

RXB

Room controllers

RXB21.1
RXB22.1

For fan-coil applications FC-10, FC-11, FC12
with Konnex bus communications (S-mode and LTE mode)

The 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
- Konnex bus communication (S-mode and LTE mode)
- Integration into the DESIGO building automation and control system via PX KNX
- Integration into Synco
- Control of AC 24 V PDM ¹⁾ thermic valve actuators, 3-position AC 24 V motorized valve and damper actuators, or electric heating coils
- Use of motorized KNX / EIB bus valves
- Volt-free relay contacts for control of fans and electric heating coils
- Commissioning with ETS Professional, Synco ACS or "HandyTool"
- AC 230 V operating voltage
- Plug-in screw terminals

1) PDM = Pulse Duration Modulation

Application

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

The following options are available with fan-coil systems:

- 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 relevant application is selected and activated during commissioning using one of the following tools:

- ETS Professional (EIB / KNX Tool Software)
- Synco ACS
- "HandyTool" (the QAX34.3 room unit includes a tool function allowing you to parameterize the connected RXB controller).

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 details, refer to the FNC description of functions, document CA110385.

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

Applications

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

Application group (type)	Fan-coil applications
FC-10 (with RXB21.1)	FNC02 2-pipe system with changeover FNC04 4-pipe system FNC08 4-pipe system and room/supply air cascade control FNC20 4-pipe system with single damper control
FC-11 (with RXB21.1)	FNC10 2-pipe system with changeover and outside air damper FNC12 4-pipe system with outside air damper FNC18 2-pipe system with changeover and radiator
FC-12 (with RXB22.1)	FNC03 2-pipe system with changeover and electric re-heater FNC05 4-pipe system with electric re-heater

Note Only one application at a time can be activated with the tool (ETS Professional, Synco ACS or "HandyTool").

Types

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

Type	AC 24 V triac outputs	Relay outputs
RXB21.1	For 2 thermic valve actuators or two 3-position actuators	For 3-speed fan control
RXB22.1	For 2 thermic valve actuators or one 3-position actuator	<ul style="list-style-type: none"> • For 3-speed fan control • internal relay for electric heating coil
RXZ20.1	Accessories: Terminal covers	

Ordering

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

Example: **30 Room controllers, type RXB21.1/FC-10**

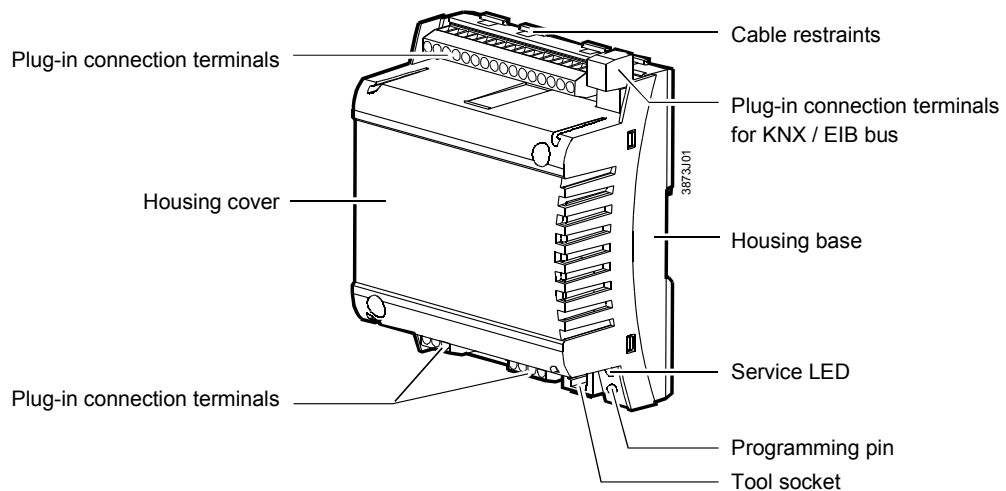
Compatibility

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

For details, refer to the DESIGO RX hardware overview, CA2N3804.

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 programming pin.



Service LED

The programming LED shows the operational status of the room controller as follows:

Green flashing	OK, device is in operation
Red ON	<ul style="list-style-type: none">Addressing mode (ACS / ETS)Fault
Orange / green flashing	Parameter download
OFF	<ul style="list-style-type: none">No supply voltageFaultService LED disabled by software
Other patterns	<ul style="list-style-type: none">Start-up (approx. 5.sec)Fault

Programming pin

The programming pin is used to identify the controller in the commissioning phase.

Pressing this pin causes the red programming LED to light up and remain on until identification of the controller is complete.

Once the programming pin has been pressed, the tool overwrites the hardware address in the room controller.



