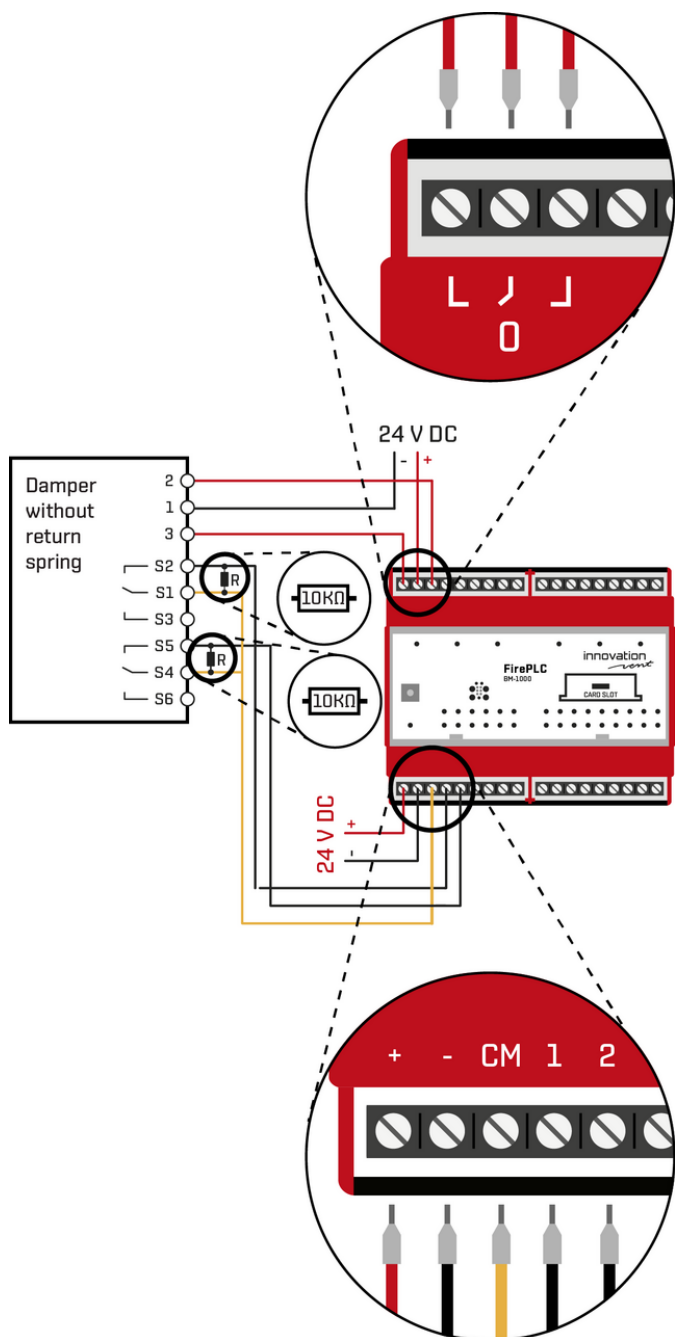


Fig. 5: Connection of actuator without return spring

### 2.2.4 Relay Outputs Connection

The BM-1000 is equipped with six relay outputs (changeover contact). The maximum load voltage of the relay is 30 V DC or 230

V AC, with a maximum current of 1 A. The maximum permissible wire cross-section is 1.5 mm<sup>2</sup>. The connected wire should not exceed 3 meters in length. The relay outputs utilize connectors located in the upper part of the enclosure. Figure 6 shows an example of connecting a relay output.

