



DESIGO™ RXB

Room controllers

For fan-coil, chilled-ceiling and radiator applications
with EIB bus communication

RXB20.1
RXB21.1
RXB22.1

The RXB20.1, RXB21.1 and RXB22.1 room controllers are used for temperature control in individual rooms.

- For 2-pipe or 4-pipe fan-coil systems, with or without change-over
- PI control
- EIB bus communication
- Integration into the DESIGO building automation system via NIEIBV2
- Control of AC 24 V PDM ¹⁾ thermic valve actuators, 3-position AC 24 V valve and damper actuators, or electric heating coils
- Use of motorized EIB bus valves
- Volt-free relay contacts for control of fans and electric heating coils
- AC 230 V operating voltage

1) PDM = Pulse Duration Modulation

Use

The RXB20.1, RXB21.1 and RXB22.1 room controllers are optimized for control of fan-coil systems in individual rooms.

The following versions are available for fan-coil systems:

- RXB20.1: Single speed automatic fan control
- RXB21.1: Single-speed to 3-speed automatic fan control
- RXB22.1: Single speed to 3-speed automatic fan control with integrated relay for electric re-heater

The application of each controller is determined by the application software.

The controllers are delivered with a fixed set of applications, each of which contains various individual applications. The actual application required is selected and activated with the ETS (EIB Tool Software) during commissioning.

Use of spare inputs/outputs

Some of the applications do not make full use of all the inputs and outputs. These I/Os can be used freely in conjunction with a building automation and control system, to register digital signals, for example, or to control various items of equipment (ON/OFF or pulse control with AC 24 V or volt-free relay contacts).

The inputs can then be read and the outputs controlled via the building automation and control system.

Note

Not suitable for time-critical processes <1 s.

Functions

The room controller functions are determined by the selected application and its parameters, and by the input/output configuration.

For a detailed description of functions, refer to the DESIGO RX applications library, document CA2A3890.

When DESIGO RXB is integrated into a building automation and control system, additional functions, such as time scheduling, central control of setpoints, etc., become available.

Applications

The following applications are available for the RXB2... room controllers:

Application group (type)	Applications
FC-06 (with RCB21.1)	FNC02 Fan coil unit, two-pipe system FNC04 Fan coil unit, four-pipe system FNC08 Fan coil unit, two-pipe system and outside air damper FNC20 Fan-coil unit, 4-pipe system with single damper control
Other application groups in preparation	

Note

Only one application at a time can be activated via the ETS.

Types

The RXB20.1, RXB21.1 and RXB22.1 room controllers differ only in the number of outputs available:

Type	AC 24 V triac outputs	Relay outputs
RXB20.1 *)	For two thermic valve actuators or one 3-position actuator	For single-speed fan control
RXB21.1	For four thermic valve actuators or two 3-position actuators	For 3-speed fan control
RXB22.1 *)	For two thermic valve actuators or one 3-position actuator	For 3-speed fan control; internal relay for electric heating coil
RXZ20.1	Accessories: Terminal covers	

*) not yet available

Ordering

When ordering please specify the quantity, product name, type code and application group.

Example: 30 Room controllers, type RXB21.1/FC-06

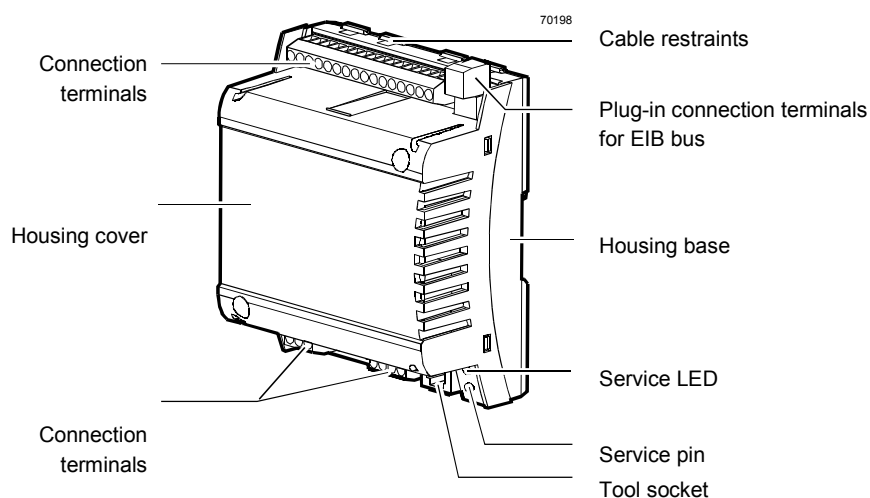
Compatibility

The RXB2... room controller is compatible with field devices from Siemens Building Technologies and with EIB-compatible third-party devices.

For details, refer to the DESIGO RXB range description, document CA2S3879.

Design

The RXB2... controllers consist of a housing base, a housing cover and the printed circuit board with connection terminals. The controllers also have a tool socket, a service LED and a service pin.



