EPC103 Heating controller, communicative

Summary

EPC103 is a communicative room heating controller (radiator, electric heater) with two outputs and two inputs. It can either work autonomously or be connected via Modbus RTU to a primary controller (e.g.: mark PLC, wall PLC …) or visualization.

Use

- **Systems with radiators, electric heating or underfloor heating - measurement and control of temperatures in rooms with access by unauthorized persons**

Function

The controller senses the temperature in the room with an external communicative temperature sensor (included in the delivery). Local correction is not possible, temperature correction and the desired operating state can be set remotely via the bus. The range of measured temperatures is +10 to +45 °C. The sensed and entered values are processed in the PI control algorithm, at the output of which there is a modulating element for the mosfet – a two-state output that controls the heating valve or the switching element of the electric heating. The controller also has two inputs, for a presence sensor (signal from an access card, etc.) and for a window contact (switches to the "Off" mode). By default, binary input DI1 switches between the operating modes Comfort and Setback and input DI2 switches to the Off mode. The sense of the contacts can be changed. Each operating mode has separate setpoints for heating and cooling. The values are set via the bus.

The output can operate either as quasi-continuous – PWM controlled by a PI controller, or as a two-state (thermostat). The functions of the individual outputs, i.e. whether they are used as heating/cooling outputs, are also configurable in the relevant registers of the Modbus table. For configuration and commissioning, the Domat tool is used - the

address table in the **Domat IDE** development environment, which is free to download on our website.

The controllers are designed for operation in a normal, chemically non-aggressive environment. They do not require maintenance and can be mounted in any position. They are fixed to the wall or any flat surface with 2 screws. There are holes on the sides of the box for cable exit. The box lid is fixed with four plastic screws with a lock - to release, simply turn the screw 90 °.

The controller contains a real-time clock that is used for statistical functions (calculation of the integrated valve opening time). This clock is not used for regulation and is not backed up by a battery. For correct calculation of statistics, regular synchronization from the superior system is necessary.

The heating output can be permanently switched off via the bus in case the NO valve is used (without heating under voltage) and the system is shut down during the summer season.

The room temperature is measured by an external communicative sensor ST1W.

They communicate with the superior system via the RS485 bus using the Modbus RTU protocol, which ensures universal use.

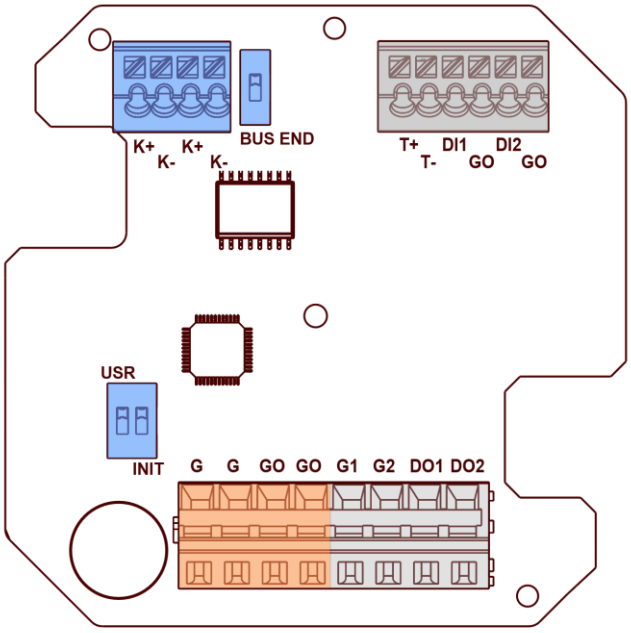
Technical data

Power supply	24 V st ± 10 % (sinus 50 Hz), 24 V ss ± 10 %
Power consumption	6 VA (5 VA is reserved to connected peripherals)
Communication RS485 – Modbus RTU (slave)	RS485 (K+, K-) selectable speed 300...115 200 bit/s, parity and bits are set via Modbus RTU default 9600, N, 8, 1 maximum bus length 1200 m the maximum number of modules on the bus depends on the required response time – up to 255 addresses, for common HVAC applications 300…400 data points on the bus there are used galvanic isolation from other parts of the module, insulation voltage 1 kV
Software	Domat IDE
Digital Inputs DI	2 × DI potential-free contacts, 24 V st, 5 mA, selectable logic
Digital Outputs DO	2 × optoMOSFET, 24 Vdc/ac, maximum switching current 1 A. Recommended actuators are STA71 (Siemens), TWA (24 V types, Danfoss).
Terminals	spring-loaded for conductor 0.35…1.5 mm2
Cover	ABS, RAL9010
IP protection	IP20
Dimensions	97 × 97 × 42 mm

