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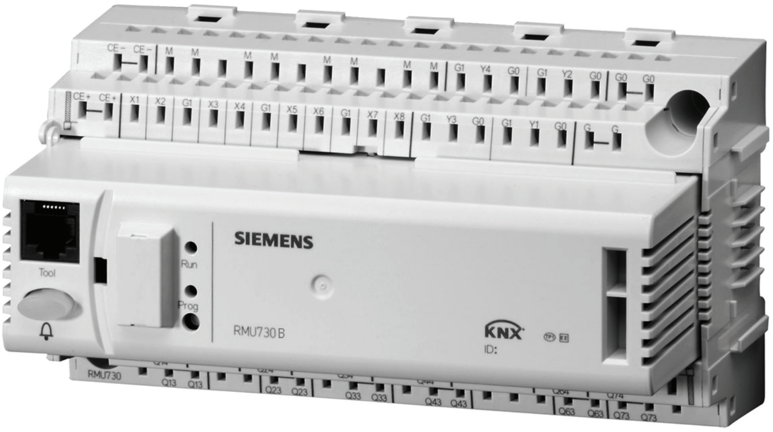

Synco™ 700
Universal controllers
RMU710B, RMU720B, RMU730B

Including extension modules RMZ785, RMZ787 and RMZ788

Basic documentation

Controller series C
CE1P3150en
03.10.2011

Building Technologies

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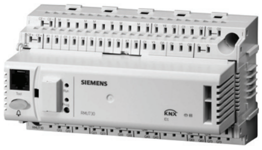
Table of contents

1 Summary

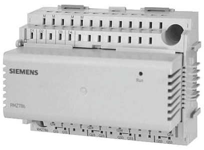
1.1 Product range

Room unit	*Name*	*Type*	*Data sheet*
Controller	Universal controller	**RMU710B**	N3150
	Universal controller	**RMU720B**	N3150
	Universal controller	**RMU730B**	N3150
Extension modules	Universal module	**RMZ785**	N3146
	Universal module	**RMZ787**	N3146
	Universal module	**RMZ788**	N3146
	Module connector	**RMZ780**	N3138
Operator units	Operator unit, plug-in type	**RMZ790**	N3111
	Operator unit, detached	**RMZ791**	N3112
	Bus operator unit	**RMZ792**	N3113
Service unit	Service tool	**OCI700.1**	N5655
Central communication unit	Central communication unit	**OZW775**	N5663
Web server	Web server	**OZW772…**	N5701

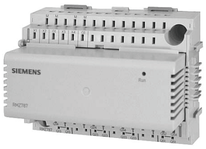
RMU7..B



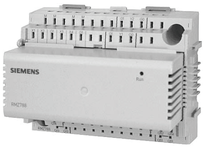
RMZ785



RMZ787



RMZ788



RMZ780

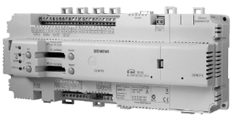
RMZ790

RMZ791

RMZ792

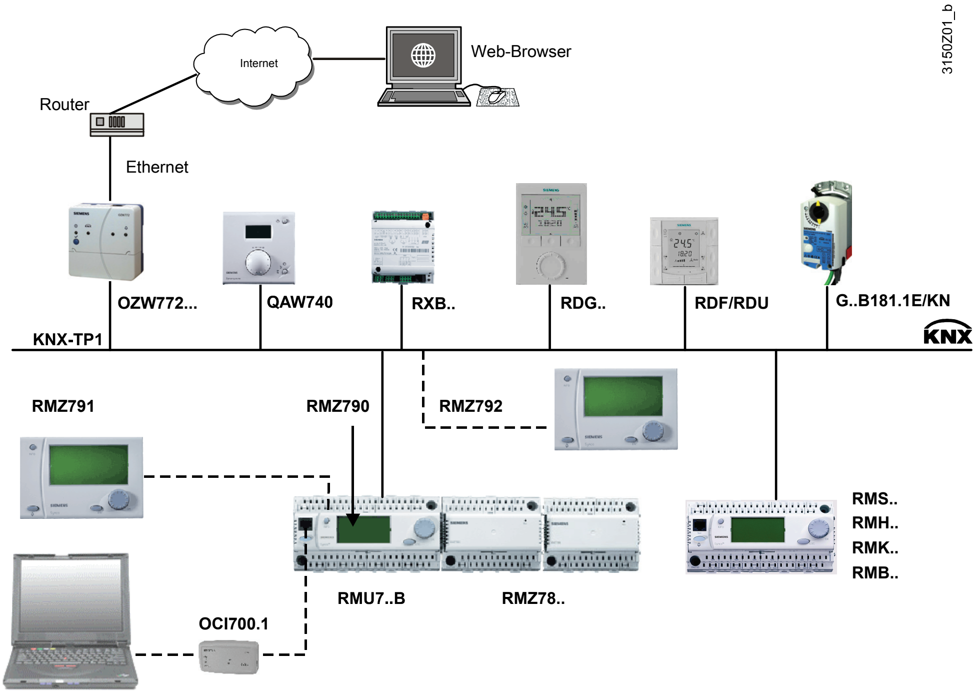
OCI700.1

OZW775



OZW772

1.2 Synco™ 700 topology



Key

RMU7..B	Universal controller	RMH..	Heating controllers
RMZ790	Operator unit, plug-in type	RMK..	Boiler sequence controller
RMZ791	Operator unit, detached	RMB..	Central control unit
RMZ792	Bus operator unit	RXB..	Room controller
RMZ78..	Extension modules	RDG.. RDF.. RDU..	Room thermostat
OCI700.1	Service tool	QAW740	Type of room unit.
OZW772..	Web server	G..B181.1E/KN	VAV compact controller
RMS..	Switching and monitoring device		

1.3 Equipment combinations

Room unit	*Type*	*Data sheet*
Passive sensors	All types of sensors using a sensing element LG-Ni 1000, Pt 1000 or T1 (PTC)	N1721...N1846, N1713
Active sensors	All sensors operating on AC 24 V modulating output DC 0...10 V	N1821, N1850...N1932
Monitors	QAF81..., QAF64..., QFA81, QFM81, QFX21, QXA2000, QBM81...	N1284, N1283, N1513, N1514, N1541, N1542 N1552
Room units	QAA25, QAA27, QAW740	N1721, N1633
Passive signal sources	BSG21.1, BSG21.5, QAA25, QAA27	N1991, N1721
Active signal sources	BSG61	N1992
Actuating devices	All types of electromotoric and electrohydraulic actuators • Operating on AC 24 V. • For modulating control DC 0...10 V. For detailed information on actuators and valves, refer to:	N4000...N4999
Volume flow controller VAV	G…B181.1E/3 G…B181.1E/KN networked versions	N3544 N3547
Transformer	SEM62.1, SEM62.2	N5536

1.4 Product documentation

In addition to this Basic Documentation, the product documentation listed below provides detailed information on the safe and proper use and operation of Synco™ 700 products in building services plant.

Type of document	*Document no.*
Range description: Synco™700	**CE1S3110en**
Basic documentation: Universal controllers RMU710B, RMU720B, RMU730B	**CE1P3150en**
Data sheet: Universal controller RMU7..B	**CE1N3150en**
Data sheet: Universal modules RMZ785	**CE1N3146en**
Data sheet: Module connector RMZ780	**CE1N3138en**
Data sheet: KNX bus	**CE1N3127en**
Basic documentation: Communication via KNX bus	**CE1P3127en**
Installation instructions (G3151xx): RMB795, RMS705B, RMU7..B	**74 319 0731 0**
Mounting instructions (M3110xx): RMZ78...	**74 319 0353 0**
Mounting instructions (M3112xx): RMZ791	**74 319 0339 0**
Mounting instructions (M3138xx): RMZ780	**74 319 0380 0**
Operating instructions de, fr, it, es (B3144x1): Universal controller RMU7..B	**74 319 0349 0**
Operating instructions en, de, fr, nl (B3144x2): Universal controller RMU7..B	**74 319 0350 0**
Operating instructions sv, fi, no, da (B3144x3): Universal controller RMU7..B	**74 319 0351 0**
Operating instructions pl, cs, sk, hu, ru, bg (B3144x4): Universal controller RMU7..B	**74 319 0352 0**
Operating instructions sr, hr, sl, ro, el, tr (B3144x5): Universal controller RMU7..B	**74 319 0438 0**
CE declaration of conformity: HVAC controls Synco 700 range	**CE1T3110xx**
Environmental declaration (RMU7..B, RMS705, RMB795, RMH760, RMK770)	**CE1E3110en01**
Environmental declaration (RMZ78..)	**CE1E3110en02**
Environmental declaration (RMZ790)	**CE1E3110en03**
Environmental declaration (RMZ791)	**CE1E3110en4**
Environmental declaration (RMZ792)	**CE1E3113en**

1.5 Performance

Function	*RMU710B*	*RMU720B*	*RMU730B*
Option modules: Max. 4 connectable, selection from	max. 4	max. 4	max. 4
Extension with universal module RMZ785	1	1	1
Extension with universal module RMZ787	2	2	2
Extension with universal module RMZ788	2	2	2
Universal inputs (controller and extension modules):	6 + 20	8 + 20	8 + 20
As analog input DC 0...10 V	✓	✓	✓
As analog input Ni 1000	✓	✓	✓
As analog input T1	✓	✓	✓
As digital input	✓	✓	✓
As remote setpoint input (absolute and relative)	✓	✓	✓
Modulating outputs (controller + option module)	2 + 4	3 + 4	4 + 4
Relay outputs (controller + option module)	2 + 12	4 + 12	6 + 12
Number of preprogrammed applications	5	5	5
Number of programmed languages, depending on language group	4 to 6	4 to 6	4 to 6
Basic types	1	1	1
Basic type A	✓	✓	✓
Basic type P	✓	✓	✓
Basic type C	✓	✓	✓
Basic type U	✓	✓	✓
Selection of operation:	1	1	1
Via internal time switch (for weekdays and holidays / special days)	✓	✓	✓
Via digital inputs (for weekdays and holidays / special days)	✓	✓	✓
Fault status messages	1	1	1
Number of free fault status inputs	10	10	10
Fault status signal relay	2	2	2
Fans (supply air, extract air)	2	2	2
1-speed fan	✓	✓	✓
2-speed fan	✓	✓	✓
Speed-controlled fan	✓	✓	✓
Pumps	2	3	4
Modulating outputs	2	3	4
Heat recovery equipment	1	1	1
Mixing damper	1	1	1
Linear/binary step switch (4 relay outputs)	3	3	3
Variable step switch (max. 6 steps)	1	1	1
Variable step switch (max. 4 steps)	1	1	1
Heat demand	1	1	1
Refrigeration demand	1	1	1
Heating / cooling changeover	1	1	1
Universal controller with 3 heating and 2 cooling sequences _//	1	1	1
Universal controller with 2 heating and 1 cooling sequence _/	0	1	2
Room supply or extract air cascade controller	1	1	1
Summer/winter compensation	1	1	1
Universal shift	1	2	3
General limit controller	1	2	3
Sequence limit controller	1	2	3
Sequence locking acc to OT	✓	✓	✓
IAQ controller	1	1	1
Opening of outside air damper	✓	✓	✓
Changeover of fan speeds	✓	✓	✓
Increase of fan speed	✓	✓	✓
Fans ON	✓	✓	✓

Function	*RMU710B*	*RMU720B*	*RMU730B*
Universal sustained mode in operating mode Precomfort and economy for heating / cooling / humidity or universal	1	2	3
Night cooling	1	1	1
Frost protection	1	1	1
Frost protection unit	1	2	3
2-stage frost protection, air side	✓	✓	✓
2-stage frost protection, water side	✓	✓	✓
Preheating function	1	1	1
Time switch (ON/OFF) for auxiliary aggregates	1	1	1
Logic block for logically linked switching cycles	4	4	4
Trend function with 4 inputs to log measured values	1	1	1
Meter function to record consumption data for 2 meters (exclusively for display purposes)	1	1	1

1.6 Application concept

1.6.1 Programmed application

Each universal controller contains 5 tested, preprogrammed applications.
The simplest commissioning method is to activate one of the programmed applications.
The 5 internally loaded application per controller are described:

- In this basic documentation in section 31.2 "Configuration diagrams"
- In data sheet N3150
- In the installation instructions G3151

Example

On the operator unit display, the operating line "plant type" displays:
A01 (AEFB01 U3B HQ)

Meaning:

A	The standard application corresponds to basic type A
01	First internally loaded standard application
AEFB01 U3B HQ	The name in parentheses is the application's code. It corresponds to the designation of the application sheet

If the plant type line only displays a letter, it means that basic type A, P, C or U is loaded. Without making adaptations on the extra configuration line, such an application does not work.

Note

Depending on the controller type, supplemental country-specific application are loaded on the universal controller.

1.6.2 Adapted application

The programmed application is not entirely correct, but an adapted application is included in HIT (www.siemens.com/HIT). In that case, enter appropriate settings in the "Extra configuration" menu.

1.6.3 Free configuration

The application you want is not described; you have to set up the configuration from scratch. Configuration diagrams allow the plant controlled to be adapted (refer to section 31.2 "Configuration diagrams".

Recommendation

You can save time by starting with a similar internally loaded or similar application sheet and edit only the differences.

1.7 Important notes

⚠ This symbol draws your attention to special safety notes and warnings. Failure to observe such notes may result in personal injury and / or considerable damage to property.

Field of use

Synco™ 700 products may only be used for control and supervision of heating, ventilation, air conditioning and chilled water plants.

Intended use

Prerequisites for flawless and safe operation of Synco™ 700 products are proper transport, installation and commissioning as well as correct operation.

Electrical installation

Fuses, switches, wiring and earthing must comply with local safety regulations for electrical installations.

Commissioning

Preparation for use and commissioning of Synco™ 700 products must be undertaken by qualified staff trained by Siemens Building Technologies.

Operation

Synco™ 700 products may only be operated by staff instructed by Siemens Building Technologies or its delegates and who understand the potential risks.

Wiring

When wiring the system, strictly segregate the AC 230 V section from the AC 24 V safety extra-low voltage (SELV) section to ensure protection against electric shock hazard!

Storage and transport

The limit values listed in the data sheet apply for storage and transport (under "Environmental conditions" in the technical data).
If in doubt, contact your supplier or Siemens Building Technologies.

Maintenance

Synco™ 700 products are maintenance-free and only require regular cleaning. Keep free of dust and dirt any system sections in the control panel whenever normal service visits are due.

Faults

Should system faults occur and you are not authorized to make diagnostics and to rectify faults, call SBT service staff.

⚠ Only authorized staff are permitted to diagnostics, correct faults and restart the plant. This applies as well to work carried out within the panel (e.g. safety checks or replacement of fuses).

Disposal

Do not dispose of the products as domestic waste as they contain electrical and electronic components.

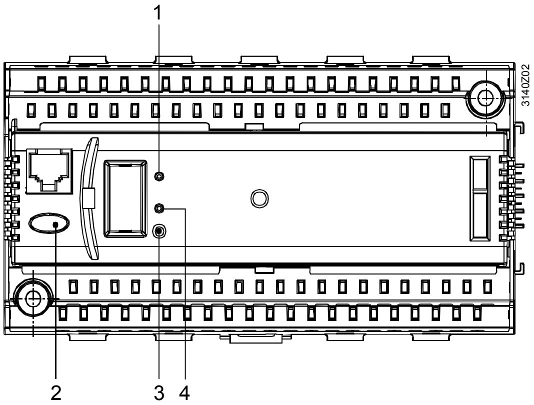
Observe all local, applicable laws.

2 Operation

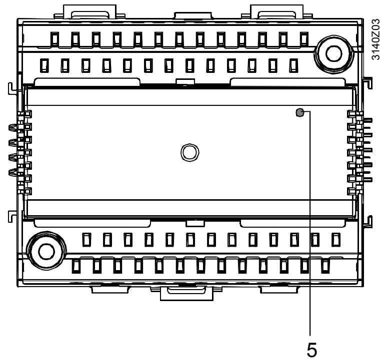
⚠ Synco™ 700 devices may only be operated by staff who have been instructed by Siemens Building Technologies or their delegates and whose attention has been drawn to potential risks.

2.1 Operation without operator unit

The following operating elements on the controller and extension module can be used with the operator unit:



Universal controller



Extension module

Key

1 LED (Run) for indicating the device's operating state:
LED lit: Power on, no fault in the application / periphery
LED off: No power or fault in the application / periphery

2 Button "🔔" with LED (red) to display fault status message and its acknowledgement:
LED flashes: Fault status message ready to be acknowledged
LED lit: Fault status message pending, but not yet reset
LED off: No fault status message
Press button: Acknowledge fault or reset

3 Programming button (Prog) for assigning the device address in KNX system mode (tool required)

4 Programming LED (Prog) to display programming process, with meaning:
LED lit: LED remains lit until addressing is completed

5 LED (Run) for monitoring power supply and addressing; with the following meaning:
LED lit: Power on, addressing successful
LED flashes: Power on, controller still has not valid KNX address
LED off: No power

2.2 Operation with operator unit

2.2.1 Operator unit functions

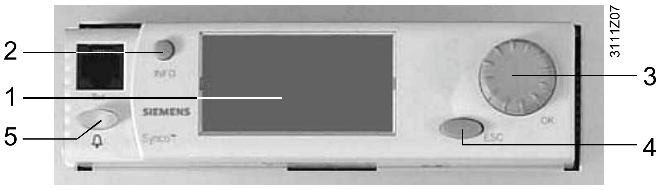
The operator unit is used to make the settings and readouts required for operation of the controller. All entries made on the operator unit are transmitted to the controller where they are handled and stored; the operator unit itself does not store any data. The information for the user is generated by the controller and passed to the operator unit where it is displayed.

2.2.2 Operating concept

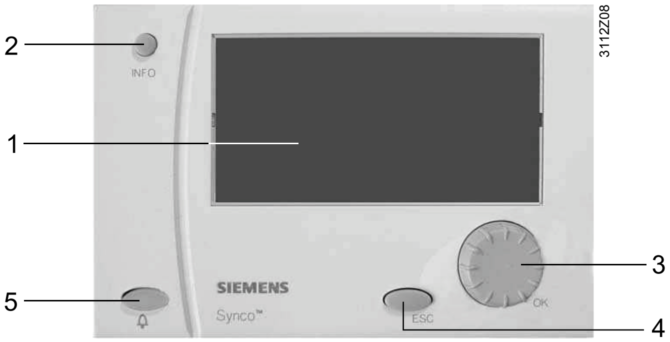
Fundamentals

On the software side, all settings and readout values are arranged as data points (operating lines) of the menu tree. Using the operating elements, every operating line can be selected, displayed or set. All menus appear on the LCD as plain text. The controller has several languages preprogrammed; the required language is activated during plant commissioning. The Operating Instructions for the end user are included with the controller including the languages loaded on the controller.

Operating elements



Plug-in type operator unit RMZ790



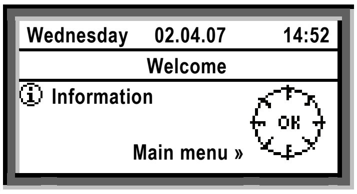
Detached operating unit RMZ791
or bus operator unit RMZ792

Key

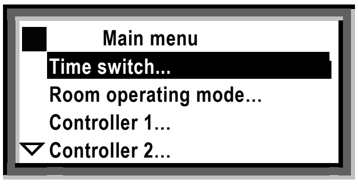
1 Display
2 INFO button
   Function 1: Display of important plant data
   Function 2: Explanations on individual operating lines on the current menu
3 • OK press-and-turn knob
   Turn: Selection of operating line or readjustment of value
   Press: Confirmation of operating line or setting
4 • ESC button
   Return to the previous menu
5 Fault button "🔔" with LED
   LED: Fault display
   Press: Acknowledge fault or reset

The backlit display automatically switches on when using one of the operating elements. It switches off and the start page appears when inactive for 30 minutes.

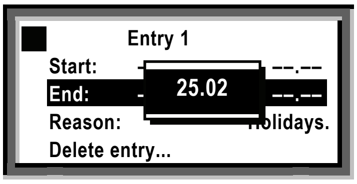
Display examples



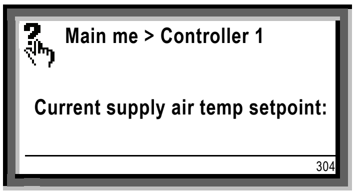
Start page



Setting level:
Select setting parameters
e.g. on the main menu of the user level


Entry 1
Start: --.--
End: 25.02 --.--
Reason: Holidays.
Delete entry...

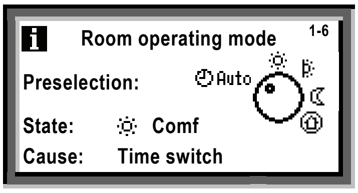
Setting level:
Pop-up, setting a numerical value


Main me > Controller 1

Current supply air temp setpoint:

304

Setting level:
Help display: Explanation of selection setting parameters. The menu Text-ID number or setting parameters is displayed in the lower right-hand corner


Room operating mode 1-6
Preselection: Auto
State: Comf
Cause: Time switch

Information level:
"Display of important plant data" (picture 1 of 6)

2.2.3 Operating levels

There are 2 operating levels:
- Info level ℹ
- Setting level ■

These 2 levels are always active regardless of the access level used.

Info level ℹ

Important plant data can be queried in this level.

Setting level ■

The setting level is set up as a menu. It provides for reading and adjustment of operating lines.
The INFO button queries menu explanations on the individual operating lines.
The information is displayed as long as the button is depressed.

Switching between the operating levels

- Switching from the info level to the setting level:
  1. Select the start page by pressing the ESC button
  2. Press the OK knob to change to the setting level
- Switching from the setting level to the info level:
  1. Select the start page with the ESC button. Press the button repeatedly until the start page reappears
  2. Press the INFO button to change to the info level

2.2.4 Access rights

An access right is defined for each parameter (operating line). There are 3 access levels:

Level	*Access*	*Symbol*
User level (for the plant operator)	The user level is always accessible. The user can adjust visible, editable operating lines	■
Service level (for maintenance)	Press the OK knob and the ESC button at the same time, then select operating line "Service level" and confirm by pressing the OK knob	🔑
Password level (for commissioning)	Press the OK knob and the ESC button at the same time; then, select operating line "Password level" and confirm by pressing the OK knob; then, enter the number 7 for the password and confirm by pressing the OK knob	🔑2

The access level determines which individual menus and operating lines are activated. At a higher access level, all of the menus and operating lines of the lower access levels remain visible.
The levels use a common menu tree as a base (the password level shows the entire menu tree).

Switching to another access level

- After time-out (= 30 minutes, during which the controller is not operated), the controller switches to the user level
- Switching from the current access level to another access level:
  1. Press the OK knob and the ESC button simultaneously. The "Access levels" menu appears
  2. Select the required access level by turning the OK knob and press to confirm
  3. Enter number 7 to access the password level

3 Philosophy of basic types

Four basic types are available for the RMU7..B. They differ by:

- Field of use
  Ventilation
  Primary air handling
  Chilled water handling
  Universal
- Operating mode
  Switch ON/OFF by room operating mode
  Demand-dependent by KNX signal
- Control
  For room temperature
  To demand-dependent setpoints by KNX signal
  By a freely selectable, universal measured value

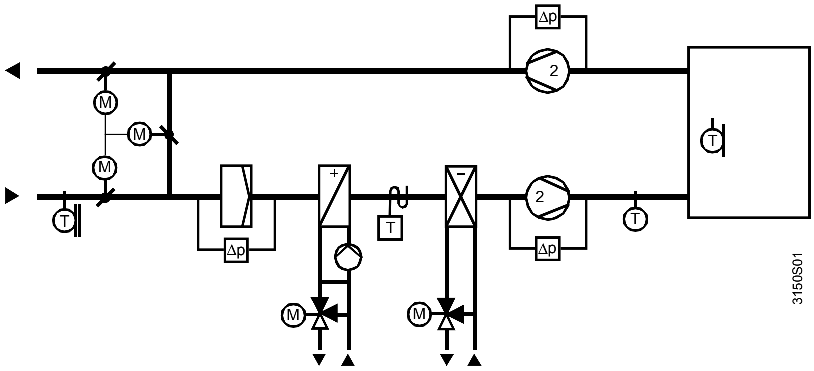
The suitable basic type must be selected for an application.
Short characteristics:

- **Basic type A**, ventilation controller
  Typical field of use: Control of an air handling plant
- **Basic type P**, primary air handling
  Typical field of use: Demand-dependent control of an air handling plant with VAV individual room control
- **Basic type C**, chilled water treatment
  Typical field of use: Demand-dependent control of a chilled water treatment
- **Basic type U**, universal controller
  Typical field of use: Control to a flow temperature setpoint (universal measured value)

3.1 Basic type A, ventilation controller

Typical field of use: Control of an air handling plant.

Example: Room / supply air temperature cascade control



Features of basic type A

Operating mode: *Switch ON/OFF by room operating mode.*
The plant is switched on and off by its own time switch.
The controller operates with room operating modes Comfort, Precomfort, Economy and Protective Mode.

Use of Controller 1: *For room temperature.*
Controller can be used as a cascade or constant temperature controller.

Fans:
Fan control for single-speed, 2-speed or speed-controlled fans.

Auxiliary functions:
- Indoor air quality control acting on mixed air dampers or fan speed
- Frost protection
- Preheating function
- Sustained mode
- Night cooling
- Smoke extraction / Fire alarm off

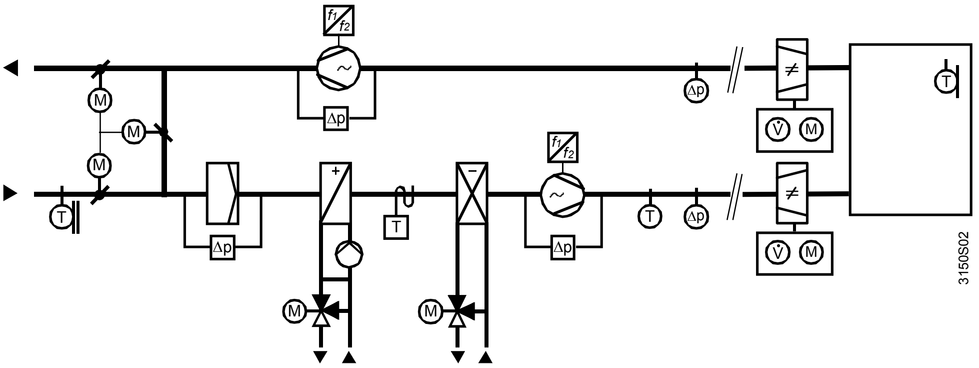
Note

The QAW740 room device can be used.

3.2 Basic type P, primary air handling

Typical field of use: Demand-dependent control of an air handling plant with VAV individual room control.

Example: Supply air temperature, demand-controlled



A RMU7..B, basic type P is used to implement air handling; the rooms have an individual room controller. All controllers connected via KNX and exchange the relevant operating data.

Features of basic type P

Operating mode: *Demand-dependent by KNX signal.*
The air handling plant is switched on and off via the demand signals (air distribution zone) for the individual room controllers. The room controller operates with room operating modes Comfort, Economy and Protective Mode.

Use of Controller 1: *To demand-dependent setpoint by KNX signal.*
The supply air temperature control works with a demand-dependent supply air setpoint; connected individual room controllers provide or coordinate the setpoints.

Fans: Optionally speed-controlled fans. Individual room controllers control to variable air flow. The following variants are available:
- Constant pre-pressure without feedback on the damper position.
- Demand-controlled pre-pressure. Individual room controllers report the damper position via KNX to the fan controller which then optimizes the pre-pressure setpoint.

Supplemental functions for control of an air handling plant.
- Indoor air quality control acting on mixed air damper
- Frost protection
- The RMU7..B time switch can be preset to the individual room controller via KNX

Note

The QAW740 room device cannot be used

Features of individual room control

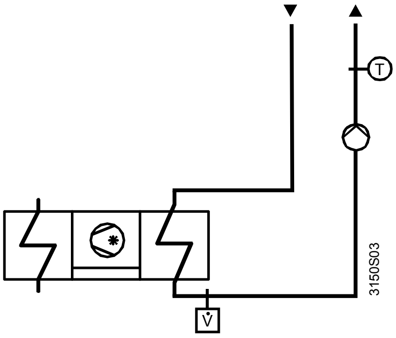
- Individual room control functions are described in the documentation P3127
- As an option, the following information can be defaulted for individual room control during configuration:
  - Room operating mode with time program.
  - Timer function.
  - Operating mode selector.
  - Holidays and special days.
  - Fire shutdown and smoke extraction.

For details, refer to the basic documentation for the RMB795 (P3121).

3.3 Basic type C, chilled water treatment

Typical field of use: Demand-dependent of chilled water treatment.

Example: Demand-dependent flow temperature control



Control of chilled water treatment with a RMU7..B as primary controller; chilled water consumers include the air cooling cool for the ventilation plants or chilled ceilings with individual room control. The controllers connected via KNX and exchange the relevant operating data.
Special case: Chilled water and domestic hot water for a 2-pipe system with heating/cooling changeover. Details described in section 27 "Heating/cooling changeover".

Features of basic type C

Operating mode: *Demand-dependent by KNX signal.*
The chilled water treatment is switched on and off via the demand signals (refrigeration distribution zones) for the individual room controllers.

Use of Controller 1: *To demand-dependent setpoints by KNX signal.*
The flow temperature controller works with a flow setpoint; connected individual room controllers provide or coordinate the flow setpoints.

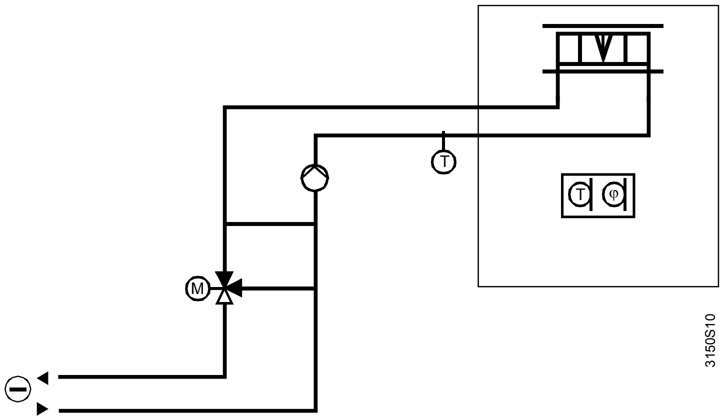
Notes

- The following aggregates/functions cannot be configured for this basic type: Fans, heat recovery equipment, mixed air damper, frost protection, preheating function, sustained mode and night cooling
- Room device QAW740 cannot be used with basic type C

3.4 Basic type U, universal controller

Typical field of use: Control to a flow temperature setpoint (universal measured value).

Example: Flow temperature control



Features of basic type U

Operating mode: *Switch ON/OFF by room operating mode.*
The plant is switched on and off by its own time switch. The controller operates with room operating modes Comfort, Precomfort, Economy and Protective Mode.

Use of Controller 1: *By a freely selectable, universal measured value.*
The universal controller works with a freely selectable, universal measured value.

Notes

- The following aggregates/functions cannot be configured for this basic type: Fans, heat recovery equipment, mixed air damper, frost protection, preheating function, sustained mode and night cooling
- Room device QAW740 cannot be used with basic type U

4 Commissioning

Preparation for use and commissioning of Synco™ 700 controllers must only be undertaken by qualified staff who have been appropriately trained by Siemens Building Technologies.

4.1 Enter commissioning mode

During commissioning, both control and plant safety functions remain deactivated!

4.1.1 Introduction during initial power-up

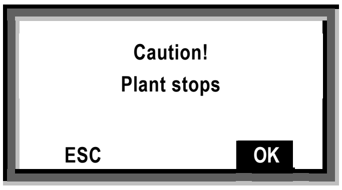
The language menu appears the first time power is supplied to the controller. Select the language for commissioning and operating the plant.

After the language is selected and confirmed with the OK knob, the time of day, date and year can be set in the same way.

The commissioning menu then appears. The access level is set to "Password level". The "Plant type" menu (path: Main menu > Commissioning > Basic configuration > Plant type) offers the commissioning engineer a number of plant types for selection. When commissioning the controller for the first time, the procedure given in the Installation Instructions 74 319 0731 0 (G3151xx) must be followed. They are enclosed with the controller.

4.1.2 Entry from the main menu

After selecting operating line "Commissioning" (only visible on the "Password level") and confirming by pressing the OK knob, a reference to plant stop appears on the display.



Caution!
Plant stops

After pressing the OK knob again, the plant (application) stops. All outputs are set to a defined OFF state and the display shows the "Commissioning" menu.

Setting level:
Commissioning menu

4.2 Basic configuration

The "Basic configuration" menu is used to make the following settings:
- Select the basic type or of preprogrammed application
- Assign extension modules to the controller position

First, each device is assigned the basic type or a preprogrammed application. When selecting the plant type, functions are enabled or disabled as required.

Configuration

Main menu > Commissioning > Basic configuration

Operating line	*Adjustable values / remarks*
Plant type	A, P, C, U, A01, A02…
Position 1	---, RMZ785, RMZ787(1), RMZ788(1)
Position 2	---, RMZ785, RMZ787(1), RMZ787(2), RMZ788(1), RMZ788(2)
Position 3	---, RMZ785, RMZ787(1), RMZ787(2), RMZ788(1), RMZ788(2)
Position 4	---, RMZ785, RMZ787(1), RMZ787(2), RMZ788(1), RMZ788(2)

4.2.1 Basic types

We distinguish between the following basic types:
- **Basic type A** (use as a ventilation controller)
  Key feature: Controller 1 is a room temperature controller, supply air temperature controller, or room/supply air temperature cascade controller
- **Basic type P** (use as a demand-dependent supply air temperature controller)
  Key feature: Controller 1 is a demand-dependent supply air temperature controller
- **Basic type C** (use as a demand-dependent chilled water controller)
  Key feature: Controller 1 is a demand-dependent chilled water flow temperature controller
- **Basic type U** (use as a universal controller)
  Key feature: Controller 1 is a universal controller

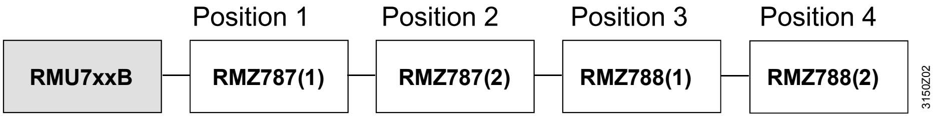
4.2.2 Assign extension modules

The function of the RMU7..B controller can be extended by attaching a maximum of 4 extension modules.
The following can be connected to each RMU7..B:

1x RMZ785:	Extension of inputs → 8 universal inputs
2x RMZ787:	Extension of the inputs and outputs → 4 universal inputs, 4 relay outputs
2x RMZ788:	Extension of the inputs and outputs → 4 universal inputs, 2 modulating outputs, 2 relay outputs

The extensions can be activated by simply attaching the modules to the controller. In addition, the position of the extension module must be set on the controller.

Example



- Disconnect the system from power prior to attaching an extension module
- A standard application in the controller can also contain connections to the extension modules. The relevant functions are only active if the respective extension module is connected and activated

4.2.3 Troubleshooting

If the extension modules and their positions actually used do not agree with the values entered on the controller list, or if an extension modules fails during operation, a fault status message is generated and handling stopped. The outputs maintain the state prior to the fault.

Fault status messages

No.	*Name*	*Effect*
7101 7102 7103 7104	Fault extension module	Urgent message; must be acknowledged

4.3 Use this basic documentation during commissioning

Per the application concept (section 1.6)…

…does your plant correspond to one of the internally loaded standard applications A01 through A05, or…	Sections 5 through 28 help to change the preset values, as required. Observe the menu path **... > Settings > ...**
…does your plant correspond to an application sheet, or…	Sections 5 through 28 help to change the preset values, as required. Observe the menu path **... > Settings > ...**
…your plant neither corresponds to an internally loaded standard application A01 through A05 nor a plant described in an application sheet	• The configuration diagrams in section 31.2 assist you in selecting the appropriate function blocks • Sections 5 through 28 help you activate function blocks. Observe the menu path **... > Extra configuration > ...** • Sections 5 through 28 help to change the preset values of the active function blocks, as required. Observe the menu path **... > Settings > ...**

4.4 Wiring test

A wiring test can be made after all peripheral devices are connected. We recommend to run this test after completing the configuration and settings. Reading values are displayed for the inputs, and aggregates (fans, pumps, etc.) connected to the outputs can be switched on and off.

⚠ During the wiring test, the application is inactive, and the outputs are in a defined OFF state; safety-related functions are deactivated!

The wiring test checks the inputs and outputs for the following types of errors:
- Connection error (lines mixed up)
- Position errors, i.e. sensor or actuator connections are mixed up
- Discrepancy between actual type of connection and controller configuration (e.g. LG-Ni 1000 in place of active DC 0...10 V)

Wiring test

Main menu > Commissioning > Wiring test > Inputs >

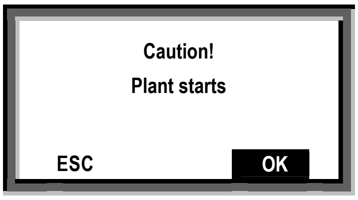
Operating line	*Comments*
e.g. N.X1	Display of the current measured value

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Positions*
e.g. fault relay 1	Off, On

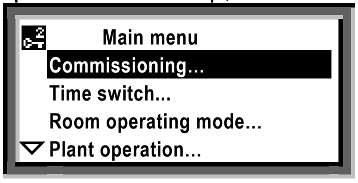
4.5 Exit commissioning

If the application is valid, the **Commissioning** menu can be closed as follows:
- Press the ESC button. The display shows a dialog box with the following information:



Caution!
Plant starts

- Press OK to confirm. Then, the controller boots using the settings made, the plant is started up, and the main menu appears on the display:



4.6 Data backup

The entire commissioning data set (configuration and all settings) can be saved in the controller after commissioning. If, any time later, an unauthorized person readjusts important values, this function can be used to restore the proper controlled state after commissioning.

The following values are not saved or restored during backup:
- All user-defined texts and business cards
- Calendar and time switch settings
- Basic settings on the "Communication" menu
- Current time of day
- Trend settings
- Values on the "Settings > Device" menu

Setting values

Main menu > Data backup >

Operating line	*Range*	*Factory setting*
Restore		
Save		

Display values

Main menu > Data backup >

Operating line	*Comments*
Storage date	Display date for download of commissioning data set to the controller’s memory
Storage year	Display of the year for download of commissioning date set to the controller’s memory

4.7 Exit password level

Set the access level on the controller to "User level" after completing commissioning. Procedure:
1. Go to main menu
2. Press the OK knob and the ESC button at the same time. The "Access level" menu appears
3. Select "User level" by turning the knob and press OK to confirm

4.8 Device information

The "Device information" menu provides the following controller information:

Display values

■ **Main menu > Device information > Controller**

Operating line	*Comments*
Plant type	e.g. A01
Plant type adapted	Standard application or changed standard application
File	e.g. AEFB01 U3B HQ
Device type	e.g. RMU730B-1
Software version	Of the controller
Hardware version	Of the controller

Example

Meaning:

Plant type	Display of the plant type loaded (e.g. A01)
File	Here, the file name of the application is displayed (e.g. AEFB01 U3B HQ)

■ **Main menu > Device information > Position 1…4**

Operating line	*Comments*
Extension module	Display of the module's type reference
Software version	Of the extension module
Hardware version	Of the extension module

4.9 Mark an intervention

Mark

If the internal standard application has been adapted or, if, subsequently, menu "Extra configuration" has been accessed, an asterisk is placed in front of the plant type's type reference.
The asterisk is set automatically when leaving the "Extra configuration" menu, even if nothing has been changed. In addition, on operating line "Plant type changed" of the "Device information" menu, the value is set to "Yes".

Reset the marking

The asterisk is deleted and the value "No" appears on operating line "Plant type changed" when, on the "Basic configuration" menu, the old or a new standard application is loaded as the plant type. A new configuration is made based on the selected application.

5 General settings

5.1 Time of day and date

5.1.1 Operating principle

The controller has a yearly clock with time of day, weekday and date.

Time format

The following time formats are available:

Time format		*Presentation*	*Example*
24 h	Date	dd.mm.yyyy (day.month.year)	31.05.2006
	Time of day	hh:mm (hours : minutes)	15:56
am/pm	Date	mm/dd/yy (month / day / year)	05/31/2006
	Time of day	hh:mm am *or* pm (hours : minutes am *or* pm)	03:56 PM

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Device >

Operating line	*Range*	*Factory setting*
Time format	24 hours 12 hours (am/pm)	24 h

■ **Main menu > Time of day/Date**

Operating line	*Range*	*Factory setting*
Time	00:00...23:59	00:00
Date	01.01...31.12	01.01
Year	2000...2080	Current

Daylight saving time/standard time changeover

The controller changes automatically from daylight saving to standard time.

The data can be changed to the earliest possible time change since the corresponding standards may change.

The dates set for the change from standard to daylight saving time, or vice versa, ensure that on the first Sunday after that date the time of day changes from 02:00 (standard time) to 03:00 (daylight saving time), and from 03:00 (daylight saving time) to 02:00 (standard time).

Note

Switch off daylight saving/standard time changeover by setting both data to the same day.

Setting values

■ **Main menu > Time of day/Date**

Operating line	*Range*	*Factory setting*
Start of summertime	01.01. ... 31.12	25.03
Wintertime start	01.01. ... 31.12	25.10

Time monitoring

Time monitoring can be switched off. This prevents the issue of fault status message 5003 "Invalid time of day". Refer to section 5.1.3.

Setting values

■ **Main menu > Time of day/date >**

Operating line	*Range*	*Factory setting*
Invalid time of day	Inactive, Active	Active

5.1.2 Communication

Time of day and date can be exchanged via bus. The controller can be autonomous, slave or master.
The following setting available for clock time operation:

- Autonomous (neither transmits nor receives)
- Slave: Time-of-day slave (receives the synchronization signal from the bus)
- Master: Time-of-day *to* bus (sends the synchronization signal to the bus)

Setting values

Commissioning > Communication > Basic settings >

Operating line	*Range*	*Factory setting*
Clock time operation	Autonomous, Slave, Master	Master

If the controller is set as a time-of-day slave, it can also be selected whether it shall be possible to manually adjust the master clock’s time of day from this controller.

For remote adjustment of the clock slave, the following setting choices exist:

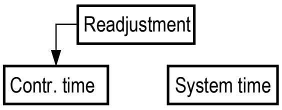
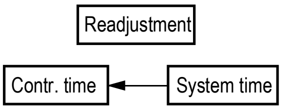
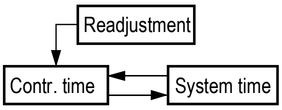
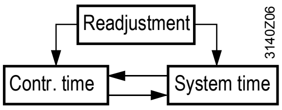
- No (clock time slave with no adjustment facility for the system time)
- Yes (clock time slave with adjustment facility for the system time)

Setting values

Commissioning > Communication > Basic settings >

Operating line	*Range*	*Factory setting*
Remote setting clock slave	Yes, No	Yes

The individual settings have the following effect:

Time of day op	*Rem. setting clock slave*	*Effect*	*Diagram*
Autonomous	No effect	• The time of day on the controller can be readjusted • The controller's time of day is not adapted to system time	
Slave	No	• The time of day on the controller cannot be readjusted • The controller's time of day is cont. and automatically adapted to system time	
Slave	Yes	• The time of day on the controller can be readjusted which changes system time • The controller's time of day is cont. and automatically adapted to the system time	
Master	No effect	• The time of day on the controller can be readjusted which changes system time • The controller’s time of day is used for the system	

Only one clock time master per system allowed. A fault status message issued if several controllers are parameterized as masters.

Recommendation

If possible, we recommend to operate the controller via the bus with a synchronized time of day as described in this section.

5.1.3 Troubleshooting

If the clock on the bus is missing and if the local clock is parameterized as the time-of-day slave, operation continues with the internal clock and a fault status message "System time failure" is generated.
The clock has a reserve of typically 48 hours for power failure and at least 12 hours. The time of day must be reset if the power outage is longer.
If the controller loses its time of day after power failure and the time is not retransmitted via the bus, a fault message "Invalid time of day" appears.
An invalid time of day flashes.

Fault status messages

No.	*Text*	*Effect*
5001	System time failure	Non-urgent message; must not be acknowledged
5002	> 1 clock time master	Non-urgent message; must be acknowledged
5003	Invalid time of day	Non-urgent message; must not be acknowledged

5.2 Select language

Every RMU7..B has a number of languages loaded.
When switching on the controller for the first time, the "Language" menu appears in English, regardless of the controller's language set. Select the required language from that menu. The language can also be changed later during operation.
The following languages are loaded, depending on the type of controller:

Type	*Language 1*	*Language 2*	*Language 3*	*Language 4*	*Language 5*	*Language 6*
RMU7..B-1	German	French	Italian	Spanish	Portuguese	
RMU7..B-2	German	French	Dutch	English		
RMU7..B-3	Danish	Finnish	Norwegian	Swedish		
RMU7..B-4	Polish	Czech	Hungarian	Russian	Slovakian	Bulgarian
RMU7..B-5	Greek	Romanian	Slovenian	Serbian	Croatian	Turkish
RMU7..B-6	Chinese					

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Device >

Operating line	*Range*	*Factory setting*
Language		English

5.3 Select unit of temperature

On the RMU7..B, the unit of temperature can be switched between °C/K and °F.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Device >

Operating line	*Range*	*Factory setting*
Unit	Degrees Celsius, degrees Fahrenheit	°C

5.4 Operator unit display contrast

The display contrast can be adapted to the environment.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Device >

Operating line	*Range*	*Factory setting*
Contrast	0...100%	50%

5.5 Text entry

5.5.1 Device name

The text for the device name appears on the welcome screen:

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Texts >

Operating line	*Range*	*Factory setting*
Device name	Max. 20 characters	

5.5.2 File name

Setting values

The file name can be assigned individual text for the selected application:

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Texts >

Operating line	*Range*	*Factory setting*
File name	Max. 20 characters	

5.5.3 Electronic business card

Configuration

The text for the electronic business card is displayed as an info picture. The electronic business card can be specially disabled, if desired:

Main menu > Commissioning > Extra configuration > Miscellaneous > Business card

Operating line	*Range*	*Factory setting*
Business card	Yes, No	Yes

Settings

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Texts >

Operating line	*Range*	*Factory setting*
Business card line 1	Max. 20 characters	Business card line 1
Business card line 2	Max. 20 characters	Business card line 2
Business card line 3	Max. 20 characters	Business card line 3
Business card line 4	Max. 20 characters	Business card line 4

6 Operating modes

We differentiate between the room operating modes and plant operating modes.

Room operating modes refer to the desired climatic conditions in the room and are operated by the end customer. The room operating mode is plant independent. It is used for heating plants, refrigeration plant or for single or 2-speed ventilation plants.

The plant is operated in a set plant operating mode to achieve the climatic conditions in the room. The plant operating mode differs depending on the application and requirement. It is directly influenced by the room operating mode.

6.1 Room and plant operating modes

There are 4 room operating modes and thus connecting multiple possible planting operating modes. The table provides an overview of the plant operating modes supported by the various room operating modes and basic types:

Room operating mode	***Possible plant operating mode***	***For basic type***
Comfort (☼):	• Normal operation (Comfort): Plant operating permanently; Control with comfort setpoint	A, U
	• Demand operation Switch on/off of the plant is demand dependent; control to demand setpoint when the plant is switched on	P, C
Precomfort (◐):	• Normal operation (Precomfort): Energy saving operation for occupied or empty room; plant in permanent operation; control to Precomfort setpoint	A, U
	• Sustained mode (Precomfort): Demand compensated operation for an occupied room; partially suspended plant operation; Precomfort setpoint as switch-on criterion	A
	• Recirculated air operation (Precomfort): Energy-saving operations for an unoccupied room; plant operating permanently at 100% recirculation; Control with Precomfort setpoint	A
	• Demand operation Switch on/off of the plant is demand dependent; control to demand setpoint when the plant is switched on	P, C

Room operating mode	***Possible plant operating mode***	***For basic type***
Economy (☾)	• Plant Off: Protective functions ensured • Sustained mode (Economy): Demand compensated operation for an unoccupied room; partially suspended plant operation; economy setpoint as switch-on criterion • Night cooling: Cooling of a room in summer during vacancy with a lower outside air temperature	A, P, C, U A A, P[1]
Protection (❄):	• Plant Off: Protective functions ensured	A, P, C, U

[1] Night cooling GT P combined with RMB795 room controller central control unit possible.

Note on room operating modes

Fire alarm off / Smoke extraction of the air treatment systems as well as frost protection for the heating coil is ensured for all room operating modes (Comfort, Precomfort, Economy and Protective operation).

In the economy operating mode, night cooling can override sustained mode (economy) or "Plant Off".

Recirculated air operation: The mixed air damper (outside air/recirculated damper) must be active for recirculated air operation. The supply air fan or supply air and extract air fan are operating during recirculated air operation. The system switches temporarily to normal operation (comfort), if the air quality gets too poor during recirculated air operation, i.e. the ppm measured value exceeds the limit value.

Enter the plant operating mode resulting from room operating modes ☀ Precomfort and ☾ Economy:

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Operating mode >

Operating line	*Range*	*Factory setting*
☀ Precomfort plant operating mode	Normal operation, Sustained mode, Recirculated air operation	Normal operation
☾ Economy plant operating mode	No sustained mode, Sustained mode	No sustained mode

6.2 Effective setpoints as a function of the plant operating mode (basic type A)

The setpoints are used as a function of the plant operating mode for control or to switch on or off in sustained mode.
The following table provides an overview of the internal controller setpoints that are effective in the respective operating mode:

Plant operating mode	*Controller 1*	*Controller 2, 3*	*IAQ controller*
Normal operation (☼ Comfort)	Comfort cooling setpoint Comfort heating setp 2-speed fan1): Supply air limit val max Supply air limit val min	Upper setpoint Comfort Lower setpoint Comfort	Damper setpoint Fan setpoint Setpoint fan speed 2
Normal operation (◐ Precomfort)	Precomfort cooling setp Precomfort heating setp 2-speed fan1): Supply air limit val max Supply air limit val min	Upper setpoint Precomfort Lower setpoint Precomfort	Damper setpoint Fan setpoint Setpoint fan speed 2
Sustained mode (◐ Precomfort)	Comfort cooling setpoint Comfort heating setp 2-speed fan1): Supply air limit val max Supply air limit val min	Upper setpoint Comfort Lower setpoint Comfort	Upon switch-on of IAQ controller 2): Damper setpoint Fan setpoint Setpoint fan speed 2
			Upon switch-on of controller 1/2/3 3): Outside air damper= 0%, Speed-controlled fan = min. speed
Recirculated air mode (◐ Precomfort)	Precomfort cooling setp Precomfort heating setp 2-speed fan1): Supply air limit val max Supply air limit val min	Upper setpoint Precomfort Lower setpoint Precomfort	Outside air damper= 0%, Speed-controlled fan = min. speed Fan control = supply or supply/extract air
Sustained mode (☾ Economy)	Comfort cooling setpoint Comfort heating setp 2-speed fan1): Supply air limit val max Supply air limit val min	Upper setpoint Comfort Lower setpoint Comfort	Upon switch-on of IAQ controller 2): Damper setpoint Fan setpoint Setpoint fan speed 2
			Upon switch-on of controller 1/2/3 3): Outside air damper= 0%, Speed-controlled fan = min. speed
Plant OFF (☾ Economy / ❄ Protection)	-	-	-

1) 2-point control of 2nd speed for 2-speed fans: This function is available only for room/supply air or extract/supply air cascade control (see section 11.6.3)
2) Upon switch-on of sustained mode by the IAQ controller, damper or fan control is according to the indicated setpoints
3) Upon switch-on of sustained mode controller1 or controller2 or controller3, control of damper or valve is fixed (i.e. without control functions)

The following table provides an overview of the primary setpoints to **switch on/off** in dependence of the corresponding plant operating modes:

Plant operating mode	*Controller 1*	*Controller 2, 3*	*IAQ controller*
Sustained mode (◐ Precomfort)	Precomfort cooling setp Precomfort heating setp	Upper setpoint Precomfort Lower setpoint Precomfort	Precomfort Indoor air quality setpoint
Recirculated air mode (◐ Precomfort)	-	-	Switch recirculated air mode to normal mode (Comfort): Precomfort Indoor air quality setpoint
Sustained mode (☾ Economy)	Economy cooling setp Economy heating setp	Upper setpoint Economy Lower setpoint Economy	Economy-Indoor air quality setpoint

Note

IAQ controller: The better signal always wins at simultaneous control of the mixed air damper by controller 1 and IAQ controller.
As a result, the outside air damper can be opened to 100% even at low outside temperatures. This applies to all plant operating modes.

Important

If the heating coil output at outside temperature design conditions (e.g. -10 °C) is not sufficient for 100% outside air volume, the max damper position can be limited continuously as a function of the outside air temperature (see section 10.5 "Mixed air damper (basic types A, P)").

6.3 Effective fan speeds as a function of the plant operating mode (basic type A)

Fan control by plant control depends on the present plant operating mode. As a rule, the following fan speeds serve as the basis:

- Off/On for single-speed or controlled fans
- Off / Speed 1 / Speed 2 for 2-speed fans

The following table shows the various possibilities and combinations for **single-speed or continuously controlled fans**:

Plant operating mode	*Fan control description*
Normal operation (☼ Comfort)	Permanent for speed 1
Normal operation (◐ Precomfort)	Permanent for speed 1
Sustained mode (◐ Precomfort)	Speed 1 as soon as a Precomfort switch-on criterion is met(1)
Recirculated air mode (◐ Precomfort)	Permanent for speed 1 (1)
Sustained mode (☾ Economy)	Speed 1 as soon as a Economy switch-on criterion is met(1)
Night cooling	Speed 1 as soon as night cooling switch-on criteria are met
Plant OFF	Permanent on Off

(1) You can indicate for the extract air fan if it is to be switched on in sustained or recirculated air mode (see section 10.1.13 "Sustained/recirculated air mode (basic type A)")

The following table shows the various possibilities and combinations for **2-speed fans**:

Plant operating mode	*Fan control description*
Normal operation (☼ Comfort)	Permanent for speed 2 as soon as setting parameter "clock priority speed 2" 1) is set to "Yes"; else at least speed 1 is on permanently Changeover criteria: Speed 1, speed 2 • Room supply air temperature cascade according to heating/refrigeration demand • IAQ control in dependence of "Setpoint fan speed 2"
Normal operation (◐ Precomfort)	Permanent for speed 1
Sustained mode (◐ Precomfort)	Speed 1 or speed 2 (depending on the setting parameters) as soon as a Precomfort switch-on criterion is met1) Changeover criteria: Speed 1, speed 2 • Room supply air temperature cascade according to heating/refrigeration demand • IAQ control in dependence of "Setpoint fan speed 2"
Recirculated air mode (◐ Precomfort)	Permanent for speed 1 2) Changeover criteria: Speed 1, speed 2 • Room supply air temperature cascade according to heating/refrigeration demand • IAQ control in dependence of "Setpoint fan speed 2"
Sustained mode (☾ Economy)	Speed 1 or speed 2 (depending on setting parameter) as soon as a Economy switch-on criterion is met1) Changeover criteria: Speed 1, speed 2 • Room supply air temperature cascade according to heating/refrigeration demand • IAQ control in dependence of "Setpoint fan speed 2"
Night cooling	Speed 1 or speed 2 is switched on as soon as the switch-on criterion for night cooling is met, depending on the setting for operating line "Speed" 3)
Plant OFF	Permanent on Off

1) see Chapter 10.1.5 "Time switch priority speed 2"

2) You can indicate for the extract air fan if it is to be switched on in sustained or recirculated air mode (see section 10.1.13 "Sustained/recirculated air mode (basic type A)")

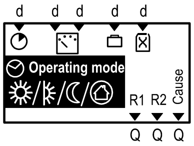
3) For more detailed information, refer to section 21.1

Note

The fire alarm off / smoke extraction function as well as frost protection is ensured for all plant operating modes.

6.4 Operating mode block

6.4.1 Room operating mode: Preselection (basic types A, U)



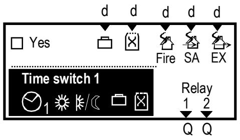
The room operating mode for basic types A and U is preset via the schedule's time switch or holiday/special day program or various digital inputs (timer function, switching to selected operating mode, room operating mode selector, holiday input, special day input).
In addition, the operating mode can also be set via menu "Room operating mode".

6.4.2 Plant operating mode presetting (basic type P)

The controller is switched on exclusively via communication and demand-controlled. Here, the plant operating modes "Demand operation" or "Plant OFF" are received via KNX bus. An RDG individual room controller can trigger demand operation via:

- Comfort
- Economy and violation of individual room controller setpoints (sustained mode for the individual room controller).
- Smoke extraction, night cooling, etc.

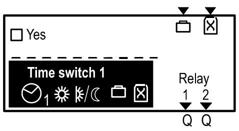
In addition, the time switch can be used for other controllers on the bus (see section 6.9.1 "Activate time switch"). The time switch allows for setting the room operating modes (Comfort, Precomfort and Economy). The external controllers convert the room operating modes to the corresponding plant operating modes.



6.4.3 Plant operating mode presetting (basic type C)

The controller is switched on demand-controlled to demand mode via communication or via the request input at the operating mode block (see section 6.6 "Plant operating mode selection via request input (basic type P, C)"). Here, the plant operating modes "Demand operation" or "Plant OFF" are commanded via communication or request input.

In addition, the time switch can be used as an option for other controllers on the bus (see section 6.9.1 "Activate time switch"). The time switch allows for setting the room operating modes (Comfort, Precomfort and Economy). The external controllers (e.g. RMU7..B with basic type U) convert the room operating mode to the corresponding plant operating mode.



The demand-controlled chilled water controller is available for the following applications:

- Chilled water precontrol.
  The switch-on command is received via bus from the secondary controllers (e.g. RMU7..B with basic type U) with a refrigeration demand signal
- Precontrol for 2-pipe system (heating / cooling changeover).
  The switch-on command is received via bus from the secondary controllers (e.g. RMU7..B with basic type U) with a heating and refrigeration demand signal

6.5 Room operating mode selection via digital inputs (basic types A, U)

This function provides for intervention in the current program without having to make any changes at the controller. In order to activate this function, you have to configure the appropriate digital inputs.

The following types of intervention can be configured:

- Timer function
- Switching to a desired operating mode *or*
- Room operating mode selector

If several of these functions are active at the same time, the following priority applies:

1. Room operating mode selector *or* switching to a desired operating mode
2. Timer function

The following settings are required depending on the desired function:

Type of action	*Operating line*	*Value*
Timer function	Timer function Timer function (duration)	N.Xx >0 min
Switching to the desired operating mode	Room operating mode input 1 Room operating mode input 2 Preselected room optg mode	N.Xx --- Setting the desired operating mode
Room operating mode selector	Room operating mode input 1 Room operating mode input 2	N.Xn N.Xm

Recommendation

Any digital inputs can be assigned to the inputs. For a better overview, we recommend arranging the inputs side by side.

Misconfiguration

Misconfiguration has the following effect:

Operating line	*Value*	*Effect*
Room operating mode input 1	---	No effect
Room operating mode input 2	N.Xx	

6.5.1 Timer function

The digital input selected for the timer function allows for switching the controller to Comfort mode (☼) for a selected period of time.

Configuration

Main menu > Commissioning > Extra configuration > Operating mode >

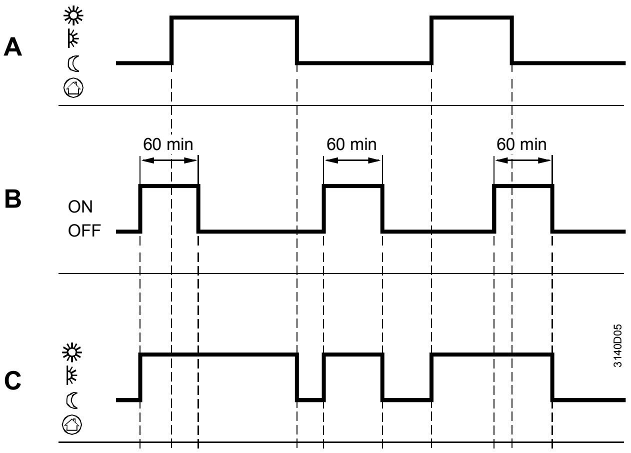
Operating line	*Adjustable values / remarks*
Timer function	---, N.X1, N.X2, ... (digital inputs only)

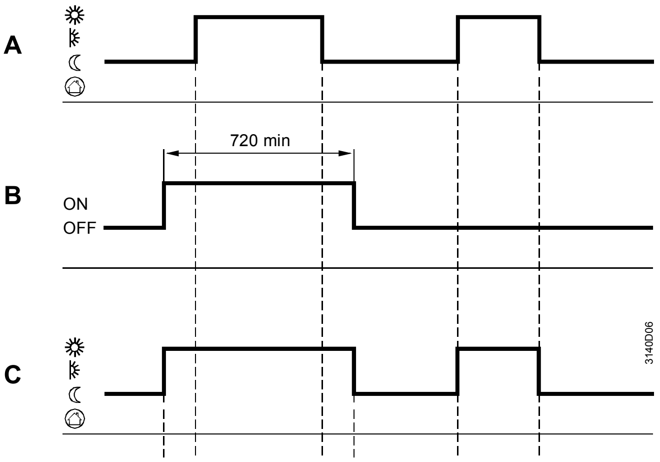
Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Operating mode >

Operating line	*Range*	*Factory setting*
Timer function	0…720 min	60 min

Function diagrams





Key

A Time switch (⏻Auto)
B Switching command via digital input for "Timer function" with time set for Comfort mode
C Active operating mode

6.5.2 Switch to the desired operating mode

The digital input enables the plant to be constantly switched to the desired operating mode. Operating line "Preselected room optg mode" is used to select the required operating mode. This operating mode is active until the signal at the control input is no longer present. Only then does the normal 7-day program resume operation.

Configuration

Main menu > Commissioning > Extra configuration > Operating mode >

Operating line	*Adjustable values / remarks*
Room operating mode input 1	---, N.X1, N.X2, ... (digital inputs only)

Setting values

Main menu > Settings > Operating mode >

Operating line	*Range*	*Factory setting*
Preselected room optg mode	☼ Comfort, Precomfort, ☾ Economy, ❄ Protection	☼ Comf

6.5.3 Room operating mode selector

Two digital inputs enable the plant to be constantly switched to the desired operating mode via an external switch. This operating mode is active until the signal is no longer present. Only then does the normal 7-day program resume operation.

Configuration

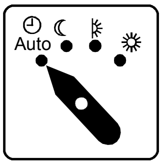
Main menu > Commissioning > Extra configuration > Operating mode >

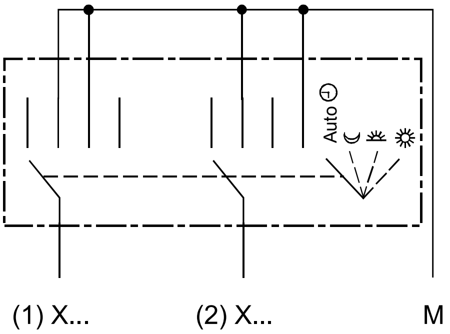
Operating line	*Adjustable values / remarks*
Room operating mode input 1	---, N.X1, N.X2, ... (digital inputs only), [Logic 1] digital, [Logic 2] digital, [Time switch 2] digital, Heat demand, Refrigeration demand
Room operating mode input 2	---, N.X1, N.X2, ... (digital inputs only), [Logic 1] digital, [Logic 2] digital, [Time switch 2] digital, Heat demand, Refrigeration demand

The operating modes are assigned according to the following table:

State of control input 1	*State of control input 2*	*Resulting operating mode*
Normally closed	Normally closed	Auto
Operating position	Operating position	☾ Economy
Operating position	Normally closed	Precomfort
Normally closed	Operating position	☼Comfort

Example





Application examples

- Button (restaurant: 2nd speed ventilation) wired to predefined timer function input "N.X...":
  If the button is pressed for more than 3 s, operating mode Comfort takes effect for the set time (timer function)
- Window switch connected to predefined room operating mode input 1 "N.X...", preselected room operating mode = Economy:
  As long as the window remains open, Economy mode is active

6.5.4 Troubleshooting

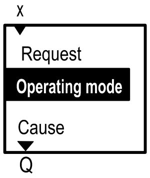
Errors in operation

Digital signals cannot be monitored. If the inputs are missing, they are interpreted as described above.

Recommendation

We recommend to keep normally open potential-free contacts for the digital inputs enabling the controller to operate in automatic mode in the event of wiring breaks.

6.6 Plant operating mode selection via request input (basic type P, C)



If the controller is configured as a demand-controlled air handling unit (basic type P) or as demand-dependent chilled water controller (basic type C), it can be switched on via a universal input. This way, the system can also be created using non-communicative controllers. To activate this function, configure the relevant digital input. This function can only be configured for basic type P or C.

Configuration

Main menu > Commissioning > Extra configuration > Operating mode >

Operating line	*Adjustable values / remarks*
Request input	---, N.X1, N.X2, ...

The request input can handle digital and analog signals. Setting values "Limit value on" and "Limit value off" are used to convert an analog signal to a request signal "On / Off".

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Operating mode >

Operating line	*Range*	*Factory setting*
Limit value on	Depending on the selected type	Depending on the type
Limit value off	Depending on the selected type	Depending on the type

6.6.1 Mode of operation: Basic type P

If a signal is present at the terminal of the input, it is interpreted as an air handling unit request, and control becomes active. Setpoint generation is described in section 12.

Note

Ensure that the air dampers for the VAV actuators are opened prior to switching on the fans.

6.6.2 Mode of operation: Basic type C

If a signal is present at the terminal of the input, it is interpreted as a chilled water request and control becomes active. Setpoint generation is described in section 13, Flow temperature, demand-controlled (basic type C).

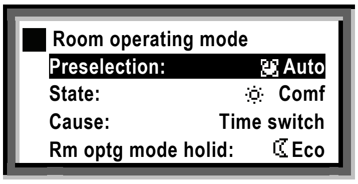
6.7 Room op mode selection (basic types A, U)

Room operating mode selection for basic types A and U

The room operating mode can always be selected with basic types "A" and "U".

Display values

■ **Main menu > Room operating mode >**



■ Room operating mode
Preselection: ◷ Auto
State: ☼ Comf
Cause: Time switch
Rm optg mode holid: ☾ Eco

An operating mode can be predefined via the "Room operating mode" menu. The same display shows the current operating mode and the reason for it.

Note

The setting is retained even in the event of a mains failure.

6.7.1 Preselection

The following operating modes are available for selection:

Setting values

■ **Main menu > Room operating mode >**

Operating line	*Range*	*Factory setting*
Preselection	◷Auto ☼Comfort ◐Precomfort ☾ Economy ❄Protection	◷Auto

Note

If a ventilation and heating controller or several ventilation controllers jointly control the same room and if they are assigned to the same geographical zone, the preselection acts on all controllers within the same geographical zone (section 6.13.1 "Room control combinations featuring multiple ventilation controllers" or section 6.13.2 "Room control combinations with heating controller").

6.7.2 State

The current room operating mode state has the following positions:

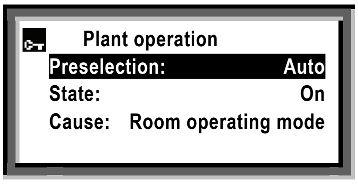
- ☼ Comfort
- ◐ Precomfort
- ☾ Economy
- ❄ Protection

6.7.3 Cause (basic types A, U)

The various types of user intervention are given as a reason. The following types of user intervention are possible (in order of priority):
- Room operating mode contact
- Room optg mode selector (preselected via menu "Room operating mode")
- Room unit presence button
- Timer function of the room unit
- Special day
- Holidays
- Time switch

6.8 Plant op mode selection (basic types A,P,C,U)

The plant can be switched off via the "Plant operation" menu.



Plant operation
Preselection: Auto
State: On
Cause: Room operating mode

The same display shows the current plant state and the reason for it.

6.8.1 Preselection

The following operating modes are available for selection:

Setting values

Main menu > Plant operation >

Operating line	*Range*	*Factory setting*
Preselection	Auto, Off	Auto

When preselecting "Off", safety-related plant functions (such as frost protection or smoke extraction) and the aggregates (such as start, stop, switch-on according to outside temperature, etc.) remain active.

Note

The plant operation preselection is local and does not affect other controllers within the same zone via the bus.

6.8.2 State

The current plant operating state has the following positions:
- On
- Off
- Transit (see below)

6.8.3 Cause

The different functions that can switch the plant On and Off are given as a reason. The following information can be provided:
- Fault
- Smoke extraction (basic type A and P)
- Stop condition 1 Supply air fan (basic type A and P)
- Operating mode contact (basic type A and U)
- Plant operation selector
- User request room (basic type A and U)
- Request (basic type P and C)
- No request (basic type P and C
- Sustained mode (basic type A)
- Night cooling (basic type A)
- Optimum start control (basic type A)

A relay output can be assigned to the configuration for the cause (Section 6.12).

All other functions (e.g. preheating) are only displayed indirectly by defining the current operation as "Transit". Transit means that parts of the plant are on or off, but not yet the entire plant.

Display values

Main menu > Plant operation >

Operating line	*Comments*
State	
Cause	

6.9 Time switch operating modes ☼, ◐, ☾ (basic types A, P, C, U)

The controller operates according to the 7-day program entered in the 7-day time switch. Different times from one week to another are not possible.
Based on the entered program, the 7-day time switch controls the change of operating modes and the associated setpoints. Operation of the 7-day time switch is described in the operating instructions B3144.

6.9.1 Activate time switch

With basic types A and U, the week time switch is always active.
For basic types P and C, Time switch 1 can be used for other controllers on the bus. The time switch must be activated for this purpose.
An active time switch always is the master. Enter a geographical zone in the RMU controller. The time switch now acts in this zone.

Configuration

▦ **Main menu > Commissioning > Extra configuration > Time switch 1 >** (basic types P and C)

Operating line	*Adjustable values*	*Comments*
Time switch	No, Yes	Activates time switch for basic type "C"

6.9.2 Time switch entries

A specific 24-hour profile can be selected for the following days.

Setting values

■ **Main menu > Time switch >** (for basic types A, U)
■ **Main menu > Time switch 1 >** (for basic types P, C)

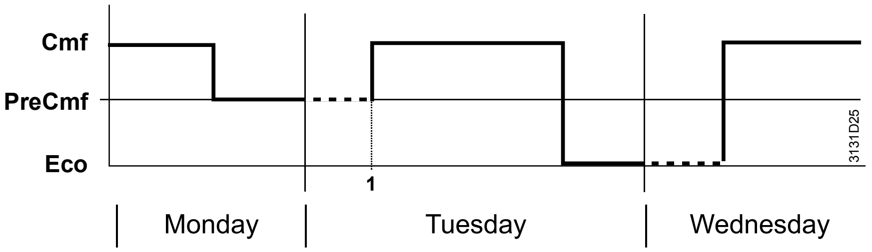
Operating line	*Range*	*Factory setting*
Monday through Sunday	Comfort, Precomfort, Economy	06:00 Comf 22:00 Eco
Special day	Comfort, Precomfort, Economy	06:00 Comf 22:00 Eco

The special day program is a 24-hour program that can be activated either via the holiday program or an external contact.

For each day, max 6 entries can be entered in the 24-hour program.
Every entry must include the following:
- Time from which the desired operating mode should apply
- Desired operating mode

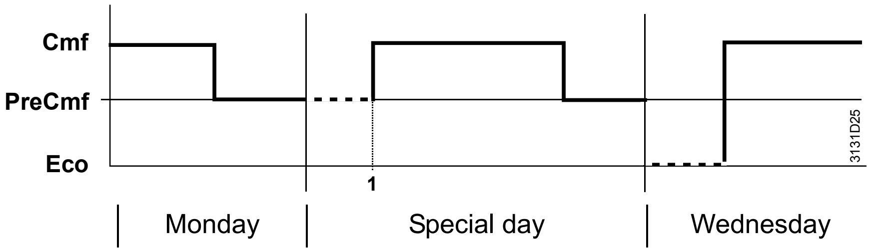
The next day always adopts the operating mode of the previous day till the next entry.

The operating mode of the previous day is displayed as broken line.



For days without entry, the previous day's operating mode is assumed and displayed as broken line.

- The special day ends with the same operating mode it was started with
- The day following the special day assumes the operating mode of the previous day's program that would have applied had there been no special day (Tuesday for the following example)



After all data is entered for a day, it can be copied to other days. If, for example, Monday is entered, the same profile can be copied to all the other working days (Monday through Friday) and need not be entered again.

6.9.3 Release room unit for time switching operating mode

If the individual room controller is equipped with a room unit QAX3x.x (with operating mode setting or fan speed), it may occur that when specifying room operating mode Economy using the user time switch, the room unit changes to Comfort. The result is that the entire air handling unit switches for a single room. This may further result in unallowed overpressure in the air ducts depending on the sizing of the air system. The setting parameter "Comfort via room unit" is used to prevent this.

Comfort via room unit = Yes	Manual changeover from Economy to Comfort is possible via QAX3x.x and QAW740
Comfort via room unit = No	Manual changeover from Economy to Comfort is not possible via QAX3x.x and QAW740

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Time switch 1 **>**

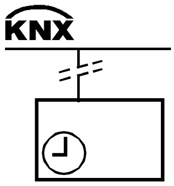
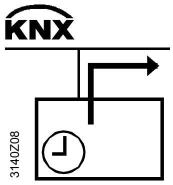
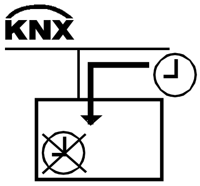
Operating line	*Range*	*Factory Setting*
Comfort via room unit	Yes / No	Yes

6.9.4 Communication

A time switch always operates in the "Geographical zone (apartment)" selected for the controller. If the controller communicates with other controllers, the 7-day time switch can be assigned to other controllers. The following settings must be made, depending on the required operating mode:

Desired operating mode	*Operating line*	*Setting*
Time switch operation "Autonomous"	Geographical zone (apartm.) Time switch slave (apartment)	---- ----
Time switch operation "Master"	Geographical zone (apartm.) Time switch slave (apartment)	1...126 ----
Time switch operation "Slave"(1)	Geographical zone (apartm.) Time switch slave (apartment)	---- 1...126

[1] Slave operation can be selected only in basic types A and U

Effect	*Description*	*Diagram*
Autonomous	The time switch only acts locally on this controller. Time switch has no impact on other controllers on the bus.	
Master	The time switch in this controller is active. The time switch also acts on all other controllers where the local time switch is switched off and that set the geographical zone of this controller as the time switch slave zone.	
Slave	The time switch in this controller is not active. The acting time switch is the time switch acting on the geographical zone set on this controller as the time switch receiving zone (time switch slave (apartment)). The external time switch must be set as the time switch master.	

Setting values

Main menu > Commissioning > Communication > Room

Operating line	*Range*	*Factory setting*
Geographical zone (apartm.)	----, 1...126	----
Time switch slave (apartment)	----, 1...126	----
Time switch operation *	Autonomous, Slave, Master	

* Information line: Result of the setting

6.9.5 Troubleshooting

For each Geographical zone (apartment), only one time switch master may be set. If several controllers are parameterized as master, a fault status message appears. The message is sent by the controller receiving two time switch signals.

Fault status messages

No.	*Text*	*Effect*
5102	>1 time switch in plant 1	Non-urgent message; must be acknowledged

If the controller expects a time switch signal via bus and the signal is not sent, the fault status message "Syst time switch failure plant 1" appears. It is set fixed to Comfort.

Fault status messages

No.	*Text*	*Effect*
5101	Syst time switch failure plant 1	Non-urgent message; must not be acknowledged

6.10 Holidays / special days (basic types A, P, C, U)

The plant operator can enter days deviating from the normal 7-day program as holidays or special days via the "Holidays / special days". Entry of holidays / special days is described in the operating instructions B3144.

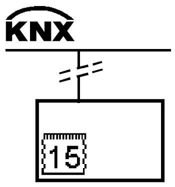
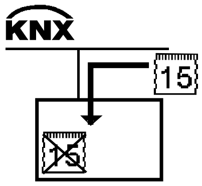
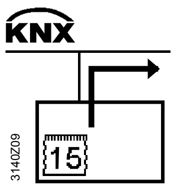
With basic types A and U, the holidays / special day program is always active.

With basic types P and C, the holidays / special day program is active only if time switch 1 is also active. See section 6.9 "Time switch operating modes ☼, ◐, ☾ (basic types A, P, C, U)" and "Communication" for settings.

6.10.1 Communication

If the controller communicates with other controllers, the same holiday / special day program can be assigned to other controllers. Different sources can be used as the master. This can be entered on the controller (see section 28.2.4 ""Holidays / special days" menu item"). The following settings are possible:

- Autonomous (neither transmits nor receives)
- From the bus: Slave (receives holiday / special day program from the bus)
- To the bus: Master (transmits holidays / special day program via bus)
- The individual settings have the following effect:

Entry	*Effect*	*Diagram*
Autonomous	The holidays / special day program only acts locally on this controller. The holidays / special day program has no impact on the holidays / special day zone entered via communication.	
Slave	The holidays / special day program in this controller is not active. The external holidays / special day program with the same holidays / special day zone is active. The external holidays / special day program must be set as the master holidays / special day program.	
Master	The holidays / special day program in this controller is active. The holidays / special day program also acts on all other controllers with the holidays / special day program switched off (slave) and that are in the same holidays / special day zone.	

Section 26 "Communication" describes how to set the holidays/ special day program zone.

6.10.2 Holidays

Holidays are periods of time when the building is not used and whose start and duration are known in advance.

Examples

- Works holidays/vacation in commercially used spaces and buildings
- School holidays/vacation in school buildings
- Public holidays

It is possible to enter if during the holiday period operating mode ☾ Economy or ❄ Protection is to be used.

Setting values

■ **Main menu > Room operating mode >** (basic types A, U)
■ **Main menu > Time switch 1 >** (basic types P and C)

Operating line	*Range*	*Factory setting*
Room operating mode holidays	☾ Economy, ❄ Protection	☾ Economy

If the controller is connected to other controllers via communication, the corresponding operating mode applies.

6.10.3 Special days

Special days are periods of time when the building is used for special purposes and whose start and duration are known in advance.

Examples

- Visitor days in special homes
- Religious holidays in churches

The 7-day program allows for an additional 24-hour program (special day) as a special day program.
See section 6.9.2 "Time switch entries" for settings.

If the controller (master) is connected to other controllers (slaves) via communication, a specific 7-day program can be entered as a special day on each controller (slave). The time of the special day is communicated by the master and applies to all controllers in the same holidays / special day zone.

6.10.4 Calendar entry

Max 16 entries can be made. The entries are sorted in chronological order. The following is required for each entry:

- Date, year and start time
- Date, year and end time
- Reason for entry (holidays or special day)

Setting values

■ **Main menu > Holidays / special days >**

Operating line	*Range*	*Factory setting*
Entry 1...16	Start End Reason	

Annually recurring holidays or special days can be entered by entering an asterisk "*" for the annual setting. Otherwise, the entries made are automatically deleted at the end of the holidays or special days.

Priority

If two entries overlap, the following applies: Special days have priority over holidays. It is thus possible to predefine a special day during the holiday period.

Example

Example of a special day during the holiday period: Stage play in the school building.

Note

At the end of the holidays or special day, operation according to the normal 7-day program is resumed. During this transition, it is possible that the optimum start control (e.g. boost heating) cannot be started in time. We thus recommend to move down the end of the holidays giving the plant sufficient time to adapt to the respective setpoints.

6.10.5 Control input "Holidays / special days"

The holidays and special days can also be activated via digital inputs. To do this, digital inputs must be assigned.

Configuration

Main menu > Commissioning > Extra configuration > Operating mode > (A, U)

Main menu > Commissioning > Extra configuration > Time switch 1 > (P and C)

Operating line	*Adjustable values / remarks*
Holiday input	---, N.X1, N.X2, ... (digital inputs only)
Special day input	---, N.X1, N.X2, ... (digital inputs only)

These inputs have an effect only if holidays / special day is set to "Autonomous" or "Master".

Activation of special day or holidays via digital inputs is not entered in the holidays / special day program, eliminating recurrence.

Special day

The digital input enables the plant to be constantly switched to the special day program in the 7-day program without requiring interventions on the controller.
If a permanent signal is applied to the configured input, the special day program becomes active. This program is maintained until there is no more signal. Only then does the normal 7-day program resume operation.

Holidays

The digital input enables the plant to be constantly switched to "Holidays" without requiring intervention on the controller.
If a permanent signal is applied to the configured input, the plant changes to "Holidays". This operating mode is maintained until there is no more signal. Only then does the normal 7-day program resume operation.

Priority

If a special day or holidays are activated simultaneously via control switches and entry in the calendar, the following priority list applies:
- Control switch "Special day"
- Control switch "Holidays"
- "Special day" entry in the calendar
- "Holidays" entry in the calendar

Note

If other controllers are configured as slaves in the same holidays / special day zone, the digital inputs also act on these controllers.

6.10.6 Troubleshooting

Only one master may be set per holidays / special day zone. If several controllers are set as master, a fault status message appears. The fault status signal is sent by the controller receiving two holidays / special day signals.

If the controller expects a holidays / special day signal from the bus and the signal is not sent, a fault status message "Holidays / special day program failure" appears. The operating modes of the 7-day program are used without considering the holidays / special day entries.

Fault status messages

No.	*Text*	*Effect*
5201	Hol/spec day program failure	Non-urgent message; must not be acknowledged
5202	>1 hol/spec day program	Non-urgent message; must be acknowledged

When evaluating the priority in the holidays / special day program, only the first two entries are considered. If more than two overlapping entries are made, the special day may no longer have priority over the holidays.

