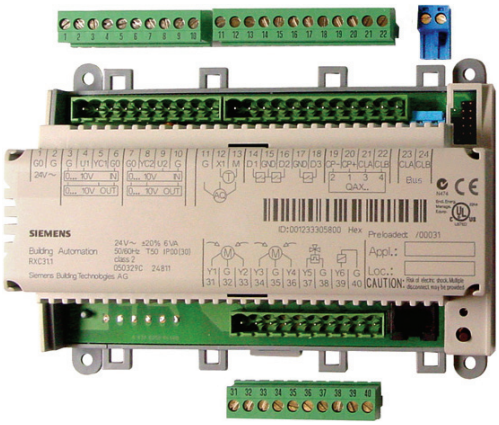
SIEMENS

3844



Desigo™ RXC

Room controller basic module RXC31.1 / RXC31.5

for VAV plants,
with LONMARK®-compatible bus communication

The RXC31 room controller is used for VAV room temperature control in individual rooms.

- **Control of supply and extract air, with volume control dampers or additional compact VAV controllers, with or without re-heaters**
- **Can be combined with extension modules for control of lighting and blinds**
- **Downloadable application software**
- **LONMARK®-compatible bus communications**
- **For use in the Desigo building automation and control system**
- **Control of damper actuators with AC 24 V, 3-position or DC 0 … 10 V control signal**
- **Control of VAV compact controllers (with differential pressure sensor, volume controller and actuator) with DC 0 … 10 V signal**
- **Control of electric or LPHW re-heaters with AC 24 V or AC 24 V 3-position signals**
- **AC 24 V operating voltage**

Application

The RXC31 controller is optimized for the control of variable air volume (VAV) systems. It is suitable for supply and extract air control with volume control dampers or external compact VAV controllers. The controller may also be used for the control of electric or LPHW re-heaters.

The RXC31 can be used in conjunction with extension modules RXC40 and RXC41 allowing additional control of lighting (on/off or dimming) and electric motors for blinds.

The controller application is determined by downloadable application software, also referred to simply as the “application”. The various applications and the associated functions are described in detail in the applications library (V1: CA2A3810, V2: CA110300).

The controllers are delivered with basic application 00031. The basic application, which contains only I/O module functions, is overwritten with the definitive application in the commissioning phase. The RXT10 commissioning and service tool is used for this purpose (see “Commissioning”).

Use as an I/O module

In conjunction with a building automation and control system, the RXC31 controller can also be used as a universal I/O module, e.g. to register digital signals or to control various equipment (ON/OFF or pulse control with AC 24 V). In this case the controller is loaded with basic application 00031. The inputs can then be read and the outputs overridden via the building automation and control system.

Functions

The controller functions are determined by the selected application and its parameters. For a detailed description of functions refer to the Desigo RXC applications library (V1: CA2A3810, V2: CA110300).

Inputs and outputs

Certain input and output parameters can be set for various functions making it possible to cover a wide range of VAV systems. (For parameter settings for the various applications refer to the Desigo RXC applications library (V1: CA2A3810, V2: CA110300).

Input	Function
D1	– Occupancy sensor (volt-free contact)
D2	– Window switch (volt-free contact)
D3	
X1	– LG-Ni 1000 temperature sensor (passive) – Air quality sensor (DC 0 … 10 V)
U1	– Differential pressure sensor DC 0 ... 10 V)
U2	– Differential pressure sensor DC 0 ... 10 V)

Output	Function
YC1	– VAV compact controller, supply air (DC 0 … 10 V) – Supply air damper actuator (DC 0 … 10 V)
YC2	– VAV compact controller, extract air (DC 0 … 10 V) – Extract air damper actuator (DC 0 … 10 V)
Y1 and Y2	– 3-position damper actuators (AC 24 V)
Y3 and Y4	– 3-position damper actuators (AC 24 V)
Y5	– LPHW reheater with thermic valve (AC 24 V, PWM)
Y6	– Radiator with thermic valve (AC 24 V, PWM) – Electric reheater (AC 24 V, on/off)
Y5 and Y6	– LPHW reheater with motorised valve (AC 24 V, 3-position)

Integration into the building automation and control system

When Desigo RXC is integrated into a building automation and control system additional functions become available such as time scheduling, central control of setpoints, etc. (refer to the Desigo INSIGHT documentation for further information).

Types

Type	SSN	Description
RXC31.1 **RXC31.5**	S55373-C115	Room controller, basic module for VAV systems
RXZ30.1		Accessory: Terminal covers

Ordering

When ordering please specify the quantity, product name and type code.
The controllers are delivered with basic application 00031.

The RXZ30.1 terminal covers are supplied in packs of 1 pair and must be ordered separately.

