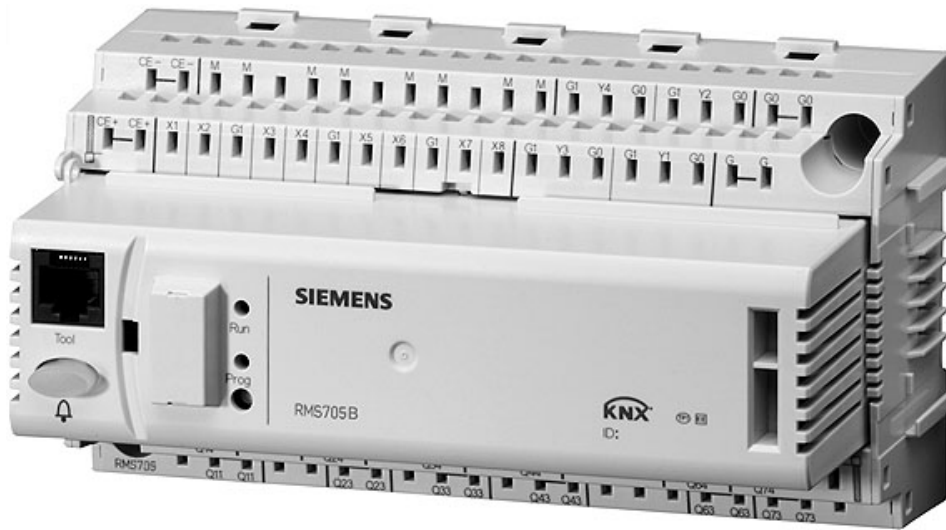


# SIEMENS



## Synco™ 700

### Switching and monitoring device RMS705B

incl. extension modules RMZ785, RMZ787und RMZ788

### Basic documentation



# Contents

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<b>1</b>	<b>Overview .....</b>	<b>6</b>
1.1	RMS705B – Features and functions .....	6
1.2	Product range.....	8
1.3	Synco™ 700 topology .....	9
1.4	Equipment combinations.....	10
1.5	Product documentation .....	11
1.6	RMS705B applications in HIT .....	11
1.7	Performance.....	12
1.8	Important notes .....	13
<b>2</b>	<b>Operation .....</b>	<b>14</b>
2.1	Operation without operator unit.....	14
2.2	Operation with operator unit.....	15
<b>3</b>	<b>Commissioning .....</b>	<b>18</b>
3.1	Start commissioning .....	18
3.2	Basic configuration.....	19
3.3	Free configuration .....	20
3.4	Wiring test .....	20
3.5	Exit commissioning .....	21
3.6	Data backup .....	21
3.7	Exit password level .....	22
3.8	Device information .....	22
<b>4</b>	<b>General settings.....</b>	<b>23</b>
4.1	Time and date .....	23
4.2	Select language .....	25
4.3	Select temperature unit.....	26
4.4	Operator unit display contrast.....	26
4.5	Text entry.....	26
<b>5</b>	<b>Inputs.....</b>	<b>28</b>
5.1	Universal inputs.....	28
5.2	Analog inputs .....	31
5.3	Digital inputs.....	35
5.4	Pulse .....	37
5.5	Remote setpoint adjuster, absolute.....	38
5.6	Outside temperature .....	40
5.7	Assign texts.....	42

<b>6</b>	<b>Data acquisition.....</b>	<b>43</b>
6.1	Trend .....	43
6.2	Event logger .....	45
6.3	Operating hours .....	49
6.4	Meters .....	52
6.5	Calculator .....	55
<b>7</b>	<b>7-day time switch .....</b>	<b>60</b>
7.1	Time switch .....	60
7.2	Holidays/special days.....	63
<b>8</b>	<b>Aggregates.....</b>	<b>67</b>
8.1	Logic.....	67
8.2	Comparator .....	74
8.3	Rotary step switch .....	78
8.4	Motor .....	106
8.5	Modulating output.....	124
<b>9</b>	<b>Signal converter .....</b>	<b>127</b>
9.1	Min-max-average .....	127
9.2	Enthalpy calculator.....	131
9.3	Signal doubler/inverter .....	134
<b>10</b>	<b>H/C demand, H/C changeover.....</b>	<b>137</b>
10.1	Heat demand function .....	137
10.2	Refrigeration demand function .....	143
10.3	H/C demand application examples .....	149
10.4	H/C changeover .....	158
10.5	Combined examples: H/C demand, H/C changeover .....	163
<b>11</b>	<b>Universal controller .....</b>	<b>165</b>
11.1	Overview .....	165
11.2	Makeup and mode of operation of the controller .....	167
11.3	Universal shift.....	170
11.4	General limiter .....	172
11.5	Eco setpoint changeover.....	175
11.6	Start the universal controller.....	176
11.7	Assign texts .....	176
<b>12</b>	<b>Faults .....</b>	<b>177</b>
12.1	Purpose and enabling .....	177
12.2	Fault priorities and acknowledgement .....	177
12.3	Universal fault inputs (1...20).....	178
12.4	External fault button .....	180
12.5	Fault relay.....	180
12.6	Function check / wiring test.....	181


<b>13</b>	<b>Communication .....</b>	<b>182</b>
13.1	Enable communication.....	182
13.2	"Communication" menu settings.....	182
<b>14</b>	<b>Support for errors and faults .....</b>	<b>191</b>
14.1	Error/fault code list .....	191
14.2	Troubleshooting .....	193
14.3	Resolve errors.....	195
<b>15</b>	<b>Electrical connections.....</b>	<b>196</b>
15.1	Connection rules .....	196
15.2	Connection terminals .....	197
<b>16</b>	<b>Appendix.....</b>	<b>198</b>
16.1	Abbreviations .....	198
16.2	Configuration diagram.....	199
16.3	Menu tree .....	207
16.4	Editable texts RMS705B .....	207
<b>Index</b>	<b>.....</b>	<b>214</b>

## 1.8 Important notes

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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.

<b>Field of use</b>	Synco™ 700 products may only be used for control and supervision of heating, ventilation, air conditioning and chilled water plants.
<b>Intended use</b>	Proper transport, installation and commissioning as well as correct operation are prerequisite for flawless and safe operation of Synco™ 700 products.
<b>Electrical installation</b>	Fuses, switches, wiring and earthing must comply with local safety regulations for electrical installations.
<b>Commissioning</b>	Only qualified staff trained by Siemens Switzerland Ltd may prepare for use and commission Synco™ 700 products.
<b>Operation</b>	Synco™ 700 products may only be operated by staff instructed by Siemens Switzerland Ltd or its delegates and who understand the potential risks.
<b>Wiring</b>	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!
<b>Storage and transport</b>	Refer to the environmental conditions specified in the respective data sheets for storage and transport. If in doubt, contact your supplier or Siemens Switzerland Ltd.
<b>Maintenance</b>	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.
<b>Faults</b>	Call service staff responsible for your plant in case of system faults; do not diagnose and correct faults.
	 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).
<b>Disposal</b>	Do not dispose of the products as domestic waste as they contain electrical and electronic components. <b>Observe all local, applicable laws.</b>

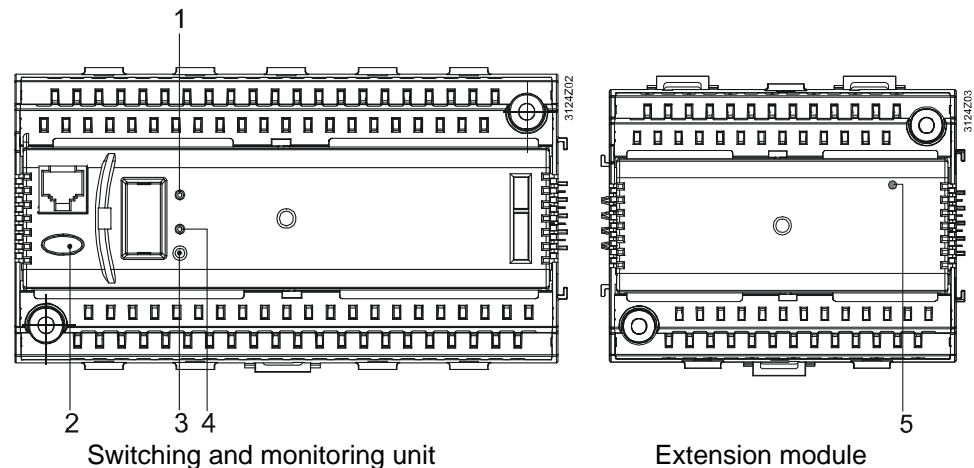
## 2 Operation



Synco™ 700 units may only be operated by staff instructed by Siemens Switzerland Ltd or its delegates and who understand the potential risks.

### 2.1 Operation without operator unit

The following operating elements on the RMS705B and extension module can be used with the operator unit:



#### Key

- 1 LED "RUN" device operating status display; with the following meanings:  
*LED lit:* Power on, no fault and periphery.  
*LED off:* No power or fault in the application / or periphery.
- 2 Button "A" 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) to assign the device address in KNX system mode (tool required).
- 4 Programming LED (Prog) to display programming process, with meaning: LED remains lit until addressing is completed.
- 5 LED (Run) to monitor power supply and addressing; with the following meaning:  
*LED lit:* Power on, addressing successful.  
*LED flashes:* Supply voltage available, but RMS705B has no valid KNX address.  
*LED off:* No power.

## 2.2 Operation with operator unit

### 2.2.1 Operator unit functions

Use a plug-in or detached operator unit to operate the RMS705B (set and read). The operator unit does not save data: Entries are transferred from the operator unit to the RMS705B on site and processed accordingly. User information is displayed on the operator unit.

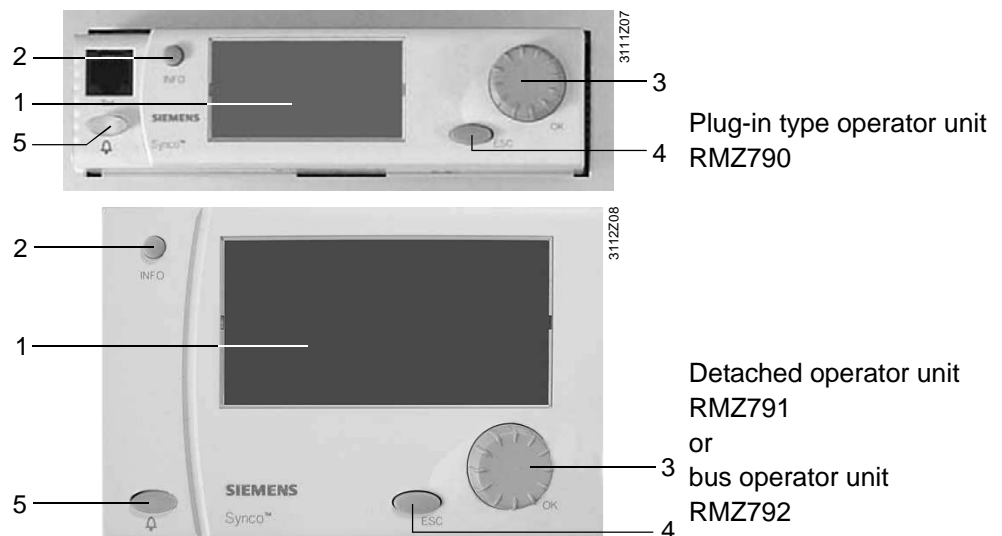
### 2.2.2 Operating concept

#### Fundamentals

All setting and readout values are presented as operating lines on the menu. Using the operating elements, every operating line can be selected, displayed or set. All menus appear on the LCD as plain text.

RMS705B contains several programmed languages. Select the desired language during commissioning.

#### Operator elements



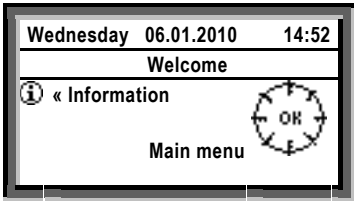
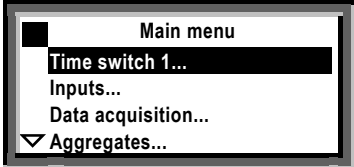
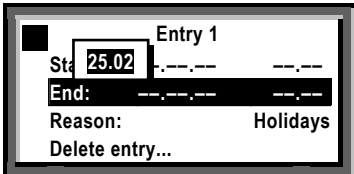
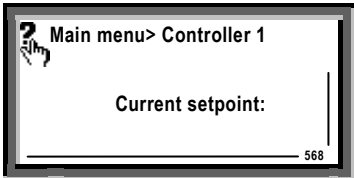
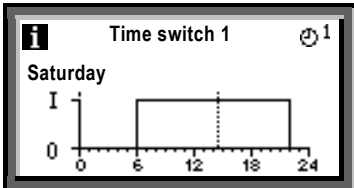
#### Key

- |   |                           |   |
|---|---------------------------|---|
| 1 | Display                   |   |
| 2 | INFO button               |   |
|   | Function 1:               | Display of important plant data.                                      |
|   | Function 2:               | Query explanations on individual operating lines in the current menu. |
| 3 | OK press-and-turn knob    |   |
|   | Turn:                     | Select operating line or readjust value.                              |
|   | Press:                    | Confirm operating line or setting.                                    |
| 4 | ESC button                |   |
|   |                           | Return to previous menu.  |
| 5 | Fault button "Q" 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

Below are a few typical displays and their explanation:

Display	Explanation
	<b>Start page</b>
	<b>Setting level</b> Select setting parameters, e.g. on the main menu of the user level.
	<b>Setting level</b> Popup, set a numerical value.
	<b>Setting level, press INFO button:</b> Help display offering explanations on the selected setting parameter (for as long as <b>INFO</b> is pressed). Note: The text ID for either menu or setting parameter is displayed in the lower right corner.
	<b>Info level</b> Query important plant data (here: Time switch settings). Note: Turn the knob to display other information pages.

### 2.2.3 Operating levels

There are two operating levels:

- Info level **i**
- Setting level **■**

Both levels are accessible from any access level.

Info level **i**

The Info level **i** provides important plant data information.

Setting level **■**

The setting level is set up as a menu. You can navigate to operating lines and change their values. The INFO button queries menu explanations on the individual operating lines. The information is displayed as long as you press the button.

Switch between the operating levels

Switching from the info level to the setting level:

1. Press the ESC button to select the start page.
2. Press the OK knob to go to the setting level.




Switch from the setting level to the info level:

1. Press the ESC button to select the start page. Press the button repeatedly until the start page reappears.
2. Press the INFO button to go to the Info level.



## 2.2.4 Access level

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

Access level	Access	Symbol
User level (for plant operators)	The user level is always accessible. Users can adjust visible, editable operating lines.	
Service level (for maintenance tasks)	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, select operating line "Password level" and confirm by pressing the OK knob. Enter "7" as password and confirm by pressing the OK knob.	

The access level determines which individual menus and operating lines are activated. At a higher access level, all menus and operating lines of the lower access levels are visible.

The levels use a common menu tree as a base (the password level shows the entire menu tree).

Switch to another access level

Switch from the current access level to another access level:

1. Press both OK knob and ESC button simultaneously.  
The "Access levels" menu is displayed.
2. Select the required access level by turning the OK knob and press to confirm.
3. Enter "7" to access the "Password level".

Note

RMS705B times out after 30 minutes without user interaction and enters "User level".

## 3 Commissioning

---



Only qualified staff trained by Siemens Switzerland Ltd may prepare and commission Synco™ 700 products.

### 3.1 Start commissioning

---



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

#### 3.1.1 Start at initial power-up

---

RMS705B starts with menu "Language" (to commission or operate the plant) when the unit is first powered.

- Select the language by turning the OK knob and confirm your selection.
- Set and confirm time, date, and year using the OK knob.

The "Commissioning" menu is displayed. The access level is set to "Password level".

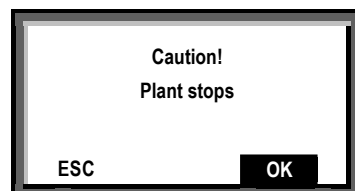
Note

Follow the installation instructions G3151, 74 319 0731 0 (added to device package) to initially commission the RMS705B.

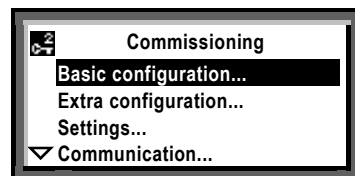
#### 3.1.2 Start from the main menu

---

After selecting menu "Commissioning" (only visible on the "Password level") and confirming by pressing the OK knob, a reference to plant stop is displayed.



Press OK again to stop the plant (application). All outputs are set to a defined OFF state and the display shows the "Commissioning" menu.



*Setting level:*  
Commissioning menu.

## 3.2 Basic configuration

Use the "Basic configuration" menu for the following settings:

- Select basic type (only basic type S is available).
- Assign extension modules to the controller position.

Note

Internal configurations are deleted if you decide to later reset RMS705B to basic type S.

Configuration

 **Main menu > Commissioning > Basic configuration >**

<i>Operating line</i>	<i>Adjustable values / remarks</i>
Basic type	S
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)

### 3.2.1 Assign extension modules

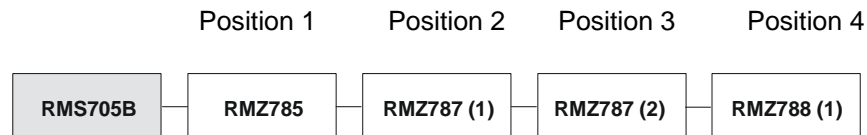
You can extend RMS705B by appending extension modules.

Max. 4 extension modules can be connected to each RMS705B. Select from:

- 1x RMZ785: Universal module with 8 universal inputs.  
2x RMZ787: Universal module with 4 universal inputs, 4 relay outputs.  
2x RMZ788: Universal module with 4 universal inputs, 2 modulating outputs, 2 relay outputs

The extension modules are activated when physically plugged in and configured in terms of software (type, position).

Example



Disconnect the system from power prior to attaching an extension module.

### 3.2.2 Troubleshooting

If the extension modules and their positions do not match the values entered in the basic configuration, or if an extension modules fails during operation, a fault is generated and handling is stopped. The outputs maintain the state prior to the fault.

Fault messages

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

### 3.3 Free configuration

You can freely configure RMS705B within the possibilities of the available function blocks.

Use the configuration diagram to adjust RMS705B to the plant (see Section 16.2 Configuration diagram").

### 3.4 Wiring test

Test the wiring 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; 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 errors, i.e. exchanged lines.
- Position errors, i.e. mixed up sensor or actuator connections.
- 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, e.g.	Comment
N.X1	Display of the current measured value

 **Main menu > Commissioning > Wiring test > Outputs >**

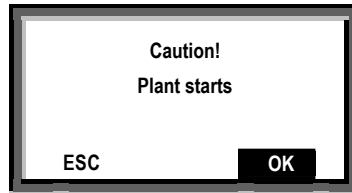
Operating line, e.g.	Positions
Fault relay 1	Off, On

## 3.5 Exit commissioning

If the application is valid, quit the Commissioning menu as follows:

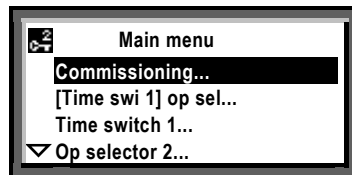
- Press the ESC button.

The display shows a dialog box with the following information:



- Press the OK knob to confirm.

RMS705B boots using the settings, the plant is started, and the main menu is displayed.




## 3.6 Data backup

The entire commissioning data set (configuration and all settings) can be saved in RMS705B after commissioning. Use this function to restore the proper controlled state of the RMS705B after commissioning if important values are changed later on.

The following values are **not** saved or restored during backup:


- All user-defined texts and business cards.
- Calendar and time switch settings.
- Basic settings in the "Communication" menu.
- Current time.
- Trend settings.
- Values in the "Settings > Device" menu.

Setting values

 Main menu > Data backup >

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Restore		
Save		

Display values

 Main menu > Data backup >

<i>Operating line</i>	<i>Comment</i>
Storage date	Displayed date when the commissioning data set was written in the device's memory.
Storage year	Displayed year when the commissioning data set was written to the device's memory.

## 3.7 Exit password level

---

Set the user level (access level for plant operator) when done with commissioning:

- Press the OK knob and the ESC button at the same time.  
The "Access levels" menu is displayed.
- Turn the knob to select the user level.
- Press the OK knob to confirm your selection.

## 3.8 Device information

---

Menu "Device information" allows you to view RMS705B information.

Display values

### ■ Main menu > Device information > Controller >

<i>Operating line</i>	<i>Comment</i>
Software version	Displays the RMS705B software version.
Hardware version	Displays the hardware version.

### ■ Main menu > Device information > Position 1...4 >

<i>Operating line</i>	<i>Comment</i>
Extension module	Displays the module's type designation.
Software version	Displays the module's software version.
Hardware version	Displays the hardware version.

## 4 General settings

### 4.1 Time and date

#### 4.1.1 Mode of operation

##### Yearly clock

The RMS705B has a yearly clock with time, weekday and date.

##### Two selectable time formats

The following time formats are available:

##### 24 h:

- The **date** is displayed as dd.mm.yyyy (day.month.year).  
Example: 01.01.2010
- The **time** is displayed as hh:mm (hours:minutes).  
Example: 15:56

##### am/pm:

- The **date** is displayed as mm/dd/yy (month/day/year).  
Example: 05/31/06
- The **time** is displayed as hh:mm am/pm (hours:minutes am/pm).  
Example: 03:56 PM

##### Setting values

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

 **Main menu > Settings > Device >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Time format	24 hours, 12 hours (am/pm)	24 h

 **Main menu > Time of day/date >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Time of day	00:00...24:00	00:00
Date	01.01...31.12	01.01
Year	2000...2080	Current

##### Daylight saving/standard time changeover

Changeover from daylight saving to standard time and vice-versa is automatic as per the set values.

The dates of the earliest changeover can be adjusted in case of corresponding standard changes.

##### Setting values

 **Main menu > Time of day/date >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Summer time start	01.01. ... 31.12	25.03
Winter time start	01.01. ... 31.12	25.10

##### Notes

- The dates set for changeover from standard to daylight saving time, or vice versa, ensure that on the first Sunday after that date the time changes from 02:00 (standard time) to 03:00 (daylight saving time), and from 03:00 (daylight saving time) to 02:00 (standard time).
- If both dates are set to the same date, daylight saving/standard time changeover does not work.

## Time monitoring

Time monitoring (see Section 4.1.3) can be disabled. In this case, no fault message 5003 "Invalid time of day" is triggered.

### Setting values

 **Main menu > Time of day/date >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Invalid time of day	Inactive/Active	Active

## 4.1.2 Communication


### Clock time operation

Various sources are possible for time. However, you must enter this in the RMS705B. Both time of day and date can be exchanged via bus.

The following settings are available for "Clock time operation":

Autonomous	Autonomous (neither transmits nor receives).
Slave: Time of day from bus	Receives the synchronization signal from the bus.
Master: Time of day to bus	Sends the synchronization signal to the bus.

### Setting values for "Clock time operation"

 **Main menu > Commissioning > Communication > Basic settings >**


<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Clock time operation	Autonomous, Slave, Master	Autonomous

If RMS705B is set as time-of-day slave, you can also select if RMS705B is to allow for changing the master clock time.

The following settings are available for "Remote setting clock slave":

No	Clock time slave with no system time adjustment option.
Yes	Clock time slave with system time adjustment option.

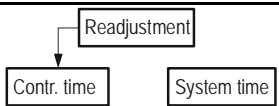
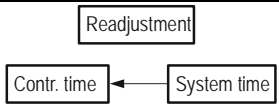
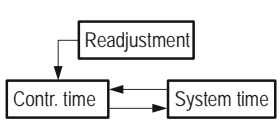
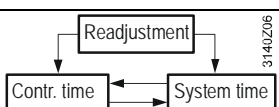
### Setting values for "Remote setting clock slave"

 **Main menu > Commissioning > Communication > Basic settings >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Remote setting clock slave	Yes, No	Yes

### Combinations

The effects of combined entries are:

<i>Entry</i>	<i>Effect</i>	<i>Diagram</i>
<b>Autonomous</b>	The time of day on the RMS705B can be readjusted. RMS705B's time of day is not adapted to system time.	
<b>Slave, Clock time slave- Remote setting No</b>	The time of day on the RMS705B cannot be readjusted. RMS705B's time of day is continually and automatically adapted to system time.	
<b>Slave, Clock time slave- Remote setting Yes</b>	The time of day on RMS705B can be readjusted and also adjusts system time. RMS705B's time of day is continually and automatically adapted to system time.	
<b>Master</b>	The time of day on RMS705B can be readjusted and also adjusts system time. RMS705B's time is used as system default.	



Note	Only one clock time master per system allowed. A fault message is displayed (on the masters) if several devices are parameterized as master.
Recommendation	Always synchronize the system, i.e. use master-slave mode (1 master, all other devices are slaves).

### 4.1.3 Troubleshooting

Possible cases	<p>RMS705B generates a fault message with regard to date and time in the following cases:</p> <ul style="list-style-type: none"> <li>• If the clock on the bus is missing and the local clock is parameterized as time-of-day slave, operation continues on the internal clock and fault message "System time failure" is generated.</li> <li>• Fault message "&gt;1 clock time master" is displayed if several devices are parameterized as clock time master on the bus.</li> <li>• Fault message "Invalid time of day" is displayed if RMS705B loses its time setting after power failure and/or if the time is not resent via bus. <ul style="list-style-type: none"> <li>• Note 1: The clock in RMS705B has a backup battery for typically 48 and at least 12 hours. The time must be reset if a power failure exceeds these hours.</li> <li>• Note 2: A flashing fault LED indicates invalid clock time.</li> </ul> </li> </ul>
----------------	---



Fault messages	<i>No.</i>	<i>Text</i>	<i>Effect</i>
	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.

## 4.2 Select language

Action on initial startup	<p>Each device type has a number of languages loaded.</p> <p>When switching on RMS705B for the first time, the "<b>Language</b>" menu is displayed in English, regardless of the device type's language set.</p> <p>Select the required language from that menu.</p> <p>The language can also be changed later during operation.</p>
---------------------------	--

Language selection	The following languages are loaded, depending on the device type:
--------------------	---

Type	Language 1	Language 2	Language 3	Language 4	Language 5	Language 6
RMS705B-1	German	French	Italian	Spanish	Portuguese	
RMS705B-2	German	French	Dutch	English		
RMS705B-3	Danish	Finnish	Norwegian	Swedish		
RMS705B-4	Polish	Czech	Hungarian	Russian	Slovakian	Bulgarian
RMS705B-5	Greek	Romanian	Slovenian	Serbian	Croatian	Turkish
RMS705B-6	Chinese					

Setting values	 <b>Main menu &gt; Commissioning &gt; Settings &gt; .... or</b>  <b>Main menu &gt; Settings &gt; Device &gt;</b>
----------------	---

Operating line	Range	Factory setting
Language		English

## 4.3 Select temperature unit

You can select the temperature unit for RMS705B as °C/K or °F.

Setting values

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

 **Main menu > Settings > Device >**


<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Unit	Degrees Celsius, Degrees Fahrenheit	Degrees Celsius

## 4.4 Operator unit display contrast

The display contrast can be adapted to the environment.

Setting values

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

 **Main menu > Settings > Device >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Contrast	0...100 %	50 %

## 4.5 Text entry


### 4.5.1 Device name

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

Setting:

Setting values

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

 **Main menu > Settings > Texts >**


<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Device name	Max. 20 characters	

### 4.5.2 File name

Individual text can be assigned to the file name for the selected application:

Setting values

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

 **Main menu > Settings > Texts >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
File name	Max. 20 characters	S

# 5 Inputs

## 5.1 Universal inputs

Digital signals, passive analog or active analog signals can be connected to universal inputs.

### Device type inputs

The device types have the following number of universal inputs:

Switching and monitoring unit:

RMS705B: 8 inputs

Extension modules:

RMZ785: 8 inputs

RMZ787: 4 inputs

RMZ788: 4 inputs

### Maximum version

Max. 4 extension modules (selection from 1 RMZ785, 2 RMZ787, and 2 RMX788) can be connected.

Max. number possible universal inputs:

RMS705B + RMZ785 + RMZ787(1) + RMZ787(2) + RMZ788

8 + 8 + 4 + 4 + 4 = 28 inputs.

### 5.1.1 Activate function

All inputs are always available. They can be used for display purposes if no longer used for specific functions.

### Recommendation

Set unused inputs to "Digital".

You can assign an identifier to each input. The identifier also defines the input's unit.

The following identifiers are available:

Outside temperature*	
°C	
%	
g/kg	
kJ/kg	
W/m <sup>2</sup>	
m/s	
bar	
mbar	
Pa	
ppm	
Universal 000.0	Universal input with one decimal place, resolution –99.9... +999.9, increment 0.1
Universal 0000	Universal input without decimal place, resolution –999...+9999, increment 1
Digital	
[Controller 1] rem setp adj*	Remote setpoint adjuster absolute for controller 1
[Controller 2] rem setp adj*	Remote setpoint adjuster absolute for controller 2
[Controller 3] rem setp adj*	Remote setpoint adjuster absolute for controller 3
Pulse	

\* These identifiers have additional functionality (see Section 5.2.4 "Special analog inputs)

## Configuration

 **Main menu > Commissioning > Extra configuration > Input identifier >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
N.X1	Activate the function by assigning the following to the input: Outside temperature, °C, %, g/kg, kJ/kg, W/m², m/s, bar, mbar, Pa, ppm, Universal 000.0, Universal 0000, digital, or pulse.
...	ditto
RMZ788(2).X4	ditto

## Comments

- The outside temperature unit is always °C.
- Identifiers °C, %, g/kg, kJ/kg, W/m², m/s, bar, mbar, Pa, ppm, Universal 000.0 and Universal 0000 are always analog inputs.
- Digital inputs do not require a unit (On/Off).
- The outside temperature can be sent via bus (KNX) (see Section 5.6 "Outside temperature").

### 5.1.2 Cause

The source of an input value is displayed. We differentiate among the following types:

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

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

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

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Cause	Terminal, LTE mode, S-mode, Simulation	

## Note

Section 13.2.5 explains LTE transmission and reception objects.

### 5.1.3 Input terminal simulation

Each input terminal can be simulated to test plant reaction.

Setting values

 **Main menu > Inputs > Simulation inputs >**

<i>Operating line</i>	<i>Range (type-dependent)</i>	<i>Factory setting (type-dependent)</i>
N.X1... A8 (2).X4	---, -50...+50 °C	---



Only authorized staff may override inputs within a limited period of time!  
During terminal simulation, fault message "Simulation inputs active" is triggered.

Fault messages

<i>No.</i>	<i>Text</i>	<i>Effect</i>
100	Simulation inputs active	Non-urgent message; must not be acknowledged.

This message remains active until "Simulation " returns to "----". This ensures that a simulation is always reset on the plant.

Note

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

### 5.1.4 Troubleshooting

RMS705B among other issues checks if input terminal simulation is still active when the Commissioning menu is exited.

Fault messages

<i>No.</i>	<i>Text</i>	<i>Effect</i>
101... 264	[N.X1] sensor error ... RMZ788(2).X4 sensor error	Non-urgent message; must not be acknowledged.

### 5.1.5 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 >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
N.X1	Display of the current measured value.
...	ditto
RMZ788(2).X4	ditto

## 5.2 Analog inputs

See Section 5.1.1 for activating analog inputs.

You can enter the following settings for analog inputs: Type, Measured range, Correction.

### 5.2.1 Type

You can select "Type" if the unit is °C (identifier °C and outside temperature). The following types are available:

Ni1000*
2xNi1000*
T1
Pt1000
DC 0...10 V

\* Physically, the sensing element types **LG**-Ni1000, 2x **LG**-Ni1000 must be used (see Section 5.2.2).

#### Setting values

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

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

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Type	Ni1000, 2xNi1000, T1, Pt1000, 0...10 V	Ni1000

#### Notes

- If the unit is not °C, the "Type" is always DC 0...10 V.
- Physically, the sensing element types **LG**-Ni1000, 2x **LG**-Ni1000 must be used (see Section 5.2.2).

## 5.2.2 Measuring range

The known measuring ranges for the passive sensing elements are preset:

<i>Passive temperature signals</i>	<i>Preset measuring range</i>
LG-Ni1000	–50...+250 °C
2x LG-Ni1000 or T1	–50...+150 °C
Pt1000	–50...+400 °C

The measuring range must be entered as per manufacturer information or the required allocation for active signals. To do this, enter the lower (Value low) and upper (Value high) measured value.

Setting values

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

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

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Value low	Depending on selected type	Type-dependent
Value high	Depending on selected type	Type-dependent

Example

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

Lower measured value (Value low): 0 °C

Upper measured value (Value high): 50 °C

A 5 V signal results in: 25 °C

## 5.2.3 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. You can thus on-site calibrate using a reference instrument.

Setting values

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

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

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Correction	–3.0...+3.0	0 K

## 5.2.4 Special analog inputs

The following analog input identifiers have a special function:

- Outside temperature (see Section 5.6 "Outside temperature")
- [Controller 1] rem setp adj, [Controller 2] rem setp adj, [Controller 3] rem setp adj (see Section 5.5 "Remote setpoint adjuster, absolute")

## 5.2.5 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

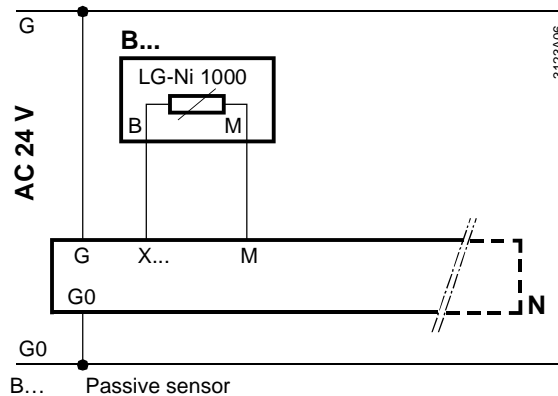
#### Setting values

**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-Ni1000 sensing elements.

#### Input configuration

**Main menu > Commissioning > Extra configuration > Input identifier >**

Operating line	Setting
N.X1	°C

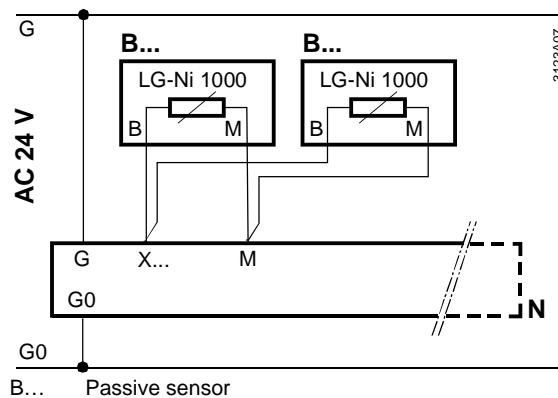
#### Setting values

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

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

Operating line	Setting
Type	2xNi1000

#### Connection diagram





Example 3

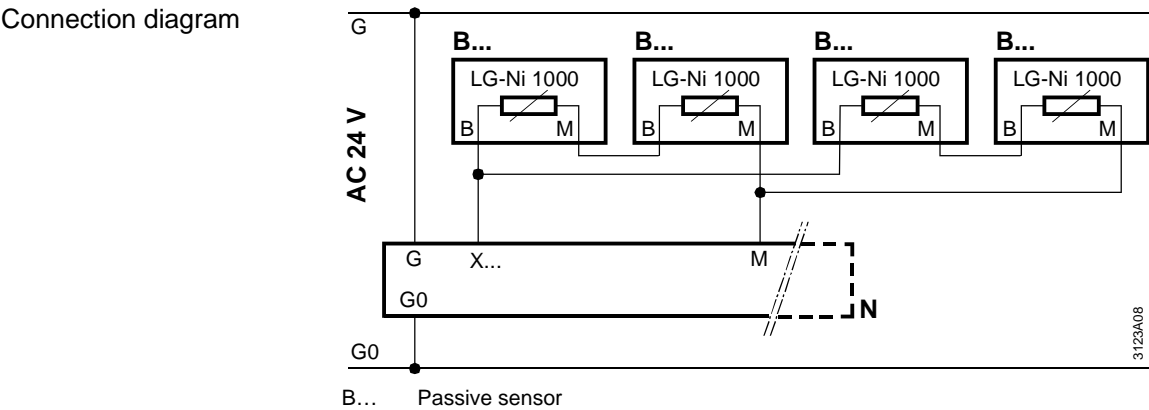
Average temperature measurement with 4 passive sensors using LG-Ni1000 sensing element.

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



5.2.6 Troubleshooting

When you exit the "Commissioning" menu, a check is made to see which sensors are connected. Message "[...X...] sensor error" is displayed if one of the sensors connected at this point is missing later on or if there is a short-circuit. 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 messages

No.	Text	Effect
101... 264	[N.X1] sensor error ... RMZ788(2).X4 sensor error	Non-urgent message; must not be acknowledged.

## 5.2.7 Multiple use of sensors

### Problem and solution

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.

### Note

Ally passive temperature signal types (LG-Ni1000, 2x LG-Ni1000, T1, Pt1000) can be converted and used multiple times.

### Configuration

 **Main menu > Commissioning > Extra configuration > Sensor multiple use >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Signal Y N.X1... Signal Y RMZ787 (2).X4	N1.Y1...A8(2).Y2 / Activate function by assigning an input terminal to the output terminal.

### Setting option

When converting a passive signal to an DC 0...10 V signal, the preset allocation of passive signal and temperature range can be adapted as needed. Do this via parameters "Value low" and "Value high" (see Section 5.2.2).

## 5.3 Digital inputs

Control function signals can be connected to the digital inputs.  
Activate the digital inputs as described in Section 5.1.

### 5.3.1 Normal position

You can define the "Normal" position for each digital input.

### Setting values

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



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

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Normal position	Open, Closed	Open

### 5.3.2 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.

Setting values

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

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Text for: Logic 0	Max. 20 characters	0
Text for: Logic 1	Max. 20 characters	1

### 5.3.3 Connection example



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

Input configuration

-  **Main menu > Commissioning > Extra configuration > Input identifier >**

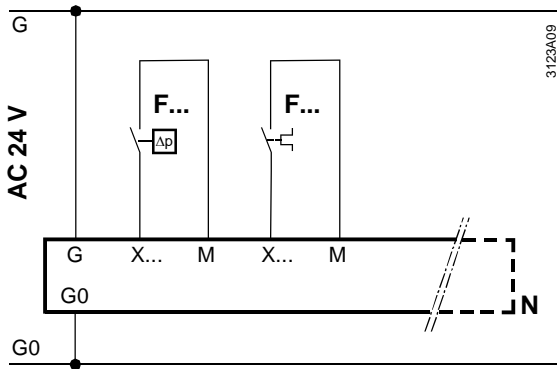
<i>Operating line</i>	<i>Setting</i>
N.X2	Digital

Setting values

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

<i>Operating line</i>	<i>Setting</i>
Normal position	Open

Connection diagram



F... Detector with potential-free switching contact.

## 5.4 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. 20 ms pulse duration.
- Electronic pulse source with max. pulse frequency of 100 Hz and min. 5 ms pulse duration.

### 5.4.1 Activate function

Configuration

 **Main menu > Commissioning > Extra configuration > Input identifier >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
...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). The type is adjustable.

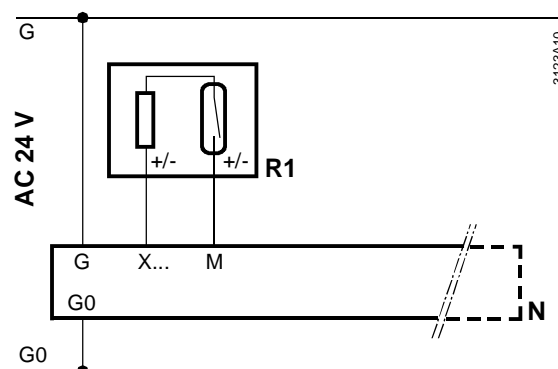
Setting value

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

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

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Type	Mechanically or Electronically	Mechanically

### 5.4.2 Connection diagram



R1 Reed pulse source.