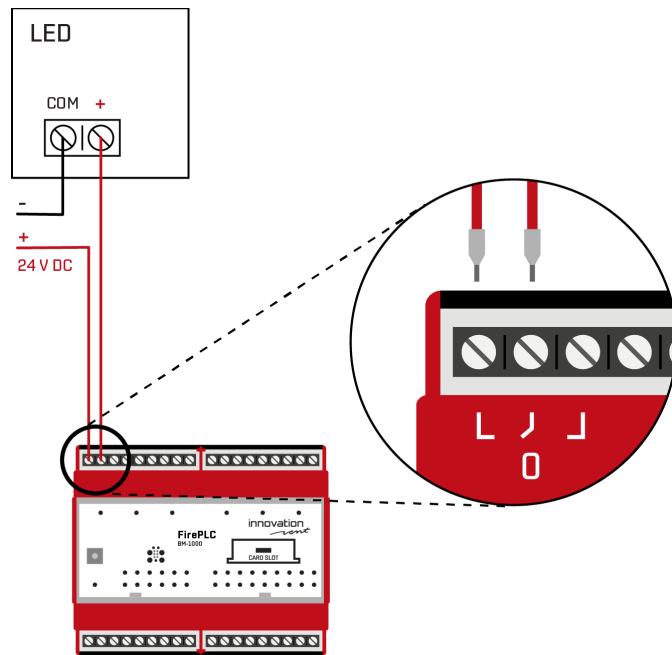


Fig. 6: Relay Outputs Connection

### 2.3 Other Components

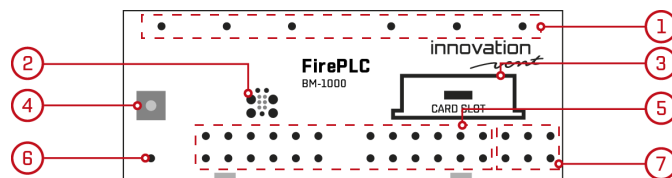


Fig. 7: Front panel BM-1000

- ① LED indicators for outputs
- ② Service connector
- ③ Expansion card slot
- ④ Address selector
- ⑤ LED indicators for inputs
- ⑥ PWR LED
- ⑦ LED indicators for expansion cards

### 2.3.1 Diody LED

LED	Description
Out LEDs (1)	- On: relay in NO position - Off: relay in NC position
In LEDs (5)	- Red On, Green Off: input shorted: - Red Off, Green On: open circuit (10 kOhm) - Both Off: discontinuity detected
PWR (6)	- On: system operate correctly - 5 Hz blinking: critical system error - 0.7 Hz blinking: not ready for operation

The input LED indicators can also flash depending on the input configuration. For algorithmic-type inputs, flashing of the LED indicates algorithm operation. For control inputs, the LEDs flash as follows:

- Flashing of the red LED indicates the absence of a valid state confirming the activation of the controlled device within the specified time,
- Flashing of the green LED indicates the absence of a valid state confirming the deactivation of the controlled device within the specified time.

For control inputs, the LED stops flashing when the fault is cleared through a reset procedure or when the device is reactivated, and the control input state changes to match the configuration. For algorithmic inputs, the LED stops flashing when the algorithm's operation is confirmed by all declared control inputs for that algorithm.

### 2.3.2 Address setter

The address setter is used to set the address for BM-1000 for communication within a single control panel. Each BM-1000 controller must have a unique address for it to be recognized by devices. Addresses must be assigned in ascending order, starting from 0. The controller with address 0 is the master controller. For example, for three devices, the addresses should be as follows: 0, 1, and 2, and for five devices: 0, 1, 2, 3, and 4. The highest address is address 5.

### 2.3.3 Expansion Card Slot

The BM-1000 controller can be expanded with additional functionalities by using an expansion card. Insert the expansion card through the slot in the front panel according to the diagram shown in figure 8. Before installing the card, remove the protective plug located on the front of the device. Each of the available cards offers different additional options for the controller.

The expansion card is activated through the PC configuration application. The absence of an installed expansion card or the installation of the wrong one is indicated by the cyclic flashing of LED 20-22. The maximum possible cross-section of wires that can be connected to the card connectors is 1,5 mm<sup>2</sup>.

