en

MANUAL

REGIOARDO

REGIN

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Regin's offer, in combination with DEOS and Industrietechnik, empower system integrators, installers, and property owners with a powerful toolbox, setting them in a position to create building automation solutions that save both energy and engineering time. Today, versatile building management, optimized room control, and effective workflows have become the pillars for leading property owners in realizing significant energy savings in properties. Regin shares the clear goal of the group; to make this challenge easier on the way towards a sustainable future.

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PART OF
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Table of Contents

1 Introduction

RegioArdo is a 24 V AC two-room controller with a pre-programmed software application for dampers, chilled beams, and radiators. The controller provides built-in communication via EXOline, Modbus, or BACnet for integration in EXOscada or other SCADA systems. The controller is fast and easy to configure and commission using Regin's free Application tool software, and it connects seamlessly to Regin room units. The controller is installed in a ceiling void by using a base plate with terminal protection covers, or on a DIN rail.

1.1 About this manual

This manual provides descriptions of the RegioArdo controller functions, as well as hardware-related information concerning controller connections, wiring, mounting, maintenance and service, and so on.

RegioArdo is configured and commissioned by using Regin's Application tool software. The controller functions and their configuration options are therefore described in an Application tool context.

The manual has the following high-level section structure:

- ✓ Sections 2-7 contain descriptions of and configuration information for controller functions, such as:
  - ✓ Heating, cooling, and variable air volume (VAV) controller modes
  - ✓ Controller states
  - ✓ Fan control
  - ✓ CO_2 control
  - ✓ Presence detection
  - ✓ Change-over
  - ✓ Two rooms
  - ✓ Removable walls
  - ✓ Configuration third-party Modbus room units
- ✓ Sections 8-11 contain hardware-related information topics, such as:
  - ✓ Controller connections and wiring diagrams
  - ✓ LED status indications
  - ✓ Mounting
  - ✓ Maintenance and service
- ✓ The Appendix sections contain the following information:
  - ✓ Technical data
  - ✓ Model overview - ED-RU-... room units
  - ✓ Room unit display parameter lists

Special text formats used in the manual:

Note! This box and symbol is used to show useful tips and tricks.

Caution! This type of text and symbol is used to show cautions.

Warning! This type of text and symbol is used to show warnings.

1.2 Software version

This manual is valid for software version 2.1-1-00 or later. The latest software version can be downloaded via www.regincontrols.com.

2 Control functions

This section contains descriptions of and configuration information for the controller's basic control functions.

2.1 Controller mode

The controller mode function enables the controller to support control of various room HVAC systems, that is, different combinations of heating, cooling, and variable air volume (VAV) devices that are part of a room.

The controller provides the following 10 selectable controller modes:

- ✓ Heating
- ✓ Heating + Heating
- ✓ Heating + Cooling
- ✓ Cooling
- ✓ Heating/Cooling (change-over)
- ✓ Heating + Heating/Cooling (change-over)
- ✓ Heating + VAV
- ✓ Cooling + VAV
- ✓ VAV
- ✓ Heating + Cooling + VAV

Based on the selected controller mode, the controller outputs one or multiple control signal sequences, denoted Y1, Y2, and Y3. The signal sequences control the heating, cooling, and VAV devices in the room, and are assigned to the different controller outputs via configuration.

Figure 2-1 shows the drop down that is used to select a controller mode in Application tool.

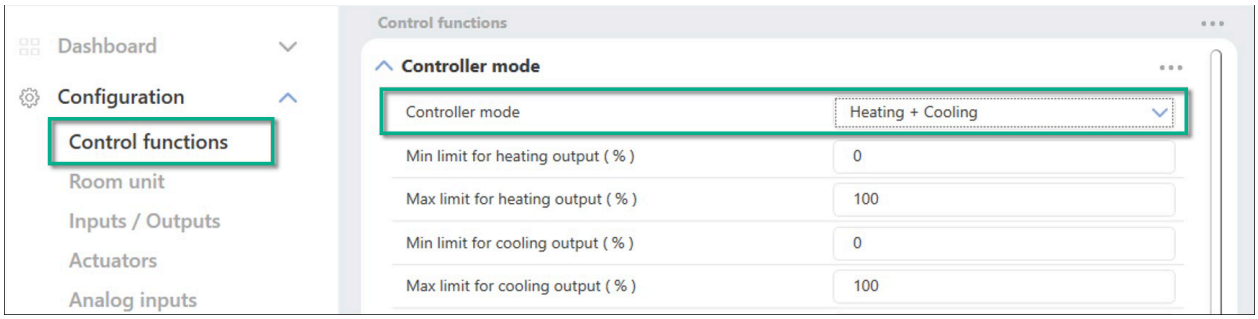


Figure 2-1 Controller mode selection in Application tool.

2.1.1 Heating

This controller mode is suitable for room HVAC systems that use a radiator or fan coil as heating device.

The controller acts as a heating controller and regulates based on the heating setpoint and the current room temperature.

The controller is always in heating mode and outputs a heating signal, Y1, that is configured on the controller outputs by using the configuration values listed in *Table 2-1*.

Maximum and minimum limits for the output signal can be set. See section *2.2*.

Table 2-1 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Heating	Analog
	Heating valve, increase Heating valve, decrease	Digital Digital
	Heating valve, thermal (PWM)	Digital

Figure 2-2 illustrates the control behaviour for this controller mode when no maximum or minimum limits are set.

The heating demand increases as the room temperature falls. When the room temperature falls below the heating setpoint, *Y1: Heating signal* increases to respond to the heating demand. At 100% heating demand, *Y1: Heating signal* reaches its maximum.

When the room temperature is higher than the heating setpoint and no heating demand exists, *Y1: Heating signal* is at its minimum.

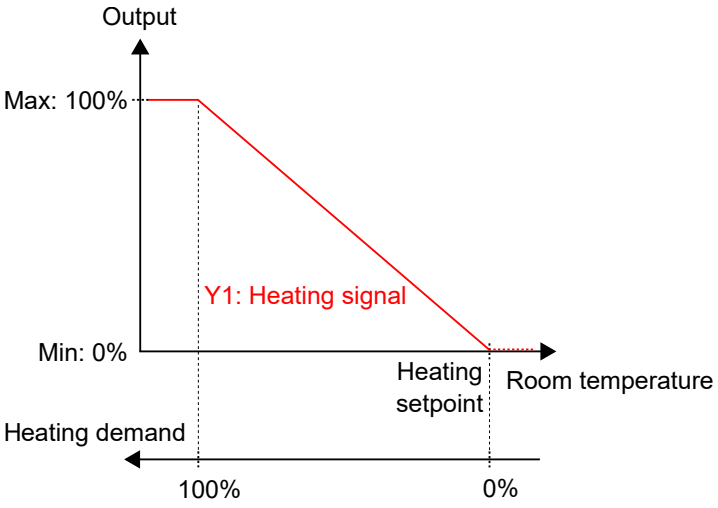


Figure 2-2 Control behaviour for the Heating controller mode.

2.1.2 Heating + Heating

This controller mode is suitable for room HVAC systems that use a combination of two heating devices in sequence, such as radiators or fan coils.

The controller acts as a heating controller and regulates based on the heating setpoint and the current room temperature.

The controller is always in heating mode and outputs two heating signals, Y1 and Y2, in sequence that are configured on the controller outputs by using the configuration values listed in table *Table 2-2*.

The Y1 and Y2 signal sequence order is configurable.

Maximum and minimum limits for the output signals can be set. See section *2.2*.

Table 2-2 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Heating	Analog
	Heating valve, increase Heating valve, decrease	Digital Digital
	Heating valve, thermal (PWM)	Digital
Y2	Heating 2	Analog
	Heating valve 2, increase Heating valve 2, decrease	Digital Digital
	Heating valve 2, thermal (PWM)	Digital

Figure 2-3 illustrates the control behaviour for this controller mode when no maximum or minimum limits are set.

The heating demand increases as the room temperature falls. When the room temperature falls below the heating setpoint, *Y1: Heating signal* increases to respond to the heating demand. At 49% heating demand, *Y1: Heating signal* reaches its maximum. When the room temperature falls further and the heating demand exceeds 51%, *Y2: Heating 2 signal* increases while *Y1: Heating signal* stays at its maximum. At 100% heating demand, *Y2: Heating signal* reaches its maximum.

When the room temperature is higher than the heating setpoint and no heating demand exists, both *Y1: Heating signal* and *Y2: Heating 2 signal* are at their minimum.

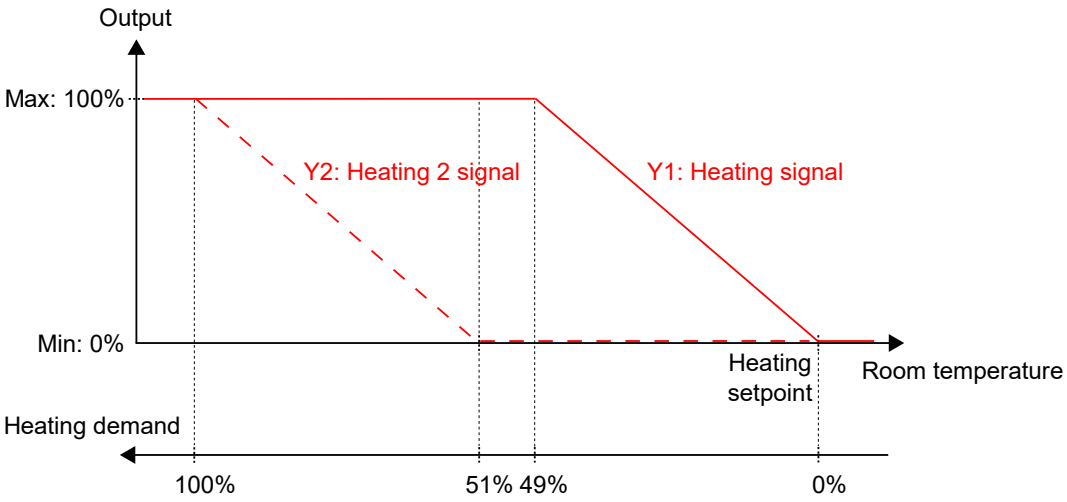


Figure 2-3 Control behaviour for the Heating + Heating controller mode.

2.1.3 Heating + Cooling

This controller mode is suitable for room HVAC systems that use a radiator or fan coil as heating device, and a fan coil or chilled beam as cooling device.

The controller acts as a heating and cooling controller and regulates based on the heating setpoint, cooling setpoint, and the current room temperature.

The temperature range between the heating and cooling setpoints is defined as the deadband. The controller is in heating mode when the room temperature is lower than [heating setpoint plus half the deadband], and in cooling mode when the room temperature is higher than [cooling setpoint minus half the deadband].

When in heating mode, the controller outputs a heating signal, Y1, that is configured on the controller outputs by using the values listed in *Table 2-3*.

When in cooling mode, the controller outputs a cooling signal, Y2, that is configured on the controller outputs by using the values listed in *Table 2-3*.

Maximum and minimum limits for the output signals can be set. See section 2.2.

Table 2-3 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Heating	Analog
	Heating valve, increase Heating valve, decrease	Digital Digital
	Heating valve, thermal (PWM)	Digital
Y2	Cooling	Analog
	Cooling valve, increase Cooling valve, decrease	Digital Digital
	Cooling valve, thermal (PWM)	Digital
Y1 + Y2	6-way valve	Analog
	6-way valve, increase 6-way valve, decrease	Digital Digital

Figure 2-4 illustrates the control behaviour for this controller mode when no maximum or minimum limits are set.

The heating demand increases as the room temperature falls. When the room temperature falls below the heating setpoint, *Y1: Heating signal* increases to respond to the heating demand. At 100% heating demand, *Y1: Heating signal* reaches its maximum. When the room temperature is in the range between the heating setpoint and the deadband centre, and no heating demand exists, *Y1: Heating signal* is at its minimum.

The cooling demand increases as the room temperature rises. When the room temperature rises above the cooling setpoint, *Y2: Cooling signal* increases to respond to the cooling demand. At 100% cooling demand, *Y2: Cooling signal* reaches its maximum. When the room temperature is in the range between the cooling setpoint and the deadband centre, and no cooling demand exists, *Y2: Cooling signal* is at its minimum.

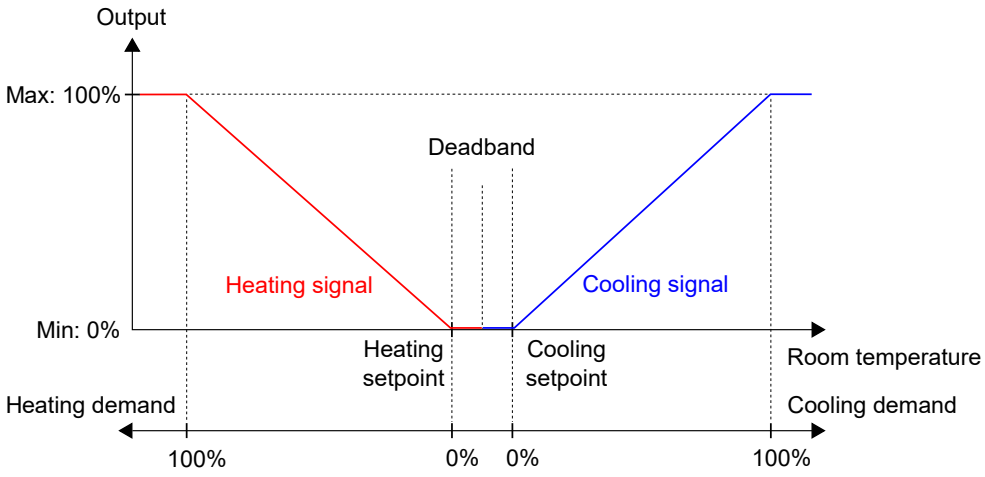


Figure 2-4 Control behaviour for the Heating + Cooling controller mode.

2.1.4 Cooling

This controller mode is suitable for room HVAC systems that use a fan coil or a chilled beam as cooling device.

The controller acts as a cooling controller and regulates based on the cooling setpoint and the current room temperature.

The controller is always in cooling mode and outputs a cooling signal, Y1, that is configured on the controller outputs by using the configuration values listed in *Table 2-4*.

Maximum and minimum limits for the output signal can be set. See section *2.2*.

Table 2-4 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Cooling	Analog
	Cooling valve, increase Cooling valve, decrease	Digital Digital
	Cooling valve, thermal (PWM)	Digital

Figure 2-5 illustrates the control behaviour for this controller mode when no maximum or minimum limits are set.

The cooling demand increases as the room temperature rises. When the room temperature rises above the cooling setpoint, *Y1: Cooling signal* increases to respond to the cooling demand. At 100% cooling demand, *Y1: Cooling signal* reaches its maximum.

When the room temperature is lower than the cooling setpoint and no cooling demand exists, *Y1: Cooling signal* is at its minimum.

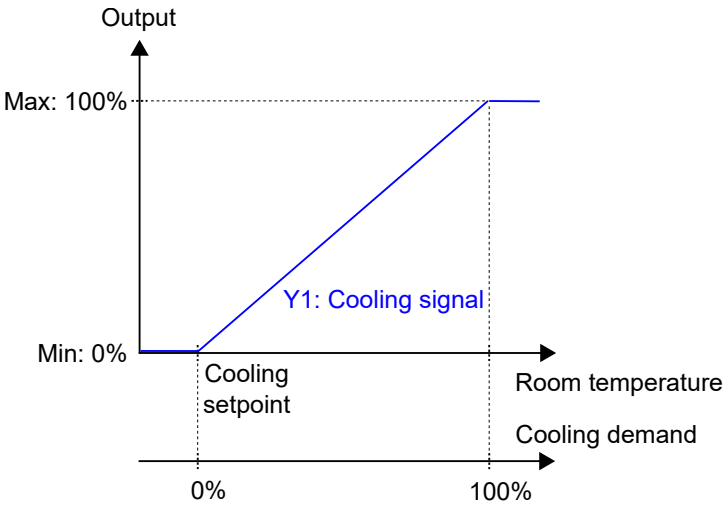


Figure 2-5 Control behaviour for the Cooling controller mode.

2.1.5 Heating/Cooling (change-over)

This controller mode is suitable for room HVAC systems that use a 2-pipe fan coil as heating and cooling device. The *Change-over* function makes it possible to use the controller in a 2-pipe change-over system, where warm or cold media flow in the same pipes and one valve is used to regulate both heating and cooling distribution. See section *2.3* for information about the *Change-over* function.

The controller acts as a heating or cooling controller and regulates based on the heating setpoint, cooling setpoint, and the current room temperature.

The controller is either in heating or cooling mode, and switches between the modes according to its current change-over state. See section *2.3*.

When the controller is in heating or cooling mode, the controller outputs a heating or cooling signal, Y1, that is configured on the controller outputs by using the configuration values listed in *Table 2-5*.

Maximum and minimum limits for the output signal can be set. See section *2.2*.

Table 2-5 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Change-over valve	Analog
	Change-over valve, increase Change-over valve, decrease	Digital Digital
	Change-over valve, thermal (PWM)	Digital

Figure 2-6 illustrates the control behaviour in heating mode, and when no maximum or minimum limits are set.

The heating demand increases as the room temperature falls. When the room temperature falls below the heating setpoint, *Y1: Change-over (heating mode) signal* increases to respond to the heating demand. At 100% heating demand, *Y1: Change-over (heating mode) signal* reaches its maximum.

When the room temperature is higher than the heating setpoint and no heating demand exists, *Y1: Change-over (heating mode) signal* is at its minimum.

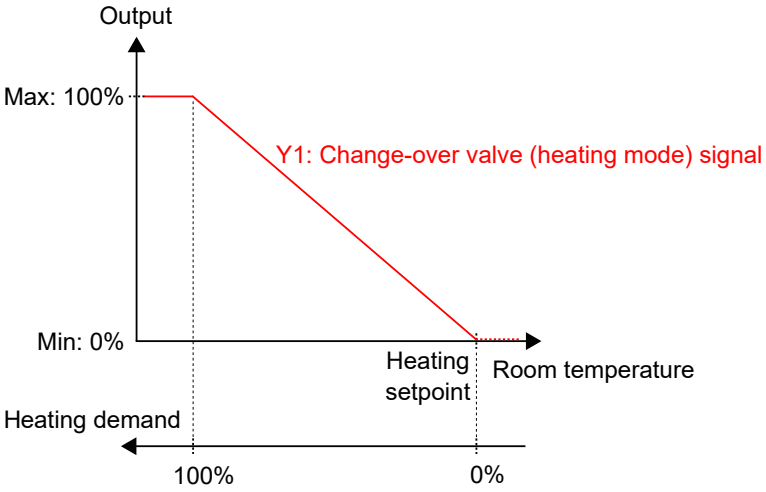


Figure 2-6 Control behaviour for the Heating/Cooling (change-over) controller mode when the controller is in heating mode.

Figure 2-7 illustrates the control behaviour in cooling mode, and when no maximum or minimum limits are set.

The cooling demand increases as the room temperature rises. When the room temperature rises above the cooling setpoint, *Y1: Change-over (cooling mode) signal* increases to respond to the cooling demand. At 100% cooling demand, *Y1: Change-over (cooling mode) signal* reaches its maximum.

When the room temperature is lower than the cooling setpoint and no cooling demand exists, *Y1: Change-over (cooling mode) signal* is at its minimum.

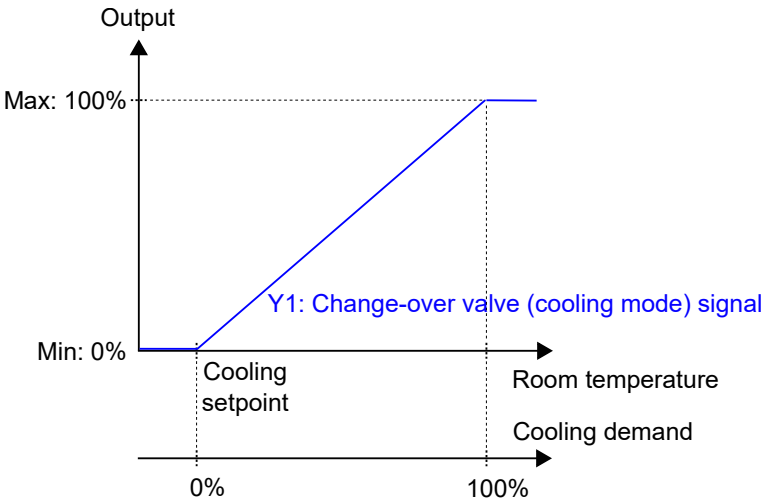


Figure 2-7 Control behaviour for the Heating/Cooling (change-over) controller mode when the controller is in cooling mode.

2.1.6 Heating + Heating/Cooling (change-over)

This controller mode is suitable for room HVAC systems that use a 2-pipe fan coil as heating and cooling device, and where an additional heating device, typically an electrical heating battery, is used to provide extra heating during cold seasons.

The controller is set to operate in either Heating + Heating mode or Heating + Cooling mode by using the *Change-over* function. The *Change-over* function makes it possible to use the controller in a 2-pipe change-over system, where warm or cold media flow in the same pipes and one valve is used to regulate both heating and cooling distribution. See section *2.3* for information about the *Change-over* function.

The controller operates in Heating + Heating mode when the controller change-over state is *heating*, and in Heating + Cooling mode when the controller change-over state is *cooling*. See section *2.3* for information about the controller change-over state.

The Heating + Heating mode is typically used during cold seasons, such as winter. The Heating + Cooling mode is typically used during warm seasons, such as summer.

Heating + Heating mode

The controller acts as a heating controller and regulates based on the heating setpoint and the current room temperature.

The controller is always in heating mode and outputs two heating signals, Y1 and Y2, in sequence that are configured on the controller outputs by using the configuration values listed in table *Table 2-6*.

The Y1 output signal is associated with the 2-pipe fan coil and increases first to respond to the initial heating demand. The Y2 output signal is associated with the additional heating device and responds to any further heating demand that the 2-pipe fan coil cannot meet.

Maximum and minimum limits for the output signals can be set. See section *2.2*.

Table 2-6 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Change-over valve	Analog
	Change-over valve, increase Change-over valve, decrease	Digital Digital
	Change-over valve, thermal (PWM)	Digital
Y2	Heating	Analog
	Heating valve, increase Heating valve, decrease	Digital Digital
	Heating valve, thermal (PWM)	Digital

Figure 2-8 illustrates the control behaviour for this mode when no maximum or minimum limits are set.

The heating demand increases as the room temperature falls. When the room temperature falls below the heating setpoint, *Y1: Change-over (heating mode) signal* increases to respond to the heating demand. At 49% heating demand, *Y1: Change-over (heating mode) signal* reaches its maximum. When the room temperature falls further and the heating demand exceeds 51%, *Y2: Heating signal* increases while *Y1: Change-over (heating mode) signal* stays at its maximum. At 100% heating demand, *Y2: Heating signal* reaches its maximum.

When the room temperature is higher than the heating setpoint and no heating demand exists, both *Y1: Change-over (heating mode) signal* and *Y2: Heating signal* are at their minimum.

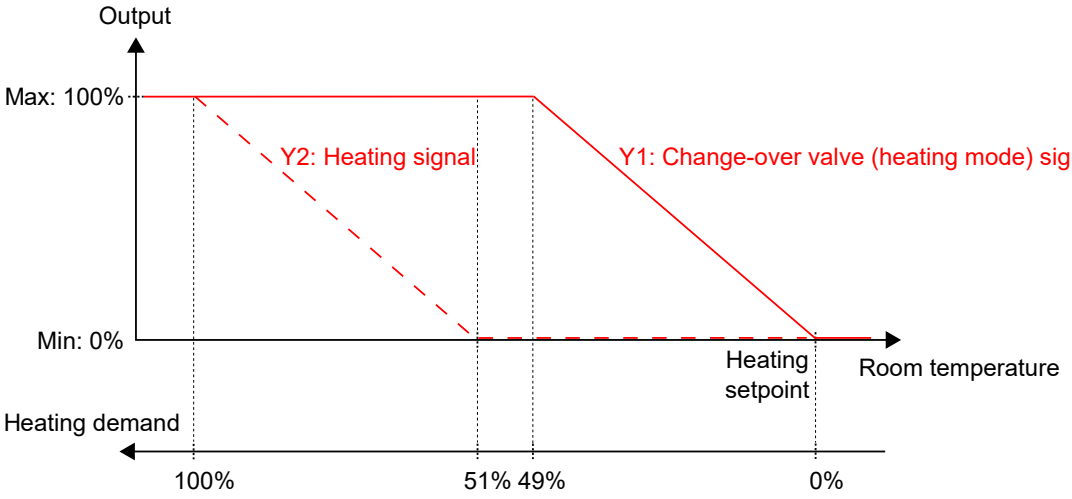


Figure 2-8 Control behaviour for the Heating + Heating/Cooling (change-over) controller mode when the controller is in Heating + Heating mode.

Heating + Cooling mode

The controller acts as a heating and cooling controller and regulates based on the heating setpoint, cooling setpoint, and the current room temperature.

The temperature range between the heating and cooling setpoints is defined as the deadband. The controller is in heating mode when the room temperature is lower than [heating setpoint plus half the deadband], and in cooling mode when the room temperature is higher than [cooling setpoint minus half the deadband].

When in cooling mode, the controller outputs a cooling signal, Y1, that is configured on the controller outputs by using the values listed in *Table 2-3*. The Y1 output signal is associated with the 2-pipe fan coil.

When in heating mode, the controller outputs a heating signal, Y2, that is configured on the controller outputs by using the values listed in *Table 2-3*. The Y2 output signal is associated with the additional heating device.

Maximum and minimum limits for the output signals can be set. See section *2.2*.

Output signal	Controller output configuration value	Controller output type
Y1	Change-over valve	Analog
	Change-over valve, increase Change-over valve, decrease	Digital Digital
	Change-over valve, thermal (PWM)	Digital
Y2	Heating	Analog
	Heating valve, increase Heating valve, decrease	Digital Digital
	Heating valve, thermal (PWM)	Digital

Figure 2-9 illustrates the control behaviour for this mode when no maximum or minimum limits are set.

The heating demand increases as the room temperature falls. When the room temperature falls below the heating setpoint, *Y2: Heating signal* increases to respond to the heating demand. At 100% heating demand, *Y2: Heating signal* reaches its maximum. When the room temperature is in the range between the heating setpoint and the deadband centre, and no heating demand exists, *Y2: Heating signal* is at its minimum.

The cooling demand increases as the room temperature rises. When the room temperature rises above the cooling setpoint, *Y1: Change-over (cooling mode) signal* increases to respond to the cooling demand. At 100% cooling demand, *Y1: Change-over (cooling mode) signal* reaches its maximum. When the room temperature is in the range between the cooling setpoint and the deadband centre, and no cooling demand exists, *Y1: Change-over (cooling mode) signal* is at its minimum.

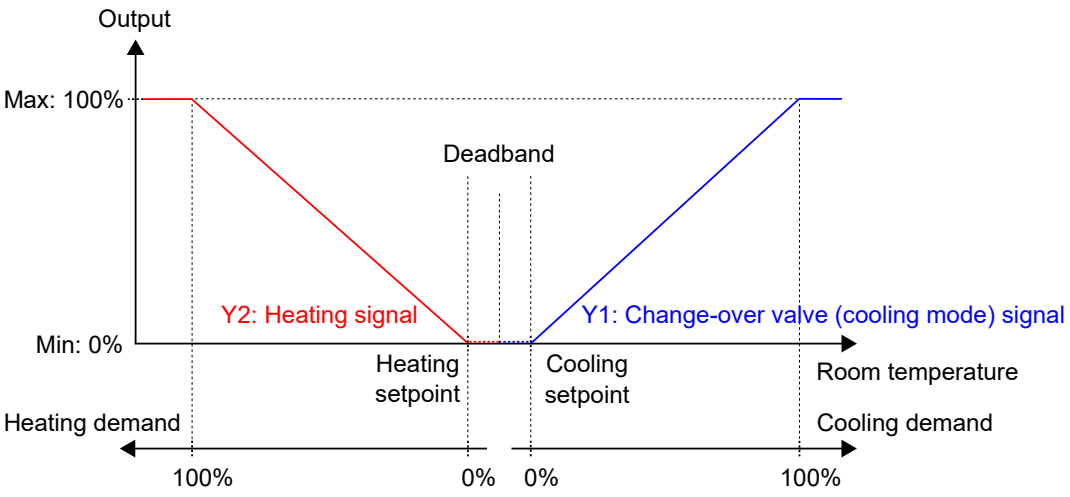


Figure 2-9 Control behaviour for the Heating + Heating/Cooling (change-over) controller mode when the controller is in Heating + Cooling mode.

2.1.7 Heating + VAV

This controller mode is suitable for room HVAC systems that use a radiator as heating device, and low supply air temperature that is distributed into the room via a diffuser damper to provide cooling and fresh air. The air must be pretreated and cooled, since the diffuser damper itself does not have any cooling capacity.

The controller acts as a heating and cooling controller and regulates based on the heating setpoint, cooling setpoint, and the current room temperature. In addition, the controller can be set to regulate based on fresh air demand instead of cooling demand, or based on cooling demand and fresh air demand simultaneously. See section *2.6*. The controller regulates based on fresh air demand by using CO_2 control. See section *2.11*.

The temperature range between the heating and cooling setpoints is defined as the deadband. The controller is in heating mode when the room temperature is lower than [heating setpoint plus half the deadband], and in cooling mode when the room temperature is higher than [cooling setpoint minus half the deadband].

When in heating mode, the controller outputs both a heating signal, Y1, and a VAV signal, Y2, that are configured on the controller outputs by using the values listed in *Table 2-3*.

When in cooling mode, the controller outputs a VAV signal, Y2, that is configured on the controller outputs by using the value listed in *Table 2-3*.

Maximum and minimum limits for the heating output signal can be set. See section *2.2*. Maximum and minimum limits for the VAV output signal are set via the *VAV control* function. See section *2.6*.

Table 2-7 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Heating	Analog
	Heating valve, increase Heating valve, decrease	Digital Digital
	Heating valve, thermal (PWM)	Digital
Y2	VAV	Analog

Figure 2-10 illustrates the control behaviour when the controller regulates based on heating and cooling demand, when no maximum or minimum limits are set for the heating output signal, and when a minimum limit is set for the VAV output signal.

The heating demand increases as the room temperature falls. When the room temperature falls below the heating setpoint, *Y1: Heating signal* increases to respond to the heating demand. At 100% heating demand, *Y1: Heating signal* reaches its maximum. When the room temperature is in the range between the heating setpoint and the deadband centre, and no heating demand exists, *Y1: Heating signal* is at its minimum.

The cooling demand increases as the room temperature rises. When the room temperature rises above the cooling setpoint, *Y2: VAV signal* increases to respond to the cooling demand. At 100% cooling demand, *Y2: VAV signal* reaches its maximum. *Y2: VAV signal* never goes below its set minimum limit.

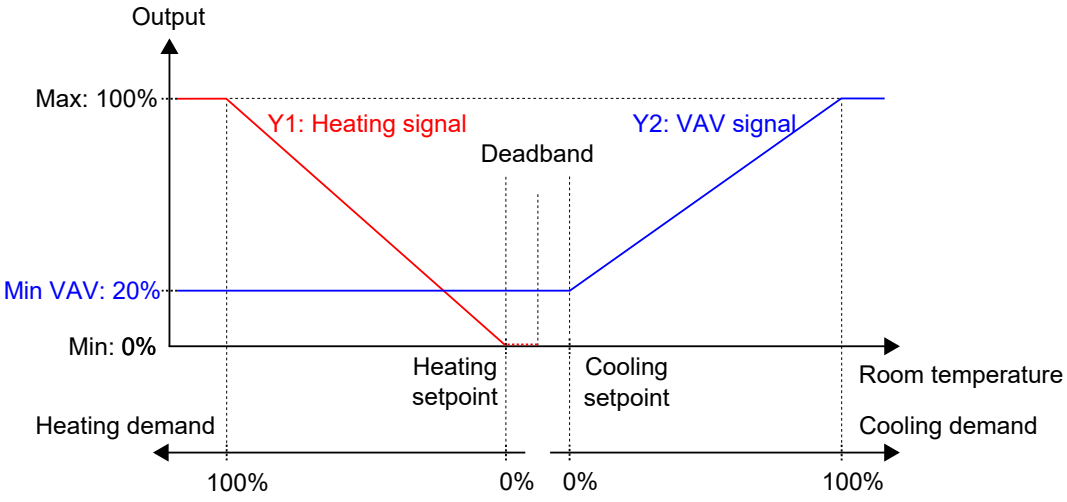


Figure 2-10 Control behaviour for the Heating + VAV controller mode when the controller regulates based on heating and cooling demand.

2.1.8 Cooling + VAV

This controller mode is suitable for room HVAC systems that use a chilled beam as cooling device, where the beam contains a cooling valve and a damper that regulates low supply air temperature that is distributed

into the room to provide cooling and fresh air. The air must be pretreated and cooled, since the damper itself does not have any cooling capacity.

The controller acts as a cooling controller and regulates based on the cooling setpoint and the current room temperature. In addition, the controller can be set to also regulate based on fresh air demand, or based on cooling demand and fresh air demand simultaneously. See section *2.6*. The controller regulates based on fresh air demand by using CO_2 control. See section *2.11*.

The controller is always in cooling mode and outputs a cooling signal, Y1, and a VAV signal, Y2, in sequence that are configured on the controller outputs by using the configuration values listed in table *Table 2-8*.

The Y1 and Y2 signal sequence order is configurable.

Maximum and minimum limits for the cooling output signal can be set. See section *2.2*. Maximum and minimum limits for the VAV output signal are set via the *VAV control* function. See section *2.6*.

Table 2-8 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Cooling	Analog
	Cooling valve, increase Cooling valve, decrease	Digital Digital
	Cooling valve, thermal (PWM)	Digital
Y2	VAV	Analog

Figure 2-11 illustrates the control behaviour when the controller regulates based on cooling demand, when no maximum or minimum limits are set for the cooling output signal, and when a minimum limit is set for the VAV output signal.