## 5.5 Remote setpoint adjuster, absolute

The absolute remote setpoint acts on setpoints of the universal controller of the RMS705B.

Setpoint sources BSG21.1 (0...1000  $\Omega$ ) and BSG61 (0...10 V) are ideal for room unit QAA25 (5...35  $^{\circ}\text{C}$ ).

The absolute remote setpoint acts on both Comfort and Economy setpoints.

### 5.5.1 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 >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
...X...	Activate the function by assigning the following value to the input: [Controller 1] rem setp adj (Rem-w1), [Controller 2] rem setp adj (Rem-w2) or [Controller 3] rem setp adj (Rem-w3).

### 5.5.2 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  $\Omega$ ).

In addition, you can set the input signal's range:

"Value high": Value at DC 10 V or at 1000  $\Omega$

"Value low": Value at DC 0 V or at 0  $\Omega$

Setting values

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

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

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Type	0...10 V, Ohm	Ohm
Value low	Depending on selected type	Type-dependent
Value high	Depending on selected type	Type-dependent

### 5.5.3 Setpoints

#### Function principle

The remote setpoint always acts on the lower setpoint ("Heating"). The dead zone (distance Seq1 and Seq4) remains as is so that the upper setpoint ("Cooling") is shifted accordingly.

#### "Comfort" setpoints

Current lower Comfort setpoint = Remote setpoint

Current upper Comfort setpoint = Remote setpoint + dead zone "Comfort"

#### Economy setpoints

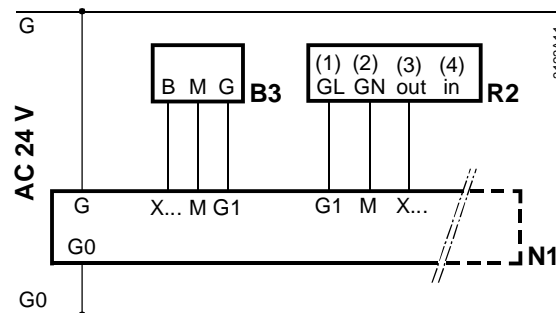
The Economy setpoints are shifted also:

Current lower Economy setpoint =  
Remote setpoint - (Comfort Setpoint low - Eco setpoint low)

Current upper Economy setpoint =  
Remote setpoint - (Eco setpoint high – Comfort Setpoint low) or  
Current lower Economy setpoint + dead zone = Economy

### 5.5.4 Connection diagram

Connect the setpoint adjuster according to the following diagram:



R2 Active setpoint adjuster BSG61.

### 5.5.5 Troubleshooting

When you exit the Commissioning menu, a check is made to see if the setpoint adjuster is connected.

Message "[...X...] sensor error" is displayed if the setpoint adjuster is connected at this point but missing later.

#### Fault messages

No.	Text	Effect
101... 264	[N.X1] sensor error... RMZ788(2).X4 sensor error	Non-urgent message; must not be acknowledged.

#### Notes

- If there is no signal from the setpoint adjuster, the controller continues to work with the internally set setpoints.
- Only the first input is considered if more than one input is activated as remote setpoint adjuster for the same controller.

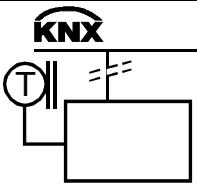
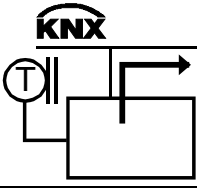
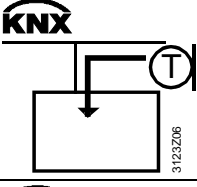
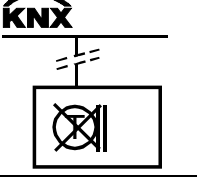
## 5.6 Outside temperature

### 5.6.1 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
<ul style="list-style-type: none"> <li>• Outside temperature at terminal.</li> <li>• Communication outside temperature not active.</li> </ul>	<ul style="list-style-type: none"> <li>• RMS705B operates with own outside temperature.</li> <li>• No effect on bus.</li> </ul>	
<ul style="list-style-type: none"> <li>• Outside temperature at terminal.</li> <li>• Communication outside temperature active.</li> </ul>	<ul style="list-style-type: none"> <li>• RMS705B operates with own outside temperature.</li> <li>• Using the bus, the outside temperature is also provided to other controllers.</li> </ul>	
<ul style="list-style-type: none"> <li>• No outside temperature at terminal.</li> <li>• Communication outside temperature active.</li> </ul>	<ul style="list-style-type: none"> <li>• RMS705B operates with outside temperature provided by another controller on the bus.</li> </ul>	
<ul style="list-style-type: none"> <li>• No outside temperature at terminal.</li> <li>• Communication outside temperature not active.</li> </ul>	<ul style="list-style-type: none"> <li>• RMS705B has no outside temperature.</li> </ul>	

### 5.6.2 Outside temperature at terminal

See Section 5.2 "Analog inputs" for settings and the connection diagram for the outside temperature at the terminal.

#### Configuration

 **Main menu > Commissioning > Extra configuration > Input identifier >**

Operating line	Adjustable values / Comment
...X...	Activate the function by assigning the "Outside temperature" value 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	Type-dependent
Value high	Depending on selected type	Type-dependent
Correction	-3.0...+3.0 K	0 K

### 5.6.3 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.

See Section 13 "Communication".

Setting values

 **Main menu > Commissioning > Communication > Distribution zones >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Outside temperature zone	---, 1...31	---

### 5.6.4 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 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Outside temperature simulation	----, -50...+50 °C	----



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

Fault messages

<i>No.</i>	<i>Text</i>	<i>Effect</i>
12	Outs sensor simulation active	Non-urgent message; must not be acknowledged.

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

Note

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



## 5.6.5 Troubleshooting

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

For each system, only one outside temperature can be sent within the same zone (only one outside temperature master).

Message ">1 outside temperature sensor" is displayed if several controllers send outside temperatures within the same zone. The fault is sent by the controllers sending and receiving outside temperature signals to and from the same zone.

Message "Outside temp sensor error" is displayed if the controller expects an outside temperature signal via the bus and the signal is not sent.

### Fault messages

No.	Text	Effect
101... 264	[N.X1] sensor error... RMZ788(2).X4 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.

## 5.7 Assign texts

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

### Setting values

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

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

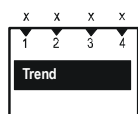
Operating line	Range	Factory setting
N.Xx	Max. 20 characters	N.Xx

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

## 6 Data acquisition

### 6.1 Trend

#### 6.1.1 Connections and application



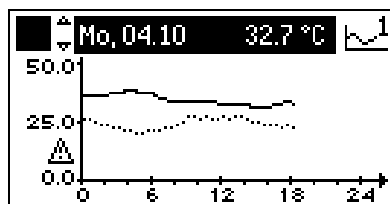
#### Purpose

- Use the Trend function block for time-related recording of measured values. It provides 4 independent trend channels.
- A trend channel can record **one** measured value.
- Two trend channels can be displayed for each Trend view: Primary channel and extra channel (as reference).
- It is possible to record signals from local inputs of RMS705B as well as room temperatures and outside temperature via bus.

#### 6.1.2 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.
- 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 next to 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.

#### Note

The 24-hour view shows the last 6 days.

## 6.1.3 Trend function settings

### Settings

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

Operating line	Adjustable values / Comment
Trend channel 1... Trend channel 4	Channel name (editable text, max.20 characters).
Trend signal	Trend signal assignment: ---, Room temp via bus, Outside temp via bus, N.X1 ... RMZ788 (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 if "Outside temp via bus" is set).
Y-axis min	Depending on selected type.
Y-axis max	Depending on selected type.
Selection extra channel	Trend channel 1 ... Trend channel 4

### 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 1..4".
- 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. "Y-axis min" and "Y-axis max" refer to value display and must be set as per the expected signal range. There is no trend display if the current values are outside the adjusted range!
- You can show a second trend channel via "Selection extra channel". This channel is displayed as a dotted line.

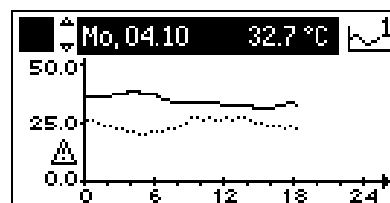
### Notes on the extra channel

- As only every second measured value is displayed for the extra channel, 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 is displayed next to the axis.

### Display values

Query the trend channels via the following menu:

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



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

## 6.1.4 Troubleshooting

---

Trend signal not available.

Trends no longer are recorded if a trend signal **at the local inputs** is no longer available (e.g. due to a faulty sensor).

In this case, check the fault messages via:

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

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

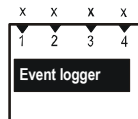
Remanent data

Behavior after power failure *or* after exiting menu "Extra configuration" (restart RMS705B):

- The values of the 8-hour and 8-minute views are deleted.
- The values of the 24-hour view and those of the last 6 days are retained.

## 6.2 Event logger

---



Purpose

Use the event logger to log events and monitor their mandatory occurrence. Event logging can be activated for max. 4 input variables, e.g. to monitor the minimum event duration *or* regularity of an event (legionella monitoring).

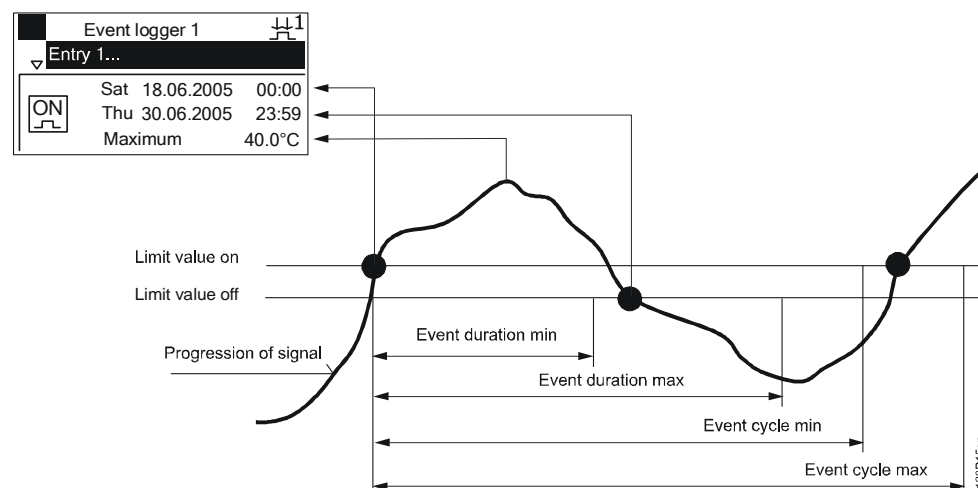
Function overview

- Event logger with 4 inputs.
- Logging of the last 10 events per logger with time and date stamp upon reaching value "Limit value on" and Off.
- Save max. *or* min. value during event.
- Adjustable values for "Limit value on" and Off.
- Selectable fault message when below "Event cycle min".
- Selectable fault message when above "Event cycle max".
- Selectable fault message when below "Event duration min".
- Selectable fault message when above "Event duration max".
- A name can be assigned to each event logger input.

There are two use cases:

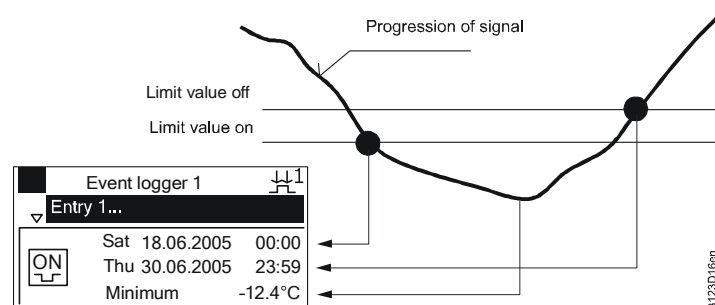
Use case 1: Monitor max. value

The max. value is monitored and displayed in the event logger under "Maximum" if "Limit value on" > "Limit value off".



Use case 2: Monitor min. value

The min. value is monitored and displayed in the event logger under "Minimum" if "Limit value off" > "Limit value on".



## 6.2.1 Activate event logger

Assigning an analog input activates the "Event logger".

Configuration

**Main menu > Commissioning > Extra configuration > Data acquisition > Event logger >**

Operating line	Range	Factory setting
Input 1	---, N.X1, N.X2, ... Room temp via bus, Outside temp via bus	---
Input 2	---, N.X1, N.X2, ... Room temp via bus, Outside temp via bus	---
Input 3	---, N.X1, N.X2, ... Room temp via bus, Outside temp via bus	---
Input 4	---, N.X1, N.X2, ... Room temp via bus, Outside temp via bus	---

## 6.2.2 Event logger settings

Setting values

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

 **Main menu > Settings > Data acquisition > Event logger > Event logger 1...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Event logger 1...4	Max. 20 characters	Event logger 1...4
Limit value on	Depending on selected type.	Type-dependent
Limit value off	Depending on selected type.	Type-dependent
Event duration min**	00.00..23.50 h.m	00.00 h.m
Event duration max**	00.00..23.50 h.m	00.00 h.m
Event cycle min**	0...720 h	0 h
Event cycle max**	0...720 h	0 h
Fault priority	Urgent, Not urgent	Not urgent
Geographical zone (apartment)	1...126 (relevant for "Room temp via bus")	1
Geographical zone (room)	1...63 (relevant for "Room temp via bus")	1
Outside temperature zone	1...31 (relevant for "Outside temp via bus")	1

\* A name can be assigned to the event logger inputs.



\*\* Set the times to 0 to deactivate the individual fault messages.

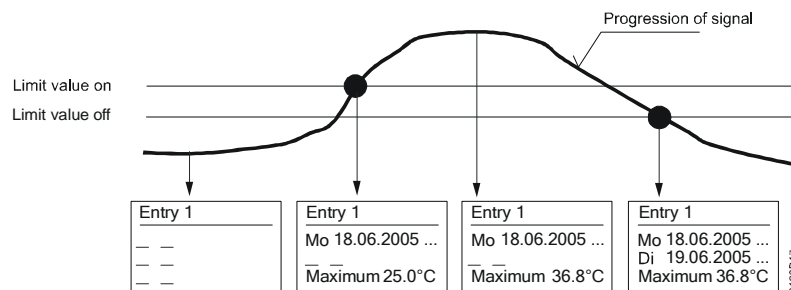
## 6.2.3 Event logger display

- You can query the last 10 event periods on the display.
- They are sorted in chronological order with 1 as the most recent entry.
- The data of the event start and end as well as duration for highest or lowest values are displayed as increment key.
- The oldest event is deleted if there are more than 10 events.

Display values

 **Main menu > Data acquisition > Event logger 1..4 >**

Event logger 1 		
Entry 1...		
	Sa 18.06.2005 00:00	
	Do 30.06.2005 23:59	
	Maximum 40.0°C	



You can delete event logger entries at the password level.

Delete entries

 **Main menu > Commissioning > Settings > Data acquisition > Event logger > Event logger 1...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Delete logger	No, Yes	No

## 6.2.4 Fault messages

The following fault messages are generated during violation (above and below) if the corresponding times for "Event duration min/max" or "Event cycle min/max" are greater than 0.

You must acknowledge these fault messages.

Fault messages

No.	Text	Effect
9111	[Logger 1] on before cycle min	Fault priority as set; must be acknowledged and reset.
9112	[Logger 1] on after cycle max	Fault priority as set; must be acknowledged and reset.
9113	[Logger 1] off before dur min	Fault priority as set; must be acknowledged and reset.
9114	[Logger 1] off after dur max	Fault priority as set; must be acknowledged and reset.
9121	[Logger 2] on before cycle min	Fault priority as set; must be acknowledged and reset.
9122	[Logger 2] on after cycle max	Fault priority as set; must be acknowledged and reset.
9123	[Logger 2] off before dur min	Fault priority as set; must be acknowledged and reset.
9124	[Logger 2] off after dur max	Fault priority as set; must be acknowledged and reset.
9131	[Logger 3] on before cycle min	Fault priority as set; must be acknowledged and reset.
9132	[Logger 3] on after cycle max	Fault priority as set; must be acknowledged and reset.
9133	[Logger 3] off before dur min	Fault priority as set; must be acknowledged and reset.
9134	[Logger 3] off after dur max	Fault priority as set; must be acknowledged and reset.
9141	[Logger 4] on before cycle min	Fault priority as set; must be acknowledged and reset.
9142	[Logger 4] on after cycle max	Fault priority as set; must be acknowledged and reset.
9143	[Logger 4] off before dur min	Fault priority as set; must be acknowledged and reset.
9144	[Logger 4] off after dur max	Fault priority as set; must be acknowledged and reset.

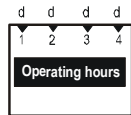
## 6.2.5 Troubleshooting

Notes

- Changing the current data or time during event logging may result in premature triggering of a fault message.
- After changing the extra configuration in the event logger, previous logs are deleted when the extra configuration is closed.
- No event logging takes place if "Limit value on" = "Limit value off".

- The event is saved in the event logger only after processing "Limit value off". Data of the current event is lost if preceded by a power failure. Previously saved events remain available.
- Logging is canceled and terminated if the measured value signal at the terminal is no longer available. Logging is resumed after the signal is reactivated.
- The previous event cycle is not saved if yet another event cycle occurs within 5 minutes.

## 6.3 Operating hours

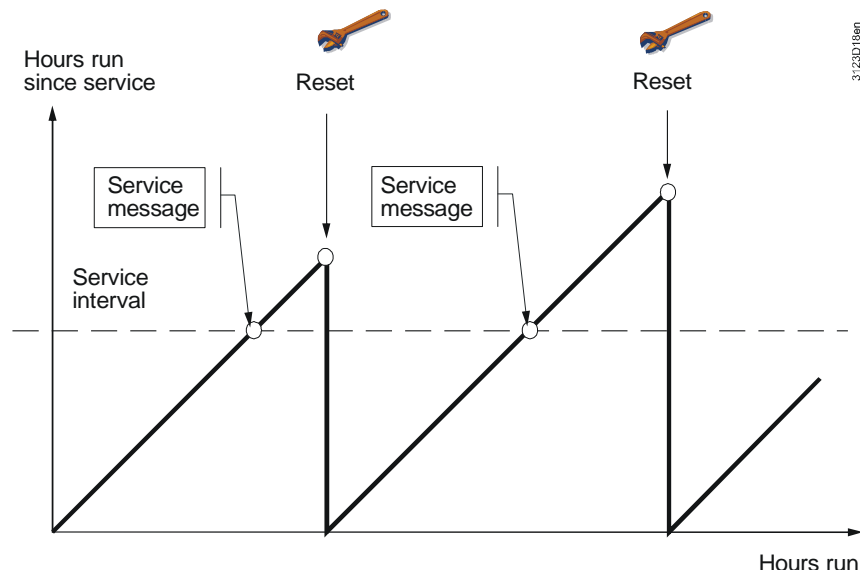


### Purpose

- The following 4 operating hours counters are available:
- They use a digital input signal to record the operating hours of any aggregate.
- Operating hours since last maintenance are counted in addition to total operating hours.
- RMS705B generates a freely definable maintenance message when the maintenance interval value is reached.
  - Counters "Operating hours since service" continue to run until reset to 0 via "Reset".
  - Resetting counter "Operating hours since service" does not impact the counter for total operating hours.
  - The maintenance messages for the operating hours counter are displayed as part of the fault message "Main menu > Faults".
- A name can be assigned to each operating hours counter.
- The counter can be set to any start value at the password level.

### Maintenance messages for the operating hours counter

The following figure provides a visual description of the above functionality:





### 6.3.1 Activate the operating hours counter

Each counter is activated by assigning an input.

Configuration

 **Main menu > Commissioning > Extra configuration> Data acquisition > Operating hours >**


<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Input 1	---, N.X1, N.X2, ...	---
Input 2	---, N.X1, N.X2, ...	---
Input 3	---, N.X1, N.X2, ...	---
Input 4	---, N.X1, N.X2, ...	---

### 6.3.2 Assign texts

A specific text can be assigned to each counter. This text is displayed as menu and operating line text on the operating pages.

Free text

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

 **Main menu > Settings > Data acquisition > Operating hours > Operating hours 1...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Operating hours x	Max. 20 characters	Operating hours x

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.


### 6.3.3 Set operating hours counter

Service staff can set the operating hours counter to a defined value or 0. This value runs on the operating hours counter.

After 99999 hours, the counter automatically returns to 0. This value can only be changed at the password level.

Set operating hours counter to start value

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

 **Main menu > Settings > Data acquisition > Operating hours > Operating hours 1...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Operating hours x	0..99999 h, settable in increments of 1.	0 h

### 6.3.4 Maintenance message

A maintenance message can be assigned to each operating hours counter, e.g.: "Service Fan SA".

Both "Text for: Service required" and "Service interval" are freely selectable.

"Service interval" specifies the number of operating hours until the next service. No maintenance message is sent if "Service interval" is set to 0 h.

The fault priority is set to "Not urgent".

Select interval and enter text for maintenance

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

■ **Main menu > Settings > Data acquisition > Operating hours > Operating hours 1...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Service interval	0...99999 h	0 h
Text for: Service required	Max. 20 characters	[O'hrs 1] serv req

A corresponding maintenance message is generated once the counter "Operating hours since service" reaches the value for the maintenance interval.

Maintenance messages

<i>No.</i>	<i>Text</i>	<i>Effect</i>
1911	[O'hrs 1] serv req	Non-urgent fault.
1912	[O'hrs 2] serv req	Non-urgent fault.
1913	[O'hrs 3] serv req	Non-urgent fault.
1914	[O'hrs 4] serv req	Non-urgent fault.

### 6.3.5 Operating hours display

Display values

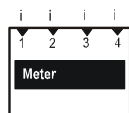
■ **Main menu > Data acquisition > Operating hours 1...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Operating hours x*	Display 0...99,999 h	
Operating hours since service	Display 0...99,999 h	
Reset**	No, Yes	No

\* Display of the operating hours run to date. The counter counts to max. 99,999 hours and then rolls over to 0.

\*\* This setting resets "Operating hours since service" to 0 hours and deletes the maintenance message.

## 6.4 Meters



### Purpose

Meters are used to acquire consumption values.  
Four independent meters are available.

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<sup>3</sup>, 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, are then 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

Pulse meters and associated counters are not suited for billing purposes since the recording of consumption can fail due to various reasons such as during power supply failures.  
Only meter readings (heat meters, electricity meters, etc.) with on-board counters, battery backed where required, deliver the correct values.  
Meters using Namur or SO circuitry are not supported by the RMS705B.

### 6.4.1 Activate meters

Assign an input to activate each meter. You can assign only inputs with identifier "Pulse".

### Configuration

 **Main menu > Commissioning > Extra configuration > Data acquisition > Meter 1...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Input n	---, N.X1, N.X2, ...	---

### 6.4.2 Display format

"Displayed unit" allows for selecting the unit to be displayed.  
"Displayed format" defines the number of decimal places.

### Display format

 **Main menu > Commissioning > Extra configuration > Data acquisition > Meter 1...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
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

### 6.4.3 Pulse valency

Every pulse from a pulse source corresponds to a specific consumption value. Pulse valency is printed on the consumption meter. Enter pulse valency using numerators and denominators.

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...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
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

### 6.4.4 Overflow value

The overflow value ensures that displayed reading on the connected meter is the same as that on RMS705B. 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

Overflow value

You can change this value only via software tool OCI700.1.

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Overflow value	0...999'999'999	99'999'999 kWh

### 6.4.5 Set and reset meter readings

In case of deviations, service staff can adjust the pulse meter reading via operating line "Meter reading current". You can change this value only via software tool OCI700.1.

Use "Reset monthly values" to delete 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...4 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Reset monthly values	No, Yes	No

## 6.4.6 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...4 >

<i>Operating line</i>	<i>Comment</i>
Meter reading current	0...999'999'999
Unit	As per the configured display format.
[Readout 1] date	
[Readout 1] meter reading	
...	
[Readout 15] date	
[Readout 15] meter reading	

Notes

- The listed operating lines also exist for meters 2 to 4.
- 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".

## 6.4.7 Assign texts

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

Free text

■ Main menu > Commissioning > Settings ... or

■ Main menu > Settings > Data acquisition > Meter > Meter 1...4 >

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Meter 1...4	Max. 20 characters	Meter 1...4

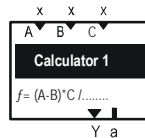
See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

## 6.4.8 Troubleshooting

Some battery-powered or mechanical meters continue metering in the event of a power failure. During a power failure affecting RMS705B, the pulses are not counted.

A restart occurs after you exit menu "Extra configuration". Pulses received between the last storage operation and restart (max. 5 minutes) are not counted.

## 6.5 Calculator



Purpose	The calculator allows for converting input values to output values applying your own formulas. This allows for sophisticated calculations. Two independent calculator blocks are available.
Application examples	<ul style="list-style-type: none"><li>• Switch on <i>or</i> off aggregates via current heating <i>or</i> cooling output.</li><li>• Temperature difference calculation (several input signals possible).</li></ul>
Supplemental features	<ul style="list-style-type: none"><li>• The calculated value can be provided to other devices at modulating output Y (DC 0...10 V).</li><li>• User-defined formulas can be entered in addition to standard formula <math>(A-B) \cdot C</math>.</li><li>• The following mathematical functions are available for calculation:<ul style="list-style-type: none"><li>• Basic operations: Add (+), Subtract (-), Multiply (*), Divide (/).</li><li>• Exponentiation <math>n^x</math>.</li><li>• Root function <math>n^u</math>, with <math>u = 0.5</math>.</li></ul></li><li>• You can enter three integer and three floating point constants when using constants in the formula.</li></ul>
Notes	<ul style="list-style-type: none"><li>• The calculated result may only be used as indicator for switching purposes and cannot be used for billing purposes.</li><li>• Measuring accuracy and sensor placement are prerequisites for the quality of the calculation.</li></ul>

## 6.5.1 Activate the calculator

Assign input A to activate the calculator.

Configuration

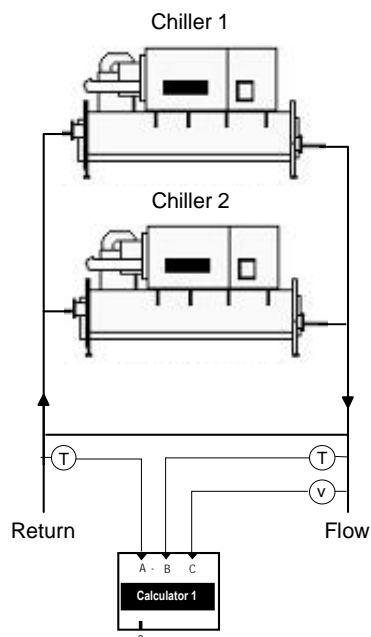
 **Main menu > Commissioning > Extra configuration > Data acquisition > Calculator 1...2 >**

Operating line	Range	Factory setting
Input A	---, N.X1, N.X2, ...	---
Input B	---, N.X1, N.X2, ...	---
Input C	---, N.X1, N.X2, ...	---
Constant u, v, w	-50.0... +999.0	1.0
Constant x, y, z	-50... +9999	1
Formula	Max. 20 characters	(A-B)*C
Modulating output	---, N.Y1, N.Y2, ...	---

Rules to enter formulas

- Max. 20 characters.
- Max. 2 parentheses in sequence, e.g. ((
- PEMDAS convention applies: ^ \* / + -
- Numbers are not entered direct, but via constants.
- No spaces in the formula.

Example for output calculation



Output calculation is based on a physical relation:

$$P = \dot{V} * \rho * c * \Delta T$$

- $P$  = Output (kW)  
 $\dot{V}$  = Volumetric flow (m³/s)  
 $\rho$  = Medium density (kg/m³)  
 $c$  = Specific heat capacity of the medium (kJ/ (kg \* K))  
 $\Delta T$  = Temperature difference (K)

Considerations	<p>Medium density and specific medium heat capacity are constants:</p> <ul style="list-style-type: none"> <li>• Density (water): 1000 kg/m<sup>3</sup> is mapped to constant <b>x</b> (integer).</li> <li>• Heat capacity (water): 4.2 kJ/ (kg*K) is mapped to constant <b>u</b> (floating point).</li> </ul>
Formula definition	<p>Output is calculated based on the following formula for the RMS705B calculator:  Output = Input C * x * u * (input A – input B).  Enter the following in the "Formula" operating line: C*x*u*(A-B)</p>
Constants	<p>Enter 1000 in operating line "Constant x".  Enter 4.2 in operating line "Constant u".</p>
Input identifiers	<p>Configure the input identifiers as follows:</p> <ul style="list-style-type: none"> <li>• Type "C" input on "Input A".</li> <li>• Type "C" input on "Input B".</li> <li>• Type "Universal 000.0" input on "Input C".</li> </ul>
Notes	<ul style="list-style-type: none"> <li>• Accuracy and resolution of floating point constants is one decimal place, i.e. 4.16 must be entered as 4.2. If greater accuracy is required, enter the constant increased by factor 10, 100, 1000, and divide the formula by this factor later on.</li> <li>• Internal connections (internal analog a) from the calculator output to other function blocks are passed on as integers within value range -50...9999.</li> </ul> <p>Other possible applications for the calculator are:</p> <ul style="list-style-type: none"> <li>• Total solar power</li> <li>• Volumetric flow</li> <li>• Energy consumption</li> <li>• etc.</li> </ul>



## 6.5.2 Limits for output and user-defined unit

The calculated output signal of the modulating output (Y) can be limited high and low.

In addition, you can assign a user-defined unit.

The output result's unit (K, kW, etc.) is entered as characters and displayed together with the output value.

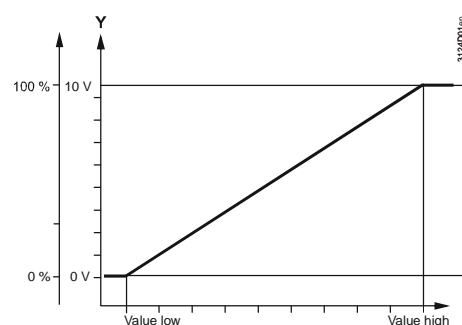
Setting

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

 **Main menu > Settings > Data acquisition > Calculator > Calculator 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Unit	Max. 20 characters	
Value low	-50...9999	0
Value high	-50...9999	100

Value low and Value high only limit the DC 0...10 V signal run to the Y-output.



## 6.5.3 Assign texts

A specific text can be assigned to each calculator.

Free text

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

 **Main menu > Settings > Data acquisition > Calculator > Calculator 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Calculator 1...2	Max. 20 characters	Calculator 1...2

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

## 6.5.4 Display values and wiring test

The following values are displayed on the operator unit:

Display values

■ Main menu > Data acquisition > Calculator 1...2 >

<i>Operating line</i>	<i>Comment</i>
Actual value	–50... +9999 or –50.0... +999.9
Unit	Max. 20 characters
Input A	
Input B	
Input C	

Note

- Consider possible number ranges of the result when writing a formula. Change to another unit (e.g. kJ rather than J) if you can expect the result to be large.
- Actual value is an integer or floating point number depending on whether you use integers (x, y, z) or floating point constants (u, v, w).

You can directly control the calculator during the wiring test.

Wiring test

■ Main menu > Commissioning > Wiring test > Outputs >

<i>Operating line</i>	<i>Comment</i>
[Calculator 1] output	---, 0...100 %
[Calculator 2] output	---, 0...100 %

## 6.5.5 Troubleshooting

The result and thus the calculator output is set to 0 if an input signal required for calculation is not available during operation.

Wrong formulas

User-defined formulas are checked for conformity to rules (see Section 6.5.1). A configuration alarm is displayed when a formula contains errors.

Examples for wrong formulas

<i>Wrong formulas</i>	<i>Error description</i>
<b>AB*</b>	2 variables without operator.
A*/B	2 operators.
A*((B-C)	Final parenthesis missing.
A*(((B-C)-x)-z)	Max. 2 same parentheses in sequence.

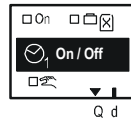
Fault messages

<i>No.</i>	<i>Text</i>	<i>Effect</i>
6401	[Calculator 1] formula invalid	Non-urgent message; must not be acknowledged.
6402	[Calculator 2] formula invalid	Non-urgent message; must not be acknowledged.

# 7 7-day time switch

## 7.1 Time switch

### Purpose



Six 7-day time switches with 6 switch-on or switch-off times are available for each day.

### Features

- Each time switch has operating line setting "Holiday priority".  
If set to "Yes", the following occurs:
  - The time switch is set to "Off" for the defined holidays.
  - Defined special days are activated.
- The "Holiday priority" setting is ignored if the time switch is set to "Slave".
- The output of the time switch can either be processed RMS-internal or output directly via a relay output.
- You can override the time switch output via operating switch . It is visible on the topmost user level.

Activate the time switches via operating line "Time switch".

### Configuration

**Main menu > Commissioning > Extra configuration > Time switch > Time switch 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Time switch	Off, On	Off
Holiday priority	Yes, No	No
[Time switch 1] relay... [Time switch 6] relay	---, N.Q1, N.Q2, ...	---
[Time switch 1] op selector.... [Time switch 6] op selector	Yes, No	No

### 7.1.1 Communication

The 7-day time switches of the RMS705B can run autonomously.

7-day time switch programs of the RMS705B can be received by other RMx controllers if RMS705B is connected to other controllers via bus. In that case, configure RMS705B as slave.

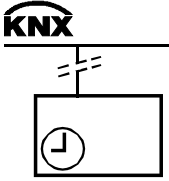
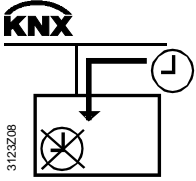
Summary:

- Autonomous 7-day time switch.
- 7-day time switch from bus: 7-day time switch slave (receives time switch from bus).

### Note

The status of 7-day time switches can be received only, but not sent to the bus.

The settings have the following effect:

Entry	Effect	Diagram
Autonomous	The time switch only acts locally on the RMS705B.	
Slave	The time switch in RMS705B is not active. The acting time switch is that one 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.	

Enter the "Geographical zone (apartment)" of the controller that is to receive the time switch data during time switch operation "Slave".

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" (RMx)	State of time switch output (RMS705B)
Comfort	On
Precomfort	Set in operating line "Transformation Precomfort": On or Off
Economy	Off

Setting values

**Main menu > Commissioning > Communication > Time switch > Time switch 1...6 >**

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

\* Information line: Result of the setting.

## 7.1.2 Entries

You can select a specific 24-hour profile for the following days.

Set time switch

**Main menu > Time switch 1...6 >**

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

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

Copy 24-hour profiles

You can copy data entered for a day to other days. If, for example, you entered data for Monday, you can copy the same profile to all other working days (Monday through Friday).

## Copy 7-day programs

You can copy a 7-day program containing all entries to another time switch. To do this, select the desired time switch (e.g. Time switch 3). Turn the press-and-turn button to the right. "Copy to" is displayed at the end of the 7-day list. You can copy the selection to either all or to one single time switch.

## Note

The data is copied if the target time switch is activated.

### 7.1.3 Assign texts

You can assign text to each time switch and operation selector. The text is displayed on the menu and in the operating line.

## Free text

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

 **Main menu > Settings > Time switch > Time switch 1...6 >**


<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Time switch 1...6	Max. 20 characters	Time switch 1...6
[Time switch 1] op selector... [Time switch 6] op selector	Max. 20 characters	[T'swi 1] op sel

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

### 7.1.4 Operation selector

You can preselect the operating mode for the time switch's output via the operation selector in the main menu. The current state for the operation selector of time switch 1, e.g., is displayed as follows:

## Display values

 **Main menu > [Time switch 1] op selector >**

<i>Operating line</i>	<i>Comment</i>
Preselection	Auto, Off, On.
State	Display of present state: Off, On.

## Important note

You must first ensure that the operation selector is set to Auto if you want to reset its configuration later on. Otherwise, the time switch constantly maintains "On" or "Off".

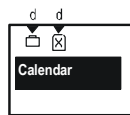
## 7.1.5 Troubleshooting

Fault message "[Time switch 2] failure" is displayed if a time switch signal from the bus is anticipated and not sent. In this case, the recipient continues to operate on "On".

Fault messages

No.	Text	Effect
5101	[Time switch 1] failure	Non-urgent message; must not be acknowledged
5111	[Time switch 2] failure	Non-urgent message; must not be acknowledged
5121	[Time switch 3] failure	Non-urgent message; must not be acknowledged
5131	[Time switch 4] failure	Non-urgent message; must not be acknowledged
5141	[Time switch 5] failure	Non-urgent message; must not be acknowledged
5151	[Time switch 6] failure	Non-urgent message; must not be acknowledged

## 7.2 Holidays/special days



Plant operators can enter days deviating from the standard 7-day program as holidays or special days via the "Holidays/special days" menu.

The holidays/special day program is visible only if at least one time switch is active.

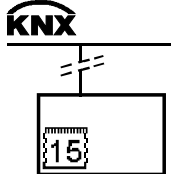
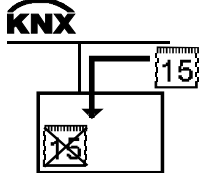
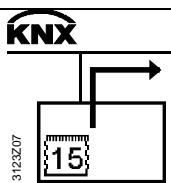
### 7.2.1 Communication

The same holidays/special day program can be assigned to other controllers if RMS705B communicates with other controllers (see Section 13). Different sources can be used as the master. Enter this in the RMS705B (see Section 13.2.2 Holidays/special days).

The following settings are possible:

- Autonomous (neither sends nor receives).
- From bus: Slave (receives holidays/special day program from the bus).
- To bus: Master (sends holidays/special day program via bus).

The individual settings have the following effect:

Entry	Effect	Diagram
Autonomous	<ul style="list-style-type: none"> <li>The holidays/special day program only acts locally on this RMS705B.</li> <li>The holidays/special day program has no impact on the holiday/special day zone entered via communication.</li> </ul>	
Slave	<ul style="list-style-type: none"> <li>The holidays/special day program in this RMS705B is not active.</li> <li>The external holidays/special day program with the same holidays / special day zone is active.</li> <li>The external holidays/special day program must be set as the master holiday/special day program.</li> </ul>	
Master	<ul style="list-style-type: none"> <li>The holidays/special day program in this RMS705B is active.</li> <li>The holidays/special day program also acts on all other controllers with holidays/special day programs switched off (slave) in the same holidays/special day zone.</li> </ul>	

See Section 13 "Communication" for "Holidays/special day zone" settings.

## 7.2.2 Holidays

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

### Examples

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

During vacation/holidays, the output of the corresponding time switch is set to Off (provided "Holiday priority: Yes).

## 7.2.3 Special days

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

### Examples

- Visitor days in special facilities.
- Religious holidays in churches.

The 7-day program allows for an additional 24-hour program (special day) as a special day program.

See section 7.1.2 for settings.

### Note

You can enter a specific 7-day program as a special day on each controller (slave) if RMS705B (master) is connected to other controllers (slaves) via communication. The time of the special day is communicated by the master and applies to all controllers in the same holidays/special day zone.

## 7.2.4 Calendar entry

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

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

Setting values

■ Main menu > Holidays/special days >

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Entry 1...16	Start, End, Reason	

Note

You can enter annually recurring holidays or special days 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

The following applies to two overlapping entries: Special days take priority over holidays. As a result, you can predefine a special day during vacation/holidays.

Example for special day during holidays/vacation  
Note

Theater play in schoolhouse during vacation/holidays.

At the end of the holidays or special day, operation according to the normal 7-day program is resumed. In this transition, you may not be able to start optimum start control (e.g. boost heating) in time. We thus recommend to move down the end of the holidays/vacation allowing the plant sufficient time to adapt to the respective setpoints.