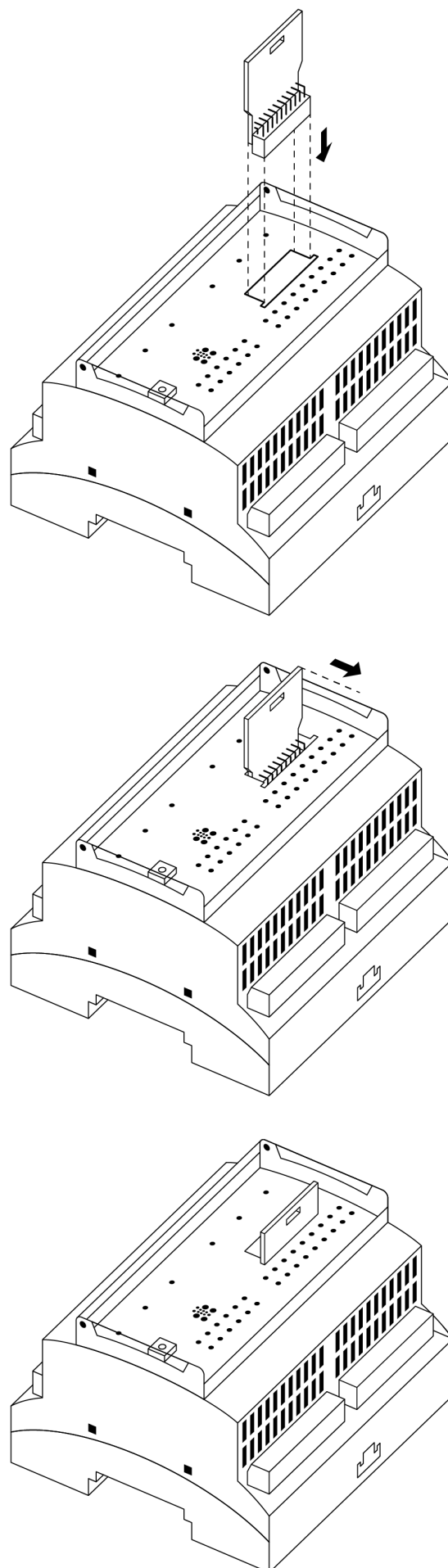


Fig. 8: Installation of the Expansion Card

**Caution!**

The installation of expansion cards must be carried out with the device disconnected from the power source.

**2.3.4 RS-485 card**

The card allows communication with the BMS system using the Modbus RTU protocol or communication with other boards in the network. Information about the current communication status is displayed on LED indicators 20-22. The connections of the card are marked in Figure 9.

Communication Status	LED Indicators
Correct communication between BM-1000	green LED number 20 - ON red LED number 20 - OFF
Incorrect communication between BM-1000	red LED number 20 - ON green LED number 20 - OFF
Correct communication with FSC-3000	green LED number 21 - ON red LED number 21 - OFF
Incorrect communication with FSC-3000	red LED number 21 - ON green LED number 21 - OFF
Correct communication in the network	green LED number 22 - ON red LED number 22 - OFF
Incorrect communication in the network	red LED number 22 - ON green LED number 22 - OFF

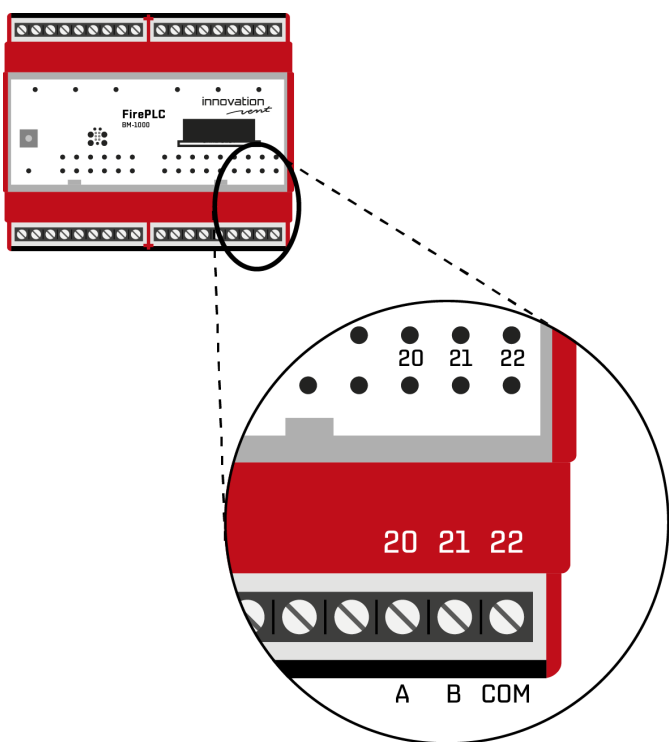


Fig. 9: RS-485 card connection

**2.3.5 Digital Input Card**

The card is equipped with three additional digital inputs. The status of the additional inputs is displayed on LED indicators numbered 20-22 and they light up in the same way as the controller's input LEDs. The connected cable to connectors 20-22 must not exceed 3 meters in length. The connections of the card are highlighted in Figure 10.

