



# USER MANUAL

Heating & Cooling Station  
Automation

SHC-E02

Version 3



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User Manual

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**STANDARDS AND PROVISIONS:** Standards, recommendations, regulations and provisions of the country in which the devices will operate, must be considered while planning and setting up electrical devices. Work on 100 .. 240 V AC network is allowed for authorized personnel only.

**DANGER WARNINGS:** Devices or modules must be protected from moisture, dirt and damage during transport, storing and operation.

**WARRANTY CONDITIONS:** For all SHC cabinets - if no modifications are performed upon and are correctly connected by authorized personnel - in consideration of maximum allowed connecting power, warranty of 24 months is valid from the date of sale to the end buyer, but not more than 36 months after delivery from Smarteh. In case of claims within warranty time, which are based on material malfunctions the producer offers free replacement. The method of return of malfunctioned module, together with description, can be arranged with our authorized representative. Warranty does not include damage due to transport or because of unconsidered corresponding regulations of the country, where the module is installed.

This device must be connected properly by the provided connection scheme in this manual. Misconnections may result in device damage, fire or personal injury.

Hazardous voltage in the device can cause electric shock and may result in personal injury or death.

**NEVER SERVICE THIS PRODUCT YOURSELF!**

This device must not be installed in the systems critical for life (e.g. medical devices, aircrafts, etc.).

If the device is used in a manner not specified by the manufacturer, the degree of protection provided by the equipment may be impaired.

Waste electrical and electronic equipment (WEEE) must be collected separately!

SHC cabinets complies to the following standards:

- EMC: EN 61000-6-3:2007 + A1:2011, EN 61000-6-1:2007, EN 61000-3-2:2006 + A1:2009 + A2: 2009, EN 61000-3-3:2013
- LVD: IEC 61010-1:2010 (3<sup>rd</sup> Ed.), IEC 61010-2-201:2013 (1<sup>st</sup> Ed.)

Smarteh d.o.o. operates a policy of continuous development. Therefore we reserve the right to make changes and improvements to any of the products described in this manual without any prior notice.

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## Heating & Cooling Station Automation SHC-E02

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## 1 ABBREVIATIONS

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|       |                                          |
|-------|------------------------------------------|
| GUI   | Graphical User Interface                 |
| SCADA | Supervisory Control And Data Acquisition |
| HMI   | Human Machine Interface                  |
| MQTT  | Message Queuing Telemetry Transport      |
| PLC   | Programmable Logic Controller            |
| DC    | Direct Current                           |
| AC    | Alternating Current                      |
| I/O   | Input/Output                             |
| AI    | Analog Input                             |
| AO    | Analog Output                            |
| DI    | Digital Input                            |
| DO    | Digital Output                           |
| NTC   | Negative Temperature Coefficient         |
| PWM   | Pulse Width Modulation                   |
| DHWT  | Domestic hot water tank                  |
| Temp  | Temperature                              |



## 2 DESCRIPTION

The Smarteh Heating & Cooling Station Automation Cabinets, like SHC-001, SHC-002 and SHC-E02, are designed as a versatile solution for managing up multiple heating and/or cooling circuits, whether in private homes or larger public buildings. These cabinets are ideal for both new construction projects and retrofits, offering a compact and integrated automation system tailored to meet the specific requirements of any heating or cooling setup. With the Smarteh Heating & Cooling Station Automation Cabinets installation, configuration, and startup are made simpler and quicker.

Unlike many automation systems that require the heating and cooling plant to adapt to a predefined layout, the Smarteh Heating & Cooling Station Automation cabinets can be adjusted to the unique hydraulic configuration of your plant. This adaptability ensures smooth integration into various environments.

For more detailed configurations of Smarteh Heating & Cooling Station Automation cabinets, please refer to the following table.

**Table 1: Heating & Cooling Station Automation cabinet configuration**

| Cabinet               | Heating sources | Heat storage | Domestic hot water tank | Divert module | Hydraulic separator | Heating & Cooling circuits |
|-----------------------|-----------------|--------------|-------------------------|---------------|---------------------|----------------------------|
| SHC-001               | up to 2         | up to 2      | 1                       | 1             | /                   | up to 2                    |
| SHC-002               | up to 2         | up to 2      | 1                       | 1             | 1                   | up to 3                    |
| SHC-002 & 1 x SHC-E02 | up to 4         | up to 2      | up to 2                 | 1             | 1                   | up to 6                    |
| SHC-002 & 2 x SHC-E02 | up to 6         | up to 2      | up to 3                 | 1             | 1                   | up to 9                    |
| SHC-002 & 3 x SHC-E02 | up to 6         | up to 2      | up to 3                 | 1             | 1                   | up to 12                   |

**Table 2: Heating & Cooling Station Automation cabinet included temperature sensors**

| Cabinet | Heating circuits pipe surface PT1000-1CH | High temperature Heating sources Immersion, 6mm 180°C PT1000-1I | Domestic hot water tank & Hot water storage tank Immersion, 6mm 85°C PT1000-1C | Room PT1000-2 | Outdoor PT1000-2E |
|---------|------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------|---------------|-------------------|
| SHC-001 | 1                                        | 2                                                               | 2                                                                              | /             | 1                 |
| SHC-002 | 2                                        | 2                                                               | 2                                                                              | 1             | 1                 |
| SHC-E02 | 4                                        | 2                                                               | 1                                                                              | /             | /                 |

**Table 3: Heating & Cooling Station Automation cabinet accessories**

| Item                           | Function                                               |
|--------------------------------|--------------------------------------------------------|
| Temperature sensor PT1000-1CH  | 85°C, pipe surface temperature sensor                  |
| Temperature sensor PT1000-1I   | 180°C , 6mm diameter, immersion temperature sensor     |
| Temperature sensor PT1000-1C   | 85°C , 6mm diameter, immersion temperature sensor      |
| Temperature sensor PT1000-2    | Room temperature sensor, wall mounted                  |
| Temperature sensor PT1000-2E   | Outdoor temperature sensor, wall mounted               |
| Touch panel 4,3" LPC-3.GOT.111 | Room temperature panel, 4,3" Touch Panel, wall mounted |

The cabinets were developed and are continuously upgraded to meet all requirements regarding the heating and cooling regulation algorithms, heating and cooling sources, valves, pumps, hot water



storage tank, etc. The main part of the solution is the Smarteh PLC based color touch panel with local and remote possibility of automation algorithms and GUI uploading, system setting and system checking.

The system enables smart management of heat sources based on current energy prices, which can be configured through energy saving schedules. Additional features include storing energy within the building when energy prices are lower. The entire system's operation can be monitored via a web browser on the local network or remotely via an Internet connection, where all real-time system data is displayed.

SHC-E02 is extension Heating & Cooling Station Automation Cabinet designed for use with the main cabinet SHC-002. Communication between the SHC-E02 and the SHC-002 is established via Modbus RTU. SHC-E02 default Modbus RTU slave address is 234. When connecting multiple extension cabinets SHC-E02 to a single main cabinet SHC-002, each cabinet's address is configured through the control panel of the main SHC-002 during system setup. Connecting an SHC-E02 to the SHC-002 expands the system's capacity to manage additional heating and cooling components, such as heating/cooling circuits and heat sources.

The SHC-E02 Heating & Cooling Station Automation cabinet has the possibility to program the functioning of up to 2 additional digital outputs from main cabinet SHC-002. For example for switching OFF/ON the re-heater, pump or valve based on the set temperature threshold and measuring the actual temperature of the specific heating/cooling point.

Actuator override commands are possible by using integrated switches in case of installed actuator failure. Fuses, the main power switch and all predefined wiring terminals are integrated and mandatory temperature sensors are included in the package.

Please check other Smarteh Heating & Cooling Station Automation cabinets like SHC-002 cabinet and SHC-001 cabinet on our web site: [www.smarteh.com](http://www.smarteh.com) under *PRODUCTS > BUILDING AUTOMATION PRODUCT LINE > CONTROL CABINETS > HEATING & COOLING STATION AUTOMATION* section.



