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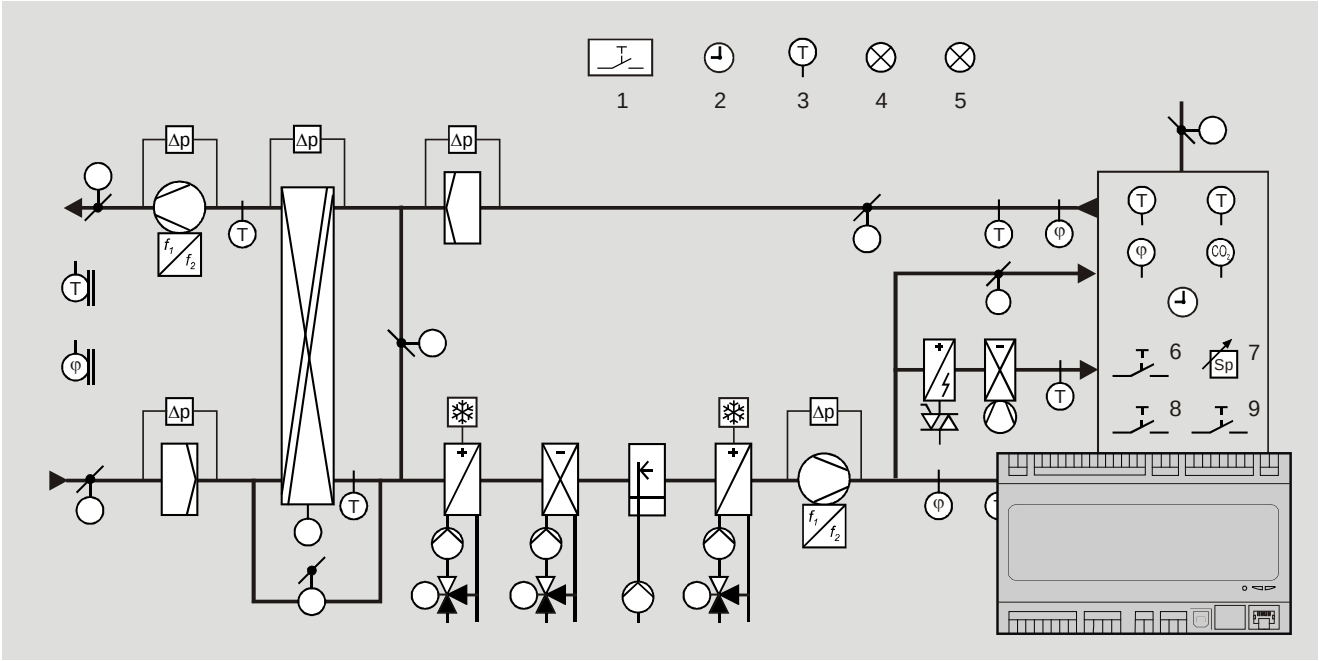

Climatix™
Climatix AHU Application v3.0x POL63X / POL42X
Basic documentation

CE1P3997en
2015-10-13

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Contents

1 About this document

1.1 Overview

Introduction

This document outlines the *Siemens Climatix AHU Application* – hereinafter referred to as *Climatix AHU Application* – for controllers POL63X and POL42X of the Climatix device family.

Carefully read this section prior to starting.

It provides important information on:

- Document validity
- Target audience, prerequisites
- Application and safety

Topic

The individual topics in the section are:

Topic	Section
Revision history	1.2
Reference documents	1.3
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1.2 Revision history

Version	Date	Changes	Section	Pages
	26.07.2012	New document	---	---
	29.05.2013	Changes in application	1.4, 2.5, 5.6.3, 5.6.4, 8.4.1	9, 19, 68, 69, 193
	21.01.2014	New name *Climatix AHU Application* Supplements in the workflow Configuration, miscellaneous Configuration IOs, Modbus devices New section *Set up EBM fan* New section *Wiring test* SD card functions, file names BACnet devices, AWB module	All 5.1, 5.2, 5.3 5.4, 5.5 5.6 5.7 5.9 5.10 8.6	 47, 48, 49 54, 65 67, 72 78 79 80 205
	12.01.2015	K-factor explanation Modbus pressure sensors Modbus fan	5.6.4 3.5 5.6.10	70 27 74
	14.04.2015	Draft update for V302, yellow marked		
	15.05.2015	Additional yellow and green marked changes - Section 3.2, No Triac on POL424		

1.3 Reference documents

Document title	Type of document	Document no.
Climatix controllers POL6XX	Basic documentation	CB1P3903en
Climatix controller POL63X.XX/XXX	Data sheet	CB1Q3230en
Climatix controllers POL42X.	Data sheet	CB1Q3973en
Climatix AHU extension module 14 I/O POL955.XX.XXX	Data sheet	CB2N3262en
Climatix communication BACnet MS/TP module POL904.00/xxx	Data sheet	CB1Q3932en
Climatix communication BACnet IP module POL908.00/xxx	Data sheet	CB1Q3933e
Climatix communication LON module POL906.00/XXX	Data sheet	CB1Q3931en
Climatix communication Modbus module POL902.00/XXX	Data sheet	CB1Q3934en
Climatix advanced Web module POL909.5X/XXX	Data sheet	CB1Q3935en
Climatix advanced Web module POL909.5X/XXX	Basic documentation	CB1P3935en
Climatix advanced Web and BACnet module POL909.8X/XXX	Data sheet	CB1Q3937en
Climatix communication M-Bus module POL907	Data sheet	CB1Q3936en
Climatix remote OPC server POL0L9.00/XX	Basic documentation	CB1P3904en
Climatix IC remote servicing	Data sheet	A6V10449189
External HMI-DM POL895.51/XXX	Data sheet	CB1N3941en
External HMI-TM POL871.XX/STD	Data sheet	CB1N3917en
Room unit HMI-SG POL822.60/XXX	Data sheet	CB2N3261en
Integration guide lines		
BACnet MS/TP communication with POL904.00/xxx	Integration guide	CB1J3967en
BACnet IP communication with POL908.00/xxx	Integration guide	CB1J3962en
LON communication with POL906.00/XXX	Integration guide	CB1J3964en
Climatix Modbus communication, slave mode	Integration guide	CB1J3960en
Advanced Web module POL909.50 (AWM)	Integration guide	CB1J3935en
Advanced Web and BACnet module POL909.80 (AWB)	Integration guide	CB1J3937en

1.4 Before you start

Validity

This document applies to the following products:

Name	Version
Climatix AHU Application	3.xx

Labeling **

The content of sections and parts thereof where the titles are labeled by trailing ****,** apply to controller **POL63X** only.

Examples:
– Section 2.4, Extension module POL955 ** (can only be used with POL63X)
– Section 5.9, Heating/Heating 2 ** (*Heating 2* can only be used with POL63X)

Labeling ***

The content of sections and parts thereof where the titles are labeled by trailing *****,** apply to controller **POL42X** only.

Example:
– See Section 3, Preset plant types ***

Product versions

Description and functional scope of the products are based on the Climatix valid version set 10.0 or higher.

Target audience

This document is intended for the following audience:
- Measuring and control engineering staff of Siemens and OEM customers
- Sales and commissioning staff of OEM customers
- Siemens employees in sales and support

Use

This document intends to help the target audience to:
- Determine and establish control function for customized ventilation and air conditioning plants and units based on the Climatix AHU application and using Climatix controllers POL63X and POL42X
- Commissioning of these ventilation and air conditioning plants.

Requirements

The above target audience:
- Has general professional knowledge on planning and commissioning HVAC technology measuring and control solutions
- Knowledge on the operating units HMI and POL822 room unit (applies to personnel that configure and commission applications)

1.5 Document conventions

Symbols used

Below is an overview of all symbols used in this document denoting risks or important information:

This symbol draws your attention to special safety notes and warnings. Failing to observe these notes may result in injury and/or serious damages.

This symbol denotes special information that, when failed to observe, may result in faulty functionality *or loss of data*.

Notes with this symbol provide important information that requires appropriate attention.

This symbol marks passages containing tips and tricks.

Abbreviations

The following abbreviations are used in text and illustrations:

Abbreviation	Meaning
HMI	Human machine interface
KP	Amplification factor (KP).
LED	Light emitting diode
NC	Normally closed (opening contact)
NO	Normally opened (closing contact)
SD	Safety device
TN	Integral action time (I time)
BSP	Board support package, equal to firmware

1.6 Important information on safety

Field of application

The Climatix devices used together with the Climatix AHU application may only be used to control and monitor functions in ventilation, air conditioning and refrigeration plants.

Intended use

Trouble-free and safe product operation of the above products presupposes transport, storage, mounting, installation, and commissioning as intended as well as careful operation.

Electrical Install

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

Wiring

When wiring, strictly separate AC 230 V mains voltage from AC 24 V safety extra-low voltage (SELV) to protect against electrical shock!

Commissioning and maintenance

Only qualified staff trained accordingly may prepare for use, commission, and maintain Climatix devices.

Maintenance

Maintenance of Climatix devices is generally limited to regular cleaning. We recommend removing dust and dirt from system components installed in the control panels during standard service.

Faults

Only authorized staff may diagnose and correct faults and recommission the plant. This applies to working within the panel as well (e.g. testing or changing fuses).

Storage and transport

Refer to the environmental conditions specified in the respective data sheets for storage and transport.
If in doubt, contact your supplier.

Disposal

Devices contain electrical and electronic components; do not dispose of them in household garbage.
Observe all local and applicable laws.

1.7 Trademarks and copyrights

Trademarks, legal owners

The table below lists the third-party trademarks used in this document and their legal owners. The use of trademarks is subject to international and domestic provisions of the law.

Trademarks	Legal owner
BACnet	American National Standard (ANSI/ASHRAE 135-1995)
LonLink™ LON® / LonManager® LonMark® LonTalk® LonWorks®	Echelon Corporation
Modbus®	The Modbus Organization, Hopkinton, MA, USA

All product names listed in the table are registered (®) or not registered (™) trademarks of the owner listed in the table. We forgo the labeling (e.g. using the symbols ® and ™) of trademarks for the purposes of legibility based on the reference in this section.

Copyright

1.8 Quality assurance

Document contents

These documents were prepared with great care.

- The contents of all documents are checked at regular intervals.
- All necessary corrections are included in subsequent versions.
- Documents are automatically amended as a consequence of modifications and corrections to the products described.

Please make sure that you are aware of the latest document revision date.

Suggestions

If you find any lack of clarity while using this document, or if you have any criticisms or suggestions, please contact the product manager in your nearest branch office. Addresses for Siemens RCs are available at www.siemens.com/sbt.

1.9 Document use / request to the reader

Request to the reader

Before using our products, it is important that you read the documents supplied with or ordered at the same time as the products (equipment, applications, tools etc.) carefully and in full.
We assume that persons using our products and documents are authorized and properly trained and have the requisite technical knowledge to use our products as intended.

Further information

Additional information on products and applications is available:

- On the intranet (for Siemens employees only) at https://workspace.sbt.siemens.com/content/00001123/default.aspx
- At your next Siemens branch office www.siemens.com/sbt or at your system suppliers.
- From the support team in the headquarters fieldsupport-zug.ch.sbt@siemens.com if no local POC is available.

Exemption from liability

Siemens assumes no liability to the extent allowed under the law for any losses resulting from a failure to comply with the aforementioned points or for the improper compliance of the same.

1.10 Overview

Introduction

The Climatix AHU application is an all-in-one solution programmed using the SAPRO Tool to control ventilation and air conditioning units (AHUs).

Knowledge provided

This section provides the following knowledge:

- Fundamental plant design
- The most important application and system properties
- Customer benefits

Topic

The individual topics in the section are:

Topic	Section
Structure and elements	2.2
Operating diagram	2.3
Control functions	2.4
System properties	2.5
Customer benefits	2.6

1.11 Structure and elements

Plant diagram

The Climatix AHU application includes all standard as well as a number of special control and monitoring functions for ventilation and air conditioning units (AHUs).

The following diagram illustrates:

- The fundamental plant design equipped with the maximum number of air handling units
- Devices that can be connected externally to implement the desired control and display functions

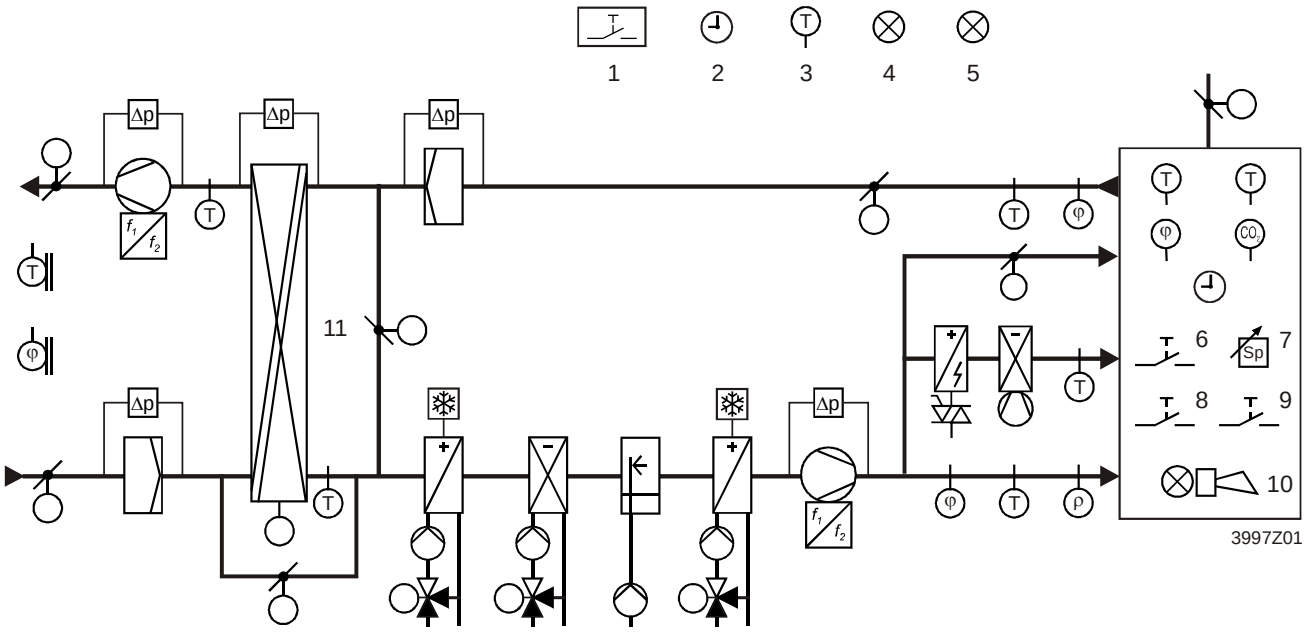


Figure 1: Plant diagram for fundamental plant design and Devices

Key

The above plant elements are:

Pos.	Element
1	Fire detector
2	Time switch program
3	Free temperature sensor
4	Free alarm display
5	Display of a specified operating mode.
6	Occupancy button
7	Setpoint settings
8	Emergency button
9	Acknowledge alarm
10	Alarm display
11	Heat recovery: Rotary heat exchanger, plate heat exchanger, water heat exchanger

Selection and configuration

The units used in this example as well as the required sensors and functions are selected and configured accordingly using the Climatix operator unit HMI or via Web browser (HMI@WEB), see section 4, Configure application.

1.12 Operating diagram

With all aggregates

The figure displays a schematic of all possible sequences included in the application. Individual sequences and series are set automatically during configuration or for sequence 2/6(a) *El heating2*, 3/7(b) *Mixing dampers*, 9/12(c) *Cooling coils* by configuring the sequence.

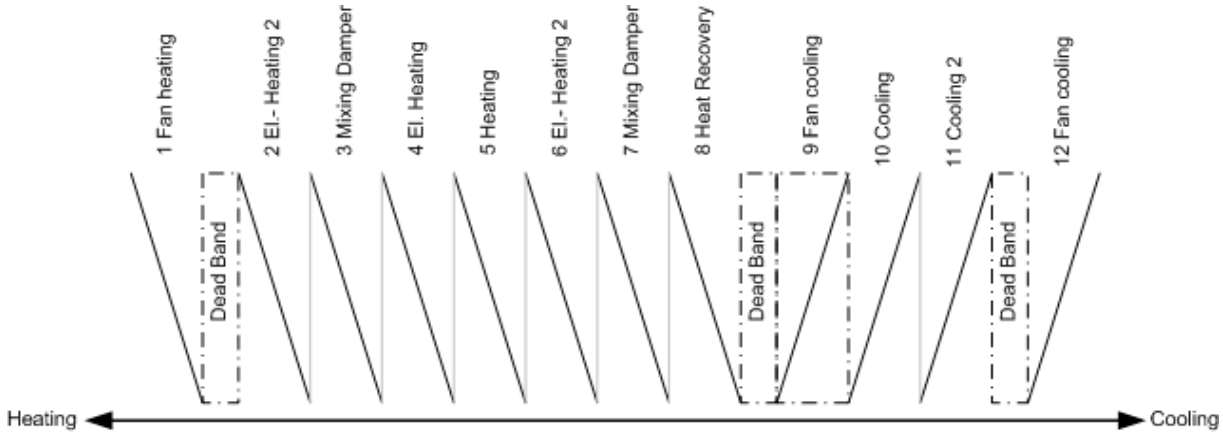


Figure 2: Operation diagram with all aggregates

Key

1	Heating coil	8	Heat recovery
2	*Heating2* or *Electric heating2* (a)	9	Cooling coils (c)
3	Mixing dampers (b)	10	Cooling
4	Electric heating	11	Cooling 2
5	Heating	12	Cooling coils (c)4
6	*Heating2* or *Electric heating2* (a)	DB	Dead zone
7	Mixing dampers (b)		

Liberties

The following liberties apply to placing units and assigning dead zones:

- Mixing dampers may be placed at various locations
- Cooling coils may be placed at various locations
- The dead zone between heating and cooling can be edited
- Heating and cooling coils have their own adjustable dead zones

Aggregate 2

All aggregate 2 s can be configured in the normal sequence (top) or as its own sequence (bottom):

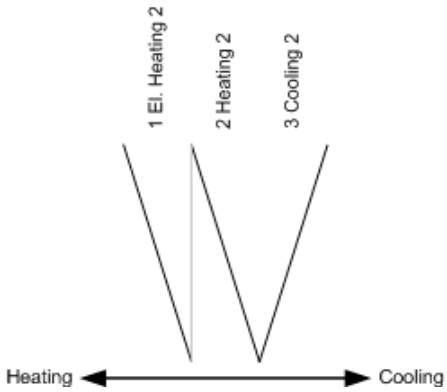


Figure 3: Operation diagram with aggregate 2

Key

1	Electric heating 2
2	Heating 2
3	Cooling 2

1.13 Control functions

Overview

The following table provides an overview of important control functions for the various plant areas:

Plant area	Control functions
Temperature and humidity control.	• Supply air, room and extract air and cascade control with optional limitation of supply air • Summer/winter compensation of setpoint • External setpoint default or setpoint shift • Plant start of plant when room temperature with separate setpoint is too low (too high) – in spite of off (standby)
Heating and cooling registers	• Control 4 heating registers: 2 warm water, 2 electric registers (with up to 3 steps, or 0-10 V DC) with up to 3 included in the heating sequence • Limitation of electric register dependent on fan speed (stage) • Preheat function for hot water register, including frost sensor and/or frost detector • 2 cooling registers (cold water or up to 3 stages or analog DX) • Limitation of direct expansion evaporator dependent on fan speed (stage) • Shut off cooling register when the outside air temperature is too low
Heat recovery	• 4 variants for heat recovery • Cooling recovery
Fans and dampers	• Fresh air and extract air damper control • Fire damper control with auto test function • Extract air fan can be disabled • Stepped (maximum 3 steps) or frequency controlled or modulating analog controlled fans
Plant control	• Emergency off function • Time switch catalog with daily, weekly and annual program

Detailed information

A complete and detailed description of all available functions is available in section 5 Function description.

1.14 System properties

Basis controllers

The Climatix AHU application is an all-in-one application programmed using the SAPRO tool. It operates on the Climatix controllers POL63X and POL42X.

The most important differences to properties are:

Basis controller	Properties
POL63X	• The user loads the application on the controller • 49 inputs and outputs are available on the basis controller and the maximum of 2 connectable extension modules POL955.00/ALG
POL42X	• Application with preset plant types is loaded at the factory • 21 inputs and outputs are available on the basis controller • No extension modules available

Sensor types

Numerous sensor types are supported to fulfill the widest range of different requirements:

- Pt1000, LGNi1000, Ni1000, NTC10k, 0-10 V, modbus sensors

The areas for active sensors can be freely selectable.

Configuration

It is configured using dialogs on the Climatix operator unit HMI or via web browser with the following features:

- Free placement of hardware inputs/outputs
- Selection and configuration of all AHU functions and sensor types
- No additional tools or programming required
- Step-by-step configuration. Functions that can no longer be selected are automatically hidden in later steps
- Disabled functions are hidden on the operator units (HMI; HMI4Web) and for communications
- Support of various languages
- Operator units are password-protected. They can also be connected via the process bus. So that a single HMI can be used for multiple controllers
- A PC-based Climatix *Factory Tool* supports OEM load the application, configure the controller, as well as automatically generate the documentation

Update and download

The Climatix controllers can be updated as needed using an SD card to elegantly upload new functions or extensions:

- Application software update and controller firmware with backup of plant parameters using the SD card
- Download preconfigured plants using SD cards or a PC with the SCOPE tool
- USB interface as the standard connection between the controller and PC

Implemented communications

The trend toward *ready to plug-in AHUs* also includes a ready-to-use integration interface that clearly documents and thoroughly tested with various control systems for building automation and control (BACS).
The Climatix AHU application supports all communication interfaces listed below so that only the corresponding Climatix communication module is used – without the need for additional engineering.

Interfaces
- BACnet-IP (B-BC profile)
- BACnet-MSTP (B-BC profile)
- Modbus RTU or TCP (master)
- Modbus RTU (slave) for the POL902 module
- LON interface, 64 SNVTs for POL906 module
- OPC via TCP/IP connection and Climatix remote OPC-server
- WEB package (POL909.50), for visualization, plant image, trend data, alarming and routing for remote maintenance

Remote operation, service

The Climatix controller can be operated remotely thanks to the integrated TCP/IP interface and an Internet browser. The user is provided the same operating structure as used for an internal or external operator element.

- Advanced Web server POL909.50/XXX (POL909.50/XXX) to set up web-based visualization, operation, trending, archiving as well as alarming, permitting the monitoring of the plant remotely by different users
- Web-HMI (for POL 638.xx only) automatically configures when configuring the plant
- SCOPE tool via modem, TCP/IP
- Alarm messages per e-mail or SMS (GSM modem required)

Climatix IC remote servicing

Climatix AHU package is already prepared to connect to the cloud based remote servicing system in order to support remote monitoring and operation but also in order to remote upgrade the complete controls system with latest version (firmware, application, translation, integration mapping).

Climatix *Factory tool*

The Climatix *Factory tool* supports OEM in its manufacturing process and is matched to the Climatix AHU application.

The tool support the OEM when:
- Loading the Climatix controller
- Configuring the controller and the application
- Creating plant diagrams

It further creates documentation specific to a configuration report.

Climatix *Change Log*

Climatix change log function is similar to a black box of an air craft. The change log recorded every write access to the objects. With every write will be the new and old value, timestamp and Object ID stored. This log is only for the OEM accessible and be hidden for service and enduser and can be read out via SCOPE tool (UUID is 00000000-0000-0000-0000-000000000001) for diagnostic purposes. The change log cannot be stopped and resists also over a BSP upgrade and application download.

Climatix *Event history*

Certain alarms are often requested to change to event only to just notify the user of an even but avoid alarm indication. Climatix AHU application is prepared, so users are enabled to change alarm messages to even messages.

Climatix *Alarm Snap shot*

The alarm snapshot function can be used to capture the state of selected values one cycle before an alarm occurs. When the alarm happens, these values are stored and visible on HMI alarm pages to support the diagnostic of a certain behavior.

1.15 Customer benefits

The trend

With the Climatic controller product range for OEM, Siemens is supporting the trend within the industry to integrate applications for air conditioning and refrigeration technology into the devices at the factory and to lower in this way the costs of plant installation and commissioning.

The basis

The Climatix product range as the basis meets the requirements since is covers all application segments, namely:

- Standard controllers for simple, cost-optimized HVAC applications such as fan coils
- Controller for more challenging, communicative applications
- Freely programmable controllers for complex solution for air conditioning units or cooling units demanding a maximum level of flexibility with regard to communications and extensions

The controllers POL6XX and POL4XX

All Climatix POL6xx and POL4XX controllers are freely programmable controllers and can be programmed accordingly for the corresponding use such as ventilation, refrigeration or district heating. The following Climatix AHU application was created for them.
The applications were developed in a manner to provide the greatest degree of flexibility to cover the need for application-ready solutions, yet remain very easy to configure via an operator unit.

Customer benefits

Various ready to use applications were created that are highly flexible allowing for the immediate use thanks to simple configuration via an operator unit to permit fast times to market for OEM customers and allow them to benefit from the application knowledge and Siemens experience in the area of integrating building automation and control systems.
No programming knowledge required. Modifications to functionality or hardware extensions are also made by reconfiguring using the operator unit.

Security

The applications are based on years of experience in the corresponding application segments. They are tested and equipped and documented with the requisite communication interfaces including BACnet, LON and Modbus.

Reduce costs

The standardization in turn significantly lowers costs at OEM, reduces support expenses as well and guarantees integration into Siemens or other building automation and control systems.

Flexibility

The Climatix AHU application is distinguished by the highest level of hardware and functionality. To meet the widest possible range of requirements for AHU plant types and variants.

Documentation

The application, devices, and parameters as well as communications interfaces are already documents as per the various target users (end users, system integrators, etc.). They do not need to be newly created on a project-by-project basis.

2 Climatix devices

2.1 Overview

Introduction

The devices of the Climatix product range forms the basis for operating and control functions of the Climatix AHU application.

Knowledge provided

This section provides the following knowledge:

- Design and elements of basis devices and extension modules
- Types and functions of operating unit HMI
- Functions and display of room unit

Topic

The individual topics in the section are:

Topic	Section
Basis controller POL424	3.2
Basis controller POL63X	3.3
Extension module POL955 **	3.4
Integrated HMI **	3.5
External HMIs	3.6
Web@HMI **	3.7
Room unit POL822	3.8

2.2 Basis controller POL424

Mechanical setup

The following image displays the controller POL424 with its elements as well as typical examples of connectable field devices:

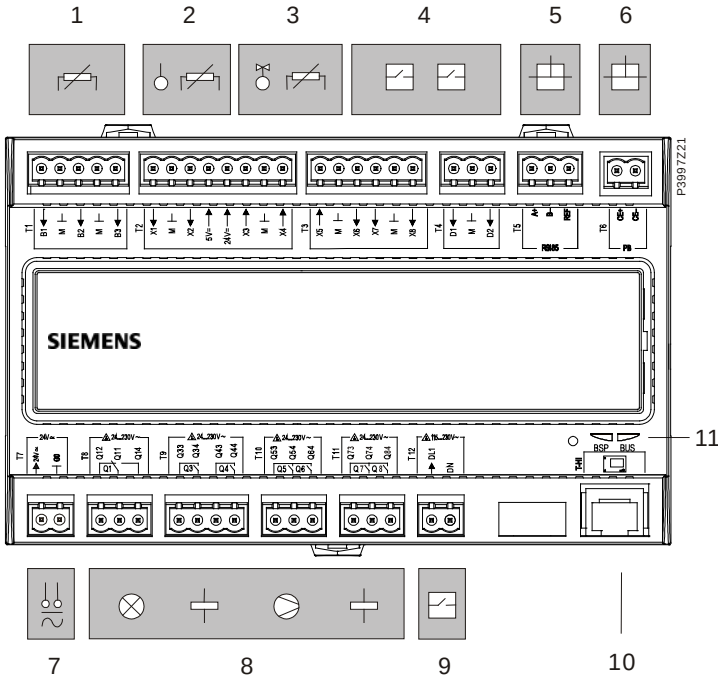


Figure 4: POL424 with its elements

Elements and connections

The elements and field devices (examples) in the figure are:

Pos.	Des.	Element / field devices
1	B1…B3	3 analog inputs: For sensors NTC 10 k and Ni1000 (TK5000) / Pt1000
2	X1, X2	2 universal inputs: Can be configured for sensors, resistance transmitters, etc.
3	X3 …X5	3 digital outputs: Can be configured for valves, relays, etc.
4	X6, X7 D1, D2 X8	4 digital inputs with polling voltage DC 24 V: For transmitter with potential-free contacts. 1 digital input for pulse transmitter.
5	A+, B-	RS-485 interface: For applications using Modbus RTU communications protocol.
6	CE-, CE+	Process bus interface.
7	0 V, 24 V	Supply voltage AC/DC 24 V: – 43 VA at AC 24 V (1.8 A) without I/O extension module – 24 VA at AC 24 V (1.0 A) without I/O extension module
8	Q3…Q8 Q1	6 relay outputs (NO) for AC 24…230 V 1 relay outputs (switching) for AC 24…230 V
9	DL1	1 digital input (0/1 binary), galvanically separated
10	T-HI	Local service interface (USB / RS-485) for HMI and tool
11	BSP, BUS	Status indicators for BSP and BUS

2.3 Basis controller POL63X

Mechanical setup

The following image displays the fully equipped controller POL63X with its elements as well as typical examples of connectable field devices:

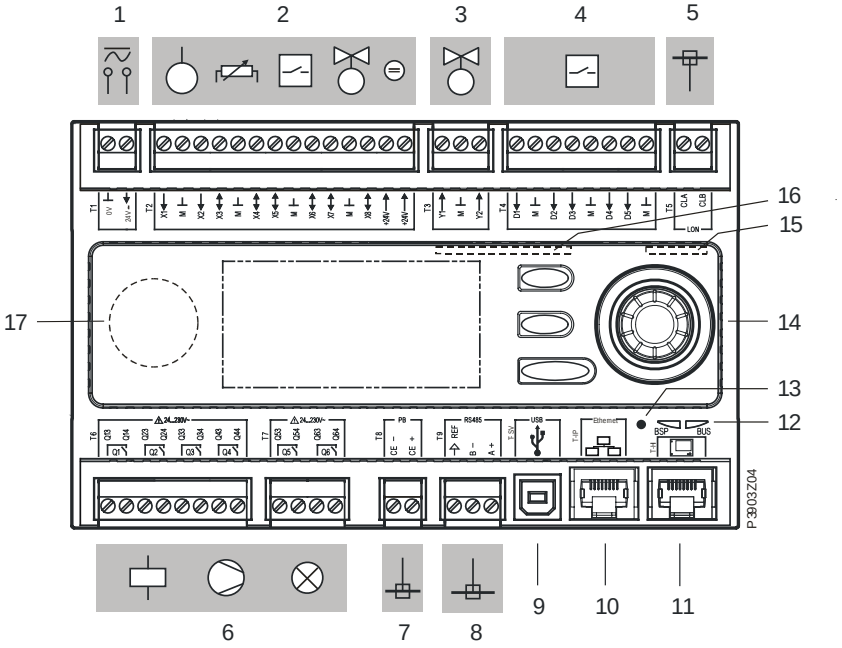


Figure 5: POL63X with its elements

Elements and connections

The elements and field devices (examples) in the figure are:

Pos.	Des.	Element / field devices
1	0 V, 24 V	Supply voltage AC/DC 24 V: – 43 VA at AC 24 V (1.8 A) without I/O extension module – 24 VA at AC 24 V (1.0 A) without I/O extension module
2	X1…X8	8 universal inputs / outputs: Configurable for sensors, resistance transmitters, relay contacts (potential free), valves, dampers, etc. **X1/X2** is only configurable as universal **in**puts
	+24 V	2 power supplies DC 24 V for sensors
3	Y1, Y2	2 analog outputs DC 0…10 V / 2 mA: For valves, dampers, etc.
4	D1…D5	5 digital inputs with polling voltage DC 24 V: For transmitter with potential-free contacts
5	CLA, CLB	LON interface Only available for **POL636.00/XXX**
6	Q1…Q6	6 relay outputs (NO) for AC 24…230 V: For contactors, fans, pumps, lights, etc.
7	CE-, CE+	Process bus interface
8	A+, B-	RS-485 interface: For applications using Modbus RTU communications protocol
9	T-SV	Tool interface / USB standard plug (plug type B)
10	T-IP	Ethernet connection (TCP/IP) for tool, touch panel, web browser. **POL636.00/XXX** only!
11	T-HI	Local service interface (USB / RS-485) for HMI and tool
12	BSP, BUS	Status indicators for BSP and BUS
13	–	Initialization button for BSP upgrade and application update
14	–	HMI with LCD and navigation elements. **POL63X.70/…** only!
15	–	Modem interface (RJ45 / RS232) for remote service tool
16	–	SD card reader for BSP and application upgrade
17	–	Battery compartment (under the lid)

2.4 Extension module POL955 **

Extension module in Climatix AHU Application is only available with controller **POL63X**.

Mechanical setup

The following image displays the I/O extension module POL955.0 with its elements as well as typical examples of connectable field devices:

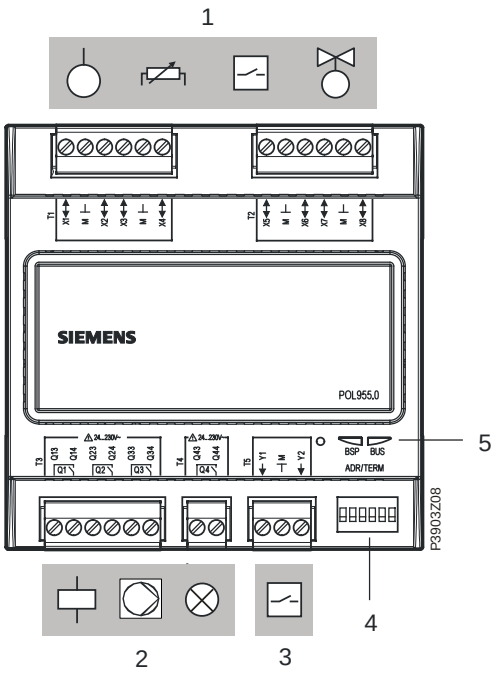


Figure 6: POL955.0 with its elements

Elements and connections

The elements and field devices (examples) in the figure are:

Pos.	Des.	Element / field devices
1	X1…X8	8 universal inputs / outputs: Configurable for sensors, resistance transmitters, relay contacts (potential free), valves, dampers, etc.
2	Q1…Q4	4 relay outputs (potential free): Closing contacts for switching voltage AC 24…230 V For contactors, fans, pumps, lights, etc.)
3	Y1, Y2	2 analog outputs DC 0…10 V / 2 mA For valves, dampers, etc.
4	ADR/TERM	DIP switch to set addresses and bus connection
5	BSP, BUS	Status LEDs for BSP and BUS

2.6 Modbus fan and variable speed drive interface

Modbus driven fans and variable speed drive

Climatix AHU application is capable to drive various fan or frequent converter via Modbus. It is even capable to address, configure and run without additional configuration tool to reducing commissioning time and hardware cost, but also gaining additional information for optimization and diagnostic.

Type	Illustration	Properties/ defaults
Siemens Sinamics GP120P		• Manual configuration • Supply fan: Modbus adr:31 • Exhaust fan: Modbus adr:21 • Baudrate 9600 • Parity even • Stop Bit 1 • Modbus delay xx, s • Response timeout xx, s • Termination passive/active
Danfoss FC102, FC102		• Supply fan: Modbus adr:32 • Exhaust fan: Modbus adr:22
EBM-Papst EC fan		• Special set up dialog for configuration • Supply fan: Modbus adr:33 • Exhaust fan: Modbus adr:23

For more details see configuration of fan IO or EBM Papst set up.

2.7 Modbus energy meters

Modbus driven energy meters

Climatix AHU application is capable to drive Carlo Cavazzi energy meter via Modbus communication.

Type	Illustration	Properties/ defaults
Energy meter Carlo Cavazzi		• Modbus address: 1 • Modbus baudrate: 9600

For more details see configuration of energy meter.

2.8 Modbus pressure sensor

2 types

The differential pressure measuring transducers with Modbus output signal listed below are well suited for use with the Climatix AHU application. A DIL switch is used to assign the address. Additional engineering not required.

There are two types of operator units available:

Type	Illustration	Properties
QBM68.X		• Differential pressure measuring transducer • Pressure-linear characteristic with selectable pressure measuring range • Operating voltage: AC 24 V or DC 15...36 V • Output signals: Modbus RTU and 0…10 V • Simple and fast mounting • Maintenance free • Calibrated and temperature-compensated measured signal • Default Modbus address: 40 • Default baudrate: 9600 baud
QBM69.X		• Differential pressure measuring transducer • Pressure-linear characteristic with selectable pressure measuring range • Operating voltage: AC 24 V or DC 15...36 V • Output signals: Modbus RTU 0…10 V • Accessory (option): 2 temperature sensor, analog (LG-Ni1000, PT1000 or NTC10K) • Maintenance free • Calibrated and temperature-compensated measured signal • Default Modbus address: 40 • Default baudrate: 9600 baud

Application example

The plant diagrams below illustrate an example for using the Modbus pressure sensor in a Climatix AHU application:

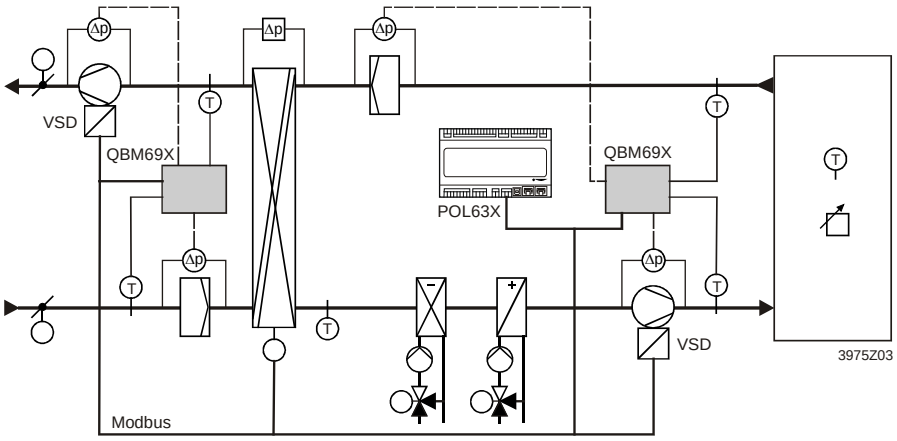


Figure 7: Example: Using the Modbus pressure sensor

Key

POL63X	Climatix controller	QBM69.X	Differential pressure measuring transducer
		VSD	Variable speed drives (VSD), e.g. for EBM-Papst

2.9 Integrated HMI **

Available only for controller **POL63X.070**.

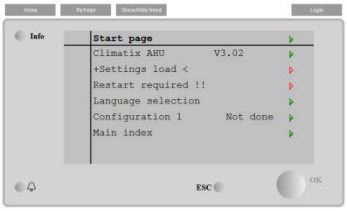
To be documented in a later edition.

2.10 External HMIs

Purpose and types

The external operating units HMI configures and parameterizes the controllers POL63X and POL42X loaded with the Climatix AHU application.

There are three types of operator units available:

Type	Illustration	Properties
HMI-DM		– 8-line display with selectable backlight (bl/ws) – Combined press/rotary knob for comfortable operation – Alarm button with LED display – Supports local or remote installation – IP 31
HMI-TM		– 8-line, high-resolution display (240 x 128 pixels) – 6 keys for easy operation – ALARM, INFO and CANCEL keys with LED indicators – Version POL871.71 for magnetic mounting; can be used as handheld unit – IP 65
Web@HMI		– Available with POL638 or together with AWM (POL909.5x) – Same look and feel as HMI-DM or HMI-TM – Same user access level as HMI-DM or HMI-TM – Remote parameterization via standard web browser – Menu screens can be used for documentation (print screen) – Online trending possibilities

Identical menu structure

The menu structures of the three operator units are identical; the design of the operating elements and functions match at about 90%.
The following pages provide a short description based on the HMI-DM.

HMI-DM view

The picture below displays the front view of the HMI-DM with display and operating elements:

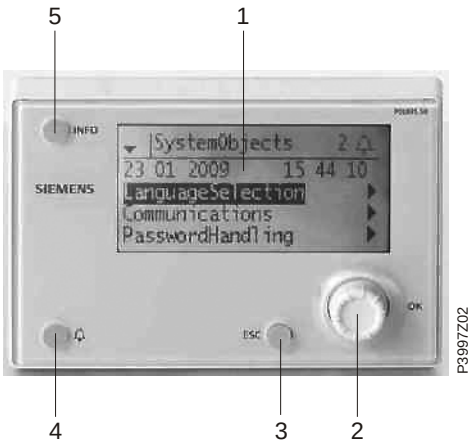


Figure 8: HMI-DM front view

Operator elements

The operating elements and functions are:

Pos.	Designation	Functions
1	Display	Displays menus, objects, parameters, parameter values, commands, etc.
2	Setting knob	**Turn:** – Select menu, objects, parameters, parameter values – Changes parameter values **Press:** – Go to lower levels or to setting pages – Exit setting pages and assume changed values Go to *password handling* page: **Press long**
3	ESC button	**Press:** – Go to the next higher level – Exit setting pages and assume changed values Go to HMI setting page: **Press long** **Press:** – Go back to last active page (after going to password handling page using the setting knob) – Go back to last active page (after going to *Main Index* page using the **Info** button)
4	Alarm button	**LED:** – Off: No alarm – Blinking: Alarm pending – Lit continuously: Pending acknowledged alarm **Press button:** – Go to last alarm – Go to alarm list (displays pending alarms and alarm history) – Go to alarm history – Go to alarm settings – Acknowledge and reset alarms in the alarm list or alarm history
5	Info button	Go to *Main Index* page: **Press** Go to *HMI basis page*: **Press long**

Display: Elements and functions

The picture below displays the principle design of the display based on an example:

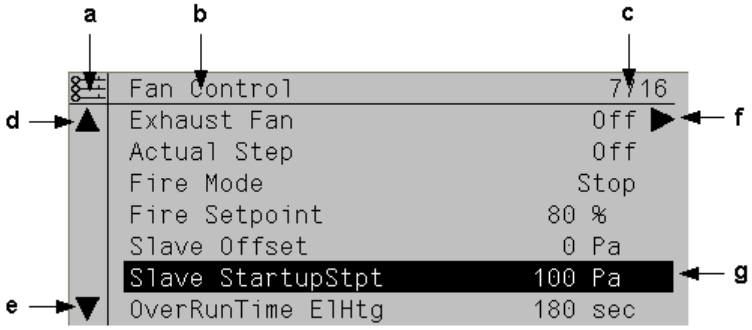


Figure 9: Example: HMI-DM principle design

Elements

The elements in the picture are:

Pos.	Explanation			
a	Current access level:			
	- No symbol:	No level		
	- 1 key:	Level 6	User	Password: 1000
	- 2 keys:	Level 4	Technical service	Password: 2000
	- 3 keys:	Level 2	OEM	Password: 6000
b	Title of displayed pages			
c	7: Number of selected lines 16: Number of available lines for the page			
d	Page includes additional lines above → You can scroll up			
e	Page includes additional lines below → You can scroll down			
f	Another level is located below this line. You can go to it.			
g	Currently selected line			

Navigation lines

On navigation lines, the object is highlighted in black when selected. It displays the present value for a component in front of the navigation arrow.

Navigation:
1. Select line: **Turn setting knob**
2. Switch to level below: **Press setting knob**

Display line

The object is also highlighted in black when selected for display lines (read only). It displays the present value for a component.

Setting lines

The parameter name and its present value are highlighted in black for the parameter setting lines.

Set value:
1. Select line: **Turn setting knob**
2. To switch setting page: **Press setting knob**
3. Set the parameter value on the setting page: **Turn setting knob**
4. Exits the settings page and assumes the changed parameter values: **Press setting knob** or exit the settings page without assuming the changed parameter value: **Press ESC**

Set discrete parameter values

When only one value is selectable:

Figure 10: HMI-DM: One value is selectable

The checked off line (Fire Setpoint) displays the presently set value. Changed as follows:

1. Select new value: **Turn setting knob**
2. Assume new value (and exit settings page): **Press setting knob**
   or
   Retain old value (and exist settings page): **Press Escape button**

When multiple values can be selected:

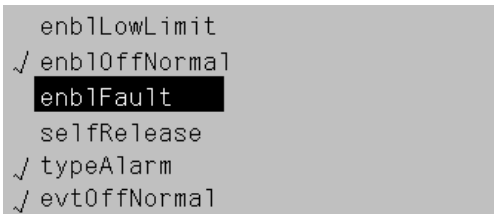


Figure 11: HMI-DM: Multiple values are selectable

Checked off lines display presently selected values.

Changed as follows:

1. Select a value: **Turn setting knob**
2. Select/deselect value: **Press setting knob**
3. Assume new selection:
   – Select *Done*: **Turn setting knob**
   – Select *Done*: **Turn setting knob**
   or
   Retain old selection (and exit settings page): **Press Escape button**

Set analog parameter values

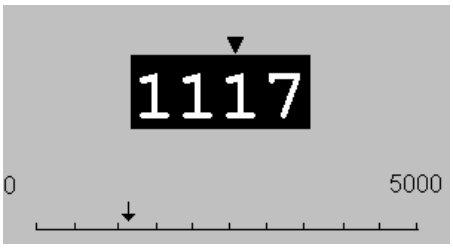


Figure 12: HMI-DM: Minimum / maximum values are adjustable

The scale displays minimum and maximum adjustable values.

Present value changed as follows:

1. Adjust number under the arrow ▼: **Turn setting knob**
2. Move arrow to the left: **Turn continuously via an increments of ten** (9 → 0 or 0 → 9)
3. Move arrow to right: **Do not turn for about 1 second**
4. Assume new value (and exit settings page): **Press setting knob**
   or:
   Retain old value (and exist settings page): **Press Escape button**

Additional information on HMI-DM

Additional information on HMI-DM is available in the document number CB1N3941en.

2.11 Web@HMI **

Possible directly only with controller **POL638**. It has a WEB server for a remote servicing using a standard web browser. The other controllers POL6XX can be supplemented for these functions using the communications module AWM, POL909.5X or POL909.8X. For details, see documentation CB1P3935en. Web@HMI is also available via Climatix IC remote servicing.

Requirements

The following conditions must be met to connect controller POL638 via Ethernet:

- Corresponding mapping file (HMI4WEB) is loaded on the controller
- The controller is connected to the Ethernet

Display TCP/IP parameters

Main Index > System overview > Communication > TCP/IP

Name	Range	Function
IP		Displays controller IP address
Mask		Displays subnet mask
Gateway		Displays gateway address
DHCP	– Active – Passive	Displays type of address assignment: – DHCP server issues addresses – IP address is fixed
Name		Displays controller name
MAC		Displays controller MAC address
Change settings		Go to page to parameterize onboard TCP/IP settings

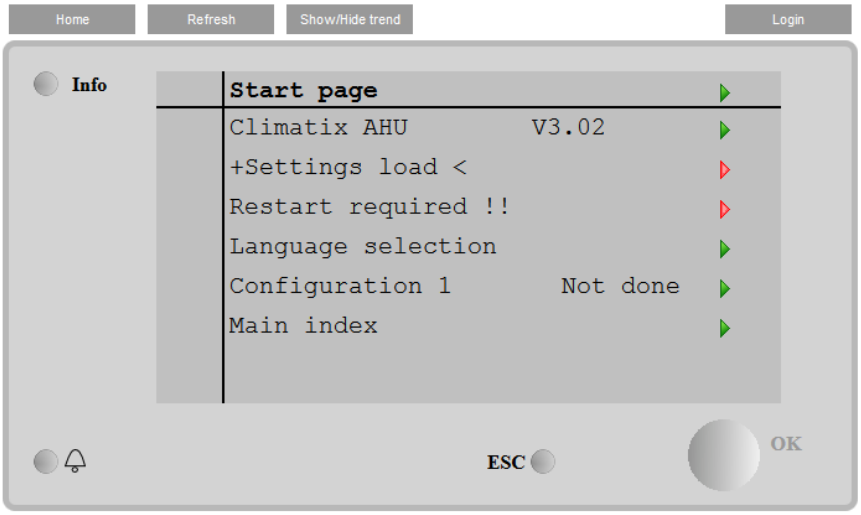
Parameterization

Main Index > System overview > Communication > TCP/IP > Change settings

Name	Range	Function
IP		Enter controller IP address if DHCP is set to passive
Mask		Enter subnet mask
Gateway		Enter gateway address
DHCP	– Active – Passive	Displays type of address assignment: – DHCP server issues addresses – IP address is fixed
Name		Controller name
100 MBit	– Passive – Active	Change transmission rate: – 10 MBit – 100 MBit
Link	– Passive – Active	– No connection to the Ethernet – Connected to Ethernet
User Name		User name for logging onto to WEB HMI
Password		Password for logging onto to WEB HMI
FTP User Name		User name to log onto FTP access
FTP Password		Password to log onto FTP access
Restart Required !!	Execute	You must restart the controller with **Execute** to assume the data after changing parameters

Initial connection to Web@HMI

Procedure:

Step	Action
1	Open web browser
2	Enter address (target name or IP address) → The **Connect to** dialog box is displayed: 
3	Enter user name [ADMIN]
4	Enter password [SBTAdmin!]
5	Confirm with **OK** → Opens the start page for Climatix AHU Application: 
6	Show/ hide trend: The new HMI@web provides also the capability to show online trend of a datapoint

Operation is the same as when using a hardware HMI.

2.12 Room unit POL822

View

The illustration shows the room unit POL822:

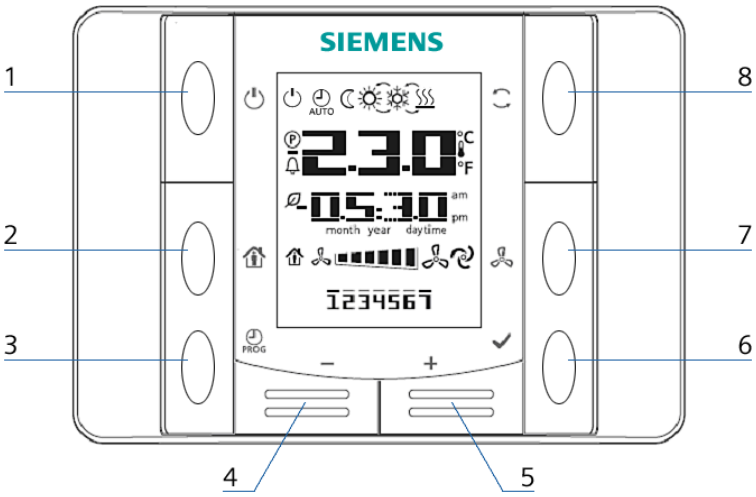


Figure 13: POL822 with its elements

Buttons and functions

The buttons and functions in the figure are:

Pos.	Sym.	Button designation and function
1		**On/Off** Switch from state *Off* and *On*. In state *Off*, buttons 2–8 are locked and the display is switched off.
2		**Presence** Switch on/off a programmed occupancy mode.
3	PROG	**Program** – Long press: Set date and time on the room unit – Short press: Change the scheduler program
4	–	**Minus** Adjusts the temperature setpoint. Each press of the button lowers the setpoint by 0.1 °C / 0.5 °F or 0.5 °C/1.0 °F.
5	+	**Plus** Adjusts the temperature setpoint. Each press of the button increases the setpoint by 0.1 °C / 0.5 °F or 0.5 °C/1.0 °F.
6		**OK** Key to confirm date/time and scheduler program entries.
7		**Fan** Adjusts the fan stage. Each press *) of the button increases the speed by one stage (release and *OpMode* is also not on *Auto*). *Cyclical: 1-2-3-Auto-1-2-3-Auto, etc.*
8		**Mode** Select between a maximum of three energy modes: *Auto*, *Comfort* and *Economy* The mode changes each time you press*) the button and is displayed with the corresponding symbol. *Cyclical: Auto – Comfort – Economy – Auto, etc.*
9		**Recovery** Heat recovery is active.

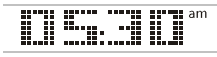
The function *Press* buttons position 7 and 8 must be enabled (Integrations/Room Unit Settings/Manual Control *Yes*).

Displays on the display

The display shows:

- Selected temperature display
  - Extract air temperature *(extract air temperature)*, or
  - the given room unit temperature, or
  - mixed room temperature
- Setpoint shift
- Energy mode
- Plant stage
- Time
- Day of the week

The table below displays and explains all the symbols available on the display.

Indication	Meaning
	Temperature display range *Displays the extract air temperature for the given room unit temperature or the mixed room temperature in °C or °F.*
	Temperature in °C *Resolution 0.1 °C*
	Temperature in °F *Resolution 1.0 °F*
	Setpoint shift *Can be displayed/changed to °C or to °F* *Resolution 0.1 °C/1.0 F or 0.5 °C/1.0 F*
	Time
	Plant stage
	Day of week display (*POL822.60/xxx only)* *1 = Monday*
	ON/OFF *The device does not fully shut down with OFF, but rather goes to standby.*
	Auto mode active *The controller overrides the room unit when the symbol blinks (*see section 5.2.2 Prioritization operating modes...) Buttons 1, 2, 5 and 8 are locked*.*
	Economy mode active
	Comfort mode active
	Cooling
	Heating
	Automatic plant control
	Occupancy mode
	Energy tracking
	Alarm display
	Parameter mode

Alarm display

When the controller sends an alarm to the room unit, the

- Alarm is displayed
- Depending on parameterization, the alarm number, including the grouping, flashes, or only the alarm is displayed
  A = Alarm switched off
  B = Normal alarm
  C = Warning

For details, see section 7.11 Process bus/room units and section 9.8 Alarm lists.

3 Preset plant types ***
3.1 Overview

This section only applies to the controller **POL42X**.

Introduction

Five different plant types are saved on the POL42X controllers that can be selected via the HMI on the start page or in the configuration.

They are basic types. They can be modified to the applicable plant accordingly. This affects configurations (1, 2, IOs) and the function as per section 4 Configure application and section 5 Function description.

