Operating instructions
Güntner Hydro Management GHM spray

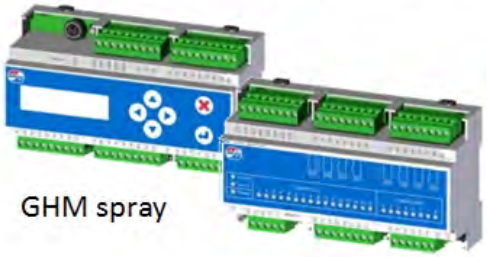
GMM EC
GMM sincon®
GMM f-drive
GMM phasecut
GMM step

GHM spray basic

GHM spray

GMM EC
GMM sincon®
GMM f-drive
GMM phasecut
GMM step

GHM spray professional



GHM spray

GIOD

www.guentner.de

Contents

1 General notes

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 electronic 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!

1.4 Warranty and liability

The current General Terms and Conditions of Sales and Delivery of Güntner 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 spray series fulfil the requirements of EN 61000-6-2 as regards resistance to EMC interference and those of EN 61000-6-3 as regards emissions.

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

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.

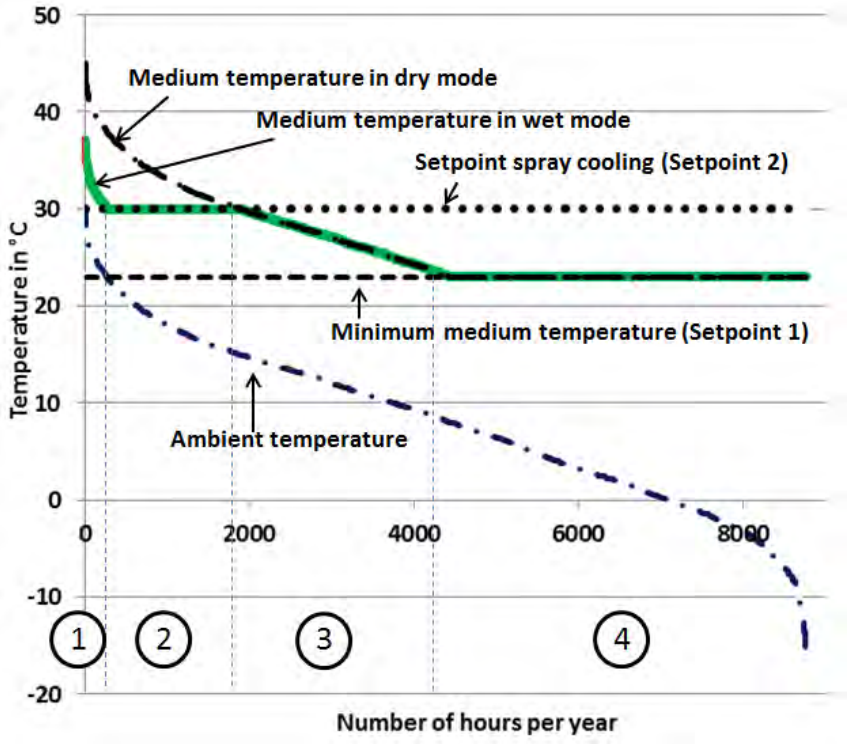
ADVICE

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 Short description

The GHM manages the spraying of heat exchangers. GHM spray basic can be used for only one spraying step.

With GHM spray professional you can manage up to nine steps. This system is notable for its minimal water consumption, which is achieved by spraying just enough sections to reach the specified setpoint.



