



Desigo™ RxC

Room controllers RxC20.1 / RxC20.5 RxC21.1 / RxC21.5 RxC22.1 / RxC22.5

For fan-coil systems, chilled ceilings and radiators
with LONMARK® compatible bus communications

The RxC20, RxC21 and RxC22 room controllers are used for temperature control in individual rooms.

- For 2-pipe or 4-pipe fan-coil systems, with or without change-over
- For chilled ceilings and radiators
- Control of AC 24 V PDM ¹⁾ thermic valve actuators, 3-position AC 24 V valve and damper actuators, or electric heating coils
- Volt-free relay contacts for fan control and electric heating coils
- PI or PID control (depending on application)
- Downloadable application software
- LONMARK® compatible bus communications
- For use in the Desigo building automation and control system
- AC 230 V operating voltage

1) PDM = pulse/duration modulated

Use

The RXC20, RXC21 and RXC22 room controllers are optimized for control of fan-coil systems, chilled ceilings and radiators in individual rooms.

The following versions are available for fan-coil systems:

- RXC20: 1-speed automatic fan control
- RXC21: 1- to 3-speed automatic fan control
- RXC22: 1- to 3-speed automatic fan control
with integrated relay for electric re-heating

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 RXC applications library. (V1: CA2A3810, V2: CA110300).

The room controllers are delivered with the basic application 00020 (RXC20), 00021 (RXC21) and 00022 (RXC22), respectively. 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 system, the RXC20, RXC21 and RXC22 room controllers can also be used as universal I/O modules, e.g. to register binary signals or to control various equipment (ON/OFF or pulse control with AC 24 V or volt-free relay contacts).

In this case, the room controllers are loaded with basic application 00020, 00021 and 00022, respectively. The inputs can then be read and the outputs overridden via the building automation system.

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 RXC applications library (V1: CA2A3810, V2:CA110300).

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

Types

The RXC20, RXC21 and RXC22 room controllers differ only in the number of outputs they provide:

Type	SSN	AC 24 V triac outputs	Relay outputs
RXC20.1 RXC20.5	S55373-C111	For two thermic valve actuators or one 3-position actuator	For 1-speed fan control
RXC21.1 RXC21.5	S55373-C112	For four thermic valve actuators or two 3-position actuators	For 3-speed fan control
RXC22.1 RXC22.5	S55373-C113	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		

Ordering

When ordering please specify the quantity, product name, type code and application. The controllers are delivered with the basic application 00020, 00021 or 00022, respectively.

The RXZ20.1 terminal covers are supplied in packs of 1 pair and must be ordered separately.

Example:

30	RXC20.5 room controllers	RXC20.5/00020
30	Pairs of terminal covers	RXZ20.1

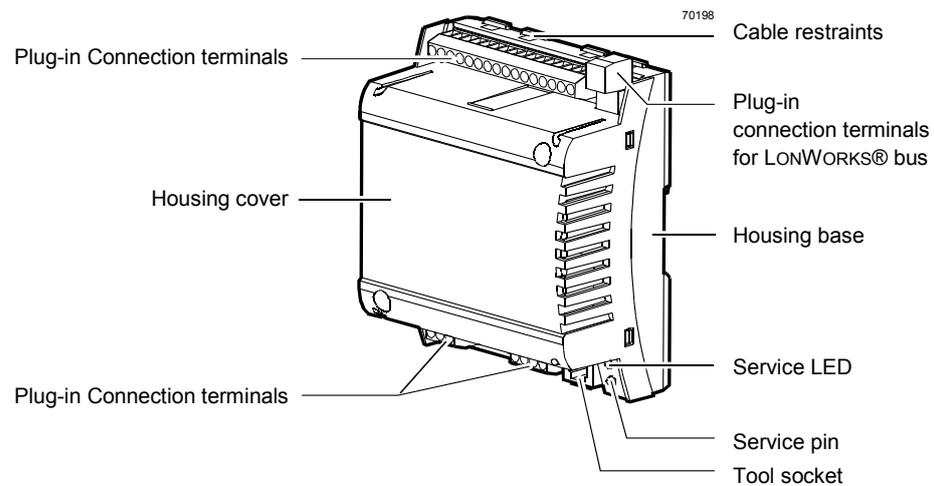
Compatibility

The QAX... room units and the Siemens field devices can be used with the RXC20, RXC21 and RXC22 room controllers.

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

Design

The RXC20, RXC21 and RXC22 room controllers consist of a housing base, a housing cover and the printed circuit board with connection terminals. The controller also has a tool socket, a service LED and a service pin.