The cooling demand increases as the room temperature rises. When the room temperature rises above the cooling setpoint, *Y1: Cooling signal* increases to respond to the cooling demand. At 49% cooling demand, *Y1: Cooling signal* reaches its maximum. When the room temperature rises further and the cooling demand exceeds 51%, *Y2: VAV signal* increases while *Y1: Cooling signal* stays at its maximum. At 100% cooling demand, *Y2: VAV signal* reaches its maximum.

When the room temperature is lower than the cooling setpoint and no cooling demand exists, both *Y1: Cooling signal* and *Y2: VAV signal* are at their minimum.

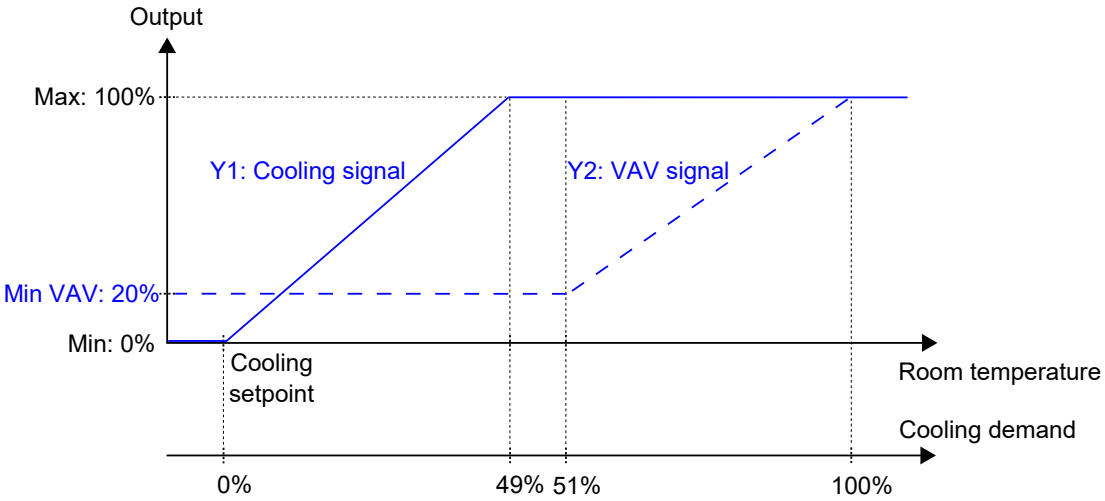


Figure 2-11 Control behaviour for the Cooling + VAV controller mode when the controller regulates based on cooling demand.

2.1.9 VAV

This controller mode is suitable for room HVAC systems that use low supply air temperature that is distributed into the room via a diffuser damper to provide cooling and fresh air. The air must be pretreated and cooled, since the diffuser damper itself does not have any cooling capacity.

The controller acts as a cooling controller and regulates based on the cooling setpoint and the current room temperature. In addition, the controller can be set to regulate based on fresh air demand instead of cooling demand, or based on cooling demand and fresh air demand simultaneously. See section *2.6*. The controller regulates based on fresh air demand by using CO_2 control. See section *2.11*.

The controller is always in cooling mode and outputs a VAV signal, Y1, that is configured on the controller outputs by using the configuration value listed in *Table 2-9*.

Maximum and minimum limits for the VAV output signal are set via the *VAV control* function. See section *2.6*.

Table 2-9 Controller output configuration value and controller output type.

Output signal	Controller output configuration value	Controller output type
Y1	VAV	Analog

Figure 2-12 illustrates the control behaviour when the controller regulates based on cooling demand, and when a minimum limit is set for the VAV output signal.

The cooling demand increases as the room temperature rises. When the room temperature rises above the cooling setpoint, *Y1: VAV signal* increases to respond to the cooling demand. At 100% cooling demand, *Y1: VAV signal* reaches its maximum.

When the room temperature is lower than the cooling setpoint and no cooling demand exists, *Y1: VAV signal* is at its minimum.

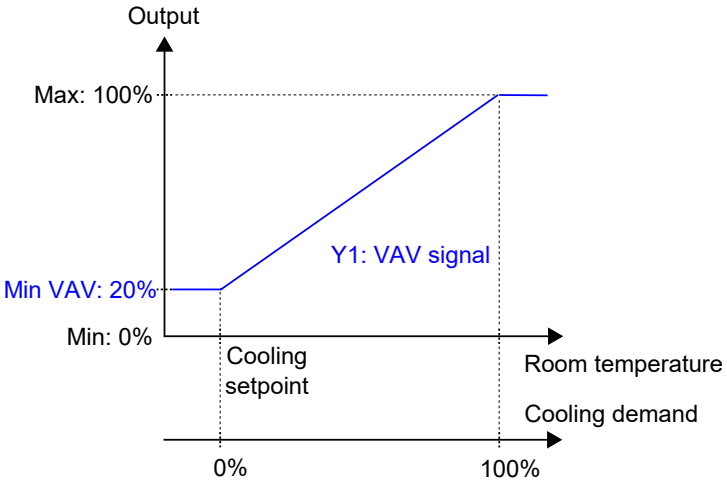


Figure 2-12 Control behaviour for the VAV controller mode when the controller regulates based on cooling demand.

2.1.10 Heating + Cooling + VAV

This controller mode is suitable for room HVAC systems that use a radiator as heating device and a chilled beam as cooling device, where the beam contains a cooling valve and a damper that regulates low supply air temperature that is distributed into the room to provide cooling and fresh air. The air must be pretreated and cooled, since the damper itself does not have any cooling capacity.

The controller acts as a heating and cooling controller and regulates based on the heating setpoint, cooling setpoint, and the current room temperature. In addition, the controller can be set to also regulate based on

fresh air demand, or based on cooling demand and fresh air demand simultaneously. See section *2.6*. The controller regulates based on fresh air demand by using CO_2 control. See section *2.11*.

The temperature range between the heating and cooling setpoints is defined as the deadband. The controller is in heating mode when the room temperature is lower than [heating setpoint plus half the deadband], and in cooling mode when the room temperature is higher than [cooling setpoint minus half the deadband].

When in heating mode, the controller outputs both a heating signal, Y1, and a VAV signal, Y3, that are configured on the controller outputs by using the values listed in *Table 2-10*.

When in cooling mode, the controller outputs a cooling signal, Y2, and a VAV signal, Y3, in sequence that are configured on the controller outputs by using the configuration values listed in *Table 2-10*.

The Y2 and Y3 signal sequence order is configurable.

Maximum and minimum limits for the heating and cooling output signals can be set. See section *2.2*. Maximum and minimum limits for the VAV output signal are set via the *VAV control* function. See section *2.6*.

Table 2-10 Controller output configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Heating	Analog
	Heating valve, increase Heating valve, decrease	Digital Digital
	Heating valve, thermal (PWM)	Digital
Y2	Cooling	Analog
	Cooling valve, increase Cooling valve, decrease	Digital Digital
	Cooling valve, thermal (PWM)	Digital
Y1 + Y2	6-way valve	Analog
	6-way valve, increase 6-way valve, decrease	Digital Digital
Y3	VAV	Analog

Figure 2-13 illustrates the control behaviour when the controller regulates based on heating and cooling demand, when no maximum or minimum limits are set for the heating or cooling output signals, and when a minimum limit is set for the VAV output signal.

The heating demand increases as the room temperature falls. When the room temperature falls below the heating setpoint, *Y1: Heating signal* increases to respond to the heating demand. At 100% heating demand, *Y1: Heating signal* reaches its maximum. When the room temperature is in the range between the heating setpoint and the deadband centre, and no heating demand exists, *Y1: Heating signal* is at its minimum.

The cooling demand increases as the room temperature rises. When the room temperature rises above the cooling setpoint, *Y2: Cooling signal* increases to respond to the cooling demand. At 49% cooling demand, *Y2: Cooling signal* reaches its maximum. When the room temperature rises further and the cooling demand exceeds 51%, *Y3: VAV signal* increases while *Y2: Cooling signal* stays at its maximum. At 100% cooling demand, *Y3: VAV signal* reaches its maximum. When the room temperature is in the range between the cooling setpoint and the deadband centre, and no cooling demand exists, both *Y2: Cooling signal* and *Y3: VAV signal* are at their minimum.

Y3: VAV signal never goes below its set minimum limit.

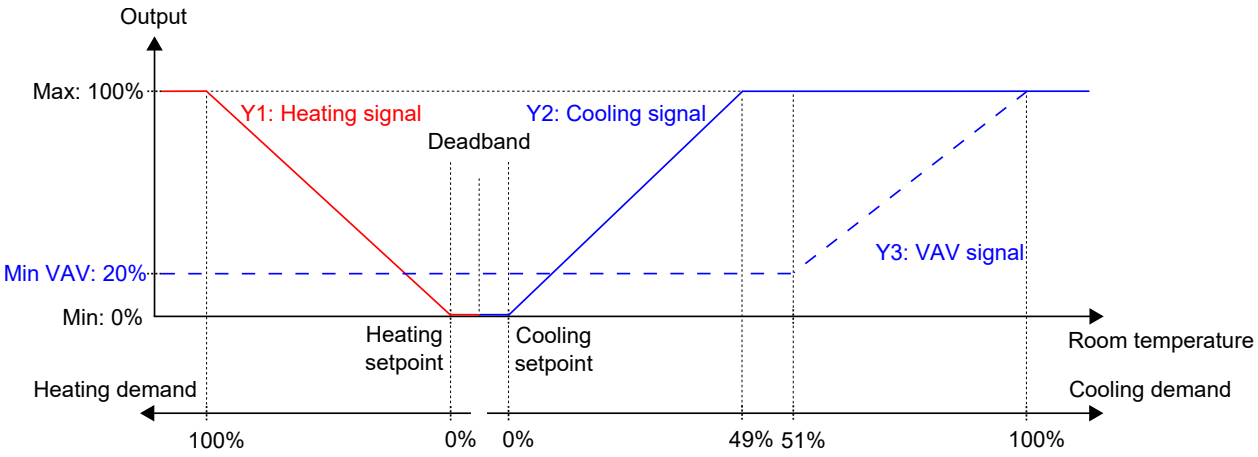


Figure 2-13 Control behaviour for the Heating + Cooling + VAV controller mode when the controller regulates based on heating and cooling demand.

2.2 Maximum and minimum limits for heating and cooling output

Maximum and minimum limits for the heating and cooling output signals can be set. *Figure 2-14* shows the configuration settings in Application tool.

Maximum and minimum limits for the VAV output signal are set via the *VAV control* function. See section *2.6*.

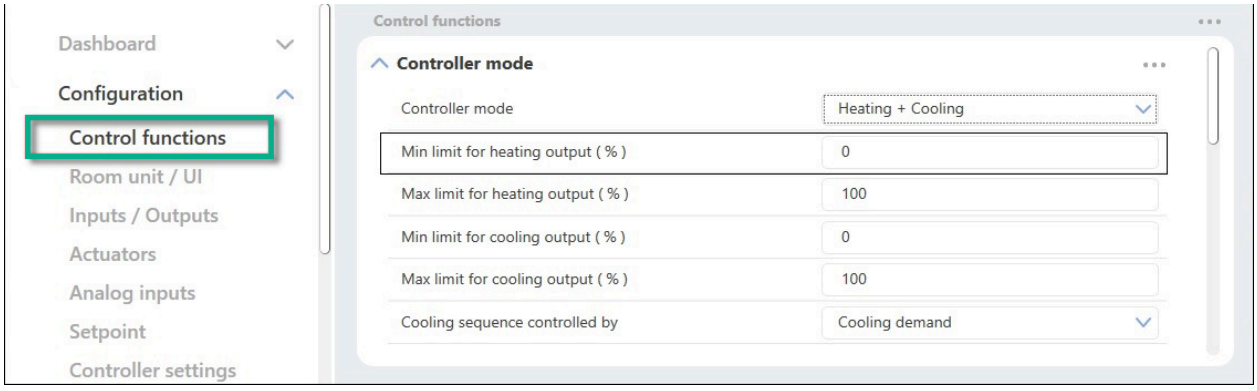


Figure 2-14 Configuration settings for maximum and minimum heating and cooling output limits in Application tool.

The heating output limits are active when the controller is in heating mode, and inactive when the controller is not in heating mode. When the controller is in heating mode or not is defined by the used controller mode. See section *2.1*.

Figure 2-15 illustrates how the control behaviour is affected when limits are set for the heating output. For example, when a 85% maximum limit is set, *Heating signal* never exceeds 85% of its practical maximum (100%). When a 20% minimum limit is set, *Heating signal* is always at least 20%, as long as the controller is in heating mode.

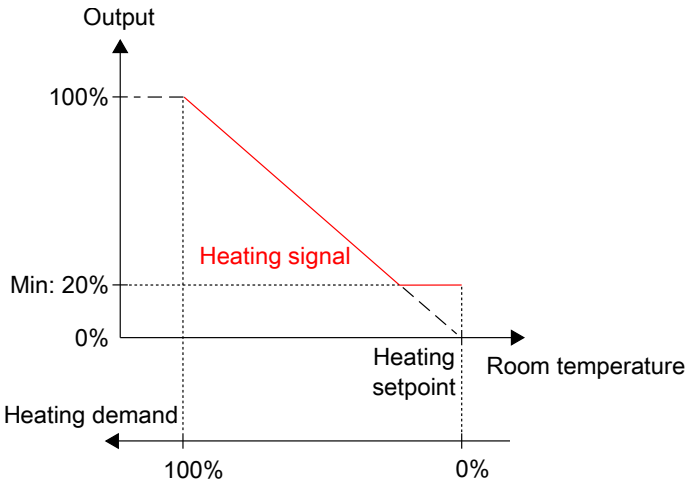


Figure 2-15 Control behaviour when maximum and minimum limits are set for the heating output.

The cooling output limits are active when the controller is in cooling mode, and inactive when the controller is not in cooling mode. When the controller is in cooling mode or not is defined by the used controller mode. See section *2.1*.

Figure 2-16 illustrates how the control behaviour is affected when limits are set for the cooling output. For example, if a 85% maximum limit is set, *Cooling signal* never exceeds 85% of its practical maximum (100%). When a 20% minimum limit is set, *Cooling signal* is always at least 20%, as long as the controller is in cooling mode.

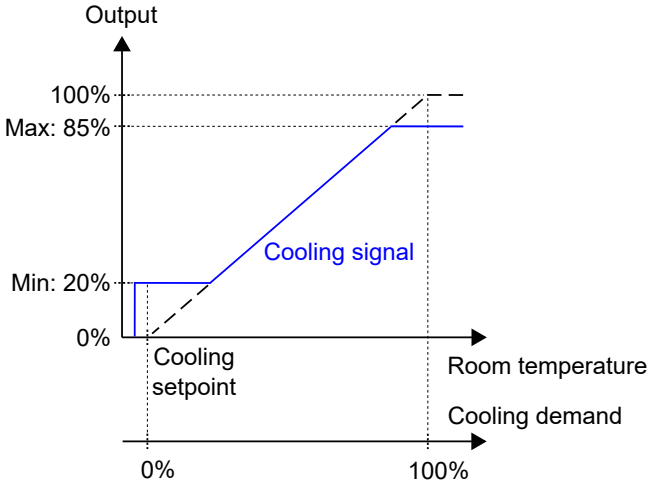


Figure 2-16 Control behaviour when maximum and minimum limits are set for the cooling output.

2.3 Change-over

Change-over is a control function that enables the controller to provide both a heating or a cooling signal on the same controller output. This is achieved by shifting the controller change-over state from *heating* to *cooling*, and vice versa. The *Change-over* function makes it possible to use the controller in a 2-pipe change-over HVAC system, where warm or cold media flow in the same pipes and one valve is used to regulate both heating and cooling distribution.

The controller change-over state is either *heating* or *cooling*, and is managed automatically via change-over detection. See section *2.3.1*. The controller change-over state can also be set manually via the Manual / Auto settings, or via communication.

The *Change-over* function is enabled and the configuration settings for change-over detection are shown in Application tool when one of the following controller modes is selected:

- ✓ Heating/Cooling (change-over)
- ✓ Heating + Heating/Cooling (change-over)

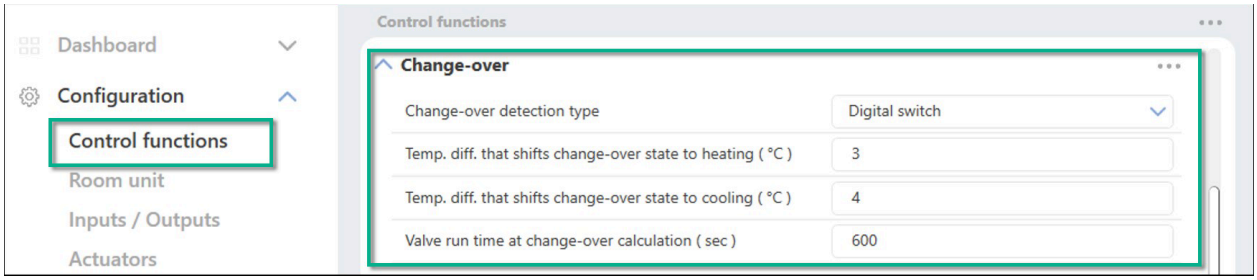


Figure 2-17 Change-over detection configuration settings in Application tool.

2.3.1 Change-over detection

Change-over detection is performed either by using a PT1000 sensor that is connected to an analog input, or by using a potential-free contact that is connected to a digital input. The PT1000 sensor is mounted so that it senses the pipe medium temperature.

When using a PT1000 sensor for change-over detection, the shift in controller change-over state is triggered based on the difference between the pipe medium temperature and the room temperature. The controller shifts the change-over state to *heating* when the pipe medium temperature is 3°C (default setting) higher than the room temperature. The controller shifts the change-over state to *cooling* when the pipe medium temperature is 4°C (default setting) lower than the room temperature.

When using a potential-free contact for change-over detection, the controller shifts the controller change-over state to *cooling* when the contact is closed. The controller shifts the controller change-over state to *heating* when the contact is open. This assumes that the digital input is set to **Normally opened**. See the *Configuration -> Inputs / Outputs* pane in Application tool.

Change-over detection is configured on the controller inputs by using the values listed in *Table 2-11*.

Table 2-11 Change-over detection configuration values and controller input types.

Controller input configuration value	Controller input type
Change-over temperature	Analog
Change-over	Digital

The configuration settings for change-over detection are described in *Table 2-12*.

Table 2-12 Change-over detection configuration settings.

Configuration setting	Description
Change-over detection type	**Digital switch**: Must be selected if a digital input is used for change-over detection (default setting). **Analog temperature in incoming pipe**: Must be selected if an analog input is used for change-over detection.
Temp. diff. that shifts change-over state to heating (°C)	The controller shifts the change-over state to *heating* when the pipe medium temperature is this amount of degrees higher than the room temperature.

Table 2-12 Change-over detection configuration settings. (continued)

Configuration setting	Description
Temp. diff. that shifts change-over state to cooling (°C)	The controller shifts the change-over state to *cooling* when the pipe medium temperature is this amount of degrees lower than the room temperature.
Valve run time at change-over calculation (sec)	The period of time (in seconds) that the valve is open before the pipe medium temperature is measured and compared to the room temperature.

2.4 Controller state

Controller state is a control function that makes it possible for the room HVAC system to operate with priority on comfort or energy saving.

The following controller states are available for use and the controller always operates in one of them:

- ✓ Off
- ✓ Unoccupied
- ✓ Standby
- ✓ Occupied
- ✓ Bypass

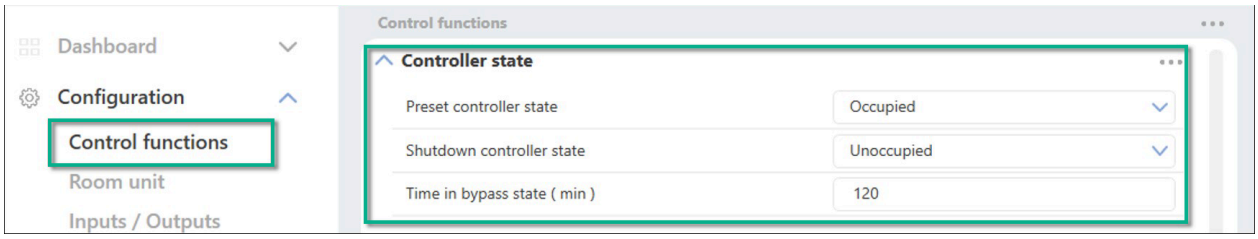


Figure 2-18 Controller state configuration settings in Application tool.

The different controller states make use of various setpoint and deadband settings to regulate the heating and cooling distribution, as described in section *2.4.1*. See section *5* for information about setpoint and deadband settings, and setpoint adjustment.

The controller state configuration settings are described in section *2.4.2*, and controller state changes are described in section *2.4.3*.

An overview of the controller states is provided in *Table 2-13*.

Table 2-13 Controller state overview.

Controller state	Description	Priority	Indications in room units with display	LED indication in room units without display
Off	This state is typically used for when the room is not in use for an extended period of time, for example, during holidays or long weekends. In this state, the controller only provides heating control for frost protection, which keeps the room temperature above 8 °C.	Energy saving and frost protection	✓ OFF indication is shown. ✓ HEAT indication is shown when the demand is greater than zero.	✓ Off
Unoccupied	This state is typically used for when the room is not in use for an extended period of time, for example, during holidays or long weekends.	Energy saving	✓ OFF indication is shown. ✓ HEAT or COOL indication is shown when the demand is greater than zero. ✓ The room temperature, setpoint, setpoint adjustment, or CO_2 level is shown (according to the current room unit configuration. See section *3.6.4*).	✓ Off
Standby	This state is typically used for when the room is not in use, temporarily or for shorter periods of time, such as during evenings, nights, or weekends.	Energy saving	✓ STANDBY indication is shown. ✓ HEAT or COOL indication is shown when the demand is greater than zero. ✓ The room temperature, setpoint, setpoint adjustment, or CO_2 level is shown (according to the current room unit configuration. See section *3.6.4*).	✓ Blinking
Occupied	This state is typically used for when the room is in use.	Comfort	✓ Occupancy indication is shown. ✓ HEAT or COOL indication is shown when the demand is greater than zero. ✓ The room temperature, setpoint, setpoint adjustment, or CO_2 level is shown (according to the current room unit configuration. See section *3.6.4*).	✓ Solid
Bypass	This state is typically used for when the room is in use, and when a temporary maximum flow of fresh air is needed. For example, when the room needs an extra boost of fresh air prior to a scheduled meeting that is going to fill up the room with a large amount of people, or due to high a CO_2 level. The increase in airflow is achieved by using the *Forced ventilation* function. See section *2.7*.	Comfort and improved air quality	✓ Occupancy indication is shown. ✓ HEAT or COOL indication is shown when the demand is greater than zero. ✓ Forced ventilation indication is shown when forced ventilation is active. ✓ The room temperature, setpoint, setpoint adjustment, or CO_2 level is shown (according to the current room unit configuration. See section *3.6.4*).	✓ Blinking slowly

2.4.1 Control behaviour

This section describes the control behaviour for the different controller states when the controller regulates based on heating and cooling demand.

Off

In this state, the controller does not regulate based on the configured occupied heating and cooling setpoints. Instead, the controller only provides heating control based on the configured frost protection setpoint. Setpoint adjustment is not active in this controller state.

Active setpoint: The configured frost protection setpoint.

Figure 2-19 illustrates the control behaviour when no maximum or minimum limits are set for the output signal.

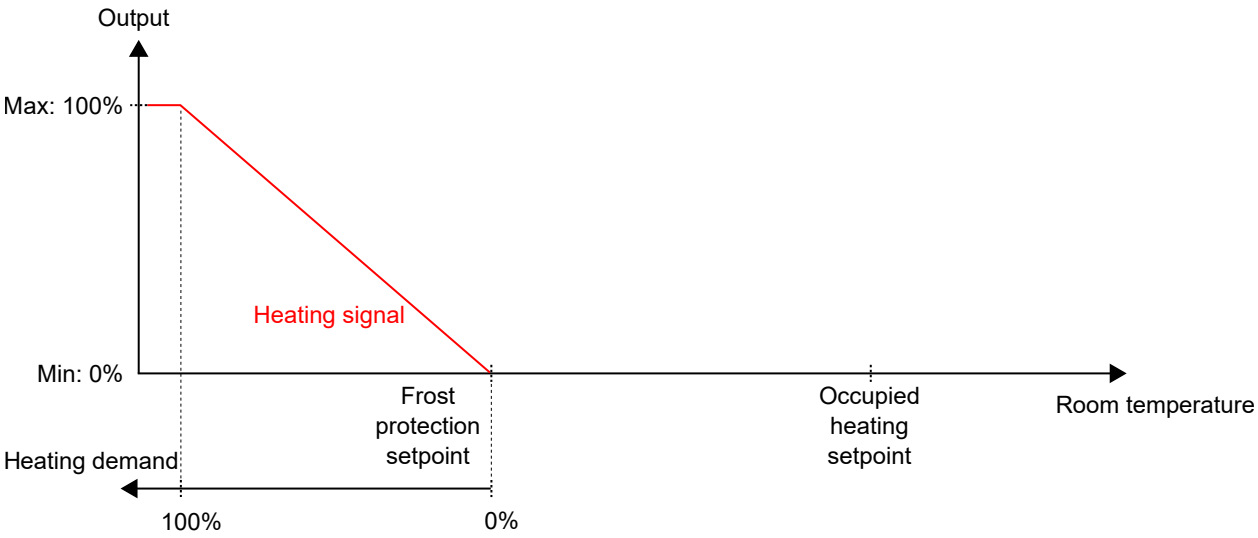


Figure 2-19 Control behaviour for the off controller state.

Unoccupied

In this state, the controller does not regulate based on the configured occupied heating and cooling setpoints. Instead, the controller provides heating and cooling control based on the configured unoccupied heating and cooling setpoints. Setpoint adjustment is not active in this controller state.

Active setpoints: The configured unoccupied heating and cooling setpoints.

Figure 2-20 illustrates the control behaviour when no maximum or minimum limits are set for the output signals.

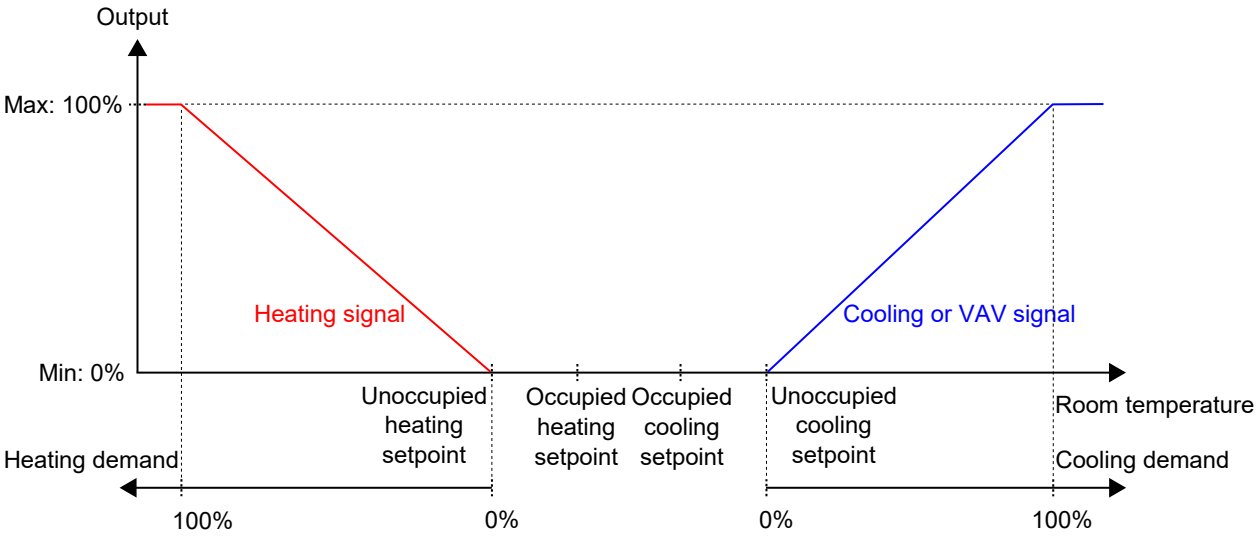


Figure 2-20 Control behaviour for the unoccupied controller state.

Standby

In this state, the controller regulates based on the configured occupied heating and cooling setpoints, in combination with the configured *standby deadband* setting. Setpoint adjustment is active in this controller state.

Active setpoints: The configured occupied heating and cooling setpoints, combined with the configured *standby deadband* setting and any applied setpoint adjustment.

Figure 2-21 illustrates the control behaviour when no maximum or minimum limits are set for the output signals.

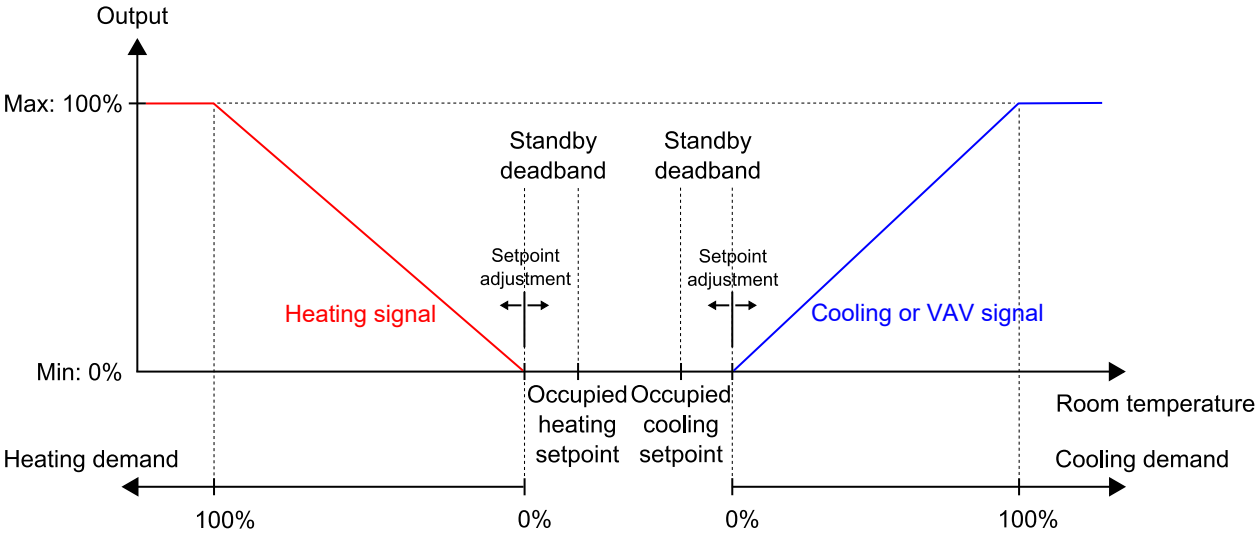


Figure 2-21 Control behaviour for the standby controller state.

Occupied and Bypass

In these states, the controller regulates based on the configured occupied heating and cooling setpoints. Setpoint adjustment is active in these controller states.

The *Forced ventilation* function can be used when the controller changes to bypass state. See section *2.7* for information about the *Forced ventilation* function.

Active setpoints: The configured occupied heating and cooling setpoints, combined with any applied setpoint adjustment.

Figure 2-22 illustrates the control behaviour when no maximum or minimum limits are set for the output signals.

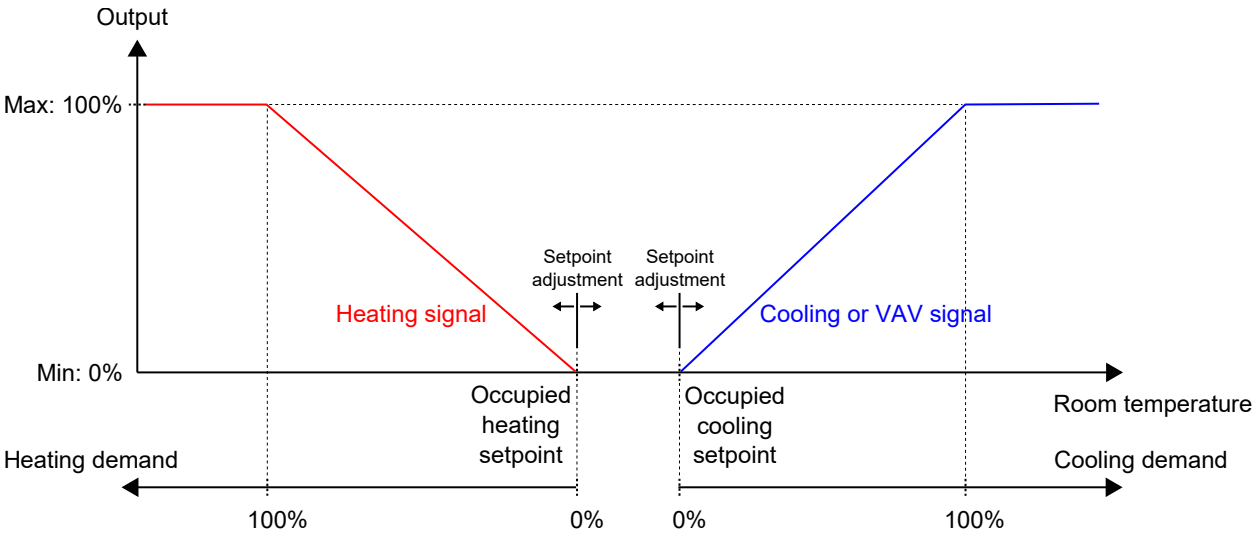


Figure 2-22 Control behaviour for the occupied and bypass controller state.

2.4.2 Configuration settings

The controller state configuration settings are described in *Table 2-14*.

Table 2-14 Controller state configuration settings.