Accumulated annual temperature curve

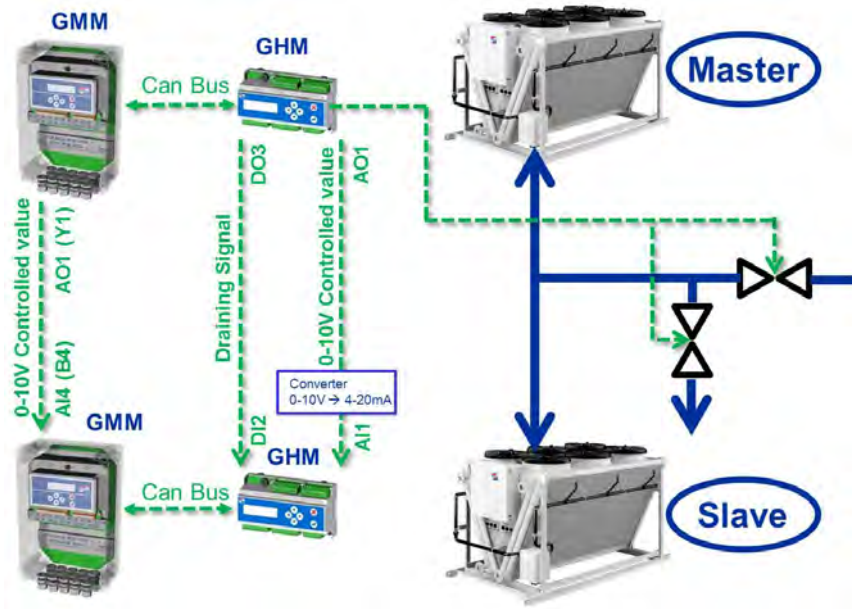
The illustrated example shows a cumulated medium temperature curve achieved with GHM spray professional. In dry operation the medium temperature (condenser temperature or return temperature) follows the ambient temperature (areas 1 to 3). When the ambient temperature is low, the medium temperature is held to the setpoint set up on the speed controller (area 4).

Using the GHM to regulate spraying calls for a second setpoint. In this example this setpoint is chosen to be 30°C. This setpoint is set up in the GHM, having been calculated by the product selection program GPC during the configuration process. The spraying setpoint determines the length of time in hours the unit is sprayed, with reference to data pertaining to the local climate. The higher the number of spraying hours for the unit the more precisely it can fulfil the setpoint. While the ambient temperature is low (area 4), the medium temperature follows the setpoint of the speed controller. If the ambient temperature rises it will no longer be possible to reach the speed control setpoint (area 3) because the fans will already be operating at maximum speed. If the ambient temperature continues to rise (area 2), the medium temperature will be governed by the setpoint of the GHM. If the ambient temperature rises so high (area 1) that the setpoint can no longer be reached, then the medium temperature will continue to rise at a corresponding displacement to the ambient value.

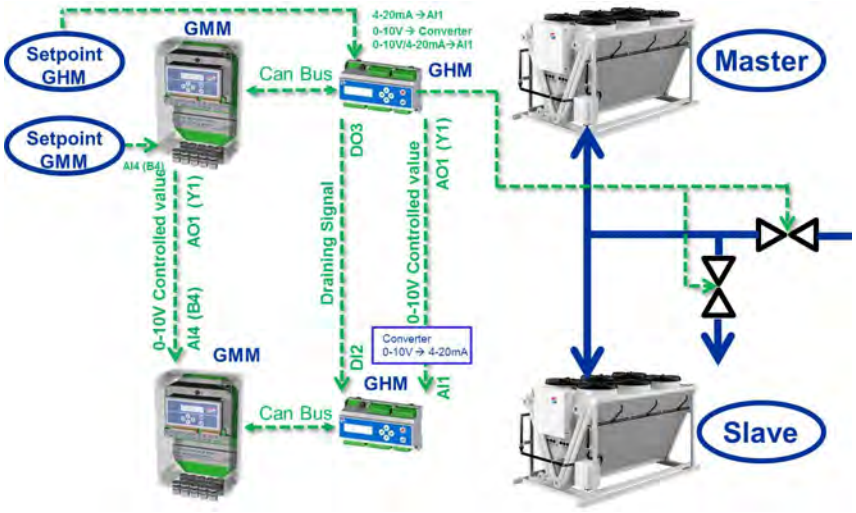
3 System operation in a master-slave configuration