Example:

30	**Room controllers for VAV systems**	**RXC31.5/00031**
30	**Pairs of terminal covers**	**RXZ30.1**

Compatibility

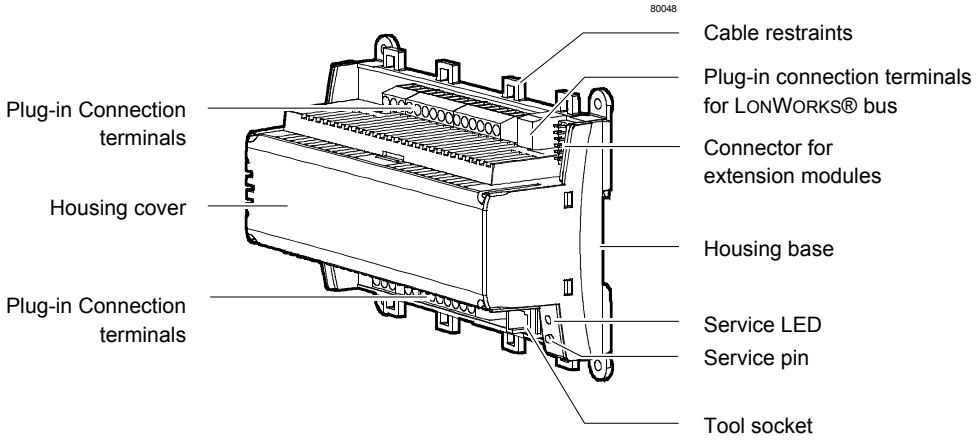
The RXC31 can be used in conjunction with extension modules RXC40 for lighting control (data sheet CA2N3842) and the RXC41 for the control of blinds (data sheet CA2N3843). For this purpose, the RXC31 controller must be loaded with an application corresponding to the selected combination. Possible combinations and the associated applications are described in the applications library (V1: CA2A3810, V2: CA110300).

For operation, a room unit from the QAX… series may be used in conjunction with conventional momentary contact switches for lighting and blind control. Alternatively, the flexible room units, QAX50.1 or QAX51.1 may be used.

See the RX hardware overview (CA2N3804) for a summary of the available field devices.

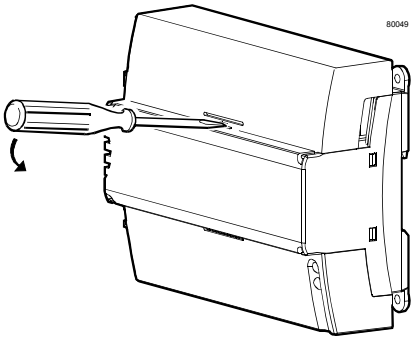
Mechanical design

The RXC31 controller consists of a housing base, a housing cover and the printed circuit board with connection terminals. The controllers also have a connector base for the extension modules, a tool socket, a service LED and a service pin.



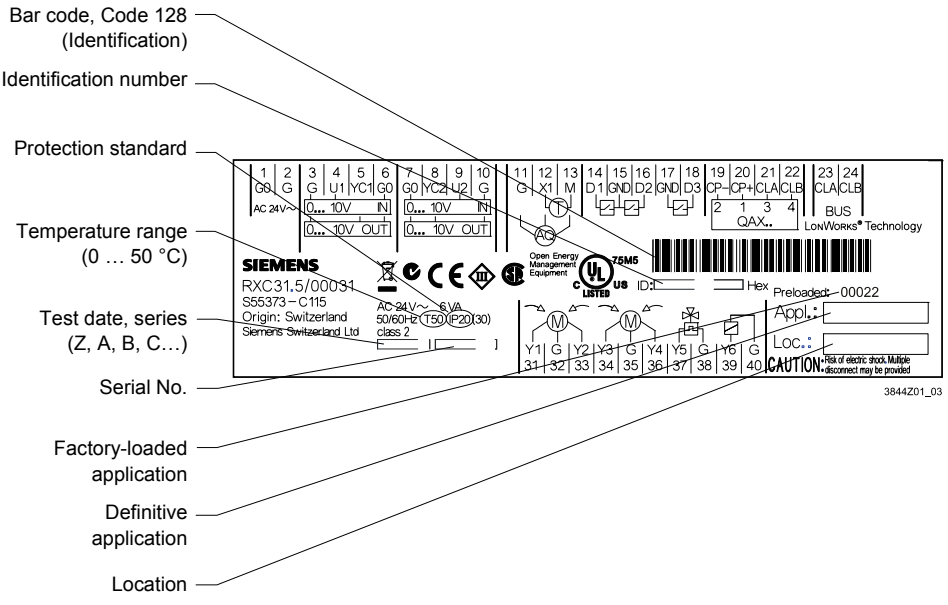
Terminal covers

Terminal covers (RXZ30.1) are available as an option to protect the connection terminals from physical contact and dirt. These covers also provide strain relief for the cables connecting the extension modules. The service LED remains visible when the terminal covers are in place, and the service pin can be operated with a pointed implement. When fitting the terminal covers ensure that they lock into place.



Removing the terminal cover

Label



Note

Options for use of the labeling fields “Appl.” and “Loc.”:

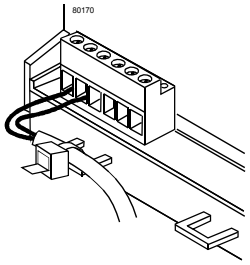
- Hand-written entry of the location and the actual application … or
- Printed adhesive label (printed from the RXT10 commissioning and service tool)

Connection terminals

All connection terminals are detachable plug-in terminals. They are arranged so that, under normal circumstances, all incoming and outgoing cables can be connected without crossing.

Cable strain relief

The conductors to the connection terminals can be secured with cable ties to the housing base.