Configuration setting	Description
Preset controller state	One of the following controller states is configured as the preset controller state: ✓ **Off** ✓ **Unoccupied** ✓ **Standby** ✓ **Occupied** (default setting)
Shutdown controller state	One of the following controller states is configured as the shutdown controller state: ✓ **Off** ✓ **Unoccupied** (default setting) ✓ **Standby** ✓ **Occupied**
Time in bypass state (min)	The period of time (in minutes) that the controller is in bypass state before the controller changes state to the configured preset controller state.

2.4.3 State changes

The controller changes state when one of the following events occur:

- ✓ The **[Occupancy]** (On/Off) button on the room unit is pressed shorter than five (5) seconds (short press).
- ✓ The **[Occupancy]** (On/Off) button on the room unit is pressed for more than five (5) seconds (long press).
- ✓ Presence is detected:
  - ✓ Via a presence detector, for example, a motion detector, which is connected to the controller.
  - ✓ Due to a high CO_2 level that is detected via a CO_2 sensor, which is connected to the controller.

  See section *2.8* for information about the *Presence detection* function and presence detection configuration settings.
- ✓ The bypass state time-out expires.
- ✓ Presence is not detected anymore.
- ✓ A schedule (occupied or unoccupied) is activated or deactivated.
- ✓ A central command is issued via communication, for example, from a SCADA system.

The following sections provide flow charts that describe how the different events trigger controller state changes.

Occupancy (On/Off) button on room unit

Figure 2-23 describes controller state changes for when the **[Occupancy]** (On/Off) button on the room unit is used.

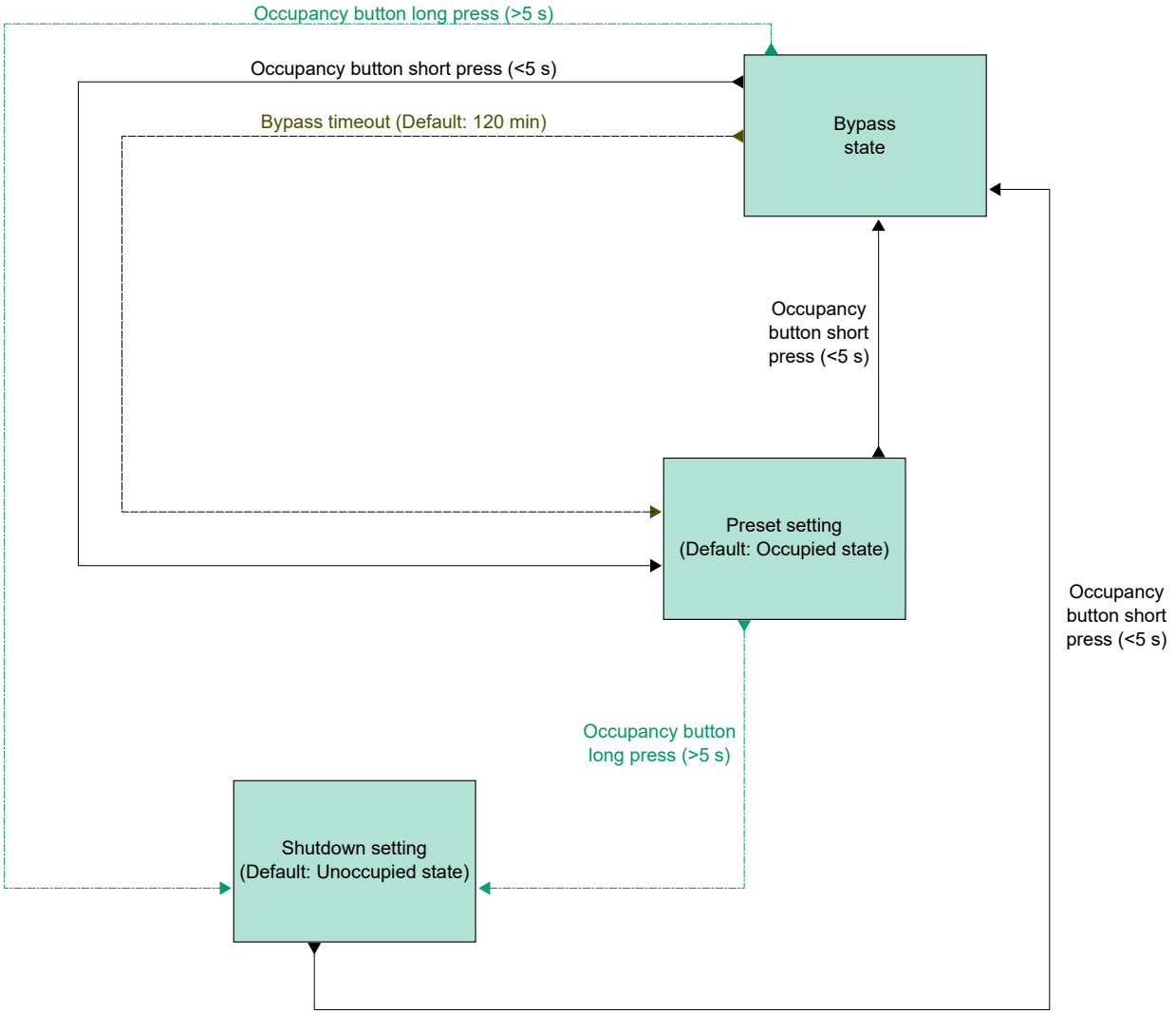


*Figure 2-23 Flow chart describing controller state changes for when the **[Occupancy]** (On/Off) button on the room unit is used.*

Presence detection and Occupancy (On/Off) button on room unit

Figure 2-24 describes controller state changes for when presence detection and the **[Occupancy]** (On/Off) button on the room unit are used.

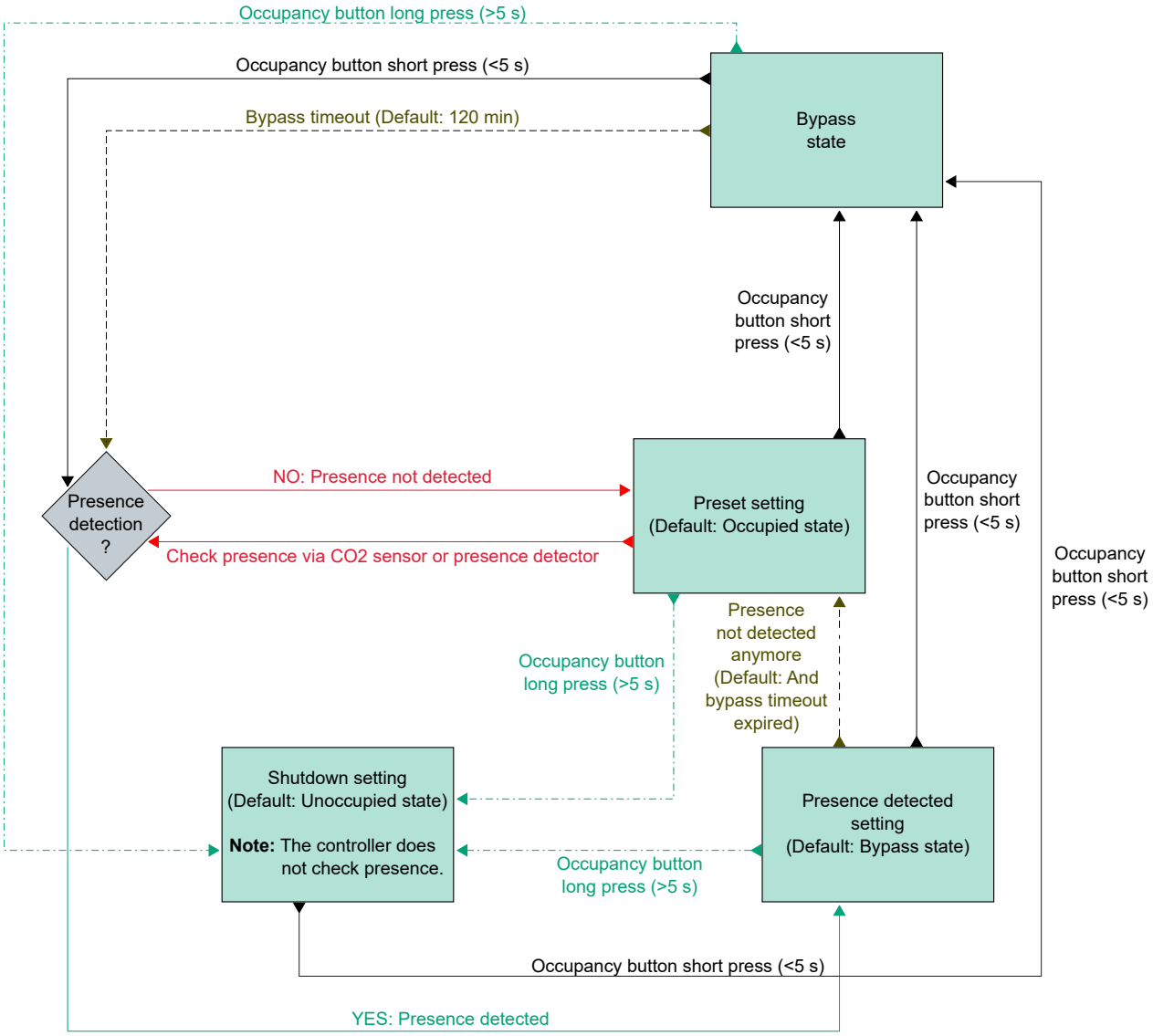


*Figure 2-24 Flow chart describing controller state changes for when presence detection and the **[Occupancy]** (On/Off) button on the room unit are used.*

Schedules and Occupancy (On/Off) button on room unit

Figure 2-25 describes controller state changes for when schedules and the **[Occupancy]** (On/Off) button on the room unit are used.

The occupied schedule has precedence. That is, if the occupied and unoccupied schedules are configured as active during the same period of time, the occupied schedule is active.

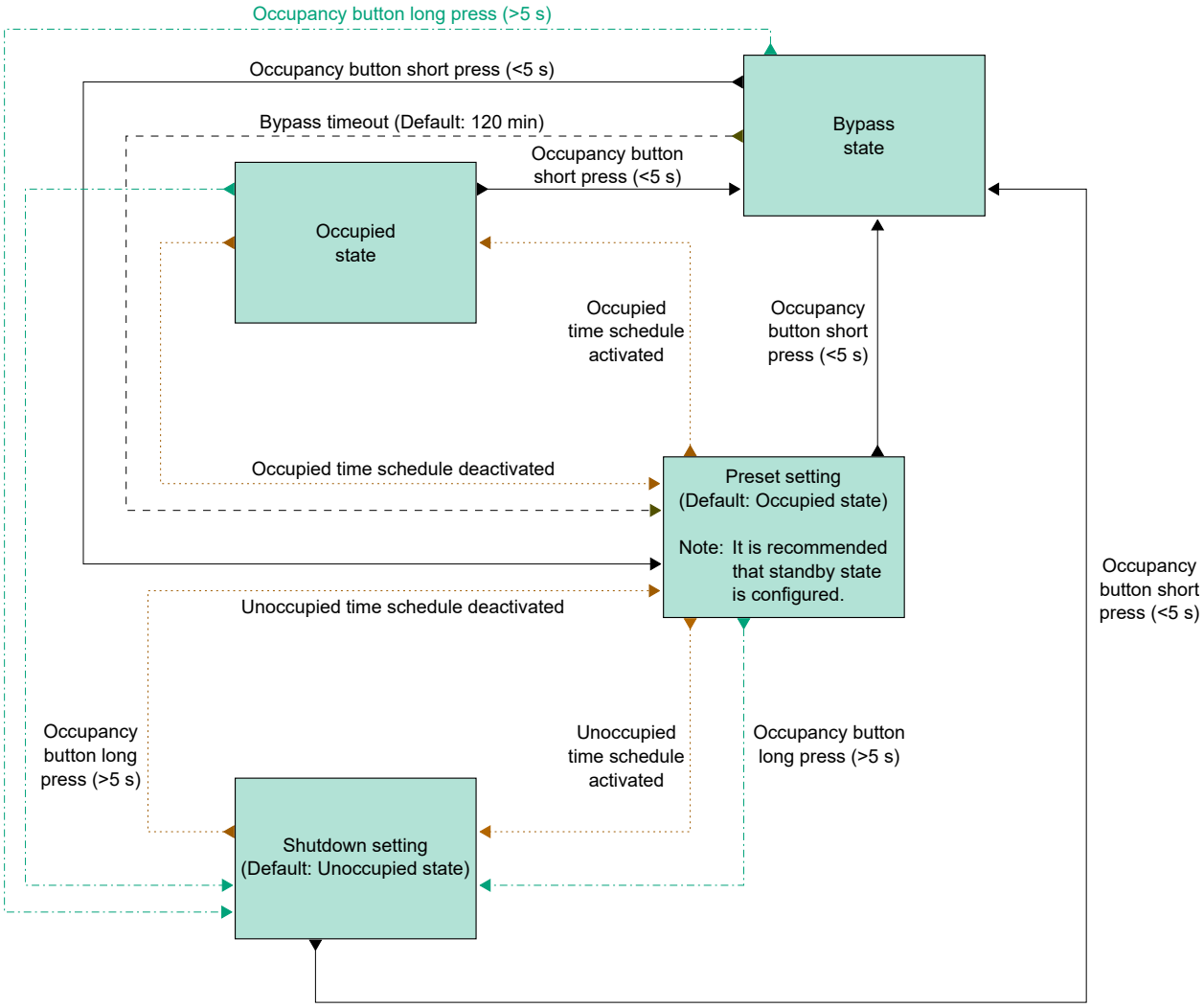


*Figure 2-25 Flow chart describing controller state changes for when schedules and the **[Occupancy]** (On/Off) button on the room unit are used.*

2.5 Fan control

The *Fan control* function enables the controller to regulate the fan speed for EC fans or 3-speed fans.

A fan is controlled in auto or manual mode. In auto mode, the fan speed is determined by the current heating or cooling demand. In manual mode, one of the following speeds is used:

- ✓ Off
- ✓ Low speed: Fan speed 1
- ✓ Medium speed: Fan speed 2
- ✓ High speed: Fan speed 3

The operative fan mode that is currently in use, that is, auto or manual (off, low speed, medium speed, or high speed), is selected by the end user via the room unit, or set via communication. When the controller is in the state specified by the *Shutdown controller state* setting, see section *2.4.2*, the operative fan mode is always auto.

In addition, fan control provides the following optional functions:

- ✓ *Fan boost*. See section *2.5.3*.
- ✓ *Fan kick-start*. See section *2.5.4*.
- ✓ *Fan afterblow*. See section *2.5.5*.

2.5.1 EC fan control

The *EC fan control* function is enabled and the EC fan control configuration settings are shown in Application tool when the configuration value listed in *Table 2-15* is configured on a controller output.

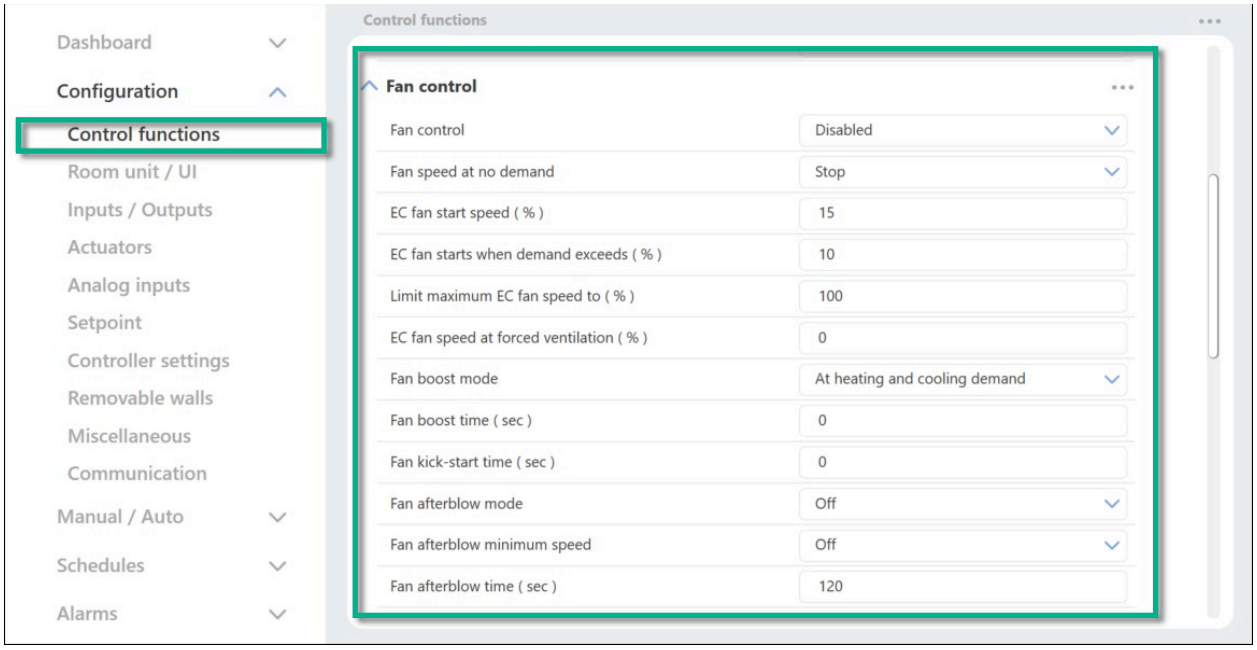


Figure 2-26 EC fan control configuration settings in Application tool.

The controller outputs a fan speed signal, Y1, that is configured on a controller output by using the value in *Table 2-15*.

In auto mode, the Y1 signal corresponds to the current heating or cooling demand, as illustrated in *Figure 2-27*.

In manual mode, the Y1 signal is independent of the current heating or cooling demand. Instead, the fan speed 1, 2, and 3 signals are defined by a number of equal thirds relative to the *Limit maximum EC fan speed to (%)* configuration setting, as illustrated in *Figure 2-28*. For example, the fan speed 1 signal is equal to 0.33 times the set maximum fan speed value, and the fan speed 2 signal is equal to 0.67 times the set maximum fan speed value.

Table 2-15 EC fan control configuration value and controller input type.

Output signal	Controller output configuration value	Controller output type
Y1	EC fan	Analog

The EC fan control configuration settings are described in *Table 2-16*.

Table 2-16 EC fan control configuration settings.

Configuration setting	Fan mode applicability	Description
Fan control	Auto	**Disabled:** Fan control in auto mode is disabled (default setting). **At cooling demand:** Fan control in auto mode is active at cooling demand. **At heating demand:** Fan control in auto mode is active at heating demand. **At heating and cooling demand:** Fan control in auto mode is active both at heating and cooling demand.
Fan speed at no demand	Auto	Fan behaviour when there is no demand **Stop:** The fan will be stopped (default setting). **Fan speed 1 / EC fan start speed:** 3-speed fans will run at *Fan speed 1*. EC-fan will run at the set speed of *EC fan start speed (%)*
EC fan start speed (%) *	Auto and manual	The fan starts at this speed.
EC fan starts when demand exceeds (%)	Auto	The fan starts when this heating or cooling demand is exceeded.
Limit maximum EC fan speed to (%)	Auto and manual	In auto mode, the maximum fan speed is set by this value. In manual mode, the maximum fan speed is set by this value, and each fan speed is defined as: ✓ Fan speed 1 = 0.33 * this value ✓ Fan speed 2 = 0 67 * this value ✓ Fan speed 3 = 1 * this value
EC fan speed at forced ventilation (%) *	Auto and manual	The speed at which the fan will run when the forced ventilation is activated.

**) Only available in Regio^{Ardo} version 2.0-1-04 or later*

Figure 2-27 illustrates the EC fan control behaviour in auto mode when a 90% maximum limit is set for the fan speed output signal, and a 10% heating and cooling demand threshold value for when the fan should start is set.

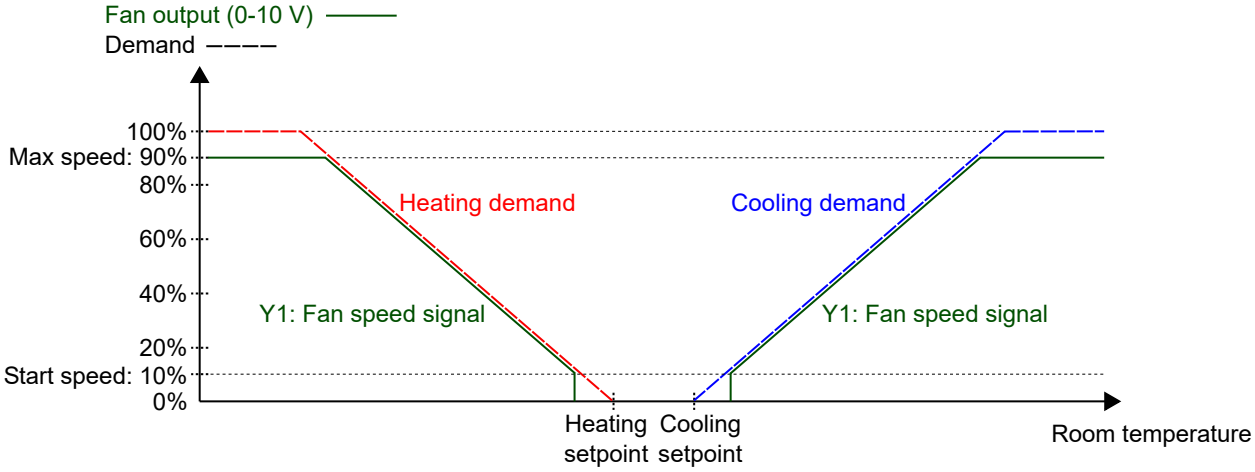


Figure 2-27 EC fan control behaviour in auto mode.

Figure 2-28 illustrates the EC fan control behaviour in manual mode when a 90% maximum limit is set for the fan speed output signal.

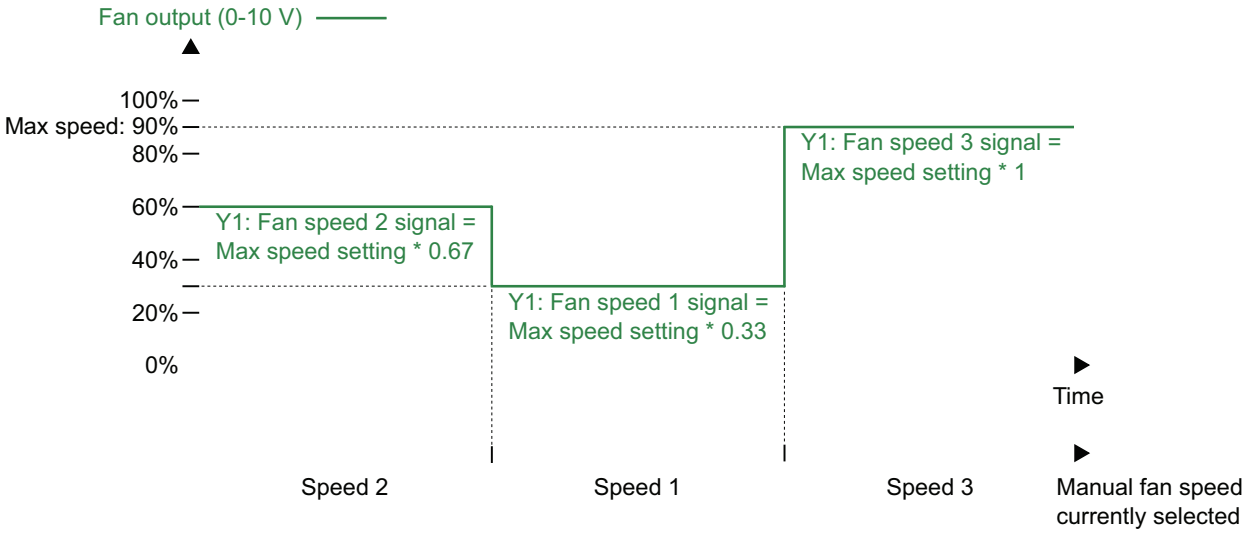


Figure 2-28 EC fan control behaviour in manual mode (fan speed 1, 2, or 3)

2.5.2 3-speed fan control

The *3-speed fan control* function is enabled and the 3-speed fan control configuration settings are shown in Application tool when any of the configuration values listed in *Table 2-17* are configured on a controller output.

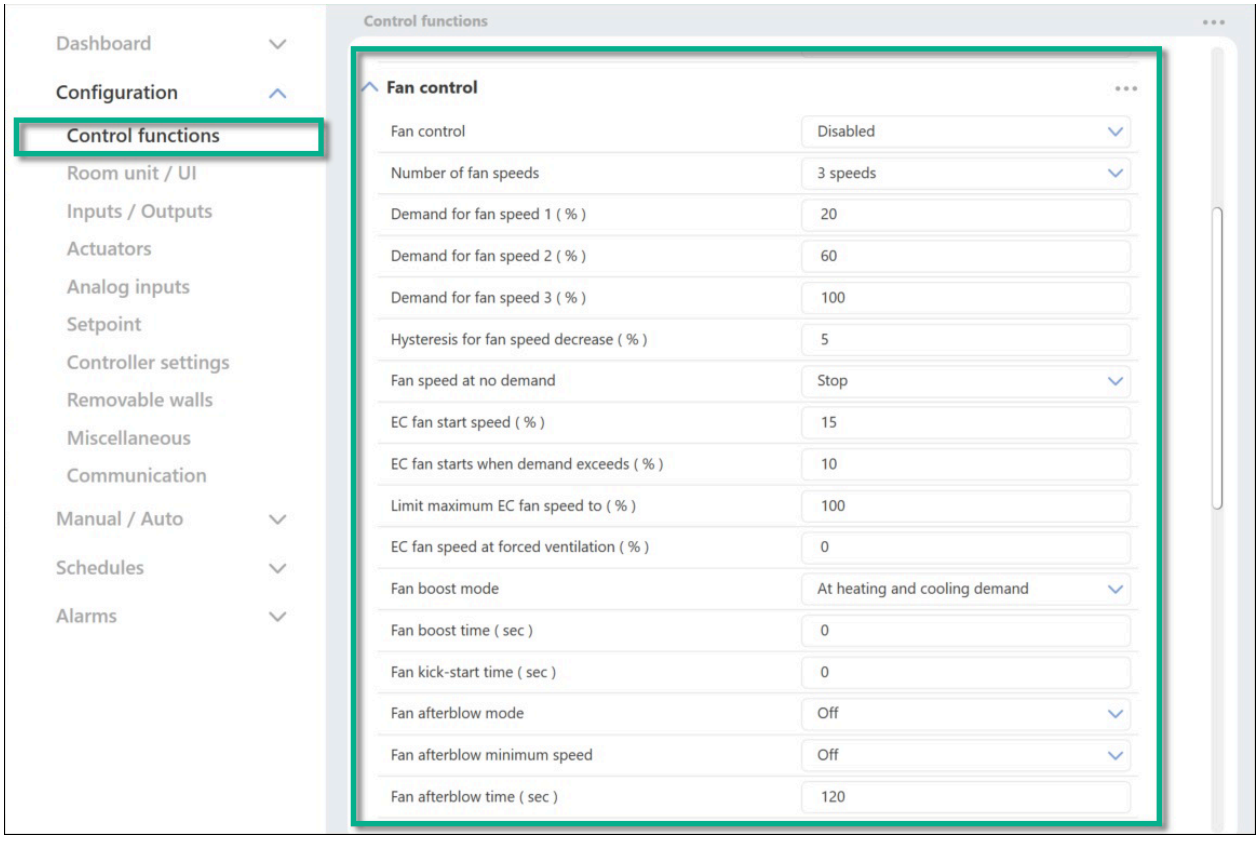


Figure 2-29 3-speed fan control configuration settings in Application tool.

The controller outputs 3 fan speed signals, Y1, Y2, and Y3, that are configured on the controller outputs by using the values listed in *Table 2-17*.

In auto mode, the Y1, Y2, or Y3 signal is active when the current heating or cooling demand is higher than the corresponding *Demand for fan speed [nr] (%)* configuration setting, as illustrated in *Figure 2-30*.

In manual mode, the Y1, Y2, and Y3 signals are independent of the current heating or cooling demand. Instead, each fan speed signal is active when the corresponding fan speed is selected in the room unit or set via communication, as illustrated in *Figure 2-31*.

Table 2-17 3-speed fan control configuration values and controller output types.

Output signal	Controller output configuration value	Controller output type
Y1	Fan speed 1	Digital
Y2	Fan speed 2	Digital
Y3	Fan speed 3	Digital

Table 2-18 3-speed fan control configuration settings.

Configuration setting	Fan mode applicability	Description
Fan control	Auto	**Disabled:** Fan control in auto mode is disabled (default setting). **At cooling demand:** Fan control in auto mode is active at cooling demand. **At heating demand:** Fan control in auto mode is active at heating demand. **At heating and cooling demand:** Fan control in auto mode is active at both heating and cooling demand.
Number of fan speeds	Auto and manual	**None:** Fan control in auto and manual mode is disabled. **1 speed:** Only the fan speed 1 signal is used. In auto mode, this means that the controller outputs the fan speed 1 signal instead of the fan speed 2 and 3 signals. **2 speeds:** Only the fan speed 1 and 2 signals are used. In auto mode, this means that the controller outputs the fan speed 2 signal instead of the fan speed 3 signal. **3 speeds:** All 3 fan speed signals are used (default setting).
Demand for fan speed 1 (%)	Auto	The fan speed 1 signal is active when the current heating or cooling demand is higher than this value and lower than the value set by the *Demand for fan speed 2 (%)* setting.
Demand for fan speed 2 (%)	Auto	The fan speed 2 signal is active when the current heating or cooling demand is higher than this value and lower than the value set by the *Demand for fan speed 3 (%)* setting.
Demand for fan speed 3 (%)	Auto	The fan speed 3 signal is active when the current heating or cooling demand is higher than this value.
Hysteresis for fan speed decrease (%)	Auto	Specifies the hysteresis for when a decrease in fan speed occurs. For example, if the *Demand for fan speed 2 (%)* setting is 60% and this setting is 5%, the fan speed 2 signal is deactivated when the heating or cooling demand decrease below 60-5 = 55%. At the same time, the fan speed 1 signal is activated.
Fan speed at no demand	Auto	Fan behaviour when there is no demand **Stop:** The fan will be stopped (default setting). **Fan speed 1 / EC fan start speed:** 3-speed fans will run at *Fan speed 1*. EC-fan will run at the set speed of *EC fan start speed (%)*

Figure 2-30 illustrates the 3-speed fan control behaviour in auto mode when no hysteresis for fan speed decrease is applied, the fan speed 1, 2, and 3 signals are configured on digital outputs 3, 4, and 5, and the *Demand for fan speed [nr] (%)* settings are set to 20, 60, and 100, respectively.

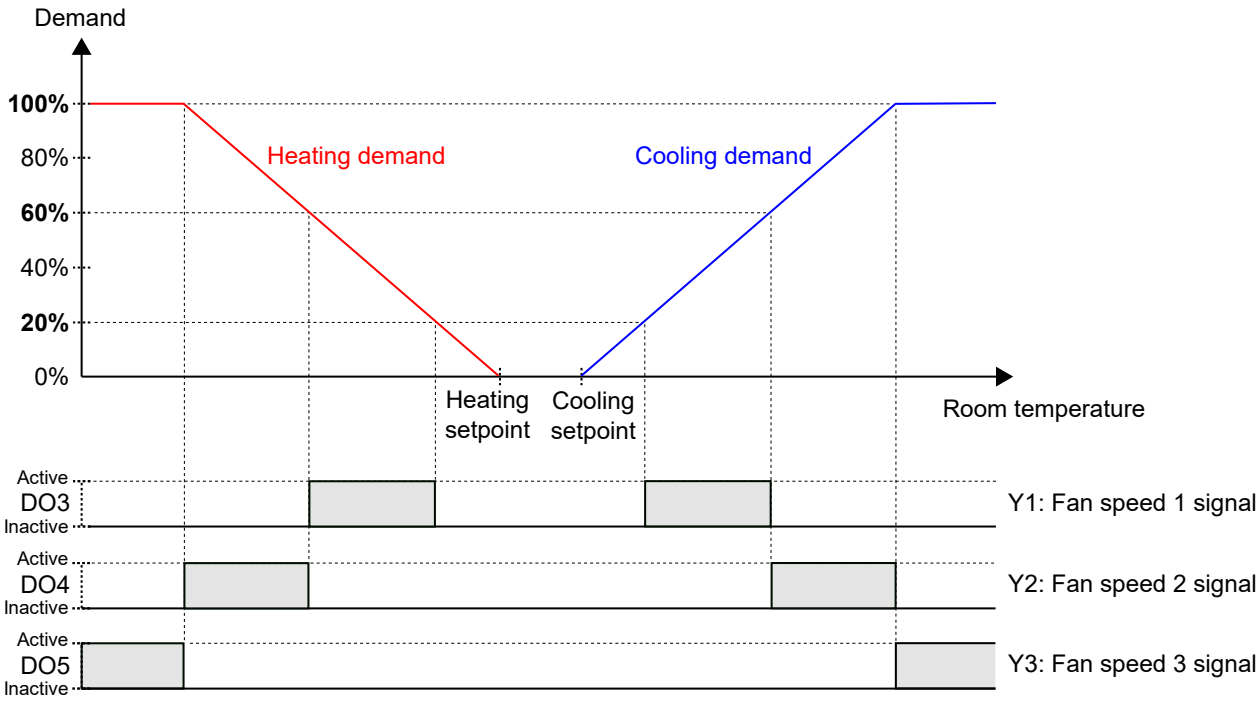


Figure 2-30 3-speed fan control behaviour in auto mode.

Figure 2-31 illustrates the 3-speed fan control behaviour in manual mode when the fan speed 1, 2, and 3 signals are configured on digital outputs 3, 4, and 5.

