Operating instructions (Basic)
Güntner Motor Management GMMnext

For management and speed regulation of EC fans

guntner.com/uk

Contents

Version history

This operating manual provides basic information regarding the operation and functions of the GMMnext controller. All possible settings and functions are described in the detailed operating manual.

Some of the features described in this operating manual depend on the software version of the GMMnext controller.

The table below shows the new features depending on the software version of the GMMnext controller.

Operating manual Version, Basic	**Amendments/supplements**	**Associated software version(s) of the GMMnext**
	First approved version of the operating manual for GMMnext EC and GMMnext Rail	1.0.1 (only for EC) 1.1.0 (EC + Rail)
	New features added: • Automatic switch-off of manual mode after time ("Auto switch back to regular operation after") • Valves manual mode ("Valves") • Locking the regulation system with a signal ("Releasing and locking the coil") • Limiting setpoint displacement with a signal • Pump alarm • Bypass valve • HRC function and HRC valve • Measurement monitoring	1.2.0 (EC + Rail)
	Revised start-up procedure	1.4.0 (EC + Rail)
	New features: • Save factory settings after successful start-up • Load/save configuration; either on the GMM itself or on a USB stick • Optimized fan incident reports	1.7.0
1.0.0	New OM Basic	-

Version history

1 General notes

1.1 Safety information

In order to prevent serious physical injuries or major material damage, work on/with the units may only be performed by authorised persons with the appropriate training and qualifications who are familiar with the set-up, installation, commissioning and operation of controllers. These persons must read the operating instructions carefully before installing and commissioning the units. In addition to the instructions and national accident prevention regulations, all recognised technical rules (safety and professional work under UVV, VBG, VDE etc.) must be followed.

Repairs to the unit may only be made by the manufacturer or a repair centre authorised by the manufacturer.

UNAUTHORISED AND IMPROPER INTERVENTIONS WILL INVALIDATE THE WARRANTY!

While the controller is open, hazardous electrical voltages are exposed; if the unit is open its protection class is IP00! The applicable national accident prevention regulations must be followed when working on controllers under voltage.

1.2 Intended use

Ensure that fuses are always replaced by fuses with the specified rating. Note that fuses should never be repaired or bridged. Only a double-pole circuit tester may be used to check that the unit is free of voltage. The unit is intended only for the purposes agreed in the order confirmation. Any other application or use for any additional purpose, is not a proper intended use. The manufacturer accepts no liability for any injury or damage arising from unintended use. Use according to the intended purpose is also contingent on compliance with the installation, operating and maintenance procedures described in these instructions. The technical data and the details of the connection assignments can be found on the name plate and in the instructions, and must be complied with.

Electronic equipment is not fundamentally failsafe! The user must therefore ensure that the system reverts to a safe condition in the event of failure of the unit. The manufacturer accepts no responsibility for any damage to life and limb or to material goods and assets in the event of failure to comply with this provision and in the event of improper use.

The electrical installation must be performed in accordance with the relevant regulations (e.g. wire cross-sections, fuses, earth conductor connections etc.). Additional information is included in the documentation. If the controller is used in a particular area of application, the required standards and regulations must be complied with.

1.3 Start-up notes

Prior to start-up the control device, check whether any residual moisture (condensation) has formed in the housing. If so, the unit must be dried out. The same applies if the sachet of silica gel (desiccant) has discoloured as this indicates that the sachet of silica gel is no longer providing any protection against moisture. If there are large volumes of condensation (droplets on the interior walls and components), they must be removed manually. Once the unit has been commissioned for the first time, the power supply and the internal control voltage must no longer be switched off for a long period. If this should nevertheless be necessary for operational reasons, suitable moisture protection must be provided.

1.4 Transport and storage, copyright notes

The controllers are packaged appropriately for transport and may only be transported in their original packaging. Avoid any impacts and collisions. Unless otherwise noted on the packaging, the maximum stacking height is 4 packs. When you receive the unit, check for any damage to the packaging or the controller.

Store the unit in its original packaging and protected from the weather, and avoid extremes of heat and cold.

Products are subject to technical changes in the interests of further development. Therefore no claims may be derived from information, images and drawings; errors excepted!

1.5 Warranty and liability

The current General Terms and Conditions of Sales and Delivery of Güntner AG & Co. KG apply.

See the homepage at http://www.guentner.com

1.6 Manufacturer and shipping address

Should you have a problem with any of our units, or any questions, suggestions or special requests, simply contact

Güntner GmbH & Co. KG
Hans-Güntner-Straße 2 - 6
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1.7 EMC-compliant installation

Controllers in the GMMnext EC/xx series fulfil the requirements of EN 61000-6-2 as regards resistance to EMC interference and those of EN 61000-6-3 as regards emissions. They also comply with standards IEC 61000-4-4/-5/-6/-11 for grid-bound interference. In order to guarantee EM compatibility, the following points must be noted:

- The unit must be properly grounded (with at least 1.5 mm²).
- All measurement and signalling lines must be connected via shielded cables.
- A special cable must be used for bus wiring to the EC fans, e.g. HELUKABEL DeviceNet PUR flexible 1x2xAWG24 + 1x2xAWG22 / 81910
- The shielding of measuring, signal and bus lines must be earthed at one end only.
- Suitable shielding and routing measures must be taken to ensure that mains cables and motor cables do not cause any interference in signal and control lines.

NOTICE
If the equipment is installed in a switch cabinet, the temperature inside the switch cabinet must be heeded. Sufficient switch cabinet ventilation is provided in Güntner switch cabinets.

2 Brief guide to quick start-up

These pages contain the main information required for quick start-up of the GMMnext.

THIS BRIEF GUIDE IS NOT A SUBSTITUTE FOR CAREFUL STUDY OF THE OPERATING INSTRUCTIONS!

Mains connection: *1)	**L1**to terminal X0 **(grey)**	
	Nto terminal X0 **(blue)**	
	PEto terminal X0 **(green/yellow)**	
Fuses: *1)	There are no replaceable microfuses **in** the GMMnext to protect its semiconductors or motor. The unit must be protected by a factory-fitted C 6A automatic circuit breaker for each phase.	
Fan connection: on the GMMnext	Depending on the version, 1 to 24 bus outputs for the EC fans are provided at the connections X4, X14 and X24:	
	Communication interface:	Terminal **A** and **B**
	24 V power supply for fan electronics:	Terminal **+** and **-**

*1) Only for the version in the closed IP54 housing

The fans are not powered from the GMMnext – they are wired in an external terminal box, e.g. on the GPD (Güntner Power Distribution).

The GMMnext has the following inputs and outputs:

- 5 analogue inputs (AI1 to AI5), each one variably configurable
- 2 analogue outputs (AO1 to AO2)
- 5 digital inputs (DI1 to DI5)
- 5 digital relay outputs (DO1+ DO2 changeover contacts, DO3 to DO5 closers)

The input and output functions can be set via the IO configuration menu. The digital inputs are designed for positive voltages of a nominal +24 V.

Analogue inputs: on the GMMnext	**Pressure sensor**	**1** (brown) on **+24 V**
	GSW 4003	**2** (green) on **AIx**
	GSW 4003.1	**2** (blue) on **AIx**
	Temperature sensor	**1** (white) on **AIx**
		2 (brown) on **GND**
	Standard signal (0 ... 1V)	**Plus (+)** on **AIx**
		Minus (-)on **GND**

Signalling outputs	For connections for signalling outputs, see "Inputs and outputs (IO interface)"
Release	Input **DI1**is, by default, to release the controller. This input must be connected to **+24 V** to ensure that the controller functions and the fans can turn!
Language	The default language on delivery is **English**. The display language can be changed in the Language menu option.
Time	The date and time must be set using the relevant menu options.

Once the above settings have been made, your GMMnext will normally be ready for use.

“Manual mode” can be selected to check that the GMMnext is functioning.
See "Manual mode".
When you deactivate manual mode after performing this test, the GMMnext will revert to the set operating mode.

Operating mode	The GMMnext operates in different modes depending on the start-up process.
Setback	The speed of the fans can be limited, e.g. to limit noise emissions at night. This value is set in the Night setback menu option. Night setback is activated either via an input (by default **DI2**) or using the timer, which is programmed in the Night setback menu option.
Setpoint changeover	It is possible to choose between two setpoints (e.g. for summer and winter operation). The changeover is effected by default via the input **DI3**.

The functions "**Setback**" and "**Setpoint changeover**" generally have to be activated in the Service menu.

3 Start-up the GMMnext

With the GMMnext, the fans are controlled via a bus. These fans must be set up and checked for use with the condenser or dry cooler, depending on the design of the heat exchanger. These settings and checks are necessary on initial start-up and may need to be repeated when a fan is replaced. This start-up process determines the performance of the heat exchanger and its noise emissions. The corresponding configurations for the heat exchanger are usually carried out ex works. However, the corresponding parameters may need to be entered again. You will find them in the attached wiring diagram or on a sticker on the heat exchanger itself.

The GMMnext automatically detects whether start-up has taken place when it is switched on. If it has, the start-up menu is skipped and normal controlled operation continues.

NOTICE

The controller will be in configuration mode until the start-up is complete. In this mode, controlled operation is not possible and the fans will be controlled with a 0 % control value. The communication interfaces and protocols are still preconfigured as follows:

- The ETH1 Ethernet interface is configured with the static IPv4 address "169.254.1.1" and the network mask "255.255.0.0".
- The RS485-1 interface is configured with the baud rate "9600 Bd" and "8N1" framing.
- The Modbus RTU and TCP protocols are activated and configured with the unit ID "1" and the TCP port "502".

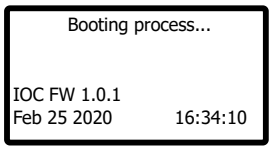
If a number of controllers are commissioned in a network at the same time, conflicts can occur in the network owing to duplicate IP addresses. You can avoid this problem by ensuring that the network cable is not connected or only one controller is actively connected to the network.

Once the start-up has been completed successfully, the controller automatically switches to the set operating mode and the communication interfaces and protocols are configured in accordance with the parametrization.

3.1 Start-up menu

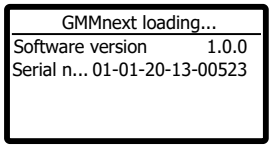
Switch on the power supply for the GMMnext. At the start of the boot process, the Güntner logo will appear for 5 seconds.

As booting progresses, the firmware version of the IO controller will be shown (approx. 25 seconds).



A black start screen with a cursor will then be shown for a short time (approx. 20 seconds).

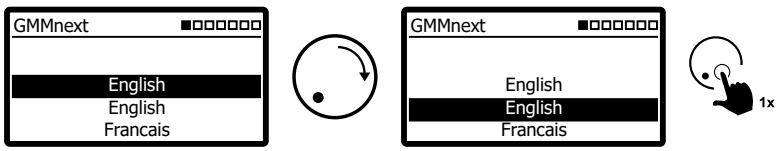
Each time that the system starts, the software version of the application that is starting as well as the serial number of the controller will be shown briefly.



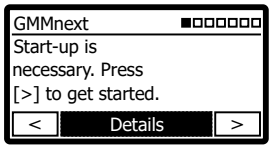
At the beginning of start-up, the language for start-up can be selected. This language setting is not permanent – it is only for start-up. After start-up, the default language for the menu is always English. The language can then be selected on a permanent basis in the Language menu.

The progress bar at the top right of the display shows your progress during start-up.

Use the rotary selection knob as well as the "Back and "Home buttons to navigate in the menu.



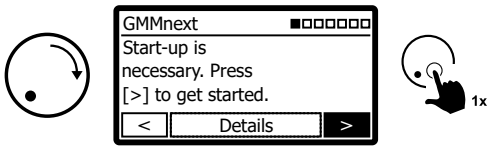
A note regarding start-up will then be shown.



In standard start-up, a heat exchanger can be parametrized with up to two coils. During start-up, the analogue and digital inputs and outputs are automatically configured and assigned standard functions. An overview of the I/O configuration after start-up is available in the "Annex" .

An extended start-up with up to five coils can be carried out after the standard start-up via the service menu.

Please follow the instructions in the display. To initiate start-up, scroll to the right [>].



The following is a systematic list of the start-up procedure:

Section	Parameter	Description
GMMnext	Language	Selection of the language for start-up.
Introduction	-	Note that a new start-up is required.
Date and time	Date	Setting the system date.
	Time	Setting the system time.
Fans	Fan count	Setting the number of fans on the heat exchanger.
	Fan row count	Setting the number of fan rows on the heat exchanger. Query only occurs if the number of fans is greater than one.
	Fan parametrization	Selection of the parametrization of the fans with or without fan ID.
	Maximum speed	Setting the maximum fan speed (working point).
Fan scan	-	Display of the result of the fan search. If the fan parametrization without fan ID has been selected, the maximum speed per fan can be adjusted at this point.
Heat exchanger	Coil count	Setting the number of coils within a heat exchanger. Selection is made between 1 or 2 control cycles. The service menu can be used for extended parametrization of up to 5 coils.
	Operating mode	Setting the operating mode of the regulation.
	Heat exchanger type	Setting the type of heat exchanger. Selection is made between condenser or dry cooler and applies to all coils.