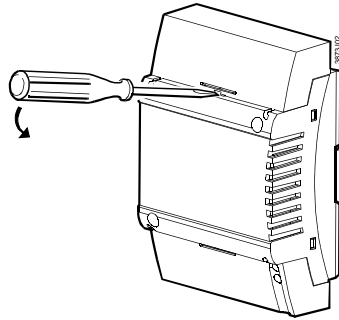
Note!

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

The adjacent terminal may be a live mains voltage conductor.

Terminal cover

Terminal covers (RXZ20.1) are available as an option, to protect the connection terminals from physical contact and dirt. The programming LED remains visible when the terminal covers are in place, and the programming 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

Note Options for use of the labeling fields “Appl.” and “Loc.”:
 – Handwritten identification of the location and the activated application group.

Connection terminals

All terminals are detachable plug-in screw-terminals. To avoid incorrect wiring, terminals which can be connected to AC 230 V (relay outputs) are physically separate from the other terminals.



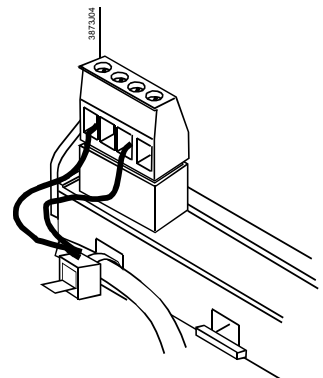
Note!

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).



Warning!

Ensure that the power is off before inserting or removing plug-in terminals connected to a mains voltage.



Communication

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

- PPS2 interface (proprietary) for the exchange of data with the room units
- KNX / EIB bus (terminals CE+ and CE-) for communication with:
 - PX/KNX interface (to DESIGO INSIGHT)
 - Interface OCI700 / OCI702 (to Synco)
 - Other DESIGO RXB controllers
 - KNX / EIB compatible field devices (e.g. temperature sensor)



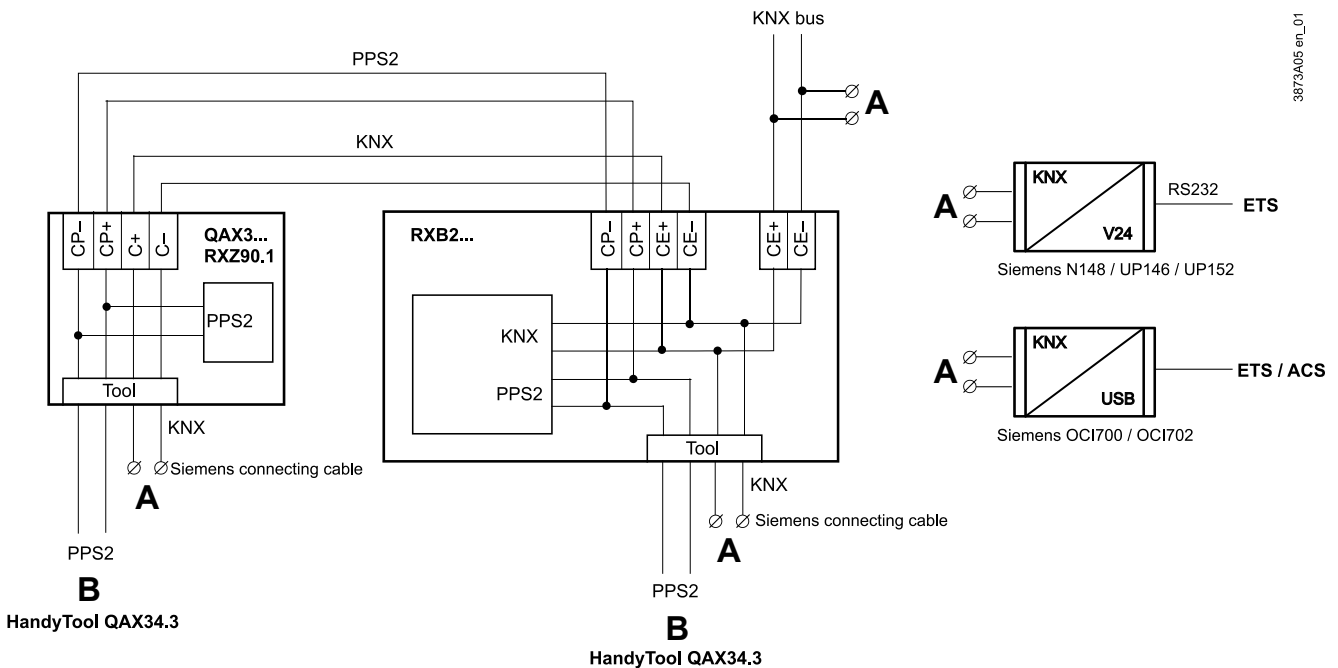
Note!

