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# VARIABLE LIST REGIO MIDI



 **REGIN**  
THE CHALLENGER



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Our goal is to make real estates in the world more energy efficient. Regin is an international group and our products sells in over 90 countries. Thanks to our global presence with strong local representation, we are well aware of the requirements of the market, as well as of how our products and systems function under the most variable conditions. Every year, Regin makes substantial investments in the development of our systems and HVAC-products.

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# I. INTRODUCTION

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## I.1 ABOUT REGIO MIDI

Regio is a wide series of room controllers which handle everything from heating, cooling and ventilation to lighting, humidity, CO<sub>2</sub> monitoring and blinds. Regio can be used for creating everything from stand-alone systems for managing the functions in one room, to large, integrated systems with a comprehensive SCADA-system.

The Regio Midi controllers (RC-C) are 24 V AC stand-alone controllers for controlling heating and cooling in a room. The series consists of different room control units and a relay box for fan control. They can be used either as stand-alone units or integrated into a system with communication. The controllers are connected to bus lines such as Modbus, BACnet (only models with display) or Regin's own bus system EXOline, to communicate with a central SCADA-system via RS485.

They can also be configured for a specific application with Regin's software tool Regio tool<sup>®</sup> which can be downloaded free of charge from Regin's homepage [www.regincontrols.com](http://www.regincontrols.com). See the manual for Regio tool<sup>®</sup> for more information.

## 2. SIGNAL TYPES AND VARIABLE LISTS

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### 2.1 MODBUS SIGNAL TYPES

#### 2.1.1 EXOL TYPE

The EXOL types of the signals:

- R = Real (-3.3E38 - 3.3E38)
- I = Integer (-32768 - 32767)
- X = Index (0 - 255)
- L = Logic (0/1)

#### 2.1.2 MODBUS TYPE

The Modbus types of the signals (types in the list below):

- 1 = Coil Status Register (Modbus function = 1, 5 and 15)
- 2 = Discrete Input (Modbus function = 2)
- 3 = Holding Register (Modbus function = 3, 6 and 16)
- 4 = Input Register (Modbus function = 4)

Supported Modbus functions:

- 1 = Read Coils
- 2 = Read Discrete Input
- 3 = Read Holding Register
- 4 = Read Input Register
- 5 = Write Single Coil
- 6 = Write Single Register
- 15 = Write Multiple Coils
- 16 = Write Multiple Registers

Scale factor Modbus

"Discrete Inputs" and "Coil status register" always have scale factor 1. For "Input register" and "Holding register", see variable list in chapter "Modbus signals".

EXOLine/Modbus

The Midi controller automatically switches between EXOLine and Modbus depending on the present communication type, without any communication error.

## Modbus wiring etc.

A protocol such as Modbus consists of several layers (OSI-model). The bottom layer is always the physical layer, number of wires and signal levels. The next layer describes the communication digits (number of data bits, stop-bits, parity etc). Then come the layers describing the Modbus specific functions (number of digits per message, the meaning of different messages etc).

For Modbus, the bottom layer can be RS485, RS422 or RS232.

## RS485 contra RS422

RS485 and RS422 are the electric part of the protocol, i. e. the physical layer. RS485 has two connections, A and B. Often there is also a protective earth (N on EXO controllers). RS485 units are connected A → A and B → B. You may have to shift A and B in order for Modbus to work. RS485 is so called half duplex communication: Communication can only go in one direction at a time; i. e. the master will first send an enquiry and will thereafter listen for the reply. A and B are used for both transmission and reception.

RS422 is a full duplex communication which means you need 4 wires, 2 for transmit (Tx+ and Tx-) and 2 for receive (Rx+ and Rx-). Tx is used to transmit and Rx to receive, which means that Tx in one unit must be connected to Rx in the other and vice versa. As for signal levels, etc., RS422 and RS485 are identical.

To interconnect RS485 and RS422: On the RS422 unit connect Tx+ with Rx+ and Tx- with Rx-. We have now changed a 4-wire system to a 2-wire system and can connect them to A and B on the RS485 unit. Which goes where is something you most often need to find out by trial and error. Incorrect polarity will just give nonfunction but cannot harm either unit.



Bitrate, two stop bits, parity is the next layer

These settings must correspond to the settings in the master unit. Find out how the master is set and then give the Controller the same settings.

Parity can be set to odd, even (FS) or none. If none is chosen, two stop bits will automatically be used. It is also possible to configure no parity using one stop bit. In this case, automatic switching between EXOline and Modbus will not function. If odd or even is chosen, only one stop-bit is used, or there will be too many bits altogether: 1 start-bit, 8 data-bits, 1 parity-bit and 1 stop-bit give a total of 11 bits which is the maximum amount.