6.11 Room op mode relay (basic types A,P,C,U)

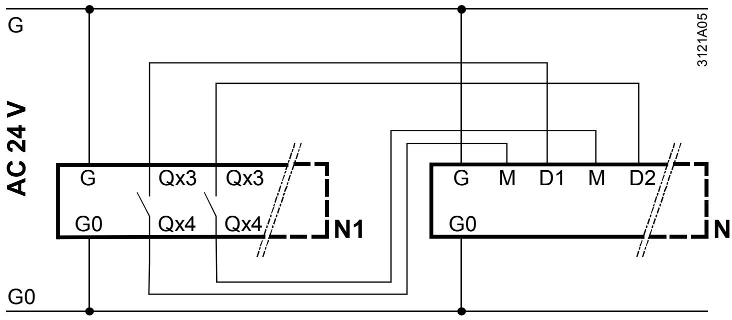
6.11.1 Operating principle

Purpose

The outputs "Operating mode relay 1" and "Operating mode relay 2" on function block operating mode (basic types A and U) or function block Time switch 1 (basic types P and C) allow for outputting the resulting room operating mode to two relay Qx of the controller.

Possible application

Route the resulting room operating mode from the Qx relay outputs of the RMU controller to a Synco™200 controller:



Key

N1: RMU7..B
N2: Synco™200 RLU2..

Configuration

Main menu > Commissioning > Extra configuration > Operating mode > (A, U)

Main menu > Commissioning > Extra configuration > Time switch 1 > (P, C)

Operating line	*Adjustable values / remarks*
Operating mode relay 1	---, N.Q1 ... (free relays only)
Operating mode relay 2	---, N.Q1 ... (free relays only)

On the **Settings** menu, the operating mode relay to be energized can be defined for each room operating mode. This ensures full flexibility, offering a host of applications.

Settings

Main menu > Settings > Operating mode > (basic types A, U)

Main menu > Settings > Time switch 1 > (basic types P, C)

Operating line	*Adjustable values*	*Factory setting*
☼ Comfort relay control	---, R1, R2, R1 + R2	---
◐ Precomfort relay control	---, R1, R2, R1 + R2	---
☾ Economy relay control	---, R1, R2, R1 + R2	R2
❄ Protection relay control	---, R1, R2, R1 + R2	R1 + R2

Meaning of adjustable values

The adjustable values previously listed under "Settings" mean the following for the operating mode relay:

Value set	*State of relay R1*	*State of relay R2*
---	Normally closed	Normally closed
R1	Operating position	Normally closed
R2	Normally closed	Operating position
R1 + R2	Operating position	Operating position

Note on factory setting

The factory setting was chosen to allow for direct connection of the digital outputs to the digital inputs of the Synco™200 controller.
As the Synco™ 200 controllers do not know operating mode Precomfort, the RMU controller switches the Synco™ 200 controllers directly to Comfort in the event of Precomfort. This setting can be changed to suit individual needs.

Connect room operating modes

The digital output relays 1 / 2 can be connected to the room operating mode inputs 1 / 2 of another RMU7..B (operating mode group) or RMB795 (function group room group).
If the Operating mode relay 1 is wired to Room operating mode input 1 and Operating mode relay 2 to Room operating mode input 2, the assignment must be as follows:

Operating line	*Assignment*
☼ Comfort	R2
◐ Precomfort	R1
☾ Economy	R1 + R2
❄ Protection	---

6.11.2 Function check / wiring test

Purpose

During wiring test, the room operating mode outputs can be switched directly allowing for function checks.

Setting values

Main menu > Commissioning > Wiring test > Outputs >(basic types A and U)

Operating line	*Comments*
Operating mode	----, Comfort, Precomfort, Economy, Protection

Main menu > Commissioning > Wiring test > Outputs >(basic types P and C)

Operating line	*Comments*
Time switch 1	----, Comfort, Precomfort, Economy, Protection

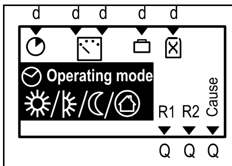
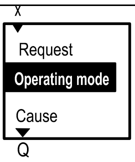
6.12 Plant operating mode relay (basic types A, P, C, U)

6.12.1 Operating principle

The output "cause" on the operating mode function block allows for the issuing of the plant operating mode via a relay (Section 6.8).

Possible application

Forwarding of the plant operating mode relay for external processing (e.g. to open skylights or windows as part of active night cooling).

	
Basic type A, U	Basic type P, C

Configuration

Main menu > Commissioning > Extra configuration > Operating mode >

Operating line	*Adjustable values / remarks*
Plant operating mode relay	---, N.Q1 ... (free relays only).

The following functions are available in the corresponding basic types for plant operating mode:

Designation "Cause"	Basic type			
	A	P	C	U
Fault	X	X	X	X
Smoke extraction	X	X	-	-
Preselected stop supp air fan	X	X	-	-
Operating mode contact	X	-	-	X
Plant operation selector	X	X	X	X
User request room	X	-	-	X
Request	-	X	X	-
No request	-	X	X	-
Sustained mode	X	-	-	-
Fault	X	-	-	-
Smoke extraction	X	-	-	-

The **Settings** menu can define the plant operating mode switched by the relay.

Settings

Main menu > Settings > Operating mode >

Operating line	*Adjustable values*	*Factory setting*
Plant operating mode relay	Fault, Smoke extraction, Preselected stop supp air fan, Operating mode contact, Plant operation selector, User request room, Request, No request, Sustained mode, Night cooling, Optimum start control	Fault

Note

The setting is independent of the basic type and is displayed the same throughout.

6.12.2 Functional check and wiring test

Purpose

During wiring test, the relay outputs can be switched directly allowing for function checks.

Setting values

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Plant operating mode relay	Off, On

6.13 Room control combinations (basic type A)

Room control combination means combined control of a room by heating and ventilation controller(s) connected to the same bus.

They use the same room operating mode and exchange information. For this purpose, the controllers must have the same geographical zone.

The Room control combination operating line allows for defining the behavior of individual devices as part of the combination.

Configuration

Main menu > Commissioning > Extra configuration > Operating mode >

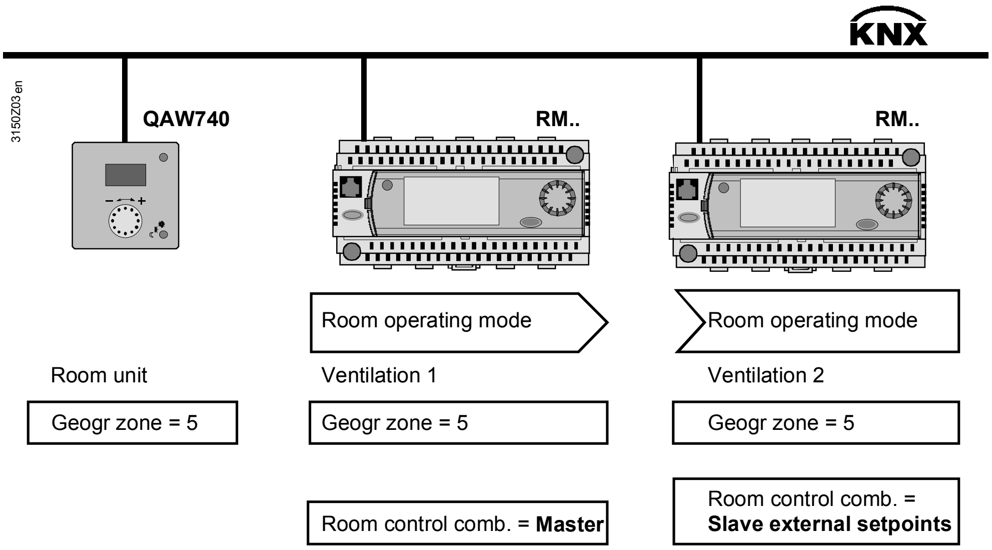
Operating line	*Range*	*Factory setting*
Room control combination	Master Slave external setpoint Slave internal setpoint	Master

The meaning of the possible room control combinations is explained in the following sections.

6.13.1 Room control combinations featuring multiple ventilation controllers

If multiple ventilation controllers jointly control the same room (e.g. for temperature control of a warehouse), they can exchange KNX bus information such as room temperature, operating mode and setpoints.
All controllers must have the same geographical zone (see section 26 "Communication"), and all controller use the same room operating mode.

The room control combination on one ventilation controller must be set to master, and to slave on all other controllers.



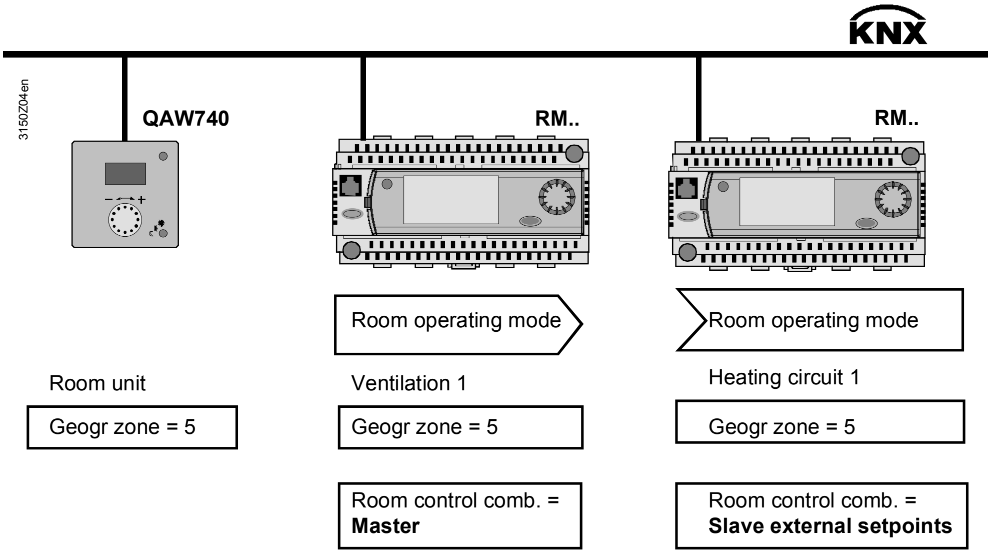
Setting for slave ventilation controller

The slave ventilation controllers apply the same operating mode as the master within the combination. With regard to setpoints, individual setpoints or the master's setpoints can be applied.

Case	*Room control combination*	*Effect*
Common room operating mode, common setpoints	Slave external setpoint	The heating/cooling setpoints for ☼ Comfort, ◐ Precomfort and ☾ Economy of the master are assumed by the slave ventilation controller and its setpoints overwritten. The setpoints can no longer be set at the slave ventilation controllers. If readjustment is needed, it must be entered on the ventilation controller (master).
Common room operating mode, individual setpoints	Slave internal setpoint	The slave ventilation controller uses its own internal heating/cooling setpoints.

6.13.2 Room control combinations with heating controller

If a heating and a ventilation controller together control the same room, the combination on the ventilation controller must be set to master.



The ventilation controller sends the values ☼ Comfort heating setpoint, ◐ Precomfort heating setpoint, and ☾ Economy heating setpoint to the heating controller via bus to overwrite the setpoints in the heating controller. This means that the heating and ventilation controller use the same setpoints.
These values can no longer be set on the heating controller. If a readjustment is needed, it must be entered on the ventilation controller (master).

6.14 Operating mode priorities

The following priorities apply to plant operation:

1. ON / OFF during wiring test
2. OFF by fan supervision (flow signal, overload signal); fan release relay signal also is off
3. ON via smoke extraction
4. OFF by one or multiples of the following functions:
   - Fire alarm off
   - Fault status messages with plant stop
   - Supply air fan stop conditions 1 or 2,
   - Pump fault at simultaneously low outside temperatures
5. Simulation VAV (basic type P)
6. OFF by plant operation selector
7. ON or OFF by room operating mode selector *or* switching to the desired operating mode)
8. Comfort, Precomfort or Economy by room operation selector which can be selected via local operation (RMZ790, RMZ791) or remote control (QAW740, RMZ792, ACS), where the last action always wins
9. Comfort by timer function
10. Comfort, Precomfort, Economy, or Protection via communication from external time switch (room control combination)
11. Special day program (Comfort, Precomfort or Economy depending on setting) via special day input
12. Holidays (Economy or Protection depending on setting "Holidays room operating mode") via holidays input
13. Holidays or special day depending on calendar entry
14. Comfort, Precomfort or Economy via internal time switch

6.15 Effect of room operating modes (examples)

Application example 1

Ventilation with 2-speed fan.

☼ Fan speed 2, control to Comfort setpoints
◐ Fan speed 1, control to Precomfort setpoints
☾ Sustained mode (Economy), night cooling and frost protection active
⊘ Plant OFF, frost protection active

Application example 2

Ventilation with 2-speed fan, speed 2 as per room temperature or IAQ controller.

☼ Fan speed 1, control to Comfort setpoints; speed 2 if room temperature setpoints are not reached or as per IAQ controller
◐ Fan speed 1, control to Precomfort setpoints; speed 2 if room temperature setpoints are not reached or as per IAQ controller
☾ Sustained mode (Economy), night cooling and frost protection active
⊘ Plant OFF, frost protection active

Application example 3

Ventilation via continuously controlled fans.

☼ Fan controlled, control to Comfort setpoints
◐ Sustained mode (Precomfort) active
☾ Sustained mode (Economy), night cooling and frost protection active
⊘ Plant OFF, frost protection active

Application example 4

Chilled ceiling (basic type U).

☼ Pump ON, control to Comfort setpoints
◐ Pump ON, control to Precomfort setpoints
☾ Pump OFF, pump kick active
⊘ Pump OFF, pump kick active

Application example 5

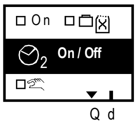
Implement as follows if the request exist after customer-specific sustained mode with basic type U:

- Configure input identifier using desired unit, connect input to logic
- Use switch-on/switch-off function for logic, time functions for logic can be set as needed switch-on delay, switch-off delay, min. switch-on time, min. switch-off time)
- Connect logic to function block "Operating mode" to input:
  - Timer function or
  - Switch to desired operating mode (room operating mode input 1) or
  - Room operating mode selector (room operating mode input 1 and 2)
- On always acts on the entire plant

Note

The reason for the plant operating mode selector (see section 6.8.3) is "User request room" and not "Sustained mode".

7 Time switch 2 (ON/OFF)



Purpose

A simple ON/OFF time switch is available e.g. to operate secondary aggregates (e.g. pump) in addition to the main time switch (section 6.9).
Time switch 2 has 6 entries per day.

7.1 Activate block and settings

Activate time switch 2 via operating line Time switch 2.

With Time switch 2, data point "Holiday priority" can be used to select if it can be overridden by the holiday program. In override, the output of time switch 2 is set fixed to OFF for holidays. Holiday priority also activates special days.

If time switch 2 is set to Slave, "Holiday priority" is ignored.

The output of time switch 2 can either be internally processed or output directly via a relay output.

The output of time switch 2 can be overridden via the operation selector ✍ at the operator unit or via ACS700. The output is visible on the topmost user level.

Configuration and settings

Main menu > Commissioning > Extra configuration > Time switch 2 >

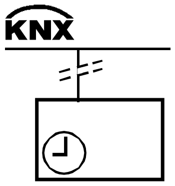
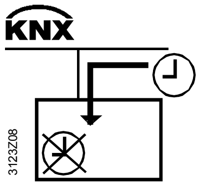
Operating line	*Range*	*Factory setting*
Time switch 2	Yes, No	No
Holiday priority	Yes, No	No
[Time switch 2] relay	---, N.Q1, N.Q2, ...	---
[Time switch 2] op selector	Yes, No	No

7.2 Communication

If the controller is connected to other controllers via the bus, time switch 2 can also be operated as slave (master mode not possible).

The following settings are possible:
- Autonomous time switch 2
- Time switch 2 receives the Time switch program from the bus

The settings have the following effect:

Effect	*Description*	*Diagram*
Autono-mous	The time switch only acts locally on this controller	
Slave	The time switch in this controller is not active. The acting time switch is that acting on the geographical zone set on this controller as the time switch receiving zone (time switch slave (apartment)). The external time switch must be set as time switch master	

For slave operation, the geographical zone of the controller sending the time switch must be entered via operating line Time switch slave (apartment).
"----" is set for autonomous operation.

Setting values

Main menu > Commissioning > Communication > Time switch 2 >

Operating line	*Range*	*Factory setting*
Time switch slave (apartment)	----, 1..126	----
Transformation Precomfort	Off, On	On

If the time switch is operated as a slave, the output of the relevant time switch assumes the following states:

State of time switch output for slave operation

Operating mode "Master time switch"	*State of time switch output*
Comfort	On
Precomfort	Adjustable via operating line Transformation Precomfort: On or Off
Economy	Off

7.3 Entries

A specific 24-hour profile can be selected for the following days.

Set time switch

■ **Main menu > Time switch 2 >**

Operating line	*Range*	*Factory setting*
Monday through Sunday	On, Off	06:00 22:00
Special day	On, Off	06:00 22:00

For each day, max 6 entries can be entered in the 24-hour program.
Each entry must have the time of day and the required operating mode (On / Off).

Copy 24-hour profiles

After all data is entered for a day, it can be copied to other days. If, for example, Monday is entered, the same profile can be copied to all the other working days (Monday through Friday) and need not be entered again.

7.4 Assign texts

Text can be assigned to each time switch and the operation selector. This text appears on the menu and in the operating line.

Free text

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Time switch 2 >

Operating line	*Range*	*Factory setting*
Time switch 2	Max. 20 characters	Time switch 2
[Time switch 2] op selector	Max. 20 characters	[Time switch 2] op select

Refer to section 31.4 for an overview of all editable texts and on how to reset them.

7.5 Operation selector

The operating mode of the time switch's output can be preselected via the operation selector in the main menu. The current state for the operation selector of time switch 2, e.g., appears as follows:

Setting value

■ **Main menu > [[Time switch 2] op selector >**

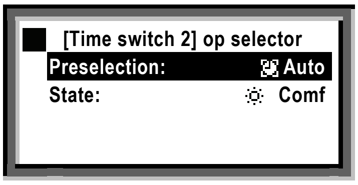
Operating line	*Range*	*Factory setting*
Preselection	Auto, Off, On	Auto

Note

If the configuration of the operation selector is reset subsequently, you must first ensure that it is set to Auto. Otherwise, the time switch constantly maintains "On" or "Off".

Display values

■ **Main menu > [[Time switch 2] op selector >**



[Time switch 2] op selector
Preselection: Auto
State: Comf

7.6 Troubleshooting

If a time switch signal from the bus is anticipated and not sent, error message "[Time switch 2] failure" appears. In this case, the receiver continues to operate on "On".

Fault status messages

No.	*Text*	*Effect*
5111	[Time switch 2] failure	Non-urgent message; must not be acknowledged

8 Inputs

8.1 Universal inputs

Digital signals, passive analog signals or active analog signals can be connected to universal inputs.
The following number of universal inputs is available for the individual types of devices:

RMU710B:	6 inputs
RMU720B:	8 inputs
RMU730B:	8 inputs

If additional inputs are required, the number of inputs can be increased via extension modules.

RMZ785:	8 inputs
RMZ787:	4 inputs
RMZ788:	4 inputs

Max. four extension modules from a RMZ785 set, two RMZ787 and two RMZ788 can be connected.
The max. number of inputs thus is:

RMU710B + RMZ785 + RMZ787(1) + RMZ787(2) + RMZ788(1):	26 inputs
RMU720B + RMZ785 + RMZ787(1) + RMZ787(2) + RMZ788(1):	28 inputs
RMU730B + RMZ785 + RMZ787(1) + RMZ787(2) + RMZ788(1):	28 inputs

8.1.1 Activate function

Each input can be assigned an identifier. The identifier also defines the unit of the input.

If an input is not needed for the application, it can be used for display purposes. To do this, the identifier/unit is assigned. A special name can then be assigned to the input. The connected value can be displayed on the operator unit.

The following identifiers are available:

Identifier	*Notes*	*..Cont.: Identifier*	*Notes*
Room temperature	1)	ppm	
Outside temperature	1)	Universal 000.0	2)
Extract air temperature	1)	Universal 0000	3)
Supply air temperature	1)	Digital	
°C		Frost protection	1)
%		Frost protection unit 1	1)
g/kg		Frost protection unit 2	1)
kJ/kg		Frost protection unit 3	1)
W/m²		[Controller 1] rem setp adj	1) 4)
m/s		[Controller 2] rem setp adj	1) 5)
bar		[Controller 3] rem setp adj	1) 6)
mbar		Rem setp adjuster relative	7)
Pa		Pulse	

1) The identifier can provide additional functionality; see 8.3 Special analog inputs"
2) Universal input with one decimal place, resolution –99.9… +999.9, increment 0.1
3) Universal input without decimal place, resolution –999…+9999, increment 1
4) Rem setp adjuster absolute for controller 1
5) Rem setp adjuster absolute for controller 2
6) Rem setp adjuster absolute for controller 3
7) Remote setpoint relative for controller 1 (basic type A)

Configuration

Main menu > Commissioning > Extra configuration > Input identifier >

Operating line	*Adjustable values / remarks*
N.X1	Activate the function by assigning the following to the value: Room temperature, Outside temperature, Extract air temperature, Supply air temperature °C, %, g/kg, kJ/kg, W/m², m/s, bar, mbar, Pa, ppm, Universal 000.0, Universal 0000, Digital, Frost protection, [Controller 1] remote setpoint adjuster, [Controller 2] remote setpoint adjuster, [Controller 3] remote setpoint adjuster, Remote setpoint adjuster relative, or Pulse
...	Ditto
RMZ788(2).X4	Ditto

Notes

- The identifiers °C, %, g/kg, kJ/kg, W/m², m/s, bar, mbar, Pa, ppm, 100 and 1000 are always analog inputs
- The unit for "Rem setp adjuster relative" is K (Kelvin)
- The "Rem setp adjuster absolute" assumes the main control variable’s unit

8.1.2 Cause

The source of the input value is displayed in the value "Cause". The following types are available:

- Terminal: Used as local terminal
- LTE mode: Used as LTE transmission and reception objects
- S-mode: Used as S-mode object
- Simulation: Input terminal simulation

Main menu > Commissioning > Settings > .... or
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Cause	Terminal, LTE mode, S-mode, Simulation	

Note

The LTE transmission and reception objects are described in Section 28.2.6.

8.1.3 Input terminal simulation

Each input terminal can be simulated to test plant reaction.

Setting values

Main menu > Inputs > Simulation inputs >

Operating line	*Range (depends on type)*	*Factory setting (by type)*
N.X1… A8 (2).X4	----, −50...+50 °C	----

⚠ The inputs should only be overridden by qualified staff and within a limited period of time!
The fault message "Simulation inputs active" is sent during terminal simulation.

Fault status messages

No.	*Text*	*Effect*
100	Simulation inputs active	Non urgent message; must not be acknowledged.

The fault message remains active until "Simulation " is reset to "----". This is to make certain it will not be forgotten on the plant to reset the simulation.

Note

The simulated input terminal value is used only locally. It is not sent via bus to other controllers.

8.1.4 Troubleshooting

Some function blocks require defined inputs; e.g. precommand checkback signal of the motors requires a digital input.

During precommand checkback signal configuration only inputs identified as digital are displayed. For this reason, the input identifiers must always be set first during configuration.

If input identifiers are changed after configuration of other blocks, certain functions of the other blocks may be set to inactive, as they would have to work with units invalid for the particular block.

8.1.5 Function check / wiring test

During the wiring test, the measured values of all inputs can be checked.

Wiring test

Main menu > Commissioning > Wiring test > Inputs >

Operating line	*Adjustable values / remarks*
N.X1	Display of the current measured value
...	Ditto
RMZ788(2).X4	Ditto

8.2 Analog inputs

Analog inputs can be activated as described in section 8.1.1 "Activate function".
With the analog inputs, the following settings are available:
Type, measuring range and readjustment.

8.2.1 Type

If the unit is °C, the type can be selected. If the unit is not °C, the type is always 0...10 V.
The following types are available:

- LG-Ni1000
- 2xLG-Ni1000
- T1
- Pt1000
- 0...10 V

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Type	Ni1000, 2xNi1000, T1, Pt1000, 0…10 V	Ni1000

8.2.2 Measuring range

Passive temperature signals from LG-Ni 1000 sensing elements have a measuring range of −50…+250 °C.
Passive temperature signals from 2x LG-Ni 1000 or T1 sensing elements have a measuring range of −50...+150 °C.
Passive temperature signals from Pt1000 sensing elements have a measuring range of −50...+400 °C.
With active signals, the measuring range is definable. A lower and an upper measured value must be entered.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Value low	Depending on selected type	Depending on type
Value high	Depending on selected type	Depending on type

Example

Room temperature with an active signal of DC 0...10 V = 0...50 °C:

Lower measured value:	0 °C
Upper measured value:	50 °C

8.2.3 Measured value correction

With passive temperature sensors, the measured value can be readjusted by −3.0 to +3.0 K to compensate for line resistance. It is thus possible to on-site calibrate using a reference instrument.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Correction	−3.0…+3.0 K	0 K

8.2.4 Connection examples for sensors

Example 1

Temperature measurement with passive temperature sensor using LG-Ni 1000 sensing element.

Input configuration

Main menu > Commissioning > Extra configuration > Input identifier >

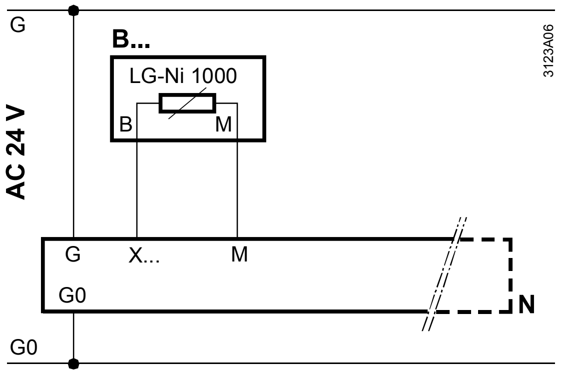
Operating line	*Setting*
N.X1	°C

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Setting*
Type	Ni1000

Connection diagram



Example 2

Average temperature measurement with 2 passive sensors using LG-Ni 1000 sensing elements.

Input configuration

Main menu > Commissioning > Extra configuration > Input identifier >

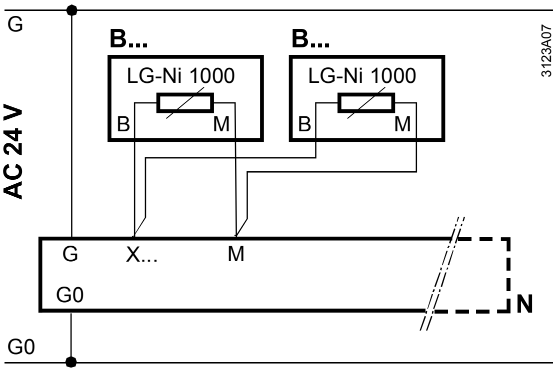
Operating line	*Setting*
N.X1	°C

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Setting*
Type	2xNi1000

Connection diagram



Example 3

Average temperature measurement with 4 passive sensors using LG-Ni 1000 sensing element.

Input configuration

Main menu > Commissioning > Extra configuration > Input identifier >

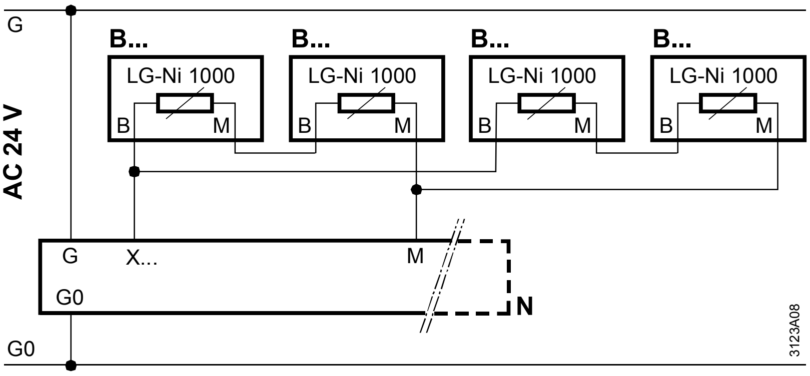
Operating line	*Setting*
N.X1	°C

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Setting*
Type	Ni1000

Connection diagram



B… Passive sensor

8.2.5 Troubleshooting

When you exit the "Commissioning" menu, a check is made to see which sensors are connected. If one of the sensors connected at this point is missing later on or if there is a short-circuit, message "[...X...] sensor error" appears.
If there is no measured value due to an open-circuit, the display reads: ----
If there is no measured value due to a short-circuit, the display reads: oooo

Fault status messages

No.	*Text*	*Effect*
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged

8.2.6 Multiple use of sensors

Problem and solution

Not all sensor signals can be routed via bus to another device. For this reason, function "Multiple use of sensors" allows for wiring a passive signal at an input terminal directly to a Y-output and provide it as a DC 0…10 V signal. The signal can then be fed to other devices.

Configuration

Main menu > Commissioning > Extra configuration > Sensor multiple use

Operating line	*Adjustable values / remarks*
Signal Y N.X1, …	Activate function by assigning an input terminal to the output terminal

Setting values

Converting signal LG-Ni1000 or Pt1000 to signal DC 0...10 V is carried out by setting parameters "Value low" and "Value high".

Note

Input terminal simulation is not available for multiple use of sensors.

8.3 Special analog inputs

The following analog inputs provide advanced, special functions:

- Supply air temperature
- Room temperature
- Extract air temperature
- Outside temperature

Note

The additional functionality of identifier "Frost protection", "Frost protection unit 1, 2 and 3", "[Controller 1, 2 and 3] rem setp adj" are described in the sections below.

The following table describes the effect of one or several input identifiers connected at the same time.
The input identifiers are assigned automatically to controller 1.

Input identifiers	*Effect*
"Supply air temperature" (no room temp via bus)	Supply air control. No sustained mode, no night ventilation
"Room temperature" or Room temp via bus	Room temperature control. Sustained mode and night ventilation by "RT"
"Extract air temperature" (no room temp via bus)	Extract air temperature control. No sustained mode, no night ventilation
"Supply air temperature" + "Room temperature" or Room temp via bus	Cascade control by room temperature or supply air temperature control (depending on casc./const. changeover input or combination heating/ventilation. Sustained mode and night ventilation by "RT"
"Supply air temperature" + "Extract air temperature" (no room temp via bus)	Cascade control by extract air temperature or supply air temperature control (depending on casc./const. changeover input or combination heating/ventilation. No sustained mode, no night ventilation
"Supply air temperature" + "Room temperature" or Room temp via bus + "Extract air temperature"	Cascade control by extract air temperature or supply air temperature control (depending on casc./const. changeover input or combination heating/ventilation. Sustained mode and night ventilation by "RT"
"Room temperature" or Room temp via bus + "Extract air temperature"	Extract air temperature control. Sustained mode and night ventilation by "RT"

The special properties and effects of outside or room temperature are described in the sections below.

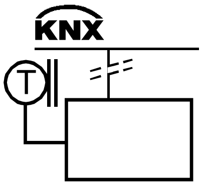
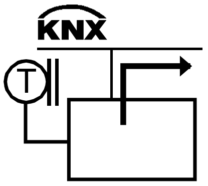
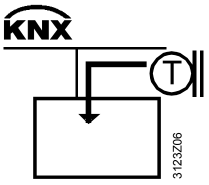
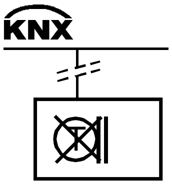
8.4 Outside temperature

8.4.1 Possible connections

The outside temperature can be provided by different sources:

- Outside temperature connected locally to terminal
- Outside temperature via bus

The following variants are available:

Variant	*Effect*	*Diagram*
Outside temperature at the terminal. Communication outside temperature not active.	Controller operates with own outside temperature, no impact on the bus	
Outside temperature at the terminal. Communication outside temperature active.	Controller operates with own outside temperature. Using the bus, the outside temperature is also provided to other controllers	
No outside temperature at terminal. Communication outside temperature active.	Controller operates with outside temperature provided via bus by another controller	
No outside temperature at terminal. Communication outside temperature not active.	Controller has no outside temperature	

8.4.2 Outside temperature at terminal

Refer to section 8.2 "Analog inputs" for settings and connection diagram for outside temperature at the terminal.

Configuration

Main menu > Commissioning > Extra configuration > Input identifier >

Operating line	*Adjustable values / remarks*
…X…	Activate function by assigning the "Outside temperature" value to the input

8.4.3 Outside temperature via bus

The outside temperature can only be provided via the bus if communication is active and an outside temperature set (Outside temperature zone = "----" means that the outside temperature on the bus is inactive).

To activate different outside temperatures to be sent via bus (e.g. outside temperature on the northern side of the building for the air conditioning plants, and outside temperature on the eastern side of the building for heating zone "East", etc.), they must be assigned to specific outside temperature zones.
Refer to section 28 "Communication" for the required settings.

Setting values

Main menu > Commissioning > Communication > Distribution zones >

Operating line	*Range*	*Factory setting*
Outside temperature zone	----, 1…31	----

8.4.4 Outside temperature simulation

To simulate the outside temperature and test the response of the plant, the measured value of the outside temperature can be overridden.

Setting values

Main menu > Inputs >

Operating line	*Range*	*Factory setting*
Outside temperature simulation	----, −50...+50 °C	----

⚠ Only authorized staff may override inputs within a limited period of time!
During simulation of the outside temperature, message "Outs sensor simulation active" appears.

Fault status messages

No.	*Text*	*Effect*
12	Outs sensor simulation active	Non-urgent message; must not be acknowledged

This message remains active until "Simulation " is returned to "----". This ensures that the simulation is always completed.

Note

The simulated outside temperature is used only locally; it is not sent via bus to other controllers.

8.4.5 Troubleshooting

When you exit the "Commissioning" menu, a check is carried out to see if the outside temperature is connected. If the outside temperature is connected at this point and missing later, message "[...X...] sensor error" appears.

For each system, only one outside temperature can be sent within the same zone (only one outside temperature master).
If several controllers send outside temperatures within the same zone, message ">1 outside temperature sensor" appears. The fault is sent by the controllers sending and receiving outside temperature signals to and from the same zone.

If the controller expects an outside temperature signal via the bus and the signal is not sent, message "Outside temperature sensor fault" appears.

Fault status messages

No.	*Text*	*Effect*
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged
11	>1 outside temperature sensor	Urgent message; must be acknowledged
10	Outside temp sensor error	Non-urgent message; must not be acknowledged

If other outside temperature signals are available on the bus, any of them are used randomly.

8.5 Room temperature

8.5.1 Possible connections

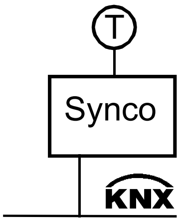
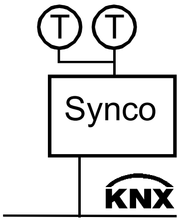
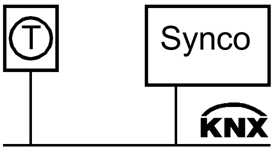
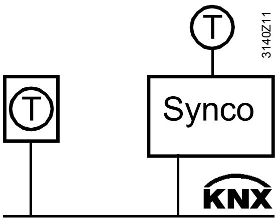
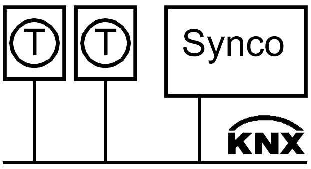
The room temperature can **only** be activated with basic type A. It can be provided by different sources:

- Room temperature connected locally to the terminal
- Room temperature via the bus

8.5.2 Averaging, connection variants

If communication is active, the room temperature is sent via the bus. The room temperature is sent within the geographical zone and made available to all devices serving the same geographical zone. See section 28.2.1 ""Basic settings" menu item" for required settings.

The following variants are available:

Variant	*Effect*	*Diagram*
One analog room temperature sensor connected to the controller	The controller operates with own room temperature. If communication is activated, the room temperature value in the respective geographical zone is sent to the bus.	
Two analog room temperature sensors connected to the same controller terminal	The controller operates with the average value of the 2 sensors. If communication is activated, the average value in the respective geographical zone is sent to the bus	
One KNX room unit	The controller operates with the room temperature of the room unit. Communication must be active, controller and room unit must be set to the same geographical zone	
One analog room temperature sensor connected to the controller and one KNX room unit	The controller operates with the average value of these 2 measured values. Communication must be active, controller and room unit must be set to the same geographical zone	
2 KNX room units	The controller operates with the average room temperature of two room units. Communication must be active, controller and room units must be set to the same geographical zone	

8.5.3 Room temperature at terminal

Max one input can be configured for the room temperature. If several inputs are designated as "Room temperature" inputs, only the first of them is used, all others are ignored!

Refer to section 8.2 "Analog inputs" for settings and connection diagram for room temperature at the terminal.

Configuration

Main menu > Commissioning > Extra configuration > Input identifier

Operating line	*Adjustable values / remarks*
…X…	Activate function by assigning the value "Room temperature" to the input

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Type	Ni1000, 2xNi1000, T1, Pt1000, 0…10 V	Ni1000
Value low	Depending on selected type	Depending on type
Value high	Depending on selected type	Depending on type
Correction	−3.0…+3.0 K	0 K

8.5.4 Installation notes

The room temperature is used for the following functions:

- Displacement ventilation:
  With displacement ventilation, the temperature gradient of the room air is used. This means that the extract air temperature can be a few degrees higher than the room temperature; thus a room temperature sensor must be used.
- Night cooling function:
  When the plant is off, the extract air temperature sensor no longer senses the room temperature but only the temperature of the stationary air in the ductwork. For this reason, this function only works on room air temperature
- Sustained mode function:
  When the plant is off, the extract air temperature sensor no longer senses the room temperature but only the temperature of the stationary air in the ductwork. For this reason, this function only works on room air temperature
- If the extract air duct is very long, the temperature in the duct can change by the time it reaches the duct sensor. This is true in particular when the extract air ducts are not insulated. In these cases, the extract air temperature can considerably deviate from the room temperature
- If an RMH7… heating controller and an RMU7... ventilation controller together control a room, room influence may only be active with the heating controller if a room temperature sensor is used, as the extract air temperature sensor only measures the temperature of the stationary air in the ductwork when the ventilation plant is off

8.5.5 Troubleshooting

When you exit the Commissioning menu, a check is made to see if room temperature is connected. If the room temperature is connected at this point but is missing later, a message appears.

Fault status messages

No.	*Text*	*Effect*
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged
60	Room sensor error plant 1	Non-urgent message; must not be acknowledged

For each system, a maximum of two room temperatures can be sent within the same geographical zone. If more than two controllers send their room temperature within the same zone, message ">2 room sensors in plant 1" appears. The fault is sent by the controller receiving several room temperatures within the same zone.

Fault status messages

No.	*Text*	*Effect*
61	>2 room sensors in plant 1	Urgent message; must be acknowledged

8.6 Digital inputs

Control function signals can be connected to the digital inputs. See section 8.1.1 "Activate function" on how to activate digital inputs.

8.6.1 Normally closed

For each digital input, the normally closed position can be predefined.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Normally closed	Open, Closed	Open

8.6.2 Texts for logical states 0 and 1

A free text can be assigned to each digital input for logical states 0 and 1. (E.g. On – Off, full – empty, etc.). The text is displayed after it is assigned to the corresponding input. If text is deleted, the factory-set default text is displayed.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Text for: Logic 0	Max. 20 characters	0
Text for: Logic 1	Max. 20 characters	1

8.6.3 Connection example

Potential-free contacts can be connected to the digital inputs.

Input configuration

Main menu > Commissioning > Extra configuration > Input identifier >

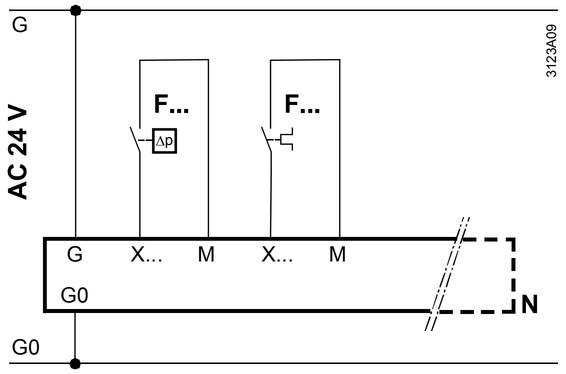
Operating line	*Setting*
N.X2	Digital

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Setting*
Normally closed	Open

Connection diagram



F… Detector with potential-free switching contact

8.6.4 Troubleshooting

Digital signals cannot be monitored.

⚠ If important protective functions, such as fire alarm, are connected to this input, it is recommended to a kind of wiring that also triggers a fire alarm when there is no signal (open-circuit) (setting value "Normal position: Closed").

8.7 Remote setpoint adjuster, absolute

The absolute remote setpoint acts on both ☼ Comfort and ◐ Precomfort setpoints. Suited setpoint adjusters are the QAA25 room operator unit (5...35 °C), the passive BSG21.1 setpoint adjuster and the active BSG61 setpoint adjuster.

8.7.1 Activate function

The function is activated by setting the identifier of an input as a remote setpoint. At the same time, specify the controller (1…3) the remote setpoint should act on.

Configuration

Main menu > Commissioning > Extra configuration > Input identifier

Operating line	*Adjustable values / remarks*
…X…	Activate function by assigning value "[Controller 1] rem setp adj" (Remote-w1), "[Controller 2] rem setp adj" (Remote-w2), or "[Controller 3] rem setp adj" (Remote-w3) to the input

8.7.2 Type and measuring range

You can select if the remote setpoint is to be an active (DC 0…10 V) or passive signal (0...1000 Ω). In addition, you can set the input signal's range:
Value high: Value at DC 10 V or 1000 Ω
Value low: Value at DC 0 V or 0 Ω

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Type	0…10 V, Ohm	Ohm
Value low	Depending on selected type	Depending on type
Value high	Depending on selected type	Depending on type

8.7.3 Setpoints

Comfort ☼
The remote setpoint always acts on the lower setpoint (setpoint heating). The dead zone between Seq1+2+3 and Seq4+5 remain the same as for the predefined setpoints.

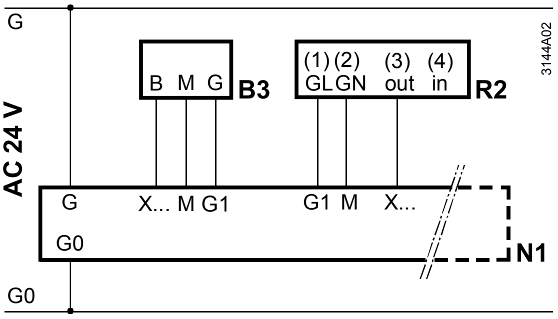
Thus, the current lower Comfort setpoint is
= Remote setpoint.
And the current upper Comfort setpoint is
= Remote setpoint + (Comfort setpoint high – Comfort setpoint low).

Precomfort ◐
The Precomfort setpoints are shifted also:
Thus, the current lower Precomfort setpoint is
= Remote setpoint + (Precomfort setpoint low – Comfort setpoint low).
And the current upper Precomfort setpoint is
= Remote setpoint + (Precomfort setpoint high – Comfort setpoint low).

Economy ☾
If sustained mode is also active, the Economy setpoints are shifted only if the Precomfort setpoints were to lie outside the Economy setpoints.

8.7.4 Connection diagram

Connect the setpoint adjuster according to the following diagram:



R2 Active setpoint adjuster BSG61

8.7.5 Troubleshooting

Error in operation
When you exit the Commissioning menu, a check is made to see if the setpoint adjuster is connected.
If the setpoint adjuster is connected at this point but missing later, message "[...X...] sensor error" appears.

Fault status messages

No.	*Text*	*Effect*
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged

If there is no signal from the setpoint adjuster, the controller continues to work with the internally set setpoints.

Configuration error
If more than one input is activated as remote setpoint adjuster for the same controller, only the first input is considered.

8.8 Remote setpoint adjuster, relative

The relative remote setpoint acts on both ☼ Comfort and ◐ Precomfort setpoints.

Suitable setpoint adjusters are the QAA27 room operator unit (−3...+3 K) and the passive BSG21.5 setpoint adjuster (−3...+3 K).
A relative setpoint adjuster is available; it is set assigned to universal controller 1 with the main controlled variable temperature.

8.8.1 Activate function

The function is activated by setting the identifier of an input as relative setpoint adjuster.
The relative remote setpoint adjuster can only be activated for room temperature control with controllers of basic type A.

Configuration

Main menu > Commissioning > Extra configuration > Input identifier

Operating line	*Adjustable values / remarks*
…X…	Activate function by assigning value "Rem setp adjuster relative" (Remote rel) to the input

8.8.2 Measuring range

The setpoint adjuster range must be 1000...1175 Ω = −3...+3 K.

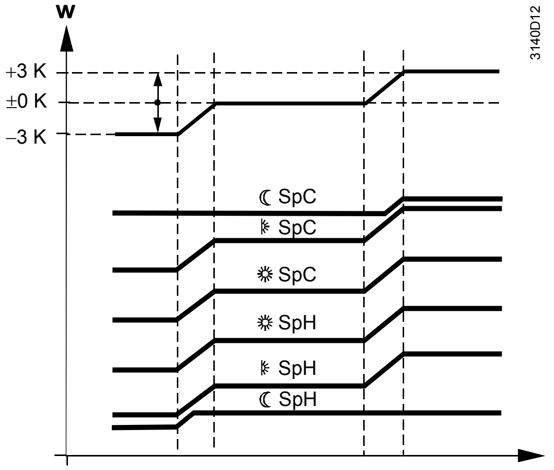
8.8.3 Setpoints

Comfort ☼
The relative remote setpoint adjuster acts on the Comfort heating setpoint and the Comfort cooling setpoint. The dead zone between Seq1+2+3 and Seq4+5 remains the same as that with the predefined setpoints.

Precomfort ◐
The relative remote setpoint adjuster acts on the Precomfort heating setpoint and the Precomfort cooling setpoint. Thus, the difference to the Comfort setpoints remains the same as with the predefined setpoints.

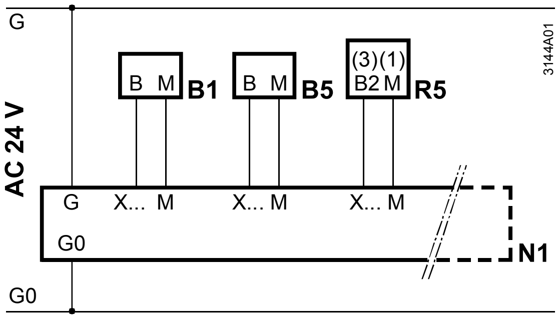
Economy ☾
The Economy setpoints are shifted only if Precomfort setpoints were to lie outside the Economy setpoints.

Function diagram



8.8.4 Connection diagram

Connect the setpoint adjuster according to the following diagram:



R5 Passive setpoint shifting unit BSG21.5

8.8.5 Troubleshooting

Error in operation
When you exit the Commissioning menu, a check is made to see if the setpoint adjuster is connected.
If the setpoint adjuster is connected at this point but missing later, message "[...X...] sensor error" appears.

Fault status messages

No.	*Text*	*Effect*
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged

If there is no signal from the setpoint adjuster, the controller continues to work without relative setpoint shift.

Configuration error
If more than one input is activated as remote setpoint adjuster, only the first is considered.

8.9 Pulse

An input with this identifier can be used to connect a pulse counter. Pulses with the following specification can be received:

- Mechanical sources (Reed contact) without Namur circuitry, max. pulse frequency of 25 Hz and a min. pulse duration of 20 ms
- Electronic pulse source with max. pulse frequency of 100 Hz and min. pulse duration of 5 ms

8.9.1 Activate function

Configuration

Main menu > Commissioning > Extra configuration > Input identifier >

Operating line	*Adjustable values / remarks*
…X…	Pulse

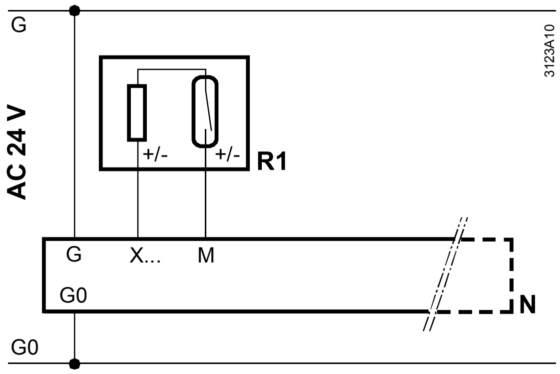
Electronic pulse sources (e.g. Open Collector outputs) generate shorter, less bouncing pulses than mechanical pulse sources (e.g. relays or Reed contacts).

Setting value

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

Operating line	*Range*	*Factory setting*
Type	Mechanical or Electronic	Mechanical

8.9.2 Connection diagram



R1 Reed pulse source

8.10 Assign texts

For every input, the texts can be adjusted via operation.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Inputs > ...X...

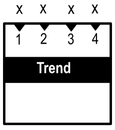
Operating line	*Range*	*Factory setting*
N.Xx	Max. 20 characters	N.Xx

Refer to section 31.4 for an overview of all editable texts and on how to reset them.

9 Data acquisition

9.1 Trend

9.1.1 Connections and application



Purpose

The Trend function block is used for time-related recording of measured values. It provides four independent trend channels.

A trend channel can record **one** measured value.

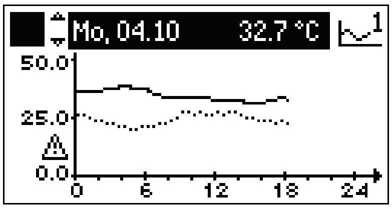
Two trend channels can be displayed per Trend view: Primary channel plus extra channel as a reference.

It is possible to record signals from local inputs of the controller as well as room temperatures and outside temperature via bus.

9.1.2 Views

Example

The following illustration shows a 24-hour view on the operator unit with primary trend curve and reference curve for an extra channel:



Contents

- The current 24-hour views (8 minutes, 8 hours, 24 hours) show the date and the current value of the primary trend curve at the top
- The primary trend curve is shown as a solid line, the reference curve as a dotted line
- The Y-axis label refers to the settings of the primary channel. If the Y-axes of the two channels do not match, a warning symbol appears below the axis

Change between views

Use the press-and-turn button on the operator unit to navigate between the four different views:

- 8-minute view: Sampling every 5 seconds, last 8 minutes
- 8-hour view: Sampling every 5 minutes, last 8 hours
- 24-hour view: Sampling every 15 minutes, current day
- Rolling over the last 6 days: Sampling every 15 minutes, last 6 days

Comment: The 24-hour view shows the last 6 days.

9.1.3 Trend function settings

Settings

Main menu > Settings > Data acquisition > Trend > Trend channel 1...4 >

Operating line	*Adjustable values / remarks*
Trend channel 1… Trend channel 4	Channel name (editable text, max.20 characters)
Trend signal	Assign trend signal: ---, room temperature via bus, outside temperature via bus, N.X1, … A7(2).X4
Geographical zone (apartment)	1…126 Relevant only if "Room temp via bus" is set
Geographical zone (room)	1…63 Relevant only if "Room temp via bus" is set
Outside temperature zone	1…31 Relevant only for "Outside temp via bus"
Y-axis min	Depending on selected type
Y-axis max	Depending on selected type
Selection extra channel	Trend channel 1…Trend channel 2

Explanation on the settings

A trend channel is activated by assigning a "Trend signal" to it.
Each trend channel can be assigned a plant-specific text with max. 20 characters via operating line "Trend channel x".
The bus address of the room for which the room temperature is to be recorded can be set via the "Geographical zone".
To acquire the outside temperature via bus, set the relevant "Outside temperature zone".
The Y-axes can be scaled for each trend channel. Data points "Y-axis min" and "Y-axis max" refer to the value display and must be set according to the expected signal range. There is no trend display if the current values are outside the adjusted range!
A second trend channel can be shown via operating line "Selection extra channel".
This channel is displayed as dotted line.

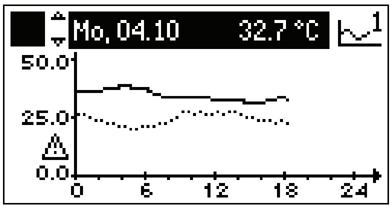
Notes on the extra channel

Only every second measured value is displayed for the extra channel; thus, the value to be measured should be put on the main channel.
The Y-axis label only refers to the primary channel. The extra channel is displayed according to its Y-axis settings. If the axes differ, a warning triangle appears next to the axis.

Display values

Call up the trend channels via the following menu:

Main menu > Data acquisition > Trend channel 1...4 >



The trend channels are displayed with their assigned text.
If a trend channel is selected, the display immediately switches to the 24-hour view.
The press-and-turn button allows you to navigate between the different views.

9.1.4 Troubleshooting

Trend signal not available

If a trend signal at the local inputs is no longer available (e.g. due to a faulty sensor), trends are no longer recorded.
In this case, observe the messages under:

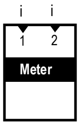
■ **Main menu > Faults > Faults current >**

If the values are not available via bus, trends are no longer recorded.

Power failure or restart

After a power failure or when exiting the "Extra configuration" menu (restart controller), the values of the 8-hour and 8-minute views are deleted.
However, the values of the 24-hour view and those of the last 6 days are retained.

9.2 Meters



Purpose

Meters are used to acquire consumption values.
Pulses from gas, hot water, cold water and electricity meters are processed. The pulse values represent:

- Energy in kJ, MJ, GJ, Wh, kWh and MWh
- Volume in m^3, l *or* ml
- Variables without unit (0…3 decimal places)
- Heat cost unit
- BTU

The pulses are converted to consumption values as per the setting values, added, and the cumulated values are stored as 15-month values at midnight upon month rollover.
The meters are used to optimize plant operation.

Note

Due to their inaccuracy, pulse counters in controllers are not suited for billing purposes. Only direct meter readings (heat meters, electricity meters, etc.) provide valid values. Meters using Namur or S0 circuitry are not supported.

Two independent meters are available.

9.2.1 Activate meters

Only inputs with identifier Pulse can be assigned (see section 8 "Inputs" on how to proceed). Each meter is activated by assigning an input.

Configuration

Main menu > Commissioning > Extra configuration > Data acquisition > Meter 1…2 >

Operating line	*Range*	*Factory setting*
Input n	---, N.X1, N.X2, ...	---

9.2.2 Display format

Operating line "Displayed unit" is used to select the unit to be displayed.
Data point "Displayed format" defines the number of decimal places.

Display format

Main menu > Commissioning > Extra configuration > Data acquisition > Meter 1…2 >

Operating line	*Range*	*Factory setting*
Displayed unit	Wh, kWh, MWh, kJ, MJ, GJ ml, l, m3, Heat cost unit, No unit, BTU	kWh
Displayed format	0, 0.0, 0.00, 0.000	0

9.2.3 Pulse valency

Every pulse from a pulse source corresponds to a specific consumption value. The pulse valency is printed on the consumption meter. Pulse valency is entered as a numerator and denominator .

Example 1	Pulse valency	20 liters / pulse
	Setting	Pulse valency numerator = 20 Pulse valency denominator = 1 Pulse unit = liter
Example 2	Pulse valency	3.33.. Wh / pulse
	Setting	Pulse valency numerator = 10 Pulse valency denominator = 3 Pulse unit = Wh

Pulse valency

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Data acquisition > Meter > Meter 1..2 >

Operating line	Range	Factory setting
Pulse unit	Wh, kWh, MWh, kJ, MJ, GJ ml, l, m3, Heat cost unit, No unit, BTU	kWh
Pulse valency numerator	1…9999 per pulse	1
Pulse valency denominator	1…9999 per pulse	1

9.2.4 Overflow value

The overflow value ensures that displayed reading on the connected meter is the same as that on the controller. The value at which the meter’s display returns to 0 can be set.
Unit and decimal place depend on unit and format displayed.

Note
This value can only be changed via software tool OCI700.1.

Overflow value

Operating line	*Range*	*Factory setting*
Overflow value	0…999'999'999	99’999’999

9.2.5 Set and reset meter readings

In case of deviations, service staff can adjust the pulse meter reading via operating line "Meter reading current".

Note
This value can only be changed via software tool OCI700.1.

Operating line "Reset monthly values" allows for deleting the last 15 monthly values. The current meter reading is retained.

Set and reset meter readings

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Data acquisition > Meter > Meter 1..2 >

Operating line	Range	Factory setting
Reset monthly values	No, Yes	No

9.2.6 Display meter readings

The current meter reading, the date and the reading of the last 15 months are displayed.

Display values

■ **Main menu > Data acquisition > Meter 1...2 >**

Operating line	*Comments*
Meter reading current	0…999'999’999
Unit	As per configured display format
[Readout 1] date	
[Readout 1] meter reading	
....	
[Readout 15] date	
[Readout 15] meter reading	

The monthly values are stored at midnight at the end of the month.

The 15 monthly values can be deleted at the password level via operating line "Reset monthly values".

9.2.7 Assign texts

A specific text can be assigned to each meter. This text appears as menu text and operating line text on the operating pages.

Free text

▨ **Main menu > Commissioning > Settings > ....** *or*

▨ **Main menu > Settings > Data acquisition > Meter > Meter 1..2 >**

Operating line	*Range*	*Factory setting*
Meter x	Max. 20 characters	Meter x

9.2.8 Troubleshooting

Some battery-powered or mechanical meters continue metering in the event of a power failure. During a power failure affecting the controller, the pulses are not counted.

Restart occurs after exiting the "Extra configuration" menu or after power failure. Pulses received between the last storage operation and restart are not counted. Thus, meter data are lost for max. 5 minutes.

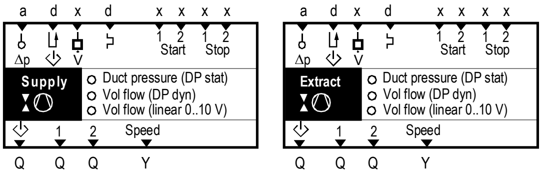
10 Aggregates

10.1 Fan (basic types A and P)

The fan block controls and monitors the connected fans.

The following variants are supported:
- 1-speed fan
- 2-speed fan
- Variable-speed fan

Possible types of control for **variable-speed** fans:
- Assign fixed speeds for 1 or 2-speed operation without and with IAQ controller override
- Control to constant duct pressure (static pressure measurement)
- Control to constant volumetric flow for 1 or 2-speed operation (2 setpoints, dynamic pressure measurement)
- Control to constant volumetric flow for 1 or 2-speed operation (2 setpoints, linear volumetric flow signal measurement)



Explanation of symbols

Inputs		Outputs	
Δp	Input pressure sensor	⏻	Precommand (section 10.1.9)
⏻	Precommand checkback signal (section 10.1.10)	1 2	Output speed 1, speed 2
V	Flow signal (section 10.1.7)	Speed	Speed output 0..10 V
⊐	Overload signal (section 10.1.8)		
1 2 Start	Start condition 1, Start condition 2 (section 10.1.11)		
1 2 Stop	Stop condition 1, Stop condition 2 (section 10.1.11)		

10.1.1 Activate fan blocks

The fans can be activated only if basic types A or P are selected.
The fans are controlled via the operating mode. In addition, the following functions can switch the fans either on or to a higher speed:
- Cascade controller
- Sustained mode
- Recirculated air operation
- Night cooling
- IAQ controller

Note

The fans can also be switched on during operating modes ⁝ Precomfort and ☾ Economy via functions "Sustained mode", "Recirculated air operation", and "Night cooling".

The fan block and type of fan block are activated by assigning the corresponding outputs to the function block and indicating the required control type.
Depending on the type of fan, the following settings must be entered:

Configuration example Basic type A

Type of fan	*Type of control*	*Operating line*	*Setting*
1-speed	1-speed fan	Speed 1	N.Qx
		Speed 2	---
		Speed	---
		Pressure sensor	---
2-speed	2-speed fan	Speed 1	N.Qx
		Speed 2	N.Qx
		Speed	---
		Pressure sensor	---
Variable speed	Assignment of fixed speeds	Speed 1	N.Qx
	For 1 or 2-speed operation	Speed 2	---
		Speed	N.Yx
		Pressure sensor	---
	Control to constant duct pressure	Speed 1	N.Qx
	(Measurement of static pressure)	Speed 2	---
		Speed	N.Yx
		Pressure sensor	N.Xx
		Control mode	Duct pressure (DP stat)
	Control to constant volumetric flow	Speed 1	N.Qx
	For 1 or 2-speed operation	Speed 2	---
	(2 setpoints,	Speed	N.Yx
	measurement of dynamic pressure)	Pressure sensor	N.Xx
		Control mode	Volumetric flow (DP dyn.)
	Control to constant volumetric flow	Speed 1	N.Qx
	For 1 or 2-speed operation	Speed 2	---
	(2 setpoints,	Speed	N.Yx
	measurement linear volumetric flow)	Pressure sensor	N.Xx
		Control mode	Volum.flow (linear 0..10 V)

Configuration examples Basic type P

Fan type	*Control type*	*Operating line*	*Setting*
variable Speed	Control to constant duct pressure (Measures static pressure)	Step 1	N.Qx
		Speed	N.Yx
		Pressure sensor	N.Xx
		Control mode	Duct pressure (DP stat.)
	Control to demand-dependent duct pressure (Measures static pressure, damper position signal analog or via KNX bus)	Step 1	N.Qx
		Speed	N.Yx
		Pressure sensor	N.Xx
		Control mode	Duct pressure (DP stat.)

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Supply air fan >
Main menu > Commissioning > Extra configuration > Aggregates > Extract air fan >

Operating line	*Adjustable values / remarks*
Fan speed 1	---, N.Q1, N.Q2, ... (free outputs only)
Fan speed 2	---, N.Q1, N.Q2, ... (free outputs only)
Speed	---, N.Y1, N.Y2, ... (free outputs only)
Pressure sensor	---, N.X1, N.X2, ... (only Pa, mbar, bar, m/s, 0000, 000.0)
Control mode	Duct pressure (DP stat), Vol flow (DP dyn), Vol flow (linear 0..10 V)

Any free relays can be assigned to the outputs. For transparency, we recommend to arrange the relays side by side.

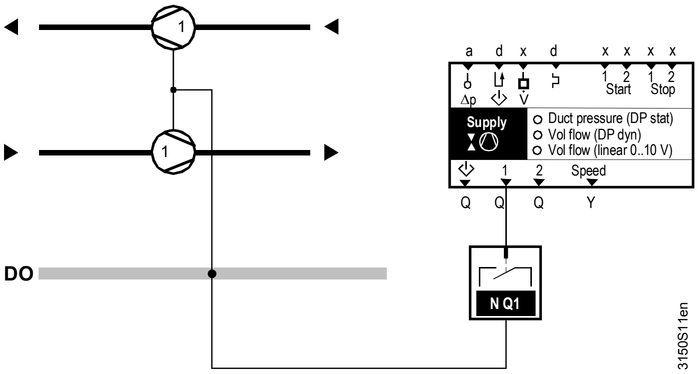
Note

Always begin by configuring the supply air fan, as the controllers are switched on only after the supply air fan is on.

10.1.2 1-speed fan

Example

1-speed fan, common control of supply and extract air fans, no supervision.



Normally, the fan is switched on for the following operating modes:

Operating mode	*Fan*
☼ Comfort:	On
Precomfort:	On
☾ Economy:	Off

The current state of the fans is displayed on the operator unit.

Display values

■ **Main menu > Aggregates > Supply air fan >**

Operating line	*Comments*
Supply air fan	Display of the current fan speed: Off, On

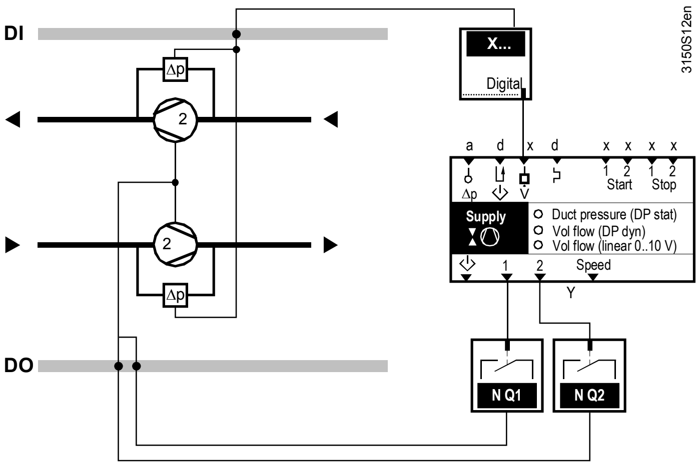
■ **Main menu > Aggregates > Extract air fan >**

Operating line	*Comments*
Extract air fan	Display of the current fan speed: Off, On

10.1.3 2-speed fan

Example

2-speed fan, common control of supply and extract air fans, with supervision.



Normally, the operating modes are assigned to the speeds as follows:

Operating mode	*Fan*
☼ Comfort:	Speed 2
Precomfort:	Speed 1
☾ Economy:	Off

Note the following for 2-speed fans:

- Both speeds are never active at the same time (disabled in the software)
- If speed 2 is selected from the start, speed 1 is first switched on for an adjustable period of time (runup time) before switching to speed 2
- When switching back from speed 2 to speed 1, the controller switches off speed 2 and switches on speed 1 only after the rundown (coasting) time is over
- If outside and exhaust air shutoff dampers (with spring return motors) and not the precommand output are used, a delay off relay must ensure that the air dampers do not suddenly shut while the fan is still coasting

Setting values

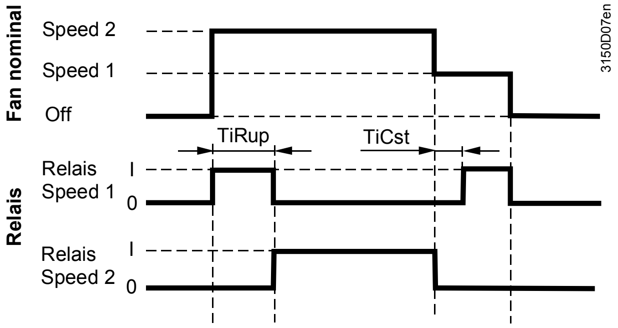
Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Aggregates > Supply air fan >

Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Runup time	00.00...10.00 m:s	00.10 m:s
Rundown time	00.00...10.00 m:s	00.10 m:s

Function diagram



TiRup = Runup time
TiCst = Rundown (coasting) time

The current state of the fans is displayed on the operator unit.

Display values

■ **Main menu > Aggregates > Supply air fan >**

Operating line	*Comments*
Supply air fan	Display of the current fan speed: Off, Speed 1, Speed 2

■ **Main menu > Aggregates > Extract air fan >**

Operating line	*Comments*
Extract air fan	Display of the current fan speed: Off, Speed 1, Speed 2

10.1.4 Variable-speed fan

Assign fixed speeds for 1 or 2-speed operation

Rather than relay outputs, the fan speeds for the variable speed drive are output via a 0…10 V signal. Fixed speeds can be assigned to both speeds. At the same time, the IAQ controller is responsible for speed control (see section 16 "IAQ controller (basic types A and P)"). There is a maximum selection.

Normally, the operating modes are assigned to the speeds as follows:

Operating mode	*Fan*
☼ Comfort:	Speed 2
◐ Precomfort:	Speed 1
☾ Economy:	Off

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Step 1	0...100%	30%
Step 2	0...100%	70%

Note

For 1-speed operation, the setpoints for Speed 1 and Speed 2 are the same.

If fixed speeds are not desired via operating modes, but the fan is to be continuously controlled via air quality instead, 0% must be set for both speeds.

If the IAQ controller requests a higher speed, the speed is increased continuously (see section 16.5 Increase fan speed (basic types A, P)).

The current state of the fans is displayed on the operator unit.

Display values

■ **Main menu > Aggregates > Supply air fan >**

Operating line	*Comments*
Supply air fan	Display of the current fan speed: ----, 0...100%

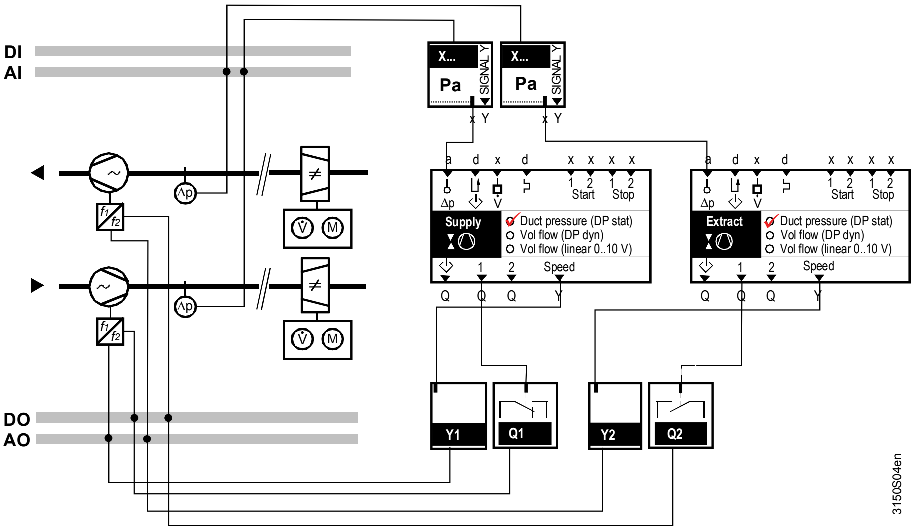
■ **Main menu > Aggregates > Extract air fan>**

Operating line	*Comments*
Extract air fan	Display of the current fan speed: ----, 0...100%

Control to duct pressure (static pressure measurement)

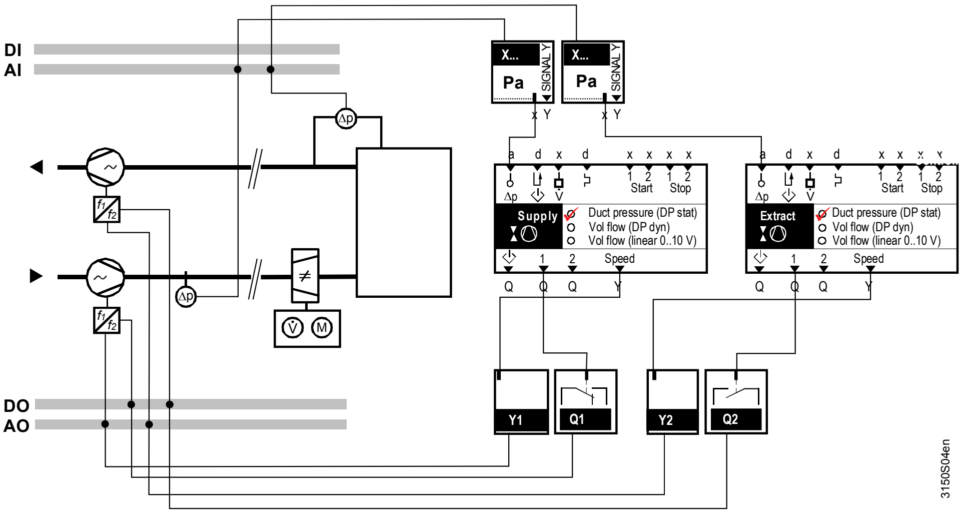
Example 1

Supply and extract air are controlled to prepressure via a variable air volume (VAV) controller with fan



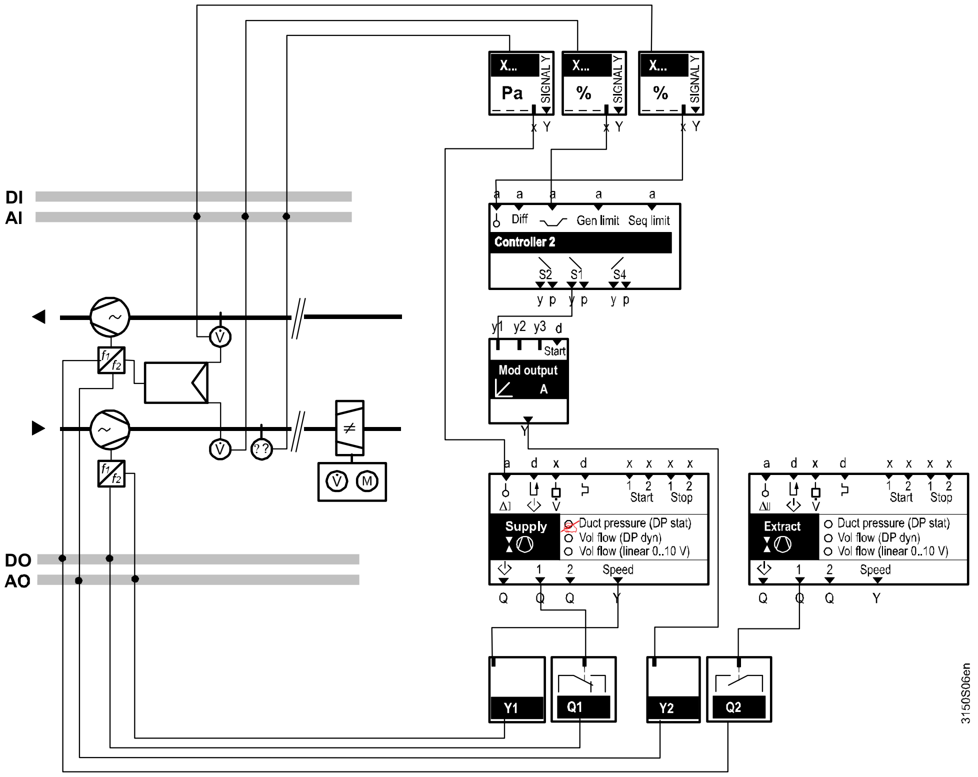
Example 2

- The supply air is controlled to prepressure via a VAV controller with supply air fan
- The extract air fan is controlled to constant room or building over- or underpressure



Example 3

- The supply air is controlled to prepressure via a VAV controller with supply air fan
- The extract air fan is controlled to the volumetric flow; the setpoint for the extract air volumetric flow is oriented to the supply air volumetric flow



Normally, the operating modes are assigned as follows:

Operating mode	*Fan*
☼ Comfort:	On
◑ Precomfort:	On
☾ Economy:	Off

If pressure in the ductwork is controlled (e.g. VAV), one input must be configured as a pressure sensor. This configuration also activates the PI pressure controller.

The corresponding control parameters Xp and Tn as well as the min. speed can be set in addition to the pressure setpoint.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Pressure setpoint	Depending on selected input identifier	300 Pa / 30 mbar / 3 bar
Pressure controller Xp	Depending on selected input identifier	1000 Pa / 50 mbar / 5 bar
Pressure controller Tn	00.00...10.00 m:s	02.00 m:s
Speed min	0...100%	0%

The current state of the fans is displayed on the operator unit.

Display values

Main menu > Aggregates > Supply air fan >

Operating line	*Comments*
Supply air fan	Display of the current fan speed: 0...100%
Actual value of pressure	
Pressure setpoint	

Main menu > Aggregates > Extract air fan >

Operating line	*Comments*
Extract air fan	Display of the current fan speed: 0...100%
Actual value of pressure	
Pressure setpoint	

Control to constant volumetric flow for 1 or 2-speed operation

Settings

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Unit	Max. 20 characters	
Step 1	0…999.9	0.9
Step 2	0…999.9	1.5
P-band Xp	0…999.9	10.0
Integral action time Tn	00.00...59.59 m:s	02.00 m:s
K-factor	0.0…999.9	45.7
Speed min	0...100%	0%

Explanation on the settings

A volumetric flow signal must be available at the input.

There are two types of volumetric flow signals:
- Case 1: The dynamic pressure is measured (signal 0…10 V corresponds to 0..100% dynamic pressure); the volumetric flow is calculated internally
- Case 2: The volumetric flow is measured directly (signal at input: 0…10 V corresponds to 0…100% volumetric flow)

Unit:
This operating line contains the unit in text form. It is displayed for volumetric flow display values. The numbers are matched to the standard unit m³/s. If another unit is requested (e.g. m³/h), the K-factor must account for this.

Speed 1, Speed 2:
A two-speed fan allows for controlling to the volumetric flow values for speed 1 and speed 2.

Note

For 1-speed operation, the setpoints for Speed 1 and Speed 2 are the same.

K-factor:

Case 1

If measurement of the dynamic pressure (internal volumetric flow calculation) is configured (Case 1), the plant-specific K-factor must be calculated and indicated in this operating line.
Use the following formula to calculate the K-factor:

$$\text{K-factor} = \frac{volumetric\_flow}{\sqrt{\Delta pdyn}} * 1000$$

K-factor: Example 1

Dynamic pressure and volumetric flow at a particular operating point are given.

The measured dynamic pressure of 500 [Pa] corresponds to a volumetric flow of 3.0 [m³/s] (10 800 [m³/h]) in the operating point.

This results in a K-factor $= \frac{3[m^3/s]}{\sqrt{500[Pa]}} * 1000 =$ 134

K-factor: Example 2

Air duct cross-sectional area, volumetric flow and atmospheric density are given.

The air duct has the following dimensions (width x height) 750 x 400 mm, resulting in a cross section of A = 0.3 m². The volumetric flow is 1.4 [m³/s] (5'000 [m³/h]).
This results in an air velocity of:
v = volumetric flow / area = 1.4 [m³/s] / 0.3[m²] = 4.67 [m/s].
The dynamic pressure is calculated from the air velocity and the atmospheric density by applying the following formula:

Dynamic pressure Δp dyn $= \frac{1}{2}$ ρ * v^2 = 12.2 [Pa]

with ρ = atmospheric density, ca. 1.12 [kg / m³]

This results in a K-factor $= \frac{1.4[m^3/s]}{\sqrt{12.2[Pa]}} * 1000 =$ 401

Case 2

If a volumetric flow measuring box provides the volumetric flow as 0…10 V signal (Case 2), the value can be used as is.
The K-factor does not need to be calculated.

The current state of the fans is displayed on the operator unit.

Display values

■ **Main menu > Aggregates > Supply air fan >**

Operating line	*Comments*
Supply air fan	Display of the current fan speed: 0...100%
Actual value volume flow	
Setpoint volume flow	
Unit	

■ **Main menu > Aggregates > Extract air fan >**

Operating line	*Comments*
Extract air fan	Display of the current fan speed: 0...100%
Actual value volume flow	
Setpoint volume flow	
Unit	

10.1.5 Time switch priority speed 2

If the fan is run as a 2-speed fan (via relay or continuous output), the following function is available:

If Speed 2 is not switched on via the time switch, but rather switched demand-dependent by the IAQ controller (see section 16 "IAQ controller (basic types A and P)") and/or the room temperature controller (see section 11.6.3 "Room supply or extract air cascade control"), the speeds are assigned as follows to the operating modes:

Operating mode	*Fan*
☼ Comfort:	Speed 1
◐ Precomfort:	Speed 1
☾ Economy:	Off

Here, Time switch priority speed 2 is set to No.

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Aggregates > Supply air fan >

Operating line	*Range*	*Factory setting*
Time switch priority speed 2	No, yes	Yes

10.1.6 Locking speed 2 at low outside temperatures

If the fan is run as a 2-speed fan (via relay or continuous output), the following function is available: Speed 2 can be locked at low outside temperatures.
If the outside temperature again exceeds the set value by 2 K, speed 2 is released again.
If locking by outside temperature is not desired, set the corresponding value to "----".

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >

Operating line	*Range*	*Factory setting*
Speed 2 locked (OT-dependent)	----, −50...+150 °C	----

If the outside temperature is missing and function "Speed 2 locked (OT-dependent)" is active, speed 2 is locked.

10.1.7 Flow signal ($\dot{V}$)

Flow supervision can be provided by a flow switch or flow sensor.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Supply air fan >
Main menu > Commissioning > Extra configuration > Aggregates > Extract air fan >

Operating line	*Adjustable values / remarks*
Flow signal	---, N.X1, N.X2, ... (digital and analog inputs) *)

*) With analog inputs, only inputs with units m/s, bar, mbar, Pa, Universal 000.0, Universal 0000 are possible

If the fan is to be switched on and if there is no feedback signal after a definable period of time (Flow delay start), a message appears and the plant is shut down. If the signal is lost during operation, a message appears also and the plant is shut down. Since measurements can fluctuate during operation, a delay time can be set (Flow delay operation).

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Flow delay start	00.00...59.55 m:s	02.00 m:s
Flow delay operation	00.00...59.55 m:s	00.05 m:s

The switching values for the flow fault can be set.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Flow switching value on	Depending on selected type	Depending on type
Flow switching value off	Depending on selected type	Depending on type

If a flow fault occurs at the fan, the plant is shut down. One of the following flow messages appears.

Fault status messages

No.	*Text*	*Effect*
1112	Supply airflow error	Urgent message, with plant stop; must be acknowledged and reset
1122	Extract airflow error	Urgent message, with plant stop; must be acknowledged and reset

10.1.8 Overload signal (⊐)

Here, e.g. overload supervision of a motor protection switch can be connected.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Supply air fan >
Main menu > Commissioning > Extra configuration > Aggregates > Extract air fan >

Operating line	*Adjustable values / remarks*
Overload signal	---, N.X1, N.X2, ... (digital inputs only)

If an overload signal is present at this input, a message appears and the plant is shut down.

The plant restarts as soon as the signal is no longer present.

Fault status messages

No.	*Text*	*Effect*
1111	Supply air overload	Urgent message with plant stop; must be acknowledged
1121	Extract air overload	Urgent message with plant stop; must be acknowledged

10.1.9 Precommand ⍗

For each fan, an associated precommand can be configured. This allows e.g. to open a damper prior to actual fan start as well as shut the damper delayed following fan switch-off.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Supply air fan >
Main menu > Commissioning > Extra configuration > Aggregates > Extract air fan >

Operating line	*Adjustable values / remarks*
Precommand	---, N.Q1, N.Q2, ... (free outputs only)

The precommand allows for starting or stopping the fans either simultaneously or delayed. Delayed switch-on/switch-off is set via the Precommand runup time and Precommand rundown (coasting) time.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Precommand runup time	00.00…59.59 m:s	00.30 m:s
Precommand rundown time	00.00…59.59 m:s	00.30 m:s

10.1.10 Precommand checkback signal

A precommand checkback signal can be configured for each fan block in addition to the precommand. The precommand checkback signal provides information on whether or not the precommand was implemented (e.g. via damper end position switch). Only then is the fan switched on.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Supply air fan >
Main menu > Commissioning > Extra configuration > Aggregates > Extract air fan >

Operating line	*Range*
Precommand checkback signal	---, N.X1, N.X2, ... (digital inputs only)

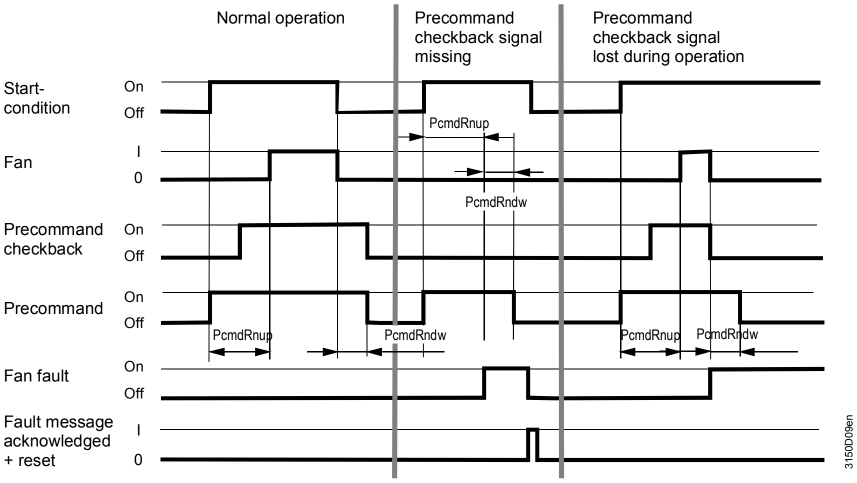
If there is no Precommand checkback signal during the set Precommand runup time, a fault message appears and the fan is not started. Precommand "Off" is given after the Precommand rundown time.