Terminal cover

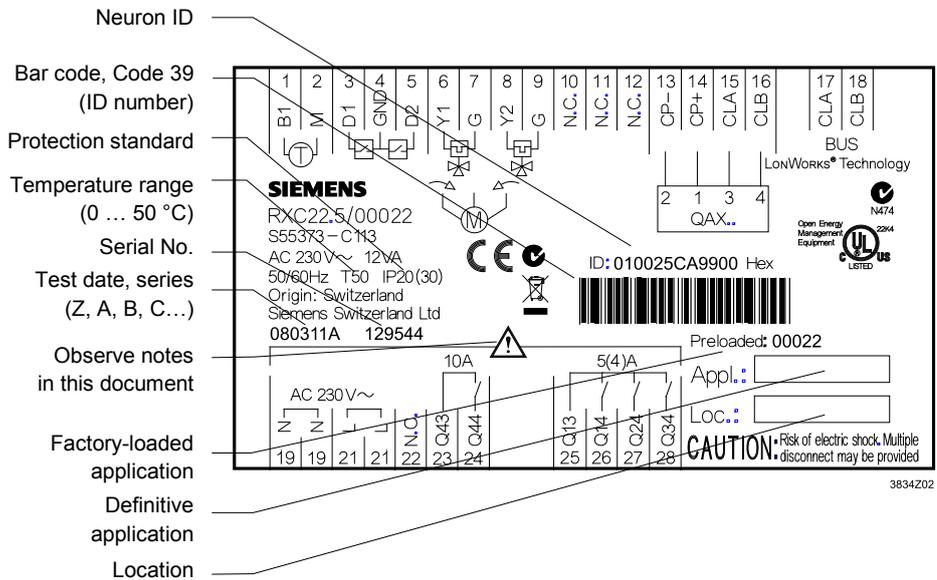
Terminal covers (RXZ20.1) are available as an option, to protect the connection terminals from physical contact and dirt. The service LED remains visible when the terminal covers are in place, and the service pin can be operated with a pointed implement. The cable is connected to the room controller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

Fehler! Es ist nicht möglich, durch die Bearbeitung von Feldfunktionen Objekte zu erstellen.

Removing the terminal cover

Label

(example RXC22.5)



Note

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

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

Connection terminals

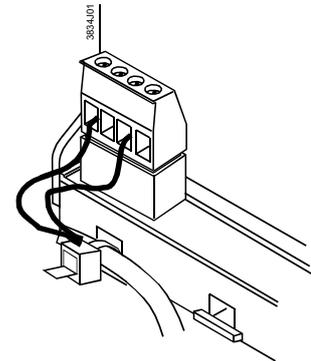
All connection terminals are detachable plug-in terminals.

To avoid incorrect wiring, terminals which can be connected to AC 230 V (supply and relay outputs) are physically separate from the other terminals.



Note!

Cable restraints must be used for the wires 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.

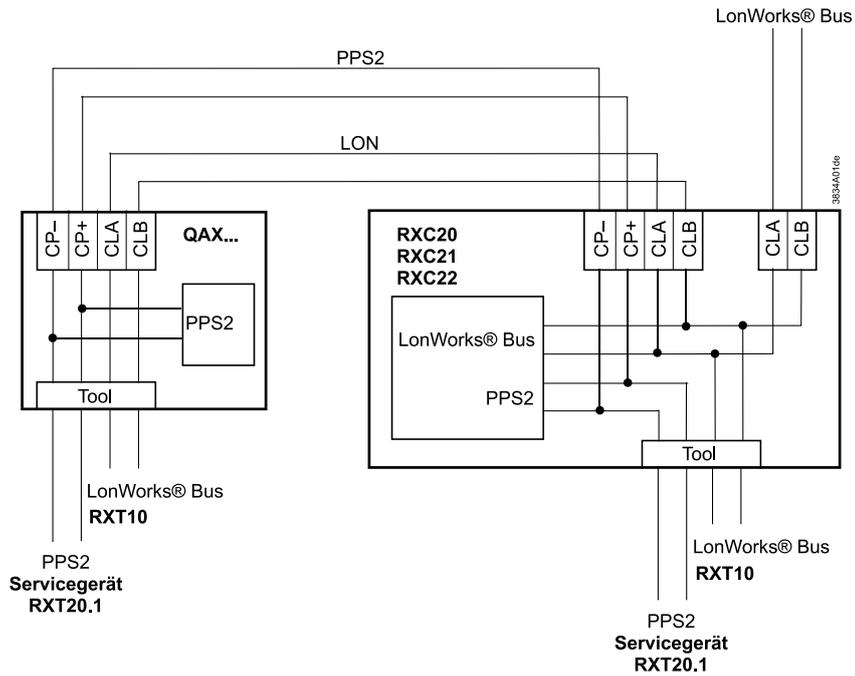
Communication

The RxC20, RxC21 and RxC22 room controllers communicate with other devices via the following interfaces:

