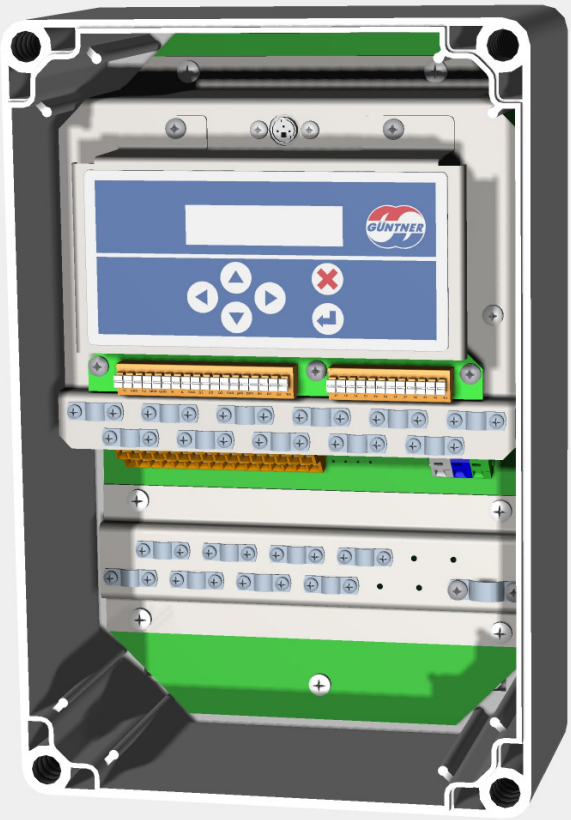
Operating instructions
Güntner Motor Management GMM

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



		UL Version
Series:	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

Status: 2009-09-03

Version: 1.2

Safety instructions

In order to prevent serious physical injuries or major material damage, work on/with the equipment may only be performed by authorised persons with the appropriate training and qualifications who are familiar with the setup, 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 IP00! The applicable national accident prevention regulations must be followed when working on controllers under voltage.

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.

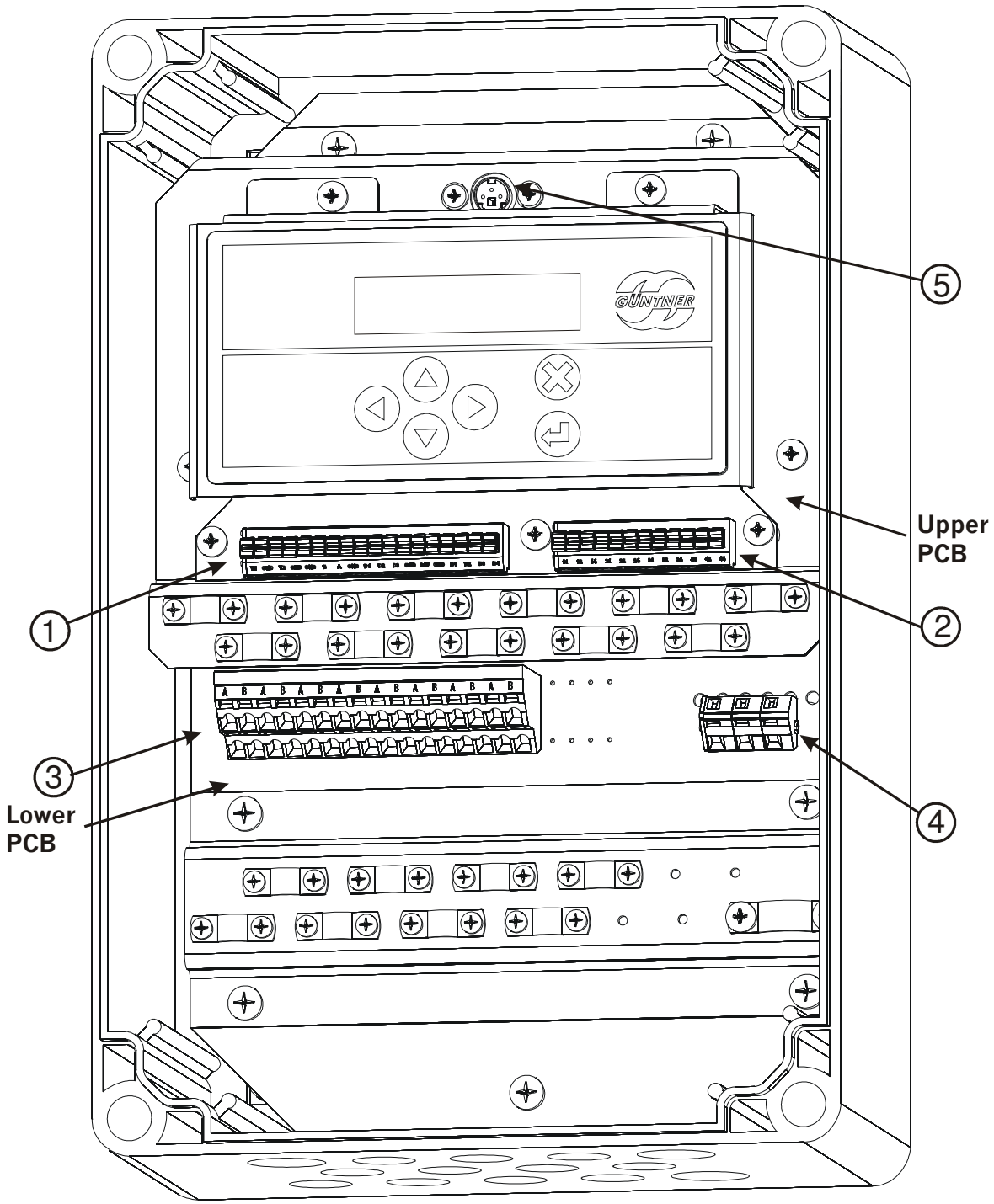
The electrical installation must be performed in accordance with the relevant regulations (e.g. cable cross-section, fuses, earth conductor connection etc.). Additional information is included in the documentation. If the controller is used in a particular area of application, the requisite standards and regulations must be followed.

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.

Contents

Fig. 1.1 Location of connections on the GMM EC/08



(1) Analogue and digital inputs and outputs (see page 15).
(2) Potential-free signalling outputs (see page 14)
(3) EC fan connections 24 V DC, communication connection (see page 13)
(4) Mains connection (see page 12)
(5) Connection for software update (see separate description)

1. General

The GMM series controllers are microprocessor control systems in a weather-resistant and impact-proof polycarbonate housing for the management and speed control of EC fans.

The connected fans must be EC fans!

The equipment is controlled by means of menus using a 2-line display and an input keyboard.

The control component operates as a PID controller. The PID controller (proportional-integral-derivative) consists of the P part Kp, the I part and the D part. The controller continuously compares the setpoint signal with the actual value measured and traced back and establishes a correcting variable from the difference between the two values, which influences the control route in such a way as to minimise the control deviation.

The GMM management functions ensure simple commissioning and maintenance of the EC fans and setup of the EC fans on the design point of the heat exchanger. In addition, operating and alarm messages in plain text are shown in the display.

Any changes in models meeting customer-specific requirements and hence deviating from the standard type are described separately and enclosed with these instructions. Always keep both documents together!

1.1 Classification

Güntner Motor Management for EC systems *GMM EC/*

01 04 08 16 = Number of control outputs for EC fans *X*

Code only for UL models (on mounting plate) *UL*

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

UL examples:

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

Special models are not covered by this device code

1.2 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!

1.3 Warranty and liability

The current General Terms and Conditions of Güntner AG & Co. KG are applicable. See the web site of Güntner AG & Co. KG.

1.4 Manufacturer and supplier address

If you have any questions, feedback or special requests, please contact

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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** exchangeable microfuses built into the GMM for semiconductor and motor protection. The equipment must be fused with a C 2A pro phase circuit breaker provided by the customer.

A 250 V / 1 A fuse is built into the **UL** model on the 24 V side.

Fan connection:
depending on the model, there are 1 to 16 bus outputs for the EC fans on the **lower PCB** on the GMM (see image page 6):
Communication interface: Terminals **A** and **B** (top row)
24 volt fan power supply: Terminals **+** 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**	**1** (brown) on **+24V** **2** (green) on **B1** or **B2**
	Temperature sensor	**1** (white) on **B3** **2** (brown) on **GND**
	Standard Signal (0...10V)	**Plus** (**+**) on **B4** **Minus** (**-**) on **GND**

Signalling outputs
Connections for the signalling outputs see page 14.

Enabled
The function of the 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)

Language
The default language on delivery is **English**. The display language can be changed in the Language menu option (see page 31).

Time
The date and time can be set in the Time menu option (see page 32). The time, date and error code are stored in the log in the event of a fault.

The GMM is generally operational once the above settings are made.

"Manual" mode can be selected to check the functioning of the GMM. To do this, select the "Manual mode" menu option with the ▼ key and then confirm with the ► key. Scroll to the "Manual mode on" menu option using the ▲▼ keys and select the function with the <┘ key. A * appears at the end of the first line and indicates that this function is now selected. Now use the ▼ key to navigate to the control value function and select it with the ► key. The control value (0 - 100%) is displayed. This control value can now be modified by pressing the <┘ key. As soon as the change has been confirmed with the <┘ key, the fans will run with this control value.

If manual mode is deactivated again after this test, the GMM will revert to the set mode.

Mode	The default mode setting is "**Automatic internal**". This means that the controller controls to the defined setpoint. For this to be possible, a setpoint must be entered (see page 28) and the input for the actual value must be defined in the I/O configuration (see page 45). The control parameters Kp. Ti and Td can still be modified in the service menu.
Limiter	The speed of the fans can be limited e.g. to limit noise emissions at night. This value is set in the Night setback menu option. The night setback is activated either via input **D2** or via the timer which is programmed in the Night setback menu option (see page 29).
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 "**Limiter**" and "**Setpoint switchover**" functions generally need to be activated in the service menu (see page 41).

3. Installation of the GMM, cabling

3.1 EMC-compliant installation

The GMM EC/01-16 series controllers meet the requirements of resistance to EMC interference in accordance with EN 61000-6-2 and emissions in accordance with EN 61000-6-3.

They also comply with standards IEC 61000-4 -4/-5/-6/-11 for grid-bound interference. In order to guarantee EM compatibility, the following points must be noted:

- The equipment must be properly earthed
- All measurement and signalling cables (only use measurement cables e.g. LIYCY 3x0.5², not telephone cables!) must be shielded.
- 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 measurement, signalling and bus cables must be earthed *unidirectionally*.
- Signalling and control cables must be laid separately from mains and motor cables e.g. in separate cable ducts.

3.2 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, the temperature inside the switch cabinet **must** be heeded (see permissible ambient temperature page 59).
- 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.

3.3 Cable laying, shielding

In principle **sensor cables** and **bus cables** must be laid separately from the motor and mains cables i.e. not in the same cable duct. Shielded cable must be used.

4. Connection

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.

4.1 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 with automatic cable protectors with characteristic "C 2".

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

IMPORTANT: The heat exchanger fans must not be switched on/off by switching the mains on/off, but only via the switch.

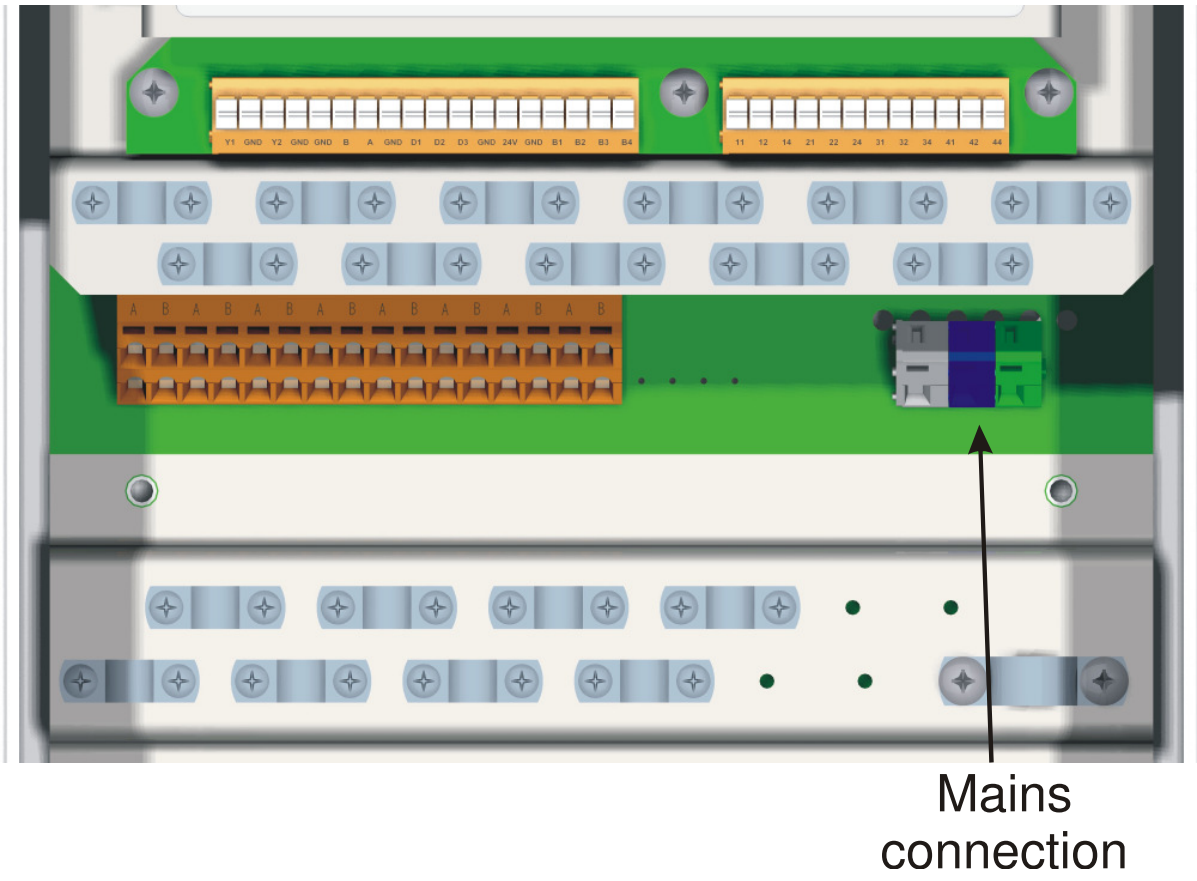


Fig. 4.1.1: GMM mains connection

4.2 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:

The communications and the DC power supply for the fans are connected on the GMM's double-level terminal block (see point 3 on equipment connection diagram page 6).

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.

Communications connection: Terminal **A** (white) and **B** (blue) **top row**

24 volt power supply: Terminal **+** (red) and **–** (black) **bottom row**

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

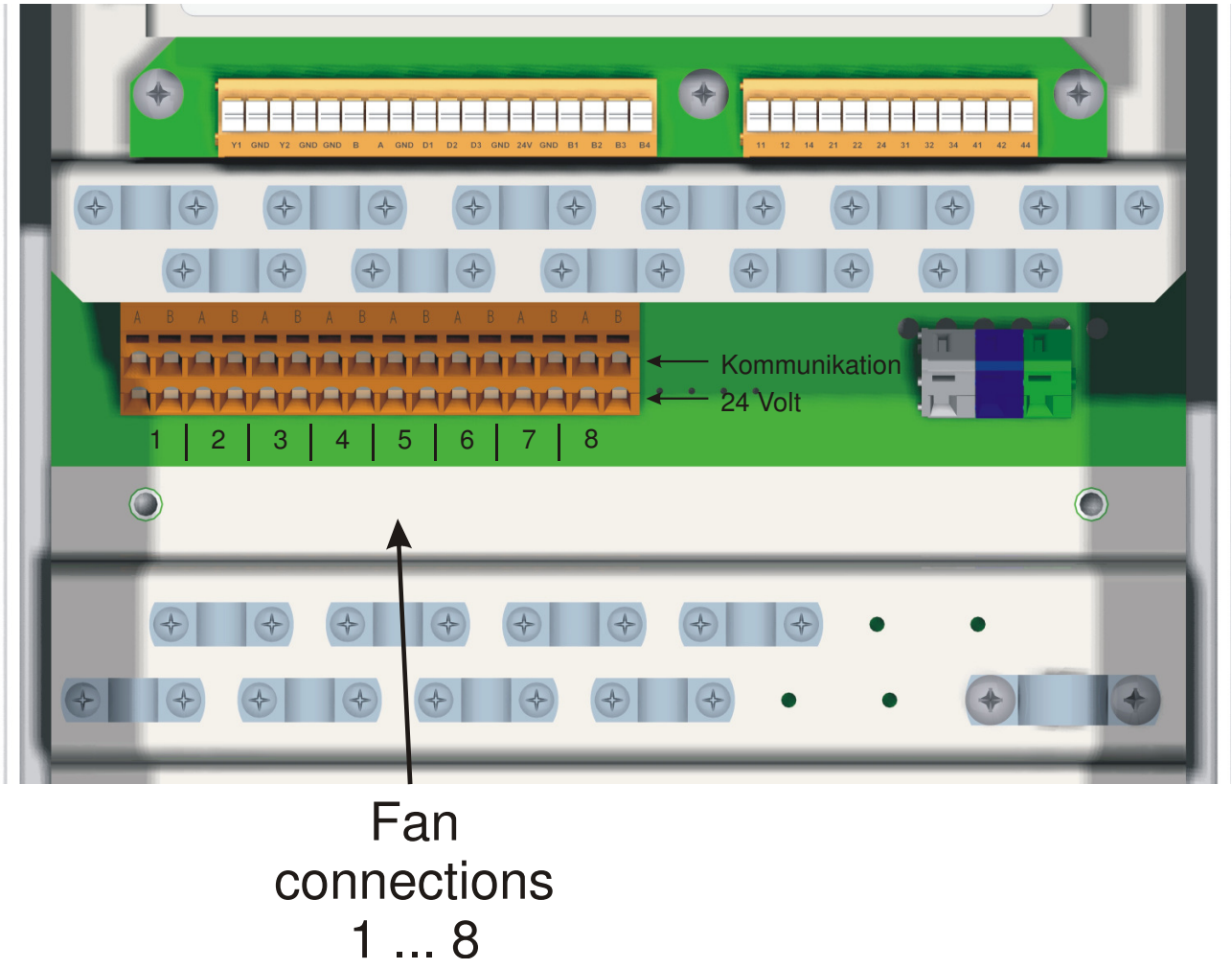


Fig. 4.2.1 GMM fan connections

5. Potential-free signalling outputs

For safety reasons, the potential-free signalling outputs (two-way contacts) are designed such that the corresponding signalling relay *drops out* i.e. the break contact of the corresponding two-way contact closes, when an event occurs. As a result a fault is also reported when a fault causes the power to the GMM to be interrupted (e.g. failed power supply).

