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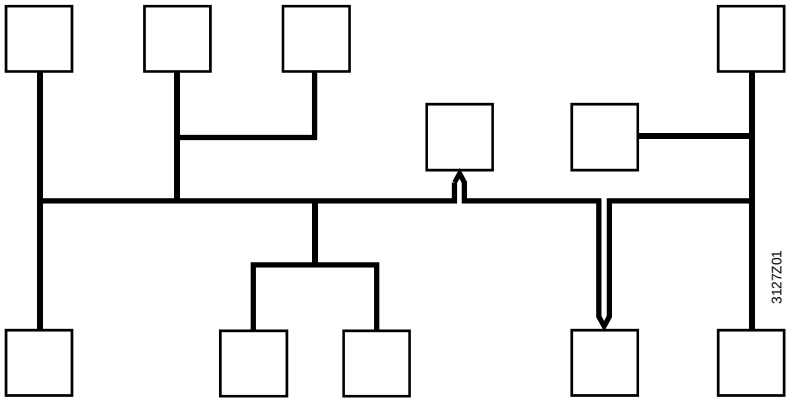

Synco™

Communication via the KNX bus

For Synco 700, 900 and RXB/RXL

Basic Documentation

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1 KNX (Konnex) and Synco

1.1 General overview

About this document

This document contains:

- Section 1 Introductory information about Synco and the KNX network
- Section 2 Notes on engineering
- Section 3 Notes on commissioning
- Sections 4 to 7 Device address, device name and addressing via ACS, special features of KNX addressing and communication in LTE mode.
- Section 8 Designing "large plants"
- Section 9 Appendix with supplementary information of a general nature

Note

This document contains specific information applicable to the European Tool Set (ETS3) only. S-mode communications are not dealt with here.

KNX Association

The KNX Association has its headquarters in Brussels and is an organization or association of manufacturers which maintains the KNX standard and develops it further. The KNX Association supports the trend towards the "smart house", in which the various building services including lighting and security systems all communicate on the same network.

The aims and objectives of the KNX Association are as follows:

- To determine the range of functions for the devices installed in the network
- To promote interaction between products from a wide range of manufacturers (interworking)
- To certify products that fulfill the KNX standards
- To facilitate the commissioning of equipment in KNX networks
- To open the KNX bus to communications providers and utilities companies
- To exploit various transfer media: bus (TP1), wireless (RF) and power line (PL)

KNX and Synco

The Synco devices are designed for HVAC applications and individual room control. They are used in:

- Residential buildings
- Shops and offices
- Shopping centers and commercial buildings
- Schools and training centers
- Hotels and fitness, leisure and wellness centers

The KNX bus enables the Synco devices to communicate with each other, i.e. to exchange process values and system data in LTE mode. Typical values and data are:

- Outside air temperature to devices in the same "outside air temperature zone" and room temperature to devices in the same "geographical zone" (multiple use of sensor values)
- Heating and cooling demand signals from zone controllers to the devices in the primary LTHW and CHW plant.
- DHW priority signals (e.g. while charging the DHW tank)
- Time synchronization (the time master synchronizes the time slaves)
- Remote indication of fault and error messages (e.g. sensor error)

1.1.1 Definition of terms

KNX bus

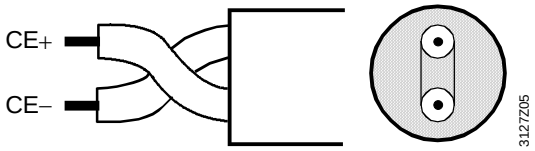
The KNX bus used with Synco is referred to as "KNX TP1". A full-scale KNX network is a three-level structure consisting of one area line, from which 15 main lines branch off. A further 15 lines can branch off from each main line. A network consisting of main lines and lines requires area and line couplers. If no area and line couplers are used, the network is restricted to one line.

Bus topologies

Permissible bus topologies are tree, line and star topologies. These topologies can be mixed as required. However, ring topologies are not allowed. The tree topology has advantages over other topologies in cases where a large network has to be created (refer to "Bus topologies" in the KNX bus data sheet, N3127).

Bus cable

The bus cable comprises two twisted conductors, CE+ (red) and CE– (black).



Unshielded bus cables are permitted for the KNX bus in conjunction with Synco devices. Shielded bus cables are recommended, however, if high interference is anticipated. For further details refer to data sheet N3127.

Bus access method

The KNX bus uses CSMA/CA (CSMA = **C**arrier **S**ense **M**ultiple **A**ccess / CA = **C**ollision **A**voidance) to access the bus. With this method of access every bus user has equal data transmission rights. There is no communication master (in contrast to the master/slave principle). The data is exchanged directly (peer-to-peer) between bus users.

A collision avoidance strategy is required when several bus users attempt to send a message on the bus at the same time (multiple access). One bus user is given transmission priority, so that it can transmit its telegram fully and correctly. The other bus users stop transmitting and repeat their message after a given delay. The CSMA/CA method offers quick response times if the transmission capacity (number of connected bus users and process events) is utilized within the permitted limits.

LTE mode

LTE mode (LTE = Logical Tag Extended) is characterized by the assignment of zone addresses (logical tags) to create communications bindings for the exchange of process values. Devices with the same zone address exchange process values with each other, one zone address being capable of transmitting the values of many data points.

Zone addresses

The zones are addressed during local commissioning with the RMZ790 or RMZ791 operator units, or in the case of remote operation, with a PC/laptop and the ACS7… software.

S-mode

S-mode is characterized by the assignment of (logical) group addresses to individual data points to create the communications bindings for the exchange of process values. Devices bearing the same group address exchange process values with each other.

Group addresses

The group addresses can be assigned to the group objects (S-mode data points) with the **ETS** engineering and commissioning tool **(**ETS = Engineering Tool Software**).**

Data points

For the various HVAC, lighting and security equipment and for integration into higher-level building automation and control systems, selected data points of the Synco devices can also communicate in S-mode.

"Data points" are also referred to as "communication objects".

Abbreviations

	Description
Ac	Area coupler (see section 1.4)
DPSU	Decentral Power Supply Unit (see section 2.2.1)
E-Mode	Easy-Mode, LTE-mode is one of several "Easy Modes"
ETS	Engineering Tool Software
HVAC	Heating, Ventilation and Air Conditioning
IP	Internet Protocol
Lc	Line coupler (see section 1.4)
LTE-Mode	Logical Tag Extended Mode, the Easy Mode used by Synco
KNX	Communications standard (wired) TP1 (Twisted Pair)
PSU	Power supply unit, (see section 2.2.3)
S-mode	System mode, configuration / commissioning with ETS only
TP1	**T**wisted **P**air **1**, data transfer medium: bus

1.2 Synco 700, 900, RXB/RXL range

Introduction

The table below lists those devices in the Synco 700, 900 and RXB/RXL ranges which have a TP1 (wired) KNX interface.

These devices have a network address and can communicate via the KNX bus in LTE mode.

The table does **not** cover all the devices in the various ranges. For example, the Synco 700 extension modules RMZ78x and the Synco 900 wireless components are not included.

	Equipment	Types	Data sheet
Synco 700	**Universal controllers**		
	for use in ventilation, air conditioning and chilled water systems	**RMU710** **RMU720** **RMU730**	**N3144**
	RMU Series B also for primary plant applications in conjunction with individual room control	**RMU710B** **RMU720B** **RMU730B**	**N3150**
	Heating controllers		
	For boiler and heating circuit controls or primary controllers	**RMH760**	**N3131**
	Additionally: RMH Series B also for district heating plant	**RMH760B**	**N3133**
	Boiler sequence controller		
	for multiple boiler systems with up to 6 boilers	**RMK770**	**N3132**
	Central control unit		
	For individual room control with RXB/RXL room controllers	**RMB795**	**N3121**
	Switching and monitoring device		
	For HVAC and chilled water applications	**RMS705**	**N3123**
	Bus operator unit		
	Access via KNX to Synco 700 devices and RXB/RXL room controllers	**RMZ792**	**N3113**
	Room unit		
	With setpoint adjuster and mode and timer buttons	**QAW740**	**N1633**
	Central communication units		
	For remote operation and monitoring of Synco devices in KNX networks		
	Central communication units for up to 4, 10 or 64 Synco devices	**OZW771**	**N3117**
	Central communication unit for up to 150 Synco devices	**OZW775**	**N5663**
Synco 900 (Synco living)	**Central apartment unit**		
	For management of one apartment Heating/cooling/ventilation, control of lighting and blinds, door and window monitoring	**QAX910**	**N2707**
Synco RXB/RXL	**Room controllers**		
	For fan-coil units with 3-speed fan control	**RXB21.1**	**N3873**
	For fan-coil units with 3-speed fan control and electric heating coil	**RXB22.1**	
	For fan-coil units with 3-speed fan control	**RXL21.1**	**N3877**
	For fan-coil units with 3-speed fan control and electric heating coil	**RXL22.1**	
	For chilled ceilings and radiators	**RXB24.1**	**N3874**
	For chilled ceilings and radiators	**RXL24.1**	**N3878**
Service tool	**ACS7… software and service-interface**		
	For Synco device commissioning and diagnostics	**OCI700.1**	**N5655**

RMZ790 and RMZ791 operator units

The RMZ790 and RMZ791 operator units are not bus devices. However they can be used to commission the Synco 700 type RM… controllers (e.g. to set the device address, see section 4.2).

Operator units		
Plug-in unit for Synco 700 controllers	**RMZ790**	**N3111**
Also suitable for mounting away from controller, e.g. on control panel door	**RMZ791**	**N3112**

Synco 100, Synco 200

The devices in the Synco 100 and Synco 200 ranges are non-communicating and are not dealt with in this document.

1.2.1 Collective terms for the device types

In this document, the devices on in the table on the previous page may be referred to collectively as follows.

Synco 700 type RM…controllers

The term "Synco 700 type RM… controllers", or "RM… controllers" for short, refers collectively to the following types:

- Universal controllers — RMU710, RMU720, RMU730, RMU710B, RMU720B, RMU730B
- Heating controllers — RMH760, RMH760B
- Boiler sequence controllers — RMK770
- Central control units — RMB795
- Switching and monitoring device — RMS705

RXB/RXL room controllers

The term "RXB/RXL room controllers" or "RX… room controllers" refers collectively to the following types:

- Room controllers — RXB21.1, RXB22.1
- Room controllers — RXL21.1, RXL22.1

OZW77x central communication units

The term "OZW77x central communication units" refers collectively to the following types:

- Central communication units — OZW771.xx (where xx = 4, 10 or 64)
- Central communication unit — OZW775

Synco bus devices

The term "Synco bus devices" refers collectively to the following types:

- Synco 700 controllers — RM…
- Room controllers — RX…
- Room unit — QAW740
- Bus operator unit — RMZ792
- Central communication units — OZW77x
- Synco 900 central apartment unit — QAX910

Bus devices

"Bus devices" include the Synco bus devices (see above) and devices from third-party manufacturers. Bus units use a KNX network address.

1.2.2 Product markings on Synco bus devices

The Synco bus devices are labeled with product markings with the following meanings:

KNX	KNX logo	Devices with this logo are certified by Konnex
TP1	KNX transmission medium	TP1 stands for **T**wisted **P**air **1** (1 pair of twisted wires)
EE	KNX configuration mode	EE stands for **E**asy (mode), Logical Tag **E**xtended

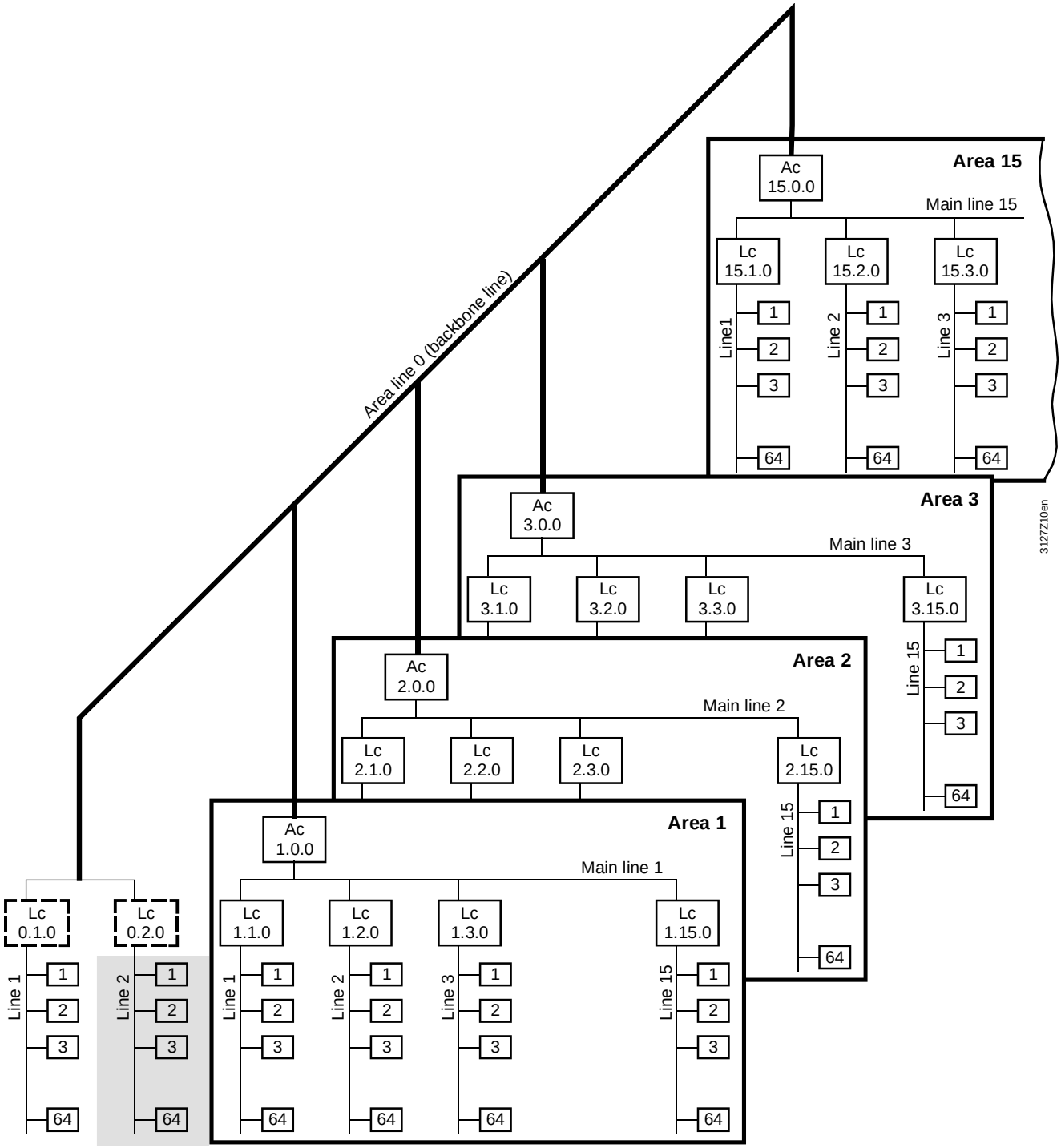
1.3 The KNX network

1.3.1 Full-scale KNX network

KNX network, three-level structure

A full Konnex network is structured on three levels. It consists of:

- Area line 0 → Area 0 (backbone line)
- Main lines 1...15 → Areas 1…15
- Lines 1.1...15.15



Note

The arrangement of the bus devices in the 3-level KNX network structure, with the Synco bus devices factory set with Area/Line address 0.2 corresponds to the gray shaded area in the illustration above.

Area line 0

The area line is the backbone of the network. The subnetwork address (area line) is 0.0 (zero.zero). 15 area couplers (Ac) can be connected to the area line, in addition to bus devices (not shown), whose number is determined by subtracting the number of area couplers from 64.

Main lines

15 main lines can branch off from area line 0 by means of area couplers. The area couplers used to establish the main lines have physical addresses from 1.0.0 to 15.0.0. Each main line can accommodate 15 line couplers (Lc), in addition to bus devices (not shown) whose number is determined by subtracting the number of line couplers from 64.

Lines

15 lines can branch off from each main line via line coupler. The line couplers used to establish the lines from main line 1 have physical addresses from 1.1.0 to 1.15.0. Line couplers from main line 15 have physical addresses from 15.1.0 to 15.15.0.

1.3.2 Network address

Network address

The network address for a full-scale KNX network consists of the area, line and device address. It reflects the exact position of a bus device in the overall network and is unique within the network.

Syntax of the network address

Syntax: Area.Line.Device

Area	0	Factory-set for Synco bus devices = 0 (backbone)
Area	1...15	
Line	1...15	Factory-set for Synco bus devices = 2
Device	1...255	Factory-set for Synco bus devices = 255 except OZW775 central communication unit = 150

Area and line address

The Synco bus devices are factory-set with the KNX-defined area and line address 0.2.

Individual address

The "individual address" (a term from the KNX world) consists of the address components area, line and device, and corresponds to the network address already defined.

Physical address

The "physical address" is another term (translated literally from the German) for the "individual address".

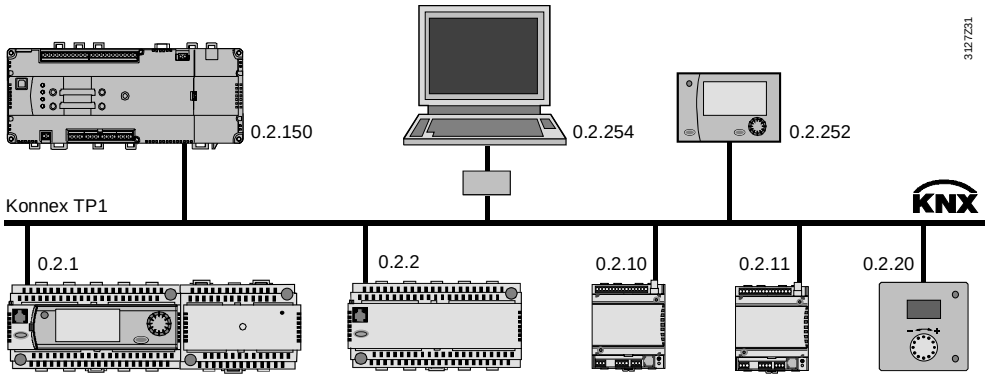
Subnetwork, Subnetwork address

In KNX terms, a subnetwork is the same as a line. Hence, the subnetwork address consists of the address components "area" and "line".

1.3.3 Device address

Device identification

As described above, the network address consists of a combination of the area, line and device address, for example 0.2.10, where 0 stands for the area, 2 for the line and 10 for the device address.



Device addressing

The addressing of the devices must be planned at the design engineering stage. Note the following points when assigning addresses:

- Each device address may be allocated only once within an area and a line.

Device addresses in the range 1 to 251 must be used for the maximum 64 bus devices on a line (the same applies on a main line). Addresses 0, 150, 252, 254 and 255 are reserved for the following:

0 is used in each area or each line for the area or line coupler respectively.

150 is the factory-set device address for the OZW775 central communication unit (device address 150 can be modified)

252 is used to connect the RMZ792 bus operator unit, i.e. the bus operator unit uses this address if it is free, otherwise it starts at 252 and looks for the next lower unused address.

254 is used to connect the ACS operator station (PC/Laptop with ACS7… software) i.e. the OCI700.1 service tool uses this address if it is free, otherwise it starts at 254 and looks for the next lower unused address.

255 is the factory-set device address of the Synco bus devices (see the notes below).

Notes

The factory-set address 255 in the Synco bus devices prevents communication problems in the commissioning phase. This is because devices with this address do not send any data. However they can be controlled manually, and can receive the new device address setting, for example.

The device addresses of the Synco 700 type RM… controllers can be set with the RMZ790 and RMZ791 operator units (see section 4.2) or with the ACS7… software (service tool OCI700.1, see section 5.2).

Remember not to use device addresses 150, 252 and 254 when addressing the bus devices.

1.4 Area/line couplers and IP router

Use of couplers

Complex networks covering large areas may require area and line couplers for two main reasons.

- When the KNX network comprises more than 64 bus devices
- When the network would exceed the permissible limits without couplers

A network which uses area and line couplers makes it possible to create "communication islands" with the aim of restricting data traffic across areas or lines to a minimum. The couplers link the "communication islands" on the basis of the network layer (the router function of Layer 3 of the OSI reference model).

Siemens area/line couplers

The recommended area/line couplers are supplied by Siemens, ordering code:

- 5WG1 140-1AB13, short code N140/13
  bus connected to main line and line via bus terminals

For further information refer to the product description and description of functions (enclosed with the device) or consult:

www.automation.siemens.com/et/gamma/

Note

For large plants, Siemens area/line couplers from version R2 should be used (these are stamped "R2") as only these couplers contain the LTE filter table (see section 8.2).

Use of IP routers

IP[1)] routers are required when a KNX network needs to be connected to an IP network.

As a device, the IP router is not technically the same as the area/line couplers. Instead of establishing a link within KNX, a "KNX-IP network" link is created, whereby the IP router connects a KNX area or a KNX line to an IP network.

[1)] IP = Internet Protocol: Network protocol for data traffic, routing and, in the case of internetworking, for global, addressing.

Siemens IP router

The recommended IP router is supplied by Siemens, Order No.

- 5WG1 146-1AB01, short code N146
  Bus connected via bus terminals, IP network connected via RJ45 socket

For further information refer to the product description and description of functions (enclosed with the device) or under:

www.automation.siemens.com/et/gamma/

Note

For large plants, Siemens IP routers from Version R4 should be used (these are stamped "R4") as only these IP routers contain the LTE filter table (see section 8.2).

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2 Engineering notes

2.1 Designing the network

2.1.1 Design engineering procedure

For design engineering refer also to the information in data sheet N3127.

Design engineering flow chart

Step	Activity	Objective
1	Assess the situation	• Accurate site plan with location of the buildings and layout of rooms • Overview of hydraulic system
2	Work out proposed solutions and establish how to implement them.	• Clear project definition
3	Include plans for possible expansion zones for extensions	• Advance planning of the scope for expansion of the plant
4	Determine device types and quantity	• Table of device types • Number of devices per line and area, within the permitted limits
5	Define the installation of the devices in accordance with their technical functions	• Entry on plant diagram • List of applications
6	Define cable routing and cable lengths	• Entry on plant diagram • Network size within permitted limits
7	Determine type of bus power supply	• Decentral bus power • Central bus power supply
8	Check limits	• Number of bus devices per line and area • Size of network • Adequate bus power (with reserve for later expansion)
9	Create network structure and wiring diagram	• Complete installation and commissioning documents

Project data

Devices, bus devices

Network

Special criteria

When structuring a network, special attention should be paid to certain criteria:

- The number of bus devices in a line, in an area and in the network
- The type of bus power supply in relation to the number and properties of the bus devices
- The total length of all the bus cables in one line and in the network
- The distances between the bus devices
- The distance between the bus devices and the nearest bus power supply

Large plants

Refer to the special notes in section 8 on design engineering for large plants.

Lightning and overvoltage protection, and EMC

Account must also be taken of special criteria in relation to lightning and overvoltage protection and EMC. For details refer to the discussion in section 9.7.

2.1.2 Number of bus devices per line, area and network

64 bus devices on one line

Up to 64 bus devices can be installed on one line (including a main line and area line 0). There are no restrictions relating to the type mix.

Notes

The Synco 700 type RMZ78x expansion modules, the RMZ790 and RMZ791 operator units and the room units connected (via PPS2) to the RXB/RXL room controllers do not have a KNX interface and can be omitted from the design total.

In installations incorporating Synco bus devices (plus the OCI700.1 service tool, if connected) and third-party devices, the number of Synco bus devices is reduced in accordance with the number of third-party devices.

960 bus devices in one area

Based on 64 bus devices per line and 15 lines per area, up to 960 bus devices can be installed in an area. The network addresses for Area 1 are:

- Area coupler 1.0.0
- Line coupler 1.1.0…1.15.0
- Bus devices 1.1.1…1.15.254

Note

With KNX TP1 only 64 bus devices are permitted in device address range 1…254.

16,320 bus devices in a network

Theoretically, a total of 16,320 bus devices could be installed in a full KNX TP1 (wired) network. In practice the number is approximately 12,000 bus devices.

Based on 960 bus devices per area, and a full-scale network comprising 15 areas, up to 14,400 bus devices can be installed in one network.

Main lines 1…15

64 bus devices can be connected to each of the 15 main lines, giving a further 960 bus devices in addition to the 14,400 calculated above, which makes a total of 15,360 bus devices.

Area line 0

Another 64 bus devices can be installed in each of the 15 lines branching off from area line 0, now giving a total of 15,260 bus devices. Normally, however, no line couplers are installed in area line 0.

Notional Line 2

Note: The preset addresses, area address 0 and line address 2 relate to a "notional line 2" branching from area line 0. The network addresses for this line are 0.2.1 to 0.2.254.

The term "notional line 2" indicates that there is no need to install a line coupler 0.2.0. See the illustration in section 1.3, Full-scale KNX network.

2.1.3 Bus load number E

Data traffic of a device

The bus load number E (short, E-number) applies to the average data traffic of a device on the bus.

The bus load number does not have to be calculated for a line containing the permitted 64 bus devices (the total of bus load number is less than 300).

The bus load number E of a device is specified in the relevant data sheet.

2.2 Bus power supply

2.2.1 Decentral bus power supply

Introduction

A bus power supply is always required for bus communications. There are two options:

- Decentral bus power supply DPSU = Decentral Power Supply Unit
- Central bus power supply PSU = Power Supply Unit

Note

In any one line (including a main line) either the DPSU or PSU may be used.

Devices with bus power

The following devices are delivered factory-set with "Decentral bus power supply = On" and supply power to the bus:

- Synco 700 type RM…controllers DC 29 V, 25 mA
- OZW775 central communication unit DC 29 V, 25 mA
- QAX910 central apartment unit See the warning note below, marked ⚠

Notes

Since the devices, which are factory-set to "Decentral bus power supply = On", are distributed on the bus, they are referred to as "Decentral bus power supply, DPSU".

Devices with the setting "Decentral bus power supply = On" must not be installed on the same line as third-party devices. In such cases, the devices must be set to "Decentral bus power supply = Off" and a power supply unit must be installed (see next section "Central bus power supply").

In devices with a bus power supply, the bus power section is electrically isolated from the KNX bus.

⚠ Caution!

In addition to its own intrinsic consumption, the QAX910 central apartment unit when set to "Bus power supply = On" delivers the bus power for one OZW771 central communication unit or for the OCI700 service interface.

If other devices are installed on the same line, the central apartment unit must be set to "Bus power supply = Off". In this case, the bus power must be supplied by setting other devices such as the RM… controllers to "Decentral bus power supply = Off", or by installing a power supply unit.

Devices without a bus power supply

Devices without a bus power supply:

- QAW740 room unit
- RXB/RXL room controllers
- RMZ792 bus operator unit
- OZW771.xx central communication units
- OCI700 service interface
- Area/line couplers and IP router

Note

Devices without a bus power supply require devices on the same line with a DPSU or a power supply unit, PSU.

Rule of thumb

The rule is: One device with a DPSU can operate two devices without a bus power supply plus the OCI700 service interface and OZW771 central communication unit.

Per line, the rule is:

1 device with a DPSU + 2 devices with no bus power supply + OCI700 + OZW771
up to a maximum of
8 devices with a DPSU + 16 devices with no bus power + OCI700 + OZW771

Optimization

An RM… controller with a DPSU delivers a net current of 25 mA. This covers the power consumption of 5 devices without a bus power supply (5 mA each required).

8 devices with a DPSU on one line deliver 200 mA. This covers the power consumption for 40 devices or 38 devices plus OCI700 plus OZW771.

Notes

Even with devices having a low current requirement (< 3 mA), the number of devices in a line must not exceed 64.

Refer to the data sheets for the power consumption of the new Synco devices.

2.2.2 Power consumption of the bus devices

To optimize the connectable devices set to "Decentral bus power supply = Off" and the devices without a bus power supply, it is necessary to calculate the power consumption from the KNX bus.

Power consumption values for Synco devices with "Bus power supply = Off":

- RMU7x0, RMU7x0B universal controllers 5 mA
- RMH760, RMH760B heating controllers 5 mA
- RMK770 boiler sequence controller 5 mA
- RMB795 central control unit 5 mA
- RMS705 switching & monitoring device 5 mA
- OZW775 central communication unit 5 mA
- QAX910 central apartment unit 5 mA

Power consumption values for Synco devices without a bus power supply:

• QAW740 room unit	7.5 mA	
• RXB/RXL room controllers	5 mA	
• RMZ792 bus operator unit	45 mA	if directly connected to bus (e.g. via bus socket) without external power supply
• RMZ792 bus operator unit	5 mA	if directly connected to bus with external AC 24 V supply
• OZW771.xx central communication units	5 mA	

Power consumption values for service interface, coupler and IP router:

• OCI700 service interface	5 mA	
• Area/line coupler N140/13	6 mA	Primary line (main line)
	8 mA	Secondary line (sub-line)
• IP router N146	10 mA	From bus [1)]

[1)] The Siemens IP router N146 consumes 10 mA from the KNX bus despite the additional external auxiliary voltage AC/DC 24 V. Power consumption with auxiliary voltage: 25 mA at DC 24 V, max. 800 mW.

2.2.3 Central bus power supply

Introduction

When one or more power supply units (PSU) are used for the bus power supply, this is referred to as a "central bus power supply". This type of bus power supply is required in the following circumstances:

- The permitted 8 Synco devices with DPSU (Decentral bus power supply = On") are insufficient to cover the power consumption of the devices without a bus power supply.
- Synco devices and third-party devices are installed on the same line.
- Only devices without a bus power supply are installed on the same line.

Note

On a line with a central bus power supply, the following devices must not be used to supply power to the bus:

- RM…controllers
- OZW775 central communication unit
- QAX910 central apartment unit

These Synco devices must be set to "Decentral bus power supply = Off" to prevent them from interfering with bus communications.

Power supply unit, PSU

Power supply units for **160, 320** and **640 mA** are available. The power consumption of the devices must be calculated as a means of determining the required power supply unit, PSU (see the relevant values on the previous page).

For a line accommodating 64 bus devices, each with a power consumption of 5 mA (64 x 5 mA = 320 mA), a power supply unit of 320 mA is sufficient.

Siemens power supply units

The following power supply units from Siemens are recommended for KNX networks (see also "GAMMA building management system").

Order codes:

- 5WG1 125-1AB01, short code N125/**01** **160 mA** (with integrated choke)
- 5WG1 125-1AB11, short code N125/**11** **320 mA** (with integrated choke)

Product data:

- Operating voltage AC 120…230 V, 50…60 Hz
- Bus voltage output DC 29 V (21…30 V, with choke)

For KNX networks with IP routers, the following Siemens power supply unit is recommended.

Order code:

- 5WG1 125-1AB11, short code N125/**21** **640 mA**

Product data:

- Operating voltage AC 120…230 V, 50…60 Hz
- Bus voltage output DC 29 V (21…30 V, with choke)
- Output, auxiliary voltage for IP router DC 24 V (12…30 V, without choke)

For further information refer to the product description and description of functions (enclosed with the device) or:

www.automation.siemens.com/et/gamma/

Note

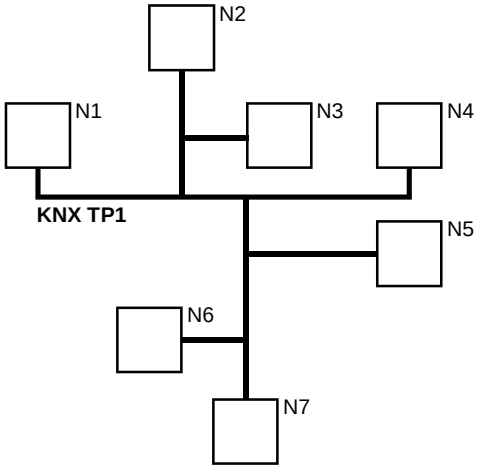
DC 29 V voltage with choke is required for the bus power supply. The DC 24 V auxiliary voltage for the IP router requires a voltage source without choke.

2.3 Bus topologies

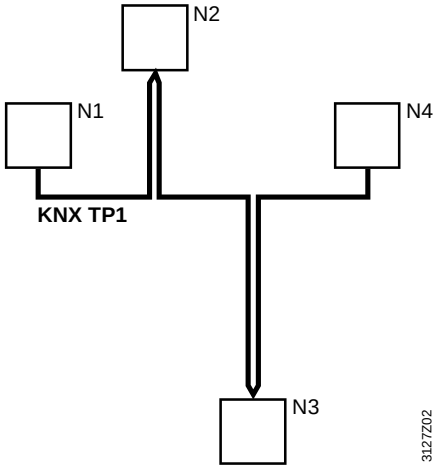
Advantage:
Tree topology

Permissible bus topologies are: tree, line and star topologies. These topologies can be mixed as needed. However, ring topologies are not permissible.
The tree topology is advantageous when creating a large network.