- LONWORKS® bus (terminals CLA and CLB) for communication with:
 - PXX-Lxx, PXR system controller or NIDES.RX interface (to Desigo)
 - Other Desigo RxC devices
 - LONMARK® compatible 3rd 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 room controller or room unit, for:
 - RXT10 commissioning and service tool (LONWORKS® bus)
 - RXT20.1 service terminal (PPS2)

LONWORKS® bus and PPS2

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 room controller by means of different flashing patterns (see the RXT10 user manual, CM110669).

Service pin

The service pin is used to identify the room controller in the commissioning phase. When the pin is pressed the room 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 2012/19/EU (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 RX 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.

The room controllers have an AC 230 V mains supply voltage. The controlled devices (valves and damper actuators) are supplied directly from the room controller.

This means that a separate AC 24 V supply is not necessary for the RXC20, RXC21 and RXC22 room controllers and the associated field devices.

AC 230 V supply cables

- The dimensions and fuse protection for the supply cables depend on the total load and on local regulations. The cables 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 10 ... 12).

AC 230 V volt-free relay outputs

The volt-free relay outputs allow switching of loads up to AC 250 V, 5 A (4 A). The heating coil relay in the RXC22 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 must be secured with cable restraints.



Note!

Parallel operation of the fans is not permitted.

AC 24 V triac outputs

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

Example:

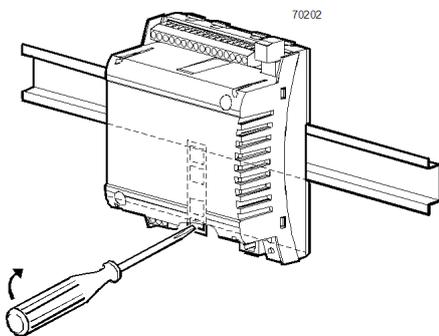
Y1 (heating)	2 thermic valve actuators, type STP73	5 W
Y2 (cooling)	2 thermic valve actuators, type STP73	5 W
Y3, Y4 (outside air)	3-position damper actuator	3.5 VA 3.5 VA

The maximum load is 8.5 VA for the heating sequence and 8.5 VA for the cooling sequence. This is acceptable because the two sequences never operate at the same time.

When using small loads (< 2 VA), the voltage tolerance may be $> + 20\%$ (see technical data, Triac outputs below)

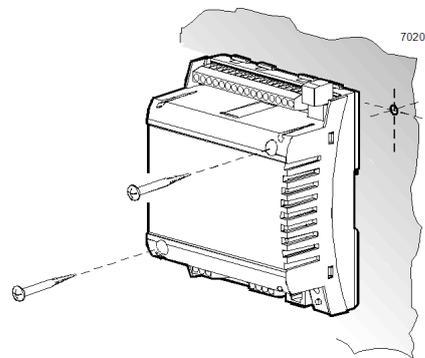
Mounting instructions

The room controllers can be mounted in any orientation using the following fixing options:



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.
- 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.

Commissioning notes

The RXC20, RXC21 and RXC22 room controllers are commissioned with the RXT10 commissioning and service tool. The RXT10 is plugged into the tool socket on the room controller or room unit for connection to the LONWORKS® bus.

The commissioning procedure for the entire Designo RXC range is described in detail in the RXT10 user manual, document CM110669.

Labeling

The labeling fields “Appl.” and “Loc.” 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 applications 00020, 00021 and 00022) allow interrogation of the inputs and control of the outputs using the RXT10 commissioning and service tool. This enables the fan-coil manufacturer to test the installed units before delivery.

Note

The LONWORKS® bus plug (terminals 17 and 18) can be removed and reconnected at any time, even while the controller is in operation. Only the original bus plug may be used.



