RCF-230CTD-EC

Room controller with communication for fan-coil applications with outputs for two thermal or one 3-position actuator. Function for control of one 0...10 V EC fan.

Intended to control heating and/or cooling in 2- or 4-pipe installations. Setpoint and fan speed are set using the buttons on the front. Communication via Modbus, BACnet or EXOline

RCF-230CTD-EC is a controller for controlling heating and/or cooling in a room. It is intended for control of thermal actuators or an actuator with 3-position function (increase-decrease), and also has a function for control of a 0...10 V EC fan.

The controller uses 230 V AC supply voltage. It has triac outputs for 230 V AC heating/cooling.

RCF-230CTD-EC has communication via RS485 (Modbus, BACnet or EXOline) for systems integration. The device can be configured using the Regio tool© software, downloadable free of charge from Regin's website (www.regincontrols.com).

Applications

The controller is suitable in buildings where you want optimal comfort and reduced energy consumption, for example offices, schools, shopping centres, airports, hotels, hospitals etc.

Easy to install

The modular design with a separate bottom plate for wiring makes the controller easy to install and commission. The bottom plate can be put into place before the electronics are installed. Mounting takes place directly on a wall or wall socket.

Control function

The controller controls heating and/or cooling in a room. Control parameters like P-band and I-time can be set in the parameter list via the display or by using Regio tool©. The setpoint can be changed using the INCREASE (⌃) and DECREASE (⌄) buttons on the front.

See also the section "Display information and handling" on page 3.

Short facts about RCF-230CTD-EC

- Supply voltage 230 V AC
- 0...10 V output for EC fan control
- Inputs for presence detector and/or window contact
- Function for electric heater
- Input for automatic change-over cooling/heating
- BTL tested from software version 1.2-1-00

Built-in or external sensor

The controller has a built-in sensor. Alternatively, the input for an external PT1000-sensor can be used.

Output function for thermal actuators

This function is activated on delivery. When using thermal actuators, the controller works with time-proportional output, which gives continuous setting of the opening position for the valve. Actuators which can be used are RTAM-230 or RTAOM-230 from Regin together with a suitable valve. Using thermal actuators, the controller can control heating and cooling in sequence with one actuator for heating and one for cooling.

Communication protocols

The room controller has automatic detection and switch-over between Modbus and EXOline. BACnet must however be set manually via the display or by using Regio tool©.

BACnet® **Modbus** **EXOline**

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Output function for 3-position actuators

This function can be configured to be used instead of the above factory setting via the display or by using Regio tool© When using an actuator with 3-position function, RCF-230TD will control it using an increase-decrease signal, in order to achieve continuous opening of the valve that varies with the temperature requirement. For optimal function, the correct running time for the actuator should be set in the controller (factory setting = 120 s). An actuator with 3-position function can only be used in 2-pipe systems or when only controlling a cooling or a heating valve.

Function for control of electric heater

RCF-230CTD-EC has a function for pulse/pause control of electric heaters, similar in operation to control of a thermal actuator. When using an electric heater, the fan will run for an additional 2 minutes after the heater has been shut down in order to cool the heater.

When an electric heater is used, an external unit (such as PULSER-ADD or a solid state relay) must be connected between RCF-230CTD-EC and the heater.

NOTE: RCF-230CTD-EC has no indication capable of showing if the fan breaks or if the heater should overheat. This requires all connections to be made externally. An overheating protection or similar can be used to cut the supply voltage.
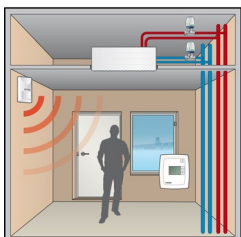
2- and 4-pipe installations

In 2-pipe installations, the same water system is used for heating as for cooling. Chilled water circulates through the system during summer and heated water during winter