## 2.2 MODBUS SIGNALS

### 2.2.1 DISCRETE INPUTS

Signal name	Type	Modbus address	Description
RC_Actual_L.RegioDigIn(0)	L,2	1	Not used
RC_Actual_L.RegioDigIn1	L,2	2	Value of digital input 1
RC_Actual_L.RegioDigIn2	L,2	3	Value of digital input 2
RC_Actual_L.RegioUDigIn1	L,2	4	Value of universal digital input 1
RC_Actual_L.RegioDigOut(0)	L,2	5	Not used
RC_Actual_L.RegioDigOut1	L,2	6	Value of digital output 1
RC_Actual_L.RegioDigOut2	L,2	7	Value of digital output 2
RC_Actual_L.RegioDigOut3	L,2	8	Value of digital output 3
RC_Actual_L.RegioDigOut4	L,2	9	Value of digital output 4
RC_Actual_L.RegioDigOut5	L,2	10	Value of digital output 5
RC_Actual_L.RegioUDigOut1	L,2	11	Value of universal digital output 1
RC_Actual_L.RegioUDigOut2	L,2	12	Value of universal digital output 2
RC_Actual_L.RegioDIOpenWindow	L,2	13	Indicate open window
RC_Actual_L.RegioDICondenseAlarm	L,2	14	Indicate condense alarm from digital input
RC_Actual_L.RegioDIPresences	L,2	15	Indicate presence from digital input
RC_Actual_L.RegioDIChangeOver	L,2	16	Indicate change over from digital input
RC_Actual_L.RegioFanSpeed1	L,2	17	Indicate fan speed 1
RC_Actual_L.RegioFanSpeed2	L,2	18	Indicate fan speed 2
RC_Actual_L.RegioFanSpeed3	L,2	19	Indicate fan speed 3
RC_Actual_L.RegioForcedventilation	L,2	20	Indicate forced ventilation
RC_Actual_L.RegioCVHeatPulsProp	L,2	21	Indicate pulse prop heating
RC_Actual_L.RegioCVCoolPulsProp	L,2	22	Indicate pulse prop cooling
RC_Actual_L.RegioCVHeatInc	L,2	23	Indicate increase heating
RC_Actual_L.RegioCVHeatDec	L,2	24	Indicate decrease heating
RC_Actual_L.RegioCVCoolInc	L,2	25	Indicate increase cooling
RC_Actual_L.RegioCVCoolDec	L,2	26	Indicate decrease cooling
RC_Actual_L.RegioAIChangeOverState	L,2	27	Indicate change-over state from analogue input
RC_Actual_L.RegioChangeOverState	L,2	28	Indicate change-over state from both digital and analogue input
Not used in this model	L,2	29	
RC_Actual_L.RegioDigOut3	L,2	30	Value of universal digital output 3
RC_Actual_L.RegioPresence	L,2	31	Indicate presence
RC_Actual_L.RegioRoomTempHighTempAlarm	L,2	32	Indicate high room temperature alarm
RC_Actual_L.RegioRoomTempLowTempAlarm	L,2	33	Indicate low room temperature alarm
RC_Actual_L.RegioDICO2	L,2	34	Indicate high CO <sub>2</sub> level
RC_Actual_L.RegioLighting	L,2	38	Lighting control, indication
RC_Actual_L.RegioDIindacation	L,2	39	Run indication, when DI2 is configured as such
RC_Actual_L.RegioPresenceByCo2	L,2	40	Indicates presence from CO <sub>2</sub> sensor

## 2.2.2 COIL STATUS REGISTER

Signal name	Type	Modbus address	Default value	Description
RC_Setp_L.RegioBypass	L,1	1	0	Force the unit in Bypass mode. Is automatically returned after Bypass time. 0=No bypass 1=Bypass
RC_Setp_L.RegioShutDown	L,1	2	0	Force the unit in Shutdown state. 0=No Shutdown 1=Shutdown
RC_Setp_L.RegioNotUsed	L,1	3		Not used
RC_Setp_L.RegioDiNC(0)	L,1	4		Not used
RC_Setp_L.RegioDi1NC	L,1	5	0	State NO/NC digital input 1: 0=NO (Normally open) 1=NC (Normally closed)
RC_Setp_L.RegioDi2NC	L,1	6	1	State NO/NC digital input 2: 0=NO (Normally open) 1=NC (Normally closed)
RC_Setp_L.RegioUDi1NC	L,1	7	0	State NO/NC universal input 1: 0=NO (Normally open) 1=NC (Normally closed)
RC_Setp_L.RegioCVHeatPulsPropNC	L,1	8	0	Selection of heating output function (NO/NC): 0=NO (Normally open) 1=NC (Normally closed)
Not used in this model	L,1	9-13	0	
RC_Setp_L.RegioMinFanSpeed	L,1	14	0	The fan will never stop: 0=Off 1=On
RC_Setp_L.RegioCVCoolPulsPropNC	L,1	15	0	Selection of cooling output functions (NO/NC): 0=NO (Normally open) 1=NC (Normally closed)
RC_Setp_L.RegioComFactoryDefault	L,1	16	0	Resets communication to default values: 1=Reset (returns to 0)
RC_Setp_L.RegioBlockConfig	L,1	21	0	Prevents parameter menu access via display
RC_Setp_L.RegioPreventManualFanSpeed	L,1	22	0	Function to prevent user from setting manual fan speed if fan should not run due to cooling/heating output according to parameter 50. 0 = Not active 1 = Active
RC_Setp_L.Regio3PEndlimProtect	L,1	23	0	Shuts down the three-position actuator output after 1 minute at 0 % or 100 % output
RC_Setp_L.RegioSteppableBPTimer	L,1	24	0	Activate manual bypass timer setting. When the function is active, the user may step through bypass time in 1 hour increments. 0 = Not active 1 = Active
RC_Setp_L.RegioChangeOverAdvanced	L,1	25	1	Select simple or advanced analog change-over
RC_Setp_L.RegioDisableAutoSave	L,1	26	0	Disables automatic saving to EEPROM
RC_Setp_L.RegioSaveNow	L,1	27	0	Save current settings to EEPROM now



