HVAC control with Synco – simple and energy-efficient

Range overview

Answers for infrastructure.

SIEMENS

Synco – enhanced comfort and energy efficiency

Buildings place different requirements on HVAC control systems depending on building size, life cycle, operating times and comfort needs.

Synco™ can be matched to all these requirements: The standard controllers offer maximum energy efficiency plus reliability and represent a product range of modular design. This means that Synco enables you to plan a versatile, cost- and energy-efficient HVAC control system and to straightforwardly install and commission it – with no need for programming.

In addition, functions like the energy indicator or the HomeControl app support your customers in monitoring and controlling their HVAC plant, facilitating energy-efficient operation.

Contents

The Synco product range

The requirements placed on comfort and functions in a building are as specific as the needs of the people using the building.

From straightforward temperature control to complex HVAC system master control, from individual rooms to residential buildings, Synco always offers the right products because the system grows along with the needs and enhances energy efficiency.

Temperature controller RLM..

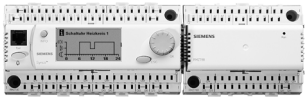
Synco 100 – compact controllers for temperature control

Synco 100 is the favorably priced range of temperature and differential temperature controllers for small systems.
The products are designed for direct mounting on plant (no control panel required) and the different functions are selected via DIP switches (no tools needed), which means that installation and commissioning are just as straightforward as operation.

Universal controller RLU..

Synco 200 – universal controllers for all types of standard applications

Synco 200 is the range of universal controllers to control temperature, humidity and pressure in ventilation, air conditioning and chilled water plants. More than 140 programmed applications are available, making engineering very efficient.



Controller RM.. with operator unit and extension module

Synco 700 – HVAC controller range of modular design

Synco 700 is the modular range of HVAC controllers for energy-efficient operation of medium-size buildings.
Communication via KNX ensures remote control and remote monitoring of plant and of all devices installed in KNX networks.

Room controller RX..

Room controllers RXB/RXL – enhanced individual room comfort

RXB/RXL room controllers offer high control accuracy and are designed for use with fan coil units, chilled ceilings and radiators in individual rooms.
In connection with Synco 700 and KNX, the production of energy is optimally matched to room occupancy schedules. Thanks to their excellent control accuracy, the room controllers are eu.bac-certified.

Room thermostats for semi-flush mounting (left) or wall mounting (right)

Room thermostats RDF/RDU/RDG – communicating with Synco via KNX

RDR/RDU/RDG room thermostats are very versatile and suited for use with fan coil units, chilled ceilings, heated ceilings, VAV systems and heat pumps. They are available in versions for semi-flush mounting on recessed conduit boxes or wall mounting. The products offer optimum energy saving functions when integrated in Synco systems via KNX.

Central apartment unit QAX913

Synco living – for enhanced comfort in living spaces

Synco living was developed as a Home Automation System to ensure high levels of room comfort in private living spaces.
The system combines all functions required for heating, cooling, ventilation, lighting, shading, safety and security, as well as consumption data acquisition. Communication is by wire (KNX bus) or wireless (KNX RF).

Web server OZW772..

Web server – remote management of Synco via the web and smartphone

Web server for remote control and monitoring of HVAC plants in office and administration buildings, sports halls, hotels, smaller industrial buildings, single-family houses and blocks of flats (Synco living).
Control is via web browser and smartphone app. Visualization of plant through web browser. Web services for external applications via the web API. Transmission of fault status messages to maximum 4 e-mail recipients.

Synco for every type of application

Comprehensive product range

Synco comprises an extensive range of products for basic or complex applications in medium-size residential or nonresidential buildings.

Controls without communication → for basic plants	
Synco 100	**Synco 200**
Compact controllers (with built-in sensor) for temperature or differential temperature control	Universal controllers for all standard applications (temperature, humidity, pressure)
For basis applications: - Solar plants - Swimming pool heating systems with solar collectors - Heat exchanger control with closed circuit - Minimum or maximum limitation of controlled temperature - Small heating, ventilation or air conditioning plants	For ventilation, air conditioning or chilled water plants: - Temperature control: Air heaters (water, electric), air coolers (water, dx coolers), mixed air dampers/heat recovery systems - Humidity control: Air dehumidifiers/humidifiers - Differential temperature control - Differential pressure control - Indoor air quality control

Controls with KNX communication → for plants in medium-size buildings				
Synco 700	**Room controllers RX..**	**Room thermostats RD..**	**Synco living**	**Synco operating**
HVAC controls range of modular design	Comfort thanks to individual room climate	Energy savings thanks to integration in KNX	For enhanced comfort in living spaces	Efficient operation of plant, straightforward remote control
Control of: - Heating - Ventilation - Air conditioning - Refrigeration - Distribution of heat and cooling energy - Production of heat and cooling energy	Individual room control with: - Fan coil units - Chilled ceilings - Radiators	Individual room control with: - Fan coil units - Single-duct VAV - Chilled ceilings - Heated ceilings - Heat pumps	Home Automation System for: - Heating - Ventilation - Cooling - DHW - Lighting - Blinds - Safety and security - Consumption data acquisition	Operation and monitoring of plant: - Web server for remote control and monitoring via the web (Ethernet) and smartphone app - Alarming via SMS, e-mail, pager, or fax

Synco for energy efficiency

Reliable controls ensure high levels of energy efficiency without loss of room comfort. Synco devices as individual controls – or integrated into building and room automation – are designed to meet this kind of demanding requirements.

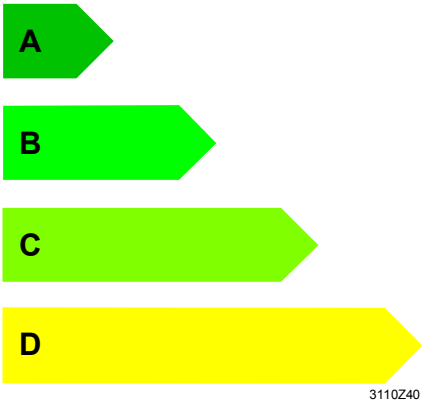
Using proven energy saving functions, Synco controls support energy-efficient operation of plant regardless of weather and building-related conditions, such as building usage and room occupancy schedules.

This means energy savings are achieved by shutting down plant when the building is not used, adjusting room temperatures to occupancy schedules, controlled via time programs. Manual control of the Synco system is easy when there is a need to override a predefined profile.

Energy efficiency classes as per EN 15232

For Building Automation and Control Systems (BACS) and Technical Building Management (TBM), the European standard EN 15232 specifies energy efficiency classes A, B, C, D.

Class A: Highly energy-efficient BACS and TBM	A
Class B: Advanced BACS and some specific TBM functions	B
Class C: Standard BACS	C
Class D: Non-energy-efficient BACS. Buildings operating with these types of system should be upgraded. Such BACS are not permitted for use in new buildings.	D



According to energy efficiency class A, energy savings of up to 30% can be achieved in relation to the standard, that is, in relation to energy efficiency class C. Synco products and applications create the prerequisites to attain energy efficiency class A.

Synco products with eu.bac certification

Products bearing the eu.bac certification stand for approved quality, control accuracy and energy efficiency conforming to European industry standards and international test standards. The tests are made by independent, eu.bac-approved test houses on behalf of the European Building Automation and Controls Association www.eubac.org

A high level of control accuracy optimizes the room climate. In comparison with noncertified products and based on a CA value of 0.1…0.2 K (control accuracy 0.1…0.2 K), eu.bac-certified controllers achieve energy savings of up to 14% in relation to the predefined setpoint.

Synco RXB/RXL room controllers are eu.bac-certified, owing to their high control accuracy and excellent energy efficiency.

Synco 100

Introduction

The Synco 100 temperature controllers are compact electronic devices for direct mounting on plant. All that is required is power supply and connection of their inputs and outputs.

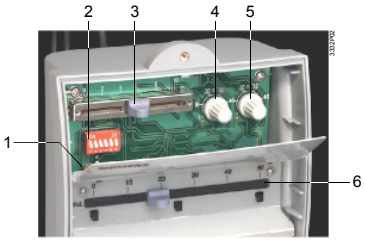
Overview

Device	Voltage	Product no.	Data Sheet
Immersion differential temperature controller (2-pos.) To control temperature differentials between 2 plant elements (e.g. in solar plants). RLE127. QAZ incl. QAP21.2	**AC 230 V**	**RLE127**	**N3337**
Temperature controller with positioning signal (3-pos.) For heating plants or DHW heating with minimum/maximum limitation	**AC 230 V**	**RLE132**	**N3334**
Temperature controller with 2 outputs DC 0…10 V For heating or cooling plants, weather-compensated heating and/or cooling, minimum and maximum limitation	**AC 24 V**	**RLE162**	**N3333**
Air duct temperature controller with 2 outputs DC 0…10 V For supply/extract air control in ventilation plants. Control of heating/cooling valves, air dampers and current valves	**AC 24 V**	**RLM162**	**N3332**
Room temperature controller with 2 outputs DC 0…10 V For control and limitation of room temperature in small plants with a reference room	**AC 24 V**	**RLA162**	**N3331**
Room temperature controller with 2 outputs DC 0…10 V For indirect control of room temperature (e.g. via the supply air temperature and fan control)	**AC 24 V**	**RLA162.1**	**N3336**
HIT → HVAC Integrated Tool (see page 87) To select and engineer plants operating with Synco 100			www.siemens.com/HIT

Functions
DIP switch block

With all types of Synco 100 temperature controllers, the functions are selected via 6 DIP switches (example below shows the RLM162 controller).

Function	1	2	3	4	5	6	Effect
Operating mode	■	■					Heating and cooling in sequence
	■	□					2-stage heating
	□	■					1-stage cooling
	□	□					1-stage heating
Integral action time			■	■			P-control action
			■	□			PI, integral action time = 600 s (SLOW)
			□	■			PI, integral action time = 120 s (FAST)
			□	□			PI, integral action time = 180 s (MEDIUM)
Test mode					■		Test mode
					□		Normal operation
Running time of actuator						■	HIGH
						□	LOW



1 LED for test mode (flashing) and normal operation (lit)
2 DIP switch block
3 Setting slider for setpoint increase and decrease
4 Setting potentiometer for P-band or (depending on type) switching point relay
5 Setting potentiometer for P-band Y1
6 Setting slider for setpoint adjustment

Immersion temperature controllers

Differential temperature controllers RLE127 and RLE127.QAZ

RLE127 differential temperature controller with immersion sensor (immersion length 150 mm). RLE127.QAZ complete with collector sensor QAP21.1.

Calculation of the temperature differential also requires an LG-Ni1000 temperature sensor. 2 relay outputs to control thermal actuators or circulating and charging pumps (for switching AC 24…230 V, max. 2 A).

- Control of temperature differential between heat source and heat consumer
- Demand-dependent changeover to a second heat source
- Maintenance of a minimum charging temperature
- Consideration can be given to an absolute temperature
- Frost protection, remote setpoint adjustment

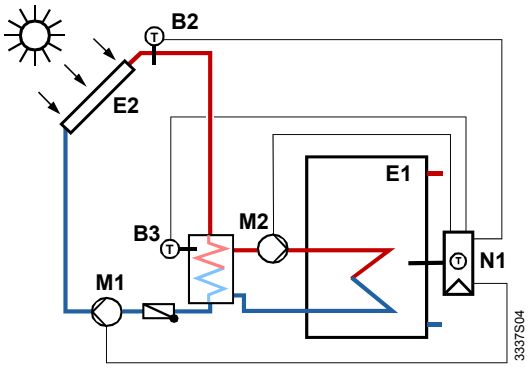
Use

- Solar plants with storage tanks
- Swimming pool heating with solar collectors
- Heat storage plants with 2 storage tanks
- Heat generation plants with 1 boiler

Application example

Solar plant with heat exchanger and storage tank

Differential temperature control of collector and storage tank. Temperature sensor B3 acquires the temperature in the heat exchanger. The storage tank is charged only when the heat exchanger temperature at B3 reaches the setpoint (controller N1).



B2	Collector sensor QAP21.2
B3	Heat exchanger sensor
E1	Storage tank
E2	Collector
M1	Charging pump 1 (solar circuit)
M2	Charging pump 2 (storage tank circuit)
N1	Differential temperature controller RLE127.QAZ

Immersion temperature controller RLE132

Immersion temperature controller (immersion length 150 mm). Modulating control via actuating device on the water side (seat or slipper valve). Positioning signal (3-pos.) acting on electromotoric actuator (for switching AC 24…230 V, max. 2 A).

- Used as a controller or minimum/maximum limiter
- Control in Economy mode (setpoint lowered)
- Control in Boost mode (setpoint raised)
- Minimum or maximum limitation of flow or return temperature
- Setpoint changeover via external contact
- Load-dependent switching contact (e.g. pump release)
- Outside temperature compensation, remote setpoint adjustment
- Frost protection

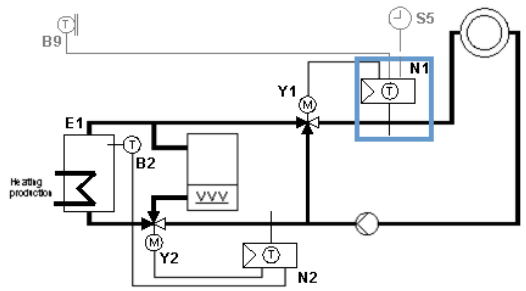
Use

- Heating zones in heating plants
- Heating sections of ventilation or air conditioning plants
- DHW control
- Flow temperature control
- Calorifier or heat exchanger control

In HIT

Application HA0002 LE1 HQ in HIT: RLE132 immersion temperature controller used together with RLE127 differential temperature controller.

HA0002 LE1 HQ - Heating Plant, Heat Exchanger / Boiler



Replace application
Remove application

Opt.	Reference	Product no.	Description	Doc
	N1	**RLE132**	**Immersion temperature controller, AC 230 V, 3-position output**	
	N2	RLE127	Differential temperature controller, AC 230 V, 2-position output	
	B2	Define ...	Immersion temperature sensor LG-Ni1000 with protection pocket	
	Y1	Define ...	2- or 3-port valve 3-position valve actuator, AC 230 V	
	Y2	Define ...	2- or 3-port valve 3-position valve actuator, AC 230 V	
☑	B9	QAC22	Outside sensor LG-Ni1000	
☑	S5	SEH62.1	Digital time switch, 1-channel, with 7-day program	

Immersion temperature controller RLE162

Immersion temperature controller (immersion length 150 mm). Modulating control via actuating device on the water side. Analog outputs Y1 and Y2 for heating and/or cooling (DC 0…10 V).

- 1- or 2-stage heating
- 1-stage cooling
- 1-stage heating and 1-stage cooling
- Minimum or maximum limitation of controlled temperature
- Load-dependent switching contact (e.g. pump release)
- Outside temperature compensation
- Remote setpoint adjustment, setpoint readjustment
- Setpoint changeover via external contact

Use

- Small ventilation and air conditioning plants
- Small heating plants
- DHW heating
- Water side control of HVAC plants
- Heat exchanger control with closed circuit
- Calorifier control
- Control of cooling water temperature

Air duct temperature controller RLM162

Air duct temperature controller with flexible probe (probe length 400 mm). Modulating control via actuating device on the water or air side. Analog outputs Y1 and Y2 for heating and/or cooling (DC 0…10 V).

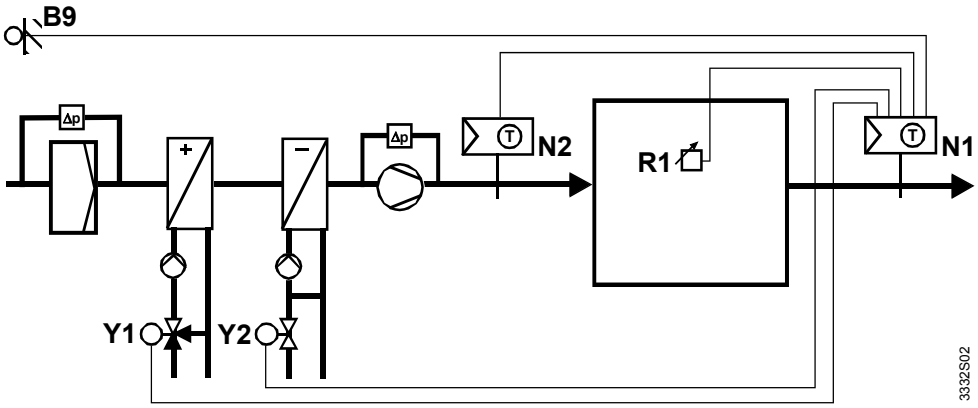
- 1- or 2-stage heating
- 1-stage cooling
- 1-stage heating and 1-stage cooling
- Minimum or maximum limitation of controlled temperature
- Load-dependent switching contact (e.g. pump release)
- Outside temperature compensation
- Remote setpoint adjustment, setpoint readjustment
- Heating/cooling changeover via external contact

Use

- Small ventilation and air conditioning plants
- Small nonresidential buildings with own air handling
- Large nonresidential buildings with decentral air handling
- Apartments or houses with reference room
- Individual rooms such as conference or training rooms

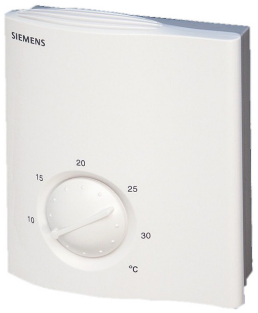
Application example

Extract air temperature control by controlling the heating and cooling valve in sequence. Outside temperature compensation, remote setpoint adjustment, limitation of supply air temperature.



B9 Outside sensor QAC22
N1 Extract air temperature controller RLM162 (as a controller)
N2 Supply air temperature controller RLM162 (as a limiter)
R1 Remote setpoint adjuster BSG21.1
Y1 Heating valve
Y2 Cooling valve

Room temperature controllers



Room temperature controller RLA162

Modulating control of room temperature via actuating device on the water or air side. Analog outputs Y1 and Y2 for heating and/or cooling (DC 0…10 V).

- 1- or 2-stage heating
- 1-stage cooling
- 1-stage heating and 1-stage cooling
- Minimum limitation of supply air temperature
- Outside temperature compensation (passive outside sensor QAC22 required)
- Setpoint changeover via external contact

Use

- Small ventilation and air conditioning plants with own air handling
- Small heating plants
- Heating sections of larger ventilation or air conditioning plants
- Ventilation zones of ventilation or air conditioning plants with central air handling

Room temperature controller RLA162.1

Controller with operating mode selector (Normal, Economy, Standby). Modulating control via actuating devices on the water or air side. Analog outputs Y1 and Y2 for heating and/or cooling (DC 0…10 V).

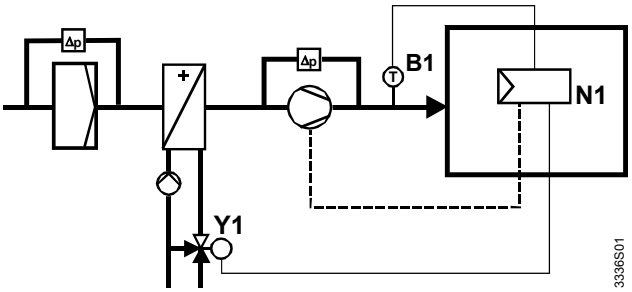
- 1- or 2-stage heating
- 1-stage cooling
- 1-stage heating and 1-stage cooling
- Selection of operating mode: Normal, Economy (energy-saving mode), Standby
- Setpoint changeover via external contact
- Outside temperature compensation (passive outside sensor QAC22 required)
- Indirect control of room temperature via supply or extract air temperature (extra temperature sensor LG-Ni1000 required)

Use

- Small ventilation and air conditioning plants with own air handling
- Small heating plants
- Heating sections of large ventilation or air conditioning plants
- Ventilation zones of ventilation or air conditioning plants with central air handling
- Houses or apartments with reference room
- Individual rooms (e.g. conference rooms, training rooms)

Application example with RLA162.1

Room-supply air temperature control through control of the heating valve, with manual control of the supply air fan via the operating mode selector.



B1 Air duct temperature sensor QAM22
N1 Room temperature controller RLA162.1
Y1 Heating valve

Synco 200

Introduction

The Synco 200 range comprises 5 universal controllers. They offer more than 140 programmed and stored applications.

The universal controllers operate autonomously and do not communicate with other Synco devices.

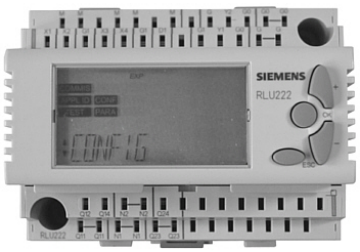
Overview

Device	Product no.	Data Sheet
Universal controllers RLU..		
1 control loop, 4 UI, 1 DI, 1 RNO, 1 RCH	**RLU202**	**N3101**
1 control loop, 4 UI, 1 DI, 2 AO	**RLU220**	↓
2 control loops, 4 UI, 1 DI, 2 AO, 1 RNO, 1 RCH	**RLU222**	↓
2 control loops, 5 UI, 2 DI, 3 AO, 1 RNO, 1 RCH	**RLU232**	↓
2 control loops, 5 UI, 2 DI, 3 AO, 4 RNO, 2 RCH	**RLU236**	↓
Signal converter UI: Universal inputs, DI: Digital inputs, AO: Analog outputs RNO: Relay with NO contact, RCH: Relay with changeover contact	**SEZ220**	**N5146**
Mounting frame Dimensions: 143 x 87 mm, for RLU202, RLU220, RLU222, and SEZ220 Dimensions: 199 x 87 mm, for RLU232 and RLU236	**ARG62.201**	**N3101**
HIT → HVAC Integrated Tool (see page 87) To select and engineer plants operating with Synco 200	www.siemens.com/HIT	

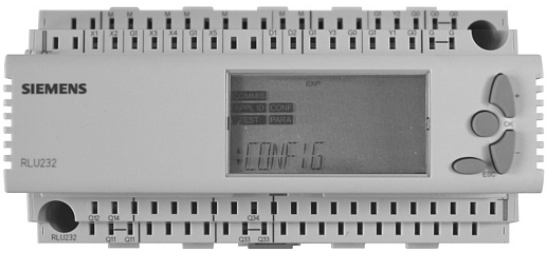
Universal controllers RLU..

Brief description

RLU.. universal controllers are used to control temperature, humidity, pressure and other HVAC-specific functions in ventilation, air conditioning and chilled water plants.



RLU202, RLU220, RLU222



RLU232, RLU236

Mechanical design

Every RLU.. universal controller consists of terminal base and control section. The control section with printed circuit board is accommodated in a plastic housing. The housing front carries the display with the operating elements. The control section plugs into the terminal base.

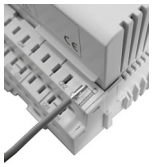
Connection terminals

The terminal base has 2 rows of connection terminals, one at the top and one at the bottom, each with 2 levels. Terminal assignment depends on the type of controller. The terminal base can be prewired.

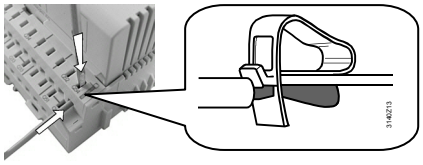
The connection terminals at the top are the low-voltage side for passive/active sensors, active signal sources, status contacts and modulating actuators.

The connection terminals at the bottom are the mains voltage side for the connection of switching aggregates, such as pumps and fans.

Spring cage terminals



1 Strip the wire over a length of 7…8 mm

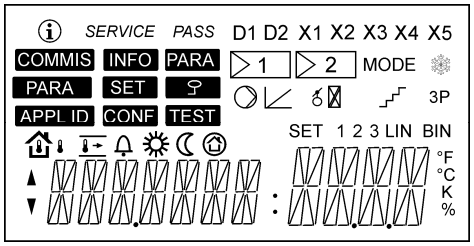


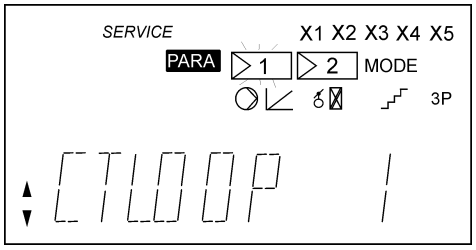
2 Push on the spring cage terminal with a screwdriver and, at the same time, insert the wire

Installation

The terminal base is fitted to a mounting rail conforming to EN 60715-TH 35-7.5 or is screwed to a flat surface.

Display





Display symbols

Symbol	Meaning
Info pages/setting pages	
ⓘ	Info pages
Access levels	
No symb.	User level
SERVICE	Service level
PASS	Password level
🔒	Lock access
Menus	
COMMIS	Commissioning
APPL ID	Basic configuration
INFO	Inputs, outputs
CONF	Extra configuration
PARA	Parameter
TEST	Wiring test
SET	Setpoints
Measuring variables, operating modes	
	Outside temperature
	Room temperature
	Supply air temperature
	Fault
	Room operating mode Comfort
	Room operating mode Economy
	Protection

Symbol	Meaning
Function block navigation	
D1, D2	Digital inputs D1 and D2
X1…X5	Analog inputs X1…X5
1	Controllers 1 and 2
MODE	Operating mode
	Frost protection
	Pump
	Analog output
	Mixed air damper/heat recovery
	Step switch
3P	3-position output
SET	Adjustable value
Function block instances	
1	Instance 1
2	Instance 2
3	Instance 3
LIN	Linear step switch
BIN	Binary step switch
Units	
°F	Degrees Fahrenheit
°C	Degrees Celsius
K	Kelvin
%	Percent

Functions and characteristics

Inputs and outputs

Controller RLU..	Universal inputs	Digital inputs	Analog outputs	Relay output changeover contact	Relay output NO contact
202	4	1	---	1	1
220	4	1	2	---	---
222	4	1	2	1	1
232	5	2	3	1	1
236	5	2	3	2	4

Universal inputs
Configurable for passive or active analog signals:
LG-Ni1000, 2 x LG-Ni1000 (averaging), Pt1000, T1, DC 0...10 V.

Digital inputs
For potential free contacts, contact sampling at DC 15 V/5 mA.

Analog outputs
Positioning signal DC 0...10 V/1 mA.

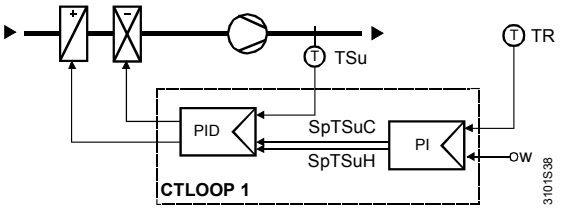
Relay outputs
Relay contacts for switching AC 19...265 V, 5 mA...4 A.

Closed loop control functions

Universal controllers with P-, PI or PID control action can also be used as differential controllers.

Control variables
Temperature, relative or absolute humidity, pressure/differential pressure, volumetric air flow, indoor air quality and enthalpy.

Cascade controller
Controller can be configured as a room-supply air temperature cascade controller with limitation of the supply air temperature.



TR	Main control variable, room temperature
TSu	Auxiliary control variable, supply air temperature
SpTSuH	Setpoint heating
SpTSuH	Setpoint cooling

Room controller with PI, supply air controller with PID. The result is PI+PID room-supply air temperature cascade control with limitation of the supply air temperature

Sequence controllers
Controller types RLU202, …220, …222, …232, and …236 can be used as sequence controllers for 2 heating (reverse acting) or 2 cooling sequences (direct acting). RLU222, RLU232 and RLU236 have a second sequence controller with 1 heating/cooling sequence.

Individual sequences can be disabled, which applies to each controller sequence.

Each sequence has 2 outputs: Output SEQx Y (modulating) is used for the load and output SEQx P for the pump (RLU202 without modulating output, RLU220 without pump). 2 sequences can act on a modulating output (maximum selection).

Min / max limitation
Sequence limitation
Minimum/maximum limitation with PI control action per sequence controller, either as absolute limitation (e.g. for the supply air temperature or supply air humidity), or as relative temperature limitation (e.g. maximum limitation of room-supply air temperature differential).

The limitation acts on all sequences. Minimum limitation can be set to a lower setpoint while cooling is on (example: cooling with dx cooler).

Limitation of sequence with PI control action per controller. Min / max limitation can be configured. The limitation acts on a single sequence (e.g. heat recovery anti-icing protection or maximum limitation of air heating coil's return temperature).

Changeover of control strategy

Digital input (heating limit switch of a heating controller) for changeover of control strategy (room-supply air cascade) is configurable.

Mixed air temperature controller

This controller controls the mixed air temperature via the air dampers.

Setpoints

Sequence controller

Individually adjustable heating and cooling setpoints (or maximum and minimum setpoints) for Comfort and Economy mode.

Predefined setpoint via the absolute remote setpoint adjuster (active or passive).

Setpoint compensation as a function of some other measuring variable and with adjustable start and end points.

Room temperature

Preselection with setpoint adjuster, absolute in °C (active and passive), or relative in K (passive only), or setpoint predefined via the room unit. Room temperature setpoint with summer and/or winter compensation

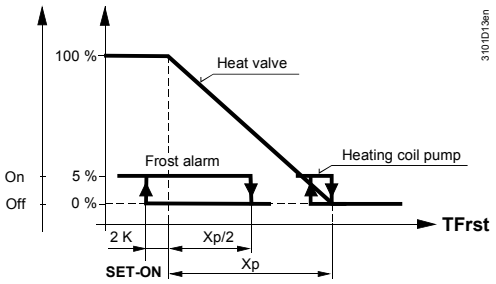
Operating mode

The operating mode is predefined via digital input D1 or D2 (e.g. by external time switch or manual switch). The current operating mode is displayed (Comfort ☼, Economy ☾, Protection ⏻).

Open loop control functions

Frost protection

2-phase frost protection function (modulating/2-position frost protection) or frost protection thermostat. Heating sequences at 100% output, fault relay for deactivating the fans (RLU220 only display).



Frost protection function also remains active when plant is off

Pump control

Control of pumps: Permanently on at low outside temperatures, on after load sequence controller (not RLU220). Periodic activation of pump (pump kick).

External load signal

Maximum selection is possible in connection with a maximum of 2 RLU-internal load signals and the external load signal. Example: The external load signal from an external dehumidification controller (acting on the chilled water cooling coil) is combined with the RLU-internal temperature controller. The external load signal is also used as a control signal to control multistage aggregates.

Positioning signal (DC 0...10 V)

Minimum and maximum limitation of positioning signal and positioning signal invertible (not possible with RLU202). Minimum limitation at low outside temperatures. Startup function at low outside temperatures.

Control of mixed air dampers or of the heat recovery system via maximum economy changeover (not possible with RLU202).

Positioning signal (3-position)

Control of an actuator via positioning signal (3-pos.) (RLU202 and RLU222). External load signal (controller only used as an analog/3-position converter).

Conversion passive to active signal

Conversion of a passive measured value signal to an active signal for further use by other controllers.

Step switches

Control of a **variable multistage** aggregate with step switch STEP V1, V2. Maximum 6 stages, 1 modulating output. Switching on/off points of each stage can be individually adjusted. Adjustable delay times. External load signal configurable (controller used as a step switch only). Modulating output with minimum and maximum position. Output signal invertible (not possible with RLU220).

Control of a **linear multistage** aggregate by step switch STEPLIN. Maximum 6 stages, 1 modulating output. Switching on/off points ready assigned to the loads. Adjustable delay times and priority changeover. External load signal configurable (controller used as a step switch only). Modulating output with minimum and maximum position. Output signal invertible (only with RLU232 and RLU236).

Control of a **binary multistage** aggregate by step switch STEPBIN. Maximum 4 relays for switching 15 loads, 1 modulating output. Fixed switching on/off points with binary logic. Adjustable delay times. External load signal configurable (controller used as a step switch only). Modulating output with minimum and maximum position. Output signal invertable (only with RLU232 and RLU236).

Engineering

When engineering the plant, the only decision to be made is whether the controller is for use in a ventilation plant or as a universal controller for a temperature, humidity or pressure control loop.

For efficient engineering of plants operating with Synco 200, Siemens' HIT is available www.siemens.com/HIT (see page 87).

Commissioning

Using the operating buttons or the OCI700.1 service tool (all RLU.. controllers have a connection facility for the tool), commissioning is effected as follows:

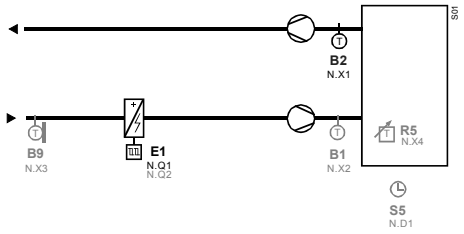
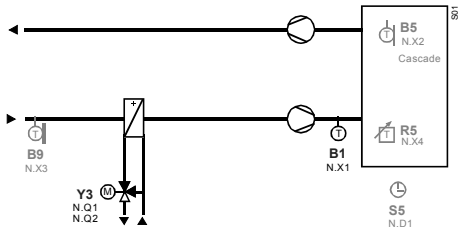
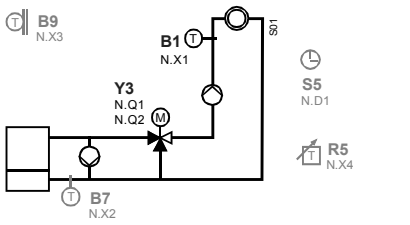
- Programmed application: Use menu APPL ID to enter the number of the programmed application (e.g. A01). This activates automatically the application with all the required inputs and outputs, functions and parameters; all parameters not required will be deactivated
- Modifying the programmed application: Configure nonassigned inputs and outputs
- Free configuration: Use menu APPL ID to enter basic type A or B according to plant-specific requirements. This enables the empty application with the respective basic functions

Applications and basic types

	RLU202	RLU220	RLU222	RLU232	RLU236
Programmed applications	18	28	48	22	32
Basic type A, ventilation plants (A = air)	1	1	1	1	1
Basic type U, universal controller	1	1	1	1	1

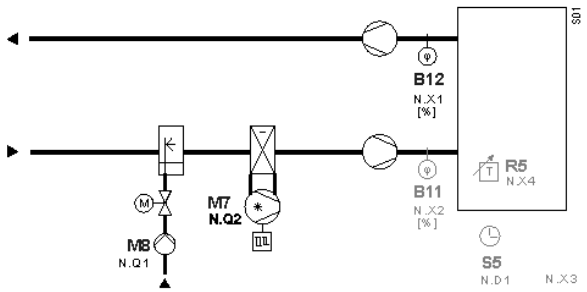
Programmed applications

Examples with RLU202 Applications programmed in controller RLU202 (for all, see Data Sheet N3101).