Room temperature sensor ST1W

Sensor accuracy	± 0.5 K (can be corrected)
Max. cable distance to sensor	30 m
Cable for sensor connection	2 × 0.5...0.8 mm2
Measuring range	10…45 °C
Protection	IP30
Dimensions	60 x 60 x 20 mm
Compliance with standards	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) on-electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016\limitation of hazardous substances EN 50581:2012

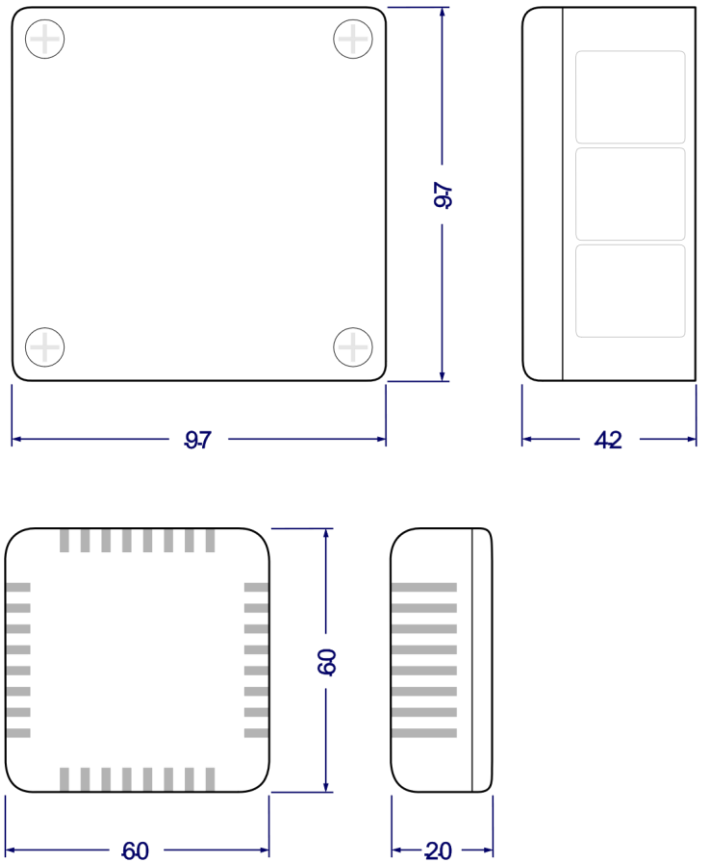
Clamps



DI1	presence input, switches Comfort – Decrease, dry contact against G0
DI2	input for window contact, switches to Off, dry contact against G0
DO1	output for head, 24 V AC against G0
DO2	output for head, 24 V AC against G0
T+	input for communicative temperature sensor +
T-	input for communicative temperature sensor -
G0	power outputs and inputs – reference point (internally connected to G0 in the bottom row)