Start-up procedure

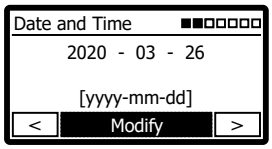
Section	Parameter	Description
	Refrigerant	Setting the type of refrigerant. Selection is made per coil. Query only occurs if condenser has been selected.
	Pressure sensor	Setting the type of pressure sensor for recording the actual pressure of a coil (refrigerant pressure). Selection is made between 25 or 40 bar. Query only occurs if condenser with unknown refrigerant has been selected.
Completion	-	Indication that start-up has been carried out successfully.

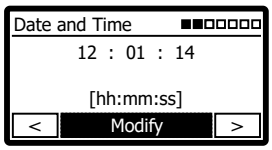
Start-up procedure

3.1.1 Detailed start-up procedure

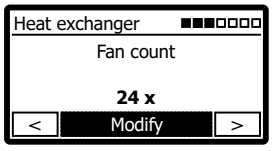
The system date and time are set first.

In the event of a power cut, the system clock will remain set for 4 – 7 days depending on the external temperature. The system time may need to be set again (e.g. after the Güntner unit is delivered ex works until it is actually commissioned). Press [Modify] or [>] to continue.





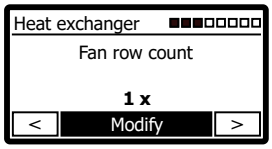
You can now set the number of fans installed on the heat exchanger.



Depending on the unit type (8/16/24), a maximum of 24 fans can be connected to a controller. Set the number of connected fans accordingly.

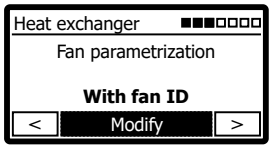
NOTICE
The GMMnext expects the fans to be in ascending order from fan connection 1 to the set number of fans.

If the number of fans is larger than 1, you will now be asked how many fan rows the heat exchanger has. This layout information is important for the controller if for example fan groups are formed or pairs of fans are controlled. Select “1” for a unit with one row or “2” for a unit with two rows.



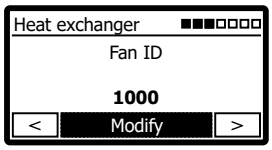
A check will then be carried out to ensure that the communication with these fans is working correctly. Press [>] to continue.

In the steps that follow, the fans' operating point will be defined. As a result, the maximum heat exchanger power and the maximum sound emissions are defined. By default, this is defined via a so-called **fan ID**. The fan ID determines the maximum speed for a specific fan type (FT number). Generally speaking, this can be found along with the maximum speed and the FT number in the attached diagram or on a separate notice on the heat exchanger. **Configuration with the help of a fan ID is the standard method** and ensures that the heat exchanger is set to the correct operating point.



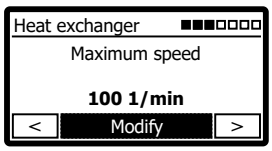
Alternatively, configuration can be carried out **without a fan ID**. In this case, only the maximum speed needs to be set. If desired, this can be set for each fan too.

In the next step, the fan ID is entered:

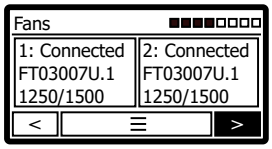


NOTICE
When changing a numerical value, you can change the cursor by **pressing and holding (2 s)** the rotary selection knob and then select which digit you would like to change.

In the next step, you need to enter the maximum speed. If you are commissioning the unit with a fan ID, this step functions as a safety check.



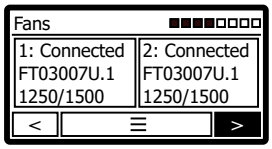
The result of the check is then shown. If the set number of fans matches the number of fans found, the connection status, the fan number (FT number and version), the set operating point speed and the maximum possible speed will be shown for each fan.



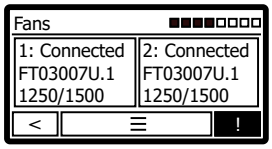
In order to scroll through the list of fans, select [Menu] and scroll through the list with the help of the rotary knob. If necessary, you can view all details for a fan.

To exit the view, press the “Back” button.

Otherwise, press [>] to continue with the start-up.



If there is a problem during the search or an incorrect fan was installed, this will be indicated by [!].



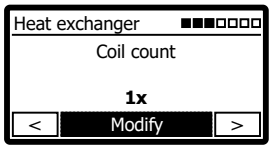
Select [!] to see the result of the fan search.

You can go a step back and scroll through the list to find out which fans are connected incorrectly.

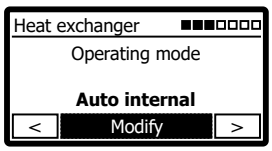
Now disconnect the controller and the fans, check the cabling, the bus connection terminals and possibly the fan itself and then start the start-up process again. The parameters you have entered so far will be retained.

Now select [>] in the search result to continue with the start-up.

You will then be asked how many coils are installed on the heat exchanger. Press [Modify] or [>] to continue.



The next step involves setting the operating mode for the controller.

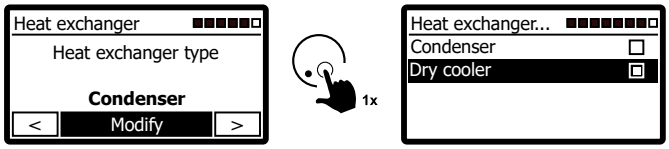


The following options can be selected:

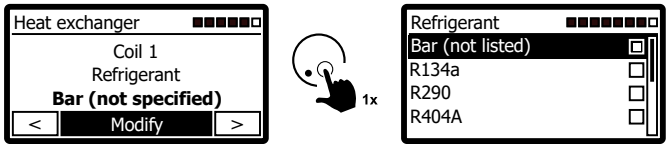
Operating mode	Way of working
Auto internal	The controller records the actual temperature or pressure and adjusts it automatically to a setpoint which can be configured via the menu.
Auto external analogue	The controller records the actual temperature or pressure and adjusts it automatically to a setpoint which is set externally in an analogue fashion.
Auto external bus	The controller records the actual temperature or pressure and adjusts it automatically to a setpoint which is set via the fieldbus interface.
Slave external analogue	The controller obtains the control value for the fans via an analogue signal.
Slave external bus	The controller obtains the control value for the fans via the fieldbus interface.

In the next step, configure the coils for the heat exchanger.

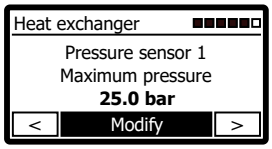
First of all, configure the heat exchanger type.



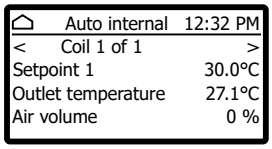
If you have set condenser as the heat exchanger type, you can also select the refrigerant. The controller can then calculate the condensing temperature based on the measured condensing pressure. If the refrigerant is not listed, please use [Bar].



If you are using a condenser with an unknown refrigerant, configure the type of pressure sensor if necessary.



You have now entered all the necessary information for operating the controller and the start-up process is complete. After start-up, the menu language once again switches to English. This can be set under “Language” in the menu.



All functions, fan settings, IO configurations and sensors can also be set via the main or service menu.

To get to the main menu, press the rotary selection knob in the home menu.

To get to the service menu, select “Service” in the main menu.

If you would like to carry out start-up again, you can reset the controller to its delivery state in the service menu.

4 Inputs and outputs (IO interface)

The GMMnext has the following inputs and outputs:

- 5 analogue inputs (AI1 to AI5), each one variably configurable
- 2 analogue outputs (AO1 to AO2)
- 5 digital inputs (DI1 to DI5)
- 5 digital relay outputs (DO1+ DO2 changeover contacts, DO3 to DO5 closers)

The functions (signal source) for the inputs and outputs, a signal inversion and, for analogue signals, the interval (scaling) can all be set flexibly via the IO configuration menu.

NOTICE
Please note that connecting the wrong voltage (e.g. 230 V) may seriously damage the controller.

4.1 Configuration table

NOTICE
The following table shows a “standard configuration” of the controller following start-up.

	I/O	Signal/profile	Function
X3	DI1	24 V	Release
	DI2		No function
	DI3		No function
	DI4		No function
	DI5		No function
	AI1	0…10 V 2…10 V 0…20 mA 4…20 mA Resistance thermometer	4…20 mA pressure sensor (scaling 0 - 25 bar) *1)
	AI2		0…10 V no function
	AI3		PT1000 outlet temperature (-30…100 °C) *2)
	AI4		0…10 V control value slave (0…100 %) *3)
	AI5		0…10 V no function
	AO1	0…10V 2…10V	Control value for fan group 1
	AO2		No function

GMMnext EC/xx.1 configuration table

	I/O	Sig-nal/profile	Function
X5	DO1	Poten-tial-free relay	Alarm message Prio 1 (contact 11/12 closed)
	DO2		Warning message Prio 2 (contact 21/22 closed)
	DO3		Operating message
	DO4		Threshold function
	DO5		No function

GMMnext EC/xx.1 configuration table

	I/O	Sig-nal/profile	Function
X1	DI1	24V	Release
	DI2		No function
	DI3		No function
	DI4		No function
	DI5		No function
X2	AI1	0...10 V 2...10 V 0...20 mA 4...20 mA Resis-tance ther-mometer	4...20 mA pressure sensor (scaling 0 - 25 bar) *1)
	AI2		0...10 V no function
	AI3		PT1000 outlet temperature (-30...100 °C) *2)
	AI4		0...10 V control value slave (0...100 %) *3)
	AI5		0...10V no function
X1	AO1	0...10 V 2...10 V	Control value for fan group 1
	AO2		No function
X9	DO1	Poten-tial-free relay	Alarm message Prio 1 (contact 11/12 closed)
	DO2		Warning message Prio 2 (contact 21/22 closed)
X10	DO3		Operating message
	DO4		Threshold function
	DO5		No function

GMMnext Rail.1 configuration table

*1) Condition: Heat exchanger = condenser and operating mode = automatic internal
*2) Condition: Heat exchanger = dry cooler and operating mode = automatic internal
*3) Condition: Operating mode = slave external analogue

5 Display and operation

Information is shown on the graphic display. Coloured LEDs indicate various operating statuses.

The controller is operated using the multifunctional wheel and the operating buttons.

5.1 Operation

Rotary selection knob

- Left or right movement: allows you to move up or down in the menu or change the parameter you are configuring.
- Short press: for function selection; change to EDIT mode and accept value
- Long press (2 seconds): brings up the relevant context menu/help menu.

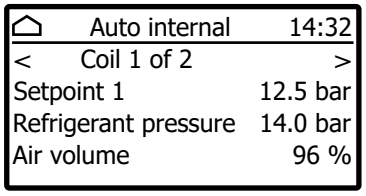
Home button
Takes you back to the home menu

Back button
Takes you back to the previous menu

5.1.1 Home menu

Depending on the controller configuration, the most important information regarding the individual coils is shown in the home menu. Depending on the number of coils, this information is automatically scrolled through at set times.

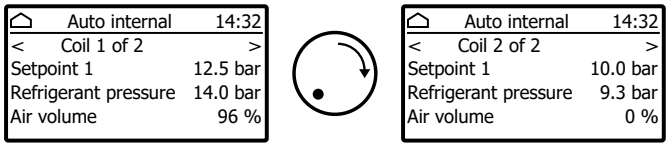
To get to the home menu, press the home button at any time  .



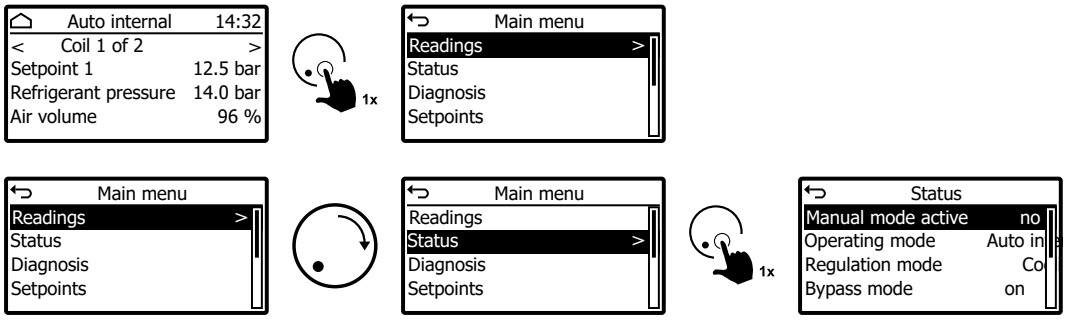
NOTICE
The display's background lighting is switched off after 5 minutes of inactivity. It is switched on again when you press a button or turn the rotary selection knob.

5.1.2 Navigation in the menu

When information is shown in the home menu at set times, you can switch between the individual displays by turning the knob to the left or right.



Pressing the rotary selection knob for a short time in the home menu takes you to the menu navigation level. From here, you can navigate to the individual menu items by turning the knob to the left or right. If you press the knob again for a short time, you can switch to the respective submenu and call up information or configure settings there.

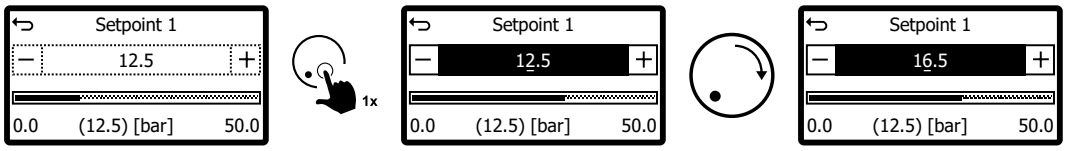


To switch to the previous menu or exit an editing function, simply press the back button .