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

Connecting the tool

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

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



Notes

- The tool socket is a proprietary socket. A Siemens connecting cable must be used (e.g. PXA-C1).



Caution!

- **When connected to Ethernet, the device on the other end may be damaged!**
- The tools ETS and ACS, even if connected to a tool socket, require an interface:
 - RS232 KNX/EIB interface (ETS)
 - OCI700 / OCI702 USB-KNX / EIB interface (ETS , ACS).
- The "HandyTool" is connected to the tool socket of the room controller or to the tool socket of the room unit (QAX3..., RXZ90.1) **(B)**.
- If you use OCI700 / OCI702 as an interface, it is connected to the service plug of the controller or of the room unit.

As long as the OCI700 / OCI702 is connected to the service plug, it must be supplied by the computer via the USB interface. Otherwise the LCD display of the room unit will turn dark and the controller will switch to addressing mode.

Disposal



The device is considered an electronics device for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Engineering notes

The KNX / EIB Building Services Management Manual and system principles supplement (see "Reference documentation", page 11) contains the information relevant for the engineering of the KNX / EIB bus (topology, bus repeaters, 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.
- The sizing and fuse protection of the power supply cables depends on the total load and on local regulations. The power supply cables connected to the room controller must be secured with cable restraints.
- If serial wiring is applied on the terminal block 19/21, the connection will be interrupted if the block is removed from the controller (the jumpers 19-19 and 21-21 are on the PCB, not in the block, see terminal diagrams on pages 11 and 12)
- The supply cables must be secured with cable restraints.

Volt-free relay outputs AC 230 V

- The volt-free relay outputs allow the 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 cables connected to the room controller must be secured with cable restraints.



Note!

The fans must not be connected in parallel.

AC 24 V triac outputs

The **simultaneous** load on outputs Y1 ... Y4 must not exceed 9.5 VA.

Example:	Y1 (heating)	2 thermic valve actuators, type STP73	5 W
	Y2 (cooling)	2 thermic valve actuators, type STP73	5 W
	Y3, Y4 (outside air)	3-position damper actuator	4.5 VA 4.5 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.

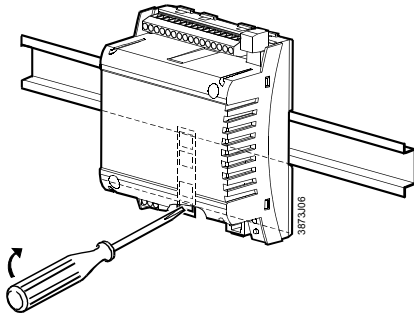


Note!

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

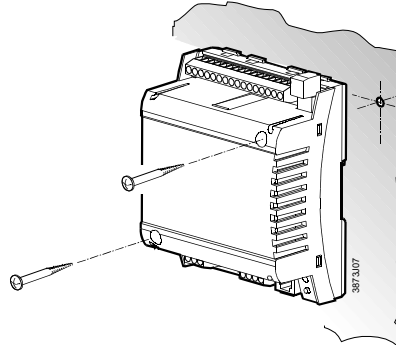
Mounting instructions

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



Rail mounting

The housing base is designed for snap-mounting on DIN rails, type EN50022-35 x 7.5 (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



Note!

Tightening torque for fixing screws max. 1.5 Nm

When mounting note the following:

- The controller should not be freely accessible after mounting. It must be mounted in a cabinet or behind a cover that can only be opened / removed with a key or a tool.
- 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

The RXB2... room controllers are commissioned with either the ETS Professional or the Synco ACS tool

- via the RS232-KNX / EIB interface, or
- via the USB-KNX / EIB interface (OCI700 / OCI702), or with the HandyTool" via PPS2

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 test mode (ETS Professional or "HandyTool") is available for operation of the outputs. Further, if the digital inputs have been activated, they can be interrogated.

**Note!**

- In the event of a long-term short circuit (approx. 4 minutes) or overload, the thermal fuse in the transformer may trip. Subsequently, the device must be exchanged.
- There is no protection against accidental connection on the AC 24 V side.
- Mains AC 230 V for the supply and for the relays must be disconnected before plugging and unplugging the terminal blocks (danger of electric shock!)
- If serial wiring is applied on the terminal block 19/21, the connection will be interrupted if the block is removed from the controller (the jumpers 19-19 and 21-21 are on the PCB, not in the block, see terminal diagrams on pages 11 and 12).