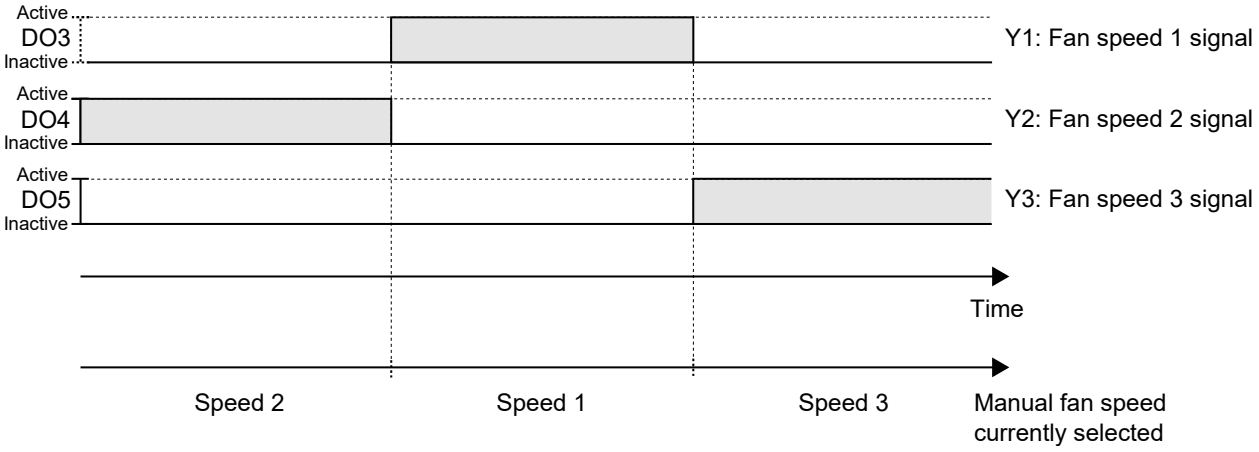


Figure 2-31 3-speed fan control behaviour in manual mode (fan speed 1, 2, or 3).

2.5.3 Fan boost

Fan boost is a control function that can be used to acknowledge to the person in the room that the fan is started when the **[Occupancy]** (On/Off) button in the room unit is pressed, or when the controller detects presence. This is useful when the initial heating or cooling demand is low (the difference between the room temperature and setpoint is small), since the fan then typically runs at a low speed.

Another use case for the *Fan boost* function is to temporarily run the fan at an increased speed to provide a perceived cooling effect, until the cooling distribution from the cooling valve establishes.

The fan boost is achieved by the use of a separate fan boost controller that operates in parallel with the temperature controller, and temporarily increases the fan speed for a configured period of time (the fan boost time). P-band and I-time settings for the different controllers are located in the *Configuration -> Controller settings* pane in Application tool.

The *Fan boost* function is enabled by configuring the *Fan boost time* setting to a value that is greater than zero.

The *Fan boost* function is activated when presence is detected, see section *2.8*, or when the controller changes to bypass state, see section *2.4*. The fan boost time is independent of the *Time in bypass state* configuration setting.

When the *Fan boost* function is active, the fan runs at maximum speed for the first 10 seconds of the fan boost time. For the remainder of the fan boost time, the fan speed output signal corresponds to whichever of the fan boost or temperature control signal that has the greatest value.

After the fan boost time has expired, the fan speed output signal corresponds to the temperature control signal, regardless if the fan boost control signal is greater than the temperature control signal. That is, the controller reverts to normal fan control, which is either auto or manual mode.

The fan boost configuration settings are described in *Table 2-19*.

Table 2-19 Fan boost configuration settings.

Configuration setting	Description
Fan boost mode	**At cooling demand:** Fan boost is active at cooling demand. **At heating demand:** Fan boost is active at heating demand. **At heating and cooling demand:** Fan boost is active at both heating and cooling demand (default setting).
Fan boost time (sec)	The period of time (in seconds) that the *Fan boost* function is active.

Figure 2-32 illustrates how the *Fan boost* function can be used to provide a perceived cooling effect until the cooling distribution from the cooling valve establishes.

In this example, the control behaviour for an EC fan in auto mode is described. It is assumed that the room temperature is 28 °C and the cooling setpoint is 24 °C at 0 seconds, resulting in an error value of 4, and that the error value is reduced to 0 at 300 seconds. The fan boost time is set to 90 seconds. The P-band for the fan boost controller is set to 5 °C, and the P-band and I-time for the temperature controller is set to 10 °C and 300 seconds, respectively.

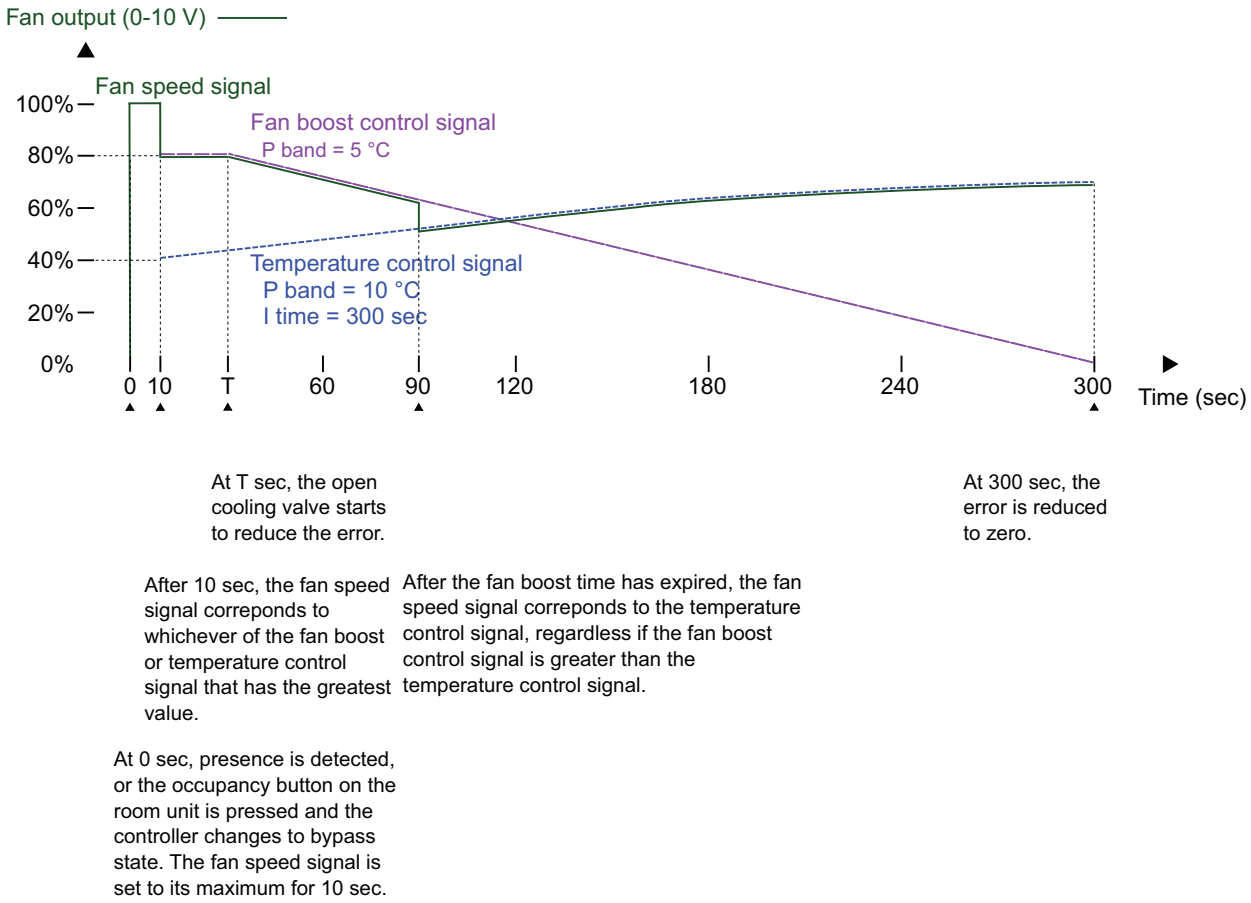


Figure 2-32 An example of fan boost control behaviour for an EC fan in auto mode, which provides a perceived cooling effect until the cooling distribution from the cooling valve establishes. The P-band for the fan boost controller has a lower value (higher gain) that the P-band for the temperature controller.

2.5.4 Fan kick-start

Fan kick-start is a control function that can be used to ensure that the EC fan starts even when the controller outputs a low-voltage control signal.

When using today's energy-saving EC fans, there is always a risk that the fan does not start due to a too low control voltage that prevents the fan from exceeding its starting torque. The fan then remains at a standstill while power still flows through it, which may cause damage to the fan. The *Fan kick-start* function ensures that the fan output is at its maximum for a set period of time, thereby making sure that the starting torque is exceeded.

The *Fan kick-start* function is enabled by configuring the *Fan kick-start time* setting to a value that is greater than zero.

The *Fan kick-start* function is activated when the fan starts from standstill, in manual or auto mode.

When the *Fan kick-start* function is active, the controller sets the fan speed output signal to its maximum for the period of time specified by the *Fan kick-start time* configuration setting.

After the fan kick-start time has expired, the controller reverts to normal fan control, that is, auto or manual mode.

The fan kick-start configuration settings are described in *Table 2-20*.

Table 2-20 Fan kick-start configuration settings.

Configuration setting	Description
Fan kick-start time (sec)	The period of time (in seconds) that the *Fan kick-start* function is active.

2.5.5 Fan afterblow

Fan afterblow is a control function that can be used as a safety precaution when an electrical heating battery that is placed in the ductwork is used to provide heating. For example, when auto fan mode is in use and the heating demand decreases to zero, the fan stops while the electrical heating battery typically remains hot for a while longer. The *Fan afterblow* function can then be used to make the fan run for and extended period of time to allow for the electrical heating battery to cool off.

The *Fan afterblow* function is enabled via the *Fan afterblow mode* configuration setting.

The *Fan afterblow* function is activated when the applicable heating output signal, as specified via the *Fan afterblow mode* configuration setting, decreases to zero.

When the *Fan afterblow* function is active, the fan runs in afterblow mode for the period of time specified by the *Fan afterblow time* configuration setting. A minimum fan speed during fan afterblow can be set via the *Fan afterblow minimum speed* configuration setting.

After the fan afterblow time has expired, the controller reverts to normal fan control, that is, auto or manual mode.

The fan afterblow configuration settings are described in *Table 2-21*.

Table 2-21 Fan afterblow configuration settings.

Configuration setting	Description
Fan afterblow mode	**Off:** Fan afterblow is disabled (default setting). **After heating 1:** Fan afterblow is activated when the heating output signal that is associated with heating sequence Y1 decreases to zero. **After heating 2:** Fan afterblow is activated when the heating output signal that is associated with heating sequence Y2 decreases to zero. **After heating 1/2:** Fan afterblow is activated both when the heating output signal that is associated with heating sequence Y1 or heating sequence Y2 decrease to zero.
Fan afterblow minimum speed	This setting is used to set a minimum fan speed during fan afterblow. **Off:** The minimum allowed fan speed is zero (default setting). **Speed 1:** The controller ensures that the minimum fan speed is the configured fan speed 1. **Speed 2:** The controller ensures that the minimum fan speed is the configured fan speed 2. **Speed 3:** The controller ensures that the minimum fan speed is the configured fan speed 3.
Fan afterblow time (sec)	The period of time (in seconds) that the *Fan afterblow* function is active.

2.6 VAV control

The *Variable Air Volume (VAV) control* function is used to manage the behaviour for a damper that is controlled by the analog VAV output signal.

The *VAV control* function enables the controller to regulate based on:

- ✓ **Cooling demand**
  The VAV output signal is controlled based on the cooling setpoint and the current room temperature.
- ✓ **Fresh air demand**
  The VAV output signal is controlled based on the CO_2 setpoint and the current CO_2 level in the room.

- ✓ **Both cooling and fresh air demand simultaneously**
  The highest demand determines if the VAV output signal currently is controlled based on the cooling setpoint and the room temperature, or the CO_2 setpoint and the CO_2 level in the room.
- ✓ **By min value**
  The VAV output is fixed at the minimum output selected for the different controller states. It is not affected by the heat/cool control.

For information about CO_2 control, see section *2.11*.

The maximum damper airflow can be controlled by setting a maximum limit on the VAV output signal. The minimum airflow that applies for each controller state can also be controlled by setting minimum limits on the VAV output signal.

The damper can also be controlled based on heating demand. This is useful when the heating device that provides the room with heat is located in the supply air duct and behind the damper that regulates the airflow into the room. When this function is active and the heating demand increases, the damper opens correspondingly and the distribution of heat into the room is boosted. This function is active when the *Max limit for VAV output at heating demand* configuration setting is greater than zero.

The *VAV control* function is enabled and the VAV control configuration settings in Application tool are shown when one of the following controller modes is selected:

- ✓ Heating + VAV
- ✓ Cooling + VAV
- ✓ VAV
- ✓ Heating + Cooling + VAV

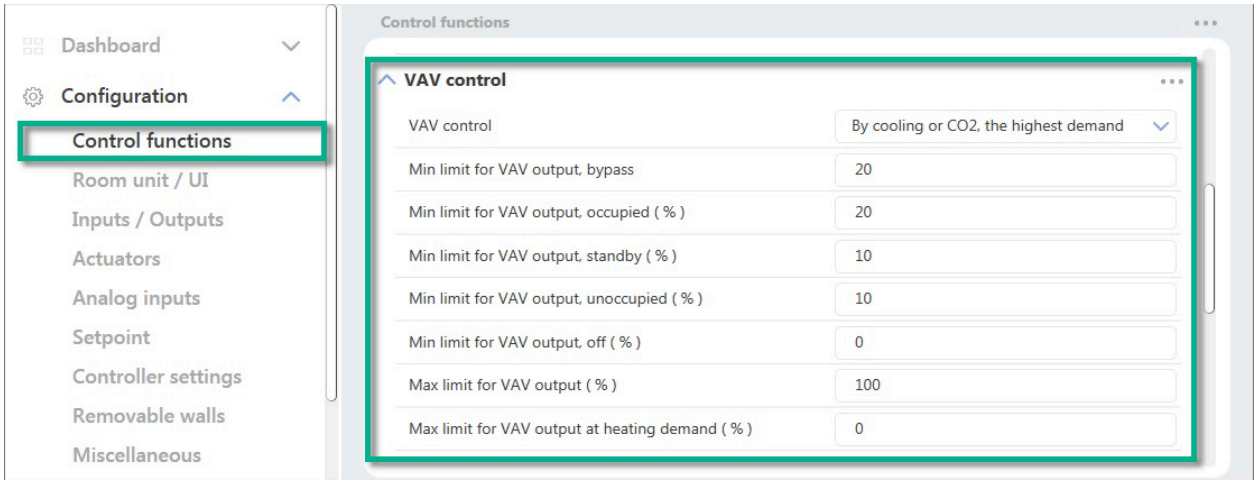


Figure 2-33 VAV control configuration settings in Application tool.

The VAV control configuration settings are described in *Table 2-22*.

Table 2-22 VAV control configuration settings.

Configuration setting	Description
VAV control	**By cooling demand:** VAV control is performed based on cooling demand. The VAV output signal is controlled based on the cooling setpoint and the current room temperature. **By CO2 demand:** VAV control is performed based on fresh air demand. The VAV output signal is controlled based on the CO_2 setpoint and the current CO_2 level in the room. **By cooling or CO2, the highest demand:** VAV control is performed based on both cooling and fresh air demand simultaneously. The highest demand determines if the VAV output signal currently is controlled based on the cooling setpoint and the room temperature, or the CO_2 setpoint and the CO_2 level in the room (default setting). **By min Value:** VAV control is fixed at the minimum output selected for the different controller states. It is not affected by the heating/cooling control. [1]
Min limit for VAV output, bypass (%) [1]	Specifies the minimum limit for the VAV output signal when the controller is in the bypass controller state. [1]
Min limit for VAV output, occupied (%)	Specifies the minimum limit for the VAV output signal when the controller is in the occupied controller state.
Min limit for VAV output, standby (%)	Specifies the minimum limit for the VAV output signal when the controller is in the standby controller state.
Min limit for VAV output, unoccupied (%)	Specifies the minimum limit for the VAV output signal when the controller is in the unoccupied controller state.
Min limit for VAV output, off (%)	Specifies the minimum limit for the VAV output signal when the controller is in the off controller state.
Max limit for VAV output (%)	Specifies the maximum limit for the VAV output signal.
Max limit for VAV output at heating demand (%)	This setting is only applicable for the following controller modes: ✓ Heating + VAV ✓ Heating + Cooling + VAV When this value is greater than zero, the VAV output signal follows the heating output signal to a maximum that is specified by this value.

1. Only available in Regio Ardo version 2.0–1–04 or later

Figure 2-34 illustrates the control behaviour for the Heating + VAV controller mode when VAV control is performed based on cooling demand, a maximum limit is set, and minimum limits for the occupied and unoccupied controller states are set.

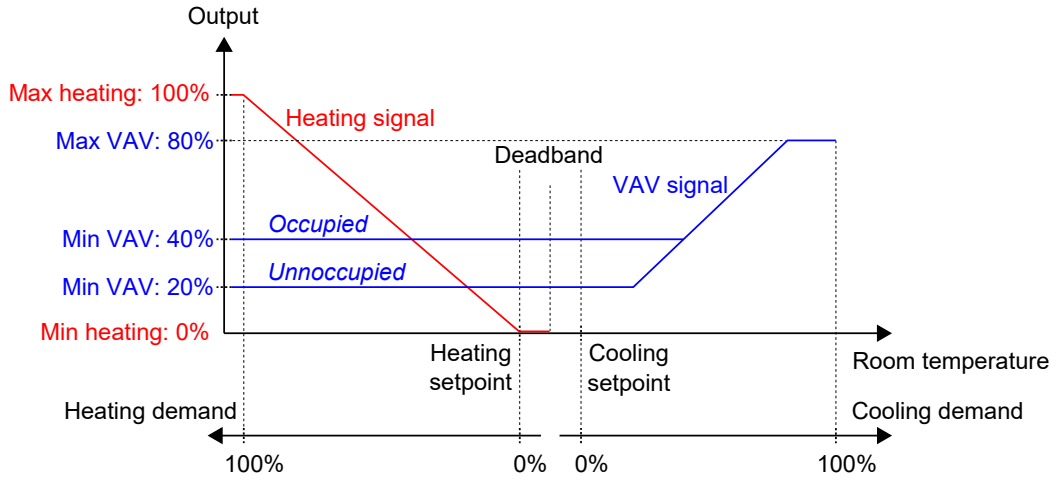


Figure 2-34 VAV control behaviour based on cooling demand when a maximum limit is set, and minimum limits for the occupied and unoccupied controller states are set.

Figure 2-35 illustrates the control behaviour for the Heating + VAV controller mode when the *Max limit for VAV output at heating demand* setting is applied. For example, when a 50% maximum is set, the VAV signal follows the heating signal as the heating demand increases but never exceeds 50% of its practical maximum (100%).

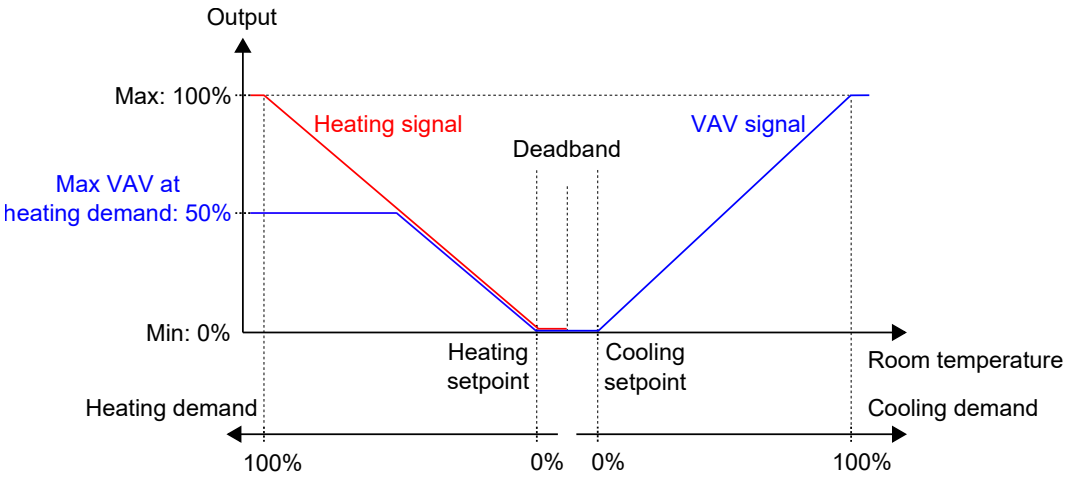


Figure 2-35 Control behaviour for the Heating + VAV controller mode when the maximum VAV output on heating demand setting is applied.

2.7 Forced ventilation

Forced ventilation is a control function that is used to improve the air quality in a room through increased airflow. This is achieved by fully opening the damper that regulates the airflow into the room, which provides an additional amount of fresh air and decreases the CO_2 level. The *Forced ventilation* function can also be used to boost the heating or cooling distribution when the heating, cooling, or VAV output signal has reached its maximum.

The *Forced ventilation* function can be used in all controller modes, and is enabled by applying the *Forced ventilation active* or *Forced ventilation active at max output* configuration settings, that is, changing them from their **Off** values.

The *Forced ventilation* function is activated when the controller changes to bypass state and any of the conditions specified by the *Forced ventilation active* or *Forced ventilation active at max output* settings are fulfilled. See section *2.4* for information about bypass state.

When the *Forced ventilation* function is active, a digital controller output that is configured with the **Forced ventilation** value is active, and the analog VAV output signal is set to its maximum for the controller modes that include a VAV sequence. Optionally, for the Cooling + VAV and Heating + Cooling + VAV controller modes, the cooling output signal can be configured to also be set to its maximum when the forced ventilation is active.

The forced ventilation configuration settings in Application tool are shown in *Figure 2-36*.

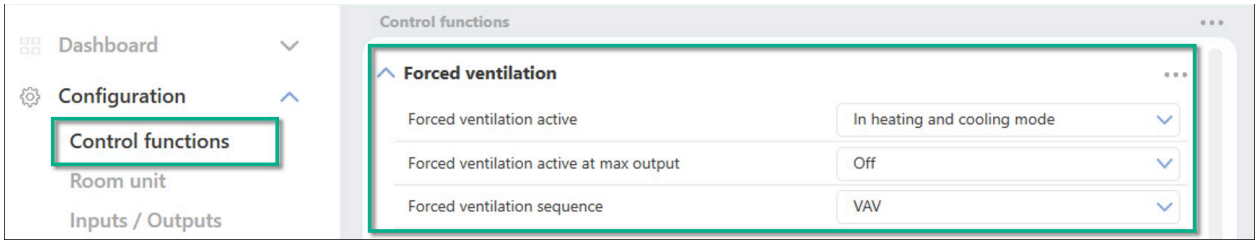


Figure 2-36 Forced ventilation configuration settings in Application tool.

The forced ventilation configuration settings are described in *Table 2-23*.

Table 2-23 Forced ventilation configuration settings.

Configuration setting	Description
Forced ventilation active	This setting is used to select if forced ventilation should be activated when the controller is in heating or cooling mode, or in both modes. This is useful for providing an additional amount of fresh air into the room and for decreasing the CO_2 level. **Off:** Forced ventilation is not activated (default setting). **In heating mode:** Forced ventilation is activated when the controller is in heating mode and bypass state. **In cooling mode:** Forced ventilation is activated when the controller is in cooling mode and bypass state. **In heating and cooling mode:** Forced ventilation is activated both when the controller is in either heating or cooling mode, and in bypass state.
Forced ventilation active at max output	This setting is used to select if forced ventilation should be activated when the output signal is at its maximum. This is useful for providing a boosted heating or cooling effect when the heating, cooling, or VAV output signal have reached their maximum. **Off:** Forced ventilation is not activated (default setting). **At max heating output:** Forced ventilation is activated when the heating output signal is at its maximum and the controller is in bypass state. **At max cooling/VAV output:** Forced ventilation is activated when the cooling or VAV output signal is at its maximum and the controller is in bypass state. **At max heating and cooling/VAV output:** Forced ventilation is activated when the heating, cooling, or VAV output signal is at its maximum, and the controller is in bypass state.
Forced ventilation sequence	This setting is only applicable for the following controller modes: ✓ Cooling + VAV ✓ Heating + Cooling + VAV **VAV:** The VAV output signal is set to its maximum when the *Forced ventilation* function is active (default setting). **Cooling and VAV:** Both the cooling and VAV output signals are set to their maximum when the *Forced ventilation* function is active.

Figure 2-37 illustrates the analog VAV output and digital output signal behaviour for the Heating + VAV controller mode when no maximum or minimum limits are set for the output signals, the controller is in bypass state, and the following configuration settings are applied:

- ✓ *Forced ventilation active*: **Off**
- ✓ *Forced ventilation active at max output*: **At max heating output**
- ✓ *Forced ventilation sequence*: **VAV**

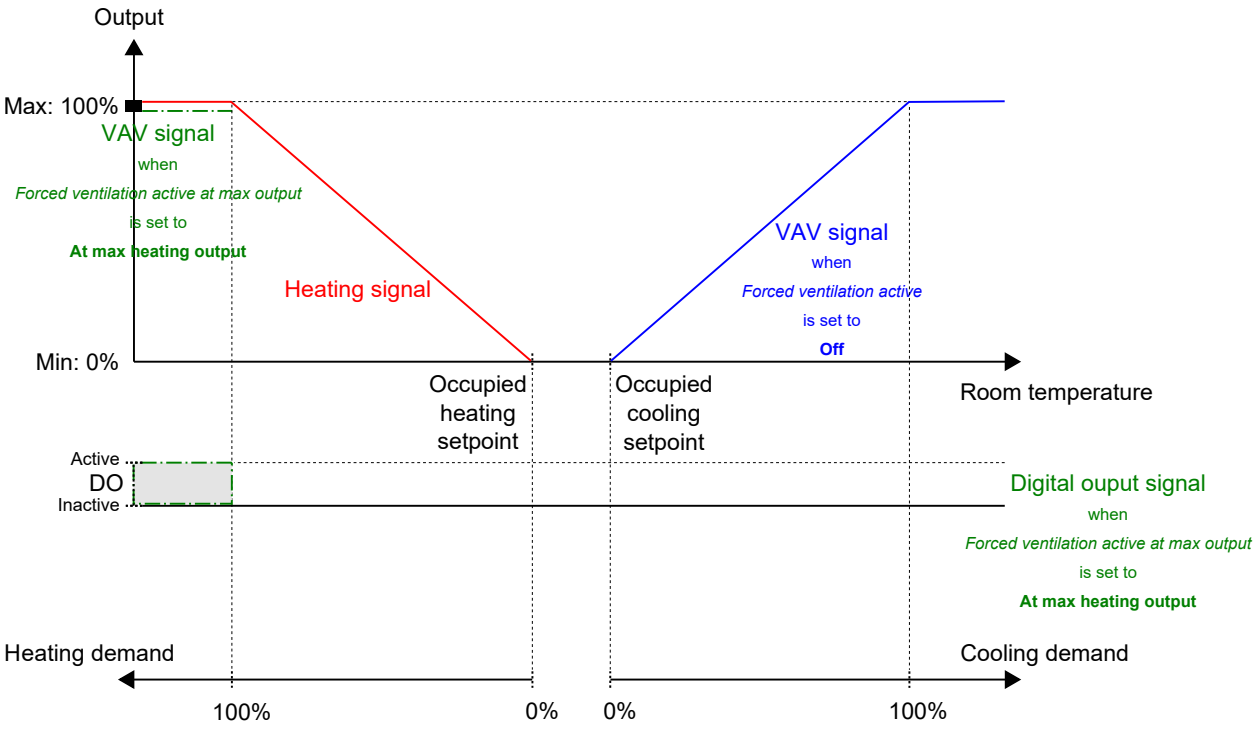


Figure 2-37 Example of forced ventilation control behaviour for the Heating + VAV controller mode when the controller is in bypass state.

Figure 2-38 illustrates the digital output signal behaviour for the Heating + Cooling controller mode when no maximum or minimum limits are set for the output signals, the controller is in bypass state, and the following configuration settings are applied:

- ✓ *Forced ventilation active*: **In cooling mode**
- ✓ *Forced ventilation active at max output*: **At max heating output**

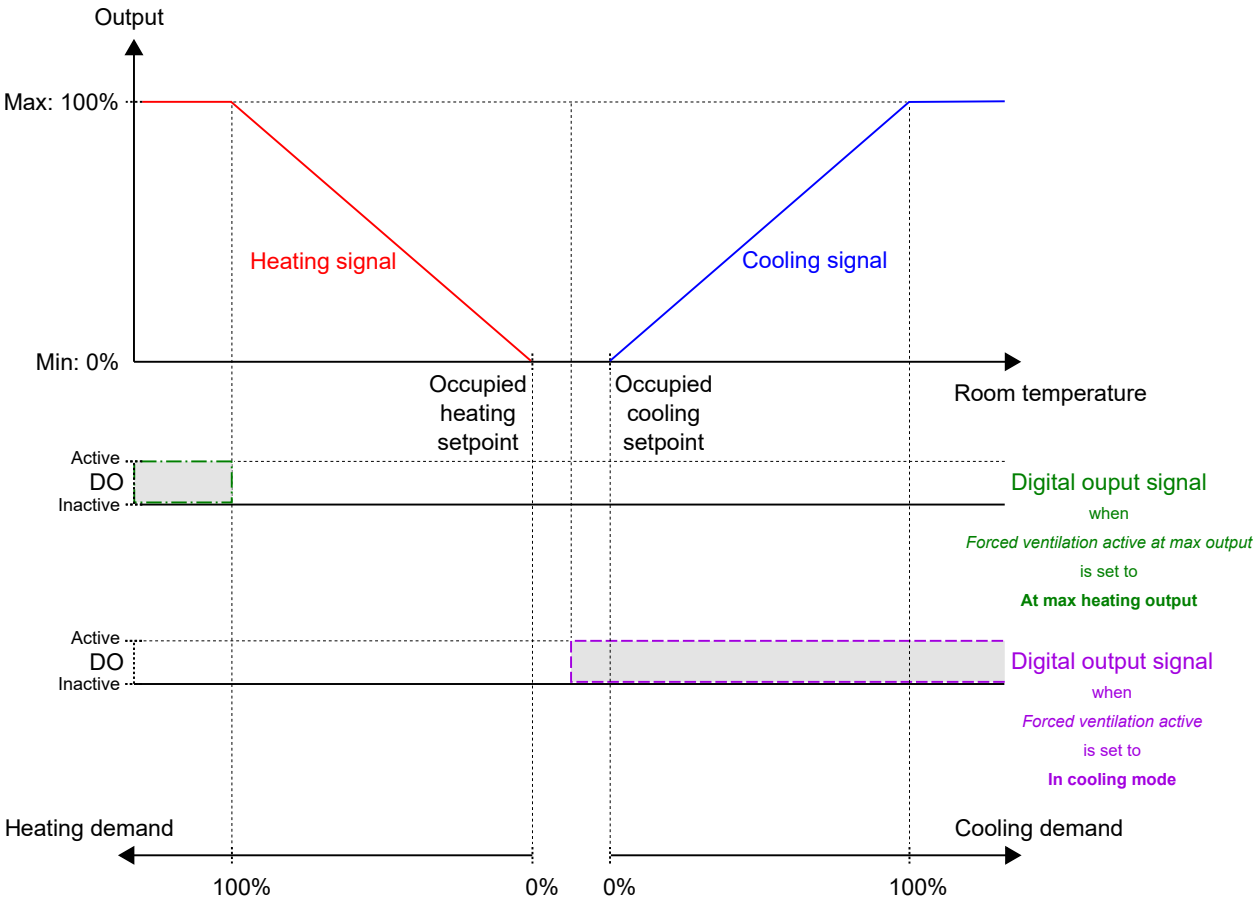


Figure 2-38 Example of forced ventilation control behaviour for the Heating + Cooling controller mode when the controller is in bypass state.

2.8 Presence detection

Presence detection is a control function that makes it possible for the controller to automatically switch between controller states based on if someone is present in the room, or if the CO_2 level in the room is too high. See section *2.4* for information about controller states, and controller state changes when using presence detection.

Presence detection is performed by using a presence detector, for example, a motion detector, that is connected to and configured on a digital controller input. Presence can also be detected by using a CO_2 sensor that measures the CO_2 level in the room, and is connected to and configured on an analog controller input. When a room unit with a built-in CO_2 sensor is connected, the controller recognizes the built-in CO_2 sensor automatically, and no controller input configuration is needed.

The controller checks for presence continuously when the controller is in the state specified by the *Preset controller state* setting. See section *Presence detection and Occupancy (On/Off) button on room unit*.

The *Presence detection* function is enabled and the presence detection configuration settings are shown in Application tool when any of the configuration values listed in *Table 2-24* are configured on a controller input, or when a room unit with a built-in CO_2 sensor is selected as connected room unit. See the *Configuration -> Room unit* pane in Application tool.

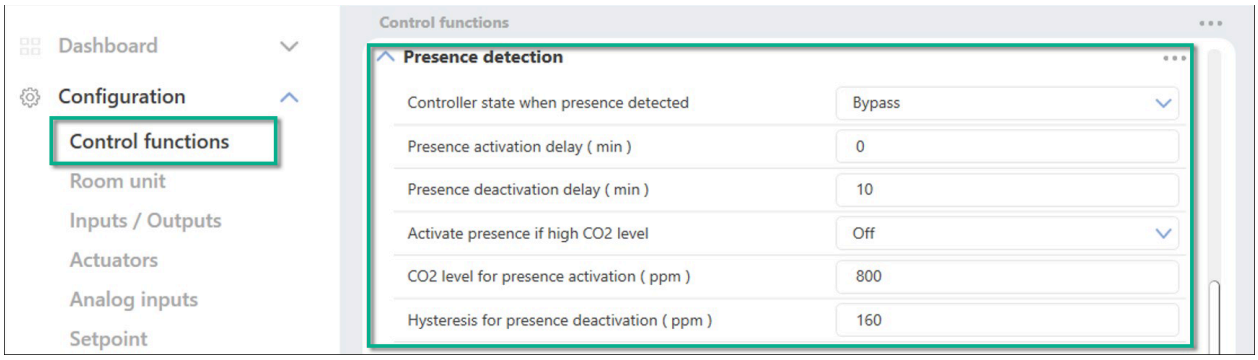


Figure 2-39 Presence detection configuration settings in Application tool.