When RCF-230CTD-EC is configured for a 2-pipe system, output DO4 is used for controlling heating or cooling (depending on the season (fluid temperature)) via an actuator, a valve or similar (change-over function). When using an actuator with 3-position function, it is connected to DO4 and DO5 for increase-decrease function.
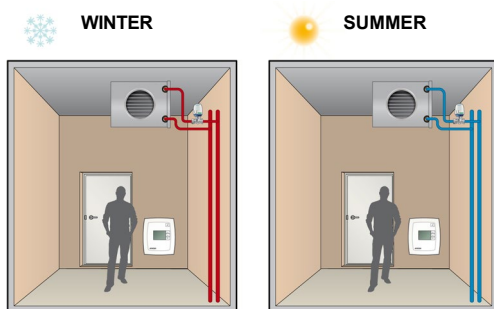
In 4-pipe installations, there are two separate water systems for heating and cooling with separate valves. The controller uses two outputs for control of heating and cooling in sequence with two thermal actuators.

Automatic cooling/heating change-over

RCF-230CTD-EC has an input for change-over which is used when the controller is configured for 2-pipe installations. It sets output DO4 to operate with heating or cooling function depending on the fluid temperature (season).

The change-over input can be connected to a potential-free relay contact or a PT1000-sensor.

The input function for the relay contact can be set to normally open (NO) or normally closed (NC). If the change-over input is not used, we recommend that it is left disconnected and set to NO (factory setting).

When using a sensor, it must be mounted so that it can measure the temperature on the supply pipe to the coil. To ensure satisfactory function, the system must also have continuous primary circuit circulation. Using a sensor, the output function is set to heating when the fluid temperature exceeds 28°C and to cooling when the temperature falls below 16°C.

At heating function "HEAT" is shown in the display and at cooling function "COOL" is shown.

When using an electric heater while change-over is set to heating, RCF-230CTD-EC will work using the sequence heating/heating, where DO5 will be activated first.

If no change-over sensor is connected, the controller will work using the sequence heating/heating. If wishing to add cooling to the sequence, the mode must be changed manually.

Occupancy detection for saving energy

By connecting an occupancy detector or a keycard switch (in hotels) to a digital input, you can alternate between Comfort and Economy mode. This way, the temperature is controlled from requirement, making it possible to save energy while maintaining the temperature at a comfortable level.

Using occupancy detection, you can delay activation and/or inactivation of Comfort mode to avoid switching mode if someone temporarily enters or leaves the room.

A window contact can be connected to either digital input 1 or universal input 1. The window contact will set the controller to "Off" mode if a window is opened, thereby minimising energy consumption.

Operating modes

There are four different operating modes, Comfort, Economy (Standby), Off and Window. Switching between these modes is performed locally or via the SCADA system.

Comfort: 👤 is shown in the display and the room is in use. The temperature is held at the comfort level with a deadband (DB) between activation of heating and cooling.

Economy (Standby): "Standby" is shown in the display. The room is in an energy saving mode and is not used at the moment. This can for example be during nights, weekends, evenings etc. or during daytime when there is no one in the room. The controller is prepared to change operating mode to Comfort if someone enters the room. Heating and cooling have freely adjustable setpoints.

Off: "Off" is shown in the display and the backlight is switched off. The controller neither heats or cools and the fan stops (except if mould protection has been selected or cooling of the electric heater is active, in which case the fan will keep running). Off mode is selected by pressing the On/Off button.

Window: ☐ is shown in the display and the controller is in off mode, neither heating or cooling and the fan stops (except if mould protection has been selected or cooling of the electric heater is active, in which case the fan will keep running).

Fan speed control

The fan is controlled 0...10 V from output AO1.

The current fan speed is shown in the display and can be set manually to Low→Medium→High→Auto by pressing the fan button. In Auto mode, fan speed is controlled by the controller output.

When there is no heating or cooling demand in the Auto position, the fan will run at its lowest setting. This function can be changed to make the fan stop when there is no heating or cooling demand. The fan is also deactivated when in modes Off and Window. However, it will continue to run if mould protection has been configured.

