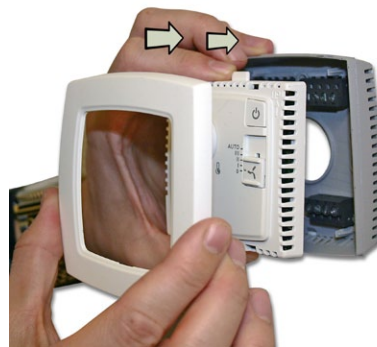# RC-CDFO

Pre-programmed room controller with display, communication and fan button

RC-CDFO is a complete pre-programmed room controller from the Regio Midi series intended to control heating and cooling in fan-coil systems.

- **Awarded design**
- **Communication via RS485 (Modbus, BACnet or EXOline)**
- **Fast and safe configuration via Regio tool©**

- **Simple installation**
- **On/Off or 0...10 V control**
- **Backlit display**
- **Input for occupancy detector, window contact, condensation detector and change-over function**

RC-CDFO is a room controller from the Regio series. It has a button for controlling a three-speed fan (fan coil), display, and communication via RS485 (Modbus, BACnet or EXOline) for integration into systems.

Regio

Regio is a wide series of controllers which handle heating and cooling.

The controllers are divided into three different series, Mini, Midi and Maxi. Mini are pre-programmed, stand-alone controllers. Maxi consists of freely programmable controllers with communication. The Midi group, to which RC-CDFO belongs, are pre-programmed controllers with communication.

Applications

The Regio controllers are suitable in buildings where you want optimal comfort and low energy consumption, for example offices, schools, shopping centres, airports, hotels and hospitals etc.

See application examples on page 4.

Design

The controllers have a modern design. The design has been awarded the 2007 "iF product design award".

Sensor

The controller has a built-in sensor. An external PT1000-sensor can also be used.

Actuators

RC-CDFO can control 0...10 V DC valve actuators and/ or 24 V AC thermal or On/Off spring return actuators.

Easy to install

The modular design with a separate bottom plate for wiring makes the whole Regio series easy to install and commission. The bottom plate can be put into place before the electronics are installed. Mounting is directly on the wall or on an electrical connection box.

Flexibility with communication

RC-CDFO can be connected to a central SCADA-system via RS485 (EXOline, BACnet or Modbus) and configured for a particular application using the cost-free configuration tool Regio tool©. Read more about Regio tool© on page 3.
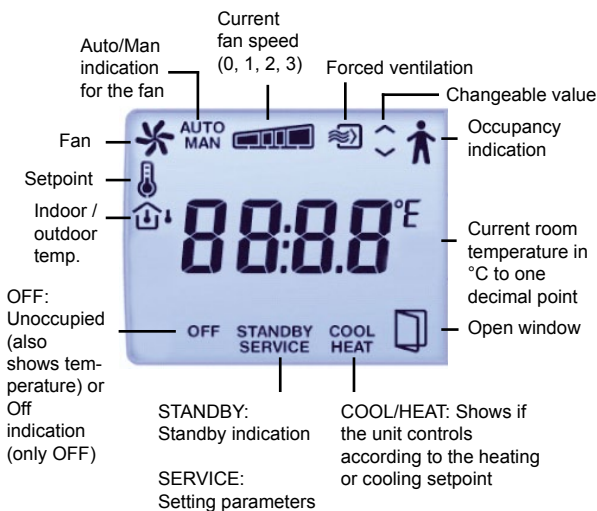
iF product design award 2007

BACnet® · **Modbus** · **EXOline**

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Display handling

The display has the following indications:

Auto/Man indication for the fan

Current fan speed (0, 1, 2, 3)

Forced ventilation

Changeable value

Fan

Occupancy indication

Setpoint

Indoor / outdoor temp.

Current room temperature in °C to one decimal point

OFF: Unoccupied (also shows temperature) or Off indication (only OFF)

Open window

STANDBY: Standby indication

SERVICE: Setting parameters

COOL/HEAT: Shows if the unit controls according to the heating or cooling setpoint

It is possible to set different parameter values in a parameter menu in the display, using the buttons on the controller. You change parameter values with the INCREASE and DECREASE buttons and confirm changes with the Occupancy button.

Occupancy button

INCREASE

DECREASE

Control modes

RC-CDFO can be configured for different control modes/ control sequences:

- Heating
- Heating/Heating
- Heating/Cooling via change-over
- Heating/Cooling
- Heating/Cooling with VAV-control and forced supply air function
- Heating/Cooling with VAV-control
- Cooling
- Cooling/Cooling
- Heating/Heating or Cooling via change-over indication

Operating modes

There are five different operating modes: Off, Unoccupied, Stand-by, Occupied and Bypass. Occupied is the preset operating mode. It can be changed to Stand-by in the parameter menu in the display. The operating modes can be activated via a central command, an occupancy detector or the Occupancy button.

