EPC102 Heating controller, communicative

Summary

EPC102 is a communicative room heating controller (radiator, electric heater) with one triac output and one input. It can either work autonomously or be connected to the primary controller (e.g. MiniPLC, markPLC, ...) or visualization (RcWare Vision or other SCADA system) via the Modbus RTU bus.

Application

• Systems with radiators, electric heaters or floor heating - measuring and controlling temperatures in public rooms

Function

The controller measures room temperature via an external temperature sensor (included). Local correction is not possible, temperature correction and operating status can be set remotely over the bus. The measured temperature range is +10 to +45 °C. The measured and entered values are processed in the PI control algorithm, the output of which is the modulating member for the triac or two-state output that controls the heating valve or electrical heating switching element. The digital input is used to connect a window contact – on activation, the controller switches to Off mode. The controller works in three modes – Comfort, Precomfort and Off. Modes differ from each other by the preset heating setpoints. The values are set over the bus.

The output can operate either as a quasi-continuous PWM controlled PI controller or a two-state (thermostat) output. Control parameters, like output mode, P and I constants, or hysteresis, are set with the ModComTool configuration software, which is free to download at domat-int.com/en/downloads/software.

Regulators are designed for operation in a standard, chemically non-aggressive environment. They are maintenance-free and can be mounted in any position. They are secured with 2 screws to the wall or any flat surface. There are cable holes on the

sides of the box. The lid of the box is secured with four plastic screws with a lock – it is sufficient to turn the screw by 90 ° to release it.

The controller contains real-time clock that is used for statistical functions (calculation of integrated valve opening time). This clock are not used for scheduling and are not backed up by batteries. For proper statistics calculation, regular synchronization from the parent system is required.

After the bus, the heating output can be switched off permanently if the NO valve is used (open when deenergized) and the system is shut down during the summer season.

The room temperature is measured by an external communication sensor. The sensor is connected to the controller over a two-line cable with a maximum length of 30 m.

The controllers communicate with the supervisory system via the RS485 bus using Modbus RTU protocol and therefore can be used in a number of control and monitoring systems. The Modbus table can be found in a separate document
UI.../UC ... – Communication description

Technical data

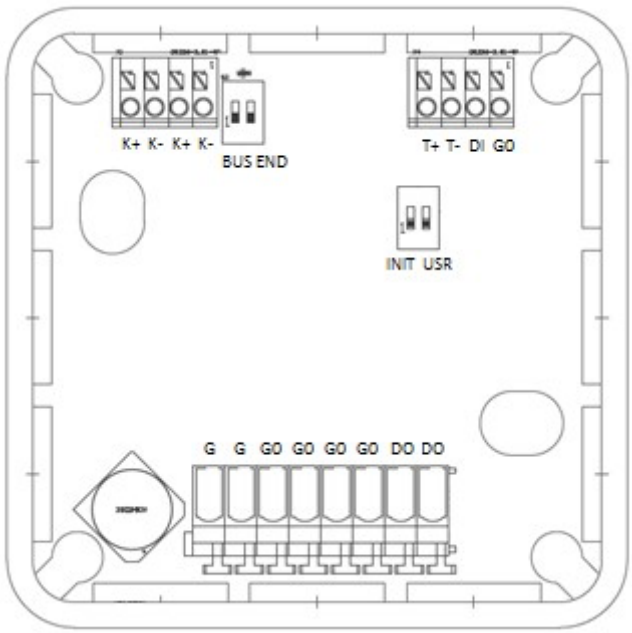
Power	24 V AC/DC ±10 %; max 1.8 W
Consumption	6 VA (of which 5 VA is reserved for the connected peripherals)
Controller	
Communication	
RS485 – Modbus RTU (slave)	RS485 (K1+, K1-) baud rates 300...115 200 bit/s, parity and bits are set over Modbus RTU default 9600, N, 8, 1 maximal bus length 1200 m maximum number of modules depends on requested response time – up to 255 addresses, for common HVAC applications use about 300…400 physical data points on the bus galvanic isolation from other modules, insulating voltage 1 kV
Digital inputs	
	1 × DI potential-free contact, 24 V AC, 5 mA, configurable logic
Digital outputs	
	1 × solid state relay for AC load, zero switching, 24 V AC, max. current 1 A. Recommended actuators are STA71 (Siemens), TWA (24 V types, Danfoss).
SW	ModComTool
Housing	ABS, RAL9010
Protection degree	IP20 (EN 60529)
Recommended wire diameter	0.35…1.5 mm^2

Dimensions	97 × 97 × 42 mm

Room Temperature Sensor

Sensor accuracy	±0.5 K (can be corrected)
Max. cable length to sensor	30 m
Sensor connection cable	2 × 0.5...0.8 mm^2
Measuring range	10…45 °C
Protection degree	IP20
Dimensions	see below
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (průmyslové prostředí)
	electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016
	restriction of hazardous substances EN 50581:2012

Terminals



Terminals and connectors

K+	serial line RS485 +
K-	serial line RS485 -
T+	Input for the communicative temperature sensor +
T-	Input for the communicative temperature sensor -
DI	presence input (switches Comfort – Precomfort)
G0	Outputs and inputs – reference point (internally connected to G0 in the lower row)
G	power
G0	power
DO	heating output, 24 V AC against G0

DIP switches

INIT

INIT (DIP 1) - if ON at power-up, configuration parameters are brought to defaults (address 1 communication parameters 9600/8/N/1)

Another function of the INIT switch is to bring EEPROM into default factory settings. To init the EEPROM, proceed as follows:

- connect the device over RS485 to a PC with ModComTool (Modbus Configuration Tool)
- set INIT to ON
- apply power
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the INIT button in the tool - remove and apply power.

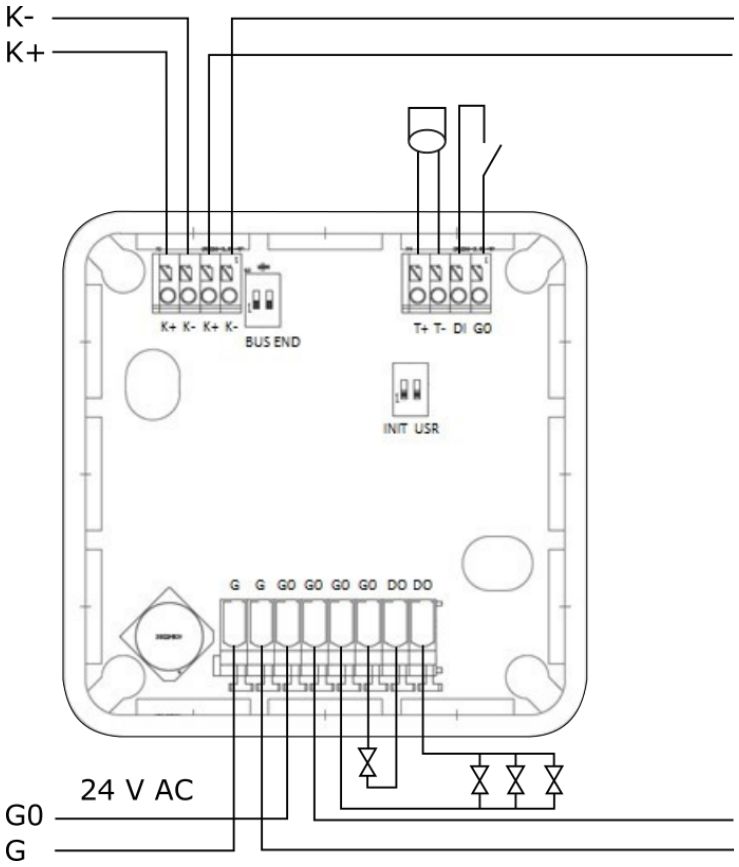
USR

not used

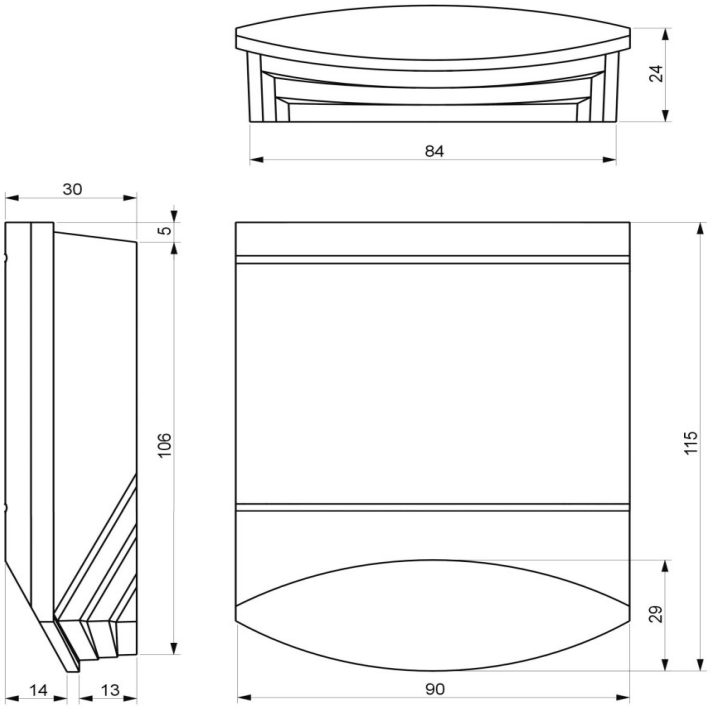
BUS END

Both in the ON position terminate the bus (if the controller is the last on the bus)

Wiring



Dimensinons



Temperature sensor. Dimensions are in *mm*.

Installation

Suitable cable types are LAM DATAPAR 2 × 0.8 (cross-section mm2), JYTY 2 × 1 (diameter mm), etc. If the same cable is used for communication, use LAM DATAPAR 2 × 2 × 0.8, JYTY 4 × 1 four-core cables. In terms of electromagnetic immunity, it is preferable to use twisted pair cable (as is the case with the LAM DATAPAR cable).

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

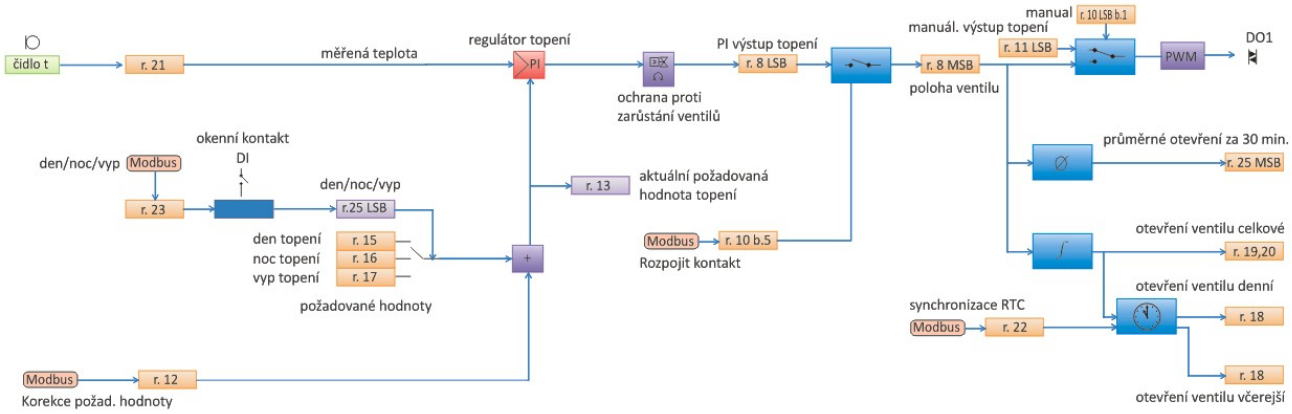
If the controller and valve are more than 50 m away from the source (transformer) or multiple valves (max. 4 valves per controller) are connected to one controller, it is recommended to provide local power supply with a separate transformer. The RS485 bus is galvanically isolated and connects all controllers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

With larger voltage drops on the line, the thermal actuators may not provide sufficient heat output to fully open the valves. The radiators would therefore be less hot.

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

Function

Part of the function description is also a Modbus table in a separate document.
The **description** - register numbers of the table are referenced in the text below.



Setting the operating mode

The default value for selecting the set values is the operating mode, which is one of the states

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

Operating mode is determined by the following factors:

- Contact brought to the DI input
- Setting over Modbus **in register 23**.

The operating mode is set directly in the register. The last written value is valid. In addition, the operating mode is affected by the state of the binary input for the window contact (switches between the Off and the remaining modes). The input is considered only when enabled (**reg. 26**). Inputs have higher priority than writing over Modbus. **The resulting operating mode is in the 25 LSB register.**

Setpoints

According to the operating mode (Comfort, Precomfort, Off), the required heating and cooling setpoint is selected (**registers 15 to 20**). User correction is always added to these values. The correction affects all three pairs of values. Modbus correction can be writen into **register 12**.

Measured temperature

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

Regulation

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

PI controllers

The current setpoint including correction and measured temperature are brought to the PI controller. This controller calculates the output signal once per second. When changing the

P or I constants at runtime, the controllers are reset, so the old integrated part is deleted and the controller integrates from zero.

Valve exercising

When this feature is enabled, the valves open once a week, regardless of the need for heating.

The resulting valve output value is available in register 8, PID output heat.

Control of PWM outputs

The output heater signal is used for PWM modulation with a period of 60 s. The **register 26 bit 7** defines whether the thermic valves are NC (normally closed, closed when deenergized, default) or NO (normally open, open when deenergized). In the case of NO, the PWM signal is inverted. The modified PWM signal is fed to the DO triac output (heating). Triac output can be manually reset. Manual override is enabled in **registers 10 bits 1 through 2**, and if the corresponding bit is active, the value from the LSB 11 manual override register is brought to the triac output, rather than the PI control signal.

Continuous opening of the valve outside the heating season

LSB register 9 serves to permanently switch off the DO outside of the heating season, so that NO valves are permanently deenergized out of the heating season. This feature has the highest priority.

Changes in versions	05/2017 – First datasheet version. 04/2017 – Norms and photo update. 09/2021 – Stylistic adjustments, change logo.

FCR010 Communicative fancoil controller

Summary **FCR010 is a communicative fan coil controller (up to 3 fan stages, heating and cooling valves). It may either work autonomously, or be connected to a primary controller (e.g. markPLC, wall, …) or SCADA. As a room unit, UC010 is used.**

Application

- **Individual room control for systems with 4 pipe fancoils**
- **Individual room control for systems with 2 pipe fancoils**
- **Individual room control for cooling fancoils and radiators**
- **Individual room control for heating convectors and cooling panels**

Function

The controller communicates with a room unit on a dedicated bus (K2+, K2-). The room unit reads room temperature, setpoint correction by a knob, and operating status, which is selected by a short push of the button or in the menu. Measured temperature range is 0 to +50 °C. Read and entered values are processed in a PI control algorithm. On the output there are PWM modulating sequences for triacs to control the thermic valves.

The controllers operate in a non-aggressive environment. No maintenance is necessary. They are mounted with two screws on any flat surface, e.g. fan coil body, or installation board. The holds can be removed and controller could be fixed on DIN rail (see Installation below).

The controller incorporates real time clock with weekly scheduler (6 events per day). It switches between the Comfort, Precomfort, and Off operation modes. There are two digital inputs on the controller for presence sensor (access card reader, PIR sensor etc.) and for window contact or dew point sensor (switches to the Off mode). Both NO and NC contact may be used, the selection follows in the configuration software.

The fan stages are either controlled automatically (with control deviation, or rather PID controller output) or manually (if this function is enabled). Three LEDs indicate correct function: green (PWR) – power OK, red (TX1) – transmit data to the building bus, and red (TX2) – transmit data to the room unit. On the top there are four DIP switches: K1 bus end, and INIT switch to set factory defaults.

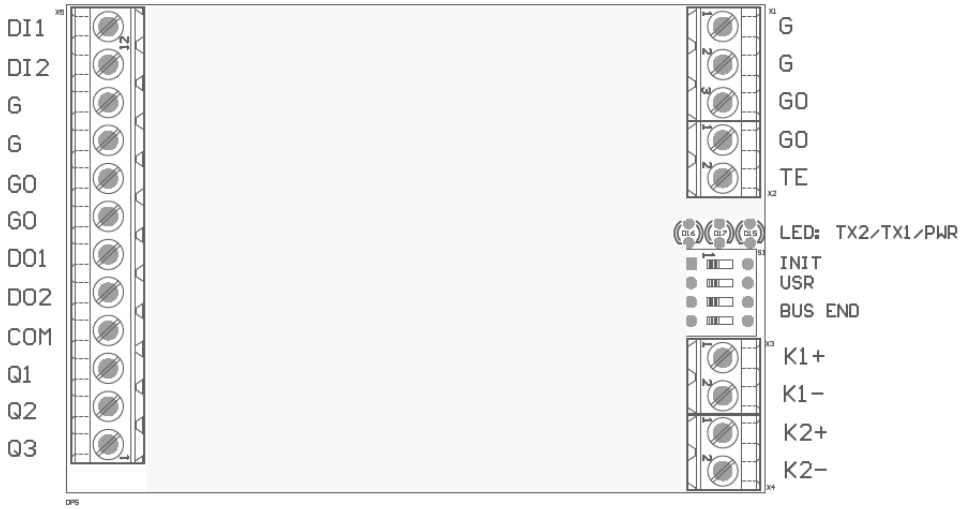
The controller communicates with the management system over RS485 bus with Modbus RTU and therefore can be used in many control systems. See the variable list (Modbus table) in a separate document *FCR010, FCR011 Modbus table*. Another bus, K2, communicates with the room unit. To configure and commission the unit use ModComTool, which is free to download at http://domat-int.com/en/downloads/software.

Technical data

Power	24 V AC ±10 %; max 1.8 W
Communication	
RS485 – Modbus RTU (slave) – to BMS	RS485 (K1+, K1-)
	baud rates 300...115 200 bit/s, parity and bits are set over Modbus RTU
	default 9600, N, 8, 1
	maximal bus length 1200 m
	maximum number of modules depends on requested response time – up to 255 addresses, for common HVAC applications use about 300…400 physical data points on the bus
RS485 – Modbus RTU (master) –	RS485 (K2+, K2-)
to room unit	default 9600, N, 8, 1 (do not change)
	both RS485 interfaces are galvanically insulated from other module parts, insulating voltage 1 kV
	(note: there is no galvanic insulation between K1 and K2 RS485 interfaces)
3× LED	PWR, Tx1, Tx2
Digital inputs	
	2× DI for a dry contact against G, 24 V AC, 15 mA
Digital outputs	
	2× solid state relay for AC load, zero switching, 24 V AC, max. current 0.4 A. Recommended actuators are STA71 (Siemens), TWA (24 V types, Danfoss).
	3× relay 230 V AC / 5 A
SW	ModComTool
Housing	Polycarbonate box (certification UL94V0)

Protection degree	IP20 (EN 60529)
Recommended wire cross-section	0.35…1.5 mm^2
Ambient temperature	5…40 °C; 5…85 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according EN 60721-3-3 climatic class 3K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 55022 ed.3:2010 EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 EN 50581:2012

Terminals



Terminals and connectors	
G	power
G0	power - common
TE	technical ground - shielding
K1+	serial line RS485 +, BMS communication
K1-	serial line RS485 -, BMS communication
K2+	serial line RS485 +, room unit communication
K2-	serial line RS485 -, room unit communication
DI1	presence input (switches Comfort - Precomfort) against G
DI2	window contact input (switches Comfort/Precomfort – Off) against G
G	power supply of outputs and inputs (internally connected to G in the upper terminal row)
G0	power supply of outputs and inputs - reference point (internally connected to G0 in the upper terminal row)
DO1	heating valve output (G, against G0)
DO2	cooling valve output (G, against G0)
COM	common terminal for Q1, Q2, Q3
Q1	fan coil relay stage 1
Q2	fan coil relay stage 2
Q3	fan coil relay stage 3

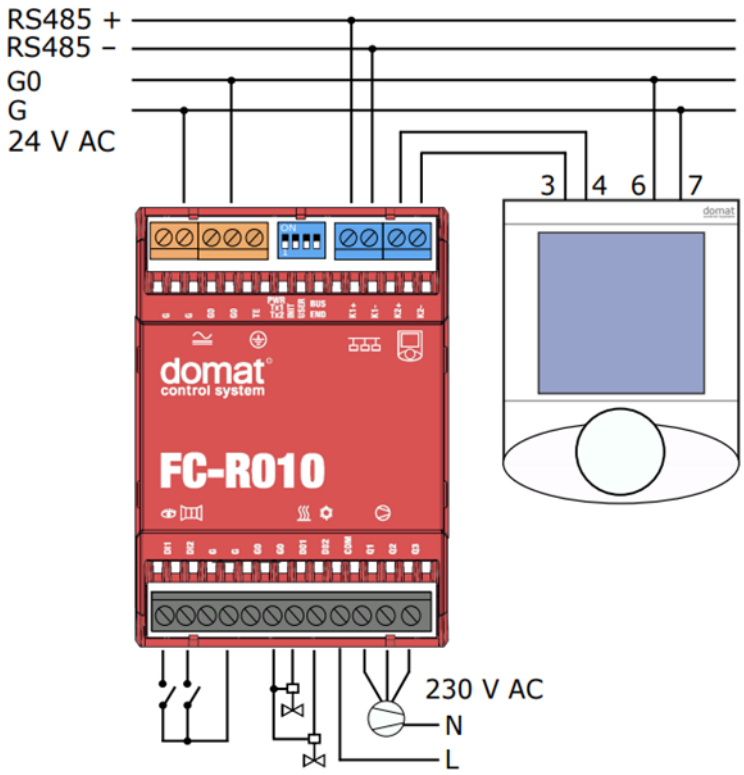
LED indication

PWR	green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, …)
Tx1	red LED – RS485 transmitting data to the building bus (flashing: transmitting data; OFF: no data traffic)
Tx2	red LED – RS485 transmitting data to the room unit (flashing: transmitting data; OFF: no data traffic)

DIP switches

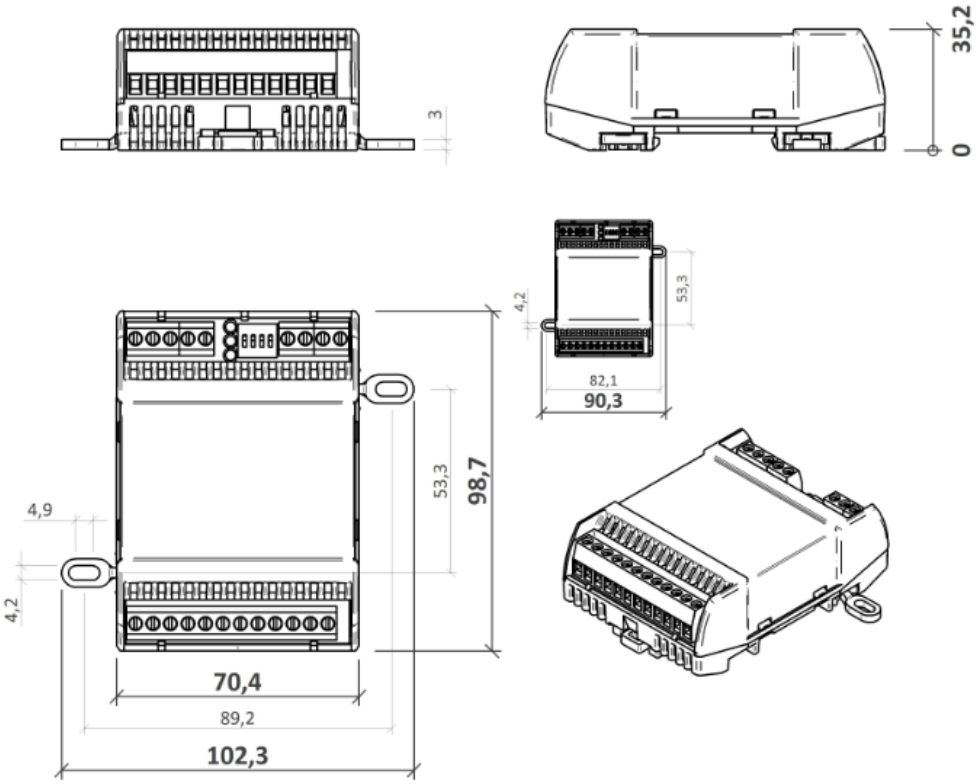
INIT	INIT (DIP 1) - if ON at power-up, configuration parameters are brought to defaults (address 1, communication parameters 9600/8/N/1) Another function of the INIT switch is to bring EEPROM into default factory settings. To init the EEPROM, proceed as follows: - connect the device over RS485 to a PC with ModComTool (Modbus Configuration Tool) - set INIT to ON - apply power - find the controller in the tool (Scan) - set INIT to OFF - in the ModComTool, open the controller window - click the INIT button in the tool - remove and apply power.
USER	(DIP2) not used
BUS END	DIP3 and DIP4 both ON = bus end RS485 K1 for BMS; the first and last devices on bus should have bus end ON

Connection



Power supply G and G0 terminals are internally connected with G and G0 terminals on the input/output terminals block.

Dimensions

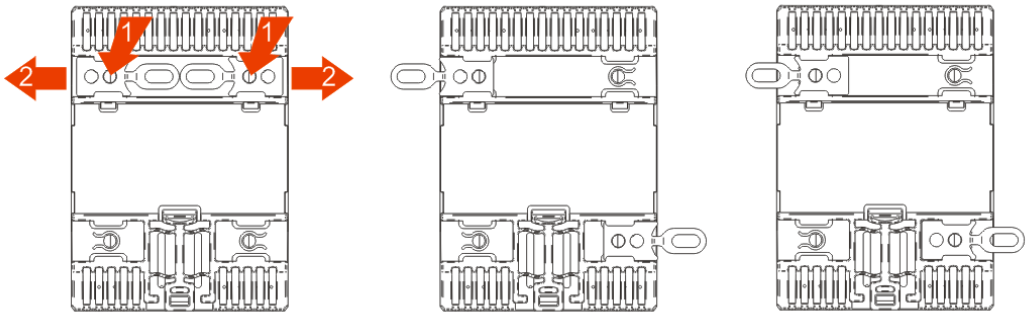


Dimensions are in *mm*.

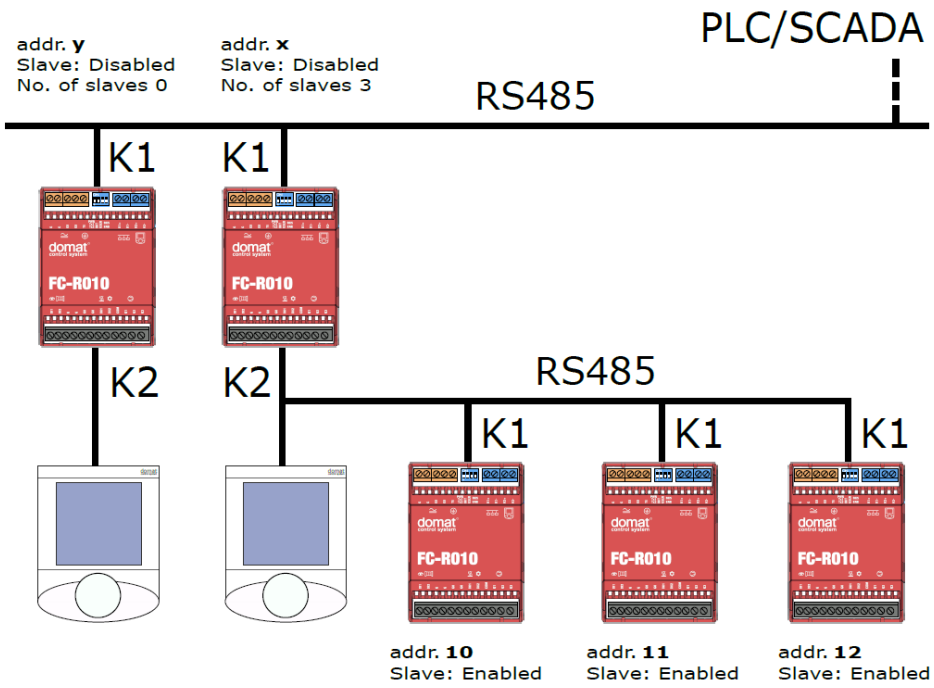
Installation

The module is mounted on a standard DIN rail or fixed by screws in mounting clips (see below).

Mounting clips are fixed on the back of the module. To eject mounting clips, push the fixing point inside the circular hole. To fix module by the clips, slip in the clips with oval hole facing outside of the module. It is possible to choose from two positions.



Master - slave



In this connection, controllers with addresses x, 10, 11, and 12 are in one zone and all of them are controlled by one room unit. The controller addressed x is a master. Outputs of controllers addressed 10, 11, and 12 are controlled by the same signals as the master controller addressed x.

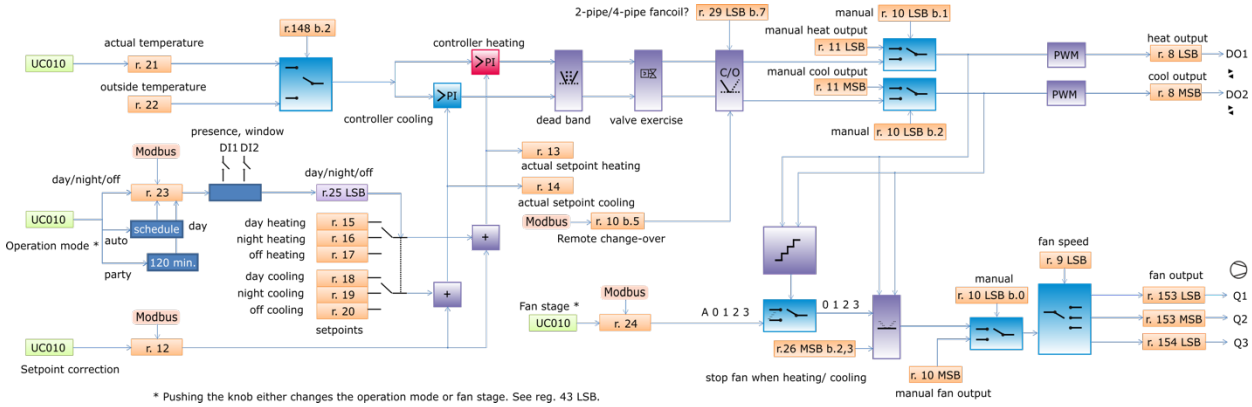
The Slave controllers are connected to the room unit bus (K2+, K2-). They must be addressed starting with 10 and all the other controllers belonging to one zone (on the same K2 bus) must be addressed 10, 11, 12, 13, 14... etc, with no gaps. Maximum number of slave controllers is not limited (or, is limited only by the upper Modbus addressing range, which is 250), however, the technology and room layout should be considered.

There may be more slave groups in the same system, each starting with address 10. The addressing of master controllers at the building bus (K1+, K1-), however, must be unique.

Parameters Slave (Enabled / Disabled), No. of slaves (integer 0…240) and controller address are set in the configuration software **ModComTool**.

Function description

The register numbers in the text below refer to the FCR010 Modbus table which is supplied as a separate document and is part of this function description.



Operation mode

The main selector of heating and cooling setpoints is the operation mode, which is one of the following states:

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

The operating mode is determined by those events:

- push of the UC010 button if the controller is set up to change the operation mode
- states of the digital inputs DI1 and DI2
- Modbus setting in **register 23**.

In the register, either the operating mode can be set directly, or a time-dependent state Party or Time schedule. The last written value applies. If Time schedule (the clock symbol) is set, the operating mode is determined by the setting of the internal time scheduler. After the controller is set to Party, it goes to Comfort for another 2 hours, and then sets back to the previous state.

The sets Comfort, Standby, Off, and Day, Night, Off have only this difference: if Residential mode (Day, Night, Off) is selected, it is possible to use the time scheduler. The Hotel mode (Comfort, Standby, Off) does not allow the time scheduler function.

The operation mode is also controlled by the digital inputs for window contact (switches between Off and the two other modes), and presence sensor or card reader (switches between Comfort (Day) and Standby (Night)). The inputs must be enabled (**reg. 26**). The inputs have higher priority than all events described above (pushbutton, Modbus, weekly scheduler). The resulting operation mode is in **Register 25 LSB.**

Setpoints
Based on the operation mode (Comfort, Standby, Off), a pair of basic setpoints for heating and cooling is selected (**registers 15 to 20**). A setpoint correction is added to the setpoints. The correction influences all three pairs of setpoints.

The user correction is available in **register 12**. The same register can be written over Modbus. The setpoint correction thus may be changed by two ways: after the value is set over Modbus, the user is allowed to set it back to a value from allowed range. The last written value is active.

Display of setpoint value
The setpoint correction is determined by the UC010 knob. The setpoint displays either as absolute or as relative value.
Relative display: a deviation against the basic setpoints, like „-3.5...+3.5“(default values)
Absolute display: The correction is added to the basic setpoint, and the result is displayed as the current calculated setpoint in °C. The current setpoint depends on the controller mode – if it is heating or in the dead zone between the heating and cooling setpoint, and the last energy used was heating (then the heating setpoint + correction is displayed), or if the controller is cooling or in the dead zone, and the last energy used was cooling (then the cooling setpoint + correction is displayed). It may thus happen that e.g. for the heating setpoint of 21 °C and cooling setpoint 24 °C the user sets correction of −1.5 K and the controller is heating. The display shows 21 − 1.5 = 19.5 °C when setting. Then, without any control intervention, the heat gains in the room increase, temperature increases to 24 °C (which is above the current cooling setpoint of 24 − 1.5 = 22.5 °C) and the controller starts cooling. As soon as the user turns the knob, the actual cooling setpoint displays, which is 22.5 °C. This also is the value to be changed (of course, the heating setpoint shifts as well). The current cooling setpoint is displayed until the controller starts heating again – then the display shows the current heating setpoint. The user may suppose that the setpoint changed automatically from 19.5 to 22.5 °C. This is not correct: the controller mode changed from heating to cooling, and the current setpoint changed from the heating setpoint to the cooling setpoint. The values of both setpoints remain unchanged.

Measured temperature
The measured temperature is read by the room unit UC010.
It is possible to switch to the outside temperature (**register 22**, written over modbus). If regulation is switched to outside temperature (reg. 148 bit 2), the temperature from room unit will not be used.

Control functions
In the following text, the functions below have higher priorities, i.e. the signals are processed in the order as described in the text.

PI controllers
Current setpoint incl. correction and measured room temperature are sent to a pair of PI controllers. These controllers calculate the output signal once per second. If the P or I constants are changed during the operation, the controllers are reset, and old integrated I-parts are deleted and the integration starts at 0.

Dead zone
If the difference between actual temperature and actual setpoint is less than 0.5 K, both outputs of the PI controllers are set to 0. This function prevents the controller from frequent switching between the heating and cooling mode, and defines the dead zone.
Valve exercise
If this function is enabled, the valves are opened and closed once per week regardless of the heating and cooling demands to prevent seizing.

The resulting values are available in **register 8**, PID output heat and PID output cool.

Change-over (C/O)
If the controller is configured as two-pipe, the next step is to calculate the change-over logic. The change-over signal informs the controller that there is cold water in the piping rather than hot water, and the valve should open on cooling demand rather than on heating demand. The change-over state can be set over the bus, using **register 10 bit 5**.

After the C/O changes, there is a safety time gap of 30 minutes (configurable in **reg. 43**) between the stop of heating and the start of cooling (and vice versa), so that the water in the piping is not mixed.

The resulting sequences are used for control of analogue outputs AO1 and AO2, triac PWM outputs DO4 and DO5, and three fan relays.

Control of PWM valve outputs
The heating and cooling signals on the output of the C/O function are brought to the PWM modulating blocks with 60 s period. **Register 26 bit 7** defines if the valves are NC (normally closed, default setting) or NO (normally open). In case of NO configuration, the PWM signal is inverted. The resulting PWM signals are brought to DO1 (heating) and DO2 (cooling) to control valves with thermic actuators. The triac outputs can be overridden manually. The manual override is enabled in **reg. 10 bits 1 to 2** and if the respective bit is active, the PWM sequence is controlled by analogue values from **registers 11 MSB and 11 LSB** rather than from the heating and cooling sequences.

Fan control
The resulting sequences are also used for control of the fan stages. At first, it is specified if a sequence shall influence the fan stage control (**register 26, bits 2 and 3**):

- bit 2: Stop fan when heating, i.e. for cooling fancoils. The heating output can be used e.g. for radiator valve control.
- bit 3: Stop fan when cooling, i.e. for heating convectors. The cooling output can be used e.g. for cooling panel valve control.

Stop fan when heating / cooling works with any operation mode set by writing over Modbus into **register 24** or by setting by user over short push of the UC010 knob, the last written value is active. This means that user is not able to manually override the fan motor at a cooling fancoil in case the controller needs to heat.

If the fan is blocked by Stop fan when heating / cooling parameters, it can be overridden only by manual override directly at the outputs.

If the fan is set to Auto, the fan stage is derived from the control sequence output. Based on the number of fan stages entered in **reg. 26, bits 4 and 5**, the sequence is recalculated among the number of stages. The three-stage control is set as follows:
Stage 1: On 8 %, Off 0 %
Stage 2: On 40 %, Off 25 %
Stage 3: On 80 %, Off 65 %.
When on Auto, there is a short time delay between the switching of the stages to prevent the motor from shocks.

The fan relays can be overridden at any time, regardless of manual or automatic fan stage control, by enabling manual override in **reg. 10 LSB bit 0** and setting of **reg. 10 MSB, bits 0 to 3**.

WEEE notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions

01/2017 – First datasheet version.
01/2017 – Terminals schema correction (COM, Q1, Q2 and Q3).
01/2017 – Terminals schema correction (COM, Q1, Q2 and Q3) changes reversion.
12/2017 – Power description changed, connection and master-slave schemes changed, safety note added.
08/2018 – Function schema changed.
08/2021 – Stylistic adjustments, edited link to Modbus table.
07/2022 – Clarification of the description of DI.
03/2023 – Clarification of the description of DI, wiring diagram changed.
06/2023 – Function scheme update, added info about outside temperature regulation.

FCR011 Communicative fancoil controller, 230 VAC

Summary **FCR011 is a 230 VAC powered communicative fan coil controller (up to 3 fan stages, heating and cooling valves). It may either work autonomously or be connected to a primary controller or SCADA. As a room unit, UC010 is used.**

Application

- **Individual room control for systems with 4 pipe fancoils**
- **Individual room control for systems with 2 pipe fancoils**
- **Individual room control for cooling fancoils and radiators**
- **Individual room control for heating convectors and cooling panels**

Function

The controller communicates with a room unit on a dedicated bus (K2+, K2-). The room unit, which is powered from the main controller, reads room temperature, setpoint correction by a knob, and operating status, which is selected by a short push of the button or in the menu. Measured temperature range is -20 to +50 °C. Read and entered values are processed in a PI control algorithm. On the output there are PWM modulating sequences for triacs to control the thermic valves.

The controllers operate in a non-aggressive environment. No maintenance is necessary. They are mounted with two screws on any flat surface, e.g. fan coil body, or installation board. The holds can be removed and controller could be fixed on DIN rail (see Installation below).

The controller incorporates real time clock with weekly scheduler (6 events per day). It switches between the Comfort, Precomfort, and Off operation modes. There are two digital inputs on the controller for presence sensor (access card reader, PIR sensor etc.) and for window contact or dew point sensor (switches to the Off mode).

Both NO and NC contact may be used, the selection follows in the configuration software.

The fan stages are either controlled automatically (with control deviation, or rather PI controller output) or manually (if this function is enabled). Three LEDs indicate correct function: green (PWR) – power OK, red (TX1) – transmit data to the building bus, and red (TX2) – transmit data to the room unit. The controller further includes DIP switches for initialisation (bringing to factory defaults) and K1 bus termination.

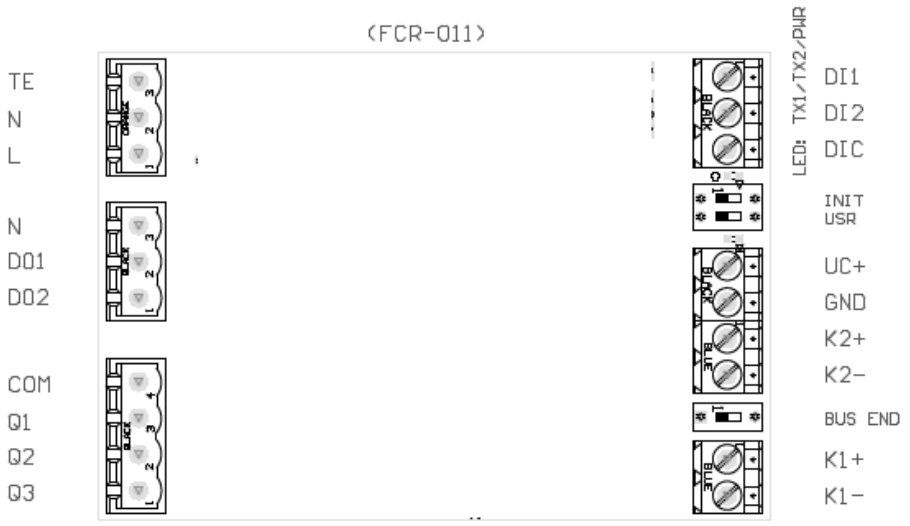
The controller communicates with the management system over RS485 bus with Modbus RTU and therefore can be used in many control systems. See the variable list (Modbus table) in a separate document *FCR010, FCR011 Modbus table* (https://www.domat-int.com/en/modbus-tables). Another bus, K2, communicates with the room unit. To configure and commission the unit use ModComTool, which is free to download at http://domat-int.com/en/downloads/software.

Technical data

Power	230 V AC, 0.5 A (L, N, TE)
Communication	
RS485 – Modbus RTU (slave) – to BMS	RS485, Modbus RTU (K1+, K1-)
	baud rates 300...115 200 bit/s, parity and bits are set over Modbus RTU
	default 9600, N, 8, 1
	maximal bus length 1200 m
	maximum number of modules depends on requested response time – up to 255 addresses, for common HVAC applications use about 300…400 physical data points on the bus
RS485 – Modbus RTU (master) –	RS485, Modbus RTU (K2+, K2-)
to room unit	default 9600, N, 8, 1 (do not change)
	both RS485 interfaces are galvanically insulated from other module parts, insulating voltage 1 kV
	(note: there are not galvanic insulation between RS485 interfaces)
3× LED	PWR, Tx1, Tx2
Digital inputs	
	2× DI for a dry contact, 24 V AC, 15 mA
Digital outputs	
	2× solid state relay for AC load, zero switching, 230 V AC, max. current 0.4 A.
	3× relay 230 V AC, 5 A. AC1, general purpose, non-inductive load according to EN 60947-4-1.

