RC-CFO

Pre-programmed room controller with communication, fan switch and forced ventilation

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

✓ Communication via RS485 (Modbus or EXOline)
✓ Quick and simple configuration via Regio tool©
✓ Easy installation
✓ On/Off or 0...10 V control
✓ Input for occupancy detector, window contact, condensation sensor or change-over function
✓ Supply air temperature limitation

Function

RC-CFO is a room controller in the Regio series. It has a switch for three-speed fan control (fan-coil), display, as well as communication via RS485 (Modbus or EXOline) for systems integration.

Regio

Regio is an extensive range of controllers for control of heating and cooling.

The controllers are divided into three different series; Mini, Midi and Maxi. Mini consists of pre-programmed, stand-alone controllers. Maxi consists of freely programmable controllers with communication. The Midi controllers, of which RC-CFO is a part, consists of pre-programmed controllers with communication.

Applications

The Regio controllers are suitable for use in buildings requiring optimum comfort and reduced energy consumption, such as offices, schools, shopping centres, airports, hotels and hospitals etc.
See application examples on page 6.

Sensor

The controller has a built-in room temperature sensor. An external sensor for room temperature, change-over or supply air temperature limitation can also be connected (PT1000).

Actuators

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

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Flexibility with communication

RC-CFO can be connected to a central SCADA system via RS485 (EXOline or Modbus) and configured for a specific application using the free configuration software Regio tool©. Read more about Regio tool© on page 4.

Modbus EXOline

Easy to install

The modular design, featuring a separate bottom plate for wiring, makes the entire Regio range of controllers easy to install and commission. The bottom plate can be put into place before the electronics are installed. Mounting takes place directly on the wall or on an electrical connection box.

Control modes

RC-CFO 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
- Change-over with VAV function

Operating modes

There are five different operating modes: Off, Unoccupied, Stand-by, Occupied and Bypass. Occupied is the preset operating mode. It can be set to Stand-by via a DIP switch. 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). This mode is activated if a window is opened.

Unoccupied: The room in which the controller is placed is not used for a extended time period, such as during holidays or long weekends. Both heating and cooling are kept within a temperature interval with configurable min/max temperatures (FS min=15°C, max=30°C).

Stand-by: The room is in an energy saving mode and is not used at the moment. This can, for instance, be during nights, weekends and evenings. The controller stands by to change operating mode to Occupied if presence is detected. Both heating and cooling are kept within a temperature interval with configurable min/max temperatures (FS min=15°C, max=30°C).

Occupied: The room is in use and a comfort mode is activated. The controller maintains 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 the Occupied operating mode. The output for forced ventilation is also active. This operating mode is useful for instance in conference rooms, where many people are present at the same time for a certain period of time.

When Bypass has been activated by pressing the occupancy button, the controller will automatically return to its preset operating mode (Occupied or Stand-by) after a configurable time has elapsed (FS=2 hours). If an occupancy detector is used, the controller will automatically return to its preset operating mode if no occupancy is detected for 10 minutes.
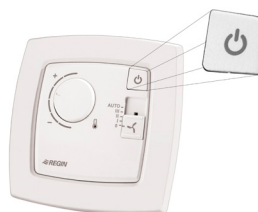
Occupancy detector

By connecting an occupancy detector, RC-CFO can switch between the preset operating mode for presence (Bypass or Occupied) and its preset operating mode. This way, the temperature is controlled from requirement, making it possible to save energy while maintaining the temperature at a comfortable level.

The occupancy button

Pressing the occupancy button for less than 5 seconds when the controller is in its preset operating mode will cause it to change to operating mode Bypass. Pressing the button for less than 5 seconds when the controller is in Bypass mode will change its operating mode to the preset operating mode

If the occupancy button is depressed for more than 5 seconds will change the controller's operating mode to "Shutdown" (Off/Unoccupied) regardless of its current operating mode. Regio tool© or the display enables selecting which operating mode, Off or Unoccupied, should be activated on "Shutdown" (FS=Unoccupied). Pressing the button for less than 5 seconds when the controller is in Shutdown mode will cause it to revert to Bypass mode.

Forced ventilation

Regio has a built-in function for forced ventilation. If the occupancy operating mode has been configured for this function, a closing of the digital occupancy detector input will set the controller to Bypass mode and activate the output for forced ventilation (DO4). This can for instance be used to open a damper. The function is terminated when the settable forcing interval has run out.

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Change-over function

RC-CFO 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 type PT1000, with the sensor mounted so that it senses the temperature of the coil supply pipe. As long as the heating valve is more than 20 % open, or each time a valve exercise takes place, the difference between the media and room temperature is calculated. The control mode is then changed based on the temperature difference.

Optionally, a potential-free contact can be used. When the contact is open, the controller will operate using the heating function, and when closed using the cooling function.

Control of electrical heater

Models offering fan functionality have a function for controlling a heating coil on UO1 in sequence with change-over on UO2. To activate this function, Regio tool© is used to set the control mode "Heating/Cooling via change-over for Cooling". 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 as a heating actuator in winter mode. When in summer mode, RC-CFO functions as a heating/cooling controller and when in winter mode as a heating/heating controller. UO2 will initiate first, followed by UO1 (heating coil).