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 10 ... 12).**

Technical data

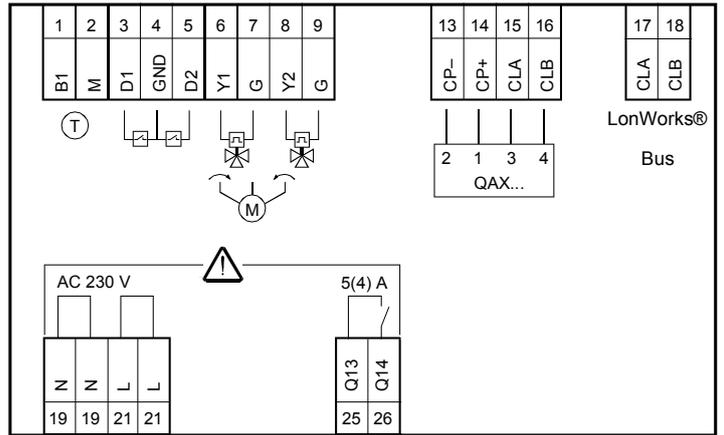
⚠ Power supply	Operating voltage	AC 230 V ± 10 %
	Frequency	50/60 Hz
	Power consumption with output field devices connected	max. 12 VA
	Internal fuse	Thermal, non-resetting
	External supply line protection (EU)	Slow-blow fuse max. 10 A or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898
<hr/>		
Operating data	Control algorithm	PI or PID
<hr/>		
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
Measured value input B1	Not suitable for pulse control	
	Compatible temperature sensors	LG-Ni 1000
	Quantity	1
	Measuring range	0 ... 50 °C
	Sensor current	2.3 mA
	Resolution	0.2 K
	Measuring error at 25 °C sensor temp. (excluding cable)	max. 0.2 K
<hr/>		
Outputs		
AC 24 V triac outputs, Y1 ... Y4	Quantity	2 (RXC20, RXC22) 4 (RXC21)
	Output voltage	AC 24 V ON/OFF, PDM 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 STP73 per heating and cooling sequence + 1 damper actuator 3.5 VA)
⚠ Relay outputs Q14, Q24, Q34	Quantity	1 (RXC20) / 3 (RXC21, RXC22)
	Relay type	single pole
	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	single pole
	Contact rating with AC voltage	
	Max. admissible load (purely resistive)	max. 1.8 kW
Fusing	External fuse (essential)	max. 10 A, see power supply
	 ..Note!	Q44 is only permitted for mains voltage, not for security extra low voltage
<hr/>		
Interfaces		
Interface to room unit	Number of room units connectable	max. 1
	Interface type for room unit	PPS2
		for RXT10
		LONWORKS® bus
LONWORKS® bus	PPS2 baud rate	4.8 kbps
	LONWORKS® baud rate	78 kbps
	Interface type	LONMARK® compatible, electrically isolated on RXC2X.1: FTT-10A, on RXC2X.5: FT 5000
	Transceiver	
	Baud rate	78 kbps
	Bus topology, bus termination	see installation guide, CA110334

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 connect- or sleeves	1 x 0.2 ... 2.5mm ² or 2 x 0.2 ... 1.5 mm ² 1 x 0.25 ... 2.5mm ²			
	Stranded conductors with connector sleeves (DIN 46228/1)	or 2 x 0.25 ... 1.0 mm ²			
	Max. tightening torque	0.6 Nm			
	Single cable lengths	see also installation guide, CA110334			
	Signal inputs D1, D2	max. 100 m with diameters ≥ 0.6 mm			
	Measured value input B1	max. 100 m			
	AC 24 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				
LONWORKS® bus	max. 500 m				
Cable type	see installation guide, CA110334				
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			
Protection class	Suitable for use in systems with protection class I or II to EN60730-1				
Ambient conditions	Operation	class 3K5 as per IEC 60721-3-3			
	Temperature	0 ... 50 °C			
	Humidity	< 85 % r.h.			
	Transport	class 2K3 as per IEC 60721-3-2			
Temperature	- 25 ... 65 °C				
Humidity	< 95 % r.h.				
Standards, directives and approvals	Product standard	EN 60730-1	Automatic electrical controls for household and similar use		
	Electromagnetic compatibility (Applications)		For use in residential, commerce, light- industrial and industrial environments		
	EU conformity (CE)		CA2T3834xx *)		
	UL certification (US)		UL 916, http://ul.com/database		
	RCM-conformity (EMC)		CA2T3834en_C1 *)		
	EAC conformity		Eurasia conformity		
eu.bac	Meets the requirements for eu.bac certification				
	See product list at: http://www.eubaccert.org/licences-by-criteria.asp				
	Type	License	Application	Control accuracy [K]	
	RXC20.5	20737	Fancoil 2 pipes	heating / cooling	0.2 / 0.1
			Heating systems (radiator)		0.3
			Electric convectors		0.2
			Chilled ceiling systems		0.3
	RXC21.5	20705	Fancoil 2 pipes	heating / cooling	0.2 / 0.1
			Fancoil 2 pipes / 2 wires	heating / cooling	0.2 / 0.1
			Fancoil 4 pipes	heating / cooling	0.2 / 0.1
		Chilled ceiling systems		0.3	
Environmental compatibility	Product environmental declaration (contains data on RoHS compliance, materials composi- tion, packaging, environmental benefit, disposal)	CA2E3834 *)			
Dimensions	See dimension diagrams				
Weight	Excluding packaging	0.59 kg			