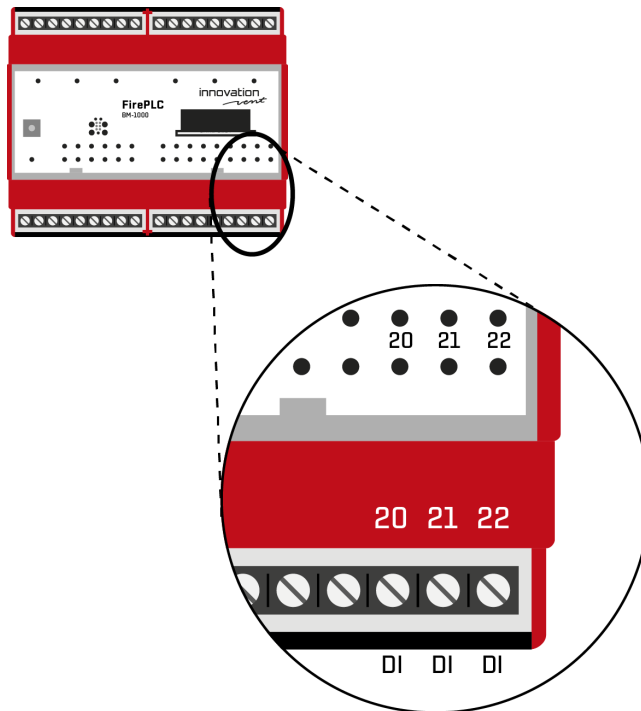


Fig. 10: Digital in card connection

**2.3.6 Digital Output Card**

The card is equipped with three additional digital outputs. The status of the additional outputs is displayed on LED indicators numbered 20-22 and they light up in the same way as the controller's output LEDs. The connected cable to connectors 20-22 must not exceed 3 meters in length. The connections of the card are highlighted in Figure 11.

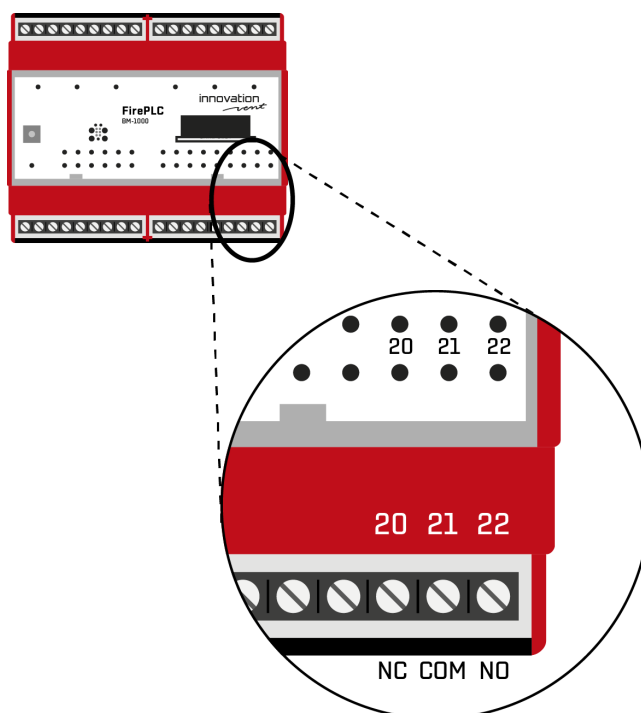


Fig. 11: Digital out card connection

### 2.3.7 Analog Input Card

The card is equipped with an analog input that can handle a maximum voltage of 10 V. Voltage thresholds are set using the configuration application and up to three thresholds can be defined. Information about the current voltage level connected to connector 20 is displayed on LEDs 20-22 and depends on the defined thresholds. The table below shows how the LEDs are activated based on thresholds P1, P2, P3. Additionally, each LED can flash to indicate the currently executed algorithm. The card connections are highlighted in Figure 12.

