

Operating instructions

Güntner Motor Management GMM phasecut



GRCP.1



GPHC 240.1



GPHC 380.1



GPHC 580.1



GMM phasecut compact 100/x.1



GMM phasecut compact 240/4.1

for management and speed control of AC fans.

GRCP.1

GPHC 240.1

GPHC 380.1

GPHC 580.1

GMM phasecut compact 100/1.1

GMM phasecut compact 100/2.1

GMM phasecut compact 240/4.1

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1 General notes

The GMM phasecut is a microprocessor-controlled speed controller designed to regulate the speed of three-phase motors.

The power unit is based on the principle of phase cutting. The output voltage can be regulated variably between 0 and 100 percent. No minimum load is required for the GMM phasecut compact owing to the controller implementation.

See [see Functional description, Page 18](#)

1.1 Safety instructions

In order to prevent serious physical injuries or major material damage, work on or with the unit may be performed only by authorised persons with 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 the installation and commissioning. In addition to the operating instructions and national accident prevention regulations, all recognised technical rules (safety and professional work under UVV, VBG, VDE etc.) must be followed.

Repairs to the 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 applicable national accident prevention regulations must be followed when working on control units under voltage.

1.2 Proper intended use

The unit is intended only for the purposes agreed in the order confirmation. Any other application or use for any additional purpose, is not a proper intended use. The manufacturer accepts no liability for any injury or damage arising from unintended use. Proper intended use is also contingent on compliance with the installation, operating and maintenance procedures described in these operating instructions. The technical data and the details of the connection assignments can be found on the type plate and in the instructions, and must be complied with.

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-sections, fuses, earth conductor connections, etc.). Additional information is included in the documentation. If the control unit is used in a particular area of application, the required standards and regulations must be complied with.

1.3 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.

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Fürstenfeldbruck

1.4 Warranty and liability

The current General Terms and Conditions of Sales and Delivery of Guntner GmbH & Co. KG apply.

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

1.5 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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1.6 EMC-compliant installation

Controllers in the GHM phasecut 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 IEC 61000 -4/-5/-6/-11 standards for grid-bound interference. In order to guarantee EM compatibility, the following points must be noted:

- The device must be earthed additionally to the mains supply on the heat exchanger. See also [see Installation / Operating conditions, Page 21](#)
- All measurement and signal lines must be connected via shielded cables.
- The shielding of measurement, signal and bus lines must be earthed at one end only.
- Suitable shielding and routing measures must be taken to ensure that mains cables and motor cables do not cause any interference in signal and control lines.

Mains connection:

Dangerously high leakage currents can occur in case of contact if the PE supply is interrupted. Refer here to EN 50178 Section 5.3.2.1 for devices with a leakage current of over 3.5 mA.

GMM phasecut compact 100/1.1 + 100/2.1

The device in question is a unit used for professional purposes with a rated power > 1kW within the meaning of DIN EN 61000-3-2. The unit therefore automatically corresponds to DIN EN 61000-3-2:2006 + A1:2009 +A2:2009.

GMM phasecut compact 240/4.+ GPHC 240.1 + GPHC 380.1 + GPHC 580.1

The device corresponds to DIN EN 61000-3-12:2011 provided that the short-circuit power ratio $R_{scc} \geq 120$. It is the responsibility of the installer or operator of the device to ensure, if necessary in consultation with the network operator, that this device is only connected to a terminal point with an S_{sc} value of greater than or equal to $120 * S_{sequ}$. S_{sequ} in this case is the rated power of the device derived from $\sqrt{3} * U_{supply} * \text{Rated current input}$.

The GRCP.1 controller and possible expansion modules are mounted on a top-hat rail and placed in the switch cabinet on an earthed mounting panel. The phase-cutting output stages GPHC 240.1, GPHC 380.1, GPHC 580.1 are likewise placed in the switch cabinet on an earthed mounting panel. The electrical supply is connected with cable connectors.

ADVICE

If the equipment is installed in a switch cabinet, **proper attention must be given to the temperature** inside the cabinet. Güntner switch cabinets are provided with sufficient ventilation.

2 Commissioning GMM phasecut

The AC fans in the GMM phasecut are controlled by means of one or more phase-cutting output stages.

The phase-cutting output stages are controlled via a CAN-BUS and have to be adjusted in accordance with the supply voltage and the fan motor parameters. This commissioning process determines the performance of the heat exchanger.

When switched on, the GMM phasecut automatically recognises whether commissioning has already been carried out and, if it has, continues with normal operation.

If the GRCP.1 detects that this has not yet been done, it initiates the commissioning procedure. When this procedure has been completed, all the specified parameters are saved. All values set up by the commissioning can also be viewed and changed individually later on in the menus.

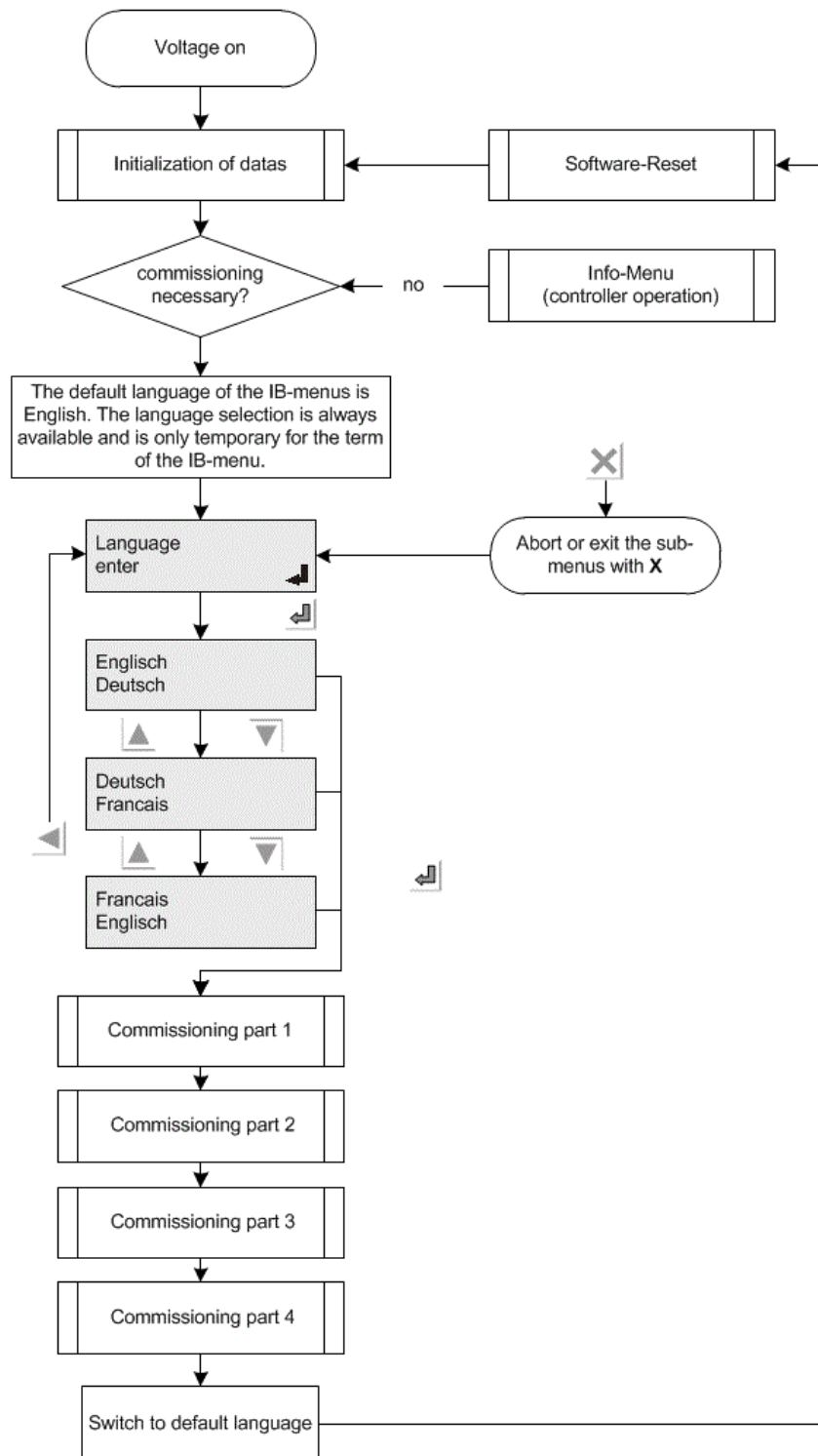


2.1 Default parameters with start-up

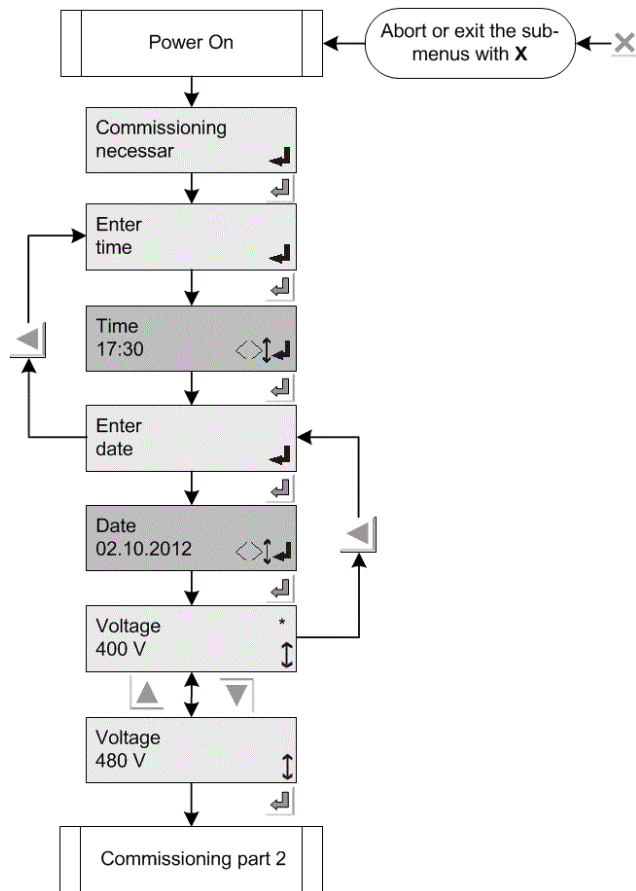
The parameters are set by default as indicated by the commissioning process, see also [Factory setting, Page 122](#).

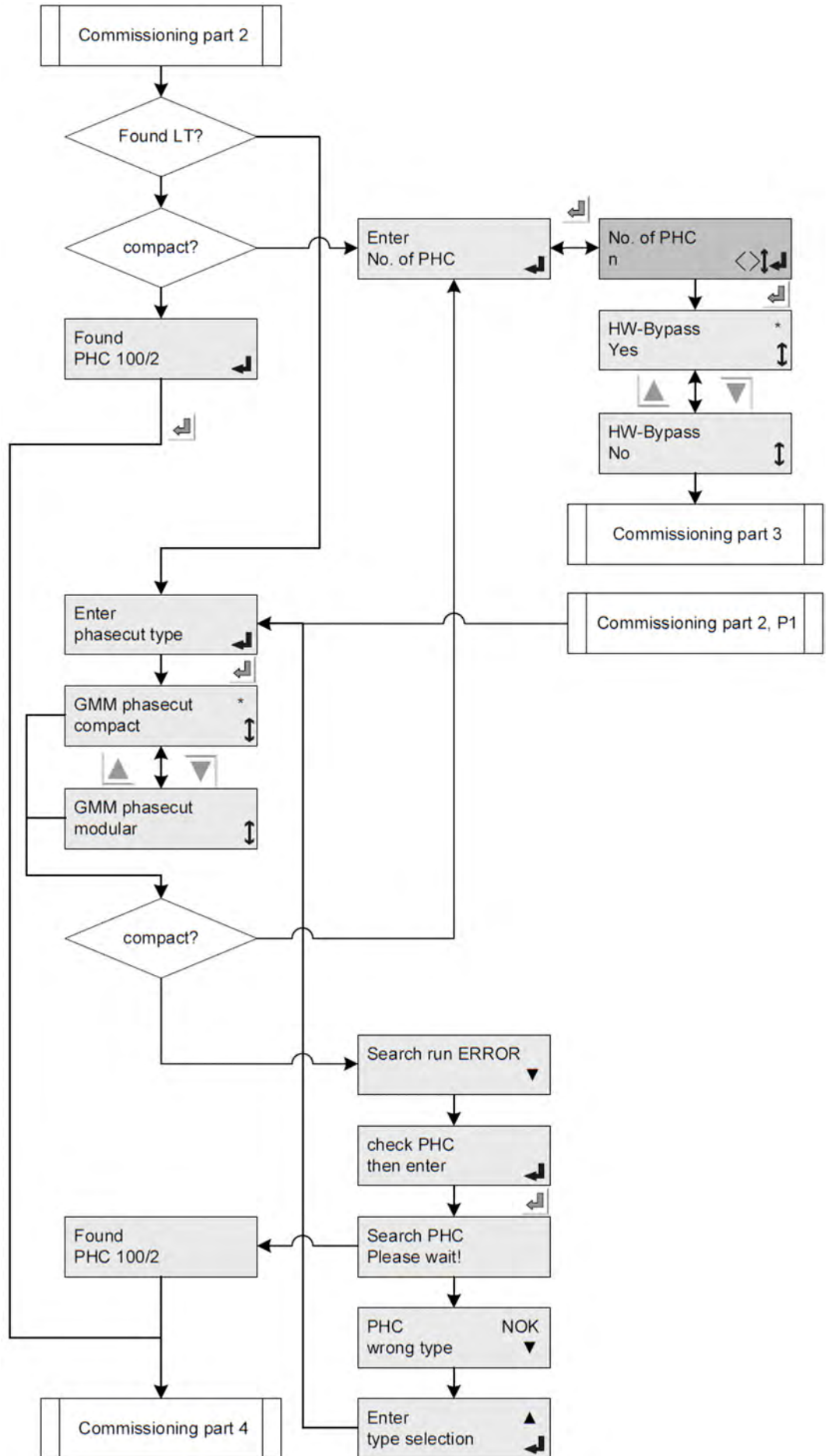
2.2 The initial commissioning procedure

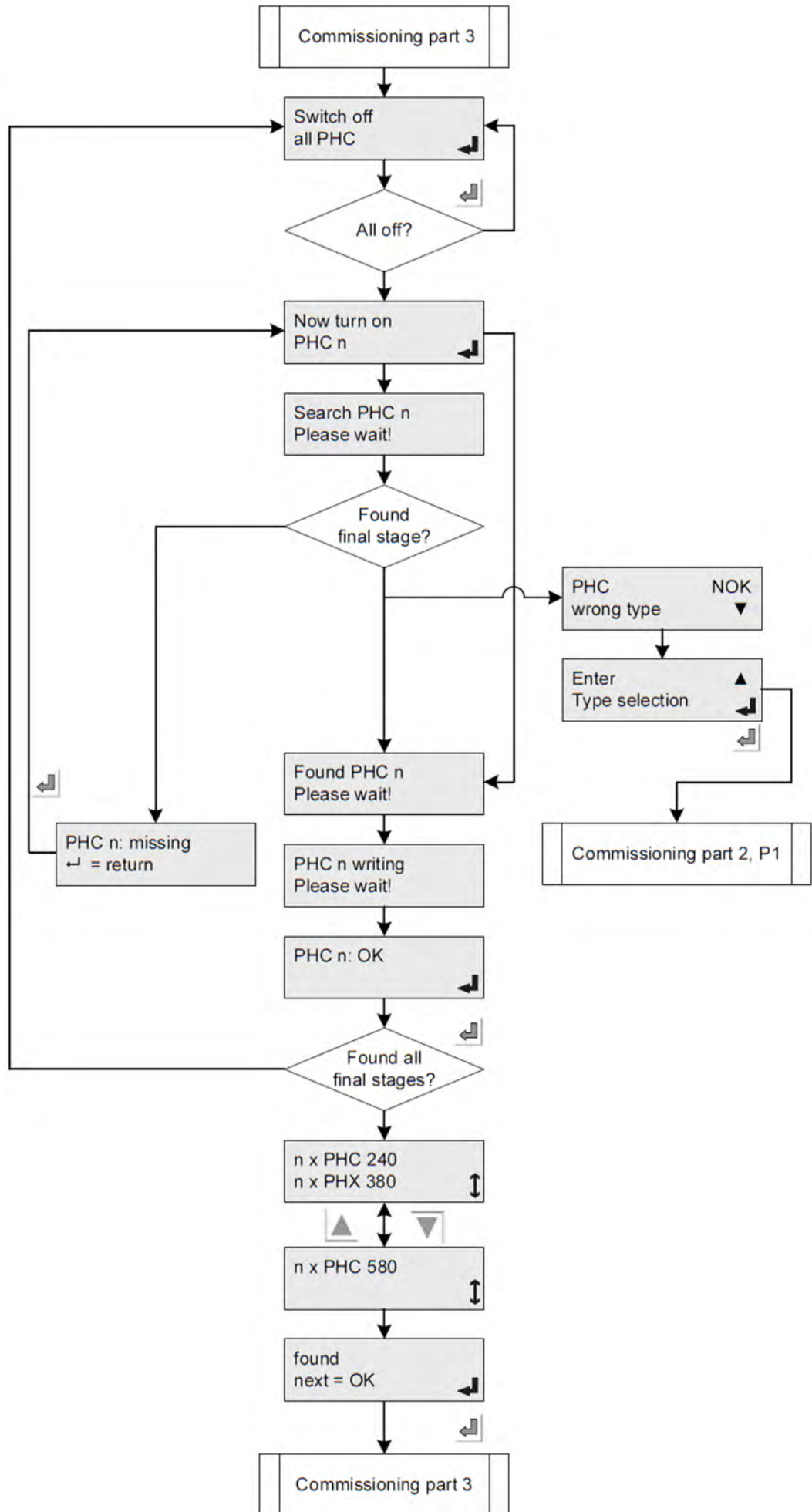
If it is recognised that commissioning has not yet taken place, the following values are queried and set up in accordance with the following flow chart.

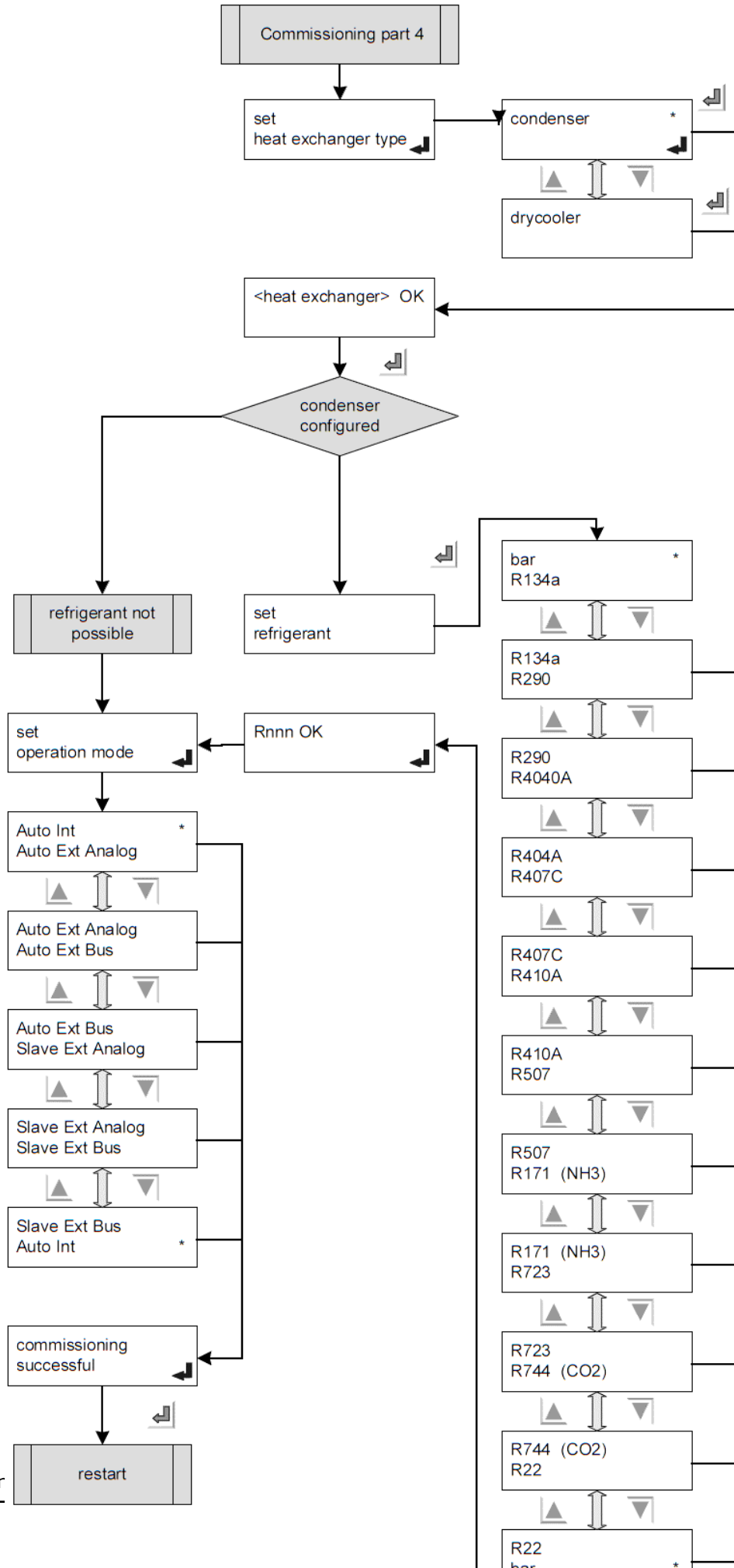


If it is recognised that commissioning is required, the commissioning menu is displayed.