Configuration software	ModComTool, or any other Modbus RTU client
Housing	Polycarbonate box (certification UL94V0)
Protection degree	IP20 (EN 60529)
Weight	0.11 kgs
Recommended wire diameter	wire cross-section 0.35…1.5 mm^2
Operating conditions	External influences according to EN 60721-3-3. Climate class 3K5 (-5…45 °C, 5…95 % non-condensing rel. humidity). Version with CO_2 (UI90x models only) according to class 3K3 (+5…40 °C, 5…85 % non-condensing relative humidity). Storage according to EN 60721-3-1 Climatic class 1K3 (-5 to +45 °C, 5 % to 95 % non-condensing relative humidity).
Standards conformity	EMC ed.3 EN 61000-6-2: 2005, EN 55022 ed.3: 2010 (industrial environment) Electrical safety EN 60950-1 ed.2: 2006 + A11: 2009 + A12: 2011 + A1: 2010 + A2: 2014 + Opr.1: 2012 Restriction of hazardous substances EN 50581: 2012

Terminals



Terminals and connectors

Upper row

DI1	presence input (switches Comfort - Precomfort)
DI2	window contact input (switches Comfort/Precomfort – Off)
DIC	power for digital inputs
UC+	power for the room unit
GND	power GND for the room unit
K2+	serial line RS485 +, room unit communication
K2-	serial line RS485 -, room unit communication
K1+	serial line RS485 +, BMS communication
K1-	serial line RS485 -, BMS communication

Lower row

TE	Technical Earth
N	Power - neutral
L	Power - live
N	N for DO1 and DO2, internally connected to the power N
DO1	heating valve output (230 V) against N
DO2	cooling valve output (230 V) against N
COM	common contact for Q1, Q2, Q3
Q1	fan coil relay stage 1
Q2	fan coil relay stage 2
Q3	fan coil relay stage 3

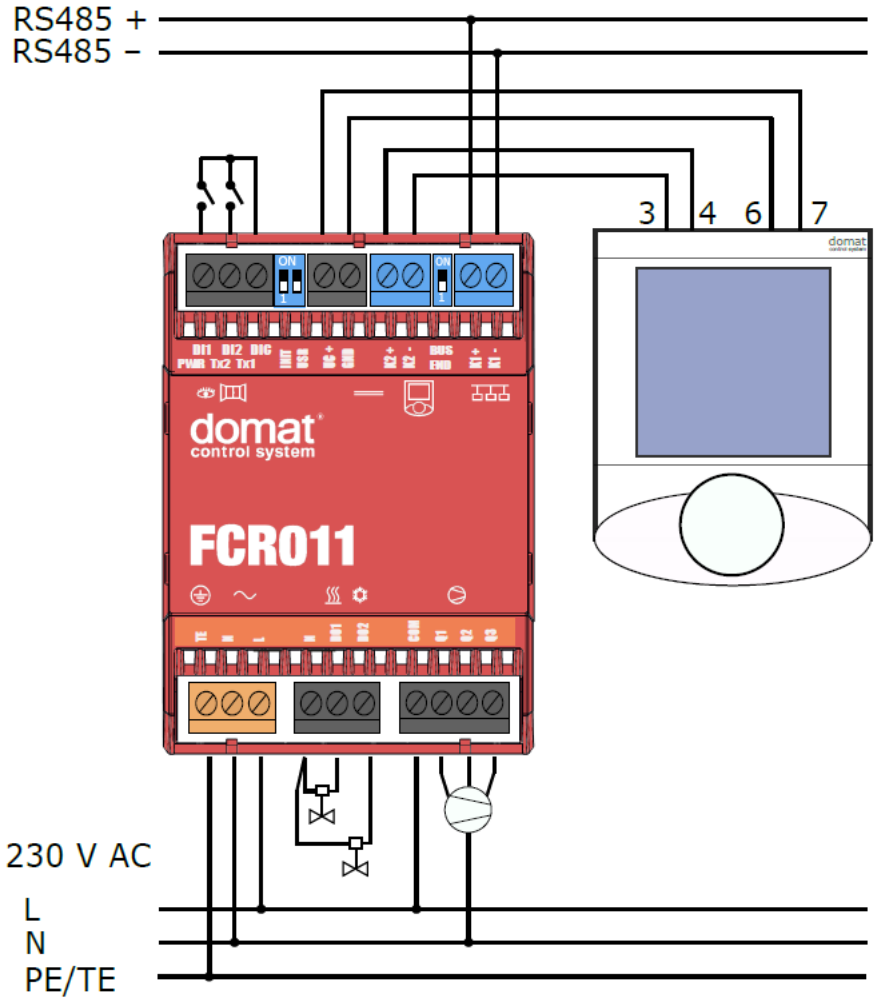
LED indication

PWR	green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, …)
Tx1	red LED – RS485 transmitting data to the building bus (flashing: transmitting data; OFF: no data traffic)
Tx2	red LED – RS485 transmitting data to the room unit (flashing: transmitting data; OFF: no data traffic)

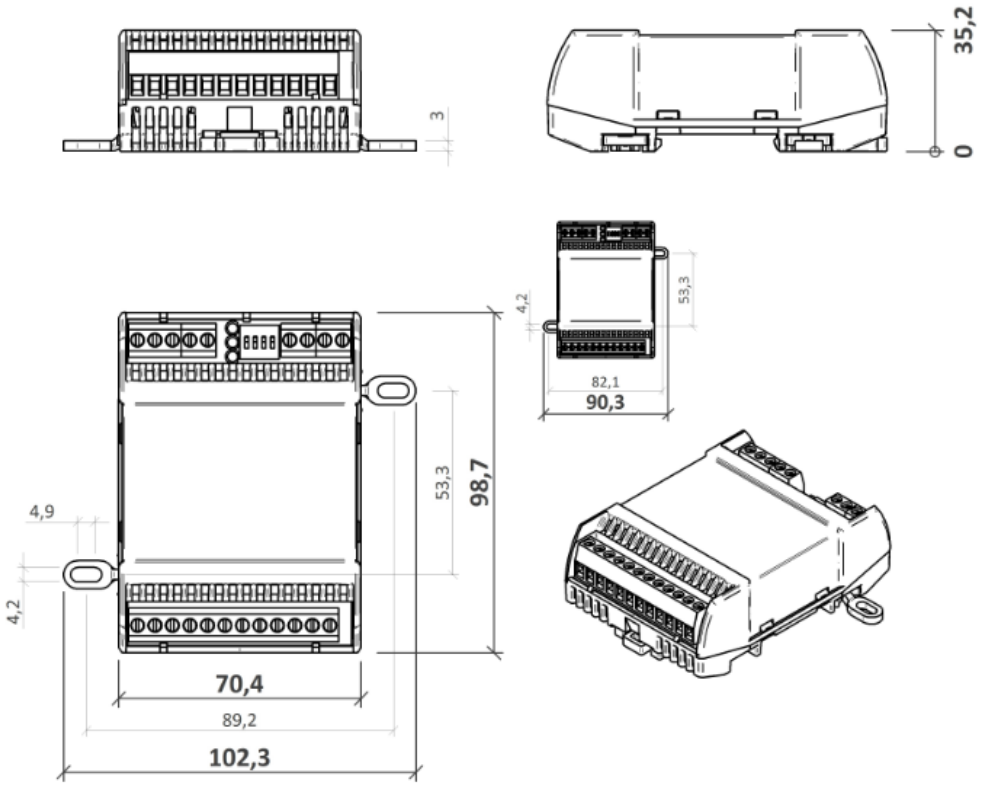
DIP switches

INIT	INIT (DIP 1) - if ON at power-up, configuration parameters are brought to defaults (address 1, communication parameters 9600/8/N/1) Another function of the INIT switch is to bring EEPROM into default factory settings. To init the EEPROM, proceed as follows: - connect the device over RS485 to a PC with ModComTool (Modbus Configuration Tool) - set INIT to ON - apply power - find the controller in the tool (Scan) - set INIT to OFF - in the ModComTool, open the controller window - click the INIT button in the tool - remove and apply power.
USER	(DIP2) not used
BUS END	(DIP1) ON = bus end RS485 K1 for BMS; the first and last devices on bus should have bus end ON

Wiring


RS485 +
RS485 –
3
4
6
7
domat
control system
FCR011
230 V AC
L
N
PE/TE

Dimensions

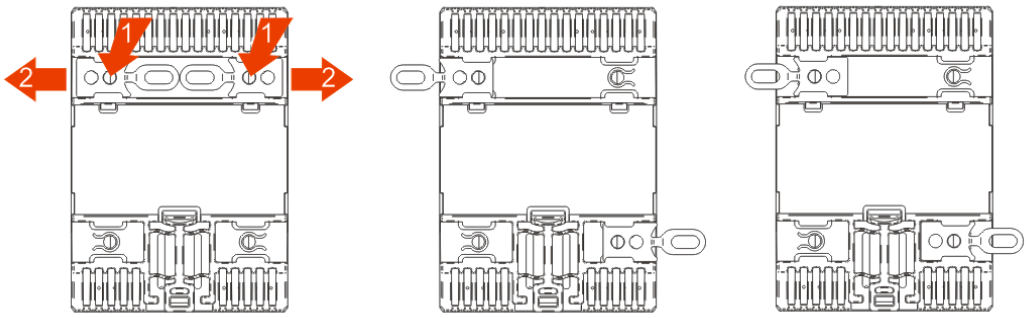


Dimensions are in *mm*.

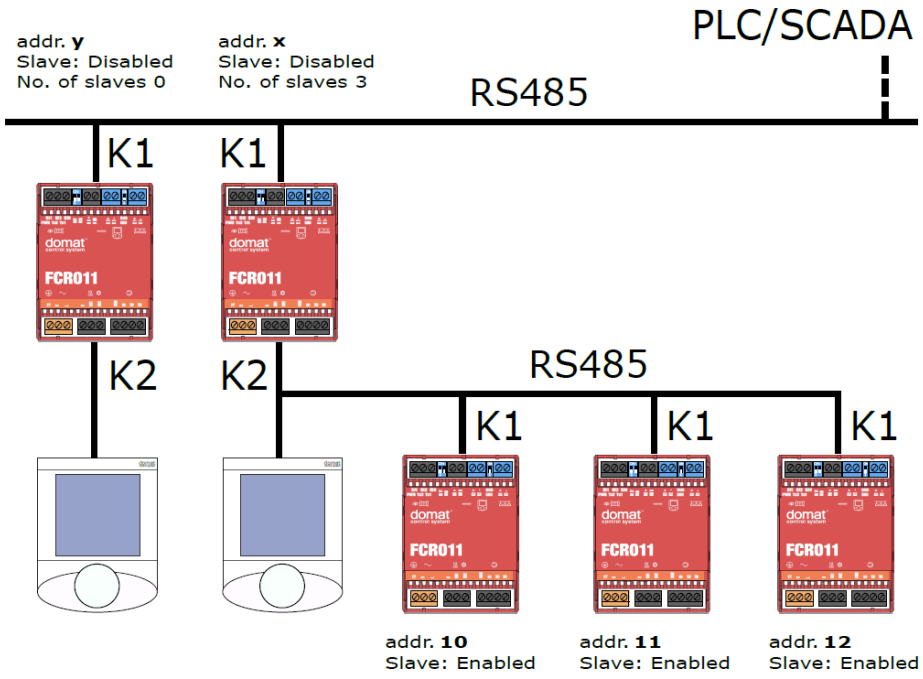
Installation

The module is mounted on a standard DIN rail or fixed by screws in mounting clips (see below).

Mounting clips are fixed on the back of the module. To eject mounting clips, push the fixing point inside the circular hole. To fix module by the clips, slip in the clips with oval hole outside of the module. It is possible to choose from two positions.



Master - slave



In this connection, controllers with addresses x, 10, 11, and 12 are in one zone and all of them are controlled by one room unit. The controller addressed x is a master. Outputs of controllers addressed 10, 11, and 12 are controlled by the same signals as the master controller addressed x.

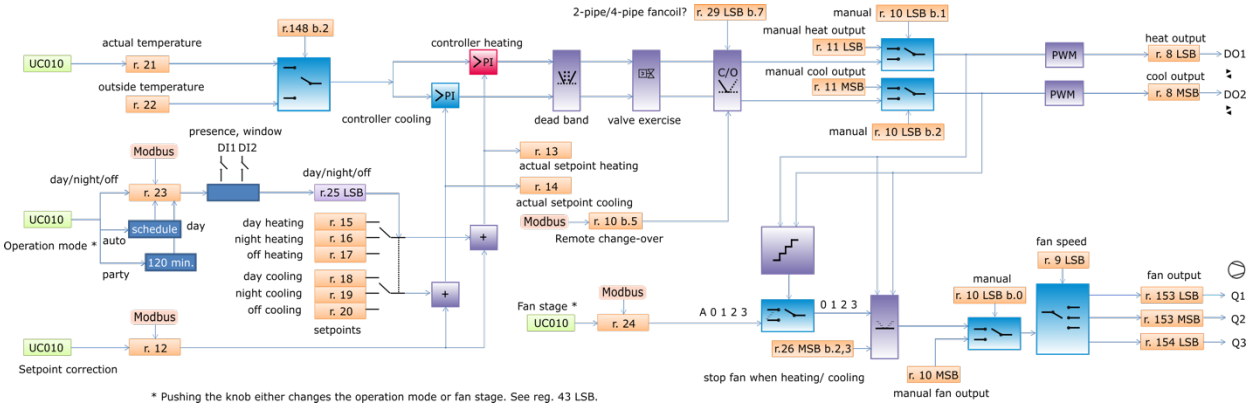
The Slave controllers are connected to the building bus (K1+, K1-). They must be addressed starting with 10 and all the other controllers belonging to one zone (on the same K1 bus) must be addressed 11, 12, 13, 14... etc, with no gaps. Maximum number of slave controllers is not limited (or is limited only by the upper Modbus addressing range, which is 250), however, the technology and room layout should be considered.

There may be more slave groups in the same system, each starting with address 10. The addressing of master controllers at the building bus (K1+, K1-), however, must be unique.

Parameters Slave (Enabled / Disabled), No. of slaves (integer 0…240) and controller address are set in the configuration software **ModComTool**.

Function description

The register numbers in the text below refer to the FCR010 Modbus table which is supplied as a separate document and is part of this function description.



Operation mode

The main selector of heating and cooling setpoints is the operation mode, which is one of the following states:

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

The operating mode is determined by those events:

- push of the UC010 button if the controller is set up so as to change the operation mode
- states of the digital inputs DI1 and DI2
- Modbus setting in **register 23**.

In the register, either the operating mode can be set directly, or a time-dependent state Party or Time schedule. The last written value applies. If Time schedule (the clock symbol) is set, the operating mode is determined by the setting of the internal time scheduler. After the controller is set to Party, it goes to Comfort for another 2 hours, and then sets back to the previous state.

The sets Comfort, Standby, Off, and Day, Night, Off have only this difference: if Residential mode (Day, Night, Off) is selected, it is possible to use the time scheduler. The Hotel mode (Comfort, Standby, Off) does not allow the time scheduler function.

The operation mode is also controlled by the digital inputs for window contact (switches between Off and the two other modes), and presence sensor or card reader (switches between Comfort (Day) and Standby (Night)). The inputs must be enabled (**reg. 26**). The inputs have higher priority than all events described above (pushbutton, Modbus, weekly scheduler). The resulting operation mode is in **Register 25 LSB.**

Setpoints

Based on the operation mode (Comfort, Standby, Off), a pair of basic setpoints for heating and cooling is selected (**registers 15 to 20**). A setpoint correction is added to the setpoints. The correction influences all three pairs of setpoints.

The user correction is available in **register 12**. The same register can be written over Modbus. The setpoint correction thus may be changed by two ways: after the value is set over Modbus, the user is allowed to set it back to a value from allowed range. The last written value is active.

Display of setpoint value

The setpoint correction is determined by the UC010 knob. The setpoint displays either as absolute or as relative value.

Relative display: a deviation against the basic setpoints, like „-3.5...+3.5“ (default values)

Absolute display: The correction is added to the basic setpoint, and the result is displayed as the current calculated setpoint in °C. The current setpoint depends on the controller mode – if it is heating or in the dead zone between the heating and cooling setpoint, and the last energy used was heating (then the heating setpoint + correction is displayed), or if the controller is cooling or in the dead zone, and the last energy used was cooling (then the cooling setpoint + correction is displayed). It may thus happen that e.g. for the heating setpoint of 21 °C and cooling setpoint 24 °C the user sets correction of -1.5 K and the controller is heating. The display shows 21 – 1.5 = 19.5 °C when setting. Then, without any control intervention, the heat gains in the room increase, temperature increases to 24 °C (which is above the current cooling setpoint of 24 – 1.5 = 22.5 °C) and the controller starts cooling. As soon as the user turns the knob, the actual cooling setpoint displays, which is 22.5 °C. This also is the value to be changed (of course, the heating setpoint shifts as well). The current cooling setpoint is displayed until the controller starts heating again – then the display shows the current heating setpoint. The user may suppose that the setpoint changed automatically from 19.5 to 22.5 °C. This is not correct: the controller mode changed from heating to cooling, and the current setpoint changed from the heating setpoint to the cooling setpoint. The values of both setpoints remain unchanged.

Measured temperature

The measured temperature is read by the room unit UC010.

It is possible to switch to the outside temperature (**register 22**, written over modbus). If regulation is switched to outside temperature (reg. 148 bit 2), the temperature from room unit will not be used.

Control functions

In the following text, the functions below have higher priorities, i.e. the signals are processed in the order as described in the text.

PI controllers

Current setpoint incl. correction and measured room temperature are sent to a pair of PI controllers. These controllers calculate the output signal once per second. If the P or I constants are changed during the operation, the controllers are reset, and old integrated I-parts are deleted and the integration starts at 0.

Dead zone

If the difference between actual temperature and actual setpoint is less than 0.5 K, both outputs of the PI controllers are set to 0. This function prevents the controller from frequent switching between the heating and cooling mode, and defines the dead zone.

Valve exercise
If this function is enabled, the valves are opened and closed once per week regardless of the heating and cooling demands to prevent seizing.

The resulting values are available in **register 8**, PID output heat and PID output cool.

Change-over (C/O)
If the controller is configured as two-pipe, the next step is to calculate the change-over logic. The change-over signal informs the controller that there is cold water in the piping rather than hot water, and the valve should open on cooling demand rather than on heating demand. The change-over state can be set over the bus, using **register 10 bit 5**.

After the C/O changes, there is a safety time gap of 30 minutes (configurable in **reg. 43**) between the stop of heating and the start of cooling (and vice versa), so that the water in the piping is not mixed.
The resulting sequences are used for control of analogue outputs AO1 and AO2, triac PWM outputs DO4 and DO5, and three fan relays.

Control of PWM valve outputs
The heating and cooling signals on the output of the C/O function are brought to the PWM modulating blocks with 60 s period. **Register 26 bit 7** defines if the valves are NC (normally closed, default setting) or NO (normally open). In case of NO configuration, the PWM signal is inverted. The resulting PWM signals are brought to DO1 (heating) and DO2 (cooling) to control valves with thermic actuators. The triac outputs can be overridden manually. The manual override is enabled in **reg. 10 bits 1 to 2** and if the respective bit is active, the PWM sequence is controlled by analogue values from **registers 11 MSB and 11 LSB** rather than from the heating and cooling sequences.

Fan control
The resulting sequences are also used for control of the fan stages. At first, it is specified if a sequence shall influence the fan stage control (**register 26, bits 2 and 3**):
bit 2: Stop fan when heating, i.e. for cooling fancoils. The heating output can be used e.g. for radiator valve control.
bit 3: Stop fan when cooling, i.e. for heating convectors. The cooling output can be used e.g. for cooling panel valve control.
Stop fan when heating / cooling works with any operation mode set by writing over Modbus into **register 24** or by setting by user over short push of the UC010 knob, the last written value is active. This means that user is not able to manually override the fan motor at a cooling fancoil in case the controller needs to heat.

If the fan is blocked by Stop fan when heating / cooling parameters, it can be overriden only by manual override directly at the outputs.

If the fan is set to Auto, the fan stage is derived from the control sequence output. Based on the number of fan stages entered in reg. 26, bits 4 and 5, the sequence is recalculated among the number of stages. The three-stage control is set as follows:

Stage 1: On 8 %, Off 0 %
Stage 2: On 40 %, Off 25 %
Stage 3: On 80 %, Off 65 %.

When on Auto, there is a short time delay between the switching of the stages to prevent the motor from shocks.

The fan relays can be overridden at any time, regardless of manual or automatic fan stage control, by enabling manual override in **reg. 10 LSB bit 0** and setting of **reg. 10 MSB, bits 0 to 3**.

WEEE notice The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions

02/2017 – First datasheet version.
03/2017 - Change the description in the wiring diagram (PE -> PE/TE).
07/2017 – Device weight information added.
01/2018 – Illustration of Terminals and Wiring sections changed, added Safety note.
08/2018 – Function schema changed.
08/2021 – Stylistic adjustments, edit links.
06/2023 – Function scheme update, added info about outside temperature regulation.

FCR013 Communicative controller for VAV systems

Summary **FCR013 is a communicative controller of heating and cooling panels and an EC (electronic commutator) motor or a VAV (variable air volume) damper. It measures room temperature using a room unit and it may either work autonomously, or be connected to a primary controller (markPLC), any other Modbus compatible control system, or SCADA. As a room unit, UC013 is used.**

Application

- **Individual room control for systems with heating and cooling panels and EC fancoils**
- **Control of VAV dampers in heating / cooling systems**

Function

The controller communicates with a room unit UC013 over a dedicated bus (K2+, K2-). The room unit UC013 reads room temperature, setpoint correction by a knob, and operating status, which is selected by a short push of the button. Measured temperature range is 0 to +50 °C. Read and entered values are processed in a PI (temperature) control algorithm. On the outputs there are analogue 0..10 V sequences to control the valve actuators and EC motor or VAV controller.

The controller incorporates real time clock with weekly scheduler (6 events per day). It switches between the Comfort, Precomfort, and Off operation modes. There are two binary inputs on the controller for access card reader, PIR sensor, window contact etc. The binary input DI1 switches between Comfort and Standby operating modes. The DI2 switches to Off mode. Both NO and NC contact may be used, the selection follows in the configuration software. Each operation mode has separate setpoints for heating and cooling which are used as basis setpoints for setpoint calculation: to the basic setpoint, the manual setpoint correction is added, and the result is used as actual setpoint for heating or cooling. The triac outputs DO1 and DO2 are controlled as PWM outputs using the AO1 and AO2 signals, or they can be controlled over the bus as independent outputs.

Three LEDs indicate correct function: green (PWR) – power OK, red (TX1) – transmit data to the building bus, and red (TX2) – transmit data to the room unit. On the top there are

four DIP switches: K1 bus end, and init switch to set communication to factory defaults (Modbus address 1, communication 9600 bps, N, 8, 1).

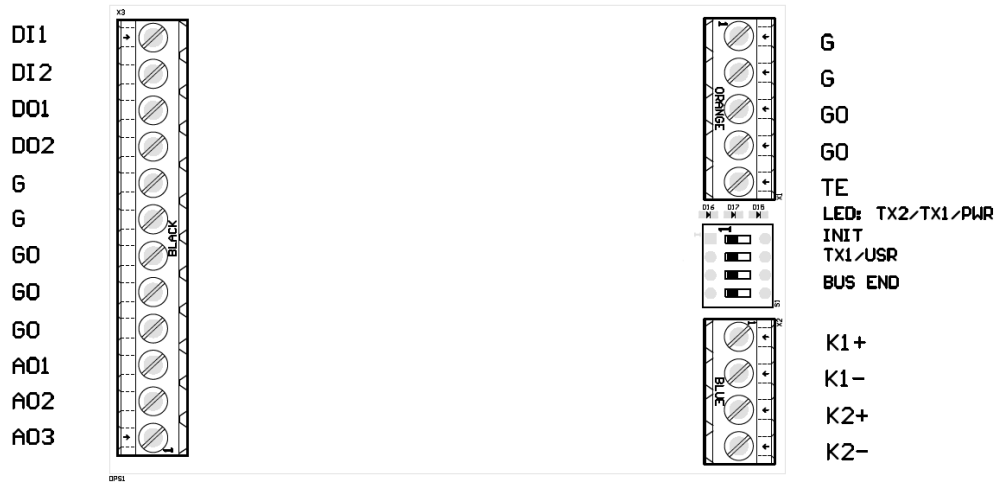
The controller communicates with the building management system or PLC over RS485 bus with Modbus RTU and therefore can be used in many control systems. See the variable list (Modbus table) in a separate document *FCR013 Modbus table*. Another bus, K2, communicates with the room unit. To configure and commission the controller use **ModComTool**, which is free to download at our website.

The controllers operate in a non-aggressive environment. No maintenance is necessary. They are mounted with two screws on any flat surface, e.g. installation board. The holds can be removed and replaced by an optional DIN rail adapter fixed on the bottom of the controller.

Technical data

Power	24 V AC, ±20 %, 0.5 A (G, G0, TE)
Consumption	3 W
Galvanic insulation	1 kV
Communication	RS485, Modbus RTU, 1200 až 115200 bit/s
SW	ModComTool (4.2.4.6 and above)
Terminals	Screw terminals M3, recommended wire 0,14 – 1,5 mm^2
Housing	elbox 4U low
Protection degree	IP20 (EN 60529)
Dimensions	70,4 × 98,7 × 35,2 mm
Digital inputs	2× DI for dry contact against G0, 24 V AC, 15 mA
Digital outputs	2× solid state relay for AC load, zero switching, 24 V AC against G0, max. curent 0,4 A, non-inductive load according to EN 60947
Analog outputs	3× analogue output 0…10 VDC, max. current 10 mA, permanent shot-circuit proof, short-circuit 50 mA
Ambient conditions	External conditions: EN 60721-3-3. climatic class 3K5 (-5 - 45 °C; 5 % - 95 % relative humidity, non-condensing gases and chemically non-agressive conditions). Storage: EN 60721-3-1 climatic class 1K3 (-5 - 45 °C; 5 % - 95 % relative humidity, non-condensing gases and chemically non-agressive conditions).
Standards of conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial enviroment) electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors:

G	power
G0	power - common wire
TE	technical ground - shielding
K1+	serial line RS485 +, BMS communication
K1-	serial line RS485 -, BMS communication
K2+	serial line RS485 +, room unit communication
K2-	serial line RS485 -, room unit communication
DI1	presence input (switches Comfort - Precomfort) against G0
DI2	window contact input (switches Comfort/Precomfort – Off) against G0
DO1	heating valve output (G, against G0)
DO2	cooling valve output (G, against G0)
G	power supply of outputs and inputs (internally connected to G in the upper row)
G0	power supply of outputs and inputs - reference point (internally connected to G0 in the upper row)
AO1	output for heating valve (0..10 V DC against G0)
AO2	output for cooling valve (0..10 V DC against G0)
AO3	output for VAV damper/EC motor (0-10V DC against G0)

LED indication:

PWR	green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, …)
Tx1	red LED – RS485 transmitting data to the building bus (flashing: transmitting data; OFF: no data traffic, ON: bus shortcircuited or overloaded)
Tx2	red LED – RS485 transmitting data to the room unit (flashing: transmitting data; OFF: no data traffic, ON: bus shortcircuited or overloaded)

DIP switches:

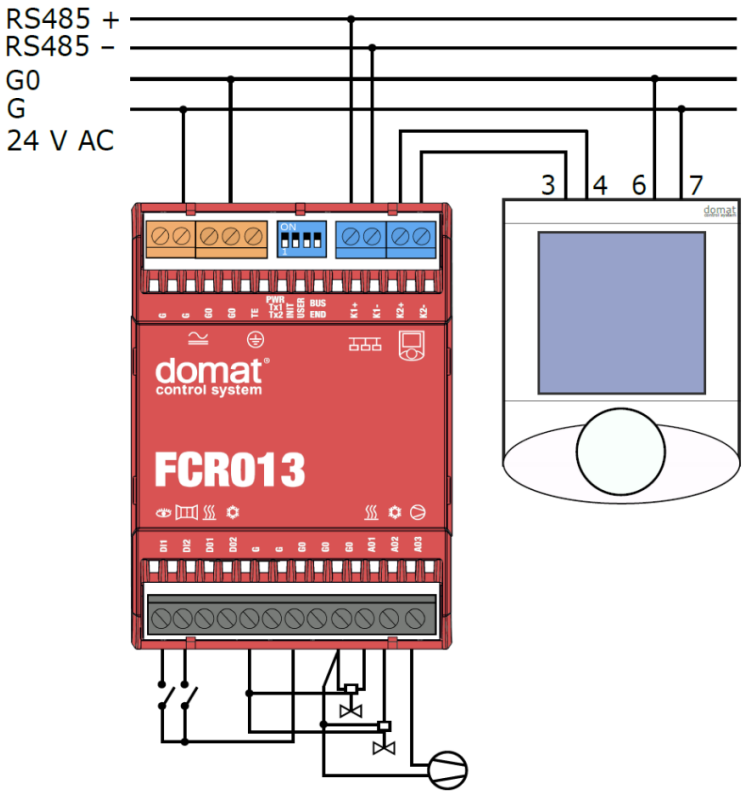
INIT INIT (DIP1): if ON at power-up, configuration parameters are brought to defaults. Default parameters are: Modbus address 1, baud rate 9600 bps, data bits 8, parity None, number of stop bits 1.

Another function of the INIT switch is to bring EEPROM into default factory settings. To init the EEPROM, proceed as follows:
- connect the device over RS485 to a PC with **ModComTool** (Modbus Configuration Tool)
- set INIT to ON
- apply power
- find the controller in the tool (Scan)
- set INIT to OFF
- in the **ModComTool**, open the controller window
- click the Initialisation button in the tool
- remove and apply power.

USER (DIP2) not used

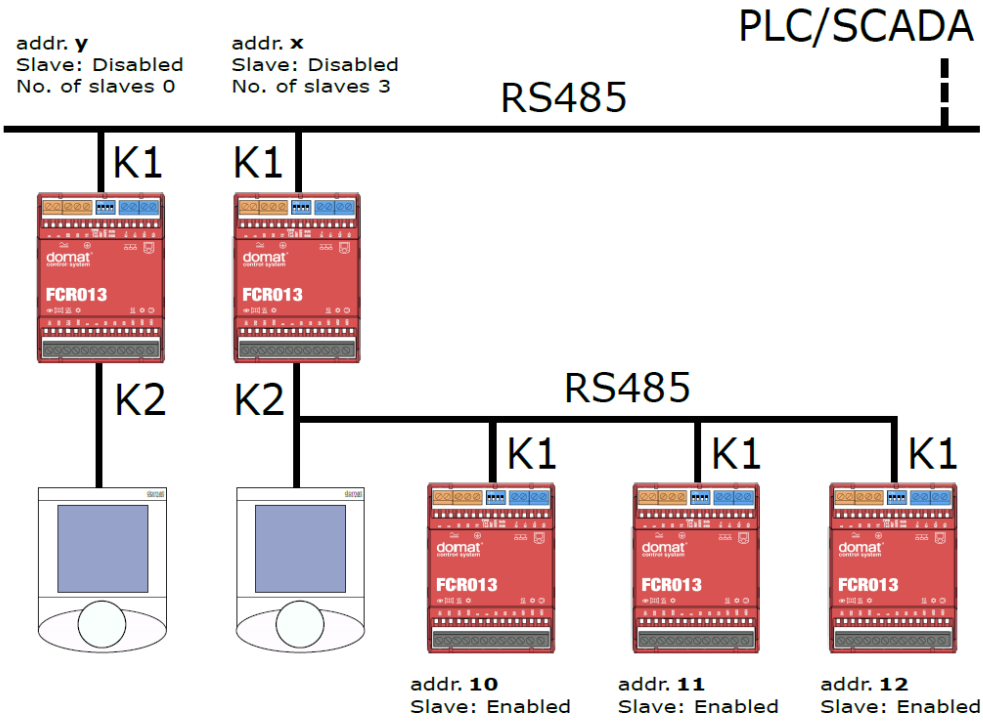
BUS END (DIP3 and DIP4) if both ON = K1 bus end, the first and last devices on the bus should have bus end ON

Connection



Power supply G and G0 terminals are internally connected with G and G0 terminals on the input/output terminals block (lower row).

Master-slave



In this connection, controllers with addresses x, 10, 11, and 12 are in one zone and all of them are controlled by one room unit. The controller addressed x is a master. Outputs of controllers addressed 10, 11, and 12 are controlled by the same signals as the master controller addressed x.

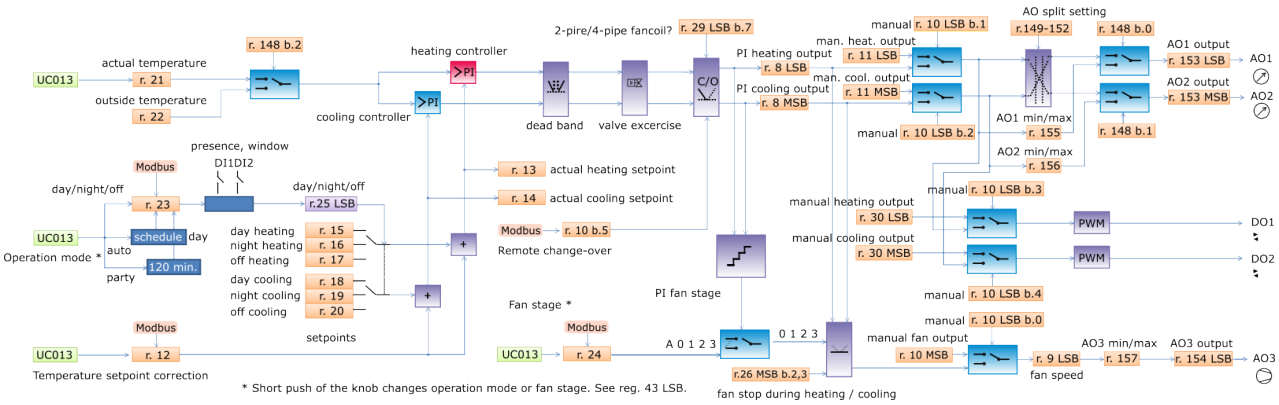
The Slave controllers are connected to the building bus (K1+, K1-). They must be addressed starting with 10 and all the other controllers belonging to one zone (on the same K1 bus) must be addressed 11, 12, 13, 14... etc, with no gaps. Maximum number of slave controllers is not limited (or, is limited only by the upper Modbus addressing range, which is 250), however, the technology and room layout should be considered.

There may be more slave groups in the same system, each starting with address 10. The addressing of master controllers at the building bus (K1+, K1), however, must be unique.

Parameters Slave (Enabled / Disabled), No. of slaves (integer 0..240) and controller address are set in the configuration software **ModComTool**.

Function description

The register numbers in the text below refer to the FCR013 Modbus table which is supplied as a separate document and is part of this function description.



Operation mode

The main selector of heating and cooling setpoints is the operation mode, which is one of the following states:

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

The operating mode is determined by those events:

- push of the UC013 button if the controller is set up so as to change the operation mode
- states of the digital inputs DI1 and DI2
- Modbus setting in **register 23**.

In the register, either the operating mode can be set directly, or a time-dependent state Party or Time schedule. The last written value applies. If Time schedule (the clock symbol) is set, the operating mode is determined by the setting of the internal time scheduler. After the controller is set to Party, it goes to Comfort for another 2 hours, and then sets back to the previous state.

The sets Comfort, Standby, Off, and Day, Night, Off have only this difference: if Residential mode (Day, Night, Off) is selected, it is possible to use the time scheduler. The Hotel mode (Comfort, Standby, Off) does not allow the time scheduler function.

The operation mode is also controlled by the digital inputs for window contact (switches between Off and the two other modes), and presence sensor or card reader (switches between Comfort (Day) and Standby (Night)). The inputs must be enabled (**reg. 26**). The inputs have higher priority than all events described above (pushbutton, Modbus, weekly scheduler). The resulting operation mode is in **Register 25 LSB.**

Setpoints

Based on the operation mode (Comfort, Standby, Off), a pair of basic setpoints for heating and cooling is selected (**registers 15 to 20**). A setpoint correction is added to the setpoints. The correction influences all three pairs of setpoints.

The user correction is available in **register 12**. The same register can be written over Modbus. The setpoint correction thus may be changed by two ways: after the value is set over Modbus, the user is allowed to set it back to a value from allowed range. The last written value is active.

Display of setpoint value
The setpoint correction is determined by the UC013 knob. The setpoint displays either as absolute or as relative value.

Relative display: a deviation against the basic setpoints, like „-3.5 ... +3.5“ (default values)
Absolute display: The correction is added to the basic setpoint, and the result is displayed as the current calculated setpoint in °C. The current setpoint depends on the controller mode – if it is heating or in the dead zone between the heating and cooling setpoint, and the last energy used was heating (then the heating setpoint + correction is displayed), or if the controller is cooling or in the dead zone, and the last energy used was cooling (then the cooling setpoint + correction is displayed). It may thus happen that e.g. for the heating setpoint of 21 °C and cooling setpoint 24 °C the user sets correction of -1.5 K and the controller is heating. The display shows 21 – 1.5 = 19.5 °C when setting. Then, without any control intervention, the heat gains in the room increase, temperature increases to 24 °C (which is above the current cooling setpoint of 24 – 1.5 = 22.5 °C) and the controller starts cooling. As soon as the user turns the knob, the actual cooling setpoint displays, which is 22.5 °C. This also is the value to be changed (of course, the heating setpoint shifts as well). The current cooling setpoint is displayed until the controller starts heating again – then the display shows the current heating setpoint. The user may suppose that the setpoint changed automatically from 19.5 to 22.5 °C. This is not correct: the controller mode changed from heating to cooling, and the current setpoint changed from the heating setpoint to the cooling setpoint. The values of both setpoints remain unchanged.

Measured temperature
The measured temperature is read by the room unit UC013.
It is possible to switch to the outside temperature (**register 22**, written over modbus). If regulation is switched to outside temperature (register 148 bit 2), the temperature from room unit will not be used.

Control functions
In the following text, the functions below have higher priorities, i.e. the signals are processed in the order as described in the text.

PI controllers
Current setpoint incl. correction and measured room temperature are sent to a pair of PI controllers. These controllers calculate the output signal once per second. If the P or I constants are changed during the operation, the controllers are reset, old integrated I-parts are deleted, and the integration starts at 0.

Dead zone
If the difference between actual temperature and actual setpoint is less than 0.5 K, both outputs of the PI controllers are set to 0. This function prevents the controller from frequent switching between the heating and cooling mode, and defines the dead zone.

Valve exercise
If this function is enabled, the valves are opened and closed once per week regardless of the heating and cooling demands to prevent seizing.

The resulting controller values are available in **register 8**, PID output heat and PID output cool.

Change-over (C/O)
If the controller is configured as two-pipe, the next step is to calculate the change-over logic. The change-over signal informs the controller that there is cold water in the piping rather than hot water, and the valve should open on cooling demand rather than on heating demand. The change-over state is read according to settings in **register 29 bit 7**: if C/O function is allowed, then state can be set over the bus, using **register 10 bit 5**.

After the C/O changes, there is a safety time gap of 30 minutes (configurable in **register 43 MSB**) between the stop of heating and the start of cooling (and vice versa), so that the water in the piping is not mixed.

The resulting sequences are used for control of analogue outputs AO1 and AO2, triac PWM outputs DO1 and DO2, and AO3 for fan control.

Control of analogue outputs
The heating and cooling signals on the output of the C/O function are used for control of outputs AO1 (heating) and AO2 (cooling). The outputs can be overridden manually. The manual override is enabled in **reg. 10 bits 1 to 2** and if the respective bit is active, the sequence is controlled by analogue values from **registers 11 MSB and 11 LSB** rather than from the heating and cooling sequences.

Analog outputs AO1 a AO2 can be split (**AO range split, reg. 148**) for heating and cooling for controling of 6-way valves (0...10 V). Range of analog outputs are splitted in two parts. One for heating and another for cooling. Limits for both parts of divided range can be set (reg. 149 – 152, default values are 0.5...4.5 V for heating and 5.5...9.5 V for cooling). If no heating nor cooling is active, the output is in the dead band between heat 0 and cool 0. Value of the output then is 5 V (in default setting).

From FW version 110 minimal and maximal value of analogue outputs can be set in **reg. 155 to 157.** For the outputs AO1 and AO2 this function will not be used if AO split function is active.

Value of the AO1 and AO2 outputs is in the register 153. Value of the AO3 output is in register 154 LSB.

Control of PWM valve outputs
The digital outputs DO1 and DO2 basically copy the analogue output AO1 and AO2 signals as PWM (pulse-width modulation). **Register 26 bit 7** defines if the valves are NC (normally closed, default setting) or NO (normally open). In case of NO configuration, the PWM signal is inverted. The resulting PWM signals are brought to DO1 (heating) and DO2 (cooling) to control valves with thermic actuators. The triac outputs can be overridden manually. The manual override is enabled in **reg. 10 bits 3 to 4** and if the respective bit is active, the sequence is controlled by PWM signals (according to values in registers for manual override 30 LSB and 30 MSB) rather than from the heating and cooling sequences.

Fan control

The resulting sequences are also used for control of the fan stages. At first, it is specified if a sequence shall influence the fan stage control (**register 26, bits 2 and 3**):

- bit 2: Stop fan when heating, i.e. for cooling fancoils. The heating output can be used e.g. for radiator valve control.
- bit 3: Stop fan when cooling, i.e. for heating convectors. The cooling output can be used e.g. for cooling panel valve control.

Stop fan when heating / cooling works with any operation mode set by writing over Modbus into **register 24** or by setting by user over short push of the room controller, the last written value is active. This means that user is not able to manually override the fan motor at a cooling fancoil in case the controller needs to heat.

The fan is controlled according to the room unit setting or writing into **register 24**. The last writing counts. If the fan is blocked by Stop fan when heating / cooling parameters, it can be overriden only by manual override directly at the outputs.

If the fan is set to Auto, the fan stage is derived from the control sequence output.

The fan relays can be manually overridden at any time, regardless of manual or automatic fan stage control, by enabling manual override in **reg. 10 LSB bit 0** and setting of **reg. 10 MSB**.

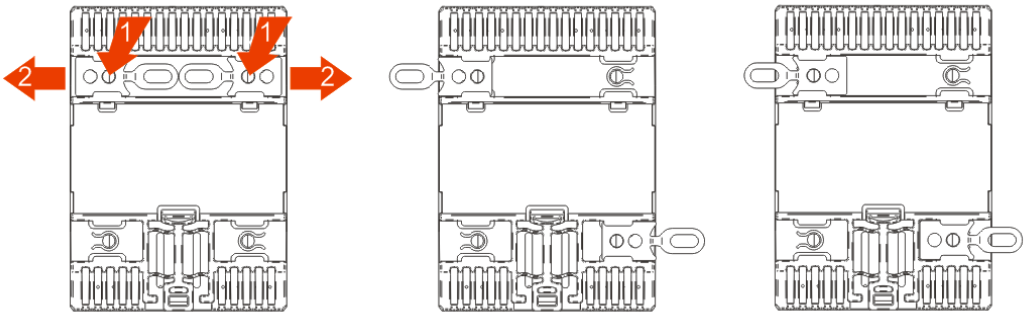
During manual override these voltage levels are used for fan stages:

Stage 0 … 0 % … 0 V
Stage 1 … 30 % … 3 V
Stage 2 … 70 % … 7 V
Stage 3 … 100% … 10 V

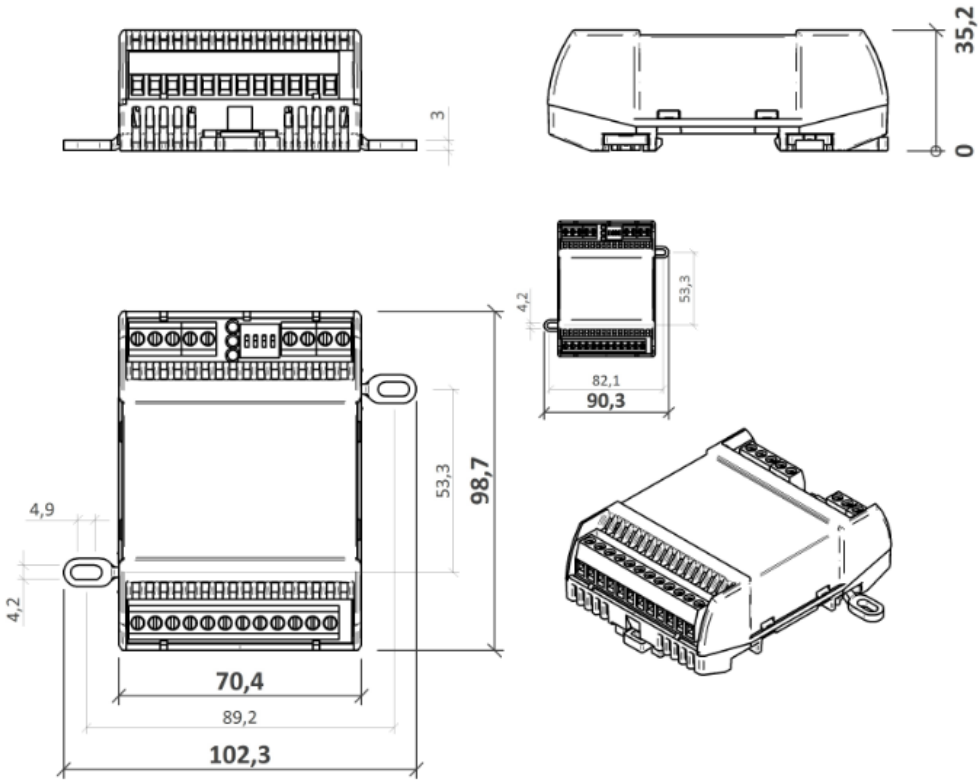
Installation

The module is fixed on standard DIN console or is fixed by mounting spots.

Mounting spots are attached to the rear side of module. Push mounting spots out (2) while simultaneously pressing safety lock which is located under the inner round hole (1). For module attachment, carefully push mounting spots back but reversed (the rings must face out). You can choose between two lock positions.



Dimensions



Dimension are in *mm.*

WEEE notice The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions

12/2017 – First datasheet version.
05/2018 – Added the *Function description* part.
08/2018 – Change of function description, change of picture.
12/2019 – Description of AO3 terminal amended.
04/2020 – *Function description* (Control of analogue outputs, fan stages) part amended.
05/2021 – Function scheme changed, AO descr. changed, logo changed.
07/2022 – Clarification of the description of DI.
06/2023 – Function scheme update, added info about outside temperature regulation.

