domat
control system

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, other colours
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
EU legislation	Council Directive 2014/35/EC, The Low Voltage Directive (LVD)
	Council Directive 2014/30/EC, Electromagnetic Compatibility (EMC) Directive
	Council Directive 2011/65/EC, RoHS2 Directive

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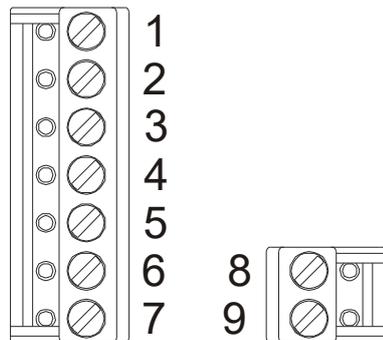
1: DI1 presence input (dry contact, against G0)
2: DI2 window contact input (dry contact, against G0)
3: DO1 heating valve output (against G0)
4: DO2 cooling valve output (against G0)
5: G0   power, output – reference point
6: G0   power, output – reference point
7: G   power
8: K-   communication RS485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

DIP switches
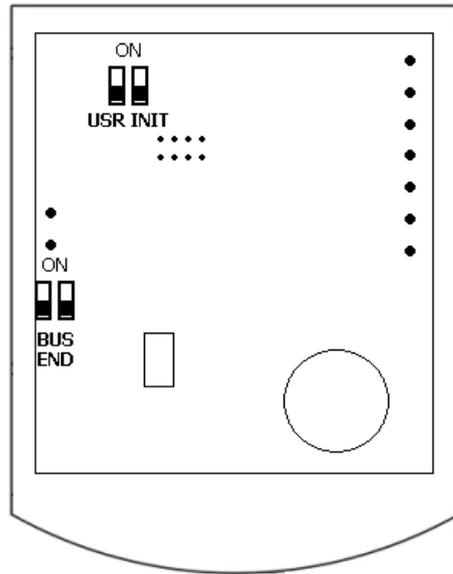
Back of the PCB

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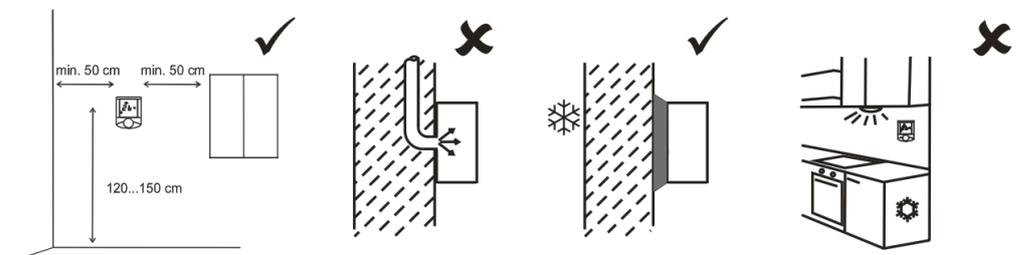
To init, proceed as follows:
- connect the device over RS485 to a PC with ModComToolconfig tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTooltool, open the controller window
- click the Init button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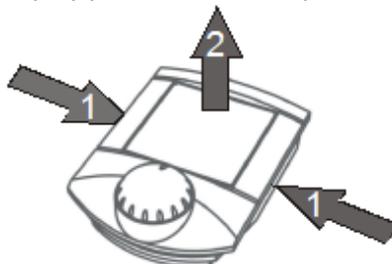
Operation

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.
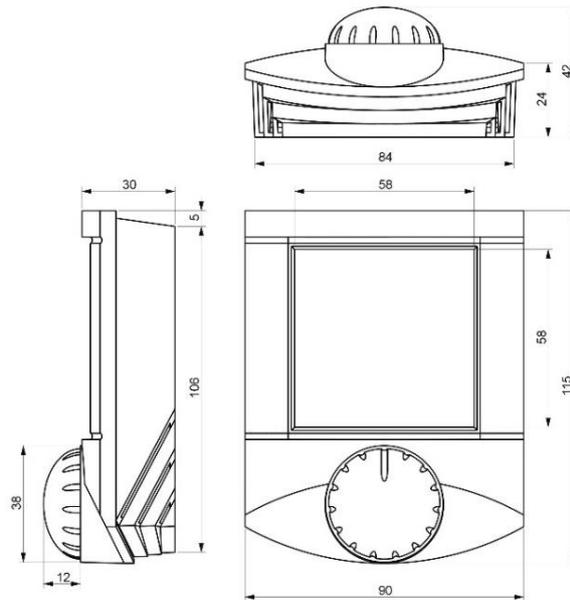
Display

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.
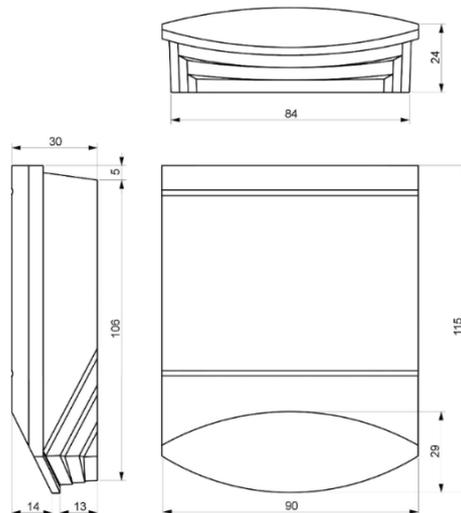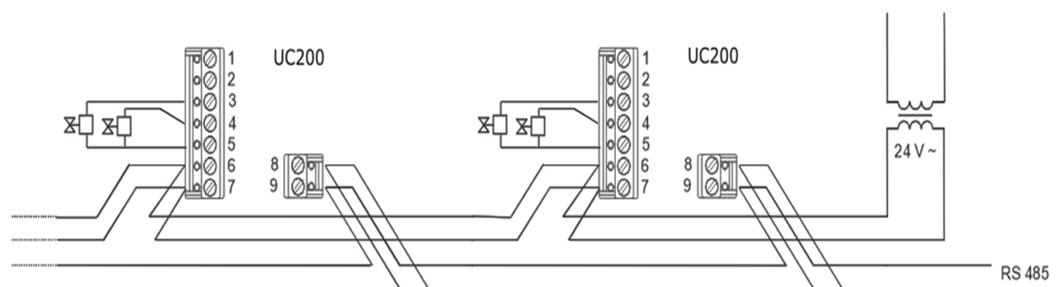
LCD symbol set

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.
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

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.