If a number of units are operated in a master-slave configuration, common inlet and drain valves provided by the customer can be used for several units. These valves are then controlled exclusively by the master. The following device configurations allow master-slave control:

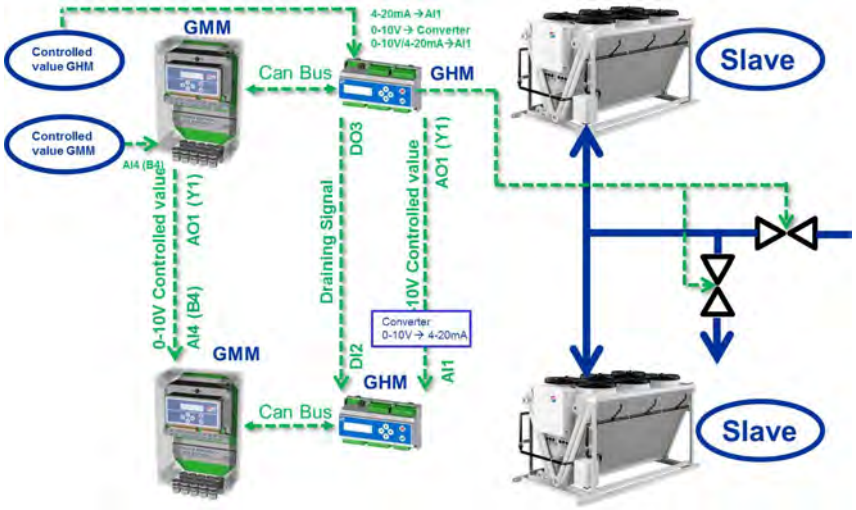
The master unit is operated in Auto internal mode. Auto internal mode has to be configured on the spraying controller (GHM controller) as well as on the speed controller (GMM controller). The slave unit is operated in Slave external analogue mode.



The master unit is operated in Auto external bus mode or Auto external analogue mode. Auto external mode has to be configured on the spraying controller (GHM controller) as well as on the speed controller (GMM controller). The slave unit is operated in Slave external analogue mode.



All units are operated in Slave mode. One of the slave units takes over control of the solenoid valves provided by the customer. The device configuration indicates which unit activates the valves provided by the customer. It has to be ensured in this mode of operation that all spraying controllers (GHM controller) and speed controllers (GMM controller) are configured in Slave mode.