Tree topology (with stub lines)

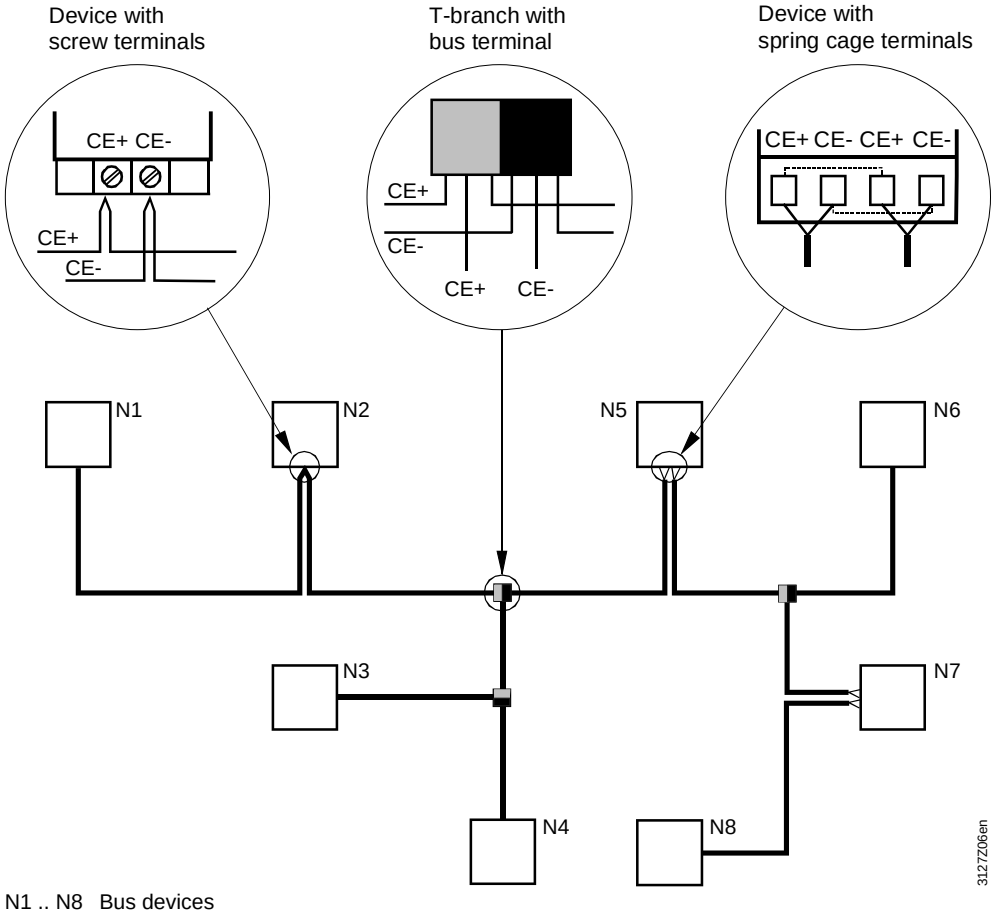


Line topology (with loops)



N1 .. N7 Bus devices

Branching and connection variants



N1 .. N8 Bus devices

2.3.1 Distances and cable lengths

Bus cable: KNX specified

The details of distances and cable lengths in a network are designed for bus cables specified by KNX.

Network with DPSU

In a KNX network with a "decentral bus power supply unit, DPSU" (see section 2.2.1) the distances between devices depend on the number of devices with a DPSU.

Number of devices with DPSU	Maximum distance		Total length of all cables in one line
	From device with DPSU to bus device	From bus device to bus device	
1	350 m	350 m	max. 350 m
2	350 m	700 m	max. 700 m
3 to 8	350 m	700 m	max. 1000 m
There is no minimum distance between devices with a DPSU.			

[1] Bus device without a bus power supply unit

Network with PSU

In a KNX network with "central bus power supply, PSU" (see section 2.2.2) the following information on distances must be observed:

- Distance between two power supply units, PSU — Min. 200 m
- Distance between bus device and nearest PSU — Max. 350 m
- Distance between bus devices — Max. 700 m
- Total length of all cables of one line — Max.1000 m

Notes

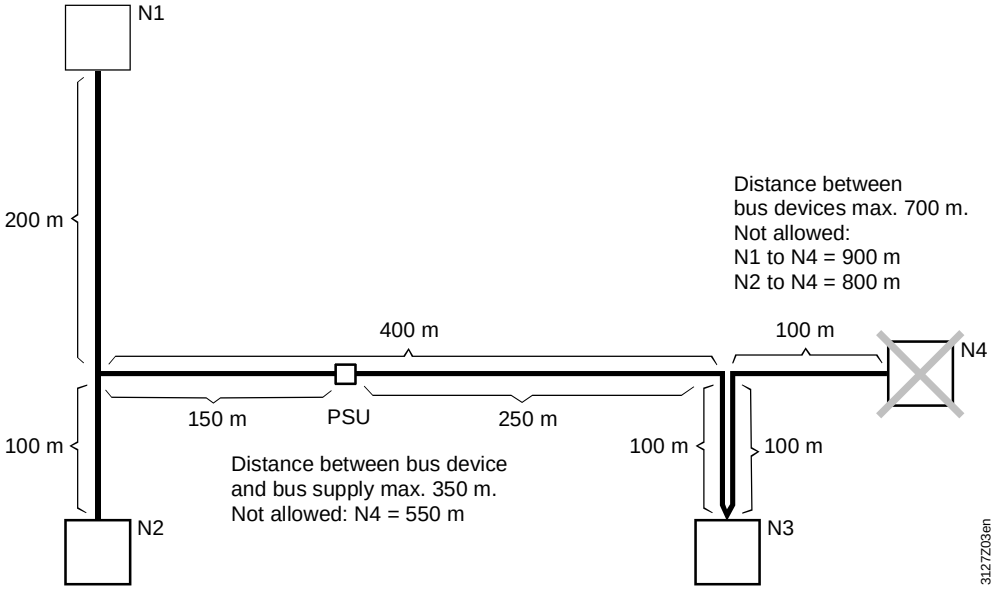
At least one power supply unit, PSU, is required for each line, and the maximum per line is two.

The power supply unit should be installed as close to the middle of a line as possible so that the maximum line length is possible.

The distance between a bus device and the nearest power supply unit must not exceed 350 meters. Hence:

- Even if the power consumption of the bus devices does not demand it, two power supply units may be required, depending on the length of a line, or a network with several lines and power supply units must be created.

Example 1



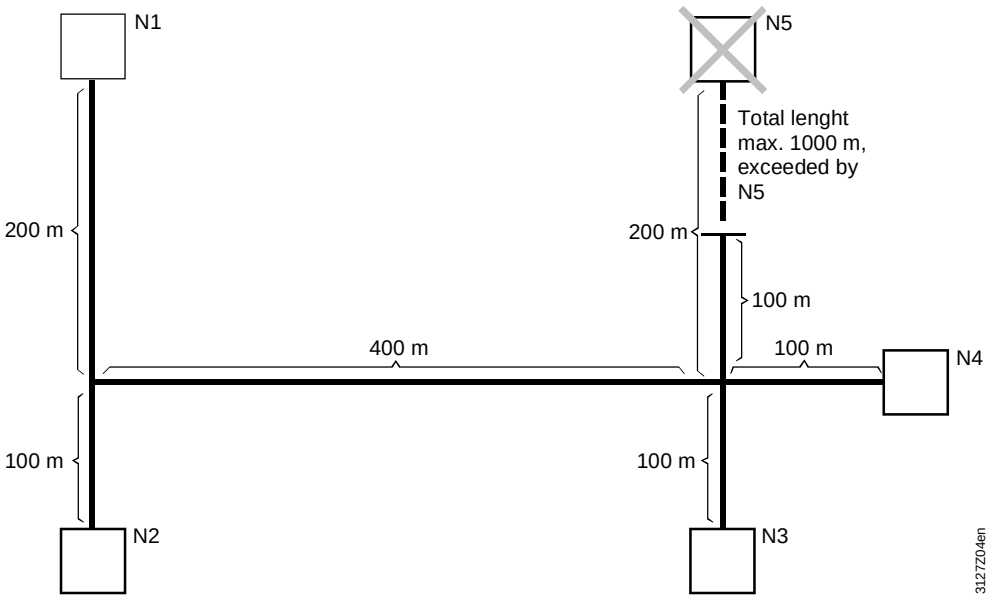
N1 .. N4 Bus devices

Distances

Bus device N4 – while adhering to the maximum distance of 700 m between bus devices – cannot be integrated on the bus if bus device N3 is integrated with a loop (instead of a sub-line).

If a maximum distance of 350 m is maintained between the central bus power supply PSU and a bus device without a bus supply, the bus power supply unit must be located at the point between 150 m and 250 m on the 400 m section shown.

Example 2



N1 .. N5 Bus devices

Total length

With the bus wiring shown, the integration of device N5 on the bus causes the permissible total length of 1000 m to be exceeded.

3 Commissioning notes

3.1 Points to check prior to commissioning

General points to check

The following points must be checked before commissioning starts:

- Check that bus devices and field devices are installed
- Check the wiring against the plant wiring diagram
- Check that all devices have an operating voltage:
  AC 24 V Synco 700 type RM… controllers, RXL room controller, OZW775 central communication unit. The RMZ792 bus operator unit can be operated with AC 24 V or powered via the KNX bus
  AC 230 V RXB room controller, OZW771 central communication unit, Synco 900 central apartment unit QAX910
  Devices without a direct connection for the operating voltage: QAW740 room unit, and RMZ790, RMZ791 operator unit
- Existing bus power supply Delivered by:
  - DPSU: Synco 700 devices set to "Decentral bus power = On"
  - PSU: Central bus power supply from power supply unit(s)
- Check that the plant is ready for operation

Note

The commissioning procedure is described in detail in the installation instructions for each individual device.

Checking communication

Communication is active if the following criteria are fulfilled:

- An existing bus power supply
- Time and date set
- Device addresses set
- Zone addresses set
- Devices not in commissioning mode

Communication of process values

The communication of process values requires that the zones are connected in the devices via the zone addresses (see section 7.1).

3.2 Commissioning with the RMZ operator units

Introduction

The Synco 700 type RM controllers can be commissioned with operator units RMZ790 and RMZ791 (but not RMZ792). This is a highly efficient method for small plants, as no commissioning tools are required.

Note

When commissioning larger systems with area/line couplers, IP routers and RXB/RXL room controllers, the OCI700.1 service tool/ACS7… software is recommended (see section 5.1).

Access levels

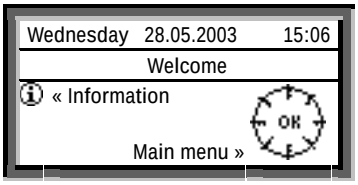
The operator units provide the option of three access levels. The selected access level is identified by the design of the square, top left, where:

• User level	■ Black square	Lowest access level, no password
• Service level	Square with key	Medium access level, no password
• Password level	Square with key 2	Highest access level, password

Commissioning, Password level

Commissioning requires access to the Password level. From the start page, the user logs in with the password and navigates to the required operating page or operating line via the predefined path.

Start page



Action Type

Press the OK "press-and-select" knob on the operator unit for access to the "Main menu" page.

3.2.1 Starting commissioning, plant mode "Off"

Before starting commissioning, it is recommended for safety and technical reasons to switch off the plant, e.g. the fan run-on for electric heating coils.

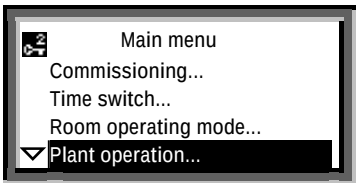
However, this requires that the plant is enabled again when commissioning is complete (see section 3.2.2).

Path

Main menu > Plant operation > Preselection

Main menu

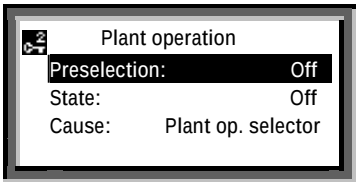
On the "Main menu" page, select "Plant operation".



Action

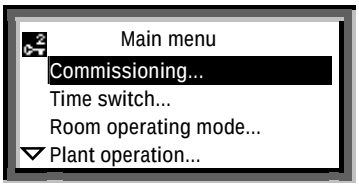
Press the OK knob to open the "Plant operation" page.

Plant operation = Off



Action — Select "Off" on the "Preselection" line and confirm by pressing the OK knob.

Return to main menu — Press ESC to return to the "Main menu" page.



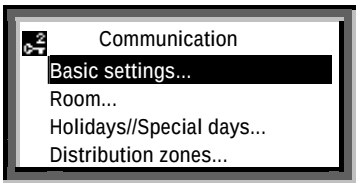
Action — Select "Commissioning" and press the knob.

Plant stopping — Before the "Commissioning" page is displayed, the following warning appears:

Action — Confirm the display of OK by pressing the knob (this causes the plant to stop). The "Commissioning" page now appears.

Action — Select the "Communication" line for example, by rotating the knob, and then press the knob to open the "Communication" page.

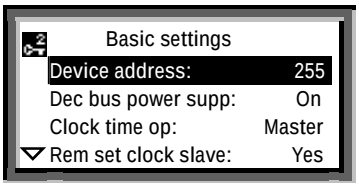
Communication — Main menu > Commissioning > Communication



Action — Press the knob for access to the "Basic settings" page

Basic settings

Main menu > Commissioning > Communication > Basic settings



Notes

Before modifiable values are changed for the first time, the operating lines show the factory-set values, e.g. device address 255.

The factory-settings are also referred to as standard or default values.

3.2.2 Terminating commissioning, plant mode "Auto"

If the plant mode was set to "Plant operation = Off" at the start of commissioning (see section 3.2.1), it must be reset to "Plant operation = Auto" when commissioning is complete.

Plant starting

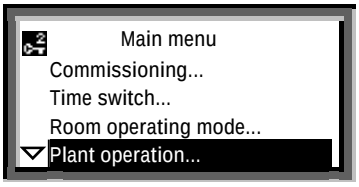
When commissioning is complete (e.g. after "Basic settings", see the operating page above), the repeated pressing of the ESC button results in the following warning:

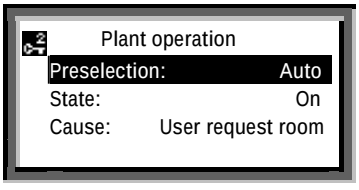
Action

Acknowledge the display of OK by pressing the knob (the plant will start). The display then reverts to the main menu.

Plant operation = Auto

Before leaving the main menu, press the knob to open the "Plant operation" page.





Action

Select "Auto" (= enable) on the "Preselection" line and acknowledge by pressing the knob. Press ESC to return to the start page.

4 Device address and device name

4.1 RM… controllers

Introduction

The RMZ790 and RMZ791 operator units are identical for the purpose of access to the RM… controllers and in terms of their application and functions.

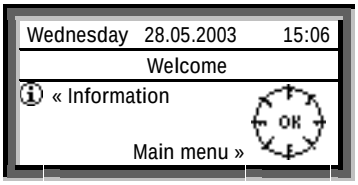
The RMZ792 bus operator unit, which has the same mechanical design as the RMZ791, is used for remote access to the Synco 700 bus devices and in terms of application and functions it differs substantially from the RMZ790 and RMZ791 operator units.

4.1.1 Reading the area, line and device address

The area, line and device address are factory-set in the RM… controllers. The settings can be read with the RMZ790 and RMZ791 operator units at the Service level (indicated by the 🔑 symbol).

Start page: Selecting the main menu

From the start page, press the OK knob for access to the "Main menu" (see illustration below).



Note

On delivery from the factory, the start page displays the word "Welcome" instead of the device name.

Main menu

Note

The bottom of an operating page is indicated by the "Arrow Up" symbol. For access to the top of the page, the knob is rotated counter-clockwise.

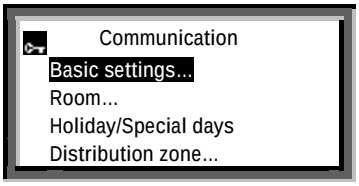
Path to the "Basic settings" page

The path for access to the "Basic settings" page containing the factory-set addresses is as follows:

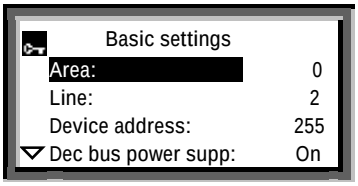
🔑 Main menu > Device information > Communication > Basic settings

Device information

Communication



Basic settings



Notes

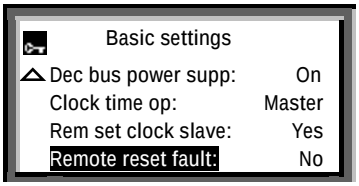
With access at the Service level, the setting values on the "Basic settings" page are read-only values. This is indicated by the fact that the highlight bar does not cover the whole operating line, i.e. the settings themselves are not highlighted.

In small networks, the KNX bus can be commissioned with the factory-set area address 0 (zero) and line address 2. These addresses are permissible only if:

- The Synco bus devices are installed in Area 0 and Line 2 of a network, and not assigned to other areas and lines by means of super-ordinate area and line couplers.

Reading other basic settings

The other basic settings under "Communication" can be read by rotating the knob clockwise.

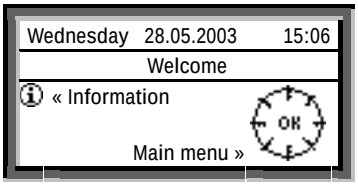


4.1.2 Assigning device names

The RMZ790 and RMZ791 operator units can be used to assign an individual device name (e.g. plant name) to every RM… controller. This device name is displayed on the second line of the start page in the RMZ790 and RMZ791 operator units.

Start page

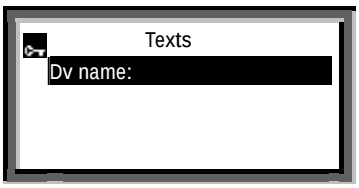
On delivery from the factory, the word "Welcome" is displayed instead of the device name.



Assigning device names

We recommend that the device name be defined at the design engineering stage. To assign a name, select the Service level and the following path:

Main menu > Settings > Texts >



Action

Write the text, via the "Texts" page and the line "Dv. Name" (= Device name):

- Turn the knob as required for access to the "Device name" page.
- Turn the knob clockwise and select a character.
- Press the knob to import the selected character to the text line.

Save the text line in the device:

- Turn the knob counterclockwise until the OK field is displayed.
- Press the knob to save the text line in the device.
- Press ESC (repeatedly) to return to the start page, and check the device name.

Notes

The device name may contain up to 21 alphanumeric characters (maximum 21 characters including spaces)

Device names cannot be assigned to the Synco 700 type RMZ78x extension modules.

At the same time as the device address, a device name can be assigned with the ACS Service software to every device (see section 5.2.1).

4.2 Setting device address with RMZ790 and RMZ791 operator units

Introduction

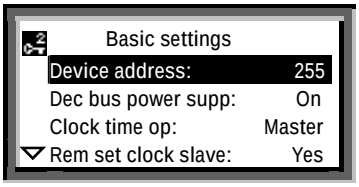
Synco bus devices with factory-set device address 255 do not transmit process values. However, these devices can be operated, and the device address can be set. The address range is 1…253 excluding 150, which is reserved for the OZW775 central communication unit.

Setting procedure

Access to the basic communication settings is via the Password Level (symbol). The device address is then set via the "Basic settings" page on the "Device address" line. The procedure is as follows:

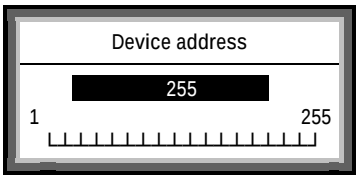
Step 1

Main menu > Commissioning > Communication > Basic settings



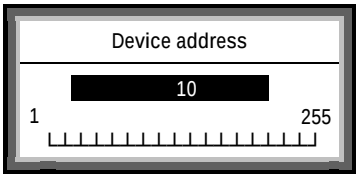
Step 2

Turn the knob as required for access to setting mode.



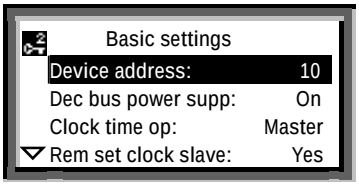
Step 3

In setting mode, set e.g. Device address=10 by rotating the knob as required.



Step 4

Press the knob to confirm the setting. An internal test to check for address conflicts is indicated by the hourglass symbol.



When there are no more basic settings to be modified, the commissioning process must be terminated (see section 3.2.2).

Note

Device addresses can also be assigned to a device via ACS (see section 5).

5 Device addresses via ACS

5.1 Service tool OCI700.1 and ACS7… software

5.1.1 Overview

Service tool OCI700.1

The OCI700.1 service tool is used for commissioning and diagnostics for devices in the Synco, SIGMAGYR and ALBATROS ranges, and for the operation of plant via the KNX bus or Local Process Bus (LPB) (see data sheet N5655).

When ordering, please use type code **OCI700.1**. No license is required for operation. The tool is supplied as a complete kit in a service case:

- CD-ROM with
  - Operating software
  - Service software
  - Documentation
- OCI700 service interface
- USB cable, Type B socket
- KNX service cable, RJ45 For Synco devices
- LPB service cable, RJ12 For SIGMAGYR and ALBATROS controllers (not illustrated below)

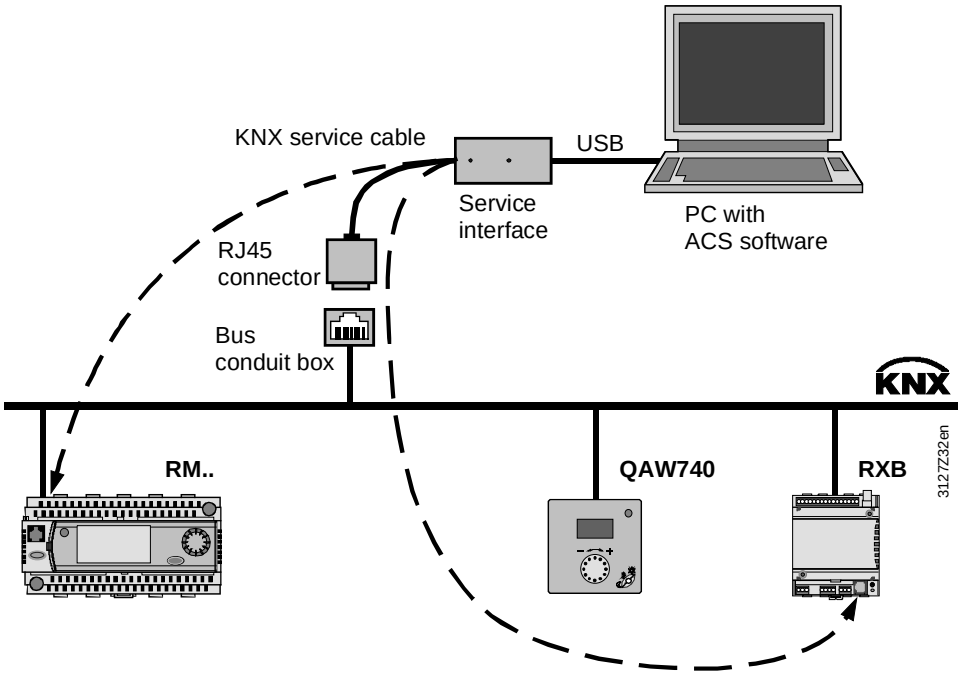
Installing the software

The OCI700.1 service tool/ACS7… software are installed on a PC/laptop from the CD-ROM. See data sheets N5640 and N5641 for details of the ACS7… software.

OCI700 service interface

The OCI700 service interface converts the signals between the USB port on the PC/laptop and the tool interface on the bus device (RJ45 connection).

There is no need to set parameters for the service interface. Only the central unit (OCI700-KNX, see section 5.1.2) needs to be selected via the software, after which communication is established with the device (and other devices on the bus).



Synco devices with a tool interface

The following Synco devices have a tool interface and can be connected directly to a PC/laptop via the OCI700 service interface:

- RM… controllers
- RX… room controllers
- QAX910 central apartment unit

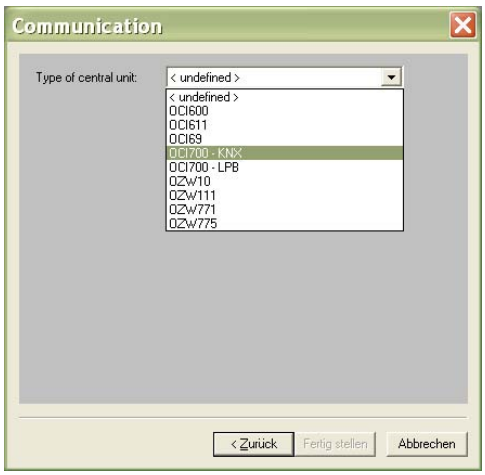
Note

The QAW740 room unit and OZW77x central communication units do not have a tool interface. Communication with these devices is possible indirectly, via Synco devices with a tool interface and the KNX bus.

5.1.2 New plant

Central unit type

If it does not already exist, a new plant must be set up. With a connection via the OCI700 service interface, OCI700 - KNX must be selected as the type of central unit.



Select, Type of central unit OCI700 - KNX Complete the input by clicking Finish

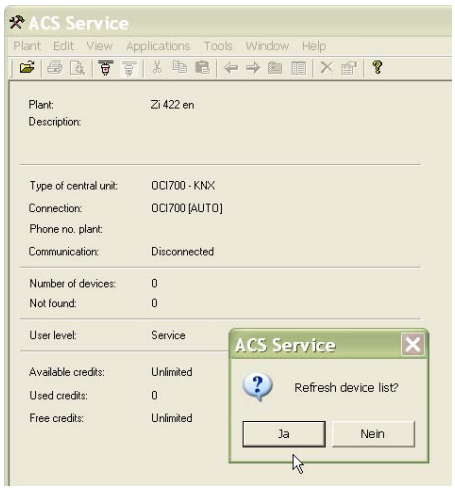
Notes on the Konnex bus system

Description of the information in the "Communication" dialog box under "Konnex bus system" (see screenshot on the right)

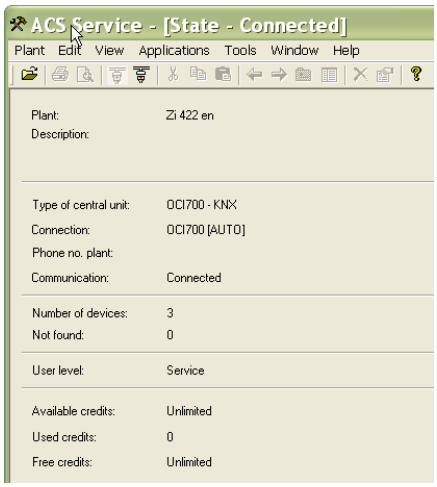
- Device at OCI700
  Only the device connected to the OCI700 service interface is imported into the device list. If the OCI700 service interface is connected to a bus socket, no devices are recognized.
- Line at OCI700
  All devices belonging to the same line as the device that is connected to the OCI700 service interface are included in the device list. Line couplers are not included in the list.
- All lines
  All devices in the KNX network, including area/line couplers and Siemens IP routers (see section 1.4) are included in the device list.

5.1.3 Establishing a connection

If "Refresh device list?" is answered with "Yes", the connection is established automatically, the device list is read and the reference data points are refreshed in the devices.



Update the device list with Yes



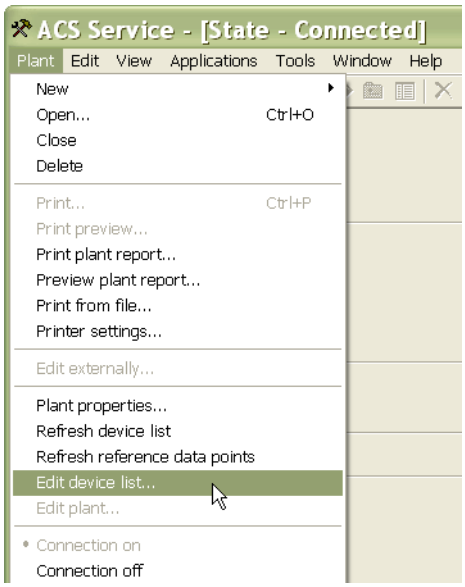
Communication: Connected 

5.1.4 Edit device list

ACS Service

The following shows how to set a device address via ACS Service. It is assumed that the user is familiar with ACS and how to use it.

In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box.

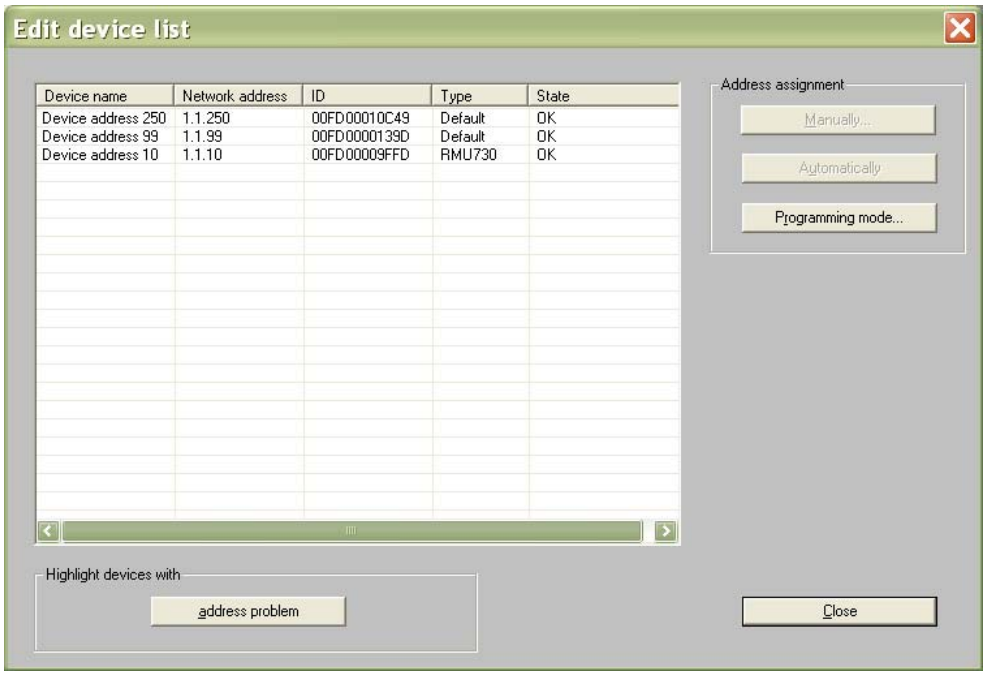


Note

If the connection status is not already [State - Connected], connection is established automatically before the "Edit device list" dialog box is opened (see next page).

Edit device list

The "Edit device list" dialog box displays the device list with the existing devices.



Description of the columns in the "Edit device list" dialog box.