Application	Application no./description	Plant diagram
A01	ADA006 LU0 HQ Extract air (room) temperature control with electric air heater. Options: - Minimum and maximum limitation of supply air temperature - Outside temperature-dependent functions - Remote setpoint adjuster (relative) - 2-stage electric air heater - Comfort/Protection changeover (time switch)	
A03	ADA014 LU0 HQ Supply air temperature control with hot water heating coil. Options: - Room temperature cascade control - Outside temperature-dependent functions - Remote setpoint adjuster (relative) - Comfort/Protection changeover (time switch)	
U06	HZC001 LU0 HQ Room temperature control. Options: - Minimum limitation of return temperature - Outside temperature-dependent functions - Remote setpoint adjuster (absolute) - Comfort/Protection changeover (time switch)	

In HIT Application U4 (APPL ID) according to ADZA01 LU0 HQ in HIT.

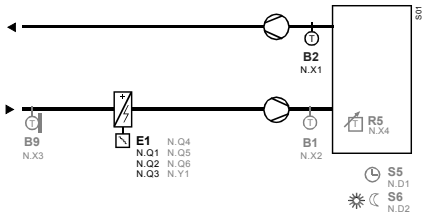
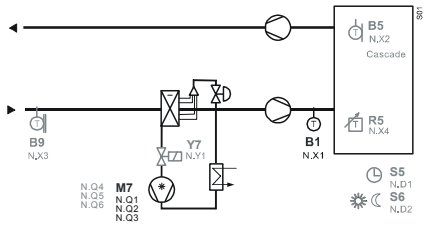
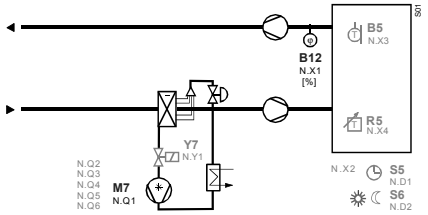
ADZA01 LU0 HQ - Ventilation Plant, Humidifying



Replace application
Remove application

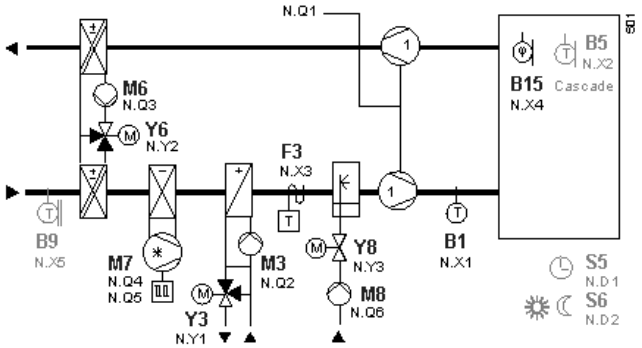
Opt.	Reference	Product no.	Description	Doc
	N1	**RLU202**	**Universal controller, 1 control loop, 2 relay outputs**	
	B12	QFM2100	Duct sensor for humidity (DC 0...10 V)	
☑	B11	QFM2100	Duct sensor for humidity (DC 0...10 V)	
☑	R5	BSG61	Active setpoint adjuster 0...100 %, for flush panel mounting	
☑	Z5	BSG-Z	Complete range of scales for BSG..	
☑	S5	SEH62.1	Digital time switch, 1-channel, with 7-day program	

Examples with RLU236 Applications programmed in controller RLU236 (for all, see Data Sheet N3101).

Application	Application no./description	Plant diagram
A01	ADA007 LU3 HQ Extract air (room) temperature control with electric air heater. Options: - Minimum and maximum limitation of supply air temperature - Outside temperature-dependent functions - 6-stage electric air heater - Comfort/Economy changeover; remote setpoint adjuster (relative) - Comfort/Protection changeover (time switch)	
A04	ADB008 LU3 HQ Supply air temperature control with dx cooler. Options: - Room temperature cascade control - Outside temperature-dependent functions - 6-stage dx cooler - Comfort/Economy changeover; remote setpoint adjuster (relative) - Comfort/Protection changeover (time switch)	
U04	ADI004 LU3 HQ Extract air (room) humidity control (r.h.) with dx cooler. Options: - Additional maximum selection from internal and external signal - Room temperature-dependent shifting of humidity setpoint - 6-stage dx cooler - Comfort/Economy changeover; remote setpoint adjuster (absolute) - Comfort/Protection changeover (time switch)	

In HIT Application A10 (APPL ID) according to AEFL01 LU3 HQ in HIT.

AEFL01 LU3 HQ - Partial Air Conditioning Plant, Heating / Cooling / Humidifying



Replace application
Remove application

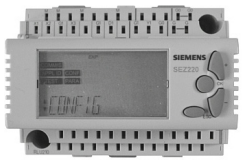
Opt.	Reference	Product no.	Description	Doc
	N1	**RLU236**	**Universal controller, 2 control loops, 3 analog and 6 relay outputs**	
	B1	QAM2120.040	Duct temperature sensor 400 mm, LG-Ni1000	
	B15	QFA2000	Room sensor for humidity (DC 0...10 V)	
	Y3	Define ...	2- or 3-port valve Modulating valve actuator, AC 24 V, DC 0...10 V	
	Y6	Define ...	2- or 3-port valve Modulating valve actuator, AC 24 V, DC 0...10 V	
	Y8	Define ...	2- or 3-port valve Modulating valve actuator, AC 24 V, DC 0...10 V	
	F3	QAF81.6	Frost monitor, 2-point, capillary tube 6000 mm	
☑	B5	QAA24	Room temperature sensor LG-Ni1000	
☑	B9	QAM2120.040	Duct temperature sensor 400 mm, LG-Ni1000	
☑	S5	SEH62.1	Digital time switch, 1-channel, with 7-day program	

Signal converter SEZ220

Brief description

The SEZ220 signal converter with its functions (see Data Sheet N5146) complements the applications of the Synco 200 and Synco 700 controllers.

The signal converter is used in connection with a controller, for example, if the enthalpy or the dewpoint temperature need be calculated, or if minimum selection from several temperature signals is required.



The SEZ220 is based on the same hardware as the Synco 200 universal controllers RLU. Mounting and wiring are identical also.

The SEZ220 operates on AC 24 V (safety extra low-voltage SELV/PELV).

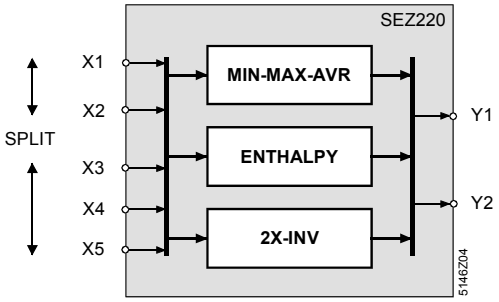
Display and operation are practically identical with the RLU universal controllers.

Inputs and outputs

Universal inputs X1…X5, configurable for passive or active analog signals: LG-Ni1000, 2 x LG-Ni1000 (averaging), Pt1000, T1, 0...1000 Ω, DC 0...10 V.

Analog outputs Y1 and Y2: positioning signal DC 0...10 V/1 mA.

Function blocks



MIN-MAX-AVR

Minimum/maximum selection and averaging:

- Selection of maximum input signals of inputs X1…X5
- Selection of minimum input signals of inputs X1…X5
- Calculation of average value of inputs X1…X5
- Weighting factor FACTIN. For calculation of the average value, input X1 can be weighted. The number of input signals for making calculations can thus be multiplied
- Configuration parameter SPLIT. This parameter is used to assign the MIN, MAX and AVR functions to inputs X1…X2 and X3…X5. This makes it possible to select the maximum input signal of X1…X2 and the minimum input signal of X3…X5, for instance, or to calculate the average value of inputs X1…X2 and X3…X5

ENTHALPY

Enthalpy processor for calculating:

- Enthalpy based on passive temperature signals and active humidity signals
- Enthalpy difference of 2 groups of signals based on temperature signals (passive) and humidity signals (active)
- Absolute humidity based on temperature (passive) and humidity signals (active)
- Dewpoint temperature based on temperature (passive) and humidity signals (active)

2X-INV

- Doubling of signals for sequential control of aggregates and components (valves, pumps, fans)
- Signal inversion from DC 0...10 V to DC 10...0 V
- Signal conversion of a passive temperature signal to 2 active signals

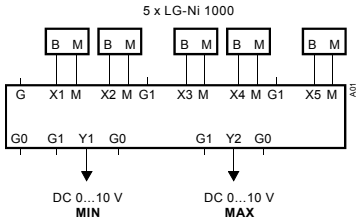
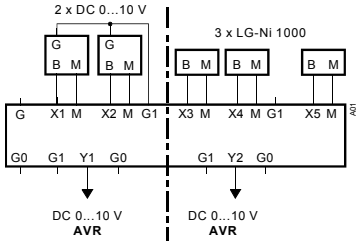
Programmed applications

When activating an application (e.g. M01 on menu APPL ID), the respective inputs and outputs, functions and parameters are automatically activated; parameters not required will be deactivated.

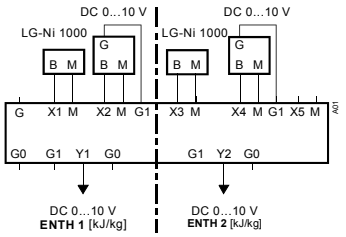
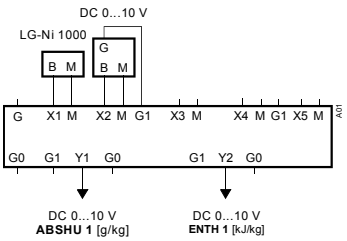
Modifying

Every programmed application can be modified. On the APPL ID menu, ADAP indicates that the programmed application was changed (adapted) or – if that is not the case – ORIG is displayed, meaning "original".

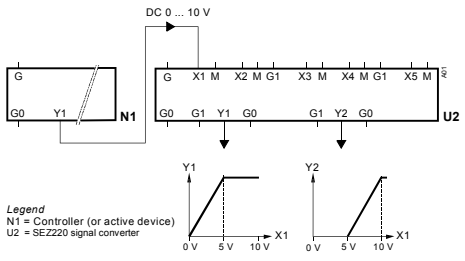
Application examples Mxx: Measuring variables as input signals

Application	Description	Connection diagram
M01	Selection of minimum and maximum input signal from all pending passive input signals.	
M05	Calculation of average of 2 active and 3 passive input signals.	

Application examples Exx: Enthalpy calculations

Application	Description	Connection diagram
E01	Calculation of enthalpies of 1 passive temperature signal and 1 active humidity signal.	
E03	Calculation of absolute humidity and enthalpy of 1 passive temperature signal and 1 active humidity signal.	

Application example D01: Signal processing

Application	Description	Connection diagram
D01	Doubling of signal for sequential control of pumps, valves and fans.	

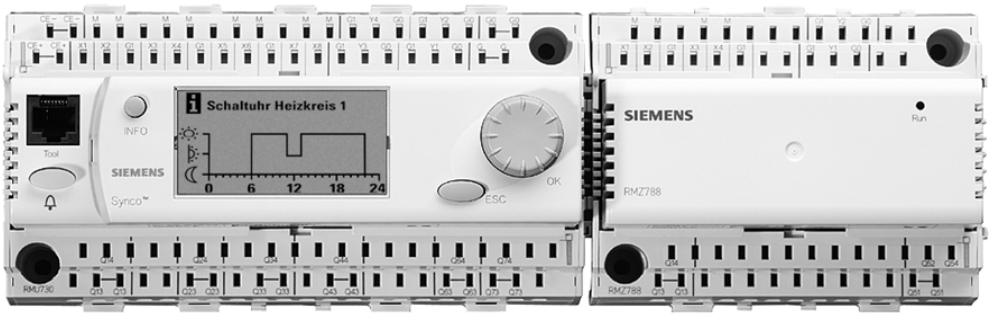
Synco 700

Introduction

Synco 700 is a modular range of devices to control and monitor HVAC plants in medium-size to large buildings. Synco controls communicate via KNX between themselves and with third-party devices.

Overview

Controls RM..	Product no.	Data Sheet
Universal controllers For use in ventilation, air conditioning and chilled water plants, in primary plant together with individual room control	**RMU710B** **RMU720B** **RMU730B**	**N3150** ↓
Heating controller For boiler, heating circuit or precontrol, for district heating plants	**RMH760B**	**N3133**
Boiler sequence controller For multiboiler plants (up to 6 boilers)	**RMK770**	**N3132**
Switching and monitoring device For applications in heating, ventilation, air conditioning, and chilled water plants	**RMS705B**	**N3124**
Central control unit For individual room control in connection with RXB/RXL room controllers	**RMB795B**	**N3122**
Extension modules For use with all types of Synco 700 controls: Universal module, 8 UI Universal module, 4 UI, 3 RNO, 1RCH Universal module, 4 UI, 2 AO, 1 RNO, 1RCH Universal module, 6 UI, 2 AO, 2 RNO, 2RCH	**RMZ785** **RMZ787** **RMZ788** **RMZ789**	**N3146** ↓
Only for use with Synco 700 heating circuit controller RMH760B: Heating circuit module, 3 UI, 1 AO, 2 RNO, 1 RCH DHW module, 4 UI, 1 AO, 3 RNO, 2 RCH	**RMZ782B** **RMZ783B**	**N3136** ↓
Module connector UI: Universal input, AO: Analog output RNO: Relay with NO contact, RCH: Relay with changeover contact	**RMZ780**	**N3138**
Synco 700 ancillary units		
Room unit With setpoint readjustment, mode and timer button	**QAW740**	**N1633**
Operator units - Operator unit plugs into Synco 700 controls - Handheld or mounted (e.g. on control panel front)	**RMZ790** **RMZ791**	**N3111** **N3112**
Bus operator unit Access via KNX to Synco 700 devices, central communication units, RXB/RXL room controllers, and RDF/RDU/RDG room thermostats	**RMZ792**	**N3113**
HIT → HVAC Integrated Tool (see page 87) To select and engineer plants operating with Synco 700	www.siemens.com/HIT	



Universal controller RMU730 with plug-in operator unit RMZ790 and attached extension module RMZ788

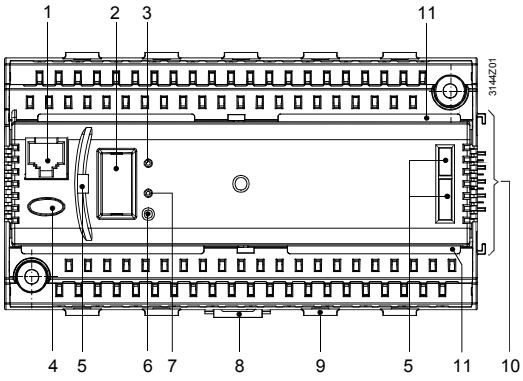
Controls RM..

Brief description

Synco 700 controls RM.. contain programmed applications that can be straightforwardly activated. For the free configuration of new customized applications, basic types in accordance with the basic device functions are available. The devices can be easily and efficiently installed and commissioned.

Basic design

The controls consist of terminal base and electronics section which plugs into the terminal base. Integrated in the terminal base is the connection facility (electrical and mechanical) for the extension module.



1 Connection facility for service tool OCI700.1
2 Connection facility for operator unit RMZ790
3 LED "Run" (green) for indication of operating state (power on, no fault)
4 Button "🔔" with LED (red) for fault indication and acknowledgement
5 Opening for plug-in type operator unit RMZ790
6 Button "Prog" for changing between normal and addressing mode
7 LED "Prog" to indicate addressing mode (adoption of physical KNX device address)
8 Catch for fitting the device to a rail
9 Fixing facility for cable tie
10 Connection facility for extension module
11 Rest for terminal cover

Mounting and installation

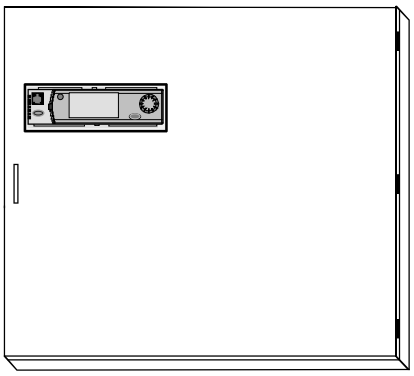
Mounting

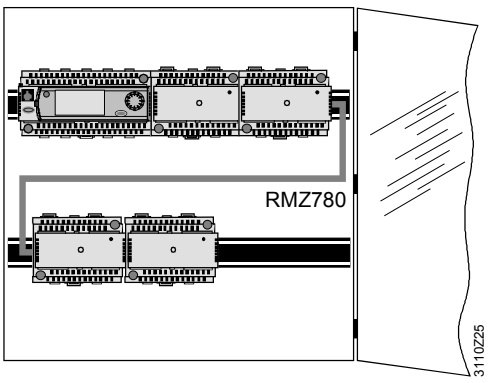
The controls and extension modules are designed for …

- mounting in a control panel (front or rear),
- fitting to a standard mounting rail as per EN 60715-TH 35-7.5,
- wall mounting with 2 fixing screws.

Control panel

Controls with an attached RMZ790 operator unit can be mounted in a control panel such that when the control panel door is closed, the unit protrudes through the cutout, giving the plant operator access to the display and the operating elements.





Note: In place of the attachable RMZ790 operator unit it is also possible to use the handheld operator unit RMZ791.

Environmental conditions

The permissible environmental conditions in the range of 0…50 °C and 5…95% r.h. (noncondensing) must be observed. Not permitted are wet or damp environments.

Extension modules

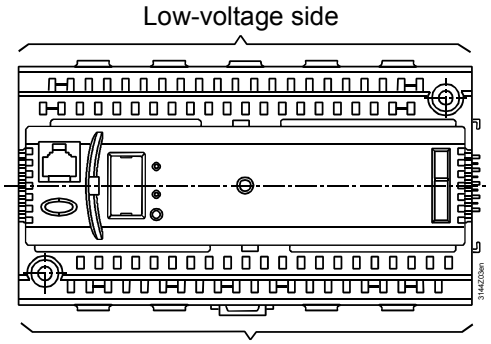
Extension modules must be fitted in accordance with their activated application.

Module connector RMZ780

If space in the control panel is confined, the devices can be fitted on 2 or more levels.

In that case, the devices are interconnected with the help of the RMZ780 module connector. The length of the connecting cables may be modified by the installer. But it may not exceed 10 meters.

Connection terminals



Connection terminals carrying protective extra low-voltage (e.g. for sensors and KNX bus) are located on the low-voltage side (top of the housing).

Connection terminals carrying mains voltage (e.g. for actuators, pumps, etc.) are located on the mains voltage side (bottom of the housing).

Operating voltage AC 24 V

The controls operate on AC 24 V (safety extra low-voltage SELV/PELV).

The RMZ78x extension modules and RMZ790/RMZ791 operator units are powered by the controls.

KNX bus

Communication between the controls is executed via the KNX bus. All controls have a connection facility for the KNX bus.

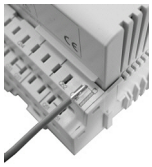
The bus wires are connected to terminals CE+ (red) and CE– (black). The polarity of the bus wires CE+ and CE– must be observed and must not be changed.

Note: The spring cage terminals of the Synco controls can accept only 1 wire. For this reason, terminals CE+ and CE– exist twice and are interconnected inside the units.

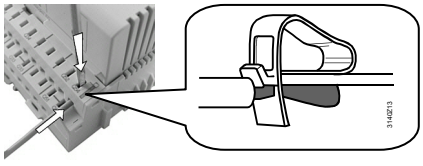
Wiring the devices

The Synco 700 controls RM.. and the RMZ78x extension modules are equipped with spring cage terminals. These terminals ensure excellent electrical connections and straightforward wiring.

Spring cage terminals



1 Strip the wire over a length of 7…8 mm



2 Push on the spring cage terminal with a screwdriver and, at the same time, insert the wire

Inputs and outputs

The number of inputs and outputs of the Synco 700 controls RM.. differ. Also, the characteristics of the universal inputs are not the same (e.g. input N.X_ configurable/nonconfigurable for pulse signals).

Example: Central control unit RMB795B

Product no.	Universal inputs	Analog outputs	Relay outputs with…	
			Ch'over contact	NO contact
RMB795B	6 = N.X1…N.X6	2 = N.Y1, N.Y2, ...	1 = N.Q1	3 = N.Q2, Q3, Q5

Inputs

The universal inputs N.X_ can be configured for analog signals of passive sensors or active signal sources using the measuring variables °C, %, g/kg, kJ/kg, W/m^2, bar, mbar, m/s, Pa, ppm, or for status signals. Signal types:

- LG-Ni1000, 2 x LG-Ni1000 (averaging), Pt1000, and T1
- 0…1000 Ω, BSG21.1 (setpoint, absolute), 0...1175 Ω, BSG21.5 (setp., relative)
- DC 0...10 V
- Status contact, potential free

Pulse signals

Depending on the type of control, the universal inputs N.X_ can be configured for the following types of pulse sources:

- Mechanical pulse source (Reed contact), pulse frequency max. 25 Hz
- Electronic pulse source (Open Collector), pulse frequency max. 100 Hz

Outputs

The analog outputs N.Y_ and relay outputs N.O_ are ready configured for the following types of signals:

- Analog: DC 0...10 V/1 mA
- Relay contacts: Potential free, for switching AC 19…250 V, max. 4 (3) A

Assigned/nonassigned inputs and outputs

Depending on the activated type of application, the controls have certain inputs and outputs assigned or nonassigned. For extensions (e.g. extra sensors), only nonassigned inputs and outputs can be configured.

Extension modules

The number of inputs and outputs can be increased by attaching extension modules to the RM.. controls (see page 57).

Universal transmit and reception zones

With the Synco 700 controls RMU7x0B, RMS705B and RMB795B, universal data exchange can be configured via the controls' own input and output terminals or via the terminals of the RMZ78x extension modules. Data exchange between the controls is the same as if the terminals were wired.

The digital and analog outputs are used as transmit objects in transmission zones, and the universal inputs as transmit objects **or** reception objects in reception zones.

It is possible to have a maximum of 32 universal transmit and reception zones per line. Data exchange between the zones takes place via KNX in LTE and S-mode.

Universal transmit and reception zones are **not** permitted in the following cases:

- On safety-related applications such as smoke extraction, frost protection, or when communication breakdown can cause damage
- With time-critical controlled systems having a high degree of difficulty

Engineering

For efficient engineering of plants operating with Synco 700, Siemens' HIT is available www.siemens.com/HIT (see page 87).

With all types of RM.. controls, engineering is based on the following criteria:

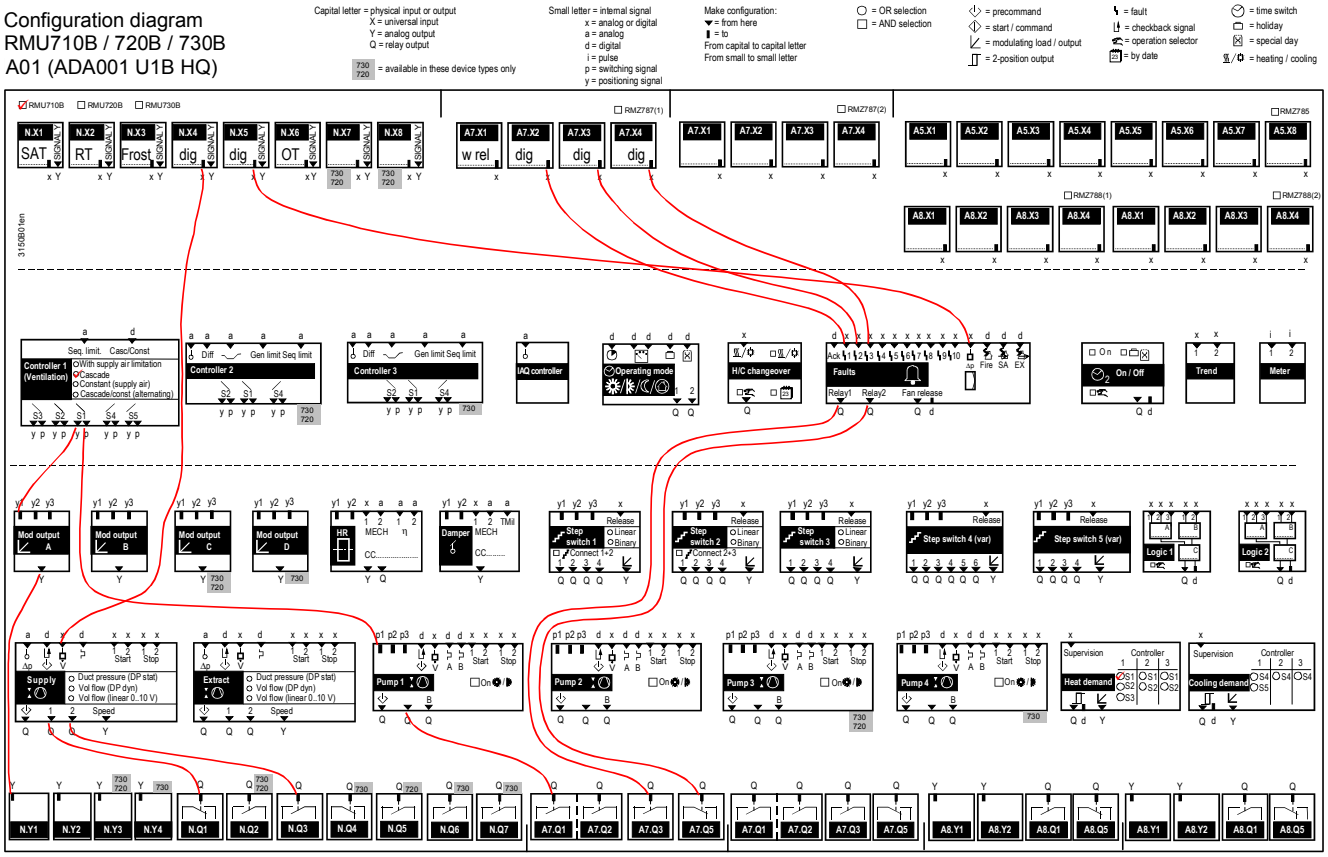
- Programmed applications
- Modified programmed applications
- Free configuration on the basis of the basic type

Only trained personnel with the respective access rights may activate and – if necessary – modify the programmed applications (also termed standard applications).

Example

Configuration diagram for programmed application A01 (ADA001 U1B HQ)

Configuration diagram
RMU710B / 720B / 730B
A01 (ADA001 U1B HQ)



Commissioning

With the RMZ790 or RMZ792 operator unit or the OCI700.1 service tool (all types of RM.. controls have a connection facility for the tool), commissioning is effected as follows:

Programmed application

Select plant type (programmed application). All associated terminal assignments, functions and parameters are automatically activated (parameters not required will be deactivated).

Modifications

After selection of the plant type, the programmed application can be modified with the operator unit or the service tool using operating page "Extra configuration".

Modifications are plant-specific supplements. For example, universal inputs are matched to the measuring variables of third-party sensors, or outputs are assigned additional aggregates or functions (modulating, multistage).

Free configuration

First, a basic type must be selected. Then, using operating page "Extra configuration", a new, customized application is created.

Restricting are merely the number of available inputs and outputs of the controls and the permissible number of extension modules.

Commissioning process

During commissioning, the application is still inactive. The outputs are in a defined state. Process data and fault status messages are not transmitted.

On completion of commissioning, a restart is made automatically. The field devices connected to the inputs (including the extension modules) are automatically checked. Faulty configurations are identified and reported.

In the case of basic plants, commissioning can be effected with the RMZ790 or RMZ791 operator unit (easy configuration, no software tool required).

For extensive modifications and applications created in free configuration, the OCI700.1 service tool is available (software ACS790).

Correct commissioning also includes optimization of the setting values.

Language sets

In every type of RM.. control of the Synco 700 line, a language set is stored (see product no. of Synco 700 controls). Where possible, the language sets contain the languages spoken in a certain geographic region (e.g. language set 3 containing sv = Swedish, fi = Finnish, no = Norwegian, and da = Danish).

Product no. (ASN) of Synco 700 controls					Language sets
RMU7x0B-1	RMH760B-1	RMK770-1	RMB795B-1	RMS705B-1	de, fr, it, es, pt
RMU7x0B-2	RMH760B-2	RMK770-2	RMB795B-2	RMS705B-2	de, en, fr, nl
RMU7x0B-3	RMH760B-3	RMK770-3	RMB795B-3	RMS705B-3	sv, fi, no, da
RMU7x0B-4	RMH760B-4	RMK770-4	RMB795B-4	RMS705B-4	pl, cs, sk, hu, ru, bg
RMU7x0B-5	RMH760B-5	RMK770-5	RMB795B-5	RMS705B-5	ro, sl, sr, hr, el, tr
RMU7x0B-6	RMH760B-6	RMK770-6	RMB795B-6	RMS705B-6	zh (Chinese)

Note: Synco 700 controls are presently available with west European languages (Latin 1), east European languages (Latin 2) and Chinese. English is supplied as standard with every control.

When commissioning the plant, the user’s language is selected and activated via the RMZ790 or RMZ791 operator unit, or the OCI700.1 service tool.

Universal controllers RMU7x0B

Brief description

The RMU710B, RMU720B and RMU730B universal controllers (see Data Sheet N3150) are designed for use in ventilation, air conditioning, chilled water, and primary plants.

- Universal controllers with integrated control and monitoring functions
- Suitable for the following control variables: Temperature, relative/absolute humidity, pressure/differential pressure, volumetric air flow, indoor air quality
- Each type of controller provides 5 programmed applications (tested plant types)
- Free configuration of customized applications
- Controller functions can be complemented by extension modules
- Up to 32 universal transmit and reception zones per line for data exchange via KNX in LTE and S-mode
- KNX bus communication for operation and process information
- Menu-driven commissioning, operation and monitoring of controllers and plant via the operator unit (cleartext display)
- No commissioning tool required for basic plants (easy configuration)
- Commissioning of complex plants with the OCI700.1 service tool

Functions and characteristics

Inputs and outputs

Product no.	Universal inputs	Analog outputs DC 0...10 V	Relay outputs with…	
			Ch'over contact	NO contact
RMU710B	6 = N.X1…N.X6	2 = N.Y1, N.Y2	1 = N.Q1	1 = N.Q3
RMU720B	8 = N.X1…N.X8	3 = N.Y1…N.Y3	1 = N.Q1	3 = N.Q2, Q3, Q5
RMU730B	8 = N.X1…N.X8	4 = N.Y1…N.Y4	2 = N.Q1, N.Q4	4 = N.Q2, Q3, Q6, Q7

Inputs

The universal inputs N.X_ can be configured for use with passive sensors, active signal sources, and status and pulse signals (see page 28).

Outputs

The analog outputs N.Y_ and relay outputs N.Q_ are ready configured.

Extension modules

Number of modules	Extension module	Universal inputs	Analog outputs	Relay outputs with…	
				Ch'over contact	NO contact
1	Universal module RMZ785	8	--	--	--
2	Universal module RMZ787	4	--	1	3
2	Universal module RMZ788	4	2	1	1
Maximum number of modules: 4 per RMU7x0B (for extension modules, see page 57)					

Closed loop control functions

Depending on the type of controller, different heating sequences (reverse acting) and cooling sequences (direct acting) are available.