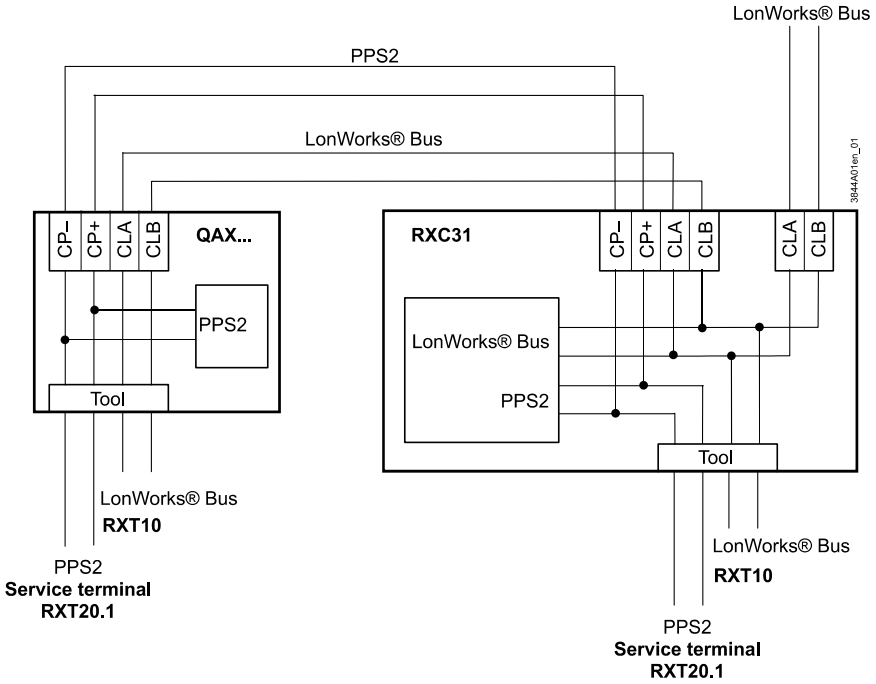
Communication

The RXC31 controller communicates with other devices via the following interfaces:

- LONWORKS® bus (terminals CLA and CLB) for communication with:
  - the PXR system controller or the NIDES.RX interface (to Desigo)
  - other Desigo RXC devices
  - LonMark®-compatible third party devices (e.g. presence detector)
- PPS2 (terminals CP– and CP+):
  - Interface to the QAX… room units. (In addition to PPS2, the LonWorks® bus is also looped to the tool socket on the room unit.)
- Tool socket (RJ45) on the controller or room unit, for:
  - RXT10 commissioning and service tool (LonWorks® bus)
  - RXT20.1 service terminal (PPS2)
- PE bus (plug-in connection):
  Interface to the RXC40 and RXC41 extension modules.

LONWORKS® bus

The diagram below shows the wiring of the LONWORKS® bus and PPS2 interface when a QAX… room unit is connected. It also shows the options for connecting the RXT10 commissioning and service tool and the RXT20.1 service terminal.



Service LED

The yellow service LED shows the current operational status of the controller by means of different flashing patterns (see the RXT10 user manual, CA110338).

Service pin

The service pin is used to identify the controller in the commissioning phase. When the pin is pressed the controller's identification number is transmitted to the RXT10 commissioning and service tool.

Disposal

The devices are classified as waste electronic equipment in terms of the European Directive 2002/96/EC (WEEE) and should not be disposed of as unsorted municipal waste.
The relevant national legal rules are to be adhered to.
Regarding disposal, use the systems setup for collecting electronic waste.
Observe all local and applicable laws.

Engineering notes

The Desigo RXC installation guide, document CA110334, contains the relevant engineering information for the LONWORKS® bus (topology, bus repeaters, bus termination, etc.) and for the selection and dimensions of connecting cables for the supply voltage and field devices.
See “Connection diagrams” for information on connecting field devices.

AC 24 V supply

The controller operates with an AC 24 V supply voltage (SELV / PELV). The supply cable must be protected with at least 10 A.
The controlled devices (valves and damper actuators) are supplied directly from the controller. The maximum load on the outputs must not be exceeded (see “Technical data”). The power consumption of the connected devices must be taken into account when sizing the transformer.

RXC40 and RXC41 extension modules

The plug-in connection for the extension modules incorporates both the communications and the power supply. The power supply is limited to a maximum of two extension modules. The possible combinations are determined by the available applications. See the Desigo RXC applications library (V1: CA2A3810, V2: CA110300).

AC 24 V triac outputs

- The **simultaneous** load on outputs Y1…Y6 must not exceed 24 VA
- The maximum load on each output must not exceed 12 VA

Example

Equipment	Y1, Y2 (supply air)	1 3-position motorised actuator GDB13…1E	3 VA
	Y3, Y4 (extract air)	1 3-position motorised actuator GDB13…1E	3 VA
	Y5 (Heating)	2 thermic valve actuators, type STP72E	6 W
	Y6 (Cooling)	2 thermic valve actuators, type STP72E	6 W

Simultaneous load:	2 motorised actuators (both ON continuously)	6 VA
	2 thermic valve actuators *	6 W (12 W) **
		12 W (18 W)

* The heating and cooling sequences are never operative simultaneously. Therefore only the actuators for one of the two sequences need to be included when calculating the total load.