If the Precommand checkback signal drops off during fan operation, the fan is switched off immediately and precommand "Off" is issued after the Precommand rundown time. A fault message appears. The fault message is removed only after acknowledgement and reset.

Note

Using the Precommand checkback signal is sensible only if combined with the configured precommand.

Function diagram



Key

PcmdRnup = Precommand runup time
PcmdRndw = Precommand rundown time

Fault status messages

No.	*Text*	*Effect*
1114	Supp air precom no checkb sign	Urgent message; must be acknowledged and reset
1124	Extr air precom no checkb sign	Urgent message; must be acknowledged and reset

10.1.11 Start and stop conditions

Two inputs can be configured as stop condition for each fan. In addition, two inputs at which the relevant speed can be selected can be configured as start condition.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Supply air fan >
Main menu > Commissioning > Extra configuration > Aggregates > Extract air fan >

Operating line	*Adjustable values / remarks*
Start condition 1	---, N.X1, N.X2, ... (digital and analog inputs)
Start condition 2	---, N.X1, N.X2, ... (digital and analog inputs)
Stop condition 1	---, N.X1, N.X2, ... (digital and analog inputs)
Stop condition 2	---, N.X1, N.X2, ... (digital and analog inputs)

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Speed start condition 1	Stage 1, Stage 2	Stage 1
Speed start condition 2	Stage 1 Stage 2	Stage 2

An analog signal can be used as start or stop signal.
The limit values for when the corresponding fan is to be switched on or off can be set via setting values "[Start value x] ON" and "[Start value x] OFF".

Setting values

Main menu > Commissioning > Settings > ... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
[Start value 1] on	Depending on selected type	Depending on type
[Start value 1] off	Depending on selected type	Depending on type
[Start value 2] on	Depending on selected type	Depending on type
[Start value 2] off	Depending on selected type	Depending on type
[Stop value 1] on	Depending on selected type	Depending on type
[Stop value 1] off	Depending on selected type	Depending on type
[Stop value 2] on	Depending on selected type	Depending on type
[Stop value 2] off	Depending on selected type	Depending on type

For example, the following function can be implemented: Control switch on the panel acting directly on the fans. With the start and stop conditions, a separate control switch for the supply and the extract air fan can be implemented.

If switching off takes place via the stop condition of the supply air fan, the entire ventilation plant (sequence controller, communication, etc.) is switched off.
Start conditions of the supply air fan and start and stop conditions of the extract air fan do not influence any other plant components.

Stop conditions take priority over start conditions (see section 10.1.20).

10.1.12 Step switch overrun

If a step switch with overrun is configured in the same plant, step switch overrun takes priority over the stop condition of the supply air fan.
Thus, if the supply air fan is switched off via stop condition, step switch overrun is observed. During operation, step switch overrun acts in the current fan speed and on speed 1 during plant shutdown.

10.1.13 Sustained/recirculated air mode (basic type A)

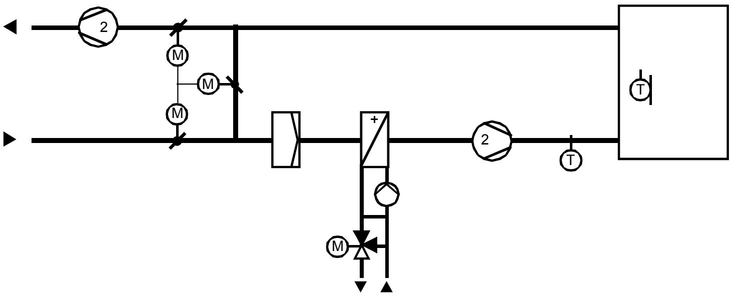
You can specify for the extract air fan if it is to be switched on or off during sustained or recirculated air mode. See sec. 20 "Recirculated air op (basic type A)". Activating the mixed air damper is prerequisite for this function.

Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Sustained/recirculated air mode	Off, On	Off

Example

Fan order in which the extract air fans must be switched off in recirculated air mode:



Note

For this fan order, we recommend to disable the startup circuit for the mixed air damper (section 10.5.10).

10.1.14 Startup delay

For some applications (extract air fan with own speed control, plant with recirculated air mode, smoke extraction with extract air fan, etc.), the supply and extract air fans must be switched on and off independently. For this reason, control of the supply and extract air fans can be activated independently.

Note

Always begin by configuring the supply air fan, as the controllers are switched on only after the supply air fan is on.

If the supply air fan and the extract air fan are to be switched on at the same time, only the supply air fan must be activated. The extract air fan can be connected in parallel to the same relay.

A startup delay can be predefined for both fans. This allows e.g. for delayed switching on of the supply air fan to prevent peak load on the network if both fans were activated at the same time.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Startup delay	00.00...59.59 m:s	00.00 m:s

10.1.15 Hours run counter

The total number of operating hours is acquired for each fan. The counter counts to max. 99 999 hours and then rolls over to 0.

Display values

■ **Main menu > Aggregates > Supply air fan >**
■ **Main menu > Aggregates > Extract air fan >**

Operating line	*Range*
Hours run stage 1	0...99,999 hrs
Hours run stage 2	0...99,999 hrs

10.1.16 Set hours run counter

Service staff can set the hours run counter to a defined value or 0. This value can only be changed at the password level.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Hours run stage 1	0...99'999 h	0
Hours run stage 2	0...99'999 h	0

10.1.17 Assign texts

The operator unit allows you to adjust the texts for the fans. They are displayed at the relevant operating line and on the menu.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan >

Operating line	*Range*	*Factory setting*
Supply air fan	Max. 20 characters.	Supply air fan

Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Extract air fan	Max. 20 characters.	Extract air fan

All fan faults possess adjustable alarm texts:

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Supply air fan > / Extract air fan >

Operating line	*Range*	*Factory setting*
Supply air overload	Max. 20 characters	Supply air overload
Supply airflow error	Max. 20 characters	Supply airflow error
Supply air press diff sensor error	Max. 20 characters	Supp air press diff
Supp air precom no checkb sign	Max. 20 characters	[Supp] precom n ch'b
Extract air overload	Max. 20 characters	Extract air overload
Extract airflow error	Max. 20 characters	Extract airflow error
Extr air press diff sensor error	Max. 20 characters	Extr air press diff
Extr air precom no checkb sign	Max. 20 characters.	[Extr] precom n ch'b

10.1.18 Wiring test

During the wiring test, the fans can be directly switched via the control switch.

Wiring test

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Supply air fan	Off, On. *or* Off, Speed 1, Speed 2, *or* ----, 0...100%
Extract air fan	Off, On. *or* Off, Speed 1, Speed 2, *or* ----, 0...100%

10.1.19 Troubleshooting

The fans are switched off if a fault message appears whose cause stops the plant. They can be restarted only after the message for plant stop is no longer present.

When exiting the Commissioning menu, a check is made to see if the pressure sensors are connected. If one of the present pressure sensors connected is missing later, a message appears. If there is no pressure sensor, the fan operates at the selected minimum speed.

Fault status messages

No.	*Text*	*Effect*
1113	Supply air press diff sensor error	Urgent message; must not be acknowledged
1123	Extr air press diff sensor error	Urgent message; must not be acknowledged

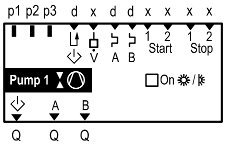
10.1.20 Priorities

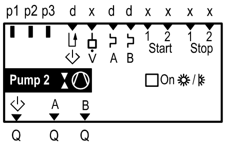
To operate the fans, the following priorities apply:

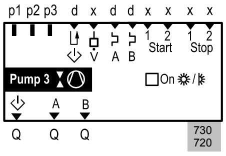
1. On / Off during wiring test
2. Off by fan supervision (flow signal, overload signal)
3. On via smoke extraction
4. Off via fault messages with plant stop (see section 24 "Faults")
5. On via overrun of "Step switch" (always speed 1)
6. Off via stop conditions "Extract air fan" (1+2)
7. Off via stop conditions "Supply air fan" (1+2)
8. On via start condition 2
9. On via start condition 1
10. Speed 2 locked (OT-dependent)
11. No release while the preheating function is active
12. Switching on or switching to a higher speed via sustained mode, night cooling or indoor air quality controller
13. Preselection in normal operation (see section 6 "Operating modes")

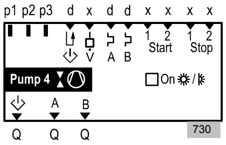
10.2 Pump

The pump block controls and monitors all pump functions. Single or twin pumps can be controlled.









For each type of universal controller, the following number of pump blocks is available:

RMU710B:	max. 2 blocks
RMU720B:	max. 3 blocks
RMU730B:	max. 4 blocks

Explanation of symbols

Inputs		Outputs	
⏻	Precommand checkback signal (section 10.2.9)	⏻	Precommand (section 10.2.8)
V	Flow signal (section 10.2.6)	▼ ▼B	Pump A, Pump B – Output
A B	Pump A, Pump B overload signal (section 10.2.7)		
1 2 Start	Start condition 1, Start condition 2 (section 10.2.10)		
1 2 Stop	Stop condition 1, Stop condition 2 (section 10.2.10)		
☐On	Operating mode-dependent ON		

Control and monitoring functions

For optimum control and supervision, the pump block in the RMU7..B offers the following functions for all pump types:

- Adjustable delay times
- Switching on according to the outside temperature
- Frost-dependent ON
- Selectable pump kick
- Assignable text
- Hours run counter

10.2.1 Activate pump block

The pump block is activated via assignment to the corresponding outputs.

Valid configurations:

Motor / Pumps	*Configuration point*	*Setting*
Single pump	Pump A Pump B	Qx ---
Twin pump	Pump A Pump B	Qx Qx

Any free relay can be assigned to the output. For transparency, we recommend to arrange the relays side by side.

Configuration

Main menu > Commissioning > Extra configuration> Aggregates > Pumps > Pump 1...4 >

Operating line	*Adjustable values / remarks*
Pump A	---, N.Q1, N.Q2, ... (free outputs only).
Pump B	---, N.Q1, N.Q2, ... (free outputs only).

10.2.2 Operating mode

To enable the pump to be switched on via the plant operating mode, value "Operating mode-dependent ON" must be set to "Yes".

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Pumps > Pump 1...4

Operating line	*Adjustable values / remarks*	*Factory setting*
Operating mode-dependent ON	Yes, No	No

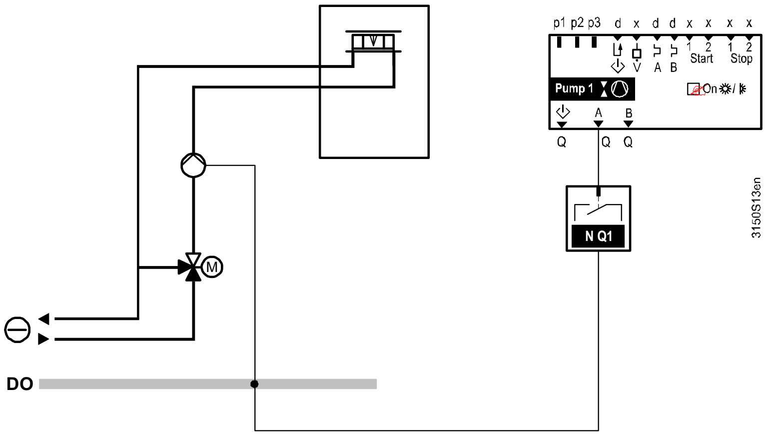
The pumps are switched on as per the plant operating mode (thus e.g. also during sustained mode, night cooling, etc.). The pumps are switched off if the plant operating mode is Off, e.g. based on a fault triggering a plant stop.

In normal operation, the pumps are assigned to the operating modes as follows:

Room operating mode	*Pump*
☼ Comfort:	On
Precomfort:	On
☾ Economy:	Off

Example

Operating mode-dependent ON.

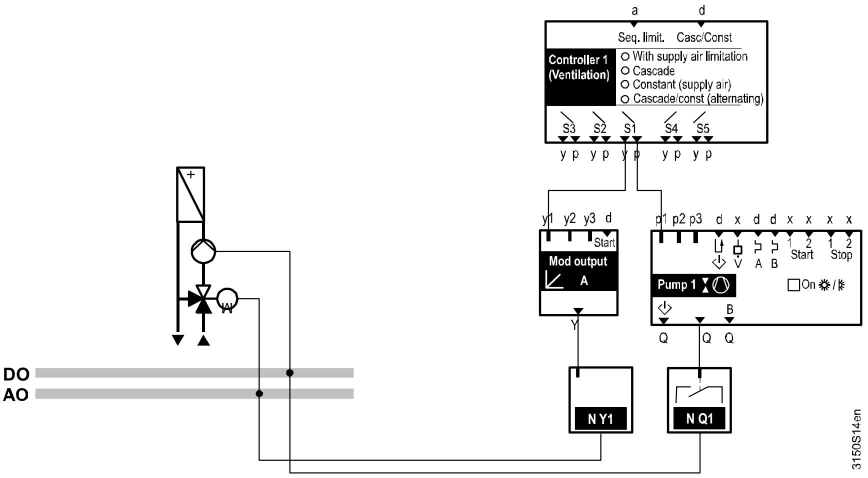


10.2.3 Load-dependent by controller

The pump can be switched on load-dependent by the controller (see section 15.1.1 "Assign aggregates to sequences").

The controllers can be used for up to three wiring connections; maximum selection applies. The switch-on and switch-off points can be entered via the settings "Load-dependent ON" and "Load-dependent OFF". In normal use, we recommend switching on the pump at 5% load and switching it off at 0% load.

Example



Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4

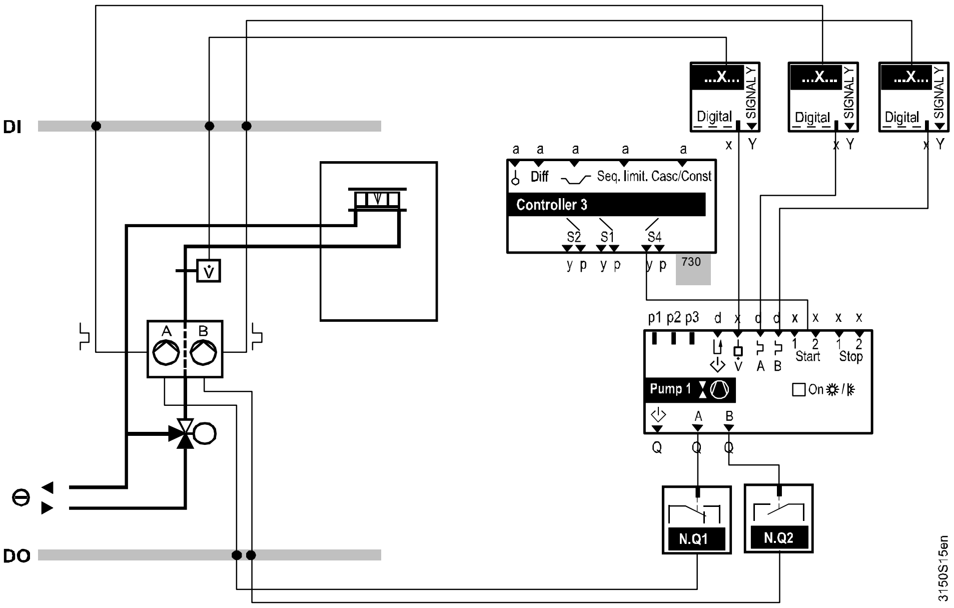
Operating line	*Range*	*Factory setting*
Load-dependent ON	0...100%	5%
Load-dependent OFF	0...100%	0%

If the value "Load-dependent ON" is smaller than "Load-dependent OFF", the control action is reversed.

10.2.4 Twin pump

Example

Control of a twin pump by the pump block.



To ensure optimum control of a twin pump, the RMU7..B provides the following control functions in addition to standard functions:

Additional control functions

- Run priority changeover automatic, manual or in the case of pump fault.
- Adjustable changeover period for orderly changeover of pumps.

Run priority changeover

Run priority changeover can be automatic, manual, or in the case of fault.

Setting value

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4

Operating line	*Range*	*Factory setting*
Run priority	Automatic Pump A Pump B	Automatic

Automatic changeover (by time)

If the selection in operating line "Run priority" is "Automatic", the run priority automatically changes weekly. Changeover always takes place at the time set for Pump kick (pump kick does not need to be active).

Manual changeover

If no changeover by time is desired, the run priority can be assigned to a pump by selecting the required pump in operating line "Run priority".
The run priority can also be changed over for test purposes. When switching back the run priority to "Auto", the run priority remains active at the current pump until the next changeover by time occurs.

Changeover in case of fault

If a pump is faulty, the run priority is set to the other pump. After the fault disappears, the same run priority as prior to the fault is assumed.

Changeover period

For orderly changeover of run priority, a changeover period can be entered.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4

Operating line	*Range*	*Factory setting*
Changeover period	−60...+60 s	0 s

- If a negative number is entered, both pumps are switched on for the period of time set during changeover
- If a positive number is entered, the second pump can switch on only after the time has expired after the first pump has switched off

Note

The changeover period is also considered for the Pump kick.

Behavior in case of fault

If both pumps are faulty at the same time, a fault message is generated and the pumps shut off.

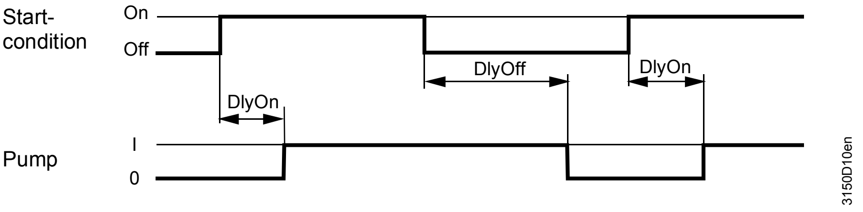
Fault status messages

No.	*Text*	*Effect*
1210	[Pump 1] fault	Urgent message; must be acknowledged and reset
1220	[Pump 2] fault	Urgent message; must be acknowledged and reset
1230	[Pump 3] fault	Urgent message; must be acknowledged and reset
1240	[Pump 4] fault	Urgent message; must be acknowledged and reset

10.2.5 Delay times

A switch-on and switch-off delay can be set for the pumps. These are considered when switching on and off the pump.

Example



DlyOn = Switch-on delay
DlyOff = Switch-off delay

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4

Operating line	*Range*	*Factory setting*
Switch-on delay	00.00...59.59 m:s	00.00 m:s
Switch-off delay	00.00...59.59 m:s	01.00 m:s

Switch-on and switch-off delay are always active for:
- Pumps switched on or off via the operating mode
- Pumps switched on load-dependent via the sequence
- Pumps switched on or off via start or stop condition

The switch-off delay does not act on the following switch-off commands:
- From the pump kick
- In case of a fault message with plant stop, if the pump is switched on or off via the operating mode

10.2.6 Flow signal (⊽)

Flow supervision can be provided by a flow switch or flow sensor.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Pumps > Pump 1...4 >

Operating line	*Adjustable values / remarks*
Flow signal	---, N.X1, N.X2, ... (digital and analog inputs) *)

*) With analog inputs, only inputs with units m/s, bar, mbar, Pa, Universal 000.0, Universal 0000 are possible.

Upon start

If there is no checkback signal after the pump is switched on after a specified time (Flow delay start), a fault status message is triggered.

During operation

Since measurements can fluctuate during operation, a delay time can be set (Flow delay operation). If a flow fault occurs during operation, a fault status message is triggered.

If the pump is switched on via the operating mode ("Operating mode-dependent ON" set to "Yes") and a fault status message is sent, the pump along with entire plant is switched off (message with plant stop). If setting value "Operating mode-dependent ON" is set to "No", only the pump is switched off.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
Flow delay start	00.00...59.59 m:s	02.00 m:s
Flow delay operation	00.00...59.59 m:s	00.05 m:s

The switching values for the flow fault can be set.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
Flow switching value on	Depending on selected type	Depending on type
Flow switching value off	Depending on selected type	Depending on type

If a flow fault occurs at the single pump, the pump is shut down. One of the following flow messages appears.

Fault status messages
Single pump

No.	*Text*	*Effect*
1212	[Pump 1] no flow	Urgent message; must be acknowledged and reset
1222	[Pump 2] no flow	Urgent message; must be acknowledged and reset
1232	[Pump 3] no flow	Urgent message; must be acknowledged and reset
1242	[Pump 4] no flow	Urgent message; must be acknowledged and reset

If a flow fault occurs with twin pumps, automatic changeover to the motor output occurs. A fault status message appears.
If both pumps are faulty, a fault message appears as per section 10.2.4 "Twin pump".

Note

During the changeover period with run priority changeover, the flow is not supervised.

Fault status messages
Twin pump

No.	*Text*	*Effect*
1216	[Pump 1A] no flow	Non-urgent message; must be acknowledged and reset
1217	[Pump 1B] no flow	Non-urgent message; must be acknowledged and reset
1226	[Pump 2A] no flow	Non-urgent message; must be acknowledged and reset
1227	[Pump 2B] no flow	Non-urgent message; must be acknowledged and reset
1236	[Pump 3A] no flow	Non-urgent message; must be acknowledged and reset
1237	[Pump 3B] no flow	Non-urgent message; must be acknowledged and reset
1246	[Pump 4A] no flow	Non-urgent message; must be acknowledged and reset
1247	[Pump 4B] no flow	Non-urgent message; must be acknowledged and reset

10.2.7 Overload signal (A B)

Here, e.g. overload supervision of a motor protection switch can be connected.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Pumps > Pump 1...4 >

Operating line	*Adjustable values / remarks*
[Pump A] overload	---, N.X1, N.X2, ... (digital inputs only)
[Pump B] overload	---, N.X1, N.X2, ... (digital inputs only)

The overload message [Pump A] overload" is sent for 1-speed pumps.

For the overload signal, fault acknowledgement can be set.

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
Fault acknowledgement	None, Acknowledge, Acknowledge and reset	Acknowledge

If the pump is switched on via the operating mode ("Operating mode-dependent ON" set to "Yes") and a fault status message is sent, the pump along with entire plant is switched off (message with plant stop). If setting value "Operating mode-dependent ON" is set to "No", only the pump is switched off.

Overload signal
Single pump

No.	*Text*	*Effect while on factory setting*
1211	[Pump 1] overload	Urgent message; must be acknowledged
1221	[Pump 2] overload	Urgent message; must be acknowledged
1231	[Pump 3] overload	Urgent message; must be acknowledged
1241	[Pump 4] overload	Urgent message; must be acknowledged

Overload signals
Twin pumps

If only one pump is faulty during twin pump operation, run priority changes to the non-faulty pump output. The fault acknowledgement setting has no effect on the changeover. The respective overload signal is issued. If both pumps are faulty, a fault message appears as per section 10.2.4 "Twin pump".

No.	*Text*	*Effect while on factory setting*
1214	[Pump 1A] overload	Non-urgent message; must be acknowledged
1215	[Pump 1B] overload	Non-urgent message; must be acknowledged
1224	[Pump 2A] overload	Non-urgent message; must be acknowledged
1225	[Pump 2B] overload	Non-urgent message; must be acknowledged
1234	[Pump 3A] overload	Non-urgent message; must be acknowledged
1235	[Pump 3B] overload	Non-urgent message; must be acknowledged
1244	[Pump 4A] overload	Non-urgent message; must be acknowledged
1245	[Pump 4B] overload	Non-urgent message; must be acknowledged

10.2.8 Precommand

For each pump, an associated precommand can be configured. This allows e.g. to open a damper or valve prior to actual pump start as well as shut the damper delayed following pump switch-off.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Pumps > Pump 1...4 >

Operating line	*Adjustable values / remarks*
Precommand	---, N.Q1, N.Q2, ... (free outputs only)

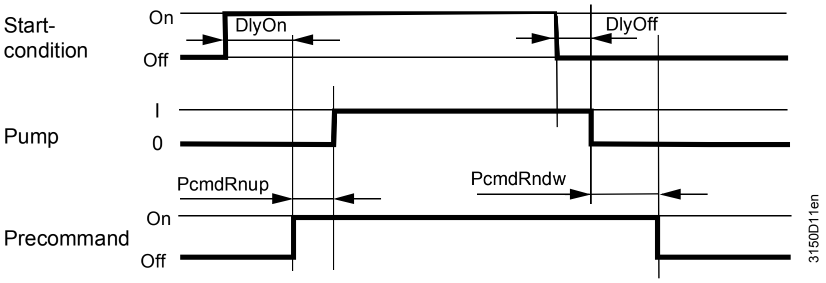
The precommand allows for starting or stopping the pumps either simultaneously or delayed. Delayed switch-on/switch-off is set via the Precommand runup time and Precommand rundown (coasting) time.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
Precommand runup time	00.00…59.59 m:s	00.30 m:s
Precommand rundown time	00.00…59.59 m:s	00.30 m:s

Function diagram



Key

DlyOn = Switch-on delay
DlyOff = Switch-off delay
PcmdRnup = Precommand runup time
PcmdRndw = Precommand rundown time

10.2.9 Precommand checkback signal

A precommand checkback signal can be configured for each pump block in addition to the precommand. The precommand checkback signal provides information on whether or not the precommand was implemented (e.g. via valve or damper end position switch). Only then is the pump switched on.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Pumps > Pump 1...4 >

Operating line	*Range*
Precommand checkback signal	---, N.X1, N.X2, ... (digital inputs only)

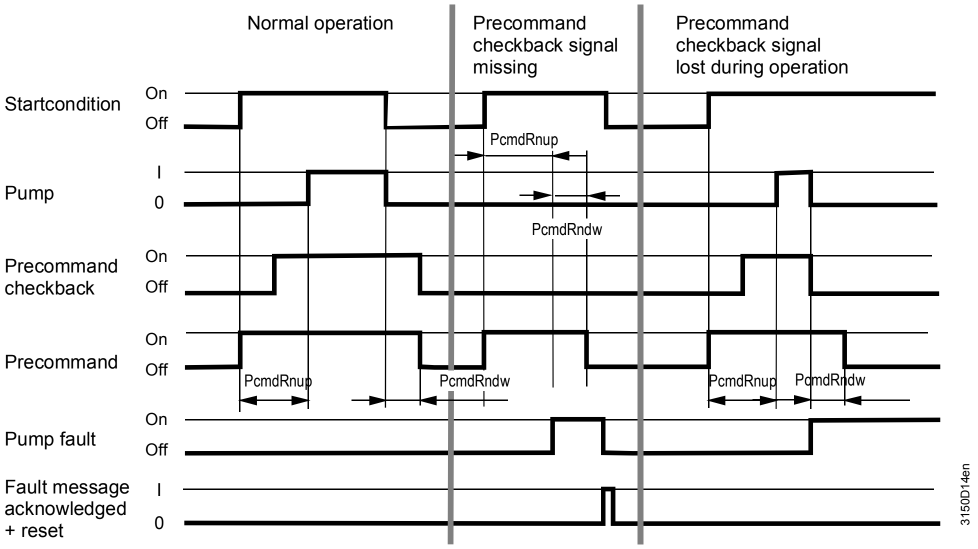
If there is no precommand checkback signal during the set Precommand runup time, a fault message appears and the pump is not started. The precommand drops off after the precommand rundown time.

If the precommand checkback signal drops off during pump operation, the pump is switched off immediately and the precommand drops off after the precommand rundown time. A fault message appears. The fault message is removed only after acknowledgement and reset.

Note

Using the precommand checkback signal is sensible only if combined with the configured precommand.

Function diagram based on single pump



PcmdRnup = Precommand runup time
PcmdRndw = Precommand rundown time

Fault status messages

No.	*Text*	*Effect*
1218	[Pump 1] precom no checkb sign	Urgent message; must be acknowledged and reset
1228	[Pump 2] precom no checkb sign	Urgent message; must be acknowledged and reset
1238	[Pump 3] precom no checkb sign	Urgent message; must be acknowledged and reset
1248	[Pump 4] precom no checkb sign	Urgent message; must be acknowledged and reset

10.2.10 Start and stop conditions

Two inputs can be configured as start and stop conditions for each pump block. The following function e.g. can be implemented: Control switch on the panel, acting directly on the pumps. A separate control switch can be implemented for each pump.
If control is to be off while the pump is off, the same input can be used for a universal fault message, triggering a plant stop (e.g. configuration of fault status message: Not urgent signal, without acknowledgement; with plant stop, text manual operation).

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Pumps > Pump 1...4 >

Operating line	*Adjustable values / remarks*
Start condition 1	---, N.X1, N.X2, ... (digital and analog inputs)
Start condition 2	---, N.X1, N.X2, ... (digital and analog inputs)
Stop condition 1	---, N.X1, N.X2, ... (digital and analog inputs)
Stop condition 2	---, N.X1, N.X2, ... (digital and analog inputs)

Note

Stop conditions take priority over start conditions (see section 10.2.16 "Priorities").

An analog signal can be used as start or stop signal.
The limit values for when the corresponding pump is to be switched on or off can be set via setting values "[Start value x] ON" and "[Start value x] OFF".

Setting values

Main menu > Commissioning > Settings > ... *or*
Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
[Start value 1] on	Depending on selected type	Depending on type
[Start value 1] off	Depending on selected type	Depending on type
[Start value 2] on	Depending on selected type	Depending on type
[Start value 2] off	Depending on selected type	Depending on type
[Stop value 1] on	Depending on selected type	Depending on type
[Stop value 1] off	Depending on selected type	Depending on type
[Stop value 2] on	Depending on selected type	Depending on type
[Stop value 2] off	Depending on selected type	Depending on type

10.2.11 "On" by outside temperature

To prevent freezing of water pipes, pumps can be operated permanently at low outside temperatures.

Note

This functionality is available for single and twin pumps.
To be able to activate the function, the outside temperature must be available (see section 8.4 "Outside temperature"). This function can be deactivated by setting operating line "Outside temp-dependent ON" to "---".
If the outside temperature drops below the set limit value, the controller switches on the motor of the circulating pump. The pump is switched off when the outside temperature exceeds the limit value by 2 K.
In twin motor operation, the motor with the current run priority is switched on.

Setting values

Main menu > Commissioning > Settings > ... *or*
Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
Outside temp-dependent ON	----, −50...+250 °C	----

Note

If the function is active and if there is an outside temperature sensor error, the pump is switched on permanently.

10.2.12 Frost-dependent ON

The pump allows for setting if the maximum of all frost functions is to influence the pump. To this end, Yes must be set in the "Frost-dependent ON" operating line. This function can be used for pumps that are to consider frost information, but are not configured as part of a controller sequence.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1…4 >

Operating line	Range	Factory setting
Frost-dependent ON	Yes, No	No

10.2.13 Behavior in case of pump fault at low outside temperatures

If the plant is to be switched off at pump fault and simultaneously low outside temperatures, but continue to run at higher outside temperatures although the related pump is at out of service due to fault, setting parameter "(Fault) plant stop OT <" allows to do just that.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4

Operating line	*Range*	*Factory setting*
(Fault) plant stop OT <	----, -50...+250 °C	----

Note

This setting is only valid with the pump setting "Load-dependent ON".

10.2.14 Pump kick

To prevent the pumps from seizing during longer off periods (e.g. heating group in summer), a periodic pump kick can be activated for each pump block. When pump kick is active, the pumps are switched on for 30 seconds once a week regardless of any other functions and settings. The pump kick is activated by setting "Pump kick" to "Yes". If the setting is "No", there is no pump kick. In addition, a kick day and time can be set. With the pump kick, the precommand output with its settable times is activated prior to the actual pump start. All other delay times are inactive. With twin pumps, both motors are switched on alternately.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
Pump kick	Yes, No	No
Kick day	Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday	Monday
Kick time	00:00...23:59 h.m	10:00 h.m

10.2.15 Function check / wiring test

The current state of the pump is displayed on the operator unit.

Display values

Main menu > Aggregates > Pump 1...4

Operating line	*Comments*
Precommand Pump APump B	Display of present state: Off, On
Precommand Pump A Pump B	Display of present state: Off, On
Precommand Pump A Pump B	Display of present state: Off, On
Precommand Pump A Pump B	Display of present state: Off, On

In a wiring test, the pumps can be switched on or off directly via the control switch.

Wiring test

Main menu > Commissioning > Wiring test > Outputs>

Operating line	*Comments*
Pump 1A / Pump 1B	Off, On
Pump 2A / Pump 2B	Off, On
Pump 3A / Pump 3B	Off, On
Pump 4A / Pump 4B	Off, On

10.2.16 Priorities

The following priorities apply to pump operations:

1. On / Off during wiring test
2. Off by pump supervision (flow signal, overload signal)
3. OFF via locking time with run priority changeover (for twin pumps)
4. On by frost protection (load-dependent ON after heating sequence
5. OFF via messages with plant stop (only for pumps switched on directly via operating mode)
6. ON via switch-off delay
7. OFF via stop conditions (1+2)
8. ON via start conditions (1+2)
9. ON by outside temperature
10. On by pump kick
11. Load-dependent ON
12. Preselection in normal operation for pumps switched on directly by the operation mode (see section 10.2.2 "Operating mode")

10.2.17 Assign texts

The texts for the motors can be adapted via operation. They are displayed at the relevant operating line and on the menu.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
Pump x	Max. 20 characters	Pump x

All pump faults possess adjustable alarm texts:

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Pump 1…4 >

Operating line	*Range*	*Factory setting*
[Pump 1] fault	Max. 20 characters	[Pump 1] fault
[Pump 1] overload	Max. 20 characters	[Pump 1] overload
[Pump 1] no flow	Max. 20 characters	[Pump 1] no flow
[Pump 1A] overload	Max. 20 characters	[Pump 1A] overload
[Pump 1B] overload	Max. 20 characters	[Pump 1B] overload
[Pump 1A] no flow	Max. 20 characters	[Pump 1A] no flow
[Pump 1B] no flow	Max. 20 characters	[Pump 1B] no flow
[Pump 1] precom no checkb sign	Max. 20 characters	[Pump 1] precom no checkb sign

10.2.18 Operating hours

The total number of operating hours is acquired for each pump output. The counter counts to max. 99 999 hours and then rolls over to 0.

Display values

Main menu > Aggregates > Pump 1…4 >

Operating line	*Range*
Operating hours pump A Optg hours pump A	0...99,999 h
Operating hours pump B Optg hours pump B	0...99,999 h

The counter reading can be adapted and e.g. reset to 0 at the password level.

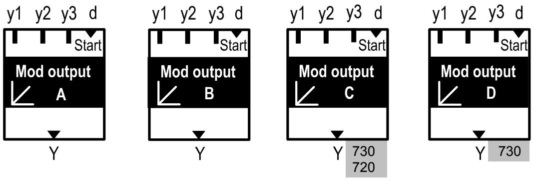
Setting values

Main menu > Settings > Aggregates > Pump 1...4 >

Operating line	*Range*	*Factory setting*
Optg hours pump A	0...99,999 h	0
Optg hours pump B	0...99,999 h	0

10.3 Modulating output

This function provides a continuous DC 0...10 V output signal for a modulating actuator requiring an appropriate input signal.



Note

The modulating output is not suitable for controlling an electric heating coil with a current valve.
The Step switch function is best suited for applications with a relay configured as switch-on agent for the electric heating coil, a modulating output signal DC 0…10 V and an input as flow monitor for release.

10.3.1 Activate block

To activate the "Modulating output" function, an output must first be assigned.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Modulating outputs > Modulating output A...D >

Operating line	*Adjustable values / remarks*
Modulating output A, …Modulating output D	---, N.Y1, N.Y2, ... / activate modulating output

For each type of universal controller, the following number of "Modulating output" blocks is available:

RMU710B:	max. 2 blocks
RMU720B:	max. 3 blocks
RMU730B:	max. 4 blocks

10.3.2 Inversion of outputs

Any output can be inverted.

Setting values

Main menu > Commissioning > Settings> .... *or*
Main menu > Settings > Aggregates > Modulating output A...D

Operating line	*Range*	*Factory setting*
Inversion	No, Yes	No

Meaning:
- Non: 0...100% Load = 0...100% output
- Yes: 0...100% Load = 100...0% output

This means for the sequences:
- No: hhh _ cc: \\\ _ //
- Yes: hhh _ cc: /// _ \\

10.3.3 Limitations

The modulating output (Y) can be limited at the top and at the bottom.

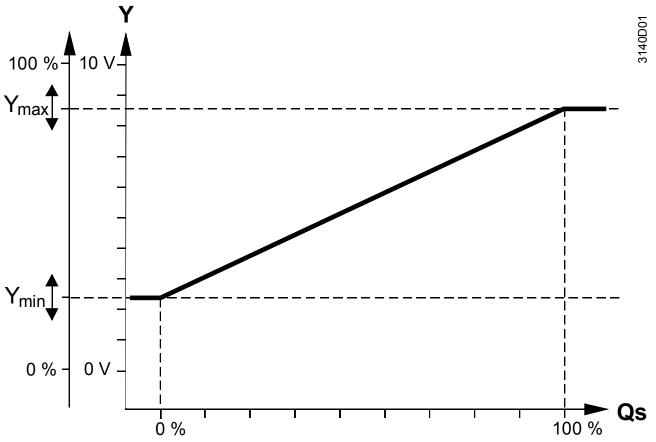
Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Modulating output A...D

Operating line	*Range*	*Factory setting*
Positioning signal min	0% ... Positioning signal max	0%
Positioning signal max	Positioning signal min... 100%	100%

0...100% output corresponds to
"Positioning signal minimum" (Ymin) ... "Positioning signal maximum" (Ymax).

Function diagram



Qs = Load demand from the sequence controller

The output can thus be parameterized with a DC 5...7.5 V input for controlling a magnetic valve, for example.
If the modulating output is controlled by more than one internal sequence controller (see section 15.1.1 "Assign aggregates to sequences"), the larger signal is valid (max. selection).

10.3.4 Start condition

- The modulating output can be activated via a digital signal.
- The output signal is delivered while giving consideration to the limitation.
- If the start signal is withdrawn, the output delivers 0 V or, in case of inversion, 10 V.
- A maximum selection is generated.
- If no start condition is configured, the output is always active.

Main menu > Commissioning > Extra configuration > Aggregates > Modulating outputs > Modulating output A...D >

Operating line	*Adjustable values / remarks*
Start condition	---, N.X1, N.X2, ... (digital only).

10.3.5 Assign texts

Text can be assigned to each modulating output.

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Modulating output A...D >

Setting values

Operating line	*Range*	*Factory setting*
Modulating output A…	Max. 20 characters	Modulating output x

10.3.6 Function check / wiring test

The current state of modulating output x is displayed on the operator unit.

Display values

Main menu > Aggregates >

Operating line	*Comments*
Modulating output A…	0...100%

During the wiring test, the modulating output can be directly controlled via the control switch.

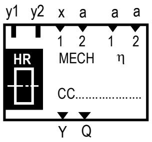
Wiring test

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Modulating output A…	----, 0...100%

10.4 Heat recovery equipment (basic types A, P)

This function controls the heat recovery equipment.



10.4.1 Activate block

To activate the "Heat recovery equipment" function, an output must first be assigned. If a switching output is required, the "Output relay" can be configured on a free relay output.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Heat recovery equipment >

Operating line	*Adjustable values / remarks*
Output modulating	---, N.Y1, N.Y2, ... / activate heat recovery
Output relay	---, N.Q1, N.Q2, …

10.4.2 Limitations

The modulating output (Y) can be limited at the top and at the bottom. 0...100% output then corresponds to "Positioning signal minimum" (Ymin) ... "Positioning signal maximum" (Ymax).

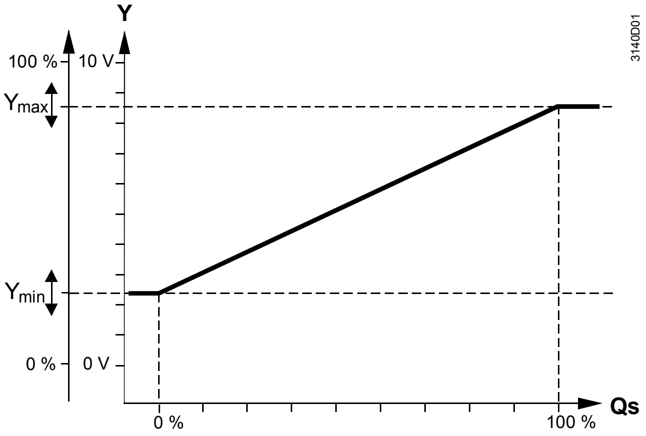
Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Heat recovery equipment >

Operating line	*Range*	*Factory setting*
Positioning signal min	0...100%	0%
Positioning signal max	0...100%	100%

0...100% output corresponds to
"Positioning signal minimum" (Ymin) ... "Positioning signal maximum" (Ymax).

Function diagram



Qs = Load demand from the sequence controller

10.4.3 Maximum Economy changeover (MECH)

The purpose of this function is to optimize control of heat recovery in air conditioning systems with regard to operating costs.
To activate Maximum Economy Changeover (MECH) of the heat recovery equipment, relevant inputs must be assigned.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Heat recovery equipment >

Operating line	*Adjustable values / remarks*
MECH input 1	---, N.X1, N.X2, ..., Outside temperature, [Logic 1] digital, [Logic 2] digital (only °C, kJ/kg, 100, 1000, Digital)
MECH input 2	---, N.X1, N.X2, ..., Room temperature, Extract air temperature (only °C, kJ/kg, 100, 1000)

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Aggregates > Heat recovery equipment >

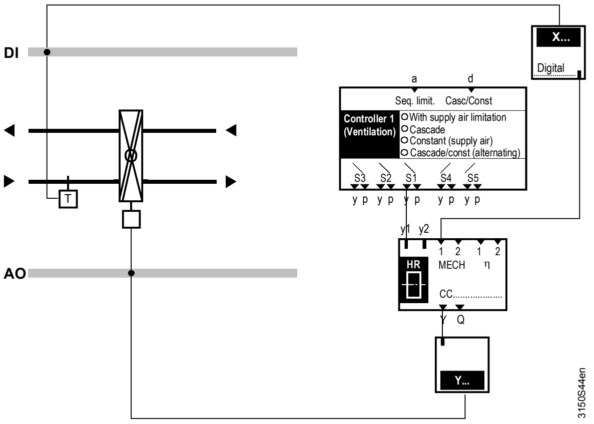
Operating line	*Range*	*Factory setting*
MECH limit value 1)		3 K, 20 °C 3 kJ/kg, 40 kJ/kg 3, 40 ---

1) The MECH limit value operating line is used when changing over to a settable value as absolute value, or when changing over based on a difference of two measured values as relative value. In this case, it is used to consider heat sources in the extract air duct (e.g. dissipated heat fan).

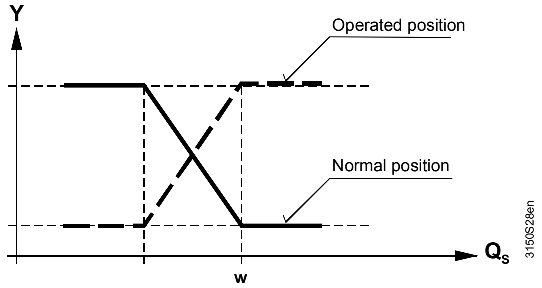
Changeover options

There are three changeover options:

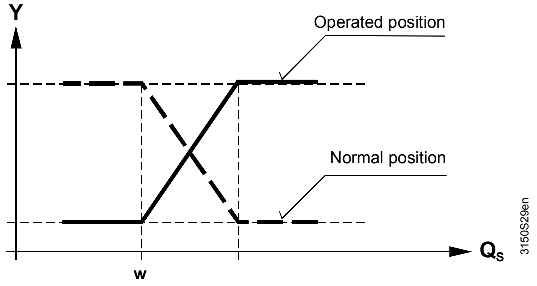
1. Changeover triggered externally via a digital signal:
Here, a digital input must be assigned to "MECH input 1".
The following applies:
Normally closed (low outside temperature) = No inversion
Operating position (high outside temperature) = Inversion



Control by heating sequences (S1, S2, S3)

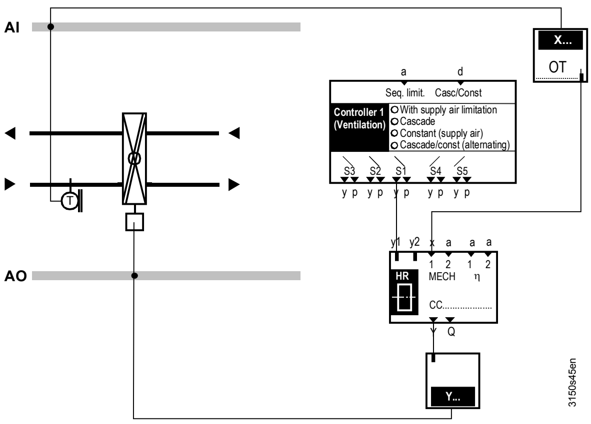


Control by cooling sequences (S4, S5)

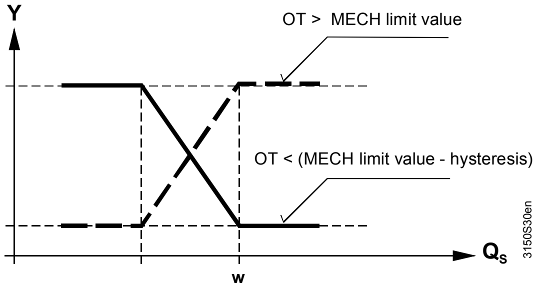


2. Changeover at an adjustable value

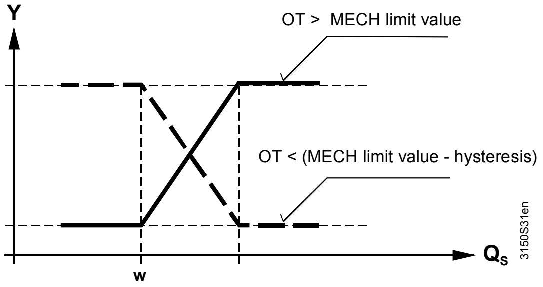
Here, an analog input must be assigned to MECH input 1. (Typically: outside temperature or enthalpy difference outside air – extract air).
If the adjusted MECH limit value is exceeded, the output is inverted.



Control by heating sequences (S1, S2, S3)

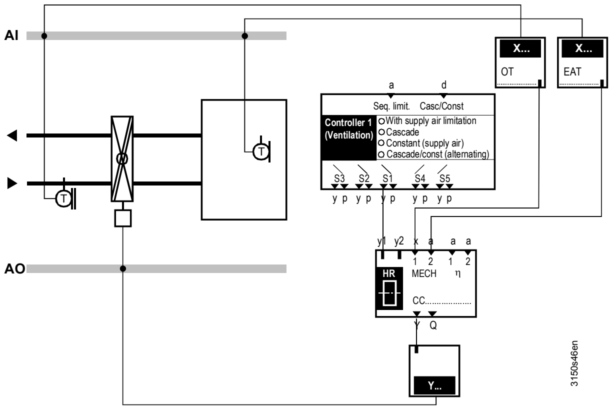


Control by cooling sequences (S4, S5)

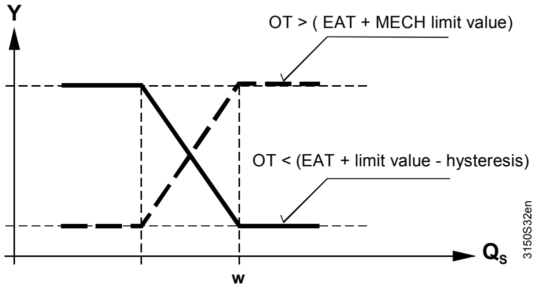


3. Changeover at an adjustable difference between two measured values

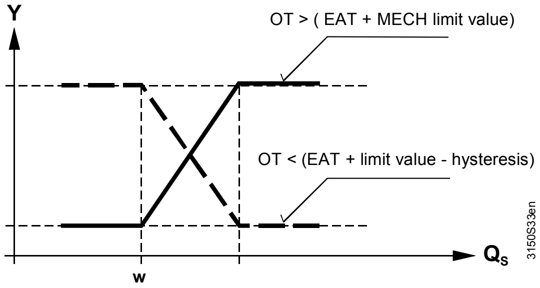
Here, one analog input each must be assigned to "MECH input 1" and "MECH input 2". (Typically: MECH input 1 = Outside temperature, MECH input 2 = Extract air temperature).
The output is inverted if as shown in this example the outside temperature is greater than extract air temperature plus MECH limit value. The hysteresis is a set 1 K.



Control by heating sequences (S1, S2, S3)



Control by cooling sequences (S4, S5)



10.4.4 Monitor efficiency of heat recovery system

To activate this function, the relevant two inputs must be assigned.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Heat recovery equipment >

Operating line	*Adjustable values / remarks*
Efficiency measurement input 1	---, N.X1, N.X2, ... , Room temperature, Extract air temperature (only °C, 000.0, 0000)
Efficiency measurement input 2	---, N.X1, N.X2, ... (only °C, 000.0, 0000)

Explanation

Efficiency measurement input 1:	Extract air or room temperature sensor
Efficiency measurement input 2:	Extra sensor

The room temperature must be available in addition (see section 8.4 "Outside temperature").

Operating principle

The efficiency of heat recovery is determined based on three measured temperature variables. The calculated value is displayed at the operator unit. If the efficiency is below the settable fault status message threshold (efficiency limit value), a "Non-urgent message" is generated.

Fault status messages

No.	*Text*	*Effect*
3111	HR efficiency deviation	Non-urgent message, without plant stop; must be acknowledged and reset

Efficiency may be reduced by faulty, fouled or incorrectly connected heat recovery equipment.

Note

The efficiency measured serves as an indicator and is not for determining the absolute performance. It only provides an indication of the magnitude and of the changes over the operating hours of the heat recovery equipment. The amount of air delivered has a considerable impact on the efficiency measured. In the case of speed-controlled fans, this measurement becomes fairly inaccurate since the amounts of air effectively delivered cannot be determined.

Display of efficiency

During the periods of time where no valid efficiency is available (e.g. one of the conditions is not satisfied, or there is no stable efficiency, as the system is not in a stable state, etc.), the display shows "----".
If the efficiency cannot be calculated, no fault status messages are generated.

Select measuring arrangement

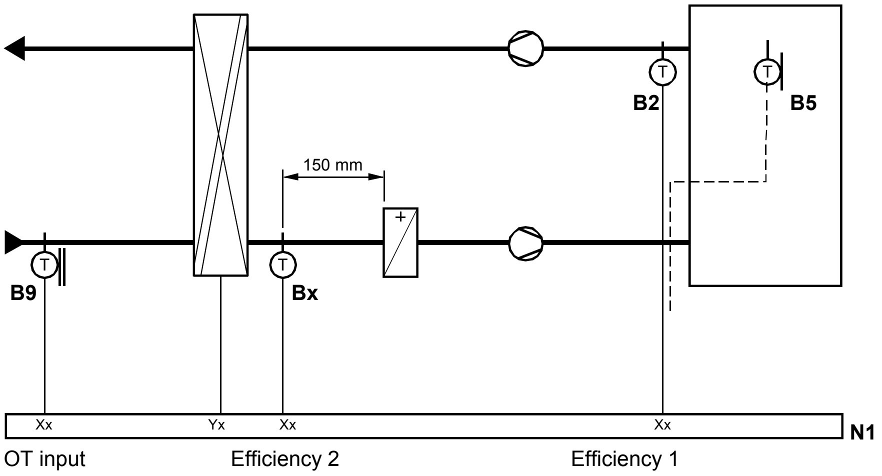
You can select between two different measuring arrangements for the sensors:

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Heat recovery equipment >

Operating line	*Range*	*Factory setting*
Measurement arrangement	Supply air, Exhaust air	Exhaust air

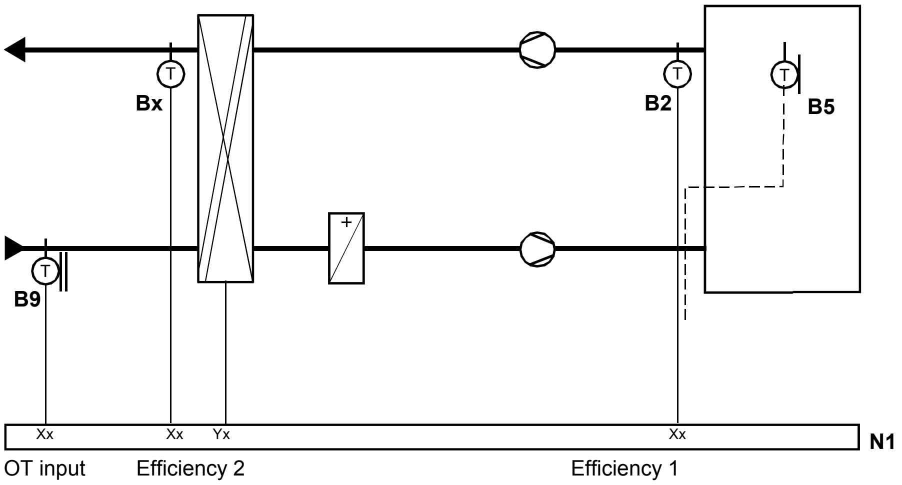
Measuring arrangement supply air



Note

Due to heat radiation, the distance between sensor B_X and the air heating coil LH must be at least 150 mm.

Measuring arrangement exhaust air



Key for both measuring arrangements

B2	Extract air temperature sensor
B5	Room temperature sensor
B9	Outside temperature sensor
Bx	Temperature sensor after heat recovery equipment
Xx	Universal input
Yx	Modulating output
N1	Universal controller

Conditions

To be able to determine the efficiency and to issue service messages, the following conditions must be satisfied:

- Difference between room or extract air temperature and outside temperature > 5 K
- Output of heat recovery equipment = 100% load
- Fans are switched on
- Outside temperature is lower than the set threshold value

In addition, the following parameters can be set:

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Aggregates > Heat recovery equipment >

Operating line	*Range*	*Factory setting*
Fault status message delay	00.00...06.00 h.m	01.00 h.m
Outside temp limit efficiency	−50...+150 °C	15 °C
Correction fan impact	0.0...5.0 K	0.5 K
Efficiency limit	0...100%	50%
HR efficiency deviation	Max. 20 characters of text	HR efficiency deviation

Explanation

Fault status message delay	Period of time during which the efficiency must be below the threshold before a fault status message is generated.
Outside temp limit efficiency	At high outside temperatures, efficiency supervision is locked.
Correction fan impact	The temperature rise resulting from the heat emitted by the fan can be adjusted here.
HR efficiency deviation	Universal fault text if the efficiency limit value is violated.

10.4.5 Fixed preselection during cooling mode

If the air cooler is used for dehumidification, temperature control can sometimes demand more heat from the heat recovery unit, which in turn must again be dissipated in the air cooler. This can be avoided by assigning the relevant cooling valve ("Modulating output" or "Step switch") to the heat recovery unit using the setting "Cooling coil valve".

Configuration

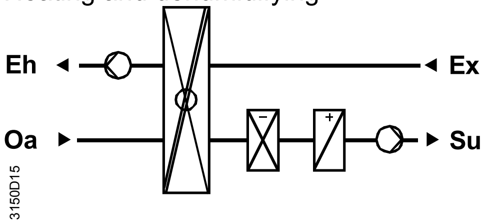
Main menu > Commissioning > Extra configuration > Aggregates > Heat recovery equipment >

Operating line	*Adjustable values / remarks*
Cooling coil valve	---, Modulating output A, ...B, ...C, ...D, Step switch 1, ...2, ...3, ...4, ...5

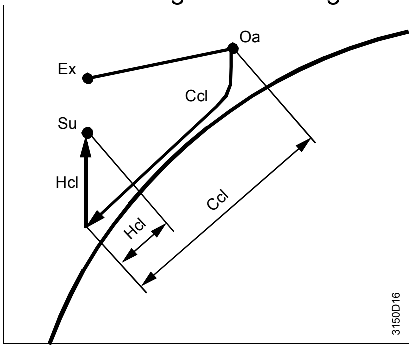
At an open cooling coil valve, the output signal of heat recovery is set such that the air temperature after heat recovery is as low as possible.

Example

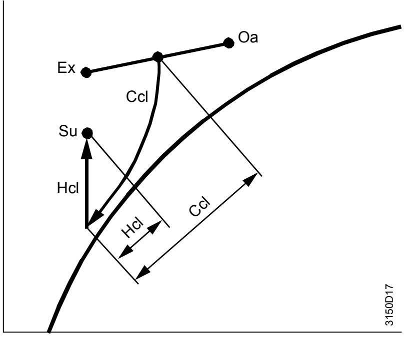
Heating and dehumidifying



Without cooling valve setting



With cooling valve setting



Ex	Extract air	Hcl	Heating coil
Oa	Outside air	Ccl	Cooling coil
Eh	Exhaust air		
Su	Supply air		

The HR output can be inverted.

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Aggregates > Heat recovery equipment >

Operating line	*Range*	*Factory setting*
Inversion	No, Yes	No

Meaning:

- No: 0...100% Load = 0...100% output
- Yes: 0...100% Load = 100...0% output

10.4.6 Motor kick

A periodic motor kick can be activated to avoid soiling (dust) and seizing of HR during extended off periods.
When motor kick is active, HR is switched on for 30 seconds once a week regardless of any other functions and settings.
The motor kick is activated by setting "Motor kick" to "Yes". If the setting is "No", there is no motor kick.
In addition, a kick day and time can be set.

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Aggregates > Heat recovery equipment >

Operating line	*Range*	*Factory setting*
Motor kick	Yes, No	No
Kick day	Mo, Tu, We, Th, Fr, Sa, Su	Mo
Kick time	00:00...23:59 h.m	10:00 h.m

10.4.7 Function check / wiring test

The current state of the heat recovery system is displayed on the operator unit.

Display values

Main menu > Aggregates >

Operating line	*Comments*
Output modulating	0...100%
Output relay	Off, On
Efficiency heat recovery	----, 0...100%

During the wiring test, the modulating output can be directly controlled.

Wiring test

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Heat recovery output	----, 0...100%

10.4.8 Troubleshooting

Errors in operation
When you exit the "Commissioning" menu, a check is made to see which sensors are connected. If one of the sensors connected now is missing, fault message "[...X...] sensor error" appears.

Fault status messages

No.	*Text*	*Effect*
101…	[N.X1] sensor error, ..	Non-urgent message; must not be acknowledged

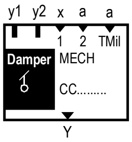
If efficiency cannot be calculated, the display shows "----" as efficiency.
If the sensors for Maximum Economy Changeover are missing, there is no changeover.

Configuration error
If "MECH input 2" does not use the same unit as "MECH input 1", only the first input is considered for changeover. If none of the inputs or only "MECH input 2" is configured, Maximum Economy Changeover is deactivated.

If calculation of the efficiency does not include configuration of two temperature sensors, efficiency is not calculated and no fault message is generated.

10.5 Mixed air damper (basic types A, P)

This function provides control of an outside air damper with a DC 0...10 V signal.



10.5.1 Activate block

To activate the "Mixed air damper" function, an output must first be assigned.

Configuration

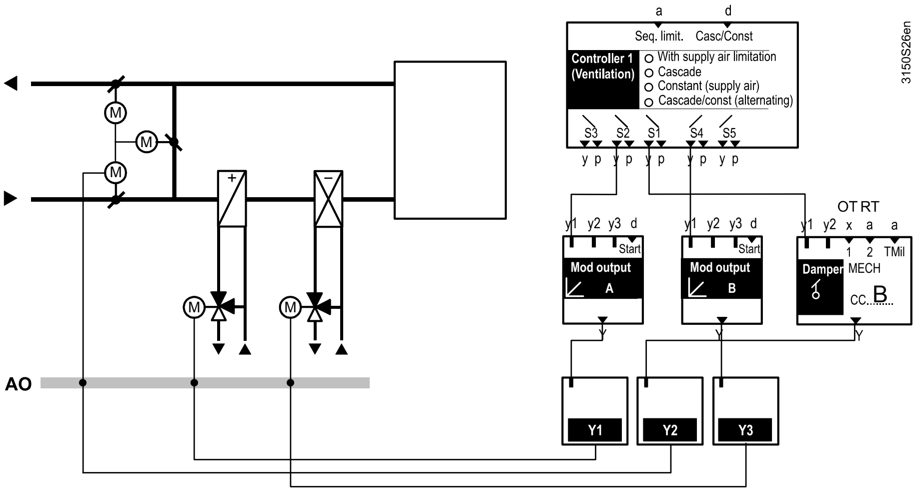
Main menu > Commissioning > Extra configuration > Aggregates > Mixed air damper >

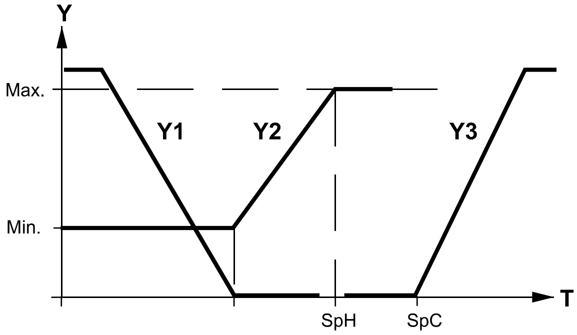
Operating line	*Adjustable values / remarks*
Output	---, N.Y1, N.Y2, ... / Activate mixed air damper

10.5.2 Direction of control action

The direction of control action is fixed inverse: 0 to 100% load = Upper limit value to Positioning signal min.

Application example

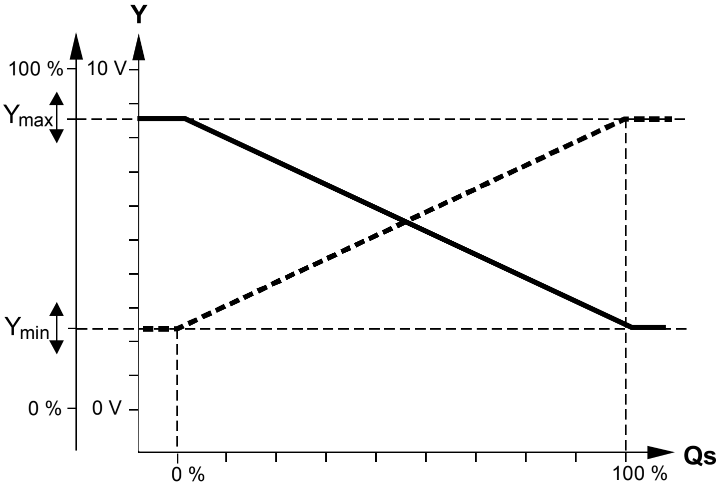




10.5.3 Limitations

The modulating output (Y) can be limited at the top and at the bottom.
0...100% output corresponds to the range between "Positioning signal min" (Ymin) and setting value "[Max limitation] end position" (Ymax).

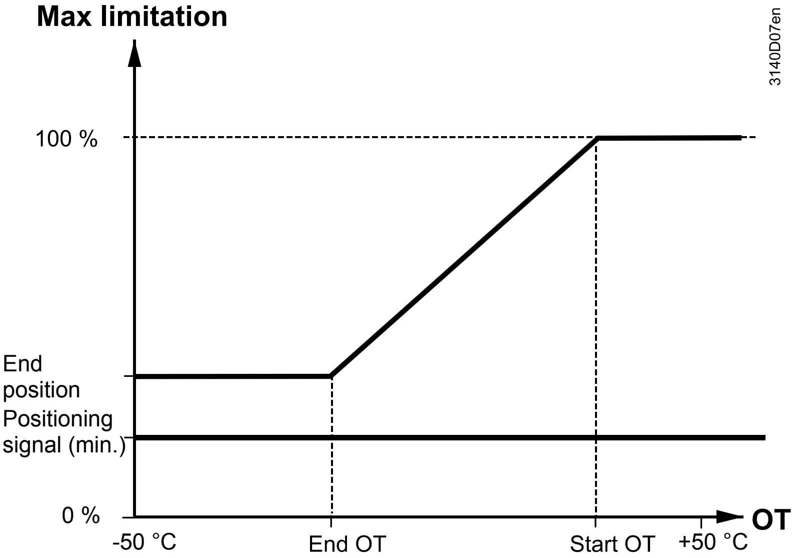
Function diagram



Qs = Load demand from the sequence controller

"Positioning signal min" (Ymin) is fixed. The upper limit value can be shifted depending on the outside temperature.

Function diagram



Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Mixed air damper >

Operating line	*Range*	*Factory setting*
Positioning signal min	0...100%	20%
[Max limitation] start OT	-50...50 °C	15 °C
[Max limitation] end OT	-50...50 °C	−5 °C
[Max limitation] end position	0...100%	100%

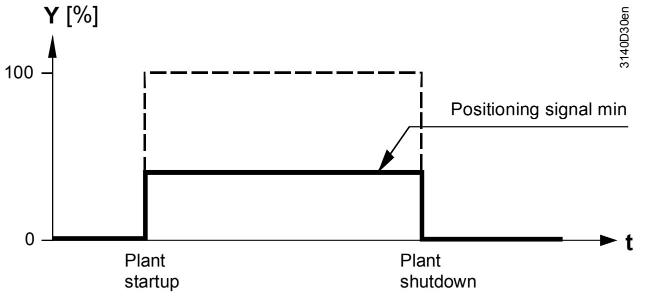
Note

During smoke extraction or night cooling, the limitations are inactive, and the output signal is always DC 10 V.

10.5.4 Fixed damper setting

When the plant is off, the signal is always DC 0 V. If the mixed air damper is not controlled by a controller, "Positioning signal min" is issued at the damper output at switched-on plant and after startup circuit time expiration:

Function diagram

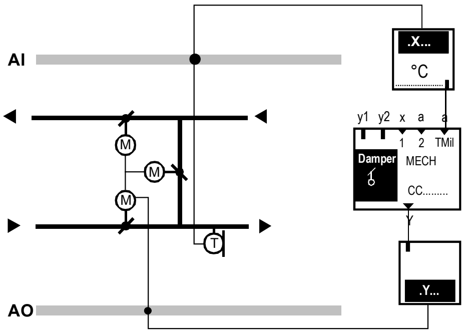


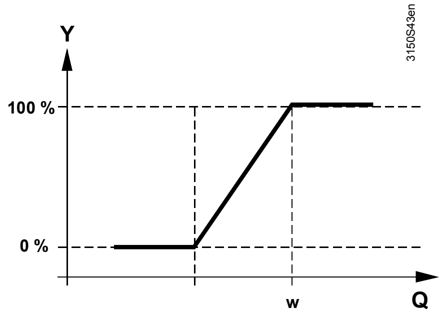
If recirculated air operation is active (see section 10.1 "Fan (basic types A and P)"), the outside air damper is closed (DC 0 V).

The output signal for the mixed air dampers may not be used for outside air dampers without recirculated air damper control, as the outside air dampers can be closed, even if the fans are running.

10.5.5 Mixed air temperature control

Connecting mixed air temperature to the air damper block activates the mixed air temperature controller. The mixed air temperature is controlled to a settable setpoint with the help of air dampers.





Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Mixed air damper >

Operating line	*Adjustable values / remarks*
Mixed air temperature	---, N.X1, N.X2, ...

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Aggregates > Mixed air damper >

Operating line	*Range*	*Factory setting*
Mixed air temperature setpoint	-50°C … 250 °C	12°C
P-band Xp	0.0 ... 500 K	10 K
Integral action time Tn	00.00...59.55 m:s	02.00 m:s

10.5.6 Priorities

The following priorities apply to mixed air temperature control:

1. Startup circuit
2. MECH changeover
3. Mixed air temperature controller signal
4. IAQ controller signal
5. Sequence controller signal

10.5.7 Troubleshooting

Errors in operation

When you exit the Commissioning menu, a check is made to see if the mixed air temperature sensor is connected. If the sensor is not connected at this point, the "Mixed air temperature control" function is set inactive.

If the sensor is connected at this time but is missing later, message "Sensor fault X.." appears and the "Mixed air temperature control" function is set inactive.

10.5.8 Maximum Economy changeover (MECH)

To activate Maximum Economy Changeover (MECH), the relevant inputs must be assigned.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Mixed air damper >

Operating line	*Adjustable values / remarks*
MECH input 1	---, N.X1, N.X2, ..., Outside temperature, [Logic1] digital, [Logic 2] digital (only °C, kJ/kg, 100, 1000, digital)
MECH input 2	---, N.X1, N.X2, ... , Room temperature, Extract air temperature (only °C, kJ/kg, 100, 1000)

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Aggregates > Mixed air damper >

Operating line	*Range*	*Factory setting*
MECH limit value[1)]		3 K, 20 °C 3 kJ/kg, 40 kJ/kg 3, 40 ---

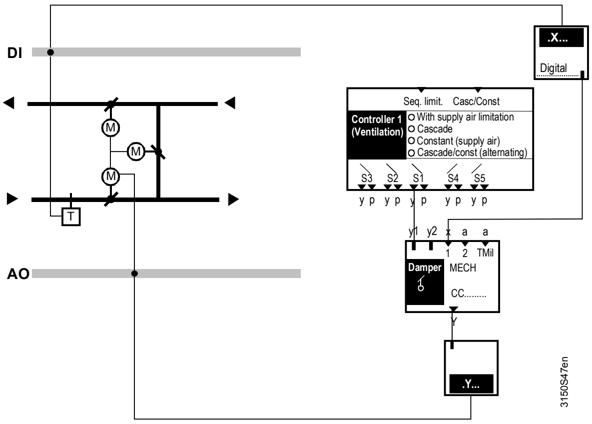
1) The MECH limit value operating line is used when changing over to a settable value as absolute value, or when changing over based on a difference of two measured values as relative value. In this case, it is used to consider heat sources in the extract air duct (e.g. dissipated heat fan)

Changeover options

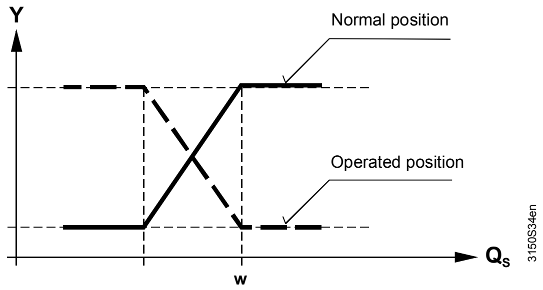
There are three changeover options:

1. Changeover triggered externally via a digital signal:
Here, a digital input must be assigned to "MECH input 1".
The following applies:

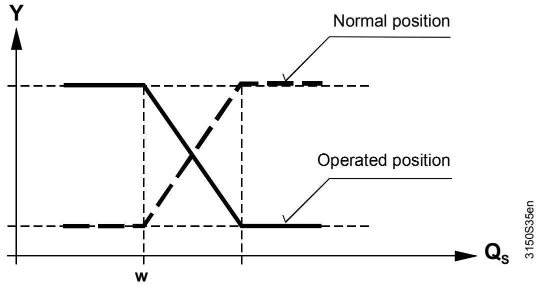
Normally closed (low outside temperature) = No inversion
Operating position (high outside temperature) = Inversion



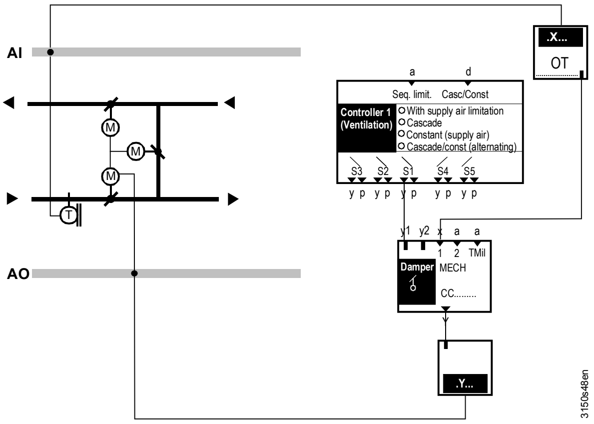
Control by heating sequences (S1, S2, S3)



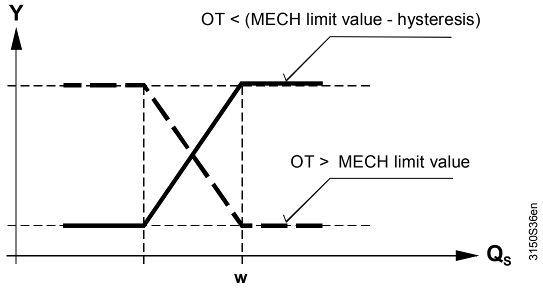
Control by cooling sequences (S4, S5)



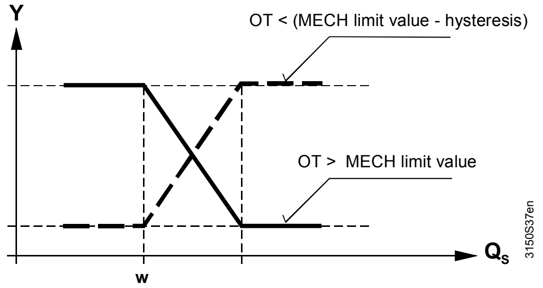
2. Changeover at an adjustable value
Here, an analog input must be assigned to MECH input 1. (Typically: outside temperature or enthalpy difference outside air – extract air).
If the adjusted MECH limit value is exceeded, the output is inverted.



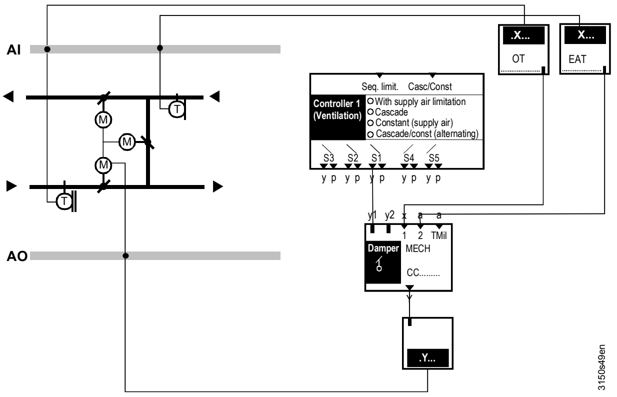
Control by heating sequences (S1, S2, S3)



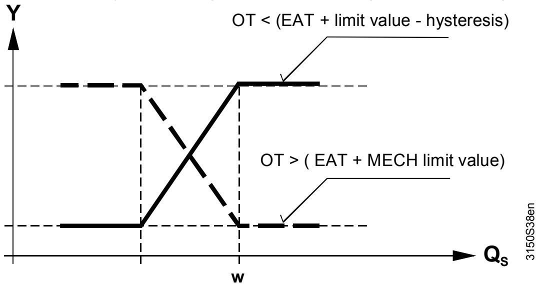
Control by cooling sequences (S4, S5)



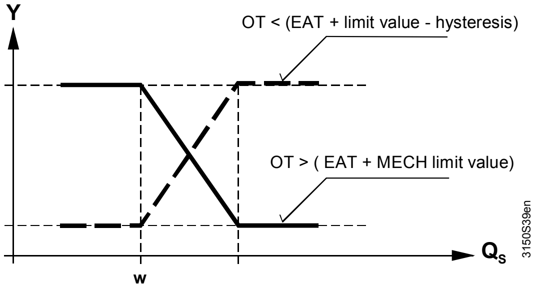
3. Changeover at an adjustable difference between two measured values
Here, one analog input each must be assigned to "MECH input 1" and "MECH input 2". (Typically: MECH input 1 = Outside temperature, MECH input 2 = Extract air temperature).
The output is inverted if as shown in this example the outside temperature with heating sequence control is greater than the extract air temperature plus MECH limit value. The hysteresis is a set 1 K.



Control by heating sequences (S1, S2, S3)



Control by cooling sequences (S4, S5)



10.5.9 Fixed preselection during cooling mode

The function corresponds exactly to that described in section
10.4 "

Heat recovery equipment (basic types A, P)".

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Mixed air damper >

Operating line	*Adjustable values / remarks*
Cooling coil valve	---, Modulating output A, ...B, ...C, ...D, Step switch 1, ...2, ...3, ...4, ...5

10.5.10 Startup circuit

The startup circuit is activated by entering a value >0 for the "Startup time".

Setting values

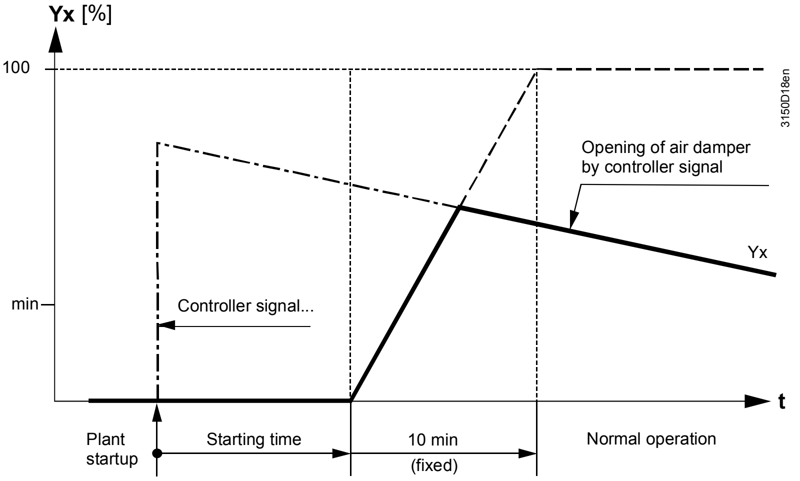
Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Mixed air damper >

Operating line	*Range*	*Factory setting*
Startup time	00.00...59.55 m:s	05.00 m:s

If the outside temperature is available, the startup circuit is only active at outside temperatures below 15 °C. At outside temperatures above 15 °C, the plant is started without startup circuit. If no outside temperature is available, startup circuit is active at all times provided a startup time of > 00.00 is entered.

If plant start is triggered by "Smoke extraction" or "Night cooling", there is no startup circuit.
On plant startup, the outside air damper operates according to the following diagram:

Function diagram



10.5.11 Function check / wiring test

The current state of the mixed air damper is displayed on the operator unit.

Display values

Main menu > Aggregates > Mixed air damper >

Operating line	*Comments*
Mixed air temperature	
Mixed air temperature setpoint	
Output modulating	0...100%

During the wiring test, the modulating output can be directly controlled via the control switch.

Wiring test

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Mixed air damper output	----, 0...100%

Note

Limits have no effect during wiring tests. They cannot be used to set minimum air volume during commissioning.

10.5.12 Troubleshooting

Errors in operation
When exiting the "Commissioning" menu, a check is made to see which sensors are connected. If one of the sensors connected now is missing, fault message "[...X...] sensor error" appears.

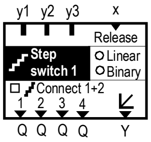
Fault status messages

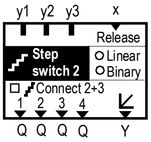
No.	*Text*	*Effect*
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged

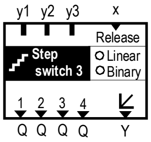
If the MECH sensors are missing, there is no MECH. If the outside temperature is missing, the value used for the upper limit is the set value "[Max. limitation] end position".

Configuration error
If the second MECH input does not use the same unit as the first MECH input, only the first input is considered for changeover. If none or only the second input is configured, changeover is deactivated.

10.6 Linear/binary step switch (1…3)







This function block is used to switch multistage aggregates depending on load or to switch several aggregates. The step switch can be cascaded to increase the number of available steps.

The step switch can be configured as:

- Linear step switch

- Switching equal-size steps or aggregates with equal performance.
- Lead/sequential control (Run priority changeover).
or

- Binary step switch

- Switching of binary stepped aggregates. Max 15 steps can be switched per step switch.
The step switches can be controlled by max three internal sequence controllers (see section 15.1.1 "Assign aggregates to sequences") with the highest signal being valid (max. selection).

10.6.1 Activate block

The linear/binary step switch is activated by assigning it to output Qx on Step 1 or to a modulating output of output Y.

Configuration

Main menu > Commissioning > Extra configuration> Aggregates > Step switch > Step switch 1...3 >

Operating line	*Range*
Step 1	---, N.Q1, N.Q2, ... (free outputs only)
Step 2	---, N.Q1, N.Q2, ... (free outputs only)
Step 3	---, N.Q1, N.Q2, ... (free outputs only)
Step 4	---, N.Q1, N.Q2, ... (free outputs only)
Modulating output	---, N.Y1, N.Y2, ... (free outputs only)

The type (linear, binary) is used to set the step switch properties.