## 7.2.5 Control input "Holidays/special days"

You can also activate holidays and special days via digital inputs. To do this, assign digital inputs.

Configuration

■ Main menu > Commissioning > Extra configuration > Holidays/special days >

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Holiday input	---, N.X1, N.X2,...
Special day input	---, N.X1, N.X2,...

Notes

- These inputs work only if Holidays/special day operation is set as "Autonomous" or "Master".
- Activation of special days or holidays via digital inputs is not entered in the holidays/special day program, eliminating recurrence.



Special day	<ul style="list-style-type: none"> <li>• The digital input enables the plant to be constantly switched to the special day program in the 7-day program without intervention on the controller.</li> <li>• The special day program becomes active if a permanent signal is applied to the configured input. This program is maintained until there is no more signal. Only then does the normal 7-day program resume operation.</li> </ul>
Holidays	<ul style="list-style-type: none"> <li>• The digital input enables the plant to be constantly switched to "Holidays" without intervention on RMS705B.</li> <li>• The plant goes to "Holidays" operating mode if a permanent signal is applied to the configured input. This operating mode is maintained until there is no more signal. Only then does the normal 7-day program resume operation.</li> </ul>
Priority	<p>The following priority list applies if a special day <i>or</i> holidays are activated simultaneously via control switches and calendar entry:</p> <ol style="list-style-type: none"> <li>1. Control switch "Special day" (highest priority).</li> <li>2. Control switch "Holidays".</li> <li>3. "Special day" entry in the calendar.</li> <li>4. "Holidays" entry in the calendar (lowest priority).</li> </ol>
Note	<p>If other controllers are configured as slaves in the same "Holidays/special day zone", the digital inputs also act on these controllers.</p>

## 7.2.6 Troubleshooting

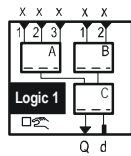
Message "Hol/spec day program failure" is displayed if RMS705B expects a holidays/special day signal via the bus and the signal is not sent. The operating modes of the 7-day program are then used without considering the holidays/special day entries. Only one master may be set per "Holidays/special day zone". A fault message is displayed if several controllers are set as the master.

Fault 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.

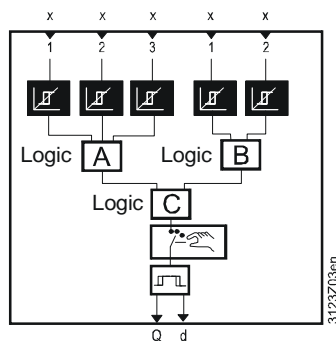
Note	<p>When evaluating the priority in the holidays/special day program, only the first two entries are considered. If you enter more than two overlapping entries, the special day may no longer take priority over the holidays.</p>
------	--

# 8 Aggregates

## 8.1 Logic



Purpose	Use the logic block for logical links to multiple input signals. 10 independent logic function blocks are available.
Operation selector	One operation selector  can be activated for each logic block, allowing users to manipulate the program from the highest main menu level. Auto, Off or On can be selected. Manipulation 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 switch-off periods for the output signal on function block C.  These time always work (e.g. for an operation selector  manipulation), except during a wiring test.
Convert analog to digital signal	You can assign a digital or analog signal to each input. You can generate an analog signal, a 2-point signal (On/Off) via switch on and off points. The following applies:  Switching value On > switching value Off: Transition 0 → 1 Switching value On < switching value Off: Transition 1 → 0  The difference between switching value On and switching value Off is the hysteresis.
Internal structure	<ul style="list-style-type: none"> <li>Inputs 1, 2 and 3 are internally connected to Logic A.</li> <li>Inputs 1 and 2 are connected to Logic B.</li> <li>The logical functions AND, NAND, OR, NOR can be set for Logic A and Logic B.</li> <li>The results from Logics A and B act on Logic C.</li> <li>In Logic C, you can select logic functions AND, NAND, OR, NOR , EXOR, EXNOR.</li> </ul>



Note	The logic function blocks are processed in ascending order, from 1 to 10. The following logic tables show the settable logic functions AND, NAND, OR, NOR, EXOR and EXNOR using the example of 2 inputs.
------	---

## Logic tables

<i>AND</i>		
Input1	Input2	Output
0	0	0
0	1	0
1	0	0
1	1	1

<i>OR</i>		
Input1	Input2	Output
0	0	0
0	1	1
1	0	1
1	1	1

<i>EXOR</i>		
Input1	Input2	Output
0	0	0
0	1	1
1	0	1
1	1	0

<i>NAND</i>		
Input1	Input2	Output
0	0	1
0	1	1
1	0	1
1	1	0

<i>NOR</i>		
Input1	Input2	Output
0	0	1
0	1	0
1	0	0
1	1	0

<i>EXNOR</i>		
Input1	Input2	Output
0	0	1
0	1	0
1	0	0
1	1	1

## 8.1.1 Activate the logic

Activate the logic by configuring at least 1 input or the operation selector.

Use menu "Extra configuration" to configure logic functions for Logic A, B, and C.

The "Operation selector" setting 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 users manual manipulations. No warning is displayed during manual manipulations.

Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Logic functions > Logic 1...10 >**

<i>Operating line</i>	<i>Adjustable values</i>	<i>Factory setting</i>
[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

Notes

- You can select format "Hours:Minutes" as an extended time format (> 59.59 m.s) for the logic function.  
Important: The changeover impacts all time-related parameters of the logic function block (switch-on/off delay and min. switch-on/off time).
- Time format "h:m" offers a 10-minute increment setting range.

## 8.1.2 Assign texts

You can assign a specific text to each logic and operation selector. The text is displayed on the menu and in the operating line.

Setting values

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

 **Main menu > Settings > Aggregates > Logic functions > Logic 1...10 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Logic 1...10	Max. 20 characters	Logic 1...10
Operation selector 1...10	Max. 20 characters	Operation selector 1...10

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

### 8.1.3 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 signal (On/Off).

Setting values

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

 **Main menu > Settings > Aggregates > Logic functions Logic 1...10 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
[Logic A switching value 1] on	Depending on selected type	Type-dependent
[Logic A switching value 1] off	Depending on selected type	Type-dependent
[Logic A switching value 2] on	Depending on selected type	Type-dependent
[Logic A switching value 2] off	Depending on selected type	Type-dependent
[Logic A switching value 3] on	Depending on selected type	Type-dependent
[Logic A switching value 3] off	Depending on selected type	Type-dependent
[Logic B switching value 1] on	Depending on selected type	Type-dependent
[Logic B switching value 1] off	Depending on selected type	Type-dependent
[Logic B switching value 2] on	Depending on selected type	Type-dependent
[Logic B switching value 2] off	Depending on selected type	Type-dependent

### 8.1.4 Switch-on/switch-off delay

For the logic output, a switch-on and switch-off delay can be set.

Setting values

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

 **Main menu > Settings > Aggregates > Logic functions Logic 1...10 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Switch-on delay	00.00...59.59 m.s or* 00.00...23.50 h.m	00.00 m.s
Switch-off delay	00.00...59.59 m.s or* 00.00...23.50 h.m	00.00 m.s

\* See Notes on the time format in Section 8.1.1

Note

The switch-on delay always acts on the switch-on command; the switch-off delay on the switch-off command.

### 8.1.5 Minimum on time

For the logic output, a min. switch-on time can be set. Thus, the output remains set to On for the set time when a switch-on command is received.

Setting values

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

 **Main menu > Settings > Aggregates > Logic functions Logic 1...10 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
On time minimum	00.00...59.59 m.s or* 00.00...23.50 h.m	00.00 m.s

\* See Notes on the time format in Section 8.1.1

The minimum on-time always takes effect after a switch-on command.

## 8.1.6 Minimum off time

The minimum switch-off time prevents aggregates from cycling too frequently.

Setting values

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

 **Main menu > Settings > Aggregates > Logic functions Logic 1...10 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Off time minimum	00.00...59.59 m.s or* 00.00...23.50 h.m	00.00 m.s

\* See Notes on the time format in Section 8.1.1

The minimum switch-off time always takes effect after a switch-off command.

## 8.1.7 Operation selector

The operating mode of the logic block output (Preselection) can be preset via the operation selector in the main menu; the current state is displayed (State). Switch-on and switch-off delay as well as minimum on and off time are considered.

Display values

 **Main menu > Operation selector 1...10 >**

<i>Operating line</i>	<i>Comment</i>
Preselection	Auto, Off, On.
State	Display of present state: Off, On.

Important note

You must first ensure that the operation selector is set to Auto if you want to reset its configuration later on. Otherwise, the output constantly remains "On" or "Off".

## 8.1.8 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 >**

<i>Operating line</i>	<i>Comment</i>
Logic 1...10	Off, On.

## 8.1.9 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

## 8.1.10 Notes

- There is no hysteresis if with an analog input of the logic block the switching value is set to On = switching value Off.
- The "Off" state is issued for the entire logic block if an error occurs at a configured input.
- Logic C is ignored and the signal of Logic A is sent directly to the output if only inputs are configured with Logic A.
- Logic C is ignored and the signal of Logic B is sent directly to the output if only inputs are configured with Logic B.

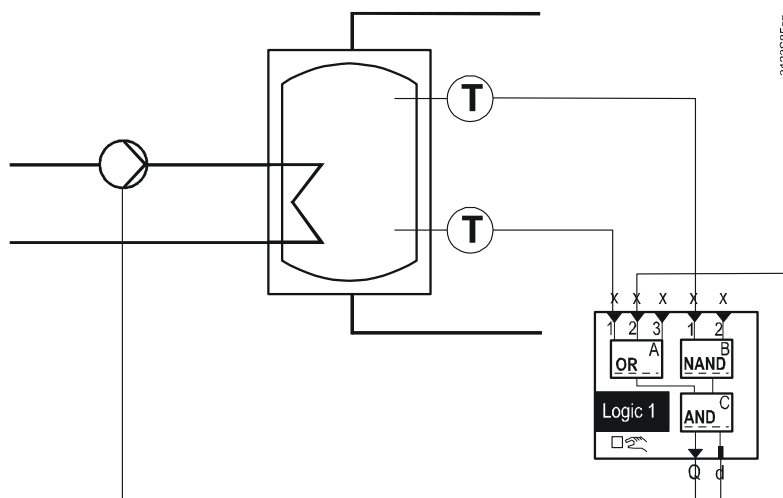
### Processing order

- The logic blocks are processed sequentially in accordance with their instance number, i.e. first Logic 1, then Logic 2.
- The result at Logic block 2 becomes available only upon the next handling cycle if outputs are looped back, e.g. from the output of Logic block 7 to the input of Logic block 2.

## 8.1.11 Application example for storage tank charging

The following application example shows a solution for a self-holding function.

- The measured value connected to Logic A input 1 issues the switch-on command for storage tank charging.
- The measured value at Logic B input 1 terminates charging.

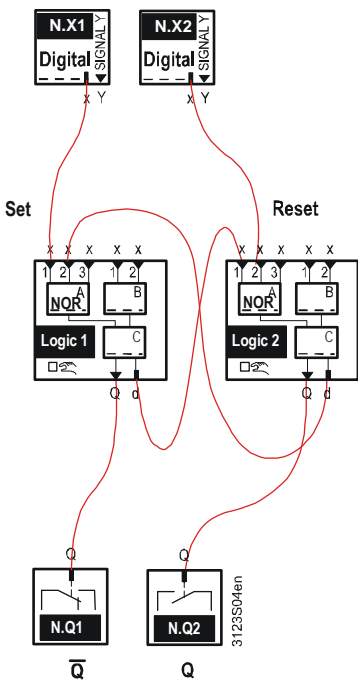


Required configuration and setting values:

Operating line	Comment
[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

### 8.1.12 Application example for RS flip-flop

The following application example shows a solution for an RS flip-flop:



Required configuration:

Operating line	Comment
Logic 1 > [Logic A] function	NOR
Logic 2 > [Logic A] function	NOR

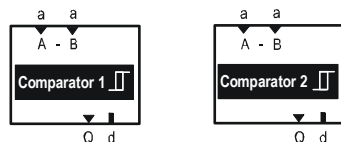
Note

Truth table for RS flip-flop:

Set	Reset	Q	$\overline{Q}$	State
0	0	X	X	Save
0	1	0	1	Reset
1	0	1	0	Set
1	1			Undetermined



## 8.2 Comparator



### Purpose

The comparator helps compare two analog input signals.  
Two comparators are available:

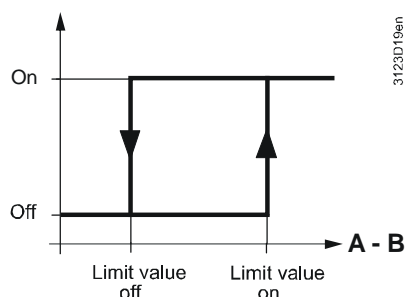
### Function principle

If differential value (A - B) between input A and B:

- Is greater than "Limit value on", the comparator turns on.
- Is smaller than "Limit value off", the comparator turns off.

### Note

A should (normally) be greater than B, as the difference (A - B) is evaluated with preceding sign, and the limit values cannot be set negative.



Min. switch-on and switch-off times can be set for the output signal of the comparator along with a switch-on and switch-off delay.  
These adjustable times are always active (except during wiring tests).

### 8.2.1 Activate comparator

Assign an input to activate the comparator.

### Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Logic functions > Comparator 1...2 >**

Operating line	Adjustable values / Comment	Factory setting
Switching value A	---, X1, X2, ... (analog inputs only)	
Switching value B	---, X1, X2, ... (analog inputs only)	
Comparator relay	---, N.Q1, N.Q2, ... (free outputs only)	
Time format	h:m, m:s	m:s

### Notes

- You can select format "Hours:Minutes" as an extended time format (> 59.59 m.s) for the comparator.  
Important: The changeover impacts all time-related parameters of the comparator (switch-on/off delay and min. switch-on/off time).
- Time format "h:m" offers a 10-minute increment setting range.

## 8.2.2 Assign texts

You can assign a text to each comparator. The text is displayed on the menu and in the operating line.

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

 **Main menu > Settings > Aggregates > Logic functions > Comparator 1...2 >**

Setting values

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Comparator 1...2	Max. 20 characters	Comparator 1...2

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

## 8.2.3 Upper and lower limit value

The comparator switches on when Limit value on is exceeded, and off when the value is below Limit value off.

Setting values

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

 **Main menu > Settings > Aggregates > Logic functions > Comparator 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Limit value on	Depending on selected type.	Type-dependent.
Limit value off	Depending on selected type.	Type-dependent.

## 8.2.4 Switch-on/switch-off delay

You can set a switch-on and switch-off delay for the comparator output.

Setting values

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

 **Main menu > Settings > Aggregates > Logic functions > Comparator 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Switch-on delay	00.00...59.59 m.s <i>or</i> * 00.00...23.50 h.m	00.00 m.s
Switch-off delay	00.00...59.59 m.s <i>or</i> * 00.00...23.50 h.m	00.00 m.s

\* See Notes on the time format in Section 8.2.1

The "Switch-on delay" acts on the switch-on command, the "Switch-off delay" on the switch-off command.

## 8.2.5 Minimum on time

For the comparator output, a minimum on-time can be set, i.e., when a switch-on command is issued, the output remains active at least for the set min. switch-on time.

Setting values

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

 **Main menu > Settings > Aggregates > Logic functions > Comparator 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
On time minimum	00.00...59.59 m.s or* 00.00...23.50 h.m	00.00 m.s

\* See Notes on the time format in Section 8.2.1

The "On time minimum" always takes effect after a switch-on command.

## 8.2.6 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 > Comparator 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Off time minimum	00.00...59.59 m.s or* 00.00...23.50 h.m	00.00 m.s

\* See Notes on the time format in Section 8.2.1

The "Off time minimum" always takes effect after a switch-off command.

## 8.2.7 Display values

Operation displays the output state of the comparator.

Display values

 **Main menu > Aggregates > Comparator 1...2 >**

<i>Operating line</i>	<i>Comment</i>
State	Display of present state: Off, On.
Switching value A	
Switching value B	

## 8.2.8 Wiring test

You can directly switch on and off the comparator's relays during the wiring test.

Wiring test

 **Main menu > Commissioning > Wiring test > Outputs >**

<i>Operating line</i>	<i>Comment</i>
Comparator 1	Off, On
Comparator 2	Off, On

## 8.2.9 Priorities

---

For comparator 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. Comparison of inputs Switching value A and B.

## 8.2.10 Troubleshooting

---

The output for the comparator is set to "Off" when the input values are compared to various units or when there is a sensor error on the input.

## 8.3 Rotary step switch

### Purpose

Use this function to control multi-stage aggregates depending on load *or* control several aggregates and be used as lead/lag control.

You can configure the rotary step switch using a selectable step switch type (3 types available for selection).

The rotary step switch can be configured as:

- **Linear step switch**

- Switch equal stages *or* aggregates with equal output (max.4 per function block).
- Lead/lag control (run priority changeover) with selectable changeover types for the same number of operating hours.

- **Flexible step switch**

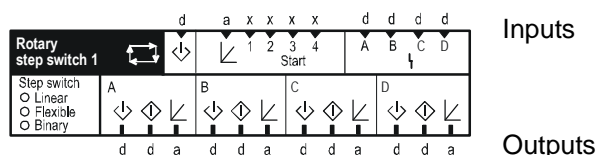
Optimum switching of aggregates with different outputs to ensure that as few aggregates as possible are operating and to achieve optimum control under partial load conditions (max. 4 stages).

- **Binary step switch**

Switching binary stepped aggregates. Max 15 stages can be switched per step switch. 2 step switches combined can switch max. 127 stages.

### Note

Only the linear step switch allows for lead/lag control (run priority changeover).



### Explanation of symbols

<i>Input</i>	<i>Section</i>	<i>Output</i>	<i>Section</i>
↓ Precommand	8.3.8	↓ Precommand	8.3.7
<sup>1 2</sup> Start ↘ Start conditions 1,2,3,4, and continuous	8.3.11	◊ Command	8.3.5
⏏ Fault status message aggregates A,B,C,D	8.3.12	↙ Load	8.3.6

### 8.3.1 Activate block

Activate the rotary step switch by assigning command  $\diamond$  or load  $\angle$  to output A. Do this via the motor block to be connected, the logic block or the continuous output, i.e. from their configuration menus.

See the following example:

Example

Command  $\diamond$  of output A is to act on Logic block 1.

Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Logic functions > Logic 1...10 >**

<i>Operating line</i>	<i>Setting (example)</i>
[Logic A] input 1	[Rot step swi 1A] command

Note the following for output switching:

- Configure the outputs without gap (order A,B,C,D).
- Assign the smallest load to command A in the event of different loads.
- Use the type ("Linear", "Flexible", "Binary") to set the step switch properties.

Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Type	Linear, Flexible, Binary	Linear

### 8.3.2 Linear step switch

#### Load connection

The linear step switch switches the load outputs in equal steps.

The following overview shows configurations for using the linear rotary step switch.

#### Overview of configuration options

##### Modulating load input with switching command outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
	$\swarrow$	$\begin{smallmatrix} 1 & 4 \\ \text{Start} \end{smallmatrix}$	$\diamond$	$\swarrow$	$\diamond$	$\swarrow$	$\diamond$	$\swarrow$	$\diamond$	$\swarrow$	
A+B	a		d		d						Yes
A+B+C	a		d		d		d				Yes
A+B+C+D (Example 1)	a		d		d		d		d		Yes

##### Start conditions with switching command outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
	↙	<sup>1, 4</sup> Start	⬇	↙	⬇	↙	↙	⬇	↙	⬇	
A+B		x	d		d						Yes
A+B+C (Example 2.1)		x	d		d		d				Yes
A+B+C+D (Example 2.2)		x	d		d		d		d		Yes

##### Modulating load input with modulating load outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
	↙	<sup>1, 4</sup> Start	◊	↙	◊	↙	◊	↙	◊	↙	
A+B (Example 3)	a			a		a					Yes
A+B+C	a			a		a		a			Yes
A+B+C+D	a			a		a		a		a	Yes

##### Modulating load input with switching command outputs and modulating load outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
	↙	1 4 Start	↙	↙	↙	↙	↙	↙	↙	↙	
A+B	a		d	a	d	a					Yes
A+B+C (Example 4)	a		d	a	d	a	d	a			Yes
A+B+C+D	a		d	a	d	a	d	a	d	a	Yes

##### Modulating load input with combinations of modulating and switching outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
	$\swarrow$	$\begin{smallmatrix} 1 & 4 \\ \text{Start} \end{smallmatrix}$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	
A+B	a			a	d						No
A+B+C (Example 5)	a			a	d		d				No
A+B+C+D	a			a	d		d		d		No

##### Modulating load input with combinations of modulating and switching outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover	
			A		B		C		D			
	↙	<sup>1-4</sup> Start	⬅	↙	⬅	↙	⬅	↙	⬅	⬅		↙
A+B	a		d	a	d							No
A+B+C (Example 6)	a		d	a	d		d					No
A+B+C+D	a		d	a	d		d		d			No

The following pages provide practical examples, function diagrams, and configuration diagrams for these applications options.

## Application examples

Modulating load input with  
switching command outputs

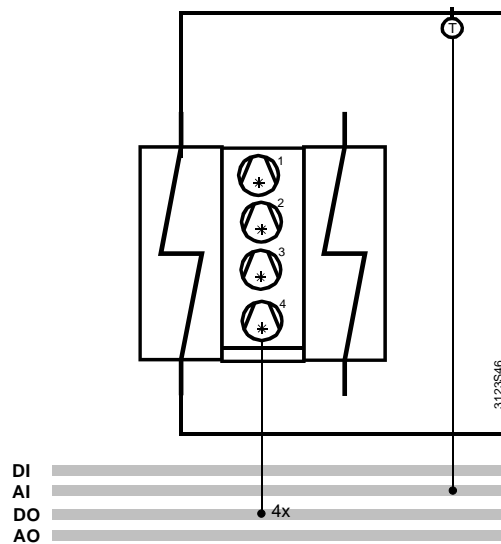
(Example 1)

Number of stages or aggregates	Load input, start condition	Output configuration								Run priority changeover
		A	B	C	D					
A+B+C+D	a	d	d	d	d					Yes

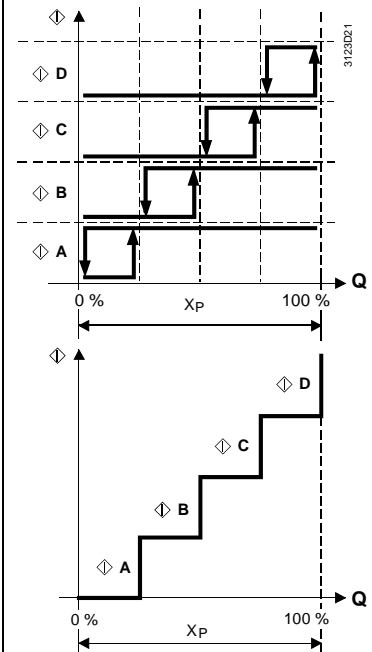
Description:

- Control of refrigeration machine with 4 compressors to outlet temperature.
- Run priority changeover includes changeover incase of fault.

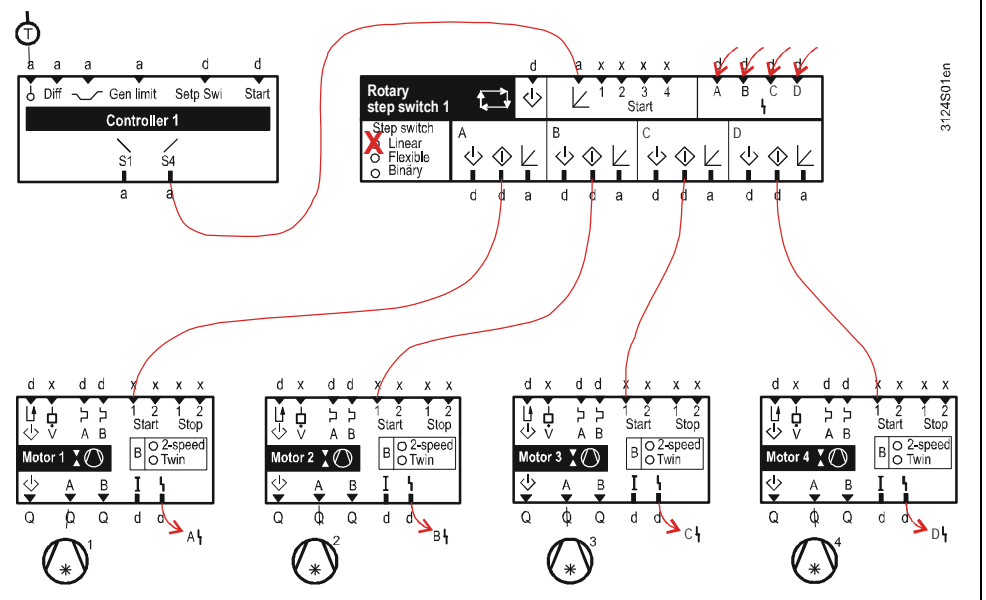
Plant diagram



Function diagram



Configuration diagram



Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Setting
Type	Linear



Start conditions with switching command outputs

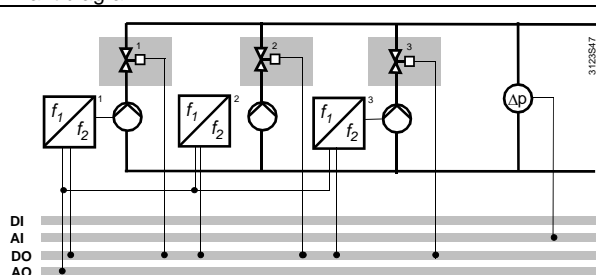
(Example 2.1)

Number of stages or aggregates	Load input, start condition	Output configuration								Run priority changeover
		A		B		C		D		
A+B+C	$\swarrow$ 1 4 Start	d		d		d				Yes

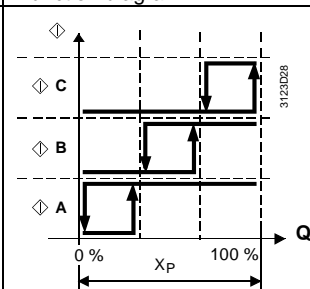
Description:

- 3 pumps controlled by one variable speed drive each.
- Control is on constant network pressure, the pumps are switched on in sequence depending on demand.
- All switched on pumps run at the same speed (parallel operation, common DC 0...10 V output).
- The pumps' run priority changes from time to time to balance out operating hours. .
- The next pump is switched on in the event of a fault (fault changeover).

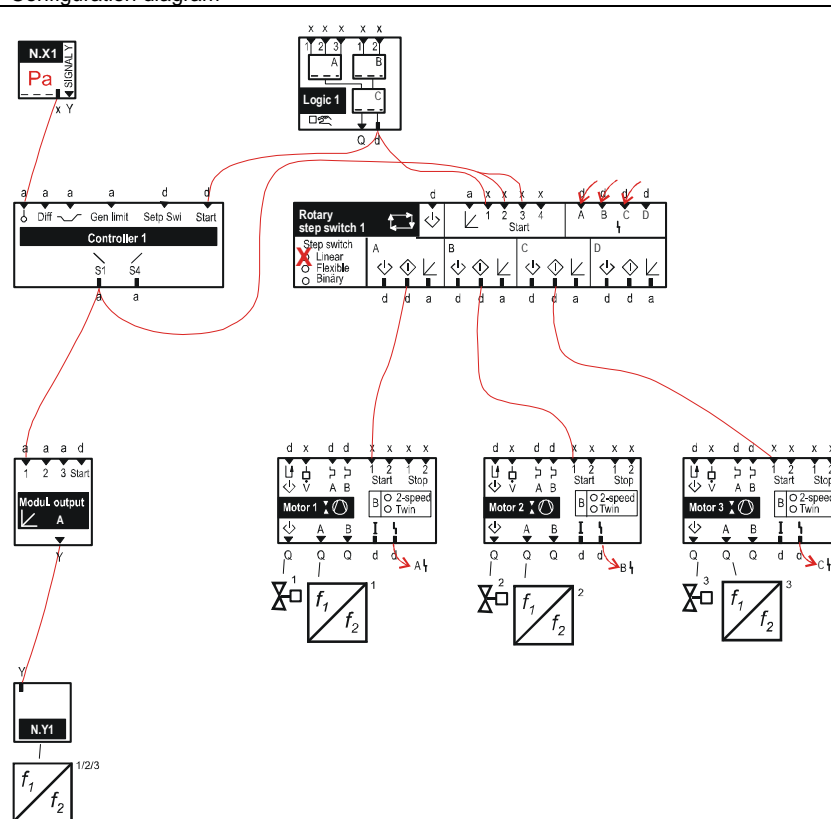
Plant diagram



Function diagram



Configuration diagram \*



\* Start conditions 2 and 3 are configured e.g.:  
 Start condition 2: [Switching value 2] On = 90 %, [Switching value 2] Off = 25 %  
 Start condition 3: [Switching value 3] On = 100 %, [Switching value 3] Off = 40 %  
 (See Section 8.3.11 for more information on start conditions).

Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Setting
Type	Linear

Start conditions with switching command outputs

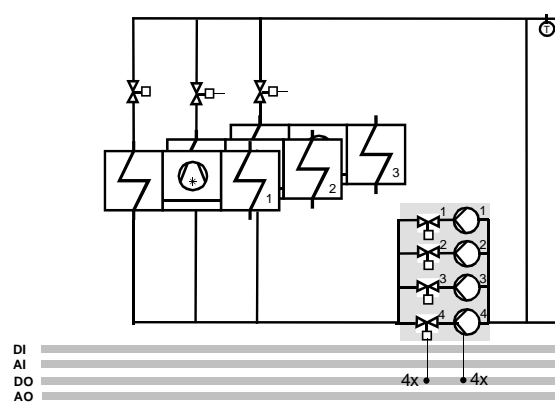
(Example 2.2)

Number of stages or aggregates	Load input, start condition	Output configuration								Run priority changeover
		A	B	C	D					
A+B+C+D	1-4 Start x	d	d	d	d					Yes

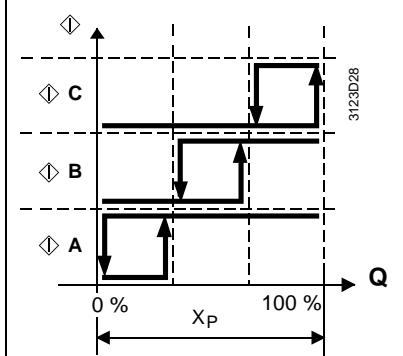
Description:

- 4 evaporator pumps available for 3 single-stage refrigeration machines.
- Max. 3 pumps are operating at the same time (1 standby).
- An evaporator pump is switched on each time a refrigeration machine is released.
- The run priority of the pumps changes periodically between the 4 pumps (first in, first Out).
- The next pump is switched on in the event of a fault (fault changeover).
- The function diagram shows a snapshot: Sequence ABC in operation; A takes priority; D in standby.

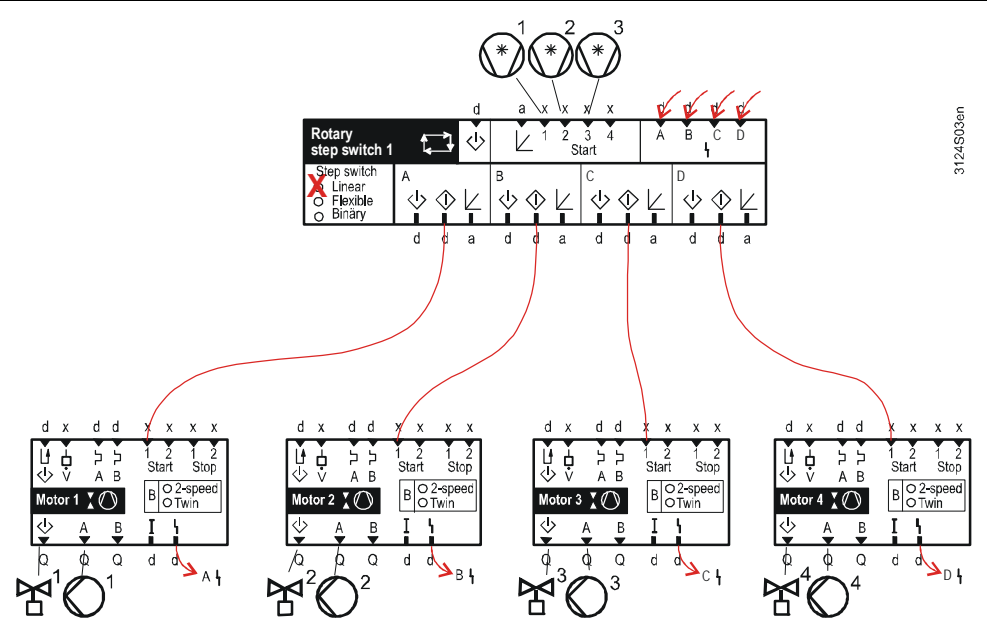
Plant diagram



Function diagram



Configuration diagram \*



\* The start conditions of the rotary step switch are configured as per the refrigeration machine releases.

Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Setting
Type	Linear

Modulating load input with  
modulating load outputs

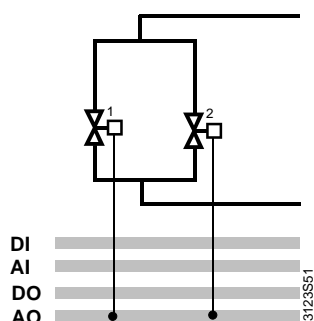
(Example 3)

Number of stages or aggregates	Load input, start condition	Output configuration								Run priority changeover
		A		B		C		D		
A+B	a	a		a						Yes

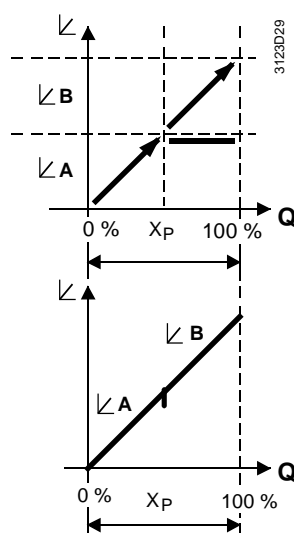
Description:

Control of 2 sequentially switched control valves of the same size and type.

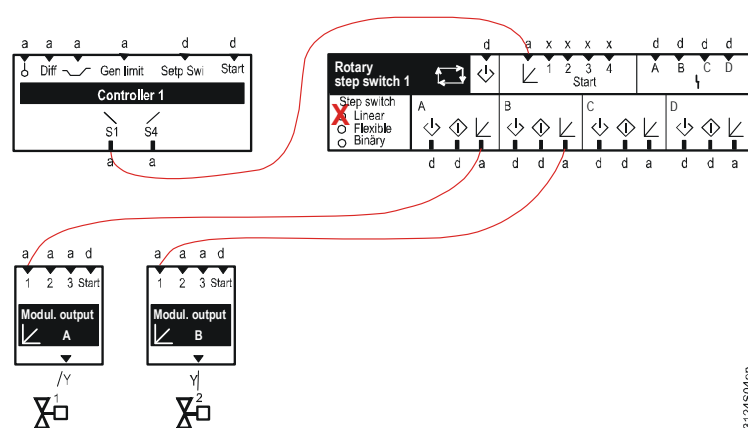
Plant diagram



Function diagram



Configuration diagram



Configuration

**2** Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >

Operating line	Setting
Type	Linear

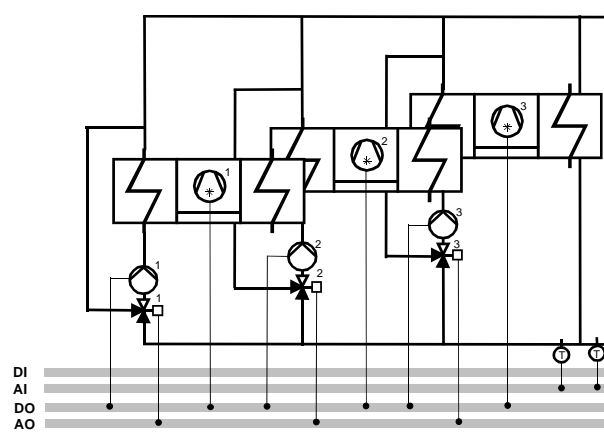
Modulating load input with  
switching command outputs and  
modulating load outputs  
(Example 4)

Number of stages or aggregates	Load input, start condition <div>↙<sup>1 4</sup> Start</div>	Output configuration								Run priority changeover
		A		B		C		D		
		↕	↙	↕	↙	↕	↙	↕	↙	
A+B+C	a		d	a	d	a	d	a		Yes

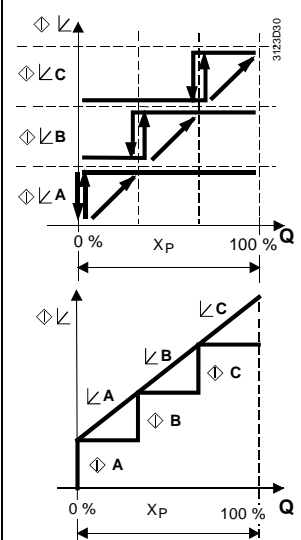
#### Description:

- 3 refrigeration machines with internal, modulating, inlet temperature-dependent output control.
- RMS705B controls to a constant temperature difference at a pressureless header to ensure the direction of flow from cold to hot.
- As a result, the main temperature flow is the same as the refrigeration machines' outlet temperature.
- The water volume is controlled via 3-port valves via evaporators in sequence.
- If more water is demanded, the pump switches on, the refrigeration machine is released, and finally, the 3-port valve opens.
- To balance out the number of operating hours, the run priority of the refrigeration machines follows the first-in, first-out principle.
- The next refrigeration machine is switched on in the event of a fault (fault changeover).

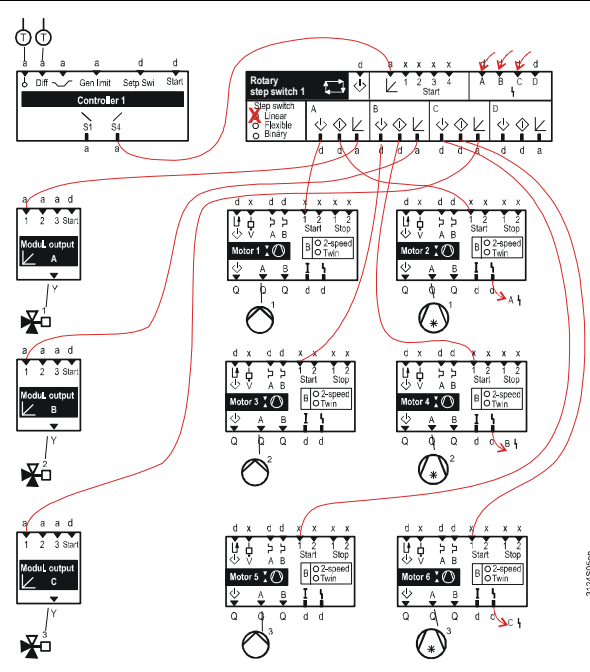
#### Plant diagram



#### Function diagram



#### Configuration diagram



#### Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Setting
Type	Linear

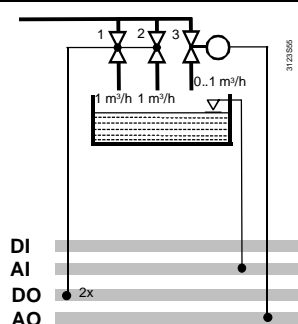
Modulating load input with combinations of modulating and switching outputs

(Example 5)

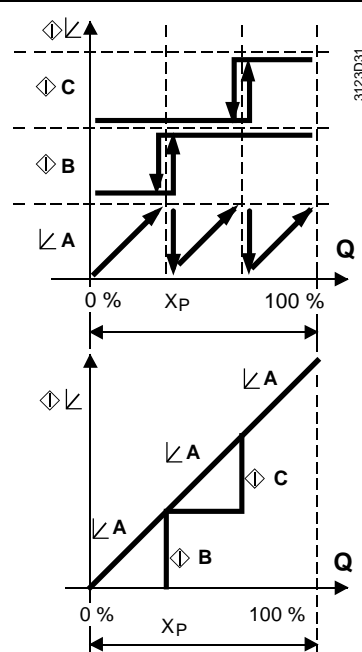
Number of stages or aggregates	Load input, start condition	Output configuration								Run priority changeover
		A		B		C		D		
A+B+C	a	a		d		d				nein

Description:  
Level control with 2 on/off shutoff valves and 1 control valve.