3 Construction of the GMM phasecut

The GMM phasecut comes in two variants.

Variant 1: GMM phasecut compact	
This variant comprises a compact control unit in 3 different versions:	
GMM phasecut compact 100/1.1	Compact phase-cutting control unit, max 10 A, 1 output, IP54, variant 1
GMM phasecut compact 100/2.1	Compact phase-cutting control unit, max 10 A, 2 outputs, IP54, variant 1
GMM phasecut compact 240/4.1	Compact phase-cutting control unit, max 24 A, 4 outputs, IP54, variant 1

The GRCP.1 control unit is always used in these compact control units. Furthermore, the unit includes a phase-cutting output stage, a main switch and a corresponding number of fan outputs.

Variant 2: GMM phasecut modular	
This variant is installed in a switch cabinet. The following components are used here:	
GRCP.1	Control unit for phase-cutting controller, variant 1
GPHC 240.1	Phase-cutting power unit for switch cabinet installation, max. 24A, 1 output, CANOpen slave, IP20, variant 1
GPHC 380.1	Phase-cutting power unit for switch cabinet installation, max. 38A, 1 output, CANOpen slave, IP20, variant 1
GPHC 580.1	Phase-cutting power unit for switch cabinet installation, max. 58A, 1 output, CANOpen slave, IP20, variant 1

The GRCP.1 controller can control up to nine phase-cutting power units. A combination of different power units is also possible here.

3.1 Remote controllers

3.1.1 Functional description

Functional description of GRCP.1

The GRCP.1 is used for controlling phase-cutting endstages. The speed of the connected fans is adjusted depending on the control deviation between the current value and the setpoint.

In order to ensure controlled operation, the controller must have a power supply and must be enabled via digital input DI1. If it 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 specified via the internal menu, an external analogue value or via an external bus module.

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

The control value is sent via a bus system to the power unit (phase-cutting endstage). At the same time this value is also provided as a 0-10V signal.

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 signal the threshold function (GMM phasecut compact variant) or to activate hardware bypass operation (GMM phasecut modular variant for switch cabinet installation).

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.

Functional description of GPHC 240.1

The Güntner Phasecut 240.1 is a microprocessor-controlled power unit designed to regulate the speed of three-phase motors in accordance with the phase-cutting principle. The output voltage of the power unit can be adjusted variably from 0 to 100 percent of the mains voltage.

A GRCP.1 control unit is required for operation. A GRCP.1 can incorporate and operate a number of GPHC 240.1 units.

The output voltage can be regulated variably between 0 and 100 percent. No minimum load is required owing to the controller implementation.

Functional description of GPHC 380.1

The Güntner Phasecut 380.1 is a microprocessor-controlled power unit designed to regulate the speed of three-phase motors in accordance with the phase-cutting principle. The output voltage of the power unit can be adjusted variably from 0 to 100 percent of the mains voltage.

A GRCP.1 control unit is required for operation. A GRCP.1 can incorporate and operate a number of GPHC 380.1 units.

No minimum load is required owing to the controller implementation.

Functional description of GPHC 580.1

The Güntner phasecut 580.1 is a microprocessor-controlled power unit designed to regulate the speed of three-phase motors in accordance with the phase-cutting principle. The output voltage of the power unit can be adjusted variably from 0 to 100 percent of the mains voltage.

A GRCP.1 control unit is required for operation. A GRCP.1 can incorporate and operate a number of GPHC 580.1 units.

No minimum load is required owing to the controller implementation.

**Functional description of
GMM phasecut compact 100/x.1 / 240/4.1**

The GMM phasecut compact is a microprocessor-controlled speed controller in the small switch cabinet designed to regulate the speed of three-phase motors.

The switch cabinet houses the main switch, motor relay and controller.

The **GMM phasecut compact 100/2.1** has two separately fused motor outputs controlled in parallel. The two motor outputs have their own thermocontact monitor and can be switched off individually.

The **GMM phasecut compact 100/1.1** only has one motor output and for this reason does not have a separate fuse for this output. The motor load has to be distributed symmetrically in the case of units with two motor outputs. The maximum nominal load per motor output is 7A in the case of a GMM phasecut compact 100/2.1.

The **GMM phasecut compact 240/4.1** has four separately fused motor outputs controlled in parallel. The four motor outputs have their own thermocontact monitor and can be switched off individually. The motor load has to be distributed symmetrically to the motor outputs. The maximum nominal load per motor output is 7A.

The power unit is based on the principle of phase cutting. The output voltage can be regulated variably between 0 and 100 percent. No minimum load is required for the GMM phasecut compact owing to the controller implementation.

A GRCP.1 is used as the control unit. The speed of the connected fans is adjusted depending on the control deviation between the actual value and the setpoint. 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 defined via the internal menu, an external analogue value or via an external bus module.

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

The control value is sent via a bus system to the power unit (phase-cutting output stage). At the same time this value is also provided as a 0-10V signal.

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 signal 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.

3.1.2 Installation / Operating conditions

Installation / Operating requirements GRCP.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

Installation / Operating conditions GPHC 240.1, GPHC 380.1, GPHC 580.1

- The device is designed for installation in the switch cabinet.
- All measurement and signal lines must be connected via shielded cables.
- The shielding of measurement, signal and bus lines must be earthed at one end only.
- Suitable shielding and routing measures must be taken to ensure that mains cables and motor cables do not cause any interference in signal and control lines.
- Ambient temperature: -20°C ... +55°C
- Storage temperature: -20°C ... +55°C, dry
- Protection rating: IP 20 if the housing is closed, IP 00 if the housing is open

**Installation / Operating conditions
GMM phasecut compact 100/x.1 / 240/4.1**

- The small switch cabinet is designed for installation on the heat exchanger.
- All measurement and signal lines must be connected via shielded cables.
- The shielding of measurement, 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.
- Ambient temperature: -20°C .. +40°C
- Storage temperature: -20°C ... +55°C, dry
- Protection rating: IP 54 if the housing is closed, IP 00 if the housing is open.
- The earthing point of the device must be connected to the earthing point of the heat exchanger. The cable must have a minimum cross section of 6 mm².
- The device must be protected from direct sunlight. A sunshield must be used for mounting on the heat exchanger.

3.1.3 LEDs

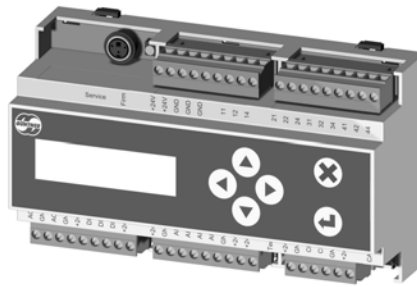
LEDs - GPHC 240.1, GPHC 380.1, GPHC 580.1			
Device status	Green LED Power	Yellow LED Ready	Red LED Err/Warn
Device switched off, no 24 Volt supply voltage	OFF	OFF	OFF
24 Volt supply voltage present	ON	OFF	OFF
Operational, ENPO is set	ON	ON	OFF
In operation (mains voltage present, rotary field OK)	ON	Flashing	OFF
Rotary field not OK	ON	OFF	ON
Warning/Error	ON	OFF	Flashing (see flash code in operating manual)

For GPHC 240.1:

The LEDs are located on the PCB and can be viewed through a viewing window in the upper left area.

The flash codes are explained in [Error messages and warnings , LED flash codes, Page 124](#).

3.1.4 Controller GRCP.1

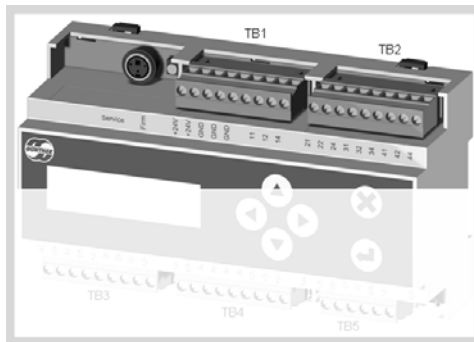






Controller GRCP.1

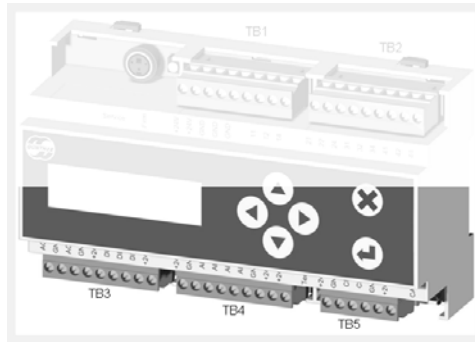
The GRCP.1 is used for controlling phase-cutting output stages. The speed of the connected fans is adjusted depending on the control deviation between the actual value and the setpoint. The equipment is controlled by means of menus using a 2-line display and an input keyboard. [see Error messages and warnings , LED flash codes, Page 124](#)

3.1.5 Connections

GRCP.1 connections



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
TB2	11	 Two-way contact for priority 1 alarms
	12	
	14	
	21	 Two-way contact for priority 2 alarms
	22	
	24	
	31	 Two-way contact for system messages
	32	
	34	
41	 Two-way contact: GMM phasecut compact: Threshold function GMM phasecut modular: Hardware bypass	
42		
44		

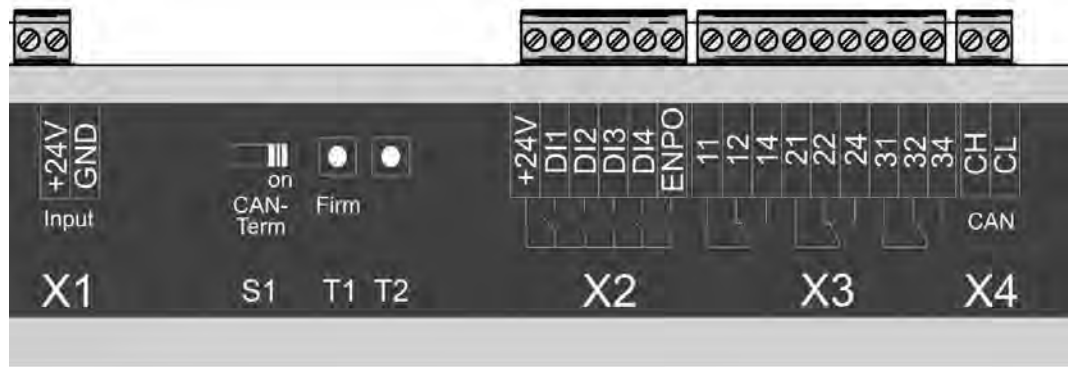


Lower row of connections		
	Name	Description
TB3	A01	Analogue output 1, 0-10V
	GND	Ground
	A02	Analogue output 2, 0-10V
	GND	Ground
	+24V	Voltage +24V
	DI1	Digital input +24V, Release
	DI2	Digital input +24V / night limiter
	DI3	Digital input +24V, setpoint changeover
	+24V	Voltage +24V
TB4	+24V	Voltage +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

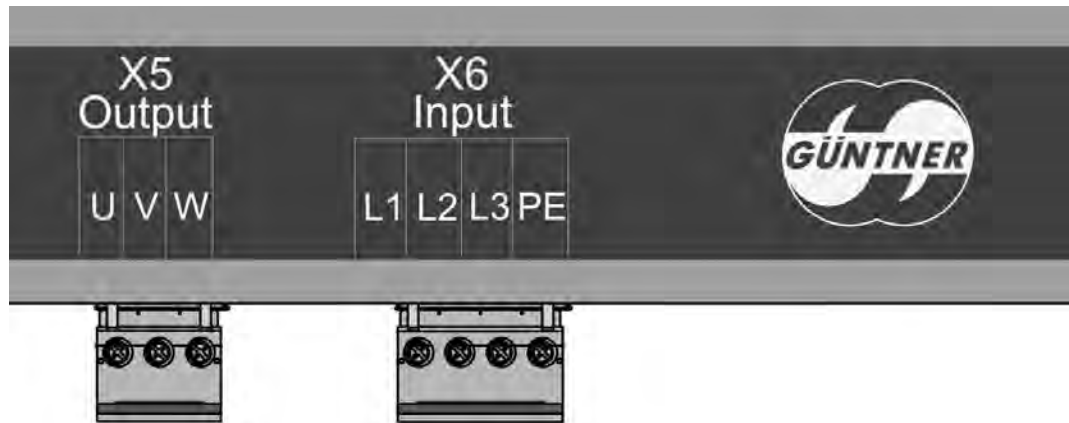
Connections GPHC 240.1



Connections GPHC 240.1

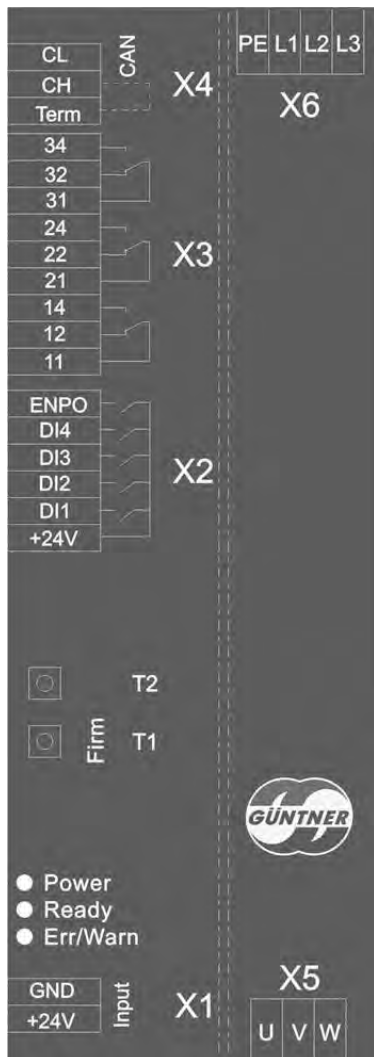
Upper row of connections		
	Name	Description
X1	+24V	Supply voltage for control unit
	GND	Ground for control unit
S1	CAN	DIP switch for CAN termination 120 Ohm
T1	Firm	Button for service engineer
T2		Not used
X2	+24V	Control voltage for potential-free dialogue inputs
	DI1	Digital input 1, free
	DI2	Digital input 2, thermal monitoring (TK) +24 Volt = Fans OK 0 Volt or open = Thermocontact has triggered
	DI3	Digital input 3, circuit breaker OK +24 Volt = Protective circuit OK 0 Volt or open = Circuit breaker has triggered
	DI4	Digital input 4, free
	ENPO	Enable Power, enables activation of the power unit, + 24 Volt = Enable output stage 0 Volt or open = Lock output stage
X3	11	 OUT 1: Phase-cutting operation = Closer 11/14 closed
	12	
	14	
	21	 OUT 2: Reset thermal monitoring = Closer 21/24 closed
	22	
	24	

Upper row of connections			
	31		OUT 3: Threshold value exceeded = Closer 31/34 closed
	32		
	34		
X4	CH	CAN Bus High	
	CI	CAN Bus Low	



Lower row of connections		
	Name	Description
X5	U	Motor output phase
	V	Motor output phase
	W	Motor output phase
X6	L1	Supply phase
	L2	Supply phase
	L3	Supply phase
	PE	Earth conductor

Connections GPHC 380.1

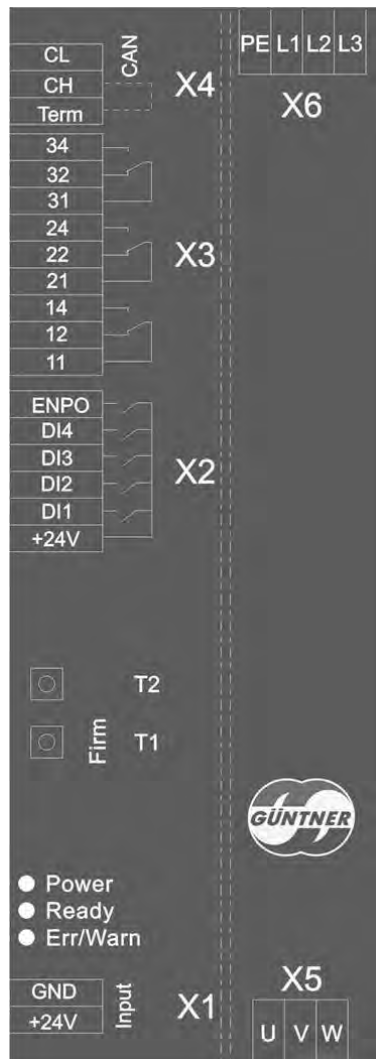


Connections GPHC 380.1

Connections on side parts		
	Name	Description
X5	U	Motor output phase
	V	Motor output phase
	W	Motor output phase
X6	PE	Earth conductor
	L1	Supply phase
	L2	Supply phase
	L3	Supply phase




Connections on housing cover			
	Name	Description	
X1	+24V	Supply voltage for control unit	
	GND	Ground for control unit	
T1	Firm	Button for service engineer	
T2		Not used	
X2	+24V	Control voltage for potential-free dialogue inputs	
	DI1	Digital input 1, free	
	DI2	Digital input 2, thermal monitoring (TK) +24 Volt = Fans OK 0 Volt or open = Thermocontact has triggered	
	DI3	Digital input 3, circuit breaker OK +24 Volt = Protective circuit OK 0 Volt or open = Circuit breaker has triggered	
	DI4	Digital input 4, free	
	ENPO	Enable Power, enables activation of the power unit, + 24 Volt = Enable output stage 0 Volt or open = Lock output stage	
X3	11		OUT 1: Phase-cutting operation = Closer 11/14 closed
	12		
	14		
	21		OUT 2: Reset thermal monitoring = Closer 21/24 closed
	22		
	24		
	31		OUT 3: Threshold value exceeded = Closer 31/34 closed
	32		
	34		
X4	Term	CAN termination 120 Ohm, if this contact is connected with CH.	
	CH	CAN Bus High	
	CL	CAN Bus Low	

Connections GPHC 580.1

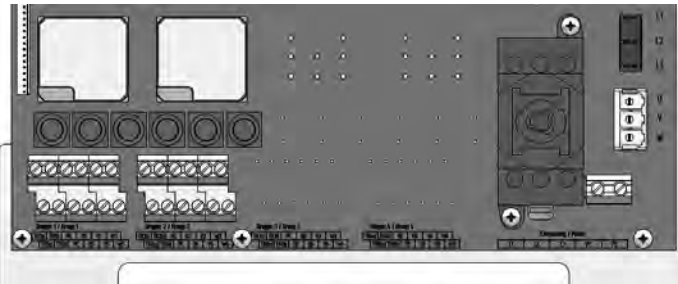


Connections GPHC 580.1

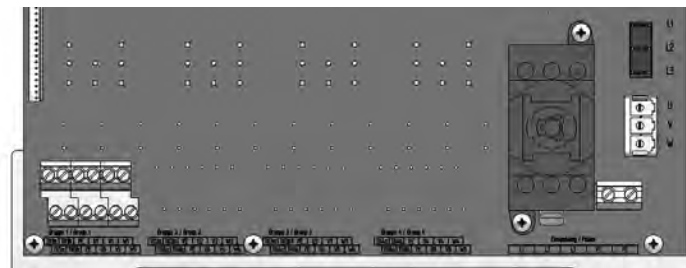
Connections on side parts		
	Name	Description
X5	U	Motor output phase
	V	Motor output phase
	W	Motor output phase
X6	PE	Earth conductor
	L1	Supply phase
	L2	Supply phase
	L3	Supply phase

Connections on housing cover			
	Name	Description	
X1	+24V	Supply voltage for control unit	
	GND	Ground for control unit	
T1	Firm	Button for service engineer	
T2		Not used	
X2	+24V	Control voltage for potential-free dialogue inputs	
	DI1	Digital input 1, free	
	DI2	Digital input 2, thermal monitoring (TK) +24 Volt = Fans OK 0 Volt or open = Thermocontact has triggered	
	DI3	Digital input 3, circuit breaker OK +24 Volt = Protective circuit OK 0 Volt or open = Circuit breaker has triggered	
	DI4	Digital input 4, free	
	ENPO	Enable Power, enables activation of the power unit, + 24 Volt = Enable output stage 0 Volt or open = Lock output stage	
X3	11		OUT 1: Phase-cutting operation = Closer 11/14 closed
	12		
	14		
	21		OUT 2: Reset thermal monitoring = Closer 21/24 closed
	22		
	24		
	31		OUT 3: Threshold value exceeded = Closer 31/34 closed
	32		
	34		
X4	Term	CAN termination 120 Ohm, if this contact is connected with CH.	
	CH	CAN Bus High	
	CL	CAN Bus Low	

Connections on power board GMM phasecut compact 100/x.1



Power board - GMM phasecut compact 100/2.1



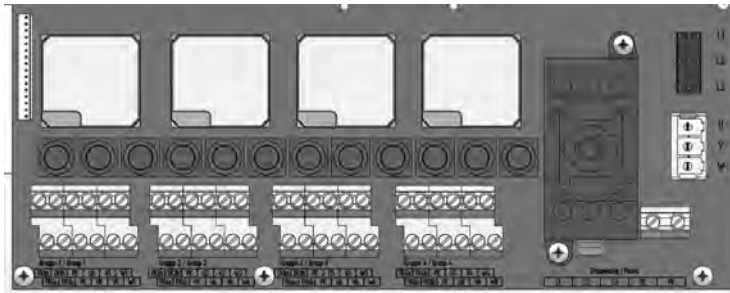
Power board - GMM phasecut compact 100/1.1

	Name	Description
Group 1	TK1a	Thermocontact for motor 1, must be bridged to TK1b if unused
	TK1b	Thermocontact for motor 1, must be bridged to TK1a if unused
	PE	Earthing point for motor 1
	U1	Phase U from motor 1
	V1	Phase V from motor 1
	W1	Phase W from motor 1
	TK5a	Thermocontact for motor 5, must be bridged to TK5b if unused
	TK5b	Thermocontact for motor 5, must be bridged to TK5a if unused
	PE	Earthing point for motor 5
	U5	Phase U from motor 5
	V5	Phase V from motor 5
	W5	Phase W from motor 5
Group 2 (only GMM PHC C 100/2.1)	TK2a	Thermocontact for motor 2, must be bridged to TK2b if unused
	TK2b	Thermocontact for motor 2, must be bridged to TK2a if unused
	PE	Earthing point for motor 2

	Name	Description
	U2	Phase U from motor 2
	V2	Phase V from motor 2
	W2	Phase W from motor 2
	TK6a	Thermocontact for motor 6, must be bridged to TK6b if unused
	TK6b	Thermocontact for motor 6, must be bridged to TK6a if unused
	PE	Earthing point for motor 6
	U6	Phase U from motor 6
	V6	Phase V from motor 6
	W6	Phase W from motor 6
Feed	L1	Phase L1 of feed
	L2	Phase L2 of feed
	L3	Phase L3 of feed
	PE	Earthing point of supply line
	PE	Earthing point of supply line or auxiliary earthing point
Earthing rods	PE	Earthing rods for earthing on heat exchanger. (see separate drawing below) Connection at the earthing point of the heat exchanger with min. 6 mm ² earthing cable.



