domat
control system

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 (MiniPLC or SoftPLC), building management system (RcWare Vision or any SCADA), or to UCWEB – the web interface.

UC300 – basic version with display and knob
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**

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.

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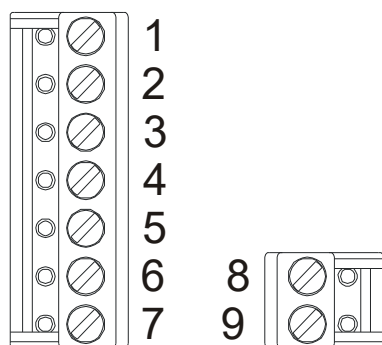
The controller contains real time clock with a weekly scheduler (6 events per day). It changes between three operation modes: Day, Night, and Off. A short push in the Night mode switches to Party mode – Comfort extension by 2 hours.

The 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

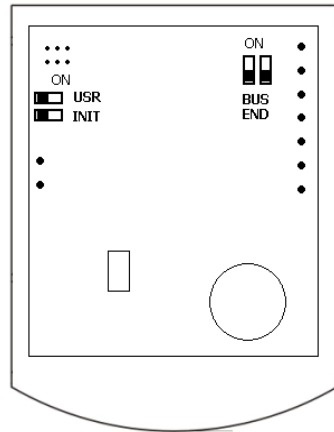|	
Power	24 V st +/- 10%
Consumption	1,5 W + periferie (cca. 5VA)
Measuring range internal sensor	-40 ÷ 125 °C
Measuring range external sensor	-50 ÷ 150 °C
Ambient temperature for controller	0 ÷ 50 °C (display illegible at lower temperatures)
Protection	IP20
Sensor accuracy	+/- 1,5 K (with software correction)
Outputs	1x solid state relay, zero switching, for AC load, 24V AC, max. switching current 0,4A; recommended thermic actuators are Siemens STA71, Danfoss TWA (24V types) etc.
Inputs	1x digital input for presence or window contact
	1x analogue input for external temperature sensor Pt1000
Setpoint correction	according to configuration, +/- 10 to +/- 1 K
Communication	2 wire RS485 - Modbus RTU, slave, optically separated, 1200 ... 115 200 bps
Display	LCD 60 x 60 mm
Terminals	screw terminals for 0,14 – 1,5 mm² wires
Cover	ABS, RAL9010, other colours
Weight	0,13 kg
Dimensions	see below

Terminals

Terminals as seen from above in the bottom part:

1: K-   communication RS485 -
2: K+   communication RS485 +
3: DO1   heating valve output
4: DI1   presence /window input
5: G0   power, output – reference point
6: G0   power, output – reference point
7: G   power

8: AIN   external temperature sensor Pt1000
9: AGND external temperature sensor Pt1000

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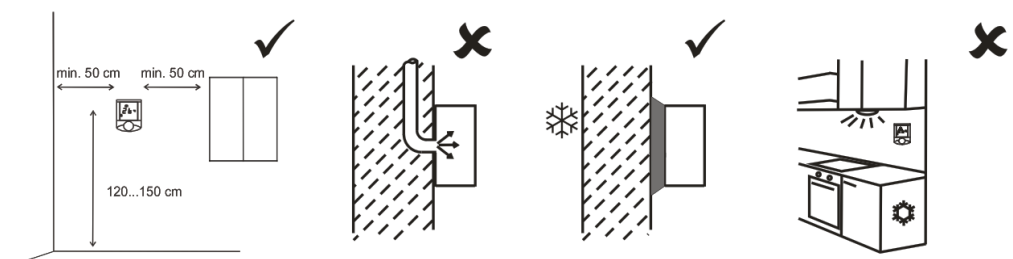- connect the device over RS485 to a PC with the ModComTool config tool
- set INIT to ON
- apply power (use only the connector without bottom)
- find the controller in the tool (Scan)
- set INIT to OFF
- in the ModComTool, open the controller window
- click the Init button in the tool
- remove and apply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