Off: Heating and cooling are disconnected. However, frost protection is still active (Factory setting (FS)=8°C). Operating mode Off is activated on open window.

Unoccupied: The room where the controller is placed is not used for an extended period, for example during holidays or long weekends. Both heating and cooling are limited to a temperature interval with configurable min/ max temperatures (FS min=15°C, max=30°C).

Stand-by: The room is in an energy save mode and is not used at the moment. This can for example be during nights, weekends, evenings etc. The controller is prepared to change operating mode to Occupied if someone enters the room. Both heating and cooling are limited to a temperature interval around the applicable setpoint (FS heating setpoint value=-3°C, cooling setpoint=+3°C).

Occupied: The room is in use and is therefore in a comfort mode. The controller regulates the temperature around a heating setpoint (FS=22°C) and a cooling setpoint (FS=24°C).

Bypass: The temperature in the room is controlled in the same way as in operating mode Occupied. The output for forced ventilation is also active. Bypass is useful for example in conference rooms, where many people are present at the same time for a certain period of time.

When Bypass has been activated by a press on the Occupancy button, the controller will automatically return to the preset operating mode (Occupied or Stand-by) after a configurable time (FS=2 hours). If an occupancy detector is used, the controller will automatically return to the preset operating mode after 10 minutes absence.

Occupancy detector

By connecting an occupancy detector, RC-CDFO can switch between Bypass and the preset operating mode (Occupied or Stand-by). The temperature is then controlled according to requirement, which saves energy and keeps the temperature at a comfortable level.

The Occupancy button

If you press the Occupancy button for less than 5 seconds when the controller is in the preset operating mode, the controller changes to operating mode Bypass. If you press the button for less than 5 seconds when the controller is in Bypass, it changes operating mode to the preset operating mode.

When the Occupancy button is held depressed for more than 5 seconds, the controller changes operating mode to "Shutdown" (Off/Unoccupied), regardless of the current operating mode. Via Regio tool©, you can configure which operating mode, Off or Unoccupied, should be activated on "Shutdown" (FS=Unoccupied). If you press the Occupancy button for less than 5 seconds in Shutdown, the controller returns to Bypass.

Forced ventilation

Regio has a built-in function for forced ventilation. When the digital input for an occupancy detector is closed, the controller will enter into Bypass mode and the output for forced ventilation (DO4) will be activated, thereby opening for instance a damper. The function is ended when the forcing interval (settable) has expired.

Change-over function

RC-CDFO has an input for change-over that automatically resets output UO1 to operate with heating or cooling function. The input can be connected to sensors of the type PT1000 and have the sensor mounted so that it senses the temperature on the supply pipe to the coil. As long as the heating valve is more than 20 % open, or every time a valve exercise is performed, the difference between the media and room temperature will be calculated. The control mode will change depending on the temperature difference.

As an alternative, a potential-free contact can be used. When the contact is open, the controller works with the heating function and when it is closed with the cooling function.

Control of electrical heater

The function for a heating battery on UO1 works in sequence with the change-over on UO2. To activate this function, Parameter 11 is used to set the control mode "Heating/Heating or Cooling via change-over". The change-over function will then be used to switch between summer and winter mode.

UO2 will be used as a cooling actuator in summer mode and a heating actuator in winter mode. In summer mode, RC-CDFO will function as a heating/cooling controller while, in winter mode, it will function as a heating/heating controller. UO2 will initiate first, followed by UO1 (heating battery) second.

The electrical heating battery connected to UO1 will start only if the heat from the ordinary heating battery on UO2 cannot meet the heating demand.

Note that Regio does not have an input for monitoring fan running status and heater overheating. These functions must instead be provided by a supervisory system.

Setpoint

In Occupied mode, the controller operates from a heating setpoint (FS = 22°C), or a cooling setpoint (FS = 24°C) that can be changed using the INCREASE and DECREASE buttons.

Pressing on INCREASE increases the current setpoint by 0.5°C with each press up to the max. limit (FS = +3°C). Pressing on DECREASE decreases the current setpoint by 0.5°C with each press down to the min. limit (FS = -3°C).

Switching between heating and cooling setpoints is done automatically in the controller depending on the heating and cooling requirement.

Built-in safety functions

RC-CDFO has an input for a condensation detector which prevents condensation. The controller also has frost protection. It prevents frost damages by ensuring that the room temperature does not drop below 8°C when the controller is in Off-mode.

Actuator exercise

All actuators are exercised. The exercise takes place at set intervals in hours (FS=23 hours interval). An opening signal is sent to the actuator for as long time as the run time has been configured. Then a closing signal is sent for as long time and the exercise is finished. The exercise is switched off if the interval is set to 0 hours.

