B 522
26.09.07 MC
REV. 01

ELECTRONIC ROOM TEMPERATURE CONTROLLER

C ←BUS

RTB 540 C2 Eng.
RTB 540 S1

- **1 On-Off output**
- **C-Bus connection to a central display unit**
- **NTC 10 kΩ temperature sensing element incorporated**
- **Option of replacing internal with remote sensor**
- **Option of adjusting the temperature & the desired program**
- **Single or centralized season switching**
- **Window switch for excluding heating or cooling when window open (RTB 540 S1 only)**

CE

1. APPLICATION

RTB 540 temperature controllers are designed for the control of room temperature in heating and air conditioning zones in: hotels and guest houses, residential and commercial centres, public buildings, etc. :
– Single controllers without timed programming;
– Controllers in a multizone system with autonomous timed programming, if connected via CosterBus to a UMT central display unit.
They are suitable for control of :
– Electric load of 24 or 230V~, max. 5(1)A, for control of valves, pumps, burners or air-handling units.

2. MODELS

Model	Description	Sensing element
RTB 540 C2	Local or centralised	NO
RTB 540 S1	Centralised	YES

3. ACCESSORIES

Model	Description	Sensing element
SAB 010	Room temperature sensor.	NTC 10 kΩ
STT 010	Temperature sensor for fan coils.	NTC 10 kΩ
STA 010	Air duct temperature sensor.	NTC 10 kΩ

4. TECHNICAL DATA

• Electrical

Power supply	24 V~
Frequency	50...60 Hz
Consumption	4 VA
Electromagnetic compatibility	EEC 93/68
Voltage-free output contacts:	
– maximum switched voltage	250 V~
– maximum switched current	5 (1) A
Measurement range of room sensor: :	
– heating	5...25 °C
– cooling	5...30 °C
Construction standards	Italian Electr. Committee (CEI)

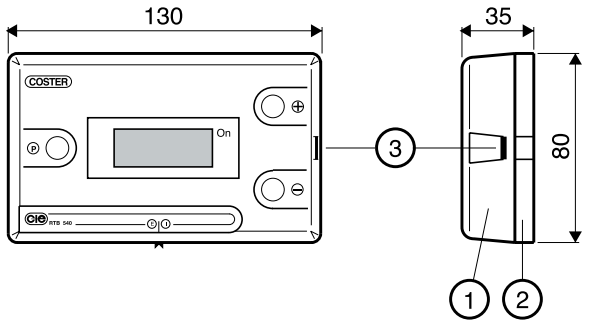
• Factory settings:

– Desired Day Heating temp	20 °C
– Desired Night Heating temp	16 °C
– Desired Frosprot Heating temp.	6 °C
– Desired Day Cooling temp.	25 °C
– Desired Night Cooling temp.	30 °C
– Half-load cycle	± 480 s
– Proportional Band - Heating	± 2 °C
– limit local variation - Cooling	± 1 °C

• Setting ranges (from central display unit):

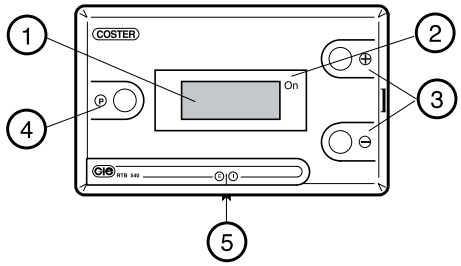
– Desired Heating temp. (Day-Night)	– – – – (excluded)...25 °C
– Desired Cooling temp. (Day-Night)	– – – – (excluded)...30 °C
– limit local variation - Heating	0...+ 5 °C
– limit local variation - Cooling	0...– 5 °C
– half-load cycle	16...496 s
– Proportional band	± 0,5...± 10 °C
Ambient temperature:	
– operation	0...45 °C
– storage	– 20...+ 60 °C
Protection	IP 30
Dimensions	130 x 80 x 35
Weight	170g

5. OVERALL DIMENSIONS



1 – Cover
2 – Base
3 – Cover securing clip

6. FACIA



1 – Alphanumeric display
2 – Status display (On-Off)
3 – + and – keys
4 – Program selection key
5 – Summer/winter switch (**only for RTB 540 C2**)

