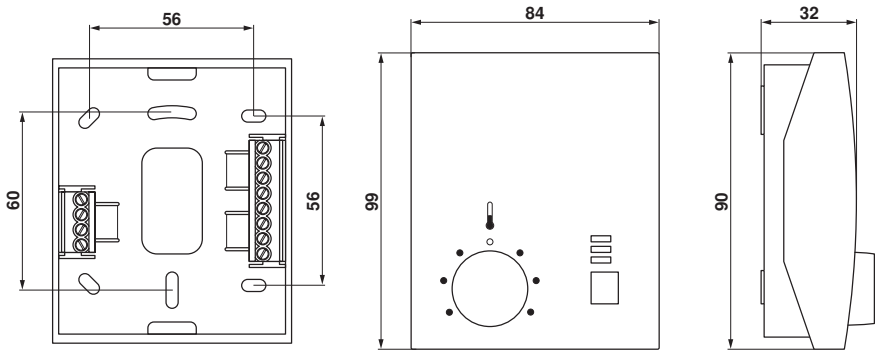
Dimensions [mm]



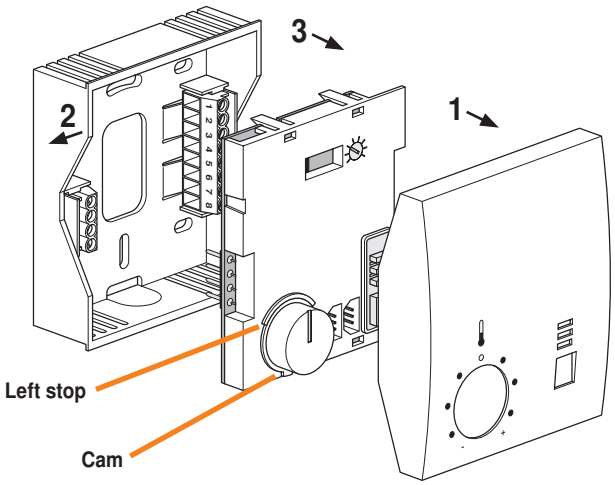
Mechanical installation

1. Remove the housing cover.
2. Pull out slightly the wall of the housing to release the pcb.
3. Remove the printed circuit board.

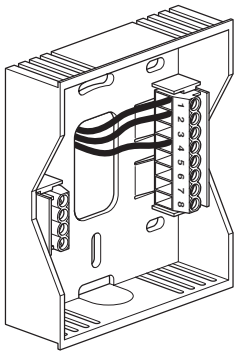
Rotary knob for setpoint adjustment

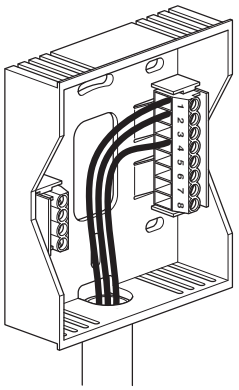
If the rotary knob has been removed proceed as follows:

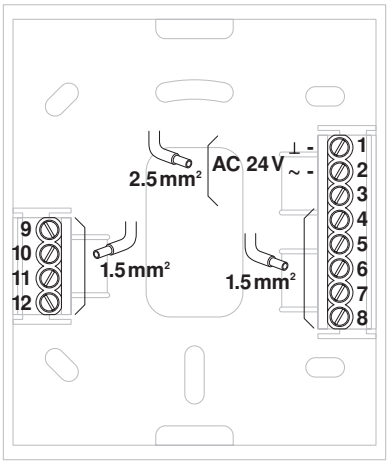
a. Insert the rotary knob approximately half way and turn it clockwise as far as the stop.
b. Remove the knob and align it so that the cam is flush with the left stop.
c. Insert the knob fully.



Electrical installation







Power supply design / wire sizing

In addition to the actual wire sizing, attention must also be paid to the surrounding area and the cable routing. Signal cables must not be laid in the vicinity of load cables, objects liable to cause EMC interference etc. Paired or layer stranded cables improve immunity to interference.

