domat
control system

FC013   Communicative fan coil controller for EC motors

Summary

FC013 is a communicative controller of heating and cooling panels and an EC (electronic commutator) motors or a VAV (variable air volume) damper. It measures temperature in the room using a room unit and it may either work autonomously, or be connected to a primary controller (MiniPLC/markPLC) or SCADA (RcWare Vision or any other SCADA able to act as Modbus master). As a room unit, UC013 is used.

Application

- **Individual room control for systems with heating and cooling panels and EC motors or VAV dampers**

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 output, there are analogue 0..10 V sequences to control the valve actuators and EC motors or VAV controller.

The binary input DI1 switches between Comfort and Standby operating modes. The DI2 switches to Off mode. The triac outputs DO1 and DO2 can be controlled over the bus as auxiliary outputs.

The controller incorporates real time clock with weekly scheduler (6 events per day). It switches between the Comfort, Precomfort, and Off operation modes. There is a binary presence input on the controller for access card reader, PIR sensor etc. 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:

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to the basic setpoint, the manual setpoint correction is added, and the result is used as actual setpoint for heating or cooling.

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 *Room units and controllers* (http://domat-int.com/en/downloads/technical-documentation/modbus-tables). Another bus, K2, communicates with the room unit. To configure and commission the controller use **ModComTool**, which is free to download at http://domat-int.com/en/downloads/software.

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 +/- 10%, 16...35 V DC (AC power necessary for optional DO control)
	Consumption	3000 mVA + peripherials (cca. 6VA)
	Protection	IP20
	Input	2x DI for a dry contact, 24 V AC, 15 mA
	Outputs	3x analogue output 0...10 V, max. 10 mA, short circuit 50 mA, permanent short-circuit proof
		2x solid state relay for AC load, zero switching, 24 V AC against G0, max. current 0,4 A
	Communication	to room unit: RS485 - Modbus RTU, 9600, N, 8, 1, master
		to BMS: RS485 - Modbus RTU, 9600, N, 8, 1, slave
	Installation	2 screws, optionally DIN rail adapter
	Terminals	screw terminals for wire 0,14 – 1,5 mm^2
	Weight	0,3 kg
	Dimensions	75 mm (104 mm with the installation holds) x 90 mm x 24 mm
	CE-conformity	$C\epsilon$

Schema
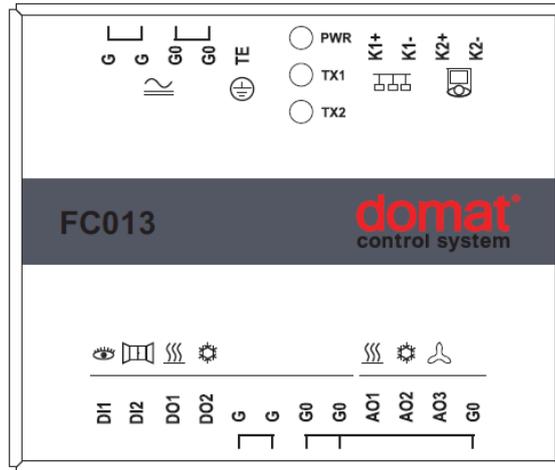
Terminals and connectors:

G	power
G	power
G0	power - common
G0	power - common
TE	optional connection for shielding
K1+	serial link RS485, building management system (BMS) communication, terminals K+
K1-	serial link RS485, building management system (BMS) communication, terminals K-
K2+	serial link RS485, room unit communication, terminals K+
K2-	serial link RS485, room unit communication, terminals K-
DI1	presence input (switches Comfort - Precomfort) against G0
DI2	window contact input (switches to Off) against G0
DO1	digital output (G, against G0)
DO2	digital output (G, against G0)
G	power of inputs and outputs
G	power of inputs and outputs
G0	power of inputs and outputs – common
G0	power of inputs and outputs – common
AO1	heating valve output (0..10 V DC against G0)
AO2	cooling valve output (0..10 V DC against G0)
AO3	VAV controller output (0..10 V DC against G0)
G0	power of inputs and outputs – common

LED indication:

