

4. CR-1
Product information
CR24-.. Single room controllers

CR



Single room controllers



CR24-B1



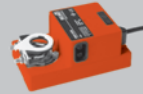
CR24-B2



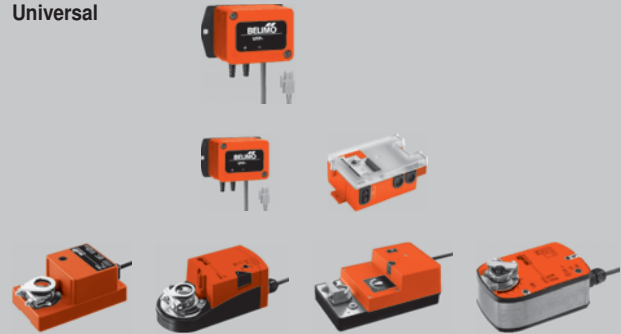
CR24-B3

VAV applications

Compact



Universal

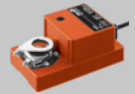


Water applications



Rotary actuator and control ball valves

Air applications



Damper actuators



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Overview of CR24-B.. functions

	CR24-B1	CR24-B2	CR24-B3
Power supply AC 24 V / 50/60 Hz	•	•	•
Application / temperature range			
– Room temperature control in comfort zone	•	•	•
– Internal temperature sensor (Type NTC, sensing range 10...45°C)	•	•	•
– Setpoint (adjustment range 15...36°C)	•	•	•
Operation (CR24-B.. only)	•	•	•
– Mode selection Switch: AUTO – ECO – MAX	•	•	•
– Mode indication LEDs: AUTO – ECO – MAX	•	•	•
– Setpoint adjustm. Rotary knob: ±3 K	•	•	•
Inputs Number	4	5	5
– Energy hold off	•	•	•
– Stand-by	• 1)	•	•
– Change-over	• 1)		• 2)
– Chilled ceiling with dew point limiting and change-over			• 2)
– Air flush		•	
– Boost			• 2)
– External temperature sensor Type NTC, sensing range 10...45°C	•	•	•
– External setpoint shift 0...10 V	•	•	•
Outputs Number	1	2	3
– (0)2...10 V system output for Belimo VAV controller or change-over	• 3)		
– (0)2...10 V system output for Belimo VAV controller		•	•
– Heating output 1		•	•
– Heating or cooling output, change-over 0...10 V			• 4)
Functions			
– Control characteristics	P	P	P / PI
– P-band switchable	•	•	•
– Boost function \dot{V}_{max} or temperature-controlled, selectable			•
– Volume increase in heating mode, selectable		•	•
– Internal function test, including nominal voltage test	•	•	•
– Commissioning mode with output and sequence simulation	•	•	•
– VAV controller diagnosis via integrated PC-Tool connection	•	•	•
Mounting			
Surface mounting with flush-mounted or surface-mounted connection	•	•	•
Housing colors			
Baseplate NCS2005-R80B light gray (corresponds approx. to RAL 7035)	•	•	•
Cover RAL 9003 signal white			

- 1) The stand-by input is not available in change-over (C/O) mode or in heating controller applications, as it is assigned to the change-over input function. CR24-B3 should be used if the stand-by function is needed in a change-over application.
- 2) The boost function is not available in change-over mode or in chilled ceiling applications with dew point limiting. A combination of change-over and dew point limiting is possible.
- 3) The output can either be used as a common cooling and heating output in change-over mode or exclusively as a cooling or heating output. The stand-by function is not available in change-over mode or in heating controller applications.
- 4) The output can either be used as a common cooling and heating output in change-over mode or exclusively as a cooling or heating output.

Additional documentation

Comprehensive and regularly updated documentation with descriptions of specific applications is available for all controllers.

Brief description

The new developed CR24-.. controller generation provides the foundation for modern single room concepts.

The technology, functionality and handling of the new microprocessor-controlled room temperature controllers are perfectly adapted to the BELIMO actuators for motorized air and water final controlling elements.

The functional classification into three basic types with up to three output sequences and the large number of specific applications facilitate cost-effective system solutions for individually controlling the room climate and reducing energy consumption. The controllers can be used in both pure VAV and combined systems with 2 and 4-pipe water applications (radiators, air heaters/coolers, heated/chilled ceilings).

Device variants



- Standard CR24-B.. type with operator panel (setpoint adjustment, mode switch and status indication). For operation, refer to page 10.



- Type CR24-A..: same functionality as the CR24-B.. but without an operator panel.

Notes

Unless otherwise expressly mentioned, all references contained in this document to the CR24-B.. also apply to the CR24-A...

Accessories

Type	Description
CRZA-A	Spare cover for A-types
CRZA-B	Spare cover for B-types (with operator panel)
CRZW	Spare baseplate Fitting to all types

Temperature controllers for single room applications with one analog output.

- The analog output ao1 can be used in VAV applications to control one or more VAV controllers.
- In change-over applications, the analog output ao1 can be changed over from cooling to heating mode via an input.



Technical data

Nominal voltage	AC 24 V 50/60 Hz
For wire sizing	3 VA, without actuators
Power supply range	AC 19.2...28.8 V
Control characteristics	P
– P-band heating / cooling	Selectable: 1.5 / 1.0 K or 3.0 / 2.0 K
External temperature sensor (ai1)	Type NTC, 5 k Ω , sensing range 10...45°C
Heating setpoint	Range 15...36°C (default 21°C)
– Energy hold off	Heating 15°C / cooling 40°C
– Stand-by	Heating –2 K / cooling +3 K
Dead band	1 K
Frost limit temperature	10°C
Operation (CR24-B.. only)	
– Mode switch and status indication (LEDs)	AUTO (green) – ECO (orange) – MAX (red)
– Rotary knob for setpoint adjustment	\pm 3 K
Inputs	2 x analog, 2 x digital
– External temperature sensor (ai2)	Type NTC, 5 k Ω , sensing range 10...45°C
– External setpoint shift (ai2)	0...10 V corresponds to 0...10 K
– Digital inputs (di1, di2)	Contact rating 10 mA
Output	1 x analog
– VAV system output (ao1)	(0)2 ... 10 V, max. 5 mA
Communication port for field devices	2 x PP (for PC-Tool, MFT remote control etc.)
Housing	Baseplate: NCS2005-R80B light gray (corresponds approx. to RAL 7035) / Cover: RAL 9003 signal white
Connections	Terminal block 1...3: 2.5 mm ² Terminal block 4...8: 1.5 mm ²
Ambient conditions	
– Operation	0...+50°C / 20...90% rH (without condensation)
– Transport and storage	–25...+70°C / 20...90% rH (without condensation)
Standards	
– Protection class	III Safety extra-low voltage
– Degree of protection	IP 30 to EN 60529
– Mode of operation	Type 1 to EN 60730-1
– Software class	A to EN 60730-1
– EMC	CE conformity to 89/336/EEC
Dimensions (H x W x D)	99 x 84 x 32 mm
Weight	105 g

Functions

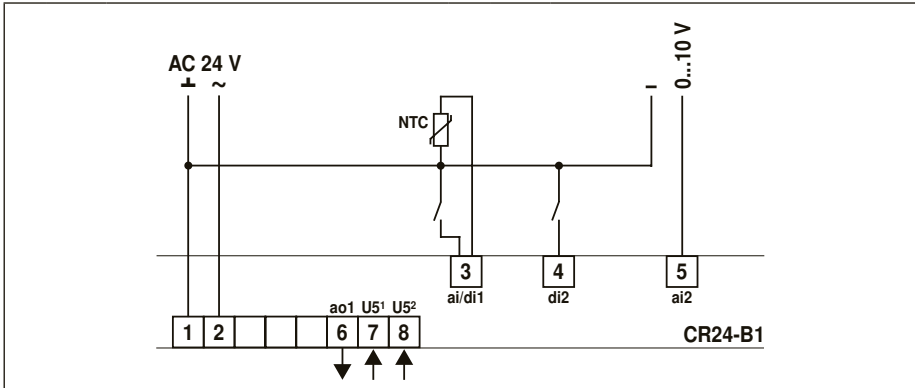
- **Energy hold off**
In energy saving mode, the room temperature is reduced to building protection level, i.e. either the heating setpoint is significantly reduced or the cooling setpoint is significantly increased, for instance in a room with an open window.
- **Stand-by**
The room temperature is reduced to stand-by level, i.e. either the heating setpoint is slightly reduced or the cooling setpoint is slightly increased, for instance in a room that is temporarily unoccupied.
- **Frost**
The frost protection function is activated if the actual room temperature falls below 10°C.
- **Change-over**
Change-over heating or heating/cooling.
- **External temperature sensor**
An external temperature sensor can be connected to the analog input ai1, for instance in order to measure the average room temperature in the exhaust air duct.
- **External setpoint shift**
An external DC 0...10 V signal at the analog input ai2 can be used to shift the basic setpoint 0...10 K, for instance for the summer/winter compensation.