Service LED

The red service LED shows the operational status of the room controller.

Service pin

The service pin is used to identify the controller in the commissioning phase. After operation of the service pin, the ETS overwrites the physical address in the room controller. As soon as the service pin is pressed, the red service LED lights up and remains on until identification of the controller is complete.

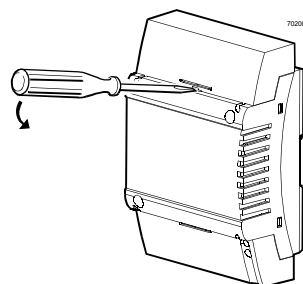
Warning

If there are no terminal covers fitted, the service pin may be operated only by a qualified electrician.

The adjacent terminal may be connected to the mains voltage.

Terminal cover

Terminal covers (RXZ20.1) are available as an option, to protect the connection terminals from physical contact and dirt. When the terminal cover is in place, the service LED remains visible and the service pin can be operated with a pointed implement. The cable is connected to the room controller by breaking out the perforated cable entry guide.



Removing the terminal cover

Label (example for RXB21.1)

Identification number
(unique serial number)

ID in bar code form, code 128

Protection standard

Temperature range
(0 ... 50 °C)

Serial No.

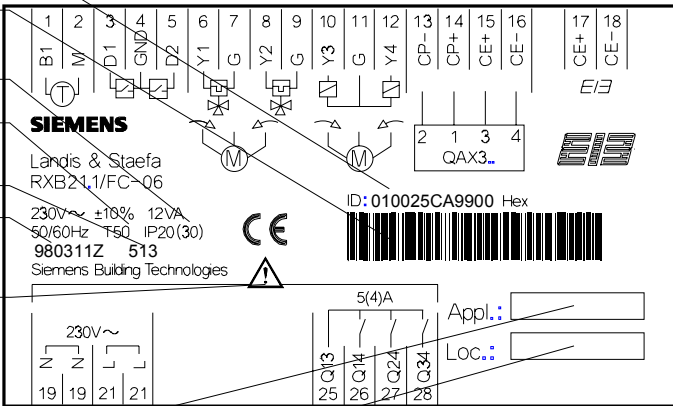
Test date, series
(Z, A, B, C...)

Observe notes
in this document

Activated
application

Location

01449



Note

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

- Handwritten identification of the location and the activated application group.

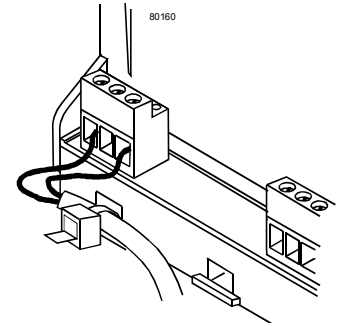
Connection terminals

The connection terminals for the EIB bus are detachable plug-in screw-terminals. All other terminals are fixed. To avoid incorrect wiring, terminals which can be connected to AC 230 V (supply and relay outputs) are physically separate from the other terminals.



Warning

The cable restraints on the housing base *must* be used for the connections to terminals 19 ... 28 (AC 230 V). The conductors must be secured with cable ties (see diagram).



Communication

The RXB2... controllers communicate with other devices via the following interfaces:

- PPS2 interface (proprietary) for the exchange of data with the room units
- EIB bus (terminals CE+ and CE-) for communication with:
 - NIEIBV2 interface (to DESIGO INSIGHT)
 - Other DESIGO RXB controllers
 - EIB compatible field devices (e.g. outside temperature sensor)