Column	Description.
Device Name	Device names can be entered together with the network address. If no device name is entered, the display reads: Device address n
Network address	Area.Line.Device Address
ID	Unique factory-set KNX serial number
Type	Device type, e.g. RMU730. "Default" indicates: device not recognized, no "Device Description"
State: OK Address not assigned Address conflict Not found	Device communicating without errors Device address 255 (factory setting): Limited device communication Device address already in use Device not found

Notes

- Devices with the following status information are highlighted in red:
  - Address not assigned (still 255)
  - Address conflict (e.g. duplicate address assigned)
  - Not found
- The following devices are included in the list:
  - Synco 700 type RM…controllers (see section 1.2.1)
  - OZW771 central communication unit
  - OZW775 central communication unit
  - Synco 900 central apartment unit QAX910
  - RXB room controller
  - RXL room controller
  - QAW740 room unit
  - RMZ792 bus operator unit
  - Service tool OCI700.1
  - Area/line couplers and IP routers (depending on the setting under "Konnex bus system" in the "Communication" dialog box, see section 5.1.2)

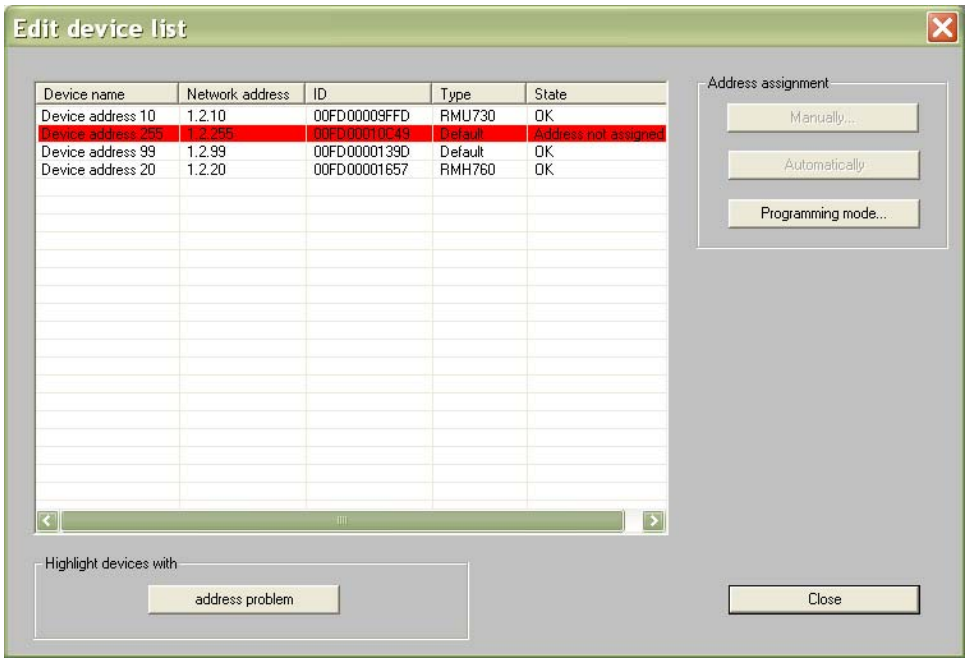
5.1.5 Addressing devices with the OCI700.1 service tool

The Synco 700 bus devices, Synco 900 type QAX910 central apartment unit, the OZW775 central communication unit and the RXB/RXL room controllers are all set with device address 255 when they leave the factory. Exception: The OZW775 central communication unit is factory-set with device address 150.

Important note

Only limited communication is possible with device address 255. Devices with this address are highlighted in red in the "Edit device list" dialog box.

For full communications, the device address must be in the range 1…253 (address 254 is reserved for the OCI700.1 service tool).



Prerequisites

The requirements for assigning the device address are as follows:

- The OCI700.1 service tool / ACS7… software must be installed on the PC/laptop
- The user must be logged on at "Service" or "Administrator" level
- The PC/laptop must be connected to the KNX bus via the OCI700 service interface, either:
  - Directly, via the bus socket, or
  - Indirectly, to a Synco bus device with an RJ45 tool interface

Bus power supply

The OCI700 service interface does not supply power to the KNX bus.

Decentral or central bus power supply is required for communication via the KNX bus (see section 2.2).

Device address and device name

The next sections describe the step-by-step procedure and the possible types of addressing for the Synco bus devices.

Note

The steps described for the addressing of the Synco bus devices cannot be applied to third-party devices.

5.2 RM… controller device address

Introduction

The Synco 700 devices are factory-set with device address 255. This address must be changed to allow communication via the KNX bus. The address can be modified in different ways with ACS Service (see further below).

Note

For information about the various RM… controllers, refer to the associated data sheets and basic description documents (for details see section 1.2).

Bus power supply

The RM… controllers can supply power to the KNX bus.

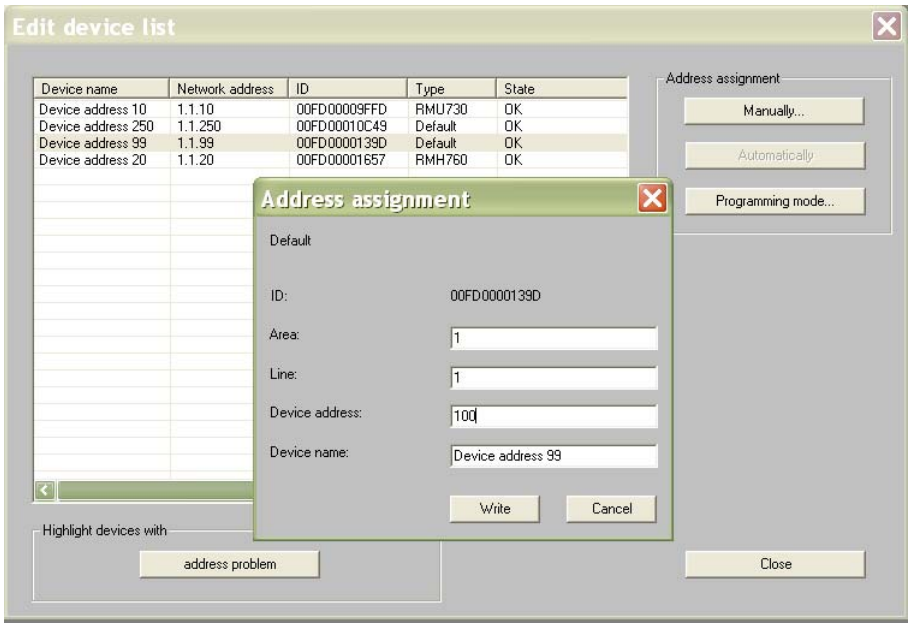
For communication purposes, the RM… controllers can be operated with the setting "Decentral bus power supply = On". Alternatively a central bus power supply must be available (see section 2.2).

5.2.1 Assigning addresses manually

With ACS service and manually assigned addresses, the Synco 700 devices, RXB/RXL room controllers, OZW77x central communication units and Synco 900 type QAX910 central apartment units can be allocated a device address and a device name.

Procedure

1. In ACS Service select Plant > Edit device list… to open the "Edit device list" dialog box.
2. Select the required device with the left mouse button.
3. Click Manually… to open the "Address assignment" dialog box.



4. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Device Name

A device name can be assigned to each device at the same time as the device address.

- Enter the device address and/or device name and confirm by clicking the Write button (see steps 1 to 4 above).

5.2.2 Assigning addresses automatically

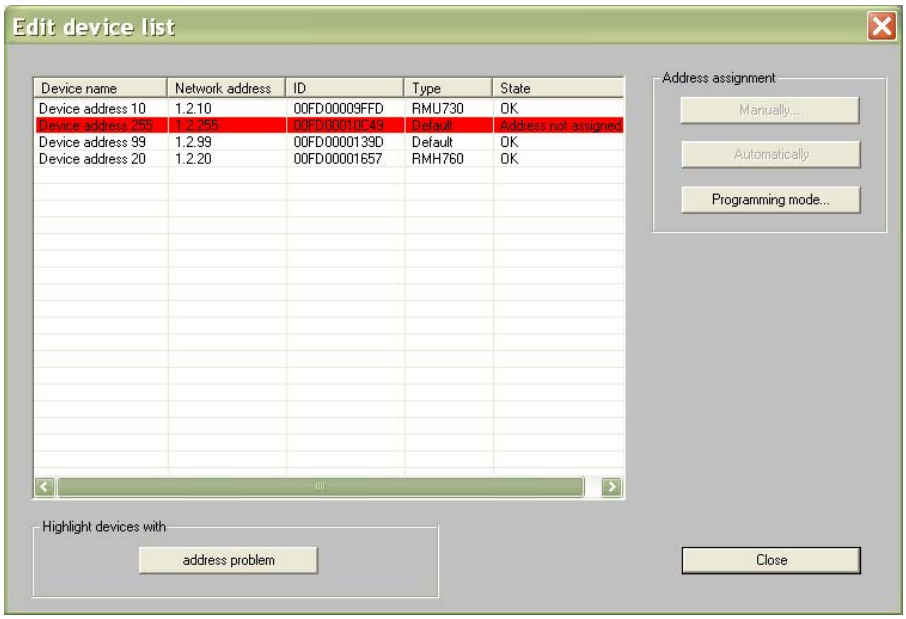
Addresses can be assigned automatically to devices in the address list which are highlighted in red because of an address problem or conflict. Possible causes:

- The device still has the factory-set device address 255
- The device address is already being used by another device (duplicate addressing)

Procedure

1. In ACS Service select Plant > Edit device list… to open the "Edit device list" dialog box.

2. Under "Highlight devices with" click the address problem button. This button is only accessible if at least one device is highlighted in red.



3. Click the address problem button to enable the button Automatically under "Address assignment". Click the button Automatically to assign the highest available unused device address.

4. After successful assignment of the address, the device list is refreshed automatically.

5. Check the "Device name", "Network address" and "State" columns to ensure that all devices have a valid address and a status of OK.

Note

When addresses are assigned automatically by the service tool, the next unused device address is assigned, in descending order from 254 (address 254 is used by the OCI700 service interface).

5.2.3 Assigning addresses in programming mode

"Address assignment in programming mode" is suitable for Synco 700 type RM… controllers, RXB/RXL room controllers, OZW77x central communication units and area/line couplers and IP routers.

Setting devices to programming mode on site

Refer to the individual product documentation for details of how to set a device to programming mode on site. Often, as with the Synco 700 RM… controllers, the button marked "Prog" has to be pressed briefly.

Only one device at a time should be set to programming mode.

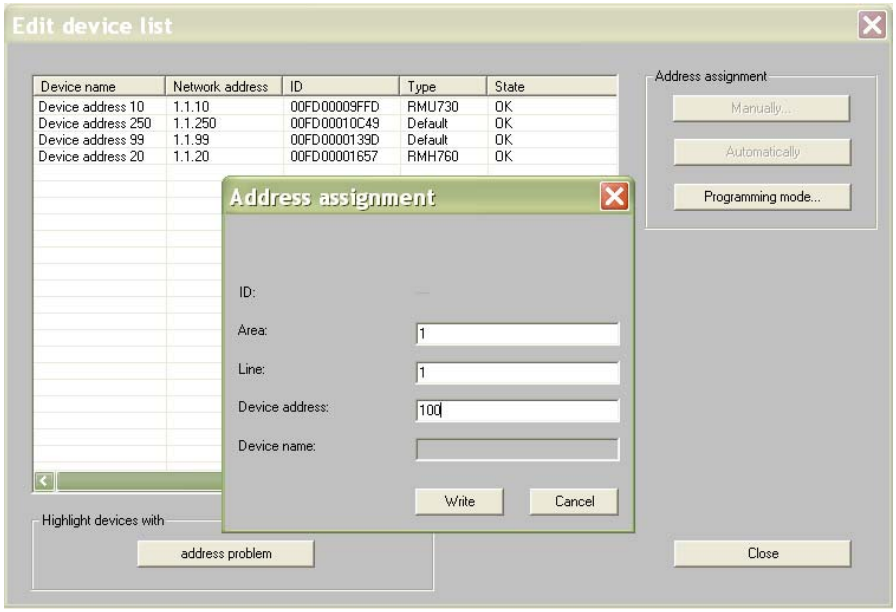
Explanation: If two or more devices are set to programming mode, the service tool cannot identify an individual device and transmit a device address specifically to that device.

Procedure

1. Set the required device to programming mode **locally**, e.g. press the "Prog" button on the RMU730. The red "Prog" LED lights up.

2. In ACS Service select Plant > Edit device list… to open the "Edit device list" dialog box.

3. The Programming mode… button is now available under "Address assignment". Click this button to open the "Address assignment" dialog box.



4. Enter a device address in the range 1…253 (excluding 150), and click Write to confirm.

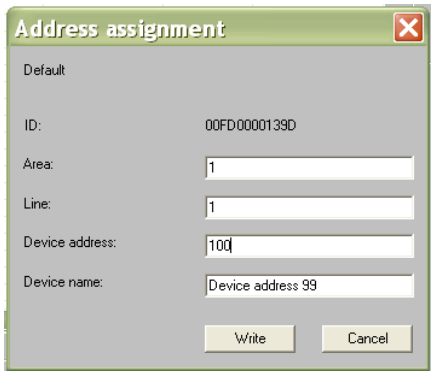
5. Check: Once the new address has been adopted, the LED on the device should be OFF.

5.2.4 Addressing via the ID number

If the devices to be addressed are a long way from the PC/laptop running ACS Service (e.g. devices in the basement, PC/laptop on KNX bus in control panel on first floor) then addressing via individual ID numbers is recommended.

Procedure

1. Read the IDs **locally** from the devices to be addressed
   12-digit hexadecimal number, e.g. ID: 00FD0000139D
2. In ACS Service select Plant > Edit device list… to open
   the "Edit device list" dialog box.
3. Identify the device from its ID and select it.
4. Assign an address manually (see section 5.2.1)
5. Identify the next device from its ID, select it and carry out Step 4 etc.



Important notes

For all the programming modes described for the RM… controllers, the area and line addresses are automatically adopted by the area/line couplers and IP routers.

If there are no couplers or routers, the factory-set area/line address 0.2 is used.

5.3 Device address for the OZW771.xx central communication units

Introduction

In the designation OZW771.xx (where xx = 4, 10 or 64), xx indicates the number of bus devices that can be connected to that central communication unit.

Note

The commissioning procedure is described in the installation instructions (G3117, packed with the device). For more information, refer to document P3117.

Bus power supply

The OZW771.xx central communication units do not supply power to the bus.

Decentral or central bus power supply is required for communication via the KNX bus (see section 2.2).

Device address

The factory-setting is device address 255. For communication via KNX, this device address must be modified.

The OZW771.xx central communication units do not have a tool socket. "Manual assignment of addresses" and "Programming mode" are only possible via the following connection:

PC/laptop → OCI700 interface → RJ45 tool socket (device or bus socket) → OZW771 on KNX bus.

If there are no couplers or IP routers, the factory-set area/line address 0.2 is used.

Assigning addresses manually

1. In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box (see section 5.2.1).
2. Select the central communication unit with the left mouse button and click the button marked Manually... to open the "Address assignment" dialog box.
3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Programming mode

1. Set the central communication unit **locally** to programming mode. To do this, press the "Install" button (top right on the central communication unit) for a maximum of 2 seconds. The red "Prog" LED lights up.
2. In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box (see section 5.2.3). Click the Programming mode... button to open the "Address assignment" dialog box.
3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Bus voltage

The central communication unit only switches to programming mode if the bus power is available.

"Prog" LED

The "Prog" LED (top, outer right) indicates the programming mode.

- LED off — Normal mode
- LED on, red — Programming mode (LED is extinguished automatically once the device address has been adopted.

5.3.1 Other addressing options, OZW771.xx

"Install" button

Pressing the "Install" button (top right) for at least 6 seconds initiates the following functions in the central communication unit:

- Creates a device list
- Finds devices
- Identify device address automatically (network address)

Note

The device, area and line address are adopted. If there are no area and line couplers, but the OCI700.1 service tool is connected, the next unused address after 254 is generated.

Network address

The device or network address can also be set in the central communication unit as follows:

- In ACS Service select Plant > Refresh device list… to open the "Edit device list" dialog box (see section 5.1.4).
  OR
- In ACS Service select Applications > Popcard…, and start a search for the address by setting the data point value "Identify device address automatically" to "Yes". When a network address has been found, the data point command is reset to "No".

5.3.2 Restoring the factory settings, OZW771.xx

To restore the factory settings, simultaneously hold down the "Reset Modem" button (top left) and the "Install" button (top right) for 6 seconds.

- All the configuration data and settings are restored, **including the device address 255**. The central communication unit then restarts.
- In ACS Service select Plant > Refresh device list… to open the "Edit device list" dialog box (see section 5.1.4).
- Click the address problem button and then click Automatically to adopt the next unused device address starting from 254.

5.4 Device address for the OZW775 central communication unit

Introduction

The OZW775 central communication unit is factory-set with **device address 150**. This address enables the central communication unit to communicate via the KNX bus. We do not recommend changing device address 150.

Note

The procedure for commissioning is described in the installation instructions, sheet G5663 (enclosed in the device packaging). For further in formation refer to the commissioning guide C5663 (PDF file on the CD enclosed with the device).

Bus power supply

The OZW775 central communication unit can power the KNX bus.

The central communication unit must be set to "Decentral bus power supply = On" or a central bus power supply must be available (see section 2.2).

Device address 150

Should it be necessary to change device address 150, then the following points should be noted:

The OZW775 central communication unit does not incorporate a tool socket. The manual assignment of addresses and "Programming mode" are only possible via the following connection:

PC/laptop → OCI700 interface → RJ45 tool socket (device or bus socket) → OZW775 on KNX bus.

If there are no couplers or IP routers, the factory-set area/line address 0.2 is used.

Assigning addresses manually

1. In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box (see section 5.2.1).
2. Select the central communication unit with the left mouse button and click the button marked Manually... to open the "Address assignment" dialog box.
3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Programming mode

1. Set the central communication unit **locally** to programming mode. To do this, press the "Modem" and "Report" buttons simultaneously. The red "Prog" LED lights up.
2. In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box (see section 5.2.3). Click the Programming mode... button to open the "Address assignment" dialog box.
3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Restoring the factory setting

Simultaneously press the three buttons "Modem", "Ack" and "Config" to restore the factory settings. All configuration data and settings are restored, **including device address 150**.

5.5 Device address for the QAX910 central apartment unit

Introduction

The QAX910 central apartment unit device address can be set on the associated operating page (display) and via the programming mode of ACS Service.

Note

The procedure for commissioning is described in the mounting and commissioning instructions, sheet C2707 (enclosed with every device).

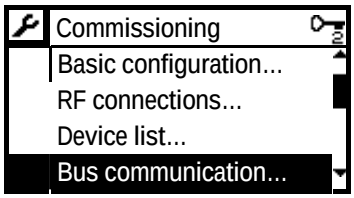
⚠ **Caution!**
Bus power supply

The central apartment unit is delivered with the "Bus power supply" set to "On".

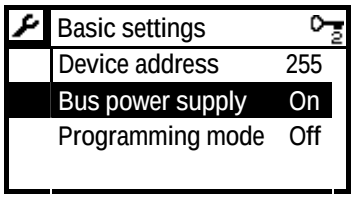
In addition to its own intrinsic consumption, the QAX910 central apartment unit when set to "Bus power = On" delivers the bus power supply for one OZW771 central communication unit or for the OCI700 service interface.

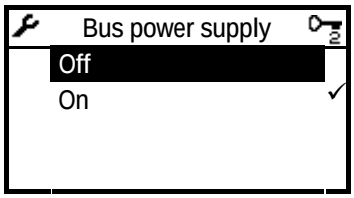
If other devices are installed on the same line, the central apartment unit must be set to "Bus power supply = Off". The path for these settings is:

Main menu > Commissioning > Bus communication



Basic settings > Bus power supply





Note

If "Bus power supply = Off" the central apartment unit receives the required bus power from a decentral or central bus power supply, i.e. the power consumption of the central apartment unit must be included in calculations (see section 2.2.2).

Device address

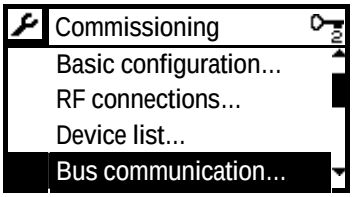
The QAX910 central apartment unit is factory-set with device address 255. For communication via KNX, this device address must be modified.

If there are no couplers or IP routers, the factory-set area/line address 0.2 is used.

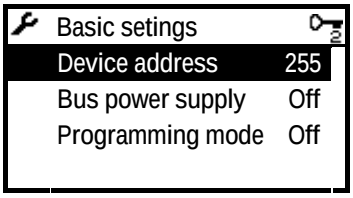
Operating pages (display)

The device address can be set manually via "Device address" line on the "Basic settings" operating page. The path for this setting is:

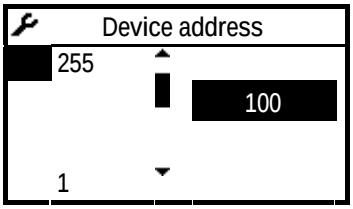
Main menu > Commissioning > Bus communication



Basic settings



Device address



Procedure

Select the "Device address" line and enter a device address in the range 1…253 (excluding 150).

When the input is complete, the central apartment unit checks whether this address is already in use. If it is not in use, the display reverts to the "Basic settings" page. This means that the address entered is permissible and has been adopted.

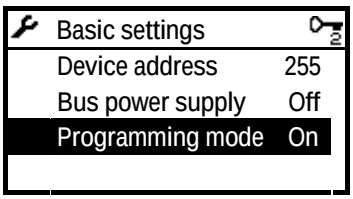
Note

If a device address is entered which is already in use, the address is not adopted. The display does not revert to the "Basic settings" page.

Programming mode

The device address can be determined in programming mode via the "Programming mode" line on the "Basic settings" operating page. For access, the central apartment unit must be set **locally** to "Programming mode = On" via the following path:

Main menu > Commissioning > Bus communication > Basic settings > Programming mode



Procedure in programming mode

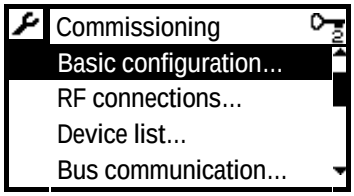
1. Set the central apartment unit **locally** to "Programming mode = On" via the operating page "Basic setting" and the line "Programming mode" (see previous page)

2. In ACS Service select Plant > Edit device list… to open the "Edit device list" dialog box (see section 5.2.3). Click the Programming mode… button to open the "Address assignment" dialog box.

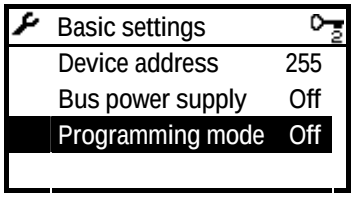
3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Adopting the device address

When the device address (and area/line address) has been adopted the "Commissioning" page is displayed.



Select the operating pages "Bus communication" and "Basic settings" and check that the "Programming mode" line has automatically been reset to "Off":



Note

The automatic reversion to "Programming mode" = "Off" parallels the response of the red LED switching off (e.g. the "Prog" LED on the RM… controllers).

Restoring the factory setting

The factory settings of the QAX910 central apartment unit can be restored. The path for this setting is:

Main menu > Data backup > Restore factory settings > OK (acknowledge)

Note

The configuration data is reset to the default values. The programmed device address and the type of bus power supply remain unchanged, i.e. they are not reset to the default values.

5.6 Device address for the RXB/RXL room controllers

Introduction

The RXB and RXL room controllers have the same application set. Both types can communicate via KNX in LTE mode (the RXB also communicates in S-mode).

The main differences between the RXB and RXL room controllers are the operating voltage and the KNX certification:

- RXB AC 230 V operating voltage KNX certified
- RXL AC 24 V operating voltage Not KNX certified

Note

Commissioning is also described in the Description of Functions, CM110385.

Bus power supply

The RXB and RXL room controllers do not power the bus.

Decentral or central bus power supply is required for communication via the KNX bus (see section 2.2).

Device address

The factory-setting is device address 255. For communication via KNX, this device address must be modified.

If there are no couplers or IP routers, the factory-set area/line address 0.2 is used.

Assigning addresses manually

1. In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box (see section 5.2.1).
2. Select the room controller with the left mouse button and click the button marked Manually... to open the "Address assignment" dialog box.
3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Programming mode

1. Set the room controller **locally** to programming mode. To do this, press the programming button (bottom right on the central communication unit) for a maximum of 2 seconds. The LED (above the programming button) lights up when the room controller is programming mode.
2. In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box (see section 5.2.3). Click the Programming mode... button to open the "Address assignment" dialog box.
3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Bus voltage

The room controller only switches to programming mode if the bus power is available.

LED display

The LED indicates whether the room controller is in programming mode as follows:

- LED flashing, green Normal mode
- LED on, red Programming mode (LED is extinguished automatically once the device address has been adopted).

5.6.1 RXB/RXL device address with QAX34.3 room unit

The QAX34.3 room unit covers all the standard room unit functions. The room unit can also be used to set the RXB/RXL room controller parameters via PPS2.

Notes

The QAX34.3 room unit is not suitable for direct connection to the KNX bus.

The tool socket (RJ45) on the RXB/RXL room controllers serves as a PPS2 interface and a bus interface (CE+ und CE-). This tool socket can be used to connect room units (PPS2), the OCI700 service interface or the RMZ792 bus operator unit.

Parameter setting

Minor parameter setting

- Physical address (network address)
- Zones (for communication in LTE mode)
- Setpoints
- Master/slave settings

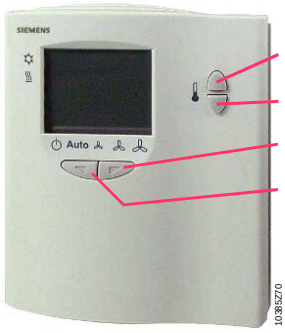
Major parameter setting

- All parameters (refer to the detailed in formation in document CM110385)

Note

Group addresses (bindings) cannot be assigned. This must be carried out with the ETS.

Function of the buttons



+ = Count/move upward

– = Count/move downward

> = Esc (exit without confirmation)

< = Enter (confirm/acknowledge)

Restart
After significant parameter changes, the room controller is restarted

Minor parameter setting

"Minor parameter setting", with access in parameter mode is sufficient for setting the device address or complete network address:

- Hold down the **<** , **>** and **–** buttons simultaneously for approximately 2 s until the display turns dark (no values displayed).
- Then briefly press the **–** button twice in succession.
- The display now reads ***n*** 0 (mode 0).
- The following modes can be selected with the ***+/–*** buttons:

n 0 **=** **Normal** mode (normal room unit functions).

n 2 **=** **Display mode:**
The parameter display is prefaced with the letter "d", e.g. ***d 15***.
Use ***+/–*** to find the required number and acknowledge with **<** (Enter).
The relevant value is then displayed.
Press **<** (Enter) or **>** (Esc) to return to the list.

n 3 **=** **Parameter mode**
Start the parameter mode by pressing **<** (Enter), enabling the parameter numbers to be selected and the parameter values to be set. Parameter numbers are preceded by the letter "P", e.g. ***P 2***.

***n 3* = Parameter mode** (continued)
Press **+/–** to find a new parameter number and confirm with **<** (Enter). The value concerned is then displayed.
Press **+/–** to change the value and confirm with **<** (Enter).
Press **>** (Esc) to return to the parameter number level without making any changes.
Press > (Esc) again for access to the list mode and a third time for access to the normal (room unit) mode.

Modifiable parameters in parameter mode

The device address or network address is set via the following parameter numbers:

P 1 Area)
P 2 Line)> Network address
P 3 Device address)

Notes

The same applies to the RXB/RXL room controllers as to the Synco bus devices, i.e. the area and line address is adopted by the super-ordinate area/line couplers.

When setting the area/line address via the room unit, take care not to reprogram any valid addresses.

5.7 Device address for the QAW740 room unit

Introduction

The QAW740 room unit is the only room unit in the Synco range that can be connected directly to the KNX bus (connections CE+ and CE-).

Bus power supply

The QAW740 room unit does <u>not</u> power the bus.

Decentral or central bus power supply is required for communication via the KNX bus (see section 2.2).

Device address

The device address is factory-set to 255. For communication via KNX, this device address must be modified.

If there are no couplers or IP routers, the factory-set area/line address 0.2 is used.

Note

The procedure for commissioning is also described in the instruction sheet B1633 (enclosed with the device).

Commissioning for the first time

When the QAW740 room unit is connected to the bus for the first time, the bus power will directly initialize the ***"d"*** field. The device address can now be set. Proceed as follows:

- Use the knob to set a device address or use the timer button to start the search for an unused device address.
- Confirm the setting with the presence button . The address entered is automatically checked in this process. If the entry is incorrect, start the process again.

Once a QAW740 room unit has been connected to the bus power supply and a device address other than 255 has been set, it is no longer possible to initialize the ***"d"*** field directly via the bus power supply. The device address then has to be set as follows:

Setting procedure

In the case of the Synco 700 room unit QAW749, the device address can be set using the controls on the front of the unit.

Step	Action	Operator controls
1	For access to the setting mode, press the presence button for approximately 12 seconds. The display shows ***Prog.***	
2	After access to setting mode, press the presence button briefly several times, until the device address setting appears, e.g. ***d 255***.	
3	Use the setting knob to set the required device address, e.g. ***d 5*** Note: ***d*** stands for "device"	
4	After setting the device address, press the presence button to exit from setting mode. Note: After setting the remaining program values, the timer button is used to exit from setting mode, not the presence button.	

Assigning addresses manually

1. In ACS Service select Plant > Edit device list… to open the "Edit device list" dialog box (see section 5.2.1).

2. Select the room unit with the left mouse button and click the button marked Manually… to open the "Address assignment" dialog box.

3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Programming mode

1. Set the room unit **locally** to programming mode. To do this, press the presence button for approximately 12 seconds. The display reads ***Prog.***

2. In ACS Service select Plant > Edit device list… to open the "Edit device list" dialog box (see section 5.2.3). Click the Programming mode… button to open the "Address assignment" dialog box.

3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.
   When the new device address has been adopted, the room unit reverts to a display of the room temperature.

Bus power

The room unit only switches to programming mode if the bus power is available.

5.8 Device address for RMZ792 bus operator unit

Introduction

The RMZ792 bus operator unit is used for remote operation of up to 150 Synco 700 bus devices including OZW77x central communication units and RXB/RXL room controllers in a KNX network. Access to the bus devices is via the device list.

There is no access to Synco 900 type QAX910 central apartment units, area/line couplers, IP routers or third-party devices.

The RMZ792 bus operator unit cannot be used to commission the Synco devices. This is in contrast to the RMZ790 and RMZ791 operator units which can be used for local commissioning of the Synco devices, but not for remote operation of other Synco devices via the bus.

Note

For more information on the RMZ792 bus operator unit, refer to data sheet N3113 and the basic documentation, P3113.

Bus power supply

The RMZ792 bus operator unit does not power the bus.

Decentral or central bus power supply is required for communication via the KNX bus (see section 2.2).

The bus operator unit is connected to an external AC 24 V power supply (recommended for fixed operator units, e.g. installed in control panel doors).

Modifying the device address

The factory-setting is device address 255. For communication via KNX, this device address must be modified.

If there are no couplers or IP routers, the factory-set area/line address 0.2 is used.

The individual device address can now be set.

- Via the "Communication" operating page
  (either set device address or search automatically for a device address)
- Via ACS Service and manual address assignment

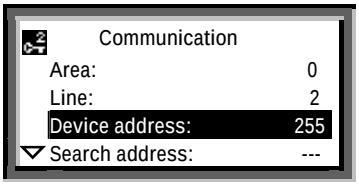
Note

The RMZ792 bus operator unit cannot be used to set the area, line and device addresses of other bus devices.

Operating page

Access to the "Communication" page is at the Password level and via the following path:

Main menu > Commissioning > Communication



Setting the device address

Select the "Device address" line by rotating the knob, then press the knob to enter the required device address. Press the knob to confirm the setting.

Finding the device address automatically

Turn the knob to select the "Search address" line. Then press the knob to initiate the search for the next unused addressed.

A successful search is indicated by the word "Found". The line and area are adopted by the super-ordinate couplers (if these exist).

To return to the start page, press the ESC button as many times as necessary.

Notes

When addresses are assigned by setting them with the rotary knob (see previous page) address 252 is suggested as a device address.

Address 252 is also suggested as a device address when the "Search address" method is used. The search is faster if address 252 has not yet been assigned to a bus device.

Assigning addresses manually

1. In ACS Service select Plant > Edit device list… to open the "Edit device list" dialog box (see section 5.2.1).

2. Select the bus operator unit with the left mouse button and click the button marked Manually… to open the "Address assignment" dialog box.

3. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

Programming mode

1. Set the bus operator unit **locally** to programming mode. To do this, select the "Communication" operator page.

Main menu > Commissioning > Communication

2. Select the operating line "Programming button" and set the "Off" status to "On", i.e. "Programming mode = On".

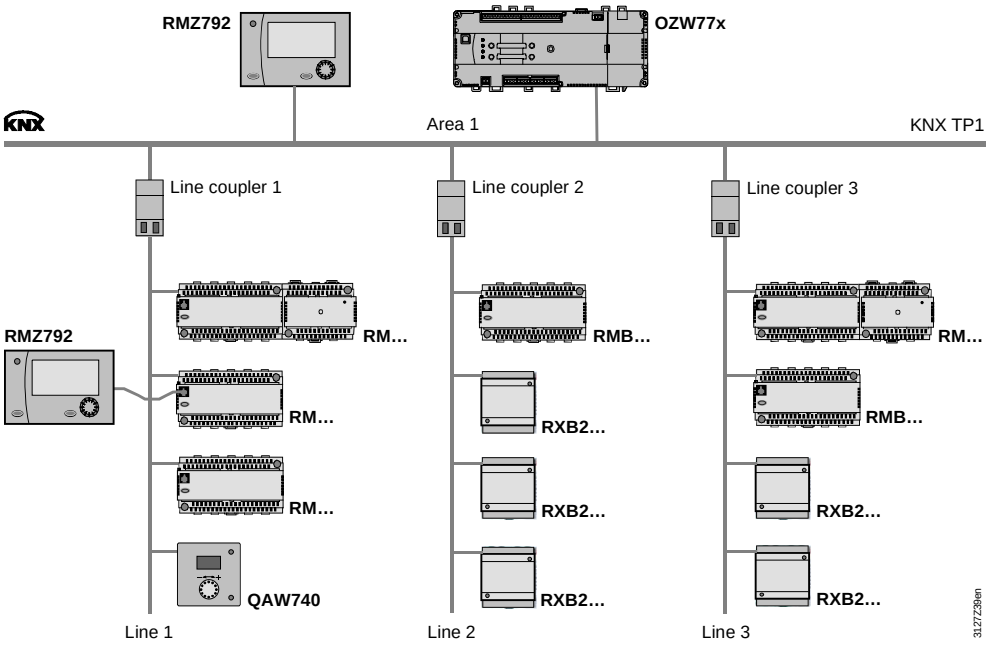
3. In ACS Service select Plant > Edit device list… to open the "Edit device list" dialog box (see section 5.2.3). Click the Programming mode… button to open the "Address assignment" dialog box.