To put the SHC-E02 Heating & Cooling Station Automation cabinet into operation, authorized person needs to perform a few following tasks:

1. Choose the corresponding Smarteh Heating & Cooling Station Automation cabinet to support a needed number of heating and/or cooling circuits on our website. For example, SHC-E02 is extension cabinet for upgrading the system to additional heating and/or cooling circuits.
2. Mount the selected cabinets to the appropriate place in the domestic hot water tank room.
3. Switch OFF main power supply and connect the cabinets to the main power supply according to the connection scheme from this document. Connect main cabinet SHC-002 and extension cabinet SHC-E02 via Modbus RTU.
4. Switch ON the main power supply and the cabinets MAIN switch. After powering up the touch panel on SHC-002 cabinet, set up the system that directly corresponds to the heating and cooling plant hydraulic layout. Please follow the document *SHC-002 Integration Manual* on our website: [www.smarteh.com](http://www.smarteh.com) under *DOWNLOADS & SUPPORT* section for system configuration setup.
5. Switch OFF the MAIN switches and the main power supply. Wire and connect heating and cooling sources, regulating and ON/OFF valves, pumps, hot water storage tank, sensors, etc. to the installed cabinet terminals. Set cabinet jumpers on the PLC modules and set integrated switches as required. Please provide the settings mentioned based on the touch panel configuration you performed and the connection scheme example inside this document.
6. Switch ON the main power supply and the cabinet MAIN switches and test the functionality.





### 3 FEATURES



Figure 1: SHC-E02

| Table 4: Features                                                          |
|----------------------------------------------------------------------------|
| A ready-made solution for the automation of heating and cooling stations   |
| Extension cabinet for upgrading to additional 3 heating & cooling circuits |
| Easy and fast integration                                                  |
| Adaptation to specific hydraulic layout                                    |
| Increased energy efficiency                                                |
| Heat source and pump operation mode selection switches                     |



## 4 OPERATION

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### 4.1 Operation description

For the SHC-E02 Heating & Cooling Station Automation cabinet system operation instructions, please refer to the the documents *SHC-002 cabinet Operator Manual*.

For the SHC-E02 Heating & Cooling Station Automation cabinet system configuration setup, please refer to the the documents *SHC-002 cabinet Integration Manual*.

Both manuals are available on our website: [www.smarteh.com](http://www.smarteh.com) under *DOWNLOADS & SUPPORT* section.





## 5 INSTALLATION

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### 5.1 Connection scheme

Connection scheme of the SHC-E02 Heating & Cooling Station Automation Cabinet can be found in document *SHC-002 connection scheme*. This document is available on our website: [www.smarteh.com](http://www.smarteh.com) under *DOWNLOADS & SUPPORT* section.



Figure 2: SHC-002 schematic example of device connections

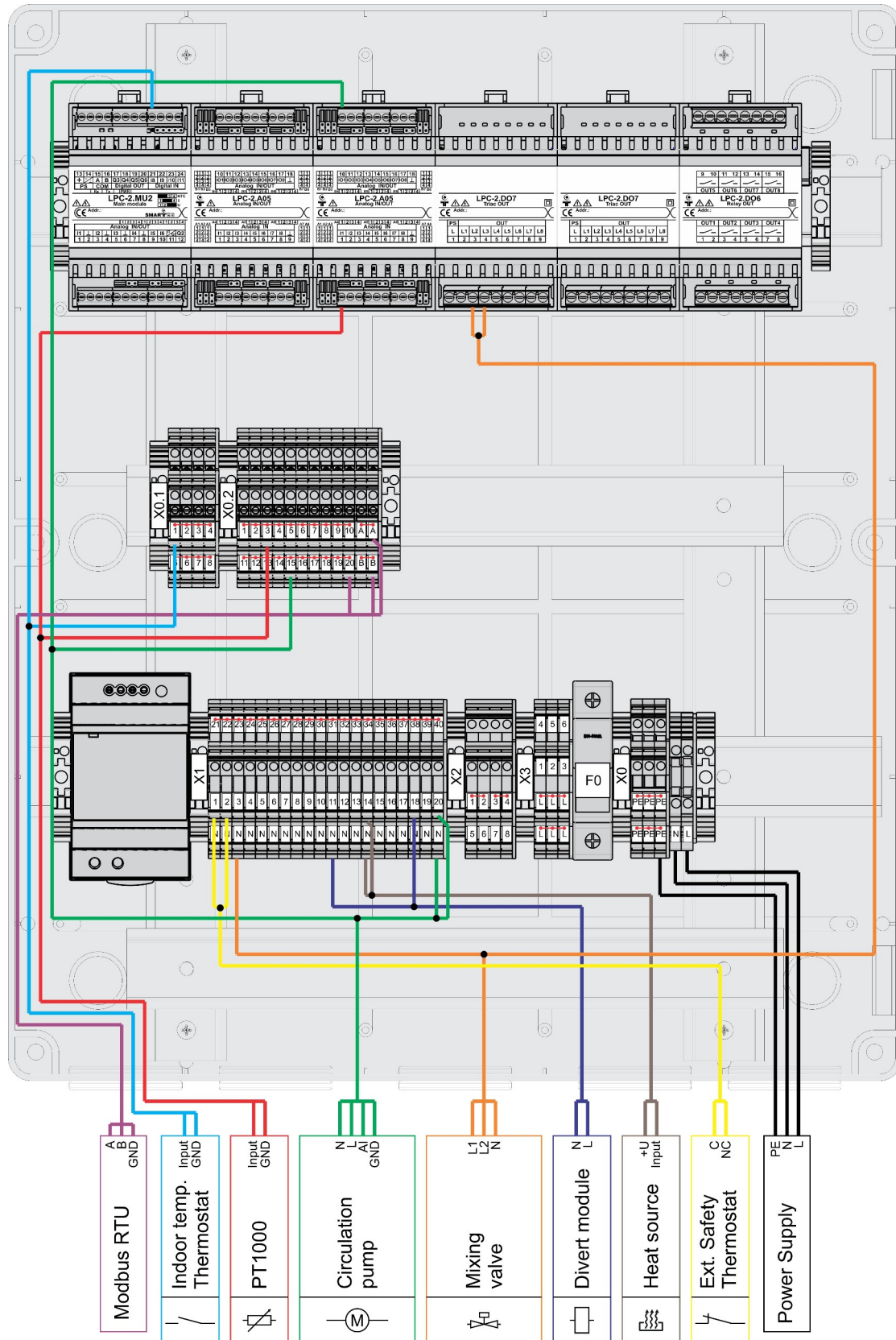
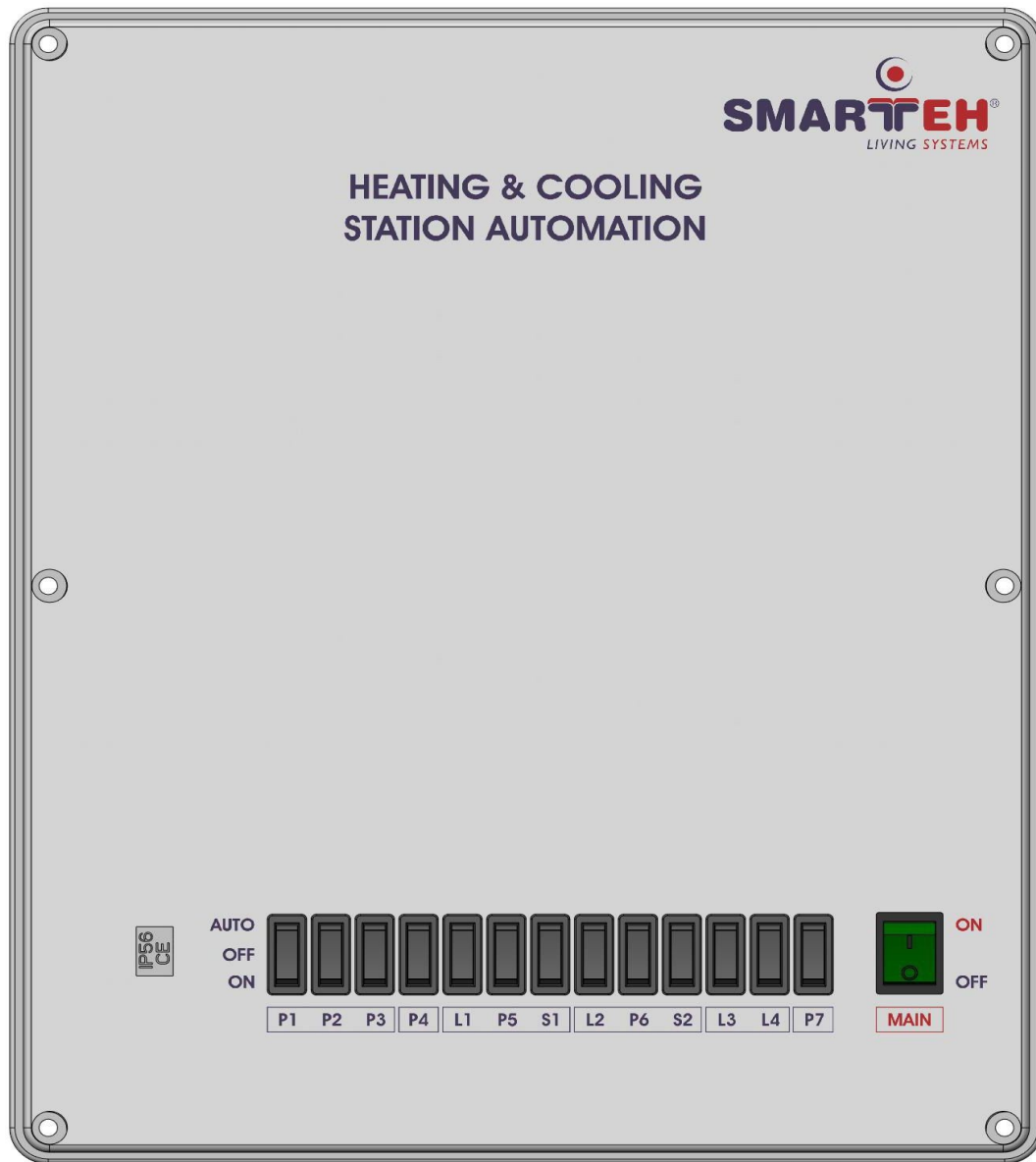