5.2 Edit mode

After you select a parameter or a function by pressing the rotary selection knob for a short time, you will enter Edit mode.

Various information will be shown on the display. To change the parameter or function, turn the rotary selection knob to the left or right.



NOTICE

When changing a numerical value, you can **press and hold the rotary selection knob (2s)** to change the cursor and then select which digit you wish to change.

5.3 LED status display

About the LEDs:

- Top LED **"General operating state"**: lights up green as soon as the application is running on the GMMnext and flashes green as soon as at least one fan is running.
- Middle LED **"Alarm status“**: see below
- Bottom LED **"Internal/external communication"**: not used at the moment.

The middle LED with the designation **"Alarm status"**:

- If an **"Alarm Prio 1“** is reported, the LED will light up **red**.
- If no **"Alarm Prio 1"** is reported, but an **"Alarm Prio 2"** is reported or the **group message for measurement monitoring** reports a warning, the LED will light up **orange**.

"Alarm Prio 1" is active as soon as at least one of the following conditions applies:

- All fans report an alarm.
- The measurement monitoring system reports a warning (optional/configurable).
- Power supply problem
- Communication fault to the master

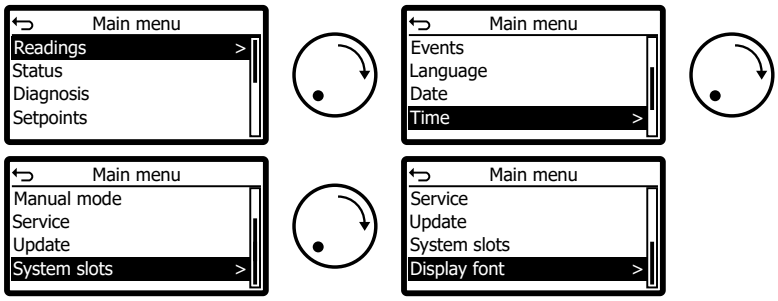
"Alarm Prio 2" is active as soon as at least one of the following conditions applies:

- At least one fan reports an alarm or a warning.
- A sensor or an analogue input reports a warning. A pump reports a warning.
- A valve reports a warning.
- The measurement monitoring system reports a warning (optional/configurable).
- A GMOD 08 reports a warning.

6 Main menu

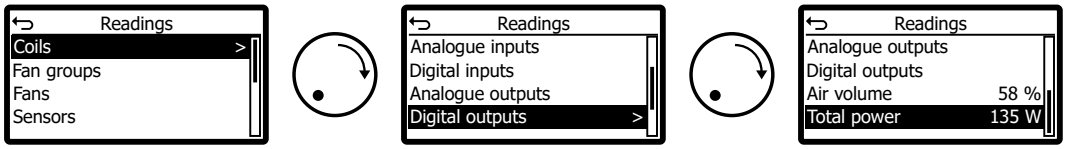
From the top menu, the home menu, you can get to the main menu by pressing the rotary selection knob for a short time. From there, you can navigate to the individual submenu points and the service menu.

The following submenu points can be found in the main menu:



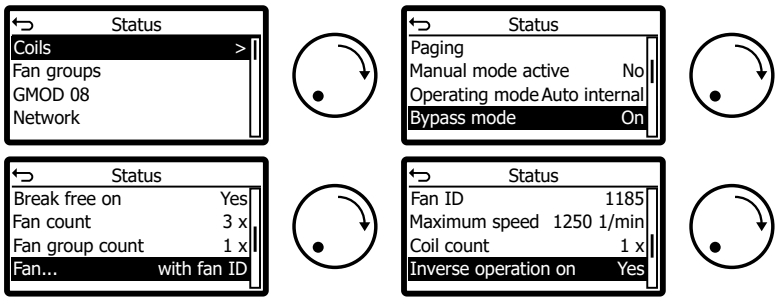
6.1 Readings

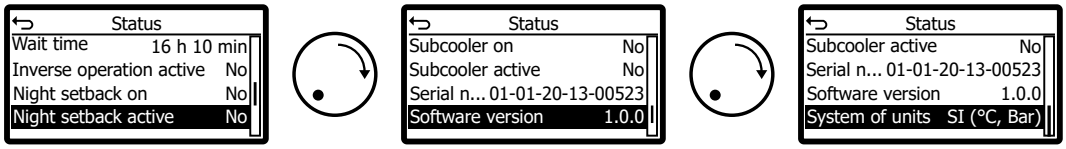
In the readings menu, the current values for the coils or input signals, fans, sensors, the statuses of digital and analogue inputs and outputs, the current total power and the air volume are shown.



6.2 Status menu

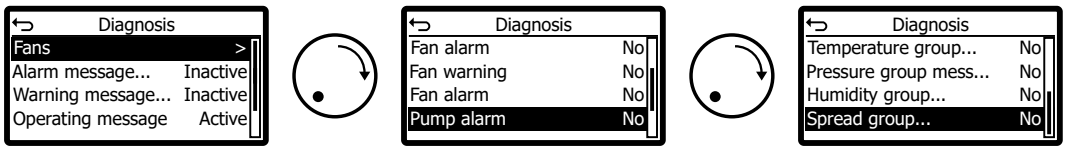
The operating statuses and configuration settings as well as the serial and software version number are shown.





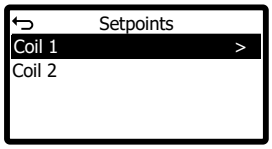
6.3 Diagnosis

The diagnosis menu provides a central overview of the controller and fan system status. Parameter and process data for the fans as well as collective messages such as alarm, warning and operating messages are shown.

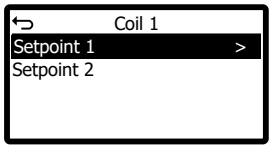


6.4 Setpoints

The setpoints for each configured coil can be set via the setpoint menu. The number of coils and their parameters can be configured in the service menu.



Depending on the configuration, up to 2 setpoints can be configured for each coil.



6.5 Events

In the event memory, both temporary and one-off events are permanently recorded with a time stamp.

Temporary events are for example fan or sensor faults. Such events are active when the fault occurs and end when the fault is rectified.

One-off events are for example system start-up points.

You can navigate horizontally (left/right) and vertically (up/down) within the event memory. On the horizontal level, the events are shown in chronological order from left to right.

Active events are left-justified. These are then followed by events which have ended.

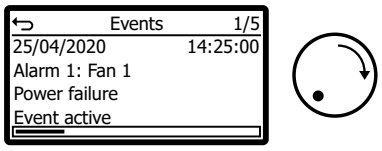
If you navigate to an event, you can press the rotary selection knob to switch to the event itself. By turning the rotary selection knob, you can scroll through the entire event entry.

If you press the rotary selection knob again, you will jump back to the horizontal selection level.

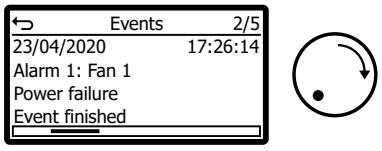
The time stamp for the event is the point at which the event became active.

Example:

Here, alarm No. 1 concerns fan 1. The fault is a power failure. The event occurred on 25.04.2020 at 14:25. The event is still active.

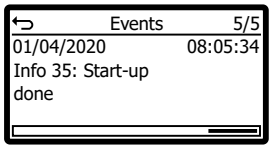


On 23.04.2020, another alarm concerning fan 1 occurred. The event has ended and the alarm is no longer active.



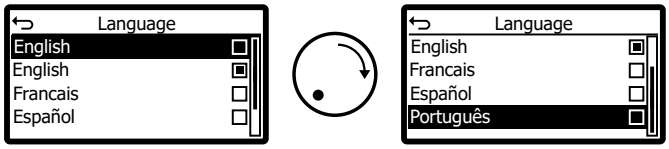
... until the end of the event list.

The controller was commissioned on 01.04.2020 at 08:05.



6.6 Language

The display language can be changed by selecting your desired language.



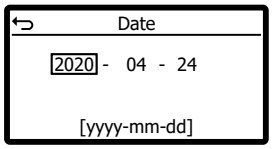
6.7 Date/time

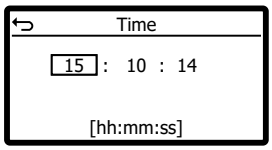
The system time (date and time) can be set here. The time is used to enter the event times in the event memory or for time-controlled functions (e.g. night setback or inverse operation).

The date and time shown are country-specific depending on the set language.

In the event of a power cut, the system clock will remain set for 4 - 7 days depending on the ambient temperature.

The date and clock are set in the formats year/month/day and hour/minute/second.



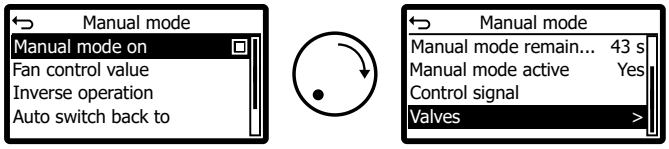


6.8 Manual mode

Manual mode is used to start up the heat exchanger fans manually. If it is activated, the fans run with the manual mode control value.

ATTENTION
Manual mode does not depend on a release signal. It has the highest priority and switches off all other regulation modes!

Active manual mode is saved permanently, in other words it is active again even after switching the power supply off and on.

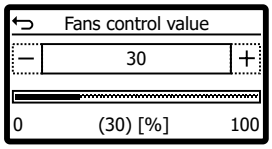


6.8.1 Manual mode on

Manual mode can be switched on and off here.

6.8.2 Fans control value

Here, you can configure the fan control value which is output to all fans when manual mode is active (switched on manually or with a control signal).



6.8.3 Inverse operation

While manual operation is active it is possible to run the fans in the opposite direction to their preferred direction.

To do this, “inverse operation” must be activated.

NOTICE
This function is possible only with EC fans supplied later than 2012 (approximate figure, because old stocks may have been being used up).

6.8.4 Auto switch back to regular operation after

This function allows a manual mode activated manually via the menu (or via fieldbus) to be switched off automatically after an adjustable time and regular operation to be continued. If the “0 min” value is set there is no automatic switch-off and the manual mode stays active until it is switched off manually.

If manual mode is switched on via the control signal (manual mode), there will be no automatic return to regular operation.

6.8.5 Manual mode remaining time

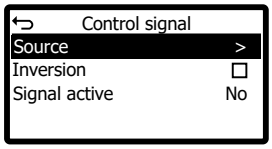
If the parameter "Auto switch back to regular operation after" > 0 and manual mode is switched on manually, the remaining time until a return to regular operation is shown here.

6.8.6 Manual mode active (status)

This shows whether manual mode is active.

6.8.7 Control signal (manual mode)

Manual mode can also be activated via a digital input (control signal). If the control signal is present, the previously set manual mode control value will be output to the fans.



6.8.7.1 Control signal source

Here, you can freely configure the source of the digital input.

If you do not wish to have a control signal, activate “no option selected”.

6.8.7.2 Control signal inversion

If necessary, the external control signal can also be inverted.

If inversion is selected, a high signal (+24 V) at the selected control input will be internally inverted. A low signal (open input or GND) at the selected control input will lead to manual mode being activated.

6.8.7.3 Signal active

The status of the internal signal after a possible inversion is shown here.

6.8.8 Valves

If valves (e.g. bypass valve or HRC valve) are configured on an analogue output, these will be shown here and can be controlled manually.

In order for control to take place, manual mode must be switched on beforehand.

6.9 Service

In the service menu, the central configurations for the controller can be carried out.

You will find the individual subfunctions in a separate section "Service menu".

6.10 Update

The GMMnext software can be updated with the help of a USB storage medium with no additional hardware or software. The update procedure is error-resistant because the system is a multi-partition system (system0 and system1).

During the update process, the new software will first be installed on the inactive partition and the new partition will only be started at the end of a successful update procedure. If for example there should be a power failure during the update process or the USB stick is pulled out, the previously active partition will remain unharmed and will be started again.

A standard USB storage stick should be used when carrying out an update. This storage stick must be formatted as follows:

- The stick should have a classic DOS partition table.
- There should be exactly one partition on the stick.
- The partition must be FAT32 formatted.
- The size of the assignment units must be 8192 bytes.
- The label for the partition must be **NEXO_RAUC** .

You can do this from Windows-Explorer by selecting the recognized stick, opening the context menu with the right mouse button, selecting the aforementioned points and then starting the formatting process.

You must then copy the update file to the main directory on the USB storage stick. The file name must be as follows:

update-bundle-guentner-image-nexo-guentner-nexo-ec-1.raucb

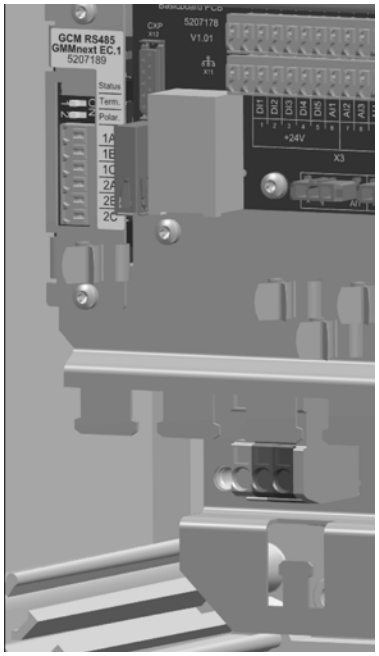
In the future, the update file will be provided for downloading via the Güntner homepage.