4. Enter a device address in the range 1…253 (excluding 150), and confirm by clicking the Write button.

5. At this stage, the following applies: Select the "Programming button" line and set the status from "On" to "Off", because unless it is reset to "Off", the bus operator unit will remain in programming mode.

Connecting the bus operator unit

As shown in the drawing below, the RMZ792 bus operator unit is connected directly to the KNX bus via a bus socket or indirectly via the tool socket on a controller.



Notes

It is possible to set the RMZ792 bus operator unit to search for bus devices in specified areas and lines. Bus devices in areas and lines other than those defined in the search criteria must be added manually.

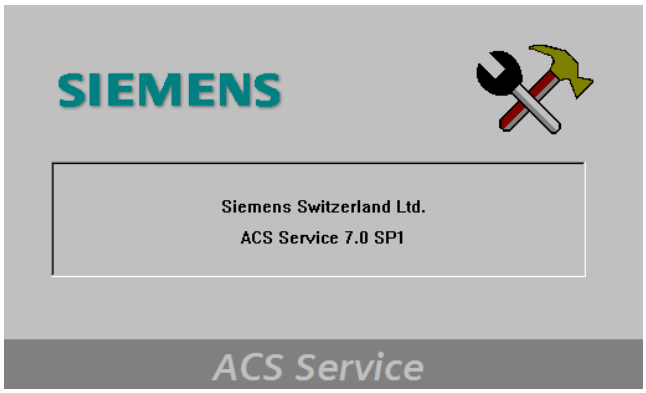
Note: The RMZ792 bus operator unit only recognizes Synco 700 bus devices, including the OZW77x central communication units and the RXB/RXL room controllers.

5.9 Addressing the couplers

5.9.1 Line couplers

Introduction

The area and line addresses for the area/line couplers can be set with "ACS Service 7.0 SP1" (SP1 = Service Pack 1).



Note

If ACS Service 7.0 SP1 (or a later version) is unavailable, the area and line addresses can be set only via ETS.

Addressing the couplers

In technical terms, the coupler devices are identical. Whether they operate as area couplers or line couplers is determined by the addressing process.

- Area coupler Ac **A.**0.0 **1.**0.0 to **15.**0.0
- Line couplers Lc X**.L.**0 1**.1.**0 to 15**.15.**0

Note

In the case of the Synco bus devices, only the device address needs to be set. The Synco bus devices adopt the area and line address dynamically from the area and line couplers.

Programming mode

Area and line addresses can be set with the coupler concerned in programming mode.

Only one coupler at a time should be set to programming mode.

Programming mode, Siemens couplers

To switch the coupler to programming mode, press the learning button A5 ("learning button A5" is a term in the product and applications description enclosed with the Siemens line/area coupler 5WG1 140). Press the key again to revert to normal operation.

LED indicator A4

LED A4 (above the "learning button" A5) indicates whether the coupler is in programming mode:

- LED off — Normal operation (communication via KNX)
- LED on, red — Programming mode (LED is extinguished automatically once the device address has been adopted).

Bus power

The coupler switches to programming mode only if the bus power is available.

Line couplers

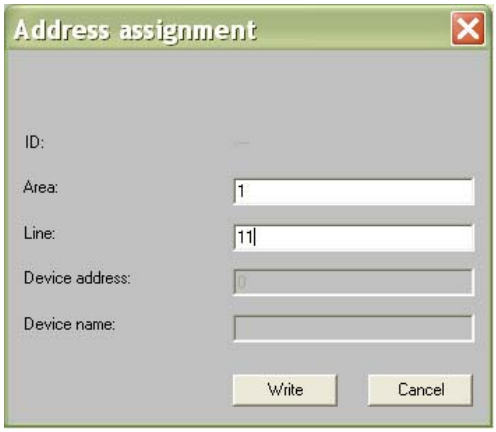
The line address can only be set with ACS Service in programming mode.

1. Set the line coupler **locally** to programming mode. To do this, press the A5 "learning button". The red LED A4 lights up. (For a definition of "learning button A4" and "LED A5" refer to the product and function description enclosed with the Siemens couplers).

2. In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box.

3. Only the Programming mode... button is available under "Address assignment".

4. Click Programming mode... . The "Address assignment" dialog box opens. Enter a line address in the range 1…15 (syntax A**.L.**0, from A**.1.**0 to A**.15.**0) and click Write to confirm.



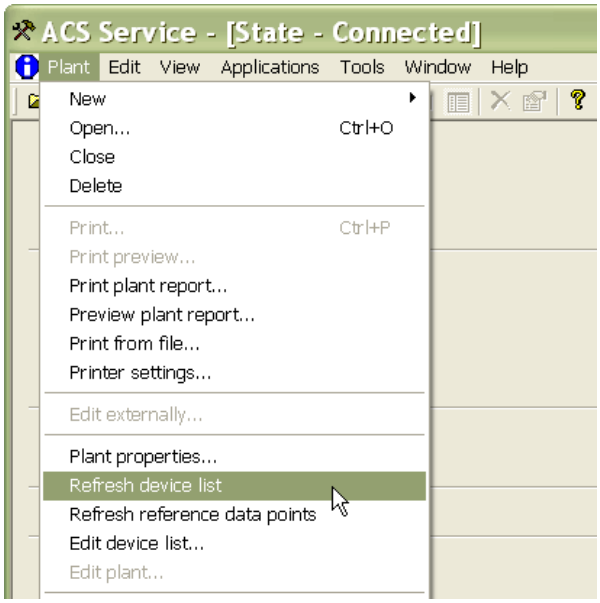
5. The new line address, 11, is adopted automatically by the line coupler when the Write button is clicked.

6. Close the "Edit device list" dialog box with click on Close button.

Note:

- The red LED on the line coupler is extinguished once the line address has been adopted.
- The line coupler automatically adopts the area address from the superordinate area coupler. If there is no area coupler, the area address is set to 0 (zero).
- The Synco devices governed by the line coupler still have the "old" line address. It is therefore essential to carry out the following steps 7, 8, 9.

7. In ACS Service click Plant > Refresh device list to initiate the automatic adoption of the new line address 11 by the Synco devices.



8. In ACS Service select Plant > Edit device list... to open the "Edit device list" dialog box.

9. Check that the Synco devices are now using the new line address 11.

5.9.2 Area couplers

The area address (syntax **A.**0.0 from **1.**0.0 to **15.**0.0) can be set in "Programming mode" via ACS Service in the same way as for the line coupler.

In principle the method is the same as for the line coupler (see Steps 1 to 9 above).

Note:

- Area couplers are always the highest-level elements in a network. Area addresses can never be adopted automatically.
- For area couplers, the line address and device address is always 0.

5.10 Addressing the IP router

5.10.1 KNX network address

Auxiliary voltage

IP routers require an auxiliary voltage of DC 24 V or AC 24 V (SELV). This auxiliary voltage must be derived from a supply without a choke.

We recommend the Siemens power supply unit which has separate outputs for the DC 29 V bus power and the DC 24 V auxiliary voltage (see section 2.2.3).

For operation of the IP routers with an AC 24 V auxiliary voltage (instead of DC 24 V), the AC 24 V operating voltage, also used to operate the Synco devices, is recommended.

KNX network address

The KNX network address of an IP router determines whether the router is operated as an area coupler or a line coupler.

- IP router as an area coupler IP Ac **A.**0.0 **1.**0.0 to **15.**0.0
- IP router as a line coupler IP Lc X**.L.**0 1**.1.**0 to 15**.15.**0

For an IP router used as an area or line coupler, the KNX network address is set in "Programming mode" via ACS Service.

The procedure is the same in principle as for an area/line coupler (see the notes on addressing the line couplers, section 5.9.1).

IP address via ACS

The IP address and other data point values for Ethernet communication can be set via ACS Service (see section 8.3).

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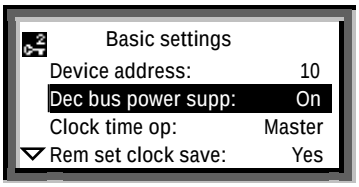
6 Basic communication settings

6.1 RM… controllers

6.1.1 Decentral bus power

The type of bus power supply is set on the "Basic settings" operating page, on the "Decentral bus power supply" line.

Main menu > Commissioning > Communication > Basic settings



Decentral bus power supply, RM… controllers
Default. On
Settings Off / On

Note

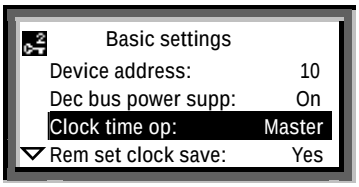
In small networks the KNX bus can be operated with the default value "Dec bus power supp: On". Refer to section 2.2 for information about the bus power supply.

6.1.2 Clock time operation

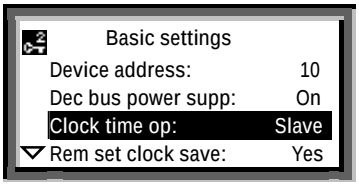
"Clock time operation" refers to the transmission of the date and time. For the RM… controllers, this is set on the "Clock time op:" line of the "Basic settings" operating page.

Main menu > Commissioning > Communication > Basic settings

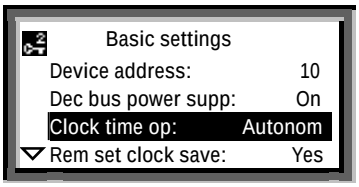
Clock time operation:
Master (time master)



Clock time operation:
Slave (time slave)



Clock time operation:
Autonomous



Clock time mode, RM… controllers
Default. Master
Settings Autonom. / Slave / Master.

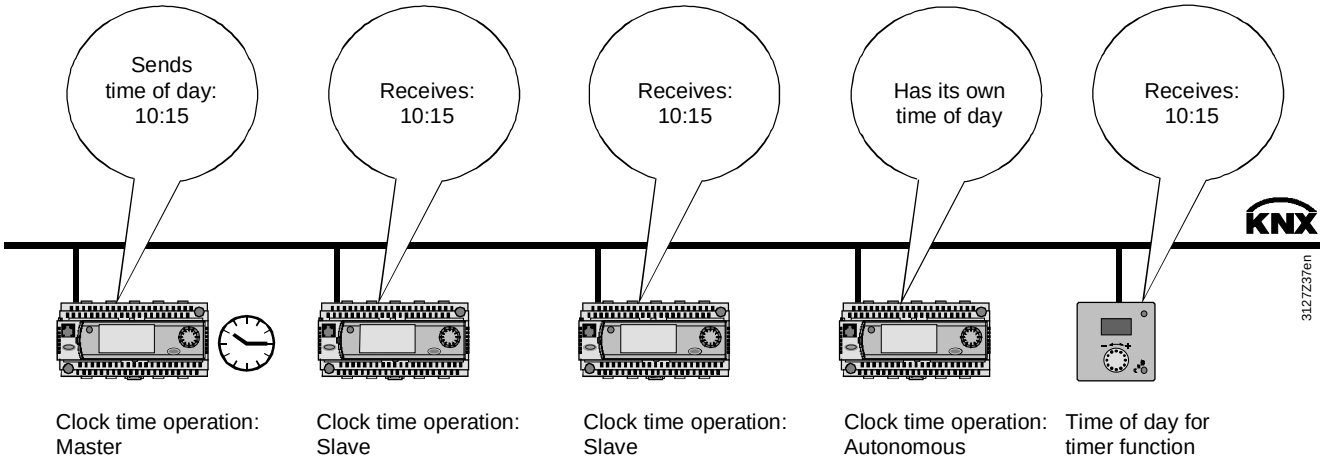
Settings

Clock time op.: **Auto** The RM… controller does not receive or transmit the time or date (The device has its own time and date).

Clock time op.: **Slave** The RM… controller receives the time and date from the time master.

Clock time op.: **Master** The RM… controller transmits the time and date in a 10 minute cycle over the KNX bus, starting from the last time-synchronization

Example



Modifying the time and date

The time and date in the time master can be modified as follows:

- By the user, on the time master
- By the user, by remote adjustment of the time slave

A user-adjustment of the time or date can be synchronized by pressing the rotary knob.

Note

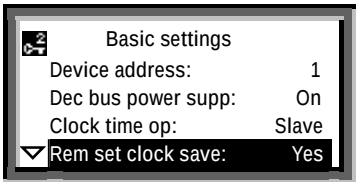
Only one bus device at a time can be the time master in a network. In relation to the date and time, the other bus devices must be set as time "slaves" or set to "Autonom."

6.1.3 Setting a time slave remotely

The operating line "Rem set clock slave" can be used to configure a time slave so that the time and date can be set by an operator. The new values are then transmitted via the KNX bus to the time master.

Main menu > Commissioning > Communication > Basic settings

Clock time operation: Slave with "Rem set clock slave:" **Yes**



Remote time-slave setting for RM… controller

Default.	Yes
Settings	No/Yes

Settings

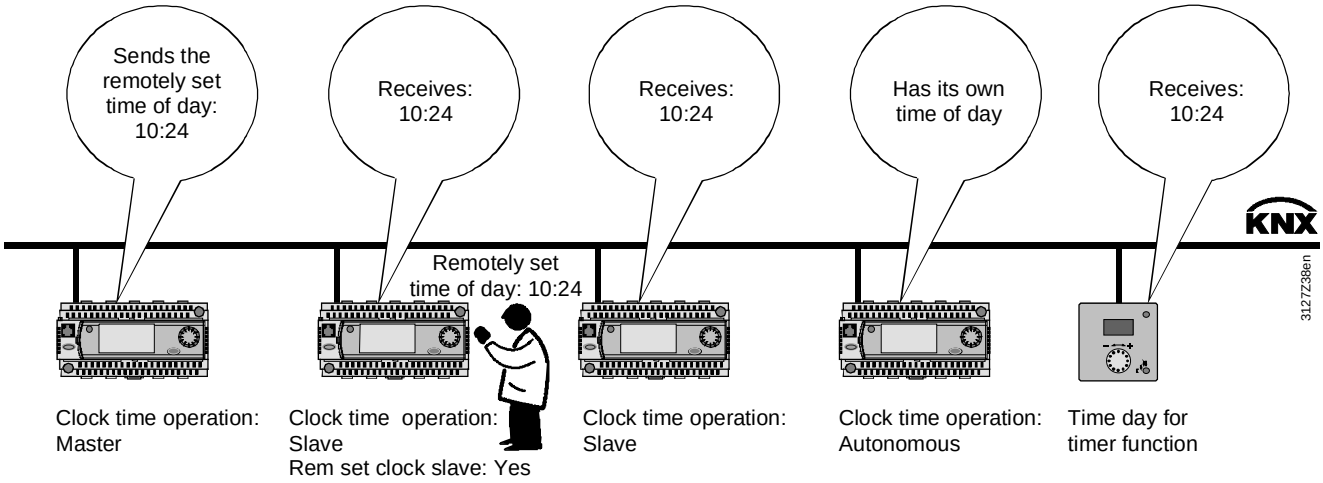
Rem set clock slave: **Yes** The time slave transmits the remote time and/or date settings to the time master. The time master transmits the values received to all time slaves (including any remotely adjustable slave(s)

Rem set clock slave: **No** Time slaves with this setting can only receive the time and date from the time master.

Note

All time slaves can operate with the default setting "Rem set clock slave: Yes". However, it is also possible for only one time slave (or none) to operate with this value.

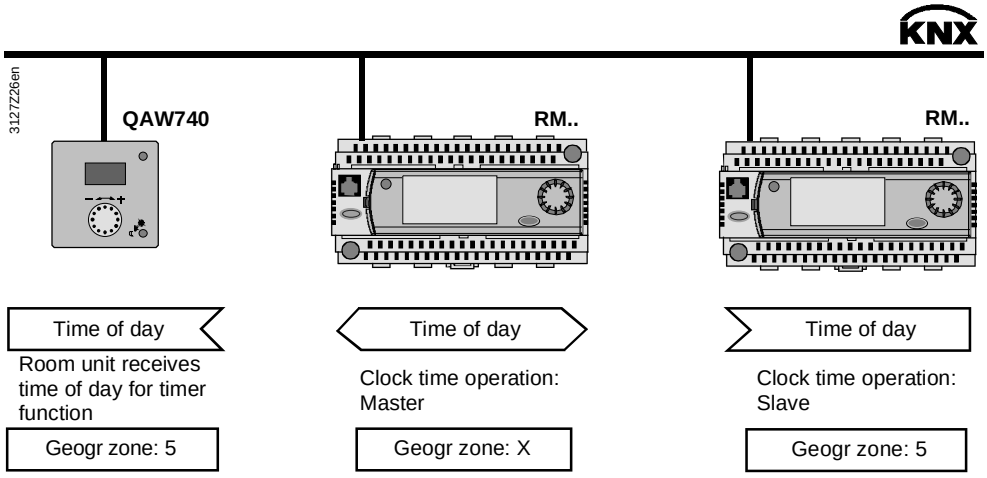
Example



Time in the QAW740 room unit

For its timer functions, the QAW740 room unit requires the time from the time master. It can receive the time over the KNX bus subject to the following criteria:

- A bus device must be defined as the time master (setting "Clock time op: Master").
- The QAW740 room unit is connected to an RM… controller via a "Geogr zone (apartm)". For communication and filtering purposes (see section 8.2) the time master and the room unit should preferably be in the same "Geogr zone (apartm)". However, this is not mandatory.
- The room unit must have received the time from the time master. Note: The time master transmits the time only every 10 minutes.

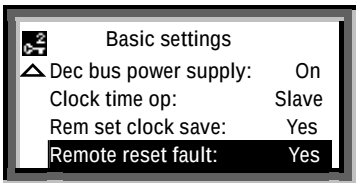


6.1.4 Remote reset of fault

The "Remote reset of fault" function is used to reset the Synco 700 RM… controller faults transmitted over the KNX bus and requiring "Acknowledgement and reset", to be acknowledged (and reset if "Remote reset fault: Yes") with the OCI700.1 service tool, the RMZ792 bus operator unit and the OZW775 central communication unit.

RM… controllers

Main menu > Commissioning > Communication > Basic settings



Remote reset faults for the RM… controllers

Default.	No
Settings	No/Yes

Note

Apart from the RMH760 heating controller, all RM… controllers (including the RMH760B heating controller) incorporate the "Remote reset of fault" function.

6.2 Basic settings via ACS

Introduction

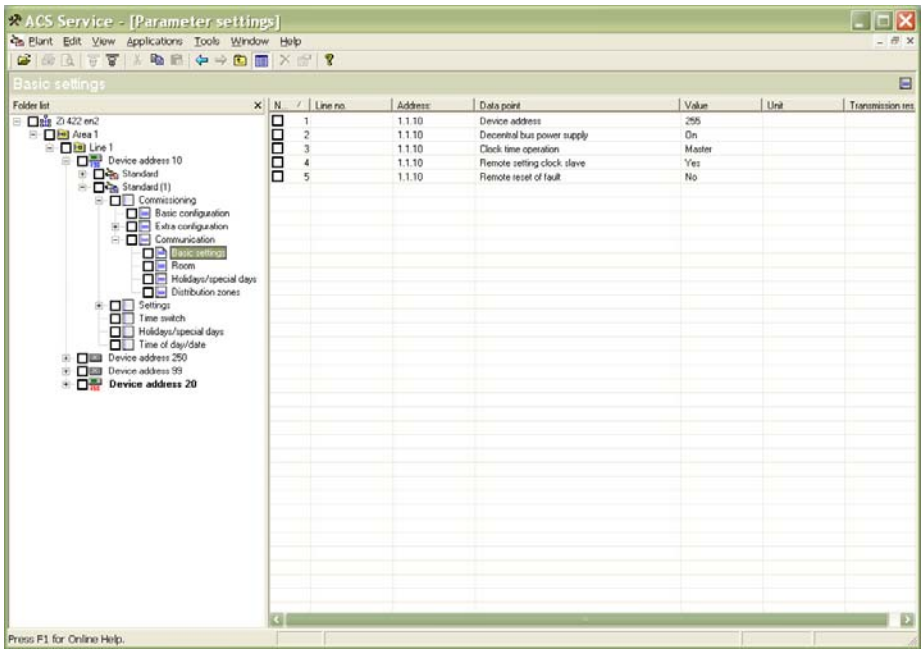
The basic settings (see section 6.1.1 ff) can also be modified with the ACS Service software.

After selection of the relevant device, the menu tree has the same structure as the path sequence in the operator units, e.g. for the RMU730 controller:

Commissioning > Communication > Basic settings

1. In ACS Service Applications > Parameter settings, open the menu tree of the device for which the basic settings (defaults) are to be modified.

2. Double-click the menu line "Basic settings" to open the operating page, and select the data point for which you want to modify the default value.



3. Double-click the selected data point to open the dialog box for entering the value.

4. Enter the value and click the Write button or (depending on the dialog box) confirm the entry with the OK button.

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7 Communication via zone addresses

7.1 General notes on zones

7.1.1 Synco zoning

Zones and devices

Zoning in Synco is based on KNX and covers the following zones for Synco 700 devices and RXB/RXL room controllers:

Designation	RMU	RMH	RMK	RMB	RMS	QAW	RXB	RXL	Zone address range	Def' value RM...	Def. value RX…
Geographical zone (apartm)	x	x	x	x	x	x	x	x	1…126	---- /1	----
Geographical zone (room)	x			x	x		x	x	1…63 *	---- /1	1
Geographical zone (subzone)							x	x	1…15 *		1
Time switch zone (apartment)							x	x	1…126		1
Time switch zone (room)							x	x	1…63 *		1
Time switch zone (subzone)							x	x	1…15 *		1
Time switch slave (apartment)	x	x	x		x				1…126	---- /1	
Master/slave zone (apartment)							x	x	1…126		1
Master/slave zone (room).							x	x	1…63 *		----
Master/slave zone (subzone)							x	x	1…15 *		1
QAW op.zone (apartment)				x					1…126	----	
Heat distribution zone	x	x			x				1…31	1	
Heat distr zone source side	x	x		x	x				1…31	----	
Heat distr zone consumer side	x	x		x					1…31	1 / 2	
Heat distr zone heating surface							x	x	1…31		----
Heat distribution zone air heater							x	x	1…31		----
Heat distrib. zone, primary distr.			x						1…31	1	
Heat distrib. zone, primary contr.			x						1…31	2	
Refrigeration distribution zone	x				x				1…31	1	
Refrig distr zone source side	x			x	x				1…31	----	
Refrig distr zone consumer side	x			x					1…31	---- /1	
Refrig distr zone cooling surface							x	x	1…31		----
Refrig distrib. zone cooling coil							x	x	1…31		----
Air distribution zone	x								1…31	1	
Boiler sequencing zone			x						1…16	1	
DHW zone		x							1…31	1	
Holiday/special day zone	x	x	x	x	x				1…31	---- /1	
Time switch, DHW slave		x							1…31	1	
Outside temperature zone	x	x	x	x	x		x	x	1...31	---- /1	1
Solar zone		x							1...31	----	
Wind zone		x							1...31	----	

---- / 1 Depending on the device, the default is "----" (e.g. RMU7x0B) or "1" (e.g. RMU7x0). See also section 7.1.4 for information on the default "----" with the series B devices.

---- With RXB/RXL room controllers "----" indicates that the zone is "out of service" and there are no process values transmitted from this zone (in the QAX34.3 room device, "-1" is displayed instead of "----".

* The zone address range for the RXB/RXL room controllers is 0…63 or 0…15.

7.1.2 Communication of process values

LTE mode

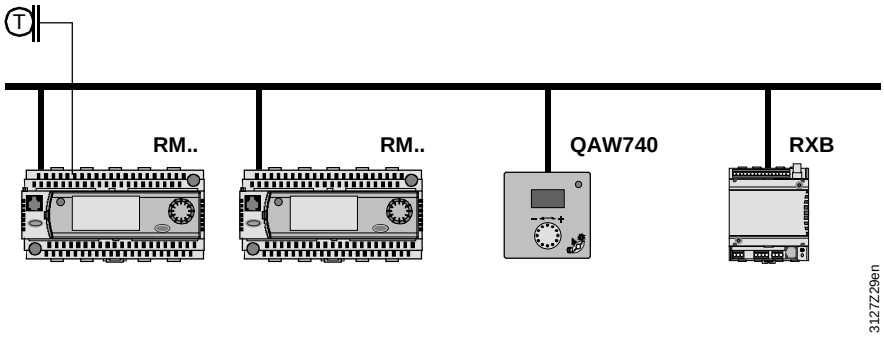
In LTE-mode (LTE = Logical Tag Extended) the communication bindings between data points are created by means of logical tags. This is the equivalent of the zone addresses in Synco.

Zone addressing, i.e. the setting of a zone address is also referred to as "binding".

Communication of process values

A common zone address is all that is necessary for the process values to be exchanged between the devices in a zone.

A further requirement is that the device address should be set in the devices (see section 5.2).



Device address	1	2	9	44
Process value	Outside temperature	Outside temperature		
Zone: Address	Outside temp zone: 2	Outside temp zone: 2		
Process value		Room temperature	Room temperature	
Zone: Address		Geogr zone: 1	Geogr zone: 1	
Process value	Heat requis	Heat demand		Heat demand
Zone: Address	Heat zone: 1	Heat zone: 1		Heat zone: 1
Process value	Time switch value	Time switch value		Time switch value
Time switch operation	Master	Slave		Slave
Zone: Address	Geogr zone: 2	TS slave: 2		TS slave: 2

7.1.3 Geographical zone (apartment)

Definition Geographical zone

The term "Geographical zone (apartment)" is specified by KNX and implies a building divided into geographical (physical) zones. However, in practice it is related to the operating strategy, which is defined as follows:

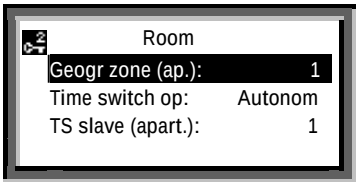
- One "Geographical zone (apartment)" consists of a number of buildings or parts of buildings which are grouped together from an operational point of view and which obey the following criteria:
  - Same room operating mode
  - Same room temperature (setpoint, actual value).

  Based on this definition, the "geographical zone (apartment)" might better be referred to as an "operating zone".

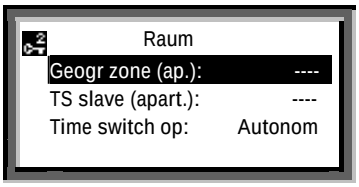
The "geographical zone (apartment)" is used in conjunction with the RM… controllers, the RXB/RXL room controllers and the QAW740 room unit.

Main menu > Commissioning > Communication > Room

RM…controllers



RM…B controllers



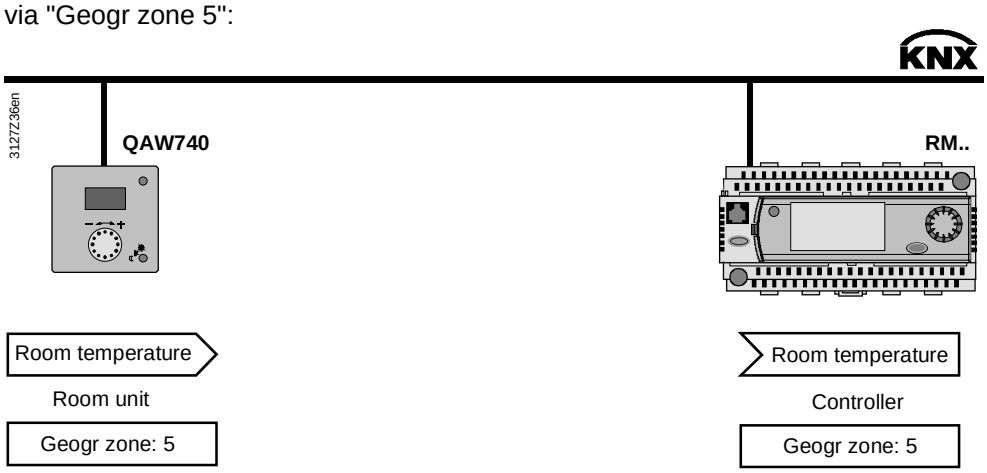
Geographical zone (apartment)	
RM… default	1
RM… B default	----
Setting	1...126

Note

The "Room" operating page and some other operating pages for the RM… controllers (RMU7x0 and RMH760) are different from those for the RM…B controllers (series B devices).

Communication of the room temperature

Communication of the room temperature from the QAW740 to an RM… controller via "Geogr zone 5":



7.1.4 Default "----" in series B devices

Introduction

The "Geographical zone (apartment)" represents the room to be controlled. Within this zone, all process values relevant to the room are transmitted (e.g. room operating mode, room setpoint and measured room value, plus user intervention and other influences).

Settings

The factory-setting or default for the RM… series B controllers is "---". This default value indicates that the zone is "out of service", i.e. no relevant process values are transmitted within this zone.

Main menu > Commissioning > Communication > Room

Operating line	Range	Factory set ting or default
Geographical zone (apartm)	----, 1...126	----
Time switch slave(apartment)	----, 1...126	----

Note

The factory-setting or default value "----" applies to all RM… series B controllers.

Autonomous controller

In the "Autonomous controller" application, a ventilation system is controlled independently of other plant, according to its own room operating conditions.

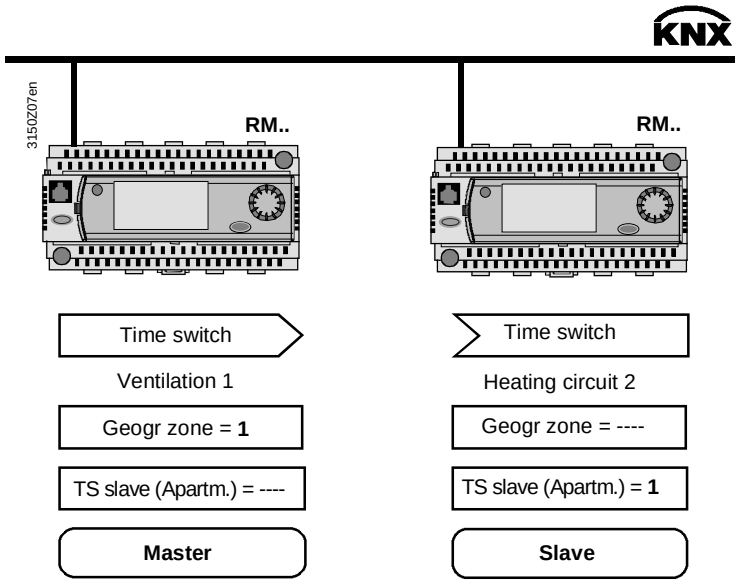
For this application there is no need to set a zone address for the "geographical zone (apartm)", i.e. the default "---" can be left unchanged.

Two controllers with identical room occupancy times

Function "Time switch operation"

If the room occupancy times for various "geographical zones" are identical, one controller can be defined as the time switch master.

The other controller or controllers act as slaves, and adopt the occupancy times in the master.



Notes

With regard to room occupancy times, the "Heating circuit 2" controller is the slave of the controller of "Ventilation 1", because the setting "Time sw. slave (apartm) = 1" means that time switch operation is adopted by "Geogr zone = 1" i.e. by the controller of "Ventilation 1".

Notes (continued)

In terms of the room operating mode, the "Heating circuit 2" controller operates autonomously, see "Geogr zone = ----" in the illustration.

Only one controller may be the time switch master in any one zone. The setting for the master is "TS slave (apartm) = ----".

A time switch master can control one or more time switch slaves in different zones. The setting for the slaves is "TS slave (apartm) = x" where x = 1…126, the zone address of the time master.

