

USER MANUAL

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The System for Underfloor Heating for the Family House with Zone Controls

Software

- The Overview tab
- The settings tab
- Devices Tab
- Others Tab
- The Ground/First Floor – The Ground Plan

2

Hardware

- The Central Unit
- The Zone Controller

17

1 Software

The system is accessible from IP address <http://192.168.11.196:8123>. Any current web browser is sufficient. It is possible to use mobile application for Android, download from Play Store.

1.1 THE OVERVIEW TAB

In a **Overview** tab (the picture 1 – a blue top menu) can be seen in one chart in a part "Comparison of Temperatures" all measured temperatures (fireplaces, tank of heat water and outside temperature). In a part "Individual Sensors", are individual temperature sensors with current measured temperature.

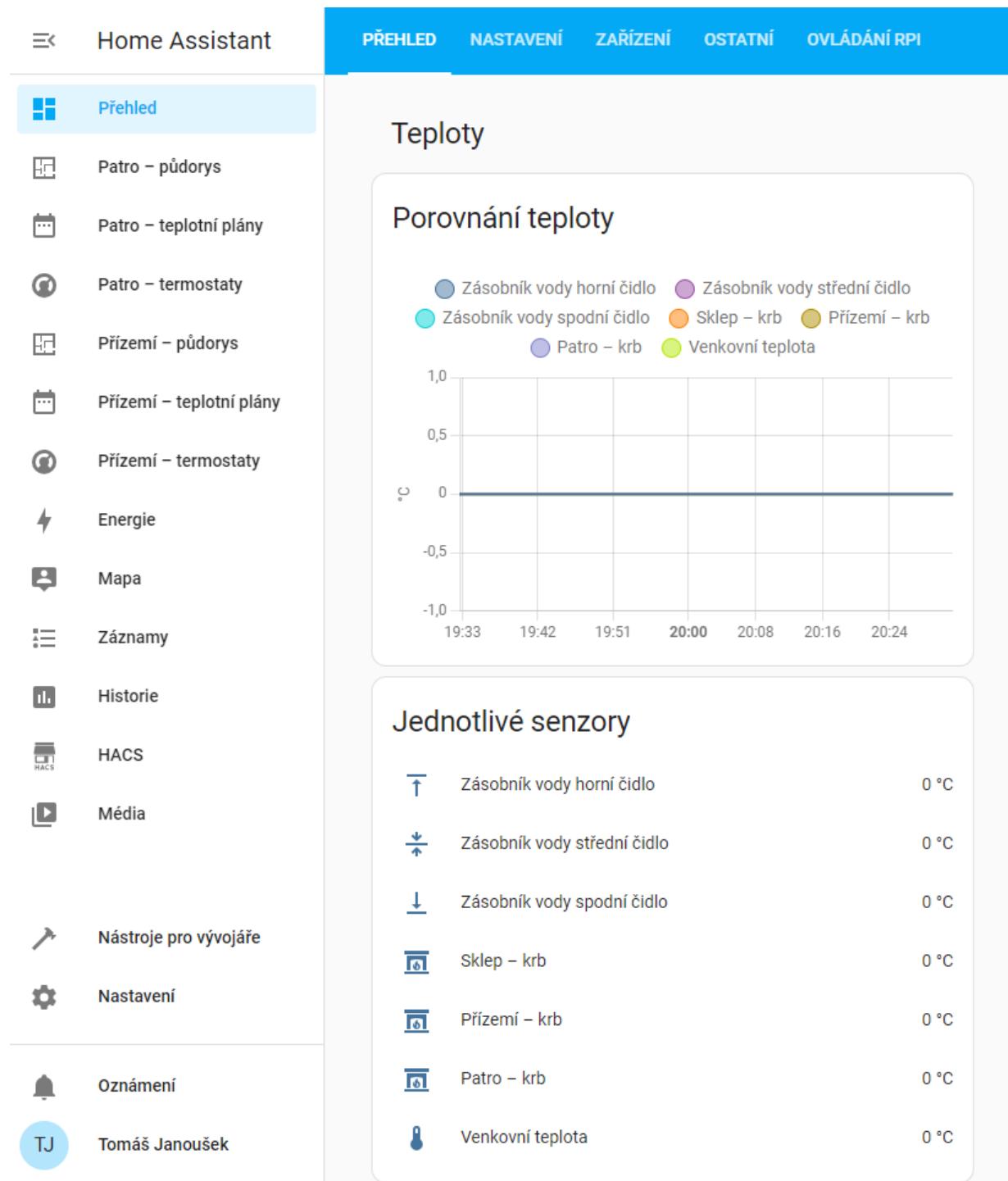


Figure 1: The Overview tab.

If user clicks on a name of temperature sensor (for example, the Tank with Water Top Sensor) then the history of measured values is displayed (the figure 2). Double-clicking on the top part of this window will further enlarge the displayed window.

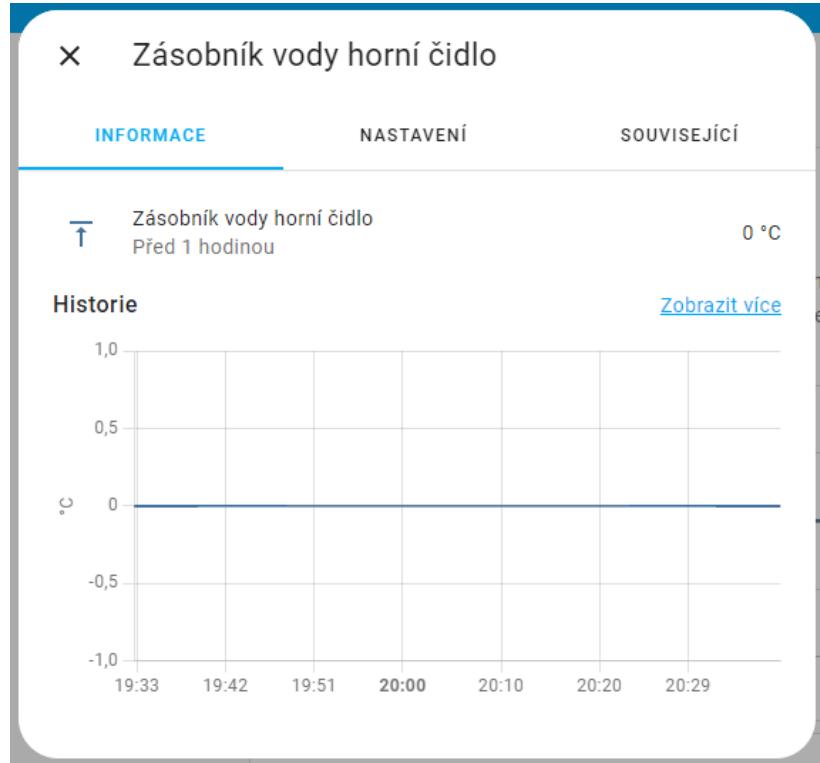


Figure 2: The temperature sensor history is displayed after clicking on its name.

1.2 THE SETTINGS TAB

In a **Settings** tab (the figure 3 – top blue menu) are displayed modes "Control of Temperature", "Control Modes", "Switching Heat Coil", "Fireplaces – Switching of Pumps", "LED Indication – Limit Parameters of Hot Water Tank" and "Other Settings". Individual options are described below.

The screenshot shows the 'NASTAVENÍ' (Settings) tab in Home Assistant. On the left is a sidebar with icons for various components like Heating, Cooling, Energy, and Media. The main area has several sections:

- Řízení teploty**: Contains checkboxes for 'Rízení teploty z chodbových termostátů' (checked), 'Manuální řízení teploty z lokálních nástěnných snímačů...' (unchecked), 'Automatické řízení podle teplotních plánů' (checked), and 'Automatické řízení podle teplotních plánů s teplotní pr...'. There are also sliders for temperature ranges.
- Módy řízení**: Shows three modes: 'Letní mód' (Summer mode), 'Zimní mód' (Winter mode), and 'Venkovní teplota' (Outdoor temperature).
- Spínání topné spirály**: Shows temperature ranges for 'Léto' (Summer) and 'Zima' (Winter).
- Ostatní nastavení**: Shows 'Hystereze topné spirály' (2 °C) and 'Min. venkovní teplota pro letní mód' (0 °C).
- Krby – spínání čerpadel**: Shows temperature ranges for 'Min. sklep' (45 °C), 'Min. první patro' (45 °C), and 'Min. druhé patro' (45 °C).
- LED indikace – mezní parametry zásobníku teplé vody**: Shows temperature ranges for 'Horní čidlo min. pod' (45 °C), 'Střední čidlo max. nad' (70 °C), and 'Spodní čidlo max. nad' (85 °C).

Figure 3: The Settings tab.

1.2.1 Temperature control

In the section of settings "Temperature Control" (the figure 4) is possible to select from several modes. In order to control heating, it is necessary to always select one of the control modes, otherwise, the heating will not be managed automatically according to automation.

