

Control equipment

Regula



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Control equipment

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Overview

Use

Customized control equipment for water and airborne climate systems with individual regulation.

Regula Duo controls heating and cooling in sequence.

Regula Combi can control heating and cooling in sequence, VAV in combination with heating and cooling, Change-Over systems, as well as communicate with Modbus/EXOLine master systems.

Regula Connect Basic, Multi and Pascal are connection cards for the flexible connection of facade systems and chilled beams. For further informations on the Regula connect Pascal, please see the Lindab Pascal catalogue.

Regula Secura is a condensation guard for installation in façade systems and chilled beams, which prevents condensation forming.

Regula Duo and Regula Combi are available for installation on the wall. Regula Combi can be integrated in a chilled beam directly also. Regula Secura and the Regula Connect cards are integrated in or on our products.

Worth noting

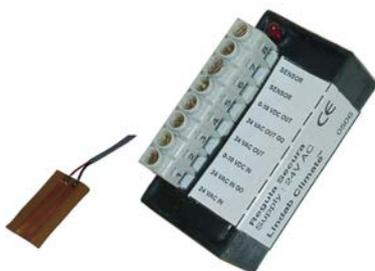
- Regula Combi is a microprocessor-based PI controller with pulsing ON/OFF signal.
- Regula Combi can control with ON/OFF and/or 0-10 V signal.
- Regula Combi can control chilled beams in combination with VAV devices.
- Regula Combi has 7 pre-defined operating programs.
- Regula Combi is provided with 4 inputs and 3 outputs.
- Regula Combi communicates via Modbus or EXOLine.
- Regula Secura prevents condensation.



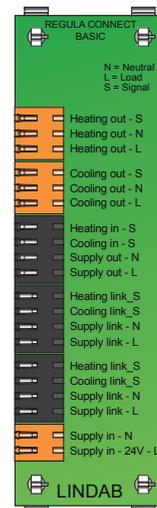
Regula Duo



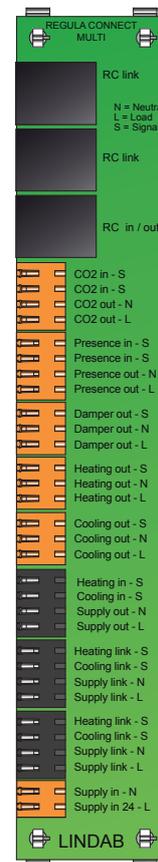
Regula Combi



Regula Secura



Regula Connect Basic



Regula Connect Multi

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Regula Duo

Function

Regula Duo is used for room individual temperature control, where the desired temperature can be adjusted easily within $\pm 4^{\circ}\text{C}$ using the control knob. The standard setting is 21°C . The set point for the desired value can be adjusted with a potentiometer between 15 and 25°C .

Regula Duo is available for installation directly on the wall. Regula Duo controls cooling and heating. A maximum of 10 actuators can be connected to the same control centre. The actuators are mounted on heating and cooling valves that open and close the heating or cooling circuits, respectively, depending on whether the room needs to be heated or cooled. The control signal governing this process is transmitted by Regula Duo, which compares the desired value (the desired temperature) and the actual value (the actual temperature) using built-in or external temperature sensor. The system continuously strives to equalise these temperature values as quickly as possible.

Regula Combi

Function

Regula Combi is a zone controller for integrated installation in products or directly on the wall. Regula Combi has a built-in temperature sensor and can use input from presence sensor, CO_2 sensor, condensation detector and an external temperature sensor (for Change Over systems).

For thermal on/off actuators Regula Combi controls digitally with time proportional pulses. By pulsing, the opening degree of the actuator (and its valve) is varied. The period time (10s) is the sum of the on and off output times on the output.

The controller varies the on and off output times proportionally depending on the output signal demand to the actuator. Alternatively 0-10V output can be chosen. A maximum of 10 actuators can be connected to the same controller. Through its three outputs, Regula Combi can control only heating and/or cooling, as well as heating, cooling and forced cooling in sequence. The controller has four inputs. One for presence sensor, one for CO_2 (0-10V), one for condensation detector and one for a Change Over temperature sensor (PT1000).

Regula Combi has 7 predefined programs which can be selected in the Service menu in the display.

The temperature setpoint value can be adjusted up and down from the basic set point values via the display (default $\pm 3^{\circ}\text{C}$) in steps of 0.5°C . On cooling demand it will control according to the cooling set point, and on heating demand it will control according to the heating set point. The set point change takes place halfway between the set points with a hysteresis of 0.1°C .

Regula Combi can also be set to operate Change Over systems, where the change over happens either via a digital signal or via an external temperature sensor in the heating/cooling media.

The display has indications for heating/cooling state, actual temperature and set point temperature when pressing increase/decrease buttons, and icons for the operating modes.

Regula Secura

Function

Regula Secura is a condensation guard for both chilled beams and facade systems, which works together with electronic control systems such as Regula Combi or any other equipment with thermoelectric actuators. If there is condensation on the supply pipe, Regula Secura's humidity sensor gives a signal that cuts the power to the cooling.

Regula Connect Basic and Multi

Function

Regula Connect Basic and Multi are two connection cards that provides flexible connection for chilled beams or facade systems. Regula Connect Basic and Multi consists of a connection card with connectors for main cables, thermostat cables and terminal blocks for actuator cables. Regula Connect Multi also offer connectors for CO_2 and presence sensors plus a damper output for air flow regulation.

Regula Combi

Predefined programmes

The controller has 7 predefined programs which is selectable in the Parameter menu (Service) on the display. The parameter menu is accessed by simultaneously holding the increase and decrease buttons depressed for about 5 seconds and then pressing the increase button twice, then the Service indication will be displayed. First the display will show the parameter number 0. By pressing the Occupancy button the 0 will be replaced by the program number. Scroll between programs by using the increase and decrease buttons.

To acknowledge and store a set program value, press the Occupancy button again, the display then returns to showing the parameter number 0. Otherwise to retrieve the original value, i.e. the value before change, press the increase and decrease buttons at the same time, then the original value is shown on the display.

1. Water (default)
2. VAV
3. eHybrid
4. Change Over digital
5. Change over sensor
6. Pascal VAV supply
7. Pascal VAV exhaust

As a supplement program 0 can be chosen. This will apply the standard mode of Regin Regio Midi RC-CDOC and will activate the full parameter list with Regins default settings.

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Program descriptions

1. Water

The regulation of temperature takes place in sequences with heating, cooling and forced (cooling) ventilation by signals from the universal outputs UO1 (heating), UO2 (cooling) and UO3 (forced cooling ventilation). The temperature is controlled according to diagram 1. Set points are adjustable.

Operating mode Standby occurs after 30 min (adjustable) if a presence sensor is connected and signal is given, then the neutral zone increases with $\pm 2^{\circ}\text{C}$ (to heating set point 19°C and cooling set point 24°C).

If a CO₂ sensor is connected the universal output signal UO3 will be affected according to the CO₂ sequence. The major requirement from the second part of the cooling sequence and the CO₂ sequence will control the UO3 signal.

If UO3 ascends to 100% signal, Bypass operating mode will be activated for 45 min (adjustable). Bypass can also

be activated by pressing the Occupancy button once (for less than 5 seconds).

The universal outputs for UO1 and UO2 is default set to thermal on/off actuators. UO3 is default set to 0-10V. Heating and cooling actuators (UO1 and UO2) are exercised every 23 h.

2. VAV

The regulation of temperature takes place in sequences with heating and cooling by signals from the universal outputs UO1 (heating) and UO2 (cooling).

The universal output UO3 (forced cooling ventilation) will be activated with 100% signal by pressing the Occupancy button (Bypass operating mode).

As default the UO2 signal will also change to 100% when pressing the Occupancy button.

The temperature is controlled according to diagram 2. Set points are adjustable.

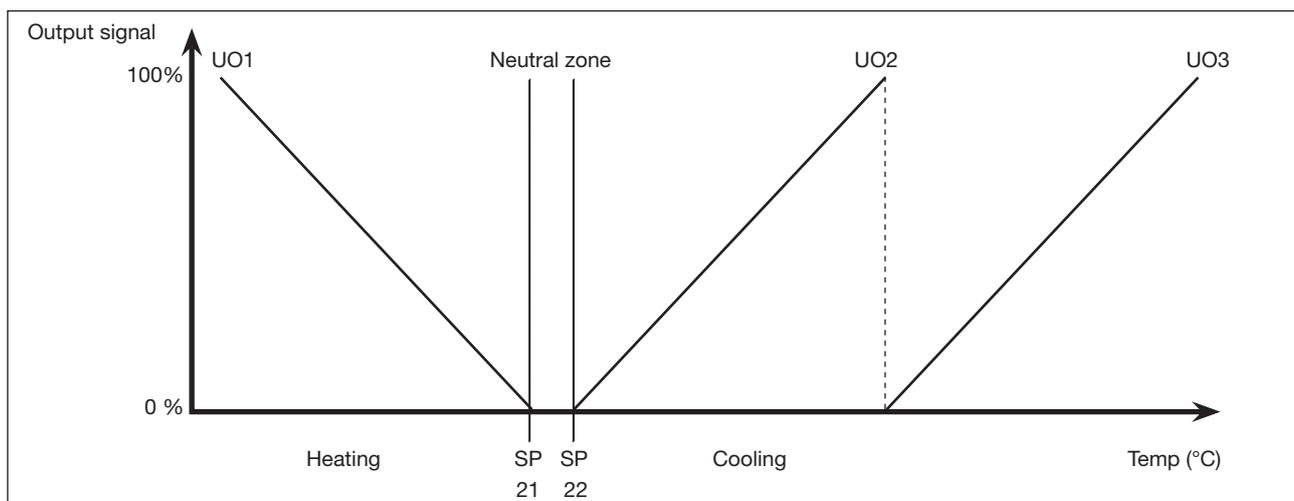


Diagram 1. Temperature sequences for program 1 water.