Knowledge provided

This section provides the following knowledge:

- Plant diagrams and application descriptions of the five plant types
- Preset terminal layouts and configuration data on them

Topic

The topics in the section are:

Topic	Section
AHU 1 – Control for fresh air	4.2
AHU 2 – Comfort control	4.3
AHU 3 – Control using mixing dampers	4.4
AHU 4 – Control using rotary heat exchanger	4.5
AHU 5 – Control using bypass dampers	4.6
Preset AHU – Terminal layout	4.7
Preset AHU – Configuration 1	4.8
Preset AHU – Configuration 2	4.9

3.2 AHU 1 – Control for fresh air

Plant diagram

The plant diagram displays the participating aggregates and sensors as well as the occupied inputs and outputs on the controller:

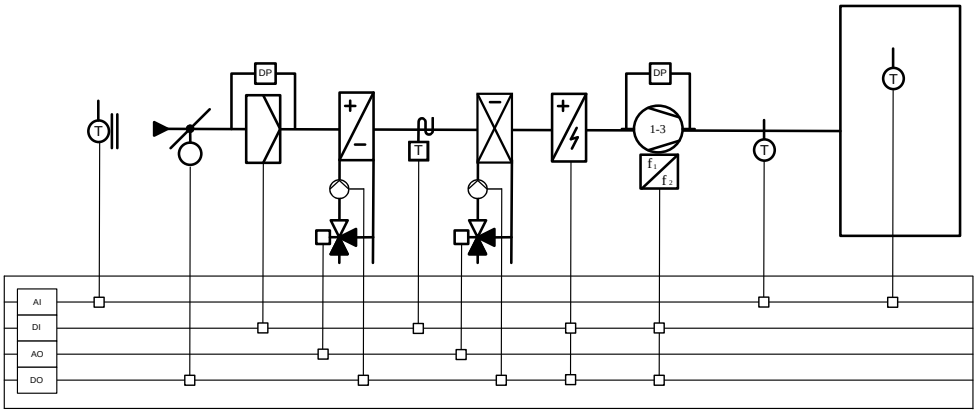


Figure 14: AHU 1: Plant diagram with participating aggregates and sensors

Application description

The features of this application are:

- Fresh air unit with room supply air cascade
- One or two registers for heating and/or cooling
- Auxiliary electric heating for reheating sequence
- Fan control (options):
  - One to three-stage fan control.
  - Speed controlled fan control.
  - Possibility for separate, binary encoded control of individual stages (two digital outputs per fan).

3.3 AHU 2 – Comfort control

Plant diagram

The plant diagram displays the participating aggregates and sensors as well as the occupied inputs and outputs:

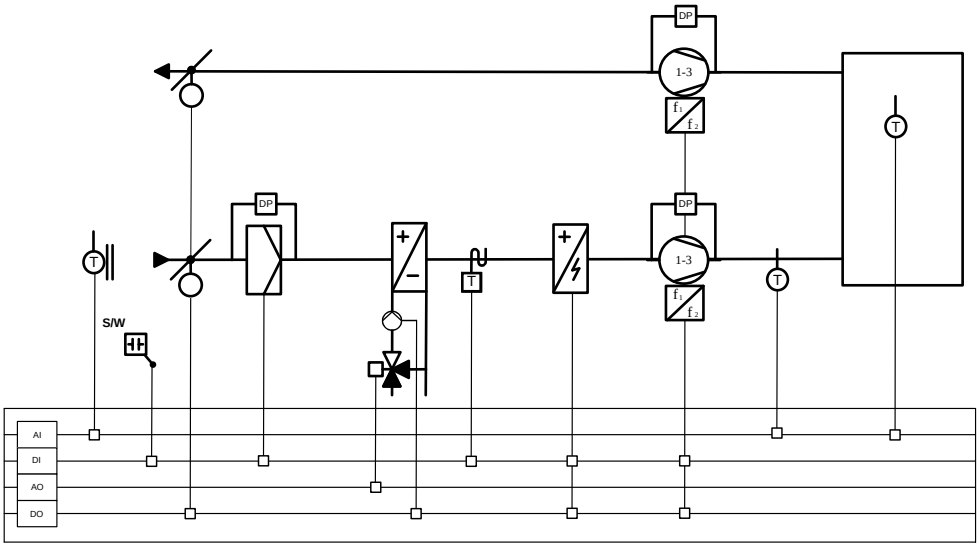


Figure 15: AHU 2: Plant diagram with participating aggregates and sensors

Application description

The features of this application are:

- Supply air/extract air unit with room supply air cascade
- One water register for heating and/or cooling
- Auxiliary electric heating for reheating sequence
- Fan control (options):
  - One to three-stage fan control.
  - Speed controlled fan control.
  - Possibility for separate, binary encoded control of individual stages (two digital outputs per fan).

3.4 AHU 3 – Control using Mixing dampers

Plant diagram

The plant diagram displays the participating aggregates and sensors as well as the occupied inputs and outputs:

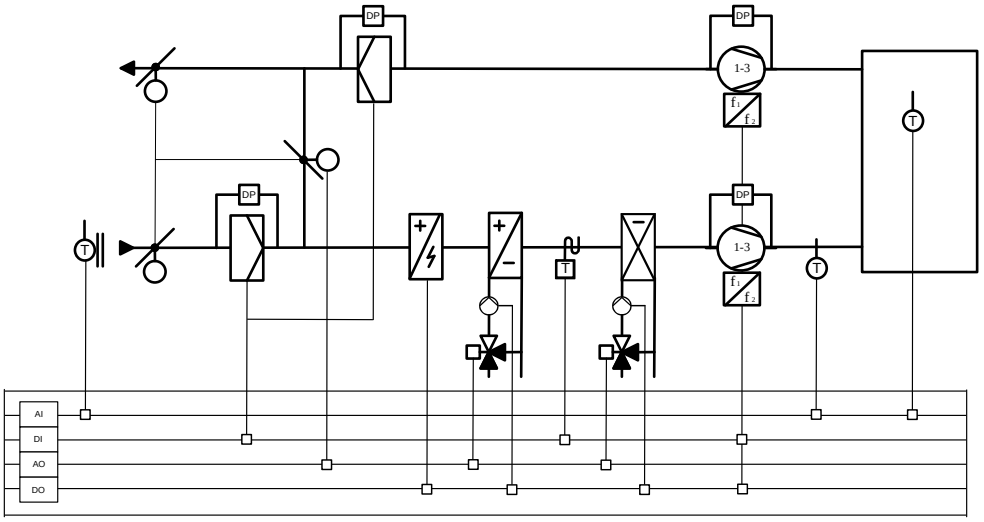


Figure 16: AHU 3: Plant diagram with participating aggregates and sensors

Application description

The features of this application are:

- Comfortable air handling unit with mixing dampers
- Supply air/extract air unit with room supply air cascade
- Mixing damper control
- Two water registers for heating and/or cooling
- Auxiliary electric heating for preheating
- Fan control (options):
  - One to three-stage fan control.
  - Speed controlled fan control.
  - Possibility for separate, binary encoded control of individual stages (two digital outputs per fan).

3.5 AHU 4 – Control using rotary heat exchanger

Plant diagram

The plant diagram displays the participating aggregates and sensors as well as the occupied inputs and outputs:

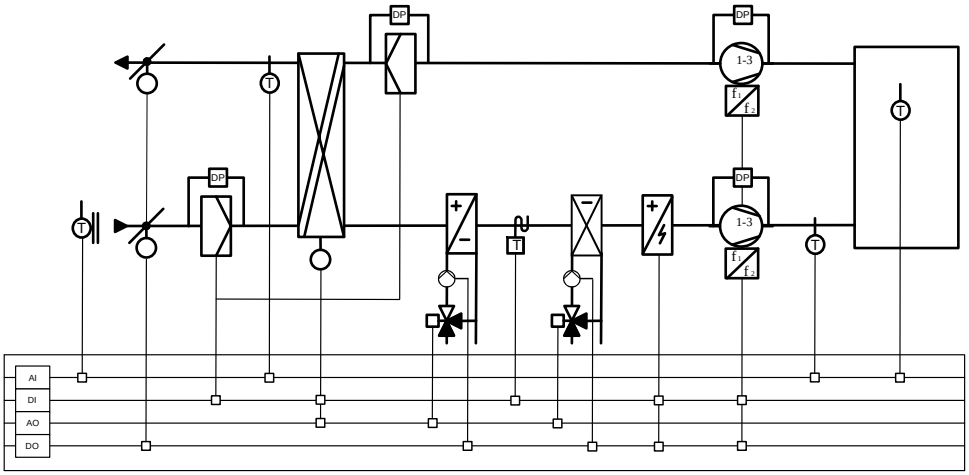


Figure 17: AHU 4: Plant diagram with participating aggregates and sensors

Application description

The features of this application are:

- Supply air/extract air unit with room supply air cascade
- Rotary heat exchanger
- One or two registers for heating and/or cooling
- Optional electric heating for reheating sequence
- Sensor for frost protecting prior to heat recovery
- Fan control (options):
  - One to three-stage fan control.
  - Speed controlled fan control.
  - Possibility for separate, binary encoded control of individual stages (two digital outputs per fan).

3.6 AHU 5 – Control using bypass dampers

Plant diagram

The plant diagram displays the participating aggregates and sensors as well as the occupied inputs and outputs:

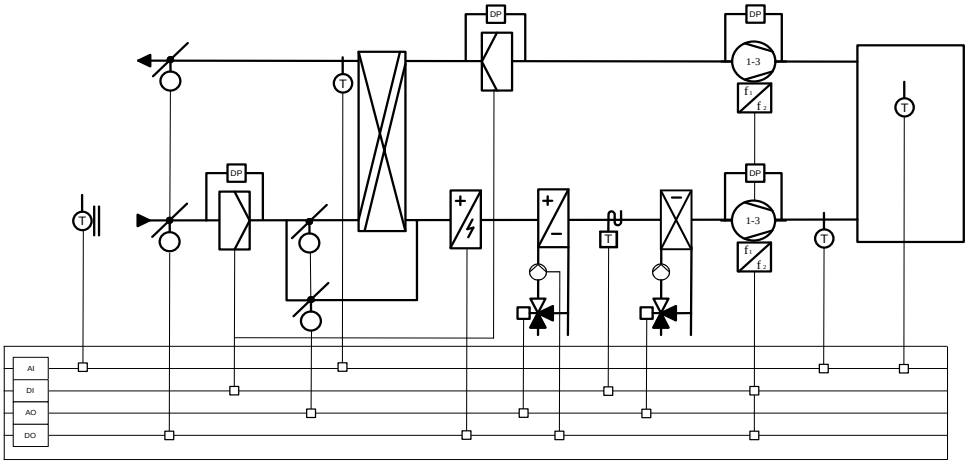


Figure 18: AHU 5: Plant diagram with participating aggregates and sensors

Application description

The features of this application are:

- Supply air/extract air unit with room supply air cascade
- Plate heat exchanger with analog output to control the bypass damper
- Heat recovery unit (via two-way damper)
- One or two registers for heating and/or cooling
- Optional electric heating for preheating
- Fan control (options):
  - One to three-stage fan control.
  - Speed controlled fan control.
  - Possibility for separate, binary encoded control of individual stages (two digital outputs per fan).

Notes:
- Preheating is only possible as per the outside air temperature since the sensor is needed to protect the plate heat recovery.
- The preheater is always electric.
- The electric heat (not the preheater) can have three stages which can then be configured as binary outputs.

3.7 Preset AHU – Terminal layout

IOs	AHU 1 AHU Control for fresh air	AHU 2 Comfortable AHU control	AHU 3 AHU control using mixing dampers	AHU 4 AHU control using rotating thermic wheels	AHU 5 AHU control using bypass dampers
Relay outputs					
DO1	El Heating St1	El Heating St1	Pre El Heating St1	El Heating St1	Pre El Heating St1
DO3	*Sply Fan St1	*Sply/Exh Fan St1	*Sply/Exh Fan St1	*Sply/Exh Fan St1	*Sply/Exh Fan St1
DO4	*Sply Fan St2	*Sply/Exh Fan St2	*Sply/Exh Fan St2	*Sply/Exh Fan St2	*Sply/Exh Fan St2
DO5	Sply Damp	Sply/Exh Damp		Sply/Exh Damp	Sply/Exh Damp
Q6	Htg Pump	Htg/Clg Pump	Htg Pump	Htg Pump	Htg Pump
DO7	Clg Pump	El Heating St2	Clg Pump	Clg Pump	Clg Pump
DO8		El Heating St3			
Analog outputs					
AO1	Htg Valve	Htg/Clg Valve	Htg Valve	Htg Valve	Htg Valve
AO2	Clg Valve		Clg Valve	Clg Valve	Clg Valve
AO3	Sply Fan	Sply/Exh Fan	Mix Damp	HrecWheel	HrecPlate
Binary inputs					
DI	Htg Frost Therm	Htg Frost Therm	Htg Frost Therm	Htg Frost Therm	Htg Frost Therm
DI2	Sply Filter	Sply Filter	Sply/Exh Filter	Sply/Exh Filter	Sply/Exh Filter
XI6	Sply Fan	Sply/Exh Fan	Sply/Exh Fan	Sply/Exh Fan	Sply/Exh Fan
XI7	El Heating Alarm	El Heating Alarm		El Heating Alarm	
XI8		SuWi ChangOvr		Heat recovery Alm	
Universal inputs					
XI1	RmTmp	RmTmp	RmTmp	RmTmp	RmTmp
XI2				Extract Tmp	Extract Tmp
Analog inputs					
AI1	SplyTmp	SplyTmp	SplyTmp	SplyTmp	SplyTmp
AI2					
AI3	OutsTmp	OutsTmp	OutsTmp	OutsTmp	OutsTmp

* XY means:
(*Step1* = DO3 TRUE; *Step2* = DO4 TRUE; *Step3* = DO3 and DO24TRUE).

3.8 Preset AHU – Configuration 1

Configuration 1	AHU 1	AHU 2	AHU 3	AHU 4	AHU 5
General:	AHU Control for fresh air	Comfortable AHU control	AHU control using mixing dampers	AHU control using rotating thermic wheels	AHU control using bypass dampers
Fire alarm	No	No	No	No	No
Filter alarm	Supply	Supply	Combined	Combined	Combined
Su/wi input	No	Yes	No	No	No
TSP function	Steps	Steps+Tmp	Steps	Steps	Steps
TSP steps	1 step	1 step	1 step	1 step	1 step
Ext control input	None	None	None	None	None
Alarm outputs	None	None	None	None	None
External setpoint	No	No	No	No	No
Sensors:					
Room tmp sensor	1 sensor	1 sensor	1 sensor	1 sensor	1 sensor
Exh air tmp sensor	No	No	No	No	No
Supply tmp sensor	Yes	Yes	Yes	Yes	Yes
Outs air tmp sensor	Yes	Yes	Yes	Yes	Yes
Sply air hum sensor	No	No	No	No	No
Functions:					
Damper	Supply	Combined	No	Combined	Combined
Extract fan	No	Combined	Combined	Combined	Combined
Fan control mode	Direct	Direct	Direct	Direct	Direct
Tmp control mode	Rm Casc	Rm Casc	Rm Casc	Rm Casc	Rm Casc
Hrec damper	No	No	Normal	No	No
Heat recovery	No	No	No	Wheel	PlateExch
Heating	Yes+PreHeat	Yes+PreHeat	Yes+PreHeat	Yes+PreHeat	Yes+PreHeat
Electrical Heating	1Step	1Step	No	1Step	No
Cooling	Water	Water	Water	Water	Water
Humidity control	No	No	No	No	No
El Heating 2	No	No	1Step	No	1Step
Configuration 1	Done	Done	Done	Done	Done
Restart Required !!	Execute	Execute	Execute	Execute	Execute

3.9 Preset AHU – Configuration 2

Configuration 2	AHU 1	AHU 2	AHU 3	AHU 4	AHU 5
	AHU Control for fresh air	**Comfortable AHU control**	**AHU control using mixing dampers**	**AHU control using rotary heat exchangers**	**AHU control using bypass dampers**
Night cooling	No	No	No	No	No
Tmp start	No	No	No	No	No
Tmp start/OSSTP blk	None	None	None	None	None
Fan alarm	Supply	Combined	Combined	Combined	Combined
Fan fdbk	No	No	No	No	No
Fan comp room tmp	No	No	No	No	No
Fan comp outs tmp	Yes	Yes	Yes	Yes	No
Fan htg/clg	No	No	Htg+Clg	Htg+Clg	Htg+Clg
Tmp stpt selection	Htg+Dz	Htg+Dz	Htg+Dz	Htg+Dz	Htg+Dz
Room draught limit	No	No	No	No	No
Sequence fan clg	Clg-Fan	Clg-Fan	Clg-Fan	Clg-Fan	Clg-Fan
Sequence hrec damper	No*	No*	Dmpr-Htg	No*	No*
Deviation alarm tmp	No	No	Sply+Room	Sply+Room	Sply+Room
Su/Wi comp tmp	No	No	Yes	Yes	No
Hrec frost protect	No*	No*	No*	TempSensor	TempSensor
Hrec (pump) cmd	No*	No*	No*	No	No
Heat recovery alarm	No*	No*	No*	Yes	No
Hrec clg recovery	No*	No*	DmprHrec	Hrec	Hrec
Hrec efficiency	No*	No*	No*	No*	No*
Htg frost protect	Detector	Detector	Detector	Detector	Detector
Heating pump	Yes+Kick	Yes+Kick	Yes+Kick	Yes+Kick	Yes+Kick
Htg pump alarm	No	No	No	No	No
Combi Coil	None	1 output	None	None	None
El htg alarm	Yes	Yes	No*	Yes	No*
Hum control unit	No*	No*	No*	No*	No*
Dehum tmp prio	No*	No*	No*	No*	No*
Dew point control	No*	No*	No*	No*	No*
Cooling pump	Yes+Kick	Yes+Kick	Yes+Kick	Yes+Kick	Yes+Kick
Auxiliary input	No	No	No	No	No
Configuration 2	Done	Done	Done	Done	Done
Restart Required !!	Execute	Execute	Execute	Execute	Execute

No* means:
The function is disabled since the hardware was not selected in *Configuration 1*.
The corresponding function is enabled if you added the sensor or components under *Configuration 1*.

4 Configure application
4.1 Overview

Introduction

An operating unit HMI or the HMI@Web is used to configure the Climatix AHU application as per the plant at hand as well as selecting and parameterizing the associated functions.

Knowledge provided

This section provides the following knowledge:

- The entire workflow with individual stages
- Climatix AHU application as per the current plant is configured in three main steps
- Use SD card functions to load and backup applications and configurations, etc. (POL63X only)

Topic

The individual topics in the section are:

Topic	Section
Workflow overview	5.2
Configuration main steps	5.3
Configuration 1	5.4
Configuration 2	5.5
Configuration IOs	5.6
Set up EBM fan	5.7
Check I/O configuration	5.8
Wiring test	5.9
SD card functions **	5.10
Backup/restore parameters **	5.11

4.2 Workflow overview

Introduction

The following illustration provides an overview of the entire workflow: From downloading the Climatix AHU application from the Siemens server, to configuring and parameterizing a controller, up to loading additional controllers with the same functionality.

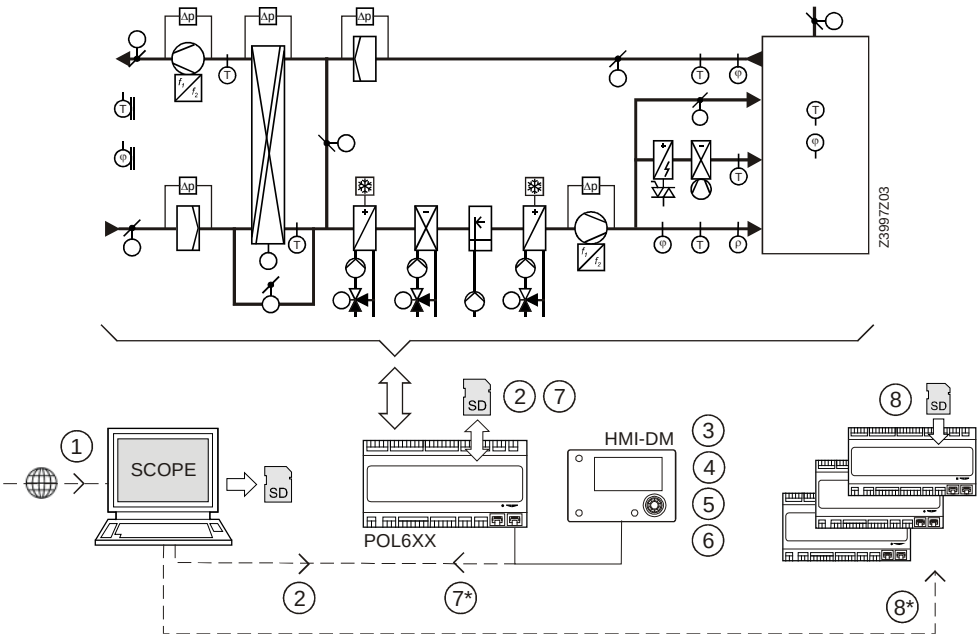


Figure 19: Overview of the entire workflow

Individual stages

The entire workflow is typically divided into the following stages:

Stage	Tasks	Sec.
1	Download the current version of files for the Climatix AHU application from the Siemens server.	5.10
2	Load the files to the controller via the SD card. *Variant:* Load using SCOPE. *Note:* Climatix POL400 controllers are already preloaded with the application.	5.10
3	Configure the application as per the plant at hand in **three main steps**. *Important:* Complete the checklist	5.3 to 5.9
4	Parameterize associated functions	6
5	Make system settings	7
6	Set up communications.	8
7	Export all configuration and parameter values to an SD card (generate the parameter file *PARAM.ucf*).	5.11
	Note: Only possible with POL6XX controllers!	
7 *	*Variant:* Save configuration and parameter values on the PC using SCOPE.	–
8	Load the parameter file using the newly created SD card to other controllers with the same functionality (POL6XX)	5.11
8 *	*Variant:* Load parameter file to additional controllers using SCOPE.	–

4.3 Configuration step by step

Three main steps

The desired plant designed is configured.

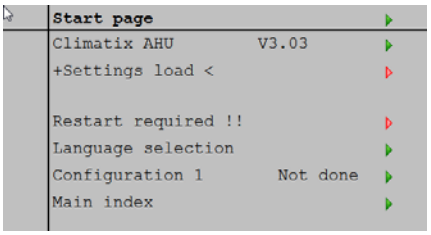
HMI is used to execute the three main steps:

Step	Designation	Tasks	Sec.
1	**Configuration 1**	Make the basic settings for the plant.	4.4
2	**Configuration 2**	Determine subfunctions for plant parts.	4.5
3	**Configuration I/Os**	– Assign previously defined hardware I/Os. – Parameterize sensor conversions.	4.6
	– EBM fan	– Set up, if existent.	5.7
	– Wiring test	– Check I/O configuration.	5.8
	– Set IO to …	– Set the I/Os to *wiring mode* or to *Auto mode*.	5.9

Below are the corresponding HMI displays of the configuration dialog.

Start configuration

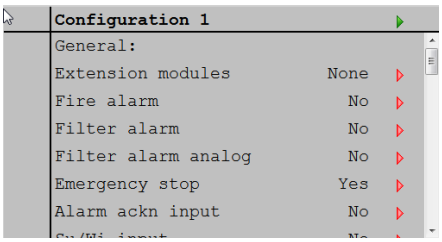
Select *Configuration 1* menu and the HMI is leading through the three main steps in sequence.



Notes:
+Settings load <
Load existing parameter file from SD card, whenever there is already a configuration available.

On *Configuration 1*

Configure the basic settings for the plant.

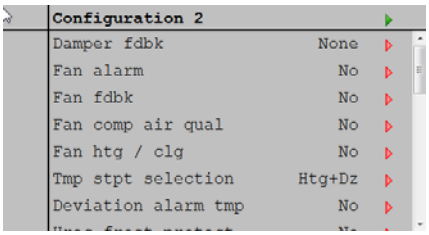


Notes:
Finalize *Configuration 1* with done and restart controller and continue with configuration 3.

Configuration main steps, *cont'd*

On *Configuration 2*

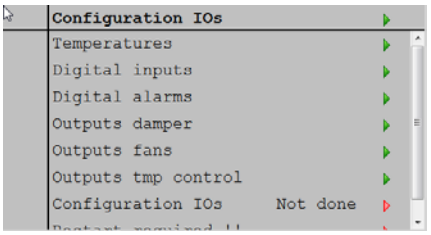
Determine subfunctions for plant parts.



Notes:
Finalize *Configuration 2* with done and restart controller continue with configuration IO's.

On Configuration IO's

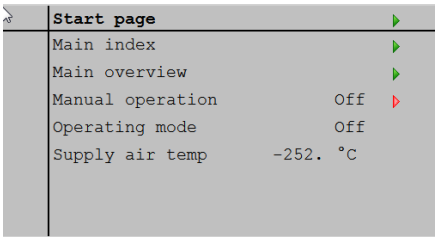
Configure the needed hardware IOs.



Notes:
Finalize *Configuration IOs* with done and restart controller.

Configuration done

Configuration is complete and done and controller is ready to operate.



Configuration page

Main Index > Configuration

The *Configuration* page in the *Main Index* includes the following lines and associated parameter values:

Name	Values	Explanation
Configuration 1	NotDone Done	Link to *Configuration 1* page and displays whether or not parameterization of *Configuration 1* was completed.
Configuration 2	NotDone Done	Link to *Configuration 2* page and displays whether or not parameterization of *Configuration 2* was completed.
Configuration IOs	NotDone Done	Link to *Configuration IOs* page and displays whether or not parameterization of *Configuration IOs* was completed.
Check Config IOs		Link to *Check Config I/Os* page.
Doubled	Fault OK	Displays whether an input or output can be used multiple times. Fault generates an alarm that locks the plant.
Not configured	Fault OK	Displays whether a function is enabled and the required I/Os are not assigned. Fault generate an alarm that the plant is locked (only enabled for fully configured plant).

The plant cannot start without:
– *Configuration 1* = Done
– *Configuration 2* = Done
and
– *Configuration IOs* = Done.

Proceed as follows if further configuring required:
Select *Configuration 1* = Not done
→ All elements are once again visible and can be modified.

Column title *Name*

In this document, the first column *Name* in the configuration and parameter tables always refers to the line in question on the HMI display – whether navigation, display, or setting lines.

It may also deal with plant components or software objects as well as individual parameters:

Name	Range	Explanation
Extension modules		
Fire alarm		
StartupStpt		

See section 2.10 External HMIs under Display: Elements and Functions.

4.4 Configuration 1

Task

The **basic settings for the plant** are entered in *Configuration 1*, subdivided into:

- General
- Sensor
- Plant parts and functions

You complete the process by restarting *Configuration 1* in order to be able to subsequently execute *Configuration 2*.
To restart, see line *Restart Required !!* at the end of the table *Plant parts and functions*.
After this step, only the selected elements are displayed on the HMI – the same applies after *Configuration 2* and *Configuration IOs*.

Start

Start page > Main Index
As required, **Password Enter** for Level 4, then:
> Configuration > *Configuration 1* --- General

General

Name	Range	Explanation
Extension modules	None	The basis controller I/Os are enough for configuration.
	One	One extension module is connecting using address 1. DIP switches 5 and 6 must be set to ON on the module.
	Two	Two extension modules are connected with addresses 1 and 2. DIP switch 5 must be set to ON on extension module 1; on extension module 2, DIP switches 4 and 6.
Fire alarm	No	No fire alarm.
	alarm	External fire alarm such as smoke detectors, thermostats, fire detection control units, etc.
	tmp	Internal fire alarm via temperature measurement of supply and extract air temperature, when both sensors exist. A fire alarm is triggered when one of the two temperatures breaches a certain value.
	alarm+tmp	Both fire alarms.
Filter alarm	No	No filter alarm.
	Combined	Supply and extract filter with common alarm input.
	Supply	Supply filter alarm input only.
	Exhaust	Extract filter alarm input only.
	Sply+Exh	Two separate filter alarm inputs for supply and extract filters.
Filter alarm analog	No	No filter alarm via pressure sensor.
	Supply	Supply filter alarm input only.
	Exhaust	Extract filter alarm input only.
	Sply+Exh	Two separate filter alarm inputs for supply and extract filters.
Emergency stop	No Yes	Input for emergency stop. A TRUE signal at this input immediately shuts down the plant. No alarm is triggered.
Alarm ackn input	No Yes	Input to acknowledge/reset an alarm. Alarms still pending are acknowledged; no longer pending alarms are reset.
Su/Wi input	No Yes NotHSo NotCWi Both	Input for summer/winter changeover: A TRUE signal on this input means summer = enabled. Active heating in summer and/or active cooling in winter can be suspended. Both: No heating in summer and no cooling in winter

General, *cont'd.*

Name	Range	Explanation
TSP function	No	No time switch program.
	Steps	Time switch program with possible settings for fan stages (*Off* and *Stx*). The parameter *TSP Steps* determines the number of possible steps x.
	Steps+tmp	Time switch program with settings for fan stages and temperature control mode (*Off*, *Ecox* and *Comx*). The parameter *TSP Steps* determines the number of possible stages x. The temperature modes comfort or economy have separate setpoints for temperature control.
TSP steps		Enable possible fan steps. This setting influences the number of setpoints for controlled fans.
	1Step	*TSP function* = *Steps* → Possible time switch program settings: Off, St1 *TSP function* = *Steps+tmp* → Possible time switch program settings: Off, Eco1, Com1
	2Steps	*TSP function* = *Steps* → Possible time switch program settings: Off, St1, St2 *TSP function* = Steps+tmp ---> Possible time switch program settings: Off, Eco1, Eco2, Com1, Com2.
	3Steps	*TSP function* = *Steps* → Possible time switch program settings: Off, St1, St2, St3 *TSP function* = *Steps+tmp* → Possible time switch program settings: Off, Eco1, Eco2, Eco3, Com1, Com2, Com3
	Example 1	*TSP function* = *Steps*, *TSP steps* = *2Step* Fan control using 2 setpoints for *St1* and *St2*. Temperature control using a setpoint for *Comfort mode*.
	Example 2	*TSP function* = *Steps+tmp*, *TSP steps* = 3 Fan control using 3 setpoints for *St1* and *St2* and *St3*. Temperature control using separate setpoints for *Eco* and *Comfort*. Under *Eco2*, the plant operates using the temperature setpoint for *Eco* and the fan setpoint *St2*.
Ext control input	None	No external input for operating mode switch, timer, button, occupancy detector, etc.
	One	One input (e.g. off / on).
	Two	Two inputs (e.g. *Auto* / *Off* / *St1* / *St2*).
Alarm outputs	None	No alarm output.
	One	One output (e.g. for high alarms).
	Two	Two outputs (for high and low alarms).

Sensor

Name	Range	Explanation
Room tmp Sensor (Bit Field)	Sensor 1 Sensor 2 Rm Unit 1 Rm Unit 2 QMX RU*	Inputs for room temperature sensors. You can select whether to apply maximum, minimum, average or individual value for control for more than one sensor in *Configuration 2*. When selecting any room unit, the interface to the room unit connection is enabled. *QMX will be available in Version V320
Extract tmp sensor	No Yes	Input for extract air sensor.
	Yes+Hold	The maximum, otherwise present temperature is stored when shutting down the plant, to the extent the plant ran for more than 5 minutes. The setting only makes sense when there is no room sensor and Standby start operations (e.g. free cooling) without plant kick are to be used. (Plant kick: Short, cyclical plant start to update the values of the sensors mounted in the duct).
Supply tmp sensor	No Yes	Input for supply air sensor.
Outs air tmp Sensor	No Yes	Input for outside air sensor.
	Yes+Hold	The minimum, otherwise present temperature is stored when shutting down the plant, to the extent the plant ran for more than 5 minutes. The setting only makes sense when the sensor is mounted in the duct and night start operations (e.g. free cooling) is used or as safety function for the pump start at a low outside air temperature.
Room hum Sensor	No Yes	Input for room humidity sensor.
Supply hum sensor	No Yes	Input for supply air humidity sensor.
Outs air hum sensor	No Yes	Input for outside air humidity sensor.

Plant parts and functions

Name	Range	Explanation
Damper		Open/close damper.
	No	No dampers.
	Combined	Two dampers with only one common output.
	Supply	Supply air damper with output.
	Supply+Exh	Two dampers with separate outputs.
Extract fan		Extract air fan (supply air fan is always available; cannot be disabled).
	No	No extract air fan.
	Yes	Extract air fan with separate output.
	Combined	Extract and supply air fan with common output.
Fan control mode		Select fan and control type. Positions *SupplySlv* and *Extract Slv* not possible without enabled extract air fan. Positions *Direct* and *DirectVar* possible if the extract air fan is parameterized as combined. The exact number of outputs depends on the number of steps and whether or not the extract air fan is enabled. The number of required inputs/outputs double if the fan is enabled with a separate output. The sensors required for control, e.g. pressure sensors, are enabled here as well.
	Direct	Up to 3 digital outputs each for stepped fans.
	DirectVar	Up to 3 digital outputs each for stepped controlled variable speed fans via digital outputs (not 0...10 V or Modbus).
	FixedSpeed	One digital and analog output each for analog – modulating controlled variable speed drives (e.g. St1 = 2 V, St2 = 5 V, St3 = 8 V).
	Pressure	One digital and analog output each and one analog input each for variable speed drives in pressure-controlled plants.
	Flow	One digital and analog output each and one analog input each for variable speed drives in flow-controlled plants.
	SupplySlv	One digital and analog output each and three analog inputs for the variable speed drives in pressure-controlled plants where the supply air fan operates dependent on the extract fan.
	ExhaustSlv	One digital and analog output each and three analog inputs for the variable speed drives in pressure-controlled plants where the extract air fan operates dependent on the supply air fan.
Tmp control mode		Select control algorithm for temperature control.
	Supply	Supply air temperature control only.
	Rm Casc	Room / supply air temperature cascade control.
	ExtrSplyC	Extract air/supply air cascade control
	RmSplyC Su	Room / supply air cascade control during the summer; supply air temperature control only during the winter.
	ExtrSplyC Su	Extract/supply air cascade control during the summer; supply air temperature control only during the winter.
	Room	Room control only.
	Extract	Pure extract air control.

Plant parts and functions,
cont'd

Name	Range	Explanation
Hrec damper		Select heat recovery control with mixed air dampers.
	No	No mixed air damper.
	Normal	Mixed air damper with output signal 100% for complete recirculation.
	Invers	Mixed air damper with output signal 0% for complete recirculation.
Heat recovery		Select *Heat recovery* control with wheel, plate or hot water heat exchanger.
	No	No heat recovery.
	Wheel	Wheel heat exchanger. An analog output to control heat wheel.
	PlateExch	Plate heat exchanger. An analog output to control bypass damper.
	Water	Water heat exchanger. An analog output to control the valve.
	Wheel Inv	Wheel heat exchanger output inverted
	PlateInv	Plate heat exchanger output inverted
	WaterInv	Water heat exchanger output inverted
Heating	No	No heating circuit.
	Yes	Heating register without preheating the register. Analog output for heating valve.
	+PreH OutsideTemp.	Heating register with preheating the register. Analog output for heating valve + pump.
	+PreH FrostTemp.	Heating register with preheating the register. Analog output for heating valve + pump.
Electrical heating		Electric heating register with control type.
	No	No electric heating register.
	Analog	Electric heating register with control via an analog output.
	1Step	1-step electric heating register with control via one analog and one digital output.
	2Steps	2-step electric heating register with control via one analog and two digital outputs.
	3StepsBin	3-step electric heating register with binary encoded control via one analog and two digital outputs.
Cooling		Select cooling register with type.
	No	No cooling register.
	Water	An analog output for the water register valve.
	DX 1Step	One analog and one digital output for 1-step control of a direct expansion evaporator.
	DX 2Steps	One analog and two digital outputs for 2-step control of a direct expansion evaporator.
	DX 3Steps	One analog and two digital outputs (binary) for 3-step control of a direct expansion evaporator.
Humidity control		Humidification and dehumidification.
	No	No humidification and dehumidification.
	Hum	One analog and one digital output for humidifier. Only possible if the room or supply air humidity sensor is enabled.
	DeHum	Dehumidification controller. Only possible when cooling enabled.
	Hum+DeHum	Humidification and dehumidification.
Heating 2	No	No additional heating register.
	Yes	Additional heating register without preheating the register. Analog output for heating valve.
	+PreH OutsideTemp.	Heating register with preheating the register depending on outside temperature. Analog output for heating valve + pump.
	+PreH FrostTemp.	Heating register with preheating the register depending on frost temperature. Analog output for heating valve + pump.

Plant parts and functions, *cont'd*

Name	Range	Explanation
El Heating 2		Electric heating register with control type.
	No	No auxiliary electric heating register.
	Analog	Auxiliary electric heating register with control via an analog output.
	1Step	Auxiliary 1-step electric heating register with control via one analog and one digital output.
	2Steps	Auxiliary 2-step electric heating register with control via one analog and two digital outputs.
	3Steps	Auxiliary 3-step electric heating register with binary encoded control via one analog and two digital outputs.
Cooling 2		Auxiliary cooling register with type.
	No	No auxiliary cooling register.
	Water	An analog output for the auxiliary water register valve.
	DX 1Step	One analog and one digital output for 1-step control of an additional direct expansion evaporator.
	DX 2Steps	One analog and two digital outputs for 2-step control of an additional direct expansion evaporator.
	DX 3Steps	One analog and two digital outputs (binary) for 3-step control of an additional direct expansion evaporator.
Fire damper		Fire dampers
	No	No fire dampers.
	Yes	Feedback signal(s) for fire damper control.
	FollowUnit	Feedback signal(s) for fire damper control. In this case, damper opened with *Unit Start* or closed with *Unit Stop*. This setting only makes sense when the damper also uses shutoff device.
	2-4	Same as *Yes*, but now for 2-4 fire dampers.
	2-4+FolwUn	Same as *FollowUnit*, but now for 2-4 fire dampers.
External setpoint	No	No analog input for connect an external setpoint or an external setpoint compensation.
	Volt	Input for one 0-10 V DC signal.
	Ohm	Input for one 0-2500 Ohm signal.
	QAA27	Input for QAA27.
	BSG21	Input for BSG21 setpoint compensation.
Configuration 1		This parameters enable the plant after successful parameterization. Enable occurs when *Configuration 1*, *Configuration 2* and *Configuration IOs* are completed, i.e. when each has the value *done*.
	NotDone	Plant locked against switching on.
	Done	The plant is unlocked after complete parameterization (*Configuration 2* and *Configuration IOs* also have a value *done*), i.e. it can be switched on.
Restart Required !!	Execute	Reset required with **Execute** after successful parameterization in *Configuration 1*. Assumes the appropriate presettings for *Configuration 2*.

4.5 Configuration 2

Task

The **subfunctions of the plant parts** are determined in *Configuration 2*.

Prerequisite:
Configuration 1 completed with reset.

Note the following items on the process:
– The configuration should be processed in order (i.e. line-for-line).
– *Configuration 2* must be completed with reset prior to starting *Configuration IOs*.

Start

Start page > Main Index
As required, ***Password Enter*** for Level 4, then:
> Configuration > Configuration 2

Name	Range	Function
Free cooling	No Yes	Free cooling Requirement: Free cooling can only be selected if one outside air temperature sensor and one room or extract air sensor is available. The fan kick function is enabled automatically if only one extract air sensor with saving property is available. If the extract air sensor saves values, the stored temperature is used to start free cooling.
Tmp start		Starting the plant in a shut down state based on a room temperature with its own setpoint. Requirement: Function can only be selected if one room or extract air sensor is available. The fan kick function is enabled automatically if only one extract air sensor with saving property is available. If the extract air sensor saves values, the stored temperature is used to start.
	No	Function not enabled.
	Htg	Function enabled for heating only.
	Clg	Function enabled for cooling only.
	Htg+Clg	Function for enabled heating and cooling.
Boost		Plant boost with heating and cooling to a separate setpoint. Requirement: Function can only be selected if one room or extract air sensor is available.
	No	Function not enabled.
	Htg	Function enabled for heating only.
	Clg	Function enabled for cooling only.
	Htg+Clg	Function for enabled heating and cooling.

Configuration 2, *cont'd*

Name	Range	Function
Tmp start/OSSTP blk		Block dampers or extract air fan when the plant is started via boost or temperature differential. Note: The function is implemented for energy considerations. **Caution:** **A bypass damper must exist and be open when the function is enabled. Otherwise, it may damage the plant.**
	None	No block.
	Damper	Dampers remain closed.
	Damper+Fan	Dampers remain closed and only the supply air fan is started.
Damper fdbk	No	No damper feedback.
	One	Feedback for supply air dampers (or a common feedback for both dampers). Digital input for feedback.
	Two	Separate feedback for supply and extract air damper. Two digital inputs for feedback.
Fan steps freq conv		Activation of additional digital outputs depending on the selected fan type.
	1Step	Digital output to enable variable speed drive (always enabled).
	2Steps	An additional digital output for optional wiring depending on fan step 2.
	3Steps	Two additional digital outputs for optional wiring depending on fan step 3.
Flow display		Display flow and possible output.
	No	Function not available.
	l/s	Display of supply air [l/s] and (if enabled) extract air flow. Analog inputs are enabled if not already enabled by the fan control setting.
	m3/h	Display of supply air [m³/h] and (if enabled) extract air flow. Analog inputs are enabled if not already enabled by the fan control setting.
Fan steps type		Required output for fan control relating to settings for fan control mode, *TSP steps* and *Fan steps freq conv*.
	Separated	Digital output for each step. Example: *Fan control mode* = direct / *TSP steps* = 2 / *Extract fan* = Yes → 4 digital outputs: Step 1 and Step 2 each, separated for supply air and extract air fans.
	SepCombine	Separate outputs on the first step, common outputs for additional steps. Example: *Fan control mode* = pressure / *TSP function* = Step+tmp / *TSP steps* = 3 / *Extract fan* = Yes / *Fan steps freq conv* = 3 → 4 digital outputs: Step 1 each as separate variable speed drive enable, two additional outputs open for use (*Fan steps freq conv*) for *Step 2* and *Step 3*.
	Binary	Outputs for the steps are binary coded. The setting is permitted for fan control mode = direct or *directVar*. Example: *Fan control mode* = direct / *TSP function* = Step+tmp / *TSP steps* = 3 / *Extract fan* = Yes → 4 digital outputs: 2 digital output each per fan (*Step 1* = DO1 TRUE; *Step 2* = DO2 TRUE; *Step 3* = DO1 und DO2 TRUE).

Name	Range	Function
Fan alarm		Inputs for fan alarms (e.g. thermal contact). Logical 1 = alarm.
	No	No alarm.
	Combined	Digital input for common alarm.
	Supply	Digital input for supply air fan alarm.
	Extract	Digital input for extract air fan alarm.
	Sply+Extr	Two digital inputs for alarms from supply and extract air fans.
Fan fdbk		Inputs for operating message from the fans (e.g. pressure switch or relay contact). Logical 1 = fan running.
	No	No feedback.
	Combined	Digital input for common operating message.
	Supply	Digital input for supply air fan operating message.
	Extract	Digital input for extract air fan operating message.
	Sply+Extr	Two digital inputs for operating messages from supply and extract air fans.
Fan deviation alm		Setpoint/actual value monitoring of the pressure or flow. An alarm is triggered for deviation over a set period.
	No	No monitoring.
	Supply	Supply air monitoring only.
	Extract	Extract air monitoring only.
	Sply+Extr	Supply and extract air monitoring.
Fan comp room tmp	No	Room-temperature dependent fan compensation.
	Yes	Requirement: A room or extract air sensor is enabled.
Fan comp air quality	No	Air quality-dependent fan compensation.
	Yes	Analog input for the sensor is enabled.
Fan cmp humidity	No	Room humidity-dependent fan compensation.
	Yes	Requirement: Room humidity sensor is enabled.
Fan comp outs tmp	No	Outside air-temperature dependent fan compensation.
	Yes	Requirement: Outside air sensor is enabled.
Fan htg / clg		The fan is further used as a heating or cooling sequence.
	No	No sequential impact on the fan.
	Htg	Only impacts fan during the heating sequence.
	Clg	Only impacts fan during the cooling sequence.
	Htg+Clg	Impact on fan in both sequences.
Tmp stpt selection		Predefined variants for temperature setpoints:
	Htg+Dz	Heating setpoint and dead zone are entered. Cooling setpoint = heating setpoint + dead zone.
	Htg/Clg	Heating and cooling setpoint is entered directly (not for QMX)
	+/- HalfDz	Base setpoint and dead zone is entered. Heating setpoint = base setpoint – half dead zone. Cooling setpoint = base setpoint + half dead zone.
	Clg-Dz	Cooling setpoint and dead zone is entered. Heating setpoint = cooling setpoint – dead zone.

Name	Range	Function
Ext stpt function		Sets whether the external setpoint acts as setpoint compensation or in absolute terms. Value corresponds to the comfort setpoint dependent on the switch *Tmp setpoint selection*. If the switch *Tmp setpoint selection* is on *HtgClgSpv*, the value of the setpoint compensation corresponds to the heating setpoint and the cooling setpoint is calculated from the difference between the entered setpoints for heating and cooling.
	Relative	Setpoint compensation.
	Absolute	Absolute.
Room tmp mix		Selection of room temperature used for control if more than one exists.
	Average	Average.
	Minimum	Lowest temperature.
	Maximum	Highest temperature.
	RoomSnsr1	Room sensor 1.
	RoomSnsr2	Room sensor 2.
	RoomUnit1	Room unit 1
	RoomUnit2	Room unit 2
Room draught limit	No Yes	Limitation to maximum/minimum supply air temperature dependent on room temperature. Requirements: One cascade control is enabled. Function minimizes draughts caused by too large a difference between supply air and room temperature.
Sequence fan clg		Sets sequence of fan sequence and cooling sequence. Requirement: *Fan htg* / *clg* is enabled.
	Fan-Clg	Fan sequence before cooling sequence.
	Clg-Fan	Cooling sequence before fan sequence.
Sequence hrec dampr		Sets sequence for heating register and mixed air dampers during heating. Requirement: Heat recovery damper is enabled.
	Damper-Htg	Mixed air dampers first.
	Htg-Damper	Heating register first.
Deviation alarm Temp		Monitors setpoint/actual value temperature. An alarm is triggered for deviations over a certain period.
	No	No monitoring.
	Supply	Supply air monitoring only.
	Room/Extr	Room temperature monitoring only. Or if available *Extract Sensor*
	Sply+Room/Ex	Supply air and room temperature monitoring.
Su-wi comp tmp	No Yes	Summer/winter compensation of temperature setpoints. Requirement: An outside air sensor must be available.
Heat recovery frost	No	No frost protection function on heat recovery.
	Detector	Frost protection using a detector. Digital input for frost protection monitor.
	TempSensor	Frost protection using a sensor. An analog input for controlled frost protection using a setpoint. Rotation and plates: Outside sensor / water: Water sensor.
	Temp+Dtctr	Frost protection using a sensor and detector. An analog input for controlled frost protection and a digital input for the frost protection monitor.
	PressSnsr	Frost protection using a pressure sensor. An analog input for controlled frost protection using a setpoint.
	Pres+Dtctr	Frost protection using a pressure sensor and detector. An analog input for controlled frost protection and a digital input for the frost protection monitor.

Configuration 2, *cont'd*

Name	Range	Function
Hrec (pump) cmd		Heat recovery with pump. Rotary heat exchanger requiring an enable can enable the pump, for example.
	No	No pump.
	Yes	Pump without pump kick: A digital output for pump.
	Yes+Kick	Pump with pump kick: A digital output for pump and activation of pump kick.
Hrec pump alarm	No	Pump without alarm or feedback.
	Alarm	Pump with alarm. One digital input for the pump alarm: Logical 1 = alarm that immediately shuts down the pump.
	Fdbk	Pump with feedback. One digital input for feedback: Logical 1 = pump running.
	Both	Pump with alarm and feedback. Two digital inputs for pump alarm and feedback.
Hrec alarm	No	No alarm.
	Alarm	Alarm. One digital input for the pump alarm: Logical 1 = alarm that immediately shuts down the recovery wheel.
	Fdbk	Feedback message. One digital input for feedback: Pulse input = wheel operating.
	Both	Pump with alarm and feedback. Two digital inputs for pump alarm and feedback.
Hrec comp air qual		Influences air quality of the mixed air dampers. Requirement: *HrecDamper* is enabled.
	No	No impact.
	Yes	Function enabled: An analog input for the air quality sensor if not already enabled for *Fan comp*.
Hrec clg recovery		Type of cooling recovery for rotary and plate exchangers.
	No	No cooling recovery.
	Temp	Cooling recovery, by temperature difference outside and inside air.
	Enthalpy	Cooling recovery, by heat content difference outside and inside air.
Hrec Damp clg rec		Type of cooling recovery for recirculating air damper.
	No	No cooling recovery.
	Temp	Cooling recovery, by temperature difference outside and inside air.
	Enthalpy	Cooling recovery, by heat content difference outside and inside air.
Hrec efficiency		Calculation for heat recovery efficiency. Requirement: One outside air temperature sensor as well as a extract air sensor must be available.
	No	No calculation of heat recovery efficiency.
	Extr air	To calculate using extract air: One analog input for the exhaust sensor if not already enabled for *Hrec frost*.
	Sply air	To calculate with a supply air sensor: On analog input for the supplemental supply air sensor.

Configuration 2, *cont'd*

Name	Range	Function
Htg frost protect	No	No frost protection.
	Sensor	Frost protection using a sensor. An analog input for controlled frost protection using a setpoint.
	Snsr+2Spv	Frost protection using a sensor and 2 setpoints. An analog input for controlled frost protection using two setpoints for standby and operation.
	Detector	Frost protection using a detector. Digital input for frost protection monitor.
	Snsr+Dtctr	Frost protection using a sensor and detector. An analog input for controlled frost protection and a digital input for the frost protection monitor.
	2Spv+Dtctr	Frost protection using a sensor, 2 setpoints and detector. An analog input for controlled frost protection using two setpoints for standby and operation and a digital input for the frost protection monitor.
Heating pump	No	No heating register pump.
	Yes	Heating register pump without pump kick. Digital output for the pump.
	Yes+Kick	Heating register pump with pump kick. A digital output for pump and activation of pump kick. Pump kick: Pump is switched on for a short period after idling for a longer period. This prevents lock up.
Heating pump alarm	No	Pump without alarm or feedback.
	Alarm	Pump with alarm. Digital input for pump alarm. Logical 1 = alarm, immediately shuts down the pump.
	Fdbk	Pump with feedback. Digital input for feedback (logical 1 = pump running).
	Both	Pump with alarm and feedback. Two digital inputs for pump alarm and feedback.
Combi Coil		A register used for heating and cooling with 2 or 4 pipe connections. Requirement: Heating and cooling with water are enabled.
	No	No *CombiCoil*.
	1Output	Combi coil with a common output. The previously enabled output for cooling valve is disabled.
	2Outputs	Combi coil with two separate outputs.
		Note: The CombiCoil uses only one (heating) physical output for pump control. The cooling pump should always be enabled if it runs for refrigeration demand. Use only heating pump alarm/feedback.
El htg alarm	No	No alarm.
	Yes	A digital input for the alarm is enabled (logical 1 = alarm).
Hum control mode		Select control algorithm for temperature control.
	No	No humidity control.
	Room	Room humidity control only.
	Supply	Supply air humidity control only.
	RmSplyCasc	Room/supply air cascade control. Requirement: Room and supply air humidity sensor is enabled.
Hum control unit		Type of humidity control.
	Relative	Relative humidity control.
	Absolute	Absolute humidity control.
	CascRelAbs	Cascade control with relative room and absolute supply air humidity control.

Name	Range	Function
Hum stpt selection		Predefined variants for humidity setpoints.
	Hum/dehum	Humidification and dehumidification setpoint is entered directly.
	+/- HalfDz	Base setpoint and dead zone is entered: Humidity setpoint = base setpoint – half dead zone. Dehumidification setpoint = base setpoint – half dead zone.
	Hum+Dz	Humidification setpoint and dead zone is entered: Dehumidification setpoint = humidification setpoint + dead zone.
	dehum-Dz	Dehumidification setpoint and dead zone is entered: Humidification setpoint = dehumidification setpoint – dead zone.
Dehum tmp prio		Dehumidification is reduced dependent on the heating output.
	No	Function not enabled.
	Yes	As of 90%, heating valve position reduces dehumidification.
Dew point control	No	Dew point monitoring.
	Yes	Minimum limitation to supply air temperature relating to *Dew point control*.
Hum deviation alarm		Monitors setpoint/actual value of humidification. An alarm is triggered for deviations over a certain period.
	No	No monitoring.
	Room/Extr	Monitors room humidity only.
	Supply	Monitors supply air humidity only.
	Sply+RmEx	Monitors supply air and room humidity.
Humidifier pump	No	No humidifying pump.
	Yes	Humidifying pump without pump kick. Digital output for the pump.
	Yes+Kick	Humidifying pump with pump kick. A digital output for pump and activation of pump kick. Pump kick: Pump is switched on for a short period after idling for a longer period. This prevents lock up.
Hum pump alarm	No	Pump without alarm or feedback.
	Alarm	Pump with alarm. Digital input for pump alarm. Logical 1 = alarm, immediately shuts down the pump.
	Fdbk	Pump with feedback. Digital input for feedback (logical 1 = pump running).
	Both	Pump with alarm and feedback. Two digital inputs for pump alarm and feedback.
Humidifier fdbk	No	Humidifier without feedback.
	Yes	Humidifier with feedback: Digital input for feedback is enabled (logical 1 = humidifier running).
Cooling pump	No	No water cooling pump.
	Yes	Water cooling pump without pump kick. Digital output for the pump.
	Yes+Kick	Water cooling pump with pump kick. A digital output for pump and activation of pump kick. Pump kick: Pump is switched on for a short period after idling for a longer period. This prevents lock up.
Cooling pump alarm	No	Pump without alarm or feedback.
	Alarm	Pump with alarm. Digital input for pump alarm. Logical 1 = alarm, immediately shuts down the pump.
	Fdbk	Pump with feedback. Digital input for feedback (logical 1 = pump running).
	Both	Pump with alarm and feedback. Two digital inputs for pump alarm and feedback.