Technical data

Power supply	Operating voltage	AC 230 V ± 10 %
	Frequency	50/60 Hz
	Power consumption with connected field devices	Max. 12 VA
	Internal fuse	Thermal, non-resetting
	External supply line protection	Slow-blow fuse max. 10 A or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898
Operating data	Control algorithm	PI
Inputs		
Signal inputs D1, D2 (for volt-free contacts)	Quantity	2
	Contact voltage	DC 16 V
	Contact current	DC 5 mA
	Contact transfer resistance	Max. 100 Ω
	Contact insulation resistance	Min. 50 kΩ
	Switch time:	min. 20ms "ON", min. 20ms "OFF"
Measured value input B1	Compatible temperature sensors	LG-Ni 1000
	Quantity	1
	measuring range	0 ... 50 °C
	Sensor current	0.5 mA
	Resolution	0.1 K
	Measuring error at 25 °C sensor temp. (without cable)	max. 0.5 K
Outputs		
AC24 V triac outputs , Y1 ... Y4	Quantity	2 (RXB22.1) 4 (RXB21.1)
	Output voltage	AC 24 V ON/OFF, PWM or 3-position: +/-20% (May exceed +20% with loads under 2VA)
	Permissible load current	Max. 0.5 A
	Power limitation	No internal limitations
	Total nominal load (at both outputs simultaneously)	Max. 9.5 VA (e.g. 2 thermic valves, type STP73 per heating and cooling sequence + 1 damper actuator 4.5 VA)
Relay outputs Q14, Q24, Q34	Quantity	3
	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
Q44	Relay type	Monostable
	Contact rating with AC voltage	
	Max. admissible load (resistive only)	Max. 1.8 kW
Fusing	External supply line protection	Slow-blow fuse max. 10 A or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898

Ports/interfaces

Interface to room unit	Number of room units connectable	1
	Interface type	PPS2
KNX / EIB bus	for room unit	KNX / EIB bus
	for ETS Professional / ACS	KNX / EIB bus
	PPS2 baud rate	4.8 kbit/s
	Baud rate on KNX / EIB bus	9.6 kbit/s
	Interface type	KNX / EIB (electrically isolated)
Transceiver	TP-UART	
Bus current	5 mA	
Baud rate	9.6 kbit/s	
Bus topology: Refer to KNX / EIB manual	(Reference documentation, see below)	

Cable connections

Connection terminals for signals and power supply (plug-in screw terminals)	Solid or stranded conductors 0.25 ... 2.5 mm ² or 2 x 1.5 mm ²
KNX / EIB bus connection terminals (plug-in screw terminals)	Solid or stranded conductors 2 x max.1.0 mm ² e.g. YCYM 2x2x0.8
Single cable lengths	For field devices, see also the RXB & RXL installation guide, CM110381
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 connecting cable for tool)
Cable type	4-core, twisted pair, unshielded
KNX / EIB bus	Max. 500 m
Cable type: Refer to KNX / EIB manual	(see "Reference documentation" below)
Tool connecting cable	Max. 3 m

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

Standards, directives and approvals

Product standard	EN 60730-1	Automatic electrical controls for household and similar use
Product family standard	EN 50491-x	General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS)
Electromagnetic compatibility (Applications)		For use in residential, commerce, light-industrial and industrial environments
EU conformity (CE)		CM2T3873xx *)
RCM-conformity (EMC)		CA2T3834en_C1 *)
EAC conformity		Eurasia conformity
Konnex compliance		Certified

eu.bac



Meets the requirements for eu.bac certification

See product list at: <http://www.eubacert.org/licences-by-criteria.asp>

Type	License	Application	Control accuracy [K]
RXB21.1/FC-10	20856	Fancoil 2 pipes heating / cooling	0.2 / 0.1
		Fancoil 4 pipes heating/ cooling	0.2 / 0.1
RXB22.1/FC-12	20853	Fancoil 2 pipes heating/ cooling	0.2 / 0.1
		Fancoil 2 pipes / 2 wires heating/ cooling	0.2 / 0.1

Product environmental declaration (contains data on RoHS compliance, materials composition, packaging, environmental benefit, disposal) CA2E3871 *)

Dimensions

Weight

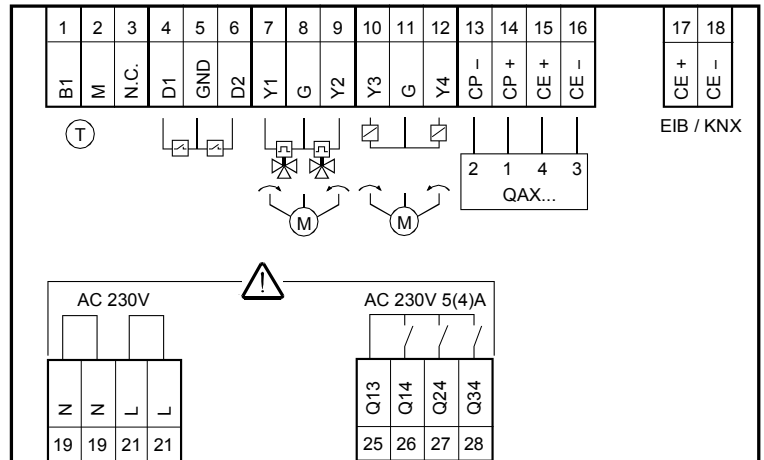
See dimension diagrams

excluding packaging	0,640 kg
including packaging	0.670 kg

*) The documents can be downloaded from <http://siemens.com/bt/download>.

