RC-C3O

Pre-programmed room controller with communication and forced ventilation

RC-C3O is a complete pre-programmed room controller from the Regio Midi series intended to control heating and cooling in a zone control system.

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

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

RC-C3O is a room controller from the Regio series. It has communication via RS485 (Modbus 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-C3O 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 3.

Design

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

iF product design award 2007

Sensor

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

Actuators

RC-C3O 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-C3O can be connected to a central SCADA-system via RS485 (EXOline or Modbus) and configured for a particular application using the cost-free configuration tool Regio tool©. Read more about Regio tool© on page 3.

Modbus

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Controller modes

RC-C3O can be configured for different controller 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/Cooling with Y3 control

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 with a dipswitch. The operating modes can be activated via a central command, an occupancy detector or the Occupancy button.

Off: Heating and cooling are disconnected. However, the temperature must not drop below the set minimum temperature (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 disconnected within 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 disconnected within 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-C3O 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. A short press of the occupancy button will transmit a signal to output UO3 and, for instance, a damper. Depending on the configuration of UO3, the signal will be either 24 V AC (digital) between terminal 20 and output UO3, or 10 V DC (analogue) between terminal G0 and output UO3.

Change-over function

RC-C3O 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 controller 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.

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 centrally or locally using dipswitches.

The setpoint can be adjusted up and down (FS=±3°C) with the knob on the front of the controller. Switching between heating and cooling setpoints is done automatically in the controller depending on the heating and cooling requirement.

Built-in safety functions

RC-C3O 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.

Indications

The controller has an LED shaped like a thermometer on the front. A red indication is shown when heating control is functional and a blue indication when cooling control is active. No LED indication shows that neither heating nor cooling control is active.

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.

Control of third damper

In controller mode Heating/Cooling with Y3 control, the cooling demand is split between UO2 and UO3 in order to enable control of a third damper in sequence with the heating/cooling actuator.

EC fan control

EC fan control is activated when setting UO3 to "Control of EC fan" via Regio tool©. When the function is activated, the UO3 will follow UO1 and UO2 respectively. The function can be activated in the controller modes Heating, Heating/Cooling via change-over, Heating/Cooling, Cooling and Cooling/Cooling.

## Configuration and supervision with Regio tool©

RC-C3O 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.
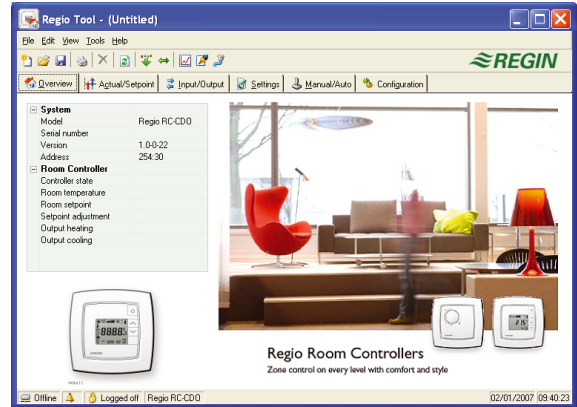
Application examples
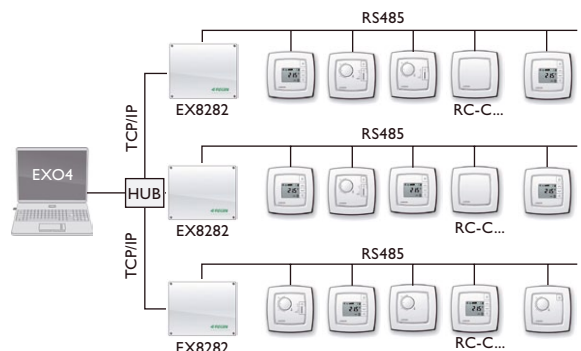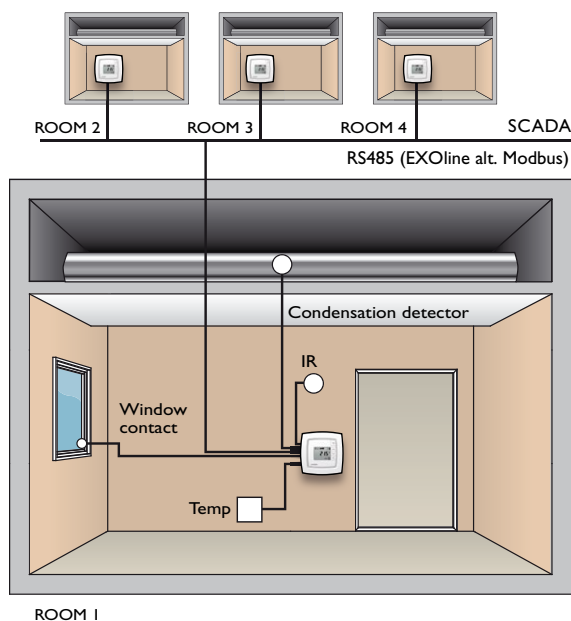
Technical data