Product no.	Controller 1, sequences _// 3 reverse, 2 direct acting	Controller 2, sequences _/ 2 reverse, 1 direct acting	Controller 3, sequences _/ 2 reverse, 1 direct acting
RMU710B	✓	--	--
RMU720B	✓	✓	--
RMU730B	✓	✓	✓

Closed loop control functions (cont'd)

- Every sequence with modulating control (modulating output, step switch, mixed air damper, heat recovery system) and 1 pump
- Up to 3 sequences acting on the same modulating control (e.g. priority cooling/ dehumidification)
- Room-supply air temperature cascade control with minimum/maximum limitation of supply air temperature setpoint
- General limitation function (minimum/maximum) with PI control action of sequence controller, either as absolute limitation (e.g. for supply air temperature or humidity), or as relative temperature limitation (e.g. maximum limitation of room-supply air temperature differential)
- Autonomous sequence controllers with P-, PI or PID control action
- Disabling of individual sequences depending on the outside temperature
- Demand-based ventilation, night purge
- Sustained heating and cooling modes
- Can also be used as differential controllers

Switching and monitoring functions

- Fans
  Control and monitoring of a supply and extract air fan with preselected command, preselected command feedback and hours run meter.
  – 1-speed fan (recirculated air operation possible)
  – 2-speed fan (locking the second speed depending on the outside temperature)
  – Speed-controlled fan, including pressure or volumetric flow control
  – Release of fan overrun time for electric heating
- Pumps
  Control and monitoring of up to 4 single or twin pumps.
  – Pump kick
  – Permanent on command at low outside temperatures
  – On according to load sequence controller or operating mode
  – Plant stop in the event of pump fault depending on the outside temperature
- Heat recovery
  – Maximum economy changeover of a heat recovery system
  – Monitoring of efficiency of heat recovery system (with service messages)
  – Release relay heat recovery system
  – Anti-icing protection for the heat recovery system
- Mixed air dampers
  – Maximum economy changeover of mixed air dampers
  – Minimum position of mixed air dampers
  – Startup and maximum position depending on the outside temperature
  – Mixed air temperature control at a constant setpoint
- Linear step switch
  Control of up to 3 aggregates by linear step switch
- Binary step switch
  Control of up to 3 aggregates by binary step switch
- Variable step switch
  Control of 2 aggregates by variable step switch with 6 or 4 steps
- Logic functions
  4 freely configurable logic function blocks to logically connect input variables
- Frost protection
  2-stage frost protection (modulating/2-position) or frost protection thermostat (heating sequences delivering 100% output, hot water heating coil pump on, fans off)
- Demand-based ventilation (CO2/VOC), acting on the air dampers or the variable speed/multispeed fans

Switching and monitoring functions (cont'd)

- Sustained heating and cooling mode during occupancy/nonoccupancy times
- Night purging during nonoccupancy times in the summer
- Heating/cooling demand: Collection, evaluation and delivery of heat and cooling energy requests via the KNX bus. Heat and cooling energy demand signal (relay and DC 0…10 V). Also configurable:
  – Modulating output (e.g. for demand-dependent setpoint shift of a refrigeration machine)
  – Relay output (e.g. to switch a refrigeration machine)
  – Demand-dependent setpoint shift acting on the primary controller
  – Adjustable setpoint increase for use with the primary controller
- Heating/cooling changeover, 2-pipe system (heating/cooling):
  – Via digital or analog input
  – Via the operating mode selector (Auto/Heating/Cooling)
  – Depending on the date or via the KNX bus
- Fault status indication with LED (red) and acknowledgement with button. In addition:
  – 2 relay outputs as fault relay
  – 10 universal inputs as fault status inputs
  – 4 predefined fault status inputs (monitoring of filter, alarm off, smoke extraction supply air, and smoke extraction extract air)
- Alarm off (emergency shutdown of plant due to fire)
- Smoke extraction (emergency on of certain aggregates)

Time switch and operating modes

- Yearly time switch with automatic summer-/wintertime changeover
- 7-day program (6 switching points per day) and yearly program for holidays/ special days (16 periods of time)
- Operating modes: Auto, Comfort, Precomfort, Economy and Protection with local operator unit or via digital inputs
- Room control combination with several ventilation controllers or with heating controller via the KNX bus. Exchange of information, such as room temperature, operating mode and setpoints
- Display of current operating mode and of reason for current mode

Basic types

The RMU7x0B universal controllers are supplied with basic types A, C, U, and P. The basic type represents the basis for the free configuration of customized applications.

Basic type	Typical applications
A	Ventilation and air conditioning plants (e.g. control of air handling plants)
C	Demand-compensated control of chilled water handling
U	Universal applications (e.g. control to flow temperature setpoint)
P	Primary air handling. Demand-compensated control of air handling plant

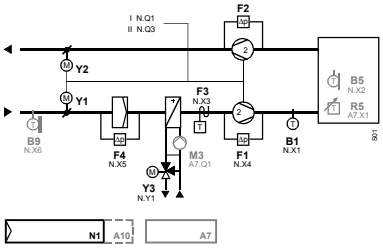
Plant types

Each of the RMU7x0B universal controllers is supplied with 5 programmed applications, which means that each controller comes with plant types A01 through A05 ready stored.

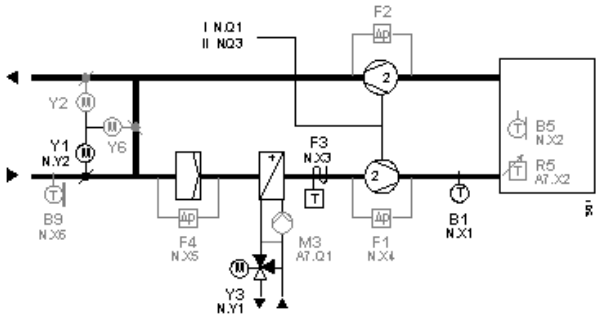
Note: Plant type A01 in RMU710B, RMU720B and RMU730B is not identical; also refer to the application numbers on the following pages and the description given in Data Sheet N3150.

Programmed applications

Controller RMU710B

Plant type	Application no./description	Plant diagram
A01	**ADA001 U1B HQ** Supply air temperature control with hot water air heating coil. Variant: Room (extract air)-supply air temperature cascade control with minimum and maximum limitation of supply air temperature.	
A02	**ADB001 U1B HQ** Supply air temperature control with chilled water cooling coil.	
A03	**ADC001 U1B HQ** Supply air temperature control with hot water heating coil and chilled water cooling coil in sequence.	
A04	**AEA001 U1B HQ** Supply air temperature control with mixed air dampers and hot water heating coil in sequence. See below: Application in HIT.	
A05	**ADAE01 U1B HQ** Supply air temperature control with plate heat exchanger and hot water heating coil in sequence.	

AEA001 U1B HQ - Ventilation Plant, Heating



Replace application
Remove application

Opt.	Reference	Product no.	Description	Doc
	N1	**RMU710B-2**	**Universal controller, 1 control loop, with languages de, en, fr, nl**	
	B1	QAM2120.040	Duct temperature sensor 400 mm, LG-Ni1000	
	F3	QAF81.6	Frost monitor, 2-point, capillary tube 6000 mm	
	Y1	Define ...	Modulating air damper actuator, AC 24 V, DC 0...10 V	
	Y3	Define ...	2- or 3-port valve Modulating valve actuator, AC 24 V, DC 0...10 V	
☑	A10	RMZ790	Plug-in type operator unit	
☑	A7	RMZ787	Universal module (4UI, 4DO)	
☐	B4	QPA2002	Room air quality sensor CO_2+VOC	
☑	B5	QAA24	Room temperature sensor LG-Ni1000	
☑	B9	QAM2120.040	Duct temperature sensor 400 mm, LG-Ni1000	
☑	F1	QBM81-3	Differential pressure monitor, 20...300 Pa	
☑	F2	QBM81-3	Differential pressure monitor, 20...300 Pa	
☑	F4	QBM81-5	Differential pressure monitor, 50...500 Pa	
☑	R5	BSG21.5	Setpoint adjuster, passive, temperature ranges: -20...20 °C; 20...60 °C; -3.....	
☑	Y2	Define ...	Modulating air damper actuator, AC 24 V, DC 0...10 V	
☑	Y6	Define ...	Modulating air damper actuator, AC 24 V, DC 0...10 V	

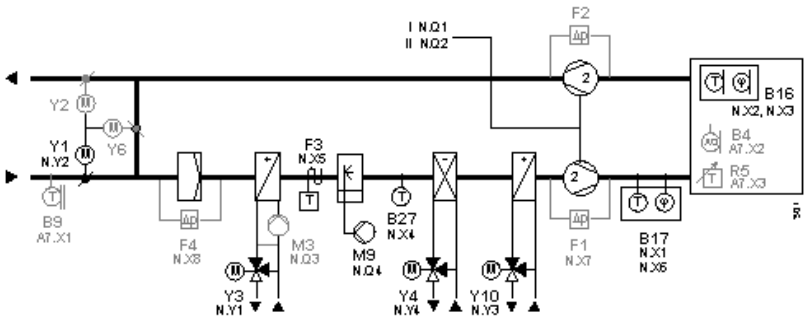
Controller RMU720B

Plant type	Application no./description	
A01	**AEC001 U2B HQ**	Supply air temperature control with mixed air dampers, hot water heating coil and chilled water cooling coil in sequence.
A02	**ADCE01 U2B HQ**	Supply air temperature control with plate heat exchanger, hot water heating coil and chilled water cooling coil in sequence.
A03	**ADFB01 U2B HQ**	Supply air temperature control with hot water heating coil and chilled water cooling coil in sequence. Room humidity control with steam humidifier.
A04	**AEDB01 U2B HQ**	Supply air temperature control with mixed air dampers and hot water heating coil in sequence. Room humidity control with steam humidifier.
A05	**ADDP01 U2B HQ**	Supply air temperature control with thermal wheel heat recovery system and hot water heating coil in sequence. Room humidity control with steam humidifier.

Controller RMU730B

Plant type	Application no./description	
A01	**AEFB01 U3B HQ**	Supply air temperature control with mixed air dampers, hot water heating coil and chilled water cooling coil in sequence. Room humidity control with steam humidifier.
A02	**ADFP01 U3B HQ**	Supply air temperature control with thermal wheel heat recovery system, hot water heating coil and chilled water cooling coil in sequence. Room humidity control with steam humidifier.
A03	**ADZA01 U3B HQ**	Room (extract air)-supply air temperature cascade control with minimum and maximum limitation of supply air temperature, with hot water reheater and chilled water cooling coil in sequence. Room humidity control with spray humidifier (release). Dewpoint temperature control (constant supply air humidity) with hot water preheater and chilled water cooling coil in sequence.
A04	**AEZH01 U3B HQ**	Room (extract air)-supply air temperature cascade control with minimum and maximum limitation of supply air temperature, with hot water reheater and chilled water cooling coil in sequence. Room humidity control with spray humidifier (release). Dewpoint temperature control (constant supply air humidity) with mixed air dampers, hot water preheater and chilled water cooling coil in sequence.
A05	**AEZH02 U3B HQ**	Room (extract air)-supply air temperature cascade control with minimum and maximum limitation of supply air temperature, with hot water reheater and chilled water cooling coil in sequence. Room humidity control with spray humidifier (release) and chilled water cooling coil. Dewpoint temperature control (constant supply air humidity) with hot water preheater. See below: Application in HIT.

AEZH02 U3B HQ - Air Conditioning Plant, Heating / Cooling / Humidifying / Dehumidifying



Replace application
Remove application

N1 A10 A7

Opt.	Reference	Product no.	Description	Doc
	N1	**RMU730B-2**	**Universal controller, 3 control loops, with languages de, en, fr, nl**	
	B16	QFA2020	Room sensor for humidity (DC 0...10 V) and temperature (LG-Ni1000)	
	B17	QFM2120	Duct sensor for humidity (0...10 V) and temperature (Ni1000)	
	B27	QAM2120.040	Duct temperature sensor 400 mm, LG-Ni1000	
	F3	QAF81.6	Frost monitor, 2-point, capillary tube 6000 mm	
	Y1	Define ...	Modulating air damper actuator, AC 24 V, DC 0...10 V	
	Y3	Define ...	2- or 3-port valve	

Heating controller RMH760B

Brief description

The RMH760B heating controller (see Data Sheet N3133) is used in medium-size or large buildings with own heat generation or district heat connection, as a heating circuit and/or primary controller.

Using the respective RMZ78x extension modules, the heating controller can also control the boiler temperature and 1 or 2 heating circuits, with or without DHW heating.

- Universal controller with integrated control and monitoring functions
- 41 programmed applications (tested plant types)
- Free configuration of customized applications (basis: basic type H)
- Extension modules for complementing controller functions
- KNX bus communication for operation and process information)
- Menu-driven commissioning, operation and monitoring of controllers and plant via the operator unit (cleartext display)
- No commissioning tool required for basic plants (easy configuration)
- Commissioning with the OCI700.1 service tool

Functions and characteristics

Inputs and outputs

Product no.	Universal inputs	Analog outputs DC 0...10 V	Relay outputs with…	
			Ch'over contact	NO contact
RMH760B	6 = N.X1…N.X6	2 = N.Y1, N.Y2	2 = N.Q1, N.Q4	3 = N.Q2, N.Q3, N.Q5

Inputs

The universal inputs N.X_ can be configured for use with passive sensors, active signal sources, and status and pulse signals (see page 28).

Note: The universal inputs N.X_ of the RMH760B heating controller can also be configured for use with NTC 575 sensors

Outputs

The analog outputs N.Y_ and relay outputs N.Q_ are ready configured.

Extension modules

Number of modules	Type of extension module	Universal inputs	Analog outputs	Relay outputs with…	
				Ch'over contact	NO contact
2	HC module RMZ782B	3	1	1	2
1	DHW module RMZ783B	4	1	2	3
1	Universal module RMZ787	4	--	1	3
2	Universal module RMZ789	6	2	2	2
Maximum number of modules: 4 per RMH760B (for extension modules, see page 57)					

Types of plant

- Heating sections of ventilation or air conditioning plants
- Distribution zones of ventilation or air conditioning plants
- Heating systems with own heat generation
- Heating systems with direct or indirect district heat connection
- Heating zones of larger plants (e.g. community district heating systems)
- Basic load heating systems

Control loops and control outputs

- Maximum 6 control systems with modulating control output (3-position or DC 0…10 V) acting on …
  - modulating burner,
  - heating circuit with mixing valve,
  - precontrol with mixing valve,
  - maintained return temperature with mixing valve.
- Control of maximum 6 pumps (single or twin pumps, or combinations of them, e.g. 4 single and 2 twin pumps)

Heating circuit control

Maximum 3 autonomous heating circuits with the following functions per circuit:

- Weather-compensated flow temperature control with own outside sensor
- Mixing or pump heating circuit
- Room operating modes:
  - Auto Changeover between 3 setpoints according to time program
  - Comfort Continuous heating to the Comfort setpoint
  - Precomfort Continuous heating to the Precomfort setpoint
  - Economy Continuous heating to the Economy setpoint
  - Protection Heating to the Protection setpoint, if necessary
- Adjustable setpoints for the room operating modes
- Output of current operating mode via 2 relays (e.g. control of a third-party device via time switch)
- 7-day program (6 switching points per day)
- Holiday and special day program:
  - Selectable room operating mode for holiday periods
  - Time program for special days
- Adjustable room influence
- Optimum start and stop control
- Boost heating and quick setback
- Room model for room functions without room sensor
- Automatic heating limit for demand-dependent control of heating system with adjustable heating limits for Comfort and Economy mode
- Automatic changeover to summer operation (heating off)
- Maximum limitation of room temperature
- Minimum and maximum limitation of flow temperature
- Limitation of rate of increase of flow temperature
- Outside temperature simulation for testing the outside temperature-dependent functions
- Outside temperature-dependent frost protection for the plant
- Remote control:
  - Remote setpoint adjuster with relative or absolute room setpoint readjustment
  - Multifunctional room unit QAW740 for various heating circuit functions
  - External contacts for operating mode changeover, "Timer" function, etc.
- For all heating circuits:
  - Adjustable solar and/or wind compensation

District heating functions

- Raising the reduced room temperature when outside temperature drops
- Outside temperature-dependent constant-shifting-constant maximum limitation of return temperature
- Reception of heat meter pulses to limit the flow rate or the heat output

Boiler temperature control

- Control of boiler temperature with 1-stage, 2-stage or modulating burner (3-position or DC 0…10 V with feedback signal)
- Acquisition of flue gas temperature, alarm when limit value is reached
- Maximum and minimum limitation of boiler temperature
- Maintained return temperature controlled via mixing valve (3-position or DC 0…10 V), or with bypass pump
- Control of a shutoff valve, with feedback signal
- Selection of boiler operating mode
- Limitation of burner's minimum on time and of the return temperature
- Protective boiler startup. Release of boiler, either automatically or manually
- Flue gas measuring mode (boiler test mode, "Chimney sweep" function)
- 3 fault signal inputs, preconfigured for over-/underpressure and water shortage in the boiler or in the hydraulic plant
- Burner hours run counter and burner start counter

Main control

- Acquisition and evaluation of heat requests (external setpoint, external DHW request, and frost protection via the KNX bus)
- Demand-compensated main control via mixing valve (3-position or DC 0…10 V), or of the system pump in the main flow
- Minimum and maximum limitation of main flow temperature
- Shifting maximum limitation of main return temperature
- Maximum limitation of main return temperature during DHW heating
- Reception of heat meter pulses to limit the flow rate or the heat output

Precontrol

- Acquisition and evaluation of heat requests (external setpoint, external DHW request and frost protection via the KNX bus)
- Demand-compensated main control via mixing valve (3-position or DC 0…10 V), or of the main pump in the main flow
- Minimum and maximum limitation of flow temperature
- Shifting maximum limitation of return temperature
- Maximum limitation of return temperature during DHW heating
- Reception of heat meters pulses to limit the flow rate or the heat output

DHW heating

- Several DHW variants available:
  - Storage tank charging via internal heat exchanger
  - Storage tank charging via external heat exchanger, optionally with maintained secondary temperature
  - Storage tank charging with electric immersion heater
  - Direct DHW consumption via heat exchanger. Downstream consumer control (control of DHW temperature at the tap)
- Maximum limitation of return temperature
- Proof of flow with flow switch
- Reception of heat meter pulses to limit the flow rate or the heat output
- "Legionella" function
- 7-day program with maximum 6 switching points per day
- 7-day program with maximum 6 switching points per day for circulating pump

DHW heating (cont'd)

- Operating modes:
  - Auto: Changeover between Normal and Reduced according to the time program
  - Continuously Normal
  - Continuously Reduced
  - Continuously Protection (frost protection)
- External contact for changeover of operating mode
- Holiday and special day program:
  - Selectable DHW operating mode for holiday periods
  - Time program for special days

For all heating circuits

- Control functions:
  - Demand-compensated precontrol based on heat request
  - P- or PI control action (PID for the control of modulating burners)
- Switching functions:
  - Control output (3-position or DC 0...10 V)
  - Configured control functions (e.g. output signal for heat demand handled via relay contact)
  - Yearly time switch with automatic summer-/wintertime changeover
  - 7-day program (6 switching points per day)
  - 5 clock channels for time program of heating circuits 1, 2, and 3, DHW heating, DHW circulating pump
  - Pump control
  - Control of twin pumps
- Monitoring and protective functions:
  - Valve overrun and valve kick
  - Pump overrun and pump kick
  - Monitoring pump overloads and pump flow
  - Outside temperature-dependent frost protection for plant and building
  - Fault indication with red LED
  - Fault relay, handling of status and fault signals

Basic type H

The RMH760B is supplied with basic type H. It represents the basis for the free configuration of customized applications.

Plant types

The RMH760B is supplied with 41 plant types. They represent combinations of heating plants.

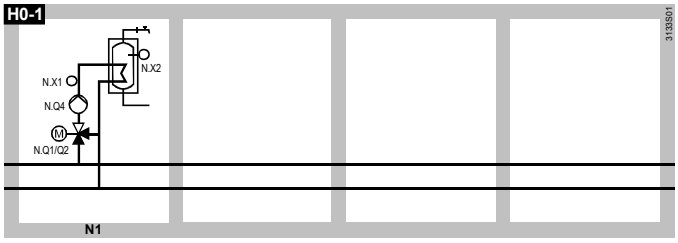
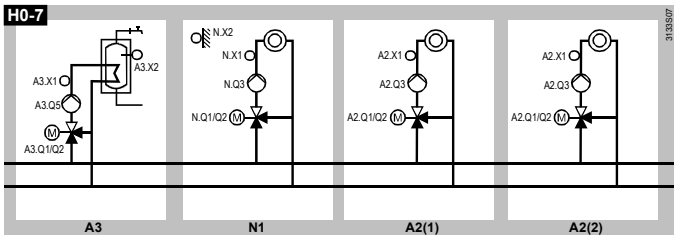
Programmed applications

A selection of plant types (programmed applications) and their associated plant diagrams are shown on the following pages. For all available applications, see Data Sheet N3133.

Programmed applications

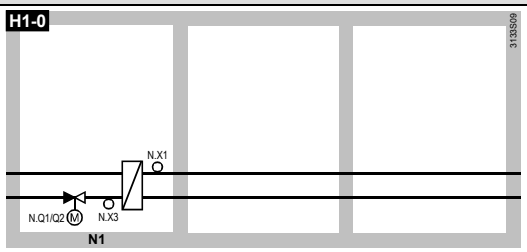
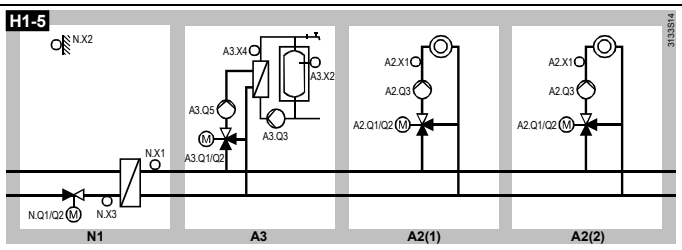
Plant types H0-x

DHW circuit and heating circuit	
H0-1	DHW circuit
H0-2	1 heating circuit
H0-3	DHW circuit and 1 heating circuit
H0-4	2 heating circuits
H0-5	DHW circuit and 2 heating circuits
H0-6	3 heating circuits
H0-7	DHW circuit and 3 heating circuits

Plant type	Description	Plant diagram
H0-1	**N1:** DHW circuit with storage tank flow controlled via mixing valve and charging pump, connected directly to uncontrolled header (BW 2).	
H0-7	**A3:** DHW circuit (BW 2). **N1:** Heating circuit, weather-compensated. Connected directly to uncontrolled header, with mixing valve and circ. pump. **A2(1):** Heating circuit, weather-compensated. **A2(2):** Heating circuit, weather-compensated.	

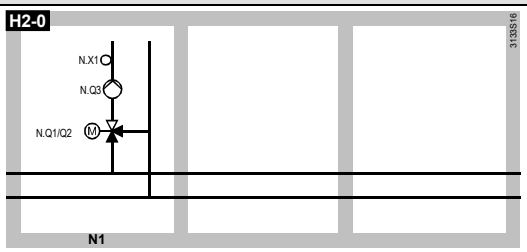
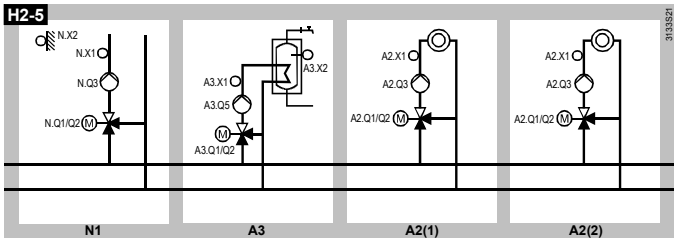
Plant types H1-x

Main controller (district heat connection) and DHW circuit, heating circuit	
H1-0	Main controller (district heat connection)
H1-1	Main controller and DHW circuit
H1-2	Main controller and 1 heating circuit
H1-3	Main controller, DHW circuit and 1 heating circuit
H1-4	Main controller and 2 heating circuits
H1-5	Main controller, DHW circuit and 2 heating circuits

Plant type	Description	Plant diagram
H1-0	**N1:** Main controller (district heat connection with heat exchanger), control of secondary flow temperature with 2-port valve in the primary return, supply to internal and external consumers.	
H1-5	**N1:** Main controller **A3:** DHW circuit (BW 4). Storage tank charging by heat exchanger controlled via mixing valve, with primary and secondary pump. **A2(1):** Heating circuit, weather-compensated. **A2(2):** Heating circuit, weather-compensated.	

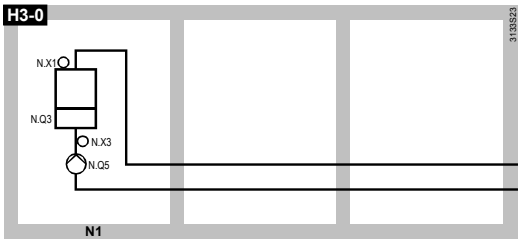
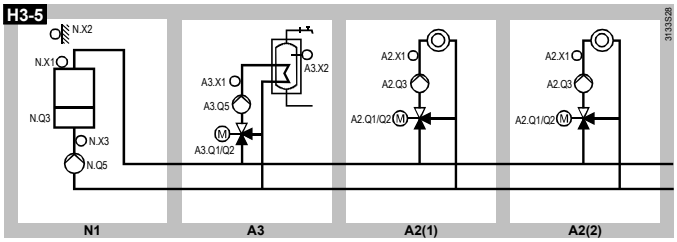
Plant types H2-x

Primary controller and DHW circuit, heating circuit	
H2-0	Primary controller
H2-1	Primary controller and DHW circuit
H2-2	Primary controller and 1 heating circuit
H2-3	Primary controller, DHW circuit and 1 heating circuit
H2-4	Primary controller and 2 heating circuits
H2-5	Primary controller, DHW circuit and 2 heating circuits

Plant type	Description	Plant diagram
H2-0	**N1:** Demand-compensated primary controller with mixing valve and circulating pump, supply to external consumers.	
H2-5	**N1:** Primary controller, weather-compensated. **A3:** DHW circuit (BW 2). With storage tank flow controlled via mixing valve and charging pump. **A2(1):** Heating circuit, weather-compensated. **A2(2):** Heating circuit, weather-compensated.	

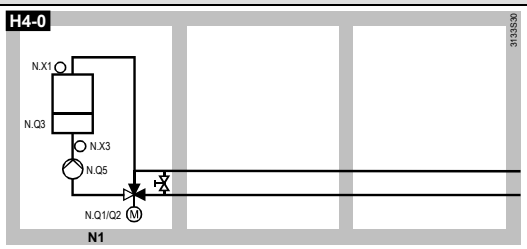
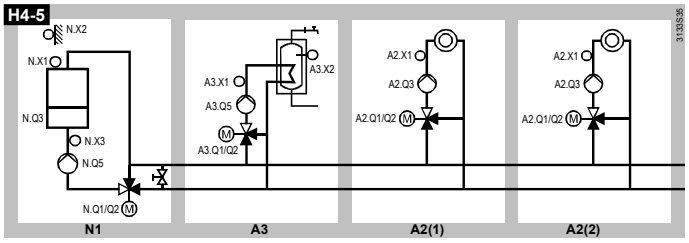
Plant types H3-x

Boiler temperature control and DHW circuit, heating circuit	
H3-0	Boiler temperature control
H3-1	Boiler temperature control and DHW circuit
H3-2	Boiler temperature control and 1 heating circuit
H3-3	Boiler temperature control, DHW circuit and 1 heating circuit
H3-4	Boiler temperature control and 2 heating circuits
H3-5	Boiler temperature control, DHW circuit and 2 heating circuits

Plant type	Description	Plant diagram
H3-0	**N1:** Boiler temperature control with 1-stage burner and boiler pump.	
H3-5	**N1:** Boiler temperature control. **A3:** DHW circuit (BW 2). With storage tank flow controlled via mixing valve and charging pump. **A2(1):** Heating circuit, weather-compensated. **A2(2):** Heating circuit, weather-compensated.	

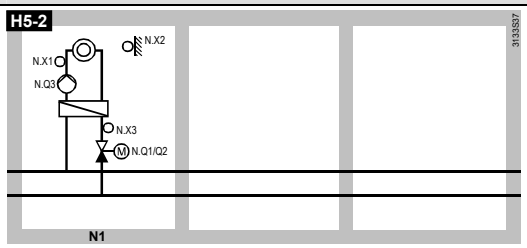
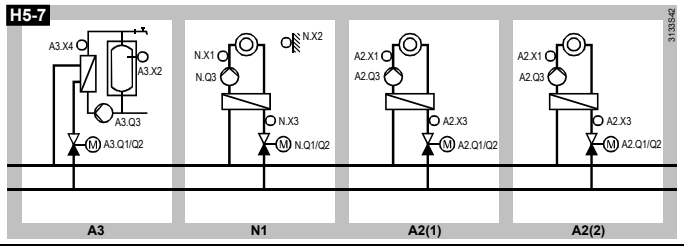
Plant types H4-x

Boiler temperature control with maintained return temperature and DHW circuit, heating circuit	
H4-0	Boiler temperature control with maintained return temperature
H4-1	… and DHW circuit
H4-2	… and 1 heating circuit
H4-3	… and DHW circuit and 1 heating circuit
H4-4	… and 2 heating circuits
H4-5	… and DHW circuit and 2 heating circuits

Plant type	Description	Plant diagram
H4-0	**N1:** Boiler temperature control with 1-stage burner and boiler pump, maintained return temperature controlled via mixing valve.	
H4-5	**N1:** Boiler temperature control. **A3:** DHW circuit (BW 2). With storage tank flow controlled via mixing valve and charging pump. **A2(1):** Heating circuit, weather-compensated. **A2(2):** Heating circuit, weather-compensated.	

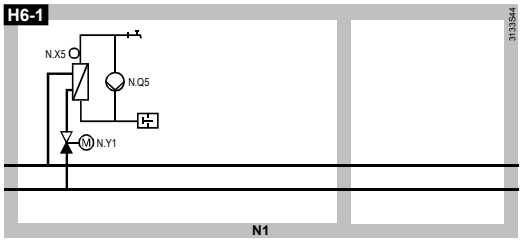
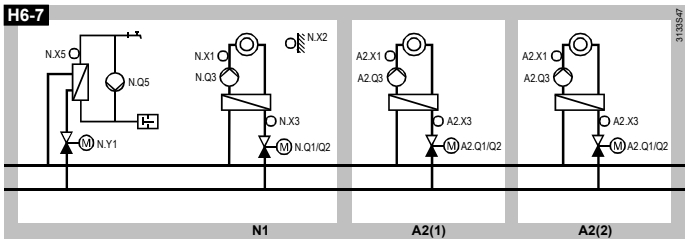
Plant types H5-x

Weather-compensated heating circuit control via heat exchanger and DHW circuit, heating circuit	
H5-2	Weather-compensated heating circuit control via heat exchanger ...
H5-3	… and DHW circuit
H5-4	… and 2 heating circuits
H5-5	… and DHW circuit and 2 heating circuits
H5-6	… and 3 heating circuits
H5-7	… and DHW circuit and 3 heating circuits

Plant type	Description	Plant diagram
H5-2	**N1:** Weather-compensated heating circuit control via heat exchanger connected to uncontrolled header, with 2-port valve in the primary return.	
H5-7	**A3:** DHW circuit (BW 3). With storage tank charging via heat exchanger connected to uncontrolled header. **N1:** Heating circuit, weather-compensated. **A2(1):** Heating circuit, weather-compensated. **A2(2):** Heating circuit, weather-compensated.	

Plant types H6-x

Direct DHW consumption via heat exchanger and heating circuit	
H6-1	Direct DHW consumption via heat exchanger
H6-3	… and 1 weather-compensated heating circuit
H6-5	… and 2 weather-compensated heating circuits
H6-7	… and 3 weather-compensated heating circuits

Plant type	Description	Plant diagram
H6-1	**N1:** Direct DHW consumption (BW 6) via heat exchanger connected to uncontrolled header, with circulating pump.	
H6-7	**N1:** DHW circuit (BW 6) and heating circuit, weather-compensated. **A2(1):** Heating circuit, weather-compensated. **A2(2):** Heating circuit, weather-compensated.	

Designations of devices in the plant diagrams

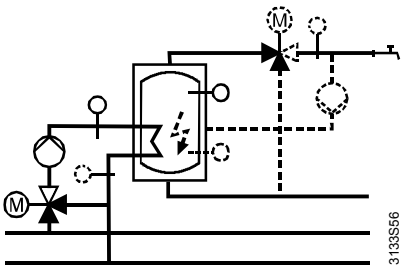
N1	Heating controller RMH760B
A2	Heating circuit module RMZ782B
A2(1)	1st heating circuit module RMZ782B (if 2 heating circuit modules are used)
A2(2)	2nd heating circuit module RMZ782B
A3	DHW module RMZ783B

Connection terminals, inputs and outputs

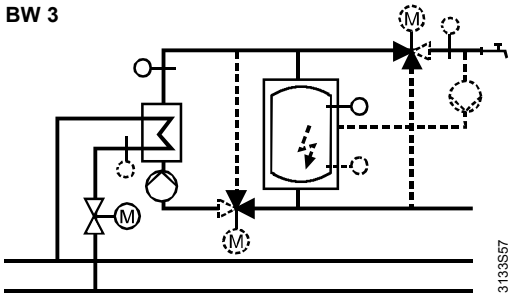
N.X1	Connection terminal X1 at heating controller RMH760B
A2.X1	Connection terminal X1 at heating circuit module RMZ782B
A3.X1	Connection terminal X1 at DHW module RMZ783B
_.X1	Universal input X1 for main control variable
_.X2...X5	Universal inputs X2...X5 for auxiliary control variables
_.Q11	Relay outputs Q11 and Q12, …

For DHW circuits, refer to H4-5 (BW 2), for example.