## 2.2.3 INPUT REGISTER

Signal name	Type	Modbus address	Scale factor	Description
RC_Actual_X.RegioSoftware	X, 4	1	-	Model
RC_Actual_X.RegioVerMajor	X, 4	2	-	Version Major
RC_Actual_X.RegioVerMinor	X, 4	3	-	Version Minor
RC_Actual_X.RegioVerBranch	X, 4	4	-	Version Branch
RC_Actual_X.RegioRevision	X, 4	5	-	Revision
RC_Actual_X.RegioFanSwitch	X, 4	6	-	Indicates the position of the fan switch: 0=Fan switched off 1=Fan speed 1 2=Fan speed 2 3=Fan speed 3 4=Auto
RC_Actual_X.RegioUnitState	X, 4	7	-	Indicate current unit state: 0=Off 1=Unoccupied 2=Stand-by 3=Occupied 4=Bypass
RC_Actual_X.RegioControllerState	X, 4	8	-	Indicate current controller state: 0=Off 1=Heating 2=Cooling
RC_Actual_X.RegioFanSpeed	X, 4	9	-	Indicate current fan speed: 0=Off 1=Fan speed 1 is on 2=Fan speed 2 is on 3=Fan speed 3 is on
RC_Actual_R.RegioNotUsedX	X, 4	10	-	Not used
RC_Actual_R.RegioRoomTemp	R, 4	11	10	Room temperature
RC_Actual_R.RegioRoomTempExt	R, 4	12	10	Room temperature from external sensor
RC_Actual_R.RegioRoomTempInt	R, 4	13	10	Room temperature from internal sensor
RC_Actual_R.RegioAIChangeOver	R, 4	14	10	Change-over temperature
RC_Actual_R.RegioAnaIn1	R, 4	15	10	Value of analogue input 1
RC_Actual_R.RegioUAnaIn1	R, 4	16	1	Value of universal analogue input 1
RC_Actual_R.RegioUAnaOut1	R, 4	17	-	Value of universal analogue output 1
RC_Actual_R.RegioUAnaOut2	R, 4	18	-	Value of universal analogue output 2
RC_Actual_R.RegioSetPAdjustment	R, 4	19	10	Setpoint adjustment from internal device
RC_Actual_R.RegioPIDSetP	R, 4	20	10	The controller setpoint
RC_Actual_R.RegioPIDOutput	R, 4	21	-	The controller output (0...100 %)
RC_Actual_R.RegioHeatOutput	R, 4	22	-	Heat output (0...100 %)
RC_Actual_R.RegioCoolOutput	R, 4	23	-	Cool output (0...100 %)
RC_Actual_R.RegioAI1Raw	R, 4	24	10	The raw value on analogue input 1
RC_Actual_R.RegioUI1Raw	R, 4	25	1	The raw value on universal input 1
RC_Actual_R.RegioUO3Output	R, 4	26	10	Value of universal output 3
RC_Actual_R.RegioUAnaOut3	R, 4	27	10	Value of universal analogue output 3
RC_Actual_R.RegioRoomCO2	R, 4	32	-	CO <sub>2</sub> input value (ppm)
Not used in this model	R, 4	44	-	
RC_Actual_R.RegioVoltInput	R, 4	45	10	Value of 0...10 V DC input at AI2
RC_Actual_R.RegioRoomFlow	R, 4	46	10	Value of Room Air Flow at AI2
RC_Actual_R.RegioSupplyAirTemp	R, 4	47	10	Supply air temperature from sensor connected to A1
RC_Actual_R.RegioSupplyAirPIDout	R, 4	48	-	Supply air controller output
RC_Actual_R.RegioPID2Setp	R, 4	49	10	Room controller output (scaled) and supply air controller setpoint

## 2.2.4 HOLDING REGISTER

Signal name	Type	Modbus address	Default value	Scale factor	Description
RC_Setp_X.AlaModStat	X, 3	1	-	-	Not used
RC_Setp_X.RegioFreeCoolAvailable	X, 3	2	0	-	Sequence order for Y2 and Y3: 0=Y2 activates before Y3 1=Y3 activates before Y2
RC_Setp_X.RegioHeatOutputSelect	X, 3	3	2	-	Manual/Auto Heating output: 0=Off 1=Manual 2=Auto
RC_Setp_X.RegioCoolOutputSelect	X, 3	4	2	-	Manual/Auto Cooling output: 0=Off 1=Manual 2=Auto
RC_Setp_X.RegioFanSelect	X, 3	5	4	-	Select fan mode: 0 = Off 1 = Manual speed 1 2 = Manual speed 2 3 = Manual speed 3 4 = Auto
RC_Setp_X.RegioFanControlMode	X, 3	6	3	-	Configuration of fan control: 0=No control 1=Fan is controlled by heating demand 2=Fan is controlled by cooling demand 3=Fan is controlled by both heating and cooling demand
RC_Setp_X.RegioFanSpeed1Start	X, 3	7	5 %	-	Start signal in % for fan speed 1 on heating or cooling control
RC_Setp_X.RegioFanSpeed2Start	X, 3	8	60 %	-	Start signal in % for fan speed 2
RC_Setp_X.RegioFanSpeed3Start	X, 3	9	100 %	-	Start signal in % for fan speed 3
RC_Setp_X.RegioFanSpeedHyst	X, 3	10	5 %	-	Hysteresis for start/stop of fans
RC_Setp_X.RegioFanSpeedMax	X, 3	11	3	-	State number of speeds for the fan
RC_Setp_X.RegioForcedVentSelec	X, 3	12	2	-	Manual/Auto Y3 forced ventilation output: 0=Off 1=Manual 2=Auto
RC_Setp_X.RegioChangeOverSelect	X, 3	13	2	-	Manual/Auto control of change-over mode: 0=Heat control 1=Cool control 2=Automatic change over depending on analogue sensor input or digital input
RC_Setp_X.RegioRemoteState	X, 3	14	5	-	Select operating mode for central control: 0=Off 1=Unoccupied 2=Stand-by 3=Occupied 5=No central control
RC_Setp_X.RegioUnitReturnState	X, 3	15	3	-	Preset operating mode: 0=Off 1=Unoccupied 2=Stand-by 3=Occupied. Forced ventilation is not set in Occupied mode.
RC_Setp_X.RegioUnitShutDownState	X, 3	16	1	-	State operating mode by pressing the occupancy button for 5 s: 0=Off 1=Unoccupied.