1) Earthing rods

Connections on power board GMM phasecut compact 240/4.1


Power board - GMM phasecut compact 240/4.1

	Name	Description
Group 1	TK1a	Thermocontact for motor 1, must be bridged to TK1b if unused
	TK1b	Thermocontact for motor 1, must be bridged to TK1a if unused
	PE	Earthing point for motor 1
	U1	Phase U from motor 1
	V1	Phase V from motor 1
	W1	Phase W from motor 1
	TK5a	Thermocontact for motor 5, must be bridged to TK5b if unused
	TK5b	Thermocontact for motor 5, must be bridged to TK5a if unused
	PE	Earthing point for motor 5
	U5	Phase U from motor 5
	V5	Phase V from motor 5
	W5	Phase W from motor 5
Group 2	TK2a	Thermocontact for motor 2, must be bridged to TK2b if unused
	TK2b	Thermocontact for motor 2, must be bridged to TK2a if unused
	PE	Earthing point for motor 2
	U2	Phase U from motor 2
	V2	Phase V from motor 2
	W2	Phase W from motor 2
	TK6a	Thermocontact for motor 6, must be bridged to TK6b if unused
	TK6b	Thermocontact for motor 6, must be bridged to TK6a if unused
PE	Earthing point for motor 6	

	Name	Description
	U6	Phase U from motor 6
	V6	Phase V from motor 6
	W6	Phase W from motor 6
Group 3	TK3a	Thermocontact for motor 3, must be bridged to TK3b if unused
	TK3b	Thermocontact for motor 3, must be bridged to TK3a if unused
	PE	Earthing point for motor 3
	U3	Phase U from motor 3
	V3	Phase V from motor 3
	W3	Phase W from motor 3
	TK7a	Thermocontact for motor 7, must be bridged to TK7b if unused
	TK7b	Thermocontact for motor 7, must be bridged to TK7a if unused
	PE	Earthing point for motor 7
	U7	Phase U from motor 7
	V7	Phase V from motor 7
	W7	Phase W from motor 7
Group 4	TK4a	Thermocontact for motor 4, must be bridged to TK4b if unused
	TK4b	Thermocontact for motor 4, must be bridged to TK4a if unused
	PE	Earthing point for motor 4
	U4	Phase U from motor 4
	V4	Phase V from motor 4
	W4	Phase W from motor 4
	TK8a	Thermocontact for motor 8, must be bridged to TK8b if unused
	TK8b	Thermocontact for motor 8, must be bridged to TK8a if unused
	PE	Earthing point for motor 8
	U8	Phase U from motor 8
	V8	Phase V from motor 8
	W8	Phase W from motor 8
Feed	L1	Phase L1 of feed
	L2	Phase L2 of feed
	L3	Phase L3 of feed
	PE	Earthing point of supply line



	Name	Description
	PE	Earthing point of supply line or auxiliary earthing point
Earthing rods	PE	Earthing rods for earthing on heat exchanger. (see separate drawing below) Connection at the earthing point of the heat exchanger with min. 6 mm ² earthing cable.



1) Earthing rods

Connection properties on power side GPHC 240.1

Device port	Min	Type	Max	Unit
Recommended mains fuse	*	*	32	A (gL/gG)
Supply line X6 single-wire			10	mm ²
Supply line X6 finely stranded with end sleeves			6	mm ²
Motor output X5 single-wire			10	mm ²
Motor output X5 finely stranded with end sleeves			6	mm ²

* A smaller fuse may be possible if the connected motor load is below the maximum rated current. This must be checked in each case.

Connection properties on power side GPHC 380.1

Device port	Min	Type	Max	Unit
Recommended mains fuse	*	*	50	A (gL/gG)
Supply line X6 phase single-wire			35	mm ²
Supply line X6 phase finely stranded with end sleeves			25	mm ²
Supply line X6 PE single-wire			50	mm ²
Supply line X6 PE finely stranded with end sleeves			50	mm ²
Motor output X5 single-wire			50	mm ²
Motor output X5 finely stranded with end sleeves			50	mm ²

* A smaller fuse may be possible if the connected motor load is below the maximum rated current. This must be checked in each case.

Connection properties on power side GPHC 580.1

Device port	Min	Type	Max	Unit
Recommended mains fuse	*	*	80	A (gL/gG)
Supply line X6 phase single-wire			50	mm ²
Supply line X6 phase finely stranded with end sleeves			35	mm ²
Supply line X6 PE single-wire			50	mm ²
Supply line X6 PE finely stranded with end sleeves			50	mm ²
Motor output X5 single-wire			50	mm ²
Motor output X5 finely stranded with end sleeves			50	mm ²

* A smaller fuse may be possible if the connected motor load is below the maximum rated current. This must be checked in each case.

Connections properties on power side GMM phasecut compact 100/x.1

Device port	Min	Type	Max	Unit
Recommended mains fuse	*	*	16	A (gL/gG)
Supply line feed phase single-wire			10	mm ²
Supply line feed phase finely stranded with end sleeves			6	mm ²
Supply line feed PE single-wire			6	mm ²
Supply line feed PE finely stranded with end sleeves			4	mm ²
Motor output GroupX single-wire			6	mm ²
Motor output GroupX finely stranded with end sleeves			4	mm ²

* A smaller fuse may be possible if the connected motor load is below the maximum rated current. This must be checked in each case.

Connections properties on power side GMM phasecut compact 240/4.1

Device port	Min	Type	Max	Unit
Recommended mains fuse	*	*	32	A (gL/gG)
Supply line feed phase single-wire			10	mm ²
Supply line feed phase finely stranded with end sleeves			6	mm ²
Supply line feed PE single-wire			6	mm ²
Supply line feed PE finely stranded with end sleeves			4	mm ²



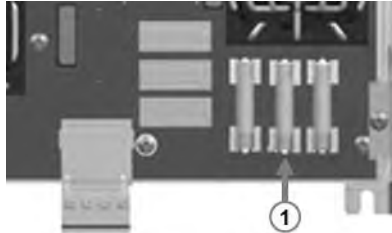
Device port	Min	Type	Max	Unit
Motor output GroupX single-wire			6	mm ²
Motor output GroupX finely stranded with end sleeves			4	mm ²

* A smaller fuse may be possible if the connected motor load is below the maximum rated current. This must be checked in each case.

3.1.6 Fuses

Fuses GPHC 240.1

The GPHC 240.1 has a fuse group in the input. The steps involved in replacing the fuses are described in the operating manual. Fuses may only be replaced when the device is disconnected from the mains. The fuses are used for protecting the device. They do not replace the necessary line protection for the supply line.



1) 3x capped fuse 30A/600V, gRL
BAAN no. 5205144

The following fuse types are used:

Type	Güntner Order No.	Reference Manufacturer	Reference Order No.
30A, gRL, 10x38mm	5205144	SIBA	6003434.30

Fuses GPHC 380.1

The GPHC 380.1 has a fuse group in the input. The steps involved in replacing the fuses are described in the operating manual. Fuses may only be replaced when the device is disconnected from the mains. The fuses are used for protecting the device. They do not replace the necessary line protection for the supply line.

The following fuse types are used:

Type	Güntner Order No.	Reference Manufacturer	Reference Order No.
50A, gRL, 14x51mm	5203121	SIBA	5012406.50

Fuses GPHC 580.1

The GPHC 580.1 has a fuse group in the input. The steps involved in replacing the fuses are described in the operating manual. Fuses may only be replaced when the device is disconnected from the mains. The fuses are used for protecting the device. They do not replace the necessary line protection for the supply line.

The following fuse types are used:

Type	Güntner Order No.	Reference Manufacturer	Reference Order No.
100A, gRL, 22x58mm	5203124	SIBA	5014006.100

Fuses GMM phasecut compact 100/x.1

The GMM phasecut compact 100/2.1 has a fuse group in the input and a fuse group for every motor group. The GMM phasecut compact 100/1.1 only has one fuse group in the input. The steps involved in replacing the fuses are described in the operating manual. Fuses may only be replaced when the device is disconnected from the mains. The fuses are used for protecting the device. They do not replace the necessary line protection for the supply line.

The following fuse types are used:

	Type	Güntner Order No.	Reference Manufacturer	Reference Order No.
Supply line	20A, gRL, 10x38mm	5205632	SIBA	6003434.20
Motor outputs (only GMM PHC 100/2.1)	12.5A, FF, 6x32mm	5203132	SIBA	7012540.12.5

Fuses GMM phasecut compact 240/4.1

The GMM phasecut compact 240/4.1 has a fuse group in the input and a fuse group for every motor group. The steps involved in replacing the fuses are described in the operating manual. Fuses may only be replaced when the device is disconnected from the mains. The fuses are used for protecting the device. They do not replace the necessary line protection for the supply line.

The following fuse types are used:

	Type	Güntner Order No.	Reference Manufacturer	Reference Order No.
Supply line	30A, gRL, 10x38mm	5205144	SIBA	6003434.30
Motor outputs	12.5A, FF, 6x32mm	5203132	SIBA	7012540.12.5



4 Display and operation

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

4.1 Info menu

Display with a dry cooler or condenser with selected refrigerant

Setpt.	XX.X°C	→ Setpoint
act val	XX.X°C A	→ Actual value

Display with a dry cooler without refrigerant selection

SP rel.	XX.Xbar	→ Setpoint
AV rel.	XX.Xbar A	→ Actual value

4.2 Status displays in the Info menu

Setpt.	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 actual value)
- See [Error messages and warnings , LED flash codes, Page 124](#)