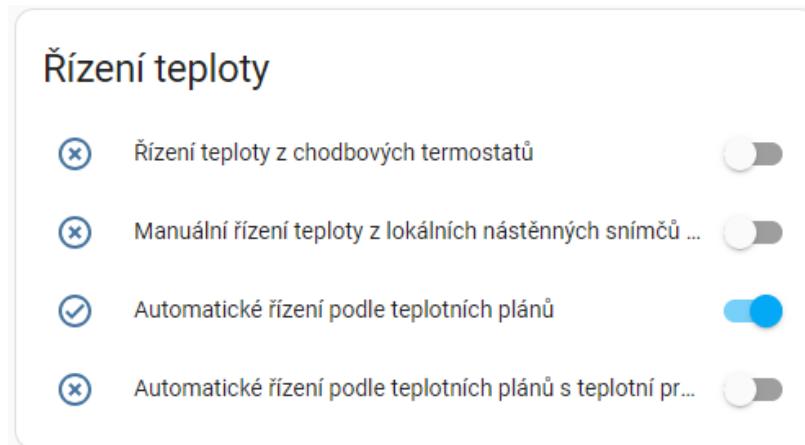


Figure 4: Temperature Control.

– Temperature Control from Corridor Thermostats

In a mode "Temperature Control from Corridor Thermostats", the temperature settings in the corridor thermostats, located on the ground floor and on the first floor, determine the heating operation for all heating circuits on the respective floor. If there is request for heating, all heating circuits will be turned on otherwise will be turn off. The status of individual corridor thermostats (heating status) is indicated by a glowing red LED directly on the thermostat or within the system under the **Devices** tab in the section *Corridor Thermostats – Heating Request* for each floor, as shown in the figure 5. The status of individual heating circuits is showed on the **Devices** tab in the section „*The Ground Floor or the First Floor – Heating Circuits (Valves)*“, as shown in the figure 6.

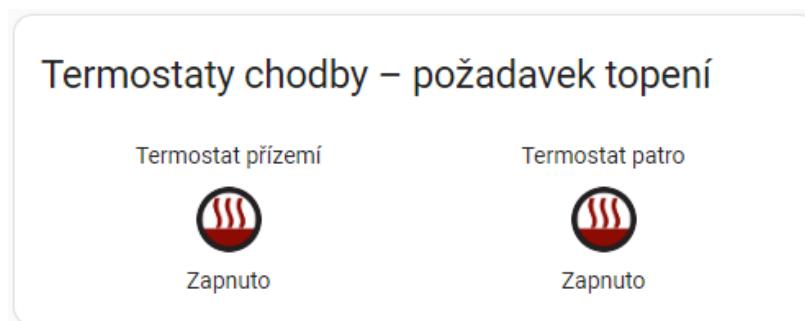


Figure 5: Corridor Thermostats – Heating Request.

Přízemí – otopné okruhy (ventily)

↗	Chodba/toaleta	Vypnuto
↗	Koupelna přízemí – žebřík	Vypnuto
↗	Koupelna přízemí	Vypnuto
↗	Kuchyně – dveře	Vypnuto
↗	Obývací pokoj – okruh 1	Vypnuto
↗	Obývací pokoj – okruh 2	Vypnuto
↗	Obývací pokoj – okruh 3	Vypnuto
↗	Kuchyně – okna	Vypnuto
↗	Sklep – žebřík	Vypnuto
↗	Garáž – okruh 1	Vypnuto
↗	Garáž – okruh 2	Vypnuto

Figure 6: The Ground Floor – Heating Circuits (Valves).

Attention!

This control is working only if it is enable "Winter Mode" in the section "Mode Control". Further description in the section 1.2.2 "Control Modes".

– Manual Control of Temperature from Local Temperature Sensors

In the mode "*Manual Control of Temperature from Local Temperature Sensors*" is temperature control according to the given wall temperature sensor which is located in each room. For each room is control of heating circuits. The status individual thermostats are showed in the left menu under "*The Ground Floor – thermostats*" or "*The First Floor – thermostats*", as shown in the figure 7. Each thermostat allows to set required temperature using the orange slider (the figure 8), alternatively, it is possible to click on 3 dots in the top right corner of the thermostat and adjust the required temperature using the arrows, as shown the figure 9. The currently measured temperature is displayed in the middle. Beneath each thermostat, there is information "*Connection Status*" which indicates connection of thermostat to system and "*Detection of Open Window*" which indicates open window in a room. If window is open, heating is turned off for room with open window. If window is close, heating is restored.

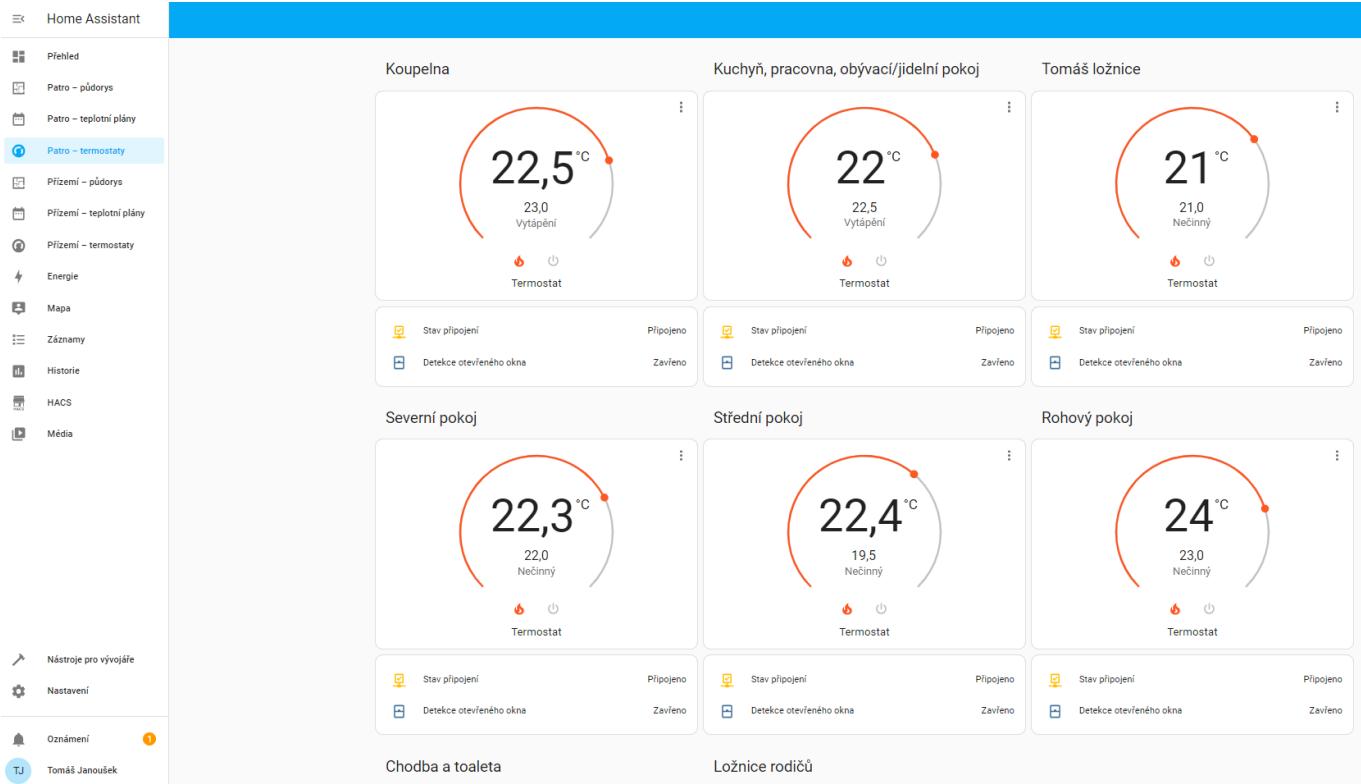


Figure 7: The First Floor – Thermostats.

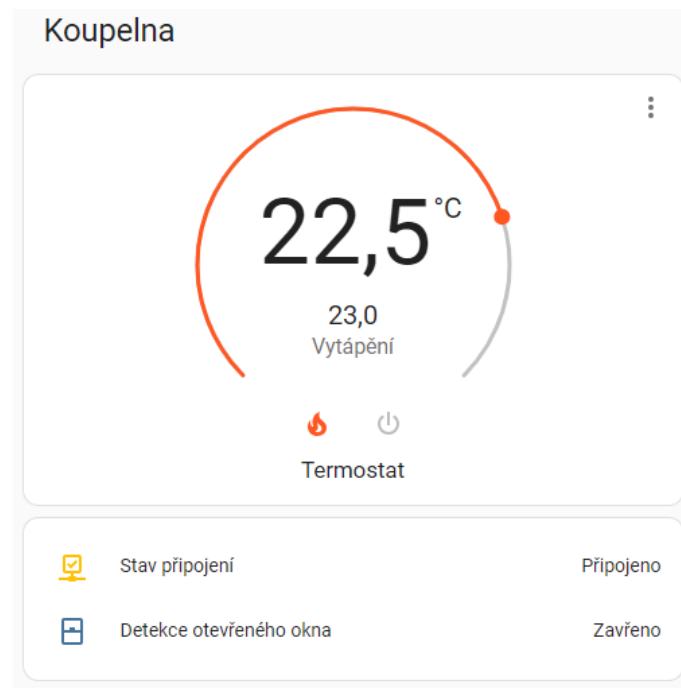


Figure 8: Thermostat – Bathroom.