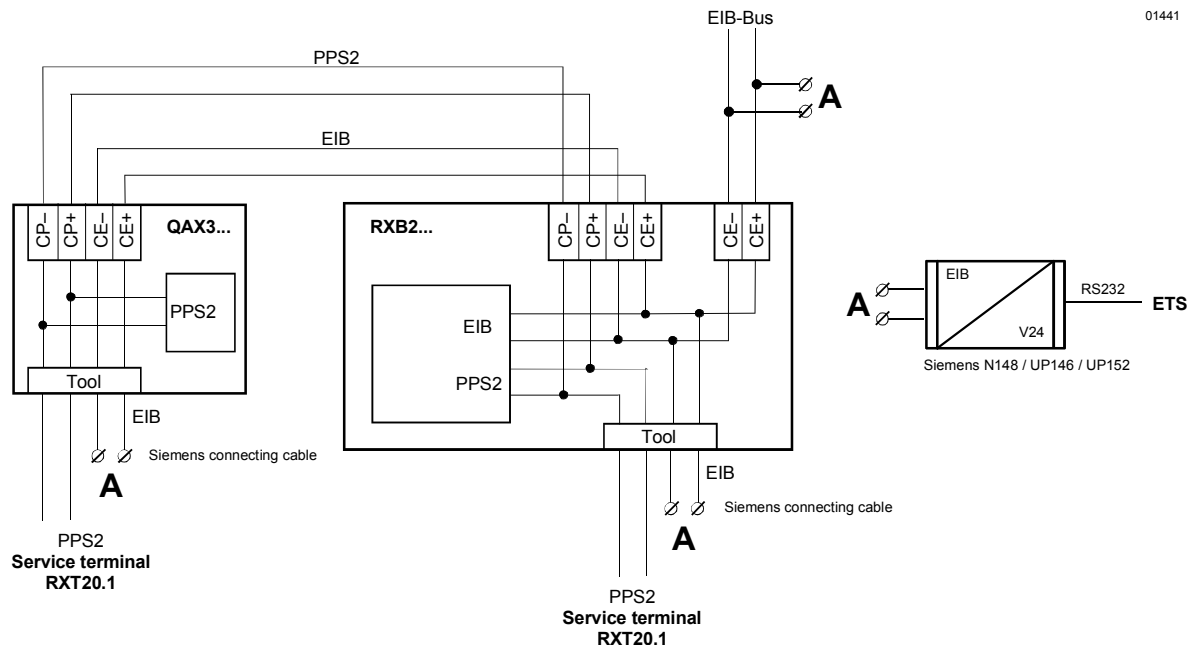
Warning

The tool socket (RJ45) must only be connected by a qualified electrician. The adjacent terminal may be a live mains voltage conductor.

Connecting the tool

To facilitate commissioning, the ETS can be connected at three different points (marked **A**) in the diagram in the plant:

- to the EIB bus cable at any point
- to the RXB2... controller (RJ45 tool socket)
- to the room unit (RJ45 tool socket)



Note

The tool connection socket is a proprietary socket. A Siemens connecting cable must be used. Even when communicating via the tool socket, an RS232 EIB interface is still required for access to the bus.

Disposal



The controller includes electrical and electronic components and must not be disposed of as domestic waste.

Current local legislation must be observed.

Engineering notes

The EIB Building Services Management Manual (Principles / Applications) contains the information relevant for the engineering of the EIB bus (topology, bus repeaters, bus termination, etc.) and for the selection and dimensions of connecting cables for the supply voltage and field devices.

AC 230 V supply cables

The RXB2... room controllers operate with a mains supply voltage of AC 230 V. The controlled devices (valves and damper actuators) receive their power directly from the room controller. This means that a separate AC 24 V supply is not necessary for the controllers and associated field devices.

Sizing and fuse protection of the supply cables depends on the total load and on local regulations. The room controller power cables must be secured with cable restraints.

Volt-free relay outputs AC 230 V

The volt-free relay outputs allow switching of loads up to AC 250 V, 5 A (4 A). The heating coil relay in the RXB22.1 switches resistive loads up to 1.8 kW.

The cable dimensions depend on the connected load and the local installation regulations. The circuits must be externally fused (≤ 10 A) as there are no internal fuses. The room controller power cables must be secured with cable restraints.



Caution

The fans must not be connected in parallel.

AC 24 V triac outputs

Example:

Y1 (heating)	2 thermic valve actuators, type STE72	6 W
Y2 (cooling)	2 thermic valve actuators, type STE72	6 W
Y3, Y4 (outside air)	3-position damper actuator	3.5 VA 3.5 VA

The maximum load is 9.5 VA for the heating sequence and 9.5 VA for the cooling sequence.

This is acceptable because the two sequences never operate at the same time.

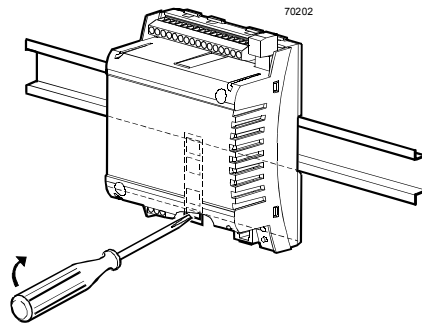


Caution

With low loads (< 2 VA) the voltage tolerance may be greater than +20% (see technical data).

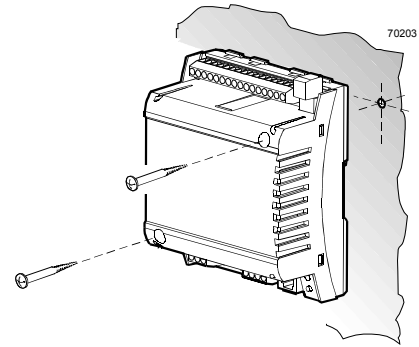
Mounting instructions

The room controllers can be mounted in any orientation, and fixed as follows:



Rail mounting

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



Surface mounting

There are two drill holes for screw-mounting (see "Dimensions" for drilling template). The housing base is fitted with raised supports.

Screws:

Max. diameter 3.5 mm, min. length 38 mm

When mounting note the following:

- The controller should not be freely accessible after mounting
- Ensure adequate air circulation to dissipate heat generated during operation.
- Easy access is required for service personnel
- Local installation regulations must be observed.