These functions are described in detail on pages 11 to 17.

Device variant

Type CR24-A1, same functionality as the CR24-B1 but without an operator panel.

Wiring diagram



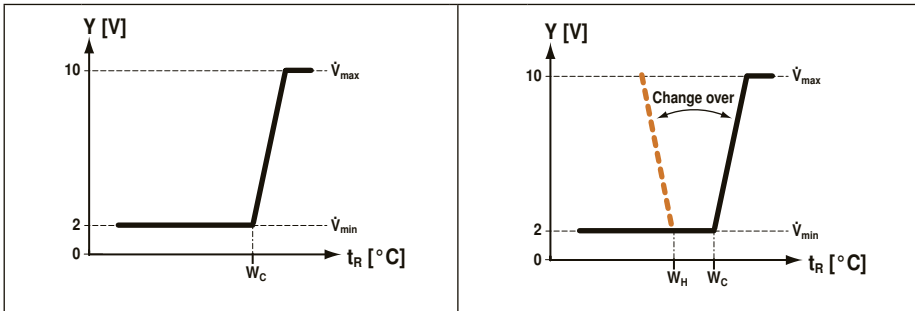
Inputs			Outputs		
3	ai1	External temperature sensor	6	ao1	System output for Belimo VAV controller
	di1	Energy hold off	Other connections		
4	di2	Stand by	7	PP1	Diagnostics socket 1
5	ai2	External setpoint shift	8	PP2	Diagnostics socket 2

Configuration



DIP	Default settings	
1	P-band normal	P-band wide
2	Input di2 Stand-by	Input di2 Change-over

Principal diagram



Key			
Y [V]	Output voltage in volt	\dot{V}_{max}	Maximum volume flow
t_R [°C]	Room temperature in degrees centigrade	\dot{V}_{min}	Minimum volume flow
W_H	Heating setpoint		
W_C	Cooling setpoint		

Temperature controllers for single room applications with two analog outputs.

- The analog output ao1 can be used in VAV applications to control one or more VAV controllers.
- The analog heating output ao3 supplies a 3-point signal.



Technical data

Nominal voltage	AC 24 V 50/60 Hz
For wire sizing	3 VA, without actuators
Power supply range	AC 19.2...28.8 V
Control characteristics	P
– P-band heating / cooling	Selectable: 1.5 / 1.0 K or 3.0 / 2.0 K
External temperature sensor (ai1)	Type NTC, 5 k Ω , sensing range 10...45°C
Heating setpoint	Range 15...36°C (default 21°C)
– Energy hold off	Heating 15°C / cooling 40°C
– Stand-by	Heating –2 K / cooling +3 K
Dead band	1 K
Frost limit temperature	10°C
Operation (CR24-B.. only)	
– Mode switch and status indication (LEDs)	AUTO (green) – ECO (orange) – MAX (red)
– Rotary knob for setpoint adjustment	\pm 3 K
Inputs	2 x analog, 3 x digital
– External temperature sensor (ai1)	Type NTC, 5 k Ω , sensing range 10...45°C
– External setpoint shift (ai2)	0...10 V corresponds to 0...10 K
– Digital inputs (di1, di2, di3)	Contact rating 10 mA
Outputs	2 x analog
– VAV system output (ao1)	(0)2 ... 10 V, max. 5 mA
– Heating output (ao3)	3-point, AC 24 V, max. source current 0.5 A / 10 VA (optimized for actuators with a running time of approx. 150 s)
Communication port for field devices	2 x PP (for PC-Tool, MFT remote control etc.)
Housing	Baseplate: NCS2005-R80B light gray (corresponds approx. to RAL 7035) / Cover: RAL 9003 signal white
Connections	Terminal block 1... 3: 2.5 mm ² Terminal block 4...12: 1.5 mm ²
Ambient conditions	
– Operation	0...+50°C / 20...90% rH (without condensation)
– Transport and storage	–25...+70°C / 20...90% rH (without condensation)
Standards	
– Protection class	III Safety extra-low voltage
– Degree of protection	IP 30 to EN 60529
– Mode of operation	Type 1 to EN 60730-1
– Software class	A to EN 60730-1
– EMC	CE conformity to 89/336/EEC
Dimensions (H x W x D)	99 x 84 x 32 mm
Weight	105 g

Functions

• Energy hold off

In energy saving mode, the room temperature is reduced to building protection level, i.e. either the heating setpoint is significantly reduced or the cooling setpoint is significantly increased, for instance in a room with an open window.

• Stand-by

The room temperature is reduced to stand-by level, i.e. either the heating setpoint is slightly reduced or the cooling setpoint is slightly increased, for instance in a room that is temporarily unoccupied.

• Frost

The frost protection function is activated if the actual room temperature falls below 10°C.

• Air flush

The room can be ventilated with the maximum volume flow (V_{max}), for instance in order to purge conference rooms, hotel rooms etc.

• External temperature sensor

An external temperature sensor can be connected to the analog input ai1, for instance in order to measure the average room temperature in the exhaust air duct.

• External setpoint shift

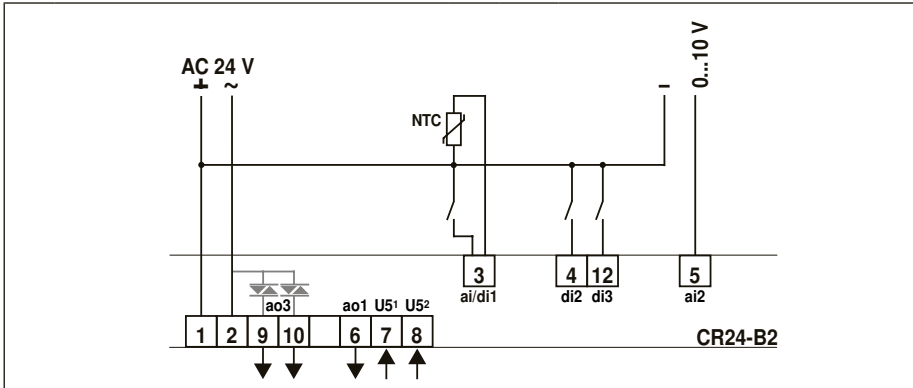
An external DC 0...10 V signal at the analog input ai2 can be used to shift the basic setpoint 0...10 K, for instance for the summer/winter compensation.

These functions are described in detail on pages 11 to 17.

Device variant

Type CR24-A2, same functionality as the CR24-B2 but without an operator panel.