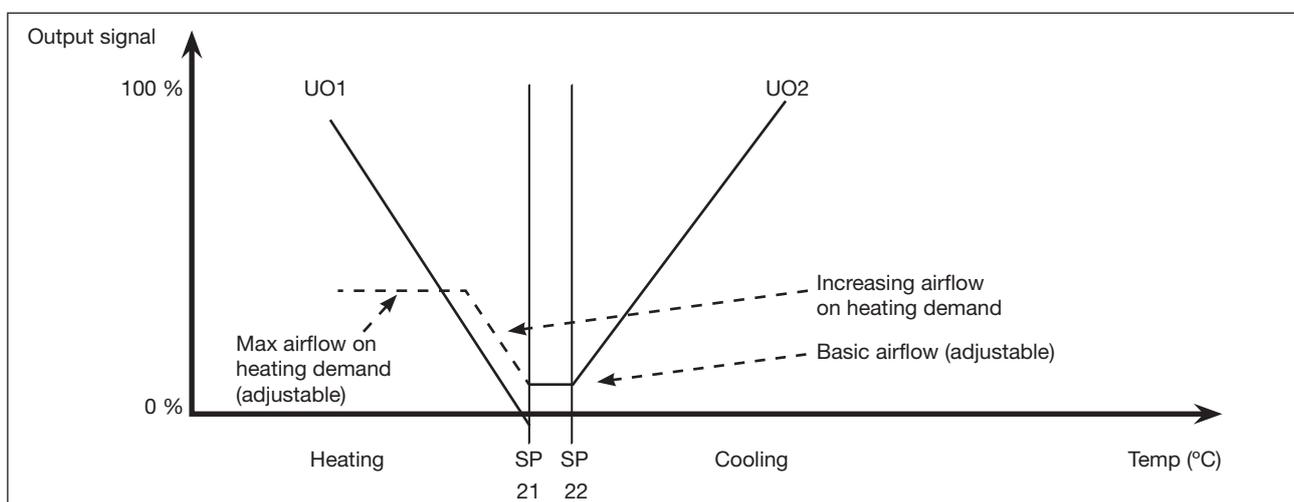


Diagram 2. Temperature sequences for program 2 VAV.

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The basic airflow is set to 20% (default), so the cooling sequence will result in signals from 20-100%. By pressing the Occupancy button for more than 5 seconds operating mode Off will occur, that will change the UO2 signal to 0% regardless of cooling or heating demands. This match Lindab volume flow regulator functions.

A heating function for UO2 can be activated (by changing parameter 11 to value 5 instead of 4). This will allow UO2 to follow the heating signal UO1 to a free chosen max level (parameter 49) when there is heating demand. This should only be used when having heated air (above room temperature) in the duct e.g. by connecting UO1 to a duct heater. If the heating function on UO2 is activated forced cooling ventilation by pressing the Occupancy button will not lead to 100% signal on UO2.

Operating mode Standby occurs after 30 min (adjustable) if a presence sensor is connected and signal is given, then the neutral zone increases with +/- 2°C (to heating set point 19°C and cooling set point 24°C).

If a CO2 sensor is connected the universal output signal UO2 will be affected according to the CO2 sequence. The major requirement from the cooling sequence and the CO2 sequence will control the UO2 signal.

Bypass operating mode with UO2 and UO3 = 100% signal will be activated for 45 min (changeable) by pressing the occupancy button once (for less than 5 seconds).

The universal outputs for UO1, UO2 and UO3 are default set to 0-10V.

Heating and cooling actuators (UO1 and UO2) are exercised every 23 h.

3. eHybrid

The regulation of temperature takes place in sequences with heating and cooling by signals from the universal outputs UO1 (heating) and UO2 (cooling). The sequence of UO3 is depending on whether there is occupancy or not. At operating mode Occupied UO3 = 100%. At Standby UO3 is following the cooling signal UO2 and the heating signal UO1 to a changeable max limit (default is 0%, so as default the UO3 damper will stay closed at heating demands). See the sequences below. Set points are adjustable.

Operating mode Standby occurs after 30 min (adjustable) if a presence sensor is connected and signal is given, then the neutral zone increases with +/- 2°C (to heating set point 19°C and cooling set point 24°C).

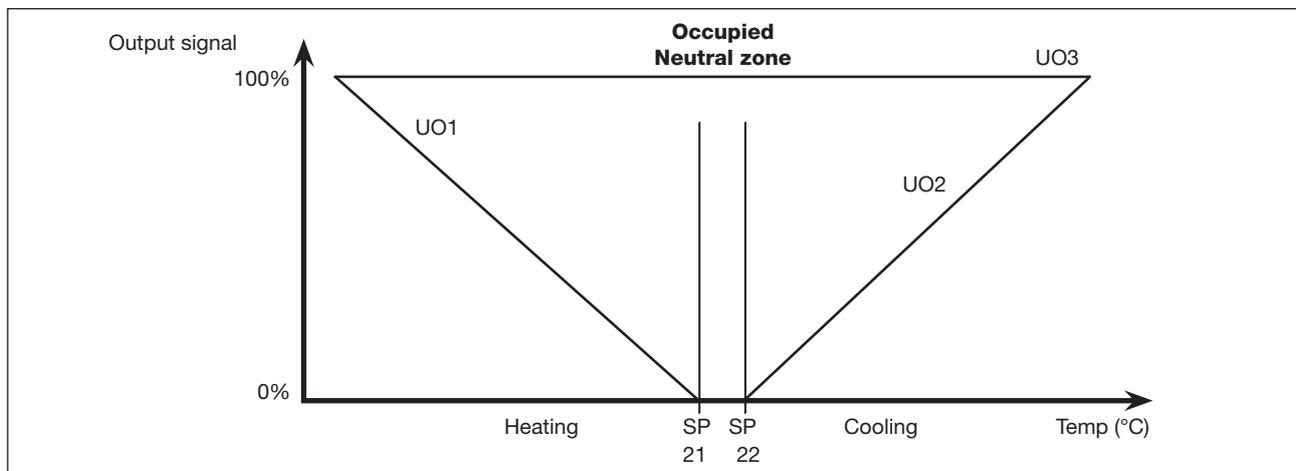


Diagram 3. Temperature sequence for program 3, eHybrid, Occupied

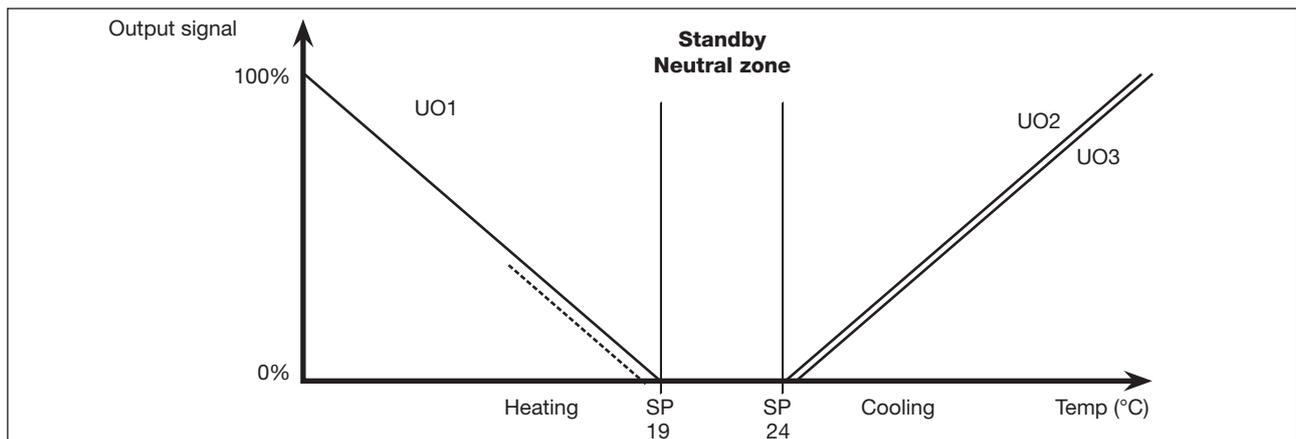


Diagram 4. Temperature sequence for program 3, eHybrid, Standby

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The universal outputs for UO1 and UO2 is default set to thermal on/off actuators. UO3 is default set to 0-10V. Heating and cooling actuators (UO1 and UO2) are exercised every 23 h.

4. Change Over digital

Change-over is a function, which makes it possible to use the same pipe/duct for both heating and cooling, depending on requirements during for example summer (cooling output) and winter (heating output).

When using the digital signal input DI2 (potential-free contact), closing the contact switches the change-over function and sets the output UO1 to cooling sequence.

On open contact, the change-over function sets the output UO1 to heating. Sequences for temperature, CO₂ and occupancy functions is as Program 1 Water. Universal outputs for UO1 and UO3 is default set to 0-10V. UO2 is not active.

5. Change Over sensor

Change-over is a function, which makes it possible to use the same pipe/duct for both heating and cooling, depending on requirements during for example summer (cooling output) and winter (heating output).