Signal name	Type	Modbus address	Default value	Scale factor	Description
RC_Setp_X.RegioBtnOnOffTime	X, 3	17	5 s (0 s for F-models)	-	Time to keep the occupancy button depressed before switching to Shutdown state.
RC_Setp_X.RegioControllerMode	X, 3	18	3	-	Control mode: 0=Heating 1= Heating / Heating 2= Heating or Cooling via change over 3= Heating /Cooling 4= Heating /Cooling with VAV-control and forced supply air function 5= Heating /Cooling with VAV-control 6= Cooling 7= Cooling/Cooling 8= Heating /Cooling/VAV (C3-models, except RC-C3DFOC) 9=Heating/Heating or Cooling via change-over (only available in models with fan control) 10= Change-over with VAV-function
RC_Setp_X.RegioCVHeatType	X, 3	19	0	-	State output signal range for Heating-actuators: 0=0...10 V 1=2...10 V 2=10...2 V 3=10...0 V
RC_Setp_X.RegioCVCoolType	X, 3	20	0	-	State output signal range for Cooling actuators: 0=0...10 V 1=2...10 V 2=10...2 V 3=10...0 V
RC_Setp_X.RegioCVHeatExerciseInterval	X, 3	21	23h	-	Time in hours between exercise of heating actuators
RC_Setp_X.RegioCVCoolExerciseInterval	X, 3	22	23h	-	Time in hours between exercise of cooling actuators
Not used in this model	X, 3	23	-	-	
RC_Setp_X.RegioAi1	X, 3	24	0	-	State connected sensor on AI1: 0=Internal sensor 1=External room sensor 2=Change over sensor (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC) 3-10= No function 11= Supply air temperature limitation sensor
RC_Setp_X.RegioAi2 (RC-C3DOC/RC-C3DFOC)	X, 3	25	5	-	State the connected sensor at AI2: (Only RC-C3DOC, RCC-C3DOCS, RC-C3DFOC) 0=None 1- 4=No function 5=CO <sub>2</sub> -sensor 6=No function 7=0...100 % (OEM-function) 8=Flow calculation 9=0...10 V
Not used in this model	X, 3	26	-	-	
RC_Setp_X.RegioDi1	X, 3	27	3	-	State connected sensor on DI1: 0=Not active 1=Window contact 2= No function 3=Presence detector 4=Change over sensor (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC)

Signal name	Type	Modbus address	Default value	Scale factor	Description
RC_Setp_X.RegioDi2	X, 3	28	2	-	State connected sensor on DI2: 1=Window contact 2=Condensation sensor 3=No function 4=Change over sensor (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC) 3-10= No function 11= Supply air temperature limitation sensor
Not used in this model	X, 3	29	0	-	
RC_Setp_X.RegioUi1	X, 3	30	2	-	State connected sensor on UI1: (All models except RC-C3DOC, RCC-C3DOCS, RC-C3DFOC) 0=None 1=Change-over digital 2=Change-over analogue
Not used in this model	X, 3	31-34	-	-	
RC_Setp_X.RegioDo1	X, 3	35	1 (-F-models), 4 (other models)	-	0=Not active 1=Fan speed 1 2=Fan speed 2 3=Fan speed 3 4=Forced ventilation 5=Thermal actuator heating 6=Thermal actuator cooling 7=Increase/Decrease valve, heating increase 8=Increase/Decrease valve, heating decrease 9=Increase/Decrease valve, cooling increase 10= Increase/Decrease valve, cooling decrease 11=Lighting control
RC_Setp_X.RegioDo2 (only used for -F- and -T- models)	X, 3	36	2 (-F-models), 7 (-T-models)	-	2=Fan speed 2 7= Heat valve increase
RC_Setp_X.RegioDo3 (only used for -F- and -T- models)	X, 3	37	3 (-F-models), 8 (-T-models)	-	3=Fan speed 3 8=Heat valve decrease
RC_Setp_X.RegioDo4 (only used for -F- and -T- models)	X, 3	38	4 (-F-models), 9 (-T-models)	-	4=Forced ventilation 9= Cool valve increase
RC_Setp_X.RegioDo5 (only used for -T- models)	X, 3	39	10 (-T-models)	-	10=Cool valve decrease
Not used in this model	X, 3	40-41	-	-	
RC_Setp_X.RegioUo1 (Not -T- models)	X, 3	42	3	-	State connected function on UO1: 0=None 1=Thermal actuator heat 2=None 3=Heating actuator 0...10 V 4=None 5=On/off actuator heat 6=None
RC_Setp_X.RegioUo2 (Not -T- models)	X, 3	43	4	-	State connected function on UO2: 0=None 1=None 2=Thermal actuator Cool 3=None 4=Cooling actuator 0...10 V 5=None 6=On/off actuator cool