Connection terminals

RXB21.1



Measured value input

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

Signal inputs

- D1 4 Signal input
- GND 5 Signal ground
- D2 6 Signal input

Triac outputs

- Y1 7 AC 24 V, 0.5 A switching output
- G 8 AC 24 V actuator supply
- Y2 9 AC 24 V, 0.5 A switching output
- 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 KNX / EIB data cable
- CE- 16 KNX / EIB data cable

KNX / EIB bus (plug-in connection)

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

Power supply

- N 19 Neutral conductor
- R 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)

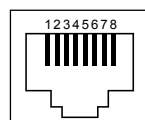


Caution

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

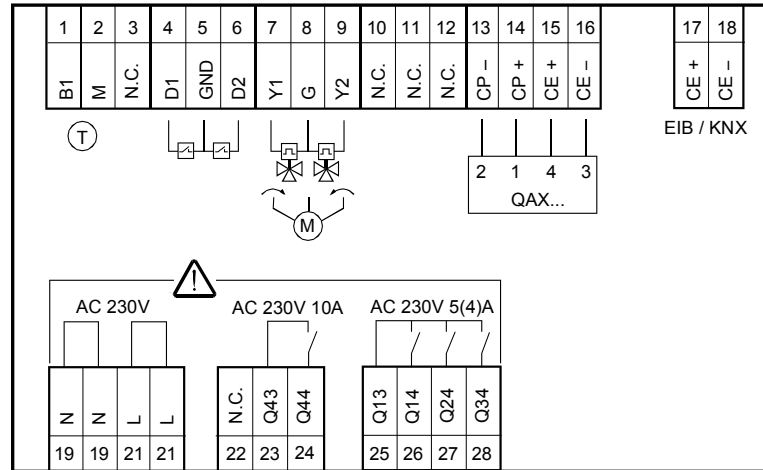
Tool socket

Proprietary RJ45-type tool socket



- 1 KNX / EIB data cable (CE+)
- 2 KNX / EIB data cable (CE-)
- 3 Not used
- 4 Not used
- 5 +12VDC
- 6 Rx/D
- 7 PPS2 (CP+) / Tx/D
- 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 4 Signal input
- GND 5 Signal ground
- D2 6 Signal input

Triac outputs

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

Room unit

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

KNX / EIB bus (plug-in connection)

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

Power supply

- N 19 Neutral conductor
- R 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)