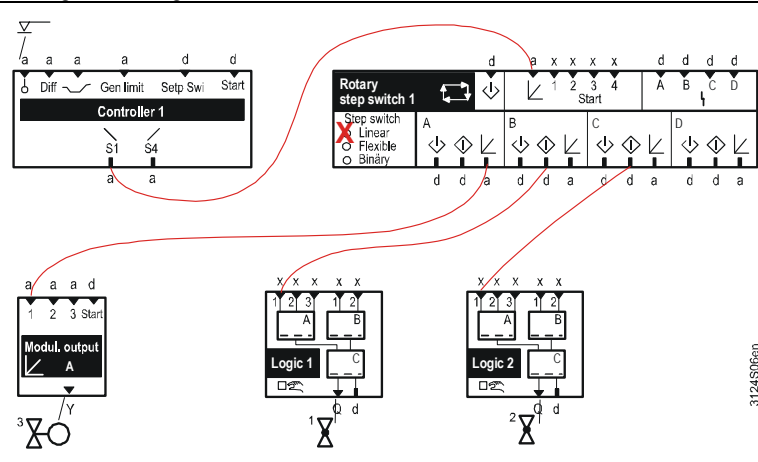
Plant diagram



Function diagram



Configuration diagram



Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

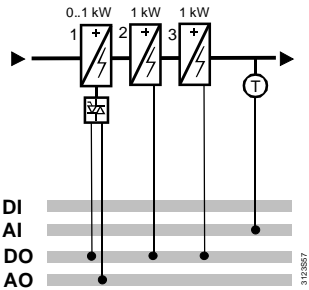
Operating line	Setting
Type	Linear

Modulating load input with combinations of modulating and switching outputs  
(Example 6)

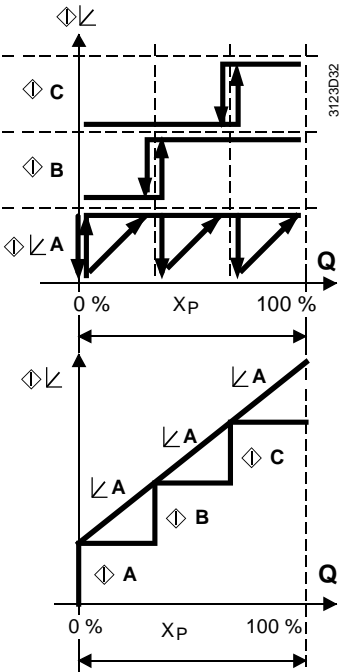
Number of stages or aggregates	Load input, start condition	Output configuration								Run priority changeover
		A		B		C		D		
		⬇	⬇ <sup>1 4</sup> Start	⬇	⬇	⬇	⬇	⬇	⬇	
A+B+C	a	d	a	d		d				nein

Description:  
Supply air temperature control with electric air heater batteries.

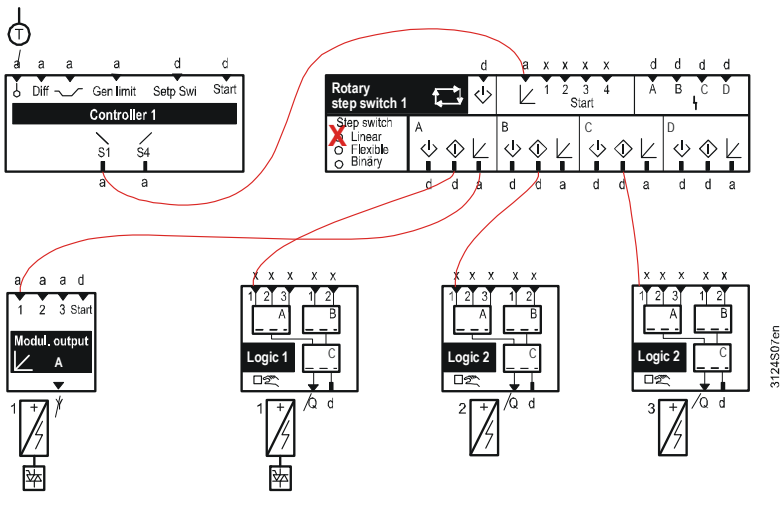
Plant diagram



Function diagram



Configuration diagram



Configuration

**2** Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >

Operating line	Setting
Type	Linear

## Run priority changeover with the linear step switch

Only the linear step switch offers run priority changeover, i.e. when the load outputs have equal-size steps. In addition, the combination of commands  $\diamond$  and load  $\angle$  must be the same for outputs A...D.

Run priority changeover may occur via:

- Sequence selector on the operator unit.
- Periodic changeover (weekly).
- Changeover by operating hours.
- First in first out.

Several changeover types can be activated at the same time.

Changeover is as follows:

Example:

Periodic changeover with 4 aggregates.

Week 1: A, B, C, D

Week 2: B, C, D, A

Week 3: C, D, A, B

Week 4: D, A, B, C

Week 5: A, B, C, D

etc.

Note

The main menu shows which aggregates are part of the changeover at any given time. This display is only available for the linear step switch.

"Rotation priority" shows the aggregate with current run priority.

 **Main menu > Settings > Aggregates > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Comment</i>
Rotation priority	---, Aggregate A, Aggregate B, Aggregate C, Aggregate D
Rotation aggregates	---, A+B, A+B+C, A+B+C+D

Sequence selector on the operator unit.

The sequence selector allows for determining the lead aggregate and the switching sequence applied to the aggregates.

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

 **Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Sequence selection manual	Auto, Aggregate A, Aggregate B, Aggregate C, Aggregate D	Auto

Auto	Automatic change of lead aggregate.
Aggregate A	Sequence <b>A</b> , B, C, D
Aggregate B	Sequence <b>B</b> , C, D, A
Aggregate C	Sequence <b>C</b> , D, A, B
Aggregate D	Sequence <b>D</b> , A, B, C

## Periodic changeover

Periodic changeover set to "Auto" means that weekly periodic changeover of the lead aggregate can be activated.

Periodic changeover balances out the number of operating hours between the individual aggregates.

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

 **Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Changeover day	--- / Monday...Sunday	---
Changeover time	00:00...23:59	04:00

You can set the changeover time (weekday, time) to avoid changeover to another lead aggregate at undesirable times (e.g. weekend).

## Changeover by operating hours

Periodic changeover set to "Auto" means that changeover by operating hours can be activated. In this case, changeover of the lead aggregate occurs in dependence of the lead aggregate's operating hours.

Changeover by operating hours balances out the number of operating hours between the individual aggregates.

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

 **Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Changeover interval	---, 1...1440 h	---

There is no changeover by operating hours if "Changeover interval" is set to "---".

Operating hours changeover can be carried out with *or* without a changeover day and time. To do this, both changeover day and time must be activated.

After a set time, the next aggregate is selected as lead aggregate upon changeover time defined in periodic changeover.

## Note

Operating hours are counted only if:

- Modulating  $\angle$  aggregates are connected.
- Control of the modulating aggregate  $\angle > 80\%$ .

## First in first out

Sequence selector set to "Auto" means that continuous changeover of the lead aggregate can be activated.

The aggregate switched on first is switched off if several aggregates are switched on and the load drops.

First-in first out balances out the number of operating hours between the individual aggregates.

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

 **Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
First in first out	No/Yes	No

With this setting, an additional aggregate can be switched even if the locking time of the aggregate switched off most recently has not yet expired.



## Fault

The corresponding aggregate is switched off in case of fault, and the next available aggregate is switched on. See Section 8.3.12 for the associated configuration.

### 8.3.3 Flexible step switch

#### Switching loads










With the flexible step switch, load outputs are switched on that are capable of covering the current output demand as per their rated output. In contrast to the linear rotary step switch, different rated outputs can be handled per aggregate.

Both minimum output and rated output for the aggregate must be indicated when working with an analog output. The flexible step switch calculates optimum switch-on and switch-off of the individual aggregates for the entire output range.

The following overview shows configurations for using the flexible rotary step switch.

#### Overview of configuration options

Modulating load input with switching command outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
		<sup>1, 4</sup> Start									
A+B	a		d		d						No
A+B+C	a		d		d		d				No
A+B+C+D (Example1)	a		d		d		d		d		No

Start conditions with modulating output

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
	↙ 1 Start	4	↕	↙	↕	↙	↕	↕	↙	↕	
A		x		a							No











Modulating load input with modulating load outputs

Number of stages or aggregates	Load input, start condition <div>↙<sup>1 4</sup>Start</div>		Output configuration								Run priority changeover
			A		B		C		D		
			↕	↙	↕	↙	↕	↙	↕	↙	
A+B	a			a		a					No
A+B+C	a			a		a		a			No
A+B+C+D	a			a		a		a		a	No

Start condition with switching command and modulating load output

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover	
			A		B		C		D			
	↙ 1	↘ 4	Start	↙	↘	↙	↘	↙	↘	↙		↘
A (Example 2)		x	d	a								No

Modulating load input with switching command and modulating load outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
											
A+B (Example 3)	a	<sup>1 4</sup> Start	d	a	d	a					No
A+B+C	a		d	a	d	a	d	a			No
A+B+C+D	a		d	a	d	a	d	a	d	a	No

The following pages provide practical examples, function diagrams, and configuration diagrams for these applications options.

## Application examples

Modulating load input with  
switching command outputs

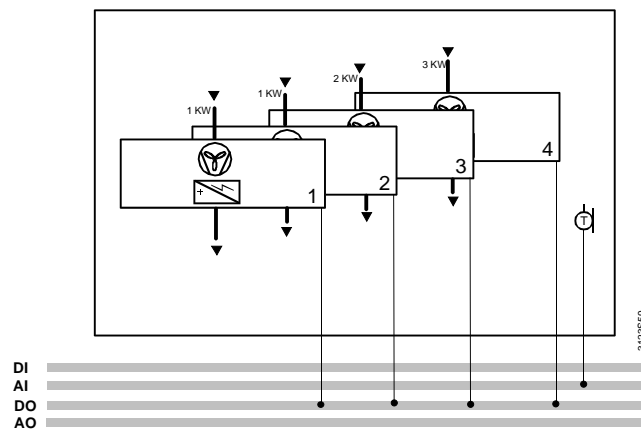
(Example 1)

Number of stages or aggregates	Load input, start condition	Output configuration								Run priority changeover
		A	B	C	D					
A+B+C+D	a	d	d	d	d					No

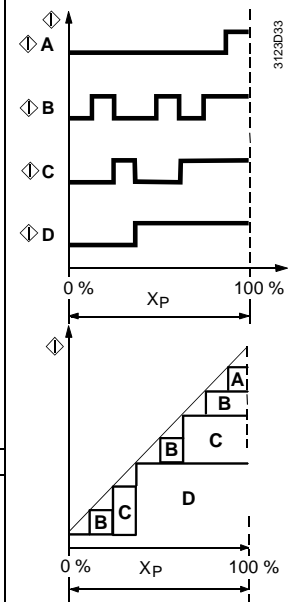
Description:

- Several recirculated air heaters with different capacities are controlled to room temperature.
- Rated outputs for the 4 aggregates controlled digitally by the flexible step switch: Aggregate A = 1 kW, Aggregate B = 1 kW, Aggregate C = 2 kW, Aggregate D = 3 kW.
- The total output at  $X_P = 100\%$  is 7 kW.

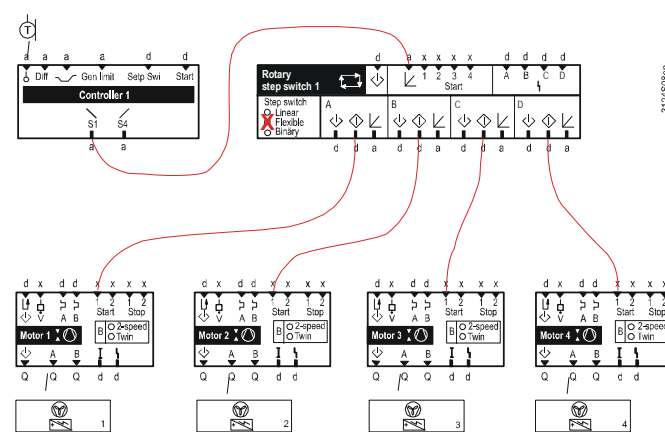
Plant diagram



Function diagram



Configuration diagram



Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Setting
Type	Flexible

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

**Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Range	Setting
Output A	0.1...999.9	1.0
Output B	0.1...999.9	1.0
Output C	0.1...999.9	2.0
Output D	0.1...999.9	3.0

Start condition with switching command and modulating load output

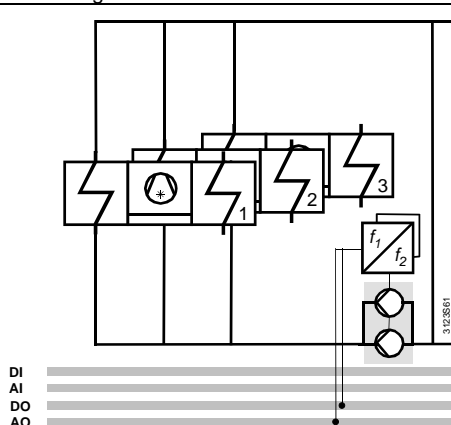
(Example 2)

Number of stages or aggregates	Load input, start condition <div>⌞<sup>1 4</sup>Start</div>	Output configuration								Run priority changeover
		A		B		C		D		
		⌞	⌞	⌞	⌞	⌞	⌞	⌞	⌞	
A	x	d	a							No

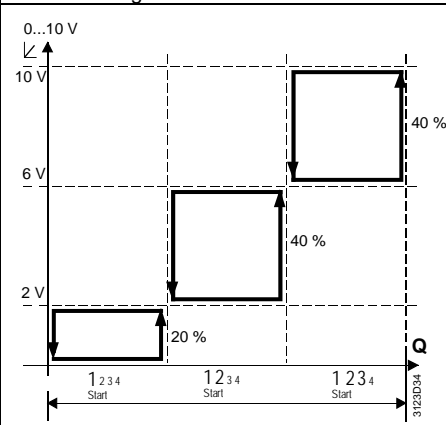
Description:

- Step-wise control of a modulating aggregate (pump, digital/analog conversion).
- 3 refrigeration machines (1-stage) use a common twin evaporator pump (with integrated variable speed drive) for changeover operation (2 x 100%) with internal run priority changeover.
- Pump(s) control comprises release and a DC 0...10 V signal for three adjustable steps.
- The function diagram shows one sample setting for the steps.

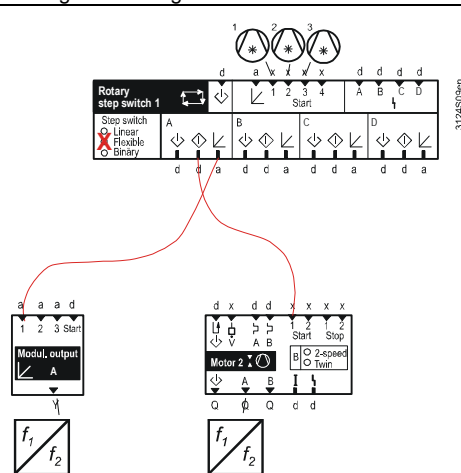
Plant diagram



Function diagram



Configuration diagram \*



\* The start conditions are configured as per the refrigeration machine releases.

Configuration

**2** Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >

Operating line	Setting
Type	Flexible

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

**2** Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >

Operating line	Setting
[Switching value 1] load	20 %
[Switching value 2] load	40 %
[Switching value 3] load	40 %
Min output A	0.0
Output A	1.0

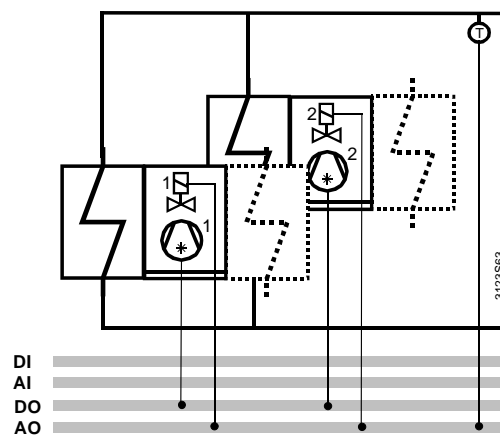
Modulating load input with  
switching command and  
modulating load outputs  
(Example 3)

Number of stages or aggregates	Load input, start condition <div>↙<sup>1 4</sup> Start</div>	Output configuration								Run priority changeover	
		A		B		C		D			
		↙	↘	↙	↘	↙	↘	↙	↘		
A+B	a			d	a	d	a				No

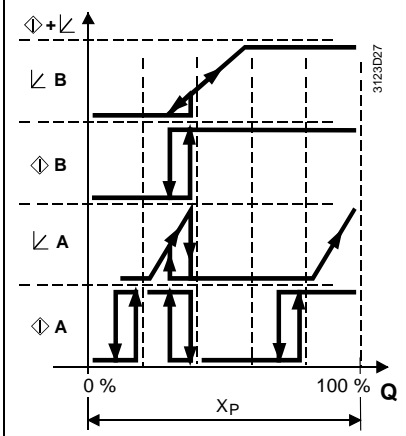
**Description:**

- 2 refrigeration machines with different capacities have an internal output control (e.g. hot gas bypass) controlled in sequence to a common flow temperature.
- Typical capacity profile: Aggregate A (min. output = 0.5 kW, rated output = 3 kW), Aggregate B (min. output 1 kW; rated output 6 kW).
- The total output at  $X_P = 100\%$  is 9 kW.

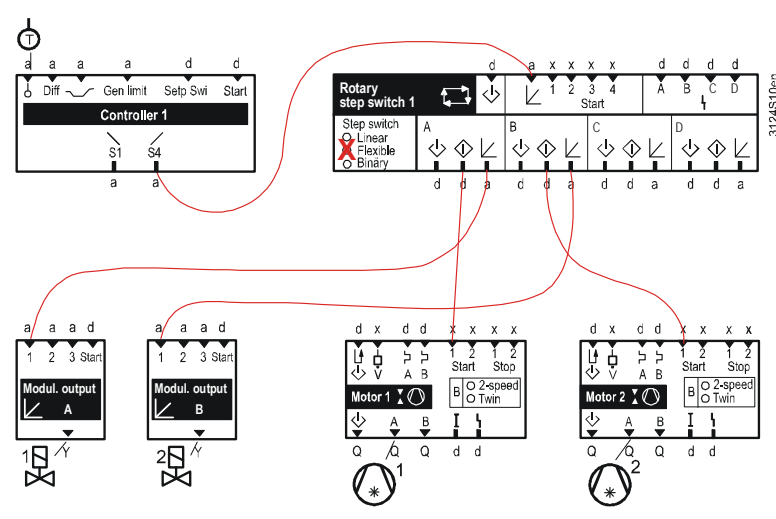
**Plant diagram**



**Function diagram (not to dimensions)**



**Configuration diagram**



**Configuration**

**2 Main menu > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Setting
Type	Flexible

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

**2 Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Range	Setting
Output A	0.1...999.9	3.0
Min output A	0.0...999.9	0.5
Output B	0.1...999.9	6.0
Min output B	0.0...999.9	1.0

## Load assignment (flexible step switch only)

With the flexible step switch, assign the load to the aggregates so that as few aggregates as possible are operating and optimum control is achieved under partial load conditions.

To this end, the output values of each connected aggregate must be set in the rotary step switch.

The mini. output (0% of the load signal) and output (100% of the load signal) must be set if the load output configuration is (L).

The rotary step switch then distributes the load on the aggregates.

Set and connect the aggregates as follows:

### Output Aggregate A ≤ Aggregate B ≤ Aggregate C ≤ Aggregate D

As shown in the examples below, the **ratio** of the loads determines the actual output in the RMS705B. Sometimes however, it is easier for the commissioning engineer, to set effective output.

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

 **Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Min output A	0.0...999.9	0.0
Output A	0.1...999.9	1.0
Min output B	0.0...999.9	0.0
Output B	0.1...999.9	1.0
Min output C	0.0...999.9	0.0
Output C	0.1...999.9	1.0
Min output D	0.0...999.9	0.0
Output D	0.1...999.9	1.0

#### Setting example 1

Output Aggregate A = 50 kW, Aggregate B = 100 kW

- Expressed in kW:

<i>Operating line</i>	<i>Setting</i>
Output A	50.0
Output B	100.0

- or as ratio:

<i>Operating line</i>	<i>Setting</i>
Output A	1.0
Output B	2.0

#### Setting example 2

Output Aggregate A = 5 kW, Aggregate B = 5 kW

- Expressed in kW:

<i>Operating line</i>	<i>Setting</i>
Output A	5.0
Output B	5.0

- or as ratio:

<i>Operating line</i>	<i>Setting</i>
Output A	1.0
Output B	1.0

### 8.3.4 Binary step switch

Use the binary step switch to switch multistage aggregates. Size the aggregates according to the binary load distribution.

#### Notes

- With the binary step switch, run priority changeover is not possible.
- Connect a modulating load signal to the output at aggregate A ( $\angle A$ ).

#### Load assignment

In the binary step switch, digital outputs and number of load steps are assigned as per the tables below to the entire switching capacity of the aggregate.

– If configured **without** modulating output:

Configured outputs	Load assignment				Number of load steps
	Cmd $\diamond A$	Cmd $\diamond B$	Cmd $\diamond C$	Cmd $\diamond D$	
0 $\angle +2 \diamond$	$\diamond A = 1/3$	$\diamond B = 2/3$			3
0 $\angle +3 \diamond$	$\diamond A = 1/7$	$\diamond B = 2/7$	$\diamond C = 4/7$		7
0 $\angle +4 \diamond$	$\diamond A = 1/15$	$\diamond B = 2/15$	$\diamond C = 4/15$	$\diamond D = 8/15$	15

– If configured **with** a modulating output:

Configured outputs	Load assignment				Number of load steps
	Load $\angle A$	Cmd $\diamond B$	Cmd $\diamond C$	Cmd $\diamond D$	
1 $\angle +2 \diamond$	$\angle A = 1/4$	$\diamond B = 1/4$	$\diamond C = 2/4$		4
1 $\angle +3 \diamond$	$\angle A = 1/8$	$\diamond B = 1/8$	$\diamond C = 2/8$	$\diamond D = 4/8$	8

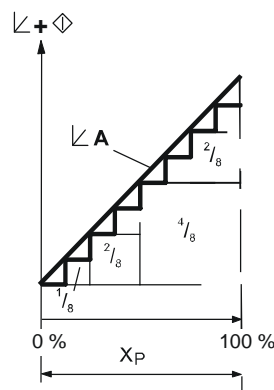
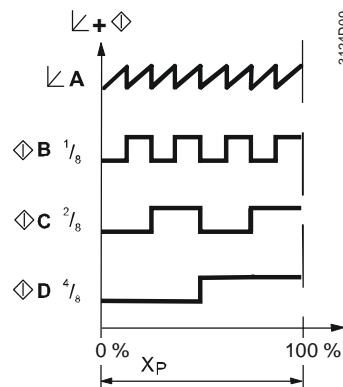
#### Key

0  $\angle$  = No modulating output.

1  $\angle$  = 1 modulating output.

#### Load assignment

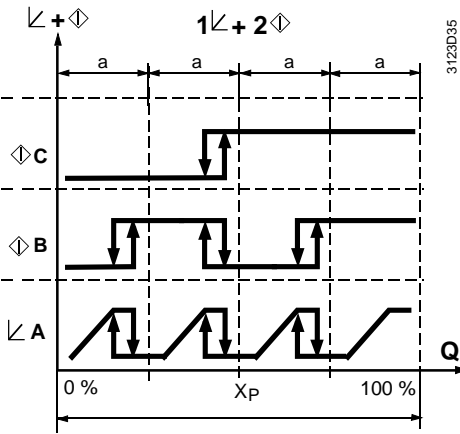
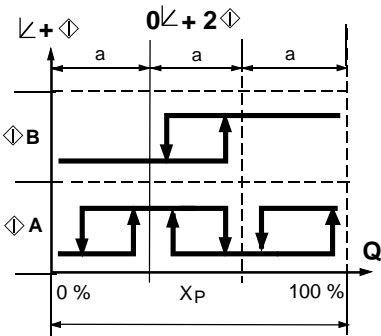
Load assignment applies the following pattern:



Example

With 2 digital outputs

With 2 digital outputs and 1 modulating output



The following overview shows configurations for using the binary rotary step switch.

Overview of configuration options

Modulating load input with switching command outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
	$\swarrow$	$\begin{smallmatrix} 1, 4 \\ \text{Start} \end{smallmatrix}$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	$\swarrow$	
A+B	a		d		d						No
A+B+C	a		d		d		d				No
A+B+C+D (Example1)	a		d		d		d		d		No

Modulating load input with combinations of modulating and switching outputs

Number of stages or aggregates	Load input, start condition		Output configuration								Run priority changeover
			A		B		C		D		
	$\swarrow$	$\begin{smallmatrix} 1 & 4 \\ \text{Start} \end{smallmatrix}$	$\diamond$	$\swarrow$	$\diamond$	$\swarrow$	$\diamond$	$\swarrow$	$\diamond$	$\swarrow$	
A+B	a			a	d						No
A+B+C (Example2)	a			a	d		d				No
A+B+C+D	a			a	d		d		d		No

Modulating load input with combinations of modulating and switching outputs

Number of stages or aggregates	Load input, start condition <div><div>↙</div><div>1 4 Start</div></div>		Output configuration								Run priority changeover
			A		B		C		D		
	<div>↗</div>	<div>↘</div>	<div>↗</div>	<div>↘</div>	<div>↗</div>	<div>↘</div>	<div>↗</div>	<div>↘</div>	<div>↗</div>	<div>↘</div>	
A+B	a		d	a	d						No
A+B+C	a		d	a	d		d				No
A+B+C+D	a		d	a	d		d		d		No

The following pages provide practical examples, function diagrams, and configuration diagrams for these applications options.

## Application examples

Modulating load input with  
switching command outputs

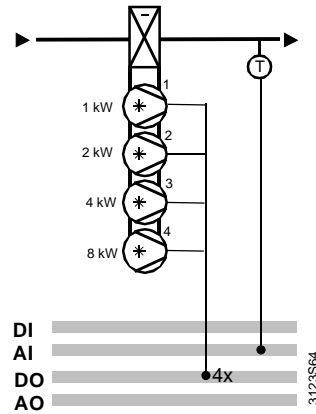
(Example 1)

Number of stages or aggregates	Load input, start condition <div>↙<sup>1 4</sup> Start</div>		Output configuration								Run priority changeover
			A		B		C		D		
			↙	↘	↙	↘	↙	↘	↙	↘	
A+B+C+D	a		d		d		d		d		No

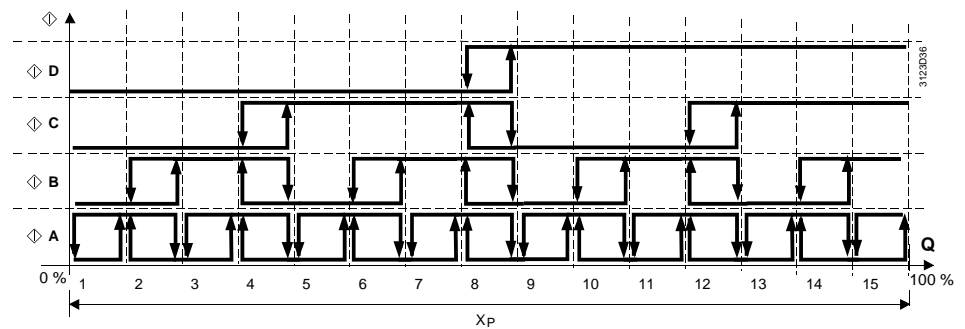
Description:

Supply air temperature control with direct evaporator (4 different-sized compressors).

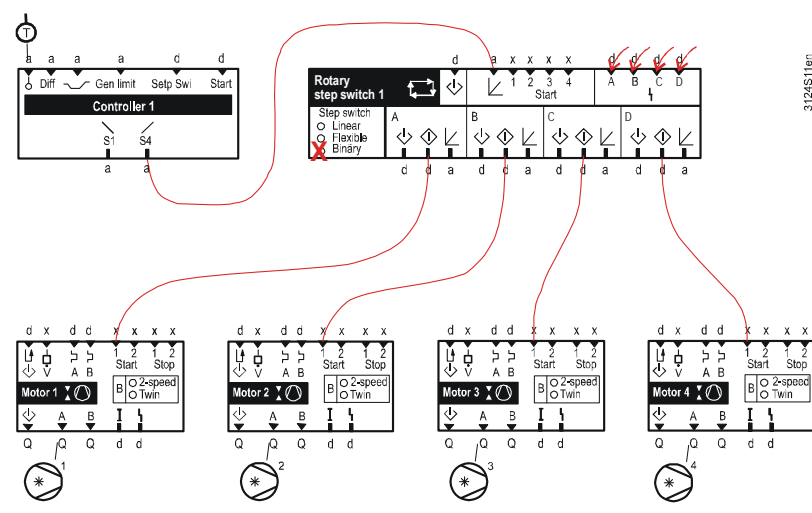
Plant diagram



Function diagram (not to dimensions)



Configuration diagram



Configuration

**2** Main menu > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >

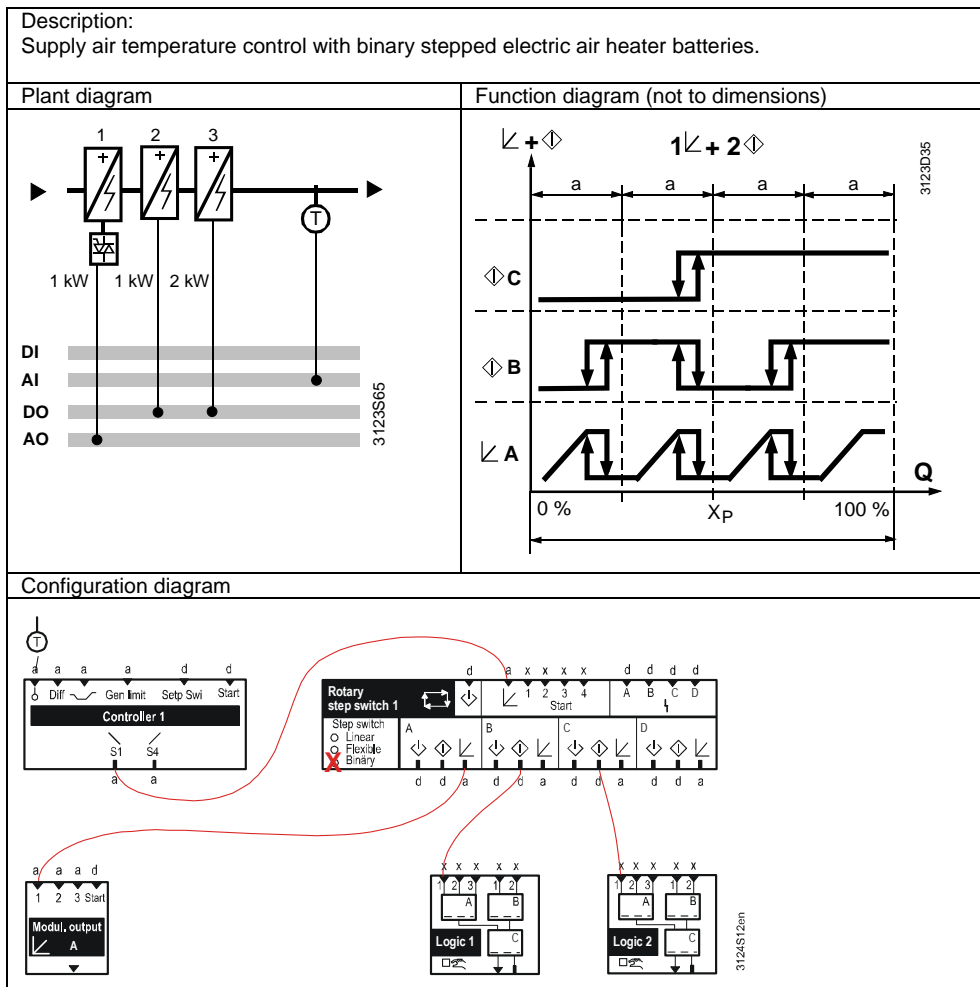
Operating line	Setting
Type	Binary



Modulating load input with combinations of modulating and switching outputs

(Example 2)

Number of stages or aggregates	Load input, start condition	Output configuration								Run priority changeover
		A	B	C	D					
A+B+C	a	a	d	d						No



Configuration

**Main menu > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

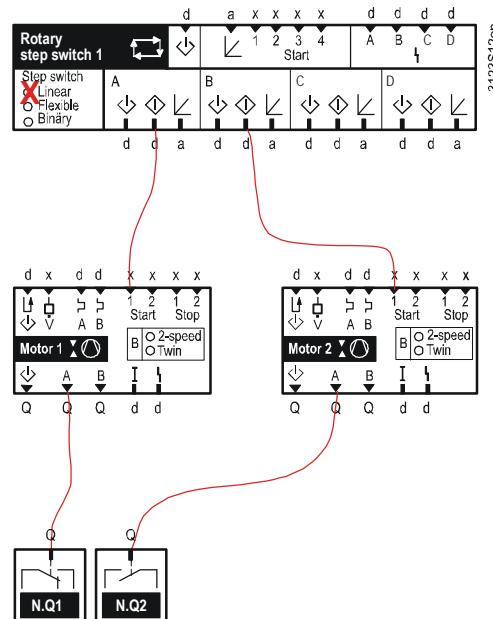
Operating line	Setting
Type	Binary

### 8.3.5 Command (◊)

An aggregate is controlled via command output A...D (◊).

Normally, the command output sends the signal via the motor block to output terminal Q(x).

#### Example



You can set for all steps a common "Runup delay", "Locking time", and "Restart time" for the command output.

#### Setting values

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

**2** Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >

Operating line	Range	Factory setting
Runup delay	00.00...59.59 m.s	00.05 m.s
Locking time	00.00...59.59 m.s	00.00 m.s
Restart time	00.00...59.59 m.s	00.00 m.s

#### Run-up delay

This delay ensures that during run-up between the stages, the next step can be switched on only after the set run-up delay. This ensures that e.g. a step of the refrigeration machine is run up before the next stage of the refrigeration machine is switched on.

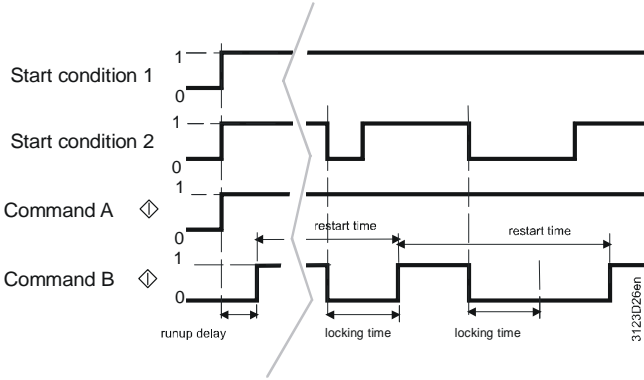
#### Locking time

This ensures that a step that has just switched off remains off for the set period of time. As a result, the compressor e.g. remains switched off for the set time.

#### Restart time

Ensures that the aggregate can restart after expiration of the set time. The time begins from the moment the aggregate is switched on. This ensures, e.g. that the heat pump restarts only after a set time.

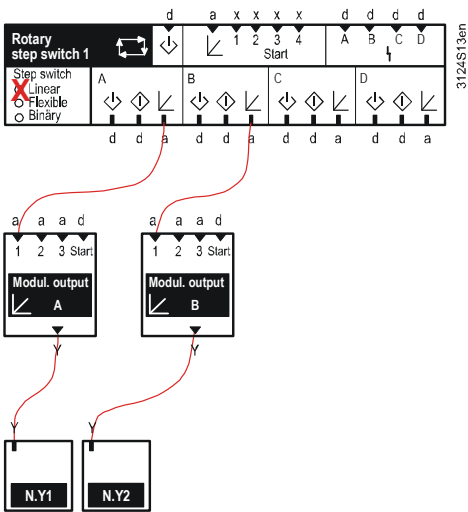
Function diagram



8.3.6 Load (↙)

The load signal (↙) 0...100 % allows for controlling a modulating aggregate. The signal is sent to the terminals Y(x) via a modulating output block.

Example



8.3.7 Precommand output (↘)

Use a precommand output to first start an aggregate (e.g. a pump must be switched on before the refrigeration machine can switch on). This command can be simultaneous or delayed by "Precommand runup time" using the precommand. After switching off the command, the precommand also switches off after an adjustable "Precommand rundown time" (see 2<sup>nd</sup> example in Section 8.3.8).

Setting values

- Main menu > Commissioning > Settings > .... or
- Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >

Operating line	Range	Factory setting
Precommand runup time	00.00...59.59 m.s	00.00 m.s
Precommand rundown time	00.00...59.59 m.s	00.00 m.s

Notes

- Use the precommand output ↘ together with command ⬆.
- "Precommand runup time" and rundown time apply to all aggregates (A...D).

### 8.3.8 Precommand input (↓)

"Precommand input" helps to enable the first precommand output (of the step switch) of the rotary step switch. For example, the evaporator pump of the first refrigeration machine can be switched to enable the flow sensor to acquire the correct flow temperature.

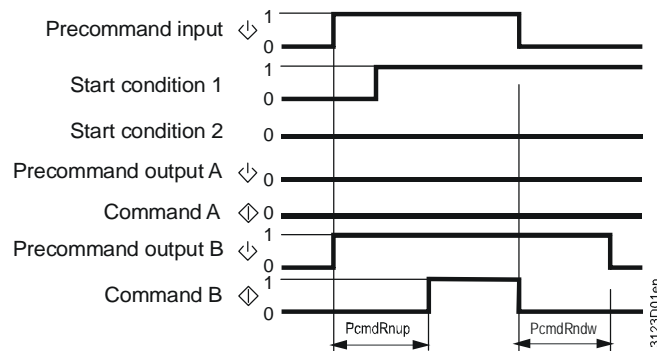
- The precommand output of the aggregate switches on at current priority if run priority changeover (linear rotary step switch) is enabled.
- The precommand input acts on precommand A during normal operation on all other rotary step switches.

#### Notes

- Aggregates can switch on only if there is a precommand and after the precommand switch-on time is expired if the precommand input is configured.
- The precommand input can be used as a release for the rotary step switch. It is active also if no precommand is configured. As a result, the aggregates switch on only if the precommand input issues a release.