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

RXC20



Measured value input

- B1 1 Measured value input with LG-Ni 1000 sensor
- 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
- CLA 15 Data A
- CLB 16 Data B

LONWORKS® bus (plug-in)

- CLA 17 Data A
- CLB 18 Data B

Power supply

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

Relay output

- Q13 25 Feed for Q14
- Q14 26 N/O contact AC max. 250 V, 5 (4) A

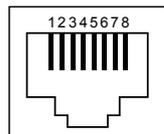


Note!

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

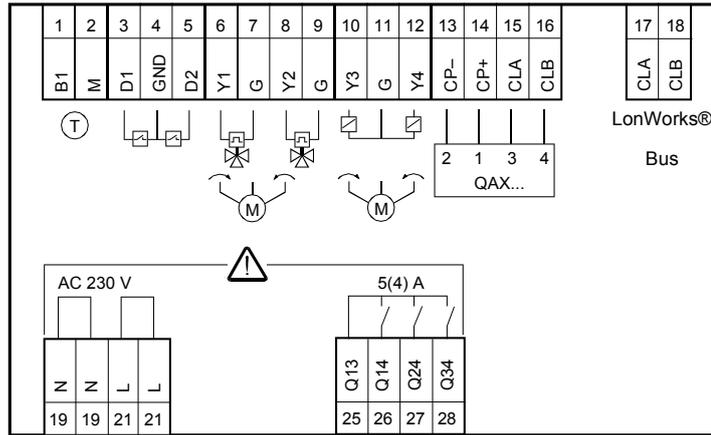
Tool socket

Standard RJ45 tool socket for LONWORKS® devices.



- | | |
|---------------------------|--------------|
| 1 LONWORKS®, Data A (CLA) | 5 Unoccupied |
| 2 LONWORKS®, Data B (CLB) | 6 unoccupied |
| 3 Unoccupied | 7 PPS2 (CP+) |
| 4 Unoccupied | 8 PPS2 (CP-) |

RXC21



Measured value input

- B1 1 Measured value input with LG-Ni 1000 sensor
- 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
- CLA 15 Data A
- CLB 16 Data B

LonWorks® bus (plug-in)

- CLA 17 Data A
- CLB 18 Data B

Power supply

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

Relay outputs

- Q13 25 Feed for Q14, Q24 and Q34
- Q14 26 N/O contact AC max. 250 V, 5 (4) A (stage 1)
- Q24 27 N/O contact AC max. 250 V, 5 (4) A (stage 2)
- Q34 28 N/O contact AC max. 250 V, 5 (4) A (stage 3)

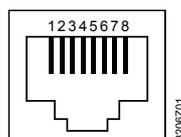


Note!

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

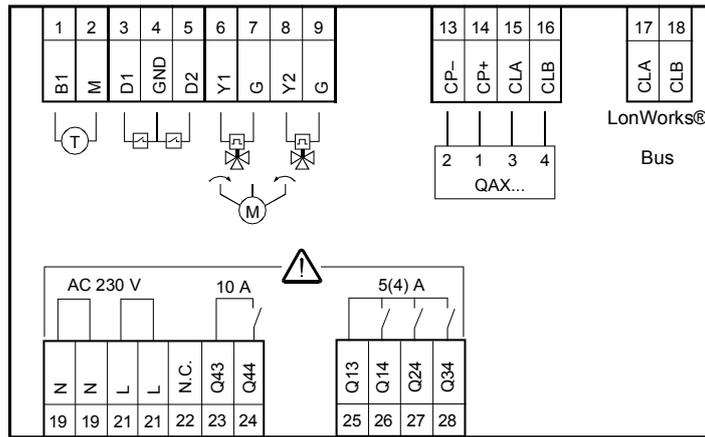
Tool socket

Standard RJ45 tool socket for LONWORKS® devices.