Wiring diagram



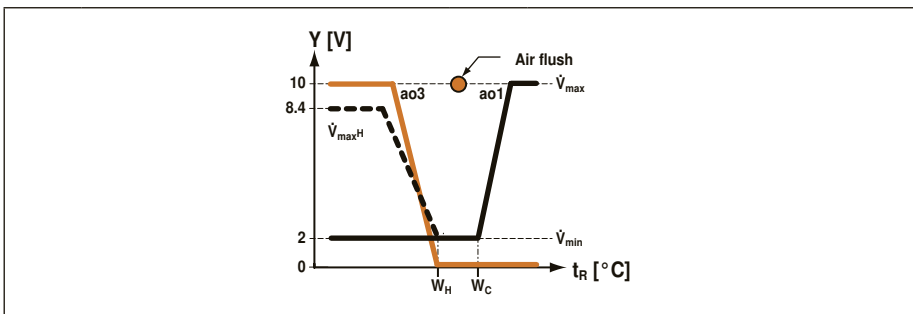
Configuration



DIP	Default settings	
1	P-band normal	P-band wide
2	\dot{V}_{max} heating off	\dot{V}_{max} heating 80%

Inputs			Outputs		
3	ai1	External temperature sensor	6	ao1	System output for Belimo VAV controller
	di1	Energy hold off	9/10	ao3	Heating (3-point)
4	di2	Stand by	Other connections		
5	ai2	External setpoint shift	7	PP1	Diagnostics socket 1
12	di3	Air flush	8	PP2	Diagnostics socket 2

Principal diagram



Key			
Y [V]	Output voltage in volt	ao..	Analog outputs
t _R [°C]	Room temperature in degrees centigrade	\dot{V}_{max}	Maximum volume flow
W _H	Heating setpoint	\dot{V}_{maxH}	Maximum volume flow heating
W _C	Cooling setpoint	\dot{V}_{min}	Minimum volume flow

Temperature controllers for single room applications with three analog outputs.

- The analog output ao1 can be used in VAV applications to control one or more VAV controllers.
- The analog output ao2 can be used to control a heating or cooling sequence (change-over).
- The analog heating output ao3 supplies a 3-point signal.



Technical data

Nominal voltage	AC 24 V 50/60 Hz
For wire sizing	3 VA, without actuators
Power supply range	AC 19.2...28.8 V
Control characteristics	P / PI
– P-band heating / cooling	Selectable: 1.5 / 1.0 K or 3.0 / 2.0 K
External temperature sensor (ai1)	Type NTC, 5 kΩ, sensing range 10...45°C
Heating setpoint	Range 15...36°C (default 21°C)
– Energy hold off	Heating 15°C / cooling 40°C
– Stand-by	Heating –2 K / cooling +3 K
Dead band	1 K
Frost limit temperature	10°C
Operation (CR24-B.. only)	
– Mode switch and status indication (LEDs)	AUTO (green) – ECO (orange) – MAX (red)
– Rotary knob for setpoint adjustment	±3 K
Inputs	2 x analog, 3 x digital
– External temperature sensor (ai1)	Type NTC, 5 kΩ, sensing range 10...45°C
– External setpoint shift (ai2)	0...10 V corresponds to 0...10 K
– Digital inputs (di1, di2, di3)	Contact rating 10 mA
Outputs	3 x analog
– VAV system output (ao1)	(0)2 ... 10 V, max. 5 mA
– Heating / cooling output (ao2)	0...10 V, max. 5 mA
– Heating output (ao3)	3-point, AC 24 V, max. source current 0.5 A / 10 VA (optimized for actuators with a running time of approx. 150 s)
Communication port for field devices	2 x PP (for PC-Tool, MFT remote control etc.)
Housing	Baseplate: NCS2005-R80B light gray (corresponds approx. to RAL 7035) / Cover: RAL 9003 signal white
Connections	Terminal block 1... 3: 2.5 mm ² Terminal block 4...12: 1.5 mm ²
Ambient conditions	
– Operation	0...+50°C / 20...90% rH (without condensation)
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Standards	
– Protection class	III Safety extra-low voltage
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– Mode of operation	Type 1 to EN 60730-1
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– EMC	CE conformity to 89/336/EEC
Dimensions (H x W x D)	99 x 84 x 32 mm
Weight	105 g

Functions

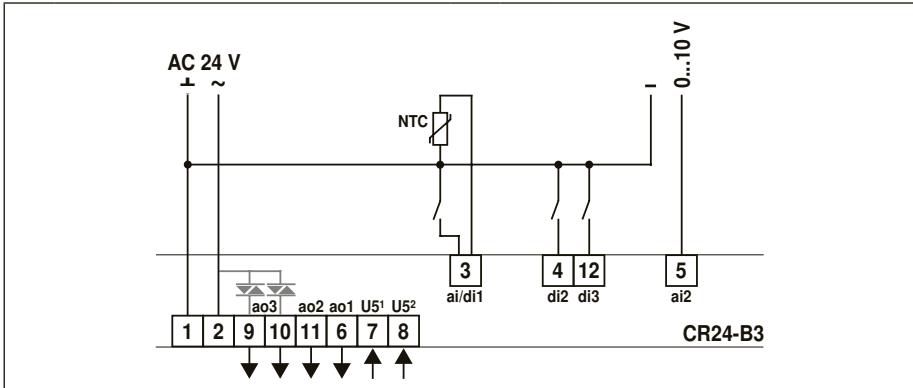
- **Energy hold off**
In energy saving mode, the room temperature is reduced to building protection level, i.e. either the heating setpoint is significantly reduced or the cooling setpoint is significantly increased, for instance in a room with an open window.
- **Stand-by**
The room temperature is reduced to stand-by level, i.e. either the heating setpoint is slightly reduced or the cooling setpoint is slightly increased, for instance in a room that is temporarily unoccupied.
- **Frost**
The frost protection function is activated if the actual room temperature falls below 10°C.
- **Change-over**
Change-over heating or heating/cooling.
- **Chilled ceiling with dew point limiting**
If the temperature falls below the dew point, the corresponding output is set to 0.
- **Boost**
The room can be ventilated with the maximum volume flow (V_{max}) or heated or cooled with the maximum capacity.
- **External temperature sensor**
An external temperature sensor can be connected to the analog input ai1, for instance in order to measure the average room temperature in the exhaust air duct.
- **External setpoint shift**
An external DC 0...10 V signal at the analog input ai2 can be used to shift the basic setpoint 0...10 K, for instance for the summer/winter compensation.

These functions are described in detail on pages 11 to 17.

Device variant

Type CR24-A3, same functionality as the CR24-B3 but without an operator panel..

Wiring diagram



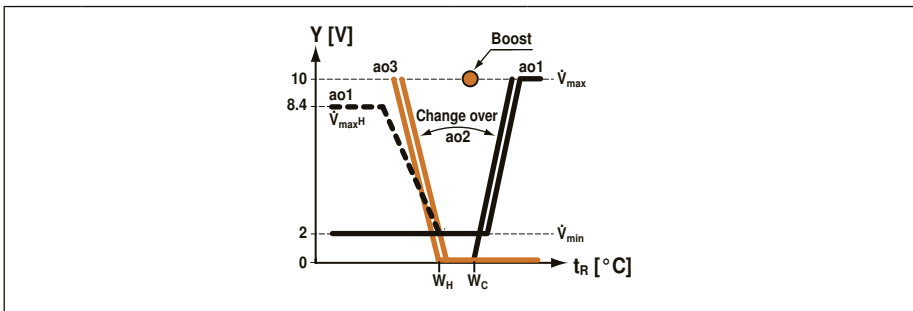
Inputs			Outputs		
3	ai1	External temperature sensor	6	ao1	System output for Belimo VAV controller
	di1	Energy hold off	9/10	ao3	Heating (3-point)
4	di2	Stand by	11	ao2	Heating / Cooling
5	ai2	External setpoint shift	Other connections		
12	di3	Boost / Change-over / Dew point	7	PP1	Diagnostics socket 1
			8	PP2	Diagnostics socket 2

Configuration



DIP	Default settings	
1	P-band normal	P-band wide
2	\dot{V}_{max} heating off	\dot{V}_{max} heating 80%
3	Output ao2 Heating	Output ao2 Change-over Cooling
4	Input di3 Boost	Input di3 Change-over Dew point
5	Boost Temperature controlled	Boost \dot{V}_{max}
6	Control characteristic PI	Control characteristic P