Figure 3: SHC-E02 cabinet



**Table 5: Switches**

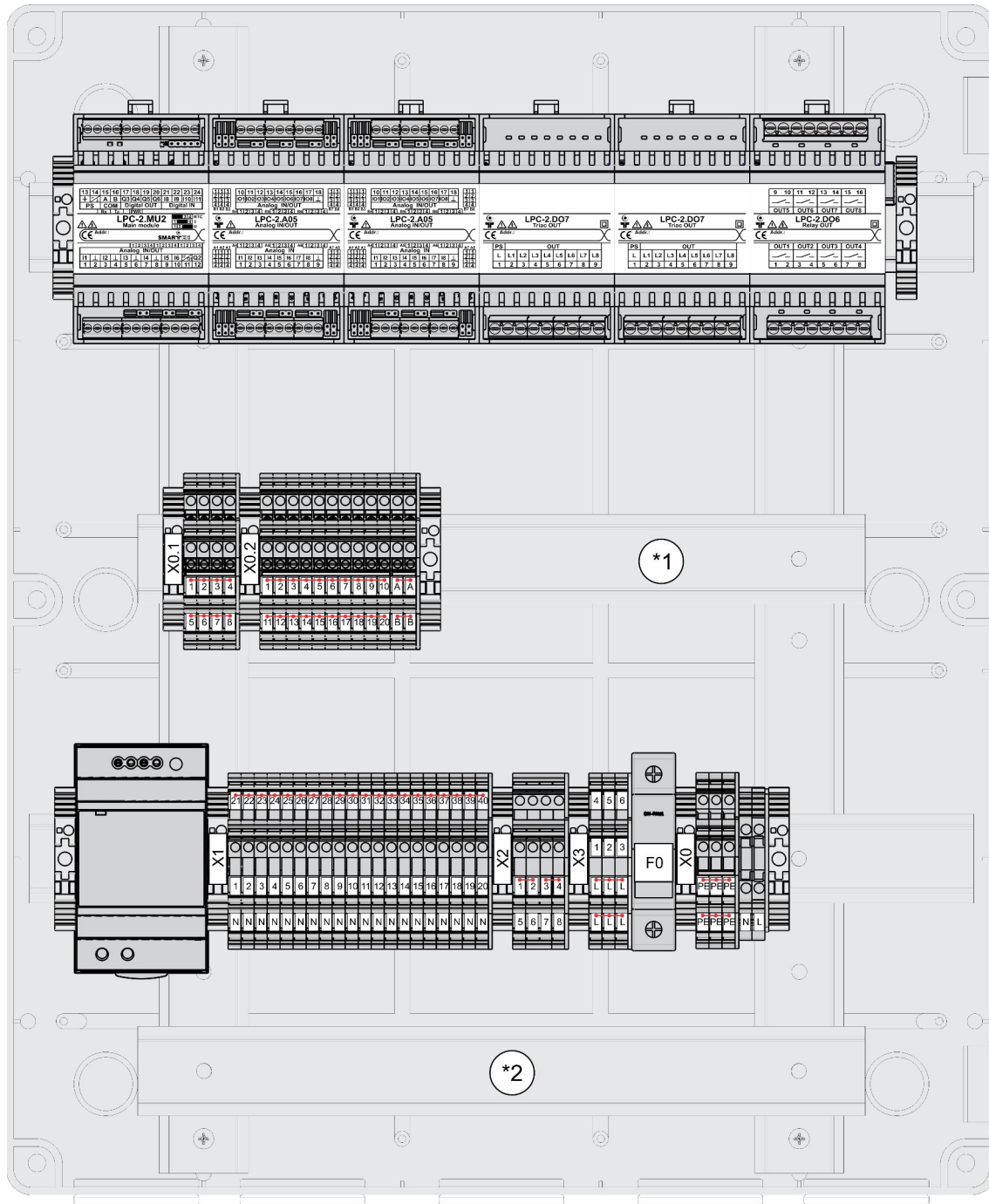
| Designation | Functionality      | Description                                                                         |
|-------------|--------------------|-------------------------------------------------------------------------------------|
| P1          | Circulation pump 1 | Switch for setting the operation mode of the pump for heating and cooling circuit 1 |
| P2          | Circulation pump 2 | Switch for setting the operation mode of the pump for heating and cooling circuit 2 |
| P3          | Circulation pump 3 | Switch for setting the operation mode of the pump for heating and cooling circuit 3 |
| P4          | Circulation pump 4 | Switch for setting the operation mode of the pump for hydraulic separator           |
| L1          | Heat source 1      | Switch for setting the operation mode of heat source 1                              |
| P5          | Circulation pump 5 | Switch for setting the operation mode of the pump for heat source 1                 |
| S1          | Special function   | Switch for setting the operation mode of heat source 1, dry contacts                |
| L2          | Heat source 2      | Switch for setting the operation mode of heat source 2                              |
| P6          | Circulation pump 6 | Switch for setting the operation mode of the pump for heat source 2                 |
| S2          | Special function   | Switch for setting the operation mode of heat source 2, dry contacts                |
| L3          | Divert module 1    | Switch for setting the operation mode of divert module 1                            |
| L4          | Divert module 2    | Switch for setting the operation mode of divert module 2                            |
| P7          | Circulation pump 7 | Switch for setting the operation mode of the pump for domestic hot water tank       |
| MAIN        | Main switch        | Switch to turn ON the station and power for all connected devices                   |

Operation mode description:

- AUTO: The device works in automatic mode and is controlled by the controller
- ON: The device works in manual mode and is turned ON
- OFF: The device works in manual mode and is turned OFF