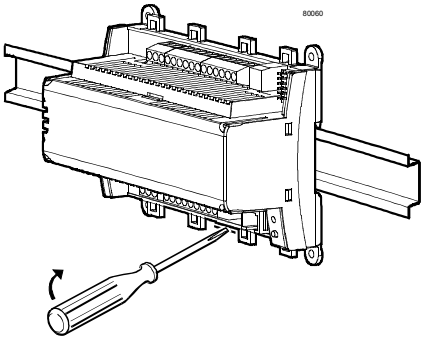
** When cold, thermic valve actuators have a consumption of approximately 6 W. A maximum of two thermic actuators may be connected to any one Y.. output.

Compact VAV controllers

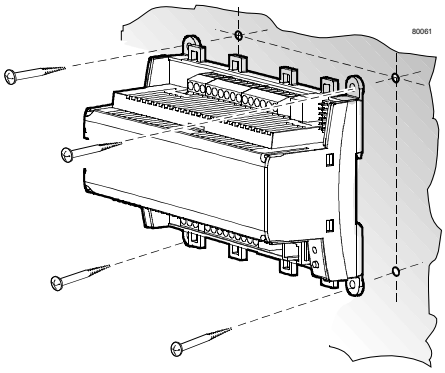
- If more than two compact VAV controllers are connected to the same output of the controller external auxiliary terminals must be used (only 2 wires per terminal).
- Only compact VAV controllers with a DC 0 … 10 V signal may be used.

Mounting

The controller can be mounted in any orientation as follows:



Rail mounting
The housing base is designed for snap-mounting on DIN rails, type EN50022-35x7.5 (can be released with a screw-driver).



Surface mounting
There are four drill holes for screw mounting (see “Dimensions” for drilling diagram). The housing base is fitted with raised supports.
Screws: Max. diameter 3.5 mm.

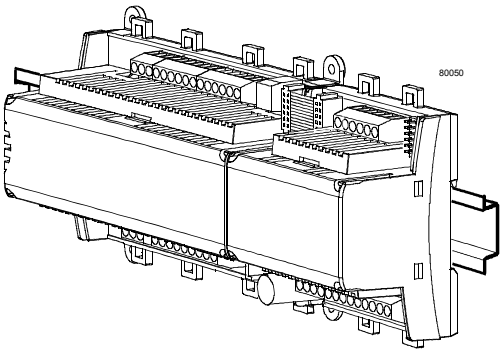
When mounting note the following:

- Ensure adequate air circulation to dissipate heat generated during operation.
- Easy access is required for service personnel.
- Local installation regulations must be observed.

The mounting instructions and a drilling template are printed on the controller packaging.

Mounting with extension modules

The controller and extension modules (RXC40 and RXC41) must be mounted on the same DIN rail.



Note

If different types of extension module are used they must be arranged in the following order: RXC31 → RXC40 → RXC41

Commissioning

The RXC31 controller is commissioned with the RXT10 commissioning and service tool. This is connected to the LONWORKS® bus via a tool socket (on the controller or room unit).

The commissioning procedure for the entire Desigo RXC range is described in detail in the RXT10 user manual, document CA110338.

Labeling

The labeling fields “Appl.” and “Loc.” on the controller are used to indicate the application actually loaded and the location of the controller, either in writing or by use of printed adhesive labels (see “Label” under “Mechanical design”).

Function test

All applications (including basic application 00031) allow direct interrogation of the inputs and control of the outputs using the RXT10 commissioning and service tool. This makes it possible to test the installation and to operate connected plant provisionally before the complete Desigo RXC system is commissioned.

Notes

- The LONWORKS® bus plug (terminals 23 and 24) can be removed and reconnected at any time, even while the controller is in operation. Only the original bus plug may be used.
- Overloading the outputs Y1 … Y6 may cause the thermal fuse to trip and disable the controller. When the problem has been solved briefly disconnect and reconnect the power supply. The controller will resume normal operation after a delay of approximately 10 minutes.

Note!

Outputs Y1 … Y6 are not protected against accidental connection to AC 24 V. This can damage the triacs.