FCR015 Communicative controller for VAV systems

Summary **FCR015 is a communicative controller for heating and cooling panels and a VAV (variable air volume) damper. It measures temperature and CO_2 concentration in the room air using a room unit and it may either work autonomously, or be connected to a primary controller (markPLC) or SCADA. As a room unit, UC905 is used.**

Application

- **Individual room control for systems with heating and cooling panels and VAV controllers**

Function

The controller communicates with a room unit UC905 over a dedicated bus (K2+, K2-). The room unit UC905 reads room temperature, CO_2 concentration in the room air, setpoint correction by a knob, and operating status, which is selected by a short push of the button or in the menu. Measured temperature range is 0 to +50 °C, CO_2 range 0 to 2000 ppm. Read and entered values are processed in PI (temperature) and proportional (CO_2) control algorithms. On the outputs, there are 3 analogue 0...10 V sequences to control the valve actuators and VAV controller.

Analogue and digital outputs can be manually controlled independently of regulation sequence.

The controller incorporates real time clock with weekly scheduler (6 events per day). It switches between the Comfort, Precomfort, and Off operation modes. There are 2 binary inputs on the controller for access card reader, PIR sensor etc. The binary input DI1 switches between Comfort and Standby operating modes. The DI2 switches to Off mode. Both NO and NC contact may be used, the selection follows in the configuration software. Each operation mode has separate setpoints for heating and cooling which are used as basis setpoints for setpoint calculation: to the basic setpoint manual setpoint correction is added, and the result is used as actual setpoint for heating or cooling.

The air volume setpoint (0..10 V output signal for the VAV controller) is derived from the CO_2 concentration in the air, and operation status:

- Comfort: the CO_2 concentration is controlled with a proportional controller so as to achieve the setpoint (default is 800 ppm), with minimum air volume as set in a parameter of the configuration tool
- Standby: there is minimum air volume required as set in the minimum air volume parameter
- Off: the VAV output goes to 0 V.

Three LEDs indicate correct function: green (PWR) – power OK, red (TX1) – transmit data to the building bus, and red (TX2) – transmit data to the room unit. On the top there are four DIP switches: K1 bus end, and INIT switch to set factory defaults (Modbus address 1, communication 9600 bps, N, 8, 1).

The controller communicates with the management system over RS485 bus with Modbus RTU and therefore can be used in many control systems. See the variable list (Modbus table) in a separate document *FCR015 Modbus table*. Another bus, K2, communicates with the room unit. To configure and commission the controller use **ModComTool**, which is free to download at our website.

The controllers operate in a non-aggressive environment. No maintenance is necessary. They are mounted on a DIN rail or using two screws on any flat surface, e.g. installation board or fan coil body.

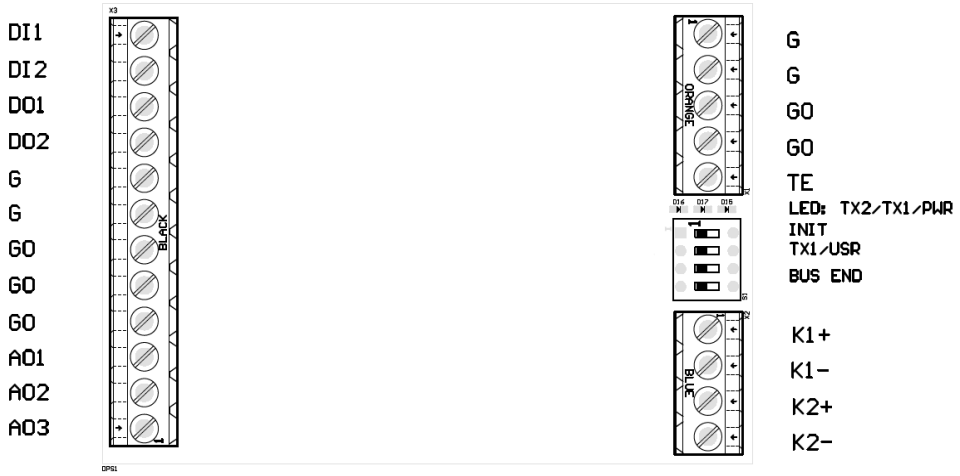
Mirroring of heating and cooling outputs at the DO outputs as PWM is not enabled by default, it must be enabled in the register 141 bits 0 and 1.

Technical data

Power	24 V AC, +/- 20%, 0.5 A (G, G0, TE)
Consumption	3 W
Galvanic insulation	1.5 kV
Communication	RS485, Modbus RTU, 1200…115200 bit/s
SW	ModComTool (4.2.4.6 and above)
Recommended wire	0.14…1.5 mm^2 (screw terminals M3)
Housing	elbox 4U low profile
Protection degree	IP20 (EN 60529)
Dimensions	70.4 × 98.7 × 35.2 mm
Digital inputs	2× DI, for dry contact against G0, load 24 V AC, 15 mA
Analogue outputs	3× analogue output 0…10 V DC, max. current 10 mA, permanent shot-circuit proof, short-circuit 50 mA
Digital outputs	2× solid state relay for AC load, zero switching, 24 V AC against G0, max. current 0,4 A

Ambient conditions	external conditions: EN 60721-3-3. climatic class 3K5 (-5…45 °C; 5…95% relative humidity, non-condensing gases and chemically non-aggressive conditions). storage: EN 60721-3-1 climatic class 1K3 (-5…45 °C; 5…95% relative humidity, non-condensing gases and chemically non-aggressive conditions).
Standards of conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors	
G	power
G0	power - common terminal
TE	technical ground - shielding
K1+	serial line RS485 +, BMS communication
K1-	serial line RS485 -, BMS communication
K2+	serial line RS485 +, room unit communication
K2-	serial line RS485 -, room unit communication
DI1	presence input (switches Comfort - Precomfort) against G0
DI2	window contact input (switches Comfort/Precomfort – Off) against G0
DO1	heating valve output (G, against G0)
DO2	cooling valve output (G, against G0)
G	power supply of outputs and inputs (internally connected to G in the upper row)
G0	power supply of outputs and inputs - reference point (internally connected to G0 in the upper row)
AO1	output for heating valve (0…10 V DC against G0)
AO2	output for cooling valve (0...10 V DC against G0)
AO3	output for VAV damper (0…10V DC against G0)

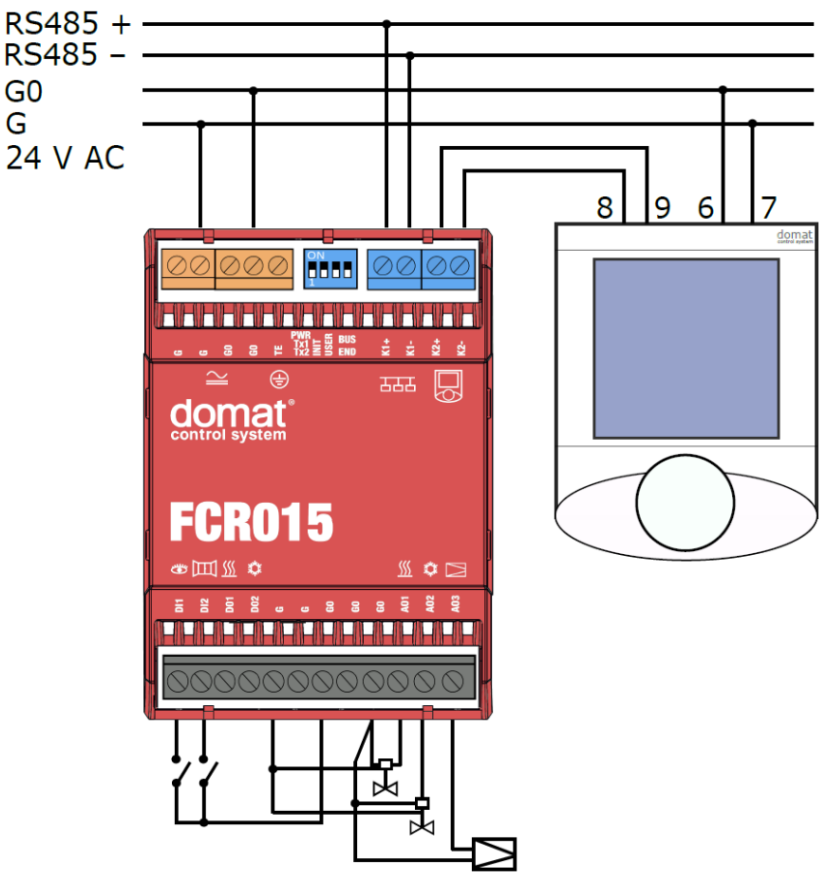
LED indication

PWR	green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, …)
Tx1	red LED – RS485 transmitting data to the building bus (flashing: transmitting data; OFF: no data traffic, ON: bus overload or short-circuited)
Tx2	red LED – RS485 transmitting data to the room unit (flashing: transmitting data; OFF: no data traffic, ON: bus overload or short-circuited)

DIP switches

INIT	INIT (DIP1): if ON at power-up, configuration parameters are brought to defaults. Default parameters are: Modnus address 1, baud rate 9600 bps, data bits 8, parity None, number of stop bits 1. Another function of the INIT switch is to bring EEPROM into default factory settings. To init the EEPROM, proceed as follows: - connect the device over RS485 to a PC with **ModComTool** (Modbus Configuration Tool) - set INIT to ON - apply power - find the controller in the tool (Scan) - set INIT to OFF - in the **ModComTool**, open the controller window - click the Initialization button in the tool - remove and apply power.
USER	(DIP2) not used
BUS END	(DIP 3 and 4) if both ON = bus termination, the first and last devices on the bus should have bus end ON

Connection

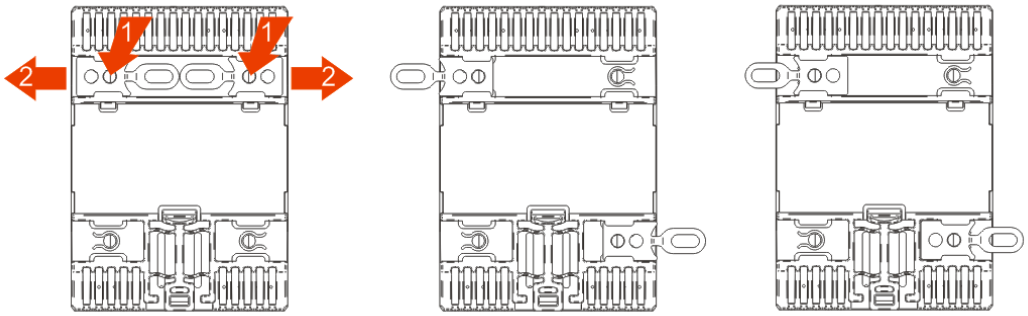


Power supply G and G0 terminals are internally connected with G and G0 terminals on the lower terminals block.

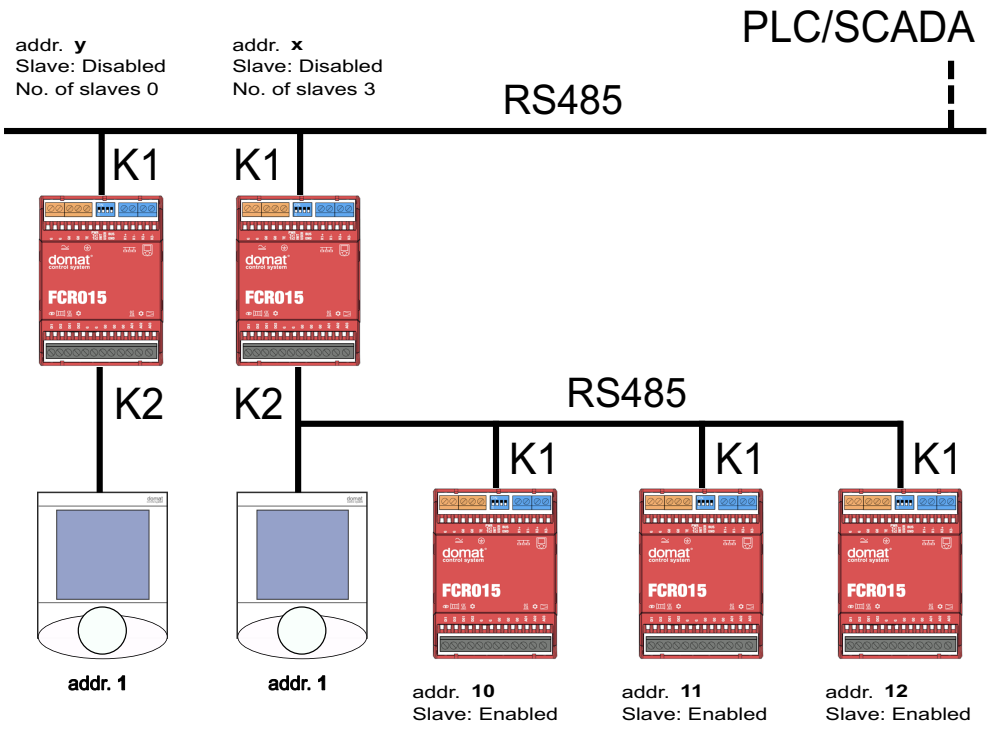
Installation

The module is fixed on standard DIN console or is fixed by mounting spots.

Mounting spots are attached to the rear side of module. Push the mounting spots out (2) while simultaneously pressing the safety lock which is located under the inner round hole (1). For module attachment, carefully push mounting spots back but reversed (the rings must face out). You can choose between two lock positions.



Master-slave



In this connection, controllers with addresses x, 10, 11, and 12 are in one zone and all of them are controlled by one room unit. The room unit must be set to address 1. The controller addressed x is a master. Outputs of controllers addressed 10, 11, and 12 are controlled by the same signals as the master controller addressed x.

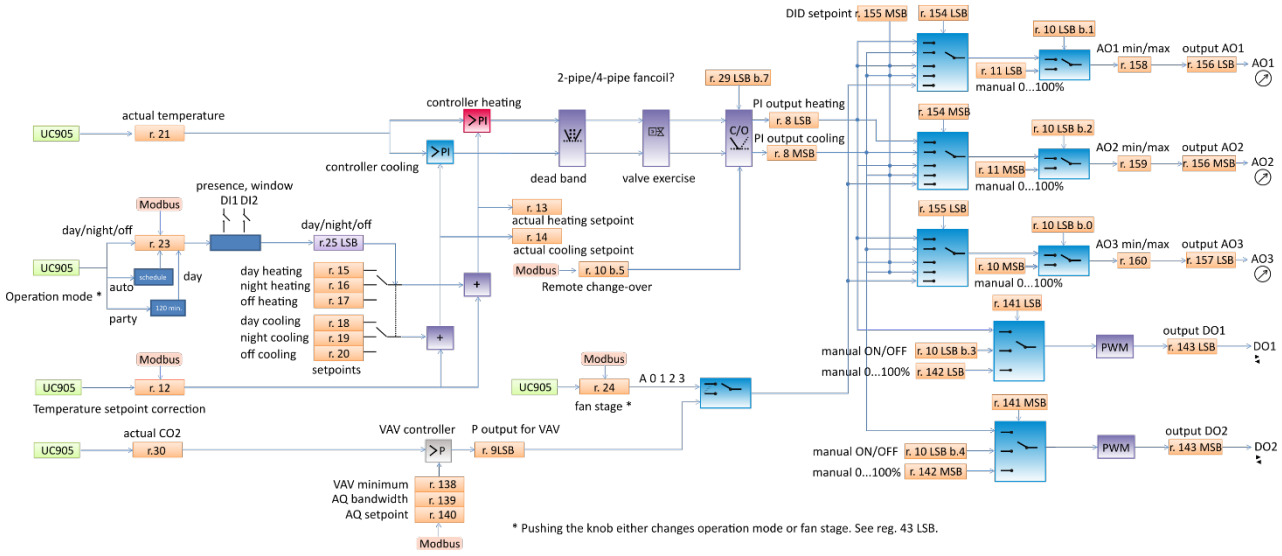
The Slave controllers are connected only to their main bus K1+ and K1-. They must be addressed starting with 10 and all the other controllers belonging to one zone (on the same K2 bus from master) must be addressed 11, 12, 13, 14... etc., with no gaps. The maximum number of slave controllers is limited only by the upper Modbus addressing range, which is 247. However, the technology and room layout should be considered.

There may be more slave groups in the same system, each starting with address 10. The addressing of master controllers at the building bus (K1+, K1-) must be unique.

Parameters Slave (Enabled / Disabled), No. of slaves (integer 0...237) and controller address are set in the configuration software **ModComTool**.

Function description

The register numbers in the text below refer to the FCR015 Modbus table which is supplied as a separate document and is part of this function description.



Operation mode

The main selector of heating and cooling setpoints is the operation mode, which is one of the following states:

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

The operating mode is determined by those events:

- push of the UC905 button if the controller is set up so as to change the operation mode
- states of the digital inputs DI1 and DI2
- Modbus setting in **register 23**.

In the register, either the operating mode can be set directly, or a time-dependent state Party or Time schedule. The last written value applies. If Time schedule (the clock symbol) is set, the operating mode is determined by the setting of the internal time scheduler. After the controller is set to Party, it goes to Comfort for another 2 hours, and then sets back to the previous state.

The sets Comfort, Standby, Off, and Day, Night, Off have only this difference: if Residential mode (Day, Night, Off) is selected, it is possible to use the time scheduler. The Hotel mode (Comfort, Standby, Off) does not allow the time scheduler function.

The operation mode is also controlled by the digital inputs for window contact (switches between Off and the two other modes), and presence sensor or card reader (switches between Comfort (Day) and Standby (Night)). The inputs must be enabled (**reg. 26**). The inputs have higher priority than all events described above (pushbutton, Modbus, weekly scheduler). The resulting operation mode is in **Register 25 LSB.**

Setpoints

Based on the operation mode (Comfort, Standby, Off), a pair of basic setpoints for heating and cooling is selected (**registers 15 to 20**). A setpoint correction is added to the setpoints. The correction influences all three pairs of setpoints.

The user correction is available in **register 12**. The same register can be written over Modbus. The setpoint correction thus may be changed by two ways: after the value is set over Modbus, the user is allowed to set it back to the value from allowed range. The last written value is active.

Display of setpoint value
The setpoint correction is determined by the UC905 knob. The setpoint displays either as absolute or as relative value.
Relative display: a deviation against the basic setpoints, like „-3.5 ... +3.5“ (default values)
Absolute display: The correction is added to the basic setpoint, and the result is displayed as the current calculated setpoint in °C. The current setpoint depends on the controller mode – if it is heating or in the dead zone between the heating and cooling setpoint, and the last energy used was heating (then the heating setpoint + correction is displayed), or if the controller is cooling or in the dead zone, and the last energy used was cooling (then the cooling setpoint + correction is displayed). It may thus happen that e.g. for the heating setpoint of 21 °C and cooling setpoint 24 °C the user sets correction of -1.5 K and the controller is heating. The display shows 21 – 1.5 = 19.5 °C when setting. Then, without any control intervention, the heat gains in the room increase, temperature increases to 24 °C (which is above the current cooling setpoint of 24 – 1.5 = 22.5 °C) and the controller starts cooling. As soon as the user turns the knob, the actual cooling setpoint displays, which is 22.5 °C. This also is the value to be changed (of course, the heating setpoint shifts as well). The current cooling setpoint is displayed until the controller starts heating again – then the display shows the current heating setpoint. The user may suppose that the setpoint changed automatically from 19.5 to 22.5 °C. This is not correct: the controller mode changed from heating to cooling, and the current setpoint changed from the heating setpoint to the cooling setpoint. The values of both setpoints remain unchanged.

Measured temperature
The measured temperature is read by the internal sensor of the room unit UC905.

Control functions
In the following text, the functions below have higher priorities, i.e. the signals are processed in the order as described in the text.

PI controllers
Current setpoint incl. correction and measured room temperature are sent to a pair of PI controllers. These controllers calculate the output signal once per second. If the P or I constants are changed during the operation, the controllers are reset, and old integrated I-parts are deleted and the integration starts at 0.

Dead zone
If the difference between actual temperature and actual setpoint is less than 0.5 K, both outputs of the PI controllers are set to 0. This function prevents the controller from frequent switching between the heating and cooling mode and defines the dead zone.

Valve exercise
If this function is enabled, the valves are opened and closed once per week regardless of the heating and cooling demands to prevent seizing.

The resulting values are available in **register 8**, PID output heat and PID output cool.

Change-over (C/O)
If the controller is configured as two-pipe, the next step is to calculate the change-over logic. The change-over signal informs the controller that there is cold water in the piping rather than hot water, and the valve should open on cooling demand rather than on heating demand. The change-over state is read according to settings in **register 29 bit 7**: if C/O function is allowed, then state can be set over the bus, using **register 10 bit 5**.

After the C/O signal changes, there is a safety time gap of 30 minutes (configurable in **register 43 MSB**) between the stop of heating and the start of cooling (and vice versa), so that the water in the piping is not mixed.

The resulting sequences are used for control of analogue outputs AO1, AO2 and AO3 according to the setting in **reg. 141**, eventually for control of triac PWM outputs DO1 and DO2.

Control of analogue outputs
The heating and cooling signals on the output of the C/O function are used for controlling outputs AO1 and AO2. The outputs can be overridden manually. The manual override is enabled in **reg. 10 bits 1 to 2** and if the respective bit is active, the sequence is controlled by analogue values from **registers 11 MSB and 11 LSB** rather than from the heating and cooling sequences.

Minimal and maximal value of analogue outputs can be set in **reg. 158 – 160** (from FW version 104).
Value of the outputs AO1 – AO3 can be read in the reg. 156 LSB – 157 LSB.

From FW version 103 it is possible to copy output from heating, cooling and fan regulation on every analogue output. Function is set in **reg. 154 LSB – 155 LSB.** Another possibility is to use it for DID unit settings.

DID unit function (Active Chilled Beam) – here is flap for fresh air inflow for CO2 regulation and after this flap are registers H and C. **If there is demand for H or C** sequence > 5 %, then this **flap must set** to value set in "DID Volume Setpoint" reg. 155 MSB (default value 100 % = 10 V), **otherwise heating or cooling would not be effective**. If there is no H or C demand, flap is controlled according to CO2 concentration.

Control of PWM valve outputs
The digital outputs DO1 and DO2 by default **do not copy** heating and cooling regulation state on output. This function is enabled in **reg. 141, bit 0 and 1. Register 26 bit 7** defines if the valves are NC (normally closed, default setting) or NO (normally open). In case of NO configuration, the PWM signal is inverted. The resulting PWM signals are brought to DO1 (heating) and DO2 (cooling) to control valves with thermic actuators. The triac outputs can be overridden manually. The manual override is enabled in **reg. 141** and if the respective bit is active, then in **reg. 10 bit 3 and 4** for ON/OFF mode, or in **reg. 142** for 0...100 % mode. During manual override the outputs are not controlled by heating and cooling resulting sequences.
Fan control, CO2 regulation
The FCR015 module fan is controlled according to CO2 concentration, or manually according to room unit setting, or over Modbus by writing into **register 24**. If the fan is set to Auto, the fan stage is derived from the control sequence output.

The current setpoint and measured value is sent to a PI controller. This controller calculates the output signal once per second.

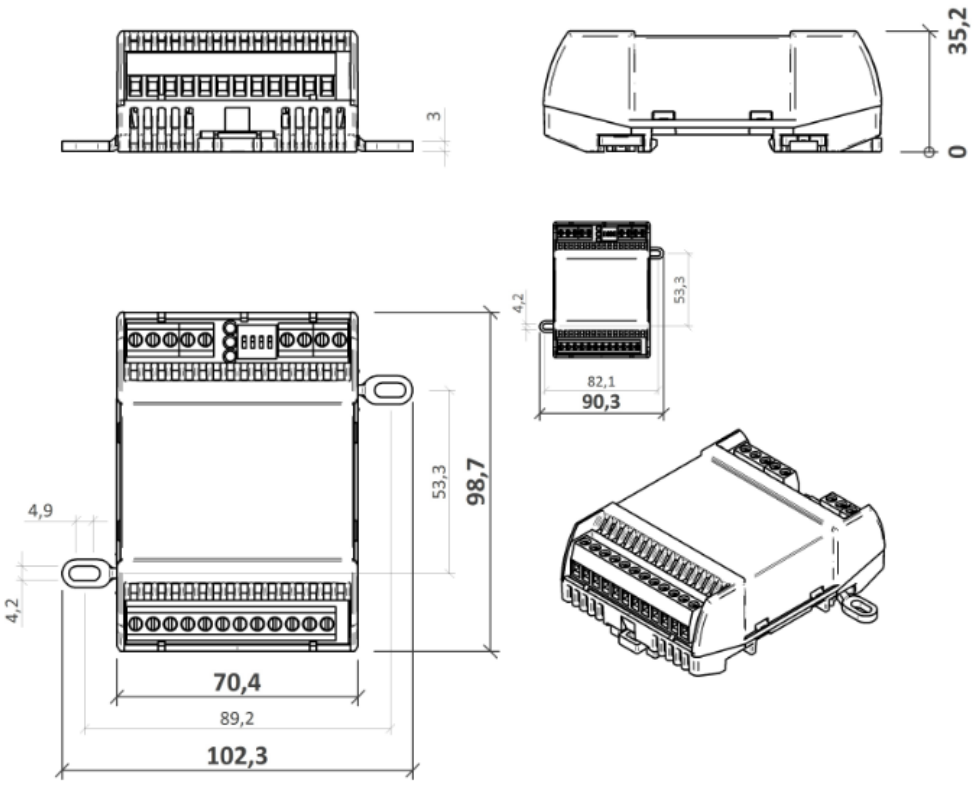
The resulting value is available in **register 9 LSB**, VAV output.

The fan output can be manually overridden at any time, regardless of manual or automatic fan stage control, by enabling manual override in **reg. 10 LSB bit 0** and setting of **reg. 10 MSB**.

During manual override these voltage levels are used for fan stages:

Stage 0 … 0 % … 0 V
Stage 1 … 30 % … 3 V
Stage 2 … 70 % … 7 V
Stage 3 … 100% … 10 V

Dimensions



Dimensions are in *mm.*

Versions compatibility

Some combinations of FCR015 and UC905/UX905 may cause issues. For avoiding problems (e. g. while replacing devices) pay attention to possible combinations:

New FCR015 (with FW 107 or later) and new UC905/UX905 (FW 205 or later) is functional combination. New FCR015 are supplied since 04/2025. Combination of older FCR015 (FW 105) and older UC905 (FW 203) is also possible.
Older FCR015 (FW 105) with new UC905/UX905 (FW 205) is also possible combination. Additionally, it shows CO_2 in ppm.

New FCR015 (FW 107) and old UC905 (FW 203) is non-functional combination. It can be solved by ordering FCR015 with FW version 105.

Upgrading UC905 (FW 203) to FW (v205) or vice versa CANNOT BE PERFORMED.
Upgrading FCR015 (FW 105) to newer FW (v107): Free of charge upon delivery to the company's address.

PN of new room controllers: UC905BL → PN 10392; UC905 → PN 10394
More information is available at Release notes | Domat Control System.

WEEE notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions

12/2017 – First datasheet version.
02/2018 – DO function note added.
05/2018 – *Function description* part added, minor corrections done.
08/2018 – Function schema changed.
07/2019 – Expanded description of AO and DO function.
04/2020 – *Function description* (Control of analogue outputs, fan stages) part amended.
05/2020 – *Measured temperature*: room unit name changed.
05/2021 – Function scheme changed, AO descr. changed, logo changed.
08/2021 – Fixed minor error in *Function scheme*.
07/2022 – Clarification of the description of DI.
05/2025 – Added information about versions compatibility.

UB100

Communicative heating controller, BACnet MS/TP

Summary **UB100 is a communicative room heating controller with two inputs and one on-off/PWM output for control of a radiator or electrical heater. It can work autonomously, or in connection to a primary controller or building management system over BACnet MS/TP.**

Application

- **Systems with radiators, electric heaters, or floor heating – control and measuring of room temperature**
- **Systems with heating and cooling panels with change-over signal sent over the bus – control and measuring of room temperature**

Function

The controller reads actual room temperature, setpoint shift by a knob, and set operation status which is set by short push of the knob. The room temperature is measured in the range of 0 to +50 °C. Measured and set values are processed in a PI algorithm, at the output of which there is a PWM controlled triac. All values are displayed on a large LCD display.

The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

The digital inputs read signals from a window contact and presence sensors. They can be used optionally.

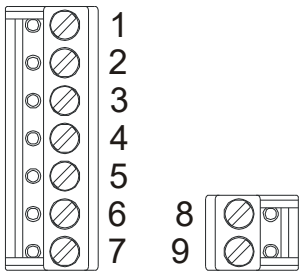
The change-over mode is set by writing into the Change-over BACnet variable, see PICS below. The controller switches after safety timeout of 30 min.

The communication bus is RS485 with BACnet MS/TP protocol, therefore the controllers are easily to integrate into most of the up-to-date SCADA or BMS system. See the BACnet PICS in Annex 1 below.

Technical data

Power	24 V AC+/- 10%
Consumption	1400 mVA + peripherials (appr. 5VA)
Measuring range	0 ÷ 50 °C
Protection	IP20
Sensor accuracy	+/- 1,5 K (with software correction)
Inputs	2x potential-free contacts, 24VAC, 5mA
Output	1x solid state relay, zero switching, for AC load, 24 V AC, maximum current 0,4A
Setpoint correction	according to configuration, +/- 10 to +/- 1 K
Communication	2 wire RS485 – BACnet MS/TP
Display	LCD 60 x 60 mm
Terminals	screw terminals for 0,14 – 1,5 mm^2 wires
Cover	ABS, RAL9010 or another
Weight	0,13 kg
Dimensions	see below

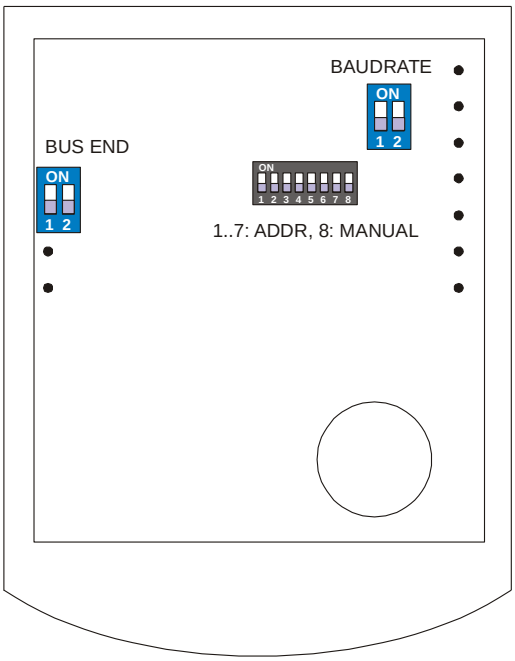
Terminals



1: DI1 presence input (dry contact to G0)
2: DI2 window contact input (dry contact to G0)
3: DO1 heating output (24 V against G0)
4: N/C not used
5: G0 power, inputs, outputs – reference point
6: G0 power, inputs, outputs – reference point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if both ON, the bus is terminated (if last device on the line)

BAUDRATE: 00 – 9600 bps (default)
01 – 19200 bps
10 – 38400 bps
11 – 76800 bps

This setting applies only if switch 8 (MANUAL) is ON

ADDR: Switches 1...7 are used for manual setting of the MS/TP address in binary form.

Example:
1000000 addr. 1
1011000 addr. 13 (= 1 + 0 + 4 + 8)
This setting applies only if switch 8 (MANUAL) is ON

Switch 8 activates MANUAL settings of the MS/TP address and baudrate. If the switch 8 is OFF, software settings from the EEPROM are used.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.

Starting sequence

After power-up, following items are displayed:

- display test (all segments active)
- 1: FW version (e.g. **1.25**)
- 2: MS/TP address (e.g. **13 A**)
- 3: Baudrate (coded 0, 1, 2, 3 – see above, **br 0** = 9600 bps)
- 4: Number of EEPROM writing cycles (for service purposes only)

After this sequence is completed, the controller starts normal operation.

Operation

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counterclockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the domat.exe configuration tool.

Operation mode change:

Push the knob shortly (<1 s). Each push changes the operation mode to Party – Day – Night – Off – Auto.

In the Auto mode, the Day / Night / Off modes change according to time schedule).
The Party mode overrides to Comfort for 120 minutes, then follows the actual time schedule.

The weekly time schedule switches between Day, Night, and Off modes according to the event list. There may be up to 6 events per day.

Time schedule settings:

It is possible to set the time scheduler over the BACnet communication only. The user can change between the operating modes using the knob.

Change of setpoints and controller time:

Switch to the settings mode with a superlong push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

Controller time and day of week (Clock icon, Day of week)
Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

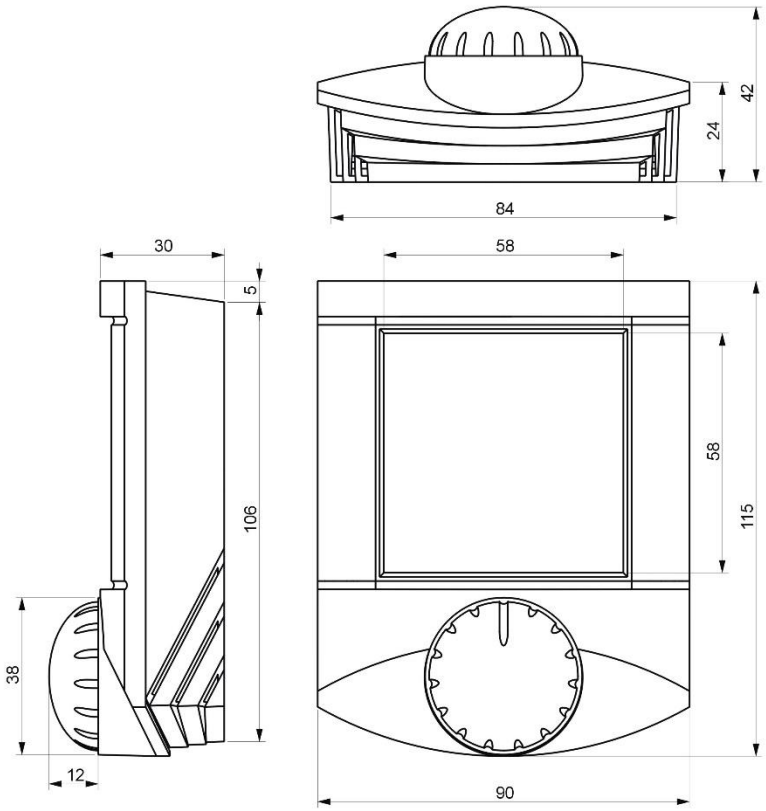
Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, UB Tool. To be able to communicate with the controllers, a MS/TP to TCP router must be used, e.g. Contemporary Controls BAS Router.

Dimensions



RoHS notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

Annex 1

BACnet Protocol Implementation Conformance Statement
Document Revision: 1.11
Date: 25.09.15
Vendor Name: Domat Control System s.r.o.
Vendor Number: 384
Product Name: BACnet room controller
Product Model Number: **UB100**
Hardware Revision: V1.1
Firmware Revision: V102
BACnet Protocol Revision: 135-2001 (1)

Product Description:
The UB100 series BACnet communicating thermostat have been specifically designed for integrated room controls of heating and cooling applications (radiators, cooling panels) to be monitored on a BACnet MS-TP® network.

BACnet Standardized Device Profile (Annex L):

☐ BACnet Operator Workstation (B-OWS)
☐ BACnet Building Controller (B-BC)
☐ BACnet Advanced Application Controller (B-AAC)
☑ BACnet Application Specific Controller (B-ASC)
☐ BACnet Smart Sensor (B-SS)
☐ BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K): The UB100 BACnet communicating thermostat meets all requirements for designation as an Application Specific Controller (B-ASC). The BACnet thermostat series supports the following BACnet Interoperability Building Blocks (BIBBs):

Tab.1

Application Service	**Designation**	**BACnet Service**
Data Sharing	DS-RP-B	Read Property
Data Sharing	DS-RPM-B	Read Property Multiple
Data Sharing	DS-WP-B	Write Property
Data Sharing	DS-COV-B	COV
Device Management	DM-DDB-B	Receive Who-Is, send I-Am
Device Management	DM-DOB-B	Receive Who-has, send I-have
Device Management	DM-DCC-B	Device Communication Control
Device Management	DM-TS-B	Time Synchronization
Device Management	DM-RD-B	Reinitialize Device
Scheduling	SCHED-I-B	Internal scheduler

Standard Object Types Supported:
An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

Tab.2

Object type	Supported Objects	Dynamically Creatable	Dynamically Deletable	Optional Property Supported	Writable Properties
Analog Input	☑	☐	☐		
Analog Value	☑	☐	☐		
Binary Input	☑	☐	☐		
Binary Output	☑	☐	☐		
Binary Value	☑	☐	☐		
Multi State Value	☑	☐	☐		
Multi State Input	☑	☐	☐		
Device	☑	☐	☐		
Calendar	☑	☐	☐		
Schedule	☑	☐	☐		

Object Property Support Table
Tab.3

List of properties	Device	BI	BO	BV	AI	AV	MV	MI	SCH	CAL
Object Identifier	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Object Name	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Object Type	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Description	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
System Status	☑									
Vendor Name	☑									
Vendor Identifier	☑									
Model Name	☑									
Firmware Revision	☑									
Protocol Version	☑									
Location	☑									
Services Supported	☑									
Object Types Supported	☑									
Object List	☑									

Max Master	☑									
Max Info Frames	☑									
Database Revision	☑									
Number Of APDU Retries	☑									
APDU Timeout	☑									
Max APDU Length	☑									
Local Time	☑									
Local Date	☑									
UTC Offset	☑									
Present Value		☑	☑	☑	☑	☑	☑	☑	☑	☑
Units					☑	☑				
Status Flags		☑	☑	☑	☑	☑	☑	☑		
Event State		☑	☑	☑	☑	☑	☑	☑		
Active text		☑	☑	☑						
Inactive text		☑	☑	☑						
Device type		☑	☑		☑					
Resolution					☑					
Maximal Value					☑					
Minimal Value					☑					
Reliability					☑					
Number Of States							☑	☑		
State Text							☑	☑		
COV Increment					☑					
Out Of Service		☑	☑	☑	☑	☑	☑	☑	☑	
Priority Array			☑	☑		☑	☑	☑		
Priority For Writing									☑	
List Of Object Property References									☑	
Effective Period									☑	
Date List										☑

Analog Input Object Instance Summary
Tab.4

Object Name	Type and ID	Units	Access Type	Description	MB Reg. add
Module ID.	AI0	Numeric	R	Module type identification	1 LSB 1 MSB
PID output Heating	AI1	Percent (%)	R	Heating routine output	8 LSB
PID output Cooling	AI2	Percent (%)	R	Cooling routine output	8 MSB
Room sensor	AI3	Cel. / Fahr.	R	Actual temperature measured by the internal sensor	21
Sys. Malfunction code	AI4	No units	R	Reserved, not used	

Analog Value Object Instance Summary
Tab.5

Object Name	Type and ID	Units	Access Type	Description	MB Reg. add
Manual Heating	AV0	Percent (%)	R/W	User requested value for Heating. Is used when the object “Heating manual control” is inactive (state manual).	11 LSB
Manual Cooling	AV1	Percent (%)	R/W	User requested value for Cooling. Is used when the object “Cooling manual control” is inactive (state manual).	11 MSB
SP correction	AV2	Cel. / Fahr.	R/W	Set point correction set by user	12
SP Heating	AV3	Cel. / Fahr.	R	Demanded room temperature in heating mode	13
SP Cooling	AV4	Cel. / Fahr.	R	Demanded room temperature in cooling mode	14
SP day/comfort Heating	AV5	Cel. / Fahr.	R/W	Day/comfort mode heating temperature set point set by user	15
SP night/ pre comfort Heating	AV6	Cel. / Fahr.	R/W	Night/standby mode heating temperature set point set by user	16
SP depression/ economy Heating	AV7	Cel. / Fahr.	R/W	Off mode heating temperature set point set by user	17
SP day/comfort Cooling	AV8	Cel. / Fahr.	R/W	Day/comfort mode cooling temperature set point set by user	18
SP night/ pre comfort Cooling	AV9	Cel. / Fahr.	R/W	Night/standby mode cooling temperature set point set by user	19
SP depression/ economy Cooling	AV10	Cel. / Fahr.	R/W	Off mode cooling temperature set point set by user	20

Outside sensor	AV11	Cel. / Fahr.	R/W	Actual outside temperature, may be written to RAM optionally for display	22
Min rel. temp correction	AV12	Cel. / Fahr.	R/W	Minimum relative user temperature correction, a positive value is saved and is taken as negative limit	33
Max rel. temp correction	AV13	Cel. / Fahr.	R/W	Maximum relative user temperature correction	34
Min day, night, depression temp	AV14	Cel. / Fahr.	R/W	Minimum temperature which user can set as set point for day, night, and off modes	35
Max day, night, depression temp	AV15	Cel. / Fahr.	R/W	Maximum temperature which user can set as set point for day, night, and off modes	36
Room sensor correction	AV16	Cel. / Fahr.	R/W	Correction: adds to the actual temperature measured by the internal sensor	37
P band*	AV17	No units	R/W	Specified for factory proprietary settings	27
I const*	AV18	No units	R/W	Specified for factory proprietary settings	28
TPSS 1*	AV19	No units	R/W	Specified for factory proprietary settings	29,41,43
TPSS 2*	AV20	No units	R/W	Specified for factory proprietary settings	45,46
TPSS 3*	AV21	No units	R/W	Specified for factory proprietary settings	42
TPSS 4*	AV22	No units	R/W	Specified for factory proprietary settings	44
Schedule Output	AV23	No units	R/W		
Factory set command	AV24	No units	W	Specified factory settings (defaults) recovering: 25545 – reinitialize object name; 5119 – clear object settings scheduler and calendar except object name settings; 61731 – reinitialize scheduler and calendar	

Note: SP-Set Point,''-usable for vendor only*

Binary Input Object Instance Summary
Tab.6

Object Name	**Type and ID**	**Active/Inactive Value**	**Access Type**	**Description**	**MB** **Reg. add**
Occupancy Input	BI0	closed/opened	R	Hardware digital input (physical level)	7 MSB-0
Window Input	BI1	closed/opened	R	Hardware digital input (physical level)	7 MSB-1
Heating request	BI2	demanded/satisfied	R	Heating request PID heating > 5%	7 MSB-2
Cooling request	BI3	demanded/satisfied	R	Cooling request PID heating > 5%	7 MSB-3

Binary Output Object Instance Summary
Tab.7

Object Name	**Type and ID**	**Active/Inactive Value**	**Access Type**	**Description**	**MB Reg. add**
Relay 1	BO0	on/off	R	Heating output	7 LSB-0
Relay 2	BO1	on/off	R	Cooling output	7 LSB-1

Binary Value Object Instance Summary
Tab.8

Object Name	**Type and ID**	**Active/Inactive Value (default value is bolded)**	**Access Type**	**Description**	**MB Reg. add**
Heating manual control (Relay1)	BV0	**auto**/manual	R/W	UB100 has only one output (heat/cool). The function is not active if Change-over is enabled.	10 LSB-1
Cooling manual control (Relay2)	BV1	**auto**/manual	R/W		10 LSB-2
Presence mode	BV2	**residential**/hotel	R/W		26 LSB-0
Temperature correction display	BV3	**absolute**/ relative	R/W		26 LSB-1
Valve exercising	BV4	**enabled**/disabled	R/W		26 LSB-4
Valve polarity	BV5	N.O./**N.C.**	R/W		26 LSB-5
Temperature correction reset	BV6	**enabled**/disabled	R/W		26 LSB-6
Control mode	BV7	on-off / **PI**	R/W		26 LSB-7
Occupancy Input status	BV8	**enabled**/disabled	R/W		26 MSB-0
Window Input status	BV9	**enabled**/disabled	R/W		26 MSB-1
Occupancy Input sense	BV10	**N.O.**/N.C.	R/W		26 MSB-2
Window Input sense	BV11	**N.O.**/N.C.	R/W		26 MSB-3
SWST*	BV12	Edit / **lock**	R/W	Specified trigger for one time system settings changing permission.	
Daylight saving	BV13	enabled/**disabled**	R/W	Power restart needed	
Change-over	BV14	enabled/**disabled**	R/W	Active (cooling) / inactive (heating), set if the controller shall activate its output on cooling sequence rather than on heating sequence. There are 30 minutes protection delay.	10 LSB-5

Fahrenheit	BV15	enabled/**disabled**	R/W	Active (Fahrenheits) / inactive (Celsius) temperature related object changes accordingly units; setpoint values are set to default values in Fahrenheits/Celsius	29 LSB-0

*Note: *'-usable for vendor only*

Multi-state Input Object Instance Summary
Tab.9

Object Name	**Type and ID**	**Access Type**	**Number of States**	**States Text**	**Description**	**MB** **Reg. add**
Presence state Hotel mode	MI0	R/W	3	Comfort Standby Off	1-Comfort(occupied house) 2-Standby (empty house) 3-Energy savings (off)	25 LSB -0 25 LSB -1 25 LSB -2
Presence state Residential mode	MI1	R/W	3	Day Night Depression	1- Day (sun + occupied house) 2-Night (moon + occupied house) 3-Depression (empty house)	25 LSB -0 25 LSB -1 25 LSB –2

Multi-state Value Object Instance Summary
Tab.10

Object Name	**Type and ID**	**Access Type**	**Number of States**	**States Text**	**Description**	**MB** **Reg. add**
Set presence Hotel mode	MV0	R/W	3	Comfort Standby Off	1 - Comfort (occupied house) 2 - Standby (empty house) 3 - Energy savings (off)	23 LSB -0 23 LSB -1 23 LSB -2
Set presence Residential mode	MV1	R/W	5	Day Night Depression Auto Party	1 - Day (sun + occupied house) 2 - Night (moon + occupied house) 3 - Depression (empty house) 4 - Auto (clock) 5 - Party (after 2 hrs go to auto)	23 LSB -0 23 LSB -1 23 LSB -2 23 LSB -3 23 LSB -4

Schedule Object Instance Summary
Tab.11

Object Name	Type and ID	Access Type	States	Description	
Schedule	SCH0	R/W	Day / Comfort Night / Standby Depression / Energy saving	1 - Day / Comfort 2 - Night / Standby 4 - Depression / Energy saving Six changes per day in weekly schedule.	