See https://www.guentner.eu/products/controls/ for more information.

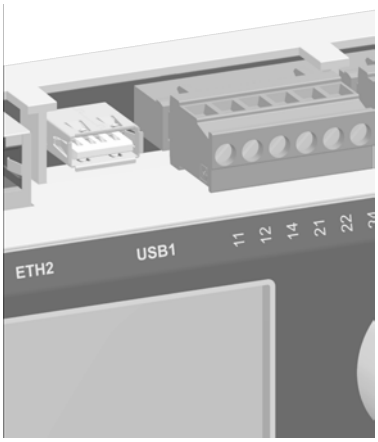
6.10.1 Update procedure

ATTENTION
First of all, ensure that the date and time are set correctly. This is essential to ensure that the update certificate can be checked successfully. See also "Date/time".

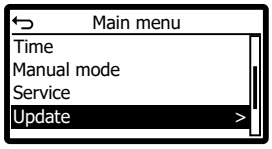
Now switch to the “Update” submenu before you insert the USB storage stick.



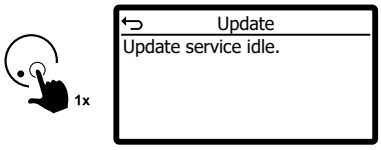
USB1 port on the GMMnext EC



USB1 port on the GMMnext Rail

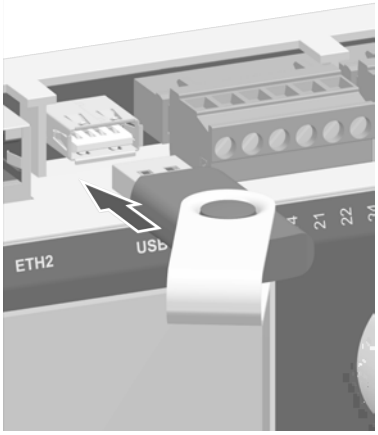


The update service status is then “inactive”, which means that no update procedure is currently under way.



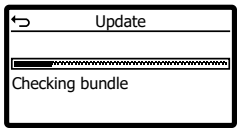
Do not insert the prepared USB storage stick into the USB port USB1 until now.

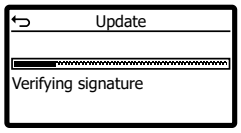
Inserting the USB storage stick into the GMMnext EC

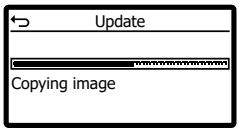


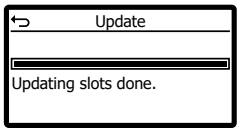
Inserting the USB storage stick into the GMMnext Rail

The update procedure will start automatically. The various stages in the update process will be shown. A progress display will show how far the update process has progressed.

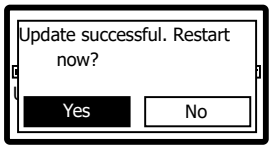




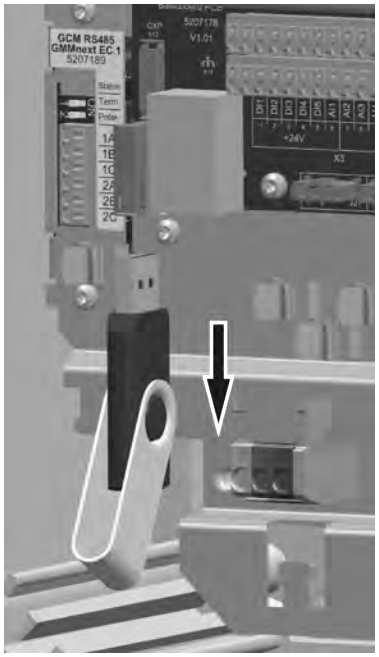




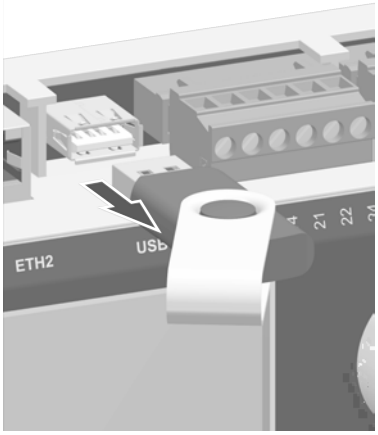
When the update including any data migration is complete, a message will appear:



ATTENTION
Remove the USB stick before restarting the system!

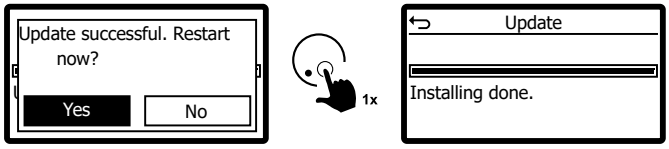


Removing the USB stick from the GMMnext EC



Removing the USB stick from the GMMnext Rail

Now confirm your selection by clicking on “Yes” for “Restart now”.

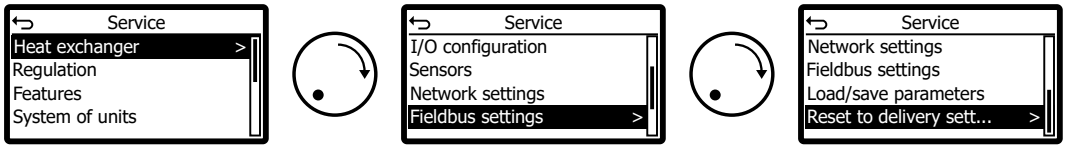


The system will now automatically restart.

7 Service menu

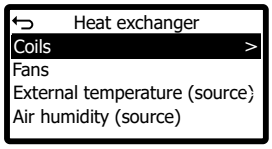
Via the Service menu you can configure all settings for the controller and the connected fans.

The following main categories can be found in the menu and are described in subsequent sections.



7.1 Heat exchanger

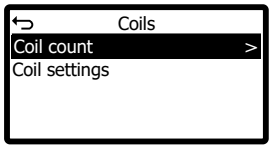
All settings which have an effect on the entire heat exchanger can be configured here.



Note: If an external temperature or ambient humidity sensor is configured and connected, the current measured values will also be shown here.

7.1.1 Coils (heat exchanger)

Here, you can configure all basic settings for the coils which relate to the heat exchanger itself. These include the number of individual heat exchangers which are installed, what type these heat exchangers are (i.e. what fluid is used), what sensors are installed and used and, possibly, the fan row which the coil is to be assigned to.



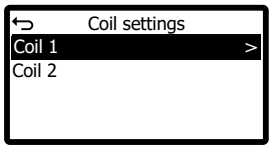
NOTICE
The associated internal coils are configured separately in the menu, see section "Regulation (service menu)".

7.1.1.1 Coil count

Up to 5 independent coils can be configured. Set the number here according to the number of heat exchanger loops.

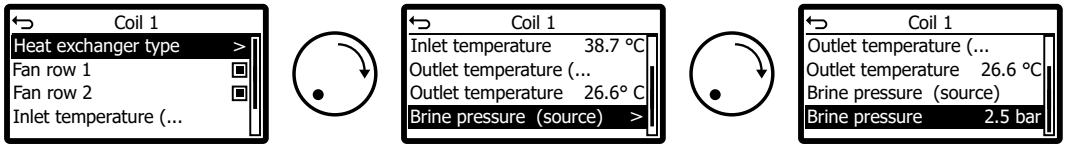
7.1.1.2 Coil settings

You can configure the settings for each coil here.

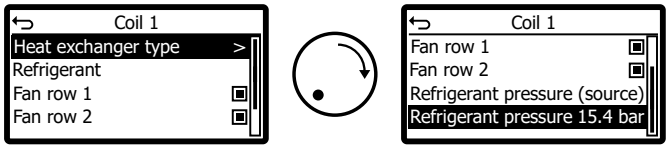


ATTENTION
The parameters available depend on the selected heat exchanger type.

The following parameters are shown for a **dry cooler**:



The following parameters are shown for a **condenser**:



7.1.1.2.1 Fan row 1

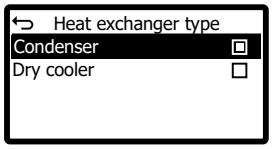
For heat exchangers with 2 fan rows, you can specify whether fan row 1 (left-hand row, viewed from the inlet side) will be influenced by this coil.

7.1.1.2.2 Fan row 2

For heat exchangers with 2 fan rows, you can specify whether fan row 2 (right-hand row, viewed from the inlet side) will be influenced by this coil.

7.1.1.3 Heat exchanger type

The type of heat exchanger for this coil can be set here.



7.1.1.4 Refrigerant

This menu point is only shown if the heat exchanger type is set to condenser. Here, you can specify whether a refrigerant is defined so that the setpoints and actual values with a temperature conversion are shown accordingly.

If no refrigerant is defined, only the pressure will be shown.

Using the condensing pressure and the refrigerant set, the GMMnext can calculate the condensing temperature, display this and use it for regulation purposes.

The following refrigerants are currently supported by the GMMnext:

- R134a
- R290
- R404A
- R407C
- R410A
- R507
- R717
- R723
- R744
- R22
- R1234yf
- R1234ze
- R1270
- R32
- R407A
- R407F
- R417A
- R427A
- R448A
- R449A
- R450A
- R452A
- R513A
- R600
- R600a

7.1.1.5 With a condenser

7.1.1.5.1 Refrigerant pressure (source)

Here, you can set the source of the pressure sensor which is used as the actual value for the PID controller in this coil.

7.1.1.5.2 Refrigerant pressure (current value)

The current measured refrigerant pressure is shown.

7.1.1.6 With a dry cooler

7.1.1.6.1 Inlet temperature (source)

The source of the inlet temperature sensor for this coil can be set here. This temperature is not used to control the coil. It is used for recording/display purposes, for provision on the fieldbus and, possibly, to calculate a difference temperature, e.g. compared to the outlet temperature.

7.1.1.6.2 Inlet temperature (current value)

The measured inlet temperature is shown if this sensor is configured and measuring valid values.

7.1.1.6.3 Outlet temperature (source)

The source of the outlet temperature sensor for this coil can be set here. This temperature is used as the actual value for the PID controller in this coil.

7.1.1.6.4 Outlet temperature (current value)

The measured outlet temperature is shown if this sensor is configured and measuring valid values.

7.1.1.6.5 Brine pressure (source)

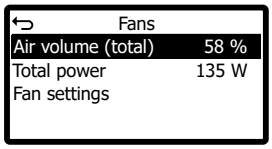
The source of any brine pressure sensor can be configured here.

7.1.1.6.6 Brine pressure (current value)

The measured brine pressure is shown if this sensor is configured and measuring valid values.

7.1.1.7 Fans

In this menu, you will find information regarding the connected fans and, if necessary, you can change the settings for each fan.



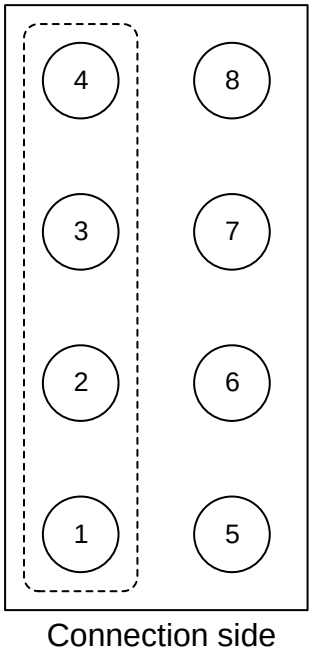
7.1.1.7.1 Counting method for fans

Here, you can define the counting method according to which the fans are numbered on the heat exchanger. The following counting methods are currently supported:

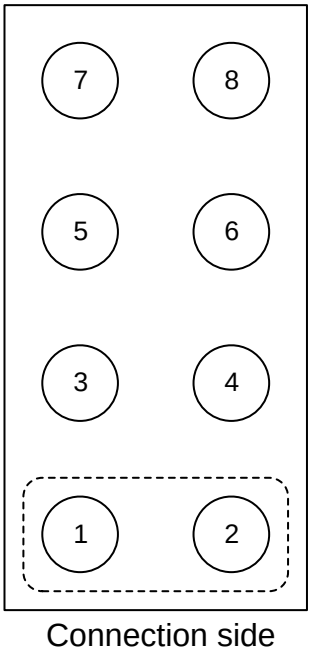
With the **"Along a row"** counting method, the fans in the first fan row are counted first from the front to the back. The fans in the next fan row to the right are counted next.

With the alternative **"Along a column"** counting method, the fans in the first fan column are counted first from left to right. The fans in the next fan column are counted next from the front to the back.

The following illustrations show the various counting methods using a heat exchanger with eight fans spread across two rows as an example.



Counting method along a row



Counting method along a column

If the method of counting fans should deviate from the common standard, this can be taken into account with this setting.

