



for the management and speed control of EC fans using pressure, temperature or voltage

Series	UL Version	
GMM EC/01		GMM EC/01 UL
GMM EC/04		GMM EC/04 UL
GMM EC/08		GMM EC/08 UL
GMM EC/16		GMM EC/16 UL
GMM EC/01.1		GMM EC/01.1 UL
GMM EC/04.1		GMM EC/04.1 UL
GMM EC/08.1		GMM EC/08.1 UL
GMM EC/16.1		GMM EC/16.1 UL
GMM EC/01.2		GMM EC/01.2 UL
GMM EC/04.2		GMM EC/04.2 UL
GMM EC/08.2		GMM EC/08.2 UL
GMM EC/16.2		GMM EC/16.2 UL

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1 General notes

1.1 Safety instructions

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

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

UNAUTHORISED AND IMPROPER INTERVENTIONS WILL INVALIDATE THE WARRANTY!

The speed controllers are located in the plastic housing (protection rating IP54). This protection rating is only guaranteed when the equipment is closed! The UL models are assembled on an open mounting plate.

An open controller creates exposure to hazardous electrical voltages; the protection rating of the open equipment is IP100! The applicable national accident prevention regulations must be followed when working on controllers under voltage.

1.2 Proper intended use

Ensure that fuses are only replaced with fuses of the specified rating and note that they must not be repaired or bridged. Only a double-pole circuit tester may be used to check that the equipment is disconnected from the power. The equipment is only intended for the purposes agreed in the order confirmation. Any other or additional use is not in accordance with its intended purpose. The manufacturer accepts no liability for any damage arising from unintended use. The intended use also includes compliance with the installation, operating and maintenance procedure described in these operating instructions. The technical data and the details of the terminal assignments can be found on the type plate and the instructions and must be followed.

Electronic equipment is not fundamentally failsafe! The user must therefore ensure that his system reverts to a safe condition in the event of failure of the equipment. 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. cable cross-section, fuses, earth conductor connection etc.). Additional information is included in the documentation. If the controller is used in a particular area of application, the requisite standards and regulations must be followed.

1.3 Commissioning notes

Prior to commissioning of the controller, check whether any residual moisture (condensation) has formed in the housing. If so, the equipment 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 equipment 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 Classification

Güntner Motor Management for EC Systems	<i>GMM EC/</i>
01 04 08 16 = Number of control outputs for EC fans	<i>X</i>
x = hardware version	<i>"X"</i>
Code only for UL models (on mounting plate)	<i>UL</i>

Examples:

GMM EC/01	= Controller and motor management for 1 EC fan
GMM EC/04	= Controller and motor management for up to 4 EC fans
GMM EC/08	= Controller and motor management for up to 8 EC fans
GMM EC/16	= Controller and motor management for up to 16 EC fans

Examples for version .1 (changed function of digital inputs):

GMM EC/01.1	= Controller and motor management for 1 EC fan
GMM EC/04.1	= Controller and motor management for up to 4 EC fans
GMM EC/08.1	= Controller and motor management for up to 8 EC fans
GMM EC/16.1	= Controller and motor management for up to 16 EC fans

UL examples:

GMM EC/01(.1) UL	= Controller and motor management for 1 EC fan
GMM EC/04(.1) UL	= Controller and motor management for up to 4 EC fans
GMM EC/08(.1) UL	= Controller and motor management for up to 8 EC fans
GMM EC/16(.1) UL	= Controller and motor management for up to 16 EC fans

Special models are not covered by this device code

1.5 Transport and storage, copyright notice

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 equipment, check for any damage to the packaging or the controller.

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

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

All rights, including rights created by patent grant or other registration, are reserved.

These operating instructions are the copyright of

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Fürstenfeldbruck

1.6 Warranty and liability

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

See homepage <http://www.guentner.de>

1.7 Manufacturer and supplier address

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

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1.8 EMC-compliant installation

Controllers in the GMM EC/01..16 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/-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 give rise to any interference in signal and control lines.

2 Quick guide to rapid commissioning

These pages contain the main information required for rapid commissioning of the GMM EC/01 /04 /08 or /16.

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

Mains connection:	L1 to terminal L1 N to terminal N PE to terminal PE
Fuses:	There are no replaceable microfuses in the GMM to protect its semiconductors or motor. The unit must be protected by an on-site C 6A circuit breaker for each phase. The UL variant has a 250V/1A fuse installed on the 24V side of the power supply unit.
Fan connection on the GMM	depending on the model, there are from 1 to 16 bus outputs for EC fans on the lower PCB (see Location of connections on the GMM EC/08, Page 18 . Communications interface: Terminal A and B (top row) 24V power supply to fan logic: Terminal + and - (bottom row)

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

Analogue inputs: on the GMM	Pressure sensor GSW 4003 GSW 4003.1 Temperature sensor Standard signal (0 ... 1V)	1 (brown) on +24V 2 (green) on B1 or B2 2 (blue) on B1 or B2 1 (white) on B3 2 (brown) on GND plus (+) on B4 minus (#) on GND
Signalling out- puts	Connections for signalling outputs, see Potential-free signalling outputs, Page 30	
Enable	The function of input D1 is to enable the controller. This input must be connected to GND for the controller to work and the fans to be able to turn (this jumper is installed in the factory). For version .1 or higher (see type plate) input D1 must be connected to +24V !	
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 GMM will generally be ready for use.		

You can select “Manual” mode in order to check that it is functioning correctly.

See [Manual mode, Page 55](#).

When you then deactivate manual mode after performing this test, the GMM will revert to the set mode.

Operating mode The GMM operates in different modes depending on the commissioning process.

See also [Operating mode, Page 61](#).

Limiter The speed of the fans can be limited, e.g. to limit noise emissions at night. This value is set in the Night limiter menu option. The night limiter is activated either via input **D2** or using the timer, which is programmed in the Night limiter menu option.

Setpoint switchover It is possible to choose between two setpoints (e.g. for summer and winter operation). The switchover is effected via input **D3**.

The functions **Limiter** and **Setpoint switchover** generally have to be activated in the Service menu.

3 GMM Commissioning

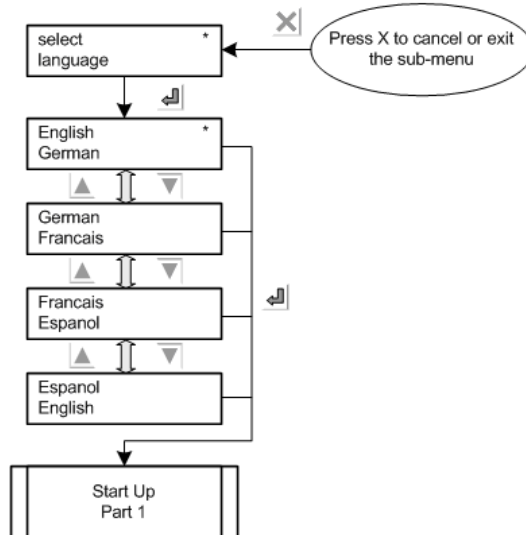
With the GMM, the fans are controlled via a bus. These fans must be set up and checked for use with the condenser or drycooler, depending on the design of the heat exchanger. These settings and checks are necessary on initial commissioning and may need to be repeated when a fan is replaced. This commissioning process determines the performance of the heat exchanger and its noise emissions. In the annex you will find a table showing the fan ID and fan type for different heat exchangers.

The GMM automatically detects whether commissioning has been carried out when it is switched on. If it has, the commissioning menu is skipped and normal operation continues.

3.1 The initial commissioning procedure

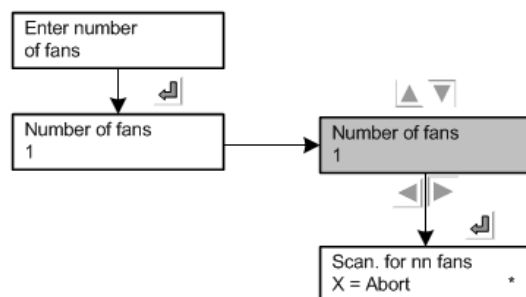
The default language for commissioning is English, even if a different language has been selected for the display. However, the commissioning and applies only to the commissioning menu.

You can exit the commissioning menu at any time by pressing the “X” key.

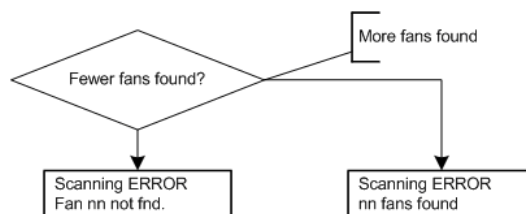


Once the language has been selected, the number of fans is interrogated.

Once the number of fans has been entered, the GMM searches for the connected fans. The flashing* indicates that a search is in progress. If the number of fans found is not the same as the number entered, an error message is returned.



If the number of fans found does not match the number entered, the following menu option appears.

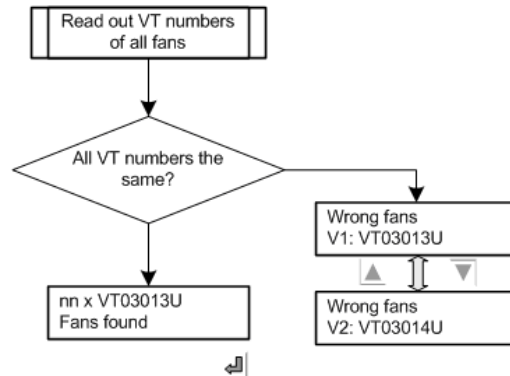


If fewer fans are found, the numbers of all the fans not found are displayed.

On the other hand, if more fans are found, the total number of fans found is displayed.

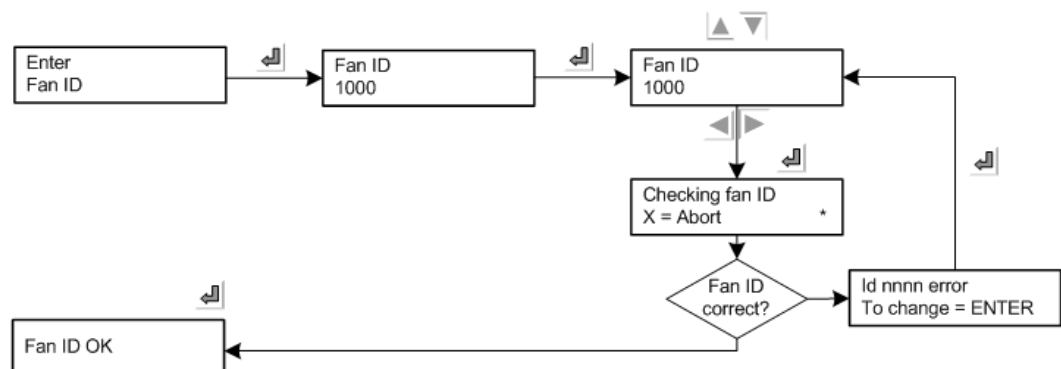
If the search is successful i.e. the specified number of fans is found, the VT numbers of the fans are then read out. The VT number is the type designation of the motor.

If the VT numbers of the fans are not all the same, the VT numbers with discrepancies are output.



It is then not possible to continue commissioning, because all the fans must have the same VT number. You will need to replace any fans with the incorrect VT number. The VT number is printed on the type plate of each fan.

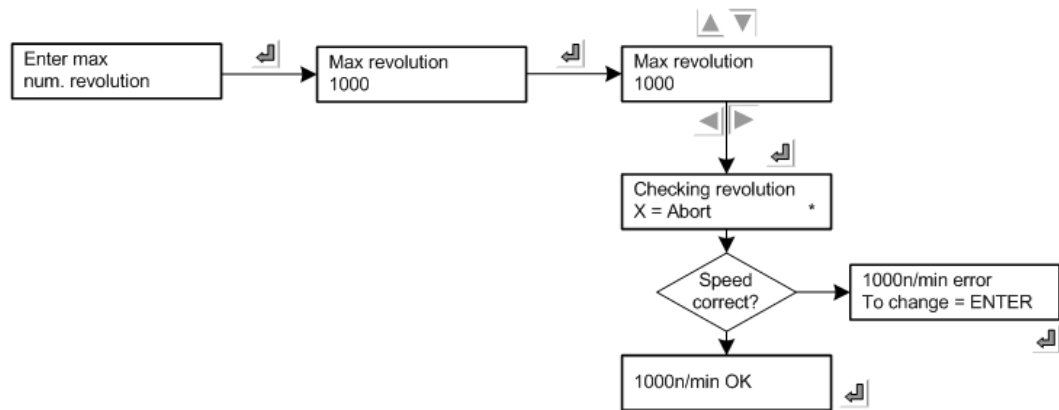
If all the VT numbers of the fans are now the same, the next step is to enter the ID number of the fans. The ID number represents the working point of the fan for this heat exchanger. You will find this number in the electrical circuit diagram of the heat exchanger or the overview table in the annex.



Fan ID 1000 has been entered **here** as an example. On initial commissioning, the smallest fan ID is proposed. If this point (ID input) has previously been completed, the last ID number entered is proposed.

After input, the GMM **checks** the fan ID. The checking process is indicated by a flashing * in the display. If the fan ID is incorrect, you are prompted to make a correct input. With the **"ENTER"** key you go back to the ID entry. However, you can also abort the process by pressing the **"X"** key. If you abort the process, commissioning is not yet complete and normal operation will not be started. Commissioning must first be performed completely.

If the appropriate fan ID is found, you are prompted for the maximum permissible speed for the heat exchanger (depending on the design point).



In the example above, a maximum speed of 1000 rpm has been entered. This speed will be checked.

If it is incorrect, i.e. if it does not match the speed specified by the ID, you will be prompted to modify the input. Once the modified speed has been entered, it is checked and may be acknowledged with **the message**, "Speed OK". Otherwise you will again be prompted to correct your entry.

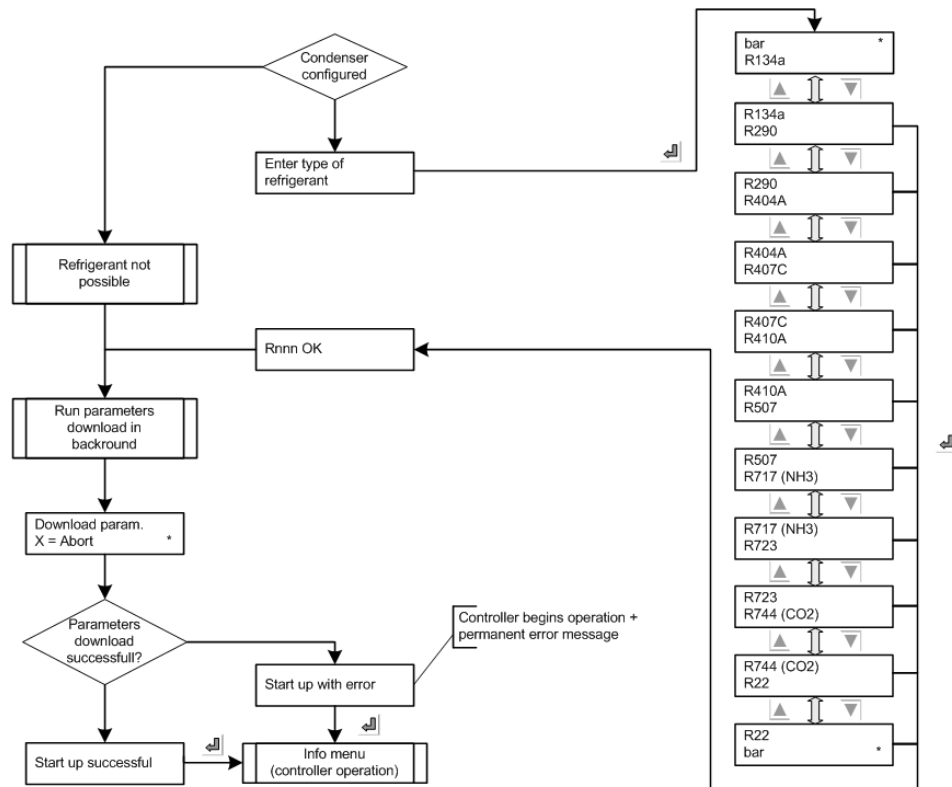
If the maximum speed is correct, you will be asked for the heat exchanger type, refrigerant and operating mode.

You can specify either a condenser (e.g. GVH, etc.) or a drycooler (e.g. GFH, etc.).

If a condenser has been selected, you will be asked for the refrigerant in the next step. There is a choice of 10 refrigerants. If "bar" is selected, the pressure will be displayed in normal operation. When a refrigerant is selected, the condensing temperature corresponding to the pressure will be displayed. The selected refrigerant or "bar" are **indicated by a "*"**.

The default value is "bar".

If a drycooler is selected, the temperature of the refrigerant in normal operation is displayed.



Finally, you need to select the operating mode. When all the parameters have been entered, they are saved. This takes a few seconds. This completes the commissioning process and the GMM will then display the “INFO” menu.

4 Construction of the GMM EC

4.1 Installing the GMM

4.1.1 Installation of the controller, ventilation

If the equipment has been taken from a very cool storage location, leave it at room temperature for 1-2 hours before installation with the lid open to allow any residual moisture to disperse and hence avoid malfunctions during commissioning. The equipment may only be commissioned when it is absolutely dry. The sachet of silica gel (desiccant sachet) must be removed.

Once the equipment 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.

There are 4 fixing drill holes in the housing for installation. The equipment may only be fixed at these points, any manipulations of the housing (e.g. drilling new fixing holes) is prohibited.

The cable entries must always be underneath; installation with cable entries at the side or even on top is not permitted!

If moisture problems occur in the housing owing to considerable external heating and cooling, the moisture must be dispersed by means of an air adjustment (cable screw with adjustment opening).

Keep an eye on good accessibility! The equipment must be easily accessible for any maintenance work.

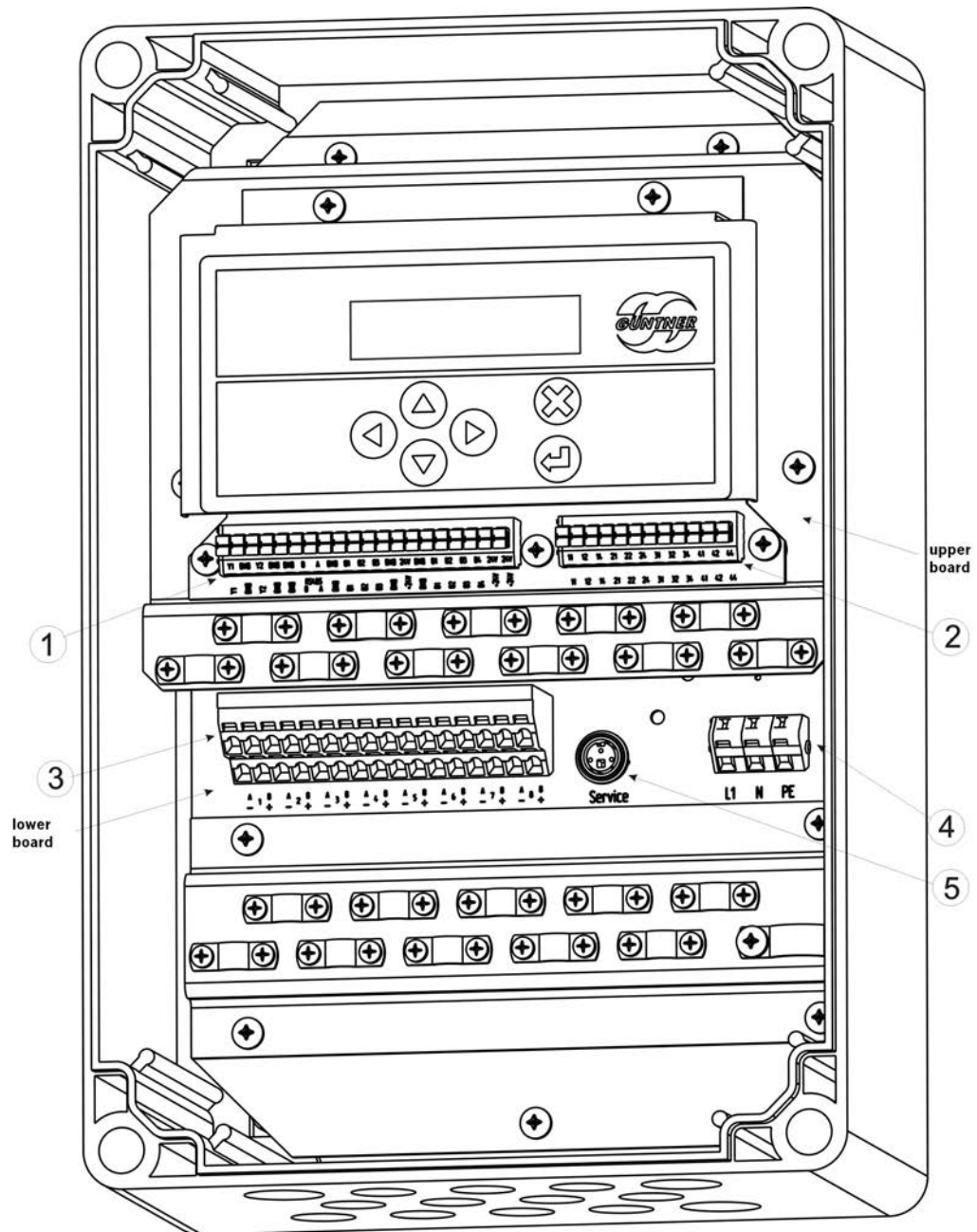
Note:

- If the equipment is installed in a switch cabinet, **proper attention must be given to the** temperature inside the cabinet (see [Electrical and mechanical properties of GMM EC, Page 87](#)).
- A hood is prescribed if the equipment is installed in the open air.
- Install the GMM out of direct sunlight and choose a location with the best possible protection against the elements.