Signal name	Type	Modbus address	Default value	Scale factor	Description
RC_Setp_X.RegioModbusSlaveAddr	X, 3	44	Factory set	-	Controller Modbus address
RC_Setp_X.RegioModbusParity	X, 3	45	2	-	Parity of Modbus communication: 0=No parity 1=Odd parity 2=Even parity 3=No parity, 1 stop bit
RC_Setp_X.RegioModbusCharTimeout	X, 3	46	3 ms	-	Modbus timeout for character (t1.5), in ms. Should be 1.5 times a character, i.e. at least 2 ms.
RC_Setp_X.RegioModbusAnswerDelay	X, 3	47	5 ms	-	Answer delay in Modbus (t3.5), in ms. Should be 3.5 times a character, i.e. at least 5 ms.
RC_Setp_X.RegioDispBacklightLO	X, 3	48	10	-	10=Backlight low
RC_Setp_X.RegioDispBacklightHi	X, 3	49	30	-	30=Backlight high
RC_Setp_X.RegioDispContrast	X, 3	50	15	-	15=Display contrast
RC_Setp_X.RegioDisplayViewMode	X, 3	51	0	-	Select if setpoint or actual value is to be shown in the display. 0=Actual value 1=Heat setpoint 2=Cool setpoint 3=Average value of heating and cooling setpoint 4=Only setpoint offset 5=CO <sub>2</sub> -concentration in the room in ppm (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC) 6=Heating setpoint +setpoint offset 7=Cooling setpoint+setpoint offset 8=Average of heating and cooling setpoint+setpoint offset 9=The calculated flow in the duct in l/s (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC )
RC_Setp_X.RegioDispSetpMode	X, 3	52	0	-	Setpoint display at setpoint adjustment: 0=The offset is shown in the display 1=The active setpoint + offset is shown in the display. Heat or Cool is shown depending on whether heat or cool is active when entering the menu 2=Heat setpoint + offset is shown in the display 3=Cooling setpoint + offset is shown in the display 4=Heating occupied setpoint + offset is shown in the display 5=Cooling occupied setpoint + offset is shown in the display 6=Average of heating and cooling setpoints + offset is shown in the display
RC_Setp_X.RegioUo3 (only used for RC-C3xxx-models)	X, 3	53	6 (RC-C3DFOC) or 1 (other C3... models)	-	State connected function on UO3: 0=None 1=Forced ventilation, digital 2=Analogue output (OEM) 3=Lighting control, digital 4=Ordinary analogue output 5=None 6=Control of a EC fan (RC-C3... models)

Signal name	Type	Modbus address	Default value	Scale factor	Description
RC_Setp_X.RegioForcedVentControlMode	X, 3	54	0	-	Forced ventilation, control function: 0=Not active 1=Forced ventilation at 100 % output of heat or cool 2=Forced ventilation at 100 % cool output
RC_Setp_X.RegioUnitDIPresenceState	I, 3	55	4	-	Operating mode at presence detection: 3=Occupied 4=Bypass
RC_Setp_I.RegioBypassTime	I, 3	56	120 min	-	Time in Bypass mode
RC_Setp_I.RegioPresenceOffTime	I, 3	57	10 min	-	Disconnect timer with Occupancy/Unoccupancy
RC_Setp_I.RegioPresenceOnTime	I, 3	58	0 min	-	Switch-on delay for Occupancy
RC_Setp_I.RegioCVHeatPeriodTime	I, 3	59	60s	-	Period time for heating actuators with thermal actuator
RC_Setp_I.RegioCVCoolPeriodTime	I, 3	60	60s	-	Period time for cooling actuators with thermal actuator
RC_Setp_I.RegioCVHeatRunTime	I, 3	61	120 s	-	Run time for heating actuators with increase/decrease actuators
RC_Setp_I.RegioCVCoolRunTim	I, 3	62	120 s	-	Run time for cooling actuators with increase/decrease actuators
Not used in this model	X, 3	63-67	-	-	
RC_Setp_R.RegioOccSetPHeat	R, 3	68	22°C	10	Basic Heating setpoint
RC_Setp_R.RegioOccSetPCool	R, 3	69	24°C	10	Basic Cooling setpoint
RC_Setp_R.RegioStandbySetPDeadBand	R, 3	70	3°C	10	Neutral zone at Stand-by, Heating sp=basic sp .heating-3 by default, Coolsp=Basic sp.cool+3 by default
RC_Setp_R.RegioUnOccSetPHeat	R, 3	71	15°C	10	Heating setpoint at Unoccupied
RC_Setp_R.RegioUnOccSetPCool	R, 3	72	30°C	10	Cooling setpoint at Unoccupied
RC_Setp_R.RegioFrostSetP	R, 3	73	8°C	10	Frost protection setpoint
RC_Setp_R.RegioSetpointOffsetPos	R, 3	74	3°C	10	Highest permitted setpoint adjustment upwards
RC_Setp_R.RegioSetpointOffsetNeg	R, 3	75	3°C	10	Highest permitted setpoint adjustment downwards
RC_Setp_R.RegioSetPOffset	R, 3	76	0 °C	10	The setpoint adjustment
RC_Setp_R.RegioPIDPGain	R, 3	77	10°C	10	P-band for room controller
RC_Setp_R.RegioPIDITime	R, 3	78	300 s		I-time (s) for room controller
RC_Setp_R.RegioCVDeadband	R, 3	79	2%		Deadband for increase/decrease actuators (%)
RC_Setp_R.RegioAIChangeOverDiffHeat	R, 3	80	3K	10	The difference between the temperature in the room and the media temperature for change over to cooling
RC_Setp_R.RegioAIChangeOverDiffCool	R, 3	81	4K	10	The difference between the temperature in the room and the media temperature for change over to heating
RC_Setp_R.RegioAi1Comp	R, 3	82	0°C	10	Temperature compensation on AI1
RC_Setp_R.RegioUi1Comp	R, 3	83	0°C	10	Temperature compensation on UI1
RC_Setp_R.RegioInternalTempComp	R, 3	84	0°C	10	Temperature compensation on internal room sensor
RC_Setp_R.RegioTempFilterFactor	R, 3	85	0,2	10	Filter factor for analogue temperature inputs