24 V supply
Wire sizing and cabling

The wire sizing and installation of the AC 24 V supply, the fuse protection, and the cables are dependent on the total operated load and local regulations.
Account must be taken of the following performance data, including starting currents:
- Wire sizing values for room temperature controllers: 3 VA per CR24-...
- Wire sizing values for control devices, VAV controllers, damper actuators, valves etc. can be found in the latest data sheets and product information (www.belimo.com)
- Other devices to be operated with the AC 24 V supply
- Reserve capacity for subsequent expansion (if planned)

Digital input connections di1 / di2 / di3

The digital inputs of the CR24 controllers are connections with a low electrical load that can be controlled by a common switching contact if necessary.
Example: Common thermostat for changeover function.
The maximum cable length depends on the number of CR24 controllers and the cross section of the cable used or the maximum resistance of the cable and switching contact as well as the quality of the environment.

No. of CR24-...	Cable cross section	Cable length
10	0.75 mm²	max. 250 m
20	0.75 mm²	max. 200 m
20	1.00 mm²	max. 250 m
25	0.75 mm²	max. 170 m
25	1.00 mm²	max. 220 m
25	1.50 mm²	max. 250 m
30	0.75 mm²	max. 140 m
30	1.00 mm²	max. 190 m
30	1.50 mm²	max. 250 m
40	0.75 mm²	max. 100 m
40	1.0 mm²	max. 140 m
40	1.50 mm²	max. 210 m
50	0.75 mm²	max. 80 m
50	1.00 mm²	max. 110 m
50	1.50 mm²	max. 170 m

If the number of CR24-.. controllers exceeds that indicated in the table, the next higher number of CR24-.. controllers should be taken instead.
Example of a system with 13 CR24-B1 controllers and a common C/O contact:
Use the table data for 20 CR24.. controllers to design the cable:
20 x CR24-.. → 0.75 mm² → 200 m.

Note
This table does not apply to the design of the AC 24 V power supply cable.
The supply cable is determined by the total power of all loads (see above).

Analog input connection ai1

The analog input ai1 is used to connect an external NTC 5 kΩ temperature sensor. The sensor value is 5969 Ω at 21 °C. A change of 50 Ω corresponds to approximately 0.2 K in this range.
The sensor cable constitutes a series resistance that must be added to the actual sensor value.
Assuming a cable length of 15 m (2 x 15 = 30 m), the resistance of one 0.75 mm2 Cu cable is approximately 0.7 Ω, in other words negligible.
To prevent interference, however, the sensor cable should be a maximum of 20 m long.

Analog input connection ai2

The 0...10 V input (with the 10 kΩ pulldown resistor) can be used to connect an external 0...10 V signal for a setpoint shift.
The current is calculated according to Ohm's Law: I = U / R: 10 V / 10 kΩ = 1 mA.
Calculation: Maximum permissible voltage drop across the cable (V) divided by the current (1 mA) = cable impedance in Ω.

Commissioning / Power on behaviour

Commissioning

1. Assemble the baseplate of the housing and connect the cables (see page 15).
2. Configure the DIP switches on the printed circuit board according to the required application.
3. Assemble the printed circuit board on the baseplate of the housing and then mount the housing cover (see page 15).
4. Switch on the nominal voltage (AC 24 V).
5. Optional: start the test and simulation mode (see below).

When the voltage is applied, the system starts operating normally in AUTO mode (unless the test and simulation mode is selected). The
active operating status is determined primarily by the configuration of the DIP switches and the status of the inputs

Power on behaviour

After power on of the voltage supply the output gets initialized as follows:
– ao1 = 0 V
– ao2 = 0 V
– ao3 = closed (200 s)

Subsequently the controller switches automatically to the control mode.

Test and simulation mode

All controllers are supplied with two auxiliary programs for commissioning and servicing:
– Internal function test
– Control sequence simulation

Activating test and simulation mode

The test and simulation mode of CR24-B.. controllers can be activated easily with the mode switch on the operator panel. With CR24-A.. controllers, the housing cover must be removed first.