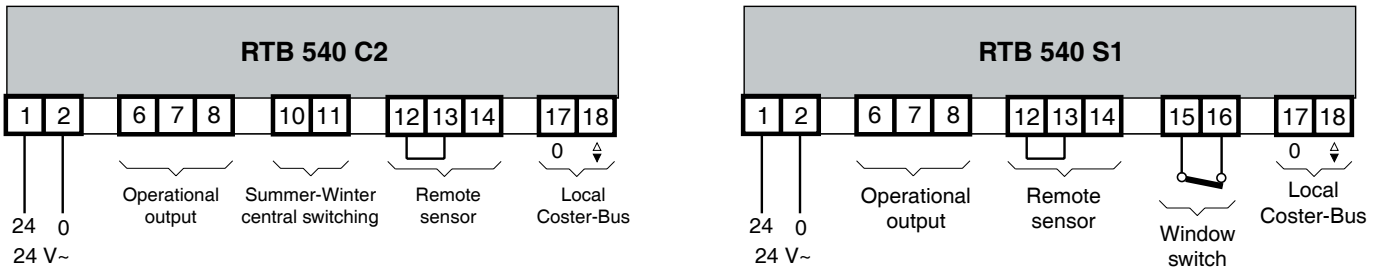
7. ELECTRICAL CONNECTIONS

You should not insert more than two cables in a single terminal of the controller and, if necessary, use an external terminal block

- Power supply 24 V~: 1.5 mm² cables
- Power supply actuators: 1.5 mm² cables.
- Connection sensors: 1 mm² minimum cables.
- **C-Bus connections: 1.5 mm² cables of different colours; maximum length 5 km; the Bus polarity must be strictly observed.**

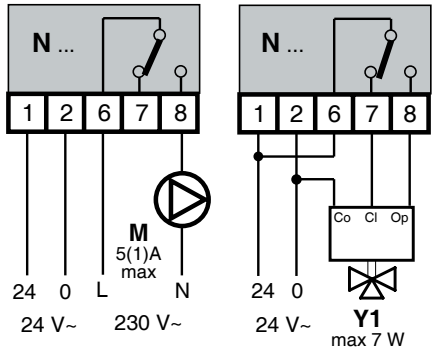
8. WIRING DIAGRAMS

General

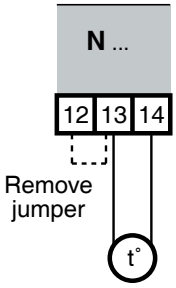


WARNING: The terminals on the terminal board of the controller and not referred to in the diagram must be NOT be used.

Output

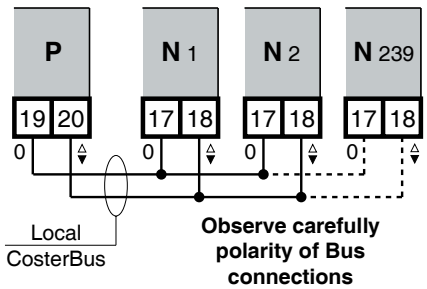


Remote sensor

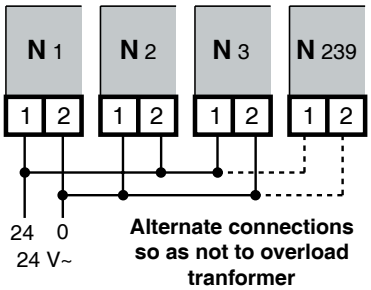


B1 - B2
With remote sensor from analogue output. The M output = 0 V goes to terminal 14