Principal diagram

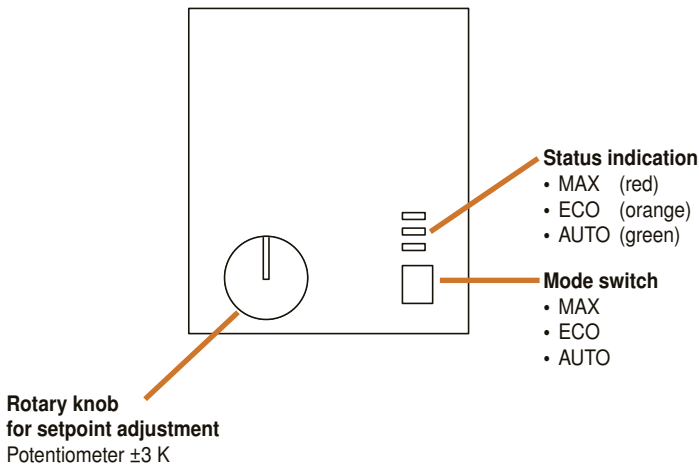


Key			
Y [V]	Output voltage in volt	ao..	Analog outputs
tR [°C]	Room temperature in degrees centigrade	\dot{V}_{max}	Maximum volume flow
WH	Heating setpoint	\dot{V}_{maxH}	Maximum volume flow heating
WC	Cooling setpoint	\dot{V}_{min}	Minimum volume flow

Operator level 1 – Operation

Operating mode / Setpoint

CR24-B.. only



Mode switch and status indication

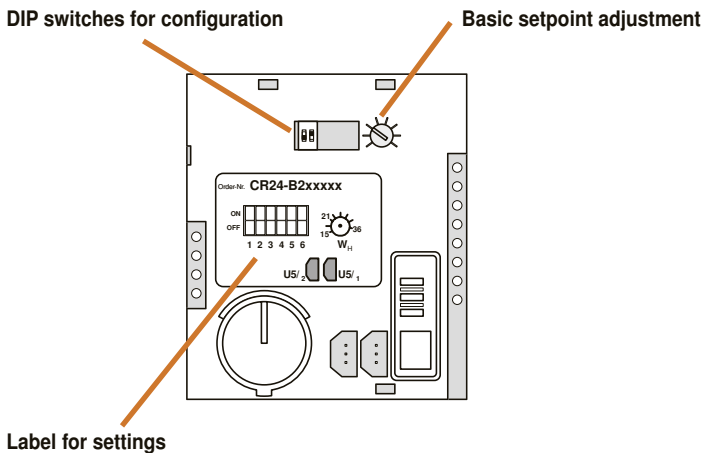
There are three possible operating modes:

- **AUTO – optimum comfort mode**
The room is heated, cooled or ventilated with the highest level of comfort, providing this is permitted by the external control signals. All the control functions (sequence control, boost function) are enabled.
- **ECO – optimum energy mode**
The room is heated, cooled or ventilated with the stand-by settings, providing this is permitted by the external control signals. The heating setpoint is reduced in this mode (-2 K) and the cooling setpoint is increased ($+3$ K). The room can be changed from "optimum energy" to "optimum comfort" in a very short time. Sequence control and the boost function are enabled. ECO mode is intended for rooms that are only irregularly occupied resp. at reduced demand.
- **MAX – boost function**
The room is ventilated with the maximum air volume or heated or cooled with the maximum capacity, providing this is permitted by the external control signals. Sequence control is disabled, but the boost and ventilation functions are active.
The boost function gets deactivated:
 - timer elapsed
 - setpoint reached (VAV fix 15 minutes)
 - change to another mode (AUTO or ECO)

Operator level 2 – Configuration

Application / Parameters

all CR24-..



DIP switches for configuration

DIP switches 1 and 2 (CR24-B1 and CR24-B2) or 1 to 6 (CR24-B3)

Basic setpoint adjustment

Potentiometer $15 \dots 36$ °C (default 21 °C)

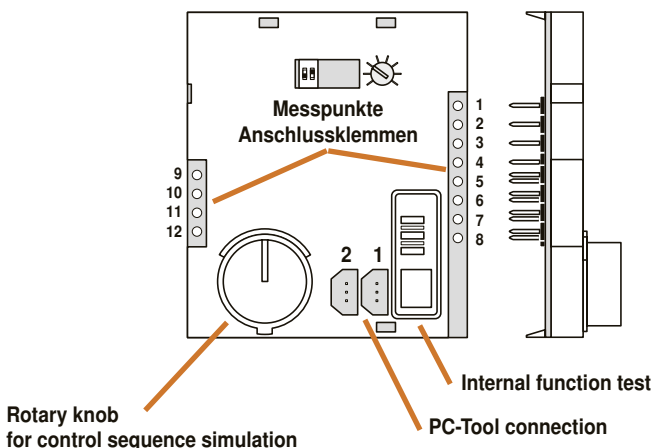
Label for settings

Used to record the selected settings (DIP switches and basic setpoint).

Operator level 3 – Service

Test / Simulation

all CR24-..



Measuring point terminals

Measuring points for all terminals (also during operation).

Internal function test

A comprehensive internal function test, including a nominal voltage test (AC 24 V), can be started for the controller with the mode switch. The three LEDs (status indication) indicate the voltage level and the states.

Control sequence simulation

The connected actuators, and thus also the heating and cooling control sequences, can be simulated independently of the room temperature with the rotary knob for adjusting the setpoint.

PC-Tool connection

Diagnostics sockets 1 and 2 are used for PP communication with the connected Belimo MFT actuators or VAV controllers. As a result, physical access to the field devices can be dispensed with.

Introduction

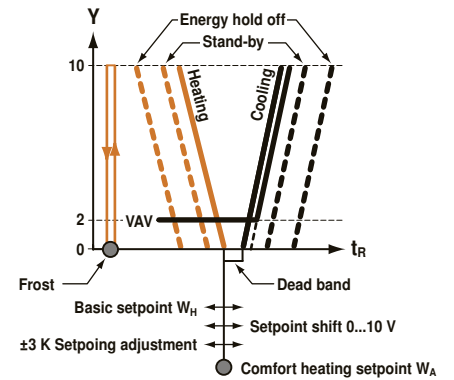
The control functions define the behavior of the controller outputs and influence the current setpoint.

Both the level of comfort and the energy saving potential can be significantly enhanced by installing suitable sensors on the input side.

Please refer to the table on page 3 for an overview of the functions of the three basic CR24-B.. types. These functions are described in detail below.

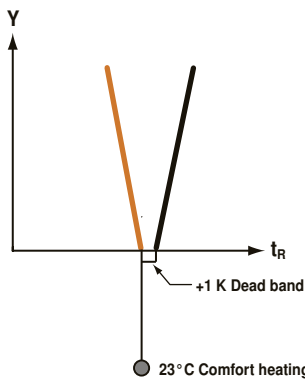
Setpoint calculation

Operating status	Heating setpoint	Cooling setpoint
Comfort	Basic setpoint W_H ± 3 K Setpoint adjustment + Setpoint shift 0...10 V	Comfort heating setpoint W_A + 1 K Dead band
Stand-by	Comfort heating setpoint W_A - 2 K Stand-by offset heating	Comfort heating setpoint W_A + 1 K Dead band + 3 K Stand-by offset cooling
Energy hold off	Fixed 15°C (building protection)	Fixed 40°C (building protection)
Frost	Fixed 10°C	Not relevant

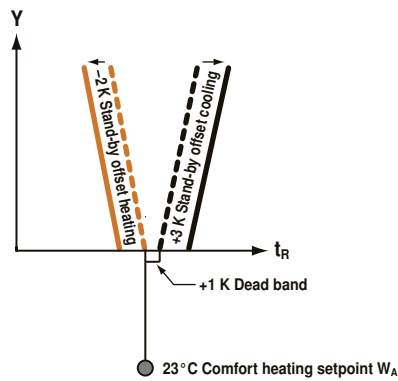


Examples

Comfort



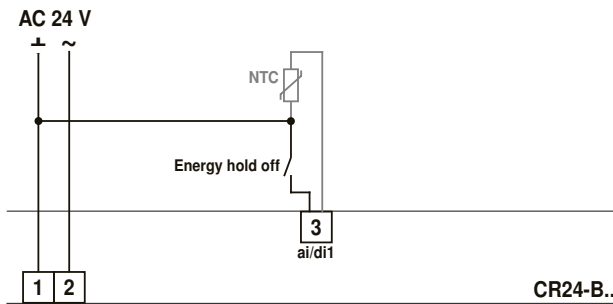
Stand-by



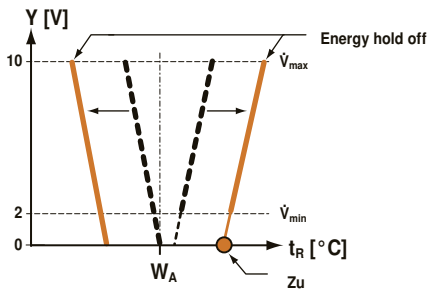
Energy hold off

Digital input di1

all CR24-..