- 1 LONWORKS®, Data A (CLA) 5 Unoccupied
- 2 LONWORKS®, Data B (CLB) 6 unoccupied
- 3 Unoccupied 7 PPS2 (CP+)
- 4 Unoccupied 8 PPS2 (CP-)

RXC22



Measured value input

- B1 1 Measured value input with LG-Ni 1000 sensor
- 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
- CLA 15 Data A
- CLB 16 Data B

LONWORKS® bus (plug-in)

- CLA 17 Data A
- CLB 18 Data B

Power supply

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

Relay outputs

- Q13 25 Common feed for Q14, Q24 and Q34
- Q14 26 N/O contact AC max. 250 V, 5 (4) A (stage 1)
- Q24 27 N/O contact AC max. 250 V, 5 (4) A (stage 2)
- Q34 28 N/O contact AC max. 250 V, 5 (4) A (stage 3)
- 22 Not connected!
- Q43 23 Feed for Q44
- Q44 24 N/O contact AC max. 250 V, 10 A (electric heating coil)

3804A/04

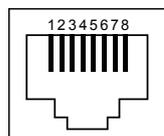


Note!

- **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

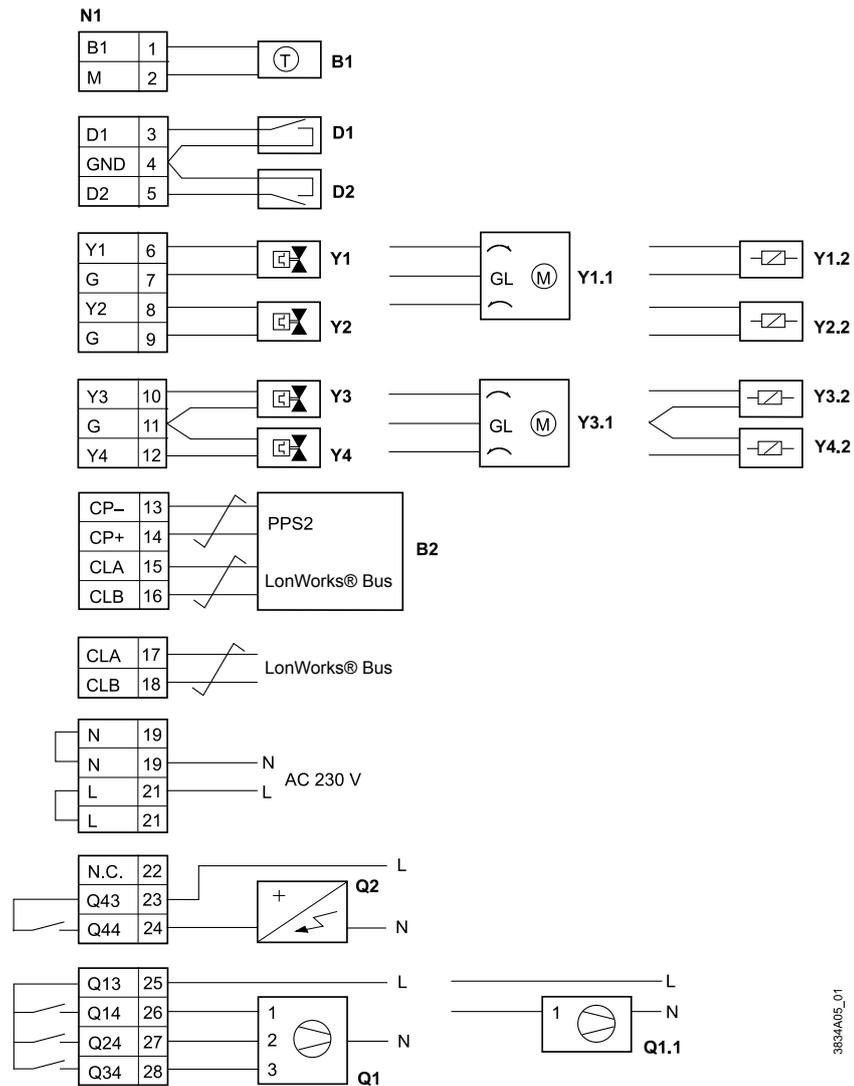
Standard RJ45 tool socket for LONWORKS® devices.