If the fan has been configured to not be affected by controller output, the "AUTO" option will not be shown when pressing the fan button.
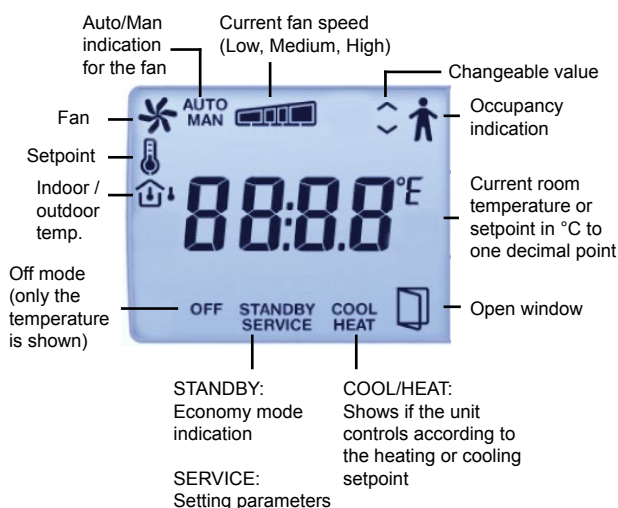
Mould protection

When this function has been configured, the fan will run at a minimum of the lowest speed setting, circulating air in the room so as to minimise the risk of mould growth in the fan-coil unit. The function is deactivated on delivery.
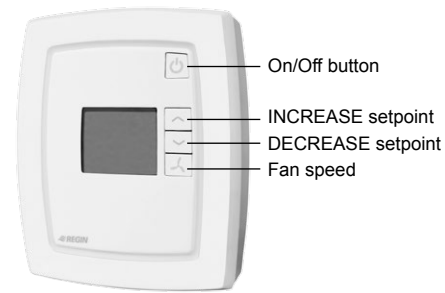
Automatic valve exercise

To ensure proper functionality, the controller has a function for valve exercise, even during periods when they are not in use. At regular intervals the output is overridden to close for a moment in order to open and close the valves. The exercise interval can be set individually for heating and cooling. The exercise function can also be inactivated if desired.

Display information and handling

The display has the following indications:

Auto/Man indication for the fan — Current fan speed (Low, Medium, High) — Changeable value — Occupancy indication — Fan — Setpoint — Indoor / outdoor temp. — Current room temperature or setpoint in °C to one decimal point — Off mode (only the temperature is shown) — Open window

STANDBY: Economy mode indication

SERVICE: Setting parameters

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

The display is handled using the buttons on the controller:

On/Off button
INCREASE setpoint
DECREASE setpoint
Fan speed

On/Off button

By pressing the On/Off button, RCF-230CTD-EC will switch between Off mode and Comfort/Economy mode.

Setpoint buttons

The INCREASE and DECREASE buttons are used to change the setpoint value. The basic setpoint can be changed within adjustable min./max. limits.

Fan button

By pressing the fan button, the fan speed is set to to Low, Medium, High or Auto.

Blocking

The buttons of the controller, the configuration menu and the manual fan control can all be blocked in order to prevent settings from being changed by unauthorized individuals.

Configuration

The factory settings can be changed by using the display and buttons on the controller, or alternatively by using Regio tool©.

The parameter values are changed with the INCREASE and DECREASE buttons and changes confirmed with the On/Off button.

The parameter list can be found in the instruction for RCF-230CTD-EC and in the manual for RCF.

Display configuration

The desired contents of the display can be configured via the parameter list. There are four alternatives:

1. The actual value is normally shown. The setpoint is shown when it is changed using the INCREASE and DECREASE buttons.
2. The actual value is normally shown. The setpoint displacement is shown when it is changed using the INCREASE and DECREASE buttons.
3. The setpoint value is shown (factory setting).
4. The setpoint adjustment is shown.

Control principles

Control principle at cooling function, 2-pipe installations

During control of cooling, the output starts to increase when the temperature has exceeded the setpoint value.
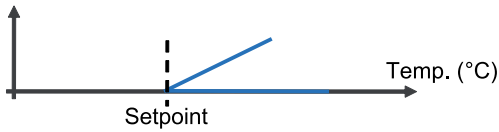

Control principle for heating function, 2-pipe installations

During control of heating, the output starts to increase when the temperature has fallen below the setpoint value.
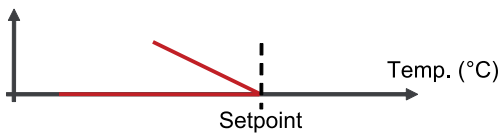
Control principle in 4-pipe installations