Calendar Object Instance Summary
Tab.12

Object Name	Type and ID	Access Type	Description	
Calendar-Holidays	CAL0	R/W		

List of Property Value Range Restrictions
Tab.13

Object Name	Type and Instance ID	Units	Under Range Value	Over Range Value	Default value
PID output Heating	AI1	Percent (%)	0 %	100 %	0 %
PID output Cooling	AI2	Percent (%)	0 %	100 %	0 %
Room sensor	AI3	Cel. / Fahr.	-10.0°C / 14.0°F	+80.0°C / 178.0°F	N/A
Manual Heating	AV0	Percent (%)	0 %	100 %	0 %
Manual Cooling	AV1	Percent (%)	0 %	100 %	0 %
SP (setpoint) correction	AV2	Cel. / Fahr.	-100°C / °F	100°C / °F	0°C / °F
SP Heating	AV3	Cel. / Fahr.	0°C / °F	100°C / °F	0°C / °F
SP Cooling	AV4	Cel. / Fahr.	0°C / °F	100°C / °F	0°C / °F
SP day/comfort Heating	AV5	Cel. / Fahr.	0°C / °F	100°C / °F	21°C / 70°F
SP night/ pre comfort Heating	AV6	Cel. / Fahr.	0°C / °F	100°C / °F	19°C / 66°F
SP depression/ economy Heating	AV7	Cel. / Fahr.	0°C / °F	100°C / °F	12°C / 54°F
SP day/comfort Cooling	AV8	Cel. / Fahr.	0°C / °F	100°C / °F	24°C / 75°F
SP night/ pre comfort Cooling	AV9	Cel. / Fahr.	0°C / °F	100°C / °F	26°C / 79°F
SP depression/ economy Cooling	AV10	Cel. / Fahr.	0°C / °F	100°C / °F	35°C / 95°F
Outside sensor	AV11	Cel. / Fahr.	-100°C / °F	100°C / °F	0°C / 0°F
Min rel. temp correction	AV12	Cel. / Fahr.	-100°C / °F	0°C / °F	-3.5°C / -6°F
Max rel. temp correction	AV13	Cel. / Fahr.	0°C / °F	100°C / °F	3.5°C / 6°F
Min day, night, depression temp	AV14	Cel. / Fahr.	0°C / °F	100°C / °F	10°C / 50°F
Max day, night, depression temp	AV15	Cel. / Fahr.	0°C / °F	100°C / °F	40°C / 104°F

Room sensor correction	AV16	Cel. / Fahr.	-100°C / °F	100°C / °F	-3.1°C / 5.6°F
P band (in tenth)	AV17	Kel. / Fahr.	0 K	100 K	2 K
I const	AV18	seconds	0 s	65535 s	3600 s
Maximal calendar entry per object	CAL0	No units	0	50	0

Note:*N/A- Not applicable.*

Data Link Layer Options:
☐ BACnet IP, (Annex J)
☐ BACnet IP, (Annex J), Foreign Device
☐ ISO 8802-3, Ethernet (Clause 7)
☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) _____
☑ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
☐ MS/TP slave (Clause 9), baud rate(s): _____
☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):_____
☐ Point-To-Point, modem, (Clause 10), baud rate(s): _____
☐ LonTalk, (Clause 11), medium: _____
☐ Other: _____

Segmentation Capability:

☐ Segmented requests supported Window Size _____
☐ Segmented responses supported Window Size _____

Note 1: The thermostat does not support segmented requests or responses

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐Yes ☑ No

Networking Options:

☐ Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Annex H, BACnet Tunneling Router over IP
☐ BACnet/IP Broadcast Management Device (BBMD)
Does the BBMD support registrations by Foreign Devices? ☐ Yes ☑ No

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

☑ ANSI X3.4 ☐ IBM™/Microsoft™ DBCS ☐ ISO 8859-1
☐ ISO 10646 (UCS-2) ☐ ISO 10646 (UCS-4) ☐ JIS C 6226

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

_____
_____
_____

Changes in versions	10/2015 – From firmware version 102 is supported unit Fahrenheit degree and internal time scheduler. From this HW revision is supported 2 potential free contacts. 10/2023 – Change of the logo

UB200

Communicative heating and cooling controller, BACnet MS/TP

Summary

UB200 is a communicative room heating controller with two inputs and two on-off/PWM outputs for control of a radiator or electrical heater and a cooling valve (cooling panels, chilled ceilings). It can work autonomously, or in connection to a primary controller or building management system over BACnet MS/TP.

Application

- **Systems with radiators, electric heaters, or floor heating, and chilled ceilings or panels – control and measuring of room temperature**
- **monitoring and communication of room temperatures**

Function

The controller reads actual room temperature, setpoint shift by a knob, and set operation status which is set by short push of the knob. The room temperature is measured in the range of 0 to +50 °C. Measured and set values are processed in a PI algorithm, at the output of which there is a PWM controlled triac. All values are displayed on a large LCD display.

The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

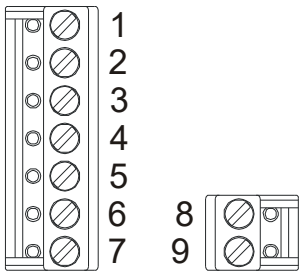
The digital inputs read signals from a window contact and presence sensors. They can be used optionally.

The communication bus is RS485 with BACnet MS/TP protocol, therefore the controllers are easily to integrate into most of the up-to-date SCADA or BMS system. See the BACnet PICS in Annex 1 below.

Technical data

Power	24 V AC+/- 10%
Consumption	3 W + peripherials (appr. 5VA)
Measuring range	0 ÷ 50 °C
Protection	IP20
Sensor accuracy	+/- 1,5 K (with software correction)
Inputs	2x potential-free contacts, 24VAC, 5mA
Outputs	2x solid state relay, zero switching, for AC load, 24 V AC, maximum current 0,4A
Setpoint correction	according to configuration, +/- 10 to +/- 1 K
Communication	2 wire RS485 – BACnet MS/TP
Display	LCD 60 x 60 mm
Terminals	screw terminals for 0,14 – 1,5 mm^2 wires
Cover	ABS, RAL9010 or another
Weight	0,13 kg
Dimensions	see below

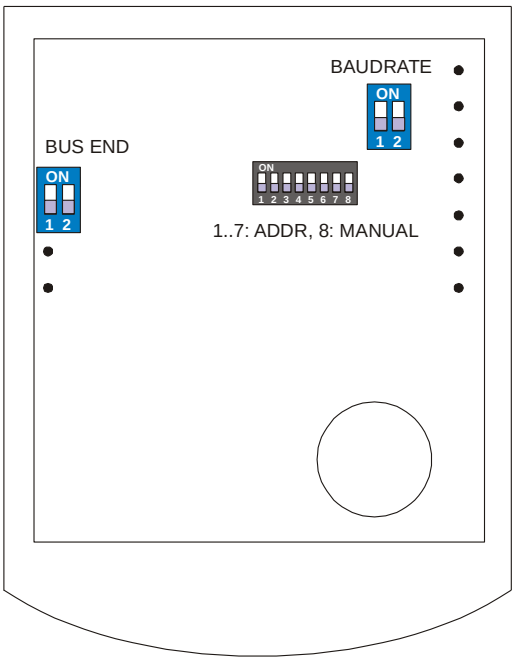
Terminals



1: DI1 presence input (dry contact to G0)
2: DI2 window contact input (dry contact to G0)
3: DO1 heating output (24 V against G0)
4: DO2 cooling output (24 V against G0)
5: G0 power, inputs, outputs – reference point
6: G0 power, inputs, outputs – reference point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if both ON, the bus is terminated (if last device on the line)

BAUDRATE: 00 – 9600 bps (default)
01 – 19200 bps
10 – 38400 bps
11 – 76800 bps

This setting applies only if switch 8 (MANUAL) is ON

ADDR: Switches 1...7 are used for manual setting of the MS/TP address in binary form.

Example:
1000000 addr. 1
1011000 addr. 13 (= 1 + 0 + 4 + 8)
This setting applies only if switch 8 (MANUAL) is ON

Switch 8 activates MANUAL settings of the MS/TP address and baudrate. If the switch 8 is OFF, software settings from the EEPROM are used.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.

Starting sequence

After power-up, following items are displayed:

- display test (all segments active)
- 1: FW version (e.g. **1.25**)
- 2: MS/TP address (e.g. **13 A**)
- 3: Baudrate (coded 0, 1, 2, 3 – see above, **br 0** = 9600 bps)
- 4: Number of EEPROM writing cycles (for service purposes only)

After this sequence is completed, the controller starts normal operation.

Operation

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counterclockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the domat.exe configuration tool.

Operation mode change:

Push the knob shortly (<1 s). Each push changes the operation mode to Party – Day – Night – Off – Auto.

In the Auto mode, the Day / Night / Off modes change according to time schedule).
The Party mode overrides to Comfort for 120 minutes, then follows the actual time schedule.

The weekly time schedule switches between Day, Night, and Off modes according to the event list. There may be up to 6 events per day.

Time schedule settings:

It is possible to set the time scheduler over the BACnet communication only. The user can change between the operating modes using the knob.

Change of setpoints and controller time:

Switch to the settings mode with a superlong push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

Controller time and day of week (Clock icon, Day of week)
Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

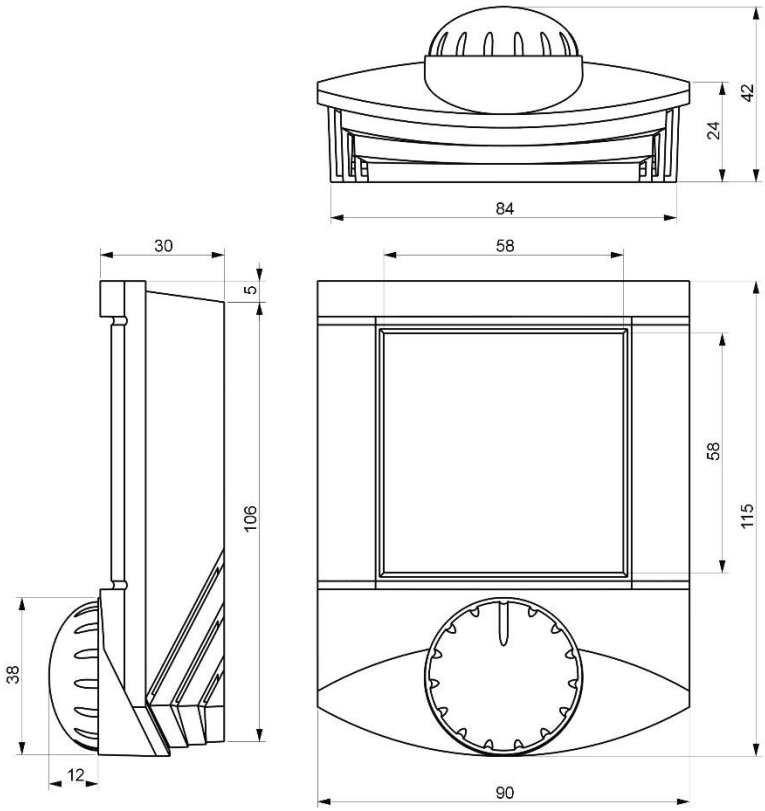
Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, UB Tool. To be able to communicate with the controllers, a MS/TP to TCP router must be used, e.g. Contemporary Controls BAS Router.

Dimensions



RoHS notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

Annex 1

BACnet Protocol Implementation Conformance Statement
Document Revision: 1.11
Date: 25.09.15
Vendor Name: Domat Control System s.r.o.
Vendor Number: 384
Product Name: BACnet room controller
Product Model Number: **UB200**
Hardware Revision: V1.1
Firmware Revision: V102
BACnet Protocol Revision: 135-2001 (1)

Product Description:
The UB200 series BACnet communicating thermostat have been specifically designed for integrated room controls of heating and cooling applications (radiators, cooling panels) to be monitored on a BACnet MS-TP® network.

BACnet Standardized Device Profile (Annex L):

☐ BACnet Operator Workstation (B-OWS)
☐ BACnet Building Controller (B-BC)
☐ BACnet Advanced Application Controller (B-AAC)
☑ BACnet Application Specific Controller (B-ASC)
☐ BACnet Smart Sensor (B-SS)
☐ BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K): The UB200 BACnet communicating thermostat meets all requirements for designation as an Application Specific Controller (B-ASC). The BACnet thermostat series supports the following BACnet Interoperability Building Blocks (BIBBs):

Tab.1

Application Service	**Designation**	**BACnet Service**
Data Sharing	DS-RP-B	Read Property
Data Sharing	DS-RPM-B	Read Property Multiple
Data Sharing	DS-WP-B	Write Property
Data Sharing	DS-COV-B	COV
Device Management	DM-DDB-B	Receive Who-Is, send I-Am
Device Management	DM-DOB-B	Receive Who-has, send I-have
Device Management	DM-DCC-B	Device Communication Control
Device Management	DM-TS-B	Time Synchronization
Device Management	DM-RD-B	Reinitialize Device
Scheduling	SCHED-I-B	Internal scheduler

Standard Object Types Supported:
An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

Tab.2

Object type	Supported Objects	Dynamically Creatable	Dynamically Deletable	Optional Property Supported	Writable Properties
Analog Input	☑	☐	☐		
Analog Value	☑	☐	☐		
Binary Input	☑	☐	☐		
Binary Output	☑	☐	☐		
Binary Value	☑	☐	☐		
Multi State Value	☑	☐	☐		
Multi State Input	☑	☐	☐		
Device	☑	☐	☐		
Calendar	☑	☐	☐		
Schedule	☑	☐	☐		

Object Property Support Table
Tab.3

List of properties	Device	BI	BO	BV	AI	AV	MV	MI	SCH	CAL
Object Identifier	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Object Name	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Object Type	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Description	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
System Status	☑									
Vendor Name	☑									
Vendor Identifier	☑									
Model Name	☑									
Firmware Revision	☑									
Protocol Version	☑									
Location	☑									
Services Supported	☑									
Object Types Supported	☑									
Object List	☑									

Max Master	☑									
Max Info Frames	☑									
Database Revision	☑									
Number Of APDU Retries	☑									
APDU Timeout	☑									
Max APDU Length	☑									
Local Time	☑									
Local Date	☑									
UTC Offset	☑									
Present Value		☑	☑	☑	☑	☑	☑	☑	☑	☑
Units					☑	☑				
Status Flags		☑	☑	☑	☑	☑	☑	☑		
Event State		☑	☑	☑	☑	☑	☑	☑		
Active text		☑	☑	☑						
Inactive text		☑	☑	☑						
Device type		☑	☑		☑					
Resolution					☑					
Maximal Value					☑					
Minimal Value					☑					
Reliability					☑					
Number Of States							☑	☑		
State Text							☑	☑		
COV Increment					☑					
Out Of Service		☑	☑	☑	☑	☑	☑	☑	☑	
Priority Array			☑	☑		☑	☑	☑		
Priority For Writing									☑	
List Of Object Property References									☑	
Effective Period									☑	
Date List										☑

Analog Input Object Instance Summary
Tab.4

Object Name	Type and ID	Units	Access Type	Description	MB Reg. add
Module ID.	AI0	Numeric	R	Module type identification	1 LSB 1 MSB
PID output Heating	AI1	Percent (%)	R	Heating routine output	8 LSB
PID output Cooling	AI2	Percent (%)	R	Cooling routine output	8 MSB
Room sensor	AI3	Cel. / Fahr.	R	Actual temperature measured by the internal sensor	21
Sys. Malfunction code	AI4	No units	R	Reserved, not used	

Analog Value Object Instance Summary
Tab.5

Object Name	Type and ID	Units	Access Type	Description	MB Reg. add
Manual Heating	AV0	Percent (%)	R/W	User requested value for Heating. Is used when the object “Heating manual control” is inactive (state manual).	11 LSB
Manual Cooling	AV1	Percent (%)	R/W	User requested value for Cooling. Is used when the object “Cooling manual control” is inactive (state manual).	11 MSB
SP correction	AV2	Cel. / Fahr.	R/W	Set point correction set by user	12
SP Heating	AV3	Cel. / Fahr.	R	Demanded room temperature in heating mode	13
SP Cooling	AV4	Cel. / Fahr.	R	Demanded room temperature in cooling mode	14
SP day/comfort Heating	AV5	Cel. / Fahr.	R/W	Day/comfort mode heating temperature set point set by user	15
SP night/ pre comfort Heating	AV6	Cel. / Fahr.	R/W	Night/standby mode heating temperature set point set by user	16
SP depression/ economy Heating	AV7	Cel. / Fahr.	R/W	Off mode heating temperature set point set by user	17
SP day/comfort Cooling	AV8	Cel. / Fahr.	R/W	Day/comfort mode cooling temperature set point set by user	18
SP night/ pre comfort Cooling	AV9	Cel. / Fahr.	R/W	Night/standby mode cooling temperature set point set by user	19

SP depression/ economy Cooling	AV10	Cel. / Fahr.	R/W	Off mode cooling temperature set point set by user	20
Outside sensor	AV11	Cel. / Fahr.	R/W	Actual outside temperature, may be written to RAM optionally for display	22
Min rel. temp correction	AV12	Cel. / Fahr.	R/W	Minimum relative user temperature correction, a positive value is saved and is taken as negative limit	33
Max rel. temp correction	AV13	Cel. / Fahr.	R/W	Maximum relative user temperature correction	34
Min day, night, depression temp	AV14	Cel. / Fahr.	R/W	Minimum temperature which user can set as set point for day, night, and off modes	35
Max day, night, depression temp	AV15	Cel. / Fahr.	R/W	Maximum temperature which user can set as set point for day, night, and off modes	36
Room sensor correction	AV16	Cel. / Fahr.	R/W	Correction: adds to the actual temperature measured by the internal sensor	37
P band*	AV17	No units	R/W	Specified for factory proprietary settings	27
I const*	AV18	No units	R/W	Specified for factory proprietary settings	28
TPSS 1*	AV19	No units	R/W	Specified for factory proprietary settings	29,41,43
TPSS 2*	AV20	No units	R/W	Specified for factory proprietary settings	45,46
TPSS 3*	AV21	No units	R/W	Specified for factory proprietary settings	42
TPSS 4*	AV22	No units	R/W	Specified for factory proprietary settings	44
Schedule Output	AV23	No units	R/W		
Factory set command	AV24	No units	W	Specified factory settings (defaults) recovering: 25545 – reinitialize object name; 5119 – clear object settings scheduler and calendar except object name settings; 61731 – reinitialize scheduler and calendar	

Note: SP-Set Point,''-usable for vendor only*

Binary Input Object Instance Summary
Tab.6

Object Name	**Type and ID**	**Active/Inactive Value**	**Access Type**	**Description**	**MB** **Reg. add**
Occupancy Input	BI0	closed/opened	R	Hardware digital input (physical level)	7 MSB-0
Window Input	BI1	closed/opened	R	Hardware digital input (physical level)	7 MSB-1
Heating request	BI2	demanded/satisfied	R	Heating request PID heating > 5%	7 MSB-2

Cooling request	BI3	demanded/satisfied	R	Cooling request PID heating > 5%	7 MSB-3

Binary Output Object Instance Summary
Tab.7

Object Name	**Type and ID**	**Active/Inactive Value**	**Access Type**	**Description**	**MB** **Reg. add**
Relay 1	BO0	on/off	R	Heating output	7 LSB-0
Relay 2	BO1	on/off	R	Cooling output	7 LSB-1

Binary Value Object Instance Summary
Tab.8

Object Name	**Type and ID**	**Active/Inactive Value** **(default value is bolded)**	**Access Type**	**Description**	**MB** **Reg. add**
Heating manual control (Relay1)	BV0	**auto**/manual	R/W	The function is not active if Change-over is enabled.	10 LSB-1
Cooling manual control (Relay2)	BV1	**auto**/manual	R/W		10 LSB-2
Presence mode	BV2	residential/**hotel**	R/W		26 LSB-0
Temperature correction display	BV3	absolute/ **relative**	R/W		26 LSB-1
Valve exercising	BV4	**enabled**/disabled	R/W		26 LSB-4
Valve polarity	BV5	N.O./**N.C.**	R/W		26 LSB-5
Temperature correction reset	BV6	**enabled**/disabled	R/W		26 LSB-6
Control mode	BV7	on-off / **PI**	R/W		26 LSB-7
Occupancy Input status	BV8	**enabled**/disabled	R/W		26 MSB-0
Window Input status	BV9	**enabled**/disabled	R/W		26 MSB-1
Occupancy Input sense	BV10	**N.O.**/N.C.	R/W		26 MSB-2
Window Input sense	BV11	**N.O.**/N.C.	R/W		26 MSB-3
SWST*	BV12	Edit / **lock**	R/W	Specified trigger for one time system settings changing permission.	
Daylight saving	BV13	enabled/**disabled**	R/W	Power restart needed	

Change-over	BV14	enabled/**disabled**	R/W	Active (cooling) / inactive (heating), set if the controller shall activate its output on cooling sequence rather than on heating sequence. There are 30 minutes protection delay.	10 LSB-5
Fahrenheit	BV15	enabled/**disabled**	R/W	Active (Fahrenheits) / inactive (Celsius) temperature related object changes accordingly units; setpoint values are set to default values in Fahrenheits/Celsius	29 LSB-0

*Note: *'-usable for vendor only*

Multi-state Input Object Instance Summary
Tab.9

Object Name	**Type and ID**	**Access Type**	**Number of States**	**States Text**	**Description**	**MB** **Reg. add**
Presence state Hotel mode	MI0	R/W	3	Comfort Standby Off	1-Comfort(occupied house) 2-Standby (empty house) 3-Energy savings (off)	25 LSB -0 25 LSB -1 25 LSB -2
Presence state Residential mode	MI1	R/W	3	Day Night Depression	1- Day (sun + occupied house) 2-Night (moon + occupied house) 3-Depression (empty house)	25 LSB -0 25 LSB -1 25 LSB –2

Multi-state Value Object Instance Summary
Tab.10

Object Name	**Type and ID**	**Access Type**	**Number of States**	**States Text**	**Description**	**MB** **Reg. add**
Set presence Hotel mode	MV0	R/W	3	Comfort Standby Off	1 - Comfort (occupied house) 2 - Standby (empty house) 3 - Energy savings (off)	23 LSB -0 23 LSB -1 23 LSB -2
Set presence Residential mode	MV1	R/W	5	Day Night Depression Auto Party	1 - Day (sun + occupied house) 2 - Night (moon + occupied house) 3 - Depression (empty house) 4 - Auto (clock) 5 - Party (after 2 hrs go to auto)	23 LSB -0 23 LSB -1 23 LSB -2 23 LSB -3 23 LSB -4

Schedule Object Instance Summary
Tab.11

Object Name	Type and ID	Access Type	States	Description	
Schedule	SCH0	R/W	Day / Comfort Night / Standby Depression / Energy saving	1 - Day / Comfort 2 - Night / Standby 4 - Depression / Energy saving Six changes per day in weekly schedule.	

Calendar Object Instance Summary
Tab.12

Object Name	Type and ID	Access Type	Description	
Calendar-Holidays	CAL0	R/W		

List of Property Value Range Restrictions
Tab.13

Object Name	Type and Instance ID	Units	Under Range Value	Over Range Value	Default value
PID output Heating	AI1	Percent (%)	0 %	100 %	0 %
PID output Cooling	AI2	Percent (%)	0 %	100 %	0 %
Room sensor	AI3	Cel. / Fahr.	-10.0°C / 14.0°F	+80.0°C / 178.0°F	N/A
Manual Heating	AV0	Percent (%)	0 %	100 %	0 %
Manual Cooling	AV1	Percent (%)	0 %	100 %	0 %
SP (setpoint) correction	AV2	Cel. / Fahr.	-100°C / °F	100°C / °F	0°C / °F
SP Heating	AV3	Cel. / Fahr.	0°C / °F	100°C / °F	0°C / °F
SP Cooling	AV4	Cel. / Fahr.	0°C / °F	100°C / °F	0°C / °F
SP day/comfort Heating	AV5	Cel. / Fahr.	0°C / °F	100°C / °F	21°C / 70°F
SP night/ pre comfort Heating	AV6	Cel. / Fahr.	0°C / °F	100°C / °F	19°C / 66°F
SP depression/ economy Heating	AV7	Cel. / Fahr.	0°C / °F	100°C / °F	12°C / 54°F
SP day/comfort Cooling	AV8	Cel. / Fahr.	0°C / °F	100°C / °F	24°C / 75°F
SP night/ pre comfort Cooling	AV9	Cel. / Fahr.	0°C / °F	100°C / °F	26°C / 79°F
SP depression/ economy Cooling	AV10	Cel. / Fahr.	0°C / °F	100°C / °F	35°C / 95°F
Outside sensor	AV11	Cel. / Fahr.	-100°C / °F	100°C / °F	0°C / 0°F
Min rel. temp correction	AV12	Cel. / Fahr.	-100°C / °F	0°C / °F	-3.5°C / -6°F
Max rel. temp correction	AV13	Cel. / Fahr.	0°C / °F	100°C / °F	3.5°C / 6°F
Min day, night, depression temp	AV14	Cel. / Fahr.	0°C / °F	100°C / °F	10°C / 50°F
Max day, night, depression temp	AV15	Cel. / Fahr.	0°C / °F	100°C / °F	40°C / 104°F

Room sensor correction	AV16	Cel. / Fahr.	-100°C / °F	100°C / °F	-3.1°C / 5.6°F
P band (in tenth)	AV17	Kel. / Fahr.	0 K	100 K	2 K
I const	AV18	seconds	0 s	65535 s	3600 s
Maximal calendar entry per object	CAL0	No units	0	50	0

Note:*N/A- Not applicable.*

Data Link Layer Options:
☐ BACnet IP, (Annex J)
☐ BACnet IP, (Annex J), Foreign Device
☐ ISO 8802-3, Ethernet (Clause 7)
☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) _____
☑ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
☐ MS/TP slave (Clause 9), baud rate(s): _____
☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):_____
☐ Point-To-Point, modem, (Clause 10), baud rate(s): _____
☐ LonTalk, (Clause 11), medium: _____
☐ Other: _____

Segmentation Capability:

☐ Segmented requests supported Window Size _____
☐ Segmented responses supported Window Size _____

Note 1: The thermostat does not support segmented requests or responses

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐Yes ☑ No

Networking Options:

☐ Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Annex H, BACnet Tunneling Router over IP
☐ BACnet/IP Broadcast Management Device (BBMD)
Does the BBMD support registrations by Foreign Devices? ☐ Yes ☑ No

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

☑ ANSI X3.4 ☐ IBM™/Microsoft™ DBCS ☐ ISO 8859-1
☐ ISO 10646 (UCS-2) ☐ ISO 10646 (UCS-4) ☐ JIS C 6226

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

_____
_____
_____

Changes in versions	10/2015 – From firmware version 102 is supported unit Fahrenheit degree and internal time scheduler. 05/2018 – Change technical data. 10/2023 – Change of the logo

UC010 Room unit for fancoil controller FCR010



Summary

The UC010 room unit is a communicative human-machine interface for fancoil controller FCR010.

According to production type, each version of the unit may contain display, backlight and knob.

UC010 – basic version with display and knob
UC010BL – version with display, knob and backlight
UC010DK – version without knob and display

Application

- **Fan coil systems – measurement and control of room temperature**

Function

The unit reads room temperature, temperature correction / setpoint by a knob, and required operation mode which is set by a short push or in the menu. Data is transmitted to the fancoil controller. The fan coil controller may send to the unit other data (heating / cooling mode, fan stage, day / night / standby mode etc.) which are displayed on the LCD display.

Connect the room unit to FCR010 over a 4 core cable, the most suitable types are JY(St)Y or LAM 2x2x0.8. Use the same type which powers the FCR010 controller as if the room unit power is taken from the FCR010 terminals, the cores in a terminal should be of the same cross-section.

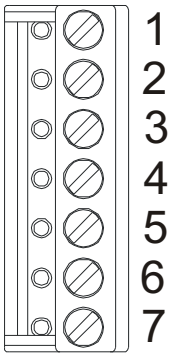
If there is communication failure between UC010 and FCR010, there is a wrench and alarm bell icon at the UC010 display. Check signal polarity (terminals 3, 4), bus termination, and correct wiring at the FCR010 side (see FCR010 data sheet).

Technical data

Power supply	24 V AC ±20 %
Consumption	1 W
Communication	RS485, Modbus RTU, selectable speed 1200 ... 115200 bps
SW	ModComTool
Temperature measuring range	-20 ÷ 70 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ÷ 90 rH (accuracy ±3 % rH)
Setpoint	as configured, ± 10 to ± 1 K
Display	LCD 60 × 60 mm
Terminals	screw terminals for wires 0.14 … 1.5 mm^2
Cover	ABS, RAL9010
Protection	IP20
Weight	0.13 kg
Dimensions	90 × 115 × 30 mm
Ambient temperature	External conditions: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5 Storage: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 Hazardous substances reduction EN 50581:2012

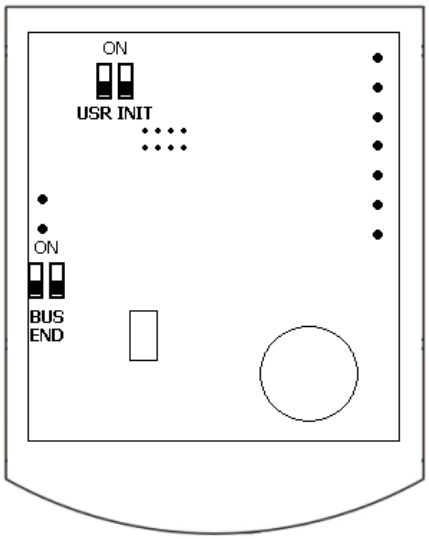
Version **UC010DK** without knob and display is available.
Version with display and without knob is also available, need to be specified in order.

Terminals



1: NC not connected
2: NC not connected
3: K- communication, RS485 –
4: K+ communication, RS485 +
5: GND technical earth (TE)
6: G0 power – common point
7: G power

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

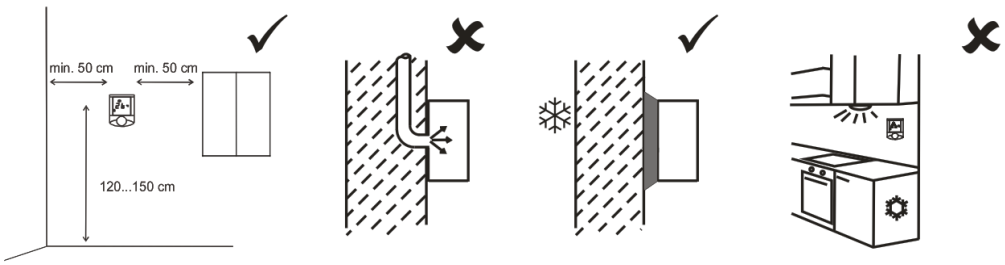
INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600.
To init, proceed as follows:

- connect the device over RS485 to a PC with ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

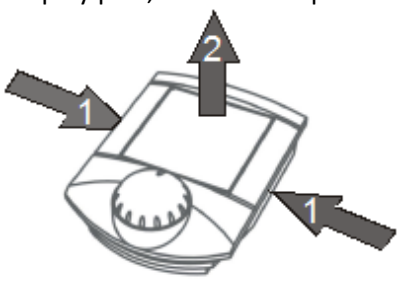


Cover opening

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Operation

The following settings are defaults. The engineer may set another way of fancoil control, disable some functions etc., so the text below is a description of the default functionality of the controller rather than the user operation manual.

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counterclockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComTool configuration tool.

Fancoil stage setting:

Push the knob shortly (<1 s). Every push changes the fancoil stage cyclically: Stage 1 – Stage 2 – Stage 3 – Off – Auto. When changing between the Comfort and Standby modes, the controller falls back into automatic fancoil stage control according to the control deviation.

Operation mode change:

The operation mode in the Hotel mode (used for fancoils in hotels and offices) is changed over bus communication or by activating digital inputs. The DI1 switches between the Comfort and Standby modes (e.g. card reader), while DI2 brings the controller into the Off mode (e.g. window contact). The time scheduler is used with Residential mode only.

Time schedule settings:

Switch to the time schedule settings mode with a long push (>1 s). The controller switches to settings mode (clock icon).

Turn the knob to select the weekday (1 to 7). Then short push to confirm the selection. Turn the knob to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push to confirm the event selection. Turn the knob to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push to confirm the operation mode setting. The event time displays. Turn the knob to set the time of the event and confirm by a short push. Then turn the knob to select another event or long push and turn the knob to select another weekday.

After all desired events have been edited, long push to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a superlong push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

- Controller time and day of week (Clock icon, Day of week)
- Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
- Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
- Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
- Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
- Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
- Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

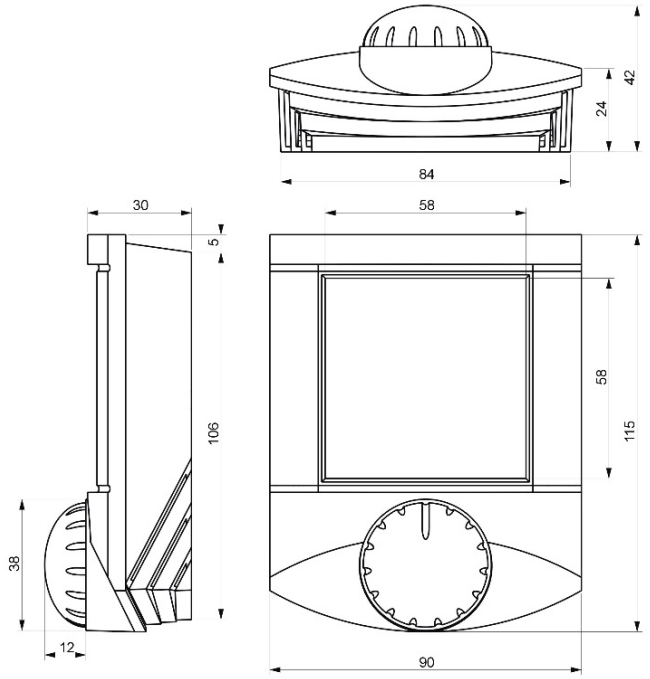
The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, ModComTool.

Display

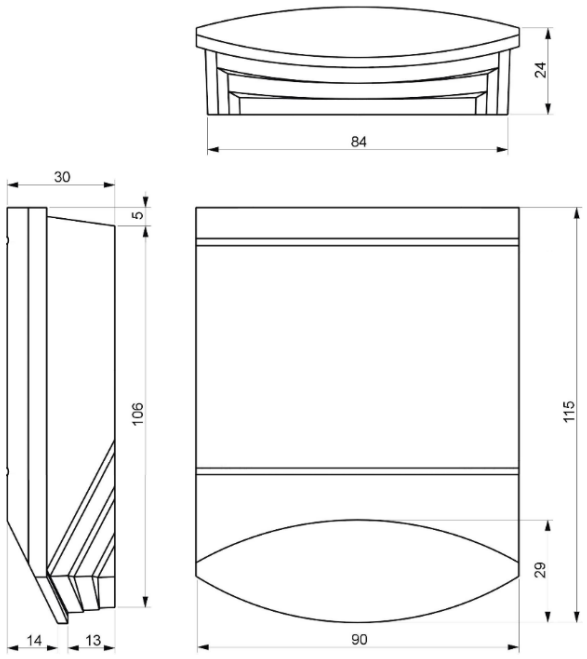
A large (60 × 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

LCD symbol set

Dimensions **UC010**



UC010DK



All dimensions in *mm.*

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.

Changes in versions	04/2015 – Added UC010/DK version. 08/2016 – Changed the format and reference to the configuration software. 03/2017 – Added picture and description of the installation and link on the datasheet with other colours. 07/2017 – Change of technical data, standards and images. BL version added. 08/2017 – Controller description change (FC to FCR version). 08/2018 – Minor changes. 10/2023 – Change of the logo, stylistic changes.

UC011 Room unit for fancoil controller FCR010



Summary

The UC011 room unit is a communicative human-machine interface for fancoil controller FCR010 with galvanically separated communication.

According to production type, each version of the unit may contain display, backlight and knob.

UC011 – basic version with display and knob
UC011BL – version with display, knob and backlight
UC011DK – version without knob and display

Application

- **Fan coil systems – measurement and control of room temperature**

Function

The unit reads room temperature, temperature correction / setpoint by a knob, and required operation mode which is set by a short push or in the menu. Data is transmitted to the fancoil controller. The fan coil controller may send to the unit other data (heating / cooling mode, fan stage, day / night / standby mode etc.) which are displayed on the LCD display.

Connect the room unit to FCR010 over a 4 core cable, the most suitable types are JY(St)Y or LAM 2x2x0.8. Use the same type which powers the FCR010 controller as if the room unit power is taken from the FCR010 terminals, the cores in a terminal should be of the same cross-section.

If there is communication failure between UC011 and FCR010, there is a wrench and alarm bell icon at the UC011 display. Check signal polarity (terminals 3, 4), bus termination, and correct wiring at the FCR010 side (see FCR010 data sheet).

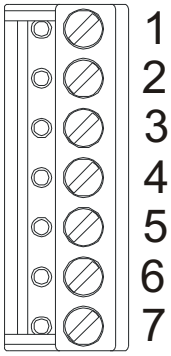
Technical data

Power supply	24 V AC ± 20 %
Consumption	1 W
Communication	RS485, Modbus RTU, selectable speed 1200 ... 115200 bps
SW	ModComTool

Temperature measuring range	-20 ÷ 70 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ÷ 90 rH (accuracy ±3 % rH)
Setpoint	as configured, ±10 to ± 1 K
Display	LCD 60 × 60 mm
Terminals	screw terminals for wires 0.14 … 1.5 mm^2
Cover	ABS, RAL9010
Protection	IP20
Weight	0.13 kg
Dimensions	90 × 115 × 30 mm
Ambient temperature	External conditions: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5 Storage: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 Hazardous substances reduction EN 50581:2012

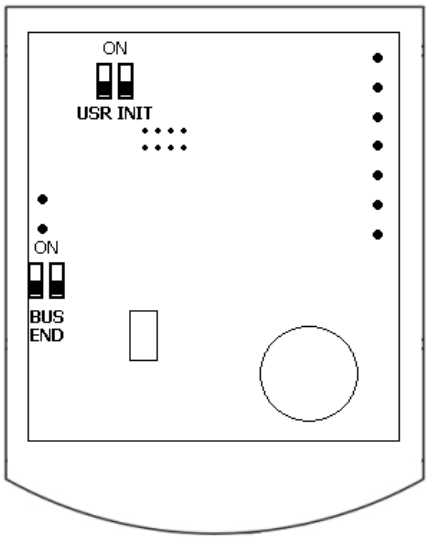
Version **UC011DK** without knob and display is available.
Version with display and without knob is also available, need to be specified in order.

Terminals



1: NC not connected
2: NC not connected
3: K- communication, RS485 –
4: K+ communication, RS485 +
5: GND technical earth (TE)
6: G0 power – common point
7: G power

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

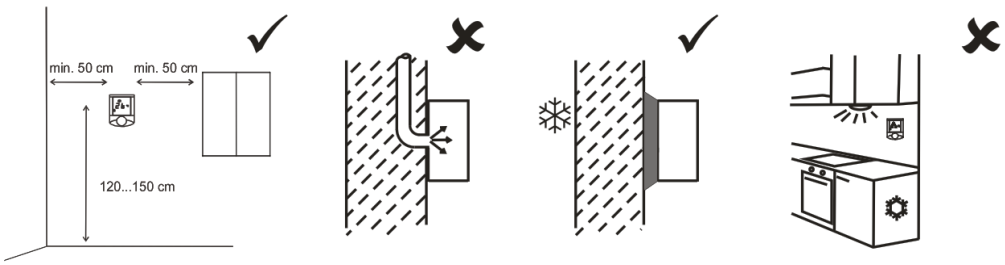
INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600.
To init, proceed as follows:

- connect the device over RS485 to a PC with ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

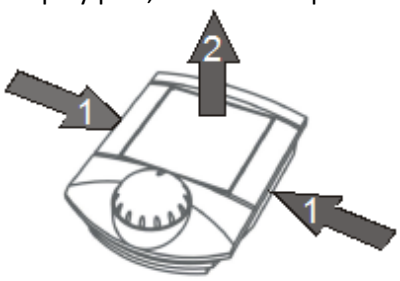


Cover opening

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Operation

The following settings are defaults. The engineer may set another way of fancoil control, disable some functions etc., so the text below is a description of the default functionality of the controller rather than the user operation manual.

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counterclockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComTool configuration tool.

Fancoil stage setting:

Push the knob shortly (<1 s). Every push changes the fancoil stage cyclically: Stage 1 – Stage 2 – Stage 3 – Off – Auto. When changing between the Comfort and Standby modes, the controller falls back into automatic fancoil stage control according to the control deviation.

Operation mode change:

The operation mode in the Hotel mode (used for fancoils in hotels and offices) is changed over bus communication or by activating digital inputs. The DI1 switches between the Comfort and Standby modes (e.g. card reader), while DI2 brings the controller into the Off mode (e.g. window contact). The time scheduler is used with Residential mode only.

Time schedule settings:

Switch to the time schedule settings mode with a long push (>1 s). The controller switches to settings mode (clock icon).

Turn the knob to select the weekday (1 to 7). Then short push to confirm the selection. Turn the knob to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push to confirm the event selection. Turn the knob to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push to confirm the operation mode setting. The event time displays. Turn the knob to set the time of the event and confirm by a short push. Then turn the knob to select another event or long push and turn the knob to select another weekday.

After all desired events have been edited, long push to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a superlong push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

- Controller time and day of week (Clock icon, Day of week)
- Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
- Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
- Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
- Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
- Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
- Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

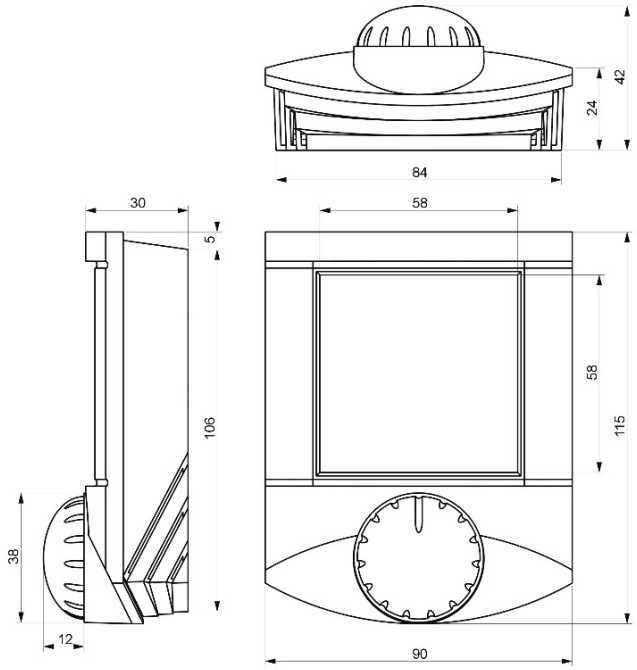
The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, ModComTool.