- 1 LONWORKS®, Data A (CLA)
- 2 LONWORKS®, Data B (CLB)
- 3 Unoccupied
- 4 Unoccupied
- 5 Unoccupied
- 6 unoccupied
- 7 PPS2 (CP+)
- 8 PPS2 (CP-)

Connection diagrams

Connection of field devices, room unit, LONWORKS® bus and power supply



- N1 RXC20, RXC21, RXC22
 B1 Temperature sensor LG-Ni 1000
 D1, D2 Volt-free contacts (window contact, occupancy sensor, etc.)
 Y1...Y4 AC 24 V thermic valve actuators
 Y1.1 AC 24 V, 3-position valve or damper actuator
 Y1.2, Y2.2, AC 24 V contactors for electric heating coil
 Y3.1 AC 24 V, 3-position valve or damper actuator
 Y3.2, Y4.2 AC 24 V contactors for electric heating coil
 B2 QAX... room unit
 Q1 3-speed fan
 Q1.1 1-speed fan
 Q2 Electric heating coil

✓ Twisted pair



Note!

- **Parallel operation of fans at relay outputs Q14 ... Q34 is not permitted. For parallel operation use cut-off relays or slave room controllers.**
- **At Q2 (1.8 kW max. ohmic load), use additional external fuses of max. 10 A to protect the conductor tracks.**

Note

For information on the compatibility of the various field devices with the RXC20, RXC21 and RXC22 room controller, refer to the various application descriptions. See Applications library, document V1: CA2A3810, V2: CA110300).

3834AD5_01

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 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.

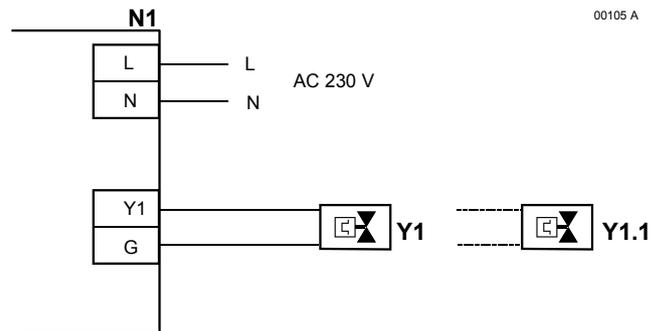


Note!

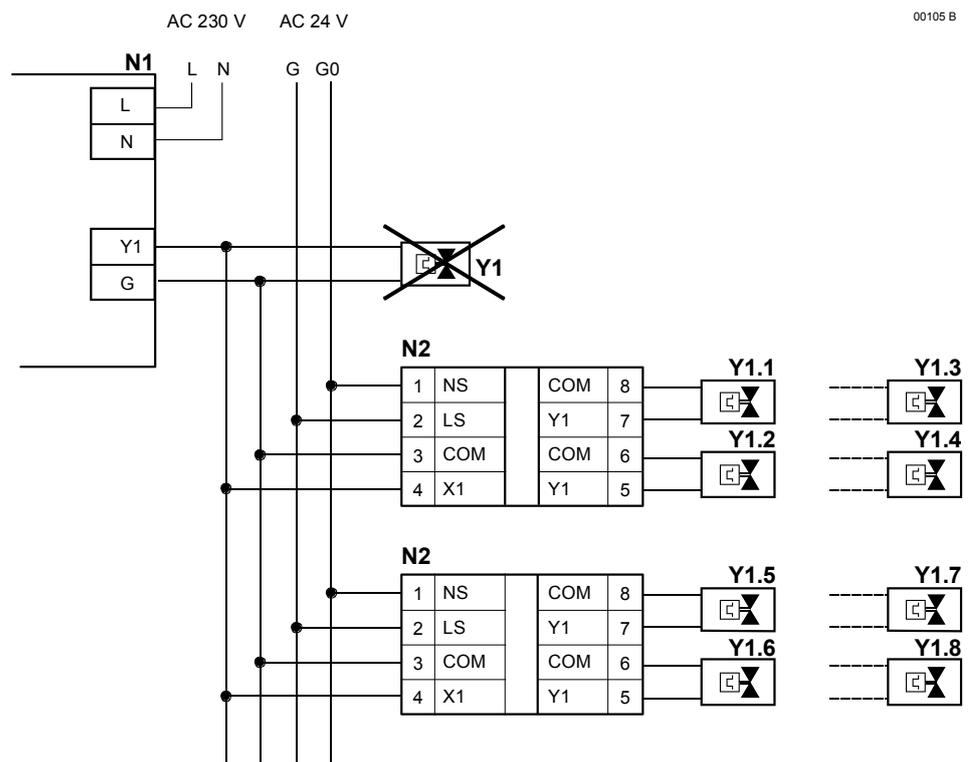
Mixed operation: **Connecting thermic actuators to the controller as well as to the power amplifier is NOT allowed.**