5.1 Digital output (11/12/14) (priority 1 alarms)

All signals on the **Priority 1** output are faults signalling the complete failure and shutdown of the heat exchanger.

The signalling relay has contacts 11/12/14. An alarm is signalled in the following situations:

- e.g.: all fans have failed (hardware error)
- Error messages and alarm assignment see table page 65

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.

5.2 Digital output (21/22/24) (priority 2 alarms)

All signals on the **Priority 2** output are events that do not result in the complete failure of the heat exchanger. These are warnings that the operation of the heat exchanger is impaired.

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 table page 65

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.

5.3 Digital output (31/32/34) (in operation)

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

5.4 Digital output (41/42/44) (threshold)

You can set a threshold on the GMM. If the control value from the GMM to the fans exceeds this threshold, signalling relay 4 (contacts 41/42/44) is tripped. This can be used, for example, to switch a solenoid valve, control an actuator, activate a spray etc.

The threshold is not a FAULT, it is just a 2-point controller with an adjustable switching point. Do not add this contact to your fault report!

As soon as the set threshold is exceeded, the two-way contact 41/42 is closed. The load on this potential-free contact must not exceed 250 V / 1 A.

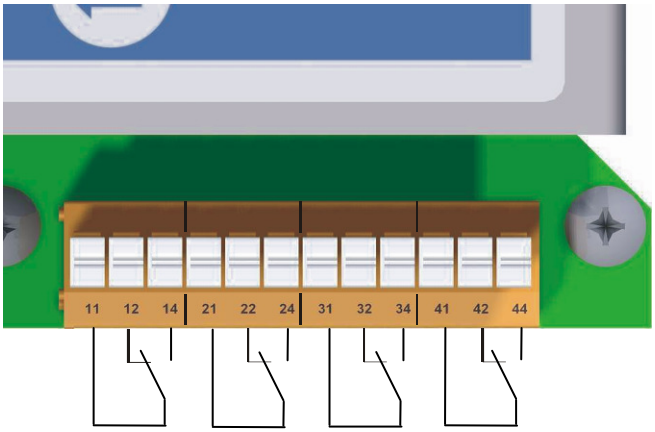


Fig. 5.4.1: Signalling outputs

6. 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 **GND** terminal and the control input **D1** or **D2** or **D3** (see figures below). The function is activated when the contact is closed.

Under no circumstances must you apply mains voltage or work with other external voltage! Nor may 24 V be applied; the internal earth from the GND terminal must be connected through!

6.1 Enabling the GMM

The fans are enabled via terminal "**D1**" (enabling). The speed then depends on the control value. Terminal **D1** must be connected to terminal **GND** for the GMM to be enabled.

If this terminal is not connected to **GND**, the fans will be disabled (speed = 0).

*If the GMM is not to be enabled externally, terminal **D1** must be connected to terminal **GND** using a jumper!*

This enabling jumper is always built in at the factory.

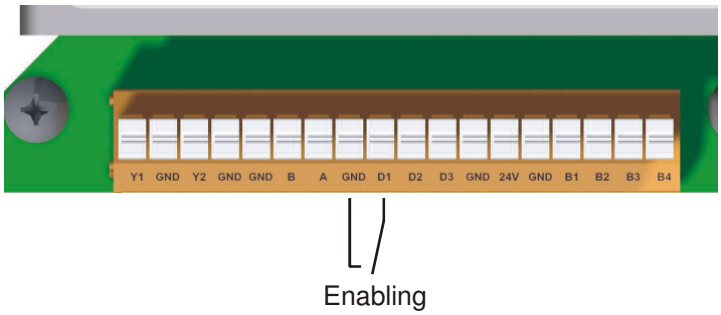


Fig. 6.1.1.: Connecting the external enabling contact

IMPORTANT: Under no circumstances may the controller be disabled by interrupting the mains voltage! Continuous switching of the supply voltage can lead to damage to the controller that is not covered by the warranty!

6.2 Speed limiter (night setback)

The (night) speed limiter is activated via terminal "**D2**". If this terminal is connected to the **GND** terminal, the control signal, and hence also the fan speed, is limited to the adjusted value. The GMM will not exceed the speed set there. For setting the speed limiter, see section "**Setpoints**" on page 28 and for general activation see section "**Service**" on page 41.

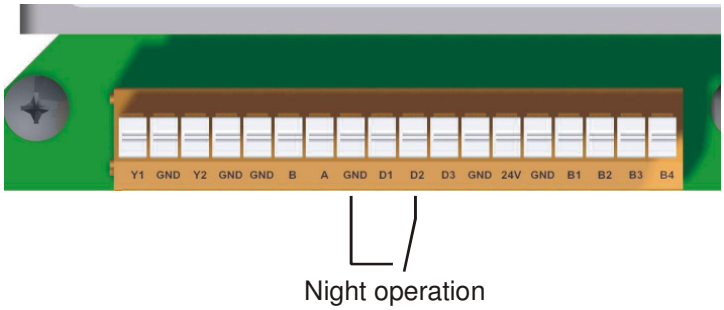


Fig. 6.2.1: Activating the speed limiter

6.3 Switching to 2nd setpoint

The second setpoint, the second setpoint shifting and the second threshold are activated via terminal "**D3**". This allows you to select two different control characteristics (e.g. summer and winter mode) via one input.

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

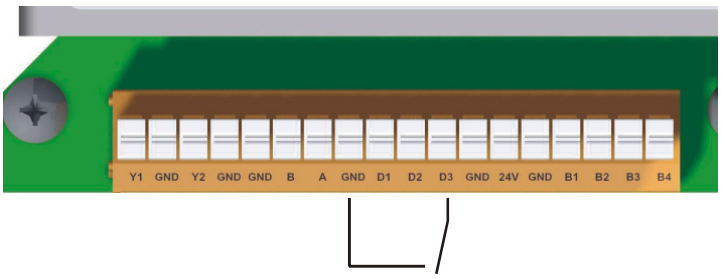


Fig. 6.3.1: Switchover from control system 1 to control system 2

7. Sensor connection

The GMM has four sensor inputs. Two of these four inputs are current inputs (4 - 20 mA) (**B1** and **B2**). One input **B3** is an input for impedance sensors (PTC). A voltage source of 0 - 10 V DC can be connected to the fourth input **B4**.

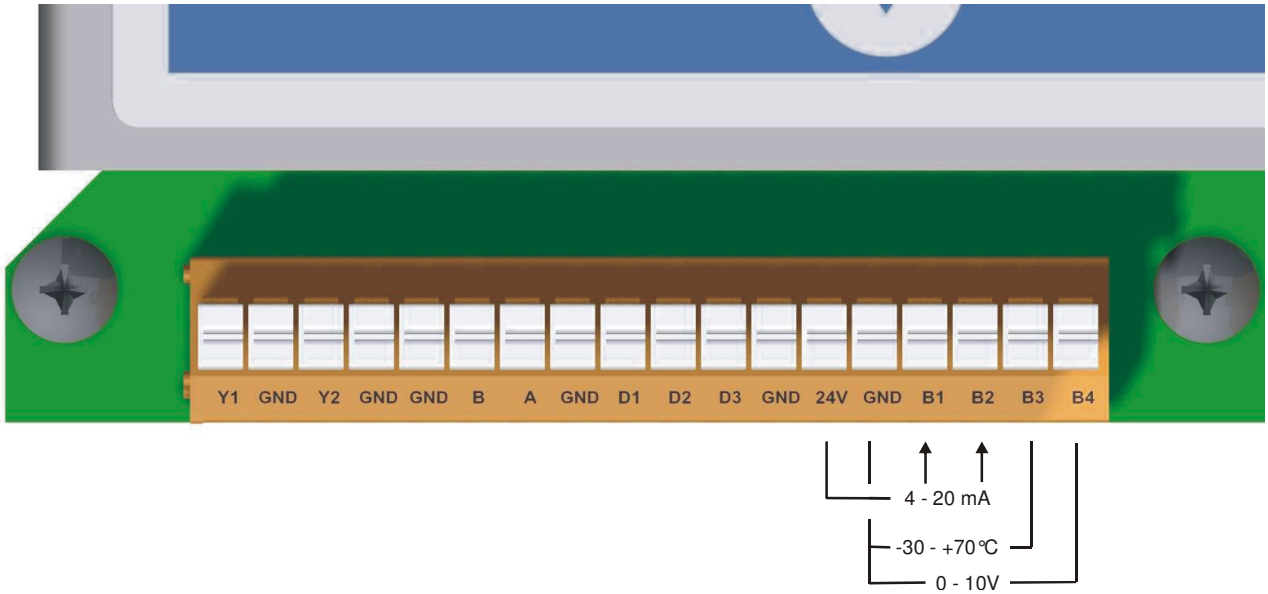


Fig. 7.1.1: Sensor connections

7.1 Pressure transmitter

1 or 2 sensors (2-wire sensors) can be connected:

+24V	= Common supply voltage	(GS4003: red core,	GSW4003: core "1")
B1	= 4-20mA signal from sensor 1	(GS4003: blue core,	GSW4003: core "2")
B2	= 4-20mA signal from sensor 2	(GS4003: blue core,	GSW4003: core "2")

If you connect two pressure transmitters and both pressure transmitter inputs are configured for internal control in the I/O configuration (see **Service - I/O configuration** menu on page 45), the greater signal is forwarded to the control system and used for speed control (MAX - select between the two pressure transmitters).

NOTE: Older 3-wire sensors with a 4-20 mA signal output can also be connected but also require an earth 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.

7.2 Temperature sensor

A temperature sensor is always connected on the following terminals:

GND = Earth
B3 = Signal input

There is no particular sequence for the cores.

The Güntner GTF210 temperature sensor is used in a range from -30°C to +70°C. Please contact us for other temperature ranges.

To test a temperature sensor that may be defective, you can 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 kΩ (-50°C) and 3.27 kΩ (+100°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	2152 Ω	35°C
1095 Ω	-45°C	2230 Ω	40°C
1150 Ω	-40°C	2309 Ω	45°C
1207 Ω	-35°C	2390 Ω	50°C
1266 Ω	-30°C	2472 Ω	55°C
1325 Ω	-25°C	2555 Ω	60°C
1387 Ω	-20°C	2640 Ω	65°C
1449 Ω	-15°C	2727 Ω	70°C
1513 Ω	-10°C	2814 Ω	75°C
1579 Ω	-5°C	2903 Ω	80°C
1645 Ω	0°C	2994 Ω	85°C
1713 Ω	5°C	3086 Ω	90°C
1783 Ω	10°C	3179 Ω	95°C
1854 Ω	15°C	3274 Ω	100°C
1926 Ω	20°C	3370 Ω	105°C
2000 Ω	25°C	3467 Ω	110°C
2075 Ω	30°C		

Fig. 7.2 Temperature/impedance table

7.3 0-10V standard signal

A standard signal (0-10V) is always connected on the following terminals

GND = Earth (negative)
B4 = Signal input 0-10V DC (**max. 12V DC**)

Make sure the polarity is correct (earth to **GND**, signal to **B4**)!

The 0-10V input is mostly used to operate the controller in slave mode. To do this, this input must be defined as a slave input in the I/O configuration. The 0-10V input signal is scaled 0-100% in a control signal and passed on to the fans.

As an alternative, you can also connect a GHP manual potentiometer as a remote control. The connecting terminals on the GHP are labelled with either **1/2/3** or **+/–/Y**.

+ or **3** on **+24V**
– or **1** on **GND**
Y or **2** on **B4**

You can then use the speed controller purely as a speed adjuster and specify the fan speed yourself manually.

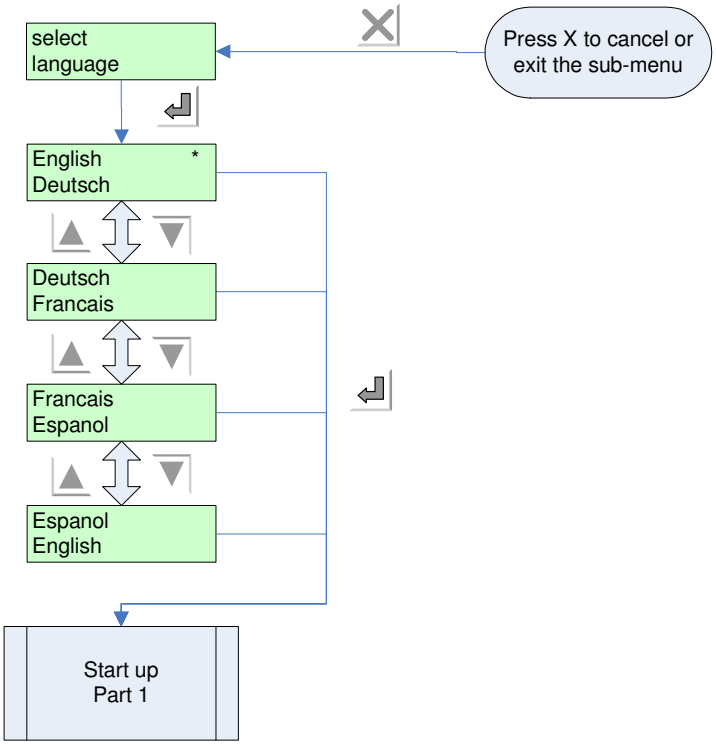
8 Commissioning the GMM

With the GMM, the fans are controlled via a bus. These fans must be set up and checked for the condenser or drycooler depending on the design of the heat exchanger. These settings and checks are necessary on initial commissioning and possibly when a fan is changed. The power and volume of the heat exchanger are defined by this commissioning. The table on page 66 shows the fan ID and fan type for various 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.

8.1 Start-up menu

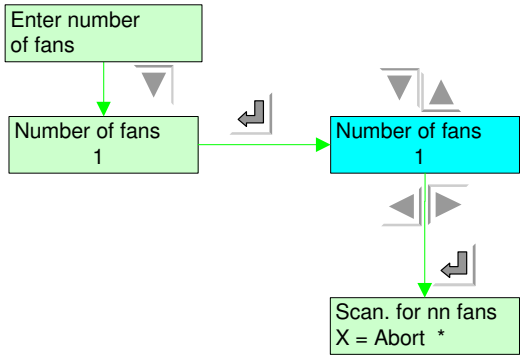
The default language for commissioning is English, even if a different language has been selected for the display. However, the commissioning language can be freely selected and only applies to the commissioning menu.



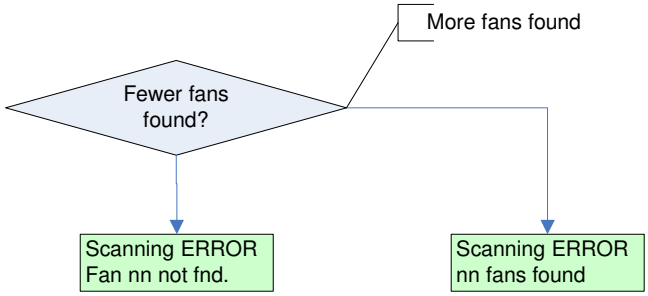
You can exit the start-up menu at any time by pressing the **"X"** key.

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

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



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

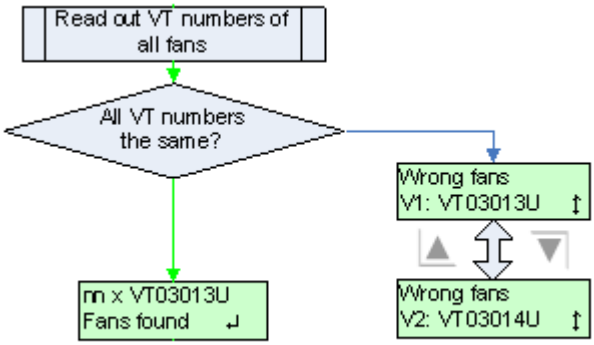


If fewer fans are found, the numbers of all the fans not found are displayed.