4 Commissioning GHM spray

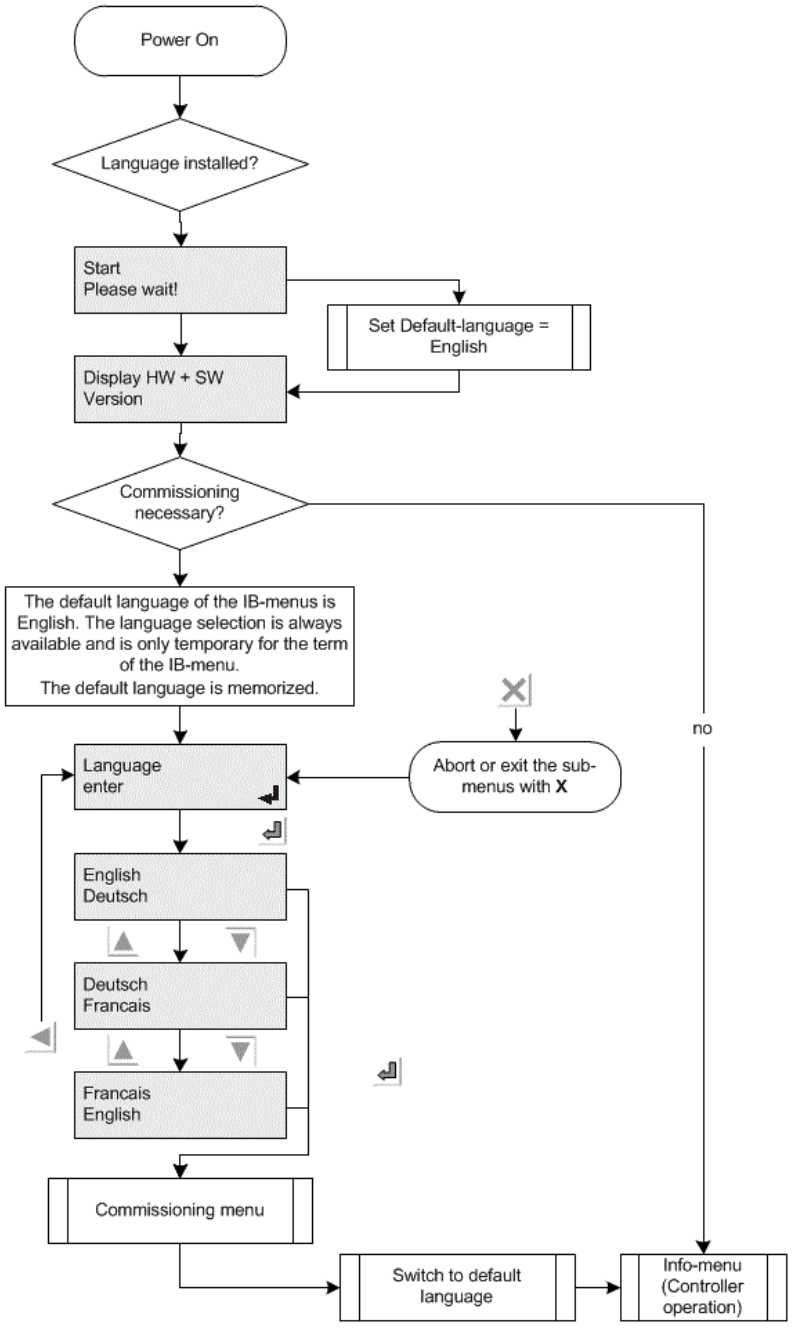
The GHM spray must be set up in accordance with the configuration of the heat exchanger and the fans. This commissioning process determines the performance of the heat exchanger.

The GHM spray automatically detects whether commissioning has been carried out when it is switched on and, if it has, continues with normal operation.