For a detailed description of time switch operation with the RMU7x0B controller, see the technical principles document P3150.

Device-specific communication

Communication via zone addresses for specific devices is described in the basic documentation for the Synco 700 RM… controllers. These descriptions are all in the "Communication" section.

The titles and document numbers are as follows:

- Universal controllers RMU710B, RMU720B, RMU730B P3150
- Modular heating controller RMH760B P3133
- Boiler sequence controller RMK770 P3132
- Central control unit RMB795 P3121
- Switching and monitoring device RMS705 P3123

For information on the room controllers, refer to the document:

- FNC – Description of functions RXB/RXL CM110385

7.2 Zone addressing with the RMZ operator units

7.2.1 RM… controllers

Introduction

For the Synco 700 type RM… controllers, the zone addresses can be set with the RMZ790 and RMZ791 operator units. The zone addresses can be set without a commissioning tool, also referred to as "Easy configuration".

Setting procedure

Access at the Password level takes the user to the operating pages and operating lines.

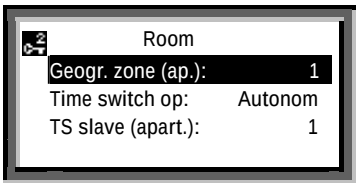
To set the zone address, use the following path to the "Room" operating page:

Main menu > Commissioning > Communication > Room

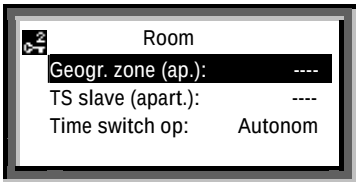
Step 1

Turn the rotary knob to select the "Geogr zone (apartm)" line.

RM…controllers



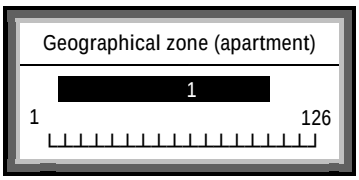
RM…B controllers



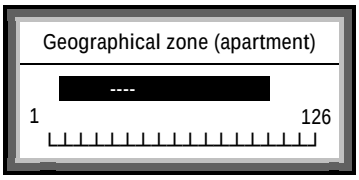
Step 2

Turn the knob as required for access to setting mode.

RM…controllers

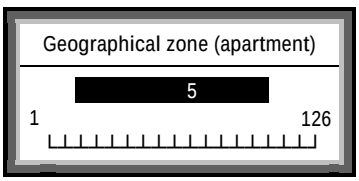


RM…B controllers



Step 3

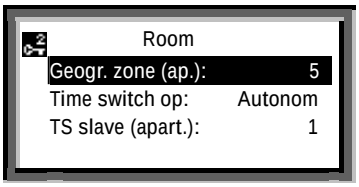
In setting mode, set the zone address rotating the knob as required.



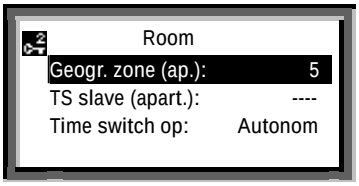
Step 4

Press the knob to confirm the zone address just set.

RM…controllers



RM…B controllers



Geographical zone (apartment), RM… controllers

RM… default	1
RM… B default	----
Settings	1...126

Zone addresses in networks

In extensive networks it is more efficient to set zone addresses via ACS Service than to use the RMZ790 and RMZ791 operator units (see section 5.1).

7.2.2 QAWZ740 room unit

Setting procedure

The QAW740 room unit only contains the "Geographical zone (apartment)". The zone address can be set by use of the operator controls on the front of the unit.

Step	Action	Operator controls
1	For access to the setting mode, press the presence button for approximately 6 seconds. A letter ***A*** is displayed and the zone address can be set.	
2	Set the zone address with the rotary knob, In this example, the value is 5, hence **A 5** Note: ***A*** stands for "Geographical zone (***A***partment)"	
3	Briefly pressing the presence button again takes the user to other settings (for setting values with rotary knob, see Step 2).	
4	After setting the zone address, press the presence button to exit from setting mode.	

Note

Zone address in the range 1…126 can be set for the "Geographical zone (apartment)" in the QAW740 room unit.

7.3 Addressing the zones with ACS

7.3.1 RM… controllers

Introduction

For the RXB/RXL room controllers and the QAW740 room unit, the zone addresses can also be set via ACS Service.

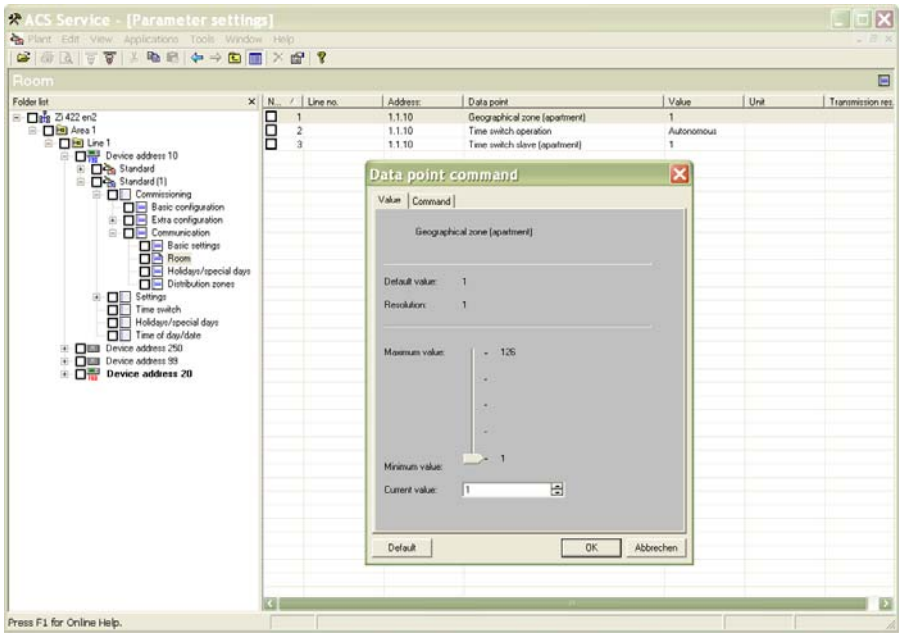
The use of ACS Service to set the zone addresses is particularly efficient for extensive networks.

Once the relevant device has been selected, the menu tree has the same structure as the path sequence for the operator units:

Commissioning > Communication > Room

1. In ACS Service Applications > Parameter settings, open the menu tree of the controller for which the zone address is to be set.

2. Double-click the menu line "Room" to open the operating page, and select the zone for which the address is to be set. Double-click to open the dialog box for your input.



3. Enter the zone address and click OK to confirm the value entered.

7.3.2 RXB/RXL room controllers

- In ACS Service Applications > Parameter settings, open the menu tree of the RXB/RXL room controller for which the zone address is to be set.
- Double-click the menu line "Communication" to open the operating page, and select the zone for which the address is to be set. Double-click to open the dialog box for entry of the address.
- Enter the zone address and click OK to confirm the value entered.

7.3.3 Zone addressing with the QAX34.3 room unit

Minor parameterization

With the RXB/RXL room controllers, the zone addresses can also be set with the QAX34.3 room unit (Minor parameterization, see section 5.6.1).

Parameter numbers and associated zones

P008	Geographical zone (apartment)	1…126	-1 = Default value
P009	Geographical zone (room)	0…63	1 = Default value
P010	Geographical zone (subzone)	0…15	1 = Default value
P011	Time-switch zone (apartment)	1…126	1 = Default value
P012	Time-switch zone (room)	0…63	1 = Default value
P013	Time-switch zone (subzone)	0…15	1 = Default value
P014	Heat distribution zone, air heater	1…31	-1 = Default value
P015	Refrig distrib. zone, cooling coil	1…31	-1 = Default value
P016	Heat distr zone heating surface.	1…31	-1 = Default value
P017	Refrig distr zone cooling surface	1…31	-1 = Default value
P018	Outside temperature zone	1…31	1 = Default value
P023	Master/slave zone (group)	1…126	1 = Default value
P023	Master/slave zone (room)	0…63	-1 = Default value
P024	Master/slave zone (subzone)	0…15	1 = Default value

Notes

"P008" indicates that the "Geographical zone (apartment)" in the RXB/RXL room controllers is parameter no. 008. For more information, refer to document CM110385.

For the RM… controllers, the default value in the QAX34.3 room unit is "-1" rather than "----". Both default values indicate that the zone is "out of service" and that no process values are transmitted within the zone.

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8 Large plants

8.1 Engineering and commissioning

Large plants

In large plants, the following points must be observed during the design engineering and commissioning stages.

Distances and conductor lengths

For all lines, the distances and line lengths (see section 2.3.1) must be observed. If the topology exceeds the prescribed limits, then area/line couplers must be used.

Number of bus devices

A maximum of 64 bus devices may be installed on one line. In systems with more than 64 bus devices, the bus devices must be distributed to different lines and/or areas (see section 2.1.2).

Area/line couplers

When structuring large plants, LTE-compatible area/line couplers are required (see section 1.4).

IP routers

For the "KNX – IP network" connection, LTE-compatible IP routers are required (see section 1.4).

Predefined filter table

The area/line couplers and IP routers must contain the predefined LTE filter table (see section 8.2).

Alarm drains

Alarm drains should be on the same line or the next higher line in the hierarchy (see section 8.1.1, example 2). The following are alarm drains:

- OZW771 central communication unit
- OZW775 central communication unit
- RM… controllers with an enabled alarm relay

Devices with room functions

Devices with room functions should be located on the same line as the devices with which they exchange data via KNX in LTE mode, for example:

- Synco QAW740 room unit ⇔ Synco RM… controllers
- RXB/RXL room controllers ⇔ Synco RMB795 central control unit
- Synco RM… controllers for room control combinations (see section 9.3)

Time master

Only one bus device in the network may be configured as the time master (see also "Time synchronization" in section 6.1.2).

ACS7… software

A search via ACS for devices in all areas and lines only works with correctly addressed area/line couplers (see section 5.9).

Design rules for zone addressing

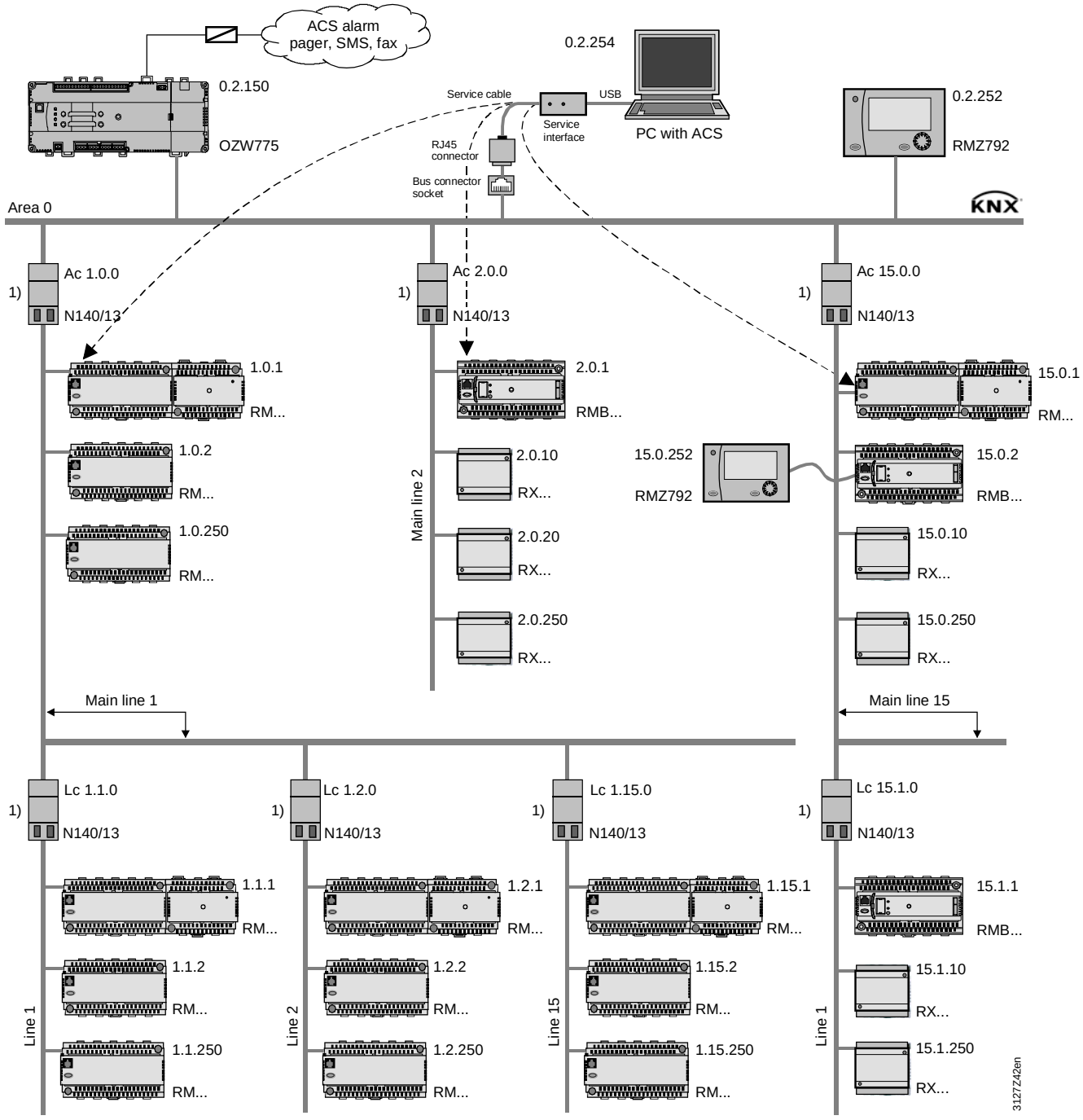
The following "design rules" must be observed when addressing zones:

- The zone addresses, which can be filtered, are permanently predefined in the LTE filter table (see section 8.2). For this reason, both the assignment of devices to areas and lines, and the addressing of the zones must be planned with extreme care.
- The data traffic should be kept to the minimum by creating "communication islands" (see section 1.4).
- There is a limit to the number of LTE telegrams that can be transmitted via area/line coupler and IP router (see section 8.2.4).

8.1.1 Network topologies

Three network topologies are illustrated on the next three pages. Among the points to note are the details of the LTE filter table (see also section 8.2).

Example 1 **KNX network with area and line couplers**



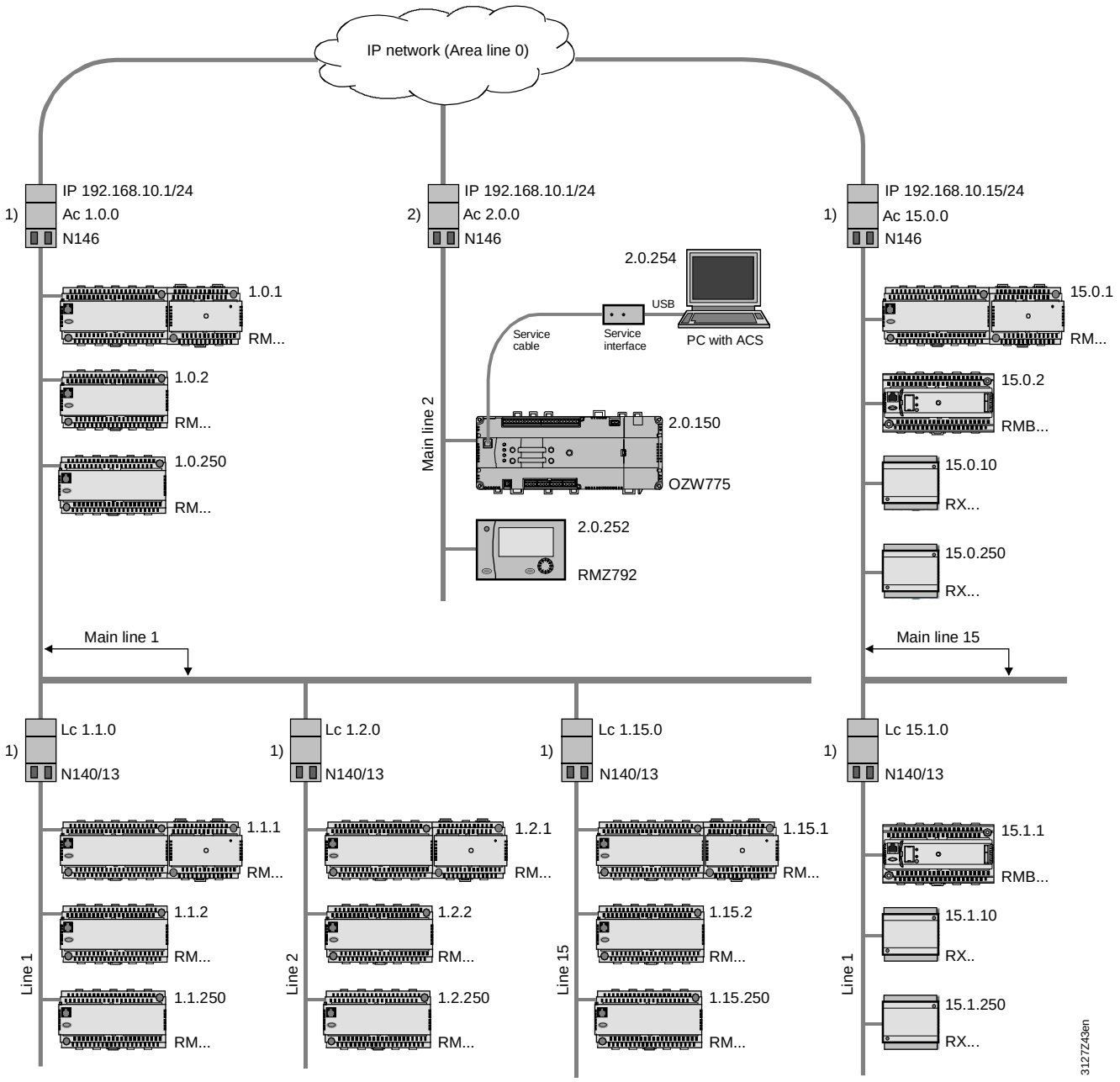
LTE filter table: 1) Normal (route)

Note

As already stated several times, one line (KNX TP1) can accommodate a maximum of 64 bus devices. The addresses (x.y.250) should refer to the highest recommended bus device address (250) and not on the maximum possible number of bus devices.

Example 2

KNX network linked via IP router to IP network (area line 0)



LTE filter table: 1) Normal (route), 2) Route all

Alarm drains

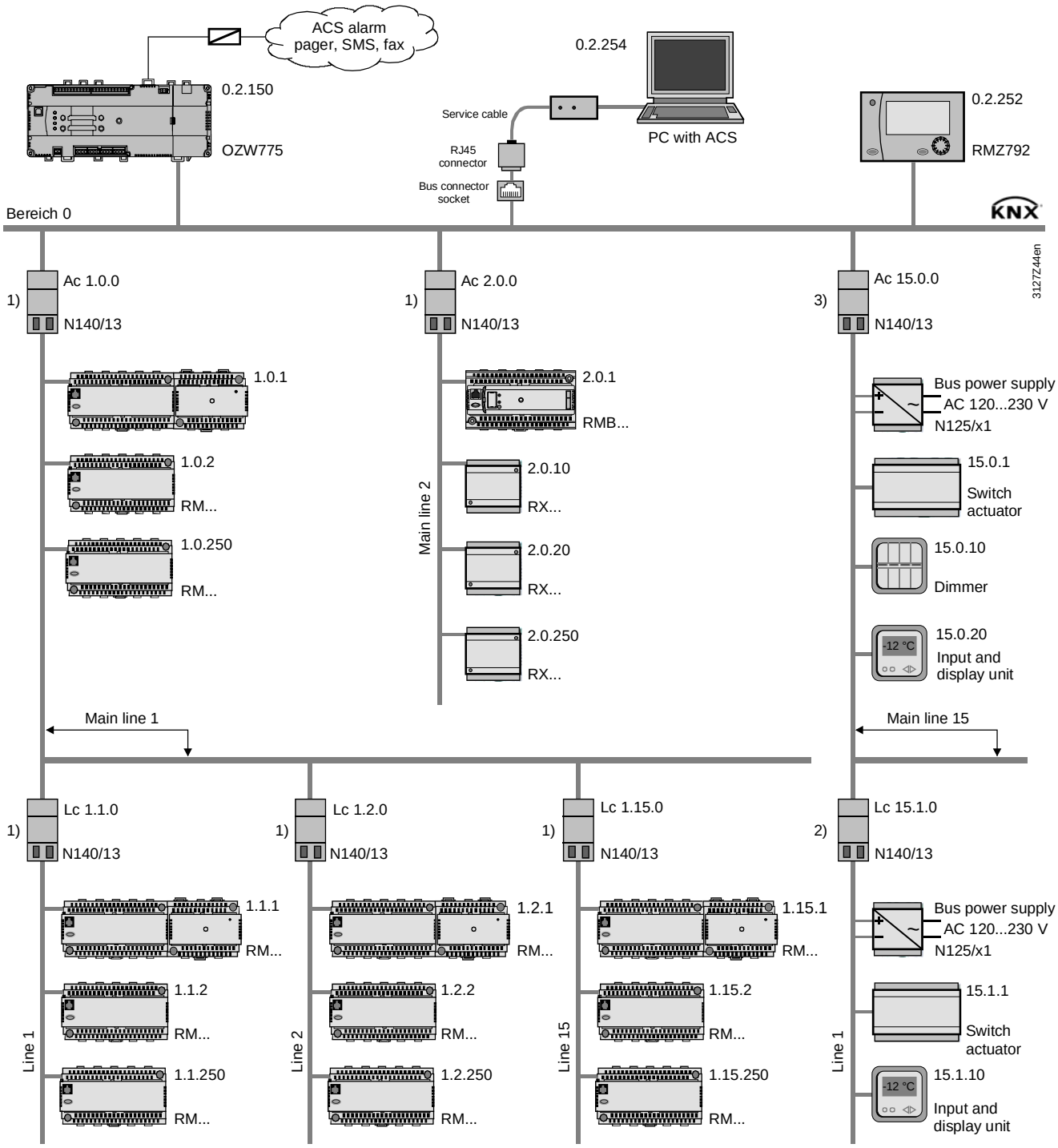
If Synco devices are used as alarm drains (see OZW775 central communication unit and RMZ792 bus operator unit in the illustration), these alarm drains must be installed directly after an IP router.

Alarm signals

To enable the alarm drains to receive all alarm signals (and other data) from the IP network, the IP router filter must be set to "Forward all" (see section 8.2.1 and 8.2.5).

Example 3

KNX network with third-party devices in Area 15



LTE filter table: 1) Normal (route), 2) Route all, 3) Block all

LTE filter table

If the filter is set to "Block all" for area coupler Ac 15.0.0, no LTE telegrams are transmitted between area 15 and the rest of the network.

The "Route all" setting for line coupler Lc 15.1.0 means that there is no filtering between line 15.1 and main line 15.

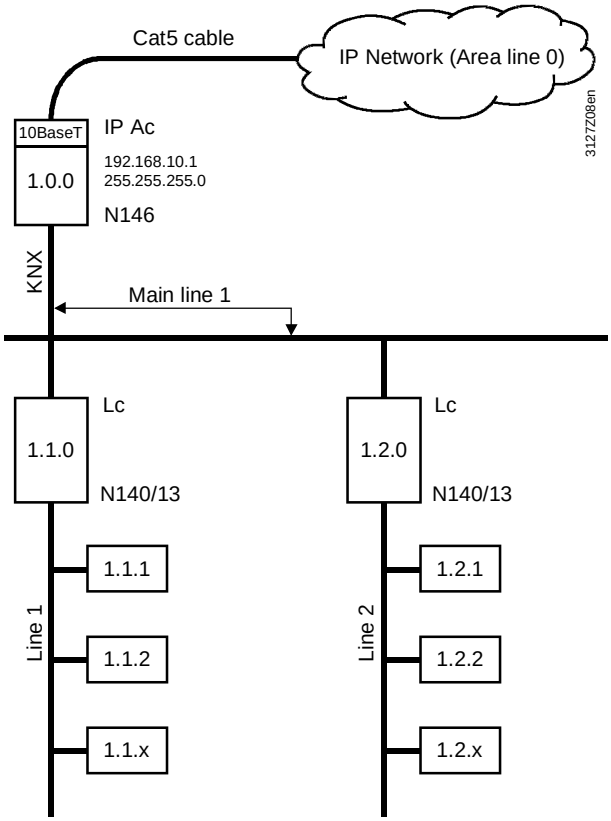
Bus power supply

If the devices in area 15 (e.g. third-party products) do not supply power to the bus, an N125/x1 power supply unit must be installed in each line (main line 15, line 15.1 plus further lines 15.x, if applicable) for the bus power supply.

8.1.2 IP router as a coupler to the IP network

10BaseT interface

The router can be connected via to the IP network via Ethernet cable and the integral RJ45 socket of the IP router.



The IP router has a 10BaseT interface (Ethernet at 10 Mbit/s via Cat5 cable).

Rules

When using IP routers, the following rules must be observed:

- With an IP router used as an area coupler (IP Ac) no other IP routers may be installed below the IP Ac in the topology.
- With an IP router used as a line coupler (IP Lc) no other IP routers may be installed above the IP Lc in the topology.

Allocation of IP addresses

When IP routers are used for coupling to an IP network, the following points must be discussed with the IP network administrator:

- **Automatic address assignment via DHCP** (see section 8.3)
  or
- **Manual IP address assignment** (see section 8.3)
  and also:
  IP routing, multicast addresses
  IP subnet mask
  IP standard gateway

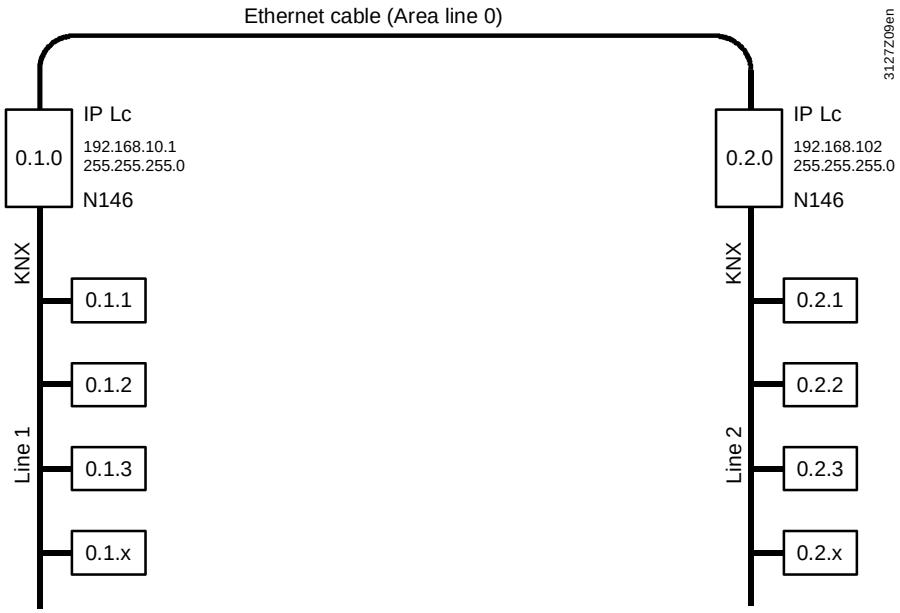
Note

This document does not deal with the technical aspects of Ethernet communications.

Point-to-point connection

With a point-to-point connection the Ethernet cable forms area line 0, irrespective of whether the coupling applies to two areas or lines (see diagram) or one area with one line.

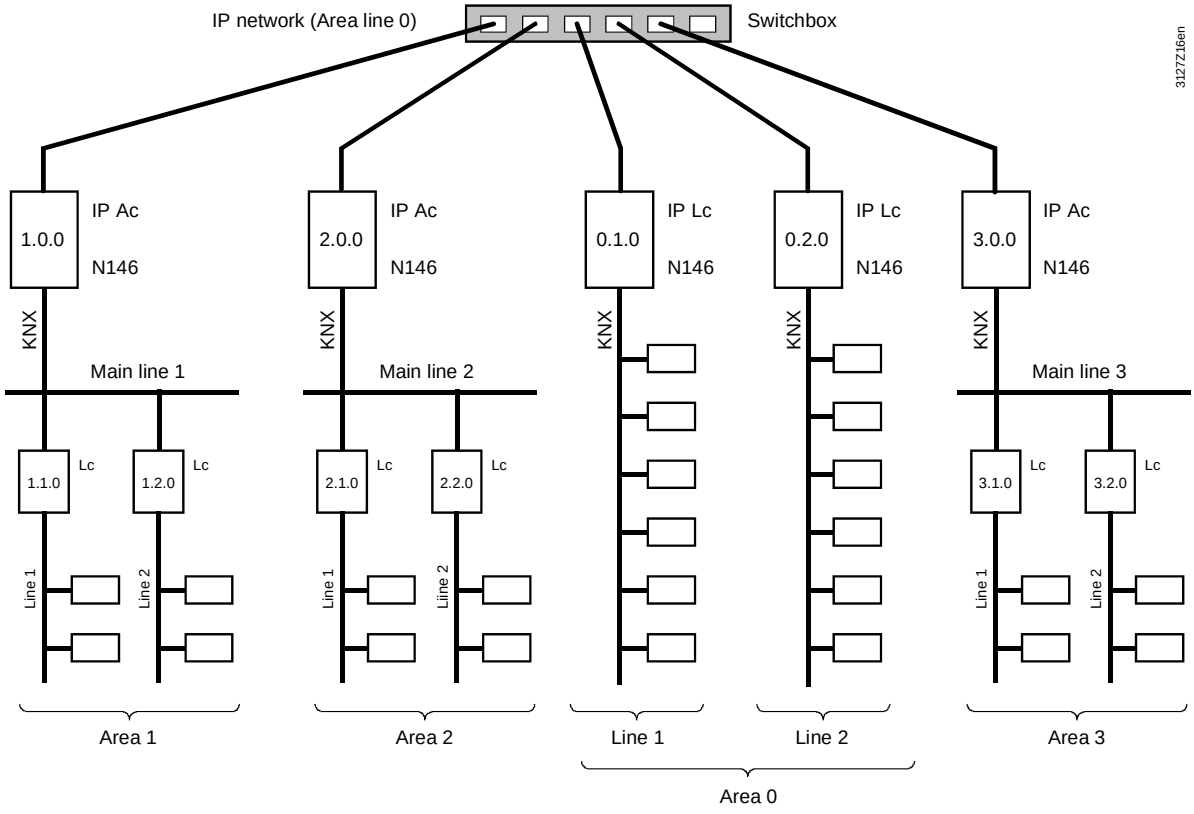
A crossed Ethernet cable is required for the coupling of two IP routers.



Multiple connections

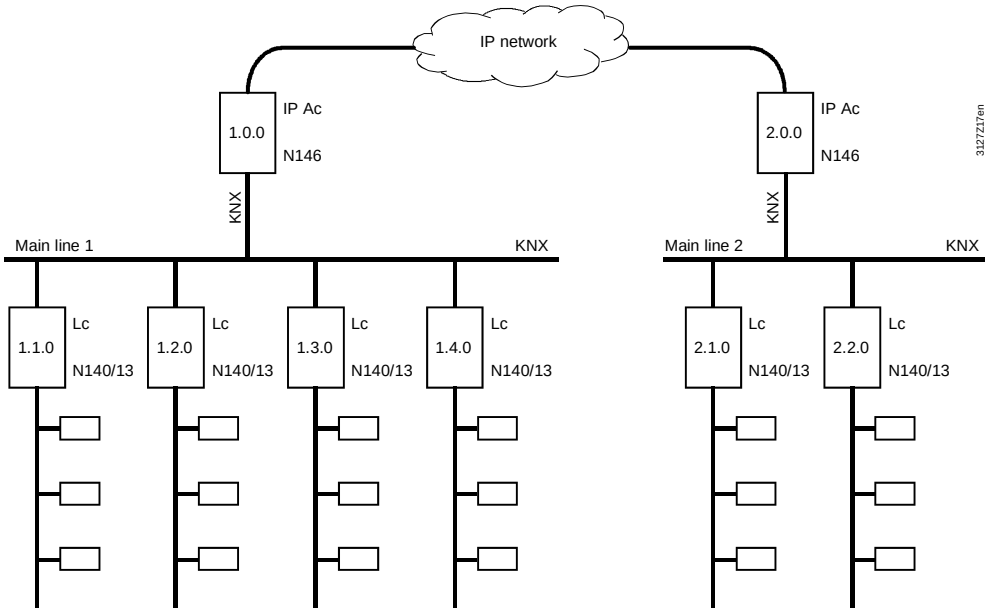
For multiple IP router connections, a switch box is required. As part of the IP network, the switch box represents area line 0.