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

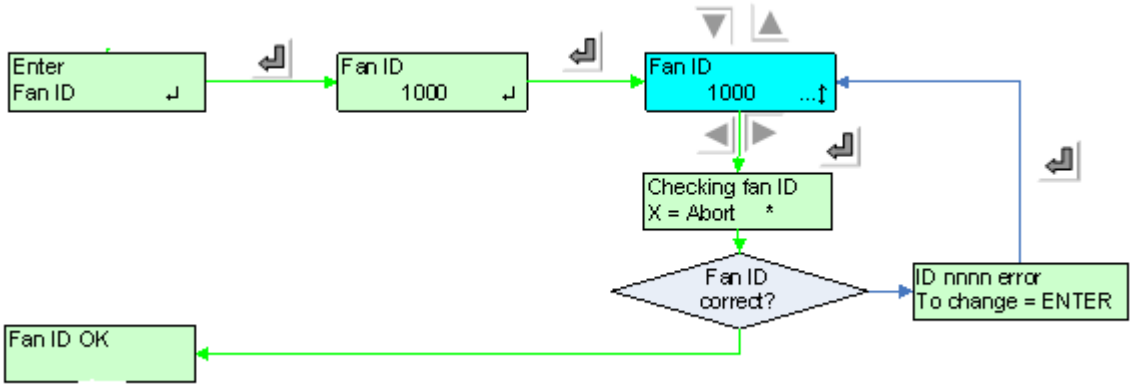
If the search is successful i.e. the specified number of fans is found, the VT numbers of the fans is read out. The VT number is the type designation of the motor.

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

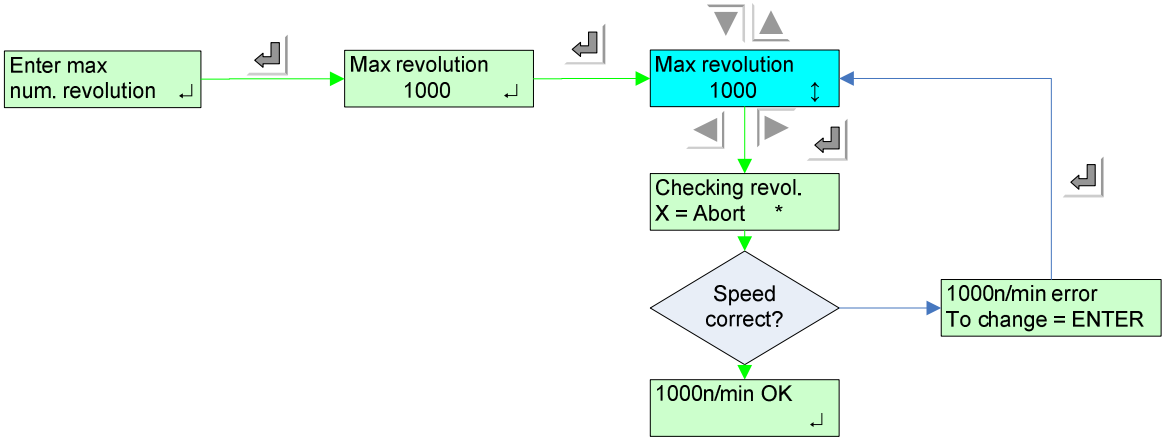


It is then not possible to continue commissioning since all the fans must have the same VT number. It is now essential to change the fans with the incorrect VT number. The VT numbers are printed on the type plate of the fans.

If all the VT numbers of the fans are now the same, the ID number of the fans is entered in the next step. The ID number represents the working point of the fan for the heat exchanger. For the corresponding fan ID, please refer to the wiring diagram of the heat exchanger or to the table on page 66.



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



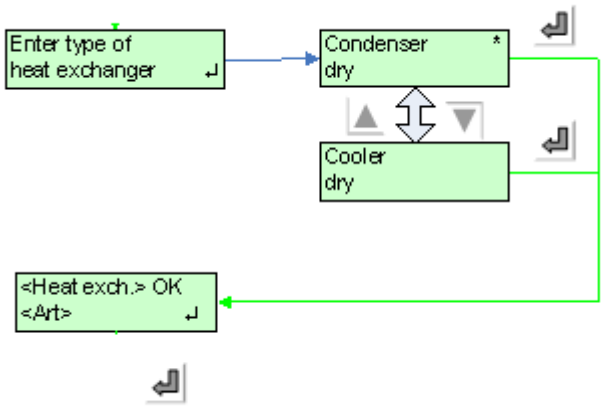
After input, the **GMM** checks the fan ID. The text cycle is indicated by a flashing ***** in the display. If the fan ID is incorrect, you are prompted to make a correct input. Press the **"ENTER"** key to return to the ID input. However, you can also abort the process by pressing the **"X"** key. If 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. 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 be prompted again to correct the input.

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



A condenser (e.g. GVH etc.) or a drycooler (e.g. GFH etc.) may be set up.

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 marked with a "*".

The default value is "**bar**".

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

If all the parameters have now been entered, they are saved. This takes a few seconds.

This completes commissioning and the GMM displays the "INFO" menu.

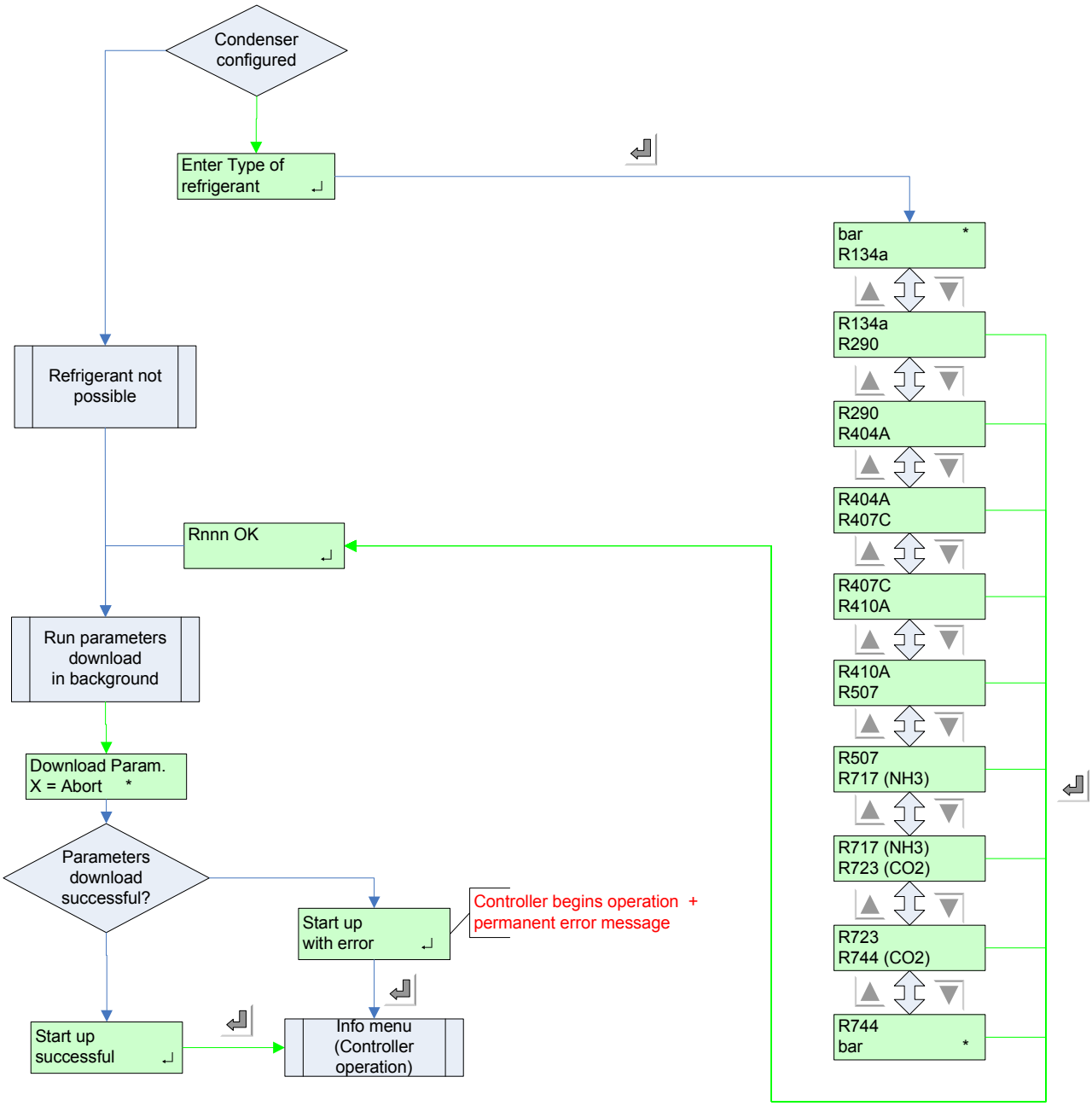
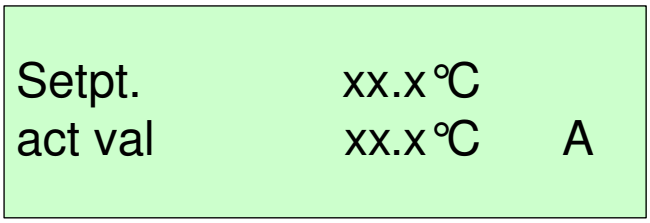


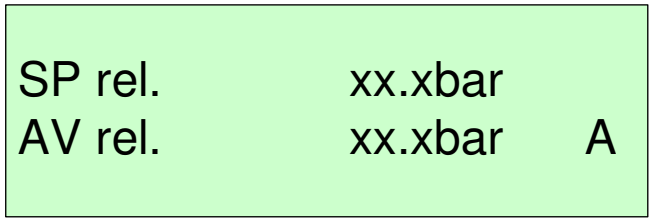
Fig. 8.1 Selection of refrigerant

9. Display and operation

Information is shown on a 2-line display with white text on a blue background. A membrane keyboard is used for input and to operate the controller.

9.1 Info menu





The **setpoint** is displayed in the first line of the info menu. It can be displayed as a pressure or temperature value depending on the cooler type condenser or drycooler) and whether or not a refrigerant is specified for the condenser. The following display assignments are possible:

		Display	
Condenser:	no refrigerant	Pressure (relative)	
	refrigerant	temperature	Refrigerant-dependent
Drycooler:		temperature	

The **actual value** is displayed using the same assignment in the second line of the display.

The last character in the second line of the display indicates the **operating mode** of the controller. The following displays are possible:

A	Automatic mode	Static display
S	Slave mode	Static display
H	Manual mode	Static display
F	Priority 1 error	Alternating with default display
W	Priority 2 warning	Alternating with default display

Fig. 9.1.1: Error display abbreviations

A	**Automatic mode**	In this mode, the actual value (relative pressure, temperature) follows the defined setpoint.
S	**Slave mode**	In this mode, there is no separate control; instead the setpoint for the fans is supplied externally, normally via the 0-10V input where 10 volts is equivalent to 100% modulation.
H	**Manual mode**	In this mode, the setpoint (in %) for the fans is displayed. The value is entered via the control panel.

F	**Error**	This status display appears alternating with the mode (A/S/H) and indicates a priority 1 error (centralised fault / fan and hardware error) The error is also displayed as plain text in line 2, again alternating with the actual value.
W	**Warning**	This status display appears alternating with the mode (A/S/H) and indicates a priority 2 warning (sensor fault).

In addition to the error messages in plain text, controller switching functions are displayed in alternation with the actual value.

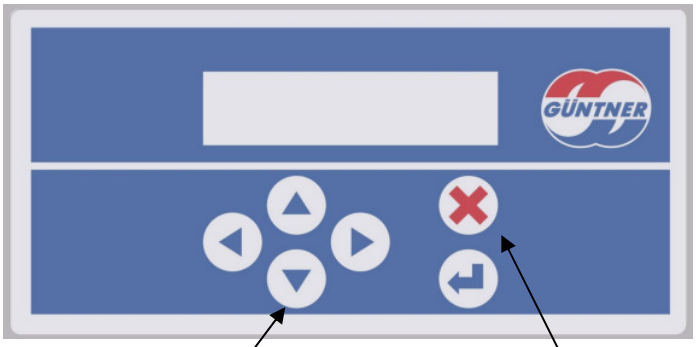
These are the two messages **-Night setback-** and **-Disabled-**.

The **Night setback** message appears when the max. control value of the controller is limited.

The **Disabled** message appears when input **D1** is not connected to **GND**, i.e. the controller is deactivated.

You can navigate through the menu using the membrane keyboard. The right hand side of the display shows information on which keys can be used.

<┘	Enter key for entering values or activating a function.
>	Right arrow for moving to the next menu level.
<	Left arrow for moving to the previous menu level.
↕	Up/down arrow for scrolling through the menu level.



Use this key to move from the **INFO** menu to the **Operating menu**.

Use this key to return to the **INFO** menu at any time.

Fig. 9.1.2: Controls

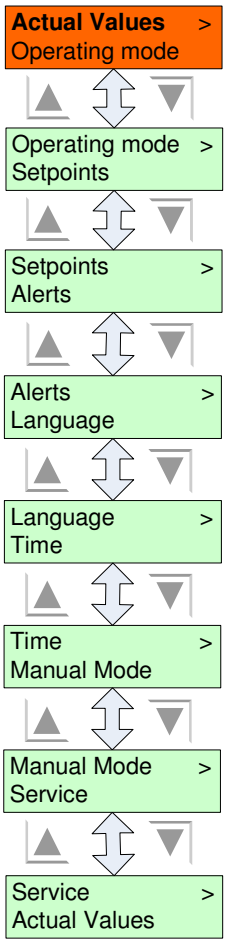
9.2 Operating menu

A selection of menu options are displayed in the operating menu. You can use the ► key to move to the menu option displayed in the first line.

The individual menus are selected using the ▲▼ keys.

If you want to edit values, enter EDIT mode by pressing the <┘ key. There you can use the ◄► keys to select the item for which the value should be modified.

The keys that can be selected are displayed in the last character of a line in every menu.



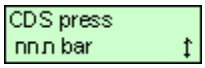
9.2.1 Actual values

The current values for input signals, control values, fan speed and power are displayed here.

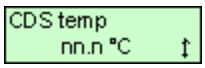
9.2.1.1 Input actual values

Multiple values are displayed when the Actual 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 drycooler) and the control mode (automatic or slave).

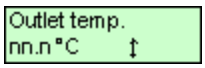
Condenser no refrigerant



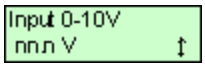
Condenser refrigerant selected



Drycooler

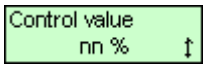


Slave via 0-10V



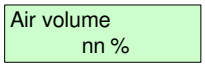
9.2.1.2 Control value

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



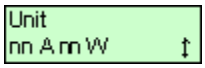
9.2.1.3 Air volume

This displays the average control value of all fans in percent. This value is fed back by the fans.



9.2.1.4 Overall power

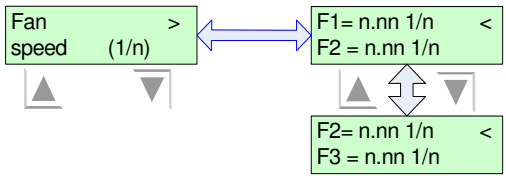
This displays the link power of all connected fans. The power is calculated from the intermediate circuit voltage and the intermediate circuit current



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

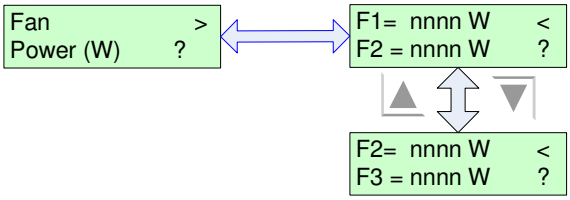
9.2.1.5 Fan speed

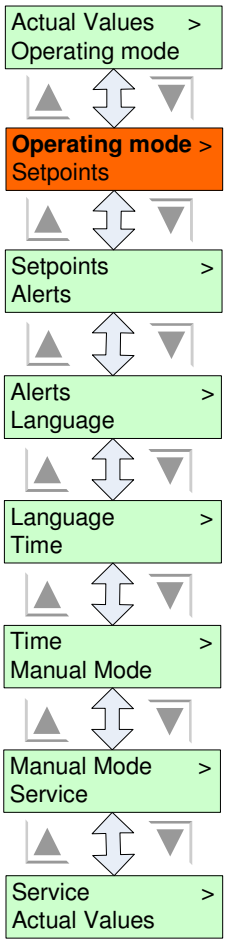
The current fan speed of each individual fan is displayed here. The list length is limited by the number of fans connected.



9.2.1.6 Fan power

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



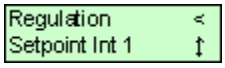


9.2.2 Operating mode

The heat exchanger settings are displayed here.

9.2.2.1 Regulation

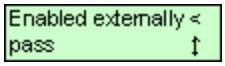
The set control mode is displayed when the Operating mode - Regulation menu option is opened. There are 5 different control modes.



Int. Setpoint	1 or 2	(see page 38)
Ext. Setpoint	1 or 2	(see page 38)
Slave mode	via 0-10V	(see page 38)
Manual mode		(see page 33)

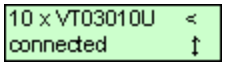
9.2.2.2 Enabled externally

This shows whether or not the controller is enabled via connection **FG**.



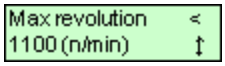
9.2.2.3 Number and type of fans

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



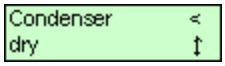
9.2.2.4 Max. fan speed

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



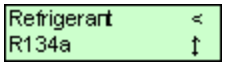
9.2.2.5 Heat exchanger

This indicates whether the heat exchanger is a condenser or a drycooler. The "dry" function is the default.



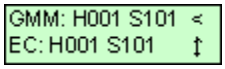
9.2.2.6 Refrigerant

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.