Figure 4: SHC-E02 inside



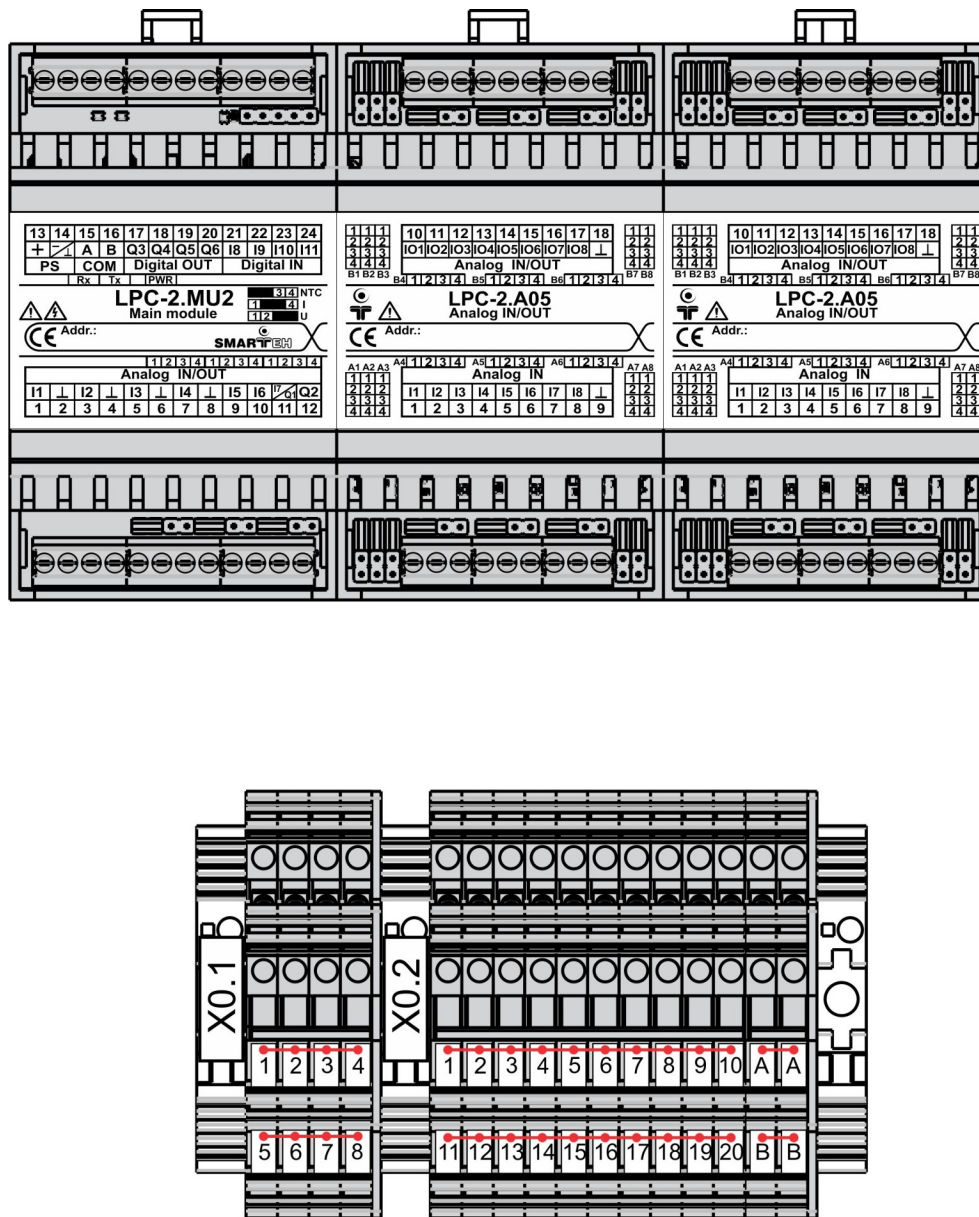
NOTE:

- The place marked with "1" is intended for adding additional user modules and equipment.
- The place marked with "2" is intended for fixing cables or wires of external units.





Figure 5: SHC-E02 inside, low voltage section



The LPC-2.MU2 module has various analog and digital inputs and outputs. Some of these are used for the operation of the SHC-E02 cabinet. Analog inputs I1 and I2 function as dry contact input recognition. Digital inputs I8, I9, and I10 are digital inputs for the digital room thermostat.

**Table 6: LPC-2.MU2**

|         | Input type                    | Input device type        | Input description     |
|---------|-------------------------------|--------------------------|-----------------------|
| I1<br>⊥ | Dry contact                   | Heat source error signal | Heat source #1 - DI1  |
| I2<br>⊥ | Dry contact                   | Heat source error signal | Heat source #2 - DI2  |
| I8      | Digital input<br>0 .. 24 V DC | Room thermostat          | Indoor temp #1 - DI8  |
| I9      | Digital input<br>0 .. 24 V DC | Room thermostat          | Indoor temp #2 - DI9  |
| I10     | Digital input<br>0 .. 24 V DC | Room thermostat          | Indoor temp #3 - DI10 |

The LPC-2.A05 module uses individual jumpers to configure the input/output functionality of each channel. Jumper positions and labels are clearly indicated on the module. The lower *Analog IN* inputs can be switched between analog voltage input, analog current input, or PT1000 input modes. Similarly, the upper *Analog IN/OUT* inputs/outputs can function as either analog voltage output, analog current output and PWM output, or as PT1000 inputs. Consult the LPC-2.A05 user manual for specific configuration details.

**Table 7: LPC-2.A05 #1 Analog IN**

|    | Jumper | Jumper position | Input type | Input device designation | Input description                              |
|----|--------|-----------------|------------|--------------------------|------------------------------------------------|
| I1 | A1     | 3 4             | Pt1000     | T1                       | Heating & Cooling circuit #1<br>PT1000 inflow  |
| I2 | A2     | 3 4             | Pt1000     | T2                       | Heating & Cooling circuit #1<br>PT1000 outflow |
| I3 | A3     | 3 4             | Pt1000     | T3                       | Heating & Cooling circuit #2<br>PT1000 inflow  |
| I4 | A4     | 3 4             | Pt1000     | T4                       | Heating & Cooling circuit #2<br>PT1000 outflow |
| I5 | A5     | 3 4             | Pt1000     | T5                       | Heating & Cooling circuit #3<br>PT1000 inflow  |
| I6 | A6     | 3 4             | Pt1000     | T6                       | Heating & Cooling circuit #3<br>PT1000 outflow |
| I7 | A7     | 3 4             | Pt1000     | T7                       | Hydraulic separator<br>PT1000 inflow           |
| I8 | A8     | 3 4             | Pt1000     | T8                       | Hydraulic separator<br>PT1000 outflow          |

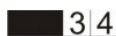
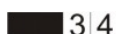


**Table 8: LPC-2.A05 #1 Analog IN/OUT control signals**

| Jumper |    | I/O type according to jumper position |                                                | I/O device designation | I/O description                                  |
|--------|----|---------------------------------------|------------------------------------------------|------------------------|--------------------------------------------------|
|        |    | 1 4                                   | 3 4                                            |                        |                                                  |
| IO1    | B1 | Voltage analog output 0 .. 10 V       | Current analog output 0 .. 20 mA or PWM output | P1                     | Heating & Cooling circuit #1<br>Circulation pump |
| IO2    | B2 | Voltage analog output 0 .. 10 V       | Current analog output 0 .. 20 mA or PWM output | V1                     | Heating & Cooling circuit #1<br>Mixing valve     |
| IO3    | B3 | Voltage analog output 0 .. 10 V       | Current analog output 0 .. 20 mA or PWM output | P2                     | Heating & Cooling circuit #2<br>Circulation pump |
| IO4    | B4 | Voltage analog output 0 .. 10 V       | Current analog output 0 .. 20 mA or PWM output | V2                     | Heating & Cooling circuit #2<br>Mixing valve     |
| IO5    | B5 | Voltage analog output 0 .. 10 V       | Current analog output 0 .. 20 mA or PWM output | P3                     | Heating & Cooling circuit #3<br>Circulation pump |
| IO6    | B6 | Voltage analog output 0 .. 10 V       | Current analog output 0 .. 20 mA or PWM output | V3                     | Heating & Cooling circuit #3<br>Mixing valve     |
| IO7    | B7 | Voltage analog output 0 .. 10 V       | Current analog output 0 .. 20 mA or PWM output | P4                     | Hydraulic separator<br>Circulation pump          |
| IO8    | B8 | Voltage analog output 0 .. 10 V       | Current analog output 0 .. 20 mA or PWM output | P5                     | Heat source #1<br>Circulation pump               |



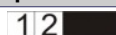
**Table 9: LPC-2.A05 #2 Analog IN**

| Jumper |    | Jumper position                                                                   | Input type | Input device designation | Input description                           |
|--------|----|-----------------------------------------------------------------------------------|------------|--------------------------|---------------------------------------------|
| I1     | A1 |  | Pt1000     | T9                       | Hot water storage tank<br>PT1000 - Temp #1  |
| I2     | A2 |  | Pt1000     | T10                      | Hot water storage tank<br>PT1000 - Temp #2  |
| I3     | A3 |  | Pt1000     | T11                      | Hot water storage tank<br>PT1000 - Temp #3  |
| I4     | A4 |  | Pt1000     | T12                      | Hot water storage tank<br>PT1000 - Temp #4  |
| I5     | A5 |  | Pt1000     | T13                      | Heat source #1<br>PT1000 - Temp #1          |
| I6     | A6 |  | Pt1000     | T14                      | Heat source #2<br>PT1000 - Temp #1          |
| I7     | A7 |  | Pt1000     | T15                      | Domestic hot water tank<br>PT1000 - Temp #1 |
| I8     | A8 |  | Pt1000     | T16                      | Domestic hot water tank<br>PT1000 - Temp #2 |