4.2 Connecting the GMM

The connector terminals for the potential-free signalling outputs, the control inputs (controller enable etc.) and sensors are located on the upper PCB. The mains connection and bus cables to the EC fans are located on the lower PCB. The power supply (single-phase 230 V or 3-phase 400 V) for the fans is located in a separate small switch cabinet.

4.2.1 Location of connections on the GMM EC/08



Location of connections on the GMM EC/08

- (1) Analogue and digital inputs and outputs (see [Control inputs, Page 32](#)).
- (2) Potential-free signalling outputs (see [Potential-free signalling outputs, Page 30](#)).
- (3) EC fan connections 24 V DC, RS485 (see [Controller fan connection, Page 20](#)).
- (4) Mains connection [Controller mains connection, Page 19](#)).
- (5) Connection for software update (see **separate description**).

4.2.2 Controller mains connection

The mains connection for the controller is on the following terminals:

- L1** = Phase conductor
- N** = Neutral conductor
- PE** = Earth conductor

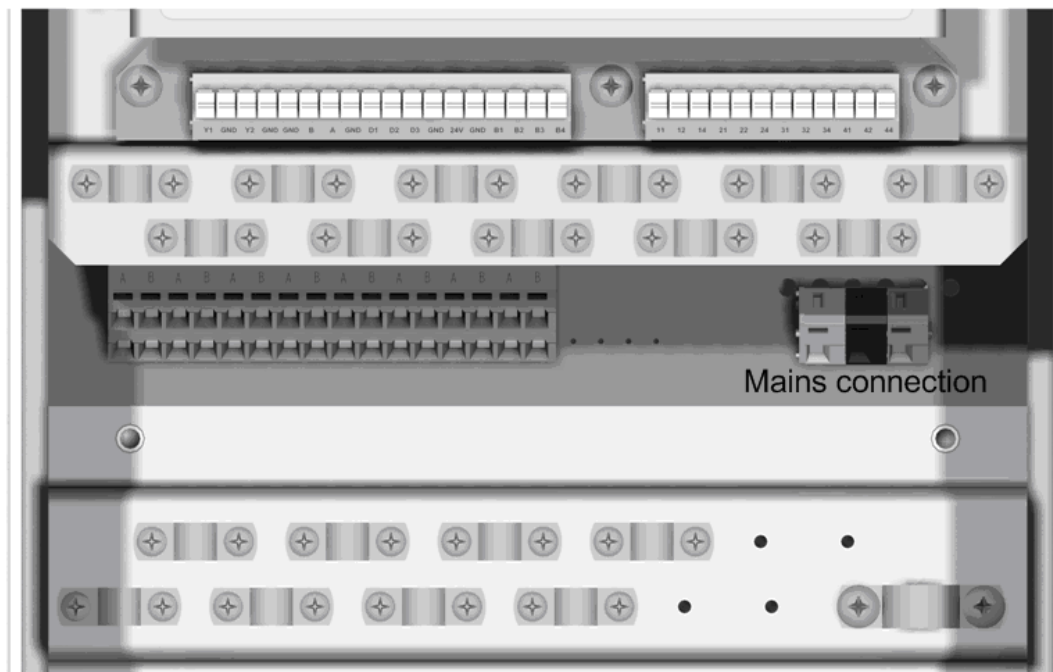
The connector terminals are designed for a maximum cable cross-section of 2.5 mm².

The supply must be fused by means of automatic cable protectors with characteristic "C 6".

In the **UL** model, the GMM is connected to the 115/230 V AC 50/60 Hz control voltage grid. Always observe the relevant local **UL** regulations.

ADVICE

The heat exchanger fans may not be switched on or off by switching the mains on or off, but only via the switch.



GMM mains connection

4.2.3 Controller fan connection

The connection for an EC fan consists of the power connection (single-phase 230 V or 3-phase 400 V) and the control connection (bus and DC power support for the fan electronics).

Power connection:

The power connections are not located in the GMM but in a separate connection box (e.g. GPD).

Control connection:

Communication and the DC power supply to the fans are connected on the GMM's double-level terminal block (see point 3 on the equipment connection diagram [Location of connections on the GMM EC/08, Page 18](#)).

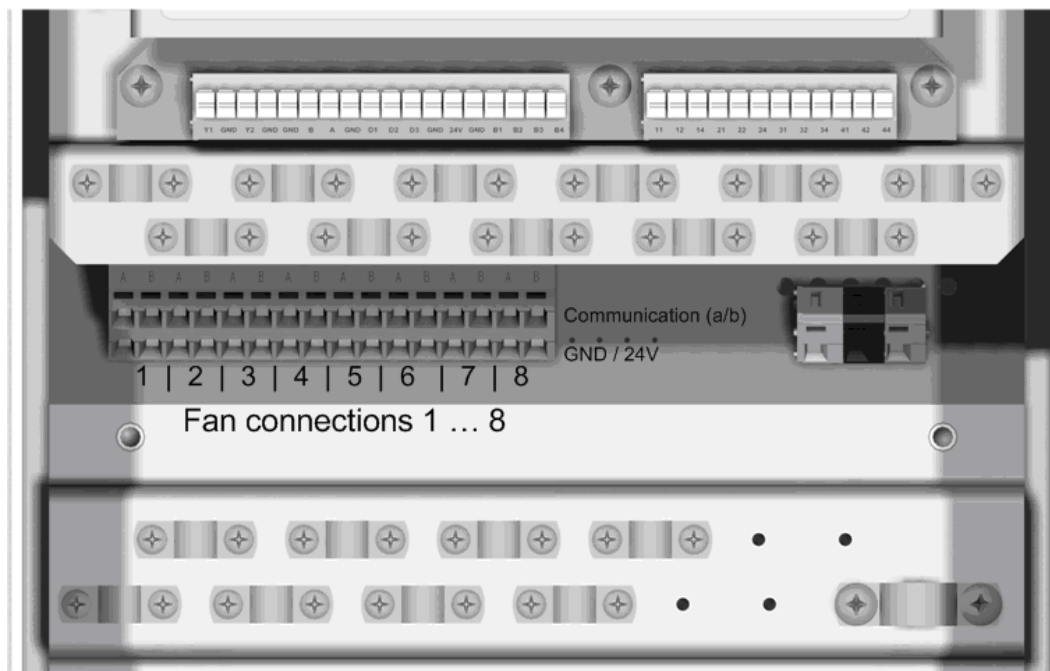
Depending on the model, there are 1 to 16 control connections for the EC fans on the lower PCB.

On the terminal block (see image bottom left), there are 2 terminals for the bus communications and 2 terminals for the power supply for each fan. The fan groups are identified on the PCB under the terminal block. The top row is used for the communications wiring and the bottom row for the power supply to the electronics in the EC fans.

Communication connection: Terminal **A** (white) and **B** (blue) **top row** 24 volt

Voltage supply: Terminal **+** (red) and **-** (black) **bottom row**

The connector terminals are designed for a maximum cable cross-section of 2.5 mm².



GMM fan connections

4.3 Remote controllers

4.3.1 Functional description

Functional description of GRCE.1

The GRCE.1 is the control unit for Güntner Motor Management for EC fans. This control unit is designed to be mounted on a top-hat rail. Among other options, it can also be operated remotely from the remainder of the GMM EC controller. In order to operate the controller it must have a power supply and must be enabled via digital input DI1. If this is not enabled the process will not be regulated. The unit has an internal PID controller, whose parameters (amplification factor, integral and differential time) can be configured either from the menu or via an external bus module.

The setpoint can be given via the internal menu, an external analogue value or via an external bus module.

The current value is determined via a pressure sensor (4-20mA), a temperature sensor (KTY, GTF210) or a 0-10V signal.

The control value is passed via the CAN bus to an EC controller, which distributes the information to the fans via a bus system.

The digital inputs are designed as potential-free contacts that must be connected to +24V. As well as enable, digital inputs are also used to control the night limiter (DI2) and setpoint switchover (DI3).

ADVICE

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

The relay outputs are used for control messages. Relay 1 reports priority 1 alarms, relay 2 reports priority 2 alarms, relay 3 reports that the fans are in operation and relay 4 is used to implement a threshold function.

Analogue output AO1 shows the current control value from the controller (0#100%) as a voltage in the range 0#10V. Analogue output AO2 can be used to control an additional subcooler.

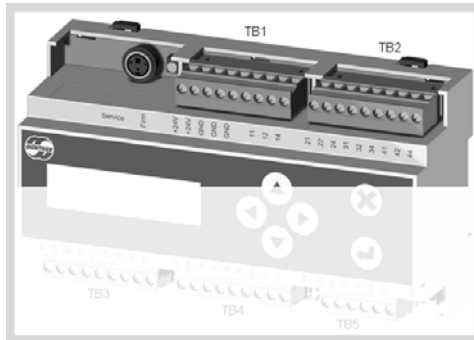
4.3.2 Installation / Operating conditions

Installation / Operating conditions GRCE.1

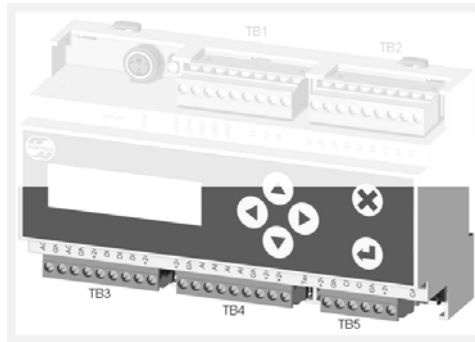
- The module is designed for mounting on a top-hat rail.
- All measurement and signalling lines must be connected via shielded cables.
- The shielding of measuring, signal and bus lines must be earthed at one end only.
- Suitable shielding and routing measures must be taken to ensure that mains cables and motor cables do not give rise to any interference in signal and control lines.
- Temperature:
Storage Transport: #20°C ... +70°C
Operation: #20°C ... +65°C
- Protection rating: IP 20
- Recommended cables: Belden 9841, Lapp 2170203, Lapp 2170803, Helukabel 81910

4.3.3 Connections

Connections GRCE.1



Upper row of connections			
	Name	Description	
	Service	Service plug only for use by service personnel	
	Firm	Pushbutton only for use by service personnel	
TB1	+24V	External feed for power supply	
	+24V		
	GND	Contact ground for external power feed	
	GND		
	GND		
		Terminal not connected	
	11		Two-way contact for priority 1 alarms
	12		
	14		
TB2	21		Two-way contact for priority 2 alarms
	22		
	24		
	31		Two-way contact for system messages
	32		
	34		
	41		Two-way contact for threshold function
	42		
	44		



Lower row of connections		
	Name	Description
TB3	AO1	Analogue output 1, 0#10V
	GND	Ground
	AO2	Analogue output 2, 0#10V
	GND	Ground
	+24V	Voltage +24V
	DI1	Digital input +24V, Enable
	DI2	Digital input +24V, Night limiter
	DI3	Digital input +24V, Setpoint switchover
	+24V	Voltage +24V
TB4	+24V	Voltage +24V
	GND	Ground
	AI1	Analogue output 4#20mA
	AI2	Analogue input 4-20mA or for temperature sensor GTF must be configured in the software
	AI3	Analogue input for temperature sensor GTF
	AI4	Analogue input 0#10V
	GND	Ground
	+24V	Voltage +24V
	+24V	
	Term	DIP switch for CAN bus termination (120Ω) / ON = termination activated
TB5	+24V	Voltage +24V
	GND	Ground
	CH	CAN high signal
	CL	CAN low signal

Lower row of connections		
	GND	Ground
	+24V	Voltage +24V
	CAN	CAN bus plug including power supply

*TB: Terminal block

5 Display and operation

Information are shown on a two-line display. The controller is operated via a membrane keyboard.

5.1 Info menu

Display with a drycooler or condenser with selected refrigerant

Setpoint	xx.x°C	→ Setpoint
Current Value	xx.x°C A	→ Current value

Display with a drycooler without refrigerant selection

set pt.	xx.xbar	→ Setpoint
act val	xx.xbar A	→ Current value

>Setpoint< ▼ Fan of ext	Display only, if function unlocked in the service menu
----------------------------	---

5.2 Status displays in the info menu

set pt.	xx.x°C ▼	→ Status display
act val	xx.x°C (A)	

A	Automatic mode – internal control	Static display
H	Manual mode – control value is specified fixed via display	Static display
S	SLAVE mode – control value is specified externally	Static display
F	Priority 1 fault	Alternating with standard display
W	Priority 2 warning	Alternating with standard display

Further messages in the second line

- No release
- Night limiter (alternating with current value)
- Error messages in clear text (alternating with current value)

See [Error messages and warnings on the GMM display, Page 92](#)

set pt.	xx.x°C	→ Text message
not enable		

5.3 Operation



Cancel and return to INFO menu



Enter key for function selection; change to EDIT mode and value acceptance



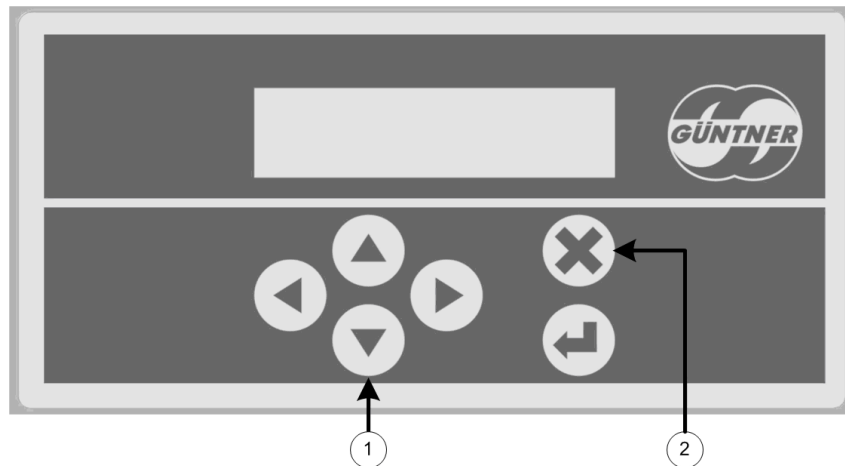
Right arrow for moving to the next menu level



Left arrow for moving to the previous menu level



Left arrow for scrolling through the menu level



1. Use this key to move from the **"INFO"** menu to the **Operating menu**
2. Use this key to return to the **"INFO"** menu at any time

5.4 Edit mode

This mode is required to change values (setpoints, for example).



Select menu option you want
(top line)

Setpoint	1
Setpoint	2



Change to menu option

Setpoint	1	<
30.0°C		↵



Change to writing mode
(cursor flashes)

Setpoint	1	<
30.0°C		↵

Setpoint	1	<
_30.0°C		<>↵↵



Decimal point selection
(cursor flashes)

Setpoint	1	
30.0°C		<>↵↵

Setpoint	1	<
30.0°C		<>↵↵



Change value

Setpoint	1	
40.0°C		↕



New value acceptance

Setpoint	1	<
40.0°C		↵

5.5 Selection mode

This mode is required to select functions (language, for example).



Select menu option you want
("Language", for example, top line)

Language
Time

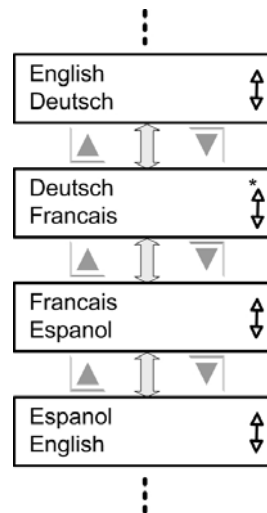


Change to the menu option
→ The function/language currently set
is marked with an *asterisk*.

English
Deutsch *



Set target language by scrolling to the
top line
→ selected function/language in top line

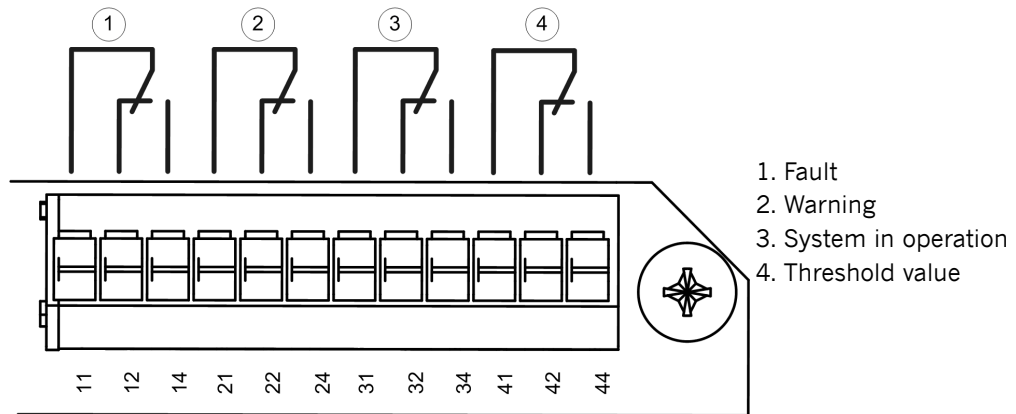


Accept function/language.
→ selected language is marked with an
asterisk.

Deutsch
Francais *

5.6 Potential-free signalling outputs

For safety reasons, the potential-free signal outputs (two-way contacts) are designed in such a way that the corresponding signal relay is deactivated when the event is triggered, i.e. the opener of the corresponding two-way contact closes. This has the effect that a malfunction is also signalled if the GMM loses power due to a fault. The load on all signal outputs must not exceed 250V/1A.



5.6.1 Digital output (11/12/14) (fault)

The message on the contact 11/12/14 is a fault, which signals complete failure and standstill of the heat exchanger.

The signal relay has contacts 11/12/14. A fault is signalled in the following situations:

- For example, all fans have failed (equipment fault)
- Error messages and corresponding alarms, see [Error messages and warnings on the GMM display, Page 92](#)

If an alarm occurs, the signalling relay is switched (drops out) i.e. the two-way contact 11/12 closes. The load on this potential-free contact must not exceed 250 V / 1 A.

5.6.2 Digital output (21/22/24) (warning)

Signals on contact 21/22/24 are warnings that do not result in the complete failure of the heat exchanger. These are warnings that the operation of the heat exchanger.

The signalling relay has contacts 21/22/24. A warning is signalled in the following situations:

- e.g. sensor faults or a failed fan (in equipment with multiple fans)
- Error messages and alarm assignment see [Error messages and warnings on the GMM display, Page 92](#)

If a warning occurs, the signalling relay is switched (drops out) i.e. the two-way contact 21/22 closes. The load on this potential-free contact must not exceed 250 V / 1 A.

5.6.3 Digital output (31/32/34) (Operating message)

The signalling relay has contacts 31/32/34. The two-way contact (31/34) is closed when a control signal is sent to the fans i.e. the fans are operational.

5.6.4 Digital output (41/42/44) (threshold value)

You can configure a threshold value function on the GMM (see [see Threshold value, Page 72](#)).

The DO4 digital output trips (contact 41/44 closes) when the respective threshold value is exceeded. This can be used, for example, to switch a solenoid valve, control an actuator, activate a spray etc..

The load on this potential-free contact must not exceed 250V/1A.

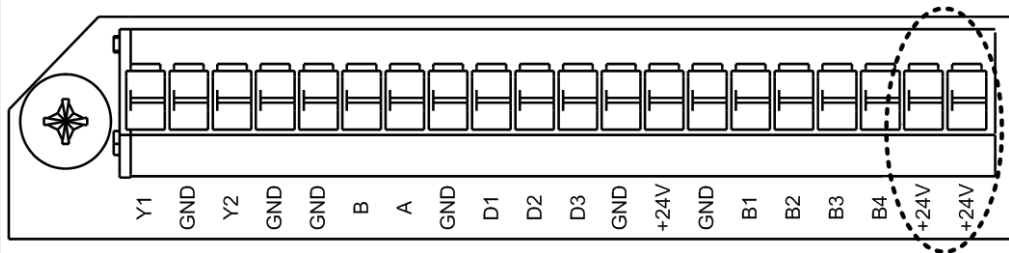
5.7 Control inputs

The control inputs are designed as a **low-voltage connection** and are connected via a potential-free contact (relay, contactor contact, switch etc.). The potential-free contact must be switched between the terminals **GND** or **+24V** (depending on the device status) and the **D1** or **D2** or **D3** control input. The function is activated when the contact is closed.

There are two versions of the GMM EC with different wiring on the digital inputs.

The current GMM ECxx.1 version can be recognized by its two additional +24V terminals.