Configuration

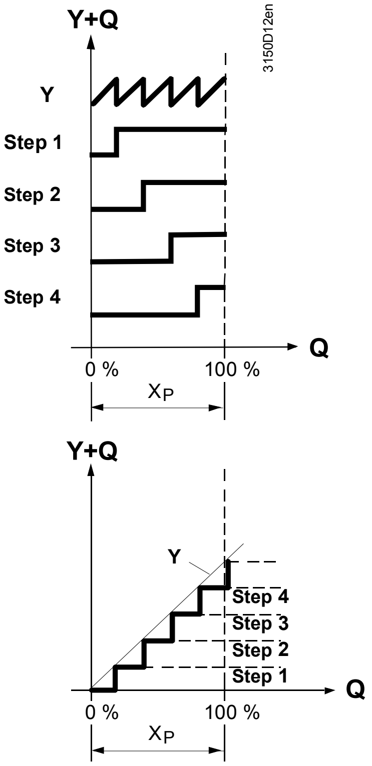
Main menu > Commissioning > Extra configuration> Aggregates > Step switch > Step switch 1...3 >

Operating line	*Range*	*Factory setting*
Type	Linear, Binary	Linear

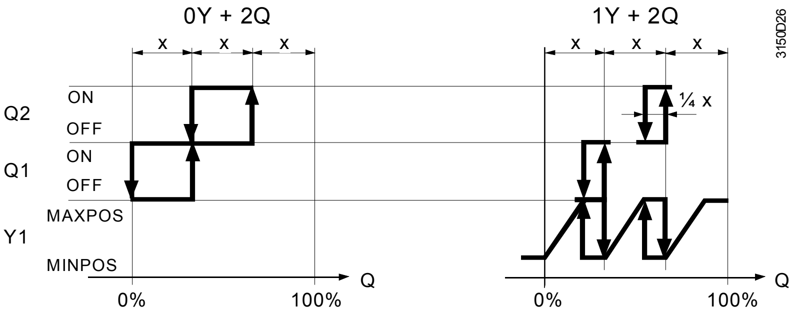
10.6.2 Linear step switch

Load connection

The linear step switch connects the relay outputs in equal steps.
Load connection applies the following pattern:



Switching distance, example with 2 digital outputs:



Note on diagram

Distance X is equal to 100% load divided by (number of steps +1).

Startup delay

To prevent excessively quick runup, you can enter a common startup delay time. This delay makes the controller wait for the set time between the steps during startup.

Run priority changeover

With the linear step switch, you can set a priority changeover of the outputs. The priorities change at fixed intervals every week (always after 7 x 24 = 168 hours).

Changeover is as follows (example with 4 steps):
Week 1: 1, 2, 3, 4
Week 2: 2, 3, 4, 1
Week 3: 3, 4, 1, 2
Week 4: 4, 1, 2, 3
Week 5: 1, 2, 3, 4

Note

Priority changeover is reset by a power outage.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 1...3 >

Operating line	*Range*	*Factory setting*
Startup delay	00.00…10.00 mm:ss	00.00
Run priority changeover	No, Yes	No

10.6.3 Binary step switch

The binary step switch is used to switch multistage aggregates. The aggregates must be sized according to the binary load distribution.
With the binary step switch, run priority changeover is not possible.

Load distribution (demand calculation)

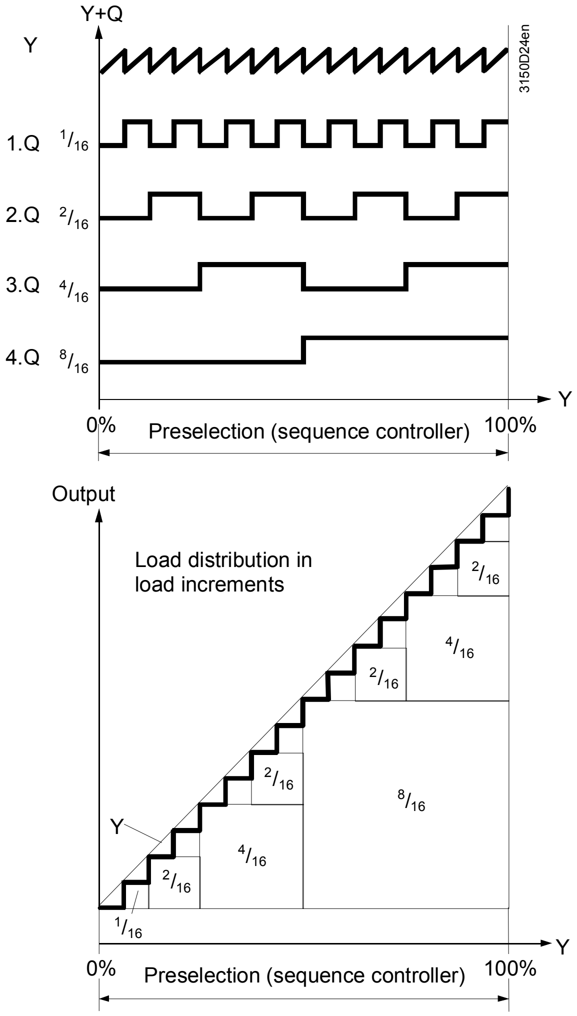
In the binary step switch, the digital outputs are distributed across the entire switching capacity of the aggregate in the following load increments:

0Y+2 Q	1.Q = 1/3	2.Q = 2/3			3 load increments
0Y+3 Q	1.Q = 1/7	2.Q = 2/7	3.Q = 4/7		7 load increments
0Y+4 Q	1.Q = 1/15	2.Q = 2/15	3.Q = 4/15	4.Q = 8/15	15 load increments

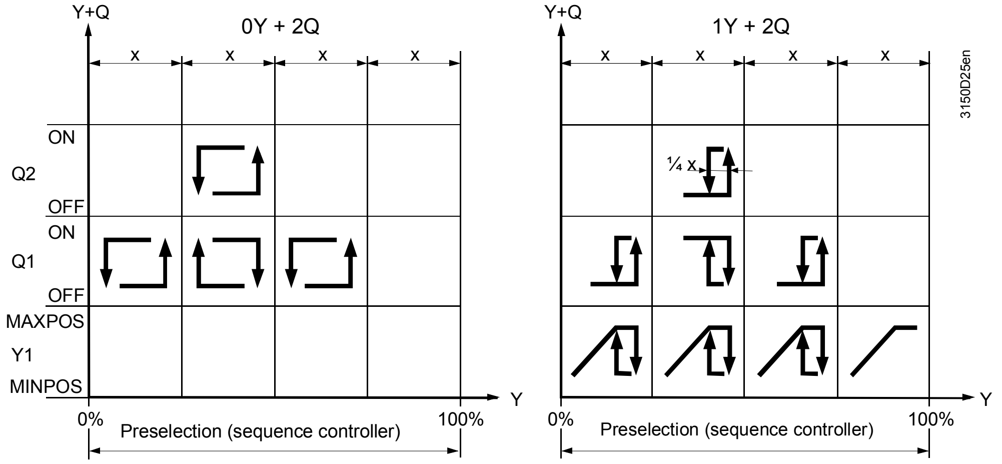
If configured with an analog output:

1Y+2 Q	Y = 1/4	1.Q = 1/4	2.Q = 2/4			4 load increments
1Y+3 Q	Y = 1/8	1.Q = 1/8	2.Q = 2/8	3.Q = 4/8		8 load increments
1Y+4 Q	Y = 1/16	1.Q = 1/16	2.Q = 2/16	3.Q = 4/16	4.Q = 8/16	16 load increments

Load distribution applies the following pattern:



Switching distance, example with 2 digital outputs (with and without modulating output):



10.6.4 Cascade step switches

To increase the number of steps, two or three linear/binary step switches can be interconnected (cascaded).

Configuration

Main menu > Commissioning > Extra configuration> Aggregates > Step switch > Step switch 1...2 >

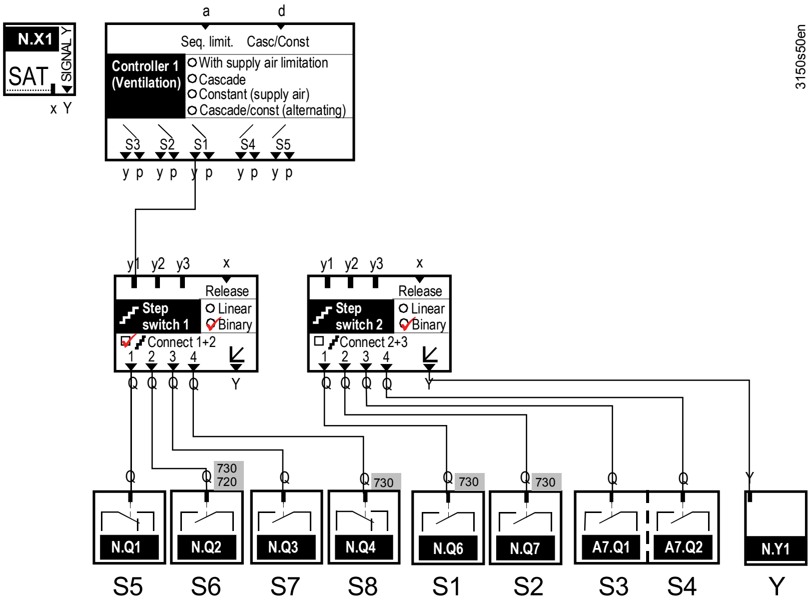
Operating line	*Range*	*Factory setting*
Connect 1+2	No, Yes	No
Connect 2+3	No, Yes	No

Notes on configuration

- If two linear/binary step switches are interconnected (cascaded), the outputs of the sequence controller must be connected only to the first step switch
- The modulating output of the 2nd (with 2) or 3rd (with 3) step switches must be configured as modulating load signal
- The type of both step switches should be equal: binary or linear
- Cascading is without effect, if the 2nd step switch is inactive
- There may not be gaps in configuration; thus, steps 1, 2 and 3 rather than steps 1, 3 and 4
- If two or three step switches are cascaded, the settings for locking time, overrun time, startup delay (linear only) as well as external release must be set for all step switches; the settings are not passed on
- Startup delay (linear only) and run priority changeover act only within the respective step switch

Example 1

Binary step switch cascaded at 256 load increments:



Load connection

The greater load increments (S5 to S8) of the first step switch are subdivided by the smaller increments (S1 to S4) of the second step switch.

Step switch 1: Greater load increments.

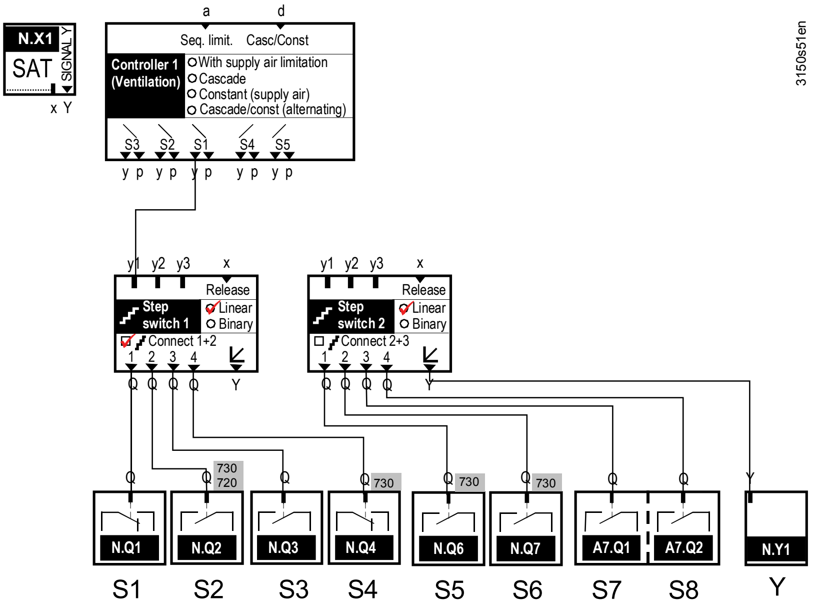
4 Q		S5 = 16/256	S6= 32/256	S7 = 64/256	S8 = 128/256

Step switch 2: Smaller load increments.

1Y+4 Q	Y = 0.. 1/256	S1 = 1/256	S2 = 2/256	S3 = 4/256	S4 = 8/256

Example 2

Linear step switch with 8 steps:



Load connection

The load increments are distributed linear to the number of configured relay outputs; each load increment supplies 1/8 of the output in this example.
- Step 1 = Output step 1 of first step switch.
- Step 8 = Output step 4 of second step switch.

10.6.5 Locking time

Additionally, you can enter a common locking time for the relay outputs. This ensures that a step that has just switched off remains off for the set period of time.

If a relay output is locked, all relays with less power remain switched on as needed to prevent a total power drop-off.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 1...3 >

Operating line	*Range*	*Factory setting*
Locking time	00.00…10.00 mm:ss	00.00

10.6.6 Fan overrun time

For the step switches, an overrun time can be entered.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 1...3 >

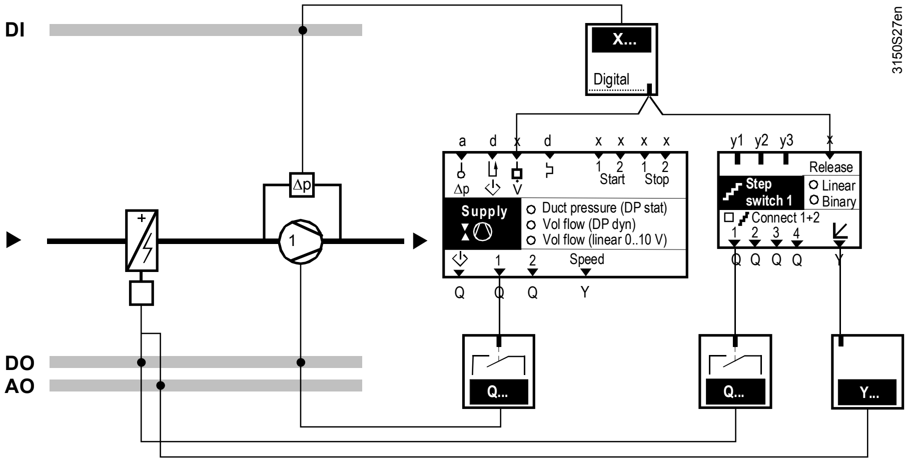
Operating line	*Range*	*Factory setting*
Fan overrun time	00.00... 59.55 m:s	00.00 m:s

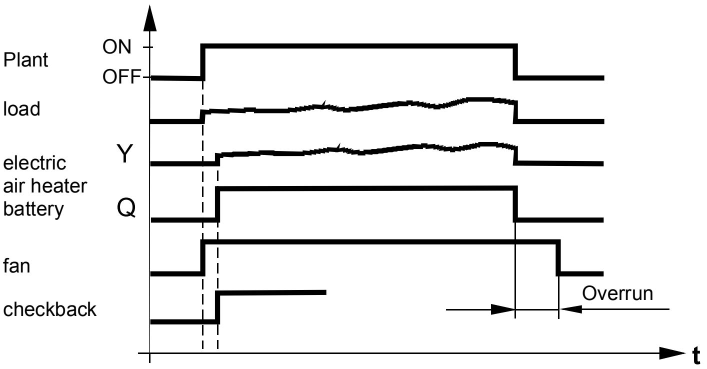
The overrun time ensures that the fans (see section 10.1 "Fan (basic types A and P)") remain on for the set time following switch-off of the last switching step. Thus, overrun time is active only if the step switch is configured with a relay.

Note

With fans configured for recirculated air operation, overrun only acts on the supply air fan. If the pumps should overrun also, set a switch-off delay for the pump.

Application example





10.6.7 External release

One input can be configured as release for each step switch.

Configuration

Main menu > Commissioning > Extra configuration> Aggregates > Step switch > Step switch 1...3 >

Operating line	*Adjustable values / remarks*
Release external	---, N.X1, N.X2, ... (digital and analog inputs)

An analog signal can be used as release signal.
The threshold values can be set via the setting values "Release switching value on" and "Release switching value off", if the corresponding step switch is to be released.

Setting values

Main menu > Commissioning > Settings > ... *or*

Main menu > Settings > Aggregates > Step switch 1...3 >

Operating line	*Range*	*Factory setting*
Release switching value on	Depending on selected type	Depending on type
Release switching value off	Depending on selected type	Depending on type

Since measurement variations can occur during operation, a delay time can be set.

For example, the following function can be implemented: Release of an electric heating coil via a flow signal.

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 1...3 >

Operating line	*Range*	*Factory setting*
Switch-off delay release	00.00...10.00 m:s	00.05 m:s

If an overrun time is entered for the step switch, we recommend to use the input of the V-belt supervision as a release for the step switch. This ensures that an electric heating coil can be switched on only when there is a flow.

Important

The external release takes priority over a signal from frost protection or from preheating. Thus, an electric heating coil can be decoupled from the frost function.

10.6.8 Modulating output

The output signal of the modulating output (Y) can be limited at the top and at the bottom.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 1...3 >

Operating line	*Range*	*Factory setting*
Positioning signal min	0...100%	0%
Positioning signal max	0...100%	100%

Each modulating output can be inverted.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 1...3 >

Operating line	*Range*	*Factory setting*
Inversion	Yes, No	No

Meaning:
- No: 0...100% load = 0...100% output
- Yes: 0...100% load = 100...0% output

Note

When the output is inverted, the modulating output remains at 0 V until the first step (relay) is switched on. This functionality is available for linear, but not cascaded step switches.

10.6.9 Assign texts

The texts for the step switches can be adapted via operation. They are displayed at the relevant operating line and on the menu.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 1...3 >

Operating line	*Range*	*Factory setting*
Step switch…	Max. 20 characters	Step switch…

10.6.10 Function check / wiring test

The current state of the step switch is displayed on the operator unit.

Display values

Main menu > Aggregates > Step switch 1…3 >

Operating line	*Comments*
Step 1	Off, On
Step 2	Off, On
Step 3	Off, On
Step 4	Off, On
Modulating output	0...100%

During the wiring test, the step switch can be switched directly via the control switch.

Wiring test

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Step switch 1	---, 0...100%
Step switch 2	---, 0...100%
Step switch 3	---, 0...100%

Note

During the wiring test, cascaded step switches are not considered, i.e. the wiring test can be carried out for each step switch.

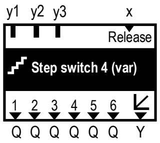
10.6.11 Priorities

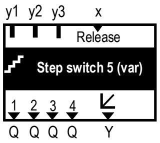
The following priorities apply to the linear/binary step switch:

1. On/Off during the wiring test

10.7 Variable step switch (4…5)

This function is used to switch multistage aggregates. All outputs can be set individually.





10.7.1 Activate block

The variable step switch is activated by assigning it to output Qx on Step 1 or to a modulating output of output Y.
Step switch 4 can be configured for max 6 steps; step switch 5 for max 4 steps.

Configuration

Main menu > Commissioning > Extra configuration> Aggregates > Step switch > Step switch 4...5 >

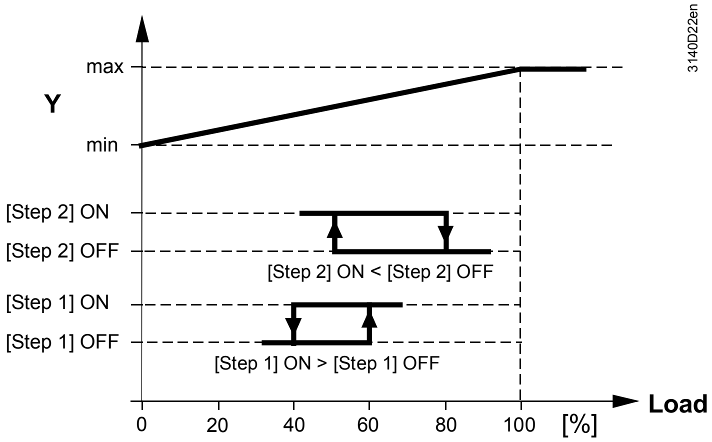
Operating line	*Adjustable values / remarks*
Step 1	---, N.Q1, N.Q2, ... (free outputs only)
Step 2	---, N.Q1, N.Q2, ... (free outputs only)
Step 3	---, N.Q1, N.Q2, ... (free outputs only)
Step 4	---, N.Q1, N.Q2, ... (free outputs only)
Step 5	---, N.Q1, N.Q2, ... (free outputs only)
Step 6	---, N.Q1, N.Q2, ... (free outputs only)
Modulating output	---, N.Y1, N.Y2, ... (free outputs only)

10.7.2 Operating principle

With variable step switching, you can set the digital outputs individually according to the load.

The step switches can be controlled by max three internal sequence controllers (see section 15.1.1 "Assign aggregates to sequences") with the highest signal being valid (max. selection).

Example for switching additional load



Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 4...5 >

Operating line	*Range*	*Factory setting*
[Step 1] ON	0...100%	17%
[Step 1] OFF	0...100%	1%
[Step 2] ON	0...100%	33%
[Step 2] OFF	0...100%	17%
[Step 3] ON	0...100%	50%
[Step 3] OFF	0...100%	33%
[Step 4] ON	0...100%	67%
[Step 4] OFF	0...100%	50%
[Step 5] ON	0...100%	83%
[Step 5] OFF	0...100%	67%
[Step 6] ON	0...100%	100%
[Step 6] OFF	0...100%	83%

You can define the digital output's direction of control action via the switching point settings. The digital outputs can overlap.

10.7.3 Locking time

A Locking time can be entered for step outputs. This time ensures that a step remains switched off for at least the period of time set.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 4...5 >

Operating line	*Range*	*Factory setting*
Locking time	00.00...10.00 m:s	00.00 m:s

10.7.4 Fan overrun time

An overrun time can be entered for step switches.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch 4...5 >

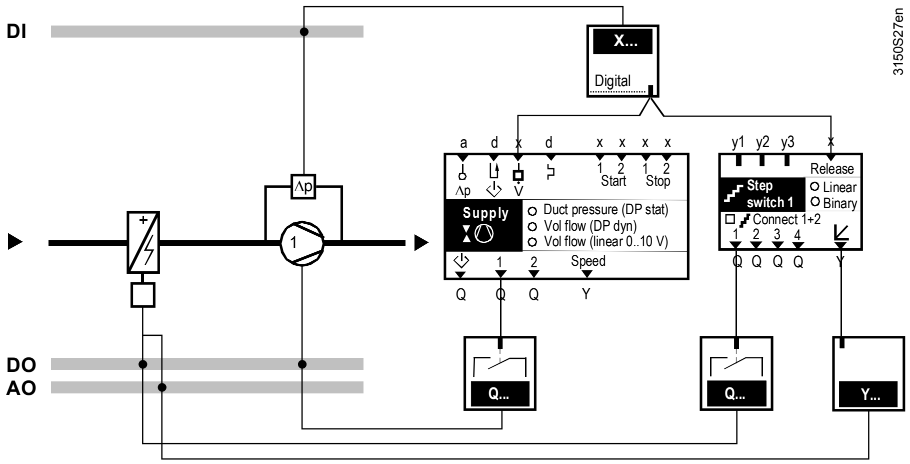
Operating line	*Range*	*Factory setting*
Fan overrun time	00.00...59.55 m:s	00.00 m:s

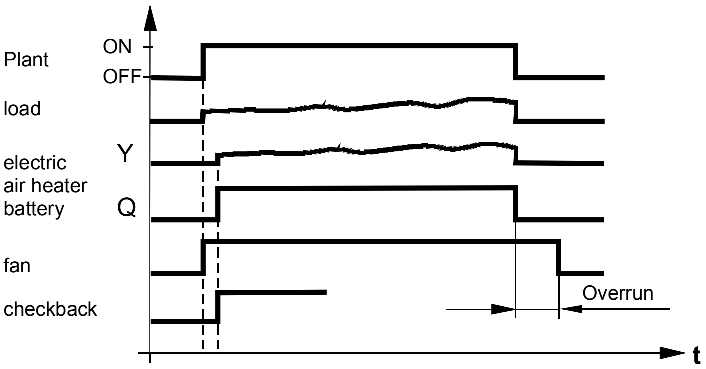
The overrun ensures that the fans (see section 10.1 "Fan (basic types A and P)") remain in operation for the set period after switching off the last step switch.

Note

With fans configured for recirculated air operation, overrun only acts on the supply air fan. Set a switch-off delay for pump overrun.

Application example





10.7.5 Release external

One input can be configured as release for the step switch.

Configuration

Main menu > Commissioning > Extra configuration> Aggregates > Step switch > Step switch 4...5 >

Operating line	*Adjustable values / remarks*
Release external	---, N.X1, N.X2, ... (digital and analog inputs)

An analog signal can be used as release signal.
The threshold values can be set via the setting values "Release switching value on" and "Release switching value off", if the corresponding step switch is to be released.

Setting values

Main menu > Commissioning > Settings > ... *or*
Main menu > Settings > Aggregates > Step switch > Step switch 4...5 >

Operating line	*Range*	*Factory setting*
Release switching value on	Depending on selected type	Depending on type
Release switching value off	Depending on selected type	Depending on type

A delay time can be set to account for measurement variations during operation. For example, the following function can be implemented: Release of an electric heating coil via a flow signal.

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch > Step switch 4...5 >

Operating line	*Range*	*Factory setting*
Switch-off delay release	00.00...10.00 m:s	00.05 m:s

We recommend using the input of the V-belt supervision as a release for the step switch when entering an overrun time for the step switch. This ensures that an electric heating coil is switched on only with flow.

Important

The external release takes priority over a signal from frost protection or from preheating. In other words, an electric heating coil can be decoupled from the frost function.

10.7.6 Modulating output

The output signal of the modulating output (Y) can be limited high and low.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch > Step switch 4...5 >

Operating line	*Range*	*Factory setting*
Positioning signal min	0...100%	0%
Positioning signal max	0...100%	100%

Each modulating output can be inverted.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch > Step switch 4...5 >

Operating line	*Range*	*Factory setting*
Inversion	Yes, No	No

Meaning:

- No: 0...100% Load = 0...100% output
- Yes: 0...100% Load = 100...0% output

10.7.7 Assign texts

Use operation to adapt step switch texts. They are displayed at the relevant operating line and on the menu.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Step switch > Step switch 4...5 >

Operating line	*Range*	*Factory setting*
Step switch…	Max. 20 characters	Step switch…

10.7.8 Function check / wiring test

The current state of the step switch is displayed on the operator unit.

Display values

Main menu > Aggregates > Step switch 4...5 >

Operating line	*Comments*
Step 1	Off, On
Step 2	Off, On
Step 3	Off, On
Step 4	Off, On
Step 5	Off, On
Step 6	Off, On
Modulating output	0...100%

The step switch can be switched directly via the control switch during the wiring test.

Wiring test

Main menu > Commissioning > Wiring test > Outputs >

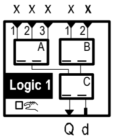
Operating line	*Comments*
Step switch 4	---, 0...100%
Step switch 5	---, 0...100%

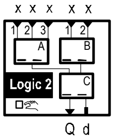
10.7.9 Priorities

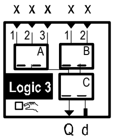
The following priorities apply to the step switch:

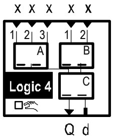
1. ON / OFF during wiring test

10.8 Logic









Purpose

The logic block is used to make logical links to multiple input signals.
4 independent logic function blocks are available.

Operation selector

One operation selector ☜ can be activated per logic block to allow the use to manually intervene at the upper main menu level.
Auto, Off and On can be selected. The intervention acts on the output of the logic function block.

Settable times

You can set a switch on and switch off delay as well as minimum switch on and off period for the output signal on function block C.
These time always act (e.g. for an operation selector ☜ intervention), except during a wiring test.

Converting an analog signal to a digital signal

Each input can be assigned a digital or analog signal.
You can generate an analog signal, a 2-point signal On, Off via switch on and off points. The following applies:

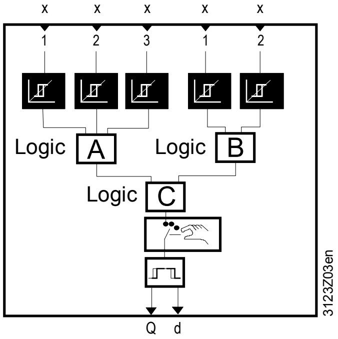
If switching value On > switching value Off → change from 0 → 1 ⎍
If switching value On < switching value Off → change from 1 → 0 ⎎

The difference between switching value On and switching value Off represents the hysteresis.

Internal structure

[Logic A] Inputs 1, 2 and 3 are internally connected to Logic A. [Logic B] Inputs 1 and 2are connected to Logic B. For Logic A and B, logic functions AND, NAND, OR or NOR can be set.

The results from logics A and B act on Logic C. Here logic functions AND, NAND, OR, NOR , EXOR or EXNOR can be selected.



Note

The logic function blocks are processed ascending, first 1 then 2.

The following logic tables show the settable logic functions AND, NAND, OR, NOR, EXOR and EXNOR using the example of 2 inputs.

Logic tables

AND		
Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

NAND		
Input 1	Input 2	Output
0	0	1
0	1	1
1	0	1
1	1	0

OR		
Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1

NOR		
Input 1	Input 2	Output
0	0	1
0	1	0
1	0	0
1	1	0

EXOR		
Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	0

EXNOR		
Input 1	Input 2	Output
0	0	1
0	1	0
1	0	0
1	1	1

10.8.1 Activate the logic

The logic is activated by configuring at least 1 input or the operation selector.
The type of internal logic A, B and C can be configured via the "Extra configuration" menu.
The setting "Operation selector" in the operating line selects if the operation selector ☝ is to be displayed in the main menu at the user level.

Note

The operation selector ☝ allows the user to make manual changes. During a manual intervention, no warning is displayed.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Logic functions > Logic 1...4 >

Operating line	*Adjustable values*	*Factory setting*
[Logic A] input 1	---, X1, X2, ...	---
[Logic A] input 2	---, X1, X2, ...	---
[Logic A] input 3	---, X1, X2, ...	---
[Logic B] input 1	---, X1, X2, ...	---
[Logic B] input 2	---, X1, X2, ...	---
[Logic A] function	AND, NAND, OR, NOR	OR
[Logic B] function	AND, NAND, OR, NOR	NOR
[Logic C] function	AND, NAND, OR, NOR, EXOR, EXNOR	AND
Logic relay	---, N.Q1, N.Q2, ... (free outputs only)	---
Operation selector	Yes, No	No
Time format	h:m, m:s	m:s

Note

The format "h:m" can be used if an advanced time format required for the logic function (> 59.55 m:s).

Important

The changeover impacts all time-related parameters of the logic function block (switch-on/off delay and min. switch-on/off time).
The time format “h:m“ can be set in 10-minute increments.

10.8.2 Assign texts

A specific text can be assigned to each logic and operation selector. This text appears on the menu and in the operating line.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Logic functions > Logic 1...4 >

Operating line	*Range*	*Factory setting*
Logic 1...4	Max. 20 characters	Logic 1...4
Operation selector 1...4	Max. 20 characters	Operation selector 1...4

Refer to section 31.4 for an overview of all editable texts and on how to reset them.

10.8.3 Setting values switching value On and Off

The logic can process digital and analog signals. Setting values "[Logic x switching value n] on" and "[Logic x switching value n] off" are used to convert a continuous signal to a 2-position "on / off" signal.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Logic functions > Logic 1...4 >

Operating line	*Range*	*Factory setting*
[Logic A switching value 1] on	Depending on select. type	Depending on type
[Logic A switching value 1] off	Depending on select. type	Depending on type
[Logic A switching value 2] on	Depending on select. type	Depending on type
[Logic A switching value 2] off	Depending on select. type	Depending on type
[Logic A switching value 3] on	Depending on select. type	Depending on type
[Logic A switching value 3] off	Depending on select. type	Depending on type
[Logic B switching value 1] on	Depending on select. type	Depending on type
[Logic B switching value 1] off	Depending on select. type	Depending on type
[Logic B switching value 2] on	Depending on select. type	Depending on type
[Logic B switching value 2] off	Depending on select. type	Depending on type

10.8.4 Switch-on delay / switch-off delay

For the logic output, a switch-on delay and switch-off delay can be set.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Logic functions > Logic 1...4 >

Operating line	*Range*	*Factory setting*
Switch-on delay	00.00...59.59 m:s	00.00 m:s
Switch-off delay	00.00...59.59 m:s	00.00 m:s

The switch-on delay always acts on the switch-on command, the switch-off delay on the switch-off command.

10.8.5 Minimum on time

For the logic output, a minimum on-time can be set. Thus, when a switch-on command is issued, the output remains active for the time set.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Logic functions > Logic 1...4 >

Operating line	*Range*	*Factory setting*
On time minimum	00.00...59.55 m:s	00.00 m:s

The minimum on-time always takes effect after a switch-on command.

10.8.6 Minimum off time

The minimum off time prevents aggregates from cycling too frequently.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Logic functions > Logic 1...4 >

Operating line	*Range*	*Factory setting*
Off time minimum	00.00...59.55 m:s	00.00 m:s

The minimum off time always takes effect after a switch-off command.

10.8.7 Operation selector

On the main menu, the operation selector can be used to preselect the operating mode of the logic block output, and the current state is displayed. Switch-on and switch-off delay as well as minimum on and off time are considered.

Display values

■ **Main menu > Operation selector 1...4 >**

Operating line	*Comments*
Preselection	Auto, Off, On
State	Display of present state: Off, On

Note

If the configuration of the operation selector is reset subsequently, you must first ensure that it is set to Auto. Otherwise, the output constantly remains "On" or "Off".

10.8.8 Wiring test

During the wiring test, the logic block outputs can be directly switched via the control switch. During the wiring test, delay and on times are inactive.

Wiring test

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Logic x	Off, On

10.8.9 Priorities

For logic operations, the following priorities apply:

1. On / Off during wiring test
2. Off by "Off time minimum"
3. On by "On time minimum"
4. Off by switch-on delay
5. On by switch-off delay
6. On by operation selector
7. On by logic inputs

10.8.10 Notes

If with an analog input of the logic block the switching value On = switching value Off, there is no hysteresis.

If an error occurs at a configured input, the "Off" state is issued for the entire logic block.

If only inputs are configured with logic A, logic C is ignored and the signal of logic A is sent directly to the output.

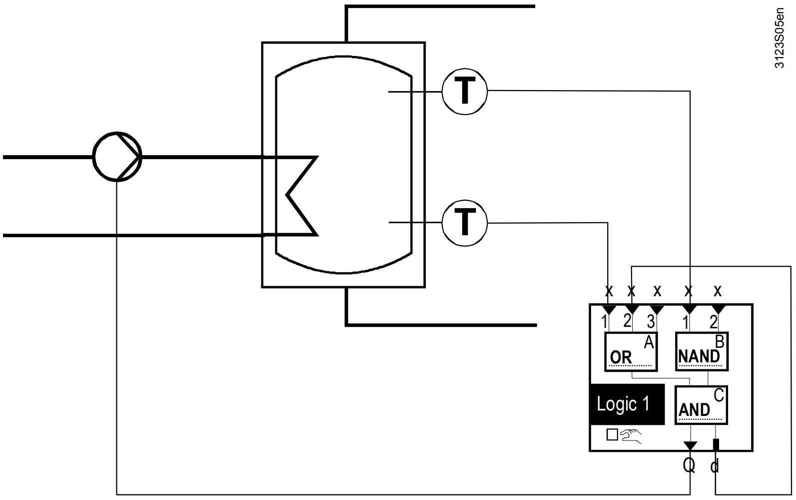
If only inputs are configured with logic B, logic C is ignored and the signal of logic B is sent directly to the output.

Processing order

The logic blocks are processed sequentially in accordance with their instance number, i.e. first logic 1, then logic 2.
If outputs are looped back, e.g. from the output of logic block 2 to the input of logic block 1, the result at logic block 1 becomes available only upon the next handling cycle.

10.8.11 Application example storage tank charging

The following application example shows a solution for a self-holding function. The measured value connected to logic A input 1 gives the switch-on command for storage tank charging. The measured value at logic B input 1 terminates charging.

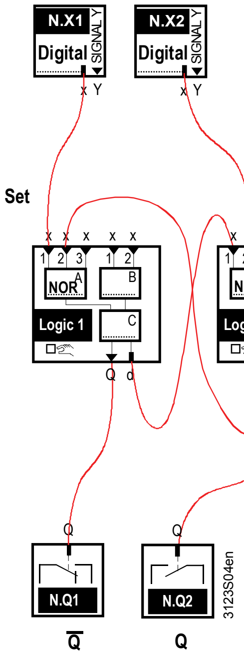


Required configuration and setting values:

Operating line	*Comments*
[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

10.8.12 Application example RS flip-flop

The following application example shows a solution for an RS flip-flop.



Required configuration:

Operating line	*Comments*
Logic 1 [Logic A] function	NOR
Logic 2 [Logic A] function	NOR

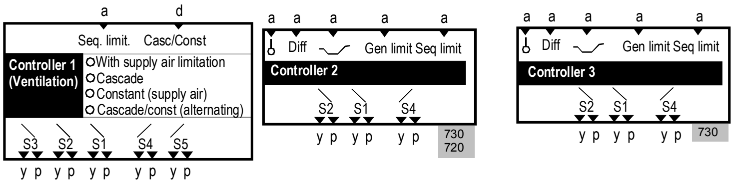
Note

Truth table:

Set	Reset	Q	$\overline{Q}$	State
0	0	X	X	Save
0	1	0	1	Reset
1	0	1	0	Set
1	1			Undef

11 Temperature controller (basic type A)

11.1 General



Controller 1 is specified for ventilation applications as cascade or constant temperature controller. Controller 2 and 3 are universal controllers.

The following control modes are available:
- Supply air temperature control
- Room temperature control (with supply air limitation as an option)
- Extract air temperature control (with supply air limitation as an option)
- Room/supply air temperature cascade control
- Extract air/supply air temperature cascade control

The following controllers (sequence controllers) are available:

RMU710B:	Controller 1
RMU720B:	Controller 1, Controller 2
RMU730B:	Controller 1, Controller 2, Controller 3

11.1.1 Procedure to configure the controllers

Action	*Notes in…*
Define control mode	Section 11.2
The following auxiliary functions can be activated additionally: • Summer/winter compensation (controller 1) • Universal shift (controller 2, controller 3) • General limiter (controller 2, controller 3) • Sequence limiter • Sequence locking acc to OT • Control timeout	 Section 11.9 Section 15.6 Section 15.2 Section 15.3 Section 15.4 Section 15.8
Assign to the individual sequence outputs	Section 15.1.1… 15.1.3
A deviation message can be activated for each controller	Section 15.7
Controller parameters controllers 1-3	Section 15.1.4

11.1.2 Limits and setpoint effects

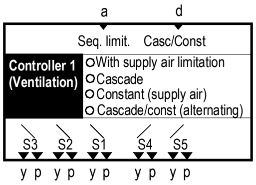
The following functions can have an impact on the setpoints:
- Type of room unit
- Summer / winter compensation (Section 11.9)
- Setpoint limitations (Section 11.10)
- Remote setpoint adjuster, absolute
- Rem setp adjuster relative

11.1.3 Priority of functions

When simultaneously activating different functions acting on the same controller, the following priority applies:

1. Frost protection
2. Locking of sequences after heating/cooling changeover
3. Preheating function
4. Sequence locking acc to OT
5. Sequence limiter
6. Supply air limiter
7. Sequence controller, assignment of aggregates

11.2 Overview of control modes



11.2.1 Activate control modes

The following control modes are available: To activate the various control modes, the following settings must be entered via the operating lines Input identifier, Control strategy, and Casc/const changeover input:

Constant temperature control

Control mode	*Operating line*	*Setting*
Supply air temperature control (section 11.3)	Input identifier N.Xn Control strategy Casc/const changeover input	SAT Constant (supply air) ---
Room temperature control (section 11.4)	Input identifier N.Xn Control strategy Casc/const changeover input	RT (or from bus) Default value (cascade)* ---
Extract air temperature control (section 11.4)	Input identifier N.Xn Control strategy Casc/const changeover input	EAT Default value (cascade)* ---

* For simple constant temperature control of room or extract air temperature, the control strategy is not required; the default value can be retained.

Room temperature control with supply air limitation

Control mode	*Operating line*	*Setting*
Room temperature control with supply air limitation (section 11.5).	Input identifier N.Xn Input identifier N.Xn Control strategy Casc/const changeover input	RT (or from bus) SAT With supply air limitation ---
Extract air temperature control with supply air limitation (section 11.5).	Input identifier N.Xn Input identifier N.Xn Control strategy Casc/const changeover input	EAT SAT With supply air limitation ---

Cascade temperature control

Control mode	*Operating line*	*Setting*
Room / supply air temperature cascade control (section 11.6).	Input identifier N.Xn Input identifier N.Xn Control strategy Casc/const changeover input	RT (or from bus) SAT Cascade ---
Extract air / supply air temperature cascade control (section 11.6).	Input identifier N.Xn Input identifier N.Xn Control strategy Casc/const changeover input	EAT SAT Cascade ---

Cascade / constant temperature control with changeover via Casc/const changeover input (see section 11.7)

Control mode	*Operating line*	*Setting*
Room supply air temperature cascade control (Off for heating, summer) and **supply air temperature control** (On for heating, winter)	Input identifier N.Xn Input identifier N.Xn Control strategy Casc/const changeover input	RT (or from bus) SAT Cascade N.X(n)
Extract air/supply air temperature cascade control (Off for heating, summer) and **supply air temperature control** (On for heating, winter)	Input identifier N.Xn Input identifier N.Xn Control strategy Casc/const changeover input	EAT SAT Cascade N.X(n)

Room control combination with heating controller

Control mode	*Operating line*	*Setting*
Room supply air temperature cascade control (Off for heating, summer) and **supply air temperature control** (On for heating, winter)	Input identifier N.Xn Input identifier N.Xn Control strategy Casc/const changeover input	RT (or from bus) SAT Alternating ---
Extract air/supply air temperature cascade control (Off for heating, summer) and **supply air temperature control** (On for heating, winter)	Input identifier N.Xn Input identifier N.Xn Control strategy Casc/const changeover input	EAT SAT Alternating ---

Note

Cascade/constant temperature control with changeover via bus (= alternating): The ventilation controller together with the heating controller controls the same room (see section 11.8 "Room control combinations with heating controller" or section 11.8.4 "Alternating control strategy").

The following configuration operating lines are used to configure the desired control modes:

Configuration

Main menu > Commissioning > Extra configuration > Input identifier >

Operating line	*Adjustable values / remarks*
N.X(n)	Activate function by assigning the value to the input: Room temperature, Extract air temperature, Supply air temperature
...	Ditto
RMZ788(2).X4	Ditto

Main menu > Commissioning > Extra configuration > Controller 1 >

Operating line	*Range*	*Factory setting*
Control strategy	With supply air limitation, Cascade, Constant (supply air), Alternating	Cascade

Main menu > Commissioning > Extra configuration > Controller 1 > Inputs >

Operating line	*Adjustable values / remarks*
Casc/const changeover input	---, N.X1, N.X2, ... (digital inputs only). Input signal meanings: • Contact closed: Supply air temperature control • Contact open: Cascade control

11.2.2 Troubleshooting

Misconfiguration

Misconfiguration has the following effect:

Operating line	*Setting*	*Type of action*
Input identifier N.X(n)	The required value(s) "Room temperature", "Extract air temperature", or "Supply air temperature" were not assigned	• Controller 1 inactive or • "---- °C" is displayed for the actual value in the corresponding operating line
Input identifier N.X(n)	The same input identifier was assigned multiple times	• Controller 1 is active and uses the input first assigned
Control strategy	Control strategy does not match input identifier N.X(n) or wrong control strategy is set	• Controller 1 inactive or • Controller 1 not visible in menu tree or • Controls as per set control strategy provided the corresponding input identifiers exist

Fault status messages

When exiting the Commissioning menu, a check is made to see if the room temperature, extract air temperature or supply air temperature are connected. If the corresponding temperature is connected but missing later, a message appears.

No.	*Text*	*Effect*
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged
60	Room sensor error plant 1	Non-urgent message; must not be acknowledged

If the main controlled variable is missing, the plant is switched off and fault message "[Main contr var 1] sensor error" is triggered.

No.	*Text*	*Effect*
3011	[Main contr var 1] sensor error	Urgent message, with plant stop; must not be acknowledged.

Control mode	*Main controlled variable*
Supply air temperature control	Supply air temperature
Room temperature control	Room temperature
Extract air temperature control	Extract air temperature
Room temperature control with supply air limitation	Room temperature
Extract air temperature control with supply air limitation	Extract air temperature
Room/supply air temperature cascade control	Supply air temperature
Extract air/supply air temperature cascade control	Supply air temperature

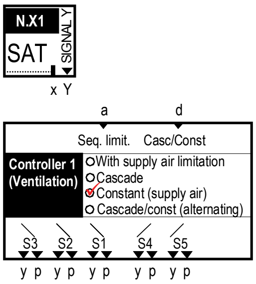
Note

If the input identifier for room temperature is configured in addition to the correctly set control mode next to the input identifier extract air temperature, control always occurs with extract air temperature.

The room temperature can be used for functions such as sustained mode, night cooling to send to the bus or for display.

The effect of having one or several input identifiers connected at the same time is described in detail in section 8.3 Special analog inputs.

11.3 Supply air temperature control



11.3.1 Operating principle

PID control controls the supply air temperature according to the set setpoint.

11.3.2 Supply air setpoints

Specific setpoints can be predefined for operating modes ☼ Comfort, ◐ Precomfort and ☾ Economy.

Setting values

■ **Main menu > Commissioning > Settings > ....** *or*
■ **Main menu > Settings > Controller 1 > Setpoints >**
■ **Main menu > Controller 1>**

Operating line	*Range*	*Factory setting*
☾ Economy cooling setpoint		30 °C
◐ Precomfort cooling setpoint		28 °C
☼ Comfort cooling setpoint		24 °C
☼ Comfort heating setpoint		21 °C
◐ Precomfort heating setpoint		19 °C
☾ Economy heating setpoint		15 °C

Note

If the room temperature is available, functions such as sustained mode and night cooling can be used; setpoint effects are active.

Display values

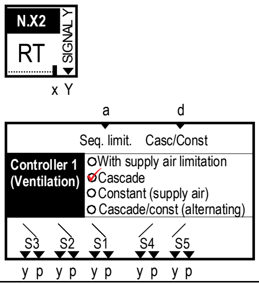
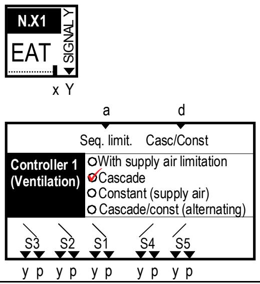
■ **Main menu > Controller 1 >**

Operating line	*Comments*
Actual value supp air temp	
Current supply air temp setpoint	

Setpoint limitations

See Section 11.10

11.4 Room or extract air temperature control

Room temperature control	Extract air temperature control
	

11.4.1 Operating principle

PID control is used to control the supply air temperature to the set setpoint.

11.4.2 Room setpoints

Specific setpoints can be predefined for operating modes Comfort, Precomfort and Economy.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Room setpoints >
■ **Main menu > Controller 1 >**

Operating line	*Range*	*Factory setting*
Economy cooling setpoint		30 °C
Precomfort cooling setpoint		28 °C
Comfort cooling setpoint		24 °C
Comfort heating setpoint		21 °C
Precomfort heating setpoint		19 °C
Economy heating setpoint		15 °C

Note

If a room temperature is still available at selected extract air temperature control, the room temperature is used for functions such as sustained mode, night cooling or setpoint effects.
In case of room temperature control, the room temperature is available for functions such as sustained mode, night cooling, and setpoint effects.

Display values for room temperature control

■ **Main menu > Controller 1>**

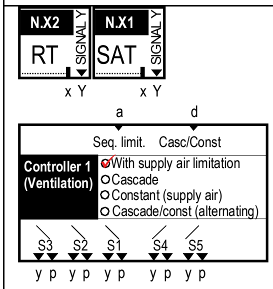
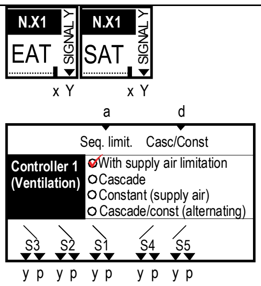
Operating line	*Comments*
Actual value room temp	
Current room temp setpoint	

Display values for extract air temperature control

■ **Main menu > Controller 1>**

Operating line	Comments
Actual value extract air temp	
Current setp extract air temp	

11.5 Room or extract air temperature control with supply air limitation

Room temperature control with supply air limitation	Extract air temperature control with supply air limitation
	

11.5.1 Operating principle

The room/extract air temperature is controlled to the set room setpoint via PID control; supply air may vary within the set limitation values.

Recommendation

For most plants, we recommend to use room / supply air temperature cascade control (PI-PI cascade) which always includes supply air limitation. Room /extract air temperature control with supply air limitation is recommended only where multistage aggregates with large load steps (e.g. 2-stage refrigeration machine with dx expansion cooling) is to be switched.

11.5.2 Room setpoints

Specific setpoints can be predefined for operating modes ☼ Comfort, ◑ Precomfort and ☾ Economy.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Room setpoints >
■ **Main menu > Controller 1>**

Operating line	*Range*	*Factory setting*
☾ Economy cooling setpoint		30 °C
◑ Precomfort cooling setpoint		28 °C
☼ Comfort cooling setpoint		24 °C
☼ Comfort heating setpoint		21 °C
◑ Precomfort heating setpoint		19 °C
☾ Economy heating setpoint		15 °C

Note

If a room temperature is still available at selected extract air temperature control, the room temperature is used for functions such as sustained mode, night cooling or setpoint effects.
In case of room temperature control, the room temperature is available for functions such as sustained mode, night cooling, and setpoint effects.

Setpoint limitations

See Section 11.10

Display values for room temperature control

■ **Main menu > Controller 1 >**

Operating line	*Comments*
Actual value room temp	
Current room temp setpoint	

Display values for extract air temperature control

Operating line	*Comments*
Actual value extract air temp	
Current setp extract air temp	

11.5.3 Supply air limiter

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Supply air limiter >

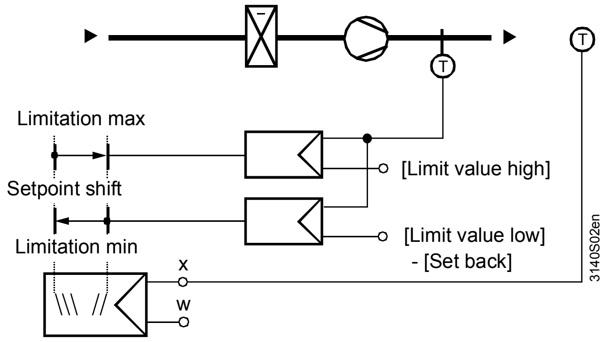
Operating line	*Range*	*Factory setting*
Limit value high		35.0 °C
Limit value low		16.0 °C
Differential high	0.0...500.0 K	50.0 K
Differential low	0.0...500.0 K	50.0 K
Reduction min limitation cooling	0...50 K	0.0 K
P-band Xp	0.0…500.0 K	15 K
Integral action time Tn	00.00...59.55 m:s	02.00 m:s

11.5.4 Operating principle

It is possible to enter absolute and relative limitation. If only one of the these functions is desired, the other function can be deactivated by setting the setpoints far outside.
If there is no supply air temperature sensor, limitation is set inactive.

Supply air limitation, absolute
If the Limit value high or Limit value low is exceeded, the limiter function overrides the normal control function with PI control to adhere to the limitation setpoint.

Application example



Acts an all sequences

Special case

If cooling sequence 4+5 is active, minimum limitation can be lowered by an adjustable value (operating line Reduction min limitation cooling).
This allows to prevent the refrigeration machine from switching off immediately in the case of multi-stage cooling.

Supply air limitation, relative

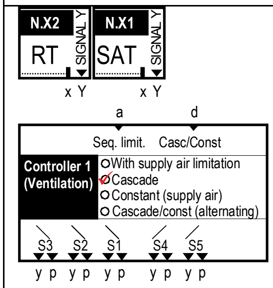
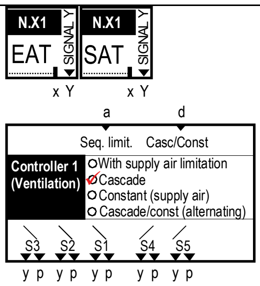
The set limitation setpoints relate to the temperature differential between the room temperature and the supply air temperature.
In addition, a Differential high and Differential low can be entered where the supply air can approximate the room temperature.

Display values

■ **Main menu > Controller 1 >**

Operating line	*Comments*
Actual value supp air temp	

11.6 Room supply or extract air cascade control

Room / supply air cascade control	Extract air / supply air cascade control
	

11.6.1 Operating principle

Note

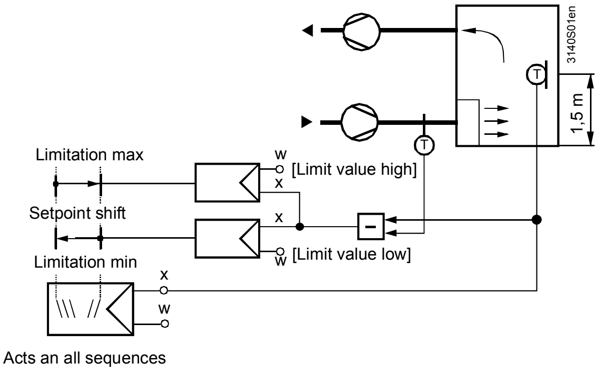
The following description also applies to extract air/supply air cascade.

The main controlled variable is the room temperature.
The PI room temperature controller predefines the setpoint for the supply air temperature within the adjusted limit values (PI-PID room / supply air temperature cascade control).

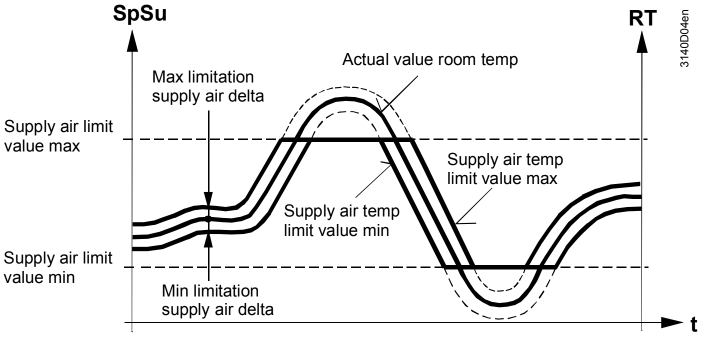
- The following limit values can be predefined for the supply air temperature controller:
- Absolute maximum and minimum limitation of the supply air temperature
- Max and min temperature difference limit control between the current room temperature value and the supply air temperature

Application example

Source air opening: Laminar air flow in occupancy area. Supply air may be introduced e.g. max 4 K below the room temperature.



Function diagram



Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Controller 1 > Cascade controller >

Operating line	*Range*	*Factory setting*
Supply air limit value max		35.0 °C
Supply air limit value min		16.0 °C
Max limitation supply air delta	0.0…50.0 K	50.0 K
Min limitation supply air delta	0.0…50.0 K	50.0 K
Room influence Xp	1.0…100.0	4 K
Room influence Tn	00.00...59.55 mm:ss	10.00 m:s

11.6.2 Room setpoints

Specific setpoints can be predefined for operating modes ☼ Comfort, ◐ Precomfort and ☾ Economy.

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Controller 1 > Room setpoints >

■ **Main menu > Controller 1 >**

Operating line	*Range*	*Factory setting*
☾ Economy cooling setpoint		30 °C
◐ Precomfort cooling setpoint		28 °C
☼ Comfort cooling setpoint		24 °C
☼ Comfort heating setpoint		21 °C
◐ Precomfort heating setpoint		19 °C
☾ Economy heating setpoint		15 °C

Setpoint limitations

See Section 11.10

Display values

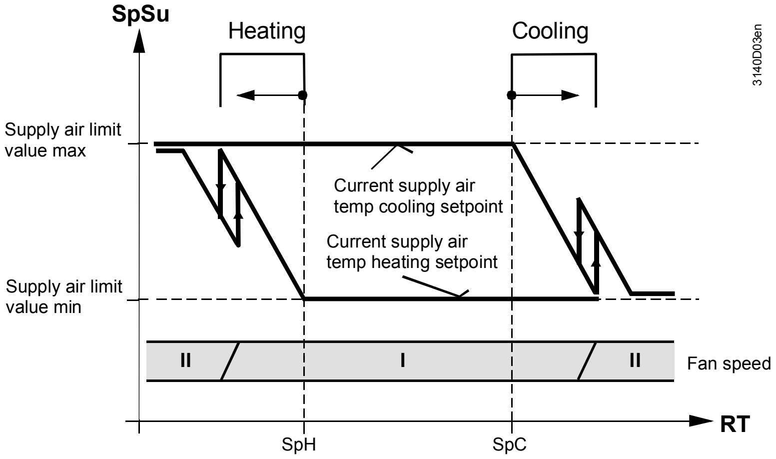
■ **Main menu > Controller 1 >**

Operating line	*Comments*
Actual value room temp	For room / supply air cascade control
Current room temp setpoint	For room / supply air cascade control
Actual value extract air temp	For extract air / supply air cascade control
Current setp extract air temp	For extract air / supply air cascade control
Actual value supp air temp	
Current supply air temp setpoint	

11.6.3 Second fan speed by heat/refrigeration demand

If required, the room temperature controller can switch the fan to speed 2 to provide more heating or cooling energy to the space. This can be activated separately for heating and cooling. For the fan to be switched to speed 2, a 2-speed fan must be configured (see section 10.1 "Fan (basic types A and P)"). The fan is switched according to the following diagram:

Function diagram



Setting values

Main menu > Commissioning > Settings > .... *or*

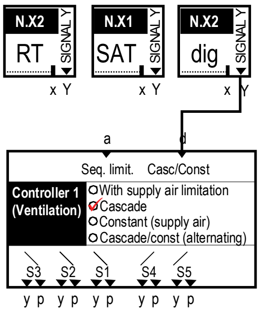
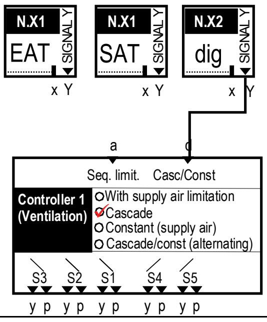
Main menu > Settings > Controller 1 > Cascade controller >

Operating line	*Range*	*Factory setting*
[Speed 2] heat demand	No, Yes	No
[Speed 2] refrigeration demand	No, Yes	No

Note

If the fan is also switched to speed 2 by the IAQ controller (see section 16), e.g. when more outside air is required, the higher value is used (maximum selection).

11.7 Cascade / constant control with changeover via casc/const changeover input

Room supply air temperature cascade control (Off for heating, summer) and **Supply air temperature control** (On for heating, winter)	**Extract air/supply air temperature cascade control** (Off for heating, summer) and **Supply air temperature control** (On for heating, winter)
	

This control mode is sensible if room heating is controlled e.g. via thermostat valves and a ventilation controller is used to cool the same room in summer.

11.7.1 Operating principle

During the heating period (winter and intermediate season), room temperature control is provided by the heating controller. This can be ensured with active room influence or thermostatic radiator valves.
The ventilation controller controls the supply air temperature constantly to the supply air temperature setpoint (see section 11.2.2).

Outside the heating period (in summer), the ventilation controller assumes room temperature control via room supply air cascade control (see section 11.6) or via extract air supply air cascade control (see section 11.6).

Changeover occurs via digital signal at the casc/const changeover input.

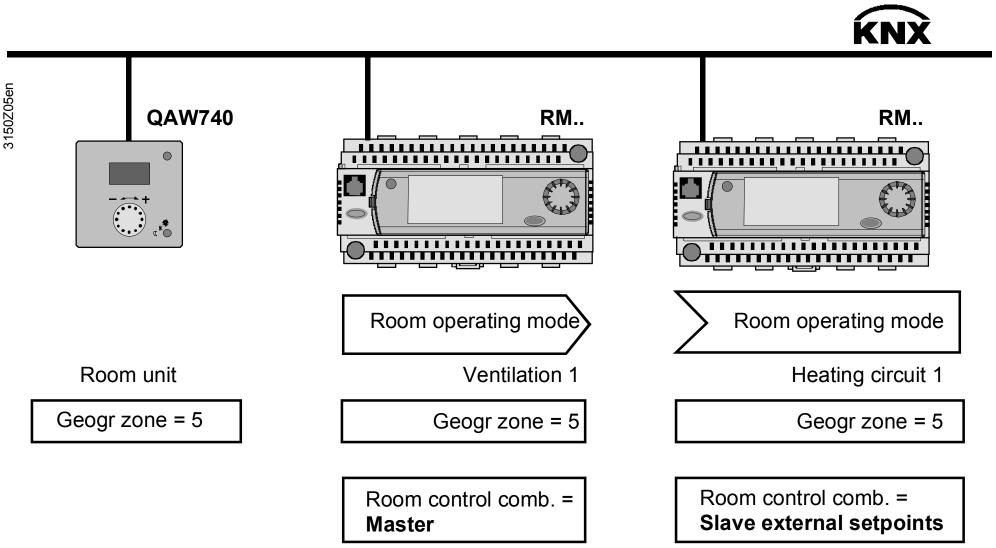
Contact closed:	Supply air temperature control
Contact open:	Cascade control

11.8 Room control combinations with heating controller

If a heating and ventilation controller together control the same room and are connected to the same bus, they can exchange information.

Both controllers must have the same geographical zone and both must work with the same room operating mode.

The room control combination (see section 6.13.2) at the ventilation controller must be set to master.



The ventilation controller sends the values ☼ Comfort heating setpoint, ◐ Precomfort heating setpoint, and ☾ Economy heating setpoint to the heating controller via bus to overwrite the setpoints in the heating controller. Heating and ventilation controller thus use the same setpoints.
These values can no longer be set on the heating controller. If a readjustment is needed, it must be entered on the ventilation controller (master).

When cooling is called for while the heating plant is on, the heating is immediately switched off. It can be switched on again only after all cooling sequences of the ventilation controller are shut down.

Technical plant conditions may need to be observed depending on the ventilation controller control mode. These are described in the following sections.

11.8.1 Control mode for supply air temperature control

When control strategy "Supply air temperature control" is selected on the ventilation controller, room temperature control can be provided by the heating controller (room influence activated or thermostatic radiator valves fitted).

Operating principle

In the ☼ Comfort and ◐ Precomfort modes, the heating controller ensures that the required room temperature is maintained. The ventilation controller controls the supply air to the set supply air temperature setpoint. In ☾ Economy mode and when heating is on (in winter and during intermediate seasons), the sustained "Heating" function on the ventilation controller is deactivated. It is released again only when the heating controller switches off.

11.8.2 Control mode for room or extract air temperature control

When the ventilation controller activates "Room temperature control", room influence on the heating controller must be switched off. Also, there may be no thermostatic radiator valves fitted in the room.
Both controllers must have the same geographical zone set.

Operating principle

In the ☼ Comfort and ◐ Precomfort modes, the ventilation controller ensures that the required room temperature is maintained. The heating system controls the weather-compensated flow temperature. In ☾ Economy mode, the ventilation controller is normally switched off, and the heating system controls the weather-compensated flow temperature. When the heating system is on (in winter and during intermediate seasons), the sustained "Heating" function on the ventilation controller is deactivated. It is released again only when the heating controller switches off.

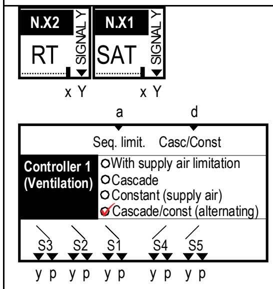
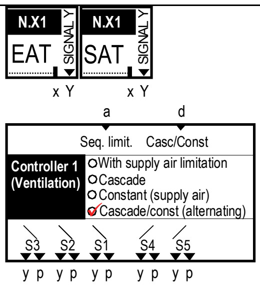
11.8.3 Room supply or extract air cascade control

When the ventilation controller activates control function "Room / supply air temperature cascade control", room influence on the heating controller must be switched off. Also, there may be no thermostatic radiator valves fitted in the room.
Both controllers must have the same geographical zone set.

Operating principle

In the ☼ Comfort and ◐ Precomfort modes, the ventilation controller ensures that the required room temperature is maintained.
The heating system controls the weather-compensated flow temperature. In ☾ Economy mode, the ventilation controller is normally switched off, and the heating system controls the weather-compensated flow temperature. When the heating system is on (in winter and during intermediate seasons), the sustained "Heating" function on the ventilation controller is deactivated. It is released again only when the heating controller switches off.

11.8.4 Alternating control strategy

Room supply air temperature cascade control (Off for heating, summer) and **Supply air temperature control** (On for heating, winter)	**Extract air/supply air temperature cascade control** (Off for heating, summer) and **Supply air temperature control** (On for heating, winter)
	

Operating principle

During the heating period (winter and intermediate season), room temperature control is provided by the heating controller. This can be ensured with active room influence or thermostatic radiator valves.
The ventilation controller controls the supply air temperature constantly to the supply air temperature setpoint (see section 11.2.2).
Outside the heating period (in summer), the ventilation controller assumes room temperature control via room supply air cascade control (see section 11.6) or via extract air supply air cascade control (see section 11.6).

The changeover heating period / no heating period occurs automatically based on the heating limit switch at the heating controller. The heating controller sends its signal via the bus to the ventilation controller which adapts its control mode accordingly.
When cooling is called for while the heating plant is on, the heating system immediately is switched off. It can be switched on again only after all cooling sequences of the ventilation controller are shut down.

11.9 Summer/winter compensation

11.9.1 Activate block

Summer/winter compensation is active when the outside temperature is available.

Setting values

Main menu > Commissioning > Settings > .... *or*

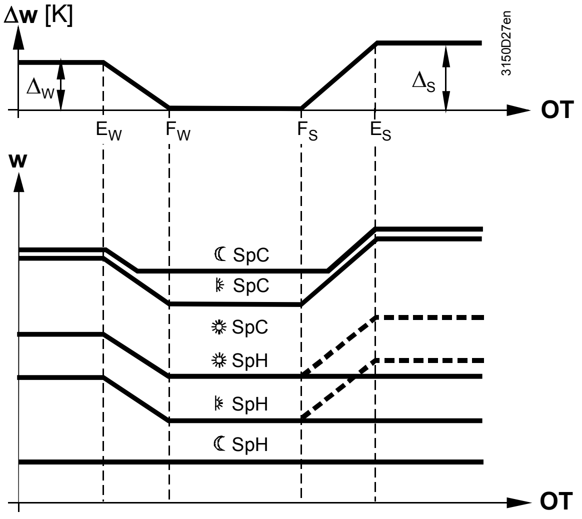
Main menu > Settings > Controller 1 > Setpoint effects >

Operating line	*Range*	*Factory setting*
Summer compensation delta	0.0...+50.0 K	2 K
Summer compensation end	20.0...250.0 °C	30.0 °C
Summer compensation start	0.0...30.0 °C	20.0 °C
Winter compensation start	−10.0...+20.0 °C	0.0 °C
Winter compensation end	−50.0... 0.0 K	−10.0 °C
Winter compensation delta	–50.0...+50.0 K	1 K
Increase heating setpoint	Yes, No	No

11.9.2 Operating principle

For the temperature controller, the setpoint can be shifted according to the outside temperature.
The setpoint shift acts on the Comfort and Precomfort setpoints according to the following diagram:

Function diagram



Key

F_S	Summer compensation start
E_S	Summer compensation end
E_W	Winter compensation end
F_W	Winter compensation start
Δs	Summer compensation delta
Δw	Winter compensation delta

The diagram shows case "Increase heating setpoint" to No; if Yes, the Comfort and Precomfort setpoints are increased by the summer compensation delta value e.g. in the event of dehumidification (dotted line in diagram).

Application examples

- Summer compensation to compensate for summer clothing worn by occupants.
- Winter compensation to compensate for cold glass surfaces in the room.

11.9.3 Troubleshooting

If the outside temperature is not available, the setpoint is not shifted.

11.10 Setpoint limitations

11.10.1 Activate function

Setpoints can be limited to save as much energy as possible. This function is made available in Comfort and Precomfort modes. This setting can only be made on controller 1 in basic type A.

Setting values

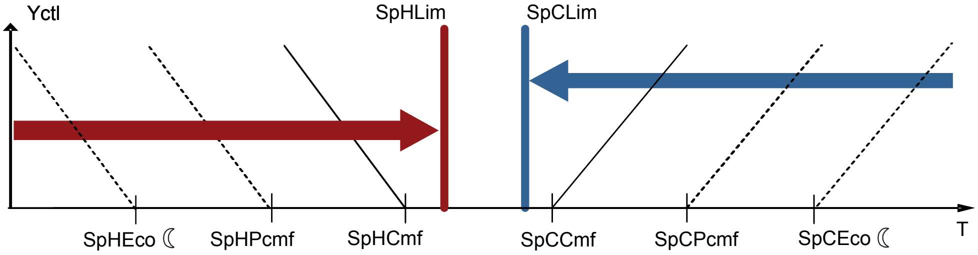
Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Setpoint effects >

Operating line	*Range*	*Factory setting*
Cooling setpoint limitation	---, -50.0…250 °C	---
Heating setpoint limitation	---, -50.0…250 °C	---

11.10.2 Operating principle

"Cooling setpoint limitation" (SpCLim) and "Heating setpoint limitation" (SpHLim) sets a minimum and maximum temperature value. The limit value cannot drop below or exceed the absolute or relative setpoint adjusted or summer/winter compensation. The cooling setpoint limitation and heating setpoint limitation are disabled by default (---°C).

Function diagram



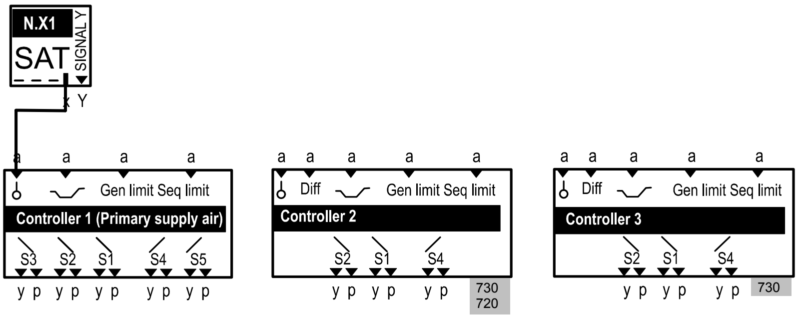
Note

This setting is available for subsequent control types:

- Supply air temperature control (Section 11.3)
- Room or extract air temperature control (Section 11.4)
- Room or extract air temperature control with supply air limitation (Section 11.5)
- Room supply or extract air/supply air cascade control (Section 11.6)

12 Supply air temperature controller, demand-controlled (type P)

12.1 General



Controller 1 is intended for demand-controlled supply temperature control with individual VAV room controllers. Input N.X1 is reserved for the supply air temperature sensor. Controller 2 and 3 are universal controllers.

The following controllers (sequence controllers) are available:

RMU710B:	Controller 1
RMU720B:	Controller 1, Controller 2
RMU730B:	Controller 1, Controller 2, Controller 3

12.2 Activate function

Main controlled variable configuration occurs via basic type selection.

Configuration

Main menu > Commissioning > Extra configuration > Controller 1 > Inputs >

Operating line	*Adjustable values / remarks*
Main controlled variable	N.X1 (read-only).

12.2.1 Further procedure to configure the controllers

Action	*Notes in…*
The following auxiliary functions can be activated additionally: • Universal shift. • General limiter • Sequence limiter • Sequence locking acc to OT • Control timeout	 Section 15.6 Section 15.2 Section 15.3 Section 15.4 Section 15.8
Assign to the individual sequence outputs.	Section 15.1.1 …15.1.3
A deviation message can be activated for each controller.	Section 15.7
Control parameters controller 1-3	Section 15.1.4

12.2.2 Limits and setpoint effects

The following function can have an impact on the supply air setpoints:

- Universal shift (e.g. by outside temperature).

12.2.3 Priority of functions

When simultaneously activating different functions acting on the same controller, the following priority applies:

1. Frost protection.
2. Locking of sequences after heating/cooling changeover.
3. Preheating function.
4. Sequence locking acc to OT.
5. Sequence limiter
6. General limiter

12.3 Demand-dependent plant operation

The air handling unit is switched on/off by supply air heat/refrigeration demand signals from the individual room controllers via KNX bus.

Setting values

Main menu > Commissioning > Settings > Operating mode .... *or*
Main menu > Settings > Operating mode

Operating line	*Range*	*Factory setting*
Min number of VAV	1…8	1

Plant operation switch-on conditions

The air handling unit is first switched on upon reaching a specified number of demand signals from individual room controllers. This "Minimum number VAV" can be set.
This eliminates inefficient switching on and off of the air handling unit by individual VAV demand signals outside occupancy as per switching program.

Required settings

- The value for the "geographic zone (Apartment" must be set if the local time switch 1 is active on the RMU controller. Additional information is available in Section 28.2.2 (Sub-menu "Room")
- The setting value "Air distribution zone" defines assignment of individual room controllers to the corresponding primary air handling unit. Additional information is available in Section 28.2.5 (Sub-menu "Distribution zone")

Non-communicative individual room controllers

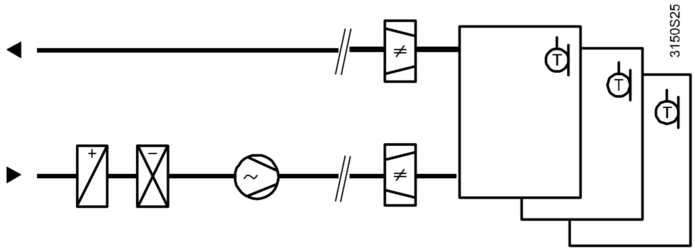
A demand input on the RMU controller is available for non-communicative individual room controllers (i.e. non KNX).
Supply air control is operated at constant setpoint if a demand signal is configured for this type of individual room controller (see Section 6.6 above).

12.4 Demand-controlled supply air temperature control

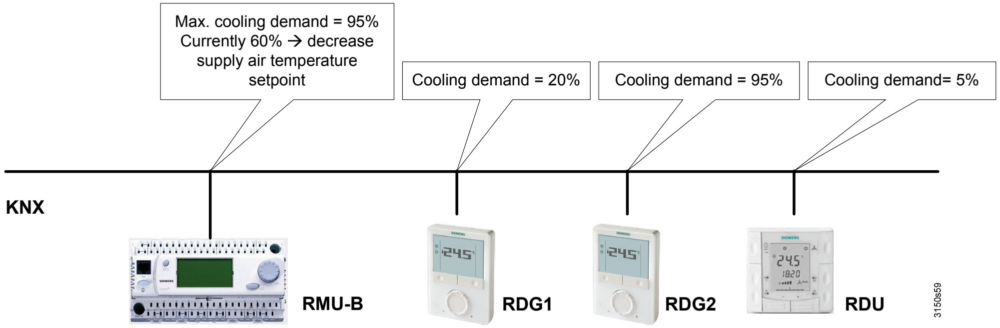
The individual room controllers send their supply air demand signals (heat or refrigeration) via KNX bus to the air handling unit. The air handling unit determines and optimizes the supply air temperature setpoint from these demand signals.

Function principle

Plant level:



Bus signal level:



Setpoint determination

The supply air temperature setpoint is determined within the limits of "Supply air limit value min" and "Supply air limit value max" starting at the start value in maintaining the limit and transition ranges linearly to the demand signals.

Note

The start values for the supply air temperature setpoint optimization is calculated based on the outside temperature to more quickly achieve the supply air temperature setpoint.

Optimization setpoint

- If individual room controllers are in heating mode, the supply air temperature setpoint is increased by current demand up to max value "Supply air limit value max".
- If individual room controllers are in cooling mode, the supply air temperature setpoint is reduced by current demand up to minimum value "Supply air limit value min".

Note

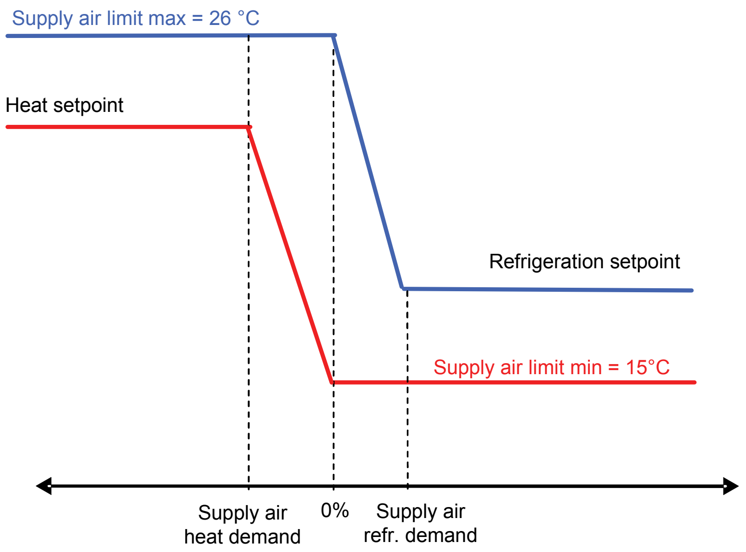
The following principle applies: Cooling takes priority over heating, i.e. the heat demand signal is ignored when occurring simultaneously to the refrigeration demand signal.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Setpoints >
■ **Main menu > Controller 1 >**

Operating line	*Range*	*Factory setting*
Supply air limit value max	Supply air limit value min ... 250°C	26 °C
Supply air limit value min	-50°C… Supply air limit value max	15 °C

Function diagram



Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Setpoints >

Operating line	*Range*	*Factory setting*
Control action	Slow, Medium, Fast	Medium
Request evaluation	Maximum, Average	Maximum
Start ramp	00.00...59.55 m:s	20 min

Control action

The rate at which supply air setpoints are optimized is defined via the "Control action" setting parameter.

Evaluation of request

In addition, you can also define how to evaluate the demand signal.

- Maximum: Only the largest heat or refrigeration demand signal is considered for shifting.
- Average: All heating or refrigeration demand signals are considered as average values for shifting.

Ramp-up

Ramp-up serves as the transition period to collect representative demand signals required to calculate setpoints ("Present setpoint for cooling", "Present setpoint for heating").
The recommended values for ramp-up depend on the control response:

Control action	**Ramp-up**
Slow	50 min
Medium	20 min
Fast	10 min

Note

An additional universal shift is possible here. It takes priority over demand-controlled optimization and can adjust the supply air setpoints above or below the supply air limit value max / min.

Display values

■ **Main menu > Controller 1 >**

Operating line
Actual value supp air temp
Current supply air temp setpoint

For diagnostic purposes, the current supply air cooling and heating setpoint can be displayed at the password level.

Main menu > Controller 1 >

Operating line
Current supply air temp setpoint
Current cooling setp supply air
Current heating setp supply air

The current energy demand heat and refrigeration from the individual room controllers is displayed for diagnostics.

Main menu > Diagn air duct network > Supp air temp optimization >

Supply air heat demand	Supply air heat demand of all received demand signals in the corresponding air distribution zone. 0%... 100%
Supply air refrigeration demand	Supply air refrigeration demand of all received demand signals in the corresponding air distribution zone. 0%... 100%

Note

Demand signals are set to 0% and the function is disabled if a demand signal is configured for the plant operating mode selection. Refer to section 6.6 above.

12.5 Troubleshooting

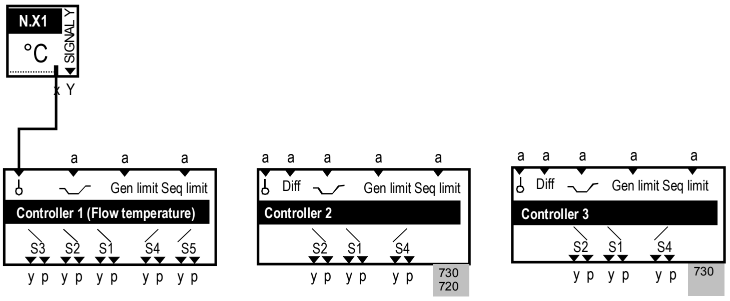
If the supply air temperature is missing, the plant is switched off and fault message "[Main contr var 1] sensor error" is triggered.

Fault status messages

No.	*Text*	*Effect*
3011	[Main contr var 1] sensor error	Urgent message, with plant stop; must not be acknowledged.

13 Flow temperature, demand-controlled (basic type C)

13.1 General



With basic type C, controller 1 is reserved for demand-dependent flow temperature control (chilled water). Input N.X1 is reserved for the flow temperature sensor. Controller 2 and 3 are universal controllers.

The following controllers (sequence controllers) are available:

RMU710B:	Controller 1
RMU720B:	Controller 1, Controller 2
RMU730B:	Controller 1, Controller 2, Controller 3

13.2 Activate function

Main controlled variable configuration occurs via basic type selection.

Configuration

Main menu > Commissioning > Extra configuration > Controller 1 > Inputs >

Operating line	*Adjustable values / remarks*
Main controlled variable	N.X1 (read-only)

13.2.1 Further procedure to configure the controllers

Action	*Notes in…*
Define control mode • Chilled water precontrol • Precontrol for 2-pipe systems	 Section 13.3 Section 13.4
The following auxiliary functions can be activated additionally: • Universal adjustment • General limiter • Sequence limiter • Sequence locking acc to OT • Control timeout	 Section 15.6 Section 15.2 Section 15.3 Section 15.4 Section 15.8
Assign to the individual sequence outputs	Sect.15.1.3
A deviation message can be activated for each controller	Section 15.7
Control parameters controllers 1…3	Section 15.1.4

13.2.2 Limits and setpoint effects

The following function can have an effect on the setpoints:
- Universal shift

13.2.3 Priority of functions

When simultaneously activating different functions acting on the same controller, the following priority applies:

1. Locking of sequences after heating/cooling changeover
2. Preheating function
3. Sequence locking acc to OT
4. Sequence limiter
5. General limiter

13.3 Chilled water precontrol

If the RMU7...B controller is used for chilled water precontrol, the subsequent control loops can send their refrigeration demand signal via the bus to precontrol. The RMU7...B controller can receive these signals and evaluate them, thus ensuring optimum flow temperature control.

At the same time, a digital signal can also be accepted and evaluated from devices without communication (see section 6.6 "Plant operating mode selection via request input (basic type P, C)").

13.4 Precontrol for 2-pipe system (H/C) with summer/winter changeover

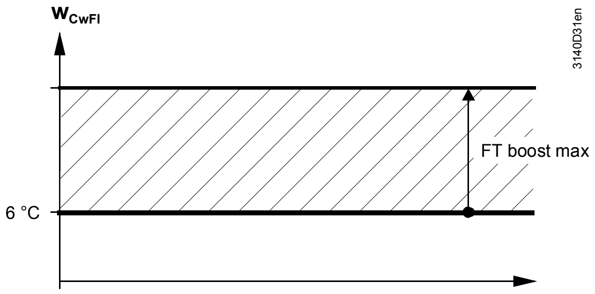
If the RMU7...B controller is used for the precontrol of a 2-pipe system, the main control loops can send their heat / refrigeration demand signals via the bus to precontrol. The RMU7...B controller can receive these signals and evaluate them, thus ensuring optimum flow temperature control.