#### Example

Switch-on sequence (current priority aggregate B):



PcmdRnup = Precommand runup time

PcmdRndw = Precommand rundown time

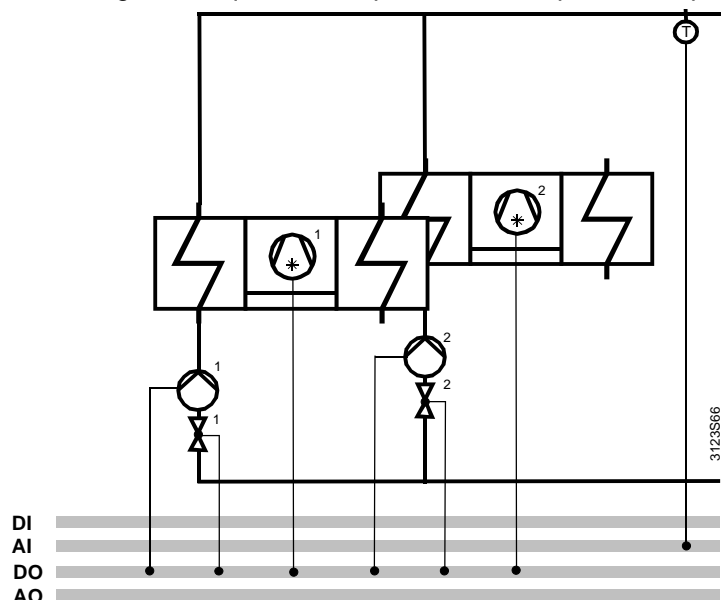
#### Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

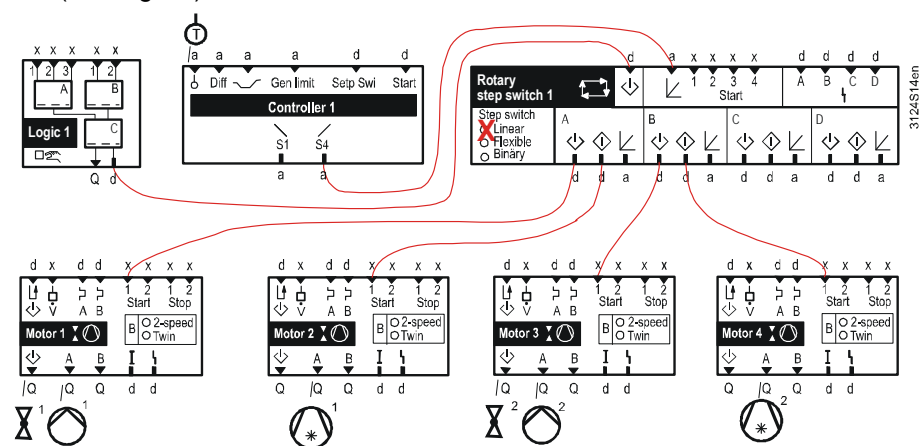
Operating line	Adjustable values / Comment
Precommand input	---, X1, X2, ...

Example for  
precommand output and  
input

Plant diagram: Sequence with precommand input and output.



Configuration diagram: The precommand input e.g. is switched via signal "Plant on" (via Logic 1).



### 8.3.9 Inputs for load-dependent switching

The rotary step switch provides various options to define load. You can use load input  $\angle$ , start conditions 1...4, or a combination of both. The result, which acts on the rotary step switch as a signal, depends on the type of rotary step switch.

Load input $\angle$	Start condition 1..4	Types	Signals acting on the rotary step switch
X	--	Linear Flexible Binary	Load ( $\angle$ )
--	X	Linear	Number of switched on start conditions = Number of started aggregates
X	X	Linear	Max. selection between load $\angle$ and number of switched-on start conditions * (100/number of aggregates)
X	X	Flexible Binary	Max. selection between load $\angle$ and $\Sigma$ [switching value n] load
--	X	Flexible Binary	$\Sigma$ [switching value n] load

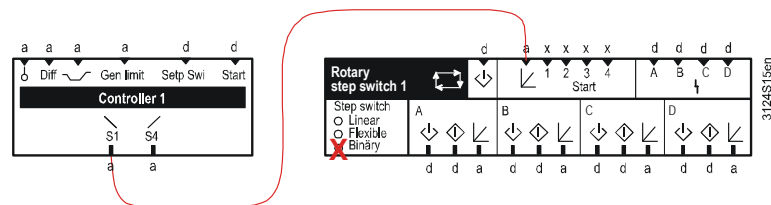
### 8.3.10 Load input $\angle$

Load signal 0...100% is provided to the rotary step switch via load input ( $\angle$ ) for the step switch function.

Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

Operating line	Adjustable values / Comment
Load input	---, X1, X2, ...



### 8.3.11 Start condition 1, 2, 3, 4

The start condition inputs are required to:

- Define the load from several signals to start several aggregates.
- Generate an analog load signal from several signals.

#### Note

The start conditions are not evaluated until the precommand input is On if a precommand input is configured and the precommand input state is Off.

#### Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Start condition 1	---, X1, X2, ...
Start condition 2	---, X1, X2, ...
Start condition 3	---, X1, X2, ...
Start condition 4	---, X1, X2, ...

#### Setting values

You can set "[switching value n] On" and "[switching value n] Off" for inputs "Start condition 1..4" to create a digital signal from a modulating signal.

Enter the value in percent that is to be effective during switch-on of the corresponding start condition via "[switching n] load".

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

 **Main menu > Settings > Aggregates > Rotary step switch > Rotary step switch 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
[Switching value 1] on	Depending on selected type	Type-dependent
[Switching value 1] off	Depending on selected type	Type-dependent
[Switching value 1] load	0...100 %	25 %
[Switching value 2] on	Depending on selected type	Type-dependent
[Switching value 2] off	Depending on selected type	Type-dependent
[Switching value 2] load	0...100 %	25 %
[Switching value 3] on	Depending on selected type	Type-dependent
[Switching value 3] off	Depending on selected type	Type-dependent
[Switching value 3] load	0...100 %	25 %
[Switching value 4] on	Depending on selected type	Type-dependent
[Switching value 4] off	Depending on selected type	Type-dependent
[Switching value 4] load	0...100 %	25 %

### 8.3.12 Fault message for aggregates (A...D)

You can configure a fault message for aggregates A...D if you want the aggregate to switch off in a controlled manner in the event of a fault. Changeover selects the next available aggregate in the linear rotary step switch.

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Fault status message A	---, X1, X2, ...
Fault status message B	---, X1, X2, ...
Fault status message C	---, X1, X2, ...
Fault status message D	---, X1, X2, ...

The aggregate's priority is assigned without delay as per the run priority plan if a fault message is removed after troubleshooting the aggregate. This may result in changeover of the aggregates depending on the assigned priority.

### 8.3.13 Functional check

The current state of the rotary step switch is displayed on the operator unit.

<i>Operating line</i>	<i>Comment</i>
[Rot step swi 1A] precommand	Off/On.
[Rot step swi 1A] command	Off/On.
[Rot step swi 1A] load	0...100 %
[Rot step swi 1B] precommand	Off/On.
[Rot step swi 1B] command	Off/On.
[Rot step swi 1B] load	0...100 %
[Rot step swi 1C] precommand	Off/On.
[Rot step swi 1C] command	Off/On.
[Rot step swi 1C] load	0...100 %
[Rot step swi 1D] precommand	Off/On.
[Rot step swi 1D] command	Off/On.
[Rot step swi 1D] load	0...100 %

### 8.3.14 Assign texts

You can assign a text to each rotary step switch. The text is displayed on the menu and in the operating line.

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Rotary step switch 1	Max. 20 characters	Rotary step switch 1

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

### 8.3.15 Troubleshooting

Run priority changeover is reset and started on the set default value following power failure.



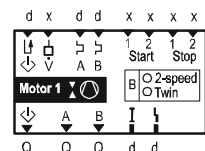
## 8.4 Motor

### Purpose

The motor block controls and monitors all motor functions. Six independent motor blocks are available.

There are 3 different types:

- 1-speed motor (pump, fan)
- 2-speed motor (fan)
- Twin motor (twin motor, twin pump)



Inputs

Outputs

### Explanation of symbols

Input	Section	Output	Section
Precommand checkback signal	8.4.9	Precommand	8.4.8
Flow signal	8.4.6	Motor A, Motor B output	8.4.1
Motor A-, Motor B-Overload signal	8.4.7	Motor operating state	8.4.10
Start condition 1, Start condition 2	8.4.12	Motor fault	8.4.11
Stop condition 1, Stop condition 2	8.4.12		

### Control and supervision functions

For optimum control and supervision, the motor block in RMS705B offers the following functions for all motor types:

- Adjustable delay times (Section 8.4.5).
- Switch-on to outside temperature for 1-speed motor and twin motor (Section 8.4.13).
- Selectable motor kick (Section 8.4.14).
- Assignable text (Section 8.4.17).
- Assignable fault texts (various sections).
- Operating hours count (Section 8.4.18).

## 8.4.1 Enabling and motor block type

Enable the motor block by assigning the corresponding outputs and determining the type for motor B.

Valid configurations:

Motor	Configuration point	Setting
1-speed motor	Motor A Motor B Motor B type	Qx --- (not relevant)
2-speed motor	Motor A Motor B Motor B type	Qx Qx 2-speed
Twin motor	Motor A Motor B Motor B type	Qx Qx Twin motor

A 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 > Motor > Motor 1...6 >**

Operating line	Range	Factory setting
Motor A	---, N.Q1, N.Q2, ... (free outputs only)	
Motor B	---, N.Q1, N.Q2, ... (free outputs only)	
Motor B type	2-speed, Twin motor	2-speed

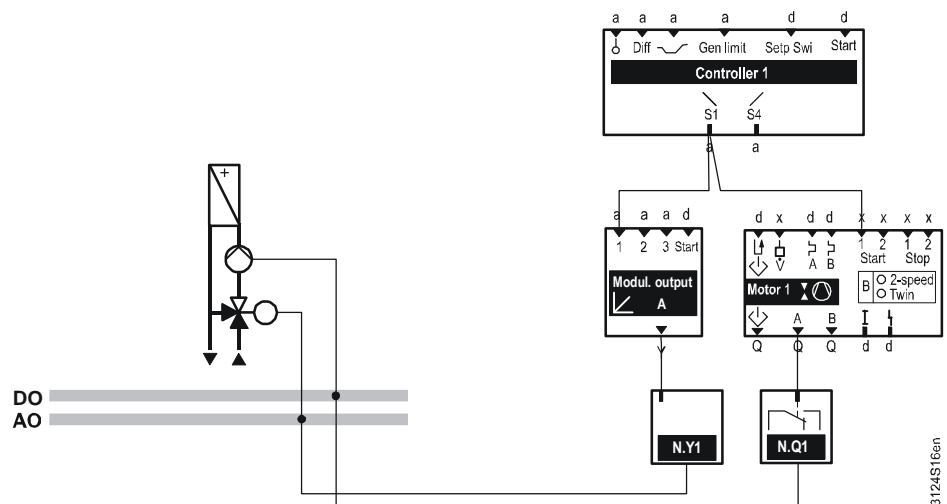
## 8.4.2 1-speed motor

Purpose

Use the single-speed motor to control a pump, a single-speed fan *or* any other aggregate.

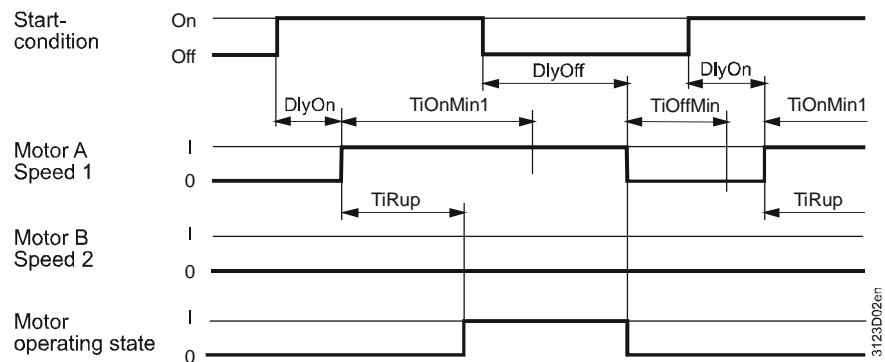
Example

Pump control via 1-speed motor.



Control sequence

Run-up and switch-off of the 1-speed motor. Switch-on delay, switch-off delay, min. switch-on time and min. switch-off time are considered.



#### Key

TiRup = Runup time  
 DlyOn = Switch-on delay  
 DlyOff = Switch-off delay  
 TiOnMin1 = On time minimum, speed 1  
 TiOffMin = Off time minimum

You can set a run-up time for the 1-speed motor. The motor operating state is indicated after the run-up time expires.

#### Settings

Main menu > Commissioning > Settings > .... or  
 Main menu > Settings > Aggregates > Motor > Motor 1...6 >

Operating line	Range	Factory setting
Runup time	00.00...59.59 m.s	00.10 m.s

### 8.4.3 2-speed motor

#### Purpose

Use the 2-speed motor to control a 2-speed fan.

#### Special control functions

In addition to default functions, RMS705B offers special control functions to optimally control a 2-speed motor:

- Locking speed 2 at low outside temperatures.
  - Speed 2 is released again if the outside temperature exceeds the set value by 2 K.
  - Set the corresponding value to "----" if you do not want locking by outside temperature.
- Speed locking; switch-on for the two speeds is mutually exclusive.
- 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, speed 2 is switched off and speed 1 is switched on only after the "Rundown time" is over.
- If outside and exhaust air shutoff dampers (spring return motors) are used, use "Precommand rundown time" for the precommand to ensure that the dampers do not close while the fan is still coasting.

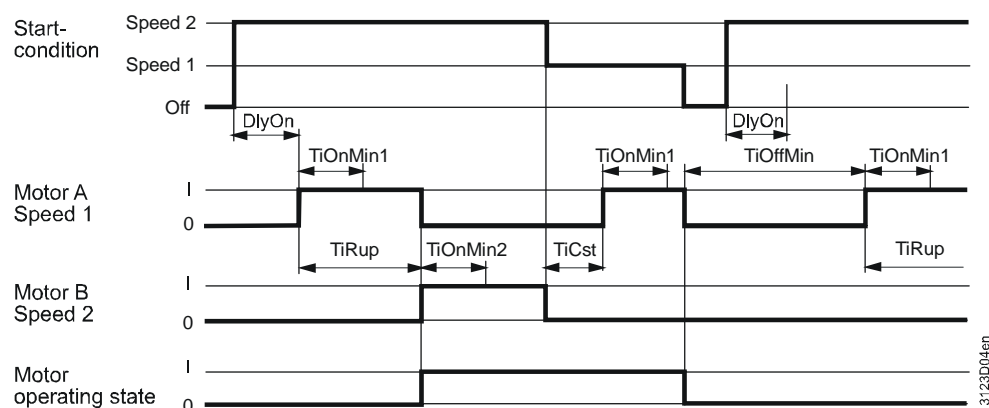


## Control sequence

Run-up and switch-off of the 2-speed motor.

"Switch-on delay", "Switch-off delay", min. switch-on time and min. switch-off time are considered.

## Function diagram



## Key

TiRup = Runup time  
 TiCst = Rundown time  
 DlyOn = Switch-on delay  
 DlyOff = Switch-off delay  
 TiOnMin1 = On time minimum, Step 1  
 TiOnMin2 = On time minimum, Step 2  
 TiOffMin = Off time minimum

## Locking 2<sup>nd</sup> speed by outside temperature

You can lock the second speed if the temperature drops below an adjustable outside temperature value.

## Settings

Main menu > Commissioning > Settings > .... or  
 Main menu > Settings > Aggregates > Motor > Motor 1...6 >

Operating line	Range	Factory setting
Speed 2 locked (OT-dependent)	-50...+250 °C, ---	---

## Notes

Setting "---" disables this function. The 2<sup>nd</sup> speed is locked if the function is active and if there is not outside temperature value during operation.

## 8.4.4 Twin motor

### Purpose

Use the "Twin motor" to control e.g. a twin pump.

### Special control functions

In addition to default functions, RMS705B offers special control functions to optimally control a twin motor:

- Run priority changeover for motor faults, automatic or manual.
- Adjustable changeover period for orderly changeover of motors.

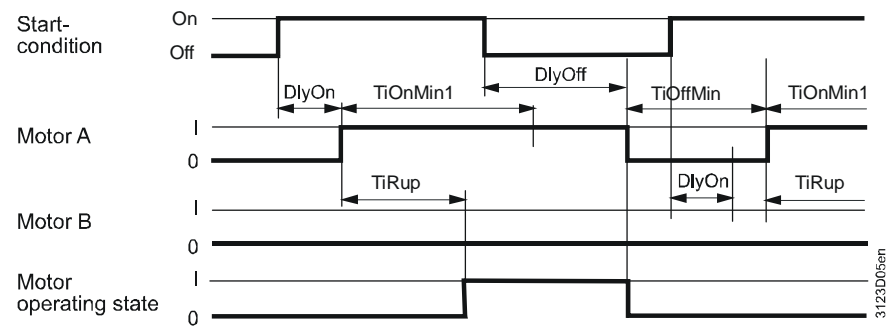


## Control sequence

Run up and switch off the twin motor:

Switch-on delay, switch-off delay, min. switch-on time and min. switch-off time are considered.

## Function diagram



## Key

TiRup = Runup time  
 DlyOn = Switch-on delay  
 DlyOff = Switch-off delay  
 TiOnMin1 = On time minimum, Step 1  
 TiOffMin = Off time minimum

## Behavior in case of fault

- If a motor is faulty, the run priority is changed over to the other motor.
- If motors A and B are faulty at the same time:
  - A fault message is generated.
  - The fault is indicated on output "Motor fault".
  - The motors are switched off.

You can change the following texts ex-works texts in the RMS705B at the password level.

### Fault messages


No.	Text	Effect
1310	[Motor 1] fault	Urgent message; must be acknowledged and reset.
1320	[Motor 2] fault	Urgent message; must be acknowledged and reset.
1330	[Motor 3] fault	Urgent message; must be acknowledged and reset.
1340	[Motor 4] fault	Urgent message; must be acknowledged and reset.
1350	[Motor 5] fault	Urgent message; must be acknowledged and reset.
1360	[Motor 6] fault	Urgent message; must be acknowledged and reset.

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 > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Run priority	Motor A Motor B Automatic	Automatic

Changeover by time

If the selection in operating line "Run priority" is "Automatic", the run priority automatically changes weekly. Changeover occurs at the time set for motor kick.

Assign the run priority to a pump by selecting the required pump in operating line "Run priority" if changeover by time is not what you want.

Changeover in case of fault

If a motor is faulty, the run priority is changed over to the other motor. After the fault is acknowledged and reset, the same run priority as prior to the fault is resumed.

Manual changeover


For testing, you can manually change over the run priority. To do this, select the desired motor in operating line "Run priority". When returning the run priority to "Automatic", the run priority remains active at the current motor until the next changeover by time.

## 8.4.5 Delay times

You can set a "Switch-on delay", "Switch-off delay", "On time minimum" and "Off time minimum" for motors.

Setting values

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

 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
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
On time minimum 1	00.00...59.59 m.s	00.00 m.s
On time minimum 2*	00.00...59.59 m.s	00.00 m.s
Off time minimum	00.00...59.59 m.s	00.00 m.s

\* Adjustable only for 2-speed motors.

- "Switch-off delay" and "Off time minimum" always act during the **switch-off** command for motors switched off via stop command *or* via removal of the start condition.
- "Switch-on delay" and "On time minimum" always act during the **switch-on** command for motors switched on via start condition.
- The above times are not effective during switch-off command by motor kick *or* while a fault is present.



## 8.4.6 Flow signal

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

### Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
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.

A fault message is triggered and a fault issued at output "Flow delay start" if you want to switch on the motor and if there is no checkback after a set time ("Motor fault").

Since measurements can fluctuate during operation, a delay time can be set ("Flow delay operation"). A fault message is triggered and a fault indicated at output "Motor fault" if a flow signal fault occurs during operation.

### Setting values

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


 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
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 signal fault can be set.

### Setting values

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

 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Flow switching value on	Depending on selected type.	Type-dependent.
Flow switching value off	Depending on selected type.	Type-dependent.

The motor is switched off if there is a flow fault with 1 *or* 2-speed motors. One of the following fault messages is displayed.

You can change the following texts ex-works texts in the RMS705B at the password level.

### Fault messages 1 *or* 2-speed motor

<i>No.</i>	<i>Text</i>	<i>Effect</i>
1312	[Motor 1] no flow	Urgent message; must be acknowledged and reset.
1322	[Motor 2] no flow	Urgent message; must be acknowledged and reset.
1332	[Motor 3] no flow	Urgent message; must be acknowledged and reset.
1342	[Motor 4] no flow	Urgent message; must be acknowledged and reset.
1352	[Motor 5] no flow	Urgent message; must be acknowledged and reset.
1362	[Motor 6] no flow	Urgent message; must be acknowledged and reset.

If a flow fault occurs with twin motors, automatic changeover to the motor output occurs. A fault message is displayed.

If both pumps are faulty, a fault message is displayed as per Section 8.4.4.

Fault messages  
Twin motor

No.	Text	Effect
1316	[Motor 1A] no flow	Non-urgent message; must be acknowledged and reset.
1317	[Motor 1B] no flow	Non-urgent message; must be acknowledged and reset.
1326	[Motor 2A] no flow	Non-urgent message; must be acknowledged and reset.
1327	[Motor 2B] no flow	Non-urgent message; must be acknowledged and reset.
1236	[Motor 3A] no flow	Non-urgent message; must be acknowledged and reset.
1337	[Motor 3B] no flow	Non-urgent message; must be acknowledged and reset.
1346	[Motor 4A] no flow	Non-urgent message; must be acknowledged and reset.
1347	[Motor 4B] no flow	Non-urgent message; must be acknowledged and reset.
1356	[Motor 5A] no flow	Non-urgent message; must be acknowledged and reset.
1357	[Motor 5B] no flow	Non-urgent message; must be acknowledged and reset.
1366	[Motor 6A] no flow	Non-urgent message; must be acknowledged and reset.
1367	[Motor 6B] no flow	Non-urgent message; must be acknowledged and reset.

## 8.4.7 Overload signal

The motor block allows for connecting an overload message (e.g. variable speed drive or motor protection switch) per motor output A and B.


Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Motor > Motor 1...6 >**

Operating line	Adjustable values / Comment
[Motor A] overload	---, N.X1, N.X2,... (digital inputs only)
[Motor B] overload	---, N.X1, N.X2,... (digital inputs only)

You can set fault acknowledgement for the overload message.

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

 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

Operating line	Range	Factory setting
Fault acknowledgement	None, Acknowledge, Acknowledge and reset	Acknowledge

A fault message is displayed and output "Motor fault" is enabled if there is an overload fault.

You can change the following texts ex-works texts in the RMS705B at the password level.

Overload messages  
1 or 2-speed motor

No.	Text	Effect with factory setting
1311	[Motor 1] overload	Urgent message; must be acknowledged.
1321	[Motor 2] overload	Urgent message; must be acknowledged.
1331	[Motor 3] overload	Urgent message; must be acknowledged.
1341	[Motor 4] overload	Urgent message; must be acknowledged.
1351	[Motor 5] overload	Urgent message; must be acknowledged.
1361	[Motor 6] overload	Urgent message; must be acknowledged.

Overload messages  
twin motor

If only one pump is faulty during twin motor operation, run priority changes to the non-faulty motor output. The fault acknowledgement setting has no effect on changeover. The corresponding overload signal is issued. If both motors are faulty, a fault message is displayed as per Section "8.4.4".

You can change the following texts ex-works texts in the RMS705B at the password level.

No.	Text	Effect with factory setting
1314	[Motor 1A] overload	Non-urgent message; must be acknowledged.
1315	[Motor 1B] overload	Non-urgent message; must be acknowledged.
1324	[Motor 2A] overload	Non-urgent message; must be acknowledged.
1325	[Motor 2B] overload	Non-urgent message; must be acknowledged.
1334	[Motor 3A] overload	Non-urgent message; must be acknowledged.
1335	[Motor 3B] overload	Non-urgent message; must be acknowledged.
1344	[Motor 4A] overload	Non-urgent message; must be acknowledged.
1345	[Motor 4B] overload	Non-urgent message; must be acknowledged.
1354	[Motor 5A] overload	Non-urgent message; must be acknowledged.
1355	[Motor 5B] overload	Non-urgent message; must be acknowledged.
1364	[Motor 6A] overload	Non-urgent message; must be acknowledged.
1365	[Motor 6B] overload	Non-urgent message; must be acknowledged.

## 8.4.8 Precommand ↕

You can configure a corresponding precommand for each motor. This allows e.g. to open a damper or valve prior to actual motor start as well as shut off the damper delayed following motor switch-off.

Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Motor > Motor 1...6 >**

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

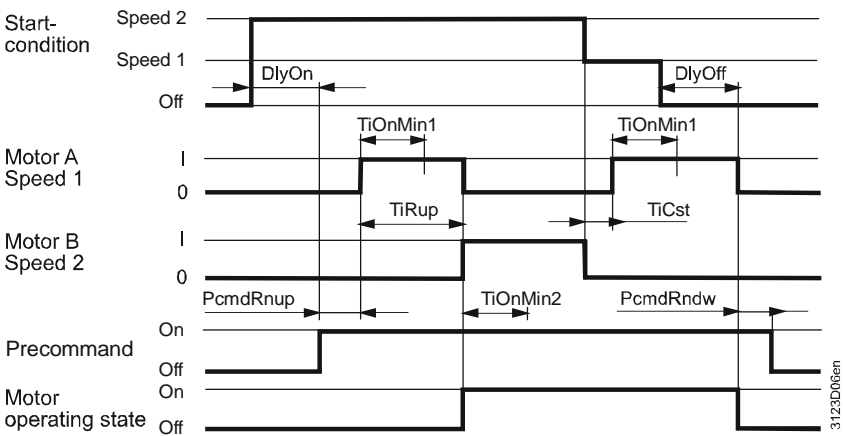
- The precommand switches on if switch-on takes place via start condition 1 or 2.
- The motors can be started or stopped with the "Precommand" simultaneously or delayed. Set delayed switch-on/off via "Precommand runup time" and "Precommand rundown time".

Setting values

**Main menu > Commissioning > Settings > .... or**  
**Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

Operating line	Range	Factory setting
Precommand runup time	00.00...59.59 m.s	00.00 m.s
Precommand rundown time	00.00...59.59 m.s	00.00 m.s

Function diagram



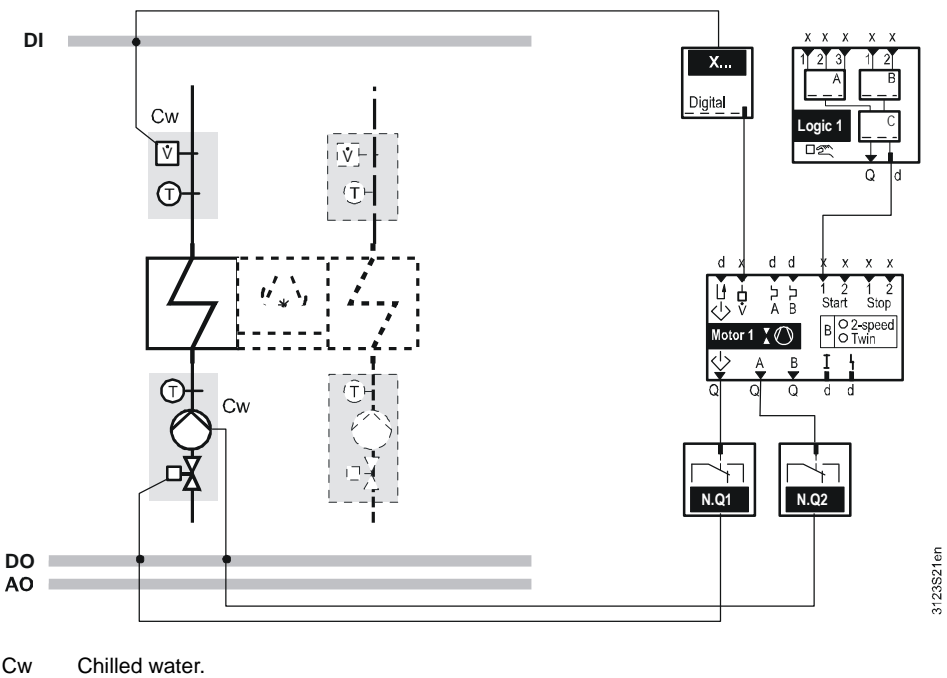
Key

- TiRup = Runup time
- TiCst = Rundown time
- DlyOn = Switch-on delay
- DlyOff = Switch-off delay
- TiOnMin1 = On time minimum, Step 1
- TiOnMin2 = On time minimum, Step 2
- PcmdRnup = Precommand runup time
- PcmdRndw = Precommand rundown time

Example

1-speed motor controls a cold-water side pump with safety shutoff valve. The valve is controlled via precommand as per the above time diagram.

Function diagram



8.4.9    Precommand checkback signal

You can configure a "Precommand checkback signal" for each motor block in addition to the precommand. The "Precommand checkback signal" provides information on if the precommand was implemented (e.g. via valve or damper end position switch). Only then is the motor switched on.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Motor > Motor 1...6 >

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

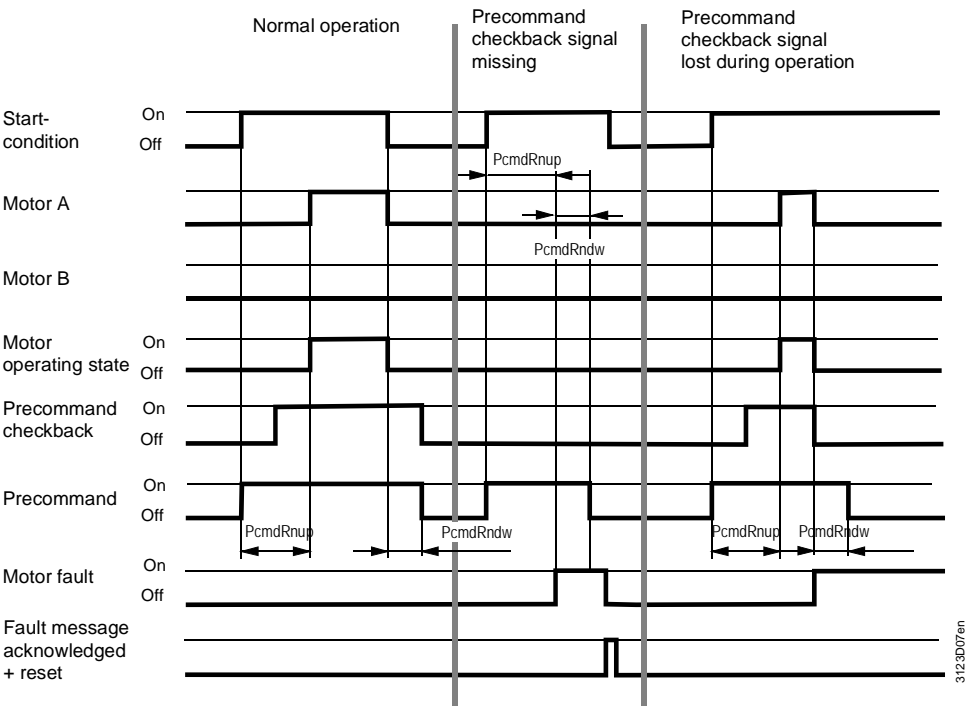
A fault message is displayed and the motor does not start if no "Precommand runup time" is issued within the set "Precommand checkback signal". Precommand "Off" is issued after the "Precommand rundown time".

If the "Precommand checkback signal" drops off during motor operation, the motor is switched off immediately and precommand "Off" is issued after expiration of "Precommand rundown time". A fault message is displayed. 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  
1-speed motor



Key

PcmdRnup = Precommand runup time  
PcmdRndw = Precommand rundown time

You can change the following texts ex-works texts in the RMS705B at the password level.

#### Fault messages


No.	Text	Effect
1318	[Mot 1] precom no checkb signal	Urgent message; must be acknowledged and reset.
1328	[Mot 2] precom no checkb signal	Urgent message; must be acknowledged and reset.
1338	[Mot 3] precom no checkb signal	Urgent message; must be acknowledged and reset.
1348	[Mot 4] precom no checkb signal	Urgent message; must be acknowledged and reset.
1358	[Mot 5] precom no checkb signal	Urgent message; must be acknowledged and reset.
1368	[Mot 6] precom no checkb signal	Urgent message; must be acknowledged and reset.

### 8.4.10 Motor operating state I

The output motor operating state **I** indicates if the motor is running at full speed. Set the time the motor needs to reach full speed via the run-up time.

#### Settings

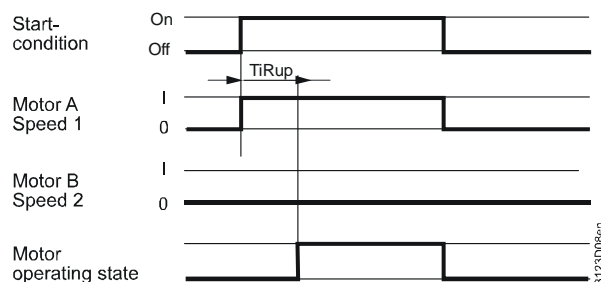
 **Main menu > Commissioning > Settings > ... or**

 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

Operating line	Range	Factory setting
Runup time	00.00...59.59 m.s	00.10 m.s

- You can configure the output motor operating state **I** for all internal inputs.
- Use the motor operating state **I** e.g. to send a checkback signal of the motor state to the rotary step switch.
- The signal can have value "On" or "Off". It is "On" after the run-up time expires.

#### Function diagram based on 1-speed motor



TiRup = Runup time

8.4.11 Motor fault

Output motor fault is "On" in the case of a fault when the motor no longer is able to transport the medium. It is used to forward the fault information to another aggregate.

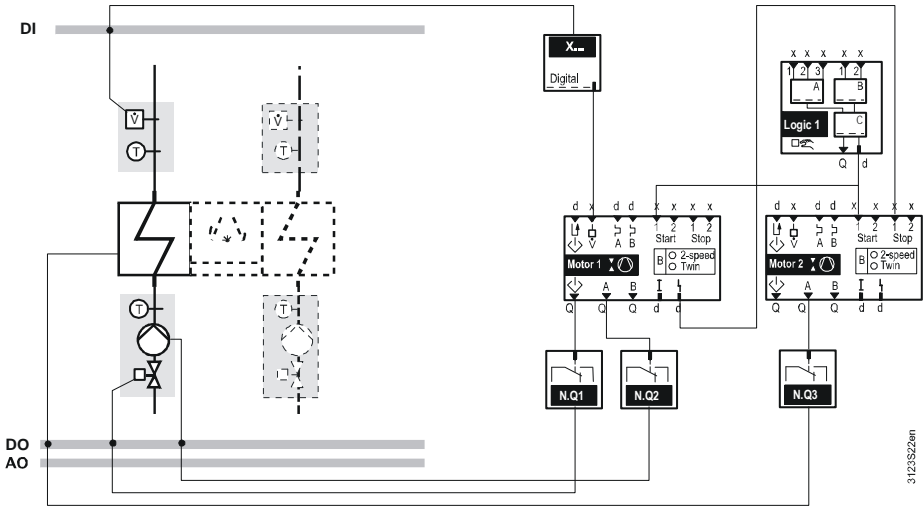
The following table shows the output motor fault state for the corresponding causes of fault:

Fault messages

Motor type	Fault	"Motor fault" state
1, 2-speed motor or twin motor	[Mot 1] precom no checkb signal	On
1 or 2-speed motor	[Motor 1] no flow	On
1 or 2-speed motor	[Motor 1] overload	On
Twin motor	[Motor 1] fault	On
Twin motor	[Motor 1A] no flow	Off
Twin motor	[Motor 1B] no flow	Off
Twin motor	[Motor 1A] overload	Off
Twin motor	[Motor 1A] overload	Off

Example

Switch off another aggregate with motor fault.



8.4.12 Start and stop conditions

You can configure two inputs as start and stop conditions for each motor block.

Configuration

Main menu > Commissioning > Extra configuration > Aggregates > Motor > Motor 1...6 >

Operating line	Adjustable values / Comment
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).

Stop conditions take priority over start conditions (see Section 8.4.19).  
The speed start condition determines which speed is to be enabled during switch-on by start condition 1 or 2 at the motor.

## Setting values

 **Main menu > Commissioning > Settings > ... or**  
 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Speed start condition 1	Speed 1, Speed 2	Speed 1
Speed start condition 2	Speed 1, Speed 2	Speed 1

## Example

Control switch on a panel acting directly on the motors (one separate control switch per motor).

Preselection of the speed start condition allows for defining the input value.

An analog signal can be used as start or stop signal.

The limit values for when the corresponding motor 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 > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
[Start value 1] on	Depending on selected type.	Type-dependent.
[Start value 1] off	Depending on selected type.	Type-dependent.
[Start value 2] on	Depending on selected type.	Type-dependent.
[Start value 2] off	Depending on selected type.	Type-dependent.
[Stop value 1] on	Depending on selected type.	Type-dependent.
[Stop value 1] off	Depending on selected type.	Type-dependent.
[Stop value 2] on	Depending on selected type.	Type-dependent.
[Stop value 2] off	Depending on selected type.	Type-dependent.

### 8.4.13 "On" by outside temperature

At low outside temperatures, motors can be run continuously to control a pump to e.g. prevent water from freezing in pipes.

## Note

- This function is available in 1-speed and twin motors.
- The function can be enabled only if there is an outside temperature value (Section 5.6 "Outside temperature").
- You can disable the function by setting "Outside temp-dependent ON" to "---".
- In twin motor operation, the motor with the current run priority is switched on.

## Example

If the outside temperature drops below the set limit value, the RMS705B switches on the motor of the circulating pump. The motor is switched off when the outside temperature exceeds the limit value by 2 K.

## Setting values

 **Main menu > Commissioning > Settings > ... or**  
 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Outside temp-dependent ON	-50...+250 °C, ---	---

## Note

If the function is active and if there is a outside temperature sensor error, the motor is switched on permanently.



## 8.4.14 Motor kick

To prevent the motors (pumps) from seizing during longer off periods (e.g. heating group in summer), a periodic motor kick can be enabled for each motor block.

- When motor kick is active, the motors are switched on for 30 seconds once a week regardless of any other functions and settings.
- The motor kick is enabled by setting "Motor kick" to "Yes". If the setting is "No", there is no motor kick.
- In addition, a "Kick day" and "Kick time" can be set.
- With the motor kick, the precommand output with its settable times is enabled prior to the actual motor start. All other delay times are inactive.
- The first speed is switched on for 2-speed motor operation, and both motors are switched on alternating for twin motor operation.

Setting values

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

 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
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

## 8.4.15 Display values

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

Display values  
1 or 2-speed motor

 **Main menu > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Comment</i>
[Motor 1] precommand... [Motor 6] precommand	Off, On.
Motor 1...6	Display of current motor speed: Off, On <b>or</b> Off, Speed 1, Speed 2

Display values  
twin motor

 **Main menu > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Comment</i>
[Motor 1] precommand... [Motor 6] precommand	Off, On.
[Motor 1] A... [Motor 6] A	Display of current motor speed: Off, On.
[Motor 1] B... [Motor 6] B	Display of current motor speed: Off, On.

### 8.4.16 Wiring test

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

Wiring test

 **Main menu > Commissioning > Wiring test > Outputs >**

<i>Operating line</i>	<i>Comment</i>
Motor 1... Motor 6	Off, Speed 1, Speed 2 (2-speed motor on display).
[Motor 1] A... [Motor 6] A	Off, On (1-speed motor, twin motor on display).
[Motor 1] B... [Motor 6] B	Off, On (twin motor on display).

Note


Adjustable times acting directly on the relay are effective (run-up time, coasting time).

### 8.4.17 Assign texts

Adapt the texts for the motors 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 > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Motor 1... Motor 6	Max. 20 characters	Motor 1... Motor 6

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

### 8.4.18 Operating hours

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

Display values

 **Main menu > Aggregates > Motor > Motor 1...6 >**

Operating hours motor A	0...99'999 h
Operating hours motor B	0...99'999 h

You can adapt the counter value at the password level, and e.g. reset it to 0.

Setting values

 **Main menu > Settings > Aggregates > Motor > Motor 1...6 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Operating hours motor A	0...99'999 h	0
Operating hours motor B	0...99'999 h	0

Note

The operating hours for speeds 1 and 2 are summarized for the 2-speed motor (sum of 1 and 2).