Types: GMM EC01.1, GMM EC04.1, GMM EC08.1, GMM EC16.1

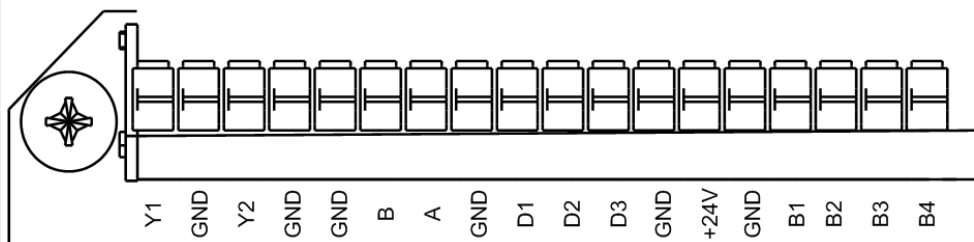


D1...D3 become active with +24V

There are two additional +24V terminals on versions from GMM ECxx.1.

GMM ECxx versions do not have any additional +24V terminals.

Types: GMM EC01, GMM EC04, GMM EC08, GMM EC16



D1...D3 become active with GND

ADVICE

A faulty connection can cause serious damage!

Under no circumstances may the mains voltage be applied to the digital outputs, nor may a different external voltage be used!

5.7.1 Enabling of GMM

Fans are enabled via terminal **D1(enable)**. Their speed then depends on the control value. If enable is not switched, the fans will be disabled (speed = 0).

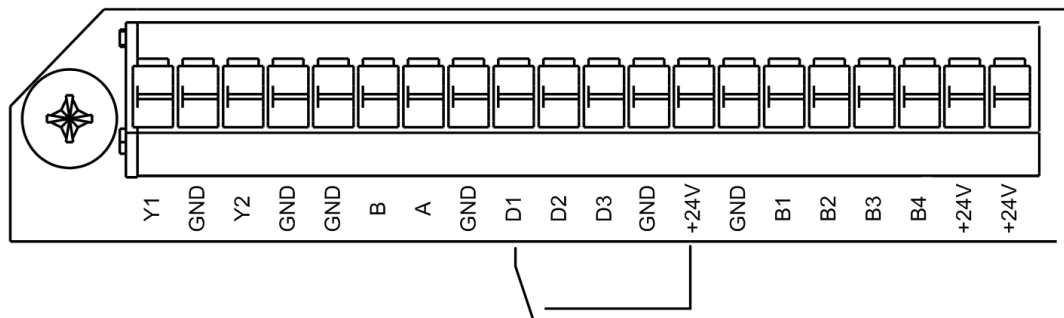
*If they are not to be enabled externally, terminal **D1** must be jumpered.*

This enabling jumper is always installed in the factory.

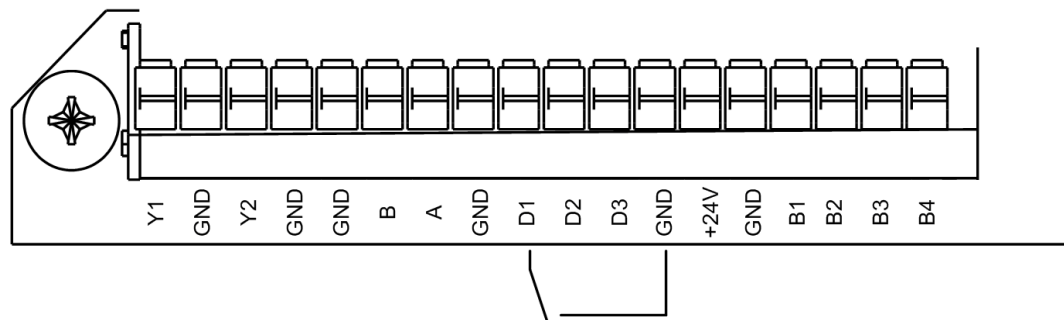
ADVICE

A faulty connection can cause serious damage!

GMM EC01 .1, GMM EC04.1, GMM EC08.1, GMM EC16.1 (see type plate)



GMM EC01, GMM EC04, GMM EC08, GMM EC16 (see type plate)



Connecting the external enabling contact

ADVICE

Under no circumstances may the controller be disabled by interrupting the mains voltage ! Continuously switching the supply voltage can damage the controller, and such damage is not covered by the warranty!

Enable is not required in "Manual mode".

See [Manual mode, Page 55](#)

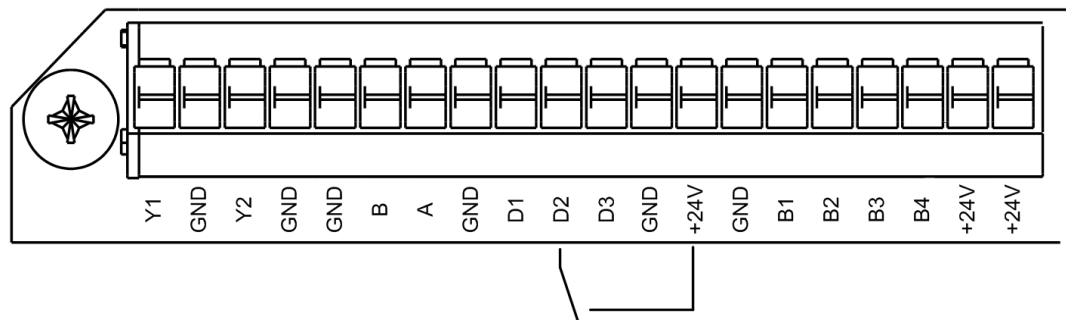
5.7.2 Speed limiter (night limiter)

is activated via terminal **D2** is used to activate the (night) speed limiter. When this terminal is switched, the control signal is activated and the fan speed is then limited to the set value. The GMM will then not attempt to set the speed any higher. For setting the speed limiter, see section [Setpoints, Page 48](#) and for general activation see section [Service, Page 56](#).

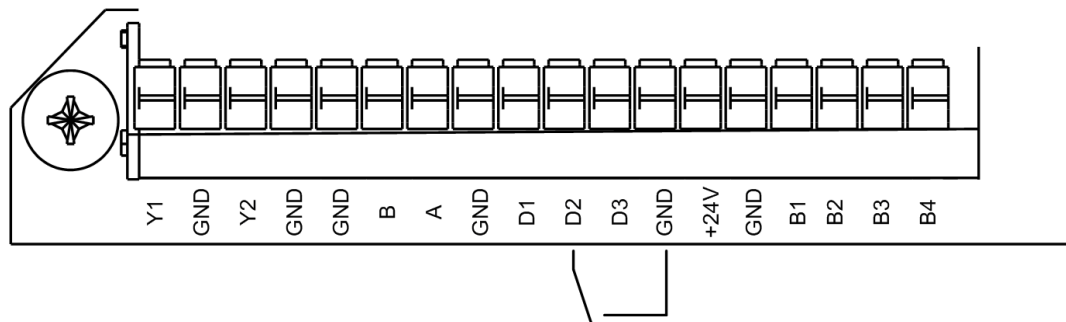
ADVICE

A faulty connection can cause serious damage!

GMM EC01 .1, GMM EC04.1, GMM EC08.1, GMM EC16.1 (see type plate)



GMM EC01, GMM EC04, GMM EC08, GMM EC16 (see type plate)



Activating the speed limiter

5.7.3 Switching to 2nd Setpoint

Setpoint switchover:

This function enables the switchover between two setpoints, which serve as controlling input values. The switchover is made by connecting the **"D3"** input.

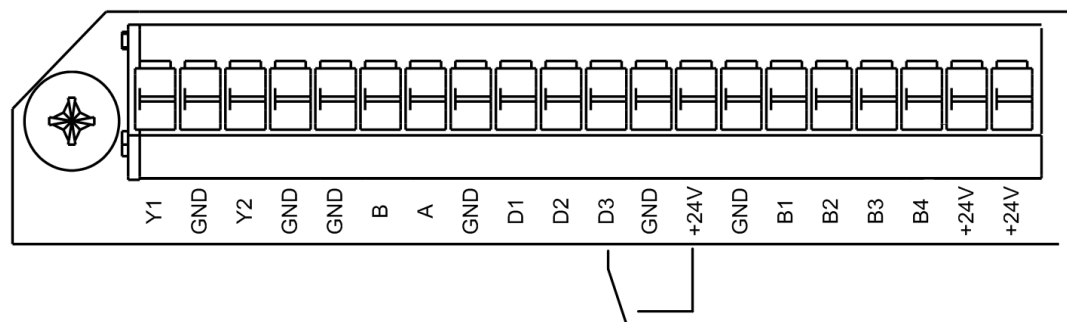
If this terminal is blank, **Setpoint 1** is always active. Ex works, this connection is blank (open).

If this function is activated in the service menu, the control mode can be switched over between heating and cooling. (Cooling and heat pump operation, for example)

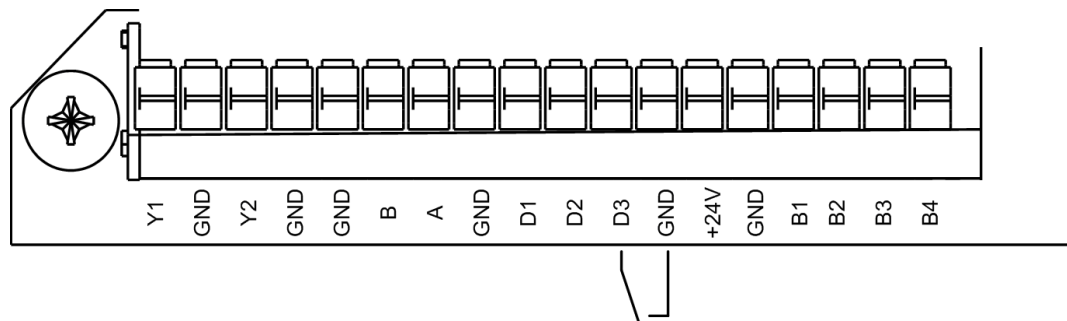
The second setpoint and the second setpoint displacement are switched over with the **"D3"** input.

CAUTION! A faulty connection can cause serious damage!

GMM EC01 .1 , GMM EC04.1 , GMM EC08.1 , GMM EC16.1 (see type plate)



GMM EC01 , GMM EC04 , GMM EC08, GMM EC16 (see type plate)



Switchover from control system 1 to control system 2

5.8 Analogue inputs

The GMM has four sensor inputs

Input BI1	Current input	4-20mA
Input BI2	switchable	4-20mA or impedance sensor GTF210
Input B3	Impedance sensor	GTF210
Input B4	Voltage source	0-10V DC

ADVICE

From variant .2, input B2 can be switched over as a 4-20mA input or for a GTF210 resistance sensor.

The various ways of using inputs and how to connect them in each case are described below.

CAUTION! A faulty connection can seriously damage the analogue inputs!

The 4-20mA inputs may be neither poled nor connected directly to 0-10V DC or +24V.

5.8.1 Connecting a pressure sensor to B1/B2

One or two (two#wire) sensors can be connected:

+24V	= Common supply voltage	(GSW4003.1: brown(1), GSW4003: brown(1))
B1	= 4-20mA signal from sensor 1	(GSW4003.1: blue(3), GSW4003: green(2))
B2	= 4-20mA signal from sensor 2	(GSW4003.1: blue(3), GSW4003: green(2))

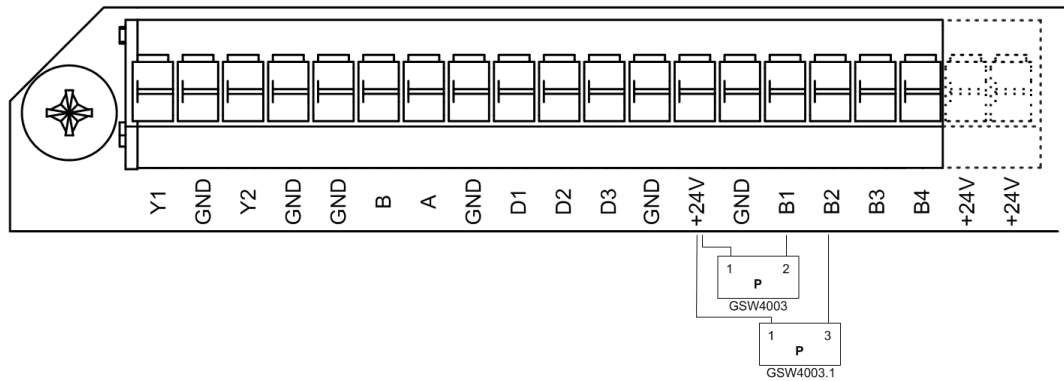
The connected pressure sensors must be configured in the hardware configuration.

When two sensors are used the larger signal is always processed by the control unit as the actual value (max. selection)

ADVICE

Three-wire sensors with a 4-20 mA signal output can also be connected, but these then require an additional chassis potential. You can tap this from the *GND* terminal.

Important for pressure sensors: Do not install the sensor in the immediate vicinity of the compressor to protect it from large pressure impacts and vibrations. It should be installed as close to the condenser inlet as possible.



Pressure transmitter connection

5.8.2 External power signal connection to B1/B2

The B1 or B2 inputs can also be used to control the controller in SLAVE operation. To do this, this input must be defined as a control value slave in the I/O configuration. The 420mA input signal is scaled 0-100% to a control signal and passed on to the fans. A setpoint can also, for example, be specified externally via the B1 or B2 inputs. Up to two power signals (4-20mA) can be connected to the B1 and B2 analogue inputs.

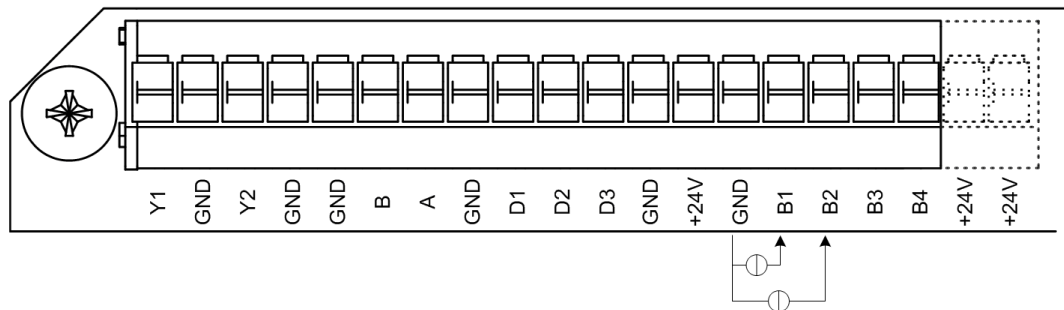
GND = Reference point (#).

B1 = Current input (+) 4..20mA

B2 = Current input (+) 4..20mA

ADVICE

Make sure the power source is correctly poled!



Power source connection

For current inputs, note that currents of less than **2mA** or greater than **22mA** will provoke a sensor fault display and corresponding message.

5.8.3 Connecting a temperature sensor on B3

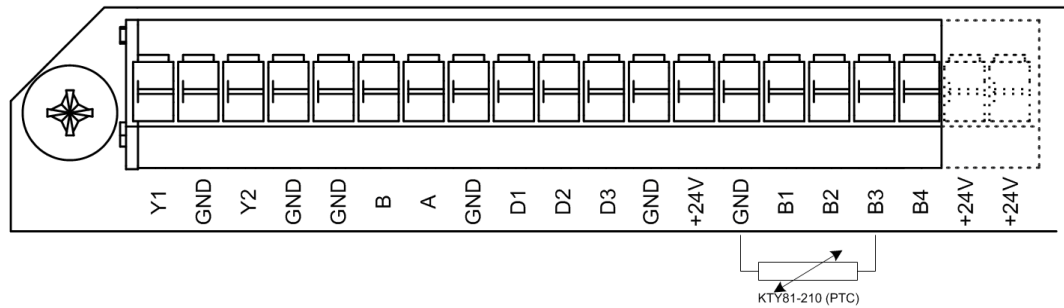
A temperature sensor is connected on the terminals

GND = Earth

B3 = Signal input

There is no particular sequence for the cores.

The Güntner GTF210 temperature sensor is used in the range -30°C to $+70^{\circ}\text{C}$. Please contact us for other temperature ranges.



Temperature sensor connection

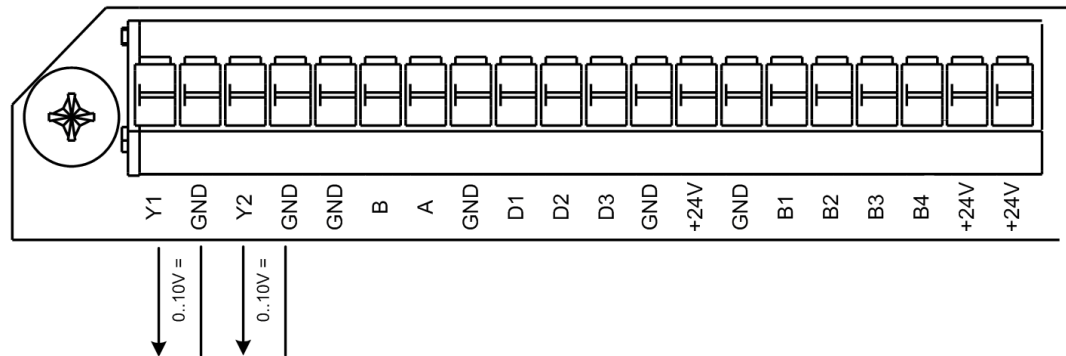
To test a temperature sensor that may be defective, disconnect it from the controller and measure the impedance of the sensor (with an ohmmeter or multimeter). On the GTF210, the impedance should be between $1.04\text{ k}\Omega$ (-50°C) and $3.27\text{ k}\Omega$ ($+100^{\circ}\text{C}$). You can use the table below to check whether the sensor has the correct impedance at a known temperature.

Impedance	Temperature	Impedance	Temperature
1040 Ω	-50°C	2075 Ω	30°C
1095 Ω	-45°C	2152 Ω	35°C
1150 Ω	-40°C	2230 Ω	40°C
1207 Ω	-35°C	2309 Ω	45°C
1266 Ω	-30°C	2390 Ω	50°C
1325 Ω	-25°C	2472 Ω	55°C
1387 Ω	-20°C	2555 Ω	60°C
1449 Ω	-15°C	2640 Ω	65°C
1513 Ω	-10°C	2727 Ω	70°C
1579 Ω	-5°C	2814 Ω	75°C
1645 Ω	0°C	2903 Ω	80°C
1713 Ω	5°C	2994 Ω	85°C
1783 Ω	10°C	3086 Ω	90°C
1854 Ω	15°C	3179 Ω	95°C
1926 Ω	20°C	3274 Ω	100°C
2000 Ω	25°C	3370 Ω	105°C

Table: Temperature / Impedance

5.9 Analogue outputs

The control unit has 2 analogue outputs with 0..10V output voltage.



Analogue outputs

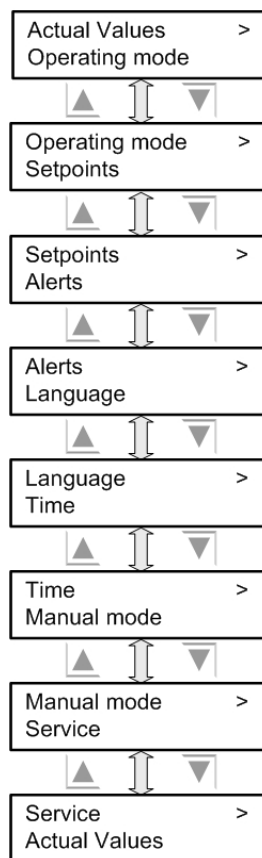
Output **Y1** issues the control signal (0..100%) scaled to 0..10V .

Output **Y2** issues the control signal for a subcooler, if this function is activated. 0..10V corresponds here with a control value of 0..100%.

See [Subcooler function, Page 71](#)

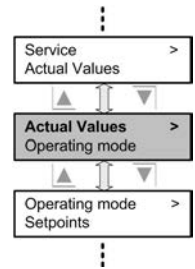
5.10 Operating menu

Structure of basic menu



5.10.1 Current values

The actual input signals and control values are shown here.



5.10.1.1 Input current values

Different values can be displayed when the *Current values* menu option is opened. The measured pressure, the temperature or the 0-10V control signal is displayed first. The value shown depends on the cooler type (condenser or recirculating cooler) and the operating mode (automatic or slave).

Condenser

No refrigerant

CDS press
nn.n bar

Condenser

Refrigerant selected

CDS temp
nn.n °C

Drycooler

Outlet temp
nn.n °C

Slave

via 0..10V

Input 0..10V
nn.n V

5.10.1.2 External temperature

The actual external temperature is shown.



5.10.1.3 Control value

The control value of the controller delivered to the fans is displayed in percent.



5.10.1.4 Air volume

The average control value of all fans is shown here as a percentage.



5.10.1.5 Overall power

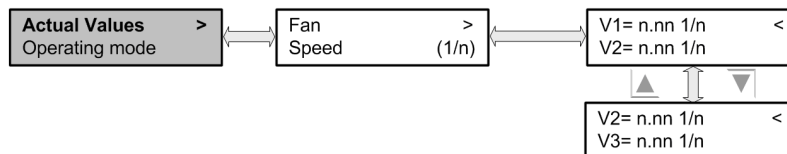
This displays the all connected fans. The power is calculated from the intermediate circuit voltage and the intermediate circuit current.

Further information on each individual fan can be queried under the next menu options.



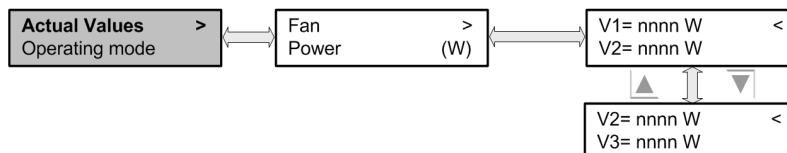
5.10.1.6 Fan speed

The current fan speed of each individual fan is displayed here. The list length is limited by the number of fans connected.