**Table 10: LPC-2.A05 #2 Analog IN/OUT 1..4 control signals**

| Table 10: I/O 2X40 #2 Analog I/O Control signals |    |                                                                                     |                                                                                     |                        |                                          |
|--------------------------------------------------|----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------|------------------------------------------|
| Jumper                                           |    | I/O type according to jumper position                                               |                                                                                     | I/O device designation | I/O description                          |
|                                                  |    |  |  |                        |                                          |
| IO1                                              | B1 | Voltage analog output 0 .. 10 V                                                     | Current analog output 0 .. 20 mA or PWM output                                      | P6                     | Heat source #2 Circulation pump          |
| IO2                                              | B2 | Voltage analog output 0 .. 10 V                                                     | Current analog output 0 .. 20 mA or PWM output                                      | P7                     | Domestic hot water tank Circulation pump |
| IO3                                              | B3 | Voltage analog output 0 .. 10 V                                                     | Current analog output 0 .. 20 mA or PWM output                                      | /                      | Spare                                    |
| IO4                                              | B4 | Voltage analog output 0 .. 10 V                                                     | Current analog output 0 .. 20 mA or PWM output                                      | /                      | Spare                                    |

**Table 11: LPC-2.A05 #2 Analog IN/OUT 5..8**

| Table 1-10 I/O Jumper #2 Analog I/O Config |    |                                                                                     |          |                        |                         |
|--------------------------------------------|----|-------------------------------------------------------------------------------------|----------|------------------------|-------------------------|
| Jumper                                     |    | Jumper position                                                                     | I/O type | I/O device designation | I/O description         |
| I05                                        | B5 |  | Pt1000   | T17                    | Outdoor temp - PT1000   |
| I06                                        | B6 |  | Pt1000   | T18                    | Indoor temp #1 - PT1000 |
| I07                                        | B7 |  | Pt1000   | T19                    | Indoor temp #2 - PT1000 |
| I08                                        | B8 |  | Pt1000   | T20                    | Indoor temp #3 - PT1000 |

**Table 12: X0.1**

| Terminal designation | Terminal type | I/O device designation | I/O description      |
|----------------------|---------------|------------------------|----------------------|
| X0.1:1               | 24 VDC        | T#1_DI_24V             | Indoor temp #1 - DI8 |
|                      |               | Spare                  | Spare                |



**Table 12: X0.1**

|        |        |            |                       |
|--------|--------|------------|-----------------------|
| X0.1:2 | 24 VDC | T#2_DI_24V | Indoor temp #2 - DI9  |
|        |        | Spare      | Spare                 |
| X0.1:3 | 24 VDC | T#3_DI_24V | Indoor temp #3 - DI10 |
|        |        | Spare      | Spare                 |
| X0.1:4 | 24 VDC | Spare      | Spare                 |
|        |        | /          | /                     |
| X0.1:5 | 24 VDC | Spare      | Spare                 |
|        |        | /          | /                     |
| X0.1:6 | 24 VDC | Spare      | Spare                 |
|        |        | /          | /                     |
| X0.1:7 | 24 VDC | Spare      | Spare                 |
|        |        | /          | /                     |
| X0.1:8 | 24 VDC | Spare      | Spare                 |
|        |        | /          | /                     |

**Table 13: X0.2**

| Terminal designation | Terminal type       | I/O device designation | I/O description                                  |
|----------------------|---------------------|------------------------|--------------------------------------------------|
| X0.2:1               | GND reference point | T1                     | Heating & Cooling circuit #1<br>PT1000 inflow    |
|                      |                     | /                      | /                                                |
| X0.2:2               | GND reference point | T2                     | Heating & Cooling circuit #1<br>PT1000 outflow   |
|                      |                     | P1                     | Heating & Cooling circuit #1<br>Circulation pump |
| X0.2:3               | GND reference point | T9                     | Hot water storage tank<br>PT1000 - Temp #1       |
|                      |                     | V1                     | Heating & Cooling circuit #1<br>Mixing valve     |
| X0.2:4               | GND reference point | T10                    | Hot water storage tank<br>PT1000 - Temp #2       |
|                      |                     | P2                     | Heating & Cooling circuit #2<br>Circulation pump |
| X0.2:5               | GND reference point | T3                     | Heating & Cooling circuit #2<br>PT1000 inflow    |
|                      |                     | V2                     | Heating & Cooling circuit #2<br>Mixing valve     |
| X0.2:6               | GND reference point | T4                     | Heating & Cooling circuit #2<br>PT1000 outflow   |
|                      |                     | P3                     | Heating & Cooling circuit #3<br>Circulation pump |
| X0.2:7               | GND reference point | T11                    | Hot water storage tank<br>PT1000 - Temp #3       |
|                      |                     | V3                     | Heating & Cooling circuit #3<br>Mixing valve     |



**Table 13: X0.2**

|         |                     |       |                                                |
|---------|---------------------|-------|------------------------------------------------|
| X0.2:8  | GND reference point | T12   | Hot water storage tank<br>PT1000 - Temp #4     |
|         |                     | P4    | Hydraulic separator<br>Circulation pump        |
| X0.2:9  | GND reference point | T5    | Heating & Cooling circuit #3<br>PT1000 inflow  |
|         |                     | P5    | Heat source #1<br>Circulation pump             |
| X0.2:10 | GND reference point | T6    | Heating & Cooling circuit #3<br>PT1000 outflow |
|         |                     | /     | /                                              |
| X0.2:11 | GND reference point | T13   | Heat source #1<br>PT1000 - Temp #1             |
|         |                     | /     | /                                              |
| X0.2:12 | GND reference point | T14   | Heat source #2<br>PT1000 - Temp #1             |
|         |                     | /     | /                                              |
| X0.2:13 | GND reference point | T7    | Hydraulic separator<br>PT1000 inflow           |
|         |                     | /     | /                                              |
| X0.2:14 | GND reference point | T8    | Hydraulic separator<br>PT1000 outflow          |
|         |                     | P6    | Heat source #2<br>Circulation pump             |
| X0.2:15 | GND reference point | T15   | Domestic hot water tank<br>PT1000 - Temp #1    |
|         |                     | P7    | Domestic hot water tank<br>Circulation pump    |
| X0.2:16 | GND reference point | T16   | Domestic hot water tank<br>PT1000 - Temp #2    |
|         |                     | Spare | Spare                                          |
| X0.2:17 | GND reference point | T17   | Outdoor temp<br>PT1000                         |
|         |                     | Spare | Spare                                          |
| X0.2:18 | GND reference point | T18   | Indoor temp #1<br>PT1000                       |
|         |                     | /     | /                                              |
| X0.2:19 | GND reference point | T19   | Indoor temp #2<br>PT1000                       |
|         |                     | /     | /                                              |
| X0.2:20 | GND reference point | T20   | Indoor temp #3<br>PT1000                       |
|         |                     | /     | /                                              |
| X0.2:A  | RS-485 A Modbus RTU | Spare | Modbus RTU master device<br>SHC-002 cabinet    |
| X0.2:B  | RS-485 B Modbus RTU | Spare | Modbus RTU slave device<br>SHC-002 cabinet     |

Note: SHC-E02 default Modbus RTU slave address is 234.