### 8.4.19 Priorities

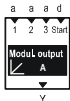
The following priorities apply to motor operations:

1. On/Off during wiring test.
2. Off by motor supervision ("Flow signal", "Overload signal").
3. Motor times ("Switch-on delay", "Switch-off delay", min. switch-on time, min. switch-off time).
4. Locking speed 2 (dependent on outside temperature).
5. On by outside temperature.
6. On by "Motor kick" (no motor times available).
7. Off by "Stop condition 1" and 2.
8. On by "Start condition 1".
9. On by "Start condition 2".

Note

See Sections 8.4.3, 8.4.4, 8.4.5, 8.4.8, and 8.4.10 for the motor times.

## 8.5 Modulating output



Purpose

"Modulating output" is a function to generate a modulating DC 0...10 V output signal. 8 "Modulating outputs" are available:

Functional scope:

- Inversion
- Max. selection from 3 signals
- Limitations

### 8.5.1 Enable modulating output

You must first assign an output to enable the "Modulating output" function.

Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Modulating outputs > Modulating output A...H >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Modulating output A... Modulating output H	---, N.Y1, N.Y2, ... / enable modulating output.

## 8.5.2 Limitations

The modulating output (Y) can be limited at the top and bottom.

Setting values

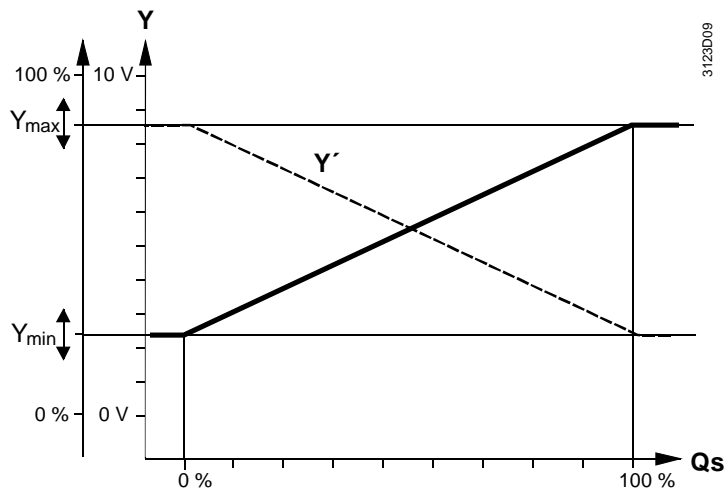
 **Main menu > Commissioning > Settings > ... or**

 **Main menu > Settings > Aggregates > Modulating outputs > Modulating output A...H >**

Operating line	Range	Factory setting
Positioning signal min	0...100 %	0 %
Positioning signal max	0...100 %	100 %

Output 0...100 % then corresponds to "Positioning signal min" (Ymin) to "Positioning signal max" (Ymax).

Function diagram



Key

Qs = Load demand from controller  
Y' = Inversion

You can thus parameterize the output with a DC 5...7.5 V input suitable for controlling a magnetic valve, for example.

Maximum selection

The greater of the signals is valid (maximum selection) when the modulating output of 3 controllers is controlled.

## 8.5.3 Output inversion

Any output can be inverted.

Setting values

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

 **Main menu > Settings > Aggregates > Modulating outputs > Modulating output A...H >**

Operating line	Range	Factory setting
Inversion	No, Yes	No

Meaning:

No: 0...100% load = 0...100% output.

Yes: 0...100% load = 100...0 % output.

## 8.5.4 Assign input

Configuration

 **Main menu > Commissioning > Extra configuration > Aggregates > Modulating outputs > Modulating output A...H >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Input 1... Input 3	---, N.X1, sequence controller x.Rot'step'swi y (analog values only).

## 8.5.5 Start condition

- Enable the modulating output via a digital signal.
- The output signal is issued by considering any limitations.
- 0 V is issued at the output, or 10 V for inversion, if the start signal is withdrawn.
- Maximum selection.
- The output is always enabled if there is no start condition.

 **Main menu > Commissioning > Extra configuration > Aggregates > Modulating outputs > Modulating output A...H >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Start condition	---, N.X1, N.X2, ... (digital only).

## 8.5.6 Assign texts

Assign text to each modulating output.

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

 **Main menu > Settings > Aggregates > Modulating outputs > Modulating output A...H >**

Setting values

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Modulating output A ...H	Max. 20 characters	Modulating output A ...H

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

## 8.5.7 Function check / wiring test

The current state of the modulating output is displayed on the operator unit.

Display values

 **Main menu > Aggregates > Modulating outputs >**

<i>Operating line</i>	<i>Comment</i>
Modulating output A ...H	0...100 %

You can directly control the modulating output during the wiring test.

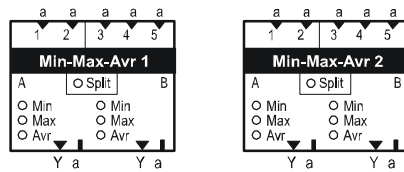
Wiring test

 **Main menu > Commissioning > Wiring test > Outputs >**

<i>Operating line</i>	<i>Comment</i>
Modulating output A ...H	----, 0...100 %

# 9 Signal converter

## 9.1 Min-max-average



### Purpose

"Min-Max-Average" executes the following calculations from the signals from inputs 1 to 5:

- Selection of minimum input signal (Min).
- Selection of maximum input signal (Max).
- Calculation of average value (Avr).

2 "Min-Max-Average" blocks are available:

The calculated values are provided as DC 0...10 V signals (Y) and internal, analog signals (a).

### Note

The calculations do not consider non-configured inputs.

### 9.1.1 Enable Min-Max-Average

Assign an input to enable this function.

### Configuration

 **Main menu > Commissioning > Extra configuration > Signal converter > Min-Max-Average 1...2**

<i>Operating line</i>	<i>Adjustable values / Comment</i>	<i>Factory setting</i>
Input 1	---, N.X1, N.X2, ...	
Input 2	---, N.X1, N.X2, ...	
Input 3	---, N.X1, N.X2, ...	
Input 4	---, N.X1, N.X2, ...	
Input 5	---, N.X1, N.X2, ...	
Inputs split	Yes, No	No
Min-Max-Average A	---, N.Y1, N.Y2, ... / enable modulating output.	
Function output A	Minimum, Maximum, Average	Minimum
Min-Max-Average B	---, N.Y1, N.Y2, ... / enable modulating output.	
Function output B	Minimum, Maximum, Average	Minimum

### Inputs split

- The calculations are carried out separately for the function ranges A and B if parameter "Inputs split" is enabled (Yes).
  - Function range A: Inputs 1 and 2.
  - Function range B: Inputs 3 to 5.
- The calculations are carried out on all configured inputs if "Inputs split" is disabled (factory setting No).

## 9.1.2 Modulating output settings

You can set the value range mapping the DC 0...10 V signal (Y) at block "Min-Max-Average". To do this, set the lower (0 V) and upper (10 V) value. RMS705B linear calculates interim values accordingly (see diagram below).

Note

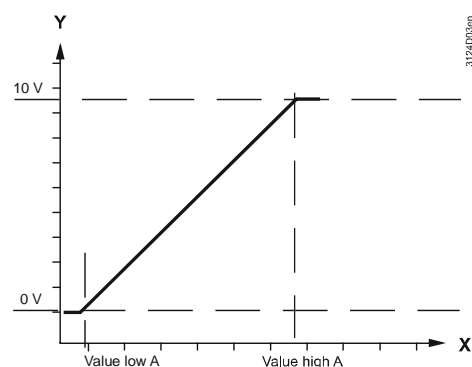
The value range setting mapped to the DC 0...10 V signal (Y) does not impact the internal, analog output signal (a).

Setting values

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

 **Main menu > Settings > Signal converter > Min-Max-Average 1...2 >**

Operating line	Range	Factory setting
Value low A	Depending on selected type	0%, 0°C, type-dependent
Value high A	Depending on selected type	100%, 50°C, type-dependent
Value low B	Depending on selected type	0%, 0°C, type-dependent
Value high B	Depending on selected type	100%, 0°C, type-dependent



## 9.1.3 Input 1 weighting factor

The value for "Input 1" can be weighted by factor x when calculating the average value.

Value at "Input 1" can be weighted double, triple to 100x the values of the remaining inputs.

X-weighted "Input 1" is counted as several inputs for calculation.

Setting values

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

 **Main menu > Settings > Signal converter > Min-Max-Average 1...2 >**

Operating line	Range	Factory setting
Factor input 1	1 ... 100	1

Example

Entry:

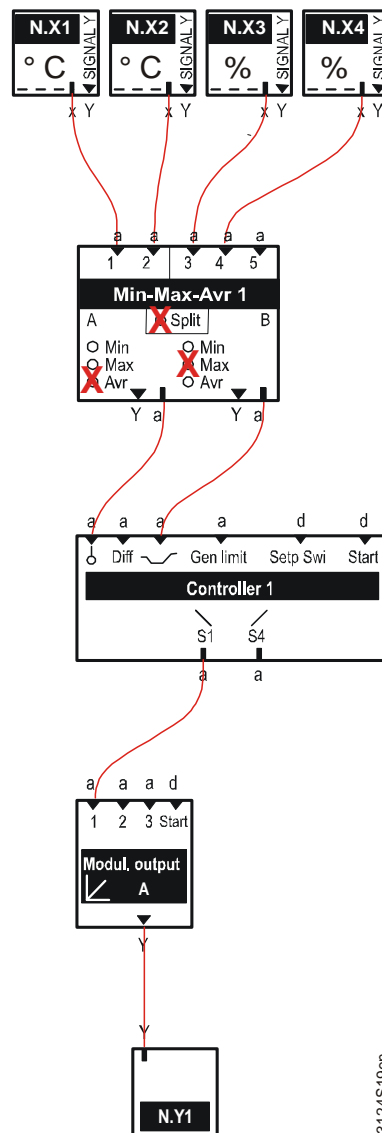
- Factor input 1": 5
- Provide signals to the remaining 4 inputs.

Result:

The output provides the average value of 9 (5 + 4) input signals.

Example  
A-Average-, B-Max  
calculation

Split function "Inputs split" is enabled.



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Function range A:

"Min-Max-Average" block calculates the average from terminal values N.X1, N.X2 (both in °C). The result is used as internal, analog signal (a) from controller 1 as main control variable.

Function range B:

"Min-Max-Average" block calculates the maximum from terminal values N.X3, N.X4 (both in %). The result (as % value) is used as internal, analog signal (a) from controller 1 as "Universal shift".



## 9.1.4 Assign texts

You can assign a text to each "Min-Max-Average" block.

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

 **Main menu > Settings > Signal converter > Min-Max-Average 1...2 >**

Setting values

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Min-Max-Average 1.. 2	Max. 20 characters	Min-Max-Average 1...2

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

## 9.1.5 Function check / wiring test

The inputs and outputs of the "Min-Max-Average" block are displayed on the operator unit.

Display values

 **Main menu > Signal converter > Min-Max-Average 1...2 >**

<i>Operating line</i>	<i>Comment</i>
Minimum A	0...100 %, °C, ppm, type-dependent.
Maximum A	0...100 %, °C, ppm, type-dependent.
Average A	0...100 %, °C, ppm, type-dependent.
Minimum B	0...100 %, °C, ppm, type-dependent.
Maximum B	0...100 %, °C, ppm, type-dependent.
Average B	0...100 %, °C, ppm, type-dependent.
Input 1...5	0...100 %, °C, ppm, type-dependent.

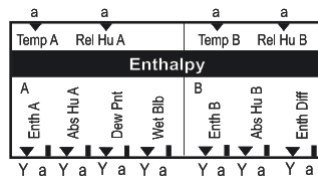
Wiring test

You can directly control "Min-Max-Average" during the wiring test.

 **Main menu > Commissioning > Wiring test > Outputs >**

<i>Operating line</i>	<i>Comment</i>
[Min-Max-Avrg 1] A	---, 0...100 %
[Min-Max-Avrg 1] B	---, 0...100 %
[Min-Max-Avrg 2] A	---, 0...100 %
[Min-Max-Avrg 2] B	---, 0...100 %

## 9.2 Enthalpy calculator



**Purpose** The function block calculates the following based on inputs temperature and relative humidity:

**Function range A** Function range A (inputs Temp A and RelHu A):

- Enthalpy A
- Absolute humidity A
- Dew point temperature
- Wet bulb temperature

**Function range B** Function range B (inputs Temp B and Rel Hu B):

- Enthalpy B
- Absolute humidity B
- Enthalpy difference (Enthalpy A Minus Enthalpy B)

The results of the calculations are provided as DC 0...10 V signals *or* as internal, analog signal.

**Definition of short names**


Range	Inputs		Outputs	
A	Temp A	Temperature input A	Enth A	Enthalpy A
	RelHu A	Relative humidity input A	Abso Hu A	Absolute humidity A
			Dew Pnt	Dew point temperature
			Wet Blb	Wet bulb temperature
B	Temp B	Temperature input B	Enth B	Enthalpy B
	RelHu B	Relative humidity input B	Abso Hu B	Absolute humidity B
			Enth Diff	Enthalpy difference A-B

## 9.2.1 Enable enthalpy calculator

Assign an input to enable this function.

Both temperature **and** relative humidity must be available and at least one output must be interconnected to enable calculation.

### Configuration

 **Main menu > Commissioning > Extra configuration > Signal converter > Enthalpy calculator >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Temperature input A	---, N.X1, N.X2, ...
Relative humidity input A	---, N.X1, N.X2, ...
Temperature input B	---, N.X1, N.X2, ...
Relative humidity input B	---, N.X1, N.X2, ...
Enthalpy A	---, N.Y1, N.Y2, ... / Enable modulating output.
Absolute humidity A	---, N.Y1, N.Y2, ... / Enable modulating output.
Dew point	---, N.Y1, N.Y2, ... / Enable modulating output.
Wet bulb temperature	---, N.Y1, N.Y2, ... / Enable modulating output.
Enthalpy B	---, N.Y1, N.Y2, ... / Enable modulating output.
Absolute humidity B	---, N.Y1, N.Y2, ... / Enable modulating output.
Enthalpy difference	---, N.Y1, N.Y2, ... / Enable modulating output.

### Value ranges


The value ranges of the output signals are limited and **cannot** be changed. The DC 0...10 V output signal corresponds to the following value ranges:


<i>Identifier</i>	<i>Unit</i>	<i>Value range output signal</i>		<i>Output signal</i>
		<i>Y Min</i>	<i>Y Max</i>	
Enthalpy A, B	kJ/kg	0.0	100.0	DC 0...10 V
Absolute humidity A, B	g/kg	0.0	20.0	DC 0...10 V
Dew point	°C	0.0	+50.0	DC 0...10 V
Wet bulb temperature	°C	-50.0	+50.0	DC 0...10 V
Enthalpy difference	kJ/kg	-50.0	+50.0	DC 0...10 V

## 9.2.2 Plant location

The enthalpy calculator includes a correction for pressure, dependent on the plant location ("Elevation above sea level").

### Setting values

 **Main menu > Commissioning > Settings > Signal converter > Enthalpy calculator.... or**

 **Main menu > Settings > Signal converter > Enthalpy calculator >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Elevation above sea level	0...5000	500 m

### 9.2.3 Assign texts

You can assign a text to the enthalpy calculator block.

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

 **Main menu > Settings > Signal converter > Enthalpy calculator >**

Setting values

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Enthalpy calculator	Max. 20 characters	

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

### 9.2.4 Function check / wiring test

The inputs and outputs of the enthalpy calculator are displayed on the operator unit.

Display values

 **Main menu > Signal converter > Enthalpy calculator >**

<i>Operating line</i>	<i>Comment</i>
Enthalpy A	---, kJ/kg
Absolute humidity A	---, g/kg
Dew point	---, °C
Wet bulb temperature	---, °C
Enthalpy B	---, kJ/kg
Absolute humidity B	---, g/kg
Enthalpy difference	---, kJ/kg
Temperature input A	---, °C
Relative humidity input A	---, %
Temperature input B	---, °C
Relative humidity input B	---, %

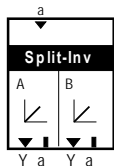
You can directly control the enthalpy calculator during the wiring test.

Wiring test

 **Main menu > Commissioning > Wiring test > Outputs >**

<i>Operating line</i>	<i>Comment</i>
Enthalpy A	---, 0...100 %
Absolute humidity A	---, 0...100 %
Dew point	---, 0...100 %
Wet bulb temperature	---, 0...100 %
Enthalpy B	---, 0...100 %
Absolute humidity B	---, 0...100 %
Enthalpy difference	---, 0...100 %

## 9.3 Signal doubler/inverter



### Purpose

The function block provides the following functions:

- Limit the upper and lower input signal value, for output signal "Modulating output A" or "Modulating output B" respectively.
- Invert output signals "Modulating output A" or "Modulating output B".
- Convert the signal of a passive input signal to two active signals.
- Double the signal.

The output signals are provided in the range DC 0...10 V or as an internal, analog signal (a).

### 9.3.1 Enable block

### Configuration

Assign an input to the function to enable this function.

 **Main menu > Commissioning > Extra configuration > Signal converter > Signal doubler-inverter >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Preselection external	---, N.X1, N.X2, ...
Modulating output A	---, N.Y1, N.Y2, ... / enable modulating output.
Modulating output B	---, N.Y1, N.Y2, ... / enable modulating output.

### 9.3.2 Settings

### Setting values

You can set the output signal of the modulating outputs for each output as an upper and lower value.

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

 **Main menu > Settings > Signal converter > Signal doubler-inverter >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Value low A	-50...+9999 %, °C	0, type-dependent.
Value high A	-50...+9999 %, °C	50, type-dependent.
Positioning signal min A*	0...100 %	0 %
Positioning signal max A*	0...100 %	100 %
Inversion A	No, Yes	No
Value low B	-50...+9999 %, °C	50, type-dependent.
Value high B	-50...+9999 %, °C	100, type-dependent.
Positioning signal min B*	0...100 %	0 %
Positioning signal max B*	0...100 %	100 %
Inversion B	No, Yes	No

\* The settings impact only signal Y, not the corresponding internal, analog output signal (a).

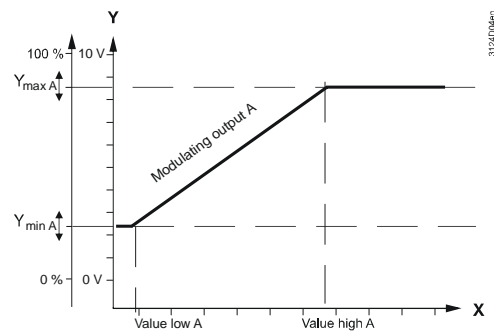
Example for signal doubling

Signal doubling with sequential control of the outputs, i.e. after output A is controlled, output B is controlled.

Function diagrams

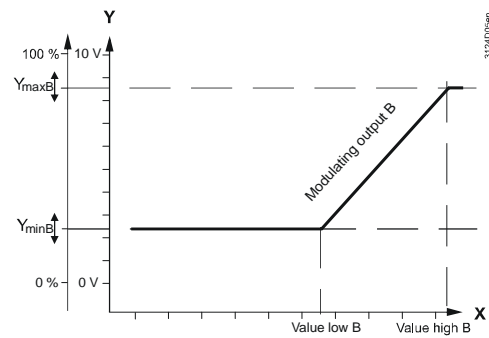
Input signal A limitation:

Output A corresponds to: "Positioning signal min A" ( $Y_{\min A}$ ) to "Positioning signal max A" ( $Y_{\max A}$ ).



Input signal B limitation

Output B corresponds to: "Positioning signal min B" ( $Y_{\min B}$ ) to "Positioning signal max B" ( $Y_{\max B}$ ).



### 9.3.3 Assign texts

You can assign a specific text to each "Signal doubler-inverter". This text is displayed as menu and operating line text on the operating pages.

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

 **Main menu > Settings > Signal converter > Signal doubler-inverter >**

Setting values

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Signal doubler-inverter	Max. 20 characters	Signal doubler-inverter

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

### 9.3.4 Function check / wiring test

The current state (inputs/outputs) of the signal doubler inverter is displayed on the operator unit.

Display values

 **Main menu > Signal converter > Signal doubler-inverter >**

<i>Operating line</i>	<i>Comment</i>
Preselection external*	%, °C, ----
Modulating output A	0...100 %
Modulating output B	0...100 %

\* Dependent on the input identifier.

You can directly control "Signal doubler-inverter" during the wiring test.

Wiring test

 **Main menu > Commissioning > Wiring test > Outputs >**

<i>Operating line</i>	<i>Comment</i>
Split-Inv output A	----, 0...100 %
Split-Inv output B	----, 0...100 %

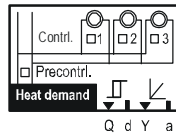
# 10 H/C demand, H/C changeover

## 10.1 Heat demand function

### 10.1.1 Purpose and enabling

#### Purpose

The "Heat demand" function acquires heat demand from a heat distribution zone via the bus. The collected heat requests can be routed to another zone *or* further handled as a resulting setpoint condition (temperature request signal, heating flow setpoint) as a continuous or digital signal.



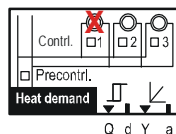
#### Enabling

To enable function "Heat demand", assign the load signal of a controller, enable the primary controller *or* assign output Q, d, Y, a.

### 10.1.2 Use universal controller as consumer

#### Purpose

Use "Extra configuration > Aggregates > Heat demand" at the corresponding controller for a sequence of the controller to generate heat demand (see Section 10.3 for application examples).



#### Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Heat demand >**

Operating line	Adjustable values / Comment
Controller 1	---, Sequence 1
Controller 2	---, Sequence 1
Controller 3	---, Sequence 1

This allows for generating a "Heat demand" signal that can be used by another device on the KNX.

To do this, set a heat distribution zone.

**Main menu > Commissioning > Communication > Distribution zones >**

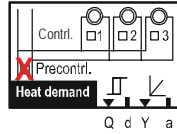
Operating line	Range	Factory setting
Heat distribution zone	1...31	1



### 10.1.3 Use universal controller as primary controller

#### Purpose

Enter an extra configuration to use a universal controller as primary controller (see Section 10.3 for application examples).



#### Configuration

**2** Main menu > Commissioning > Extra configuration > Aggregates > Heat demand >

Operating line	Adjustable values / Comment
Primary controller	Yes, No

As a primary controller, it provides the acquired demand signals from the heat distribution zone as well as the internal demand signals from RMS705B to "Heat distr zone source side", where they are passed on to generation or another primary controller.

Heat demand in °C is made up of the current setpoint of the control loop and a temperature boost. The temperature boost helps compensate line losses.

#### Setting values

**2** Main menu > Commissioning > Communication > Distribution zones >

Operating line	Range	Factory setting
Heat distribution zone	1...31	1
Heat distr zone source side	----, 1...31	----
Heat demand setpoint increase	0...50 K	0 K

### 10.1.4 Demand signals from the bus

#### Demand signals

RMS705B receives the following demand signals via bus from the respective heat distribution zone:

- Valve position in %  
from a control with RMU7... as basic type A or U or from other RMS-internal controllers 1...3 (see Section 10.1.2) as "Heat demand air handling";  
e.g. for air handling unit with air heating coil.
- Heat demand in %  
from room control with RXB, RXL, RDF, RDG as "Heat demand air retreatment";  
e.g. heating register.
- Heat demand in %  
from room control with RXB, RXL, RDF, RDG as "Heat demand heating surface"; e.g. floor heating.
- Temperature request in °C  
from a RMH760 controller or RMU basic type C as "Heat demand" in °C;  
e.g. from a heating circuit controller or cascaded primary controller.

All of these signals are handled simultaneously.

## Setting values

### Main menu > Commissioning > Communication > Distribution zones >

Operating line	Range	Factory setting
Heat distribution zone	1...31	1

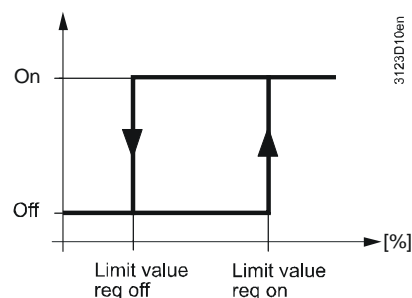
### Main menu > Commissioning > Settings > ... or

### 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 %
Heating flow setpoint	0...140 °C	40 °C
Flow temperature reduction max	0...100 K	0 K
Control action	Slow, Medium, Fast	Medium
Request evaluation	Average, Maximum	Maximum

## Limit value request on

This adjustable value prevents entire plants from being switched on (e.g. heat generation plants) in the case of low heat 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.



## Heating flow setpoint, Flow temperature reduction max

Use setting value "Flow temperature reduction max" to enable optimization, which determines the current optimum flow temperature for control from the received request signals.

In this case, value "Flow temperature reduction max" can be floating, i.e. deviate from the set value for "Heating flow setpoint".

This current flow temperature is controlled to a 90% valve position of the heat consumer with the greatest demand (evaluation of request in setting "Maximum") so that:

- Valve position < 90 %: The flow temperature is reduced continuously until value "Heating flow setpoint" minus "Flow temperature reduction max" is reached.
- Valve position > 90 %: The flow temperature is increased continuously until value "Heating flow setpoint" is reached.

As a result, the following min. flow temperature setpoint can be set at valve positions ≤ 90%:

$$\text{Min. flow temperature} = \text{"Heating flow setpoint"} - \text{"Flow temperature reduction max"}$$

## Note

This optimization function is enabled only if value "Flow temperature reduction max" > 0 (factory setting: 0 = disabled).

Control action	The "Control action" of the flow temperature on the setpoint shifts can be set in three steps ("Fast", "Medium", "Slow") to adapt to the plant.
Request evaluation	<p>Use setting "Request evaluation" to determine if the max value or the average of the requests is to be used.</p> <ul style="list-style-type: none"> <li>• 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%.</li> <li>• When using the "Average" setting, the flow temperature is readjusted so that the valve positions of the 4 largest consumers are 90% on average</li> </ul> <p>Note: This setting does not ensure that all consumers can cover their heat demand. It prevents, however, an individual consumer from forcing the flow temperature to high levels (e.g. because a window was left open).</p>

### 10.1.5 Internal heat demand

Purpose and function	<p>RMS705B provides the calculated request signals as internal signals. To this end, function block "Heat demand" offers two outputs.</p> <ul style="list-style-type: none"> <li>• (I d) The demand as a digital value, e.g. via a motor block, logic block, etc., can be further handled, e.g., to switch on a pump when a heat demand signal was sent.</li> <li>• (L a) For example, as demand-dependent setpoint for setpoint shift or as DC 0..10 V temperature signal.</li> </ul>
----------------------	--

### 10.1.6 Heat demand relay (Q<sub>1</sub>)

Purpose and function	<p>Release for an external heat source, for example, can be connected to this output. The heat demand relay responds as soon as the bus requests "heat".</p> <p>Meaning:</p> <ul style="list-style-type: none"> <li>• Contact open = No heat demand.</li> <li>• Contact closed = Heat demand</li> </ul>
----------------------	---

Configuration	 <b>Main menu &gt; Commissioning &gt; Extra configuration &gt; Aggregates &gt; Heat demand &gt;</b>
---------------	--

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Heat demand relay	---, N.Q1, N.Q3, ... / Enable output.

## 10.1.7 Heat demand continuous (L)

### Purpose

In addition to the heat demand relay, heat demand can be provided at a continuous output of other devices. You can set the characteristic of the continuous 0...10 V signal.

### Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Heat demand >**

Operating line	Adjustable values / Comment
Heat demand modulating	---, N.Y1, N.Y2, ... / Enable output.

### Setting values

**Main menu > Settings > Aggregates > Heat demand >**

Operating line	Range	Factory setting
Setpoint at 0 Volt	-50 °C...Setpoint at 10 Volt	0 °C
Setpoint at 10 Volt	Setpoint at 0 Volt...250 °C	100 °C
Limit value	Setpoint at 0 Volt... Setpoint at 10 Volt	10 °C

### Notes

- "Setpoint at 0 Volt" determines the flow temperature setpoint at DC 0 V.
- "Setpoint at 10 Volt" determines the flow temperature setpoint at DC 10 V.
- "Limit value" means limit value for heat demand: Temperatures below this level are interpreted as "no heat demand".

Output signal DC 0 V is sent as long as the flow temperature setpoint does not exceed the set limit value. When the limit value is exceeded, the relevant output signal is sent until the setpoint is again below the limit value minus a 0.5 K hysteresis.

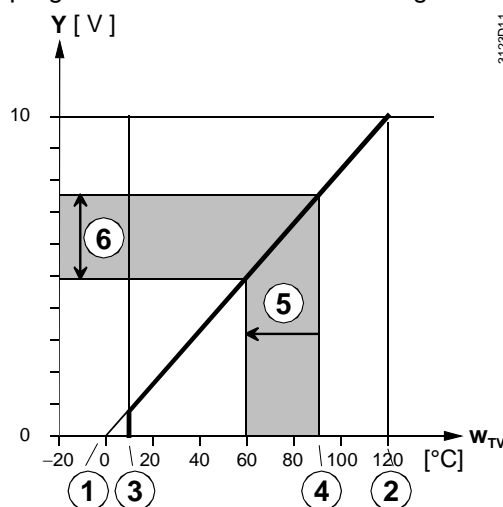
### Application example

- Output signal Y (DC 0...10 V) for heat demand corresponds to a flow temperature setpoint range of 0...120 °C. This limit value should be at 10 °C.
- The heating flow setpoint may float between 60...90 °C depending on demand.
- An output signal corresponding to the set characteristic is to be issued at output Y.

### Note

DC 0...10 V output is only a continuous signal if "Flow temperature reduction max" > 0 is set.

The diagram shows the values of the parameters to be set and the resulting progression of the heat demand signal:



- ① Setpoint in °C at DC 0 V.
- ② Setpoint in °C at DC 10 V.
- ③ Limit value.
- ④ Heating flow setpoint = 90 °C.
- ⑤ Flow temperature reduction max, here 30 K.
- ⑥ Shifting range for output signal.

$w_{TV}$ : Current flow temperature setpoint.

## 10.1.8 Display values

Heat and refrigeration demand are visible on the password level under:

 **Main menu > Aggregates > Heat and refrig demand >**

<i>Operating line</i>	<i>Range</i>	<i>Comment</i>
Heat demand air handling	0...100 %	From RMU(A,U), RMS
Heat demand air retreatment	0...100 %	From RXB, RXL, RDF, RDG
Heat demand heating surface	0...100 %	From RXB, RXL, RDF, RDG
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 >**

<i>Operating line</i>	<i>Range</i>	<i>Comment</i>
Heat demand relay	On, Off	Output Q
Heat demand modulating	0...100 %	Output Y

## 10.1.9 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 >**

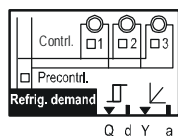
<i>Operating line</i>	<i>Comment</i>
Heat demand relay	---, 0...100% (relay switches > 1%)
Heat demand modulating	---, 0...100 %

## 10.2 Refrigeration demand function

### 10.2.1 Purpose and enabling

#### Purpose

The "Refrigeration demand" function acquires refrigeration demand from various zones via the bus. The acquired refrigeration requests can be routed to another zone *or* further handled as a resulting setpoint condition (temperature request signal, chilled water flow setpoint) as a continuous or digital signal.



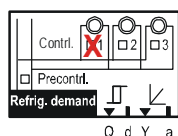
#### Enabling

To enable function "Refrigeration demand", assign the load signal of a controller, enable the primary controller *or* assign output Q, d, Y, a.

### 10.2.2 Use universal controller as consumer

#### Purpose

Use "Extra configuration > Aggregates > Refrigeration demand" at the corresponding controller for a sequence of the controller to generate refrigeration demand (see Section 10.3 for application examples).



#### Configuration

**2** Main menu > Commissioning > Extra configuration > Aggregates > Refrigeration demand >

Operating line	Adjustable values / Comment
Controller 1	---, Sequence 4
Controller 2	---, Sequence 4
Controller 3	---, Sequence 4

This allows for generating a refrigeration demand signal that can be used by another device on the KNX. To do this, set a "Refrigeration distribution zone".

#### Setting values

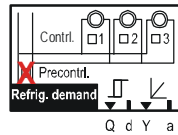
**2** Main menu > Commissioning > Communication > Distribution zones >

Operating line	Range	Factory setting
Refrigeration distribution zone	1...31	1

### 10.2.3 Use universal controller as primary controller

#### Purpose

Enter an extra configuration to use a universal controller as primary controller (see Section 10.3 for application examples).



#### Configuration

**Main menu > Commissioning > Extra configuration > Aggregates > Refrigeration demand >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Primary controller	Yes, No

As a primary controller, it provides the acquired demand signals from the refrigeration distribution zone as well as the internal demand signals from RMS705B to "Refrig distr zone source side", where they are passed on to generation *or* another primary controller.

Refrigeration demand in °C is made up of the current setpoint of the control loop and a temperature reduction. The reduction helps compensate line losses.

#### Setting values

**Main menu > Commissioning > Communication > Distribution zones >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Refrigeration distribution zone	1...31	1
Refrig distr zone source side	----, 1...31	----
Refrig demand setp reduction	0...50 °C	0 K

### 10.2.4 Demand signals from the bus

#### Demand signals

RMS705B receives the following demand signals via bus from the respective refrigeration distribution zone:

- Valve position in %  
from a control with RMU7... as basic type A or U *or* from other RMS-internal controllers 1...3 (see Section 10.1.2) as "Refrig demand air handling";  
e.g. for air handling unit with air cooling coil.
- Refrigeration demand in %  
from room control with RXB, RXL, RDF, RDG as "Refrig demand air retreatment"; e.g. cooling register.
- Refrigeration demand in %  
from room control with RXB, RXL, RDF, RDG as "Refrig demand cooling surface"; e.g. chilled ceiling.
- Temperature request in °C  
from a RMH760 controller *or* RMU basic type C as "Refrigeration demand" in °C;  
e.g. from a primary controller of a chilled water plant.

## Setting values

### Main menu > Commissioning > Communication > Distribution zones >

Operating line	Range	Factory setting
Refrigeration distribution zone	1...31	1

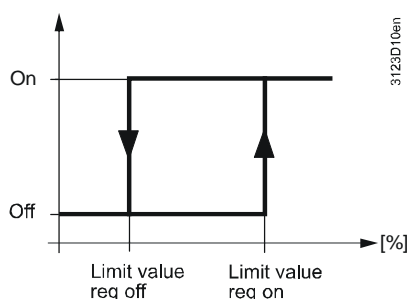
### Main menu > Commissioning > Settings > ... or

### 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 %
Chilled water flow setpoint	0...140 °C	6 °C
Flow temperature increase max	0...100 K	0 K
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 plants) 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.



## Chilled water flow setpoint, Flow temperature increase max

Use setting value "Flow temperature increase max" to enable optimization, which determines the current optimum flow temperature for control from the received request signals.

In this case, value "Flow temperature increase max" can be floating, i.e. deviate from the set value for "Chilled water flow setpoint".

This current flow temperature is controlled to a 90% valve position of the refrigeration consumer with the greatest demand (evaluation of request in setting "Maximum") so that:

- Valve position < 90 %: The flow temperature is increased continuously until value "Chilled water flow setpoint" plus "Flow temperature increase max" is reached.
- Valve position > 90 %: The flow temperature is decreased continuously until value "Chilled water flow setpoint" is reached.

As a result, the following max. flow temperature setpoint can be set at valve positions ≤ 90%:

$$\text{Max. flow temperature} = \text{"Chilled water flow setpoint"} + \text{"Flow temperature increase max"}$$

## Note

This optimization function is enabled only if value "Flow temperature increase max" > 0 (factory setting: 0 = disabled).

## Control action

The "Control action" of the flow temperature on the setpoint shifts can be set in three steps ("Fast", "Medium", "Slow") to adapt to the plant.



Use setting "Request evaluation" 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 can cover their refrigeration demand. It prevents, however, an individual consumer from forcing the flow temperature to low levels (e.g. because a window was left open).

## 10.2.5 Internal refrigeration demand

RMS705B provides the calculated request signals as internal signals. To this end, function block "Refrigeration demand" offers two outputs.

- (I d)  
The demand as a digital value, e.g. via a motor block, logic block, etc., can be further handled, e.g., to switch on a pump when a refrigeration demand signal was sent.
- (L a)  
For example as setpoint for setpoint shift, differential control.

## 10.2.6 Refrigeration demand relay (QI)

Release for an external refrigeration source, for example, 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.

 **Main menu > Commissioning > Extra configuration > Aggregates > Refrigeration demand >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Refrigeration demand relay	---, N.Q1, N.Q3, ... / Enable output.

## 10.2.7 Refrigeration demand continuous (L)

In addition to the refrigeration demand relay, the refrigeration demand can be provided at a continuous output for other devices.

 **Main menu > Commissioning > Extra configuration > Aggregates > Refrigeration demand >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Refrig demand modulating	---, N.Y1, N.Y2 / Enable output.



## 10.2.8 Display values

Heat and refrigeration demand are visible on the password level under:

 **Main menu > Aggregates > Heat and refrig demand >**

<i>Operating line</i>	<i>Range</i>	<i>Comment</i>
Refrig demand air handling	0...100 %	From RMU(A,U), RMS.
Refrig demand air retreatment	0...100 %	From RXB, RXL, RDF, RDG.
Refrig demand cooling surface	0...100 %	From RXB, RXL, RDF, RDG.
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 >**

<i>Operating line</i>	<i>Range</i>	<i>Comment</i>
Refrigeration demand relay	On, Off	Output Q.
Refrig demand modulating	0...100 %	Output Y.

## 10.2.9 Function check / wiring test

Purpose

During the output wiring test, refrigeration demand can be switched directly via the control switch.

Setting values

 **Main menu > Commissioning > Wiring test > Outputs >**

<i>Operating line</i>	<i>Comment</i>
Refrigeration demand relay	---, 0...100% (relay switches > 1%).
Refrig demand modulating	---, 0...100 %

## 10.3 H/C demand application examples

### 10.3.1 Overview

---

#### Application

RMS705B as universal device can assume functions *or* partial functions of a consumer, primary controller, or generation.

This results in sophisticated configurations and settings of the corresponding distribution zones via the Communication menu.

The section explains the various applications and the required configuration and communication settings to transmit H/C demand.

RMS705B can generate or evaluate demand signals for the following applications:

- Consumers (Section 10.3.3).
- Primary controllers (Section 10.3.4).
- Generation (Section 10.3.5).
- Consumers and primary controllers (Section 10.3.6).
- Consumers and generation (Section 10.3.7).

#### Note

The following examples are for hot water networks (heat distribution zone). However, they equally apply to chilled water networks (refrigeration distribution zone).

### 10.3.2 Setting rules

---

Controllers (controllers 1...3, primary controller) on the H/C demand block are enabled (shown as a cross in the configuration diagrams) if the controller's demand is to be passed on.

#### RMS705B as consumer

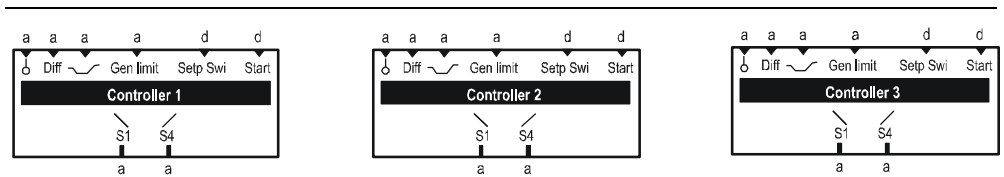
Demand from controllers 1, 2 *or* 3 is to be passed on (to bus, to digital (d, Q) *or* analog (a, Y) output).

#### RMS705B as primary controller

Primary controller demand is to be passed on to the bus.

# 11 Universal controller

## 11.1 Overview



Purpose

RMS705B provides 3 controllers with 2 sequential outputs each. The universal controller can provide control to an absolute variable *or* differential variable.