Setpt.	XX.X°C	→ Text message
not enabled		


4.3 Operation

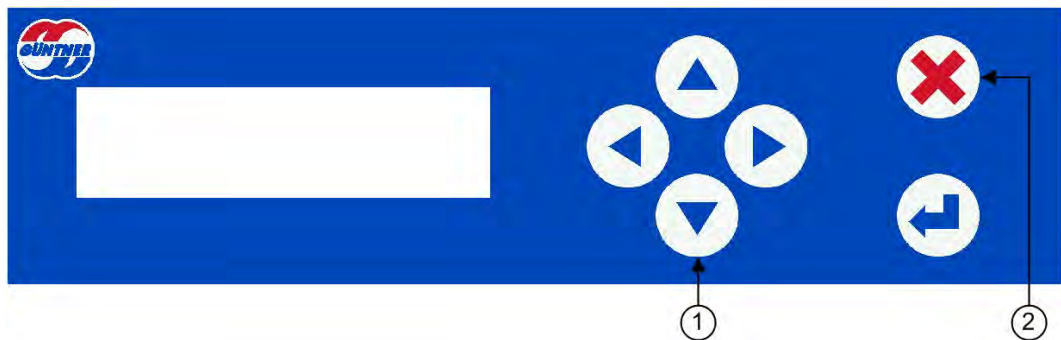
 **Cancel** and return to INFO menu

 **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.

 **Up/down 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.

4.4 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 <
_0.0°C
```

```
Setpoint 1 <
30.0°C
```



Change value

```
Setpoint 1 <
40.0°C
```



New value acceptance

```
Setpoint 1 <
40.0°C
```

4.5 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

⋮
english *
Deutsch
Deutsch
Francais
Francais
english *
⋮



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

Deutsch
Francais *

4.6 Configuration

The GMM phasecut is configured with an appropriate number of potential-free contacts. Their assignments will differ depending on the configuration.

4.6.1 Configuration table

Configuration table GPHC 240.1

GPHC 240.1	Phase-cutting power unit, max. 24 A nominal motor current, 1 output, IP 20, variant 1
------------	---

Configuration table GPHC 380.1

GPHC 380.1	Phase-cutting power unit, max. 38 A nominal motor current, 1 output, IP 20, variant 1
------------	---

Configuration table GPHC 580.1

GPHC 580.1	Phase-cutting power unit, max. 58 A nominal motor current, 1 output, IP 20, variant 1
------------	---

Configuration table 2 GMM phasecut compact 100/x.1

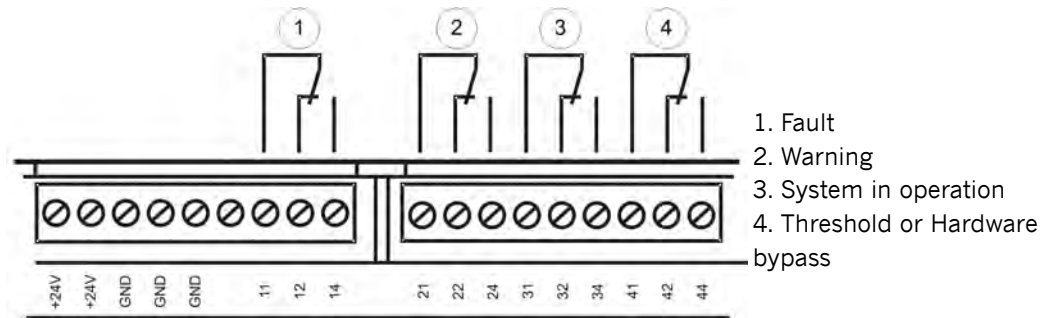
GMM phasecut compact 100/1.1	Phase-cutting compact control unit, max. 10 A nominal motor current, 1 output, IP 54, variant 1 BAAN No. 5205494
GMM phasecut compact 100/2.1	Phase-cutting compact control unit, max. 10 A nominal motor current, 2 outputs, IP 54, variant 1 BAAN No. 5205495

Configuration table GMM phasecut compact 240/4.1

GMM phasecut compact 240/4.1	Phase-cutting compact control unit, max. 24 A nominal motor current, 4 outputs, IP 54, variant 1
------------------------------	--

4.7 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. All signalling outputs must not exceed 250 V / 1 A.



Potential-free signalling outputs

4.7.1 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.

Contact 11/12 is closed in alarm status.

Alarms, see [Error messages and warnings , LED flash codes, Page 124](#)

4.7.2 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.

Contact 21/22 is closed when a warning is issued.

4.7.3 Digital output (31/32/34) (System in operation)

The two-way contact (31/34) is closed when a control signal is sent to the GMM phasecut, i.e. the fans are turning.

4.7.4 Digital output (41/42/44) Hard bypass operation or threshold

The threshold function is available at this output in the case of the GMM phasecut compact. [see Threshold value, Page 92](#)

Contact 41/44 closes when the configured threshold value is exceeded.

In the case of the modular variant in the switch cabinet, the bypass function is tripped with this output. If a bypass value is programmed as of which the phase cutting is to be bridged, this relay (contacts 41/44) is switched at this bypass value following a definable delay time. For the precise function description, see [see Bypass, Page 84](#)

4.8 Control inputs

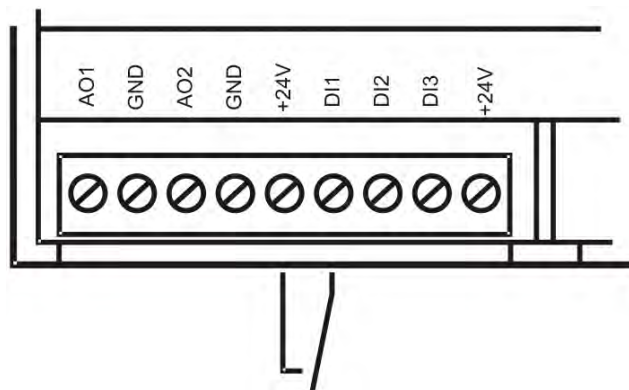
The control inputs are designed as a **low-voltage connection** and are connected via a potential-free contact (relay, contactor contact, switch etc.). The potential-free contact must be switched between the terminals **+24V** and the **DI1** or **DI2** or **DI3** control input. The function is activated when the contact is closed.

4.8.1 Enabling of GMM phasecut

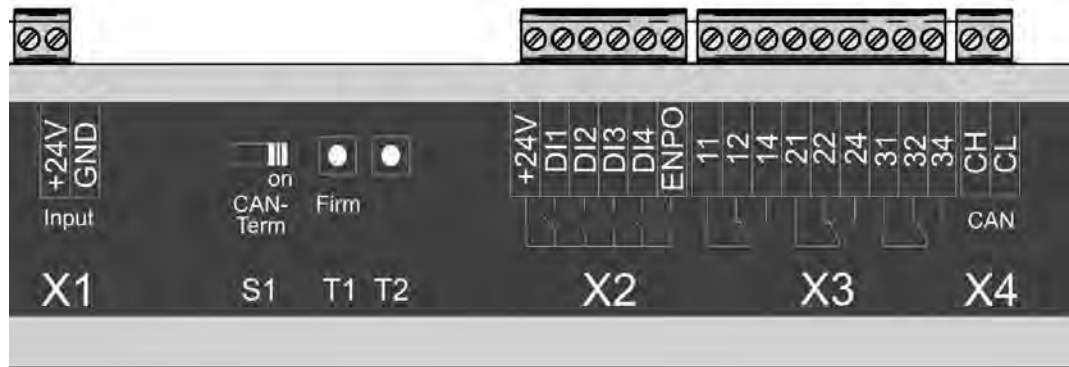
Fans are enabled via terminal **DI1** (enable). Their speed then depends on the control value. If enable is not switched, the fans will be disabled (speed = 0).

*If they are not to be enabled externally, terminal **DI1** must be jumpered.*

This enabling jumper is always installed in the factory.



Connection of external enable contact +24V – DI1



As well as enabling on GRCP.1 you also need to enable the power unit. The "ENPO" input of the phase-cutting output stage must be connected to +24V for this purpose. (This is already wired internally in the GMM phasecut compact variant.)

ADVICE

Under no circumstances may the controller be disabled by interrupting the supply 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 76](#)

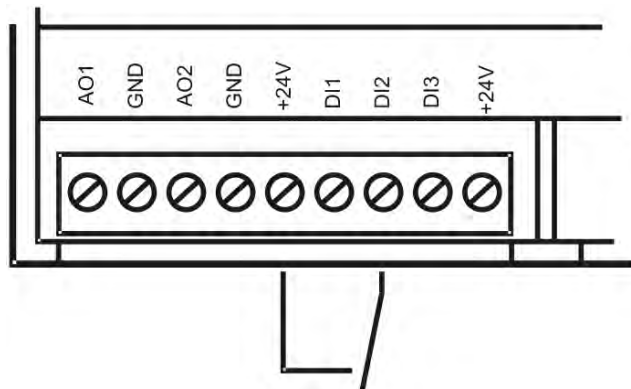


4.8.2 Speed limiter/External manual mode

Terminal **DI2** can be used to activate the (night) speed limiter and thereby limit the control signal and fan speed to their set values. This is then the maximum speed. For setting the speed limiter, see section [Nightsetback, Page 70](#) and for general activation see section [Service, Page 77](#).

Digital input 2 may have to be configured here accordingly (see IO configuration - [Digital inputs, Page 100](#)).

Alternatively, the input can also be used to activate manual mode. The input has to be configured accordingly for this purpose.



Activating the speed limiter externally/External manual mode

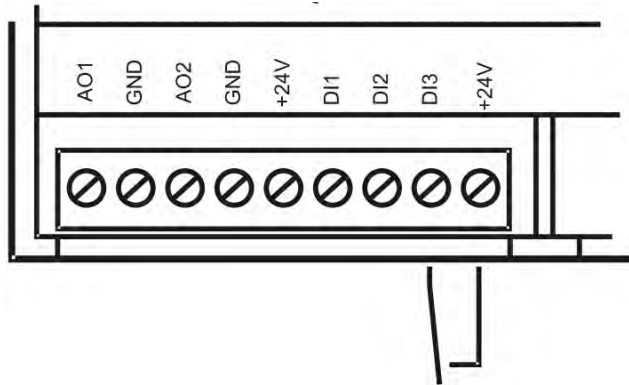
4.8.3 Switching to 2nd setpoint (or between heating and cooling mode)

Setpoint switchover:

This function enables the switchover between two setpoints, which serve as controlling input values. The switchover is made by connecting the "**DI3**" 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 **DI3** input.

4.9 Analogue inputs

The GMM has four sensor inputs:

Input AI1	Current input	4-20mA
Input AI2	switchable	4-20mA or impedance sensor GTF210
Input AI3	Impedance sensor	GTF210
Input AI4	Voltage source	0-10V DC

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

4.9.1 Connecting a pressure sensor to AI1/AI2

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

+24V = Common supply voltage (GSW4003.1: brown(1), GSW4003: brown(1))

AI1 = 4-20mA signal from sensor 1 (GSW4003.1: blue(3), GSW4003: green(2))

AI2 = 4-20mA signal from sensor 2 (GSW4003.1: blue(3), GSW4003: green(2))

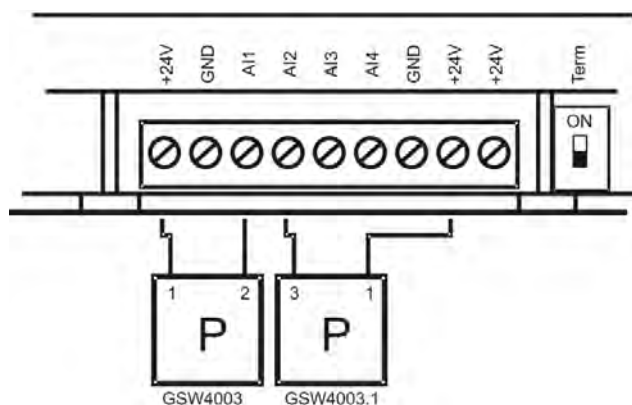
The connected pressure sensors must be configured in the hardware configuration.

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

4.9.2 External power signal connection to AI1/AI2

The AI1 or AI2 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 4..20mA 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 AI1 or AI2 inputs. Up to two power signals (4-20mA) can be connected to the AI1 and AI2 analogue inputs.

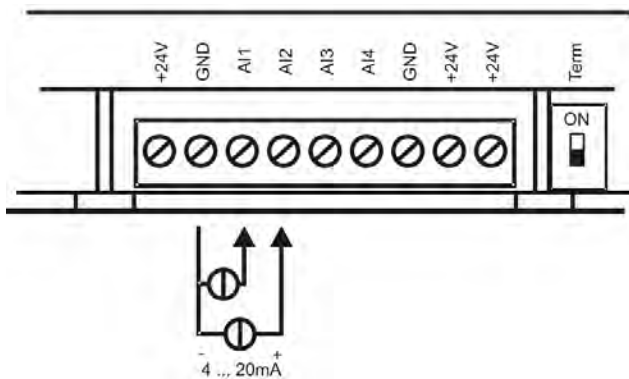
GND = Reference point (-).

AI1 = Current input (+) 4..20mA

AI2 = Current input (+) 4..20mA

ADVICE

Make sure the current source polarity is correct!



Power source connection

For current inputs, note that currents of less than **2.4mA** or greater than **22mA** will provoke a sensor fault display and corresponding message.

4.9.3 Connecting a temperature sensor on AI3

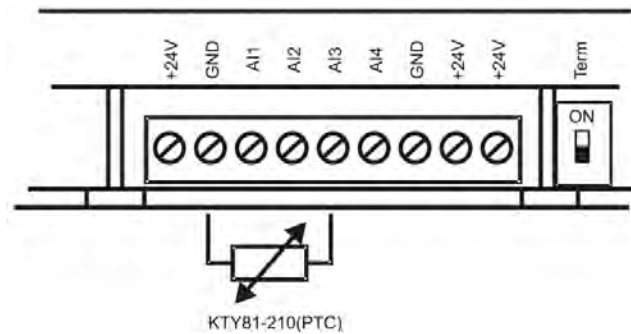
A temperature sensor is connected on the terminals

GND = Earth

AI3 = Signal input

There is no particular sequence for the cores.

The Güntner GTF210 temperature sensor is used in the range -30°C to +70°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 k Ω (-50°C) and 3.27k Ω (+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	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

Temperature / Impedance

Impedance	Temperature	Impedance	Temperature
1926Ω	20°C	3274Ω	100°C
2000Ω	25°C	3370Ω	105°C

Temperature / Impedance

4.9.4 0-10V voltage signal connection to AI4

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

GND = Earth (negative)

AI4 = Signal input 0-10V DC (**max. 12V DC**).

Make sure the polarity is correct (earth to **GND**, signal to **AI4**)!

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.

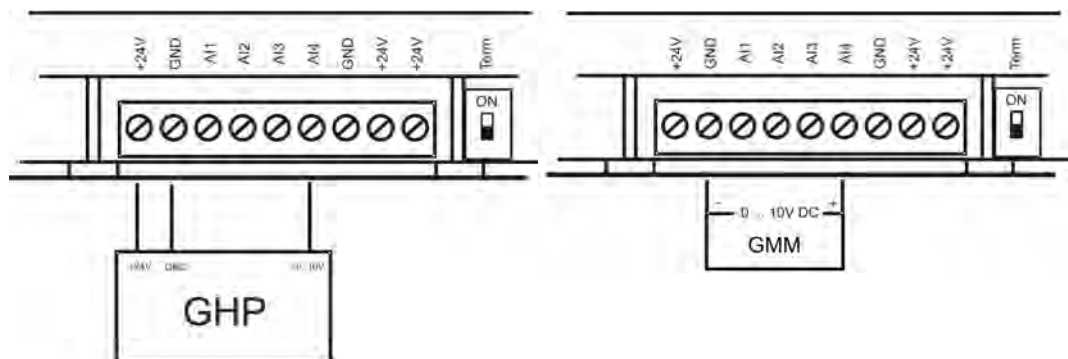
As an alternative, you can also connect a GHP manual potentiometer as a remote control. The connecting terminals on the GHP are labelled with either **1/2/3** or **x/-/Y** :

+ or 3 on **+24V**

- or 1 on **GND**

Y or 2 on **AI4**

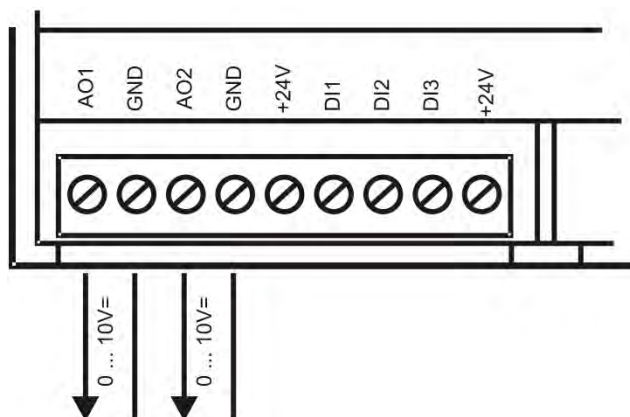
You can then use the speed controller purely as a speed adjuster and specify the fan speed yourself manually.



0-10V standard signal connection

4.10 Analogue outputs

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



Analogue outputs

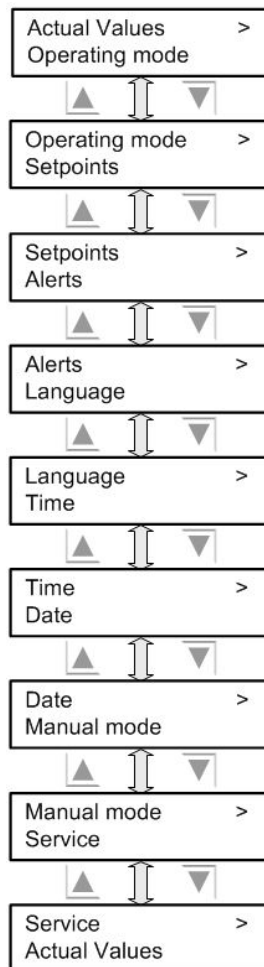
The **AO1** output issues the control signal (0..100%) scaled to 0..10V .

Output **AO2** 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 90](#)

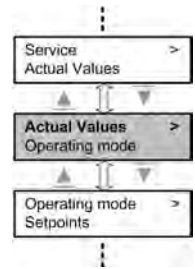
4.11 Operating menu

Structure of basic menu



4.11.1 Actual values

The actual input signals and control values are shown here.



4.11.1.1 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 or 4..20mA	Control Value Master nn.n V

4.11.1.2 Ambient temperature

The current ambient temperature is shown.
(Only if an ambient temperature sensor is configured.)



4.11.1.3 Control value

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



4.11.1.4 Air volume

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



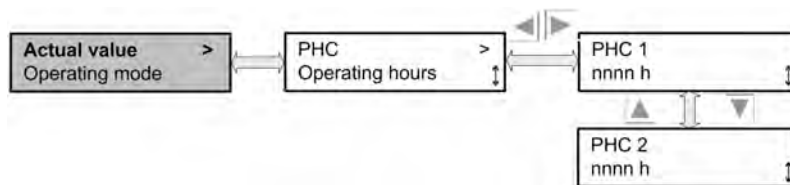
4.11.1.5 Operating hours

The operating hours of the phase-cutting output stage(s) are displayed here.
The operating hours are increased if the output stage is activated.

GMM phasecut compact

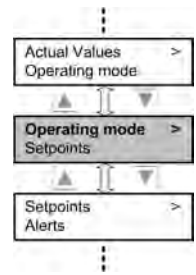


GMM phasecut modular



4.11.2 Status

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



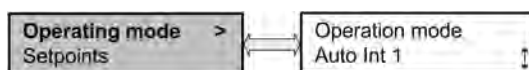
4.11.2.1 Operating mode

This shows the current operating mode.

There are:

Internal control	Auto int. 1	Setpoint 1 active	See Auto internal, Page 82
	Auto int. 2	Setpoint 2 active	See Auto internal, Page 82
	Auto ext. 1	Setpoint 1 active	See Auto external , Page 82
	Auto ext. 2	Setpoint 2 active	See Auto external , Page 82
	Auto ext. bus1	Setpoint 1 active	See Auto external BUS, Page 83
	Auto ext. bus 2	Setpoint 2 active	See Auto external BUS, Page 83
Slave	Slave ext.	Control value via 0...10V or 4-20mA	See Slave external , Page 83
	Slave ext. bus	Control value via GCM *	See Slave external BUS, Page 83
Manual mode	Manual mode		See Manual mode, Page 76

* GCM = Guntner Communication Module



For a precise description of the operating modes see section [Operating mode, Page 82](#)

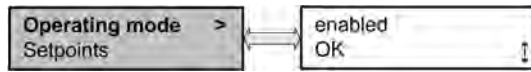
4.11.2.2 Mode

Set heating or cooling mode display.



4.11.2.3 External release - Status

Controller on connection **DI1** enabled "**OK**" or not "**None**"



4.11.2.4 Heat exchanger

The heat exchanger type is displayed here.