Straight Ethernet cables must be used when connecting IP routers to the switch box.



IP router as area coupler

When the selected method of coupling is "IP router as area coupler", two or more KNX areas are linked via an IP network. The IP routers are used to link main lines, i.e. they must be addressed on the KNX side as area couplers.

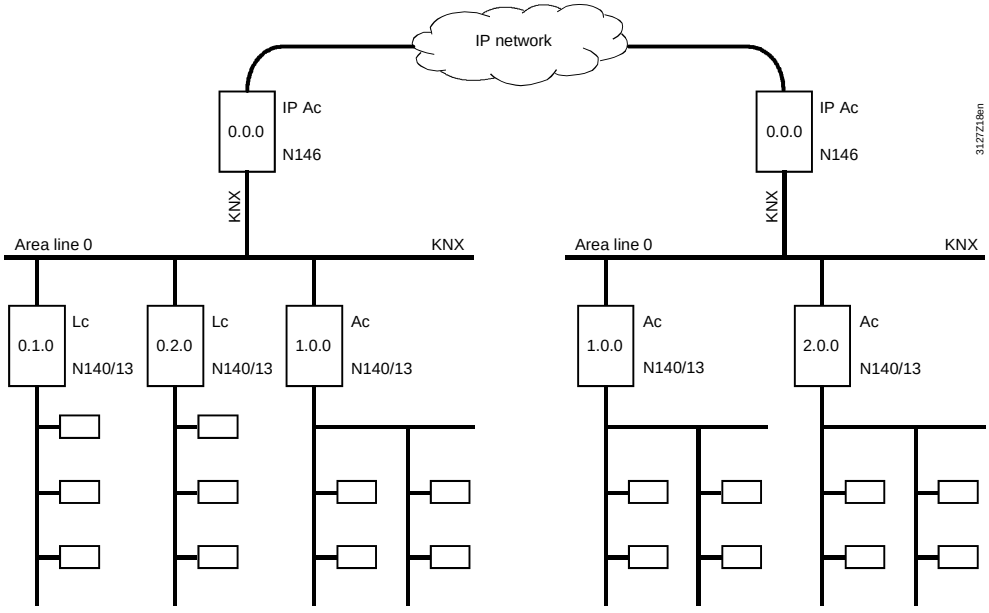


KNX Area 1 (Main line 1) – IP network – KNX Area 2 (Main line 2)

IP routers as couplers between "worlds"

IP routers are also used to link "worlds". This method of coupling is used to link two or more KNX networks via an IP network

In this case, the IP routers connect the IP network to the KNX area line 0 of each of the KNX networks concerned. The IP routers in all KNX networks must be set to KNX address 0.0.0.



KNX Network 1 (Area line 0) – IP network – KNX Network 2 (Area line 0)

8.2 LTE filter table for couplers and IP routers

Introduction

Area/line couplers and IP routers with an integrated LTE filter table make it possible to filter LTE telegrams, so reducing the amount of data traffic.

The valid LTE filter table versions are version R2 and later for the Siemens area/line coupler N140/13, and version R4 and later for Siemens IP router N146. This means that the couplers and IP routers must be stamped R2 and R4 respectively (see section 1.4).

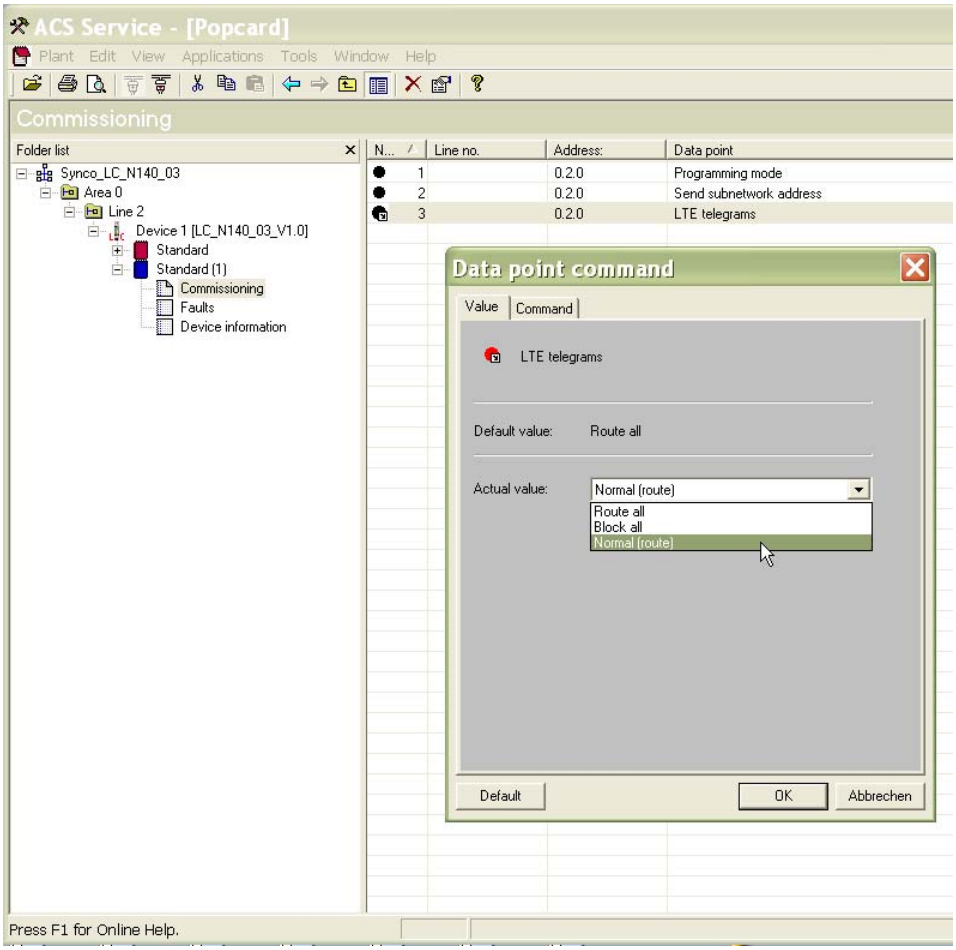
Note: S-mode telegrams are not subject to LTE filtering.

8.2.1 Filter settings

The filter settings in the area/line couplers and IP routers are:

- Normal (route) LTE telegrams of predefined zones and zone addresses are filtered (see the table in section 8.2.2)
- Route all All LTE telegrams are routed
- Block all All LTE telegrams are blocked

The required filtering mode is selected in ACS Service via Applications > Popcard… for the data point "LTE telegrams" (see screenshot).



8.2.2 Predefined LTE filter table

Filter setting "Normal (route)"

The predefined LTE filter table is available in the Siemens area/line coupler N140/13 from Version R2, and in the Siemens IP router N146 from Version R4.

The filter setting "Normal (route)" either blocks or routes the LTE telegrams from the zones and zone addresses, as shown in the list.

Zones	LTE telegrams of the following zone addresses are…	
	Blocked	Routed
Geographical zones[1)]	1…110	111…126
Heat distribution zones[2)]	1…15	16…31
Refrig distribution zones[3)]	1…15	16…31
Air distribution zone	1…15	16…31
Boiler sequencing zone	1…8	9…16
DHW zone	1…15	16…31
Holiday/special day zone[4)]	1…15	16…31
Outside temperature zone[4)]	1…15	16…31
Solar zone[4)]	1…15	16…31
Wind zone[4)]	1…15	16…31

Note

The zone address in the filter table with the attributes "Blocked" or "Routed" are predefined and these attributes cannot be modified.

1) The geographical zones comprise:
   - Geographical zone (apartm), … (Room), … (Subzone)
   - Time switch zone (apartment)… (Room), … (Subzone
   - Time-switch slave (apartment)
   - Master/slave zone (apartm), … (Room), … (Subzone)
   - QAW op.zone (apartment)

2) The heat distribution zones comprise:
   - Heat distr zone source side
   - Heat distr zone consumer side
   - Heat distr zone heating surface
   - Heat distribution zone air heater
   - Heat distrib. zone, primary distr.
   - Heat distrib. zone, primary contr.

3) The refrigeration distribution zones comprise:
   - Refrig distr zone source side
   - Refrig distr zone consumer side
   - Refrig distrib. zone air cooler
   - Refrig distr zone cooling surface

4) In these zones only one devices transmits LTE telegrams to several devices. Example: The device to which the outside temperature sensor is connected, measures the outside temperature. Only this device transmits the outside temperature value to the other devices which also need this value (multiple use of sensor values).

8.2.3 Filtering, zone addresses, communication areas

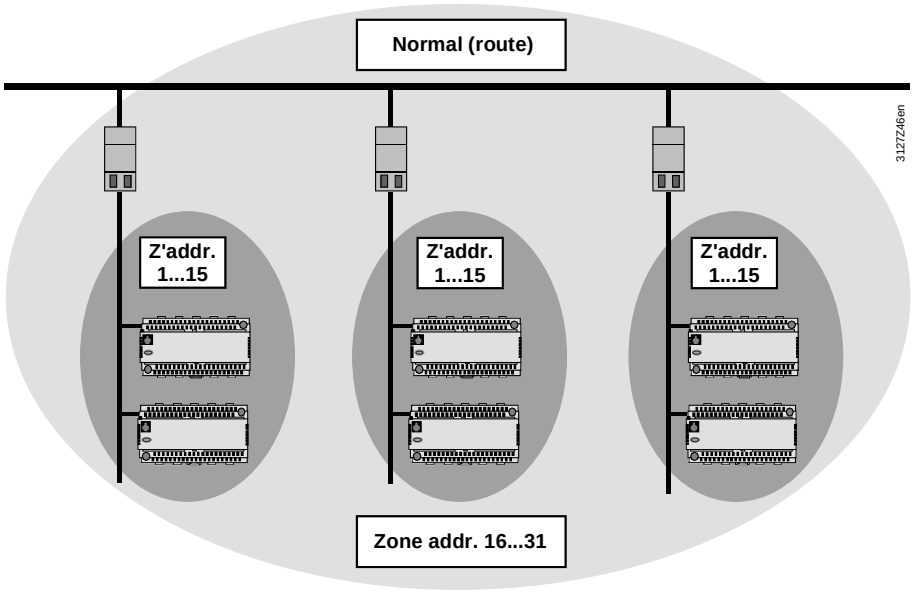
The diagrams below show the relationship between filter settings, zone addresses and communication areas, based on the zone addresses for distribution zones.

Prerequisite: All area/line couplers and IP routers in the network must have the same filter setting.

Normal (route)

LTE telegrams with zone addresses 1…15 are communicated only within the line, i.e. telegrams with these zone addresses are blocked.

LTE telegrams with zone addresses 16…31 are communicated outside that line, i.e. telegrams with these zone addresses are routed.

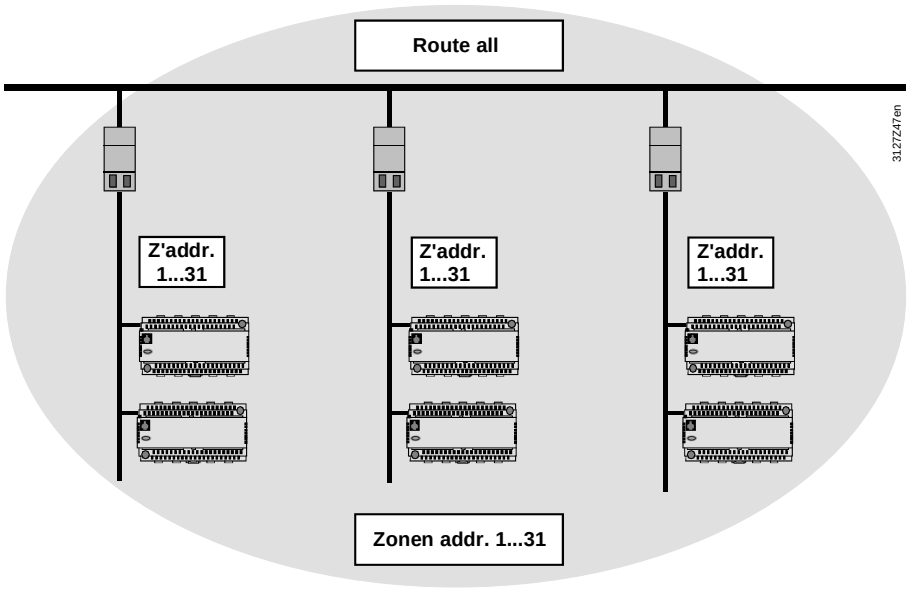


Note

Zone addresses that are blocked by the filter setting "Normal (route)" can be re-used in other KNX areas and lines, but only if the attribute "Normal (route)" is valid.

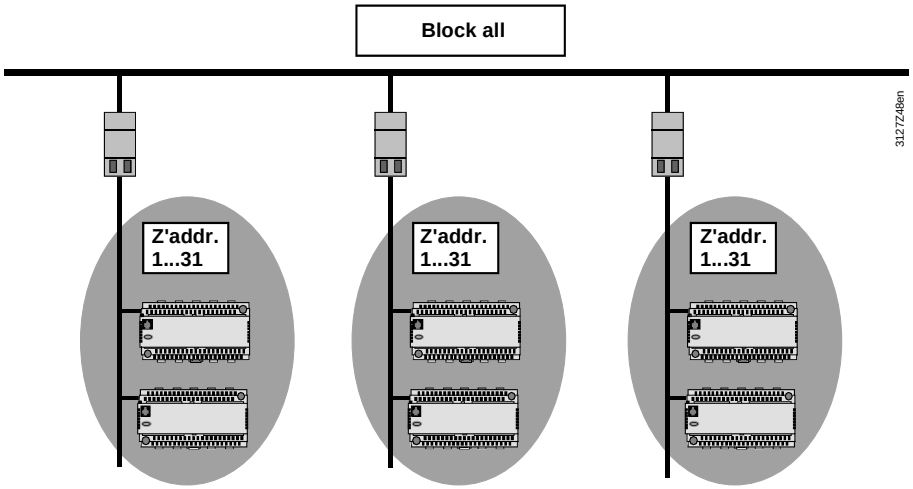
Route all

All LTE telegrams with zone addresses 1…31 are communicated throughout the network (no filtering).



Block all

All LTE telegrams with zone addresses 1…31 are communicated only within the line concerned.



8.2.4 LTE telegrams via couplers and IP routers

Recommendation

When using Siemens area/line couplers and IP routers in conjunction with Synco devices, it is recommended that no more than 15 devices be configured with the same zone (e.g. heat distribution zone) and the same zone address (see the addresses highlighted in green in section 8.2.2).

Notes

The reason for this recommendation is that the area/line couplers and IP routers have limited buffers.

The aim is to prevent the transmission of too many LTE telegrams (e.g. heat demand signals from more than 15 devices) in the same cycle.

If it is possible in a given plant to ensure that only a small number of LTE telegrams is transmitted in the same cycle or that the telegrams are short, then it is acceptable to configure more than 15 devices with the same zone and zone address. However, observing the recommendation ensures reliable data communication at all times.

The "Block all" filter setting prevents all data communication via the area/line couplers and IP routers. In this case, the recommendation can be ignored.

Zones

The above recommendation is not relevant for all zones, only for those listed below (see also the table in section 8.2.2).

- Geographical zones
- Heat distribution zones
- Refrigeration distribution zones
- DHW zone
- Air distribution zone
- Boiler sequencing zone

Network with RX… room controllers

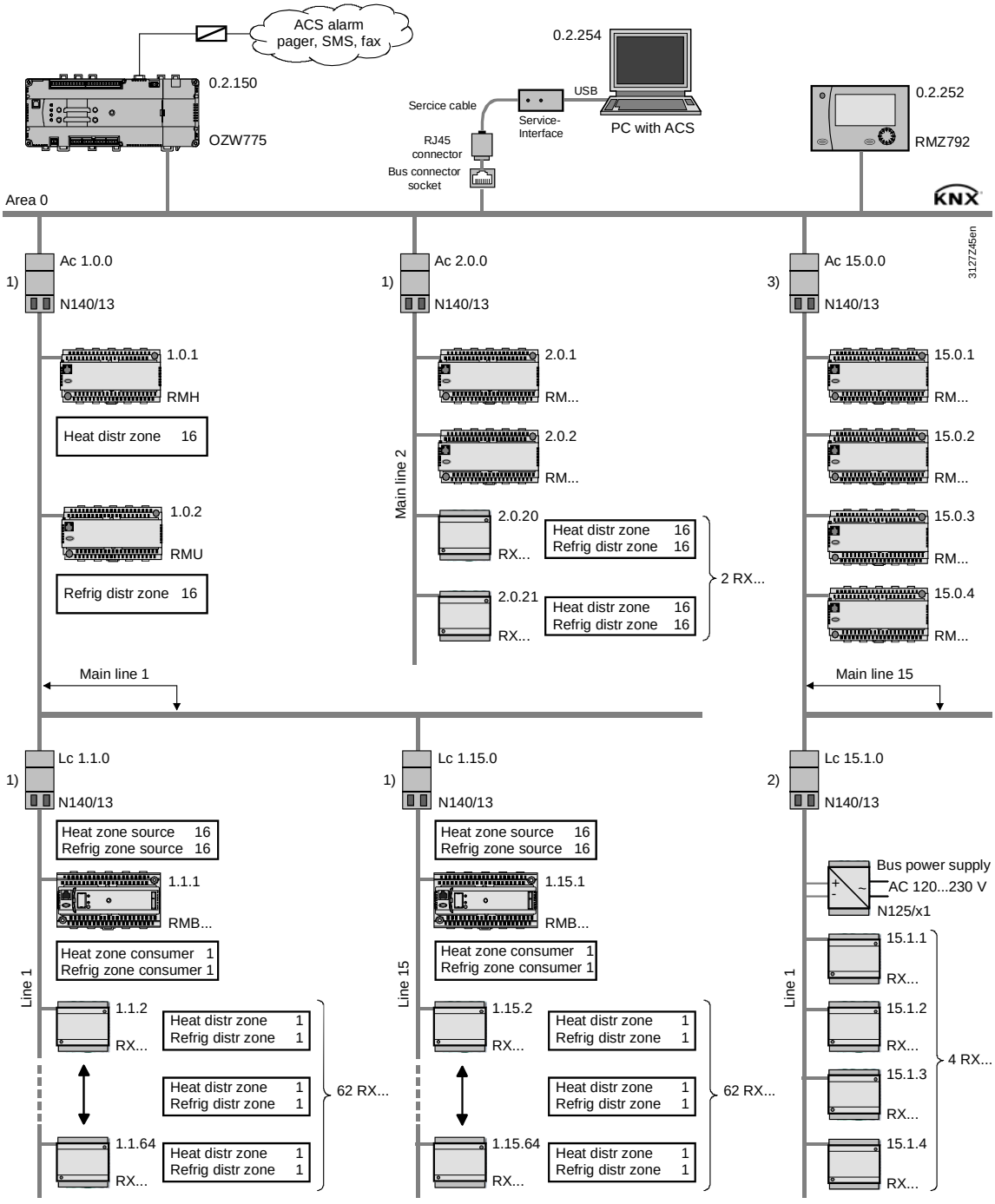
The recommendation on the previous page is particularly important in relation to a network with a large number of RX… room controllers.

In a line containing up to 62 RX… room controllers, an RMB795 central control unit is used as a "collector". The area/line couplers are set to "Normal (route)".

The heating and refrigeration distribution zone in each RX… room controller is configured with a zone address in the range 1...15 (data communication within the line).

The heating and refrigeration distribution zone in each RX… room controller is configured on the consumer side with a zone address in the range 16...13 (data communication via area/line coupler).

The heating/refrigeration demand from the RX… room controllers is transmitted by the "collector" to the RMH primary heating and RMU primary cooling controllers.



LTE filter table: 1) Normal (route), 2) Route all, 3) Block all

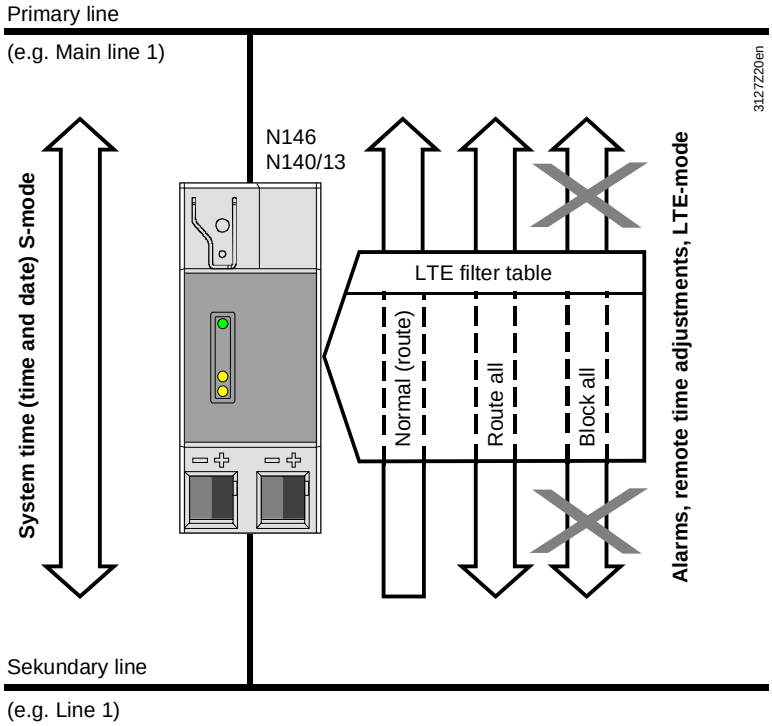
8.2.5 System time, alarms and remote time adjustments

System time

The system time (time and date) are communicated in S-mode and are not affected by LTE filtering.

Alarms and remote time adjustments

Alarms and remote time adjustments are transmitted in LTE mode (LTE broadcast address). This address is in the predefined LTE filter table and is therefore subject to LTE filtering.



Two-way and one-way communication

The diagram shows the following:

The system time (time and date) is always transmitted by devices on the primary line to devices on the secondary line and vice versa → two-way communication.

Normal (route)

If the filter is set to "Normal (route)" in the area/line couplers and IP routers, then alarms and remote time adjustments are transmitted only from the secondary line to the primary line → one-way communication.

Route all

If the setting is "Route all", then alarms and remote time adjustments are transmitted from the secondary line to the primary line and vice versa → two-way communication.

Block all

The "Block all" setting means that the transmission of alarms and remote time adjustments is blocked → no LTE telegram communications.

Time synchronization

In a network containing couplers and IP routers, only one RM… controller can operate as the time master (see section 6.1.2).

The time can only be adjusted remotely via a time slave if the time master is located on the same line or on the line above it in the hierarchy.

8.3 Engineering of large plants

Engineering with ACS

The ACS7… software is recommended for the engineering of large plants, because it can be used to set all the necessary addresses and configuration values.

Addressing

1. Address the area/line couplers (see section 5.9) and IP routers (see section 5.10).

2. Set the device addresses for the bus devices (see section 5.2 ff).

3. Additional settings for the IP network in the IP router via ACS Service (see further below).

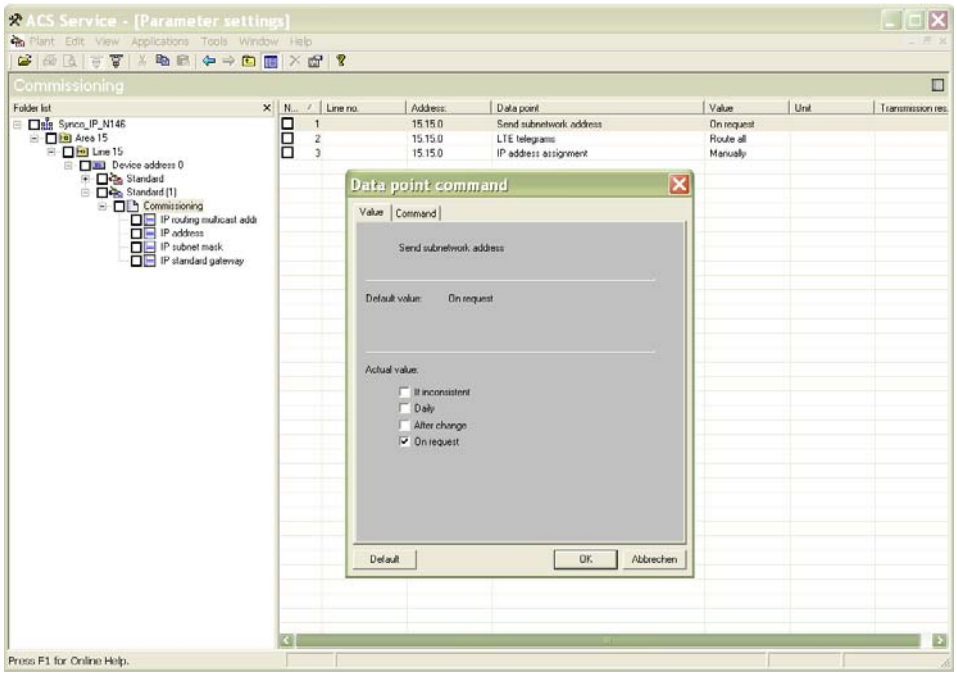
Note

If the area/line couplers and IP routers are addressed before the bus devices, them the bus devices will be ready to receive the "area" and "line" components of the address. See "Transmitting the subnet address" below.

Send subnetwork address

The following settings are possible in conjunction with transmission of the subnetwork address (SNA):

- If inconsistent
- Daily
- After change
- On request (default)

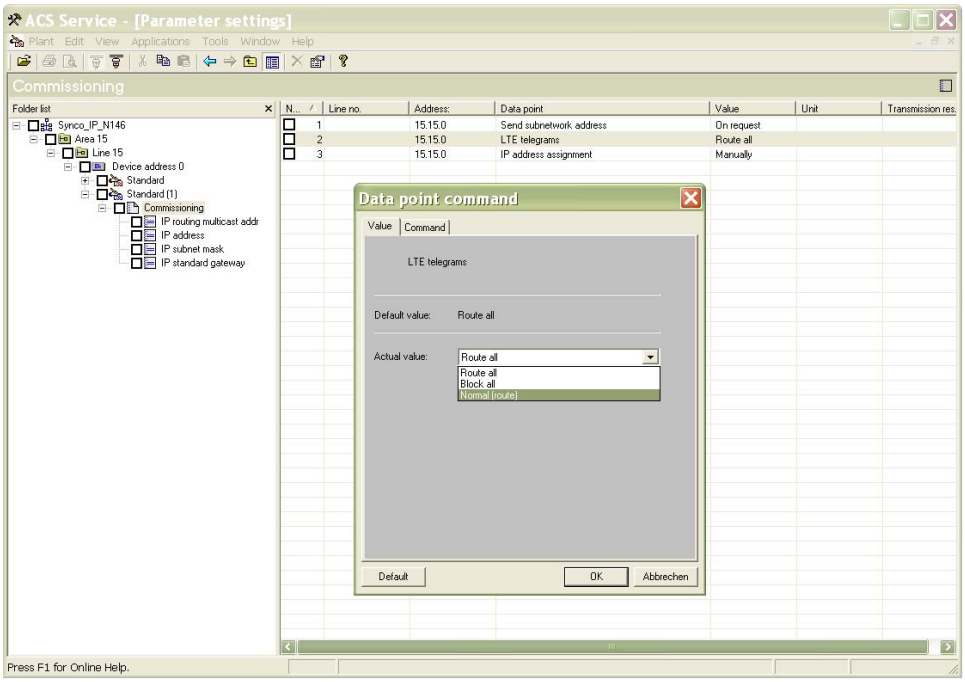


Note

For transmission of the subnet address (SNA) all settings should be enabled (i.e. ensure that all checkboxes are selected).

Filtering of LTE telegrams

To keep communication to a minimum, the filter setting "Normal (route)" should be retained (default, see section 8.2).

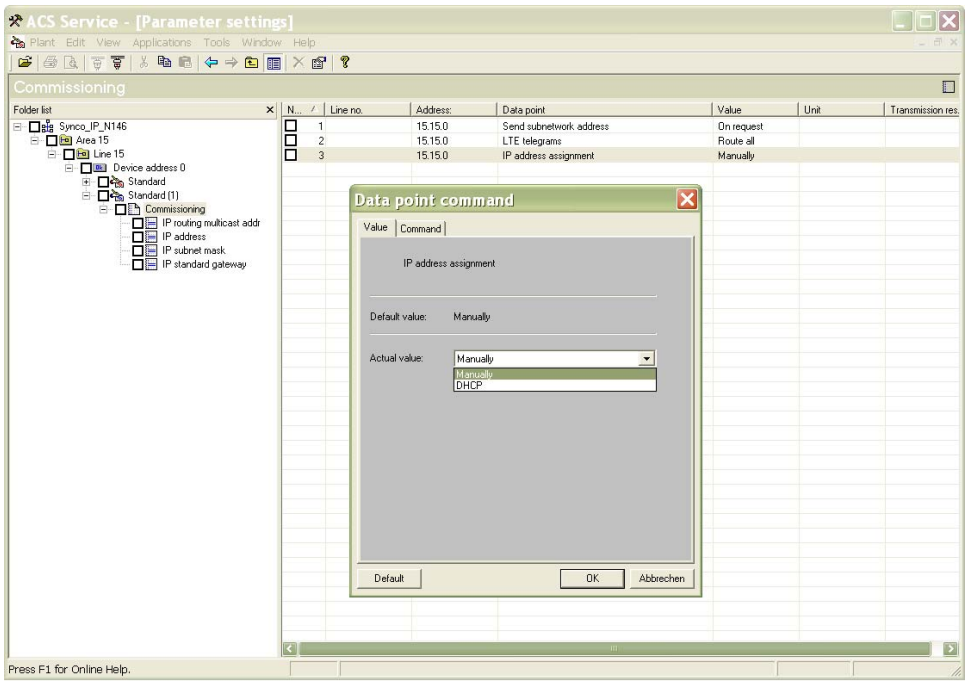


IP address assignment

The IP routers are factory-set to obtain their IP address from a DHCP[1)] server.

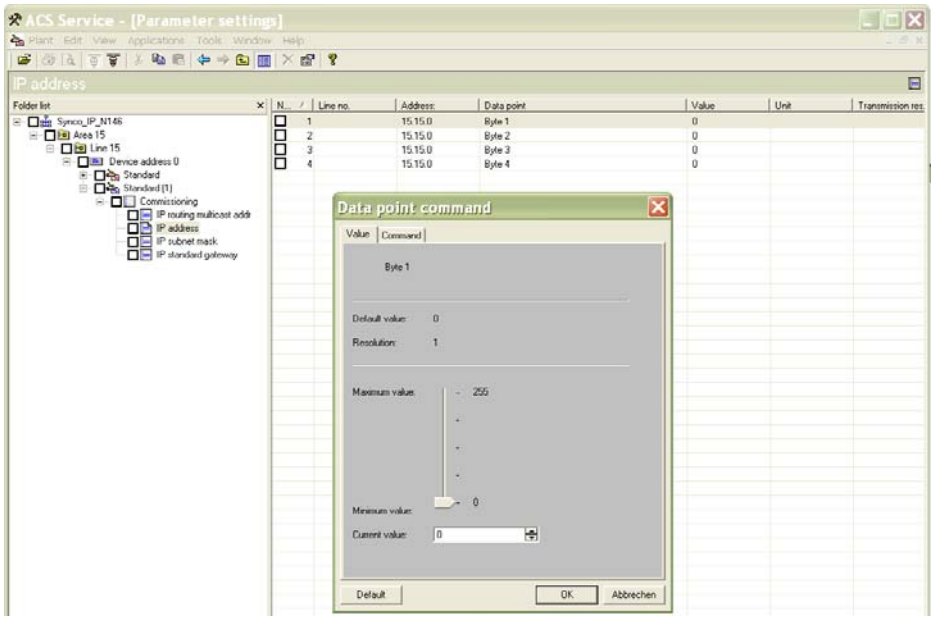
The IP addresses can also be assigned manually with ACS (see the next two screenshots).

1) Dynamic Host Configuration Protocol. DHCP is a Client-Server-Protocol which reduces the time and effort involved in assigning IP addresses.



IP address, manual

If the manual assignment of IP addresses is selected (instead of DHCP), the 4-byte IP address can be programmed in ACS.