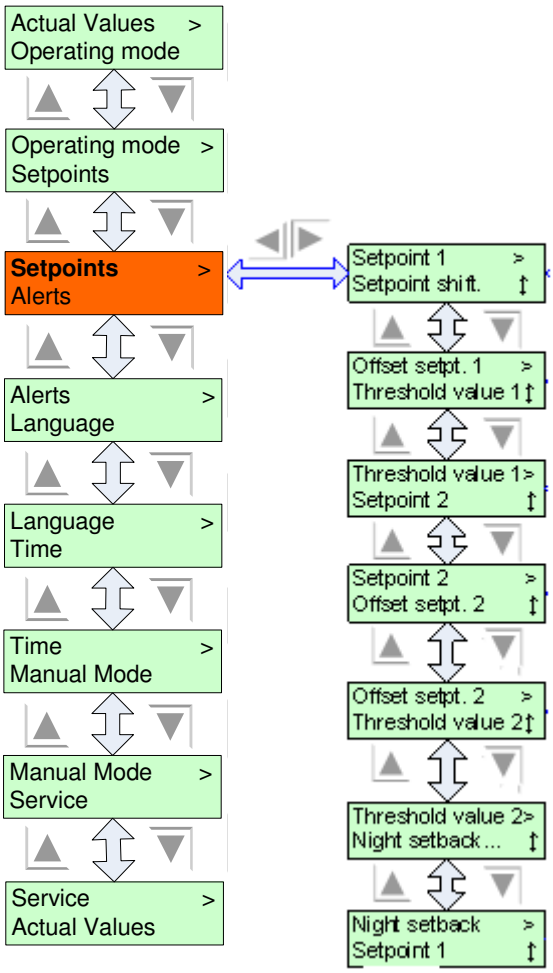


9.2.2.7 Hardware and software versions

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



GMM	is the controller with the display and keyboard.
EC	is the fan management (PCB with fan connections).
H	is the hardware version.
S	is the software version.

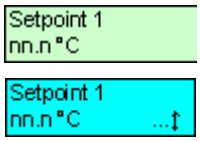


9.2.3 Setpoints

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

9.2.3.1 Setpoint 1

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



Press the <┘ key to enter EDIT mode.

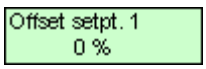
Use the ◄► keys to select the write position. The position is displayed on the right of the second line. Use the ▲▼ keys to edit the value at the selected position. The minimum and maximum adjustment range is:

Pressure	1 bar to 50 bar
Temperature	0°C to 100°C
Volt	1V to 10V

The values are entered to one decimal place. Press the <┘ key to accept the adjusted value.

9.2.3.2 Offset setpoint (in preparation)

The setpoint is displaced in this menu option. It is displaced via an input signal (temperature, pressure or voltage). The amplification of the shifting is set in the range -100% to +100%. At present the offset setpoint is set to 0%, i.e. no shifting.



9.2.3.3 Threshold

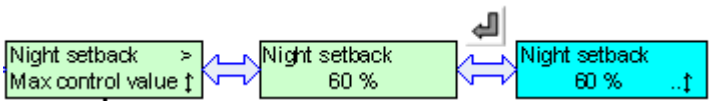
A value between 0 and 100% is set under this option. If the control value on the fans exceeds this value, the threshold relay trips. When the value falls below the threshold, the relay drops out again. If 100% is entered as the threshold, this function is deactivated.

The above also applies to setpoint 2, offset setpoint 2 and threshold 2.

9.2.3.4 Night setback

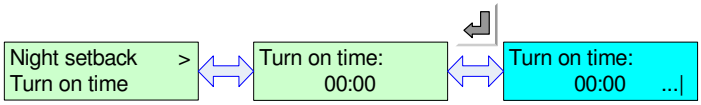
The night limited function is used to limit the control value for the fans to a maximum value and minimise noise emissions. Since this is used at night in residential areas, the function is called night setback. The limiter can be activated via digital input "**D2**" or via the built-in timer.

The maximum control value is set according to the diagram above, whereby again, as described above, EDIT mode is activated by pressing the ENTER key, the left and right arrows are used to select the write position and the up and down key are used to modify the value.



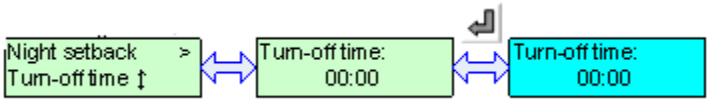
9.2.3.5 Night setback - turn-on time

The built-in timer allows the night setback to be activated and deactivated at specific times (see also page 41).



The time is set according to the diagram above, whereby again, as described above, EDIT mode is activated by pressing the ENTER key, the left and right arrows are used to select the write position and the up and down key are used to modify the value.

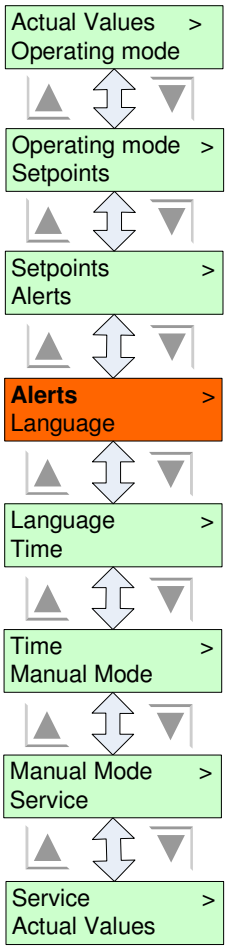
9.2.3.6 Night setback - turn-off time



If the same value is entered for both the turn-on and turn-off time (e.g. 00:00), the time-controlled night setback is deactivated.

9.2.3.7 Night setback - list of functions

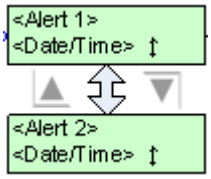
Input D2	Night setback with time	Night setback
inactive	off	off
active	off	on
inactive	on	on
active	on	on



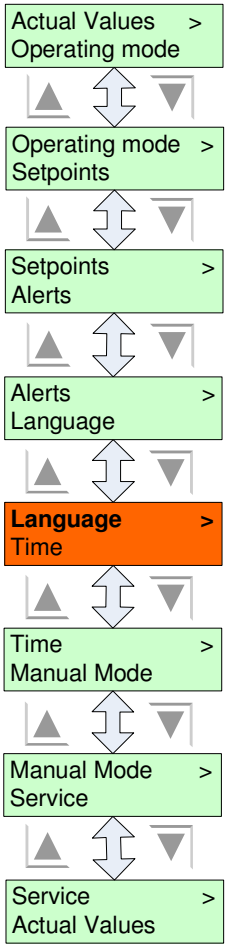
9.2.4 Alerts

The GMM has a built-in alarm memory where up to 37 priority 1 error messages are stored consecutively (ring memory). These error messages consist of the fault and the time stamp, comprising the date and time, at which the fault occurred.

When the alarm memory is selected, the display shows the last fault that occurred.

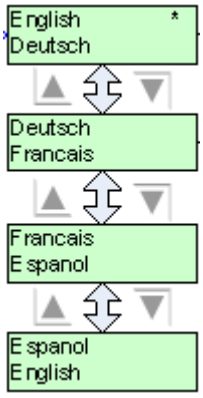


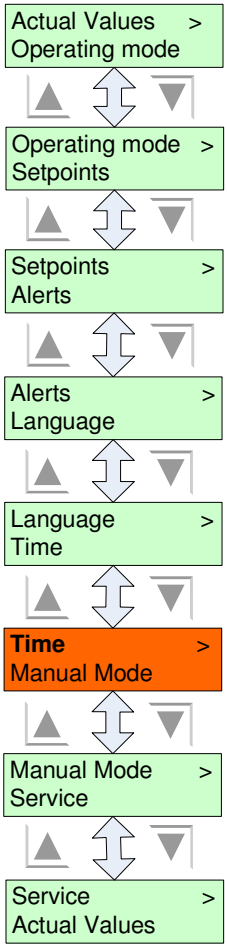
Use the ▼ key to display older faults.



9.2.5 Language

4 languages can be selected in the Language selection menu. The selected language is marked with an asterisk.





9.2.6 Time

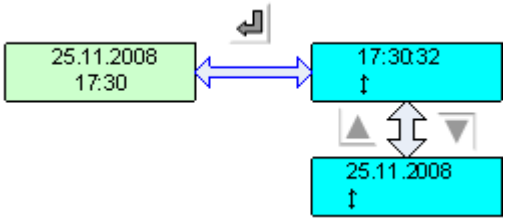
The set time is displayed in the first line of the Time menu, using the 24-hour clock. The set date is displayed in the second line.

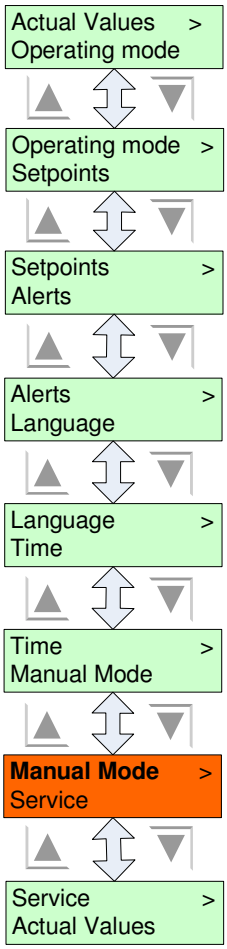
If you want to change the date and time, enter EDIT mode by pressing the <┘ key.

The time appears first. Use the ▼ and ▲ keys to move between time and date. If you press the <┘ key to enter EDIT mode while the date or time is displayed, you can use the ► and ◄ keys to select the position you want to edit. The second line shows the position currently selected. Press the <□ key to exit EDIT mode.

The time is then set when you exit the Set time function using the ◄ key. Pressing the X key aborts the programming of the time and the time is not changed.

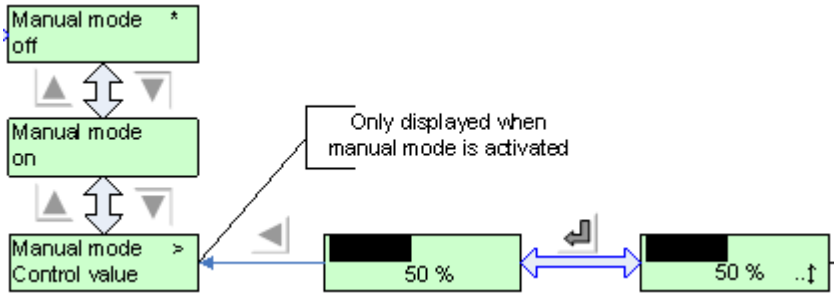
The time and date are used to enter the alarm times in the alarm memory and for all timer functions (night setback etc.).



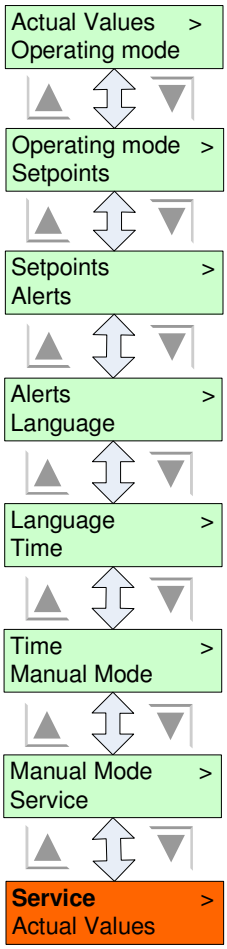


9.2.7 Manual mode

The Manual mode menu option shows whether manual mode is activated or deactivated. When it is activated, the control value can be modified. The * indicates whether manual mode ON or OFF is active.



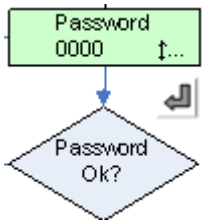
Manual mode always overrides all other control modes.

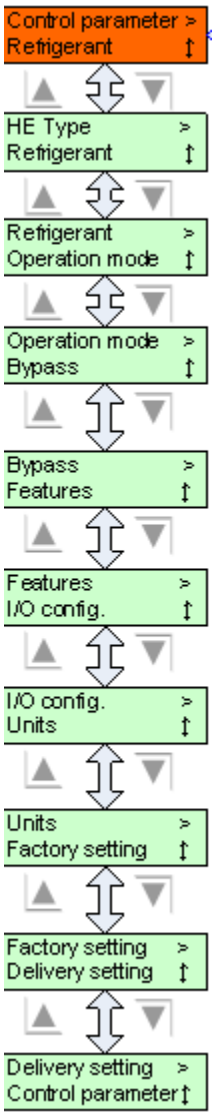


9.3. Service

The Service menu is only accessible with a password which you are prompted for first. The password is **3795**.

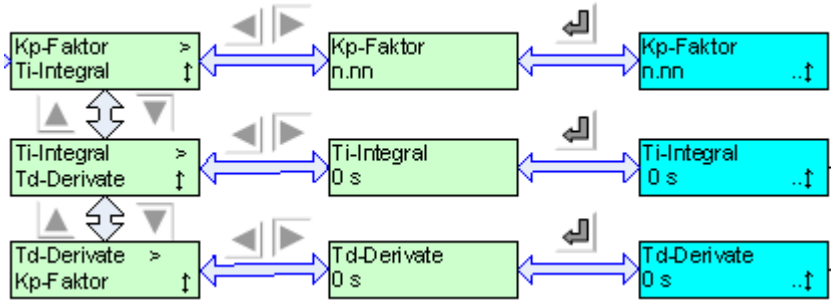
Once the password has been accepted, the Service menu appears.





9.3.1 Control parameters

The control parameters Kp-Faktor, reset time Ti and rate time Td are set in this menu option. The procedure is as shown below.

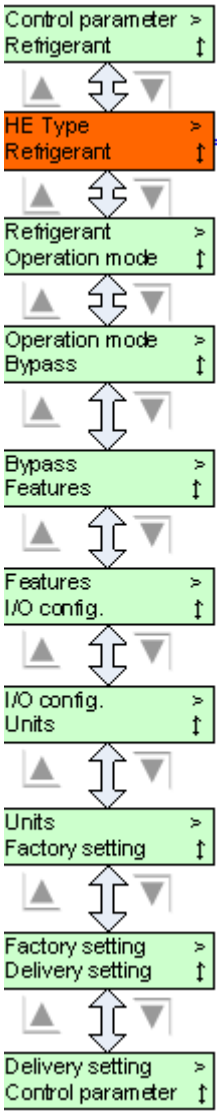


Select, display and, if necessary, modify control parameters.

The Kp-Faktor can be entered in a range from 0.1 to 100.0 to one decimal place. The Kp-Faktor specifies the control amplification. It is the proportion of the control path following the input signal.

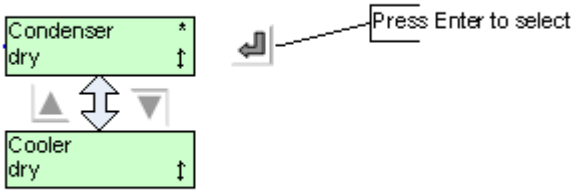
The reset time Ti can be set in a range from 0 to 1000 seconds. The I part of the control achieves a time reconciliation with the setpoint. The reset time, for example $T_I = 2s$, means that at time t=0 the output value after 2s has reached the value of the constant input value.

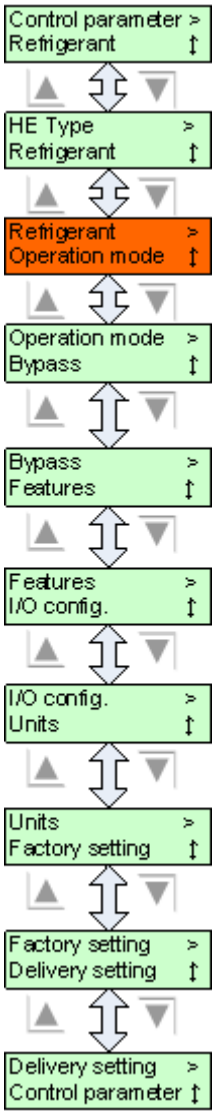
The rate time Td can be set in a range from 0 to 1000 seconds. The D part of the control reacts not to the control deviation but to the speed of change.



9.3.2 Heat exchanger

The heat exchanger type is selected here. The options are drycooler and condenser in the dry version (no spray). The selected type is displayed with a *.

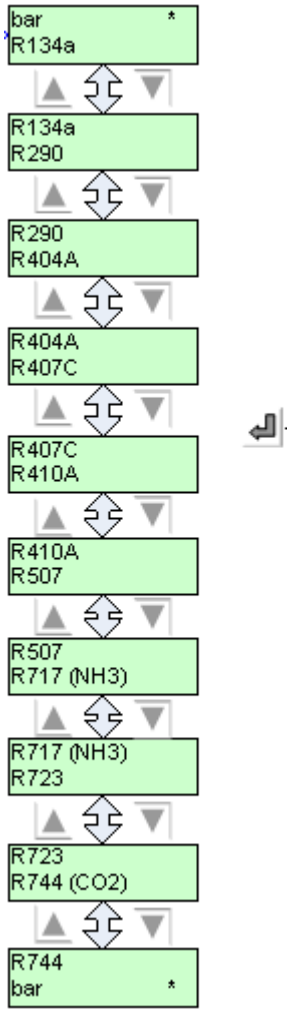


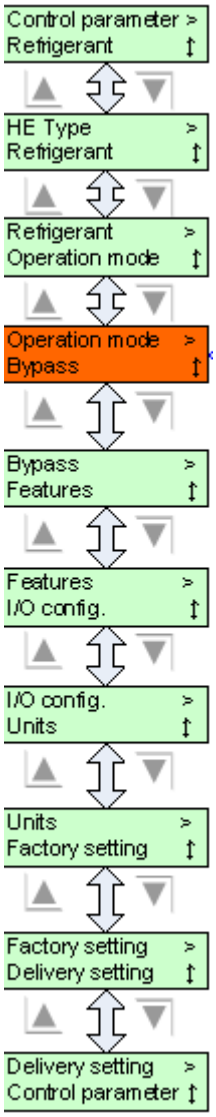


9.3.3 Refrigerant

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

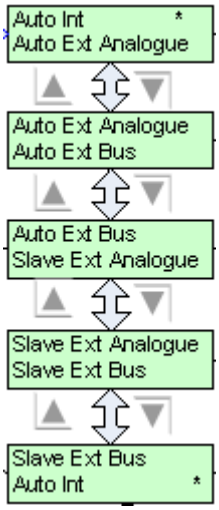
The selected option is displayed with a *.