4.11.2.5 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.



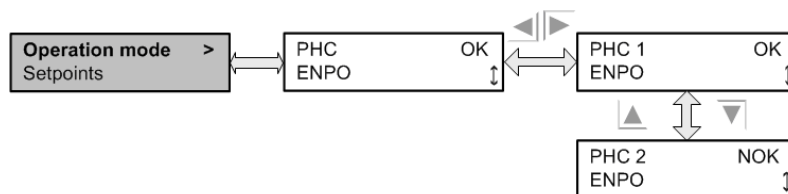
4.11.2.6 HW enable output stage (ENPO)

The status of the ENPO enabling of the output stage (ENPO=Enable Power) is displayed here.

GMM phasecut compact



GMM phasecut modular



4.11.2.7 Status of mains phases

The status of the mains phases is displayed here.

GMM phasecut compact



GMM phasecut modular



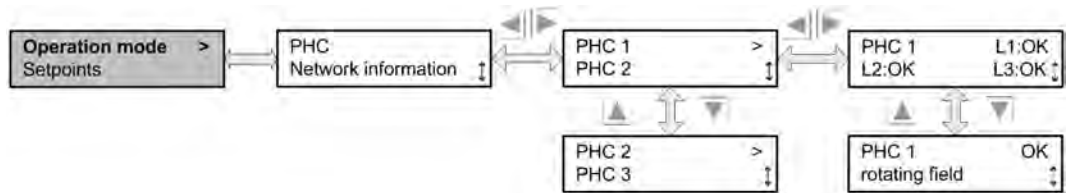
4.11.2.8 Rotary fields of mains voltage

It is shown here whether the mains rotary field is connected properly. A clockwise field of rotation is expected.

GMM phasecut compact



GMM phasecut modular



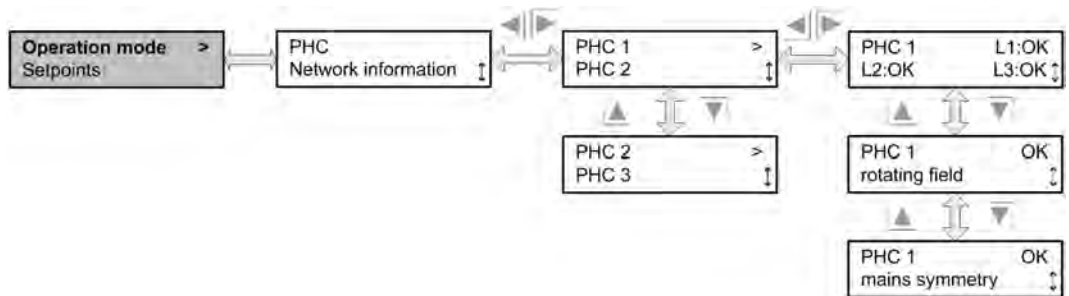
4.11.2.9 Mains symmetry

It is shown here whether the mains voltage is symmetrical.

GMM phasecut compact



GMM phasecut modular



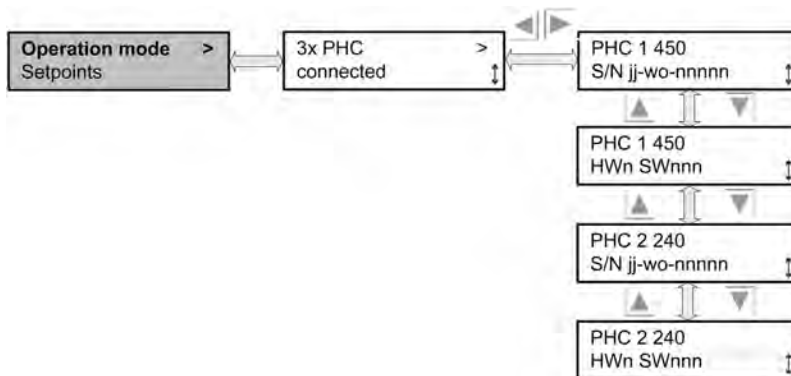
4.11.2.10 Serial numbers of output stages

The serial numbers of the output stages are shown here.

GMM phasecut compact



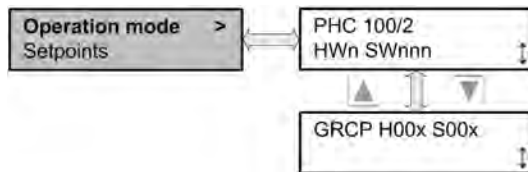
GMM phasecut modular



4.11.2.11 Software and hardware version

The software and hardware version of the output stage(s) are shown here.

GMM phasecut compact



GMM phasecut modular



4.11.2.12 HW bypass

(only with modular variant)

Whether the HW bypass function is switched on or off is shown here.

See [Hardware bypass \(HW bypass\), Page 85](#)



4.11.2.13 Hardware and software versions

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



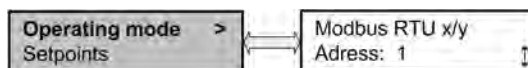
GRCP.1 = Controller with display and keyboard

H = hardware version

S = software version

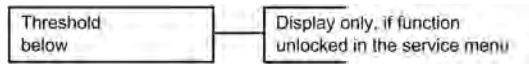
4.11.2.14 Bus module

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

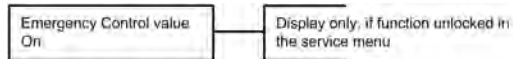


4.11.2.15 Threshold value/emergency control value

If the threshold value function is activated (see [Threshold value, Page 92](#)), a status display shows whether the value is above or below the threshold value.

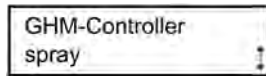


If the emergency control value is issued because of the threshold value function, it is displayed here.



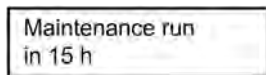
4.11.2.16 GHM Controller

If a GHM spray controller is connected, this will be shown here.



4.11.2.17 Maintenance run

If the maintenance run is activated in the Service menu, the time until the maintenance run is indicated here.



4.11.3 Setpoints

The setpoints can be set here.

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



4.11.3.1 Setpoint 1

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

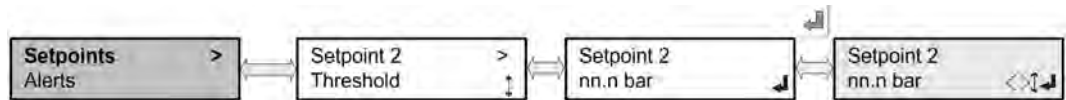
The minimum and maximum adjustment range is:

Set current value	Set operating mode	Setpoint display
Temperature	Control	-30.0 - 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.

4.11.3.2 Setpoint 2

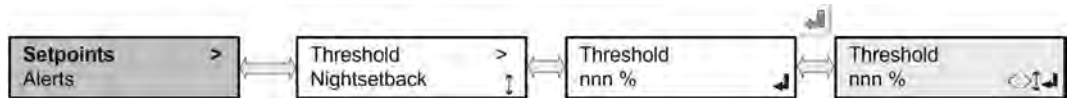
If 2 setpoints are defined in the **SERVICE** menu, a second setpoint is set here. This can be activated via digital input **DI3**. Setpoint 2 is programmed the same way as **setpoint 1**.



4.11.3.3 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 92](#)).

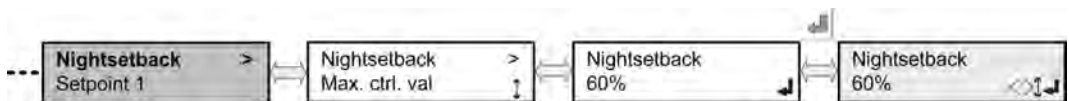
The threshold relay trips when the threshold value is exceeded.



4.11.3.4 Nightsetback

The Nightsetback function is used to limit the control value for the fans to a maximum value and thus minimise noise emissions. The limiter can be activated via **DI2** digital input or via the built-in timer.

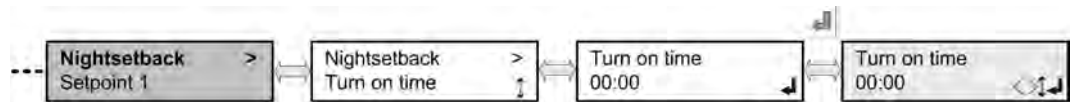
Defining maximum value



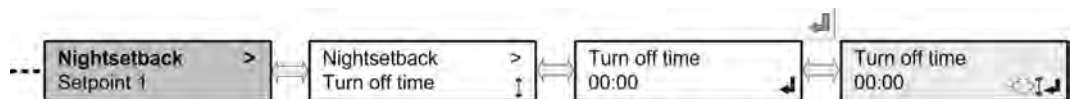
4.11.3.4.1 Night limiter activation/deactivation time

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



4.11.3.4.2 Night limiter functions list

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

4.11.4 Alerts

The last 85 alerts can be called up here.

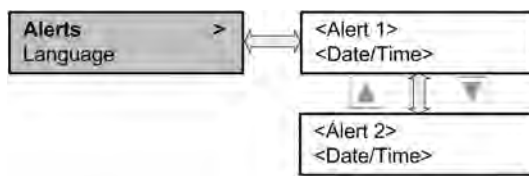


4.11.4.1 Alert memory

The GMM has an alert memory that can accommodate up to 85 incident report, turn-on and reset times stored consecutively (cyclically). These incident reports consist of the fault and the time stamp, comprising the date and time when the fault occurred. For a list of error messages and warnings see [Error messages and warnings , LED flash codes, Page 124](#).

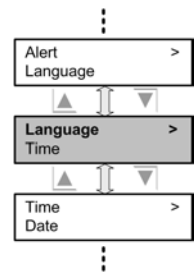
When the alert memory is selected, the display shows the last fault that occurred.

Use the “down” arrow key to display older faults.



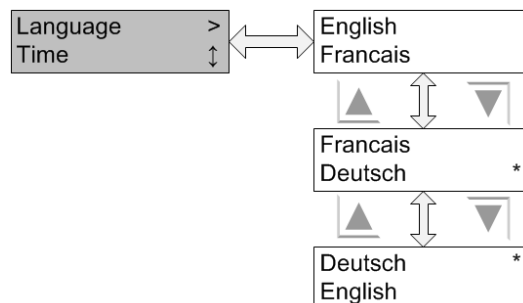
4.11.5 Language

The menu language can be selected here.



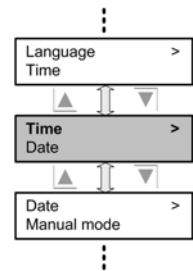
4.11.5.1 Language selection

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



4.11.6 Time

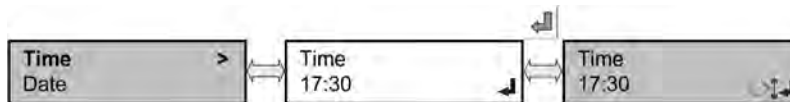
The time can be selected here.



4.11.6.1 Time setting

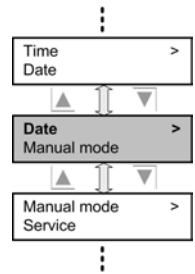
The set time is displayed and changed where required in the 24-hour clock.

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



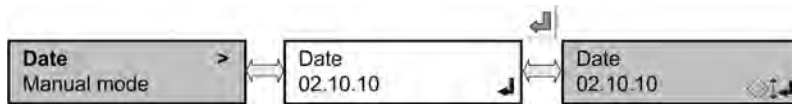
4.11.7 Date

The date can be set here.



4.11.7.1 Set date

The date is used to enter the alarm times in the alarm memory and for all timer functions.



4.11.8 Manual mode

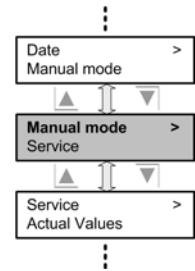
Manual mode is used to start up the heat exchanger fans by hand.

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

Manual mode does not depend on DI1 enabling.

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

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.



Manual mode can also be activated via digital input 2. The digital input has to be configured accordingly for this purpose in the Service menu (see [Digital inputs, Page 100](#) or [Speed limiter/External manual mode, Page 52](#)).

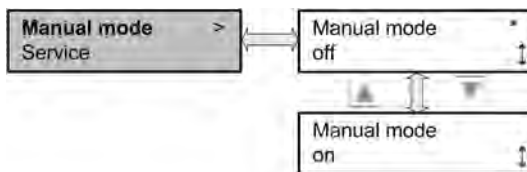
If the input is configured and connected with +24 Volt, the previously defined manual mode control value is output.

4.11.8.1 Manual mode settings

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



Manual mode can also be activated via digital input DI2.

The input has to be configured accordingly in the Service menu (see [Digital inputs, Page 100](#)).

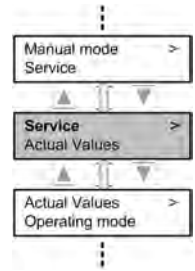
4.12 Service

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

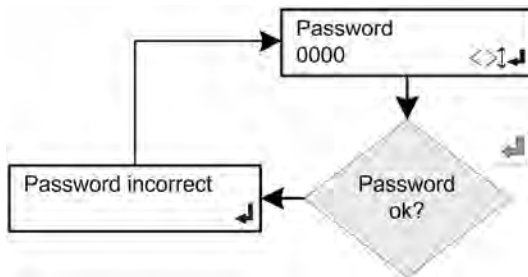
The password is **3795**.

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

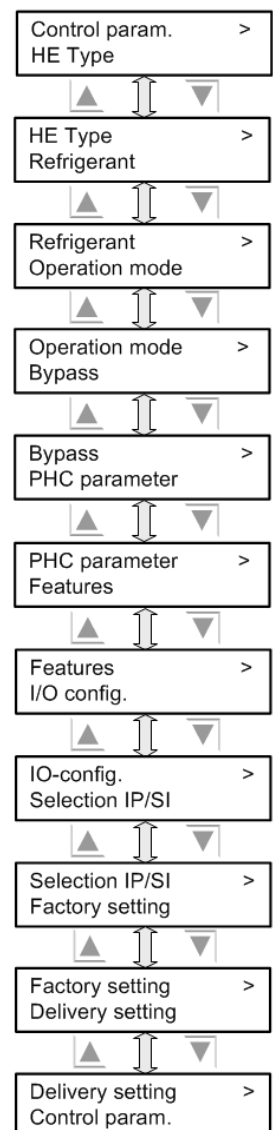
The password is valid for 15 minutes and will not be requested again during this time.



Password prompt

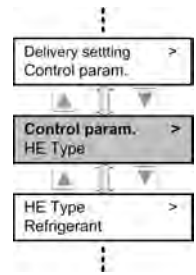


Service menu set-up

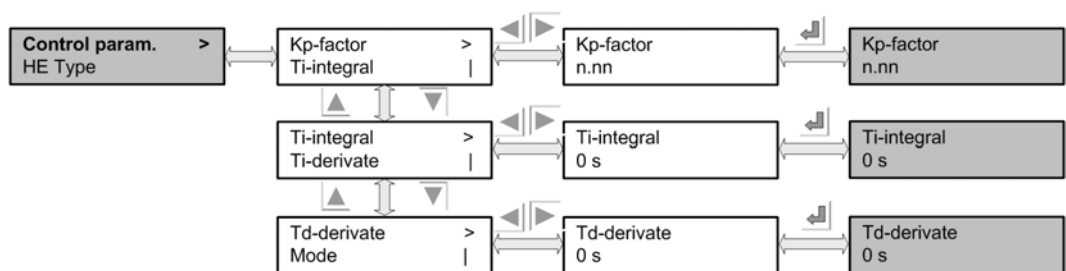


4.12.1 Control parameters

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



4.12.1.1 Control parameters Kp, Ti and Td



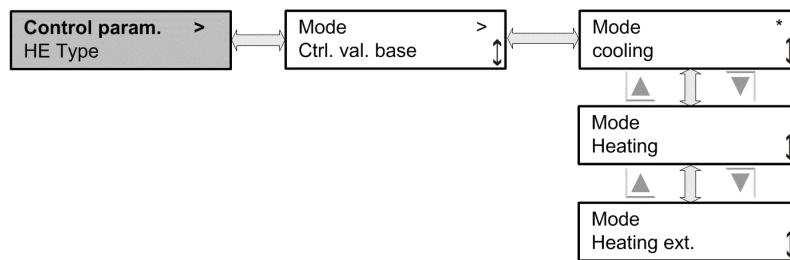
The Kp factor can be entered in a range from 0.1 to 100.0 to one decimal place. The Kp factor specifies the control amplification. It is the proportion of the control path following the input signal.

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.

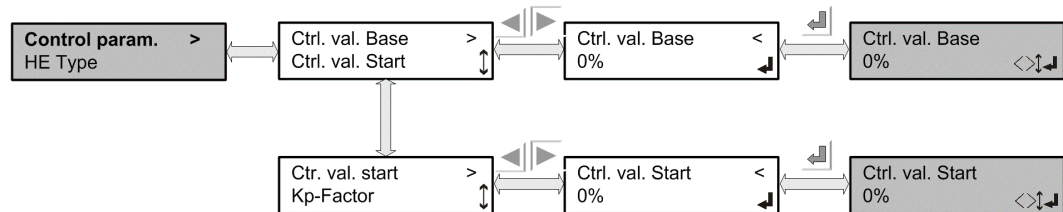
4.12.1.2 Cooling/heating control parameter mode



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.

4.12.1.3 Base control value and Start control value control parameters



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

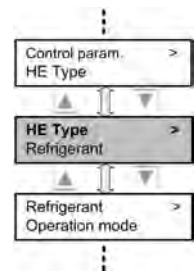
The **start control value** function is used to define a start point for issuing the control value.

Here are some setting examples:

Base control value	Start control value	Position
0%	0%	Functions of, normal control 0%-100% with enable
10%	0%	At least 10% control value is issued, when the enable is active
10%	5%	At least 10% control value is only then issued when the control has reached 5% and the enable 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 enable (5%-100%).

4.12.2 Heat exchanger

The heat exchanger type is selected here.



4.12.2.1 Heat exchanger type

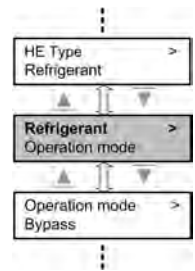
The heat exchanger type is selected here.
The selected type is displayed with a *.

→ Select with ENTER.

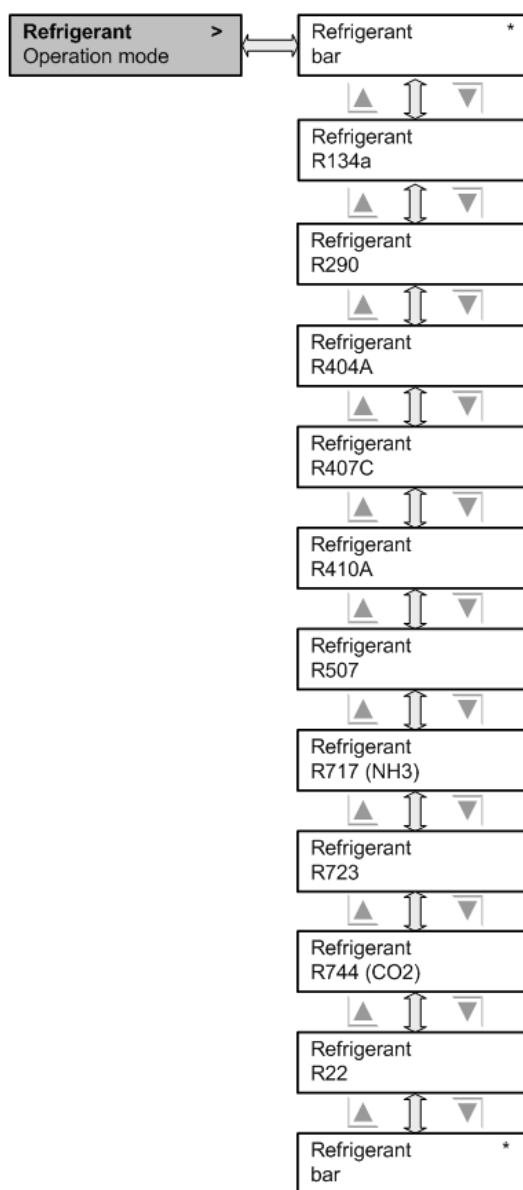
4.12.3 Refrigerant

A refrigerant is selected here.

This menu option is not offered if a drycooler is defined with the heat exchanger.



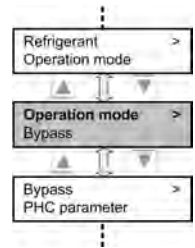
4.12.3.1 Refrigerant selection



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 *.

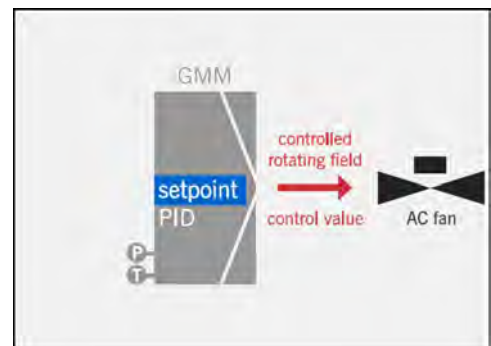
4.12.4 Operating mode

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



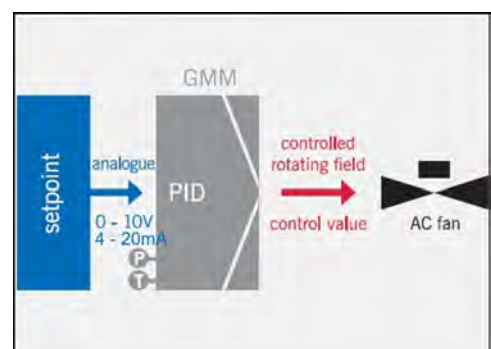
4.12.4.1 Auto internal

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



4.12.4.2 Auto external

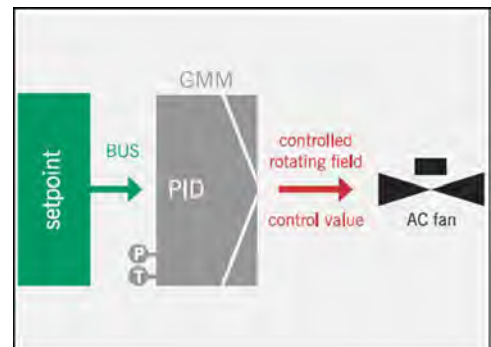
In this mode, control is automatic on the basis of the setpoint defined externally by the analogue input. Which input delivers the setpoint and which the actual value is defined in the IO configuration.



4.12.4.3 Auto external BUS

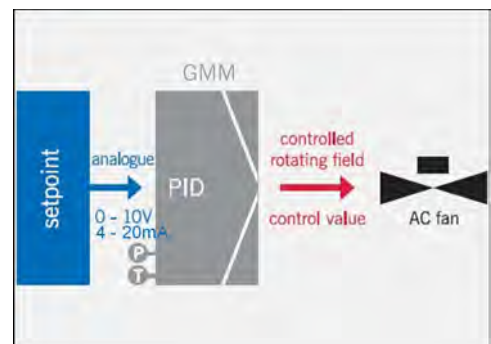
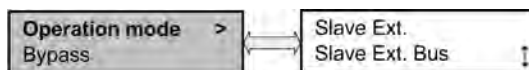
In this mode the setpoint is specified via BUS.

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



4.12.4.4 Slave external

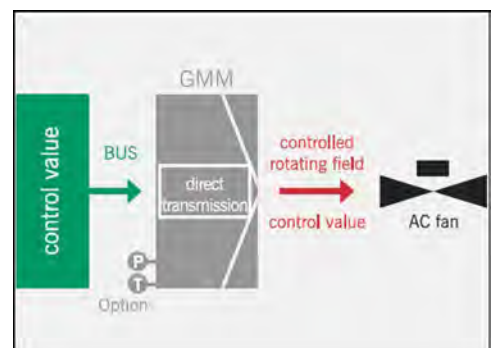
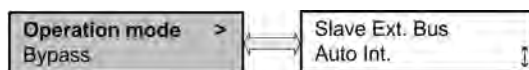
In this mode, there is no internal control. Instead the control value on the slave input is scaled and forwarded directly to the fans. Which input is to be used as the slave input is defined in the I/O configuration.



4.12.4.5 Slave external BUS

In this mode the control value is specified via BUS.

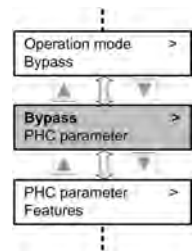
A Güntner Communication Module (GCM module) is required for this operating mode.



4.12.5 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 relieve the phase-cutting output stage at full load and to maintain operation in the event of a fault in a GMM phasecut component.



4.12.5.1 Bypass switching

There are two kinds of bypass – the software bypass and the hardware bypass; they are referred to below as **SW** bypass and **HW** bypass.

The **SW** bypass function has the effect that if there is a fault in the GRCP controller, the fans will run at the speed specified here. This speed is activated automatically 10 s after the connection to the GRCP is lost.

The **HW** bypass is a function that bridges the phase-cutting output stage if the control value exceeds a settable value.

It is used to switch the full voltage to the fans.

The HW bypass can also be activated in the event of a fault in the phase-cutting output stage.