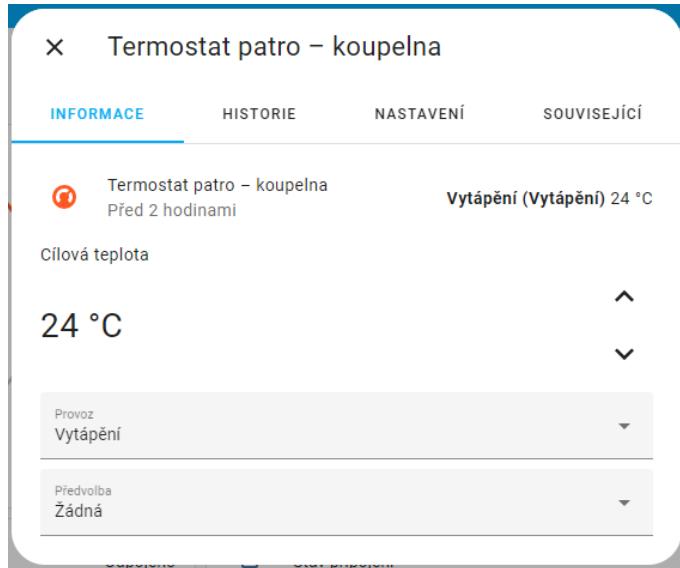


Figure 9: Clicking on 3 dots in the top right corner of thermostat – bathroom.

– Automatic Control According to Temperature Plans

In mode "Automatic Control According to Temperature Plans" is control of heating according to wall temperature sensor for each room. However, it takes place on the basis of temperature plans, setting the desired temperature (the figure 10).

Figure 10: Temperature Plans for Control.

There is a predefined temperature plan for each room. To make adjustments, simply click on it and the figure 11 will appear. To modify the temperature of a specific section, click on the desired section and use the slider below to change the temperature. Alternatively, you can add or delete a section. Then, save the settings using the buttons at the bottom right. Based on this configured temperature plan, the desired temperature for the room's thermostat is set, which controls the heating of that room.

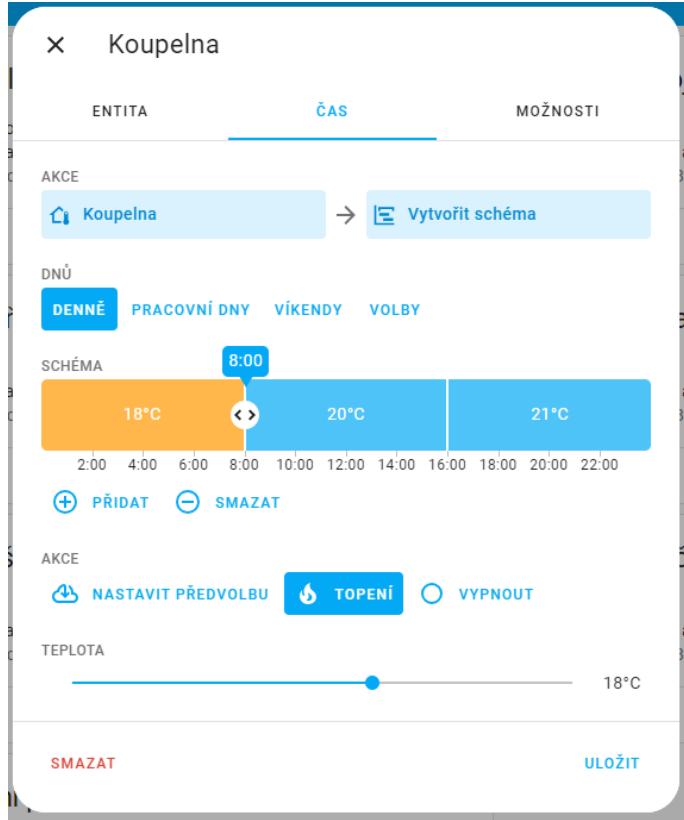


Figure 11: Settings/adjustment of the temperature plan.

1.2.2 Control Modes

Based on the selected control modes (the figure 12), the heating coil in the hot water tank is regulated. The limit of the min. top sensor and the max. middle sensor are determined according to chosen summer or winter mode (the figure 13). Control diagram for the specified mode is shown in the figure 14.'



Figure 12: Control Modes.

Spínání topné spirály

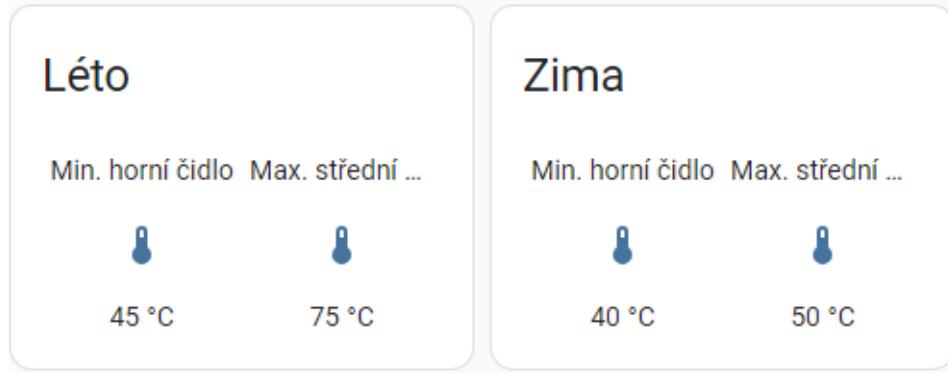


Figure 13: Switching of Heating Coil.

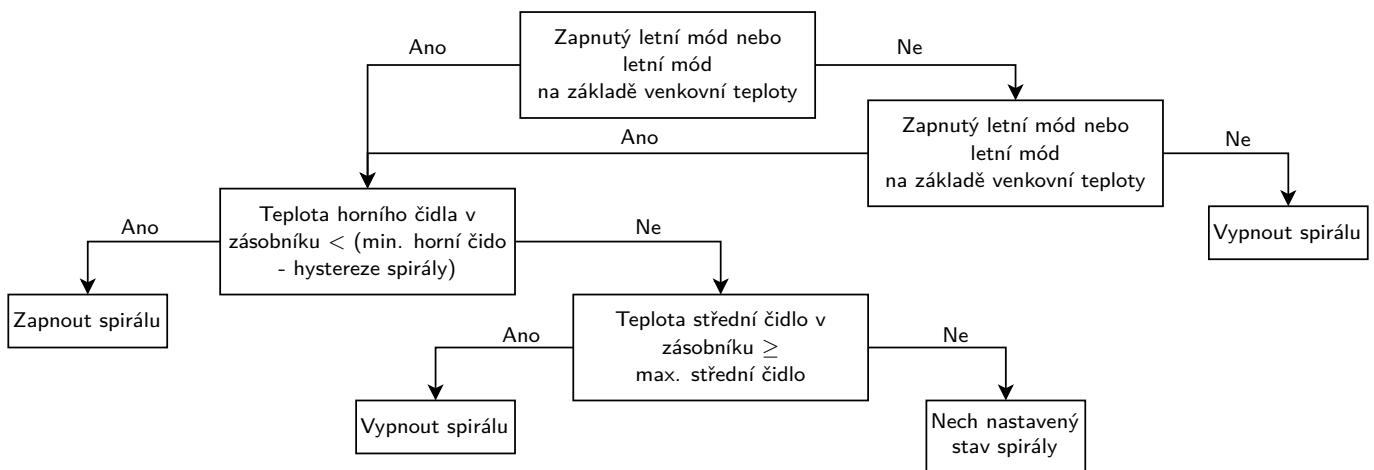


Figure 14: Control diagram mode.

– Other Settings

In the section "Other Settings" it is possible to set the hysteresis of heating coil which is used in **Control Modes**. In the section "Min. Outdoor Temperature for Summer Mode" is defined a threshold to determine whether it is a summer or winter mode. If the outdoor temperature is greater than or equal to this threshold, the summer mode is selected otherwise the winter mode is chosen.

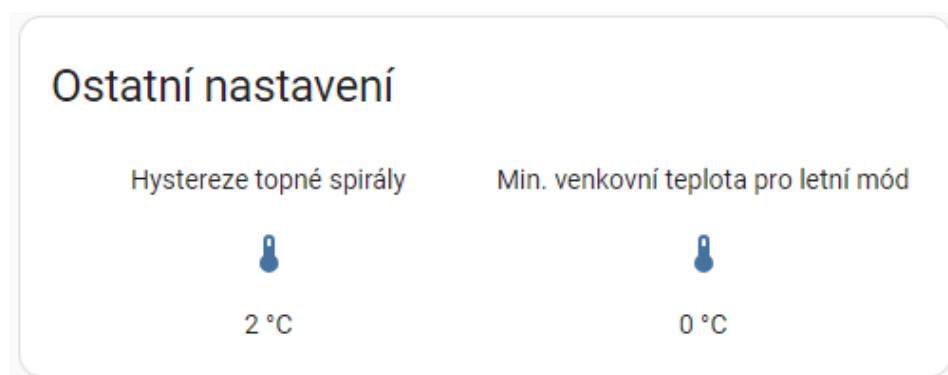


Figure 15: Other Settings.