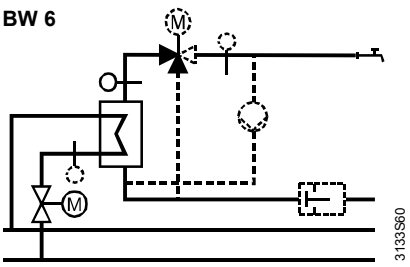
BW 2



BW 3



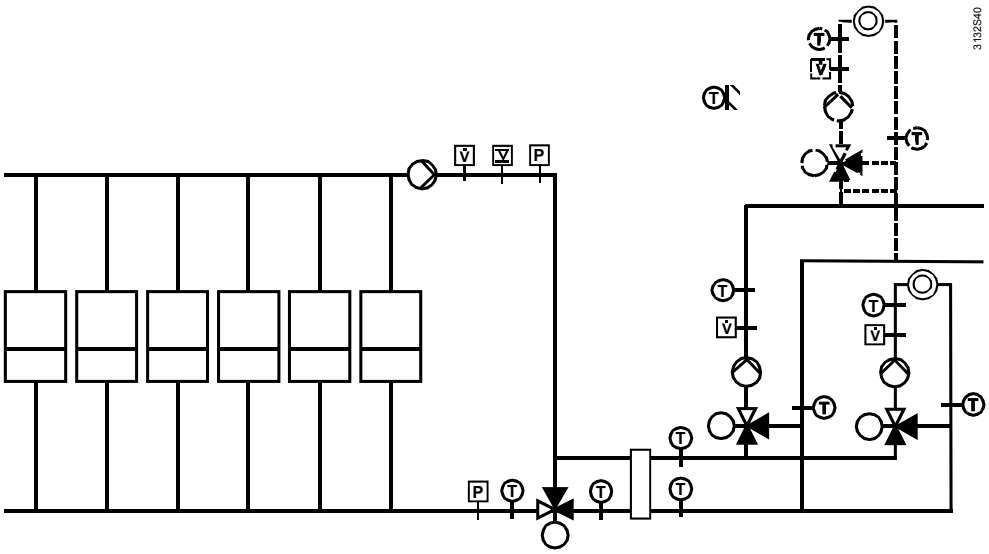
BW 6



Boiler sequence controller RMK770

Brief description

The RMK770 boiler sequence controller (see Data Sheet N3132) controls 1 to 6 heating boilers plus the boiler temperature, and can be used as a heating circuit and/or primary controller.



- Boiler sequence controller with integrated control and monitoring functions
- 18 programmed applications (tested plant types)
- Free configuration of customized applications (basis: basic type K)
- Extension modules for complementing the controller functions
- KNX bus communication for operation and process information
- Menu-driven commissioning, operation and monitoring (cleartext display)
- No commissioning tool required for basic plants (easy configuration)
- Commissioning of complex plants with the OCI700.1 service tool

Functions and characteristics

Inputs and outputs

Product no.	Digital inputs	Universal inputs	Analog outputs	Relay outputs with...	
				Ch'over contact	No contact
RMK770	2 = N.D1, N.D2	8 = N.X1...N.X8	2 = N.Y1, N.Y2	2 = N.Q1, N.Q4	5 = N.Q2, N.Q3, N.Q5, N.Q6, N.Q7

Inputs

The digital inputs N.D_ are ready configured for potential free status contacts.

The universal inputs N.X_ can be configured for use with passive sensors, active signal sources, and status and pulse signals (see page 28).

Note: The universal inputs N.X_ of the RMK770 boiler sequence controller cannot be configured for use with NTC 575 sensors.

Outputs

The analog outputs NY_ and relay outputs N.Q_ are ready configured.

Extension modules

Number of modules	Extension module	Universal inputs	Analog outputs	Relay outputs with…	
				Ch'over contact	NO contact
3	Universal module RMZ785	8	--	--	--
3	Universal module RMZ787	4	--	1	3
3	Universal module RMZ788	4	2	1	1
3	Universal module RMZ789	6	2	2	2

Maximum number of modules: 3 per RMK770 (for extension modules, see page 57)

Types of plant

- Heat generation with a maximum of 6 boilers
- Heating sections of ventilation or air conditioning plants
- Heating systems with own heat generation
- Basic load heating systems

General functions

- Up to 7 control systems with modulating output (3-position or DC 0…10 V) acting on …
  - modulating burner,
  - heating circuit with mixing valve,
  - precontrol with mixing valve,
  - maintained return temperature with mixing valve.
- Control of a maximum of 7 pumps (single or twin pumps or combinations of them, e.g. 4 single pumps and 3 twin pumps)
- Monitoring pump overloads and pump flow
- Fault indication with red LED, acknowledgement with button
- 2 fault relays and 4 fault status inputs can be configured

Boiler sequence control

- Acquisition and evaluation of main flow and main return temperature
- Sequence control of a maximum of 6 boilers
- Definition of boiler sequence (lead boiler):
  - Automatically: Lead boiler changes based on parameter settings (boiler sequence mode: Auto)
  - Manually (selection of boiler via operator unit)
  - With signal via digital input
- 3 fault signal inputs, preconfigured for over-/underpressure and water shortage
- Acquisition and evaluation of heat requests (external setpoint, external DHW request and frost protection via the KNX bus)
- Control outputs for up to 7 single or twin pumps
- Mixing valve and pump overrun, mixing valve and pump kick, frost protection

Control functions

Control of boiler temperature – in general

- Control of boiler temperature (max. 6 boilers) with 1-stage, 2-stage or modulating burner (individual boiler settings)
- P- or PI control action (PID for the control of modulating burners)
- Island mode for boiler 1, which means autonomous operation of boilers 2…6

Control of boiler temperature – per boiler

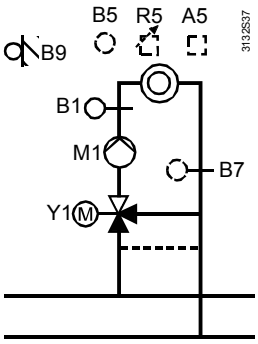
- Control of boiler temperature with 1-stage, 2-stage or modulating burner (3-position or DC 0…10 V with feedback signal)
- Acquisition of flue gas temperature, alarm when limit value is reached
- Maximum and minimum limitation of boiler temperature
- Maintained return temperature controlled via mixing valve (3-position or DC 0…10 V), or with bypass pump
- Control of a shutoff valve, with feedback signal
- Selection of boiler operating mode

- Limitation of minimum burner on time and return temperature
- Protective boiler startup. Boiler release, either automatically or manually
- Flue gas measuring mode (boiler test mode, "Chimney sweep" function)
- 3 fault signal inputs, preconfigured for over-/underpressure and water shortage in the boiler or in the hydraulic plant
- Burner hours run counter and burner start counter

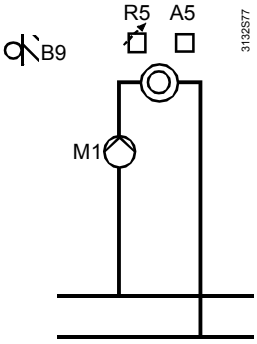
Heating circuit control

In addition to boiler sequence control and boiler temperature control (boilers 1…6), the RMK770 provides the following functions:

Weather-compensated heating circuit control



Weather-compensated pump heating circuit



A5 Room unit (optional)
B1 Flow sensor
B5 Room sensor (optional)
B7 Return sensor (optional, for maximum limitation)
B9 Outside sensor
M1 Heating circuit pump
R5 Remote setpoint adjuster (optional)
Y1 Mixing valve

- Adjustable setpoint for the room operating modes: Comfort, Precomfort, Economy, and Protection
- 7-day program (6 switching points per day) and yearly program for holidays/ special days (16 periods of time)
- Adjustable room influence
- Optimum start and stop control
- Boost heating and quick setback
- Room model for room functions without room sensor
- Automatic heating limit for demand-dependent control of heating system with adjustable heating limits for Comfort and Economy mode
- Automatic changeover to summer operation (heating off)
- Maximum limitation of room temperature
- Minimum and maximum limitation of flow temperature
- Maximum limitation of return temperature
- Limitation of rate of increase of flow temperature
- Valve overrun and valve kick
- Pump overrun and pump kick
- Outside temperature-dependent frost protection for plant and building
- Heating circuit connection to the main header or the precontrolled header

Precontrol

- Acquisition and evaluation of heat requests (external setpoint, external DHW request and frost protection via the KNX bus)
- Demand-compensated main control via mixing valve (3-position or DC 0….10 V), or via the system pump in the main flow
- Minimum and maximum limitation of flow temperature
- Maximum limitation of return temperature
- Maintained return temperature without/with separate mixing valve

Basic type K

The RMK770 boiler sequence controller is supplied with basic type K. It represents the basis for the free configuration of customized applications.

Plant types

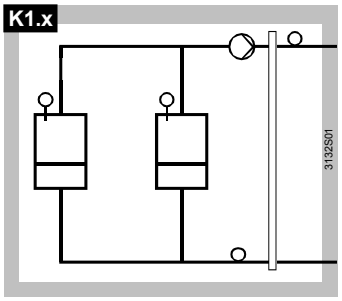
The RMK770 boiler sequence controller is supplied with 18 plant types. They represent combinations of heating plants.

Optimization

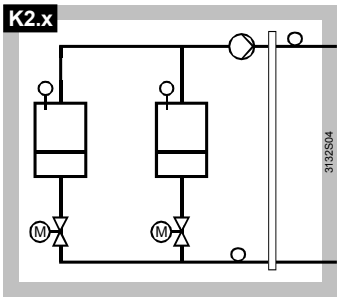
To ensure optimum plant operation, the various plant types are configured with boiler sensor, main flow sensor and main return sensor.

Types of hydraulic circuit

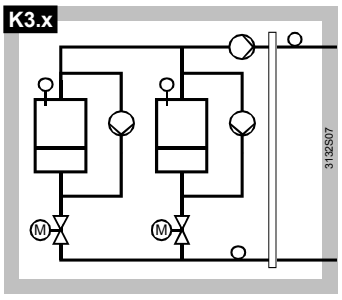
The 6 hydraulic circuit types K1.x through K6.x form the plant type basis in the boiler sequence controller. Each type of hydraulic circuit has 2 boilers; extensions up to 6 boilers are possible.



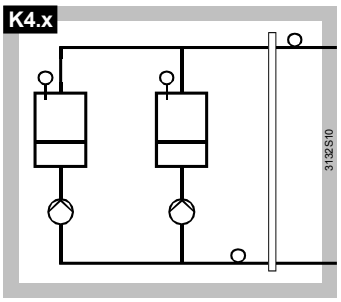
Multiboiler plant with:
- 1 main pump in the common boiler flow



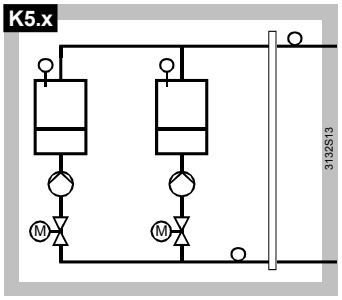
Multiboiler plant with:
- 1 main pump in the common boiler flow
- 1 shutoff valve in the return of each boiler



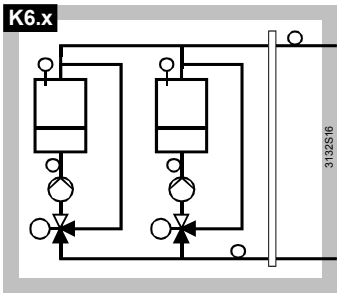
Multiboiler plant with:
- 1 main pump in the common boiler flow
- 1 bypass pump of each boiler
- 1 shutoff valve in the return of each boiler



Multiboiler plant with:
- 1 pump in the return of each boiler



Multiboiler plant with:
- 1 pump in the return of each boiler
- 1 shutoff valve in the return of each boiler



Multiboiler plant with:
- 1 pump in the return of each boiler
- Maintained return temperature of each boiler with mixing valve (modulating or 3-position)

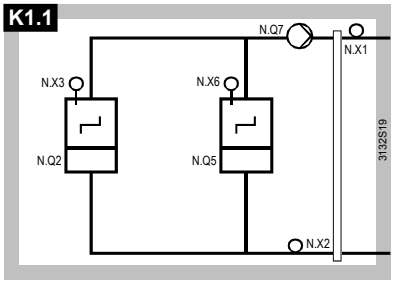
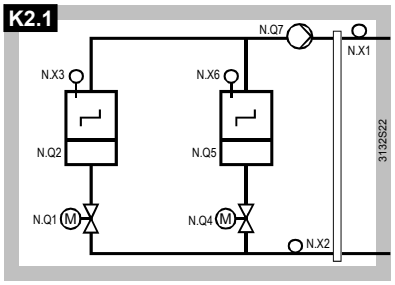
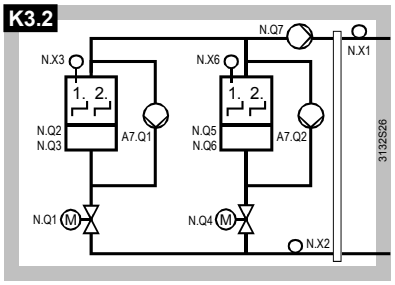
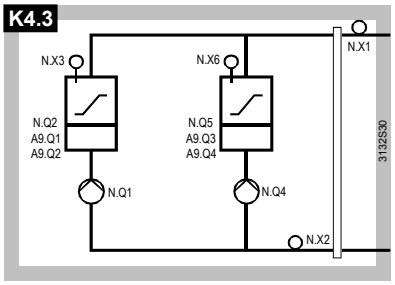
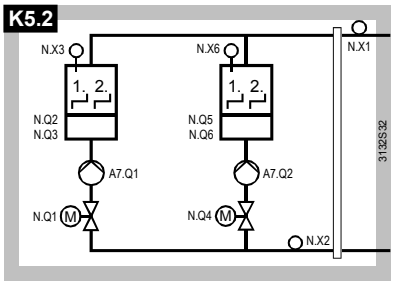
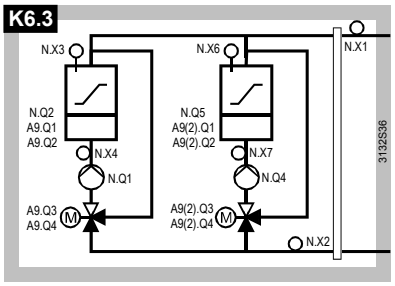
Burner types

The type of burner can be selected for every type of hydraulic circuit:

- K_.1 1-stage burner, optionally modulating burner (DC 0…10 V)
- K_.2 2-stage burner
- K_.3 Modulating burner with 3-position control

The 6 hydraulic circuit types K1.x through K6.x and the 3 selectable burners K_.1 through K_.3 produce the 18 plant types K1.1, K1.2, K1.3, K2.1, ..., K6.3.

Plant types K_._ Selection of 6 plant types out of a total of 18 (see Data Sheet N3132)

Plant type	Description	Plant diagram
K1.1	Multiboiler plant with 1-stage burner: - 1 main pump in the common boiler flow Functions: - Boiler temperature control with 1-stage burner; optionally with modulating burner and modulating control DC 0…10 V - Control of main flow or main return temperature - Control of main pump	
K2.1	Multiboiler plant with 1-stage burner: - 1 main pump in the common boiler flow - 1 shutoff valve in the return of each boiler Functions: - Boiler temperature control with 1-stage burner; optionally with modulating burner and modulating control DC 0…10 V - Control of shutoff valve in the boiler return - Control of main flow or main return temperature - Control of main pump	
K3.2	Multiboiler plant with 2-stage burner: - 1 main pump in the common boiler flow - 1 bypass pump per boiler and 1 shutoff valve in the return of each boiler Functions: - Boiler temperature control with 2-stage burner - Control of main flow or main return temperature - Control of main pump - Control of boiler bypass pump - Control of shutoff valve in the boiler return Extension module RMZ787 required.	
K4.3	Multiboiler plant with modulating burner: - 1 bypass pump per boiler Functions: - Gas-fired heating boilers with modulating burners - Control of boiler bypass pump - Control of main flow or main return temperature Extension module RMZ789 required.	
K5.2	Multiboiler plant with 2-stage burner: - 1 boiler return pump per boiler and 1 shutoff valve in the return of each boiler Functions: - Boiler temperature control with 2-stage burner - Control of boiler return pump - Control of shutoff valve in the boiler return - Control of main flow or main return temperature Extension module RMZ787 required.	
K6.3	Multiboiler plant with modulating burner: - 1 boiler return pump per boiler - Maintained return temp. with mixing valve for each boiler (mod. or 3-pos) Functions: - Boiler temperature control with modulating burner and 3-position control - Maintained return temperature with controlled boiler return temperature and 3-position control (optionally DC 0…10 V) - Control of boiler circuit pump - Control of main flow or main return temperature 2 extension modules RMZ789 required.	

Switching and monitoring device RMS705B

Brief description

The RMS705B switching and monitoring device (see Data Sheet N3124) is for use in HVAC and chilled water plants. The functions provided by the RMS705B are very universal.

- Choice of switching and monitoring functions combined with mathematical and physical operations (calculations based on self-generated formulas, minimum, maximum, average and enthalpy calculations, signal doubler/inverter)
- Lead-lag control of pumps, fans, refrigeration machines, motors, etc., with automatic changeover
- P-, PI or PID universal controller with limitation function and Economy setpoint
- Data acquisition: Pulse count (for display purposes), operating hours count, trend display of data and event logging (e.g. for the "Legionella" function)
- Freely configurable (device supplied with empty application of basic type S)
- Simulation of input terminals for engineering and commissioning phases
- Connection of RMZ785, RMZ787 and RMZ788 extension modules, thus providing additional inputs for display and monitoring/alarming
- Up to 32 universal transmit and reception zones per line for data exchange via KNX in LTE and S-mode
- KNX bus communication for operation and process information
- Menu-driven commissioning, operation and monitoring (cleartext display)
- No commissioning tool required for basic plants (easy configuration)
- Commissioning of complex plants with the OCI700.1 service tool

Functions and characteristics

Inputs and outputs

Product no.	Universal inputs	Analog outputs DC 0...10 V	Relay outputs with…	
			Ch'over contact	NO contact
RMS705B	8 = N.X1…N.X8	4 = N.Y1…N.Y4	2 = N.Q1, N.Q4	4 = N.Q2, Q3, Q6, Q7

Inputs

The universal inputs N.X_ can be configured for use with passive sensors, active signal sources, and status and pulse signals (see page 28).

Outputs

The analog outputs N.Y_ and relay outputs N.Q_ are ready configured.

Extension modules

Number of modules	Extension module type	Universal inputs	Analog outputs	Relay outputs with…	
				Ch'over contact	NO contact
2	Universal module RMZ785	8	--	--	--
2	Universal module RMZ787	4	--	1	3
2	Universal module RMZ788	4	2	1	1
Maximum number of modules: 4 per RMS705B (for extension modules, see page 57)					

Applications on plant side

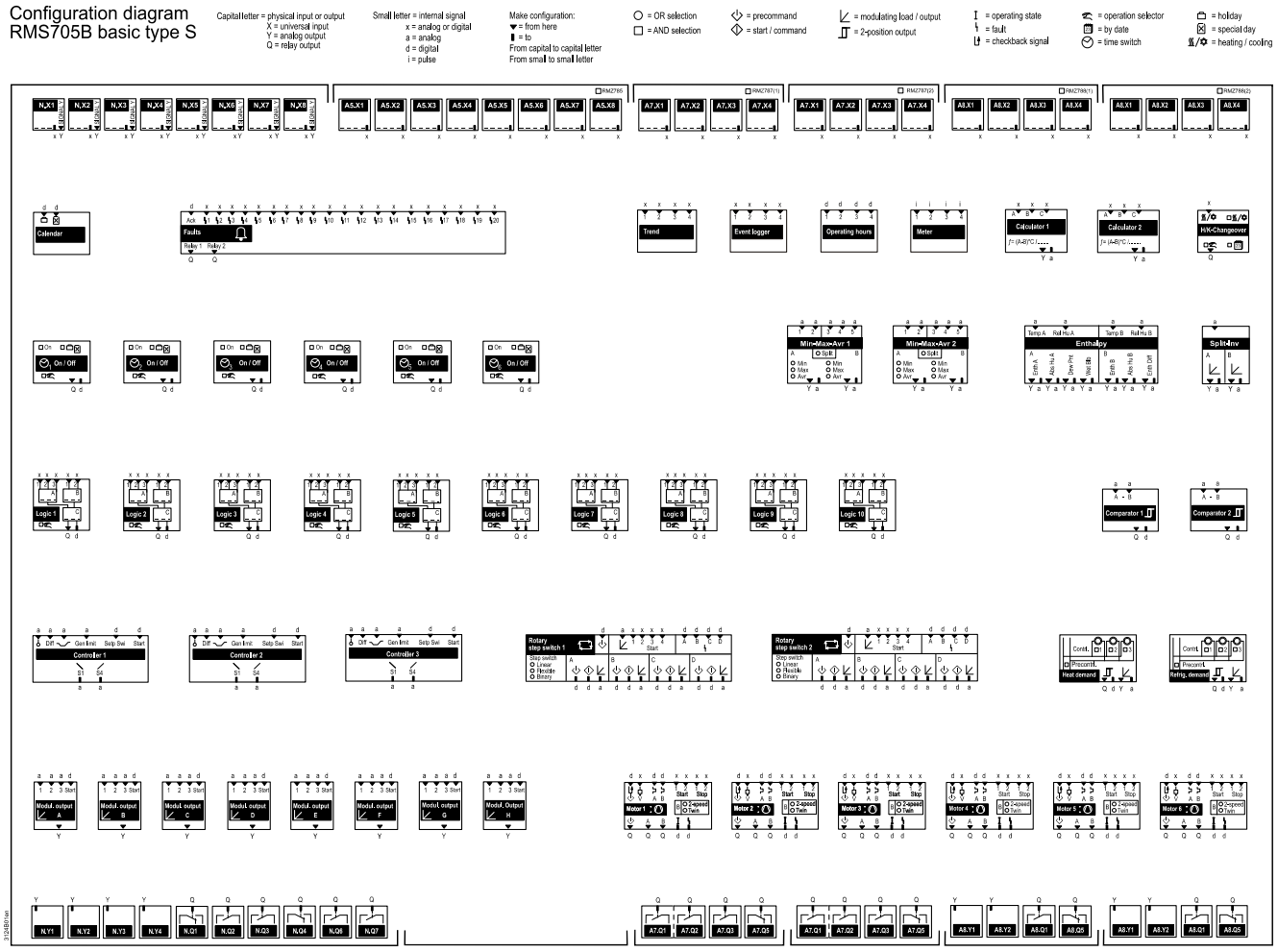
The RMS705B switching and monitoring device is for use in heating, ventilation and refrigeration plants. It allows the free configuration of control and monitoring loops with different types of function blocks.

The device comes without any programmed applications. Like with all Synco 700 controls, once an application is created, it can be archived and reused for further identical or modified applications.

Configuration diagram RMS705B and function blocks

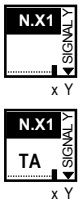
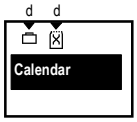
Basic type S

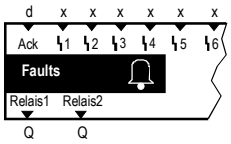
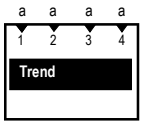
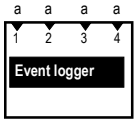
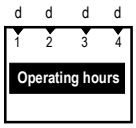
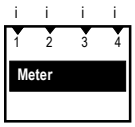
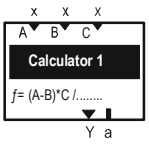
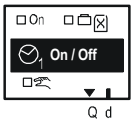
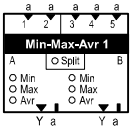
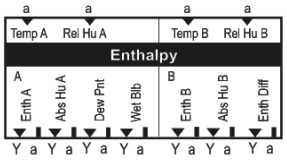
Basic type S represents the empty application for free configuration. In the configuration diagrams, the input and output functions (that is, their internal signals) are connected to the inputs and outputs.

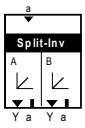
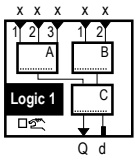
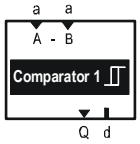
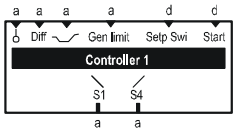
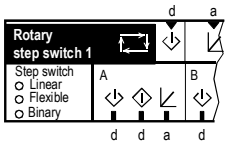
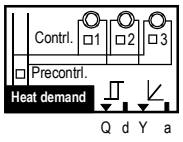
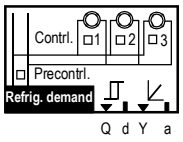
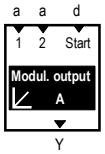
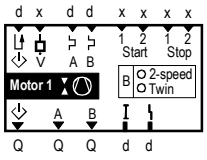


Function blocks

The following table gives a brief description of all function blocks integrated in the RMS705B switching and monitoring device. The large number of function blocks clearly demonstrate the universal use of the product.

Inputs	Functions
	- Universal input for entry of input identifier and units: °C, %, g/kg, kJ/kg, W/m², m/s, bar, mbar, Pa, ppm, display 000.0 (with 1 decimal place), 0000 (without decimal place) - Input for: LG-Ni1000, 2x LG-Ni1000 (averaging), T1, Pt1000, DC 0…10 V, digital (potential free contacts), pulses up to 25 Hz (mechanical signal sources, Reed contact), 100 Hz (el. signal sources) - Each input can be assigned a name (e.g. OT for outside temperature) - Connection of outside temperature sensor to terminals or outside temperature via the KNX bus - Special identifiers: Outside temperature, remote setpoint adjuster (internal connections)
Calendar	**Functions**
	- Holiday and special day input: Digital input for holidays (selectable room operating mode) or special day (special day program of time switch) - Selection whether holidays/special day zone shall operate autonomously, as a slave (holidays/ special day information via KNX bus) or master (sends holidays/special day information via the KNX bus)

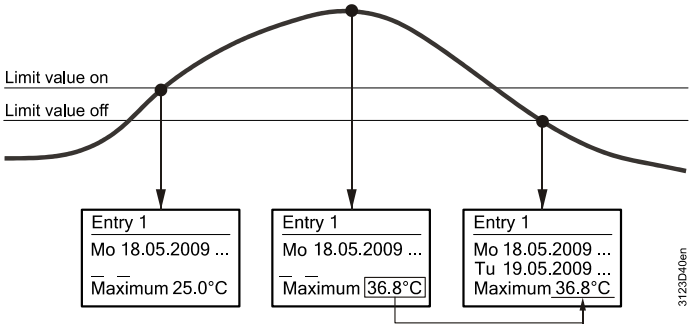
Faults	Functions
	- 20 fault status inputs, fault status message delay, fault acknowledgement (none, acknowledge), fault priority (urgent, nonurgent) can be selected - 2 fault relays, priority (urgent, nonurgent, all) and signaling can be selected - Direct connection of analog signals, adjustable threshold values - Each fault signal input can be assigned a name
Trend	**Functions**
	- 4 autonomous trend channels, 2 of them simultaneously - Logging the progression of signals of local inputs, room and outside temperature via the KNX bus - Views: 8-minute, 8-hour, 24-hour and 6-day history
Event logger	**Functions**
	- Event logger for up to 10 events and their duration - Adjustable limit values - Fault status messages when minimum or maximum event cycle time is crossed and when minimum or maximum event duration is crossed
Operating hours	**Functions**
	- Acquisition of the number of operating hours - Functionality: Setting the start value - Display of the current number of operating hours - Editable service message, selectable interval (e.g. every 500 hours)
Meter	**Functions**
	- Acquisition of pulse sources and display of cumulated values, selectable unit, valency, presentation, etc.
Calculator	**Functions**
	2 calculators - Conversion of input values to output values according to self-generated formulas - Calculation using the 4 basic operations, plus raising to a power and root extraction ($n^{0.5}$). - Self-generated (maximum 20 characters), e.g. for solar yield, volumetric flow, etc.
Heating/cooling ch'over	**Functions**
	- Changeover of operating mode (heating/cooling) in 2-pipe systems - Changeover via digital or analog input, operating mode selector (Auto, Heating, Cooling), or according to date or via KNX - Heating/cooling signal can be sent via KNX or delivered via relay
Time switch	**Functions**
	6 time switches - 1 channel for time switch on/off - 7 days + special day, 6 switching points per day - Holidays/special day program - Operating mode selector (Auto, On, Off)
Min-Max-Avr	**Functions**
	2 function blocks - Minimum/maximum selection and averaging of 5 input values, or minimum/maximum selection and averaging of 2 and 3 input values (split) - 2 continuous signals DC 0…10 V
Enthalpy	**Functions**
	- Following are calculated from temperature and relative humidity: Enthalpy, absolute humidity, dewpoint temperature, wet bulb temperature, and enthalpy differential - Pressure adjustment for location of plant (elevation above sea level)

Split-Inv	Functions
	- Splitting input signals into 2 DC 0…10 V outputs and inversion of output signals (inversion selectable) - Doubling of signal for sequential control of pumps, valves, and fans
Logic functions	**Functions**
	10 logic blocks - Generation of digital signal from continuous input signals - Selectable logic functions: AND, NAND, OR, NOR, EXOR and EXNOR for logic A, B and C - Operating mode selector (Auto, On, Off), including manual control - Adjustable output signal delay times
Comparator	**Functions**
	2 comparators - Comparison of 2 analog input signals - Adjustable output signal delay times
Universal controllers	**Functions**
	3 universal controllers, can be used as P-, PI or PID controllers. 2 sequences (heating sequence, cooling sequence) - Control to an absolute variable or a differential - Heating and cooling setpoints individually adjustable - Universal setpoint shift depending on some other variable or via the remote setpoint adjuster - Setpoint changeover between operating modes with digital input - Adjustable control timeout, controller can be activated via start input - Each controller can be assigned a name
Rotary step switch	**Functions**
	2 rotary step switches - Step switch characteristics can be selected: Linear step switch (max. 4 steps), or Flexible step switch (max. 4 steps), or Binary step switch (max. steps) - Lead-lag control of aggregates with automatic changeover
Heat demand	**Functions**
	- Collection of heat demand via the KNX bus (acquisition of demand in the selected zone) - Forwarding heat demand (e.g. for control of a central pump) - Forwarding heat demand as a continuous output signal (°C) - Forwarding demand signals to some other distribution zone on the KNX bus
Refrigeration demand	**Functions**
	- Collection of cooling energy demand via the KNX bus (acquisition of demand in the selected zone) - Forwarding cooling energy demand (e.g. for control of a central pump) - Forwarding cooling energy demand as a continuous output signal (°C) - Forwarding demand signals to some other distribution zone on the KNX bus
Modulating output	**Functions**
	8 function blocks for continuous signals DC 0…10 V (e.g. for valve position) - Load signal from controller (max. 2 sequences with maximum selection) - Adjustable "Positioning signal minimum" and "Positioning signal maximum" - Inversion selectable - Release via start input
Motor	**Functions**
	6 universal motor blocks, can be used for 1-speed, 2-speed or twin motors - Changeover of run priority: Automatically, manually, in the event of fault - Configurable flow supervision, overload signal, and precommand function - Status signal: Operating state and fault. Operating hours count per motor block - Configurable motor start and stop conditions, adjustable delay times - Locking the second speed at low outside temperatures - Motor kick and on at low outside temperatures

Examples

Event logger

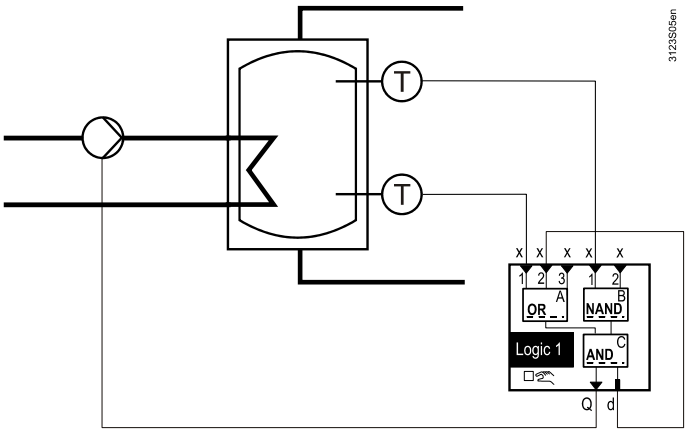
Monitoring and recording mandatory events and functions (e.g. "Legionella" function).



Monitoring of maximum value:
If data point "Limit value on" > "Limit value off", the maximum value is monitored and displayed by the event logger under "Maximum".

Logic function block

Logic relationships of universal inputs

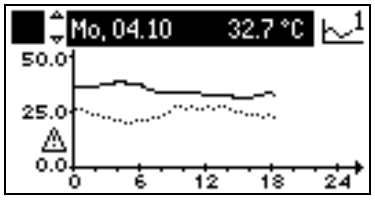


The measured value at input 1, OR Logic A, gives the switch on command for storage tank charging.
The measured value at input 1, NAND Logic B, ends charging.

Operating line	Setting value
[Logic A] function	OR
[Logic B] function	NAND
[Logic C] function	AND
[Logic A switching value 1] on	30 °C
[Logic A switching value 1] off	35 °C
[Logic B switching value 1] on	65 °C
[Logic B switching value 1] off	60 °C

Trend function

Logging measuring variables



24-hour log showing primary trend (solid line) and reference trend of an additional channel (dotted line)

Central control unit RMB795B

Brief description

The RMB795B central control unit (see Data Sheet N3122) is used to control, monitor and operate room groups with RXB/RXL room controllers or RDF/RDU/RDG room thermostats.