7.1.1.7.2 Air volume

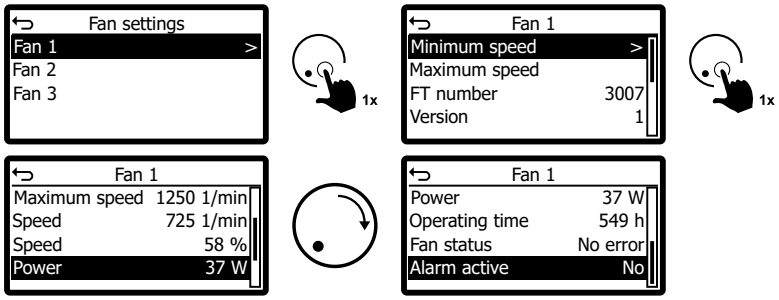
The cumulated total air volume for all fans is shown in %.

7.1.1.7.3 Total power

The current total power for all fans is shown.

7.1.1.7.4 Fan settings

In this menu, the current process data, warnings and alarms are shown for each fan. Manual changes to the parameters can also be made.



Minimum speed

If necessary, the minimum speed of the fan can be configured here.

ATTENTION
This parameter should only be changed by a person with specialist knowledge because it affects the fan's minimum air volume.

If you would like a base value for a coil for example, configure this in the relevant coil instead.

Maximum speed

If necessary, the maximum speed (working point speed) of the fan can be configured here.

ATTENTION
This parameter should only be changed by a person with specialist knowledge because it affects the fan's working point and, if configured incorrectly, will lead to the maximum noise limit being exceeded.

FT number

The fan type number (without version number) is shown. It is part of the Güntner item number for the fan.

Version number

The hardware version number of the fan is shown. It is part of the Güntner item number for the fan.

Maximum speed

The fan's current configured maximum speed is shown here. This speed is also referred to as the working point speed.

Current speed

The fan's current speed is shown.

Speed in %

The current speed in percent in relation to the fan's maximum speed is shown.

Power

The current fan power, calculated from the intermediate circuit voltage and the intermediate circuit current, is shown.

Operating time

The fan's operating hours are shown.

Fan status

This shows whether the fan is currently error free or has an error.

Alarm active

This shows whether an alarm is currently active for this fan.

7.1.1.8 External temperature(Source)

Here, you can configure the source of an external temperature sensor. Select a temperature sensor which you set up previously here.

7.1.1.9 External temperature (current value)

The measured external temperature is shown if this sensor is configured and measuring valid values.

7.1.1.10 Ambient humidity(Source)

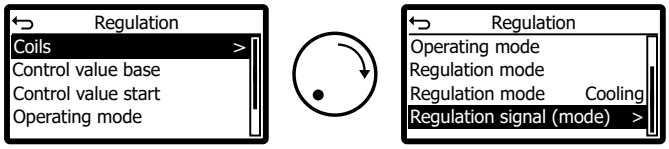
Here, you can configure the source of an ambient humidity sensor. Select an ambient humidity sensor which you set up previously here.

7.1.1.11 Ambient humidity (current value)

The measured ambient humidity is shown if this sensor is configured and measuring valid values.

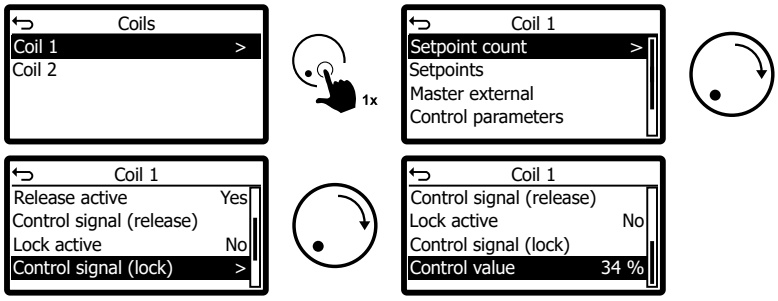
7.2 Regulation (service menu)

Here, you can configure settings which apply either to each coil or to all coils.



7.2.1 Coils (regulation)

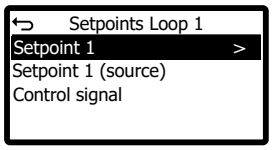
Here, you can configure settings which apply exclusively to the selected coil.



7.2.1.1 Setpoint count

Up to 2 setpoints can be configured for each coil. The switchover from setpoint 1 to setpoint 2 is effected by a control signal which can be configured freely. If setpoint 2 (source and value) is to be displayed later on, the number of setpoints must be set to 2.

7.2.1.2 Setpoint settings



Here, you can configure the setpoints for the internal PID controller, possibly the setpoint sources and the control signal for switching from setpoint 1 to setpoint 2.

7.2.1.2.1 Setpoint 1/2

Here, you can set the parameter setpoints 1 or 2 for this coil.

7.2.1.2.2 Setpoint 1/2 (source)

If the setpoint will not come from the internal parameter setpoint 1 or 2, you can select the source, e.g. an external analogue setpoint signal, here.

See also "Setpoint temperature signals/setpoint pressure signals"menu.

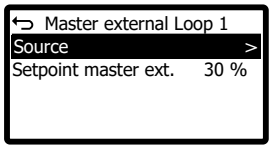
7.2.1.2.3 Control signal

If necessary, you can configure the source of a control signal (digital input) which switches the selected coil from setpoint 1 to setpoint 2.

7.2.1.3 Master external

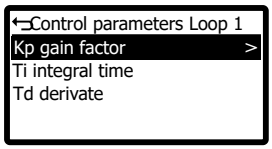
In the “Slave external analog” operating mode, the control value for the fans is given via an analogue signal. Here, you can configure the source of the previously configured fan control value signal.

See also "Fan control value signals".



7.2.1.4 PID control parameters

Here, you can set the control parameters for the PID controller in the respective coil.



7.2.1.4.1 Kp gain factor

The Kp factor specifies the control gain. It is the proportion of the control path following the input signal.

7.2.1.4.2 Ti hold time

The I part of the regulation constantly changes the degree of regulation until the actual value reaches the setpoint.

7.2.1.4.3 Td derivate

The D part of the regulation reacts not to the control deviation but to the speed of change.

7.2.1.5 Releasing and locking the coil

An explicit release control signal and an explicit locking control signal can be configured for each coil. The source of the signal and inversion if desired can be set for this purpose.

Both signals can be used separately and flexibly to influence the output signal of the coil with various logic approaches.

In order that the coil (PID controller) works and generates the desired output signal to control the fans, the release signal must be 1 (= High) **AND** the locking signal 0 (= Low). Otherwise, the output signal for the coil is 0, i.e. the assigned fans are not controlled.

By default, the first coil is released via digital input 1 and no additional lock is configured. However, the release can also be configured via other inputs. All other settings should be configured as necessary according to the number of coils and additional functions.

7.2.1.5.1 Release active

This shows whether the coil is released (either by a control signal or permanently).

7.2.1.5.2 Control signal (release)

Here, you can configure the source of the control signal which releases the chosen coil. If necessary, the signal can also be inverted.

ATTENTION
If no control signal for release is configured, the coil is always released.

7.2.1.5.3 Lock active

If the coil is locked (either via a digital input or possibly via another function, e.g. "Fan lock from valve position" during HRC operation), this is shown here.

7.2.1.5.4 Control signal (lock)

Here, you can configure the source of the control signal which locks the coil. If necessary, the signal can also be inverted.

ATTENTION
If no control signal for the lock is configured, the lock is not effective.

7.2.2 Control value base and control value start

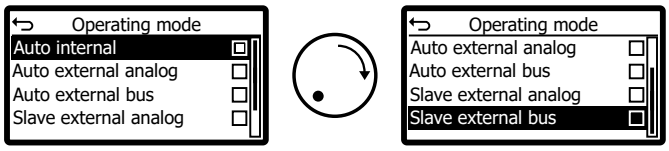
The control value base function is used to set a minimum speed. The control value start function is used to define a start point for issuing the control value.

Here are some setting examples:

Control value base	Control value start	Function
0 %	0 %	Functions off, normal regulation 0 %...100 % with release
10 %	0 %	At least 10 % control value is output, when the release is active

Control value base	Control value start	Function
10 %	5 %	At least 10 % control value is only then output when the regulation has reached 5 % and the release is due
10 %	10 %	The 10 %...100 % control value is only output when the regulation reaches 10 %
0 %	5 %	The control value is 0 % when the control value is under 5 %. The control value is output from 5 % regulation with given release (5 %-100%).

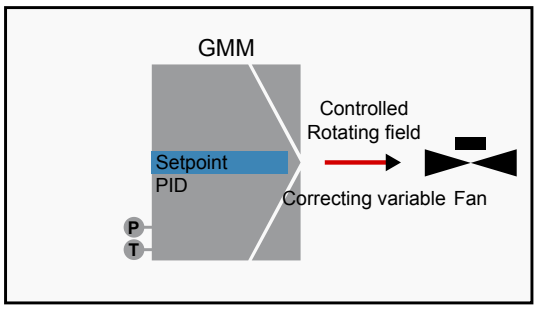
7.2.3 Operating mode



The operating mode can be set in this menu. The setting then applies to all coils.

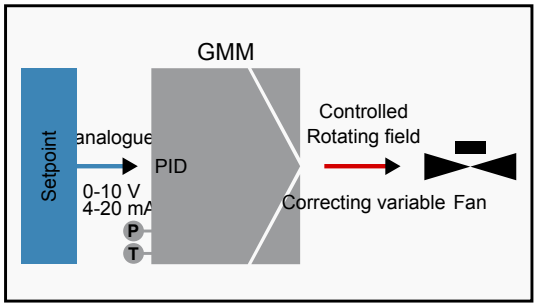
7.2.3.1 Auto internal

In this mode, the system is regulated automatically to the setpoint set internally. The setpoint 1 and possibly a setpoint 2 can be set individually for each coil under “Setpoints” in the menu.



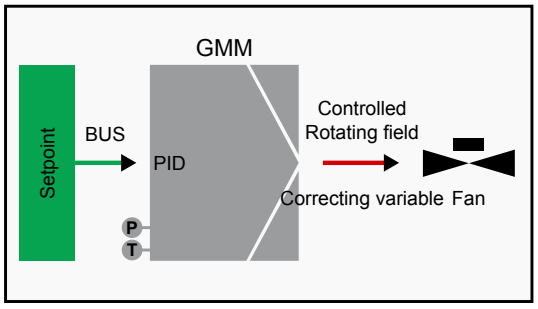
7.2.3.2 Auto external analog

In this mode, the system is regulated automatically to a setpoint defined externally in an analogue fashion. A corresponding "Temperature setpoint" or "Pressure setpoint" sensor signal (see "Setpoint temperature signals/setpoint pressure signals") must be configured and assigned to an analogue input.



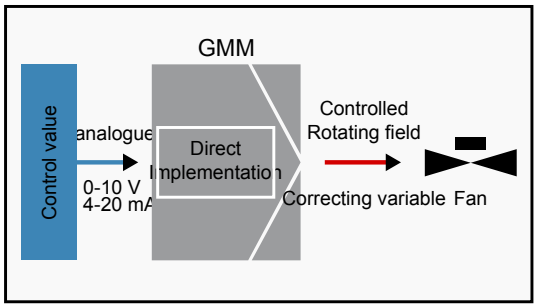
7.2.3.3 Auto external bus

In this mode, the setpoint is given via one of the possible fieldbus interfaces/protocols. In order for the fieldbus interface to operate, another communication module may be required in order to configure the fieldbus interface.



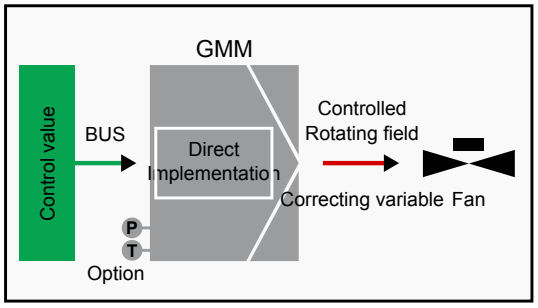
7.2.3.4 Slave external analog

In this mode, there is no internal control. Instead the fan control value signal which is given externally in an analogue fashion is passed directly to the fans. In order for this to be possible, a corresponding fan control value signal must be set up beforehand, assigned to an analogue input and assigned to the coil as a master control value, see also "Fan control value signals".



7.2.3.5 Slave external bus

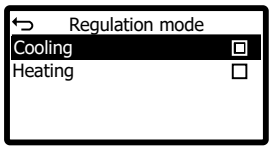
In this mode, the control value is given via one of the possible fieldbus interfaces/protocols. In order for the fieldbus interface to operate, another communication module may be required, see also, in order to configure the fieldbus interface.



7.2.4 Regulation mode

Normally, the GMMnext is used to cool liquids and refrigerants. With some applications, a reversal of the function is required, i.e. liquids are warmed (e.g. with heat pumps). With the “Regulation mode” parameter, you can set the regulation logic globally to Heating for all coils.

As an alternative to setting a fixed regulation mode, the switchover can be effected via a freely configurable control signal, see "Regulation signal (mode)".



7.2.5 Regulation mode (current)

The current regulation mode is shown.