To activate test mode

1. Set the mode switch to MAX
   – The red LED (MAX status indication) lights up
2. Keep the mode switch pressed for ten seconds
   – The internal function test is activated (see below)

To activate simulation mode

3. Press the mode switch again briefly (for approximately one second)
   – The green LED (AUTO status indication) flashes
   – Control sequence simulation is activated (see below)

Deactivating test and simulation mode

The test and simulation mode can be deactivated either by pressing the mode switch again for ten seconds or by interrupting the power supply. It is also deactivated automatically 15 minutes after the last user action (auto-reset).

Internal function test

The internal function test tests the nominal voltage that is connected to the controller (AC 24 V), in other words the complete electrical wiring system from the control cabinet to the controller. The three LEDs (status indication) indicate the voltage level (see below) and states during the test.

Nominal voltage (AC 24 V)

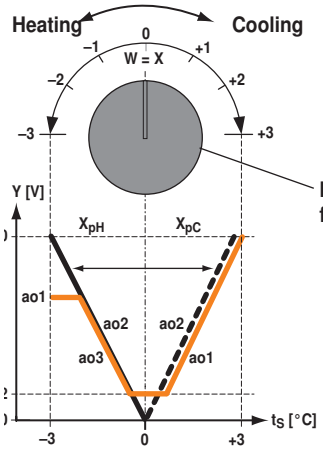
LED (status indication)		Scenario A	Scenario B	Scenario C
MAX	red	**flash**	**flash**	**permanently on**
ECO	orange	**flash**	**flash**	**permanently on**
AUTO	green	**permanently off**	**flash**	**permanently on**
		<20 V	**20...22 V**	**>22 V**

Note
Case B and C do not need further attention. In case A (<20 V) attation must be paid to the following points:
– Quality of the wiring and connections
– Cable length/diameter and the transformer sizing.

Control sequence simulation (CR24-B1, CR24-B2, CR24-B3)

CR24-B1, CR24-B2, CR24-B3

The connected actuators, and thus also the heating and cooling control sequences, can be simulated independently of the room temperature in simulation mode.
This permits the air volume ($\dot{V}_{min}$ and $\dot{V}_{max}$) to be tested in air systems or the maximum heating and cooling capacity in water systems.

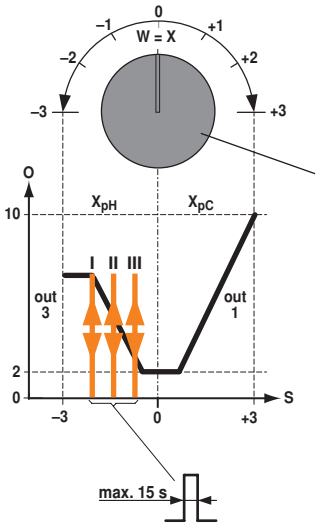


Potentiometer (setpoint adjustment) for simulating the room temperature

Notes
- The external control signals (di1, di2 and di3) are suppressed while the simulation is active.
- The potentiometer changes during simulation mode should be done slowly to avoid overshooting of the output values due to the system depending adjuster damping.
- A-types (controllers without operation panel): please do reset the potentiometer to the 0-position after simulation to avoid setpoint deviations.
- Simulation mode is automatically deactivated 15 minutes after the last user action (auto-reset).

CR24-B2E

The simulation mode for the CR24-B2E is basically as described above.
Unlike water operated air heaters, electric air heaters are not allowed to be operated without a flow. Simulations can be carried out on the CR24-.. at any time, even if the ventilation system is not operating.
The two triac outputs are activated for a maximum of 15 seconds in simulation mode to prevent overheating due to operation without ventilation. To activate these outputs again, the potentiometer must be reset via the “0” position to the heating range.



Potentiometer (setpoint adjustment) for simulating the room temperature