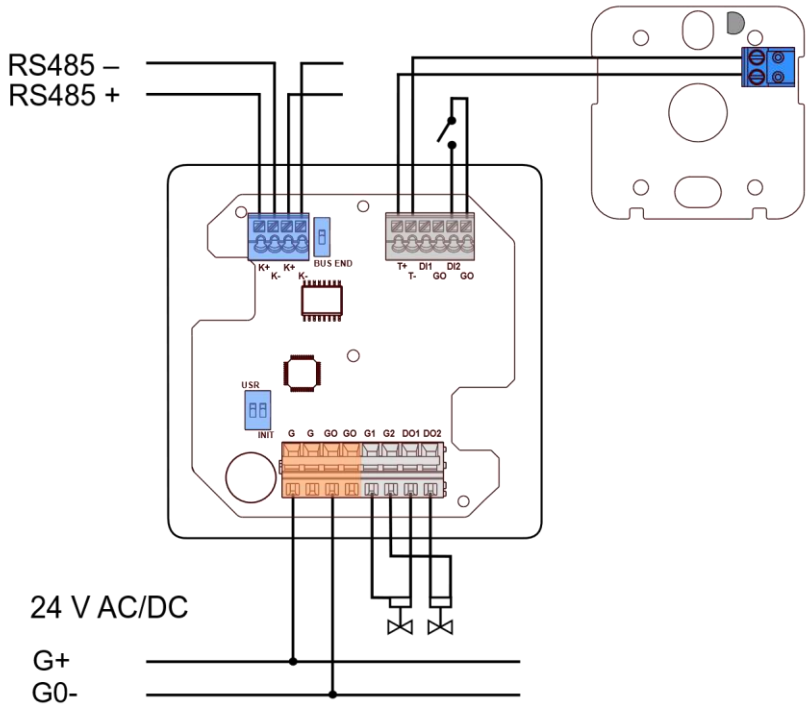
G	power
K+	communication RS485 +
K1-	communication RS485 -
DIP BUS END	if ON = termination of bus RS485, the first and last modules on the bus should have bus termination turned on
DIP USR	unused, reserve
DIP INIT	INIT (DIP1): if is set to ON when power connected, the controller is set to the default communication parameters: address 1, communication speed 9600, data bits 8, parity N-none, number of stop bits 1. The second function is to initialize all values stored in the EEPROM to the factory-defined default values (see Modbus table). To initialize, proceed as follows: • connect the device via the RS485 bus to a PC with the ModComTool configuration program • set INIT to ON position • connect power • search for the controller in the program (Scan function) • set INIT to OFF position • in the ModComTool program, click on the controller – click on the Init button in the program – turn the power off and on.
LED PWR	green LED – power supply (on: power supply is OK, off: power supply is not connected, power supply is weak, power supply failure occurred, …)
LED DI1	physical state of input DI1 (not logical, does not resolve NO/NC)
LED DI2	physical state of input DI1 (not logical, does not resolve NO/NC)
LED DO1	physical state of input DI1 (not logical, does not resolve NO/NC)
LED DO2	physical state of input DI1 (not logical, does not resolve NO/NC)
LED TxD	blinks when Modbus communication is active

Dimensions



Dimensions listed are in *mm*.

Instalion



Suitable cable types are LAM DATAPAR 2 × 0.8 (cross-section mm2), JYTY 2 × 1 (diameter mm), etc. If communication is also carried in the same cable, use four-core cables LAM DATAPAR 2 × 2 × 0.8, JYTY 4 × 1. At distances of tens of meters, the simultaneous operation of 24 V power supply and bus does not matter. From the point of view of electromagnetic immunity, it is more suitable if the cores are twisted in pairs (as is the case with the LAM DATAPAR cable).

When using the above types of cables, the considered maximum (starting) power consumption of the "regulator + valve" set is approx. 7 VA and a permissible voltage drop of up to 15%, the maximum cable length for 10 controllers, each equipped with one valve, is about 50 m.

If the controller with the valve is more than 50 m away from the source (transformer) or if more than one valve is connected to one controller (max. 4 valves per controller), it is advisable to provide local power supply with a separate transformer. The RS485 bus is galvanically isolated and connects all controllers regardless of their power supply.

With larger voltage drops on the line, it could happen that the thermal drives would not provide sufficient thermal power required to fully open the valves. The radiators would therefore heat up less.

If the controllers are connected in series using terminals G-G and G0-G0, the maximum current (8 A) flowing through the PCB between the terminals of the same name must not be exceeded.

Function description

The function description also includes a Modbus table in a separate document. The register numbers in the text below refer to it.

Determining the operating mode

The default data for selecting the required values is the operating mode, i.e. one of the states:

- Comfort (Day)
- Setback (Night)
- Off.

The operating mode is determined by these factors:

- Contacts DI1 and DI2 **register 26 MSB**.
- Modbus settings in **register 23**.

The operating mode is set directly in the register. The last entered value applies. Furthermore, the operating mode is influenced by the state of the binary inputs for **window contact** (switches between Off and the remaining modes) and **presence sensor** or card reader (switches between Comfort (Day) and Setback (Night)). Inputs are only taken into account if they are enabled **(reg. 26)**. Inputs have a higher priority than the mode written via Modbus. **The resulting operating mode is in register 25 LSB**.

Setting the required values

According to the operating mode (Comfort, Setback, Off) the required temperature for heating and cooling is selected **(registers 15 to 17, and registers 51 to 53)**. A correction is always added to these values. The correction affects all three pairs of values.

Determining the measured temperature

The measured temperature is the sensor temperature from the communicative OneWire temperature sensor.

Control

In the following description, the functions described below have a higher priority, i.e. The signal is processed sequentially as stated in the text.

PI controllers

The current setpoint including correction and the measured temperature are fed to a pair of PI controllers. These controllers calculate the output signal once per second. When the P or I constant is changed during operation, the controllers are reset, i.e. the old integrated components are deleted and integration is started from zero.