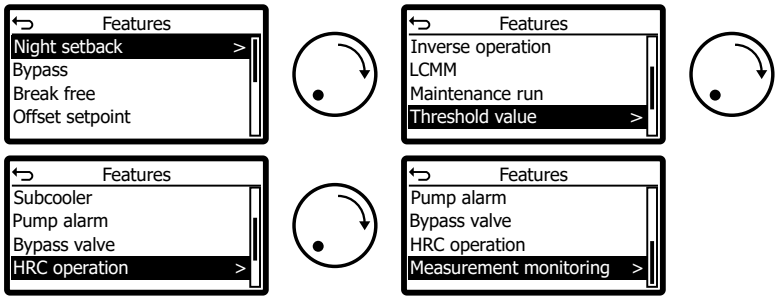
7.2.6 Regulation signal (mode)

With the help of a control signal, the regulation mode can be switched from Cooling to Heating. If you wish, you can configure the source of the digital signal here. You can also configure the inversion of the control signal if necessary.

Switching from Cooling to Heating will then affect all coils.

7.3 Features

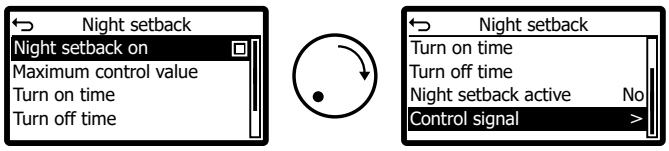
With this item in the service menu, you can activate and configure special functions if necessary.



7.3.1 Night setback

With this item in the service menu, you can configure night setback. Night setback limits the fans to a maximum control value (speed).

In order for time-dependent night setback to work, the turn on and turn off times must be different. Please also ensure that the system time is set correctly, see also "Date/time". You should also bear in mind that the system time may need to be set correctly if the controller was switched off for a long period. This is because the real-time clock only remains set for a few days without power.



7.3.1.1 Night setback on

The function can be switched on or off here. Night setback will only work if the function is switched on, e.g. by an external control signal or independently of time.

7.3.1.2 Maximum control value

The maximum control value to which the output signals for the fans are limited can be set here.

7.3.1.3 Turn on time

The turn on time for night setback can be set here. Night setback will then be turned on depending on the system time.

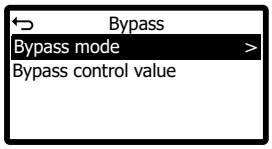
7.3.1.4 Turn off time

The turn off time for night setback can be set here. The limiting of the fan control value will then be turned off again.

7.3.1.5 Control signal

If necessary, the source of a control signal (digital input) for activating night setback can be configured here.

7.3.2 Bypass



With this item in the service menu, the bypass function can be switched on or off. If the function was activated, the control value for bypass operation can be set. This function is used to maintain operation in the event of a fault in a GMMnext component.

The bypass function has the effect that if there is a fault in the GMMnext the fans will run at the speed specified here. The bypass speed is activated automatically 10 s after the connection to the GMMnext is lost or there is a sensor fault.

The following options can be set:

Bypass operation ON

Control value 0 %

... if the GMMnext is defective or the connection to the fans has been interrupted:

=> all the fans stop

Control value 100 %

... if the GMMnext is defective or the connection to the fans has been interrupted:

=> all fans run at a speed of 100 %

Bypass operation OFF

... if the GMMnext is defective or the connection to the fans has been interrupted:

=> all fans run at their last speed before the GMMnext failed

7.3.3 Break free

The break-free function prevents the fans from being blocked by snow during the winter.

The GMMnext menu offers this function only if it is possible for all the EC fans.

NOTICE
This function is possible only with EC fans supplied later than 2012 (approximate figure, because old stocks may have been being used up).

If, while the break-free function is **deactivated**, the EC fan will signal a fault if, when started up, it is found to be not rotating. The EC fan will then continue to make regular low-starting-current attempts to start up in the preferred direction.

If, while the break-free function is **activated**, the EC fan attempts to start up and finds that it is blocked, it will automatically make a number of further attempts, with increasing starting current and in alternating directions. The GMMnext does not issue a fault report during this time. If the fan does succeed in rotating it then changes automatically to its preferred direction and goes into normal operation.

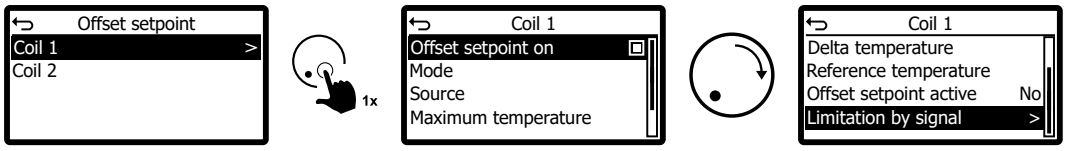
If this also fails to start rotation the fan will then report this in the form of a Blocked report and will then use its minimum starting current to continue attempting to start up, in alternating directions.

7.3.4 Offset setpoint

Setpoint offset results in the setpoint which is currently used being raised or lowered depending on another signal value.

2 offset setpoint modes are supported. In the “reference offset” mode, the offset takes place depending on the external temperature or wet bulb temperature for example. In the “direct offset” mode, the offset takes place depending on a setpoint offset signal which can come from any analogue input. This setpoint offset signal should be set up in the sensor menu beforehand.

Setpoint offset can be configured separately for each coil.



7.3.4.1 Offset setpoint on

Setpoint offset for the relevant coil can be switched on and off here.

7.3.4.2 Mode

Select the setpoint offset mode here.

Select **"Reference offset"** if setpoint offset is to take place depending on the external temperature or wet bulb temperature. Please note that reference offset depending on the aforementioned reference temperatures only makes sense and is only available if the actual regulation takes place on the basis of a temperature.

Select **"Direct offset"** if the setpoint is to be displaced depending on an analogue signal.

7.3.4.3 Source

This menu option is only available if the "Direct offset" mode is set.

In the “direct offset” mode, the source can be selected here. In order to do this, you must first set up a temperature setpoint offset sensor or a pressure setpoint offset sensor.

See also "Setpoint temperature signals/setpoint pressure signals".

You can also configure the scaling of the setpoint offset for the relevant signal source. As a result, any positive and negative offset signals are possible depending on an analogue input.

7.3.4.4 Maximum temperature

This menu option is only available if the "Reference offset" mode is set.

You can set the maximum temperature up until which the offset signal influences the offset here.

7.3.4.5 Delta temperature

This menu option is only available if the "Reference offset" mode is set.

You can set the delta temperature, i.e. the difference between the setpoint and the offset signal, here.

7.3.4.6 Reference temperature

This menu option is only available if the "Reference offset" mode is set.

You can select the temperature which will be used as a reference here.

External temperature-dependent setpoint offset

In order to ensure the optimum operation from an energy point of view, it is beneficial to displace the setpoint under certain circumstances, depending on the external temperature. Setting the min. condensing temperature can cause rising external temperatures, so that the external temperature is above the setpoint. If the system is now only to be operated at partial load, raising the setpoint can save energy on the fans. Without an offset these fans would always be controlled with 100 %, as the high external temperature (above the setpoint) means this setpoint cannot be reached.

Example:

Setpoint = 25 °C

ΔT = 5 K

T_{max}= 40 °C

In this example, the setpoint must always be 5 K above the external temperature. As soon as the external temperature reaches 20.1 °C, the setpoint is displaced to 25.1 °C. The limit Tmax marks the area up until which the offset works. In this example, the setpoint is displaced from 20 °C. The max. value up until which the setpoint can be displaced to is 45 °C in this example.

7.3.4.7 Offset setpoint active

This shows whether setpoint offset is currently active.

7.3.4.8 Limitation by signal

This menu option is only available if the "Reference offset" mode is set. Setpoint offset can be limited by a signal. If the signal is present, the final result of setpoint offset can be limited to the value set under "Maximum temperature".

This function is used during HRC operation for example in order to ensure that the HRC system in combination with the dry cooler functions reliably and with optimum energy consumption when setpoint offset is activated.

7.3.4.8.1 Maximum temperature

If the signal for limiting setpoint displacement is active, the displacement signal will only influence the displacement up to this new maximum temperature.

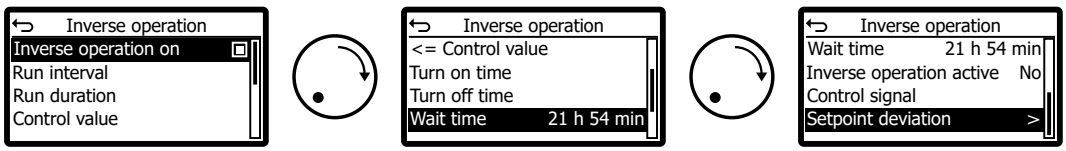
7.3.4.8.2 Limitation max. setpoint offset active

If the limiting of setpoint offset by a signal is active, this is shown here.

7.3.4.8.3 Control signal (limitation by signal)

The source and, if desired, inversion of the control signal for limiting setpoint offset can be set here.

7.3.5 Inverse operation



Activation of inverse operation depends on the fan having been in operation for a certain time. It is carried out with a configurable control value in the opposite direction.

Inverse operation can be used to delay contamination of the fins in the heat exchanger.

This function is carried out if the following conditions are met:

- Manual mode is deactivated
- Control value for all PID controllers in the coils ≤ configurable control value

- Night setback off
- No unit fault
- Possibly for a configured time window
- The delta between the actual value and the setpoint for the relevant coils is not greater than the configured value Δ max. value

Inverse operation is performed independently of the releasing of the controller.

If, in inverse operation, one of the above conditions is not met, inverse operation will be aborted and the controller will return to regular operation. In this case, inverse operation will be deemed not to have taken place and it will only be started again if all of the conditions above are met. Aborting inverse operation always resets the counter for the inverse operation duration.

Inverse operation is not considered to be complete until a full cycle has been carried out at one time. Inverse operation can also be activated via a control signal.

ATTENTION
This function is possible only with EC fans supplied later than 2012 (approximate figure, because old stocks may have been being used up).

7.3.5.1 Inverse operation on

This is used to turn the function on or off.

7.3.5.2 Run interval

When the fans have been in operation for this length of time, inverse operation is scheduled. Only actual operating time in seconds is counted. Standstill times are not counted.

7.3.5.3 Run duration

This is used to specify the duration of inverse operation.

7.3.5.4 Control value

This control value allows inverse operation. This control value is also used if inverse operation is activated via a control signal.

7.3.5.5 Inverse operation condition

Condition for inverse operation. Inverse operation is released only if the current control value for all PID controllers in the coils is ≤ this configured control value.

7.3.5.6 Turn on time/turn off time

If necessary, a time window in which inverse operation can take place can be configured. In order for this to be possible, all other conditions must be met. If the two times are the same, no time window will be active.

7.3.5.7 Wait time

This shows the remaining required waiting time before the next inverse operation.

7.3.5.8 Inverse operation active

This shows whether inverse operation is currently taking place.

7.3.5.9 Control signal

If necessary, you can configure an external control signal and, possibly, a desired inversion.

7.3.5.10 Setpoint deviation

Inverse operation will only be released or aborted if the difference between the setpoint and the actual value is smaller than the value Δ max. Monitoring can be turned on and off for each coil and the maximum deviation Δ max. can be configured. This function only makes sense in auto internal or auto external mode.

7.3.6 Maintenance run

A maintenance run is activated in response to the length of time the fans have been stationary. Its purpose is to prevent them from becoming jammed.

Activation of a maintenance run after the configured system standstill period depends on all the following conditions being fulfilled:

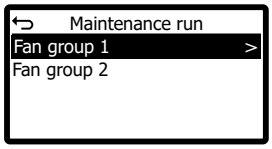
- Manual mode is deactivated
- Control value for all PID controllers in the coil = 0, i.e. no speed requirement
- No unit fault

The controller does not need to be released because the speed controller is often released only when cooling has been requested. Otherwise the maintenance run would effectively be disabled and a maintenance run would never happen.

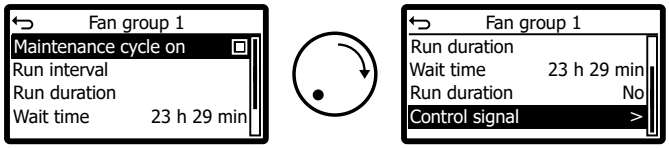
If a speed request is made during a maintenance run, the maintenance run will be aborted and the system will return to regulation mode. In such cases, maintenance is deemed to have been performed, because the fans have been in operation.

A maintenance run is carried out at full speed, but this will be limited by an active night setback.

The maintenance run can be set for each fan group.



The following functions can then be configured for each fan group:



7.3.6.1 Maintenance run on/off

This is used to turn the function on or off.

7.3.6.2 Run interval

If the fans have not been in operation at all during this configured period then a maintenance run will be started.

7.3.6.3 Run duration

This is used to specify the duration of a maintenance run.

7.3.6.4 Wait time

This shows the current waiting time until the next maintenance run.

7.3.6.5 Maintenance run active

This shows whether a maintenance run is currently taking place.