Table 2-24 Presence detection configuration values and controller input types.

Controller input configuration value	Controller input type
CO2 sensor	Analog
Presence detector	Digital

The presence detection configuration settings are described in *Table 2-25*.

Table 2-25 Presence detection configuration settings.

Configuration setting	Description
Controller state when presence detected	One of the following controller states is configured as active when presence is detected: ✓ **Occupied** ✓ **Bypass** (default setting)
Presence activation delay (min)	The controller checks for presence continuously when the controller is in the state specified by the *Preset controller state* setting. When presence is detected, a timer starts and the controller waits this delay time (in minutes) before changing to the state specified by the *Controller state when presence detected* setting. If presence is not detected continuously during this delay time, for example, if a person leaves the room before the delay time has passed, the controller does not change to the presence detected controller state, and the timer is stopped and reset.
Presence deactivation delay (min)	The controller checks for presence continuously when the controller is in the presence detected controller state. When no presence is detected anymore, a timer starts and the controller waits this delay time (in minutes) before changing to the state specified by the *Preset controller state* setting. If presence is detected again during this delay time, for example, if a person re-enters the room before the delay time has passed, the controller stays in the presence detected controller state, and the timer is stopped and reset.
Activate presence if high CO2 level	**Off:** Presence detection via the CO_2 sensor is disabled. **On:** Presence is detected via the CO_2 sensor by using the *CO2 level for presence activation (ppm)* setting (default setting).
CO2 level for presence activation (ppm)	Presence is detected via the CO_2 sensor when the measured CO_2 level exceeds this value.
Hysteresis for presence deactivation (ppm)	Specifies the hysteresis for when presence is not detected via the CO_2 sensor anymore. For example, if presence has been detected at 800 ppm and this setting is 160 ppm, the controller stops detecting presence at 800-160 = 640 ppm.

2.9 Communication heartbeat

The *Communication heartbeat* function enables the controller to continue to regulate locally also if the communication to the SCADA system is lost. When the function is activated and there is a communication failure, the controller reverts to a preset controller state until the communication is reestablished. At that moment the controller resumes normal operation. The function will activate an alarm when there is a communication failure.

Note! When this function is activated the SCADA system has to reset the variable RegioCommFailsafe at a set timespan.

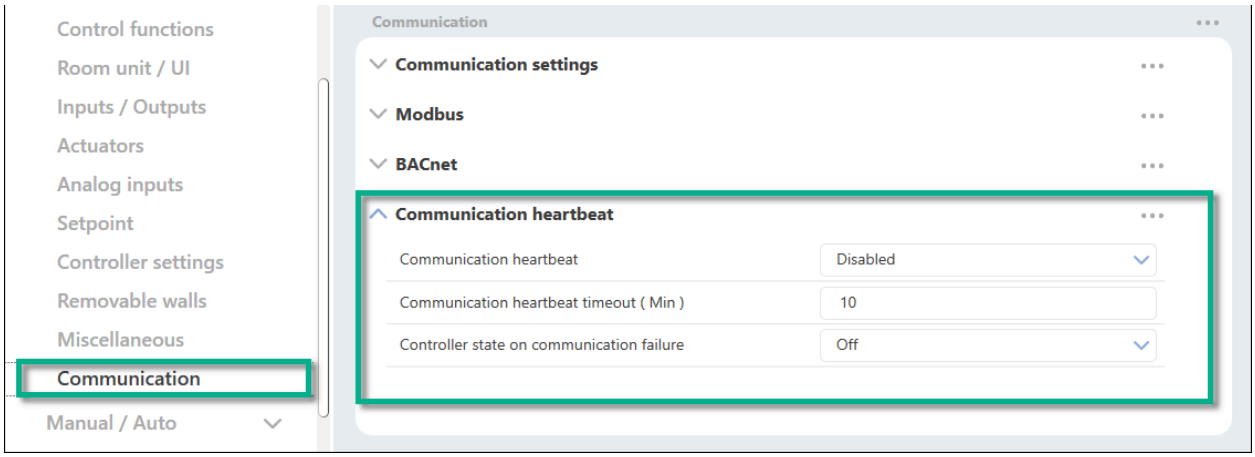


Figure 2-40 Communication heartbeat in Application Tool

The communication heartbeat configuration settings are described in *Table 2-26*.

Table 2-26 Configuration settings for communication heartbeat control

Configuration setting	Description
Communication heartbeat	**Enabled:** Activates the function **Disabled:** Inactivates the function (default setting)
Communication heartbeat timeout (Min)	The length, in minutes, between the communication is lost until the controller will start to regulate locally (default setting = 10 minutes) according to the preset state (**Failure safe time** in communication variables)
Controller state on communication failure	The state that the controller will revert to after the **Failure safe time** **Off** (default setting) **Unoccupied** **Stand-by** **Occupied** **ByPass** **Keep current**

2.10 Two rooms

Two rooms is a control function that enables the controller to control two separate rooms independently of each other.

For information about room unit identification in a two-room installation. See section *3.3*.

Figure 2-41 Two rooms configuration settings in Application tool.

When the *Two rooms* function is enabled, all configuration settings for room 2 are displayed in all panes in Application tool. *Figure 2-42* shows, for example, how setpoint settings for room 1 and room 2 are displayed.

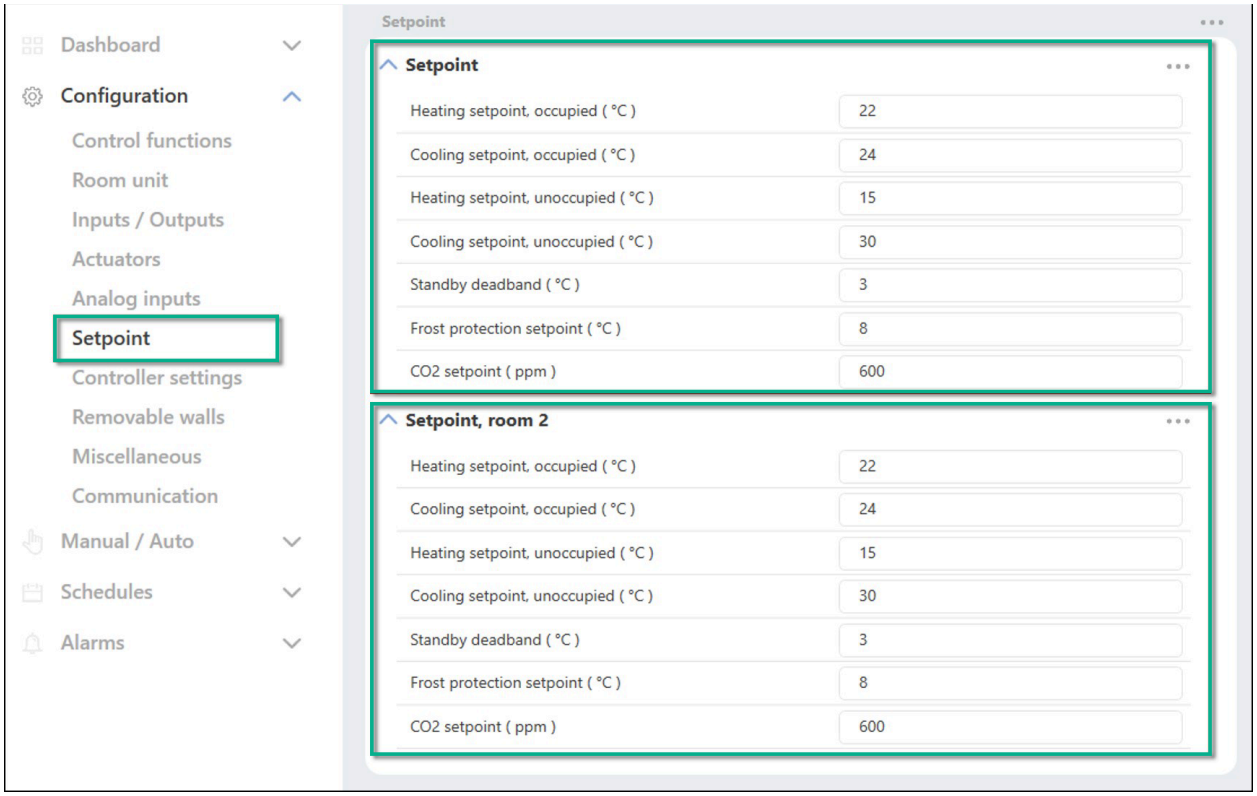


Figure 2-42 Example of room 2 configuration settings in Application tool.

The configuration settings for the *Two rooms* function are described in *Table 2-27*.

Table 2-27 Configuration settings for the Two rooms function.

Configuration setting	Description
Enable room 2	**Disabled:** Two-room control is disabled (default setting). **Enabled:** Two-room control is enabled. When the *Two rooms* function is enabled, all configuration settings for room 2 are displayed in all panes in Application tool.

2.11 CO_2 control

CO_2 *control* is a function that enables the controller to regulate based on fresh air demand. CO_2 control is performed by connecting a CO_2 sensor, and by letting the controller control the VAV output signal based on the CO_2 setpoint and the current CO_2 level in the room.

CO_2 control can be used together with the controller modes that include a VAV sequence:

- ✓ Heating + VAV
- ✓ Cooling + VAV
- ✓ VAV
- ✓ Heating + Cooling + VAV

CO_2 control is managed via the *VAV control* function, by applying the *VAV control* configuration setting. See section *2.6*.

The CO_2 sensor is connected to and configured on an analog controller input by using the value listed in *Table 2-28*. When a room unit with a built-in CO_2 sensor is connected, the controller recognizes the built-in CO_2 sensor automatically, and no controller input configuration is needed.

Table 2-28 CO_2 control configuration value and controller input type.

Controller input configuration value	Controller input type
CO2 sensor	Analog

CO_2 control provides a specific setting, listed in *Table 2-29*, that is only applicable for the controller modes that include a cooling sequence. This setting is located in the *Configuration -> Control functions -> Controller mode* pane in Application tool, and is shown when an applicable controller mode is selected.

Table 2-29 CO_2 control configuration setting.

Configuration setting	Description
Cooling sequence controlled by	**Cooling demand:** The cooling output signal is controlled based on the cooling setpoint and the current room temperature (default setting). **VAV control selection:** The cooling output signal is controlled according to the *VAV control* setting. See section *2.6*. That is, either by: ✓ Cooling demand ✓ CO_2 demand ✓ Cooling or CO_2, the highest demand

Figure 2-43 illustrates the control behaviour for CO_2 control when a minimum limits is set for the VAV output signal.

The demand for fresh air increases as the CO_2 level in the room rises. When the CO_2 level rises above the CO_2 setpoint, *VAV signal* increases to respond to the fresh air demand. At 100% fresh air demand, *VAV signal* reaches its maximum.

When the CO_2 level in the room is lower than the CO_2 setpoint and no fresh air demand exists, *VAV signal* is at its minimum.

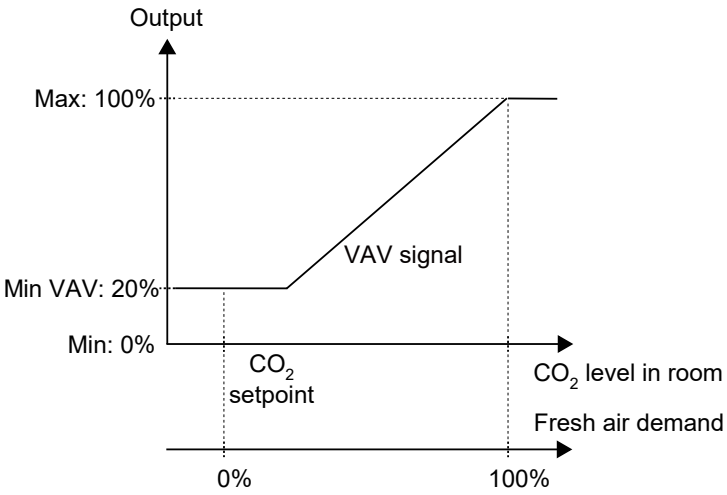


Figure 2-43 CO_2 control behaviour.

2.12 Extra zone control

This function is available in Regio^{Ardo} version 2.0-1-04 or later. The *Extra zone* function is intended to control the underfloor heating in an extra zone, e.g. a bathroom, in parallel to the controlling main room. This means that the extra zone control runs with the same presence triggers as the main room, i.e. it always listens to the main rooms control state and acts accordingly.

The extra zone control is activated when the main zone controller state is the same or higher than the selection in *Table 2-32 Extra zone configuration settings*. When the main zone is in cooling mode the extra zone heating can be disabled.

The extra zone acts as a heating controller and regulates based on it's own heating setpoint and the extra zone temperature sensor.

The Digital output *Extra zone active signal* is corresponding to the *Activate Extra zone* configuration setting and doesn't require any *Extra zone temperature* sensor to work. It only indicates if the main room is in a selected control mode or higher.

However, an *Extra zone temperature* sensor can be used in order to regulate according to a set *Extra zone heating setpoint (°C)*.

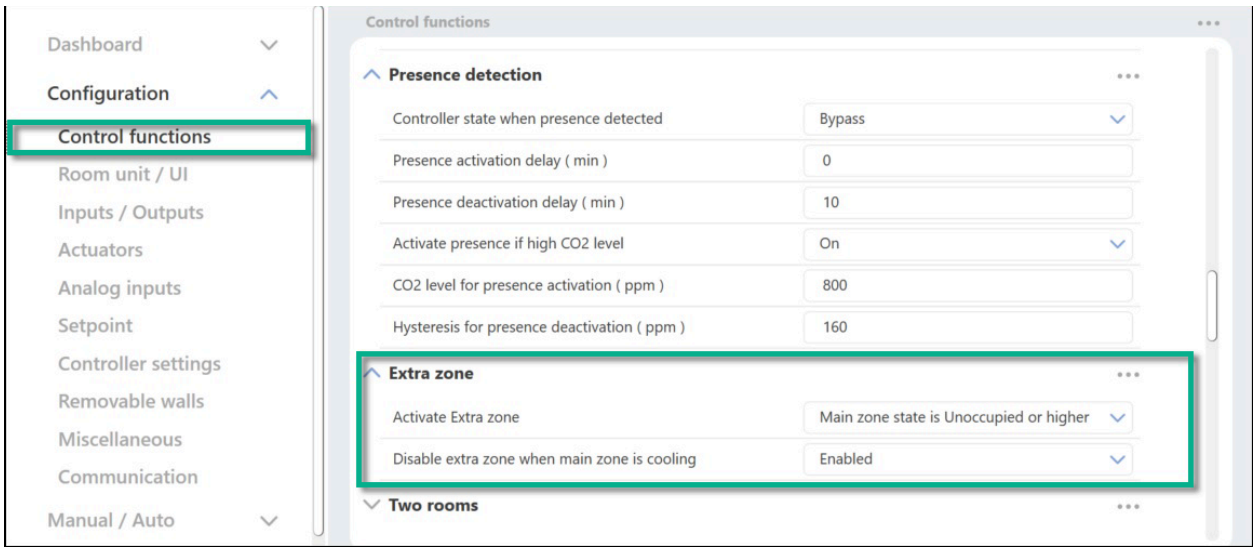


Figure 2-44 Extra zone configuration settings in Application tool.

Table 2-30 Controller input

Controller input configuration value	Controller input type
Extra zone temperature	Analog

Table 2-31 Controller output

Controller output configuration value	Controller output type
Extra zone heating valve, 0-10 V	Analog
Extra zone heating valve, thermal (PWM)	Digital
Extra zone active signal	Digital

The extra zone configuration settings are described in *Table 2-32*.

Table 2-32 Extra zone configuration settings.

Configuration setting	Description
Activate Extra zone	One of the following controller states is configured as active when presence is detected: **Disabled** (default setting) **Main zone state is Unoccupied or higher** **Main zone state is Standby or higher** **Main zone state is Occupied or higher** **Main zone state is Bypass** **Always on**
Disable extra zone when main zone is cooling	**Disabled** (default setting) **Enabled**

Note! The extra zone shares the valve exercise configuration with the main heating valve, thus it will exercise at the same day and for the same period of time.

3 Room unit

A person in the room can control the room's HVAC behaviour by using a room unit that is connected to the controller. A room unit, depending on the model, lets the person in the room:

- ✓ Put the room HVAC system in a comfort or energy saving mode
- ✓ Perform a setpoint adjustment
- ✓ Improve the air quality in the room through a temporary increase in airflow
- ✓ Select a fan speed
- ✓ Turn the room lighting on or off
- ✓ Control sun blinds

Room unit models with display can be used to perform basic controller configuration, as an alternative to using Application tool. See section *B.3.5*

A room unit, depending on the model, is also used to provide status information to the person in the room regarding:

- ✓ Controller state
- ✓ If the controller is heating or cooling
- ✓ Room temperature
- ✓ CO_2 level in room
- ✓ Setpoint adjustment
- ✓ Fan speed
- ✓ If a window is open
- ✓ If a sun blind is out
- ✓ If the room lighting is on
- ✓ Relative humidity level in room
- ✓ Outdoor temperature

You can use all Regin room units together with this product. Such as, ED-RU… .
Also other third-party room units can be used, and then configured via Modbus. See section *3.7 Third-party Modbus room unit*.

3.1 Communication LED

An LED is located inside the lower right corner of the room unit and blinks when the room unit is communicating with the controller.

The blinking is visible when the frame on top of the room unit is removed, and the room unit is communicating.

3.2 Enable or disable buttons/switch and knob

The buttons, fan switch, and setpoint adjustment knob on the room unit can be enabled or disabled in different ways to restrict end-user control. Note that the parameter menu in room units with display is accessible even if the up/down buttons are not enabled.

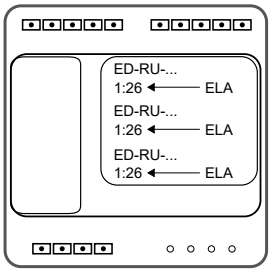
Configuration options for enabling or disabling buttons, the fan switch, or the setpoint adjustment knob are listed in section *3.6.4*.

3.3 Two-room installation

Note! You do not need to fill in the ELA-address when you are using only one room unit.

Follow these steps to ensure that the controller automatically associates the connected room units with room 1 and room 2:

1. Make sure that the two room units have different ELA addresses. The room unit with the lowest ELA will be assigned to room 1.
   The ELA address has the format 1:[1-30] and is printed on a label that is located on the back of the room unit PCB, as shown in the following figure.

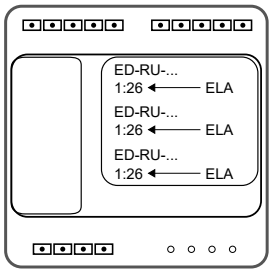


2. Connect both room units to the controller using the cable splitter.
3. In Application tool, connect to the controller and enable the *Two rooms* function via the *Enable room 2* configuration setting. The *Enable room 2* setting is located in the *Configuration -> Control functions* pane.
   Load/synchronize the *Enable room 2* parameter to the controller.
4. Allow the controller to identify the room units, which takes up to 45 seconds.
   For room units without display, the LED in the centre of the room unit blinks red and blue during the identification phase. The controller has completed the identification when the LED stops blinking.
   For room units with display, *FAIL* or is shown in the display during the identification phase. The controller has completed the identification when neither *FAIL* nor is shown.
   After the room units have been identified by the controller, Application tool provides support functions for checking assigned room unit IDs, and for swapping IDs between room units. See section *3.6.2*.

3.4 Two-room installation (alternative method)

In a two-room installation, make note of the ELA addresses for the room units in room 1 and room 2. Also, make sure the two room units have different ELA addresses.

The ELA address has the format 1:[1-30] and is printed on a label that is located on the back of the room unit PCB, as shown in the following figure.



1. Start the controller with both room units connected.

2. In Application tool, connect to the controller and enable the *Two rooms* function via the *Enable room 2* configuration setting. The *Enable room 2* setting is located in the *Configuration -> Control functions* pane.
   Then load/synchronize the *Enable room 2* parameter to the controller.
3. In Application tool, in the *Configuration -> Room unit* pane, select *Connected room unit* and enter *Room unit ELA*, 1-30, for both rooms.
   Then load/synchronize the parameters to the controller.
4. For room units without display, the LED in the centre of the room unit blinks red and blue during the identification phase. The controller has completed the identification when the LED does not blink red and blue anymore.
   For room units with display, *FAIL* or ▪▪▪▪ is shown in the display during the identification phase. The controller has completed the identification when neither *FAIL* nor ▪▪▪▪ is shown anymore.

3.5 Wiring

For information on how to wire a room unit and connect it to the controller. See section *7*.

3.6 Configuration settings

The room unit configuration settings are described in the following sections.

3.6.1 General

This section describes the general configuration settings.

Note! You do not need to fill in the ELA-address when you are using only one room unit.

Table 3-1 General configuration settings.

Configuration setting	Description
Connected room unit	The room unit model that is used in the room HVAC system: Select the room unit model. This setting is used for configuration purposes, that is, for displaying relevant configuration settings in Application tool that are related to the specific room unit model.
Reset user settings on shutdown [1]	**Disabled:** No user settings are reset (default setting) **Enabled:** All manual inputs in the room unit are reset when the controller changes to the controller state defined as Shutdown Control state. It is only recommended to use this setting on room units with display, else there will be a difference in value between the room unit and the controller until a new change is made by a user.

1. Only available in Regio Ardo version 2.0–1–04 or later.

3.6.2 Two rooms support functions

Application tool provides support functions for checking the room unit IDs, and for swapping the IDs between the room units. A search for and identification of connected room units can also be initiated. This can be useful, for example, if the initial automatic search and identification did not succeed.

Table 3-2 lists the configuration settings that are used to enable these functions. The configuration settings are shown in Application tool when the *Enable room 2* setting is enabled. See section *2.10*.

Table 3-2 Two rooms support functions.

Configuration setting	Description
Show room unit ID	**Disabled:** The room units do not indicate their room unit IDs (default setting). **Enabled:** The room units indicate their room unit IDs. For room units without display, the LED in the centre of the room unit blinks. One slow blink indicates ID 1 and two fast blinks indicate ID 2. For room units with display, ID 1 and ID 2 are shown in the displays. When the indications are shown in room units with display, the IDs can be swapped between the room units by pressing the **[Up]** or **[Down]** button on any of the room units. The indications are shown until the **[Occupancy]** (On/Off) button on any of the room units is pressed.
Show room unit ID at controller power up	**Disabled:** The room units do not indicate their room unit IDs at controller power up (default setting). **Enabled:** The room units indicate their room unit IDs at controller power up. For room units without display, the LED in the centre of the room unit blinks. One slow blink indicates ID 1 and two fast blinks indicate ID 2. For room units with display, ID 1 and ID 2 are shown in the displays. When the indications are shown in room units with display, the IDs can be swapped between the room units by pressing the **[Up]** or **[Down]** button on any of the room units. The indications are shown for 1 minute or until the **[Occupancy]** (On/Off) button on any of the room units is pressed.
Search for and identify room units	**Disabled:** No search is performed (default setting). **Enabled:** The controller initiates a search for and identification of the room units that are connected to the controller.
Swap room unit IDs	**Disabled:** The room unit IDs are not swapped (default setting). **Enabled:** The room unit IDs are swapped between the room units.

3.6.3 Max setpoint adjustment

This section describes the max setpoint adjustment configuration settings.

Table 3-3 Max setpoint adjustment configuration settings.

Configuration setting	Description
Max setpoint adjustment up (°C)	Specifies the maximum allowed setpoint adjustment up.
Max setpoint adjustment down (°C)	Specifies the maximum allowed setpoint adjustment down.

3.6.4 Display and buttons

This section describes the display and buttons configuration settings.

Table 3-4 Configuration settings.

Configuration setting	Description
Occupancy button press time for shutdown controller state (s)	The period of time (in seconds) that the occupancy button must be pressed (long press) for the controller to change to the state specified by the *Shutdown controller state* setting.
Fan button behaviour	**Manual mode:** Manual fan control (default setting) **Forced ventilation**: Activates forced ventilation

Table 3-4 Configuration settings. (continued)

Configuration setting	Description
View mode	One of the following options is selected: ✓ **Temperature:** The room temperature is shown (default setting). ✓ **Heating setpoint:** The occupied heating setpoint, including setpoint adjustment, is shown. ✓ **Cooling setpoint:** The occupied cooling setpoint, including setpoint adjustment, is shown. ✓ **Average of cooling and heating setpoint:** The average of the occupied cooling and heating setpoint, including setpoint adjustment, is shown. ✓ **Setpoint adjustment:** The setpoint adjustment is shown. ✓ **CO2 level:** The CO_2 level in the room is shown.
View mode during setpoint adjustment	One of the following options is selected: ✓ **Setpoint adjustment:** The setpoint adjustment is shown (default setting). ✓ **Controlling setpoint:** The occupied heating or cooling setpoint, including setpoint adjustment, that is used for control is shown. ✓ **Heating setpoint:** The occupied heating setpoint, including setpoint adjustment, is shown. ✓ **Cooling setpoint:** The occupied cooling setpoint, including setpoint adjustment, is shown.
Alternate between view mode setting and CO2 level	**Enabled:** The display alternates between showing the current *View mode* setting and the CO_2 level in the room (default setting). **Disabled:** The current *View mode* setting is shown.
Brightness when lit (%)	Specifies the display background brightness when lit.
Brightness when dimmed (%)	Specifies the display background brightness when dimmed. The brightness is dimmed after 2 minutes of inactivity.
Enabled buttons/switch and knob	One of the following options is selected: ✓ **All disabled** ✓ **Occupancy button** ✓ **Fan button/switch** ✓ **Up/down buttons, knob** ✓ **Occupancy button, up/down buttons, knob** ✓ **Fan button/switch, up/down buttons, knob** ✓ **All enabled** (default setting) **Note:** The parameter menu in room units with display is accessible even if the up/down buttons are not enabled.
Parameter menu access	**Enabled:** The parameter menu is accessible (default setting). **Disabled:** The parameter menu is not accessible.

3.6.5 BACnet object names

It is allowed to renaming BACnet objects, from BACnet as well as from Application tool. The changed BACnet object names are included when a configuration is saved on disk by Application tool.

3.7 Third-party Modbus room unit

This chapter describes how to set up a third-party Modbus room unit to work with Regio Ardo.

Note! For Regio Ardo, you can add and setup up to two single third party Modbus room unit at a time.

Support for third-party room units was added in Regio version 2.1.

3.7.1 Communication setup

On the **Room unit / UI menu** page, set **Connected room unit** to **Generic Modbus unit**. A number of communication settings will appear.

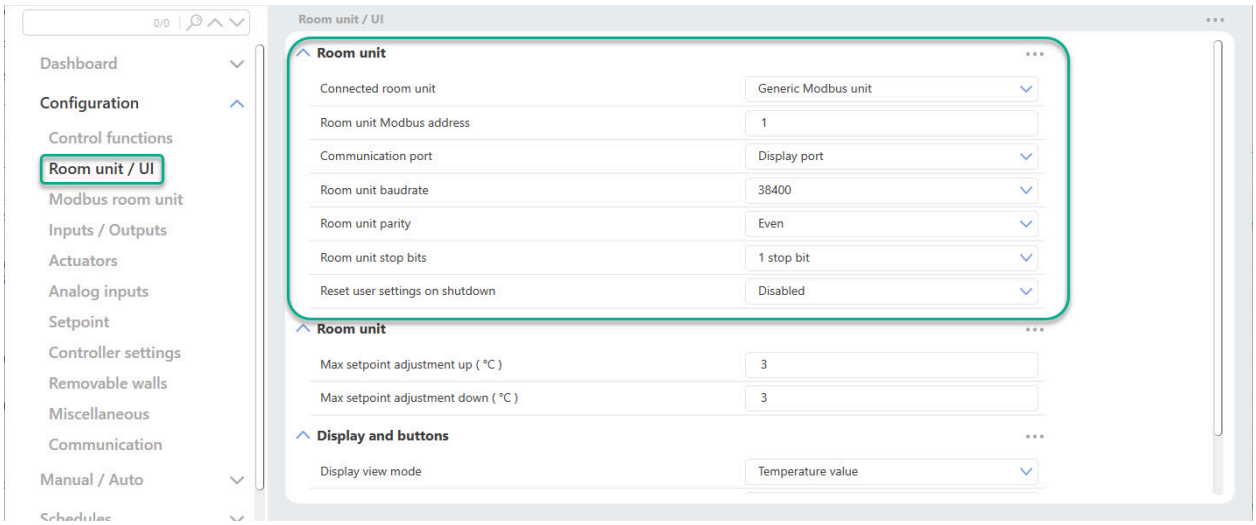


Figure 3-1 Connected room unit settings

Configuration settings	Description
Connected room unit	**None** (default setting) **Generic Modbus unit**: Select to configure third-party room unit. ... *Other compatible room units*
Room unit Modbus address	Min. 0, Max. 255, Default: **1**
Communication port	**Display port** (default setting) Port 1 Port 2
Room unit baud rate	9600, 19200, **38400** (default setting), 57600, 76800, 115200
Room unit parity	No parity, Odd, **Even** (default setting)
Room unit stop bits	**1 stop bit** (default setting), 2 stop bits
Reset user settings on shutdown	Enabled, **Disabled** (default setting). Resets the user settings in the room unit at shutdown.

3.7.2 Modbus room unit menu

The **Modbus room unit** menu appears when a **Generic Modbus unit** is selected.

In this menu a number of Modbus registers can be set up, which will be read from or written to the third-party room unit. For each register the type and address is specified, for some registers there is also a scale parameter. **None** is the default setting.

Note! Not all registers are available in all third-party room units. Set the type to **None** for the registers that are not applicable.

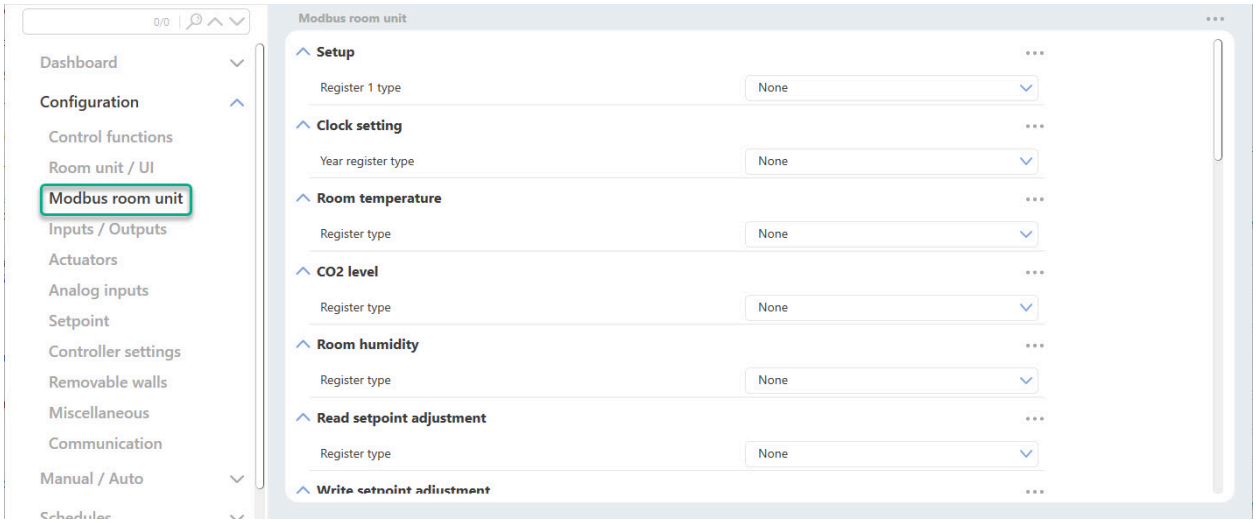


Figure 3-2 Modbus room unit menu

Configuration settings	Description
Setup → Register type	Each register type corresponds to a Modbus function code. If **None** is selected, no read/write will take place. Only one register is read/written in each transaction, even if **Write multiple registers** is selected. This option is only available because some Modbus units do not support all function codes.
Setup → Register address	This is the Modbus register **address**, not the register number. Modbus unit documentation sometimes specify address, sometimes register number. If the document specifies register numbers, subtract 1 before entering the address.
Setup → Register scale	Because Modbus only handles integers, scaling is necessary for some values. When reading, the register value is divided with the scale value before it is handled in the Regio. When writing, the Regio value is multiplied with the scale value before write.
Setup → Room unit setup	If the third-party room unit needs to be initialized in some way after reset, a number of Modbus registers can be specified which will be written at startup and when a third-party room unit is connected. Select Modbus command type, address and value to be written for each register. Up to 10 registers can be specified.
Clock setting	For room units with a real time clock, the clock can be set from the Regio Ardo / Eedo at startup or when the unit is connected, like the setup registers above. Select Modbus type and address for each register to be set.
Room temperature	Registers for reading sensor values from the third-party room unit.
CO2 level	Registers for reading sensor values from the third-party room unit.
Room humidity	Registers for reading sensor values from the third-party room unit.
Read setpoint adjustment	This is used when the third-party room unit has a base setpoint and a +/- adjustment. The adjustment is read here and added to the base setpoint.
Write setpoint adjustment	The register where the setpoint adjustment is written if it has been changed outside the third-party room unit. It is normally the same register as above, but that is not the case for all room units.
Read active setpoint	This is used when the third-party room unit does not have a +/- adjustment, and the setpoint is adjusted directly. The setpoint is read here and the base setpoint is subtracted to get an adjustment value that is used in the Regio.
Write active setpoint	The register where the active setpoint is written if it has been changed outside the third-party room unit. It is normally the same register as above, but that is not the case for all room units.
Write base setpoint	The register where the base setpoint is written, see **Read setpoint adjustment** above. It can not be changed by the user, so there is no need for a read function.
Adjust setpoint or offset	The register to set if the setpoint or the +/- adjustment should be shown on the display during adjustment.
Display view mode	The register to set what to show on the display when idle.
Read fan speed	The register for reading the fan speed setting. The scale parameter should be set to get an input value from 0 to 3. Values outside this range will be interpreted as auto.
Write fan speed	The register where the fan speed is written if it has been changed outside the third-party room unit. It is normally the same register as above, but that is not the case for all room units.