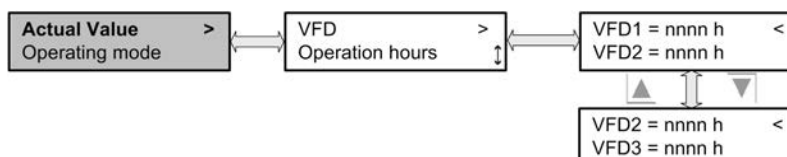
5.10.1.7 Fan power

The current power of any fan, calculated from the intermediate circuit voltage and the intermediate circuit current, is displayed here.



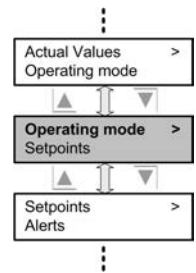
5.10.1.8 Fan operating hours

The operating hours of every EC fan are displayed.



5.10.2 Status

The operating statuses and software/hardware versions are displayed here.



5.10.2.1 Operating mode

This shows the current operating mode.

There are:

Internal control	Auto int. 1	Setpoint 1 active	See Auto internal, Page 61
	Auto int. 2	Setpoint 2 active	See Auto internal, Page 61
	Auto ext. 1	Setpoint 1 active	See Auto external analogue, Page 61
	Auto ext. 2	Setpoint 2 active	See Auto external analogue, Page 61
	Auto ext. bus1	Setpoint 1 active	See Auto external BUS, Page 62
	Auto ext. bus 2	Setpoint 2 active	See Auto external BUS, Page 62
Slave	Slave ext.	Control value via 0...10V or 4-20mA	See Slave external analogue, Page 62
	Slave ext. bus	Control value via GCM *	See Slave external BUS, Page 63
Manual mode	Manual mode		See Manual mode, Page 55

* GCM = Güntner Communication Module



For a precise description of the operating modes see chapter [Operating mode, Page 61](#)

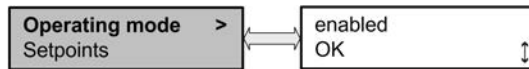
5.10.2.2 Mode

Set heating or cooling mode display.



5.10.2.3 External Release

Controller on connection **D1** enabled **OK** or not **None**



5.10.2.4 Number and type of fans

This displays the number of fans connected and their VT numbers.



5.10.2.5 Max. fan speed

The set maximum speed appropriate to the design point of the heat exchanger appears. This speed is the same for all fans.



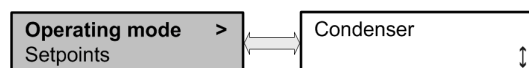
5.10.2.6 Fan ID

This shows which working point is set up for the connected fans via the fan ID. See [Fan IDs, Page 94](#)



5.10.2.7 Heat exchanger

The heat exchanger type is displayed here.



5.10.2.8 Refrigerant

If a condenser has been selected as the heat exchanger, the selected refrigerant is displayed here. If no refrigerant has been selected, "bar" is displayed.



5.10.2.9 Hardware and software versions

This shows information about the current hardware and software versions of the GMM.

GMM → Controller with display and keyboard.
 EC → Fan management (PCB with fan connections)
 H → Respective hardware version
 S → Respective software version



5.10.2.10 Bus module

This display gives information on the module type, firmware version and the address of the GCM bus module, when it is connected.



5.10.2.11 Threshold value/emergency control value

If the threshold value function is activated (reference to Service menu), a status display shows whether the value is above or below the threshold value.



If the emergency control value is issued because of the threshold value function, it is displayed here.



5.10.2.12 Fan from external.

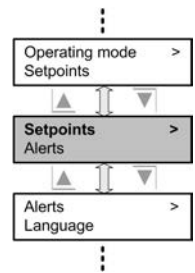
If the "Selective fan switch-off" function is switched on (reference to Service menu), it is displayed here.



5.10.3 Setpoints

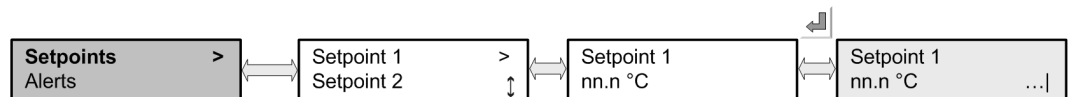
The setpoints can be set here.

The setpoint is the value (pressure, temperature or voltage) used as the reference for the control.



5.10.3.1 Setpoint 1

The set setpoint is displayed when the Setpoint 1 menu option is opened. What is displayed as the setpoint depends on the set current value input (voltage, temperature or pressure) and the operating mode (internal control or slave operation). As an example, the setpoint 1 is displayed as temperature.



Press the enter key to enter EDIT mode.

Use the left/right arrow keys to select the write position. Use the up/down arrow keys to edit the value at the selected position.

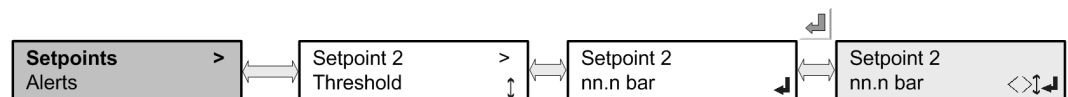
The minimum and maximum adjustment range is:

Set current value	Set operating mode	Setpoint display
Temperature	Control	0.00 - 100.0 °C
Pressure	Control	0.0 - 50.0 bar
Volt	Control	0.0 - 10.0 V

The values are entered to one decimal place. Press the enter key to accept the set value.

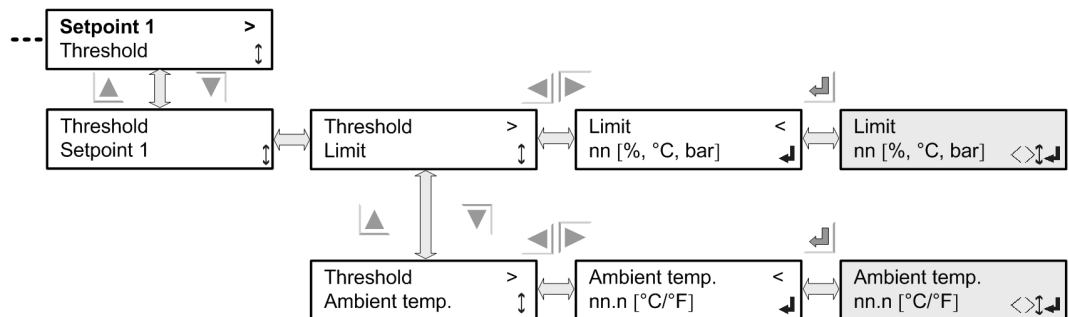
5.10.3.2 Setpoint 2

If 2 setpoints are defined in the **SERVICE** menu, a second setpoint is set here. This can be activated via the **DI3** digital input. Setpoint 2 is programmed the same way **Setpoint 1** is.



5.10.3.3 Threshold value

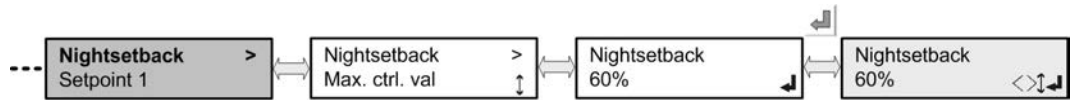
Here you can set the threshold values, violation of which will activate the threshold function. Appropriate threshold values for the configured system are offered in the Service menu (see [Threshold value, Page 72](#)).



5.10.3.4 Night limiter

The night limited function is used to limit the control value for the fans to a maximum value and minimise noise emissions. The limiter can be activated via a "D2" digital input or via the built-in timer.

Defining maximum value

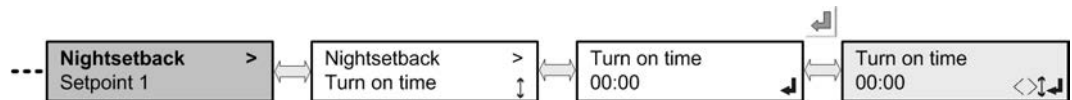


5.10.3.4.1 Night limiter activation/deactivation time

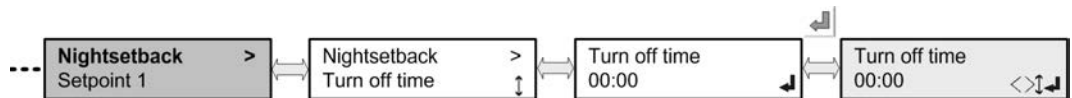
The built-in timer allows the night limiter to be activated and deactivated at specific times.

If the same value is entered for both the activation and deactivation time (e.g. 00:00), the time-controlled night limiter is deactivated.

Set start time



Set end time

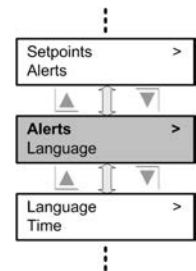


5.10.3.4.2 Night limiter functions list

Input	Night limiter with time	Night limiter
Inactive	Off	Off
Active	Off	On
Inactive	On	On
Active	On	On

5.10.4 Alarms

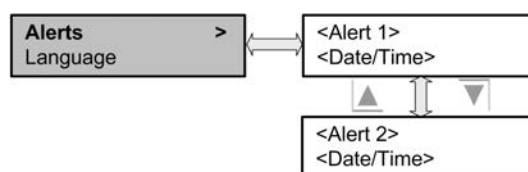
The last 85 alarms can be called up here.



5.10.4.1 Alarm memory

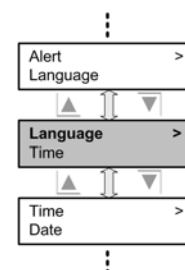
The GMM has an alarm memory that can accommodate up to 85 priority 1 and 2 messages (errors and warnings) stored consecutively (cyclically). These error messages consist of the fault and the time stamp, i.e. the date and time, at which the fault occurred. For a list of error messages and warnings see [Error messages and warnings on the GMM display, Page 92](#).

When the alarm memory is selected, the display shows the last fault that occurred. Use the “down” arrow key to display older faults.



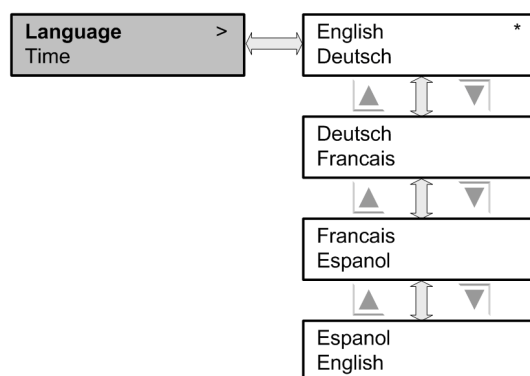
5.10.5 Language

The menu language can be selected here.



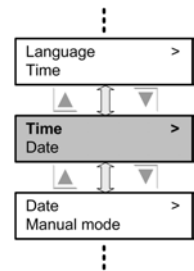
5.10.5.1 Language selection

In the Language selection menu you can select from four languages. The selected language is marked with an *asterisk*.



5.10.6 Time

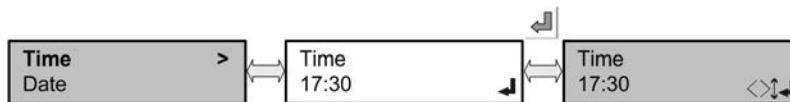
The time can be selected here.



5.10.6.1 Time setting

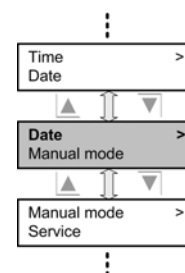
The set time is displayed and changed where required in the 24-hour clock.

This time is used to enter the alarm times in the alarm memory and for all timer functions (night reduction etc.).



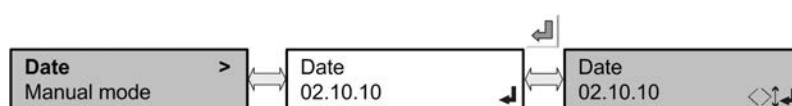
5.10.7 Date

The date can be set here.



5.10.7.1 Set date

The date is used to enter the alarm times in the alarm memory and for all timer functions (night reduction etc.).



5.10.8 Manual mode

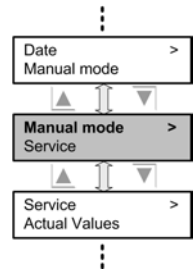
Manual mode is used to start up the heat exchanger fans by hand.

If it is activated, the fans run with the manual mode control value.

Manual mode does not depend on D1 enabling.

Manual mode has the highest priority and switches all other control types off.

The fact that manual mode is active is recorded permanently. In other words, it will still be active after you have switched the system off and back on.

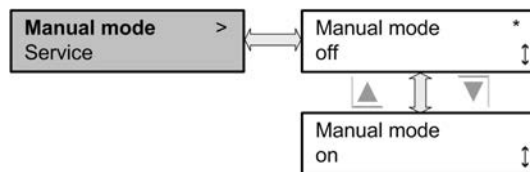


5.10.8.1 Manual mode ON / OFF / Control value/

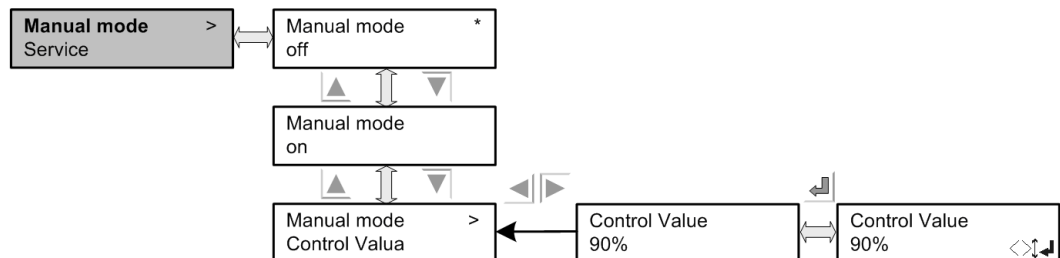
When manual mode is activated, the value in the control value menu can be changed.

The * indicates whether manual mode ON or OFF is active.

Manual mode ON / OFF



Manual mode control value

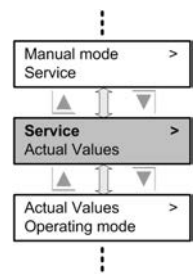
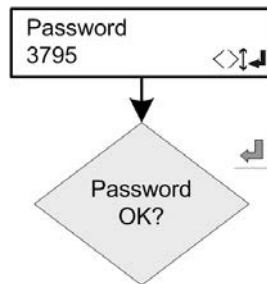


5.11 Service

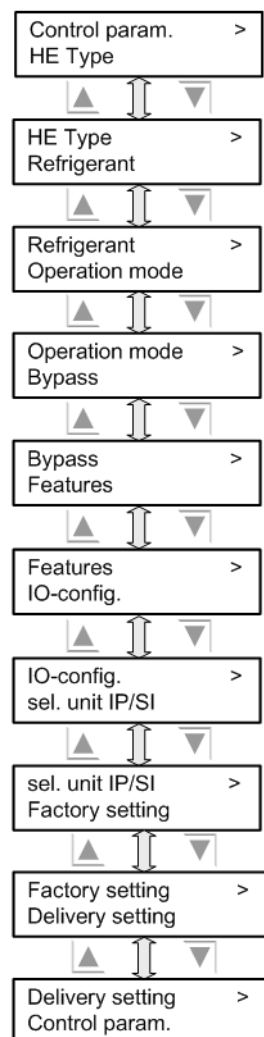
The Service menu is accessible only with the correct password, which is the first thing you are asked for. The password is **3795**.

Once the password has been accepted, the Service menu appears.

The password is valid for 15 minutes and will not be requested again during this time.

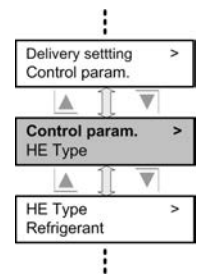


Service menu set-up

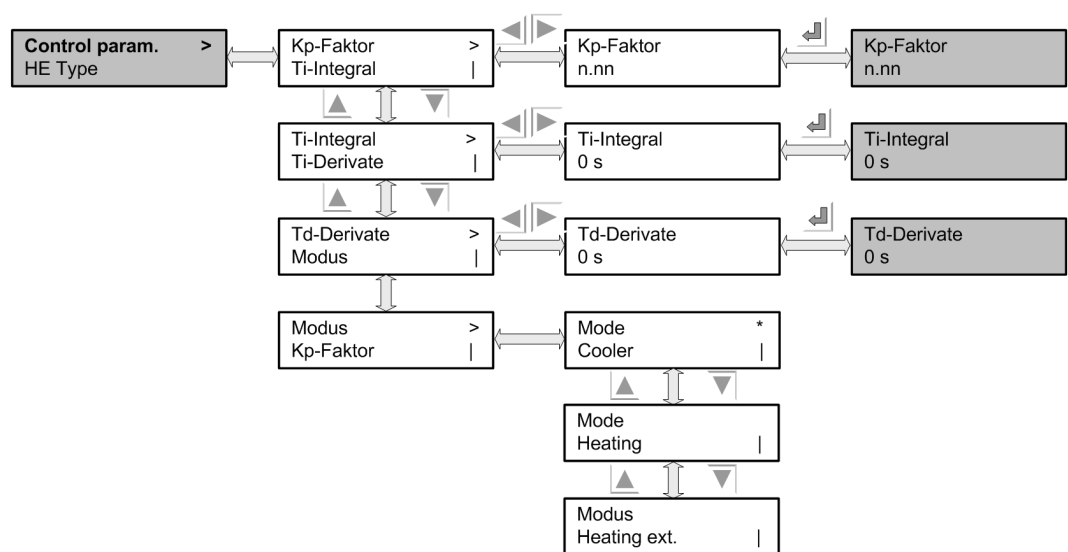


5.11.1 Control parameters

In this menu you configure the control parameters of the digital PID controller (proportional, integral, derivative controller).



5.11.1.1 Control parameters Kp, Ti and Td



The Kp factor can be entered in a range from 0.1 to 10.0 to one decimal place. The Kp factor specifies the control amplification. It is the proportion of the control path following the input signal.

The Ti reset time changes the control value in the set time by the value specified by the proportional factor.

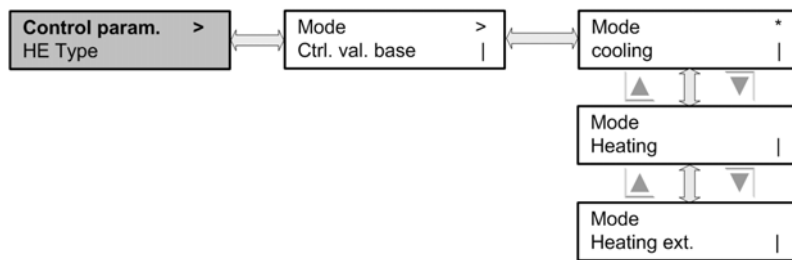
Example: With an unchanged control deviation (X_S) of 1K and $X_P = 10$ the control signal in $T_i = 25s$ is increased by 10%.

The delay time Td can be set in a range from 0 to 1000 seconds. The D part of the controller does not react to the deviation but to the speed of change.

Normally the GMM is used to cool liquids and refrigerants. With some applications a reversal of the function is required, i.e. liquids are warmed. With the regulator parameter setting "Mode" the control characteristics can be set to heating.

This function can generally be performed once (heating), or it can even be switched over via the DI3 input (heating ext.).

5.11.1.2 Cooling/heating control parameter mode



Normally the GMM 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 “Mode” control parameter setting the control characteristics can be set to heating.

It is possible to change the mode (heating ext) via the DI3 input.

5.11.1.3 Base control value and Start control value control parameters



The **base control value** is used to set a minimum speed.

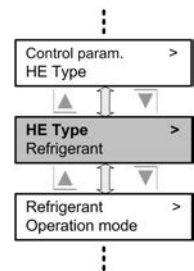
The **start control value** function is used to define a start point for issuing the control value.

Here are some setting examples:

Base control value	Start control value	Function
0%	0%	Functions of, normal control 0%-100% with release
10%	0%	At least 10% control value is issued, when the release is active
10%	5%	At least 10% control value is only then issued when the control has reached 5% and the release is due
10%	10%	The 10%-100% control value is only issued when the control reaches 10%
0%	5%	The control value is 0% when the general value is under 5%. The general value is issued from 5% control with given release (5%-100%).

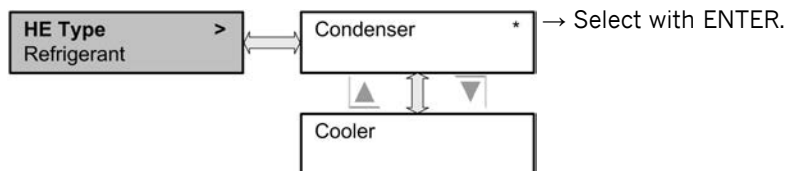
5.11.2 Heat exchanger

The heat exchanger type is selected here.



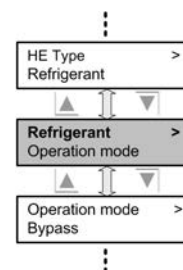
5.11.2.1 Heat exchanger type

The heat exchanger type is selected here.
The selected type is displayed with a *.