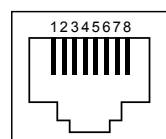


Caution

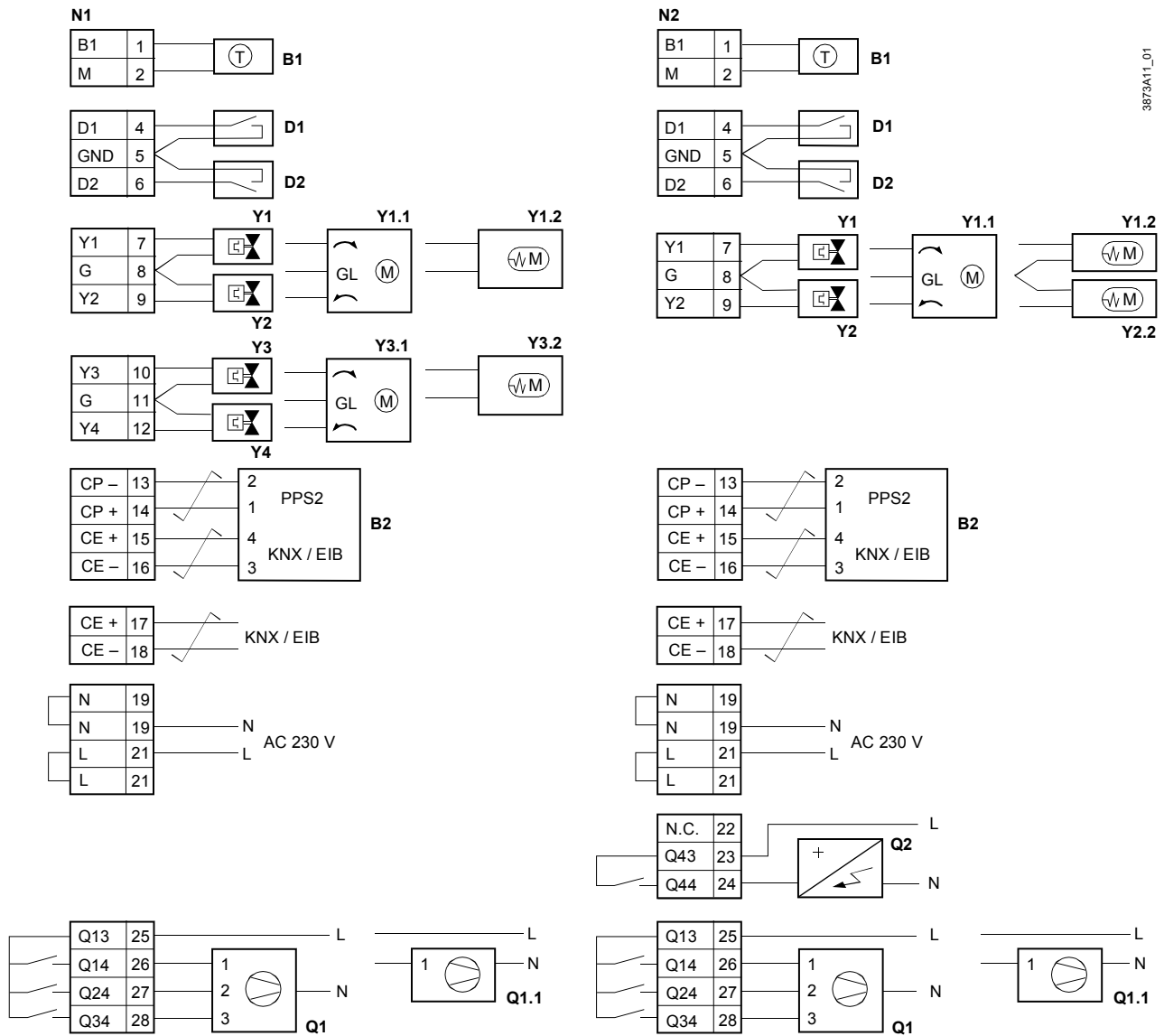
- **Observe the technical data for the relay outputs: Max. AC 250 V, 5 (4) A and 10 A, respectively**
- **Local installation regulations must be observed.**

Tool socket

Proprietary RJ45-type tool socket



- 1 KNX / EIB data cable (CE+)
- 2 KNX / EIB data cable (CE-)
- 3 Not used
- 4 Not used
- 5 +12VDC
- 6 RxD
- 7 PPS2 (CP+) / TxD
- 8 PPS2 (CP-)



- N1 / N2 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, Y3.1 Electromechanic AC 24 V, 3-position valve or damper actuator
- Y1.2, Y2.2, Y3.2 Electromechanic AC 24 V, 2-position valve actuator
- B2 QAX... room unit
- Q1 3-speed fan
- Q1.1 1-speed fan
- Q2 Electric heating coil

Twisted pair



Note!

- 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 field devices with the RXB21.1 and RXB22.1 room controller, refer to the various application descriptions (see the FNC description of functions, document CA110385)

Parallel connection of several thermic valve actuators

Up to two thermic actuators per sequence may be connected directly to the room controller. With more than two thermic actuators, a UA1T power amplifier is required.

The principle is the same for output Y2. Do not exceed the maximum simultaneous load on outputs Y1 and Y2 (max. 9.5 VA).

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

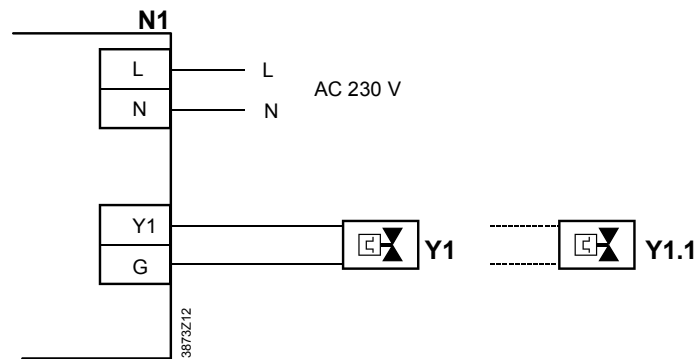


Note!