Display

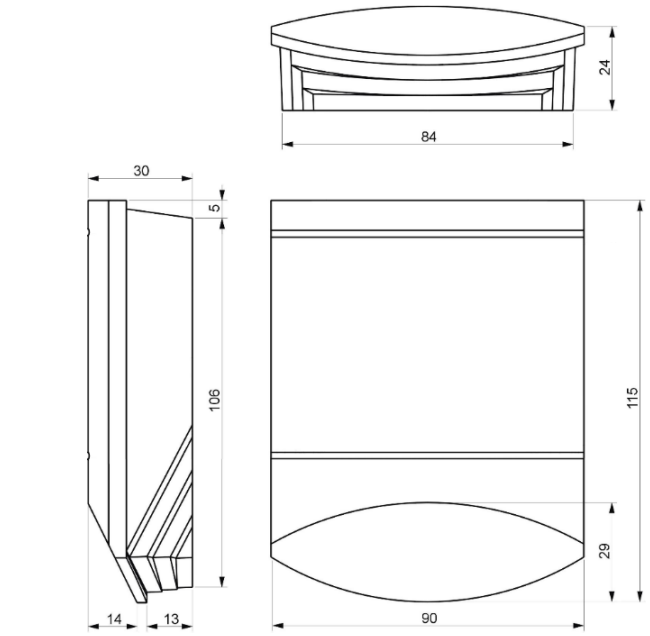
A large (60 × 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are weekdays used for time scheduler setup. Other symbols are not used.

LCD symbol set

Dimensions **UC011**



UC011DK



All dimensions in *mm.*

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.

Changes in versions	04/2015 – Added UC010/DK version. 08/2016 – Changed the format and reference to the configuration software. 03/2017 – Added picture and description of the installation and link on the datasheet with other colours. 07/2017 – Change of technical data, standards and images. BL version added. 08/2017 – Controller description change (FC to FCR version). 08/2018 – Minor changes. 10/2023 – Change of the logo, stylistic changes.

UC013 Room unit for controller FCR013



Summary

The UC013 room unit is a communicative human-machine interface for EC motors or VAV unit controller FCR013.

According to production type, each version of the unit may contain display, backlight and knob.

UC013 – basic version with display and knob
UC013BL – version with display, knob and backlight
UC013DK – version without knob and display

Application

- **EC motors or VAV systems – measurement and control of room temperature.**

Function

The unit reads room temperature, temperature correction / setpoint by a knob, and required operation mode which is set by a short push. Data is transmitted to the room controller. The main controller, FCR013, may send to the unit other data (heating / cooling mode, fan stage, day / night / standby mode etc.) which are displayed on the LCD display.

Connect the room unit to FCR013 over a 4 core cable, the most suitable types are JY(St)Y or LAM 2x2x0.8. Use the same type which powers the FCR013 controller as if the room unit power is taken from the FCR013 terminals, the cores in a terminal should be of the same cross-section.

If there is communication failure between UC013 and FCR013, there is a wrench and alarm bell icon at the UC013 display. Check signal polarity (terminals 3, 4), bus termination, and correct wiring at the FCR013 side (see FCR013 data sheet).

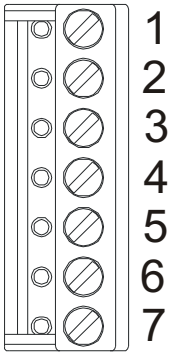
Technical data

Power supply	24 V AC ± 20 %
Consumption	1 W
Communication	RS485, Modbus RTU, selectable speed 1200 ... 115200 bps
SW	ModComTool

Temperature measuring range	-20 ÷ 70 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ÷ 90 rH (accuracy ±3 % rH)
Setpoint	as configured, ± 10 to ± 1 K
Display	LCD 60 × 60 mm
Terminals	screw terminals for wires 0.14 … 1.5 mm^2
Cover	ABS, RAL9010
Protection	IP20
Weight	0.13 kg
Dimensions	90 × 115 × 30 mm
Ambient temperature	External conditions: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5 Storage: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 Hazardous substances reduction EN 50581:2012

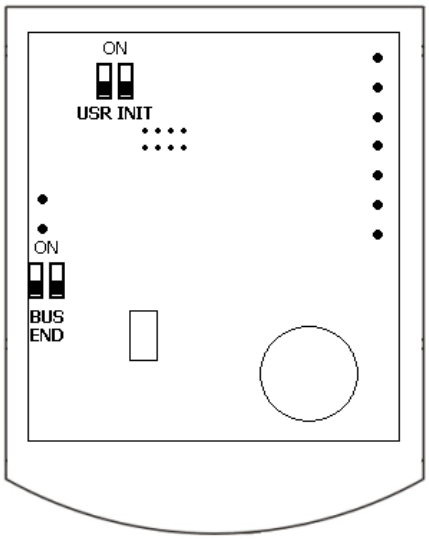
Version **UC013DK** without knob and display is available.
Version with display and without knob is also available, need to be specified in order.

Terminals



1: NC not connected
2: NC not connected
3: K- communication, RS485 –
4: K+ communication, RS485 +
5: GND technical earth (TE)
6: G0 power – common point
7: G power

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

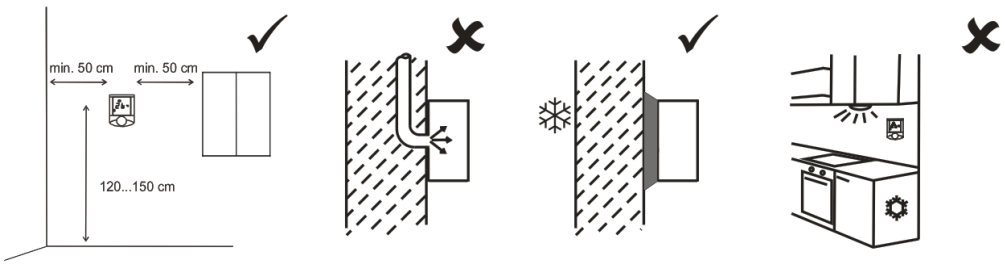
INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600.
To init, proceed as follows:

- connect the device over RS485 to a PC with ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

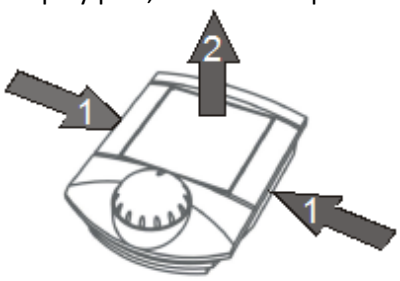


Cover opening

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Operation

The following settings are defaults. The engineer may set another way of fancoil control, disable some functions etc., so the text below is a description of the default functionality of the controller rather than the user operation manual.

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counterclockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComTool configuration tool.

Fancoil stage setting:

Push the knob shortly (<1 s). Every push changes the fancoil stage cyclically: Stage 1 – Stage 2 – Stage 3 – Off – Auto. When changing between the Comfort and Standby modes, the controller falls back into automatic fancoil stage control according to the control deviation.

Operation mode change:

The operation mode in the Hotel mode (used for fancoils in hotels and offices) is changed over bus communication or by activating digital inputs. The DI1 switches between the Comfort and Standby modes (e.g. card reader), while DI2 brings the controller into the Off mode (e.g. window contact). The time scheduler is used with Residential mode only.

Time schedule settings:

Switch to the time schedule settings mode with a long push (>1 s). The controller switches to settings mode (clock icon).

Turn the knob to select the weekday (1 to 7). Then short push to confirm the selection. Turn the knob to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push to confirm the event selection. Turn the knob to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push to confirm the operation mode setting. The event time displays. Turn the knob to set the time of the event and confirm by a short push. Then turn the knob to select another event or long push and turn the knob to select another weekday.

After all desired events have been edited, long push to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a superlong push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

- Controller time and day of week (Clock icon, Day of week)
- Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
- Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
- Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
- Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
- Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
- Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

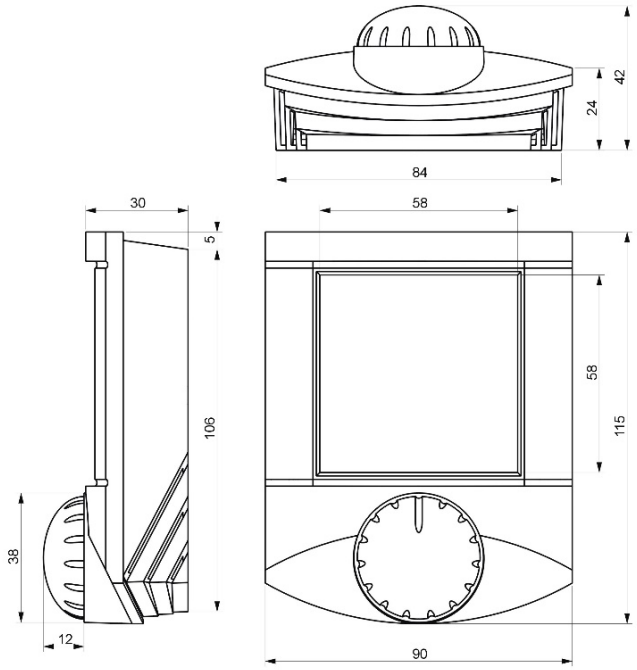
The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, ModComTool.

Display

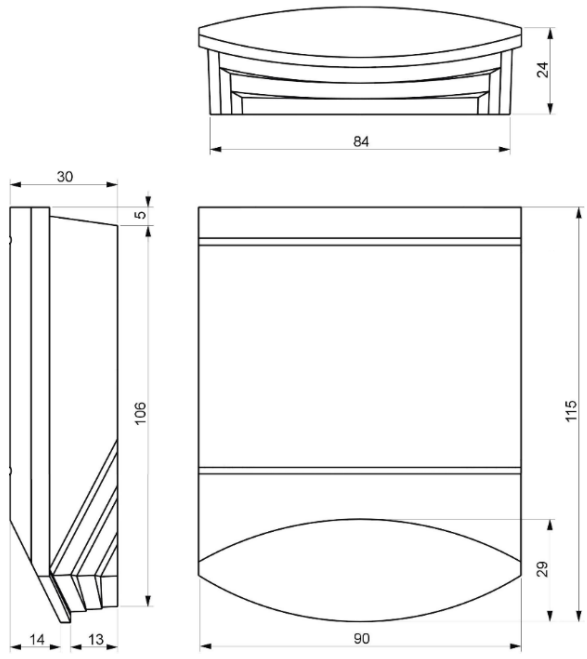
A large (60 × 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

LCD symbol set

Dimensions **UC013**



UC013DK



All dimensions in *mm.*

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.

Changes in versions	04/2015 – Added UC010/DK version. 08/2016 – Changed the format and reference to the configuration software. 03/2017 – Added picture and description of the installation and link on the datasheet with other colours. 07/2017 – Change of technical data, standards and images. BL version added. 08/2017 – Controller description change (FC to FCR version). 08/2018 – Minor changes. 10/2023 – Change of the logo, stylistic changes.

UC102 Communicative heating controller


Summary

UC102 is a communicative room heating controller with two inputs and one PWM output for control of a radiator or electrical heater. It can work autonomously, or in connection to a primary controller (markPLC or SoftPLC), building management system, or to UCWEB – the web interface.

Depending on production type, the unit may contain display, backlight and knob.

UC102 – basic version with display and knob
UC102BL – version with display, knob and backlight
UC102DK – version without knob and display

Application

- **Systems with radiators, electric heaters, or floor heating – control and measuring of room temperature**
- **Monitoring and communication of room temperatures**

Function

The controller reads actual room temperature, setpoint shift by a knob, and set operation status which is set by short push of the knob. The room temperature is measured in the range of 0 to +50 °C. Measured and set values are processed in a PI algorithm, at the output of which there is a PWM controlled triac. All values are displayed on a large LCD display.

The output works either as PWM controlled by a PI controller, or on/off (thermostat). The functionality and control parameters, i.e. P and I constants, and hysteresis, can be set with **ModComTool**, the configuration software, which is free to download at http://domat-int.com/en/downloads/software.

The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

The Change-over function (communicated over the bus) switches to the cooling mode while cooling setpoints come into effect. This mode is used when heat pumps with change-over mode are installed. The change-over signal is read from the heat pump interface or a thermostat at the supply water piping, and is transmitted to the

controllers over markPLC, UCWEB, or any Modbus master. See Room units and controllers, Communication protocol description handbook for register addressing and communication examples.

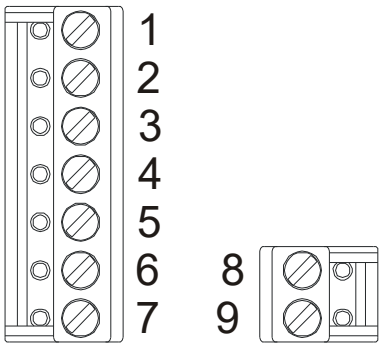
The change-over signal may be also set as inverse: then the controller acts as a cooling controller, and is switched to heating mode by the C/O signal sent over the bus.

The communication bus is Modbus RTU over RS485, therefore the controllers are easily to integrate into any SCADA or BMS system. Protocol description is available in a separate document.

Technical data

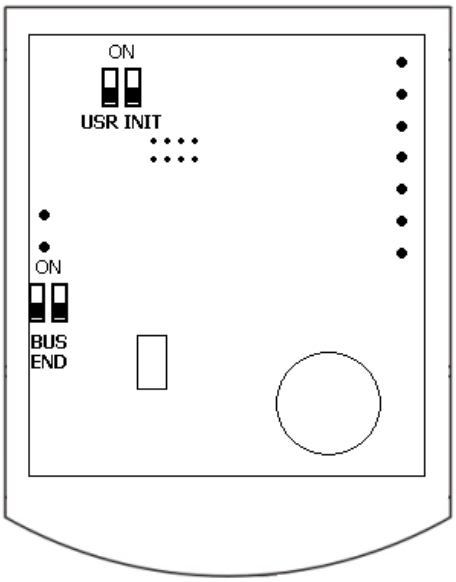
Power	24 V AC +/- 20%
Consumption	1 W
Galvanic isolation of the RS485 interface	1 kV
Communication	RS485, Modbus RTU, selectable speed 1200 ... 115200 bps
SW	ModComTool
Temperature measuring range	0 ÷ 50 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ÷ 90 rH (accuracy ±3 % rH)
Inputs	2× potential-free contacts, 24 V AC, 5mA
Outputs	1× solid state relay, zero switching, for AC load, 24 V AC, max. switching current 0,4A; recommended thermic actuators are Siemens STA71, Danfoss TWA (24V types) etc.
Display	LCD 60 × 60 mm
Terminals	screw terminals for 0.14 – 1.5 mm^2 wires
Cover	ABS, RAL9010
Protection	IP20
Dimensions	90 × 115 × 30 mm
Weight	0.13 kg
Ambient temperature	External conditions: -5 – 45 °C; 5 – 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5 Storage: -5 – 45 °C; 5 – 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Corr.1:2012 + Z1:2016 Hazardous substances reduction EN 50581:2012

Terminals



1: DI1 presence input (dry contact against G0)
2: DI2 window contact input (dry contact against G0)
3: DO1 heating valve output (against G0)
4: NC not connected
5: G0 power, output – reference point
6: G0 power, output – reference point
7: G power
8: K- communication RS485-
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

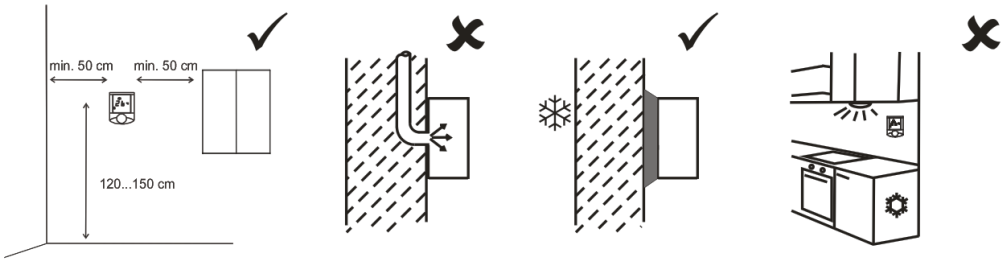
INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600.
To init, proceed as follows:

- connect the device over RS485 to a PC with ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

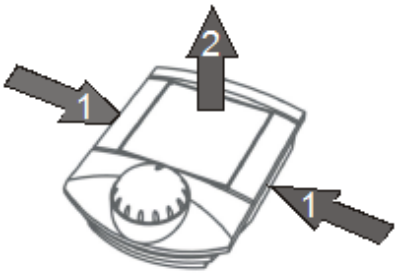


Cover opening

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Operation

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counterclockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComTool configuration tool.

Operation mode change:

Push the knob shortly (<1 s). Each push changes the operation mode to Party – Day – Night – Off – Auto.

In the Auto mode, the Day / Night / Off modes change according to time schedule).

The Party mode overrides to Comfort for 120 minutes, then follows the actual time schedule.

The weekly time schedule switches between Day, Night, and Off modes according to the event list. There may be up to 6 events per day.

Time schedule settings:

Switch to the time schedule settings mode with a long push (> 1 s). The controller switches to settings mode (clock icon).

Turn the knob to select the weekday (1 to 7). Then short push to confirm the selection. Turn the knob to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push to confirm the event selection. Turn the knob to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push to confirm the operation mode setting. The event time displays. Turn the knob to set the time of the event and confirm by a short push. Then turn the knob to select another event or long push and turn the knob to select another weekday.

After all desired events have been edited, long push to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a superlong push (> 2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

- Controller time and day of week (Clock icon, Day of week)
- Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
- Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
- Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
- Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
- Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
- Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, ModComTool.

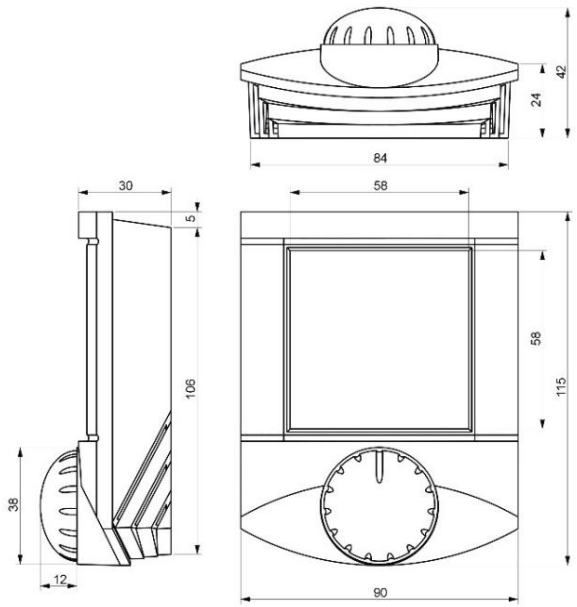
Display

A large (60 × 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

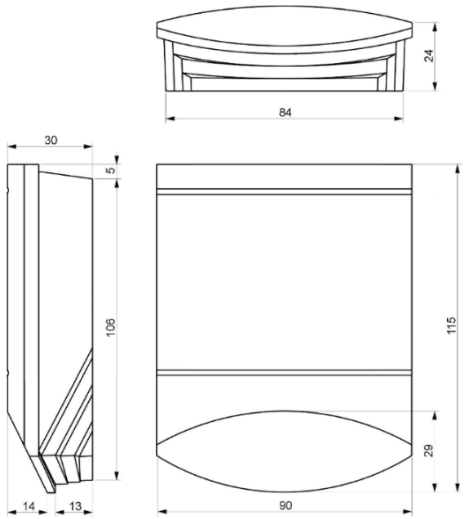
LCD symbol set

Dimensions

UC102

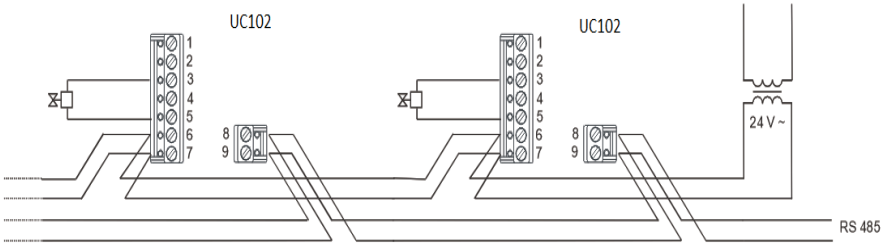


UC102DK



All dimensions are in *mm.*

Connection



Connection of power, communication, and valve. Suitable cable types are LAM DATAPAR 2×0.8 (cross-section in mm^2), JYTY 2x1 (diameter in mm) etc. If communication and power are in the same cable, use 4-core LAM DATAPAR 2×2×0.8, JYTY 4×1. Up to 100-120 meters, parallel lines of 24 V and data bus are no problem. Regarding to EMC it is better if the pairs are twisted, such as with the LAM DATAPAR or Belden 8205 cable.

A terminal is designed for maximum 3 wires of 0.8 mm^2. With cable types as above, maximum (starting) power of the controller and valve of ca. 7 VA and acceptable voltage drop of max. 15 %, the maximum cable length for 10 controllers is about 50 m.

If the controllers and valves are at higher distance than 50 m from the transformer or more valves are connected to the transformer (max. 2 valves per controller), it is more suitable to supply the controllers locally. The RS485 bus is galvanically separated and connects all controllers, regardless of the way they are powered.

Temperature compensation

After switching the unit on, allow about 90 mins to dissipate the heat inside of the housing. Then the sensor is measuring correctly. Do not change the sensor correction variable immediately after powering the device on.

RoHS notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions

04/2015 — Added UC102/DK version.
08/2016 — Changed reference to the configuration software.
03/2017 — Added picture and description of the installation and link on the datasheet with other colours.
01/2018 — Added UC102BL and UC102DK version, changed technical data, changed images, added Safety note.
10/2023 — Change of the logo

UC120

Communicative heating controller 0…10 V output

Summary

UC120 is a communicative room heating controller with two binary inputs and one 0...10 V DC output for control of a radiator or electrical heater. It can work autonomously, or in connection to a primary controller (MiniPLC or SoftPLC) or building management system (RcWare Vision or any SCADA).

UC120 – basic version with display and knob.
UC120/DK – version without display and knob.

UC120 controller can be supplied with fw supporting split AO, if you want this variant, please contact sales@domat.cz

Application

- **Systems with radiators, electric heaters, or floor heating – control and measuring of room temperature**
- **monitoring and communication of room temperatures**

Function

The controller reads actual room temperature, setpoint shift by a knob, and set operation status which is set by short push of the knob. The room temperature is measured in the range of -20…50 °C. Measured and set values are processed in a PI algorithm, brought to one 0...10 V DC output. All values are displayed on a large LCD display.

The functionality and control parameters, i.e. P and I constants, and hysteresis, can be set with **ModComTool**, the configuration software, which is free to download at http://domat-int.com/en/downloads/software.

The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

Analogue output AO1 can be split (AO range split, reg. 26 bit 3) for heating and cooling for controlling of 6-way valves (0...10 V). Range of analog outputs are splitted in two parts. One for heating and another for cooling. Limits for both parts of divided range can be set, default values are 0.5...4.5 V = 100…0 % for heating and 5.5...9.5 V = 0…100 % for cooling). If no heating nor cooling is active, the output is in the dead band

between heat 0 and cool 0. Value of the output then is 5 V. This function is by default setting turned-on in UC120 with fw10101 and turned-off in UC120 with fw10102. Other fw versions do not support this function.

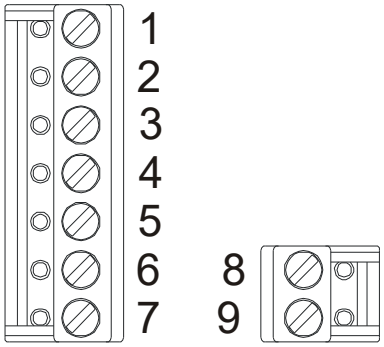
The Change-over function (communicated over the bus) switches to the cooling mode while cooling setpoints come into effect. This mode is used when heat pumps with change-over mode are installed. The change-over signal is read from the heat pump interface or a thermostat at the supply water piping, and is transmitted to the controllers over MiniPLC, UCWEB, or any Modbus master. See *Room units and controllers, Communication protocol description* handbook for register addressing and communication examples.

The communication bus is Modbus RTU over RS485, therefore the controllers are easily to integrate into any SCADA or BMS system. Protocol description is available in a separate document.

Technical data

Power	16...35 V DC (typical 24 V DC)
Consumption	1400 mVA
Measuring range	-20…70 °C
Protection	IP20
Sensor accuracy	±1.5 K (with software correction)
Inputs	for dry contact
Input current	2.4 mA
Input voltage	24 V DC, derived from the power voltage
Output	1x 0...10 V DC
Maximum output current	10 mA (corresponding to 1 kOhm load)
Short-circuit current	50 mA, tolerant to permanent short-circuit
Resolution	10 bit D/A converter
Setpoint correction	according to configuration, ±10 to ±1 K
Communication	2 wire RS485 - Modbus RTU slave
RS485 separation	optically separated up to 1000 V
Baud rate	selectable, 1200...115200 bps
Display	LCD 60 × 60 mm
Terminals	screw terminals for 0.14…1.5 mm^2 wires
Cover	ABS, RAL9010
Weight	0.13 kg
Dimensions	see below

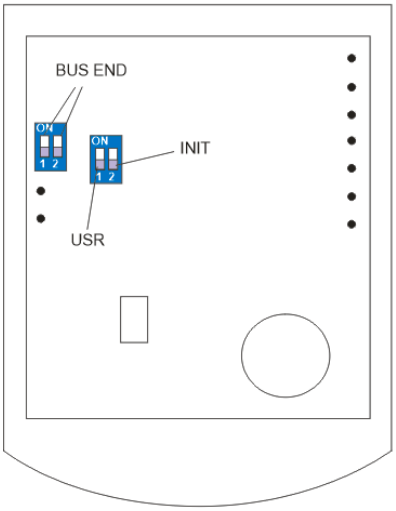
Terminals



1: DI1 presence input (active when connected to G0)
2: DI2 window contact input (active when connected to G0)
3: AO1 0...10 V heating output
4: G0 power -, output – reference point
5: NC not connected
6: G0 power -, output – reference point
7: G power +

8: K- communication RS485 -
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

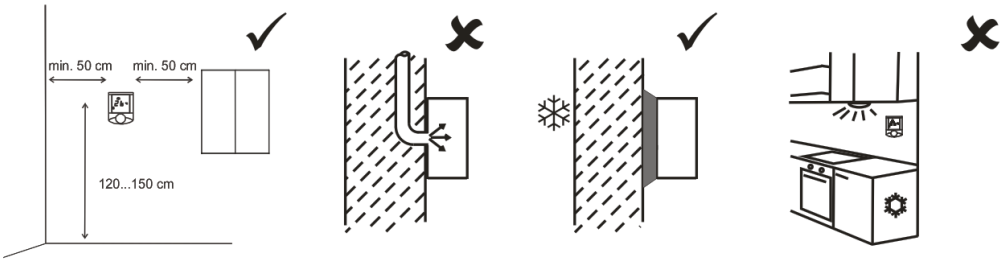
INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600.

To init, proceed as follows:
- connect the device over RS485 to a PC with ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.



Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.

Operation

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counterclockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComTool configuration tool.

Operation mode change:

Push the knob shortly (<1 s). Each push changes the operation mode to Party – Day – Night – Off – Auto.

In the Auto mode, the Day / Night / Off modes change according to time schedule).

The Party mode overrides to Comfort for 120 minutes, then follows the actual time schedule.

The weekly time schedule switches between Day, Night, and Off modes according to the event list. There may be up to 6 events per day.

Time schedule settings:

Switch to the time schedule settings mode with a long push (>1 s). The controller switches to settings mode (clock icon).

Turn the knob to select the weekday (1 to 7). Then short push to confirm the selection. Turn the knob to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push to confirm the event selection. Turn the knob to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push to confirm the operation mode setting. The event time displays. Turn the knob to set the time of the event and confirm by a short push. Then turn the knob to select another event or long push and turn the knob to select another weekday.

After all desired events have been edited, long push to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a superlong push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

- Controller time and day of week (Clock icon, Day of week)
- Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
- Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
- Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
- Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
- Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
- Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

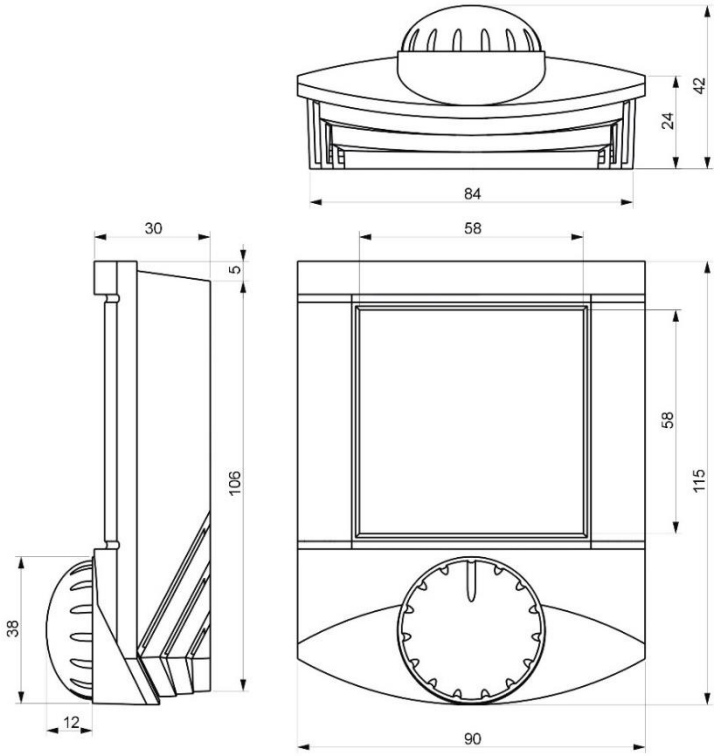
Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

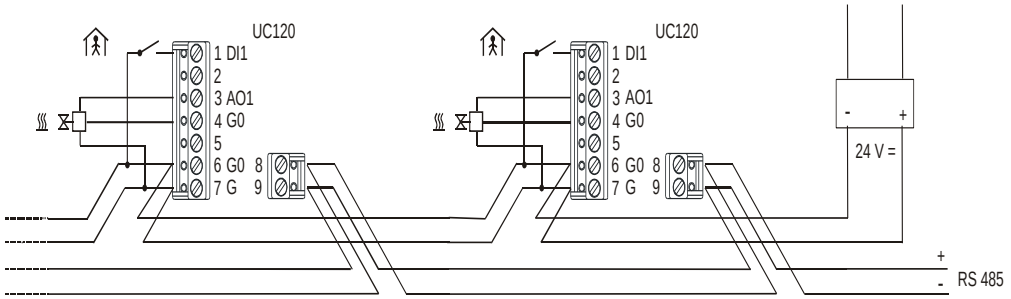
The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, ModComTool.

Dimensions



All dimensions in *mm*.

Connection



Connection of power, communication, and valve. Suitable cable types are LAM DATAPAR 2x0.8 (cross-section in mm^2), JYTY 2x1 (diameter in mm) etc. If communication and power are in the same cable, use 4-core LAM DATAPAR 2x2x0.8, JYTY 4x1. Up to 100-120 meters, parallel lines of 24 V and data bus are no problem. Regarding to EMC it is better if the pairs are twisted, such as with the LAM DATAPAR or Belden 8205 cable.

A terminal is designed for maximum 3 wires of 0.8 mm^2.

Temperature compensation

After switching the unit on, allow about 90 mins to dissipate the heat inside of the housing. Then the sensor is measuring correctly. Do not change the sensor correction variable immediately after powering the device on!

WEEE notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions

08/2016 – Changed reference to the configuration software.
Added picture and description of the installation and link on the datasheet with other colours.
03/2017 – Added picture and description of the installation and link on the datasheet with other colours.
08/2021 – Added description support of AO split function, added *safety note*, logo changed.
01/2022 – Added description of AO split function settings from fw10102.
10/2023 – Modified description of split AO availability.

UC200

Communicative heating and cooling controller



Summary

UC200 is a communicative room heating controller with two inputs and two PWM outputs for control of a radiator or electrical heater and a cooling valve (cooling panels, chilled ceilings). It can work autonomously, or in connection to a primary controller (markPLC or SoftPLC), building management system, or to UCWEB – the web interface.

According to production type, each version of the unit may contain display, backlight and knob.

UC200 – basic version with display and knob
UC200BL – version with display, knob and backlight
UC200DK – version without knob and display

Application

- **Systems with radiators, electric heaters, or floor heating, and chilled ceilings or panels – control and measuring of room temperature**
- **monitoring and communication of room temperatures**

Function

The controller reads actual room temperature, setpoint shift by a knob, and set operation status which is set by short push of the knob. The room temperature is measured in the range of 0 to +50 °C. Measured and set values are processed in a PI algorithm, at the output of which there are two PWM controlled triacs. All values are displayed on a large LCD display.

The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

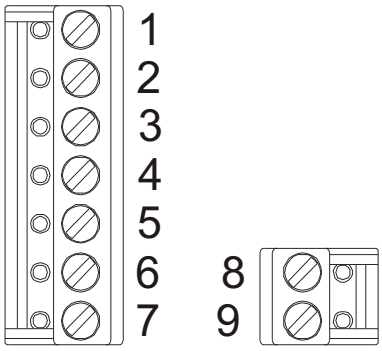
The digital inputs read signals from a window contact and presence sensors. They can be used optionally.

The communication bus is Modbus RTU over RS485, therefore the controllers are easily to integrate into any SCADA or BMS system. Protocol description is available in a separate document.

Technical data

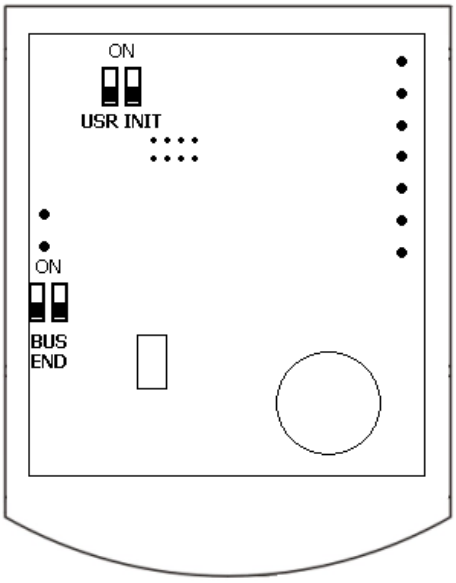
Power	24 V AC ± 20 %
Consumption	1 W
Galvanic isolation	1 kV
Communication	RS485, Modbus RTU, selectable speed 1200 ... 115200 bps
SW	ModComTool
Temperature measuring range	0 ÷ 70 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ÷ 90 rH (accuracy ±3 % rH)
Inputs	2× potential-free contacts, 24VAC, 5mA
Outputs	2× solid state relay, zero switching, for AC load, 24 V AC, max. switching current 0,4 A; recommended thermic actuators are Siemens STA71, Danfoss TWA (24V types) etc.
Display	LCD 60 × 60 mm
Terminals	screw terminals for 0.14 … 1.5 mm^2 wires
Cover	ABS, RAL9010
Protection	IP20
Dimensions	90 × 115 × 30 mm
Weight	0.13 kg
Ambient temperature	External conditions: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5 Storage: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 Hazardous substances reduction EN 50581:2012

Terminals



1: DI1 presence input (dry contact, against G0)
2: DI2 window contact input (dry contact, against G0)
3: DO1 heating valve output (against G0)
4: DO2 cooling valve output (against G0)
5: G0 power, output – reference point
6: G0 power, output – reference point
7: G power
8: K- communication RS485 -
9: K+ communication RS485

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

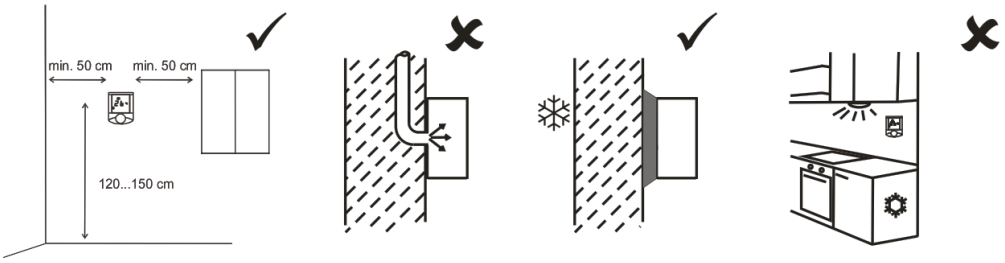
INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600.

To init, proceed as follows:
- connect the device over RS485 to a PC with ModComToolconfig tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTooltool, open the controller window
- click the Init button in the tool
- remove and apply power.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

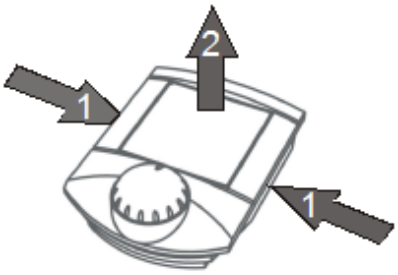


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Operation

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counterclockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComToolconfiguration tool.

Operation mode change:

Push the knob shortly (< 1 s). Each push changes the operation mode to Party – Day – Night – Off – Auto.

In the Auto mode, the Day / Night / Off modes change according to time schedule).

The Party mode overrides to Comfort for 120 minutes, then follows the actual time schedule.

The weekly time schedule switches between Day, Night, and Off modes according to the event list. There may be up to 6 events per day.

Time schedule settings:

Switch to the time schedule settings mode with a long push (> 1 s). The controller switches to settings mode (clock icon).

Turn the knob to select the weekday (1 to 7). Then short push to confirm the selection. Turn the knob to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push to confirm the event selection. Turn the knob to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push to confirm the operation mode setting. The event time displays. Turn the knob to set the time of the event and confirm by a short push. Then turn the knob to select another event or long push and turn the knob to select another weekday.

After all desired events have been edited, long push to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a superlong push (> 2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

- Controller time and day of week (Clock icon, Day of week)
- Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
- Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
- Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
- Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
- Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
- Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

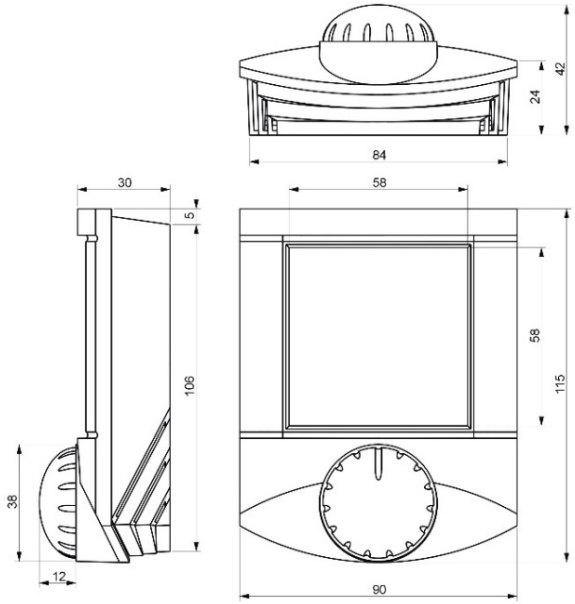
The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, ModComTool.

Display

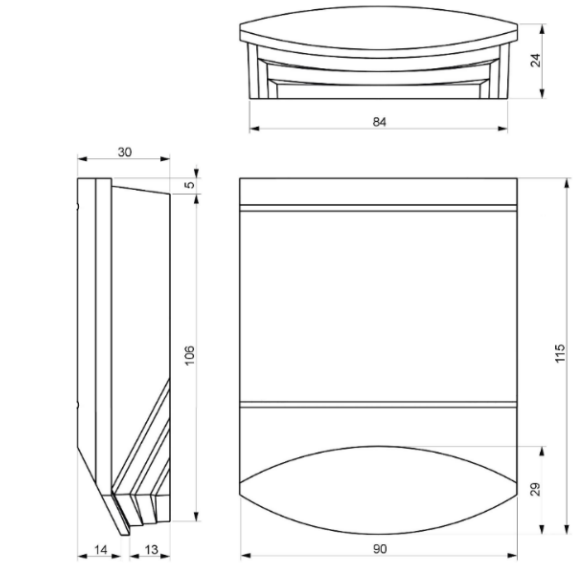
A large (60 × 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

LCD symbol set

Dimensions **UC200**

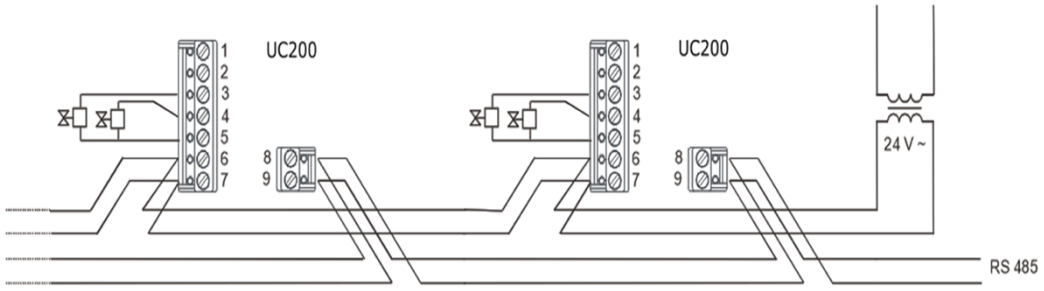


UC200DK



All dimensions in *mm.*

Connection



Connection of power, communication, and valve. Suitable cable types are LAM DATAPAR 2×0.8 (cross-section in mm^2), JYTY 2×1 (diameter in mm) etc. If communication and power are in the same cable, use 4-core LAM DATAPAR 2×2×0.8, JYTY 4×1. Up to 100-120 meters,

parallel lines of 24 V and data bus are no problem. Regarding to EMC it is better if the pairs are twisted, such as with the LAM DATAPAR or Belden 8205 cable.

A terminal is designed for maximum 3 wires of 0.8 mm^2. With cable types as above, maximum (starting) power of the controller and valve of ca. 7 VA and acceptable voltage drop of max. 15 %, the maximum cable length for 10 controllers is about 50 m.

If the controllers and valves are at higher distance than 50 m from the transformer or more valves are connected to the transformer (max. 2 valves per controller), it is more suitable to supply the controllers locally. The RS485 bus is galvanically separated and connects all controllers, regardless of the way they are powered.

Temperature compensation

After switching the unit on, allow about 90 mins to dissipate the heat inside of the housing. Then the sensor is measuring correctly. Do not change the sensor correction variable immediately after powering the device on.

WEEE notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in version	08/2016 — Changed the format and reference to the configuration software. 03/2017 — Added picture and description of the installation and link on the datasheet with other colours. 01/2018 — Added UC200BL and UC200DK version, changed technical data, changed images, added Safety note. 10/2023 — Change of the logo, stylistic changes.

UC220

Communicative heating and cooling controller, 0...10 V output

Summary **UC220 is a communicative room heating controller with two binary inputs and two 0...10 V DC outputs for control of a radiator or electrical heater and a cooling valve (cooling panels, chilled ceilings). It can work autonomously, or in connection to a primary controller (MiniPLC or SoftPLC), or building management system (RcWare Vision or any SCADA).**

Application

- **Systems with radiators, electric heaters, or floor heating, and chilled ceilings or panels – control and measuring of room temperature**
- **monitoring and communication of room temperatures**

Function

The controller reads actual room temperature, setpoint shift by a knob, and set operation status which is set by short push of the knob. The room temperature is measured in the range of -20 to +70 °C. Measured and set values are processed in a PI algorithm, which is brought to sequence block and two 0..10 V DC outputs. All values are displayed on a large LCD display.

The functionality and control parameters, i.e. P and I constants, and hysteresis, can be set with **ModComTool**, the configuration software, which is free to download at http://domat-int.com/en/downloads/software.

The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

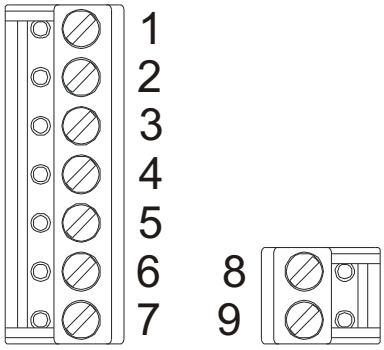
The digital inputs read signals from a window contact and presence sensors. They can be used optionally.

The communication bus is Modbus RTU over RS485, therefore the controllers are easily to integrate into any SCADA or BMS system. Protocol description is available in a separate document.