### 11.1.1 Enable the universal controller

Assign an input to the main controlled variable to enable the universal controller.

Configuration

**Main menu > Commissioning > Extra configuration > Controller 1...3 >**

Operating line	Range	Factory setting
Main controlled variable	---, N.X1, N.X2, ..., internal analog (analog values).	---
Differential input	---, N.X1, N.X2, ..., internal analog (analog values).	---

The following settings are required depending on the desired function:

Desired control	Operating line	Setting
Control to an <b>absolute</b> variable (1 sensor input)	Main controlled variable	Xx (analog)
	Differential input	---
Control to a <b>differential</b> variable (2 sensor inputs)	Main controlled variable	Xx (analog)
	Differential input	Xx (same unit as main controlled variable)

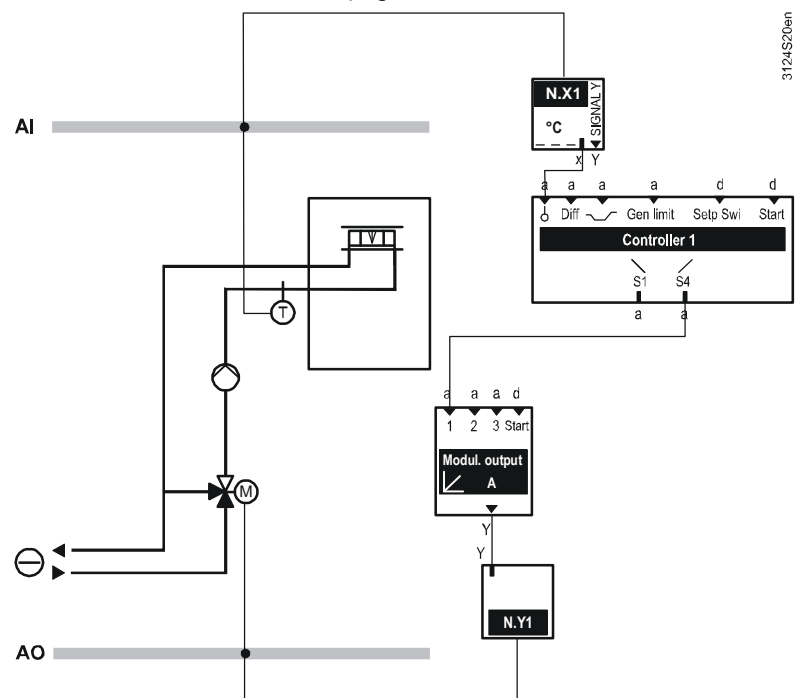
The controller always uses the same unit as the main controlled variable.

Misconfiguration has the following effect:

Operating line	Setting	Type of action
Main controlled variable	---	Controller inactive.
Differential input	(not relevant)	---
Main controlled variable	Xx (digital)	Message sent: "[Main contr var 1] sensor error"
Differential input	(not relevant)	
Main controlled variable	Xx (analog)	Message sent: "[Main contr var 1] sensor error"
Differential input	Xx (other unit as main controlled variable)	

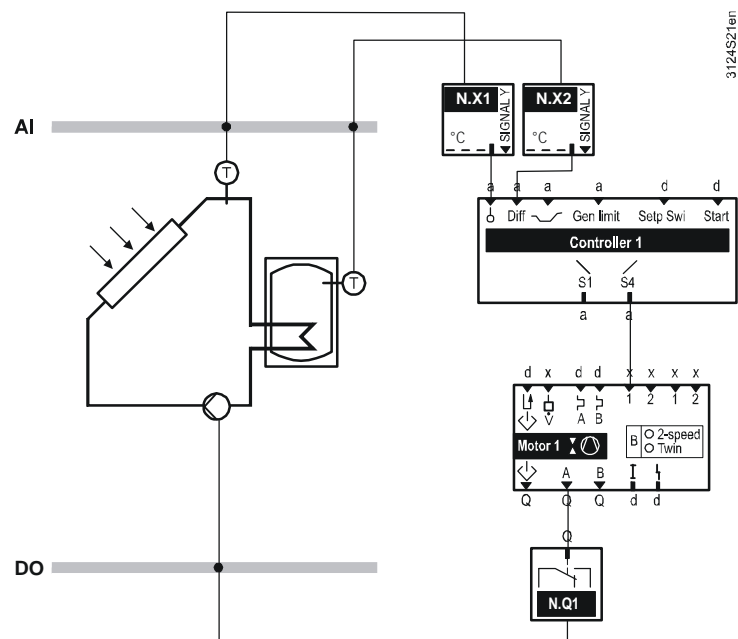
### Application example 1

Control to absolute variable (e.g. chilled water control for chilled ceiling).



## Application example 2

Control to differential variable (e.g. solar storage plant).



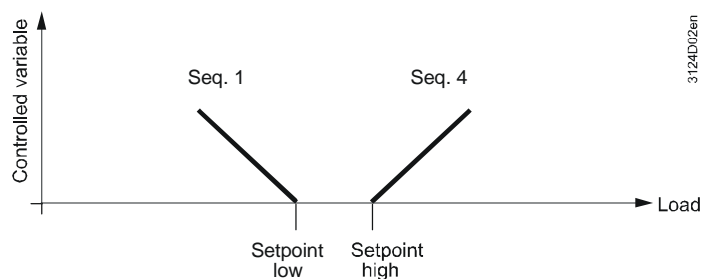
## 11.2 Makeup and mode of operation of the controller

PID control controls the main controlled variable according to the defined setpoint.

The controller can contain max 2 sequences in the following combinations:

- One sequence: Sequence 1 or Sequence 4.
- Two sequences: Sequence 1 and 4.

Function diagram



The "Setpoint low" (heating setpoint) is assigned to sequence 1. Its output signal acts reverse to the load (inputs variable).  
Example for heating: Outside temperature  $\uparrow$  , sequence 1  $\downarrow$ .

The "Setpoint high" (cooling setpoint) is assigned to sequence 4. Its output signal acts reverse to the load (input variable).  
Example for cooling: Outside temperature  $\uparrow$  , sequence 4  $\uparrow$ .

### Note

Functions "Heat demand" (see Section 10) and "Refrigeration demand" (see Section 10.2) process the controller's output signal. The settings are described in the corresponding chapters.

## 11.2.1 Setpoints

### Setting values


-  Main menu > Commissioning > Settings > .... or
-  Main menu > Settings > Controller 1...3 > Setpoints >

<i>Operating line</i>	<i>Range</i>	<i>Factory setting (type-dependent)</i>
Setpoint high	Depending on selected type.	24 °C, 24 K, 60 %, 10 g/kg, 30 kJ/kg, 800 W/m <sup>2</sup> , 15 m/s, 100 bar, 1000 mbar, 1000 Pa, 1000 ppm, 100, 1000
Setpoint low	Depending on selected type.	21 °C, 21 K, 40 %, 6 g/kg, 20 g/kg, 20 kJ/kg, 600 W/m <sup>2</sup> , 10 m/s, 6 bar, 60 mbar, 400 Pa, 0 ppm, 60, 600


### Note on differential control

- The following applies to differential control:  
Differential actual value = Main controlled variable – differential input.

### Display values

-  Main menu > Controller 1...3 >

<i>Operating line</i>	<i>Comment</i>
Actual value	
Current setpoint	

-  Main menu > Controller 1...3 >

<i>Operating line</i>	<i>Comment</i>
[Sequence 1 \ ] load	Current controller output in 0...100%.
[Sequence 4 _/ ] load	Current controller output in 0...100%.



## 11.2.2 Troubleshooting

- If no aggregates are configured for the control sequences, the "Current setpoint" is displayed as "---".
- When the commissioning menu is exited, a check is carried out to see if the main controlled variable exists.
- If the main controlled variable or differential input is missing, the corresponding universal controller is switched off and a fault message is triggered (see "Fault messages").

### Fault messages

No.	Text	Effect
3011	[Main contr var 1] sensor error	Urgent message; must not be acknowledged.
3012	[Main contr var 2] sensor error	Urgent message; must not be acknowledged.
3013	[Main contr var 3] sensor error	Urgent message; must not be acknowledged.

## 11.2.3 Control parameters (P-band, integral action time, derivative action time)

For every sequence, a P-band (Xp), an integral action time (Tn), and a derivative action time (Tv) can be set.

### Notes

- Integral action time Tn = 00:00 m.s: The controller has no I-part (PD).
- Derivative action time Tn = 00:00 m.s: The controller has no D-part (PI).

### Setting values

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

 **Main menu > Settings > Controller 1...3 > Control parameters >**

Operating line	Range (type-dependent)	Factory setting (type-dependent)
[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 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


## 11.2.4 Control timeout

You can enter a control timeout period, for example, to prevent the cooling valve from opening immediately after the heating valve closes.

The controller does not add the integral action part 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

## 11.3 Universal shift

### 11.3.1 Enable universal shift

Assign an input to enable this function.

#### Configuration

 **Main menu > Commissioning > Extra configuration > Controller 1...3 >**

Operating line	Adjustable values / Comment
Universal shift	---, N.X1, N.X2, ..., internal analog (analog values only).

### 11.3.2 Mode of operation

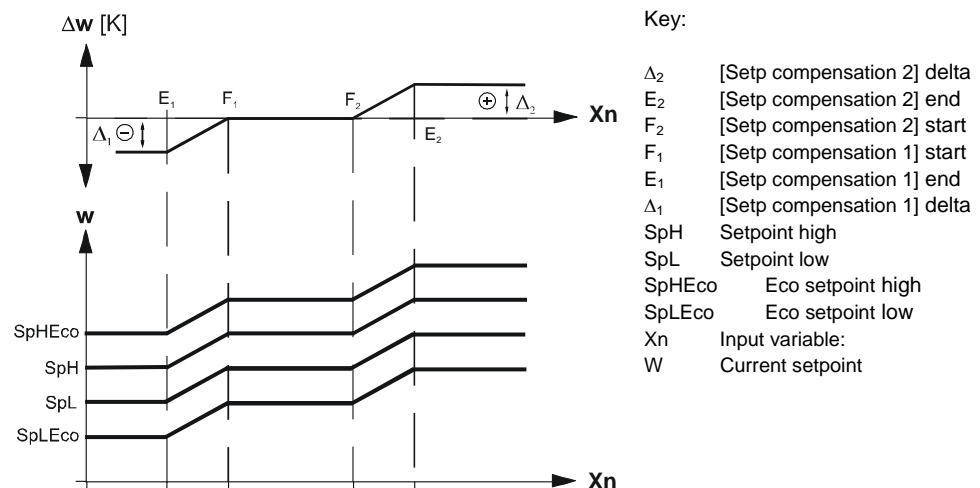
The setpoint can be shifted from a universal input *or* an internal analog signal.

#### Application

- Refrigeration: Shifting the flow temperature setpoint for the chilled ceiling by room enthalpy *or* the surface temperature.
- Ventilation: Shifting by room humidity *or* surface temperature.
- General: Shifting by outside temperature.

Setpoint shifting acts on "Setpoint high/low" and "Eco setpoint high/low" as per the following diagram:

#### Function diagram



### 11.3.3 Setting values for universal shift

Setting values

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

 **Main menu > Settings > Controller 1...3 > Setpoint effects >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting *</i>
[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

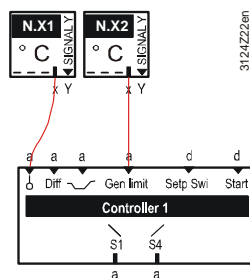
\* Depends on analog value; here, e.g. temperature °C.

### 11.3.4 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 disabled.

## 11.4 General limiter



You can select a general limiter function.  
The limitation function overrides the normal control function of the controller.  
See Section 11.4.2 for this function.

### 11.4.1 Enable function

Assign an input to the function to enable this function.

#### Configuration

**Main menu > Commissioning > Extra configuration > Controller 1...3 > Inputs >**

Operating line	Adjustable values / Comment
General limit controller	---, N.X1, N.X2, ..., internal analog (analog values only) Enable general limitation.

#### Setting values

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

**Main menu > Settings > Controller 1...3 > General limiter >**

Operating line	Range (dependent on selected type)	Factory setting (type-dependent)
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/m <sup>2</sup> , 50 m/s, 10 bar, 50 mbar, 50 Pa, 100 ppm, 10.0, 50
Integral action time Tn	00.00...60.00 m.s	01.00 m.s

#### Display values

**Main menu > Controller 1...3 >**

Operating line	Comment
Actual value general limiter	

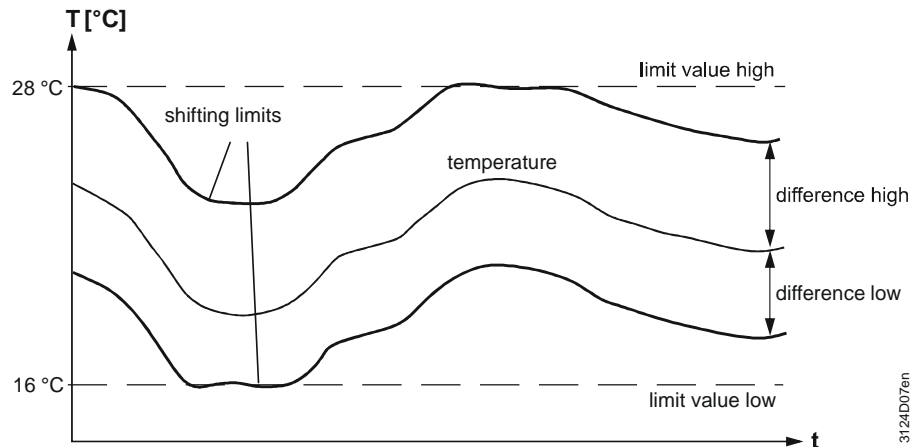
## 11.4.2 Mode of operation

The general limitation function overrides the normal control function with PI control to adhere to the limitation setpoint when the limitation setpoint is exceeded (up or down).

Absolute/relative limitation

You can configure absolute and relative limitation.

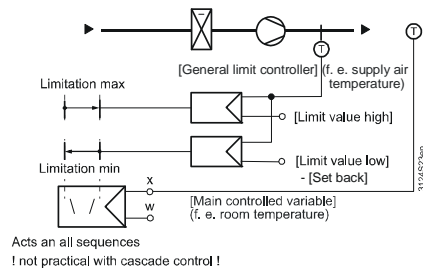
If only one of these functions is desired, the other function can be disabled by setting the setpoints far outside.



### Absolute general limitation

One setpoint each for maximum ("Limit value high") and minimum "Limit value high" limitation can be entered.

Principle of operation (example)



Special setting for direct cooling

If cooling sequence 4 is enabled, minimum limitation can be lowered by a set value ("Reduction min limitation cooling"). This prevents the refrigeration machine from being switched off again just after switching on in the case of staged (direct) cooling.

Note

This function is only enabled if both main controlled variable and input for general limitation use unit °C.

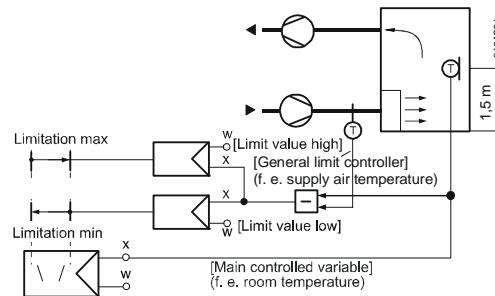
### Relative general limitation

One setpoint each for maximum ("Differential high") and minimum "Differential low" differential temperature limitation can be entered.

#### Notes

- The maximum and minimum differential temperature limitation can only be enabled if the main controlled variable and the general limiter are configured with the same unit (e.g. °C).
- The set limitation setpoints relate to the differential (e.g. temperature) between the main controlled variable and the general limiter.

#### Principle of operation (example)

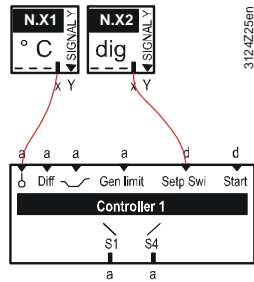


### 11.4.3 Troubleshooting

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 there is no limitation sensor, limitation is disabled.

## 11.5 Eco setpoint changeover



This function allows for changeover to Eco setpoints.

### Enabling

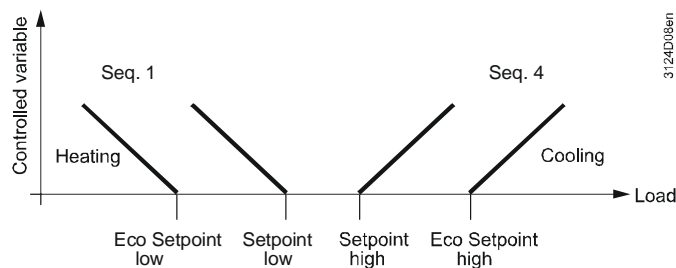
To activate this function, configure the relevant digital input.  
Eco setpoint changeover is available at controllers 1...3.

### Configuration

**Main menu > Commissioning > Extra configuration > Controller 1...3 >**

Operating line	Adjustable values / Comment
Setpoint switch	---, N.X1, N.X2, ... (digital values only).

### Function diagram



### 11.5.1 Setpoints

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

**Main menu > Settings > Controller 1...3 > Setpoints >**

### Setting values

Operating line	Range	Factory setting (type-dependent)
Eco setpoint high	Depending on selected type.	28 °C, 28 K, 80 %, 12 g/kg, 50 kJ/kg, 1000 W/m <sup>2</sup> , 15 m/s, 100 bar, 1000 mbar, 1000 Pa, 1500 ppm, 100, 1000
Eco setpoint low	Depending on selected type.	19 °C, 19 K, 20 %, 4 g/kg, 0 kJ/kg, 200 W/m <sup>2</sup> , 0 m/s, 0 bar, 0 mbar, 0 Pa, 0 ppm, 0

## 11.6 Start the universal controller

---

Configure a start condition for the universal controller.  
The controller is stopped and started via a digital signal.

### Notes

- "Current setpoint" is displayed with "---" when a universal controller is stopped.
- The controller always runs without configured start condition.

 **Main menu > Commissioning > Extra configuration > Controller 1...3 >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Start condition	---, N.X1, N.X2, ... (digital values only). Starts the controller, all outputs to 0%.

## 11.7 Assign texts

---

Adapt the texts for the universal controller via operation.

### Setting values

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

 **Main menu > Settings > Controller 1...3 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Controller x	Max. 20 characters	Controller x

See Section 16.4 "Editable texts RMS705B" for an overview of all editable texts and on how to reset them.

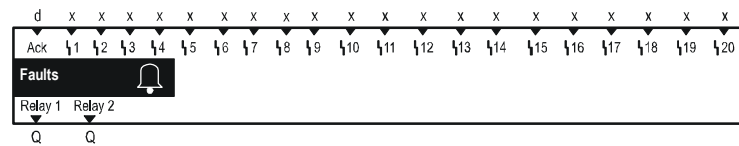


# 12 Faults

## 12.1 Purpose and enabling

### Purpose

Function block "Faults" collects all fault messages and sends them to the fault display, fault relays, and via bus.



### Enabling

Enable the fault block by configuring fault inputs 1...20 *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 enabled to display these faults.

## 12.2 Fault priorities and acknowledgement

### Fault priorities

There are 2 types of fault priorities:

**Urgent** Fault messages representing plant risks *or* for which trouble-free plant operation is no longer guaranteed.

**Not urgent** Fault messages representing risks that do not represent a great risk to plant operation.

### Fault acknowledgement

There are 2 types of fault acknowledgement:

- (No acknowledgement).
- Acknowledge
- Acknowledge and reset

### Note

See Section 14 on fault acknowledgement.

### Impact of fault


Faults "No stop" and "Stop" are not available in RMS705B. Plant stops *or* partial plant stops are configured internally, e.g. using stop conditions *or* logical links to start/stop conditions of the function blocks.

## 12.3 Universal fault inputs (1...20)

### Connections

RMS705B provides function block "Faults" with 20 universal fault inputs. Any type of analog or digital signal can be connected to these inputs.

### Configuration

 **Main menu > Commissioning > Extra configuration > Faults >**

<i>Operating line</i>	<i>Adjustable values / Comment</i>
Fault input 1	---, N.X1, N.X2, ...
...	
Fault input 20	---, N.X1, N.X2, ...


### Settings

The following settings are possible for each fault message:

- Fault status message delay: Elapsed time until a pending fault generates a fault message.
- Fault acknowledgement
- Fault priority
- Limit value fault on: Limit value from which the fault 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...20 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Fault status message delay	00.00...59.59 m.s	00.05 m.s
Fault acknowledgement	None, Acknowledge, Acknowledge and reset	None
Fault priority	Urgent, Not urgent	Not urgent
Limit value fault on	Depending on selected type.	Type-dependent.
Limit value fault off	Depending on selected type.	Type-dependent.


### Notes

- If the upper and lower limit of a measured value is to be monitored, the signal is must be sent to 2 fault inputs.
- For monitoring, set the lower limit "Limit value fault on" to lower than "Limit value fault off". This generates a fault message when the measured value is lower than the "Limit value fault on".
- The difference between "Limit value fault on" and "Limit value fault off" represents the hysteresis.
- No fault message is generated if value "Limit value fault on" is equal to "Limit value fault off".

### Fault texts

Adjust the texts for the universal fault inputs via the operator unit.

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

 **Main menu > Settings > Faults > Fault input 1...20 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Fault text 1	Max. 20 characters	[Fault inp 1] fault

## Fault messages

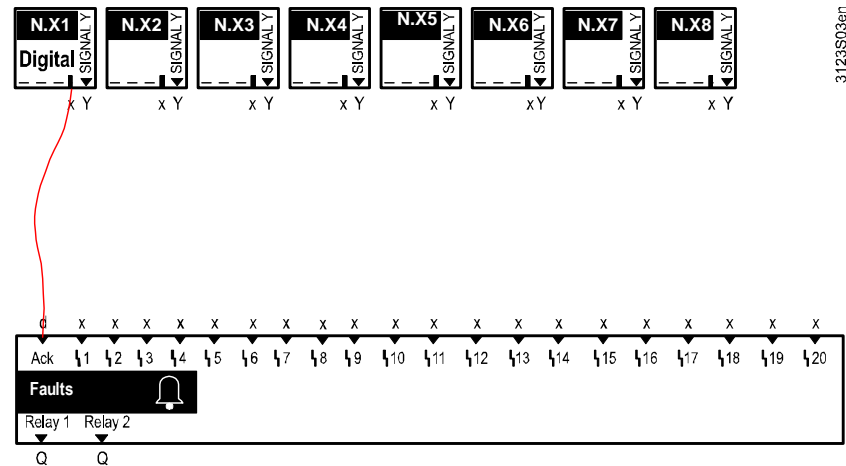
No.	Standard text	Effect
9000	>1 fault input faulty	Urgent message; must not be acknowledged (effect can be adjusted for each fault input).
9001	[Fault inp 1] fault	As per the selected setting (see Sec. 12.5, Setting values).
9002	[Fault inp 2] fault	Ditto
9003	[Fault inp 3] fault	Ditto
9004	[Fault inp 4] fault	Ditto
9005	[Fault inp 5] fault	Ditto
9006	[Fault inp 6] fault	Ditto
9007	[Fault inp 7] fault	Ditto
9008	[Fault inp 8] fault	Ditto
9009	[Fault inp 9] fault	Ditto
9010	[Fault inp 10] fault	Ditto
9011	[Fault inp 11] fault	Ditto
9012	[Fault inp 12] fault	Ditto
9013	[Fault inp 13] fault	Ditto
9014	[Fault inp 14] fault	Ditto
9015	[Fault inp 15] fault	Ditto
9016	[Fault inp 16] fault	Ditto
9017	[Fault inp 17] fault	Ditto
9018	[Fault inp 18] fault	Ditto
9019	[Fault inp 19] fault	Ditto
9020	[Fault inp 20] fault	Ditto

### >1 fault input faulty

The fault is sent at the highest priority via the KNX bus. If more than one fault input with priority "Urgent" is signaling a fault, message ">1 fault input faulty" is indicated with highest priority. Without this message, only the message from one fault input would be indicated. The new fault message can be viewed on the Info level via "Bus fault messages".

## 12.4 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 RMS705B. Both allow for concurrent operation.
- The current alarm state can be externally indicated via the fault relay.



Configuration

**3** Main menu > Commissioning > Extra configuration > Faults >

Operating line	Adjustable values / Comment
Fault button external	---, N.X1, N.X2, ... (digital only).

## 12.5 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 outputs "Fault relay 1" and "Fault relay 2" can be configured on any two free outputs N.Qx.

Configuration

**3** Main menu > Commissioning > Extra configuration > Faults >

Operating line	Adjustable values / Comment
Fault relay 1	---, N.Q1 ... (free relays only) / assign fault relay.
Fault relay 2	---, N.Q1 ... (free relays only) / assign fault relay.


Settings

For "Fault relay 1", the following settings are possible:

Fault priority	<ul style="list-style-type: none"> <li>• Priority at which the relay is to be energized.</li> </ul>
Indication of fault	<ul style="list-style-type: none"> <li>• The fault relay only indicates internal faults and remains energized until faults are no longer present.</li> <li>• The fault relay only indicates internal faults and remains energized until the fault is acknowledged.</li> <li>• The fault relay only indicates faults from the bus and remains energized until the fault is acknowledged.</li> </ul>
Inversion	<ul style="list-style-type: none"> <li>• No: The relay is energized upon fault.</li> <li>• Yes: The relay is deenergized upon fault.</li> </ul>

## Setting values

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

 **Main menu > Settings > Faults > Fault relay 1...2 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Fault priority	Urgent, Not urgent, All	All
Indication of fault	Fault internally (optically), Fault internally (audibly), Fault via bus (audibly) **	Fault internally (audibly) *
Inversion	Yes, No	No

\* Factory setting for "Fault relay 2": "Fault via bus (audibly)".

\*\* Max. 1 bus fault message can be processed (even if the priorities are different). Recommendation: Do not configure 2 bus fault relays.

## Display values

At menu item "Aggregates", the state of the 2 fault relays can be read.

 **Main menu > Aggregates > Faults >**

<i>Operating line</i>	<i>Current state</i>
Fault relay 1	Off, On
Fault relay 2	Off, On

## 12.6 Function check / wiring test

### Wiring test

During the wiring test, the two fault relays can be enabled directly:

 **Main menu > Commissioning > Wiring test > Outputs >**

<i>Operating line</i>	<i>Comment</i>
Fault relay 1	Off, On
Fault relay 2	Off, On

# 13 Communication

See basic documentation "Communication via KNX bus" (P3127) for a detailed description of communications.

The following section only describes the most important settings to commission simple communications.

## 13.1 Enable communication


Device communication is enabled when:

- The device address is entered  
(each bus member requires an individual device address).
- Bus power supply is available.
- RMS705B is not in the Commissioning menu.

## 13.2 "Communication" menu settings

### 13.2.1 Basic settings

Setting values

 **Main menu > Commissioning > Communication > Basic settings >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Device address	1...253 (1...255)	255
Decentral bus power supply	Off, On.	On.
Clock time operation	Autonomous, Slave, Master	Autonomous
Remote setting clock slave	Yes, No	Yes
Remote reset of fault	Yes, No	No

View the settings entered here via:

Main menu > Device information > Communication > Basic settings

Device address

Each bus member requires a unique device address.

Notes

- Device address 255 is used to disable communications  
(no exchange of process data).
- If two devices on the KNX bus have the same device address, fault message ">1 identical device address" is displayed.

Decentral bus power supply

For small plants, decentralized bus power supply suffices.  
This is the default setting.

Notes

- See documents N3127 and P3110 on decentralized bus supply.
- Fault message "No bus power supply" is displayed and communications interrupted if there is no bus supply.
- Access using Service tool OC1700.1 is only possible if communications is enabled.

Clock time operation	<p>If a common clock time is to be used in the system, one device must be defined as "Master", all other devices as "Slave".</p> <p>When set to "Autonomous", the device <i>neither</i> sends <i>nor</i> receives the clock time.</p>
Remote setting clock slave	<p>"Remote setting clock slave" = Yes allows for adjusting the clock time at the slave. The time is sent to the master and transmitted to all other devices.</p>
Remote reset of fault	<p>You can set if self-holding fault messages can be unlocked remote <i>or</i> if unlocking must take place via the local button. The default setting does not allow for "Remote reset of fault".</p>
Reasons	<p>When device communications is enabled, the effects are:</p> <ul style="list-style-type: none"> <li>Fault messages are always sent via KNX bus and can be further processed by other Synco devices.</li> </ul> <p>Fault messages from other Synco devices are displayed under: Main menu &gt; Faults &gt; Fault status message bus.</p> <p>Fault messages from other Synco devices can be sent to a fault relay (see Section 12.5).</p> <p>All fault messages can be acknowledged from remote, e.g. via operator station with OCI700.1.</p>

### 13.2.2 Holidays/special days

Setting values

 Main menu > Commissioning > Communication > Holidays/special days >

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Holidays/special day operation	Autonomous, slave, master.	Autonomous
Holidays/special day zone	1...31	1

### 13.2.3 Time switch

Setting values

 Main menu > Commissioning > Communication > Time switch > Time switch 1...6 >

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Time switch operation	Autonomous, slave	Autonomous
Time switch slave (apartment)	1...126	1
Transformation Precomfort	Off, On.	On.

### 13.2.4 Distribution zones

Setting values

 Main menu > Commissioning > Communication > Distribution zones >

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
Outside temperature zone	----, 1...31	----
Heat distribution zone	1...31	1
Heat distr zone source side	----, 1...31	----
Refrigeration distribution zone	1...31	1
Refrig distr zone source side	----, 1...31	----

### 13.2.5 Universal transmission and reception zones

---

Device RMS705B allows for universal data exchange via own terminals as well as via terminals of extension modules RMZ78x. Data between devices is exchanged via KNX bus.

Function principle	<ul style="list-style-type: none"><li>• Universal inputs, digital and analog outputs of RMS705B can be used as transmission objects (for transmission zones).</li><li>• Universal inputs of RMS705B can be used as reception objects (in reception zones).</li><li>• Data is exchanged as if the device terminals were wired.</li></ul>
Number of transmission and reception zones	Max. 32 transmission and reception zones are allowed per line (see N3127, P3127 on the KNX bus).
Note	Note "allowed" and "not allowed" applications due to KNX-bus-specific properties (e.g. transmission frequency).
Examples for allowed applications	Universal transmission and reception zones are allowed and sensible for: <ul style="list-style-type: none"><li>• Controlling decentralized aggregates such as motors, pumps, etc..</li><li>• Simple control functions that are not time-critical.</li><li>• Common processing or use of bus information.</li></ul>
Examples for not allowed applications	The following applications or input/output values may <b>not</b> be implemented using universal transmission and reception zones: <ul style="list-style-type: none"><li>• Safety-relevant plants and equipment (e.g. fire alarm off, smoke extraction, frost protection function).</li><li>• If request "Simultaneous start condition of plants" exists.</li><li>• Applications where communications failure of transmission or reception zones may cause damage.</li><li>• Time-critical control paths or control paths with greater degree of difficulty (e.g. speed control via pressure, humidity).</li><li>• Main controlled variables that must be available.</li><li>• Acquisition and evaluation of pulses.</li></ul>
Note	After RMS705B power-up, it may take some time until the bus signals are available. This may result in faulty plant behavior in the case of transmission and reception zone applications that are not allowed.
<b>Enable</b>	To enable the function, set the desired transmission or reception zone at a terminal in RMS705B. Set the partner device accordingly.
Note	Transmission/reception is a 1:n relation, i.e. one sender and several recipients are possible in a transmission/reception zone.



## Overview

<i>Reception zones</i>	<i>Transmission zones</i>
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 >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
N.X1...A8(2).X4	---, 1...4095	---

## Setting values

 **Main menu > Commissioning > Communication > LTE transmission zones >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
N.X1... A8(2).X4 N.Q1...A8(2).Q5 N.Y1...A8(2).Y2	---, 1...4095	---

## Note



You can simulate bus signals using the "Simulation inputs" function when commissioning plants (see Section 5.1.3).



Example 1

The air quality average value of 2 air quality sensors is available in RMS705B (device 1). This value is sent as transmission object via an analog output and handled by RMS705B (device 2).

Data exchange concept


The following transmission and reception zone is engineered for the example:

RMS705B, device 1		RMS705B, device 2		Value
Terminal	Transmission zone	Terminal	Reception zone	
N.Y1 	1	N.X1 	1	Air quality average

 = Transmission  
 = Reception

Configuration Device 1


Configure the following in RMS705B, device 1:

 Main menu > Commissioning > Communication > LTE transmission zones >


Operating line	Range	Factory setting
N.Y1	1	

Device 2

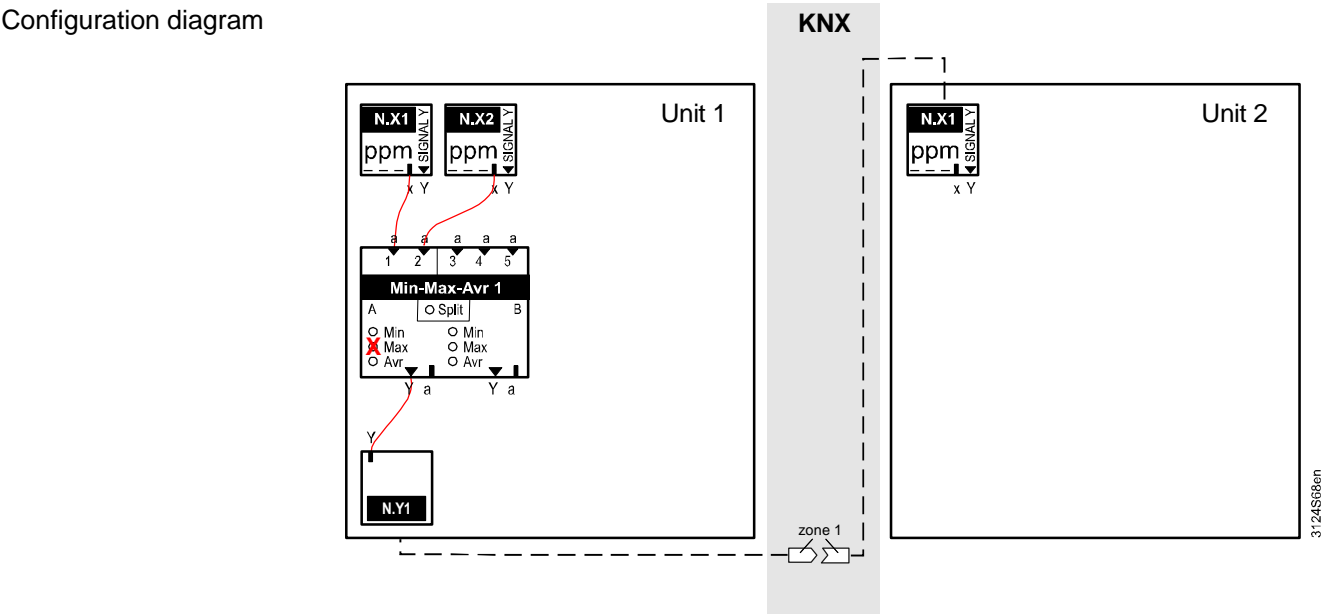
Configure the following in RMS705B, device 2:

 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	









## Example 2

A detached ventilation control (RMS705B, device 1) controls a rooftop fan (RMS705B, device 2). To do this, a release command created in device 1 is sent as transmission object via digital output and used by device 2 to start the rooftop fan. In reverse direction, any operating message created in device 2 is sent as transmission object via digital output to device 1 and processed accordingly.

## Data exchange concept

The following transmission and reception zones are engineered for the example:

<i>RMS705B, device 1</i>		<i>RMS705B, device 2</i>		<i>Value</i>
Terminal	Transmission zone	Terminal	Reception zone	
N.Q1 	1	N.X1 	1	Rooftop fan release
	Reception zone		Transmission zone	
N.X1 	2	N.Q2 	2	Rooftop fan operating message

 = Transmission  
 = Reception

## Configuration

Device 1 Configure the following in RMS705B, device 1 (ventilation control):

 **Main menu > Commissioning > Extra configuration > Input identifier >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
N.X1	Digital	

 **Main menu > Commissioning > Communication > LTE transmission zones >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
N.Q1	1	

 **Main menu > Commissioning > Communication > LTE reception zones >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
N.X1	2	

## Device 2

Configure the following in RMS705B, device 2 (rooftop fan):

 **Main menu > Commissioning > Extra configuration > Input identifier >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
N.X1	Digital	

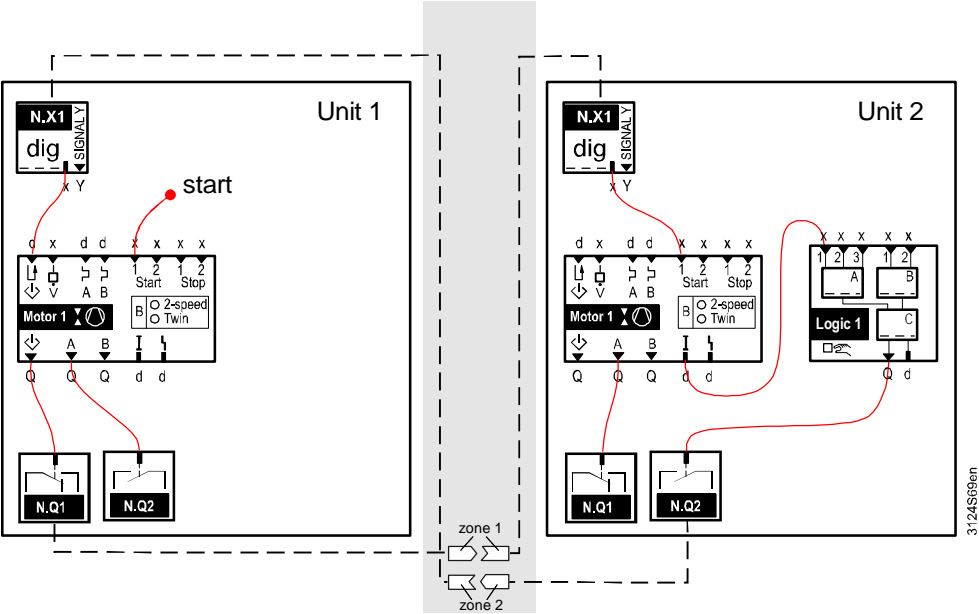
 **Main menu > Commissioning > Communication > LTE transmission zones >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
N.Q2	2	

 **Main menu > Commissioning > Communication > LTE reception zones >**

<i>Operating line</i>	<i>Range</i>	<i>Factory setting</i>
N.X1	1	

Configuration diagram



Example 3



An enthalpy value calculated from temperature and relative humidity is available in RMS705B (device 1). This value is sent as transmission object via an analog output and handled by the second device.



Note

Adjust the value range of the reception terminal (device 2) to the unchangeable value range of the calculated enthalpy prior to use in device 2. See Section 9.2.1 for the set value range for the enthalpy calculator.