Figure 6: SHC-E02 inside, power section

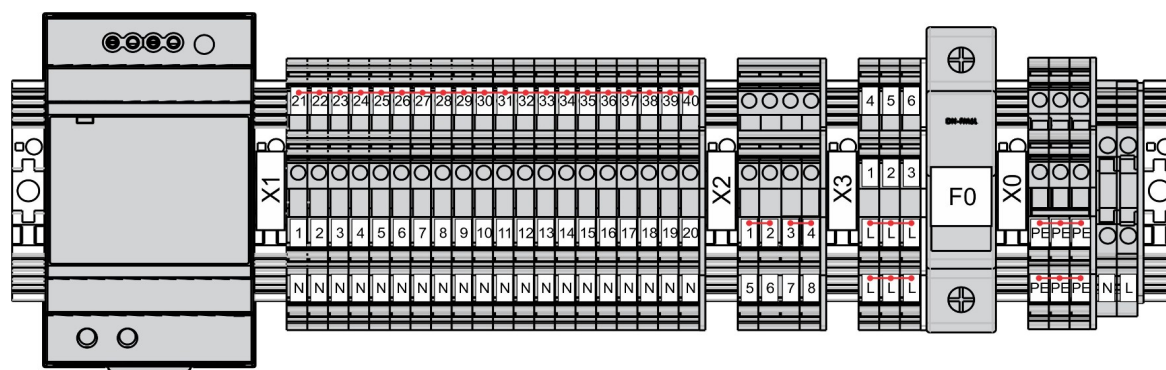


Table 14: X1

| Terminal designation | Terminal type      | I/O device designation | I/O description                                                                             |
|----------------------|--------------------|------------------------|---------------------------------------------------------------------------------------------|
| X1:1                 | 0..230 V AC - Line | P1                     | Heating & Cooling circuit #1<br>Circulation pump<br>Optionally - External safety thermostat |
| X1:2                 | 0..230 V AC - Line | P1                     | Heating & Cooling circuit #1<br>Circulation pump<br>Optionally - External safety thermostat |
| X1:3                 | 0..230 V AC - Line | V1 - L1                | Heating & Cooling circuit #1<br>Mixing valve                                                |
| X1:4                 | 0..230 V AC - Line | V1 - L2                | Heating & Cooling circuit #1<br>Mixing valve                                                |
| X1:5                 | 0..230 V AC - Line | P2                     | Heating & Cooling circuit #2<br>Circulation pump<br>Optionally - External safety thermostat |
| X1:6                 | 0..230 V AC - Line | P2                     | Heating & Cooling circuit #2<br>Circulation pump<br>Optionally - External safety thermostat |
| X1:7                 | 0..230 V AC - Line | V2 - L1                | Heating & Cooling circuit #2<br>Mixing valve                                                |
| X1:8                 | 0..230 V AC - Line | V2 - L2                | Heating & Cooling circuit #2<br>Mixing valve                                                |
| X1:9                 | 0..230 V AC - Line | P3                     | Heating & Cooling circuit #3<br>Circulation pump<br>Optionally - External safety thermostat |
| X1:10                | 0..230 V AC - Line | P3                     | Heating & Cooling circuit #3<br>Circulation pump<br>Optionally - External safety thermostat |
| X1:11                | 0..230 V AC - Line | V3 - L1                | Heating & Cooling circuit #3<br>Mixing valve                                                |
| X1:12                | 0..230 V AC - Line | V3 - L2                | Heating & Cooling circuit #3<br>Mixing valve                                                |
| X1:13                | 0..230 V AC - Line | P4                     | Hydraulic separator<br>Circulation pump                                                     |



**Table 14: X1**

|       |                    |    |                                                  |
|-------|--------------------|----|--------------------------------------------------|
| X1:14 | 0..230 V AC - Line | L1 | Heat source #1<br>Turning ON                     |
| X1:15 | 0..230 V AC - Line | P5 | Heat source #1<br>Circulation pump               |
| X1:16 | 0..230 V AC - Line | L2 | Heat source #2<br>Turning ON/valve               |
| X1:17 | 0..230 V AC - Line | P6 | Heat source #2<br>Circulation pump               |
| X1:18 | 0..230 V AC - Line | L3 | Divert module #1                                 |
| X1:19 | 0..230 V AC - Line | L4 | Divert module #2                                 |
| X1:20 | 0..230 V AC - Line | P7 | Domestic hot water tank<br>Circulation pump      |
| X1:21 | Neutral            | P1 | Heating & Cooling circuit #1<br>Circulation pump |
| X1:22 | Neutral            | /  | Spare                                            |
| X1:23 | Neutral            | V1 | Heating & Cooling circuit #1<br>Mixing valve     |
| X1:24 | Neutral            | /  | Spare                                            |
| X1:25 | Neutral            | P2 | Heating & Cooling circuit #2<br>Circulation pump |
| X1:26 | Neutral            | /  | Spare                                            |
| X1:27 | Neutral            | V2 | Heating & Cooling circuit #2<br>Mixing valve     |
| X1:28 | Neutral            | /  | Spare                                            |
| X1:29 | Neutral            | P3 | Heating & Cooling circuit #3<br>Circulation pump |
| X1:30 | Neutral            | /  | Spare                                            |
| X1:31 | Neutral            | V3 | Heating & Cooling circuit #3<br>Mixing valve     |
| X1:32 | Neutral            | /  | Spare                                            |
| X1:33 | Neutral            | P4 | Hydraulic separator<br>Circulation pump          |
| X1:34 | Neutral            | L1 | Heat source #1<br>Turning ON                     |
| X1:35 | Neutral            | P5 | Heat source #1<br>Circulation pump               |
| X1:36 | Neutral            | L2 | Heat source #2<br>Turning ON/valve               |
| X1:37 | Neutral            | P6 | Heat source #2<br>Circulation pump               |
| X1:38 | Neutral            | L3 | Divert module #1                                 |
| X1:39 | Neutral            | L4 | Divert module #2                                 |
| X1:40 | Neutral            | P7 | Domestic hot water tank<br>Circulation pump      |

**Table 15: X2**

| Terminal designation | Terminal type | I/O device designation | I/O description |
|----------------------|---------------|------------------------|-----------------|
|----------------------|---------------|------------------------|-----------------|



**Table 15: X2**

|      |                       |    |                              |
|------|-----------------------|----|------------------------------|
| X2:1 | voltage free contacts | S1 | Heat source #1<br>Turning ON |
| X2:2 | voltage free contacts | S1 | Heat source #1<br>Turning ON |
| X2:3 | voltage free contacts | S2 | Heat source #2<br>Turning ON |
| X2:4 | voltage free contacts | S2 | Heat source #2<br>Turning ON |
| X2:5 | voltage free contacts | S1 | Heat source #1<br>Turning ON |
| X2:7 | voltage free contacts | S2 | Heat source #2<br>Turning ON |

**Table 16: X3 - Power supply input**

| Terminal designation | Terminal type             | Input description |
|----------------------|---------------------------|-------------------|
| L1                   | 0 .. 230 VAC - Line fused | Spare             |
| L2                   | 0 .. 230 VAC - Line fused | Spare             |
| L4                   | 0 .. 230 VAC - Line fused | Spare             |
| L5                   | 0 .. 230 VAC - Line fused | Spare             |

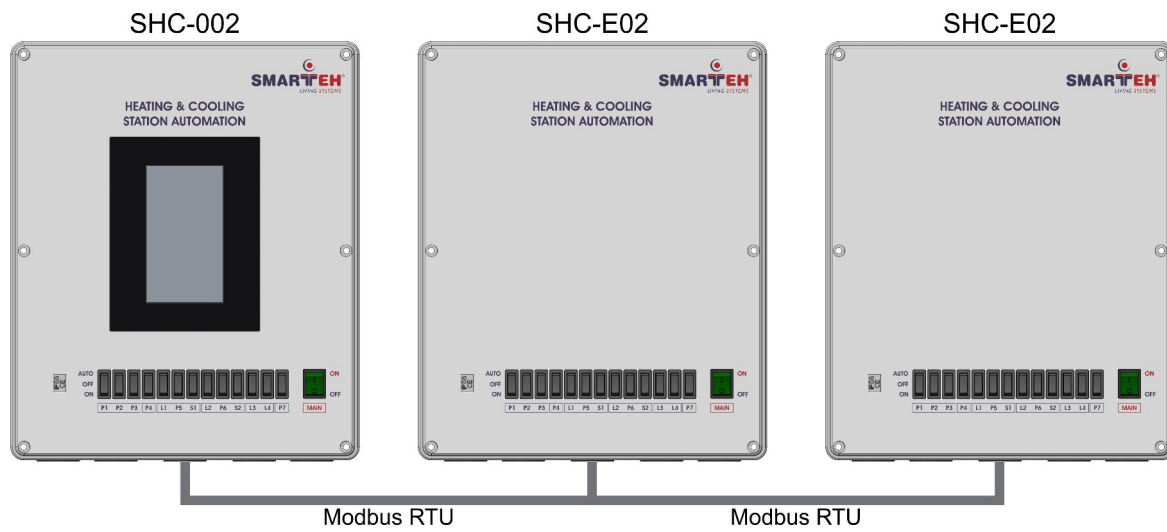
**Table 17: X0 - Power supply input**

| Terminal designation | Terminal type          | Input description    |
|----------------------|------------------------|----------------------|
| L                    | 0 .. 230 VAC - Line    | Power supply line    |
| N                    | 0 .. 230 VAC - Neutral | Power supply neutral |
| PE                   | Earth                  | Power supply earth   |