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

Commissioning notes

The RXB2... room controller is commissioned with the ETS via the EIB-RS232 interface.

Labeling

The definitive application and the controller's location are handwritten in the labeling fields "Appl." and "Loc" in the commissioning stage.

Function test

A special (ETS) test mode is available, in which the outputs can be operated. Further, if the digital inputs have been activated, they can be interrogated.





Caution

In the event of a long-term short circuit or overload, the thermal fuse in the transformer may trip. The controller must then be replaced.

There is no protection on the AC 24 V side against accidental connection to AC 230 V.

Technical data

 Power supply	Operating voltage	AC 230 V ± 10 %
	Frequency	50/60 Hz
	Power consumption including connected field devices.	Max. 12 VA
	Internal fuse	Thermal, non-resetting
Operating data	Control algorithm	PI
Inputs		
Signal inputs D1, D2 (for volt-free contacts)	Quantity	2
	Contact voltage	DC 16 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 B1	Compatible temperature sensors	LG-Ni 1000
	Quantity	1
	Measuring range	0 ... 50 °C
	Sensor current	2.3 mA
	Resolution	0.01 K
	Measuring error at 25 °C sensor temp. (without cable)	Max. 0.2 K
Outputs		
AC24 V triac outputs , Y1 ... Y4	Quantity	2 (RXB20.1, RXB22.1) 4 (RXB21.1)
	Output voltage	AC 24 V ON/OFF, PWM or 3-position: +/-20% (May exceed +20% with loads under 2VA)
	Output current	Max. 0.5 A
	Total nominal load (at both outputs simultaneously)	Max. 9.5 VA (e.g. 2 thermic valves, type STE72 per heating and cooling sequence + 1 damper actuator 3.5 VA)
 Relay outputs Q14, Q24, Q34	Quantity	1 (RXB20.1) 3 (RXB21.1, RXB22.1)
	Relay type	Monostable
	Contact rating with AC voltage	
	Switching voltage	Max. AC 250 V, min. AC 19 V
	Nominal current, resistive/inductive	Max. AC 5 A/4 A (cos φ = 0.6)
	Making current 200 ms half-time	Max. 20 A
	Switching current at AC 29 V	Min. AC 10 mA
	Contact rating with DC voltage	
	Switching voltage	Max. DC 250 V, min. DC 5 V
	Switching current at DC 5 V	Min. DC 100 mA
	Switching capacity	Max. 20 W
	Inductive load L/R	Max. 7 ms
	Relay type	Monostable
	Contact rating with AC voltage	
Q44	Max. admissible load (resistive only)	Max. 1.8 kW
	External fuse (essential)	Max. 10 A
Ports/interfaces		
Interface to room unit	Number of room units connectable	1
	Interface type for room unit	PPS2
	for ETS	EIB bus
	PPS2 baud rate	4.8 kbit/s
	EIB baud rate	9.6 kbit/s
EIB bus	Interface type	EIB (electrically isolated)
	Transceiver	TP-UART
	Bus current	5 mA
	Baud rate	9.6 kbit/s
	Bus topology, bus termination	Refer to EIB manual (Reference documentation, see next page)