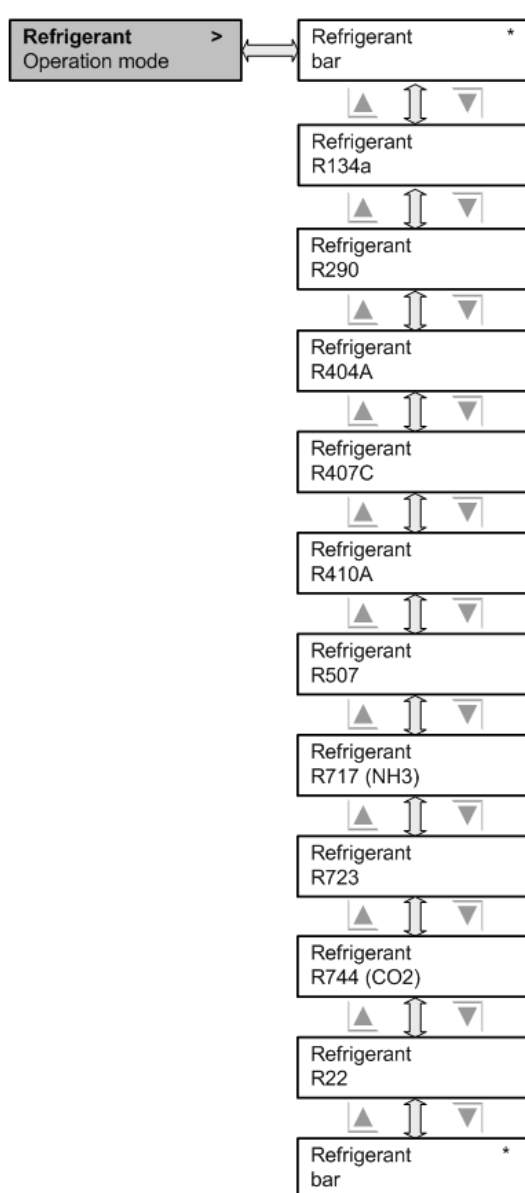


5.11.3 Refrigerant

A refrigerant is selected here.



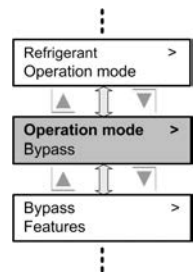
5.11.3.1 Refrigerant selection



In this menu option you can select whether a refrigerant has been defined and whether the display of reference and current values with temperature should be converted accordingly, or whether no refrigerant has been defined (bar) and the setpoints and current values should be displayed as pressure. The selected option is displayed with a *.

5.11.4 Operating mode

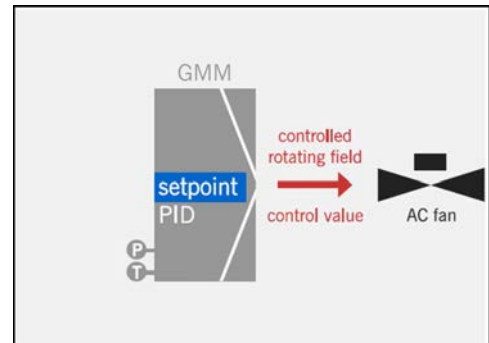
The operating mode can be set in this menu.
The active operating mode is shown with a *.



5.11.4.1 Auto internal



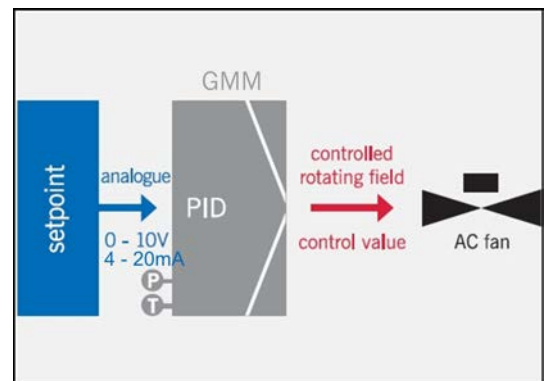
In this mode, control is automatic on the setpoint set internally. This setpoint is entered in the **Setpoints** menu option.



5.11.4.2 Auto external analogue



In this mode, control is automatic on the setpoint defined externally by the analogue input. Which input delivers the setpoint and which the current value is set in the I/O configurations.

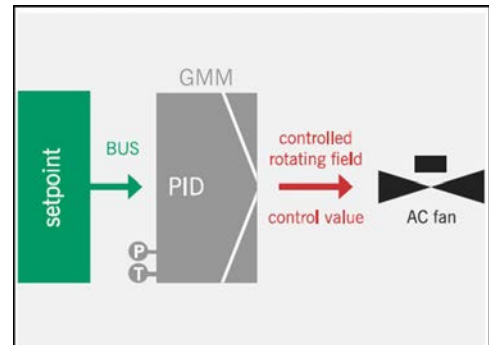


5.11.4.3 Auto external BUS



In this mode the setpoint is specified via BUS.

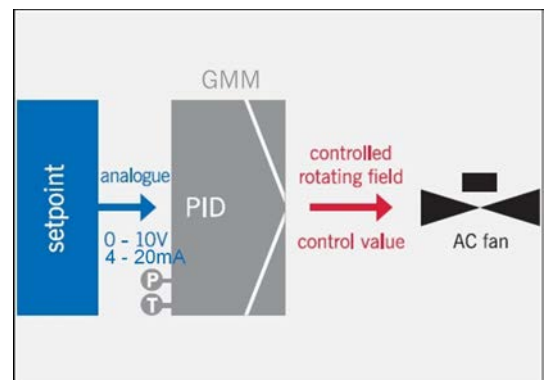
A Güntner Communication Module (GCM module) is required for this operating mode.



5.11.4.4 Slave external analogue



In this mode, there is no internal control. Instead the control value on the slave input is scaled and forwarded directly to the fans. Which input is to be used as the slave input is defined in the I/O configuration.

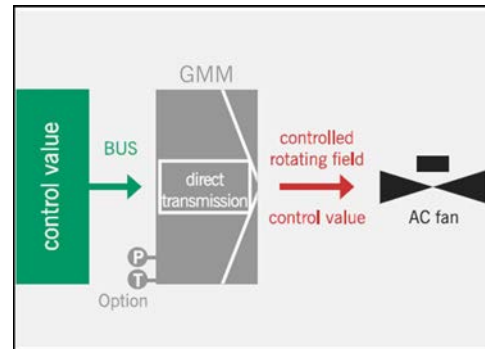


5.11.4.5 Slave external BUS



In this mode the control value is specified via BUS.

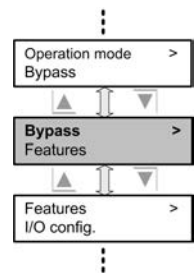
A Güntner Communication Module (GCM module) is required for this operating mode.



5.11.5 Bypass

The bypass function can be activated or deactivated in this service option. If the function has been activated, the control value for bypass mode can be set.

This function is used to maintain operation with a GMMEC component fault.



5.11.5.1 Bypass switching

The bypass function has the effect that if there is a fault in the GMM the fans will run at the speed specified here.

The bypass speed is activated automatically 10 s after the connection to the GMM is lost or there is a sensor fault.

The bypass mode currently set is shown with an asterisk.

The following options can be set:

Bypass operation ON

Control value 0%

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

→ all the fans stop

Bypass operation ON

Control value 100%

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

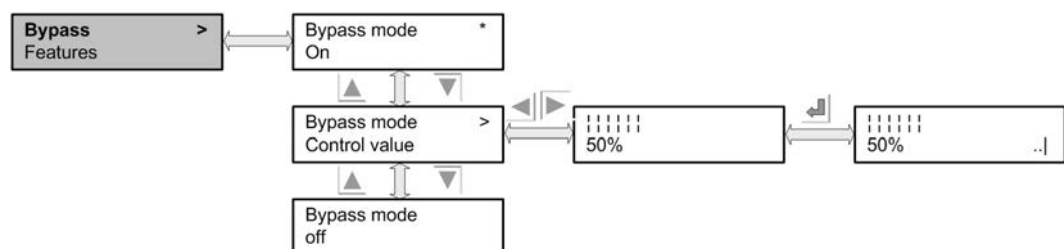
→ all fans run at their maximum speed

Bypass operation OFF

The control value is then not visible on the display and therefore does not have to be set.

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

→ all fans run at their last speed before the GMM failed

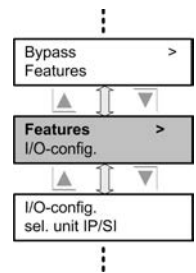


ADVICE

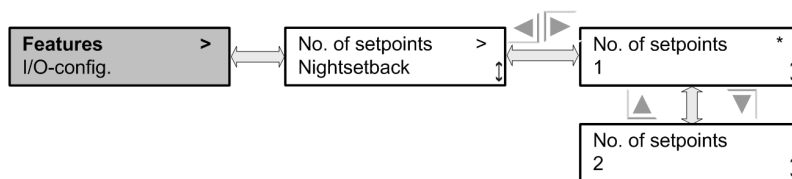
After modifying the bypass function you should switch the fans off and back on.

5.11.6 Functions

The control functions, such as number of setpoints, the night limiter or setpoint displacement, the Low Capacity Motor Management or the subcooler function are selected in this service menu option.



5.11.6.1 Number of setpoints

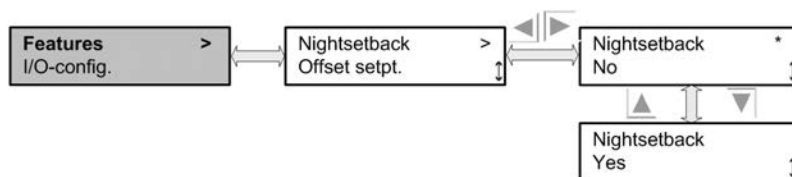


The number of setpoints is set here. The minimum number is 1 setpoint on which control is performed. If 2 setpoints are selected, switchover is via the **D3** digital input. If the input is open, setpoint 1 is used for control.

If the **D3** input must be connected with **GND**, setpoint 2 is used for control. In version **.1** the **D3** input must be connected with **+24V** to switch over to setpoint 2.

Two different setpoints can consequently be determined for summer and winter operation, for example.

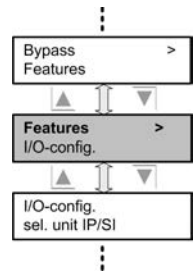
5.11.6.2 Nightsetback



A night limiter is generally activated or deactivated in this service option. The value of the night limiter is set in the **Nightsetback** menu option. The night limiter, i.e. activation and deactivation and the control value, can also be programmed in the normal operating menu. The night limiter is activated both via the **DI2** digital input and via the activation and deactivation time. Both activations can take place in parallel. If the activation and deactivation times are the same, activation is only via the **DI2**.

5.11.6.3 Setpoint displacement

It is beneficial to ensure the optimum energy operation to displace the setpoint under certain circumstances, depending on the external temperature. Setting the min. condensation 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 a displacement these fans would always be controlled with 100%, as the high external temperature (above the setpoint) means this setpoint cannot be reached.

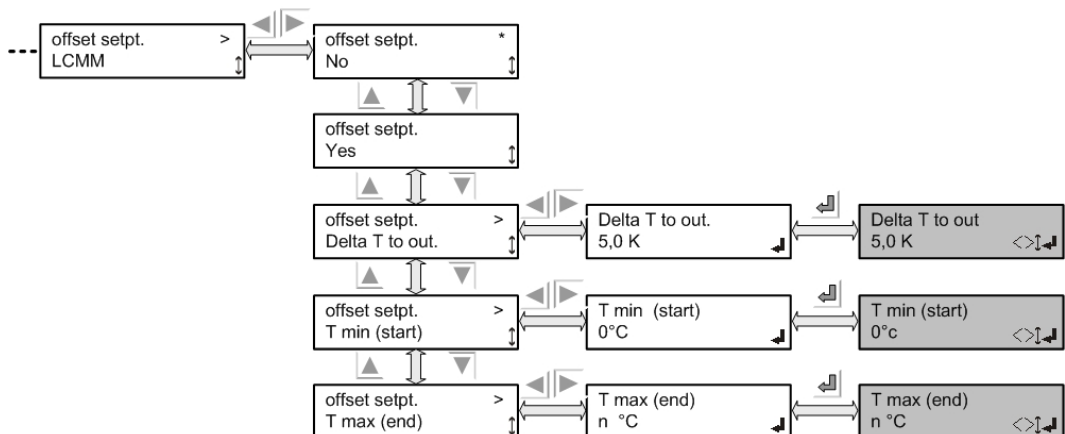


The temperatures T_{min} external and T_{max} external can be set in the menu. The range between T_{min} external and T_{max} external marks the range to be displaced into. The ΔT , which defines the offset between the setpoint and the external temperature, must also be defined.

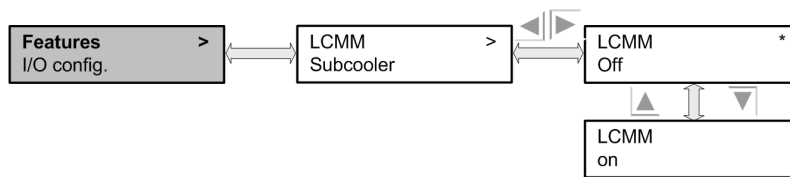
Example:

Setpoint	=	25°C
ΔT	=	5 K
T_{min} external	=	20°C
T_{max} external	=	40°C

In this example the setpoint must always be 5 K above the external temperature. The displacement therefore begins at 20.1°C external temperature. At this point the setpoint is displaced to 25.1°C. T_{min} external and T_{max} external limits mark the range in which the displacement works. In this example the setpoint is displaced at 20°C at the earliest, provided the setpoint is low enough. The max. value where the setpoint can be displaced to is at 45°C in this example.



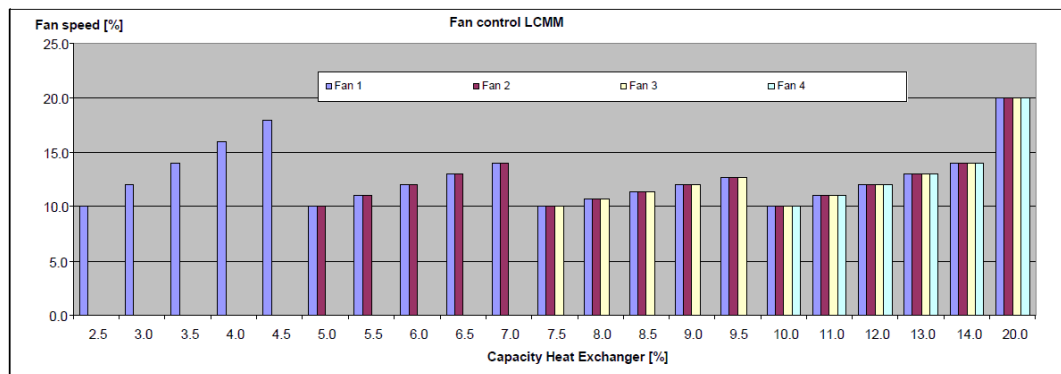
5.11.6.4 Low Capacity Motor Management



EC fans have a minimum speed that is in an approx. 9 – 15% range of the maximum speed. With systems with one fan this is simultaneously the smallest possible control value of the controller for the overall system.

With systems with several fans the controller's LCMM function enables a control value that is lower than the minimum control value of an individual fan by switching the fans off and on (min. control value = min. fans speed / number of fans). With control values that are above the minimum speed of an individual fan (therefore from approx. 9-15%), all fans run regularly and the control is now only via the fans' speed. The advantage of this control is the ability, even with low heat exchanger power, to use the continuous control via the fan speed instead of to running a pure 2 point control.

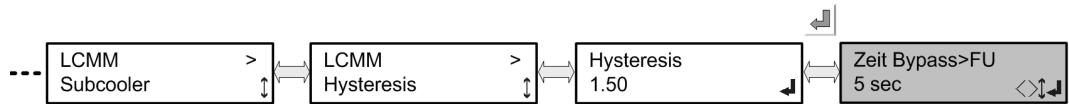
A system with 4 individually controlled fans serves as an example. With an assumed minimum fan speed of 10% of the maximum speed, a control value of 2.5% can be set for the heat exchanger (10% / 4). At this setting one fan runs with the required minimum speed and all other fans are switched off. If the control value is increased, the activated fan increases its speed. As soon as the overall system reaches a control value of 5% the 2nd fan is activated; from 7.5% the third and from 10% all fans run. The figure below illustrates the process. Without LCMM only heat exchanger powers > 10% are possible (all fans run).



LCMM with 4 fans

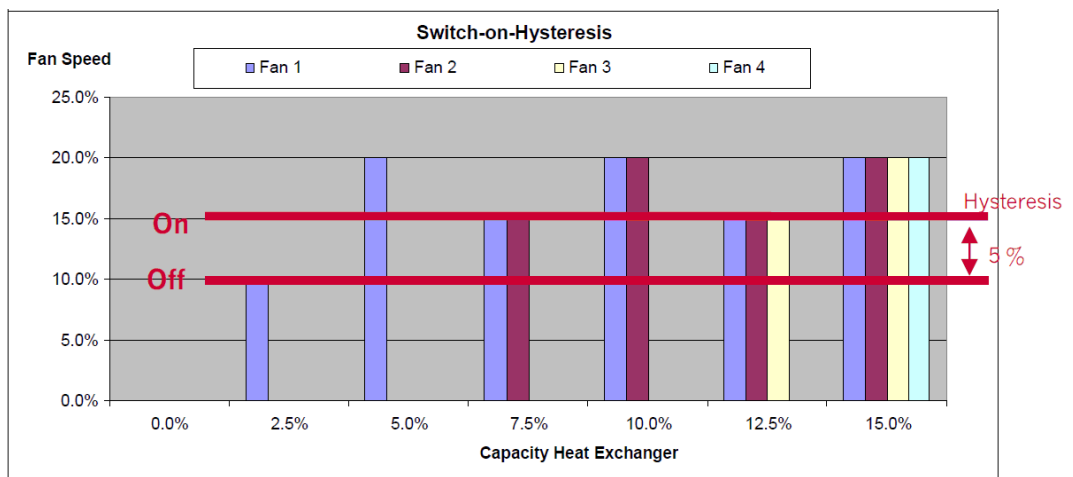
5.11.6.4.1 LCMM hysteresis

To avoid a constant switching on and off of the fans depending on the calculated control value, a hysteresis factor between 1.0 and 2.5 can be defined. This factor is multiplied with the minimum speed of the respective fan and the control value from which the first/next fan will be activated is therefore determined. (A hysteresis factor > 1.0 means no hysteresis.)



Within the hysteresis curve the GMM control continues to run regularly via the speed of the fans, as described in the above section. The control values, with which individual fans are activated or deactivated, have changed.

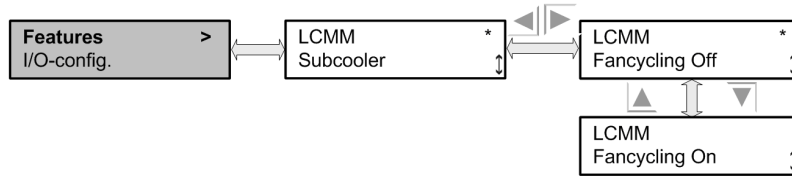
In the example shown below the minimum speed of a fan is at 10%, the hysteresis factor is at 1.5 and therefore the speed at which the first fan is activated is at 15% (this is equal in our example with 4 fans to a heat exchanger power of 3.75%). The first fan is deactivated at a heat exchanger power of 2.5% or less, i.e. when the minimum speed of the individual fan is reached. The second fan is activated in our example at a system control value of 7.5% (2 of 4 fans run at a control value of 15%), the third fan at 11.25% and the fourth at 15%.



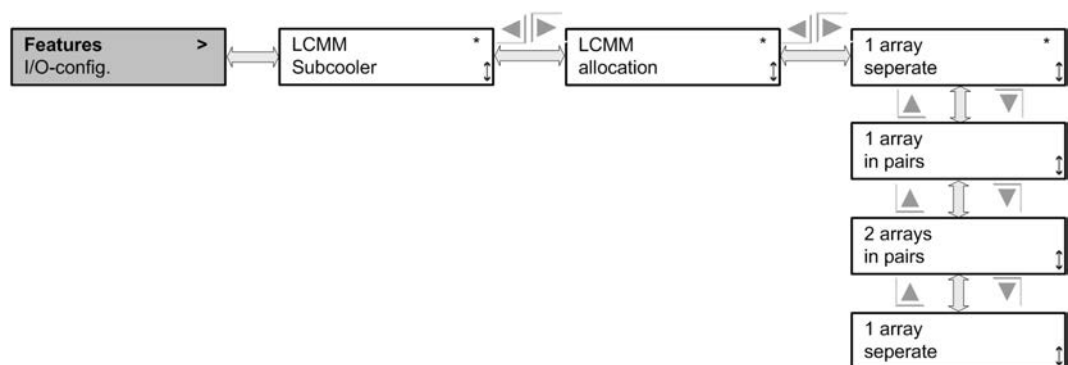
LCMM hysteresis switch-on

5.11.6.4.2 LCMM Fancycling

Via the Fancycling LCMM offers the ability to keep the fans' runtimes more or less the same. When this feature is activated the fans at low control values are switched on in an alternating sequence, so that the devices with the least operating hours are switched on first. This in turn increases the EC fans' overall service life.