**Figure 7: Smarteh Heating & Cooling Station Automation Cabinets connection example**



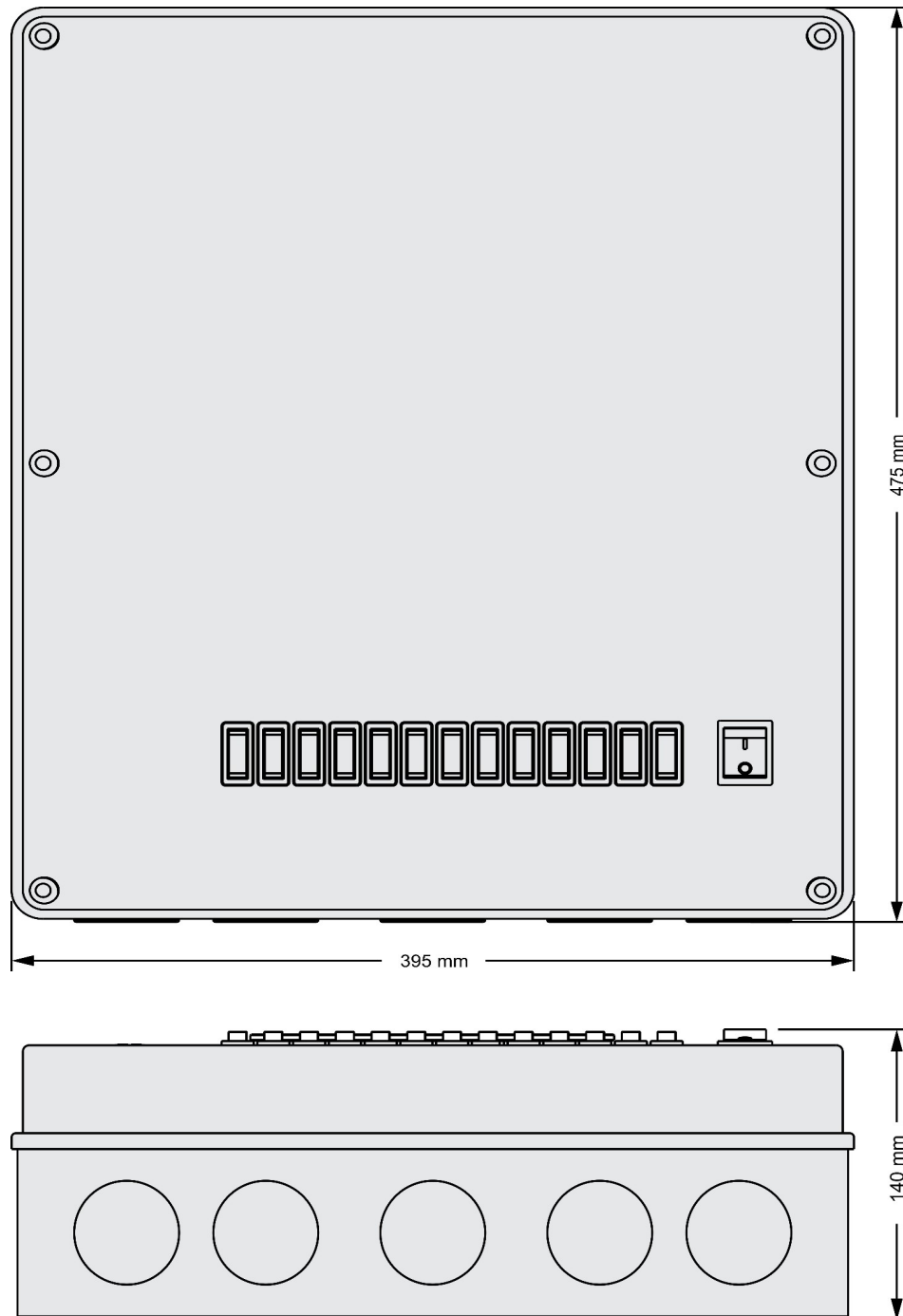
**NOTE:** To connect the cabinets to each other, you need to use a twisted pair cable (e.g. UTP, STP). One pair is used for RS-485 A and B lines and the others for GND.





## 5.2 Mounting instructions

**Figure 8: Housing dimensions**

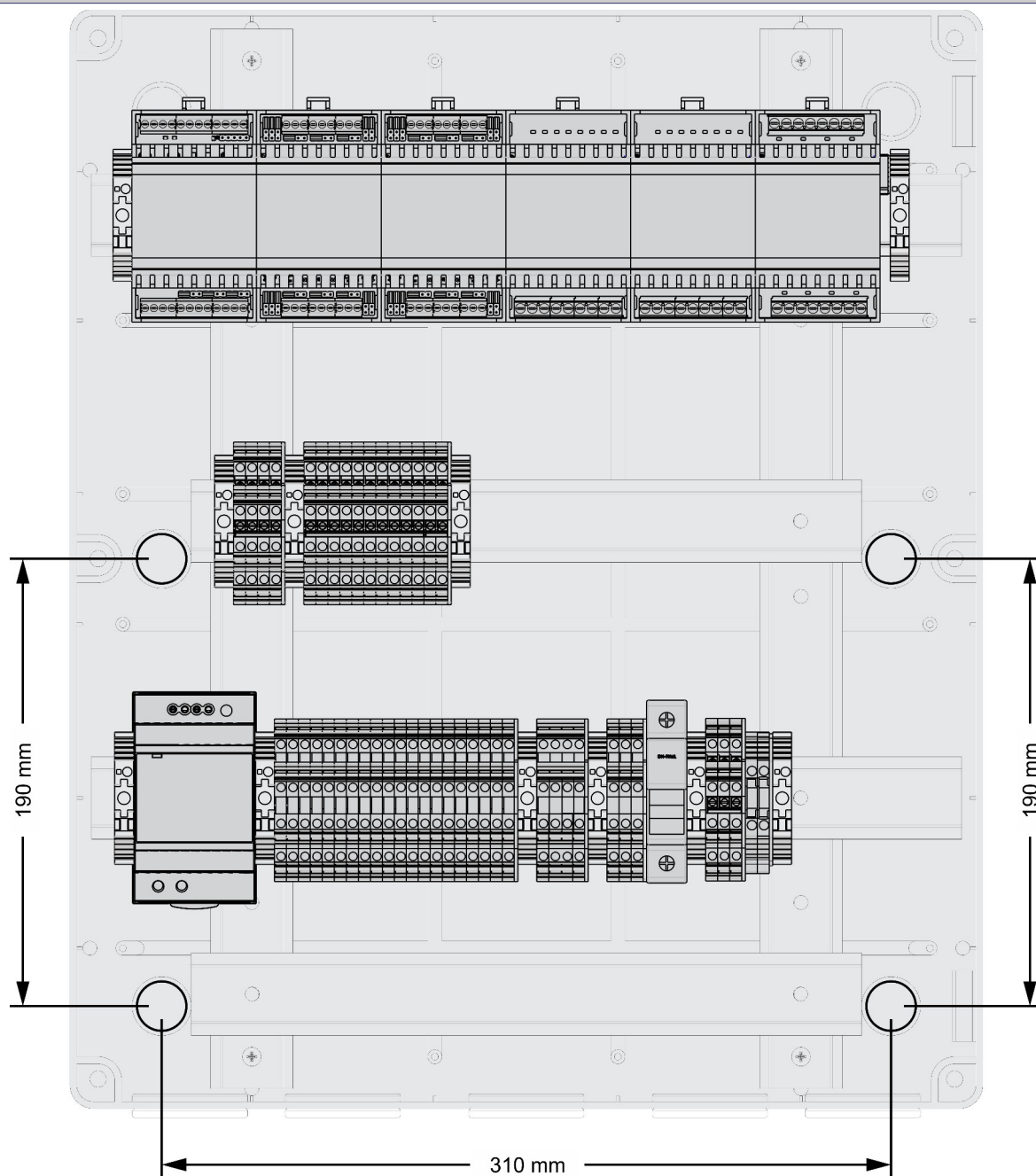


Dimensions in millimeters.