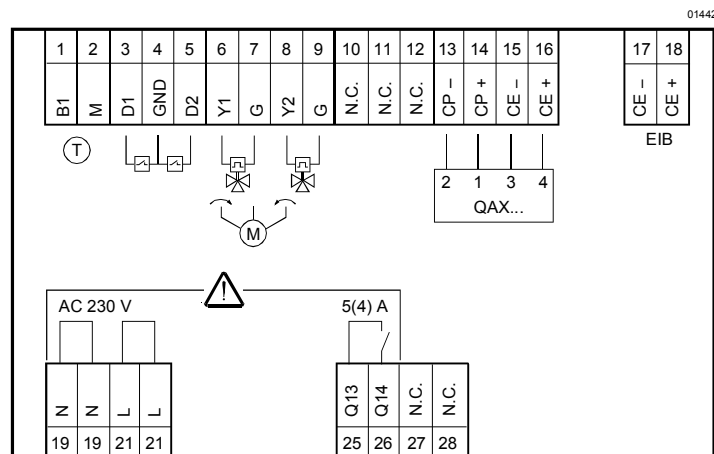
Cable connections	Connection terminals for signals and power supply (screw terminals)	Stranded or solid conductors, 0.25 ... 2.5 mm ² or (solid conductors only) 2 x 1.5 mm ²
	EIB bus connection terminals (plug-in screw terminals)	Stranded or solid conductors 2 x 1.00 mm ² (isolation length: < 7 mm)
	Single cable lengths	see also installation guide, CA2Z3802
	Signal inputs D1, D2	Max. 100 m with diameters ≥ 0.6 mm
	Measured value input B1	Max. 100 m
	AC24 V triac outputs , Y1 ... Y4	Max. 100m where A ≥ 1.5 mm ²
	Relay outputs Q14, Q24, Q34, Q44	Depends on load and local regulations
	Interface to room unit	max. 115 m where A= 0.75 mm ² (including tool connecting cable)
	Cable type	4-core, twisted pair, unscreened
	EIB bus	Max. 500 m
	Cable type	Refer to EIB manual
		(see "Reference documentation" below)
	Tool connecting cable	Max. 3 m
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Housing protection standard	Protection standard to EN 60529	IP30 with terminal cover fitted and wall mounted without DIN rail IP20 for all other mounting arrangements
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Protection class	Suitable for use in systems with protection class I or II	
Ambient conditions	Normal operation	class 3K5 to IEC 60721-3-3
	Temperature	0 ... 50 °C
	Humidity	< 85 % rh
	Transport	Class 2K3 to IEC 60721-3-2
	Temperature	– 25 ... 65 °C
	Humidity	< 95 % rh
<hr/>		
Industry standards	Product safety	
	Automatic electronic controls for household and similar use	EN 60730-1
	Special requirements for energy regulators	EN 60730 -2 -11
	Electromagnetic compatibility	
	Interference immunity	EN 50082-2
	Emitted interference	EN 50081-1
	Meets the requirements for CE marking:	
	Electromagnetic compatibility, in accordance with Directive	89/336/EEC
	Low Voltage Directive	73/23/EEC
	Home and building electronic systems (HBES)	EN 50090-2-2
<hr/>		
Abmessungen	See dimension diagrams	
Weight	Excluding packaging	0.59 kg

Reference documentation

- Building Services Management Manual – Fundamental principles
- Building Services Management Manual – Applications

Zentralverband Elektrotechnik- und Elektronikindustrie e.V. (ZVEH)
(Central association for the electrical and electronic engineering industry)
 Stresemannallee 19D-60596 Frankfurt a. M, Germany.

RXB20.1



Measured value input

B1	1	Measured value input for LG-Ni 1000 sensors
M	2	Measured value input ground

Signal inputs

D1	3	Signal input
GND	4	Signal ground
D2	5	Signal input

Triac outputs

Y1	6	AC 24 V, 0.5 A switching output
G	7	AC 24 V actuator supply
Y2	8	AC 24 V, 0.5 A switching output
G	9	AC 24 V actuator supply

Room unit

CP-	13	PPS2 ground
CP+	14	PPS2 data
CE-	15	EIB data cable -
CE+	16	EIB data cable +

EIB bus (plug-in)

CE-	17	EIB data cable -
CE+	18	EIB data cable +

Power supply

N	19	Neutral conductor
L	21	Phase conductor AC 230 V +/- 10 %

Relay output

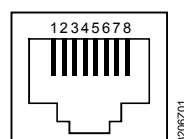
Q13	25	Lead wire for Q14
Q14	26	Normally-open contact max. AC 250 V, 5 (4) A

Caution

- Observe the technical data for the relay output: max. AC 250 V, 5 (4) A
- Local installation regulations must be observed.

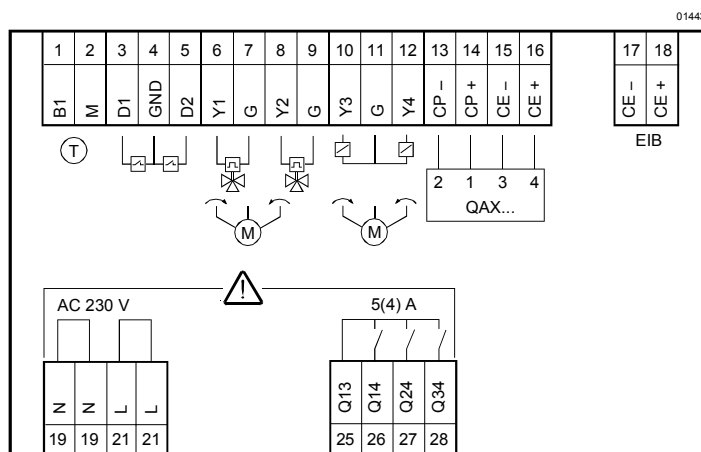
Tool socket

Proprietary RJ45-type tool socket



- | | |
|---|------------------------|
| 1 | EIB data cable (CE+) |
| 2 | EIB data cable - (CE-) |
| 3 | Not used |
| 4 | Not used |
| 5 | Not used |
| 6 | Not used |
| 7 | PPS2 (CP+) |
| 8 | PPS2 (CP-) |

RXB21.1



Measured value input

- B1 1 Measured value input for LG-Ni 1000 sensors
M 2 Measured value input ground