- Management of 10 autonomous room groups with up to 63 room controllers or room thermostats per room group and line in a KNX network
- Control unit for central use, with selectable time, calendar and special day programs and predefined setpoints
- Yearly time switch with automatic summer-/wintertime changeover
- Time master for RX.. room controllers and RD.. room thermostats
- Monitoring of highest/lowest room temperature per room group
- Monitoring of RX.. room controllers and RD.. room thermostats
- Forwarding requests to the primary side
- Consumption data acquisition from pulse counters (gas, hot water, chilled water, electricity; for display only, not for billing purposes)
- 10 freely configurable logic function blocks
- 4 autonomous trend channels to log measuring variables of local inputs and, via KNX, room temperatures and the outside temperature
- Up to 32 universal transmit and reception zones per line for data exchange via KNX in LTE and S-mode
- 1 freely configurable application based on basic type B
- Optimum start control: Before "Comfort" mode applies, rooms can be preheated or precooled to the required temperature
- Priority of setpoints: It can be selected on the central control unit whether the unit's setpoints shall always have priority in the room controllers (e.g. in workshops) or not in "Comfort" mode (in office spaces) or only when changed (in hotel rooms), that is, whether they shall be overwritten
- Air flow balancing VAV: Settings "Simulation VAV supply air" and "Simulation VAV extract air" activate the supply or extract air fan of the ventilation plant and the respective VAV boxes open, enabling the volumetric air flow to be balanced with the maximum air volume
- Fire alarm off: In an emergency, the devices assigned to a room group can be switched off via input signal
- Smoke extraction: A room group can be switched to "Smoke extraction" mode via 1 or 2 input signals
- 2-pipe system: The central control unit forwards changeover signal "Heating/cooling" via the KNX bus to the room controllers
- KNX bus communication for operation and process information
- Menu-driven commissioning, operation and monitoring (cleartext)
- No commissioning tool required for basic plants (easy configuration)
- Complex plants are commissioned with the OCI700.1 service tool

Functions and characteristics

Inputs and outputs

Product no.	Universal inputs	Analog outputs DC 0...10 V	Relay outputs with…	
			Ch'over contact	NO contact
RMB795B	6 = N.X1…N.X6	2 = N.Y1, N.Y2	1 = N.Q1	3 = N.Q2, Q3, Q5

Inputs

The universal inputs N.X_ can be configured for use with passive sensors, active signal sources, and status and pulse signals (see page 28).

Outputs

The analog outputs N.Y_ and relay outputs N.Q_ are ready configured.

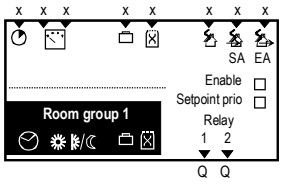
Extension modules

Number of modules	Extension module	Universal inputs	Analog outputs	Relay outputs with…	
				Ch'over contact	NO contact
1	Universal module RMZ785	8	--	--	--
2	Universal module RMZ787	4	--	1	3
Maximum number of modules: 3 per RMB795B (for extension modules, see page 57)					

Device-specific function blocks

The RMB795B central control unit has 2 device-specific function blocks a description of which is given below (FB = function block(s)).

FB "Room group"



Function blocks "Room group 1...10" control the operation of 1 to 10 room groups (see configuration diagram on the left).

Features:

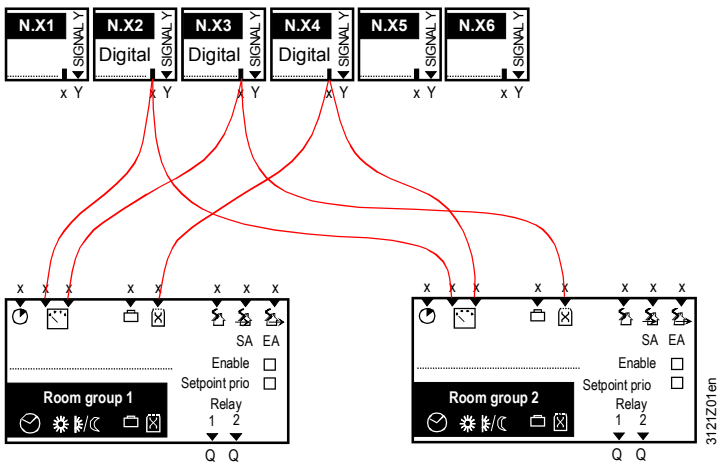
- A room group serves a maximum of 63 RX.. room controllers or RD.. room thermostats, delivering the same …
  - room operating modes, room temperature setpoints, setpoint readjustments (summer/winter compensation), and emergency modes,
  - application operating modes (controller mode: Auto, Night_Purge, etc.),
  - extra functions, such as "Night cooling", can be activated, depending on the application.
- Each room group has its own 7-day program (6 switching points per day); time switch entries can be copied
- Each room group has its own calendar (16 programmable time periods), which can also act on several time switches or room groups
- 1 to 3 individual rooms of a room group can be defined as reference rooms and determine the preselection of the "Night cooling" function. The display of the RMB795B shows the temperatures of the reference rooms per room group
- The currently highest and lowest room temperature of each room group is displayed (overview of temperature distribution in a room group)

Room operating modes

Room operating mode		Explanation
Comfort		Operating mode for occupied rooms
Precomfort		Energy-saving operating mode for rooms
Economy		Plant off. Minimum/maximum room temperature ensured (sustained mode)
Protection		Plant off. Frost protection active

Example: Configuration of room groups 1 and 2

The same operating mode for several room groups can be preselected via universal inputs N.X_ (digitally configured for timer, manual switch), but the setpoints of the room groups can differ.



FB "H/C changeover"

Operating mode changeover from heating to cooling, or vice versa, takes place via function block "H/C changeover".

The following types of changeover are available:

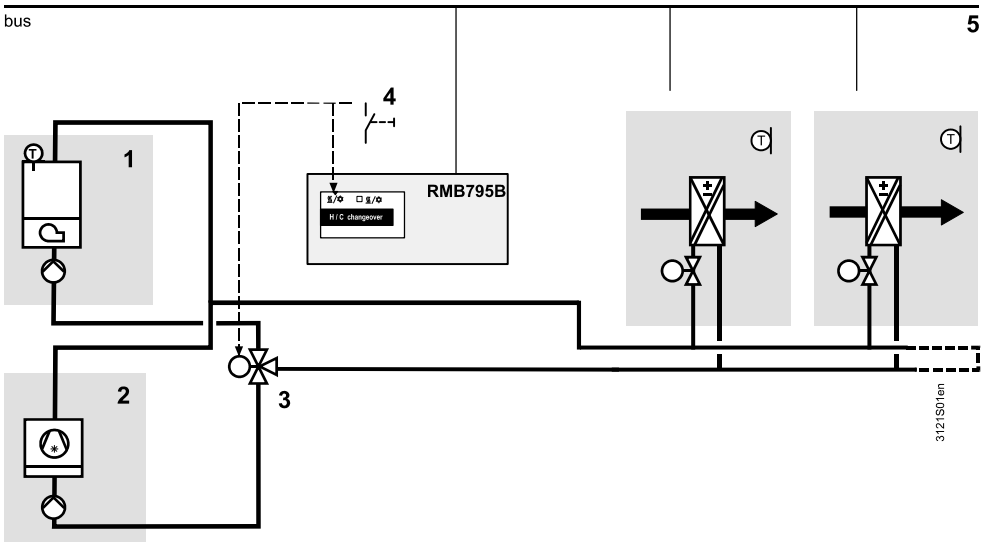
- Via the operating mode selector (manually)
- Via analog input (e.g. according to the outside temperature)
- Via digital input (e.g. with a changeover thermostat installed in the flow)
- According to a calendar date

If several types of changeover are activated, the following priorities apply:

- Operating mode selector before
- changeover input before
- calendar.

Plant example

2-pipe system "Heating/cooling" with production of heat and cooling energy. Heating/cooling changeover is effected manually via the operating mode selector.



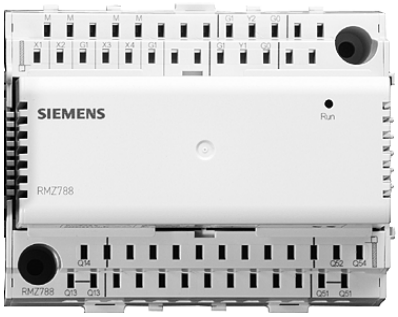
1 Production of heat
2 Production of cooling energy
3 Changeover valve
4 Manual heating/cooling changeover to changeover valve and function block "H/C changeover"
5 Forwarding of "Heating/cooling" changeover signal via the KNX bus

The RMB795B central control unit does not provide any closed loop control functions (precontrol). Its main task is to collect the request signals and to forward them to the heat or cooling energy source.

Extension modules RMZ78x

Brief description

The RMZ78x extension modules (see Data Sheets N3136 and N3146) are used to extend the scope of functions of the Synco 700 controls RM.. and to increase the number of inputs and outputs.



- Extension modules can only be attached to Synco 700 controls RM.. (cannot operate autonomously)
- Extension modules are ready to operate as soon as they are connected to one of the controls
- The modules are powered via the controls
- The modules are identified and monitored by the controls
- The exchange of data between extension modules and controls is executed by the controls. This means that the signals from the sensors, signal sources, etc. are fed to the control where they are handled. The output signals and switching commands generated by the control are forwarded to the respective extension module
- Use of the extension modules (types and numbers) depends on the type of Synco 700 control

Types and numbers

Overview

Type of extension module	Controls RM..				
	RMU7x0B	RMH760B	RMK770	RMB795B	RMS705B
Universal module RMZ785	✓	--	✓	✓	✓
Universal module RMZ787	✓	✓	✓	✓	✓
Universal module RMZ788	✓	--	✓	--	✓
Universal module RMZ789	--	✓	✓	--	--
Heating circuit module RMZ782B	--	✓	--	--	--
DHW module RMZ783B	--	✓	--	--	--
Number of modules per RM..	**4**	**4**	**3**	**3**	**4**

Universal modules

The universal modules RMZ785, …787, …788, and …789 are suited for use with all types of Synco 700 controls RM.., but consideration must be given to the type of module and their number.

Description and product no.	Universal inputs	Analog outputs	Relay outputs with…	
			Ch'over contact	NO contact
Universal module RMZ785	8	--	--	--
Universal module RMZ787	4	--	1	3
Universal module RMZ788	4	2	1	1
Universal module RMZ789	6	2	2	2

Inputs and outputs

The universal inputs N.X_ can be configured for use with passive sensors, active signal sources, and status and pulse signals (see page 28). The analog outputs N.Y_ and relay outputs N.Q_ are ready configured.

Modules for RMH760B heating controller

The extension modules RMZ782B and RMZ783B can only be used in connection with the RMH760B heating controller.

Heating circuit module RMZ782B

- Weather-compensated flow temperature control of heating circuit via heating circuit mixing valve, 3-position or DC 0...10 V
- Pump control (system or heating circuit pump)

DHW module RMZ783B

- Control of DHW heating and storage tank temperature
- Storage tank charging via the common flow, with charging pump or mixing valve
- Storage tank charging via external heat exchanger, with charging pump or mixing valve

Type of extension module	Universal inputs	Analog outputs	Relay outputs with…	
			Ch'over contact	NO contact
Heating circuit module RMZ782B	3	1	2	1
DHW module RMZ783B	4	1	3	2

Inputs

The universal inputs N.X_ can be configured for use with passive sensors, active signal sources, status and pulse signals, and sensors using NTC 575 sensing elements.

Number of inputs and outputs

Number of modules	Type of extension module	Universal inputs	Analog outputs	Relay outputs with…	
				Ch'over contact	NO contact
2	Universal module RMZ785	8	--	--	--
2	Universal module RMZ787	4	--	1	3
2	Universal module RMZ788	4	2	1	3
Maximum number of modules: 4 per RMS705B					

Example RMS705B

When using 1 RMZ785, 2 RMZ787 and 1 RMZ788 (maximum 4 modules per RMS705B), the number of inputs and outputs can be increased, adding …

- 20 universal inputs,
- 2 analog outputs,
- 10 relay outputs: 3 with changeover contact, 7 with NO contact.

The order the different module types are fitted can be freely selected. But the positions starting from the RM.. control unit must be set.

Synco 700 ancillary units

Room unit QAW740

The QAW740 room unit (see Data Sheet N1633) is a multifunctional device with KNX bus connection facility and direct power supply via the bus. The LCD shows:

- The room temperature
- The room operating mode
- Faults
- The remaining time of Comfort mode extended via the "Timer" function

The room unit has operating elements which can be used for interfering with the functions of the Synco controls. The commands are transmitted to the controllers of the same geographic zone (same zone address) via the KNX bus.

- Setting knob for room temperature setpoint readjustment (relative)
  Command to the controller: Room temperature control according to the readjusted setpoint
- "Mode" button for changeover of operating mode
  Command to the controller: Changeover to the preselected operating mode and control to the respective room temperature setpoint
- Timer button for "Timer" function
  Command to the controller: Maintain Comfort mode during the set period of time, even if the time program calls for Precomfort or Economy mode

  Note: Room unit QAW740 is not suited for use with the RXB/RXL room controllers.

Operator units RMZ790 and RMZ791

Brief description

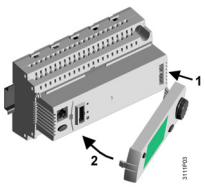
The RMZ790 and RMZ791 operator units (see Data Sheets N3111 and N3112) are used to configure, commission and operate the Synco 700 controls RM.. and to display process values, operating and plant states, plant and device faults.

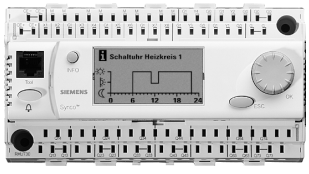
- Information and setting level for users (without access protection)
- 2 setting levels for service and commissioning (with access protection)
- Information in cleartext (presently 23 languages)
- Fast access to current plant data
- Backlit LCD (easy to read, even if light conditions are unfavorable)
- Select-and-push knob for navigation and settings. This means: Select (turn) → select menu line and push to confirm, then select (turn) → set the value and push to confirm

Operator unit RMZ790

The RMZ790 operator unit plugs into the controls with no need for using a tool.

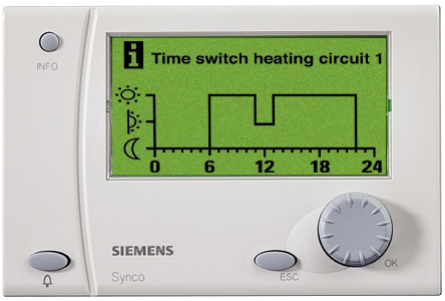
Operator unit RMZ790





Operator unit RMZ791

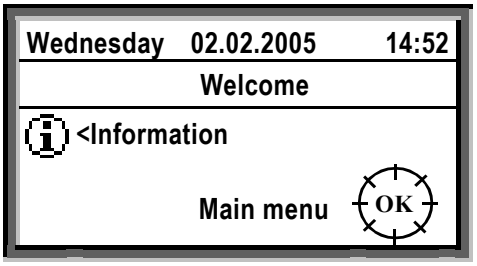
The RMZ791 operator unit is designed for flush panel mounting and can also be used as a handheld device. It is connected to the control via a 3-meter cable (supplied with the RMZ791).



Operator unit RMZ791

Commissioning with RMZ790 or RMZ791

The RMZ790 and RMZ791 operator units are designed for commissioning the Synco 700 controls.



Start page

Menu page "Commissioning"

From the start page, commissioning is effected via menu page "Commissioning". Settings that can be made under the following menu items, for example:

- Basic configuration — Plant type
- Extra configuration — Sensor and fault signal inputs (additional inputs)
- Settings — Language, time format, clock time operation
- Communication — Device and zone address
- Wiring test — Checking inputs and outputs

Wiring test — is shown when push knob is turned

Local operation with RMZ790 or RMZ791

From the start page, the information level is reached by pressing the INFO button (top left on operator unit). This level (read only) offers a quick overview:

- Current operating mode and setpoints/actual values of each control loop
- 24-hour profile of the 7-day time switch
- Plant faults and faults of the devices on the bus

From the start page, the user reaches the user level by pressing the select-and-push knob (read and write without entering a password). Clearly structured menus offer the following operating and setting choices, for example:

- Adjustment of controller setpoints
- Setting the switching times and defining the operating modes of the 7-day time switch(es)
- Acknowledgement/resetting of pending faults with the fault button on menu line "Current faults"

Bus operator unit RMZ792 series B

The RMZ792 operator unit of the B-series (see Data Sheet N3113) is used to control from a remote location Synco 700 controls, central communication units, RX.. room controllers and RD.. room thermostats in a KNX network. Basic design and dimensions are identical to the RMZ791 operator unit.

The RMZ792 bus operator unit can be installed in a control panel or can be used as a handheld device. During mobile use, the unit is powered via the KNX bus. When installed in a control panel, it operates on AC 24 V.

- Same operating philosophy as operator units RMZ790 and RMZ791
- Supports all languages used with the Synco 700 controls
- Info, user, service and password level, whereby user, service and password level have optional password protection
- Automatic device search run to find the bus devices on the KNX network
- Creation of customized device lists, e.g. with access to heating plant (plant view), or a certain building (building view)
- Device list: Automatic or manual sorting. Naming/renaming devices. Removal of individual devices from the list. Deletion of entire device list
- Up to 20 favorite pages with the most important plant and process values can be freely defined (maximum 10 per page). Sorting or deletion of favorite pages
- Fault indication: Red, illuminated button and an alarm bell symbol on the display
- List of the 20 current faults
- Fault acknowledgement by pressing the acknowledgement button
- User-defined business card for service address/telephone

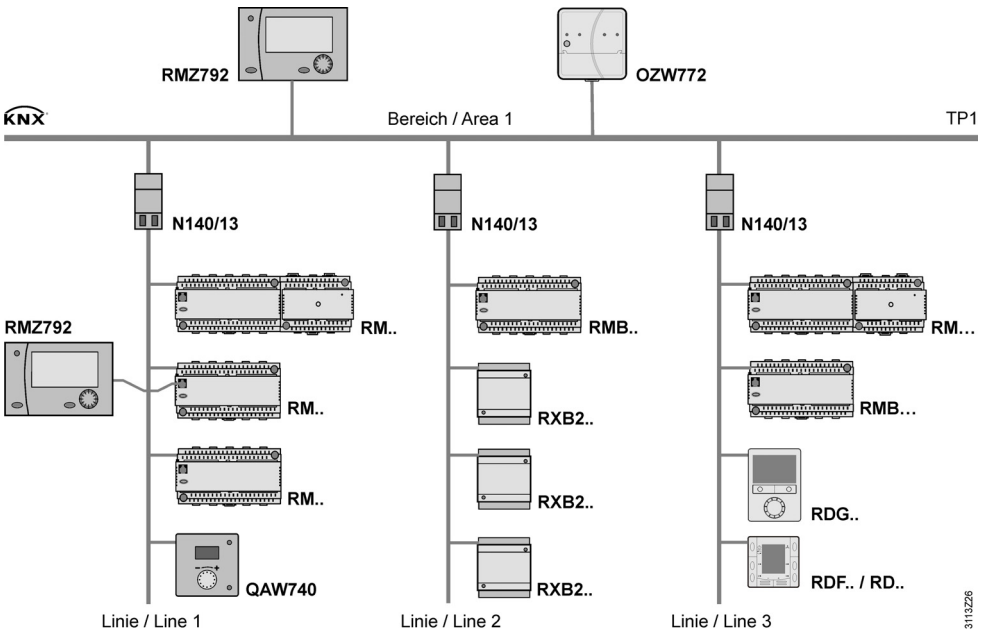
Note: Configuration and commissioning of Synco devices with the RMZ792 bus operator unit are not possible on KNX networks.

Replacement unit S/RMZ792

The RMZ792 bus operator unit of the B-series always comes with the languages currently available, including the Device Descriptions.
To operate new units in the future, a **replacement unit S/RMZ792** can be ordered.

Remote control with RMZ792

The bus operator unit allows for remote control of up to 150 devices via KNX. Access is made possible via the device list.



VAV compact controllers

Introduction

The VAV* compact controllers are used to control variable or constant volumetric air flow. They are certified by KNX and can be used in connection with all KNX devices which, in terms of application, are compatible.

* VAV = Variable Air Volume

Overview

Device	Product no.	Data Sheet
VAV compact controller, rated torque 5 Nm	GDB181.1E/KN	N3547
VAV compact controller, rated torque 10 Nm	GLB181.1E/KN	

Features and use

Features of VAV compact controllers:

- Actuator with built-in high-precision differential pressure sensor
- Rated torque 5 or 10 Nm (see product nos.)
- Angular rotation of air damper mechanically adjustable between 0° and 90°
- Control unit configurable for VAV or CAV
- Configurable as an individual controller (for one room) or for cascade control
- With connecting cable for operating voltage AC 24 V or KNX bus
- Communication via KNX in LTE mode, e.g. for VAV system solutions between primary air handling (RMU7x0B) and room thermostats (RDG400KN)
- Communication via KNX in S-mode (integration of third-party devices)

Use:

- Supply air temperature control
- Extract air temperature control
- Supply-extract air cascade control with …
  - 1-to-1 ratio control,
  - over-/underpressure ratio control,
  - over-/underpressure differential control.

Commissioning

Usually, the OEM fits the entirely factory-configured VAV compact controllers in the box. This simplifies commissioning on site.

However, if changes to the configuration or settings become necessary, the VAV compact controllers can be commissioned in KNX networks via the following tools:

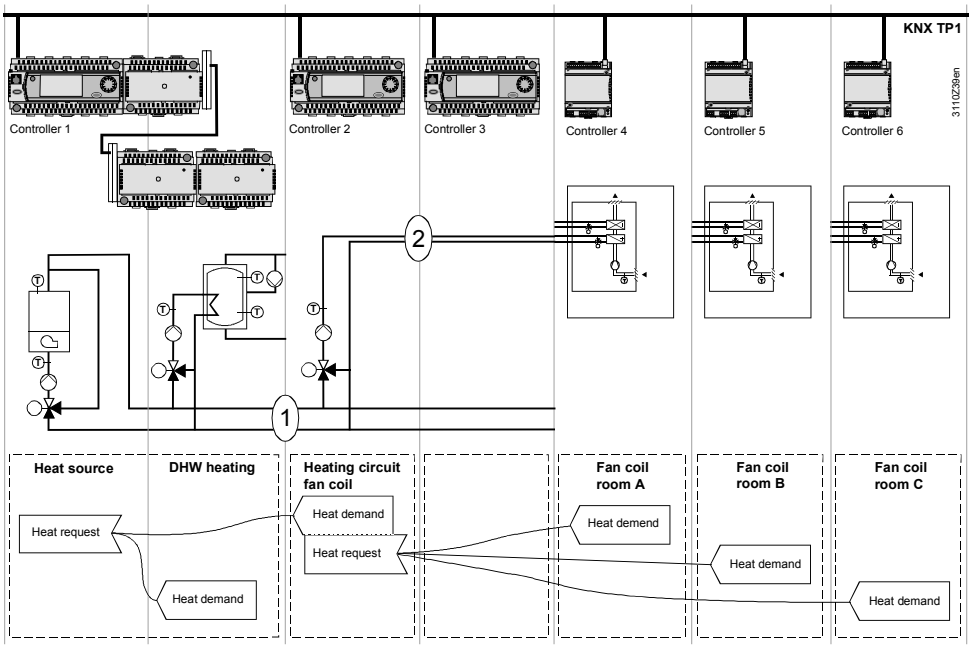
Communication	Planning and commissioning tool
KNX LTE mode	Service tool OCI700.1 with service and operating software ACS790
KNX S-mode	ETS3 or ETS4, see KNX Association http://www.knx.org/
PC via AST11	PC software ACS941 (service and maintenance) via interface converter AST11

Room controllers RXB/RXL

Brief description

In buildings having a large number of rooms, such as office buildings, schools or hotels, the RXB/RXL room controllers ensure individual comfort in every room.

The controllers forward the heat or cooling energy demand signal from the rooms via KNX as a heat or cooling energy request to the Synco 700 controls.



Together with the Synco controllers, which ensure the production and distribution of heat/cooling energy, the room controllers make certain the required room temperature is reached at the right time.

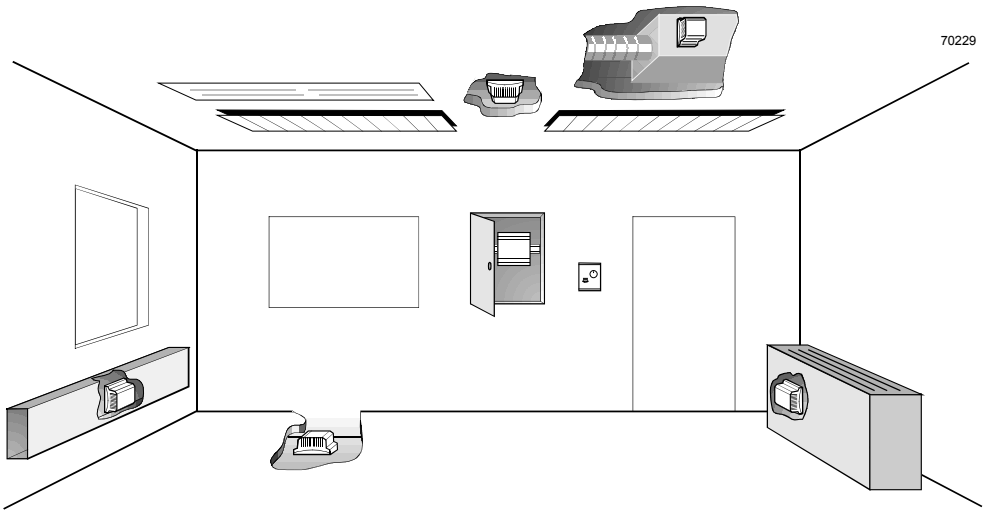
So ideal room comfort conditions are guaranteed any time, reliably and economically, because due to their control accuracy and energy efficiency, Synco room controllers RXB/RXL are eu.bac-certified (eu.bac = European Building Automation and Controls Association).

Overview

Type of device	Product no.	Data Sheet
Room controller, AC 230 V For fan coil unit systems: - With 1- to 3-speed fan control - With 1- to 3-speed fan control and electric reheater	 **RXB21.1** **RXB22.1**	 **N3873**
Room controller, AC 24 V For fan coil unit systems: - With 1- to 3-speed fan control - With 1- to 3-speed fan control and electric reheater	 **RXB21.1** **RXB22.1**	 **N3877**
Room controller, AC 230 V For chilled ceilings and radiators	 **RXB24.1**	 **N3874**
Room controller, AC 24 V For chilled ceilings and radiators	 **RXL24.1**	 **N3878**
Room controller, AC 230 V For fan coil unit systems: - With 3 control outputs DC 0...10 V - With 3 control outputs DC 0...10 V	 **RXB39.1** **RXL39.1**	 **N3875** **N3876**
HIT → HVAC Integrated Tool (see page 87) To select and engineer plants operating with Synco RXB/RXL	www.siemens.com/HIT	

Functions and characteristics

The RXB/RXL are compact controllers for direct mounting in aggregates, floors, ceilings, etc.

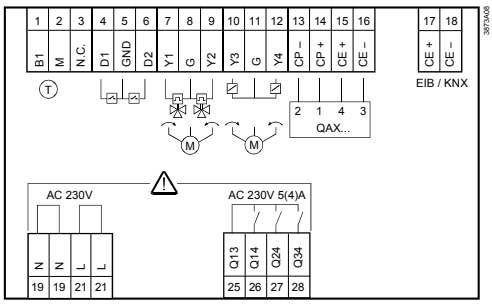


Inputs and outputs

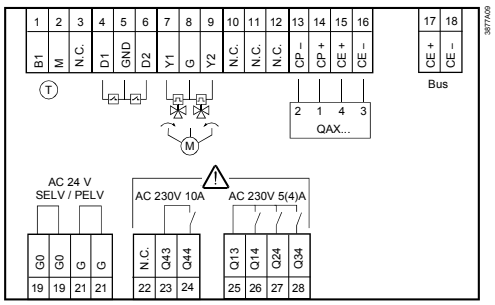
RXB21.1, RXB22.1, RXL21.1, RXL22.1

Product no.	Voltage	Inputs		Outputs	
		Analog	Digital	Triac AC 24 V	Relays: NO contact
RXB21.1 RXL21.1	AC 230 V AC 24 V	1 LG-Ni1000	2 potential free contacts	4 2 actuators, therm./ 2 actuators, 3-pos.	3 3-speed fan
RXB22.1 RXL22.1	AC 230 V AC 24 V	1 LG-Ni1000	2 potential free contacts	2 2 actuators, therm./ 1 actuator, 3-pos.	3 + 1 3-speed fan and internal relay for electric air heater

Relay outputs:
Fan: AC 230 V, 5 (4) A
Electric air heater: AC 230 V, 10 A



Connection terminals of RXB21.1



Connection terminals of RXL22.1

RXB24.1, RXL24.1

Product no.	Voltage	Inputs		Outputs	
		Analog	Digital	Triac AC 24 V	Relays: NO contact
RXB24.1 RXL24.1	AC 230 V AC 24 V	1 LG-Ni1000	2 potential free contacts	2 2 actuators, therm./ 1 actuator, 3-pos	--

RXB39.1, RXL39.1

Product no.	Voltage	Inputs		Outputs	
		Analog	Digital	DC 0...10 V	Relays: NO contact
RXB39.1 RXL39.1	AC 230 V AC 230 V	2 LG-Ni1000	4 potential free contacts	3 Control	2 Release of fan and electric air heater

General

Room controllers RX..

- PI control
- Integration in Synco 700 via RMB795 central control unit
- Potential free relay contacts for fan control, electric air heater

Specific

Room controllers RXB2..

- KNX-certified for individual room control
- Operating voltage AC 230 V
- KNX communication (LTE and S-mode)
- Connection of motoric KNX/EIB bus valves
- Control of thermal valve actuators AC 24 V PDM (pulse duration modulation, triac), motoric valve and damper actuators AC 24 V (3-pos.) or electric air heater
- Commissioning with ETS Professional (S-mode data points), "HandyTool" (room unit QAX34.3) or service tool OCI700.1

Room controllers RXL2..

- Like RXB2.., but proprietary KNX communication (LTE mode only)
- Operating voltage AC 24 V
- Commissioning with "HandyTool" only, service tool OCI700.1 or ACS790

Room controllers RXB39..

- Like RXB2.., but with 3 control outputs DC 0...10 V (not triac) for fan, valve actuator or electric air heater
- Communication in LTE and S-mode

Room controllers RXL39..

- Like RXL2.., but with 3 control outputs DC 0...10 V (not triac) for fan, valve actuator or electric air heater
- Communication in S-mode only

Engineering

To engineer plants and to select room controllers, Siemens' HIT is available www.siemens.com/HIT (see page 87).

Application library

The application library for RXB/RXL room controllers contains predefined applications (application software) for fan coil units, chilled ceilings/radiators

Outputs: Triac, 3-pos.

RXB21.1, RXL21.1

- For fan coil units, 2- or 4-pipe systems with/without changeover

RXB22.1, RXL22.1

- For fan coil units, 2- or 4-pipe systems with/without changeover and electric air heater (reheater)

RXB24.1, RXL24.1

- For chilled ceiling systems with dewpoint monitoring and radiator systems with downdraft compensation

Outputs: DC 0...10 V

RXB39.1, RXL39.1

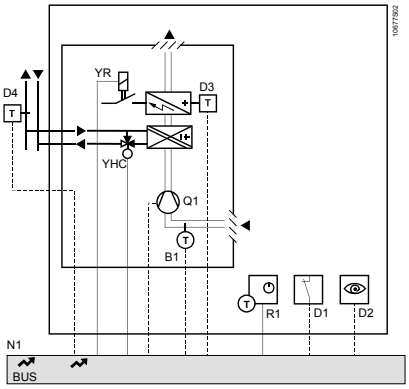
- For fan coil units, 2- or 4-pipe systems with/without changeover and electric air heater (reheater)

Functionality

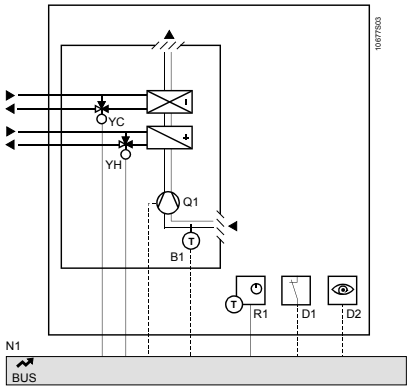
The room controllers' functionality is determined by the application when activated.

If the room controllers are integrated in a KNX network with Synco controls, additional functions, such as time programs or central control of setpoint changes, etc., can be provided.