CR24-B..



Key
 Y Output signal
 t_R Room temperature
 W_A Current setpoint

If a local detector (e.g. a window switch) acts on the digital input di1 and closes the corresponding contact, the room is adjusted to the building protection settings in energy saving mode, in other words the heating setpoint is significantly reduced (15°C) or the cooling setpoint significantly increased (40°C), though not sufficiently to cause damage to sensitive objects (plants, paintings etc.).

Typical applications

- A window switch at di1 stops all energy consumption from the moment the window is opened until the lower or upper building protection limit is reached.
- Higher-level override command, e.g. building management system.

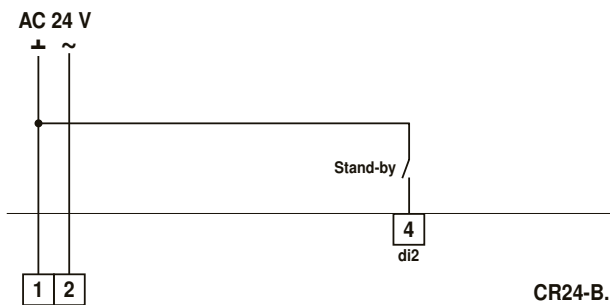
Notes

- The minimum VAV output is set to 0 V instead of 2 V while energy hold off is active (forced closing in 2...10 V)
- The mode switch (operator level 1) is deactivated while energy hold off is active (input di1 takes priority).
- If an external temperature sensor is used, the frost limit is monitored by the internal sensor while energy hold off is active.
- Due to the automatic sensor detection the change into Energy hold off takes about 40 seconds.

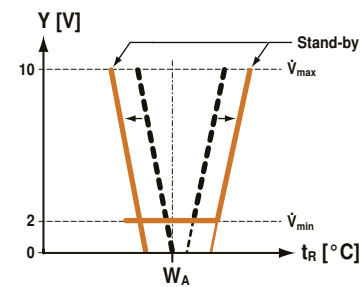
Stand-by

Digital input di2

all CR24-..



CR24-B..



Key
 Y Output signal
 t_R Room temperature
 W_A Current setpoint

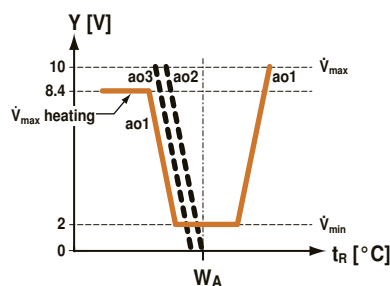
If a local detector (e.g. a motion detector) acts on the digital input di2 and closes the corresponding contact, the room is adjusted to the stand-by settings, in other words the heating setpoint is reduced by 2 K or the cooling setpoint is increased by 3 K.

Typical applications

- A motion detector, a light switch or another detector at di2 reduces the energy consumption of unoccupied rooms.
- Higher-level override command, e.g. building management system.

VAV function: air volume in heating mode (Reheater)

CR24-B2 and CR24-B3 only



Key
 Y Output signal
 t_R Room temperature
 W_A Current setpoint

If the selected application requires an increased air volume for heating, e.g. for:

- Providing or assisting heating with air.
- Improving the air quality during heating.

CR24-B2 configuration

The VAV function is configured using DIP switch 2.



CR24-B3 configuration

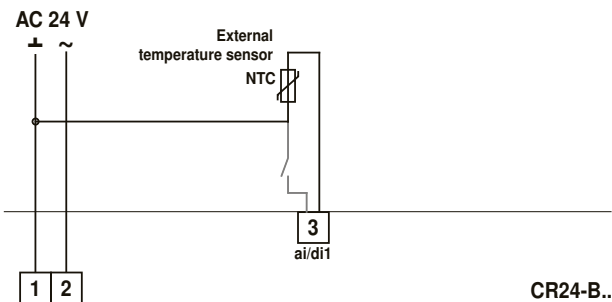
The VAV function is configured using DIP switch 2.



External temperature sensor

Analog input ai1

all CR24-..



An external NTC temperature sensor can be connected to the analog input ai1.

Typical application

A temperature sensor measures the average room temperature in the exhaust air duct.

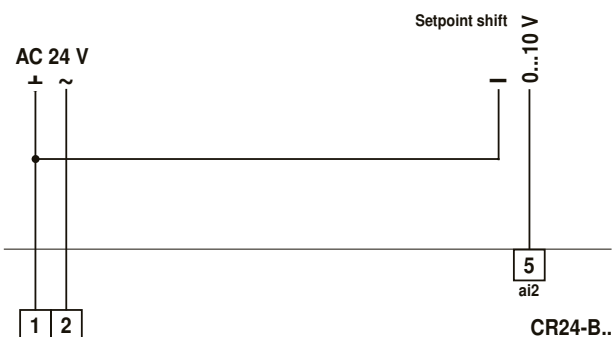
Notes

- The internal sensor automatically detects the presence of an external sensor.
- It is possible to install an energy hold off switch simultaneously at di1, in which case the system changes over to the internal sensor (see also "Energy hold off"). This permits the actual room temperature to be monitored in order to protect the building.

External setpoint shift

Analog input ai2

all CR24-..



An external DC 0...10 V signal at the analog input ai2 can be used to shift the basic setpoint 0...10 K (corresponds to 0...10 V).

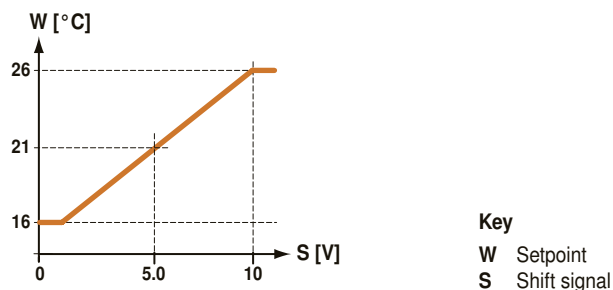
Typical application

- Summer/winter compensation

Notes

A negative shift can be achieved by adjusting the basic setpoint to the required final setpoint, e.g. from 21°C (default value) to 16°C. In this case:

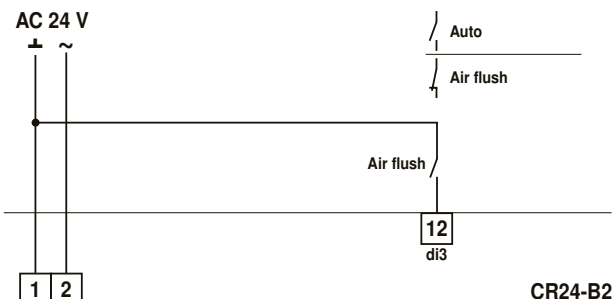
- 0... 5 V corresponds to 16...21°C and
- 5...10 V corresponds to 21...26°C (see diagram opposite).



Air flush

Digital input di3

CR24-B2 only



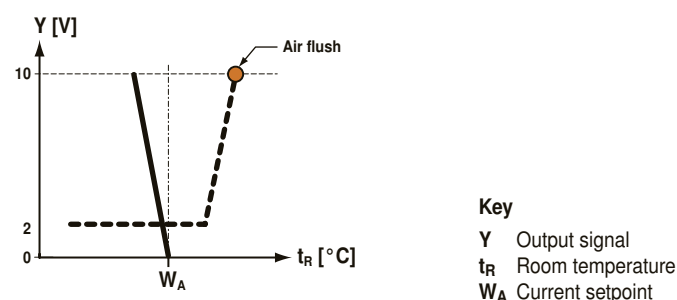
The CR24-B2 controller allows override control at the digital input di3, to enable the room to be flushed with the maximum volume flow (\dot{V}_{max}).