Configuration settings	Description
Read fan manual/auto	The register for reading the fan manual/auto setting.
Fan symbol manual/auto	The register to set if the fan symbol shows manual or auto mode.
Fan symbol	The register to set the fan symbol on or off.
Heat/cool symbol	The registers to set the heat and cool symbols on or off. If there is a combined heat/cool symbol register these should be set to the same address.
Presence symbol	The register to set the presence symbol on or off.
Open window symbol	The register to set the open window symbol on or off.
On/off button enable	The register to enable/disable the on/off button.
Up/down button enable	The register to enable/disable the up/down button for setpoint adjustment.
Fan button enable	The register to enable/disable the fan speed button.
Combined button register	To be used if there is one combined register to enable/disable buttons. Values can be specified for all combinations of buttons.
Temperature compensation	The register for a temperature compensation that is added to the room temperature value.
Controller state	Settings for reading and setting controller state in the room unit, such as Off, Bypass or Eco. Specify registers for reading and writing the state. They can be the same. Specify the register values that correspond to the different controller states. The register to set the presence symbol.

4 Inputs / Outputs

4.1 General configuration

The controller inputs and outputs are configurable. *Figure 4-1* shows the *Inputs / Outputs* pane in Application tool.

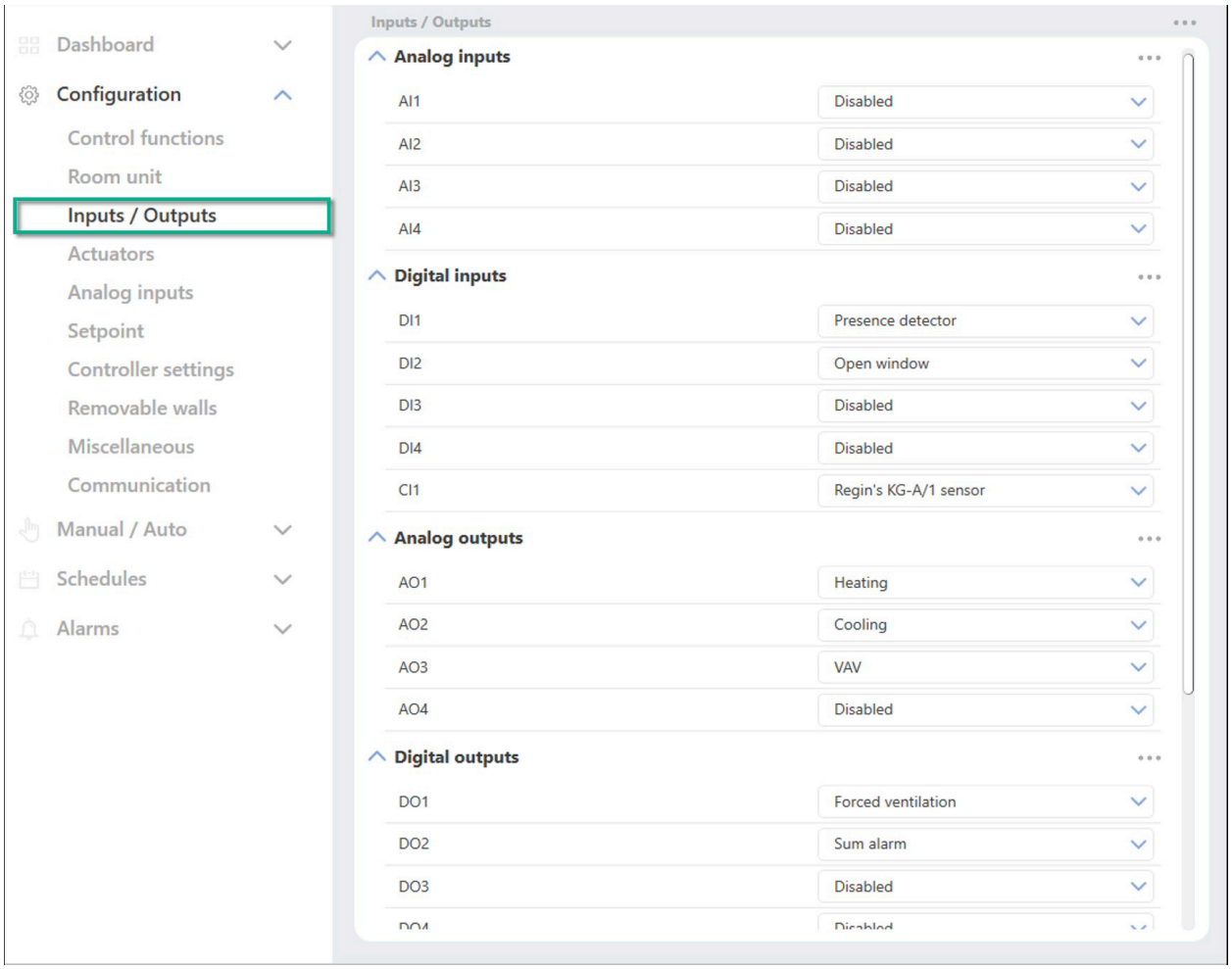


Figure 4-1 Controller input and output configuration in Application tool.

Table 4-1 provides an overview of the controller inputs and outputs, and lists their configuration options. The **room 2** configuration values are shown and selectable when the *Two rooms* function is enabled. See section *2.10*.

Table 4-1 Controller inputs and outputs, and their configuration options.

Input or output	Type	Configuration value options
AI1 AI2 AI3 AI4	Analog input, AIa	✓ Disabled ✓ External room temperature ✓ Change-over temperature ✓ Outdoor temperature ✓ Condensation sensor ✓ CO2 sensor ✓ RH sensor ✓ Supply air temperature ✓ Extra zone temperature[1] ✓ External room temperature 0-10 V [2] ✓ Flow sensor [2] ✓ External room temperature, room 2 ✓ Outdoor temperature, room 2 ✓ Condensation sensor, room 2 ✓ CO2 sensor, room 2 ✓ RH sensor, room 2 ✓ Supply air temperature, room 2 ✓ Extra zone temperature, room 2 [1] ✓ External room temperature 0-10 V, room 2 [2] ✓ Flow sensor, room 2 [2] ✓ Ext. Analog Input PT1000 [1] ✓ Ext. Analog Input 0…10V [1]
DI1 DI2 DI3 DI4	Digital input, DIb	✓ Disabled ✓ Open window ✓ Change-over ✓ Presence detector ✓ Open window, room 2 ✓ Presence detector, room 2 ✓ Ext. Digital Input [1]
CI1 CI2	Digital input, CIa	✓ Disabled ✓ Regin's KG-A/1 sensor ✓ Regin's KG-A/1 sensor, room 2
AO1 AO2 AO3 AO4	Analog output, AOa	✓ Disabled ✓ Heating ✓ Heating 2 ✓ Cooling ✓ Change-over valve ✓ 6-way valve ✓ VAV ✓ EC fan ✓ Heating extra zone, room 2[1] ✓ Heating, room 2 ✓ Heating 2, room 2 ✓ Cooling, room 2 ✓ Change-over valve, room 2 ✓ 6-way valve, room 2 ✓ VAV, room 2 ✓ EC fan, room 2 ✓ Heating extra zone, room 2 [1]

Table 4-1 Controller inputs and outputs, and their configuration options. (continued)

Input or output	Type	Configuration value options
DO1 DO2 DO3 DO4 DO5 DO6	Digital output, DOd	✓ Disabled ✓ Fan speed 1 ✓ Fan speed 2 ✓ Fan speed 3 ✓ Lighting ✓ Blind in ✓ Blind out ✓ Forced ventilation ✓ Heating valve, increase ✓ Heating valve, decrease ✓ Heating valve, thermal (PWM) ✓ Heating valve 2, increase ✓ Heating valve 2, decrease ✓ Heating valve 2, thermal (PWM) ✓ Cooling valve, increase ✓ Cooling valve, decrease ✓ Cooling valve, thermal (PWM) ✓ Change-over valve, increase ✓ Change-over valve, decrease ✓ Change-over valve, thermal (PWM) ✓ 6-way valve, increase ✓ 6-way valve, decrease ✓ Sum alarm ✓ Sum alarm A ✓ Sum alarm B ✓ Heating valve extra zone, thermal (PWM)[1] ✓ Extra zone active signal[1] ✓ Fan speed 1, room 2 ✓ Fan speed 2, room 2 ✓ Fan speed 3, room 2 ✓ Lighting, room 2 ✓ Blind in, room 2 ✓ Blind out, room 2 ✓ Forced ventilation, room 2 ✓ Heating valve, increase, room 2 ✓ Heating valve, decrease, room 2 ✓ Heating valve, thermal (PWM), room 2 ✓ Heating valve 2, increase, room 2 ✓ Heating valve 2, decrease, room 2 ✓ Heating valve 2, thermal (PWM), room 2 ✓ Cooling valve, increase, room 2 ✓ Cooling valve, decrease, room 2 ✓ Cooling valve, thermal (PWM), room 2 ✓ Change-over valve, increase, room 2 ✓ Change-over valve, decrease, room 2 ✓ Change-over valve, thermal (PWM), room 2 ✓ 6-way valve, increase, room 2 ✓ 6-way valve, decrease, room 2 ✓ Sum alarm, room 2 ✓ Sum alarm A, room 2 ✓ Sum alarm B, room 2 ✓ Heating valve extra zone, thermal (PWM), room 2[1] ✓ Extra zone active signal, room 2[1]

1. Only available in Regio Ardo version 2.0–1–04 or later
2. Only available in Regio Ardo version 2.0–1–05 or later

4.2 Input control

External sensor inputs that are not connected to any central loop or room can be read and configured by a SCADA system. This is enabled by selecting one of the corresponding configuration value options in Application tool.

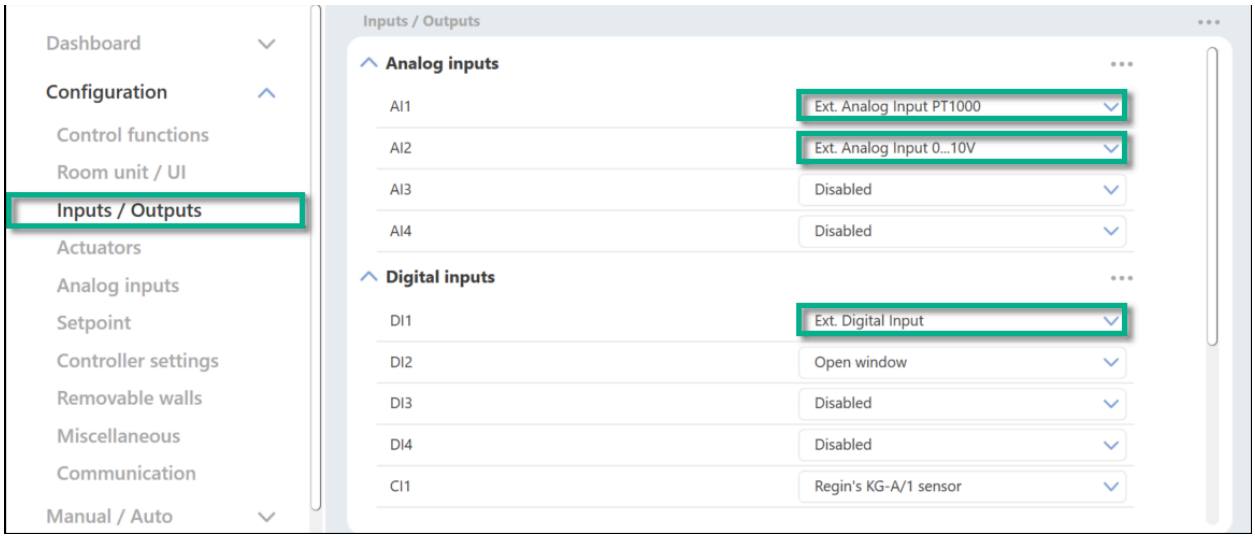


Figure 4-2 Controller input configuration in Application tool

Table 4-2 Configuration options for SCADA controlled inputs

Configuration setting	Configuration options
AI	Ext. Analog Input PT1000 Ext. Analog Input 0…10V
DI	Ext. Digital Input

4.3 Output control

When the outputs are configured for manual configuration it is possible to control the outputs in the controller via the SCADA system. The controller outputs are configured in the *Hardware control* pane in Application tool (see *Figure 4-3*).

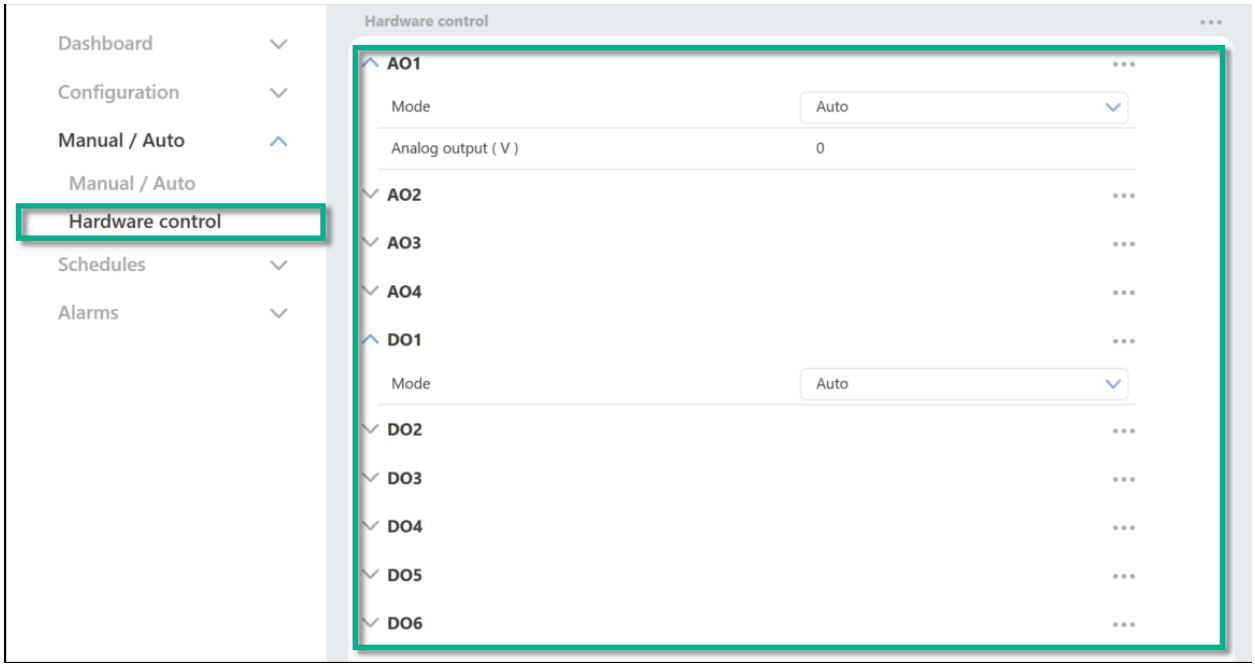


Figure 4-3 Hardware output configuration in Application tool

The possible configuration options to enable SCADA controlled outputs are shown in *Table 4-3*

Table 4-3 Configuration options for SCADA controlled outputs

Configuration setting	Configuration options
AO Mode	✓ **Manual - Off:** The AO is off ✓ **Manual - Set value:** The AO is set to a fixed value ✓ **Auto:** The AO runs in Auto mode
AO Set value (V)	The output value when in Set value mode
DO Mode	✓ **Manual - Off:** The DO is off ✓ **Manual - On:** The DO is on ✓ **Auto:** The DO runs in Auto mode

5 Setpoint

Different setpoint and deadband settings are used by the different controller states, see section *2.4*, to regulate the heating and cooling distribution. *Figure 5-1* shows the setpoint and deadband configuration settings in Application tool.

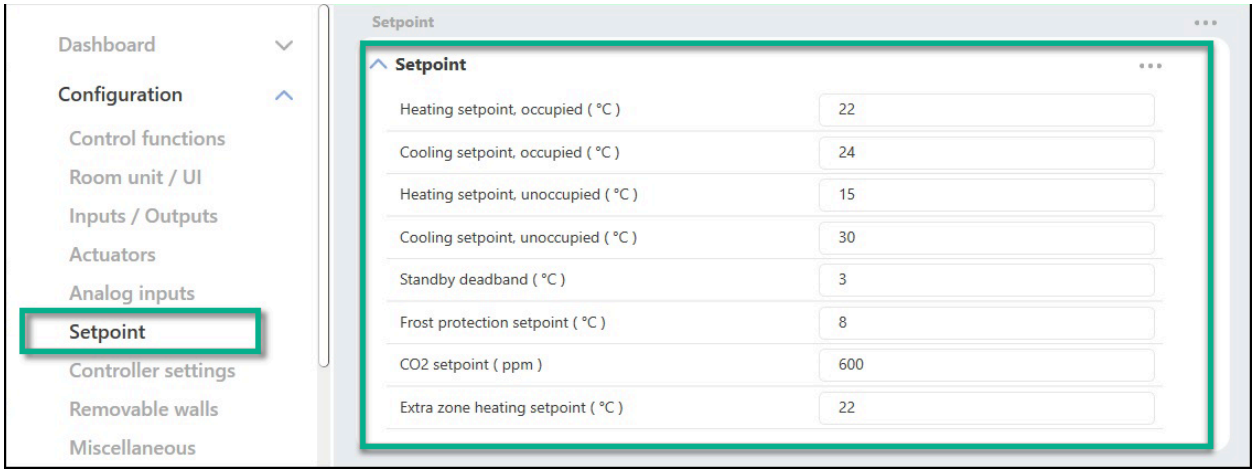


Figure 5-1 Setpoint and deadband configuration settings in Application tool.

An overview of the setpoint and deadband configuration settings are provided in *Table 5-1*.

Table 5-1 Setpoint and deadband settings overview.

Configuration setting	Controller state applicability
Heating setpoint, occupied (°C)	✓ Standby ✓ Occupied ✓ Bypass
Cooling setpoint, occupied (°C)	
Heating setpoint, unoccupied (°C)	✓ Unoccupied
Cooling setpoint, unoccupied (°C)	
Standby deadband (°C)	✓ Standby
Frost protection setpoint (°C)	✓ Off
CO2 setpoint (ppm)	✓ Unoccupied ✓ Standby ✓ Occupied ✓ Bypass
Extra zone heating setpoint (°C)	The extra zone setpoint, in °C, room 2

5.1 Active setpoint

The active setpoint is the setpoint value currently being used for control. The active setpoint is determined by:

- ✓ The current controller state in use.
- ✓ The configured setpoint and deadband settings.
- ✓ Any applied setpoint adjustment. Note that setpoint adjustment is not active in certain controller states.

See section *2.4.1* for descriptions of the control behaviour for the controller states, including how the active heating and cooling setpoints are defined in each controller state.

5.2 Setpoint adjustment

The active setpoint can be raised or lowered by performing a setpoint adjustment. A setpoint adjustment is performed via the setpoint knob or the buttons on the room unit, or via communication.

A setpoint adjustment shifts both the active heating and cooling setpoints by equal measure. For example, if a +1 °C setpoint adjustment is applied, both the active heating and cooling setpoint are raised by +1 °C.

Maximum limits (up and down) for the setpoint adjustment can be set via configuration. See the *Configuration -> Room unit* pane in Application tool.

6 Removable walls

Removable walls is a function that enables one controller to act as a master that controls up to four other slave controllers. This is useful in large spaces that are equipped with several heating, cooling, or VAV devices, and where a uniform climate control throughout the whole space is needed. Typical applications where the *Removable walls* function is useful are large conference rooms or open-plan offices that are equipped with removable walls.

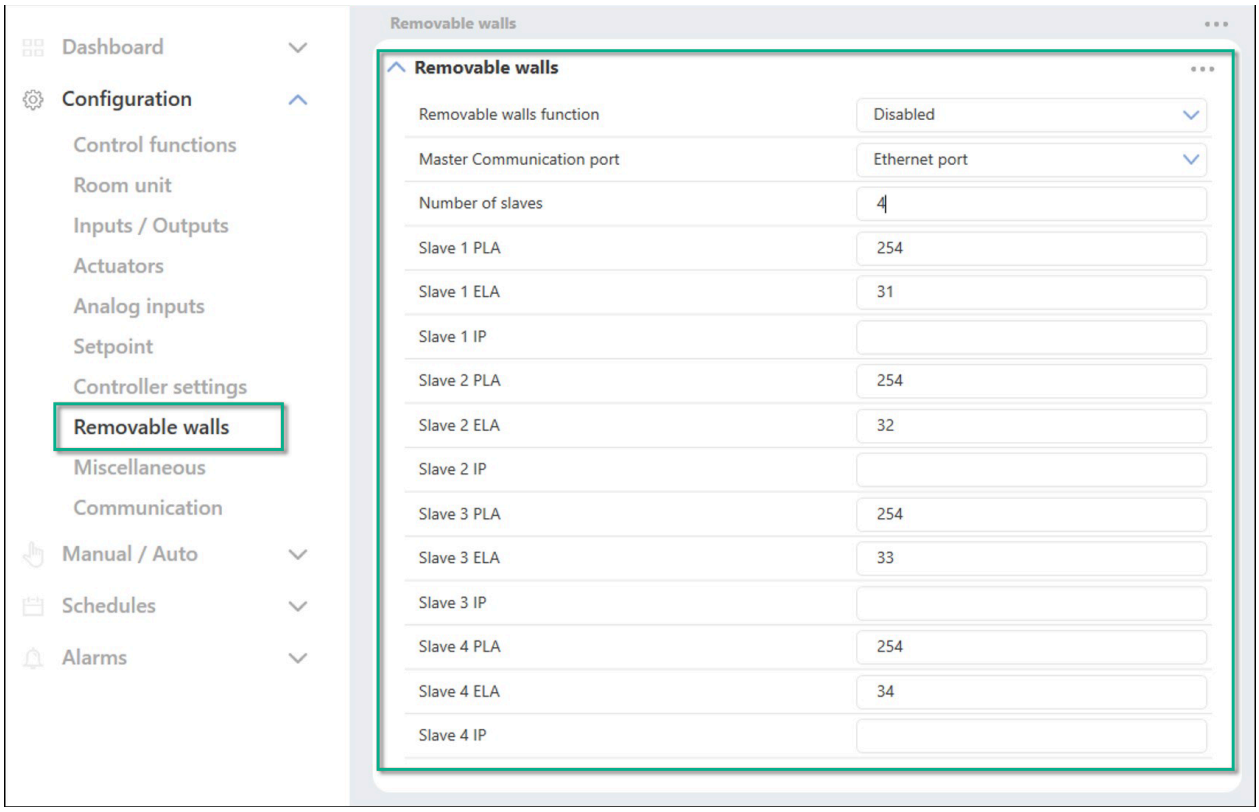


Figure 6-1 Removable walls configuration settings in Application tool.

When the *Removable walls* function is enabled, a shared zone that includes the master and the configured slaves is established. The master collects measurements from all the slaves, and calculates an average that it uses as baseline to determine the control demand data that applies for the whole shared zone. Only the configuration settings in the master are used to determine the control demand data that is used for controlling the shared zone.

After the master has determined the control demand data, the master sends the same data to all the slaves. Each controller in the shared zone then uses the control demand data to generate output signals corresponding to its connected devices. This means that any unique set of heating, cooling, or VAV devices that are configured on a slave in the shared zone perform according to the control demand data that is determined by the master.

If the master loses communication with a slave, the slave reverts to standalone operation and starts to control its connected heating, cooling, or VAV devices according to its own configuration settings.

Each room unit that is connected to the master or any slave in the shared zone is active. This means that the latest setting change performed in any of the room units is accepted by the master and is visible in all the other room units.

6.1 Master controller configuration

The controller that acts as master is configured by using the settings that are described in *Table 6-1*.

The PLA and ELA, and IP addresses for each slave must be entered in the master configuration. The slave unit PLA and ELA addresses are clearly labelled on the slave controller casings.

If the master uses port 1 or port 2 for communication with the slaves, the *Port [nr] function* setting must be configured with the value **Exoline master**. The *Port [nr] function* setting is located in the *Configuration -> Communication -> Communication settings* pane in Application tool.

If the master uses the Ethernet port for communication with the slaves, no configuration is needed in the *Configuration -> Communication -> Communication settings* pane.

If the master configuration settings need to be modified after an initial configuration has been performed, do the following:

1. Disable the *Removable walls* function.
2. Synchronize parameters.
3. Edit the master configuration settings.
4. Enable the *Removable walls* function.
5. Synchronize parameters.

Table 6-1 Removable walls configuration settings in the master controller.

Configuration setting	Description
Removable walls function	**Disabled:** The *Removable walls* function is disabled (default setting). **Enabled:** The *Removable walls* function is enabled.
Master communication port	Specifies the communication port that the master uses to communicate data related to the *Removable walls* function: ✓ **Ethernet port** (default setting) ✓ **Port 1** ✓ **Port 2**
Number of slaves	Specifies the number of slaves that are in use.
Slave [nr] PLA	The PLA address for slave [nr].
Slave [nr] ELA	The ELA address for slave [nr].
Slave [nr] IP	The IP address for slave [nr].

6.2 Slave controller configuration

If a slave uses port 1 or port 2 for communication with the master, the *Port [nr] function* setting must be configured with the value **Exoline slave**. The *Port [nr] function* setting is located in the *Configuration -> Communication -> Communication settings* pane in Application tool.

If a slave uses its Ethernet port for communication with the master, no configuration needs to be performed in the slave.

7 Controller connections and wiring diagrams

The controller connections are shown in *Figure 7-1* and described in *Table 7-1*.

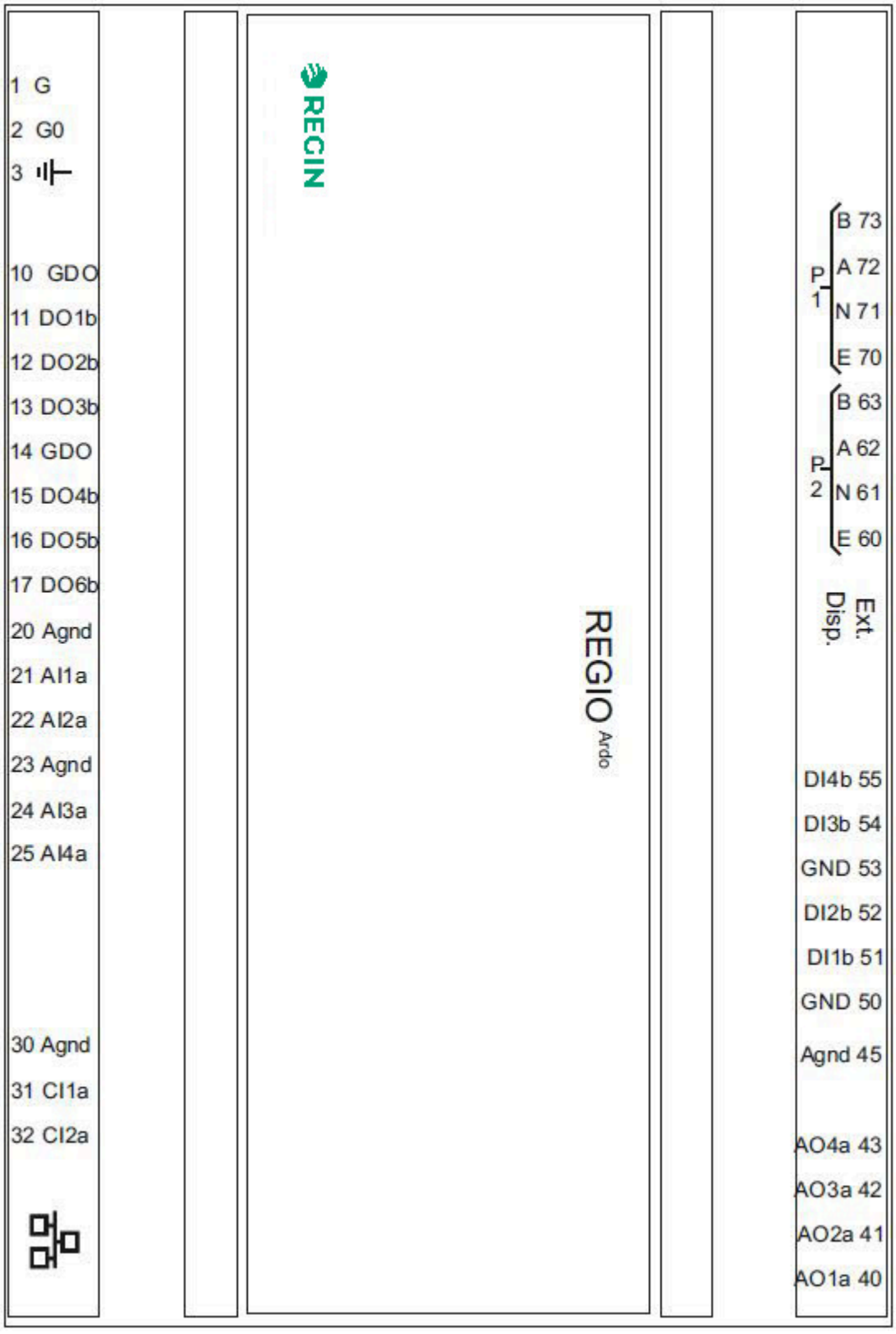


Figure 7-1 Controller connections layout.

Table 7-1 Controller connection descriptions.

Terminal № and designator	Type	Description
1 G	Supply voltage	24 V AC supply voltage.
2 G0	Supply voltage (reference)	24 V AC supply voltage (reference).
⏚	Ground	Earth ground.
10 GDO 14 GDO	Supply voltage output	24 V AC supply voltage output for use together with digital outputs.
11 DO1b 12 DO2b 13 DO3b 15 DO4b 16 DO5b 17 DO6b	Digital output	Mosfet output used for valve, 3-speed fan, blinds, or lighting control, or for alarms or forced ventilation.
20 Agnd 23 Agnd 30 Agnd 45 Agnd	Analog ground	Signal ground for analog inputs and outputs.
21 AI1a 22 AI2a 24 AI3a 25 AI4a	Analog input	Input used for change-over detection or for temperature, CO_2, condensation, or relative humidity sensor.
31 CI1a 32 CI2a	Condensation input	Input dedicated for Regin's condensation detector KG-A/1.
	Ethernet communication port	8P8C modular connector used for Ethernet - TCP/IP communication.
40 AO1a 41 AO2a 42 AO3a 43 AO4a	Analog output	Output used for valve, damper, or EC fan control.
50 GND 53 GND	Digital ground	Signal ground for digital inputs.
51 DI1b 52 DI2b 54 DI3b 55 DI4b	Digital input	Input used for presence, open window, or change-over detection.
Ext. Disp.	External display communication port	4P4C modular connector used for communication with an ED-RU... room unit.
60 E 61 N 62 A 63 B	RS485 communication port	RS485 connector used for communication via BACnet, or for master/slave communication via Exoline or Modbus. N can be used as common signal reference if a large difference in potential between units in the network is causing communication problems. This connection is not galvanically isolated.
70 E 71 N 72 A 73 B	RS485 communication port	RS485 connector used for communication via BACnet, or for master/slave communication via Exoline or Modbus. N can be used as common signal reference if a large difference in potential between units in the network is causing communication problems. This connection is galvanically isolated.

The wiring diagram in *Figure 7-2* exemplifies controller connections usage.

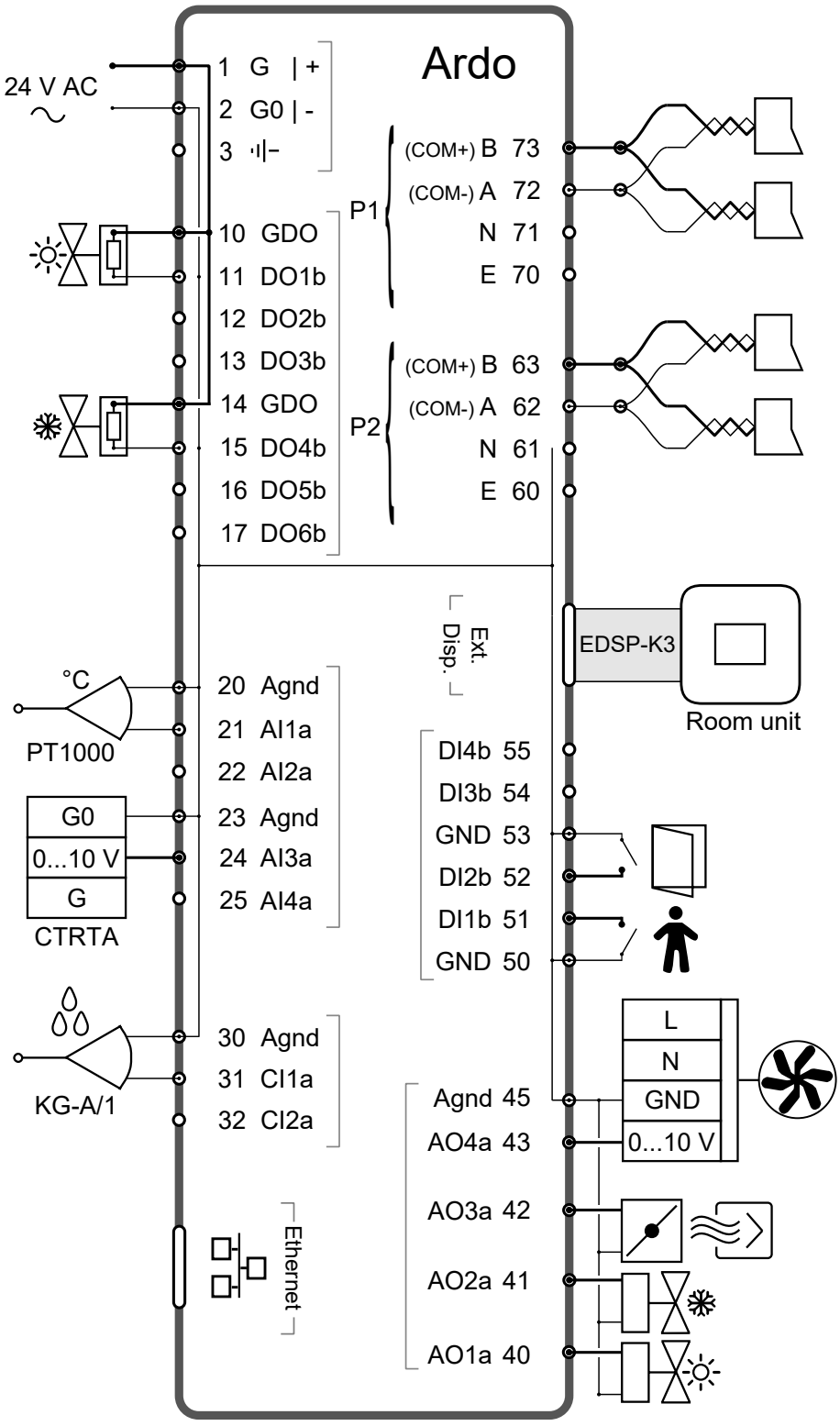


Figure 7-2 Wiring diagram exemplifying controller connections usage.