Signal inputs

- D1 3 Signal input
GND 4 Signal ground
D2 5 Signal input

Triac outputs

- Y1 6 AC 24 V, 0.5 A switching output
G 7 AC 24 V actuator supply
Y2 8 AC 24 V, 0.5 A switching output
G 9 AC 24 V actuator supply
Y3 10 AC 24 V, 0.5 A switching output
G 11 AC 24 V actuator supply
Y4 12 AC 24 V, 0.5 A switching output

Room unit

- CP- 13 PPS2 ground
CP+ 14 PPS2 data
CE- 15 EIB data cable -
CE+ 16 EIB data cable +

EIB bus (plug-in)

- CE- 17 EIB data cable -
CE+ 18 EIB data cable +

Power supply

- N 19 Neutral conductor
L 21 Phase conductor AC 230 V +/- 10 %

Relay outputs

- Q13 25 Common feed for Q14, Q24 and Q34
Q14 26 Normally-open contact, max. AC 250 V, 5 (4) A (Stage 1)
Q24 27 Normally-open contact, max. AC 250 V, 5 (4) A (Stage 2)
Q34 28 Normally-open contact, max. AC 250 V, 5 (4) A (Stage 3)

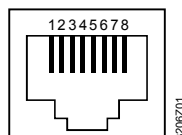


Caution

- Observe the technical data for the relay outputs: max. AC 250 V, 5 (4) A
- Local installation regulations must be observed.

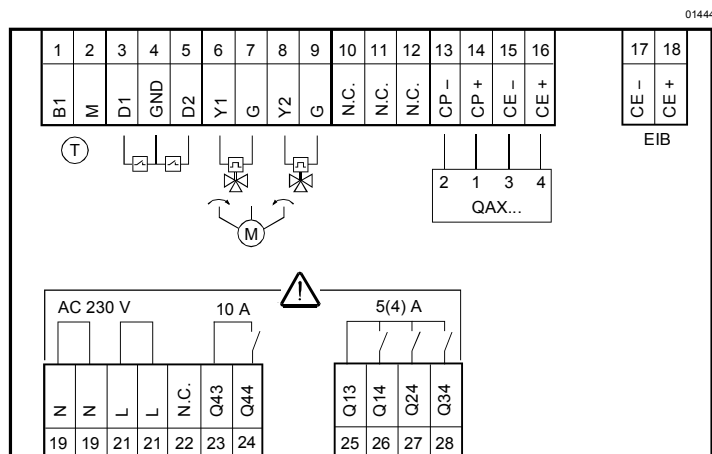
Tool socket

Proprietary RJ45-type tool socket



- | | |
|------------------------|--------------|
| 1 EIB data cable (CE+) | 5 Not used |
| 2 EIB data cable (CE-) | 6 Not used |
| 3 Not used | 7 PPS2 (CP+) |
| 4 Not used | 8 PPS2 (CP-) |

RXB22.1



Measured value input

B1	1	Measured value input for LG-Ni 1000 sensors
M	2	Measured value input ground

Signal inputs

D1	3	Signal input
GND	4	Signal ground
D2	5	Signal input

Triac outputs

Y1	6	AC 24 V, 0.5 A switching output
G	7	AC 24 V actuator supply
Y2	8	AC 24 V, 0.5 A switching output
G	9	AC 24 V actuator supply

Room unit

CP-	13	PPS2 ground
CP+	14	PPS2 data
CE-	15	EIB data cable -
CE+	16	EIB data cable +

EIB bus (plug-in)

CE-	17	EIB data cable -
CE+	18	EIB data cable +

Power supply

N	19	Neutral conductor
L	21	Phase conductor AC 230 V +/- 10 %

Relay outputs

Q13	25	Common feed for Q14, Q24 and Q34
Q14	26	Normally-open contact, max. AC 250 V, 5 (4) A (Stage 1)
Q24	27	Normally-open contact, max. AC 250 V, 5 (4) A (Stage 2)
Q34	28	Normally-open contact, max. AC 250 V, 5 (4) A (Stage 3)
Q43	23	Lead wire for Q44
Q44	21	N/O contact AC max. 250 V, 10 A...(electric heating coil)

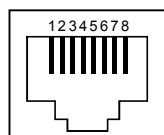


Caution

- **Observe the technical data for the relay outputs: max. AC 250 V, 5 (4) A and 10 A, respectively**
- **Local installation regulations must be observed.**