Signal name	Type	Modbus address	Default value	Scale factor	Description
RC_Setp_R.RegioMinFlow	R, 3	86	20	-	Min flow at cool output when control mode Heating/Cooling with VAV-control is selected Min flow at Y3 output when control mode Heating/Cooling/VAV is selected
RC_Setp_R.RegioMaxFlowHeat	R, 3	87	0%	-	Max flow on cool output when control mode Heating/Cooling with VAV-control is selected and heating is applied.
RC_Setp_R.RegioRoomTempHighLimit	R, 3	88	40°C	10	Alarm limit for high room temperature
RC_Setp_R.RegioRoomTempLowLimit	R, 3	89	15°C	10	Alarm limit for low room temperature
RC_Setp_R.RegioVAVMaxHeatCool	R, 3	90	100 %	-	VAV-damper max limitation. Applies to control modes 4, 5 and 8.
Not used in this model	R, 3	90-92	-	-	
RC_Setp_R.RegioUo3OutputManual	R, 3	93	0%	-	Y3 Output in manual mode
RC_Setp_R.RegioHeatOutputManual	R, 3	94	0%	-	Heating output in manual mode
RC_Setp_R.RegioCoolOutputManual	R, 3	95	0%	-	Cooling output in manual mode
RC_Setp_R.RegioRoomTempRemote	R, 3	96	-255	10	Room temp set by remote control if external room sensor is configured (-255 = disabled)
RC_Setp_R.RegioCO2_0V (RC-C3DOC/RC-C3DFOC)	R, 3	120	0ppm	-	CO <sub>2</sub> -level at 0 V (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC)
RC_Setp_R.RegioCO2_10V (RC-C3DOC/RC-C3DFOC)	R, 3	121	2000ppm	-	CO <sub>2</sub> -level at 10 V (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC)
RC_Setp_R.RegioCO2FilterFactor (RC-C3DOC/RC-C3DFOC)	R, 3	125	0,2	10	Filter factor for CO <sub>2</sub> -input (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC)
RC_Setp_R.RegioCO2PresenceLimit (RC-C3DOC/RC-C3DFOC)	R, 3	133	800ppm	-	Activate presence if CO <sub>2</sub> level is higher (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC)
RC_Setp_R.RegioCO2PresenceHyst (RC-C3DOC/RC-C3DFOC)	R, 3	134	160ppm	-	Deactivate presence if the CO <sub>2</sub> level is lower than the limit minus this hysteresis (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC)
RC_Setp_R.RegioCO2LimitLow (RC-C3DOC/RC-C3DFOC)	R, 3	147	600ppm	-	Min limit for VAV-damper at CO <sub>2</sub> -control (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC)
RC_Setp_R.RegioCO2LimitHigh (RC-C3DOC/RC-C3DFOC)	R, 3	148	800ppm	-	Max limit for VAV-damper at CO <sub>2</sub> -control (RC-C3DOC, RCC-C3DOCS, RC-C3DFOC)
RC_SetpExt_R.RegioFlowFilterFactor	R, 3	149	0	10	Flow filter factor
RC_Setp_R.RegioFanBoostTime	R, 3	276	0	-	Fan boost function. Activation time: 0= Not active 1-10 = The function is active for 10 s. 10-600 = Total activation time
RC_SetpExt_R.RegioFlow_0V (RC-C3DOC/RC-C3DFOC)	R, 3	277	0 l/s	-	Flow at 0 V input in AI2 (l/s)
RC_SetpExt_R.RegioFlow_10V (RC-C3DOC/RC-C3DFOC)	R, 3	278	100 l/s	-	Flow at 10 V input in AI2 (l/s)
RC_SetpExt_R.RegioThermostatHystHeat	R, 3	279	2K	10	Hysteresis for On/Off actuators and heating
RC_SetpExt_R.RegioThermostatHystCool	R, 3	280	2K	10	Hysteresis for on/off actuators and cooling

Signal name	Type	Modbus address	Default value	Scale factor	Description
RC_SetpExt_R.RegioMinHeat	R, 3	281	0 %	-	Min. limit for the heat output
RC_SetpExt_R.RegioMinECFanSpeed (RC-C3DOC/RC-C3DFOC)	R, 3	282	10 %	-	Min. limit for EC fan (%)
RC_SetpExt_R.RegioMaxECFanSpeed (RC-C3DOC/RC-C3DFOC)	R, 3	283	100 %	-	Max. limit for EC fan (%)
RCPSettings.RegioMinFlowStandby	R, 3	285	10 %	-	Basic flow at "Standby" when control state "Heating/Cooling with VAV-control" or "Heating/Cooling/VAV" is configured
RCPSettings.RegioMinFlowUnoccupied	R, 3	286	10 %	-	Basic flow at "Unoccupied" when control state "Heating/Cooling with VAV-control" or "Heating/Cooling/VAV" is configured
RCPSettings.RegioMinFlowOff	R, 3	287	0 %	-	Basic flow at "Off" when control state "Heating/Cooling with VAV-control" or "Heating/Cooling/VAV" is configured
RC_Setp_R.SupplyAirTLim_HeatHi	R, 3	289	35°C	10	Supply air max limitation for cascade control and heating control
RC_Setp_R.SupplyAirTLim_HeatLo	R, 3	290	24°C	10	Supply air min limitation for cascade control and heating control
RC_Setp_R.SupplyAirTLim_CoolHi	R, 3	291	24°C	10	Supply air max limitation for cascade control and cooling control
RC_Setp_R.SupplyAirTLim_CoolLo	R, 3	292	12°C	10	Supply air min limitation for cascade control and cooling control
RC_Setp_R.SupplyAirTLim_CascadeFact	R, 3	293	3°C	10	Cascade factor between room controller and supply air controller
RC_Setp_R.SupplyAirTLim_FrostProtect	R, 3	294	8°C	10	Frost protection temperature for supply air when supply air temperature limitation is active
RC_Setp_X.RegioExerciseSelect	X, 3	296	1	-	Use valve exercise 0 = Never 1 = Regularly 2 = Regularly and at power-up 3 = Regularly, at power-up and when changing state to Occupied



## 2.3 BACNET SIGNAL TYPES

### 2.3.1 BACnet

Bacnet communication is only available in models with display. In order to communicate via BACnet, the protocol has to be changed either via Regio tool<sup>®</sup> or via the parameter list in the display. Once the protocol has been set to BACnet it can only be switched back to EXOline and Modbus via the display.