8 LED status indications

An LED is located at the top of the controller cassette and provides information about the controller status and behaviour.

LED colour	Description
Green, solid	Power is on. All is OK.
Red, solid	Battery problem.
Yellow, blinking	The controller is selected from the list in the *Search* window in Application tool. The *Search* window is located in the *Tools -> Search for controllers* menu in Application tool.

9 Mounting

The controller is mounted either on a DIN rail, or on a wall above a false ceiling. The controller form factor is EURO norm, which makes it fit into a standard EURO norm cabinet.

Caution! Before installation or maintenance, the power supply should first be disconnected. Installation or maintenance of this unit should only be carried out by qualified personnel. The manufacturer is not responsible for any eventual damage or injury caused by inadequate skills during installation, or through removal of or deactivation of any safety devices.

9.1 DIN rail mounting

To mount the controller:

1. Pull out the fastener.
2. Attach the controller to the rail.
3. Push in the fastener to secure the controller.

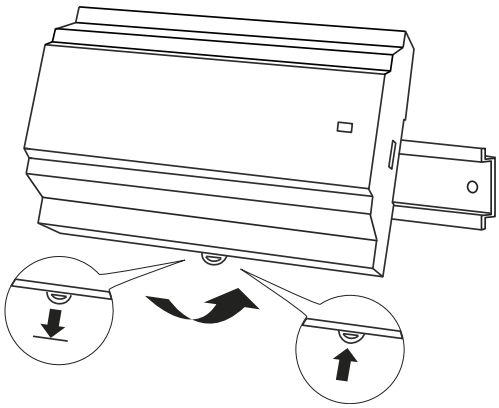


Figure 9-1 Attaching the controller to the DIN rail.

9.2 Wall mounting

To mount the controller:

1. Attach the baseplate to the wall using screws.

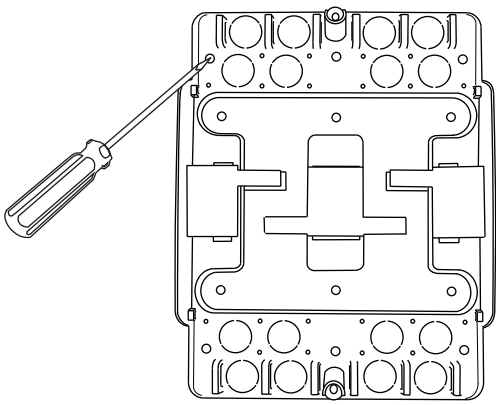


Figure 9-2 Attaching the baseplate to the wall.

2. Pull out the fastener and attach the controller to the baseplate, and then push in the fastener to secure the controller.

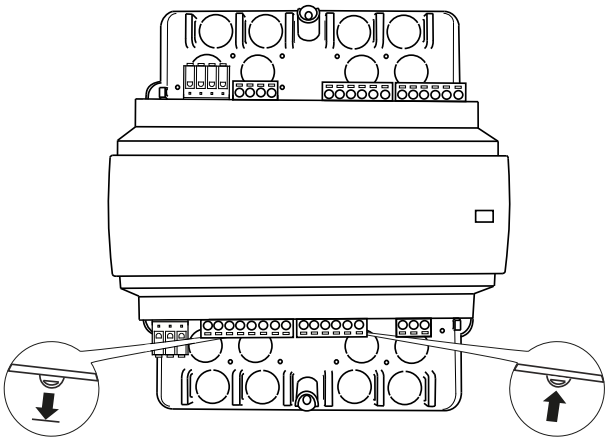


Figure 9-3 Attaching the controller to the baseplate.

3. Attach the terminal protection covers to the baseplate, and then secure the covers using the pre-mounted Torx T20 screws.

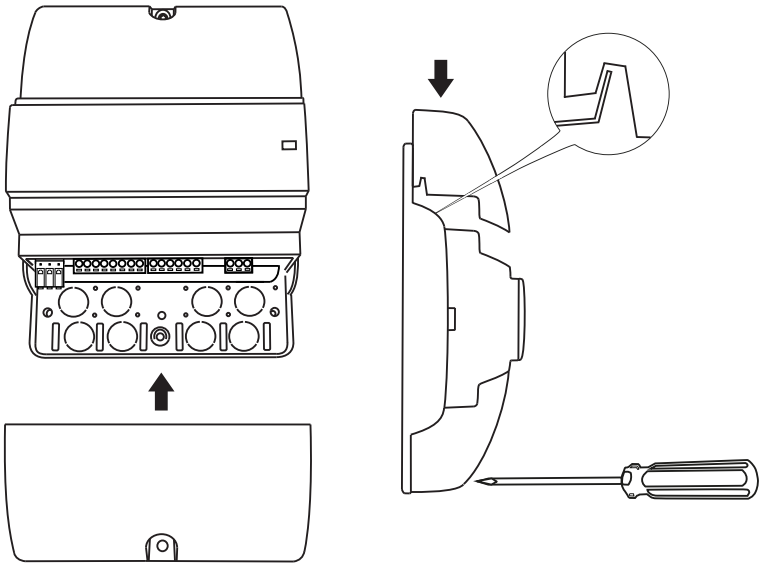


Figure 9-4 Attaching and securing the terminal protection covers.

10 Maintenance and service

Caution! Before installation or maintenance, the power supply should first be disconnected. Installation or maintenance of this unit should only be carried out by qualified personnel. The manufacturer is not responsible for any eventual damage or injury caused by inadequate skills during installation, or through removal of or deactivation of any safety devices.

10.1 Changing the battery

Caution! The controller must be disconnected from power before the battery is changed.

To change the battery:

1. Disconnect the controller from power, and then remove the terminal protection covers (if wall mounted).
2. Remove the top of the casing by pressing the two tabs on each side of the casing, and then lift up the top of the casing carefully.

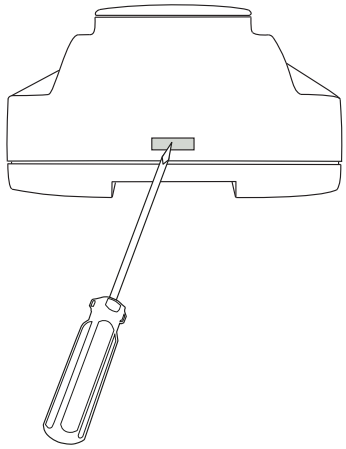


Figure 10-1 Removing the top of the casing.

3. Change the battery. A lithium CR2032 battery is used.
4. Assemble the casing carefully again.
5. Wire the controller, attach the terminal protection covers (if wall mounted), and then power up the controller.

10.2 Resetting the application memory

Caution! This procedure should only be carried out by qualified personnel, since it requires advanced knowledge. The current application will stop running and the controller will return to its default settings which may damage the system.

The controller is reset by pressing the reset button on the side of the casing by using something thin, such as a paper clip. After a reset, the controller starts up again with factory settings applied.

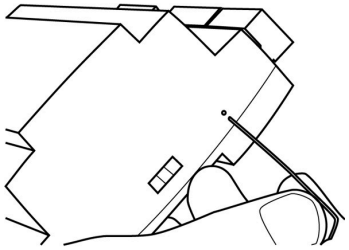


Figure 10-2 Resetting the application memory.

Appendix A Technical data

A.1 General data

Supply voltage	24 V AC (20.4…27.6 V AC)
Power consumption without load	< 1 W
Memory backup	Backup of memory and real-time clock function
Battery type	CR2032 replaceable lithium cell
Battery life	Min. 5 years
Protection class	IP20
Protection class, with terminal protection covers	IP30
Protection class, electrical	Class III
Ambient humidity	Max. 95 % RH (non-condensing)
Ambient temperature	0…55 °C
Storage temperature	-20…+70 °C
Mounting	Wall, DIN rail
Number of DIN modules	8.5
Weight	490 g
Dimensions, controller unit with terminal blocks (WxHxD)	149 x 136 x 58 mm
Dimensions, controller unit with baseplate and terminal protection covers (WxHxD)	153 x 202 x 68 mm
Cable connections	Pluggable terminal blocks, screw (AI, AO, DI, DO, COM port 2) Pluggable terminal blocks, push-in (supply voltage, COM port 1)
Operating system	EXOrealC

Communication ports	**RS485**	**Ethernet**	**Total**
Count	2	1	3

Inputs and outputs	**AIa**	**DIb**	**CIa**	**AOa**	**DOb**	**Total**
Count	4	4	2	4	6	20

A.2 Inputs

Analog input a (AIa)	0…10 V DC, PT1000
Digital input b (DIb)	Sourcing input type, GND is reference
Condensation input a (CIa)	Input dedicated for Regin's condensation detector KG-A/1

A.3 Outputs

Analog output a (AOa)	0…10 V DC, max. 5 mA, short-circuit proof
Digital output b (DOb)	Mosfet output 24 V AC, max. 2 A, total max. 8 A

A.4 RS485 communication port 1

Default protocol	EXOline
Supported protocols	EXOline, Modbus, BACnet MS/TP
Port isolation	Galvanic common mode voltage, max. 150 V
Communication speed	9600 bps (1200…38400 bps)
Parity	Even, Odd, None
Stop bits	1 or 2

A.5 RS485 communication port 2

Default protocol	EXOline
Supported protocols	EXOline, Modbus, BACnet MS/TP
Port isolation	No
Communication speed	9600 bps (1200…38400 bps)
Parity	Even, Odd, None
Stop bits	1 or 2

A.6 Ethernet communication port

Default protocol	EXOline
Supported protocols	EXOline, Modbus IP, BACnet/IP
Communication speed	9600 bps (1200…38400 bps)

Appendix B Model overview - ED-RU-... room units

B.1 ED-RU... room units

The controller supports various Regin ED-RU... room unit models, that is room units with or without:

- ✓ **LEDs or display**
  For providing status information.
  Models without display are equipped with LEDs that indicate the current controller state, and if the controller is heating or cooling. For models with display, all types of indications are provided in the display.
- ✓ **[Occupancy] (On/Off) button**
  For putting the room HVAC system in a comfort or energy saving mode, see section *2.4*, or for improving the air quality in the room through a temporary increase in airflow (if forced ventilation is activated, see section *2.7*).
- ✓ **[Up]/[Down] buttons or knob**
  For performing a setpoint adjustment.
- ✓ **[Fan speed] button or switch**
  For selecting a fan speed. That is, auto speed or manual (off, low, medium, or high) speed.
- ✓ **Temperature and CO_2 sensor**
  For measuring the temperature or CO_2 level in the room.
  All models are equipped with a built-in temperature sensor, and the ED-RU-DOCS model includes a built-in CO_2 sensor.
- ✓ **[Multi-function] button**
  For selecting a fan speed, controlling room lighting or sun blinds, or for viewing the outdoor temperature or relative humidity in the room.
  Only the ED-RU-DOS model is equipped with the **[Multi-function]** button.

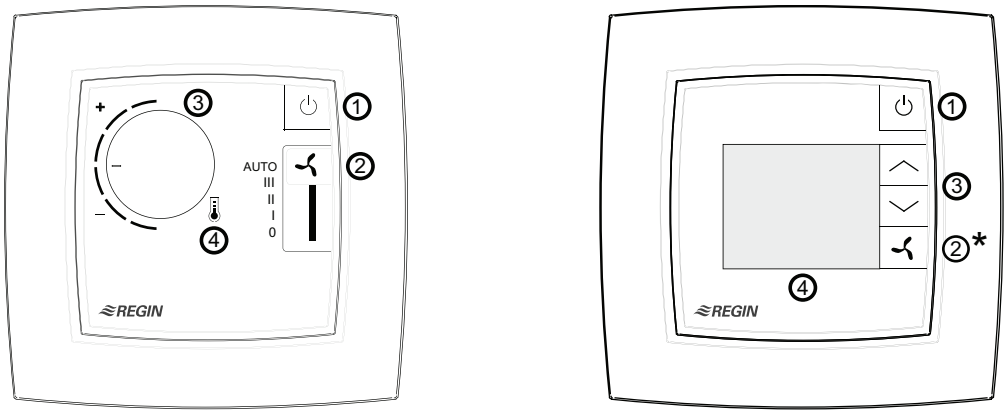
The controller also support the touch screen room units ED-RUD and ED-RUD-2. When used with the Regio *Two room* function, it is required to use two display units of the same kind, i.e. an ED-RUD / ED-RUD-2 can only be combined with another ED-RUD / ED-RUD-2 and not with any of the ED-RU... models.

Table B-1 shows an overview of the features that the different room unit models provide.

Table B-1 Room unit features per model.

Model	LEDs	Display	[Occupancy] (On/Off) button	[Up]/[Down] buttons for setpoint adjustment	Setpoint adjustment knob	[Fan speed] button	Fan speed switch	Temperature sensor	CO_2 sensor	[Multi-function] button
ED-RU-H								✓		
ED-RU	✓				✓			✓		
ED-RU-F	✓				✓		✓	✓		
ED-RU-O	✓		✓		✓			✓		
ED-RU-FO	✓		✓		✓		✓	✓		
ED-RU-DO		✓	✓	✓				✓		
ED-RU-DFO		✓	✓	✓		✓		✓		
ED-RU-DOS		✓	✓	✓				✓		✓
ED-RU-DOCS		✓	✓	✓				✓	✓	

The room unit user interface is shown in *Figure B-1*.



Room units without display

Room units with display

Figure B-1 The ED-RU-FO room unit to the left and the ED-RU-DFO room unit to the right.

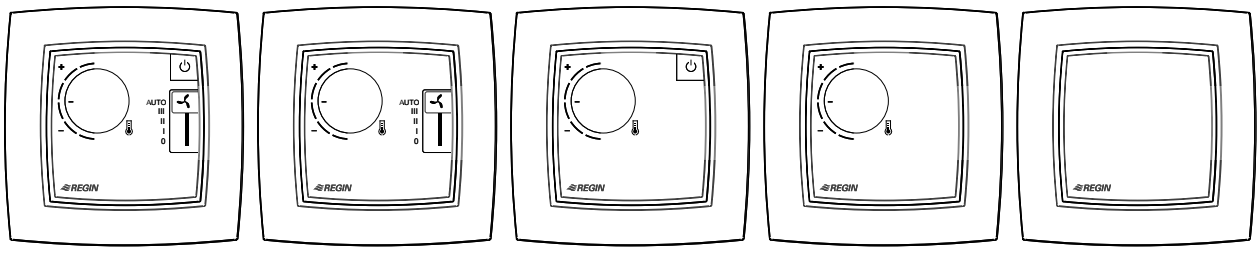
Table B-2 describes the buttons, switch, knob, and LEDs that are available on room units with and without display.

Table B-2 Button, switch, knob, and LED descriptions for room units with and without display.

Room units without display		Room units with display	
№	**Description**	**№**	**Description**
1	**[Occupancy]** (On/Off/) button with LED that indicates the controller state	1	**[Occupancy]** (On/Off) button
2	Fan speed switch	2 (*)	**[Fan speed]** button (***[Multi-function]** button on the ED-RU-DOS model. See section *B.3.9*)
3	Setpoint adjustment knob	3	**[Up/Down]** buttons for setpoint adjustment
4	LED in temperature icon that indicates if the controller is heating or cooling	4	Display

B.2 Room units without display

Figure B-2 shows all the different room unit models without display.



ED-RU-FO ED-RU-F ED-RU-O ED-RU ED-RU-H

Figure B-2 ED-RU... room unit models without display.

B.2.1 Selecting a fan speed

A fan speed is selected via the fan speed switch.

When the controller is in the state specified by the *Shutdown controller state* setting the fan speed is always auto, regardless of what is selected via the room unit.

B.2.2 Performing a setpoint adjustment

A setpoint adjustment is performed by turning the knob.

B.2.3 Putting the room HVAC system in a comfort/energy saving mode or increasing the airflow

A short press (<5 s) on the **[Occupancy]** (On/Off) button puts the room HVAC system in comfort mode (first in bypass controller state, and then by default in occupied controller state), and increases the airflow temporarily (if forced ventilation is activated).

A long press (>5 s) on the **[Occupancy]** (On/Off) button puts the room HVAC system in energy saving mode (by default in unoccupied controller state).

B.2.4 LED indications

The LEDs indicate the current controller state, and if the controller is heating or cooling. *Table B-3* describes the LED behaviour.

Table B-3 LED indication descriptions.

LED location	LED behaviour
In **[Occupancy]** (On/Off) button	**Blinking slowly:** The controller is in bypass state. **Blinking:** The controller is in standby state. **Solid:** The controller is in occupied state. **Off:** The controller is in unoccupied or off state.
In temperature icon in the centre of the room unit	**Red solid:** The controller is in heating mode and the demand is greater than zero. **Blue solid:** The controller is in cooling mode and the demand is greater than zero. **Off:** The demand is zero.

B.3 Room units with display

Figure B-3 shows all the different room unit models with display.

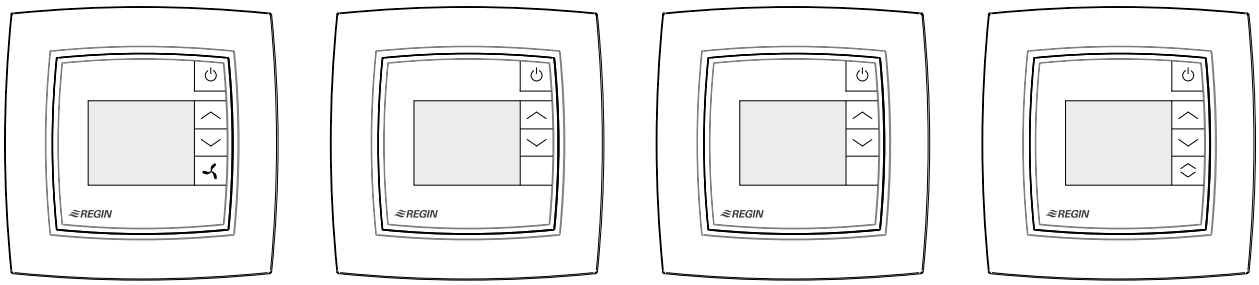


Figure B-3 ED-RU... room unit models with display.

B.3.1 Selecting a fan speed

This instruction is only applicable for the ED-RU-DFO model. For information on selecting a fan speed on the ED-RU-DOS model. See section *B.3.9*.

To select a fan speed:

1. Press the fan speed button to enter fan speed selection mode. The fan indication in the display starts to blink.

2. Press the fan speed button to scroll between the auto fan speed selection and the available (as configured in the controller) manual fan speed selections.
3. Press the **[Occupancy]** (On/Off) button to make the selection, or wait 10 seconds for the selection to be made automatically. After the selection has been made, the fan indication stops blinking.

When the controller is in the state specified by the *Shutdown controller state* setting the fan speed is always auto, regardless of what is selected via the room unit.

B.3.2 Performing a setpoint adjustment

For room units with display, a setpoint adjustment can be performed when the controller is in bypass, occupied, or standby state.

To perform a setpoint adjustment:

1. Press the **[Up]** or **[Down]** button to enter setpoint adjustment mode. The setpoint adjustment and up/down arrow indications in the display start to blink.
2. Press the **[Up]** or **[Down]** button to increase or decrease the setpoint adjustment, respectively. The selected setpoint adjustment value is shown in the display.
3. Press the **[Occupancy]** (On/Off) button to make the selection, or wait five (5) seconds for the selection to be made automatically. After the selection has been made, the setpoint adjustment and up/down arrow indications stop blinking.

B.3.3 Putting the room HVAC system in a comfort/energy saving mode or increasing the airflow

A short press (<5 s) on the **[Occupancy]** (On/Off) button puts the room HVAC system in comfort mode (first in bypass controller state, and then by default in occupied controller state), and increases the airflow temporarily (if forced ventilation is activated).

A long press (>5 s) on the **[Occupancy]** (On/Off) button puts the room HVAC system in energy saving mode (by default in unoccupied controller state).

B.3.4 Display indications

The display indications are shown in *Figure B-4*.

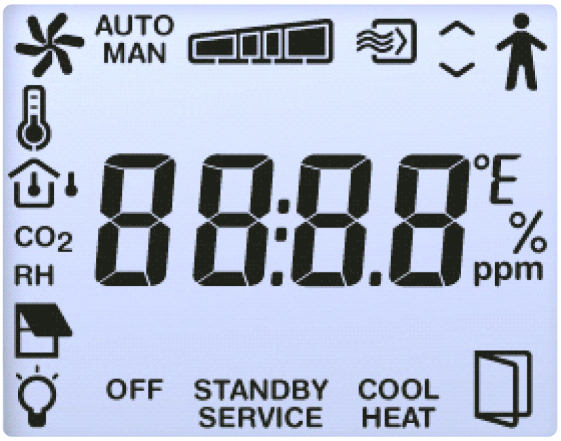


Figure B-4 Indications in room unit display.

The display indications are described in *Table B-4*.

Table B-4 Display indication descriptions.

Indication	Description
	Occupancy indication is shown when the controller is in occupied or bypass state.
STANDBY	Controller is in standby state.
OFF	Controller is in unoccupied or off state.
	Room temperature is shown.
CO_2	CO_2 level in room is shown.
	**Solid:** Setpoint or setpoint adjustment is shown (according to the current *View mode* setting. See section *3.6.4*). **Blinking:** Setpoint adjustment is in progress by using the up and down buttons.
	Up/down arrows are blinking alternatively when setpoint adjustment is in progress.
	**Turning:** The fan is active. **Blinking:** Fan speed selection is in progress.
AUTO	EC or 3-speed fan control in auto or manual mode. The fan speed is shown in the following ways: When **3 speeds** is configured in the controller as number of used fan speeds, one of these indications is shown:  No fan speed Fan speed 1 Fan speed 2 Fan speed 3 When **2 speeds** is configured in the controller as number of used fan speeds, one of these indications is shown:  No fan speed Fan speed 1 Fan speed 2 When **1 speed** is configured in the controller as number of used fan speeds, one of these indications is shown:  No fan speed Fan speed 1
MAN	
HEAT	Controller is in heating mode and the demand is greater than zero.
COOL	Controller is in cooling mode and the demand is greater than zero.
	Forced ventilation is active.
SERVICE	Room unit is in service mode, in which the parameter menu can be accessed.
	Room window is open.
	Lighting is active.
	Sun blind is out.
RH	Relative humidity level in room is shown temporarily. **Note:** Only the ED-RU-DOS model supports showing the relative humidity level in the display.
	Outdoor temperature is shown temporarily. **Note:** Only the ED-RU-DOS model supports showing the outdoor temperature in the display.

B.3.5 Basic controller configuration via the display

Basic controller configuration can be performed via the parameter menu in room units with display. The room unit display parameters are listed in *Appendix C*.

The parameter menu is divided into the following groups:

- ✓ **CTRL** - Controller mode, setpoint, P-band, and I-time settings
- ✓ **SYS** - Controller state, change-over, presence detection, and lighting control settings
- ✓ **ACTR** - Actuator settings
- ✓ **FAN** - Fan control settings
- ✓ **M/AT** - Manual / Auto settings
- ✓ **HMI** - Room unit settings
- ✓ **IO** - Input / Output settings
- ✓ **ALAM** - Alarm settings

B.3.6 Accessing the parameter menu and setting a parameter value

To access the parameter menu and set a parameter value:

1. Press the **[Up]** or **[Down]** buttons simultaneously, for about five (5) seconds, until the **SERVICE** indication is shown in the display.
2. Press the **[Up]** button twice (2) to enter the parameter menu. The **CTRL** group heading is shown by default.
3. Use the **[Up]** or **[Down]** button to scroll to the applicable group heading, and then press the **[Occupancy]** (On/Off) button to access the parameters in the group.
4. Use the **[Up]** or **[Down]** button to scroll to the applicable parameter, and then press the **[Occupancy]** (On/Off) button to enter *Edit* mode for the parameter.
5. Use the **[Up]** or **[Down]** button to select a parameter value, and then press the **[Occupancy]** (On/Off) button to set the selected value. During parameter value selection, the currently set value can be retrieved by pressing the **[Up]** and **[Down]** buttons simultaneously.

Back navigation in the parameter menu structure can be done in the following ways:

- ✓ Press the **[Up]** and **[Down]** buttons simultaneously.
- ✓ Use the **[Up]** or **[Down]** button to scroll to the **EXIT** value and then press the **[Occupancy]** (On/Off) button.

The display returns to *Normal view* mode after two (2) minutes of inactivity in the parameter menu.

B.3.7 Parameter menu access

Access to the parameter menu in room units with display can be disabled to prevent unauthorized users to perform basic controller configuration.

The configuration setting for disabling or enabling access to the parameter menu is listed in section *3.6.4*.

B.3.8 Display background lighting

The display background is lit, and dimmed after two (2) minutes of inactivity, when the controller is in:

- ✓ Bypass state

- ✓ The state specified by the *Preset controller state* setting
- ✓ The state specified by the *Controller state when presence detected* setting

The display background is not lit when the controller is in the state specified by the *Shutdown controller state* setting.

Configuration options for setting the display background brightness are listed in section *3.6.4*.

B.3.9 ED-RU-DOS functions

ED-RU-DOS is a multipurpose room unit with display. In addition to having **[Up]/[Down]** buttons for setpoint adjustment and an **[Occupancy]** (On/Off) button for putting the room HVAC system in comfort or energy saving mode, this model is equipped with a **[Multi-function]** button ( ) that can be used for:

- ✓ **Selecting a fan speed** - auto fan speed or the available (as configured in the controller) manual fan speeds
- ✓ **Performing a setpoint adjustment** - increase or decrease
- ✓ **Temporarily viewing:**
  - ✓ Room and outdoor temperature
  - ✓ CO_2 level in the room
  - ✓ Relative humidity in the room
- ✓ **Controlling sun blinds** - send in/out or stop
- ✓ **Controlling room lighting** - turn on/off

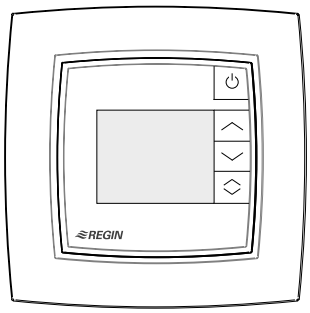


Figure B-5 ED-RU-DOS room unit.

B.3.10 Performing an action in multi-function menu

To perform an action in the multi-function menu:

1. Press the **[Up]** or **[Down]** button to scroll between the items in the multi-function menu. The current item blinks.
2. Press the **[Up]** or **[Down]** button to modify the value for current item
3. Press the **[Occupancy]** (On/Off) button to select the modified value, or wait 10 seconds for the selection to be made automatically. After the selection has been made, the display returns to normal view mode.

When the controller is in the state specified by the *Shutdown controller state* setting the fan speed is always auto, regardless of what is selected via the room unit.

Appendix C Room unit display parameter lists

C.1 CTRL

Parameter	Signal name	Default value	Units	Description
1	RCPSettings.RegioControllerMode	9		Control Mode 0=Heating 1=Heating + Heating 2=Heating + Cooling 3=Cooling 4=Heating/Cooling (change-over) 5=Heating + Heating/Cooling (change-over) 6=Heating + VAV 7=Cooling + VAV 8=VAV 9=Heating + Cooling + VAV
2	RCPSettings.RegioHeatSetPointOccupied	22	°C	Room Base setpoint heating
3	RCPSettings.RegioCoolSetPointOccupied	24	°C	Room Base setpoint cooling
4	RCPSettings.RegioRoomTempPBand	10		Temperature PID P Band
5	RCPSettings.RegioRoomTempITime	300	sec	Temperature PID I Time
6	RCPSettings.RegioHeatSetPointUnoccupied	15	°C	Setpoint heating in Unoccupied
7	RCPSettings.RegioCoolSetPointUnoccupied	30	°C	Setpoint Cooling in Unoccupied
8	RCPSettings.RegioSetPointDeadBandStandby	3	°C	Deadband in Standby mode
9	RCPSettings.RegioFrostProtectionSetPoint	8	°C	Setpoint frostprotection
10	RCPSettings. RegioSupplyAirTempLimCascadeFactor	3		Cascade Factor for the Cascade PID
11	RCPSettings.RegioSupplyAirTempLimHeatMinLimit	24	°C	Min Setpoint for the Cascade PID in Heat Mode
12	RCPSettings.RegioSupplyAirTempLimHeatMaxLimit	35	°C	Max Setpoint for the Cascade PID in Heat Mode
13	RCPSettings.RegioSupplyAirTempLimCoolMinLimit	12	°C	Min Setpoint for the Cascade PID in Cool Mode
14	RCPSettings.RegioSupplyAirTempLimCoolMaxLimit	24	°C	Max Setpoint for the Cascade PID in Cool Mode
15	RCPSettings. RegioSupplyAirTempLimFrostProtSetPoint	8	°C	Supply Air Temp Frost Protection Temperature
16	RCPSettings.RegioCO2PBand	100		CO2 PID P Band
17	RCPSettings.RegioCO2ITime	100	sec	CO2 PID I Time
18	RCPSettings.RegioCO2SetPoint	600	ppm	Setpoint for CO2 PI Controller in PPM
19	RCPSettings.RegioControllerModeZone2	9		Control Mode Room2 0=Heating 1=Heating + Heating 2=Heating + Cooling 3=Cooling 4=Heating/Cooling (change-over) 5=Heating + Heating/Cooling (change-over) 6=Heating + VAV 7=Cooling + VAV 8=VAV 9=Heating + Cooling + VAV
20	RCPSettings.RegioHeatSetPointOccupiedZone2	22	°C	Room Base setpoint heating Room2
21	RCPSettings.RegioCoolSetPointOccupiedZone2	24	°C	Room Base setpoint cooling Room2
22	RCPSettings.RegioRoomTempPBandZone2	10		Temperature PID P Band Room2
23	RCPSettings.RegioRoomTempITimeZone2	300	sec	Temperature PID I Time Room2
24	RCPSettings.RegioHeatSetPointUnoccupiedZone2	15	°C	Setpoint heating in Unoccupied Room2

Parameter	Signal name	Default value	Units	Description
25	RCPSettings.RegioCoolSetPointUnoccupiedZone2	30	°C	Setpoint Cooling in Unoccupied Room2
26	RCPSettings. RegioSetPointDeadBandStandbyZone2	3	°C	Deadband in Standby mode Room2
27	RCPSettings.RegioFrostProtectionSetPointZone2	8	°C	Setpoint frostprotection Room2
28	RCPSettings. RegioSupplyAirTempLimCascadeFactorZone2	3		Cascade Factor for the Cascade PID Room2
29	RCPSettings. RegioSupplyAirTempLimHeatMinLimitZone2	24	°C	Min Setpoint for the Cascade PID in Heat Mode Room2
30	RCPSettings. RegioSupplyAirTempLimHeatMaxLimitZone2	35	°C	Max Setpoint for the Cascade PID in Heat Mode Room2
31	RCPSettings. RegioSupplyAirTempLimCoolMinLimitZone2	12	°C	Min Setpoint for the Cascade PID in Cool Mode Room2
32	RCPSettings. RegioSupplyAirTempLimCoolMaxLimitZone2	24	°C	Max Setpoint for the Cascade PID in Cool Mode Room2
33	RCPSettings. RegioSupplyAirTempLimFrostProtSetPointZone2	8	°C	Supply Air Temp Frost Protection Temperature Room2
34	RCPSettings.RegioCO2PBandZone2	100		CO2 PID P Gain Room2
35	RCPSettings.RegioCO2ITimeZone2	100	sec	CO2 PID I Time Room2
36	RCPSettings.RegioCO2SetpointZone2	600	ppm	Setpoint for CO2 PI Controller in PPM Room2
37	RCPSettings.RegioUnderfloorHeatingSetpoint [1]	0	ºC	Room Setpoint for underfloor heating
38	RCPSettings.RegioUnderfloorHeatingPBand [1]	0		Underfloor heating PI Control P Band
39	RCPSettings.RegioUnderfloorHeatingITime [1]	0	sec	Underfloor heating PI Control I Time
40	RCPSettings.RegioUnderfloorHeatingDisable-Cooling [1]	0		Disable underfloor heating when main area is cooling
41	RCPSettings.RegioUnderfloorHeatingSetpointZone2 [1]	0	ºC	Room Setpoint for underfloor heating Room2
42	RCPSettings.RegioUnderfloorHeatingPBandZone2 [1]	0		Underfloor heating PI Control P Band Room2
43	RCPSettings.RegioUnderfloorHeatingITimeZone2 [1]	0	sec	Underfloor heating PI Control I Time Room2
44	RCPSettings.RegioUnderfloorHeatingDisableCoo-lingZone2 [1]	0		Disable underfloor heating when main area is cooling Room2