In order to minimise energy consumption at Comfort mode, neither heating nor cooling is used when the temperature lies within the deadband. The heating output is activated when the temperature has fallen below the set value for the deadband. The cooling output is activated when the temperature has exceeded the set value for the deadband. The deadband is divided into two equal parts with one part below and one part above the setpoint. See the figure below.
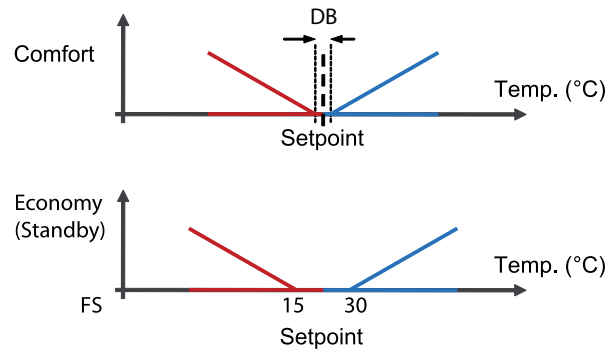
The above figure of the control principle show the corresponding requirement of the controller function. This requirement is recalculated by the controller to a value for the actuator output, depending on the selected output function.

Technical data

Supply voltage	230 V AC ±10 %, 50/60 Hz
Power consumption	3 W, class II construction
Ambient temperature	0...50°C
Storage temperature	-20...+70°C
Ambient humidity	Max. 90 % RH
Protection class	IP20
Communication	RS485 (Modbus or EXOline with automatic detection/switching), or BACnet
Modbus	8 bits, 1 or 2 stop bits. Odd, even (FS) or no parity.
BACnet	MS/TP slave and master
Communication speed	9600, 19200, 38400 bps (EXOline, Modbus and BACnet) or 76800 bps (BACnet only)
Pollution degree	2
Overvoltage category	3
Display	LCD with backlight
Built-in temperature sensor	NTC type, measuring range 0...50°C
Terminal blocks	Lift type for max. cable area 2.1 mm^2
Material, casing	Polycarbonate, PC
Colour	
Cover	Polar white RAL9010
Bottom plate	Light grey
Mounting	Indoor, wall mounting, fits on a standard wall socket
Dimensions (HxWxD)	120 x 102 x 29 mm
Weight	0.18 kg

$\mathsf{C}\mathsf{E}$ **LVD, Low Voltage Directive / EMC emissions & immunity standards:** This product conforms to the EMC and LVD requirements in the European harmonised standards EN 60730-1:2000 and EN 60730-2-9:2002. It carries the CE mark.

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

Inputs

External sensor, AI1	PT1000-sensor. Suitable sensors are TG-R5/PT1000, TG-UH/PT1000, TG-A1/PT1000 and TG-K3-PT1000 from Regin.
UI1	Change-over, potential-free contact or PT1000-sensor. Suitable sensor is TG-A1/PT1000 from Regin or window contact.
Presence/window contact, DI1	Potential free contact. A suitable occupancy detector is IR24-P from Regin.

Outputs

Fan control, AO1	0...10 V output
Actuator, DO4, DO5	2 outputs, 230 V AC, max. 300 mA (3 A initially)

Settings

|	Possible settings	Factory setting (FS)
Basic setpoint	5...50°C (0...100°C with Regio tool©)	22°C
Internal sensor calibration	-10...10 K	0 K
External sensor calibration	-10...10 K	0 K
P band	1...300°C	10°C
I-time	0...1000 s	300 s
DB, deadband at Comfort	0.1...10 K	2 K
Installation type	2- or 4-pipe or electric heating	2-pipe
Input DI1	Normally open (NO) or normally closed (NC)	NO
Input UI1	NO or NC, when used as a relay contact input	NO
Output DO4	NO or NC	NC
Output DO5	NO or NC	NC
Valve exercise	Individually settable for heating and cooling outputs	23 hours interval