Technical data

Power	16...35 V DC (typical 24 V DC)
Consumption	1400 mVA
Measuring range	-20 ÷ 70 °C
Protection	IP20
Sensor accuracy	± 1.5 K (with software correction)
Inputs	for dry contact
Input current	2.4 mA
Input voltage	24 V DC, derived from the power voltage
Outputs	2× 0...10 V DC
Maximum output current	10 mA (corresponding to 1 kOhm load)
Short-circuit current	50 mA, tolerant to permanent short-circuit
Resolution	10 bit D/A converter
Setpoint correction	according to configuration, ± 10 to ± 1 K
Communication	2 wire RS485 - Modbus RTU slave
RS485 separation	optically separated up to 1000 V
Baud rate	selectable, 1200...9600...115200 bps
Display	LCD 60 × 60 mm
Terminals	screw terminals for 0.14 … 1.5 mm^2 wires
Cover	ABS, RAL9010
Weight	0.13 kg
Dimensions	90 × 115 × 30 mm

Terminals

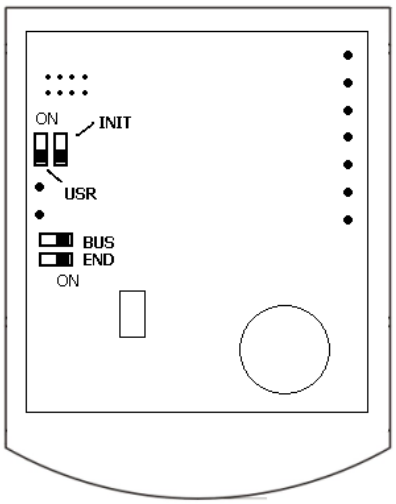


Terminals as seen from above in the bottom part:

1: DI1 presence input (active by connecting to G0)
2: DI2 window contact input (active by connecting to G0)
3: AO1 0...10 V heating output
4: G0 power -, output – reference point
5: AO2 0...10 V cooling output
6: G0 power -, output – reference point
7: G power +

8: K- communication RS485 -
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

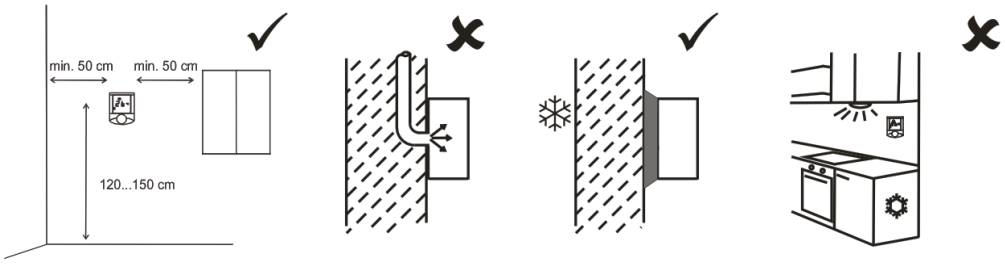
USR: not used, reserved for future applications

INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600. To init, proceed as follows:
- connect the device over RS485 to a PC with **ModComTool** config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the **ModComTool** tool, open the controller window
- click the Init button in the tool
- remove and apply power.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

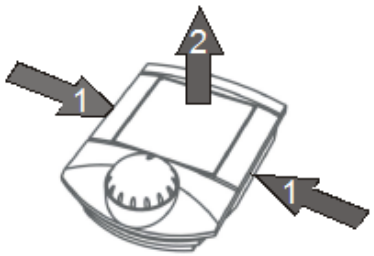


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



User settings

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counter clockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComTool configuration tool.

Operation mode change:

Push the knob shortly (<1 s). Each push changes the operation mode to Party – Day – Night – Off – Auto.

In the Auto mode, the Day / Night / Off modes change according to time schedule).

The Party mode overrides to Comfort for 120 minutes, then follows the actual time schedule.

The weekly time schedule switches between Day, Night, and Off modes according to the event list. There may be up to 6 events per day.

Time schedule settings:

Switch to the time schedule settings mode with a long push (>1 s). The controller switches to settings mode (clock icon).

Turn the knob to select the weekday (1 to 7). Then short push to confirm the selection. Turn the knob to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push to confirm the event selection. Turn the knob to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push to confirm the operation mode setting. The event time displays. Turn the knob to set the time of the event and confirm by a short push. Then turn the knob to select another event or long push and turn the knob to select another weekday.

After all desired events have been edited, long push to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a super long push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:
Controller time and day of week (Clock icon, Day of week)
Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

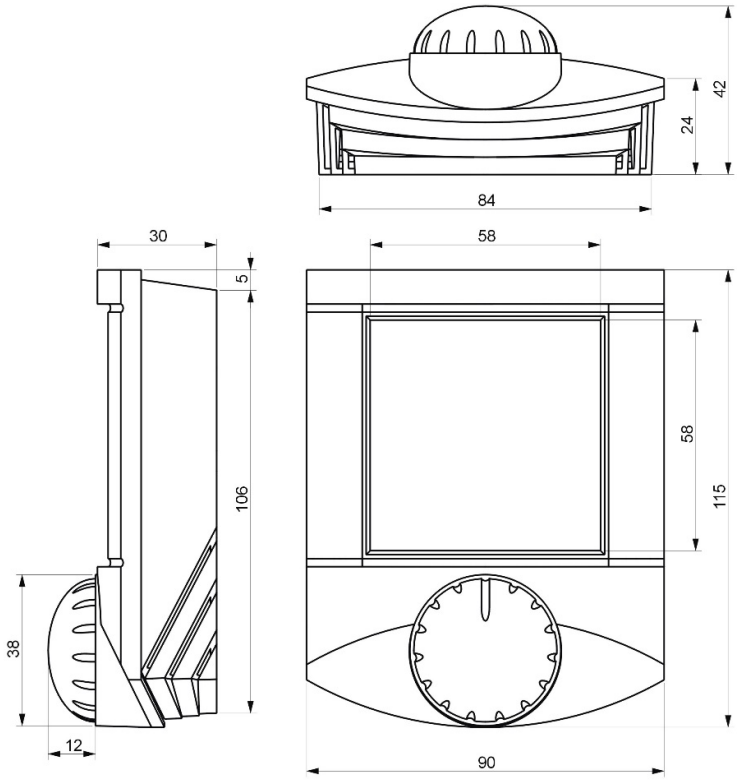
Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 secs, the controller goes to the basic display mode.

Default values:

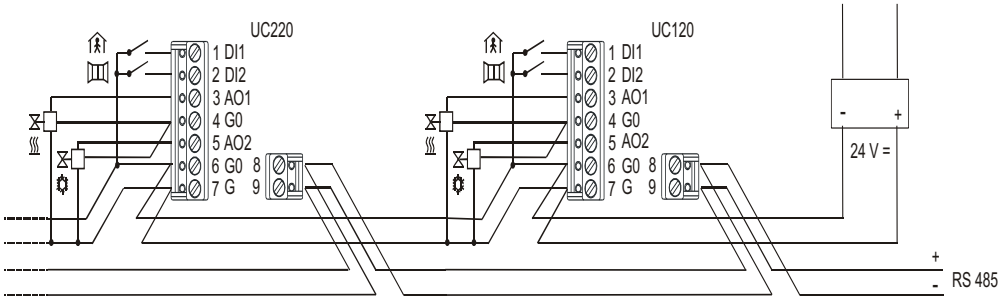
The default values as well as all other settings (PI parameters, address, baud rate...) can be set by the configuration program, ModComTool.

Dimensions



All dimensions in *mm.*

Connection



Connection of power and communication. Suitable cable types are LAM DATAPAR 2x0.8 (cross-section in mm^2), JYTY 2x1 (diameter in mm) etc. If communication and power are in the same cable, use 4-core LAM DATAPAR 2x2x0.8, JYTY 4x1. Up to 100-120 meters, parallel lines of 24 V and data bus are no problem. Regarding to EMC it is better if the pairs are twisted, such as with the LAM DATAPAR or Belden 8205 cable.

A terminal is designed for maximum 3 wires of 0.8 mm^2.

Temperature compensation

After switching the unit on, allow about 90 mins to dissipate the heat inside of the housing. Then the sensor is measuring correctly. Do not change the sensor correction variable immediately after powering the device on.

WEEE notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions	09/2016 — Changed reference to the configuration software and deleted Related products. 03/2017 — Added picture and description of the installation and link on the datasheet with other colours. 10/2023 — Added *Safety note*, change of the logo, stylistic changes.

UC300 Communicative floor heating controller


Summary

UC300 is a communicative floor heating controller with one PWM output for control of a thermic actuator, or electric floor heater. It can work autonomously, or in connection to a primary controller or building management system.

Different versions of unit may contain display, backlight and knob:

UC300 – basic version with display and knob
UC300BL – version with knob and display with backlight
UC300/DK – version without knob and display

Applications

- **Systems with water or electrical floor heating – control and measuring of room temperature.**
- **Monitoring and communication of room temperatures and relative humidity.**

Function

The controller reads actual room temperature, floor temperature with an external Pt1000 sensor, setpoint shift by a knob, and set operation status which is set by short push of the knob. Measured and set values are processed in a PI algorithm, at the output of which there is a PWM controlled triac. All values are displayed on a large LCD display.

Temperature regulation controller may be set in three modes (reg. 29):

- floor heating controller (regulation is based on internal temperature sensor, external sensor is used as floor temp limitation, incl. protection against external sensor fail, if its value is same as maximum range of the ext. sensor -> value is ignored)
- controller with external sensor (regulation is based on external temperature sensor only, internal sensor is not used)
- average from of sensors (e.g. for larger rooms; incl. protection against external sensor fail, if its value is same as maximum range of the ext. sensor -> value is ignored)

The floor sensor located in the floor body or at supply water limits the temperature of the floor and prevents overheating. Maximum floor or water temperature (measured

by the floor sensor) is set in the configuration program or in the controller menu. In case the sensor is not connected (missing or broken), the limitation is not active and the controller uses room setpoint and actual value only.

The output works either as PWM controlled by a PI controller, or on/off (thermostat). The functionality and control parameters, i.e. P and I constants, and hysteresis, can be set with **ModComTool**, the configuration software, which is free to download at our website.

The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

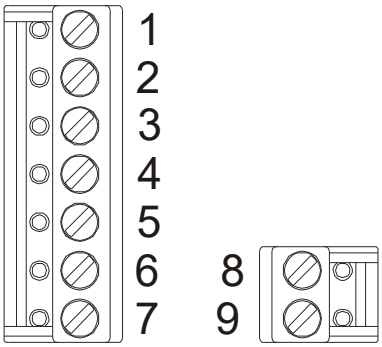
The communication bus is Modbus RTU over RS485, therefore the controllers are easily to integrate into any SCADA or BMS system. Protocol description is available in a separate document.

Technical data

Power	24 V AC/DC ±20 %, 1.5 W
Temperature measuring range internal sensor	-20 ... 55 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ... 90 % rH (accuracy ±3 %)
Temperature measuring range external sensor	-20 ... 55 °C (accuracy ±1 ˚C)
Protection	IP20
Inputs	1x digital input for presence or window contact, max. switching frequency 10Hz 1x analogue input for external temperature sensor Pt1000, 16 bit, linearized, non-isolated
Outputs	1x solid state relay 24 V AC, optical isolation 1 kV, EN 60947-4-1 ed. 3, AC1 (general usage, non-inductive load), 0.400 mA AC, AC3 (motor), 0.050 A AC, cos fi > 0.45, AC1 (ballast), max. 0.125 A AC, cos fi > 0.45
Setpoint	according to configuration, ±10 to ±1 K
Communication	RS485 - Modbus RTU, slave selectable speed 1200 ... 115200 bps, parity and bits are set in service SW, default 9600/N/8/1 The interface is optically separated 1 kV.
Display	LCD 60 × 60 mm
Terminals	recommended wire cross-section 0.35 – 1.5 mm^2
Cover	ABS, RAL9010
Weight	0.13 kg
Dimensions	90 × 115 × 30 mm, see below
Ambient conditions	According to EN IEC 60721-3-3 ed. 2, climatic class 3K22 (+5 to +40 °C, 5 to 85% non-condensing relative humidity).

Storage conditions	According to EN IEC 60721-3-1 ed. 2:2018, climatic class 1K21 (+5 to +40 ° C, 5 to 85% non-condensing relative humidity).
Standards conformity	EMC EN IEC 61000-6-2 ed. 4:2019, EN IEC 61000-6-4 ed. 3:2019 (industrial environment) Electrical safety EN IEC 62368-1 ed. 2:2020+A11:2020 Restriction of hazardous substances EN IEC 63000:2019

Terminals

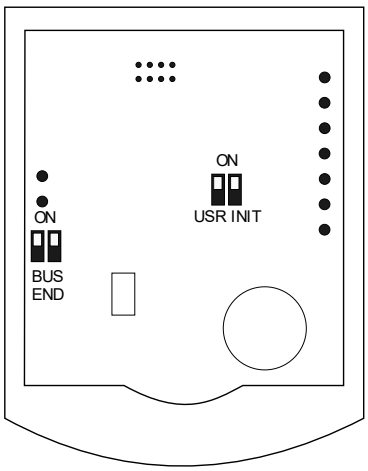


Terminals as seen from above in the bottom part:

1: AIN external temperature sensor Pt1000
2: AGND external temperature sensor Pt1000
3: DI1 input (presence/window) activated by connection to G0
4: DO1 output for heating valve
5: G0 power, outputs – common point
6: G0 power, outputs – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

DIP Switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600. To init, proceed as follows:
- connect the device over RS485 to a PC with the ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

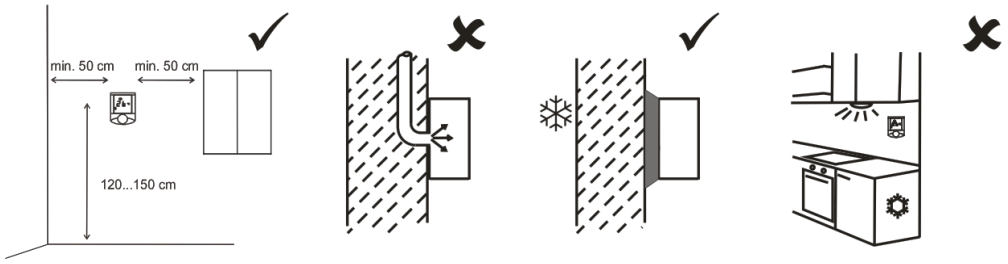
Type table

Type	LCD	Backlight	Knob	DI	DO	AI	t	rH
UC300	✓		✓	**1**	**1**	**1**	✓	✓
UC300BL	✓	✓	✓	**1**	**1**	**1**	✓	✓
UC300DK				**1**	**1**	**1**	✓	✓

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

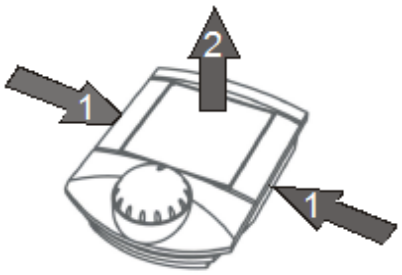


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Tracing regulation

If the controller is configured as a *floor controller* (see above, i.e. with the external sensor measuring floor inlet water temperature), the floor water temperature is limited by three conditions:

- PI controller output = 0 (for the P or on/off controller it means that the current setpoint was reached at the room sensor)
- maximum absolute water temperature (reg. 31 in the Modbus table) reached at the external sensor
- max. tracing temperature reached at the external sensor, where the maximum tracing temperature is calculated as a sum of the current room setpoint and value entered in Modbus register 32 (default value 3 K). This limitation shall prevent from high temperature difference between room and floor temperature.

The valve closes as soon as at least one of the conditions above is met. Note if the output is inactive in the *floor* controller mode even when the room setpoint is not reached, setting of both above mentioned parameters should be checked.

User settings

Temperature correction:

Turn the knob clockwise to increase setpoint, turn it counter clockwise to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComTool configuration tool.

Operation mode change:

Push the knob shortly (<1 s). Each push changes the operation mode to Party – Day – Night – Off – Auto.

In the Auto mode, the Day / Night / Off modes change according to time schedule).
The Party mode overrides to Comfort for 120 minutes, then follows the actual time schedule.

The weekly time schedule switches between Day, Night, and Off modes according to the event list. There may be up to 6 events per day.

Time schedule settings:

Switch to the time schedule settings mode with a long push (>1 s). The controller switches to settings mode (clock icon).

Turn the knob to select the weekday (1 to 7). Then short push to confirm the selection. Turn the knob to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push to confirm the event selection. Turn the knob to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push to confirm the operation mode setting. The event time displays. Turn the knob to set the time of the event and confirm by a short push. Then turn the knob to select another event or long push and turn the knob to select another weekday.

After all desired events have been edited, long push to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a super long push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Turning the knob selects between following settings:

- Controller time and day of week (Clock icon, Day of week)
- Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
- Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
- Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
- Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
- Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
- Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

Select the requested value by a short push. Turn knob to change value. Confirm by a short push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

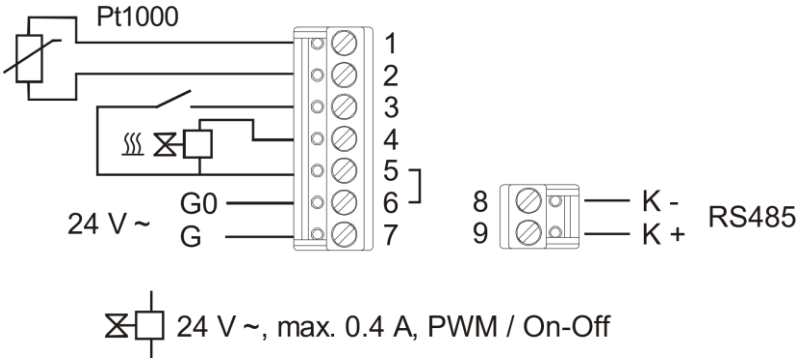
Default values as well as all other settings (PI parameters, address, baud rate...) can be set by the configuration program, ModComTool, and a USB/RS485 or RS232/RS485 converter – see Related products.

Display

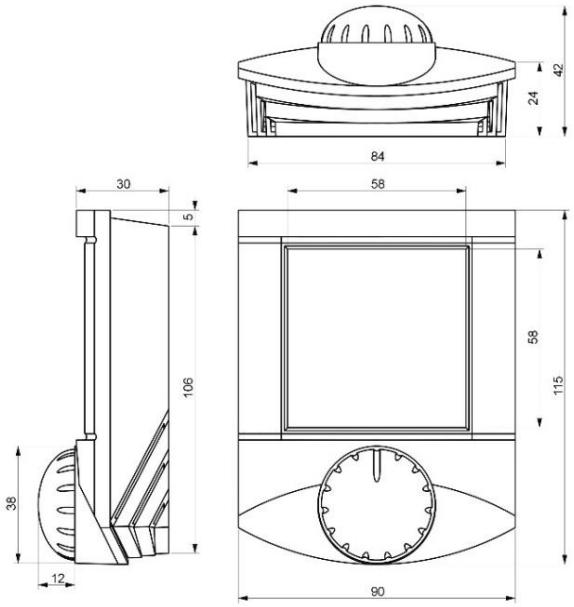
A large (60 x 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.
Room unit configuration – Designer's handbook

LCD symbol set

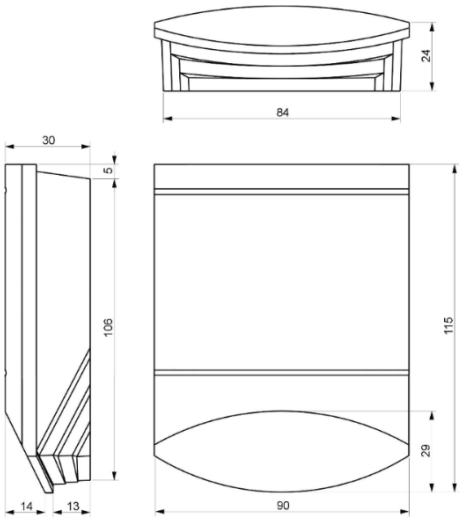
Connection



Dimensions **UC300, UC300BL**



UC300/DK



All dimensions in *mm*.

WEEE notice The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions	05/2021 – First datasheet version.

UC905 Room unit for controller FCR015



Summary

The UC905 room unit is a communicative human-machine interface for VAV unit controller FCR015.

According to production type, each version of the unit may contain display, backlight and knob.

UC0905 – basic version with display and knob
UC905BL – version with display, knob and backlight
UC905DK – version without knob and display

The UC905 is a successor of UC095 room unit and can be used with controllers FC015 and FCR015. Beware of unit terminals connection. It differs from its predecessor.

Application

- **VAV systems – measurement and control of room temperature and CO_2 concentration.**

Function

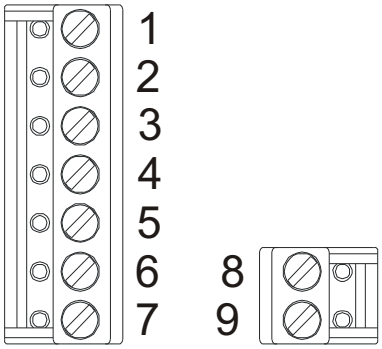
The unit reads room temperature, humidity and CO_2 concentration in the room air, temperature correction / setpoint by a knob, and required operation mode which is set by a short push or in the menu. Data is transmitted to the room controller. The main controller, FCR015, may send to the unit other data (heating / cooling mode, fan stage, day / night / standby mode etc.) which are displayed on the LCD display.

Connect the room unit to FCR015 over a 4-core cable, the most suitable types are JY(St)Y or LAM 2x2x0.8. Use the same type which powers the FCR015 controller as if the room unit power is taken from the FCR015 terminals, the cores in a terminal should be of the same cross-section.
If there is communication failure between UC905 and FCR015, there is a wrench and alarm bell icon at the UC905 display. Check signal polarity (terminals 8, 9), bus termination, and correct wiring at the FCR015 side (see FCR015 data sheet).

Technical data

Power supply	24 V AC ± 20 %
Consumption	3 W
Galvanic isolation	1 kV
Communication	RS485, Modbus RTU, selectable speed 1200 ... 115200 bps
SW	ModComTool
Temperature measuring range	-20 ÷ 70 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ÷ 90 rH (accuracy ±3 % rH)
CO_2 concentration measuring range	NDIR technology, range 0…5000 ppm, measuring accuracy (operating conditions 0…45 °C, relative non-condensing humidity 0 to 85%) ± 50 ppm ± 3% of measured value, CO2 reaction time (90%) 90 s
Setpoint	as configured, ± 10 to ± 1 K
Display	LCD 60 × 60 mm
Terminals	screw terminals for wires 0.14 … 1.5 mm^2
Cover	ABS, RAL9010
Protection	IP20
Dimensions	90 × 115 × 30 mm
Ambient temperature	External conditions: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5 Storage: -5 … 45 °C; 5 … 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 Hazardous substances reduction EN 50581:2012

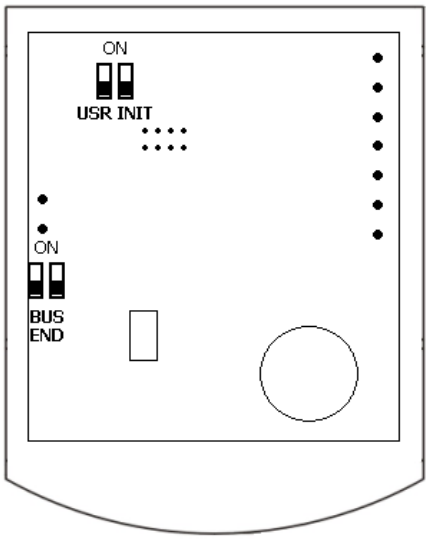
Terminals



1: NC not connected
2: NC not connected
3: NC not connected
4: NC not connected
5: GND technical earth (TE)
6: G0 power – common point
7: G power

8: K- communication, RS485 –
9: K+ communication, RS485 +

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600.
To init, proceed as follows:

- connect the device over RS485 to a PC with ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

Version compatibility

- New FCR015 (FW 107) and new UC905 (FW 205) → Functional combination. Supplied since 04/2025.
- Old FCR015 (FW 105) and old UC905 (FW 203) → Functional combination.
- Old FCR015 (FW 105) and new UC905 (FW 205) → Functional combination. Additionally, it displays CO_2 in ppm.
- New FCR015 (FW 107) and old UC905 (FW 203) → Non-functional combination. It can be solved by ordering FCR015 with FW version 105.

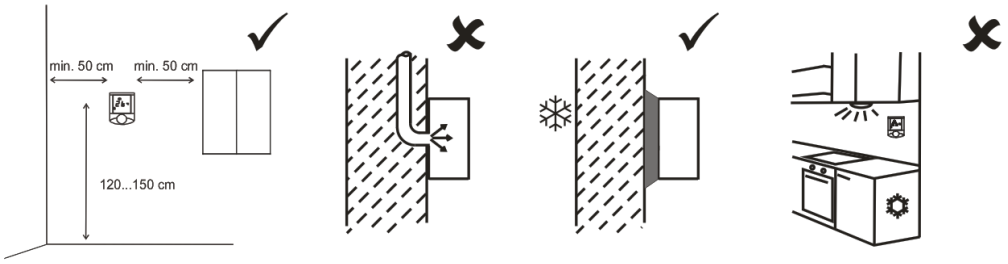
Upgrading UC905 (105) to newer FW (107): CANNOT BE PERFORMED
Upgrading FCR015 (203) to newer FW (205): Free of charge upon delivery to the company's address.

PN of new room controllers: UC905BL → PN 10392; UC905 → PN 10394
More information is available at Release notes | Domat Control System.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any service or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refrigerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use an insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

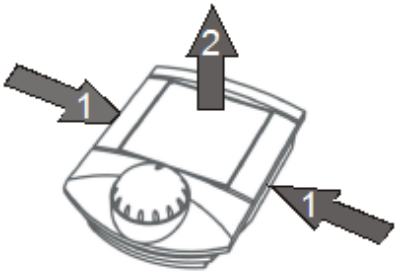


Cover opening

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several millimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.

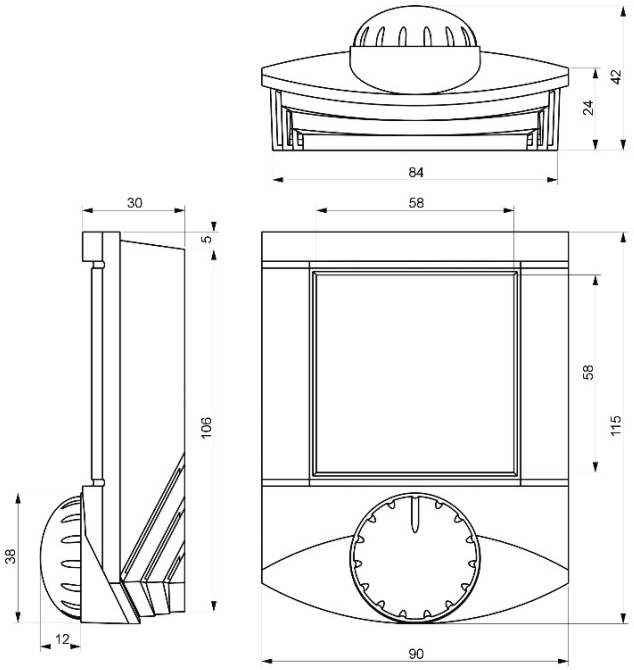


Display

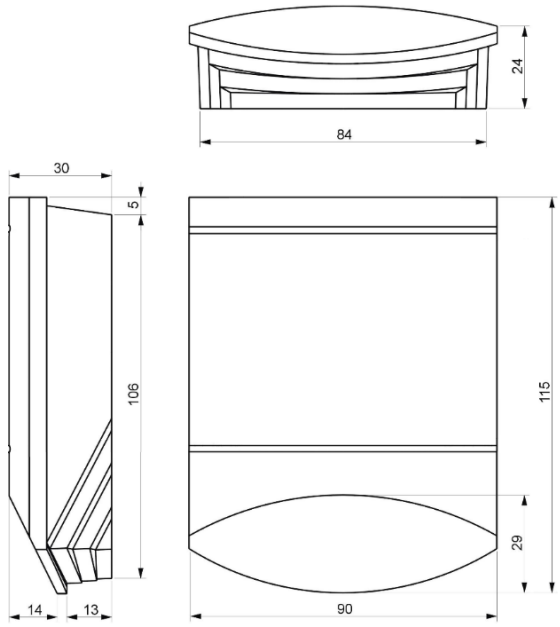
A large (60 × 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are weekdays used for time scheduler setup. Other symbols are not used.

LCD symbol set

Dimensions **UC905**



UC905DK



All dimensions in *mm.*

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.

Changes in versions	10/2017 – The first datasheet version. 08/2018 – Minor changes. 10/2023 – Change of the logo, stylistic changes. 05/2025 – Added information about version compatibility.

UI0xx Communicative room units and sensors


Summary

The UI...(BL) room unit is a family of universal communicative human-machine interface for control of HVAC units and plants, and IRC controllers. The units communicate over Modbus RTU / RS485 and they can be used as open system components with majority of building control system and controllers. Compared to the old series UI0xx, these types contain knob and display with blue colour backlight function and more accurate sensors of temperature and humidity.

According to production type, each version of the unit may contain display, backlight, RTC nad IO, see type table below.

All versions of the room units now contain relative humidity measurement. UI04x, UI06x and UI08x series have been replaced.

Application

- **systems with fancoils, convectors, floor and radiator heating, AHUs, air conditioning units.**
- **control of boilers, DHW, heating circuits, building controls in general**
- **monitoring of room temperature and humidity**

Function

The units acquire temperature and optionally relative humidity in the room, temperature correction (knob) and required operation status which is set by push of the button or in the menu. In the configurable menu following values can be set and displayed:

- temperature, actual temperature correction
- humidity (actual value only at room units containing the humidity sensor)
- time (only display at room units with RTC)
- basic setpoint - day
- basic setpoint - night
- outside temperature for heating enable
- DHW temperature
- heating curve type (1...4)
- operation mode (Residential with Day, Night, Time schedule, Off, or Hotel / Office with Comfort, Standby, Party, Off)
- fan stage (Auto, Off, St.1, St. 2, St. 3)
- A/C mode (Auto, Heating, Cooling, Off, Fan only)

- weekly scheduler: 7 days, up to 6 events per day
- another 5 variables (air quality, fan speed etc.) – each has a profile where max. and min. values, step, number of decimals, and symbol set are defined.

It is also possible to set / reset any of the LCD symbols on the display over Modbus.

The turn / push knob has three basic functions:

- instant edit (turning the knob) – settings of one predefined analogue value, usually room temperature correction
- quick edit (short push) – change of predefined state, e.g. Presence (Comfort / Standby / Off), Air condition (Auto / Heating / Cooling / Fan only / Off) etc.
- long push – jump to menu where values are listed by turning the knob, short push selects the value to be edited, and the value is changed by turning the knob followed by short push for confirmation.

After definable inactivity time, the display goes back to its basic state with rolling display of selected values (e.g. actual temperature and humidity).

Backlight function

UI0xxBL type contain knob and display blue colour backlight function. It is possible to set brightness 0-100 % separately for knob and display. If user make some action with knob, display and knob will shine for defined time. All of the backlight functions could be set from Modbus master.

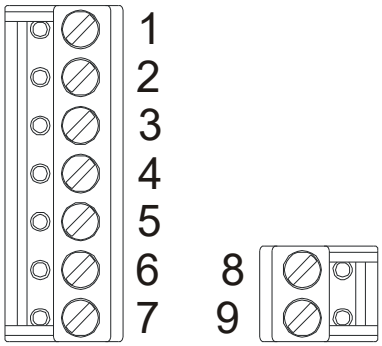
The unit Modbus address and functionality is defined over the RS485 interface with service software **ModComTool** which is free for download at **http://domat-int.com/en/downloads/software.** To interface the room unit to the computer use the USB/485 converter **M080**, RS232/RS485 converter **R012**, or any suitable RS485 converter.

Technical data

Power supply	24 V AC ± 20%, 1 W
Temperature measuring range	-20 ... 70 °C (accuracy ±1 ˚C)
Humidity measuring range	digital sensor 10 ÷ 90 %rH accuracy ±3%
Protection	IP20 (EN 60529)
Inputs (specific types only, see table below)	2x potential-free contact (dry contact) against G0, 24 V AC, 5 mA, max. switching frequency 10 Hz
Outputs (specific types only, see table below)	1x - 2x solid state relay, zero switching, for AC load 24 V AC, max. 0.4 A, AC1, general usage, non-inductive load according to EN 60947-4-1, galvanic isolation 1.5 kV
Setpoint	according to configuration, ± 10 to ± 1 K
Communication	RS485 - Modbus RTU, slave selectable speed 1200 ... 115200 bps, parity and bits are set in service SW default 9600/N/8/1 The interface is optically separated 1 kV (except for UI010 and UI010BL).
Display	LCD 60 x 60 mm, symbol set see above

Terminals	recommended wire cross-section 0,14 – 1,5 mm^2
Cover	ABS, RAL9010
Weight	0,13 kg
Dimensions	90 x 115 x 30 mm, see below
Ambient conditions	According to DIN EN 60721-3-3. Climate class 3K5 (-5 to +45 ° C, 5% to 95% RH non-condensing humidity)
Storage conditions	According to DIN EN 60721-3-1 Climatic class 1K3 (-5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Standards conformity	EMC ed.3 EN 61000-6-2: 2005, EN 55022 ed.3: 2010 (industrial environment) Electrical safety EN 60950-1 ed.2: 2006 + A11: 2009 + A12: 2011 + A1: 2010 + A2: 2014 + Opr.1: 2012 Restriction of hazardous substances EN 50581: 2012

Terminals



As seen when removing the display part.

The wiring goes towards the center of the unit so that the cable can be brought through the aperture in the middle of the bottom part.

UI010(BL), UI0x1(BL)

1: NC not connected
2: NC not connected
3: K- communication RS485 -
4: K+ communication RS485 +
5: G0 power – common point
6: G0 power – common point
7: G power

8: -- connector not installed
9: -- connector not installed

UI0x2(BL)

1: DI1 input1, activated by connection to G0
2: DI2 input2, activated by connection to G0
3: DO1 output 1, 24 V AC against G0
4: NC not connected
5: G0 power, output – common point
6: G0 power, output – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

UI020BL, UI0x5(BL)

1: DI1 input1, activated by connection to G0
2: DI2 input2, activated by connection to G0
3: DO1 output 1, 24 V AC against G0
4: DO2 output 2, 24 V AC against G0
5: G0 power, outputs, inputs – common point
6: G0 power, outputs, inputs – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

Type table

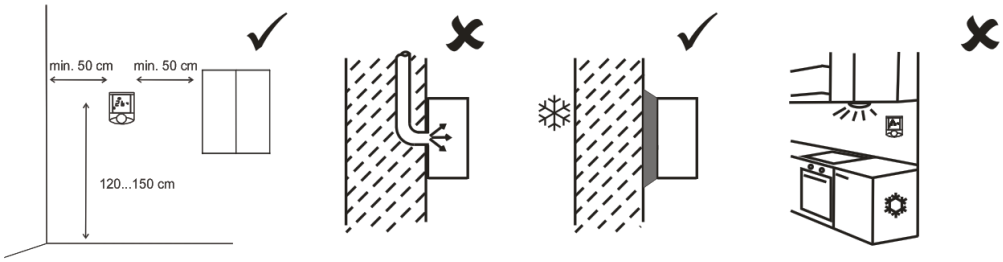
Typ	LCD	Backlight	Knob	DI	DO	t	rH	RTC
UI010	✓		✓	-	-	✓	✓	
UI010BL	✓	✓	✓	-	-	✓	✓	
UI011	✓		✓	-	-	✓	✓	
UI011BL	✓	✓	✓	-	-	✓	✓	
UI012	✓		✓	2	1	✓	✓	✓
UI012BL	✓	✓	✓	2	1	✓	✓	✓
UI020	✓		✓	2	2	✓	✓	✓
UI020BL	✓	✓	✓	2	2	✓	✓	✓
UI051	✓			-	-	✓	✓	
UI051BL	✓	✓		-	-	✓	✓	
UI052	✓			2	1	✓	✓	✓
UI052BL	✓	✓		2	1	✓	✓	✓
UI055	✓			2	2	✓	✓	✓
UI055BL	✓	✓		2	2	✓	✓	✓
UI071				-	-	✓	✓	
UI072				2	1	✓	✓	✓
UI075				2	2	✓	✓	✓

Units without knobs are used as indicators, optionally with remote controlled inputs / outputs. Process control algorithms (activating of the outputs by increased / decreased temperature, humidity etc.) must be implemented in a master controller.

Installation

Units are intended for operating in ordinary and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature and humidity, i.e. in the height of about 150 cm, with no direct sunlight or other source heat or cold (AHU outlets, refrigerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and top cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. There is an aperture for cabling in the back of the bottom part. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other sources of heat.



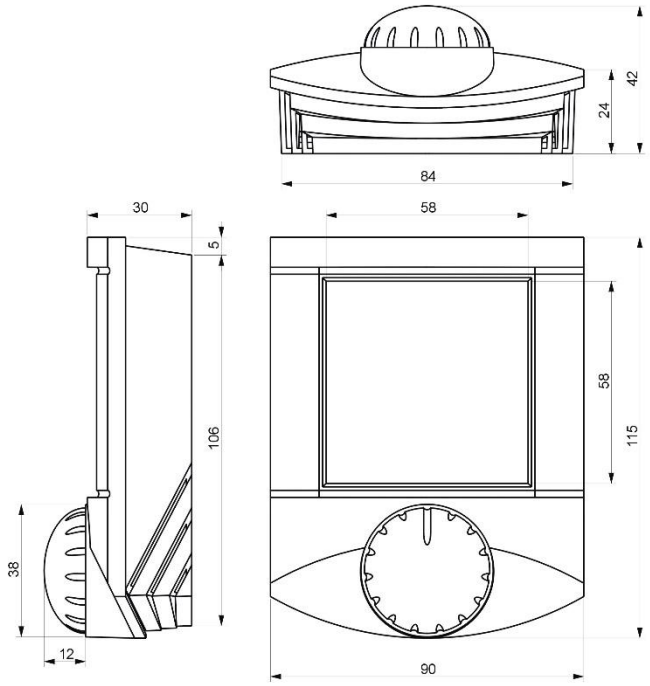
Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.

Dimensions



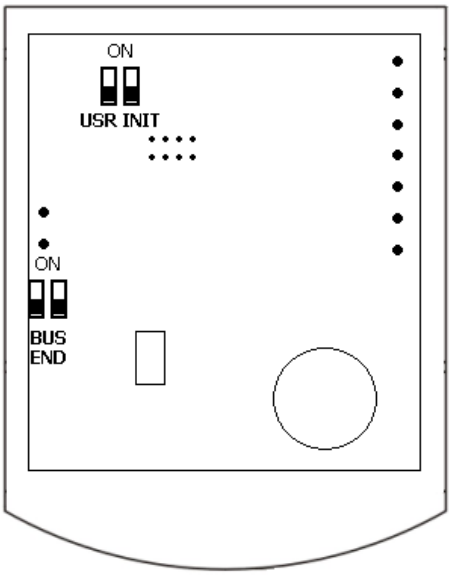
All dimensions are in *mm*.

Display

Over Modbus, it is possible to set / reset the complete symbol set except for the 7 segment digits, „Error“ and „Setting“ texts, and symbols of °C, °F, %, and rH. Those are part of the configurable menu profiles. The register description is available in a separate document *Room units UI... – Communication description.*

LCD symbol set (see in the picture).

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: if ON on power-up, sets the controller into default state and sets bus address to 1, baud rate to 9600.

To set EEPROM into factory settings by INIT, proceed as follows:
- connect the device over RS485 to a PC with the **ModComTool** config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power

RoHS notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in version

01/2017 — The first datasheet version.
03/2017 — Added picture and description of the installation. Corrected information in table types.
07/2017 — Added non-backlight types – summary datasheet
10/2017 — Added Safety note
10/2020 — Box Ø corrected, added max. switching frequency and terminal description
10/2023 — Change of the logo

UI90x Communicative room unit with CO_2 sensor

UI901/903/905

UI901BL/903BL/905BL

UI900/UI907

Summary

The room unit with CO_2 sensor contains temperature sensor, NDIR CO_2 sensor for carbon dioxide concentration measurement, optional humidity sensor, and control knob for setpoint control and other settings. The binary output is controlled either on a remote basis, or as thermostat, hygrostat or CO_2 controller. The units communicate over Modbus RTU / RS485 and they can be used as open system components with majority of building control system and controllers. Compared to the old series UI09x, these types dispose of knob and display blue backlight function and more accurate sensors.

All versions of the room units now contain relative humidity measurement. UI092 and UI094 versions have been replaced.

Beware of unit terminals connection. It differs from its predecessor.

Application

- **Air handling units and air condition in rooms with variable load – schools, cinemas, lecture halls etc.**
- **monitoring and recording of temperature, and CO_2 concentration indoors**

Function

The units acquire temperature, CO_2 concentration, and optionally relative humidity in the room, temperature correction (controlled by the knob) and required operation status which is set by short push of the knob or in the menu. In the configurable menu following values can be set and displayed:

- temperature, actual temperature correction
- humidity (actual value only at room units containing the humidity sensor)
- time (only display at room units with RTC)
- basic setpoint - day
- basic setpoint - night
- outside temperature for heating enable
- DHW temperature
- heating curve type (1...4)

- operation mode (Residential with Day, Night, Time schedule, Off, or Hotel / Office with Comfort, Standby, Party, Off)
- fan stage (Auto, Off, St.1, St. 2, St. 3)
- A/C mode (Auto, Heating, Cooling, Off, Fan only)
- weekly scheduler: 7 days, up to 6 events per day
- another 5 variables (air quality, fan speed etc.) – each has a profile where max. and min. values, step, number of decimals, and symbol set are defined.

It is also possible to set / reset any of the LCD symbols on the display over Modbus.
The turn / push knob has three basic functions:

- instant edit (turning the knob) – settings of one predefined analogue value, usually room temperature correction
- quick edit (short push) – change of predefined state, e.g. Presence (Comfort / Standby / Off), Air condition (Auto / Heating / Cooling / Fan only / Off) etc.
- long push – jump to menu where values are listed by turning the knob, short push selects the value to be edited, and the value is changed by turning the knob followed by short push for confirmation.

After definable inactivity time, the display goes back to its basic state with rolling display of selected values (e.g. actual temperature and CO_2).

Backlight function

Types UI0xxBL dispose of knob and display blue backlight function. It is possible to set brightness 0-100 % separately for knob and display. If user make some action with knob, display and knob shine for defined time. All of the functions could be set from Modbus master.

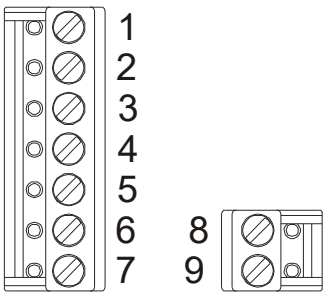
The unit Modbus address and functionality is defined over the RS485 interface with service software **ModComTool** which is free for download at **http://domat-int.com/en/downloads/software** To interface the room unit to the computer use the USB/485 converter **M080**, RS232/RS485 converter **R012**, or any suitable RS485 converter.

Technical data

Power supply	24 V AC/DC ± 20 %, 1 W
Temperature measuring range	-20 ÷ 70 °C (accuracy ±1 ˚C)
Humidity	digital sensor 10 ÷ 90 %rH accuracy ±3%
CO_2 measuring range	0 ... 5000 ppm (secondary output 0-100%)
CO_2 measuring method	NDIR (Non-dispersive Infra Red)
CO_2 measuring accuracy	± 50ppm, ± 3% of measured value (defined conditions for at least 3 calibration ACDL completed over the past 3 weeks)
Reaction time of CO_2 sensor (90 %)	90 seconds heating time (warm-up), 2 minutes, ECDL calibration (automatic calibration in dimming light mode), correction of measuring CO_2
Protection degree	IP20
Inputs(specific types only, see table below)	2x potential-free contact (dry contact) against G0, 24 V AC, 5 mA, max. switching frequency 10 Hz
Outputs (specific types only, see table below)	2x solid state relay, zero switching, for AC load 24 V AC, max. 0.4 A, AC1, general usage, non-inductive

	load according to EN 60947-4-1, galvanic isolation 1.5 kV
Setpoint	according to configuration, ± 10 to ± 1 K
Communication	RS485 - Modbus RTU, slave selectable speed 1200 ... 115200 bps, parity and bits are set in service SW default 9600/N/8/1 The interface is optically separated 1 kV.
Display	LCD 60 x 60 mm, symbol set see above
Terminals	recommended wire cross-section 0,14 – 1,5 mm^2
Cover	ABS, RAL9010
Weight	0,17 kg
Dimensions	90 x 115 x 30 mm, see below
Ambient conditions	According to class 3K3 (+5 to +40 ° C, 5% to 85% non-condensing relative humidity).
Storage conditions	According to DIN EN 60721-3-1 Climatic class 1K3 (-5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Standards conformity	EMC ed.3 EN 61000-6-2: 2005, EN 55022 ed.3: 2010 (industrial environment) Electrical safety EN 60950-1 ed.2: 2006 + A11: 2009 + A12: 2011 + A1: 2010 + A2: 2014 + Opr.1: 2012 Restriction of hazardous substances EN 50581: 2012

Terminals



As seen when removing the display part. The wiring goes towards the center of the unit so that the cable can be brought through the aperture in the middle of the bottom part. DI/DO mix is according types, see table below.