To activate the controller as hot/chilled water controller, the controller must be configured as 2-pipe system heating/cooling (see section 27 "Heating/cooling changeover").

13.5 Setpoints

A "Chilled water flow setpoint" and a "Flow temperature increase max" can be set. With 2-pipe systems, it is also possible to set a "Heating flow setpoint" and a "Flow temperature reduction max". Both functions are switched off by default (= 0 K).

Function diagram

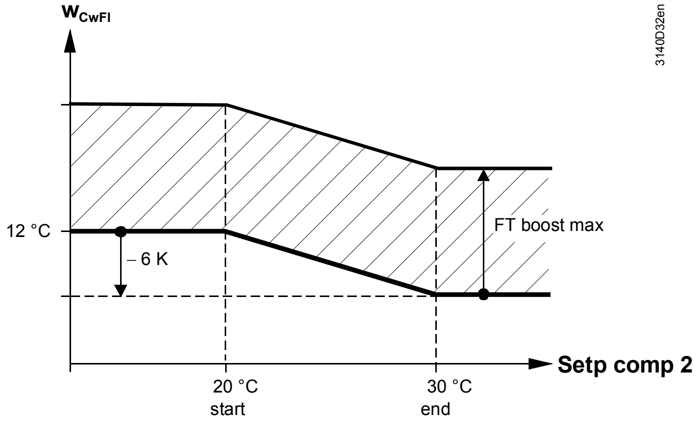


Key:

w_{CwFl}	Chilled water flow setpoint

The "Chilled water flow setpoint" can be shifted via universal shift.

Function diagram



Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Controller 1 > Setpoints >

Operating line	*Range*	*Factory setting*
Heating flow setpoint [1]	-50...250 °C	40 °C
Flow temperature reduction max [1]	0...100 K	0 K
Chilled water flow setpoint	-50...250 °C	6 °C
Flow temperature increase max	0...100 K	0 K

[1] Available only for configuration of a 2-pipe system

Display values

Main menu > Controller 1 >

Operating line	*Comments*
Actual value	
Current setpoint	

13.6 Request signals

13.6.1 Possible chilled water request signals

The following request signals can be handled depending on the main control loop:

- Valve position (e.g. from RMU7..B control as basic type A for an air handling plant with a cooling coil) via the bus
- Refrigeration demand in % (e.g. from individual room control "Cooling coil") via the bus
- Refrigeration demand in °C (e.g. from RMU7...B main chilled water control as basic type C) via the bus
- Refrigeration demand as digital input (see section 6.6 "Plant operating mode selection via request input (basic type P, C)")

All of these signals can be handled simultaneously.

Request signal "Valve position in %"

This request signal can be sent by a controller RMU7..B basic type A or U or by an RXB room controller. The signal can be handled by any number of controllers.

Condition

The only condition is that all of them have the same chilled water distribution zone set. With 2-pipe systems, the same hot water distribution zone must also be set.

The type of maximum selection is made via the demand signals. The type of maximum selection can be set.

- Maximum: For shifting, only the largest signal is considered
- Average: For shifting, the 4 largest signals are considered. These 4 values are used to generate an average signal

The controller controls the valve position to 90% by increasing the flow temperature based on the set "Chilled water flow setpoint" by the set "Flow temperature increase max".

The control action can be matched to the type of plant.
The following settings are possible:

- Slow
- Medium
- Fast

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Setpoints >

Operating line	*Range*	*Factory setting*
Control action	Slow, Medium, Fast	Medium
Request evaluation	Maximum, Average	Maximum

Refrigeration request signal in °C

This request signal can be set by a controller RMU7..B basic type C. A chilled water flow temperature setpoint is predefined for the controller via this signal. On the controller, the predefined setpoint can be limited via the settings "Chilled water flow setpoint" and "Flow temperature increase max"; universal setpoint shift may not be activated.

If the request signal is only used as a switch-on/switch-off command of the primary controller, a chilled water flow setpoint can be predefined; in addition, this setpoint can be shifted by using the universal shift, and setting value "Flow temperature increase max" must be set to "OK".

Request input

Configuration

Main menu > Commissioning > Extra configuration > Operating mode >

Operating line	*Adjustable values / remarks*
Request input	---, N.X1, N.X2, ... (digital and analog values only).

If there is a request at the digital input, the setpoint called for is the value set under "Setpoints" (section 13.5).

See section 6.6 "Plant operating mode selection via request input (basic type P, C)" for settings.

Setting "Flow temperature increase max" has no effect; the calculated setpoint is also shifted by the universal setpoint shift.

A combination of the digital input for devices without communication with other request signals via communication is possible. The current setpoint then is the lowest setpoint called for.

13.6.2 Possible hot water request signals

The following request signals can be handled depending on the main control loop:

- Valve position (e.g. from RMU7..B control as basic type A for an air handling plant with a heating coil) via the bus
- Heat demand in % (e.g. from individual room control "RXB with heating register") via the bus
- Heat demand in °C (e.g. from a heating controller or apartment control station) via the bus
- Demand as digital input (see section 6.6 "Plant operating mode selection via request input (basic type P, C)")

All of these signals can be handled simultaneously.

See section 13.6.1 for a description of the request signal "Valve position in %".

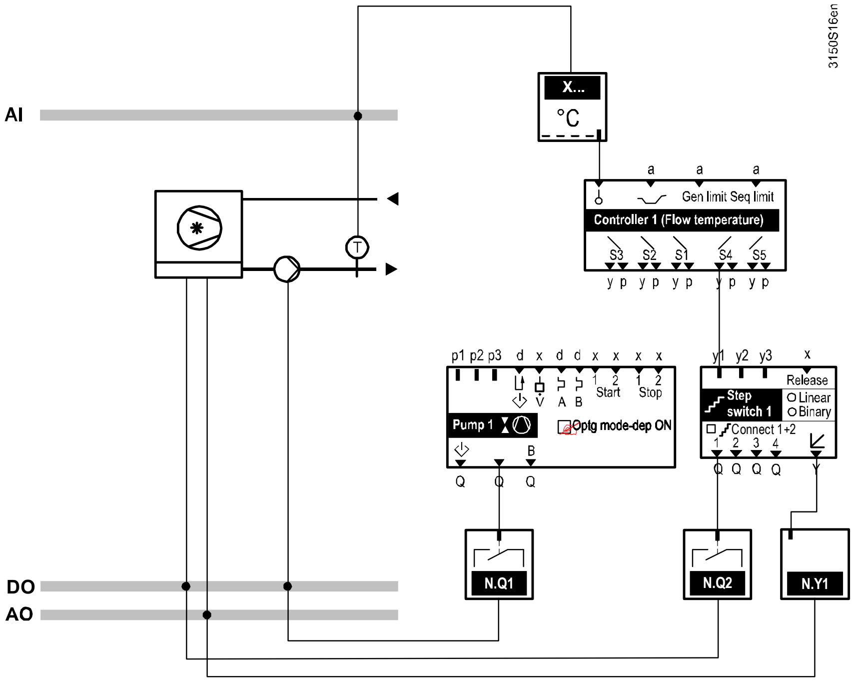
Heat request signal in °C

This request signal can be sent by a heating controller e.g. RMH760 or QAX910. This signal is used to predefine a heating flow setpoint for the controller. On the controller, the predefined setpoint can be limited via the settings "Heating flow temperature setpoint" and "Flow reduction maximum"; universal shift may not be activated.

If the request signal is only used as a switch-on/switch-off command of the precontroller, a heating flow setpoint can be predefined; in addition, this setpoint can be shifted by using the universal shift, and setting value "Flow temperature reduction max" must be set to "OK".

13.7 Application examples

Application example 1

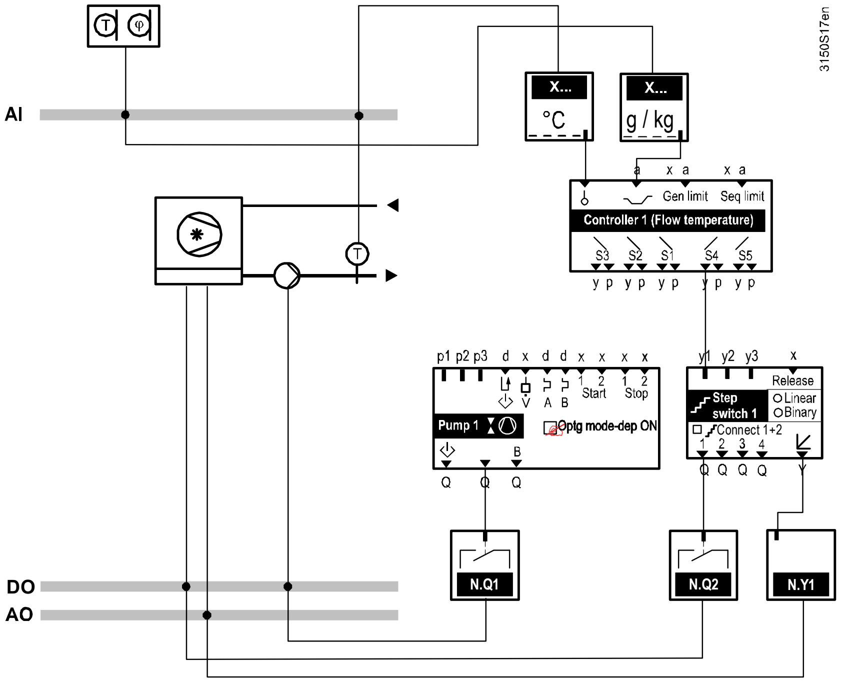


Depending on demand, the chilled water flow is to be maintained at a level between 6 °C and maximum 20 °C.

Settings:

- Chilled water flow setpoint = 6 °C
- Flow temperature increase max = 14 K
- No setpoint compensation

Application example 2



As soon as refrigeration is called for, the plant is operated at a fixed flow temperature of 8 °C. The demand signal is only used for switching control on and off. To prevent condensation, the flow temperature is to be raised when outside air humidity rises excessively.

Settings:

- Chilled water flow setpoint = 8 °C
- Flow temperature increase max = 0 K
- Setpoint compensation by outside air humidity absolute (with enthalpy calculation SEZ220 or RMS705B):
  [w-compensation 1] Delta = 10 K
  [w-compensation 1] Start = 6 g/kg
  [w-compensation 1] Endp = 13 g/kg
  [w-compensation 2] Delta = 0 K

13.8 Troubleshooting

If the flow temperature is missing, the plant is switched off and fault message [Main contr var 1] sensor error" is triggered.

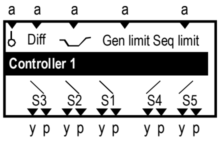
If the bus anticipates a heating / cooling changeover signal but no such signal is sent, a fault message is generated and the plant set to heating operation.

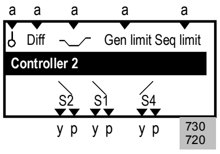
Fault status messages

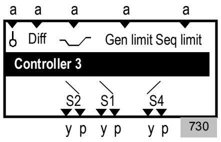
No.	*Text*	*Effect*
3011	[Main contr var 1] sensor error	Urgent message, with plant stop; must not be acknowledged
5801	H/C changeover signal failure	Urgent message; must not be acknowledged

14 Universal controller (basic types A, P, C, U)

14.1 General







This universal controller can be activated for controller 1, basic type U, and controllers 2 and 3 of all basic types. Assign an input to the main controlled variable to activate the controller.

The universal controller can provide control to an absolute variable or differential variable.

The following controllers (sequence controllers) are available:

RMU710B:	Controller 1
RMU720B:	Controller 1, Controller 2
RMU730B:	Controller 1, Controller 2, Controller 3

14.2 Activate function

Configuration

Main menu > Commissioning > Extra configuration > Controller 1..3 > Inputs >

Operating line	*Adjustable values / remarks*
Main controlled variable	---, N.X1, N.X2, ... (analog values only) / Activate main controlled variable
Main controlled variable	---, N.X1, N.X2, ... (analog values only) / Activate differential control

The following settings are required depending on the desired function:

Desired control	*Operating line*	*Setting*
Control to a sensor input	Main controlled variable Differential input	Xx (analog) ---
Differential control	Main controlled variable Differential input	Xx (analog) Xx (same unit as main controlled variable)

The sequence controller always uses the same unit as that of the main controlled variable (e.g. main controlled variable is the room temperature: Unit °C).

With controllers 2 and 3, the setpoint of controller 1 can be configured as a differential input. As a result, it is possible e.g. to use controller 2 as a differential controller with controller 1.

Note

Misconfiguration has the following effect:

Operating line	*Setting*	*Type of action*
Main controlled variable Differential input	--- (not relevant).	Controller inactive ---
Main controlled variable Differential input	Xx (digital) (not relevant).	Message "[Main contr var 1] sensor error" is issued
Main controlled variable Differential input	Xx (analog) Xx (not same unit as main controlled variable)	Control to absolute variable

14.2.1 Operating principle

PID control controls the main controlled variable according to the defined setpoint.

14.2.2 Setpoints

Controllers 2+3, basic type A; controllers 1+2+3, basic type U:
Specific setpoints can be predefined for the ☼ Comfort and ◐ Precomfort modes.

Controllers 2+3 basic type C and basic type P:
Setpoints can only be predefined for ☼ Comfort mode.

We differentiate between the following:

- Heating setpoints (sequence 1+2+3)
- Cooling setpoints (sequence 4+5)
- The following functions can influence the setpoints:
- Universal shift (see section 15.6)
- Remote setpoint adjuster, absolute (see section 8.7)

Setting values

▨ **Main menu > Commissioning > Settings > ....** *or*
▬ **Main menu > Settings > Controller 1...3 > Setpoints >**
■ **Main menu > Controller 1…3 >**

Operating line	*Factory setting*
◐ Precomfort setpoint high	28 °C, 28 K, 80 %, 12 g/kg, 50 kJ/kg, 1000 W/m2, 15 m/s, 100 bar, 1000 mbar, 1000 Pa, 1500 ppm, 100, 1000
☼ Comfort setpoint high	24 °C, 25 K, 60 %, 10 g/kg, 30 kJ/kg, 800 W/m2, 15 m/s, 100 bar, 1000 mbar, 1000 Pa, 1000 ppm, 100, 1000
☼ Comfort setpoint low	21 °C, 21 K, 40 %, 6 g/kg, 20 kJ/kg, 600 W/m2, 10 m/s, 6 bar, 60 mbar, 400 Pa, 60 ppm, 600
◐ Precomfort setpoint low	19 °C, 19 K, 20 %, 4 g/kg, 0 kJ/kg, 200 W/m2, 0 m/s, 0 bar, 0 mbar, 0 Pa, 0 ppm, 0

Display values

■ **Main menu > Controller 1…3 >**

Operating line	*Comments*
Actual value	
Current setpoint	

14.2.3 Troubleshooting

If there is no main controlled variable or no differential input, the plant is switched off and fault message "[Main contr var 1] sensor error", "[Main contr var 2] sensor error" or "[Main contr var 3] sensor error" is triggered.

Fault status messages

No.	*Text*	*Effect*
3011	[Main contr var 1] sensor error	Urgent message, with plant stop; must not be acknowledged
3012	[Main contr var 2] sensor error	Urgent message, with plant stop; must not be acknowledged
3013	[Main contr var 3] sensor error	Urgent message, with plant stop; must not be acknowledged

15 Sequence controller

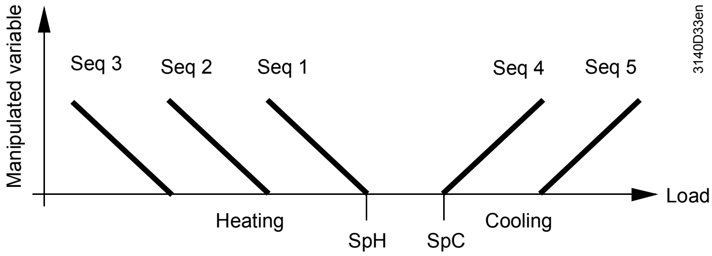
15.1 Sequence controller structure

The sequence controller is activated by assigning a main controlled variable. See sections 11, 12, 0 and 14 for the associated settings.

Controller 1

Controller 1 can contain max 5 sequences in the following combinations:
- One sequence: Sequence 1 or sequence 4
- Two sequences: Sequence 1+2, or sequence 1+4, or sequence 4+5
- Three sequences: Sequence 1+2+3, or sequence 1+2+4, or sequence 1+4+5
- Four sequences: Sequence 1+2+3+4, or sequence 1+2+4+5
- 5 sequences: Sequence 1+2+3+4+5

Function diagram

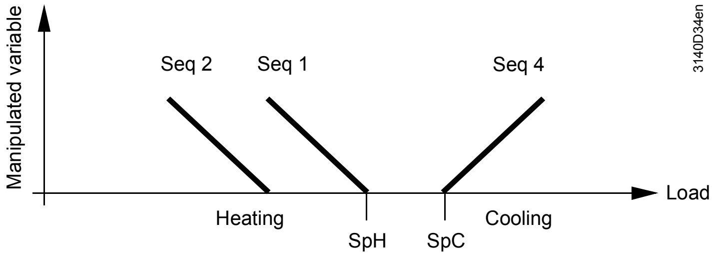


The heating setpoint is assigned to the combined sequences 1, 2 and 3. Their output signal acts reversed to the load (input variable), e.g. heating.
The cooling setpoint is assigned to the combined sequences 4 and 5. Their output signal acts directly to the load (input variable), e.g. cooling.

Controllers 2+3

Controllers 2+3 can contain max 3 sequences in the following combinations:
- One sequence: Sequence 1 or sequence 4
- Two sequences: Sequence 1+2, or sequence 1+4
- Three sequences: Sequence 1+2+4

Function diagram



The heating setpoint is assigned to the combined sequences 1 and 2. Their output signal acts reversed to the load (input variable), e.g. heating.
The cooling setpoint is assigned to sequence 4. Its output signal acts directly to the load (input variable), e.g. cooling.

15.1.1 Assign aggregates to sequences

Each sequence can be assigned:
- 1 load output
- 1 pump output

Note

The functions "Heat demand" (see section 25) and "Refrigeration demand" (see section 26) also process the output signal of the sequence controller. The relevant settings are described with these functions.

Configuration

Main menu > Commissioning > Extra configuration > Controller 1...3 > Outputs \ \ _ >

Operating line	*Adjustable values / remarks*
[Sequence 1] load	---, Modulating output A..D, Step switch 1..5, Heat recovery equipment, Mixed air damper
[Sequence 1] pump	---, Pump 1...4
[Sequence 2] load	---, Modulating output A..D, Step switch 1..5, Heat recovery equipment, Mixed air damper
[Sequence 2] pump	---, Pump 1...4
[Sequence 3] load1)	---, Modulating output A..D, Step switch 1..5, Heat recovery equipment Mixed air damper
[Sequence 3] pump1)	---, Pump 1..4

1) only available in controller 1

Main menu > Commissioning > Extra configuration > Controller 1...3 > Outputs _ / / >

Operating line	*Adjustable values / remarks*
[Sequence 4] load	---, Modulating output A..D, Step switch 1..5, Heat recovery equipment, Mixed air damper
[Sequence 4] pump	---, Pump 1..4
[Sequence 5] load1)	---, Modulating output A..D, Step switch 1..5, Heat recovery equipment, Mixed air damper
[Sequence 5] pump1)	---, Pump 1..4

1) only available in controller 1

A sequence is activated by assigning either a load output or pump output to it. If none of the 2 is assigned to a sequence, this sequence and all subsequent sequences are inactive.

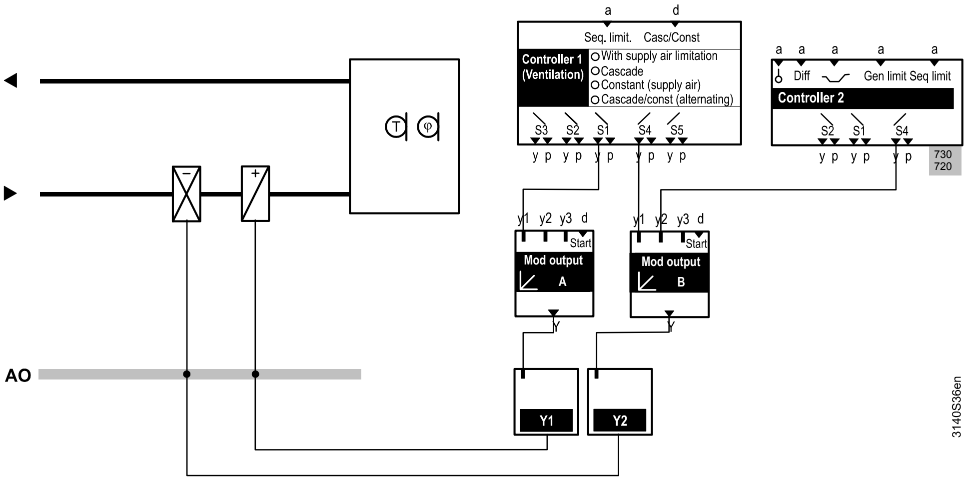
15.1.2 Load outputs

Load outputs are:
- Modulating output A…D
- Heat recovery equipment
- Mixing damper
- Step switch 1…5

Only one load output can be assigned to each sequence. Each load output can be controlled by max 2 to 3 sequences (depending on function block).

Application example

Cooling and dehumidification.



Note

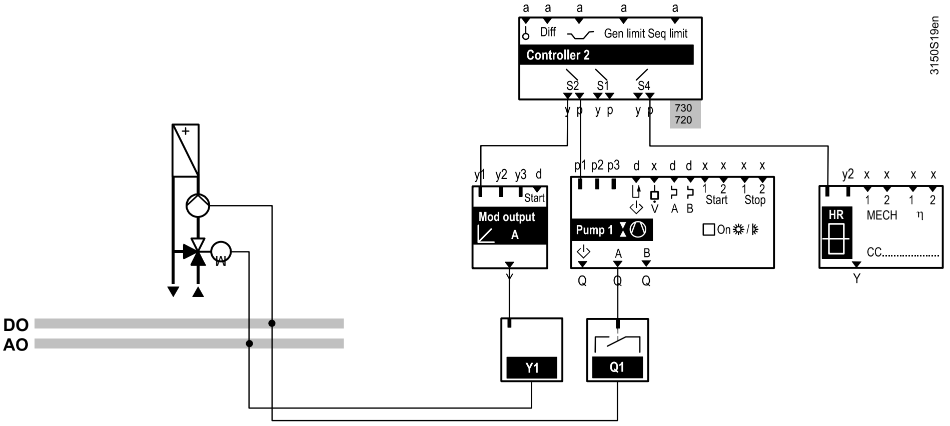
The sequence controller is not suited for delivering more cooling via the second fan speed because supply air temperature control overrides the sequences!
A second room temperature controller step can be entered directly at the cascade controller (see section 11.6.3).

15.1.3 Pump outputs

Only one pump can be assigned to each sequence. However, each pump can be controlled by max two sequences.

Application example

Pump for heating coil on sequence 2.



15.1.4 Control parameters (P-bands, integral action times)

For every configured sequence, a P-band (Xp), an integral action time (Tn) and a derivative action time (Tv) can be set.

Integration action time Tn = 00:00: The controller operates in P- or PD mode.
Derivative action time Tv = 00:00: The controller operates in P- or PI mode.

For fast commissioning of the controller, we recommend the following:

- Set integral-action time Tn equal to the greatest time constant of the controlled path
- Set the derivative action time Tv of the controller equal to the time constant of the measuring sensor

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Controller 1..3 > Control parameters >

Operating line	*Range*	*Factory setting*
[Sequence 1 _] Xp		30 K
[Sequence 1 _] Tn	00.00...59.55 m:s	03.00 m:s
[Sequence 1 _] Tv	00.00...59.55 m:s	00.00 m:s
[Sequence 2 \ .._] Xp		30 K
[Sequence 2 \ .._] Tn	00.00...59.55 m:s	03.00 m:s
[Sequence 2 \ .._] Tv	00.00...59.55 m:s	00.00 m:s
[Sequence 3 \ .. .._] Xp 1)		30 K
[Sequence 3 \ .. .._] Tn 1)	00.00...59.55 m:s	03.00 m:s
[Sequence 3 \ .. .._] Tv 1)	00.00...59.55 m:s	00.00 m:s
[Sequence 4 _/] Xp		30 K
[Sequence 4 _/] Tn	00.00...59.55 m:s	03.00 m:s
[Sequence 4 _/] Tv	00.00...59.55 m:s	00.00 m:s
[Sequence 5 _.. /] Xp 1)		30 K
[Sequence 5 _.. /] Tn 1)	00.00...59.55 m:s	03.00 m:s
[Sequence 5 _.. /] Tv 1)	00.00...59.55 m:s	00.00 m:s

1) only available in controller 1

Recommendation

The following settings are guide values:

- Cascade controller:
  Room influence Xp = 4 K.
  Room influence Tn = 10.00 m:s.
- Control parameters sequence controller (depending on connected aggregate):
  Heating coil (or preheater):
    - [S...] Xp = 30.0 K
    - [S...] Tn = 03.00 m:s
    - [S...] Tv = 00.00 m:s

  Reheater:
    - [S...] Xp = 15.0 K
    - [S...] Tn = 02.00 m:s
    - [S...] Tv = 00.00 m:s

  Cooling coil:
    - [S..] Xp = 15.0 K
    - [S...] Tn = 02.00 m:s
    - [S...] Tv = 00.00 m:s

  Heat recovery equipment:
    - [S...] Xp = 15.0 K
    - [S...] Tn = 02.00 m:s
    - [S...] Tv = 00.00 m:s

  Mixed air damper:
    - [S...] Xp = 15.0 K
    - [S...] Tn = 02.00 m:s.
    - [S...] Tv = 00.00 m:s
- Humidification and dehumidification with room humidity sensor:
  Air humidifier:
    - [S...] Xp = 40%
    - [S...] Tn = 04.00 m:s
    - [S...] Tv = 00.00 m:s

  Air dehumidifier (with cooling coil):
    - [S...] Xp = 20%
    - [S...] Tn = 10.00 m:s.
    - [S...] Tv = 00.00 m:s

  Maximum limitation of supply air humidity (with sequence limitation):
    - Limit value = 85%
    - P-band Xp = 10%
    - Integral action time Tn = 00.00 m:s

Display values

Main menu > Controller 1…3 >

Operating line	*Comments*
[Sequence 1 _] load	Display of current sequence controller output in 0..100%, including frost and limitation signals
[Sequence 2 \ .._] load	Display of current sequence controller output in 0..100%, including frost and limitation signals
[Sequence 3 \ .. .._] load 1)	Display of current sequence controller output in 0..100%, including frost and limitation signals
[Sequence 4 _/] load	Display of current sequence controller output in 0..100%, including frost and limitation signals
[Sequence 5 _.. /] load 1)	Display of current sequence controller output in 0..100%, including frost and limitation signals

1) only available in controller 1

15.1.5 Troubleshooting

Configuration error

If no inputs are assigned to individual sequences, the sequences and all subsequent sequences are inactive. See section 15.1 "Sequence controller structure" for possible combinations.

If no aggregates are configured for the control sequences, the "Current setpoint" is displayed as "---".

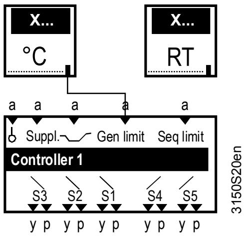
Errors in operation

If the controller has no main controlled variable (e.g. in case of open-circuit), the plant is switched off and a fault message triggered.

Fault status messages

No.	*Text*	*Effect*
3011	[Main contr var 1] sensor error	Urgent message, with plant stop; must not be acknowledged
3012	[Main contr var 2] sensor error	Urgent message, with plant stop; must not be acknowledged
3013	[Main contr var 3] sensor error	Urgent message, with plant stop; must not be acknowledged

15.2 General limiter



A general limiter function can be selected.

15.2.1 Activate function

To activate this function, an input must be assigned.
If several other influences simultaneously act on the general limiter, priority order as described in section 11.1.3 "Priority of functions" applies.

Note

The general limiter cannot be activated for basic type A, controller 1, as the supply air limiter is available for that controller.

Configuration

Main menu > Commissioning > Extra configuration > Controller 1...3 > Inputs >

Operating line	*Adjustable values / remarks*
General limit controller	---, N.X1, N.X2, ... (analog values only) / Activate main controlled variable

Setting values

Main menu > Settings > Controller 1...3 > General limiter > .... *or*
Main menu > Settings > Controller 1...3 > General limiter >

Operating line	*Range*	*Factory setting*
Limit value high		35.0 °C
Limit value low		16.0 °C
Differential high	0...100 K	50 K
Differential low	0...100 K	50 K
Reduction min limitation cooling	0...10 K	0.0 K
P-band Xp		15 K, 10 %, 5 g/kg, 10 kJ/kg, 100 W/m2, 50 m/s, 10 bar, 50 mbar, 50 Pa, 400 ppm, 10.0, 50
Integral action time Tn	00.00...59.55 m:s	02.00 m:s

Display values

Main menu > Controller 1...3 >

Operating line	*Comments*
Actual value general limiter	

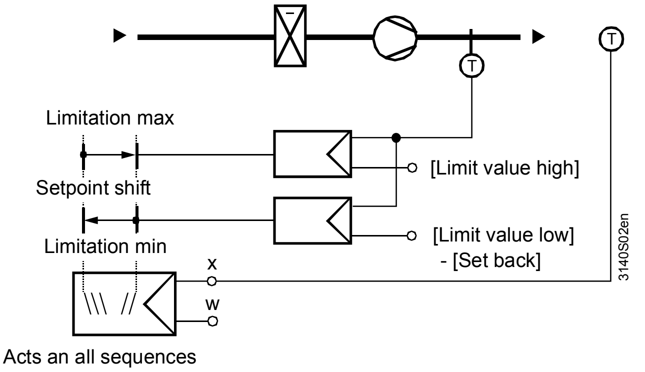
15.2.2 Operating principle

The limitation function with PI control overrides the normal control function to adhere to the limitation setpoint when the limitation setpoint is exceeded (up or down).

Absolute and relative limitation can be entered. If only one of the these functions is desired, the other function can be deactivated by setting the setpoints far outside.

General limitation, absolute
One setpoint each for maximum and minimum limitation can be entered.

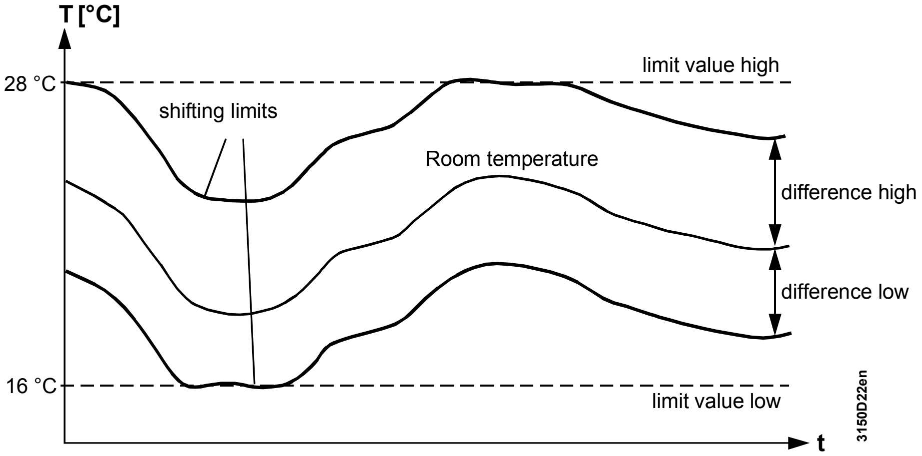
Application example



Special case

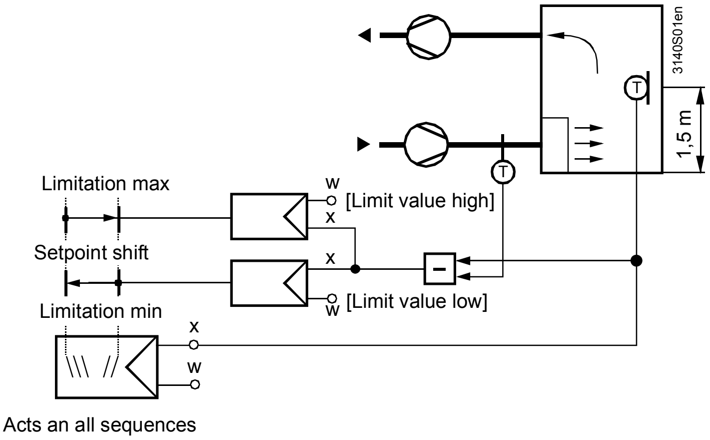
If cooling sequence 4+5 is active, minimum limitation can be lowered by a set value. This prevents the refrigeration machine from being switched off again just after switching on in the case of staged (direct) cooling. This function is only active if both main controlled variable and input for general limitation use unit °C.

General limitation, relative
The maximum and minimum differential limitation can only be activated if the main controlled variable and the general limiter are configured with the same unit.
The set limitation setpoints relate to the differential (e.g. temperature) between the main controlled variable and the general limiter.



A setpoint each for maximum and minimum limitation of the temperature differential can be entered.

Application example

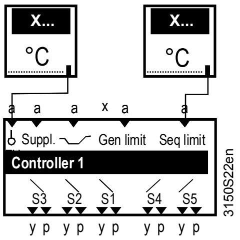


15.2.3 Troubleshooting

A check is made to see if a sensor is connected to the input when exiting the commissioning menu. If the sensor is connected but missing later, a fault message "Sensor error X.." is generated.

If there is no limitation sensor, limitation is set inactive.

15.3 Sequence limiter



This function is used to limit individual sequences.

15.3.1 Activate function

This function is activated by configuring an input for the controller. Only analog inputs can be assigned (see section 8.2 "Analog inputs"). This function can be activated only once per controller.

Configuration

... > Commissioning > Extra configuration > Controller 1...3 > Inputs >

Operating line	*Adjustable values / remarks*
Sequence limit controller	---, N.X1, N.X2, ... (analog values only) / Activate sequence limitation

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1...3 > Sequence limiter >

Operating line	*Range*	*Factory setting*
Type of limitation	Minimum, Maximum	Minimum
Sequence selection	Sequence 1, Sequence 2, Sequence 3, Sequence 4, Sequence 5	Sequence 1
Limit value		1 °C, 80%, 12 g/kg, 70 kJ/kg, 1500 W/m2, 10 m/s, 40 bar, 500 mbar, 1000 Pa, 2000 ppm, 100.0, 1000
P-band Xp		10 K, 10%, 5 g/kg, 10 kJ/kg, 100 W/m2, 50 m/s, 10 bar, 50 mbar, 50 Pa, 400 ppm, 10.0, 50
Integral action time Tn	00.00...59.55 m:s	01.00 m:s

Display values

Main menu > Controller 1...3 >

Operating line	*Comments*
Actual value sequence limiter	

If, at the same time, there are other influences acting on the sequence limiter, the priority order used is that described in section 11.1.3 "Priority of functions".

15.3.2 Operating principle

This function is configurable either as min or max limitation. The effect can be assigned to a sequence.

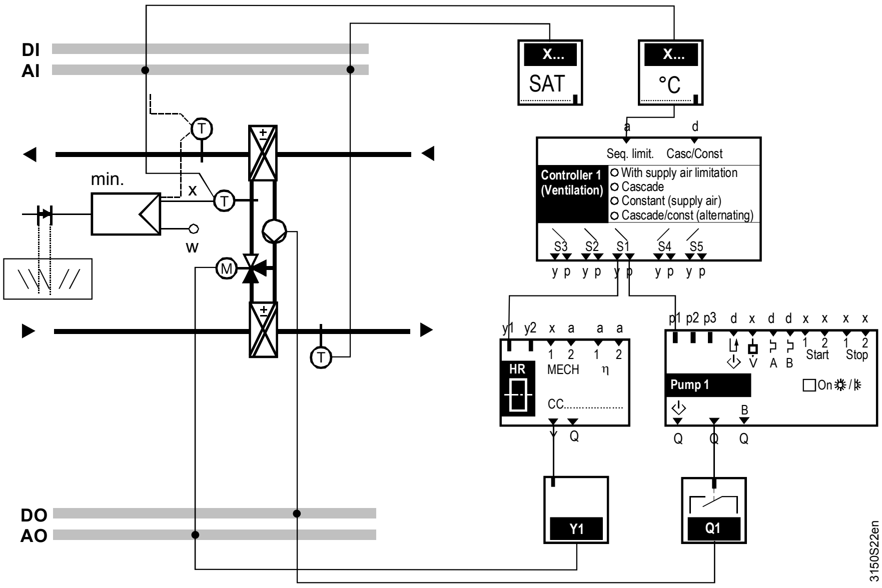
Note

If a pump connected to this sequence is to remain active despite limitation, setting value "Load-dependent OFF" must be set to 0% at the pump. Sequence limitation does not limit a sequence down to 0%.

Minimum limitation

The limitation function with PI control overrides the normal controller function to adhere to the limitation setpoint when the value drops below the limitation setpoint. Minimum limitation causes the relevant sequences to close, the other sequences are not affected.

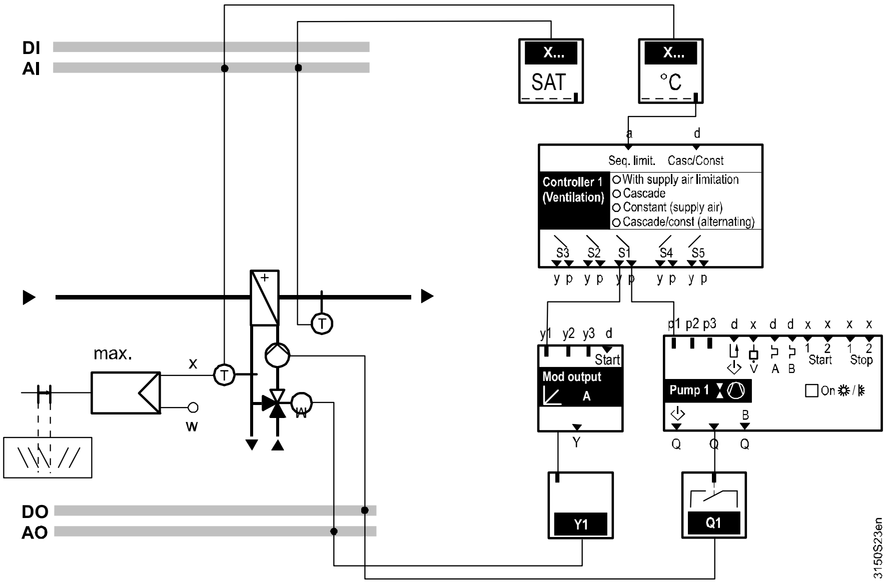
Application example



Maximum limitation

The limitation function with PI control overrides the normal controller function to adhere to the limitation setpoint when the value is above the limitation setpoint. Maximum limitation causes the sequence to close.

Application example



Note

If a pump connected to this sequence is to remain active despite limitation, setting value "Load-dependent OFF" must be set to 0% at the pump. Sequence limitation does not limit a sequence down to 0%.

15.3.3 Troubleshooting

A check is made to see if a sensor is connected to the input when exiting the commissioning menu. If the sensor is connected but missing later, a fault message "Sensor error X.." is generated.
If there is no sensor, limitation is set inactive.

15.4 Sequence locking acc to OT

This function is used to lock individual sequences depending on the outside temperature.

15.4.1 Activate function

This function is always active when the outside temperature is available.
If other influences simultaneously act on the sequence limitation controller, priority order as described in section 11.1.3 "Priority of functions" applies.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Sequence lock acc to OT >

Operating line	*Range*	*Factory setting*
[Sequence 1] outside temp >	−50.0...+250.0 °C	250.0 °C
[Sequence 2] outside temp >	−50.0...+250.0 °C	250.0 °C
[Sequence 3] outside temp > 1)	−50.0...+250.0 °C	250.0 °C
[Sequence 4] outside temp <	−50.0...+250.0 °C	−50.0 °C
[Sequence 5] outside temp < 1)	−50.0...+250.0 °C	−50.0 °C

1) only available in controller 1.

15.4.2 Operating principle

You can lock heating sequences at a higher outside temperature and cooling sequences at a lower outside temperature. This ensures that heating is deactivated in summer and cooling in winter. The switching differential is 2 K (fixed value).

If individual sequences are locked, the controller continues to control with the other sequences. Thus, if e.g. sequence 2 is locked, the controller provides heating control as follows: Sequence 1, then sequence 3 (sequence 2 does not delay control).

15.4.3 Troubleshooting

A check is made to see if a sensor is connected to the input when exiting the commissioning menu. If the sensor is connected but missing later, a fault message "Sensor error X.." is generated.
If the outside temperature is not available, the sequences are not locked.

15.5 Sequence locking by heating/cooling changeover

In the case of a 2-pipe system, the corresponding heating or cooling sequences are locked depending on the operating mode (see section 27 "Heating/cooling changeover").

15.6 Universal shift

15.6.1 Activate function

This function can be activated for basic types P, C and U for controllers 1, 2 and 3 as well as for basic type A for controllers 2 and 3 by configuring the corresponding input or specifying if room or outside air temperature via bus is used.

Configuration

Main menu > Commissioning > Extra configuration > Controller 1...3 > Inputs >

Operating line	*Adjustable values / remarks*
Universal shift	---, N.X1, N.X2, ... (analog values only)

15.6.2 Setting values for universal shift

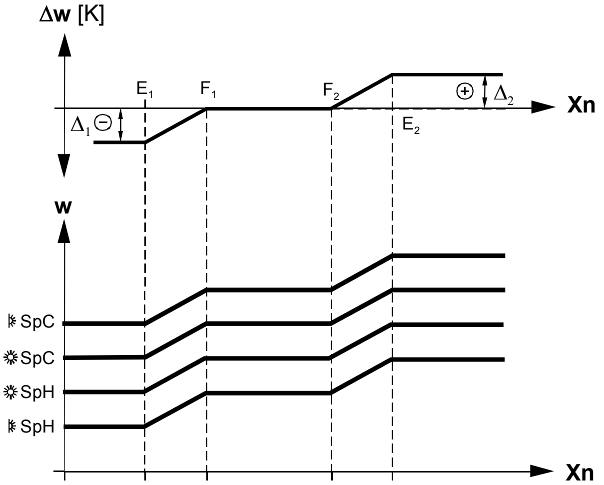
The setpoint can be shifted by a universal input.

Application

- Refrigeration: Shifting the flow temperature setpoint for the chilled ceiling according to the room enthalpy or the surface temperature.
- Ventilation: Shifting according to room humidity or surface temperature.

Setpoint shift acts on the ☼ Comfort and ☼ Precomfort setpoints according to the following diagram:

Function diagram



Key:

Δ_2	[Setp compensation 2] delta
E_2	[Setp compensation 2] end
F_2	[Setp compensation 2] start
F_1	[Setp compensation 1] start
E_1	[Setp compensation 1] end
Δ_1	[Setp compensation 1] delta
SpC	Setpoint high
SpH	Setpoint low
Xn	Input variable
w	Current setpoint

Setting values

Main menu > Commissioning > Settings > ... *or*
Main menu > Settings > Controller 1...3 > Setpoint effects >

Operating line	*Range*	*Factory setting*
[Setp compensation 2] delta		0.0 K
[Setp compensation 2] end		30.0 °C
[Setp compensation 2] start		20.0 °C
[Setp compensation 1] start		0.0 °C
[Setp compensation 1] end		0.0 °C
[Setp compensation 1] delta		0.0 K

* Depends on analog value; here, e.g. temperature °C

15.6.3 Troubleshooting

A check is made to see if a sensor is connected to the input when exiting the commissioning menu. If the sensor is connected but missing later, a fault message "Sensor error X.." is generated.

If there is no sensor, setpoint compensation is set to inactive.

15.7 Deviation signal

A deviation message can be generated for every main controlled variable. This function can be deactivated by setting the values extremely high.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1...3 > Setpoint effects >

Operating line	*Range*	*Factory setting*
Deviation message		100 K, 100%, 900 g/kg, 900 kJ/kg, 2000 W/m2, 500 m/s, 100 bar, 1000 mbar, 9000 Pa, 9000 ppm, 900.0, 9000
Deviation message delay high	00.00...6.00 h.m	00.30 h.m
Deviation message delay low	00.00...6.00 h.m	00.30 h.m

15.7.1 Operating principle

A fault message is triggered after a set period of time, if the control loop operates at its limit (all heating sequences open and all cooling sequences closed, or vice versa) and the set actual value / setpoint deviation is exceeded.

The fault message delay can be adjusted separately for the upper and lower stop. This allows also for monitoring plants, not only heating or cooling.

Notes

- The time must be sufficiently long to ensure that no fault message is generated when the plant is started.
- The deviation message always refers to the sequence controller. In other words the supply air is monitored for supply air temperature cascade control. Set the values accordingly.
- The deviation message only works when the control process is active. No deviation message is generated e.g. when all sequences are locked according to the outside temperature.

Fault status messages

No.	*Text*	*Effect*
3101	[Controller 1] inadm deviation	Non-urgent message; must not be acknowledged
3102	[Controller 2] inadm deviation	Non-urgent message; must not be acknowledged
3103	[Controller 3] inadm deviation	Non-urgent message; must not be acknowledged

Application example

Basic type C: Chilled water flow temperature control.
With an upward adjustment of the setpoint, the water can take a very long time to warm up if the valves are closed and the pipe is well insulated. Here, the message delay is set to 10 hours in order to avoid unnecessary fault status messages. It is very likely that the valves do not close properly, if, after 10 hours, there is still a setpoint deviation.

15.8 Control timeout

You can define a control timeout period (TIMEOUT) in order, for example, to prevent the cooling valve from opening immediately after the heating valve closes. The controller does not add the integral action component during that period of time.

Setting values

Main menu > Commissioning > Settings > … *or*
Main menu > Settings > Controller 1…3 > Control parameters >

Operating line	Range	Factory setting
Control timeout	00.00…59.55 m:s	00.00 m:s

15.9 Assign texts

A text can be assigned to each controller. This text appears on the menu and in the operating line.

Free text

Main menu > Commissioning > Settings > … *or*
Main menu > Settings > Controller 1…3 >

Operating line	*Range*	*Factory setting*
Controller x	Max. 20 characters	Controller x

Refer to section 31.4 for an overview of all editable texts and on how to reset them.

16 IAQ controller (basic types A and P)

The ventilation plant controls room temperature and supplies the rooms with fresh (high quality) air.
The IAQ controller is tasks, by demand, i.e. issue a positioning signal to the fan or air damper based on the air quality measured in the rooms. Fans or air dampers control to Comfortable air quality. In addition to Comfort, the rooms are optimized for energy consumption based on occupancy (auditoriums, conference rooms, offices, restaurants, etc.).
Demand-dependent ventilation can save energy since ventilation is switched on only when the room requires air as well. In that case, it is not only the fans' power for air transportation that is saved, but heating / cooling losses for air renewal in the room are kept to a minimum.

- The IAQ controller offers the following functions based on measured air quality (CO2 or CO2/VOC value):
- Open the outside air damper (basic types A and P)
- Switch on the fans or ventilation plant (basic type A)
- Changeover fan speeds (basic type A)
- Increase fan speed (basic type A and P)

16.1 Activate function

This function is activated by assigning an input to the function block. Only ppm inputs DC 0...10 V (see section 8.2 "Analog inputs") can be assigned.

Configuration

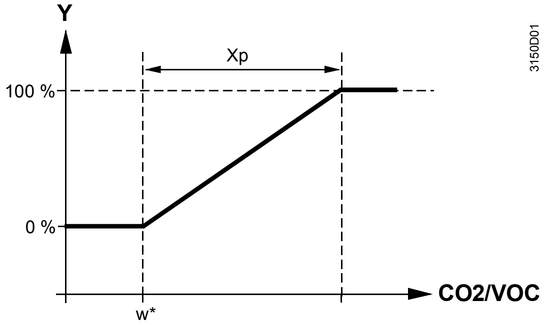
Main menu > Commissioning > Extra configuration > IAQ controller >

Operating line	*Adjustable values / remarks*
Input	---, N.X1, N.X2, ... (only ppm)

16.2 Open outside air damper (basic types A and P)

To enable the air damper to open, a modulating damper must be configured (see section 10.5 "Mixed air damper (basic types A, P)"). The air damper opens according to the following diagram:

Function diagram



* Air damper setpoint

The air damper's adjusted minimum and maximum positions are taken into consideration. The higher of the 2 values is used (maximum selection), if the air damper is also controlled by the sequence controller (e.g. for heat recovery).

The set values apply for operating modes ☼ Comfort, ◐ Precomfort and ☾ Economy.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > IAQ controller >

Operating line	*Range*	*Factory setting*
Air damper setpoint	---, 0...2000 ppm	1000 ppm
Air damper Xp	0...2000 ppm	400 ppm

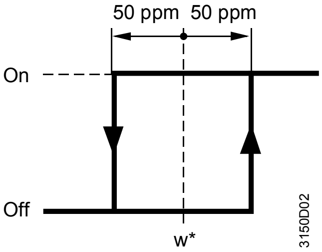
This function can be deactivated by setting the damper setpoint to "---".

16.3 Switch on fans (basic type A)

The demand-dependent ventilation is selected using the plant operating modes sustained mode (Precomfort) and sustained mode (Economy) (see section 19 "Sustained mode (basic type A)").

The fans switch on or off based on the air quality setpoint per the following diagram:

Function diagram



* Setpoint indoor air quality (Precomfort or Economy)

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > IAQ controller >

Operating line	*Range*	*Factory setting*
☾ Setpoint indoor air quality	---, 0...2000 ppm	1100 ppm
◐ Setpoint indoor air quality	---, 0...2000 ppm	1000 ppm

You can disable the function by setting the corresponding setpoint indoor air quality to "---".

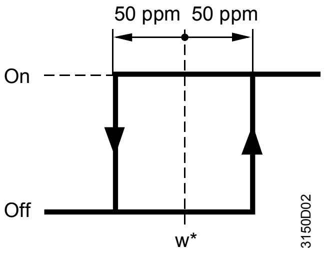
16.4 Changeover fan speeds (basic type A)

A speed changeover is available for 2-speed fan operation. The changeover is available for the following operating modes:

- Normal operation (Comfort), or
- Normal operation (Precomfort), or
- Sustained mode (Precomfort), or
- Recirculated air operation (Precomfort), or
- Sustained mode (Economy)

The fan is switched based on air quality as per the following diagram:

Function diagram



* Setpoint fan speed 2

The higher of the two values applies (maximum selection), when the fan is also switched to speed 2 by the cascade controller (e.g. when there is increased demand for cooling).
The set values apply for operating modes ☼ Comfort, ◐ Precomfort and Economy.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > IAQ controller >

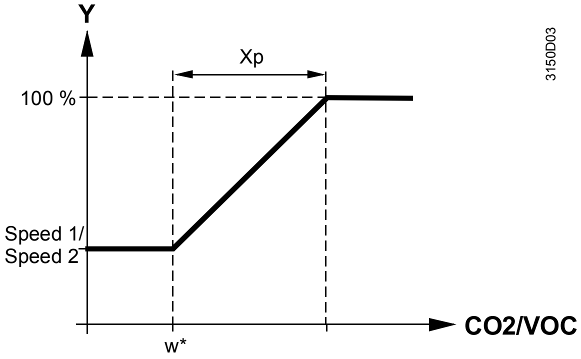
Operating line	*Range*	*Factory setting*
Setpoint fan speed 2	---, 0...2000 ppm	1200 ppm

This function can be deactivated by setting the setpoint fan speed 2 to "---".

16.5 Increase fan speed (basic types A, P)

A speed-controlled fan configured with assignment of fixed speeds for 1 or 2 speed operation required to power up the fan (see section 10.1 "Fan (basic types A and P)"). The fan increases its speed according to the following diagram:

Function diagram



* Fan setpoint

The adjusted minimum position of speed control is taken into consideration.
The adjusted values apply to both operating modes ☼ Comfort and ◐ Precomfort mode.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > IAQ controller >

Operating line	*Range*	*Factory setting*
Fan setpoint	---, 0...2000 ppm	1000 ppm
Fan Xp	0...2000 ppm	400 ppm

This function can be deactivated by setting the fan setpoint to "---".

16.6 Troubleshooting

16.6.1 Errors in operation

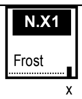
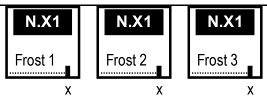
A check is made to see whether the air quality sensor is connected when existing the commissioning menu. If the sensor is not connected at this point, the "Indoor air quality control" function is set inactive.

If the sensor is connected at this time but missing later, message "Sensor fault X.." appears and the "Indoor air quality control" function is set inactive.

17 Frost protection (basic types A and P)

Protects the hot water heating coils against freezing.

The following types of frost protection are available:

Frost protection		• Frost protection unit • 2-speed frost protection on the air side • 2-stage frost protection on the water side
Frost protection units 1..3		• Frost protection units 1..3 (acts directly on the corresponding control loops 1..3)

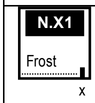
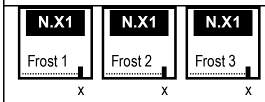
⚠ Note that frost protection control cannot protect the plant against frost damage if there is insufficient heat output (e.g. no heating water).

17.1 Activate block

Activate the function by setting the identifier for an input to "Frost protection" or "Frost protection 1..3" (see section 8.1 "Universal inputs").

Configuration

Main menu > Commissioning > Extra configuration > Input identifier >

Function block	*Operating line*	*Range*
	...X...	Activate "Frost protection" function by assigning the input the "Frost" value
	...X...	Activate the function by assigning the input for the value "Frost protection unit 1", "Frost protection unit 2" and/or "Frost protection unit 3"

Setting values for frost protection

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Frost protection >

Operating line	*Range*	*Factory setting*
Identification	Monitor, Active DC 0...10 V = 0...15 °C (air side), Passive LG-Ni 1000 (water side)	Monitor
Risk of frost limit	−50.0...+50.0 °C	5.0 °C
P-band Xp	1.0…100.0 K	5.0 K
Plant OFF frost protection setp	−50.0...+50.0 °C	20.0 °C
Plant OFF Xp	0.5...999.5 K	7.0 K
Plant OFF Tn	00.00...59.55 m:s	03.30 m:s
Control loop with risk of frost	Controller 1...3	Controller 1

Note

You can use the settings for "Identification" and "Control loop with risk of frost" for the frost protection function.

Identification

"Identification" is used to select the detector / unit frost. One of the following frost protection functions becomes active depending on the setting:
- Type of unit: Frost protection unit.
- Active DC 0… 10 V = 0… 15 ° C: 2-stage frost protection, frost protection detector with active signal DC 0...10 V = 0...15 °C, for frost protection on the air side
- Passive LG-Ni1000: 2-stage frost protection, frost protection detector with passive LG-Ni 1000 signal, for frost protection on the water side

To enable 2-stage frost protection on the water side to work properly, a heating coil pump must be installed and the outside temperature must be available (see section 8.4 "Outside temperature").

Control loop with risk of frost

In addition, frost protection must be assigned the controller to which the relevant heating coil is connected.

The following compiles the proper configuration for the frost protection function:

Frost protection function	*Operating line*	*Setting*
Frost protection unit	Input identifier N.Xn	Frost protection
	Identification	Monitors
	Control loop with risk of frost	Controller 1...3
2-stage frost protection on the air side	Input identifier N.Xn	Frost protection
	Identification	Active DC 0...10 V = 0...15 °C (air side)
	Control loop with risk of frost	Controller 1...3
2-stage frost protection on the water side	Input identifier N.Xn	Frost protection
	Identification	Passive Ni1000 (water side)
	Control loop with risk of frost	Controller 1...3

Notes

If the frost protection function and the frost protection unit are acting simultaneously (e. g. frost protection on control loop 2 acting and frost protection unit 2) on a control loop, the maximum acts on the controllers for the two frost functions.

The current state of the heating / cooling changeover is "cooling" and frost is detected, a frost fault is generated and the plant is shut down. The frost function acts on all aggregates connected to sequences 1 and 3 for the control loop with risk of frost.

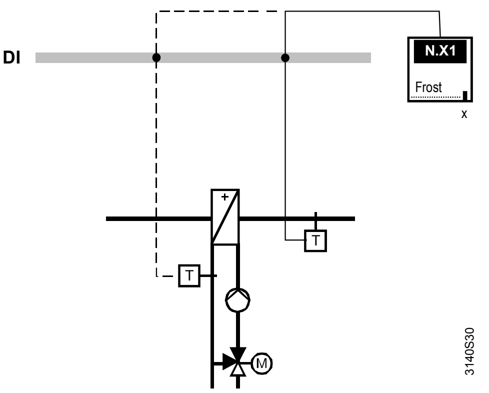
The maximum of all frost functions acts directly on the pumps when one or more pumps have the operating line frost priority set to Yes.

If, at the same time, there are other influences acting on the sequence controller, the priority order used is that described in section 11.1.3 "Priority of functions".

17.2 Operating principle

17.2.1 Frost protection unit operating principle

Application example



Note

Reliable frost protection depends on correct sensor placement.
When the temperature drops below the limit value adjusted on the frost protection unit, a signal is delivered to the controller.

Meaning:
- Contact closed: No frost hazard
- Contact open: Frost hazard

Frost alarm triggers the following:
- The fans are switched off
- The control loop configured with the heating coil at risk from frost switches off all cooling sequences, and opens all heating sequences to 100%. It also switches on the heating coil pump

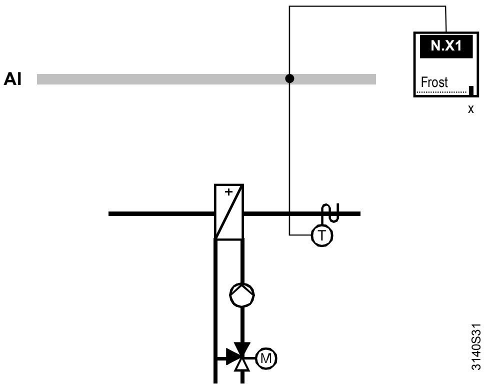
Caution

- Step switches are switched on at the same time if not locked via input "Release external".
- All the other control loops are switched off
- The outside air dampers are closed (see section 10.5 "Mixed air damper (basic types A, P)")

The frost protection function with frost protection unit is active in all operating modes (☼ Comfort, ◐ Precomfort, ☾ Economy and ❄ Protection).

17.2.2 2-phased frost protection air side (Active DC 0...10 V = 0...15 °C)

Application example



Note

Reliable frost protection depends on correct sensor placement.

When the temperature drops below the adjusted level (= Risk of frost limit + 2 K + P-band), all heating sequences are continuously opened and all cooling sequences continuously closed. It also switches on the heating coil pump. The temperature is thus prevented from falling below the "risk of frost limit".

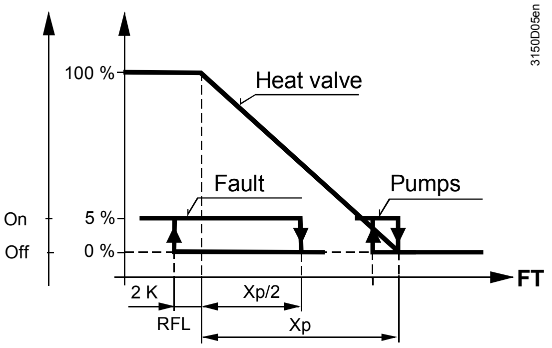
If, in spite of this, the temperature does drop below the limit value, the following actions are triggered:

- The fans are switched off
- The configured control loop with the relevant heating coil keeps all heating sequences open and all cooling sequences closed, the heating coil pump remains on

Caution

- The step switches remain on if not locked via input "Release external"!
- All the other control loops are switched off
- The outside air dampers are closed (see section 10.5 "Mixed air damper (basic types A, P)")

Function diagram



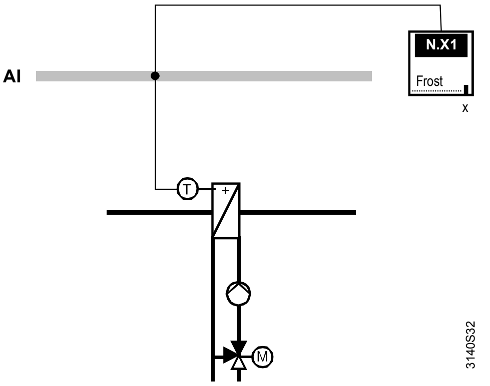
Key:

RFL	Risk of frost limit
FT	Temperature measured on the frost sensor

The frost protection function remains active when the plant is off.

17.2.3 2-phased frost protection on water side (passive Ni 1000)

Application example



Notes

- Reliable frost protection depends on correct sensor placement. The detector should be located on the water outlet of the heating coil within the air duct
- As an additional protective function, the heating circuit pump must automatically switch on at outside temperatures below 5 °C (setting value "ON according to the outside temperature", see section "Pump")

When the temperature drops below the adjusted level, the heating sequences are continuously opened and the cooling sequences continuously closed. The temperature is thus prevented from falling below the "risk of frost limit".

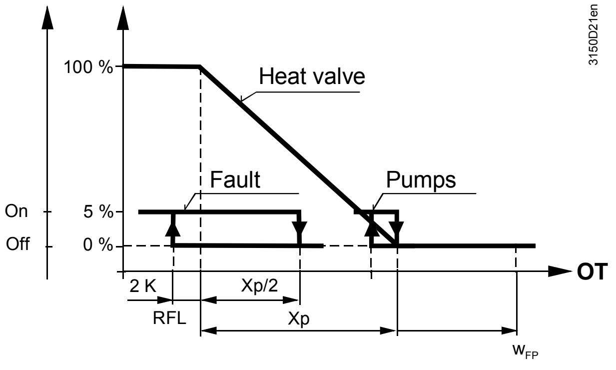
If, in spite of this, the temperature does drop below the risk of limit value, the following actions are triggered:

- The fans are switched off
- The configured control loop with the relevant heating coil keeps all heating sequences open and all cooling sequences closed, the heating coil pump remains on

Caution

- The step switches remain on if not locked via input "Release external"!
- All the other control loops are switched off
- The outside air dampers are closed (see section 10.5 "Mixed air damper (basic types A, P)")

Function diagram



Key:

w_{FP}	Plant OFF frost protection setp.
RFL	Risk of frost limit
FT	Temperature measured at the frost sensor

When the plant is off, a PI controller keeps the temperature of the heating coil at an adjustable level, ensuring that a certain amount of heat is available when the plant is started. This function acts on the heating sequences of the configured control loop, but:

- The outside air damper remains closed (see section 10.5 "Mixed air damper (basic types A, P)")
- The heat recovery equipment is switched on (see section 0 "
- Heat recovery equipment (basic types A, P)")

17.3 Acknowledgment

The plant can only start again when there is no more frost status message and the fault has been reset.
The following alternative acknowledgement choices for fault messages are available:

- Acknowledge and reset on the controller
- Acknowledgement only on the controller (to be recommended only when a frost protection unit with own interlock is used)
- No acknowledgement

Setting values frost protection

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Frost protection >

Operating line	*Range*	*Factory setting*
Fault acknowledgement	None, Acknowledge, Acknowledge and reset	Acknowledge and reset

Setting values
Frost protection units 1..3

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Frost protection unit 1...3 >

Operating line	*Range*	*Factory setting*
Fault acknowledgement [1..3]	None, Acknowledge, Acknowledge and reset	Acknowledge and reset

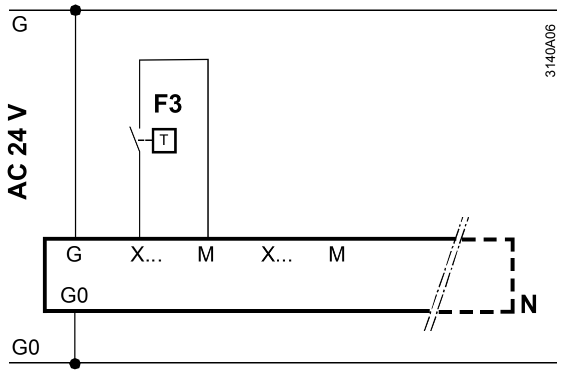
Note

If a frost protection unit own fault interlock is used, the fault message is reset on the unit. The plant can start again as soon as the fault is reset, independent of whether or not the fault message was acknowledged on the controller.

17.4 Connection diagrams

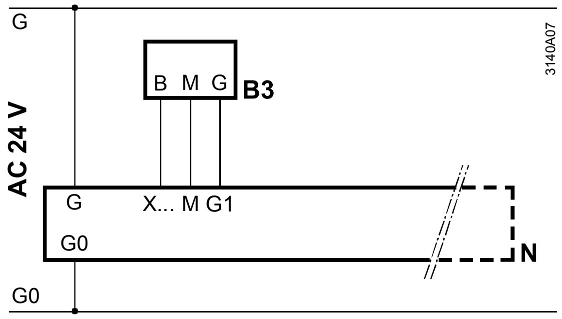
Connection diagram, frost protection unit

You can connect a frost protection unit to the input. The monitor must be connected according to the following diagram:



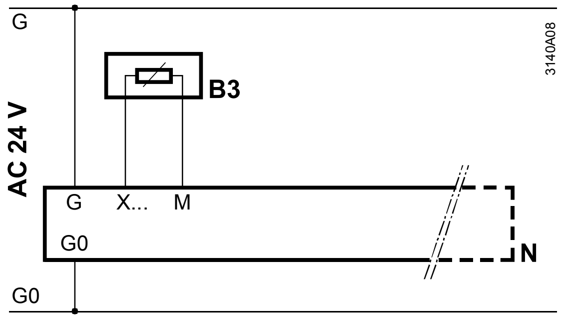
Connection diagram, air

You can connect an active temperature sensor with a DC 0…10 V = 0…15 °C signal to the input: The sensor must be connected according to the following diagram:



Connection diagram, water

You can connect a passive LG-Ni 1000 temperature sensor to the input. The sensor must be connected according to the following diagram:



Key for the connection diagrams

B3	QAF63… frost sensor (air)
B3	QAE26.9 immersion temperature sensor (water)
F3	QAF81 frost protection unit (air)
N	Universal controller RMU7..B

17.5 Troubleshooting

17.5.1 Configuration error

The first input with the input identifier is used when multiple inputs are configured as frost protection inputs with the same identifier frost protection, frost protection unit 1, frost protection unit 2, or frost protection unit 3.

17.5.2 Errors in operation

- Frost protection unit:
  Digital signals cannot be monitored. If signal (= contact open) is missing, the interpretation is risk of frost so that the plant switches to frost protection mode
- Two-phased frost protection air side "Active DC 0...10 V = 0...15 °C".
  If the signal from the frost protection detector is missing, a message is sent and the plant switches to frost protection mode
- Two-stage frost protection on the water side (passive Ni 1000).
  If the signal from the frost protection detector is missing, a message is sent and the plant switches to frost protection mode.
  If the outside temperature signal is missing, the pump runs permanently (see section 10.2.11 "On" by outside temperature", the setting value must be set to 5 °C)

Fault status messages

No.	*Text*	*Effect*
3920	Frost	Urgent message, with plant stop
3921	Frost protection sensor error	Urgent message, with plant stop
3922	Frost risk frost 1	Urgent message, with plant stop
3923	Frost risk frost 2	Urgent message, with plant stop
3924	Frost risk frost 3	Urgent message, with plant stop

18 Preheating function (basic types A, P)

Hot water heating coils are susceptible to frost. If we assume that the ventilation plant remains switched off at night and there are low outside temperatures early in the morning, a sudden intake of cold outside air would cause the water in the heating coils to freeze within a short period of time. This problem is especially apparent in plants that use on / off air dampers.

The preheating function prevents the heating coils from freezing when the outside temperature is very low while the ventilation or air conditioning plant is started.

18.1 Activate block

At least one frost protection must be activated for the preheating function. The preheating function is activated by entering a value > 0 for the "Purge time max".

Setting values

Main menu > Commissioning > Settings > .... *or*

Main menu > Settings > Preheating function >

Operating line	*Range*	*Factory setting*
Outside temperature limit	0... 30 °C	5 °C
Design temperature	−35...+35 °C	−10 °C
Purge time max	00.00...59.55 m:s	00.00 m:s
Locking time	00.00...59.55 m:s	30.00 m:s

18.2 Operating principle

Preheating acts on the same sequence controller as the frost protection function.

The configured control loop with the relevant heating coil opens all heating sequences as described below. It also switches on the heating coil pump.

Caution

Step switches are switched on at the same time if not locked via input "Release external".

Heating coil purging starts when the plant is switched on, the outside temperature is below the set value, and the locking time since the last switch-off action has expired.

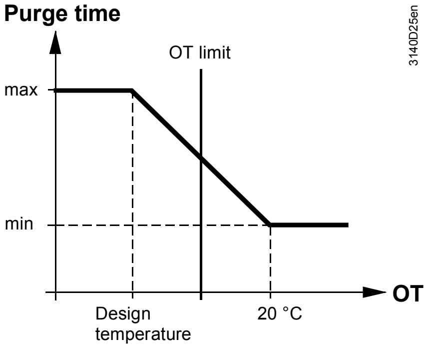
If the plant is switched on via time switch, purging begins at the calculated purge time before the time switch switches on, allowing fans to start when the time switch becomes active.

During purging, the fan remains off and the outside air damper remains closed (minimum limitation has no impact, see section 10.5 "Mixed air damper (basic types A, P)").

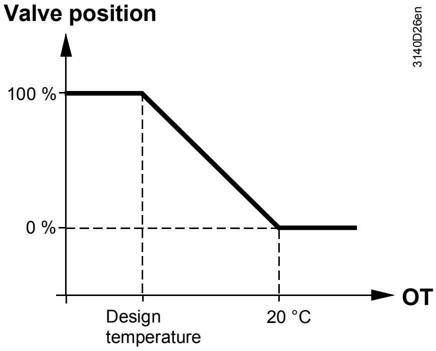
To calculate purge time, the design temperature (= lowest outside temperature) and the associated "purge time max" must be entered. The preheating function is only started if the outside temperature lies below the adjusted "Outside temperature limit value".

The purge time is calculated according to the following diagram, as a function of the outside temperature:

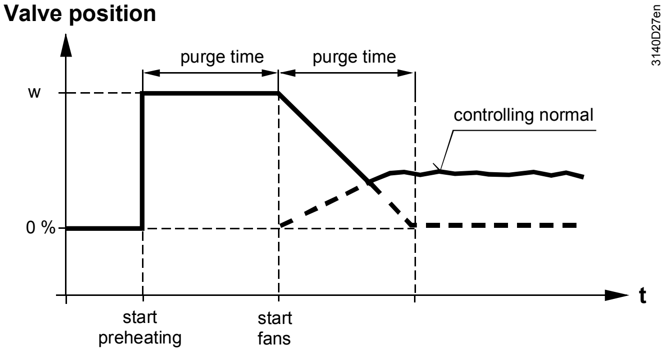
Function diagrams



The output position during the purge time is calculated according to the following diagram:



Prepurging takes place according to the following diagram:



On completion of the prepurge time and of the start delays entered for the fans, the fans start to operate.

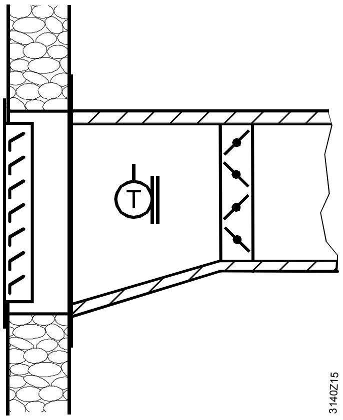
Note

The preheating function is not activated when the fan is switched on via the "Smoke extraction" function.

Proper functioning of the preheating function depends on the correct location of the sensor. For this reason, the outside air sensor should be installed outside the building. If that is not possible, it should be located directly by the outside air intake in front of the outside air damper.

Example

Place the outside air sensor before the outside air damper.



If the outside temperature is not available, the function can still be activated. In that case, the function is activated for maximum purge time each time the plant is started. This can be useful when the heating systems remains switched off in summer (heating may not switch on demand-dependent via communication!).

If the plant is switched on shortly after switching off, the heating coils need not be prepurged. The period of time after switching off where the preheating function need not be activated can be set by using setting value "Locking time".

18.3 Troubleshooting

If the outside temperature is not available, the preheating function becomes active for the maximum purge time each time the plant is started. In that case, the positioning signal is 100%.

19 Sustained mode (basic type A)

The function Sustained mode (Precomfort) or Sustained mode (Economy) monitors one or more physical measured values in operating modes ☼ Precomfort or ☾ Economy, i.e. while the fans are switched off.

- Example with room temperature sensor:
  If the room temperature drops below or exceeds a certain level, the fans are switched on again to prevent cooling down or overheating of the building (or the room(s))
- Example with room humidity sensor:
  If the room humidity drops below or exceeds a certain level, the fans are switched on again to prevent too dry or too humid room conditions
- Example with room indoor air quality sensor:
  The fans are switched at uncomfortable air quality conditions to regain comfortable room conditions

Note

Embedding the function sustained mode in the operating modes is described in section 6 "Operating modes".

19.1 Activate function

The function sustained mode (Precomfort), sustained mode (Economy) can be activated in basic type A.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Operating mode >

Operating line	*Range*	*Factory setting*
☼ Plant operating mode	Normal operation, Sustained mode, Recirculated air mode	Normal operation
☾ Plant operating mode	No sustained mode, Sustained mode	No sustained mode

Additionally, at least one of the following measured values must be available for the sustained function:
- Room temperature
- Main controlled variable 2
- Main controlled variable 3
- Room indoor air quality as the main controlled variable for the indoor air quality controller

The sustained function is activated as soon as the corresponding main controlled variable is available and the plaint operation "sustained mode" is selected. The main controlled variables for controller 2 or controller 3 can be universal variables (e.g. relative humidity, absolute humidity, surface temperature, etc).

19.2 Sustained mode operation

The Precomfort setpoints determine switch-on/switch-off of sustained mode (Precomfort); Economy setpoints determine switch on/switch-off of sustained mode (Economy). The entire plant with all controllers switches on as soon as the main controlled variable from the controller drops below or exceeds the switch-on value. The switched on plant is controlled to Comfort setpoints. The fan speed can be set.

Corresponding setpoints must be set to extreme values if only one single main controlled variable is desired (e.g. ☾ Economy heating setpoint: −50 °C, ☾ Economy cooling setpoint: 100 °C).

You can prevent the plant elements from being switched on or off too often via the setting "Operating time min".

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Operating mode >

Operating line	*Range*	*Factory setting*
Sustained mode time minimum	00.00...06.00 h.m	00.30 h.m
Sustained mode fan	Speed 1, Speed 2	Speed 1

Notes

The following controls apply to switching on/off the plant by controller 1, controller 2, or controller 3:
- Mix air damper with normal control
- The speed-controlled fan with fixed speed for 2-speed operation is controlled with maximum speeds (see section 10.1.4 "Variable-speed fan")

The following points apply to switching on/off the plant by the IAQ controller:
- The mixed air damper controls the damper setpoint (see section 16.2 "Open outside air damper (basic types A and P)")
- The speed-controlled fan without pressure control is controlled via the fan setpoint (see section 16.5 "Increase fan speed (basic types A, P)")
- Control of supply air and extract air fans:
- The supply air fan is always switched on when the plant is switched on by sustained mode. The switch-on of the extract air fan depends on setting parameter "Sustained/Recirculated air operation" (see section 10.1.13)
- For 2-speed operation of fans and configured room/supply air or extract/supply air cascade control, speed changeover may occur according to heating/refrigeration demand (see section 11.6.3)
- For 2-speed operation of fans and configured IAQ controller, speed changeover may occur according to indoor air quality(see section 16.4)

Sustained mode (Precomfort) and sustained mode (Economy) for heating is automatically set to inactive via bus at active heating, when the ventilation controller RMU7..B is controlled in the same room together with a heating controller RMH760 (see section 11.8 "Room control combinations with heating controller").

Sustained mode is also automatically set to inactive when using the input contact "Casc/Const" if closed.

19.2.1 Setpoint for switch on/off of plant during sustained mode (Precomfort)

Controller 1 as room temperature controller

Switch-on criteria for sustained mode:	*Switch-off criteria for sustained mode:*
Room temp < ◐ Precomfort heating setpoint	Room temp > ◐ Precomfort heating setpoint + 1K
Room temp > ◐ Precomfort cooling setpoint	Room temp < ◐ Precomfort cooling setpoint - 1K

Recommended setting for Precomfort setpoints to reach the switch-off criteria:

- ◐ Precomfort heating setpoint < ☼ Comfort heating setpoint - 1K
- ◐ Precomfort cooling setpoint > ☼ Comfort cooling setpoint + 1K

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Room setpoints >

Operating line	*Factory setting*
◐ Precomfort cooling setpoint	28 °C
◐ Precomfort heating setpoint	19 °C

Controller 2 and 3 as universal controller

Switch-on criteria for sustained mode:	*Switch-off criteria for sustained mode:*
Main contr var < ◐ Precomfort setpoint low	Main controlled variable > ◐ Precomfort setpoint low + x% [1]
Main contr var > ◐ Precomfort setpoint high	Main controlled variable < ◐ Precomfort setpoint high – x% [1]

Recommended setting for Precomfort setpoints to reach the switch-off criteria:

- ◐ Precomfort setpoint low < ☼ Comfort setpoint low – x% [1]
- ◐ Precomfort setpoint high > ☼ Comfort setpoint high + x% [1]

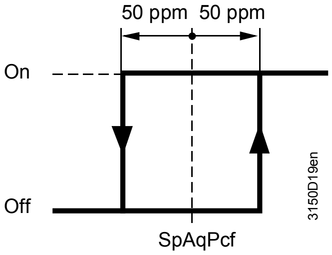
[1] x% is calculated from the set setpoint * 0.05

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 2...3 > Setpoints >

Operating line	*Factory setting*
◐ Precomfort setpoint high	28 °C, 80%, 12 g/kg, 50 kJ/kg, 1000 W/m2, 15 m/s, 100 bar, 1000 mbar, 1000 Pa, 1500 ppm, 100, 1000
◐ Precomfort setpoint low	19 °C, 20%, 4 g/kg, 0 kJ/kg, 200 W/m2, 0 m/s, 0 bar, 0 mbar, 0 Pa, 0 ppm, 0

The IAQ controller for switch on/off of the plant (see section 16 "IAQ controller (basic types A and P)"):



SpAqPcf : Setpoint indoor air quality Precomfort.

- On for actual value for indoor air quality > Precomfort indoor air quality setpoint + 50 ppm
- OFF for actual value for indoor air quality < Precomfort indoor air quality setpoint - 50 ppm

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > IAQ controller >

Operating line	*Range*	*Factory setting*
☼ Setpoint indoor air quality	---, 0...2000, ppm	1000 ppm

Disable Precomfort IAQ setpoint by setting it to "---"

19.2.2 Setpoint to switch on/off the plant in sustained mode (Economy)

Controller 1 as room temperature controller

Switch-on criteria for sustained mode:	*Switch-off criteria for sustained mode:*
Room temp < ☾ Economy heating setpoint	Room temp > ☾ Economy heating setpoint + 1K
Room temp > ☾ Economy cooling setpoint	Room temp < ☾ Economy cooling setpoint – 1K

Recommended setting for Economy setpoints to reach the switch-off criteria:

- ☾ Economy heating setpoint < ☼ Comfort heating setpoint - 1K
- ☾ Economy cooling setpoint > ☼ Comfort cooling setpoint + 1K

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Room setpoints >

Operating line	*Factory setting*
☾ Economy cooling setpoint	30.0 °C
☾ Economy heating setpoint	15.0 °C

Controllers 2 and 3 as universal controller

Switch-on criteria for sustained mode:	*Switch-off criteria for sustained mode:*
Main contr var < ☾ Economy setpoint low	Main controlled variable > ☾ Economy setpoint low + x% [1]
Main contr var > ☾ Economy setpoint high	Main controlled variable < ☾ Economy setpoint high – x% [1]

Recommended setting for Economy setpoints to reach the switch-off criteria:
- ☾ Economy setpoint low < ☼ Comfort setpoint low – x% [1].
- ☾ Economy setpoint high > ☼ Comfort setpoint high + x% [1].

[1] x% is calculated as the entered setpoint * 0.05

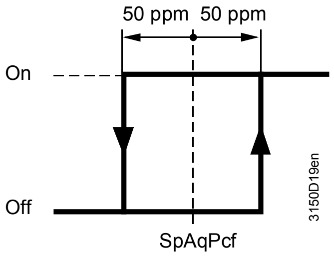
Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 2...3 > Setpoints >

Operating line	*Factory setting*
☾ Economy setpoint high	30 °C, 30 K, 100%, 999 g/kg, 999 kJ/kg, 1638 W/m2, 327 m/s, 9999 bar, 9999 mbar, 9999 Pa, 9999 ppm, 999, 9999
☾ Economy setpoint low	15 °C, 15 K, 0%, -50 g/kg, -50 kJ/kg, -50 W/m2, -50 m/s, -50 bar, -50 mbar, -50 Pa, -50 ppm, -50, -50

IAQ controller to switch on/off the plant

(See section 16 "IAQ controller (basic types A and P)"):



SpAqPcf: Setpoint indoor air quality Economy.

- On for actual value for indoor air quality > Economy indoor air quality setpoint + 50 ppm
- OFF for actual value for indoor air quality < Economy indoor air quality setpoint - 50 ppm

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > IAQ controller >

Operating line	*Range*	*Factory setting*
☾ Setpoint indoor air quality	---, 0...2000, ppm	1100 ppm

Disable Economy IAQ setpoint by setting it to "---".