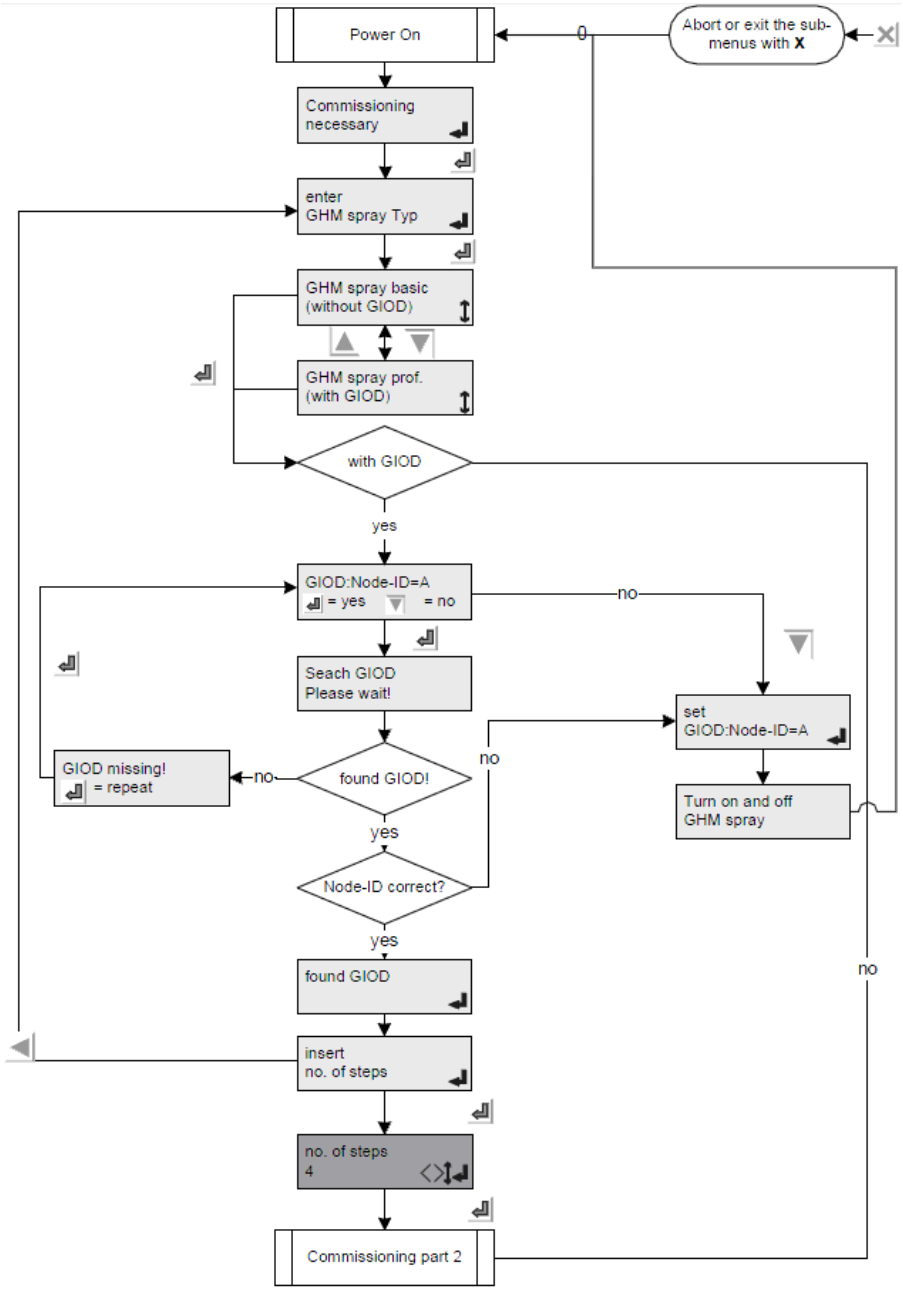
If the GHM spray detects that this has not yet been done, it initiates the commissioning procedure. When this procedure has been completed, all the specified parameters are saved.