9.3.4 Operation mode

The active operation mode is marked with a *.



9.3.4.1 Auto internal

In this mode, control is automatic on the setpoint set internally. This setpoint is entered in the **9.2.3 Setpoints** menu option, page 28.

9.3.4.2 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 actual value is set in the **9.3.7 I/O** configuration page 45.

9.3.4.3 Auto external bus

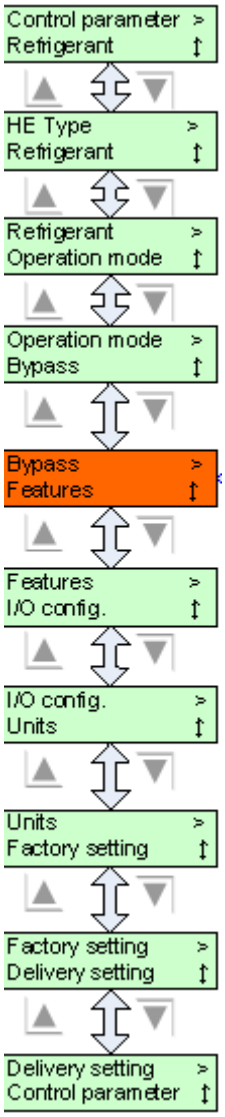
This mode has not yet been implemented.

9.3.4.4 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 45 on page **9.3.7 I/O** configuration.

9.3.4.5 Slave external bus

This mode is in preparation.

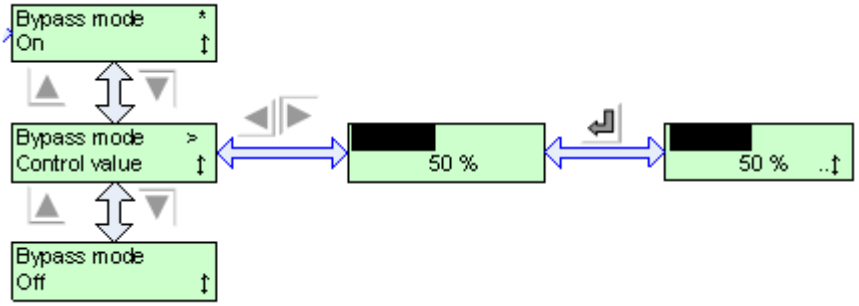


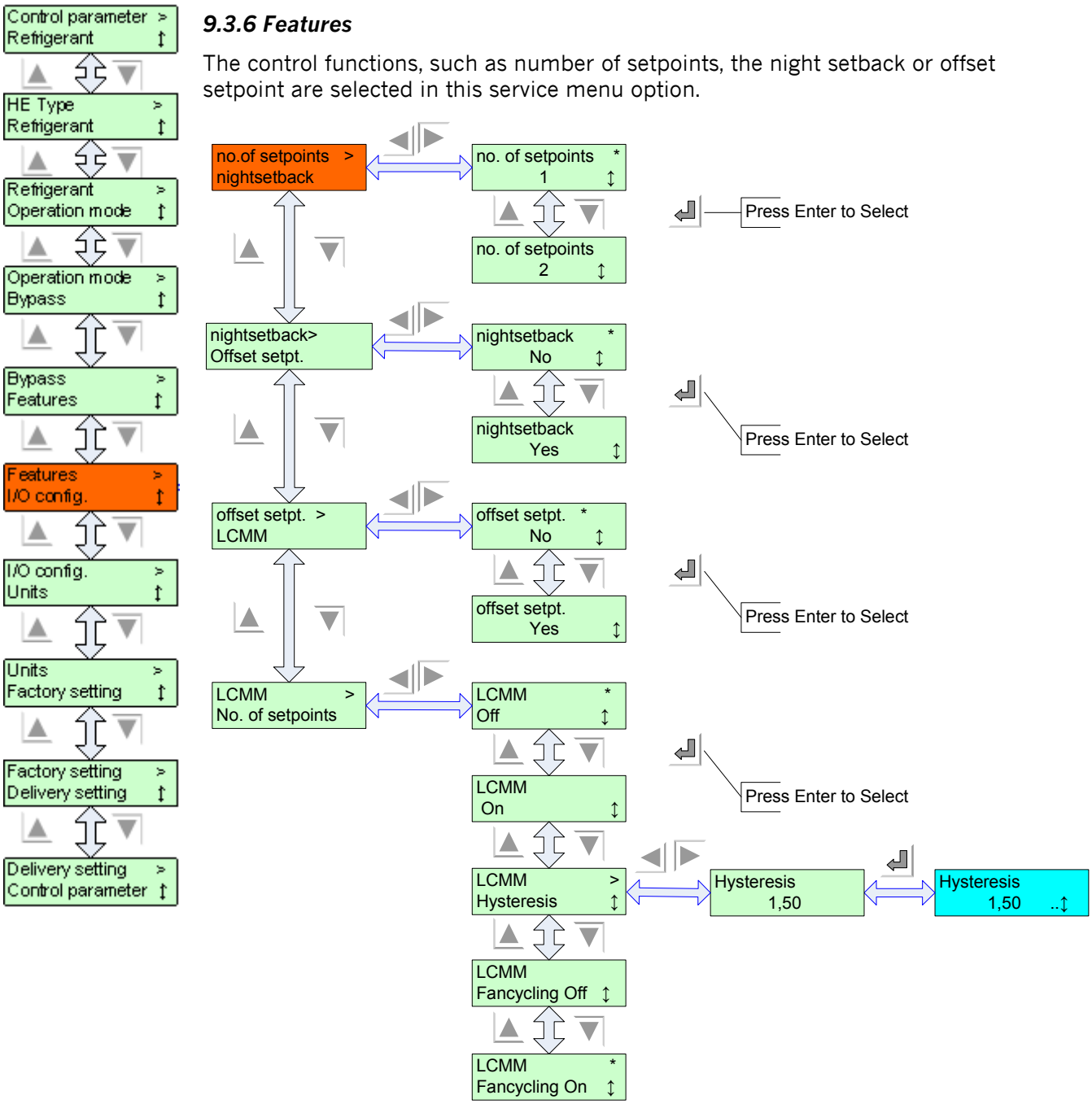
9.3.5 Bypass

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.

The bypass function causes the fans to run at a speed set here in the event of a fault in the regulation. This bypass function is activated on the motors 10 seconds after failure of the regulation.

The bypass mode currently set is marked with an asterisk. The operation mode is selected with the <┘ key. Display the control value by using the ► key. The value is changed as described in the **9.2 Operating menu** on page 25 .





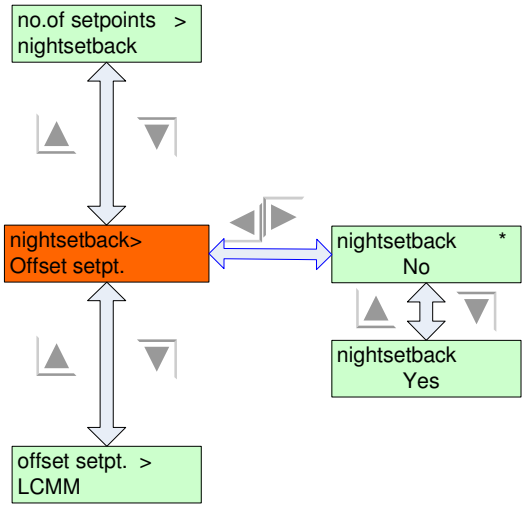
9.3.6 Features

The control functions, such as number of setpoints, the night setback or offset setpoint are selected in this service menu option.

9.3.6.1 Number of setpoints

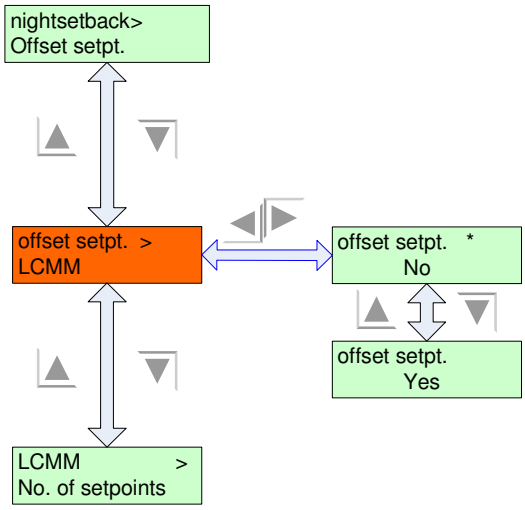
The number of setpoints is set here. The minimum number is 1 setpoint on which regulation is performed. If 2 setpoints are selected, switchover is via digital input **D3**. If the input is open, setpoint 1 is used for regulation. If input **D3** is connected to **GND**, setpoint 2 is used for regulation.

If different setpoints are used for control in summer and winter, the switchover can be effected via a digital input if the number of setpoints is set to 2.



9.3.6.2 Night setback

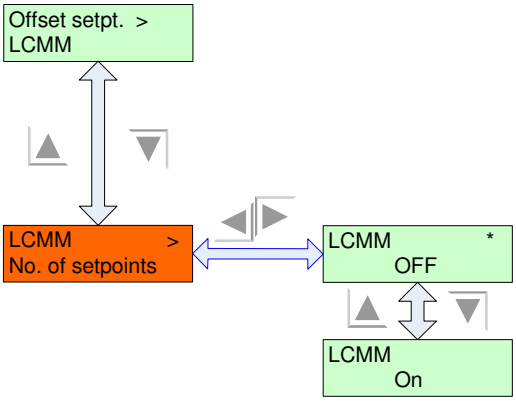
A night setback is generally activated or deactivated in this service option. The value of the night setback is set in the Setpoints menu option (9.2.3.4 page 29). The night setback, i.e. turn-on and turn-off time and the control value, can also be programmed there in the normal operating menu. The night setback is activated both via digital input **D2** and via the turn-on and turn-off time. Both activations can take place in parallel. If the turn-on and turn-off times are the same, activation is only via the digital input **D2**.



9.3.6.3 Offset setpoint

A setpoint adjustment (offset setpoint) can be activated here. This offset setpoint is used to adjust the setpoint, and hence the operating point, of a cooling system dynamically, either independently of the external temperature or a control value from a master control.

The maximum value of the offset is set in the Setpoints menu option (see page 28).



9.3.6.4 Low Capacity Motor Management

EC fans have a minimum speed which is in the range of about 9%-15% of the maximum speed. With a single fan installed the smallest possible control value depends on its minimum speed. With several fans installed the LCMM feature enables a control value which is lower than the minimum speed of a fan. The minimum control value is calculated as follows: Control Value = Minimum fan speed [%] / number of fans. This control value is reached by switching fans on and off as needed. The running fans will be speed controlled by the GMM as usual. When control values above the minimum speed are needed then all fans will run as usual. The advantage of LCMM is a continuous control of the heat exchanger performance even in the low capacity region instead of a 2 point control (on/off).

The figure below shows an example with 4 fans. At an assumed minimum speed of 10% of the maximum speed the heat exchanger can operate at a control value of 2.5% (10% minimum fan speed / 4 fans). At this particular setting a single fan operates at minimum speed whereas all other fans are switched off. If the control value increases the operating fan will increase the speed. As soon as a control value of 5% is reached the second fan will be switched on. Both fans will now run at minimum speed. At 7.5% control value the third fan is switched on and at 10% all are operating. The figure below illustrates this behaviour. Without LCMM the smallest possible heat exchanger capacity is 10% even though the control value might be lower.

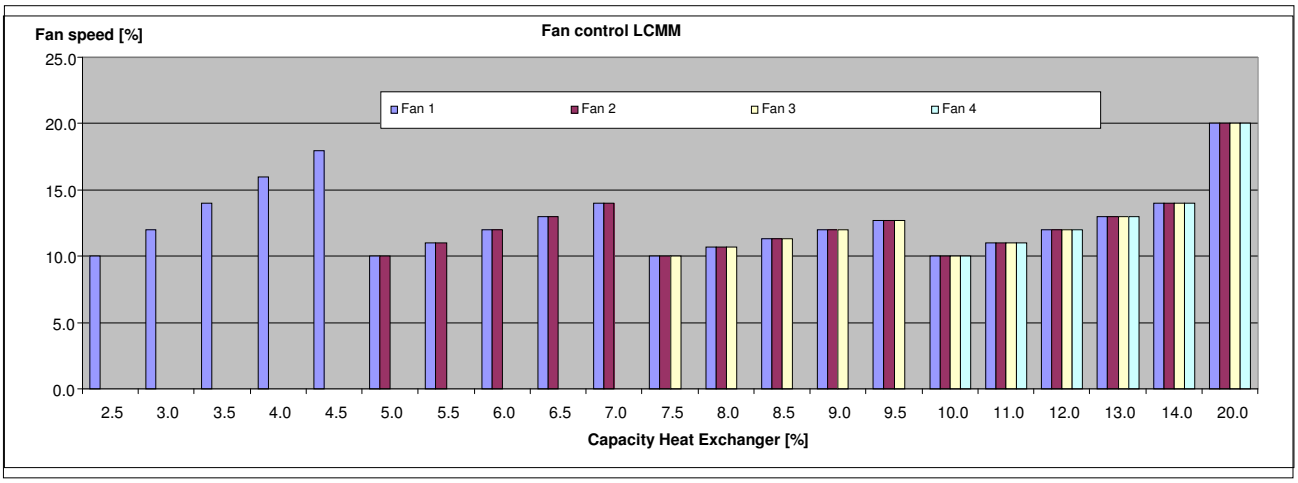
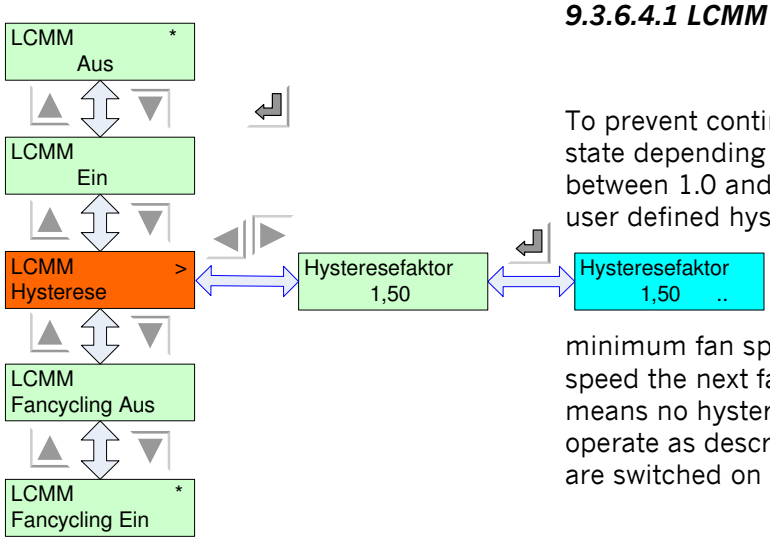


Fig. 9.3.6.1: LCMM Fan Control



9.3.6.4.1 LCMM Hysteresis

To prevent continuous switching between on and off state depending on the control value a hysteresis factor between 1.0 and 2.5 can be defined. The GMM uses the user defined hysteresis factor and multiplies it with the minimum fan speed. When the first fan(s) reach this speed the next fan(s) are switched on. A setting of 1.0 means no hysteresis. Within the Hysteresis curve the fans operate as described above. Only the points where fans are switched on or off have changed.

In the example below the minimum speed of the fans is 10% of the maximum value. The Hysteresis faxtor is 1.5. This means that the threshold to turn on the next fan is set to 15%. In our example with 4 fans this relates to a heat exchanger capacity of 3.75% to switch on the first fan. The fan is switched off again when the Heat Exchanger capacity drops below 2.5%. The seconded fan is turned on when a heat exchanger capacity of 7.5% is needed. (15% / 4 *2) – The third fan at a capacity of 11.25% and the fourth at a capacity of 15%.