Configuration 2, *cont'd*

Name	Range	Function
Cooling DX alarm	No	Direct expansion evaporator without alarm or feedback.
	Alarm	Direct expansion evaporator with alarm. Digital input for pump alarm. Logical 1 = alarm, immediately shuts down the pump.
	Fdbk	Direct expansion evaporator with feedback. Digital input for feedback is enabled (logical 1 = pump running).
	Both	Direct expansion evaporator with alarm and feedback. Two digital inputs for alarm and feedback.
Heating 2 frost protect	No	No frost protection.
	Sensor	Frost protection using a sensor. An analog input for controlled frost protection using a setpoint.
	Sensor+2Spv	Frost protection using a sensor and 2 setpoints. An analog input for controlled frost protection using two setpoints for standby and operation.
	Detector	Frost protection using a detector. Digital input for frost protection monitor.
	Snsr+Dtctr	Frost protection using a sensor and detector. An analog input for controlled frost protection and a digital input for the frost protection monitor.
	2Spv+Dtctr	Frost protection using a sensor, 2 setpoints and detector. An analog input for controlled frost protection using two setpoints for standby and operation and a digital input for the frost protection monitor.
Heating 2 pump	No	No pump.
	Yes	Pump without pump kick. Digital output for the pump.
	Yes+Kick	Pump with pump kick. A digital output for pump and activation of pump kick. Pump kick: Pump is switched on for a short period after idling for a longer period. This prevents lock up.
Heating 2 pump alm	No	Pump without alarm or feedback.
	alarm	Pump with alarm. Digital input for pump alarm. Logical 1 = alarm, immediately shuts down the pump.
	fdbk	Pump with feedback. Digital input for feedback (logical 1 = pump running).
	Both	Pump with alarm and feedback. Two digital inputs for pump alarm and feedback.
Heating 2 control		Positioning of additional hot water register.
	StandAlone	Hot water register not integrated in sequence. An additional analog input for one control sensor (if not already enabled for *El Heating 2* or *Cooling 2*).
	Seq H-Heating2	Sequence: First the heater, then heater 2. Note: Only one of the two auxiliary registers (*Heating 2* or *El heating 2*) can be integrated into the sequence prior or after the heater.
	Seq Heating2-H	Sequence: First heater 2, then heater 1.
El heating 2 alarm	No	No alarm.
	Yes	A digital input for the alarm is enabled (logical 1 = alarm).
El Heating 2 control	StandAlone	Electric register not integrated in sequence. An additional analog input for one control sensor (if not already enabled for *Heating 2* or *Cooling 2*).
	Seq H-Heating2	Sequence: First the heater, then electric heater 2.
	Seq Heating2-H	Sequence: First electric heater 2, then heater.

Configuration 2, *cont'd*

Name	Range	Function
Cooling 2 pump	No	No additional water cooling pump.
	Yes	Water cooling pump without pump kick. Digital output for the pump.
	Yes+Kick	Water cooling pump with pump kick. A digital output for pump and activation of pump kick. Pump kick: Pump is switched on for a short period after idling for a longer period. This prevents lock up.
Cooling 2 pump alm	No	Pump without alarm or feedback.
	Alarm	Pump with alarm. Digital input for pump alarm. Logical 1 = alarm, immediately shuts down the pump.
	Fdbk	Pump with feedback. Digital input for feedback (logical 1 = pump running).
	Both	Pump with alarm and feedback. Two digital inputs for pump alarm and feedback.
Cooling 2 Dx alarm	No	Additional direct expansion evaporator without alarm or feedback.
	Alarm	Direct expansion evaporator with alarm. Digital input for pump alarm. Logical 1 = alarm, immediately shuts down the pump.
	Fdbk	Direct expansion evaporator with feedback. Digital input for feedback is enabled (logical 1 = pump running).
	Both	Direct expansion evaporator with alarm and feedback. Two digital inputs for alarm and feedback.
Cooling 2 control		Positioning of additional cooling register.
	StandAlone	Cooling register not integrated in sequence. An additional analog input for one control sensor (if not already enabled for *Heating 2* or *El Heating 2*).
	InSequence	E.g. integrated as second cooling register in the sequence.
Fire damper fdbk		Feedback from fire dampers.
	Closed	Only one feedback for close. Digital input.
	Clsd+Opnd	Two separate feedbacks for open and close. Two digital inputs.
	Combined	Two feedbacks for open and close, but only one signal. The sequence must be correct 1 → 0 → 1 => Close → Movement → Open. A digital input.
	Clsd.Inv	One feedback and inverted signal
Auxiliary input	No	No auxiliary input.
	Input	An additional digital input for display only.
	Alm	An additional digital input with alarm.
	Inp+Alm	Two additional digital inputs. One for display and one with alarm.
Aux tmp sensor	No	No additional analog input.
	Yes	Additional analog input to connect a temperature for display.
Aux TSP output	No	No additional digital output.
	Yes	An auxiliary digital output controller by its own time switch program.
Aux A outp fan	No	No additional analog output.
	Fan	Auxiliary analog output that provides a 0-10 V signal depending on the present fan step.
	AdjDiscrg	AO for adjustable *Fan Jet* (discharger)
Aux op mode indication	No	No additional digital output.
	Yes	An additional digital output, switched dependent on present operating mode (e.g. *Comfort* or *Off*).

Configuration 2, *cont'd*

Name	Range	Function
Configuration 2		This parameters enable the plant after successful parameterization. Enable occurs when *Configuration 1*, *Configuration 2* and *Configuration IOs* are completed, i.e. when each has the value *done*.
	NotDone	Plant locked against switching on.
	Done	The plant is unlocked after complete parameterization (*Configuration 2* and *Configuration IOs* also have a value *done*), i.e. it can be switched on.
Restart Required !!	Execute	Reset required with **Execute** after successful parameterization in *Configuration 2*. Assumes the appropriate presettings for *Configuration IOs*.

4.6 Configuration IOs

4.6.1 General

Task

Configuration IOs encompasses the following activities:

- Assigning **inputs/outputs** to the **hardware** that were determined previously by functions selected in *Configuration 1* and *Configuration 2*.
- Assigning **inputs/outputs** to **Modbus devices** such as frequency drives or pressure module.
- The parameterization of the required **conversion for the sensors** takes place here (e.g. Ni1000; Pt1000; 0-10 V = 0-1000 Pa).

Prerequisite:
Configuration 1 and *Configuration 2* are both completed with one reset.

Distribution of the positions

The distribution of the pin positions on the basis controller and extension module is as follows:

- Basis controller: All single-digit positions, e.g. X1.
- Extension module 1: All positions X1x, DI1x, DO1x, AO1x (e.g. X11, DO14).
- Extension module 2: All positions X2x, DI2x, DO2x, AO2x (e.g. X21, AO23)

The I/Os on the extension modules are available, if the module was enabled in *Configuration 1*.

4.6.2 Start page

Start

Start page > Main Index
As required, ***Password Enter***, then:
> Configuration > Configuration IOs

Line	Range	Go to hardware configuration page for …	Section
Temperatures		… all temperature sensors.	5.6.3
Pressures / flows		… all pressure and flow sensors.	5.6.4
Humidity		… all humidity sensors.	5.6.5
Digital inputs		… all digital inputs without alarm function.	5.6.6
Digital alarms		… all digital inputs with alarm function.	5.6.7
Other		… the air quality sensor and the external setpoint sources.	5.6.8
Outputs damper		… the supply air, extract and fire dampers.	5.6.9
Output fans		… the fans.	5.6.10
Outputs tmp control		… heating, cooling, heat recovery, etc.	5.6.11
Outputs humidifier		… the humidifier.	5.6.12
Outputs auxiliary		… the auxiliary functions.	5.6.13
Outputs alarm		… both alarm outputs.	5.6.14

Line	Range	Function
Configuration IOs		Enables the plant after successful parameterization. Enable occurs when *Configuration 1*, *Configuration 2* and *Configuration IOs* are completed, i.e. when each has the value *done*.
	NotDone	Plant locked against switching on.
	Done	The plant is unlocked after complete parameterization, i.e. it can be switched on.
Restart Required !!	Execute	Reset required with **Execute** after successful parameterization in *Configuration IOs*. Assumes the appropriate presettings for *Configuration IOs*.

4.6.3 Temperatures

Hardware assignments

The listed hard assignments are possible for all temperature sensors.

HW IO	Pos	Type
Supply, Room 1, Room 2, Return, ... , Auxiliary	NUsd, Comm, X1...X8, X11...X18, X21...X28	Pt1k, Ni1k, Ni1kLG, NTC10K, 0-10V T401-402, T411-412, T421-422, T431-432 (Modbus sensors)

Temperature measurements

- Supply air (supply air temperature)
- Room
- Room 2
- Extract air (extract air temperature)
- Outside (outside air temperature)
- Heating frost (0-10 V fix for QAF63 und QAF64)
- Exhaust air (exhaust air temperature)
- Heat recovery water
- Hrec supply (heat recovery supply air temperature)
- Supply 2 (extra supply air temperature, when *Heating 2* or *Cooling 2* are used
- Heating 2 frost
- Auxiliary (additional connectable temperature)

Terminal positions

Position	Explanation
X1...X8	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Comm	Sensor is connected via communication and therefore does not occupy a hardware input. Some sensors can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Sensors may also be enabled in parallel as well (via hardware and communication). The value selector must be set accordingly when enabling via communication (details page *Analog Inputs*, section 8.5 Alarm history).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: *Not configured* (function enabled, but hardware not assigned).

Sensor types

The following sensor types are possible for all temperature sensors:

- Pt1k: Platinum 1000 Ohm
- Ni1k: Nickel 1000 Ohm
- NTC10K: NTC 10 kOhm
- Ni1kLG: Nickel 1000 Ohm LG (Siemens)
- Active sensors 0-10 V
- T401, T402, T411, T412, T421, T422, T431, T432
  (Modbus Address T (T = temperature) 40, position on sensor 1)
  If selected as T40x, the position is changed to *Comm*

The following is available in addition to these settings for the active temperature sensor:

HW IO	Pos.	At 0 V	At 10 V
- Outside Air	NUsd, Comm,X1…X28	-50.0…190.0 °C	-50.0…190.0 °C
Cmn set active Sens			
- All other Sens	NUsd, Comm,X1…X28	-50.0…190.0 °C	-50.0…190.0 °C

4.6.4 Pressures / flows

Hardware assignments

The listed hard assignments are possible for all pressure and flow sensors.

HW IO	Pos	K-factor	Scale (x Pa at 10 V)
Supply pressure	NUsd...X28	---	0...5000
Return pressure	NUsd…X28	---	0…5000
Supply air flow	NUsd…X28	0.00…99.90	0…5000
Extract air flow	NUsd…X28	0.00…99.90	0…5000
Hrec frost pressure	NUsd…X28	---	0…5000

Pressure and flow sensors

New function on these sensor types:
0-10 V, P401, P402, P411, P412, P421, P422, P431, P432
(Modbus address P (P = pressure) 40, position on sensor 1)
If selected as P40x, the position is changed to *Comm*

K-factor

K-factor is used for each fan to calculate the flow out from a pressure sensor. The K-factor is specified for m³/s and are later, in the controller, multiplied with 1000 to get the value in l/s.
Formula: Flow (l/s) = 1 / K-factor * square root of pressure (Pa) * 1000

Terminal positions

Position	Explanation
X1...X8	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Comm	Sensor is connected via communication and therefore does not occupy a hardware input. Some sensors can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Sensors may also be enabled in parallel as well (via hardware and communication). The value selector must be set accordingly when enabling via communication, see section 8.5. Analog inputs).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.5 Humidity

Hardware assignments

The listed hard assignments are possible for all humidity sensors.

HW IO	Pos.	Y1 (humidity at 0 V	Y2 (humidity at 10 V)
Supply	NUsd, Comm,X1…X28	0.0…100.0%	0.0…100.0%
Room	NUsd, Comm,X1…X28	0.0…100.0%	0.0…100.0%
Outside	NUsd, Comm,X1…X28	0.0…100.0%	0.0…100.0%

Terminal positions

Position	Explanation
X1...X8	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Comm	Sensor is connected via communication and therefore does not occupy a hardware input. Some sensors can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Sensors may also be enabled in parallel as well (via hardware and communication). The value selector must be set accordingly when enabling via communication, see section 8.5. Analog inputs.
NUsd	Not used. See explanation table above.

4.6.6 Digital inputs

Hardware assignments

The listed hard assignments are possible for all digital inputs.

HW IO	Pos.
External control 1	NUsd, Comm,X4...X28,D1...D5
External control 2	NUsd, Comm,X4...X28,D1...D5
Emergency stop	NUsd, Comm,X4...X28,D1...D5
Su-wi input	NUsd, Comm,X4...X28,D1...D5
Alarm ackn button	NUsd, Comm,X4...X28,D1...D5
Auxiliary input	NUsd, Comm,X4...X28,D1...D5

Terminal positions

Position	Explanation
X4...X8	Terminals on basis controller.
D1...D5	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Comm	Function is connected via communication and therefore does not occupy a hardware input. Some signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Signals may generally be enabled in parallel as well (via hardware and communication). The value selector must be set accordingly when enabling via communication, see section 8.6.2 Special settings.
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.7 Digital alarms

Hardware assignments

The listed hard assignments are possible for all digital alarms.

HW IO	Pos
Htg frost protect, *Heating pump*...Auxiliary	NUsd, Comm, X4...X28, DI1...DI5

Terminal positions

Position	Explanation
X4...X8	Terminals on basis controller.
D1...D5	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Comm	Function is connected via communication and therefore does not occupy a hardware input. Some signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Signals may generally be enabled in parallel as well (via hardware and communication). The value selector must be set accordingly when enabling via communication, see section 8.6.2 Special settings.
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.8 Other

Hardware assignments

The listed hardware assigned are possible air quality sensor and the external setpoint adjuster/slider.

HW IO	Pos	Scale (at 10 V; 0 V = 0 ppm, fix)
Air quality sensor	NUsd, Comm, X1…X28	0…3000 ppm
External setpoint	NUsd, Comm, X1…X28	---

Note:
Parameterize the *External setpoint* in menu *Unit* > *Inputs* > *Other*.

Terminal positions

Position	Explanation
X4...X8	Terminals on basis controller.
D1...D5	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Comm	Sensor is connected via communication and therefore does not occupy a hardware input. Some sensors can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Sensors may also be enabled in parallel as well (via hardware and communication). The value selector must be set accordingly when enabling via communication (see *Analog inputs*, *Special settings* – section 8.5.2 Special settings).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.9 Outputs: Dampers

Hardware assignments

The listed hard assignments are possible for dampers.

HW IO	Pos.
Outs air damper DO	Q1...Q24
Extr air damper DO	Q1...Q24
Fire damperDO	Q1...Q24

Terminal positions

Position	Explanation
Q1...Q6	Terminals on basis controller.
Q11...Q14	Terminals on extension module 1.
Q21...Q24	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.10 Outputs: Fans

Hardware assignments

The listed hard assignments are possible for fans.

HW IO	Pos.
Modbus Fan	No, Sinamics, Danfoss, EBM-Papst. Those devices get driven via Modbus. In case of EBM-Papst, additional work flow appers after *IO config*.
Supply fan DO1	NUsd, Comm, Q1..Q24
Supply fan DO2	NUsd, Comm, Q1..Q24
Supply fan DO3	NUsd, Comm, Q1..Q24
Extract fan DO1	NUsd, Comm, Q1..Q24
Extract fan DO2	NUsd, Comm, Q1..Q24
Extract fan DO3	NUsd, Comm, Q1..Q24
Supply fan AO	NUsd, Comm, X3...X28, Y1...Y22
Extract fan AO	NUsd, Comm, X3...X28, Y1...Y22

Terminal positions for digital outputs

Position	Explanation
Q1...Q6	Terminals on basis controller.
Q11...Q14	Terminals on extension module 1.
Q21...Q24	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication). → In case a Modbus type of fan or frequence drive is used, Climatix automatically defines the outputs to COM. Depending on the need, those outputs can still be connected to any hardware output.
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

Terminal positions for analog outputs (0...10 V DC)

Position	Explanation
X3...X8	Terminals on basis controller.
Y1, Y2	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
Y11, Y12	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Y21, Y22	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.11 Outputs: *tmpControl*

Hardware assignments

The listed hard assignments are possible for all outputs.

HW IO	Pos
El heating AO	NUsd, Comm, X3..X28, Y1...Y22
El heating DO1	NUsd, Comm, Q1..Q24
El heating DO2	NUsd, Comm, Q1..Q24
Heating AO	NUsd, Comm, X3..X28, Y1...Y22
Heating pump DO	NUsd, Comm, Q1..Q24
Hrec damper AO	NUsd, Comm, X3..X28, Y1...Y22
Heat recovery AO	NUsd, Comm, X3..X28, Y1...Y22
Hrec pump DO	NUsd, Comm, Q1..Q24
Cooling AO	NUsd, Comm, X3..X28, Y1...Y22
Cooling pump DO	NUsd, Comm, Q1..Q24
Cooling DX DO1	NUsd, Comm, Q1..Q24
Cooling DX DO2	NUsd, Comm, Q1..Q24
El heating 2 AO	NUsd, Comm, X3..X28, Y1...Y22
El heating 2 DO1	NUsd, Comm, Q1..Q24
El heating 2 DO2	NUsd, Comm, Q1..Q24
Heating 2 AO	NUsd, Comm, X3..X28, Y1...Y22
Heating 2 pump DO	NUsd, Comm, Q1..Q24
Cooling AO	NUsd, Comm, X3..X28, Y1...Y22
Cooling 2 pump DO	NUsd, Comm, Q1..Q24
Cooling 2 DX DO1	NUsd, Comm, Q1..Q24
Cooling 2 DX DO2	NUsd, Comm, Q1..Q24

Terminal positions for digital outputs

Position	Explanation
Q1...Q6	Terminals on basis controller.
Q11...Q14	Terminals on extension module 1.
Q21...Q24	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

Terminal positions for analog outputs (0...10 V DC)

Position	Explanation
X3...X8	Terminals on basis controller.
Y1, Y2	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
Y11, Y12	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Y21, Y22	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to NUsd and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.12 Outputs: Humidifier

Hardware assignments

The listed hard assignments are possible for all outputs.

HW IO	Pos
Humidifier AO	NUsd, Comm, X3..X28, Y1...Y22
Humidifier DO	NUsd, Comm, Q1..Q24
Humidifier pump DO	NUsd, Comm, Q1..Q24

Terminal positions for digital outputs

Position	Explanation
Q1...Q6	Terminals on basis controller.
Q11...Q14	Terminals on extension module 1.
Q21...Q24	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to NUsd and the following fault issued: Not configured (function enabled, but hardware not assigned).

Terminal positions for analog outputs (0...10 V DC)

Position	Explanation
X3...X8	Terminals on basis controller.
Y1, Y2	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
Y11, Y12	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Y21, Y22	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.13 Outputs: Auxiliary

Hardware assignments

The listed hard assignments are possible for all outputs.

HW IO	Pos
Auxiliary A outp	NUsd, Comm, X3..X28, Y1...Y22
TSP output DO	NUsd, Comm, Q1..Q24
Aux op mode ind DO	NUsd, Comm, Q1..Q24

Terminal positions for digital outputs

Position	Explanation
Q1...Q6	Terminals on basis controller.
Q11...Q14	Terminals on extension module 1.
Q21...Q24	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

Terminal positions for analog outputs (0...10 V DC)

Position	Explanation
X3...X8	Terminals on basis controller.
Y1, Y2	Terminals on basis controller.
X11...X18	Terminals on extension module 1.
Y11, Y12	Terminals on extension module 1.
X21...X28	Terminals on extension module 2.
Y21, Y22	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to NUsd and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.6.14 Outputs, alarms

Hardware assignments

The listed hard assignments are possible for all outputs.

HW IO	Pos
Alarm DO1	NUsd, Comm, Q1..Q24
Alarm DO2	NUsd, Comm, Q1..Q24

Terminal positions for digital outputs

Position	Explanation
Q1...Q6	Terminals on basis controller.
Q11...Q14	Terminals on extension module 1.
Q21...Q24	Terminals on extension module 2.
Comm	This output is connected via communication and therefore does not occupy a hardware input. Some output signals can also be connected via communication (see lists in the documentation on the basics for LON, Modbus, BacNet). Outputs may generally be enabled in parallel as well (via hardware and communication).
NUsd	Not used: The hardware position is not yet selected. The plant is locked against switching on if an enabled sensor is set to *NUsd* and the following fault issued: Not configured (function enabled, but hardware not assigned).

4.7 Fan configuration: EBM-Papst

In case an EBM-Papst (Modbus driven) is selected, this set up appears as next mandatory configuration step.

Task

Climatix AHU is capable to set up EBM-Papst ventilators without additional Modbus tool and therefore the sequence below must be proceed.

Prerequisite:
Configuration 1 and *Configuration 2* are both completed with one reset.
Configuration HW IO and EBM-Papst Modbus device EBM-Papst selected.

Procedure

> Configuration > Fan configuration

Step	Action
1	Connect the Modbus communication cable with EBM *Supply Fan* only.
2	On the Climatix HMI, select *Supply*
3	Climatix controller is going to establish the Modbus communication with the supply fan, set start up parameters, set address to 33 and feedback with *Success*.
4	Connect the Modbus communication cable with EBM *Extract fan*.
5	On the Climatix HMI, Select “Extract”
6	Climatix controller is going to establish the Modbus communication with the *Extract fan*, set start up parameters and set Modbus address 23 and feedback with *Success*.
7	Set the fan configuration from *Success* to *Done* and restart Climatix controller.

Explanation

The Climatix controller is the Modbus master and the EBM-Papst fans are Modbus slaves.
EBM-Papst fan default baud rate is 19200 baud, 1 stop bite and parity even, but it will be set to Climatix Modbus parameter after configuration.

Set up with loaded configuration **Erro**

In case you are using a configured application parameter set, the follow sequence needs to be considered in order to proper address the EBM-Past Fans.

Step	Action
1	Go to *Main index* / *Password enter* (service level)
2	*Configuration* / *Fan Configuration*: Set it to *Not done*
3	Restart Climatix
4	Go to *Configuration* / *Fan Configuration* start the above fan configuration procedure (step 1-7)

EBM-Papst fail save mode **Erro**

Climatix is configuring the EBM-Past fan with a certain fail save mode to define the status, whenever the Modbus communication gets lost.

Fail save: Active
Fail save speed: 0
Fail save Timeout: 5 s if there is no Modbus communication longer than 5 s, fan will stop

4.8 Check I/O configuration

Task

The hardware assigned as per section 4.6 Configuration IOs are checked for the following errors:

- Unassigned points
- Double occupied hardware inputs or outputs

Prerequisite:
Configuration 1 and *Configuration 2* completed with one reset each.

Start

Start page > Main Index
As required, ***Password Enter***, then:
> Configuration > Check config IOs

Line	Range	Function
Not config IO	No Yes	Displays whether there are unassigned I/Os.
1st notconfig IO pos	0, 1, ...	Displays the position of the first unassigned I/O. The associated plant elements are available in the table in appendix 10.3.
Doubled config IO	No Yes	Displays whether hardware input or outputs are occupied in duplicate.
Doubled config IOs		Displays positions of the first double occupancy. The associated plant elements are available in the table in appendix 10.3.
Doubled config IO pos	XO1...XO28	Displays the first double occupied input or output (exception: DO).
Doubled config DO pos	Q1...Q24	Displays first double occupied DO.
Not used xIO	0... [pcs]	Displays number of unused universal inputs/outputs.
Not used DI	0... [pcs]	Displays the number of unused digital inputs.
Not used AO	0... [pcs]	Displays the number of unused analog outputs.
Not used DO	0... [pcs]	Displays the number of unused digital outputs.

4.9 Wiring test

Task

To verify and check the correct panel wiring, the controller can be set into *wiring test*, where all input values will be showed and all outputs can be forced.

Prerequisite:
Configuration 1 and *Configuration 2* completed with one reset each.

Start

Start page > Main Index
As required, ***Password Enter***, then:
> Configuration > Set IO to

Overview on outputs and inputs shows the values.

Important:
The wiring test needs to be disabled to run the unit:
> Configuration > Set IO to: Auto

4.10 Integrations

Task

There are certain additional configurations possibilities for room unit or energy meter device.

- Climatix Room unit POL82xx
- Energy meter EM24

Configuration

***Main Index >Configuration* > Integrations**

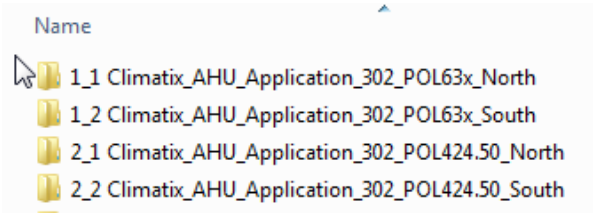
Name	Range	Function
+Room units	1 sensor 2 sensor 1 RU 1snsr + RU 2 RU	Inputs for room temperature sensors. You can select whether to apply maximum, minimum, average or individual value for control for more than one sensor in *Configuration 2*. When selecting *1 RU*, *1snsr + RU* or *2 RU*, the interface to the room unit connection is enabled.
Settings		Goes to page with all settings relevant to parameterizing room units.
Inputs		Go to page with temperature inputs.
+Energy meter EM24	No Yes	No energy meter selected.
Settings		Go to page with all parameterization for the energy meter or the RS-485 Modbus settings.
Inputs		Go to page with energy inputs.

4.11 SD card functions **

Available on controllers **POL63X** or **POL4xx.5x.**

Overview

The controllers have an SD card slot (formatted to FAT32).
The SD card files are ready prepared in Climatix AHU deployment (controller type and geographical region (languages).



SD card functions include

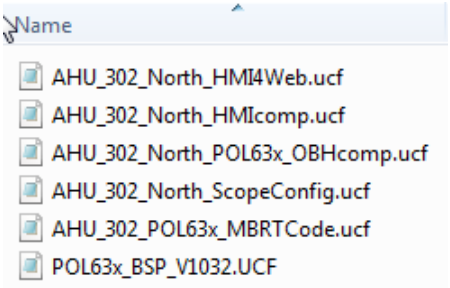
- **Download application**:
  - Operating system (XXX_BSP_V10x.ucf).
  - Applications software (MBRTcode.ucf).
  - HMI operating software (HMIcomp.ucf).
  - Web HMI operating software (HMI4Web.ucf).
  - Language and communication information (OBHcomp.ucf).
  - Scope light configuration software(ScopeConfig.ucf)
- **Download basic configuration**:
  - Plant configuration including parameter (Param.bin or Param.ucf).
- **Upload application** (*Save*, upload):
  - Plant configuration including parameter (Param.bin or Param.ucf).

Download application

Requirements

The function updates/upgrades the controller.
– The files for download must be unzipped in the root folder on the SD card.
– All files must be *.UCF and compressed where possible (XXXcomp.ucf).

Files on the SD card



Procedure

Conduct the following steps to download:

Step	Action
1	Insert card into the controller.
2	Turn off power.
3	Using a thin object press the button in the hole next to the controller status display (noticeable, light resistance and a slight clicking sound) and keep pressed.
4	Turn on power.
5	Wait until the LED flashes red and green.
6	Release the button.
7	Wait until the LED is orange.
8	Turn off / on power.

Upload and download parameters

You can save the set parameters and configurations on the SD card after successful commissioning and adjustment.
For example, you can use is to download to another controller with the same basic configuration (operating system, application, HMI, HMI4Web and language/communications).
Requires level 4.

Procedure

The steps to up and download the configuration:

Step	Action
1	Insert empty SD card in the controller.
2	Saves data on the SD card (upload): **Main Index > System overview > Save / restore > Config save SD = Execute**
3	Wait until: **Main Index > System overview > Save / restore > Config save SD = Done**
4	Insert card into the next controller.
5	Download data from the SD card: **Main Index > System overview > Save / restore > Config load SD = Execute**
6	Wait until: **Main Index > System overview > Save / restore > Config load SD = Done**
7	Restart controller: **Main Index > System overview > Save / restore > Restart Required !! = Execute**

4.12 Auto update with SD card

Auto update features

Climatix AHU application V3xx is supporting the end user with automatic upgrade features using SD card:

- Load BSP and application files
- Save parameter setting to SD card
- Load parameter setting from SD card.

The detailed procedures are described below and has to be used depending on the actual need.
The existing workflow via HMI is still supported.

SD card lock / unlock

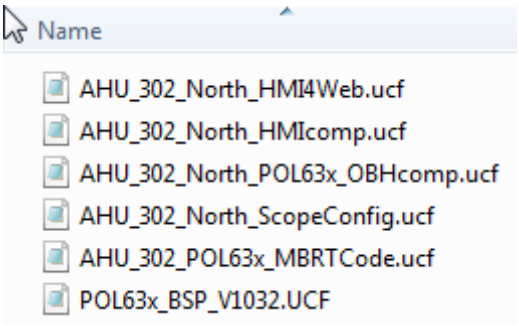
Every SD card can be locked (read only) or unlocked (read/write).

This needs to be considered fort he described workflow.

Load BSP and application files

Even at factory time or even in the field, an upgrade of the controls system is requested.
It is important to know, before upgrade controls system, a parameter back up is recommend to keep the original parameter settings (see save parameter file to SD card, load parameter file from SD card.

SD card preparation (example AHU V302)
Copy all the necessary files on SD card root folder.



Procedure

1. Lock the SD card
2. Repower controller (SD card out), wait until BSP LED lighting green.
3. Insert SD card ← In → Out ← In (within 30 s), upgrade process starts (*wait 1 s at each step, but not more than 5 s in total)
4. The process will start with a restart of the controller and BSP LED will indicate the upgrade procedure by red/green blinking.
5. If BSP LED is yellow or OFF, please repower (manually) controller and wait till BSP LED is green.

Save parameter to SD card

In case a control system needs to be upgraded, the existing parameters (commissioning settings shall be back up).

Procedure

1. SD card unlock
2. SD card ← In → Out ← In, save parameter to SD card process start (*wait 1 s at each step, but not more than 5 s in total).
3. The BUS LED turns red and the controller is now saving the param.ucf (and param.bin) to the SD card.
   The BUS LED is indicating the export process.
4. If BUS LED is off, the save parameter to SD card process has finished.

Load parameter from SD card

After for example an upgrade, it is requested to load the original parameter files from SD card.

Procedure

Please make sure, a valid param.ucf (file name does not matter)is on the SD card available.
Please make sure to have only one param.ucf in the root folder.

1. SD card lock.
2. Insert SD card and repower the controller to initialize the procedure.
3. The controller BUS LED is indicating (red on) the loading process.
4. After load process is completed, controller is saving the parameter setting to factory setting and makes a restart.
5. Please remove the SD card, otherwise the controller will start the procedure again.

Hints

- Load firmware and application files can be started 30 s after startup.
- The loaded parameter file will be saved in OEM factory store and generate a restart of the controller.
- Auto update via SD card only works with AHU V302 or greater.

4.13 Backup/restore parameters **

4.13.1 Options

The SD card functions are available on **POL63X** and **POL4xx.5x** controllers.

Entire plant files (Param.bin)

The functions *Backup/restore parameters* offers the following for entire plants:

- A fully configured and parameterized plant can be backed up on an SD card or loaded on the controller from the card
- Two different parameter sets for an identically configured plant can be backed up on the controller and restored.
  For example, a back up after parameterizing the standard parameters at the factory (*Par factory save*) and a backup after commissioning the plant (*Par service save*)

Individual data sets

Commands are available for alarm history and internal archiving:

– Archive (data points)
– Alarm snapshot with history
– Trace (communication)

The actions listed below only possible at access level 4.
The command *Sett.factory save* is an exception.

4.13.2 Execute commands

Command sequence

Main Index > System overview > Save / load

Name	Range	Function
Settings load ← SD		Loads configuration file (Param.bin) with the plant configuration and all parameters from the SD card to the controller. A reset required after download! Caution: The **Main Index > Configuration > Configuration 1 = Not done** must be set prior to fully downloading a new configuration (only possible if the plant is not operating)
	– ✓ – Execute	– Passive position. – Execute download. *Done* is displayed as soon as the load process is completed.
Restart Required !!		Restart after downloading parameters.
	– ✓ – Execute	– Passive position. – Reset. The controller operate using the configuration loaded from the SD card.
Settings save → SD		Backs up present plant configuration with all parameters on the SD card:
	– ✓ – Execute	– Passive position. – Run backup. *Done* is displayed in the same line. The SD card can now be removed. An existing parameter file (Param.bin) is overwritten on the card.

Execution commands,
cont'd

Name	Range	Function
Set appli.default	– ✓ – Execute	Download configuration with all parameters per the overall standard program loaded at the factory. Requires complete re-commissioning! – Passive position. – Download. Display returns to ✓.
Sett.service load	– ✓ – Execute	Downloads parameter files from commissioning. – Passive position. – Download. Display returns to ✓.
Sett.factory load	– ✓ – Execute	Downloads parameter files from factory. – Passive position. – Download. Display returns to ✓.
Sett.service save	– ✓ – Execute	Saves parameter files from the commissioning to the controller. – Passive position. – Save. Display returns to ✓.
Sett.factory save	– ✓ – Execute	Saves parameter files from factory. – Passive position. – Save. Display returns to ✓.
A-snapshot save → SD	– ✓ – Execute	– Exports snapshots, alarm history and event history – Passive position. – Execute. Display returns to ✓. – Exported data is not deleted.
Archive save → SD	– None – Full – Mth – Wk – Now	– Export of internal archive to the SD card. – No export to SD card – Export if internal storage is full. – Export monthly + if full. – Export weekly + if full. – Export. Display returns to ✓. – Exported data is not deleted.
Trace save → SD	– ✓ – Execute	– Passive position. – Execute. Display returns to ✓.
BSP load	– ✓ – Execute	– Passive position. – Execute Caution: Stop the controller and load the BSP + application file located on the SD card).

5 Function description
5.1 Overview

Introduction

The previous section 4 Configure application explains the entire workflow for configuring and parameterizing the Climatix AHU application and describes the configuration process in accordance with the plant at hand in three main steps.
The application automatically assigned appropriate basic values to the selected functions.
These values are displayed in the corresponding HMI menus.

Knowledge provided

Automatically assigned functions and basic values can be changed as needed.

This section provides the information to this end, specifically:
- Short description of all available standard functions including parameters and ranges
- Detailed explanations of the individual functions

Topic

The topics in the section are:

Topic	Section
Higher functions	6.2
Operating mode	6.3
Damper control	6.4
Fan control	6.5
Temperature control	6.6
Heat recovery with mixed air damper	6.7
Heat recovery with heat exchanger	6.8
Heating/heating 2 **	6.9
Electric register/electric register 2	6.10
Cooling/cooling 2 **	6.11
Humidity control with POL63X	6.12
Dehumidification control with POL42X	6.13
Air quality control **	6.14
Auxiliary functions	6.15
Alarm troubleshooting (alarm outputs)	6.16

** Applies to POL63X only

5.2 Higher functions
5.2.1 About this section

Introduction

The section *Higher functions* deals with functions that impact the entire application.

Elements

The image below illustrates the participating plant elements using symbols:

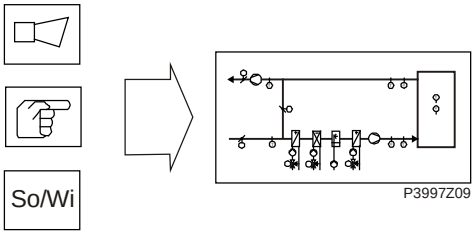


Figure 20: Overview of the plant elements using symbols

Topic

The topics in the section are:

Topic	Section
General parameters	6.2.2
Calculation for Summer/winter changeover	6.2.3

5.2.2 General parameters

Table of contents

This section describes the functions of general parameters.

Prerequisites

None

Parameter

Main Index > Global functions

Name	Range	Function
Su-Wi calculation	– Summer – Winter	Displays present status for summer and winter operation. Go to page to parameterize summer/winter changeover.
Manual mode		Displays whether one of the outputs is not in auto mode (intervention via HMI), a sensor is out of service or the manual operation mode is not on auto. Go to page with all digital inputs, e.g. to set the alarm class for enabled manual alarm.
	– Auto – Manual	– Auto mode: No element in manual mode or out of service. – Manual mode: At least one element is in manual operation or out of service.
Enable manual alarm		Enables an alarm if when Manual mode = manual.
	– No – Yes	– No alarm trigger. – Alarm trigger.

5.2.3 Calculation for Summer/Winter changeover

Prerequisite

None.

Function

It decides whether the plant is in summer or winter operation based on various options (hardware input, date, temperature).
This information is required (as an option) to shut down humidification in summer, to changeover the combi coils and to changeover temperature control (*Tmp control mode* = *RmSplyC Su* or *RtSplyC Su*).
You can also disable heating in summer and/or cooling in winter.
A hardware input enabled for the changeover (**Main Index > Configuration > Configuration 1 > Su/Wi input = Yes**) has the highest priority (signal 1 = summer).
The *SummerHeating* and/or *WinterCooling* function was enabled here as well.
The temperature or date can affect the changeover depending on parameterization.
Both criteria must be met when both are enabled.
There is no changeover and the plant in continuously in winter operation when no criterion is enabled.
Winter mode if outside sensor is in alarm.

Parameter

Main Index > Global functions > Su/Wi calculation

Name	Range	Function
State	– Winter – Summer	Status of summer/winter changeover: – Winter operation is enabled. – Summer operation is enabled.
Su/Wi input	– Winter – Summer	Status of input on hardware side for changeover. Go to page with all digital input settings. For example, you can change the input's direction of control there. – Winter operation enabled: Signal 0. – Summer operation enabled: Signal 1.
Outs air tmp damped		Damped outside air temperature.
Summer date / time	*.* *:*	Set date and time for changeover to summer operation. Example: 23:30 01. Apr → Changeover on April 1 at 11:30 pm. – Asterisks only (*.* *:*): Changeover date is not relevant; changeover occurs based on temperature. – Permissible time entries: *:* → 00:00 *:20 → 00:20 10:* → 10:00. – Date entry: Allowed: 15. May Not allowed by month: Odd / Even.
Winter date / time	*.* *:*	Set date and time for changeover to winter operation. Example: 10:40:00 PM 01. Oct → Changeover on October 1 at 10:40 pm. Note: See summer date / time
Time constant	0…36000 [h]	Time constant to calculate dampened (determined over this period) outside air temperature. Set this value for the short period to 0 to reset the dampened or assume present outside air temperature.
Outs air tmp summer	-64...64 [°C]	Changes over to summer operation when the damped outside air temperature is greater than this value.
Outs air tmp winter	-64...64 [°C]	Changes over to winter operation when the damped outside air temperature is less than this value.

5.3 Operating mode.
5.3.1 About this section

Introduction

This section discusses the following topics:
- Elements and settings that determine present operating mode
- Operating diagram
- Special *Operating modes* (section 6.3.6 to 6.3.9).

Elements

The image below illustrates the participating plant elements using symbols:

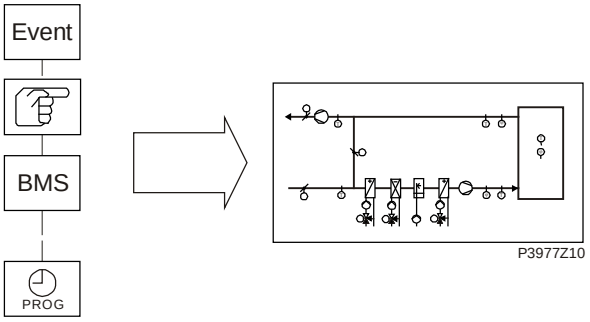


Figure 21: Overview of the plant elements using symbols

Topic

The topics in the section are:

Topic	Section
General	6.3.2
Operating diagrams	6.3.3
Scheduler	6.3.4
External control	6.3.5
Duct temperature, kick function	6.3.6
Free fan cooling	6.3.7
Temperature difference start	6.3.8
Boost function	6.3.9

5.3.2 General

Purpose

Present operating mode and reason for it:
- Start conditions (configured)
- Switch off conditions (alarms, defects)
- Operating mode (scheduler, special operating modes, or manual interventions)

Example

For *Actual Operating Mode* you can intervene manually via the HMI to specify the operating mode.
The display *Operating State* (a line lower) changes the status to *Manual* accordingly.
You can also intervene manually using a switch, room unit, or BMS.
If these types of devices are overridden, the *Operating State* is set accordingly (e.g. to *RoomUnit*).

Prerequisites

None

Parameterization

None.
The configuration in *Configuration1* and *Configuration2* provide the various ways to switch on the plant.

Displays/settings

Main Index > Unit > Operating Mode

Name	Range	Function
Actual Operating Mode		Plant operating mode:
	– Off	– Plant is switched off.
	– On/Comfort	– Plant operating in *Comfort mode*.
	– Economy	– Plant operating in *Economy mode*.
Operating state		Plant operating state:
	– Configuration	– Plant is configured.
	– Fire	– Plant in fire mode (depending on the parameterization of *Fire mode*).
	– Alarm Danger	– Plant stopped and locked.
	– Emergency Stop	– Plant stopped and locked.
	– Alarm Critical	– Plant stopped and locked.
	– Fire damper Test	– Fire damper test running.
	– Manual	– *Operating mode* preset by HMI.
	– Extern	– *Operating mode* preset by external source.
	– RoomUnit	– *Operating mode* preset by room unit.
	– Boost	– Boost function operating.
	– Unoccupied Htg/Clg	– Plant operating for building protection.
	– Free cooling	– Fan cooling.
	– BMS	– *Operating mode* preset by BMS.
	– TSP	– *Operating mode* preset by scheduler.
	– Duct Temp	– Night kick active to update duct temperature.
	– Calendar	– *Operating mode Off* preset by calendar.

Displays/settings, *cont'd*

Name	Range	Function
Manual operation		Manual plant operation via HMI (only possible for *Tsp function* ≠ *Steps+Tmp*).
	– Auto	– Auto mode: Time switch catalog, free cooling, etc., can switch on the plant.
	– Off	– Plant off.
	– Stage 1	– Plant operating in stage 1 (using setpoint stage 1 for analog controlled plants).
	– Stage 2	– Plant operating in stage 2 (using setpoint stage 2 for analog controlled plants).
	– Stage 3	– Plant operating in stage 3 (using setpoint stage 3 for analog controlled plants).
	– Eco St1	– Plant operating in *Economy* at stage 1 (using setpoint stage 1 for analog controlled plants).
	– Comf St1	– Plant operating in *Comfort mode* at stage 1 (using setpoint stage 1 for analog controlled plants).
	– Eco St2	– Plant operating in *Economy* at stage 2 (using setpoint stage 2 for analog controlled plants).
	– Comf St2	– Plant operating in *Comfort mode* at stage 2 (using setpoint stage 2 for analog controlled plants).
	– Eco St3	– Plant operating in *Economy* at stage 3 (using setpoint stage 3 for analog controlled plants).
	– Comf St3	– Plant operating in *Comfort mode* at stage 3 (using setpoint stage 3 for analog controlled plants).
Time switch program	– Off – Stage 1…Stage 3 – Eco – Comf	Displays current command for time switch catalog (for *Tsp function* = *Steps only*). Jumps to page to parameterize time switch catalog.
From BACS		Displays plant command from BMS (for *TspFunction* ≠ *Steps+Tmp* only). The value may also be operated using HMI even when communication not connected.
	– Auto	– Auto mode: Time switch catalog, free cooling, etc., can switch on the plant.
	– Off	– Plant off.
	– Stage 1	– Plant operating in stage 1 (using setpoint stage 1 for analog controlled plants).
	– Stage 2	– Plant operating in stage 2 (using setpoint stage 2 for analog controlled plants).
	– Stage 3	– Plant operating in stage 3 (using setpoint stage 3 for analog controlled plants).
	– Eco St1	– Plant operating in *Economy* at stage 1 (using setpoint stage 1 for analog controlled plants).
	– Comf St1	– Plant operating in *Comfort mode* at stage 1 (using setpoint stage 1 for analog controlled plants).
	– Eco St2	– Plant operating in *Economy* at stage 2 (using setpoint stage 2 for analog controlled plants).
	– Comf St2	– Plant operating in *Comfort mode* at stage 2 (using setpoint stage 2 for analog controlled plants).
	– Eco St3	– Plant operating in *Economy* at stage 3 (using setpoint stage 3 for analog controlled plants).
	– Comf St3	– Plant operating in *Comfort mode* at stage 3 (using setpoint stage 3 for analog controlled plants).

Displays/settings, *cont'd*

Name	Range	Function
External control	– Auto – Off – Stage 1 – Stage 2 – Stage 3	Displays current plant command from hardware plant switch. – Auto mode: Time switch catalog, free cooling, etc., can switch on the plant. – Plant off. – Plant operating in stage 1 (using setpoint stage 1 for analog controlled plants). – Plant operating in stage 2 (using setpoint stage 2 for analog controlled plants). – Plant operating in stage 3 (using setpoint stage 3 for analog controlled plants).
Room unit op mode	– Auto – Comfort – Standby – Economy	Displays present plant command from room unit – Auto mode: Time switch catalog, free cooling, etc., can switch on the plant. – Plant operating in Comfort Mode. – Plant is in standby. – Plant operating in Economy Mode.
Fan kick exh tmp	---	Starts plant to update sensor values for return-air controlled plant and activated free cooling or *UnitStart TmpDelta*. (Temperature difference start). Jumps to page to parameterize night kick.
Free cooling	---	Free cooling. Goes to page to parameterize free cooling.
Tmp start	---	Starts plant at switched off state based on temperature difference. Jumps to page to parameterize temperature difference start.
Boost	---	Boost plant start. Jumps to page to parameterize boost plant start.
Power up delay	0…36000 [s]	Delayed plant start after controller restart.

5.3.3 Operating diagrams

Table of contents

This section includes the operating diagram for:

- Operating modes
- Start sequence
- Fire alarm
- Stop

Operating modes

Display of various operating modes:
Disabled functions and elements are ignored.

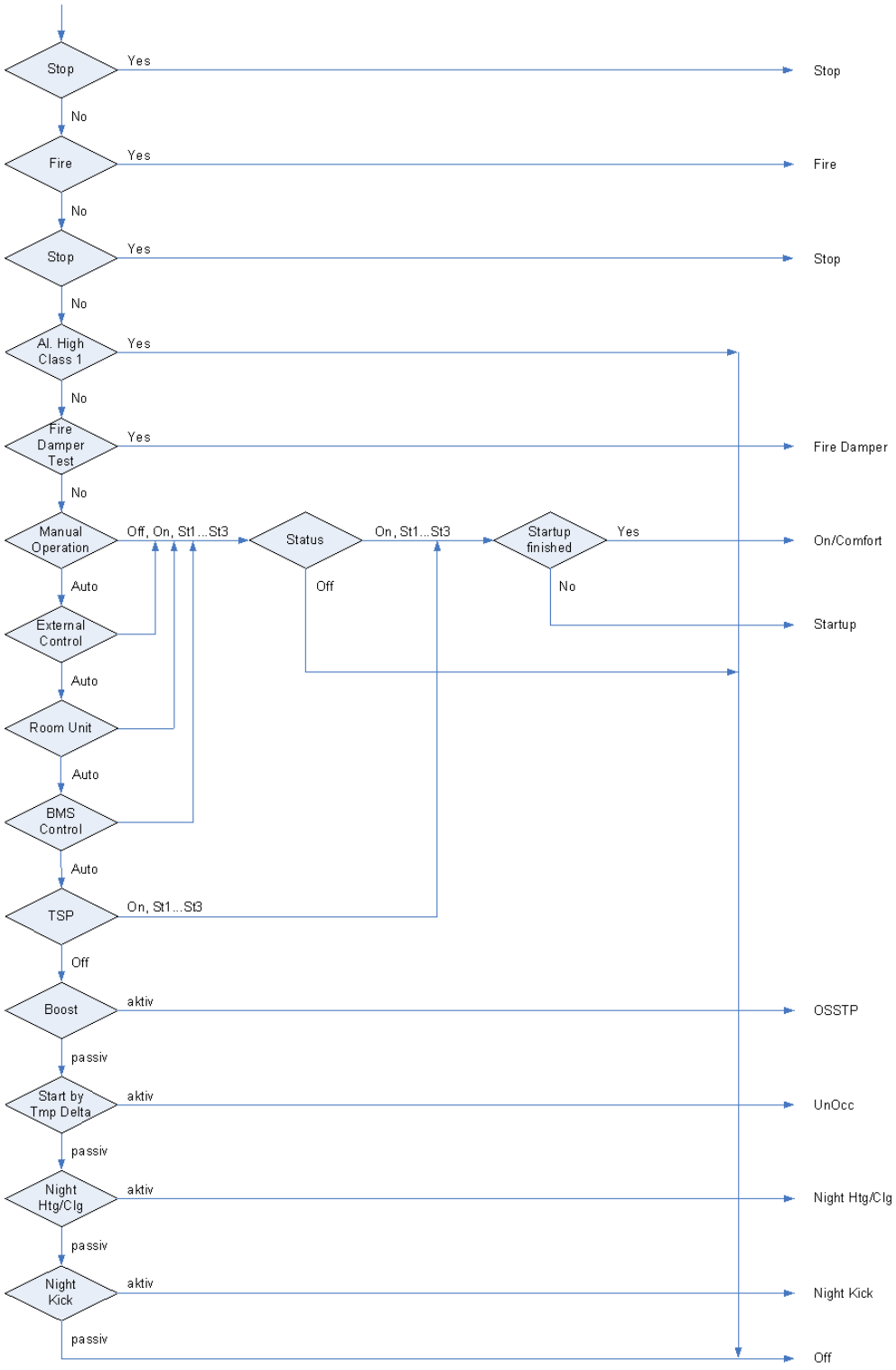


Figure 22: Operating diagram: Operating mode

Start sequence

Plant start sequence. Disabled functions and elements are ignored.

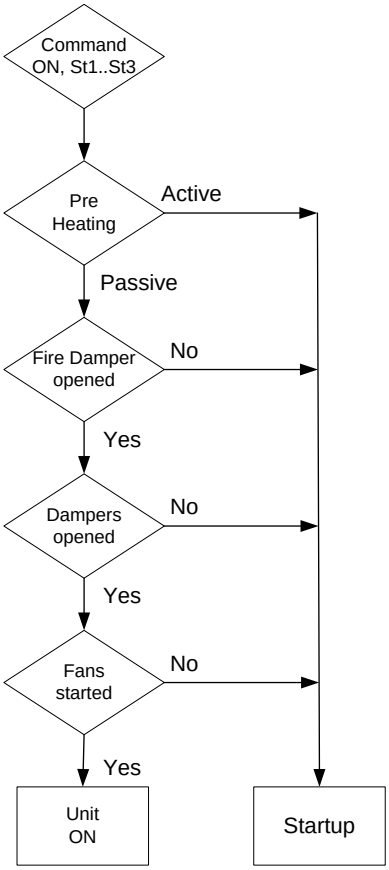


Figure 23: Operating diagram: Start sequence

Fire alarm

Conditions to trigger a fire alarm.

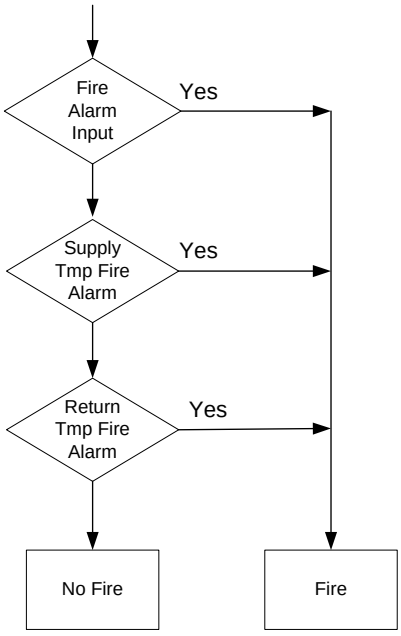


Figure 24: Operating diagram: Fire alarm

Stop

Conditions that stop the plant:

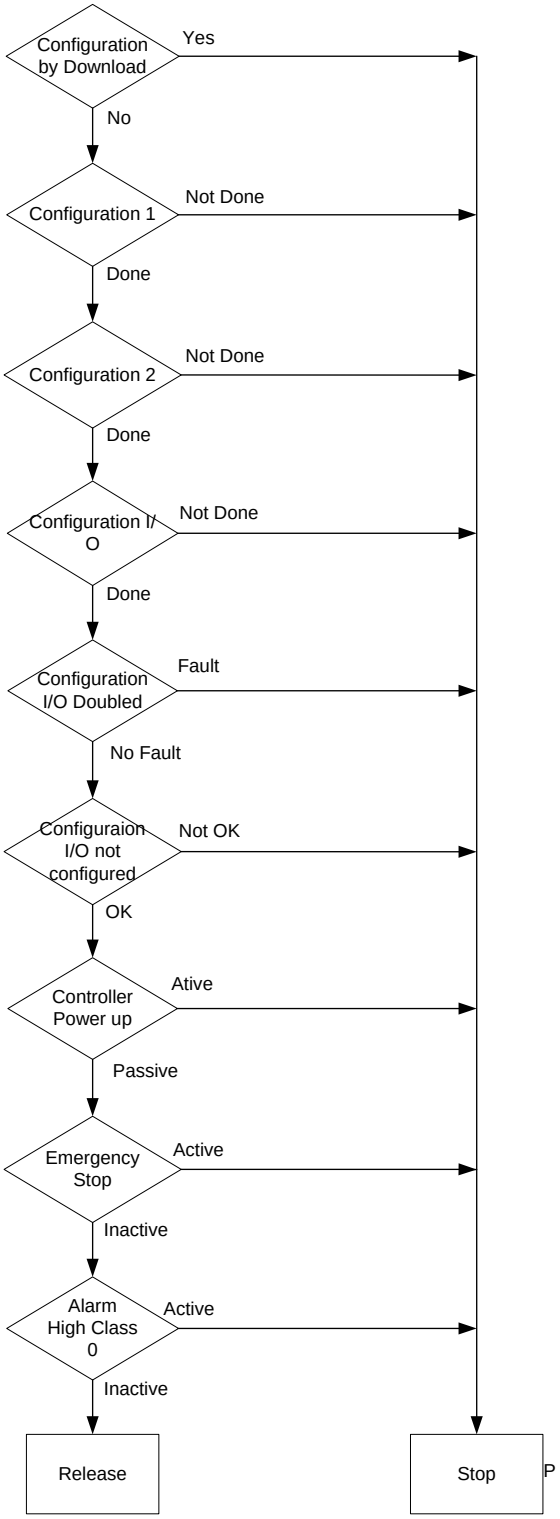


Figure 25: Operating diagram: Stop

5.3.4 Scheduler

Prerequisite

A time switch catalog is enabled:
Main Index > Configuration > Configuration 1 > TSP function ≠ No

Function

The plant is controlled via the time switch program.