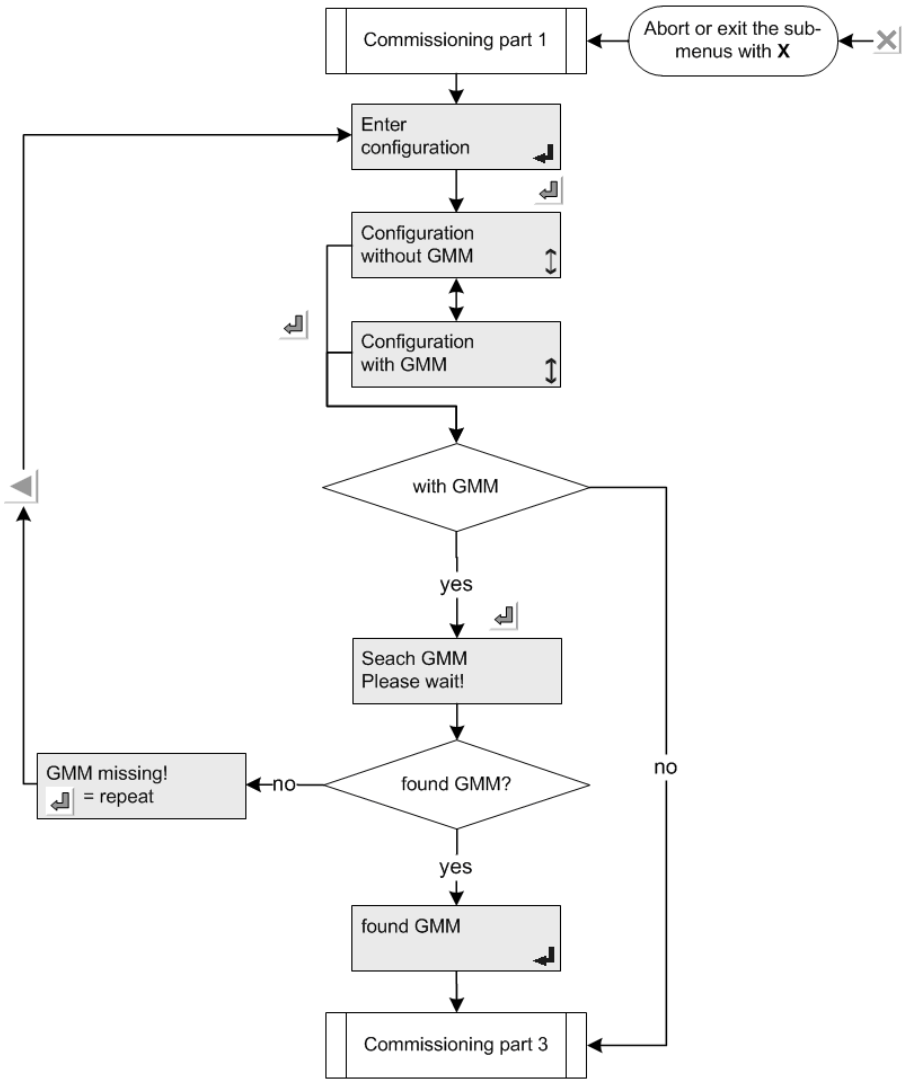
4.1 The initial commissioning procedure

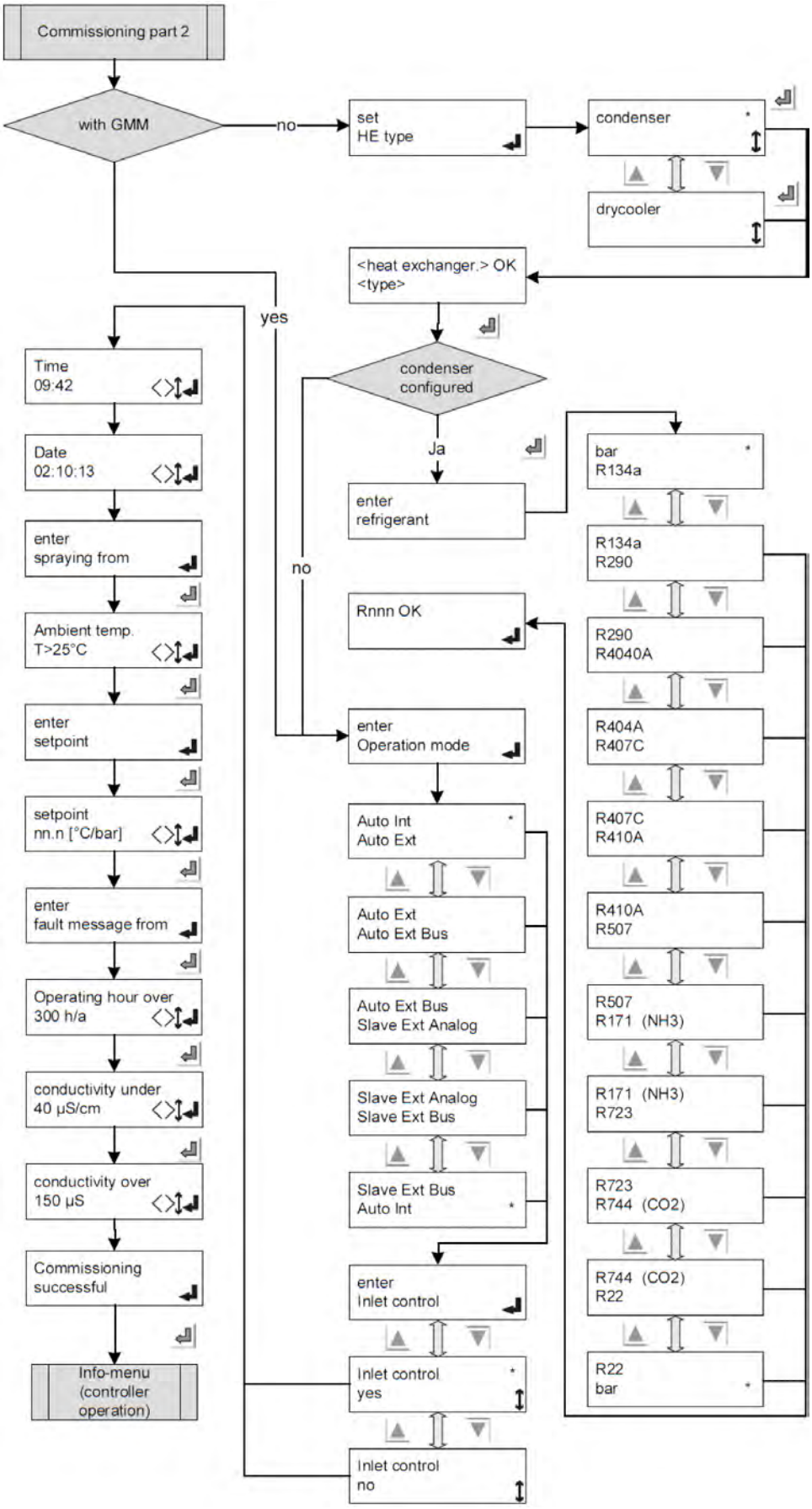
If it is recognized that commissioning has not yet taken place, the following values are interrogated and set up in accordance with the following flow chart.