Typical applications

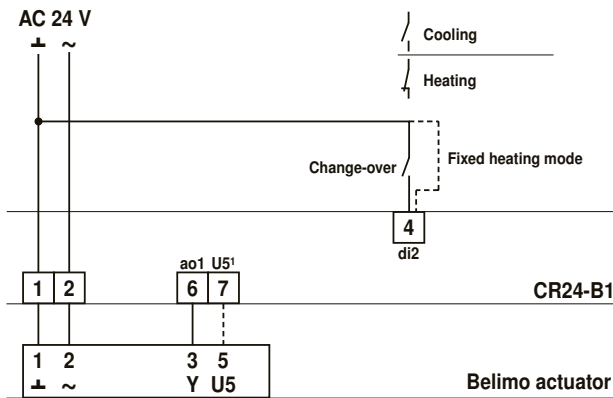
- Purging conference rooms, hotel rooms etc. (e.g. time switch-controlled)
- Assisting smoke extraction
- Controlling air quality (2-point signal)

Notes

- The VAV output ao1 is set to a fixed value of \dot{V}_{max} (10 V).
- The heating output ao3 remains in the normal control mode and continues to be controlled by means of the heating sequence.



Change-over ao1



Digital input di2

CR24-B1 only

In change-over applications, the digital input di2 controls the VAV system output ao1 of the CR24-B1 controller.

Typical applications

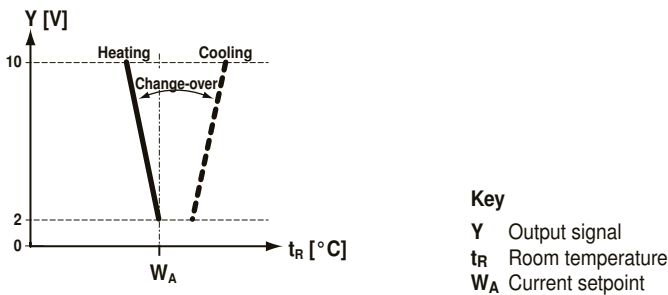
Change-over heating or heating/cooling.

Note

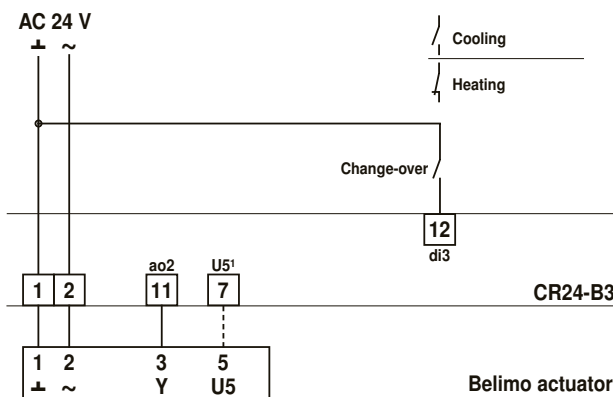
The CR24-B3 controller is suitable for applications that require both a stand-by function and a change-over function.

Configuration

The change-over function is configured using DIP switch 2



Change-over ao2



Digital input di3

CR24-B3 only

In change-over applications, the digital input di3 controls the common heating/cooling output ao2 of the CR24-B3 controller.

Typical applications

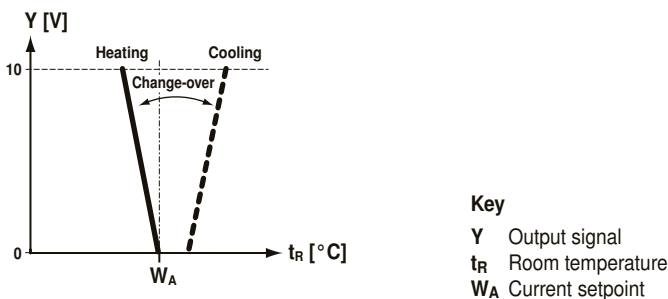
Change-over heating or heating/cooling.

Note

- For chilled ceiling applications, refer to page 12.
- The CR24-B1 controller is suitable for applications that only require a change-over function.

Configuration

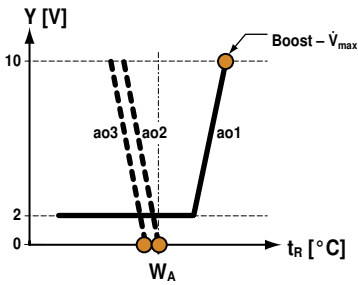
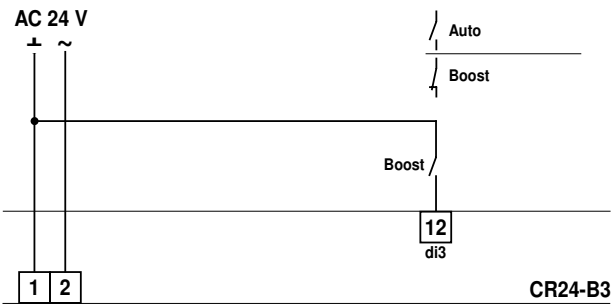
The change-over function is configured using DIP switches 3 and 4.



Boost – \dot{V}_{max}

Digital input di3

CR24-B3 only



Legende

- Y Output signal
- t_R Room temperature
- W_A Current setpoint

The CR24-B3 controller allows override control at the digital input di3, to enable the room to be ventilated with the maximum air flow (\dot{V}_{max}). This function acts on all three analog outputs (see "Notes"). Room temperature control is deactivated in this mode (exception: frost protection function).

Typical applications

- Purging conference rooms, hotel rooms etc.
- Assisting smoke extraction
- Free- or night cooling

Notes

The boost function acts on the outputs as follows:

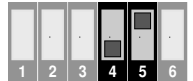
- ao1 (VAV) 100% > 10 V (\dot{V}_{max})
- ao2 (heating / cooling) 0% > 0 V
- ao3 (heating) 0% > closed (3-point)

The boost function is deactivated by the following events:

- Boost signal (di3) not active
- Frost limit temperature (10°C) undershot

Configuration

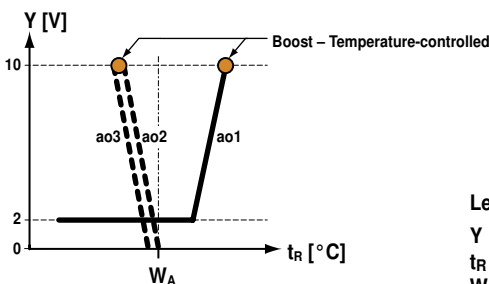
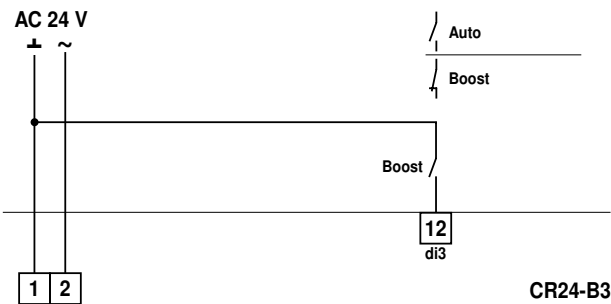
This boost function is configured using DIP switches 4 (boost on) and 5 (boost \dot{V}_{max}).



Boost – Temperature-controlled

Digital input di3

CR24-B3 only



Legende

- Y Output signal
- t_R Room temperature
- W_A Current setpoint

The CR24-B3 controller allows override control at the digital input di3, to enable the room to be heated or cooled with the maximum capacity. This function acts on all three analog outputs (see "Notes").

Typical applications

- Rapid heating, rapid cooling
- Cooling, morning boost etc.