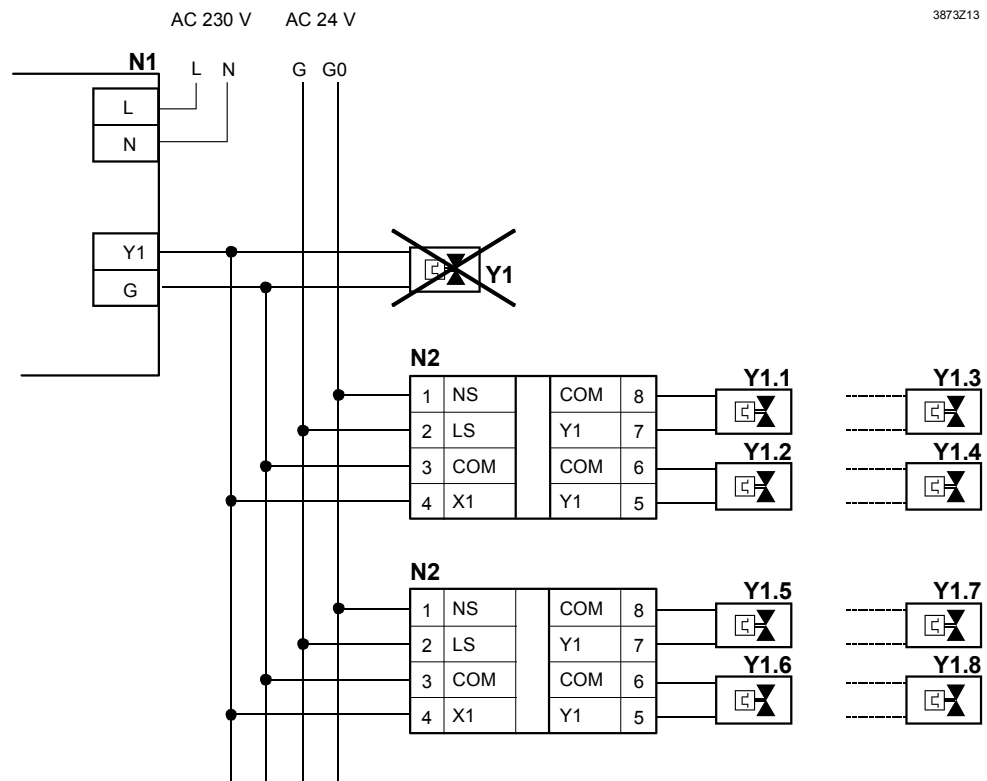
Mixed operation: It is not permissible to connect thermic actuators both to the controller and to the power amplifier.

Owing to the difference in voltage between the controller's internal transformer and the power supply of the UA1T, this could cause the valve positions to deviate substantially.

Connection to the controller



Connection to the power amplifier



- N1 Room controller RXB21.1, RXB22.1
- N2 UA1T power amplifier (see data sheet CA2N3591)
- Y1 AC 24 V thermic valve actuators connected to the controller
- Y1.x AC 24 V thermic valve actuators (max. 2 STA73 / STP73 actuators per Y1 output on the UA1T)