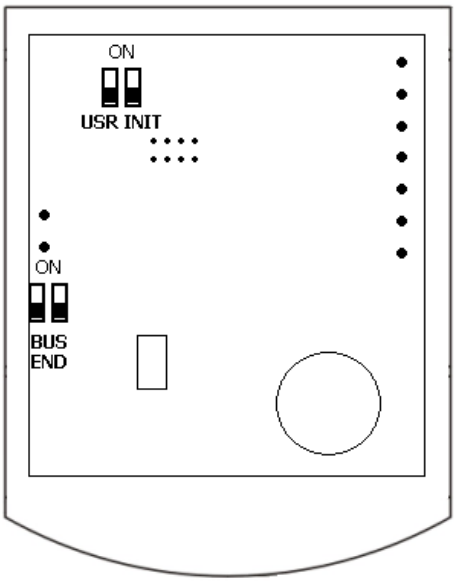
1: DI1 input1, activated by connection to G0
2: DI2 input2, activated by connection to G0
3: DO1 output 1, 24 V AC, against G0
4: DO2 output 2, 24 V AC, against G0
5: G0 power, outputs, inputs – common point
6: G0 power, outputs, inputs – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

Type table

Type	LCD	Backlighting	Knob	CO_2	DI	DO	t	rH
UI900				✓	**-**	-	✓	✓
UI901	✓		✓	✓	**2**	**2**	✓	✓
UI901BL	✓	✓	✓	✓	**2**	**2**	✓	✓
UI903	✓			✓	**2**	**2**	✓	✓
UI903BL	✓	✓		✓	**2**	**2**	✓	✓
UI905	✓		✓	✓	**-**	-	✓	✓
UI905BL	✓	✓	✓	✓	**-**	-	✓	✓
UI907				✓	**2**	**2**	✓	✓

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: if ON at power-on, sets the controller into default state and sets bus address to 1, baud rate to 9600 bps.
Another function of the INIT switch is to bring EEPROM into default factory settings. To init, proceed as follows:
- connect the device over RS485 to a PC with domat.exe config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the **ModComTool** tool, open the controller window
- click the Init button in the tool
- remove and apply power.

Measuring range

The integrated temperature sensor range is -20 to +70 °C. Read and entered values are available at the RS485 bus where a controller or SCADA reads them. The supervising system can also write values to the unit (operation mode, fan stage, etc.), which are displayed on a large LCD display.

The CO_2 measuring range is 0...5000 ppm. A range defined by two parameters is then recalculated to 0...100 %, value, which is displayed on the LCD, e.g. 300...2500 ppm displays as 100...0 % (of air quality) or 0...100 % (of air pollution). At the bus it is possible to read the absolute value in ppm, too. The parameters are set through the configuration software **ModComTool** or by direct writing into Modbus registers. Default values are 0% ... 350 ppm (fresh air), 100 % ... 2500 ppm (maximum pollution).

Autocalibration

Transportation and aging may cause sensor drift. The sensor records the lowest reading and expects that at least once per 8 days the CO_2 level reaches the outside air concentration (400 ppm). The lowest measured value is then assigned the 400 ppm level. Autocalibration does not work if the room is occupied 24 hours a day, or there are no periods when the gas level drops to background (e.g. greenhouses). Then, the autocalibration function can be disabled through the configuration program or by direct writing into the Modbus register. The autocalibration is set to on by default.

During the first days of operation, until the first autocalibration, the sensor may read values which differ from the real values by several hundreds ppm, e.g. 200 ppm at night etc. This error is automatically corrected with the first autocalibration.

Room unit as controller

The binary output (SSR), if available, may be controlled either from a PLC over the bus, or configured as one of controllers:

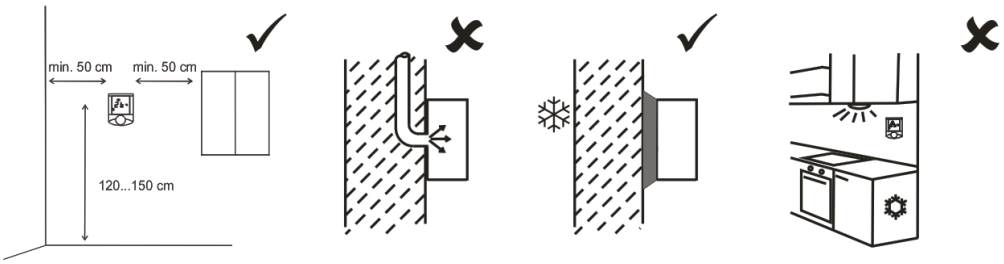
- thermostat
- hygrostat (only at devices with rH sensor)
- controller switching at a predefined CO_2 level.

Setpoint and hysteresis are set over the bus. This function is not suitable for standard integrated room control, it is to be used as supplementary only. The setpoints are not influenced by operation modes (Day, Night, Off).

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature and humidity, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.



Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part

- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.

Communication

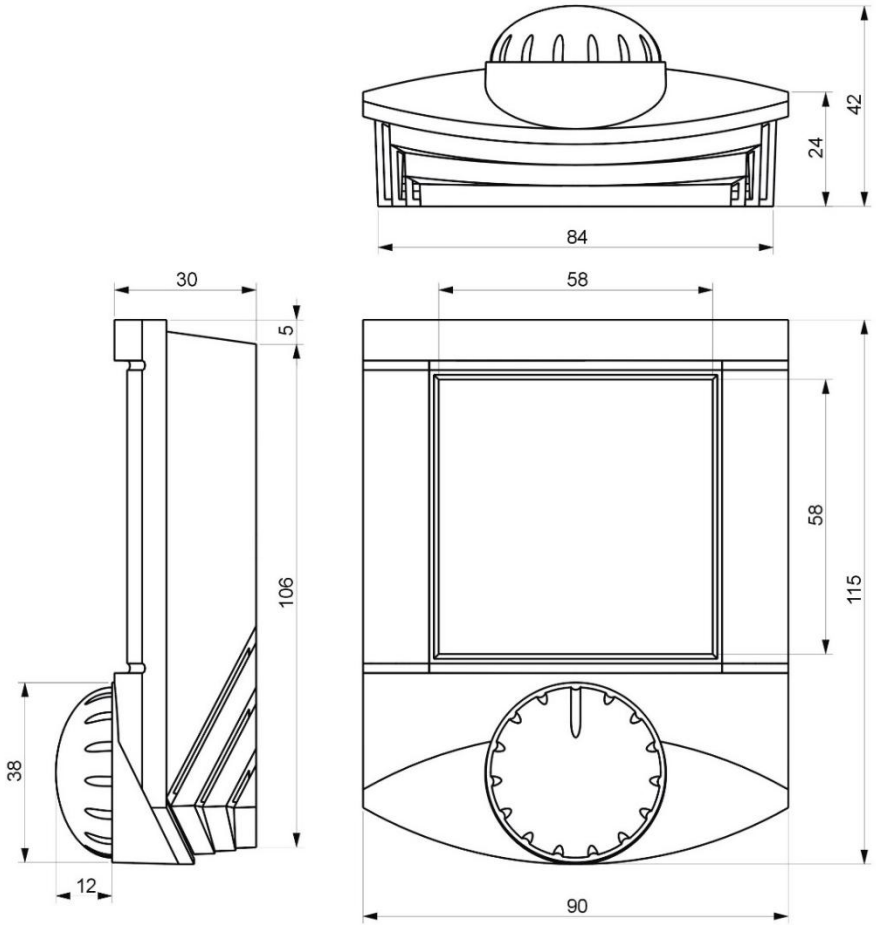
The units communicate with a controller (master) over RS485 using Modbus RTU and thus they can be used in a number of control and SCADA systems. The register description is available in a separate document *Room units UI... – Communication description.* User manual for domat.exe and detailed description of the room unit functions find in the document *Room units configuration – User manual.*

Display

Over Modbus, it is possible to set / reset the complete symbol set except for the 7 segment digits, „Error“ and „Setting“ texts, and symbols of °C, °F, %, and rH. Those are part of the configurable menu profiles. The register description is available in a separate document *Room units UI... – Communication description.*

LCD symbol set (see in the picture).

Dimensions



All dimensions in *mm.*

RoHS notice The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions

01/2017 — The first datasheet version.
03/2017 — Added picture and description of the installation.
10/2017 — Added Safety note.
09/2019 — UI907 added.
10/2020 — Box Ø corrected, added max. switching frequency and terminal description.
10/2023 — Change of the logo.
02/2025 — Correction of power supply information.

UI300 Communicative room unit


Summary

UI300 is communicative room unit with analogue input for PT1000 sensor, with temperature sensor, humidity sensor, and control knob for setpoint control and other settings. The binary output is controlled either on a remote basis, or as thermostat, hygrostat. The units communicate over Modbus RTU / RS485 and they can be used as open system components with majority of building control system and controllers.

Different versions of unit may contain display, backlight and knob:

UI300 – basic version with display and knob
UI300BL – version with knob and display with backlight
UI300DK – version without knob and display

Application

- **Air handling units and air condition in rooms with variable load – schools, cinemas, lecture halls etc.**
- **Systems with water or electrical floor heating – control and measuring of room temperature**
- **Monitoring and recording of temperature indoors**

Function

The units acquire temperature, and relative humidity in the room, temperature correction (controlled by the knob) and required operation status which is set by short push of the knob or in the menu. In the configurable menu following values can be set and displayed:

- temperature, actual temperature correction
- humidity (actual value only at room units containing the humidity sensor)
- time (only display at room units with RTC)
- basic setpoint - day
- basic setpoint - night
- outside temperature for heating enable
- DHW temperature
- heating curve type (1...4)

- operation mode (Residential with Day, Night, Time schedule, Off, or Hotel / Office with Comfort, Standby, Party, Off)
- fan stage (Auto, Off, St.1, St. 2, St. 3)
- A/C mode (Auto, Heating, Cooling, Off, Fan only)
- weekly scheduler: 7 days, up to 6 events per day
- another 5 variables (air quality, fan speed etc.) – each has a profile where max. and min. values, step, number of decimals, and symbol set are defined.

It is also possible to set / reset any of the LCD symbols on the display over Modbus.
The turn / push knob has three basic functions:

- instant edit (turning the knob) – settings of one predefined analogue value, usually room temperature correction
- quick edit (short push) – change of predefined state, e.g. Presence (Comfort / Standby / Off), Air condition (Auto / Heating / Cooling / Fan only / Off) etc.
- long push – jump to menu where values are listed by turning the knob, short push selects the value to be edited, and the value is changed by turning the knob followed by short push for confirmation.

After definable inactivity time, the display goes back to its basic state with rolling display of selected values (e.g. actual temperature and humidity).

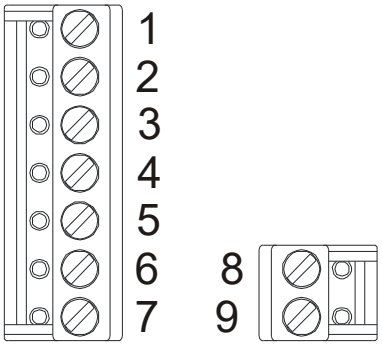
The unit Modbus address and functionality is defined over the RS485 interface with service software **ModComTool** which is free for download at **http://domat-int.com/en/downloads/software** To interface the room unit to the computer use the USB/485 converter **M080/R080**, RS232/RS485 converter R012, or any suitable RS485 converter.

Technical data

Power supply	24 V AC ±20 %, 1.5 W
Temperature measuring range	-20 ... 55 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ... 90 % rH (accuracy ±3 %)
Protection degree	IP20
Inputs	1x digital input for presence /window contact, max. switching frequency 10Hz 1x analogue input for external temperature sensor Pt1000
Outputs	1x solid state relay, zero switching, for AC load 24 V AC, max. 0.4 A, AC1, general usage, non-inductive load according to EN 60947-4-1, galvanic isolation 1 kV
Setpoint	according to configuration, ±10 to ±1 K
Communication	RS485 - Modbus RTU, slave selectable speed 1200 ... 115200 bps, parity and bits are set in service SW default 9600/N/8/1 The interface is optically separated 1 kV.
Display	LCD 60 x 60 mm

Terminals	recommended wire cross-section 0,14 – 1,5 mm^2
Cover	ABS, RAL9010
Weight	0,17 kg
Dimensions	90 x 115 x 30 mm, see below
Ambient conditions	According to class 3K3 (+5 to +45 °C, 5% to 95% non-condensing relative humidity).
Storage conditions	According to DIN EN 60721-3-1 Climatic class 1K3 (-5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Standards conformity	EMC EN 61000-6-2 ed.3:2005 + opr.2005-09, EN 61000-6-4 ed.2:2007 + A1:2011 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 + corr.1:2011-10 Restriction of hazardous substances EN 50581: 2012

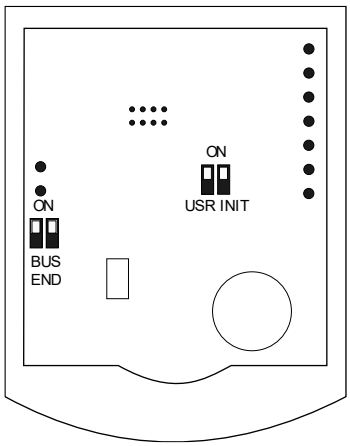
Terminals



1: AIN external temperature sensor Pt1000
2: AGND external temperature sensor Pt1000
3: DI1 input (presence/window)
activated by connection to G0
4: DO1 output for heating valve
5: G0 power, outputs – common point
6: G0 power, outputs – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600. To init, proceed as follows:
- connect the device over RS485 to a PC with the ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

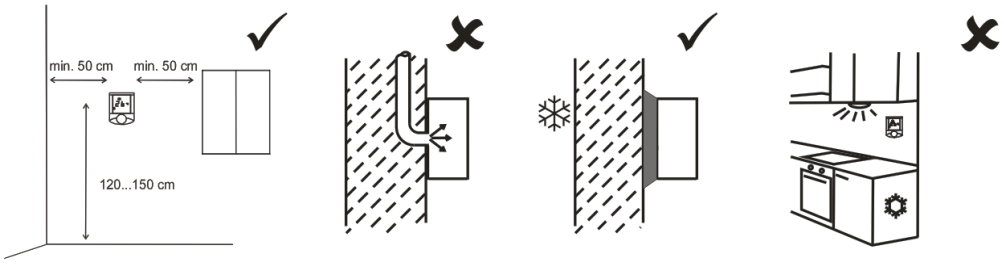
Type table

Type	LCD	Backlight	Knob	DI	DO	AI	t	rH
UI300	✓		✓	**1**	**1**	**1**	✓	✓
UI300BL	✓	✓	✓	**1**	**1**	**1**	✓	✓
UI300DK				**1**	**1**	**1**	✓	✓

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

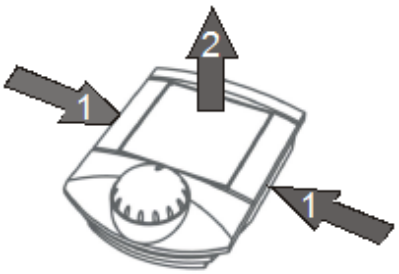


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



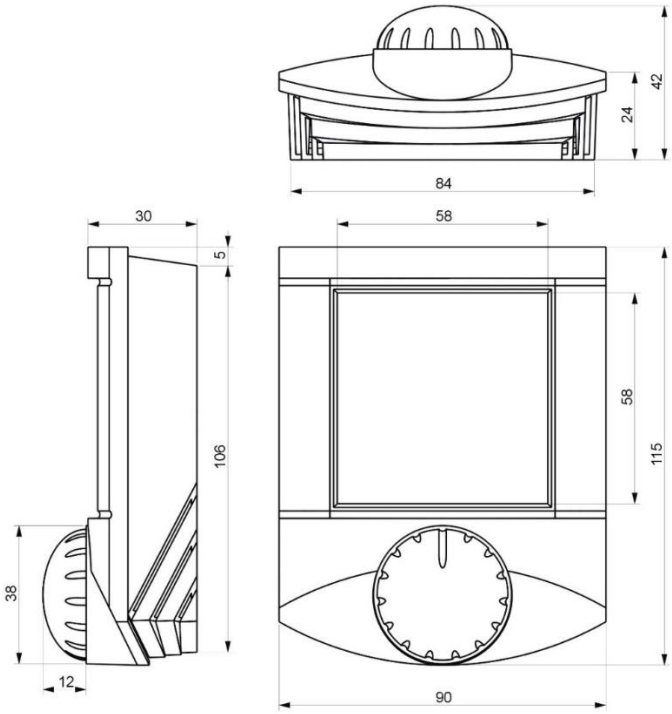
Communication The units communicate with a controller (master) over RS485 using Modbus RTU and thus they can be used in a number of control and SCADA systems. The register description is available in a separate document *Room units UI... – Communication description.* User manual for domat.exe and detailed description of the room unit functions find in the document *Room units configuration – User manual.*

Display

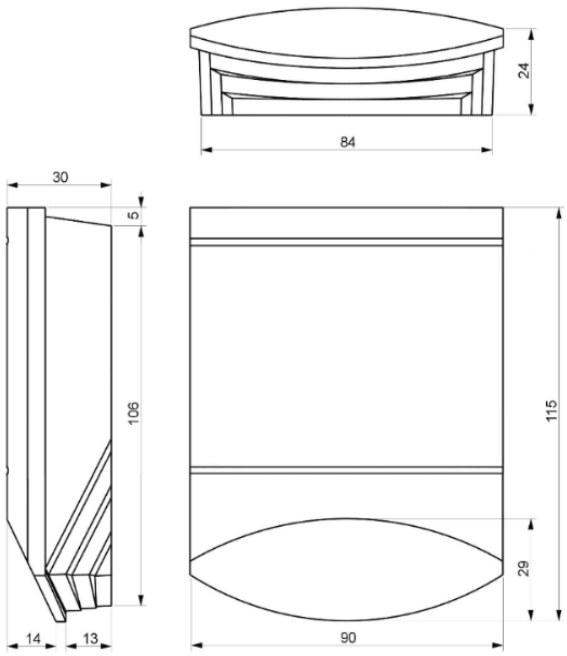
A large (60 x 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

LCD symbol set

Dimensions **UI300, UI300BL**



UI300DK



All dimensions in *mm*.

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.

Changes in versions	09/2019 – First datasheet version. 12/2019 – I/O position corrected. 09/2020 – Box Ø corrected, added max. switching frequency 10/2023 – Change of the logo

UI309 Communicative room unit with CO_2 sensor


Summary

UI309 is communicative room unit with analogue input for PT1000 sensor, with temperature sensor, humidity and CO_2 sensor and control knob for setpoint control and other settings. The binary output is controlled either on a remote basis, or as thermostat, hygrostat or CO_2 controller. The units communicate over Modbus RTU / RS485 and they can be used as open system components with majority of building control system and controllers.

Different versions of unit may contain display, backlight and knob:

UI309 – basic version with display and knob
UI309BL – version with knob and display with backlight
UI309DK – version without knob and display

Application

- **Air handling units and air condition in rooms with variable load – schools, cinemas, lecture halls etc.**
- **Systems with water or electrical floor heating – control and measuring of room temperature**
- **monitoring and recording of temperature, and CO_2 concentration indoors**

Function

The units acquire temperature, CO_2 concentration, and relative humidity in the room, temperature correction (controlled by the knob) and required operation status which is set by short push of the knob or in the menu. In the configurable menu following values can be set and displayed:

- temperature, actual temperature correction
- humidity (actual value only at room units containing the humidity sensor)
- time (only display at room units with RTC)
- basic setpoint - day
- basic setpoint - night
- outside temperature for heating enable
- DHW temperature
- heating curve type (1...4)

- operation mode (Residential with Day, Night, Time schedule, Off, or Hotel / Office with Comfort, Standby, Party, Off)
- fan stage (Auto, Off, St.1, St. 2, St. 3)
- A/C mode (Auto, Heating, Cooling, Off, Fan only)
- weekly scheduler: 7 days, up to 6 events per day
- another 5 variables (air quality, fan speed etc.) – each has a profile where max. and min. values, step, number of decimals, and symbol set are defined.

It is also possible to set / reset any of the LCD symbols on the display over Modbus.
The turn / push knob has three basic functions:

- instant edit (turning the knob) – settings of one predefined analogue value, usually room temperature correction
- quick edit (short push) – change of predefined state, e.g. Presence (Comfort / Standby / Off), Air condition (Auto / Heating / Cooling / Fan only / Off) etc.
- long push – jump to menu where values are listed by turning the knob, short push selects the value to be edited, and the value is changed by turning the knob followed by short push for confirmation.

After definable inactivity time, the display goes back to its basic state with rolling display of selected values (e.g. actual temperature and humidity).

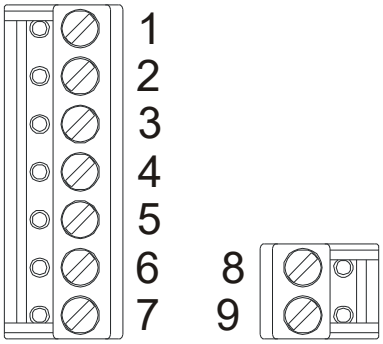
The unit Modbus address and functionality is defined over the RS485 interface with service software **ModComTool** which is free for download at **http://domat-int.com/en/downloads/software** To interface the room unit to the computer use the USB/485 converter **M080/R080**, RS232/RS485 converter R012, or any suitable RS485 converter.

Technical data

Power supply	24 V AC ±20 %, 1.5 W
Temperature measuring range	-20 ... 55 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ... 90 % rH (accuracy ±3 %)
CO_2 measuring range	0 ... 5000 ppm (secondary output 0-100%)
CO_2 measuring method	NDIR (Non-dispersive Infra Red)
CO_2 measuring accuracy	± 50ppm, ± 3% of measured value (defined conditions for at least 3 calibration ACDL completed over the past 3 weeks)
Reaction time of CO_2 sensor (90 %)	90 seconds heating time (warm-up), 2 minutes, ECDL calibration (automatic calibration in dimming light mode), correction of measuring CO_2
Protection degree	IP20
Inputs	1x digital input for presence /window contact, max. switching frequency 10Hz 1x analogue input for external temperature sensor Pt1000
Outputs	1x solid state relay, zero switching, for AC load 24 V AC, max. 0.4 A, AC1, general usage, non-inductive load according to EN 60947-4-1, galvanic isolation 1 kV

Setpoint	according to configuration, ±10 to ±1 K
Communication	RS485 - Modbus RTU, slave selectable speed 1200 ... 115200 bps, parity and bits are set in service SW default 9600/N/8/1 The interface is optically separated 1 kV.
Display	LCD 60 x 60 mm
Terminals	recommended wire cross-section 0,14 – 1,5 mm^2
Cover	ABS, RAL9010
Weight	0,17 kg
Dimensions	90 x 115 x 30 mm, see below
Ambient conditions	According to class 3K3 (+5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Storage conditions	According to DIN EN 60721-3-1 Climatic class 1K3 (-5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Standards conformity	EMC EN 61000-6-2 ed.3:2005 + opr.2005-09, EN 61000-6-4 ed.2:2007 + A1:2011 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 + corr.1:2011-10 Restriction of hazardous substances EN 50581: 2012

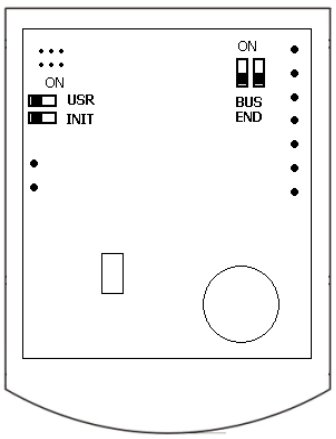
Terminals



1: AIN external temperature sensor Pt1000
2: AGND external temperature sensor Pt1000
3: DI1 input (presence/window) activated by connection to G0
4: DO1 output for heating valve
5: G0 power, outputs – common point
6: G0 power, outputs – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600. To init, proceed as follows:
- connect the device over RS485 to a PC with the ModComTool config tool
- set INIT to ON

- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

Type table

Type	LCD	Backlight	Knob	DI	DO	AI	t	rH	CO_2
UI309	✓		✓	**1**	**1**	**1**	✓	✓	✓
UI309BL	✓	✓	✓	**1**	**1**	**1**	✓	✓	✓
UI309DK				**1**	**1**	**1**	✓	✓	✓

Measuring range

Measuring range of temperature sensor is from -20 to +55 °C.
Measuring range of humidity sensor is from 10 to 90 % rH.

CO2 measuring range is 0...5000 ppm. Measured value from this range is recalculated as value on scale 0...100%, which is displayed in the screen. There is absolute value in modbus registers in ppm as well. Parameters are set in **ModComTool** or by direct writing in Modbus registers. Default values are 0% = 350 ppm (clean air), 100% = 2500 ppm (pollution).

Autocalibration

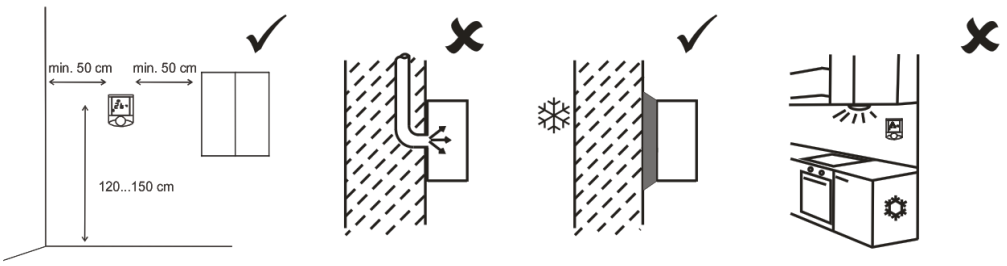
Due to aging and shocks during transport, the sensor accuracy may be reduced. The sensor continuously monitors the minimum measured values during operation and assumes that the CO2 level will drop to outside air concentration (400 ppm) at least once every 8 days. The lowest measured value is then assigned a concentration of 400 ppm. The self-calibration algorithm does not work if the room is occupied continuously, ot there is no decrease in concentration (e.g. greenhouses). In this case, the function can be disabled via the configuration program or directly by writing to the Modbus registers. By default the autocalibration is turned on.

During first couple of days i.e. until first autocalibration, the sensor may show values that differs by hundreds of ppm from real values, e.g. 200 ppm at night. This state is automaticlly corrected with first autocalibration.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

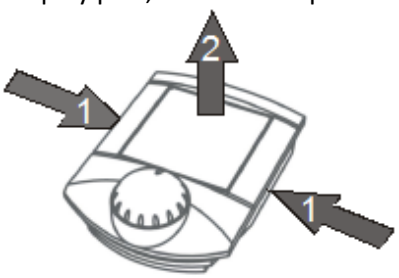


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Communication

The units communicate with a controller (master) over RS485 using Modbus RTU and thus they can be used in a number of control and SCADA systems. The register description is available in a separate document *Room units UI... – Communication description.* User manual for domat.exe and detailed description of the room unit functions find in the document *Room units configuration – User manual.*

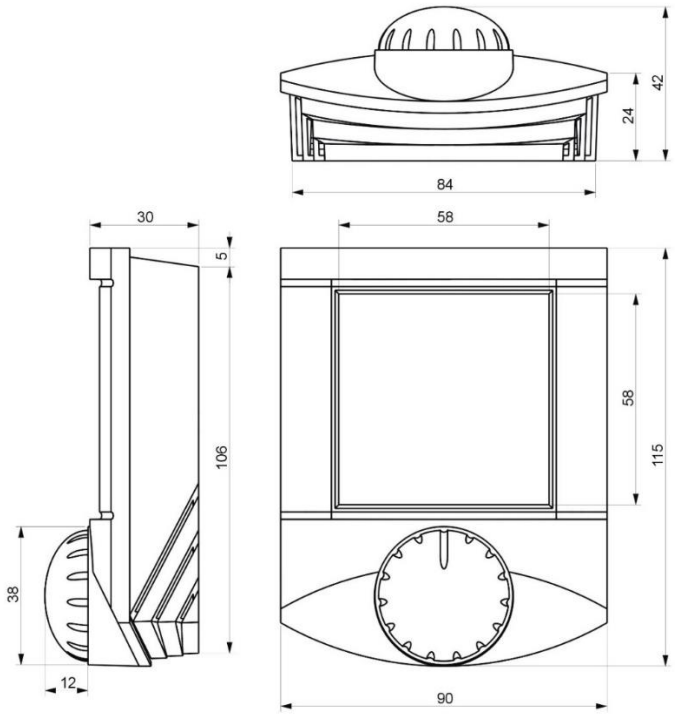
Display

A large (60 x 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

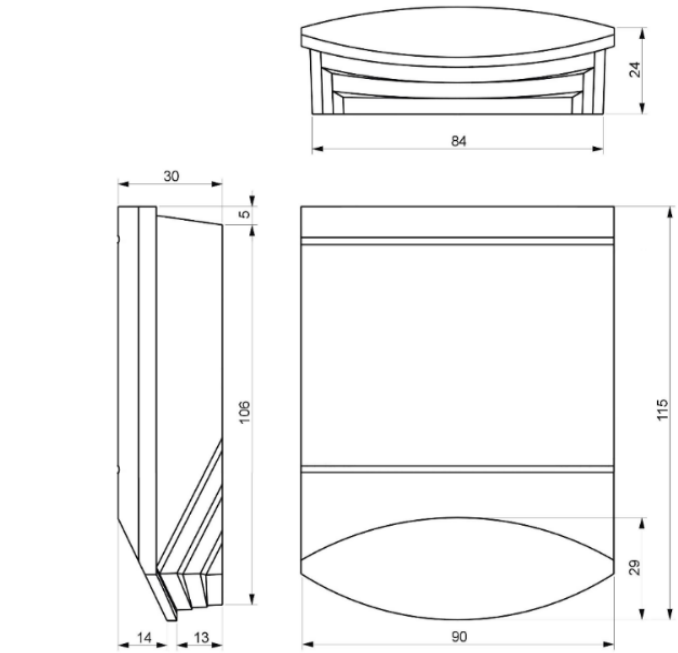
LCD symbol set

Dimensions

UI309, UI309BL



UI309DK



All dimensions in *mm*.

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.

Changes in versions	09/2020 — First datasheet version. 10/2023 — Change of the logo

UI310 Communicative room unit with PIR sensor



Summary

UI310 is communicatiove room unit with analogue input for PT1000 sensor, with temperature sensor, humidity sensor and PIR, and control knob for setpoint control and other settings. The binary output is controlled either on a remote basis, or as thermostat, hygrostat. The units communicate over Modbus RTU / RS485 and they can be used as open system components with majority of building control system and controllers.

Different versions of unit may contain display, backlight and knob:

UI310 – basic version with display and knob
UI310BL –version with knob and display with backlight
UI310DK – version without knob and display

Application

- **Air handling units and air condition in rooms with variable load – schools, cinemas, lecture halls etc.**
- **Systems with water or electrical floor heating – control and measuring of room temperature**
- **Monitoring and recording of temperature indoors**

Function

The units acquire temperature, and relative humidity in the room, temperature correction (controlled by the knob) and required operation status which is set by short push of the knob or in the menu. In the configurable menu following values can be set and displayed:

- temperature, actual temperature correction
- humidity (actual value only at room units containing the humidity sensor)
- time (only display at room units with RTC)
- basic setpoint - day
- basic setpoint - night
- outside temperature for heating enable
- DHW temperature
- heating curve type (1...4)
- operation mode (Residential with Day, Night, Time schedule, Off, or Hotel / Office with Comfort, Standby, Party, Off)

- fan stage (Auto, Off, St.1, St. 2, St. 3)
- A/C mode (Auto, Heating, Cooling, Off, Fan only)
- weekly scheduler: 7 days, up to 6 events per day
- another 5 variables (air quality, fan speed etc.) – each has a profile where max. and min. values, step, number of decimals, and symbol set are defined.

It is also possible to set / reset any of the LCD symbols on the display over Modbus.
The turn / push knob has three basic functions:

- instant edit (turning the knob) – settings of one predefined analogue value, usually room temperature correction
- quick edit (short push) – change of predefined state, e.g. Presence (Comfort / Standby / Off), Air condition (Auto / Heating / Cooling / Fan only / Off) etc.
- long push – jump to menu where values are listed by turning the knob, short push selects the value to be edited, and the value is changed by turning the knob followed by short push for confirmation.

After definable inactivity time, the display goes back to its basic state with rolling display of selected values (e.g. actual temperature and humidity).

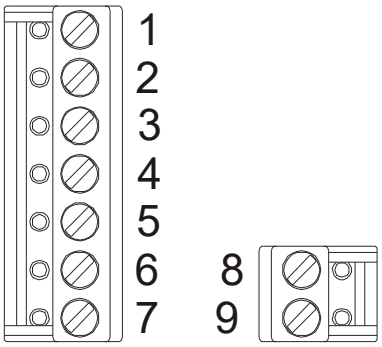
The unit Modbus address and functionality is defined over the RS485 interface with service software **ModComTool** which is free for download at **http://domat-int.com/en/downloads/software** To interface the room unit to the computer use the USB/485 converter **M080/R080**, RS232/RS485 converter R012, or any suitable RS485 converter.

Technical data

Power supply	24 V AC ±20 %, 1.5 W
Temperature measuring range	-20 ... 55 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ... 90 % rH (accuracy ±3 %)
Protection degree	IP20
Inputs	1x digital input for presence /window contact, max. switching frequency 10Hz 1x analogue input for external temperature sensor Pt1000
Outputs	1x solid state relay, zero switching, for AC load 24 V AC, max. 0.4 A, AC1, general usage, non-inductive load according to EN 60947-4-1, galvanic isolation 1 kV
Setpoint	according to configuration, ±10 to ±1 K
Communication	RS485 - Modbus RTU, slave selectable speed 1200 ... 115200 bps, parity and bits are set in service SW default 9600/N/8/1 The interface is optically separated 1 kV.
Display	LCD 60 x 60 mm
Terminals	recommended wire cross-section 0,14 – 1,5 mm^2
Cover	ABS, RAL9010

Weight	0,17 kg
Dimensions	90 x 115 x 30 mm, see below
Ambient conditions	According to class 3K3 (+5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Storage conditions	According to DIN EN 60721-3-1 Climatic class 1K3 (-5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Standards conformity	EMC EN 61000-6-2 ed.3:2005 + opr.2005-09, EN 61000-6-4 ed.2:2007 + A1:2011 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 + corr.1:2011-10 Restriction of hazardous substances EN 50581: 2012

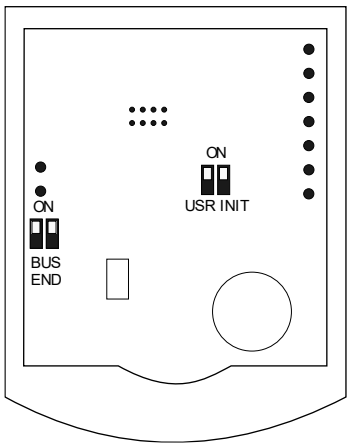
Terminals



1: AIN external temperature sensor Pt1000
2: AGND external temperature sensor Pt1000
3: DI1 input (presence/window) activated by connection to G0
4: DO1 output for heating valve
5: G0 power, outputs – common point
6: G0 power, outputs – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600. To init, proceed as follows:
- connect the device over RS485 to a PC with the ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

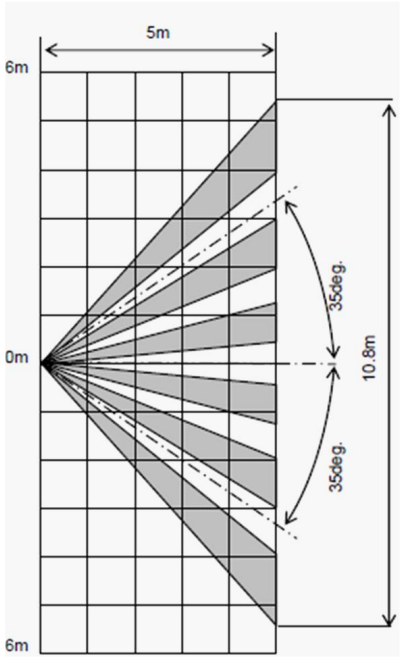
Type table

Type	LCD	Backlight	Knob	DI	DO	AI	t	rH	PIR
UI310	✓		✓	**1**	**1**	**1**	✓	✓	✓
UI310BL	✓	✓	✓	**1**	**1**	**1**	✓	✓	✓
UI310DK				**1**	**1**	**1**	✓	✓	✓

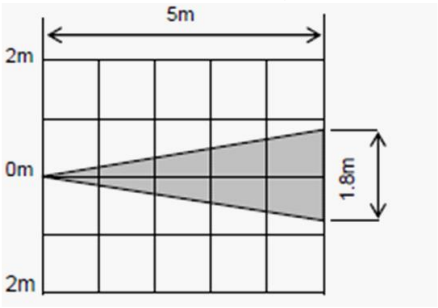
PIR

The PIR sensor is designed to detect people. Range of the sensor is 5 m, horizontal detection area is 70 °, range of motion 0.5-1.5 m/s

Horizontal detection area (right chart):



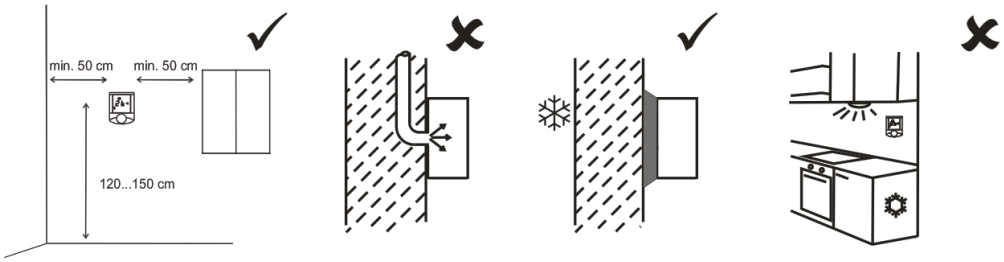
Vertical detection area (bottom chart):



Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

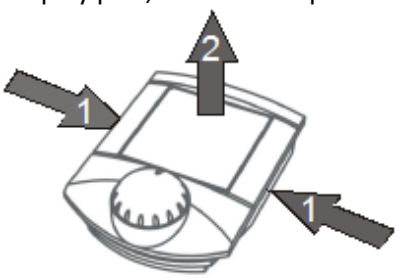


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Communication

The units communicate with a controller (master) over RS485 using Modbus RTU and thus they can be used in a number of control and SCADA systems. The register description is available in a separate document *Room units UI... – Communication description.* User manual for domat.exe and detailed description of the room unit functions find in the document *Room units configuration – User manual.*

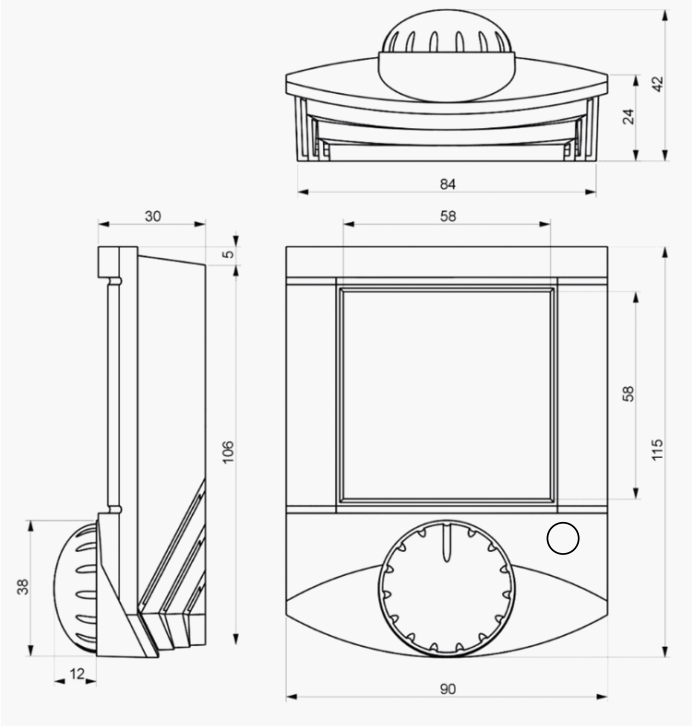
Display

A large (60 x 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

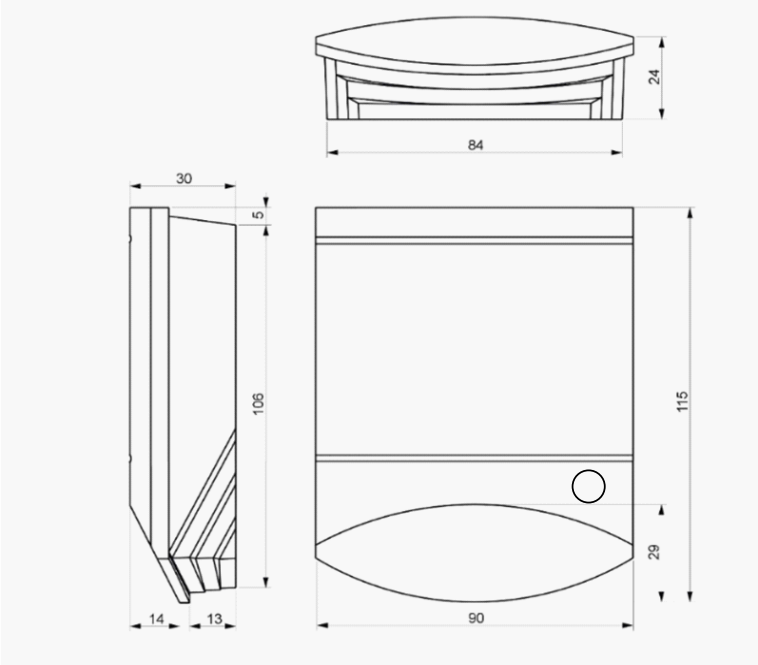
LCD symbol set

Dimensions

UI310, UI310BL



UI310DK



All dimensions in *mm*.

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.

Changes in versions	09/2020 – First datasheet version. 10/2023 – Change of the logo

UI319 Communicative room unit with CO_2 sensor and PIR sensor



Summary

UI319 is communicative room unit with analogue input for PT1000 sensor, with temperature and humidity sensor, CO_2 and PIR sensor, and control knob for setpoint control and other settings. The binary output is controlled either on a remote basis, or as thermostat, hygrostat or CO_2 controller. The units communicate over Modbus RTU / RS485 and they can be used as open system components with majority of building control system and controllers.

Different versions of unit may contain display, backlight and knob:

UI319 – basic version with display and knob
UI319BL – version with knob and display with backlight
UI319DK – version without knob and display

Application

- **Air handling units and air condition in rooms with variable load – schools, cinemas, lecture halls etc.**
- **Systems with water or electrical floor heating – control and measuring of room temperature**
- **monitoring and recording of temperature, and CO_2 concentration indoors**

Function

The units acquire temperature, CO_2 concentration, and relative humidity in the room, temperature correction (controlled by the knob) and required operation status which is set by short push of the knob or in the menu. In the configurable menu following values can be set and displayed:

- temperature, actual temperature correction
- humidity (actual value only at room units containing the humidity sensor)
- time (only display at room units with RTC)
- basic setpoint - day
- basic setpoint - night
- outside temperature for heating enable
- DHW temperature

- heating curve type (1...4)
- operation mode (Residential with Day, Night, Time schedule, Off, or Hotel / Office with Comfort, Standby, Party, Off)
- fan stage (Auto, Off, St.1, St. 2, St. 3)
- A/C mode (Auto, Heating, Cooling, Off, Fan only)
- weekly scheduler: 7 days, up to 6 events per day
- another 5 variables (air quality, fan speed etc.) – each has a profile where max. and min. values, step, number of decimals, and symbol set are defined.

It is also possible to set / reset any of the LCD symbols on the display over Modbus.
The turn / push knob has three basic functions:

- instant edit (turning the knob) – settings of one predefined analogue value, usually room temperature correction
- quick edit (short push) – change of predefined state, e.g. Presence (Comfort / Standby / Off), Air condition (Auto / Heating / Cooling / Fan only / Off) etc.
- long push – jump to menu where values are listed by turning the knob, short push selects the value to be edited, and the value is changed by turning the knob followed by short push for confirmation.