The Pt1000-sensor connected to AI1 must be mounted so that it senses the temperature in/on the heating/cooling media.

If the media temperature is higher than the room temperature the heating sequence is active on UO1. If the media temperature is lower than the room temperature the cooling sequence is active on UO1. When valves/dampers are closed, water/air will be stagnant at the media temperature sensor, so in this program there is exercise of the valves/dampers for 10 min every 3 h (adjustable). In the exercise period the difference between room temperature and media temperature is checked. If the difference is larger than 3 K (changeable) for heating or 4 K (changeable) for cooling then there will be 0% output on UO1 until next exercise.

Sequences for temperature, CO₂ and occupancy functions are as Program 1 Water. Universal outputs for UO1 and UO3 is default set to 0-10V. UO2 is not active.

6. Pascal VAV supply

The regulation of temperature takes place in sequences with heating and cooling by signals from the universal outputs UO1 (heating) and UO2 (cooling).

The regulation of temperature takes place in sequences with heating and cooling, and the volume flow regulator (MBBV or VRU-2) must be connected to the cooling output (UO2).

For easy commissioning all air flow settings for ventilation in the room are set in Regula Combi (and not in the volume flow regulator). The cooling part of the temperature sequence will then result in variable output signals, which depend on four different air flow settings:

- Minimum air flow at presence/occupied (AirflowMinOcc)
- Maximum air flow at presence/occupied (AirflowMaxOcc)
- Standby air flow (AirflowStandby) when there is no presence and a size dependable air flow (AirflowNominal).

Normally AirflowNominal should not be changed manually.

All air flows are set in the Service parameter menu (in l/s). The size and number of connected volume flow regulators is also set in the service parameter menu.

Note: If more than one volume flow regulator is controlled by the same Regula Combi, the size of the volume flow regulators must be the same. Every volume flow regulator size has predefined default values for AirflowNominal, AirflowMaxOcc, AirflowMinOcc and AirflowStandby. These values can of course be changed, but are reset to default values if the parameter for size is changed.

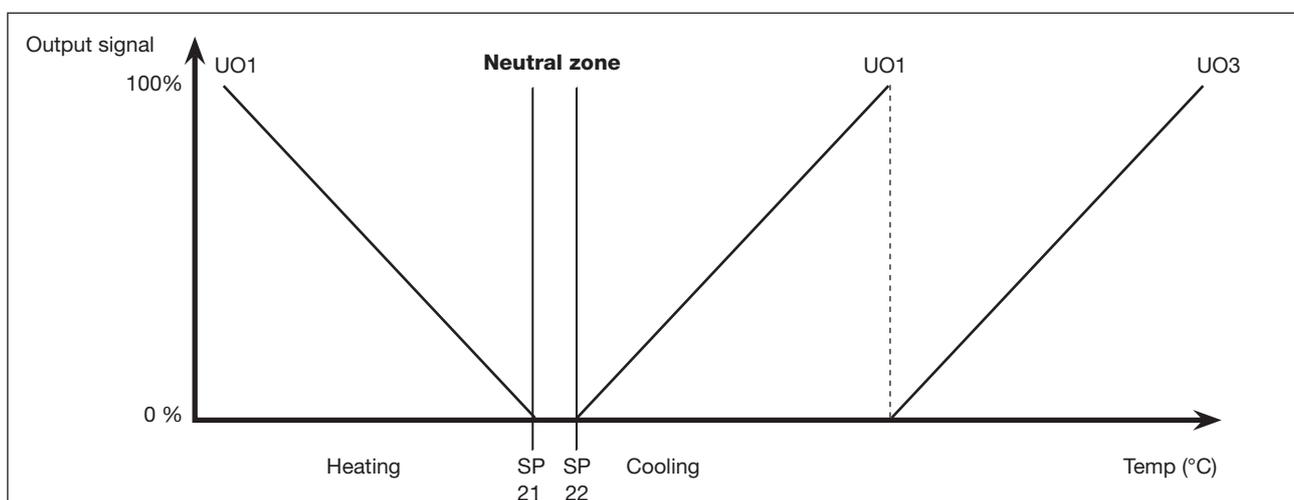


Diagram 5. Temperature sequence for program 5, Change-Over Sensor.

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1 In program 6 the modes Off, Standby, Occupied and Bypass are used.

2 Off can be reached by pressing the occupancy button for more than 5 sec. This will close the volume flow regulator damper.

3 By connecting a presence detector to Regula Combi, Standby will occur if there is no occupancy in the room. When Standby is active a signal corresponding to the air-flow setting AirflowStandby will be transmitted from the cooling output.

4 If no presence detector is connected or if the presence detector indicates occupancy, mode Occupied will occur. In Occupied mode signals will vary between the calculated levels corresponding to AirflowMinOcc and AirflowMaxOcc.

5 Bypass can be reached by pressing the occupancy button, and a signal corresponding to AirflowMaxOcc will be transmitted from the cooling output.

6 An external CO2 sensor with relay (CO2RT-R) can be connected, then the major requirement from the cooling sequence and the CO2 sequence will be transmitted from the cooling output.

7 Damper position is registered (via EXOline) and used in Regula Master for fan optimization. Also the air flow set point from Regula Combi is collected in Regula Master (via EXOline) and is used for exhaust regulation.

7. Pascal VAV exhaust

8 The Pascal VAV exhaust program is quite simple, since there is no regulation of room temperature. This program simply collects the exhaust air flow value sent by Regula Master via EXOline and translates it to a corresponding 2-10V air flow control signal for the exhaust volume flow regulator at UO2.

9 In program 7 there is no temperature regulation.

10 The controller serves as a translator for the exhaust flow signal that is sent from Regula Master (via EXOline). The exhaust flow signal is converted and transmitted to the cooling output depending on the chosen volume flow regulator size (and thus AirflowNominal). Every volume flow regulator size has predefined default values for AirflowNominal. This value can be changed, but is reset to default value if the parameter for size is changed.

11 The exhaust damper position is registered (via EXOline) and used in Regula Master for fan optimization.

Operating modes

Regula Combi is based on Regin Regio Midi RC-CDOC which has five different operating modes: Off, Unoccupied, Standby, Occupied and Bypass.

Operating mode **Off** means that the controller is not heating or cooling. However, the temperature must not drop below a set minimum temperature (8°C). If it does, the controller will start heating. In the display the background lighting is not lit, and only OFF is shown in the display. (Off can be reached by pressing the Occupancy button for more than 5 seconds.)

Operating mode **Unoccupied** is not used in Regula Combi programs.

Operating mode **Standby** means that the room is in energy save mode. The controller is prepared to change operating mode to Occupied (comfort) if someone enters the room (presence). The room temperature is controlled around the applicable heating and cooling set points, with an extended temperature interval (default +/-2°C). For example, with the default heating set point = 21°C and the default cooling set point = 22°C, the controller will allow the temperature in the room to be between 19°C and 24°C without giving output signals. In the display the background lighting is lit (dimmed). STANDBY and the current room temperature (or set point depending on the configuration) are shown in the display.

Operating mode **Occupied** means that the room is in use and is therefore in a comfort mode. The controller regulates the room temperature around the heating set point (default 21°C) and the cooling setpoint (default 22°C). The set points can be adjusted +/- 3°C locally with the increase/decrease buttons. In the display the background lighting is lit (dimmed), and the occupancy indication is shown (see Display handling and indications). The current room temperature (or set point depending on the configuration) is also shown in the display.

Operating mode **Bypass** means that the controller controls the room temperature in the same way as in operating mode Occupied, but the output for forced ventilation is active with full signal (100%). After a configurable time (default 45 min) in Bypass, the controller automatically returns to the preset operating mode. Bypass is activated when the Occupancy button is pressed once (for less than 5 sec), or if 100% cooling signal is needed (because of too high room temperature or CO2 level). The operating mode is useful for example in conferencerooms, where many people are present at the same time for a certain period of time. In the display the background lighting is lit (dimmed). The occupancy indication and the symbol for forced ventilation are shown (see Display handling and indications). The current room temperature (or set-point depending on the configuration) is shown in the display.

The preset operating mode is Standby, but the digital input DI1 for presence sensor is set default to NC (normally closed) in Regula Combi, so the controller will immediately change to Occupied if no presence sensor is connected or if the presence sensor indicates occupancy.

Control equipment

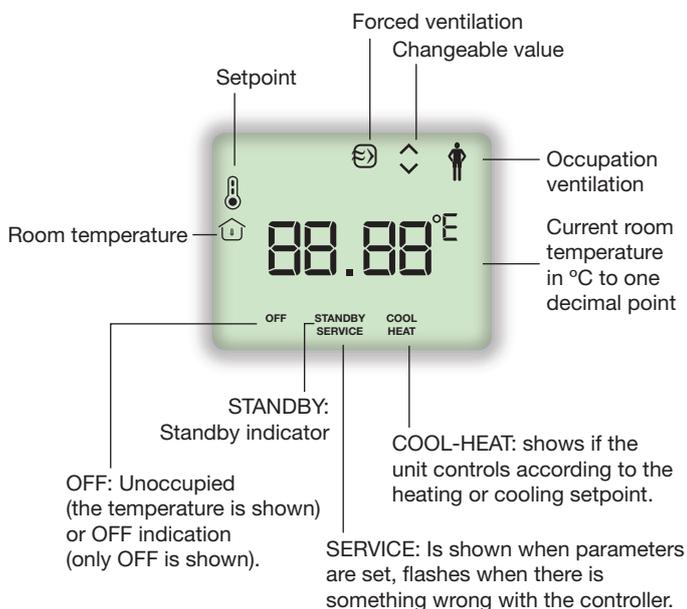
Regula

Display handling and indications

Regula Combi has an Occupancy button, as well as an INCREASE button and a DECREASE button to increase and decrease the set point.