Tool socket

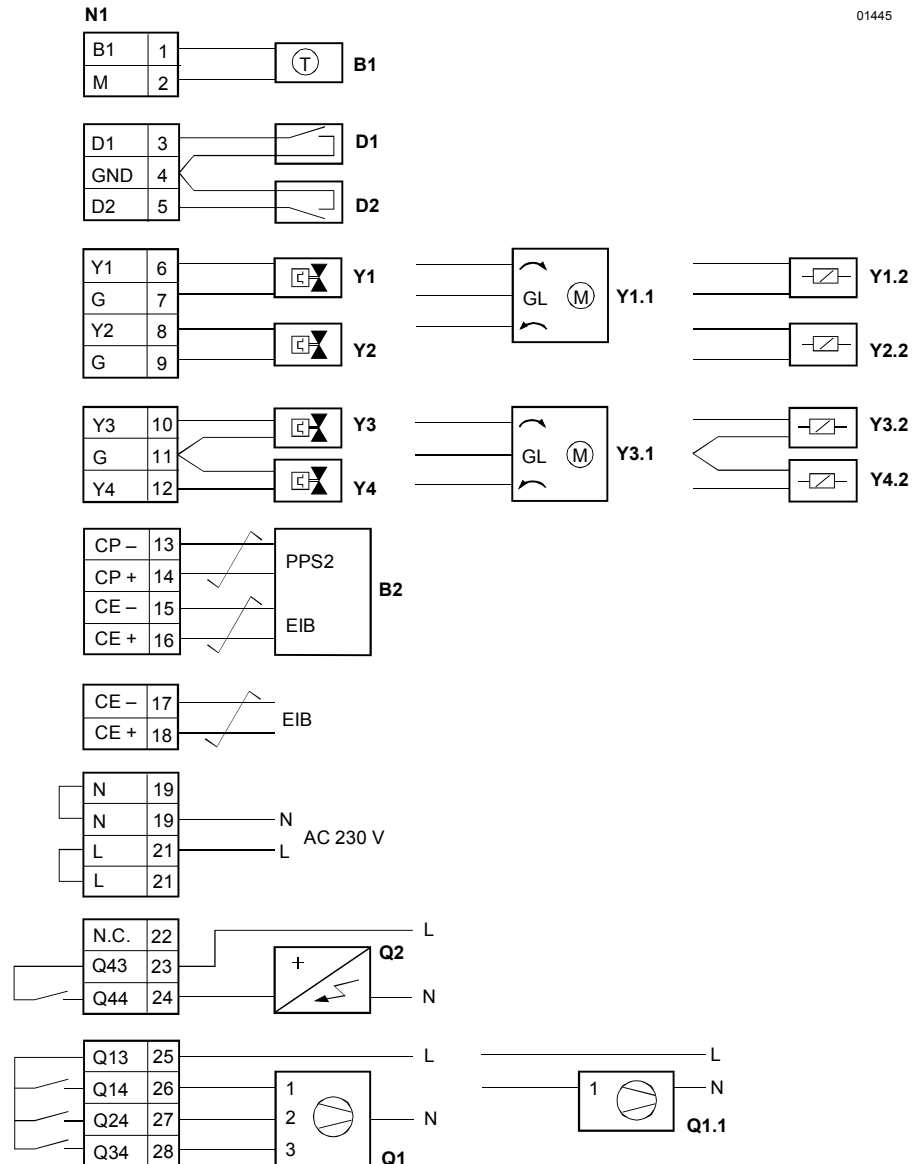
Proprietary RJ45-type tool socket



1 EIB data cable (CE+)	5 Not used
2 EIB data cable (CE-)	6 Not used
3 Not used	7 PPS2 (CP+)
4 Not used	8 PPS2 (CP-)

Connection of field devices, room unit, EIB bus and power supply

01445



- N1 RXB20.1, RXB21.1, RXB22.1
- B1 LG-Ni 1000 temperature sensor
- D1, D2 Volt-free contacts (window contact, occupancy sensor, etc.)
- Y1...Y4 AC 24 V thermic valve actuators
- Y1.1 Motorized AC 24 V, 3-position valve or damper actuator
- Y1.2, Y2.2 AC 24 V contactors for electric heating coil
- Y3.1 Motorized AC 24 V, 3-position valve or damper actuator
- Y3.2, Y4.2 AC 24 V contactors for electric heating coil
- B2 QAX3... room unit
- Q1 3-speed fan
- Q1.1 Single speed fan
- Q2 Electric heating coil

Twisted pair

⚠ Caution

- Fans connected to relay outputs Q14 ... Q34 must not be operated in parallel. For parallel operation use cut-off relays or slave room controllers.
- At Q2 (1.8 kW max. resistive load), use additional external fuses of max. 10 A to protect the pcb tracks.