After definable inactivity time, the display goes back to its basic state with rolling display of selected values (e.g. actual temperature and humidity).

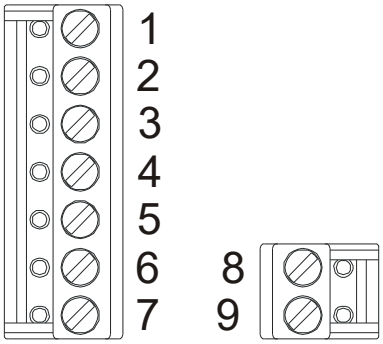
The unit Modbus address and functionality is defined over the RS485 interface with service software **ModComTool** which is free for download at **http://domat-int.com/en/downloads/software** To interface the room unit to the computer use the USB/485 converter **M080/R080**, RS232/RS485 converter R012, or any suitable RS485 converter.

Technical data

Power supply	24 V AC ±20 %, 1.5 W
Temperature measuring range	-20 ... 55 °C (accuracy ±1 ˚C)
Humidity measuring range	10 ... 90 % rH (accuracy ±3 %)
CO_2 measuring range	0 ... 5000 ppm (secondary output 0-100%)
CO_2 measuring method	NDIR (Non-dispersive Infra Red)
CO_2 measuring accuracy	± 50ppm, ± 3% of measured value (defined conditions for at least 3 calibration ACDL completed over the past 3 weeks)
Reaction time of CO_2 sensor (90 %)	90 seconds heating time (warm-up), 2 minutes, ECDL calibration (automatic calibration in dimming light mode), correction of measuring CO_2
Protection degree	IP20
Inputs	1x digital input for presence /window contact, max. switching frequency 10Hz 1x analogue input for external temperature sensor Pt1000
Outputs	1x solid state relay, zero switching, for AC load 24 V AC, max. 0.4 A, AC1, general usage, non-inductive load according to EN 60947-4-1, galvanic isolation 1 kV

Setpoint	according to configuration, ±10 to ±1 K
Communication	RS485 - Modbus RTU, slave selectable speed 1200 ... 115200 bps, parity and bits are set in service SW default 9600/N/8/1 The interface is optically separated 1 kV.
Display	LCD 60 x 60 mm
Terminals	recommended wire cross-section 0,14 – 1,5 mm^2
Cover	ABS, RAL9010
Weight	0,17 kg
Dimensions	90 x 115 x 30 mm, see below
Ambient conditions	According to class 3K3 (+5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Storage conditions	According to DIN EN 60721-3-1 Climatic class 1K3 (-5 to +45 ° C, 5% to 95% non-condensing relative humidity).
Standards conformity	EMC EN 61000-6-2 ed.3:2005 + opr.2005-09, EN 61000-6-4 ed.2:2007 + A1:2011 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 + corr.1:2011-10 Restriction of hazardous substances EN 50581: 2012

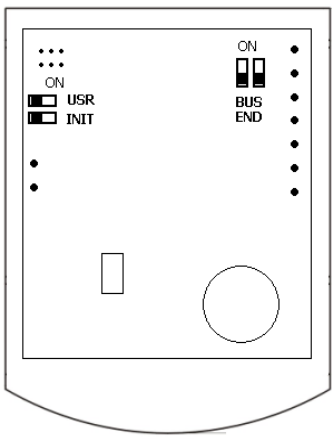
Terminals



1: AIN external temperature sensor Pt1000
2: AGND external temperature sensor Pt1000
3: DI1 input (presence/window) activated by connection to G0
4: DO1 output for heating valve
5: G0 power, outputs – common point
6: G0 power, outputs – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600. To init, proceed as follows:
- connect the device over RS485 to a PC with the ModComTool config tool
- set INIT to ON

- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply power.

Type table

Type	LCD	Backlight	Knob	DI	DO	AI	t	rH	CO_2	PIR
UI319	✓		✓	**1**	**1**	**1**	✓	✓	✓	✓
UI319BL	✓	✓	✓	**1**	**1**	**1**	✓	✓	✓	✓
UI319DK				**1**	**1**	**1**	✓	✓	✓	✓

Measuring range

Measuring range of temperature sensor is from -20 to +55 °C.
Measuring range of humidity sensor is from 10 to 90 % rH.

CO2 measuring range is 0...5000 ppm. Measured value from this range is recalculated as value on scale 0...100%, which is displayed in the screen. There is absolute value in modbus registers in ppm as well. Parameters are set in ModComTool or by direct writing in Modbus registers. Default values are 0% = 350 ppm (clean air), 100% = 2500 ppm (pollution).

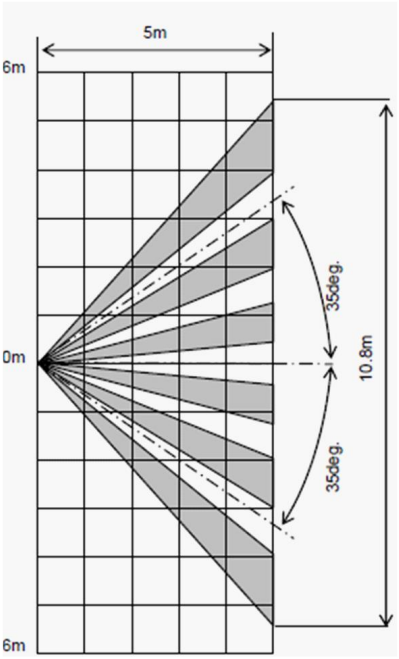
Autocalibration

Due to aging and shocks during transport, the sensor accuracy may be reduced. The sensor continuously monitors the minimum measured values during operation and assumes that the CO2 level will drop to outside air concentration (400 ppm) at least once every 8 days. The lowest measured value is then assigned a concentration of 400 ppm. The self-calibration algorithm does not work if the room is occupied continuously, ot there is no decrease in concentration (e.g. greenhouses). In this case, the function can be disabled via the configuration program or directly by writing to the Modbus registers. By default the autocalibration is turned on.

During first couple of days i.e. until first autocalibration, the sensor may show values that differs by hundreds of ppm from real values, e.g. 200 ppm at night. This state is automaticlly corrected with first autocalibration.

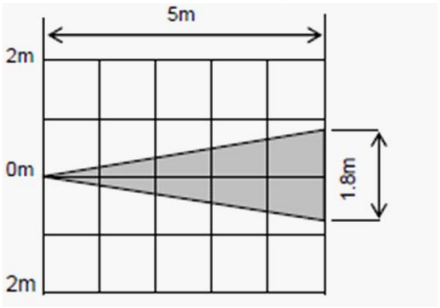
PIR

The PIR sensor is designed to detect people. Range of the sensor is 5 m, horizontal detection area is 70 °, range of motion 0.5-1.5 m/s



Horizontal detection area (right chart):

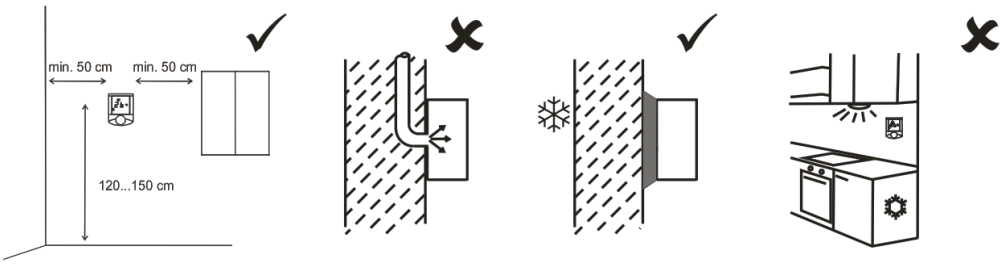
Vertical detection area (bottom chart):



Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

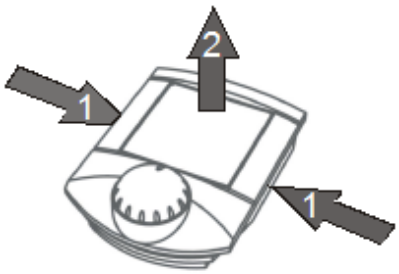


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Communication

The units communicate with a controller (master) over RS485 using Modbus RTU and thus they can be used in a number of control and SCADA systems. The register description is available in a separate document *Room units UI... – Communication description.* User manual for domat.exe and detailed description of the room unit functions find in the document *Room units configuration – User manual.*

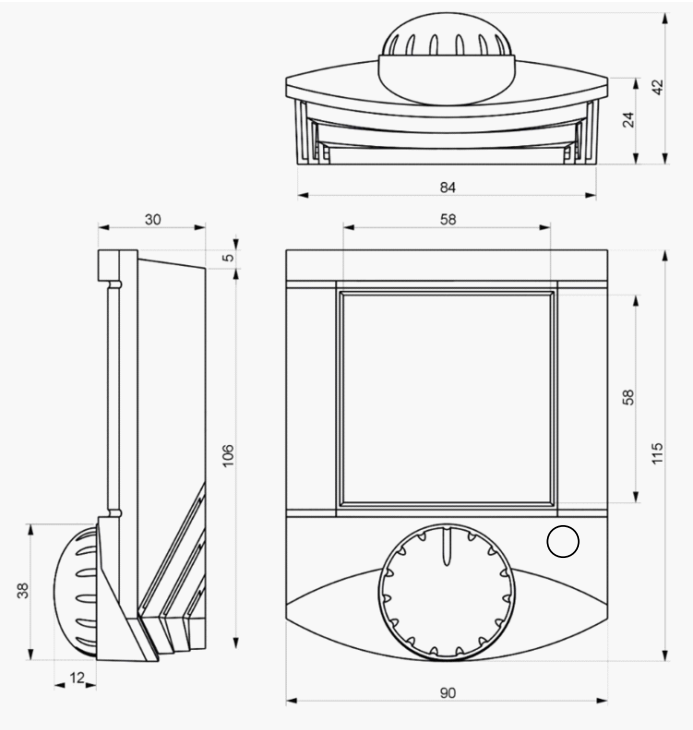
Display

A large (60 x 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

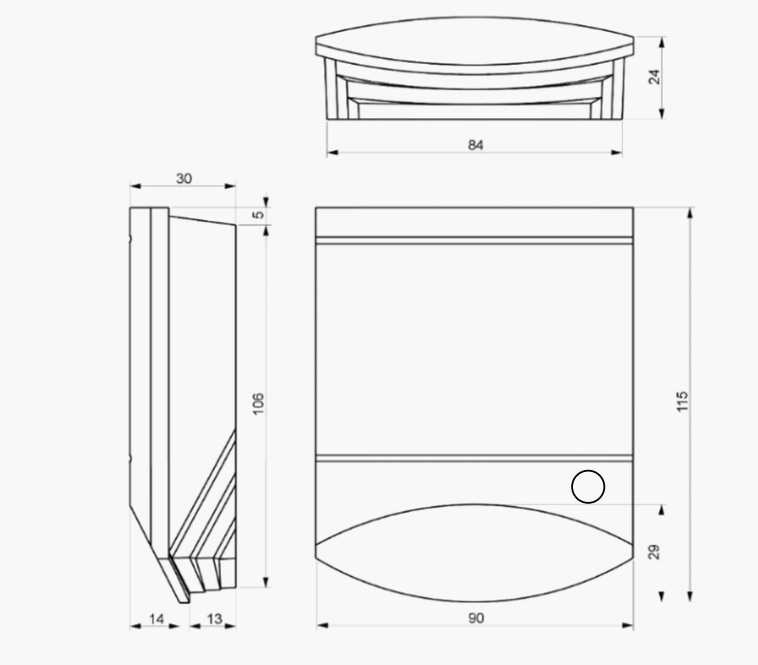
LCD symbol set

Dimensions

UI319, UI319BL



UI319DK



All dimensions in *mm*.

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.

Changes in versions	09/2020 — First datasheet version. 10/2023 — Change of the logo

UI416 Solar irradiation integrator

Summary **UI416 calculates cumulated energy on an area unit based on actual irradiation value. The cumulated energy is used for long-term efficiency calculations of a PV plant operation. The energy may be read at the pulse output to be processed in an external pulse counter, or may be directly read out over a bus – the communication protocol is Modbus RTU / RS485.**
Different versions of unit may contain display, backlight and knob:

Application

- **PV monitoring systems**
- **Integration of any analogue value represented by a 0...10 V signal**

Function

The solar radiation integrator acquires input voltage which is proportional to the solar radiation intensity from an external sensor with 0...10 V output (must be ordered separately). The actual intensity in kW/m2 is displayed at the LCD display. This value is integrated in time once per second and available at the potential free output as pulses which are proportional to the energy corresponding to 1 m^2 of the measured area. The output pulses may be brought to any counting device which cumulates the resulting energy. The cumulated values are used for comparison to the real plant production to determine both short-term and long-term efficiency of the plant.

All actual and cumulated values are available at the open RS485 bus. The protocol used is Modbus RTU and therefore the UI416 integrator may be connected to most of the PLC and SCADA systems on the market. See table below for register description. The most important available values are:

Daily cumulated energy
The integration starts at midnight (00:00) and its value increases throughout the day. At next midnight (24:00) it is copied to the Last day cumulated energy and then reset to zero.

Last day cumulated energy
For the next 24 hours it contains the accumulated energy of yesterday. This is for comfortable readout of the daily cumulated energy.

Total energy
This value integrates the total cumulated energy since commissioning of the device. The value is backupped by a battery.

In the registers, another set of values is calculated:

Cumulated energy above the irradiation limit
This register integrates only if the actual irradiation exceeds a predefined limit (settable over the bus as an analogue value, default 300 W/m^2). This cumulated value is useful because the inverters start operation only above certain irradiation level, and the measuring errors caused by night residual light cumulation are avoided.

Cumulated energy when inverters active
This register integrates only if the integration is enabled by a binary value written over the bus from a PLC or another Modbus master. The binary value indicates operating inverters and thus the comparison of the real produced energy (read at the inverters or at the main meter) and this value gives an image of efficiency of the inverters and distribution components.

The integrator contains real time clock backupped by a battery. There is also integrated thermometer on the PCB, the value of which is available on the bus. The temperature may be used as informative value for monitoring of enviromental conditions at the installation place (switchboard, transformer room etc.).

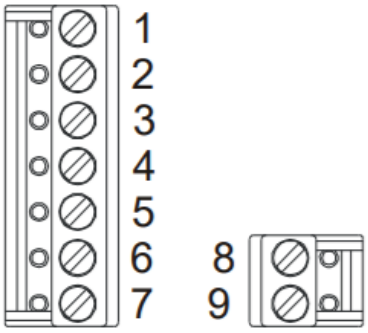
The constant of Wh/m2 is changeable and therefore the integrator may be used with various sensor types and even for integration of another values than solar irradiation.

Technical data

Power supply	24 V AC/DC ±20 %, 1.5 W
Temperature measuring range	-20...55 °C (accuracy ±1 ˚C)
Humidity measuring range	10...90 % rH (accuracy ±3 %)
Protection degree	IP20 (EN 60529 + A2:2019)
Analog input for exposure sensor	1 × AI (0...10 V, input resistance 10 kOhm)
Measuring range	adjustable, 10 V corresponds to 1...65 000 W/m^2 default value is 0…10 V corresponds to 0…1300 W/m^2
Measuring principle	integration of current exposure 1/s corresponds to EN 61724 photovoltaic system performance control - Guidelines for measurement, data exchange and analysis

Digital output	1 × DO SSR solid state relay, for load 60 V / 550 mA AC / DC
	AC1 - non-inductive load 400 mA
	AC3 - motor, 50 mA AC
	AC1 - ballast, 125 mA AC
	ČSN EN 60947-4-1
	galvanic insulation 1 kV
Output pulses	pulse output 1 or 10 Wh / m2 (DIP switch setting)
	fixed pulse length 100 ms
Setpoint setting	using the ModComTool configuration program
Communication	RS485 - Modbus RTU, slave
	selectable speed 1200 ... 115200 bps, parity and bits are set in service SW
	default 9600/N/8/1
	the interface is optically separated 1 kV
Display	LCD 60 × 60 mm
Terminals	screw terminals for conductors 0.14…1.5 mm^2
Cover	ABS, RAL9010
Weight	0.13 kg
Dimensions	90 × 115 × 24 mm, see below
Ambient conditions	from -20…50 °C; 5…85 % relative humidity; non-condensing gases, chemically non-aggressive conditions, fog, ice and frost (according EN IEC 60721-3-3 ed. 2:2019 climatic class 3K22, 1K21, 3M11)
	for installation at high altitude, it is necessary to consider the reduction of dielectric strength and a limited cooling air (EN IEC 60664-1 ed.3: 2020)
Storage conditions	5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN IEC 61000-6-2 ed. 4:2019, EN IEC 61000-6-4 ed. 3:2019 (industrial environment)
	electrical safety EN IEC 62368-1 ed. 2:2020+A11:2020
	hazardous substances reduction EN IEC 63000:2019

Terminals

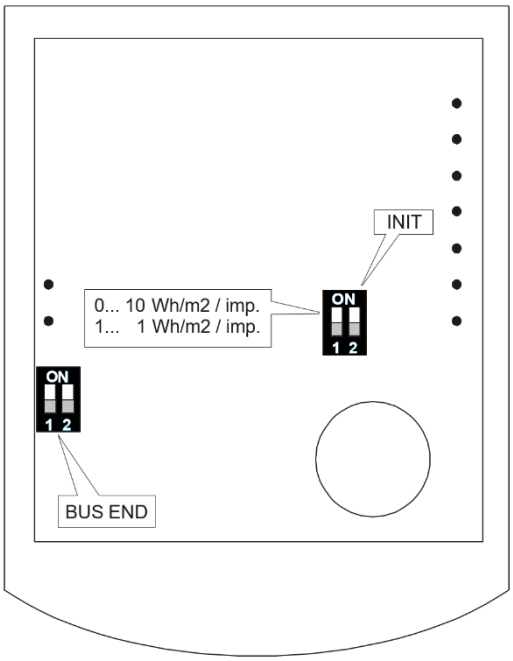


1: AI1 input 0...10 V for exposure intensity sensor
2: AGND
3: DO1 A pulse output (SSR relay)
4: DO1 B pulse output (SSR relay)
5: G0 supply (-), input - reference point
6: G0 supply (-), input - reference point
7: G power supply (+)

8: K - RS485 communication
9: K + RS485 + communication

Terminals 5 and 6 (supply ground) and 2 (input ground) are galvanically connected. We recommend powering the UI416 from the same source as the exposure sensor.

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

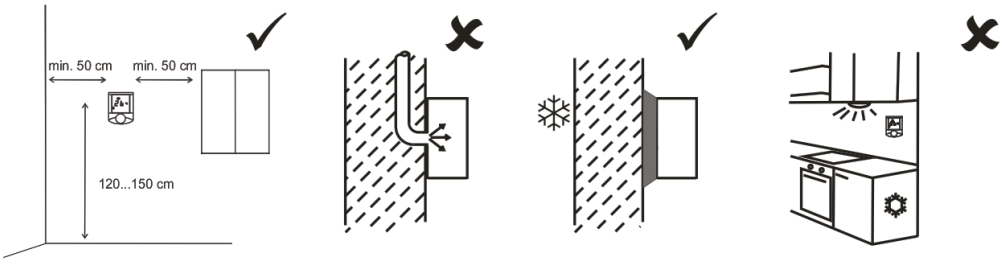
USR: in position 0 the output gives 10 Wh / m2 per pulse (normal setting), in position 1 the output gives 1 Wh / m2 per pulse (usually for tests)

INIT: sets the device to the default communication parameters: Modbus address 1, baud rate 9600 bps.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refrigerators, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

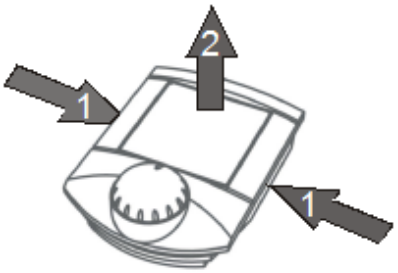


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Communication

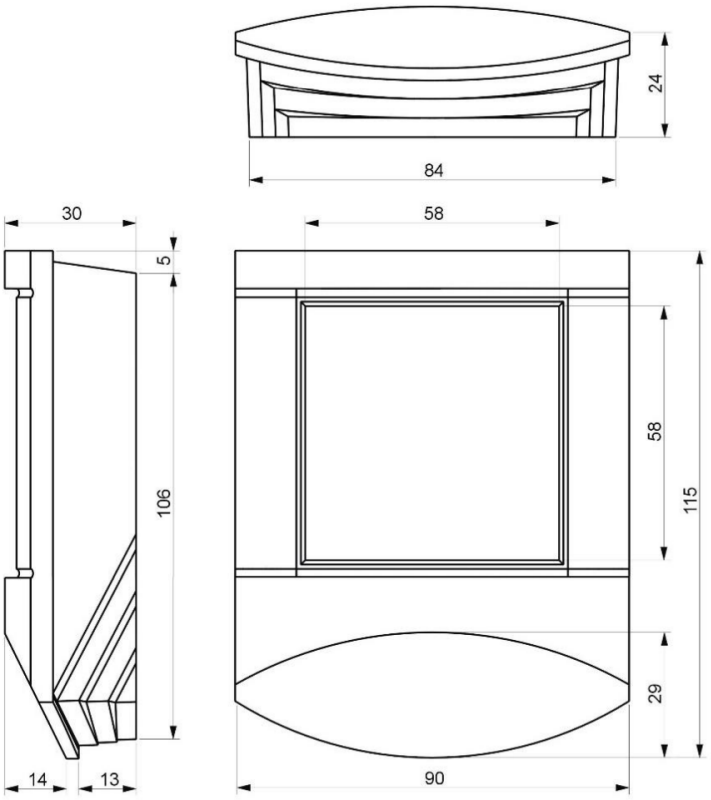
The units communicate with a controller (master) over RS485 using Modbus RTU and thus they can be used in a number of control and SCADA systems. The register description is available in a separate document *Room units UI... – Communication description.* User manual for domat.exe and detailed description of the room unit functions find in the document *Room units configuration – User manual.*

Display

A large (60 × 60 mm) display clearly shows actual room temperature and controller status with 7-segment digits and standard Day, Night, Off, and Time scheduler symbols. Active output is indicated by a heating symbol. In the upper part, there are week days used for time scheduler setup. Other symbols are not used.

LCD symbol set

Dimensions **UI416**



All dimensions in *mm*.

WEEE notice The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions	01/2022 – First datasheet version.

US100

Communicative heating controller with sunblind control

Summary **US100 is a communicative room heating controller with one PWM output for control of a radiator or electrical heater, and two digital outputs for sunblind motor control. It can work autonomously, or in connection to a primary controller (MiniPLC or SoftPLC), or to a building management system (RcWare Vision or any SCADA).**

Application

- **Systems with radiators, or electric heaters – control and measuring of room temperature, sunblind manual control and central override**
- **monitoring and communication of room temperatures**

Function

The controller reads actual room temperature, setpoint set by the pusbuttons, and set operation status which is set by short push of the central button. The room temperature is measured in the range of -20 to +50 °C. Measured and set values are processed in a PI algorithm, at the output of which there is a PWM controlled triac. All values are displayed on a large LCD display.

The output works either as PWM controlled by a PI controller, or on/off (thermostat). The functionality and control parameters, i.e. P and I constants, and hysteresis, can be set with **ModComTool**, the configuration software, which is free to download at http://domat-int.com/en/downloads/software.

The digital input may be configured as a window contact (switches to Off) or presence contact (switches to Standby/Night). It may be set as normally open or normally closed.

The sunblinds are controlled by the „up“ and „down“ buttons. It is possible to control the sunblind operation as central building function, such as „fully closed“ at night time, „fully open“ at strong wind, etc. Those commands must be programmed in the BMS and communicated over the RS485 bus to the controller.

The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

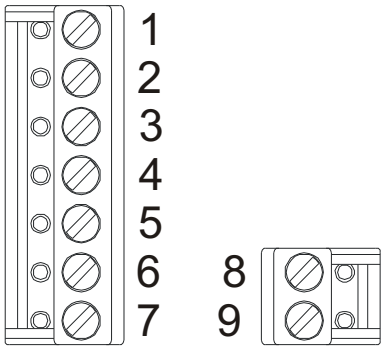
The Change-over function (communicated over the bus) switches to the cooling mode while cooling setpoints come into effect. This mode is used when heat pumps with change-over mode are installed. The change-over signal is read from the heat pump interface or a thermostat at the supply water piping, and is transmitted to the controllers over MiniPLC, UCWEB, or any Modbus master. See *Room units and controllers, Communication protocol description* handbook for register addressing and communication examples.

The communication bus is Modbus RTU over RS485, therefore the controllers are easily to integrate into any SCADA or BMS system.

Technical data

Power	24 V AC +/- 10%
Consumption	1,5 W + peripherials (ca. 5VA)
Measuring range	-20 ÷ 50 °C
Protection	IP20
Sensor accuracy	according to DIN IEC 751, Class B
Output - heating	1x solid state relay, zero switching, for AC load, 24 V AC against G0, max. switching current 0,4A; recommended thermic actuators are Siemens STA71, Danfoss TWA (24V types) etc.
Outputs - sunblinds	2x solid state relay, zero switching, for AC load, 24 V AC against G0, max. switching current 0,4A
Input	24 V AC, 7.5 mA
Setpoint correction	according to configuration, +/- 10 to +/- 1 K
Communication	2 wire RS485 - Modbus RTU, slave, optically separated, 1200...115200 bps, bus end switches
Display	LCD 60 x 60 mm
Terminals	screw terminals for 0.14 – 1.5 mm^2 wires
Cover	ABS, similar to RAL9010
Weight	0.13 kg
Dimensions	see below

Terminals



Terminals as seen from above in the bottom part:

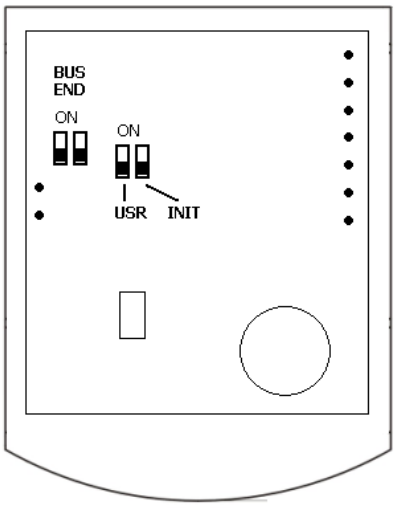
1: DI1 presence / window contact input
2: DO1 heating valve output
3: DO2 blinds up output
4: DO3 blinds down output
5: G0 power, input, outputs – reference point
6: G0 power, input, outputs – reference point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

Motor connection

Note that the triac outputs must not be connected directly to the sunblind control motor. They are low-power, low-voltage outputs. Consult the sunblind power control unit manual if you want to connect US100 to the sunblind control unit. Use **ME200**, the relay power module, to control the sunblind motors directly.

DIP switches



Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

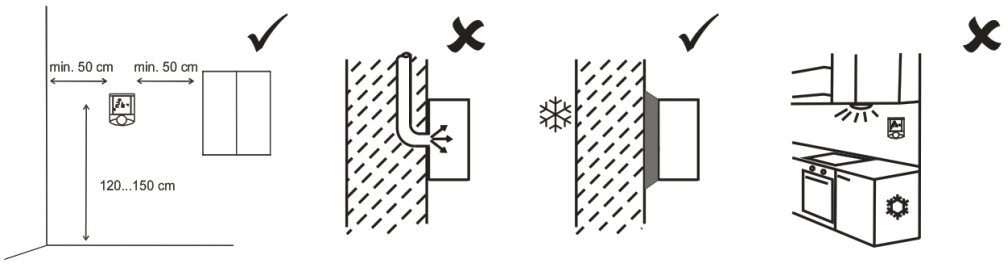
INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600. To init, proceed as follows:
- connect the device over RS485 to a PC with ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the **ModComTool** tool, open the controller window
- click the Init button in the tool
- remove and apply power.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom

should be installed and cabling connected first, and the upper part inserted after the construction workshave been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

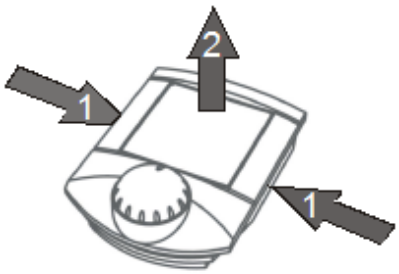


Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several milimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Settings

Temperature correction:

Push the right button to increase setpoint, push the left button to decrease setpoint. The maximum correction range can be modified over the bus e.g. with the ModComTool configuration tool.

Sunblind controls:

Push the up / down button shortly to change the slat angle. Hold the up / down button (>1.5 s) to travel the sunblind up / down. Push the down / up button to stop travelling. The triacs are deenergized after the sunblind reaches its terminal positions; the travelling time is configurable with 70 secs default.

It is possible to set and read the sunblind position (0...100 % of travelling time) over the bus. See Modbus register description.

Operation mode change:

Push the central button shortly (<1 s). Each push changes the operation mode to Party – Day – Night – Off – Auto.

In the Auto mode, the Day / Night / Off modes change according to time schedule.

The Party mode overrides to Comfort for 120 minutes, then follows the actual time schedule.

The weekly time schedule switches between Day, Night, and Off modes according to the event list. There may be up to 6 events per day.

Time schedule settings:

Switch to the time schedule settings mode with a long central button push (>1 s). The controller switches to settings mode (clock icon).

Push the left / right buttons to select the weekday (1 to 7). Then short push central button to confirm the selection. Push the left / right buttons to select the event (large number 1 to 6). Each event displays the mode activated by this event.

Short push the central button to confirm the event selection. Push the left / right buttons to select the operation mode (Day, Night, Off, Event inactive) invoked by this event. If the event is not active, the operation mode is not changed at the set time.

Short push the central button to confirm the operation mode setting. The event time displays. Push the left / right buttons to set the time of the event and confirm by a short central button push. Then push the left / right buttons to select another event or long push the central button and push the left / right buttons to select another weekday.

After all desired events have been edited, long push the central button to leave the time schedule settings. The controller goes to the basic display mode also after 30 secs of user inactivity.

Change of setpoints and controller time:

Switch to the settings mode with a superlong central button push (>2.5 s). The controller switches to settings mode (flashing thermometer icon).

Pushing the left / right buttons selects between following settings:
Controller time and day of week (Clock icon, Day of week)
Setpoint temp. Heating Day mode (Temperature, Heating, Day are flashing)
Setpoint temp. Heating Night mode (Temperature, Heating, Night are flashing)
Setpoint temp. Heating Off mode (Temperature, Heating, Empty house are flashing)
Setpoint temp. Cooling Day mode (Temperature, Cooling, Day are flashing)
Setpoint temp. Cooling Night mode (Temperature, Cooling, Night are flashing)
Setpoint temp. Cooling Off mode (Temperature, Cooling, Empty house are flashing)

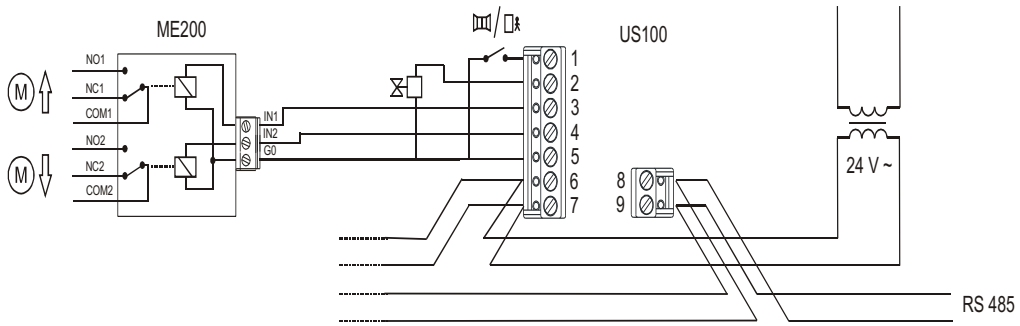
Select the requested value by a short central button push. Push the left / right buttons to change value. Confirm by a short central button push again.

If there is no user activity for 30 s, the controller goes to the basic display mode.

Default values:

The default values as well as all other settings (PI parameters, address, baudrate...) can be set by the configuration program, *ModComTool*.

Connection



Connection of power, communication, motors, and valve. Suitable cable types for low -voltage installations are LAM DATAPAR 2x0.8 (cross-section in mm^2), JYTY 2x1 (diameter in mm) etc. If communication and power are in the same cable, use 4-core LAM DATAPAR 2x2x0.8, JYTY 4x1. Up to 100-120 meters, parallel lines of 24 V and data bus are no problem. Regarding to EMC it is better if the pairs are twisted, such as with the LAM DATAPAR or Belden 8205 cable.

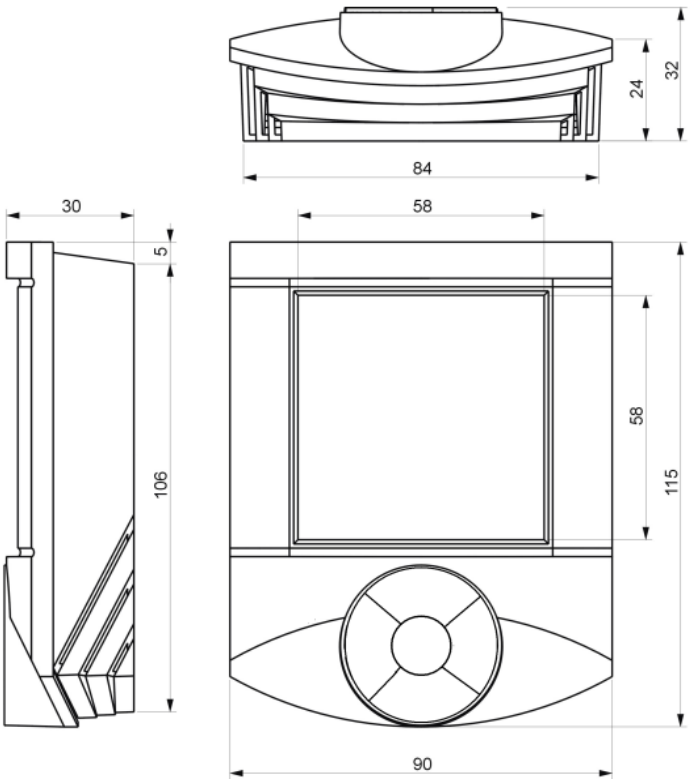
A terminal is designed for maximum 3 wires of 0.8 mm^2. With cable types as above, maximum (starting) power of the controller and valve of ca. 7 VA and acceptable voltage drop of max. 15 %, the maximum cable length for 10 controllers is about 50 m.

If the controllers and valves are at higher distance than 50 m from the transformer or more valves are connected to the transformer (max. 2 valves per controller), it is more suitable to supply the controllers locally. The RS485 bus is galvanically separated and connects all controllers, regardless of the way they are powered.

Temperature compensation

After switching the unit on, allow about 90 mins to dissipate the heat inside of the housing. Then the sensor is measuring correctly. Do not change the sensor correction variable immediately after powering the device on!

Dimensions



All dimensions in *mm*.

WEEE notice The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in version	09/2016 — Changed the format and reference to the configuration software. 03/2017 — Added picture and description of the installation and link on the datasheet with other colours. 05/2018 – Change technical data. 10/2023 – Added *Safety note*, change of the logo, stylistic changes.

domat
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UX0…

Communicative room units with sunblind control

Summary **The UX... room unit range is a family of universal communicative human-machine interface for control of HVAC units and plants, IRC controllers, and blinds. The units communicate over Modbus RTU / RS485 and they can be used as open system components with majority of building control system and controllers.**

Application

- **rooms with heating / air conditioning and sunblinds.**
- **systems with fancoils, convectors, floor and radiator heating, AHUs, air conditioning units.**
- **control of boilers, DHW, heating circuits, building controls in general**
- **monitoring of room temperature and humidity**
- **with a SCADA system: temperature, humidity and status recording, remote control.**

Function

The units acquire temperature and optionally relative humidity in room, temperature correction (left / right button), sunblind correction (up / down button) and required operation status (central button or in the menu). In the configurable menu following values can be set and displayed:

- temperature, actual temperature correction
- humidity (actual value only at room units containing the humidity sensor)
- time (only display at room units with RTC)
- basic setpoint - day
- basic setpoint - night
- outside temperature for heating enable
- DHW temperature
- heating curve type (1...4)
- operation mode (Residential with Day, Night, Time schedule, Off, or Hotel / Office with Comfort, Standby, Party, Off)
- fan stage (Auto, Off, St.1, St. 2, St. 3)

- A/C mode (Auto, Heating, Cooling, Off, Fan only)
- weekly scheduler: 7 days, up to 6 events per day
- another 5 variables (air quality, fan speed etc.) – each has a profile where max. and min. values, step, number of decimals, and symbol set are defined.

It is also possible to set / reset any of the LCD symbols on the display over Modbus.

- The multifunction button set has three basic functions:
- instant edit (left / right button) – settings of one predefined analogue value, usually room temperature correction
- sunblind up / down (up / down button) – control of two digital outputs with sunblind control functionality (slat angle, up / down, move to end positions)
- quick edit (short push of the central button) – change of predefined state, e.g. Presence (Comfort / Standby / Off), Air condition (Auto / Heating / Cooling / Fan only / Off) etc.
- long push of the central button – jump to menu where values are listed by left / right buttons, short push selects the value to be edited, and the value is changed by left / right buttons followed by short push for confirmation.

After definable inactivity time, the display goes back to its basic state with rolling display of selected values (e.g. actual temperature and humidity).

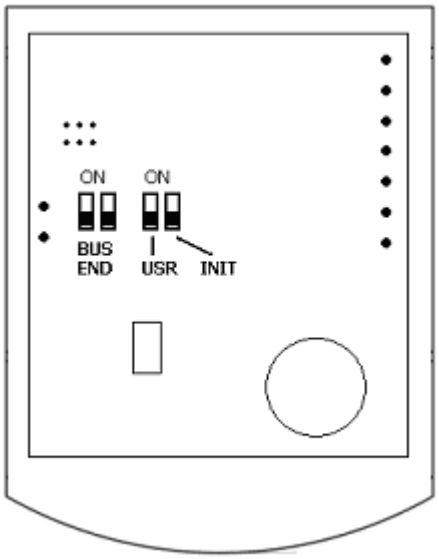
The unit Modbus address and functionality is defined over the RS485 interface with service software **ModComTool** which is free for download at **http://domat-int.com/en/downloads/software**. To interface the room unit to the computer use the USB/485 converter **M080**, RS232/RS485 converter **R012**, or any suitable RS485 converter.

Technical data

Power supply	24 V AC +/- 10%
Consumption	1.5 W
Temperature measuring range	-20 ÷ 70 °C, accuracy according to DIN IEC 751, Class B
Humidity measuring range (selected types only, see table below)	10 ÷ 90 %rH (30-70% +/- 3.5%, 10-90 +/- 4.5%)
Protection	IP20
Inputs	1x for dry contacts, 24 V AC, 5 mA
Outputs	3x solid state relay, zero switching, AC load, 24 V AC, maximum switched current 0,4 A Use ME200 relay module for power switching of the sunblind motors.
Communication	RS485 - Modbus RTU, slave, selectable speed 1200 ... 115200 bps, N,8,1 The interface is optically separated.
Display	LCD 60 × 60 mm, symbol set see above
Terminals	screw terminals for wires 0.14 – 1.5 mm^2

Cover	ABS, RAL9010
Weight	0.13 kg
Dimensions	see below

DIP switches



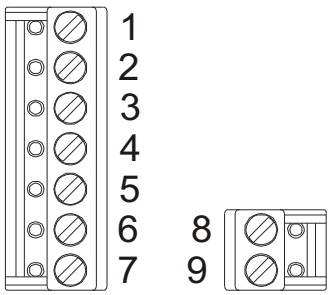
Back of the PCB

BUS END: if ON, the bus is terminated (if last device on the line)

USR: not used, reserved for future applications

INIT: sets the controller into default state and sets bus address to 1, baud rate to 9600. To init, proceed as follows:
- connect the device over RS485 to a PC with domat.exe config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool tool, open the controller window
- click the Init button in the tool
- remove and apply power.

Terminals



UX0...: 1 binary input, 3 binary SSR outputs

1: DI1 input 1
2: DO1 output 1, 24 V AC against G0
3: DO2 output 2, 24 V AC against G0 – sunblind up
4: DO3 output 3, 24 V AC against G0 – sunblind down
5: G0 power, outputs, input – common point
6: G0 power, outputs, input – common point
7: G power

8: K- communication RS485 -
9: K+ communication RS485 +

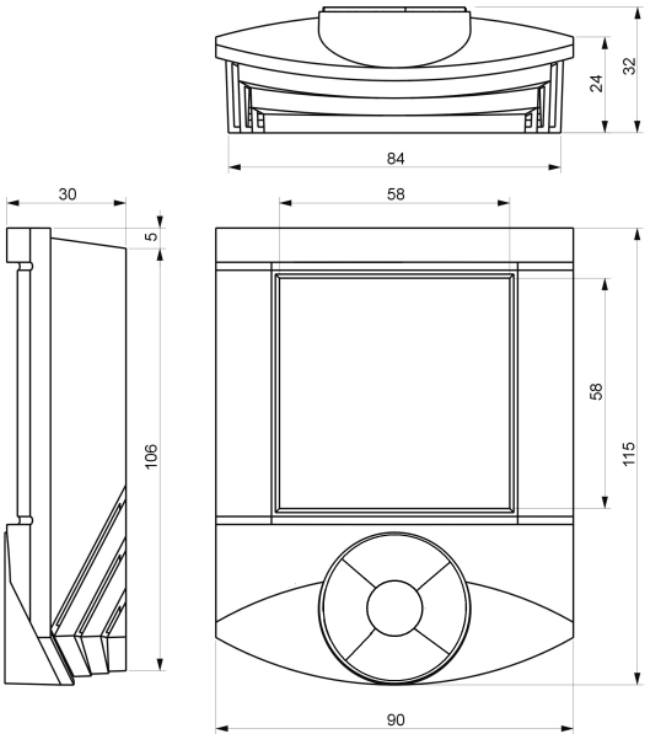
Type table

Type	LCD	5 buttons	DI	DO	t	rH	RTC
UX011	✓	✓	**1**	**3**	✓		
UX015	✓	✓	**1**	**3**	✓		✓
UX041	✓	✓	**1**	**3**	✓	✓	
UX045	✓	✓	**1**	**3**	✓	✓	✓

RTC... real time clock

Process control algorithms (evaluation of the temperature sensor and digital input DI1, activating of the DO1 output by increased / decreased temperature, humidity etc.) and central sunblind override must be implemented in the master controller.

Dimensions

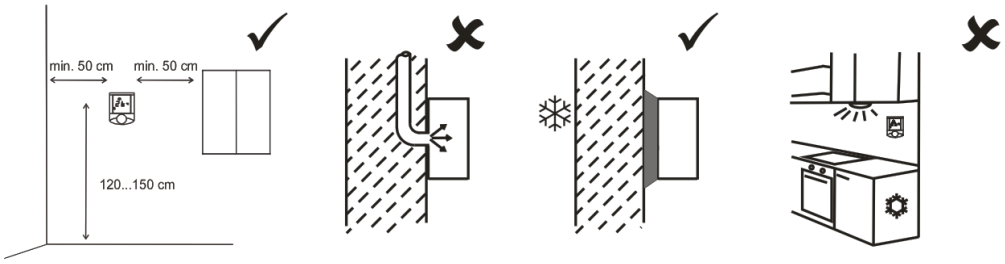


All dimensions in *mm*.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature and humidity, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refridgerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 50 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.



Opening the cover

When removing the display part, proceed as follows:

- press gently the side parts of the unit and pull the right of the display part by several millimeters
- pull the left of the display part
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.

Display

Over Modbus, it is possible to set / reset the complete symbol set except for the 7 segment digits, „Error“ and „Setting“ texts, and symbols of °C, °F, %, and rH. Those are part of the configurable menu profiles. The register description is available in a separate document *Room units UI... – Communication description.*

The integrated temperature sensor range is -20 to +70 °C. Read and entered values are available at the RS485 bus where a controller or SCADA reads them. The supervising system can also write values to the unit (operation mode, fan stage, etc.), which are displayed on a large LCD display. Models with digital inputs and outputs also have those data available. It is possible to control the sunblind operation as central building function, such as „fully closed“ at night time, „fully open“ at strong wind, etc. Those commands must be programmed in the BMS and communicated over the RS485 bus to the room unit. A control algorithm must be implemented in the master; for independent communicative control use the UC..., FC... controllers.

RoHS notice The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

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.

Changes in versions	09/2016 — Changed the format and reference to the configuration software. 03/2017 — Added picture and description of the installation. Add link on the datasheet with other colours. 05/2018 – Change technical data. 10/2023 – Change of the logo