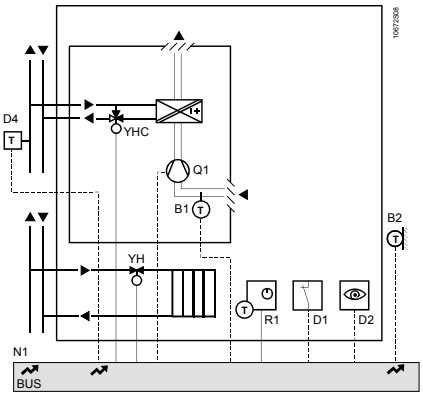
Examples



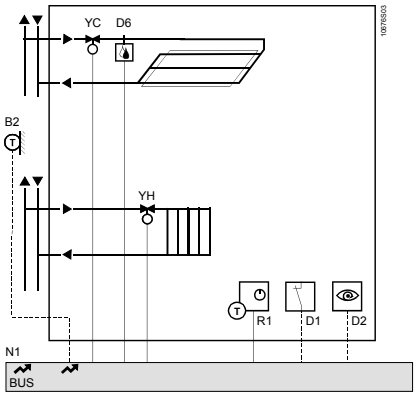
FNC03 2-pipe system with changeover and electric reheater



FNC04 4-pipe system



FNC18 2-pipe system with changeover and radiator



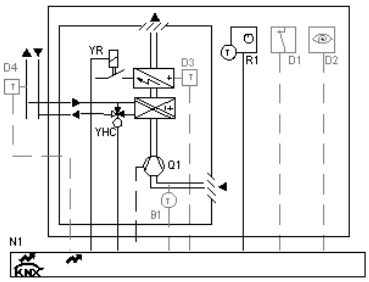
CLC02 Chilled ceiling with dewpoint supervision, radiator with downdraft compen.

B1	Return air sensor	Q1	Fan
B2	Outside sensor (signal via bus)	YH	Heating valve actuator
D1	Window contact	YC	Cooling valve actuator
D2	Presence detector	YHC	Heating/cooling valve actuator
D3	Safety thermostat	YR	Relay for electric air heater
D4	Changeover sensor (signal via bus)	R1	Room unit (PPS2)
D6	Dewpoint sensor	N1	Room controllers RXB/RXL

In HIT

Application XFNC03 B22 HQ in HIT: With RXB22.1 room controller and application FNC03.

XFNC03 B22 HQ - Two-pipe fan coil with changeover and electric reheater

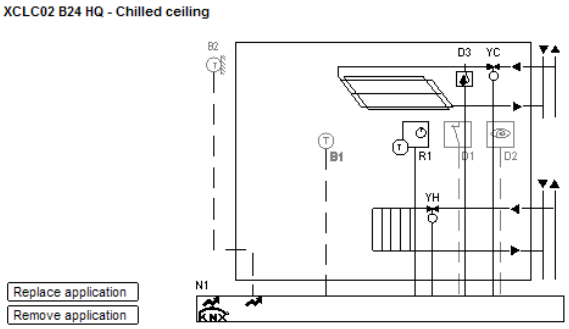


Replace application
Remove application

Opt.	Reference	Product no.	Description	Doc
	N1	RXB22.1/FC-12	Room controller with 3-speed fan and electric heating coil	
	R1	QAX34.1	Room unit with sensor, setpoint and operating mode selector, display and P...	
	YHC	Define ...	2-port, 3-port and 3-port seat valves with bypass, PN16	
		STP72E	Electrothermal actuator, 105 N, AC/DC 24 V, 2P	
☑	B1	QAP22	Cable temperature sensor PVC 2 m, LG-Ni1000	

In HIT

Application XCLC02 B24 HQ in HIT: With RXB24.1 room controller and application CC-02.



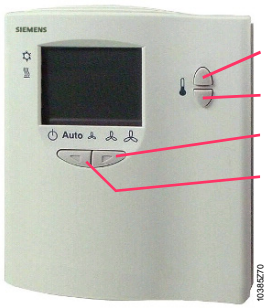
Opt.	Reference	Product no.	Description	Doc
	N1	RXB24.1/CC-02	Room controller for chilled ceilings and radiators	
	R1	QAX34.1	Room unit with sensor, setpoint and operating mode selector, display and P...	
	YH	Define ...	Radiator valve	
		STA72E	Electrothermal actuator, 105 N, 1.5 m, AC/DC 24 V, 2P	
	YC	Define ...	Radiator valve	
		STA72E	Electrothermal actuator, 105 N, 1.5 m, AC/DC 24 V, 2P	
	D3	QXA2000	Condensation monitor	
		AQX2000	AC 230 V extension module for QXA2000	
☑	B1	QAA24	Room temperature sensor LG-Ni1000	

Commissioning

After activating the required application, the room controller must be parameterized, meaning that the following settings must be made:

- Physical address (network address)
- Zones (e.g. time switch zones, heat/refrigeration distribution zones → LTE mode)
- Other parameters (e.g. Comfort heating setpoint, maximum supply air temperature)

The QAX34.3 room unit as a "HandyTool" allows the RXB/RXL room controllers to be parameterized via PPS2.



+ = counting/shifting "upward"

+ = counting/shifting "downward"

> = escape (quitting unconfirmed)

< = enter (confirmation)

Note: Room unit QAX34.3 is not suited for direct connection to the KNX bus.

Parameter number	Parameter name	Basic setting	Setting range
*034	Comfort heating setpoint	21 °C	10...40 °C
*108	Unit of temperature	°C	°C or °F

The room controllers can also be commissioned with the OCI700.1 service tool or the ACS790.

Controls with room functions

Controls providing room functions should be located on the same KNX line as the devices with which they exchange data via the KNX bus, which means:

- RXB/RXL room controllers and RMB795B control unit on the same KNX line

In every room controller, the heat and refrigeration distribution zone is to be configured with a zone address. Data exchange always takes place within the line.

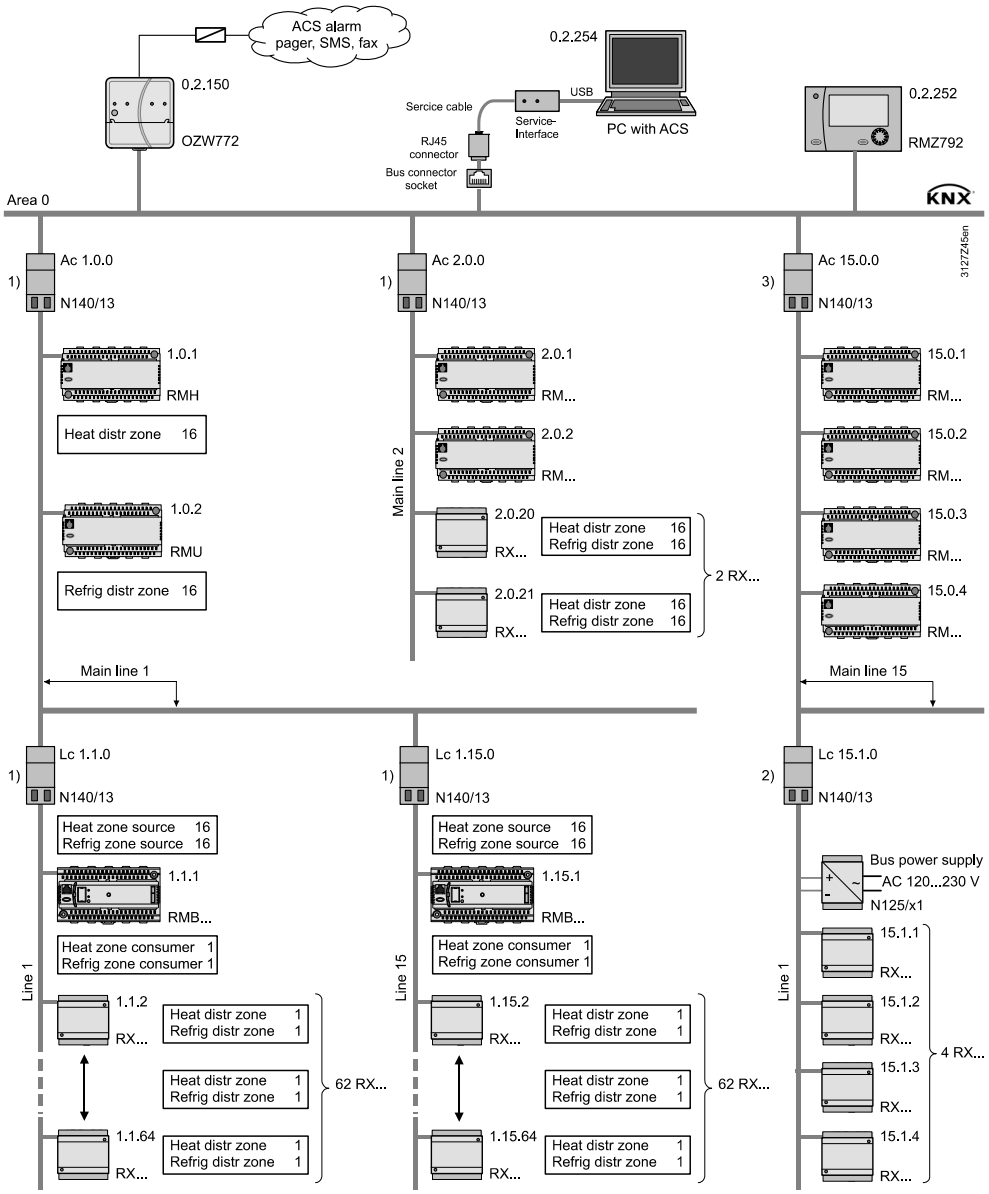
Central control unit RMB795B as "collector"

On a line with RXB/RXL room controllers, the RMB795B central control unit is used as a "collector".

In the "collector", the heat and refrigeration distribution zone on the generation side is configured with a zone address. Data exchange in LTE mode takes place via line couplers (Lc) and area couplers (Ac).

The "collector" forwards the room controllers' heat/cooling energy demand to the Synco 700 controllers for the production of heat and cooling energy.

Example



1) Area/line coupler with LTE filter table: Normal (route)
2) Line coupler with LTE filter table: Route all
3) Area coupler with LTE filter table: Block all

Room thermostats RDF/RDU/RDG

Introduction

The RD.. room thermostats are low-cost products for room automation. They represent compact solutions in modern design.

The products offer everything to ensure a pleasant room climate in residential buildings, hotels, office buildings, etc., and to save energy. Time programs, central setpoint compensation and local setpoint limitations for heating/cooling ensure optimum energy savings without loss of comfort.

The room thermostats extend the field of application of Synco and other BACS when it comes to individual room control with fan coil units, chilled ceilings/heated ceilings, radiators, or VAV systems.

Overview

Device	Product no.	Data Sheet
Semi flush-mount room thermostats, AC 230 V For fan coil units: 2-pipe, 2-pipe with electric heater, 4-pipe - With 1- to 3-speed fan control - With 1- to 3-speed fan control and buttons for the following functions: Switching, dimming, blinds, and scenes	**RDF301** **RDF301.50**	**N3171** ↓
Semi flush-mount room thermostats, AC 24 V For VAV systems: 1-duct and 1-duct with electric heater	**RDU341**	**N3172**
Room thermostats for wall mounting, AC 230 V For fan coil units and chilled ceilings/heated ceilings	**RDG100KN**	**N3191**
Room thermostats for wall mounting, AC 24 V For VAV systems: 1-duct and 1-duct with electric heater, with radiator, with air heating coil/air cooling coil	**RDG400KN**	**N3192**
HIT → HVAC Integrated Tool (see page 87) To select and engineer plants with RDF/RDU/RDG	www.siemens.com/HIT	

Integration in Synco 700

The RD.. room thermostats communicate via KNX in LTE and S-mode. They are suited for use with Synco 700 controls and other KNX-compatible products. Features in connection with Synco 700:

- Operation and monitoring of the room thermostats with the RMZ792 bus operator unit and/or the web browser when using the OZW772 web server
- Maximum energy efficiency thanks to exchange of relevant energy data, such as heat or cooling energy demand, with Synco 700 controllers
- Time programs and central setpoint compensation through RMB795B central control unit
- Minimum engineering effort in LTE mode (plug & play). The only settings needed are the room thermostats' KNX address and addressing of the zone

Integration in third-party systems

The integration of RD.. room thermostats in third-party systems or use with KNX-compatible products is made in S-mode. Addressing of groups is always effected with the ETS. The workflow is the same as with standard KNX devices.

Functions and characteristics

Common functions of RD..

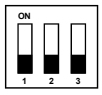
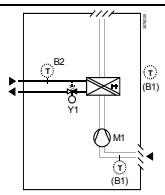
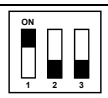
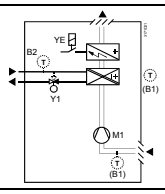
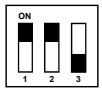
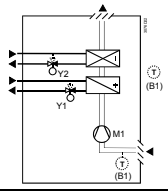
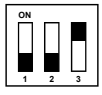
- Room temperature control with the built-in sensor or an external room/return temperature sensor
- Heating/cooling changeover (automatically via local sensor or bus, or manually via switch)
- Selection of application via DIP switches or commissioning tool (when commissioning with the ACS790 or ETS, all DIP switches must be set to OFF)
- Selection of operating mode via operating mode button on the room thermostat
- Temporary extension of Comfort mode
- Display of current room temperature or setpoint in °C and/or °F
- Minimum or maximum limitation of room temperature setpoint
- Reset to factory settings (commissioning and control parameters)
- Communication with Synco and other KNX-compatible controls via KNX
- Display of outside temperature or time of day via KNX
- Scheduling and central setpoint compensation via KNX
- Synco controls use air demand signal from the room thermostats to optimize the supply air temperature

Specific functions of RDF..

RDF301.50 only

- 1- or 3-speed fan control (automatically or manually)
- 2 multifunctional inputs, freely selectable for:
  - Operating mode changeover contact (Keycard) and H/C changeover sensor
  - External room or return air temperature sensor, dewpoint sensor
  - Electric heater enable
  - Monitoring input for temperature sensor or switch state
- Extended fan functions: E.g. fan kick, fan start, selection of fan's operating mode (enabled, disabled, or depending on heating or cooling mode)
- "Purge" function together with 2-port valve in a 2-pipe changeover system
- Request to clean filters
- Temperature limitation of floor heating system
- 4 buttons to control KNX actuators in KNX S-mode (switching groups with the functions switching, dimming, blinds, and scenes)

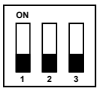
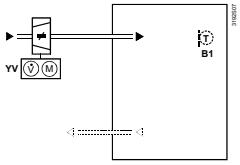
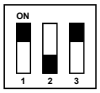
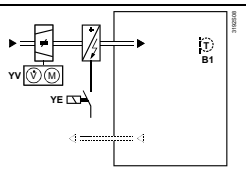
Applications RDF..

Application	Control outputs			DIP switches
Factory setting	Configuration via tool - ACS790 - ETS			
2-pipe heating **or** cooling	- 1-stage compressor - Chilled/heated ceiling	On/Off On/Off		
	- 2-pipe fan coil unit - Chilled/heated ceiling	3-pos. 3-pos.		
2-pipe with electric heater heating **or** cooling	- 2-pipe fan coil unit - Chilled/heated ceiling - 1-stage compressor	On/Off On/Off On/Off		
4-pipe heating **and** cooling	- 4-pipe fan coil unit - Chilled ceiling and radiator - 1-stage compressor	On/Off On/Off On/Off		

Specific functions of RDU..

- Minimum and maximum limitation of flow signal DC 0...10 V
- Button lock (automatically or manually)
- 2 multifunctional inputs, freely selectable for:
  - Operating mode changeover contact (Keycard) and H/C changeover sensor
  - External room or return air temperature sensor, dewpoint sensor
  - Electric heater enable
  - Monitoring input for temperature sensor or switch state

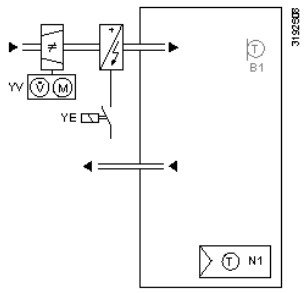
Applications RDU..

Application	Control outputs		DIP switches
Factory setting	Configuration via tool - ACS790 - ETS		
1-duct heating **or** cooling	- DC 0...10 V		
	- DC 0...10 V inverted		
1-duct with electric heater heating **or** cooling	- DC 0...10 V		
	- DC 0...10 V inverted		

In HIT

Application TBZB01 DU3 HQ in HIT: With RDU341 room thermostat.

TBZB01 DU3 HQ - Single-duct with electric heater



Replace application
Remove application

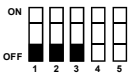
Opt.	Reference	Product no.	Description	Doc
	N1	RDU341	Semi Flush-mount room thermostat with KNX communications, for VAV appl...	
	YV	GQD161.1A	Rotary air damper actuator, AC/DC 24 V, 2 Nm, DC 0...10 V, with spring ret...	
☑	B1	QAH11	Cable temperature sensor PVC 2.5 m, NTC 3 kOhm, with connectors 2.8 x 0...	

Specific functions of RDG100KN

- 3 multifunctional inputs, freely selectable for:
  - Operating mode changeover contact (Keycard, window contact, etc.)
  - Changeover sensor for automatic heating/cooling changeover
  - External room or return air temperature sensor, dewpoint sensor
  - Electric heater enable
  - Monitoring input for temperature sensor or switch state
- Control outputs, 2-position and modulating (better control performance)
- Extended fan control functions: Fan kick, fan start, selectable fan operating mode (depending on heating/cooling mode), fan start delay in plants with 2-position control
- "Purge" function together with 2-port valve in a 2-pipe system with automatic heating/cooling changeover
- Request to clean filters
- Temperature limitation of floor heating system

Applications RDG100KN

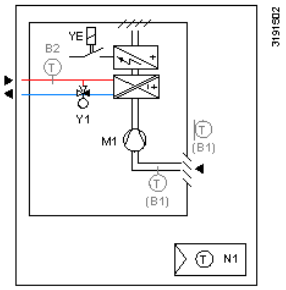
Fan coil unit and chilled/heated ceiling.

Applications	DIP switches
Factory setting, configuration via tool - ACS790 - ETS	
Heating **or** cooling - 2-pipe fan coil unit - Chilled/heated ceiling	
Heating **or** cooling - 2-pipe fan coil unit with electric heater - Chilled/heated ceiling	
Heating **or** cooling - 2-pipe fan coil unit and radiator - Chilled/heated ceiling and radiator	
Heating **and** cooling - 4-pipe fan coil unit - Chilled ceiling and radiator	
Heating **or** cooling - 4-pipe fan coil unit with electric heater	
2-stage heating **or** cooling - 2-pipe fan coil unit - 2-stage chilled/heated ceiling	

In HIT

Application TAAB01 DG1 HQ in HIT: With RDG100KN room thermostat.

TAAB01 DG1 HQ - 2-pipe fan coil with electric heater



Replace application
Remove application

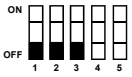
Opt.	Reference	Product no.	Description	Doc
	N1	RDG100KN	Room thermostat with KNX communications, AC 230 V, for fan coil units an...	
	Y1	Define ...	2- or 3-port valve Actuator for small valves, 2-position, PDM or 3-position, AC 230 V	
☑	B1	QAH11	Cable temperature sensor PVC 2.5 m, NTC 3 kOhm, with connectors 2.8 x 0...	
☑	B2	QAH11	Cable temperature sensor PVC 2.5 m, NTC 3 kOhm, with connectors 2.8 x 0...	

Specific functions of RDG400KN

- 2 multifunctional inputs, freely selectable for:
  - Operating mode changeover contact (Keycard, window contact, etc.)
  - Changeover sensor for automatic heating/cooling changeover
  - External room or return air temperature sensor, dewpoint sensor
  - Electric heater enable
  - Monitoring input for temperature sensor or switch state
- 1 input DC 0...10 V for feedback of damper position
- Temperature limitation of floor heating system

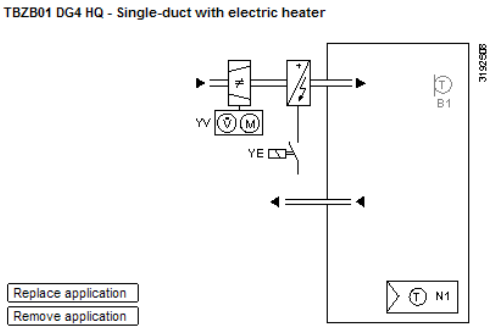
Applications RDG400KN

VAV systems

Application	DIP switches
Factory setting, configuration via tool - ACS790 - ETS	
1-duct - Damper actuator DC 0…10 V - Damper actuator 3-pos.	
1-duct with electric heater - Damper actuator DC 0…10 V and electric heater on/off, PWM or 3-pos. - Damper actuator 3-pos. and electric heater DC 0…10 V	
1-duct and radiator/floor heating system - Damper actuator DC 0…10 V, radiator on/off, PWM or 3-pos. - Damper actuator 3-pos. and radiator DC 0…10 V	
1-duct, air heating/cooling coil - Damper actuator DC 0…10 V, heating/cooling coil on/off, PWM or 3-pos. - Damper actuator 3-pos. and heating/cooling coil DC 0…10 V	

In HIT

Application TBZB01 DG4 HQ in HIT: With RDG400KN room thermostat.



Opt.	Reference	Product no.	Description	Doc
	N1	RDG400KN	Room thermostat with KNX communications, AC 24 V, VAV heating and co...	
	YV	GQD161.1A	Rotary air damper actuator, AC/DC 24 V, 2 Nm, DC 0...10 V, with spring ret...	
☑	B1	QAH11	Cable temperature sensor PVC 2.5 m, NTC 3 kOhm, with connectors 2.8 x 0...	

Synco living

Overview
Synco living products

Central apartment unit
The QAX9.. central apartment unit is the heart and brain of the system. From the central unit, all functions can be conveniently controlled and checked on the display.

Room unit
The room unit acquires the room temperature and enables the user to individually change settings predefined by the central apartment unit (setpoints or operating mode). Comfort mode can be extended at the touch of a button.

Room temperature sensor
The sensor acquires the room temperature and sends the respective signal wirelessly to the central apartment unit.

Heating circuit controller
The controller receives via RF link the setpoints and actual values of each room from the central apartment unit, compares them, and ensures control to the required room temperature by adjusting the valves of the heat distributor.

Multicontroller
The multicontroller is used to provide precontrol of up to 2 room groups or control of a ventilation plant with up to 3 stages.

Meteo sensor
The meteo sensor acquires the outside temperature and the atmospheric pressure.

Radiator control actuator
RF-driven control actuator for radiator valves. The built-in sensor acquires the room temperature and compares it with the setpoint transmitted by the central apartment unit via RF. If there is a deviation, the radiator valve ensures control to the required room temperature. Silent mode (e.g. for use in sleeping rooms).

Consumption data interface
Acquisition of data of the various meters (heat/cooling energy, hot/chilled water, electricity, gas, incl. set day and monthly values) and wireless transmission to the QAX903 or QAX913 central apartment unit.

RF links for lights and blinds
To control lights and blinds via RF link – centrally, locally in the room, or as a scene.

Handheld transmitter
For remote control of the QAX913 central apartment unit via KNX RF. A multicolor LED indicates the operating state and confirmation feedback messages received from the central apartment unit.

Door/window contact
The door/window contact checks if doors and windows are closed.

Water monitor
The wireless sensor detects water on the floor of wet rooms (e.g. kitchen, bathroom, laundry). It then enables the central apartment unit to automatically close the main shutoff valve, to activate a horn, or to send an alarm to a PC or mobile phone via the web.

Smoke detector
The smoke detector detects the smoke produced by fire and sets off an alarm.

Central apartment units QAX9..

Introduction

Synco living is a Home Automation System which can be easily matched to changing conditions in living spaces.
The heart and brain of the system is the central apartment unit. It offers intelligent room comfort because it ensures optimum control of room temperature, indoor air quality, light conditions (combined control of lighting and blinds), a high level of security and acquires energy consumption in apartments with up to 12 rooms.

Overview

Device	Product no.	Data Sheet
Central apartment units Management of an apartment with up to 12 rooms, consumption data acquisition of heat, water, electricity and gas	**QAX903**	**N2741**
In addition (to consumption data acquisition), control of lighting and blinds, DHW heating, water monitor and smoke detector, and remote control via handheld transmitter	**QAX913**	**N2740**

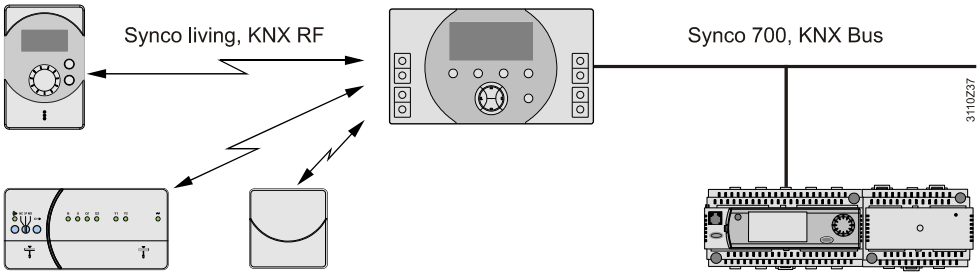
Central apartment units

The central apartment unit is the operation, display and communication device for the entire department. Key features:

- Control of heating and cooling of an apartment comprising up to 12 rooms
- Flow temperature control of 2 autonomous room groups
- Management of ventilation plant, control of AC equipment (e.g. split units)
- Selection of operating mode, timer and holiday/special day function
- Autonomous time switches and operating modes for all 12 rooms
- Absence function for heating, cooling, ventilation; with QAX913 also DHW heating and presence simulation lighting
- Monitoring of windows and doors; with QAX913 also water monitor and smoke detector
- Summer operation with preselected valve position for cooling mode
- Display of meteo and other important data on info pages
- Acquisition of consumption data of heat/cooling energy, water, electricity, gas
- DHW heating with time switch and selection of operating mode (QAX913 only)
- Control of lighting, blinds and scenes via 4 pairs of universal buttons, time switch and events (QAX913 only)
- Remote control via web server; QAX913 also via handheld transmitter
- Operating voltage AC 230 V

Communication

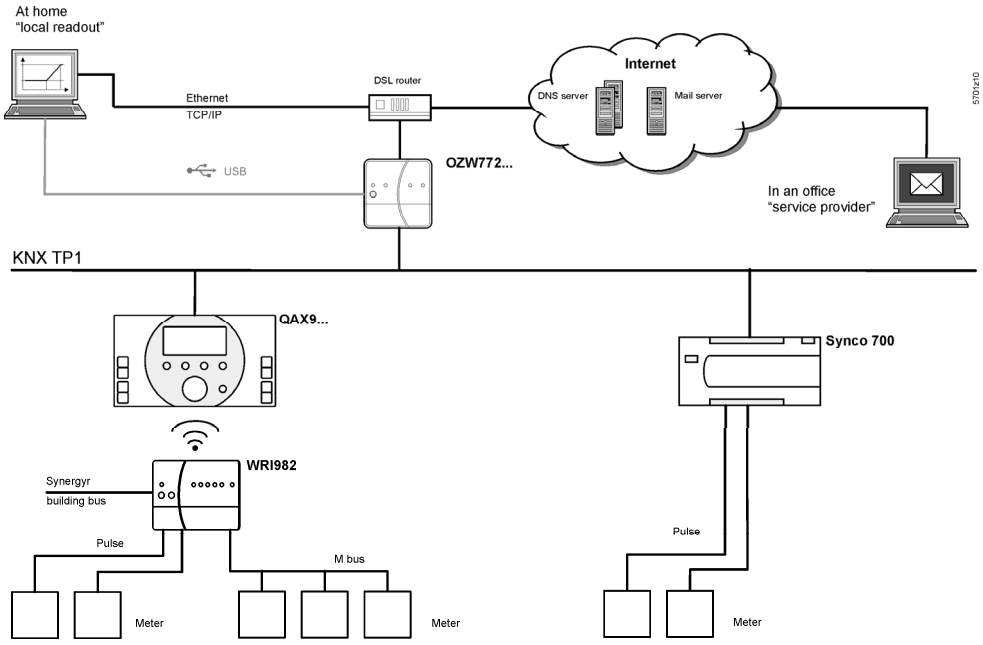
Within Synco living, data are transmitted via KNX RF, that is, wirelessly. RF (868.3 MHz, bidirectional) with the RF-compatible devices of the following product ranges: Synco living, GAMMA wave, and Hager tebis TX conforming to the KNX standard.



The central apartment unit forms the link between Synco living and Synco 700 controls on the KNX bus.

Consumption data acquisition

When integrating the WRI982 consumption data interface, Synco living becomes an ECA (Energy Cost Allocation) system.



Meters

The meters always store the current consumption data (legal requirement).

Consumption data interface WRI982

The WRI982 consumption data interface queries the meter readings (at 4-hour intervals) and the monthly and set day values (once a day) and transmits them wirelessly to the central apartment unit.

Central apartment unit

The consumption data can be read out in the QAX903 or QAX913 central apartment unit and/or sent to a service company via the OZW772 web server (e.g. for billing).

Web server OZW772

The web server or the consumption data can be accessed either on site (USB) or via the Internet.

The web browser can display the consumption data of one or several central apartment units.

A consumption data file can be downloaded from the web server. This data file can be periodically sent to 1 or 2 e-mail recipients (transmission interval can be set on the web server).

Synco 700 controls

The OZW772 web server provides function "Consumption data acquisition" for the following Synco 700 controls:

- RMU7x0B, RMH760B, RMK770 (V2.0 or higher), RMS705, RMS705B, RMB795, and RMB795B

Central communication units, web servers

Introduction

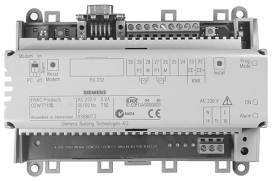
Central communication units and web servers ensure remote control and monitoring of Synco controls in KNX networks.

For facility management companies, building service companies and real estate administrations, the central communication units and web servers represent the link to the building systems.

Overview

Device	Product no.	Data Sheet
Central communication units For remote control of plants with up to 64 Synco devices, communication via RS-232	**OZW771..**	**N3117**
Web servers For remote control of plants with up to 250 Synco devices, communication via USB and Ethernet	**OZW772..**	**N5701**

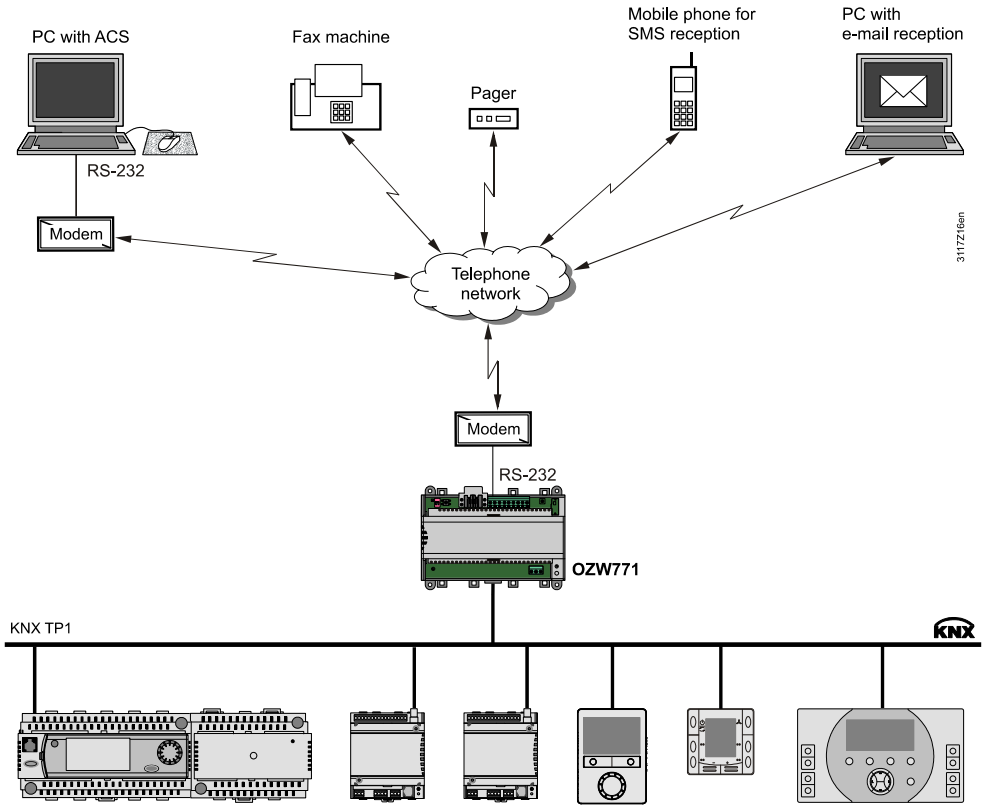
Central communication units OZW771



The OZW771.. central communication units (see Data Sheet N3117) are used in plants operating with up to 4, 10 or 64 Synco devices (number of devices depending on the type of central communication unit).

For remote control, an operator station (PC/laptop) running on ACS790 software is required.

If device or plant faults occur, the central communication units send messages via modem to fax machines, pagers, mobile phones or PCs/laptops with e-mail facility.



Note: OZW771.. central communication units operate on AC 230 V

Functions and characteristics

Key functions

- Identification of Synco devices in the KNX network through automatic search run
- Monitoring of Synco devices and 2 fault signal inputs (e.g. to acquire plant faults)
- Signaling faults to locally connected operator station or via modem to pager, mobile phone, fax machine and to PC/laptop with e-mail facility*
- The different message receivers can be combined as required
- Clock time master with predefined system time for devices in the KNX network

* Only possible with GSM modem, depending on telephone provider

Faults

2 fault signal inputs for potential free contacts. The contacts' normal position (fault/no fault) and fault priority can be parameterized.