Parameter

Main Index > Unit > Operating mode > Time switch program

Name	Range	Function
Schedule	– Off – Stage1…Stage3	Present plant operating mode from the time switch catalog for *Tsp function* ≤ *Steps*. Goes to details page to parameterize time switch catalog.
Schedule	– Off – Eco St1…Eco St3 – Comf St1…Comf St3	Present plant operating mode from the time switch catalog for *Tsp function* = *Steps*+*Tmp*. Goes to details page to parameterize time switch catalog.
Calendar exception	– Passive – Active	Calendar enable exception day. An enabled entry executes the daily switching operations for exception days. Goes to details page to parameterize time switch catalog.
Calendar fix off	– Passive – Active	Additional calendar to switch off the plant. Goes to details page to parameterize second calendar.

5.3.5 External control

Purpose

Here is where the actual plant switch for the AHU unit is configured, i.e. determines whether the plant is switched via an external plant switch, a presence detector, or via a scheduler.

Prerequisite

The external plant switch is enabled:
Main Index > Configuration > Configuration 1 > Ext control input ≠ None

For *Tmp stpt's* it needs the *TSP function Step+Tmp*:
Main Index > Configuration > Configuration 1 > TSP function = Step+Tmp

Function

Plant operation via external plant switch, presence detectors or buttons (*Ext control input* 1, *Ext control input 2*).
The plant can be switched to auto mode, a set stage or to off depending on parameterization and configuration.
The command defaulted here is only enabled when no higher priority command is not active, e.g. manual operation via HMI is enabled.

Parameter

Main Index > Unit > Operating mode > External control

Name	Range	Function
Actual mode	– Auto – Off – Stage 1 – Stage 2 – Stage 3	Actual plant operating mode as triggered by the plant switch. – Auto mode: Time switch catalog, free cooling, etc., can switch on the plant. – Plant off. – Plant operating in stage 1 (using setpoint stage 1 for analog controlled plants). – Plant operating in stage 2 (using setpoint stage 2 for analog controlled plants). – Plant operating in stage 3 (using setpoint stage 3 for analog controlled plants).
Tmp stpt input 1	– Comfort – Economy	Applied temperature setpoint at the active input *Ext control input 1*; enabled only for *Tsp function = Steps+Tmp*. – Comfort setpoint. – Economy setpoint. Note: The present temperature setpoint is determined by the value from *Tmp stpt input 2* if both inputs are enabled.
Tmp stpt input 2	– Comfort – Economy	Applied temperature setpoint at the active input *Ext control input 2*; enabled only for *Tsp function = Steps+Tmp*. – Comfort setpoint. – Economy setpoint. See not for *Tmp stpt input 1*!
Off delay	0…23.0 [h]	Switch-off delay. Plants goes to auto mode after the delay. Notes: – Off delay = 0 → the present command is pending as long as the impacted input is enabled. This is mandatory for plant switches. – Off delay > 0 → is used exclusively for external buttons or presence detectors that requires resetting the plant to auto mode after a set period.

Name	Range	Function
Fan steps		Select fan step:
	– 3Step	– Plant operating in stage 3 (using setpoint stage 3 for analog controlled plants).
	– 2Step	– Plant operating in stage 2 (using setpoint stage 2 for analog controlled plants).
	– 1Step	– Plant operating in stage 1 (using setpoint stage 1 for analog controlled plants).
	– Off	– Plant off.
	– Auto	– Auto mode.
Start/stop function		Define input functions:
	– Off	– Each pulse on the input start the *Timer Off delay*.
	– On	– The first pulse on the input starts the *Timer Off delay* and sets the command. The next pulse resets to auto mode. The same applies when the timer expires.

Fan steps function

- **Main Index > Configuration > Configuration 1 > Ext control input = *One*** → Only input *Ext control input 1* is enabled.
  The command set with fan steps is issued when *Ext control input 1* = *On*.

- **Main Index > Configuration > Configuration 1 > Ext control input = Two** → Both inputs *Ext control input 1* and *Ext control input 2* are enabled.

  In this case:
  - *Ext control input 1* = *Off* and *Ext control input 2* = *Off* → *Command* = *Auto mode*.
  - *Ext control input 1* = *Off* and *Ext control input 2* = *Off* → *Command* = *1Step*.
  - *Ext control input 1* = *Off* and *Ext control input 2* = *On* → *Command* = *2Step*.
  - *Ext control input 1* = *On* and *Ext control input 2* = *On* → Command as determined by fan step.

Start/stop function and off delay

- Start/stop function = *Off* and *Off delay* = 0 → the command is issues as long as the signal is pending.

- Start/stop function = *Off* and *Off delay* > 0 → the command is issued during the off delay period for a pulse at the input.
  The timer restarts for each new pulse on the input.

- Start/stop function = *On* and *Off delay* = 0 → the command is issued for a pulse on the input and then reset against at the next pulse.

- Start/stop function = *On* and *Off delay* > 0 → the command is issued for a pulse on the input and then reset against at the next pulse or after the off delay period.

5.3.6 Duct temperature, kick function

Prerequisite

Function automatically enabled when the following conditions are met:
– Non room sensor available and
– the *Extract tmp sensor* is not parameterized as saved and
– free cooling or start is enabled based on the temperature difference:

Main Index > Configuration > Configuration 1 > Room tmp sensor = *No*
and
Main Index > Configuration > Configuration 1 > Ext air tmp sensor = Yes
and
Main Index > Configuration > Configuration 2 > Free cooling = Yes
Main Index > Configuration > Configuration 2 > Tmp start ≠ No

Function

Plant kick ramps up the plant after a longer period of in operation to update the measured extract temperature in the duct.
This temperature is used as the decision-making criterion to start free cooling or temperature difference start and should be kept updated as much as possible.

Parameter

Main Index > Unit > Operating mode > Fan kick exh tmp

Name	Range	Function
Kick time	00:00...23:59	Time to execute kick. Example: 23:00 Kick is run at 11:00 pm. *:* Time is not relevant; the interval applies accordingly.
Interval time	0.0…36000.0 [h]	Interval time to execute kick. Example: 3.0 Run every 3 hours. 0.0 Interval is not relevant; kick time applies accordingly.
On time	0...36000 [s]	Kick period.

Example

Kick time = 23:00 / interval time = 3 / on time = 300.
→ The plant is switched-on for 300 seconds if the plant has been off for at least 3 hours as of 11:00 pm.

Kick time = *:* and interval time = 0.0 h → no plant kick is triggered.

5.3.7 Free cooling

Purpose

Free fan cooling (subsequently referred to as free cooling) cools down a building at night using cool outside air without auxiliary energy for high daytime temperatures.

- Free cooling is **switched on** in the following cases:
  - Outside air temperature is greater than the lower level: *Out tmp* > *Min outs tmp*
    and
  - outside air temperature is less than the difference from room temperature and switch-on differential: *Out tmp* < *Room tmp* - *Delta*
    and
  - room temperature is greater than the sum of the room setpoint and hysteresis: *Room tmp* > *Room tmp setpoint* + *hysteresis*.

- Free cooling is **switched off** in the following cases:
  - *Timer Min run time* = 0
    and
  - plant switches on.
    or
  - outside air temperature is less than the difference from room temperature and switch-off differential: *Out tmp* > *Room tmp* – 1
    or
  - room temperature is less than or equal to room setpoint: *Room tmp* ≤ *Room tmp setpoint*

Prerequisite

Free cooling (*Free cooling*) is enabled:
Main Index > Configuration > Configuration 2 > Free cooling ≠ No

The function is disabled for faulty outside air or room temperature measurement.

Parameter

Main Index > Unit > Operating mode > Free cooling

Name	Range	Function
Room tmp setpoint	-64.0…64.0 [°C]	Room setpoint for free cooling. Setpoint applies to extract air for free cooling with a extract air sensor.
Hysteresis	0.0…64.0 [°C]	Hysteresis for switch on.
Delta	1.0…64.0 [°C]	Minimum difference between room and outside air temperature.
Min outs tmp	-64.0…64.0 [°C]	Minimum outside air temperature to enable night cooling.
Min run time	0…999 [min]	Minimum runtime after a start.

5.3.8 Temperature difference start

Purpose

Plant start (in switched off state) based on temperature difference prevents the building from cooling down or heating up too much.
It is controlled to a separate setpoint for heating and cooling.

The heating and or cooling start can be enabled separately:
Main Index > Configuration > Configuration 2 > Tmp start

The function can be implemented using a extract air sensor if no room sensor is available.

Prerequisite

Plant start by temperature difference is enabled:
Main Index > Configuration > Configuration 2 > Tmp start ≠ No

Cooling demand

The ***Tmp start*** of plant by temperature difference for cooling demand occurs when the following conditions are met:
– *Room tmp* > *Tmp start* cooling
– *Timer min off* = 0

The **shutdown** occurs for:
– *Room tmp* < *Tmp start cooling – Hysteresis*
– *Timer min run* = 0

Heating demand

The ***Tmp start*** of plant by temperature difference for heating demand occurs when the following conditions are met:
– *Room tmp* < *Tmp start heating*
– *Timer min off* = 0

The **shutdown** for heating demand occurs for:
– *Room tmp* > *Tmp start heating + Hysteresis*
– *Timer min run* = 0

The function is switched off when the room temperature, or extract air sensor fails.

Parameter

Main Index > Unit > Operating mode > Tmp start

Name	Range	Function
Start stpt cooling	-64.0….64.0 [°C]	Start temperature for cooling.
Cooling setpoint	-64.0….64.0 [°C]	Cooling setpoint.
Start stpt heating	-64.0…64.0 [°C]	Start temperature for heating.
Heating setpoint	-64.0….64.0 [°C]	Heating setpoint.
Hysteresis	0.1…64.0 [°C]	Switch down hysteresis.
Minimum off time	0…999 [min]	Minimum switch-off time after active heating or cooling.
Min run time	0.0…..999.0 [min]	Minimum runtime after a start.

5.3.9 Boost function

Purpose

Boost ensures a comfortable room temperature exists when the plant is switched on normally to *Comfort*.

The heating and or cooling start can be enabled separately:
Main Index > Configuration > Configuration 2 > Boost

The function can be implemented using an extract air sensor if no room sensor is available.

Prerequisite

Boost is enabled:
Main Index > Configuration > Configuration 2 > Boost ≠ No

Cooling demand

Boost for cooling demand occurs when the following conditions are met:
– *Room tmp* > *Start stpt cooling* + **Hysteresis**
and
– Time to normal start via the time switch program < *Compensation time*

The **shutdown** occurs for:
– *Room tmp* < *Start stpt cooling*

Heating demand

Boost for heating demand occurs when the following conditions are met:
– *Room tmp* < *Start stpt heating* - *Hysteresis*
and
– Time to normal start via the time switch program < *Compensation time*

The **shutdown** occurs for:
– *Room tmp* > *Start stpt heating*

The function is disabled when the room temperature (extract temperature) sensor fails.

Parameter

Main Index > Unit > Operating mode > Boost

Name	Range	Function
Room tmp setpoint	-64.0…64.0 [°C]	Boost room setpoint.
Start stpt cooling	-64.0….64.0 [°C]	Start temperature for cooling.
Start stpt heating	-64.0…64.0 [°C]	Start temperature for heating.
Hysteresis	0.1…64.0 [°C]	Switch down hysteresis.
Compensation time	0…999 [min]	Time by which plant start is advanced.

5.3.10 Optimum start/stop function.

Not yet available.

5.4 Damper control
5.4.1 Overview

Introduction

This section describes the control of outside air/exhaust air dampers and the fire dampers.

Elements

The figure illustrates the participating plant elements (with gray background):

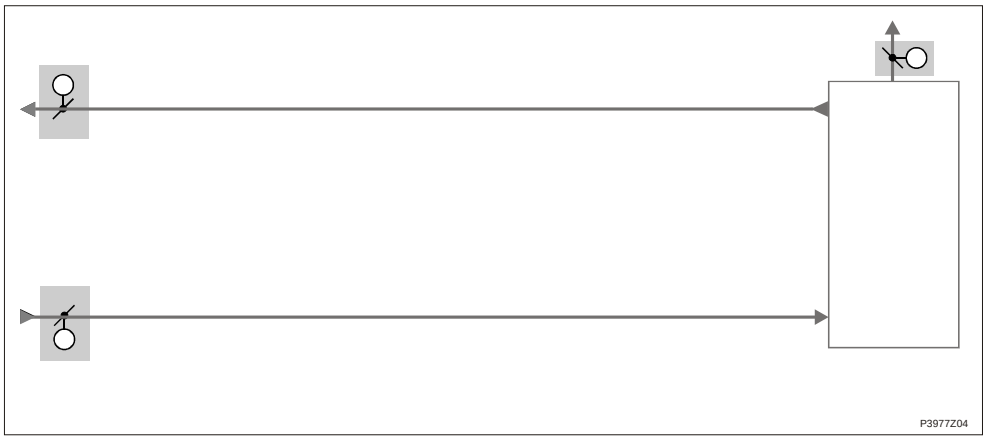


Figure 26: Overview of the plant elements for damper control

Topic

The topics in the section are:

Topic	Section
General	6.4.2
Outside/exhaust air dampers	6.4.3
Fire dampers	6.4.4

5.4.2 General

Content

This section describes functions the impact the entire damper control (outside air and fire dampers).

Prerequisite

Dampers are enabled in *Configuration 1*, *Configuration 2* and *Configuration IOs*, preconfigured and the inputs, outputs defined.

Enable

Main Index > Configuration > Configuration 1

Name	Range	Function
Damper	– No – Combined – Supply – Supply+Exh	– No open/close damper. – Two dampers with common output. – Outside air damper with output. – Two dampers with separate outputs.
Fire damper	– No – Yes – FollowUnit – 2 – 2+FolwUn – 3 – 3+FolwUn – 4 – 4+FolwUn	– No fire dampers. – Fire dampers. – Fire dampers are opened with *Unit Start* or closed with *Unit Stop*. – Up to 4 fire dampers can be connected.

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
Damper fdbk	– No – One – Two	– No damper feedback. – Feedback for outside air dampers (or a common feedback for both dampers). – Separate feedback for outside air and extract air damper.
Fire damper fdbk	– Closed – Clsd+Opnd – Combined	Feedback from fire dampers. – Only one feedback for close. – Two separate feedbacks for open and close. – Two feedbacks for open and close, but only one signal. The syntax must be correct: 1 (close) → 0 (moving) → 1 (open)

Parameterization

Main Index > Unit > Damper Control

Name	Range	Function
Off delay by fan off	0…36000 [s]	Switch-off delay for outside air, extract and fire dampers. The dampers are closed after this period after switching off the supply air fan.
Damper	---	Jump to damper page to parameterize the outside and extract air damper.
Fire damper	– On – Off	Current fire damper status. Jump to fire damper page to parameterize the fire damper.

5.4.3 Outside/extract air dampers

Prerequisite

Outside and extract air dampers are enabled and preconfigured in *Configuration 1*, *Configuration 2* and *Configuration IOs*.

Functions

Per settings outside and extract air damper open at plant start and close at plant stop.
Damper opening times can be defined separately.
A common default period can be set if no damper feedback exists.
The damper command can still be kept at pending for a feedback alarm.
Only the output for the outside air damper is enabled if two dampers are enabled as combined.
This is also true for triggering feedback alarms for the extract air damper, if a separate feedback per damper is enabled.
The supply air fan controls the outside air damper.
The extract air fan controls the extract air.
The signal for the damper actuator depends on the supply air/extract air fan if a combined damper actuator is selected.
Please very careful, if using, for example, *Fire mode Rune*!

Parameter

Main Index > Unit > Damper Control > Damper

Name	Range	Function
Outside air cmd	– Off – On	Current state of outside air damper command. Go to page with all digital output settings.
Outside air fdbk	– No – Yes	Active feedback as to whether the damper is open. Go to page with all digital input settings. For example, you can set the time for jitter protection (default: 5 s).
Outs off by fdbk alm	– No – Yes	Determines, in the event of a feedback fault, whether a damper command is still pending or whether to switch off the command.
StrtUpDly outs fdbk	0…36000 [s]	Defines the period after an open command without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Extract air cmd	– Off – On	Current state of extract air damper command. Go to page with all digital output settings.
Extract air fdbk	– No – Yes	Active feedback as to whether the damper is open. Go to page with all digital input settings. For example, you can set the time for jitter protection (default: 5 s).
Extr offby fdbk alm	– No – Yes	Determines, in the event of a feedback fault, whether a damper command is still pending or whether to switch off the command.
StrtUpDly Extr fdbk	0…36000 [s]	Defines the period after an open command without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Opening time	0…36000 [s]	Estimates damper opening time for both dampers, if not active feedback (fdbk) is enabled. It is assumed that the dampers are open after this period and that the start release is issued for the fans.

Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

5.4.4 Fire dampers.

Prerequisite

Fire dampers are enabled and preconfigured in *Configuration 1*, *Configuration 2* and *Configuration IOs*.

Functions

Fire dampers can be controlled via the plant operating mode or the automatic test, or can be continuously open.
Reaching and leaving the given end switch is monitored.
Displays the current state and operating state of the dampers.
The fire dampers are controlled by the supply air as well as the extract air fans.

Parameter

Main Index > Unit > Damper Control > Fire damper

Name	Range	Function
Command	– Off – On	Current state of outside air damper command. Go to page with all digital output settings.
Feedback opened	– OK – 1 / 2 / 3 / 4 – +all combinations possible	Active feedback if the damper is open. The feedback opened is automatically set after 115% of open time if *fdbk Open* is not enabled in *Configuration 2*.
Feedback closed	– OK – 1 / 2 / 3 / 4 – +all combinations possible	Active feedback if the damper is closed (fire). This feedback must always be available. The alarm is immediately triggered if close cannot be commanded.
State	– NotDefined – Closed – Move – Opened	Current damper state. – Only possible during configuration. – Closed. – Moving. – Opened. See example below.
Mode	– NotDefined – Ok – Test – Alarm	Damper operating state. – Only possible during configuration. – Okay. – In test mode. – In alarm state.
Opening time	1…600 [s]	Positioning time to open the damper (see Data Sheet damper actuator).
Closing time	1…600 [s]	Positioning time to close the damper (see Data Sheet damper actuator).
Start manual test	– Passive – Active	Active triggers a manual test of the fire dampers. See examples below.
Auto test	Time, weekday, date	Determines the time for an automatic start of the damper test. The automatic test is disabled for *Configuration 1 > Fire damper = FollowUnit*. See examples below.
Auto test interval	0...36000 [h]	Set the time interval for a period automatic damper test. See examples below.

In case of having 2 fire dampers, 2 DI are needed.
In IO configuration, only the first DI needs to be selected, the next after will be taken automatically.
Example for 4 fire dampers:
Configure DI2, then DI3, DI4 and DI5 are configured and occupied.

Examples of no move and state

Damper command 0 → 1:
- After 15% of open time, *fdbk* must be *Closed* = *No*, otherwise a no move alarm is triggered.
- After 115% of open time, *fdbk* must be *Opened* = *Ok*, otherwise a *fdbk Open alarm*.

Damper command 1 → 0:
- After 15% of close time, fdbk must be *Opened* = *No*, otherwise a no move alarm occurs.
- After 115% of close time, fdbk must be *Closed* = *Ok*, otherwise a fdbk close alarm.

Examples on auto test, *Auto test interval*

The automatic test can be set to a time (day, time) and / or conducted periodically.
- *Auto test* = *:* *,*.* / *Auto test interval* = 24 h:
  A test is conducted every 24 hours regardless of the time.
- *Auto test* = 23:* Mo,*.* / *Auto test interval* = 47 h:
  → A test is conducted each month at 11:00 pm to the extent the last test is older than 47 hours.

Auto test = *:* *,*:* and *Auto test interval* = 0 h:
→ No automatic test is conducted.

Test flow (manual or automatic)

Pending command = 1
First test start

Step	Action
1	Mode goes to test, the entire unit is stopped. – After the period *Off delay* by fan off, outside and extract air dampers are closed and the fire damper test is started.
2	The command changes: 1 → 0 – After 15% of close time, *fdbk* must be *Opened* = *No*, otherwise a *NoMove* alarm occurs. – After 115% of close time, fdbk must be *Closed* = *Ok*, otherwise a *fdbk* close alarm.
3	If everything is ok: The command changes again: 0 → 1. – After 15% of open time, *fdbk* must be *Closed* = *No*, otherwise a *NoMove* alarm occurs. – After 115% of open time, *fdbk* must be *Opened* = *Ok*, otherwise a fdbk opened alarm.
4	If everything is ok: Mode goes to *OK*; the unit is restarted.

Pins

Specifications for pin and designation of the fire dampers:

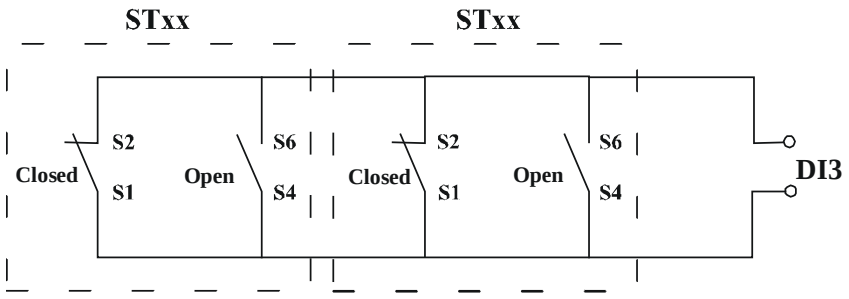


Figure 27: Overview of the pins of the fire dampers

The fire dampers must be connected as illustrated above for trouble-free operation.

5.5 Fan control
5.5.1 Overview

Introduction

This section describes:
- Configure supply and extract air fans
- Control of the same
- Monitoring and alarms

Elements

The figure illustrates the participating plant elements (with gray background):

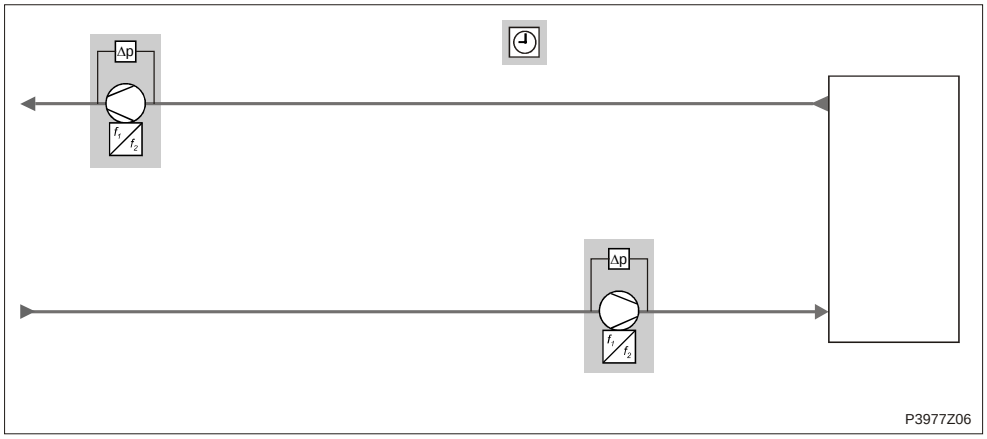


Figure 28: Overview of the plant elements for fan control

Topic

The topics in the section are:

Topic	Section
Configure fan functions	6.5.2
Description of fan modes	6.5.3
Supply air/extract air control	6.5.4
Summer/winter compensation	6.5.5
Supply air/extract air fan, deviation alarms	6.5.6
Operating hours monitoring	6.5.7
Fan compensation	6.5.8

5.5.2 Configure fan functions

Procedure

Fan functions are configured in three steps:

Step	Action
1	Select and enable
2	Configuration
3	Parameterization

First select and enable

In this step, the fan type and control mode is selection and possible steps are enabled.

Main Index > Configuration > Configuration 1

Name	Range	Function
TSP steps		Enable possible fan steps.
	– 1Step	– Single-step fan (only one setpoint).
	– 2Steps	– 2-step fan (two setpoints).
	– 3Steps	– 3-step fan (three setpoints).
Fan control mode		Select fan and control type.
	– Direct	– Digitally controlled stepped fans.
	– DirectVar	– Digitally controlled variable speed drives.
	– FixedSpeed	– Stepped analog controlled variable speed drive with digital release [%].
	– Pressure	– Pressure-controlled plant with modulating controlled variable speed drive and digital release [Pa].
	– Flow	– Volume-controlled plant with modulating controlled variable speed drive and digital release [l/s].
	– SupplySlv	– One digital and analog output each for the variable speed drives in pressure-controlled plants where the supply air fan operates dependent on the extract air fan [Pa]/[l/s]. The extract air fan is pressured controlled and the extract air volume is calculated; the supply air fan is volume controlled and provided to the extract air volume.
	– ExhaustSlv	– One digital and analog output each for the variable speed drives in pressure-controlled plants where the extract air fan operates dependent on the supply air fan [Pa]/[l/s]. The supply air is pressured controlled and the supply air is calculated; the extract air volume is volume controlled and provided to the supply air volume.
Extract fan	– No	– *Extract fan*
	– Yes	– ---
	– Combined	Both fans use the same output.
		The extract air fan must be set to *combined* if a combined signal is wanted for extract air and supply air fans. It must be set to *No* if no extract fan is available.

Second configuration

In this step, additional digital outputs are activated and coded.

Main Index > Configuration > Configuration 2

Name	Range	Function
Fan steps freq conv		Activation of additional digital outputs depending on the selected fan type. Function available only for analog controlled variable speed drives (*Fan control mode* ≠ *Direct or DirectVar*). The switch does not affect air control and fan behavior.
	– 1Step	– Enable variable speed drive (always active).
	– 2Steps	– Output for optional wiring depending on fan step 2.
	– 3Steps	– Outputs for optional wiring depending on fan step 3.
Fan steps type		Coding of digital outputs for fan control. The number of outputs and possible steps (setpoints) depends on the setting in *TSP steps* and also *FanStep FreqConv*, for analog controlled variable speed drives. Refer to explanations under *General Operating Modes*.
	– Separated	– On digital output per stage and fan.
	– SepCombine	– Separate outputs on the first step, common outputs for additional steps.
	– Binary	– Outputs for the steps are binary coded. The setting is permitted for *Fan Type* = *Direct* or *DirectVar*.

Third parameterization

In this step, the values for the fan functions are set.

Main Index > Unit > Fan Control

Comment:
Functions not enabled in *Configuration 1* and/or *Configuration 2* are hidden.

Name	Range	Function
Supply fan	– Off – Stage 1 – Stage 2 – Stage 3	Current supply air fan status. Go to parameter page for supply air fan.
Extract fan	– Off – Stage 1 – Stage 2 – Stage 3	Current extract air fan status. Go to parameter page for extract air fan.
Actual step	– Off – Stage 1 – Stage 2 – Stage 3	Current calculated, valid stage (setpoint for control) for fans.
Fire mode	 – Stop – RunSply – RunExh – Run both	Fan behavior in the event of a fire alarm: – Fans are off. – Only the supply air fan starts at the maximum enabled stage. – Only the extract air fan starts at the maximum enabled stage. – Both fans start at the maximum enabled stage.
Fire setpoint	0…100 [%]	Output signal for fan start in the event of a fire alarm for all analog controlled variable speed drives.
Slave offset	-999….999 [Pa]	Setpoint offset for fan control mode = *Supply Slv* or *Extract Slv*.
Slave start up stpt	0….999 [l/s]	Start setpoint for fan control mode = *Extract Slv* for extract fan until the supply air fan is operating. The extract air fan then operates using the *Slave Offset* setpoint.
Rundown time el htg	0…36000 [s]	Supply air fan overrun if an electrical heating register is active.
Min stage time	0…999 [s]	Minimum runtime for a stage prior to stepping up to the next step. Note: This period remains active when intervening using the operator unit: Even for a direct jump from off to stage 3, the output remains on each individual step for the minimum runtime.
Coasting time	0..99 [s]	Coasting time when reducing each stage.
Disable high speed	-64.0…64.0 [°C]	Stages greater than 1 (setpoint stage 1) are blocked (as with manual operation) if the outside air temperature < *Disable HighSpeed*. All possible stages are enabled for outside air temperature > *Disable HighSpeed* + 1 K. In Winter (at low outside air temperature) the function prevents too great a volume of air from discharging requiring heating, saving energy in this manner.

Parameters, *cont'd*

Name	Range	Function
Disable fan comp		Limit to compensated step up (step up switching):
	– None	– No limit. For active stage 1 can be switched to stage 2, for active stage 2 to stage 3. For analog controlled variable speed drives (*Fan control mode* ≠ *Direct* or *DirectVar*), can be stepped up per curve (see *Fan compensation*) for active *Stage1* setpoint and *Stage2* setpoint.
	– Stage 1	– Compensation blocked for active stage 1 (*Stage1* setpoint). Can be switched to stage 3 for active stage 2. For analog controlled variable speed drives (*Fan control mode* ≠ *Direct* or *DirectVar*), can be stepped up per curve (see *Fan compensation*) for active *Stage2* setpoint.
	– Stage1+Stage2	– Compensation blocked for active step 1 and step 2. For analog controlled variable speed drives, active step 3 compensate to *MaxForce*.
Summer comp	-100….100%	Present value for summer compensation. Go to parameter page for summer compensation.
Winter comp	-100….100%	Present value for winter compensation. Go to parameter page for winter compensation.
Op hours settings		Go to parameter page for fan maintenance messages.

5.5.3 Description of fan modes

Content

This section describes the functions of the various fan modes for:

- *Fan steps type* = Separated
- *Fan steps type*= SepCombine
- *Fan steps type* = Binary

The following relationship apply among the values for the parameters *Fan control mode*, *TSP steps*, fan step freq conv and *Fan steps type*:

Fan steps type = Separated

Fan control mode = Direct / DirectVar

	DO1	DO2	DO3	
Off	0	0	0	
Stage1	1	0	0	DOs each for supply air and extract air fan (if selected).
Stage2	0	1	0	
Stage3	0	0	1	

***Fan control mode ≠ Direct / DirectVar*, *Fan steps freq conv* = 1**

	DO1	
Off	0	
Stage1	1	DO1 each for supply air and extract air fan (if selected).
Stage2	1	
Stage3	1	

***Fan control mode ≠ Direct / DirectVar*, *Fan steps freq conv* > 1**

	DO1	DO2	DO3	
Off	0	0	0	
Stage1	1	0	0	DOs each for supply air and extract air fan (if selected).
Stage2	1	1	0	
Stage3	1	0	1	

Fan steps type = SepCombine

Fan control mode = Direct / DirectVar

	DO1	DO2	DO3
Off	0	0	0
Stage1	1	0	0
Stage2	0	1	0
Stage3	0	0	1

– DO1 each for supply air and extract air fan (if selected).
– DO2, DO3: Combined output for both fans.

***Fan control mode ≠ Direct / DirectVar*, *Fan steps freq conv* = 1**

In this case, *Fan steps freq conv* = 1 has no impact, since output DO1 is always available for supply and extract air fan.

	DO1
Off	0
Stage1	1
Stage2	1
Stage3	1

DO1 each for supply air and extract air fan (if selected).

***Fan control mode ≠ Direct / DirectVar*, *Fan steps freq conv* > 1**

	DO1	DO2	DO3
Off	0	0	0
Stage1	1	0	0
Stage2	1	1	0
Stage3	1	0	1

– DO1 each for supply air and extract air fan (if selected).
– DO2, DO3: Combined output for both fans.

Fan steps type = Binary

Fan control mode = Direct / DirectVar

	DO1	DO2
Off	0	0
Stage1	1	0
Stage2	0	1
Stage3	1	1

DOs each for supply air and extract air fan (if selected).

For all frequency controlled fans: Stage = active setpoint.

5.5.4 Supply air/extract air control

Configuration

Supply air fan is always available; cannot be disabled.

Only the extract air fan must be enabled:
Main Index > Configuration > Configuration 1

Name	Range	Function
Extract fan	– No – Yes – Combined	– No extract air fan. – Extract air fan with separate outputs. – Extract and supply air fan with common outputs.

Functions

- Fans can be operated staged, pressure-controlled, flow controlled and as master-slave.
  Common or separate outputs are used depending on the configuration.
- Fans may include an alarm and/or active feedback contact.
- Up to 3 setpoints per fan can be defaulted for controlled fans and achieving the setpoints can be monitored.
- You can influence the fan stage (speed) by room temperature, air quality, humidity, outside air temperature or supply air temperature.
- Operating hours are recorded separately.
  A message can be triggered upon reaching a certain number of operating hours for the supply air fan.

Parameterization

Main Index > Unit > Fan Control > Supply fan
Main Index > Unit > Fan Control > Extract fan

Name	Range	Function
Actual Value	xx [l/s], [Pa]	Depends on control type (*Fan control mode*), e.g. present value of pressure.
Controller	0…100 [%]	Present value for the controller. Go to page with all controller settings.
Output signal	0…100 [%]	Present value for output. Go to page with all analog output settings.
Command	– Off – Stage 1 – Stage 2 – Stage 3	Present state of fan. Go to page with all digital modulating output settings.
Fdbk	– Alarm – Ok	Condition: *Master Index* > *Configuration* > *Configuration 2* > *Fan fdbk* ≠ *No*. Present value of the feedback. Go to page with all digital input settings. For example, you can set the time for jitter protection (default: 5 s).
Alarm	– Ok – Alarm	Condition: *Master Index* > *Configuration* > *Configuration 2* > *Fan alarm* ≠ *No*. Present alarm state of fan. Go to page with all digital input settings. For example, you can set the time for jitter protection (default: 0 s).
Alarm	– Ok – Alarm	For supply air fan only! Condition: *Master Index* > *Configuration* > *Configuration 2* > *Fan alarm* <> *Combined*. Present alarm state for both fans. Go to page with all digital input settings. For example, you can set the time for jitter protection (default: 0 s).
Setpoints/settings	xx [%], [l/s], [Pa]	Depends on control type (*Fan control mode*), present calculated setpoint. Go to parameter settings page for supply air fan.

Parameters, *cont'd*

Main Index > Unit > Fan Control > Supply fan > Setpoints / Settings
Main Index > Unit > Fan Control > Extract fan > Setpoints / Settings

Name	Range	Function
Actual step	– Off – Stage1 – Stage2 – Stage3	Present fan stage. – Off. – Stage 1 (setpoint 1) active. – Stage 2 (setpoint 2) active. – Stage 3 (setpoint 3) active.
Act supply stpt	0...100 [%] 0...40'000 [l/s] 0...5000 [Pa]	Depends on control type (*Fan control mode* ≠ *Direct* or *DirectVar*): Present calculated setpoint for fan.
Stage 1	0...100 [%] 0...40'000 [l/s] 0...5000 [Pa]	Depends on control type (*Fan control mode* ≠ *Direct* or *DirectVar*): Setpoint for stage 1 (*TSP steps* ≥ 1 for controlled fans).
Stage 2	0...100 [%] 0...40'000 [l/s] 0...5000 [Pa]	Depends on control type (*Fan control mode* ≠ *Direct* or *DirectVar*): Setpoint for stage 2 (*TSP steps* ≥ 2 for controlled fans).
Stage 3	0...100 [%] 0...40'000 [l/s] 0...5000 [Pa]	Depends on control type (*Fan control mode* ≠ *Direct* or *DirectVar*): Setpoint for stage 3 (*TSP steps* = 3 for controlled fans).
Max forcing	0...(100-Stage max.) [%] 0...(40'000-Stage max.) [l/s] 0...(5000-Stage max.) [Pa	Depends on control type (*Fan control mode* ≠ *Direct* or *DirectVar*): The maximum possible fan compensation is derived from the following formula: *Stage max. + Max forcing - Stage x* [%], [l/s], [Pa] (see *Fan compensation*).
Min runtime	0…36000 [s]	Define the minimum runtime for the fan after a start.
Switch on delay	0…36000 [s]	For supply air fan only! Defines switch-on delay for the supply air fan after a extract fan start.
Start up delay fdbk	0…36000 [s]	Defines the period after a fan start without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Deviation alarm		Condition: *Fan control mode* ≠ *Direct*, *DirectVar* or *FixedSpd*. Present state for the setpoint/actual value monitoring of the supply air pressure (or volume). Go to parameter page for supply air monitoring.
	– Passive – Active	– No alarm. – Alarm pending.

Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

5.5.5 Summer/winter compensation

Requirements

– An outside air temperature sensor must be available:
Main Index > Configuration > Configuration 1 > Outside tmp sensor = Yes.
– Summer/winter compensation must be enabled:
Main Index > Configuration > Configuration 2 > Fancomp Outsidetmp = Yes.

Functions

– Summer compensation:
Adjustment to setpoint relevant to control when the outside air temperature is high during the summer.
– Winter compensation:
Adjustment to setpoint relevant to control when the outside air temperature is low during the winter.

Setpoint compensation during summer

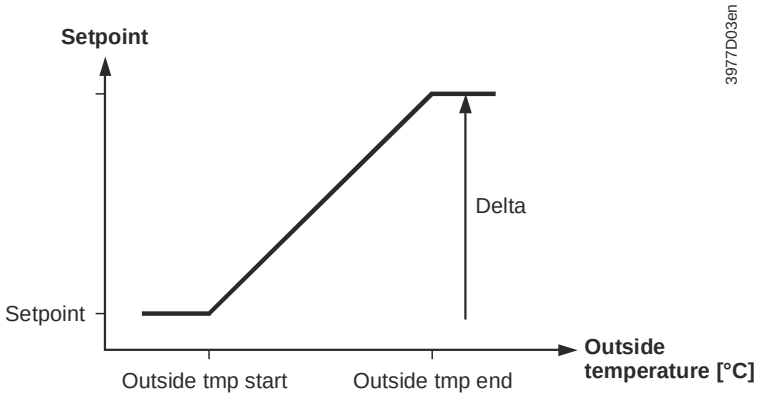
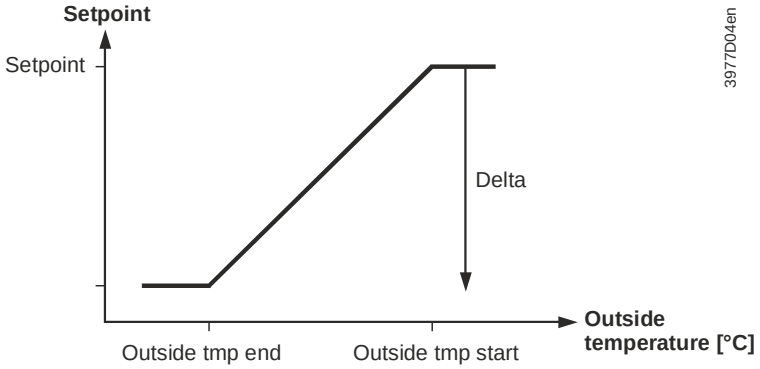


Figure 29: Setpoint compensation during summer

Setpoint compensation during the winter



Parameterization

Main Index > Unit > Fan Control > Summer comp
Main Index > Unit > Fan Control > Winter Comp

Name	Range	Function
Outside tmp start	-64…64 [°C]	Outside air temperature at which point the compensation begins to act.
Outside tmp end	-64…64 [°C]	Outside air temperature by which the maximum (summer) or minimum setpoint is reached.
Delta	-100…100 [%]	Fan setpoint compensation relating to the maximum allowed fan compensation (see *Fan compensation* as well).

Setpoint compensation is not undertaken during the summer and winter when the outside air temperature sensor fails.
A negative value means a reduction in fan output; a positive value an increase in fan output.
For *Fan control mode* = *Direct*, *DirectVar* the delta must be set to -100% or 100%, since a switch down or up occurs is the total added compensation is above 90% (switch down at 10%), but may be less if another compensation is enabled.

5.5.6 Supply air/extract air fan, deviation alarms.

Requirements

– **Main Index > Configuration > Configuration 1 > Fan control mode ≠ Direct, DirectVar** or **FixedSpd**
– Fan deviation alarm must be enabled:
Main Index > Configuration > Configuration 2 > Fan deviation alarm ≠ No

Function

Setpoint/actual value monitoring of air control:
An alarm is triggered for the following cases when the air pressure (or volume) deviates from the setpoint during a certain period:
– *Actual value* < *Min Limit* (is also used as feedback for act value > *Min limit*, for example, to enable electric heating).
– *Actual value* > *Setpoint* + *Maximum*.
– *Actual value* < *Setpoint* – *Maximum*.
– When setpoint – *Maximum* < *Min Limit*, *Min Limit* applies as the comparison value.

Parameterization

Main Index > Unit > Fan Control > Supply Fan > Setpoints / Settings > Deviation alarm
Main Index > Unit > Fan Control > Extract fan > Setpoints / Settings > Deviation alarm

Name	Range	Function
Alarm	– Passive – Active	Alarm state. Go to settings page for digital alarms. Set all control-related settings such as alarm delay (default 60 s).
Min limit	-0...40'000 [%; Pa]	Depends on control type (*Fan control mode*), an alarm is triggered when it breaches this value.
Maximum deviation	-0...40'000 [%; Pa]	Depends on control type (*Fan control mode*); maximum allowed deviation between setpoint and actual value.
Start up delay	0…36000 [s]	The function is activated after this period after a start.

Monitoring is switched off when the sensor fails.

5.5.7 Operating hours monitoring

Prerequisite

None.

Function

An alarm (low class) can be triggered for maintenance purposes when the present operating hours for the supply air fan exceeds the operating hours limit.

Parameterization

Main Index > Unit > Fan Control > Op hours settings

Name	Range	Function
Op hours alarm	– Passive – Active	Present alarm status.
Enble ophours alarm	– No – Yes	Alarm enable.
Op hours limit	0…999999 [h]	Operating hours limit to trigger an alarm.

5.5.8 Fan compensation

General notes

- Disable comp parameter setting (**Main Index > Unit > Fan control > Disable comp**) must be observed for each compensation.
- All types of compensation that results in a step-up or switch, are added to the overall compensation ∑ comp.
- All types of compensation that result in a step-down or switch, are subtracted from the overall compensation ∑ comp.
- ∑ comp up and ∑ comp down are limited to 100 %.

Percentage of ∑ comp up

- Temperature control:
  - Fan cooling [%]
  - Fan compensation [%] (*Increase*)
- From fan control:
  - Summer compensation [%] (if positive).
  - Winter compensation [%] (if positive).
- From humidification:
  - Fan compensation [%] (*Increase*)
- From air quality control:
  - Function normal [%]

Percentage of ∑ comp down

- From temperature control:
  - Fan heating [%]
  - Fan compensation [%] (*Decrease*)
- From fan control:
  - Summer compensation [%] (if negative).
  - Winter compensation [%] (if negative).
- From humidification:
  - Fan compensation [%] (*Decrease*)
- From air quality control:
  - Function inverse [%].

Staged fans

Fan control mode = *Direct* or *DirectVar*.

- ∑ comp up > 90% → if possible step-up of a stage (see *Disable comp*).
- ∑ comp up < 10% → remove compensation stage.
- ∑ comp down > 90% → step-down of a stage (*Stage1* is the minimum).
- ∑ comp down < 10% → the removed stage is enabled again.

Analog fans

Fan control mode ≠ *Direct* or *DirectVar*.

Calculates maximum compensation (100% compensation):
Highest stage setpoint + Max forcing – Stage1 Setpoint with set minimum limitation to *Stage1 Setpoint* and maximum limitation to *Stage max* + *Max forcing*.

Example 1

∑ comp up	80%
Fan control mode	Pressure
TSP steps	3
Stage1 Setpoint	500 Pa
Stage2 Setpoint	800 Pa
Stage3 Setpoint	1000 Pa
Max forcing	200 Pa
Active stage setpoint	*Stage1*, 500 Pa

– Maximum compensation = 1000 + 200 – 500 = 700 [Pa]
– Compensation setpoint = setpoint *Stage1* + 80% of maximum compensation = 500 + 700 * 0,8 = 500 + 560 = 1060 [Pa]
– Maximum possible setpoint = *Stage3 Setpoint* + *max force* = 1000 + 200 = 1200 [Pa]

Example 2

∑ comp down	30%
Fan control mode	Pressure
TSP steps	3
Stage1 Setpoint	500 Pa
Stage2 Setpoint	800 Pa
Stage3 Setpoint	1000 Pa
Max forcing	200 Pa
Active stage setpoint	*Stage2*, 800 Pa

– Maximum compensation 1000 Pa + 200 Pa – 500 Pa = 700 Pa.

– Setpoint = setpoint *Stage2* - 30% of maximum compensation
= 800 - 700 * 0.3 = 800 - 210 = 590 [Pa]

– Minimum possible setpoint = *Stage1 Setpoint* = 500 Pa, since the setpoint compensation is limited to this value.

5.6 Temperature control
5.6.1 Overview

Introduction

This section describes the functions relating to heating and cooling register control, including:

- Temperature setpoints
- Compensations and limitations
- Deviation alarms
- Fan compensation

Elements

The figure illustrates in a simplified manner the participating plant elements:

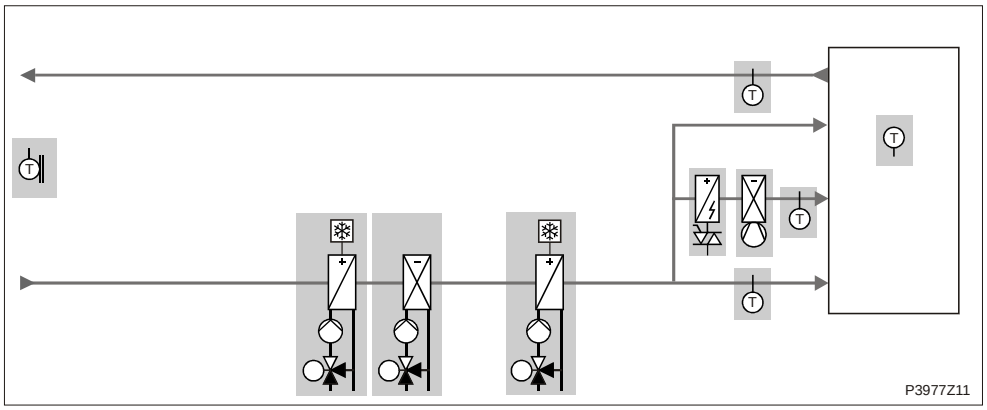


Figure 30: Overview of the plant elements for temperature control

Topic

The topics in the section are:

Topic	Section
General	6.6.2
Temperature setpoints	6.6.3
Summer/winter compensation	6.6.4
Temperature deviation alarm	6.6.5
Supply air temperature minimum/maximum control	6.6.6
Fan heating/cooling	6.6.7
Fan compensation	6.6.8
Common heating/cooling register	6.6.9

5.6.2 General

Parameterization **Main Index > Unit > Temp control**

Name	Function
Act controlled tmp	Present temperature used for control. Eight supply air, room or extract temperature depending on the setting and control type.
Tmp setpoints	Go to setpoint page with all setpoints affected by temperature control, e.g. comfort, economy, cascade min max, deviation alarm, summer-winter compensation.
Cascade controller	Displays heating and cooling setpoint. Go to cascade controller page with detailed settings.
Min/max ctrlr sply	Go to page for *Min/max ctlr sply* to parameterize the minimum and maximum limit controller. You can use the existing supply air sensor to limit the minimum or maximum allowable supply air temperature if purely room or extract air control is active.
Hrec damper	Present value of the mixed aid damper control. Go to parameter page for mixed air damper control.
Heat recovery	Present value for heat recovery control. Go to parameter page for heat recovery control.
Heating	Present value for heating register control. Go to parameter page for heating register control.
Electrical heating	Present value for electrical heating register control. Go to parameter page for electric heating register control.
Cooling	Present value for cooling register control. Go to parameter page for cooling register control.
Heating 2	Present value for heating register control for an additional register. Go to parameter page for heating register control.
El Heating 2	Present value for electric heating register control for an additional register. Go to parameter page for electric heating register control.
Cooling 2	Present value for cooling register control for an additional register. Go to parameter page for cooling register control.
Fan heating	Present value of the fan heating sequence. Go to parameter page for fan heating sequence.
Fan cooling	Present value of the fan cooling sequence. Go to parameter page for fan cooling sequence.
Fan compensation	Present value of the fan temperature compensation. Go to parameter page for fan temperature compensation.

5.6.3 Temperature setpoints

Parameterization **Main Index > Unit > Temp control > Tmp setpoints**

Name	Range	Function
Act controlled tmp	---	Present temperature used for control. Eight supply air, room or extract temperature depending on the setting and control type.
Act cooling stpt	---	Present calculated room or supply air setpoint for cooling.
Act heating stpt	---	Present calculated room or supply air setpoint for heating.
Act sply clg stpt	---	Present calculated supply air setpoint in cooling for a cascade control.
Act sply htg stpt	---	Present calculated supply air setpoint in heating for a cascade control.
External setpoint	---	Present external setpoint or setpoint compensation.
Sply air comp	-10.0…10.0 [°C]	Setpoint compensation for winter operation for: *Tmp control mode* = *RmSplyC Su* (room supply air cascade control in summer, pure supply air control in winter). or *Tmp control mode* = *RtSplyC Su* (return supply air cascade control in summer, pure supply air control in winter). The room setpoint for cascade control, active in the summer, are active (summer - winter changeover). During winter, these room setpoints must be adapted to the supply air control.
Comfort setpoint	0…99 [°C]	Comfort based setpoint. Only available when *Tmp stpt selection* = *+/-Half degree Celsius*.
Comfort cooling	0…99 [°C]	Comfort cooling setpoint. Only available when *Tmp stpt selection* = *Htg/Clg or Clg-degrees Celsius*.
Comfort heating	0…99 [°C]	Comfort heating setpoint. Only available when *Tmp stpt selection* = *Htg/Clg or Htg-degrees Celsius*.
Comfort dead zone	0…20 [°C]	Comfort dead zone. Only available when *Tmp stpt selection* = *Clg-degrees Celsius* or *Htg+degrees Celsius* or *+/-Half degree Celsius*.
Economy setpoint	0…99 [°C]	Economy base setpoint. Only available when *Tmp stpt selection* = *Spv+Halfdegree Celsius*.
Economy cooling	0…99 [°C]	Economy setpoint for cooling. Only available when *Tmp stpt selection* = *Htg/Clg or Clg-degrees Celsius*.
Economy heating	0…99 [°C]	Economy setpoint for heating. Only available when *Tmp stpt selection* = *Htg/Clg or Htg-degrees Celsius*.
Economy dead zone	0…20 [°C]	Economy dead zone. Only available when *Tmp stpt selection* = *Clg-degrees Celsius* or *Htg+degrees Celsius* or *+/-Half degree Celsius*.
Extra Seq setpoint	0…99 [°C]	Setpoint for *Heating 2*, *El Heating 2*, *Cooling 2* if configured as stand alone.

Parameters, *cont'd*

Name	Range	Function
Supply tmp min stpt	15.0… Supply tmp max stpt [°C]	Lower allowable supply air temperature for pure room or extract air control with additional available supply air sensor. Limited control of the cooling setpoint occurs if the supply air temperature < *Supply tmp min*. The heating register is started if this is not enough.
Supply tmp max stpt	Supply tmp min stpt … 50.0 [°C]	Highest allowable supply air temperature for pure room or extract air control with additional available supply air sensor. Limited control of the heating setpoint occurs if the supply air temperature > *Supply tmp min*.
Supply tmp min stpt	-64.0 …99.0 [°C]	Lowest allowable supply air temperature for a cascade control.
Supply tmp max stpt	-64.0 …99.0 [°C]	Highest allowable supply air temperature for a cascade control.
Draught htg max dev	0.0…64.0 [°C]	Maximum difference between supply air and room temperature for heating when the room draught limit is enabled (*Configuration 2*).
Draught clg max dev	0.0…64.0 [°C]	Maximum difference between supply air and room temperature for cooling when the room draught limit is enabled (*Configuration 2*).
Fan htg dead zone	0…20 [°C]	Controller dead zone: Setpoint = supply air heating setpoint – dead zone.
Fan clg dead zone	0…20 [°C]	Controller dead zone: Setpoint = Supply air heating setpoint – dead zone. Or if sequence is placed last: Supply air cooling setpoint + dead zone.
Fan comp tmp stpt	0…99 [°C]	Setpoint for room-related fan compensation. See *Fan compensation*; function: Increase/decrease fan setpoint based on room temperature.
Fan comp tmp functn	Increase Decrease	See *Fan compensation*; function: Increase/decrease fan setpoint based on room temperature.
Summer comp	---	Present value for summer compensation. Go to parameter page for summer compensation.
Winter comp	---	Present value for winter compensation. Go to parameter page for winter compensation.
Sply tmp dev alarm	---	Present state for the setpoint/actual value monitoring of the supply air pressure: – Passive: No alarm. – Active: Pending alarm. Go to parameter page for supply air monitoring.
Room tmp dev alarm	---	Present state for the setpoint/actual value monitoring of the room temperature: – Passive: No alarm. – Active: Pending alarm. Go to parameter page for room temperature monitoring.

5.6.4 Summer/winter compensation

Requirements

– Summer/winter compensation must be enabled:
Main Index > Configuration > Configuration 2 > So-Wi comp tmp = Yes
– An outside air temperature sensor must be available:
Main Index > Configuration > Configuration 1 > Outside tmp sensor ≠ No

Function

- **Summer compensation**:
Adjustment to temperature setpoint (depending on control, supply air, room or extract air) relevant to control when the outside air temperature is high during the summer.
- **Winter compensation**:
Adjustment to temperature setpoint (depending on control, supply air, room or extract air) relevant to control when the outside air temperature is low during the winter.