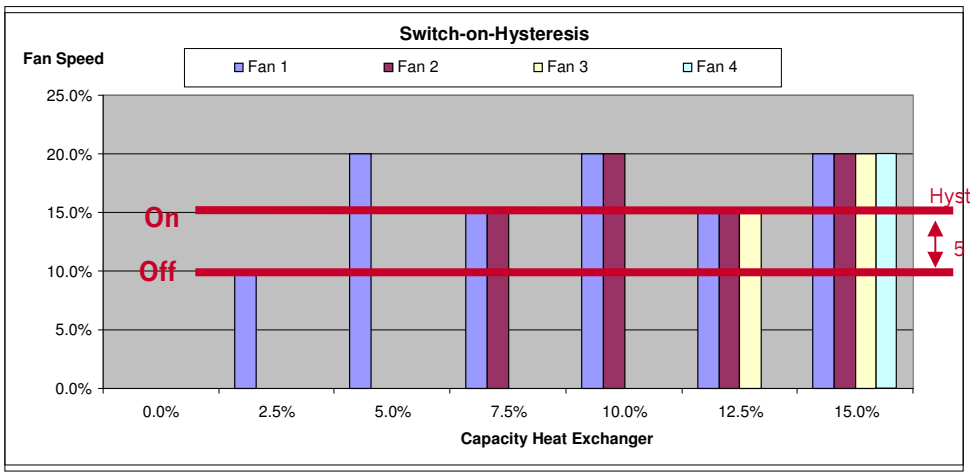
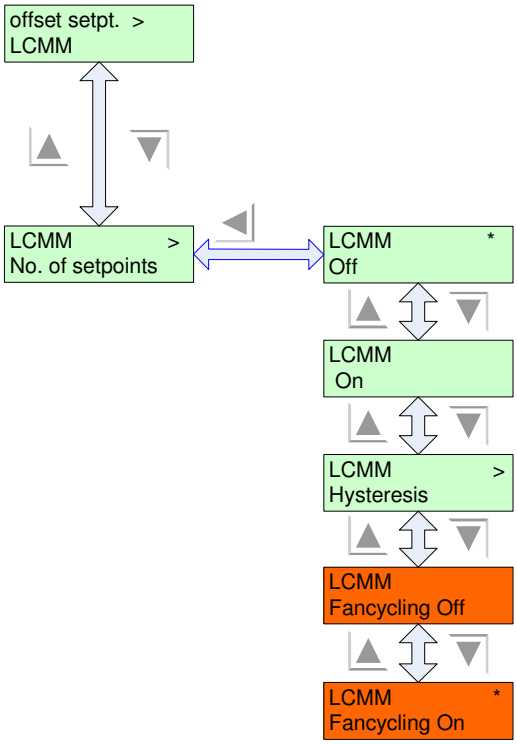
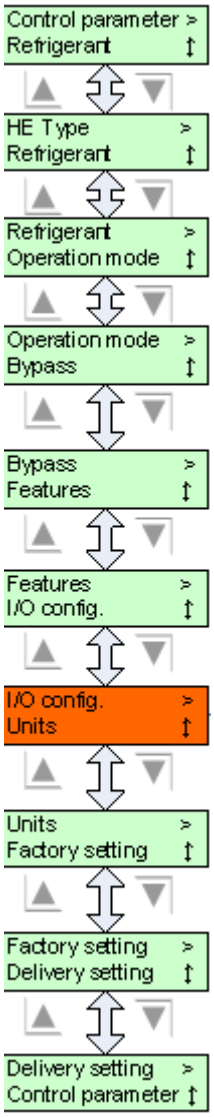


Fig. 9.3.6.2: LCMM Hysteresis



9.3.6.4.2 LCMM Fancycling

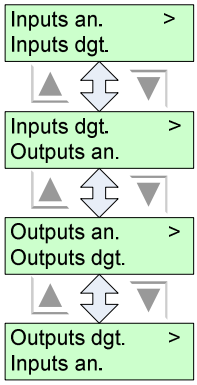
The fancycling feature of LCMM gives the opportunity to level the operating hours of the individual fans. When activating this feature the fans will be switched on in a changing order. The fans with the least operating hours are switched on first thus increasing the lifetime expectation of the fans.



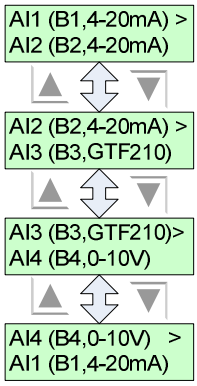
9.3.7 I/O configuration

This menu option is used to configure the analogue and digital inputs and outputs. Selected functions can be assigned to the inputs and outputs.

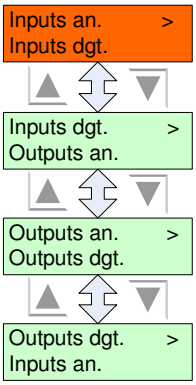
This is done at 3 menu levels. The input or output groups are selected at the first level.



The individual inputs or outputs in a group are selected at the second level. Here are the analogue inputs as an example.



A function can be assigned to the individual inputs and outputs at the third level.



9.3.7.1 Inputs analogue

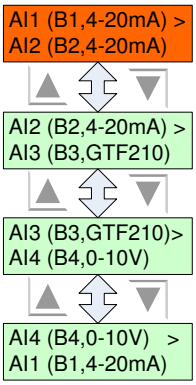
-Level 1-

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

Terminals **B1** and **B2** are two current inputs (4-20 mA). Terminal **B3** has an input for the GTF210 temperature sensor. There is an input for 0-10 V DC on terminal **B4**.

9.3.7.2 Current inputs

-Level 2-



-Level 3-

Actual value means that the current measurement signal exists on this input. With pressure sensor **GSW4003** this is the current corresponding to the pressure. Make sure that "Auto Int" mode has been selected in the **9.3.4 Operation mode** menu (see page 38). There is a special situation if both current inputs are configured as actual value. The current input delivering the greatest measurement signal is then selected (**MAX selection**).

Ctrl. val slave means that the control signal for the fans follows this input. With current input this means that 4 mA generates a control signal of 0% and hence the fans are stationary. A 20 mA input current would generate a control signal of 100% on the fans. Make sure that "Slave Ext" mode has been selected in the **9.3.4 Operation mode** menu (see page 38).

Setpoint 1 means that setpoint 1 on which internal control is performed is specified via the current input. The origin of the actual value has then still to be configured. Make sure that "Auto Ext" mode has been selected in the **9.3.4 Operation mode** menu (see page 38).

Setpoint 2 (see **Setpoint 1**)

No function is selected if this input should be inactive.

The same applies to current input 2 as to current input 1.

9.3.7.3 Temperature sensor input

Act val temp means that a **GTF210** temperature sensor is connected to this input. Make sure that "Auto Int" mode has been selected in the **9.3.4 Operation mode** menu (see page 38).

No function is selected if this input should be inactive.

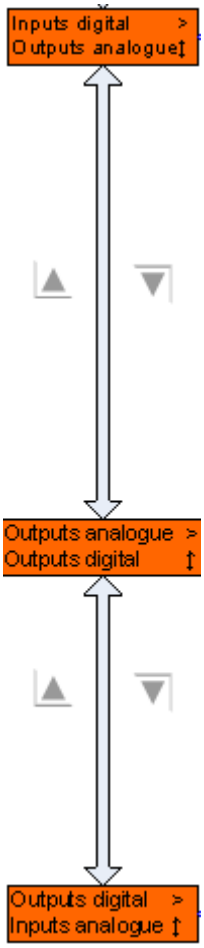
9.3.7.4 Input 0..10V

Actual value means that the actual value (0-10V) for regulation exists on this input. Make sure that "Auto Int" mode has been selected in the **9.3.4 Operation mode** menu (see page 38).

Ctrl. val slave means that the control signal for the fans follows this input. The characteristic curve is linear from 0-100%. Make sure that "Slave Ext" mode has been selected in the **9.3.4 Operation mode** menu (see page 38).

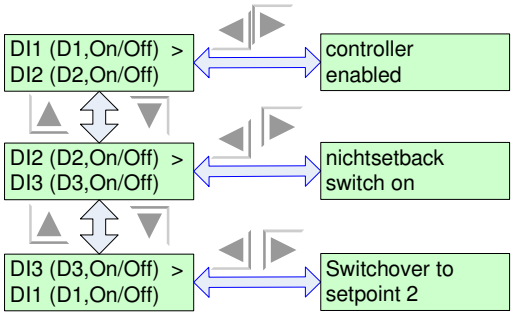
Setpoint 1 means that setpoint 1 on which internal control is performed is specified via the voltage input. The voltage input is scaled to the set actual value (0-10V on 4-20 mA - **16mA = 10V / 0Volt = 4mA**- or on 0-100°C –Factor 10-). The origin of the actual value has then still to be configured. Make sure that "Auto Ext" mode has been selected in the **9.3.4 Operation mode** menu (see page 38).

Setpoint 2 (see **Setpoint 1**)



9.3.7.5 Inputs digital

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

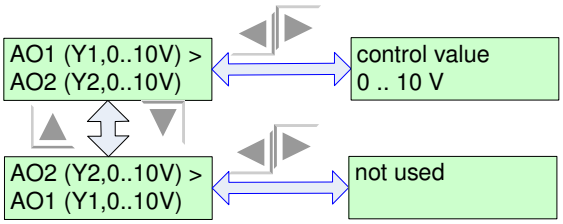


The inputs are active when they are connected to **GND**. They can only be switched with potential-free contacts (relay contact).

9.3.7.6 Outputs analogue

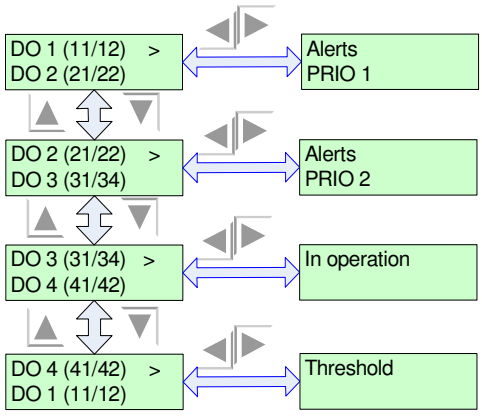
The analogue outputs can output a voltage of 0-10 V DC. A fixed function is assigned to analogue output 1.

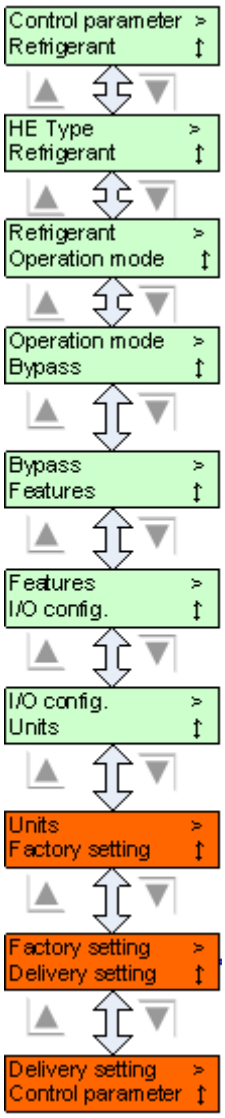
It outputs the control signal from 0-100% scaled as a 0-10V signal.



9.3.7.7 Outputs digital

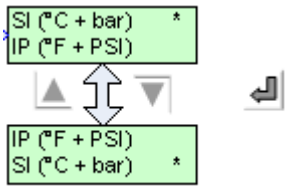
The digital outputs are relay contacts. Each output has a 250 V / 1 A two-way contact. The alarm output PRIO 1 is switched as a **failsafe** contact i.e. the contact is closed when there is no current. Fixed functions are assigned to the digital outputs. See **Table of error messages and warnings on the GMM** display on page65.





9.3.8 Sel. unit IP/SI

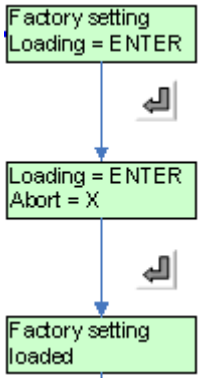
The units to be used for temperature and pressure are selected here. SI are the international units (***S****ystème* ***i****nternational d'unités).* IP are the Anglo-American measurement units (imperial system).



The selected unit of measurement is marked with a *.

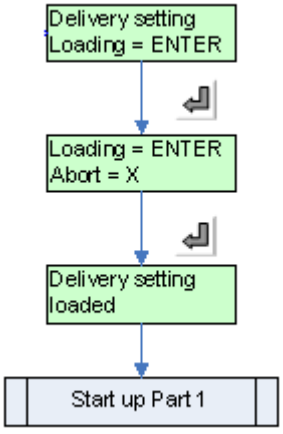
9.3.9 Factory settings

The regulation can be reset to factory settings here. **CAUTION:** Any changes made locally will be deleted. Factory commissioning values will be retained. The bypass and control functions are reset to their defaults.



9.3.10 Delivery setting

The regulation can be reset to delivery setting here. **CAUTION:** Any changes made locally and commissioning values will be deleted. Once this function has been completed, a completely new factory commissioning must be carried out.



10. Errors and troubleshooting

10.1 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:

Operating mode 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**, go to **Test point 2**.
- If the **Hardware error** message is displayed, there is a fault in the EC controller (lower PCB with fan connections). Then please check the fan connections on the EC controller. Are the 24V DC supply cables connected to the fans properly? Are the bus connections **A** and **B** connected properly 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 **9.3.7 I/O** configuration (see page 45).

Test point 2:

Mains connection:

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

Sensor connection:

- Is the sensor connected correctly? Cf section 7. Sensor connection page 16.
- Sensor OK? (Measure! Pressure: 4-20mA, Temp.: 1.2-2.7kΩ, Standard 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?

11. Technical data

11.1 GMM EC/01 /04 /08 dimensions

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

Fixing drill holes max. ∅ 7.5 mm.

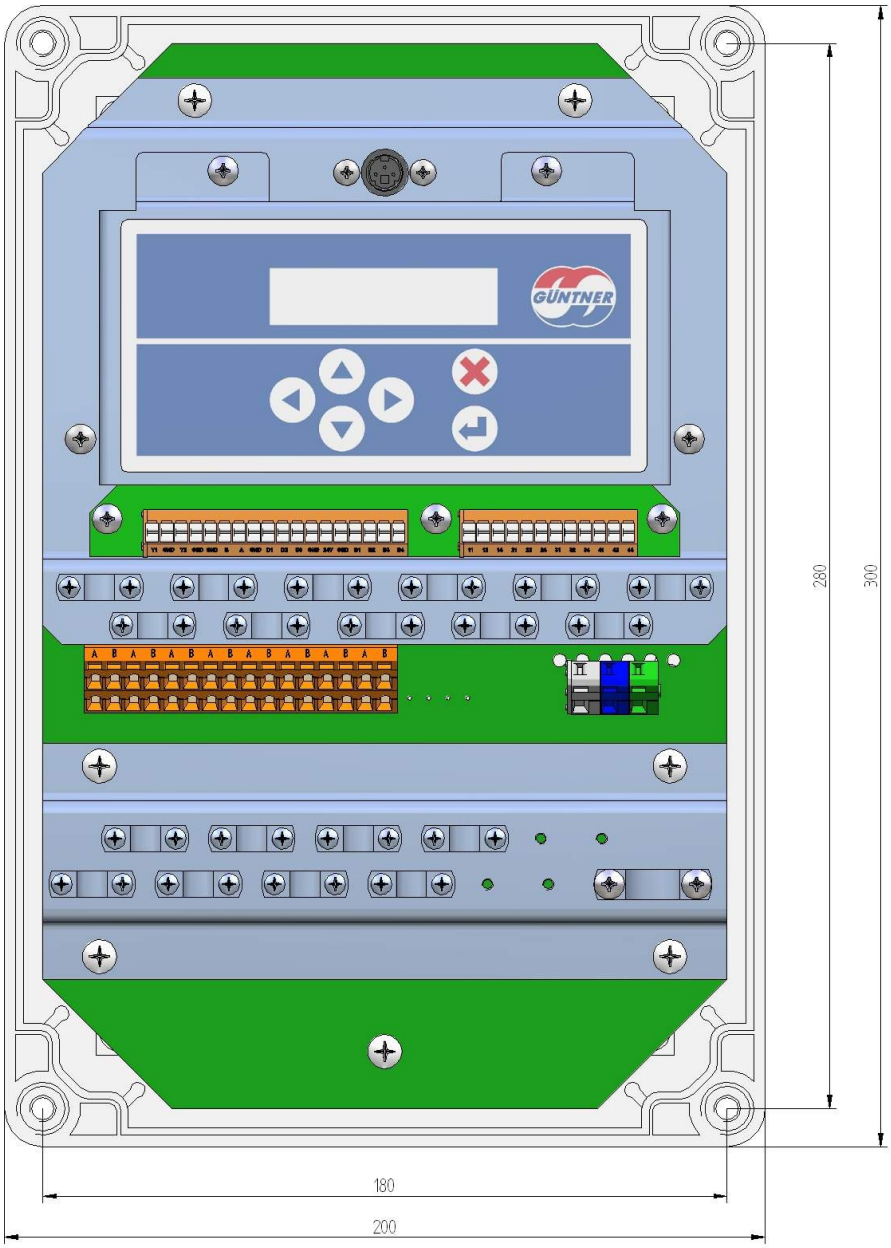


Fig. 11.1: GMM EC/01 /04 /08 housing dimensions

11.2 GMM EC/16 dimensions

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

Fixing drill holes max. ∅ 7.5 mm.