19.3 Examples of sustained mode

19.3.1 Sustained mode (Economy) for heating

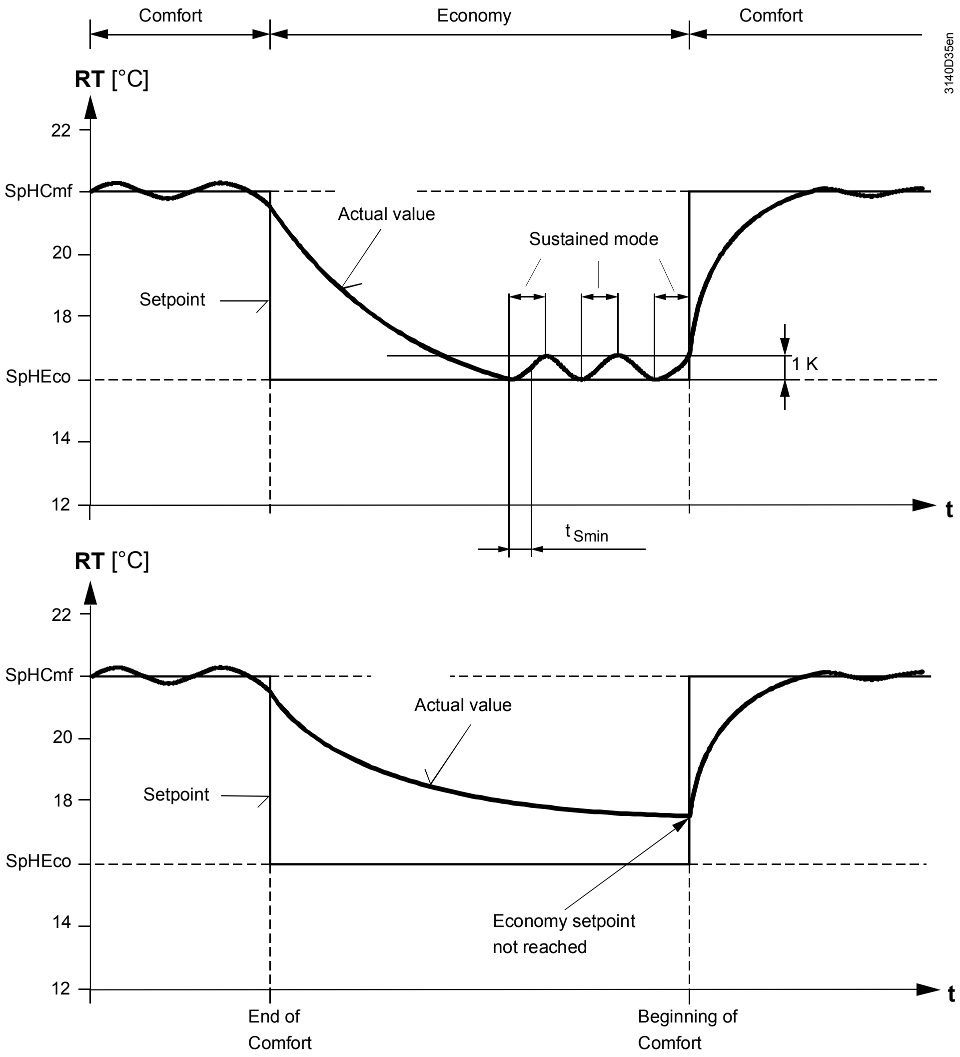
The example refers to controller 1 with a main controlled variable for room temperature. The example can be functionally applied to controller 2, controller 3, and the IAQ controller.

At the end of occupancy, the plant switches off, i.e. the plant operating mode changes from normal operation (Comfort) to sustained mode (Economy). The room temperature falls or rises depending on the prevailing weather conditions and the climatic conditions in the room.

If the room temperature drops below the Economy heating setpoint, sustained mode heating results.

In sustained mode, heating is provided until the room temperature is 1 Kelvin above the Economy heating setpoint. The plant is again switched off.

Function diagrams



Plant component state

In Economy mode, the plant is switched on when the room temperature drops below the set Economy heating setpoint (SpHEco). When the plant operates, the set Comfort setpoints are maintained (fan speeds and setpoints of all control loops).

Note

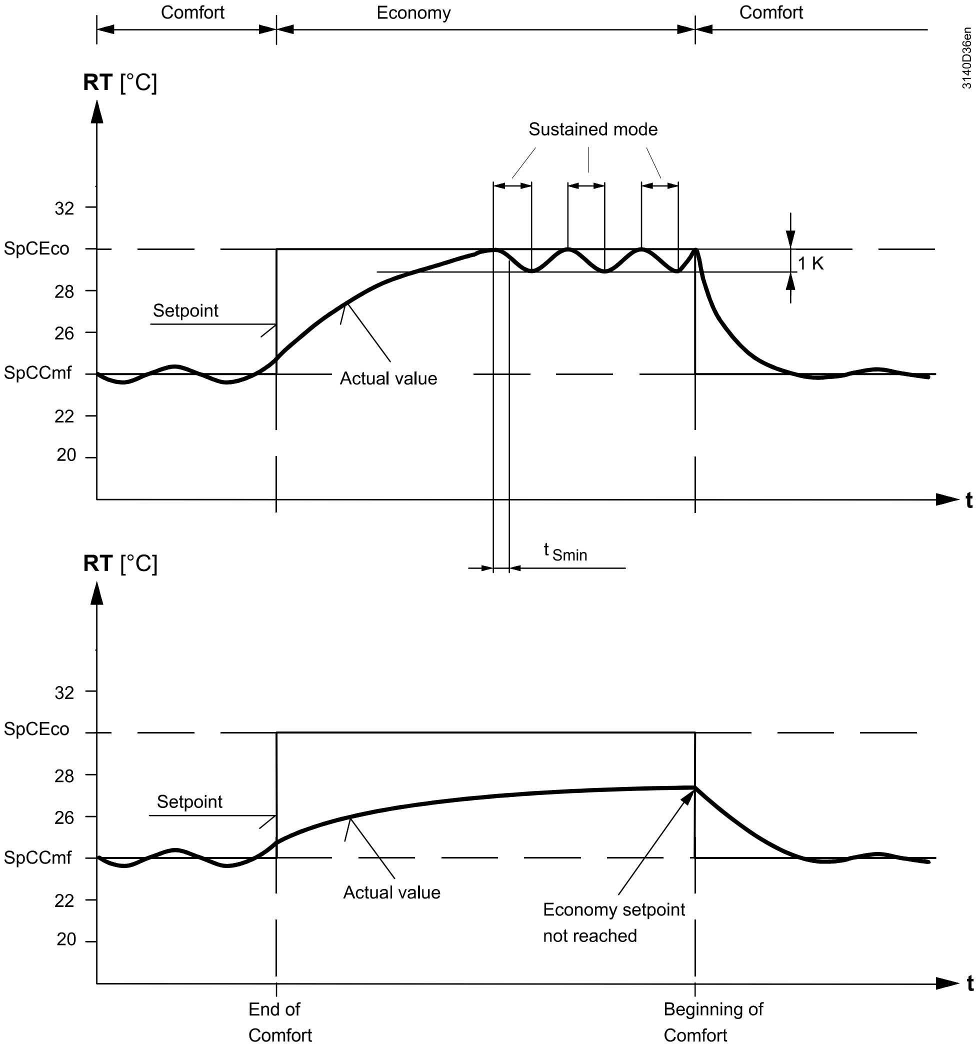
Sustained mode can only be activated when there are no fault messages that switch off the plant.

19.3.2 Sustained mode (Economy) for cooling

The example refers to controller 1 with a main controlled variable for room temperature. It can be functionally be applied to controller 2 and controller 3.

At the end of occupancy, the plant switches off, i.e. the plant operating mode changes from normal operation (Comfort) to sustained mode (Economy). The room temperature falls or rises depending on the prevailing weather conditions and the climatic conditions in the room.
If the room temperature exceeds the Economy cooling setpoint, sustained mode cooling results.
In sustained mode, cooling is provided until the room temperature drops 1 Kelvin below the Economy cooling setpoint. The plant is again switched off.

Function diagrams



Plant component state
In Economy mode, the plant is switched on when the room temperature drops below the set Economy heating setpoint (SpHEco). When the plant operates, the set Comfort setpoints are maintained (fan speeds and setpoints of all control loops).

Note

Sustained mode can only be activated when there are no fault messages that switch off the plant.

20 Recirculated air op (basic type A)

The recirculated air operation function (Precomfort) must control the room climate to Precomfort setpoints during operating mode Precomfort for permanently switched on fan(s) and 100% recirculated air operation of the mixed air dampers.

20.1 Activate function

The function recirculated air (Precomfort) can be activated in basic type A.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Operating mode >

Operating line	*Range*	*Factory setting*
Plant operating mode	Normal operation, Sustained mode, Recirculated air mode	Normal operation

The recirculated air function is active as soon as the plant operation recirculated air operation is selected and the mixed air damper is configured (see section 10.5.1).

20.2 Recirculated air operation

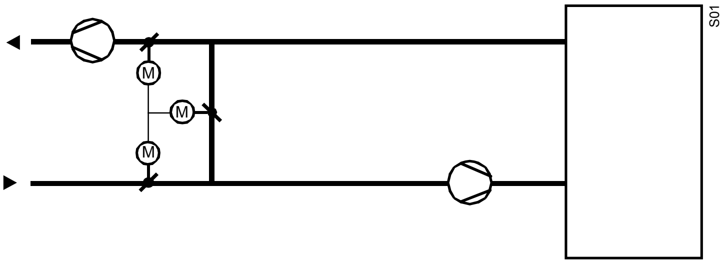
The plant with all configured aggregates (with the exception of the damper block) and controllers is permanently on during recirculated air operation. The switched on plant is controlled to the Precomfort setpoints.

Notes

Mixed air damper control:

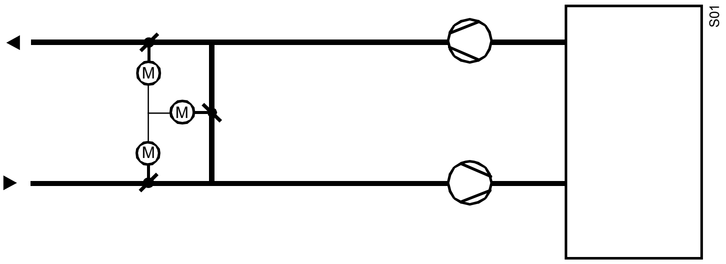
- For recirculated air operation, the outside air damper is controlled at 0%, i.e. the mixed air damper is open at the 100% position
- Control of supply air and extract air fans:
- The supply air fan is always switched on during recirculated air operation. Switch-on of the extract air fan depends on the setting parameter Sustained/Recirculated air operation (see section 10.1.13 "Sustained/recirculated air mode (basic type A)"). The two application examples illustrate this point
- For 2-speed fans and configured room/supply air or extract/supply air cascade control, speed changeover may occur according to heating/refrigeration demand (see section 11.6.3 "Second fan speed by heat/refrigeration demand")

Application example 1



Control of supply air fan

Application example 2



Control of supply and extract air fans

Notes

Automatic changeover from recirculated air operation (Precomfort) to normal operation (Comfort):

- When an IAQ controller is configured, the system changes over to normal operation (Comfort) when the IAQ Precomfort setpoint is exceeded. It switches back to recirculated air operation (Precomfort) after Comfortable air quality is achieved
- For 2-speed operation of fans and configured IAQ controller, speed changeover may occur according to indoor air quality(see section 16.4 "Changeover fan speeds (basic type A)")

20.2.1 Setpoints for control in recirculated air operation (Precomfort)

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Room setpoints >

Operating line	*Factory setting*
Precomfort cooling setpoint	28 °C
Precomfort heating setpoint	19 °C

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Controller 1 > Setpoints >

Operating line	*Factory setting*
Precomfort setpoint high	28 °C, 28 K, 80%, 20 g/kg, 50 kJ/kg, 1000 W/m2, 15 m/s, 10 bar, 100 mbar, 500 Pa, 1500 ppm, 100, 1000
Precomfort setpoint low	19 °C, 19 K, 20%, 0 g/kg, 0 g/kg, 0 kJ/kg, 200 W/m2, 0 m/s, 0 bar, 0 mbar, 0 Pa, 0 ppm, 0

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > IAQ controller >

Operating line	*Range*	*Factory setting*
Setpoint indoor air quality	---, 500...2000, ppm	1000 ppm
Setpoint fan speed 2	500...2000 ppm	1200 ppm

Disable Precomfort IAQ setpoint by setting it to "---"

21 Night cooling (basic type A)

Purpose

The purpose of the "Night cooling" function is to precool the room during vacancy in summer by making use of lower outside temperatures. Cooling energy can thus be saved during occupancy.

21.1 Activate block

This function can only be activated with basic type A.
In addition, the following conditions must be satisfied:

- Both room temperature and outside temperature must be available
- Fan must be activated

Night cooling function is disabled by setting the "Precooling time max" to 0 minutes.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Night cooling >

Operating line	*Range*	*Factory setting*
Outside temperature limit	0...50 °C	12 °C
Room-outside temp delta	0.0...20.0 K	5.0 K
Operating time min	0...720 min	30 min
Precooling time max	0...2880 min	0 min
Speed	Speed 1, Speed 2	Speed 1

21.2 Operating principle

Switch-on conditions

- Room temperature > (☼ Comfort heating setpoint plus 1 K)
- Outside temperature > outside temperature limit value
- (Room temperature minus outside temperature) > Room-outside temp delta
- Time until the plant is switched on the next time by the time switch or holiday / special day program < precooling time max, i.e. precooling time max can be maintained
- Controller must be in operating mode ☾ Economy

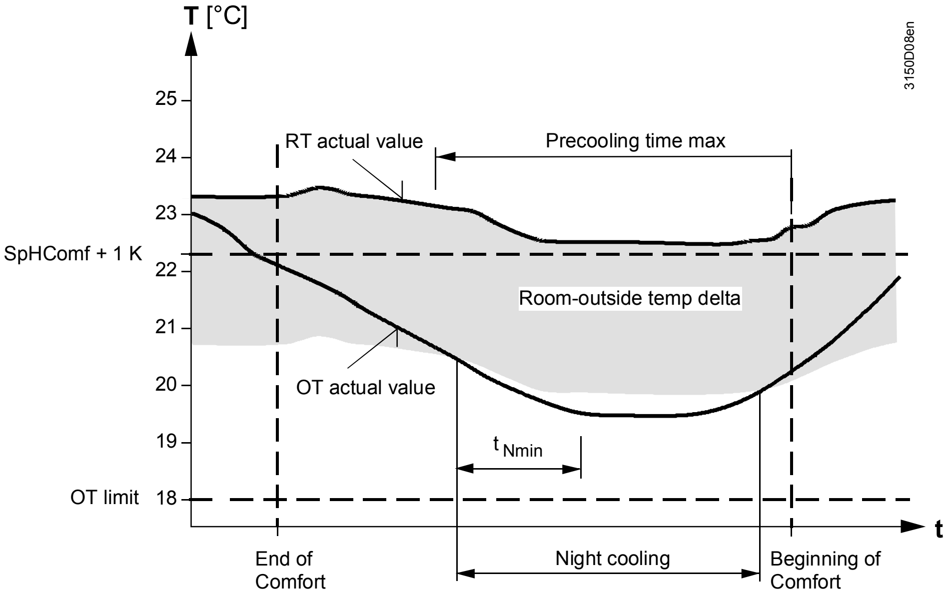
Switch-off conditions

- Room temperature < ☼ Comfort heating setpoint
- Outside temperature < outside temperature limit value
- (Room temperature minus outside temperature) > Room-outside temp delta

With these conditions, the minimum operating time of the "Night cooling" function is observed.

The outside air damper is opened during night cooling (see section 10.5 "Mixed air damper (basic types A, P)"); the fans are operating as per the set speed. Speed-controlled fan (control to constant pressure/volumetric flow) operates at "Speed min". All other aggregates are disabled.

Function diagram



SpHComf + 1 K	Comfort heating setpoint plus 1 K	t_{Nmin}	Operating time min
OT limit value	Outside temperature limit value		

21.3 Troubleshooting

Monitoring room temperature is described in section 8.5; monitoring of outside temperature in section 8.4.

If both room temperature and outside temperature are not available, "Night cooling" is deactivated.

22 Optimum start control (basic type A)

The optimum start control heats or cools the room to the desired room temperature prior to the automatic changeover of the operating mode to Comfort. This applies only to change over of operating mode to Comfort (e. g. from a switch from Economy to Comfort).

The plant is then switched on, if the setpoint can still achieve the next subsequent operating mode. The time switch can thus be set to actual room occupancy. This significantly shortens actual plant operation since pre-cooling or pre-heating is optimized.

22.1 Activate function

The function optimum start control can be activated in basic type A.
2 types of optimum start control are available:

1. "On: Values fix" (room temperature setback or rise)
2. "On: Values adapted" (automatic adaption of setting values)

For the second option, the controller automatically optimizes the setting values and adapts them to the conditions of the given plant.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Optimum start control >

Operating line	*Range*	*Factory setting*
Optimum start control	Off, On: Values fix, On: Values adapted	Off

Optimum start control uses the room temperature for calculations. Does not support calculation using the extract air temperature.

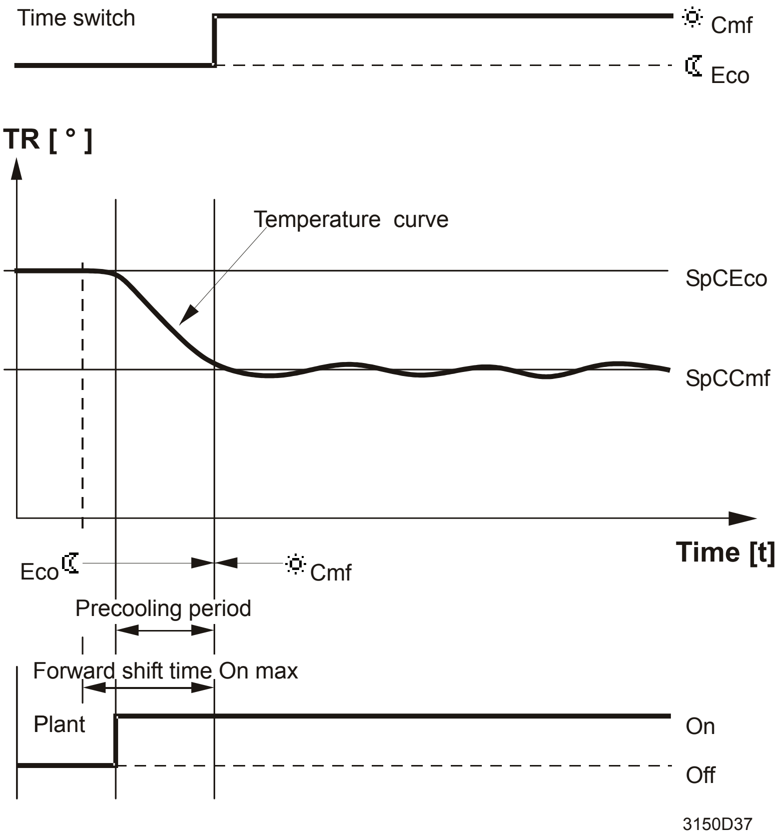
Note

When applying optimum start control it is recommended to use the "cascade" control strategy. See section 11.2

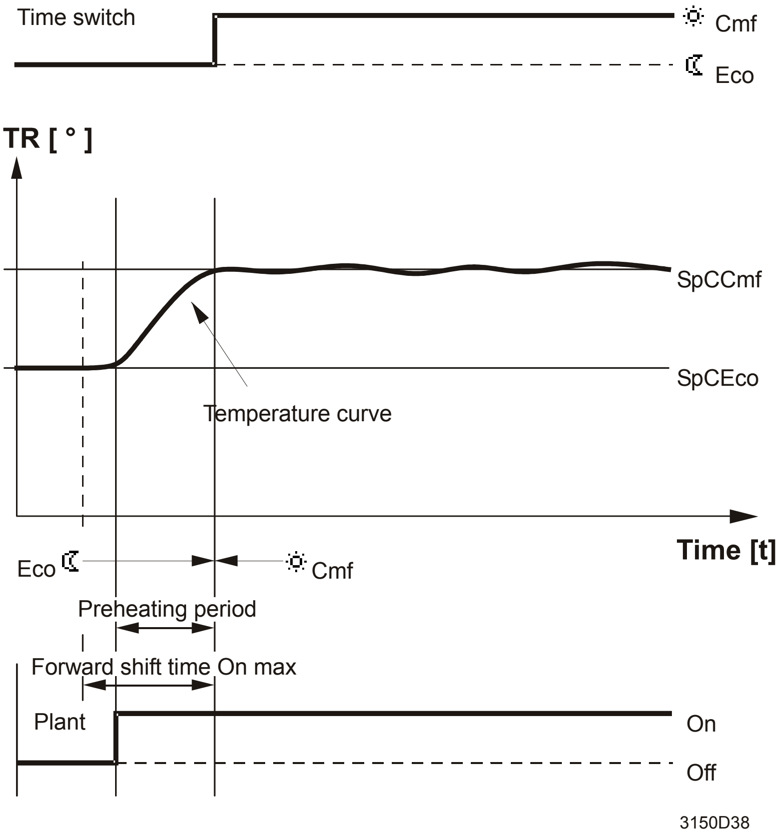
22.2 Optimum start control for cooling and heating

The required precooling or preheating period is calculated based on the present room temperature and the set "Room temperature setback" or "Room temperature rise". In other words, the new room temperature setpoint is already achieve at the time of the change in operating mode.

Optimum start control: Cooling



Optimum start control: Heating



Setting values cooling

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Optimum start control >

Operating line	*Range*	*Factory setting*
Room temperature setback	1…600 min/K	30 min/K

Setting values heating

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Optimum start control >

Operating line	*Range*	*Factory setting*
Room temperature rise	1…600 min/K	30 min/K

For automatic adapting of the setting values, the actual achieved values after each completed optimum start control is used as the new basis for calculation. The set value are adapted if the calculated values and the set values are too great; this achieves better results for the next optimization.

The optimized setting value is also displayed. The adapted value can be reset to another start value by switching optimum start control to "On: Values fix" and then back to "On: **Values** adapted".

Display value: Cooling

Main menu > Commissioning > Settings > .... or
Main menu > Settings > Optimum start control >

Operating line	*Range*	*Comments*
Room temp setback adapted	1…600 min/K	Display value for diagnostics only.

Display value: Heating

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Optimum start control >

Operating line	*Range*	*Comments*
Room temp rise adapted	1…600 min/K	Display value for diagnostics only.

The setting value "Forward shift On max" limits the maximum precooling or preheating period. Optimum start control is only executed within this period.

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Optimum start control >

Operating line	*Range*	*Factory setting*
Forward shift on max	0…2880 min	90 min

All plant elements are switched in accordance with the following operating mode during optimum start control. The supply air limitation values can be temporarily expanded to quickly and efficiently achieve the setpoints during optimum start control.

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Optimum start control >

Operating line	*Range*	*Factory setting*
Max limitation supply air delta	0.0…50.0 K	0.0 K
Min limitation supply air delta	0.0…50.0 K	0.0 K

The current state of optimum start control is displayed on the operator unit.

Display values

■ **Main menu > Plant operation >**

Operating line	*Comments*
Cause	Displays present plant operating mode [Optimum start control]

Note

Optimum start control is only enabled together with the time switch.

The adapted optimum start control can result in confusing results, if the functions such as supply air / sequence limitations, sequence locks by outside temperature, controller timeout, etc. influence control. In applications, we recommend the setting "On: Values fix".

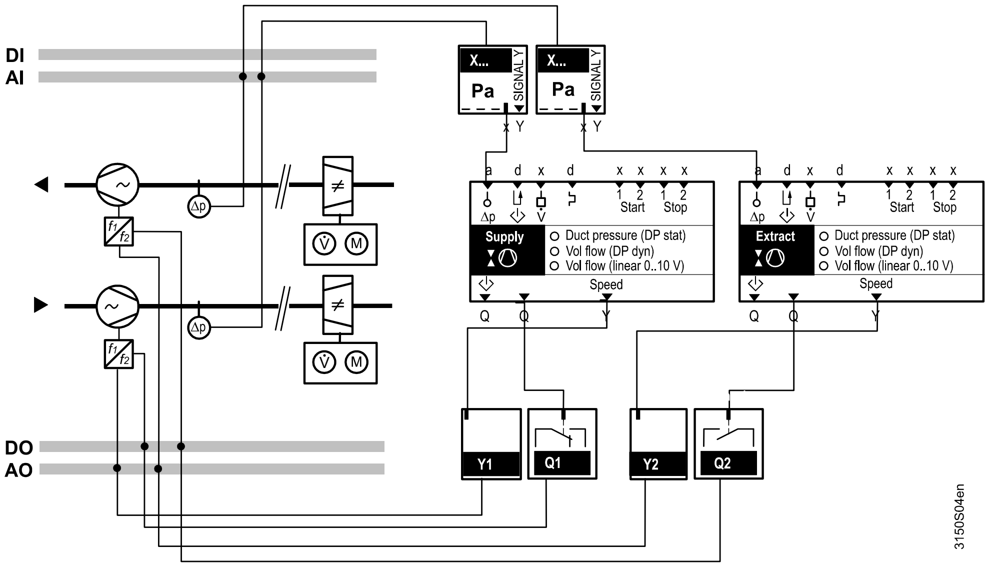
22.2.1 Priorities

The following priorities apply to activating optimum start control:

1. On / Off during wiring test.
2. Smoke extraction.
3. Fire alarm off.
4. Frost.
5. Room/plant operating mode specifications.
6. Optimum start control.
7. Sustained mode.
8. Night cooling.

23 Fan speed controller, demand-controlled (basic type P)

23.1 General



The "supply air fan" or "extract air fan" is intended for demand-controlled speed control with individual VAV room controllers.

The individual room controllers are connected via KNX and exchange the relevant operating data. They execute the following functions:

- Demand-controlled speed control with pressure setpoint optimization (next Section)
- Demand-controlled plant operation via KNX bus (See 12.3)
- Demand-controlled supply air temperature control (Section 12.4)

23.2 Demand-controlled speed control with pressure setpoint optimization

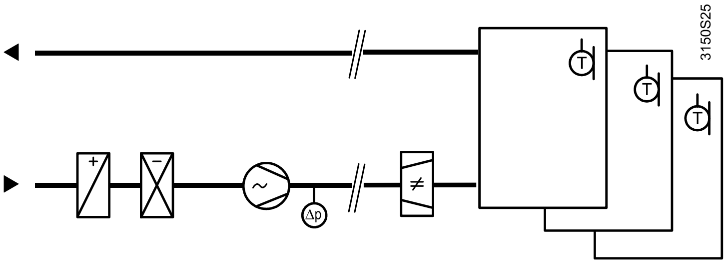
The individual room controllers send their applicable damper position (0-100%) to the primary air handling unit. With 0% = damper closed; 100% = damper open.

Note

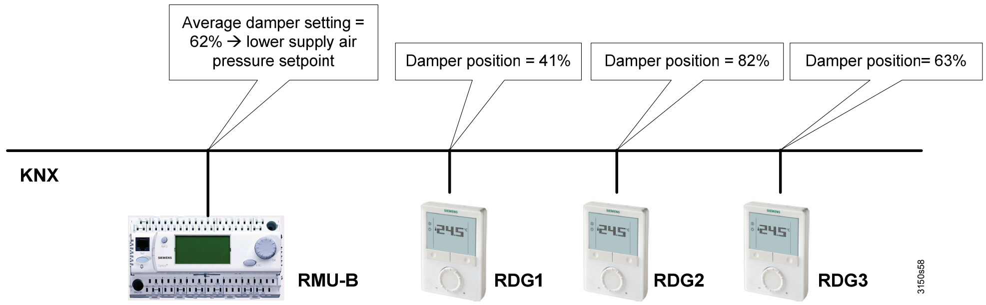
The signal does not correspond to the output signal from the individual room controller to the volume flow controller. The damper positions are collected and evaluated and used to optimize the duct pressure setpoints.

Function principle

Plant level:



Bus signal level:



The fan speed is optimized to open the air dampers controlled by the volume flow controller as wide as possible. So that the volume flow controller or rooms always have sufficient air without the need for the volume flow controller to reduce pressure.

23.3 Set pressure setpoint compensation by damper position

Demand signals from the individual VAV room controller directly control the primary air handling unit. The VAV controller sends is damper position signals to the plant. The plant reacts dynamically to the damper position and optimizes the duct pressure setpoint accordingly.

The following types of pressure setpoint optimization are available:
- Supply air: Pressure setpoint for supply air based on the VAV damper position for supply air. See application example 1
- Supply-extract air in parallel: Pressure setpoint for supply/extract air based on the VAV damper position. Common use of the control signal. See application example 2
- Supply and extract air: Pressure setpoint for supply/extract air fan based on the VAV damper position together with the KNX volume flow controller supply and extract air. Separate use of the supply and extract control signal. See application example 3.

Application examples

See chapter 23.4

Setting values

Main menu > Commissioning > Settings > *.... or*
Main menu > Settings > Aggregates > Supply air fan >

Operating line	*Range*	*Factory setting*
Pressure optimization	None, Supply air, Supply-extract air parallel, Supply and extract air	None

A Pressure setpoint and a Pressure setpoint reduction can be set. The pressure setpoint corresponds to the design pressure for the plant at full load. The pressure setpoint reduction determines the maximum pressure reduction based on the evaluated damper position that impacts the pressure setpoint.

The Pressure setpoint reduction is switched off by default (= 0). The setting value "Speed min" is used to ensure that a minimum speed is maintained.
The evaluated damper positions are controlled to the setpoint VAV supply air dampers or setpoint VAV extract air dampers.

Damper position influence on pressure setpoint compensation

- Case 1: Evaluated damper position > Setpoint VAV damper position
  The pressure control supplies the plant with the optimum pressure setpoint. No reduction or increase in the pressure setpoint is required; there is no potential for optimization.
- Case 2: Evaluated damper position < Setpoint VAV damper position
  The pressure control supplies the plant with a pressure setpoint that is too high. Potential for optimization exists. The pressure setpoint is reduced based on the present damper position or the setting value for pressure setpoint reduction.

Setting values

Main menu > Commissioning > Settings > *.... or*
Main menu > Settings > Aggregates > Supply air fan >
Main menu > Settings > Aggregates > Extract air fan >

Operating line	*Range*	*Factory setting*
Pressure setpoint	Depending on the selected input identifier	500 Pa / 30 mbar / 3 bar
Pressure setpoint reduction	Depending on the selected input identifier	0 Pa / 0 mbar / 0 bar
Pressure controller Xp	Depending on the selected input identifier	500 Pa / 50 mbar / 5 bar
Pressure controller Tn	00.00…10.0 m:s	02.00 m:s
Speed min	0…100 %	0%
Setpoint VAV supp air dampers	0…100%	80%
Setpoint VAV extr air dampers	0…100%	80%

Variant with constant room overpressure control

Setting values must be adapted accordingly, if the extract air fan is implemented as constant room overpressure control (e. g. pressure setpoint = 25 Pa, setpoint reduction = 0 Pa etc.).

Control action

The rate at which pressure setpoints or speed are optimized is defined via the "Control action" setting parameter.

Evaluation of request

In addition, you can also define how to evaluate the collected damper positions.
- Maximum: Only the highest damper position is considered for setpoint compensation.
- Average: The average of all damper positions is considered for setpoint compensation.

Setting values

Main menu > Commissioning > Settings > *.... or*
Main menu > Settings > Aggregates > Supply air fan >

Operating line	*Range*	*Factory setting*
Control action	Slow, Medium, Fast	Medium
Request evaluation	Maximum, Average	Maximum

These settings are entered for Supply air fan and apply as well for the Extract air fan.

Required settings

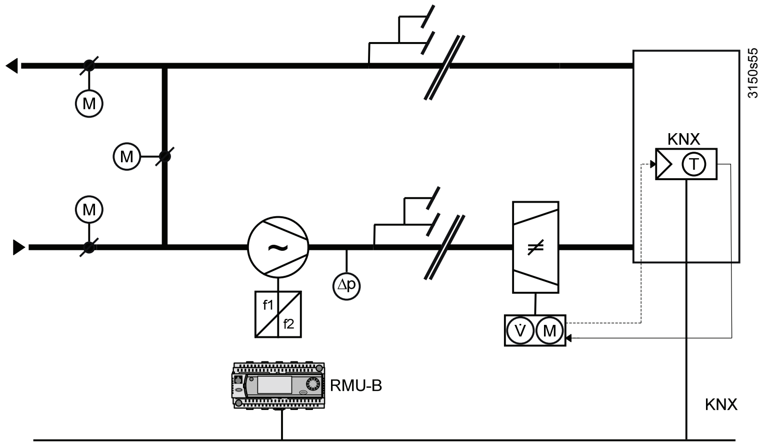
- The value for the "geographic zone (Apartment" must be set if the local time switch 1 is active on the RMU controller. Additional information is available in Section 28.2.2 (Sub-menu "Room")
- The setting value "Air distribution zone" defines assignment of individual room controllers to the corresponding primary air handling unit. Additional information is available in Section 28.2.5 (Sub-menu "Distribution zone")

23.4 Application examples

The application examples below include the configurations and settings required for basic type P together with the individual VAV room controllers and the volume flow controllers.

Example 1

- Primary air handling unit with supply air fan and mixed air damper.
- Individual room control (RDG400KN) for VAV single duct system with supply air compact controller with analog damper position signal.
- Data exchange between the primary air handling unit and the individual room controllers via KNX with the following functions:
- Optimization of the pressure setpoints for supply air using the damper positions VAV supply air compact controller.
- Demand-controlled plant operation and optimization of the supply air setpoint by heat and refrigeration demand signals.

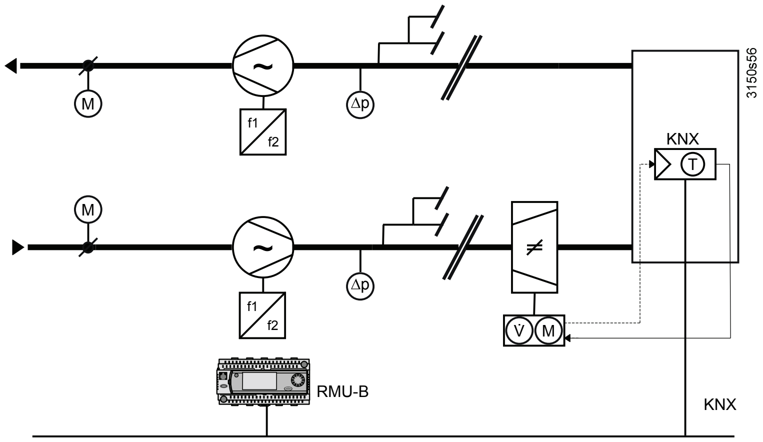


Configuration overview
Primary air handling unit RMU7x0B

Setting values	*Supply air*	*Extract air*
	Fan	*Fan*
Control mode	Duct pressure (DP stat)	----
Pressure optimization	Supply air	
Pressure setpoint	220 Pa	----
Pressure setpoint reduction	160 Pa	----
	VAV supply air damper position (0…100%).	----
Demand-controlled supply air temperature control		
Supply air limit value max	26°C	
Supply air limit value min	15°C	
Supply air heat demand	(0…100%)	
Supply air refrigeration demand	(0…100%)	
Individual room control RDG400KN, VAV controller G…B181.1E		
	Supply air	*Extract air*
Assignment VAV	Yes	No
Damper position signal, type	Yes - analog 0-10V DC via RDG400KN	----
Setpoint compensation fans	Yes	----

Example 2

- Primary air handling unit with supply/extract air fan
- Individual room control (RDG400KN) for VAV single duct system with supply air compact controller with analog damper position signal.
- Data exchange between the primary air handling unit and the individual room controllers via KNX with the following functions:
- Optimization of the pressure setpoints for supply air and extract air using the damper positions VAV supply air compact controller.
- Demand-controlled plant operation and optimization of the supply air setpoint by heat and refrigeration demand signals.

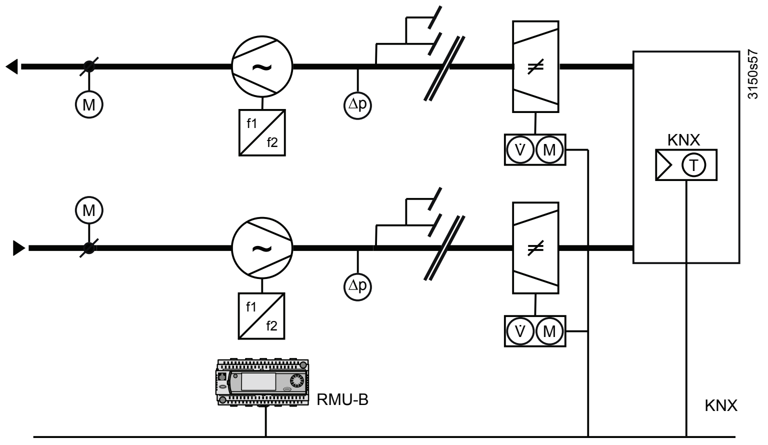


Configuration overview
Primary air handling unit RMU7x0B

Setting values	*Supply air* *Fan*	*Extract air* *Fan*
Control mode	Duct pressure (DP stat)	Duct pressure (DP stat)
Pressure optimization	Supply-extract air in parallel	
Pressure setpoint	220 Pa	230 Pa
Pressure setpoint reduction	160 Pa	160 Pa
	VAV supply air damper position (0…100%)	VAV extract air damper position (0…100%).
Demand-controlled supply air temperature control		
Supply air limit value max	26°C	
Supply air limit value min	15°C	
Supply air heat demand	(0…100%)	
Supply air refrigeration demand	(0…100%)	
Individual room control RDG400KN, VAV controller G…B181.1E		
	Supply air	*Extract air*
Assignment VAV	Yes	No
Damper position signal - type	Yes - analog 0-10V DC via RDG400KN	No
Setpoint compensation fans	Yes	Yes, common control signal from VAV controller supply air

Example 3

- Primary air handling unit with supply/extract air fan
- Individual room control (RDG400KN) for VAV single duct system with communicative supply/extract air compact controller featuring a KNX damper position signal.
- Data exchange between the primary air handling unit and the individual room controllers via KNX with the following functions:
  - Optimization of the pressure setpoints for supply air and extract air using the damper positions VAV supply air (master) and extract air (slave) compact controller.
  - Demand-controlled plant operation and optimization of the supply air setpoint by heat and refrigeration demand signals.



Configuration overview
Primary air handling unit RMU7x0B

Setting values	*Supply air* *Fan*	*Extract air* *Fan*
Control mode	Duct pressure (DP stat)	Duct pressure (DP stat)
Pressure optimization	Supply and extract air	
Pressure setpoint	220 Pa	230 Pa
Pressure setpoint reduction	160 Pa	160 Pa
	VAV supply air damper position (0…100%).	VAV extract air damper position (0…100%)
Demand-controlled supply air temperature control		
Supply air limit value max	26°C	
Supply air limit value min	15°C	
Supply air heat demand	(0…100%)	
Supply air refrigeration demand	(0…100%)	
Individual room control RDG400KN, networked VVS G..B181.1E/KN		
	Supply air	*Extract air*
Assignment VAV	Yes (master)	Yes (slave)
Damper position signal - type	Yes - KNX Bus	Yes - KNX Bus
Setpoint compensation fans	Yes	Yes

23.5 Diagnostics: Pressure setpoint optimization

The following menu items are available to check pressure setpoint compensation and current plant situation:

Main menu > Diagn air duct network > Pressure optimization >

Operating line	*Comments*
Pressure optimization	Type of pressure optimization
Supply air	
VAV supp air damper positions	Display value for collected supply air damper positions
Supply air fan	Xx %
Actual value of pressure	Display value
Pressure setpoint current	Display value (dp setpoint compensation optimization)
Pressure setpoint	Display setting value
Pressure setpoint reduction	Display setting value
Extract air	
VAV extr air damper positions	1)
Extract air fan	Xx %
Actual value of pressure	Display value
Pressure setpoint current	Display value (dp setpoint compensation optimization)
Pressure setpoint	Display setting value
Pressure setpoint reduction	Display setting value

1) Display value (available only if network field device is available) of the collected extract air damper positions.

Demand-controlled supply air temperature control

Refer to section 12.4.

23.6 Air volume flow balancing

Forced control signals on the ventilation unit to set maximum air volume is required to setup the air volume. You can override the volume flow controller (open) for the corresponding air distribution zone regardless of the current available energy demand signals for heating or cooling. Activating the "Simulation VAV supply air" or "Simulation VVS extract air" switches on the supply air or extract air fan respectively. The fans should be controlled to provide sufficient pressure prior to the volume flow controller with the highest pressure loss so that even it can achieve the maximum volume flow.

Procedure: Air volume flow balancing

Prerequisites

- All devices are installed and commissioning is completed.
- Communications between the devices is operational and all zone settings (geographical zone/air distribution zones) have been checked.

The VAV controller can control the corresponding room groups through forced controlled of the air volume flow balancing.
The selection "Vmax" opens all VAV dampers for the corresponding air distribution zone. This allows you to make the optimum settings for required air flow.
To exit the simulation, select "---". This resets the simulation mode.

Forced control

Main menu > Air flow balancing >

Operating line	*Comments*
Simulation VAV supply air	----, Vmax
Simulation VAV extract air	----, Vmax

⚠ The fault message "Simulation VAV supply air" or "Simulation VAV extract air" are sent while simulating the volume flow controller.

Fault status messages

No.	*Text*	*Effect*
3931	Simulation VAV supply air	Non urgent message; must not be acknowledged.
3932	Simulation VAV extract air	Non urgent message; must not be acknowledged.

23.7 General commissioning notes

Observe the following during commissioning:

- Setting values dependent on time, such as the pre-command of fire protection dampers or dampers, switch-on delay, fans, ramp-up time and other setting values that may have an impact on plant start-up behavior.
- Time-related specifications such as overshoot time when using electric heating coils.
- Conduct function and communication tests of room control and the corresponding volume flow controllers.
- KNX communications between the primary air handling unit and individual room control: Data exchange of heat and refrigeration demand signals and request signals (temperature or pressure control) are checked and fully operational.
- Ensure when switching on the primary air handling unit that the volume flow controller is open and the fans cannot start when the dampers are closed.

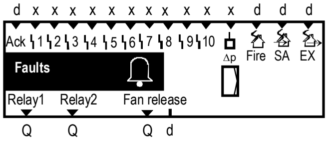
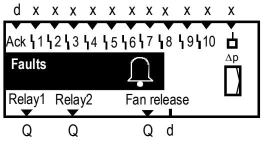
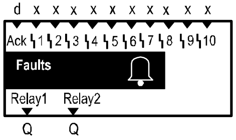
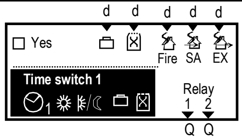
⚠ Failure to comply with these items may result in damage to the aggregates and plant parts!

24 Faults

24.1 Purpose and activation

Purpose

Function block "Faults" collects all fault status messages and reports them to the fault display, fault relay, and via bus. A distinction is made between "universal fault inputs" and "predefined fault inputs" (filter supervision, fire alarm off, smoke extraction).

Basic type A	Basic type P	Basic types C and U
		
		

Activation

The fault block is activated by configuring fault inputs 1...10 or assigning a fault relay.

Note

Many faults are acquired automatically and need not be specifically configured in function block "Faults". These faults are described with the relevant function. The fault block does not have to be activated to display these faults.

24.2 Fault categories

Fault messages are divided into three categories for engineering purposes:

Category	*Value*	*Comments*
Acknowledgement	None	Detailed information in section 29.3.2
	Acknowledge	
	Acknowledge and reset	
Priority	Urgent	Fault messages representing plant risks or for which trouble-free plant operation is no longer guaranteed (e.g. frost, smoke extraction)
	Not urgent	These are fault messages that represent no direct risk to plant operation (e.g. "Filter dirty", "Outside temp sensor error")
Effect	Stop	Plant stop: For messages about faults that represent a risk to the plant (e. g. "Supply air overload")
	No stop	No plant stop: For messages about faults that do not represent a risk to plant operation (e.g. "Outside temp sensor error")

24.3 Universal fault inputs (1…10)

Connections

Function block "Faults" has 10 universal fault inputs at its disposal. Any type of analog or digital signal can be fed to these inputs.

Configuration

Main menu > Commissioning > Extra configuration > Faults >

Operating line	*Adjustable values / remarks*
Fault input 1	---, N.X1, N.X2, ...
...	
Fault input 10	---, N.X1, N.X2, ...

Settings

The following settings are possible for each fault message:

- Fault status signal delay.
  Elapsed time until a pending fault generates a fault message
- Fault acknowledgement
- Impact of fault
- Fault priority
- Limit value "Fault on": Limit value from which the fault status message is generated
- Limit value "Fault off": Limit value for the normal state

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Faults > Fault input 1...10 >

Operating line	*Range*	*Factory setting*
Fault status message delay	00.00...59.55 m:s	00.00 m:s
Fault acknowledgement	None, Acknowledge, Acknowledge and reset	None
Fault priority	Urgent, Not urgent	Not urgent
Impact of fault	No stop, Stop	No stop
Limit value fault on	Depending on the selected type	Depending on the type
Limit value fault off	Depending on the selected type	Depending on the type

Notes

- If the upper and the lower limit of a measured value is to be monitored, the signal must be fed to 2 fault inputs
- To monitor the lower limit, the operating line "Limit value fault on" is set below "Limit value fault off". This generates a fault message when the measured value is lower than the "Limit value fault on"
- The differential "Limit value fault on" and "Limit value fault off" represents the hysteresis
- If data point "Limit value fault on" is set equal to "Limit value fault off", no fault message is generated

Fault texts

The text for the universal fault inputs can be adjusted via the operator unit. Displayed locally in the event of a fault and transmitted via the bus.

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Faults > Fault input 1...10 >

Operating line	*Range*	*Factory setting*
Fault text x	Max. 20 characters	[Fault input x] Fault

Fault status messages

No.	*Standard text*	*Effect*
9000	>1 fault input faulty	Urgent message; does not require acknowledgement (Effect can be set for each fault input)
9001	[Fault input 1] fault	As per the settings
9002	[Fault input 2] fault	ditto
9003	[Fault input 3] fault	ditto
9004	[Fault input 4] fault	ditto
9005	[Fault input 5] fault	ditto
9006	[Fault input 6] fault	ditto
9007	[Fault input 7] fault	ditto
9008	[Fault input 8] fault	ditto
9009	[Fault input 9] fault	ditto
9010	[Fault input 10] fault	ditto

>1 fault input faulty

The fault with the highest priority is sent over the KNX bus. If more than one fault with priority "urgent" is pending at the fault input, “>1 fault input faulty” is sent with the highest priority. Without this fault message, only the message from one fault input would be known. The newly arriving fault message can be displayed on the Info level under "Fault status message bus".

24.4 Predefined fault inputs

Predefined fault inputs are available depending on the controller basic type:

- Filter supervision
- Fire alarm off
- Smoke extraction supply air
- Some extraction extract air

24.4.1 Filter supervision (basic types A and P)

An input must be assigned to this function to activate it (basic types A and P).

Configuration

Main menu > Commissioning > Extra configuration > Faults >

Operating line	*Adjustable values / remarks*
Filter supervision	---, N.X1, N.X2, ...

The following settings available for filter supervision:

- Fault status signal delay.
  Elapsed time until a pending fault generates a fault message
- Limit value "Fault on": Limit value from which the fault status message is generated
- Limit value "Fault off": Limit value for the normal state

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Faults > Filter supervision >

Operating line	*Range*	*Factory setting*
Fault status message delay	00.00...59.59 m:s	10.00 m:s
Limit value fault on	Depending on the selected type	Depending on the type
Limit value fault off	Depending on the selected type	Depending on the type

This input is used to supervise a filter monitor and handling its messages. When, due to filter contamination, the pressure drop across the filter is too high, a fault message can be generated.

Fault status messages

No.	*Text*	*Effect*
3911	Filter dirty	Non-urgent message; must be acknowledged and reset

If several filters are to be supervised (e.g. the extract and supply air filter), the two filter monitors can be connected in series.
Signal priority is always "Non-urgent", a filter fault message must always be acknowledged and reset. If a filter is clogged, the plant is not stopped.

24.4.2 Fire alarm off (basic types A and P)

You can switch the ventilation plant to operating mode "Fire alarm off" via a digital signal on the "Fire alarm off" input.

Configuration

The function is activated by configuring a digital input Xx in fault block (basic type A) or at time switch 1 (basic type P):

Main menu > Commissioning > Extra configuration > Faults (basic type A)
Main menu > Commissioning > Extra configuration > Time switch 1 (basic type P)

Operating line	*Adjustable values / remarks*
Fire alarm off	---, N.X1, N.X2, ... (digital inputs only)

The supply air fan and extract air fan are emergency shut down for an active signal at input "Fire alarm off". This input can be controlled by e.g. external fire alarm equipment.

Furthermore, a geographic zone can be entered for basic type P on the RMU7..B controller. Time switch 1 or the fire alarm off signal also acts in this zone. This is the same functionality as in the RMB795 central control unit (see basic documentation CE1P3121en, section 8.8).

The fault priority is always "Urgent", a fire alarm must always be acknowledged and reset.

Fault status messages

No.	*Text*	*Effect*
3900	Fire alarm off	Urgent message with plant stop; must be acknowledged and reset

24.4.3 Smoke extraction (basic types A and P)

The ventilation plant can be switched to operating mode "Smoke extraction" via a digital signal or two digital signals on the inputs "Smoke extraction supply air" and "Smoke extraction extract air".

Configuration

The function is activated by configuring at a minimum a digital input Xx in fault block (basic type A) or at time switch 1 (basic type P):

Main menu > Commissioning > Extra configuration > Faults (basic type A)
Main menu > Commissioning > Extra configuration > Time switch 1 (basic type P)

Operating line	*Adjustable values / remarks*
Smoke extraction supply air	---, N.X1, N.X2, ... (digital inputs only)
Smoke extraction extract air	---, N.X1, N.X2, ... (digital inputs only)

At an active signal on input "Smoke extraction supply air", the supply air fan and the extract air fan on input "Smoke extraction extract air" can be emergency shut down.

Furthermore, a geographic zone can be entered for basic type P on the RMU controller. Time switch 1 or smoke extraction signals also act in this zone. This is the same functionality as in the RMB795 central control unit (see basic documentation CE1P3121en, section 8.9).

Notes

- Both inputs can be configured from the same digital input Xx for smoke extraction with supply and extract air
- The ON by smoke extraction takes priority over the OFF by fire alarm (see section 6.13 Operating mode priorities)
- You must provide a hardware solution should smoke extraction be activated first for a pending fire alarm off

The fans are switched on to maximum speed during smoke extraction operation (e.g. speed 2 for 2-speed operation) and remain on for as long as the smoke extraction signal is pending. Then, the plant resumes normal operation according to schedule.
The fault priority is always "Urgent", smoke extraction must always be acknowledged.

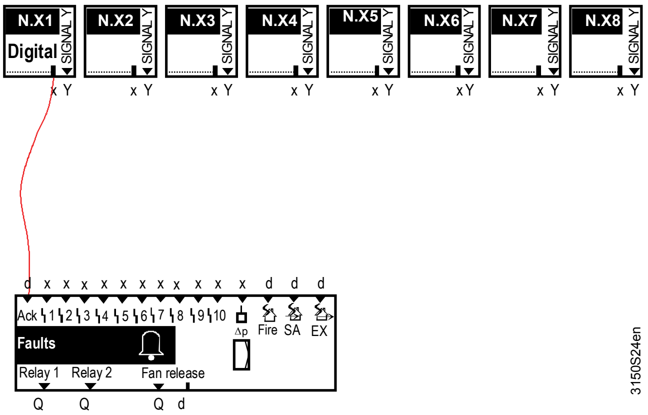
Fault status messages

No.	*Text*	*Effect*
3901	Smoke extraction	Urgent message; must be acknowledged

⚠ During smoke extraction, control is off and the outside air damper open. Although the frost protection function can switch on the pump and open the heating coil valves, the plant cannot be switched off. If heat is not available, the heating coil cannot be prevented from freezing.

24.5 External fault button

The fault block allows for connecting an external fault button. The external fault button has the same function as fault button "🔔" on the unit. Both can be operated in parallel.
The current alarm state can be externally indicated via the fault relay.



Configuration

Main menu > Commissioning > Extra configuration > Faults >

Operating line	*Adjustable values / remarks*
Fault button external	---, N.X1, N.X2, ... (digital only)

24.6 Fault relay

Route fault status messages

To route fault messages, or for acoustic or visual indication on a control panel, e.g. two outputs for the fault blocks "Relay1" and "Relay2" can be configured to any two free outputs N.Qx.

Configuration

Main menu > Commissioning > Extra configuration > Faults >

Operating line	*Adjustable values / remarks*
Fault relay 1	---, N.Q1 ... (free relays only) / assignment of fault relay
Fault relay 2	---, N.Q1 ... (free relays only) / assignment of fault relay

Settings

The following settings are possible for fault relays 1 and 2:

- *Fault priority* Priority at which the relay is to be energized
- *Indication* The following indications of fault can be selected:

– *Internal fault (visual):* The fault relay only indicates internal faults and remains energized until faults are no longer present
– *Internal fault (acoustic):* The fault relay only indicates internal faults and remains energized until the fault is acknowledged
– *Fault via bus (acoustic):* The fault relay only indicates internal device faults and bus faults and remains energized until the fault is acknowledged

- Inversion:

– "No" means: In case of fault, the relay is energized
– "Yes" means: In case of fault, the relay is deenergized

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Faults > Fault relay 1..2 >

Operating line	*Range*	*Factory setting*
Fault priority	Urgent, Not urgent, All	All
Indication of fault	Internal fault (visual), Internal fault (acoustic), Fault via bus (acoustic)	Internal fault * (acoustic)
Inversion	Yes, No	No

* Factory setting for fault relay 2: "Fault via bus (audibly)"

Display values

At menu item "Aggregates", the state of the 2 fault relays can be read.

Main menu > Aggregates > Faults >

Operating line	*Current state*
Fault relay 1	Off, On
Fault relay 2	Off, On

24.7 Fan release relay

The fan release relay can only be configured for basic types A and P.

Configuration

Main menu > Commissioning > Extra configuration > Faults

Operating line	*Adjustable values / remarks*
Fan release relay	---, N.Q1, N.Q2, ... (free relays only) / assign fault relay

This relay is deenergized as soon as a fault exists in the device where the fans must be switched off (e.g. risk of frost).

If external on / off switches for the fans are used and they take priority over the controller (in the control chain after the controllers or the load switch), we recommend to release the fans only via this relay, enabling the fans to be locked in an emergency.

Caution

Although the fans can be switched off via this relay in an emergency, smoke extraction operation with the fans is no longer possible!
If smoke extraction operation is required, we recommend to use a fan on / off switch via the controller inputs in place of external on / off switches (see section 10.1.11 "Start and stop conditions").

Display values

At menu item "Aggregates", the state of the 2 fan release relays can be read.

Main menu > Aggregates > Faults >

Operating line	*Current state*
Fan release relay	Off, On

24.8 Function check / wiring test

Wiring test

During the wiring test, the two fault relays can be activated directly:

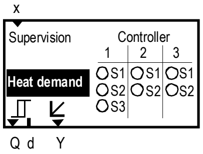
Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Fault relay 1	Off, On
Fault relay 2	Off, On
Fan release relay	Off, On

25 Heat demand

The heat demand function collects heat requests.
These heat requests occur internally or come from consumers of a heat distribution zone via the bus. The collected heat requests can be routed to a zone (basic type C only) or further handled as a resulting setpoint condition (temperature request signal, heating flow setpoint) in the form of a continuous or digital signal.

25.1 Activate block (basic types A, P, U)



To activate the "heat demand" function, the function must be assigned the sequence with heating coil or heating surfaces configured.

Configuration example

- Sequence 1 for controller 1 control the heat recovery
- Sequence 2 for controller 1 control heating coil valve

→ Required setting: Controller 1: Sequence 2.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Heat demand >

Operating line	*Adjustable values / remarks*
Controller 1	---, Seq 1, Seq 2, Seq 3
Controller 2	---, Seq 1, Seq 2
Controller 3	---, Seq 1, Seq 2

Heat demand can be transmitted via communication when communication is activated (see section 28 "Communication"). The heat distribution zone must be set to generate a heat demand signal that is processed by another device on KNX.

Heat distribution zone

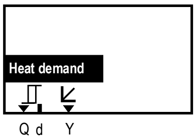
Main menu > Commissioning > Communication > Distribution zones >

Operating line	*Range*	*Factory setting*
Heat distribution zone	1…31	1

Load signal

Heat demand is sent as a load signal (0...100% load) via communication. At the same time, the primary controller receives information whether or not heat is called for. This means that the primary controller is switched on and off depending on demand.

25.2 Activate block (basic type C)



For basic type C, the heat demand block together with the heating/cooling changeover (section 27) is required.

The heating/cooling changeover function must be activated to send the head demand collected in the heat distribution zone to a heat generator and to issue a "Heat distr zone source side". Heat demand can also be issued modulating via the heat demand relay or heat demand.

Setting values

Main menu > Commissioning > Communication > Distribution zones >

Operating line	*Range*	*Factory setting*
Heat distribution zone	1…31	1
Heat distr zone source side	----, 1…31	----

The signal is sent as heat demand. Heat demand is made up of the current setpoint of controller 1 and a temperature boost. The temperature boost helps compensate line losses.

Setting values

Main menu > Commissioning > Communication > Distribution zones >

Operating line	*Range*	*Factory setting*
Heat demand setpoint increase	0...50 K	0 K

A feedback signal via communication with information about the available amount of heat is not possible.

25.3 Supervision (basic types A, P, U)

The heat feedback signal can be fed to this input.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Heat demand >

Operating line	*Adjustable values / remarks*
Supervision	---, N.X1, N.X2, ... / Activate function "Supervision"

The feedback signal can be fed via an input such as a thermostat in the flow which switches at temperatures >15 °C, or via an analog input such as a LG-Ni1000 sensor in the flow which signals heat at temperatures >15 °C.

In the case of a digital input:
Normally closed = No heat available
Operating position = Heat available

In the case of the analog input, only inputs in °C can be configured. A limit value can be entered. Below this limit value, heat is considered unavailable.

If there is no heat after an adjustable period of time (fault status message delay), a fault message is generated. In addition, setting value "Fault effect" allows for selecting if the plant should be switched on.

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Heat demand >

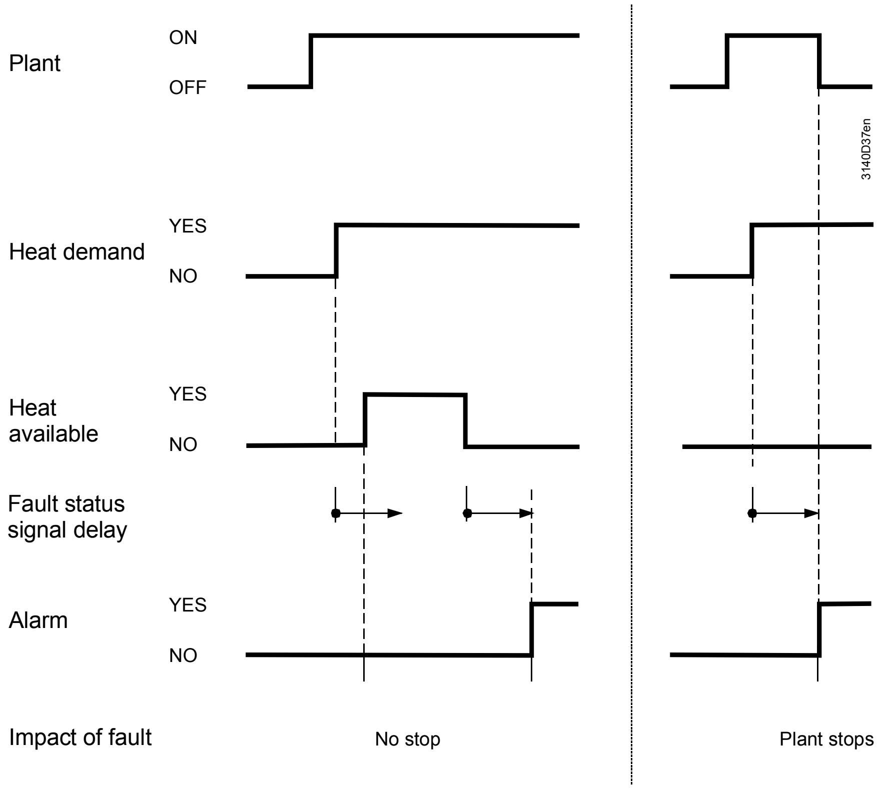
Operating line	*Range*	*Factory setting*
Limit value	0...50 °C	15 °C
Fault status message delay	00.00...59.55 m:s	30.00 m:s
Impact of fault	No stop, Stop	No stop

Note

If the plant is to switch off in the event of fault, no more heat demand is signaled.

The settings have the following effect:

Function diagram



If, with basic type A, the preheating function is active at the same time as the heat demand signal, the fan is started only after the preheating time.

Note

The "Fault signal delay time" should roughly equal the "Purge time max". If there is still no heat supply after the purge time, a fault message appears.

25.4 Heat demand relay (Q⎍)

Purpose and function

Release for an external heating source, for example, can be connected to this output.
The heat demand relay responds as soon as the assigned sequences or of "heat" is demanded from other bus participants within the same heat distribution zone.
Meaning:

- Contact open = No heat demand
- Contact closed = Heat demand

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Heat demand >

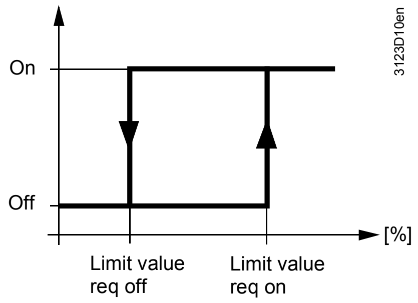
Operating line	*Adjustable values / remarks*
Heat demand relay	---, N.Q1, N.Q2, ... / Activate output

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Heat demand >

Operating line	*Range*	*Factory setting*
Limit value request on	0...100%	10%
Limit value request off	0...100%	5%
Control action	Slow, Medium, Fast	Medium
Request evaluation	Average, Maximum	Maximum

"Limit value request on"

The adjustable value prevents entire plants from being switched on (e.g. heat generation plant), even in the case of the smallest heat demand. Switching on (that is, routing as a bus signal, or to outputs Q, d, Y, a) takes place only when the set limit value "Limit value request on" is exceeded.



Control action

To adapt the control system to the plant, the control action of the flow temperature can be set to the setpoint shifts in 3 steps (slow, medium, fast) using the following setting:

Evaluation of request

Setting "Request evaluation" is used to determine if the max value or the average of the requests is to be used.

- When using the maximum setting, the flow temperature is readjusted so that the valve position for the consumer with the greatest heat demand is 90%
- When using the average setting, the flow temperature is readjusted so that the valve positions of the 4 largest consumers are 90% on average
  Note: This setting does not ensure that all consumers are covered. It makes certain, however, that an individual consumer cannot force the flow temperature to high levels (e.g. because a window was left open)

25.4.1 Internal heat demand

Purpose and function

The "heat demand relay" signal is available as well as an internal signal on output (⎍ d). The demand as a digital value can be further handled by a logic block, etc., for example, to switch on a pump when a heat demand was sent.

25.5 Heat demand modulating (∠)

Purpose

In addition to the heat demand relay, the heat demand can be provided at a modulating output of other devices. You can set the characteristic of the modulating 0…10 V signal.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Heat demand >

Operating line	*Adjustable values / remarks*
Heat demand modulating	---, N.Y1, N.Y2, ... Activate output

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Heat demand >

Operating line	*Range*	*Factory setting*
Setpoint at 0 V	–50 °C…setpoint at 10 V	0 °C
Setpoint at 10 V	Setpoint at 0 V…250 °C	100 °C
Limit value	Setpoint at 0 V…setpoint at 10 V	10 °C

Explanations relating to the setting values

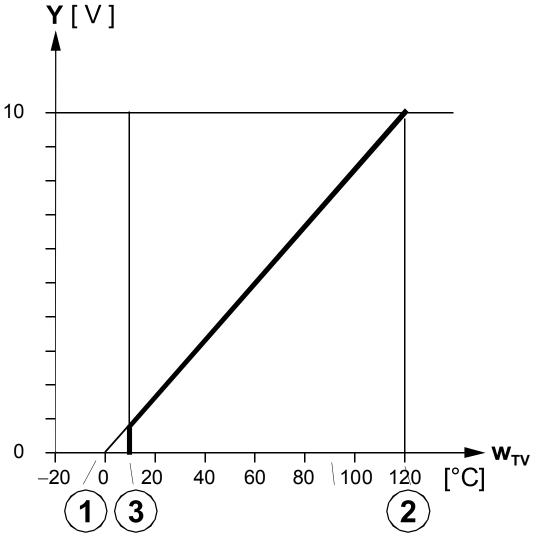
"Setpoint at 0 V" determines the flow temperature setpoint at DC 0 V.
"Setpoint at 10 V" determines the flow temperature setpoint at DC 10 V.

Limit value denotes a limit value for heat demand: Temperatures below this level are interpreted as "no heat demand".

As long as the flow temperature setpoint does not exceed the set limit value, output signal DC 0 V is sent. When the limit value is exceeded, the relevant output signal is sent until the setpoint is again below the limit value minus a hysteresis of 0.5 K.

Diagram relating to the setting values (application example)

Output signal Y (DC 0…10 V) for the heat demand corresponds to a flow temperature setpoint range of 0…120 °C. This limit value should be at 10 °C.



Key:
1. Setpoint in °C at DC 0 V
2. Setpoint in °C at DC 10 V
3. Limit value

w_{TV}: Current flow temperature setpoint

25.6 Display values

Heat and refrigeration demand are visible at the password level under:

Main menu > Aggregates > Heat and refrig demand >

Operating line	*Range*	*Comments*
Heat demand air handling	0...100%	From RMU(A,U), RMS
Heat demand air retreatment	0...100%	From RXB
Heat demand heating surface	0...100%	From RXB
Heat demand	-50…250°C	From RMU (C), RMH
Heat demand relay	On, Off	Output Q
Heat demand modulating	0…100%	Output (Y)

The following are visible at the service level:

Main menu > Aggregates > Heat and refrig demand >

Operating line	*Range*	*Comments*
Heat demand relay	On, Off	Output Q
Heat demand modulating	0…100%	Output (Y)

25.7 Function check / wiring test

Purpose

When testing wiring, the outputs for the function check can be switched directly.

Settings

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Heat demand relay	---, 0...100% (relay switches >= 1%)
Heat demand modulating	---, 0...100%

25.8 Troubleshooting

The supervision temperature sensor (section 25.3 "Supervision (basic types A, P, U)") is also monitored:

When exiting the "Commissioning" menu, a check is made to see if the sensor is connected. If no sensor is connected, there is no supervision.

If the sensor is connected but is missing later, a fault message appears (see section 8.2 "Analog inputs"). The sensor fault is interpreted as "No heat available".

Fault status messages

No.	*Text*	*Effect*
3201	No heat available	Non-urgent message; must not be acknowledged or * Urgent message, with plant stop; must be acknowledged and reset
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged

* The effect depends on the setting "Impact of fault" (section 25.3)

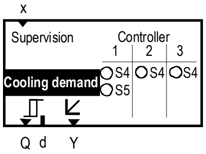
Note

Digital signals cannot be monitored.

26 Refrigeration demand

The refrigeration demand function collects refrigeration requests. These refrigeration requests occur internally or come from consumers of a refrigeration distribution zone via the bus. The collected refrigeration demand can be sent to a an other zone (basic type C only) or further handled as a resulting setpoint condition (temperature request signal, chilled water flow temperature setpoint) in the form of a continuous or digital signal.

26.1 Activate block (basic types A, P, U)



To activate the "refrigeration demand" function, the sequence must be assigned to the function where the cooling coil or cooling surfaces are configured. A sequence can be assigned to each controller.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Refrigeration demand >

Operating line	*Adjustable values / remarks*
Controller 1	---, Sequence 4, Sequence 5
Controller 2	---, Sequence 4
Controller 3	---, Sequence 4

Refrigeration demand can be transmitted via communication when communication is activated (see section 28 "Communication"). The refrigeration distribution zone must be set to generate a refrigeration demand signal that is processed by another device on KNX.

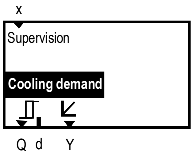
Main menu > Commissioning > Communication > Distribution zones >

Operating line	*Range*	*Factory setting*
Refrigeration distribution zone	1…31	1

Load signal

Refrigeration demand is sent as a load signal (0...100% load) via communication. At the same time, the primary controller receives information whether or not refrigeration is called for. This means that the primary controller is switched on and off depending on demand.

26.2 Activate block (basic type C)



The refrigeration demand block is always active for basic type C and the refrigeration demand signals are always received. To send the entire refrigeration demand from the refrigeration distribution zone, "Refrig distr zone source side" must be entered. Refrigeration demand can also be issued modulating via the refrigeration demand relay or refrigeration demand modulating.

Setting values

Main menu > Commissioning > Communication > Distribution zones >

Operating line	*Range*	*Factory setting*
Refrigeration distribution zone	1…31	1
Refrig distr zone source side	----, 1…31	----

The signal is sent as temperature request. Refrigeration demand in °C is made up of the current setpoint of control loop 1 and a temperature reduction. The reduction helps compensate line losses.

Setting values

Main menu > Commissioning > Communication > Distribution zones >

Operating line	*Range*	*Factory setting*
Refrig demand setp reduction	0...50 K	0 K

A checkback signal on existing refrigeration via communication is not possible.

26.3 Supervision

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Refrigeration demand >

Operating line	*Adjustable values / remarks*
Supervision	---, N.X1, N.X2, ... / Activate function "Supervision"

The checkback signal for the refrigeration source can be connected to this input. The checkback signal can be sent via a digital input (e.g. motor protection switch "Refrigeration machine") or via an analog input (e.g. Ni 1000 sensor in the water flow which signals refrigeration at temperatures <10 °C).

In the case of a digital input:
Normally closed = No refrigeration available
Operating position = Refrigeration available

In the case of the analog input, only inputs in °C can be configured. A limit value can be entered. Above this limit value, refrigeration is considered unavailable.

If there is no refrigeration after a set time (fault status message delay), a fault message is issued. In addition, setting value "Fault effect" allows for selecting if the plant should be switched on.

Setting values

Main menu > Commissioning > Settings > Refrigeration demand >

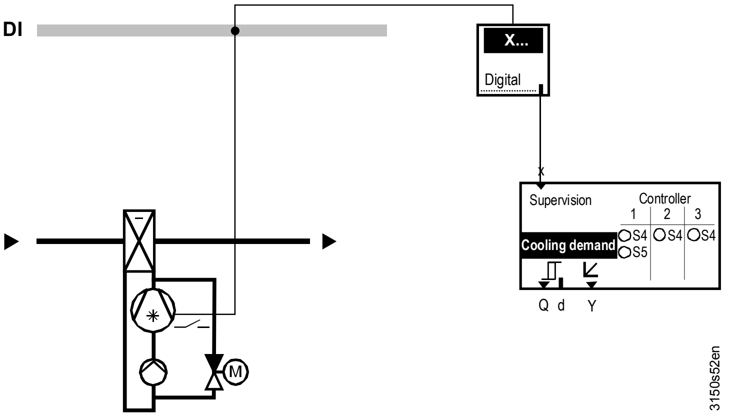
Operating line	*Range*	*Factory setting*
Limit value	0...50 °C	15 °C
Fault status message delay	00.00...59.55 m:s	30.00 m:s
Impact of fault	No stop, Stop	No stop

Note

If the plant is to be switched off in case of fault, no more refrigeration demand is signaled.

Application example

Supervision of refrigeration machine with thermal cutout.



The plant is shut down if cooling is requested and the refrigeration machine is faulty.

26.4 Refrigeration demand relay (Q⎍)

Purpose and function

Release for an external refrigeration source, e.g., can be connected to this output. The refrigeration demand relay responds as soon as the bus requests refrigeration.

Meaning:

- Contact open = No refrigeration demand
- Contact closed = Refrigeration demand

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Refrigeration demand >

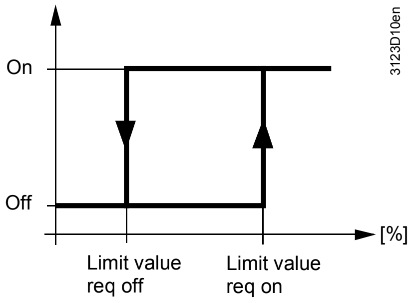
Operating line	*Adjustable values / remarks*
Refrigeration demand relay	---, N.Q1, N.Q3, ... / Activate output

Main menu> Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Refrigeration demand >

Operating line	*Range*	*Factory setting*
Limit value request on	0...100%	10%
Limit value request off	0...100%	5%
Control action	Slow, Medium, Fast	Medium
Request evaluation	Average, Maximum	Maximum

"Limit value request on"

This settable value prevents entire plants from being switched on (e.g. refrigeration plant) in the case of extremely low refrigeration requests. Switching on (i.e. routing as a bus signal or to outputs Q, d, Y, a) takes place only when the set value "Limit value request on" is exceeded.



Control action

The control action of the flow temperature on the setpoint shifts can be adapted with the following setting in three steps (slow, medium, fast) to adapt to the plant.

Evaluation of request

Setting "Request evaluation" is used to determine if the max value or the average of the requests is to be used:

- Setting maximum adjusts the flow temperature so that the valve position of the consumer with the greatest demand is 90%
- When using the average setting, the flow temperature is readjusted so that the valve positions of the 4 largest consumers are 90% on average
  Note: This setting does not ensure that the refrigeration demand of all consumers can be satisfied. However, it ensures that an individual consumer cannot force the flow temperature to a low level (e.g. because a window is open).

26.4.1 Internal refrigeration demand

Purpose and function

The calculated request signal is available as internal signal. To this end, function block "Refrigeration demand" offers output (⎍ d).
The demand as a digital value can be further handled e.g. via a logic block, etc., to e.g. switch on a pump when a refrigeration request is sent.

26.5 Refrigeration demand modulating (⊾)

Purpose

In addition to the refrigeration demand relay, the refrigeration demand can be provided at a modulating output for other devices.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Refrigeration demand>

Operating line	*Adjustable values / remarks*
Refrig demand modulating	---, N.Y1, N.Y2 / activate output

Setting values

Main menu > Commissioning > Settings > .... *or*
Main menu > Settings > Aggregates > Refrigeration demand >

Operating line	*Range*	*Factory setting*
Setpoint at 0 Volt	Setpoint at 10 V…250 °C	12 °C
Setpoint at 10 Volt	–50 °C…setpoint at 0 V	6 °C
Limit value	Setpoint at 10 V…setpoint at 0 V	12 °C

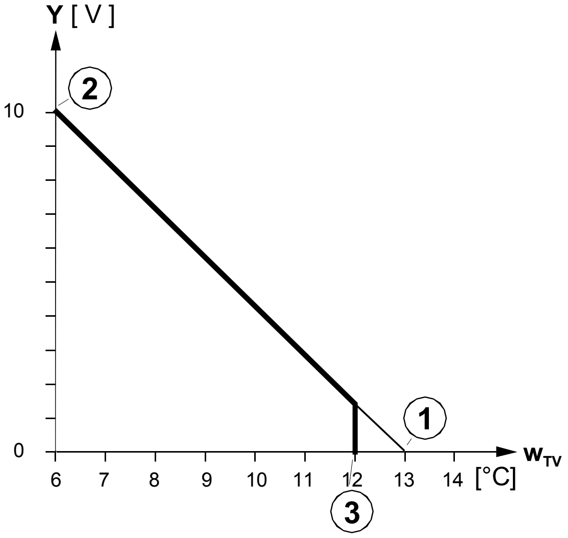
Explanations relating to the setting values

"Setpoint at 0 V" determines the flow temperature setpoint at DC 0 V.
"Setpoint at 10 V" determines the flow temperature setpoint at DC 10 V.
Limit value means limit value for refrigeration demand: Temperatures above this level are interpreted as no refrigeration demand.

As long as the flow temperature setpoint does not exceed the set limit value, DC 0 V output signal is issued. If the temperature drops below the limit value, the corresponding output signal is issued until the setpoint again exceeds the limit value plus hysteresis of 0.5 K.

Diagram relating to the setting values (application example)

Output signal Y (DC 0…10 V) for refrigeration demand must correspond to a flow temperature setpoint range of 6…13 °C. This limit value should be at 12 °C.



Key:
1. Setpoint in °C at DC 0 V
2. Setpoint in °C at DC 10 V
3. Limit value

W_{TV}: Current flow temperature setpoint

26.6 Display values

Heat and refrigeration demand are visible on the password level under:

Main menu > Aggregates > Heat and refrig demand >

Operating line	*Range*	*Comments*
Refrig demand air handling	0...100%	From RMU(A,U), RMS
Refrig demand air retreatment	0...100%	From RXB
Refrig demand cooling surface	0...100%	From RXB
Refrigeration demand	-50…250°C	From RMU (C)
Refrigeration demand relay	On, Off	Output Q
Refrig demand modulating	0…100%	Output (Y)

The following are visible at the service level:

Main menu > Aggregates > Heat and refrig demand >

Operating line	*Range*	*Comments*
Refrigeration demand relay	On, Off	Output Q
Refrig demand modulating	0…100%	Output (Y)

26.7 Function check / wiring test

Purpose

During the output wiring test, refrigeration demand can be switched directly.

Setting values

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Refrigeration demand relay	---, 0...100% (relay switches >= 1%)
Refrig demand modulating	---, 0...100%

26.8 Troubleshooting

The temperature sensor is monitored as follows:
When exiting the "Commissioning" menu, a check is made to see if the sensor is connected. If no sensor is connected, there is no supervision.

If the sensor is connected but is missing later, a fault message appears (see section 8.2 "Analog inputs"). The sensor fault is interpreted as "No refrigeration available".

Fault status messages

No.	*Text*	*Effect*
3202	No refrigeration available	Non-urgent message; must not be acknowledged <u>*or **</u> Urgent message, with plant stop; must be acknowledged and reset
101…	[N.X1] sensor error	Non-urgent message; must not be acknowledged

* The effect depends on the setting "Impact of fault" (section 26.3)

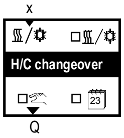
Note

Digital signals cannot be monitored.

27 Heating/cooling changeover

Application

The heating/cooling changeover function block is used to change over the operating mode (heating or cooling) in 2-pipe systems.
The preselection heating/cooling is generated on the device or received as a heating/cooling signal from the bus.



The following types of changeover are available for operating mode preselection H/C:

- Changeover with operating mode selector via operation
- Changeover with analog input (e.g. to change over by outside temperature or by flow temperature)
- Changeover with digital input (e.g. to change over via manual switch or via changeover thermostat in the flow)
- Changeover by date

If several changeover types are active, the operating mode is determined by the following priority selection:

1. Operating mode selector
2. H/C changeover input
3. Heating/cooling acc to calendar

The preselected operating mode heating/cooling is provided in the heat and refrigeration distribution zone to all other controllers within the same zone.
In a hydraulic circuit, the operating mode heating/cooling can be preselected only via one point. If several changeover signals are sent simultaneously to the bus within the same distribution zone, a fault message is generated.

Recommendation

The preselected operating mode input H/C should be activated at the precontroller or generator where possible.

27.1 Activate function

To activate the function, Yes must be set in operating line "2-pipe heating/cooling system".

Configuration

Main menu > Commissioning > Extra configuration > Heating/cooling ch'over >

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

27.2 Preselected operating mode input H/C

27.2.1 Changeover with operating mode selector

Configuration

▦ **Main menu > Commissioning > Extra configuration > Heating/cooling ch'over >**

Operating line	*Range*	*Factory setting*
Operation selector	No, Yes	No

The H/C changeover signal can be preselected in operating line "Preselection". The current state is displayed in operating line "2-pipe heating/cooling system".

■ **Main menu > Heating/cooling ch'over >**

Operating line	*Range*	*Factory setting*
Preselection	Auto, Heating, Cooling	Auto
2-pipe heating/cooling system	Heating, Cooling	

Meaning:

Auto:	Automatic operation by H/C changeover input or H/C by calendar.
Heating:	Fixed preselection on heating
Cooling:	Fixed preselection on cooling

27.2.2 Changeover by calendar

Configuration

▦ **Main menu > Commissioning > Extra configuration > Heating/cooling ch'over >**

Operating line	*Range*	*Factory setting*
Heating/cooling acc to calendar	No, Yes	No

Changeover is by date. After the date for heating start, "Heating" is active; "Cooling" is active after the date for cooling start.

Setting values

▦ **Main menu> Commissioning > Settings > Heating/cooling ch'over >**

Operating line	*Range*	*Factory setting*
Start date heating	Day – month	01.10.****
Start date cooling	Day – month	01.05.****

27.2.3 Changeover with analog or digital input

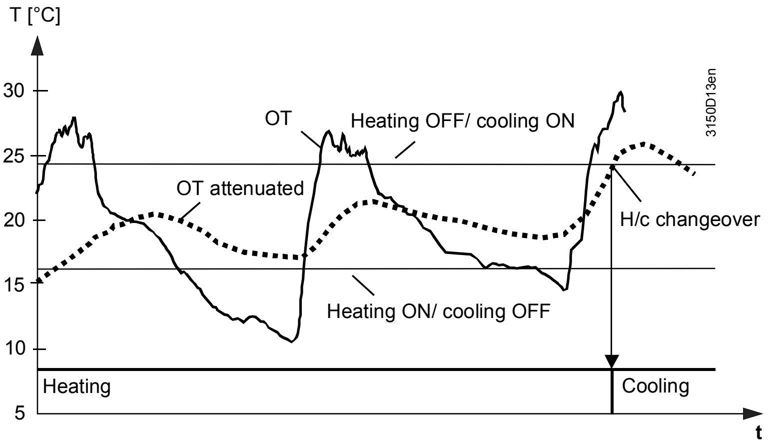
Configuration

▦ **Main menu > Commissioning > Extra configuration > Heating/cooling ch'over >**

Operating line	*Range*	*Factory setting*
H/C changeover input	---, N.X1, N.X2, ... /	---

If an analog input signal is used to generate the changeover signal, two limit values must be selected for changeover.

Example: Changeover by outside temperature



When value "Heating off/cooling on" is exceeded, the H/C changeover signal is changed to cooling. When value "Heating on/cooling off" is exceeded, the H/C changeover signal is changed to heating. Attenuation can be set for the input signal.