The heating coil connected to UO1 will activate only if the coil on UO2 cannot fulfill the heating requirement by itself.

Note that Regio has no input for monitoring fan status or overheating of the heating coil. These functions must instead be supplied by a SCADA system.

Setpoint adjustment

When in mode Occupied, the controller operates using a heating setpoint (FS=22°C) or a cooling setpoint (FS=24°C) that can be changed centrally or locally using DIP switches.

Setpoint can be adjusted up and down (FS=±3°C) using the knob on the front of the controller. Switching between heating and cooling setpoints takes place automatically in the controller depending on heating or cooling requirements.

Built-in safety functions

RC-CFO has an input for a condensation sensor to detect moisture accumulation. If detected, the cooling circuit will be stopped. The controller also has frost protection. This prevents frost damages by ensuring that the room temperature does not drop below 8°C when the controller is in mode Off.

Indication

The controller has a LED shaped as a thermometer on its front. A red light indicates heating control is active and a blue light indicates active cooling control. If the LED is switched off, it means neither heating or cooling control is active.

Fan control

RC-CFO has a fan switch with the following positions:

Auto Automatic control of the fan speed to maintain desired room temperature.
0 Manually off.
I Manual position with low speed.
II Manual position with medium speed.
III Manual position with high speed
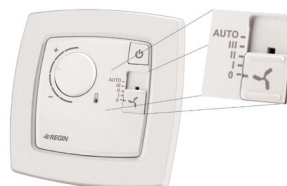
In operating modes Off and Unoccupied, the fan is stopped regardless of the position of the fan switch. Manual fan control can be blocked, if desired.

Supply air temperature limitation

AI1 can be configured for use with a supply air temperature limitation sensor. A room controller will then work together with a supply air temperature controller using cascade control, resulting in a calculated supply air temperature maintaining the room temperature setpoint. It is possible to set individual min/max limitation setpoints for heating and cooling. Settable temperature range: 10…50°C.

Actuator exercise

All actuators are exercised, regardless of type or model. The exercise takes place at intervals, settable in hours (FS=23 hours interval). An opening signal is sent to the actuator for as long time as its configured run time. A closing signal is then sent for an equal amount of time, after which the exercise is completed. Actuator exercise is switched off if the interval is set to 0.

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Fan boost function

If there is a great difference between the room setpoint and the current room temperature, or if one simply wishes to hear the fan start, a boost function can be activated to make the fan run at top speed for a short start-up duration.

Fan kickstart

When using today's energy-saving EC fans, there is always a risk the fan will not start due to the low control voltage preventing the fan from exceeding its starting torque. The fan will then remain at a standstill while power still flows through it, which may give rise to damage. To prevent this, a fan kickstart function can be activated. The fan output will then be set to 100 % for a set time (1...10 s) when the fan is set to run at its lowest speed when starting from an off position. In this way, the starting torque is exceeded. After the set time has elapsed, the fan will return to its original speed.

Relay module, RB3

RB3 is a relay module with three relays for controlling fans in fan-coil applications. It is intended to be used together with RC-...F... model controllers from the Regin range. For more information, see the instruction for RB3.

Configuration and supervision using Regio tool©

RC-CFO is pre-programmed upon 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 its settings using a comprehensive user interface.
The program can be downloaded free of charge from Regin's website www.regincontrols.com.
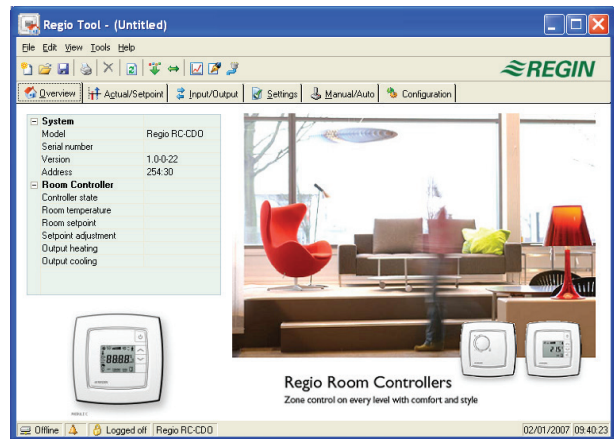
Technical data

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
Modbus	8 bits, 1 or 2 stop bits. Odd, even (FS) or no parity
Communication speed	9600, 19200 or 38400 bps (changeable)
Built-in temperature sensor	NTC type, measuring range 0...50°C, accuracy ±0.5°C at 15...30°C
Material, casing	Polycarbonate, PC
Weight	110g
Colour	Signal white RAL 9003

CE

This product carries the CE mark. For more information, see www.regincontrols.com.

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Inputs

External room sensor or supply air temperature limitation 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 sensor, window contact	Regin's condensation sensor KG-A/1 resp. potential-free contact

Outputs

Valve actuator (0...10 V), alt. thermal actuator (On/Off pulsing) or On/Off actuator (UO1, UO2)	2 outputs
Valve actuators	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
Output	Heating, cooling or VAV (damper)
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

Setpoint settings via Regio tool©

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

Basic heating setpoint, set via DIP switches.