1.2.3 Fireplaces – Switching of Pumps

In the figure 16, there is the diagram to turn on circulation pumps for fireplaces in case of flooding. This settings is the same for all fireplace pumps, only the min. threshold for activation differs (the figure 17).

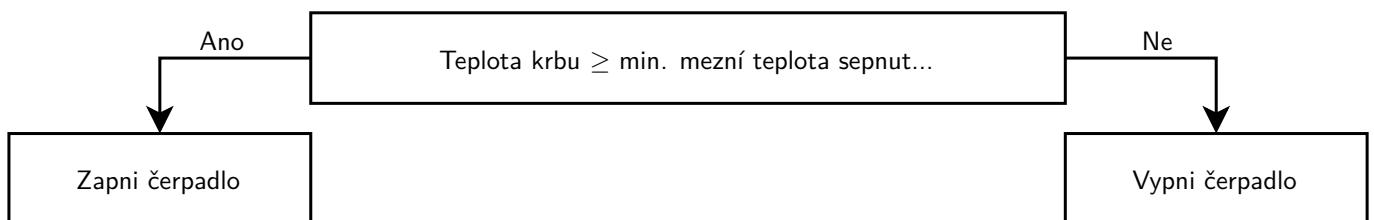


Figure 16: Diagram to turn on circulation pumps for fireplaces.



Figure 17: Settings min. threshold for turn on circulation pumps for fireplaces in case flood.

Note

This setting is completely independent of other system settings. In case of flooding, the pump must always be activated.

1.2.4 The LED Indication – limiting parameters of the hot water tank

In the picture 18 are adjustable thresholds for controlling signaling LEDs for the hot water tank. Each LED indicates the heating or cooling section of the hot water tank. The red LED is for the bottom part, the orange LED for the middle part and the blue LED for the top part of hot water tank. In case the temperature in the bottom or middle part is greater than the thresholds set for the red or orange LED, the red or orange LED will light up. In case the temperature in top part is lower than the threshold for blue LED, the blue LED will light up. The diagram is for red respectively orange LED is in the figure 19. The diagram for the blue LED is in the figure 20.

LED indikace – mezní parametry zásobníku teplé vody

Horní čidlo min. pod Střední čidlo max. nad Spodní čidlo max. nad



45 °C



70 °C



85 °C

Figure 18: Thresholds for controlling of signaling LED for the hot water tank.

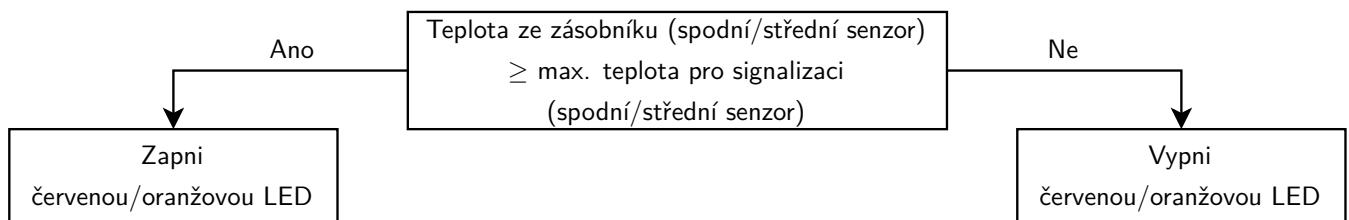


Figure 19: The diagram for controlling red and orange signaling LED.

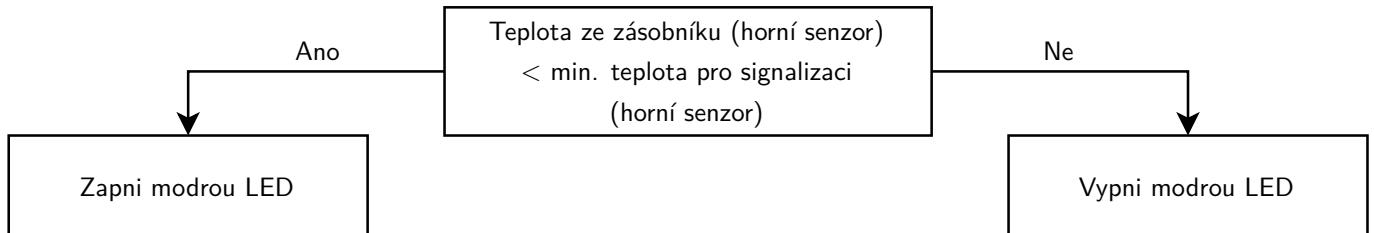


Figure 20: The diagram for controlling blue signaling LED.

Note

This settings is completely independent of other system settings.

1.3 DEVICES TAB

1.3.1 End Devices

In the **devices** tab in the figure 21 (the top blue menu) are shown in the section "End Devices". The state respectively option for turn on/off given device (the figure 22). If the user wants to change the device state, they must set the "*Manual Device Control*" button to the enabled state (blue state of the button) then it is possible to manually control the device. If the user changes the device state without the option of "*Manual Device Control*", it may result in overwriting the user's device settings according to the system state. At the LED is possible to see the on/off state for manual control of the LED is not available.

The screenshot shows the Home Assistant interface with the 'Devices' tab selected. The left sidebar includes links for Overview, Configuration, History, Maps, Notifications, and a user profile for Tomáš Janoušek.

- Koncová zařízení** (End Devices):

Manuální ovládání zařízení	<input checked="" type="checkbox"/>
Plynový kotel	<input checked="" type="checkbox"/>
Sklep – čerpadlo krbu	<input checked="" type="checkbox"/>
Přízemí – čerpadlo krbu	<input checked="" type="checkbox"/>
Patro – čerpadlo krbu	<input checked="" type="checkbox"/>
Přízemí – podlahové topení	<input checked="" type="checkbox"/>
Patro – podlahové topení	<input checked="" type="checkbox"/>
Modrá LED indikace	Zapnuto
Oranžová LED indikace	Vypnuto
Červená LED indikace	Vypnuto
- Termostaty chodby – požadavek topení** (Room Thermostats):

Termostat přízemí	Termostat patro
Zapnuto	Zapnuto
- Patro – otopné okruhy (ventily)** (Floor Heating Circuits):

Koupelna patro	Vypnuto
Koupelna patro – žebřík	Vypnuto
Obyvák/jídelna	Vypnuto
Pracovna	Vypnuto
Kuchyně	Vypnuto
Chodba/toaleta	Vypnuto
Severní pokoj	Vypnuto
Ložnice rodičů – okno	Vypnuto
Ložnice rodičů – dveře	Vypnuto
Střední pokoj	Vypnuto
Rohový pokoj	Vypnuto
Tomáše ložnice	Vypnuto

Figure 21: Devices Tab.

Koncová zařízení

Manuální ovládání zařízení	<input checked="" type="checkbox"/>
Plynový kotel	<input checked="" type="checkbox"/>
Sklep – čerpadlo krbu	<input checked="" type="checkbox"/>
Přízemí – čerpadlo krbu	<input checked="" type="checkbox"/>
Patro – čerpadlo krbu	<input checked="" type="checkbox"/>
Přízemí – podlahové topení	<input checked="" type="checkbox"/>
Patro – podlahové topení	<input checked="" type="checkbox"/>
Modrá LED indikace	Zapnuto
Oranžová LED indikace	Vypnuto
Červená LED indikace	Vypnuto

Figure 22: End Devices.

Attention!!!

If the user sets button "Manual Control Devices" to the enabled state. The system **can not** subsequently control the device according to the configured automation. It is necessary to always return the button to the **disabled** state.

1.3.2 Thermostats Corridors – Heating Requirement

In the figure 23 is shown state on/off for corridor thermostat. This setting is further used in heating mode "Control Temperature from Corridor Thermostats", more information in the section "Control Temperature from Corridor Thermostats".

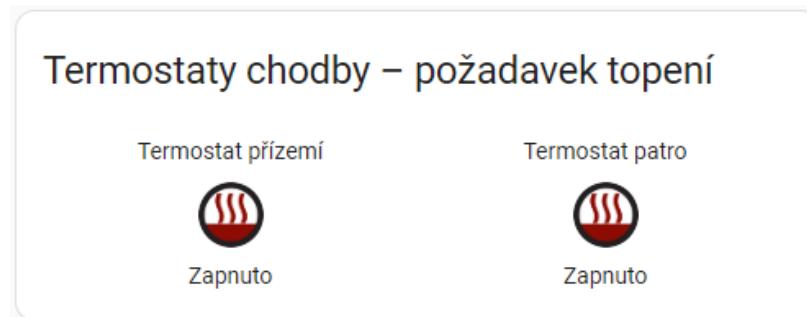


Figure 23: Corridor Thermostats – Heating Requirement.