Setting values

Main menu> Commissioning > Settings > Heating/cooling ch'over >

Operating line	*Range*	*Factory setting*
Heating on/cooling off	*	**
Heating off/cooling on	*	**
Attenuation	0...100 h	0 h

* Depending on unit
** Variable units

Note

If a digital input is used for changeover, operating line "Heating on/cooling off" = 1 and "Heating off/cooling on" = 0 must be set (factory setting).

Configuration error

If changeover by calendar and by digital input is configured at the same time, the controller uses the latter.

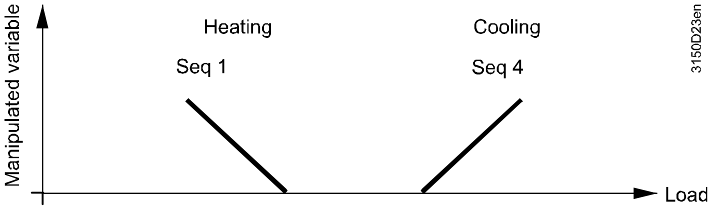
27.3 Effect of function H/C

The effect of preselected H/C depends on the type of changeover and if it occurred locally or via signal from the bus.

27.3.1 Lock sequences at sequence controller

In operating mode "Heating", the sequence assigned to function block "Refrigeration demand" are locked.
In operating mode "Cooling", the sequence assigned to function block "Heat demand" are locked.

Example



Lock for "Cooling" Lock for "Heating".

27.3.2 Heat / refrigeration demand

In operating mode "Heating", the refrigeration demand relay is locked, refrigeration demand set continuously to 0%, and no refrigeration demand signal is sent to the bus.
In operating mode "Cooling", the heat demand relay is locked, heat demand set continuously to 0%, and no heat demand signal is sent to the bus.

27.3.3 Locking time

To prevent the refrigeration machine from switching on immediately following switch-off of heat generation, a locking time can be set.
Control is locked during the locking time; as a result, no heat or refrigeration demand is generated or signaled.

⚠ Excessive inlet temperature at the refrigeration machine can damage the refrigeration machine.

Setting values

Main menu> Commissioning > Settings > Heating/cooling ch'over >

Operating line	*Range*	*Factory setting*
Locking time	00.00...23.50 h.m	00.30 h.m

The locking time acts also after a power drop-related switch-off of the device and when exiting the Commissioning menu.

27.4 Display current state

The current state is displayed in menu "Heating/cooling ch'over":

■ **Main menu > Heating/cooling ch'over >**

Operating line	*Comments*
2-pipe heating/cooling system	Heating, Cooling

27.5 Heating/cooling changeover relay

If the H/C signal is not to be sent to the bus but rather to a relay output to e.g. switch a valve or to be routed to a non-communicative device, the H/C changeover relay can be configured accordingly.

Configuration

Main menu > Commissioning > Extra configuration > Heating/cooling ch'over >

Operating line	*Range*	*Factory setting*
Heating/cooling ch'over relay	---, N.Q1, N.Q2,…/	---

Display values

The current state of the changeover relay can be queried:

Main menu > Heating/cooling ch'over >

Operating line	*Current state*
Heating/cooling ch'over relay	"Off": Cooling / "On": Heating

Wiring test

During wiring test, the H/C changeover relay can be switched directly.

Main menu > Commissioning > Wiring test > Outputs >

Operating line	*Comments*
Heating/cooling ch'over relay	"Off": Cooling / "On": Heating

27.6 Troubleshooting

Behavior

If the changeover signal "Heating/Cooling" is missing in a 2-pipe heating/cooling system, the controller continues to use the last received value. If there was never a signal, "Heating" is used as the default value.

Fault status message

No.	*Text*	*Effect*
5801	H/C changeover signal failure	Non-urgent message; must not be acknowledged

Behavior

If an H/C changeover input, H/C by calendar, or operating mode selector is configured and a changeover signal from another device on the bus is received in one of the zones, fault message "> 1 heat/cool changeover signal" is generated in a 2-pipe system.

Fault status message

No.	*Text*	*Effect*
5802	>1 heat/cool changeover signal	Non-urgent message; must be acknowledged

27.7 Application examples

27.7.1 Ventilation with heating/cooling coil (2-pipe system)

H/C principle

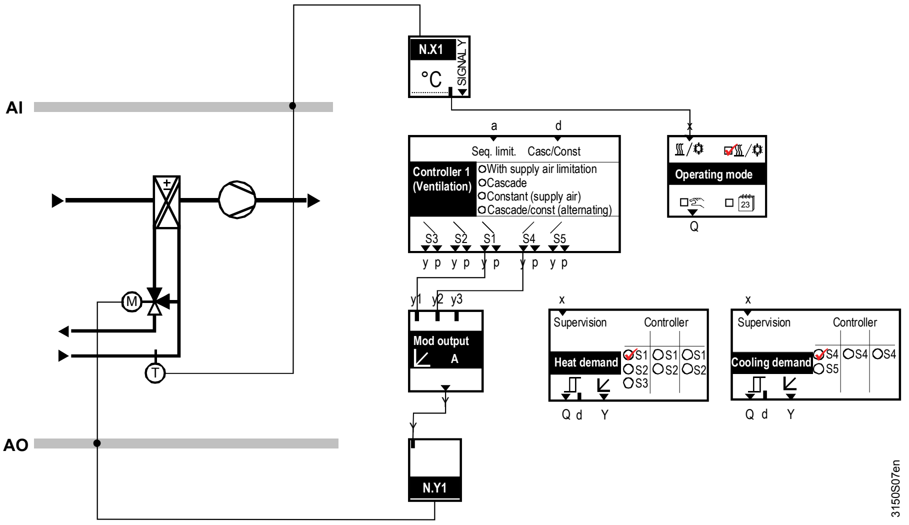
Routing an H/C changeover signal to other consumer controllers in the same heat and refrigeration zone.

Application

Heat and refrigeration generation is not controlled directly with a Synco controller. Merely the water for heating or cooling is provided.

Diagram and configuration

Basic types A and P



with:
X1: Flow temperature sensor
Y1: Valve

Typical settings

Heating ON 30 °C, cooling ON 19 °C

Configuration variant

A variant e.g. is to use a digital input (DIG) rather than a flow temperature sensor.
Typical settings are:
Heating On/cooling Off = 1
Heating Off/cooling On = 0

27.7.2 Ventilation with heat/refrigeration demand relay

H/C principle

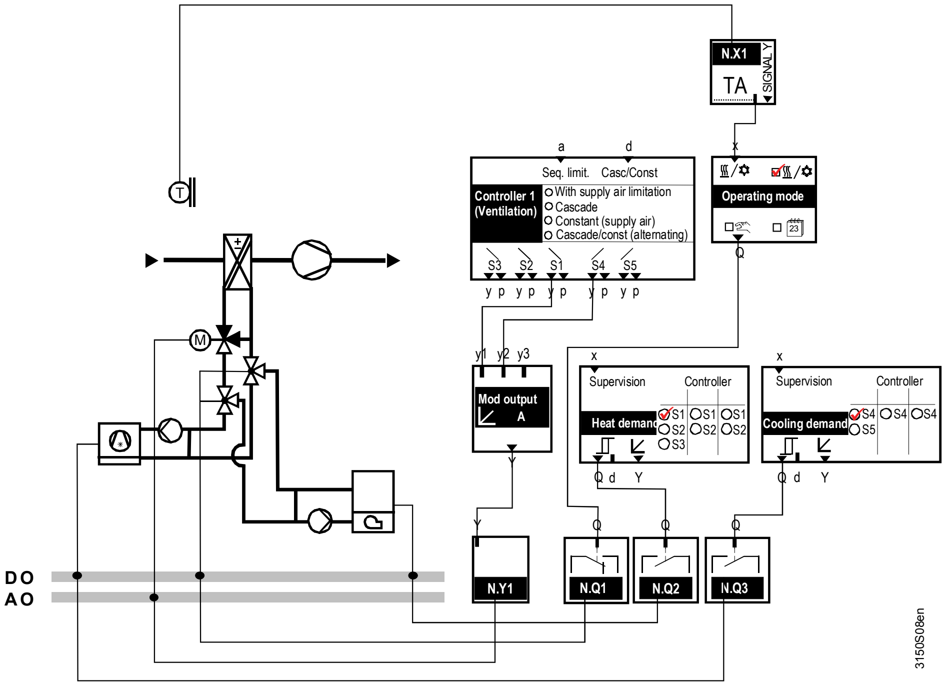
H/C changeover occurs by attenuated outside temperature.

Application

Heat and refrigeration generation is not controlled directly with a Synco controller. Heating and cooling release as well as changeover valve control are carried out via an RMU7..B. Heat and refrigeration demand from other consumers in the same zone is collected and sent to the heat or refrigeration demand relay. The H/C changeover signal is routed to these consumer controllers.

Diagram and configuration

Basic types A and P



with:
X1: Outside sensor
Y1: Valve
Q1: Changeover valve relay
Q2: Heat demand relay
Q3: Refrigeration demand relay

Typical settings

Heating ON 16 °C, cooling ON 24 °C, attenuation 24 h, locking time 4 h (locking of relays Q2 and Q3 after changeover).

27.7.3 Precontroller for 2-pipe system heating / cooling

H/C principle

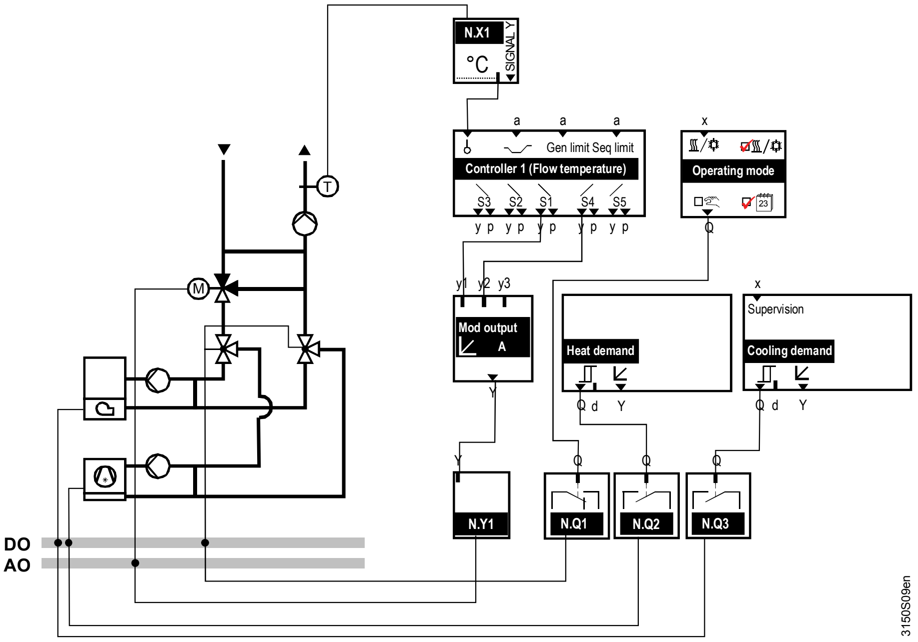
H/C changeover occurs by (e.g.) calendar.

Application

Precontrol, routing of H/C demand signals (demand relay, continuous demand or demand signal KNX) as well as changeover valve control are carried out via the RMU7..B. The plant controls to the heat and refrigeration demand signals from the connected consumer controllers. The H/C changeover signal is routed to these consumer controllers.

Diagram and configuration

Basic type C



with:
Y1: Valve
Q1: Changeover valve relay
Q2: Heat demand relay
Q3: Refrigeration demand relay

Typical settings

Heating start 01.10., cooling start 01.05., locking time 4 h (locking of relays Q2 and Q3 or demand signals KNX after changeover).

Entry

Heating start	Day – month	01.10.****
Cooling start	Day – month	01.05.****

Note

For a detailed description of the KNX signals in various H/C variants, see "KNX documentation" (P3127, section 9).

28 Communication

See basic documentation "Communication via KNX bus" (order number: CE1P3127en) for a detailed description of communications. The following section only describes the most important settings to commission a simple plant.

28.1 Activate communication

Communication is active when:
- The device address is entered (each bus member requires an individual device address)
- Bus power supply is available
- Bus device is not in commissioning mode

When communication is active, the effects are:
- Exchange of data relevant for heating and ventilation technology (e.g. heat/refrigeration demand, setpoints, etc.) if the corresponding zone settings are available
- Remote device operation possible via KNX bus from operator station or control station
- Fault messages are always sent via KNX bus and can be further processed by other Synco devices
- Fault messages from other Synco devices are displayed under:
  "Main menu > Faults > Fault status message bus" bus
- Fault messages from other Synco devices can be delivered to a fault relay (see section 24.6 "Fault relay ")

28.2 "Communication" menu

28.2.1 "Basic settings" menu item

"Device address" operating line
Each bus member requires an individual device address.
Device addresses 254 and 255 are reserved for special functions. Device address 255 is used to deactivate communication (no exchange of process data).

Setting values

Main menu > Commissioning > Communication > Basic settings>

Operating line	*Range*	*Factory setting*
Device address	1...253 (1...255)	255

If two devices on the KNX bus have the same device address, fault message "> 1 identical device address" appears.
If two Synco RMU... basic types A or U have the same "Geographical zone (apartment)", fault message ">1 identical geogr zone [1]" appears.

Fault status messages

No.	*Text*	*Effect*
6001	>1 identical device address	Urgent message; must be acknowledged
5402	>1 identical geogr zone [1]	Non-urgent message; must be acknowledged

"Decentral bus power supply" operating line

For small plants, decentralized bus power supply suffices. This is the factory setting.

Setting values

Main menu > Commissioning > Communication > Basic settings >

Operating line	*Range*	*Factory setting*
Decentral bus power supply	Off, On	On

See data sheet N3127 (KNX bus) or basic documentation P3110 (KNX communication) for more information.

If there is no bus supply, fault message "No bus power supply" appears.

Fault status messages

No.	*Text*	*Effect*
5000	No bus power supply	Non-urgent message; must not be acknowledged

"Clock time operation" operating line

If a common clock time is to be used in the system, one device must be defined as masters, all other devices as slaves.

Setting values

Main menu > Commissioning > Communication > Basic settings >

Operating line	*Range*	*Factory setting*
Clock time operation	Autonomous, Slave, Master	Autonomous
Remote setting clock slave	Yes, No	Yes

When set to "Autonomous", the device neither sends nor receives the clock time. Setting "Remote setting clock slave" allows the user to set the time and date at the clock time slave.
The new values are then sent to the clock time master via KNX bus. The master sends the new time to all bus members. Thus, operation for the user is the same as with the clock time master.

"Remote reset of fault"operating line

Setting values

Main menu > Commissioning > Communication > Basic settings >

Operating line	*Range*	*Factory setting*
Remote reset of fault	Yes, No	No

"Remote reset of fault = "Yes" means that all self-held fault messages can also be reset via KNX bus, e.g. via RMZ792 bus operation, operator station via OCI700.1 or OZW775 central station.
If "No" is set, resetting must occur locally on the device via the fault acknowledgement button.

28.2.2 "Room" menu item (basic types A, P, and C)

A geographical zone combines buildings or building sections that must satisfy the following criteria from an operational point of view:

- Same room operating mode
- Same room temperature (setpoint, actual value)

Here, we can speak of operational zones rather then geographical zones.

The Geographical zone (apartment) symbolizes the room to be controlled. Within this zone, all data relevant to the room such as operating mode, setpoints, actual values incl. user intervention and effects are exchanged.

Setting values

Main menu > Commissioning > Communication > Room >

Operating line	*Range*	*Factory setting*
Geographical zone (apartment)	----, 1...126	----
Time switch slave (apartment)	----, 1...126	----

Room model variants

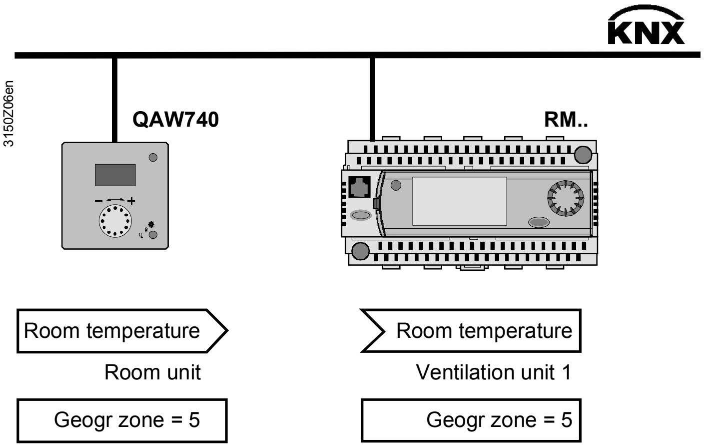
The following variants are intended to help find the correct setting (for the respective building situation) via the operating lines "Geographical zone (apartment)" and "Time switch slave (apartment)".

Variant 1: Autonomous controllers

Basic variant 1 assumes that a ventilation plant has its own individual room operating mode regardless of other plants (heating circuits, etc.). No geographical zone needs to be set for this application; "Geographical zone (apartment)" can be kept at "----".

Variant 2: Extension by 1 (with room unit)

The QAW740 is available as a digital room operator unit with bus communication. To allow the room operator units to influence the ventilation controllers, the same geographical zone must be set. The ventilation controller receives the room temperature and setpoint adjustment from the room operator unit. In addition, data to determine the room operating mode is exchanged with the RMU7..B basic type A.

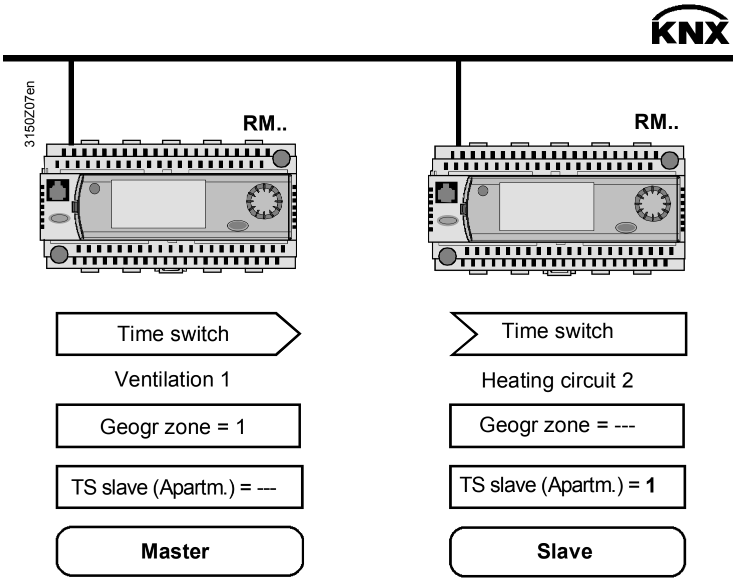


Variant 3: Controllers with common holiday /special day program

A calendar for the common holidays and special days are defined. The occupancy times (time switches) of the various geographical zones are individual, but the same holidays or special days apply to all (or individual) zones.
See section 6.7 "Room op mode selection (basic types A, U)" for settings.

Variant 4: Controllers with same room occupancy times

If the room occupancy times of the various geographical zones are identical, a time switch can be defined as the master. The other controllers assume the master occupancy times as time switch slaves.



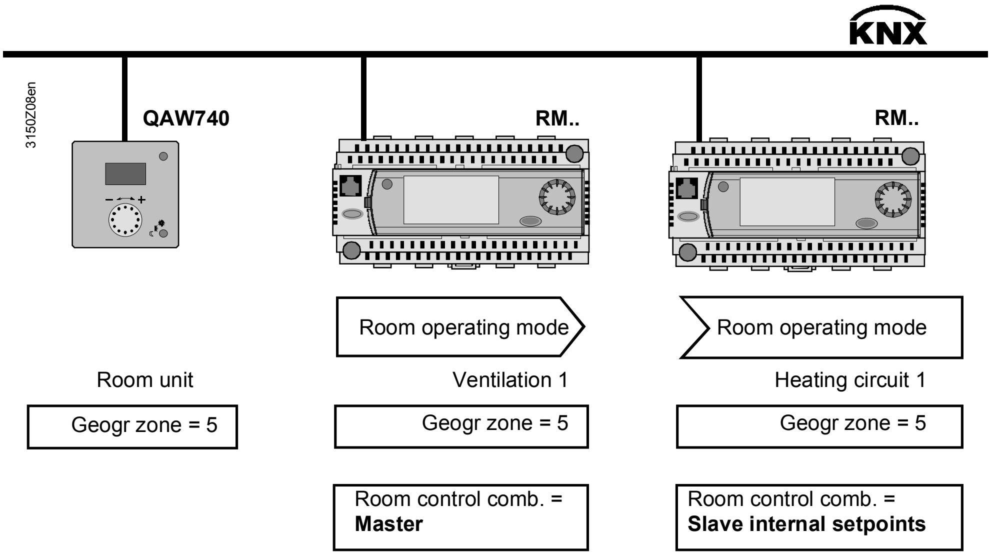
See section 6 for a detailed description of time switch operation.

Variant 5: Controllers with common room operating mode

If two ventilation plants or one heating circuit and one ventilation plant supply the same rooms, they also have the same geographical zone.
The two plants acquire the same room temperature and use the same room occupancy schedule (i.e. the room operating mode is the same).

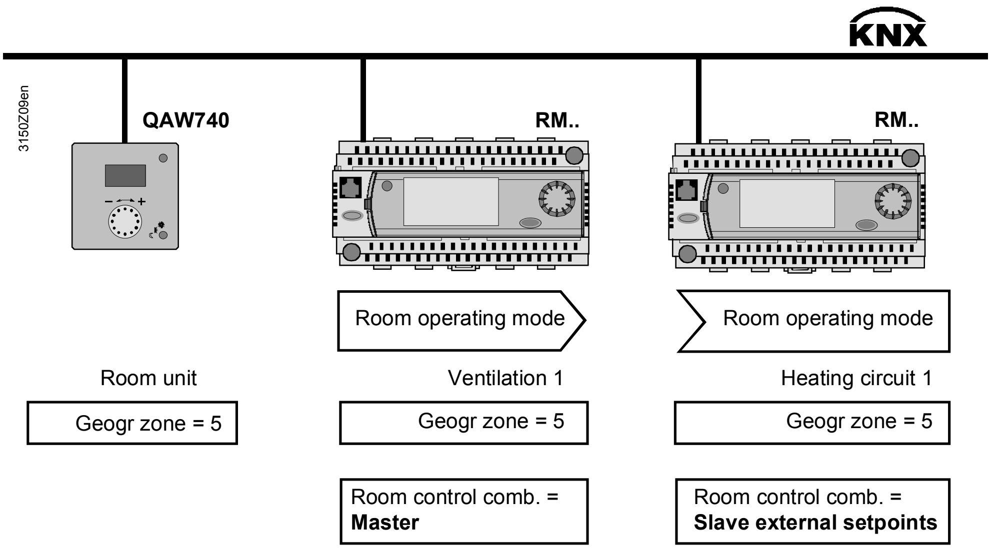
If the room operating mode is changed with the mode button on the room unit (e.g. QAW740), the room control master assumes the change and sends it to the room control slave.

In room control combinations heating circuit/ventilation plant, the ventilation plant **always** assumes the room control master function.

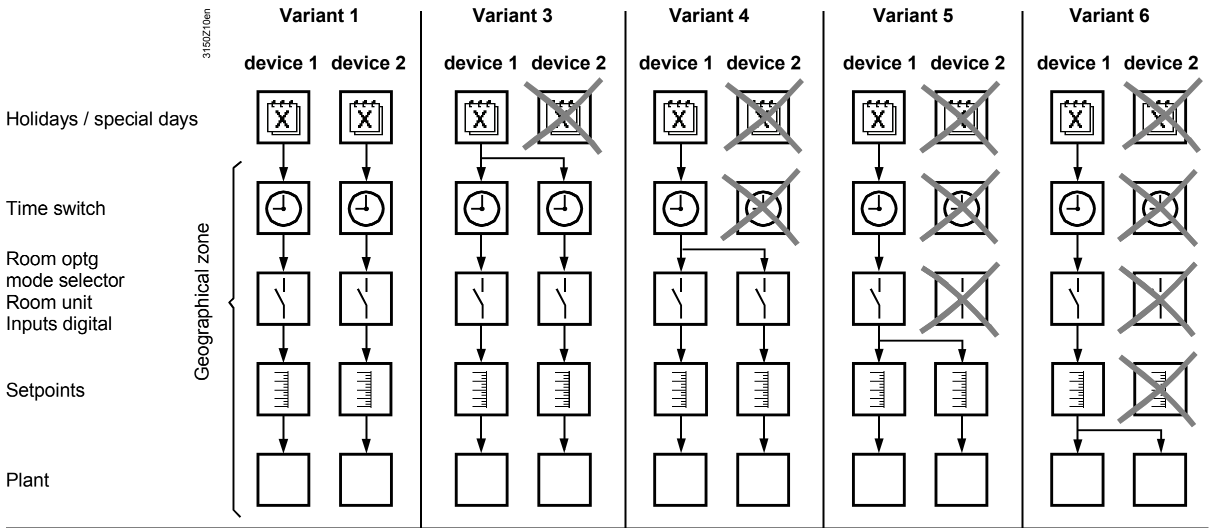


Variant 6: Extension by 5 (common setpoints)

With a room control combination, a setpoint can be sent to the slave in addition to the room operating mode.



Summary of the variants:



	Variant 1		Variant 3		Variant 4		Variant 5		Variant 6	
	device 1	device 2	device 1	device 2	device 1	device 2	device 1	device 2	device 1	device 2
Holidays / spec day zone	---	---	1	1	---	---	---	---	---	---
Holidays / spec day op	Autonom	Autonom	Master	Slave	Autonom	Autonom	Autonom	Autonom	Autonom	Autonom
Geogr. Zone (Apart.)	---	---	---	---	1	---	5	5	5	5
Time switch slave (apartment)	---	---	---	---	---	1	---	---	---	---
Room controller combination*	Master	Master	Master	Master	Master	Master	Master (RMU)	Slave setpoints intern	Master (RMU)	Slave setpoints extern
Possible with basic type	A + U		A + U		A + U		A		A	
Remarks			same holidays / special day zone		time switch of zone 1		same geogr zone		same geogr zone	

* See section 6.13 for room control combinations.

28.2.3 "Time switch 2" menu item

Setting values

If the device is connected to other controllers via communication, time switch 2 rather than autonomous operation can be operated as slave (i.e. it receives the time switch via bus).

Main menu > Commissioning > Communication > Time switch 2 >

Operating line	*Range*	*Factory setting*
Time switch slave (apartment)	----, 1..126	----
Transformation Precomfort	Off, On	On

See section 7 for a detailed description of the operating lines.

28.2.4 "Holidays / special days" menu item

Setting values

If the controller communicates with other controllers, the same holidays/special days program can be assigned to other controllers.

Main menu > Commissioning > Communication > Holidays/special days >

Operating line	*Range*	*Factory setting*
Holidays/special day operation	Autonomous, Slave, Master	Autonomous
Holidays/special day zone	1...31	1

See section 6.10.1 for a detailed description of the operating lines

28.2.5 "Distribution zones" menu item

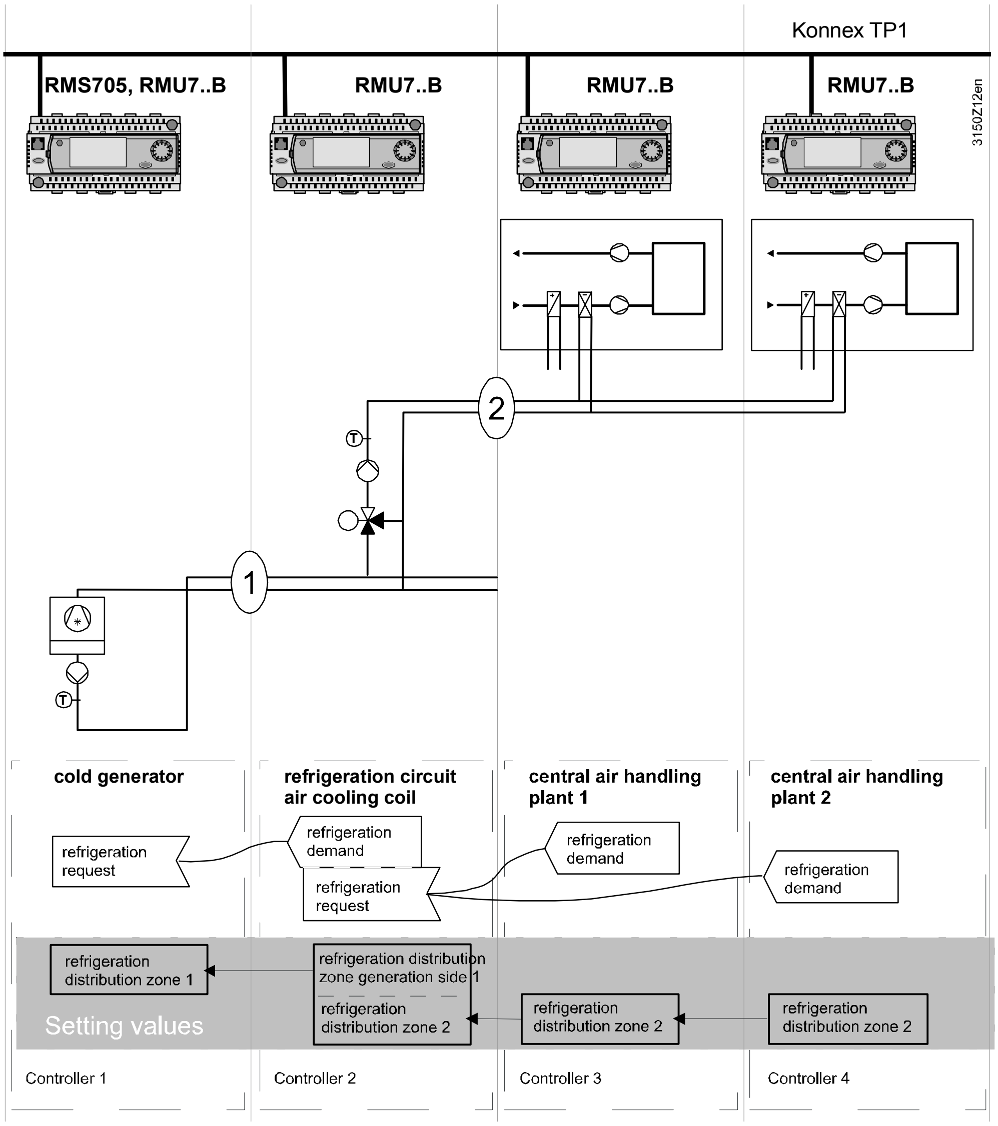
Setting values

Main menu > Commissioning > Communication > Distribution zones >

Operating line	*Range*	*Factory setting*	*For basic type*	*See section…*
Outside temperature zone	----, 1...31	----	A, P, C, U	8.4.3
Air distribution zone	----, 1...31	1	P	3.2, 12.3 or 23.3
Heat distribution zone	----, 1...31	1	A, P, C[1], U	25.1 or 25.2
Heat distr zone source side	----, 1...31	----	C[1]	25.2
Heat demand setpoint increase	0...50	0 K	C[1]	25.2
Refrigeration distribution zone	----, 1...31	1	A, P, C, U	26.1 or 26.2
Refrig distr zone source side	----, 1...31	----	C	26.2
Refrig demand setp reduction	0...50	0 K	C	26.2

[1] Only for basic type C and simultaneous H/C changeover

Application example for distribution zones with one refrigeration plant basic type C and using the "Refrigeration distribution zone" as well as "Refrig distr zone source side":



28.2.6 Universal transmission and reception zones

The device RMU7x0B allows for the universal exchange of data via its own terminals as well as via terminals for the extension module RMZ78x. The data is exchanged via KNX bus from device to device.

Function principle

- Universal inputs, digital and analog outputs can be used as send objects (to the send zones).
- Universal inputs can be used as receiving objects (in the receiving zones).
- The data is exchanged as if the device terminals were hardwired.

Number of transmission / reception zones

A maximum of 32 transmission and reception zones each are permitted for each line (for the KNX bus, see N3127, P3127).

Note

"Allowed" and "not allowed" applications exist pursuant to the KNX bus specifications (e.g. send frequency).

Examples of allowed applications

The use of universal transmission and reception zones is allowed and makes sense for:

- Controlling decentralized aggregates such as motors, pumps, etc..
- Simple control functions that are not time-critical.
- Common follow-on processing or use of bus information.

Examples of not allowed applications

The applications below or input/output variables cannot be implemented using universal transmission and reception zones:

- Safety-relevant plants and facilities (e.g. fire alarm off, smoke extraction, frost protection function).
- If a "simultaneous start behavior of plants" is requested.
- Applications where the loss of communications of transmission and reception zones can cause damage.
- Controlled systems of a time sensitive or highly complex manner (e.g. speed control via pressure, humidity).
- Main controlled variable that must be present.
- Recording and evaluating pulses.

Note

After switching on the RMU7x0B (power-up), it may take some time before signals from the bus are available. For not allowed applications of the transmission and reception zone, this may result in a faulty plant behavior.

Activation

The desired transmission or reception zone must be set on a terminal on the RMU7x0B to activate the function. The partner device must also be set in the same manner.

Note

The transmission/receiver procedure is a 1:n relationship, i.e. in a transmission/reception zone, one transmitter, but multiple receivers are possible.

Overview

Reception zones	*Transmission zones*
Inputs (N.X1…A8(2).X4)	Inputs (N.X1…A8(2).X4) Digital outputs (N.Q1…A8(2).Q5) Analog outputs (N.Y1…A8(2).Y2)

Setting values

Main menu > Commissioning > Communication > LTE reception zones >

Operating line	*Range*	*Factory setting*
N.X1…A8(2).X4	---, 1…4095 1)	---

Setting values

Main menu > Commissioning > Communication > LTE transmission zones >

Operating line	*Range*	*Factory setting*
N.X1… A8(2).X4 N.Q1…A8(2).Q5 N.Y1…A8(2).Y2	---, 1…4095 1)	---

1) The following range data applies for the activated filter table function when using the universal transmission and reception zones with line coupler or IP router:

- 1…3839 are blocked for data exchange.
- 3840…4095 are open for data exchange.

Note

Bus signals can be simulated using the "Simulation inputs" function when commissioning the plant (Section 8.1.3).

Fault status messages

No.	*Text*	*Effect*
5902	>1 identical LTE zone	Non urgent message; must not be acknowledged.

Example 1

The air quality average for 2 air quality sensors are available on one RMS705B (device 1) from 2 air quality sensors. This value is sent as a transmission object via an analog output and processed from an RMU7x0B (device 2).

Data exchange concept

The following transmission and reception zones are engineered for example tasks:

RMS705B, device 1		*RMU7x0B, device 2*		*Value*
Terminal	Transm.zone	Terminal	Reception zone	
N.Y1 ⇨	1	N.X1 ⇥	1	Average for air quality

⇨ = Transmit
⇥ = Receive

Configuration
Device 1

In RMS705B, device 1, the following is configured:

Main menu > Commissioning > Communication > LTE transmission zones >

Operating line	*Range*	*Factory setting*
N.Y1	1	

Device 2

In RMU7x0B, device 2, the following is configured:

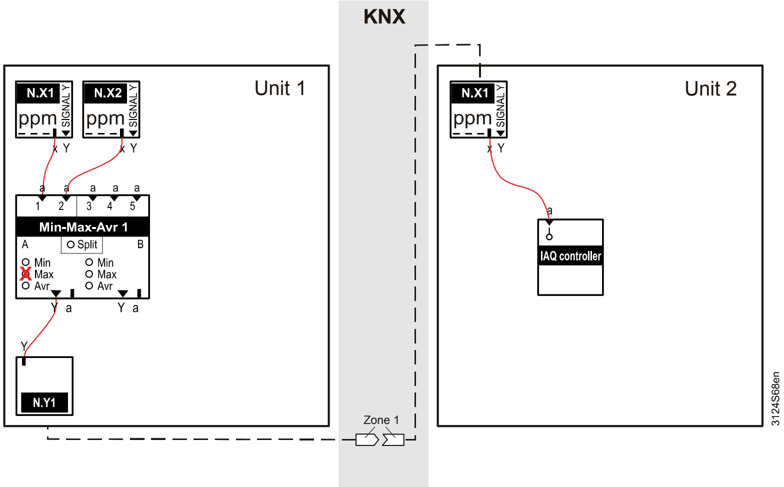
Main menu > Commissioning > Extra configuration > Input identifier >

Operating line	*Range*	*Factory setting*
N.X1	ppm	

Main menu > Commissioning > Communication > LTE reception zones >

Operating line	*Range*	*Factory setting*
N.X1	1	

Configuration diagram



Example 2

A remote ventilation controller (RMU7x0B, device 1) controls a rooftop fan (RMS705B, device 2). A release command generated in device 1 is sent as transmission object via a digital output. Device 2 uses this command to start the rooftop fan.
In the reverse direction, any operating message in device 2 is sent as a transmission via a digital output to device 1, where it is processed accordingly.

Data exchange concept

The following transmission and reception zones are engineered for example tasks:

RMU7x0B, device 1		RMS705B, device 2		Value
Terminal	Transm.zone	Terminal	Reception zone	
N.Q1 ▷	1	N.X1 ⅀	1	Release rooftop fan
	Reception zone		Transm-zone	
N.X1 ⅀	2	N.Q2 ◁	2	Operating message rooftop fan

▷ = Transmit
⅀ = Receive

Configuration Device 1

Configuration on RMU7x0B, device 1 (ventilation control):

Main menu > Commissioning > Extra configuration > Input identifier >

Operating line	*Range*	*Factory setting*
N.X1	Digital	

Main menu > Commissioning > Communication > LTE transmission zones >

Operating line	*Range*	*Factory setting*
N.Q1	1	

Main menu > Commissioning > Communication > LTE reception zones >

Operating line	*Range*	*Factory setting*
N.X1	2	

Device 2

Configuration on RMS705B, device 2 (rooftop fan):

Main menu > Commissioning > Extra configuration > Input identifier >

Operating line	*Range*	*Factory setting*
N.X1	Digital	

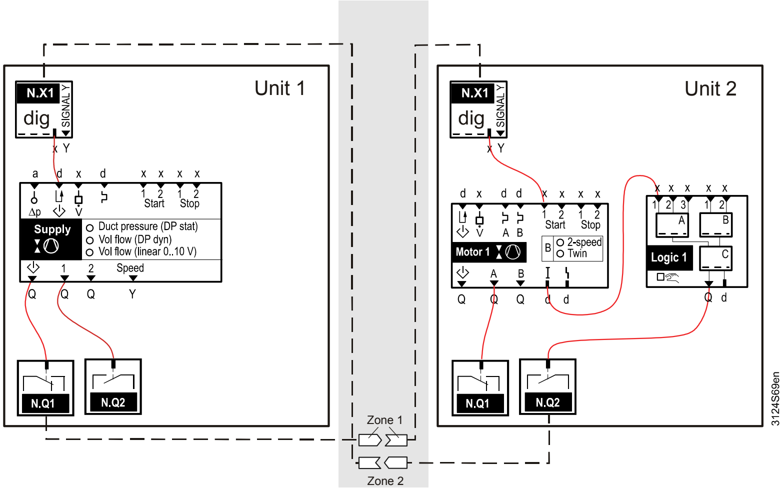
Main menu > Commissioning > Communication > LTE transmission zones >

Operating line	*Range*	*Factory setting*
N.Q2	2	

Main menu > Commissioning > Communication > LTE reception zones >

Operating line	*Range*	*Factory setting*
N.X1	1	

Configuration diagram



Example 3

On one RMS705B (device 1), enthalpy values A, B are pending, calculated from temperature and relative humidity. These values are sent as a transmission object via the analog outputs and used in a second device by the mixed air damper or heat recovery for the MECH function.

Note

Adjust the value range of the receiving terminal (device 2) to the unchangeable value range of the calculated enthalpy prior to use in device 2. The fixed default value ranges for the enthalpy computer are available in Section 9.2 above (P3124).

Data exchange concept

The following transmission and reception zones are engineered for example tasks:

RMS705B, device 1		RMU7x0B, device 2		Value
Terminal	Transm.zone	Terminal	Reception zone	
N.Y1 ⊐	1	N.X1 ⊏	1	Enthalpy value for another application.
N.Y2 ⊐	2	N.X2 ⊏	2	Enthalpy value for another application.

⊐ = Transmit
⊏ = Receive

Configuration Device 1

In RMS705B, device 1, the following is configured:

Main menu > Commissioning > Communication > LTE transmission zones >

Operating line	*Range*	*Factory setting*
N.Y1	1	
N.Y2	2	

Configuration Device 2

In device 2, the following is configured:

Main menu > Commissioning > Extra configuration > Input identifier >

Operating line	*Range*	*Factory setting*
N.X1	kJ/kg	
N.X2	kJ/kg	

Setting values

Main menu > Commissioning > Settings > … *or*
Main menu > Settings > Inputs > N.X1

Operating line	*Range*	*Factory setting*
Value low	0.0 kJ/kg	- 50.0 kJ/kg
Value high	100.0 kJ/kg	50.0 kJ/kg

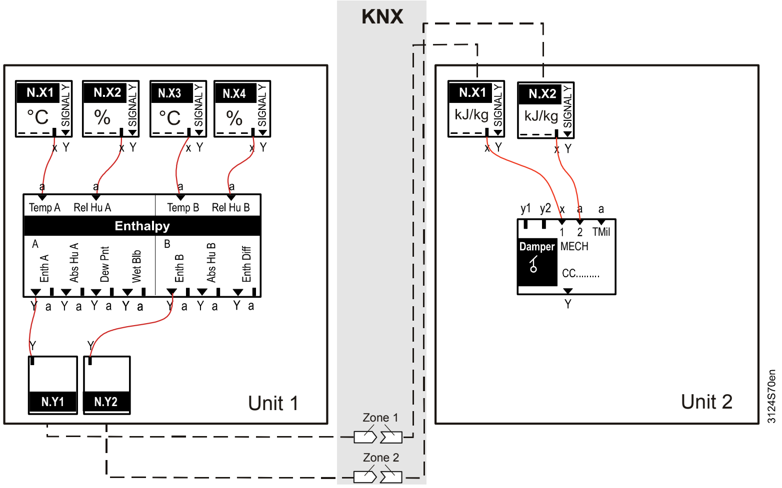
Main menu > Commissioning > Settings > … *or*
Main menu > Settings > Inputs > N.X2

Operating line	*Range*	*Factory setting*
Value low	0.0 kJ/kg	- 50.0 kJ/kg
Value high	100.0 kJ/kg	50.0 kJ/kg

Main menu > Commissioning > Communication > LTE reception zones >

Operating line	*Range*	*Factory setting*
N.X1	1	
N.X2	2	

Configuration diagram



29 Support on errors and faults

29.1 How to handle faults

Each fault is displayed with a fault number (fault no) in the operator unit display. In addition **Welcome > Main menu > Faults > Faults current..** allows you to view all queued faults.

Proceed as follows:

1. Go to the section containing the specific fault description using the error/fault code list (section 29.2)
2. Identify the type of fault acknowledgement via the "Effect" column
3. Identify the LED signal meaning by means of the below table and carry out the suitable action (e.g. acknowledge, acknowledge and reset, and/or find and remove fault cause)

Type of acknowledgement	*Fault is…*	*LED*	*Action*	*Result*
No acknowledgement required	Pending	Lit		
			No action required	Lit
			Remove cause	Off
	No longer pending	Off		
			No action required	Off
Acknowledgement required	Pending	Flashing		
			Press once (acknowledge)	Lit
			Remove cause	Off
	No longer pending	Flashing		
			Press once (acknowledge)	Off
Acknowledge and reset required	Pending	Flashing		
			Press once (acknowledge)	Lit
			Remove cause	Lit
			Press twice (reset)	Off
	No longer pending	Flashing		
			Press once (acknowledge)	Lit
			Press twice (reset)	Off

29.2 Error/fault code list

Code no.	*Cause of error/fault*	*Effect*
10	Outside temp sensor error	See 8.4.5 Outside temperature
11	>1 outside temperature sensor	See 8.4.5 Outside temperature
12	Outs sensor simulation active	See 8.4.5 Outside temperature
60	Room sensor error plant 1	See 8.5.5 Room temperature
61	>2 room sensors in plant 1	See 8.5.5 Room temperature
100	Simulation inputs active	See 8.1.3 Input terminal simulation
101 ...264	[N.X1] sensor error, RMZ788(2).X4 sensor error	See 8.2.5 Analog inputs See 8.7.5 Remote setpoint adjuster, absolute See 8.8.5 Remote setpoint adjuster, relative See 8.4.5 Outside temperature See 8.5.5 Room temperature See 10.4 Heat recovery equipment (basic types A, P) See 10.5.12 Mixed air damper (basic types A, P) See 15.2.3 General limiter See 15.3.3 Sequence limiter See 15.6.3 Universal shift See 16.6.1 IAQ controller (basic types A and P) See 25.8 Heat demand See 26.8 Refrigeration demand
1111	Supply air overload	See 10.1.8 Fan (basic types A and P)
1112	Supply airflow error	See 10.1.7 Fan (basic types A and P)
1113	Supply air press diff sensor error	See 10.1.19 Fan (basic types A and P)
1114	Supp air precom no checkb sign	See 10.1.10 Fan (basic types A and P)
1121	Extract air overload	See 10.1.8 Fan (basic types A and P)
1122	Extract airflow error	See 10.1.7 Fan (basic types A and P)
1123	Extr air press diff sensor error	See 10.1.19 Fan (basic types A and P)
1124	Extr air precom no checkb sign	See 10.1.10 Fan (basic types A and P)
1210	[Pump 1] fault	See 10.2.4 Pump
1211	[Pump 1] overload	See 10.2.7 Pump
1212	[Pump 1] no flow	See 10.2.6 Pump
1214	[Pump 1A] overload	See 10.2.7 Pump
1215	[Pump 1B] overload	See 10.2.7 Pump
1216	[Pump 1A] no flow	See 10.2.6 Pump
1217	[Pump 1B] no flow	See 10.2.6 Pump
1218	[Pump 1] precom no checkb sign	See 10.2.9 Pump
1220	[Pump 2] fault	See 10.2.4 Pump
1221	[Pump 2] overload	See 10.2.7 Pump
1222	[Pump 2] no flow	See 10.2.6 Pump
1224	[Pump 2A] overload	See 10.2.7 Pump
1225	[Pump 2B] overload	See 10.2.7 Pump
1226	[Pump 2A] no flow	See 10.2.6 Pump
1227	[Pump 2B] no flow	See 10.2.6 Pump
1228	[Pump 2] precom no checkb sign	See 10.2.9 Pump
1230	[Pump 3] fault	See 10.2.4 Pump
1231	[Pump 3] overload	See 10.2.7 Pump
1232	[Pump 3] no flow	See 10.2.6 Pump

Code no.	*Cause of error/fault*	*Effect*
1236	[Pump 3A] overload	See 10.2.6 Pump
1237	[Pump 3B] overload	See 10.2.6 Pump
1234	[Pump 3A] no flow	See 10.2.7 Pump
1235	[Pump 3B] no flow	See 10.2.7 Pump
1238	[Pump 3] precom no checkb sign	See 10.2.9 Pump
1240	[Pump 4] fault	See 10.2.4 Pump
1241	[Pump 4] overload	See 10.2.7 Pump
1242	[Pump 4] no flow	See 10.2.6 Pump
1246	[Pump 4A] overload	See 10.2.6 Pump
1247	[Pump 4B] overload	See 10.2.6 Pump
1244	[Pump 4A] no flow	See 10.2.7 Pump
1245	[Pump 4B] no flow	See 10.2.7 Pump
1248	[Pump 4] precom no checkb sign	See 10.2.9 Pump
3011	[Main contr var 1] sensor error	See 12.4 Demand-controlled supply air temperature control See 14.2.3 Universal controller (basic types A, P, C, U) See 13 Flow temperature, demand-controlled (basic type C) See 15.1.5 Sequence controller
3012	[Main contr var 2] sensor error	See 14.2.3 Universal controller (basic types A, P, C, U) See 15.1.5 Sequence controller
3013	[Main contr var 3] sensor error	See 14.2.3 Universal controller (basic types A, P, C, U) See 15.1.5 Sequence controller
3101	[Controller 1] inadm deviation	See 15.7.1 Deviation message
3102	[Controller 2] inadm deviation	See 15.7.1 Deviation message
3103	[Controller 3] inadm deviation	See 15.7.1 Deviation message
3111	HR efficiency deviation	See 10.4 Heat recovery equipment (basic types A, P)
3201	No heat available	See 25.8 Heat demand
3202	No refrigeration available	See 26.8 Refrigeration demand
3900	Fire alarm off	See 24.4 Faults
3901	Smoke extraction	See 24.4.2 Faults
3911	Filter dirty	See 24.4.2 Faults
3920	Frost	See 17.5.2 Frost protection (basic types A and P)
3922	Frost risk frost 1	See 17.5.2 Frost protection (basic types A and P)
3923	Frost risk frost 2	See 17.5.2 Frost protection (basic types A and P)
3924	Frost risk frost 3	See 17.5.2 Frost protection (basic types A and P)
3921	Frost protection sensor error	See 17.5.2 Frost protection (basic types A and P)
3931	Simulation VAV supply air	See 23.6 Volume flow balancing
3932	Simulation VAV extract air	See 23.6 Volume flow balancing
5000	No bus power supply	See 28.2.1 Communication
5001	System time failure	See 5.1.3 Time of day and date
5002	>1 clock time master	See 5.1.3 Time of day and date
5003	Invalid time of day	See 5.1.3 Time of day and date
5101	Syst time switch failure plant 1	See 6.9.5 Troubleshooting
5102	>1 time switch in plant 1	See 6.9.5 Troubleshooting
5111	[Time switch 2] failure	See 7.6 Time switch 2 (ON/OFF)
5201	Hol/spec day program failure	See 6.10.6 Holidays / special days (basic types A, P, C, U)
5202	>1 hol/spec day program	See 6.10.6 Holidays / special days (basic types A, P, C, U)
5402	>1 identical geogr zone [1]	See 28.2.1 Communication
5801	H/C changeover signal failure	See 13 Flow temperature, demand-controlled (basic type C)
5802	>1 heat/cool changeover signal	See 27.6 Heating/cooling changeover

Code no.	*Cause of error/fault*	*Effect*
6001	>1 identical device address	See 28.2.1 Communication
7101	Fault extension module	See 4.2.3 Basic configuration; same fault text for module 1..4
…		Same fault text for module 1..4
7104	Fault extension module	See 4.2.3 Basic configuration; same fault text for module 1..4
9001	[Fault input 1] fault	See 24.3 Faults
…		
9010	[Fault input 10] fault	See 24.3 Faults

29.3 Troubleshooting

29.3.1 Fault indication

Fault status messages queued on the controller are indicated by the LED on the fault button. This button allows you to acknowledge fault messages.
Meaning:

Fault status message	*Message ackn.*	*LED status*
Fault pending	No	Flashing
Fault pending	Yes	Lit (also applies to messages that must not be acknowledged)
Fault no longer pending	No	Flashing
Fault no longer pending	Yes	Off

If a fault relay is also configured, the LED on the fault button always flashes when the relay is energized.

Note

If the LED on the fault button is lit and cannot be extinguished by mere acknowledgement, a fault message is still pending. The LED extinguishes only when no more faults are present.

29.3.2 Fault acknowledgement

No acknowledgement required
This applies to all fault messages that do not need to be acknowledged or reset.

Example

If the outside temperature is not available, a fault message is generated. When the outside temperature returns, the fault message automatically disappears and the plant resumes normal operation.

Acknowledge
Applies to all fault messages that only need to be acknowledged. The fault must be locked and reset externally.

Caution

When the fault message disappears (external reset), the plant resumes normal operation even if the fault message was not acknowledged.

Example

A frost protection unit requiring local reset is installed in the plant. The only purpose of the fault indication is to ensure that the service staff notices the fault message.

Acknowledgement and reset
Applies to all fault messages that must be acknowledged and reset.
After acknowledgement, the fault message is maintained until the fault is no longer present. Only then can the fault message be reset. After resetting, the LED in the fault button extinguishes.

Example

A fault s message from a filter must be acknowledged and reset. To prevent regeneration of the fault message each time the plant is started, the message is merely acknowledged. However, the fault message must be reset after the filters are exchanged.

Fault messages from other controllers cannot be acknowledged on the controller.

29.3.3 Delete fault status messages

The operator unit allows for deleting the fault history list at the service level via operating line "Delete faults".

Functions

Main menu > Faults >

Operating line	*Comments*
Delete faults	All current faults are reset internally, the "Faulty history" list is deleted

When activating this function, all other fault messages are reset. Only the pending faults continue to be displayed.

Note

If the type of acknowledgement is changed for a pending fault, you may not be able to acknowledge or reset the fault message.
You can also use this function to reset these fault messages!

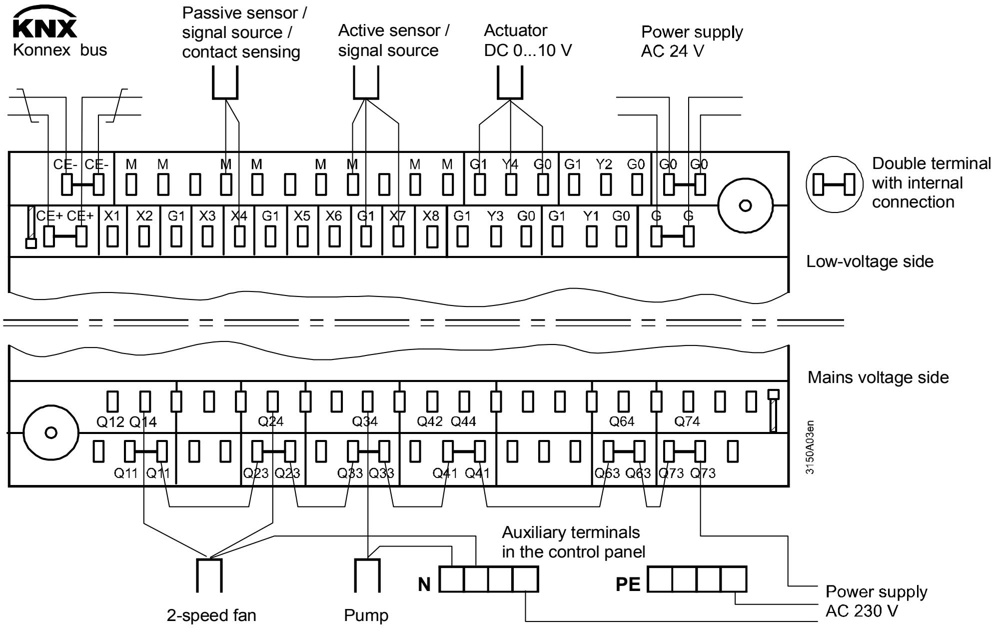
29.4 Resolve errors

Question	*Answer*
During commissioning, the wrong language was selected. Where do I find my language?	1. Press the ESC and OK buttons simultaneously. 2. Select the password level and enter number **112** as password (same as international emergency call) and confirm by pressing OK. The language changes to English. 3. Select your language via "Settings > Device > Language".
The device is completely off, the operator unit displays "Operation locked, Remote operation". How do I restart the device?	Remote operation (OCI700.1) set the device to commissioning mode, which locked local operation. If the controller is not correctly restarted via remote operation, it remains in this state. Locally, the controller can only be restarted by briefly disconnecting it from power.
Changing from the "Commissioning" menu to the main menu is not possible, the display reads "Caution! Invalid settings, start not possible". How do I restart the device?	The configuration was not completely downloaded via the service tool (OCI700.1). Reload the configuration with the service tool (OCI700.1), or reconfigure the device via the operator unit.
Maximum Economy Changeover does not work (properly). Readjusting the setpoint has no impact.	Check the configuration. If "MECH input 1" and "MECH input 2" are configured, but the inputs do not use the same unit or one of the inputs is not connected, Maximum Economy Changeover does not work properly.
Fault status message "[N.X4] sensor error" cannot be acknowledged.	When exiting the "Commissioning" menu, a check is made to see which sensors are connected. If one of the sensors connected is missing later, a fault message appears. If a sensor was incorrectly wired and is rewired later, a "false" fault message may be generated. *Remedy:* Go to the "Commissioning" menu (Caution, plant stops!), then return to the main menu (Caution, plant starts).
The buttons on the QAW740 room unit do not work.	On the controller, the room operating mode is overridden by a higher priority.

30 Electrical connections

30.1 Connection rules

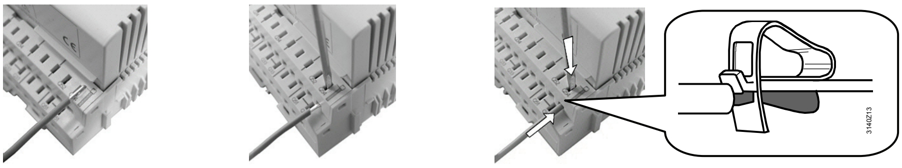
Terminal connection concept



Note

Each terminal (cage terminal) can accommodate only 1 solid wire or 1 stranded wire.

Connection procedure with spring cage terminals



1. 2. 3.

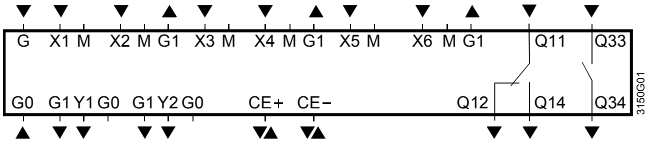
Steps

1. Strip wire (length 7...8 mm; for module connector RMZ780: length 8…9 mm)
2. Connect wire using a screwdriver (size 0 to 1; for module connector: size 0)
3. Apply pressure with screwdriver while inserting the wire
4. Remove screwdriver

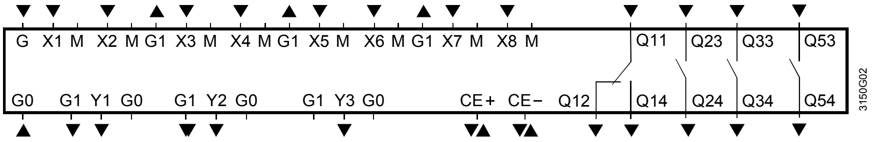
30.2 Connection terminals

30.2.1 Universal controller RMU7..B.

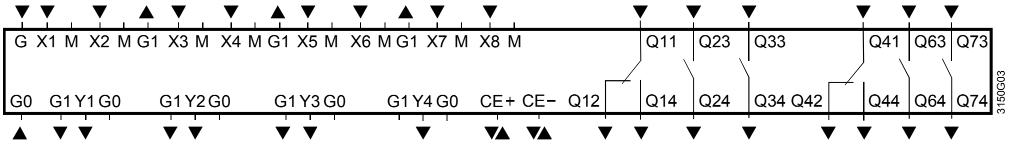
RMU710B



RMU720B



RMU730B

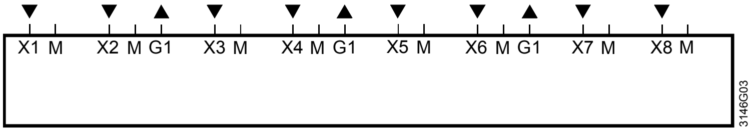


Key

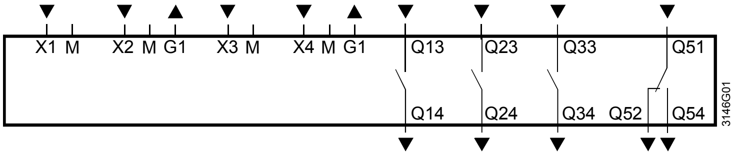
G, G0	Rated voltage AC 24 V
G1	AC 24 V output voltage to supply external active sensors, detectors, monitors or transmitters
M	Measuring neutral for signal input
G0	System neutral for signal output
X1...X8	Universal signal inputs for LG-Ni 1000, 2x LG-Ni 1000 (averaging), T1, Pt 1000, DC 0...10 V, 0...1000 Ω (setpoint), 1000..1175 Ω (rel. setpoint), contact sensing (potential-free)
Y1...Y4	Control or status outputs, analog DC 0...10 V
Q2x/3x/5x/6x/7x	Potential-free relay outputs (N.O. contact) for AC 24...230 V
Q1x/4x	Potential-free relay outputs (changeover contact) for AC 24...230 V
CE+	KNX bus data line (positive)
CE−	KNX bus data line (negative)

30.2.2 Universal modules RMZ785, RMZ787, RMZ788

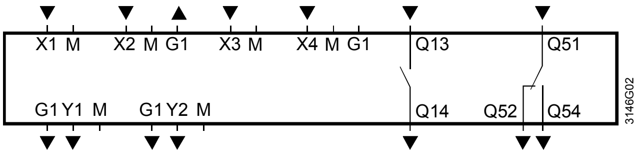
RMZ785



RMZ787



RMZ788



Key

M	Measuring neutral for signal input
G0	System neutral for signal output
G1	Power supply AC 24 V for connected active devices
X1...X8	Universal signal inputs for Ni 1000, 2x Ni 1000 (averaging), T1, Pt 1000, DC 0...10 V, 0...1000 Ω (setpoint), 1000..1175 Ω (rel. setpoint), contact sensing (potential-free)
Y1, Y2	Control or status outputs, analog DC 0...10 V
Q1x/2x/3x	Potential-free relay outputs (N.O. contact) for AC 24...230 V
Q5x	Potential-free relay outputs (changeover contact) for AC 24...230 V

31 Appendix

31.1 Abbreviations

Below is a list of the most common and possible hard-to-understand abbreviations in alphabetical order.

⊕	Heating
⊖	Cooling
Δw	Setpoint shift
Δw_S	Summer compensation delta
Δw_W	Winter compensation delta
AC	Alternating current
AI	Analog input
AO	Analog output
DC	Direct current
DI	Digital input
DO	Digital output
DX	Direct expansion cooling
EIB	European Installation Bus (to be replaced by KNX)
E_S	Summer compensation end
E_W	Winter compensation end
RFL	Risk of frost limit
F_S	Summer compensation start
F_W	Winter compensation start
I	I-response
KNX	KNX bus connection (for operating and process information)
KNX LTE mode	New communication standard used by Synco and RXB
KNX S-mode	Same as with EIB to date
LCD	Liquid crystal display
LED	Light emitting diode
LH	Heating coil
LC	Cooling coil
MECH	Maximum Economy Changeover (MECH) of air dampers
HMI	Human machine interface
P	P mode
PI	PI mode
SI	Switching interval
SD	Switching differential
SpC	Cooling setpoint
SpCCmf	Comfort cooling setpoint
SpCEco	Economy cooling setpoint
SpCLim	Setpoint cooling limitation
SpCPcmf	Setpoint cooling precomfort
SpH	Heating setpoint
SpHCmf	Comfort heating setpoint
SpHEco	Economy heating setpoint
SpHLim	Setpoint heating limitation
SpHPcmf	Setpoint heating precomfort
SpSu	Supply air temperature setpoint
t	Time
OT	Outside temperature
TiCst	Rundown time

TiRup	Runup time
Tn	Integral-action time
tNmin	Operating time min for night cooling
RT	Room or extract air temperature
tSmin	Sustained mode time min for sustained mode
Tv	Derivative action time
VAV	Variable air flow (basic type P)
w	Setpoint
w_{CwFl}	Chilled water flow setpoint
w_F	Frost protection setpoint
w_{FP}	Plant OFF frost protection setpoint
w_R	Setpoint room or extract air temperature
w_Z	Supply air temperature setpoint
X	Actual value
Xp	P-band
x_R	Actual value room temp
x_Z	Actual value supp air temp

31.2 Configuration diagrams

31.2.1 Explanation of presentation

The controller has a large number of preconfigured function blocks. The available configuration options are shown in the configuration diagrams; they include:

- Input identifiers (inputs, input functions)
- Aggregates (outputs, output functions)
- Function blocks for open and closed-loop control functions
- In the configuration diagram, planning engineers can enter and draw the interconnections of individual input and output functions (of their internal signals) together with the associated connection terminals.

Designations used

- Devices and extension modules:

N	Universal controller RMU7..B
A5	Universal module RMZ785
A7	Universal module RMZ787
A8	Universal module RMZ788

- Physical inputs:

X	universal (analog or digital)

- Physical outputs:

Q	Relay
Y	DC 0...10 V

Rules for the inputs

- The input identifier can be a device or a special sensor (outside temperature, room temperature, supply air temperature, extract air temperature, frost protection, setpoint adjuster, pulse)
- Multiple use of inputs is possible, no limitations (e.g. differential pressure sensor to monitor fan drive belt and release signal for the electric heating coil)
- If an input is wired, the display only shows the units possible (e.g. for an indoor air quality sensor, only inputs "ppm" are available)
- Alarming for inputs is only active if the input is connected prior to the end of commissioning
- If an input identifier is changed, all associated settings are changed also (e.g. Xp was 28 K, now it is 10 Pa)

Procedure for extra configuration

- Order of configuration:
  - First basic configuration, then extra configuration
  - First input identifier, then aggregates, then control functions
- Wiring options:
  - Always from arrow (▾) to line (▮)
  - From function to input: "x" to "x", "a" to "x", "d" to "x", "i" to "x"
  - From output block to output terminal: Analog "Y" to "Y"
  - Relay "Q" to "Q"
  - From the controller: Load "y" to "y", pumps "p" to "p"
  - Grayed surface (e.g. 720) means: Available only for this device type

Rules for the outputs

- Output functions must be connected to the relevant terminals; each output terminal can only be used once (e.g. N.Q1 for pump 1)
- Each output function has max 3 load signal inputs with max selection (e.g. the cooling coil valve opens when the room temperature or room humidity is too high)

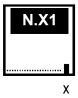
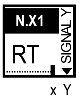
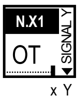
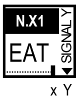
31.2.2 Overview of configuration diagrams

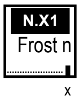
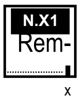
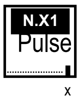
See the configuration diagram for assignment of inputs and outputs.

Basic configuration

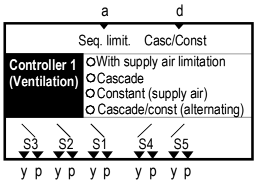
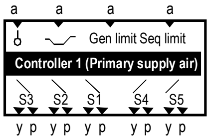
Configuration	Function
Plant type	• Basic type A: Room temperature ventilation controller (sequence controller 1 is a room temperature controller, room/supply air temperature cascade controller or supply air temp controller) • Basic type P: Supply air temperature controller, demand-controlled (sequence controller 1 is supply air temperature controller) • Basic type C: Flow temperature controller, demand-dependent (sequence controller 1 is a demand-dependent chilled water flow temperature controller) • Basic type U: Universal controller (sequence controller 1 is a universal controller) • A01…A05: Select a programmed application (activate configuration stored in the controller)
☐ RMZ785 ☐ RMZ787(1), (2) ☐ RMZ788(1), (2)	• Add further inputs and outputs with extension modules RMZ785, RMZ787, and RMZ788; controller functions can be configured to these inputs/outputs • Specify which modules are connected to the controller in which order (position); max 4 modules

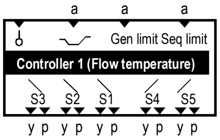
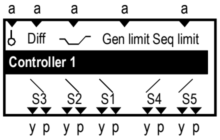
Input identifiers

Inputs → Section 8	Configuration	Functions
	N.X1…RMZ788.X4	Enter input identifier • Units: °C, %, g / kg, kJ / kg, W / m², m / s, bar, mbar, Pa, ppm, Universal 000.0 (display with one decimal place), Universal 0000 (display without decimal place). The unit is only required for presentation on the display. The unit presents all unit-dependent settings (e.g. P-bands) on the unit. Sensors for °C: LG-Ni1000, 2xLG-Ni1000 (averaging), T1, Pt1000, DC 0…10 V, all other units DC 0…10 V, adjustable range • Digital (input for potential-free contacts) • Special identifiers: Room temperature, Outside temperature, Extract air temperature, Supply air temperature, Frost protection, Remote setpoint adjuster, Pulse. With the special identifiers, internal connections are taken directly from the controller • A name can be assigned to each input
	Room temperature	Only possible with basic type A, also in combination with room unit (averaging), sensor as described under "Sensors for °C"
	Outside temperature	Outside temperature, sensor as described under "Sensors for °C", for the following functions: • Summer/winter compensation • Sequence locking acc to OT • Pump on at low outside temperatures • Locking of fan speed 2 at low outside temperatures • Max limitation of the outside air damper at low outside temperatures
	Extract air temperature	Basic type A only, sensor as described under "Sensors for °C", for the following functions: • Extract air temperature control, extract/supply air cascade control

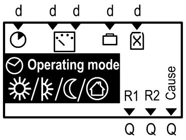
	Supply air temperature	Basic type A only, sensor as described under "Sensors for °C", for the following functions: • Controlled variable for supply air temperature
	Frost protection	Frost prot. function selectable for sequence controllers 1, 2, 3 for: • Water-side frost protection (input LG-Ni 1000) with 2 stages, PI control when plant is switched off • Air-side frost protection (input DC 0…10 V = 0…15 °C) with 2 stages • Frost protection unit • Preheating function
	Frost protection unit 1 Frost protection unit 2 Frost protection unit 3	• Frost protection unit, direct acting on corresponding sequence controllers 1, 2, or 3
	[Controller 1] rem setp adj [Controller 2] rem setp adj [Controller 3] rem setp adj Rem setp adjuster relative	• Remote w1: Absolute for sequence controllers 1..3 (0..1000 Ω or DC 0...10 V) • Remote rel: Relative for room temperature with basic type A sequence controller 1 (1000...1175 O = -3...+3 K)
	Pulse	Select input identifier "Pulse" for an input. • Connection of a pulse source (mechanical or electronic) • Pulse source type can be assigned to the input

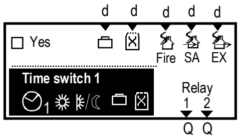
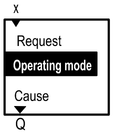
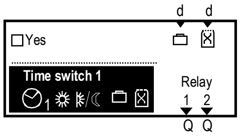
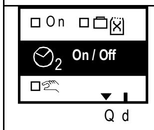
Open and closed-loop control functions

Controller → Section 11, 12, 13, 14	Configuration	Functions
	Controller 1, basic type A: • Sequence limiter (seq. limiter) • Casc/const changeover input • Sequence S1…S5 load (y) • Sequence S1…S5 pump (p) • Control strategy	Sequence controller, can be used as a P, PI or PID controller. • The following control modes are available: • Supply air temperature control • Room temperature control (with optional limitation of supply air) • Extract air temp. control (with optional limitation of supply air) • Room/supply air temperature cascade control • Extract air/supply air temperature cascade control • Configurable sequence assignments; one load output (modulating output A…D, heat recovery unit, mixed air damper, step switch 1…5) and a pump can be connected to each sequence • Heating sequences S1, S2 and S3 (_) • Cooling sequences S4 and S5 (_//) • Supply air temperature limiter acts on all sequences • Sequence limiter, adjustable as min or max limiter, acts on a settable sequence (closing) • Sustained mode room temperature • Night cooling of room • fan speed at large heating or cooling load in room • Summer/winter compensation with outside temperature • Sequence locking acc to OT • Fault message for unacceptable control deviation can be activated
	Controller 1 basic type P: • Universal shift (⁓) • General limiter (gen. limiter) • Sequence limiter (seq. limiter) • Sequence S1…S5 load (y) • Sequence S1…S5 pump (p)	Activate sequence controller dependent on demand, settable as P, PI or PID controller, for demand-dependent supply air temperature control related to individual room controller (supply air temperature sensor readily wired to N.X1). • Configurable sequence assignments; one load output (modulating output A…D, step switch 1…5) and a pump can be connected to each sequence • Heating sequences S1, S2 and S3 (_) • Cooling sequences S4 and S5 (_//)

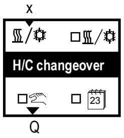
		• General limiter acts on all sequences • Sequence limiter, can be set as min or max limiter, acts on a adjustable sequence (closing) • Universal shift • Sequence locking acc to OT • Fault message for unacceptable control deviation can be activated
	Controller 1 basic type C: • Universal shift (∼⁄) • General limiter (gen. limiter) • Sequence limiter (seq. limiter) • Sequence S1…S5 load (y) • Sequence S1…S5 pump (p)	Activate sequence controller dependent on demand, settable as P, PI or PID controller, for demand-dependent flow temperature control (chilled water or 2-pipe systems H/C) flow temperature sensor readily wired to N.X1). • Configurable sequence assignments; one load output (modulating output A…D, step switch 1…5) and a pump can be connected to each sequence • Heating sequences S1, S2 and S3 (_) • Cooling sequences S4 and S5 (_//) • General limiter acts on all sequences • Sequence limiter, can be set as min or max limiter, acts on a adjustable sequence (closing) • Universal shift • Sequence locking acc to OT • Fault message for unacceptable control deviation can be activated
	Controller 1 basic type U; Controllers 2, 3 (basic types A, P, C, and U): • Main controlled variable • Differential input (diff) • Universal shift (∼⁄) • General limiter (gen. limiter) • Sequence limiter (seq. limiter) • Sequence S1…S5 load (y) • Sequence S1…S5 pump (p)	Universal sequence controller, as P, PI or PID controller. • Configurable sequence assignments; one load output (modulating output A…D, step switch 1…5) and a pump can be connected to each sequence • Heating sequences S1, S2 and S3 (_) • Cooling sequences S4 and S5 (_//) • Simple or differential controller (setpoint linkable to sequence controller 1) • General limit controller acts on all sequences • Sequence limit controller, settable as min or max limiter, acts on a settable sequence (closing) • Universal shift • Sequence locking acc to OT • Fault message for unacceptable control deviation can be activated
IAQ controller. → Section 16	Configuration	Functions
	• Input	• Room air quality control • Open outside air damper • Switch on fans at poor air quality (Precomfort, Economy) • Changeover of fan speeds (with 2-speed fans) • Increase fan speed (speed-controlled fans without pressure control)

Operating modes / Time switches

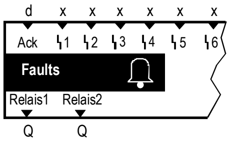
Operating mode → Section 6, 7	Configuration	Functions
	Basic types A and U: • Timer function (◔) • Rm optg mode inp 1 (⌸) • Rm optg mode inp 2 (⌸) • Holiday input (▭) • Special day input (☒)	Room operating modes • Timer function: Digital input for room operating mode Comfort for a settable period of time • Preselection of settable room operating mode with room operating mode input 1 • Room optg mode selector with room operating mode input 1+2

	• Operating mode relay 1, 2	• Holiday input and special day input: Digital input for holidays (settable room operating mode) or special day (special day program of time switch) • Settings for possible plant operation mode (e.g. sustained mode, recirculated air mode) • Output of operating mode via relay contacts
	Basic type P: • Time switch (Yes, No) • Holiday input (▭) • Special day input (☒) • Fire alarm off (🔥 fire) • Extract air (Supply air, Extract air) • Operating mode relay 1, 2	• Time switch can be activated for other applications, acts on bus • Holiday input and special day input: Digital input for holidays (settable room operating mode) or special day (special day program of time switch) • Fire and smoke extraction inputs to control plants and signal to individual room controller via bus • Output of operating mode via relay contacts
 	Basic type C: • Request input • Time switch (Yes, No) • Holiday input (▭) • Special day input (☒) • Operating mode relay 1, 2	• Request input signal for external request signal refrigeration • Time switch can be activated for other applications, acts on bus • Holiday input and special day input: Digital input for holidays (settable room operating mode) or special day (special day program of time switch) • Output of operating mode via relay contacts
	• Time switch (Yes, No)	• 1-channel time switch on / off • 7 days + special day, 6 switching points per day • Note selectable holidays/special day information (Yes, No) • Operation selector

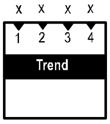
Heating / cooling changeover

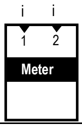
Heating / cooling changeover → Section 27	Configuration	Functions
	• 2-pipe system H/C (☐ ♨/☼) • H/C changeover input (♨/☼) • Changeover with operating mode selector (☞) • Changeover by date (📅)	• Changeover of operating mode heating or cooling in 2-pipe systems • Preselection of heating/cooling on device generated or received as signal via bus • Changeover by analog or digital input • Changeover with operating mode selector • Changeover by date

Faults

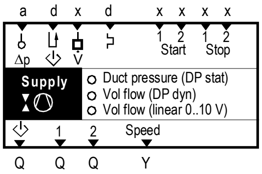
Faults → Section 24	Configuration	Functions
	• External fault button • Fault inputs 1 through 10 • Fault relays 1 and 2 • Filter supervision (⍌) • Fire alarm off (🔥 fire) • Extract air (Supply air, Extract air) • Fan release relay	• 10 universal fault signal inputs, fault signal delay, fault acknowledgement (none, acknowledge), fault priority (urgent, not urgent) and fault effect (stop, no stop) can be set • 2 fault relays, priority (urgent, not urgent, all) and signaling can be set • Filter supervision, Fire alarm off and Smoke extraction • Fan release relay (if external fan switch, no release in case of fault with plant stop; fans remain released with smoke extraction) • Direct connection possible for analog signals and settable threshold values • A name can be assigned to each fault input

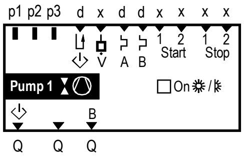
Data acquisition

Trend → Section 9.1	Configuration	Functions
	• Input	The trend is used to log the progression of signals. • 4 independent trend channels • Logging of local inputs, room temperatures and outside temperature from the bus • Simultaneous display of 2 channels • Views: 8-minutes, 8-hours, 24-hours and 6-day history

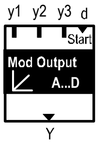
Meters → Section 9.2	Configuration	Functions
	• Input	• Acquire pulse sources and display cumulated values; selectable unit, valency, presentation, etc.

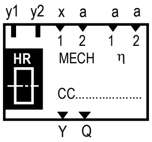
Aggregates

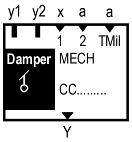
Supply air fan extract air fan → Section 10.1	Configuration	Functions
	Speed 1(1Q) Speed 2 (2Q) • Speed (Y) • Precommand output (⏻) • Precommand checkback (⏻) • Pressure sensor (Δp) • Flow signal ($\dot{V}$) • Overload signal (⊐) • Start condition 1 / 2 • Stop condition 1 / 2	• Can be used for single-speed, 2-speed or speed-controlled fans • Possible types of control for variable-speed fans: • Assign fixed speeds for 1 or 2-speed operation • Control to constant duct pressure (static pressure measurement) • Control to constant volumetric flow for 1 or 2-speed operation (2 setpoints, dynamic pressure measurement) • Control to constant volumetric flow for 1 or 2-speed operation (2 setpoints, linear volumetric flow signal measurement) • 2. Speed can be switched via time switch (time switch priority speed 2), room temperature controller or indoor air quality controller; speed 2 can be locked at low outside temperatures • Recirculated air operation possible • Configurable precommand output and checkback signal • Settable start delay, separate for supply air and extract air fan • Fan release relay and smoke extraction with fans (see "Faults") • Fans can be directly switched on/off via start and stop conditions (stop of supply air fan causes plant to stop) • Acquire number of operating hours

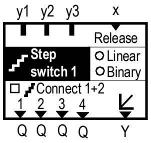
Pump / twin pumps → Section 10.2	Configuration	Functions
	• Pump A • Pump B • Precommand output (⏻) • Precommand checkback (⏻) • Flow signal ($\dot{V}$) • Overload signal (⊐) • Start condition 1/2 • Stop condition 1/2 • Optg mode-dep ON (☐On☀/❄)	• Usable as single or twin pump (e.g. heating coil pump) or as main pump (e.g. chilled water primary controller) • ON via load signal from sequence controller (max 2 sequences with max selection, settable switching points), ON by operating mode (operating mode-dependent ON), OT-dependent ON (settable) • Settable switch-off delay • Settable pump kick • Configurable precommand output and checkback signal • Pump can be directly switched on/off via start and stop conditions • Selectable run priority • Changeover of run priority in automatic operation once a week (same time as the pump kick)

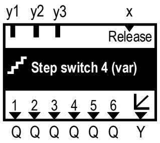
		• Automatic changeover of run priority in case of fault, settable changeover time (overlapping or with delay prior to restart of second pump) • Acquire number of operating hours

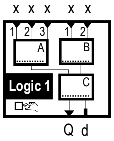
Modulating outputs → Section 10.3	Configuration	Functions
	• Modulating output A…D (Y) • Input • Start preset	For continuous signals DC 0…10 V, e.g. for valve control. • Load signal from sequence controller (from max 3 sequences with maximum selection) • Settable "Positioning signal min" and "Positioning signal max". • Settable inversion • Enable via start input

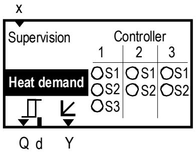
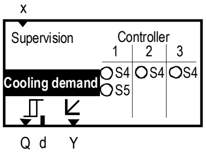
HR → Section 10.4	Configuration	Functions
	• Output (Y) • MECH input 1 • MECH input 2 • Efficiency 1 • Efficiency 2 • Cooling coil valve (modulating, switching)	To control heat recovery equipment. • Configuration always with "heating" load signal from sequence controller (from max 2 sequences with max selection) • Maximum economy changeover, optionally with 1 input (digital or analog) or 2 inputs (differential measurement) • Efficiency supervision with sensor in supply air after HR equipment or with sensor in exhaust air • HR equipment supports cooling when cooling coil valve opens (also in case of dehumidification) • Settable "Positioning signal min" and "Positioning signal max" • Settable inversion

Mixed air damper → Section 10.5	Configuration	Functions
	• Output (Y) • MECH input 1 • MECH input 2 • Cooling coil valve • Mixed air temperature (TMil)	To control mixed air dampers. • Configuration of sequence controller (from max 2 sequences with max selection) • Output signal DC 0…10 V (closed / open refer to outside air damper) • Control mixed air temperature • Maximum economy changeover, optionally with 1 input (digital or analog) or 2 inputs (differential measurement) • Damper supports cooling when cooling coil valve opens (also in case of dehumidification) • Selectable start operation • Settable "Positioning signal min" and "Positioning signal max", max position can be shifted by outside temperature

Step switch → Section 10.6, 10.7	Configuration	Functions
	• Step 1 to ... (Q...) • Modulating output (Y) • Release external • Connect 1+2	To control a multistage aggregate. • Configuration of each step in dependence of load signal from sequence controller (from max 3 sequences with max selection) • Selection • Linear step switch to switch equal-size steps or aggregates with equal output for lead/sequential run (run priority changeover) • Binary step switch to switch binary stepped aggregates. • Step switches can be cascaded • Release external of the step switch with digital input, e.g. flow

		monitoring for electric heating coil - Settable fan overrun time, e.g. for connected electric heating coil - Modulating output can be configured, same function as "Modulating outputs" - Settable locking time (restart delay) (time applies to all steps)
	- Step 1 to ... (Q...) - Modulating output (Y) - Release external	To control a multistage aggregate. - Depending on the load signal from the sequence controller (max. 3 sequences with maximum selection), each step can be assigned a switch-on and switch-off point; the switching points may overlap and can be inverted (ON < OFF) - Release external of the step switch with digital input, e.g. flow monitoring for electric heating coil - Settable fan overrun time, e.g. for connected electric heating coil - Configurable modulating output - Settable locking time (restart delay) (time applies to all steps)

Logic functions → Section 10.8	Configuration	Functions
	- Input - Logic function - Operation selector - Relay output - Digital output	- 4 logic blocks, logic 1 to 4 - Generation of digital signal from continuous input signals - Selectable logic for logic A, B and C - Selectable operation - Delay times can be set for output signal - Selectable time formats

Heat demand → Section 25	Configuration	Functions
	- Controllers 1 to 3 - Supervision - Heat demand modulating - Heat demand relay	Plant functions when heat is requested. - Setting giving the sequences where heating valves are configured - Supervision: When heat is requested, but no heat is available after a set period of time, a fault message can be triggered, plant stop can be selected as needed. Digital input or temperature sensor - Heat demand relay or modulating output to route heat demand - Heat demand can also be transmitted via bus, (see Communication)
Refrigeration demand → Section 26	**Configuration**	**Functions**
	- Controllers 1 to 3 - Supervision - Refrig demand modulating - Refrigeration demand relay	Plant functions when refrigeration is requested. - Setting giving the sequences where cooling valves are configured - Supervision: When refrigeration is requested, but no refrigeration is available after a set period of time, a fault message can be triggered, plant stop can be selected as needed. Digital input or temperature sensor - Refrigeration demand relay or modulating output to route refrigeration demand - Refrigeration demand can also be transmitted via bus, (see Communication)

31.2.3 Configuration diagram RMU7..B, basic type A

Room temperature ventilation controller (sequence controller 1 is a room temperature controller, room/supply air temperature cascade controller or supply air temperature controller).