7.3.6.6 Control signal

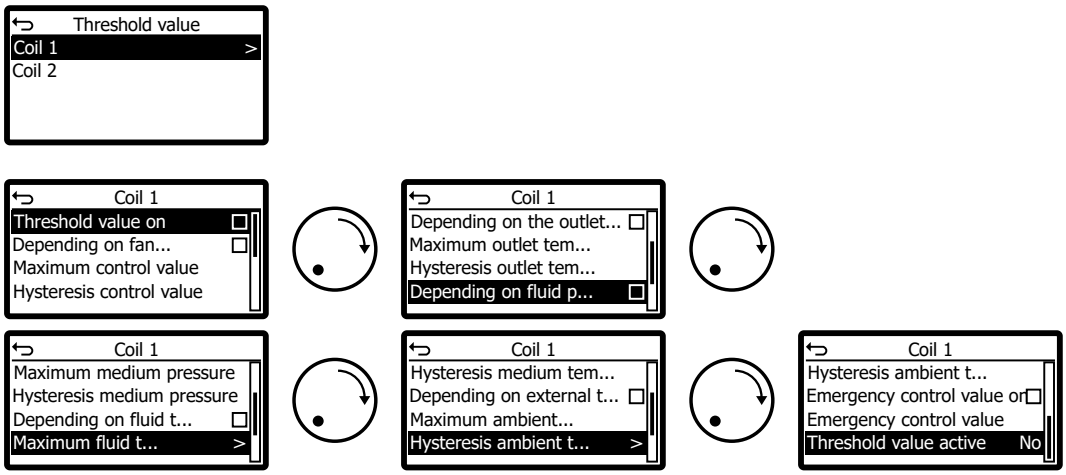
The maintenance run can also be activated via an external control signal. This can be configured here.

7.3.7 Threshold value

With the help of the threshold value function you can switch any relays (digital output) depending on various parameters separately for each coil.

ATTENTION
You can select a number of dependencies. The results of the dependencies come together in an **AND function** i.e. the threshold function is only fulfilled if all activated dependencies are fulfilled. For each dependency, a **Maximum value** and a **Hysteresis** can be set.

The threshold value output signals are assigned to any digital output separately in the I/O configuration -> Digital outputs.



The following dependencies can be activated and parametrized separately:

7.3.7.1 Depending on the fan control value

The threshold value condition is fulfilled if the fan control value is greater than the configured maximum value.

7.3.7.2 Depending on the outlet temperature

The threshold value condition is fulfilled if the outlet temperature is greater than the configured maximum value. This dependency makes sense only if the coil is of the dry cooler type.

7.3.7.3 Depending on the refrigerant pressure

The threshold value condition is fulfilled if the refrigerant pressure is greater than the configured maximum value. This dependency makes sense only if the coil is of the condenser type.

7.3.7.4 Depending on the fluid temperature

The threshold value condition is fulfilled if the fluid temperature is greater than the configured maximum value. This dependency makes sense only if the coil is of the condenser type and an appropriate refrigerant is configured.

7.3.7.5 Depending on the external temperature

The threshold value condition is fulfilled if the external temperature is greater than the configured maximum value.

7.3.7.6 Maximum value

If the relevant maximum value is exceeded, the threshold condition is fulfilled.

7.3.7.7 Hysteresis

In order to prevent the threshold value signal switching back and forth, a hysteresis can be configured for each condition. If a threshold value condition was fulfilled, it will only be deemed to be not fulfilled again if the dependent value is smaller than the maximum minus the hysteresis.

The threshold value function can be configured separately for each coil.

7.3.7.8 Emergency control value on

The emergency control value is issued as the control value for the relevant coil if the following conditions are fulfilled:

- Threshold value function is active
- Threshold value condition(s) exceeded
- Emergency control value function is active
- Emergency control value is greater than the calculated fan control value (e.g. during controlled operation or bypass value with sensor fault)
- Manual mode is not active
- coil is released

The emergency control value can be reduced to active night setback if necessary.

7.3.7.9 Emergency control value

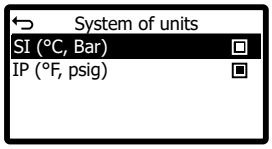
The relevant emergency control value can be set here.

7.3.7.10 Threshold value active

This shows whether a threshold value signal is active for this coil.

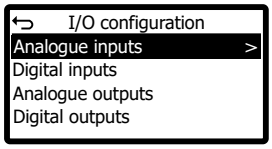
7.4 System of units

Here, you can set the units system which is used to show the values in the display.



7.5 I/O configuration

In this menu, the analogue and digital inputs/outputs can be configured.



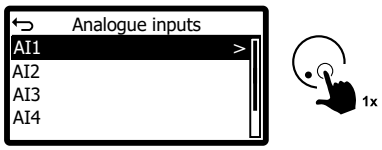
7.5.1 Analogue inputs

The analogue inputs are multifunctional inputs which can measure either current, voltage or resistance.

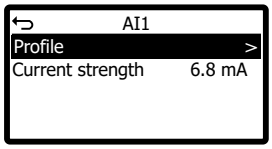
A so-called profile can be assigned freely to each of the analogue inputs. Select the relevant input and set your desired profile.

Both standard profiles such as those used in typical control and regulation systems and user-defined profiles are available. As a result, there is a very wide range of signal processing options.

Select an analogue input...



... and assign your desired profile to the input:



The following profiles can be selected:

- Voltage 0... 10 V
- Voltage 2... 10 V
- Current 0... 20 mA
- Current 4... 20 mA
- Resistance thermometer
- Custom voltage
- Custom Current
- Custom Resistance

With the custom profiles, you can also configure the minimum and maximum value with which the input signal is then converted to the internal signal values 0.0 to 1.0.

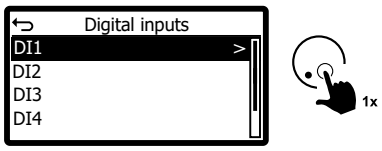
Depending on the selected profile, the currently measured value is shown in the corresponding unit.

7.5.2 Digital inputs

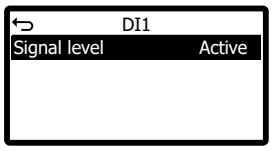
Only the statuses of the digital inputs can be shown here.

The control inputs are always assigned for the relevant functions.

Select a digital input...



... and the current signal level will then be shown:



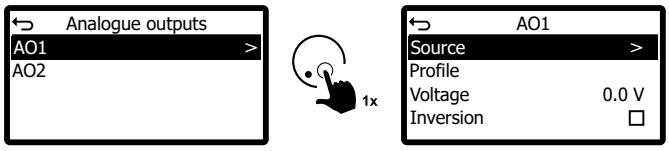
Active means that a “high level = logically 1” is present.

Inactive means that a “low level = logically 0” is present.

7.5.3 Analogue outputs

You can configure the profiles, the signal sources and, if desired, an inversion of the analogue outputs here. The current signal value for the output is also shown here.

Select an analogue output...



...and then select the source which is to be output at this output and, possibly, your desired profile.

The following signal sources can be selected:

- None
- AI1...AI5
- Control value for the fan groups
- Control value for the PID controller for the relevant coil
- Control value for a fan
- Control value for the subcooler function
- Bypass valve (coil 1)

- HRC valve (coil 1)
- ....

The following profiles can be set:

- Voltage 0 – 10 V
- Voltage 2 – 10 V
- Voltage (custom)

Activate “Inversion” if the output signal is to be output inverted with respect to the input signal.

7.5.4 Digital outputs

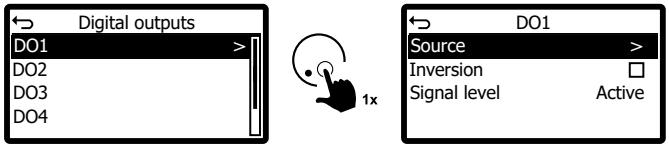
Here, you can configure the source for controlling the digital outputs and, possibly, a desired inversion of the control signal.

In addition, the current signal level is shown here.

Active means that the digital output is being controlled.

Inactive means that the digital output is not being controlled.

Select a digital output...



...and assign to this output the signal source which this output is to react to.

The following signal sources can be selected:

- No assignment
- Status of the digital inputs
- Threshold values for the relevant coils
- Alarm message Prio 1
- Warning message Prio 2
- Operating message
- HRC release (coil 1)
- Pump alarm
- Group message with temperature monitoring
- Group message with pressure monitoring
- Group message with ambient humidity monitoring
- Group message with temperature spread monitoring

NOTICE
All alarm messages, warning messages and group messages are **wire break-proof signals,** i.e. these signals are inverted by default. A fault status is always signalled with a low signal = deactivated output (relay not energized). This ensures that a fault is signalled even if the control unit is not connected to the power supply. The collective fault signals for temperature, pressure, humidity and spread exist only once, i.e. all collective faults from the various coils result in the relevant group messages.

If you would like to invert the status of the digital output, then activate “Inversion”.

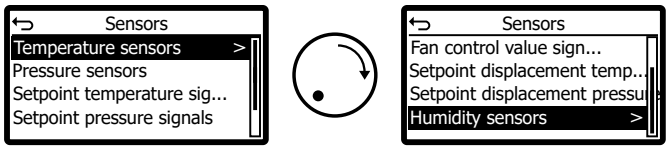
This can also be used to manually switch the status of the digital output on and off for test purposes.

7.6 Sensors

In this menu, you can add or configure sensors. With the exception of the resistance thermometers PT1000 and GTF210 (KTY), all sensors can be freely scaled and the signals can be inverted if necessary. This results in a large number of possible uses.

The sensors set up here can then be selected for coils or other functions as signal sources.

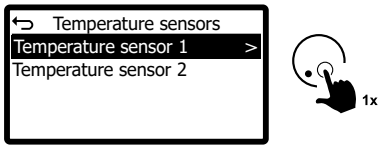
Selecting the correct profile for the analogue input is important in order to ensure that the sensors function correctly.



Sensors can be added here during start-up or later on.

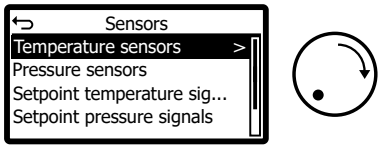
To configure an existing sensor, select the sensor and then change its settings.

If you would like to change the settings for a temperature sensor for example, navigate to the sensor, select it...



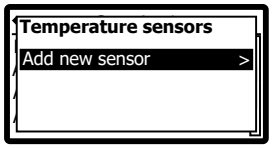
...and then make your desired changes.

To add a new sensor, select a sensor type in the sensor menu...



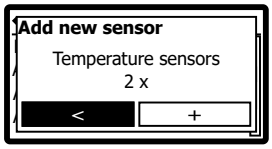
...and then press and hold (for at least 2 seconds) the rotary selection knob.

The context menu will now open.

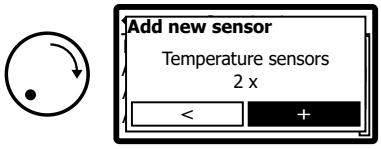


Press the rotary selection knob briefly to continue adding the sensors.

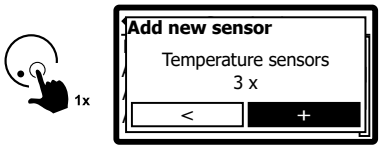
You will also see how many temperature sensors have already been set up.



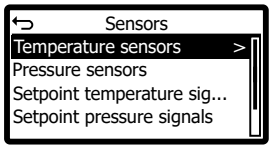
Now select the “+” field by turning the selection knob.



Each time that you press the rotary selection knob briefly, you can add another sensor. The total number of each sensor type will increase and will be shown here.

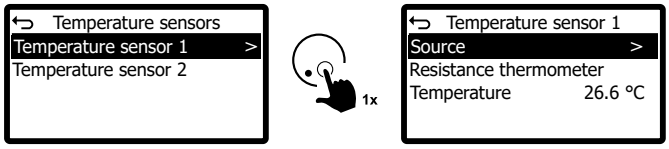


You can exit the context menu by pressing the “Back” button twice.



You can then configure these newly created sensors, e.g. assign the signal source for the analogue input to the sensor.

Select the relevant sensor.



7.6.1 Pressure sensors

Pressure sensors serve to record pressures within various systems. These pressures can be processed by various functions, e.g. as an input signal. These include actual values for the PID controller, input values for calculating the condensing temperature on the basis of the condensing pressure or the pressure of the brine in the refrigerant circuit.

Generally speaking, pressure sensors are connected via the standard signals 4...20 mA or 0... 10 V. Here too, you should ensure that the correct profile is assigned to the selected analogue input.

In order to rule out incorrect configurations, the system prevents pressure sensors being assigned to an analogue resistance thermometer input profile.

You can configure the interval (minimum and maximum pressure) as well as an inversion for the pressure sensors.

7.6.2 Setpoint temperature signals/setpoint pressure signals

In the “Auto external analog” operating mode, the setpoints (1 or 2) can be specified via an external analogue signal. The source of the relevant setpoint signal should be selected in the relevant coil.

Use “Setpoint temperature signals” if regulation relates to the temperature.

Use “Setpoint pressure signals” if regulation relates to the pressure.

Any analogue input can be selected as the signal source. You can also configure the minimum and maximum figure for the setpoint – this is calculated on the basis of the specified analogue source signal. This allows flexible scaling with respect to the input signal.

It is also possible to invert the setpoint signal.

7.6.3 Fan control value signals

In the “Slave external analog” operating mode, the control values for the coil which is to be regulated can be given externally via an analogue signal. The source of the relevant fan control value signal should be set in the relevant coil.

Any analogue input can be selected as the signal source. You can also configure the minimum and maximum figure for the control value – this is calculated on the basis of the specified analogue source signal. This allows flexible scaling with respect to the input signal.

It is also possible to invert the control value signal.