Technical data

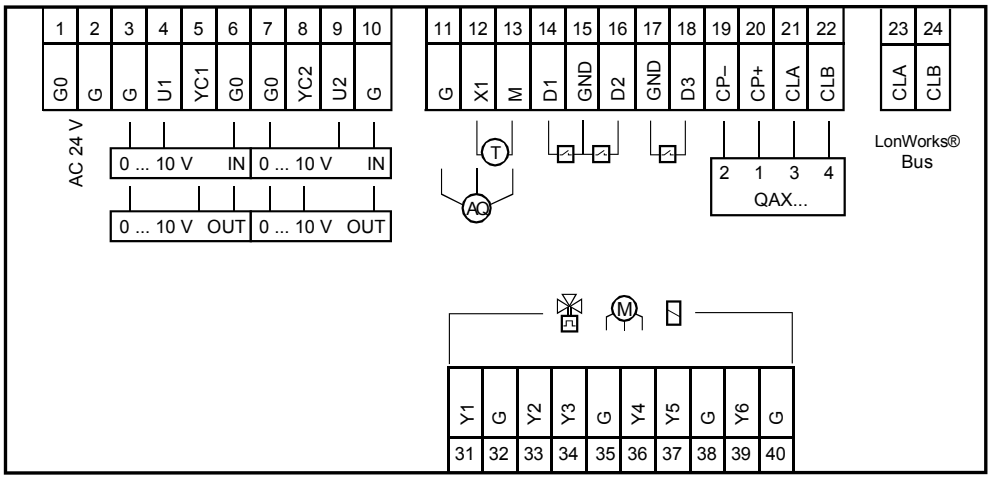
Power supply	Operating voltage	SELV / PELV AC 24 V ± 20 %
	Rated voltage	AC 24 V
	Frequency	50/60 Hz
	Power consumption	
	without field devices	6 VA
	with field devices & extension modules	Max. 33 VA
	Internal fuse	Thermal, automatic reset
	Supply cable protection (external fuse)	≤ 10 A
Inputs	Signal inputs for volt-free contacts	
	Quantity	3 (D1, D2, D3)
	Contact voltage	DC 33 V
	Contact current	DC 8 mA
	Contact transfer resistance	Max. 100 Ω
	Contact insulation resistance	Min. 50 kΩ
	Not suitable for pulse control	
	Measured value input for temp. measurement	
	Quantity	
	Suitable temperature sensors	1 (X1) [1)]
	Measuring range	LG-Ni 1000
	Sensor current	–40 ... 110 °C (2.1 ....2.6 mA)
	Resolution	2.5 mA at 0 °C
	Accuracy	≤ 0.2 K
		At 25 °C ± 0,2 K
	Measured value inputs for DC 0 … 0.10 V	
	Quantity	3 (X1, U1, U2) [1)]
	Measuring range (nominal)	DC 0 ... 10 V
	Overreach	3.0 V
	Underreach	0 V
	Resolution	20 mV
	Sample rate	≤ 200 ms (U1, U2)
		≤ 1 s (X1)

1) X1 selected by option button in RXT10 tool: LG-Ni 1000 or DC 0 …10 V

Outputs	Triac outputs AC 24 V	
	Quantity	6 (Y1 ... Y6)
	Output voltage	AC 24 V on/off, PWM or 3-position (selected by switch)
	Output current	Max. 0.5 A
	Total nominal load (load on all outputs simultaneously)	Max. 24 VA
	Control outputs DC 0 …10 V	
	Quantity	2 (YC1, YC2)
	Voltage range (nominal)	DC 0 ... 10 V
	Overreach	5.5 V
	Resolution	8 bits (50 mV)
	Output current	Max. 1mA
	Response time	100 ms
	Interface to room unit	
	Max. no. of connectable room units	Max. 1
	Interface type for RXT10	LONWORKS®
	Baud rate PPS2	4.8 kBit/s
	Baud rate LONWORKS®	78 kBit/s
	LONWORKS® bus	
	Interface type	LONMARK®-compatible, electrically isolated
	Transceiver	on RXC31.1: FTT-10A, on RXC31.5: FT5000
	Baud rate	78 kBit/s
	Bus topology and bus termination	See Installation guide, CA110334
	Interface to extension modules	Serial PE bus (power supply and data)
Cable connections	Plug-in terminal blocks	Rising cage terminals
	Solid conductors	1 x 0.2 ... 2.5mm^2 or 2 x 0.2 ... 1.0 mm^2
	Stranded conductors without connector sleeves	1 x 0.2 ... 2.5mm^2 or 2 x 0.2 ... 1.5 mm^2
	Stranded conductors with connector sleeves (DIN 46228/1)	1 x 0.25 ... 2.5mm^2 or 2 x 0.25 ... 1.0 mm^2
	Max. tightening torque	0.6 Nm
	Connecting cable for extension modules	10-core ribbon cable, part of scope of delivery
	Single cable lengths	See Installation guide, CA110334
	Signal inputs D1 … D3	Max. 100 m with diameters ≥ 0.6 mm
	Measured value input X1	Max. 100 m with diameters ≥ 0.6 mm
	Triac outputs AC 24 V, Y1 ... Y6	Max. 100m where A ≥ 1.5 mm^2
	Control outputs DC 0 ... 10 V, YC1, YC2	Max. 100m where A ≥ 1.5 mm^2
	Interface to room unit	Max. 115 m where A= 0.75 mm^2 (including tool connecting cable)
	Cable type	4-core, twisted pair, unscreened Max. 230 m where A = 1.5mm^2, for all compact VAV controllers together
	Compact VAV controller with PPS2 interface (YC1, YC2)	
	LONWORKS® bus	
	Cable type	See Installation guide, CA110334
	Tool connecting cable	See Installation guide, CA110334
Housing protection standard	Protection standard to EN 60529	IP30 with terminal cover fitted and wall mounted without DIN rail All other mounting arrangements: IP20
Protection class	Insulation protection class	III

Ambient conditions	Operation	Class 3K5 to IEC 60,721-3-3
	Temperature	0 ... 50 °C
	Humidity	< 85 % rh
	Transport	Class 2K3 to IEC 60,721-3-2
	Temperature	– 25 ... 65 °C
	Humidity	< 95 % rh
Standards and directives	Product safety	
	Automatic electronic controls for household and similar use	EN 60730-1
	Electromagnetic compatibility	
	Immunity (industrial & residential)	EN 60730-1
	Emissions (residential)	EN 60730-1
	CE compliance	
	Meets requirements of EMC directive	2004/108/EC
	UL compliance	UL916
	C-Tick conformity (EMC)	AS/NZS 61000-6-3
Environmental compatibility	The product environmental declaration CA2E3840 contains data on RoHS compliance, materials composition, packaging, environmental benefit, disposal	ISO 14001 (Environment) ISO 9001 (Quality) 2002/95/EC (RoHS)
Dimensions	See dimension diagrams	
	Width in DIN modular spacing units	8.5
Weight	Excluding packaging	0.28 kg