The hardware bypass does NOT exist in the GMM phasecut compact variant.

It may be included in the modular variant.

4.12.5.2 Software bypass (SW bypass)



The following variants can be set with the SW bypass:

Bypass operation OFF

Control value 0%

... if the GRCP is defective or the connection to the phase-cutting output stage is damaged:

→ all fans stop

Bypass operation ON

Control value > 0% (e.g. 100%)

... if the GRCP is defective or the connection to the phase-cutting output stage is damaged:

→ all fans run at a speed of 100%, for example

If a limiter is configured ([see Limiter, Page 86](#)) this will likewise limit the control value configured here!

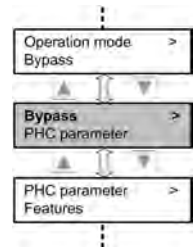
4.12.5.3 Hardware bypass (HW bypass)

ADVICE

The hardware bypass does not exist in the GMM phasecut compact variant. It may be included in the modular variant.

The HW bypass is used to bridge the phase-cutting output stage or is activated in the event of a fault.

The following parameters can be set with the HW bypass:



HW bypass from

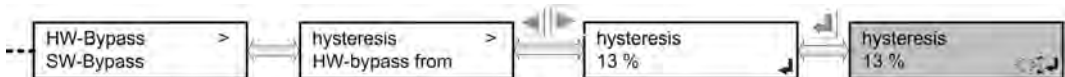
... Setting, from which control value the phase-cutting output stage is bridged and the bypass protection is switched on.



Hysteresis

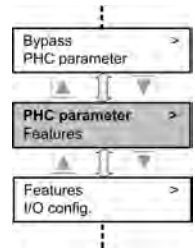
... Setting of the value at which the control value must be below the "HW bypass from" value to switch back to phase-cutting output stage operation

98% → ON with control signal 98%

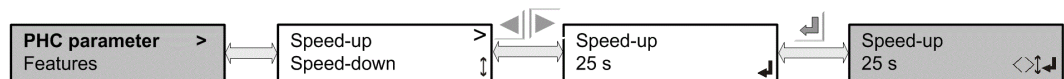


4.12.6 PHC parameters

GMM phasecut specific parameters can be configured in this menu section. The changes are adopted without restarting the device.



4.12.6.1 Speed-up



The acceleration rate of the fans from standstill to full speed is entered here.

4.12.6.2 Speed-down



The acceleration rate of the fans from full speed to standstill is entered here.

4.12.6.3 Full level control off



The threshold from which the Thyristor module is fully activated can be set here.

4.12.6.4 Limiter



The maximum threshold for the output stage can be set here.

4.12.6.5 Thermocontact reset

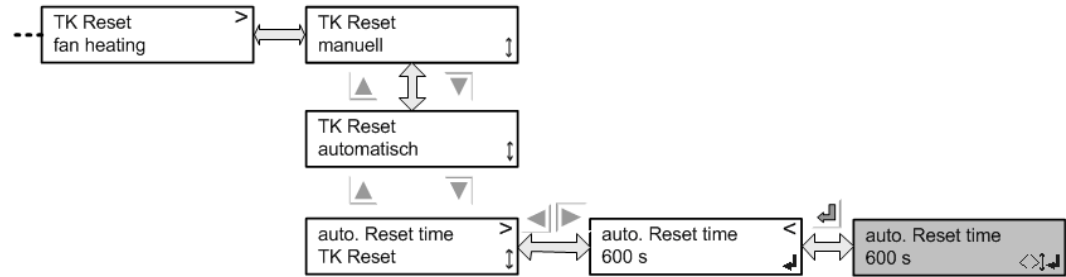
The thermocontacts of the fans are used to interrupt a self-maintaining actuation of the contactors.

An overheated fan is thus switched off. The thermocontact reset circuit can also be used to re-activate the self-maintaining function.

The thermocontact reset is a pulse of about two seconds duration and is output on digital output OUT 2 on the GPHC.

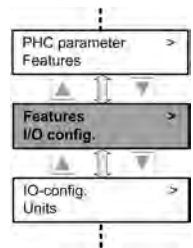
The function can be set up in this menu.

A thermocontact reset pulse is emitted by default when the controller is first switched on and one minute after any fault message.

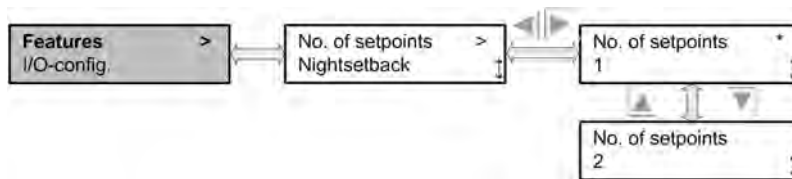


4.12.7 Features

The special functions, such as number of setpoints, the night limiter or setpoint displacement, or the subcooler function, can be selected in this service menu option.



4.12.7.1 Number of setpoints

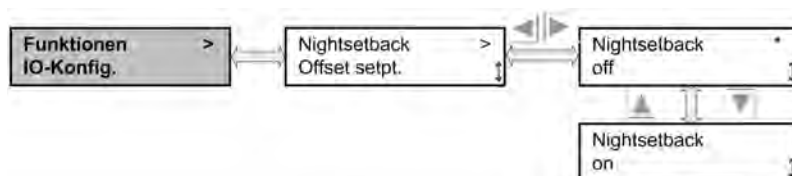


The number of setpoints is set here. The minimum number is 1 setpoint on which control is performed. If 2 setpoints are selected, switchover is via digital input **DI3**. If the input is open, setpoint 1 is used for control.

If the **DI3** input is connected with **+24V**, setpoint 2 is used for control.

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

4.12.7.2 Nightsetback



A night limiter is generally activated or deactivated in this service option. The night limiter value is set with the **Night limiter** 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 can be activated both via digital input **DI2** 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 digital input **DI2**.

4.12.7.3 Offset setpoint

It is beneficial in order to ensure the optimum energy operation to displace the setpoint under certain circumstances, depending on the external temperature.

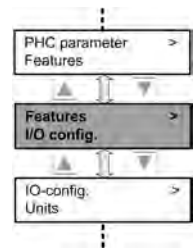
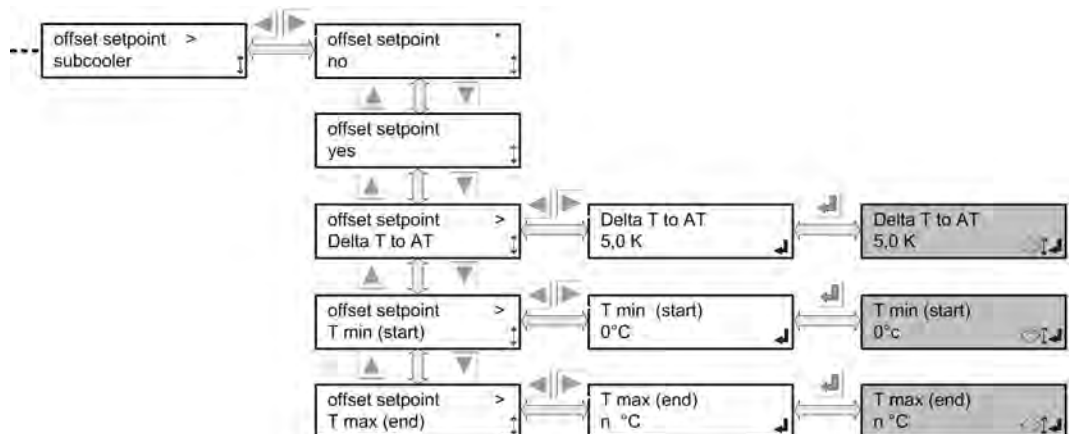
Setting the min. condensation temperature can cause rising external temperatures, so that the external temperature is above the setpoint. If the system is now only to be operated at partial load, raising the setpoint can save energy on the fans. Without a displacement these fans would always be controlled 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.



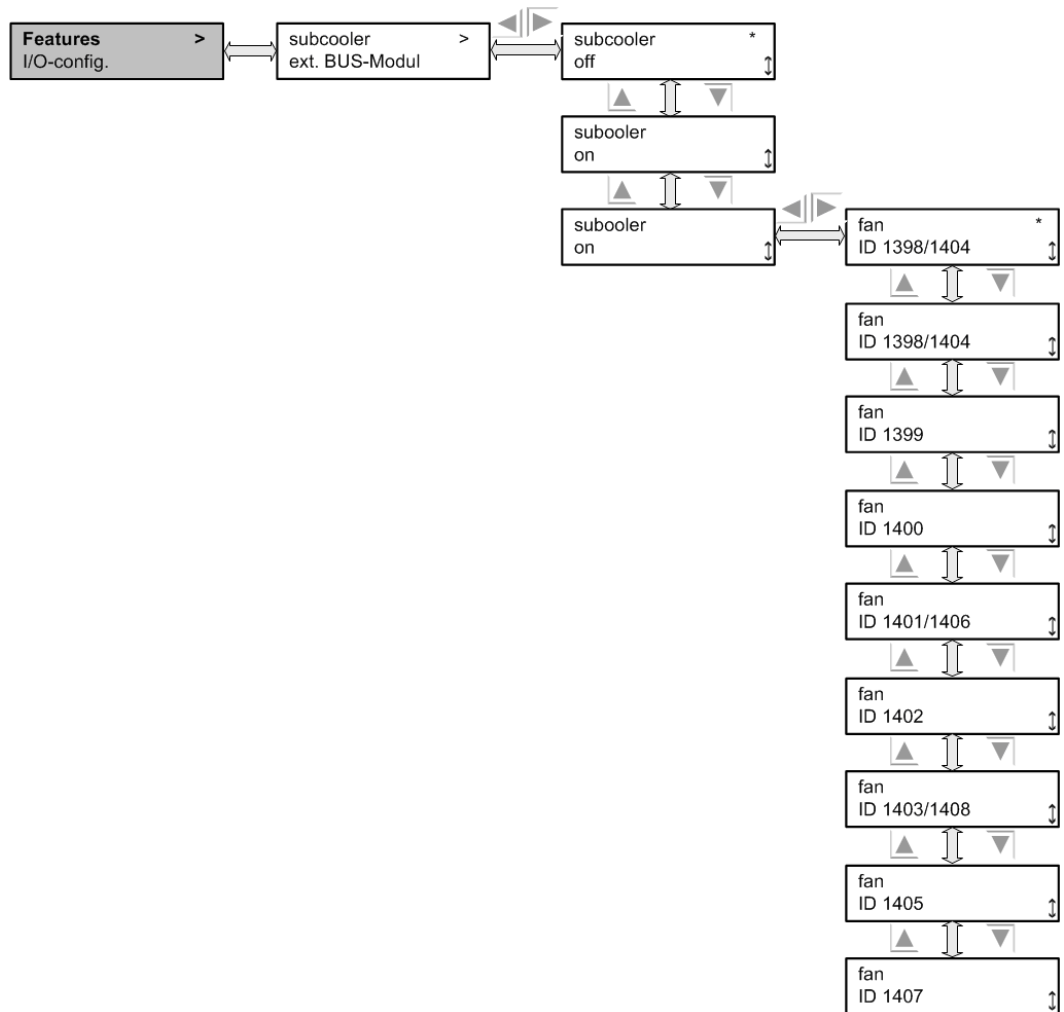
4.12.7.4 Subcooler function

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.

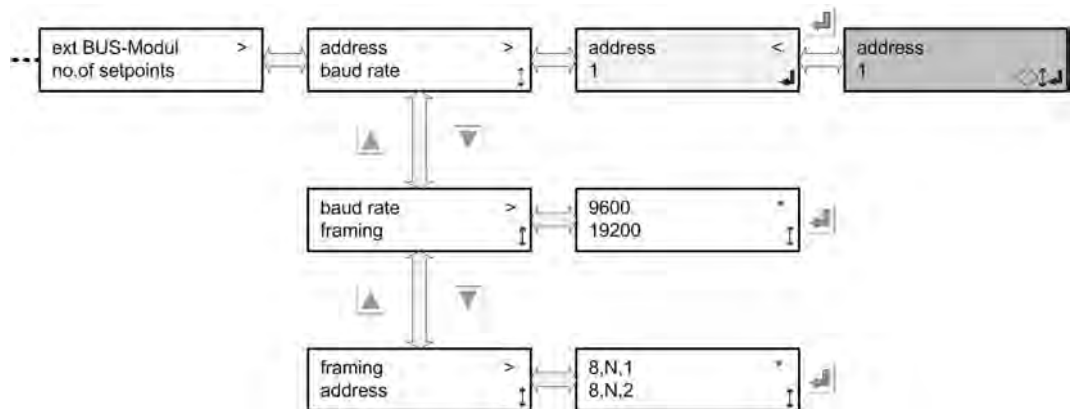
This subcooler runs constantly, independent of the regulation of the control unit with the set speed. It is activated like the regulated fans via the enable.

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

The fan type used is selected in the selection menu.



4.12.7.5 External BUS module



These functions allow you to change the interface parameters of the connected bus module.

The following parameters can be changed for a Modbus RTU module:

Address:	1....247
Baud rate:	1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200 Baud
Framing:	8,E,1 (8 Bit, even parity, 1 Stop Bit) 8,N,1 (8 Bit, no parity, 1 Stop Bit) 8,N,2 (8 Bit, no parity, 2 Stop Bit) 8, O,1 (8 Bit, odd parity, 1 Stop Bit)

Only the fieldbus address can be changed for a Profibus (0....126); the baud rate is set automatically.

ADVICE

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

4.12.7.6 Threshold value

Using the threshold value function, the threshold value relay (digital output) can be tripped depending on various parameters.

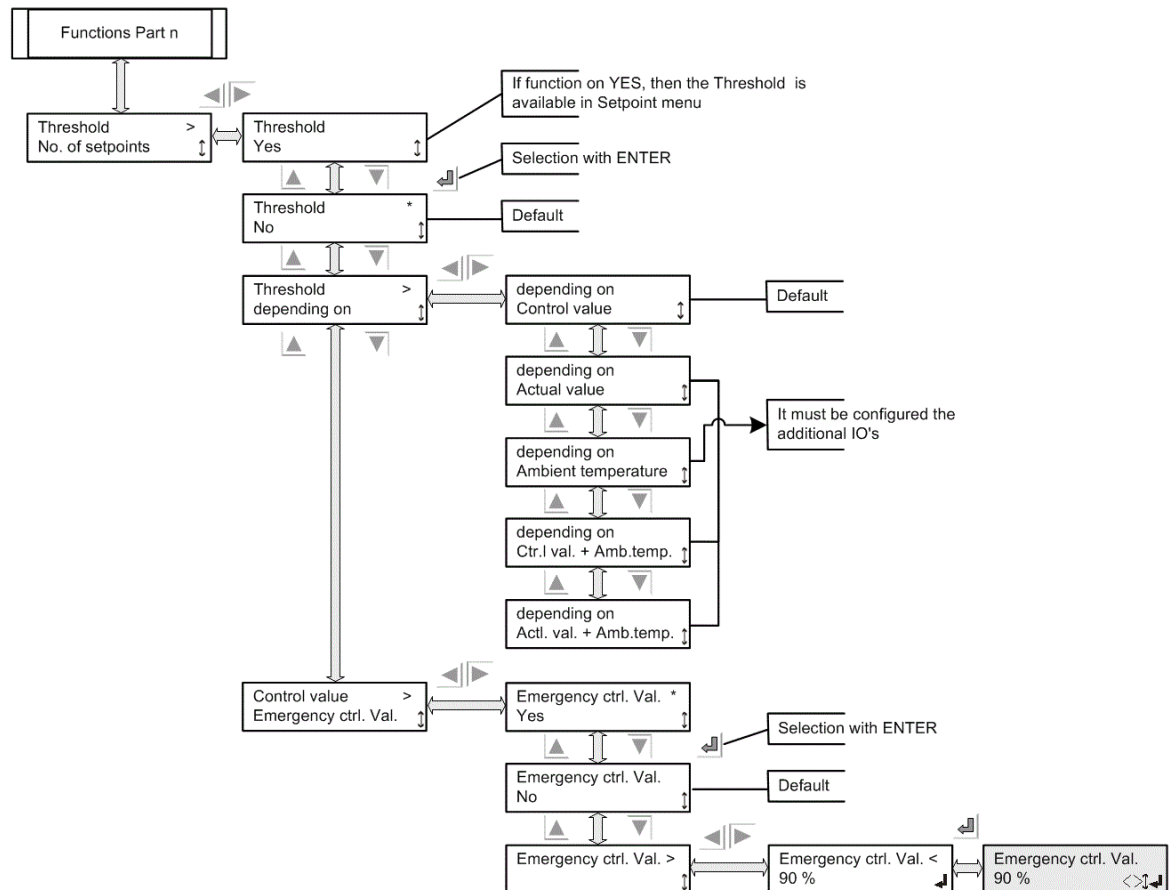
In the case of the GMM phasecut compact, GRCP output DO4, contact 41/44 trips when the threshold value is exceeded.

In the case of the modular variant, output OUT 3, contact 31/34 trips.

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**control value + Ext. temp.:**

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

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 values.

Emergency control value Yes/No/Emergency control value:

The emergency control value is issued as a 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 enable provided

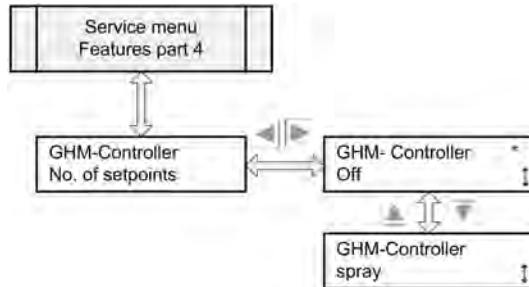
The emergency control value can be reduced to an active night limiter if necessary.

4.12.7.7 GHM Controller

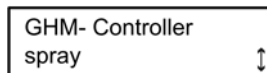
When a GMM is coupled with a GHM spray via the CAN bus, this function has to be activated for the GMM (master).

The GMM is then responsible for the control and monitoring of the GHM.

If the connection fails, an entry is made in the GMM alarm history (and that of the GHM).



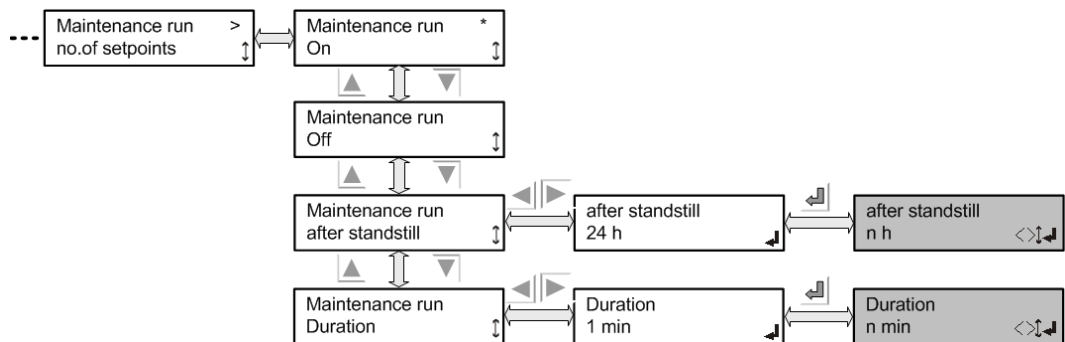
If the GHM spray function is activated, this will be displayed in the status menu:



If the function is corrupt (e.g. GHM is off), GHM-NOK will be displayed in the Info menu.

Furthermore, a priority 2 incident report is issued and an entry made in the alarm history.

4.12.7.8 Maintenance run



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

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

- Manual operation is deactivated
- Control value of the PID controller = 0, i.e. no speed request
- No fault pending

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

If a speed request is made during a maintenance run, the maintenance process will be aborted and the controller will return to normal operation. In such cases, maintenance is considered to have been performed, because the fans have been in operation.

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

The following parameters can be set up:

“Maintenance run On/Off”:

Default = **On**

This is used to turn the function on or off.

“Maintenance run after standstill”:

Default: **24 hrs**, min=1, max = 1000 hrs

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

“Duration of maintenance run ”:

Default = **1 min**, min = 1 min, max = 10 min

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

setpt. 25.0 °C
Maintenance run

The Info menu display **“Maintenance run”** flashes while a maintenance cycle is in operation.

Maintenance run
in 15 h

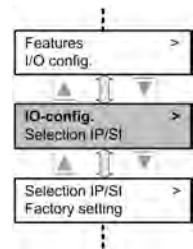
Status menu display: **“Maintenance run in: nnn h”**

This shows the remaining required stationary period before the next maintenance cycle.

4.12.8 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.



4.12.8.1 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 terminal **AI1** is a current input (4-20 mA)

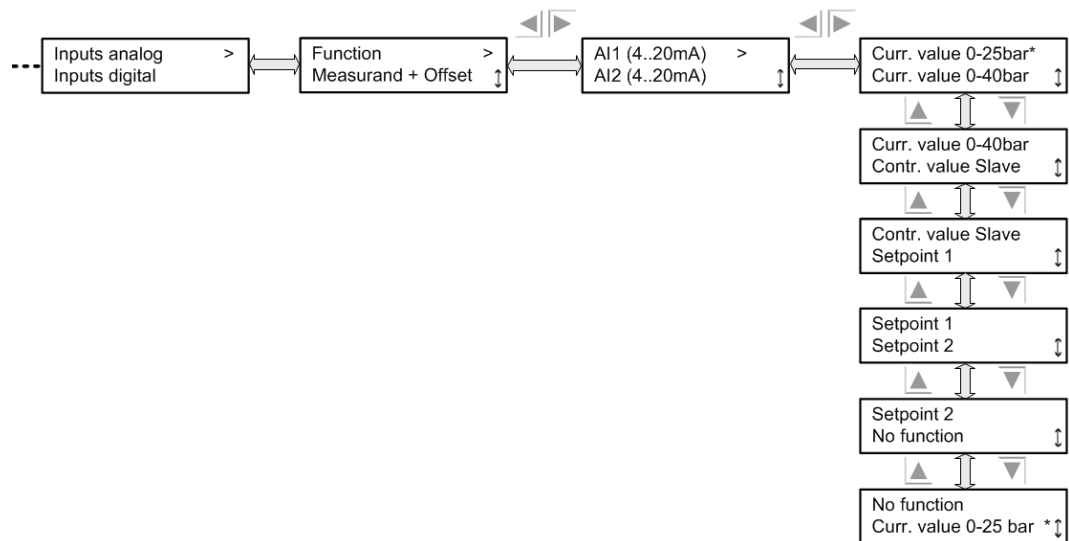
The terminal **AI2** is a switchable input (4-20 mA or for a GTF210 temperature sensor)

Terminal **AI3** has an input for the GTF210 temperature sensor.

There is an input for 0-10 V DC on terminal **AI4**.



4.12.8.1.1 Current inputs AI1



Actual value means that the current measurement is signalled 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 Operating mode menu. There is a special situation if both current inputs are configured as the actual value. The current input delivering the greatest measurement signal is then selected (**MAX selection**). A **Actual value of 0-25 bar** or **0-40 bar** can be selected with the current input

Slave control value 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 20mA input current a control signal of 100% on the fans. Make sure that the "Slave ext" mode has been selected in the Operating mode menu.

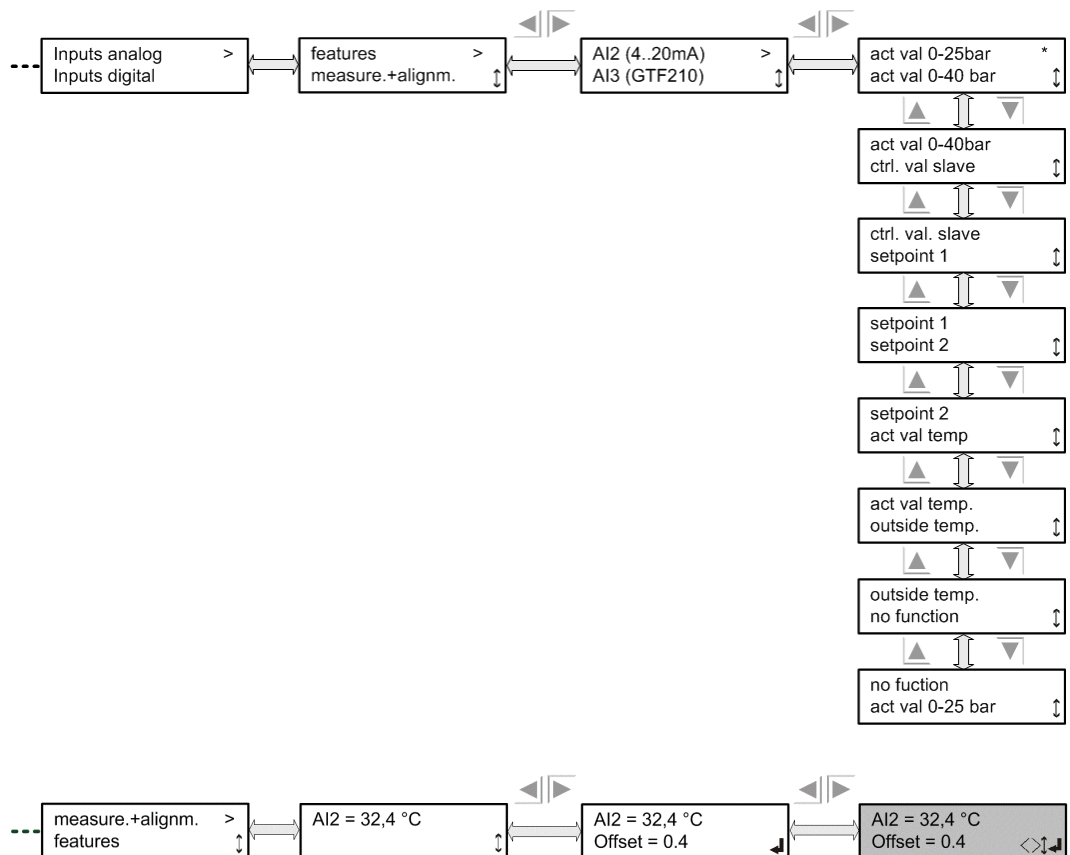
Setpoint 1 means that setpoint 1 on which internal control is performed is specified via the current input. The current input is scaled to the set actual value (see table [Error messages and warnings](#) , [LED flash codes](#), [Page 124](#)). The origin of the actual value still has to be configured. Make sure that the "Auto ext" mode has been selected in the Operating mode menu.

Setpoint 2 is offered only if the number of setpoints has been configured as **2** (see [Number of setpoints](#), [Page 88](#)). If setpoint 2 is configured, the same applies as described with **Setpoint 1** .

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

The same essentially applies to **current input 2** as to current input **1**, except that there are still two additional setting options.

4.12.8.1.2 Switchover input AI2



ADVICE

The Service menu enables you to adjust the temperature sensors by specifying an offset for the configured temperature inputs AI2 and AI3.

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

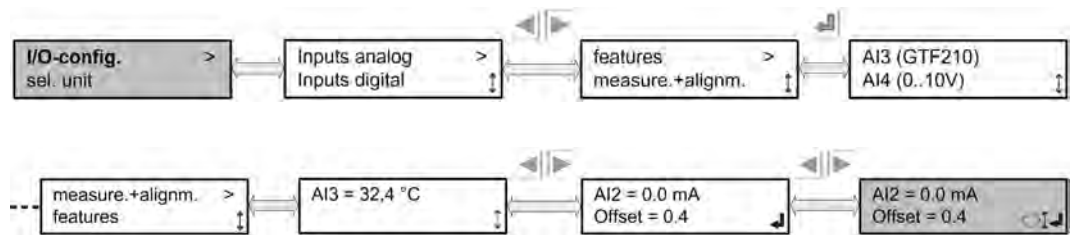