IP settings

Other IP settings in ACS

- IP routing multicast address
- IP subnet mask
- IP standard gateway

Engineering with ETS3

When using the ETS3 engineering tool, e.g. in systems with third-party devices, the ETS product database of Synco bus devices must be imported into ETS3.

Pay special attention to the following points when engineering with ETS3:

- ETS3 does not allow access to the LTE filter table (for filtering zone addresses).
- ETS3 does allow access to the S-mode filter table (for filtering group addresses).
- Fixed group addresses are defined in the KNX standard for some system functions, including, for example, group address 30/3/254 for the system time.
- Group address 30/3/254 is set in the Synco bus devices before they leave the factory.

Notes

When downloading new group addresses into Synco bus devices, the group address 30/3/254 referred to above must be set up in the ETS3 tool and connected. Only then can the download be initiated.

Without group address 30/3/254 and a connection for the system time, it will no longer be possible to synchronize the time between the Synco bus devices after the first download.

If a different group address is used for the system time, then this group address must be entered and downloaded to all devices with system time communication (master and all slaves).

It is not possible to set up group address 30/3/254 (main group 30) in the ETS3 with the default values. However, it is possible to enable the setting up of main groups > 15 via the Windows Registry entries. Questions about the required entries for this purpose should be addressed to your ETS3 supplier.

9 Appendix

9.1 Faults and errors

Various events cause faults and errors which then trigger error messages. This document deals only with communication errors (see also the tables on the next page).

Communication errors

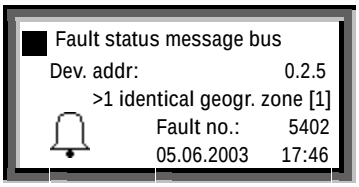
Type of error	Examples
• Failure	• No bus power supply • System time failure
• Setting error	• More than 1 system time master defined • More than 1 room master defined in the same "geographical zone" • Addressing error (e.g. two bus devices with the same device address)

Device errors such as sensor errors, faults in the extension module or plant faults such as fan overload, burner fault, dirty filters, frost conditions etc. are described in the basic documentation.

9.1.1 Bus fault status message

All faults messages are distributed over the KNX bus. In this process, the fault with the highest priority or, in the case of equal priority, the oldest fault, can be displayed on the "Fault status message bus" operating page (access via Service level).

■ Main menu > Faults > Fault status message bus



Notes

The "Fault status message bus" operating page can be selected at all access levels.

The operating lines on the "Faults" operating page, namely "Faults current" and "Fault history" relate to the faults associated with that controller (i.e. not to faults from other devices transmitted over the KNX bus).

The faults are arranged in order of priority. However, "Fault 1" (the "Fault 1" line displayed on the RMZ790 and RMZ791 operator units or the "Fault 1" menu line in the ACS menu tree) and the highest-priority fault are not necessarily identical.

9.1.2 Communication errors

The following is a list of errors associated with communication over the KNX bus (see also the listed sections in this document).

Failure

Fault No.	Fault message on RMZ79x operator unit	Type of failure
5000	No bus power supply	No bus power supply
5001	System time failure	System time failure (slave)
5101	Time swi fail pl 1	Time switch program failure (plant 1)
5111	Time swi fail pl 2	Time switch program failure (heating circuit 2)
5201	Hol/spec day failure	Failure holiday/special day program
5301	DHW time swi fail	DHW time switch program failure
5401	Room mast fail pl 1	Room master failure (plant 1)
5411	Room mast fail pl 2	Room master failure (heating circuit 2)

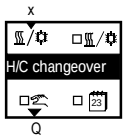
Setting errors

Fault No.	Fault message on RMZ79x operator unit	Setting errors
6001	>1 id device address	More than one device with identical device address
5002	>1 clock time master	More than one clock time master
5102	>1 time switch pl 1	More than one time switch program active in same zone (plant 1)
5112	>1 time switch pl 2	More than one time switch program active in same zone (heating circuit 2)
5202	>1 hol/sp day prgm	More than one holiday/special day program active in the same day/special day zone
5302	>1 DHW time switch	More than one time DHW switch program active in same zone
5402	>1 geogr zone [1]	More than one controller operating as room master in the identical geographical zone [1]
5412	>1 geogr zone [2]	More than one controller operating as room master in the identical geographical zone [2] (e.g. RMH: heating circuit 2)

9.2 Heating / cooling changeover

Use

The **universal RMU7x0B controllers** are programmed with the new "H/C changeover" function block, which is used for changeover of the specified "Heating" or "Cooling" mode in **2-pipe systems**.



The specified "Heating" or "Cooling" mode can be generated in the controller itself, or received as a "Heating/cooling changeover signal" over the KNX bus.

The following methods of changeover can be programmed for the specified "Heating/Cooling" mode:

- Changeover via digital input, e.g. with manual switch or with a changeover thermostat in the flow (already an option with RMU7x0).
- Changeover vie analog input, e.g. based on outside air temperature or flow temperature.
- Changeover based on the calendar (date): Configured in the "H/C Changeover" function block (calendar symbol checkbox selected)
- Changeover with operating mode selector. Configured in the "H/C Changeover" function block ("Hand" symbol checkbox selected)

Effect of specified mode

The "Heating/Cooling" mode is not affected by the type of changeover.
If several types of changeover are selected, the required operating mode is determined in the following order of priority:

1. Operating mode selector
2. H/C changeover input
3. Heating/cooling based on calendar

The required "Heating/Cooling" mode is transmitted by the "changeover controller" to all other controllers in the heating distribution and refrigeration distribution zones.

In a hydraulic circuit, the "Heating/Cooling" mode can be defined in one location only. If several H/C changeover signals in the same distribution zone are distributed over the KNX bus, a fault message is generated.

Note

If possible, the required "Heating/Cooling" changeover command should be activated in the primary controller or generator.

Activating the function

The "H/C changeover" function is activated by setting the operating line "2-pipe system heating/cooling" to "Yes".

Configuration

Main menu > Commissioning > Extra configuration > Heating/cooling changeover

Operating line	Range	Factory setting
2-pipe heating/cooling system	No, Yes	No

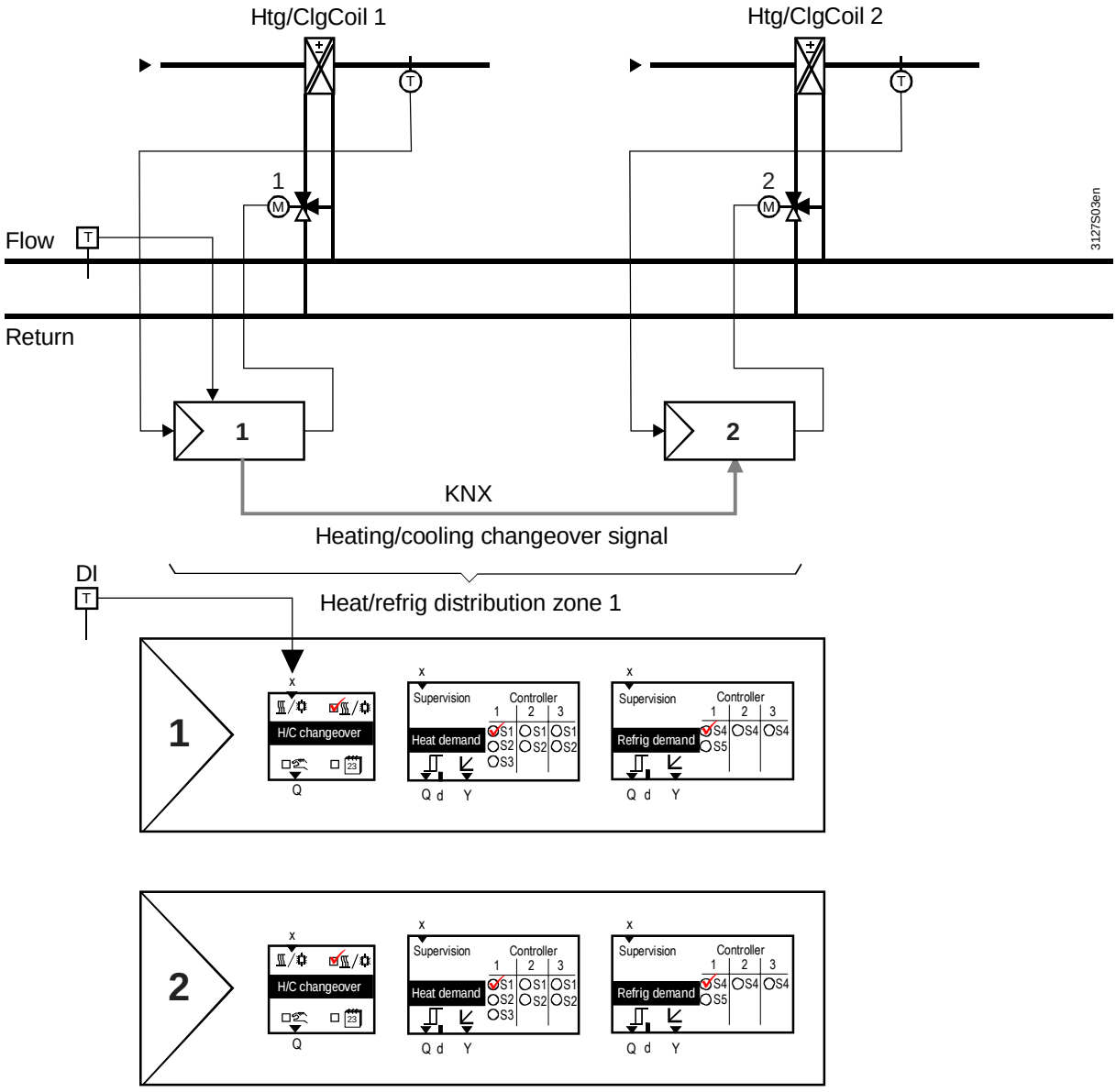
9.2.1 Changeover via digital input

Changeover source digital input DI

The changeover thermostat in the flow is wired to universal input "x"(configured as a digital input) of the "H/C changeover" function block in controller 1 (RMU7x0B).

Changeover signal via KNX

The heating/cooling changeover signal transmitted over the KNX bus affects all controllers (in this case controllers 1 and 2) in the same heating/refrigeration distribution zone, provided all controllers have the same heating/refrigeration zone address.



9.2.2 Changeover via analog input

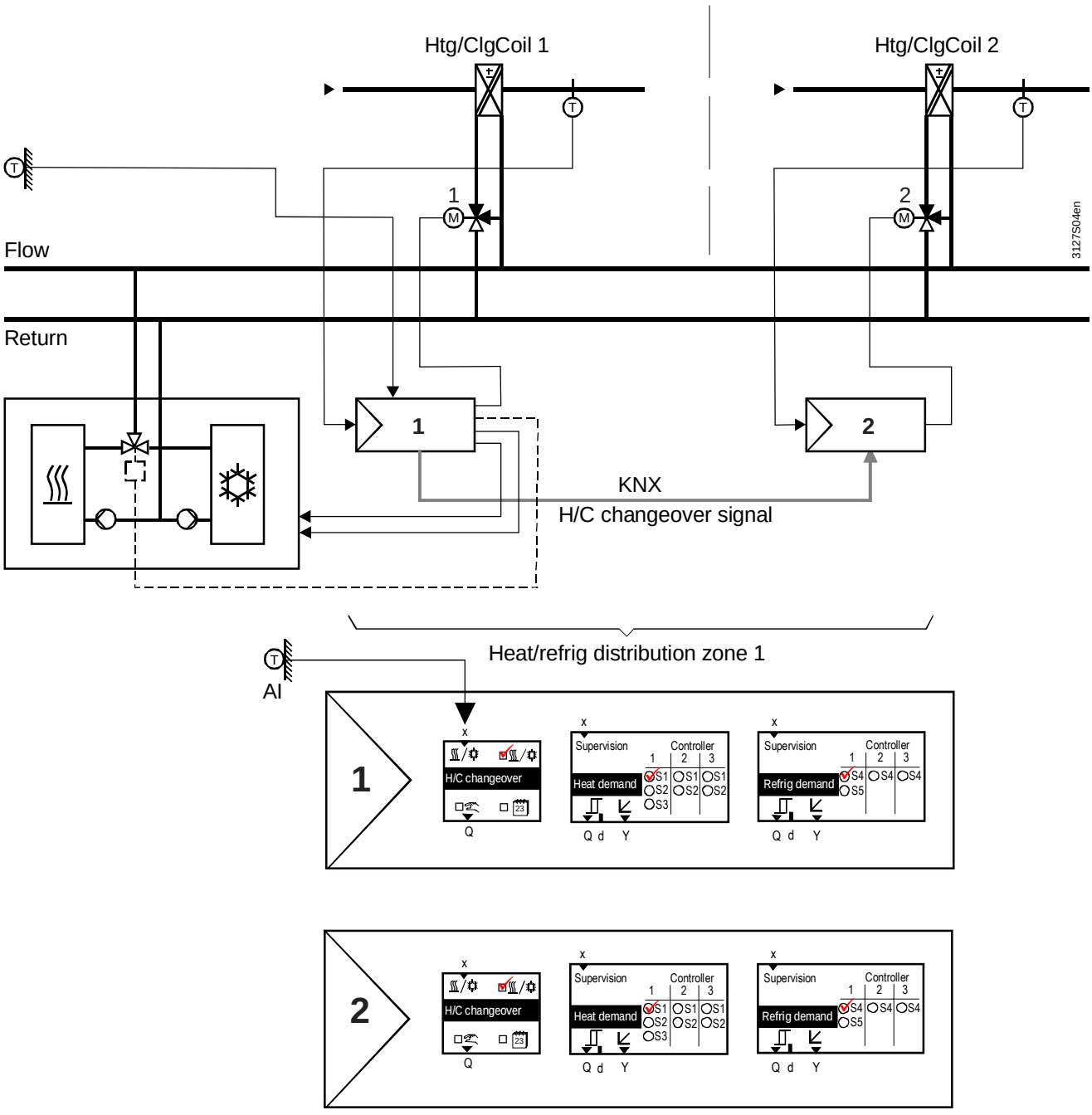
Changeover source analog input AI

The outside temperature sensor is wired to universal input "x"(configured as an analog input) of the "H/C changeover" function block in controller 1 (RMU7x0B).

The release relay in controller 1 affects the generation of heating/refrigeration energy. The heating/cooling changeover signal affects all controllers (in this case controller 1 and controller 2) in the same heating/refrigeration distribution zone.

Note

If the source of the H/C changeover is an analog signal, then two limit values must be selected for the changeover. For further information refer to the basic documentation, manual P3150.

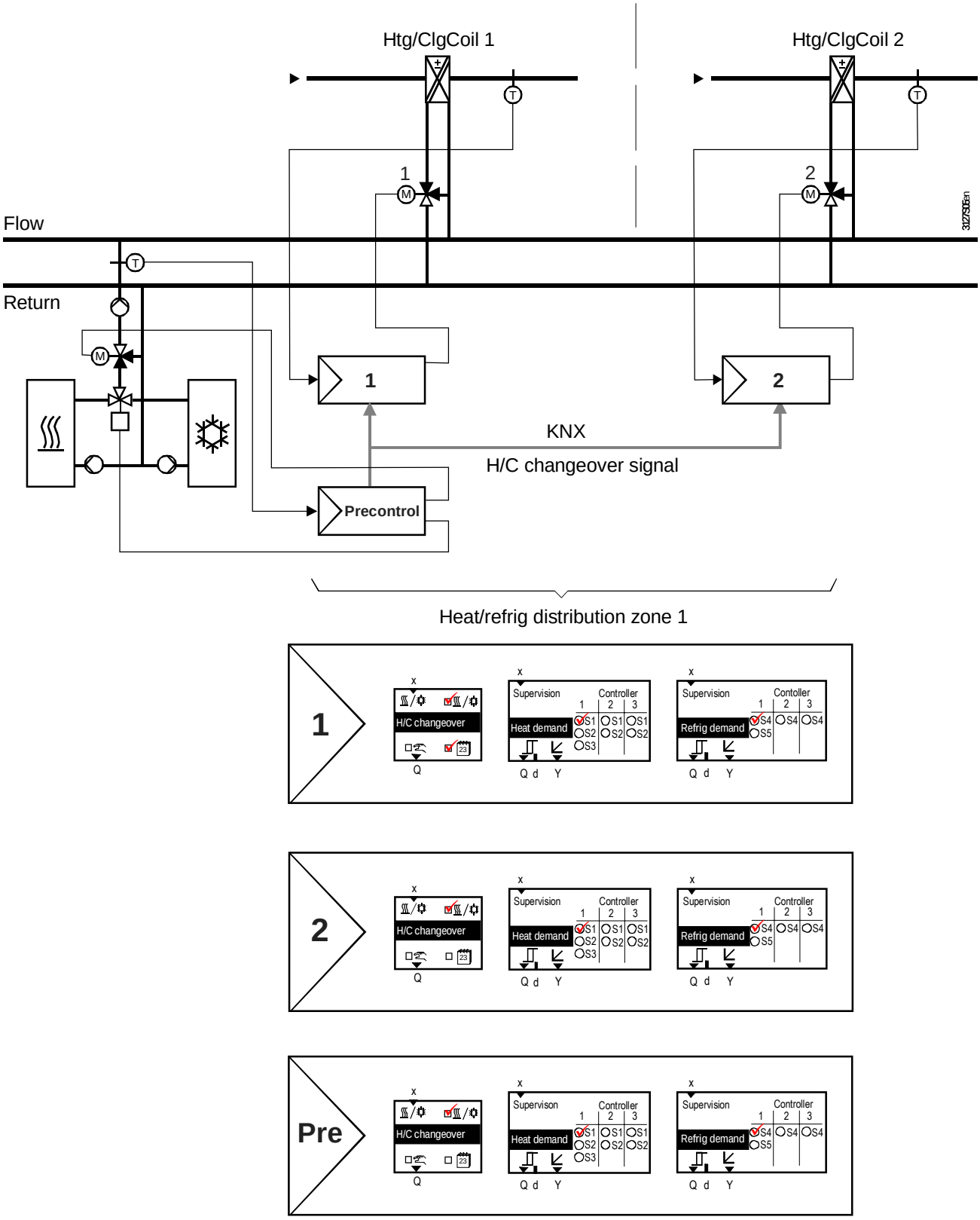


9.2.3 Changeover based on calendar

Changeover source calendar

Calendar-based changeover is configured in the "H/C changeover" function block (see the checkmark by the calendar symbol in the primary controller, RMU7x0B).

The HC changeover relay in the primary controller acts on the generation of heating/refrigeration energy which is also controlled by the primary controller.



Configuration

Main menu > Commissioning > Extra configuration > Heating/cooling changeover

Operating line	Range	Factory setting
Heating/cooling based on calendar	No, Yes	No

Settings

Main menu > Commissioning > Settings > Heating/cooling changeover

Operating line	Range	Factory setting
Start date, heating	01.01. - 31.12.	01.10.
Start date, cooling	01.01. - 31.12.	01.05.

The changeover occurs on the "Start date, heating" or "Start date, cooling".

9.2.4 H/C changeover relay and fault messages

Heating/cooling changeover relay

If, instead of being transmitted over the bus, the H/C changeover signal is to be made available at a relay output e.g. for switch control of a valve or for forwarding to a non-communicating device, the H/C changeover relay can be configured accordingly. See the notes on connecting the primary controller to the changeover valve.

Configuration

Main menu > Commissioning > Extra configuration > Heating/cooling changeover

Operating line	Range	Factory setting
Heating/cooling changeover relay	----, N.Q1, N.Q2,…/	----

Current contact position

The current contact position (status) of the changeover relay can be displayed via the Service level.

Main menu > Heating/cooling changeover

Operating line	Current contact position (status)
Heating/cooling changeover relay	Open (Off) Cooling / Closed (On) Heating

Fault status messages

H/C changeover signal failure

In a 2-pipe heating/cooling system without a "Heating/Cooling changeover" signal on the KNX bus, the controller continues to use the last received value. If the signal never existed, then "Heating" is used as the default value.

Fault status message 5801

No.	Text	Effect
5801	H/C changeover signal failure	Non-urgent message; no acknowledgement required.

> 1 H/C changeover signal

If the "H/C changeover" in a 2-pipe system is configured so that it is initiated by calendar or by operating mode selector, and a changeover signal is received in one of the zones from another device, then the fault message "> 1 heat/cool changeover signal" is transmitted.

Fault status message 5802

No.	Text	Effect
5802	>1 heat/cool changeover signal	Non-urgent message; acknowledgement is required.

9.3 Room control combination

9.3.1 Application examples

Introduction

The "Room control combination" feature can be used to link two RM… controllers so that they operate with the same operating mode and the same room setpoint. The two controllers must belong to the same "Geographical zone (apartm)".

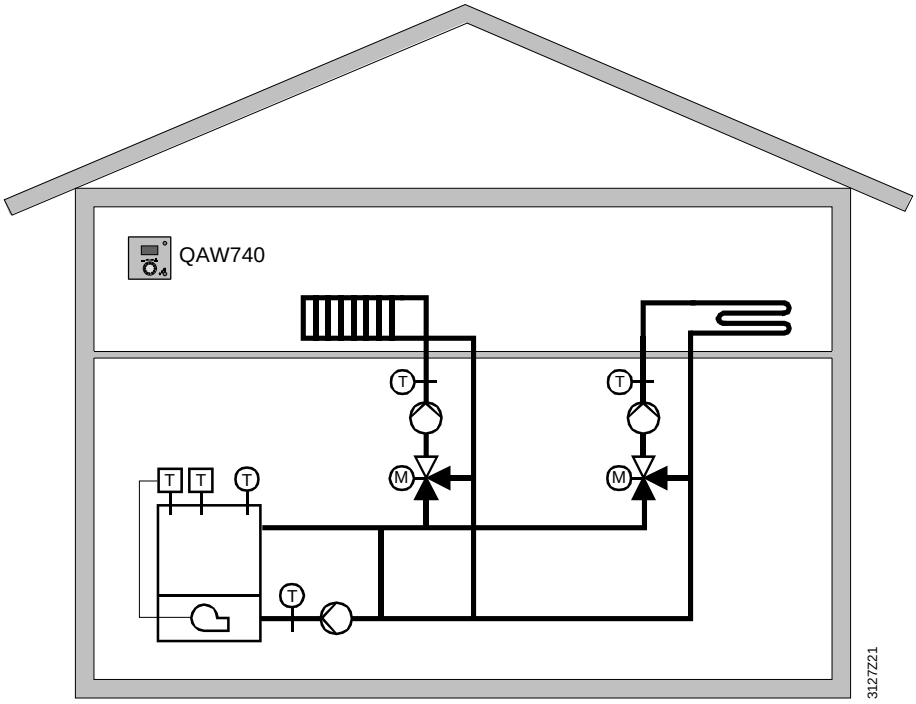
If one of the two controllers is a type RMU controller, the RMU controller always becomes the "Room controller master". If two type RMU or RMH controllers are used in the same application, one must be defined as the master and the other as a slave.

Application example 1

Radiator and underfloor heating

The "Room control combination" function can be used, for example, enables a room to be heated with both radiator-type heating and underfloor heating. Exchanging the room temperature and operating mode over the KNX bus permits a joint control strategy with the following aims:

- Optimum control (e.g. boost enabled at the correct time)
- The same room operating mode for both controllers (time switch and holiday/special day program, manual override)
- Adjustable room influence

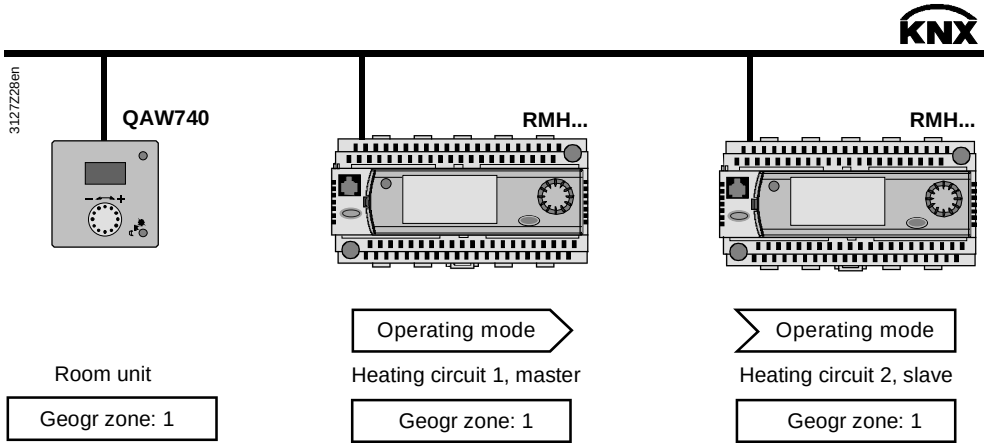


Controller 1 and 2, both type RMH

The application "Radiator and underfloor heating in the same room" requires two RMH controllers. Controller 1 is defined as the master room controller, and Controller 2 as the slave room controller.

The first step is to set the zone addresses of the "Geographical zone (apartm)" in the controllers.

Zone addressing



Setting the room control combination

Room control combination **Master**
Transmits room setpoint and operating mode

Room control combination **Slave, external setpoint**
Receives room setpoint and operating mode

Room control combination **Slave, internal setpoint**
Retains its own room setpoint as valid, but adopts the operating mode from the master.

Application example 2

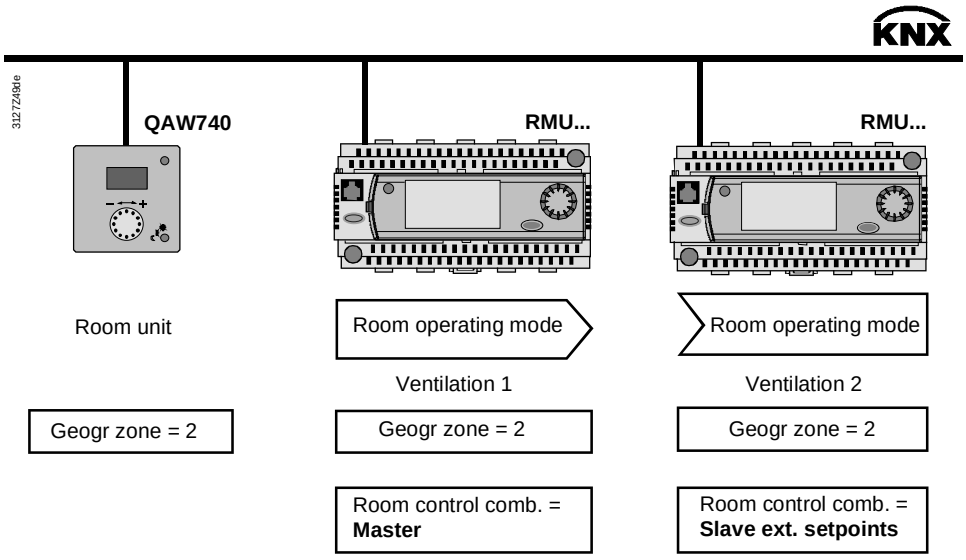
Room control combinations featuring multiple ventilation controllers

When a space is controlled by more than one ventilation controller (e.g. two RMU7x0B controllers (and they must be RMU7x0B controllers) controlling the temperature in a warehouse) the controllers can exchange information such as room temperature, operating mode and setpoint over the KNX bus.

Note

With this room control combination, one ventilation controller must be set as the master and all the others as slaves.

Zone addressing



Settings for the slave ventilation controller(s)

Within the room control combination, the slave ventilation controllers operate with the same operating mode as the master.

The slave controllers can use either the same setpoints as the master, or individual setpoints.

Control strategy

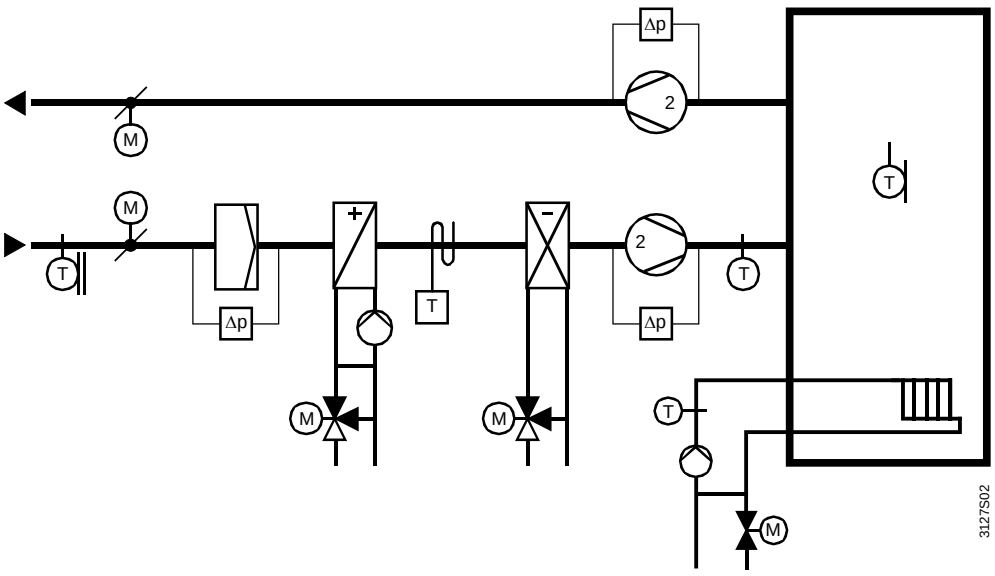
Control strategy	Room control combination	Effect
• Same room operating mode • Shared setpoints	Slave external setpoint	The slave ventilation controller shares the same setpoint as the master: ☼ Comfort heating setpoint ☽ PreComfort heating setpoint ☾ Economy heating setpoint The setpoints cannot be set in the slave ventilation controllers. Any setpoint adjustments required must be made in the master ventilation controller.
• Same room operating mode • Individual setpoints	Slave internal setpoint	The slave ventilation controller operates with its own setpoints.

Application example 3

Room with underfloor heating and ventilation

Another application of the "Room control combination" is a room with underfloor heating and a ventilation system. Exchanging the relevant process values over the KNX bus enables a common control strategy to be applied, with the following aims:

- Optimum control, heating or cooling
- The same room operating mode for both controllers
  (time switch and holiday/special day program, manual override)
- Automatic changeover of ventilation control
  (Winter: Constant supply air temperature control, own setpoints)
  (Summer: Room/supply air cascade control)



Ventilation,
Master controller RMU

The ventilation settings for an RMU master controller programmed with plant type A03 (ADC001 MU1 HQ) are carried out under:

...> Commissioning > Communication > Room
➔ Geogr zone (Apart): **3**

...> Commissioning > Settings > Controller 1 > Cascade controller
➔ Control strategy: **Alternating**

Heating,
Slave controller, RMH

The heating settings for an RMH slave controller programmed with basic type 0-2 are carried out under:

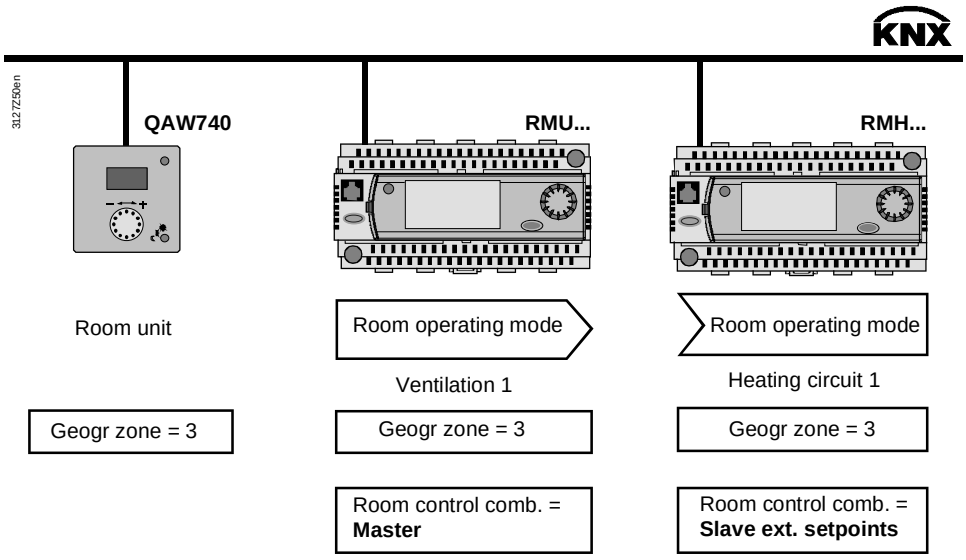
...> Commissioning > Communication > Room 1
➔ Geogr zone (apart): **3**
...> Commissioning > Extra configuration > Heating circuit 1 > Functions
➔ Room control combination: **Ext. setpoint** (slave, internal setpoint

...> Commissioning > Extra configuration > Heating circuit 1 > Optimizations/Influences
➔ Room temperature influence **0**

Note

If the same room is controlled by an RMU ventilation controller and an RMH heating controller, the RMU ventilation controller in this room control combination must be set to "Master".