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

Connection to controller



Connection to power amplifier



- N1 RXC20, RXC21, RXC22
- N2 UA1T (see data sheet CA2N3591)
- Y1 AC 24 V thermic valve actuator
- Y1.1 AC 24 V thermic valve actuator (max. 2 STA73 / STP73 actuators per Y1 output on the UA1T)

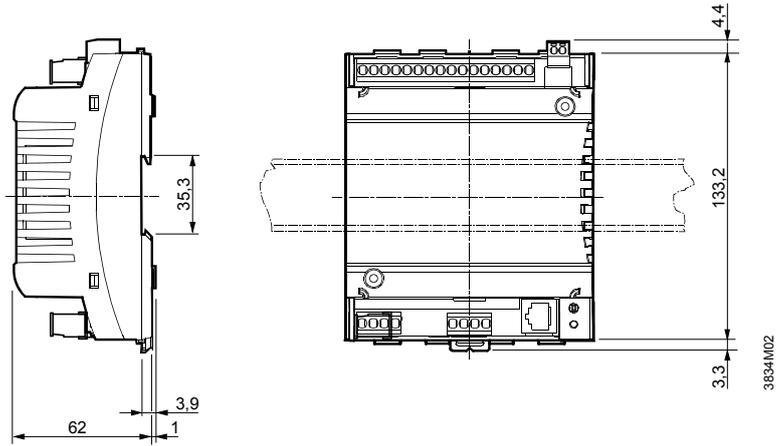
Notes

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

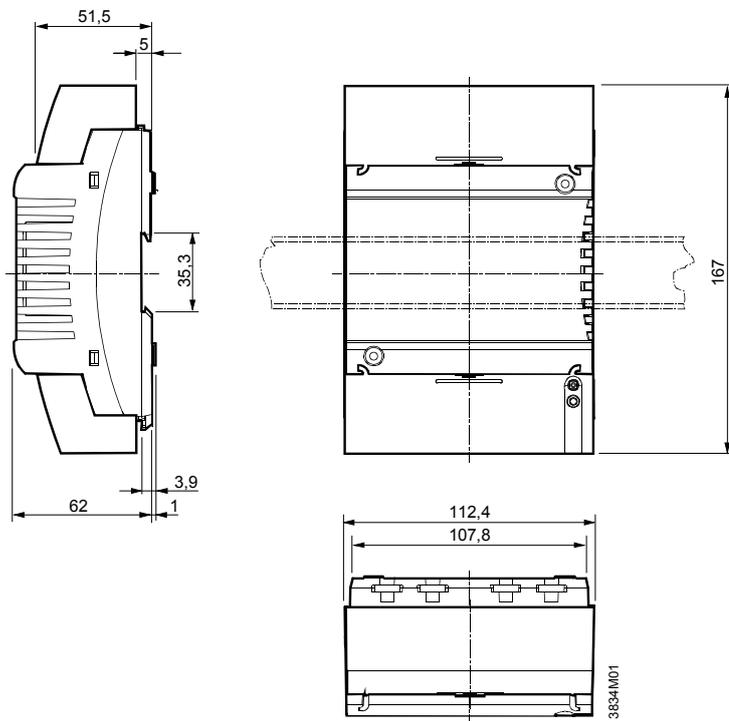
Dimensions

(all Dimensions in mm)

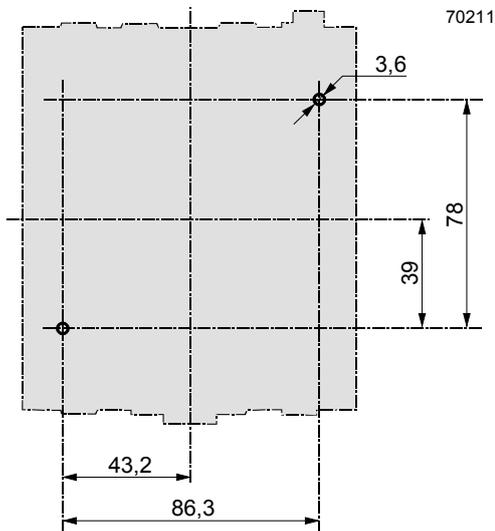
Without terminal covers



With terminal covers



Drilling diagram



Published by:
Siemens Switzerland Ltd.
Building Technologies Division
International Headquarters
Gubelstrasse 22
6301 Zug
Switzerland
Tel. +41 41-724 24 24
www.siemens.com/buildingtechnologies

© Siemens Switzerland Ltd 2000
Delivery and technical specifications subject to change