1.3.3 The Ground/First Floor – Heating Circuits (Valves)

In the picture 24 is shown state on/off valve for individual heating circuits, devied to the ground floor and the first floor. If the user manual turns on valve with switch on the zone controller located na floor heating distributors. The enabled state does not reflect in the system. The enabled state is not visible in the system. Manual activation via the switch should only be used if the system is non-functional. When the valve or heating circuit is manually turned on in this way, the corresponding circulation pump will be activated. The user doesn't have the option to manually turn on individual heating circuits through the system, only to view their status. Further information on controlling heating circuits is in the section 1.2.1 "Control Temperature".

Přízemí – otopné okruhy (ventily)

↗	Chodba/toaleta	Vypnuto
↗	Koupelna přízemí – žebřík	Vypnuto
↗	Koupelna přízemí	Vypnuto
↗	Kuchyně – dveře	Vypnuto
↗	Obývací pokoj – okruh 1	Vypnuto
↗	Obývací pokoj – okruh 2	Vypnuto
↗	Obývací pokoj – okruh 3	Vypnuto
↗	Kuchyně – okna	Vypnuto
↗	Sklep – žebřík	Vypnuto
↗	Garáž – okruh 1	Vypnuto
↗	Garáž – okruh 2	Vypnuto

Figure 24: The Ground Floor – Heating Circuits (Valves).

1.4 OTHERS TAB

In the **Others** tab, in the figure 25 (the top blue menu) is shown settings for "Control of Pumps – Limescale". This setting is useful for regular "flushing" of fireplace circulation pumps on a defined day and time with a specified duration of operation. If the pumps remain inactive for an extended period, they may become seized due to limescale buildup. This setting helps minimize this phenomenon by periodically running the pumps for a brief duration.

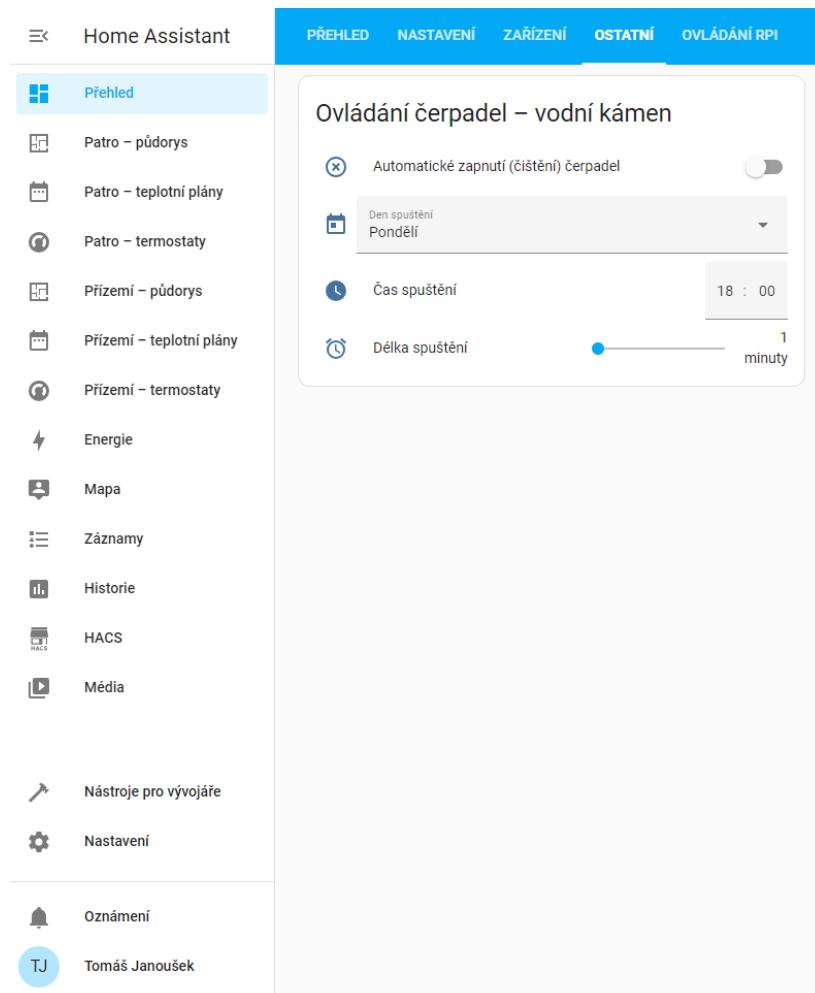


Figure 25: Others Tab.

1.5 THE GROUND/FIRST FLOOR – THE GROUND PLAN

In **The Ground/First Floor – The Ground Plan** tab in the picture 26 (the left menu) is shown the ground plan for the ground/first floor og house with individual currently measured temperatures, with desired temperatures, the heating status in the given room, and the status of the pumps or the heating status in the fireplace. After clicking on the desired temperature, it is possible to adjust the set temperature, etc. This setting is programmed into individual thermostats in the room.

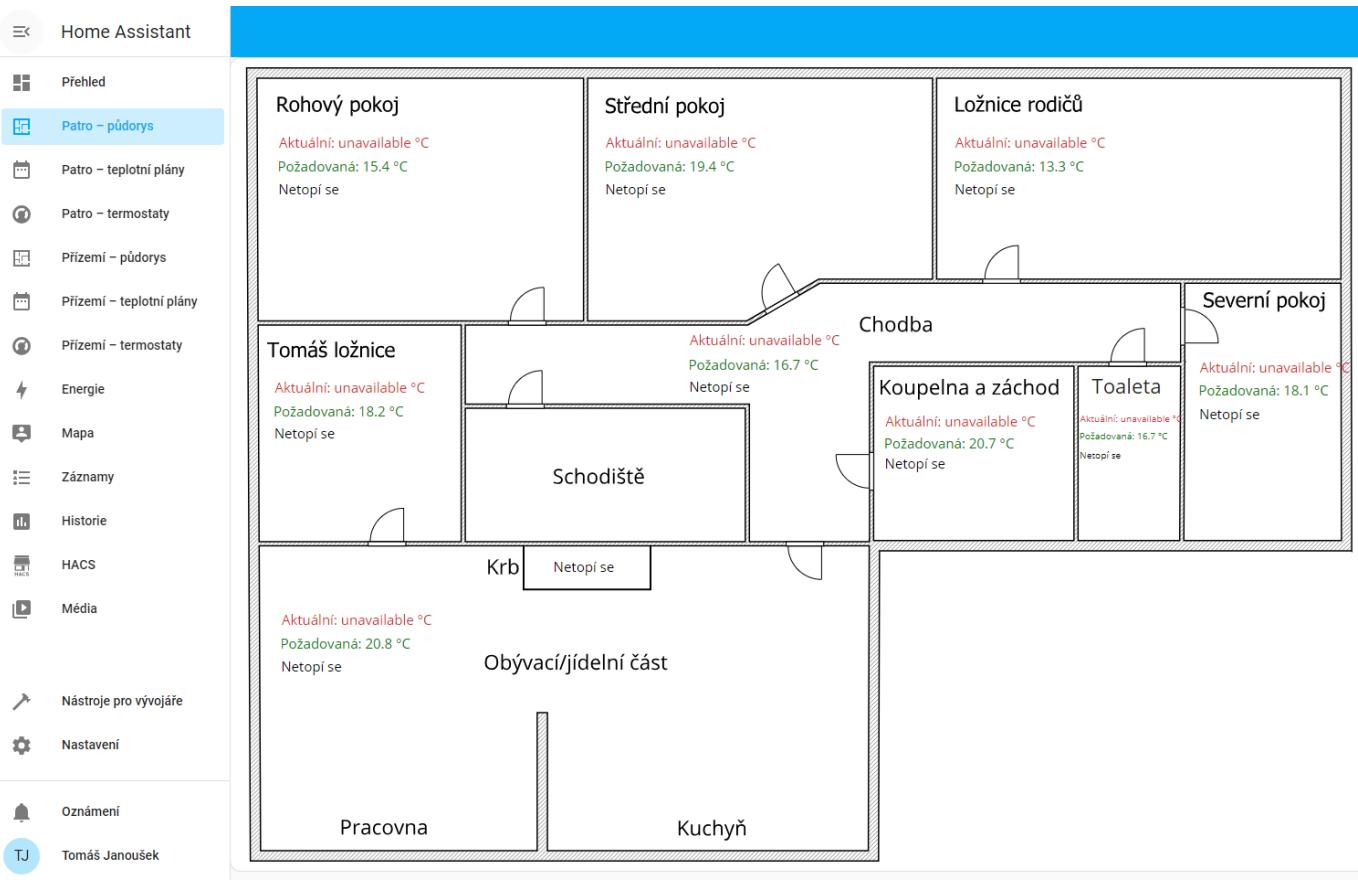


Figure 26: The First Floor – The Ground Plan.