Example:

The control setpoint is 22°C and the added displacement is +1.5°C. This means that the value 23.5°C will be shown in the display. "HEAT" or "COOL" will flash depending on which of the setpoint values is the control setpoint when you enter the set point menu, i.e. depending on which set point you are changing. The displacement is added to both the heating and cooling set point.



Parameter menu

It is possible to set different parameter values in the parameter menu. The parameter menu is accessed by simultaneously holding the INCREASE and DECREASE buttons depressed for about 5 seconds and then pressing the INCREASE button twice. The Service indication will be displayed. First the display will show the parameter number 0 (which chooses program). Scroll between parameters by using the INCREASE and DECREASE buttons. Press the Occupancy button to select the desired parameter. The parameter number will be replaced by the parameter value. The value can be changed using the INCREASE and DECREASE buttons. If a button is held depressed the value will start scrolling, first slowly and then with increasing speed in 3 – 4 steps with 2 – 3 seconds between steps.

To retrieve the original value, i.e. the value before change, press the INCREASE and DECREASE buttons at the same time. The original value is shown on the display. To acknowledge and store a set parameter value, press the Occupancy button again, the display then returns to showing the parameter number.

After a certain time, about 1 minute, or when the INCREASE and DECREASE buttons are pressed at the same time while in the menu, the display returns to the normal view. Exit is shown on the display after the last parameter. The parameter menu is exited by pressing the Occupancy button while in Exit. Pressing INCREASE goes to the first parameter and pressing DECREASE goes to the last parameter. In the Parameter list the numbers of selectable parameters will vary depending on which program is activated. The defaults for Program 1 (Water) are shown in the parameter list. Not all parameters are selectable in all program.

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Parameter number	Description	Default
0	Regula Combi Programs: 0=Regin Regio Midi RC-CDOC, 1=Water, 2=VAV, 3=eHybrid, 4=Change Over digital, 5=Change Over sensor, 6=Pascal VAV supply, 7=Pascal VAV exhaust	1
1	Basic heating setpoint	21°C
2	Basic cooling setpoint	22°C
3	Neutral zone at Stand-by, Heating sp=Basic sp heating-2, Cooling sp=Basic sp cooling+2	2°C
7	P-band for room controller	10°C
8	I-time (s) for room controller	300 s
9	With a lower temperature on the analogue change-over input, the cooling function is selected	-3 K
10	With a higher temperature on the analogue change-over input, the heating function is selected	+4 K
12	Time in Bypass mode	45 min
13	Disconnect timer with occupancy/unoccupancy	30 min (eHybrid 20 min)
15	State connected sensor on AI1: 0=internal sensor, 1=External room sensor	0
20	State function of signal on UO1: 0=None, 1=Thermal actuator heat, 2=None, 3=Heating actuator 0...10V, 4=None	1
21	State function of signal on UO2: 0=None, 1=None, 2=Thermal actuator cooling, 3=None, 4=Cooling actuator 0...10V	2
22	State function of signal on UO3: 0=None, 1=Forced vent. digital, 2=None, 3=None, 4=Cooling actuator 0...10V	4
36	Time in hours between exercise of heating actuator	23 h (COS:3)
42	Select if setpoint or actual value is to be shown in display, 0=Actual, 1=Heating setpoint, 2=Cooling setpoint, 3=Average value of heating and cooling setpoint, 4=Only setpoint displacement, 5=CO2 concentration in the room in ppm	0
43	Highest permitted setpoint offset upwards	3°C
44	Highest permitted setpoint offset downwards	3°C
45	Preset operating mode: 1=Unoccupied, 2=Stand-by, 3=Occupied. Forced ventilation is not set in Occupied mode	2
48	Min flow at cooling output when control state Heat/cool with VAV-control is selected	20 l/s
49	Max flow at cooling output when control state Heat/cool with VAV-control is selected and heating is applied	0 l/s
56	Temperature compensation on AI1	0°C
58	Temperature compensation of internal room sensor	0°C
60	State NO/NC digital input 1 0=NO (Normally open), 1=NC (Normally closed)	1 (eHybrid 0)
61	State NO/NC digital input 2 0=NO (Normally open), 1=NC (Normally closed)	1
62	State NO/NC universal input 1 0=NO (Normally open), 1=NC (Normally closed)	0
73	Selection of heating output function UO1 (NO/NC): 0=NC, 1=NO	0
74	Setpoint display at setpoint adjustment:0=The offset is shown in the display, 1=The active setpoint + offset are shown in the display. HEAT or COOL is shown depending on whether the unit controls according to the heating or cooling setpoint when you enter the menu, 2=The heating setpoint + offset are shown in the display, 3=The cooling setpoint + offset are shown in the display.	1
77	Operating mode at occupancy indication (DI1): 3=Occupied, 4=Bypass	3
80	Selection of cooling output function UO2 (NO/NC): 0=NC, 1=NO	0
112	Min. limit for the VAV damper when using CO2 control	800 ppm
113	Max. limit for the VAV damper when using CO2 control	1000 ppm

Default values program 1 water.

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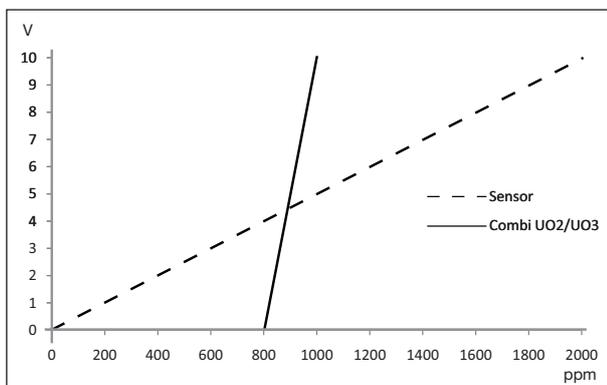
All the Regio Midi parameters (with Regin defaults) can be accessed by selecting the value 0 at parameter 0.

Furthermore all parameters can be accessed and changed via RegioTool or Modbus/EXOLine communication.

CO2 Sequence

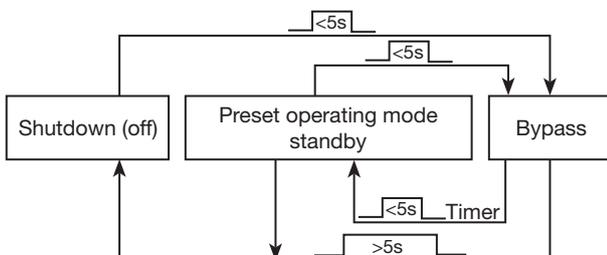
A CO2 sensor (CO2RT) can be used as input for Regula Combi. The signal from the CO2 sensor to the Regula Combi is 0-10 V corresponding to 0-2000 ppm. In the Regula Combi a lower and upper limit of CO2 is set (default 800 and 1000 ppm). These limits will affect the output signal (UO2 or UO3) from Regula Combi. The CO2 limits are adjustable (parameter 112 and 113).

Output signal actuator/signal from CO₂ sensor



Occupancy button

When pressing the occupancy button for less than 5 sec, the controller is set to forced ventilation (Bypass). If the button is pressed again when forced ventilation is active, the controller will go to the Preset operating mode (default: standby/occupancy). Though if there is signal of presence from an occupancy detector or if no occupancy detector is connected the controller will go to operating occupancy mode shortly after.



When the Occupancy button is held depressed for more than 5 seconds, the controller changes operating mode to Off, regardless of the current operating mode.

If you press the Occupancy button for less than 5 seconds when the controller is in off, standby or occupancy mode, the controller changes to Bypass mode. If you

press the button for less than 5 seconds when the controller is in Bypass mode, it changes operating mode to the Preset operating mode (default: standby/occupancy).

After a configurable time in Bypass (default 45 min), the controller returns to the preset operating mode (default: standby/occupancy).

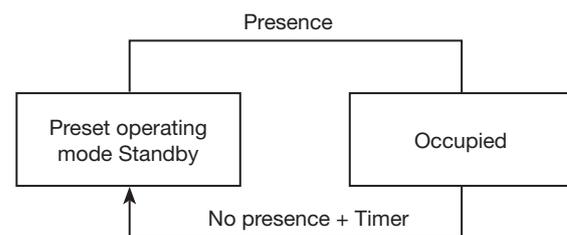
Occupancy detector

For local control of the operating mode between the preset operating mode (Standby) and Occupied, an occupancy detector can be connected.

When occupancy is indicated, the controller changes operating mode to Occupied.

In Occupied on presence, there is a switch-off timer, which means that if there is no occupancy indication during this time (default 30 min), the controller will return to the preset operating mode (Standby).

The off-delay must be at least 1 min



Condensation detector

There is a special input (CI) on the Regula Combi controller. This input is intended for the Regula Secura sensor, and functions internally as a digital input, i.e. condensation or no condensation.

When condensation is detected, the signal from the room controller to the cooling actuator is blocked.

Lindab recommends using the condensation input only when the Regula Combi unit is integrated into the beam and thereby only one cooling actuator is controlled by the Regula Combi.

If the Regula Combi unit is placed on the wall Lindab recommends using the Regula Secura instead that not involves the special input (CI) on the Regula Combi.