Notes

The boost function acts temperature-sensitive on the outputs as follows:

- ao1 (VAV) 100% > 10 V (\dot{V}_{max})
- ao2 (heating / cooling) 100% > 10 V
- ao3 (heating) 100% > open (3-point)

To support reheater applications the VAV system output (ao1) gets activated at the heating condition too.

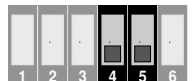
The boost function is deactivated by the following events:

- Boost signal (di3) not active
- Comfort setpoint (W_A) reached

The air is always conditioned to the comfort setpoint W, even if stand-by is active, in order to facilitate room preconditioning.

Configuration

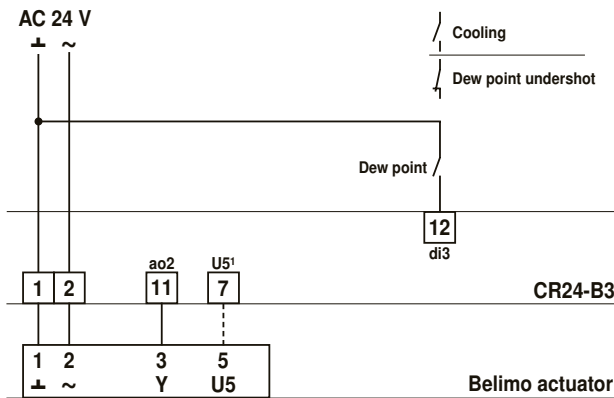
This boost function is configured using DIP switches 4 (boost on) and 5 (boost temperature-controlled).



Chilled ceiling with dew point limiting

Digital input di3

CR24-B3 only



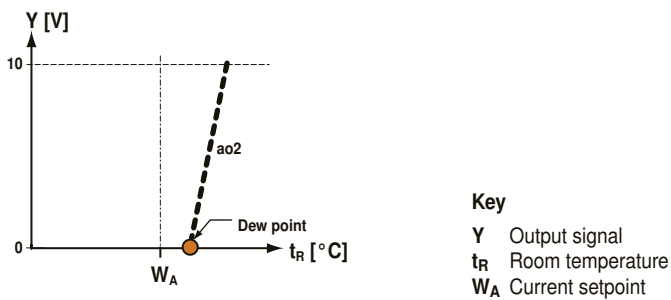
If the temperature at the external dew point monitor (input di3) falls below the dew point, output ao2 is set to 0 V.

Typical applications

Chilled ceiling systems that require dew point limiting.

Configuration

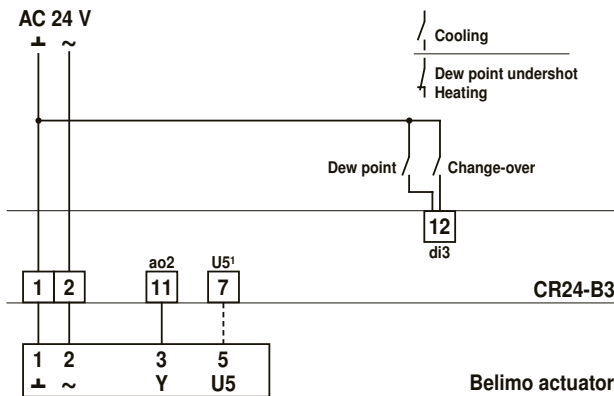
This function is configured using DIP switches 3 and 4.



Chilled ceiling with dew point limiting and change-over

Digital input di3

CR24-B3 only



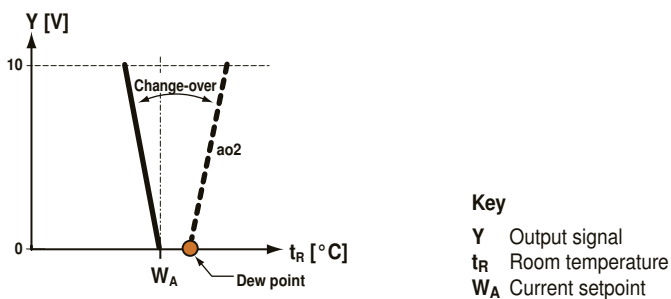
If the temperature at the external dew point monitor (input di3) falls below the dew point, output ao2 is set to 0 V. Dew point limiting can be combined with the change-over function.

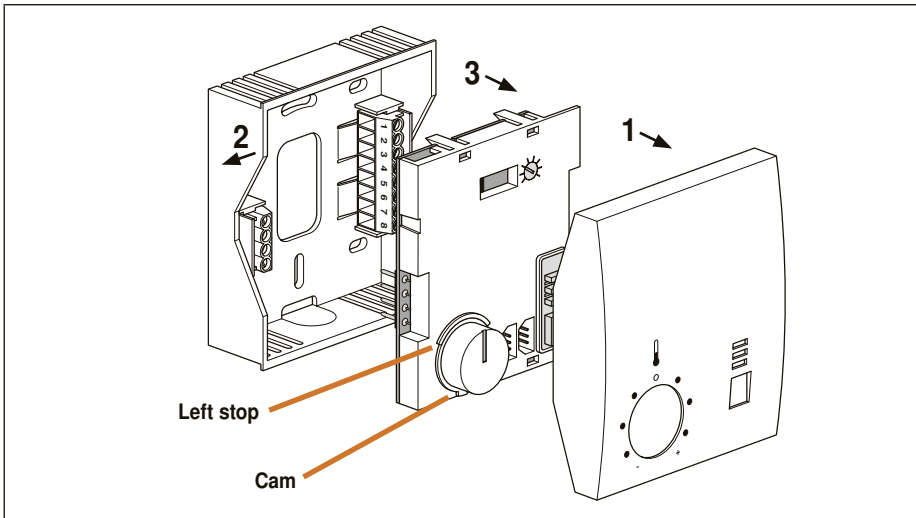
Typical applications

Switchable heated/chilled ceiling systems that also require dew point limiting.

Configuration

This function is configured using DIP switches 3 and 4.