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 384000 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	110 g
Colour	Cover: Polar white RAL9010
	Bottom plate: Light gray

Is also available in other colours on inquiry, contact Regin for more information.

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

Valve actuator, alt. thermal actuator 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)
Damper actuator (UO3)	1 output
Forced ventilation	24 V AC, max. 2.0 A, alt. 0...10 V, max. 5 mA
Control	Forced ventilation, alt. EC fan or damper following Heating/Cooling in sequence

Setpoint settings via Regio tool©

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

Basic heating setpoint, setting with dipswitches
The ON-position is marked on the dipswitch. 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 dipswitches

	ON	OFF	Comment
SW3	Stand-by	Occupied (FS)	Preset operating mode
SW4	DI, window contact. Closed contact indicates closed window.	CI, Regin's condensation detector, 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
	Choosing NC (factory setting) gives direct action on output UO1, i.e. increasing signal (longer pulses) on increasing control output. This setting is used when UO1 is connected to a thermal actuator of type Regin RTAM-24 (NC). In the event of a power cut the valve will close.		
	Choosing NO gives reverse action on output UO1, i.e. decreasing signal (shorter pulses) on increasing control output. This setting is used when UO1 is connected to a thermal actuator of type Regin RTAOM-24 (NO). In the event of a power cut the valve will open.		

Wiring

Terminal	Designation	Operation
10	G	Supply voltage 24 V AC
11	G0	Supply voltage 0 V
12-14		No function
20	GDO	24 V AC out common for DO
21	G0	0 V common for UO (when 0...10 V actuator is used)
22	UO3	Output for Forced ventilation damper. 24 V AC, alt. EC fan 0...10 V DC, alt. damper following heating/cooling in sequence.
23	UO1	Output for 0...10 V valve actuator alt. thermal or On/Off actuator. Heating or cooling.
24	UO2	Output for 0...10 V valve actuator alt. thermal or On/Off actuator. Heating or cooling.
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
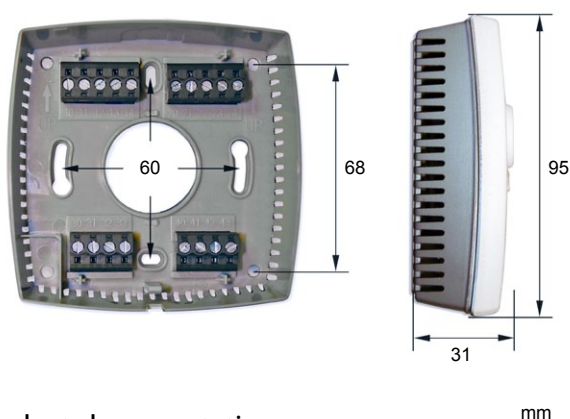
Product documentation

Document	Type
Regio Midi Manual	Manual for the controllers from the Regio Midi series
Installation instruction Regio RC-C3O	Installation instruction for RC-C3O
Product sheet TG-R4/PT1000, TG-R5/PT...	Information about room sensors suitable for RC-C3O
Product sheet TG-UH/PT...	
Product sheet TG-A1/PT...	
Product sheet IR24-P	Information about occupancy detector suitable for RC-C3O
Instruction IR24-P	
Product sheet KG-A/1	Information about condensation detector for the Regio controllers

All product documentation is available at www.regin.se.

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