**Figure 9: Mounting holes position**



Dimensions in millimeters.





**EXTERNAL SWITCH OR CIRCUIT-BREAKER AND EXTERNAL OVERCURRENT PROTECTION:** The unit is allowed to be connected to installation with over current protection that has nominal value of 16 A or less.

**RECOMMENDATION ON SWITCH OR CIRCUIT-BREAKER PROTECTION:** There should be two poles main switch in the installation in order to switch off the unit. The switch should meet the requirements of standard IEC60947 and have a nominal value at least 16 A. The switch or circuit-breaker should be within easy reach of the operator. It should be marked as the disconnecting device for the equipment.

All connections, module attachments and assembling must be done while module is not connected to the main power supply.

#### ***Mounting instructions:***

1. Switch OFF the main power supply.
2. Mount SHC-E02 cabinet to the provided place.
3. Connect the cabinet to the main cabinet SHC-002 via Modbus RTU.
4. Connect the cabinet main power supply.
5. Switch on the main cabinet SHC-002 and extension cabinet SHC-E02 MAIN switches and after powering up the touch panel on the main cabinet, set up the system that directly corresponds to the heating and cooling plant hydraulic layout.
6. Switch OFF the MAIN switches and the main power supply.
7. Wire and connect heating and cooling sources, regulating and ON/OFF valves, pumps, Hot water storage tank, sensors, etc. to the installed cabinet terminals.
8. Switch ON the main power supply and the MAIN switches.

**NOTE:** To connect the cabinets to each other, you need to use a twisted pair cable (e.g. UTP, STP). One pair is used for RS-485 A and B lines and the others for GND.

**NOTE:** Signal wires must be installed separately from power and high voltage wires in accordance with general industry electrical installation standard.



## 6 TECHNICAL SPECIFICATIONS

**Table 18: General technical specifications**

|                                   |                              |
|-----------------------------------|------------------------------|
| Rated power supply                | 115/230 V AC, 50/60 Hz       |
| Operational power supply          | 90 .. 264 V AC               |
| Max. cabinet power consumption    | 30 W                         |
| Max. total power consumption      | 1300 W                       |
| Fuse                              | 6 A, type C                  |
| Dimensions (L x W x H)            | 475 x 395 x 140 mm           |
| Cabinet weight                    | 6.2 kg                       |
| Ambient temperature               | 0 to 50 °C                   |
| Ambient humidity                  | max. 95 %, no condensation   |
| Maximum altitude                  | 2000 m                       |
| Mounting position                 | vertical                     |
| Transport and storage temperature | -20 to 60 °C                 |
| Pollution degree                  | 2                            |
| Over-voltage category             | II                           |
| Electrical equipment              | Class II (double insulation) |
| Protection class                  | IP 30                        |

**Table 19: LPC-2.MU2 Technical specifications**

|                                                 |                                                                      |
|-------------------------------------------------|----------------------------------------------------------------------|
| Connection type                                 | Screw type connector for max. wire cross section 1.5 mm <sup>2</sup> |
| Digital input I8, I9, I10 threshold             | ON: > 4 V<br>OFF: < 1.5 V                                            |
| Sensors input type I1, I2                       | Pt1000                                                               |
| Analog input I1, I2 measuring accuracy, Pt1000  | ± 1 °C                                                               |
| Analog input I1, I2 measuring temperature range | - 50 °C .. 300 °C                                                    |

**Table 20: LPC-2.A05 Technical specifications**

|                                                       |                                                                      |
|-------------------------------------------------------|----------------------------------------------------------------------|
| Connection type                                       | Screw type connector for max. wire cross section 1.5 mm <sup>2</sup> |
| Pt1000 temperature measurement accuracy -20..250 °C   | ± 1 °C                                                               |
| Pt1000 temperature measurement accuracy on full range | ± 2 °C                                                               |
| Max. output current per digital output                | 20 mA                                                                |
| Analog output accuracy of the full scale value        | ± 2 %                                                                |
| Load resistance for analog outputs                    | R > 500 Ω                                                            |
| Analog output range                                   | 0 .. 10 V                                                            |
| Max. transition time per channel                      | 1 s                                                                  |



**Table 21: X0 Technical specifications**

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| Connection type | Screw type connector for max. wire cross section 2.5 mm <sup>2</sup> |
|-----------------|----------------------------------------------------------------------|

**Table 22: X1 Technical specifications**

|                                     |                                                                      |
|-------------------------------------|----------------------------------------------------------------------|
| Connection type                     | Screw type connector for max. wire cross section 2.5 mm <sup>2</sup> |
| Max. load per pump channel          | 200 W                                                                |
| Max. load per other channel (valve) | 75 W                                                                 |

**Table 23: X2 Technical specifications**

|                                 |                                                                      |
|---------------------------------|----------------------------------------------------------------------|
| Connection type                 | Screw type connector for max. wire cross section 2.5 mm <sup>2</sup> |
| Type of output                  | relay make contacts (NO), non-protected                              |
| Max. current per channel        | AC: 230 V, 3 A<br>DC: 48 V, 1 A<br>30 V, 3 A                         |
| Min. permitted load per channel | 100 mA at 5 V DC                                                     |

**Table 24: X3 Technical specifications**

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| Connection type | Screw type connector for max. wire cross section 2.5 mm <sup>2</sup> |
|-----------------|----------------------------------------------------------------------|



## 7 MODULE LABELING

**Figure 10: Label**

Label (sample):

**XXX-N.ZZZ**  
P/N: AAABBBCCDDDEEE  
S/N: SSS-RR-YYXXXXXXXXXX  
D/C: WW/YY

### *Label description:*

1. **XXX-N.ZZZ** - full product name.
  - **XXX-N** - Product family
  - **ZZZ** - product
2. **P/N: AAABBBCCDDDEEE** - part number.
  - **AAA** - general code for product family,
  - **BBB** - short product name,
  - **CCDDD** - sequence code,
    - **CC** - year of code opening,
    - **DDD** - derivation code,
  - **EEE** - version code (reserved for future HW and/or SW firmware upgrades).
3. **S/N: SSS-RR-YYXXXXXXXXXX** - serial number.
  - **SSS** - short product name,
  - **RR** - user code (test procedure, e.g. Smarteh person xxx),
  - **YY** - year,
  - **XXXXXXXXXX** - current stack number.
4. **D/C: WW/YY** - date code.
  - **WW** - week and
  - **YY** - year of production.

### *Optional*

1. **MAC**
2. **Symbols**
3. **WAMP**
4. **Other**



## 8 SPARE PARTS

For ordering spare parts following part numbers should be used:

| SHC-E02 accessories and spare parts |                                                               |                |
|-------------------------------------|---------------------------------------------------------------|----------------|
| Item                                | Description                                                   | Part number    |
| Temperature sensor PT1000-1CH       | 85°C, pipe surface temperature sensor                         | 204PT1230CH001 |
| Temperature sensor PT1000-1I        | 180°C, 6mm diameter, immersion temperature sensor             | 204PT12300I001 |
| Temperature sensor PT1000-1C        | 85°C, 6mm diameter, immersion temperature sensor              | 204PT12300C001 |
| Temperature sensor PT1000-2         | Room temperature sensor, wall mounted                         | 204PT223001001 |
| Temperature sensor PT1000-2E        | Outdoor temperature sensor, wall mounted                      | 204PT22300E001 |
| Touch panel 4,3" LPC-3.GOT.111      | Room temperature panel, 4,3" touch panel, wall mounted, black | 226GOT21111B04 |
| Touch panel 4,3" LPC-3.GOT.111      | Room temperature panel, 4,3" touch panel, wall mounted, white | 226GOT21111W04 |





## 9 CHANGES

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The following table describes all the changes to the document.

| Date       | V. | Description                                                       |
|------------|----|-------------------------------------------------------------------|
| 15.06.2026 | 3  | Update default Modbus RTU slave address from 2 to 234             |
| 05.11.2025 | 2  | Figure 9 has been updated.                                        |
| 05.03.2025 | 1  | The initial version, issued as <i>SHC-E02 module UserManual</i> . |





## 10 NOTES

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