Fan control

RC-CDFO has a fan button. The speed is set with the fan button. When the fan button is pressed, the fan speed will step from the current speed to the next.

The controller has the following positions:

Auto   Automatic control of the fan speed to maintain desired room temperature.
0   Manual off.
I   Manual position with low speed.
II   Manual position with medium speed.
III   Manual position with high speed.

In operating modes Off and Unoccupied, the fan is stopped, regardless of the setting in the display.
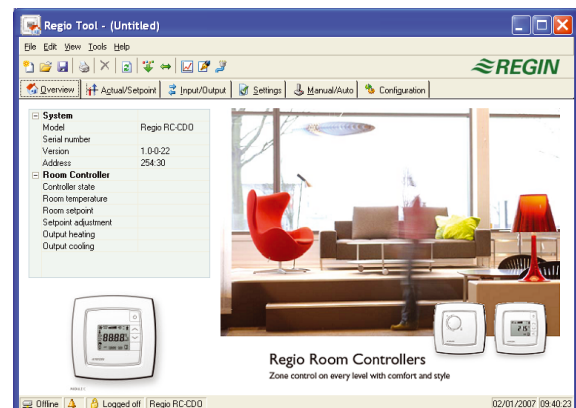
Relay module RB3

RB3 is a relay module with three relays for controlling fans in fan-coil units. It is intended for use together with the Regio RC-...F... controllers. *For more information, see the instruction for RB3.*

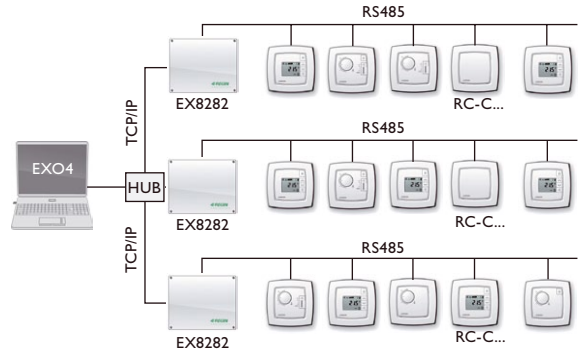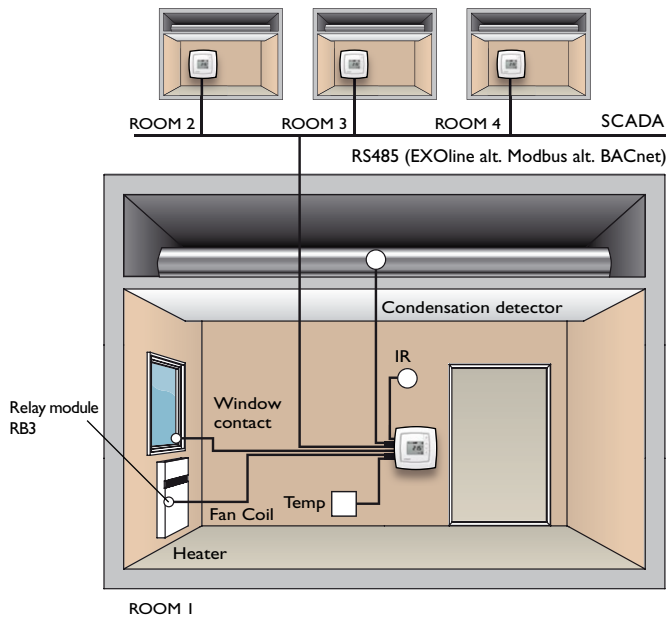### Configuration and supervision with Regio tool©

RC-CDFO is pre-programmed on delivery, but can be configured using Regio tool©.

Regio tool© is a PC-based program that makes it possible to configure and supervise an installation, and change settings, via a clear and easy user interface.

The program can be downloaded free of charge from Regin's homepage www.regin.se.

Application examples

ROOM 2   ROOM 3   ROOM 4   SCADA

RS485 (EXOline alt. Modbus alt. BACnet)

Condensation detector

IR

Relay module
RB3

Window
contact

Temp

Fan Coil

Heater

ROOM 1

RS485

EX8282   RC-C...

RS485

EXO4   HUB   EX8282   RC-C...

RS485

EX8282   RC-C...