The following functions exist in addition to the functions offered with input AI1:

act. val. temp. means that a temperature sensor with 4..20mA current output (-30°C to +70°C) is connected on this current input. Function as described for **actual value**.

outside temp. 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 recording external temperature.

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

4.12.8.1.3 AI3 input temperature sensor



ADVICE

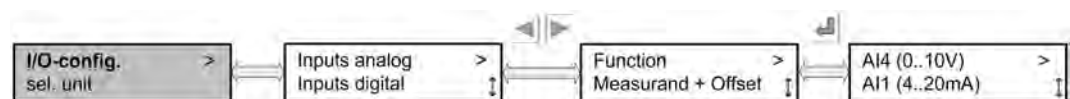
The Service menu enables you to adjust the temperature sensors by specifying an offset for the configured temperature inputs AI2 and AI3.

act val GTF210 means that a **GTF210** temperature sensor is connected to this input.

outside temp. 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.

4.12.8.1.4 0..10V AI4 input



act. val 0.10V 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.

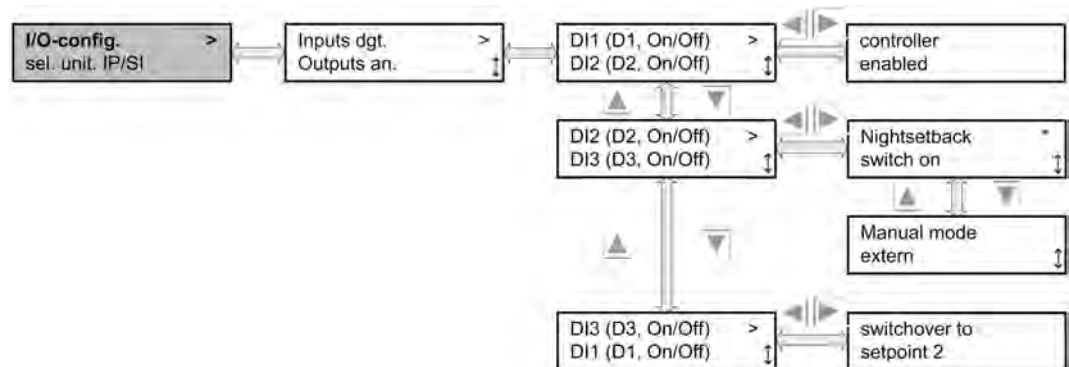
ctrl. val slavesignifies that the fans are addressed in response to the input signal (0-10V). The characteristic curve is linear from 0-100%. A 10V signal corresponds to a control value of 100% for the fans. Make sure that the **mode "Slave Ext" has been selected from the Operating mode menu.**

setpoint 2 is offered only if the number of setpoints has been configured as **2** (see [Number of setpoints, Page 88](#)). If setpoint 2 is configured, the same applies as described for **Setpoint 1**.

4.12.8.2 Digital inputs

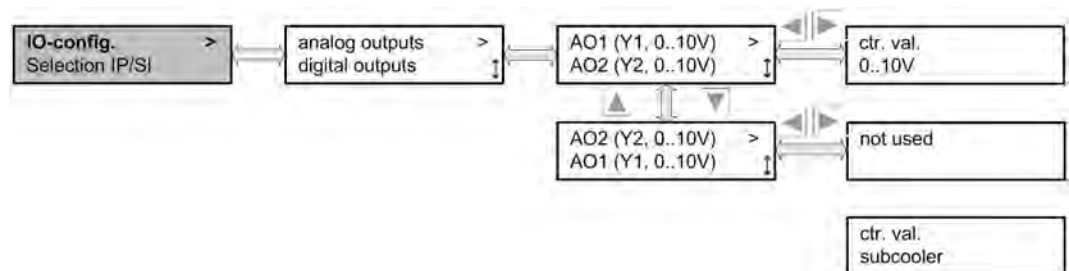
The digital inputs on terminals **DI1**, **DI2** and **DI3** are control inputs.

Their function is permanently assigned according to the diagram below.



The inputs are active when they are connected to **+24V**. They can only be switched with potential-free contacts (e.g. relay contact).

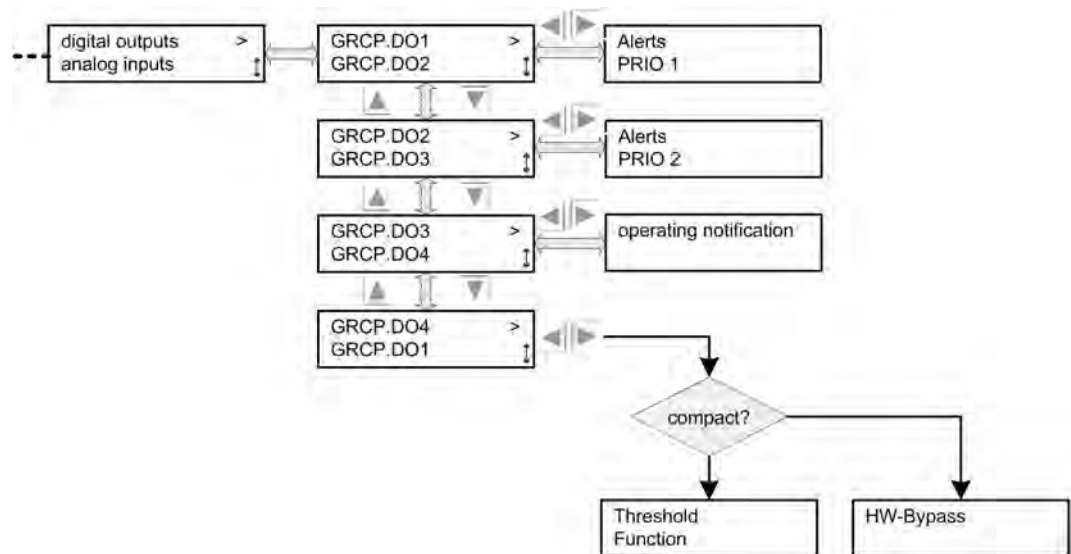
4.12.8.3 Analogue outputs



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 2 issues the control signal for the subcooler, when the function is selected.

4.12.8.4 Digital outputs



The digital outputs are relay contacts. Each output has a 250V/1A two-way contact. The alarm outputs Prio 1 and Prio 2 are **connected as failsafe** contacts, i.e. the contact is closed when there is no current.

Fixed functions are assigned to the digital outputs.

4.12.9 SI/IP selection

The units system can be selected here.



4.12.9.1 SI/IP units system

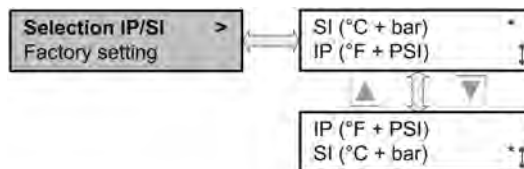
Unit selection for pressure and temperature.

International units →

SI (Système international d'unités)

Anglo-American units →

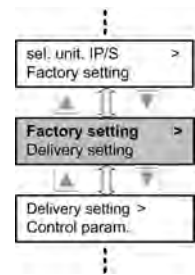
IP (Imperial System)



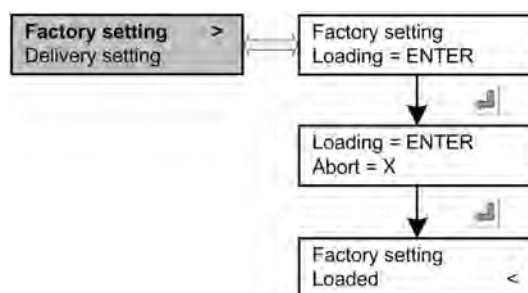
The selected unit of measurement is marked with a *.

4.12.10 Factory setting

The control can be reset to factory settings here.



4.12.10.1 Control reset (factory setting)



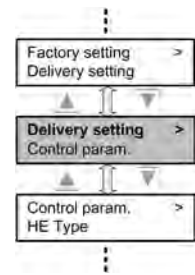
ADVICE

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.

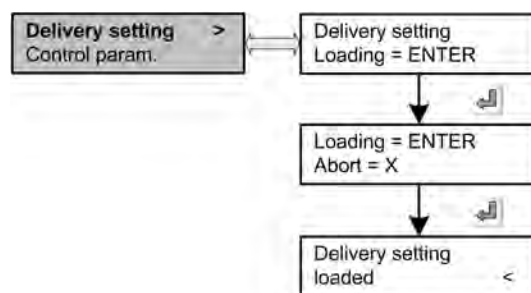
See [Factory setting, Page 122](#)

4.12.11 Delivery condition

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



4.12.11.1 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.

5 Faults and troubleshooting

5.1 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 **X**).
- If **NO**, then go to **Test point 2**.
- If the message "Equipment failure" is displayed, there is a fault in the phase-cutting output stages.

Please check if the voltage supply is present on the output stages.

- For other error messages see Table [Error messages and warnings , LED flash codes, Page 124](#)

TEST POINT 2:

Mains connection:

- Are all phases present? Rotary field OK?

Sensor connection:

- Is the sensor connected correctly? Cf "Sensor connection" section
- Sensor OK? (Measure! Pressure: 4-20mA, Temp.: 1.2-2.7k Ω , 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:

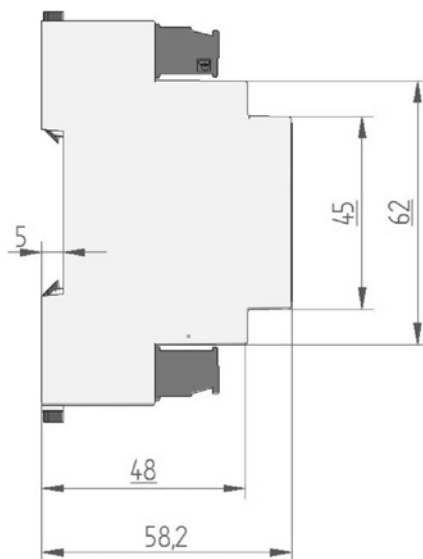
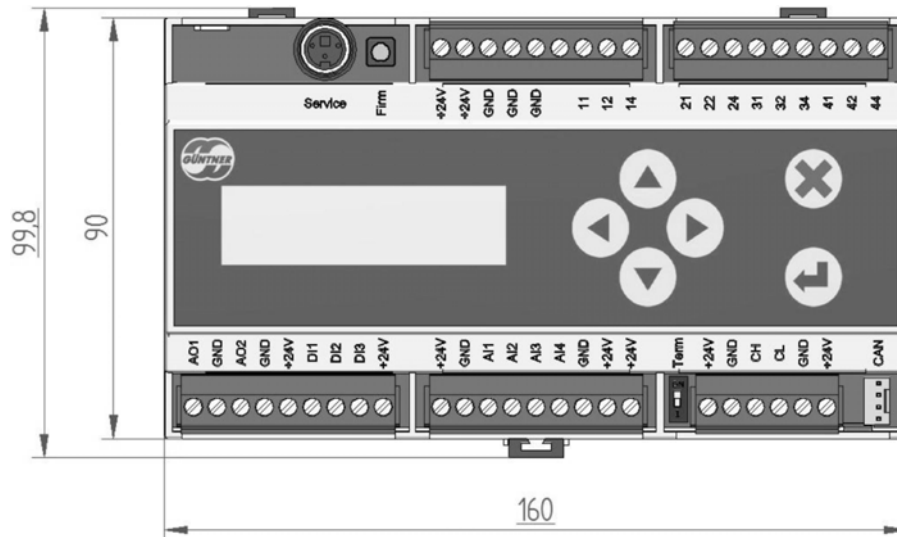
- Is the fuse on the controller supply OK?

6 Technical data

6.1 Dimensions and weight

Dimensions of GRCP.1

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



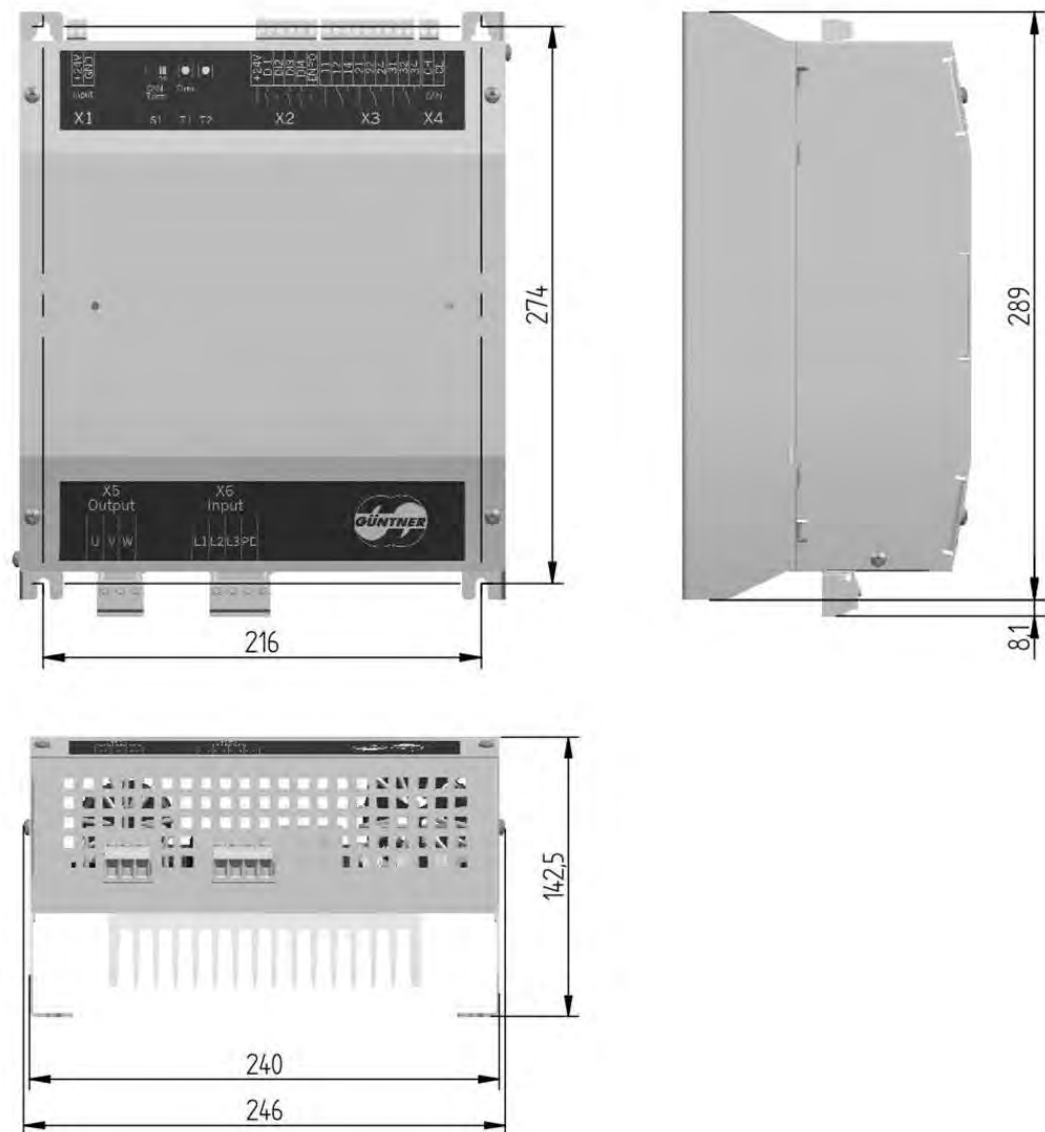
Dimensions of casing GRCP.1

Weight:
ca. 340g



Dimensions GPHC 240.1

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

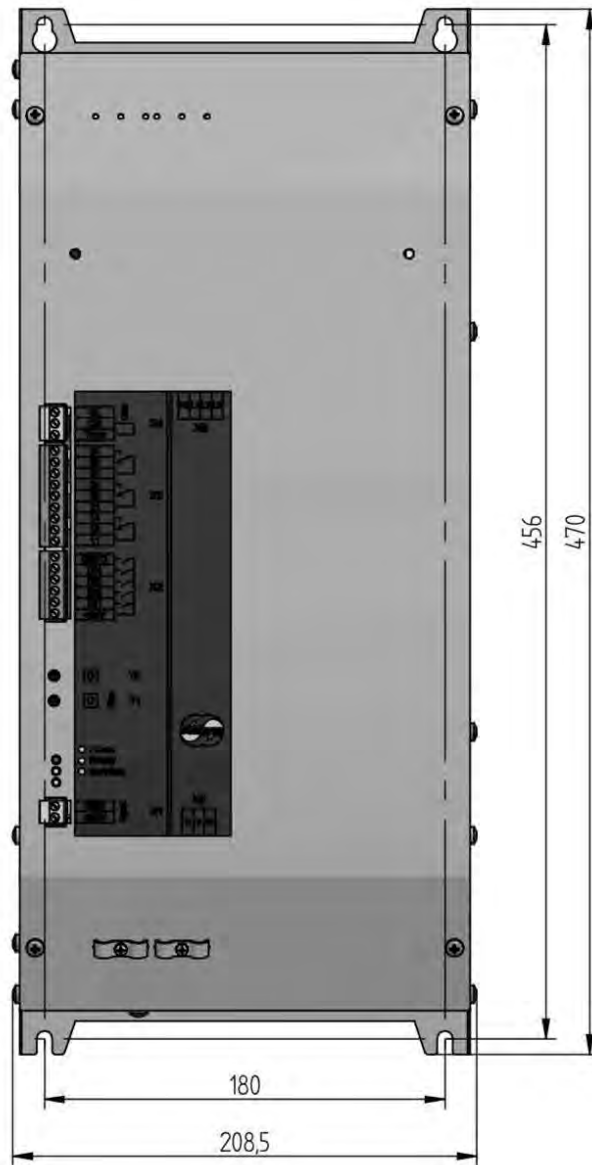


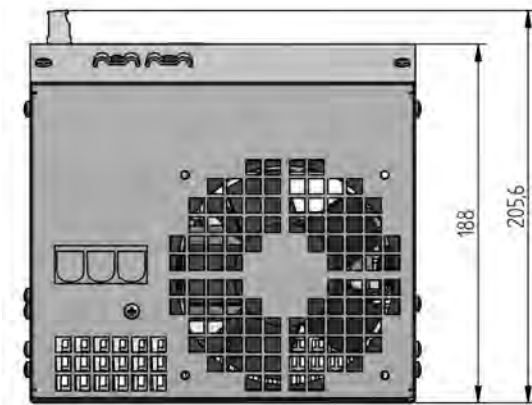
Dimensions GPHC 240.1

Weight:
approx. 4.2 kg

Dimensions GPHC 380.1

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



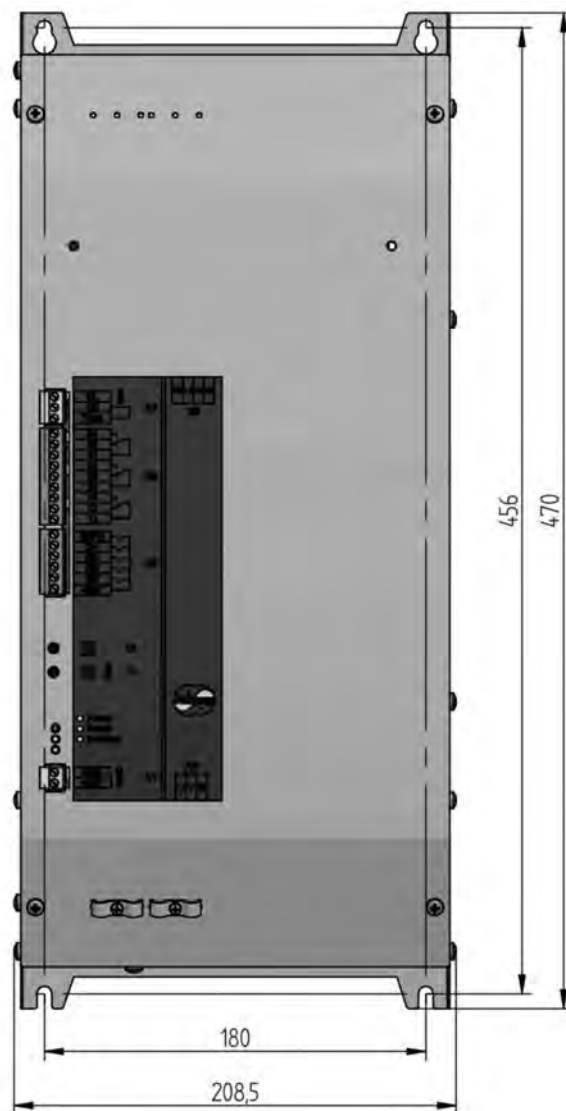


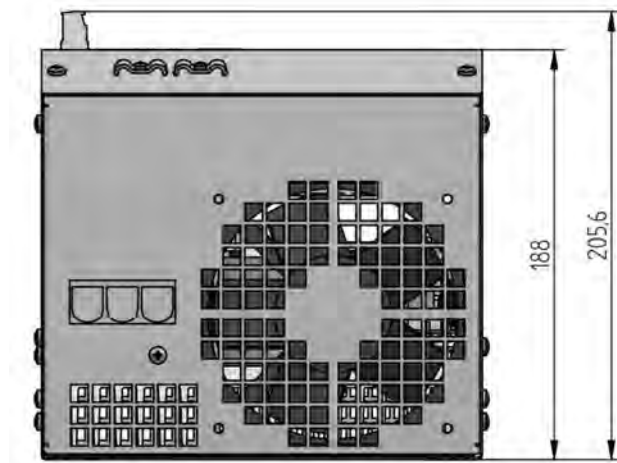
Dimensions GPHC 380.1

Weight:
approx. 11 kg

Dimensions GPHC 580.1

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



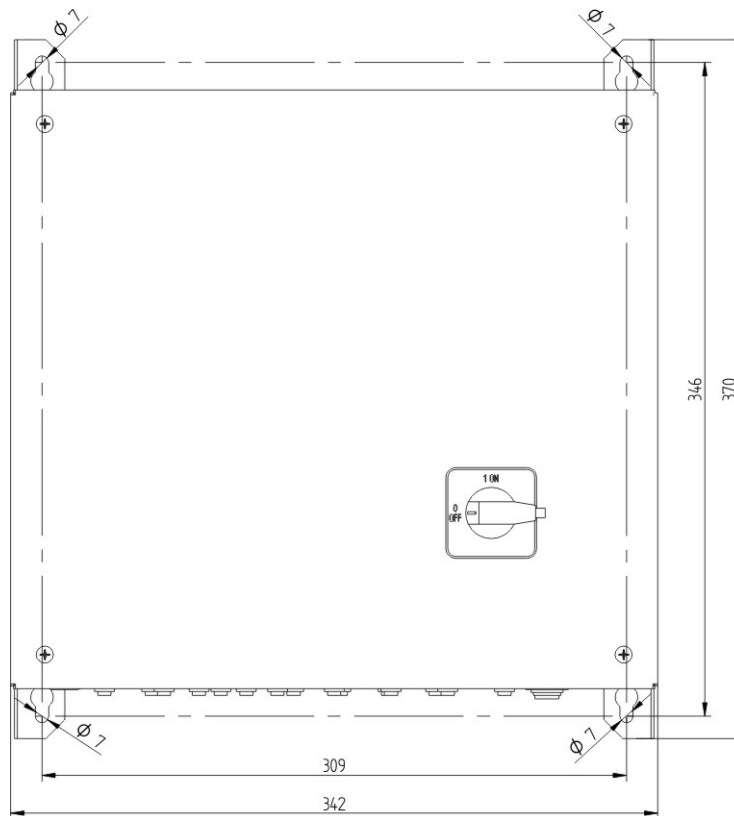


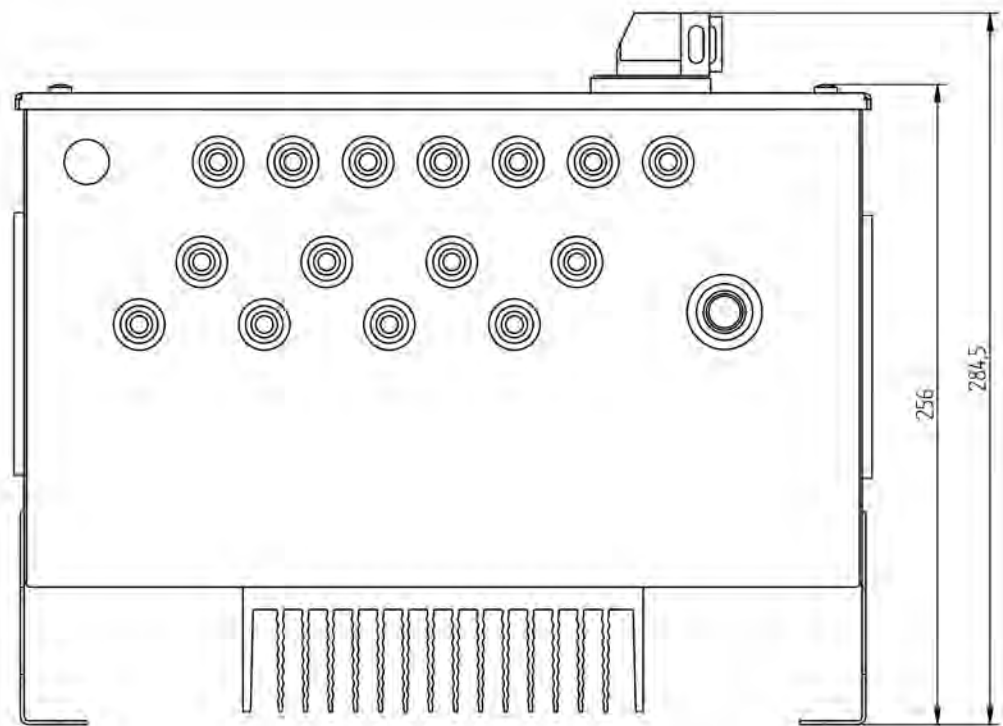
Dimensions GPHC 580.1

Weight:
approx. 11.5 kg

Dimensions
GMM phasecut compact 100/x.1 / 240/4.1

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





Dimensions GMM phasecut compact 100/x.1 / 240/4.1

Weight:

GMM phasecut compact 100/x.1 approx. 10.5 kg

GMM phasecut compact 240/4.1 approx. 11 kg

7 Electrical properties of the components

Electrical properties of GRCP.1 controller				
	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			Switching cycles
Switch cycles, electrical	1*10 ⁵			Switching cycles
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		21	mA
Resolution			10	bit
Fault			1	‰ ²
Input resistance (without protective circuit)		130		Ω

Electrical properties of GRCP.1

	Min	Type	Max	Unit
Voltage output				
Voltage range	0		10	V
Load resistance		>=100		kΩ
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			

Electrical properties of GRCP.1

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

Electrical properties of GPHC 240.1				
	Min	Type	Max	Unit
Control unit				
Voltage supply	22	24	27	V
Current consumption		300	500	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			Switching cycles
Switch cycles, electrical	1*10 ⁵			Switching cycles
CAN bus				
Dielectric strength	-24		24	V
Transmission rate		125		kbit/s
Galvanic separation	No			
Power unit				
Voltage supply AC	380	400	480	V AC
Mains frequency		50/60		Hz
Voltage of motor outputs	0		Mains voltage	V AC
Rated current (sum total of all connected motor currents)			24 ¹	A
Power loss		100	130	W

Electrical properties of GPHC 240.1

1) The peak power during an acceleration ramp from 0 to 100% can be 30% above the maximum rated current. The acceleration ramp has to be extended if the values are above this until this factor is fulfilled.

Electrical properties of GPHC 380.1				
	Min	Type	Max	Unit
Control unit				
Voltage supply	22	24	27	V
Current consumption		300	500	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			Switching cycles
Switch cycles, electrical	1*10 ⁵			Switching cycles
CAN bus				
Dielectric strength	-24		24	V
Transmission rate		125		kbit/s
Galvanic separation	No			
Power unit				
Voltage supply AC	380	400	480	V AC
Mains frequency		50/60		Hz
Voltage of motor outputs	0		Mains voltage	V AC
Rated current (sum total of all connected motor currents)			38 ¹	A
Power loss		200	240	W

Electrical properties of GPHC 380.1

1) The peak power during an acceleration ramp from 0 to 100% can be 30% above the maximum rated current. The acceleration ramp has to be extended if the values are above this until this factor is fulfilled.

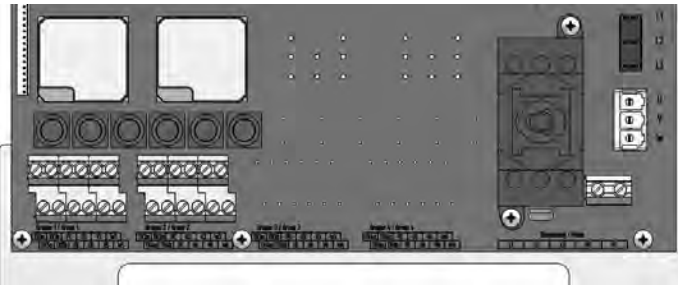


Electrical properties of GPHC 580.1				
	Min	Type	Max	Unit
Control unit				
Voltage supply	22	24	27	V
Current consumption		300	500	mA
Digital inputs				
High level	15	24	30	V
Low level	-3	0	5	V
Relay outputs				
Voltage DC		24	30	V
Voltage AC			250	V
Current resistive load 24V DC/250V AC			1	A
Current inductive load 24V DC/250V AC			1	A
Switch cycles, mechanical	1*10 ⁶			Switching cycles
Switch cycles, electrical	1*10 ⁵			Switching cycles
CAN bus				
Dielectric strength	-24		24	V
Transmission rate		125		kbit/s
Galvanic separation	No			
Power unit				
Voltage supply AC	380	400	480	V AC
Mains frequency		50/60		Hz
Voltage of motor outputs	0		Mains voltage	V AC
Rated current (sum total of all connected motor currents)			58 ¹	A
Power loss		300	350	W

Electrical properties of GPHC 580.1

1) The peak power during an acceleration ramp from 0 to 100% can be 30% above the maximum rated current. The acceleration ramp has to be extended if the values are above this until this factor is fulfilled.

Electrical properties of GMM phasecut compact 100/x.1

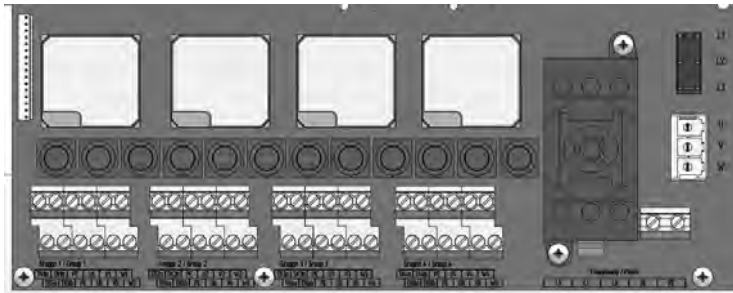


	Min	Type	Max	Unit
Voltage supply	380	400	480	V AC
Mains frequency		50/60		Hz
Voltage of motor outputs	0		Mains voltage	V AC
Voltage of motor contact		300		V DC
Rated current (sum total of all connected motor currents)			10 ¹	A
Power loss at full control		75	90	W

Electrical properties of GMM phasecut compact 100/x.1

1) The peak power during an acceleration ramp from 0 to 100% can be 30% above the maximum rated current. The acceleration ramp has to be extended if the values are above this until this factor is fulfilled. The maximum current has to be distributed symmetrically to the motor outputs.

Electrical properties of GMM phasecut compact 240/4.1



	Min	Type	Max	Unit
Voltage supply	380	400	480	V AC
Mains frequency		50/60		Hz
Voltage of motor outputs	0		Mains voltage	V AC
Voltage of motor contact		300		V DC
Rated current (sum total of all connected motor currents)			24 ¹	A
Power loss with rated current		130	160	W

Electrical properties of GMM phasecut compact 240/4.1

1) The peak power during an acceleration ramp from 0 to 100% can be 30% above the maximum rated current. The acceleration ramp has to be extended if the values are above this until this factor is fulfilled. The motor load has to be distributed symmetrically to the outputs.

8 External control value scaling

The dependencies of the external control value specs for the actual 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

[External control value scaling](#)



9 Factory setting

Units	Drycooler		Condenser with refrigerant		Condenser without refrigerant	
	SI	IP	SI	IP	SI	IP
Language	English					
Setpoint 2 present	No					
Setpoint displacement	No					
Kp	10.0	10.0	10.0	10.0	20.0	20.0
Ti	25 sec.	25 sec.	25 sec.	25 sec.	40 sec.	40 sec.
Td	0 sec.					
Base control value	0 %					
Start control value	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	No					
Night limiter	100 %					
Manual mode	Off					
Manual mode control value	0 %					
Setpoint displacement Δ T	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					
Subcooler function	Off					