7.6.4 Temperature setpoint offset/pressure setpoint offset

In the “Automatic” operating mode, the setpoint can be displaced both in a positive or negative direction depending on an analogue signal.

Depending on whether the control reacts to temperature or pressure, you can add an offset signal.

Use “Temperature setpoint offset” if regulation relates to the temperature.

Use “Pressure setpoint offset” if regulation relates to the pressure.

Any analogue input can be selected as the signal source. You can also configure the minimum and maximum figure for the setpoint offset – this is calculated on the basis of the specified analogue source signal. The setpoint offset can be configured in a positive or negative direction.

This allows flexible reactions and scaling with respect to the input signal.

It is also possible to invert the offset signal.

7.6.5 Humidity sensors

You can add humidity sensors here. If necessary, this sensor can be used for displaying, for provision on the field bus or for regulation, just like the ambient temperature.

Any analogue input can be selected as the signal source. You can also configure the minimum and maximum figure for the ambient humidity – this is calculated on the basis of the specified analogue source signal.

It is also possible to invert the ambient humidity signal.

7.7 Load/save configuration

The GMMnext allows you to save all settings in the form of a configuration. This configuration can be loaded again later on in order to restore the previously saved GMMnext settings and thus put the unit into a clearly defined status. However, a configuration can also be used to transfer the settings from one GMMnext unit to another.

Configurations are essentially files whose name ends in ".gmmnext". The rest of the file name can be selected at will. Configurations can be stored either in the GMMnext's internal memory or on an external USB storage medium such as a USB stick. Up to 20 configurations can be stored in the internal memory.

NOTICE
To ensure that a USB stick is correctly recognized by the GMMnext and can be used by it, it must be formatted with the FAT32 file system. You should also ensure that the USB stick that you use to manage configurations was not previously used to update the GMMnext software to avoid triggering accidental updates.

When a configuration is saved, it is automatically given a generated file name which includes things like the date and time when it was created. Because the GMMnext sorts configurations according to their file names by default, this implicitly results in sorting according to the date and time of creation. If the configuration is saved on a USB stick or exported, a separate directory containing the configuration will be created for each GMMnext on the basis of its serial number. As a result, the assignment between configurations and GMMnext units remains clear if one and the same USB stick is used to manage the configurations of a number of GMMnext units.

If the file name of a configuration is to be changed, the configuration can first be saved on a USB stick or exported. The USB stick can then be connected to a standard computer in order for the file name to be changed. The renamed configuration can then be imported to the GMMnext again.

A number of application scenarios can have far-reaching consequences for the current GMMnext settings. These include the "Load configuration", the "Load factory settings" and the "Resetting the unit to its delivery state". The GMMnext allows you to create a backup configuration in the internal memory which can be accessed later on if necessary. This is a comfort function to make application scenarios with far-reaching consequences as easy and secure as possible. If there is no more space available in the GMMnext's internal memory for a backup configuration, an existing configuration must first be removed via the "Delete configuration" menu item. Alternatively, you can of course save the current configuration on a USB stick via the "Save configuration" menu item so that there is no need for a backup configuration in the internal memory.

7.7.1 Save configuration

You first select your desired storage medium on which the current GMMnext configuration is to be saved. You can choose from the GMMnext's internal memory or a connected USB stick.

After that, you only need to confirm the save procedure. Once you have done this, you will be given the file name under which the configuration was saved on the storage medium.

7.7.2 Load configuration

First of all, you select the storage medium from which you wish to load a configuration. You can choose from the GMMnext's internal memory or a connected USB stick. After that, you can view your chosen storage medium with the help of an integrated file manager and select the configuration which is to be loaded. Once you have successfully loaded the configuration, the GMMnext will switch to a shorter start-up procedure during which the loaded fan settings can be checked and changed if necessary.

7.7.3 Import configuration

With the help of the import function, you can copy a configuration from a connected USB stick to the GMMnext's internal memory without influencing the GMMnext's current settings. With this facility, you can save a configuration on the GMMnext and load it from the internal memory later on if required.

7.7.4 Export configuration

With the help of the export function, you can transfer a configuration which was saved in the GMMnext's internal memory to a connected USB stick. With this function, you can create backup copies of important configurations in case the GMMnext ever needs to be replaced.

7.7.5 Delete configuration

Via this menu item, you can delete existing configurations from the GMMnext's internal memory and thus free up space which can then be used to store new configurations.

7.8 Factory settings

The factory settings are order-related settings with which the GMMnext is preconfigured in the factory. If these factory settings are saved on the GMMnext, the GMMnext can be reset to use these settings later on. If factory settings are available, the menu will show various information including the date on which the factory settings were saved.

7.8.1 Load factory settings

Via this menu item, you can reset the GMMnext to its original factory settings.

7.9 Resetting the unit to its delivery state

Via this menu item, you can reset the unit to its delivery state.

In this case, all parameters will be deleted and the unit will need to be commissioned again.

ATTENTION
Select this menu item only if you understand the implications and have all parameters for this step.

8 Error messages and warnings

The table shows which signal relay (**Priority 1** or **Priority 2**) is assigned to which message on the display in the event memory.

			In the GMMnext event memory	Report relay to GMMnext
Code	**Component / function**	**Severity**	**Text in the event memory (DE)**	**Prio**
1	Fan	Alarm	Fan <1…24> power outage.	Priority 2
2	Fan	Alarm	Fan <1…24> overheated.	Priority 2
3	Fan	Alarm	Fan <1…24> fault. *	Priority 2
4	Fan	Alarm	Fan <1…24> overheated.	Priority 2
5	Fan	Alarm	Fan <1…24> Hall sensor fault.	Priority 2
6	Fan	Alarm	Fan <1…24> blocked.	Priority 2
9	Fan	Alarm	Fan <1…24> undervoltage. (*)	Priority 2
27	Fan	Alarm	Fan <1…24> cable broken.	Priority 2
28	Fan	Alarm	Fan <1…24> wrong FT No.	Priority 2
29	Analogue input	Warning	AI <1…5> current high.	Priority 2
30	Analogue input	Warning	AI <1…5> current low.	Priority 2
31	Analogue input	Warning	AI <1…5> resistance high.	Priority 2
32	Analogue input	Warning	AI <1…5> resistance low.	Priority 2
33	Analogue input	Warning	AI <1…5> voltage high.	Priority 2
34	Analogue input	Warning	AI <1…5> voltage low.	Priority 2
35	Controller	Info	Commissioning complete.	-
36	Pump alarm	Warning	Pump <1/2> (coil <1…5>): Pump alarm.	Priority 2
37	Bypass valve	Warning	Bypass valve (coil <1…5>): Outlet temperature above the critical interval.	Priority 2
38	Bypass valve	Warning	Bypass valve (coil <1…5>): Outlet temperature below the critical interval.	Priority 2
39	HRC operation	Warning	HRC valve (coil <1…5>): Inlet temperature above the critical interval.	Priority 2
40	HRC operation	Warning	HRC valve (coil <1…5>): Inlet temperature below the critical interval.	Priority 2
41	Measurement monitoring	Warning	Inlet temperature (coil <1…5>): above the interval.	Prio 2 (*²)

			In the GMMnext event memory	Report relay to GMMnext
Code	**Component / function**	**Severity**	**Text in the event memory (DE)**	**Prio**
42	Measurement monitoring	Warning	Inlet temperature (coil <1…5>): below the interval.	Prio 2 (*²)
43	Measurement monitoring	Warning	Outlet temperature (coil <1…5>): above the interval.	Prio 2 (*²)
44	Measurement monitoring	Warning	Outlet temperature (coil <1…5>): below the interval.	Prio 2 (*²)
45	Measurement monitoring	Warning	Ambient temperature above the interval.	Prio 2 (*²)
46	Measurement monitoring	Warning	Ambient temperature below the interval.	Prio 2 (*²)
47	Measurement monitoring	Warning	Brine pressure (coil <1…5>): above the interval.	Prio 2 (*²)
48	Measurement monitoring	Warning	Brine pressure (coil <1…5>): below the interval.	Prio 2 (*²)
49	Measurement monitoring	Warning	Fluid temperature (coil <1…5>): above the interval.	Prio 2 (*²)
50	Measurement monitoring	Warning	Fluid temperature (coil <1…5>): below the interval.	Prio 2 (*²)
51	Measurement monitoring	Warning	Fluid pressure (coil <1…5>): above the interval.	Prio 2 (*²)
52	Measurement monitoring	Warning	Fluid pressure (coil <1…5>): below the interval.	Prio 2 (*²)
53	Measurement monitoring	Warning	Air humidity above the interval.	Prio 2 (*²)
54	Measurement monitoring	Warning	Air humidity below the interval.	Prio 2 (*²)
55	Measurement monitoring	Warning	Wet bulb temperature above the interval.	Prio 2 (*²)
56	Measurement monitoring	Warning	Wet bulb temperature below the interval.	Prio 2 (*²)
57	Measurement monitoring	Warning	ΔT fluid temp./ambient temp. (Coil <1…5>): above the interval.	Prio 2 (*²)
58	Measurement monitoring	Warning	ΔT fluid temp./ambient temp. (coil <1…5>): below the interval.	Prio 2 (*²)
59	Measurement monitoring	Warning	ΔT inlet temp./outlet temp. (coil <1…5>): above the interval.	Prio 2 (*²)
60	Measurement monitoring	Warning	ΔT inlet temp./outlet temp. (coil <1…5>): below the interval.	Prio 2 (*²)
61	Measurement monitoring	Warning	ΔT outlet temp./ambient temp. (coil <1…5>): above the interval.	Prio 2 (*²)
62	Measurement monitoring	Warning	ΔT outlet temp./ambient temp. (coil <1…5>): below the interval.	Prio 2 (*²)

			In the GMMnext event memory	Report relay to GMMnext
Code	**Component / function**	**Severity**	**Text in the event memory (DE)**	**Prio**
63	Controller	Warning	GMOD 08 <1...3> not available.	Priority 2
64	Load/save configura-tion	Info	Configuration loaded.	-
65	Factory setting	Info	Factory settings loaded.	-
66	Controller	Warning	GHMspray not available.	Priority 2
	Failure of all fans	-	-	Priority 1

*) Fault also occurs if the fan is without power

*²) Default setting

9 Index

10 Annex

10.1 Default I/O configuration

	DI1	DI2	DI3	DI4	DI5
Function	Release (all coils)	(Night) setback*	Setpoint changeover** (all coils)	-	-

Default configuration of digital inputs after start-up

*: The maximum control value for the setback can be set, e.g. "Night setback" via the menu.

**: For setpoint changeover to work, a second setpoint must first be configured, e.g. via the "Coils (regulation)"menu.

	DO1	DO2	DO3	DO4	DO5
Function	Alarm message (Prio 1)	Warning message (Prio 2)	In operation	Threshold value (coil 1)	-
Broken wire-secure output	Yes	Yes	No	No	No

Default configuration of digital outputs after start-up

	AO1	AO2
AO profile	0-10 V	0-10 V
Function	Control value (fan group 1)	-

Default configuration of analogue outputs after start-up

	AI1	AI2	AI3	AI4	AI5
Operating mode	**4-20 mA**	**0-10 V**	**PTC / PT1000**	**0-10 V**	**PTC / PT1000**
Slave external analogue	-	Control value fans (coil 1)	-	Control value fans (coil 2)**	-
Slave external bus	-	-	-	-	-

Default configuration of analogue inputs after start-up for dry coolers and condensers and slave operating modes

	AI1	AI2	AI3	AI4	AI5
Operating mode	**4-20 mA**	**0-10 V**	**PTC / PT1000**	**0-10 V**	**PTC / PT1000**
Auto internal & Auto external bus	-	-	Actual value temperature sensor (coil 1)	-	Actual value temperature sensor (coil 2)**
Auto external analogue	-	Setpoint setting (coil 1)	Actual value temperature sensor (coil 1)	Setpoint setting (coil 2)**	Actual value temperature sensor (coil 2)**

Default configuration of analogue inputs after start-up for dry coolers and automatic operating modes

	AI1	AI2	AI3	AI4	AI5
Operating mode	**4-20 mA**	**0-10 V**	**4-20 mA**	**0-10 V**	**PTC / PT1000**
Auto internal & Auto external bus	Actual value pressure sensor (coil 1)	-	Actual value pressure sensor (coil 2)**	-	-
Auto external analogue	Actual value pressure sensor (coil 1)	Setpoint setting* (coil 1)	Actual value pressure sensor (coil 2)**	Setpoint setting (coil 2)**	-

Default configuration of analogue inputs after start-up for condensers and automatic operating modes

*: If a refrigerant is selected, a temperature setpoint is specified, otherwise a pressure setpoint.

**: If two coils are set, otherwise free.

10.2 Default parameters

	Setpoint	Pressure sensor	PID-Kp*	PID-Ti*
Dry cooler	30.0 °C	-	10	25 s
Condenser with undefined refrigerant	12.5 bar	25 bar or 40 bar**	20	40 s
Condenser with R744 ($_{CO2}$) as refrigerant	25.0 °C	40 bar	10	25 s
Condenser with other refrigerant	40.0 °C	25 bar	10	25 s

Default parameters after start-up

*: The PID control parameters are set to the specified default values whenever the heat exchanger type or refrigerant is changed (e.g. subsequent change via the service menu).

**: The type of pressure sensor (25 or 40 bar) can be selected during start-up.