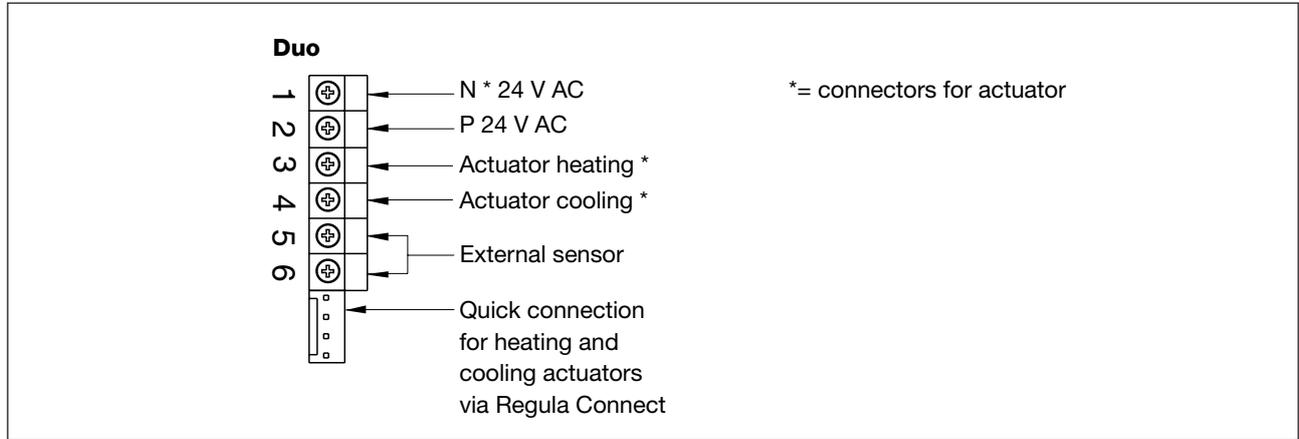
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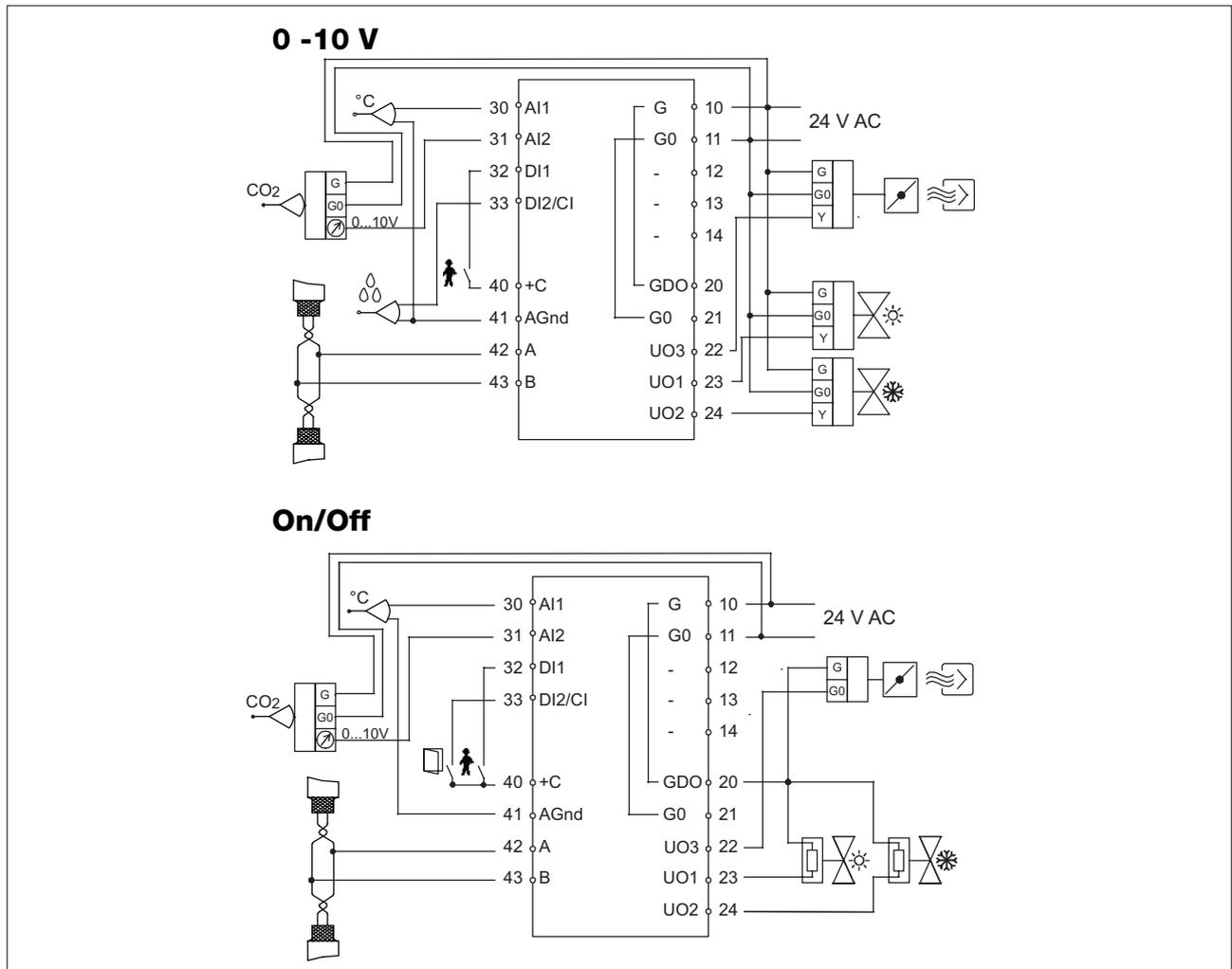
Electrical wiring diagrams

Regula Duo



Circuit diagrams Regula Combi

The maximum number of actuators that can be connected to the digital output (ON/OFF) is 10 for cooling and heating, respectively. When more than 4 actuators for cooling or heating are connected, terminal blocks 10 and 20 must be connected with a cable.

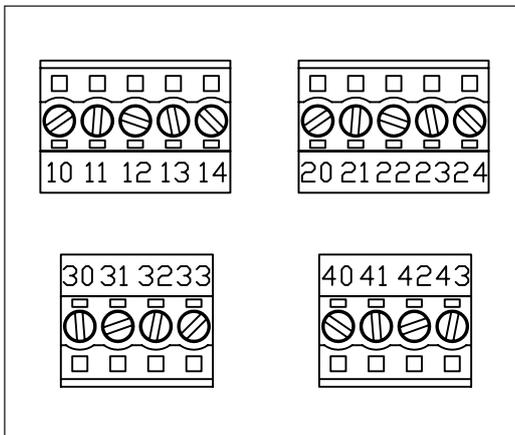


Control equipment

Regula

Electrical wiring diagrams

Regula Combi



	<p>10 G Supply voltage 24 V AC 11 G0 Supply voltage 0 V 12-14 No function.</p>
	<p>20 GDO 24 V AC out common for DO. Internally connected to terminal 10, G. 21 G0 0 V common for UO. Internally connected to terminal 11, G0. 22 UO3 Control output forcing (cooling). For a 0...10 V DC actuator, max 5 mA. The actuator's 0...10 V control signal terminal is connected to terminal 22 and its supply terminals to terminals 20 and 21. Make sure that the reference pole G0 is connected to the correct terminal on the actuator. Alternative For a 24 V AC thermal actuator, max 2.0 A. The thermal actuator is connected between terminals 22 and 20, GDO. 23 UO1 Control output heating. For a 0...10 V DC actuator, max 5 mA. The actuator's 0...10 V control signal terminal is connected to terminal 23 and its supply terminals to terminals 20 and 21. Make sure that the reference pole G0 is connected to the correct terminal on the actuator. Alternative For a 24 V AC thermal actuator, max 2.0 A. The thermal actuator is connected between terminals 23 and 20, GDO. 24 UO2 Control output cooling. For a 0...10 V DC actuator, max 5 mA. The actuator's 0...10 V control signal terminal is connected to terminal 24 and its supply terminals to terminals 20 and 21. Make sure that the reference pole G0 is connected to the correct terminal on the actuator. Alternative For a 24 V AC thermal actuator, max 2.0 A. The thermal actuator is connected between terminals 24 and 20, GDO.</p>
	<p>30 AI1 For temperature sensor, PT1000. Measuring range 0...50°C. The sensor is connected between terminals 30 and 41, AGnd. 31 AI2 For a 0...10 V CO2 sensor 32 DI1 Presence sensor. A potential-free contact is connected between terminals 32 and 40, +C. Open contact corresponds to occupancy. 33 DI2/CI Condensation detector. The sensor is connected between terminals 33 and 41, AGnd.</p>
	<p>40 +C 24 V DC out common for DI 41 AGnd Analogue ground, reference for AI 42 A RS485-communication A 43 B RS485-communication B</p>

Control equipment

Regula

Technical data

Model	Regula Duo	Regula Combi
Supply voltage	24 V AC \pm 15%	18...30 V AC, 50...60 Hz
Communication	N/A	RS485, EXOline or Modbus. 8 data bits, even parity, 1 or 2 stop bit. 9600 bps.
Outputs	2	3 UO (either AO or pulsating DO) heating, cooling and forcing (cooling)
Inputs	1 temperature sensor	2 AI for temperature and CO ₂ DI for occupancy and condensation
Installation	In equipment box or surface mounted	In equipment box or surface mounted.
Analog Output signal	N/A	0-10 V, max 5 mA.
Digital Output signal	24 V / 2 A on-off*	24 V, max 2.0 A (time proportional pulse output signal) **
Temperature range	11-29 °C	5-40 °C
Temperature setpoint	21 °C (adjustable 15-25 °C)	Heating 21, Cooling 22 \pm 3°C ***
Dead zone	1 °C	1 °C (set by h/c setpoints)
Power consumption	1 W	2.5 VA
Electrical connection	Screw-in plinth or quick connection	Screw-in plinth
Size, controller	85 x 85 x 35 mm	95 x 95 x 31 mm
Casing	ABS, white color	Polycarbonate, RAL 9010
Protection class	IP 20	IP 20
Certification	CE	CE
Ambient temperature	0...50 °C	0...50 °C
Storage temperature	-20...70 °C	-2...70 °C
Ambient humidity	Max 90 % RH	Max 90 % RH
Actuator exercise	No	Yes. 5 min once every 23 hours
Indication, heating	Red LED	"Heat" in display
Indication, cooling	Blue LED	"Cool" in display
Adjustment of desired valve	\pm 4 °C using the control knob	\pm 3 °C (adjustable)

* Max 10 actuators for heating or cooling stages.