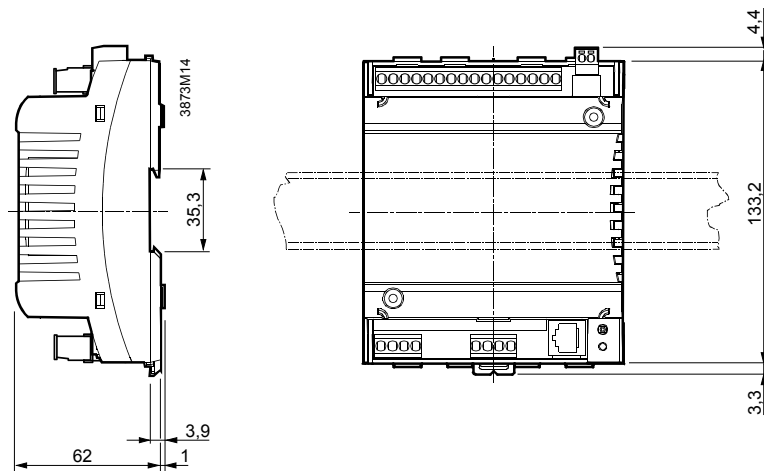
Notes

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

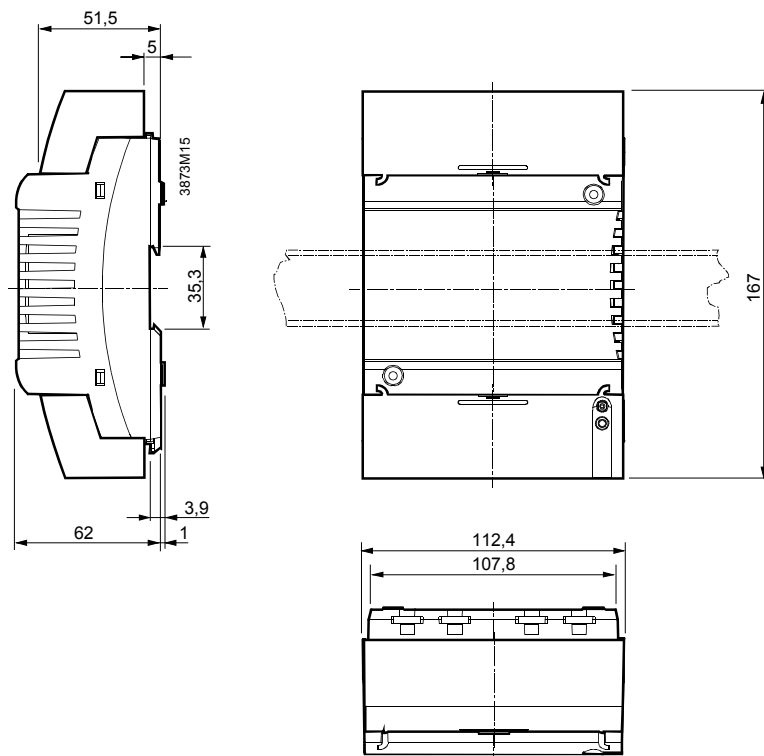
Dimensions

Dimensions in mm

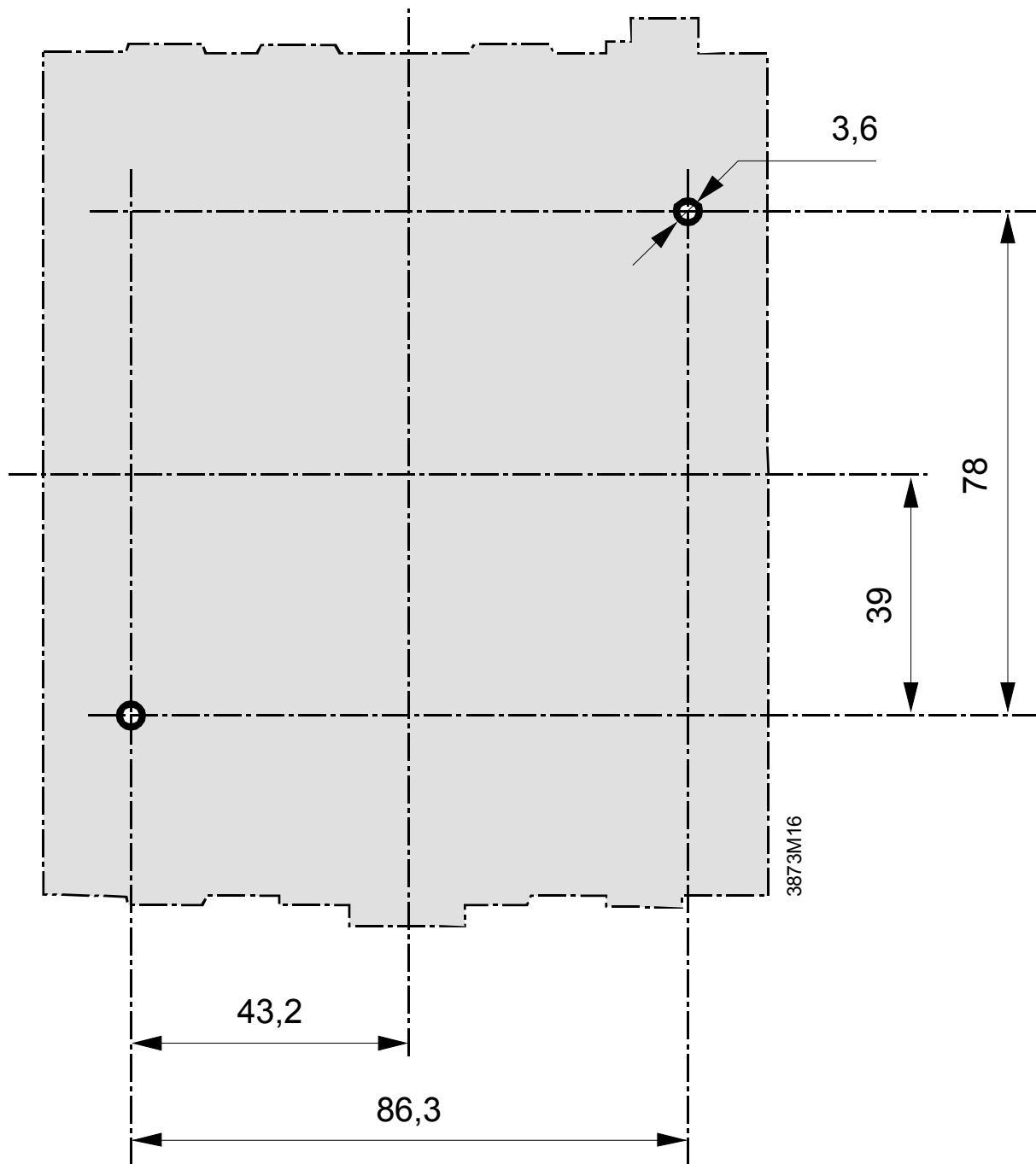
Without terminal cover



With terminal covers



Drilling diagram (1:1)



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