Zone addressing



Heating setpoints

The heating setpoints

- Comfort heating setpoint
- Precomfort heating setpoint
- Economy heating setpoint

are transmitted by the ventilation controller to the heating controller over the KNX bus. The existing setpoints heating controller are overwritten.

Both controllers then operate with the same heating setpoint. If a heating controller setpoint needs to be adjusted, it must be changed in the ventilation controller (master).

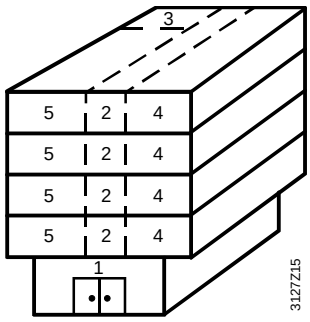
9.4 Applications with zones

The following assumes a commercial building with a ground floor and four upper floors. On the ground floor is a retail outlet with a showroom. Each of the upper floors has four offices, three laboratories and one IT room (server, printer, fax etc.) Access to the upper floors is via a staircase and good elevator. There are various alternatives for dividing this commercial building into operating zones.

Variant 1:

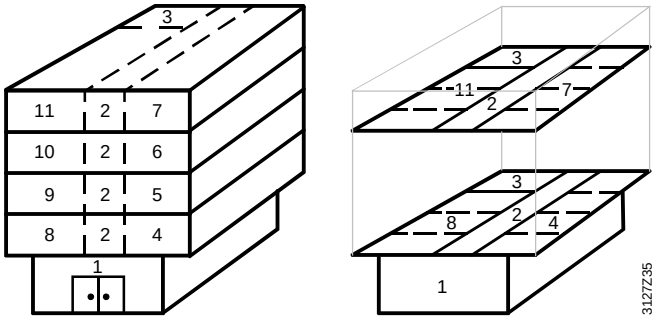
The commercial building is occupied by only one tenant. In this case the building can easily be divided into 5 room groups or "geographical zone (apartm)".

Ground floor		➔ Geographical zone (apartm)=**1** (room group 1)
Stairwell		➔ Geographical zone (apartm)=**2** (room group 2)
All IT rooms	Floors 1 - 4	➔ Geographical zone (apartm)=**3** (Room group 3)
All offices	Floors 1 - 4	➔ Geographical zone (apartm)=**4** (Room group 4)
All laboratories	Floors 1 - 4	➔ Geographical zone (apartm)=**5** (Room group 5)



Variant 2:

There are five tenants in the commercial building. Tenant 1 occupies the ground floor, and tenants 2 to 5 each occupy one of the four upper floors. All the tenants on the upper floors have their own requirements for the offices and laboratories. From a technical perspective, this requires the building to be divided into eleven "geographical zone (apartm)" or room groups.



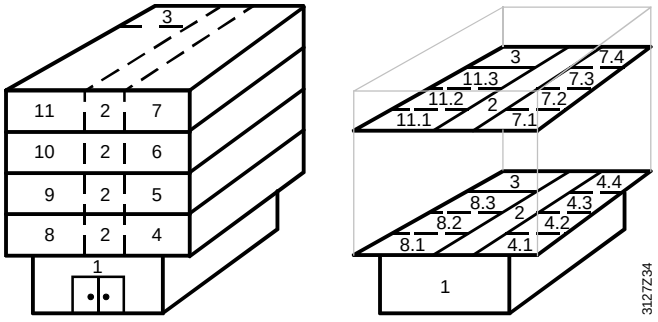
9.4.1 Additional zones in the RXB/RXL room controller

The RXB/RXL room controllers have not only the "Geographical zone (apartment)" zone category, but also the "Geographical zone (room)" and "Geographical zone (subzone)".

For applications with RXB and RXL room controllers, use only the "Geographical zone (apartment)" and "Geographical zone (room)" categories. For Variant 2 above, these two zone categories can then be used for zone addressing as follows:

Variant 2 RXB/RXL zoning

Ground floor		➔ Geographical zone (apartment)=**1**
Stairwell		➔ Geographical zone (apartment)=**2**
All IT rooms		➔ Geographical zone (apartment)=**3**
Office 1	1st floor	➔ Geographical zone (apartment).(room)=**4.1**
Office 2	1st floor	➔ Geographical zone (apartment).(room)=**4.2**
Office 3	1st floor	➔ Geographical zone (apartment).(room)=**4.3**
Office 4	1st floor	➔ Geographical zone (apartment).(room)=**4.4**
Office 1	2nd floor	➔ Geographical zone (apartment).(room)=**5.1**
...		
Office 4	4th floor	➔ Geographical zone (apartment).(room)=**7.4**
Laboratory 1	1st floor	➔ Geographical zone (apartment).(room)=**8.1**
Laboratory 2	1st floor	➔ Geographical zone (apartment).(room)=**8.2**
Laboratory 3	1st floor	➔ Geographical zone (apartment).(room)=**8.3**
Laboratory 1	2nd floor	➔ Geographical zone (apartment).(room)=**9.1**
...		
Laboratory 3	4th floor	➔ Geographical zone (apartment).(room)=**11.3**



Notes

Extending the address by the "geographical zone (room)" results in individual room control with the RXB/RXL room controllers. This allows for individual manual intervention such as the adjustment of the room setpoint in every room (in our example in every office and laboratory).

For additional division of the geographical zone (room), the RXB/RXL room controller offers the geographical zone (subzone). This subzone can be valuable in lighting installations, to subdivide a "Geographical zone (room)" for example into the two subzones "lighting along window" and "lighting along hallway" (e.g. EIB applications). For HVAC applications, the setting subzone =1 can be left unchanged.

The supplementary labels "(Apartment)", "(Room)" and "(Subzone)" are predefined by KNX. However, "Apartment" here does not denote an actual apartment.

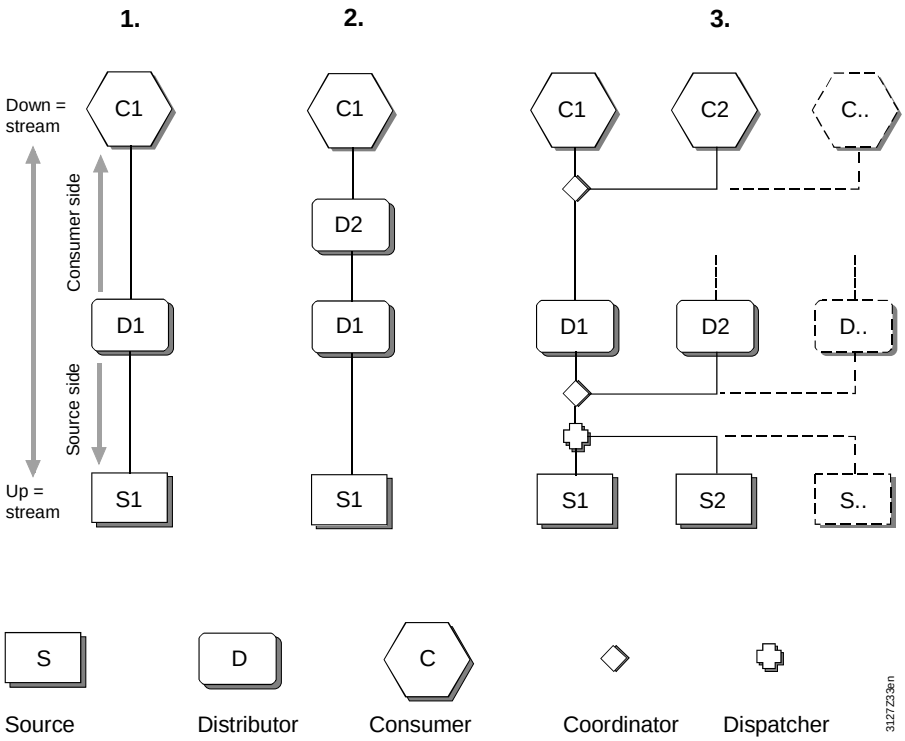
9.5 Supply chains

The applications in the Synco 700 type RMU/RMH controllers consist of HVAC functional units. These functional units are based on the supply chains in buildings.

The supply-chain structure

A "supply chain" consists of at least energy generator and an energy consumer, but often of an energy generator, an energy distributor and an energy consumer.

1. One energy generator with one distributor and one energy consumer.
2. One energy generator, two distributors in series and one energy consumer
3. Several energy generators, distributors and energy consumers in parallel



The "Coordinator" and "Dispatch Handler" are defined as logical elements in the supply chain. Their role is as follows:

- The Coordinator collates the demand signals from all the downstream links in the chain, and delivers the resulting demand signal to the link upstream. The Coordinator also reports the operational status of the upstream links to the downstream link.
- From resulting demand signals from the energy consumers, the Dispatch Handler determines which generators, and how many, need to be enabled.

Supply chain outputs and inputs

The above illustrations of supply chains show the following:

- Energy consumer has one output to the distribution component
- Energy generator has one input from the distribution component

Supply/demand

- **Energy consumer** transmits heating/cooling **demand** to the upstream distribution component
- **Energy generator** receives heating/cooling **demand** from the upstream distribution component

HVAC application architecture

For a better understanding of the distribution zones for heating and cooling, the following extract is reproduced from document CM110057 "HVAC application architecture".

Supply chains for a room

Different energy consumption needs such as *heat, refrigeration* and *outside air* can be defined for a room.

Heat

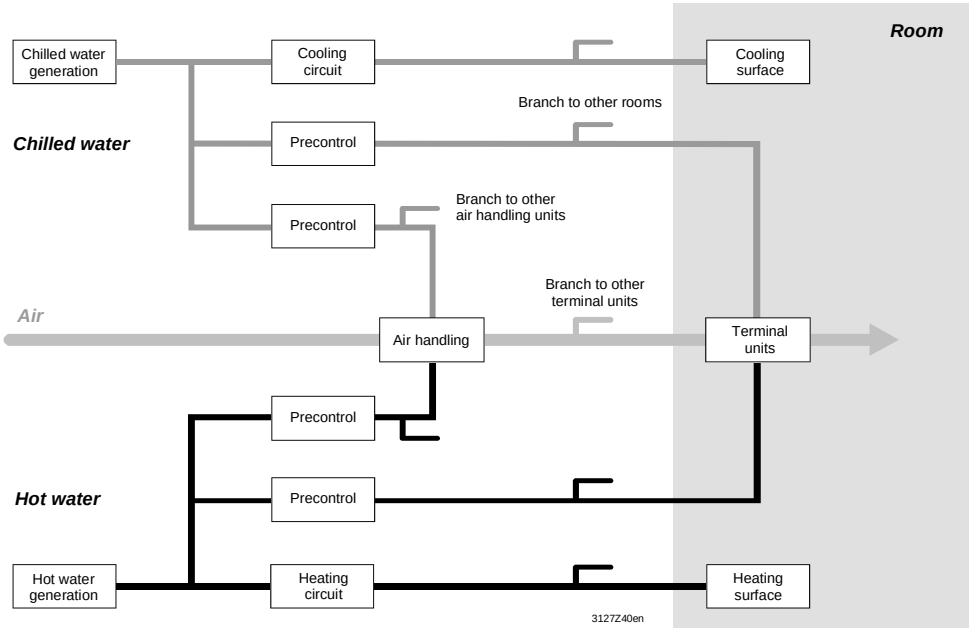
The *hot water* supply chain is available to meet the *heating* requirement. The medium *hot water* is generated in the hot water supply system and distributed via a heating circuit; demand-based *heat* is then supplied to the room via a heating surface. If the heat transfer medium is air, this involves primary and secondary air handling.

Refrigeration

The *refrigeration* requirement is met by the *chilled water* supply chain. The medium *chilled water* is generated in the chilled water supply system and distributed via a cooling circuit; *refrigeration* is then supplied to the room according to demand by means of a *cooling surface*. When the cooling-energy transfer medium is air, this involves primary and secondary air handling.

Outside air

The *outside air* is provided by the *air* supply chain. The medium is treated in the air handling plant, distributed via the ducting, adapted if necessary by an air retreatment system to the requirements in the room, and discharged into the room via air diffusers.



Plant

Essentially, a plant comprises partial plant, aggregates and components, but in principle, these can equally be expressed in terms of a supply chain with the following links: energy generator, distribution (primary controller, heating circuit) and energy consumer (radiator).

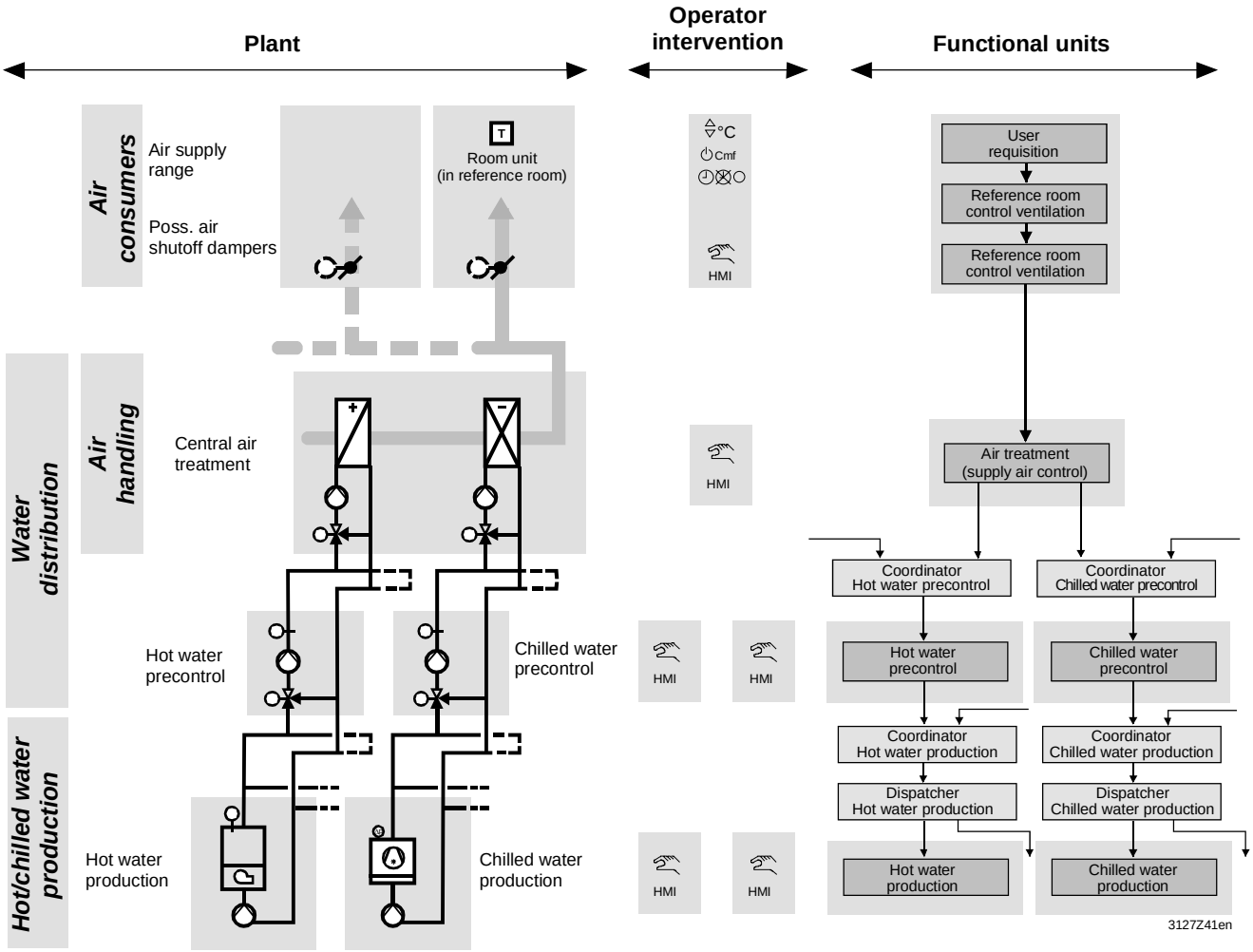
Operator intervention

For each link in the supply chain, the operator unit (HMI) can be used for commands which affect the plant (the process) via the relevant functional unit and the automation system.

Functional units

The functional units correspond to the software images (mapping) of the links in the chain and the items of plant. They contain all the control, monitoring and limit functions required for operation.

Example



9.5.1 Data exchange in LTE mode

Data exchange

The control chains and control circuits in an HVAC plant consist of data points. The data points or their process values are programmed in function blocks to create the technical functions in the HVAC process.

For the exchange of process values between the Synco devices within a zone, it is sufficient simply to allocate a common zone address to those devices.

LTE mode

In LTE-mode (LTE = Logical Tag Extended) the communication bindings between data points are created by means of logical tags. This is the equivalent of the zone addresses in Synco.

LTE mode does not require time-consuming engineering to create the communication bindings for the exchange of process values.

9.6 Updating the process values

Example outside air temperature

Process values such as the outside air temperature can be transmitted to other bus devices via distribution zones. Since the process values are rarely constant, transmitting every minimal change in value would result in heavy traffic on the bus.

COV = change of value

The Synco controller updates the process values (in our example the outside air temperature) when it changes by a fixed, predefined differential ("delta value"). In other words, the fluctuations in the outside air temperature are added together until the delta value is reached, and only then is the new value transmitted/updated. The term COV ("change of value") is applied to process values updated in this way.

Minimum repetition time

If a process value fluctuates widely and the delta value is reached before the "minimum repetition time" of 10 seconds has expired, there is a delay of 10 seconds before the process value is updated.

Heartbeat

With a constant outside air temperature, it may take a long time until the delta value is reached. For this reason, the outside air temperature is updated every 15 minutes. This is referred to as a "heartbeat".

Fault status message

However, if the outside air temperature is still not transmitted after the first 15 -minute delay, the controller waits for a further 15 minutes plus 1 minute (i.e. a total of 31 minutes since the last update) and then transmits a fault status message.

Depending on the application, the controller now continues to operate with the preset values, e.g. if the outside air temperature sensor is faulty, the flow temperature is controlled as as if the outside air temperature were 0 °C. Certain functions are also disabled, e.g. there is no summer/winter compensation.

Important notes

- Process values are not updated if the bus device is set to device address 255.
- Process values are not updated when the controller is in commissioning mode, i.e. if the "Commissioning" operating page is selected directly or as part of a sequence.

9.7 Lightning and overvoltage protection, EMC

9.7.1 Lightning protection

Bibliography

The notes on lightning and overvoltage protection are based on the "KNX Handbook", Volume 4, Part 4 "Installation Safety Requirements".

Lightning protection precautions

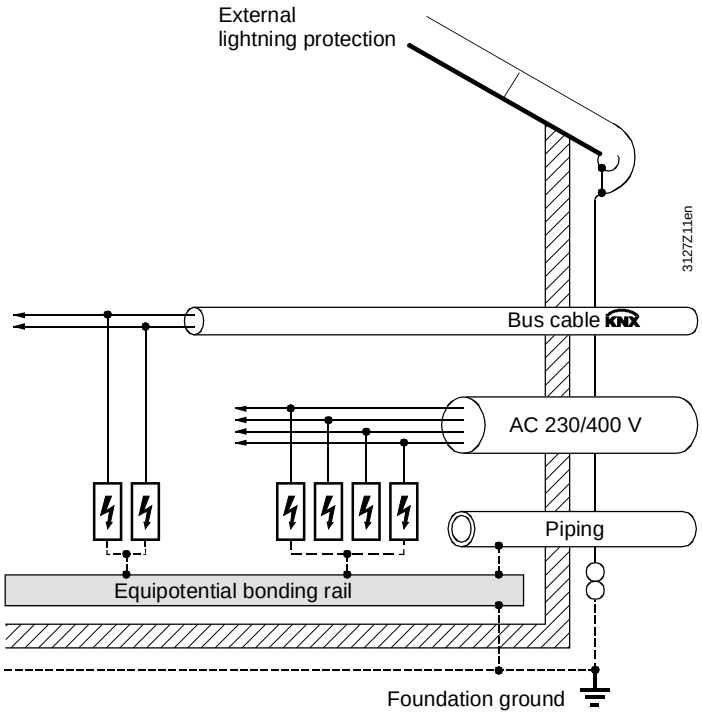
- The KNX bus must be included in the safety precautions for the mains network.
- Lighting protection systems must be engineered and installed by specialists who understand and comply with the relevant regulations and standards.

External lightning protection

External lighting protection consists of permanently active lightning conductors (an air-termination system, a down conduction system and an earth termination system).
External lightning protection is required for buildings where lightning strikes are common due to the location, type of building or its use, or where the consequences may be severe. Lightning protection is mandatory for public buildings and buildings with assembly rooms. The necessity of erecting a lighting protection system is determined by the building regulations of the country concerned.

Internal lightning protection

Internal lightning protection is based on consistent equipotential bonding for lightning protection, i.e. all metal components such as water, heating and gas pipes, metal walls etc. must be connected to the equipotential bonding rail.
Internal lightning protection is required in buildings with electronic devices susceptible to transient surges. This protection consists of precautions to counter the effect of the lightning current and its electric and magnetic fields on metal and electrical conductors and equipment.



Lightning equipotential bonding (primary protection)

Engineering of lightning protection arrangements

The current standard for "Protection for building services, Lightning protection systems and surge protection" is VDI 6004, Part 2, Issue July 2007.

If lightning protection is required in a building, the active cores (see diagram on previous page) must be connected with lightning arresters. This is also recommended in the following cases, for example, if:

- The building is connected to a low voltage overhead cable.
- The construction of the building includes metal parts which can be struck by lightning, e.g. metal chimneys or aerials
- There is another building with a lightning protection system in the vicinity

Note

In the design engineering phase, the selection of the lightning arrester must be coordinated with the overvoltage protection arrangements (note the information supplied by the manufacturers on the use of their products).

Lightning arresters for primary protection

Lightning arresters can discharge high-energy lightning current repeatedly without damage. They are installed in the AC 230/400 V mains network and in the KNX network.

230/400 V Mains network

Lightning arrester (Class B) for the AC 230/400 V mains network:

- Nominal leakage current of at least 10 kA (10/350 µs)
- Protection level < 4 kV

KNX network

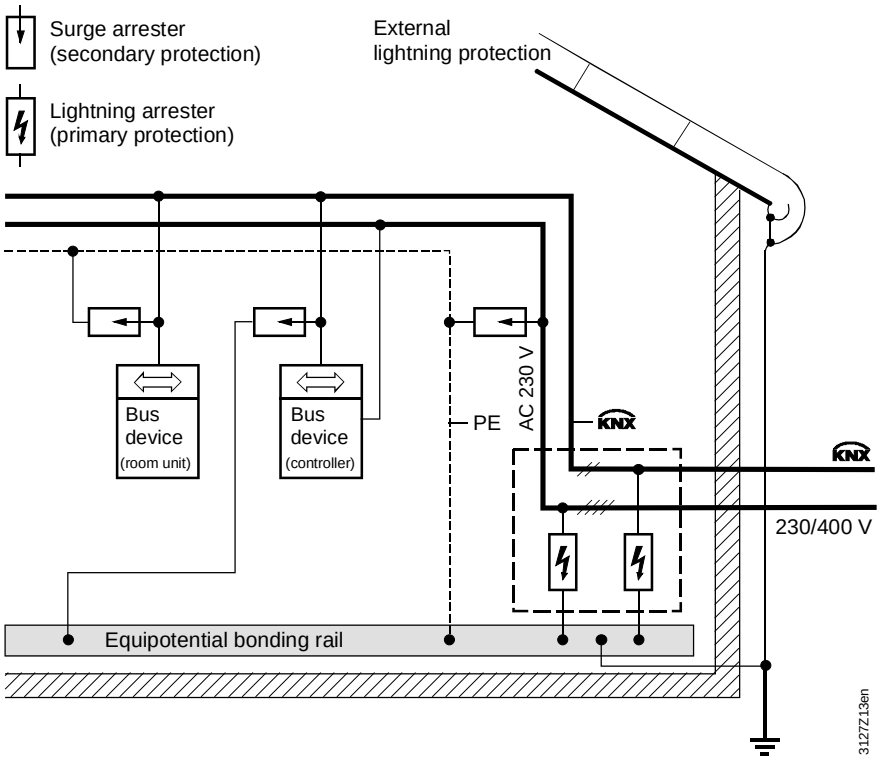
Lightning arrester for the KNX network

- Nominal leakage current of at least 1 kA (10/350 µs)
- Protection level < 4 kV

Routing cables between buildings

Alternative 1 with lightning arresters

When routing cables between buildings, lightning arresters must be installed where the bus cable enters the building. They must be connected to the nearest equipotential bonding point.

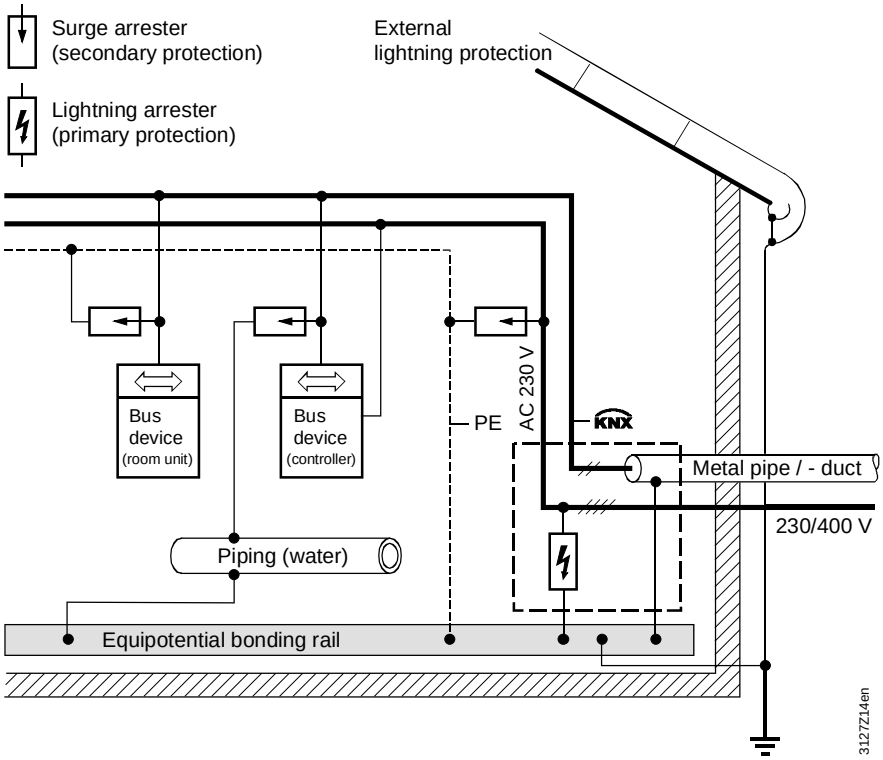


Routing cables between buildings

Alternative 2 with surge arresters

With Alternative 2, the bus cable is protected with surge arresters and routed in a metal conduit or duct which is part of the equipotential bonding system.

The minimum cross-section of the conduit or duct must be sufficient to allow a substantial part of the lightning current to pass across it (minimum cross-section: Cu 16 mm^2, Al 25 mm^2, Fe 50 mm^2).



Note

With Alternatives 1 and 2, a surge arrester must be installed as secondary on the bus device closest to the entry to the building. In relation to the bus cable length, the bus device should be installed some meters away from the lightning arrester, so that the surge arrester is not also partly responsible for primary protection.

9.7.2 Overvoltage protection

Overvoltage protection, secondary protection

Overvoltage protection acts as secondary protection. Surge protectors are installed in the AC 230/400 V mains network and in the KNX network.

AC 230/400 V mains network

Surge arrester (Class B) for the AC 230/400 V mains network:

- Nominal discharge capacity of at least 5 kA (8/20 µs)
- Protection level < 2 kV
- If varistors are used, they must be thermally monitored, and provided with an insulating arrangement

KNX network

Surge arresters for the KNX network

- Nominal discharge capacity of at least 5 kA (8/20 µs)
- Protection level < 2 kV
- The surge arrester must be matched to the KNX (TP1) levels.

Effect of surge protectors

The surge protector protects the bus devices from overvoltages (transient surge voltages) which can be picked up by the bus cables. If the protective effect is damaged (e.g. by exceeding the permitted number of surge arresters), this results in a bus fault (bus low resistance). Note that no message is generated by this bus fault. Faulty surge arresters must be replaced immediately.

Note

The use of surge arresters can improve the interference immunity of a KNX (TP1) network regardless of any precautions for overvoltage protection in conjunction with lightning protection.

Surge arresters in bus terminal technology

Surge arresters normally have the same dimensions as bus connection terminals. However, the surge arresters can be distinguished by their color (blue) and the additional earth conductor. Where surge arresters are used instead of bus terminals, they must be connected to the nearest grounding point (e.g. protective conductor).

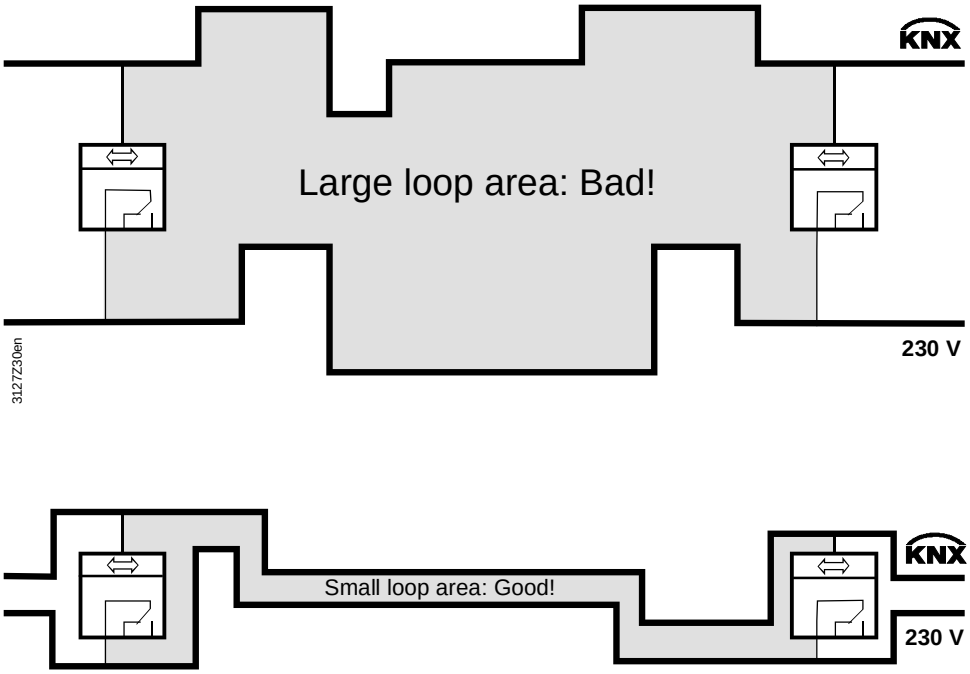
Surge arresters (manufacturer: Dehn) are available from Siemens as off-the-shelf components in bus terminal format.

- Overvoltage protection Order no. 5WG1 190-8AD01

Ensure in the design engineering phase, that surge arresters can be installed, and that there is a connection point for them.

9.7.3 Overvoltages in loops

Loops are frequently the cause of electromagnetic interference (EMI) and surges resulting from lightning strikes. Loops occur when two independent networks (e.g. the KNX network and the AC 230 V mains network) are connected to one bus device.



Avoiding loops

Lightning can generate powerful surge voltages in loops, which cause short circuits in devices and damage electronic components irreparably.

It is important right in the earliest project design phase to take care to avoid loops where possible, or to keep the extent of any loops (the "loop area") as small as possible. The formation of loops must be considered in relation to the entire installation and all conductive components must be taken into account, because the significant aspect of a loop is its overall area.

Note also:

- Bus and mains voltage conductors (power cables) must be routed as close together as possible This also applies to earthed components, if they are in contact with the bus devices during normal operation.
- The distance between conductor ends, earthed components and other conductor ends should be as great as possible.
- Maintain an adequate distance from the lighting protection system (e.g. from arresters).

9.7.4 EMC protection management

Buildings with computer centers require EMC protection management in addition to lightning and overvoltage protection.

If a KNX network is installed in a building of this type, it must be part of the EMC protection management. The EMC protection arrangements must be agreed in detail with the person responsible for EMC protection management.

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