** Max 10 actuators for heating or cooling stages. When more than 4 actuators for cooling or heating are connected, terminal blocks 10 and 20 must be connected with a cable.

*** Basic heating setpoint 5...40 °C, Basic cooling setpoint 5...50°C, Setpoint displacement +/-0...10°C

Control equipment

Regula

Regula Secura

Security against condensation

Lindab has developed a condensation guard for both chilled beams and facade systems. The condensation guard is called Regula Secura. Since the control exercised by Regula Secura is based on actual condensation, a greater effect is obtained than with conventional humidity control. Conventional humidity control usually measures the mean humidity and sets aside a safety margin for the water temperature, to avoid condensation. With Regula Secura, no margins are required for either the sensor settings or the thermal resistance in the piping.

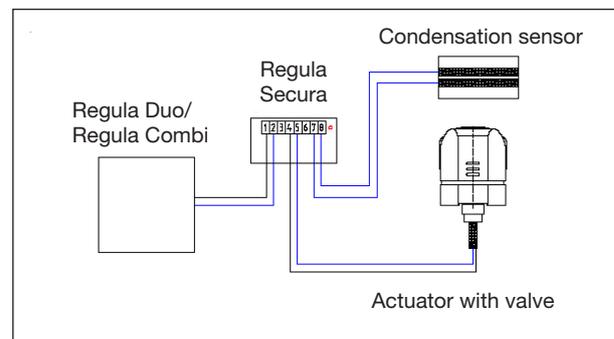
When condensation is formed on the supply pipes, the cooling valve temporarily shuts down the water flow through the affected product. The protection provided by Regula Secura is separate for each individual chilled beam or facade system. This prevents damp damage caused by condensation. The condensation guard continues to regulate the effect even below the dew point, so the performance of the chilled beam or the facade system is kept to the optimum. An example of a control sequence is shown in the diagram below.

The use of Regula Secura on all beams and facade systems increases the protection against condensation for each individual product. This means that only units where condensation forms will be shut down until the condensation dries out, while all other units will continue working. This is particularly beneficial for room environments with variable climatic conditions, or where there is a risk of external moisture entering the room, for example through open windows.

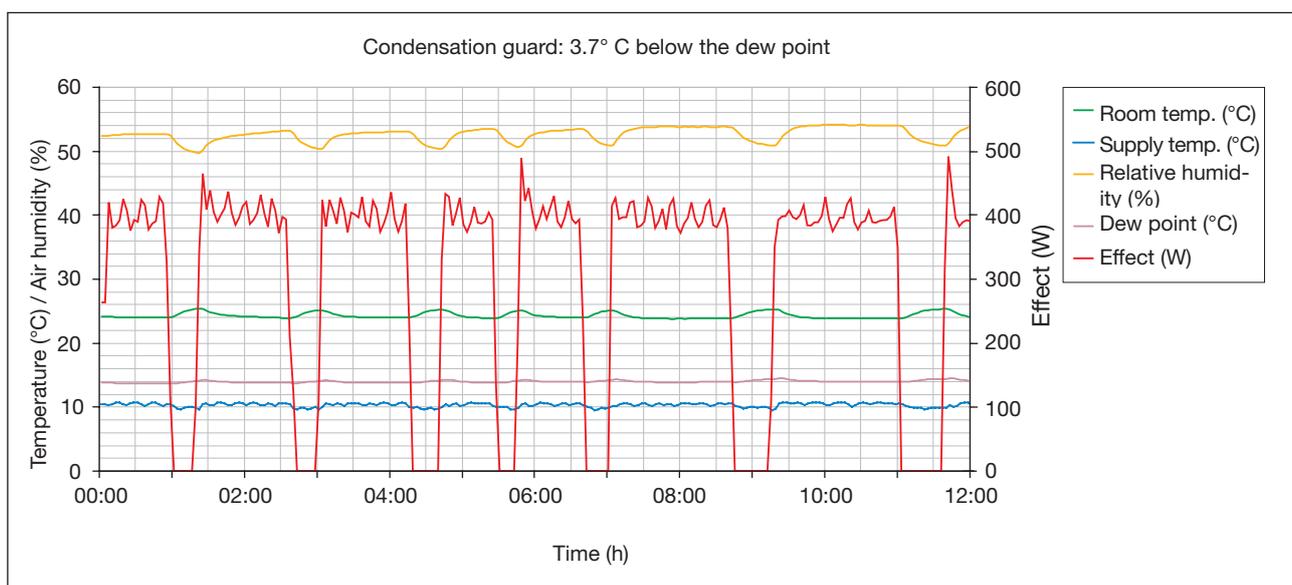
Function

Regula Secura exercises control through the output signal to the actuator and is only active when there is a signal to the actuator to open the valve. When the control signal does not ask for cooling, there is no need to activate Regula Secura. Regula Secura has a sensor mounted on the supply pipe of the beam or the facade system. When the sensor indicates that condensation has formed on the supply pipe, Regula Secura closes the valve until the condensation has dried out.

Regula Secura is compatible with electronic control devices such as Regula Combi or any other equipment with thermoelectric actuators. It is important to note that the valve and the actuator need to be closed in the event of a power cut.



Schematic showing how to connect Regula Secura.



The diagram shows a control sequence where the water temperature is 3.7 °C below the dew point. Throughout the whole process, the control centre asks for cooling. It can be seen how Regula Secura controls using the ON/OFF feature.

Control equipment

Regula

Regula Connect Basic

Regula Connect Basic is a connection card that provides flexible connection for chilled beams or façade systems. Regula Connect Basic consists of a connection card with connectors for mains cables, thermostat cables and terminal blocks for actuator cables. The card has alternatives for the mains cable outputs, so the control signal can be transmitted to the next chilled beam or facade system in both directions or terminated at any point. A transformer is also connected to a free port.

Regula Connect Multi

In addition to the connectors available in Regula connect Basic, the Regula Connect Multi also offers connectors for CO₂ and Presence sensors. Further more it is also possible to connect a damper on the Regula Connect Multi, for air flow control. The damper option is used to for forced ventilation and for the Lindab eHybrid system.

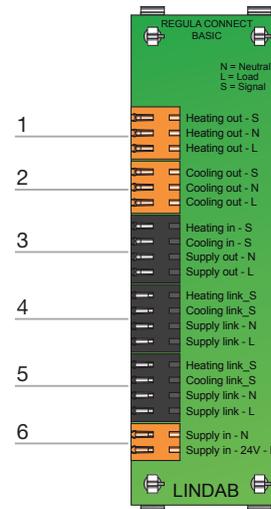
Reconnecting control cables

When moving, building new, or removing existing partitions, the control system can be reconnected (see picture below). This to allow the control centre to control the products in the room where it is installed.

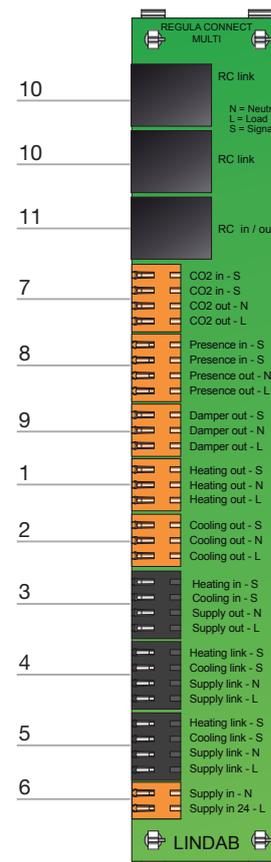
The unit's cable consists of four conductors, two for the supply voltage and two for the control signal to the heating and cooling actuators.

The figures refer to the picture below.

- 1 Connectors for heating output devices, such as heating circuit actuators.
- 2 Connectors for cooling output devices, such as cooling circuit actuators.
- 3 Connector for power and communication input from Regula Combi.
- 4-5 Connector for power and communication link between one or more beams.
- 6 Connector for direct power via external transformer.
- 7 Connector for CO₂ sensor input.
- 8 Connector for Presence sensor input.
- 9 Connector for damper output.
- 10 RC link.
- 11 RC in/out.