Connection terminals



Power supply

G0	1	Controller ground
G	2	AC 24 V supply

Analogue inputs and outputs

G	3	AC 24 V supply for sensors, actuators or compact VAV controllers
U1	4	Measured value input for sensor (DC 0 … 10 V)
YC1	5	DC 0 … 10 V control output for actuator
G0	6	Controller ground
G0	7	Controller ground
YC2	8	DC 0 … 10 V control output for actuator
U2	9	Measured value input for sensor (DC 0 … 10 V)
G	10	AC 24 V supply for sensors, actuators or compact VAV controllers

Measured value inputs for temperature or air quality sensors

G	11	AC 24 V supply for sensor
X1	12	Measured value input for sensor (LG-Ni 1000 or DC 0 … 10 V)
M	13	Sensor ground

Signal input for volt-free contacts

D1	14	Signal input
GND	15	Signal ground
D2	16	Signal input
GND	17	Signal ground
D3	18	Signal input

Room unit

CP–	19	Ground
CP+	20	Data
CLA	21	Data A
CLB	22	Data B

LONWORKS® bus (plug-in)

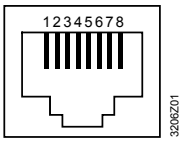
CLB	23	Data B
CLA	24	Data A

Triac outputs

Y1	31	AC 24 V, 0.5 A switching output
G	32	AC 24 V actuator supply
Y2	33	AC 24 V, 0.5 A switching output
Y3	34	AC 24 V, 0.5 A switching output
G	35	AC 24 V actuator supply
Y4	36	AC 24 V, 0.5 A switching output
Y5	37	AC 24 V, 0.5 A switching output
G	38	AC 24 V actuator supply
Y6	39	AC 24 V, 0.5 A switching output
G	40	AC 24 V actuator supply

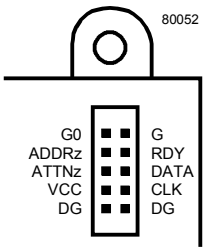
Tool socket

Standard RJ45 tool socket for LONWORKS® devices.



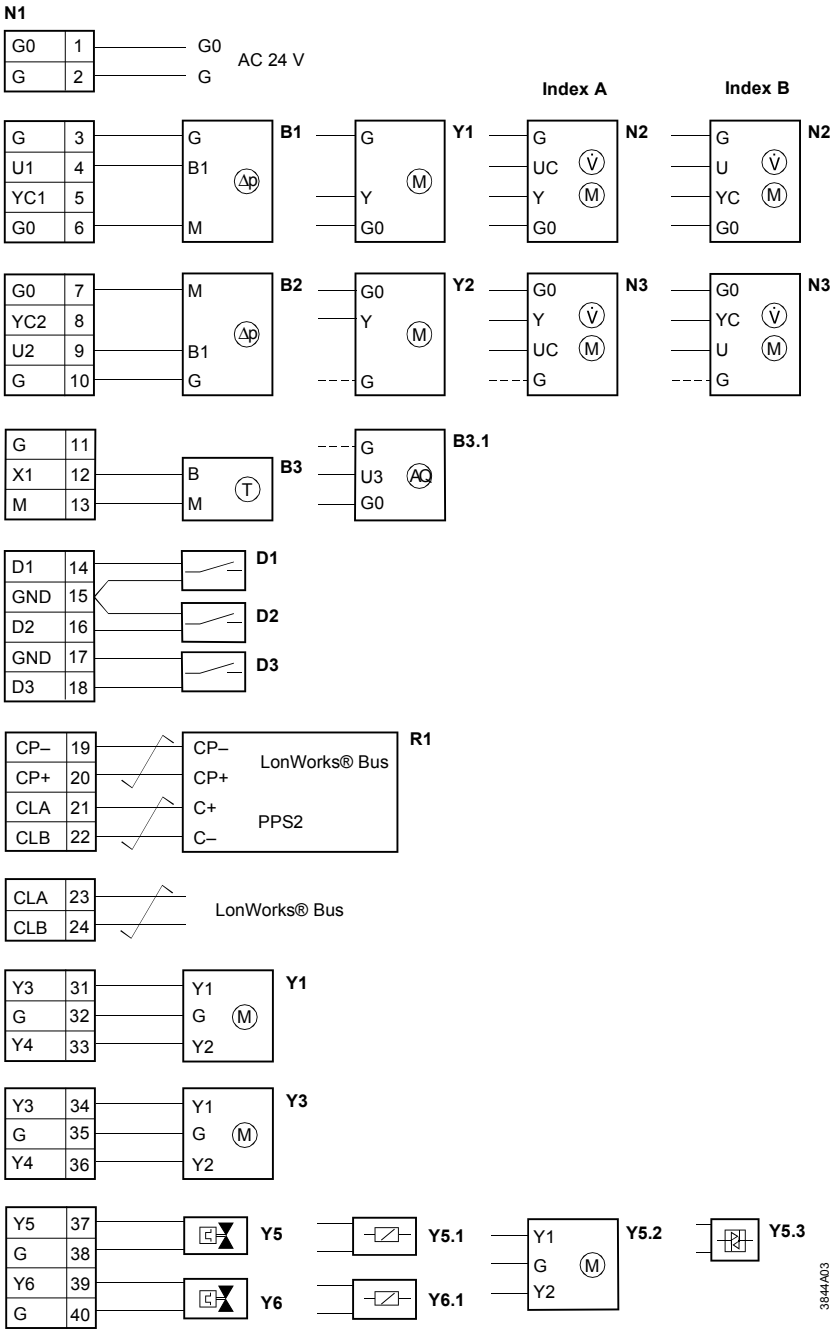
1	LONWORKS®, Data A (CLA)	5	Not used
2	LONWORKS®, Data B (CLB)	6	Not used
3	Not used	7	CP+
4	Not used	8	CP–