Setpoint compensation during summer

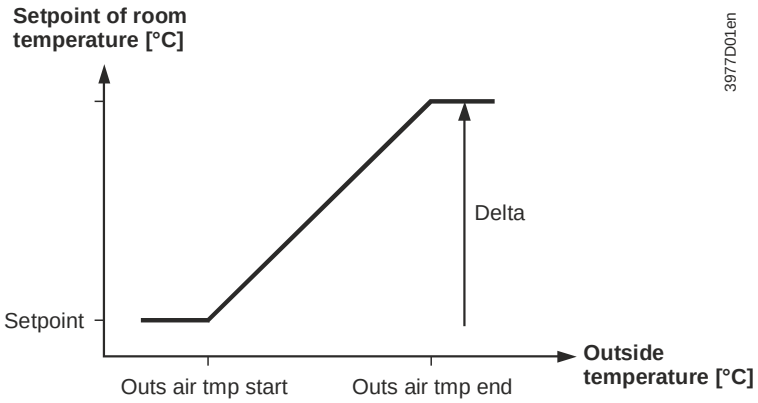


Figure 31: Setpoint compensation during summer

Setpoint compensation during the winter

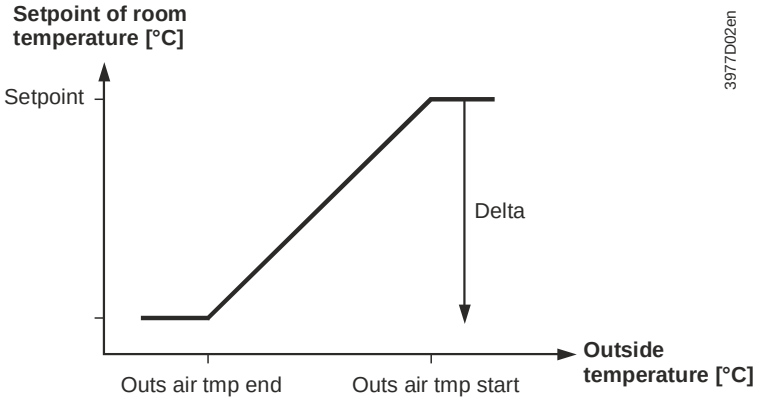


Figure 32: Setpoint compensation during winter

Parameterization

Main Index > Unit > Temp control > Setpoints > Summer comp
Main Index > Unit > Temp control > Setpoints > Winter comp

Name	Range	Function
Outs air tmp start	-64.0…64.0 [°C]	Outside air temperature at which point the compensation begins to act.
Outs air tmp end	-64.0…64.0 [°C]	Outside air temperature by which the maximum (summer) or minimum setpoint is reached.
Delta	-64.0…64.0 [K]	Maximum setpoint temperature-compensation.

Setpoint compensation is not undertaken during the summer and winter when the outside air temperature sensor fails.

5.6.5 Temperature deviation alarm

Requirements

– For supply air deviation alarm, a supply air sensor must be available:
Main Index > Configuration > Configuration 1 > Supply tmp sensor = Yes.

– Deviation alarm tmp must be enabled:
Main Index > Configuration > Configuration 2 > Deviation alarm tmp ≠ No

– For room air deviation alarm, a room or extract air sensor must be available:
Main Index > Configuration > Configuration 1 > Room tmp Sensor = Yes.

Function

Setpoint/actual value monitoring of temperature:
An alarm is triggered for the following cases when the temperature deviates from the setpoint during a certain period:
– *Actual value* < *Min limit*.

– *Actual value* > *Setpoint* + *Maximum*.

– *Actual value* < *Setpoint* – *Maximum*.

– *When setpoint* – *Maximum* < *Min limit*, *Min limit* applies as the comparison value.

Parameterization

Main Index > Unit > Temp control > Tmp setpoints > Sply tmp dev alarm
Main Index > Unit > Temp control > Tmp setpoints > Room tmp dev alarm

Name	Range	Function
Alarm	– Passive – Active	Alarm state. Go to settings page for digital alarms. Set all control-related settings such as alarm delay (default 3600 s).
Min limit	0...99.0 [°C]	An alarm is triggered below this temperature.
Maximum deviation	0...99.0 [°C]	Maximum allowable deviation between setpoint and actual value.
Start up delay	0…36000 [s]	The function is activated after this period after a start.

Monitoring is switched off when the temperature sensor fails.

5.6.6 Supply air temperature minimum/maximum control

Requirements

– **Main Index > Configuration > Configuration 1 > Tmp control mode = Room** or **Extract**

– **Main Index > Configuration > Configuration 1 > Supply tmp sensor = Yes**

Function

Limits the supply air temperature for pure room or extract air control to prevent discharge temperatures that are too high or too low.

Parameterization

Main Index > Unit > Temp control > Min/max ctrlr sply

Name	Range	Function
Min controller	0...100 [%]	Present value for the minimum limit controller. Go to controller settings page. This is where you enter all control-related settings.
Max controller	0...100 [%]	Present value for the maximum limit controller. Go to controller settings page. This is where you enter all control-related settings.
Min setpoint	15...Max setpoint [°C]	Lowest allowable supply air temperature for pure room temperature or extract air temperature control. A controlled limiting of the cooling setpoint controller occurs for supply air temperature < *Min setpoint*. The heating register is started if this is not enough.
Max setpoint	Min setpoint...50 [°C]	Highest allowable supply air temperature for pure room temperature or extract air temperature control. A controlled limiting of the heating controller occurs for supply air temperature > *Max setpoint*.

5.6.7 Fan heating/cooling

Enable **Main Index > Configuration > Configuration 2**

Name	Range	Function
Fan htg / clg		The fan is further used as a heating or cooling sequence.
	– No	– No sequential impact on the fan.
	– Htg	– Only impacts fan during the heating sequence.
	– Clg	– Only impacts fan during the cooling sequence.
	– Htg+Clg	– Impact on fan in both sequences.
Sequence fan clg		For free cooling only!
	– Fan-Clg	– Fan sequence prior to cooling sequence.
	– Clg-Fan	– Cooling sequence prior to fan sequence.

Functions

Controller output reduced (increased during cooling) the fan setpoint as it relates to the maximum allowable fan compensation (see *Fan compensation* as well) in the event the supply air setpoint is not achieved. The fan speed (stage) is reduced when all available heating registers are operating at 100% during heating.
This heats up the discharged air. The fan speed (stage) is increased if all available cooling registers are operating at 100% (*Sequence fan clg* = *Clg-Fan*) during cooling. This cools down the discharged air. The fan speed (stage) is first increased during the *Sequence fan clg* = *Fan-Clg* and the first cooling register is switched on.

Parameterization

Main Index > Unit > Temperature control > Fan heating
Main Index > Unit > Temperature control > Fan cooling

Name	Range	Function
Controller	0…100 [%]	Present value for the controller. Go to controller settings page.
Dead zone	0…20 [°C]	Controller dead zone heating: Setpoint = supply air setpoint – dead zone. Controller dead zone *Clg*: Setpoint = supply air heating setpoint + dead zone. Or if sequence is placed last (*Clg-Fan*): Supply air cooling setpoint + dead zone

Heating example

– Calculated supply air setpoint for heating register: 22 °C.
– Dead zone for the fan heating controller (dead zone): 2 °C.
→ Effective setpoint for the controller = 22 °C – 2 °C = 20 °C.

Ensures that the fans are only influenced, if the heating register does not supply the required output.
This function not required when the heating register is sufficiently sized.

Calculation

– Setpoint supply air pressure:
  80 Pa (maximum possible setpoint = setpoint of the maximum enabled stage + *Max forcing*, e.g. = 120 Pa).
– Maximum allowable fan compensation (100% compensation): 40 Pa.
– Controller output: 50%.
→ New setpoint: 80 Pa – (40 Pa * 50%) = 60 Pa
  (no exact value. See fan compensation for the precise calculation!)

The fan stage is reduced by reducing the setpoint.
The air volume to be heated at the heating register becomes smaller and the discharge air temperature increases.

Cooling example

Switching *Sequence fan clg*: *Clg-Fan*
– Calculated supply air setpoint for cooling: 22 °C.
– Dead zone for the fan cooling controller (dead zone): 2 °C.
→ Effective setpoint for the controller: 22 °C + 2 °C = 24 °C.

Ensures that the fans are only influenced, if the cooling register does not supply the required output.
This function not required when the cooling is sufficiently sized.

Switching *Sequence fan clg*: *Fan-Clg*
– Calculated supply air setpoint for cooling: 24 °C.
– Calculated supply air setpoint for heating register: 22 °C.
– Dead zone for the fan cooling controller (dead zone): 1 °C.
→ Effective setpoint for the controller: 22 °C + 1 °C = 23 °C.

Ensure that fans are influence prior to the start of the cooling register.
This function is also used if no cooling register is available.
You do not receive any cooler air, but the increased volume also increases the comfort level.

Calculation

– Setpoint supply air pressure: 80 Pa (maximum possible setpoint = setpoint of the maximum enabled stage + *Max Force*, e.g. = 120 Pa).
– Maximum allowable fan compensation (100% compensation): 40 Pa.
– Controller output: 50%.

→ New setpoint: 80 Pa + (40 Pa * 50%) = 100 Pa.

5.6.8 Fan compensation

Enable **Main Index > Configuration > Configuration 2**

Name	Range	Function
Fan comp room tmp	– No – Yes	Room-temperature dependent fan compensation.

Function

The controller output reduces or increases the fan setpoint relating to the maximum allowable fan compensation (see as well *Fan compensation*).

The fan setpoints should be increased or decreased for KP>0 if the room temperature is below the setpoint, or for KP<0 if the room temperature is above the setpoint (heating/cooling response).

Parameterization **Main Index > Unit > Temperature control > Fan compensation**

Name	Range	Function
Controller	0…100 [%]	Present value for the controller. Go to controller settings page.
Setpoint	0…99 [°C]	Controller setpoint relating to the room temperature.
Function	– Increase – Decrease	– Increase the fan setpoint. – Reduce the fan setpoint.

Example

– Room temperature setpoint: 22 °C.
– Present room temperature: 20 °C.
→ Controller output > 0% (e.g. 50%).

Switch function: Increase

The controller output increases the fan setpoint relating to the maximum allowable fan compensation (see as well *Fan compensation*).
– Setpoint supply air pressure: 80 Pa (maximum possible setpoint = setpoint of the maximum enabled stage + *Max Force*, e.g. = 120 Pa).
– Maximum allowable fan compensation (100% compensation): 40%.
– Controller output: 50%.
→ New setpoint: 80 Pa + (40 Pa * 50%) = 100 Pa.

Switch function: Decrease

The controller output reduces the fan setpoint relating to the maximum allowable fan compensation (see as well *Fan compensation*).
– Setpoint supply air pressure: 80 Pa (maximum possible setpoint = setpoint of the maximum enabled stage + *Max Force*, e.g. = 120 Pa).
– Maximum allowable fan compensation (100% compensation): 40 Pa.
– Controller output: 50%.
→ New setpoint = 80 Pa – (40 Pa * 50%) = 60 Pa.

5.6.9 Common heating/cooling register

Prerequisite

One heating register water and one cold water register for cooling is enabled.

Main Index > Configuration > Configuration 1 > Heating ≠ No
Main Index > Configuration > Configuration 1 > Cooling = Water

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
Combi Coil	– None – 1 output – 2 outputs	This setting selected whether the combi coil is a 2-pipe (1 output) or 4 pipe (2 outputs).

Functions

A common register is used for heating and cooling.

The following functions apply depending on the number of outputs:

Outputs	Functions
1	– For the *CombiCoil* with one output, the input for summer-winter changeover must be enabled so that the information on summer or winter operation is available (*Configuration 1* > *Su-wi input* = *Yes*). – The heating register is exclusively active during the winter; the cooling register exclusively during the summer. – The output for heating is used for heating and cooling (valve).
1/2	– The various control settings can be made separately for heating and cooling. – If an additional electrical register is activated, it acts as a second heating register during the winter and a normal heating register during the summer. This makes it possible to heating as needed during the summer. – Both in range *1 output* as well as *2 outputs*, the frost controller and frost alarm are disabled in summer. This also applies as well if the cooling valve is open. – Only 1 output is used for the pump (heating). The pump functionality must, however, be enabled as well for cooling if cooling also controls the output.
2	– The summer/winter changeover is not used for combi coils with 2 outputs. The heating output and the cooling output can, however, never by enabled at the same time.

5.7 Heat recovery with mixed air damper

5.7.1 Overview

Introduction

This section describes the mixed air damper control for heat or cooling recovery.

Elements

The figure illustrates in a simplified manner the participating plant elements:

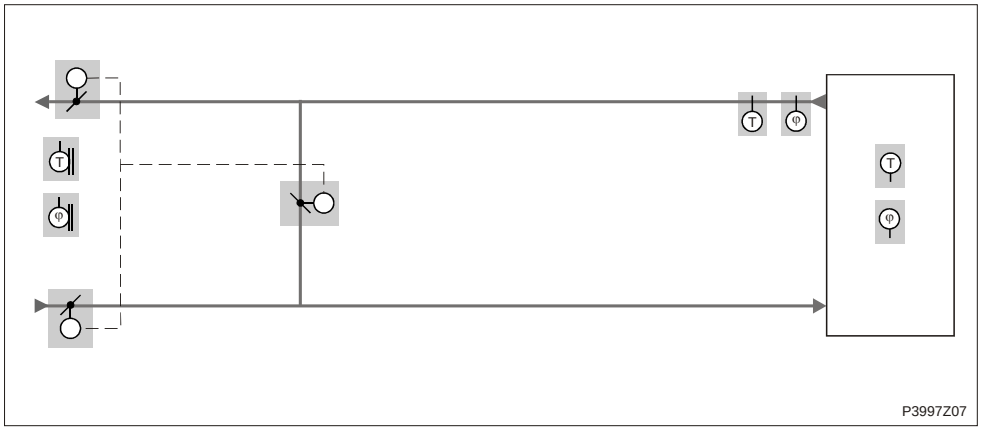


Figure 33: Overview of the plant elements for heat recovery with mixed air damper

Topic

The topics in the section are:

Topic	Section
Properties	6.7.2
Settings	6.7.3
Startup behavior	6.7.4

5.7.2 Properties

Control direction and fresh air ratio

The direction of control action (normal/inverse) and a minimum ration of fresh air can be set.

Extreme settings recirculating/fresh air

The plant can be started for a set period at full recirculation in dependence on the outside air temperature.

Mixed air damper is ramped up to full recirculation, if:
– *Tmp start* (temperature start) heat or cool is enabled.

Mixed air damper is ramped up to full fresh air, if:
– Summer free cooling
– Supply fan after run
– Fire mode with running fan

5.7.3 Settings

Enable **Main Index > Configuration > Configuration 1**

Name	Range	Function
Hrec damper	No	No mixed air damper.
	Normal	Mixed air damper with output signal 100% for complete recirculation.
	Inverse	Mixed air damper with output signal 0% for complete recirculation.

Configuration **Main Index > Configuration > Configuration 2**

Name	Range	Function
HrecDampr Sequence		Intervention sequence for mixed air dampers and heating register.
	Damper-Htg	Mixed air dampers first.
	Htg-Damper	Heating register first.
Hrec clg recovery	No	No cooling recovery.
	Temp	Cooling recovery, e.g. using rotation or plate heat exchangers as per outside and room temperature.
	Enthalpy	Cooling recovery, e.g. using rotation or plate, or hot water exchangers as per outside and room enthalpy.
HrecDampr clg recovery	No	No cooling recovery.
	Temp	Cooling recovery using mixed air damper as per outside and room temperature.
	Enthalpy	Cooling recovery using mixed air damper as per outside and room enthalpy.

HrecDampr Sequence

Position *Damper-Htg*:
For heating, the mixed air damper is deployed to the maximum allowable recirculating position (depends on *Min FreshAir*), before the subsequent heating register starts.

Position *Htg-Damper*:
For heating, the heating register is first deployed to full load prior the mixed air damper control starts.
The startup function for the mixed air damper control must be disabled (*StartupTime* = 0 s), since otherwise the heating register starts off directly at 100% and output.

Parameterization **Main Index > Unit > Temp control > Hrec damper**

Name	Range	Function
Controller	0…100 [%]	Present value of the mixed air controller. Go to controller settings page.
Output signal	0…100 [%]	Present value for damper actuator output. Go to page with all analog output settings.
Recovery value	0…100 [%]	Displays present heat recovery. For *Hrec damper* = *Normal*, this value is always the same as the output signal. For *Hrec damper* = *Inverse*, this value is always the inverse of the output signal.
Min fresh air	0…100 [%]	Minimum fresh air ratio. The controller output is limited to 100% - *Min fresh air*. This ensures that some amount of fresh air always makes it to the room.
Start up time	0…600 [s]	Time for controller start behavior (100% recirculation).
Start up tmp	–64.0…64.0 [°C]	Temperature limit for start behavior.

5.7.4 Startup behavior

Situation at start

The mixed air damper is fully opened during the startup period for outside air temperature < *Startup temp at startup*.
The controller determines the present position after this period expires.
If heat demand exists at startup, the heating register is started in parallel, and after successful startup, the mixed air controller for heat recovery deploys to the maximum allowable position (100% - *Min fresh air*).

Cooling recovery

Temperature-controlled cooling recovery **starts**, when the following conditions are met:
– *Outside temperature* > *Room temperature* + 2 K
– *Room temperature* > *Room setpoint* + 1 K
– Cooling output >2%

Temperature-controlled cooling recovery **stops** for the following cases:
– *Outside temperature* ≤ *Room temperature*
or
– *Room temperature* ≥ *Room setpoint*.
–
Enthalpy-guided cooling recovery **starts**, when the following conditions are met:
– *Outside air enthalpy* > *Room air enthalpy* + 2 kJ/kg
and
– *Room temperature* > *Room setpoint* + 1 K

The **enthalpy-guided** cooling recovery **stops** for the following cases:
– *Outside air enthalpy* ≤ *Room air enthalpy*
or
– *Room temperature* ≥ *Room setpoint*.

The following sensors are required for **temperature-controlled** cooling recovery:
– Outside temp sensor
– Room or extract air temperature sensors

The extract temperature sensor is used if room and extract temperature sensors exist.

The following sensors are required for **enthalpy-controlled** cooling recovery:
– Outside temperature and humidity
– Room or extract temperature sensor and humidity.

The extract temperature sensor is used if room and extract temperature sensors exist.

For pure supply air control, the room setpoint test is disabled and then only the outside air temperature-room temperature condition or the outside air enthalpy room-room air enthalpy condition is considered.

Sensor failure

The function is blocked when the sensor fails.

5.8 Heat recovery with heat exchanger
5.8.1 Overview

Introduction

This section describes heat or cooling recovery using a heat exchanger, e.g. with:
- Plate heat exchanger
- Rotating thermic wheels
- Hot water heat exchanger

Elements

The figure illustrates the participating plant elements (with gray background):

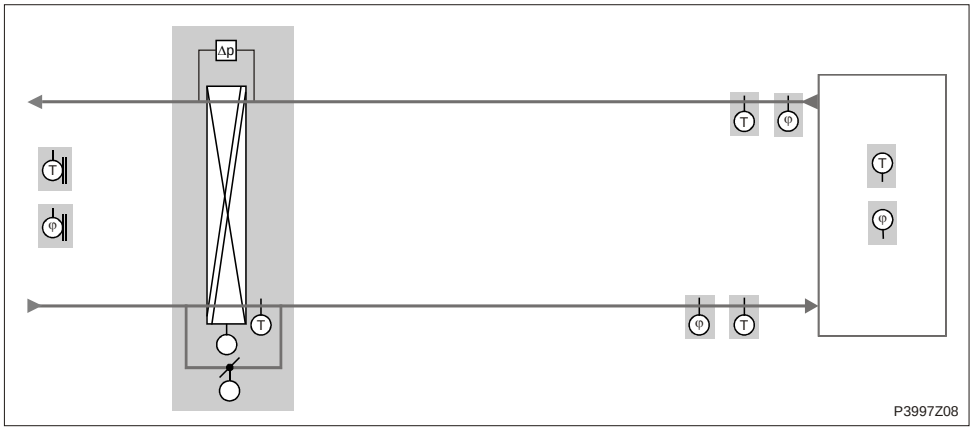


Figure 34: Overview of the plant elements for heat recovery with heat exchanger

Topic

The topics in the section are:

Topic	Section
General	6.8.2
Heat recovery pump	6.8.3
Pump kick	6.8.4
Heat recovery frost protection	6.8.5

5.8.2 General

Functions

Functions are available for plate, wheel or water exchangers (with pump control and frost protection).
The plant can be started for a set period at full recirculation in dependence on the outside air temperature.

Heat recovery is switched off, if:
– *Tmp start* (unoccupied) cool
– Summer free cooling
– Fire mode with running fan

Enable

Main Index > Configuration > Configuration 1

Name	Range	Function
Heat recovery	– No – Wheel – PlateExch – Water	No heat recovery. Rotary heat exchanger. Plate heat exchanger. Water heat exchanger.

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
Heat recovery frost	– No – Detector – Sensor – Dtctr+Snsr – PressSnsr – Pres+Dtctr	– No frost protection. – Frost protection using a detector. – Frost protection using a sensor. – Frost protection using a sensor and detector. – Frost protection using a pressure sensor. – Frost protection using a pressure sensor and detector.
Hrec pump / cmd	– No – Yes – Yes+Kick	– No pump. – Heat exchanger pump without pump kick. – Heat exchanger pump with pump kick.
Hrec pump alarm	– No – Alarm – Fdbk – Both	– Pump without alarm or feedback. – Pump with alarm. – Pump with feedback. – Pump with alarm and feedback.
Heat recovery alarm	– No – Yes	Heat recovery with or without alarming.
Hrec clg recovery	– No – Temp – Enthalpy	– No cooling recovery. – Cooling recovery, e.g. using rotation, plate, or hot water exchangers as per outside and room temperature. – Cooling recovery, e.g. using rotation or plate, or hot water exchangers as per outside and room enthalpy.
HrecDampr clg recovery	– No – Temp – Enthalpy	– No cooling recovery. – Cooling recovery using mixed air damper as per outside and room temperature. – Cooling recovery using mixed air damper as per outside and room enthalpy.

Parameterization ***Master Index > Unit > Temperature Control > Heat recovery***

Name	Range	Function
Controller	0…100 [%]	Present value for the heat exchanger controller. Go to controller settings page.
Output signal	0…100 [%]	Present value for analog output. Go to page with all analog output settings.
Pump / cmd	– Off – On	Current pump status. Go to heat recovery pump page.
Alarm	– Ok – Alarm	Alarm state for heat recovery. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 0 s).
Frost monitor	– Ok – Frost	Present state of frost detector. Go to page with digital input settings. The output limited for *DeFrost MaxSpeed* for *Frost* state. The plant is shut down after 20 minutes and an alarm is triggered.
Frost protection	– 0…100%	Present value for the frost controller. Go to *Hrec frost protect* page to parameterize frost control.
Frost protect press	---	Go to pressure frost page to parameterize frost control.
Efficiency	0…100%	Present value of heat recovery efficiency. Go to page with settings for heat recovery efficiency.
Start up time	0…600 [s]	Time for controller start behavior.
Start up tmp	–64.0…64.0 [°C]	Temperature limit for start behavior.
Max speed defrost	0…100%	Maximum allowable output value for frost detection.

– The pump signal can also be used as the control signal for the rotation thermic wheel.
– A frost protection sensor for rotating, or plate heat exchangers enable an extract air sensor.
– A frost protection sensor on a hot water exchanger enables a water sensor.
– The extract air sensor can be used as well to increase efficiency.

Startup behavior

The startup time for the output is set to 100% if the outside air temperature < Start up tmp. Afterwards, the controller determines the present position.

If heat demand exists at startup, the heating register is started in parallel, and after successful startup, the controller for heat recovery deploys to the maximum allowable position (100%).

Function cooling recovery

Temperature-controlled cooling recovery **starts**, when the following conditions are met:
– *Outside temperature* > *Room temperature* + 2 K
and
– *Room temperature* > *Room setpoint* + 1 K

Temperature-controlled cooling recovery **stops** for the following cases:
– *Outside temperature* ≤ *Room temperature*
or
– *Room temperature* ≥ *Room setpoint*.

Enthalpy-controlled cooling recovery **starts**, when the following conditions are met:
– *Outside air enthalpy* > *Room air enthalpy* + 2 kJ/kg
and
– *Room temperature* > *Room setpoint* + 1 K

Enthalpy-controlled cooling recovery **stops** for the following cases:
– *Outside air enthalpy* ≤ *Room air enthalpy*
or
– *Room temperature* ≥ *Room setpoint*.

For pure supply air control, the room setpoint test is disabled and then only the outside air temperature-room temperature condition or the outside air enthalpy room-room air enthalpy condition is considered.

An outside air and room or extract air temperature sensor required for **temperature-controlled** cooling recovery.
The extract temperature sensor is used if room and extract temperature sensors exist.

The following sensors are required for **enthalpy-controlled** cooling recovery:
- Outside temperature and humidity
- Room or extract temperature sensor and humidity
- The extract temperature sensor is used if room and extract temperature sensors exist

Sensor failure

The function is blocked when the sensor fails.

5.8.3 Heat recovery pump

Prerequisite

Heat recovery pump is enabled:
Main Index > Configuration > Configuration 2 > Hrec (pump) / cmd ≠ No

Function

The pump **starts**, if one of the following conditions is met:
- No fault is pending ***and*** the heat exchanger valve is opened to at least 5%.

or
- Pump kick is enabled.

The pump **stops** for the following cases:
- A fault occurs.

or
- The heating valve is under 1%.

The pump output can, e.g. for a heat wheel, be used as a digital enable as well. The pump kick should not, however, be enabled in this case.

Record operating hours

Operating hours for the pump can be recorded and reset:
Main Index > Unit > Operating hours > Hrec (pump) cmd

Parameterization

Main Index > Unit > Temp control > Heat recovery > Pump/Cmd

Name	Range	Function
Command	– Off – On	Current pump state. Go to page with digital output settings.
Fdbk	– OK – No fdbk	Present state of pump feedback. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 5 s).
Alarm	– OK – Alarm	Current pump alarm state. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 0 s).
Start up delay fdbk	0...36000 [s]	Defines the period after a pump start without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Off by fdbk alarm	– No – Yes	Determines, in the event of a feedback fault, whether a pump command is still pending or whether to switch off the command.
Min run time	0...36000 [s]	Define the minimum runtime for the pump after a start.

Note
Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

5.8.4 Pump kick

Prerequisite

Pump kick is enabled.
Main Index > Configuration > Configuration 2 > Hrec (pump)/cmd = Yes+Kick

Function

The pump is switched on for a short period for longer idle periods.
This prevents lock up.

Parameterization

Main Index > Unit > Temp control > Heat recovery > Pump / cmd

Name	Range	Function
Kick date / time	Mo 00:00...So 23:29	Weekday and time for pump kick. Sets the weekday (Mon...Sun) and time to run the pump kick. Examples: Mon *:* Each Monday at midnight. Sat 07:* Each Saturday at 7:00 am. * *:* Time is not relevant; the kick interval applies accordingly.
Kick interval	0.0...36000.0 [h]	Idle time for pump kick. Set the idle time after which a pump kick is run. Examples: 168 After 168 hours. 123.4 After 123 hours and 24 minutes. 0 Idle time is not relevant; kick date/time applies accordingly.
Kick on time	0.0...36000 [s]	Set the period for the pump kick. Examples: 10 Period = 10 seconds. 0 Period = 1 controller cycle (approx. 150 ms).

Kick date/time = * *:* and kick interval = 0 → no pump kick is run.

5.8.5 Heat recovery frost protection

Prerequisite

Frost protection type is enabled:
Master Index > *Configuration* > *Configuration 2*, *Heat recovery frost* ≠ *No*

Two monitoring types

- **Temperature frost protection**:
  Detects icing via a temperature sensor in the hot water exchanger, if selected, or in the extract air duct, if a plate exchanger or rotation thermic wheel.

  This applies for the following settings:
  Heat recovery frost = *Detector*, *Sensor* or *Dtctr+Snsr*.

- **Air-side frost protection**:
  Detects icing using a pressure sensor.

  This applies for the following settings:
  Heat recovery frost = *PressSnsr* und *Pres+Dtctr*.

Functions

– For output *Frost controller* > *Output recovery*:
  → The output follows the recovery.
– For output *Frost controller* < *Output recovery*:
  → The output follows the frost controller.
– Controller is disabled when the sensor fails.

The heat recovery controller goes to 100% output signal as soon as the frost controller is no longer enabled, when the subsequent heating register was enabled during frost control.

Parameterization

Master Index > Unit > Temp control > Heat recovery > Frost

Name	Range	Function
Controller	0...100 [%]	Present value for the frost controlled. Go to controller settings page.
Setpoint	-64...64 [°C]	For temperature frost protection only! For one setpoint: Present setpoint for the frost controller.
Fan stage 1 stpt	0...5000 [Pa]	For air-side frost protection only! Setpoint for the controller at fan stage 1.
Fan stage 2/3 stpt	0...5000 [Pa]	For air-side frost protection only! Setpoint for the controller at fan stage 2 and 3.

5.9 Heating/Heating 2 **
5.9.1 Overview

The functions *Heating 2* apply to controller **POL63X** only.

Introduction

This section describes:
- Enable, configure, and parameterize the heating register
- Preheating and frost protection
- Heat pump control

Elements

The figure illustrates the participating plant elements (with gray background):

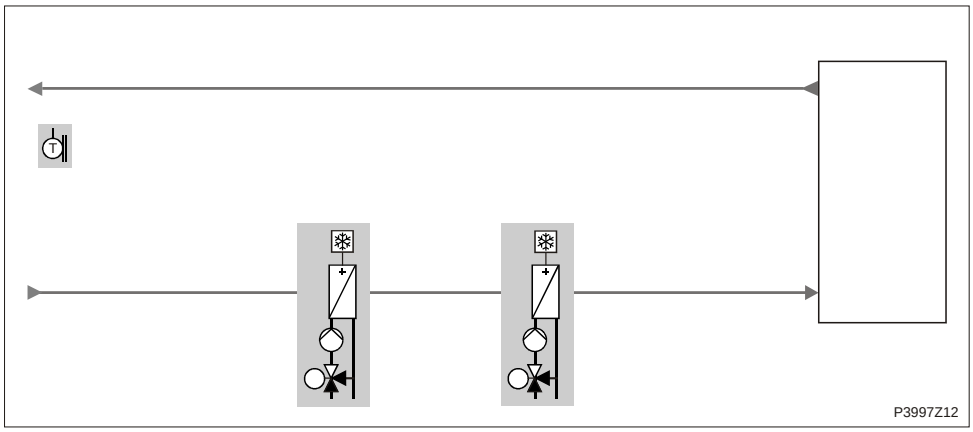


Figure 35: Overview of the plant elements for heating/heating 2 **

Topic

The topics in the section are:

Topic	Section
General	6.9.2
Heat pump	6.9.3
Pump kick	6.9.4
Heating register frost protection	6.9.5
Preheat heating register	6.9.6

5.9.2 General

Content

This section describes enabling, configuring, and parameterizing general heating register functions.

Prerequisite

Heating / *Heating 2* is enabled and preconfigured in *Configuration 1*, *Configuration 2* and *Configuration IOs*.

Enable heating register

Main Index > Configuration > Configuration 1

Name	Range	Function
Heating / Heating 2 (PreHeater)	– No – Yes – +PreH OutsideTemp. – +PreH FrostTemp.	– No heating register. – One heating register (fixed sequence 5). – Auxiliary heating register 2 to preheat as per outside temperature sensor. – Auxiliary heating register 2 to preheat as per frost temperature sensor.

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
Htg frost protect / Heating 2 frost (PreHeater)	– No – Sensor – Sensor2Spv – Detector – Snsr+Dtctr – 2Spv+Dtctr	– No frost protection. – Frost protection using a sensor. – Frost protection using a sensor and 2 setpoints. – Frost protection using a detector. – Frost protection using a sensor and detector. – Frost protection using a sensor, 2 setpoints and detector.
Heating 2 Control / El Heating 2 Control	– StandAlone – Heating-Heating2 – Heating2-Heating	– Own sequence. – First (elec.) heating then (elec.) heating 2 – First (elec.) heating 2 then (elec.) heating.
Heating pump / Heating 2 pump	– No – Yes – Yes+Kick	– No heating register pump. – Heating register pump without pump kick. – Heating register pump with pump kick.
Htg pump alarm / Heating 2 pump alm	– No – Alarm – Fdbk – Both	– Pump without alarm or feedback. – Pump with alarm. – Pump with feedback. – Pump with alarm and feedback.
Heating 2 control	– StandAlone – InSequence	– Not integrated in sequence. – Integrated in sequence.

Functions

The hot ware registers can be operated with pump (pump kick, alarm, feedback) or without pump.
Frost detection and controlled frost protection is integrated.
The additional heating register can be operated as a separate register with its own setpoint.

Heat recovery is switched off, if:
– *Tmp start* (unoccupied) cool
– Summer free cooling
– Comb coil at summer (only heating, not heating 2)

A maximum of one of the two auxiliary registers *Heating 2* or *El heating 2* can be integrated into the temperature control sequence prior to or after the heating register.

Parameterization

Main Index > Unit > Temp control > Heating
Main Index > Unit > Temp control > Heating 2

Name	Range	Function
Controller	0...100 [%]	Present value for the heating controller. Go to page with all controller settings.
Output signal	0...100 [%]	Present value for heating valve output. Go to page with all analog output settings.
Setpoint Extra Seq	0.0...99.0 [°C]	**For *Heating 2* only**: Setpoint for additional stand-alone heating register.
Frost protection	0...100 [%]	Present value for the frost controller. Go to heating register frost protection page to parameterize frost control.
Pump	– On – Off	Current pump status. Go to heat pump page to parameterize the pump.
Pre heating	– Passive – Active	Present state of preheating. Go to heating register preheating page to parameterize the preheating function for the register.
Frost monitor	– OK – Frost	Present state of frost detector. Go to page with digital input settings. For the *Frost* state, the pump starts, the heating valve opens to 100% and the plant is shut down and locked.

5.9.3 Heat pump

Prerequisite

Heat pump is enabled:
Main Index > Configuration > Configuration 2 > Heating pump ≠ No
Main Index > Configuration > Configuration 2 > Heating 2 pump ≠ No

Functions

The pump **starts**, if one of the following conditions is met:
- No fault is pending **and** the heating valve is opened to at least 5%.

or
- The outside air temperature is less than the *Pump start tmp*

or
- Pump kick is enabled.

The pump **stops** for the following cases:
- A fault occurs.

or
- The heating valve is under 1%.

Record operating hours

Operating hours for the pump can be recorded and reset:
Main Index > Unit > Operating hours > Heating pump or Heating 2 pump Reset

Parameter

Main Index > Unit > Temp control > Heating > Pump
Main Index > Unit > Temp control > Heating 2 > Pump

Name	Range	Function
Command	– Off – On	Current pump state. Go to page with digital output settings.
Fdbk	– OK – No Fdbk	Present state of pump feedback. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 5 s).
Alarm	– OK – Alarm	Current pump alarm state. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 0 s).
Start up delay fdbk	0...36000 [s]	Defines the period after a pump start without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Off by fdbk alarm	– No – Yes	Determines, in the event of a feedback fault, whether a pump command is still pending or whether to switch off the command.
Outs tmp start	-64...64 [°C]	The pump starts when the outside air temperature drops below this value. Heat is thus available immediately for heating (passive frost protection) when switching on the plant. The function is disabled when no outside air temperature is configured or the sensor fails.
Min run time	0...36000 [s]	Define the minimum runtime for the pump after a start.

Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

5.9.4 Pump kick

Prerequisite

Pump kick is enabled.
Main Index > Configuration > Configuration 2 > Heating pump = Yes+Kick
Main Index > Configuration > Configuration 2 > Heating 2 pump = Yes+Kick

Function

The pump is switched on for a short period for longer idle periods.
This prevents lock up.

Parameter

Main Index > Unit > Temp control > Heating > Pump
Main Index > Unit > Temp control > Heating 2 > Pump

Name	Range	Function
Kick date / time	Mo 00:00...So 23:29	Weekday and time for pump kick. Sets the weekday (Mon...Sun) and time to run the pump kick. Examples: Mon *:* Each Monday at midnight. Sat 07:* Each Saturday at 7:00 am. * *:* Time is not relevant; the kick interval applies accordingly.
Kick interval	0.0...36000.0 [h]	Idle time for pump kick. Set the idle time after which a pump kick is run. Examples: 168 After 168 hours. 123.4 After 123 hours and 24 minutes. 0 Idle time is not relevant; kick date/time applies accordingly.
Kick on time	0.0...36000 [s]	Set the period for the pump kick. Examples: 10 Period = 10 seconds. 0 Period = 1 controller cycle (approx. 150 ms).

Kick date/time = * *:* and kick interval = 0:
→ No pump kick is run.

5.9.5 Heating register frost protection

Prerequisite

Frost protection type is enabled:
Master Index > *Configuration* > *Configuration 2*, *Htg frost protect* ≠ *No*
Master Index > Configuration > *Configuration 2*, *Heating 2 frost protect* ≠ No

Functions

– For heat demand frost controller > heat demand heating controller
  → The output follows the frost controller.
– For heat demand frost controller > heat demand heating controller
  → The output follows the heat controller.
– Frost control remains active when the plant is off (Building Protection).
– Controller is disabled when the sensor fails.
– For the *Frost* state (frost protection monitor is triggered), the pump starts, the heating valve opens to 100% and the plant is shut down and locked.

Parameter

Master Index > Unit > Temp control > Heating > Frost protection
Master Index > Unit > Temp control > Heating 2 > Frost protection

Name	Range	Function
Controller	0...100 [%]	Present value for the frost controlled. Go to controller settings page.
Setpoint	-64...64 [°C]	– For one setpoint: Present setpoint for the frost controller. – For 2 setpoints: Present setpoint for the frost controller, if the plant is operating.
Standby Setpoint	-64...64 [°C]	Present setpoint for the frost controller, if the plant is **not operating**. This value only exists on one of the following settings is selected: *Master Index* > *Configuration* > *Configuration 2*, *HtgFrost* = *Sensor2Spv* or *2Spv+Dtctr*

5.9.6 Preheat heating register

Prerequisite

Preheating is enabled:
Master Index > *Configuration* > *Configuration 1*, *Heating* = *+PreHeat OutsideTemp* or *FrostTemp*.
Master Index > *Configuration* > *Configuration 1*, *Heating 2* = *+PreHeat OutsideTemp* or *FrostTemp*.

Functions

– The heating valve is 100% opened for the period *Pre htg on time* if the outside air temperature is lower than *Outs air tmp X2* at plant start.
The heating valve then goes to the position defaulted by both auxiliary points and are released for plant start (delay for *Damper opening Ti* and *SupplyFan delay*)
– It assumes the present position after the complete heating controller is released.
– The function is blocked for the period *Min off time* after preheating is completed.
– The function is deactivated when the outside air temperature senor not activated or fails.

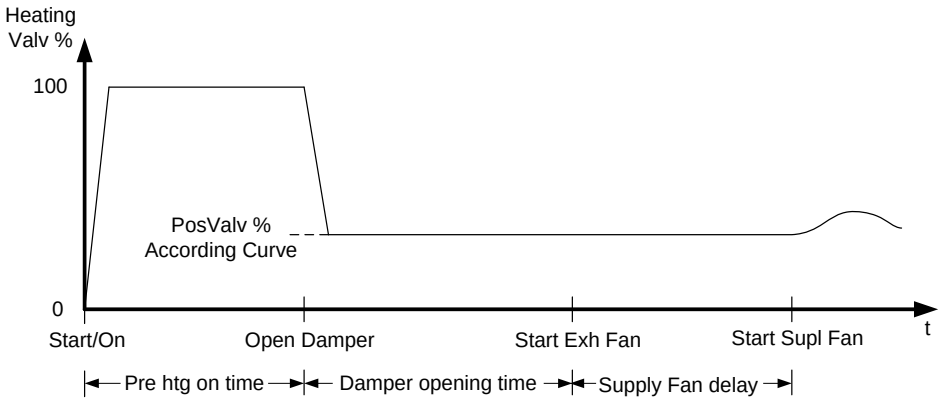


Figure 36: Function of the preheat heating register

Parameter

Main Index > Unit > Temp control > Heating > Preheating
Main Index > Unit > Temp control > Heating 2 > Preheating

Name	Range	
Mode	On Off	Current status preheating.
Outs air tmp X1	-30.0...5.0 [°C]	Lower design temperature.
Outs air tmp X2	0.0...50.0 [°C]	Upper design temperature.
Output signal Y1	0...100 [%]	Value for lower design temperature.
Output signal Y2	0...100 [%]	Value for upper design temperature.
Pre htg on time	0...600 [s]	Time to preheat lines and register.
Min off time	0.0...1400.0 [min]	Minimum off time for the function after preheating is completed.

5.10 Electric register/electric register 2
5.10.1 Overview

Introduction

This section describes configuring and parameterizing heating register functions.

Elements

The figure illustrates the participating plant elements (with gray background):

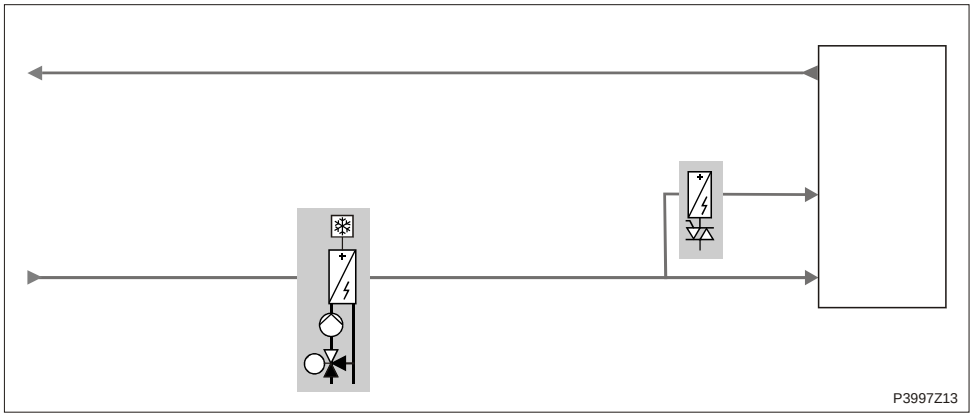


Figure 37: Overview of the plant elements for electric register/electric register 2

Topic

The topics in the section are:

Topic	Section
General	6.10.2
Electric register output high limit control	6.10.3

5.10.2 General

Content

This section describes enabling, configuring, and parameterizing general electric register functions.

Prerequisite

Electrical heating / *Electrical heating 2* are enabled and preconfigured in *Configuration 1*, *Configuration 2* and *Configuration IOs*.

Functions

Both electric registers can be deployed with up to 3 stages (binary).
An alarm is possible for each register.
Register output is limited by fan out, which prevent the register from overheating.
The additional electric heating register can be operated as a separate register with its own setpoint.

The heating register is locked, if:
– *Tmp start* (unoccupied) cool
– Summer free cooling

A maximum of one of the two additional registers *Heating 2* or *El Heating 2* can be integrated into the temperature control sequence.

Enable

Main Index > Configuration > Configuration 1

Name	Range	Function
Electrical heating / El Heating 2	– No	– No (additional) electric register.
	– Analog	– (Additional) electric register with analog control.
	– 1Step	(Auxiliary) 1-step electric heating register.
	– 2Steps	(Auxiliary) 2-step electric heating register.
	– 3Steps	(Auxiliary) 3-step electric heating register.

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
El Htg alarm / El heating 2 alarm	No	No alarm.
	Alarm	With alarm.
El heating 2 control	StandAlone	Not integrated in sequence.
	InSequence	Integrated in sequence.

Stage control

The stages are controlled as follows for electric heating registers (2 step):

	DO1	DO2
Off	0	0
Stage1	1	0
Stage2	1	1

The stages are controlled as follows for electric heating registers (3 step):

	DO1	DO2
Off	0	0
Stage1	1	0
Stage2	0	1
Stage3	1	1

Parameterization

Main Index > Unit > Temp control > Electrical heating /
Main Index > Unit > Temp control > El Heating 2

Name	Range	Function
Controller	0...100 [%]	Present value for the heating controller. Go to controller settings page.
Output signal	0...100 [%]	Present value for output. Go to page with all analog output settings.
Command	– Off – Stage 1 – Stage 2 – Stage 3	Present state of electric register. Go to page with staged output settings.
Extra Seq setpoint	0.0...99.0 [°C]	**For *El Heating 2* only**: Setpoint for additional stand-alone heating register.
Alarm	– Ok – alarm	Register alarm state. Go to page with digital inputs.
Start stage 1	0...100 [%]	Controller heat demand to start the first stage.
Start stage 2	Start stage 1...100 [%]	Controller heat demand to start the second stage.
Start stage 3	Start stage 2...100 [%]	Controller heat demand to start the third stage.
Stage hys off	0...Start stage 1 [%]	Shutdown hysteresis of the stages. See example.
Max limitation fan		Go to *Max fan limitation* page to parameterize the register output limitation by fan output.

Example of shutdown hysteresis

Start stage 1 = 20 %
Start stage 2 = 40 %
Start stage 3 = 60 %
Stage hys off = 10 %

Off Stage 3: 50%
Off Stage 2: 30%
Off Stage 1: 10%

5.10.3 Electric register output high limit control

Prerequisite

Electric heating register is enabled:
Main Index > Configuration > Configuration 1 > Electrical heating ≠ No
Main Index > Configuration > Configuration 1 > El Heating 2 ≠ No

Parameterization

Main Index > Unit > Temp control > Electrical heating > Max limitation fan
Main Index > Unit > Temp control > El Heating 2 > Max limitation fan

Name	Range	Function
		Set the maximum allowable electric register output for the given active fan stage. The value limits the maximum possible control heat demand. The settings depend on electric register and fan output. Must be clarified with the manufacturer as required!
Fan stage 1	0...100 [%]	Allowed electric register output when the fan is operating on stage 1 or using the setpoint with the setpoint for stage 1.
Fan stage 2	0...100 [%]	Allowed electric register output when the fan is operating on stage 2 or using the setpoint with the setpoint for stage 2.
Fan stage 3	0...100 [%]	Allowed electric register output when the fan is operating on stage 3 or using the setpoint with the setpoint for stage 3.

Example

Fan stage1 = 30%
Start stage2 = 40%

In this case, the controller output for fan state 1 is limited to 30%.
So that the switch-on point of 40% for electric register stage 2 is never achieved.

5.11 Cooling/Cooling 2 **
5.11.1 Overview

The functions *Cooling 2* apply to controller **POL63X** only.

Introduction

This section describes configuring and parameterizing heating register functions.

Plant elements

The figure illustrates the participating plant elements (with gray background):

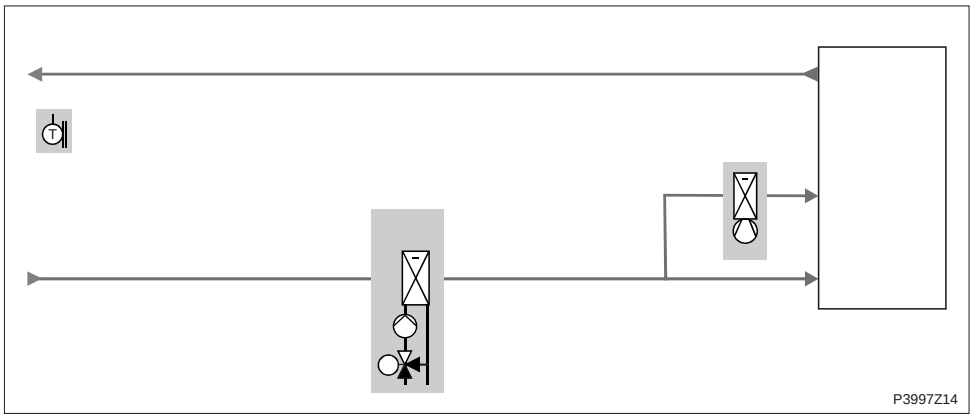


Figure 38: Overview of the plant elements for cooling/cooling 2 **

Topic

The topics in the section are:

Topic	Section
General	6.11.2
Cooling pump	6.11.3
Pump kick	6.11.4
Direct expansion evaporator control	6.11.5
Expansion evaporator output high limit control	6.11.6

5.11.2 General

Content

This section describes enabling, configuring, and parameterizing general cooling functions.

Enable cooling register

Main Index > Configuration > Configuration 1

Name	Range	Function
Cooling / Cooling 2	– No	– No (auxiliary) cooling register.
	– Water	– (auxiliary) cold water register.
	– DX 1Step	– (Auxiliary) 1 step direct expansion evaporator aggregate.
	– DX 2Steps	– (Auxiliary) 2 step direct expansion evaporator aggregate.
	– DX 3Steps	– (Auxiliary) 3 step direct expansion evaporator aggregate.

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
Cooling pump / Cooling 2 pump	No	No cooling register pump.
	Yes	Cooling register pump without pump kick.
	Yes+Kick	Cooling register pump with pump kick.
Clg pump alarm / Cooling 2 pump alm	No	Pump without alarm or feedback.
	Alarm	Pump with alarm.
	Fdbk	Pump with feedback.
	Both	Pump with alarm and feedback.
ClgDX alarm / Cooling 2 Dx alarm	No	Direct expansion evaporator without alarm or feedback.
	Alarm	Direct expansion evaporator with alarm.
	Fdbk	Direct expansion evaporator with feedback.
	Both	Direct expansion evaporator with alarm and feedback.
Cooling 2 control	StandAlone	Not integrated in sequence.
	InSequence	Integrated in sequence.

Functions

- You can select between cold water register and direct expansion evaporator for both cooling registers.
- The cold water register can be operated with or without pump (with pump kick, alarm, feedback).
- The direct expansion evaporator register can have up to 3 stages (binary control). It blocks cooling when outside air temperatures are too low.
- The additional cooling register can be operated as an option as a separate register with its own setpoint, or an additional register can be integrated into the temperature control sequence.
- The cooling register can be forced shut down:
  - *Tmp start* (unoccupied) heating
  - Summer free cooling

Stage control

The stages are controlled as follows for direct expansion evaporators (2 steps):

	DO1	DO2
Off	0	0
Stage1	1	0
Stage2	1	1

The stages are controlled as follows for direct expansion evaporators (3 steps):

	DO1	DO2
Off	0	0
Stage1	1	0
Stage2	0	1
Stage3	1	1

Parameterization

Main Index > Unit > Temp control > Cooling
Main Index > Unit > Temp control > Cooling 2

Name	Range	Function
Controller	0...100 [%]	Present value for cooling controller. Go to controller settings page.
Output signal	0...100 [%]	Present value for heating valve output. Go to page with all analog output settings.
Extra Seq setpoint	0.0...99.0 [°C]	**For *Cooling 2* only**: Setpoint for additional stand-alone cooling register.
Disable by outs tmp	-64...64.0 [°C]	Cooling is blocked when the outside air temperature is below this value. The function is disabled when no outside air temperature is configured or the sensor fails.
Pump.	On Off	Current pump status. Jump to pump for cooling register page to parameterize the pump.
Direct expansion	Off Stage1 Stage2 Stage3	Present state of direct expansion evaporator. Jump to DX cooling page to parameterize the direct expansion evaporator.
Max limitation fan	---	Go to *Cooling Fan Max Limitation* page to parameterize output limitation for the direct expansion evaporator.

5.11.3 Cooling pump

Prerequisite

Pump for cooling register enabled:
Main Index > Configuration > Configuration 2 > Cooling pump ≠ No
Main Index > Configuration > Configuration 2 > Cooling 2 pump ≠ No

Function

The pump **starts**, when the following conditions are met:
- No fault is pending **and** the cooling valve is at least opened to 5%.

or
- Pump kick is enabled.

The pump **stops** for the following cases:
- A fault occurs.

or
- The cooling valve is opened under 1%.

Record operating hours

Operating hours for the pump can be recorded and reset:
Main Index > Unit > Operating hours > Cooling pump or **Cooling 2 pump reset.**

Parameterization

Main Index > Unit > Temp control > Cooling > Pump
Main Index > Unit > Temp control > Cooling 2 > Pump

Name	Range	Function
Command	On Off	Present value of the pump. Go to page with digital output settings.
Fdbk	OK No fdbk	Present state of pump feedback. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 5 s).
Alarm	OK Alarm	Current pump alarm state. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 0 s).
Start updelay fdbk	0...36000 [s]	Defines the period after a pump start without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Off by fdbk alarm	No Yes	Determines, in the event of a feedback fault, whether a pump command is still pending or whether to switch off the command.
Min run time	0...36000 [s]	Define the minimum runtime for the pump after a start. In the event of a fault, the evaporator is shut down immediately without regard to the minimum runtime.

Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

5.11.4 Pump kick

Prerequisite

Pump kick is enabled.
Main Index > Configuration > Configuration 2 > Cooling pump = Yes+Kick
Main Index > Configuration > Configuration 2 > Cooling 2 pump = Yes+Kick

Function

The pump is switched on for a short period for longer idle periods.
This prevents lock up.

Parameterization

Main Index > Unit > Temp control > Cooling > Pump
Main Index > Unit > Temp control > Cooling 2 > Pump

Name	Range	Function
Kick date / time	Mo 00:00...So 23:29	Weekday and time for pump kick. Sets the weekday (Mon...Sun) and time to run the pump kick. Examples: Mon *:* Each Monday at midnight. Sat 07:* Each Saturday at 7:00 am. * *:* Time is not relevant; the kick interval applies accordingly.
Kick interval	0.0...36000.0 [h]	Idle time for pump kick. Set the idle time after which a pump kick is run. Examples: 168 After 168 hours. 123.4 After 123 hours and 24 minutes. 0 Idle time is not relevant; kick date/time applies accordingly.
Kick on time	0.0...36000 [s]	Set the period for the pump kick. Examples: 10 Period = 10 seconds. 0 Period = 1 controller cycle (approx. 150 ms).

Kick date/time = * *:* and kick interval = 0:
→ No pump kick is run.