Wiring

|			
10	L	230 V AC L	Supply voltage
11	-	Not connected	
12	N	230 V AC N	Supply voltage (internally connected to terminal 13)
13	N	Fan-coil common / 230 V AC N	Common fan-coil connector (internally connected to terminal 12)
20-22	-	Not connected	
30	-	Not connected	
31	DO4	Digital output 4 for heating/cooling or opening with 3-point actuator	Digital output. 230 V AC, max. 300 mA (3 A initially).
32	CDO45	Common DO4 & 5	Common connection for digital outputs 4 and 5
33	DO5	Digital output 5 for cooling (or heating when using alectric heater) or closing with 3-point actuator	Digital output. 230 V AC, max. 300 mA (3 A initially).
40	DI	Digital input	Floating (potential-free) window contact or occupancy contact. Configurable for NO/NC.
41	Agnd	Analogue ground	
42	AI	Analogue input	PT1000, external room sensor or supply sensor
43	UI	Universal input	Change-over input, floating (potential-free) switch (configurable for NO/NC) or PT1000, alternatively a window contact.
44	Agnd	Analogue ground	
50	Agnd	Analogue ground	
51	AO1	Control signal for EC fan	
52	-	Not connected	
53	A	RS485-communication A	
54	B	RS485 communication B	