Data exchange concept


The following transmission and reception zone is engineered for the example:

RMS705B, device 1		Device 2		Value
Terminal	Transmission zone	Terminal	Reception zone	
N.Y1 	1	N.X1 	1	Enthalpy value for further use

 = Transmission  
 = Reception

Configuration


Device 1Configure the following in RMS705B, device 1:

 **Main menu > Commissioning > Communication > LTE transmission zones >**

Operating line	Range	Factory setting
N.Y1	1	



Device 2

Configure the following in device 2:


 **Main menu > Commissioning > Extra configuration > Input identifier >**

Operating line	Range	Factory setting
N.X1	kJ/kg	

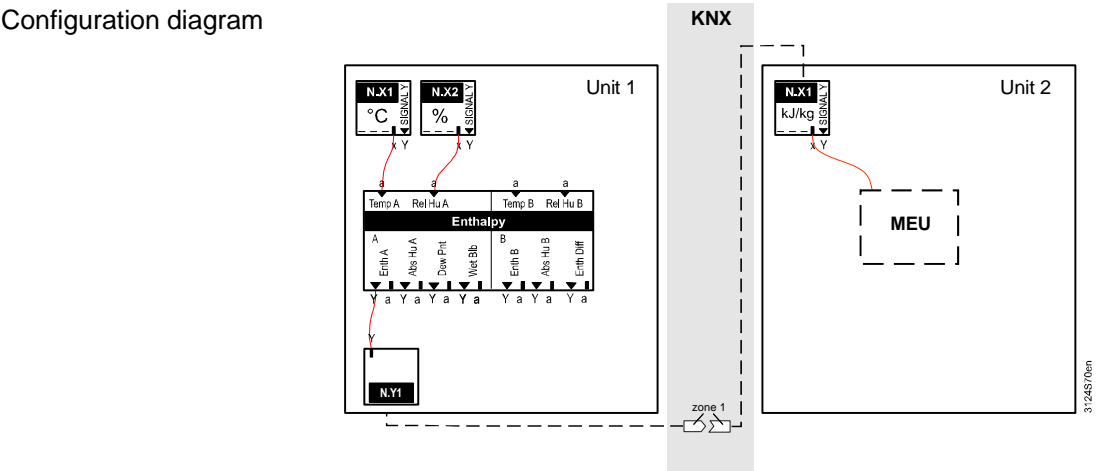
Setting values

 **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 > Communication > LTE reception zones >**

Operating line	Range	Factory setting
N.X1	1	



### 13.2.6 Troubleshooting

---

After expiration of a specific time (ca. 30 minutes), a fault message "[...X...] Sensor error" is sent if the bus should receive a signal from an input, but the signal is not available.

#### Fault messages

<i>No.</i>	<i>Text</i>	<i>Effect</i>
5000	No bus power supply	Non-urgent message; must not be acknowledged.
5902	>1 identical LTE zone	Non-urgent message; must not be acknowledged.
6001	>1 identical device address	Urgent message; must be acknowledged.

# 14 Support for errors and faults

## 14.1 Error/fault code list

Code no.	Cause of error/fault	Described in Section
10	Outside temp sensor error	See 5.6.5 "Outside temperature"
11	>1 outside temperature sensor	See 5.6.5 "Outside temperature"
12	Outs sensor simulation active	See 5.6.5 "Outside temperature"
100	Simulation inputs active	See 5.1.2 "Universal inputs"
101...264	[N.X1] sensor error ... RMZ788(2).X4 sensor error	See 5.2.6 "Analog inputs" See 5.5.5 "Remote setpoint adjuster, absolute" See 5.6.5 "Outside temperature"
1310	[Motor 1] fault	See 8.4.4 "Motor"
1311	[Motor 1] overload	See 8.4.7 "Motor"
1312	[Motor 1] no flow	See 8.4.6 "Motor"
1314	[Motor 1A] overload	See 8.4.7 "Motor"
1315	[Motor 1B] overload	See 8.4.7 "Motor"
1316	[Motor 1A] no flow	See 8.4.6 "Motor"
1317	[Motor 1B] no flow	See 8.4.6 "Motor"
1318	[Mot 1] precom no checkb signal	See 8.4.9 "Motor"
1360	[Motor 6] fault	See 8.4.4 "Motor"
1361	[Motor 6] overload	See 8.4.7 "Motor"
1362	[Motor 6] no flow	See 8.4.6 "Motor"
1364	[Motor 6A] overload	See 8.4.7 "Motor"
1365	[Motor 6B] overload	See 8.4.7 "Motor"
1366	[Motor 6A] no flow	See 8.4.6 "Motor"
1367	[Motor 6B] no flow	See 8.4.6 "Motor"
1368	[Mot 6] precom no checkb signal	See 8.4.9 "Motor"
1911	[O'hrs 1] serv req	See 6.3.4 "Operating hours"
1912	[O'hrs 2] serv req	See 6.3.4 "Operating hours"
1913	[O'hrs 3] serv req	See 6.3.4 "Operating hours"
1914	[O'hrs 4] serv req	See 6.3.4 "Operating hours"
3011	[Main contr var 1] sensor error	See 11.2.2 "Universal controller"
3012	[Main contr var 2] sensor error	See 11.2.2 "Universal controller"
3013	[Main contr var 3] sensor error	See 11.2.2 "Universal controller"
5000	No bus power supply	See 13.2.6 "Communications"
5001	System time failure	See 4.1.3 "Date and time"
5002	>1 clock time master	See 4.1.3 "Date and time"
5003	Invalid time of day	See 4.1.3 "Date and time"
5101	[Time switch 1] failure	See 7.1.5 "Time switch"
...	...	...
5151	[Time switch 6] failure	See 7.1.5 "Time switch"
5201	Hol/spec day program failure	See 7.2.6 "Holidays/special days"
5202	>1 hol/spec day program	See 7.2.6 "Holidays/special days"
5801	H/C changeover signal failure	See 10.4.12 "H/C changeover"
5802	>1 heat/cool changeover signal	See 10.4.12 "H/C changeover"
5902	>1 identical LTE zone	See 13.2.6 "Communications"
6001	>1 identical device address	See 13.2.6 "Communications"

<i>Code no.</i>	<i>Cause of error/fault</i>	<i>Described in Section</i>
6401	[Calculator 1] formula invalid	See 6.5.5 "Calculator"
6402	[Calculator 2] formula invalid	See 6.5.5 "Calculator"
7101... 7104	Fault extension module	See 3.2.2 "Basic configuration"
9000	>1 fault input faulty	See 12.3 "Faults"
9001	[Fault inp 1] fault	See 12.3 "Faults"
...		
9020	[Fault inp 20] fault	See 12.3 "Faults"
9111	[Logger 1] on before cycle min	See 6.2.4 "Event logger"
9112	[Logger 1] on after cycle max	See 6.2.4 "Event logger"
9113	[Logger 1] off before dur min	See 6.2.4 "Event logger"
9114	[Logger 1] off after dur max	See 6.2.4 "Event logger"
9121	[Logger 2] on before cycle min	See 6.2.4 "Event logger"
9122	[Logger 2] on after cycle max	See 6.2.4 "Event logger"
9123	[Logger 2] off before dur min	See 6.2.4 "Event logger"
9124	[Logger 2] off after dur max	See 6.2.4 "Event logger"
9131	[Logger 3] on before cycle min	See 6.2.4 "Event logger"
9132	[Logger 3] on after cycle max	See 6.2.4 "Event logger"
9133	[Logger 3] off before dur min	See 6.2.4 "Event logger"
9134	[Logger 3] off after dur max	See 6.2.4 "Event logger"
9141	[Logger 4] on before cycle min	See 6.2.4 "Event logger"
9142	[Logger 4] on after cycle max	See 6.2.4 "Event logger"
9143	[Logger 4] off before dur min	See 6.2.4 "Event logger"
9144	[Logger 4] off after dur max	See 6.2.4 "Event logger"



## 14.2 Troubleshooting

### 14.2.1 Fault indicator

If one or several fault messages are queued, the current message is displayed and indicated via the fault LED.

Fault information is available via the following path:

Display fault information

■ **Main menu > Faults >**

<i>Menu item</i>	<i>Comment</i>
Faults current	Currently queued faults.
Fault history	Individual listing of the 10 most recent faults.
Fault status message bus	Faults of other devices on the bus:

The fault button allows you to acknowledge error (fault) messages. Meaning:

<i>Fault message is...</i>	<i>Message is...</i>	<i>Fault LED status / Comment</i>
Pending	Unacked	Flashing / Message must be acknowledged.
Pending	Acknowledged	Lit / Also applies to messages that must not be acknowledged.
No longer pending	Unacked	Flashing
No longer pending	Acknowledged	Off

If a fault relay is also configured, the LED on the fault button always flashes when the relay is energized.

Note

A fault message is still pending if the LED on the fault button is lit and cannot be extinguished by mere acknowledgement. The LED extinguishes only when no more faults are present.

### 14.2.2 Fault acknowledgement

No acknowledgement  
required

This applies to all fault messages that do not need to be acknowledged or reset on RMS705B.

Example

A fault message is generated if the outside temperature is not available. 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 on RMS705B. The fault message is displayed until acknowledged.

Caution

When the fault disappears in the plant, the plant resumes normal operation even if the fault message has not yet been acknowledged.

Example

A plant has a pump with fault message to be reset locally at the pump. The plant resumes operation after the pump is reset. The only purpose of the fault indication on RMS705B is to ensure that service staff notices the fault message.

Acknowledge and reset	Applies to all fault messages that must be acknowledged and reset on RMS705B. After acknowledgement on RMS705B, the fault message is maintained until the fault is no longer present. Only then can the fault message on RMS705B be reset. After resetting, the LED in the fault button extinguishes.
Example	A pump with fault contact is connected to the motor block's overload message. The fault contact of the pump is reset if the pump switches off because of this fault message. Manually acknowledge and reset the fault on RMS705B to restart the pump.
Note	RMS705B does not allow for acknowledging fault messages from other Synco™ devices.

### 14.2.3 Delete fault messages

The operator unit allows for deleting the "Fault history" list at the service level via operating line "Delete faults".

#### Functions

 **Main menu > Faults >**

<i>Operating line</i>	<i>Comment</i>
Delete faults	All current faults are reset internally, the "Fault history" list is deleted.

When enabling this function, all other fault messages are reset. Only pending faults continue to be displayed.

#### Note

You may not be able to acknowledge or reset the fault message if the type of acknowledgement is changed at a pending fault.  
You can also use the "Delete faults" function to reset these fault messages!

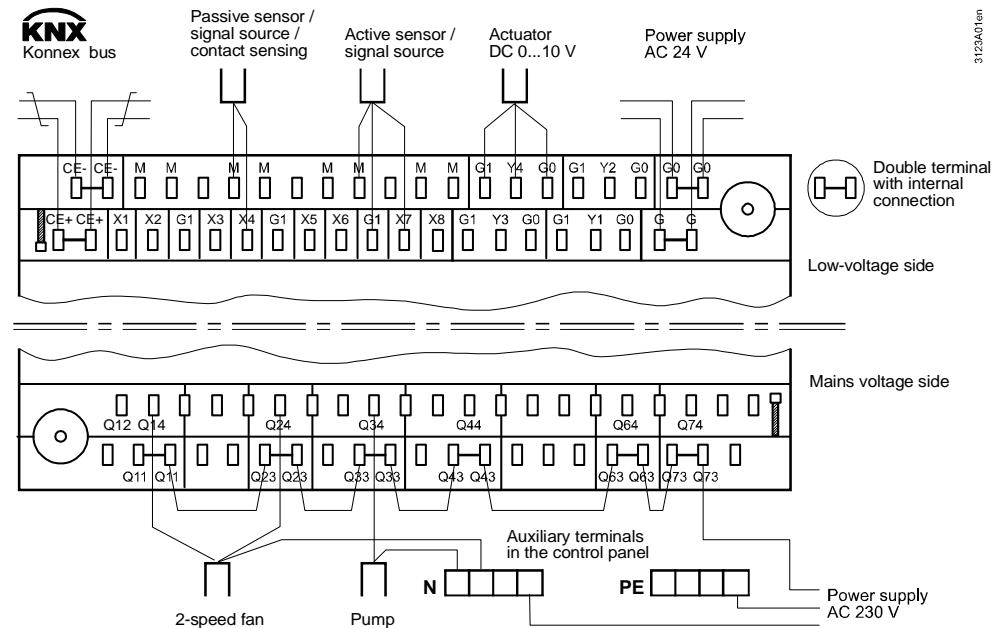
## 14.3 Resolve errors

Question	Answer
During commissioning, the wrong language was selected. Where do I find my language?	<ol style="list-style-type: none"> <li>1. Press the ESC and OK buttons simultaneously.</li> <li>2. Select the password level and enter <b>112</b> for password (same as international emergency call).</li> <li>3. Press "OK" to confirm. The device activates English.</li> <li>4. Select "Settings &gt; Device &gt; Language" to go to the desired language.</li> </ol>
RMS705B is completely off, but the following is displayed: "Operation locked, Remote operation". How do I restart RMS705B?	<ul style="list-style-type: none"> <li>• Remote operation (OCI700.1) set RMS705B to commissioning mode, which locked local operation.</li> <li>• If RMS705B is not restarted correctly via remote operation, it remains in this state.</li> <li>• You can only restart RMS705B locally by briefly disconnecting it from power.</li> </ul>
Menu "Commissioning" does not allow for navigation to "Main menu". The following text is displayed: "Caution! Invalid settings, Start not possible". How do I restart RMS705B?	<p>Configuration was not completely downloaded via the service tool (OCI700.1).</p> <p>Reload the configuration with the service tool (OCI700.1), or reconfigure RMS705B via the operator unit.</p>
Fault message "[N.X4] sensor error" cannot be acknowledged.	<ul style="list-style-type: none"> <li>• When exiting the "Commissioning" menu, a check is made to see which sensors are connected.</li> <li>• If one of the sensors connected is missing later, a fault message appears.</li> <li>• If a sensor was incorrectly wired and is rewired later, a "false" fault message may be generated.</li> <li>• Resolve error:</li> <li>• Select "Commissioning" (Caution! Plant stops), then back to "Main menu" (Caution! Plant starts).</li> </ul>
The unit is "°C" rather than ...???	<p>Configuration error: An input of a disabled function block was configured. RMS705B in this case automatically displays "°C".</p> <p>Resolve error: Enable the corresponding function block.</p>
Flow signal not working?	<p>Wrong values were entered for "Flow switching value on/Off".</p> <p>Resolve error: Select "Settings &gt; Motor &gt; Motor 1... &gt; Flow switching value on/Off" and enter the correct data.</p>

# 15 Electrical connections

## 15.1 Connection rules

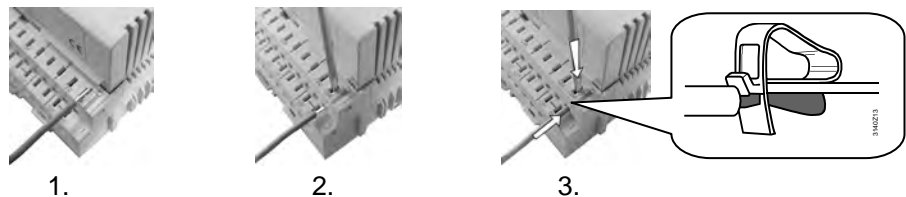
Terminal connection concept



Note

Only 1 solid wire or 1 stranded wire can be connected to each terminal (cage terminal).

Connection procedure with spring cage terminals

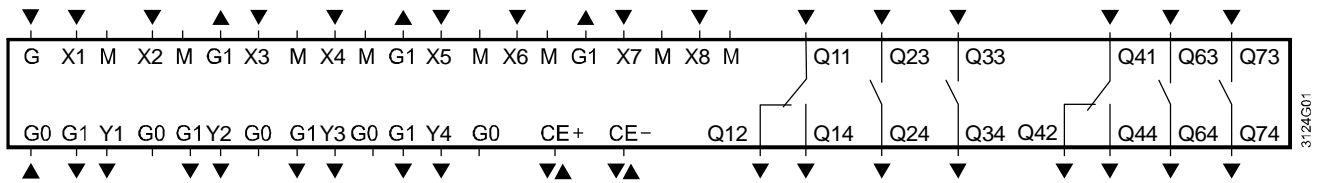


Steps

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.

## 15.2 Connection terminals

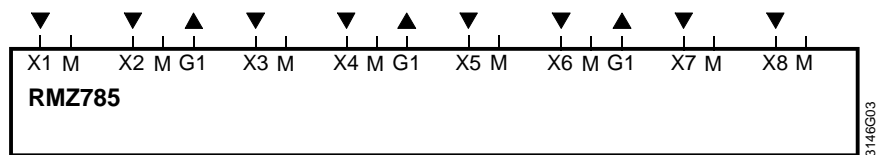
### 15.2.1 RMS705B



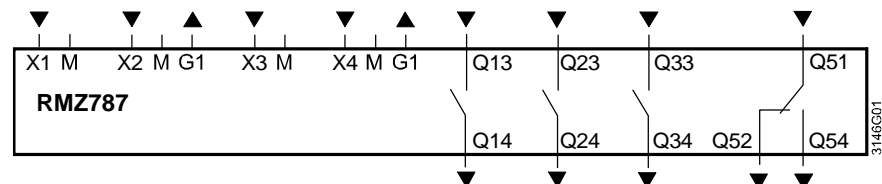
Key	G, G0	Rated voltage AC 24 V.
	G1	Power supply AC 24 V for active sensors, detectors, monitors <i>or</i> signal sources.
	M	Measuring neutral for signal input.
	G0	System neutral for signal output.
	X1...X8	Universal signal inputs for LG-Ni1000, 2x LG-Ni1000 (averaging), T1, Pt1000, DC 0...10 V, 0...1000 Ω (setpoint), pulse, contact query (potential-free).
	Y1...Y4	Control <i>or</i> status outputs, analog DC 0...10 V.
	Q2x/3x/6x/7x	Potential-free relay outputs (N.O. contact) for AC 24...230 V.
	Q1x/Q4x	Potential-free relay outputs (changeover contact) for AC 24...230 V.
	CE+	KNX bus data line, positive.
	CE–	KNX bus data line, negative.

### 15.2.2 Universal modules RMZ785, RMZ787, RMZ788

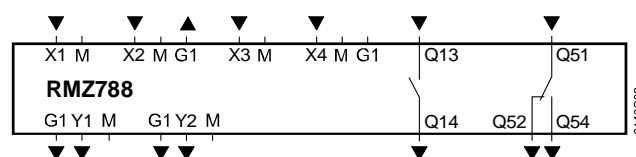
RMZ785



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 LG-Ni1000, 2x LG-Ni1000 (averaging), T1, Pt1000, DC 0...10 V, 0...1000 Ω (setpoint), contact query (potential-free), pulse.
	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.

# 16 Appendix

## 16.1 Abbreviations

Below is a list of the most common and possibly somewhat cryptic abbreviations in alphabetical order.

⊕	Heating
⊖	Cooling
AbsHu	Absolute humidity
AC	Alternating current
AI	Analog input
AO	Analog output
DC	Direct current
DewPnt	Dew point temperature
DI	Digital input
DlyOn	Switch-on delay
DlyOff	Switch-off delay
DO	Digital output
DX	Direct expansion cooling
EIB	European Installation Bus (to be replaced by KNX)
Enth	Enthalpy
EnthDiff	Enthalpy difference
I	I-mode
KNX	KNX bus (for operating and process information)
KNX LTE-Mode	New communication standard used by Synco <sup>TM</sup> and RXB
KNX S-Mode	Same as with EIB to date
LCD	Liquid crystal display
LED	Light emitting diode
HMI	Human machine interface
P	P-mode
PI	PI mode
RelHu	Relative humidity
SA	Switching interval
SD	Switching differential
SpHEco	Eco setpoint high
SpH	Setpoint high
SpL	Setpoint low
SpLEco	Eco setpoint low
StepSwi	Setpoint change
t	Time
TA	Outside temperature
Temp	Temperature
TiCst	Rundown time
TiRup	Runup time
TiOnMin	On time minimum
TiOffMin	Off time minimum
Tn	Integral action time
w	Setpoint
WetBlb	Wet bulb temperature
x	Actual value
Xp	P-band
xz	Actual value supp air temp

## 16.2 Configuration diagram

### 16.2.1 Explanation of diagram

---

RMS705B has a large number of preconfigured function blocks. The configuration diagram shows the various configuration options.

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	Switching & monitoring device RMS705B
A5	Universal module RMZ785
A7	Universal module RMZ787
A8	Universal module RMZ788

Physical inputs:

X	Universal
---	-----------

Physical outputs:

Q	Relay
Y	DC 0...10 V

Internal signals (lowercase):

x	analog <i>or</i> digital
a	analog
d	digital
i	pulse

## 16.2.2 Configuration rules

---

### Rules for inputs

- The input identifier can be a device *or* a special sensor (outside temperature, setpoint adjuster).
- Multiple use of inputs is possible, no limitations.
- Only inputs with compatible units are offered for input "wiring".
- Alarming for inputs is only active if the input is connected prior to the end of commissioning.
- If an input identifier changes, all related settings are changed automatically without explicit information (e.g., P-band Xp is changed automatically from 30 K to 500 Pa if the processed identifier is changed from temperature to pressure).

### Procedure for extra configuration

- Order of configuration:
  - First basic configuration, then extra configuration.
- Connection methods:
  - Always from arrow (▼) to line (■).
  - From uppercase to uppercase.
  - From lowercase to lowercase.
  - From function to input: "x" to "x".
  - From output block to output terminal: Analog "Y" to "Y".
  - Relay "Q" to "Q".

### Example for good configuration

The result of logic block 1 is provided to logic block 2. As a result, the result from logic block 1 is provided at logic block 2 in the same process. This allows for best possible timing to process RMS705B input signals.







## 16.2.3 Overview of configuration diagrams

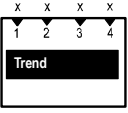
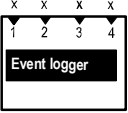
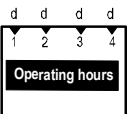
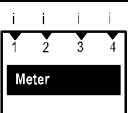
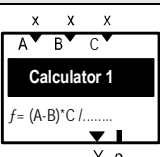
### Basic configuration

Configuration	Function
<input type="checkbox"/> RMZ785 <input type="checkbox"/> RMZ787 (1), (2) <input type="checkbox"/> RMZ788 (1), (2)	<ul style="list-style-type: none"> <li>• Add further inputs and outputs with extension modules RMZ785, RMZ787, and RMZ788.</li> <li>• Controller functions are configured to these inputs/outputs.</li> <li>• Specify which modules are connected to RMS705B in which order (position); max 4 modules.</li> </ul>

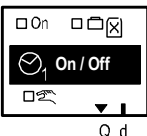
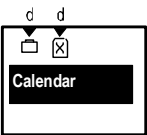
### Input identifiers

Inputs (Section 5)	Configuration	Functions
	N.X1...RMZ788(2).X4	<p>Enter input identifier</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• <b>Sensor for °C:</b> LG-Ni1000, 2xLG-Ni1000 (averaging), T1, Pt1000, DC 0...10 V, all other units DC 0...10 V, adjustable range.</li> <li>• Digital (input for potential-free contacts).</li> <li>• Pulse (up to 25 Hz for mechanical source (Reed contact), or up to 100 Hz for electronic source).</li> <li>• Special identifiers: Outside temperature, remote setpoint adjuster. With the special identifiers, internal connections are taken directly from RMS705B.</li> <li>• A name can be assigned to each input.</li> </ul>
	Outside temperature	<p>Outside temperature for the following functions:</p> <ul style="list-style-type: none"> <li>• Connect one outside temperature sensor.</li> <li>• The bus can be used to receive the outside temperature.</li> <li>• Sensor as listed above under "Sensor for °C".</li> </ul>
	[Controller 1] rem setp adj [Controller 2] rem setp adj [Controller 3] rem setp adj	<ul style="list-style-type: none"> <li>• Rem setp1: Absolute for controller 1 to 3 (0...1000 Ω or DC 0...10 V).</li> </ul>
	Pulse	<p>Select input identifier "Pulse" for an input.</p> <ul style="list-style-type: none"> <li>• Connection of a pulse source (mechanical or electronic).</li> <li>• Pulse source type can be assigned to the input.</li> </ul>

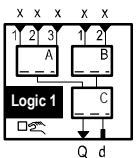
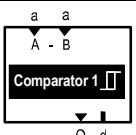
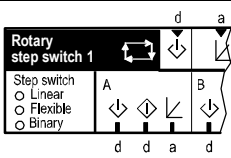
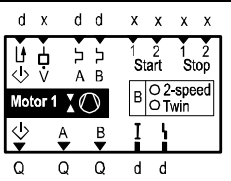
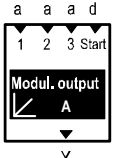
## Data acquisition

Trend (Section 6.1)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> </ul>	<p>Use the trend to log time-related progression of signals.</p> <ul style="list-style-type: none"> <li>4 independent trend channels.</li> <li>Logging of local inputs, room temperatures and outside temperature from the bus.</li> <li>Simultaneous display of 2 channels.</li> <li>Displays: 8-minutes, 8-hours, 24-hours and 6-day history.</li> </ul>
Event logger (Section 6.2)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> </ul>	<ul style="list-style-type: none"> <li>Event logger for max. 10 events and their duration.</li> <li>Adjustable threshold values.</li> <li>Selectable alarm messages for drop below min. cycle time, exceed max. cycle time, drop below min. duration and exceed max. duration.</li> </ul>
Operating hours (Section 6.3)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> </ul>	<ul style="list-style-type: none"> <li>Acquire operating hours.</li> <li>Function: Set start value.</li> <li>Operating hours display.</li> <li>Editable maintenance message, at selectable interval (e.g. every 500 h).</li> </ul>
Meter (Section 6.4)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> </ul>	<ul style="list-style-type: none"> <li>Acquire pulse sources and display cumulated values; selectable unit, valency, presentation, etc.</li> </ul>
Calculator (Section 6.5)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input A...C</li> <li>Formula</li> <li>Modulating output</li> </ul>	<ul style="list-style-type: none"> <li>2 calculators.</li> <li>Convert input to output values by applying own formulas.</li> <li>User-defined formulas (max. 20 characters), e.g. for solar power, volumetric flow, etc.</li> </ul>

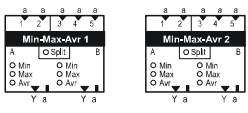
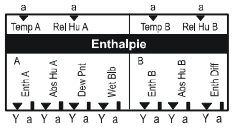
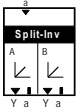
## 7-day time switch

Time switch (Section 7.1)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Time switch On, Off</li> </ul>	<ul style="list-style-type: none"> <li>1-channel time switch on/off.</li> <li>7 days + special day, 6 switching points per day.</li> <li>Note selectable holidays/special day information (Yes, No).</li> <li>Operation selector</li> </ul>
Calendar (Section 7.2)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Holiday input (☐)</li> <li>Special day input (☒)</li> </ul>	<p>Room operating modes.</p> <ul style="list-style-type: none"> <li>Holiday input And "Special day input": Digital input for holidays (settable room operating mode) or special day (special day program of time switch).</li> <li>Selectable if holidays/special day zone autonomous, slave (holidays/special day information from KNX bus) or master (sends holidays/special day information to KNX bus).</li> </ul>

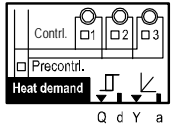
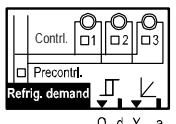

## Aggregates

Logic functions (Section 8.1)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> <li>Logic function</li> <li>Operation selector</li> <li>Relay output</li> <li>Digital output</li> </ul>	<ul style="list-style-type: none"> <li>10 logic blocks.</li> <li>Generation of digital signal from continuous input signals.</li> <li>Selectable logic for logic A, B and C.</li> <li>Selectable operation selector.</li> <li>Delay times can be set for output signal.</li> <li>Selectable time formats.</li> </ul>
Comparator (Section 8.2)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> </ul>	<ul style="list-style-type: none"> <li>2 comparators.</li> <li>The comparator helps compare two analog input signals.</li> <li>Delay times can be set for output signal.</li> <li>Selectable time formats.</li> </ul>
Rotary step switch (Section 8.3)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Type (Linear, Flexible, Binary)</li> <li>Precommand input</li> <li>Start condition 1</li> <li>Fault status message A</li> <li>[Rot step swi 1A] precommand</li> <li>[Rot step swi 1A] command</li> <li>[Rot step swi 1A] load</li> </ul>	<p>2 rotary step switches with the following functions:</p> <ul style="list-style-type: none"> <li>Adjustable step switch properties. <ul style="list-style-type: none"> <li>Linear step switch (max. 4 steps).</li> <li>Flexible step switch (max. 4 steps).</li> <li>Binary step switch (max. 15 steps).</li> </ul> </li> <li>Lead/lag control for aggregates with runtime balancing.</li> </ul>
Motor (Section 8.4)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Motor A</li> <li>Motor B</li> <li>Motor B type</li> <li>Precommand</li> <li>Precommand checkback signal</li> <li>Flow signal</li> <li>[Motor A] overload</li> <li>[Motor B] overload</li> <li>Start condition 1</li> <li>Start condition 2</li> <li>Stop condition 1</li> <li>Stop condition 2</li> </ul>	<p>Usable as 1-speed, 2-speed or twin motor.</p> <ul style="list-style-type: none"> <li>Changeover of run priority: Automatic, manual, fault.</li> <li>Adjustable delay times.</li> <li>Configurable flow signal monitoring.</li> <li>Configurable overload signal.</li> <li>Configurable precommand function.</li> <li>Motor fault status message.</li> <li>Motor operating state status message.</li> <li>Configurable motor start, stop conditions.</li> <li>Switching on by outside temperature.</li> <li>Locking speed 2 at low outside temperatures.</li> <li>Selectable motor kick.</li> <li>Record operating hours.</li> <li>Free fault text.</li> </ul>
Modulating output (Section 8.5)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> <li>Start condition</li> <li>Modulating output A...H</li> </ul>	<p>For continuous signals DC 0...10 V, e.g. for valve position.</p> <ul style="list-style-type: none"> <li>Load signal from controller (from max 3 sequences with maximum selection).</li> <li>"Positioning signal min" and adjustable "Positioning signal max".</li> <li>Settable inversion.</li> <li>Release via start input.</li> </ul>

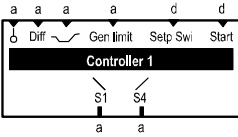
## Signal converter

Min-Max-Average (Section 9.1)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> <li>Inputs split (Split)</li> <li>Min-Max-Average output A...B</li> <li>Modulating output A...B</li> </ul>	<p>2 function blocks.</p> <ul style="list-style-type: none"> <li>5 inputs for min. max selection and average calculation.</li> <li>2 continuous signals DC 0...10 V.</li> </ul>
Enthalpy calculator (Section 9.2)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Temperature input A...B, Relative humidity input A...B</li> <li>Enthalpy A...B</li> <li>Absolute humidity A...B</li> <li>Dew point temperature</li> <li>Wet bulb temperature</li> <li>Enthalpy difference</li> </ul>	<p>Calculation of the following variables from temperature and relative humidity:</p> <ul style="list-style-type: none"> <li>Enthalpy, absolute humidity, dew point temperature, Wet bulb temperature, Enthalpy difference.</li> <li>Pressure correction for plant location (Elevation above sea level).</li> </ul>
Signal doubler-inverter (Section 9.3)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Input</li> <li>Modulating output A...B</li> </ul>	<p>For 2 continuous signals DC 0...10 V.</p> <ul style="list-style-type: none"> <li>"Positioning signal min" and adjustable "Positioning signal max".</li> <li>Scaling of input signal (value low, value high).</li> <li>Settable inversion.</li> </ul>

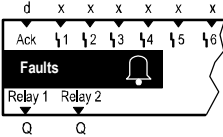
## Heat demand, refrigeration demand, H/C changeover

Heat demand (Section 10.1)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Controller 1</li> <li>Controller 2</li> <li>Controller 3</li> <li>Primary controller</li> <li>Relay output</li> <li>Modulating output</li> </ul>	<ul style="list-style-type: none"> <li>Acquire heat demand from bus (acquire valid heat demand in the set zone).</li> <li>Pass on heat demand as digital output e.g. to control a central pump.</li> <li>Pass on heat demand as continuous output °C.</li> <li>Pass on demand signals to other distribution zone on KNX bus.</li> </ul>
Refrigeration demand (Section 10.2)	Configuration	Functions
	<ul style="list-style-type: none"> <li>Controller 1</li> <li>Controller 2</li> <li>Controller 3</li> <li>Primary controller</li> <li>Relay output</li> <li>Modulating output</li> </ul>	<ul style="list-style-type: none"> <li>Acquire refrigeration demand from bus (acquire valid refrigeration demand in the set zone).</li> <li>Pass on refrigeration demand as digital output e.g. to control a central pump.</li> <li>Pass on refrigeration demand as continuous output °C.</li> <li>Pass on demand signals to other distribution zone on KNX bus.</li> </ul>
Heating/cooling ch'over (Section 10.4)	Configuration	Functions
	<ul style="list-style-type: none"> <li>2-pipe heating/cooling system (□ H/•)</li> <li>H/C changeover input (H/•)</li> <li>Changeover with operating mode selector (☞)</li> <li>Changeover by date (📅)</li> </ul>	<ul style="list-style-type: none"> <li>Changeover of operating mode heating or cooling in 2-pipe systems.</li> <li>Preselection of heating/cooling on device generated or received as signal via bus.</li> <li>Changeover by analog or digital input.</li> <li>Changeover with operating mode selector</li> <li>Changeover by date.</li> </ul>

## Universal controller

Universal controller (Section 11)	Configuration	Functions
	<ul style="list-style-type: none"> <li>• Main controlled variable</li> <li>• Differential input</li> <li>• Universal shift</li> <li>• General limiter</li> <li>• Input setpoint changeover</li> <li>• Start condition</li> <li>• Sequence outputs</li> </ul>	<p>3 universal controllers, can be used as a P, PI or PID controller.</p> <ul style="list-style-type: none"> <li>• Differential control possible.</li> <li>• Universal shift for setpoints.</li> <li>• Min./max limitation function.</li> <li>• Connection of remote setpoint adjuster.</li> <li>• Controller can be enabled via start input.</li> <li>• 1 heating sequence S1, (□); 1 cooling sequence S4, (□).</li> <li>• A name can be assigned to each controller.</li> </ul>

## Faults

Faults (Section 12)	Configuration	Functions
	<ul style="list-style-type: none"> <li>• Fault button external</li> <li>• Fault input 1 to 20</li> <li>• Fault relay 1 and 2</li> </ul>	<ul style="list-style-type: none"> <li>• 20 universal fault signal inputs, "Fault status message delay, Fault acknowledgement" (none, acknowledge), "Fault priority" (urgent, not urgent).</li> <li>• 2 fault relays, priority (urgent, not urgent, all) and signaling can be set.</li> <li>• Direct connection possible for analog signals and settable threshold values.</li> <li>• A name can be assigned to each fault input.</li> </ul>

## 16.3 Menu tree

All setting and readout values are arranged as 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 the following menu items:

1. Commissioning
2. Time switches
3. Inputs
4. Data acquisition
5. Signal converter
6. Aggregates
7. Controller
8. Holidays/special days
9. Time of day/date
10. Faults
11. Settings
12. Device information
13. Data backup

## 16.4 Editable texts RMS705B

The list with editable text is intended as an aid for engineering and commissioning. 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 >**

<i>Operating line</i>	<i>Comment</i>
Reset	No, Yes

Note

The texts for the operating lines "Device name", "File name", and "Business card line 1..4" are not deleted when the menu texts are reset.

### 16.4.1 Inputs

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

<i>Operating line name</i>	<i>User-defined text</i>
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	

# Index

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## A

Access levels .....	17
Access right .....	17
Activate comparator .....	74
Altitude .....	132
Analog inputs .....	31
Measuring range .....	32

## B

Basic configuration .....	19
Basic settings .....	182
Binary step switch .....	95
Business card .....	27

## C

Calculator .....	55
Setting values .....	58
Calendar entry .....	65
Changeover .....	163
Changeover by calendar .....	159
Changeover with analog or digital input .....	159
Changeover with operating mode selector .....	159
Commissioning .....	18
Commissioning data set .....	21
Communication .....	182
Comparator .....	74
Configuration diagram .....	199
Configuration diagram for RMS705B .....	206
Configuration rules .....	200
Connection examples for sensors .....	33
Connection rules .....	196
Connection terminals .....	197
Consumer and generation .....	156
Consumer and primary controller .....	155
Consumers .....	150
Control input "Holidays/Special days" .....	65
Control parameter .....	169
Control timeout .....	169

## D

Data acquisition .....	43
Daylight saving/standard time changeover .....	23
Delete faults .....	194
Device information .....	22
Device name .....	26
Digital inputs .....	35
Display contrast .....	26
Display meter readings .....	54

## E

Eco setpoint changeover .....	175
-------------------------------	-----

Editable texts RMS705B .....	207
Effect of function H/C .....	160
Enthalpy calculator .....	131
Equipment combinations .....	10
Error/fault code list .....	191
Event logger .....	45
Activate .....	46
Display .....	47
Settings .....	47
Exit commissioning .....	21
Exit password level .....	22
Extension modules .....	19
External fault button .....	180

## F

Fault acknowledgement .....	193
Fault history .....	194
Fault indicator .....	193
Fault priority .....	177
Fault relay 1/2 .....	180
Fault status message aggregate (A...D) .....	104
Faults .....	177
Features and functions .....	6
File name .....	26
Flexible step switch .....	90
Load assignment .....	94
Flow signal .....	114
Free configuration .....	20

## G

General limiter .....	172
Generation .....	152

## H

H/C changeover .....	158
H/C demand .....	
Application examples .....	149
H/C demand, H/C changeover .....	
Combined examples .....	163
Heat demand .....	137
Demand signals from bus .....	138
Heat demand continuous .....	141
Heat demand relay .....	140
Heating/cooling changeover relay .....	162
HIT – HVAC integrated tool .....	11
Holiday/Special day program .....	63
Holidays .....	64
Hours run counter .....	49

## I

Important notes .....	13
Input terminal simulation .....	30

Input type .....	31	Precommand input .....	101
Internal refrigeration demand .....	146	Precommand output .....	100
<b>L</b>		Primary controller .....	150
Language selection .....	25	Processing order .....	200
Linear step switch .....	80	Product documentation .....	11
Load input .....	103	Product range .....	8
Load-dependent switching .....	103	Pulse .....	37
Lock individual sequences .....	161	Pulse valency .....	53
Logic .....	67	<b>R</b>	
Activate .....	69	Refrig demand continuous .....	146
RS flip-flop .....	73	Refrigeration demand relay .....	146
<b>M</b>		Refrigeration demand .....	143
Maintenance message .....	51	Remote setpoint, absolute .....	38
Measured value correction .....	32	Resolve errors .....	195
Menu tree .....	207	Rotary step switch .....	78
Meter		Run priority changeover .....	88
Display format .....	52	<b>S</b>	
Meters .....	52	Set and reset meter readings .....	53
Min-max-average .....	127	Set operating hours counter .....	50
Settings .....	128	Signal converter .....	127
Modulating output .....	124	Signal doubler/inverter .....	134
Output inversion .....	125	Special analog inputs .....	32
Motor .....	106	Special days .....	64
1-speed. ....	107	Start condition .....	104
2-speed. ....	108	Synco™ 700 topology .....	9
Activation and motor block type .....	107	<b>T</b>	
Operating hours .....	123	Temperature unit .....	26
Twin motor .....	110	Time	
Motor fault .....	120	Settings .....	23
Motor kick .....	122	Source .....	24
Motor operating state .....	119	Troubleshooting .....	25
Multiple use of sensors .....	35	Time formats yearly clock .....	23
<b>O</b>		Trend	
On by outside temperature .....	121	Funktionsblock .....	43
Operating hours counter		Settings .....	44
Activate .....	50	Troubleshooting .....	45, 59
Operating hours display .....	51	Views .....	43
Operating levels .....	16	<b>U</b>	
Operation .....	14	Universal controller .....	165
Operator elements .....	14, 15	Makeup and mode of operation .....	167
Operator unit .....	15	Setpoints .....	168
Outside temperature .....	40	Universal fault inputs .....	178
Outside temperature simulation .....	41	Universal inputs .....	28
Outside temperature via bus .....	41	Cause .....	29
Overflow value .....	53	Universal shift .....	170
Overload signal .....	115	Universalschiebung .....	171
<b>P</b>		<b>W</b>	
Performance overview .....	12	Week schedule .....	60
Plant location .....	132	Wiring test .....	20
Power up .....	18		
Precommand .....	116		
Precommand checkback signal .....	118		