1. Only available in Regio Ardo version 2.0–1–04 or later

C.2 SYS

Parameter	Signal name	Default value	Units	Description
1	RCPSettings.RegioControllerStateReturn	3		Select return unit state: 0=Off 1=Unoccupied 2=Stand-by 3=Occupied
2	RCPSettings.RegioControllerStateShutDown	1		Select shutdown state : 0=Off 1=Unoccupied 2=Stand-by 3=Occupied
3	RCPSettings.RegioControllerStatePresence	4		Presence operating mode: 3=Occupied 4=ByPass

Parameter	Signal name	Default value	Units	Description
4	RCPSettings.RegioControllerStateRemote	5		Is used for remote control: 0=Off 1=Unoccupied 2=Stand-by 3=Occupied 5=No remote control
5	RCPSettings.RegioControllerStateBypassTime	120	min	Time for Bypass mode (Min)
6	RCPSettings.RegioChangeOverSelect	2		Select Change Over: 0=heating 1=cooling 2=Auto
7	RCPSettings.RegioChangeOverType	0		Type of Changeover used in Room 1 0-Digital (Thermostat) 1-Analog Temperature in IncomingPipe
8	RCPSettings.RegioChangeOverAIDiffHeat	3	°C	The difference between the temperature in the room and the media temperature for change over to cooling
9	RCPSettings.RegioChangeOverAIDiffCool	4	°C	The difference between the temperature in the room and the media temperature for change over to heating
10	RCPSettings.RegioCO2PresenceDetection	1		Activate presence on CO2
11	RCPSettings.RegioCO2PresenceLimit	800		Activate presence if CO2 is higher
12	RCPSettings.RegioLightControlFunction	0		Select light control function 0=Central controlled 1=Local Time controlled 2=Presence controlled 3=Time or Presence controlled 4=Central controlled or Presence controlled
13	RCPSettings.RegioControllerStateReturnZone2	3		Select return unit state Room2: 0=Off 1=Unoccupied 2=Stand-by 3=Occupied
14	RCPSettings.RegioControllerStateShutDownZone2	1		Select shutdown state Room2: 0=Off 1=Unoccupied 2=Stand-by 3=Occupied
15	RCPSettings.RegioControllerStatePresenceZone2	4		Presence operating mode Room2: 3=Occupied 4=ByPass
16	RCPSettings.RegioControllerStateRemoteZone2	5		Is used for remote control Room2: 0=Off 1=Unoccupied 2=Stand-by 3=Occupied 5=No remote control
17	RCPSettings. RegioControllerStateBypassTimeZone2	120	min	Time for Bypass mode (Min) Room2
18	RCPSettings.RegioCO2PresenceDetectionZone2	1		Activate presence on CO2 Room2
19	RCPSettings.RegioCO2PresenceLimitZone2	800	ppm	Activate presence if CO2 is higher Room2
20	RCPSettings.RegioLightControlFunctionZone2	0		Select light control function Room2: 0=Central controlled, 1=Local Time controlled 2=Presence controlled 3=Time or Presence controlled 4=Central controlled or Presence controlled
21	RCPSettings.RegioAutoSummerTime	1		Switch automatically between summer and winter time
22	Qsystem.Sec	-	sec	System Time Seconds

Parameter	Signal name	Default value	Units	Description
23	Qsystem.Minute	-	min	System Time Minutes
24	Qsystem.Hour	-	hour	System Time Hours
25	Qsystem.WDay	-		System WeekDay
26	Qsystem.Week	-		System Week
27	Qsystem.Date	-		System Date Day
28	Qsystem.Month	-		System Date Month
29	Qsystem.Year	-		System Date Year
30	RCPSettings.RegioEnableCommFailsafe [1]	0		Enables/Disables the communication Failsafe function
31	RCPSettings.RegioFailsafetime [1]	10	min	Communication failure safe time for triggering Failsafe
32	RCPSettings.RegioFailsafeState [1]	0		State the controller will revert to if communication Failsafe is active 0=Off 1=Unoccupied 2=Stand-by 3=Occupied 4=ByPass 5=Resume Normal Operation
33	RCPSettings.RegioUnderfloorHeatingEnable [1]	0		Underfloor Enable Condition 0=Disabled 1=Main zone state is Unoccupied or higherf 2=Main zone state is Standby or higher 3=Main zone state is Occupied or higher 4=Main zone state is Bypass 5=Always on
34	RCPSettings.RegioUnderfloorHeatingEnableZone2 [1]	0		Underfloor Enable Condition Room2 0=Disabled 1=Main zone state is Unoccupied or higherf 2=Main zone state is Standby or higher 3=Main zone state is Occupied or higher 4=Main zone state is Bypass 5=Always on

1. Only available in Regio Ardo version 2.0–1–04 or later

C.3 ACTR

Parameter	Signal name	Default value	Units	Description
1	RCPSettings.RegioVAVOutputMinLimitOff	0	%	Min Limit for VAV Output at off State
2	RCPSettings.RegioVAVOutputMinLimitUno	10	%	Min Limit for VAV Output at Unoccupied State
3	RCPSettings.RegioVAVOutputMinLimitStandby	10	%	Min Limit for VAV Output at Stanby State
4	RCPSettings.RegioVAVOutputMinLimitOcc	20	%	Min Limit for VAV Output at Occupied or Bypass State
5	RCPSettings.RegioVAVOutputMaxLimit	100	%	Max Limit for VAV Output
6	RCPSettings.RegioVAVOutputMinLimitOffZone2	0	%	Min Limit for VAV Output at off State Room2
7	RCPSettings.RegioVAVOutputMinLimitUnoZone2	10	%	Min Limit for VAV Output at Unoccupied State Room2
8	RCPSettings. RegioVAVOutputMinLimitStandbyZone2	10	%	Min Limit for VAV Output at Stanby State Room2
9	RCPSettings.RegioVAVOutputMinLimitOccZone2	20	%	Min Limit for VAV Output at Occupied or Bypass State Room2
10	RCPSettings.RegioVAVOutputMaxLimitZone2	100	%	Max Limit for VAV Output Room2

Parameter	Signal name	Default value	Units	Description
11	RCPSettings.RegioHeatValve1Type	0		Output Signal for HeatValve1: 0=0-10V 1=2-10V 2=10-2V 3=10-0V 4=Inc/Dec 5=PWM(Thermal) 6=6 Way-vay valve
12	RCPSettings.RegioHeatValve2Type	0		Output Signal for HeatValve2:
13	RCPSettings.RegioCoolValve1Type	0		Output Signal for CoolValve1:
14	RCPSettings.RegioCoolValve2Type	0		Output Signal for CoolValve2:
15	RCPSettings.RegioHeatCoolValveType	0		Output Signal for ChangeOver/6-WayValve
16	RCPSettings.RegioVAVType	0		Output Signal for VAV
17	RCPSettings.RegioECFANType	0		Output Signal for EC fan
18	RCPSettings.RegioHeatValve1TypeZone2	0		Output Signal for HeatValve Room2
19	RCPSettings.RegioHeatValve2TypeZone2	0		Output Signal for HeatValve2 Room2
20	RCPSettings.RegioCoolValve1TypeZone2	0		Output Signal for CoolValve1 Room2
21	RCPSettings.RegioCoolValve2TypeZone2	0		Output Signal for CoolValve2 Room2
22	RCPSettings.RegioHeatCoolValveTypeZone2	0		Output Signal for ChangeOver/6-WayValve Room2
23	RCPSettings.RegioVAVTypeZone2	0		Output Signal for VAV Room2
24	RCPSettings.RegioECFANTypeZone2	0		Output Signal for EC fan Room2
25	RCPSettings.RegioCVHeatExerciseDay	8		Day for exercise heating and heat/cool valve: 0=Never 1-7=mon-sun 8=every day
26	RCPSettings.RegioCVCoolExerciseDay	8		Day for exercise cooling valve: 0=Never 1-7=mon-sun 8=every day
27	RCPSettings.RegioCVHeatExerciseHour	15	hour	Hour for exercise heating and heat/cool valve
28	RCPSettings.RegioCVCoolExerciseHour	15	hour	Hour for exercise cooling valve
29	RCPSettings.RegioHeatExerciseTime	120	sec	Time in seconds to Exercise the Heat Valves
30	RCPSettings.RegioCoolExerciseTime	120	sec	Time in seconds to Exercise the Cool Valves
31	RCPSettings.RegioCVHeatExerciseDayZone2	8		Day for exercise heating valve Room2: 0=Never 1-7=mon-sun 8=every day
32	RCPSettings.RegioCVCoolExerciseDayZone2	8		Day for exercise cooling valve Room2: 0=Never 1-7=mon-sun 8=every day
33	RCPSettings.RegioCVHeatExerciseHourZone2	15	hour	Hour for exercise heating valve Room2
34	RCPSettings.RegioCVCoolExerciseHourZone2	15	hour	Hour for exercise cooling valve Room2
35	RCPSettings.RegioHeatExerciseTimeZone2	120	sec	Time in seconds to Exercise the Heat Valves for Room2
36	RCPSettings.RegioCoolExerciseTimeZone2	120	sec	Time in seconds to Exercise the Cool Valves for Room2
37	RCPSettings.RegioVAVOutputMinLimitBypass [1]	0	%	Min Limit for VAV Output at Bypass State
38	RCPSettings.RegioVAVOutputMinLimitBypassZone2 [1]	0	%	Min Limit for VAV Output at Bypass State for Room2

Parameter	Signal name	Default value	Units	Description
39	RCPSettings.RegioUnderfloorHeatingValveType [1]	0		Underfloor heating valve type 0=0-10V 1=2-10V 2=10-2V 3=10-0V 4=NU 5=PWM(Thermal)
40	RCPSettings.RegioUnderfloorHeatingValveType-Zone2 [1]	0		Underfloor heating valve type Room2 0=0-10V 1=2-10V 2=10-2V 3=10-0V 4=NU 5=PWM(Thermal)

1. Only available in Regio Ardo version 2.0–1–04 or later

C.4 FAN

Parameter	Signal name	Default value	Units	Description
1	RCPSettings.RegioFanControlMode	0		FanControl Mode 0=No control 1=Controlled by Heating 2=Controlled by cooling 3=Controlled by both heat and cooling
2	RCPSettings.RegioFanSpeed1Start	20	%	If higher controller output start fanspeed 1
3	RCPSettings.RegioFanSpeed2Start	60	%	If higher controller output start fanspeed 2
4	RCPSettings.RegioFanSpeed3Start	100	%	If higher controller output start fanspeed 3
5	RCPSettings.RegioFanSpeedHyst	5	%	Hysteresis % for start/stop fan
6	RCPSettings.RegioRUNoOfFanSpeeds	3		Configured number of fanspeeds (1-3)
7	RCPSettings.RegioMinFanSpeed	0		Min Speed for the fan: 0=Stop 1=Speed 1
8	RCPSettings.RegioFanStopTime	120	sec	Time (Sec) for the Fan Stop delay when Fan AfterBlow used
9	RCPSettings.RegioFanAfterBlowMinSpeed	0		Minimum Fan Speed when FanafterBlow Active
10	RCPSettings.RegioFanControlModeZone2	0		FanControl Mode Room2: 0=No control 1=Controlled by Heating 2=Controlled by cooling 3=Controlled by both heat and cooling
11	RCPSettings.RegioFanSpeed1StartZone2	20	%	If higher controller output start fanspeed 1 Room2
12	RCPSettings.RegioFanSpeed2StartZone2	60	%	If higher controller output start fanspeed 2 Room2
13	RCPSettings.RegioFanSpeed3StartZone2	100	%	If higher controller output start fanspeed 3 Room2
14	RCPSettings.RegioFanSpeedHystZone2	5	%	Hysteresis % for start/stop fan Room2
15	RCPSettings.RegioRUNoOfFanSpeedsZone2	3		Configured number of fanspeeds (1-3) Room2
16	RCPSettings.RegioMinFanSpeedZone2	0		Min Speed for the fan Room2: 0-=Stop 1=Speed 1

Parameter	Signal name	Default value	Units	Description
17	RCPSettings.RegioFanStopTimeZone2	120	sec	Time (Sec) for the Fan Stop delay when Fan AfterBlow Room2
18	RCPSettings.RegioFanAfterBlowMinSpeedZone2	0		Minimum Fan Speed when FanafterBlow Active Room2

C.5 M/AT

Parameter	Signal name	Default value	Units	Description
1	RCPSettings.RegioLightManual	0		Controls the light when central control
2	RCPSettings.RegioSunBlindsControl	0		Remote Control for the Jalusi: 0=Go In 1=Stop 2=Go out
3	RCPSettings.RegioLightManualZone2	0		Controls the light when central control Room2
4	RCPSettings.RegioSunBlindsControlZone2	0		Remote Control for the Jalusi Room2 0=Go In 1=Stop 2=Go out
5	RCPSettings.RegioHeat1OutputSelect	2		Manual/Auto of Heat1 0=Off 1=Manual 2=Auto
6	RCPSettings.RegioHeat2OutputSelect	2		Manual/Auto of Heat2
7	RCPSettings.RegioCoolOutputSelect	2		Manual/Auto of Cool1
8	RCPSettings.RegioHeatCoolOutputSelect	2		Manual/Auto of Heat Cool
9	RCPSettings.RegioVAVOutputSelect	2		Manual/Auto of VAV
10	RCPSettings.RegioECFanOutputSelect	2		Manual/Auto of ECFan
11	RCPSettings.RegioHeat1OutputSelectZone2	2		Manual/Auto of Heat1 Room2
12	RCPSettings.RegioHeat2OutputSelectZone2	2		Manual/Auto of Heat2 Room2
13	RCPSettings.RegioCoolOutputSelectZone2	2		Manual/Auto of Cool1 Room2
14	RCPSettings.RegioHeatCoolOutputSelectZone2	2		Manual/Auto of Heat Cool Room2
15	RCPSettings.RegioVAVOutputSelectZone2	2		Manual/Auto of VAV Room2
16	RCPSettings.RegioECFanOutputSelectZone2	2		Manual/Auto of ECFan Room2
17	RCPSettings.RegioHeat1OutputManual	0	%	Manual value Heat 1
18	RCPSettings.RegioHeat2OutputManual	0	%	Manual value Heat 2
19	RCPSettings.RegioCoolOutputManual	0	%	Manual value Cool
20	RCPSettings.RegioHeatCoolOutputManual	0	%	Manual value Heat Cool
21	RCPSettings.RegioVAVOutputManual	0	%	Manual value VAV
22	RCPSettings.RegioECFanOutputManual	0	%	Manual value ECFan
23	RCPSettings.RegioHeat1OutputManualZone2	0	%	Manual value Heat 1 Room2
24	RCPSettings.RegioHeat2OutputManualZone2	0	%	Manual value Heat 2 Room2
25	RCPSettings.RegioCoolOutputManualZone2	0	%	Manual value Cool Room2
26	RCPSettings.RegioHeatCoolOutputManualZone2	0	%	Manual value Heat Cool Room2
27	RCPSettings.RegioVAVOutputManualZone2	0	%	Manual value VAV Room2
28	RCPSettings.RegioECFanOutputManualZone2	0	%	Manual value ECFan Room2

Parameter	Signal name	Default value	Units	Description
29	RCPSettings.RegioLightSelect	2		Manual/Auto of Lighting: 0=Off 1=On 2=Auto
30	RCPSettings.RegioSunBlindsInSelect	2		Manual/Auto of BlindIn
31	RCPSettings.RegioSunBlindsOutSelect	2		Manual/Auto of BlindOut
32	RCPSettings.RegioForcedVentSelect	2		Manual/Auto of ForceVentilation
33	RCPSettings.RegioDigOutSelectSumAlarm	2		Manual/Auto of SumAlarm
34	RCPSettings.RegioDigOutSelectSumAlarmA	2		Manual/Auto of SumAlarmA
35	RCPSettings.RegioDigOutSelectSumAlarmB	2		Manual/Auto of SumAlarmB
36	RCPSettings.RegioLightSelectZone2	2		Manual/Auto of Lighting Room2
37	RCPSettings.RegioSunBlindsInSelectZone2	2		Manual/Auto of BlindIn Room2
38	RCPSettings.RegioSunBlindsOutSelectZone2	2		Manual/Auto of BlindOut Room2
39	RCPSettings.RegioForcedVentSelectZone2	2		Manual/Auto of ForceVentilation Room2
40	RCPSettings.RegioDigOutSelectSumAlarmZone2	2		Manual/Auto of SumAlarm Room2
41	RCPSettings.RegioDigOutSelectSumAlarmAZone2	2		Manual/Auto of SumAlarmA Room2
42	RCPSettings.RegioDigOutSelectSumAlarmBZone2	2		Manual/Auto of SumAlarmB Room2
43	RCPSettings.RegioFanSelect	4		Fan speed Selected Remote/RegioTool: 0=Off 1=Speed1 2=Speed2 3=Speed3 4=Auto
44	RCPSettings.RegioFanSelectZone2	4		Fan speed Selected Remote/RegioTool Room2 0=Off 1=Speed1 2=Speed2 3=Speed3 4=Auto
45	RCPSettings.RegioUnderfloorHeatingSelect [1]	0		Manual/Auto of Underfloor heating 0=Off 1=Manual 2=Auto
46	RCPSettings.RegioUnderfloorHeatingManualValue [1]	0	%	Manual Value Underfloor heating
47	RCPSettings.RegioUnderfloorHeatingSelectZone2 [1]	0		Manual/Auto of Underfloor heating Room2 0=Off 1=Manual 2=Auto
48	RCPSettings.RegioUnderfloorHeatingManualValue-Zone2 [1]	0	%	Manual Value Underfloor heating Room2

1. Only available in Regio Ardo version 2.0–1–04 or later

C.6 HMI

Parameter	Signal name	Default value	Units	Description
1	RCPSettings.RegioRUSetPointAdjPos	3	°C	Max allowed offset over setpoint
2	RCPSettings.RegioRUSetPointAdjNeg	3	°C	Max allowed offset below setpoint
3	RCPSettings.RegioRUSetPointAdjPosZone2	3	°C	Max allowed offset over setpoint Room2
4	RCPSettings.RegioRUSetPointAdjNegZone2	3	°C	Max allowed offset below setpoint Room2

Parameter	Signal name	Default value	Units	Description
5	RCPSettings.RegioRUType	9		Room Unit attached to the controller: 0=None 1=ED-RU 2=ED-RU-O 3=ED-RU-F 4=ED-RU-FO 5=ED-RU-DO 6=ED-RU-DFO 7=ED-RU-DOS 8=ED-RU-H 9=ED-RU-DOCS 10=ED-RUD/ED-RUD-2 99=Third party Modbus unit
6	RCPSettings.RegioRUTempUnit	1		Display Unit: 0=None 1=°C 2=°F
7	RCPSettings.RegioRUDisplayViewType	0		Select view mode for the display: 0=Display temperature value 1=Heat setpoint 2=Cool setpoint 3=Average cool/heat setpoint 4=Only setpoint offset 5=CO2 Level
8	RCPSettings.RegioRUDisplaySetPointType	0		Select view mode for the display when pressing increase decrease button: 0=Setpoint offset 1=Controlling setpoint 2=Heat setpoint 3=Cool setpoint
9	RCPSettings.RegioRUButtonsUsed	7		Buttons that can be used in the RU
10	RCPSettings.RegioRUConfigMenuDisable	0		Enable entering the configuration menu in the RU unit when pressing the UP and Down Key
11	RCPSettings.RegioRUDisplayBacklightLow	20		Lightning Lo (0-255)
12	RCPSettings.RegioRUDisplayBacklightHigh	100		Lightning Hi (0-255)
13	RCPSettings.RegioRUDisplayContrast	15		Contrast (0-15)
14	RCPSettings.RegioRUTypeZone2	9		Room Unit attached to the controller Room2: 0=None 1=ED-RU 2=ED-RU-O 3=ED-RU-F 4=ED-RU-FO 5=ED-RU-DO 6=ED-RU-DFO 7=ED-RU-DOS 8=ED-RU-H 9=ED-RU-DOCS 10=ED-RUD/ED-RUD-2 99=Third party Modbus unit
15	RCPSettings.RegioRUTemperatureCompZone2	0	°C	Temperature Compensation for RU 2
16	RCPSettings.RegioRUDisplayViewTypeZone2	0		Select view mode for the display Room2: 0=Display temperature value 1=Heat setpoint 2=Cool setpoint 3=Average cool/heat setpoint 4=Only setpoint offset 5=CO2 Level
17	RCPSettings.RegioRUDisplaySetPointTypeZone2	0		Select view mode for the display when pressing increase decrease button Room2: 0=Setpoint offset 1=Controlling setpoint 2=Heat setpoint 3=Cool setpoint

Parameter	Signal name	Default value	Units	Description
18	RCPSettings.RegioRUButtonsUsedZone2	7		Buttons that can be used in the RU Room2
19	RCPSettings.RegioRUConfigMenuDisableZone2	-		Enable entering the configuration menu in the RU unit when pressing the UP and Down Key Room2
20	RCPSettings.RegioRUDisplayBacklightLowZone2	20		Lightning Lo (0-255) Room2
21	RCPSettings.RegioRUDisplayBacklightHighZone2	100		Lightning Hi (0-255) Room2
22	RCPSettings.RegioRUDisplayContrastZone2	15		Contrast (0-15) Room2
23	RCPSettings.RegioForceDisplayID	-		Forces the Display to identify themselves (show number on display/blink leds), can leave this state by pressing On/Off button
24	RCPSettings.RegioDisplayIDOnPowerUp	-		If enabled will show display identification on power for 60 seconds or press of the on/off button
25	RCPSettings.RegioForceDisplaySearch	-		Trigger a search for display on display port
26	RCPSettings.RegioSwapDisplayAddress	-		Swap the addres of the display. RU in Room1 will go to Room2 and ViceVersa. Only possible with two display detected and Dual Zone Active
27	RCPSettings.RegioResetRUSettingsOnShutdow [1]	0		Enables reset of user inputs on shutdown
28	RCPSettings.RegioResetRUSettingsOnShutdow-Zone2 [1]	0		Enables reset of user inputs on shutdown for Room2
29	RCPSettings.RegioFanButtonBehaviour [1]	0		Fan Button Behaviour 0=Manual fan control (default setting) 1=Activates forced ventilation
30	RCPSettings.RegioFanButtonBehaviourZone2 [1]	0		Fan Button Behaviour Room2 0=Manual fan control (default setting) 1=Activates forced ventilation

1. Only available in Regio Ardo version 2.0–1–04 or later

C.7 IO

Parameter	Signal name	Default value	Units	Description
1	RCPSettings.RegioAi1	0		Configuration for Analog Input 1 0=Disable 1=External room temp 2=ChangeOver temp 3=Outdoor temp 4=Condensation 5=CO2 sensor 6=RH sensor 11=Supply air Temp 12=Extra zone temperature [11] 13=External room temp 0-10 V [2] 14=Flow sensor [2] 101=External room temp room 2 103=Outdoor temp room 2 104=Condensation room 2 105=CO2 sensor room 2 106=RH sensor room 2 111=Supply air temp room 2 112=Extra zone temperature, room 2 [1] 113=External room temp 0-10 V room 2 [2] 114=Flow sensor room 2 [2] 200=Ext. Analog Input PT1000 [1] 201=Ext. Analog Input 0…10 V [1]
2	RCPSettings.RegioAi2	0		Configuration for Analog Input 2
3	RCPSettings.RegioAi3	0		Configuration for Analog Input 3
4	RCPSettings.RegioAi4	0		Configuration for Analog Input 4
5	RCPSettings.RegioDi1	3		Configuration for Digital Input 1 0=Disable 1=Open window 2=Not Used 3=Presence detector 4=Changeover 101=Open window room 2 102=Not used 103=Presence detector room 2
6	RCPSettings.RegioDi2	1		Configuration for Digital Input 2
7	RCPSettings.RegioDi3	0		Configuration for Digital Input 3
8	RCPSettings.RegioDi4	0		Configuration for Digital Input 4
11	RCPSettings.RegioCI	1		Configuration for Digital Condensation Input 1: 0=Disable 1=Regin's KG-A/1 sensor 2=Regin's KG-A/1 sensor room 2
12	RCPSettings.RegioCI2	0		Configuration for Digital Condensation Input 2

Parameter	Signal name	Default value	Units	Description
13	RCPSettings.RegioAo1	1		Configuration for Analog Output 1 0=Disable 1=Heat 2=Heat 2 3=Cool 4=Not used 5=Changeover / 6-Way Valve 6=VAV 7=EC fan 101=Heat room 2 102=Heat 2 room 2 103=Cool room 2 104=Not used 105=Changeover / 6-Way valve room 2 106=VAV room 2 107=EC fan room 2
14	RCPSettings.RegioAo2	3		Configuration for Analog Output 2
15	RCPSettings.RegioAo3	6		Configuration for Analog Output 3
16	RCPSettings.RegioAo4	0		Configuration for Analog Output 4

Parameter	Signal name	Default value	Units	Description
17	RCPSettings.RegioDo1	7		Configuration for Digital Output 1 0 =Disabled 1 =Fan speed 1 2 =Fan speed 2 3 =Fan speed 3 4 =Lighting 5 =Blind in 6 =Blind out 7 =Forced ventilation 8 =Heat valve Inc. 9 =Heat valve Dec 10=Heat valve thermal (PWM) 11=Heat valve 2 Inc. 12=Heat valve 2 Dec. 13=Heat valve 2 thermal (PWM) 14=Cool valve Inc. 15=Cool valve Dec. 16=Cool valve thermal (PWM) 20=Change over valve Inc 21=Change over valve Dec 22=Change over thermal (PWM) 23=SumAlarm 24=SumAlarm A 25=SumAlarm B 26=Heating valve extra zone, thermal (PWM) [1] 27=Extra zone active signal [1] 101=Fan speed 1 room 2 102=Fan speed 2 room 2 103=Fan speed 3 room 2 104=Lighting room 2 105=Blind in room 2 106=Blind out Room 2 107=Forced ventilation room 2 108=Heat Valve Inc.room 2 109=Heat Valve Dec room 2 110=Heat Valve thermal (PWM) room 2 111=Heat Valve 2 Inc. room 2 112=Heat Valve 2 Dec. room 2 113=Heat Valve 2 Thermal (PWM) room 2 114=Cool Valve Inc. room 2 115=Cool Valve Dec. room 2 116=Cool Valve thermal (PWM) room 2 120=Change over Valve Inc. room 2 121=Change over Valve Dec. room 2 122=Change over Thermal (PWM) room 2 123=SumAlarm room 2 124=SumAlarm A room 2 125=SumAlarm B room 2 126=Heating valve extra zone, thermal (PWM), room 2 [1] 127= Extra zone active signal, room 2 [1]
18	RCPSettings.RegioDo2	23	-	Configuration for Digital Output 2
19	RCPSettings.RegioDo3	0	-	Configuration for Digital Output 3
20	RCPSettings.RegioDo4	0		Configuration for Digital Output 4
21	RCPSettings.RegioDo5	0		Configuration for Digital Output 5
22	RCPSettings.RegioDo6	0		Configuration for Digital Output 6
23	RCPSettings.RegioAi1Comp	0	°C	Analog input 1 compensation
24	RCPSettings.RegioAi2Comp	0	°C	Analog input 2 compensation
25	RCPSettings.RegioAi3Comp	0	°C	Analog input 3 compensation
26	RCPSettings.RegioAi4Comp	0	°C	Analog input 4 compensation
27	RCPSettings.RegioInternalTempComp	0	°C	Internal temperature sensor compensation
28	RCPSettings.RegioInternalTempCompZone2	0	°C	Internal temperature sensor compensation for Room2

Parameter	Signal name	Default value	Units	Description
29	RCPSettings.RegioAnalog1Select [1]	2		Manual Selection for Analog Output 1 0=Off 1=Manual 2=Auto
30	RCPSettings.RegioAnalog2Select [1]	2		Manual Selection for Analog Output 2
31	RCPSettings.RegioAnalog3Select [1]	2		Manual Selection for Analog Output 3
32	RCPSettings.RegioAnalog4Select [1]	2		Manual Selection for Analog Output 4
33	RCPSettings.RegioAnalog1ManualValue [1]	0		Analog Manual Value for Analog Output 1
34	RCPSettings.RegioAnalog2ManualValue [1]	0		Analog Manual Value for Analog Output 2
35	RCPSettings.RegioAnalog3ManualValue [1]	0		Analog Manual Value for Analog Output 3
36	RCPSettings.RegioAnalog4ManualValue [1]	0		Analog Manual Value for Analog Output 4
37	RCPSettings.RegioDigital1Select [1]	2		Manual Selection for Digital Output 1 0=Off 1=Manual 2=Auto
38	RCPSettings.RegioDigital2Select [1]	2		Manual Selection for Digital Output 2
39	RCPSettings.RegioDigital3Select [1]	2		Manual Selection for Digital Output 3
40	RCPSettings.RegioDigital4Select [1]	2		Manual Selection for Digital Output 4
41	RCPSettings.RegioDigital5Select [1]	2		Manual Selection for Digital Output 5

1. Only available in Regio Ardo version 2.0–1–04 or later
2. Only available in Regio Ardo version 2.0–1–05 or later

C.8 ALAM

Parameter	Signal name	Default value	Units	Description
1	RCPSettings.RegioAlarmHyst	0.2		Alarm hysteresis
2	RCPSettings.RegioRoomTempHighLimit	40		High room temp
3	RCPSettings.RegioRoomTempLowLimit	15		Low room temp
4	RCPSettings.RegioRoomTempMaxDeviationLimit	20		Max allowed difference between setpoint and room temp before alarm
5	RCPSettings.RegioAlarmHystZone2	0.2		Alarm hysteresis Room2
6	RCPSettings.RegioRoomTempHighLimitZone2	40		High room temp Room2
7	RCPSettings.RegioRoomTempLowLimitZone2	15		Low room temp Room2
8	RCPSettings. RegioRoomTempMaxDeviationLimitZone2	20		Max allowed difference between setpoint and room temp before alarm Room2
9	RCPSettings.RegioCondenseLimit	80		High limit for condense alarm
10	RCPSettings.RegioCondenseHyst	2		Condense alarm hysteresis
11	RCPSettings.RegioCondenseLimitZone2	80		High limit for condense alarm Room2
12	RCPSettings.RegioCondenseHystZone2	2		Condense alarm hysteresis Room2
13	RCPSettings.RegioCO2MaxLimit	1500	ppm	Max CO2 Level for Alarm
14	RCPSettings.RegioCO2MaxLimitZone2	1500	ppm	Max CO2 Level for Alarm Room2
15	AlaData.AlaPt1_DelayValue	0		Delay value for point no. 1 Condensation
16	AlaData.AlaPt2_DelayValue	0		Delay value for point no. 2 CondensationZone2
17	AlaData.AlaPt3_DelayValue	0		Delay value for point no. 3 SensorAlarm
18	AlaData.AlaPt4_DelayValue	0		Delay value for point no. 4 SensorAlarmZone2
19	AlaData.AlaPt5_DelayValue	0		Delay value for point no. 5 Presence

Parameter	Signal name	Default value	Units	Description
20	AlaData.AlaPt6_DelayValue	0		Delay value for point no. 6 OpenWindow
21	AlaData.AlaPt7_DelayValue	0		Delay value for point no. 7 PresenceZone2
22	AlaData.AlaPt8_DelayValue	0		Delay value for point no. 8 OpenWindowsZone2
23	AlaData.AlaPt9_DelayValue	0		Delay value for point no. 9 RoomUnitError
24	AlaData.AlaPt10_DelayValue	0		Delay value for point no. 10 RoomUnitErrorZone2
25	AlaData.AlaPt11_DelayValue	0		Delay value for point no. 11 Slave1CommFail
26	AlaData.AlaPt12_DelayValue	0		Delay value for point no. 12 Slave2CommFail
27	AlaData.AlaPt13_DelayValue	0		Delay value for point no. 13 Slave3CommFail
28	AlaData.AlaPt14_DelayValue	0		Delay value for point no. 14 Slave4CommFail
29	AlaData.AlaPt15_DelayValue	0		Delay value for point no. 15 RoomTempHigh
30	AlaData.AlaPt16_DelayValue	0		Delay value for point no. 16 RoomTempLow
31	AlaData.AlaPt17_DelayValue	0		Delay value for point no. 17 RoomTempDeviation
32	AlaData.AlaPt18_DelayValue	0		Delay value for point no. 18 RoomControllerInManualMode
33	AlaData.AlaPt19_DelayValue	0		Delay value for point no. 19 RoomTempHighZone2
34	AlaData.AlaPt20_DelayValue	0		Delay value for point no. 20 RoomTempLowZone2
35	AlaData.AlaPt21_DelayValue	0		Delay value for point no. 21 RoomTempDeviationZone2
36	AlaData.AlaPt22_DelayValue	0		Delay value for point no. 22 RoomControllerInManualModeZone2
37	AlaData.AlaPt23_DelayValue	0		Delay value for point no. 23 MasterCommFail
38	AlaData.AlaPt24_DelayValue	0		Delay value for point no. 24 SlaveNormalOperation
39	AlaData.AlaPt25_DelayValue	10		Delay value for point no. 25 CO2 Level High
40	AlaData.AlaPt26_DelayValue	10		Delay value for point no. 26 CO2 Level High Room2
41	Alarms.AlaAcknow	0		External acknowledge command
42	Alarms.AlaBlock	0		External blocking command
43	Alarms.AlaUnBlock	0		External unblocking command
44	AlaData.AlaPt27_DelayValue [1]	0		Delay value for point no. 27 Communication fail safe
45	AlaData.AlaPt28_DelayValue [1]	0		Delay value for point no. 28 Hardware Manual Operation
46	AlaData.AlaPt29_DelayValue [1]	0		Delay value for point no. 29 External Alarm Digital Input 1
47	AlaData.AlaPt30_DelayValue [1]	0		Delay value for point no. 30 External Alarm Digital Input 2
48	AlaData.AlaPt31_DelayValue [1]	0		Delay value for point no. 31 External Alarm Digital Input 3
49	AlaData.AlaPt32_DelayValue [1]	0		Delay value for point no. 32 External Alarm Digital Input 4

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