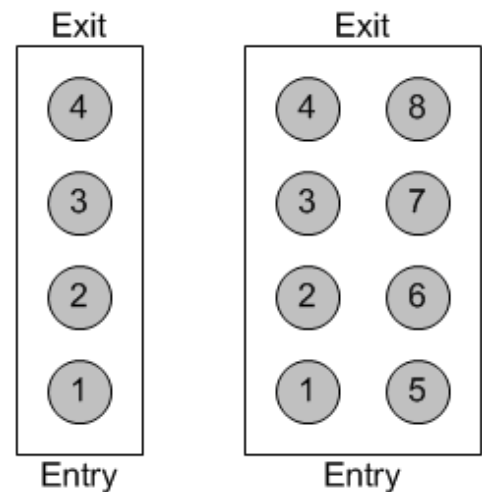


5.11.6.4.3 LCMM Fancycling assignment

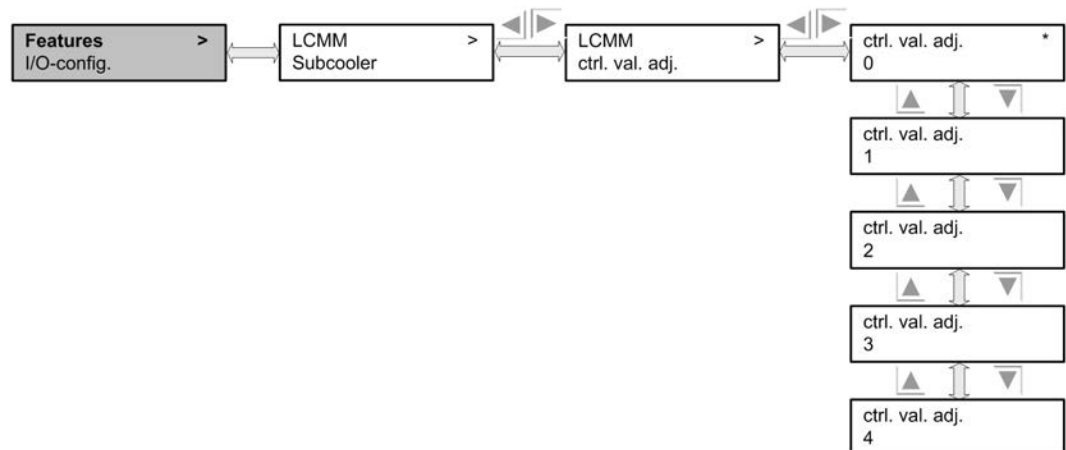


The assignment of how the fan cycling is to run can be performed in 4 different ways. The single row assignment for heat exchangers of up to 8 fans is in 1 row. The two row assignment applies for heat exchangers with up to 16 fans in 2 rows.

- 1 row single (1- 2 - 3- 4- 5- 6- 7- 8)
- 1 row in pairs (1+2, 3+4, 5+6, 7+8)
- 2 rows single beside one another (e.g. with fan unit 8: 1-5-2-6-3-7-4-8)
- 2 rows in pairs (e.g. with fan unit 8: 1+5, 2+6, 3+7, 4+8)



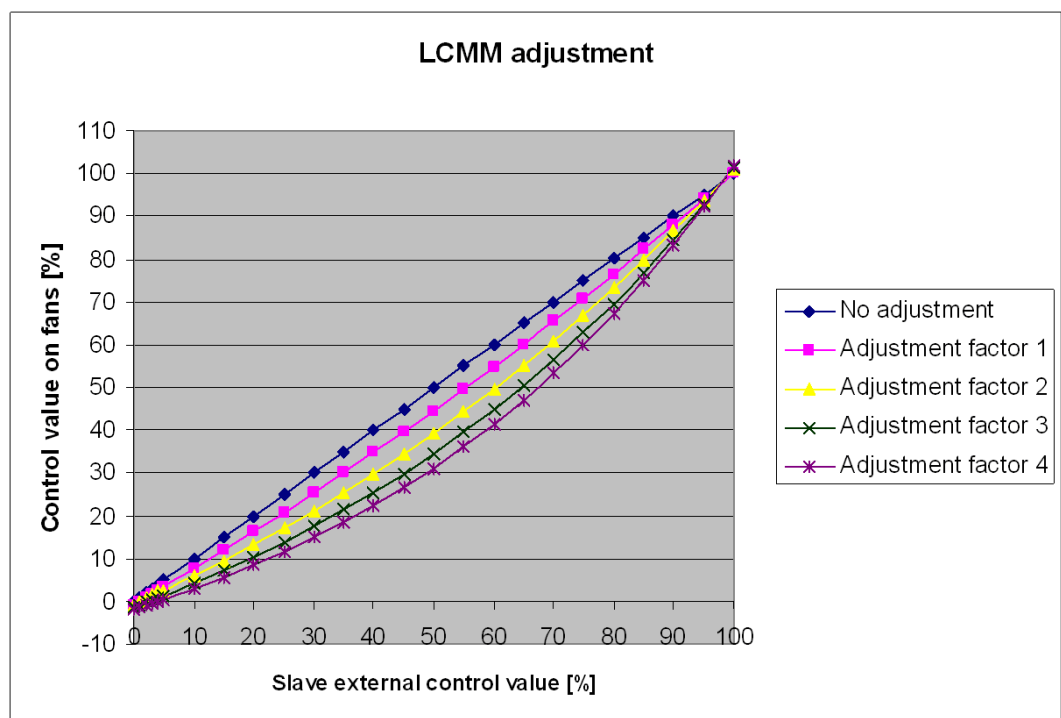
5.11.6.4.4 LCMM min. control value adjustment



The control value adjustment means that with the “Slave external” operating mode the pre-set control value 1:1 is not issued, but it can be adjusted to a maximum of 4 levels.

This makes it possible to make a “Signal adjustment” over the 0-100% range, whereby the values 0% and 100% are not adjusted.

The adjustment is shown in the diagram below. The X axis gives the external pre-set control value in % and the control value for the fans can be read in % on the Y axis.



LCMM adjustment

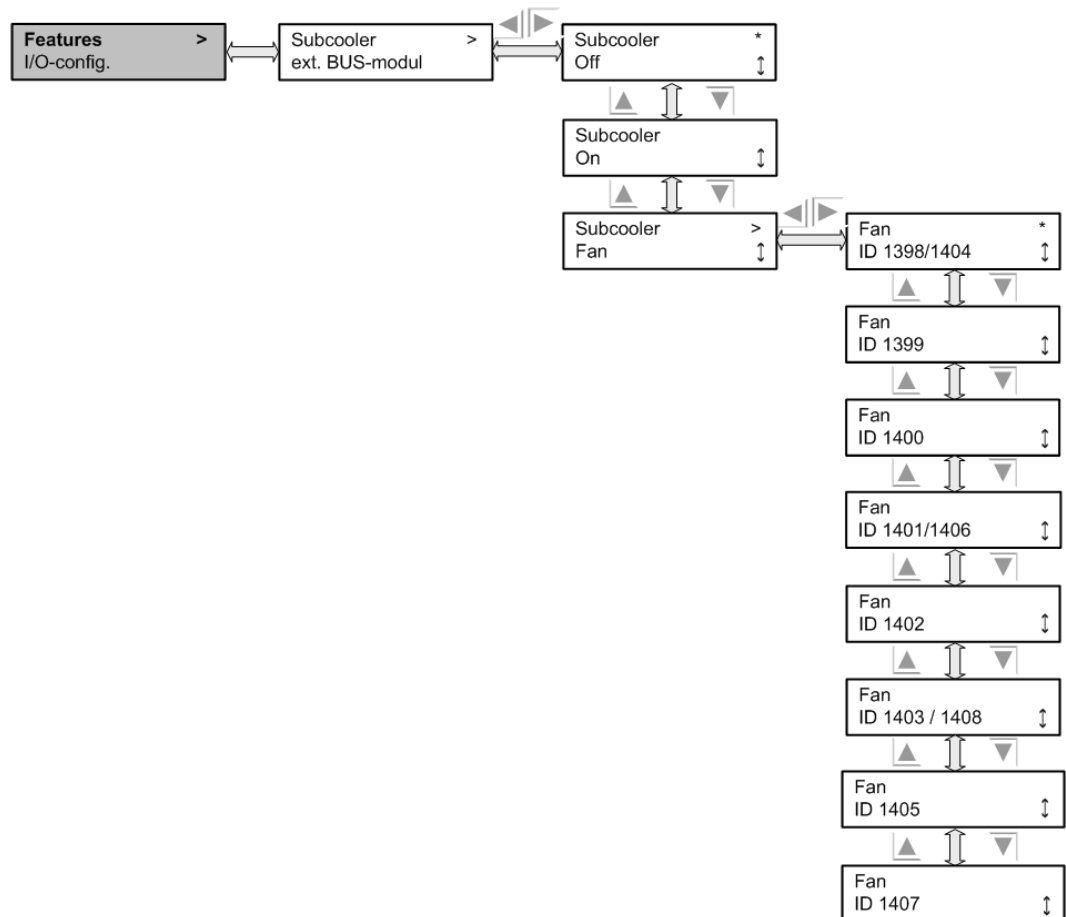
5.11.6.5 Subcooler function

This function allows a separate EC fan to be operated as subcooler. The control value for the subcooler fan (0..10V = 0..100%) is given via the “AO2” output to the fan.

This subcooler runs constantly, independent of the regulation of the control unit with the set speed. It is activated like the regulated fans via the release.

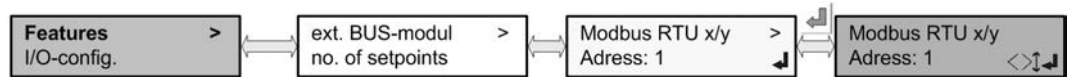
The subcooler function can be switched on and off in the functions menu.

The fan type used is selected in the selection menu.



5.11.6.6 External BUS module

This function allows you to change the field bus address of the external BUS module. The default value is 1. At the position given by x/y the system displays the modules' firmware version. x = MODBUS module, y = CAN module.



ADVICE

Turn off the power to GMM + bus module after every address change. Only then will the new addresses be accepted.

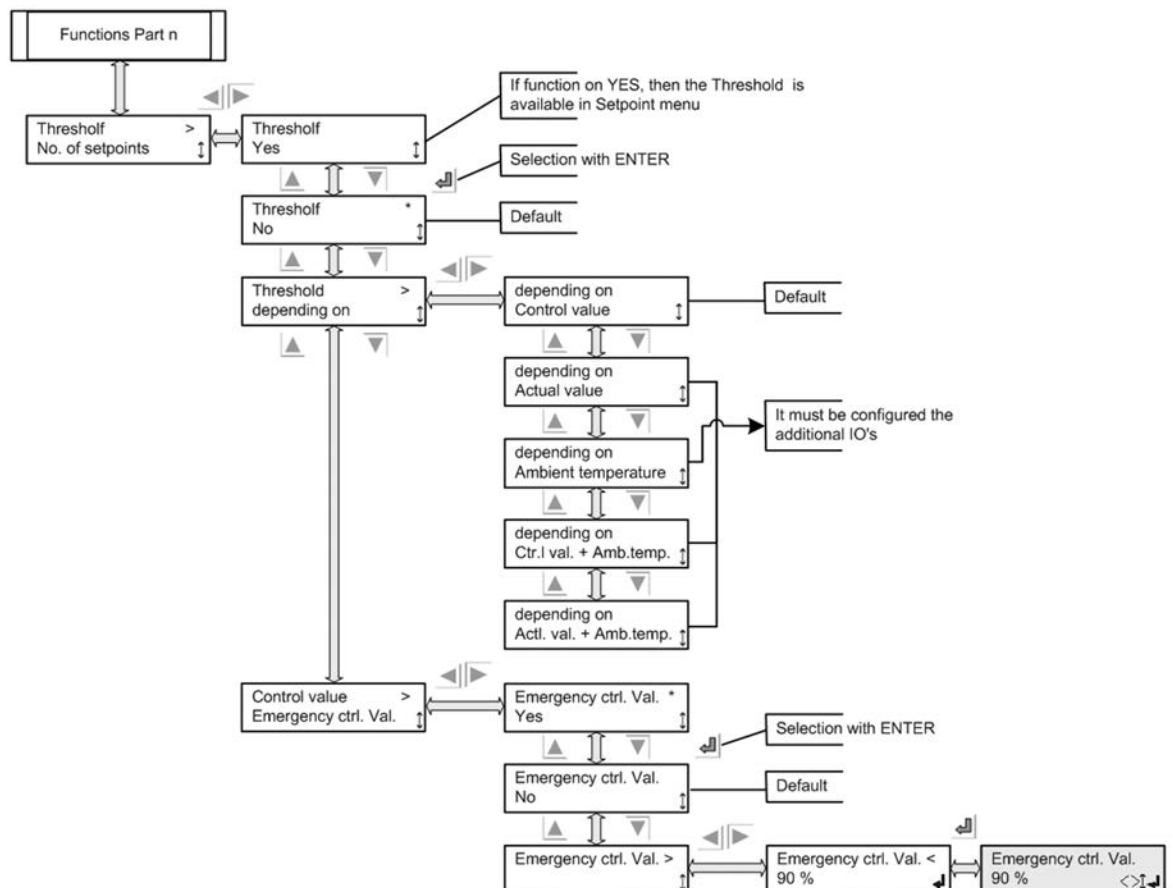
5.11.6.7 Threshold value

Using the threshold value function you can switch the threshold value relay (digital output DO4, contact 41/44) depending on various parameters.

The function must first be activated and pre-configured in the Service menu for this.

The respective threshold values can then be set in the Setpoints menu.

The function is deactivated by default.



YES/NO threshold value:

The function can be switched on or off here. Only when the function is switched on is this active and offered in the setpoints menu.

Threshold value depends on:

What the function depends on can be configured here.

Depends on**Control value:**

The threshold value relay is tripped when the control value is greater than the configured threshold value.

Depends on**Actual value:**

The threshold value relay is tripped when the actual value is greater than the configured threshold value.

Depends on**Ctrl value + ext. temp.:**

The threshold value relay is tripped when the control value AND the external temperature are greater than the configured threshold value.

Depends on**Actual value + ext. temp.:**

The threshold value relay is tripped when the actual value AND the external temperature are greater than the configured threshold value.

Emergency control value Yes/No/Emergency control value:

The emergency control value is issued as control value when the following conditions are satisfied:

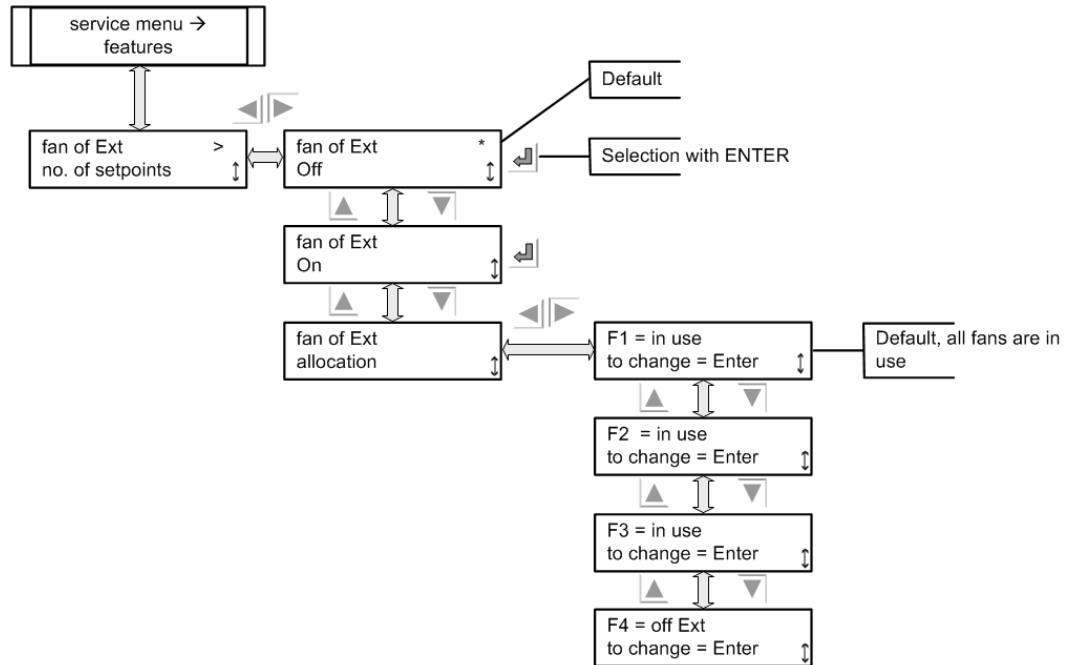
- Threshold value function is active
- Threshold value condition(s) exceeded
- Emergency control value function is active
- Emergency control value is greater than its calculated control value (e.g. with control operation or bypass value with sensor fault)
- Manual mode is not active
- External release provided

The emergency control value is reduced to an active night limit.

5.11.6.8 Fan off external

With this function you can selectively switch off specific fans using the DI3 digital input (speed = 0).

The function is deactivated by default.



Fan off Ext Off/On

This allows the function to be switched on/off.

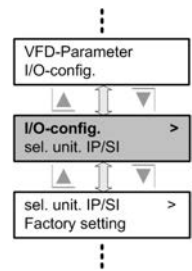
Fan off Ext Allocation

For each connected fan you can select here if it will be switched off with activated DI3 input.

5.11.7 I/O configuration

This menu option is used to configure the analogue and digital inputs and outputs.

Selected functions can be assigned to the inputs and outputs.



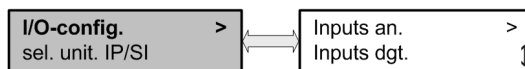
5.11.7.1 Analogue inputs

The analogue inputs are measurement inputs for recording temperature or pressure values. These inputs can also be used to prescribe control values (slave mode).

The terminals **B1** and **B2** are two current inputs (4-20mA).

Terminal **B3** has an input for the GTF210 temperature sensor.

There is an input for 0-10 V DC on terminal **B4**.



5.11.7.2 Switchover input AI2

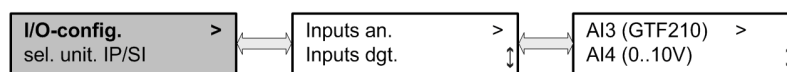
The function of this input has been extended in hardware version .2.

In addition to the functions offered by input AI1, the following functions are also offered: **Actual temperature value** means that a temperature sensor with 4..20mA (-30°C bis +70°C) is connected on this current input. Function as described with **actual value**.

External temperature means that a temperature sensor with 4..20mA current output (-50°C to +50°C) is connected on this current input. This input is used exclusively for external temperature recording.

Current value GTF210 means that a GTF210 temperature sensor is connected to this input. Please note! This function is only available with the corresponding software version.

5.11.7.3 AI3 input temperature sensor

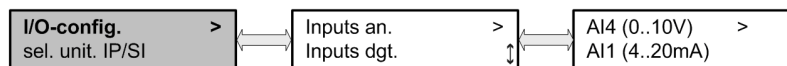


Temp actual value means that a GTF210 temperature sensor **is connected to this input**.

External temperature means that a **GTF210** temperature sensor is connected to this input to record the external temperature. The measurement range is -30°C to +70°C. It is ensured that only 1 external temperature can be selected.

No function is selected if this input is to be inactive.

5.11.7.4 0..10V AI4 input



Current value means that the current value (0..10V) for the controller should be connected to this input. Make sure that the **mode** "Auto Int" has been selected from the Operating mode menu.

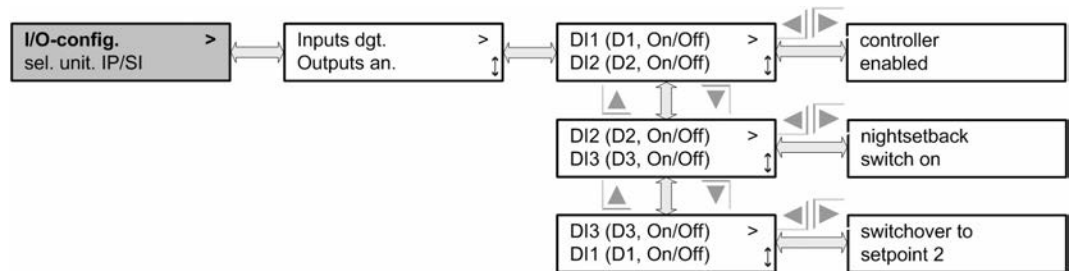
Slave control value signifies that the fans are addressed in response to the input signal (0#10V). The characteristic curve is linear from 0-100%. A 10V signal corresponds to a control value of 100% for the fans. Make sure that the **mode "Slave Ext" has been selected from the Operating mode menu**.

Setpoint 1 means that the setpoint 1 on which internal control is performed is specified via the voltage input. The voltage input is scaled to the set actual value (see [Error messages and warnings on the GMM display, Page 92](#)). The origin of the actual value still has to be configured. Make sure that the **mode "Auto Ext" has been selected from the Operating mode menu**.

Setpoint 2 is offered only if the number of setpoints has been configured as **2** (see [Number of setpoints, Page 65](#)). If setpoint 2 is configured, the same applies as described for **setpoint 1**.