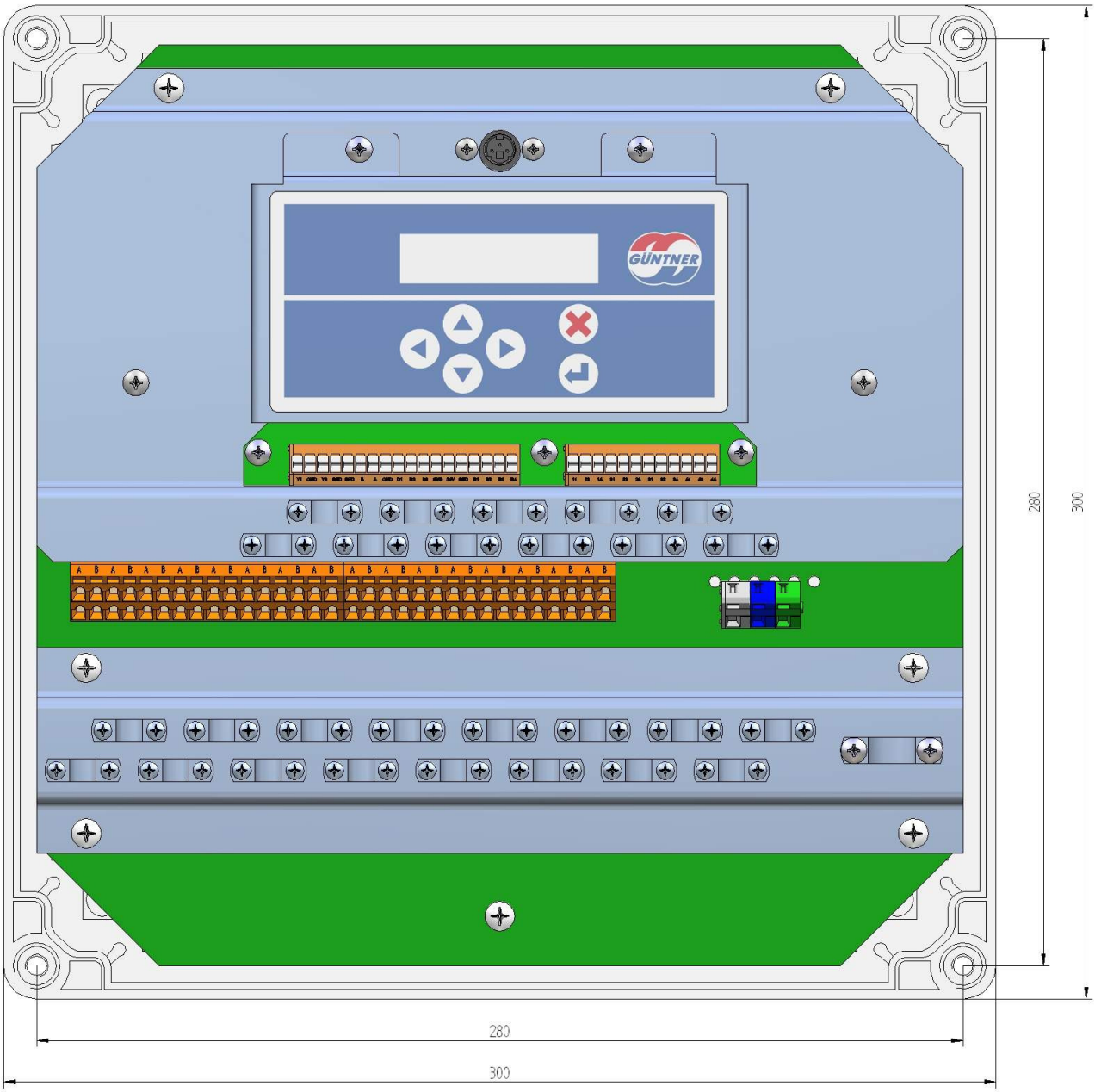


Fig. 11.2 GMM EC/16 housing dimensions

11.3 GMM EC/01 /04 /08 UL dimensions

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

Fixing drill holes max. ∅ 5mm.

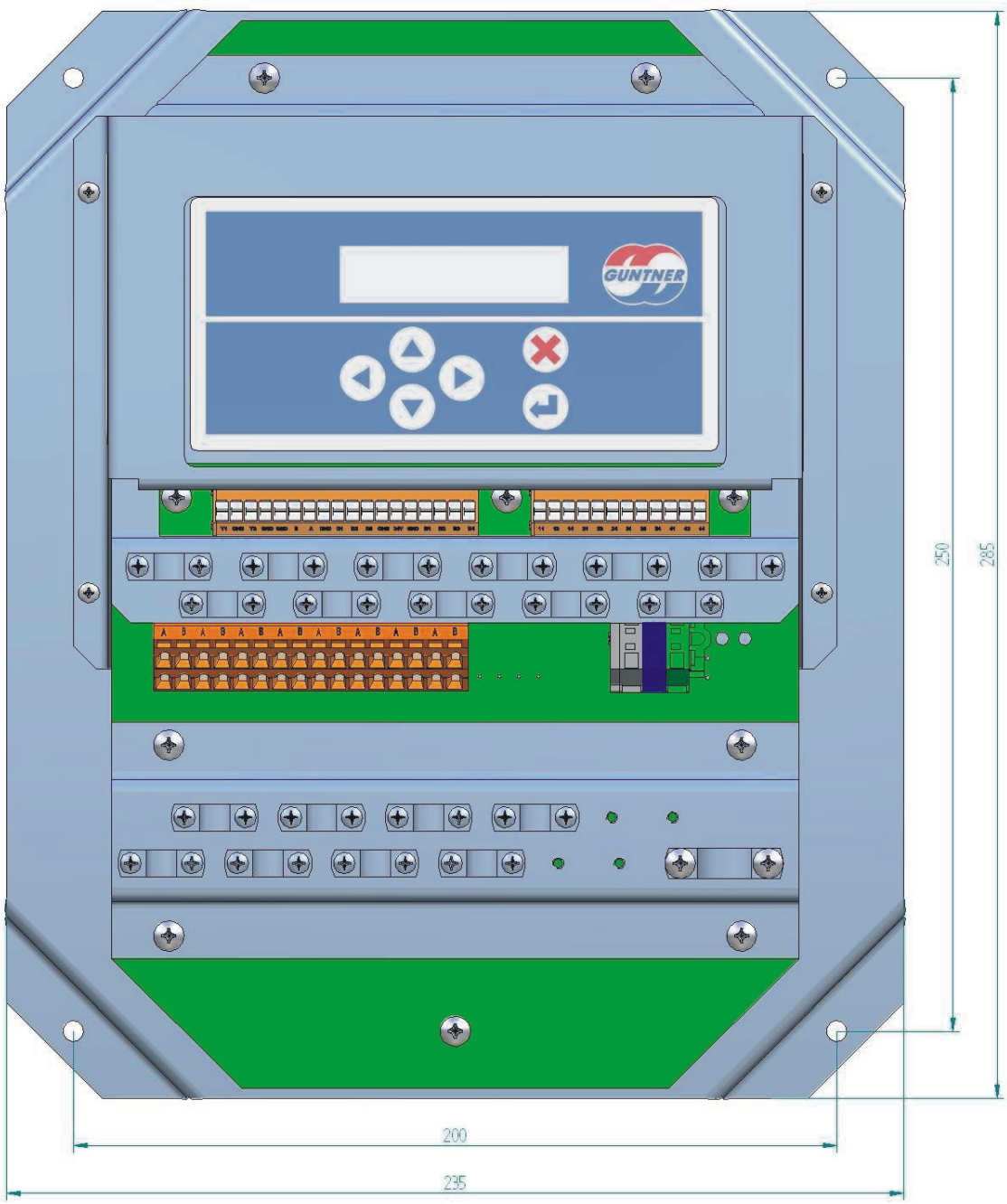


Fig. 11.3: GMM EC/01 /04 /08 UL housing dimensions

11.4 GMM EC/16 UL dimensions

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

Fixing drill holes max. ∅ 5mm.

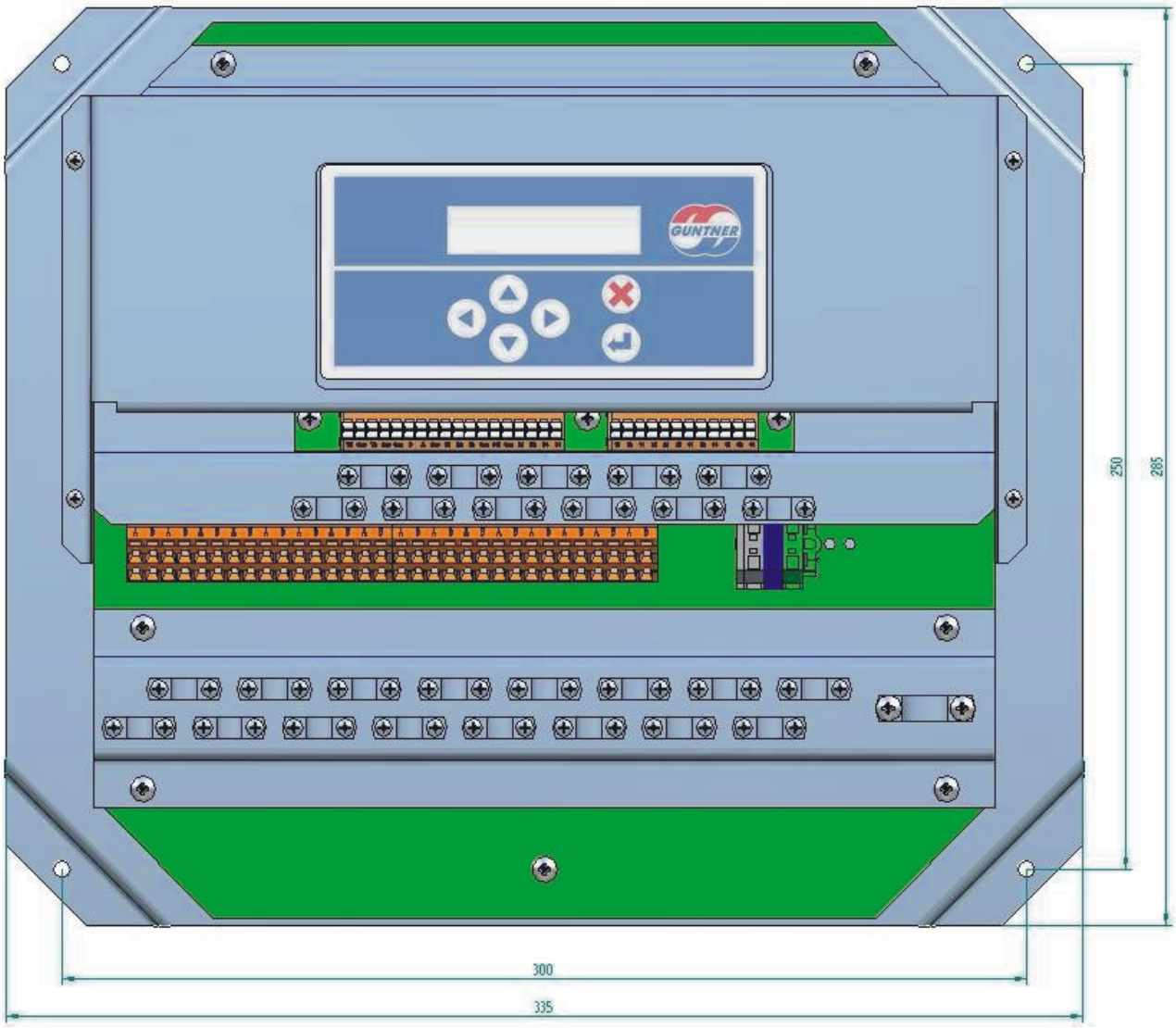
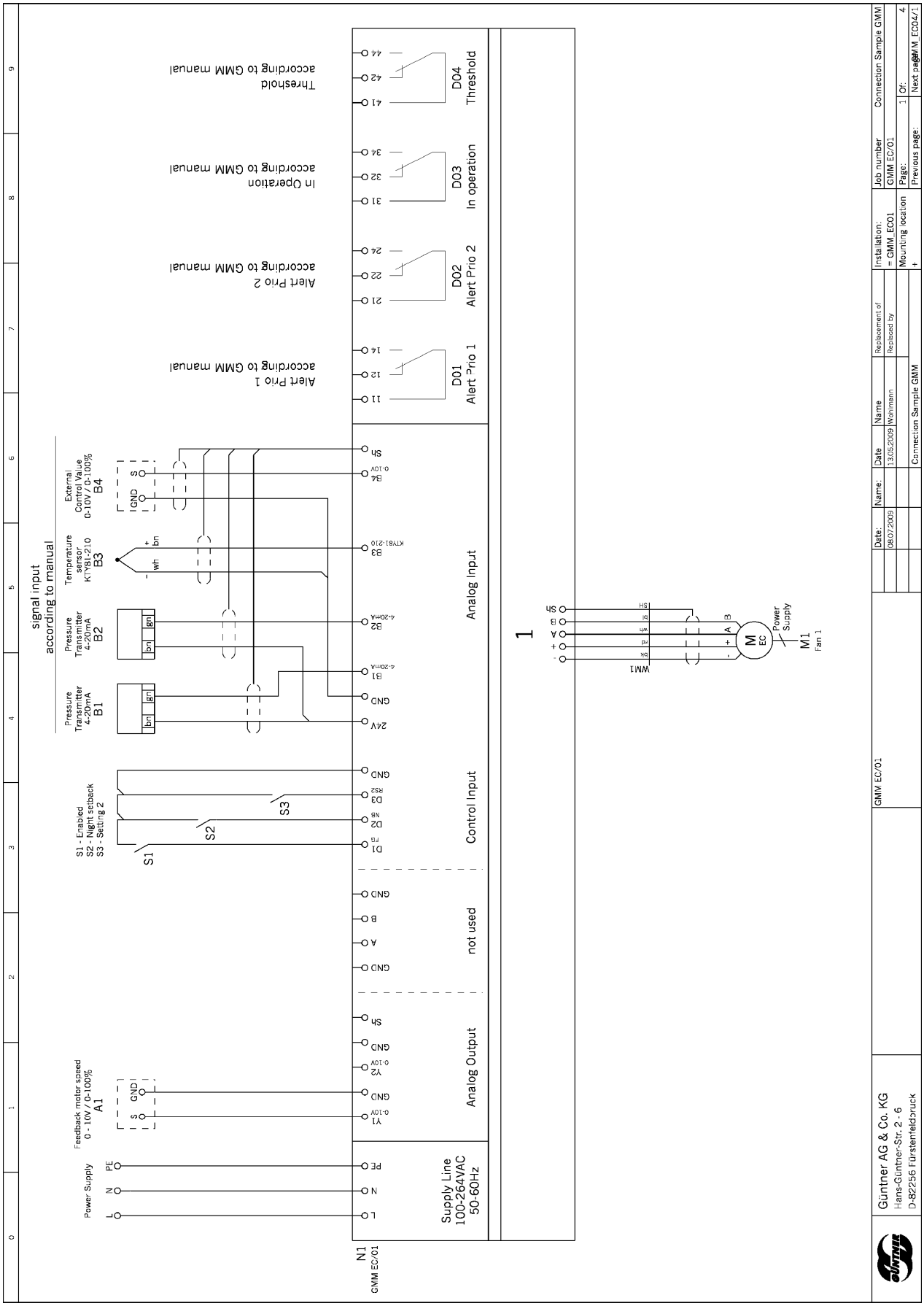
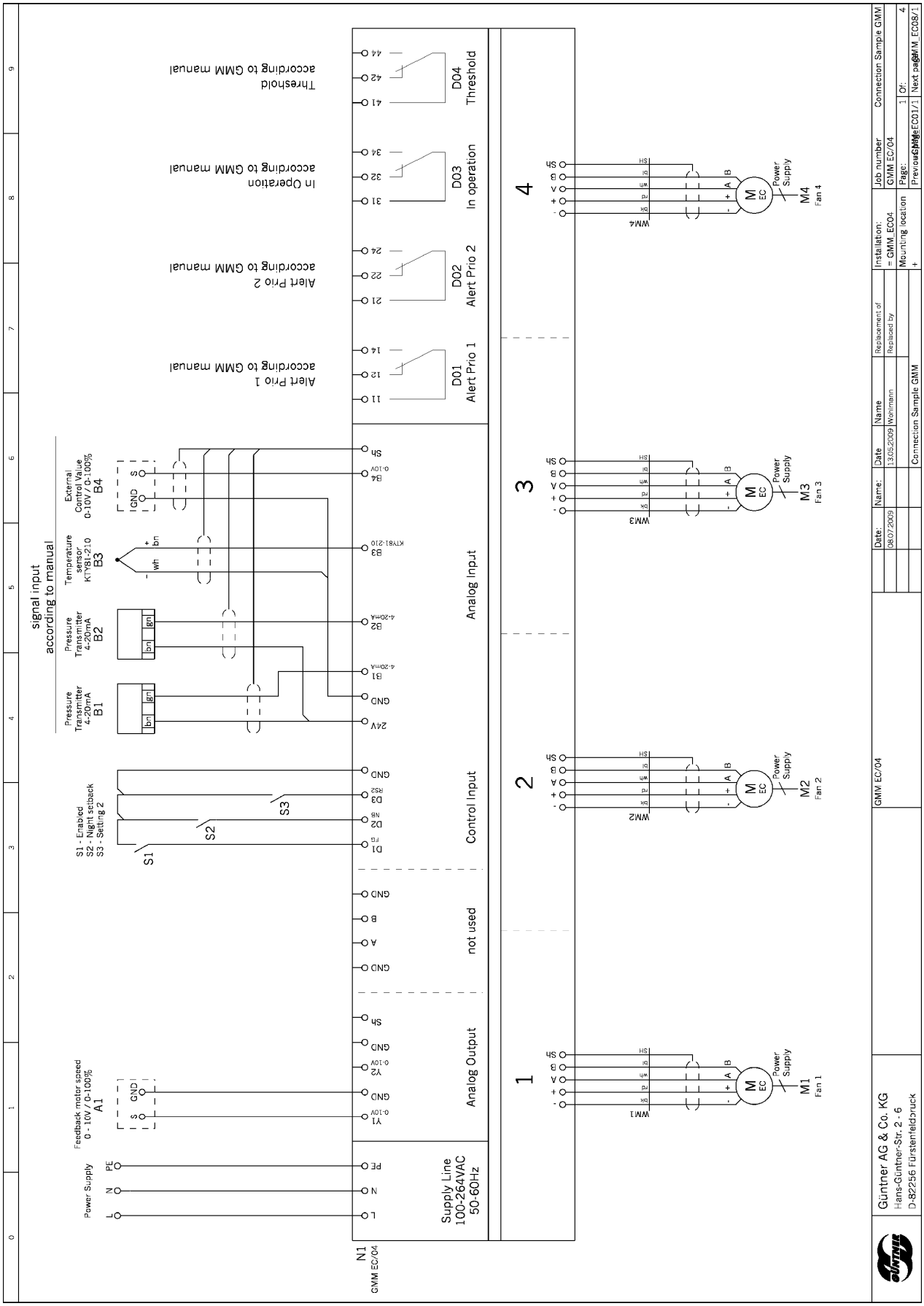