Connector for extension modules



G0	Ground	G	AC 24 V
ADDRz	Module address	RDY	Handshake
ATTNz	Handshake	DATA	Data
VCC	DC 5 V	CLK	Clock
DG	Electronics ground	DG	Electronics ground

Connection diagrams



N1	RXC31
N2, N3 [1)]	VAV compact controller AC 24 V, 0...10 V
B1, B2 [1)]	Differential pressure sensor
B3.1	Air quality sensor
B3	LG-Ni 1000 temperature sensor
Y1, Y2 [1)]	Actuator for damper types 0... 10 V
D1 ... D3	Volt-free contacts (window switch, occupancy sensor, etc.)
R1	QAX… room unit
Y1, Y3, Y5.2	AC 24 V 3-position damper actuators
Y5, Y6	AC 24 V thermic valve actuators
Y5.1, Y6.1	AC 24 V contactors for electric heating coil
Y5.3	Solid state relays Ac24V

1) Supply air devices to U1, YC1, and extract air devices to U2, YC2 (depending on application)

Notes

- Do not exceed the maximum simultaneous load on outputs Y1 … Y6 (see “Engineering”).
- A power amplifier may be used to connect additional valve actuators to Y5 and Y6 (see Desigo RXC installation guide, CA110334).
- For information on actuators compatible with the RXC31 controller, refer to the relevant application descriptions (see Desigo RXC applications library (V1: CA2A3810, V2: CA110300).
- The AC 24 V supply (G) for devices such as the compact VAV controllers or DC 0 …10 V damper actuators, for example, can be derived either from the controller or from an external source (see Desigo RXC installation guide CA110334). If the connected devices receive their supply from the controller the power consumption of these devices must be taken into account when sizing the transformer.
- The feedback signal (U or UC) from the VAV compact controller is not an essential requirement for the control in the RXC31 controller.

Parallel connection of several thermic actuators

Up to 2 thermic actuators can be connected directly to the room controller.
In the case of more than 2 actuators a power amplifier is required.

The same principle applies to output Y6.

Note that the simultaneous load on outputs Y5 and Y6 must not exceed 9.5 VA.

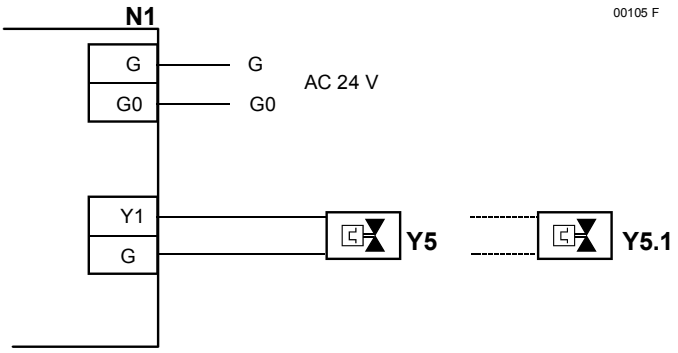
Power consumption at input X1 of the UA1T: 0.5 VA.

Note!

Mixed operation: **Connecting thermic actuators to the controller as well as to the power amplifier is NOT allowed.**