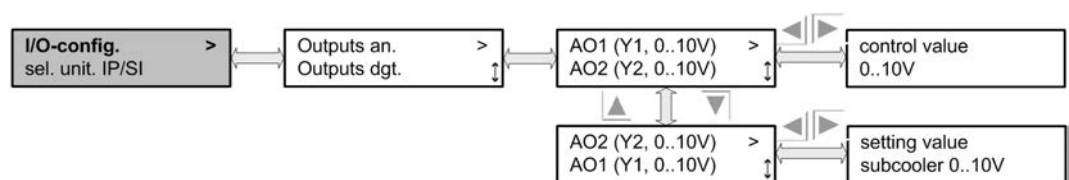
5.11.7.5 Digital inputs

The digital inputs on terminals **D1**, **D2** and **D3** are control inputs. Their function is permanently assigned according to the diagram below.



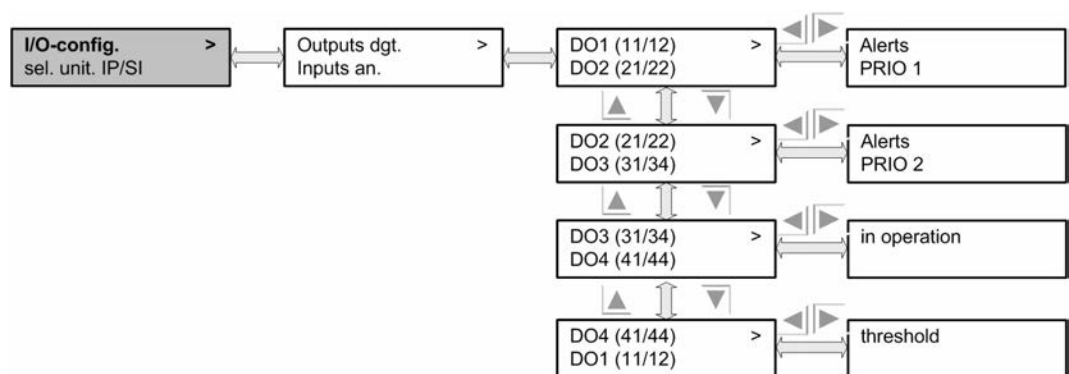
The inputs are active when they are connected to **GND**. From version **1** the inputs are active when they are connected with **+24V**. They can only be switched with potential-free contacts (relay contact).

5.11.7.6 Analogue outputs



The analogue outputs can output a voltage of 0-10 V DC. Fixed functions are assigned to analogue outputs 1 and 2. Output 1 issues the control signal from 0-100% scaled as a 0-10V signal. Output 1 issues the control signal for the subcooler, when the function is selected.

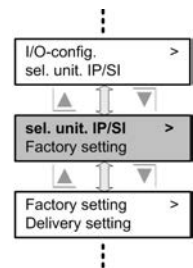
5.11.7.7 Digital outputs



The digital outputs are relay contacts. Each output has a 250V/1A two-way contact. The alarm output PRIO 1 is **switched as a failsafe** contact i.e. the contact is closed when there is no current. Fixed functions are assigned to the digital outputs.

5.11.8 SI/IP selection

The units system can be selected here.



5.11.8.1 SI/IP units system

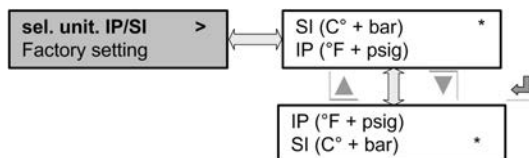
Unit selection for pressure and temperature.

International units →

SI (Système international d'unités)

Anglo-American units →

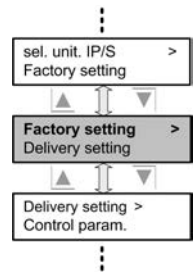
IP (Imperial System)



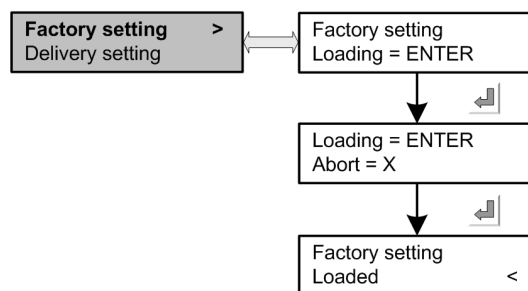
The selected unit of measurement is shown with a *.

5.11.9 Factory setting

The control can be reset to factory settings here.



5.11.9.1 Control reset (factory setting)



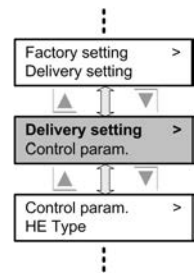
ADVICE

Any changes made locally will be deleted. Factory commissioning values will be retained. The control functions and the bypass are reset to their default values.

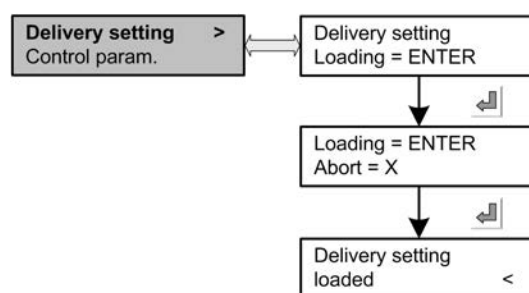
See [Parameters after commissioning -Factory setting, Page 91](#)

5.11.10 Delivery condition

The control can be reset to delivery condition here.
Commissioning is then not necessary.



5.11.10.1 Control reset (delivery condition)



ADVICE

Any changes made locally and the commissioning values will be cleared. Once this function has been completed, a completely new factory commissioning must be carried out.

6 Faults and troubleshooting

6.1 General notes

Most faults that occur during commissioning are due to wiring faults or defective sensors. It is only in the rarest of cases that the speed controller itself is defective. Check the following points before ordering a replacement:

Status info menu:

- Is a fault displayed in the info menu? (You can always return to the Info menu by pressing the **X** key).

- If **NO**, then go to **Test point 2**.

- If the message "Equipment failure" is displayed, there is a fault in the EC controller (lower PCB with fan connections).

In this case please check the fan connections on the EC controller. Are the 24V DC supply cables properly connected to the fans? Are the bus connections **A** and **B** properly connected and with the correct polarity.

- If the "**Vn temperature**" message appears, one or more of the fans has a temperature fault. **Vn** represents the fan number. If more than one fan is affected, they are listed in succession. A temperature fault exists if the motor winding or motor end stage is too hot.

- If the "**Vn mains failure**" message appears, one or more of the fans has a phase failure (only on 3-phase fans). For single-phase fans, the message "**Vn general error**" appears. **Vn** represents the fan number. If more than one fan is affected, they are listed in succession.

If the message "**No sensor selected**" appears, no sensor input has been selected in the IO configuration.

TEST POINT 2:

Mains connection:

- Are all phases present? (The message "**V? general fault**" appears if there is a missing phase appears fans. **V?** stands for the fan number. If more than one fan is affected, they are listed in succession.

Sensor connection:

- Is the sensor connected correctly? Cf "Sensor connection" section
- Sensor OK? (Measure! Pressure: 4-20mA, Temp.: 1.2-2.7kΩ, default signal: 0-10V)
- Are the sensor cables laid in the immediate vicinity of the mains or motor cable? Consider increasing the distance!
- Are the sensor cables shielded? If not – swap for shielded cables!
- Is the shielding applied unidirectionally on the controller?

Fuses:

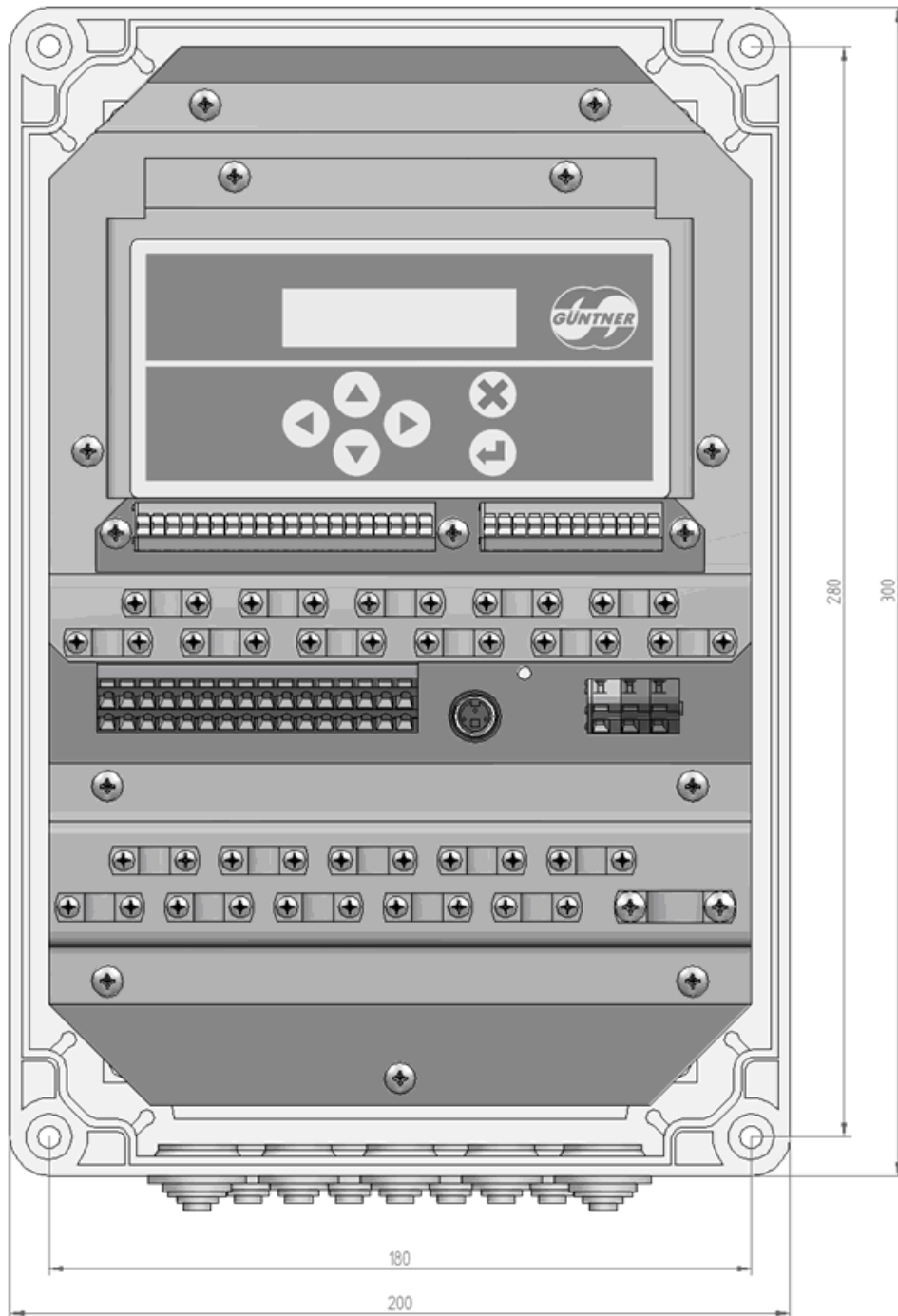
- Is the fuse on the controller supply OK?

7 Technical data

7.1 GMM EC/01 /04 /08 (.1, .2) dimensions

The dimensions of the housing and fixing are shown below. All dimensions are given in millimetres.

Fixing drill holes max. Ø 7.5 mm.

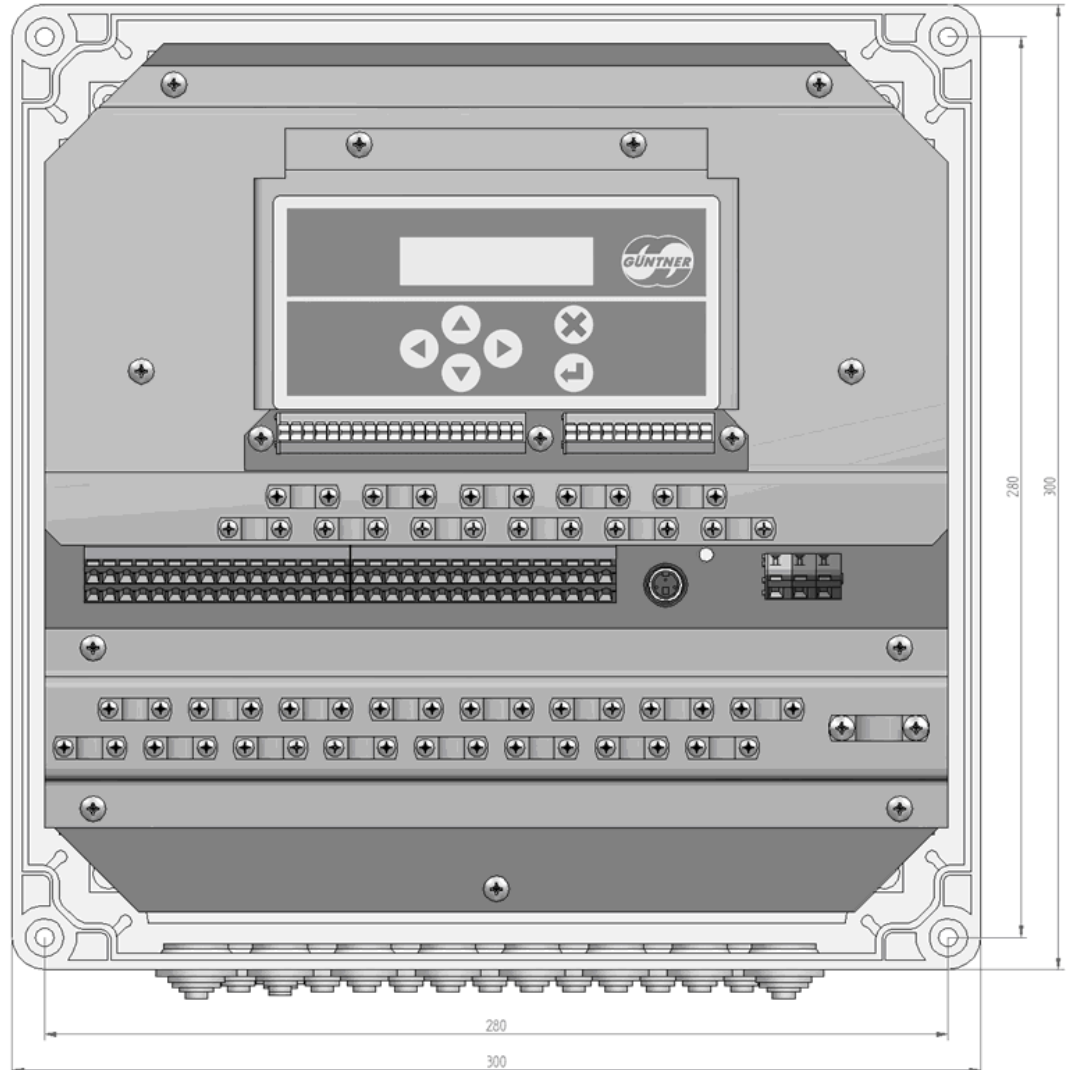


GMM EC 01 / 04 / 08 (.1, .2) casing dimensions

7.2 GMM EC/16 (.1, .2) dimensions

The dimensions of the housing and fixing are shown below. All dimensions are given in millimetres.

Fixing drill holes max. Ø 7.5 mm.

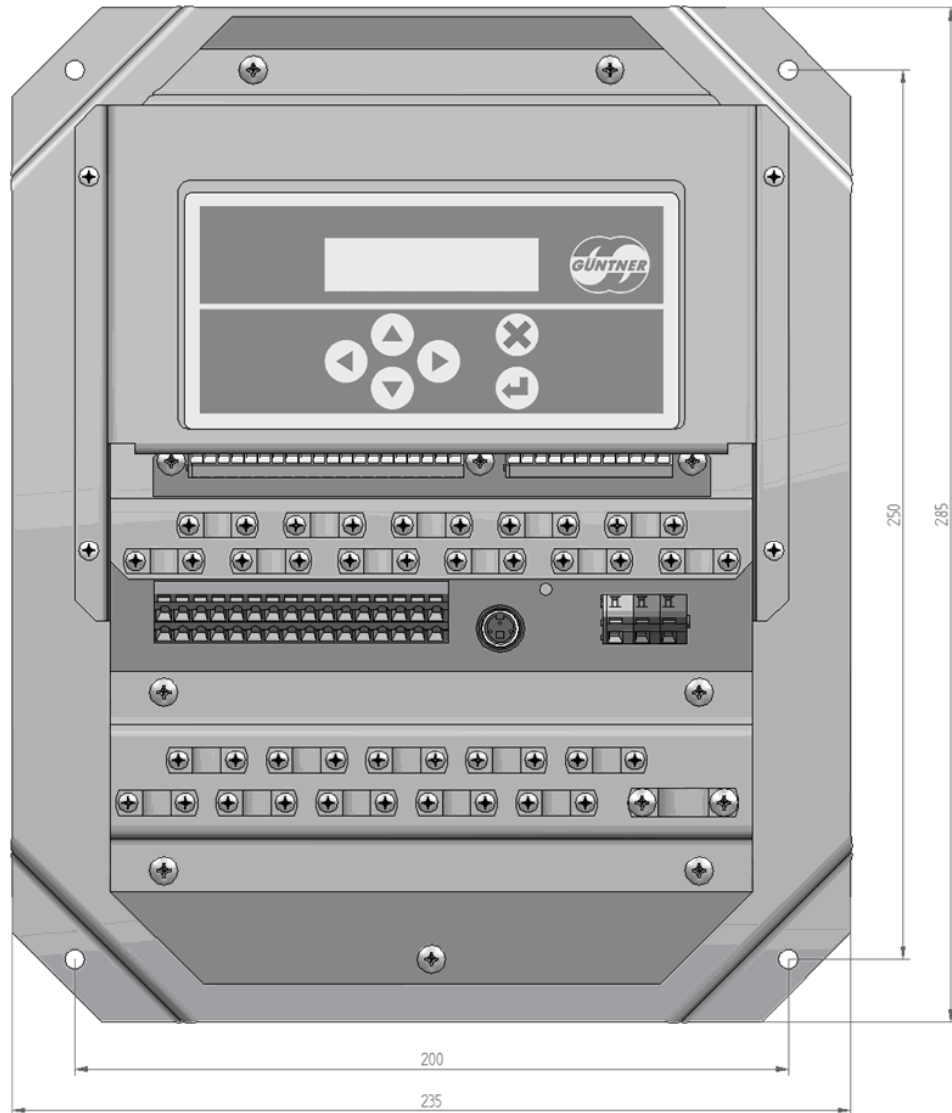


GMM EC 16 (.1, .2) casing dimensions

7.3 GMM EC/01 /04 /08 (.1, .2) UL dimensions

The dimensions of the housing and fixing are shown below. All dimensions are given in millimetres.

Fixing drill holes max. Ø 5mm.

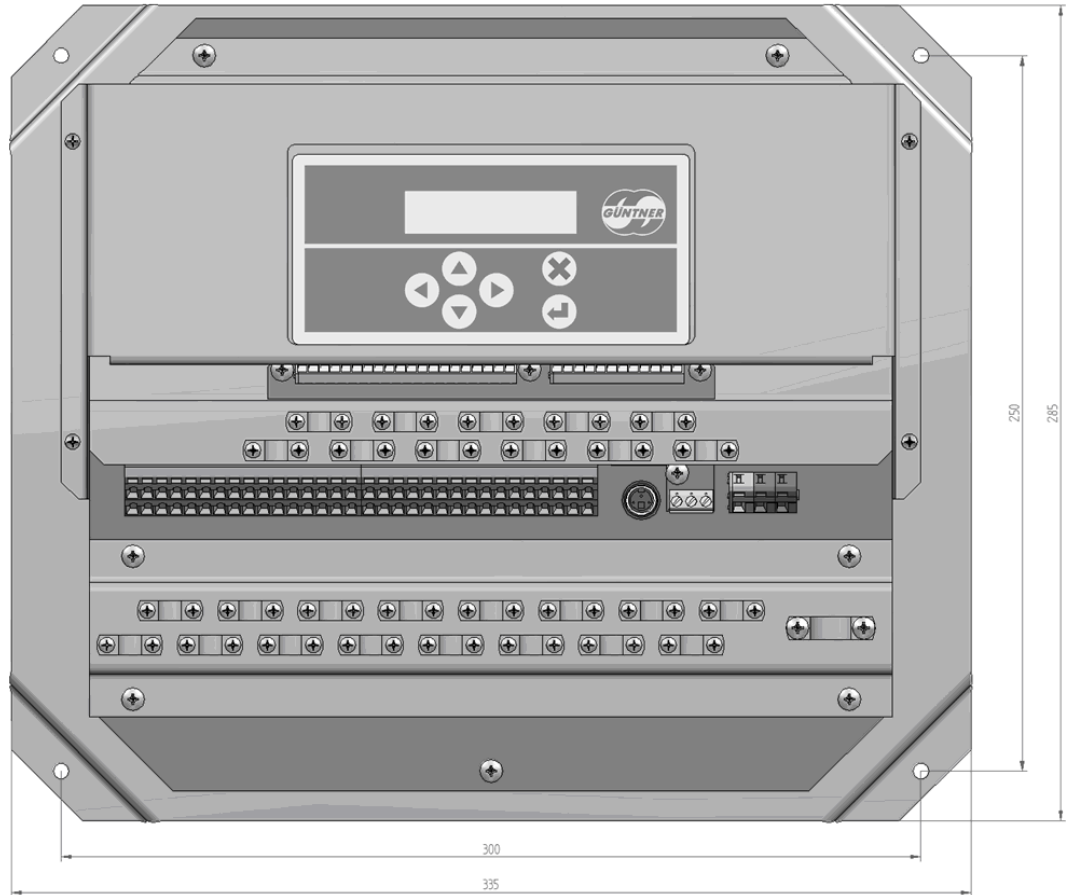


GMM EC 01 / 04 / 08 (.1, .2) UL casing dimensions

7.4 GMM EC/16 (.1, .2) UL dimensions

The dimensions of the housing and fixing are shown below. All dimensions are given in millimetres.