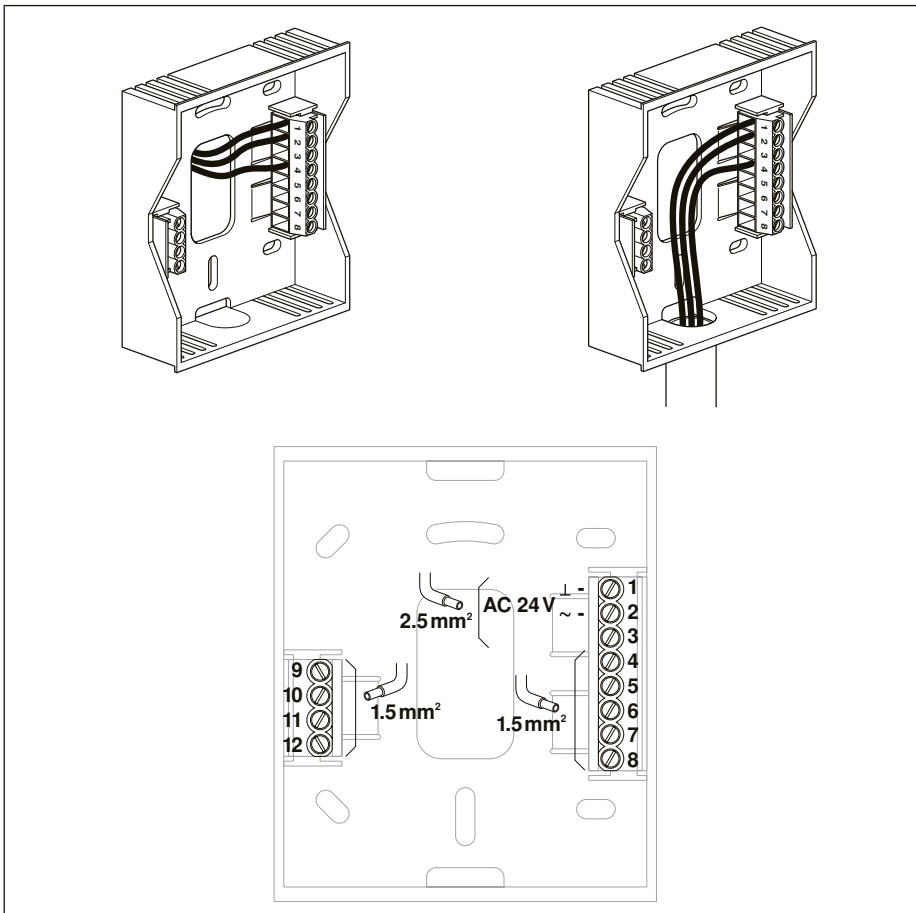
Mechanical installation

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

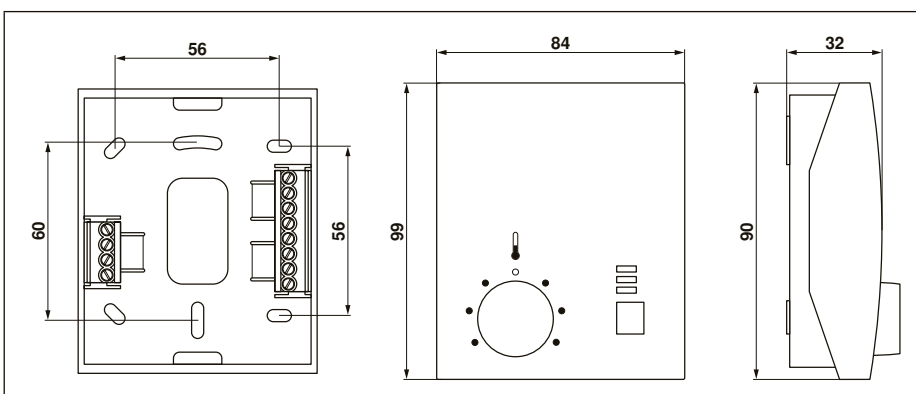
If the rotary knob has been removed proceed as follows:

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



Electrical installation

If space is limited or the cables that are used are short, it is possible to release and remove the terminal blocks, then connect the cables, reinsert the prewired terminal blocks into the housing from behind and snap them in tightly again.



Dimensions [mm]

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 opposite).

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

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

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.

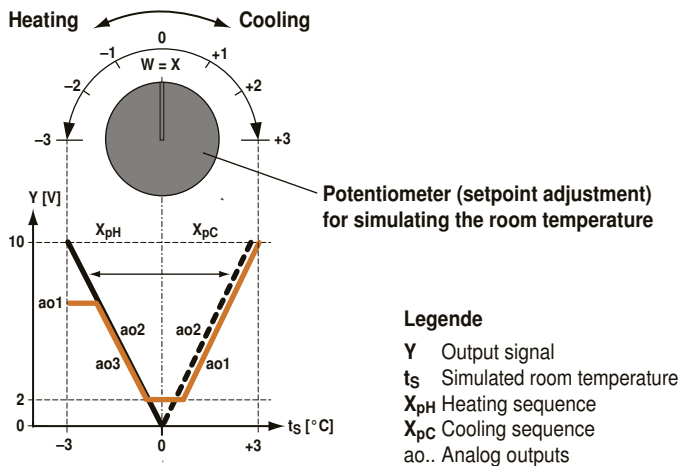
The three LEDs (status indication) indicate the voltage level (see opposite) and states during the test.

Note

Case B and C do not need further attention. In case A (<20 V) attention must be paid to the following points:

- Quality of the wiring and connections
- Cable length/diameter and the transformer sizing.

Control sequence simulation



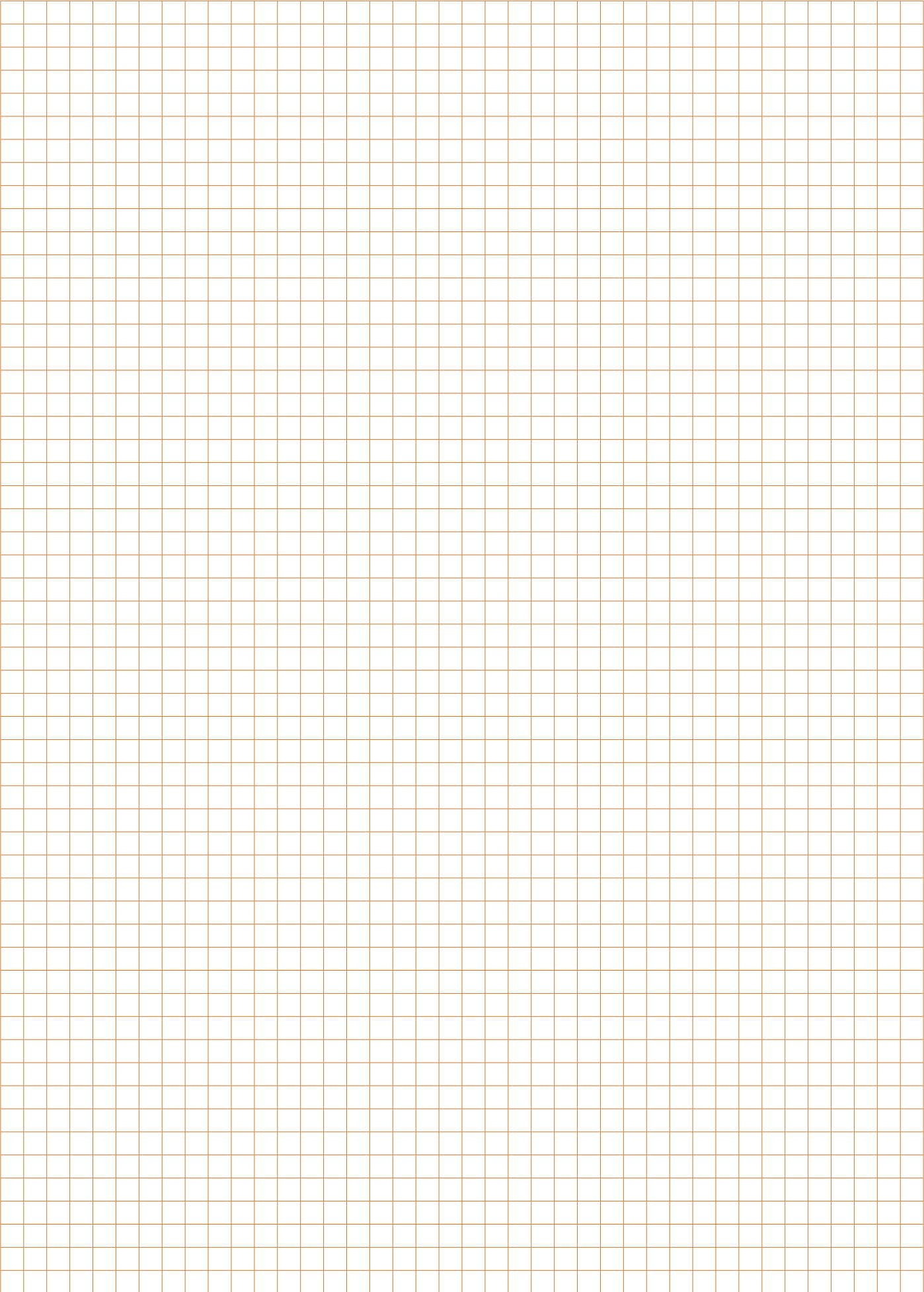
Control sequence simulation

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.

Note

- 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.



Air applications



Standard actuators and spring-return actuators for air control dampers in HVAC systems

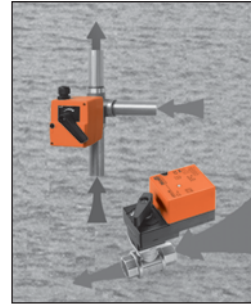


Safety actuators for motorizing fire and smoke extraction dampers



VAV systems for individual room air control

Water applications



Mixing actuators and motorized ball valves for HVAC water circuits



Globe valves and intelligent linear actuators – also for leading makes of valve

Innovation, Quality and Consultancy: A partnership for motorizing HVAC actuators

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