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.
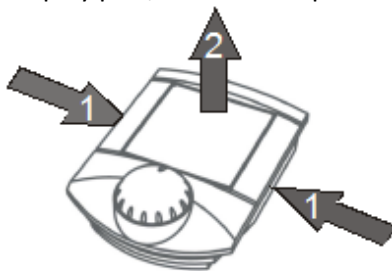

Opening the cover

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 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.
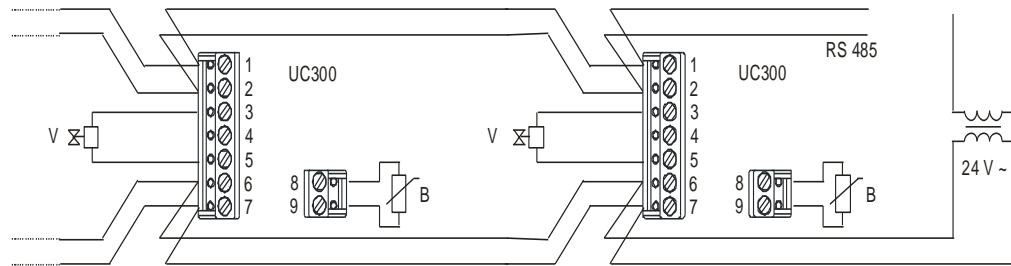
Display

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.

LCD symbol set

Connection

V   thermic valve 24 V AC
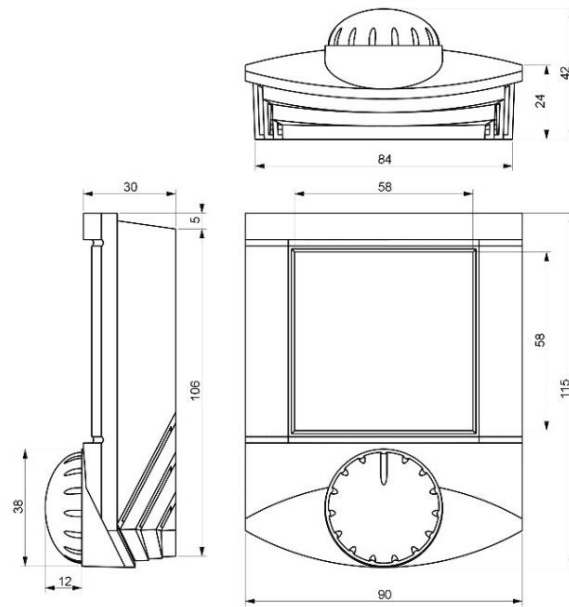B   floor temperature sensor, Pt1000, e.g. domat HTF

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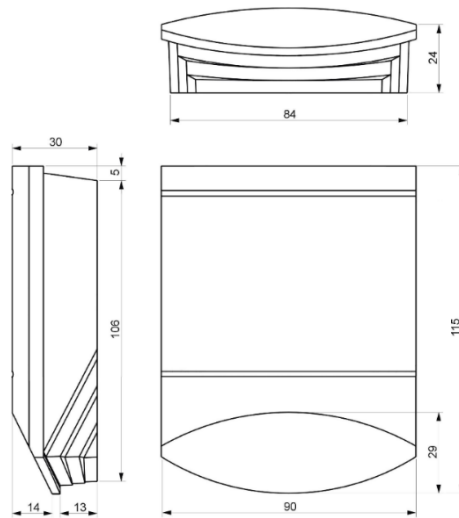
If the controllers and valves are at higher distance than 50 m from the transformer or more valves are connected to the transformer (max. 2 valves per controller), it is more suitable to supply the controllers locally. The RS485 bus is galvanically separated and connects all controllers, regardless of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

Dimensions   **UC300**

UC300/DK

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

02/2015 — Changes in measuring ranges, configuration tool program, web pages for downloading software and related products.
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.
10/2017 — Added Safety note, description UC300/DK version, change pictures.
05/2018 – Technical data change.
01/2019 – Technical data change.