Fig. 11.4: GMM EC/16 UL housing dimensions

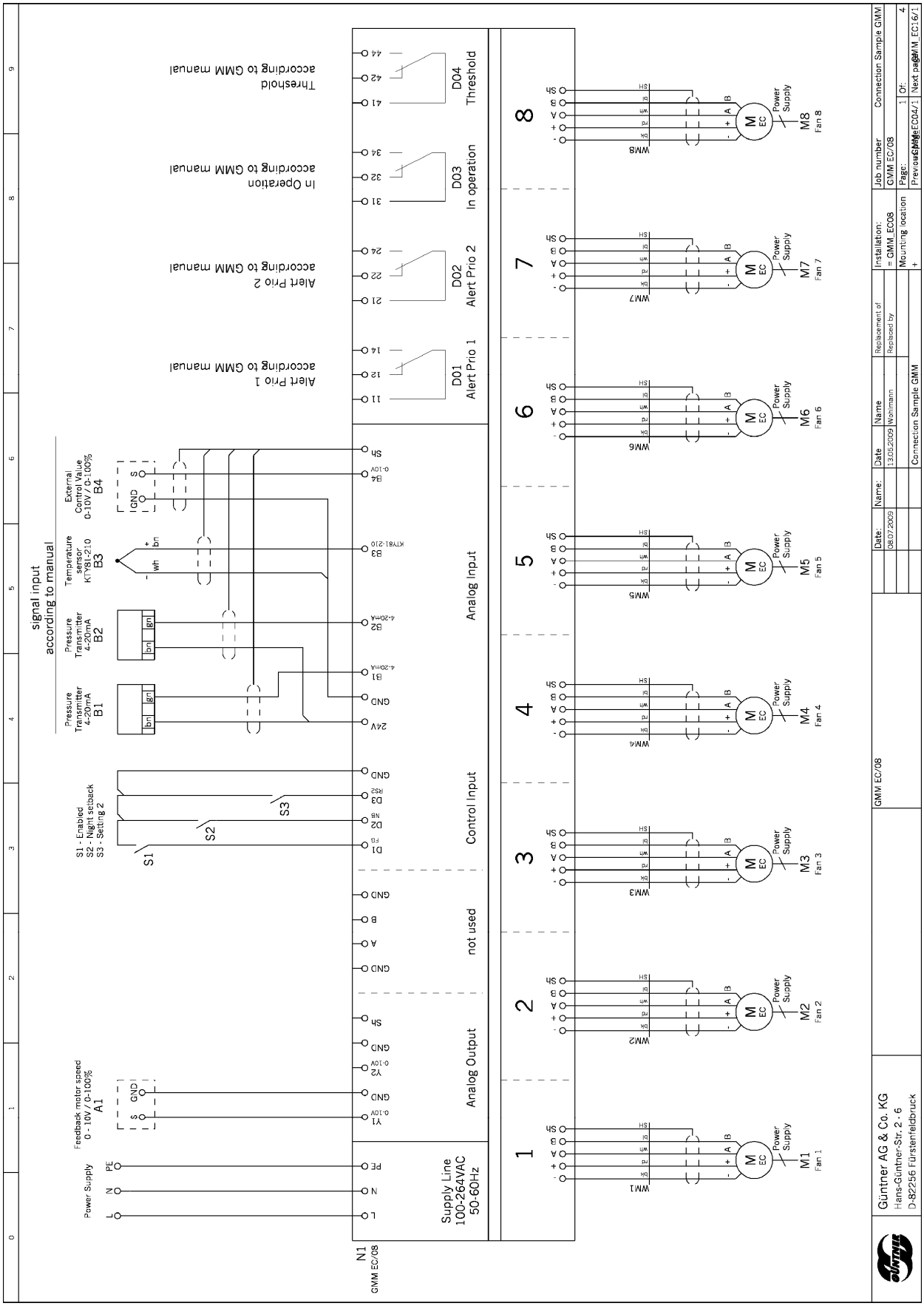
11.5 GMM EC/01 wiring diagram



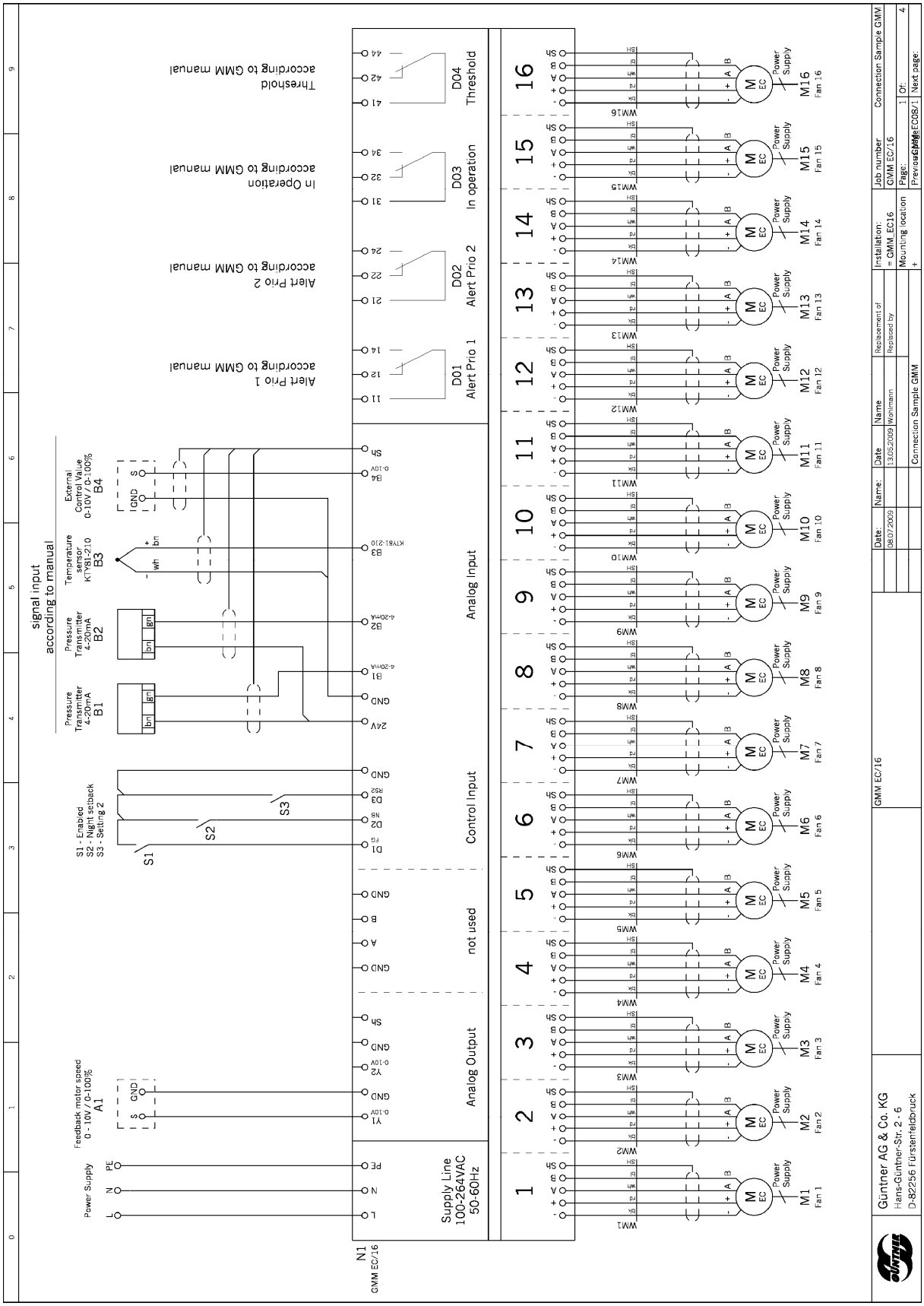
11.6 GMM EC/04 wiring diagram



11.7 GMM EC/08 wiring diagram



11.8 GMM EC/16 wiring diagram



12. Electrical and mechanical properties

Mains voltage:	230V +/- 10% 50Hz	
Current consumption:	GMM EC/01	0.3A
	GMM EC/04 /08 /16	0.4A
Heat loss:	GMM EC/01	approx. 14W
	GMM EC/04	approx. 18W
	GMM EC/08	approx. 20W
	GMM EC/16	approx. 30W
Sensor connection:	Pressure transmitter 4-20 mA *or* temperature sensor GTF210 (-30°C - +70°C) *or* standard signal 0-10V	
Ambient temperature:	-20 - +40°C	
Storage temperature:	0 - +50°C dry	
Weights:	GMM EC/01 = 2.6 kg GMM EC/04 = 2.8 kg GMM EC/08 = 2.8 kg GMM EC/16 = 3.9 kg GMM EC/01 UL = 2.7 kg GMM EC/04 UL = 2.9 kg GMM EC/08 UL = 2.9 kg GMM EC/16 UL = 4.0 kg	
Protection rating:	IP 54	
Dimensions:	GMM EC/01 /04 /08	see 11.1 GMM EC/01 /04 /08 dimensions
	GMM EC/16	see 11.2 GMM EC/16 dimensions
	GMM EC/01/04 /08 UL	see 11.3 GMM EC/01 /04 /08 UL dimensions
	GMM EC/16 UL	see 11.4 GMM EC/16 UL dimensions

List of diagrams

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Repair order / Fault report

Equipment type: _____ Serial no. _____

Customer: _____

Administrator: _____

Tel. (direct dial) _____ Date: _____

Güntner order number: _____ of: _____

Reason for return:

- ☐ Repair as per fault description
- ☐ Check functions and controller behaviour
- ☐ We would like a cost estimate
- ☐ Repair at cost

Time of the fault:

- ☐ During commissioning at the customer's premises
- ☐ During operation
- ☐ On activation
- ☐ On deactivation

Nature of the fault:

- ☐ Fault occurs intermittently
- ☐ Fault occurs all the time
- ☐ Fault only occurs in particular situations

Description of the fault:

_____

_____

_____

_____

_____

_____

_____

_____

_____

Please complete and fax back to +49 (0)8141/242-422 Güntner AG & Co. KG

Notes

Table of error messages and warnings on the GMM display

The table shows which signalling 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
Hardware error	**X**		No cooling on the heat exchanger
No sensor selected			No sensor activated in the I/O configuration
Sensor fault x			The sensor with no. x has a fault.
Disabled			D1 not switched
Controller 2			Control system 3 activated
Night setback			Night setback activated
V x cable break		**X**	Communications fault on fan x
V x temperature		**X**	Temperature fault on fan x
V x mains failure		**X**	Mains failure on fan x
V x disabled		**X**	Fan x disabled
Vx not OK		**X**	Internal communications fault on fan x
V x Hall sensor		**X**	Hall sensor on fan x defective

PRIO 1 = Relay contacts 11/12

PRIO 2 = Relay contacts 21/22

In operation = Relay contacts 31/34 if control signal > 0%

Threshold = Relay contacts 41/42 the contacts close when the control signal has reached the set threshold. Setting a threshold see page28.

Table of Fan IDs and VT numbers

Heat Exchanger	EC Fans			
	Fan type	Fan-ID	working point (maximum speed) n [min-1]	Voltage [V]
Gxx045xxxNW	VT03007U	1185	1250	230
GVX.0xxxNW	VT03007U	1185	1250	230
Gxx045xxxLW	VT03006U	1186	1000	230
GVX.0xxxLW	VT03006U	1272	900	230
Gxx045xxxSW	VT03006U	1187	770	230
GVX.0xxxLW	VT03006U	1273	750	230
052xxxND	VT03013U	1188	1500	400
Gxx052xxxNJ	VT03013U	1188	1500	400
GVX.0xxxND	VT03012U	1195	1455	400
Gxx052xxxNS	VT03011U	1189	1140	230
GVX.0xxxNS	VT03010U	1196	1070	230
Gxx052xxxLD	VT03011U	1190	1000	230
Gxx052xxxLJ	VT03011U	1190	1000	230
GVX.0xxxLD	VT03010U	1197	930	230
Gxx052xxxLS	VT03009U	1191	785	230
Gxx052xxxSD	VT03009U	1240	750	230
GVX.0xxxSD	VT03008U	1198	710	230
Gxx052xxxED	VT03009U	1193	660	230
GVX.0xxxED	VT03008U	1199	640	230
GVX.0xxxLS	VT03008U	1200	620	230
Gxx052xxxSS	VT03009U	1192	610	230
GVX.0xxxSS	VT03008U	1201	570	230
Gxx052xxxES	VT03009U	1194	385	230
GVX.0xxxES	VT03008U	1271	375	230
Gxx067xxxND	VT03017U	1202	1300	400
Gxx067xxxNJ	VT03017U	1202	1300	400
Gxx067xxxNS	VT03016U	1203	1050	400
Gxx067xxxLD	VT03016U	1204	890	400
Gxx067xxxLJ	VT03016U	1204	890	400
Gxx067xxxLS	VT03015U	1205	745	230
Gxx067xxxSD	VT03015U	1206	715	230
Gxx067xxxED	VT03014U	1208	615	230
Gxx067xxxSS	VT03014U	1207	550	230
Gxx067xxxES	VT03014U	1209	400	230
GVX071.0xxxND	VT03021U	1279	1220	400
GVX071.0xxxMD	VT03021U	1280	1150	400
GVX071.0xxxMS	VT03021U	1281	960	400
GVX071.0xxxNS	VT03021U	1278	900	400
GVX071.0xxxLD	VT03020U	1274	845	400
GVX071.0xxxLS	VT03020U	1275	720	400
GVX071.0xxxSD	VT03020U	1276	620	400
GVX071.0xxxSS	VT03035U	1282	500	230
GVX071.0xxxED	VT03035U	1283	415	230
GVX071.0xxxES	VT03035U	1284	340	230

Heat Exchanger	EC Fans			
	Fan type	Fan-ID	working point (maximum speed) n [min-1]	Voltage [V]
Gxx080xxxND	VT03025U	1210	975	400
Gxx080xxxNL	VT03025U	1210	975	400
Gxx080xxxNJ	VT03025U	1241	900	400
Gxx080xxxMD	VT03025U	1212	865	400
Gxx080xxxNS	VT03025U	1211	770	400
Gxx080xxxML	VT03025U	1211	770	400
Gxx080xxxLD	VT03024U	1219	735	400
Gxx080xxxMJ	VT03024U	1242	700	400
Gxx080xxxMS	VT03023U	1213	600	230
Gxx080xxxLL	VT03023U	1213	600	230
Gxx080xxxLS	VT03023U	1214	575	230
Gxx080xxxLJ	VT03023U	1243	545	230
Gxx080xxxSD	VT03023U	1237	470	230
Gxx080xxxSL	VT03023U	1237	470	230
Gxx080xxxED	VT03022U	1217	435	230
Gxx080xxxEL	VT03022U	1217	435	230
Gxx080xxxSJ	VT03022U	1217	435	230
Gxx080xxxSS	VT03022U	1216	380	230
Gxx080xxxEJ	VT03022U	1216	380	230
Gxx080xxxES	VT03022U	1218	300	230
Gxx090xxxMD	VT03030U	1220	960	400
Gxx090xxxML	VT03030U	1220	960	400
Gxx090xxxMJ	VT03030U	1220	960	400
Gxx090xxxNS	VT03029U	1221	910	400
Gxx090xxxLL	VT03028U	1244	825	400
Gxx090xxxLJ	VT03028U	1244	825	400
Gxx090xxxMS	VT03028U	1222	690	400
Gxx090xxxSL	VT03027U	1245	650	400
Gxx090xxxSJ	VT03027U	1245	650	400
Gxx090xxxSD	VT03027U	1224	610	400
Gxx090xxxLD	VT03027U	1223	570	400
Gxx090xxxED	VT03027U	1225	530	400
Gxx090xxxEL	VT03027U	1225	530	400
Gxx090xxxSS	VT03026U	1227	485	230
Gxx090xxxEJ	VT03026U	1227	485	230
Gxx090xxxLS	VT03026U	1226	355	230
Gxx090xxxES	VT03026U	1228	335	230
Gxx100xxxND	VT03032U	1233	935	400
Gxx100xxxNS	VT03031U	1229	745	400
Gxx100xxxLD	VT03031U	1229	745	400
Gxx100xxxSD	VT03031U	1231	640	400
Gxx100xxxED	VT03031U	1238	575	400
Gxx100xxxLS	VT03031U	1230	525	400
Gxx100xxxSS	VT03031U	1232	470	400
Gxx100xxxES	VT03031U	1239	380	400

Troubleshooting table

Error	Possible cause, suggested solution
Fans are not turning	• If NOTHING happens when the controller is switched on and nothing appears in the Info menu either as a setpoint or a actual value, check the **operation mode** and the **I/O configuration**. The operation 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 operation mode in the I/O configuration (see page 45). • If the setpoint and the actual value appear in the Info menu but the setpoint does not match the defined setpoint, check the mode for any setpoint that may have been set externally (see page 38). • Check the power supply and the cable to the fan for faults (cable break etc.). • Has the sensor failed? Check: • **2-wire pressure sensor:** Should deliver 4-20 mA (check with ampmeter). You can also check the voltage between "GND" and the signal connection, it should be between 0.4 and 2 V. • **Temperature sensor:** Measure the impedance, it should 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 more quickly. **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 should 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. Alternatively you can measure the voltage at the signal input to minus (GND): this should be between 0.4 and 2.0 V.