Input Voltage U	LED Indicators
$U < P1$	green LED number 20 - ON red LED number 20 - OFF
$U \geq P1$	green LED number 20 - OFF red LED number 20 - ON
$U < P2$	green LED number 20 - ON red LED number 20 - OFF
$U \geq P2$	green LED number 20 - OFF red LED number 20 - ON
$U < P3$	green LED number 20 - ON red LED number 20 - OFF
$U \geq P3$	green LED number 20 - OFF red LED number 20 - ON

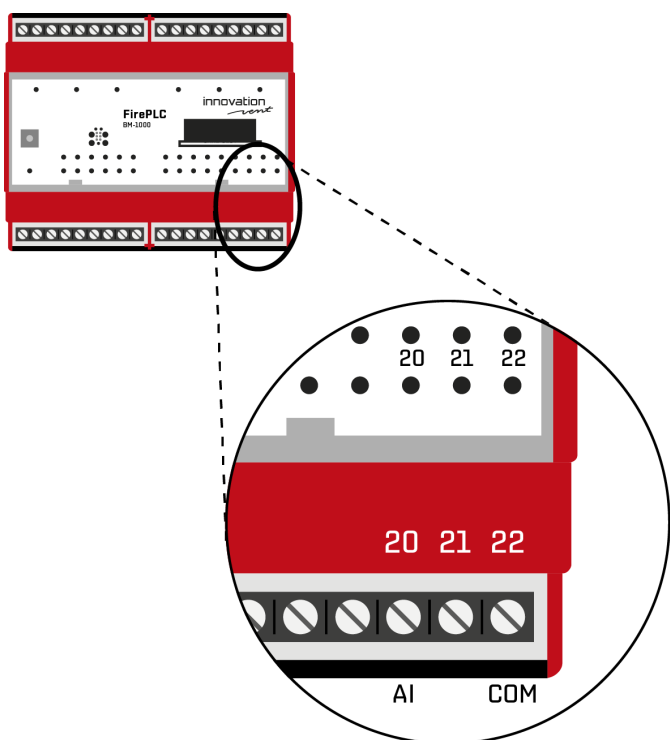


Fig. 12: Analog in card connection

### 2.3.8 Analog Output Card

The card is equipped with a 0-10 V analog output. The output voltage is configured using the configuration application. Information about the currently set voltage on connector 20 is displayed on LED 20. The table below shows how the LED indicators are activated depending on the voltage applied to this connector. The connections on the card are marked in Figure 13.

Output Voltage U	LED Indicators
$U = 0 \text{ V}$	Green LED 20 - ON Red LED 20 - OFF
$U = U_{desired}$	Red LED 20 - ON Green LED 20 - OFF

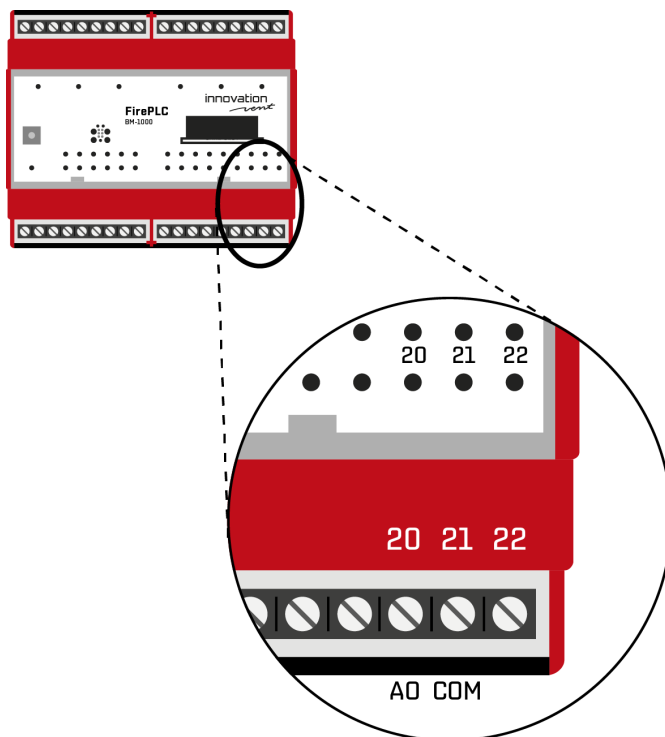


Fig. 13: Analog out card connection

### 2.3.9 Service Connector

A service connector is located on the front panel of the device, which allows configuration and reading of device parameters. In a single control panel, only the controller with address 0 communicates with the application.

**Caution!**

Connecting the configuration cable disables the RS-485 card. This results in the suspension of communication with the BMS system and network communication.

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