5.11.5 Direct expansion evaporator control

Prerequisite

Direct expansion evaporator is enabled:
Main Index > Configuration > Configuration 1 > Cooling = DX [x]Step
Main Index > Configuration > Configuration 1 > Cooling 2 = DX [x]Step

Parameterization

Main Index > Unit > Temp control > Cooling > Direct expansion
Main Index > Unit > Temp control > Cooling 2 > Direct expansion

Name	Range	Function
Command	– Off – Stage1 – Stage2 – Stage3	Present state of direct expansion evaporator. Go to page with staged output settings.
Fdbk	– Ok – Alarm	Present value of the feedback for the direct expansion evaporator. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 1 s).
Alarm	– OK – Alarm	Present alarm state of direct expansion evaporator. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 0 s).
Start up delay fdbk	0...36000 [s]	Defines the period after a start without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Min run time	0...36000 [s]	Define the minimum runtime after a start.
Min off time	0...600 [s]	Minimum idle time for the direct expansion evaporator after a stop.
Min stage time	5...600 [s]	Minimum runtime for a stage prior to stepping up to the next step. Note: This period remains active when intervening using the operator unit: Even for a direct jump from off to stage 3, the output remains on each individual step for the minimum runtime.
Start stage 1	0...100 [%]	Controller refrigerator demand to start the first stage.
Start stage 2	Start stage 1...100 [%]	Controller refrigeration demand to start the second stage.
Start stage 3	Start stage 2...100 [%]	Controller refrigeration demand to start the third stage.
Stage hys off	0...Start stage 1 [%]	Shutdown hysteresis of the stages. See example.

Example of shutdown hysteresis

Start stage 1 = 20%
Start stage 2 = 40%
Start stage 3 = 60%
Stage hys off = 10%

Off stage 3: 50%
Off stage 2: 30%
Off stage 1: 10%

Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

5.11.6 Expansion evaporator output high limit control

Prerequisite

Direct expansion evaporator is enabled:
Main Index > Configuration > Configuration 1 > Cooling = DX...
Main Index > Configuration > Configuration 1 > Cooling 2 = DX...

Parameterization

Main Index > Unit > Temp control > Cooling > Max limitation fan
Main Index > Unit > Temp control > Cooling 2 > Max limitation fan

Name	Range	Function
		Set the maximum allowable expansion evaporator output for the given active fan stage. The value limits the maximum possible refrigeration demand. The settings depend on expansion evaporator and fan output. Must be clarified with the manufacturer as required!
Fan stage 1	0...100 [%]	Allowed expansion evaporator output when the fan is operating on stage 1 or using the setpoint with the setpoint for stage 1.
Fan stage 2	0...100 [%]	Allowed expansion evaporator output when the fan is operating on stage 2 or using the setpoint with the setpoint for stage 2.
Fan stage 3	0...100 [%]	Allowed expansion evaporator output when the fan is operating on stage 3 or using the setpoint with the setpoint for stage 3.

Example

FanStage1 = 30%
StartStage2 = 40%

In this case, the controller output for fan state 1 is limited to 30%.
So that the switch-on point of 40% for expansion evaporator stage 2 is never achieved.

5.12 Humidity control with POL63X
5.12.1 Overview

Introduction

This section describes the functions relating to humidity and dehumidification control, including:

- Enable and configure
- Setpoints and deviation alarms
- Humidifier pump
- Fan compensation

Elements

The figure illustrates the participating plant elements (with gray background):

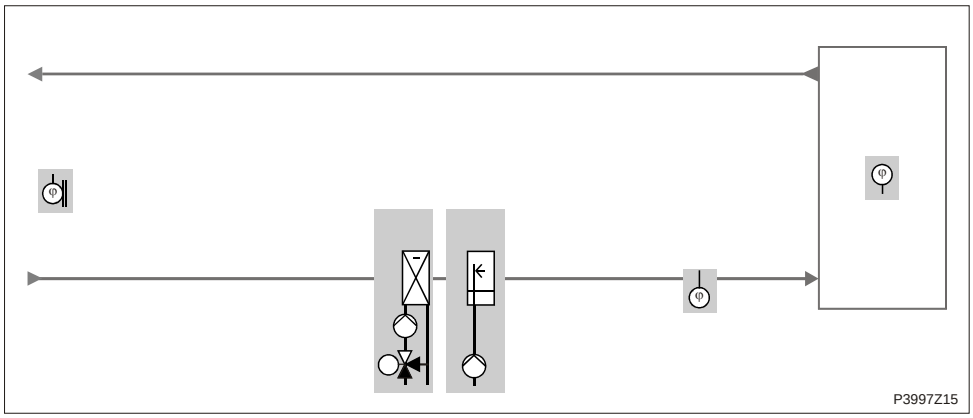


Figure 39: Overview of the plant elements for humidity control with POL63X

Topic

The topics in the section are:

Topic	Section
General	6.12.2
Humidity setpoints	6.12.3
Humidity deviation alarm	6.12.4
Maximum supply air humidity	6.12.5
Humidification controller	6.12.6
Humidifier pump	6.12.7
Humidifier pump kick	6.12.8
Fan compensation	6.12.9

5.12.2 General

Content

This section describes enabling, configuring, and parameterizing general humidity control functions.

Enable

Main Index > Configuration > Configuration 1

Name	Range	Function
Room hum sensor	No Yes	Room humidity sensor.
Supply air hum sensor	No Yes	Supply air humidity sensor.
Outs air hum sensor	No Yes	Outside air humidity sensor.
Cooling	 No Water DX1step DX2steps DX3steps	Only required for dehumidification! No (auxiliary) cooling register. (Auxiliary) cold water register. (Auxiliary) 1 step direct expansion evaporator aggregate. (Auxiliary) 2 step direct expansion evaporator aggregate. (Auxiliary) 3 step direct expansion evaporator aggregate.
Humidity control	No Hum Dehum Hum+Dehum	No humidification and dehumidification. Humidification only. Dehumidification only. Humidification and dehumidification.

Heater 2 and *elec. Heater 2* are switched off if dehumidification is enabled – it should be installed prior to the cooling register.

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
Hum control mode	 – No – Room – Supply – RoomCasc	Type of humidity control. – No humidity control. – Room control only. – Supply air temperature control only. – Room / supply air temperature cascade control.
Hum control unit	 – Relative – Absolute – CacsRelAbs	Type of humidity control. – Relative humidity control. – Absolute humidity control. – Cascade control with relative room and absolute supply air humidity control.

Configure, *cont'd*

Name	Range	Function
Hum stpt selection		Predefined variants for humidity setpoints:
	– Hum/Dehum	– Humidification and dehumidification setpoint is entered directly.
	– +/- HalfDz	– Base setpoint and dead zone is entered.
	– Hum+Dz	– Humidification setpoint and dead zone is entered.
	– dehum-Dz	– Dehumidification setpoint and dead zone is entered.
Dehum tmp prio		Dehumidification is reduced dependent on the heating output:
	– No	– Function not enabled.
	– Yes	– As of 90%, heating valve position reduces dehumidification.
Dew point control	– No	Dew point monitoring.
	– Yes	
Hum deviation alarm		Monitors setpoint/actual value of humidification. An alarm is triggered for deviations over a certain period:
	– No	– No monitoring.
	– Room/Extr	– Monitors room/extract humidity only.
	– Supply	– Monitors supply air humidity only.
	– Sply+RmEx	– Monitors supply air and room/extract humidity.
Humidifier pump	– No	– No humidifying pump.
	– Yes	– Humidifying pump without pump kick.
	– Yes+Kick	– Humidifying pump with pump kick.
Hum pump alarm	– No	– Pump without alarm or feedback.
	– Alarm	– Pump with alarm.
	– Fdbk	– Pump with feedback.
	– Both	– Pump with alarm and feedback.
Humidifier fdbk	– No	– Humidifier without feedback.
	– Yes	– Humidifier with feedback.

Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

Functions

- Water vapor or air washer is used for humidification.
- Enable and analog control signal planned for the humidifier.
- A pump (with or without kick functions, with alarm and/or feedback signal) can be enabled.
- Humidification can be locked in summer.
- It can monitor achieving the setpoint or deviations over longer periods.
  Any eventual dehumidification can be limited when heat demand is too large.
- It can also monitor and impact dew point and supply air temperature.

Parameterization

Main Index > Unit > Humidity control

Name	Range	Function
Act controlled hum	---	Actual humidity used to control humidity. This may be supply air or room humidity depending on setting and control type.
Setpoints	---	Go to setpoint page with all setpoints related to humidity control: Humidification, dehumidification, cascade control, deviation alarm.
Cascade controller	---	Displays humidification and dehumidification setpoint. Go to cascade controller page with detailed settings.
Max controller sply		Go to page for max ctlr sply to parameterize the maximum limit controller. You can limit the maximum allowable supply air humidity via the supply air humidity sensor when room control only is enabled.
Humidification	0...100 [%]	Present value of humidity control. Go to parameter page for humidity control.
Dehumidification	0...100 [%]	Present value of dehumidification control. Go to parameter page for dehumidification control.
Fan compensation	0...100 [%]	Present value of the fan humidity compensation. Go to parameter page for fan humidity compensation.
Summer disable	– No – Yes	Shuts off humidification in the summer (summer/winter changeover must be enabled).
Dew point	-64...64 [°C]	Present calculated dew point.
Dew point dead zone	-64...64 [°C]	Dead zone for dew point (minimum discharge temperature for temperature control = present calculated dew point + dead zone.

5.12.3 Humidity setpoints

Parameter **Main Index > Unit > Humidity control > Setpoints**

Name	Range	Function
Act controlled hum	Room [%r.H.] or [g/kg] Supply [%r.H.] or [g/kg]	Actual humidity used for control (%r.H. or g/kg depending on control type). This may be supply air or room humidity depending on setting and control type.
Act dehum stpt	0.0...100.0 [%r.H.] or [g/kg]	Actual calculated room or supply air dehumidification setpoint (%r.H. or g/kg).
Act hum stpt	0.0...100.0 [%rH] or [g/kg]	Actual calculated room or supply air humidification setpoint (%r.H. or g/kg).
Act sply dehum stpt	0.0...100.0 [%rH] or [g/kg]	Actual calculated supply air dehumidification setpoint for a cascade control (%r.H. or g/kg).
Act sply hum stpt	0.0...100.0 [%rH] or [g/kg]	Actual calculated supply air humidification setpoint for a cascade control (%r.H. or g/kg).
Setpoint	0…100 [%rH]	Base setpoint. Only available when *Hum stpt selection* = *+/-Half degree Celsius*.
Dead zone	0…100 [%rH]	Comfort dead zone. Only available when *Hum stpt selection* = *Dehum -degrees Celsius* or *Hum+degrees Celsius* or *+/-half degree Celsius*.
Dehum stpt	0…100 [%rH]	Setpoint for dehumidification. Only available when *Hum stpt selection* = *Hum/dehum* or *Dehum/-degree Celsius*.
Hum stpt	0…100 [%rH]	Setpoint for humidification. Only available when *Hum stpt selection* = *Hum/dehum* or *Hum/-degree Celsius*.
Setpoint	0…100 [g/kg]	Base setpoint. Only available when *Hum stpt selection* = *+/-Half degree Celsius*.
Dead zone	0…100 [g/kg]	Comfort dead zone. Only available when *Hum stpt selection* = *Dehum -degrees Celsius* or *Hum+degrees Celsius* or *+/-half degree Celsius*.
Dehum stpt	0…100 [g/kg]	Setpoint for dehumidification. Only available when *Hum stpt selection* = *Hum/dehum* or *Dehum/-degree Celsius*.
Hum stpt	0…100 [g/kg]	Setpoint for humidification. Only available when *Hum stpt selection* = *Hum/dehum* or *Hum/-degree Celsius*.
Sply hum min stpt	0…100 [%r.H.]	Lowest allowable supply air humidity for a cascade control.
Sply hum max stpt	0…100 [g/kg]	Highest allowable supply air humidity for a cascade control.
Sply hum max stpt	0…100 [%r.H.] or [g/kg]	Highest allowable supply air humidity for pure cascade control for room humidity control with supplemental available supply air humidity sensor. Limited control of the humidity controller occurs for supply air humidity > *Supply hum min*.
Sply hum dev alarm	---	Go to parameter page for supply air monitoring.
Room hum dev alarm	---	Go to parameter page for room humidity monitoring.

5.12.4 Humidity deviation alarms

Prerequisite

Supply air humidity deviation alarm:

- A supply air humidity sensor must be available:
  Main Index > Configuration > Configuration 1 > Supply hum sensor = Yes.
- Deviation alarm must be enabled:
  Main Index > Configuration > Configuration 2 > Deviation alarm hum ≠ No.

Room air humidity deviation alarm:

- A room air humidity sensor must be available:
  Main Index > Configuration > Configuration 1 > Room hum Sensor = Yes.

Function

Setpoint/actual value monitoring of humidity: An alarm is triggered for the following cases when the humidity deviates from the setpoint during a certain period:

– *Actual value* < *Min limit*.
– *Actual value* > *Setpoint* + *Maximum*.
– *Actual value* < *Setpoint* – *Maximum*.
– *When setpoint* – *Maximum* < *Min limit*, Min limit applies as the comparison value.

Parameter

Main Index > Unit > Humidity control > Hum setpoints > Sply hum dev alarm
Main Index > Unit > Humidity control > Hum setpoints > Room hum dev alarm

Name	Range	Function
Alarm	– Passive – Active	Alarm state. Go to settings page for digital alarms. Set all control-related settings such as alarm delay (default 3600 s).
Min limit	0...99.0 [%r.H.] or [g/kg]	An alarm is triggered below this humidity.
Maximum deviation	0...99.0 [%r.H.] or [g/kg]	Maximum allowable deviation between setpoint and actual value.
Start up delay	0…36000 [s]	The function is enabled after this period after a start.

Monitoring is switched off when the humidity sensor fails.

5.12.5 Maximum supply air humidity

Prerequisite

Main Index > Configuration > Configuration 1 > Supply hum sensor = Yes
Main Index > Configuration > Configuration 2 > Hum control mode = Room

Function

Limit supply air humidity for room control only to prevent discharge humidity that is too high.

Parameter

Main Index > Unit > Humidity control > Max controller sply

Name	Range	Function
Max controller sply	0...100 [%r.H.] or [g/kg]	Actual value for the maximum limit controller. Go to controller settings page. This is where you enter all control-related settings.
Max setpoint	0.0...100 [%r.H.] or [g/kg]	Highest allowable supply air humidity for a room humidity control. Limited control of the humidity controller occurs for supply air humidity > *Max*.

5.12.6 Humidification controller

Prerequisite **Main Index > Configuration > Configuration 1 > Humidity control = Hum** or **Dehum+Hum**

Function Humidification controller

Parameter **Main Index > Unit > Humidity control > Humidification**

Name	Range	Function
Controller	0…100 [%]	Present value for the controller. Go to page with all controller settings.
Output signal	0…100 [%]	Present value for output. Go to page with all analog output settings.
Command	– Off – On	Present state of humidifier. Go to page with all digital output settings.
Feedback	– Ok – No Fdbk	Condition: **Master Index > Configuration > Configuration 2 > Humidifier fdbk ≠ No.** Present value of the feedback. Go to page with all digital input settings. For example, you can set the time for jitter protection (default: 5 s).
Pump	– Off – On	Current pump status. Go to humidifier pump page.
Start up delay fdbk	0…36000 [s]	Defines the period after a humidifier start without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Off by fdbk alarm	– No – Yes	Determines, in the event of a feedback fault, whether a humidifier command is still pending or whether to switch off the command.

Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

5.12.7 Humidifier pump

Prerequisite

Humidifier pump is enabled:
Main Index > Configuration > Configuration 2 > Humidifier Pump ≠ No

Function

The pump **starts**, if one of the following conditions is met:
- No fault is pending **and** the output for the humidifier controller is opened to at least 5%.

or
- Pump kick is enabled.

The pump **stops** for the following cases:
- A fault occurs.

or
- The humidifier controller is under 1%.
  Which conditions apply here?

Record operating hours

Operating hours for the pump can be recorded and reset:
Main Index > Unit > Operating hours > Humidifier pump

Parameter

Main Index > Unit > Humidity control > Humidification > Pump

Name	Range	Function
Command	Off On	Current pump state. Go to page with digital output settings.
Feedback	OK No Fdbk	Present state of pump feedback. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 5 s).
Alarm	OK Alarm	Current pump alarm state. Go to page with digital input settings. For example, you can set the time for jitter protection (default: 0 s).
Start up delay fdbk	0...36000 [s]	Defines the period after a pump start without feedback before a feedback alarm is triggered. Jitter time is enabled exclusively if the feedback is pending after this period.
Off by fdbk alarm	No Yes	Determines, in the event of a feedback fault, whether a pump command is still pending or whether to switch off the command.
Min run time	0...36000 [s]	Define the minimum runtime for the pump after a start.

Feedback can only be used as alarm, when *Contact function* = *NO* (Normally Open) and the element is set to *ON*.

5.12.8 Humidifier pump kick

Prerequisite

Pump kick is enabled.
Main Index > Configuration > Configuration 2 > Humidifier pump = Yes+Kick

Function

The pump is switched on for a short period for longer idle periods. This prevents lock up.

Parameter

Main Index > Unit > Humidity control > Humidification > Pump

Name	Range	Function
Kick date / time	Mo 00:00...So 23:29	Weekday and time for pump kick. Sets the weekday (Mon...Sun) and time to run the pump kick. Examples: Mon *:* Each Monday at midnight. Sat 07:* Each Saturday at 7:00 am. * *:* Time is not relevant; the kick interval applies accordingly.
Kick interval	0.0...36000.0 [h]	Idle time for pump kick. Set the idle time after which a pump kick is run. Examples: 168 After 168 hours. 123.4 After 123 hours and 24 minutes. 0 Idle time is not relevant; kick date/time applies accordingly.
Kick on time	0.0...36000 [s]	Set the period for the pump kick. Examples: 10 Period = 10 seconds. 0 Period = 1 controller cycle (approx. 150 ms).

Kick date/time = * *:* and kick interval = 0:
→ No pump kick is run.

5.12.9 Fan compensation

Prerequisite

Main Index > Configuration > Configuration 1 > Room hum Sensor = Yes
Main Index > Configuration > Configuration 2 > Fan comp humidity = Yes

Enable

Main Index > Configuration > Configuration 2

Name	Range	Function
Fan comp humidity	– No – Yes	Room-temperature dependent fan compensation.

Function

The controller output reduces or increases the fan setpoint relating to the maximum allowable fan compensation (see as well Fan compensation).

Fan setpoints are increased or decreased, if:
– KP > 0: Room humidity < setpoint.
– KP < 0: Room humidity > setpoint

Parameterization

Main Index > Unit > Humidity control > Fan compensation

Name	Range	Function
Controller	0…100 [%]	Present value for the controller. Go to controller settings page.
Setpoint	0…100 [%]	Controller setpoint relating to the room humidity.
Function	Increase Decrease	Increase the fan setpoint. Reduce the fan setpoint.

Example

– Room humidity setpoint: 50% r.H.
– Present room humidity: 40% r.H.
→ Controller output > 0% (e.g. 50%).

Switch function: Increase
The controller output increases the fan setpoint relating to the maximum allowable fan compensation (See as well Fan compensation).
– Setpoint supply air pressure: 80 Pa (maximum possible setpoint = setpoint of the maximum enabled stage + *Max Force*, e.g. = 120 Pa).
– Maximum allowable fan compensation (100% compensation): 40%.
– Controller output: 50%.
→ New setpoint = 80 Pa + (40 Pa * 50%) = 100 Pa.

Switch function: Decrease
The controller output reduces the fan setpoint relating to the maximum allowable fan compensation (See as well Fan compensation).
– Setpoint supply air pressure: 80 Pa (maximum possible setpoint = setpoint of the maximum enabled stage + *Max Force*, e.g. = 120 Pa).
– Maximum allowable fan compensation (100% compensation): 40 Pa.
– Controller output: 50%.
→ New setpoint = 80 Pa – (40 Pa * 50%) = 60 Pa.

5.13 Dehumidification control with POL42X
5.13.1 Overview

Introduction

This section describes how to configure and parameterize dehumidification control with the POL42X.

Elements

The figure illustrates the participating plant elements (with gray background):

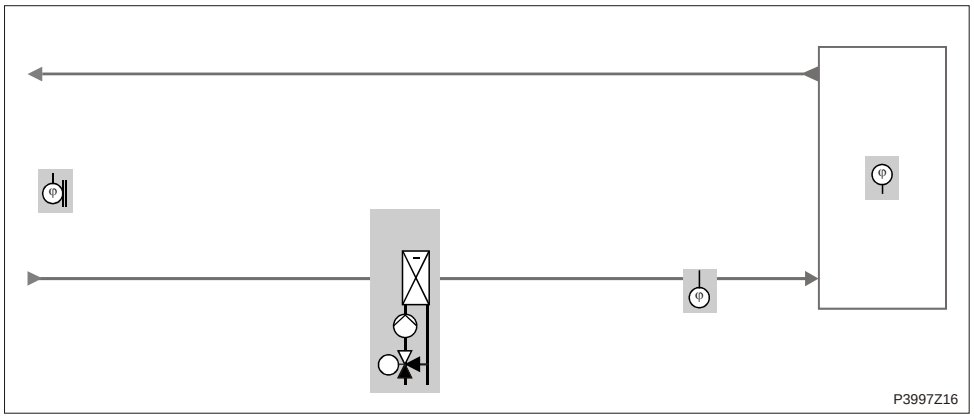


Figure 40: Overview of the plant elements for dehumidification control with POL42X

Topic

The topics in the section are:

Topic	Section
General	6.13.2
Humidity setpoints	6.13.3

5.13.2 General

Content

This section describes enabling, configuring, and parameterizing general dehumidification control functions.

Enable

Main Index > Configuration > Configuration 1

Name	Range	Function
Supply air hum sensor	– No – Yes	Supply air humidity sensor.
Cooling	 – No – Water – DX1step	Only required for dehumidification! – No cooling register. – Cold water register. – 1-step direct expansion evaporator.
Humidity control	– No – Dehum	– No dehumidification. – Dehumidification.

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
Hum control unit	 Relative Absolute	Type of humidity control. Relative humidity control. Absolute humidity control.
Dehum tmp prio	 No Yes	Dehumidification is reduced dependent on the heating output: Function not enabled. As of 90%, heating valve position reduces dehumidification.
Dew point control	No Yes	Dew point monitoring.

Function

It can monitor and impact dew point and supply air temperature.

Parameterization

Main Index > Unit > Humidity control

Name	Range	Function
Act controlled hum	---	Actual humidity used to control humidity. This may be supply air or room humidity depending on setting and control type.
Setpoints	---	Go to setpoint page with all setpoints related to humidity control: Humidification, dehumidification, cascade control, deviation alarm.
Dehumidification	0...100 [%]	Present value of dehumidification control. Go to parameter page for dehumidification control.
Dew point	-64...64 [°C]	Present calculated dew point.
Dew point dead zone	-64...64 [°C]	Dead zone for dew point (minimum discharge temperature for temperature control = present calculated dew point + dead zone).

5.13.3 Humidity setpoints

Parameterization **Main Index > Unit > Humidity control > Setpoints**

Name	Range	Function
Act controlled hum	– Supply [%r.H.] or [g/kg]	Actual supply air humidity used for control (%r.H. or g/kg depending on control type).
Act dehum stpt	0.0...100.0 [%r.H.] or [g/kg]	Actual calculated room or supply air dehumidification setpoint (%r.H. or g/kg).
Dehum stpt	0…100 [%r.H.]	Setpoint for dehumidification. Only available when *Hum stpt selection* = *Hum/dehum* or *Dehum/-degree Celsius*.
Dehum stpt	0…100 [g/kg]	Setpoint for dehumidification. Only available when *Hum stpt selection* = *Hum/dehum* or *Dehum/-degree Celsius*.

5.14 Air quality control **

The function *Air quality control* applies to controller **POL63X** only.

Function

The fans (section 5.5.8) and/or mixed air dampers (section 5.7) are influenced based on air quality:

– The fresh air volume is increased when CO2 content is too high (fan speed increases; recirculation flow is reduced).
– The fresh air volume is increased when outside CO content is too high (fan speed decreases; recirculation flow is increased).

Elements

The figure illustrates the participating plant elements (with gray background):

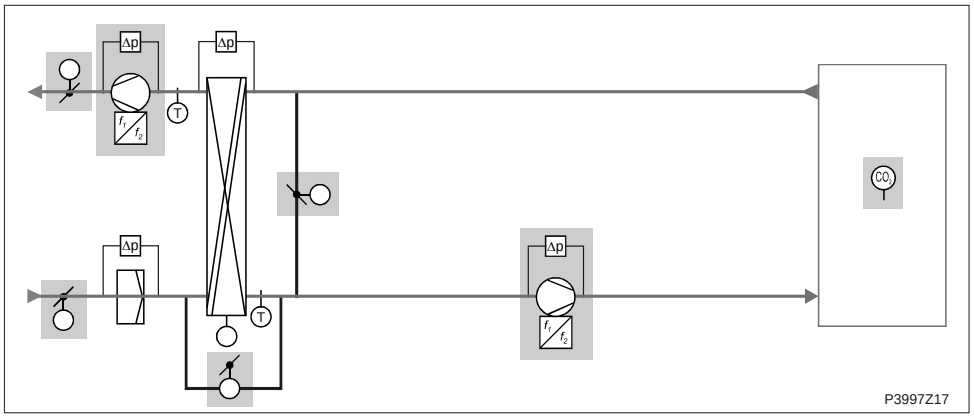


Figure 41: Overview of the plant elements for air quality control **

Prerequisite

Main Index > Configuration > Configuration 2 > Fan comp air qual = Yes
and / or
Main Index > Configuration > Configuration 2 > Hrec comp air qual = Yes

Parameter

Main Index > Unit > Air quality control

Name	Range	Function
Controller	0…100 [%]	Present value for the controller. Go to controller settings page.
Function	– Normal – Inverted	The control direction of the controller must be selected depending on demand: Normal for CO_2. Inverted for CO.
Setpoint	0…3000 [ppm]	Air quality control setpoint.

5.15 Auxiliary functions
5.15.1 Overview

Content

This section describes the functions for the auxiliary input and output *Aux* as well as the scheduler program TSP.
This functions have no impact on control.
They are used exclusively to display, switch or control independent devices.

Elements

The figure illustrates the participating plant elements:

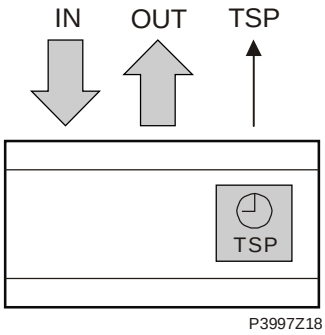


Figure 42: Overview of the plant elements for auxiliary functions

Topic

The topics in the section are:

Topic	Section
Inputs/outputs "Aux"	6.15.2
TSP output	6.15.3

5.15.2 Inputs/outputs *Aux*

Content

This section describes configuring and parameterizing auxiliary inputs and outputs (Aux).

Requirements

In *Configuration 1*: None

Configuration

Main Index > Configuration > Configuration 2

Name	Range	Function
Auxiliary input	No Input Alm Inp+Alm	No auxiliary input. Auxiliary input for display only. Auxiliary input with alarm. Two auxiliary inputs: To display and with alarm.
Aux tmp sensor	No Yes	Auxiliary input for temperature sensor.
Aux TSP output	No Yes	An auxiliary digital output controller by its own time switch program.
Aux A outp fan	No Yes	Auxiliary analog output that provides a 0-10 V signal depending on the present fan step.
Aux op mode indication	No Yes	Auxiliary digital output that displays whether a desired operating mode for the plant (e.g. *Comfort*, *Off*) is enabled.

Parameterization

Main Index > Unit > Auxiliary

Name	Range	Function
TSP output	Off On	Present state of the output controlled by the time switch program. Go to parameter page for the output.
Analog output	0…100 [%]	Present value of output *Aux A outp fan*. Go to page with all analog output settings.
A outp fan step 0	0…100 [%]	Voltage value at output for shut off plant (for plant faults as well).
A outp fan step 1	0…100 [%]	Voltage value on the output for active fan step 1 (setpoint 1 for controlled fans).
A outp fan step 2	0…100 [%]	Voltage value on the output for active fan step 2 (setpoint 2 for controlled fans).
A outp fan step 3	0…100 [%]	Voltage value on the output for active fan step 3 (setpoint 3 for controlled fans).
Alarm input	 Passive Active	Present state of alarm for auxiliary input. Go to page with digital input settings. The behavior NO/NC for the input can be changed there. Logical 0 at input. Logical 1 at input.
Input	 Off On	Present state of input for auxiliary input. Go to page with digital input settings. The behavior NO/NC for the input can be changed there. Logical 0 at input. Logical 1 at input.
Auxiliary tmp	-64.0…64.0 [°C]	Present value of temperature at input *Aux tmp sensor*. Go to page with analog input settings.
Op mode output	Off On	Displays whether the desired (using *Op mode outp select*) operating mode for the plant is enabled. Go to page with digital output settings.
Op mode outp select	 Off On/Comfort Economy Manual Osstp Free clg Unocc Fan kick Fire dmper Fire Stop Running Htg full Hrec full Clg full	Selection of operating modes to be displayed on output op mode output: Plant off. Plant on or in Comfort mode. Plant in Economy mode. Manual intervention enabled. Boost enabled. Free cooling enabled. Not used, active (*Temp. difference start*). Plant kick enabled. Fire damper test enabled. Fire alarm enabled; plant in fire alarm mode. Plant stopped and locked. Plant is operating (*On*/*Co*/*Ec*/*Osstp*/*FreeClg*/*Unocc*/*Fankick*/*Startup*). Hot water or electrical register on 100%. Heat recovery (plates, water, heat wheel) at 100%. Cooling at 100%.

5.15.3 TSP output

Parameterization **Main Index > Unit > Auxiliary > TSP output**

Name	Range	Function
Output	– Off – On	Present state for output. Go to page with digital output settings.
Manual operation	 – Off – On – Auto	Manual adjustment of output (always has the highest priority). – Off – On – Auto: The time switch catalog or the BACS controls the output.
Schedule	– Off – On	Present value for the time switch program. Go to page with time switch program settings.
Calendar exception	 – Passive – Active	Present status of calendar for exception days. Go to page with calendar settings. – Calendar not in intervention. – Calendar in intervention.
From BACS	 – Auto – Off – On	Control output via BACS: – No intervention by BACS: The time switch catalog only acts on the output in this position. – Off from BACS. – On from BACS.

5.16 Alarm troubleshooting (*Alarm outputs*)

Function

Displays communication module states and parameterization of *Alarm outputs*:

- Is determines the alarm to be displayed (high A and/or low B) for a single alarm output
- For two outputs, output 1 always displays the high (A) alarms and output 2 the low (B) alarms

Elements

The figure illustrates the participating plant elements:

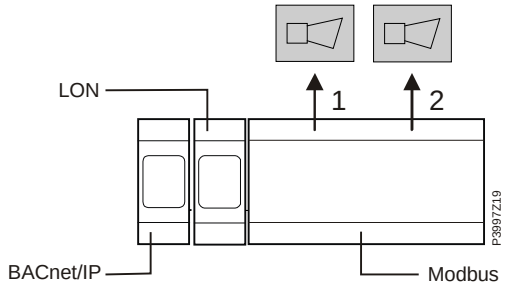


Figure 43: Overview of the plant elements for alarm troubleshooting

Enable

Main Index > Configuration > *Configuration 1*

Name	Range	Function
Alarm outputs	None One Two	Number of alarm outputs.

Parameterization

Main Index > Alarm handling

Name	Range	Function
Alarm acknowledge	Off On	Acknowledge button (for pending alarms) or reset button (for alarms that are no longer pending).
Danger (A)	Normal Alarm	Displays alarm class danger (the plant is shut down without delay, except for the special case for fire mode).
Critical (A)	Normal Alarm	Displays alarm class critical (the plant is shut down normally).
Low (B)	Normal Alarm	Displays alarm class low (plant continues to operate).
Warning (C)	 Normal Alarm	Displays warnings (plant continues to operate). Is not displayed on digital outputs; see below. No warning. Warning pending.
Alarm outp 1 select	 High (A) H+L (A+B)	Function of alarm output 1 for a single output: Signals only alarms for group a (*Danger* and *Critical*). Signals only alarms for groups A and B (*Danger*, *Critical* and *Low*).
Alarm output 1	Normal Alarm	Present state of alarm output 1. Go to page with digital output settings.
Alarm output 2	Normal Alarm	Present state of alarm output 2. Go to page with digital output settings.

Parameters, *cont'd*

Name	Range	Function
Modbus communicate	0...1	Displays Modbus communication state.
Comm module 0 Comm failure State	 – Passive – Active	Displays communication state of the module on position 0 (only available when module is plugged in). Go to *Comm module overview* page. – No error. – Pending error on module 0. Cause of error.
Comm module 1 Comm failure State	 – Passive – Active	Displays communication state of the module on position 1 (only available when module is plugged in). Go to *Comm module overview* page. – No error. – Pending error on module 1. Cause of error.
Comm module 2 Comm failure State	 – Passive – Active	Displays communication state of the module on position 2 (only available when module is plugged in). Go to *Comm module overview* page. – No error. – Pending error on module 2. Cause of error.

6 System settings and Info
6.1 Overview

Introduction

Although the workflow is specifically classified in section 4.2 Higher functions as a stage, you can also individually change or read the objects described in the following topics as needed and depending on the situation.

Knowledge provided

This section provides the following knowledge:

- System ***Settings***, can be changed as needed
- System ***Information***, is read only

Topic

The topics in the section are:

Topic	Section
Operating levels and access protection	7.2
Change password	7.3
Supported languages	7.4
System information	7.5
Summer/winter time change	7.6
Main settings HMI	7.7
Diagnostics: Controllers and application	7.8
Diagnostics: Object handler	7.9
Application info	7.10

6.2 Operating levels and access protection

Defined levels

Password protection in Climatix consists of a maximum of nine passwords, in three levels defined.
The passwords can be modifying by HMI as required.

Parameterization

Main Index > System overview > Password handling

Functions on the individual levels

The following functions are possible at the tree levels:

Level	User, password	Functions
No	All users, No password required	– Read access to all menu except system parameters, Configuration and detail pages. – Read access to alarm list and alarm history.
6	User Password: 1000	– Read access to all menus except configuration. – Write access to most important setpoints (*Setpoints*/*Settings* > *Main Setpoints*). – Alarms and alarm history can be acknowledged
4	Service, Password: 2000	– Access to all menus except advanced configuration and settings.
2	Factory/OEM Password: 6000	– Access to all menus and system settings.

Each operating level includes the level with the higher number.

6.3 Change password

Function

You can change the standard passwords.
Requires level 4 at a minimum.

Parameter

Main Index > System overview > Password handling

Name	Range	Function
Log in		If logged in at level 4, can be increased here to level 2. Conversely, the system goes to the *Main Index* page when logging in using a level 6 password The line is unavailable at level 2.
Log off		Logging off. Go to *Main Index* page.
Change user password		Requires level 4: The password for level 6 can be changed.
Change service password		Requires level 4: The password for level 4 can be changed.
Change factory password		Requires level 2: The password for level 2 can be changed.

Example using the *Service password*

Step	Action
1	Select Change Service password.
2	Enter the new password under the line **Enter password**: – Turn: The active digit changes. – Press: Go to next position. – Press after the fourth position: Go to first position for the *Confirm password* line.
3	Re-enter the new password as described above. – Press after the fourth position: The new password is accepted.

Press **ESC**:
Pressing **ESC** cancels entry of the new password.
The old password still applies.

6.4 Supported languages

Previously implemented languages

The following languages already implemented upon delivery:

	Splitted in two language set's	North and south
– English	*	*
– Swedish	*	
– German	*	*
– Italian		*
– Spanish		*
– Chinese		*
– Danish	*	
– Finnish	*	
– Polish	*	
– French		*
– Dutch		*
– Russian	*	
– Turkish		*

Additional languages may be implemented upon request

Parameter

Minimum access level: **6 (User)**

Main Index > System overview > Language selection

Name	Range	Function
HMI language	– English – Svenska – Deutsch – ……	– English. – Swedish. – German. – …..
AlarmSnapshot -Save → SD	– English – Svenska – Deutsch – ……	– English. – Swedish. – German. – …..
Modem -SMS language	– English – Svenska wenka – Deutsch – ……	– English. – Swedish. – German. – …..

Parameter

Requires access level **4**:

Main Index > System overview > Language selection

Name	Range	Function
Modem -Language	– English – Svenska – Deutsch – ……	– English. – Swedish. – German. – …..

6.5 System information

6.5.1 General

Functions

Displays and defines special system data for the controller.
Requires level 4 password

Parameter

Main Index > System overview > All system settings > Target

Name	Range	Function
Imperial unit sys	– Passive – Active	Changes unit from metric system to imperial. – Metric system enabled. – Imperial system enabled.
BSP version		Controller operating system.
Reset counter		Displays the number of controller resets and can reset the counter to 0.
Internal temp		Internal controller temperature.
GUID target		Unique controller ID number worldwide.
GUID application		Unique application software ID number worldwide.
GUID HMI		Unique HMI ID number worldwide.
GUID Web HMI		Unique web HMI ID number worldwide.
GUID OBH		Unique ID number of the OBH.bin files worldwide (object handler support).
Serial number		Controller serial number.
Target ID	– 3 – 4	Controller ID number: – POL 636 controller. – POL 638 controller.
Applic security	– Passive – Active	Displays software lock: – Unlocked. – Locked.
		Note: Standard AHU is never locked.
Appli start allowed	– Yes – No	Displays whether the installed software can operate on this controller. An application with application security may only operate, for example, in the intended controller.
Special settings		Go to *Target special settings* page.

6.5.2 Special settings

Parameter

Main Index > System overview > All system settings > Target > Special settings

Name	Range	Function
Target name	---	Change controller name on the bus (TCP/IP name and controller USB). Default name is, for example, POL638_128. (128: last three bytes of the MAC address).
Modbus termination	– Passive – Active	Activate the terminating resistor for the Modbus.

6.6 Summer/winter time change

Functions

Define changeover from daylight saving time (summer) to standard time (winter).
The data refers to Middle European Time (MET).
Page requires level 4.

Parameter

Main Index > System overview > All system settings > Daylight saving time

Name	Range	Function
Enable	Yes No	Displays changeover from daylight saving time to standard time.
Active	Passive Active	Displays whether summer time is currently enabled: *Passive*: Winter time *Active*: Daylight saving time (summer).
B-time active	 Passive Active	Displays whether the B-time is enabled for the change from daylight saving time to standard time: B time disabled. B time enabled.
Time	0…12 [h]	Number of hours for the adjustment.
Start month	Jan ... Dec	Month when daylight saving time is enabled.
Start week day	Mo…Su	Day of the week to start daylight saving time.
Start offset	 0 1 2 3 4 5 6 7 8 9 10	Week of the month for the changeover to daylight saving time: Fifth to last week. Fourth to last week. Third to last week. Second to last week. Last week. Not allowed. First week. Second week. Third week. Fourth week. Fifth week.
Start hour	0...23 [h]	Time of day of change to daylight saving time.
Start delay	-32768...32767 [h]	Delay for changeover.
End month	Jan…Dec	Month for changeover to standard time.
End week day	Mo…Su	Day of the week for changeover to standard time.
End offset	 0 1 2 3 4 5 6 7 8 9 10	Week of the month for the changeover to standard time: Fifth to last week. Fourth to last week. Third to last week. Second to last week. Last week. Not allowed. First week. Second week. Third week. Fourth week. Fifth week.
End hour	1...23 [h]	Time of day for changeover to standard time.
End delay	-32768...32767 [h]	Missing
UTC-difference	-720...720 [min]	Difference between local time and global UTC. The following generally applies: UTC - Local time = UTC-difference. For MET (default): 12:00 - 13:00 = -60 min. Caution: Daylight saving time not considered!

6.7 Main settings HMI

6.7.1 General settings

Contents

The table below lists menus for general operating settings applying to the entire HMI (operator unit).
The suffix inbuilt means that this parameter applies only to the HMI integrated in the controllers.

Parameter **Main Index > System overview > sHMI**

Name	Range	Function
Temperature (extern)	0-40 °C	Show the Temperature measured in the HMI-DM/TM
HMI language		Displays current language and options for selection:
	English	English
	Svenska	Swedish
	Deutsch	German
	Italiano	Italian
	Espaniol	Spanish
	中文	Chinese
	Dansk	Danish
	Suomi	Finnish
	Polski	Polish
	Français	French
	Nederlands	Dutch
	Русский	Russian
	Turkçe	Turkish
Imperial unit sys.	Passive	Display Metric Units e.g. °C
	Active	Display imperial Units e.g. °F
Reset time	3...30 [min]	Setting time after log in after which an access level expires after the last operation. Must log in again after this period.
Message duration: inb.	2...15 [s]	Time period during which an error page is displayed. This is the case, for example, when a setpoint is entered that is outside the entry range.
Advanced		Requires access level 2: Go to HMI advanced settings page.

6.7.2 Special settings

Parameter **Main Index > System overview > All system settings > HMI > Advanced**

Name	Range	Function
Auto password (ext. HMI)	- Passive - Active	
Alarm ackn level	2, 4, 6, 253	Sets required access level to acknowledge/reset alarms. 253 no PW needed
Alarm format	%s %T: %V	Modify the display of alarms, e.g. in the HMI. See token explanation →

6.7.3 Info LED

Position on HMI

The LED is located in the **INFO** button on the top of the HMI-DM:

Figure 44: HMI-DM: LED INFO button

States/meaning

The Info LED can have three colors, red, green, and yellow, and can flash.

The table below lists the available LED states and their meaning:

State	Meaning
Dark	AHU switched off or *not configured*
Green	On / Comfort / Economy
	Economy
Green, flashing	OSSTP
	Night cooling
	Unoccupied Htg/Clg
	Night Temp Test
Orange flashing	Fire damper test
Orange	Stop (*Alarm*/*Em.stop*)
Orange / green, flashing	Manual operation

6.8 Diagnostics: Controllers and application
6.8.1 General diagnostic settings

Functions

This page has the following functions:
– Information on the controller's required cycle.
– Information on internal software faults.
– General information on the application.
– Enter project-specific information for the application.

Page requires level 4. !!!New page with different information, needs to be added!!!

Parameter

Main Index > System overview > Diagnostic

Name	Range	Function
Restart	– ✓ – Execute	Restarts the controller. – Passive position. – Restart.
Versions		Displays application Info and BSP versions.
+Target name		Displays the target name of the controller
Serial number		Serial number of the controller
Target ID		Target type
+Restart counter		Shows the amount of restarts
- Reset	- Execute	Reset the restart counter
- Reason		Displays the reason for last restart
Internal temp.		Displays temperature within the controller.
Operating hours		Displays controller operating hours.
+ Enable trace	- Passive - Active	Enable or disable trace file generation
- State	- No file	Shows the amount of available trace file
+ SD card	- Read only - R/W - No card	Inserted SD card is locked (read only) Inserted SD card is unlocked. No SD card inserted
Trace save → SD	– ✓ - Execute	Export trace to SD card.
Settings save -> SD	– ✓ – Execute	Save settings to the SD card (Param.bin and Param.ucf) and indicated with done.
A-snapshot sa.->SD	– ✓ – Execute	Save Alarm snap shot into to the SD card
Advanced		Additional page "Advanced Diagnostic"

6.8.2 Diagnostics: *Advanced* settings

Parameter **Main Index > System overview > Diagnostic > Advanced**

Name	Range	Function
Oject handler		Information about the amounts of objects, memory and more.
IO – Module bus		Information about the IO-Module bus for the ext. I/O's
Cycle time reset		Resets *aver. min.* and *max.* times.
Cycle time actual	0... [ms]	Current cycle time for the controller.
Cycle time average	0... [ms]	Average required cycle time for the controller since the last controller start or cycle time reset.
Cycle time min	0... [ms]	Shortest required cycle time for the controller since the last controller start or cycle time reset.
Cycle time max	0... [ms]	Longest required cycle time for the controller since the last controller start or cycle time reset.
MSR failure		Internal software failure.
MSR failure type		Internal software failure type (failure number).
MSR started up	– Yes – No	Control startup successful.
+GUID target		Unique identification number for target
+GUID application		Unique identification number for application-file
+GUID HMI		Unique identification number for HMI file
+GUID Web HMI		Unique identification number for Web HMI file
+GUID OBH		Unique identification number for OBH-File
+GUID BSP		Unique identification number for BSP file
Appli.security	– Passive – Active	Application security enabled or disabled
Appli.start alowed	– Yes – No	Application is allowed to start or not

6.9 Diagnostics: Object handler

Information

Diagnoses ram, objects and COV or alarm handler clients.
Parameters can be read with level 4.
They are always write-protected.
!!!New link from diagnostic!!!

Parameter

Main Index > System overview > All system settings > Diag object handler

Name	Range	Function
Actual objects		Number of actual objects for the enabled configuration.
Act object memory	... [B]	Actual required memory.
Act int memory	... [B]	Maximum amount of available dynamic memory.
COV act clients		Number of subscribed internal and external COV clients.
ALH act clients		Number of subscribed internal and external alarm handler clients.
Valid objects	– Yes – No	Displays whether valid data is present in the object handler. For faults, evaluate the measuring and control task of the diagnostic object.
Version		Object handler version.
Data check sum		Internal checksum of the enabled configuration.
Max objects		Maximum number of enabled objects.
Max object memory	... [B]	Maximum memory for objects.
Max int memory	... [B]	Maximum memory for data.
COV max clients		Maximum number of internal and external COV clients.
ALH max clients		Maximum number of internal and external alarm handler clients.

6.10 Application info

Main information

You can always read, i.e. password not required, the main information:
- Application name
- Application version
- Unique target name (automatically) or OEM identification (e.g. Order Nr.)

Additional information

Additional information can be edited at access level 4 and thus modified to the present plant (e.g. installation location):
- Plant Name
- Street
- City

Parameter

- **Main Index > System overview > Plant info**
- Minimum access level 4:
  Main Index > System overview > Plant info > Advanced

Name	Explanation/Example
Plant Name	E.g. plant name
Street	E.g. plant address
City	E.g. plant city
Advanced	Requires access level 4: You can change *name, street* and *city* here.

Example of text entry

Proceed as follows to enter text:

Step	Action
1	Press knob to select entry line
2	Turn knob to change the first position
3	Press the knob to switch to the next line and continue as of step 2.
	Note: Maximum of 19 characters.
4	Enter # to finish the entry if the string is less than 19 characters.
	Note: No characters allowed after entering #.

7 Communication
7.1 General

A number of communication options, for integration to BACS, are available, depending on the type of basic controller and the connected external communication modules.
No external communications modules can be connected to the POL42x controllers.

Communication interface with basic controllers

Basic controller	Modbus RTU	Process bus	LON	Modem	TCP/IP
POL63x.xx/xxx	X	X		X	X
POL636.xx/XXX	X	X	On board	X	
POL42x.xx/XXX	X	X			

The TCP/IP connection on the POL63X controller can be used for:
- Modbus TCP (slave)
- OPC via TCP/IP or modem
- Web server with HMI simulation
- Climatix IC (Cloud based remote servicing)
- JSON Interface
- PC tools (scope light etc)

Communication interface with external communication modules

The following communication options are available for the POL63X controller via communication modules:
- POL902.00, Modbus RTU (slave)
- POL904.00, BACnet MSTP (client and server)
- POL908.00, BACnet IP (client and server)
- POL906.00, LON
- POL909.50, advanced Web module (Web server with Scada application)
- POL909.80, advanced Web & BACnet module(Web server with Scada application and BACnet IP)

Parameters

Main index > Systemoverview > Communication >

Parameter	Range	Description
Communic.modules		To the parameterization pages for all external communication modules
Process bus	OK Not OK	To the parameterization page for the process bus (for HMI and room unit)
+IP-Config.	xxx.xxx.xxx.xxx	Address of controller on the bus Name of controller on the bus To the parameterization page for the internal TCP/IP connection (see web HMI)
Climatix IC		Cloud server (page: Climatix IC)
Modbus		To the parameterization page for the internal Modbus
Modem		To the parameterization page for the modem connection
SMS		To the parameterization page for the *SMS* function via modem

7.2 TCP/IP (internal)

General

The POL63x controller is equipped with a TCP/IP interface.
This internal interface can be used for several communications, working together at the same time.
All communications use the same TCP/IP settings, but can have different security.

The TCP/IP connection on the POL63X controller can be used for:
- Modbus TCP (slave)
- OPC via TCP/IP or modem
- Web server with HMI simulation
- Climatix IC (cloud based remote servicing)
- JSON
- PC tools (scope light etc)

The controller can be accessed by either the IP address or the controller name.

Parameters

Main index > Systemoverview > Communication > +IP-Config. >

Parameter	Range	Description
DHCP	Active Passive	Address source: Get address from DHCP server IP address is set fixed by the given address
Actual IP		Display of controller's IP address
Actual Mask		Display of subnet mask
Act.Gateway		Display of gateway's address
Given IP		Set the IP address xxx.xxx.xxx.xxx
Given Mask		Set the mask (e.g. 255.255.255.000)
Giv Gateway		Set the gateway xxx.xxx.xxx.xxx
Primary DNS		Set/display the primary DNS xxx.xxx.xxx.xxx
Secondary DNS		
Name		Display of controller's name (can be changed in the settings for the controller)
MAC		Display of controller's MAC address
Link	Active Passive	Shows if the controller is connected to the Ethernet network
100 MBit	Active Passive	Shows if the controller is connected to a 100 MBit network
Advanced		Extended entry (to page *Adv. IP-Config*)
After modification of value Restart Required !!	✓ Execute	After changing parameters, the controller must always be restarted, ensuring that data are adopted

Parameters

Main index > Systemobjects > Communication > +IP-Config. > Advanced >

Parameter	Range	Description
+Automation stat.	Active Passive	E.g. connection from a PC tool
Port	0…65535	Define the port (e.g. 4242)
+Authorization		Authorization (needs to be entered in the PC)
+Administrator		Administrator (can be used for all)
+User name		Line title for user's name
	Name	User name
+Password		Line title for the password
	Password	Password
+WEB HMI (HTTP)	Passive Active	User for the internal web server (HMI simulation)
Port	0…65535	Define the port (e.g. 80)
+User name		Line title for user's name
	Name	User name
+Password		Line title for the password
	Password	Password
+FTP	Passive Active	User for the internal ftp server (remote access to the SD card)
Port	0…65535	Define the port (e.g. 21)
+User name		Line title for user's name
	Name	User name
+Password		Line title for the password
	Password	Password
+TFTP	Passive Active	
Port	0…65535	Define the port (e.g. 69)
+JSON		User for the internal JSON interface
Communication	Mapping 1	JSON mapping (assigned data points)
+User name		Line title for user's name
	Name	User name
+Password		Line title for the password
	Password	Password
After modification of value Restart Required !!	 ✓ Execute	Information Trigger restart

7.4 Climatix IC remote servicing**

Climatix AHU V3xx packaging is prepared to connect Climatix POL6xx controller to Climatix IC remote servicing system.

Introduction

Climatix IC is a cloud based remote servicing system to remotely monitor, operate and upgrade Climatix controls system.
Climatix POL63xx controllers can be connected via Internet ((T-IP) without any port or IP settings and accessable via normal web browser over the follow URL www.ClimatixIC.com.

Features

Climatix IC20 is providing the following main features:

- Read and write data points (watch pages)
- Data history trend viewer
- Alarm and alarm email notification
- Time scheduler and callendar set up
- HMI@web
- Remote upgrade (BSP and application file)
- Remote diagnostics

For more info about Climatix IC, please have a look on
Link: https://www.climatixic.com/home/functional description

Devices

Participating devices
– Climatix controller POL63x
– Climatix IC user credential
– Web browser
– Internet connectivity

Requirements

Internet connectivity is running for normal web surfing.

Set up Climatix IC

Step	Action
1	Connect Internet cable to Ethernet port of POL63x controller (T-IP)
3	Enable Climatix IC
4	Enter distribution ID according your Climatix IC OEM tenant ID
5	Check connectivity status
6	Log in to Climatix IC and check on the unassigned area for your controller (type and controller name)
6	Assign your controller in Climatix IC

Parameter **Main Index > Communication>Climatix IC**

Name	Range	Function
Enable	Yes No BSP only	Enable controller to Climatix IC Do not enable to Climatix IC For upgrade only, no data transmitting
Serial number		Serial number of the controller
+State		
Communication	- Ok - IPErr - ServerErr - InternalErr - ResponseErr	Climatix IC communication status
Cloud server	- IPErr - Init - InitErr - Reg - RegErr - Description - Connected	Climatix IC server status
Distributor	xxxxxxxxxxxx	Distributor ID of the OEM , to be known by OEM informed by OEM tenant administrator
Upgrade allowed	Wait Yes NO	Controller is busy with shot down sequence Controller is ready for upgrade procedure Controller does not accept upgrade at all
Upgrade request	Active Passive	Climatix IC indicate an upgrade request for the controller Climatix IC does not have an upgrade request from the controller
Advanced	Various	Additional information like IP address, activation key
Plant Info	Various	Jump to plant information page

!!!Maybe more lines/values in 3.04!!!

Climatix IC Update Control

In case Climatix IC is requesting a controller for an upgrade, it is mandatory to first proceed a shot down sequence of the application to prevent any damage on the machine.
As soon the controller has finished the shot down procedure, it is indicating to Climatix IC to progress the remote upgrade.
Climatix IC is firstly saving the parameter set (back up), progress the upgrade and restore the parameter set automatically.

Main Index > System overview > Communication > Climatix IC >

The member **Upgrade allowed** the update process can be blocked if it set to *No*

7.5 Modbus

General

The basic controller is always equipped with a Modbus RTU interface via RS-485. This interface can be defined as a master, slave or can be deactivated, but can't be used as slave (BSM integration) and master at the same time.

The POL638 controller has also Modbus TCP onboard via the TCP/IP interface and can also connect a communication module, POL902, for 2 extra Modbus slave interfaces.
Latest version of the module must always be used.