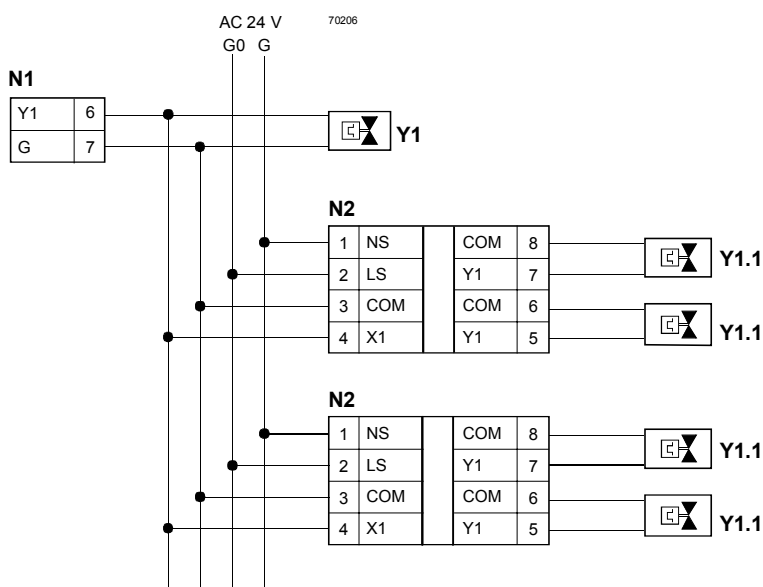
Note

For information on the compatibility of the various field devices with the RXB20.1, RXB21.1 and RXB22.1 room controller, refer to the various application descriptions (see Applications library, document CA2A3890)

Connection of power amplifiers

Parallel connection of a number of thermic valve actuators to output Y1 using the UA1T power amplifier.

The same principle applies to outputs Y2 ... Y4. Note that the simultaneous load on outputs Y1 ... Y4 must not exceed 9.5 VA (power consumption at input X1 of the UA1T: 0.5 VA).



- N1 RXB20.1, RXB21.1, RXB22.1
- N2 UA1T (see data sheet CA2N3591)
- Y1 AC 24 V thermic valve actuator
- Y1.1 AC 24 V thermic valve actuator (max. 2 STE72 actuators per Y1 output on the UA1T)

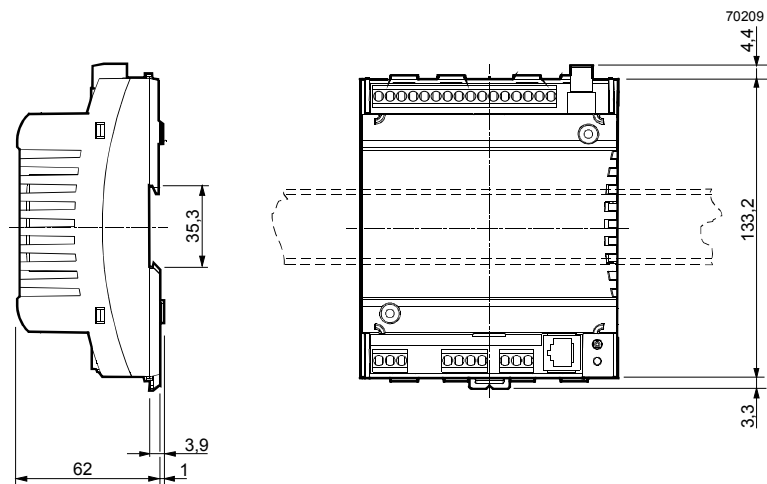
Notes

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

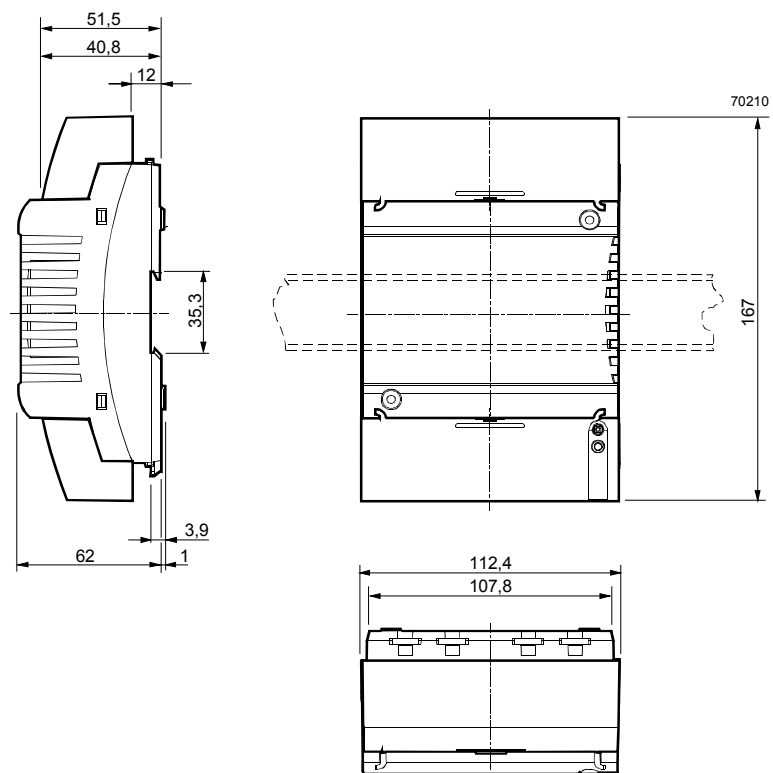
Dimensions

Dimensions in mm

Without terminal cover



With terminal cover



Drilling diagram (1:1)