### 2.3.2 MS/TP MODE

Both MS/TP master and slave are supported. The mode is controlled by setting the MAC address. If < 127, master mode is selected. A MAC address of > 127 enables slave.

### 2.3.3 OBJECT TYPE

The BACnet types of the signals (types in the list below):

- Analogue inputs
- Analogue values
- Binary inputs
- Binary values
- Loop
- Multistate inputs
- Multistate values
- Device

### 2.3.4 OUT OF SERVICE

The property out\_of\_service is not writable for all Object Types.

### 2.3.5 COMMANDABLE

The value objects are not commandable (i.e. does not use a priority array).

## 2.4 BACnet SIGNALS

### 2.4.1 ANALOGUE INPUTS

Object name	Object-ID	Description	Unit	Writable
RC_Actual_R.RegioRoomTemp	Analog input, 0	Room temperature	°C	No
RC_Actual_R.RegioAIChangeOver	Analog input, 1	Change over temperature	°C	No
RC_Actual_R.RegioAnaIn1	Analog input, 2	Value of analogue input 1	°C	No
RC_Actual_R.RegioUAnaIn1	Analog input, 3	Value of universal analogue input 1	V	No
RC_Actual_R.RegioRoomCO2	Analog input, 4	CO <sub>2</sub> input value	ppm	No
RC_Actual_R.RegioSupplyAirTemp	Analog input, 5	Supply air temperature	°C	No
RC_Actual_R.RoomFlow	Analog input, 6	Air flow	l/s	No
RC_Actual_R.VoltInput	Analog input, 7	Value on analogue input 2	V	No

### 2.4.2 ANALOGUE VALUES

Object name	Object-ID	Description	Unit	Writable
RC_Actual_R.RegioUAnaOut1	Analog value, 0	Value of universal analogue output 1	V	No
RC_Actual_R.RegioUAnaOut2	Analog value, 1	Value of universal analogue output 2	V	No
RC_Actual_R.RegioSetPAdjustment	Analog value, 2	Setpoint adjustment from internal device	°C	No
RC_Actual_R.RegioPIDSetP	Analog value, 3	Controller setpoint	°C	No
RC_Actual_R.RegioPIDOutput	Analog value, 4	Controller output	%	No
RC_Actual_R.RegioHeatOutput	Analog value, 5	Heat output	%	No
RC_Actual_R.RegioCoolOutput	Analog value, 6	Cool output	%	No
RC_Setp_R.RegioOccSetPHeat	Analog value, 7	Room base setpoint heating	°C	Yes
RC_Setp_R.RegioOccSetPCool	Analog value, 8	Room base setpoint cooling	°C	Yes
RC_Setp_R.RegioUnOccSetPHeat	Analog value, 9	Room heat setpoint in unoccupied mode	°C	Yes
RC_Setp_R.RegioUnOccSetPCool	Analog value, 10	Room cool setpoint in unoccupied mode	°C	Yes
RC_Setp_R.RegioFrostSetP	Analog value, 11	Frost protection setpoint	°C	Yes
RC_Setp_R.RegioSetPOffset	Analog value, 12	Setpoint adjustment	°C	Yes
RC_Setp_R.RegioHeatOutputManual	Analog value, 13	Manual value heating output	%	Yes
RC_Setp_R.RegioCoolOutputManual	Analog value, 14	Manual value cooling output	%	Yes
RC_Setp_R.RegioRoomTempRemote	Analog value, 15	Remote control of room temperature	°C	Yes
RC_Setp_R.RegioStandbySetPDeadBand	Analog value, 16	Deadband in Standby mode	°C	Yes

Object name	Object-ID	Description	Unit	Writable
RC_Setp_R.RegioCVDeadband	Analog value, 17	Deadband control valve	%	Yes
RC_Setp_R.RegioAIChangeOverDiffHeat	Analog value, 18	Difference between media temperature and room temperature to switch to heating control	K	Yes
RC_Setp_R.RegioAIChangeOverDiffCool	Analog value, 19	Difference between media temperature and room temperature to switch to cooling control	K	Yes
RC_Setp_R.RegioRoomTempHighLimit	Analog value, 20	Alarm limit for high room temperature	°C	Yes
RC_Setp_R.RegioRoomTempLowLimit	Analog value, 21	Alarm limit for low room temperature	°C	Yes
RC_Setp_R.RegioFlow_0V	Analog value, 22	Flow at 0 V input signal at AI2	l/s	Yes
RC_Setp_R.RegioFlow_10V	Analog value, 23	Flow at 0 V input signal at AI2	l/s	Yes
RC_Setp_R.RegioThermostatHystHeat	Analog value, 24	Hysteresis when On/Off control and Heat control	K	Yes
RC_Setp_R.RegioThermostatHystCool	Analog value, 25	Hysteresis when On/Off control and Cool control	K	Yes
RC_Setp_R.RegioMinHeat	Analog value, 26	Minimum heat output at Heat control	%	Yes
RC_Setp_R.RegioMinECFanSpeed	Analog value, 27	Minimum speed for the EC fan	%	Yes
RC_Setp_R.RegioMaxECFanSpeed	Analog value, 28	Maximum speed for the EC fan	%	Yes
RC_Setp_R.RegioAnaOut3	Analog value, 29	Value on universal analogue output 3	V	No
RC_Setp_R.RegioUO3Output	Analog value, 30	UO3 Output (0... 100 %)	%	No
RC_Actual_R.RegioPID2Setp	Analog value, 31	Calculated supply air setpoint	°C	No
No function	Analog value, 32-34			
RC_SetpExt_R.RegioCO2LimitLow	Analog value, 35	CO <sub>2</sub> value when damper starts to open	ppm	Yes
RC_SetpExt_R.RegioCO2LimitHigh	Analog value, 36	CO <sub>2</sub> value when damper is fully open	ppm	Yes