Devices

Devices used:
- Climatix controller POL638 with communication module POL902.00/STD
  or
- Climatix controller POL638 and POL42x with internal Modbus

Tools

Tools used for commissioning:
- Operator unit (HMI)

Illustration POL638, POL42x and POL902 module

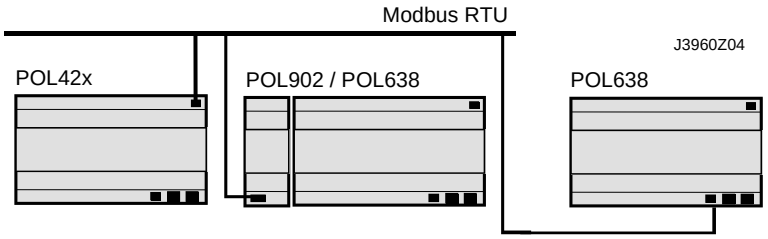


Figure 45: Illustration POL638, POL42x and POL902 module

Configuration

Main index > Systemoverview > Communication > Modbus > Modbus module >
or for internal
Main index > Systemoverview > Communication > Modbus > RS-485 >
or
Main index > Systemoverview > Communication > Modbus > TCP/IP >

Configuring the internal Modbus interface

Main index > Systemoverview > Communication > Modbus >

Parameter	Range	Description
Device type	None Slave Master	Internal Modbus interface is activated by selecting *Slave* for BMS integration or *Master* for integration of meters

Note
After changing configuration settings, the controller must always be restarted, ensuring that data are adopted.

Detailed instruction

Use the Modbus integration documentations, for a detailed description how to integrate the DHN application to any BACS.
See section 3 Preset plant types ***, for the needed document number.

7.6 LON **

Interfaces

A LON interface is always available on the basis controller POL636.xxx.
The external LON module POL906.xx also required for controllers POL635.xxx and POL638.xxx.

7.6.1 Internal LON interface

Devices

Participating devices
– Climatix POL636 controller.

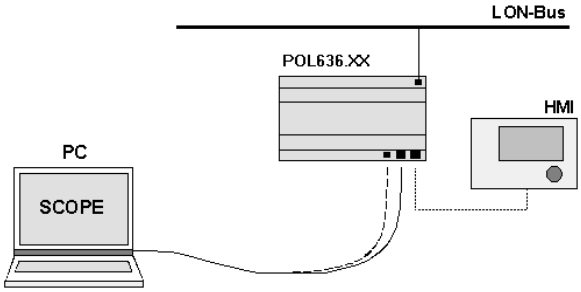


Figure 46: Illustration internal LON interface

Requirements

Prerequisites for commissioning a LON section:
– Working application loaded on the Climatix controller.
– Mapping file (OBH.UCF) is loaded.

Configuration

Main index > Systemoverview> Communication > LON

After successful LON commissioning via the LON tool, you can access the controller via the LON bus using SCOPE.

Detailed instruction

For detailed information about LON integration see document CB1P3934.

7.6.2 External LON module

General

The POL638 controller can connect a communication module, POL906 for LON communication.
Latest version of the module must always be used.

Devices

Devices used:
- Climatix controller POL63x
- LON communication module POL906.00/STD

Tools

Tools used:
- Operator unit (HMI)
- PC with LON tool (NL220, LonMaker)

Illustration POL906

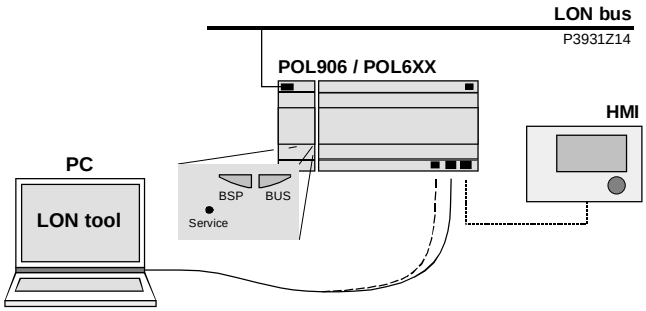


Figure 47: Illustration external LON module

Configuration

Main index > Systemobjects > Communication > Communic.modules > LON module >

Note
After changing configuration settings, the controller must always be restarted, ensuring that data are adopted.

Detailed instruction

Use the LON integration documentations, for a detailed description how to integrate the DHN application to any BACS. See section 1.3 Reference documents, for the needed document number.

7.7 BACnet IP and MSTP

Applies to controllers **POL63X** only.

General

The POL63x controller can connect a communication module, POL904 for BACnet, MSTP or POL908 for BACnet IP.
Latest version of the module must always be used.

Devices

Devices used:
- Climatix controller POL63x
- BACnet MSTP communication module POL904.00/STD
  or
- BACnet IP communication module POL908.00/STD

Tools

Tools used:
- Operator unit (HMI)
- PC with web browser

Illustration
POL908 and POL904

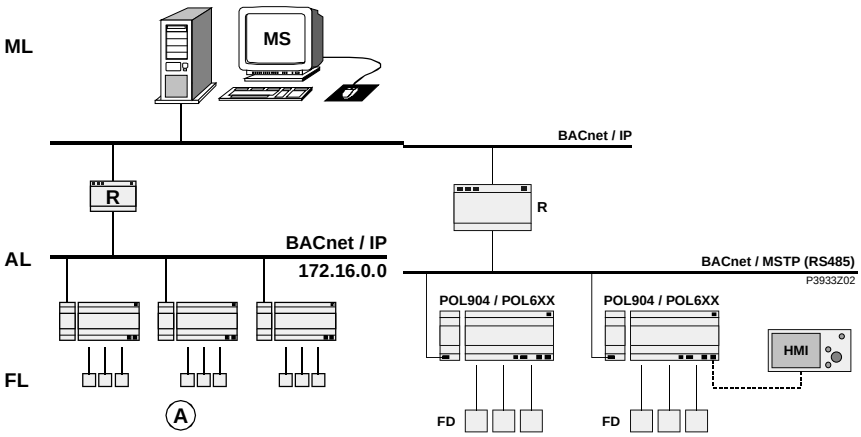


Figure 48: Illustration POL908 and POL904

Key

ML	Management level	R	IP router OR MSTP/IP router
AL	Automation level	FL / FD	Field level / Field devices

Configuration

Main index > Systemoverview > Communication > Communic.modules > BACnet IP module >
or
Main index > Systemoverview > Communication > Communic.modules > BACnet MSTP mod. >

Note
After changing configuration settings, the controller must always be restarted, ensuring that data are adopted.

Detailed instruction

Use the BACnet integration documentations, for a detailed description how to integrate the Climatix AHU application to any BACS. See section 1.3 Reference documents, for the needed document number.

7.8 BACnet Client**

Applies to controllers **POL63X** only.

Introduction

Some objects can receive (Read) or send (Write) data from/to other remote BACnet devices (BACnet Servers) on the network.

Example:
Climatix controller reads outdoor temperature from another device.

The binding to the remote BACnet device is done by a file called BACNET.CSV.
This file must contain a uniqe internal connection name for each used object and also the uniqe IDs of the remote device, object and property.
The BACNET.CSV file is related to the specific project network and the needed binding and are uploaded, at commisioning time, to each BACnet module or Climatix controller.
It needs therefore to be separated backuped after commisioning.

Devices

Participating devices
– Climatix controller POL6XX.
– Communication module POL908 or POL909.80 (AWB module).
– External BACnet server device, from where BACnet data needs to be read.

Tools

Required tools:
– Operator unit (HMI)
– SCOPE light tool to download project specific BACnetClient file

Prerequisite

For integration, the BACnet device ID of the server (remote BACnet device) and the object information must be known.
This information is listed e.g. in the object list of the remote BACnet server.
The client requires the information to know where to look for the BACnet objects to be integrated.

Only present values are supported:
– BACnet device ID
– BACnet object instance ID
– BACnet object type (*AnalogInput* etc)

Detailed instruction

Use the BACnet integration documentations, for a detailed description how to integrate.
See section 1.3 Reference documents, for the needed document number.

7.9 AWM (Advanced Web Module)

Applies to controllers **POL63X** only.

General

The POL63X controller can connect a communication module, POL909 for a Web server with SCADA application.
Latest version of the module must always be used.

SCADA application

The SCADA application, including plant pictures etc, must be loaded to the module.

Devices

Devices used:
- Climatix controller POL63x
- AWM communication module POL909.50/STD
  or
- AWB (Web and BACnet) communication module POL909.80/STD

Tools

Tools used:
- Operator unit (HMI)
- PC with web browser

Illustration POL909

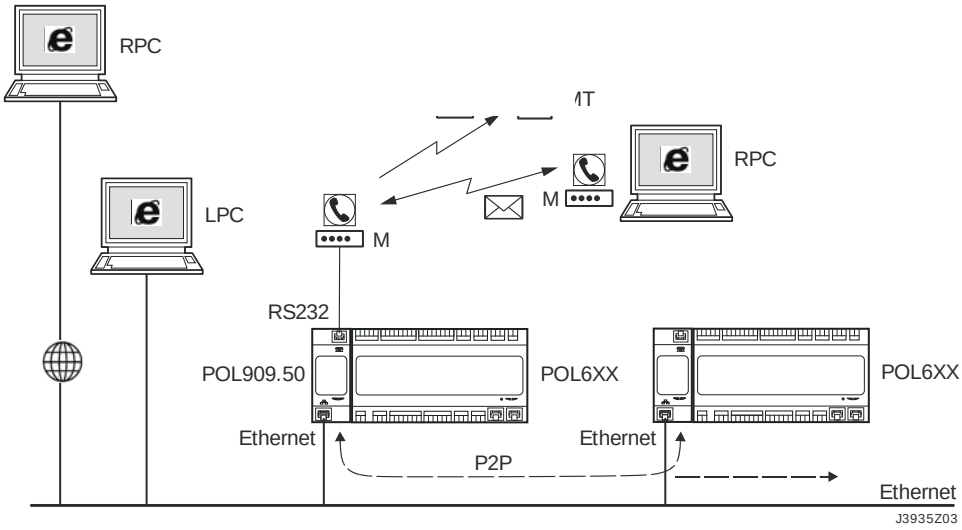


Figure 49: Illustration POL909

RPC	Remote PC with browser and mail program	RS232	RS232 modem interface including GSM/GPRS support
LPC	Local PC with browser and mail program	M	Modems
Ethernet	Ethernet interface / Ethernet bus	MT	Mobile telephone for receiving SMS

Configuration

Main index > Systemoverview > Communication > Communic.modules > AWM module >
or
Main index > Systemoverview > Communication > Communic.modules > AWB module >

Note:
After changing configuration settings, the controller must always be restarted, ensuring that data are adopted.

Detailed instruction

Use the AWM integration documentation, for a detailed description how to use the AWM and SCADA application.
See section 1.3 Reference documents, for the needed document number.

7.10 Modem / SMS **

Applies to controllers **POL63X** only.

Remote service interface

All Climatix 63X controllers possess a modem interface for an external modem.

The following functions are available:
- Remote-service via SCOPE.
- Send alarm SMSs by the controller.
  A Siemens TC35 terminal (GSM modem) required, though.
  Other GSM modems may be connected, but are not tested.

7.10.1 Commission modem/SMS function

Plug type

RJ45 jack, 8 pins.
The connection is located on the upper right-hand side of the controller cover:

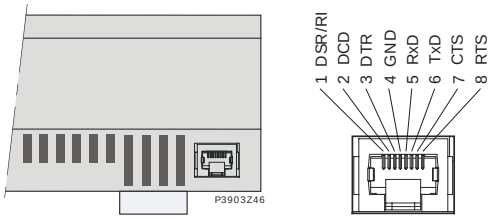


Figure 50: Illustration connection of the commission modem/SMS

The illustration displays pin assignment.

Install and commission

The following steps required to connect a modem:

On the Climatix controller:

Step	Action
1	Turn off power.
2	Connect modem.
3	Turn on power.
4	Enter modem settings.

Requirements

Requirement for commissioning the modem:
- The SAPRO application is fully commissioned.
- Level 4 (password 2000).
- Mapping file (OBH.bin) is loaded.

Commission controller

Step	Action
1	In the menu system parameter > communication, select SMS
2	Configure and parameterize as per the following tables

You can access the controller after you successfully commission the modem using the SCOPE.

Configuration

Main Index > (System overview >) Communication > SMS

Name	Range	Function
Actual number	– Disable – Nbr 1 – Nbr 2 – Nbr 3 – Nbr 4	Do not send SMS. Send SMS to telephone numbers 1-4.
Settings SMS		Go to settings page to parameterize SMS.
Settings Modem		Go to settings page to parameterize modem.

Parameterize SMS

Main Index > (System overview >) Communication > SMS > Settings SMS

Name	Range	Function
Free SMS 1 SAPHIR free SMS….		Free flow text for SMS text 1 Edit SMS text on the page **Main Index > System overview > Communication > SMS > Settings SMS > Settings**
Free SMS 2 SAPHIR free SMS….		Free flow text for SMS text 2 Edit SMS text on the page **Main Index > System overview > Communication > SMS > Settings SMS > Settings**
Fix SMS 1… Fix SMS 10		
Settings		Go to settings page to enter both free flow SMS texts

Parameterize modem

Main Index > (System overview >) Communication > SMS > Settings Modem
Main Index > (System overview >) Communication > Modem

Name	Range	Function
Connection type	0 No modem 1 GSM modem 2 Analog modem	Displays whether a modem is connected
State	0…11	See list below (status description)
Signal streng GSM		Signal strength of GSM modem
PIN		Modem pin number
SMS PIN		The controller can also receive SMS. Is only edited if you have a certain pin that can be set here. **This function currently not implemented!**
Phone nbr 1		Enter telephone 1
Phone nbr 2		Enter telephone 2
Phone nbr 3		Enter telephone 3
Phone nbr 4		Enter telephone 4
SMS active nbr	0…4	Displays the number to which potential SMS is sent. 0 = SMS switched off.

Parameterize modem,
cont'd

Name	Range	Function
SMS language	– English – Swenka – Deutsch – …	Select SMS language
Send string		Displays modem initialization string for send
Receive string		Displays modem initialization string for receive
Special settings		Go to modem settings page to enter required parameters, e.g. initialization string

Status description

Value.	Operating state
0	OK; SMS
1	OK; general
2	Modem is initializing
3	Modem is transferring data
4	Modem is not logged on with the provider
5	Searching for network
6	Provider prevented network logon
7	Unknown registration state
8	Modem is making connection
9	Modem is connected
10	General error, modem not responding, possibly no modem connected
11	Modem initialization failed

Parameterize mode (advanced)

Main Index > System overview > Communication > Modem > Advanced

Name	Range	Function
Enable bus LED	– No – Yes	Enable bus LED Off = No modem connect or LED not enabled Yellow = Modem connected and initialized; communication not active Green = Modem connected, communication active Red = Modem connected, but error is active (e.g. missing provider, initialization not possible, etc.)
Init string 1		Modem initialization string 1
Init string 2		Modem initialization string 2 (additional)
Force Reset	– Passive – Active	Reset modem with new initialization
SMS POU mode	– Passive – Active	**Passive:** SMS are sent as text message **Active:** SMS sent in PDU mode (some older cell phones can only use this mode)
Cell phone	– Passive – Active	**Passive:** A GSM modem connected as sender **Active:** Cell phone connected as sender
Baud rate(19200)	– Passive – Active	**Passive:** Baud rate between controller and modem is 57.6 kbps **Active:** Baud rate is 19.2 kbps

7.11 Process bus/room units

A process bus interface is always available on the basis controllers POL63X and POL424 to connect room units.

The application is designed differently, however, for both controllers:
- POL636 for a maximum of 2 room units
- POL424 for 1 room unit

7.11.1 Commission room unit

Devices

Participating devices
- Climatix controller POL636 or POL424
- Climatix room unit HMI-SG POL822.60

Requirements

Requirement for commissioning room units:
- Commission of the SAPRO application is completed and a constellation with room unit is selected in the **Main index** > **Configuration** > **Configuration 1** under *Room tmp sensor* (you can also select it in the menu **Main index > Integrations > Room unit**)
- Level 4 (password 2000)
- Mapping file (OBH.bin) is loaded

Commission room units

Step	Action
1	Select a constellation with room unit in the menu **System Parameter > Configuration 1** under *Room tmp sensor*
2	Configure additional settings as required

See section 2.12 Room unit POL822"

Parameter

Main Index > Communications >

Name	Range	Function
Energy meter EM24	– No – Yes	No energy meter selected
Settings		Goes to page with all settings relevant to parameterize the energy meter
Inputs		Go to page with inputs
Room units	– 1 sensor – 2 sensors – 1 RU – 1snsr+ RU – 2 RU	Inputs for room temperature sensors. You can select whether to apply maximum, minimum, average or individual value for control for more than one sensor in *Configuration 2*. When selecting *1 RU*, *1snsr + RU* or *2 RU*, the interface to the room unit connection is enabled.
Settings		Goes to page with all settings relevant to parameterizing room units
Inputs		Go to page with temperature inputs
Restart Required !!	– Execute	You must restart the controller with **Execute** to assume the data after changing parameters

Settings

Main Index > Com/Room units > Settings

Name	Range	Function
Room tmp sensor	– 1 sensor – 2 sensors – 1 RU – 1snsr+ RU – 2 RU	Display the room sensor combination selected.
Displayed Alarm	 – none – event – permanent	Alarm display on room unit. – Only the alarm symbol flashes for an alarm. – The alarm symbol and alarm number flashes for an alarm. After press the bell button, the entire display returns and only the alarm symbol flashes. – For an alarm, the alarm symbol flashes and the alarm number is displayed instead of the clock as long as the alarm is pending.
Displayed temp	 – RmUnit – RoomMix – Return	Temperature display. – Own, measured in the room unit. – Set in *Configuration 2* with *Room tmp mix*. – Extract air temperature.
Eng system temp	 – Target – Metric – Imperial	Temperature display in the room unit. – Valid to the controller. – Metric system for the room unit. – Imperial system for the room unit.
Stpt range +/-	0.0…..12.0 [K]	Maximal possible setpoint adjustment.
Stpt increment	- 0.1 [K] - 0.5 [K]	Setpoint adjustment increment.
Hrec display lim	0…100 [%]	Threshold to show energy tracking symbol on the display. The symbol is displayed for value **Efficiency > Hrec display lim**.
Manual control	 – No – Yes	Enable mode button to changeover operating mode on the room unit. – Changeover is locked. – Changeover is enabled.
Presence time	0…23 [h]	Runtime presence. Plants goes to auto mode after the delay.
Back2Auto Off-Eco	 – Off – On	Reset setpoint adjustment and presence for change in time switch command from **Off > Economy**. – Reset locked. – Reset enabled.
Back2Auto Off-Cmf	 – Off – On	Reset setpoint adjustment and presence for change in time switch command from **Off > Comfort**. – Reset locked. – Reset enabled.

Settings *cont'd*

Back2Auto Eco-Cmf	– Off – On	Reset setpoint adjustment and presence for change in time switch command from **Economy > Comfort**. – Reset locked. – Reset enabled.
Back2Auto Cmf-Eco	– Off – On	Reset setpoint adjustment and presence for change in time switch command from **Comfort > Economy**. – Reset locked. – Reset enabled.
Back2Auto Cmf-Off	– Off – On	Reset setpoint adjustment and presence for change in time switch command from **Comfort > Off**. – Reset locked. – Reset enabled.
Back2Auto Eco-Off	– Off – On	Reset setpoint adjustment and presence for change in time switch command from **Off > Economy**. – Reset locked. – Reset enabled.
Time format	– 24 h – 12 h	Time format 24 hour or 12 hour clock.
Room zone	0…..127	Room zone address on the controller: This value may only be changed if multiple controllers are operated on one bus with the room units. The value must always be the same as room unit parameter 5.
Device1 BSP version		Room unit 1 firmware version.
Device1 comm alarm	– passive – active	Present alarm state of communication to room unit 1.
Device2 BSP version		Room unit 2 firmware version.
Device2 comm alarm	– passive – active	Present alarm state of communication to room unit 2.
Process bus		Goes to page with all settings relevant to parameterizing the process bus. Settings are only required on this page if the controller is integrated on the process bus system.

8 HMI details pages
8.1 Overview

Introduction

Information in the previous sections is normally enough to configure and parameterize the Climatix AHU application.

Knowledge provided

The HMI details pages go one level lower.
The object contained therein could be influence in even greater detail.

Most of the listed and briefly outlines values are parameters are designed exclusively for experts.

Possible reliability states (messages) for the base controller and the extension modules may differ.

Access level

Detail pages can only be read/written at the following access levels:
- **Read**: Levels 6, 4 and 2, special settings with levels 4 and 2 only.
- **Write**: Levels 4 and 2.

Changes to parameters and settings may have a massive impact on plant operation and safety.

Topic

The topics in the section are:

Topic	Section
Analog outputs	9.2
Digital outputs	9.3
Multi-stage outputs	9.4
Analog inputs	9.5
Digital inputs	9.6
PID controller	9.7
Cascade controller	9.8
Scheduler program, general	9.9
Weekly schedule	9.10
Daily schedule	9.11
Exception days and fixed off	9.12

8.2 Analog outputs
8.2.1 General

Access

The details page for analog outputs can be reached multiple ways, including:
- **Main Index > Unit > Outputs > Analog outputs > Plant Element**
  or
- **Main Index > Unit > Element Control > Analog Element > Output Signal**

Examples

- **Main Index > Unit > Outputs > Analog outputs > Exh fan outp signal**
  or
- **Main Index > Unit > Fan Control > Extract fan > Output signal**

Parameters

Name	Range	Function
Manual operation	0…100 [%]	Manual intervention on the output. The output goes directly to manual operation when entering a value (for 0 as well). Is not automatically reset. An alarm can be triggered after a set period when the manual alarm function is enabled.
Present Value	0…100 [%]	Present value for output.
Fault	Ok	
Active prio	– Out of serv. – Prio1 – …. – Prio16 – Default	– Displays the wired prio elements currently on the output.
Fault priority	– OK – Other – Process Error – Config err	Reliability state for hardware. – Basis controller: Calibration lacking (output defective). Extension module POL955: Calibration lacking (output defect) or communication to basic controller unavailable or the output is incorrectly configured. – Basic controller: Process error in program. – Extension module: Message no available. – Basic controller: Output configured incorrectly. Extension module: Message no available.
Advanced		Go to advanced settings page (at access levels 4 and 2 only).
Priority array		Go to Priority array page (at access levels 6, 4 and 2 only).

8.2.2 Special settings

Access level

- Read: Levels 4 and 2.
- Write: Levels 4 and 2.

Parameter

Name	Range	Function
Msg class fault	– Danger (A) – High (A) – Low (B) – Warning (C) – No alarm	Set alarm class (and groups A, B, C): – Set the unit in stop mode – Set the unit in off mode – Only message – Only message – No message, no alarm
High limit	0…100 [%]	Upper limit of output signal
Low limit	0…100 [%]	Lower limit of output signal

8.2.3 Special information

Access level

- Read: Levels 6, 4 and 2.
- Write: Not possible.

Parameters

Name	Range	Function
Physical value	0…100 [%]	Value on output. Only differs from present value with out of service intervention via BACnet.
Disable OffNormal	– Passive – Active	The *OffNormal* alarm is disabled. Example: A value greater than the high limit does not trigger an alarm: – Alarm is triggered – Alarm is not triggered
ToOffNormal	Day of week, dd.mm.yyyy hh:mm:ss	Date and time the last off normal alarm occurred
ToFault	Day of week, dd.mm.yyyy hh:mm:ss	Data and time last fault alarm (reliability ≠ 0) occurred
ToNormal	Day of week, dd.mm.yyyy hh:mm:ss	Date and time last alarm was reset
Communication infos	---	Not enabled for analog outputs

8.2.4 Priority range

Access level

- Read: Levels 6, 4 and 2.
- Write: Read only.

Parameters

Name	Range	Function
Default	0…100 [%]	Replacement value, when no priority is active
Prio 01	Fix 0 [%]	Value for priority 1 (always 0%): Plant is locked during configuration or during controller start up
Prio 02	0…100 [%]	Value for priority 2: Not used
Prio 03	0…100 [%]	Value for priority 3: Not used
Prio 04	Fix 0 [%]	Value for priority 4 (always 0%): Shut off for error
Prio 05	0…100 [%]	Value for priority 5: Forced to a certain value, e.g. for frost protection
Prio 06	0…100 [%]	Value for priority 6: For example, the minimum runtime for the element or overshoot time, e.g. dampers remain open until the fan is off
Prio 07	0…100 [%]	Value for priority 7: Not used
Prio 08	0…100 [%]	Value for priority 8: Manual intervention via HMI
Prio 09	0…100 [%]	Value for priority 9: Special function to reset from priority 8 to auto mode
Prio 10 to Prio 14	0…100 [%]	Value for priority 10 through 14: Not used
Prio 15	0…100 [%]	Value for priority 15: Normal plant operation
Prio 16	0…100 [%]	Value for priority 16: Timeswitch catalogs

The lowest active priority controls the output.

8.3 Digital outputs
8.3.1 General

Access

The details page for digital outputs can be reached multiple ways, including:
- **Main Index > Unit > Outputs > Analog outputs > Plant Element**
  or
- **Main Index > Unit > Element Control > Analog Element > Output Signal**

Examples

- **Main Index > Unit > Outputs > Digital outputs > Htg pump cmd**
  or
- **Main Index > Unit > Temp control > Heating > Pump > Command**

Parameter

Name	Range	Function
Manual operation	– Off – On – NULL	Manual operation on element (e.g. pump). Manual operation is not automatically reset! An alarm can be triggered after a set period when the manual alarm function is enabled. NULL: Auto; The program controls the output.
Present Value	– Off – On	Present value for output
Reliability	– OK – Other – Process Error – Config err	Reliability state for hardware. – Basis controller: Calibration lacking (output defective). Extension module POL955: Calibration lacking (output defect) or communication to basic controller unavailable or the output is incorrectly configured. – Basic controller: Process error in program – Extension module: Message no available. – Basis Controller: Output configured incorrectly. – Extension module: Message not available.
Active prio	– Out of serv. – Prio1 – …. – Prio16 – Default	Displays the wired prio elements currently on the output.
Operating hours	0... [h]	Number of operating hours for the output
Operating seconds (Reset)	0... [s]	Number of operating seconds for the output. Input of 0 seconds reset operating hours to 0
Last op hours reset	Wday, dd.mm.yyy hh:mm:ss	Date and time for the last time operating hours was reset
Special settings	---	Go to *Special settings* page (at access levels 4 and 2 only)
Special infos	---	Go to *Special info* page (at access levels 6, 4 and 2 only)
Priority array	---	Go to *Priority array* page (at access levels 6, 4 and 2 only)

8.3.2 Special settings

Access level

- Read: Levels 4 and 2.
- Write: Levels 4 and 2.

Parameters

Name	Range	Function
Contact Function		Changes output from normal open to normal closed:
	– NO	Normal open (default)
	– NC	Normal closed (in this position, the output is enabled when the plant is shut down).

8.3.3 Special information

Access level

- Read: Levels 6, 4 and 2.
- Write: Not writable.

Parameters

Name	Range	Function
Physical value	– Off – On	Value on output. Only differs from present value with out of service intervention via BACnet.
Disable OffNormal		The *OffNormal* alarm is disabled:
	– Passive	– Alarming is enabled
	– Active	– Alarming is switched off
BACnet fdbk value		If connected: Feedback value from the bus
Communication infos	---	Not enabled for digital outputs

8.3.4 Priority range

Access level

- Read: Levels 6, 4 and 2.
- Write: Read only.

Parameters

Name	Range	Function
Default	– Off – On – NULL	Replacement value, when no priority is active. NULL means the prio is disabled.
Prio 01	Fix Off	Value for priority 1 (always *Off*): Plant is locked during configuration or during controller start up
Prio 02	– Off – On – NULL	Value for priority 2: Not used
Prio 03	– Off – On – NULL	Value for priority 3: Not used
Prio 04	Fix Off	Value for priority 4 (always *Off*): Shut off for error
Prio 05	– Off – On – NULL	Value for priority 5: Forced to a certain value, e.g. for frost protection
Prio 06	– Off – On – NULL	Value for priority 6: Minimum runtime for the element or overshoot time, e.g. dampers remain open until the fan is off
Prio 07	– Off – On – NULL	Value for priority 7: Not used.
Prio 08	– Off – On – NULL	Value for priority 8: Manual intervention via HMI
Prio 09	– Off – On – NULL	Value for priority 9: Special function to reset from priority 8 to auto mode
Prio 10 to Prio 14	– Off – On – NULL	Value for priority 10 through 14: Not used
Prio 15	– Off – On – NULL	Value for priority 15: Normal plant operation
Prio 16	– Off – On – NULL	Value for priority 16: Timeswitch catalogs

The lowest active priority controls the output.

8.4 Multi-stage outputs
8.4.1 General

Access

The details page for multistate outputs can be reached multiple ways, including:
- **Main Index > Unit > Outputs > Analog outputs > Plant Element**
  or
- **Main Index > Unit > Element Control > Analog Element > Output Signal**

Examples

- **Main Index > Unit > Outputs > Digital outputs > Supply fan cmd**
  or
- **Main Index > Unit > Fan Control > Supply fan > Output signal**

Parameters

Name	Range	Function
Manual operation	– Off – Stage1 – Stage2 – Stage3 – NULL	Manual operation on element (e.g. fan). Manual operation is not automatically reset! An alarm can be triggered after a set period when the manual alarm function is enabled. NULL: *Auto*; the program controls the output.
Present Value	– NULL – Off – Stage1 – Stage2 – Stage3	Present value for output
Reliability	 – OK – noOutput – Other Process Error – Config err	Reliability state for hardware. – Basis controller: Calibration lacking (output defective). – Extension module POL955: Calibration lacking (output defect) or communication to basic controller unavailable or the output is incorrectly configured. – Basic controller: Process error in program. Extension module: Message no available. – Basis Controller: Output configured incorrectly. Extension module: Message no available. – Basic controller: Output configured incorrectly. Extension module: Message no available.
Active prio	– Out of serv. – Prio1 – …. – Prio16 – Default	Displays the wired prio elements currently on the output
Special infos	---	Go to *Special info* page (at access levels 6, 4 and 2 only)
Priority array	---	Go to *Priority array* page (at access levels 6, 4 and 2 only)

8.4.2 Special information

Access level

- Read: Levels 6, 4 and 2.
- Write: Not writable.

Parameters

Name	Range	Function
Physical value	– Off – Stage1 – Stage2 – Stage3	Value on output. Only differs from present value with out of service intervention via BACnet.
Disable OffNormal	 – Passive – Active	The OffNormal alarm is disabled: – Alarming is enabled – Alarming is switched off
Communication infos	---	Not enabled for multistate outputs

8.4.3 Priority range

Access level

- Read: Levels 6, 4 and 2.
- Write: Read only.

Parameters

Name	Range	Function
Default	– Off – Stage1 – Stage2 – Stage3 – NULL	Replacement value, when no priority is active. NULL means the prio is disabled.
Prio 01	Fix Off	Value for priority 1 (always *Off*): Plant is locked during configuration or during controller start up.
Prio 02	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 2: Not used.
Prio 03	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 3: Not used.
Prio 04	Fix Off	Value for priority 4 (always *Off*): Shut off for error.
Prio 05	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 5: Forced to a certain value, e.g. for frost protection.
Prio 06	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 6: Minimum runtime for the element or overshoot time, e.g. dampers remain open until the fan is off.
Prio 07	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 7: Not used.
Prio 08	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 8: Manual intervention via HMI.
Prio 09	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 9: Special function to reset from priority 8 to auto mode.
Prio 10 bis Prio 14	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 10 through 14: Not used.

Parameters, *cont'd*

Prio 15	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 15: Normal plant operation.
Prio 16	– Off – Stage1 – Stage2 – Stage3 – NULL	Value for priority 16: Timeswitch catalogs.

The lowest active priority controls the output.

8.5 Analog inputs
8.5.1 General

Access

The details page for analog inputs can be reached multiple ways, including:
- **Main Index > Unit > Inputs > Element Group > Plant Element**
  or
- **Main Overview > Plant Element**

Examples

- **Main Index > Unit > Inputs > Temperatures > Outside Air**
  or
- **Main Overview > Outside air temp**

Parameters

Name	Range	Function
Present Value	Depends on hardware.	Present input value.
Reliability (Basis Controller)	– OK – No sensor – Over range – Shorted loop – Other – Process Error – Config Error	Reliability state for hardware. – Interrupt for sensors NI1000, PT1000, R2500, NTC10k, NTC100k – Value outside measuring range on 0-10 V DC inputs – Short circuit to sensors NI1000, PT1000, R2500, NTC10k, NTC100k – Calibration lacking. Controller must be returned to the factory – Internal fault – Input not configured
Reliability (Extension Module POL 955)	– OK – Over range – Under range – Other	Reliability state for hardware. – Value outside measuring range on 0-10 V DC inputs. Interrupt for sensors NI1000, PT1000, R2500, NTC10k, NTC100k. – Short circuit to sensors NI1000, PT1000, R2500, NTC10k, NTC100k. – Calibration lacking. Controller must be returned to the factory; internal fault or input not configured.
High limit active	– Passive – Active	Display an *Off normal Alarms*, when **Present Value > High limit**.
High limit active	– Passive – Active	Display an *Off normal Alarms*, when **Present Value < Low limit**.
High limit	Depends on hardware.	Limit value for a high-limit alarm.
Low limit	Depends on hardware.	Limit value for a low-limit alarm.
Sensor correction	Depends on hardware.	Sensor correction value. Example: If the present value is 20.4 and the real temperature is 20.1, the value should be set to -0.3.
PT1 filter HW	0…32767 [s]	Time constant for the input filter. Allows you, for example, to filter out peaks for pressure sensors.
Time delay	0…65535 [s]	Alarm time delay for high and low-limit alarms.
Special settings	---	Go to *Special settings* page (at access levels 4 and 2 only).
Special infos	---	Go to *Special info* page (at access levels 6, 4 and 2 only).

8.5.2 Special settings

Access level

- Read: Levels 4 and 2.
- Write: Levels 4 and 2.

Parameters

Name	Range	Function
Out of service		Take input offline to manually enter a value, e.g. a temperature. Manual operation is not automatically reset. An alarm can be triggered after a set period when the manual alarm function is enabled.
	– Passive	– The input is in *Auto mode*.
	– Active	– Input is out of service: The present value for the hardware has not influence on the input.
Present value	Depends on hardware.	Present value. You can enter a value for out of service = active.
Alarm config		Alarm response: Definition of a trigger for an alarm event.
	– enblHighLimit	– High-limit alarms are enabled.
	– enblLowLimit	– Low-limit alarms are enabled.
	– enblOffNormal	– Not available for analog inputs.
	– enblFault	– Fault alarms (reliability ≠ 0) are enabled.
	– self Release	– Automatic reset of fault and off normal alarms.
	– type Alarm	– Not used.
	– evtOffNormal	– Not used.
	– evtFault	– Not used.
	– evtNormal	– Not used.
	– Done	– Assumes changed parameters. Must be set after a change.
Msg class OffNormal		Defines message class for OffNormal alarms (high limit; low limit):
	– Danger (A)	– Plant goes to stop.
	– High (A)	– Plant shuts down.
	– Low (B)	– The impacted plant portion switches off (e.g. the heat pump).
	– Warning (C)	– Message only.
	– No Alarm	– No alarm.
	– Event	– Event history
Msg class fault		Defines message class for fault alarms (reliability ≠ 0, value = invalid):
	– Danger (A)	– Plant goes to stop.
	– High (A)	– Plant shuts down.
	– Low (B)	– The impacted plant portion switches off (e.g. the heat pump).
	– Warning (C)	– Message only.
	– No Alarm	– No alarm.

Parameters, *cont'd*

Name	Range	Function
Value selector		Select valid input value for the application:
	– Hardware	– Value on hardware input.
	– Comm	– Value from communications.
	– Average	– Average from the values on hardware input and from communications. Alarm triggers (if enabled), if one of the two values is invalid.
	– Minimum	– Lowest value from the values on hardware input and from communications. Alarm triggers (if enabled), if one of the two values is invalid.
	– Maximum	– Highest value from the values on hardware input and from communications. Alarm triggers (if enabled), if one of the two values is invalid.
	– PreferedHW	– Value on hardware input has priority. The value from communications assumed if invalid. Alarm triggers (if enabled), if both values are invalid.
	– PrefComm	– Value from communications has priority. The value from hardware input assumed if invalid. Alarm triggers (if enabled), if both values are invalid.

8.5.3 Special information

Access level

- Read: Levels 6, 4 and 2.
- Write: Read only.

Parameters

Name	Range	Function
BACnet present Value	Depends on hardware.	Present value on BACnet. Value is frozen for an alarm.
Value selector		Displays valid input value for the application:
	– Hardware	– Value on hardware input.
	– Comm	– Value from communications.
	– Average	– Average from values on the hardware input and communications. An alarm is triggered when one of the two values are invalid (if enabled).
	– Minimum	– Lowest value from the values on hardware input and from communications. Alarm triggers (if enabled), if one of the two values is invalid.
	– Maximum	– Highest value from the values on hardware input and from communications. Alarm triggers (if enabled), if one of the two values is invalid.
	– PreferedHW	– Value on hardware input has priority. The value from communications assumed if invalid. Alarm triggers (if enabled), if both values are invalid.
	– PrefComm	– Value from communications has priority. The value from hardware input assumed if invalid. Alarm triggers (if enabled), if both values are invalid.
Value HW	Depends on hardware.	Present value for hardware.
Value comm	Depends on hardware.	Present value from communications.
Reliability HW	Depends on hardware.	Present reliability of hardware value.
Reliability comm	Depends on hardware.	Present reliability of value from communications.
Disable OffNormal		The OffNormal alarm is disabled. Example: A value greater than the high limit does not trigger an alarm:
	– Passive	– Alarm is triggered.
	– Active	– Alarm is not triggered.
ToOffNormal	Day of week, dd.mm.yyyy hh:mm:ss	Date and time the last off normal alarm occurred.
ToFault	Day of week, dd.mm.yyyy hh:mm:ss	Data and time last fault alarm (reliability ≠ 0) occurred.
ToNormal	Day of week, dd.mm.yyyy hh:mm:ss	Date and time last alarm was reset.
Communication infos		Information on the communication status for elements.
	– Comm OK	– No error.
	– Comm Err	– Error (varies – depends on communication – not yet implemented).

8.6 Digital inputs
8.6.1 General

Access

The details page for digital inputs can be reached multiple ways, including:
- **Main Index > Unit > Inputs > Digital inputs > Element**
  or
- **Main Index > Unit > Inputs > Digital inputs > Extr air dmper fdbk**

Examples

- **Main Index > Unit > Element Control > Element Group > Extr air dmper fdbk**
  or
- **Main Index > Unit > Damper control > Damper > Extract air fdbk**

Parameters

Name	Range	Function
Present Value	Depends on hardware.	Present input value. Value is frozen for an alarm.
Reliability (Basis Controller)	– OK – Other – Process Error – Config Error	Reliability state for hardware. – Calibration lacking. Controller must be returned to the factory. – Internal fault. – Input not configured.
Reliability (Extension Module POL 955)	– OK – Other	Reliability state for hardware. – Calibration lacking. Controller must be returned to the factory; internal fault or input not configured.
OffNormal	– Passive – Active	Displays *OffNormal* alarms: – No alarm. – Alarm
Operating hours	0... [h]	Number of operating hours for the input: Time, during which input = TRUE applies.
Operating seconds (Reset)	0... [s]	Number of operating seconds for the input. Input of 0 seconds reset operating hours to 0.
Last op hours reset	Wday, dd.mm.yyy hh:mm:ss	Date and time for the last time operating hours was reset.
Time delay	0…65535 [s]	Alarm time delays for off normal alarms.
Special settings	---	Go to *Special settings* page (at access levels 4 and 2 only).
Special infos	---	Go to *Special info* page (at access levels 4 and 2 only).

8.6.2 Special settings

Access level

- Read: Levels 4 and 2.
- Write: Levels 4 and 2.

Parameters

Name	Range	Function
Out of service		Take input offline to manually enter a value, e.g. a temperature. Manual operation is not automatically reset. An alarm can be triggered after a set period when the manual alarm function is enabled.
	– Passive	– The input is in *Auto mode*.
	– Active	– Input is out of service: The present value for the hardware has not influence on the input.
Present value	Depends on hardware.	Present value. You can enter a value for out of service = active.
Alarm config		Alarm response: Definition of a trigger for an alarm event.
	– enblHighLimit	– Not implemented.
	– enblLowLimit	– Not implemented.
	– enblOffNormal	– *OffNormal Alarm* (alarm, e.g. for logical 1 on input) is enabled.
	– enblFault	– Fault alarms (reliability ≠ 0) are enabled.
	– self Release	– Automatic reset of fault and off normal alarms.
	– type Alarm	– Not used.
	– evtOffNormal	– Not used.
	– evtFault	– Not used.
	– evtNormal	– Not used.
	– Done	– Assumes changed parameters. See all!
Msg class OffNormal		Defines message class for OffNormal alarms (missing feedback):
	– Danger (A)	– Plant goes to stop.
	– High (A)	– Plant shuts down.
	– Low (B)	– The impacted plant portion switches off (e.g. the heat pump).
	– Warning (C)	– Message only.
	– No Alarm	– No alarm.
		Note: This switch must be on *No Alarm* for all inputs not intended to trigger an alarm (e.g. plant switch).
	– Event	– Event history
Msg class fault		Defines message class for fault alarms (reliability ≠ 0, value = invalid):
	– Danger (A)	– Plant goes to stop.
	– High (A)	– Plant shuts down.
	– Low (B)	– The impacted plant portion switches off (e.g. the heat pump).
	– Warning (C)	– Message only.
	– No Alarm	– No alarm.

Parameters, *cont'd*

Name	Range	Function
Contact Function		Changes input from normal open to normal closed:
	– NO	– Normal open (logical 1 on input = TRUE in the program)
	– NC	– Normal closed (logical 0 on input = TRUE in the program)
Value selector		Select valid input value for the application:
	– Hardware	– Value on hardware input
	– Comm	– Value from communications
	– And	– The input is 1, if the value on the hardware input and the value from communications = 1. Alarm triggers (if enabled), if one of the two values is invalid.
	– Or	– The input is 1, if the value on the hardware input or the value from communications = 1. Alarm triggers (if enabled), if one of the two values is invalid.
	– PreferedHW	– Value on hardware input has priority. The value from communications assumed if invalid. Alarm triggers (if enabled), if both values are invalid.
	– PrefComm	– Value from communications has priority. The value from hardware input assumed if invalid. Alarm triggers (if enabled), if both values are invalid.

8.6.3 Special information

Access level

- Read: Levels 4 and 2.
- Write: Not writable.

Parameters

Name	Range	Function
Value selector	– Hardware – Comm – And – Or – PreferedHW – PrefComm	Displays valid input value for the application: – Value on hardware input – Value from communications – The input is 1, if the value on the hardware input and the value from communications = 1. Alarm triggers (if enabled), if one of the two values is invalid. – The input is 1, if the value on the hardware input or the value from communications = 1. Alarm triggers (if enabled), if one of the two values is invalid. – Value on hardware input has priority. The value from communications assumed if invalid. Alarm triggers (if enabled), if both values are invalid. – Value from communications has priority. The value from hardware input assumed if invalid. Alarm triggers (if enabled), if both values are invalid.
Value HW	Text depends on hardware	Present value for hardware.
Value comm	Text depends on hardware	Present value from communications.
Reliability (Basis Controller)	– OK – Other – Process Error – Config Error	Reliability state for hardware. – Calibration lacking. Controller must be returned to the factory. – Internal fault. – Input not configured.
Reliability (Extension Module POL 955)	– OK – Other	Reliability state for hardware. – Calibration lacking. Controller must be returned to the factory; internal fault or input not configured.
Reliability comm	– OK – Fault	Present reliability of value from communications.
Disable OffNormal	– Passive – Active	The OffNormal alarm is disabled. Example: An alarm is not triggered if alarm input true: – Alarm is triggered. – Alarm is not triggered.
Enable Value	– Passive – Active	Displays enable of software input within the application: – Input is disabled. – Input is enabled.
ToOffNormal	Day of week, dd.mm.yyyy hh:mm:ss	Date and time the last off normal alarm occurred.
ToFault	Day of week, dd.mm.yyyy hh:mm:ss	Data and time last fault alarm (reliability ≠ 0) occurred.
ToNormal	Day of week, dd.mm.yyyy hh:mm:ss	Date and time last alarm was reset.
Communication infos	– Comm OK – Comm Err	Information on the communication status for elements. – No error. – Function not yet available.

8.7 PID controller
8.7.1 General

Content

This section describes parameterization of the PID and cascade controllers.

For all control settings from PID controllers a reference is made on the same page for the loop controller; for all control settings for cascade controllers on the same page for the *Cascade controller*.
All physical units were left out for this reason.
Furthermore, the outputs *Control output clg* und *Control output htg* for humidity controllers are used for dehumidification or humidification.

Access

The details page for PID controllers can be reached multiple ways, including:
- **Main Index > Unit > Loop controllers > Controller-Element**
  or
- **Main Index > Unit > Element Group > Element > Controller**

Examples

- **Main Index > Unit > Loop controllers > Supply fan**
  or
- **Main Index > Unit > Fan control > Supply fan > Controller**

Parameters

Name	Range	Function
Control output	0…100 [%]	Present output for the controller.
Present value		Present actual value (input value) for the controller.
Setpoint		Present setpoint for the controller.
Enable	– Passive – Active	Enable controller: – Controller disabled. – Controller enabled.
Fault	– Passive – Active	Controller fault status, e.g. faulty sensor signal: – No error. – Error pending. Does not trigger an event, since the cause of a control fault must be recorded separately (e.g. sensor fault).
Status	– GESP – OG – UG – REG – Y-NV – UDEF	– Blocked: Controller not enabled or set to out of service. – Control output = high limit. – Control output = low limit. – Control mode – Direct intervention on hardware output is enabled (e.g. manual via HMI or frost). – Undefined.
Invert outpt/funct	– Passive – Active	Inverts control action of the controller and the output signal in switched off state: – Output signal = 0%. – Output signal = 100%. Function: See relationship between gain and invert under special settings.

Parameters, *cont'd*

Name	Range	Function
High limit		Maximum limit control for the controller.
Low limit		Minimum limit control for the controller.
Special settings		Go to *Special settings* page (at access levels 4 and 2 only).

8.7.2 Special settings

Access level

- Read: Levels 4 and 2.
- Write: Levels 4 and 2.

Parameters

Name	Range	Function
Gain	-1000...1000	Amplification factor (KP). Set control action with *Invert output/funct* (heating or cooling). Function: See relationship gain and invert.
Int action time	0….18000 [s]	Integral action time (Tn).
Derivative act time	0….18000 [s]	Derivative action time (Td).
Out of Service	– Passive – Active	Out of service: Controller is taken out of the sequence and the control output is set to 0.

Relationship gain and invert

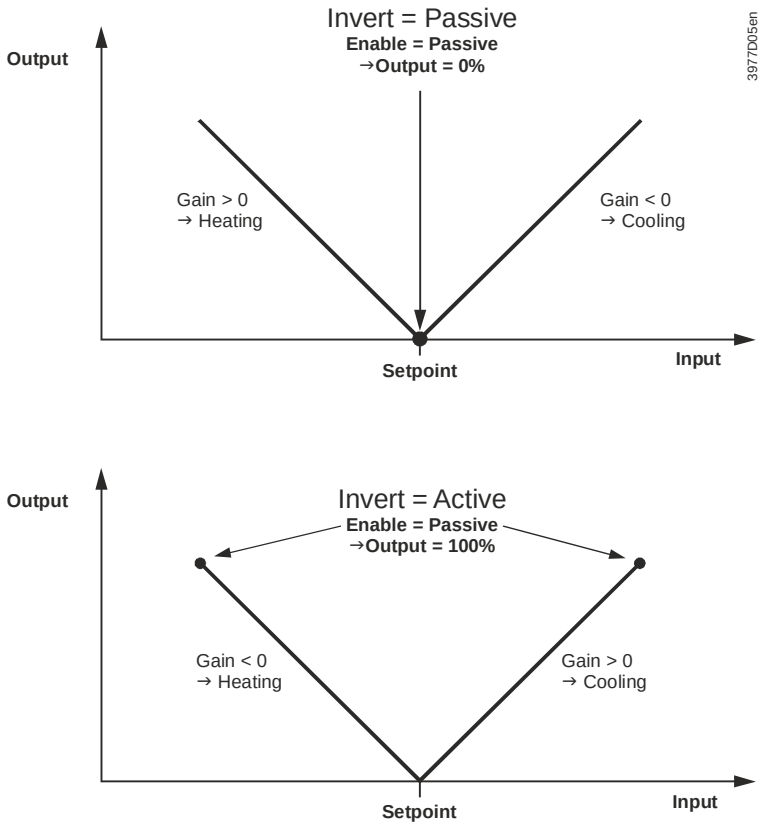


Figure 51: Diagram of relationship gain and invert

8.8 Cascade controller
8.8.1 General

Access

The details page for cascade controllers can be reached multiple ways, including:
- **Main Index > Unit > Temp control > Cascade controller**
- **Main Index > Unit > Humidity control > Cascade controller**
- **Main Index > Unit > Loop controllers > Casc controller tmp**
- **Main Index > Unit > Loop controllers > Casc controller hum**

Parameters

Name	Range	Function
Control output clg		Present controller output for cooling setpoint or dehumidification setpoint.
Control output htg		Present controller output for heating setpoint or humidification setpoint.
Present Value		Present actual value (input value) for the controller.
Room stpt clg/dehum		Cool or dehumidification setpoint from the program.
Room stpt htg/hum		Heating or humidification setpoint from the program.
High limit	-64.0 …99.0 [°C] / [% r.H.]	Maximum supply air temperature or humidity.
Low limit	-64.0…99.0 [°C] / [% r.H.]	Minimum supply air temperature or humidity.
Load compensation	-64.0…99.0 [°C] / [% r.H.]	Set compensation for a room load. Calculates the present controller outputs as follows: – Control output clg = Internally calculated *Control Output clg* + *Load compensation* – Control output htg = Internally calculated *Control Output htg* + *Load compensation*
Setpoint selection	– Htg+Dz – Htg/Clg – +/-Half Dz – Clg-Dz	Displays setpoint variants in the program (*Configuration 2 >Tmp stpt selection* or *Hum stpt selection*).
Setpoint dead zone		From the entry of calculated dead zones. (Displays dead zones: *Configuration 2 >Tmp stpt selection* or *Hum stpt selection*).
Enable	 – Passive – Active	Enable controller: – Controller disabled. – Controller enabled.
Fault	 – Passive – Active	Controller fault status (e.g. faulty sensor signal): – No error. – Error pending. Does not trigger an event, since the cause of a control fault must be recorded separately (e.g. room sensor fault).

Parameters, *cont'd*

Name	Range	Function
Status	 – GESP – OG – UG – REG – UDEF	Controller status: – Controller disabled. – Control output = high limit. – Control output = low limit. – Control mode – Undefined
Special settings		Go to *Special settings* page (at access levels 4 and 2 only).

8.8.2 Special settings

Name	Range	Function
Gain	0...1000	Amplification factor (KP).
Int action time	0….18000 [s]	Integral action time (Tn).
Min/max limit	-64.0…99.0 [°C] / [% r.H.]	Adjusts high and low limits to end position. Ensures the difference between heating and cooling output in the end position as well as needed.

Function during cooling

Min/max limit positive:
– Lowest control output clg = low limit + min/max limit
– Lowest control output htg = low limit

Min/max limit negative:
– Lowest control output clg = low limit
– Lowest control output htg = low limit + min/max limit

Function during heating

Min/max limit positive:
– Lowest control output clg = high limit
– Lowest control output htg = high limit + min/max limit

Min/max limit negative:
– Lowest control output clg = high limit + min/max limit
– Lowest control output htg = high limit

ExampleHigh limit = 28
Low limit = 16
Min/max limit = -2

Cooling:
– Lowest control output clg = low limit ≥ 16
– Lowest control output htg = low limit - min/max limit ≥ 16 – 2 = 14

Heating:
– Lowest control output htg = high limit + min/max limit ≥ 28 – 2 = 30
– Lowest control output htg = high limit ≥ 28

8.9 Scheduler program, general

Content

This section describes the functions and entries for time switch catalogs and calendars.

Possible entries

Possible entries vary depending on the configuration.

It is set in *Configuration 1*:
Main Index > Configuration > Configuration 1 > TSP function
Main Index > Configuration > Configuration 1 > TSP steps

Calendar in auxiliary

The time switch catalog/calendar available in auxiliary has the set entries *Off* and *On*:
Main Index > Configuration > Configuration 2 > Aux TSP output

Functions

The plant can be switched to off or any step (for analog controlled fan, to the given stage setpoint) if no high priority element (e.g. *Manual Operation* ≠ *Auto*) is enabled.
A maximum of 6 switching entries are possible per week.
The calendar *Fix Off* (in operating mode only) override the calendar exception and this in turn overrides the normal time switch catalog.
Up to 10 periods or exception days can be defined for each calendar.

TSP function = *Steps+Tmp*:
The time switch program determines both fan stage setpoint as well as the temperature setpoint (*Comfort*/*Economy*).

8.10 Weekly schedule

Parameter

Main Index > Unit > Main overview > Time switch program > Schedule
Main Index > Unit > Main setpoints > Time switch program > Schedule
Start page > Main overview > Time switch program > Schedule

Name	Range	Function
Present value	---	Resulting switching command from the scheduler.
Monday	– Passive – Active	Display is enabled of the present day is Monday. The last entry for the day applies to 23:59. Go to the daily switching plan for Monday.
Copy schedule	– Monday to – Tu to Fr	Copies entries for the time switch program from Monday to Tuesday through Friday: – Passive position (copy disabled). – Copy starts. Returns to display.
Tuesday		Similar to Monday.
...		...
Sunday		Similar to Monday.
Exception		Displays the enabled command, when the present day is an exception day. Go to daily switching plan for exception days.
Period:Start		(Only available at access level 2). Start date for the weekly schedule. The entry *,* *.00 means that the weekly schedule is always enabled → enable weekly schedule.
Period:Stop		(Only available at access level 2). Start date and time for when the weekly schedule no longer applies.