Desensitivity band

If the actual temperature differs from the setpoint temperature by less than 0.5 K, both outputs of the PI controllers are set to 0. This function prevents constant switching between heating and cooling and defines a dead zone, the so-called ecozone.

Valve fouling protection

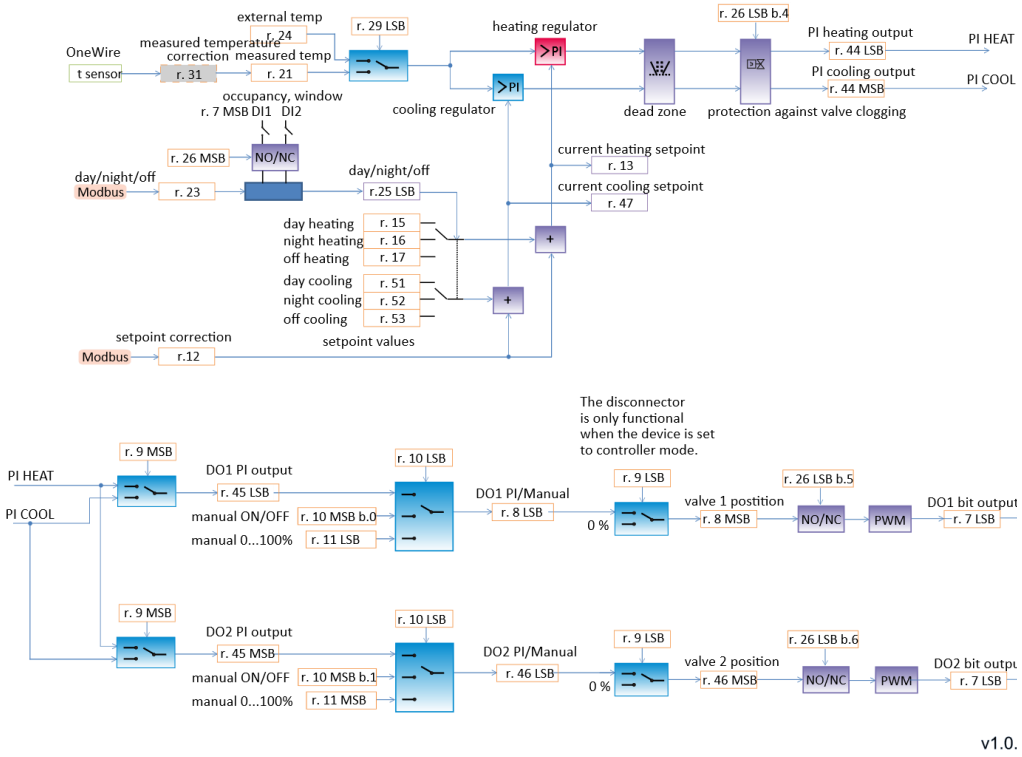
If this function is enabled, the valves will open for one minute once a week regardless of the need for heat or cold. The resulting values are available in register 44, PID output heat and PID output cool.

PWM output control

The heating and cooling signal at the output is used for PWM modulation with a period of 20 s. **Register 26 LSB** defines whether the thermal valves are NC (normally closed, no voltage closed, default setting) or NO (normally open, no voltage open). In the case of NO, the PWM signal is inverted. The modified PWM signals are fed to the triac outputs DO1 (heating) and DO2 (cooling). The triac outputs can be individually set to be controlled by the heating or cooling controller **(reg. 9 MSB)** or they can be manually overridden. Manual overriding is enabled in **reg. 10 bits 1 to 2** and if the corresponding bit is active, the value from the resulting sequence (controller) is not fed to the triac output, but the binary value ON/OFF, or PWM according to **reg. 10 LSB bits 3 to 4**. The binary state ON/OFF is set in **reg.10 MSB bit 0 to 1**. PWM signal according to the analog value from the register for manual override **reg. 11 LSB**.

Permanent valve opening outside the heating season

Register **9 LSB** is used for permanent opening of DO contacts outside the heating season, so that NO valves are not permanently energized outside the heating season. This function has the highest priority.



Safety note

The device is designed for monitoring and control of heating, ventilation, and air conditioning systems. It must not be used for protection of persons against health risks or death, as a safety element, or in applications where its failure could lead to physical or property damage or environmental damage. All risks related to device operation must be considered together with design, installation, and operation of the entire control system which the device is part of.

Version changes	07/2025 — First version of the catalog sheet. 10/2025 — Conversion of the catalog sheet into a database for automatic generation.