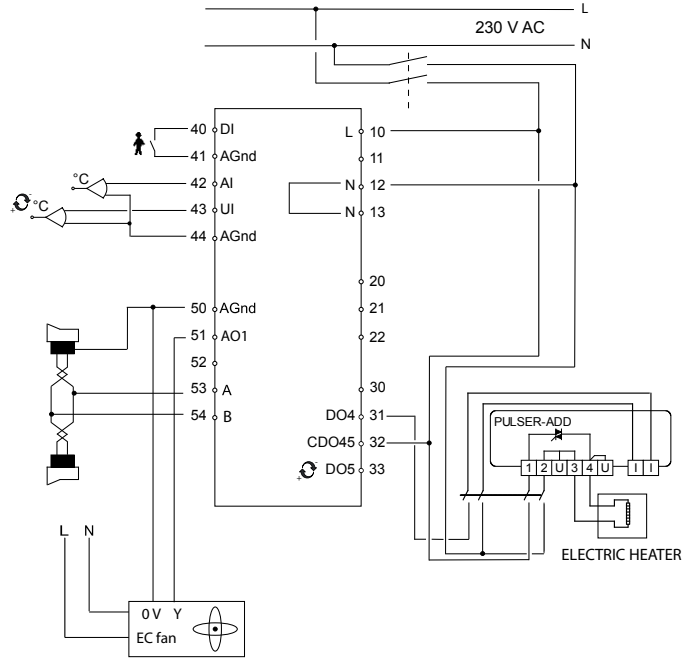*The sum of the current through DO1-DO3 is protected by a fuse
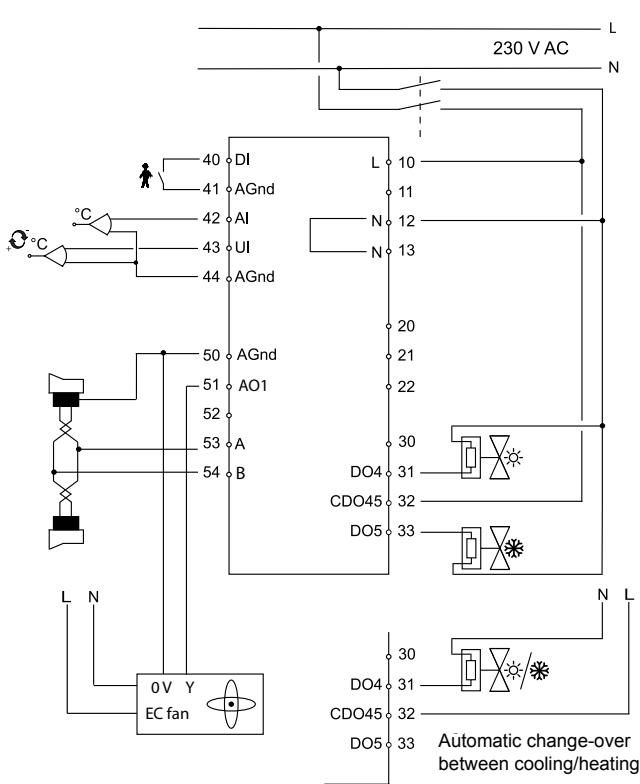
Wiring diagram for connection of EC fan to RCF-230CTD-EC
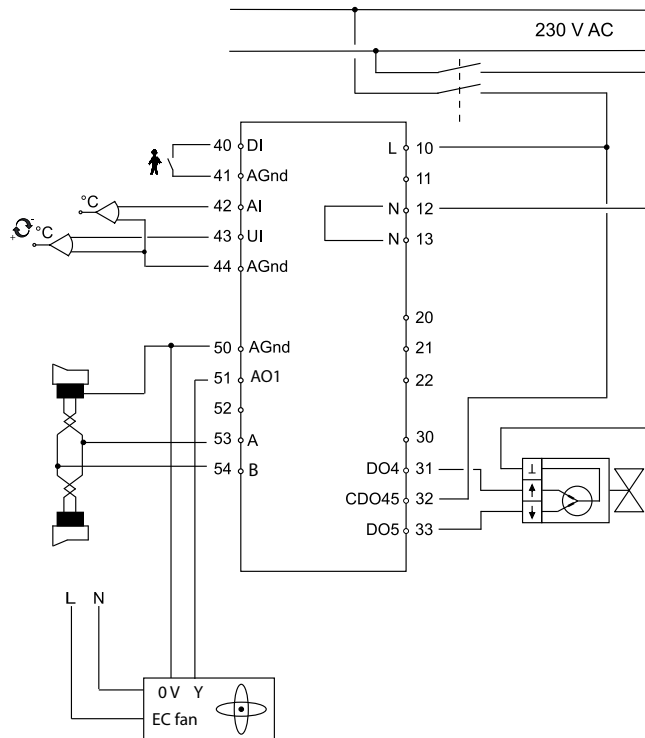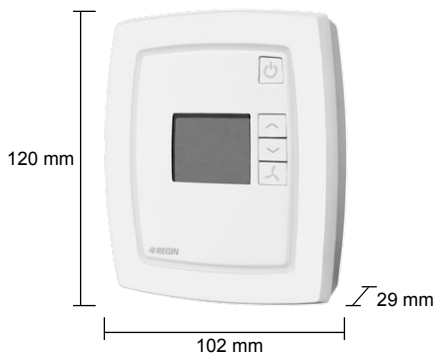
Wiring diagram for 3-position actuators
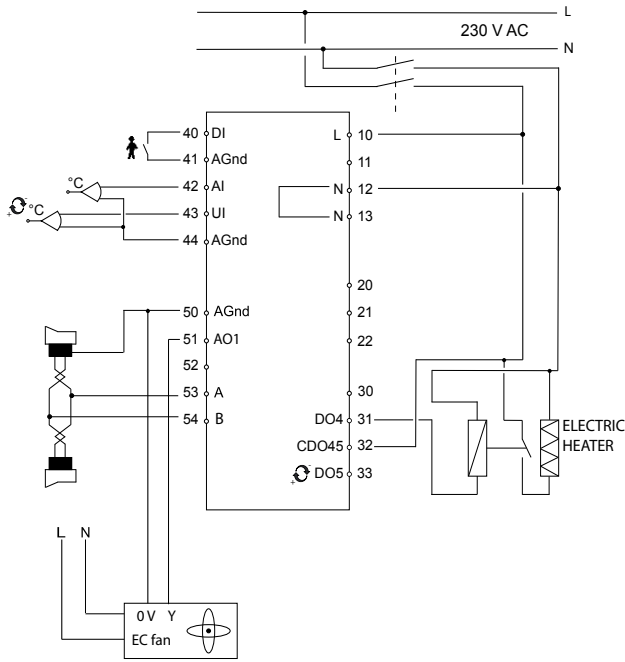
Wiring diagram with electric heater

Wiring diagram with PULSER-ADD for electric heater

Dimensions

120 mm

102 mm

29 mm

Product documentation

Document	Type
Instruction RCF-230CTD-EC	Instruction for RCF-230CTD-EC
Manual RCF	Manual for the RCF range

The documents can be downloaded from www.regincontrols.com.

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