8.11 Daily schedule

Parameter

Main Index > Unit > Main overview > Time switch program > Schedule > Monday....Exception
Main Index > Unit > Main setpoints > Time switch program > Schedule > Monday....Exception
Start page > Main overview > Time switch program > Schedule > Monday....Exception

Name	Range	Function
Day Schedule	– Passive – Active	Status of week or exception day in question: – Present week day (system day) does not correspond to the processed day. – Present week day (system day) corresponds to the processed day.
Time 1		Special case: This entry may not be adjusted; it must always be set to 00:00 and requires password level 4 to change.
Value 1		Switching command for *Time 1*.
Time 2		Switching *Time 2*. *: * → entry disabled.
Value 2 ... Value 6		Analog value 1.
Time 3 ... Time 6		Analog time 2.

8.12 Exception days and fixed off

Exception days, definition

Exception days are defined in the calendars.
These may include certain days, periods or days of the week.
On the exception days, the exception days override the weekly schedule.

Exception days, active entries

The plant switches per the weekly scheduler under the exceptions set in the daily schedule when an entry is enabled in the calendar exception.

Fixed off

The plant switches off when the entry calendar fix Off is enabled.

Path

- **Main Index > Unit > Main overview > Time switch program > Calendar exception**
- **Main Index > Unit > Main overview > Time switch program > Calendar fix off**
- **Main Index > Unit > Auxiliary > TSP Output > Calendar exception**

Name	Range	Function
Present value	– Passive – Active	Displays whether a calendar entry is currently enabled: – No calendar entry is currently enabled. – A calendar entry is currently enabled.
Choice-x	– Date – Range – WeekDay – Passive	Specifies the entry for the exception: – A certain day (e.g. Friday). – A period (e.g. vacation). – A certain day of the week. – Entries are ignored. This value should be set last after the date is entered.
-(Start)date		– Choice-x = range: Enter start date for the period. – (Choice-x = date: Enter data for a single day).
-End date		Choice-x = range: Enter end date for the period. End date must always be after the start date.
-Week day		For Choice-x = weekday only: Enter the day of the week.

Examples

The following are examples for entries and results:
- Choice-x = Date
- Choice-1 = Range
- Choice-1 = WeekDay

Choice-x = Date

Only the entry in (start) is relevant.
- -(Start) date = *,01.01.09
  Result: January 1, 2009 is an exception day.
- -(Start) date = Mo,*.*.00
  Each Monday is an exception day.
- -(Start) date = *,*.Evn.00
  The days for the entire month are exception day for each even month (February, April, June, August, etc.).

Examples, *cont'd*

Choice-1 = Range

The entries in (start) date and end date are relevant.

- -(Start) date = *,23.06.09 / -End date = *,12.07.09
  June 23, 2009 through July 12, 2009 are exception day (e.g. vacation).
- -(Start) date = *,23.12.00 / -End date = *,31.12.00
  Each year, the days from December 23 through December 31 are exception days. The entry end date = *,01.01.00 does not work here, since January 1 is before December 23.
- -(Start) date = *,23.12.09 / -End date = *,01.01.09
  23. December 2009 through 01. January 2010 are exception day.
- -(Start) date = *,*.*.00 / -End date = *,*.*.00
  Caution!
  This entry is always enabled! The plant is continuously on exception or off.

Choice-1 = WeekDay

The entries for week day are relevant.

- Week day = *,Fr,*
  Every Friday is an exception day.
- Week day = *,Fr, Evn
  Each Friday in even months (February, April, June, August, etc.) is an exception day.
- Week day = *,*,*
  Caution!
  This entry is always enabled! The plant is continuously on exception or off.

9 Alarming
9.1 Overview

Introduction

This section describes the reaction to incoming alarms and actions triggered from the alarms.

Knowledge provided

The section provides the following knowledge:
- Interpret alarm messages and state indications
- Acknowledge and reset alarms.
- Set sort criteria for alarm and history list.

Topic

The topics in the section are:

Topic	Section
Functions and workflows	10.2
Alarm lists detail	10.3
Alarm list, active alarms	10.4
Alarm history	10.5
Alarm lists/history settings	10.6
Alarm lists	10.7

9.2 Functions and workflows

Actions and state indications

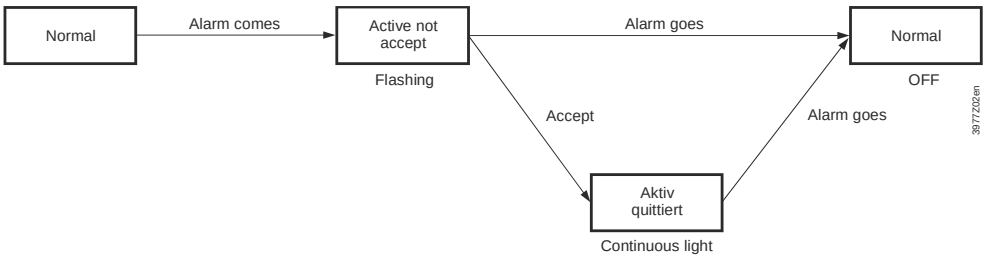
The following actions and status indications are listed for incoming alarms, acknowledgements and resets:

- Each alarm is reported in clear text, notification class, alarm group, date and time.
- Each new alarm generates a line in both the alarm list as well as the history list.
- Active alarms:
  - The alarm LED flashes on the external HMI.
  - The alarm bell symbol rings back and forth in the in-built HMI.
- An acknowledge, but still active alarm:
  - The alarm LED is lit on the external HMI.
  - The alarm bell symbol is still in the in-built HMI.
- Reset alarms:
  - Alarm list: Line is deleted.
  - History list: Display of going alarm.

Acknowledge alarms

The following diagrams display the workflows for acknowledgement of unsaved or saved alarms:

A. Unsaved alarms:



B. Saved alarms:

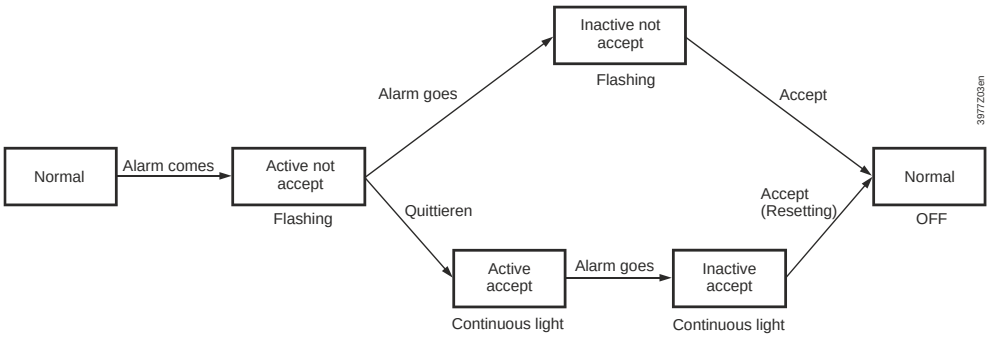


Figure 52: Diagram for acknowledge alarms

Alarm button function

The following diagram represents the states and functions of the alarm button relating to detailed info, alarm list, and history list:

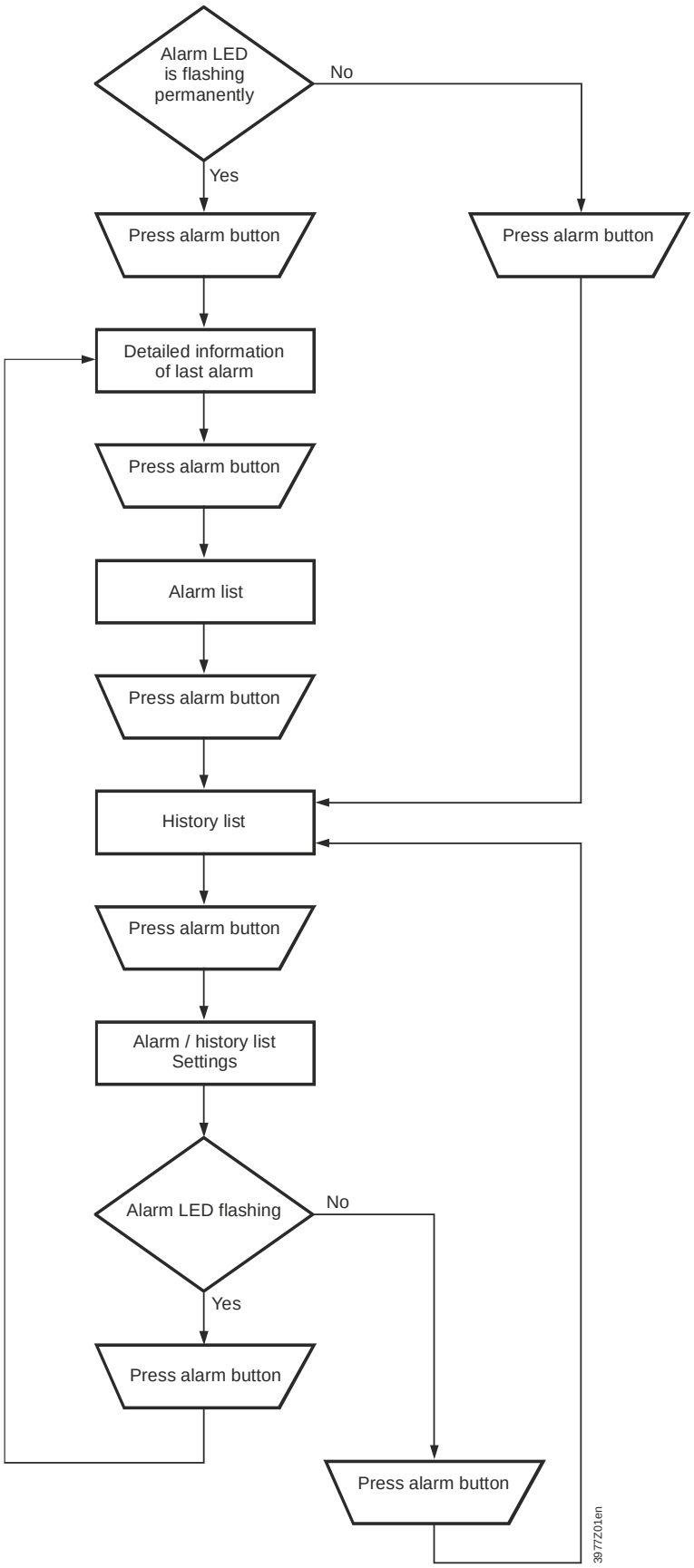


Figure 53: Diagram of alarm button function

9.3 Alarm lists detail

Information

The Alarm list detail includes the following information on the last occurring alarm:

Line	Information	
1st line	+ Alarm name:	State
2nd line	Notification class	
3rd line	Date	Time of day

Example:

+ Heating frost tmp:	Frost
0	Emerg(A)
15.10.2009	21:32:55

9.4 Alarm list, active alarms

Information

Information on the active alarms in the alarm list:

1st line	The line displays how many alarms are still not acknowledged: Acknowledge Passive number of unacknowledged alarms. *Example:* Acknowledge Passive 14 **Pressing** the **setting knob** and select *Active* to acknowledge all unacknowledged alarms or rest the same if the fault as eliminated, but not yet saved.
Other lines	+ Alarm name: State *Example:* + Supply air temp: Alarm – **Press knob**: Go to alarm's detail information. – **Press alarm knob**: Go to the list settings.

List may include up to 50 entries.

9.5 Alarm history

Information

Information on the active and passive alarms in the alarm history:

1st line	The line displays how many entries are included in the list: Acknowledge Passive Number of entries. Example: Acknowledge Passive 14 Press setting knobs and select *Active* to delete all entries from the history list.
Other lines	+ Alarm name: State Example: + Supply air temp: Alarm (coming alarm). - Supply air temp: OK (going alarm). – Press knob: Go to alarm's detail information. – Press alarm knob: Go to the list settings.

List may include up to 50 entries.

9.6 Event history (new add info!!)

Information

Information on event history in the alarm history:

Reset	Reset the even history list
Set order 1	– Time – Object ID – Priority – State
Set order 2	– Time – Object ID – Priority – State
Descending order	- Active - passive

List may include up to 50 entries.

9.7 Alarm lists/history settings

Parameter

No fixed path
(the alarm knob is used for example, see diagram in section 9.2 Point tables: Hardware)

Name	Range	Function
Alarm list:		
Reset		Reset/acknowledge pending alarms
Sort order 1	– Time – Name – AlarmClass – State	Main sorting criteria – Sort by data and time. – Sort alphabetically in ascending order. – Sort by notification class (0,1,2,3 corresponding to *Danger* / *High* / *Low* / *Warning*). – Sort by status (fault, no fault).
Sort order 2	– Time – Name – AlarmClass – State	Auxiliary sort criteria: See *Sort order 1*.
Descending order	– Passive – Active	Alarms sorted in ascending or descending order. What is the criteria applied for? – Ascending – Descending
Alarm history		
Reset		Deletes history list.
Sort order 1	– Time – Name – AlarmClass – State	Main sorting criteria See *Alarm list*.
Sort order 2	– Time – Name – AlarmClass – State	Auxiliary sort criteria: See *Alarm list*.
Descending order	– Passive – Active	See *Alarm list*.
EVENT HISTORY		Add info
ALARM SNAPSHOT		Add info

9.8 Alarm lists
9.8.1 Sort numerically (alarm numbers)

Alarm Text	Notification class / group	Alarm no. room unit	Settings 1	Settings 2
Communication test	3/C	1		Time delay 600 s
External setpoint	2/B	20	High Limit 6.0 °C Low Limit -6.0 °C	Time delay 5s
Supplemental alarm	2/B	21		Time delay 0s
Manual mode	2/B	22		Time delay 1800 s
Modbus comm.	2/B	23		Time delay 10 s
Process bus comm.	2/B	23		Time delay 10 s
Room unit temp.	2/B	24		Time delay 17m
Room unit 2 temp.	2/B	24		Time delay 17m
AHU Rturn temp.	2/B	25		Time delay 0s
Room temperature	2/B	26		Time delay 0s
Room temperature 2	2/B	27		Time delay 0s
Extract air temperature	2/B	28	Low Limit -10.0 °C	Time delay 0s
Energy recover supply air temperature	2/B	29		Time delay 0s
Supply air temperature 2	2/B	30		Time delay 0s
Supplement temp.	2/B	31		Time delay 0s
Supply air temp. deviation	2/B	32	Max deviation = 10.0 °C Min Limit = 10.0°C StrtUpDly 60 s	Time delay 3600s
RAL temp. deviation	2/B	33	Max deviation = 10.0 °C Min Limit = 10.0°C StrtUpDly 600 s	Time delay 3600 s
H-Reg pump alarm	2/B	34		Time delay 0s
Heating reg. pump RM	2/B	34	StrtUpDly 10 s	Time delay 0s
C-Reg 2 CM alarm	2/B	35		Time delay 0s
Cooling register 2 RM	2/B	35	StrtUpDly 10 s	Time delay 5s
C-Reg 2 pump alarm	2/B	35	StrtUpDly 30 s	Time delay 1s
Cooling register 2 pump RM	2/B	35		Time delay 0s
C-Reg 2 pump alarm	2/B	36		Time delay 0s
Heating reg. 2 pump RM	2/B	36	StrtUpDly 10 s	Time delay 0s
Humid. pump alarm	2/B	37		Time delay 0s
Humid. pump RM	2/B	37	StrtUpDly 30 s	Time delay 5s
Humidifier RM	2/B	38	StrtUpDly 10 s	Time delay 5s
Exhaust air filter alarm	2/B	39		Time delay 0s
Filter alarm	2/B	39		Time delay 0s
Supply air filter alarm	2/B	39		Time delay 0s
Fan op hours alarm	2/B	40	Alarm Lim Op hours 17520 h	Time delay 0 s
C-Reg CM alarm	2/B	41		Time delay 0s
C-Reg CM RM	2/B	41	StrtUpDly 30 s	Time delay 1s
Cooling register pump Alm	2/B	41		Time delay 0s
Cooling reg. pump RM	2/B	41	StrtUpDly 10 s	Time delay 5s
HR Alarm	2/B	42		Time delay 0s
HR pump alarm	2/B	43		Time delay 0s
HR pump RM	2/B	43	StrtUpDly 10 s	Time delay 5s

Alarm list sorted numerically, *cont'd*

Alarm Text	Notification class / group	Alarm no. room unit	Settings 1	Settings 2
HR efficiency	2/B	44		Time delay 600 s
HR damper	2/B	45		Time delay 0 s
Supply air relative humidity	2/B	46	High Limit 100%rel	Time delay 0 s
Supply air humidity deviation	2/B	46	Max deviation = 5.0%rel Min Limit = 10.0%rel StrtUpDly 60 s	Time delay 3600 s
AHU relative humidity	2/B	47	High Limit 100%rel	Time delay 0 s
RAL humidity deviation	2/B	48	Max deviation = 10.0%rel Min Limit = 10.0%rel StrtUpDly 60 s	Time delay 3600 s
Room air relative humidity	2/B	48	High Limit 100%rel	Time delay 0 s
Air quality	2/B	49	High Limit 3000 ppm	Time delay 0 s
Supply air temperature	1/A	60		Time delay 0 s
Extract air temperature	2/B	61		Time delay 0 s
Electric reg alarm	1/A	62		Time delay 0 s
Electric reg 2 alarm	1/A	63		Time delay 0 s
Fire dampers closed	1/A	64	Start delay = Closing Time * 1.15	Time delay 5 s
Fire damper change	1/A	64		Time delay 5 s
Fire damper open	1/A	64	Start delay = Opening Time * 1.15	Time delay 5 s
Extract air damper RM	1/A	65	StrtUpDly 180 s	Time delay 5 s
Extract air damper RM	1/A	65	StrtUpDly 180 s	Time delay 5 s
Fan alarm	1/A	66		Time delay 0 s
Supply air fan alarm	1/A	66		Time delay 0 s
Supply air fan RM	1/A	66	StrtUpDly 60 s	Time delay 5 s
Extract air fan alarm	1/A	67		Time delay 0 s
Extract air fan RM	1/A	67	StrtUpDly 30 s	Time delay 5 s
Dew point	0/A	68		Time delay 0 s
Supply air fan deviation	0/A	69	StrtUpDly 180 s	Time delay 60 s
Supply air flow	0/A	69	High Limit 40000 l/s	Time delay 10 s
Supply air pressure	0/A	69	High Limit 5000 Pa	Time delay 10 s
Extract air fan deviation	0/A	70	StrtUpDly 180 s	Time delay 60 s
Extract air flow	0/A	70	High Limit 20000 l/s	Time delay 10 s
Extract air pressure	0/A	70	High Limit 5000 Pa	Time delay 10 s
Extract air temp. fire alarm	1/A	81	Limit 50 °C	Time delay 2 s
Supply air temp. fire alarm	1/A	81	Limit 70 °C	Time delay 2 s
Fire alarm	0/A	81		Time delay 0 s
H-Reg frost temp	1/A	82	Low Limit 5.0 °C	Time delay 0 s
Heat recovery water temp.	1/A	83	Low Limit -2.0 °C	Time delay 0 s
H-Reg 2 frost temp	1/A	84	Low Limit 5.0 °C	Time delay 0 s
H-Reg frost detector	1/A	85		Time delay 0 s
H-Reg 2 frost detector	1/A	86		Time delay 0 s
HR frost detector	1/A	87		Time delay 1200 s
HR frost pressure	1/A	87	High Limit 5000 Pa	Time delay 0 s
Conf. alarm H-Reg 2	0/not Exist			Time delay 0 s
Duplicate config IO	0/not Exist			Time delay 0 s
Unconfigured IO	0/not Exist			Time delay 0 s
IO auxiliary module	0/A			Time delay 0 s

9.8.2 Alphabetically (Alarm names)

Alarm text	Notification class / group	Alarm no. room unit	Settings 1	Settings 2
Extract air pressure	0/A	70	High Limit 5000 Pa	Time delay 10 s
Extract air filter alarm	2/B	39		Time delay 0 s
Extract air filter alarm analog	2/B	39	High Limit 5000 Pa	Time delay 600 s
Extract air flow	0/A	70	High Limit 20000 l/s	Time delay 10 s
Extract air temp. fire alarm	1/A	81	Limit 50 °C	Time delay 2 s
Extract air temperature	2/B	61		Time delay 0 s
Extract air fan deviation	0/A	70	StrtUpDly 180 s	Time delay 60 s
Extract air fan alarm	1/A	67		Time delay 0 s
Extract air fan RM	1/A	67	StrtUpDly 30 s	Time delay 5 s
AHU relative humidity	2/B	47	High Limit 100%rel	Time delay 0 s
Extract air damper RM	1/A	65	StrtUpDly 180 s	Time delay 5 s
AHU Rturn temp.	2/B	25		Time delay 0 s
Humid. pump alarm	2/B	37		Time delay 0 s
Humid. pump RM	2/B	37	StrtUpDly 30 s	Time delay 5 s
Humidifier RM	2/B	38	StrtUpDly 10 s	Time delay 5 s
Fire alarm	0/A	81		Time delay 0 s
Fire damper open	1/A	64	Start delay = Opening Time * 1.15	Time delay 5 s
Fire dampers closed	1/A	64	Start delay = Closing Time * 1.15	Time delay 5 s
Fire damper change	1/A	64		Time delay 5 s
Duplicate config IO	0/not Exist			Time delay 0 s
Electric reg 2 alarm	1/A	63		Time delay 0 s
Electric reg alarm	1/A	62		Time delay 0 s
External setpoint	2/B	20	High Limit 6.0 °C Low Limit -6.0 °C	Time delay 5 s
Filter alarm	2/B	39		Time delay 0 s
Extract air damper RM	1/A	65	StrtUpDly 180 s	Time delay 5 s
Extract air temperature	2/B	28	Low Limit -10.0 °C	Time delay 0 s
Heating reg. 2 pump RM	2/B	36	StrtUpDly 10 s	Time delay 0 s
Heating reg. pump RM	2/B	34	StrtUpDly 10 s	Time delay 0 s
H-Reg 2 frost temp	1/A	84	Low Limit 5.0 °C	Time delay 0 s
H-Reg 2 frost detector	1/A	86		Time delay 0 s
H-Reg frost temp	1/A	82	Low Limit 5.0 °C	Time delay 0 s
H-Reg frost detector	1/A	85		Time delay 0 s
H-Reg pump alarm	2/B	34		Time delay 0 s
IO auxiliary module	0/A			Time delay 0 s
Communication test	3/C	1		Time delay 600 s
Conf. alarm H-Reg 2	0/not Exist			Time delay 0 s
C-Reg 2 pump alarm	2/B	35	StrtUpDly 30 s	Time delay 1 s
C-Reg 2 pump alarm	2/B	36		Time delay 0 s
C-Reg 2 CM alarm	2/B	35		Time delay 0 s
Cooling register 2 pump RM	2/B	35		Time delay 0 s
C-Reg CM alarm	2/B	41		Time delay 0 s
C-Reg CM RM	2/B	41	StrtUpDly 30 s	Time delay 1 s
Cooling register pump Alm	2/B	41		Time delay 0 s
Cooling reg. pump RM	2/B	41	StrtUpDly 10 s	Time delay 5 s

Alarm list sorted alphabetically, *cont'd*

Alarm text	Notification class/group	Alarm no. room unit	Settings 1	Settings 2
Cooling register 2 RM	2/B	35	StrtUpDly 10 s	Time delay 5 s
Air quality	2/B	49	High Limit 3000 ppm	Time delay 0 s
Manual mode	2/B	22		Time delay 1800 s
Modbus comm.	2/B	23		Time delay 10 s
Unconfigured IO	0/not Exist			Time delay 0 s
Process bus comm.	2/B	23		Time delay 10 s
RAL humidity deviation	2/B	48	Max deviation = 10.0%rel Min Limit = 10.0%rel StrtUpDly 60 s	Time delay 3600 s
RAL temp. deviation	2/B	33	Max deviation = 10.0 °C Min Limit = 10.0 °C StrtUpDly 600 s	Time delay 3600 s
Room air relative humidity	2/B	48	High Limit 100%rel	Time delay 0 s
Room unit 2 temp.	2/B	24		Time delay 17 m
Room unit temp.	2/B	24		Time delay 17 m
Room temperature	2/B	26		Time delay 0 s
Room temperature 2	2/B	27		Time delay 0 s
Dew point	0/A	68		Time delay 0 s
Fan op hours alarm	2/B	40	Alarm Lim Op hours 17520 h	Time delay 0 s
Fan alarm	1/A	66		Time delay 0 s
HR Alarm	2/B	42		Time delay 0 s
HR frost detector	1/A	87		Time delay 1200 s
HR frost pressure	1/A	87	High Limit 5000 Pa	Time delay 0 s
HR damper	2/B	45		Time delay 0 s
HR pump alarm	2/B	43		Time delay 0 s
HR pump RM	2/B	43	StrtUpDly 10 s	Time delay 5 s
Heat recovery water temp.	1/A	83	Low Limit -2.0 °C	Time delay 0 s
HR efficiency	2/B	44		Time delay 600 s
Energy recover supply air temperature	2/B	29		Time delay 0 s
Supply air pressure	0/A	69	High Limit 5000 Pa	Time delay 10 s
Supply air humidity deviation	2/B	46	Max deviation = 5.0%rel Min Limit = 10.0%rel StrtUpDly 60 s	Time delay 3600 s
Supply air relative humidity	2/B	46	High Limit 100%rel	Time delay 0 s
Supply air filter alarm	2/B	39		Time delay 0 s
Supply air filter alarm analog	2/B	39	High Limit 5000 Pa	Time delay 600 s
Supply air flow	0/A	69	High Limit 40000 l/s	Time delay 10 s
Supply air temp. deviation	2/B	32	Max deviation = 10.0 °C Min Limit = 10.0 °C StrtUpDly 60 s	Time delay 3600 s
Supply air temp. fire alarm	1/A	81	Limit 70 °C	Time delay 2 s
Supply air temperature	1/A	60		Time delay 0 s
Supply air temperature 2	2/B	30		Time delay 0 s
Supply air fan deviation	0/A	69	StrtUpDly 180 s	Time delay 60 s
Supply air fan alarm	1/A	66		Time delay 0 s
Supply air fan RM	1/A	66	StrtUpDly 60 s	Time delay 5 s
Supplemental alarm	2/B	21		Time delay 0 s
Supplement temp.	2/B	31		Time delay 0 s

10 Appendices
10.1 Overview

Introduction

The following pages include:
- Auxiliary tables that can be used when configuring
- Diagram and tables for reference purposes

Topics

The topics in the section are:

10.2 Point tables: Hardware

Procedure for configuration

As a matter of principle, we recommend the following configuration procedure:

Step	Job
1	During configuration (*Configuration 1* and *Configuration 2*) all required I/Os in the table must be executed using the following templates.
2	Clean up the tables prior to starting I/O configuration.
3	Conduct I/O configuration per the table.

This ensures that:
– the plant on the basis controller and the planned extension modules fit.
– It is evident at all times which terminals used for the required inputs and outputs.

Basis controller

Hardware assignment of the basis controller POL683x

IO	Function	IO type	Connection	Comments
Digital outputs				
Q1		Digital	T6 (Q13,Q14)	
Q2		Digital	T6 (Q23,Q24)	
Q3		Digital	T6 (Q33,Q34)	
Q4		Digital	T6 (Q43,Q44)	
Q5		Digital	T7 (Q53,Q54)	
Q6		Digital	T7 (Q63,Q64)	
Analog outputs				
Y1		0...10 V DC	T3 (Y1,M)	
Y2		0...10 V DC	T3 (Y2,M)	
Binary inputs				
DI1		Digital	T4 (D1,M)	
DI2		Digital	T4 (D2,M)	
DI3		Digital	T4 (D3,M)	
DI4		Digital	T4 (D4,M)	
DI5		Digital	T4 (D5,M)	
Universal inputs				
X1			T2 (X1,M)	
X2			T2 (X2,M)	
Universal inputs / outputs				
X3			T2 (X3,M)	
X4			T2 (X4,M)	
X5			T2 (X5,M)	
X6			T2 (X6,M)	
X7			T2 (X7,M)	
X8				

Note the following for universal I/Os:
– Universals I/Os **X1** and **X2** can be configured **exclusively** as inputs (digital, Ni1000, Pt1000, NTC10K, 0-10 V DC).
– Universals I/Os **X3 – X8** can be configured as inputs (digital, Ni1000, Pt1000, NTC10K, 0-10 V DC) **or** outputs 0-10 V DC.

Extension module 1 Hardware assignment of extension module POL955 with address 1

IO	Function	IO type	Connection	Comments
Digital outputs				
Q11		Digital	T3 (Q13,Q14)	
Q12		Digital	T3 (Q23,Q24)	
Q13		Digital	T3 (Q33,Q34)	
Q14		Digital	T4 (Q43,Q44)	
Analog outputs				
Y11		0...10 V DC	T5 (Y1,M)	
Y12		0...10 V DC	T5 (Y2,M)	
Universal inputs / outputs				
X11			T1 (X1,M)	
X12			T1 (X2,M)	
X13			T1 (X3,M)	
X14			T1 (X4,M)	
X15			T2 (X5,M)	
X16			T2 (X6,M)	
X17			T2 (X7,M)	
X18			T2 (X8,M)	

Universals I/Os **X11 – X18** can be configured as inputs (digital, Ni1000, Pt1000, NTC10K, 0-10 V DC) **or** outputs 0-10 V DC.

Extension module 2 Hardware assignment of extension module POL955 with address 2

IO	Function	IO type	Connection	Comments
Digital outputs				
Q21		Digital	T3 (Q13,Q14)	
Q22		Digital	T3 (Q23,Q24)	
Q23		Digital	T3 (Q33,Q34)	
Q24		Digital	T4 (Q43,Q44)	
Analog outputs				
Y21		0...10 V DC	T5 (Y1,M)	
Y22		0...10 V DC	T5 (Y2,M)	
Universal inputs / outputs				
X21			T1 (X1,M)	
X22			T1 (X2,M)	
X23			T1 (X3,M)	
X24			T1 (X4,M)	
X25			T2 (X5,M)	
X26			T2 (X6,M)	
X27			T2 (X7,M)	
X28			T2 (X8,M)	

Universals I/Os **X21 – X28** can be configured as inputs (digital, Ni1000, Pt1000, NTC10K, 0-10 V DC) **or** outputs 0-10 V DC.

10.3 Diagnostics tables for I/O check

Purpose

Clear text can be determined from the following tables:
- Not configured, but the required inputs/outputs for a function.
- Inputs/outputs that are assigned twice.

Example 1

1rst notconf IO Pos = 82
→ Input external control 2 is not assigned an input (Nusd).

Caution:
The plant is locked against switch on!

Example 2

Doubled config IO = Yes
Doubled config IOs = 82 81
Doubled conf IO pos = DI3
→ Meaning: Inputs *External contrl 1* and *External contrl 2* were assigned the same output DI3.

Caution:
The plant is locked against switch on!

Analog inputs

Name	Type	Position (IO Check)	Name	Type	Position (IO Check)
Temperature supply	AI	1	Pressure supply	AI	21
Temperature room 1	AI	2	Pressure return	AI	22
Temperature rum 2	AI	3	Flow supply	AI	23
Temperature return	AI	4	Flow return	AI	24
Temperature out	AI	5	Pressure over recovery	AI	25
Temperature frost	AI	6	Suply Filter Alarm Prs	AI	26
Temperature water recovery	AI	7	Extract Filter Alarm Prs	AI	27
Temperature extract	AI	8	Humidity supply	AI	31
Temperature supply after recovery	AI	9	Humidity room	AI	32
Temperature supply Extra seq.	AI	10	Humidity out	AI	33
Temperature frost Extra heat	AI	11	Air quality	AI	35
Temperature Aux	AI	12	External setpoint	AI	36

Digital inputs

Name	Type	Position (IO Check)	Name	Type	Position (IO Check)
Frost thermostat / External frost	DI	41	Feedback supplyfan (combined)	DI	66
Alarm pump heat	DI	42	Alarm exhaustfan	DI	67
Feedback pump heat	DI	43	Feedback exhaustfan	DI	68
Alarm el.heat / overheat	DI	44	Alarm filter	DI	69
Frost thermostat recovery	DI	45	Alarm filter supply	DI	70
Alarm pump recovery	DI	46	Alarm filter return	DI	71
Feedback pump recovery	DI	47	Alarm fire/smoke	DI	72
Alarm recovery / Wheel guard	DI	48	Feedb. supply damper (combined)	DI	73
Alarm pump cool	DI	49	Feedb. extract damper	DI	74
Feedback pump cool	DI	50	Feedb. fire damper 1 (open)	DI	75
Alarm cool machine (DX cool)	DI	51	Feedb. fire damper 1 (close/comb.)	DI	76
Feedb. Cool machine (DX cool)	DI	52	Alarm Aux	DI	77
Alarm pump humidity	DI	53	Feedback Recovery Wheel (Pulse)	DI	78
Feedback pump humidity	DI	54	External control 1 (Timer etc)	DI	81
Feedback humidifier	DI	55	External control 2	DI	82
Frost thermostat Extra heat	DI	56	Emergency stop	DI	83
Alarm pump Extra heat	DI	57	Summer/Winter switch	DI	84
Feedback pump Extra heat	DI	58	Input Aux	DI	85
Alarm Extra el.heat / overheat	DI	59	Alarm acknowledge/reset	DI	86
Alarm pump Extra cool	DI	60	Feedb. fire damper 2 (open)	DI	120
Feedback pump Extra cool	DI	61	Feedb. fire damper 3 (open)	DI	121
Alarm Extra cool machine	DI	62	Feedb. fire damper 4 (open)	DI	122
Feedback Extra cool machine	DI	63	Feedb. fire damper 2 (close/comb.)	DI	123
Alarm fans	DI	64	Feedb. fire damper 3 (close/comb.)	DI	124
Alarm supplyfan	DI	65	Feedb. fire damper 4 (close/comb.)	DI	125

Analog outputs

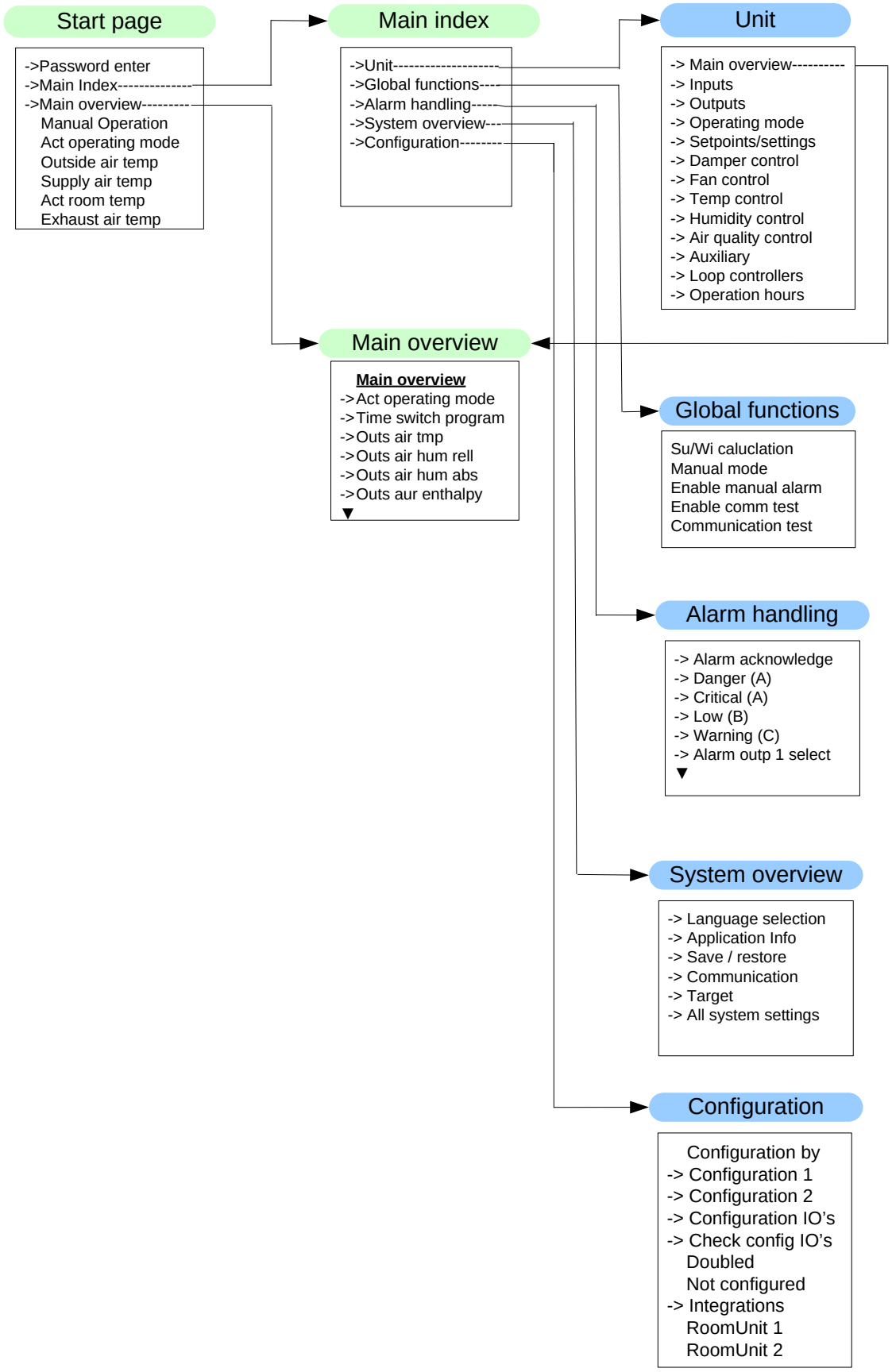
Name	Type	Position (IO Check)	Name	Type	Position (IO Check)
Frequency converter supplyfan	AO	91	Valve cooler	AO	99
Frequency converter exhaustfan	AO	92	Extra electrical heater	AO	100
Electrical heater	AO	95	Valve Extra heater	AO	101
Valve heater	AO	96	Valve Extra cooler	AO	102
Mix damper	AO	97	Aux output	AO	111
Recovery	AO	98	Humidifier	AO	116

Digital outputs

Name	Type	Position (IO Check)	Name	Type	Position (IO Check)
Supply damper (combined)	DO	131	DX cooling output 1	DO	150
Extract damper	DO	132	DX cooling output 2	DO	151
Fire damper	DO	133	Extra electrical heater output 1	DO	152
Supply fan output 1	DO	136	Extra electrical heater output 2	DO	153
Supply fan output 2	DO	137	Pump Extra heating	DO	154
Supply fan output 3	DO	138	Pump Extra cooling	DO	155
Extract fan output 1	DO	139	DX cooling extra cooler output 1	DO	156
Extract fan output 2	DO	140	DX cooling Extra cooler output 2	DO	157
Extract fan output 3	DO	141	Aux time switch program	DO	165
Electrical heater output 1	DO	145	Aux operation mode indication	DO	166
Electrical heater output 2	DO	146	Alarm output High/A (combined)	DO	168
Pump heater	DO	147	Alarm output Low/B	DO	169
Pump/Maneuver recovery	DO	148	Humidifier	DO	171
Pump cooler	DO	149	Pump humidity	DO	172

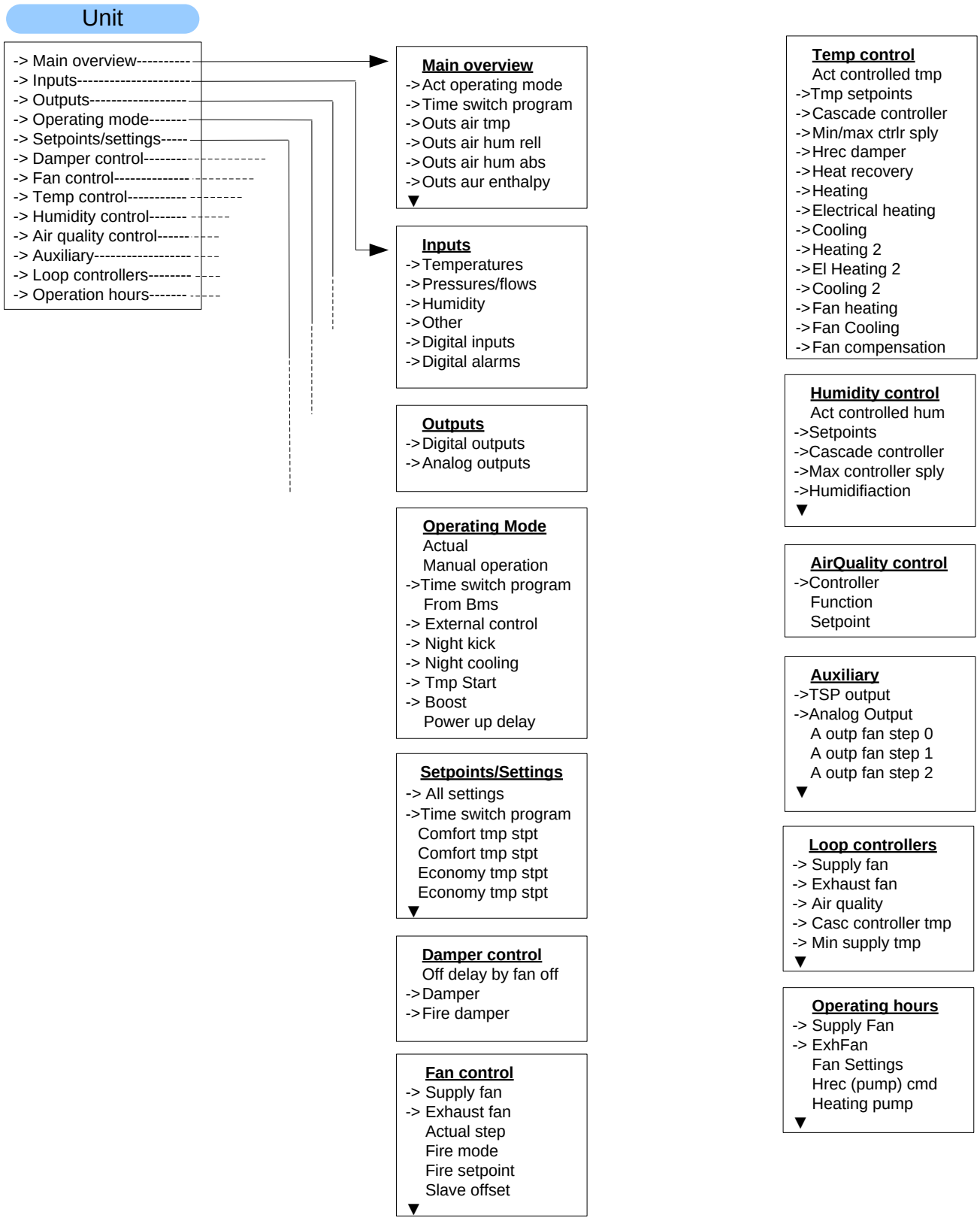
10.4 Navigation images HMI

Start page **Start page > Main index / Main overview**



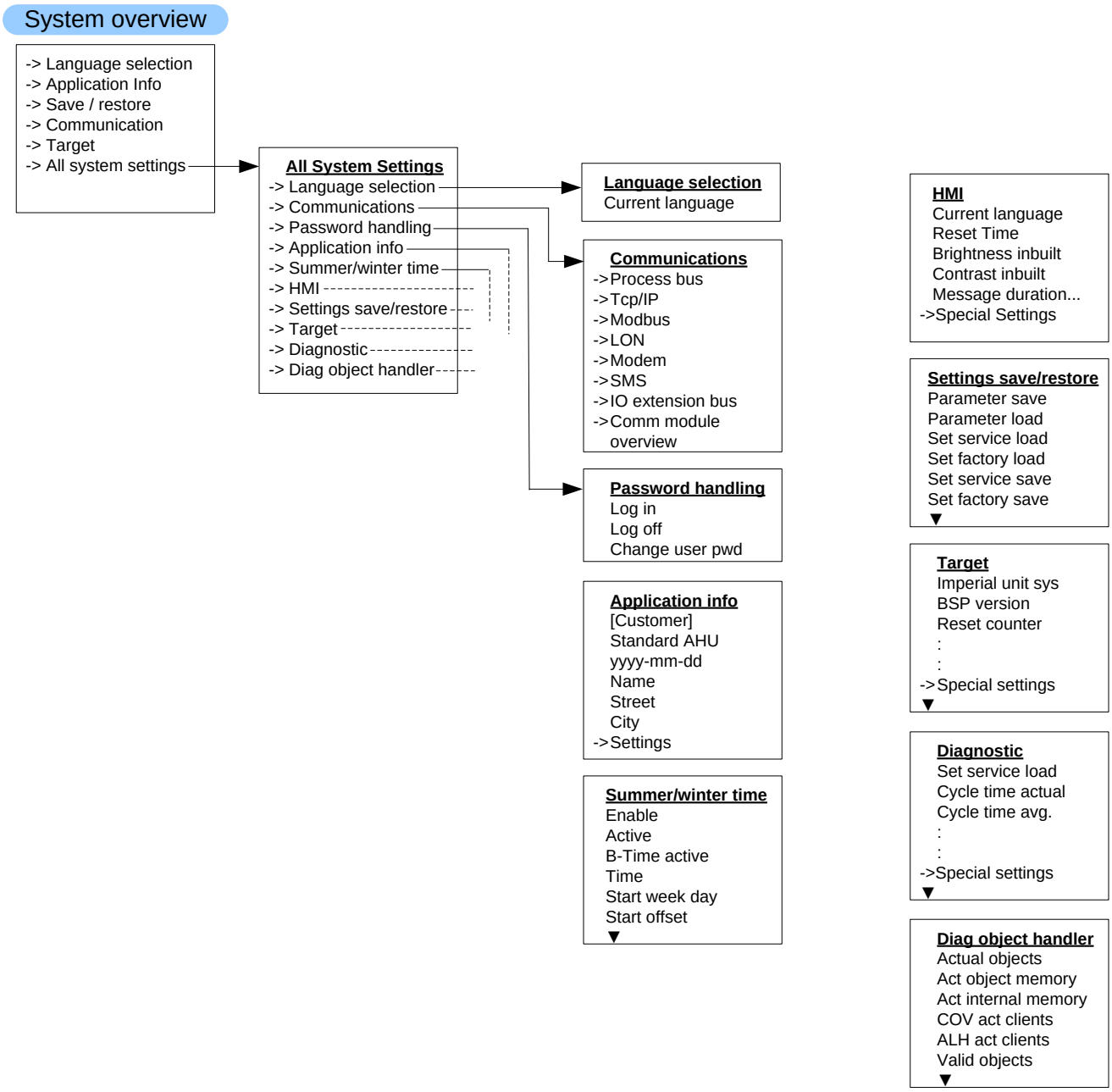
Device

Start page > Main index > Unit



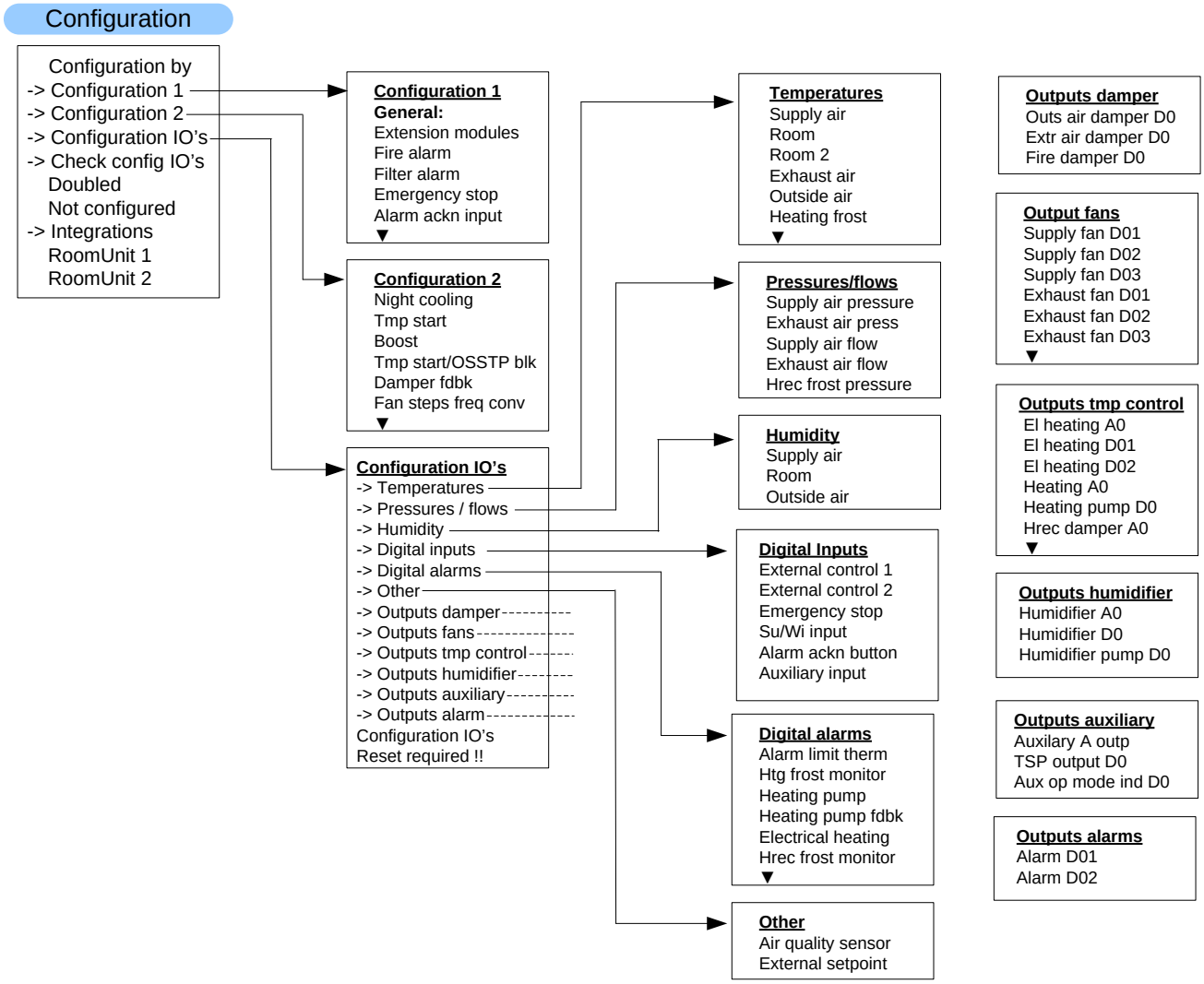
System overview

Start page > Main index > System overview



Configuration

Start page > Main index > Configuration



10.5 Parameter list room unit

To enter the parameter list, password needs to enter.

Parameter Group/ID	Description	Access level for writing
S1	Diagnostic / reset	6
S2	Device / acknowledge all	2
S11	Addr building	4
S12	Addr line	4
S13	Addr device	4
S20	Presence time	6
S21	Apartment	4
S22	Alarm mode	4
S23	OffIsBlckd	6
S24	Displayed roomtemperature	6
S25	Back2Auto Off-Eco	6
S26	Back2Auto Off-Cmf	6
S27	Back2Auto Eco-Cmf	6
S28	Back2Auto Cmf-Eco	6
S29	Back2Auto Cmf-Off	6
S30	Back2Auto Eco-Off	6
S31	Manual control	4
S32	Heatrecovery display limitation	4
S33	Setpoint range +/-	4
S34	Setpoint increment	4
S35	Time format	4
A1	Actual operating mode	X
A2	Actual fan step	X
A3	Outside air temperature	X
A4	Actual valid room temperature	X
A5	Supply air temperature	X
A6	Extract air temperature	X
A7	Actual control mode temperature	X
A8	Actual value controlled temperature	X
A9	Actual cooling setpoint	X
A10	Actual heating setpoint	X
A11	Actual supply cooling setpoint	X
A12	Actual supply heating setpoint	X
A13	Cooling output signal	X
A14	Heatrecovery damper recovery value	X
A15	Heatrecovery output signal	X
A16	Heating output signal	X
A17	Electrical heating output signal	X
A18	Actual control mode humidity	X
A19	Actual value controlled humidity	X
A20	Actual dehumidity setpoint	X
A21	Actual humidity setpoint	X
A22	Actual supply dehumidity setpoint	X

Parameter list room unit, *cont'd*

Parameter Group/ID	Description	access level for writing
A23	Actual supply humidity setpoint	X
A24	Actual dehumidity value	X
A25	Humidifier output signal	X
A26	Air quality setpoint	X
A27	Air quality	X
A28	Actual supply fan setpoint	X
A29	Actual supply fan value	X
A30	Supply fan output signal	X
A31	Supply fan command	X
A32	Actual extract fan setpoint	X
A33	Actual extract fan value	X
A34	Extract fan output signal	X
A35	Extract fan command	X
C1	Comfort temperature setpoint (basic setpoint)	6
C2	Comfort temperature cooling setpoint	6
C3	Comfort temperature heating setpoint	6
C4	Comfort temperature dead band	6
C5	Economy temperature setpoint	6
C6	Economy temperature cooling setpoint	6
C7	Economy temperature heating setpoint	6
C8	Economy temperature dead band	6
C9	Supply temperature minimum setpoint (room, return controlled)	6
C10	Supply temperature maximum setpoint (room, return controlled)	6
C11	Supply temperature minimum setpoint (cascade controlled)	6
C12	Supply temperature maximum setpoint (cascade controlled)	6
C14	Humidity Setpoint relative (basic setpoint)	6
C15	Dehumidity setpoint relative	6
C16	Humidity setpoint relative	6
C17	Humidity dead zone relative	6
C18	Humidity setpoint absolute (basic setpoint)	6
C19	Dehumidity setpoint absolute	6
C20	Humidity setpoint absolute	6
C21	Humidity Dead zone absolute	6
C22	Supply humidity max setpoint (room, return controlled)	6
C23	Supply humidity max setpoint (cascade controlled)	6
C24	Min fresh air	6
C25	Air quality setpoint	6
C26	Supply Fan step 1 setpoint	4
C27	Supply Fan step 2 setpoint	4
C28	Supply Fan step 3 setpoint	4
C29	Extract fan step 1 setpoint	4
C30	Extract fan step 2 setpoint	4
C31	Extract fan step 3 setpoint	4

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