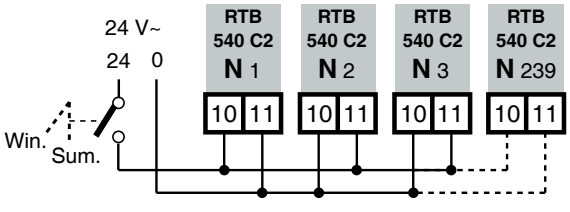
Bus connnection with central unit



Centralised power supply

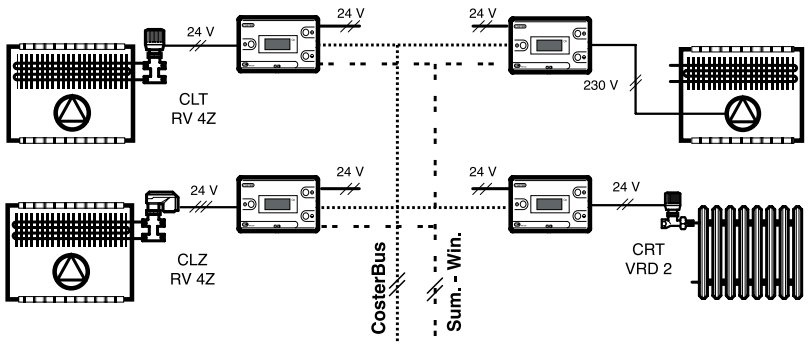


Centralised Sum-Win switching (only for RTB 540 C2)

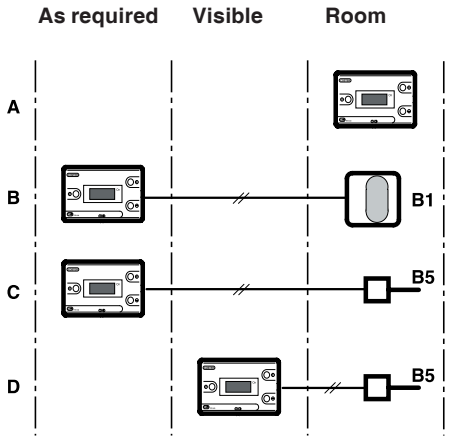


9. EXAMPLES OF APPLICATION

Three-wire On-Off control thermal valves and fans



Measurement temperature Positioning



B 1 – SAB 010 room sensor
B 5 – Fan Coil extract air sensor STT 010 or STA 010

10. INSTALLATION

RTB 540 controller, when used with its own incorporated sensor, must be installed at a height of 1.5 to 1.6 metres from the floor, at a point which represents the average temperature of the space. It must be positioned as far as possible from windows, doors and sources of heat, and corners and curtains must be avoided.
If a remote sensor is used, RTB 540 can be installed anywhere.

- Separate the base from the cover by releasing the cover securing clip.
- Fix the base to the wall or to a flush-mounting pattress using the holes provided
- Carry out the electric wiring strictly in accordance with the diagram (8) and with the safety regulations in force.
- Replace the cover on the base and close the two parts carefully until they click into place.

WARNING:
If the controller is mounted on a flush-mounting pattress the sensor may become cooled by air coming from the ducts enclosing the electric wires. In this event it will be necessary to provide thermal insulation for the controller.

11. OPERATION

RTB 540 are microprocessor-based temperature controllers with display on which can be viewed all the settings entered.
The setting data are distinct for heating and cooling, the controller using one or the other according to the season switching which can be made from a single controller or centralised.
When they are connected to a supervisory system by means of the CosterBus parallel connection, 24hour and 7day programs can be used.

11.1 Temperature measurement

Room temperature is measured by an incorporated NTC 10 kΩ sensing element or by a remote sensor. When the remote sensor is connected (jumper12-13 removed) the internal sensor is automatically excluded.
You can use:
– SAB 010 room sensor;
– STT 010 sensor for fan coils;
– STA 010 air duct sensor.
In event of use as remote sensor of an analogue output of another controller, it is necessary to respect the polarity. The output B is connected to terminal 13 and output M to terminal 14.
The value of the desired temperature (Heating & Cooling) can be adjusted by means of the + and – keys; to change the current program you must use the P key.
On the controller it is possible to limit the variation of the programmed temperature only if the controller is connected to a UMT 704 central display unit.

11.2 Output

One On-Off output (Heating or Cooling) with voltage-free SPDT switch (250 V~, 5(1) A) for direct control or via relay of: Fan-coil fans, circulation pumps, electric radiators, burners, air conditioning units.

11.3 Output features

- On-Off outputs with P control action:

The controller calculates the output value in relation to the difference existing between the desired temperature and that actually measured by the sensor; calculating the difference, the controller sends an On or Off output signal. When the output is 0% the control is always Off; when it is 100% the control is always On; when it is 50% the duration of the On control is equal to that of the Off control and the total time is the “half-load operating cycle” (e.g. 16 minutes = 8 minutes On and 8 minutes Off.
With this system the effective hysterisis is much narrower than the Proportional Band set and the room temperature is much more stable.