2 Hardware

2.1 THE CENTRAL UNIT

In the figure 27, there is the central unit with a description of individual LEDs a switches.

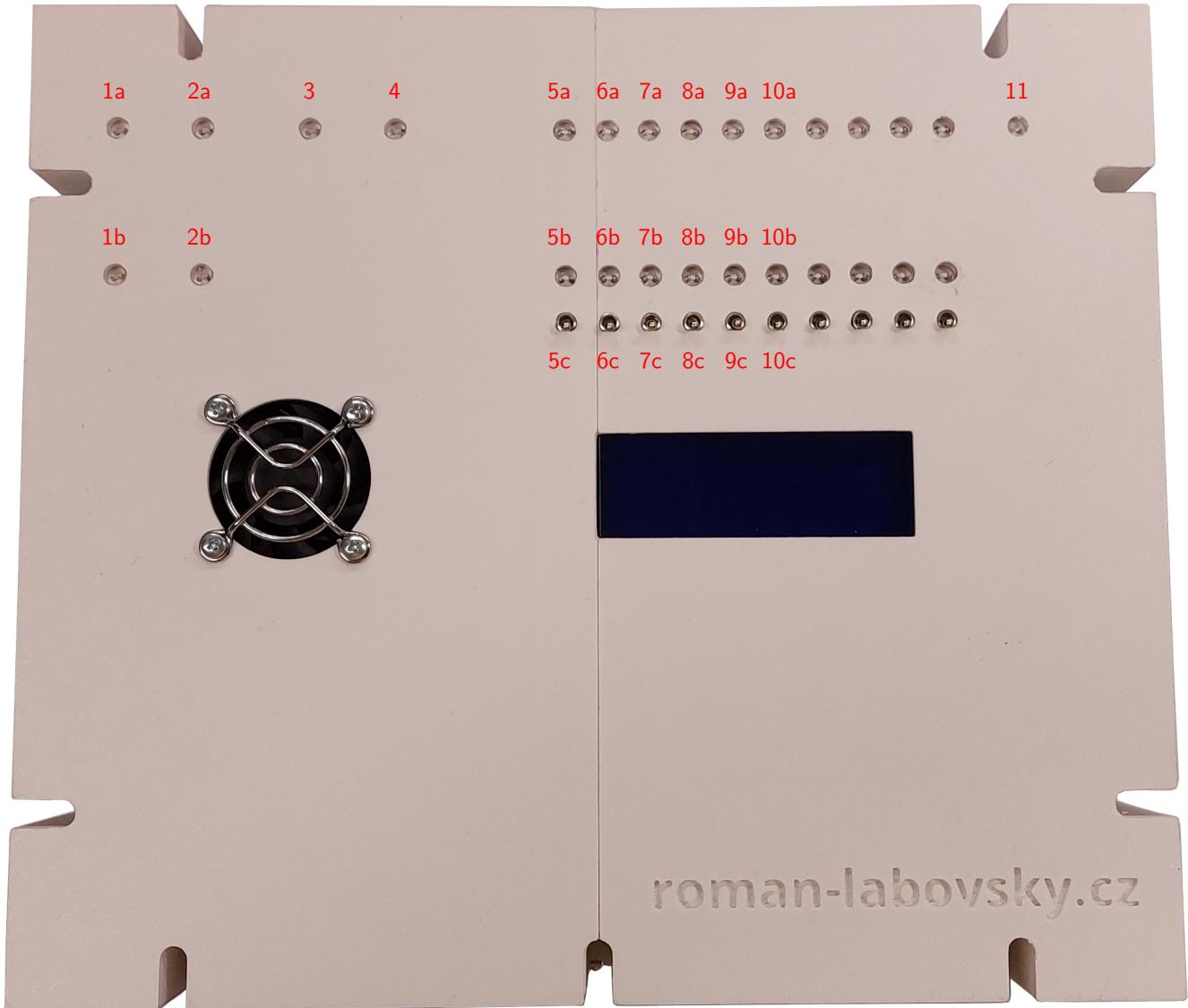


Figure 27: The central unit with a cover.

2.1.1 Description of Marked Parts

- **1a** – Signal LED for 5V (power supply for Raspberry Pi). If blinking, an overcurrent protection is activated.
- **1b** – Signal LED for 3.3V. If lit/blinking, there is a malfunction.
- **2a** – Signal LED for 5V. If blinking, an overcurrent protection is activated.
- **2b** – Signal LED for 3.3V. If lit/blinking, there is a malfunction.
- **3** – Signal LED for 12 V. If lit/blinking, there is a malfunction. Power supply for relay modules.
- **4** – Signal LED for 24V. If lit/blinking, there is a malfunction. Power supply for relay modules.
- **5a** – Signal LED for underfloor heating circulation pump on the ground floor. If lit, the device is turned on.

- **5b** – Signal LED for the underfloor heating circulation pump on the ground floor. If lit, the device is turned on. The switch 5c is turned on.
- **6a** – Signal LED for the underfloor heating circulation pump on the first floor. If lit, the device is turned on.
- **6b** – Signal LED for the underfloor heating circulation pump on the first floor. If lit, the device is turned on. The switch 6c is turned on.
- **7a** – Signal LED for the fireplace circulation pump in the basement. If lit, the device is turned on.
- **7b** – Signal LED for the fireplace circulation pump in the basement. If lit, the device is turned on. The switch 7c is turned on.
- **8a** – Signal LED for the fireplace circulation pump on the ground floor. If lit, the device is turned on.
- **8b** – Signal LED for the fireplace circulation pump on the ground floor. If lit, the device is turned on. The switch 8c is turned on.
- **9a** – Signal LED for the fireplace circulation pump on the first floor. If lit, the device is turned on.
- **9b** – Signal LED for the fireplace circulation pump on the first floor. If lit, the device is turned on. The switch 9c is turned on.
- **10a** – Signal LED for the heating coil. If lit, the device is turned on.
- **10b** – Signal LED for the heating coil. If lit, the device is turned on. The switch 10c is turned on.
- **11** – Signal LED for 5V. If blinking, overcurrent protection is activated. Power supply for signaling the activation/deactivation of corridor thermostats.

Note

*Other unmarked switches or outputs
are free.*

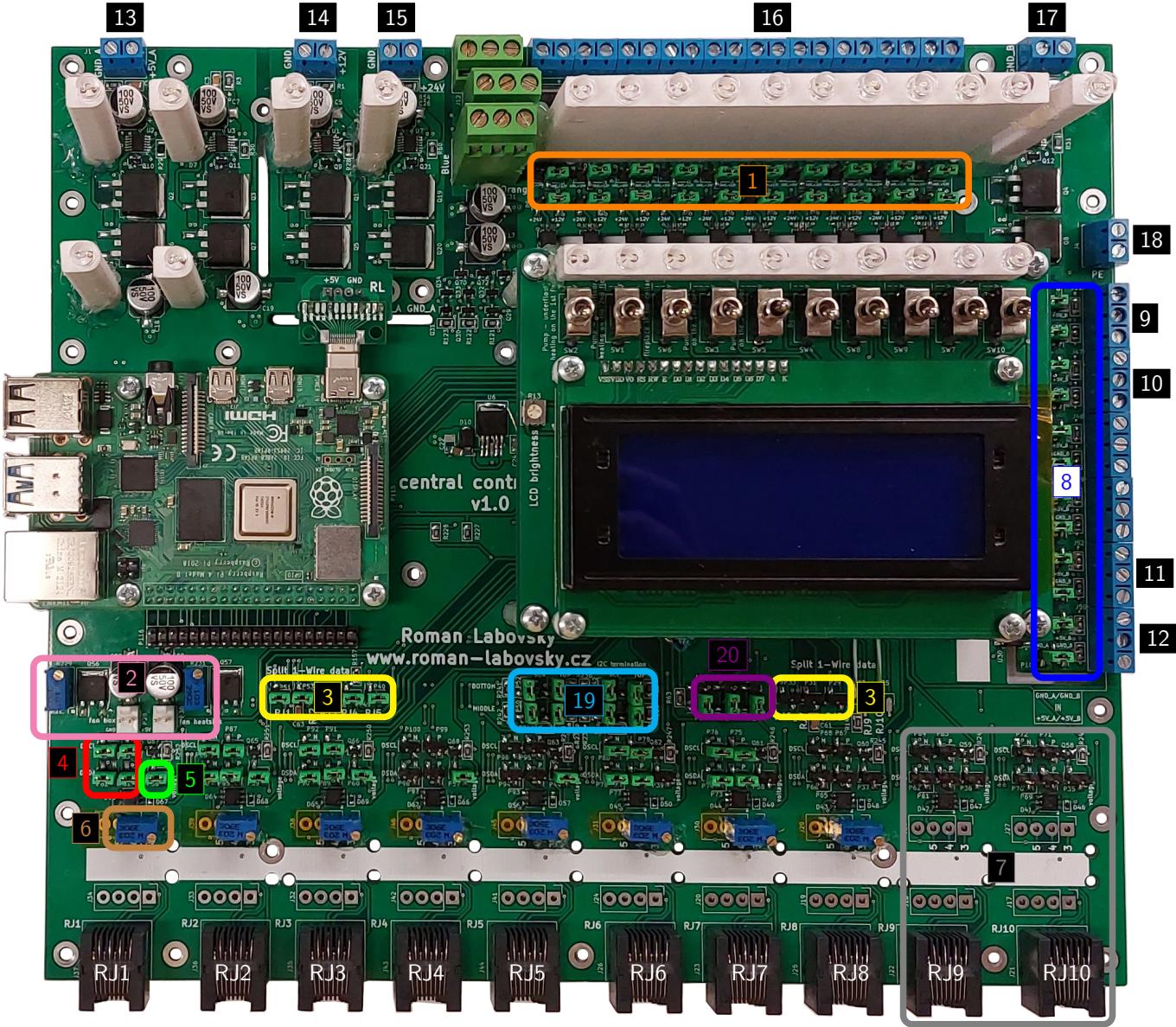


Figure 28: The central unit. PCB.