PWR	green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, …)
TX1	red LED – RS485 transmitting data at TX1 (flashing: transmitting data; OFF: no data traffic)
TX2	red LED – RS485 transmitting data at TX2 (flashing: transmitting data; OFF: no data traffic)
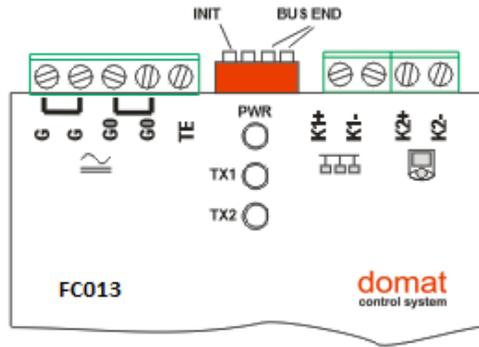
DIP switches:

INIT   If it is DIP4 INIT in position ON at power-on, sets the controller into default state and sets bus address to 1, baud rate to 9600 bps.
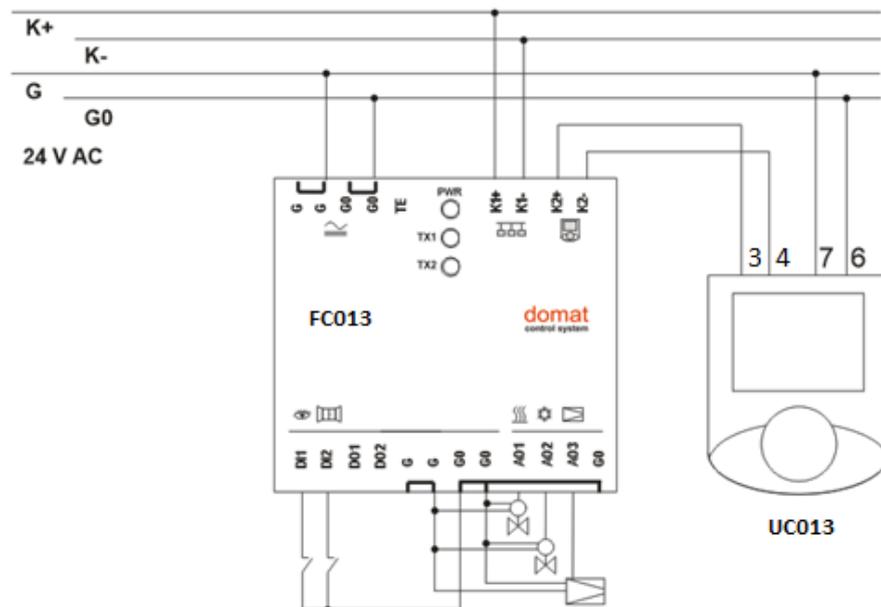
Another function of the INIT switch is to bring EEPROM into default factory settings. To init the EEPROM, proceed as follows:
- connect the device over RS485 to a PC with **ModComTool** config tool
- set INIT to ON
- apply power
- find the controller in the tool (Scan)
- set INIT to OFF
- in the **ModComTool**, open the controller window
- click the INIT button in the tool
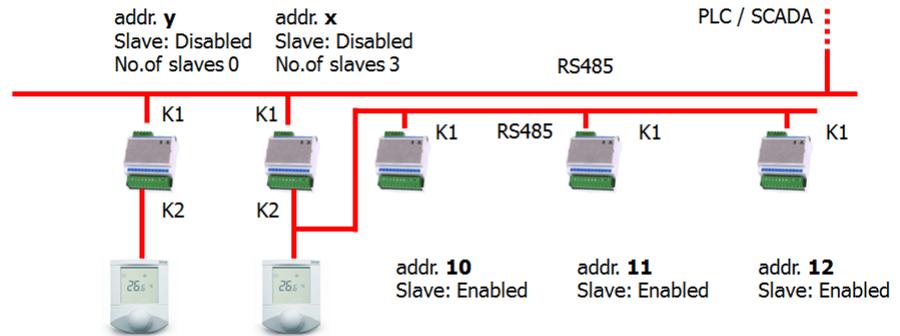- remove and apply power.

BUS END   (DIP1, 2 next to K1+ RS485)bus end; the first and last devices on bus should have bus end ON

Wiring

Master slave

addr. **y**
Slave: Disabled
No.of slaves 0

addr. **x**
Slave: Disabled
No.of slaves 3

PLC / SCADA

RS485

K1   K1   K1   RS485   K1   K1

K2   K2

addr. **10**
Slave: Enabled

addr. **11**
Slave: Enabled

addr. **12**
Slave: Enabled

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**.

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.

Changes in versions   01/2016 — First datasheet version.