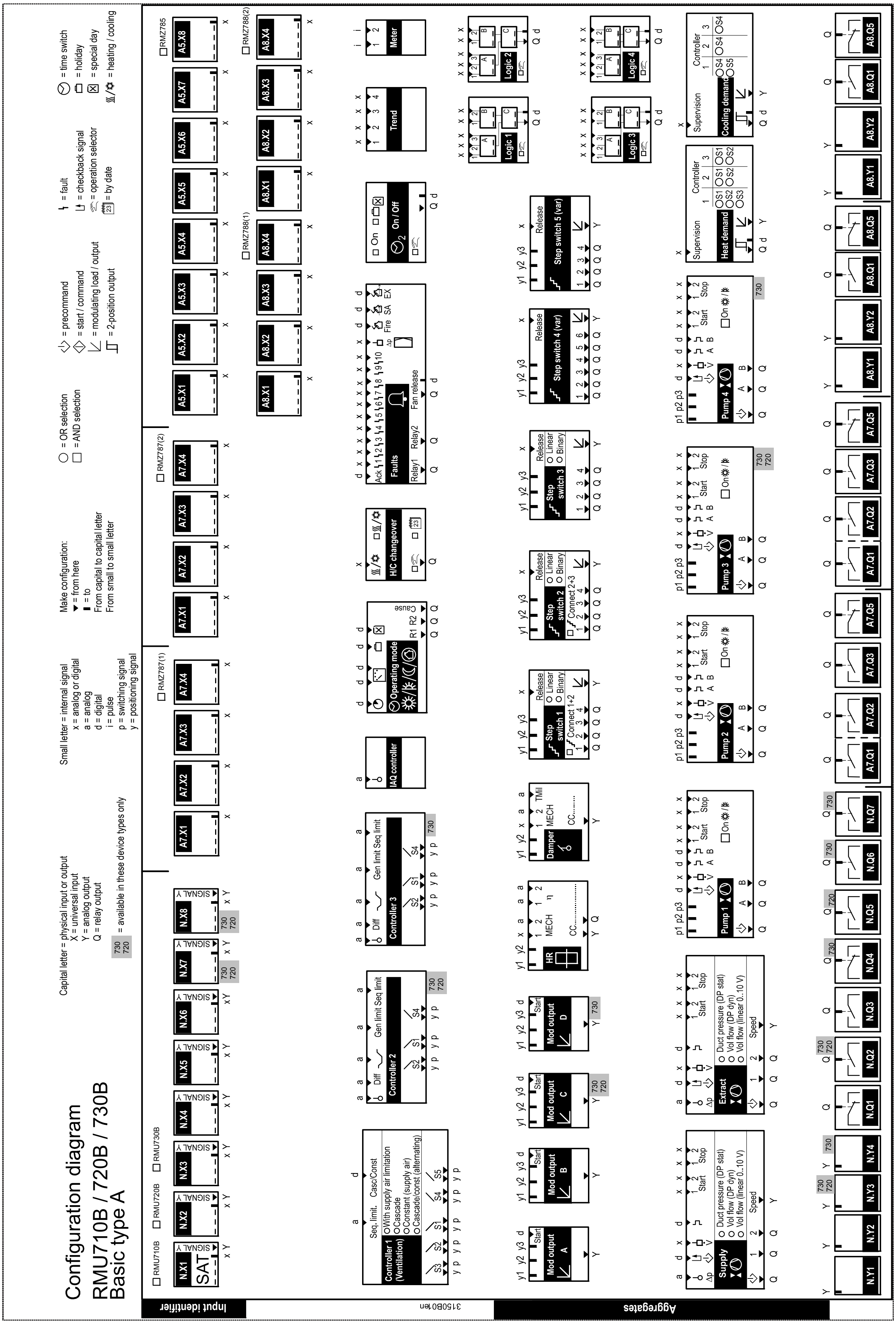


Fig. 1: Configuration diagram, basic type A for RMU7..B

31.2.4 Configuration diagram RMU7..B, basic type P

Supply air temperature controller, demand-controlled (sequence controller 1 is supply air temperature controller).

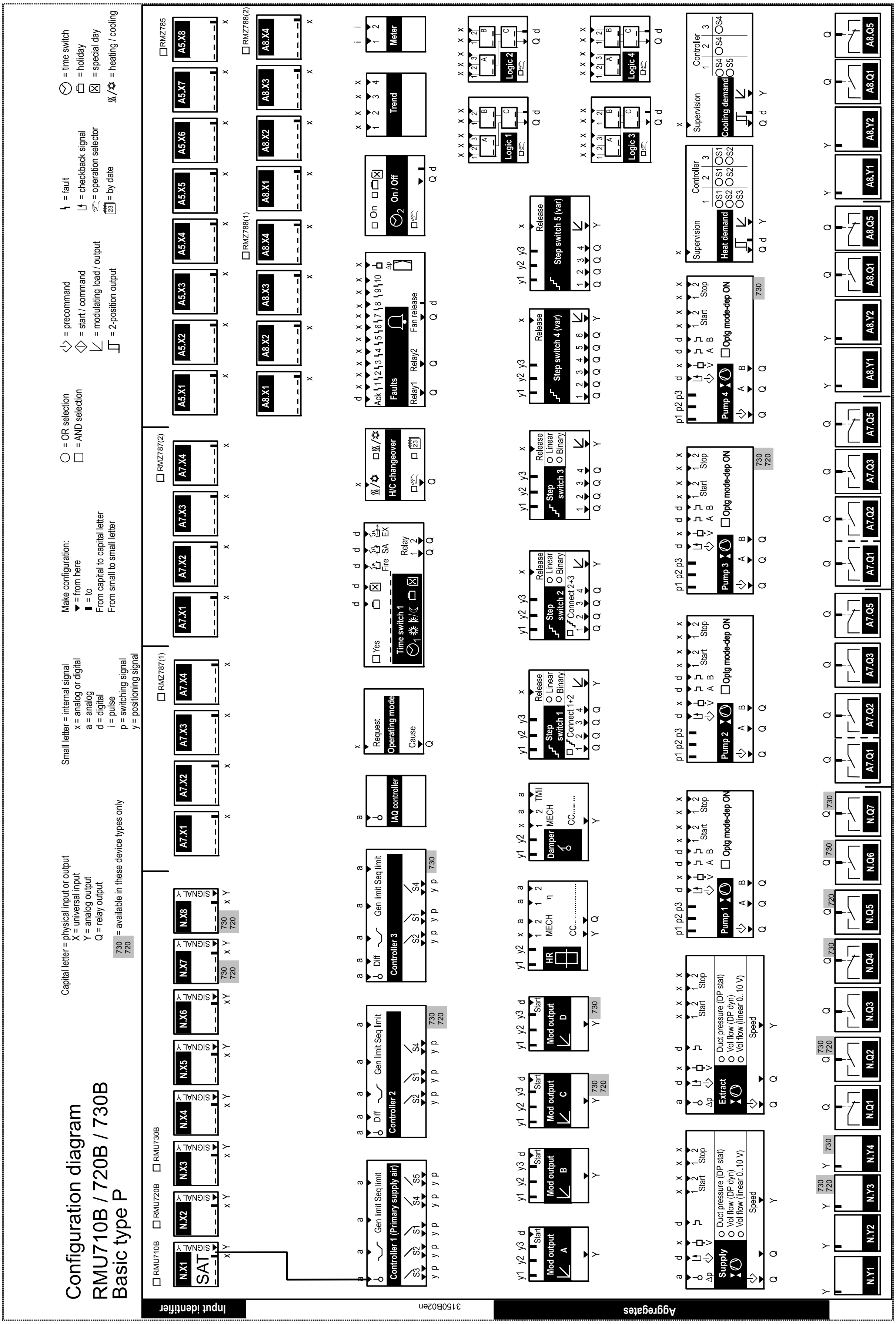


Fig. 2: Configuration diagram, basic type P for RMU7..B

31.2.5 Configuration diagram RMU7..B, basic type C

Demand-dependent chilled water primary controller (sequence controller 1 is a demand-dependent chilled water flow temperature controller)

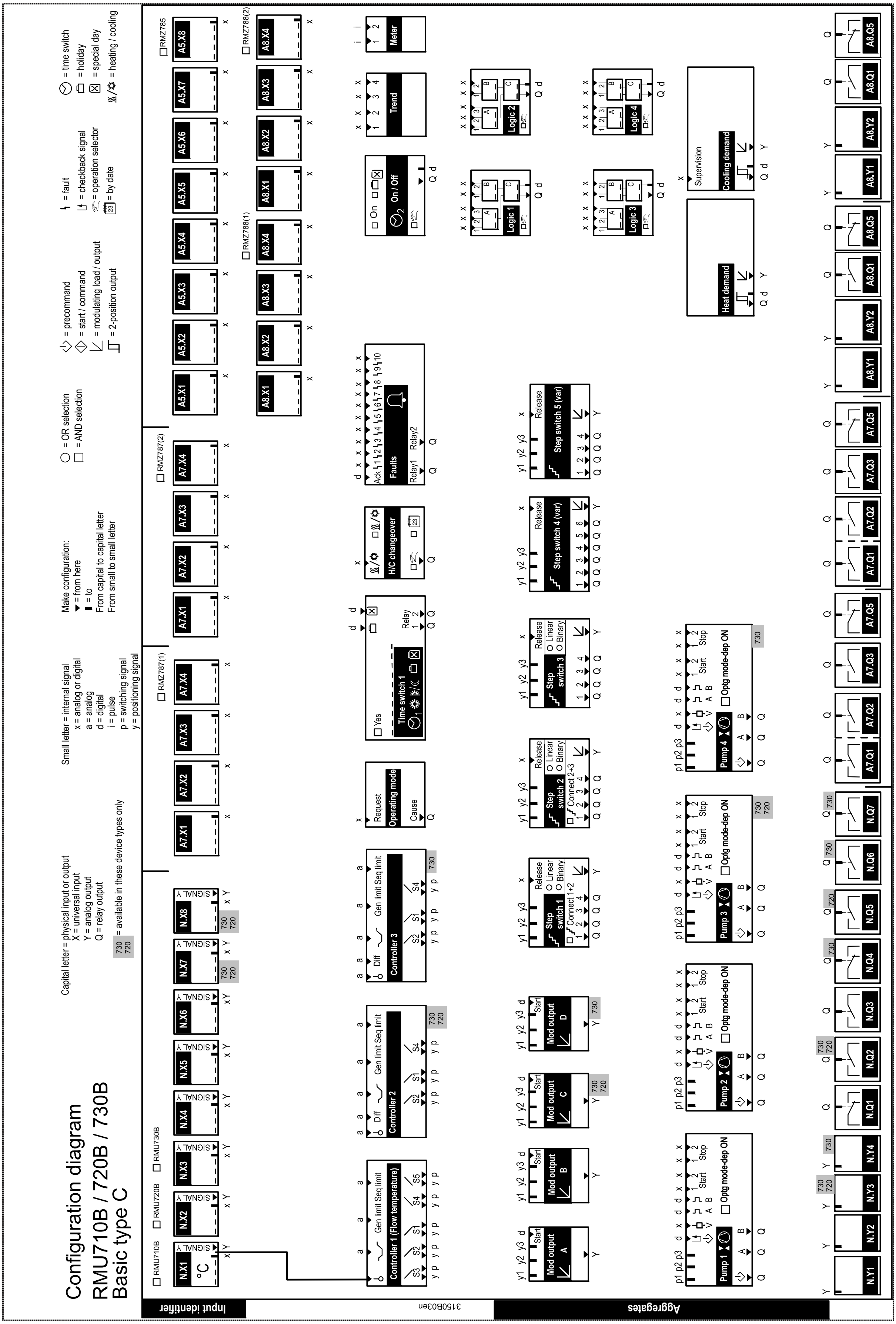


Fig. 3: Configuration diagram, basic type C for RMU7..B

31.2.6 Configuration diagram RMU7..B, basic type U

Universal controller (sequence controller 1 is a universal controller).

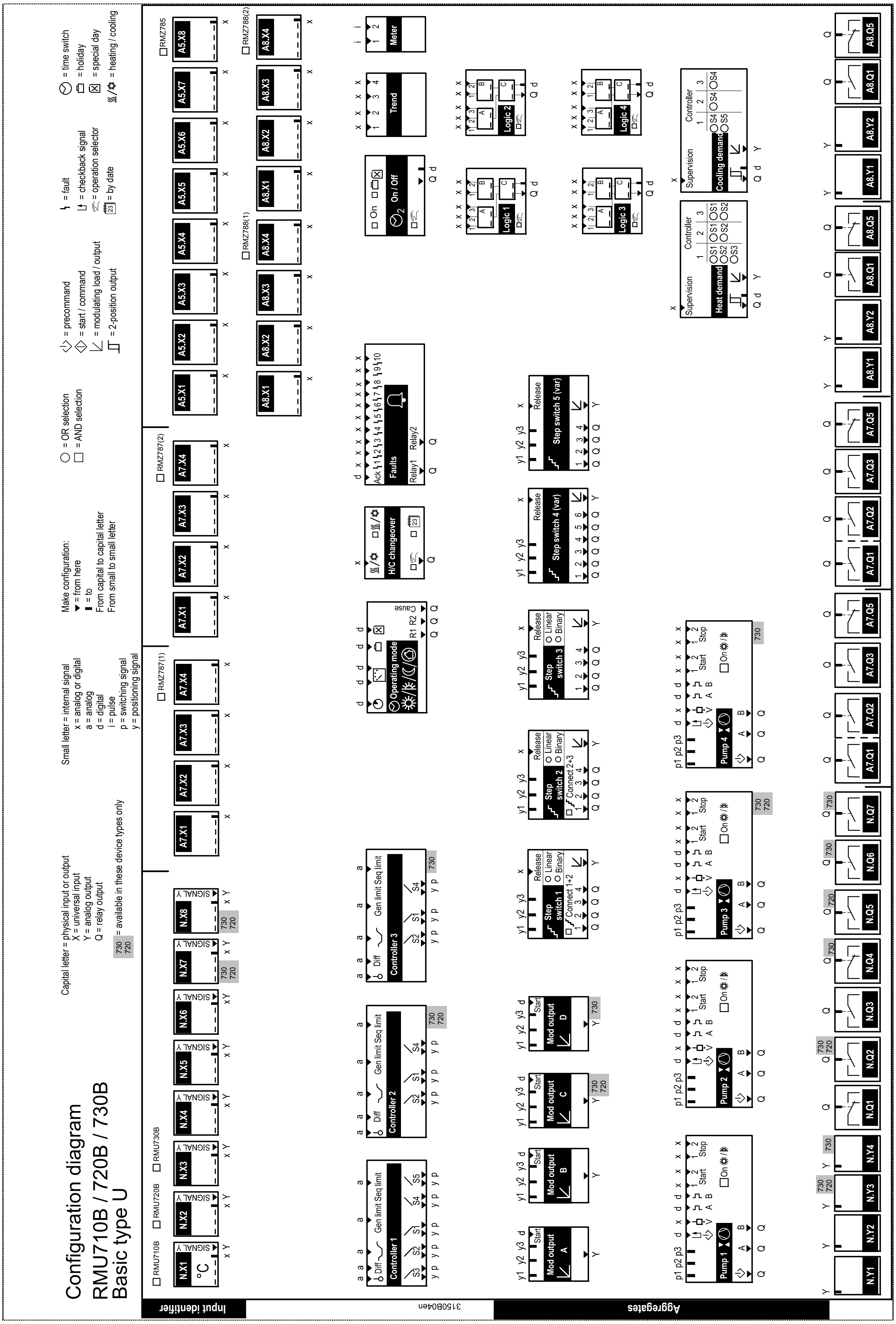


Fig. 4: Configuration diagram, basic type U for RMU7..B

31.2.7 Configuration diagram RMU710B plant type A01

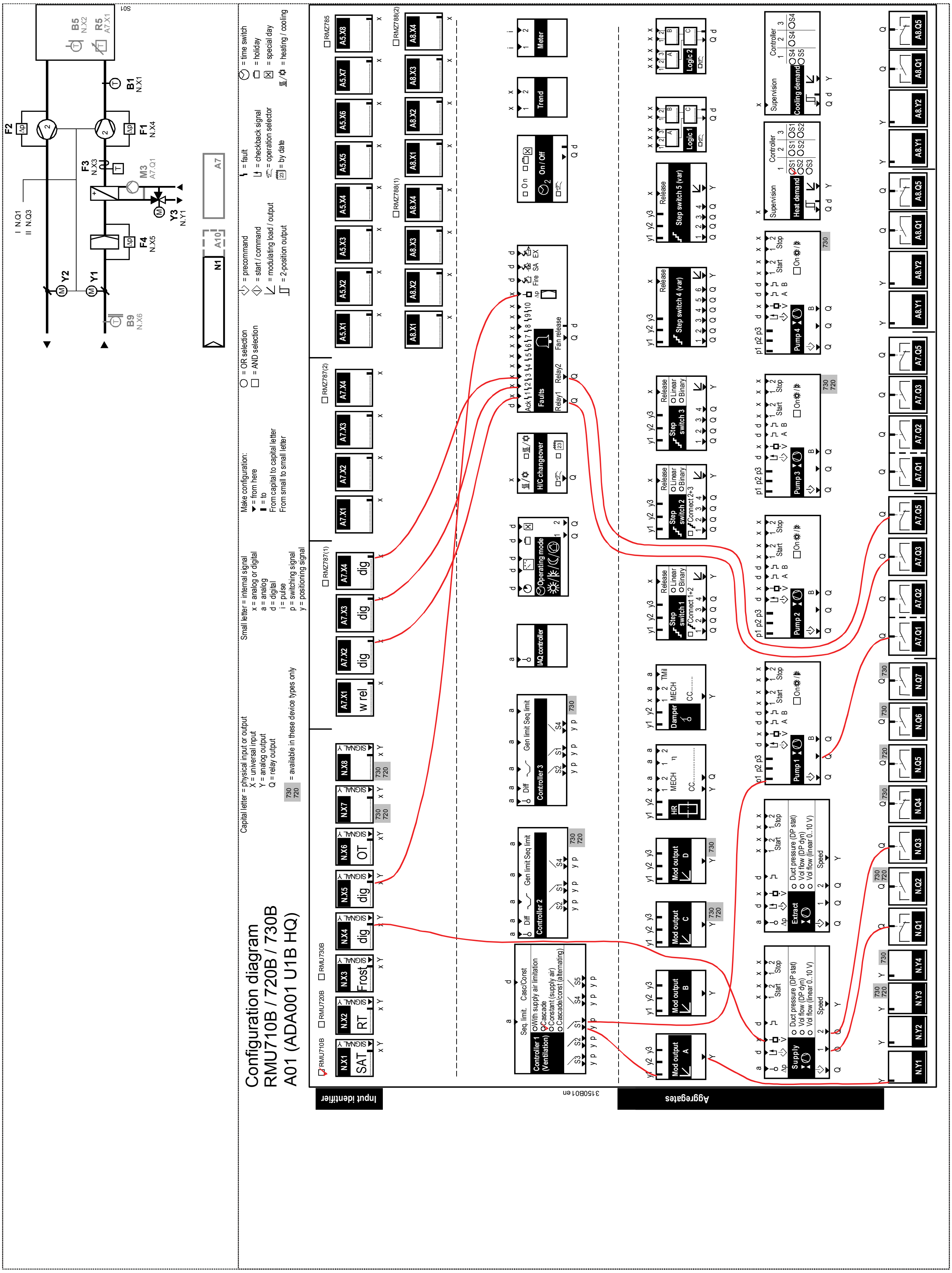


Fig. 5: Configuration diagram for application sheet ADA001 U1B HQ

31.2.8 Configuration diagram RMU710B plant type A02

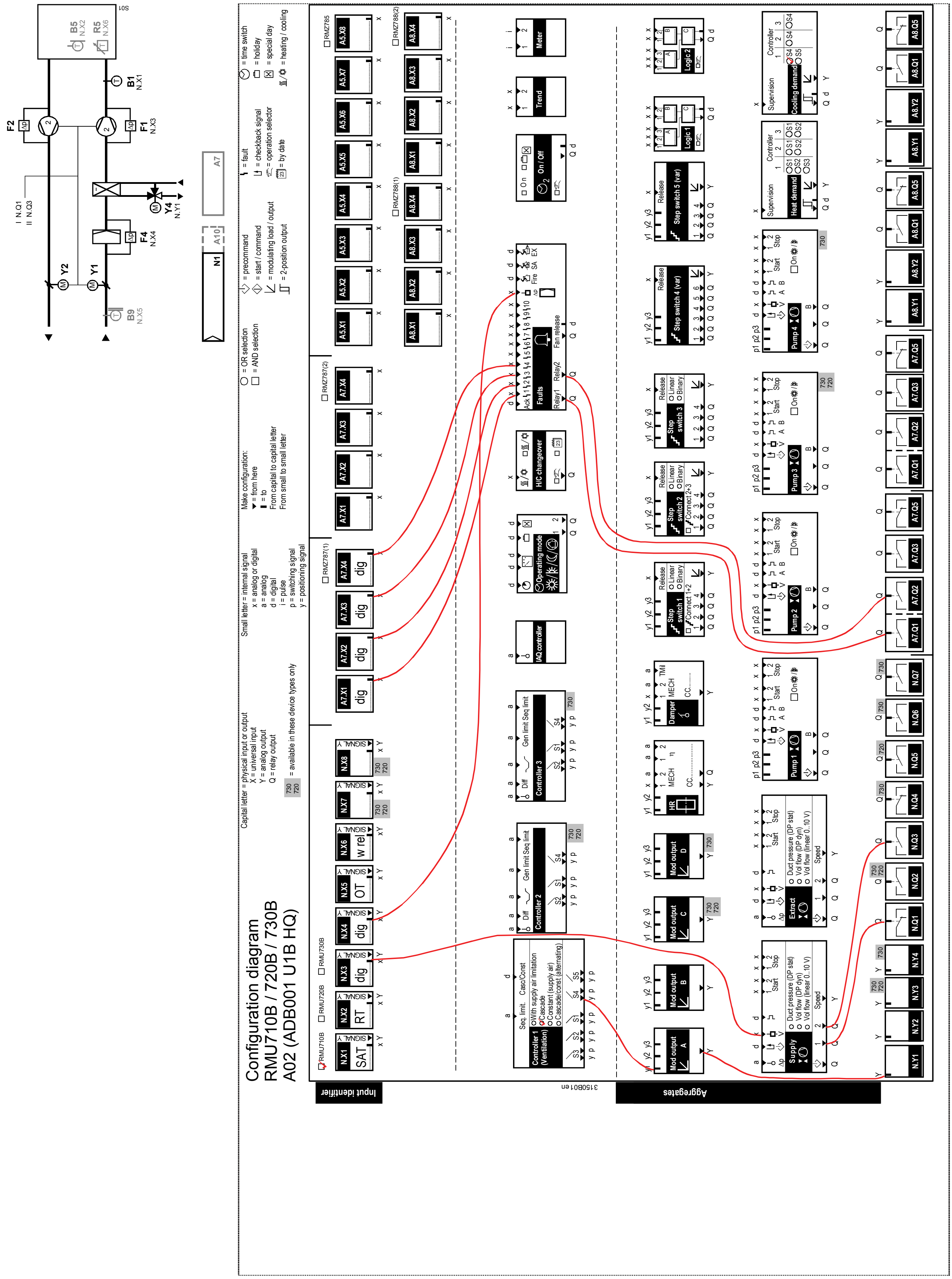


Fig. 6: Configuration diagram for application sheet ADB001 U1B HQ

31.2.9 Configuration diagram RMU710B plant type A03

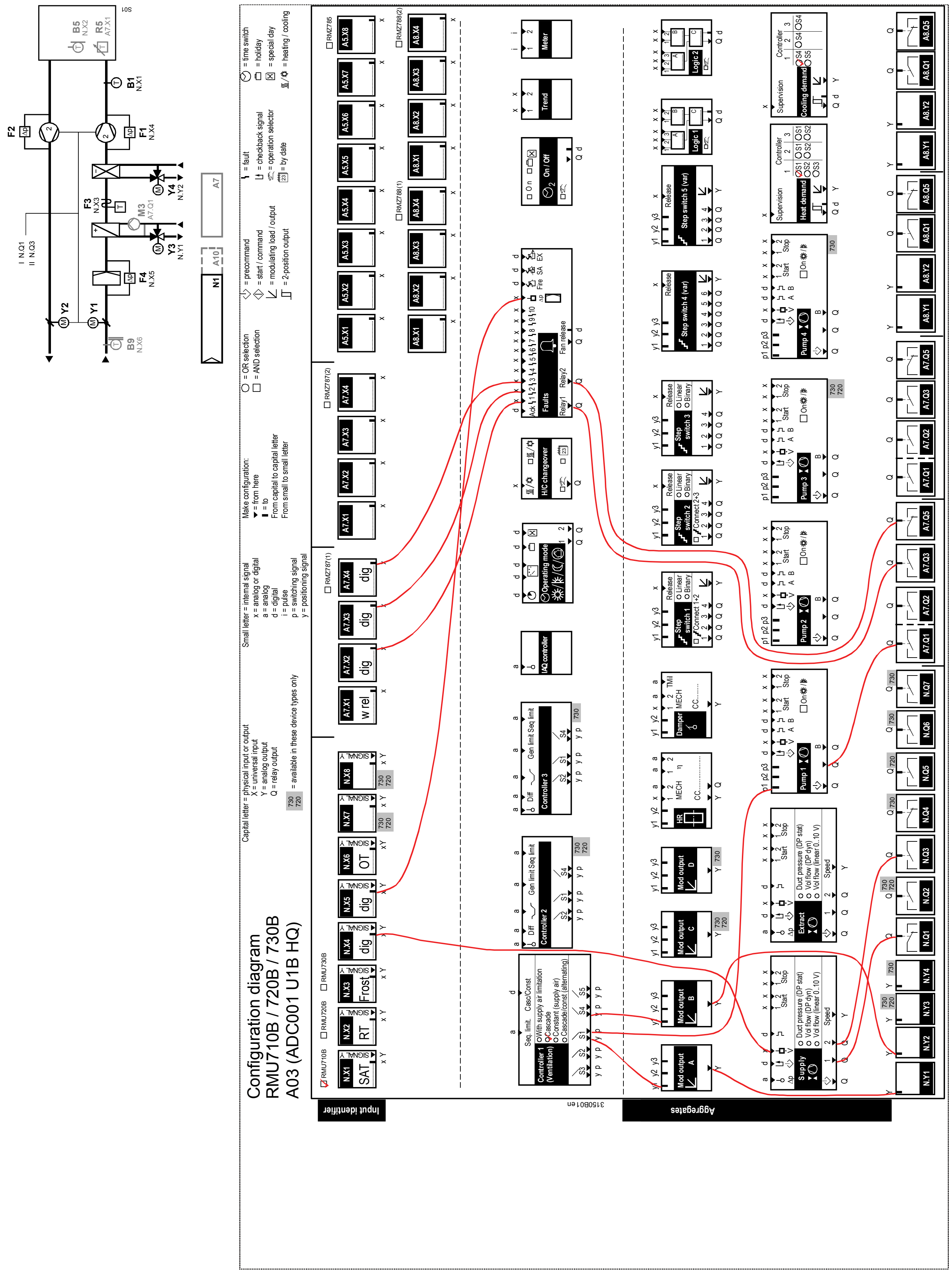


Fig. 7: Configuration diagram for application sheet ADC001 U1B HQ

31.2.10 Configuration diagram RMU710B plant type A04

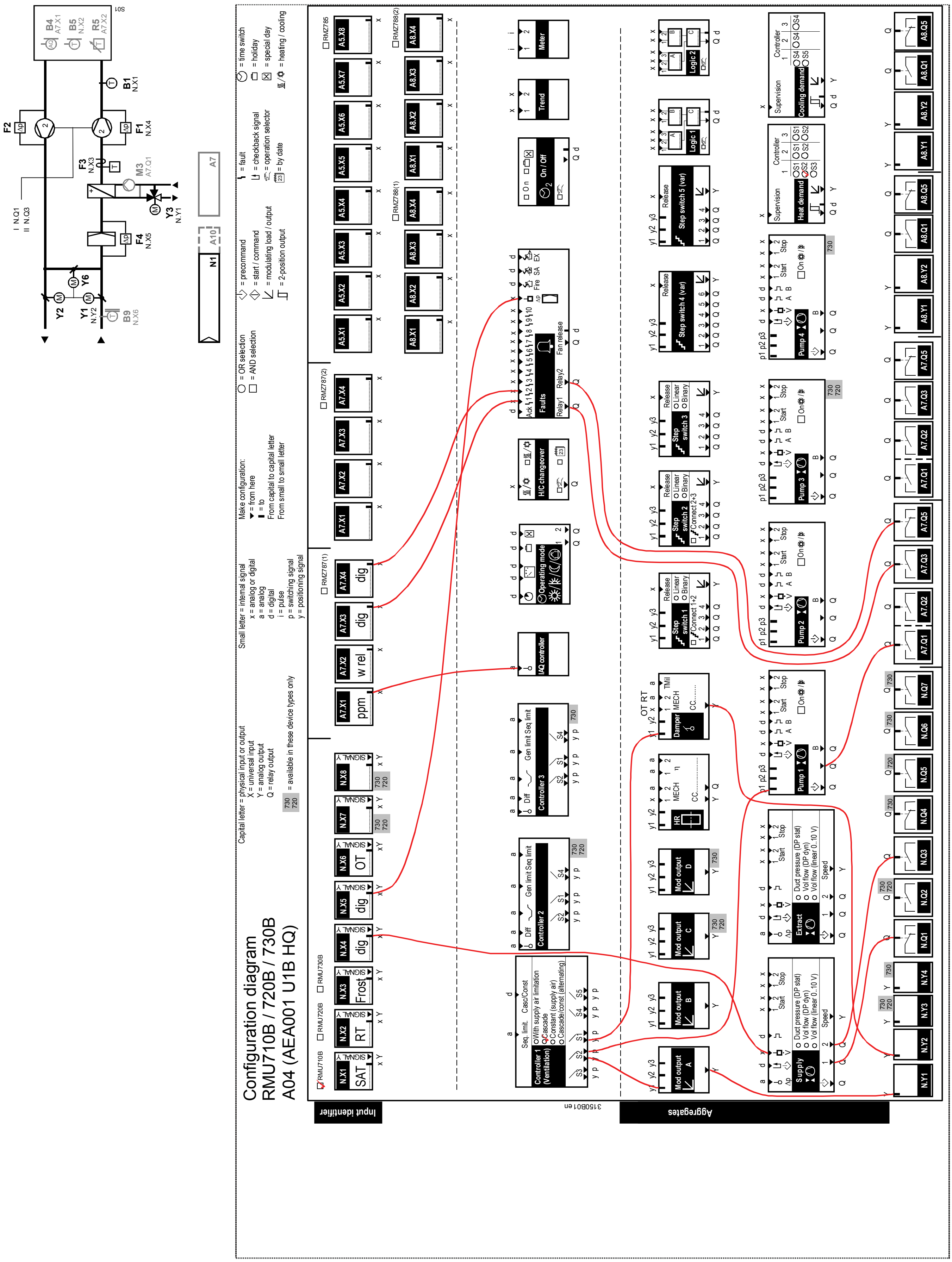


Fig. 8: Configuration diagram for application sheet AEA001 U1B HQ

31.2.11 Configuration diagram RMU710B plant type A05

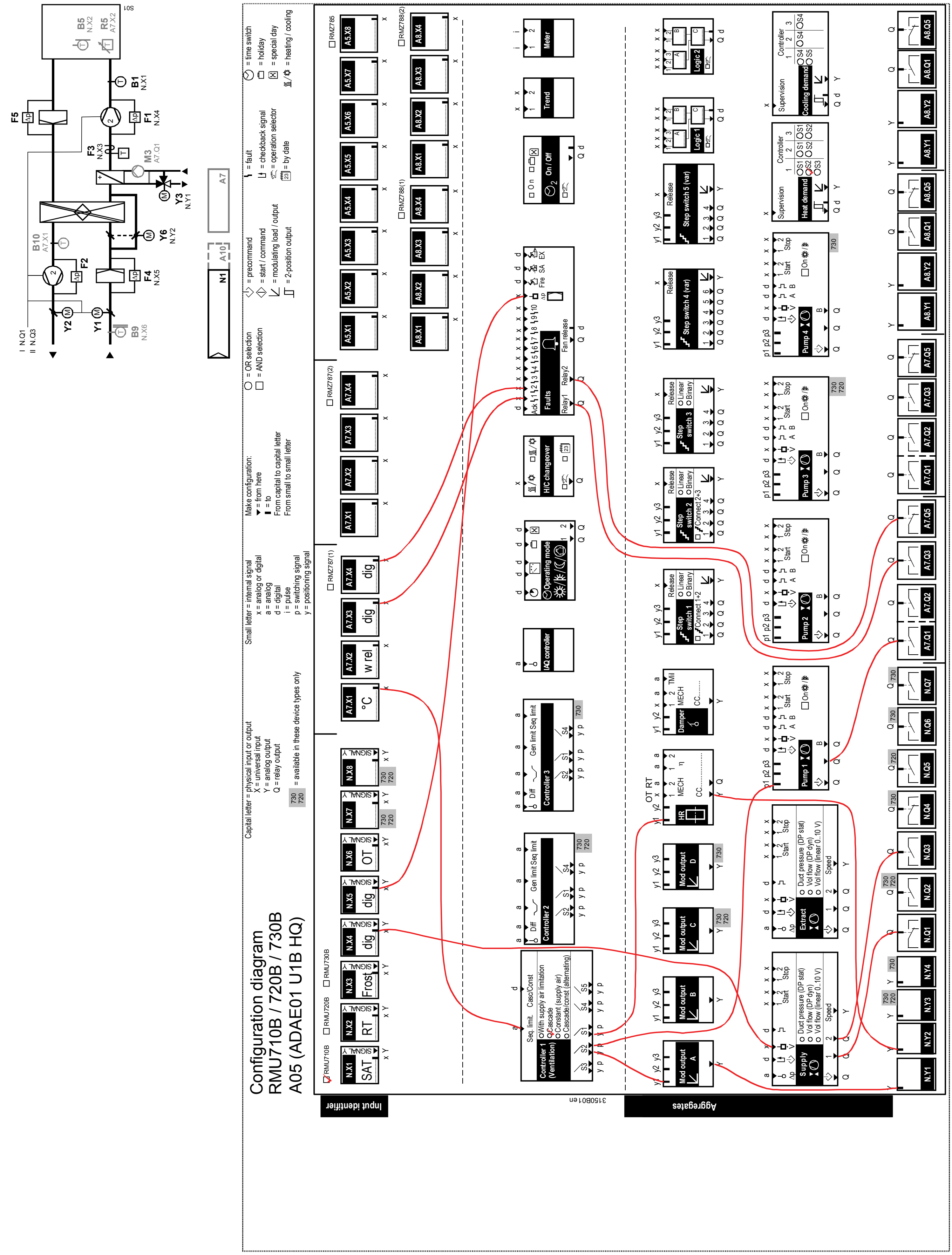


Fig. 9: Configuration diagram for application sheet ADAE01 U1B HQ

31.2.12 Configuration diagram RMU720B plant type A01

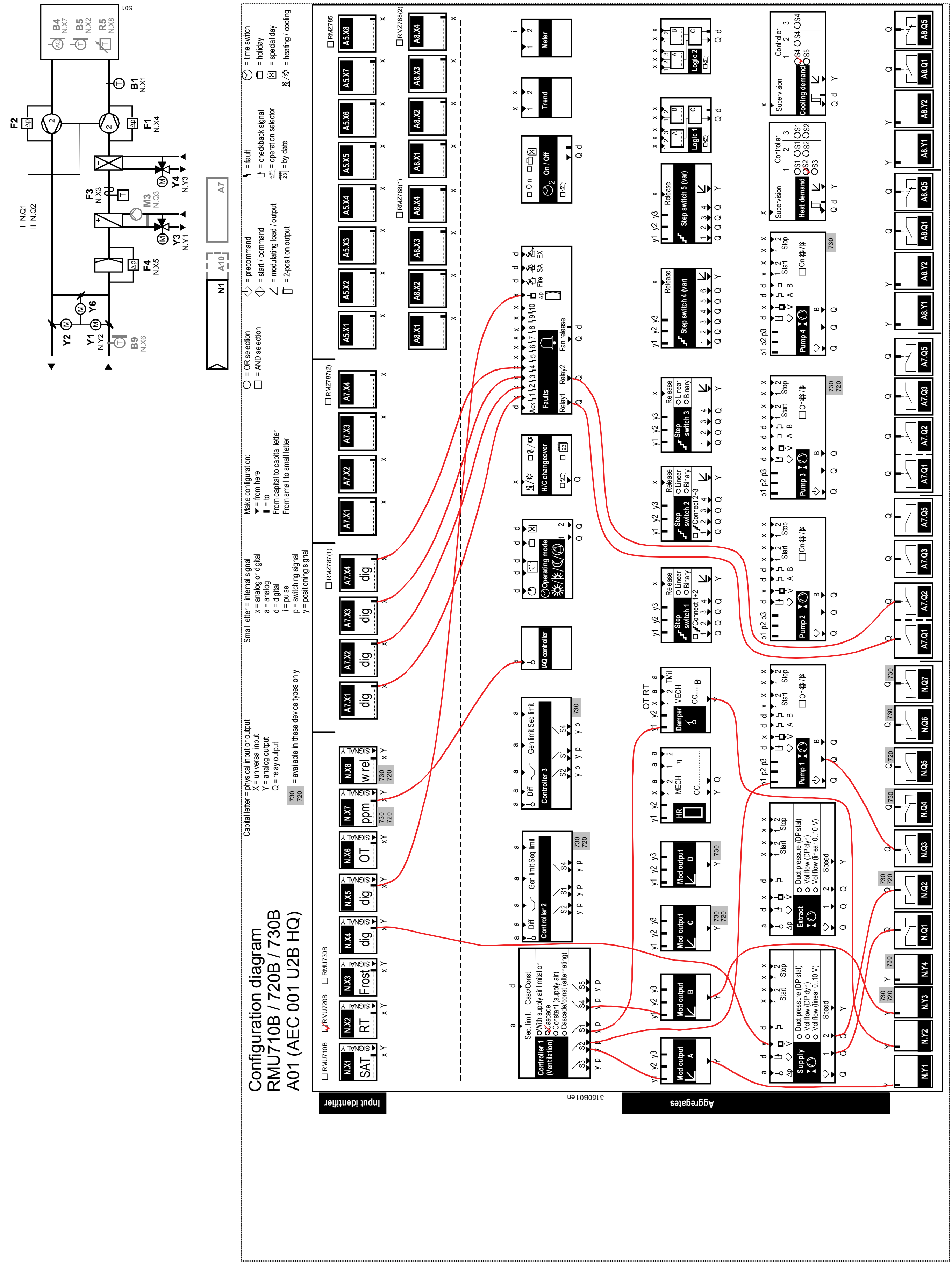


Fig. 10: Configuration diagram for application sheet AEC001 U2B HQ

31.2.13 Configuration diagram RMU720B plant type A02

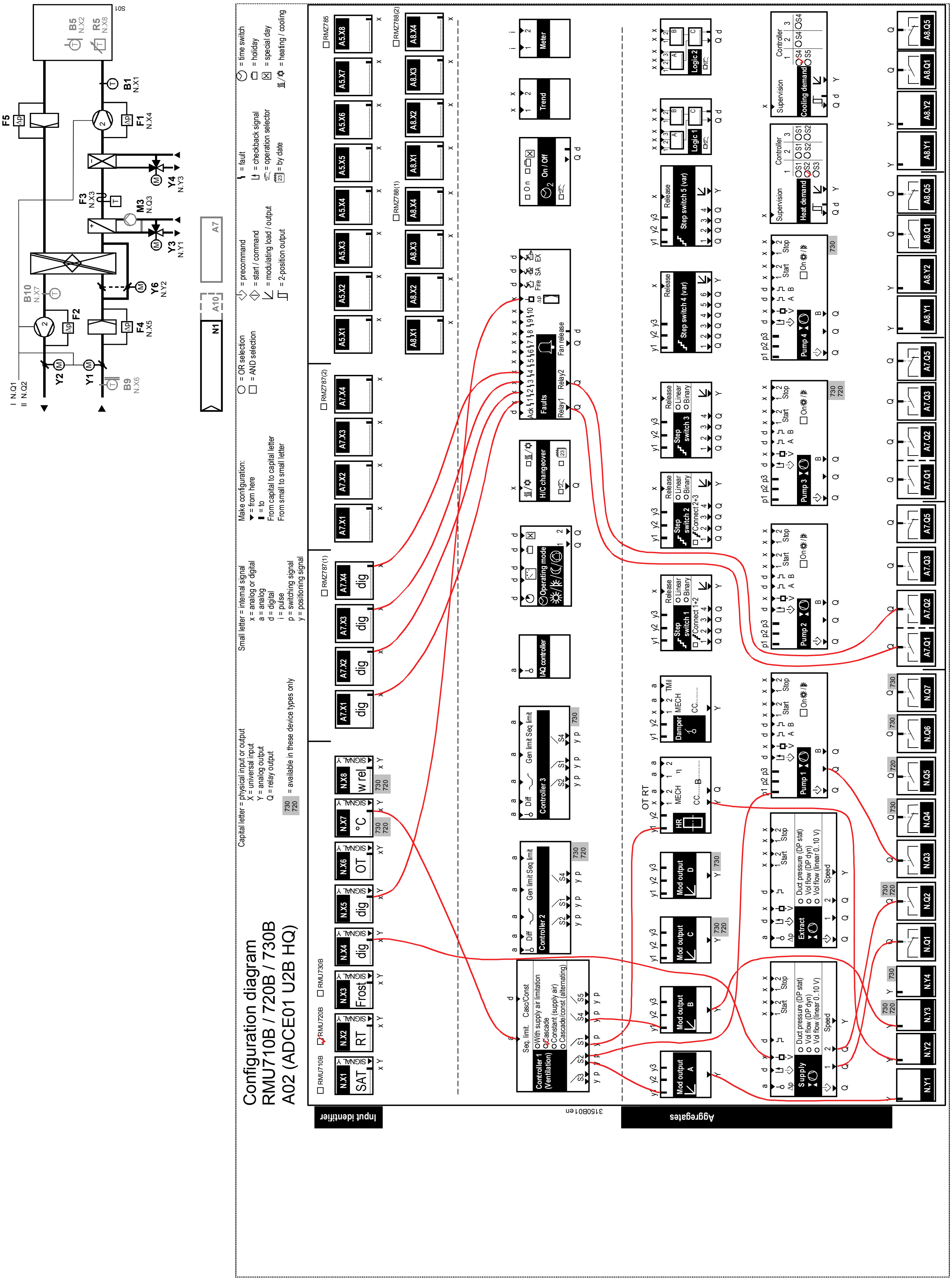


Fig. 11: Configuration diagram for application sheet ADCE01 U2B HQ

31.2.14 Configuration diagram RMU720B plant type A03

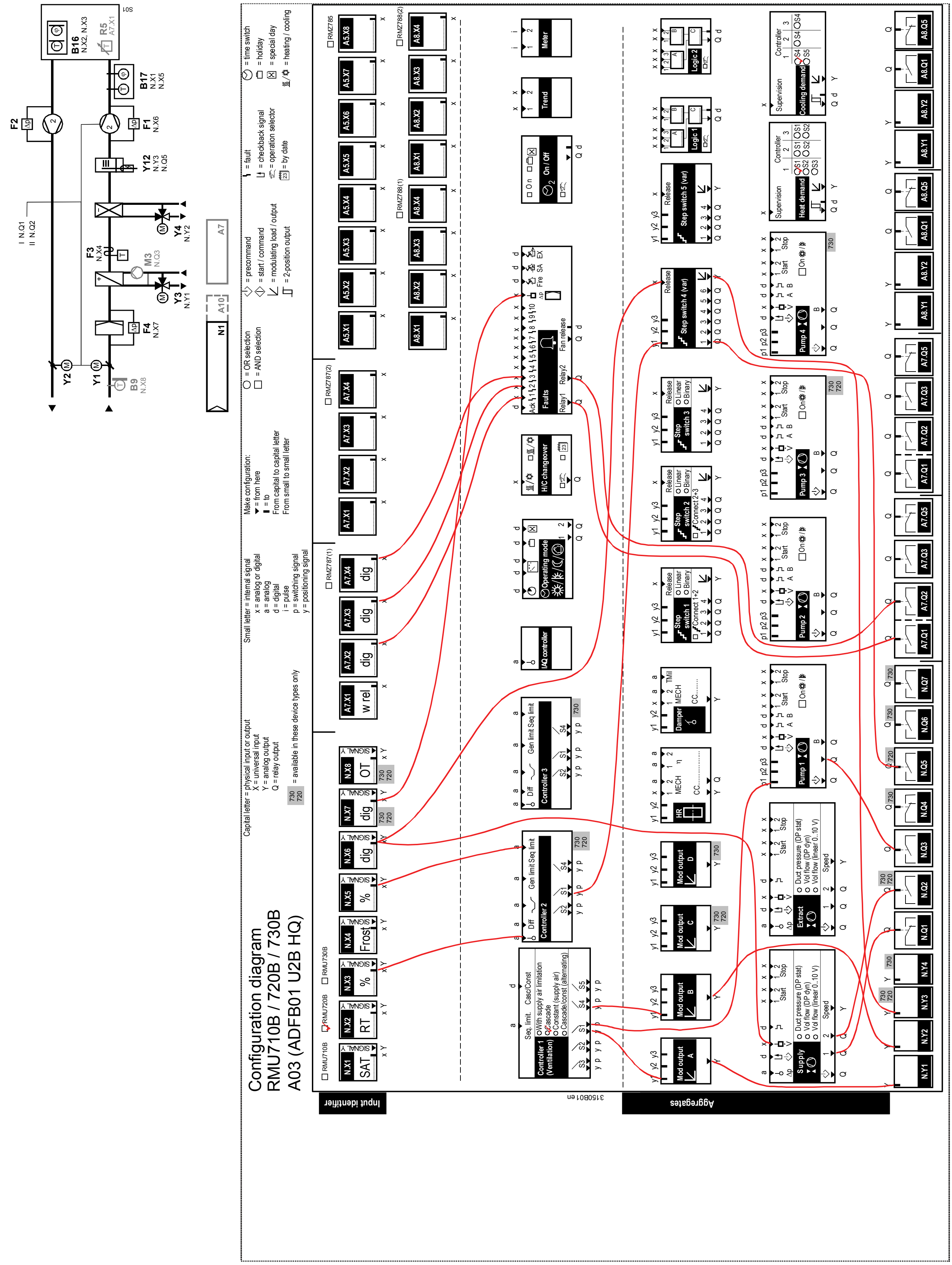


Fig. 12: Configuration diagram for application sheet ADFB01 U2B HQ

31.2.15 Configuration diagram RMU720B plant type A04

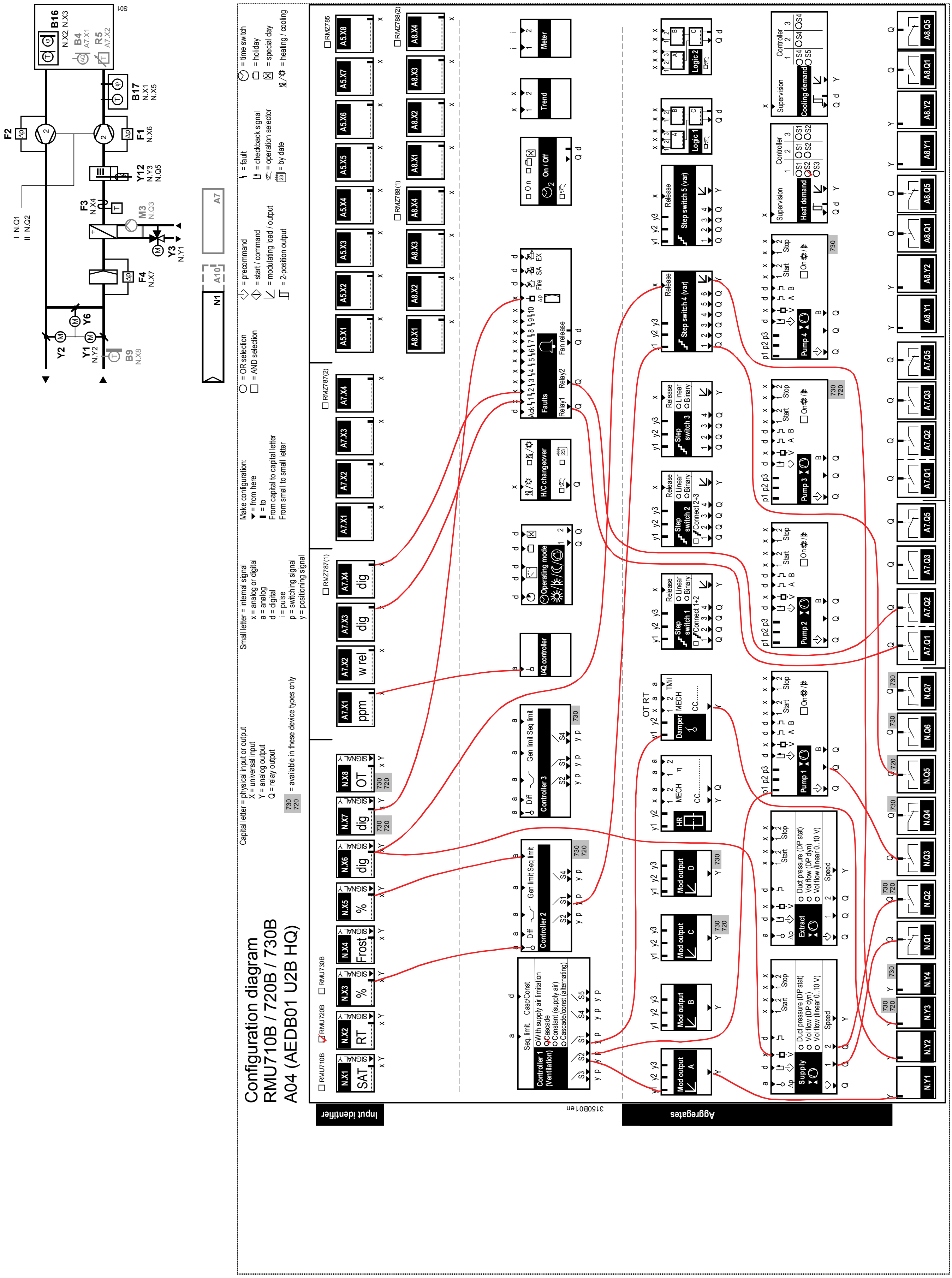


Fig. 13: Configuration diagram for application sheet AEDB01 U2B HQ

31.2.16 Configuration diagram RMU720B plant type A05

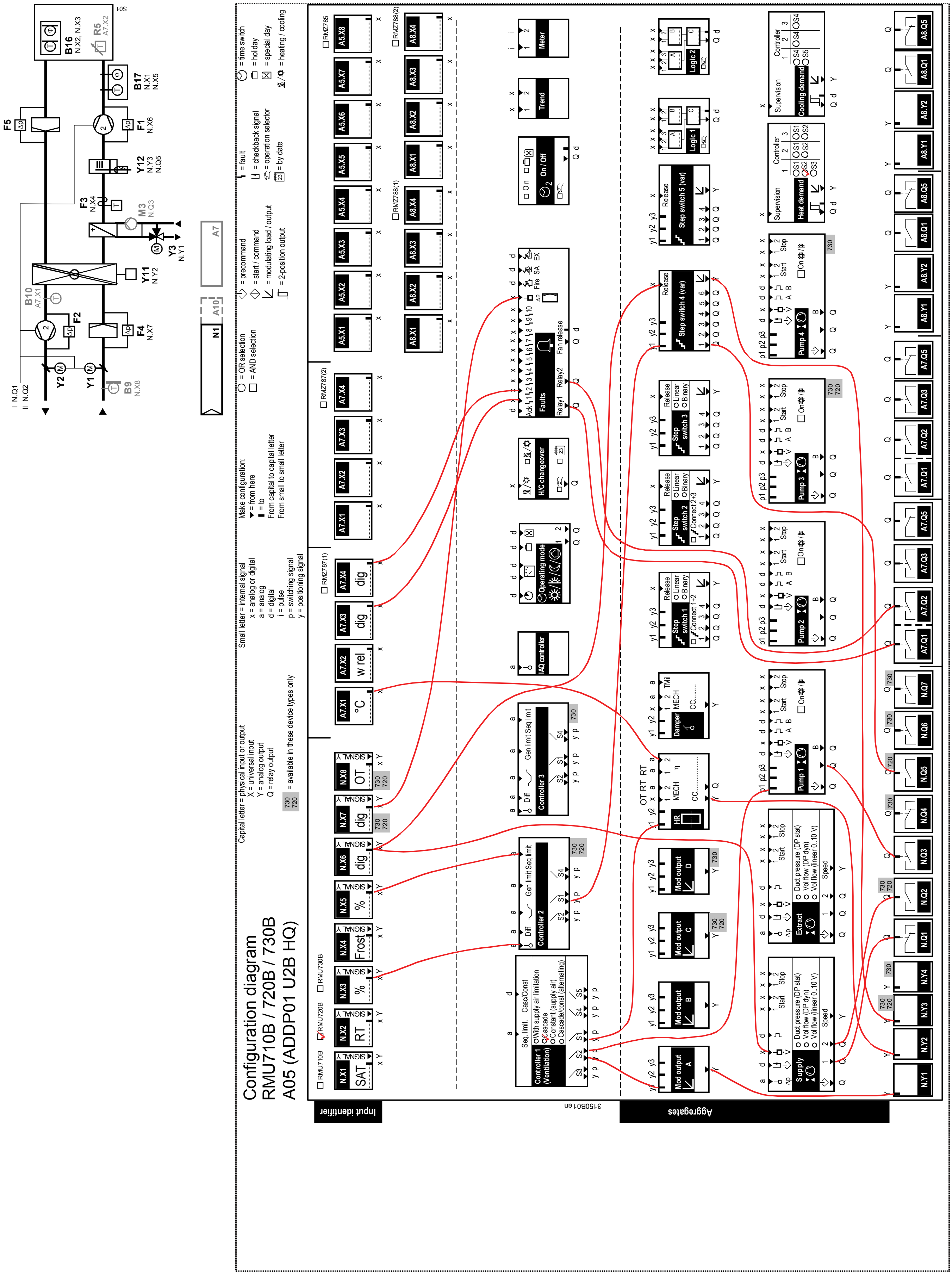


Fig. 14: Configuration diagram for application sheet ADDP01 U2B HQ

31.2.17 Configuration diagram RMU730B plant type A01

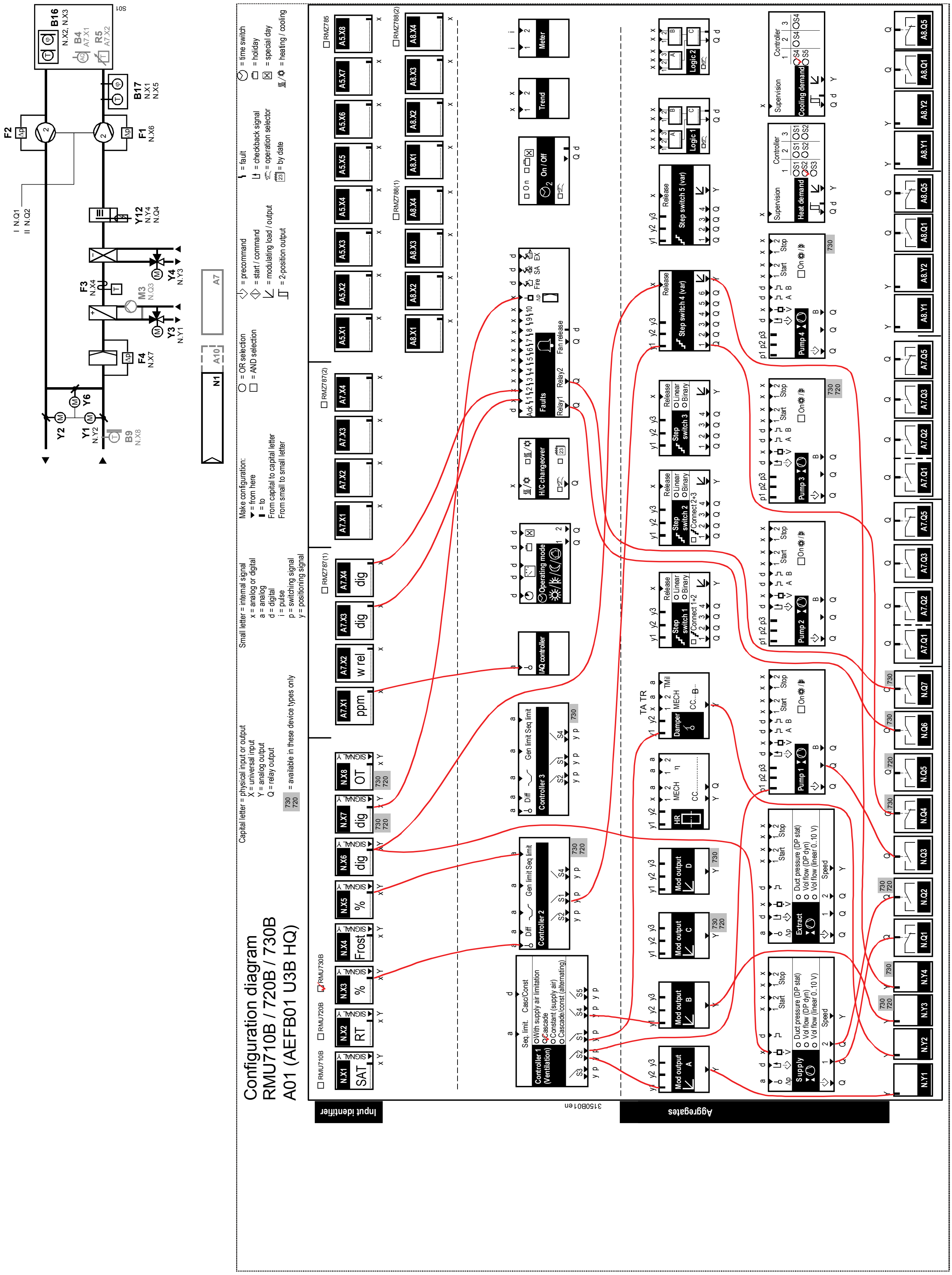


Fig. 15: Configuration diagram for application sheet AEFB01 U3B HQ

31.2.18 Configuration diagram RMU730B plant type A02

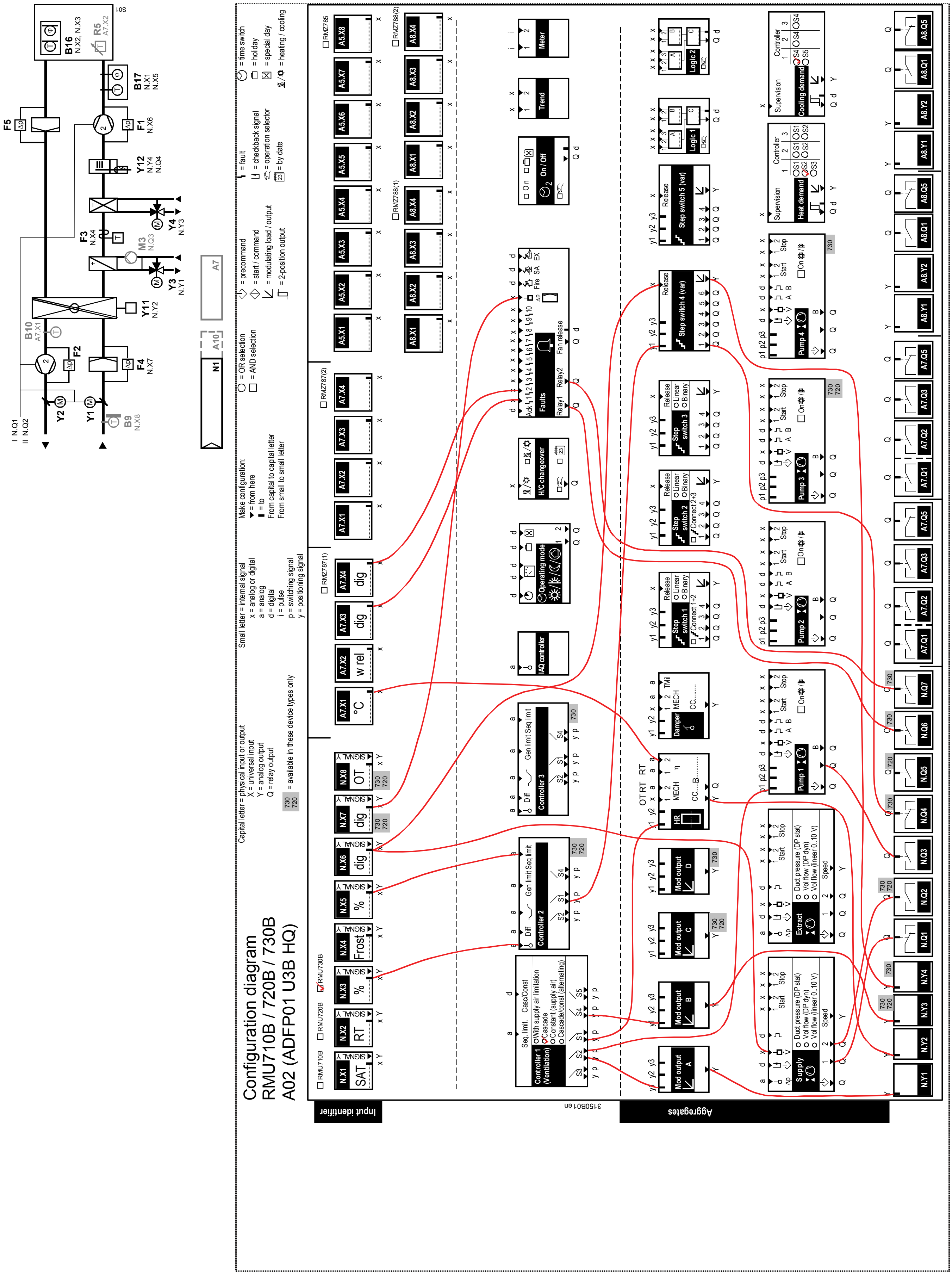


Fig. 16: Configuration diagram for application sheet ADFP01 U3B HQ

31.2.19 Configuration diagram RMU730B plant type A03

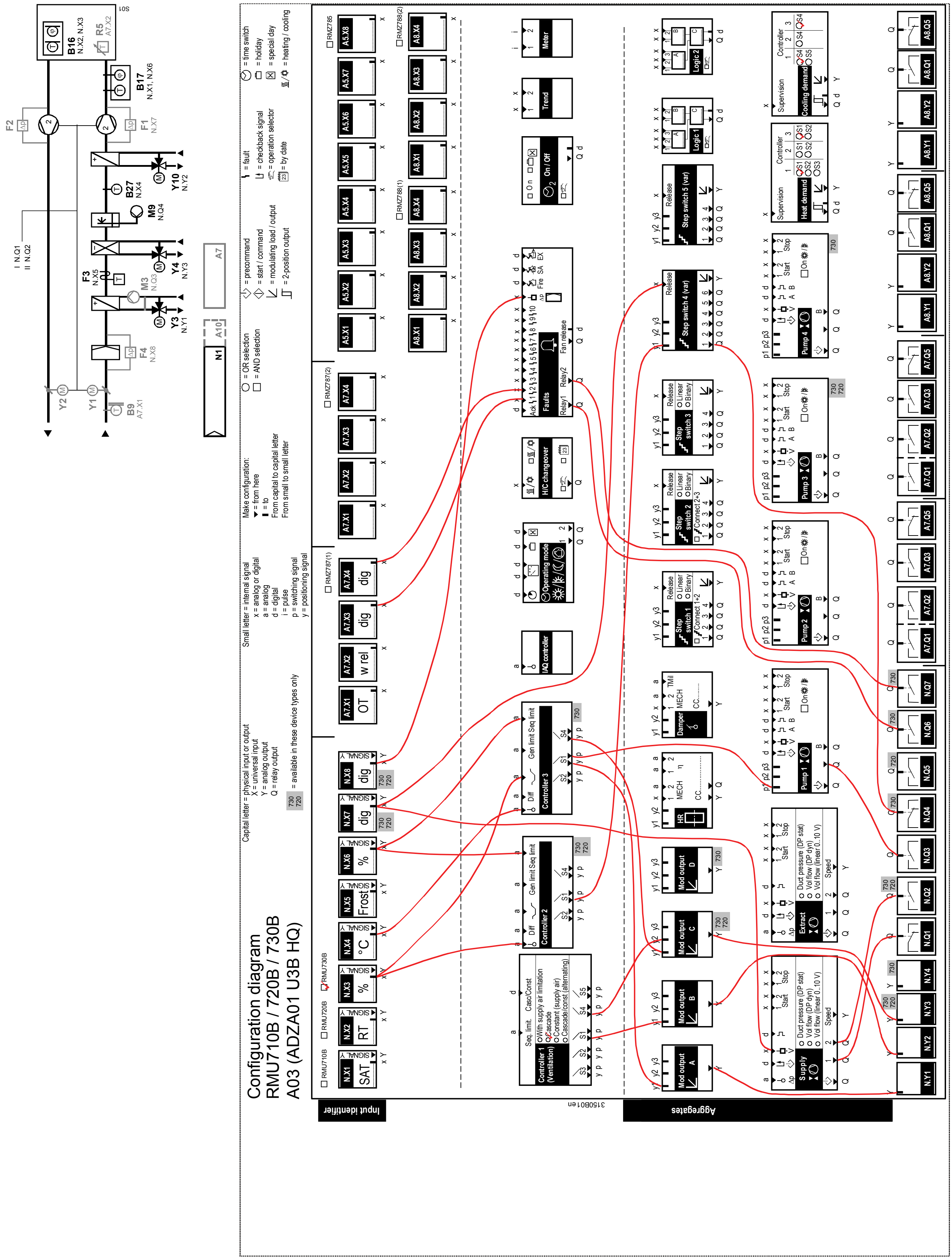


Fig. 17: Configuration diagram for application sheet ADZA01 U3B HQ

31.2.20 Configuration diagram RMU730B plant type A04

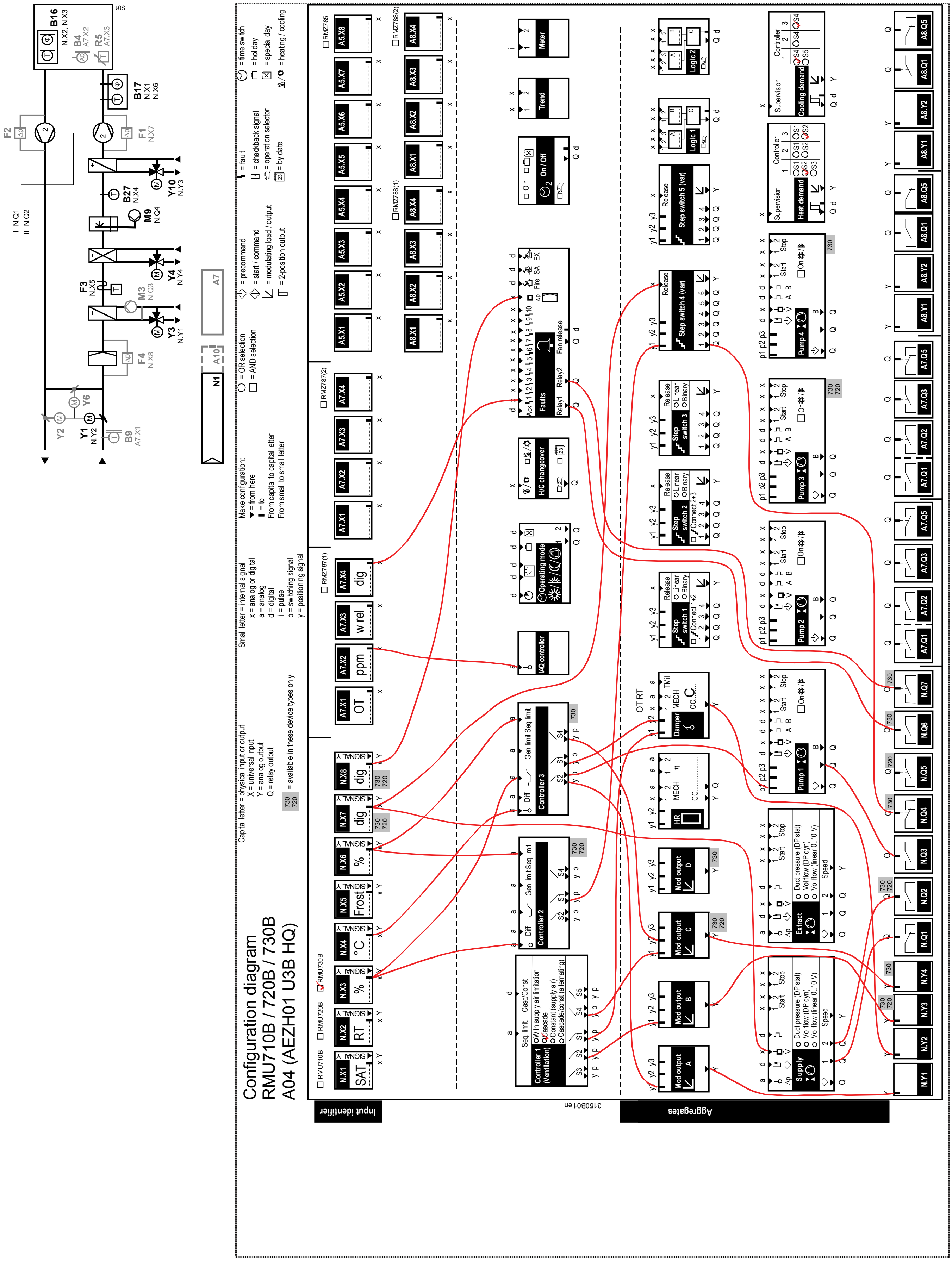


Fig. 18: Configuration diagram for application sheet AEZH01 U3B HQ

31.2.21 Configuration diagram RMU730B plant type A05

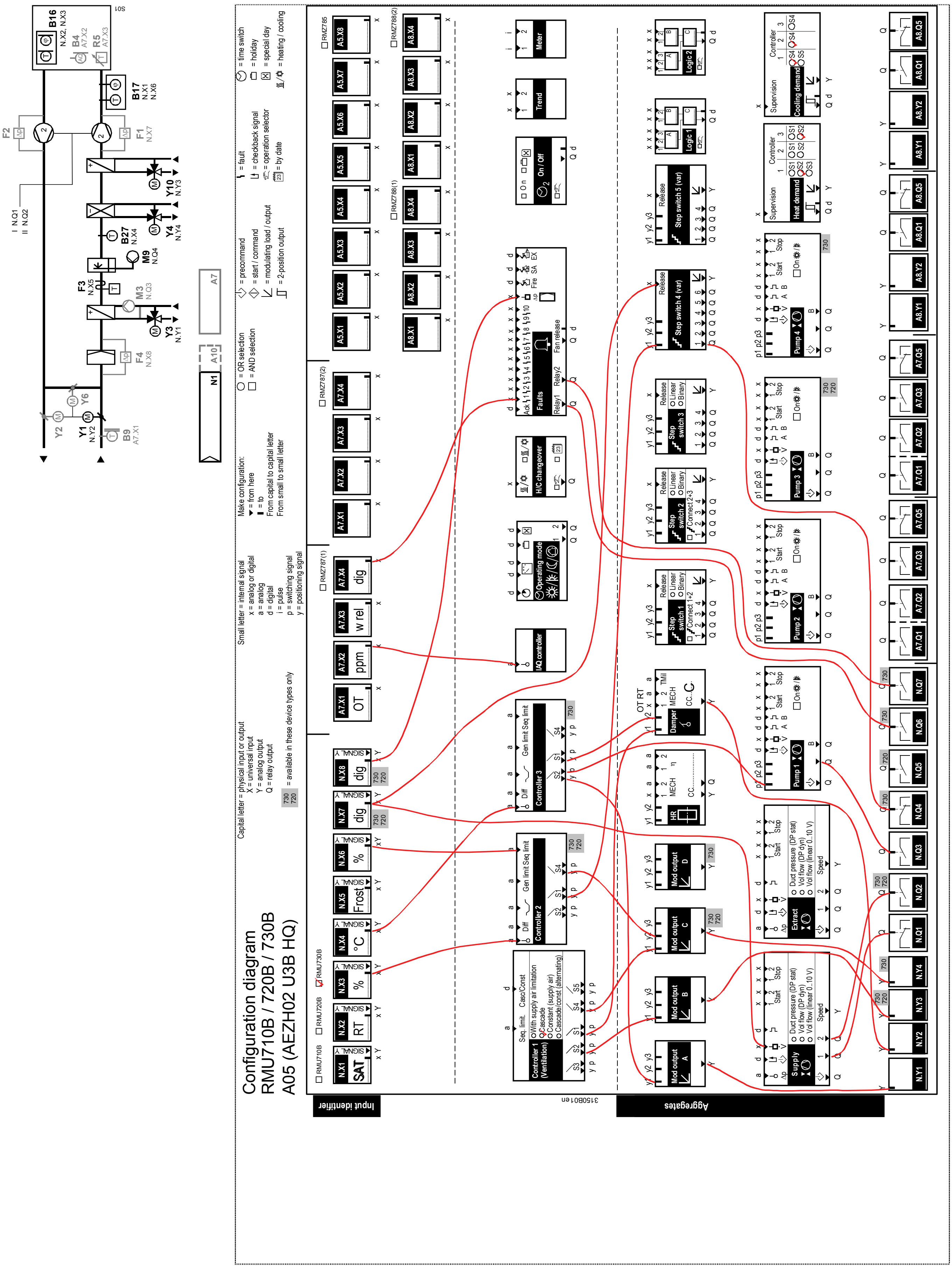


Fig. 19: Configuration diagram for application sheet AEZH02 U3B HQ

31.3 Menu tree

All setting and readout values are arranged as data points (operating lines) in a software menu tree.

The operating elements of the operator units allow for selecting and reading or setting according to access rights.

The **Main menu** comprises 24 menu items:

1. Commissioning
2. Time switch
3. Room operating mode
4. Plant operation
5. Time switch 1
6. Time switch 2
7. [Time switch 2] op selector
8. Operation selector 1
9. Operation selector 2
10. Operation selector 3
11. Operation selector 4
12. Inputs
13. Data acquisition
14. Aggregates
15. Controller 1
16. Controller 2 (only RMU720B/RMU730B)
17. Controller 3 (only RMU730B)
18. Heating/cooling ch'over
19. Holidays/special days
20. Time of day/date
21. Faults
22. Settings
23. Device information
24. Data backup

Note

Depending on the basic type, only one subset of the max 24 menu items is displayed.

31.4 Editable text

The list with editable text is intended as an aid for engineering and commissioning. You can plan the user-defined texts here in writing.
Maximum length of the text is 20 characters.

At the password level, user texts such as menu texts, fault texts or operating lines can be reset as follows:

Main menu > Settings > Texts >

Operating line	*Comments*
Reset text	No, Yes

Note

The texts for the operating lines "Device name", "File", and "Business card line 1...4" are not deleted when the menu texts are reset.

31.4.1 Inputs

Main menu > Settings > Inputs > ...X...

Operating line name	*User-defined text*
N.X1	
Text for: Logic 0	
Text for: Logic 1	
N.X2	
Text for: Logic 0	
Text for: Logic 1	
N.X3	
Text for: Logic 0	
Text for: Logic 1	
N.X4	
Text for: Logic 0	
Text for: Logic 1	
N.X5	
Text for: Logic 0	
Text for: Logic 1	
N.X6	
Text for: Logic 0	
Text for: Logic 1	
N.X7	
Text for: Logic 0	
Text for: Logic 1	
N.X8	
Text for: Logic 0	
Text for: Logic 1	
A5 (1).X1	
Text for: Logic 0	
Text for: Logic 1	
A5 (1).X2	
Text for: Logic 0	
Text for: Logic 1	
A5 (1).X3	
Text for: Logic 0	
Text for: Logic 1	
A5 (1).X4	
Text for: Logic 0	

Operating line name	*User-defined text*
Text for: Logic 1	
A5 (1).X5	
Text for: Logic 0	
Text for: Logic 1	
A5 (1).X6	
Text for: Logic 0	
Text for: Logic 1	
A5 (1).X7	
Text for: Logic 0	
Text for: Logic 1	
A5 (1).X8	
Text for: Logic 0	
Text for: Logic 1	
A7 (1).X1	
Text for: Logic 0	
Text for: Logic 1	
A7 (1).X2	
Text for: Logic 0	
Text for: Logic 1	
A7 (1).X3	
Text for: Logic 0	
Text for: Logic 1	
A7 (1).X4	
Text for: Logic 0	
Text for: Logic 1	
A7 (2).X1	
Text for: Logic 0	
Text for: Logic 1	
A7 (2).X2	
Text for: Logic 0	
Text for: Logic 1	
A7 (2).X3	
Text for: Logic 0	
Text for: Logic 1	
A7 (2).X4	
Text for: Logic 0	
Text for: Logic 1	
A8 (1).X1	
Text for: Logic 0	
Text for: Logic 1	
A8 (1).X2	
Text for: Logic 0	
Text for: Logic 1	
A8 (1).X3	
Text for: Logic 0	
Text for: Logic 1	
A8 (1).X4	
Text for: Logic 0	
Text for: Logic 1	
A8 (2).X1	
Text for: Logic 0	
Text for: Logic 1	

Operating line name	*User-defined text*
A8 (2).X2	
Text for: Logic 0	
Text for: Logic 1	
A8 (2).X3	
Text for: Logic 0	
Text for: Logic 1	
A8 (2).X4	
Text for: Logic 0	
Text for: Logic 1	

31.4.2 Aggregates

Main menu > Settings > Aggregates > …

Operating line name	*User-defined text*
Supply air fan	
Unit	
Extract air fan	
Unit	
Pump 1	
Pump 2	
Pump 3	
Pump 4	
Modulating output A	
Modulating output B	
Modulating output C	
Modulating output D	
Step switch 1	
Step switch 2	
Step switch 3	
Step switch 4	
Step switch 5	
Logic 1	
Operation selector 1	
Logic 2	
Operation selector 2	
Logic 3	
Operation selector 3	
Logic 4	
Operation selector 4	

31.4.3 Controller

Main menu > Settings > Controller 1…3 >

Operating line name	*User-defined text*
Controller 1	
Controller 2	
Controller 3	

31.4.4 Faults

Main menu > Settings > Faults > Fault input 1...10 >

Operating line name	*User-defined text*
Fault text 1	
Fault text 2	
Fault text 3	
Fault text 4	
Fault text 5	
Fault text 6	
Fault text 7	
Fault text 8	
Fault text 9	
Fault text 10	

31.4.5 Trend

Main menu > Settings > Data acquisition > Trend channel 1….4 >

Operating line name	*User-defined text*
Trend channel 1	
Trend channel 2	
Trend channel 3	
Trend channel 4	

31.4.6 Meters

Main menu > Settings > Data acquisition > Meter 1..2 >

Operating line name	*User-defined text*
Meter 1	
Meter 2	

31.4.7 Time switch

Main menu > Settings > Time switch 2 >

Operating line name	*User-defined text*
Time switch 2	
[Time switch 2] op selector	

31.4.8 Room unit

Main menu > Settings > Texts >

Operating line name	*User-defined text*
Device name	
File name	
Business card line 1	
Business card line 2	
Business card line 3	
Business card line 4	

Notes:

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