11.4 Season switching

In the controllers with one output it is possible to reverse the output action in order to change from winter to summer operation in three different ways :
– Single switching by means of the incorporated season switch (**only for RTB 540 C2**).
– Centralised switching from the central display unit.
– Centralised switching using a central switch which powers in parallel at 24 V~ the terminals 10-11 of all the controllers. Without power it is “Heating” and with power “Cooling”. With this type of switching all the controllers must remain in the “Winter” position (**only for RTB 540 C2**).

11.5 Window switch open (only for RTB 540 S1)

An electric switch of the burglar-alarm type, mounted on the window of the space controlled and connected to terminals 15 and 16, permits changing the heating to frost protection or excluding cooling, when the window is opened..
– WINDOW CLOSED = switch On = normal operation
– WINDOW OPEN = switch Off = Frosprot program (winter), off (summer)
NB: Should it be necessary to reverse the operation of the switch, use the AIC 240 cable; (for electrical wiring see Technical Data Sheet D 615).

11.6 Timer switch

If connected via CosterBus to a central display unit, the controller can operate as a time switch; in this event the internal sensor of the controller must be disabled by removing the jumper between the terminals 12 and 13..

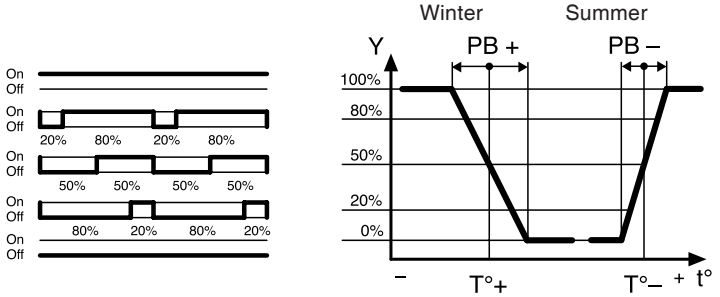
11.7 Normal use

When RTB 540 is switched on the display shows:
– Normally the measured temperature.
– To see the temperature set, press + or – key once; to change it press + or – key the required number of times.
– The maximum adjustment range permitted goes from (0…+5°C) for heating and from (0…-5°C) for cooling; this variation can be limited to lower figures by the central display unit (UMT 704) or by the Telemanagement program. To cancel the adjustments made press at the same time the + and – keys of UMT 704; the same cancellation operation can also be made from the PC..
– To display the current program press the P key once; to adjust the program press the P key the required number of times.
– Programs which can be set
- **nott** = Program: Setback with temperature of 16°C
- **dAY** = Program: Normal with temperature of 20°C
- **AGEL** = Program: Frosprot with temperature of 6°C
- **Off** = Program: Off, with all functions excluded
- **Sett** = Program: 7day (program set from MON – SUN P1)
- **P1** = Program: 24hour1 (times set 7.00 – 22.00)
- **P2** = Program: 24hour2 (times set 8.00 – 23.00)
- **P3** = Program: 24hour3 (times set 6.00 – 8.00 17.00 – 22.00)
- **P4** = Program: 24hour4 (times set 6.00 – 8.00 11.00 – 14.00 17.00 – 22.00)

The times set can be adjusted only from UMT 704 or by the Telemanagement program.

12. OPERATING CONTROL ACTION

RTB - 540
On-Off output with season switching



Amendments to data sheet

Date	Revision No	Page	Section	Details of amendments	Firmware Version	Software Version
30.03.06 MZ		Various	Various	Updated switching current		
13.07.06 MZ		3	11.1 Temperature measurement	Note included regarding use of remote sensor		
06.11.06 MC		2 2	8. Wiring Diagrams 11. 5 Window switch open	Inserted wiring diagram for window switch. Inserted note for use of AIC 240 cable for reversal switch.		
30.10.07 MC		3	8. Wiring diagram	Eliminated window switch wiring diagram; amendments made to the various diagrams		
26.09.07 MC	**01**	2	8. Wiring diagram	The numbers of the terminals shown in the actuators have been eliminated	08	≥ 0.98.2295

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