Heating function	Off					
Acceleration	25 s					
Delay	25 s					
Full level control off	100 %					
Min. actuation	5 %					
Limiter	100 %					
SW bypass Control value	100 %					

Factory setting

Units	Drycooler		Condenser with refrigerant		Condenser without refrigerant	
	SI	IP	SI	IP	SI	IP
HW bypass from	98 %					
HW bypass Hysteresis	13 %					
TC reset	Automatic					
Auto reset time	600 s					
Maintenance run function	On					
Duration of maintenance run	1 min					
Maintenance run after stop	24 h					

[Factory setting](#)

10 Error messages and warnings , LED flash codes

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	Red LED flash code on output stage	
Display dark, GMM phasecut OFF	X	X		<p>Displayed where? -</p> <p>Explanation: GMM has no supply voltage</p> <p>Possible cause: Main switch off, power pack has no power supply, power pack defective, display defective</p> <p>Measure: Check the power supply and the fuses</p>
No sensor selected				<p>Displayed where? Info menu</p> <p>Explanation: No sensor activated in the I/O configuration</p> <p>Possible cause: Error in the I/O configuration</p> <p>Measure: Choose the appropriate assignment in the I/O configuration</p>
not enabled				<p>Displayed where? Info menu</p> <p>Explanation: DI1 (enable) not switched (open or 0 V)</p> <p>Possible cause: Enable input DI1 on the GRCP is not switched; no enable from a higher-level controller; jumper between +24V and DI1 not in place</p> <p>Measure: Check the wiring; if appropriate check the signal from a higher-level control unit or controller</p>
Setpoint 2				<p>Displayed where? Info menu</p> <p>Explanation: Control is on setpoint 2, DI3 is connected (+24 V)</p> <p>Possible cause: This is generally due to a specific action from the customer interface</p> <p>Measure: None required</p>

Error messages / warnings on the display



Messages / warnings on the display	PRIO 1	PRIO 2	Red LED flash code on output stage	
nightsetback				<p>Displayed where? Info menu</p> <p>Explanation: Night limiter is on, DI2 is switched on or active via clock</p> <p>Possible cause: This is generally due to a specific action from the customer interface</p> <p>Measure: None required</p>
Sensor fault 1		X		<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: The sensor on input AI1 is defective or the signal is out of range (4 ... 20 mA).</p> <p>Possible cause: Cable break, sensor not connected or defective</p> <p>Measure: Check the I/O configuration; check the connections and wiring; check the input current, which must lie in the range 4 to 20 mA, values below 2 mA will trigger the fault; replace the sensors</p>
Sensor fault 2		X		<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: The sensor on the switchable input AI2 is defective or the signal is out of range (4 ... 20 mA or KTY).</p> <p>Possible cause: Cable break, sensor not connected or defective</p> <p>Measure: Check the I/O configuration; check the connections and wiring; check the input current, which must lie in the range 4 to 20 mA, values below 2 mA will trigger the fault; replace the sensors, if a KTY sensor is connected, check the value of the resistance</p>
Sensor fault 3		X		<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: The sensor on input AI3 is defective or the signal is out of range (KTY).</p> <p>Possible cause: Cable break, sensor not connected or defective</p> <p>Measure: Check the I/O configuration; check the connections and wiring; replace the sensors</p>

Error messages / warnings on the display



Messages / warnings on the display	PRIO 1	PRIO 2	Red LED flash code on output stage	
Sensor fault 4		X		<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: The signal is out of range (0...10 V)</p> <p>Possible cause: Voltage is higher than 12V</p> <p>Measure: Check the I/O configuration; check the voltage of the power source, which must lie between 0 and 10 V. You may have +24 V connected to this input.</p>
<p>PHC: TK n NOK (only compact variant)</p> <p>PHC n: TK NOK (only modular variant)</p>		X		<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: The thermocontact of a fan has tripped</p> <p>Possible cause: A fan is not OK, thermocontact has tripped</p> <p>Measure: Check whether there is a fan fault; if this error occurs more frequently, the fan may be defective and should be replaced</p>
<p>PHC n: protect. (only modular variant)</p>		X		<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: The motor circuit breaker of a fan has tripped</p> <p>Possible cause: The current consumption of a fan was too high</p> <p>Measure: Check whether there is a fan fault; the fan may be blocked; check whether the acceleration ramp has been set too low; if this error occurs frequently the fan may be defective and should be replaced.</p>
PHC n: NOK		X		<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: Phase-cutting output stage n cannot be addressed via the CAN bus or is no longer responding</p> <p>Possible cause: Output stage is defective, CAN bus cabling is not OK (unplugged or cable defective)</p> <p>Measure: Power supply/fuses in output stage, check the CAN bus cabling</p>

Error messages / warnings on the display



Messages / warnings on the display	PRIO 1	PRIO 2	Red LED flash code on output stage	
PHC n: not enab.	X	-		<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: Phase cutting output stage not enabled (input ENPO not set), but enable iss et on GRPP.1</p> <p>Possible cause: Wiring error/cable break</p> <p>Measure: Check the wiring</p>
PHC n: rot. field	X		ON	<p>Displayed where? Info menu + alarm memory + red LED on output stage</p> <p>Explanation: The rotary field of the three-phase supply is not connected properly</p> <p>Possible cause: Wiring error</p> <p>Measure: Connect the three-phase supply to the rotary field on the right</p>
PHC n: Lx NOK	X		1 x	<p>Displayed where? Info menu + alarm memory + red LED on output stage</p> <p>Explanation: Phase failure on phase-cutting output stage</p> <p>Possible cause: Phase failure, a phase fuse has tripped</p> <p>Measure: Check the mains voltage of all phases, check the fuses</p>
PHC n: SYM NOK	X		2 x	<p>Displayed where? Info menu + alarm memory + red LED on output stage</p> <p>Explanation: Symmetrical mains on phase-cutting output stage not OK</p> <p>Possible cause: Error in mains supply</p> <p>Measure: Check symmetrical mains</p>

Error messages / warnings on the display



Messages / warnings on the display	PRIO 1	PRIO 2	Red LED flash code on output stage	
PHC n: TEMP		X	3 x	<p>Displayed where? Info menu + alarm memory + red LED on output stage</p> <p>Explanation: Temperature at heat sink of phase-cutting output stage n has reached a critical level (GPHC x only)</p> <p>Possible cause: Inadequate cooling, device was calculated incorrectly, device is defective, motor current is too high (possible winding short)</p> <p>Measure: Check that the heat sink is free, check that the fan is rotating for cooling, check the switch cabinet ventilation, check the fan power, replace the fan if necessary, contact the Service department if necessary, replace the device</p>
PHC n: O-TEMP	X		4 x	<p>Displayed where? Info menu + alarm memory + red LED on output stage</p> <p>Explanation: Temperature at heat sink of phase-cutting output stage n has exceeded a critical level and has been switched off</p> <p>Possible cause: Inadequate cooling, device was calculated incorrectly, motor current is too high (possible winding short)</p> <p>Measure: Check that the heat sink is free, check that the fan is rotating for cooling, check the switch cabinet ventilation, check the fan power, replace the fan if necessary, contact the Service department if necessary, replace the device</p>
PHC n: CPU			5 x	<p>Displayed where? Info menu + alarm memory + red LED on output stage</p> <p>Explanation: There is an internal fault in the phase-cutting output stage, CPU collective fault</p> <p>Possible cause: Defective electronics</p> <p>Measure: Inform the Service department, replace the device</p>

Error messages / warnings on the display



Messages / warnings on the display	PRIO 1	PRIO 2	Red LED flash code on output stage	
-	-	-	6x	<p>Displayed where? The red LED flashes quickly on the phase-cutting output stage</p> <p>Explanation: The output stage has lost the CAN connection to the master (GR-CP.1), the software bypass is switched on and was activated.</p> <p>Possible cause: The GRCP.1 controller has failed, the CAN bus connection to GR-CP.1 is disrupted or defective. The CAN interface on the output stage is defective.</p> <p>Measure: Check the power supply to the GRCP.1 controller, check the CAN connection between GRCP.1 and the output stages, inform the Service department if necessary and replace the device</p>
Unit fault	X			<p>Displayed where? Info menu + alarm memory</p> <p>Explanation: All phase-cutting output stages are faulty</p> <p>Possible cause: All phase-cutting output stages are faulty, CAN connection between GRCP.1 and output stages is defective, CAN interface on GRCP.1 is defective</p> <p>Measure: Check the power supply to the phase-cutting output stages, check the CAN connection between GRCP.1 and the output stages, inform the Service department if necessary</p>

Error messages / warnings on the display

* There is a pause of 5 seconds between the flash codes.

xx	= Fault type, can help with detailed diagnosis	
ii	= Input number	
PRIO 1	= Relay contacts 11/12	
PRIO 2	= Relay contacts 21/22	
Operating message	= Relay contacts 31/34	if control signal > 0%
Hard bypass operation	= Relay contacts 41/42	



11 Troubleshooting tips

Errors	Possible cause, suggested solution
Fans are not turning	<p>If when the controller is switched on and appears in the Info menus , 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. (See I/O configuration, Page 96).</p> <ul style="list-style-type: none"> • If the setpoint and the actual value appear in the Info menu, but the setpoint shown does not match the set setpoint, check the mode for any setpoint that may have been set externally. (See Operating mode, Page 82) • Check the power supply and the cable to the fan for faults (cable break etc.). • Has the sensor failed? Check: <ul style="list-style-type: none"> • 2-wire pressure sensor: Must deliver 4-20 mA (check with ampmeter). • Temperature sensor: Measure the impedence; 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	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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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