Typical faults:

- Faults of pumps
- Thermal cutouts
- Response of level switches

In addition to the faults received at the fault signal inputs, the central communication units identify …

- breakdowns and malfunctions of Synco devices in the KNX network,
- own faults (faults of central communication units).

For each fault source (fault signal input, Synco device, central communication unit) it can be selected if the faults shall be reported only when they occur (coming) or when they occur and disappear (coming and going).

Faults acquired by the central communication unit are immediately sent as fault status messages to maximum 2 message receivers. If a message cannot be delivered, the central communication unit repeats it at the parameterized interval (until it is successfully delivered), or the transmission is aborted when the number of parameterized repetitions is reached.

System reports

The central communication units can generate system reports to inform at certain intervals about the plants' and devices' states.

Commissioning

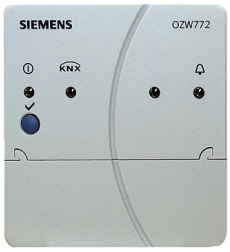
The central communication units are commissioned and parameterized with a locally connected PC/laptop running on ACS790 software via the RS-232 port, or with the OCI700 communication interface (see OCI700.1 service tool) via the KNX bus.

Interfaces

The central communication units are equipped with 2 interfaces:

- RS-232 connector, 9 poles
- Terminals CE+ and CE- for KNX bus connection

Web servers OZW772



The OZW772.. web servers (see Data Sheet N5701) allow remote control and monitoring of plants via the web and smartphone apps.

A total of 4 types of web servers are available, allowing the connection of 1, 4, 16 or 250 Synco 700 devices, RXB/RXL room controllers, RDG/RDF/RDU room thermostats or Synco living QAX central apartment units.

Functions and characteristics

Key functions

- Operation via web browser with PC/laptop and smartphone
- Operation via smartphone app (iPhone or Android)
- Visualization of plant via web browser with standard plant diagrams and user-defined plant web pages
- Types of connection: USB and Ethernet
- Display of fault status messages via web browser
- Sending fault status messages to maximum 4 e-mail recipients
- Sending system reports to e-mail recipients at certain intervals
- Acquisition, display and transmission of consumption data to 2 e-mail recipients
- Function "Energy indicator" monitors data points with regard to energy limit values, so-called "green limits"
- Web services for external applications via web API (web Application Programming Interface)
- Encryption with https and e-mail with TLS (Transport Layer Security)

Faults

The web servers identify breakdowns and faults of plants or devices plus own faults (web server faults).

Faults are indicated by the web server's LED (with unacknowledged faults, flashes). After acknowledgement with button (on the web server) or via the web or ACS, the LED remains lit as long as the fault is pending.

Fault status messages can be forwarded as e-mails to maximum 4 e-mail recipients and/or via provider to SMS recipients. Each recipient's fault priority can be selected (Urgent/All).

System reports

The web servers generate system reports (operating state of plants and devices) and send these to e-mail recipients at certain intervals. Transmit time (hh:mm), transmit cycle interval (1...255 days) and priority (Urgent/Nonurgent) can be selected.

History

The last 500 events concerning faults, fault status messages and system reports are stored in the web server (circular memory).

Time of day

The web servers have a system clock with selectable time zone and summer-/wintertime changeover. As clock time masters they can send the preset system time (date and time of day) to the KNX devices (clock time slaves).

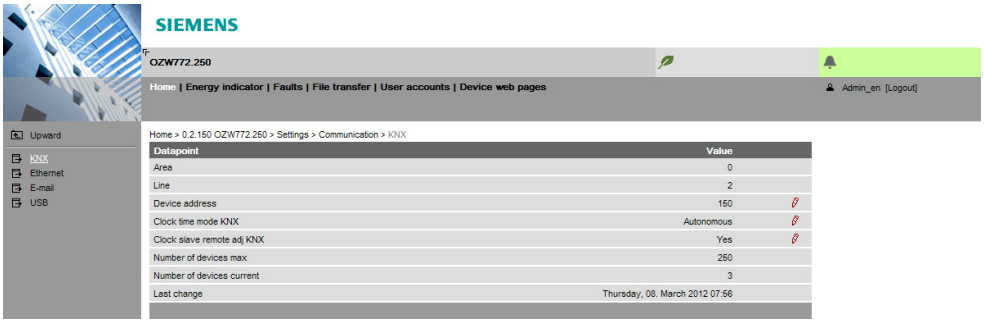
Compatibility with ACS790

The web servers are compatible with the ACS790 service and operating software.

Function "Consumption data acquisition"

Each OZW772 web server provides function "Consumption data acquisition". For information about consumption data acquisition, refer to chapter "Synco living".

User interface



Primary navigation

Primary navigation provides the following functions:

Home	Menu-based plant and device operation.
Energy indicator	Display and operate "Energy indicator" data points.
Faults	Display system faults.
File transfer	Download consumption data and event history, upload documents, logos and system definitions.
User accounts	User administration.
Device web pages	Create device list and operating pages.

Secondary navigation

Secondary navigation is used to select the devices (see menu tree below).

User accounts

To ensure user-friendly operation, the administrator can open user accounts. An account for a specific user includes: User name, customized password, user-specific language (choice of 23 languages), and user group.

User groups

User group "Enduser" (lowest access priority) offers general operation via the menu tree and plant diagrams as well as access to the fault overview. The 2 other user groups are "Service" (medium access priority) and "Administrator" (highest access priority).

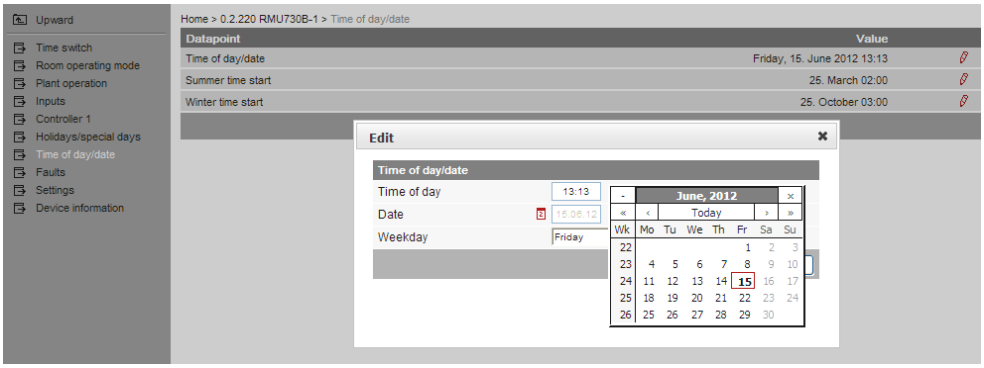
Web operation

Simultaneous operation with several browsers is not restricted. In that case, the maximum data throughput is handled by the different browsers.

Menu tree

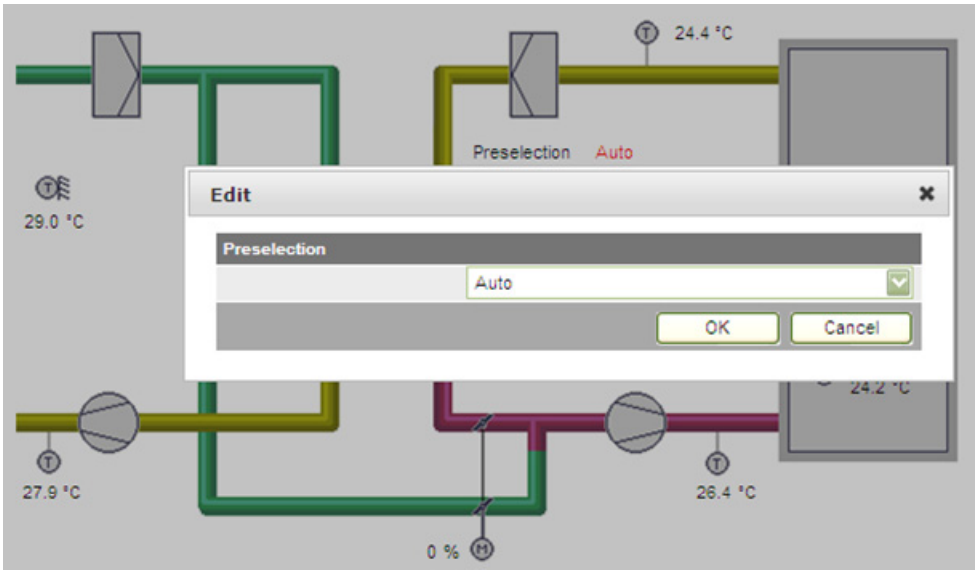
The menu tree enables navigation to the different devices. The data points are displayed depending on the user group. The writable data points are marked by a red pencil.

A mouse click opens the respective dialog box, allowing the value to be changed. The web browser displays the time of day/date as follows:



Visualization of plant

The OZW772 web server enables building plants to be visualized via plant web pages (below: central air handling unit) and setting values in dialog boxes to be changed (below: preselection of operating mode).



Creating plant web pages

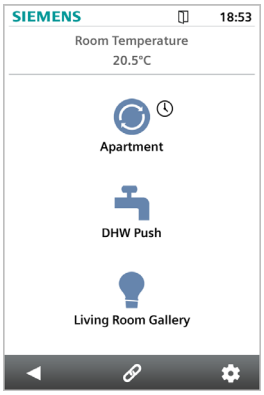
For convenient creation of plant web pages – also called plant diagrams – an action bar appears.

Web-compatible plant diagrams can be freely created. Or plant diagrams available via HIT can be modified (see page 87).

Web page elements

Plant web pages can be used to include additional data, such as links to function descriptions or external links to webcams.

Web services



The web "Application Programming Interface" (web API) is an interface that enables clients to access the web services offered by the web server.

All web API functions are retrieved via "http" or encrypted with "https". Each session is started by authentication at the web server.

If the "Home Control App" is installed on a smartphone, the web services can be used to access the data points of the devices in the KNX network via the web API (for connection of communication for smartphone, see page 84).

Function "Energy indicator"

The "Energy indicator" function is used by the OZW772 web server to read predefined data point values from the devices on the KNX bus and to compare them with energy-related so-called "green limits".

This means that the data points are monitored to ensure their "green limits" are observed. The result is presented by the "Energy indicator" in the form of a leaf.

Note: The "green limits" are only used in connection with the "Energy indicator" function. They **do not** correspond to process- or security-related limit values which, in the case of limit value violations, trigger fault status messages, for example, or shut down the plant in an emergency.

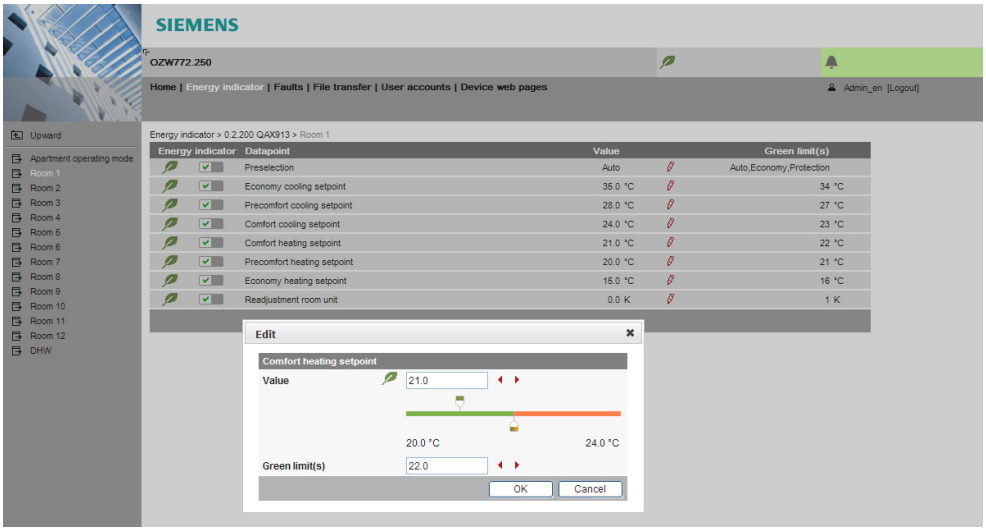
Green leaf

Data point value is within its "green limit". So, with regard to energy usage, the value is within its "green range": Leaf appears in green, pointing upward.

Orange leaf

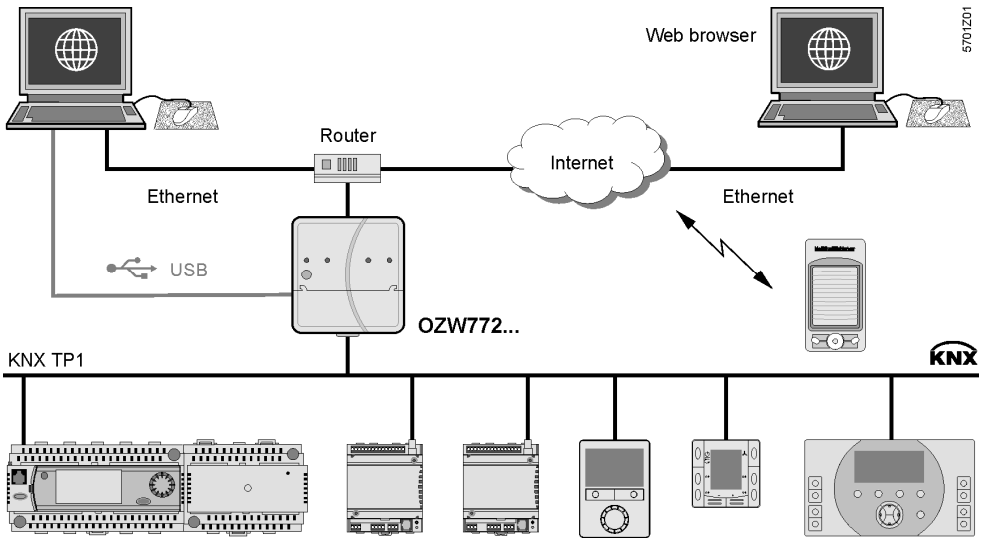
Data point value exceeded its "green limit". The value is no longer within its "green range": Leaf appears in orange, pointing downward.

Web page "Energy indicator"



Web page of the "Energy indicator" function with the data points of "Room 1", the dialog box for setting the data point value "Comfort heating setpoint" and its "green limit".

Communication connections



Devices on KNX bus

The "Energy indicator" function is available with the following devices:

- Synco 700: RMU7x0B, RMH760B, RMK770 (V2.0 or h.), RMS705B, RMB795B
- Synco living: QAX903, QAX913, (QAX910 V3.0 or higher)
- Controllers: RXB2.., RXL2.., RXB3.., and RXL3..
- Room thermostats: RDF301, RDU341, and RDGx00KN

Network environment of web server OZW772

Commissioning

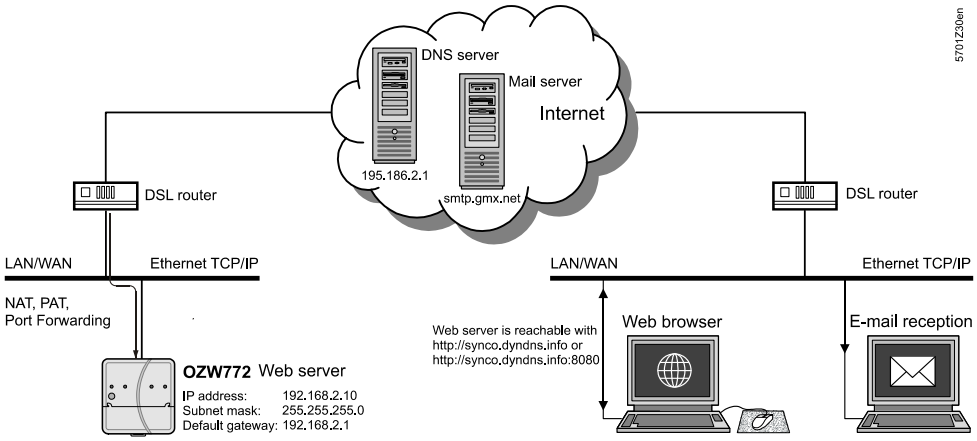
The web server is commissioned on site via the USB interface using a PC/laptop on which a suitable web browser or the ACS790 software is installed.

It is to be checked whether the OZW772 web server is integrated in a private network (LAN) or a proprietary network (Intranet) with/without connection to the Internet.

Another criterion is whether the web server shall send e-mails to an in-house mail server or via the Internet to an external mail server.

Topology of Internet connection

The OZW772 web server is to be connected to the Internet via Ethernet and DSL router (with built-in DSL modem) and DNS server.



NAT = Network Address Translation, PAT = Port and Address Translation. DynDNS = Dynamic Domain Name System, registers dynamic IP addresses and links these to domain names

Integrating the web server in Ethernet

Prerequisites for integrating the OZW772 web server in an Ethernet TCP/IP network:

- The web server is correctly integrated in the network, physically and logically
- IP address, IP subnet mask, DSL router (standard gateway) and DNS server are configured

E-mail account

To be able to send e-mails (e.g. alarming via e-mail), following information must be available:

- E-mail account, mail server address, port number of mail server, e-mail address of sender, authentication of mail server, user name, and password

This information is to be obtained from the e-mail provider. In the case of a proprietary network, the information is provided by the network administrator.

Sending e-mails

Fault status messages, meter consumption data and "Energy indicators" are delivered by e-mail via SMTP. If supported by the mail server, e-mails are transmitted encrypted with TLS (Transport Layer Security).

Connection to Internet or Intranet

For connection to the Internet or Intranet, the conventional telephone lines normally used are made of copper. In that case, a DSL router with built-in DSL modem is required (DSL = Digital Subscriber Line).

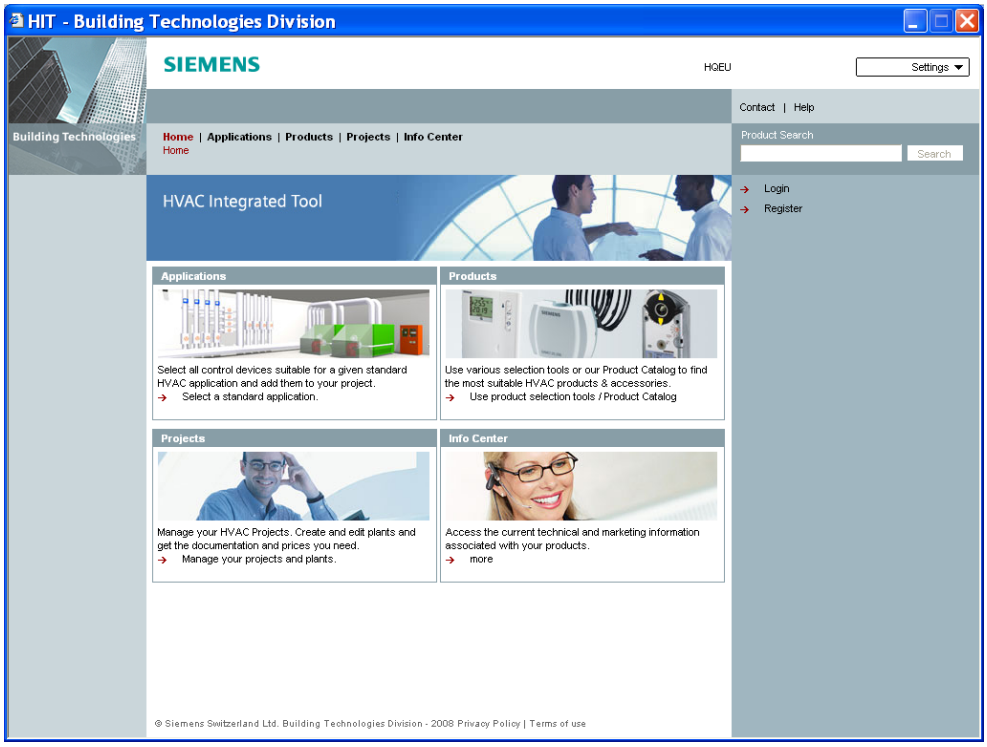
Engineering and commissioning

HIT (HVAC Integrated Tool)

HIT is a software program that enables planning engineers and installers to simplify reliable planning and engineering of heating, ventilation, air conditioning and refrigeration plants.

- HIT relieves experts of troublesome searching for optimum control systems for a given HVAC plant
- HIT offers practice-related and user-friendly access to the current range of controllers, valves, actuators, and sensors from Siemens
- Operation of HIT is menu-driven, self-explanatory and matched to the working processes used in the HVAC sector
- For more information about HIT, visit www.siemens.com/HIT

HIT start page (Home)



HIT contains more than 300 tested applications for all Synco products covered by this document:

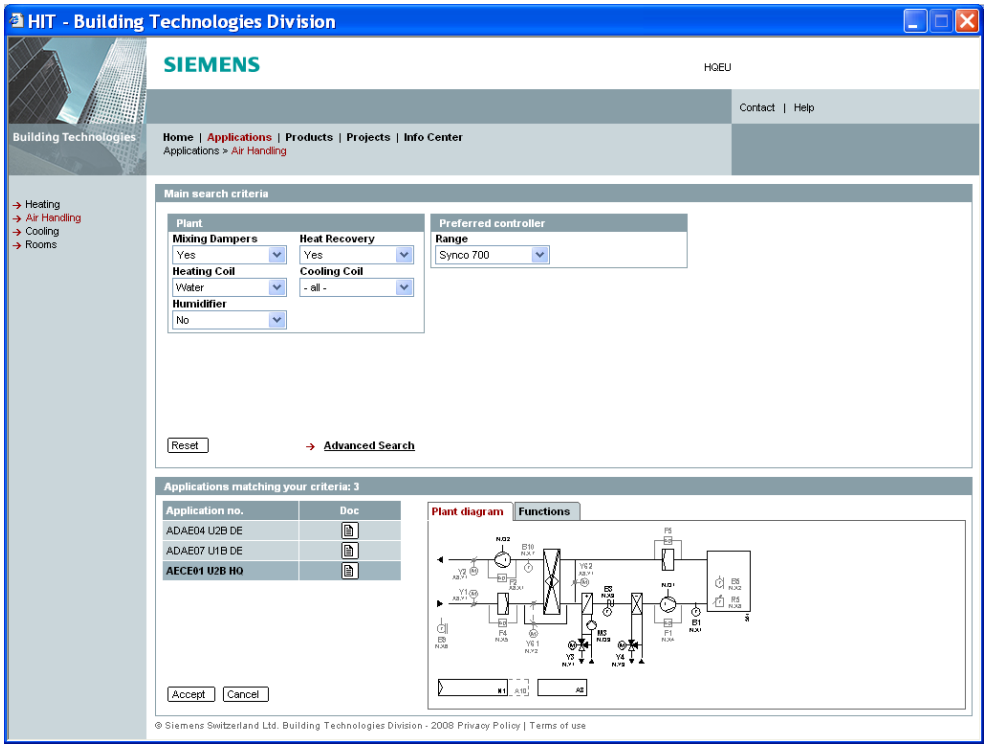
- Synco 100, Synco 200, and Synco 700
- RXB/RXL room controllers
- RDF/RDU/RDG room thermostats
- Synco living

Menu "Applications"

Using the "Applications" menu, the user selects the required type of plant (e.g. heating or ventilation/air conditioning, see next page) and then the product range (e.g. Synco 200 or Synco 700).

When the preselection is made, HIT delivers the application (or often several applications) matching the respective project, including the plant diagram, the product list, and the complete technical documentation.

Menu "Applications"
→ Air Handling

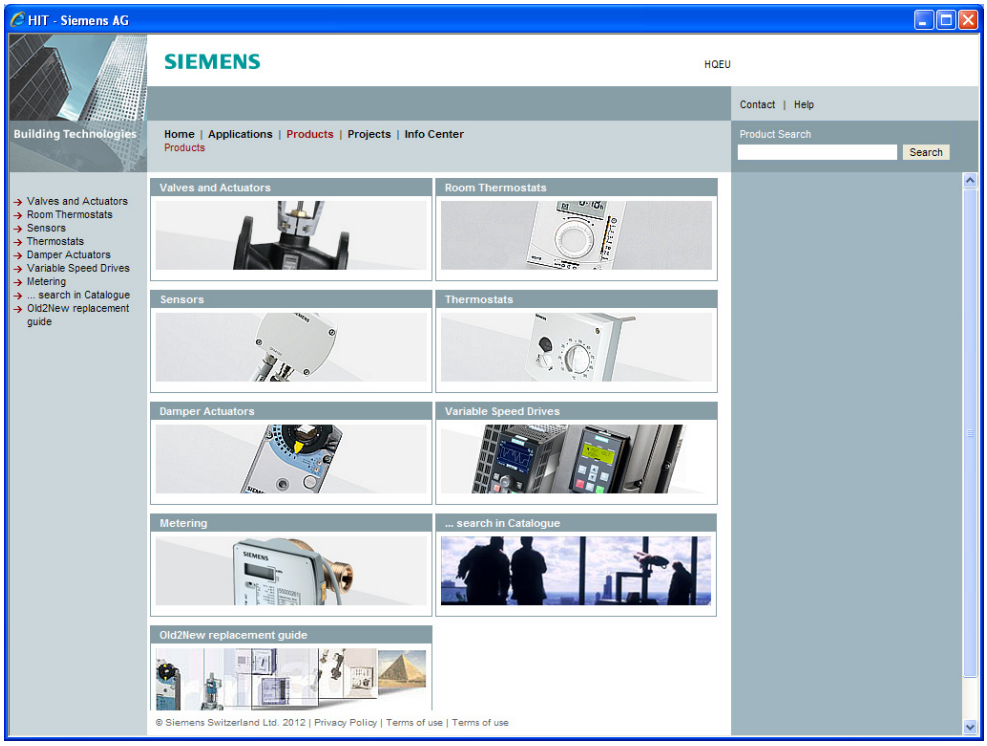


Once a plant or project is planned, it can be copied and modified. The stored data can be used to automatically create tender specification texts in Word and product lists on Excel spreadsheets.

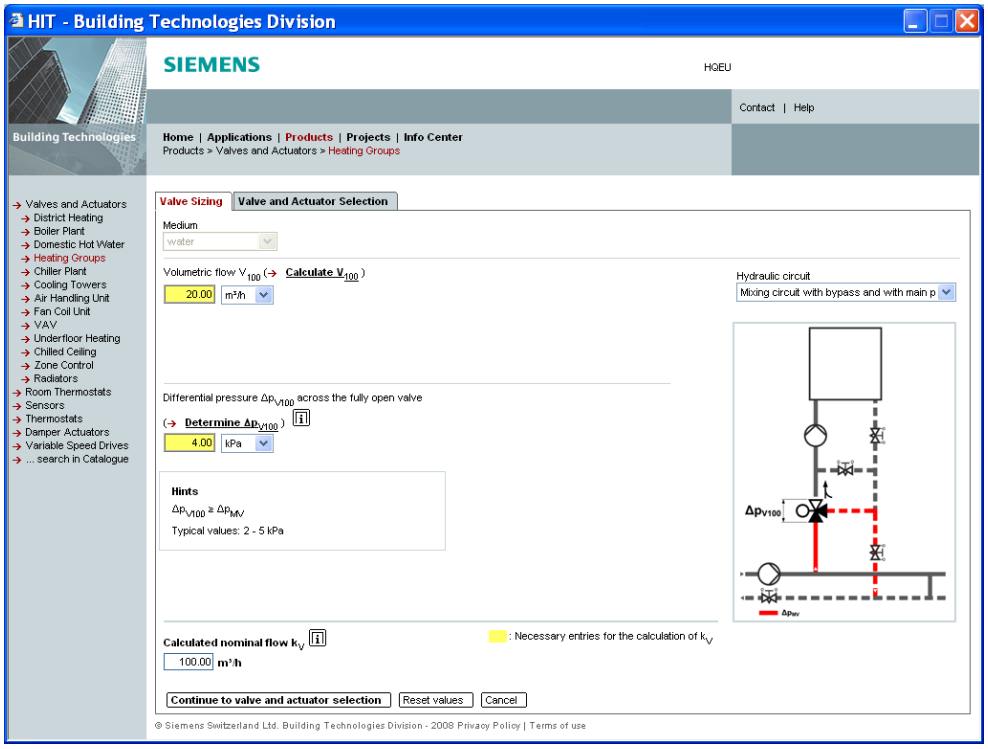
When accessing former projects, the software program identifies products that are no longer available and – using the search function – suitable successive products are proposed.

"Products" menu

The "Products" menu helps find the suitable product in only a few steps, including Product no., Data Sheet, and Price.



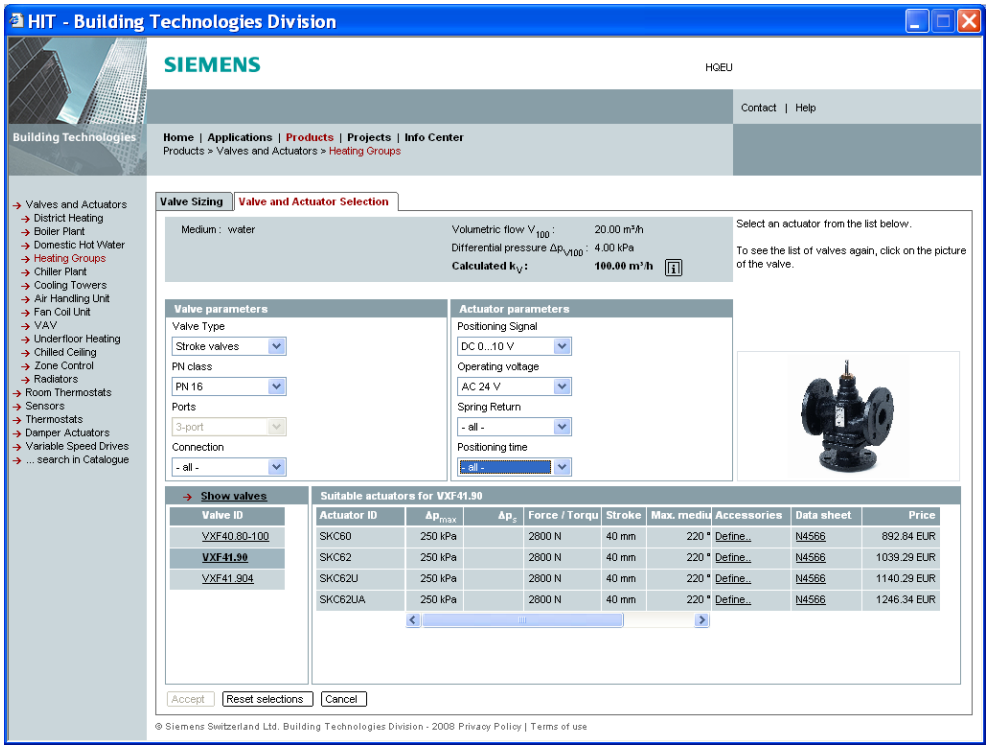
"Products" menu
Valve Sizing



Steps 1…3

1. Selection of products	Valves and actuators
2. Selection of partial plant	Heating groups
3. Sizing of valves	Enter the data

Valve and Actuator
Selection

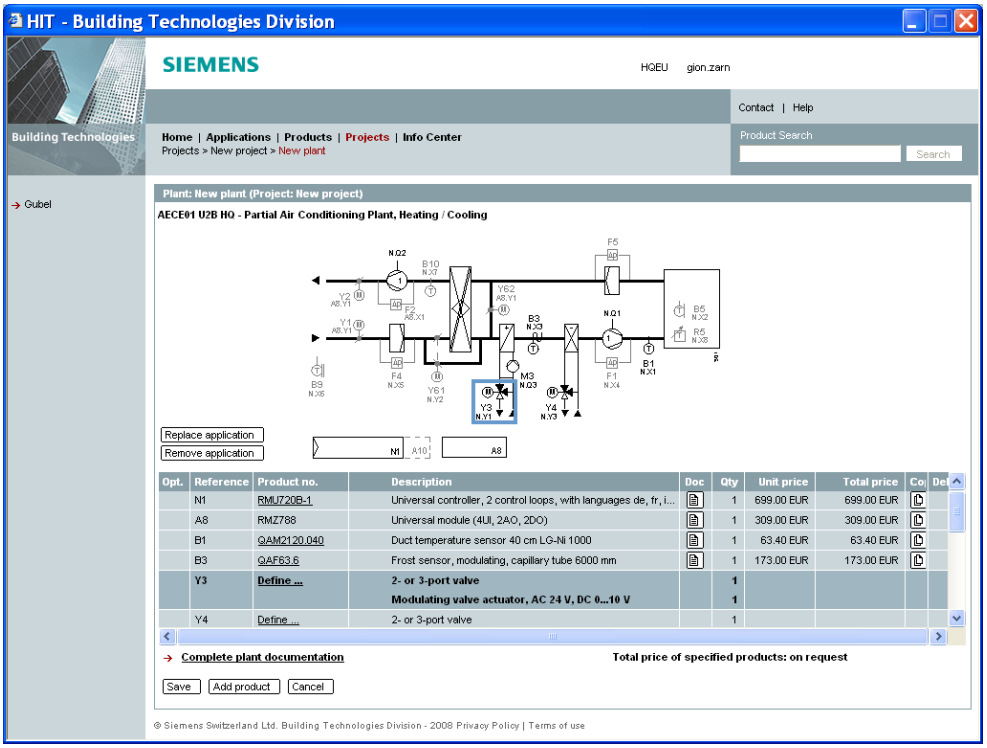


Steps 4…6

4. Selection of valves and actuators	Set the parameters
5. Selection list	Select the product
6. Selection list	Select the accessories

Menu "Projects"

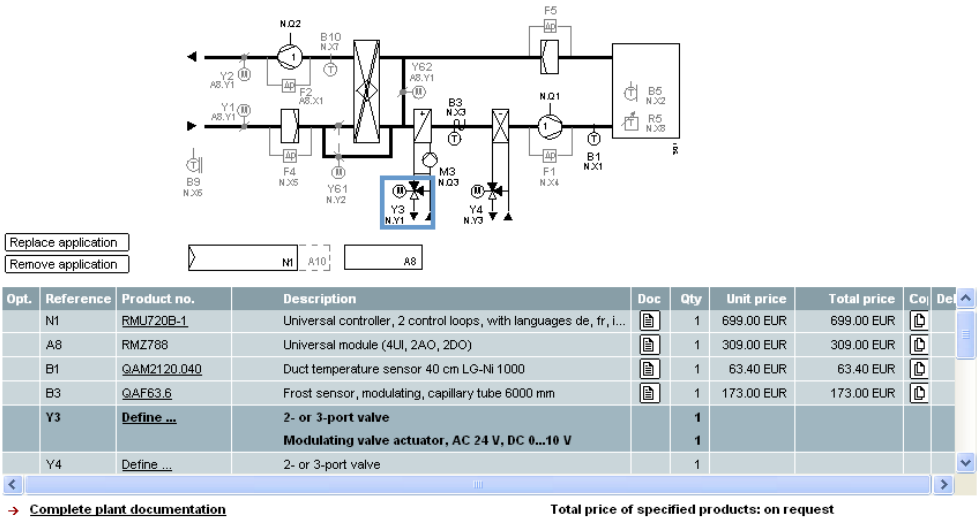
On the "Projects" menu, the application created via the "Applications" menu is integrated into the project. Now, project-specific adjustments can be made (e.g. adding extra sensors, or copying and changing existing projects).