2.1.2 Description of the Marked Parts

– The number 1 (orange colour)

There is possible to set +12 V or +24 V for externally connected devices (SSR relays and others) according to the desired voltage range. The selection is made using jumpers, as shown in the figure 29. For the given output, it is necessary to correctly set both the voltage, either +12V or +24V, and the corresponding ground (GND) for the respective voltage.

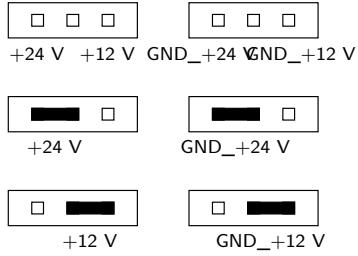


Figure 29: Selection of voltage for outputs - SSR relays and others. Similar marking is also present on the printed circuit board.

– The number 2 (pink colour)

There is possible to connect external fans to +5V; one connector is already populated for the fan on the central unit cover. Speed regulation is possible with the trimmer next to it.

– The number 3 (yellow colour)

To enable the 1-Wire bus (data) on a specific RJ45 connector or UTP, according to RJ45 (numbered RJ1 to RJ10), it is necessary to connect the given jumper in yellow marking. If the 1-Wire bus is not used, remove the jumpers.

– The number 4 (red colour)

There is differential I²C bus is enabled for the specified RJ45 or UTP using 4 jumpers. If the differential I²C bus is not used, remove the jumpers. Each RJ45 has its own jumpers above the connector.

– The number 5 (green color)

To enable the 1-Wire bus (power) on a specific RJ45 connector or UTP, according to RJ45 (numbered RJ1 to RJ8), it is necessary to connect the given jumper in green marking. If the 1-Wire bus is not used, remove the jumpers. Each RJ45 has its own jumpers above the connector.

– The number 6 (brown colour)

The pull-up resistor for the 1-Wire bus can be adjusted using trimmers for the RJ45 connector or UTP. Resistance decreases counterclockwise and increases clockwise. Each RJ45 has its own trimmer above the connector.

– The number 7 (gray colour)

The 1-Wire bus is not available for these two connectors. Only the differential I²C bus is available.

– The number 8 (blue colour)

There is possible to set +5V_A or +5V_B for externally connected devices. The voltage +5 V_A is for the same potential external devices as the central unit. The voltage +5 V_B is galvanically isolated. The selection is made using jumpers, as shown in the figure 29. It is necessary to have the same jumper for both the voltage and ground.

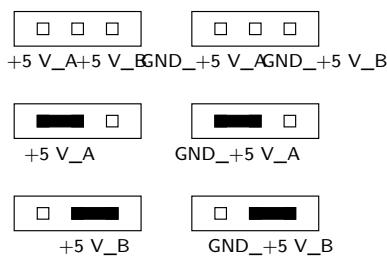


Figure 30: Selection of voltage for outputs - external states. Similar labeling is also present on the printed circuit board.

– The number 9, 10

The middle pin of connector 9 or 10 is connected to the corridor thermostat from the ground floor respectively from the first floor. Voltage +5V_B is used for the middle pin. The connection of the device to the connector is shown in the figure 31. Similar marking is also present on the printed circuit board. It is necessary to have a jumper for both the voltage +5V_B and GND_B.

– The number 11, 12

The middle pin of connector 11 or 12 is connected to the external state for controlling the circulation pump from the zone controller on the ground floor respectively from the first floor. The middle pin of the connector is used. The connection of the device to the connector is shown in the figure 31. Similar marking is also present on the printed circuit board. The orientation of the connector is in the figure 31 is identical to the orientation in the figure 28. It is necessary to have a jumper for both the voltage +5V_A and GND_A.

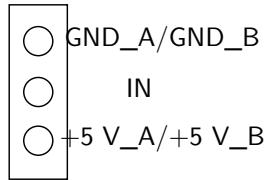


Figure 31: The connection of the external device to the terminal block for external states. Similar marking is also present on the printed circuit board.

– Connectors from RJ1 to RJ10

Connectors from RJ1 to RJ10 are used for connecting devices utilizing either the 1-Wire bus or the differential I²C bus.

- RJ1 – the cellar fireplace, connection of 1-Wire bus for a thermocouple, differential I²C bus for a display.
- RJ2 – the ground floor fireplace, connection of 1-Wire bus for a thermocouple, differential I²C bus for a display.
- RJ3 – the first floor fireplace, connection of 1-Wire bus for thermocouple, differential I²C bus for a display.
- RJ4 – the hot water tank on the first floor, connection of 1-Wire bus for temperature sensors.
- RJ5 – the outdoor temperature sensor, connection of 1-Wire bus.
- RJ6 – the distribution box on the ground floor, connection of differential I²C bus for controlling valves.
- RJ7 – the distribution box on the first floor, connection of differential I²C bus for controlling valves.

Note

The other RJ45 connectors (RJ8, RJ9, RJ10) are available. RJ9 and RJ10 connectors support only the differential I²C bus.

– The number 13, 14, 15, 17

Connectors for connection of +5V, +12V, +24V, +5V. The maximum allowed voltage is written on the PCB. The power supply connection to the connector is shown in the figure 32. Orientation of the connector in the figure 32 is the same as the orientation in figure 28.

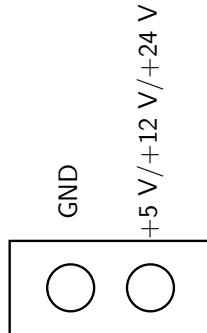


Figure 32: Connector for power supply voltages. The maximum allowed voltage is written on the PCB. Similar marking is also present on the printed circuit board.

Attention

The maximum allowed voltage is written on the PCB.

– The number 16

Connectors for connecting external devices (SSR relays and others). The connection of devices to the connector is shown in the figure 33. Similar marking is also present on the printed circuit board. The orientation of the connector in the figure 33 is the same as the orientation in 28.

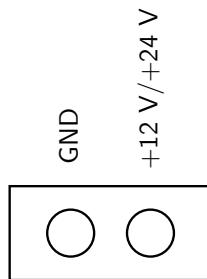


Figure 33: Connector for connecting external devices (SSR relays and others). Similar marking is also present on the printed circuit board.

– The number 18

Connector for connecting the protective earth wire (PE). Both terminals can be connected to the PE wire.

– The number 19 cyan colour

Enabling the I²C bus on RJ45 connectors. Jumpers connect terminating resistors between wires. Leave all connected.

– The number 20 violet colour

The jumpers set the address for the SPI device (reset circuit for the 1-Wire bus power). No need to reconfigure.

2.2 THE ZONE CONTROLLER

In the figure 34, there is the zone controller with a description of individual LEDs and switches.