Fixing drill holes max. Ø 5mm.

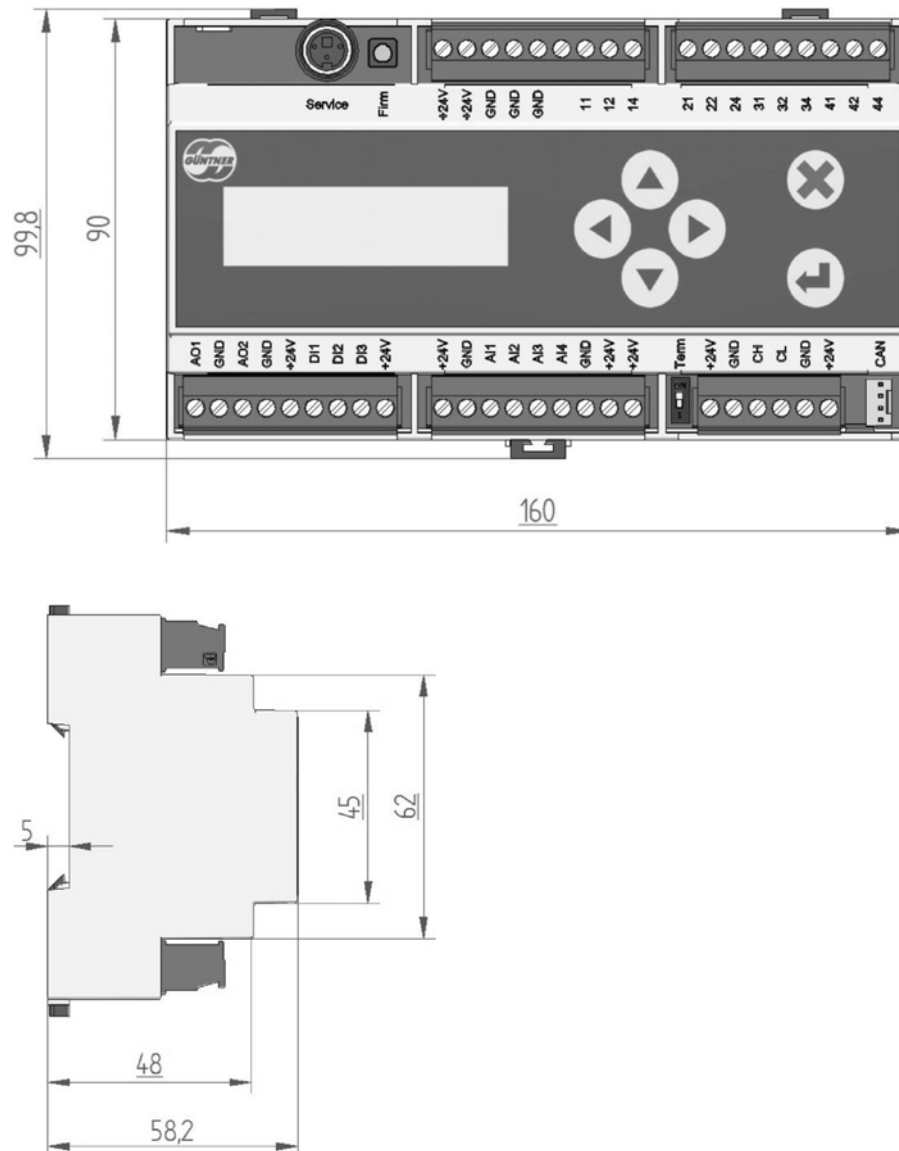


GMM EC 16 (.1, .2) UL casing dimensions

7.5 Dimensions and weight

Dimensions of GRCE.1

You will find the casing dimensions below. All dimensions are given in millimetres.



Dimensions of casing of

Weight:
ca. 340g

8 Electrical and mechanical properties of GMM EC

Mains voltage	100 - 240V +/- 10% 50-60 Hz	
Current consumption	GMM EC/01.(.1, .2)	0.3A
	GMM EC/04 /08 /16 (.1, .2)	0.47A
Heat loss	GMM EC/01.(.1, .2)	approx. 14W
	GMM EC/04.(.1, .2)	approx. 18W
	GMM EC/08.(.1, .2)	approx. 20W
	GMM EC/16.(.1, .2)	approx. 30W
Sensor connection	Pressure transmitter 4-20 mA or temperature sensor GTF210 (-30...+70°C) or standard signal 0-10V	
Ambient temperature	-20...+55°C	
Storage temperature	0 - +50°C dry	
Weights	GMM EC/01.(.1, .2) = 2.6 kg	
	GMM EC/04.(.1, .2) = 2.8 kg	
	GMM EC/08.(.1, .2) = 2.8 kg	
	GMM EC/16.(.1, .2) = 3.9 kg	
	GMM EC/01.(.1, .2) UL = 2.7 kg	
	GMM EC/04.(.1, .2) UL = 2.9 kg	
	GMM EC/08.(.1, .2) UL = 2.9 kg	
	GMM EC/16.(.1, .2) UL = 4.0 kg	
Protection rating	IP 54	
Dimensions	GMM EC/01 /04 /08 (.1, .2)	
	GMM EC/16 (.1, .2)	
	GMM EC/01 /04 /08 (.1, .2) UL	
	GMM EX/16 (.1, .2) UL	

9 Electrical properties of the components

Electrical properties of GRCE.1				
	Min	Type	Max	Unit
Voltage supply	21	24	30	V
Current consumption		80	250 ¹	mA
Digital inputs				
High level	15	24	30	V
Low level	-3	0	5	V
Relay outputs				
Voltage DC		24	30	V
Voltage AC			250	V
Current resistive load 24V DC/250V AC			1	A
Current inductive load 24V DC/250V AC			1	A
Switch cycles, mechanical	1*10 ⁶			Hysteresis
Switch cycles, electrical	1*10 ⁵			Hysteresis
Voltage input				
Dielectric strength	-24		30	V
Measuring range	0		12	V
Resolution			10	bit
Fault			1	% ²
Input resistor:		230		kΩ
Current input				
Dielectric strength	-24		30	V
Measuring range	0		12	V
Resolution			10	bit
Fault			1	% ²
Input resistance (without protective circuit)		130		Ω

Table: Electrical properties of GRCE.1

	Min	Type	Max	Unit
Voltage output				
Voltage range	0		10	V
Load voltage		≥ 100		k Ω
Resolution			10	bit
Fault			2.5	% ²
Short protection	Yes			
Potential separation	No			
Temperature input				
Dielectric strength	-24		30	V
Measuring range	-30		100	°C
Resolution			10	bit
Precision			3	% ²
CAN bus				
Dielectric strength	-24		24	V
Transmission rate		125		kbit/s
Galvanic separation	No			

Table: Electrical properties of GRCE.1

1. The maximum current consumption includes supplying two attached pressure transponders and one attached temperature sensor.
2. Of the appropriate range

10 External control value scaling

The dependencies of the external control value specs for the current value regulations are explained in this table. A 0 ..10V external voltage can, for example, specify a temperature control value. 0V is then equal to a temperature of 0°C and a voltage of 10V is equal to a control value temperature of 100°C.

Current value	Setpoint internal, depending on current value	Setpoint external Current 4 .. 20mA	Setpoint external Voltage 0 .. 10V
Pressure 0 ..25 bar	Pressure 0 .. 50 bar	4mA = 0 bar 20mA = 50 bar	0V = 0 bar 10V = 5 bar
Temperature 0 .. 100°C	Temperature -30 .. 100°C	4mA = 0°C 20mA = 100°C	0V = 0°C 10V = 100°C
Voltage 0 .. 10V	Voltage 0 .. 10V	4mA = 0V 20mA = 10V	0V = 0V 10V = 10V

Table: External control value scaling

11 Parameters after commissioning - Factory setting

	Drycooler		Condenser with refrigerant		Condenser without refrigerant	
Units	SI	IP	SI	IP	SI	IP
Language	English	English	English	English	English	English
Setpoint 2 present	No	No	No	No	No	No
Night-time operation	No	No	No	No	No	No
Bypass	Yes	Yes	Yes	Yes	Yes	Yes
Setpoint displacement	No	No	No	No	No	No
Operating mode	Automatic internal	Automatic internal	Automatic internal	Automatic internal	Automatic internal	Automatic internal
Kp	10.0	10.0	10.0	10.0	20.0	2.0
Ti	25 sec.	25 sec.	25 sec.	25 sec.	40 sec.	40 sec.
Td	0 sec.	0 sec.	0 sec.	0 sec.	0 sec.	0 sec.
Base control value	0%	0%	0%	0%	0%	0%
Start control value	0%	0%	0%	0%	0%	0%
Setpoint 1 (2)	30°C	86°F	40°C (25°C CO2)	104°F (77°F CO2)	12.5 bar	181 psig
Threshold value 1	100%	100%	100%	100%	100%	100%
Night limiter	100%	100%	100%	100%	100%	100%
Manual mode control value	0%	0%	0%	0%	0%	0%
Setpoint displacement ΔT	5 K	5 K	5 K	5 K	5 K	5 K
External temperature displacement min.	0°C	32°F	0°C	32°F	0°C	32°F
External temperature displacement max.	50°C	122°F	50°C	122°F	50°C	122°F
Depends on external temperature disp.	Off	Off	Off	Off	Off	Off
Subcooler function	Off	Off	Off	Off	Off	Off
Heating function	Off	Off	Off	Off	Off	Off
LCMM function	Off	Off	Off	Off	Off	Off

12 Error messages and warnings on the GMM display

The table shows which signal relay (**PRIO 1** or **PRIO 2**) is tripped with which message on the display.

Messages / warnings on the display	PRIO 1	PRIO 2	Explanation
Display dark, GMM off	x		GMM has no supply voltage
Equipment fault	x		All fans off, no cooling on the heat exchanger
“No sensor selected “			No sensor activated in the I/O configuration
Sensor fault x		x	The sensor with no. x has a fault
Disabled			D1 (enable) not switched
Controller 2			Control system 3 activated
Night limiter			Night limiter activated
Fan x cable break		x	Communications fault on fan x (poss. cable break)
Fan x Temp M		x	Temperature fault on fan x, motor
Fan x Temp E		x	Temperature fault on fan x, output stage
Fan x Temp I		x	Temperature fault on fan x, electronics
Fan x wrong VT		x	Fan x wrong VT number
Fan x mains failure		x	Mains failure on fan x
Fan x blocked		x	Fan x blocked
Fan x not OK		x	Fan x internal communication errors in the motor electronics. Caution: This error is also displayed when the mains supply on the fan fails. For 1-phase motors, when the mains fails. For 3-phase motors, when 2 or 3 phases fail.
Fan x Hall sensor		x	Hall sensor on fan x defective
Fan x fault B		x	Fan x braking operation (external operation)
Fan x fault H		x	Fan x intermediate circuit, overvoltage
Fan x fault L		x	Fan x intermediate circuit, undervoltage
Fan x mains overvoltage		x	Fan x mains overvoltage
Fan x mains undervoltage		x	Fan x mains undervoltage

Table: Error messages / warnings on the display

PRI0 1	= Relay contacts 11/12	
PRI0 2	= Relay contacts 21/22	
System message	= Relay contacts 31/34	if control signal > 0%
Threshold value	= Relay contacts 41/42	the contacts close when the control signal has reached the set threshold. See Threshold value, Page 49

13 Fan IDs

Fan #	Heat exchanger / Device		Use until	EC fans			
	Series	Type		Motor type	Fan ID	Working point Max. speed n [min-1]	Voltage [V]
450	GVH/V.1	NW		VT03007U	1185	1250	230
		LW		VT03006U	1186	1000	230
		SW		VT03006U	1187	770	230
	GVX.1	NW		VT03007U	1185	1250	230
		LW		VT03006U	1272	900	230
		SW		VT03006U	1273	750	230
	S-GHN			VT03070U	1738	1240	230
500	GVH/V.1 / GFH/V.0 / GVHX.1	ND		VT03013U	1188	1500	400
		NS		VT03011U	1189	1140	230
		NJ		VT03013U	1188	1500	400
		NW		VT03013U	1188	1500	400
		LD		VT03011U	1190	1000	230
		LS		VT03009U	1191	785	230
		LJ		VT03011U	1190	1000	230
		LW		VT03011U	1190	1000	230
		SD		VT03009U	1191	785	230
		SS		VT03009U	1192	610	230
		SW		VT03009U	1191	785	230
		ED		VT03009u	1193	660	230
		ES		VT03009U	1194	385	400
	GVX.1	ND		VT03012U	1195	1455	400
		NS		VT03010U	1196	1070	230
		LD		VT03010U	1197	930	230
		LS		VT03008U	1200	620	230
		SD		VT03008U	1198	710	230
		SS		VT03008U	1201	570	230
		ED		VT03008U	1199	640	230
		ES		VT03008U	1271	375	230
	Other			VT03013U	1396	1100	400
				VT03009U	1240	750	230
650	GVH/V.1 / GFH/V.0	ND		VT03017U	1202	1300	400
		NS		VT03016U	1203	1050	400

Fan #	Heat exchanger / Device		Use until	EC fans			
	Series	Type		Motor type	Fan ID	Working point Max. speed n [min-1]	Voltage [V]
		NJ		VT03017U	1202	1300	400
		LD	05/2010	VT03016U	1204	890	400
		LD		VT03071U	1744	890	230
		LS		VT03015U	1205	745	230
		LJ	05/2010	VT03016U	1204	890	400
		LJ		VT03071U	1744	890	230
		LW		VT03071U	1744	890	230
		SD		VZ03015U	1206	715	230
		SS		VT03014U	1207	550	230
		SW		VT03015U	1206	715	230
		ED		VT03014U	1208	615	230
		ES		VT03014U	1209	400	230
		EW		VT03014U	1208	615	230
	Other			VT03071U	1826	1310	400
710	GVX.1 / GVHX.1	ND		VT03021U	1279	1220	400
		NS		VT03021U	1278	900	400
		MD		VT03021U	1280	1150	400
		MS		VT03021U	1281	960	400
		LD		VT03020U	1274	845	400
		LS		VT03020U	1275	720	400
		SD		VT03020U	1276	620	400
		SS		VT03035U	1282	500	230
		ED		VT03035U	1283	415	230
		ES		VT03035U	1284	340	230
800	GVH/V.3 / GFH/V.3 / GVW.2 / GFW.2 / GVD.2 / GFD.1	ND		VT03025U	1210	975	400
		NS		VT03025U	1211	770	400
		NJ		VT03025U	1241	900	400
		NL		VT03025U	1210	975	400
		MD		VT03025U	1212	865	400
		MS		VT03023U	1213	600	230
		MJ		VT03024U	1242	700	400
		ML		VT03025U	1211	770	400
		LD		VT03024U	1219	735	400
		LS		VT03023U	1214	575	230



Fan #	Heat exchanger / Device		Use until	EC fans			
	Series	Type		Motor type	Fan ID	Working point Max. speed n [min-1]	Voltage [V]
		LJ		VT03023U	1243	545	230
		LL		VT03023U	1213	600	230
		LL		VT03024U	1741	600	400
		SD		VT03023U	1237	470	230
		SS		VT03022U	1216	380	230
		SJ		VT03022U	1217	435	230
		SL		VT03023U	1237	470	230
		SL		VT03024U	1742	500	400
		ED		VT03022U	1217	435	230
		ES		VT03022U	1218	300	230
		EJ		VT03022U	1216	380	230
		EL		VT03022U	1217	435	230
	GVD.1 / GFD.1 Jumbo	ND		VT03059U	1656	1000	400
		ND		VT03059U	1657	770	400
		NJ		VT03059U	1659	900	400
		NL		VT03059U	1656	1000	400
		MD		VT03059U	1658	865	400
		MS		VT03061U	1662	600	230
		MJ		VT03060U	1661	710	400
		ML		VT03059U	1657	770	400
		LD		VT03060U	1660	735	400
		LS		VT03061U	1663	575	230
		LJ		VT03061U	1665	545	230
		LL		VT03061U	1662	600	230
		SD		VT03061U	1664	470	230
		SS		VT03062U	1682	380	230
		SJ		VT03062U	1683	435	230
		SL		VT03061U	1664	470	230
		ED		VT03062U	1683	435	230
		ES		VT03062U	1684	300	230
		EJ		VT03062U	1682	380	230
		EL		VT03062U	1683	435	230
	Other			VT03025U	1828	1000	400
				VT03059U	1830	975	400



Fan #	Heat exchanger / Device		Use until	EC fans			
	Series	Type		Motor type	Fan ID	Working point Max. speed n [min-1]	Voltage [V]
900	GVH/V.3 / GFH/V.3 / GVW.2 / GFW.2 / GVD.2 / GFD.1	NS		VT03029U	1221	910	400
		MD		VT03030U	1220	960	400
		MS		VT03028U	1222	690	400
		MJ		VT03030U	1220	960	400
		ML		VT03030U	1220	960	400
		LD		VT03027U	1223	570	400
		LS		VT03026U	1226	355	230
		LJ		VT03028U	1244	825	400
		LL		VT03028U	1244	825	400
		SD		VT03027U	1224	610	400
		SS		VT03026U	1227	485	230
		SJ		VT03027U	1245	650	400
		SL		VT03027U	1245	650	400
		ED		VT03027U	1225	530	400
		ES		VT03026U	1228	335	230
		EJ		VT03026U	1227	485	230
		EL		VT03027U	1225	530	400
	GVD.1 / GFD.1 Jumbo	NS		VT03064U	1671	910	400
		MD		VT03063U	1668	960	400
		MS		VT03065U	1672	690	400
		MJ		VT03063U	1688	960	400
		ML		VT03063U	1688	960	400
		LD		VT03066U	1674	570	400
		LS		VT03067U	1678	355	230
		LJ		VT03065U	1673	825	400
		LL		VT03065U	1673	825	400
		SD		VT03066U	1675	610	400
		SS		VT03067U	1679	485	230
		SJ		VT03066U	1677	650	400
		SL		VT03066U	1677	650	400
		ED		VT03066U	1676	530	400
		ES		VT03067U	1680	335	230
		EJ		VT03067U	1679	485	230
		EL		VT03066U	1676	530	400



Fan #	Heat exchanger / Device		Use until	EC fans			
	Series	Type		Motor type	Fan ID	Working point Max. speed n [min-1]	Voltage [V]
1000	Other			VT03030U	1391	920	400
				VT03030U	1325	910	400
	GVH.2 / GFH.2	ND		VT03032U	1233	935	400
		NS		VT03031U	1229	735	400
		LD		VT03031U	1229	735	400
		LS		VT03031U	1230	525	400
		SD		VT03031U	1231	640	400
		SS		VT03031U	1232	470	400
		ED		VT03031U	1238	575	400
		ES		VT03031U	1239	380	400

14 Troubleshooting tips

Errors	Possible cause, suggested solution
Fans are not turning	If NOTHING happens when the controller is switched on and nothing in the either as a setpoint or a current value, check the Operating mode and the I/O configuration. The operating mode appears on the far right of the 2nd line (A = automatic, S = slave mode, H = manual mode). The wrong input function has been chosen for the selected operating mode in the I/O configuration. • If the setpoint and the actual value appear in the Info menu, but the setpoint does not match the set setpoint, check the mode for any setpoint that may have been set externally • Check the power supply and the cable to the fan for faults (cable break etc.). • Has the sensor failed? Check: • 2-wire pressure sensor: Must deliver 4-20 mA (check with ampmeter). • Temperature sensor: Measure the impedance; it must be between 1200 and 2700 Ohm. Lower values indicate a short circuit or similar fault (e.g. water in the terminal box), higher values indicate a loose connection or cable break. • Standard signal: May be between 0 and 10V. If it is permanently at 0V, a defect is probable.
Fan does not reach its maximum speed or runs too slowly in normal operation	• Is the limiter active? The maximum fan speed is limited to the speed set here. Check the setting! • The control system may be incorrectly set up. • The fan speed increases when you increase the setpoint. If this does not help, you can adjust the Kp factor carefully: if the Kp factor is increased, the fan will reach its maximum speed quicker. NOTE: too great an increase in the Kp factor can lead to "oscillation"! If this happens, reduce the Kp factor again. • Is the sensor delivering a correct signal? If it is too low, the fan will not reach the requisite speed. Check: • Temperature sensor: Has the sensor been installed correctly? An incorrect value will be recorded near heat sources or e.g. in direct sunlight. Check the sensor and wiring! (Cable break? Has a wire come loose from the connection terminals?) • Standard signal 0-10V: Measure the signal on the terminals using a multimeter. It must be between 0 and 10V. Is the polarity correct? • Pressure transmitter: The 2-wire sensor delivers 4-20 mA; check this value (ammeter). If the value is not within this range or remains constant even when the pressure changes, the pressure transmitter is defective.

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