The ON-position is marked on the DIP switch. The cooling setpoint is 2°C higher.

Basic setpoint, heating (°C)	SW1	SW2
20	OFF	OFF
22 (FS)	OFF	ON
24	ON	OFF
26	ON	ON

Other DIP switches

|	ON	OFF	Comment
SW3	Stand-by	Occupied (FS)	Preset operating mode
SW4	DI, window switch. Closed contact indicates closed window	CI, Regin's condensation sensor, KG-A/1 (FS)	Function terminal 33, DI2/CI
SW5	Digital output for 24 V AC thermal actuator	Analogue output for 0...10 V DC valve actuator (FS)	Function terminal 23, UO1
SW6	Digital output for 24 V AC thermal actuator	Analogue output for 0...10 V DC valve actuator (FS)	Function terminal 24, UO2
SW7	External, PT1000-sensor	Internal NTC-sensor (FS)	Temperature sensor
SW8	NO	NC (FS)	Function terminal 23, UO1
	Selecting NC (factory setting) in the controller gives direct action on output UO1, i.e. increasing output signal (longer pulses) on increasing controller output. This setting is used when UO1 is connected to a thermal actuator of type Regin RTAM-24 (NC). In the event of system power outage, the valve will close. **Selecting NO** in the controller will give output UO1 the opposite effect, providing a decreasing output signal (shorter pulses) on increasing controller output. This setting is used when UO1 is connected to a thermal actuator of type Regin RTAM-24 (NO) on UO1. In the event of system power outage, the valve will open.		

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Wiring

Terminal	Designation	Function
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 (if using 0...10 V actuators)
22	DO4	Output for forced ventilation
23	UO1	Output for 0...10 V valve actuator alt. thermal actuator alt. On/Off actuator, Heating (FS) or Cooling or Heating via change-over.
24	UO2	Output for 0...10 V valve actuator alt. thermal actuator alt. On/Off actuator, Heating (FS) or Cooling or Heating via change-over..
30	AI1	Input for an external sensor, alt. supply air temperature limitation 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 sensor KG-A/1 alt. window switch
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
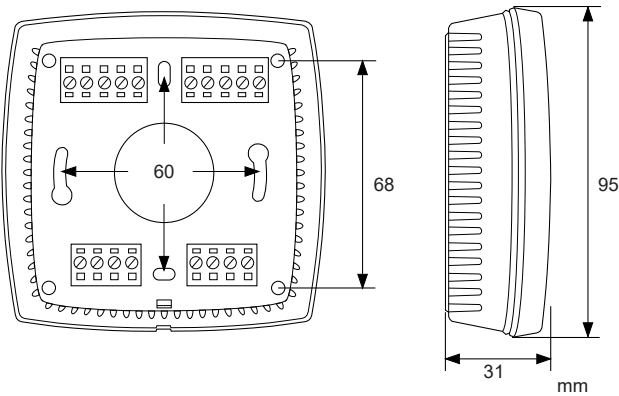
Application examples
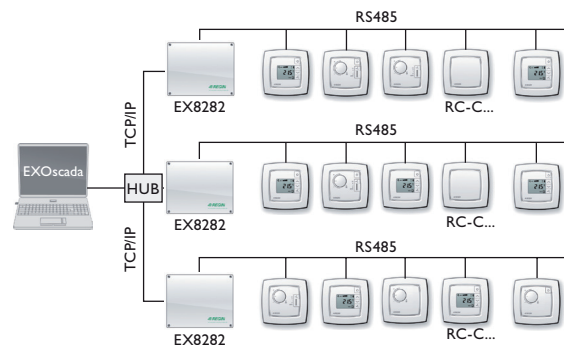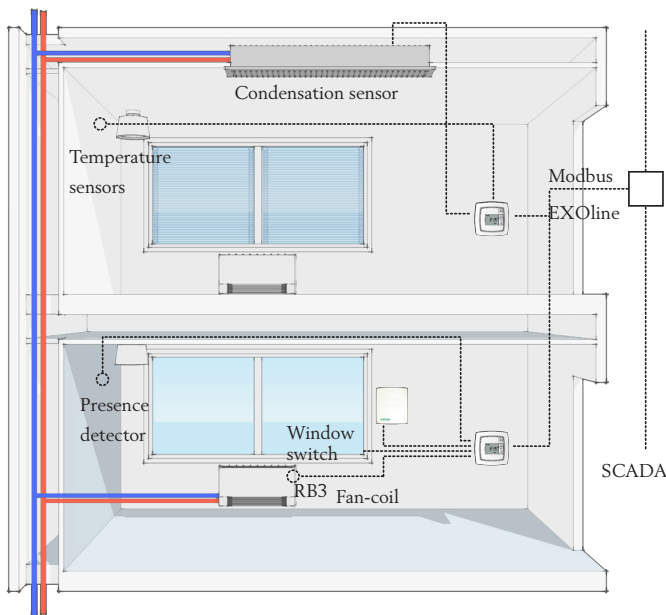
Product documentation

The product documentation can be downloaded from www.regincontrols.com.

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