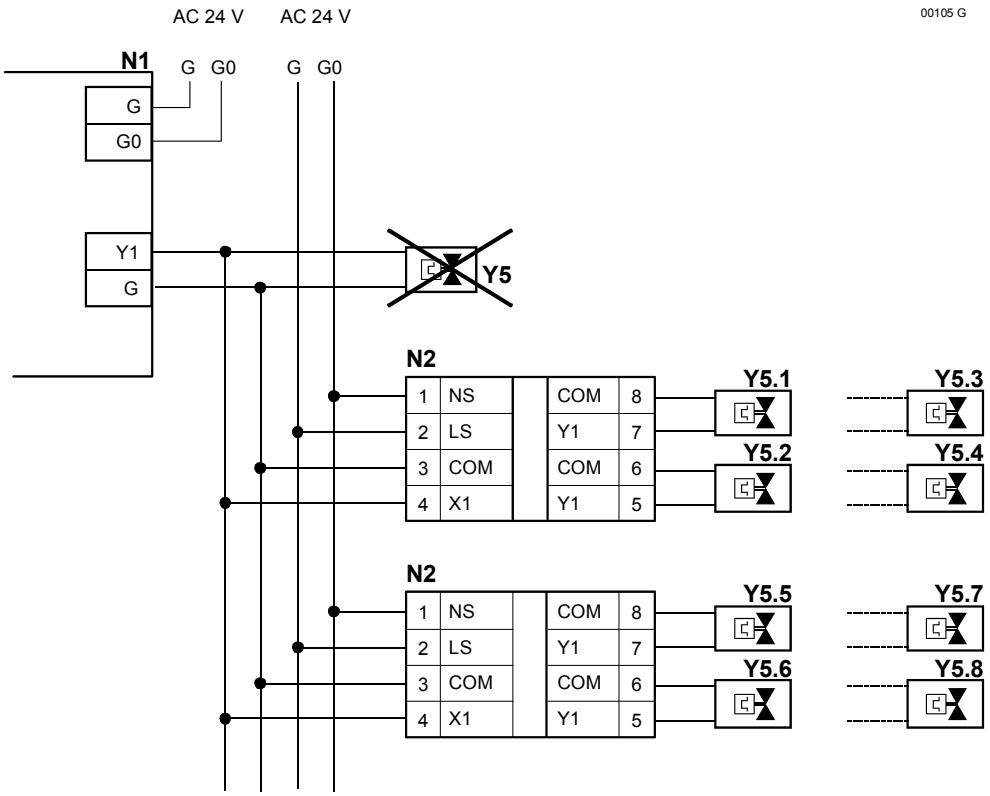
Differing voltage of the power supply of the controller and the supply of the power amplifier may cause big differences in the position of the valves.

Connection to controller



N1 RXC31
N2 UA1T (see data sheet CA2N3591)
Y5 AC 24 V thermic valve actuator
Y5.1 AC 24 V thermic valve actuator

Connection to power amplifier



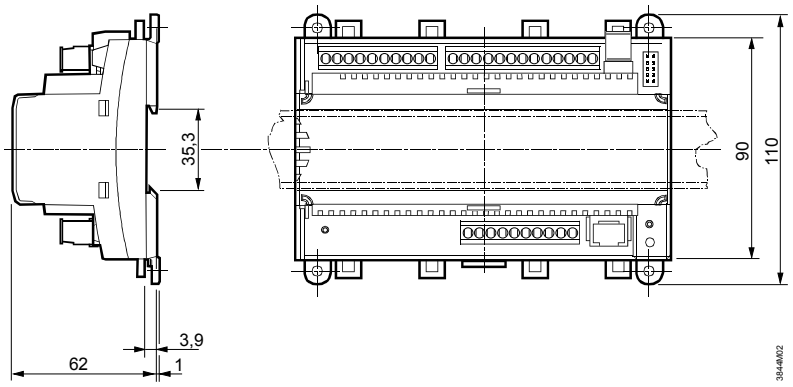
N1 RXC31
N2 UA1T (see data sheet CA2N3591)
Y5 AC 24 V thermic valve actuator
Y5.x AC 24 V thermic valve actuator (max. 2 STA72E / STP72E actuators per Y1 output on the UA1T)

Notes
- The UA1T requires an AC 24 V supply voltage
- The UA1T is *not* suitable for the connection of 3-position actuators.

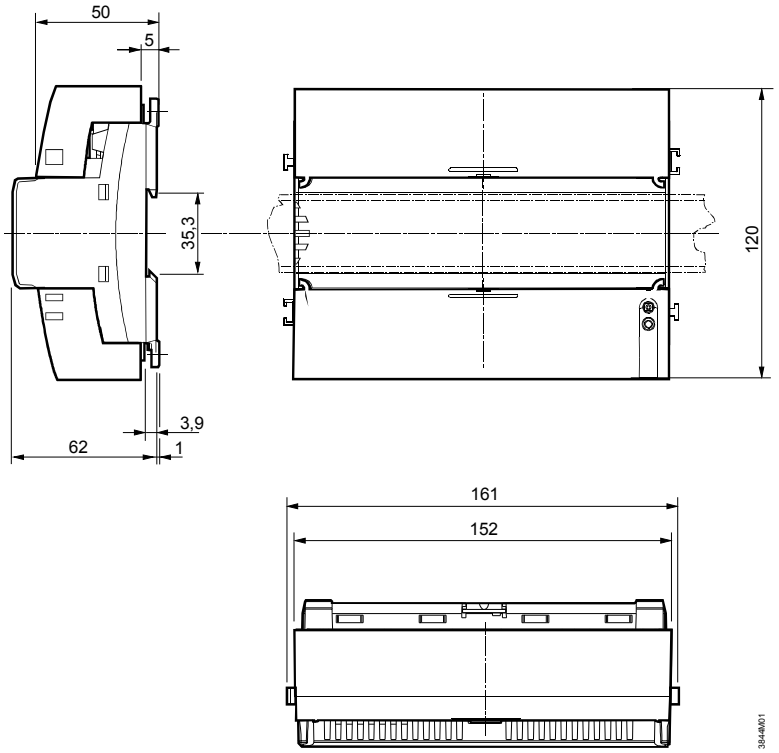
Dimensions

All dimensions in mm

Without terminal covers



With terminal covers



Drilling diagram