Product list

When clicking on field devices (sensors, valves, etc.), the devices are highlighted on the product list so that their data are instantly displayed (see valve Y3 in the illustrations).

If valve Y3 was not yet selected and defined on the "Products" menu (Product no., PN class, etc.), this can be made via the product list on the "Projects" menu.



Documentation

HIT contains the complete plant documentation and product documentation (Data Sheets, Installation Instructions, Operating Instructions, Basic Documentation).

Service and operating software ACS790

The ACS790 service and operating software (see Data Sheet N5649) is to be installed on a PC/laptop.

Key functions of ACS790:

- Commissioning, servicing, operating and monitoring plants with KNX devices (Synco controls, room controllers, room thermostats, central apartment units)
- Alarming (optically or acoustically) in the event of plant or device faults
- Batchjob software for technical plant management

ACS tool

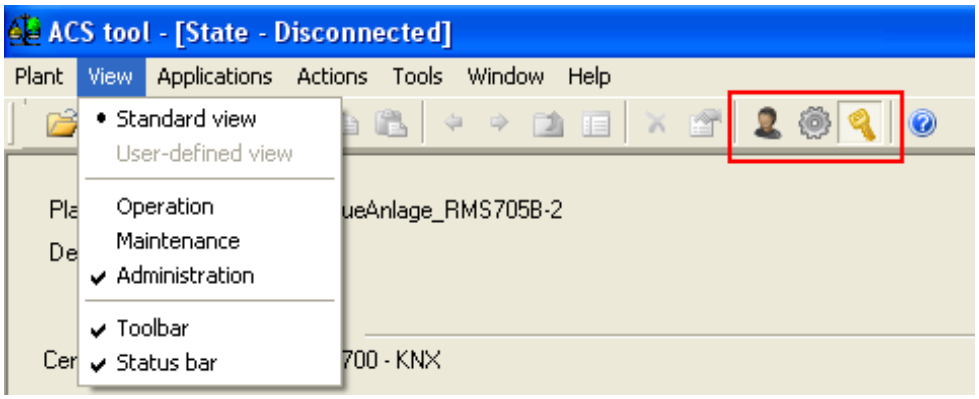
The "ACS tool" program comprises the following applications:

- Plant operation
- Plant engineering
- Online trend
- Offline trend
- File transfer

The applications can be started several times and operated concurrently.

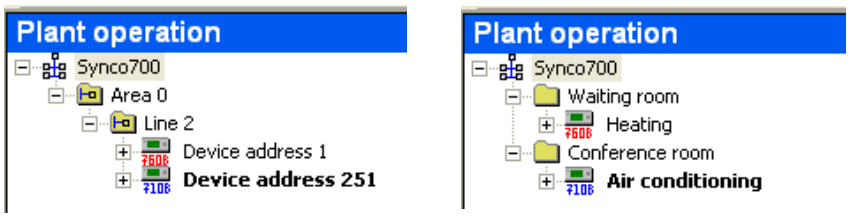
Selectable user views (user levels):

- Operation
- Maintenance
- Administration



Plant navigation

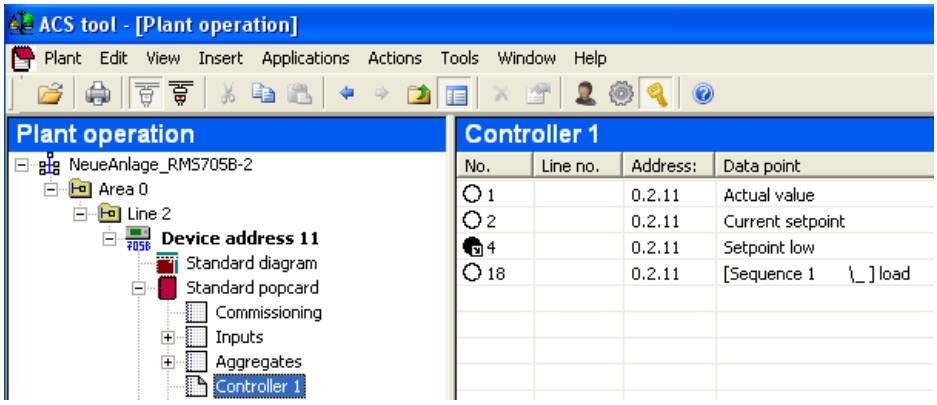
The devices are shown in the form of a tree structure in accordance with their addresses (left).



The tree structure can be redefined, assigning adequate names by adding new nodes (right).

Popcard

A standard popcard with a predefined tree structure and contents of the operating pages is available for each device type.



Every selected operating page is automatically updated, meaning that the color of the circle symbol changes from red (not updated) to black (updated).

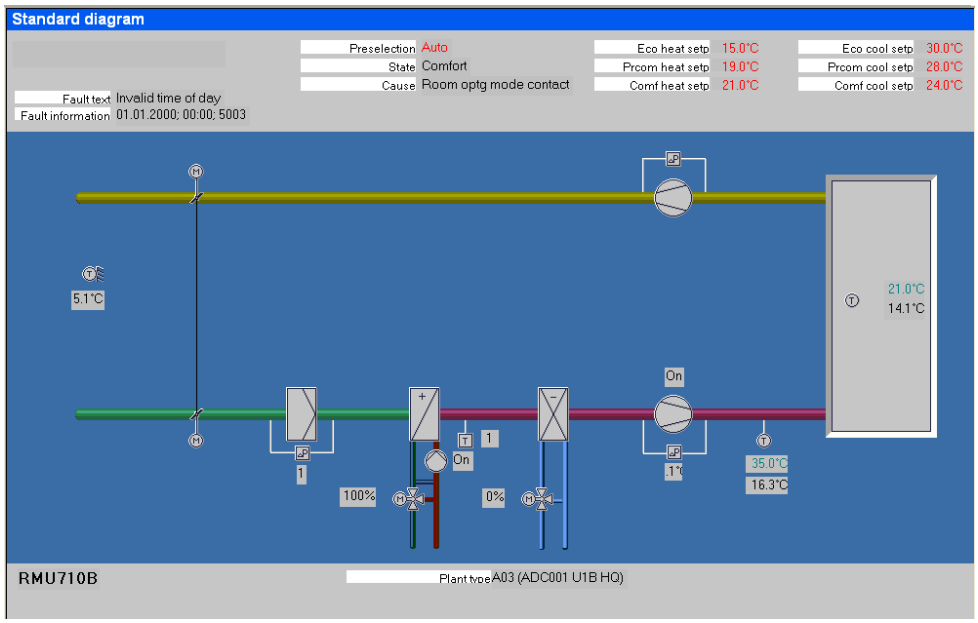
User-defined popcards are created by the administrator. This provides for quick access to frequently used data points in the user views "Operation" and "Maintenance".

Plant diagram

A plant diagram is the graphical representation of a plant (e.g. ventilation plant) and can include one or several devices. Characteristics:

- Data points and their values are updated and displayed in the diagram
- Writable data point values can be changed in the diagram
- User-defined diagrams make possible links to other diagrams

ACS790 shows standard plant diagrams depending on the device's configuration (plant type).



Standard plant diagrams can be copied and then adapted. This means that a user-defined plant diagram can be created from a standard plant diagram.

ACS790 software contains a library with standard plant diagrams.

Engineering of plant

Application "Plant engineering" enables the data points (parameter sets) of the devices to be edited. Following editing functions are available:

- Creating configurations (editing data points)
- Reading, writing and comparing data points (parameter set)
- Importing, exporting and archiving parameter set
- Producing the commissioning report and exporting it as an xls file

Commissioning report

	A	B	C	D	E	F
1	**Parameter set "Inbetriebnahmeprotokoll2011-09-23 15:08:00 (0.2.1)" from:**	RMU730B 0.2.1				
2	**Created on:**	27.09.2011 17:46				
3						
4						
5						
6	Commissioning / Basic configuration					
7	**Line no.**	**Data point**	**Address:**	**Value**	**Unit**	**State**
8		Plant type	0.2.1	Basic type A vent controller		OK
9		Position 1	0.2.1	----		OK
10		Position 2	0.2.1	----		OK
11		Position 3	0.2.1	----		OK
12		Position 4	0.2.1	----		OK
13						
14	Commissioning / Extra configuration / Input identifier					
15	**Line no.**	**Data point**	**Address:**	**Value**	**Unit**	**State**
16		N.X1	0.2.1	Supply air temperature		OK
17		N.X2	0.2.1	Digital		OK

Trend

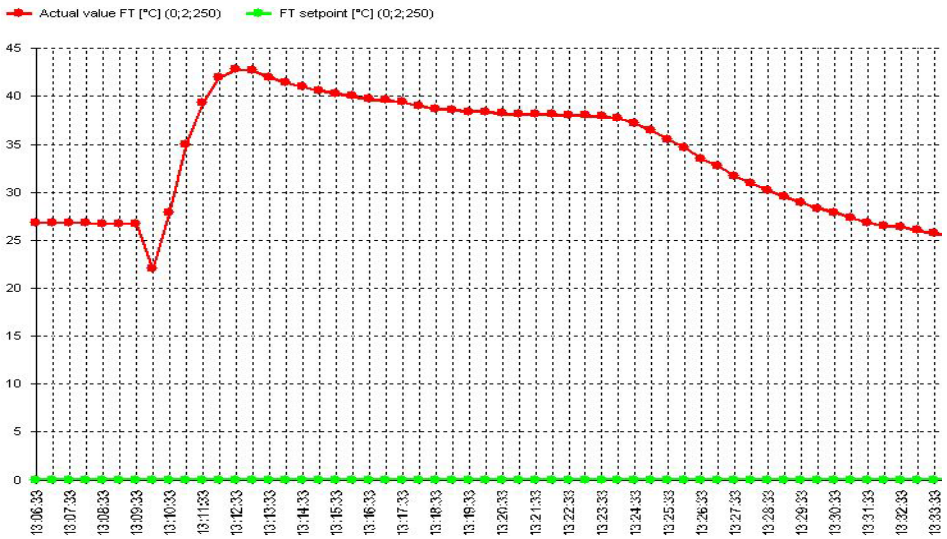
Applications "Online trend" and "Offline trend" are used to acquire the progression of data point values and to show them graphically. The respective trend data can be exported as an xls file.

Online trend

There is a connection between plant and ACS790. Trend data are stored in the ACS790 and graphically presented online.

Offline trend

There is no connection between plant and ACS790. Trend data are stored in the web server and then read from the web server for graphical representation in the ACS790.



The trend graphs show the data point values according to the sampling interval (graph above is based on a sampling interval of 1 minute).

ACS Alarm

Program "ACS Alarm" receives, stores, displays and prints out the alarm messages from the plants and devices.

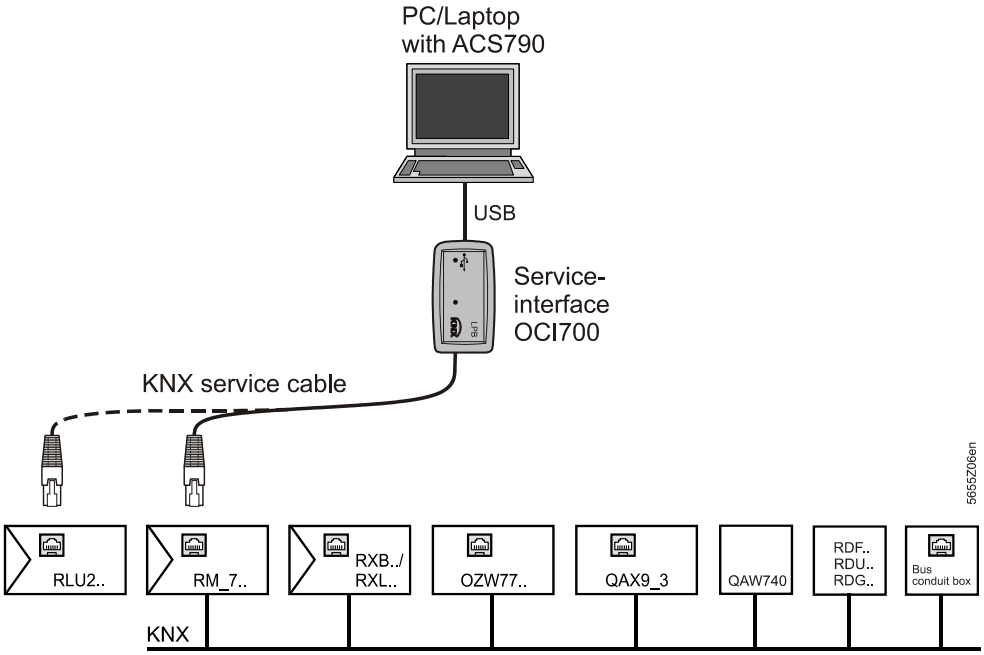
ACS Batchjob

The "ACS Batchjob" program allows for automatic execution (once or periodically) of planned jobs.

Service tool OCI700.1

The OCI700.1 service tool (see Data Sheet N5655) consists of a service case containing a CD-ROM with the ACS790 software, the OCI700 service interface and 3 device-specific connecting cables.

Software and service interface facilitate commissioning and servicing of Synco devices and communication via KNX. The OCI700.1 tool is for installation on a PC/laptop.



The OCI700 service interface converts the signals between the USB interface at the PC/laptop and the device's interface or the KNX bus connection facility.

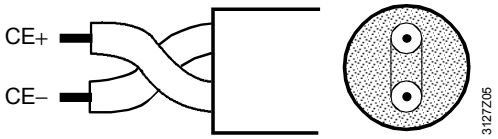
Synco and KNX

KNX www.knx.org is based on the European Installation Bus (EIB). EIB, BatiBUS and EHS, the producers of bus technology, jointly developed the KNX standard for HVAC plants, lighting and security technology, the objectives being the following:

- Interworking of products of different manufacturers in the same network
- Certification of products used in KNX communication networks
- Backward compatibility with EIB (communication of KNX devices in S-mode)

KNX bus

In its simplest form, the KNX bus (see Data Sheet N3127) consists of a twisted pair of wires, CE+ (red) and CE– (black), and a jacket.



Shielding of bus cable

In plants operating with Synco devices, bus cables without shielding are permitted. If interference on the KNX bus is to be expected, the bus cable must be shielded.

Synco and KNX

The following types of Synco devices have a KNX bus connection facility, enabling them to be integrated into a KNX network:

- Universal controllers RMU710B, RMU720B, and RMU730B
- Heating controller RMH760B
- Boiler sequence controller RMK770
- Central control unit RMB795B
- Switching and monitoring device RMS705B
- Room unit QAW740 and bus operator unit RMZ792 of the B-series
- Room controllers RXB21.1, RXB22.1, RXL21.1, RXL22.1, RXB24.1, RXL24.1, RXB39.1, and RXL39.1
- Room thermostats RDF301, RDF301.50, RDU341, RDG100KN, RDG400KN
- Central communication units OZW771.04, OZW771.10, and OZW771.64
- Web servers OZW772.01, OZW772.04, OZW772.16, and OZW772.250
- Service interface OCI700
- Central apartment units QAX9.. (Synco living)

Product markings

The Synco devices bear the following markings:

KNX — Devices carrying this logo are certified by KNX

TP1 — **T**wisted **P**air **1**, 1 twisted pair of wires (transmission medium)

EE — **E**asy (mode), Logical Tag Extended (configuration mode)

LTE mode, S-mode

The Synco devices communicate with each other via zone addresses in LTE (Logical Tag Extended) mode.

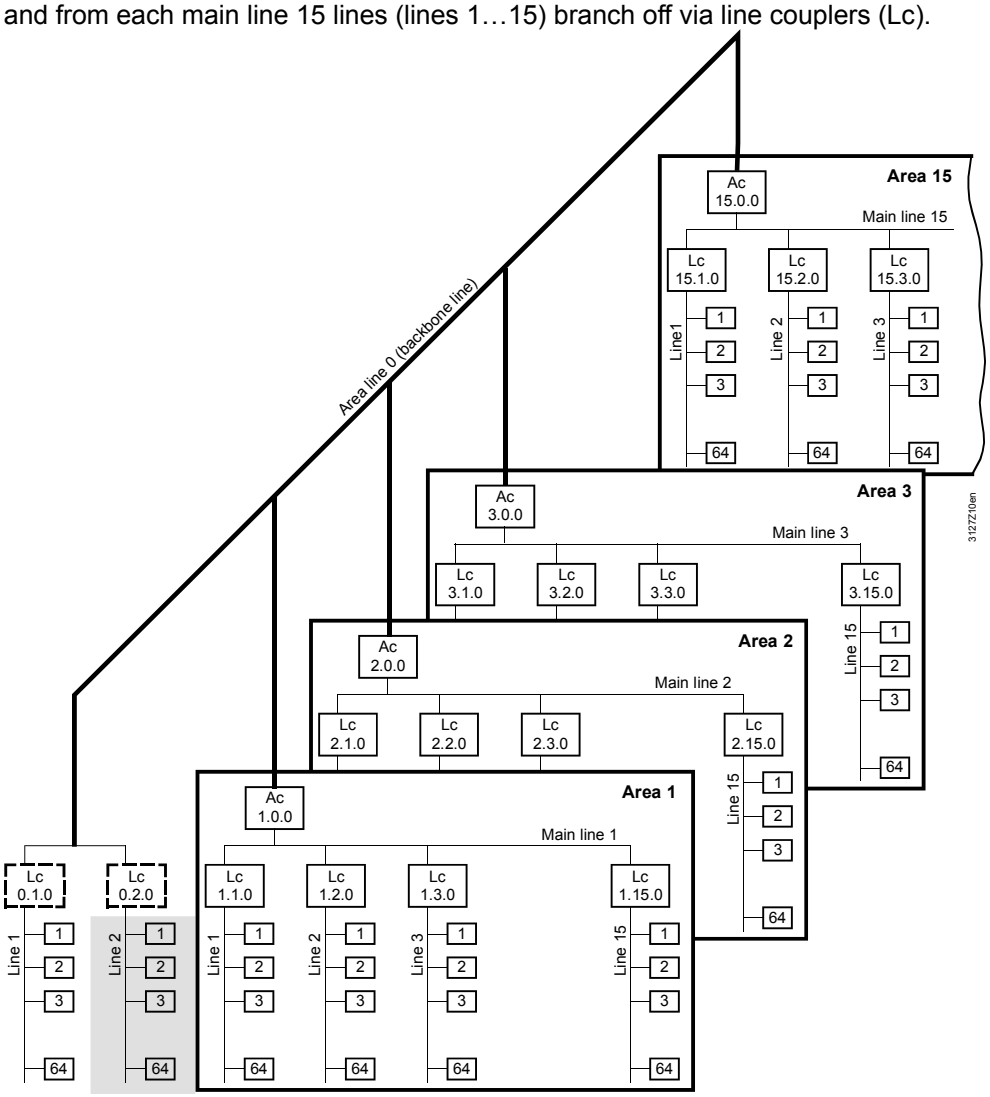
Synco devices and KNX devices supplied by thirds communicate with each other via group addresses in S-mode (S = System Mode). For S-mode addressing, commissioning tool ETS Professional is required.

The Synco devices can simultaneously communicate in LTE mode and S-mode.

KNX network

A fully extended KNX network has a 3-level structure. Area line 0 forms the network's backbone.

From each area line, 15 main lines (area 1…15) branch off via area couplers (Ac), and from each main line 15 lines (lines 1…15) branch off via line couplers (Lc).



Notes: Synco devices and devices supplied by thirds integrated in a KNX network are also termed "bus devices". Bus devices are assigned network addresses.
The factory-set area/line address 0.2 of Synco devices corresponds to the area highlighted in grey in the above illustration. This means that without area and line couplers, the network structure remains limited to area 0, line 2, that is, to one line.

Area and line couplers

In the following cases, area and line couplers are required in extensive KNX networks with large numbers of bus devices:

- The KNX network includes more than 64 bus devices
- Creation of "communication islands", aimed at keeping data traffic across areas or lines in the network as low as possible

Siemens area/line couplers

5WG1 140-1AB13, short type reference N140/13.
Bus connection to main line and line via terminals.

IP router

Technically speaking, the IP[1)] router is not identical with the area/line couplers. Instead of having a connection within KNX, a "KNX - IP network" connection is established. In that case, an IP router connects a KNX area or KNX line to an IP network.

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

Siemens IP router

5WG1 146-1AB02, short product no. N146/02.
Bus connection via terminals, IP network connection via RJ45.

Bus power supply units

In extensive networks, the bus must be powered via power packs. Commercially available power supply units are rated at 160, 320 and 640 mA.

Siemens power supply units

Power supply units for KNX networks without IP router.
5WG1 125-1AB02, short product no. N125/**02**, current output **160 mA**
5WG1 125-1AB12, short product no. N125/**12**, current output **320 mA**

Power supply units for KNX networks with IP router.
5WG1 125-1AB22, short product no. N125/**22**, current output **640 mA**

For more information about Siemens area/line couplers, IP routers and power supply units, visit www.siemens.com/knx-td

Large plants

Engineering and commissioning

When engineering and commissioning large plants, the following points must be observed:

Cable lengths

In the case of lines, the maximum permissible cable length is 1,000 meters. If the network's topology exceeds that limit, area/line couplers and power supply units are required.

Number of bus devices

A maximum of 64 bus devices may be installed on one line. If the number of bus devices installed in a plant exceeds 64, they must be distributed to different lines and/or areas.

Bus power supply

If the devices do not power the bus (e.g. third-party products), a power supply unit for the bus must be installed on each line (main line 15 and line 15.1, or other lines 15.x, if present).

Area and line couplers

Large plants necessitate LTE-compatible area/line couplers.

IP routers

For coupling KNX with IP networks, LTE-compatible IP routers are required.

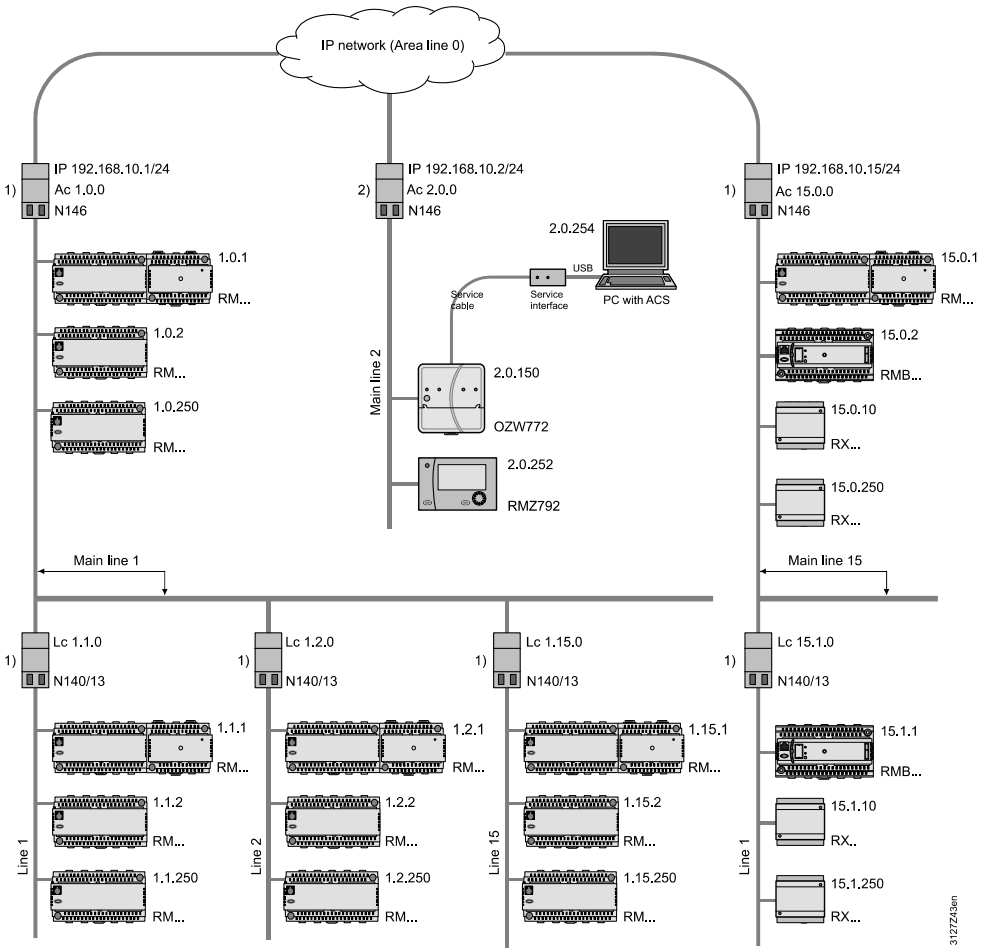
LTE filter table

Area/line couplers and IP routers must contain the predefined LTE filter table because it enables LTE telegrams to be filtered, thus reducing the amount of data traffic.

The predefined LTE filter table is contained in Siemens' area and line coupler N140/13 and in Siemens' IP router N146/02.

Example

KNX network coupled with IP network via IP router (area line 0)



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

Alarm drains

Alarm drains – in the above example, the OZW772 web server and the RMZ792 bus operator unit – must receive all alarm signals and all other data from the network and, for this reason, must be installed on a superposed line.

Main line 2 acts as a "backbone" and the alarm drains need be installed on that line. Area coupler Ac 2.0.0 must be set to "Route all telegrams".

Note: A maximum of 64 bus devices can be installed on one line. Addresses x.y.250 (see example) shall refer to the highest possible address for bus devices and not to the possible number of bus devices.

LTE mode data points

Communication between Synco devices takes place in LTE mode via LTE data points.

S-mode data points

Communication between Synco devices and third-party KNX devices is executed in S-mode via S-mode data points. In the Synco devices, the S-mode data points correspond to a subset of the LTE data points.

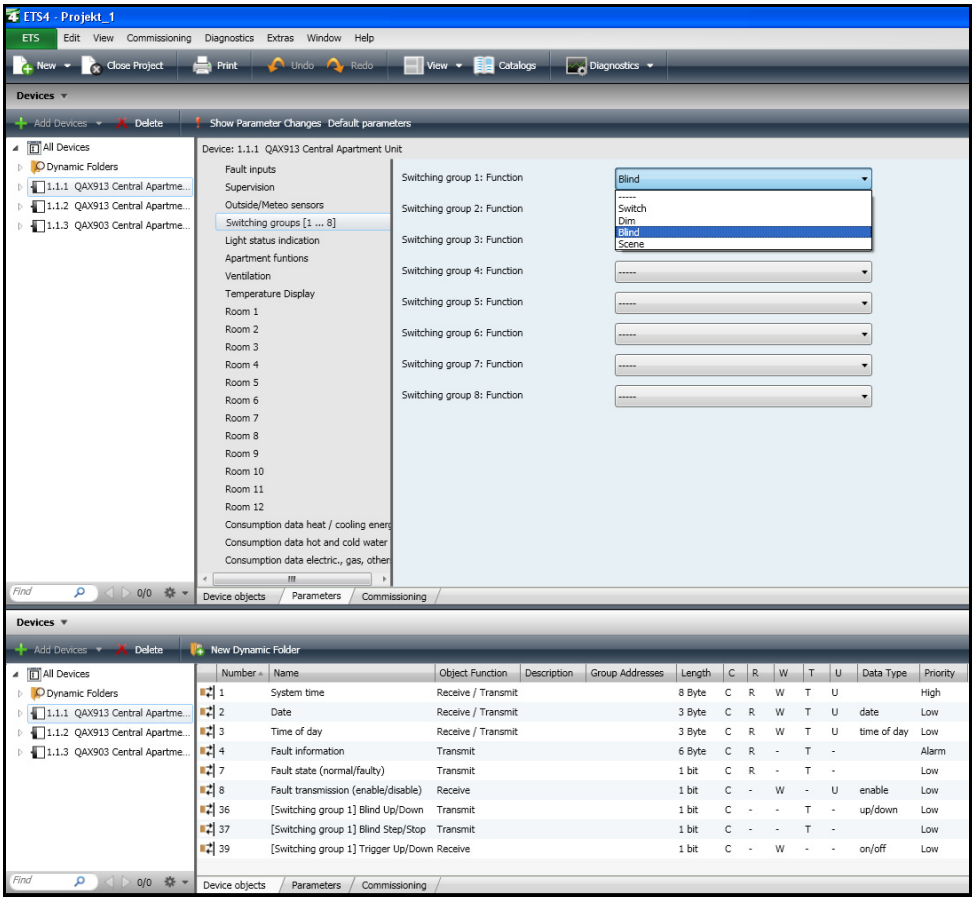
The S-mode data points of the current Synco devices are available for downloading from Siemens Building Technologies as an import file for ETS Professional.

Engineering Tool Software, ETS

The S-mode data points are to be configured in ETS Professional. The tool can be ordered with the KNX Association: http://www.knx.org/

Example:
Tool interface ETS4

The top section of the screen shows that for the Synco living central apartment unit QAX913, the parameters for "Switching groups [1...8]" are selected and set for "Switching group 1: Function" → "Blind".



Resulting from parameter setting "Switching group 1: Function" → "Blind", the bottom section of the screen shows the following S-mode data points (in ETS "Device objects"):

36	[Switching group 1] Blind Up/Down	Object function: Transmit
37	[Switching group 1] Blind Step/Stop	Object function: Transmit
39	[Switching group 1] Trigger Up/Down	Object function: Receive

Note: The data point numbers 1...8 comprise the general S-mode data points, contained in every KNX Synco device.

Simple, versatile and reliable

Comprehensive product range

From basic temperature control to complete HVAC plant control – from heat or refrigeration generation control through distribution to individual room control: Synco offers a comprehensive range of standard controllers for all types of applications.

Versatile and expandable for future use

Synco supports the entire life cycle of a building. Whether you change the usage of a building, in case of a staged construction or when you expand or modernize a plant – Synco is the ideal solution for you. Thanks to their modular concept and backward-compatible communication, the controllers can be expanded and adapted at any time. This means that the functionality of HVAC plants can grow depending on new requirements, and investments can be made in stages.

Straightforward operation and quick commissioning

Synco excels in high levels of user and service friendliness, owing to straightforward and efficient operation. Proven and preprogrammed applications and energy saving functions are integrated, enabling you to save time and costs in terms of planning, engineering and commissioning.

Competent support for your work

With Siemens, you have a strong and competent partner at your side. Backed by our in-depth know-how, we offer you extensive support for Synco – for example different training modules, e-learnings as well as comprehensive technical documentation and application descriptions.

Decades of experience and high quality standards

HVAC plant control is one of the challenges we have been facing for more than 70 years. The incremental development of our products benefits from our in-depth application know-how resulting from decades of practical experience and extensive research work.

We attach great importance to quality management and systematically subject our products to stringent tests. Controllers and their functions are thoroughly tested in our own HVAC laboratory. This ensures the highest levels of product quality and puts us in a position to work with you as your competent partner.

Highlights

- Energy savings thanks to intelligent building automation
- Comprehensive product range for any requirements
- Versatility and expandability for future use
- Straightforward operation and quick commissioning
- Optimum control and fast setting options through remote plant access
- Superior support through a reliable partner
- Highest quality and reliability backed by decades of experience and high standards

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Answers for infrastructure.

Our world is undergoing changes that force us to think in new ways: demographic change, urbanization, global warming and resource shortages. Maximum efficiency has top priority – and not only where energy is concerned. In addition, we need to increase comfort for the well-being of users. Also, our need for safety and security is constantly growing. For our customers, success is defined by how well they manage these challenges. Siemens has the answers.

"We are the preferred partner for energy-efficient, safe and secure buildings and infrastructure."

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