### 2.4.3 BINARY INPUTS

Object name	Object-ID	Description	Values	Writable
RC_Actual_L.RegioDIOpenWindow	Binary input, 0	Indicate open window	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioDICondenseAlarm	Binary input, 1	Indicate condense alarm from digital input	YES/ NO	No
RC_Actual_L.RegioDIPresences	Binary input, 2	Indicate presence from digital input	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioDIChangeOver	Binary input, 3	Indicate change over from digital input	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioRoomTempHighTempAlarm	Binary input, 4	Room high temperature alarm	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioRoomTempLowTempAlarm	Binary input, 5	Room low temperature alarm	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioDICO2	Binary input, 6	Indicates high CO <sub>2</sub> level	ACTIVE/ INACTIVE	No

Object name	Object-ID	Description	Values	Writable
RC_Actual_L.RegioDIIndacation	Binary input, 7	Run indication, when DI2 is configured as such	ACTIVE/ INACTIVE	No

## 2.4.4 BINARY VALUES

Object name	Object-ID	Description	Values	Writable
RC_Actual_L.RegioForcedVentilation	Binary value, 0	Indicate forced ventilation	ON/OFF	No
RC_Actual_L.RegioCVHeatPulsProp	Binary value, 1	Indicate pulse prop heating	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioCVCoolPulsProp	Binary value, 2	Indicate pulse prop cooling	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioCVHeatInc	Binary value, 3	Indicate increase heating	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioCVHeatDec	Binary value, 4	Indicate decrease heating	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioCVCoolInc	Binary value, 5	Indicate increase cooling	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioCVCoolDec	Binary value, 6	Indicate decrease cooling	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioChangeOverState	Binary value, 7	Indicate change over state from both digital and analogue input	ACTIVE/ INACTIVE	No
RC_Actual_L.RegioRoomTempSensorAlarm	Binary value, 8	Indicate sensor alarm on room sensor	ACTIVE/ INACTIVE	No
RC_Setp_L.RegioBypass	Binary value, 9	Force the unit in Bypass mode. Is automatically returned after Bypass time (default=120 min)	ACTIVE/ INACTIVE	Yes
RC_Setp_L.RegioShutDown	Binary value, 10	Force the unit in ShutDown state	ACTIVE/ INACTIVE	Yes
RC_Setp_L.RegioComDefaults	Binary value, 11	Resets communication settings to default values	ACTIVE/ INACTIVE	Yes
RC_Setp_L.RegioBlockConfig	Binary value, 12	Prevents unauthorised access to the configuration menu via controller buttons	ACTIVE/ INACTIVE	Yes

## 2.4.5 LOOP

Object name	Object-ID	Description
Regulator	Loop, 0	The Regio Regulator

## 2.4.6 MULTISTATE INPUTS

Object name	Object-ID	Description	Values	Writable
RC_Actual_X.RegioFanSwitch	Multistate input, 0	Fan switch state	1=OFF 2=LOW 3=MEDIUM 4=HIGH 5=AUTO	No
RC_Actual_X.RegioUnitState	Multistate input, 1	Current unit state	1=Off 2=Unoccupied 3=Stand-by 4=Occupied 5=Bypass	No

Object name	Object-ID	Description	Values	Writable
RC_Actual_X.RegioControllerState	Multistate input, 2	Current controller state	1=Off 2=Heating 3=Cooling	No
RC_Actual_X.RegioFanSpeed	Multistate input, 3	Current fan speed	1=Off 2=Fan speed 1 3=Fan speed 2 4=Fan speed 3	No

## 2.4.7 MULTISTATE VALUES

Object name	Object-ID	Description	Values	Writable
RC_Setp_X.RegioHeatOutputSelect	Multistate value, 0	Manual/Auto heat output	1=Off 2=Manual output 3=Automatic output	Yes
RC_Setp_X.RegioCoolOutputSelect	Multistate value, 1	Manual/Auto cool output	1=Off 2=Manual output 3=Automatic output	Yes
RC_Setp_X.RegioFanSelect	Multistate value, 2	Fan mode select	1=Off 2=Manual speed 1 3=Manual speed 2 4=Manual speed 3 5=Auto 6=Auto 2 7=Auto 1	Yes
RC_Setp_X.RegioForcedVentSelect	Multistate value, 3	Manual/Auto forced ventilation	1=Off 2=Manual On 3=Auto	Yes
RC_Setp_X.RegioChangeOverSelect	Multistate value, 4	Manual/Auto change-over	1=Heating 2=Cooling 3=Auto	Yes
RC_Setp_X.RegioRemoteState	Multistate value, 5	Remote control unit state	1=Off 2=Unoccupied 3=Stand-by 4=Occupied 6=No remote control	Yes
RC_Non_Modbus.RegioButtonActiveConf	Multistate value, 6	Active buttons	1=No buttons 2=Occupancy button only 3=INCREASE/DECREASE only 4=Occupancy button and INCREASE/DECREASE 5=Fan button only 6=Occupancy button and fan button 7=INCREASE/DECREASE and fan button 8=All buttons	Yes

## 2.4.8 DEVICE

The device object contains two writable properties; Description and Location. Description can be 17 characters long, and Location can be 33 characters long, if using single byte character encoding.