4

Technical data

Supply voltage	18...30 V AC, 50...60 Hz
Internal consumption	2.5 VA
Ambient temperature	0...50°C
Storage temperature	-20...+70°C
Ambient humidity	Max 90 % RH
Protection class	IP20
Communication	RS485 (EXOline or Modbus with automatic detection/change-over, or BACnet)
Modbus	8 bits, 1 or 2 stop bits. Odd, even (FS) or no parity.
BACnet	MS/TP
Communication speed	9600, 19200, 38400 bps (EXOline, Modbus and BACnet) or 76800 bps (BACnet only)
Display	LCD with background illumination
Built-in temperature sensor	NTC type, measuring range 0...50°C, accuracy ±0.5°C at 15...30°C
Material, casing	Polycarbonate, PC
Weight	110 g
Colour	Cover: Polar white RAL9010 Bottom plate: Light gray

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EMC emissions & immunity standards: This product conforms to the requirements of the EMC Directive 2004/108/EC through product standards EN 61000-6-1 and EN 61000-6-3.

RoHS: This product conforms to the Directive 2011/65/EU of the European Parliament and of the Council.

Inputs

External room sensor	PT1000-sensor, 0…50°C. Suitable sensors are Regin's TG-R5/PT1000,TG-UH/PT1000 and TG-A1/PT1000.
Change-over alt. potential-free contact	PT1000-sensor, 0…100°C. Suitable sensor is Regin's TG-A1/PT1000.
Occupancy detector	Closing potential-free contact. Suitable occupancy detector is Regin's IR24-P.
Condensation detector alt. window contact	Regin's condensation detector KG-A/1 resp. potential-free contact

Outputs

|	
Fan control	3 outputs for speed I, II and III respectively, 24 V AC, max 0.5 A
Forced ventilation	24 V AC actuator, max 0.5 A
Valve actuator (0...10 V), thermal actuator (pulse On/Off) or On/Off actuator (UO1, UO2)	2 outputs
Valve actuator	0...10 V, max. 5 mA
Thermal actuator	24 V AC, max. 2.0 A (time-proportional pulse output signal)
On/Off actuator	24 V AC, max. 2.0 A
Control	Heating, Cooling or VAV (damper)
Actuator exercise	FS = 23 hours interval
Terminal blocks	Lift type for cable cross-section 2.1 mm^2

Setpoint settings via Regio tool© or in the display

Basic heating setpoint	5...40°C
Basic cooling setpoint	5...50°C
Setpoint displacement	±0...10°C (FS = ±3°C)

Wiring

Terminal	Designation	Operation
10	G	Supply voltage 24 V AC
11	G0	Supply voltage 0 V
12	DO1	Output for fan control I
13	DO2	Output for fan control II
14	DO3	Output for fan control III
20	GDO	24 V AC out common for DO
21	G0	0 V common for UO (when 0...10 V actuator is used)
22	DO4	Output for forced ventilation
23	UO1	Output for 0...10 V valve actuator alt. thermal or On/Off actuator. Heating (FS), cooling or heating or cooling via change-over.
24	UO2	Output for 0...10 V valve actuator alt. thermal or On/Off actuator. Heating, cooling (FS) or heating or cooling via change-over.
30	AI1	Input for external sensor
31	UI1	Input for change-over sensor alt. potential-free contact
32	DI1	Input for occupancy detector, alt. window contact
33	DI2/CI	Input for Regin's condensation detector KG-A/1 alt. window contact
40	+C	24 V DC out common for UI and DI
41	AGnd	Analogue ground
42	A	RS485 communication A
43	B	RS485 communication B

Dimensions

mm
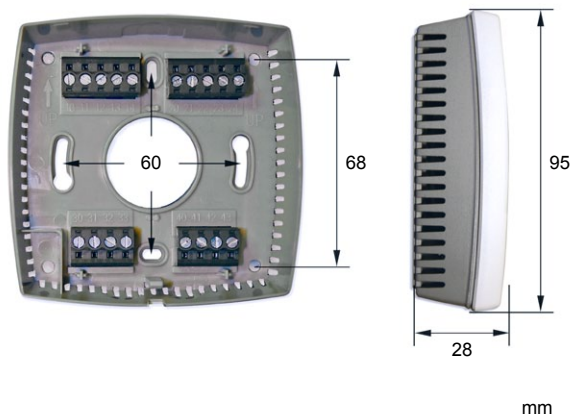
Product documentation

Document	Type
Regio Midi manual	Manual for the controllers from the Regio Midi series
Installation instruction Regio RC-CDFO	Installation instruction for RC-CDFO
Product sheet TG-R4/PT1000, TG-R5/PT...	Information about sensors suitable for RC-CDFO
Product sheet TG-UH/PT...	
Product sheet TG-A1/PT...	
Product sheet IR24-P	Information about occupancy detector suitable for RC-CDFO
Instruction IR24-P	
Instruction RB3	Information about relay module for RC-CDFO
Product sheet KG-A/1	Information about condensation detector for the Regio controllers

All product documentation is available at www.regincontrols.com.

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