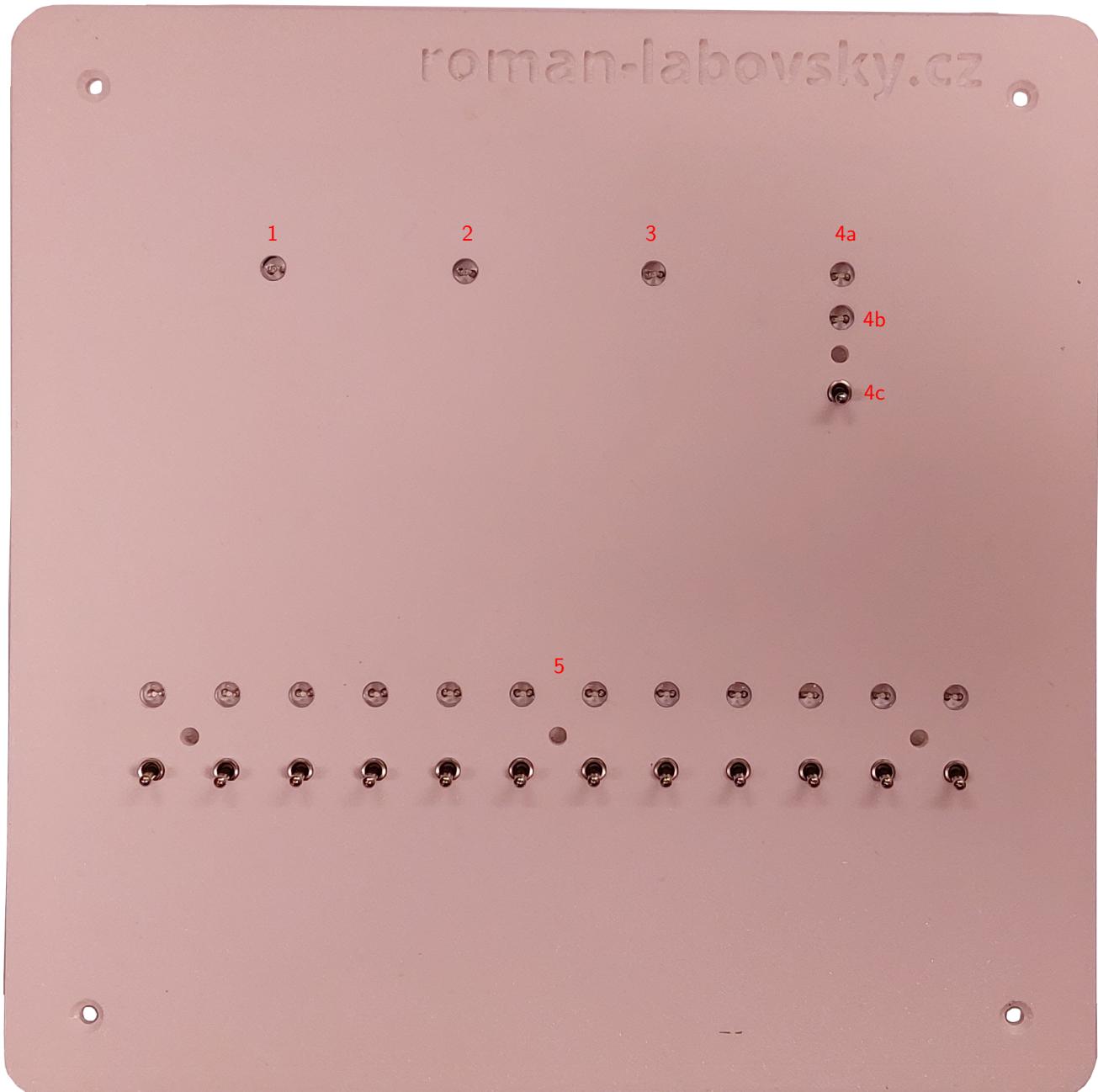


Figure 34: The zone regulator with a cover.

2.2.1 The Description of Marked Parts

- 1 – Signal LED for +24V. If blinking, an overcurrent protection is activated for valves 1–6 from the left.
- 2 – Signal LED for +24V. If blinking, an overcurrent protection is activated for valves 7–12 from the left.
- 3 – Signal LED for +5V. If blinking, an overcurrent protection is activated.
- 4a – Signal LED for underfloor heating circulation pump. If lit, the device is turned on.
- 4b – Signal LED for underfloor heating circulation pump. If lit, the device is turned on. The switch 4c is turned on.
- 5 – Signal LED for individual heating circuits. Each switch has one corresponding indicator LED indicating its status.

If lit, the circuit is turned on.

If a heating circuit is manually turned on via the switch, the circulation pump will also be automatically turned on. The circulation pump itself can also be manually turned on via the switch. However, manual control of circuits is not visible in the system (the on/off status), the system cannot subsequently control the circuits according to automation.

Note

Manual control of circuits is primarily for cases of system malfunction.

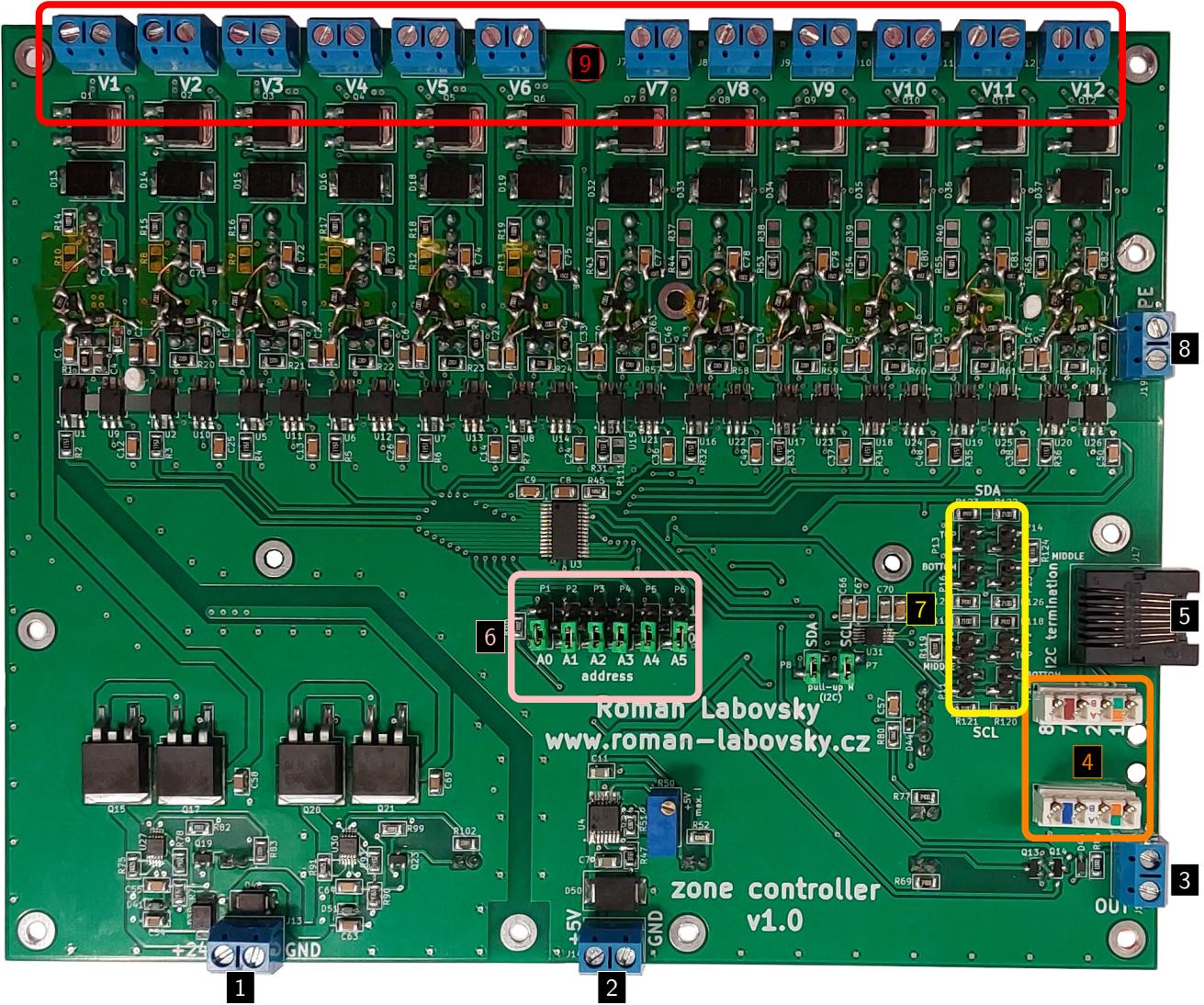


Figure 35: The zone regulator. PCB

2.2.2 The Description of Marked Parts

- The number 1

Connector for connecting +24 V.

- The number 2

Connector for connecting +5 V.

- The number 3

Output connector for signaling (+5V (on) or 0V (off)) activation of the circulation pump. In case of manual activation of the circuit or pump.

- The number 4 orange colour

The connector for connecting UTP cable or twisted pair without RJ45 connector using a punch-down tool. Input for I²C bus. Same configuration as the number 5.

– The number 5

The connector for connecting UTP cable. Input for I²C bus. Same configuration as the number 4.

– The number 6 pink colour

Jumpers for setting the device address for the I²C bus. No need to reconfigure.

– The number 7 yellow colour

Jumpers connect terminating resistors between wires for the I²C bus. Enable only on devices with the longest UTP cable.

– The number 8

The connector for connecting the protective earth wire (PE).

– The number 9 red colour

Connectors for connecting thermoelectric valves to +24 V. The polarity connection is shown in the figure 36. The orientation of the connector in the figure 36 is the same as the orientation in 35.

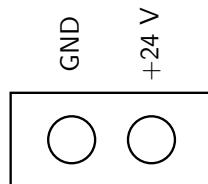


Figure 36: The connector for connecting the thermoelectric actuator. Similar marking is also present on the printed circuit board.

2.3 WALL-MOUNTED ROOM TEMPERATURE SENSOR

In the figure ??, there is the wall-mounted room temperature sensor with a description of individual parts.