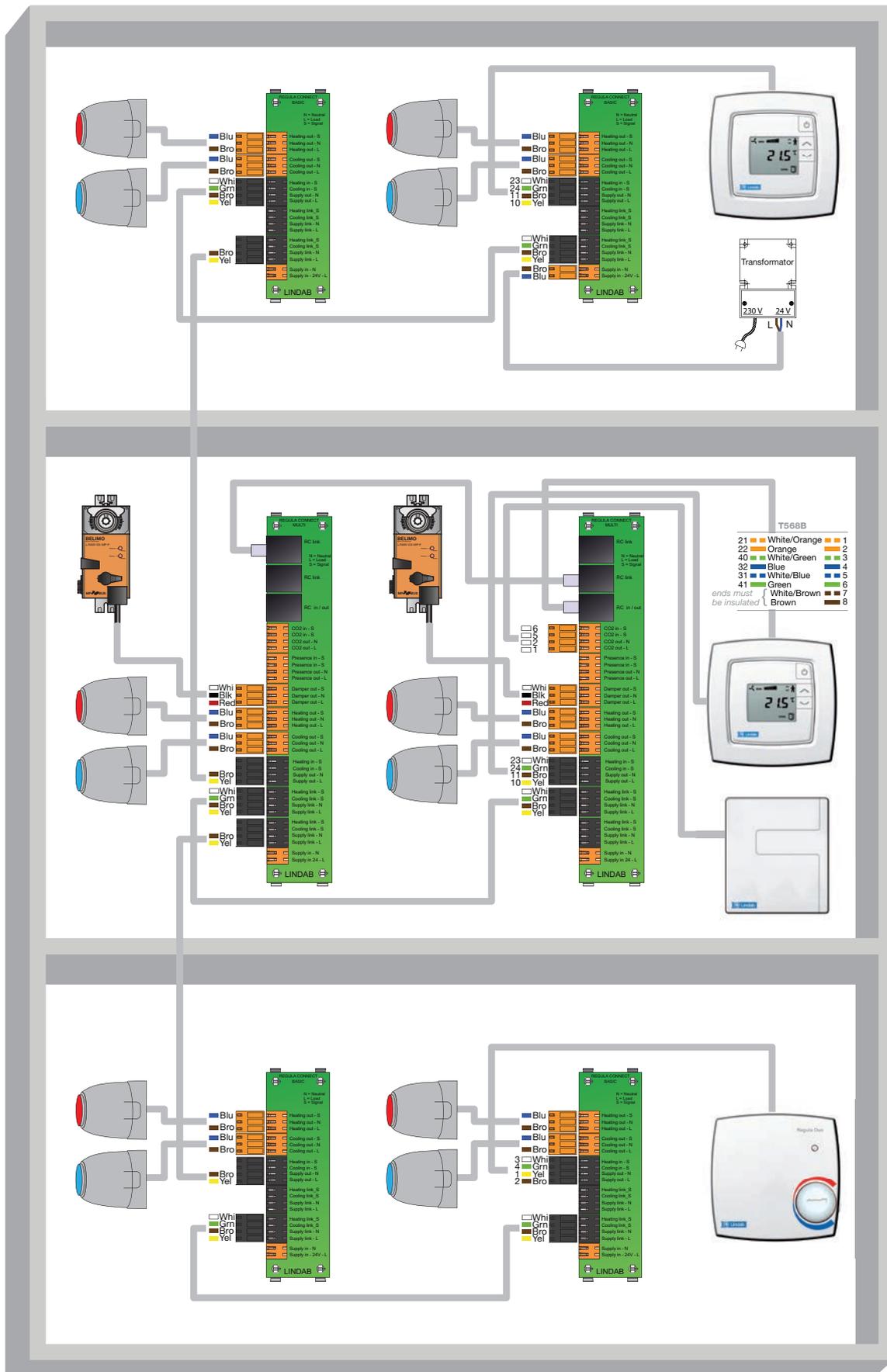
Regula Connect Basic



Regula Connect Multi

Control equipment

Regula



- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19

Control equipment

Regula

Technical data, actuators & valves

Lindab's standard actuators are of the type 24V NC (normally closed).

Supply voltage:	24V AC/DC
Power consumption:	75 m A, initially max. 250 mA
Effect, operation:	1.8 W
Opening and closing time:	approx. 3 min
Actuating power:	100 N +/- 5%
Cylinder stroke:	approx. 4 mm
Ambient temperature:	0...60 °C
Protection class:	IP 54
Weight:	73 g without adapter

Lindab's standard valves are 2-way TTR/TTV valves.

Max. temperature:	2...95 °C at 6 bar
Kvs value:	0.05-1.2
Static pressure class:	PN10
Max. differential pressure:	60 kPa
Material:	Brass
Recommended pressure drop over valve:	8-10 kPa

Please contact Lindab for more information.

TTR-15

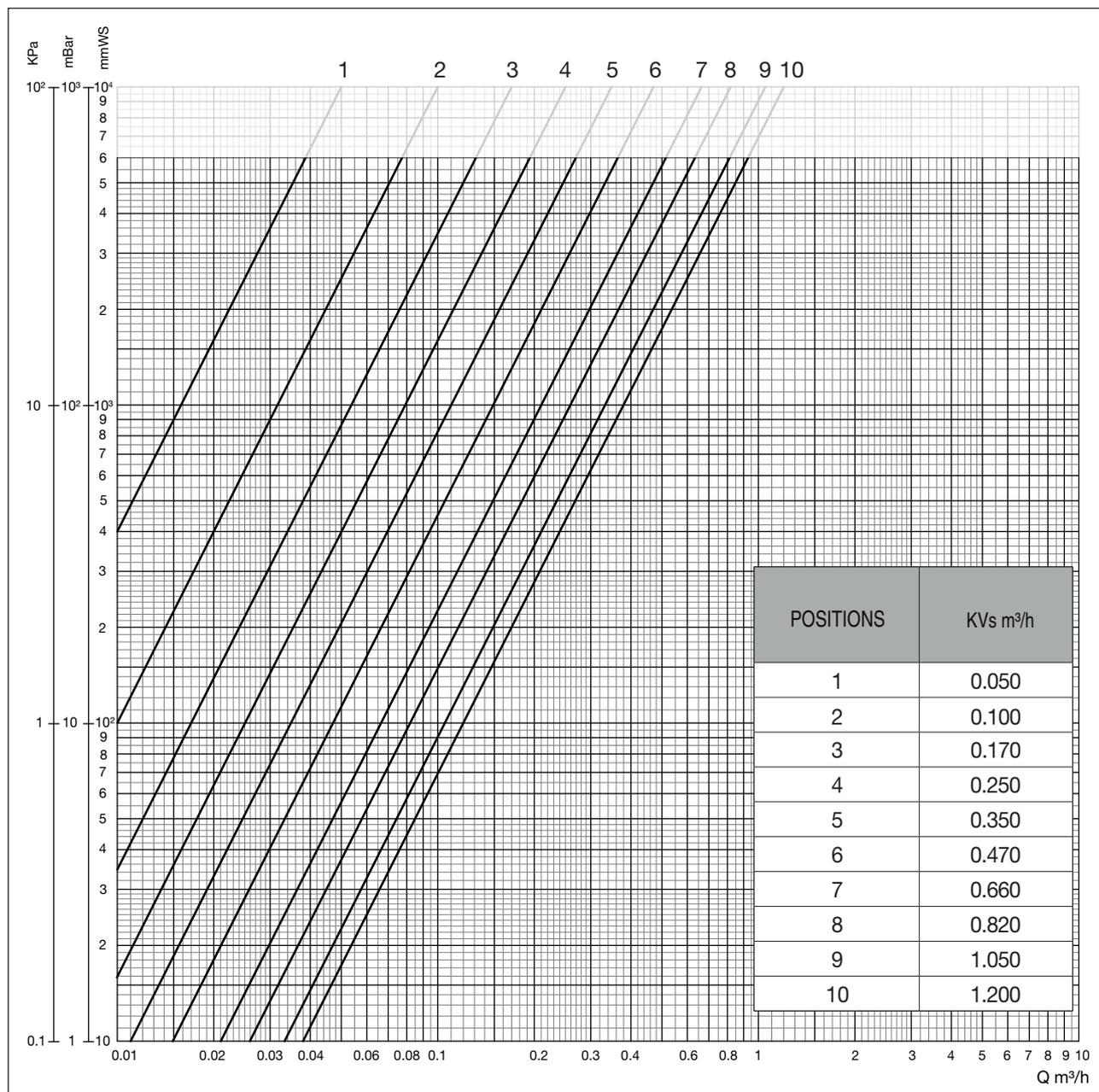


Diagram 6. Valve settings for thermal actuators TTR-15.

Control equipment

Regula

TTR-12

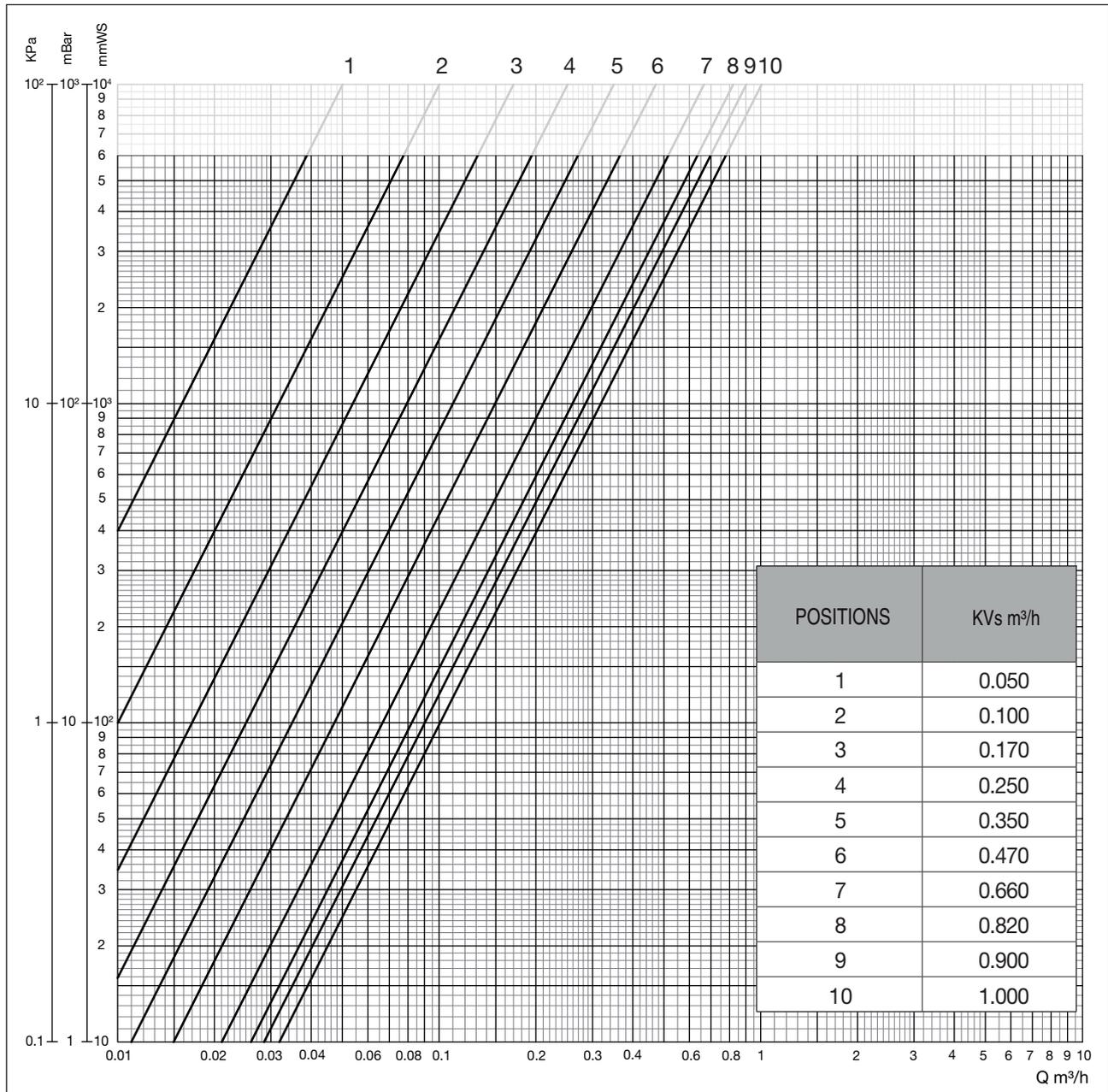


Diagram 7. Valve settings for thermal actuators TTR-12.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19

Control equipment

Regula

TTV-10-12, TTV-12

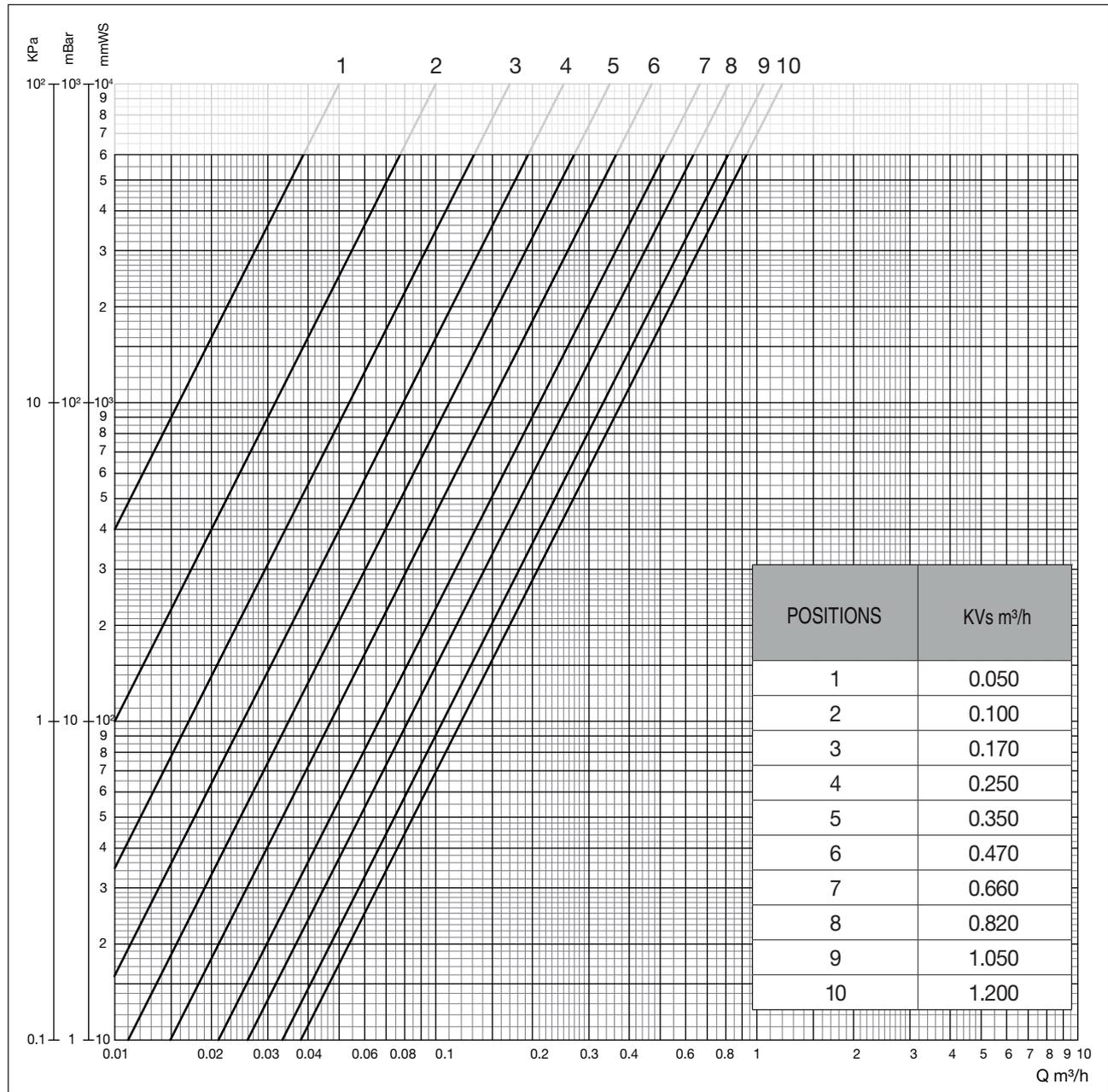


Diagram 8. Valve settings for thermal actuators TTV-10-12 and TTV-12.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19

Control equipment

Regula

Other accessories

CO2 sensor	CO2 RT
Supply voltage:	24 V AC +/- 15 %
Power consumption:	3 W
Protection class:	IP30
CO2:	0...2,000 ppm
Temperature:	0...50° C

Outputs	
CO2:	0...0.10 V DC refers to 0...2,000 ppm
Temperature:	0...10 V DC refers to 0...50° C

CO2 relay sensor CO2 RT-R

Same as above, but with a relay instead of a modulating output signal. Coupling difference and level can be installed.

Calculation of the transformer size

Prerequisites

- The size of the transformer is calculated with regard to greatest number of heating or cooling actuators in the building or the zone.
- Consumption is 6 W on opening and 1.8 W in continuous operation. The calculation needs to take into consideration whether the total power consumption is higher/lower on opening or in continuous operation.

Example:

15 cooling actuators and 25 heating actuators are installed in the building/zone. Number of heating actuators dimensioned: 25.

Consumption at start-up will then be 6 W x 25 actuators and 1.8 W x 25 actuators in continuous operation.

With the formula $P = U \times I$, we calculate, as follows:
 $6 \text{ W} / 24 \text{ V} = 0.25 \text{ A}$ per actuator
 $25 \times 0.25 \text{ A} = 6.25 \text{ A}$

The transformer size is then = $6.25 \text{ A} \times 24 \text{ V} = 150 \text{ VA}$

Remember that, for example, if NO actuators are used for heating and NC actuators for cooling, all actuators need to be added together.

Presence sensor IR24-P

Supply voltage:	24 V AC +/- 2 V
Power consumption:	5 m A
Monitoring area:	15 x 15 m at 25° C
Installation height:	1.8...3.6 m
Detectable movement:	0,1...0.3 m/s

Outputs

Output relay:	24 V AC/DC, 0.2 A max
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External temperature sensor R5/PT1000

Protection class:	IP30
Sensor element:	PT1000
	Accuracy better than +/- 0.5° C
Colour:	Lid: Polar white, RAL 9010 Bottom part: Dark grey

Besides, there is also a strap-on sensor, immersion sensor and duct sensor. Please contact Lindab for additional information.

Miscellaneous

Designations

Product designation:	Regula
Type:	Combi, Connect or Secura

Programme text

Lindab control equipment	Qty
Regula Combi	20
CO2 sensor (RT, RT-R)	4
Presence sensor	4
Regula Secura	30
Regula Connect Basic	5
Cooling actuator, 24 V NC	30
Heating actuator, 24 V NC	30
2-way valve TTR-15	60
Transformer 150 VA	1