If it is recognized that a commissioning is required, the commissioning menu is displayed.

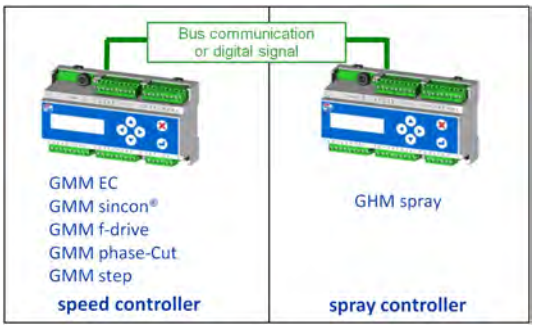




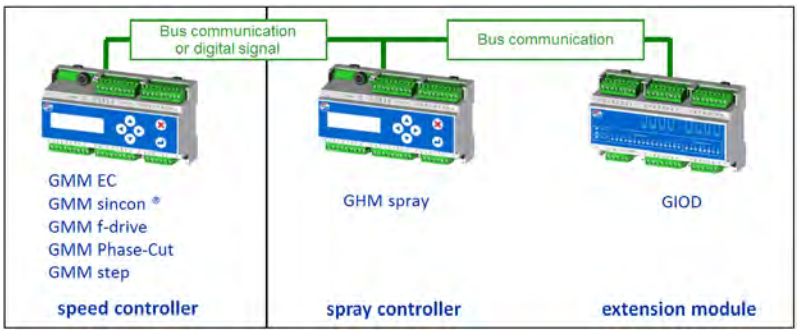


5 Construction of the GHM spray

GHM spray basic system



GHM spray professional system

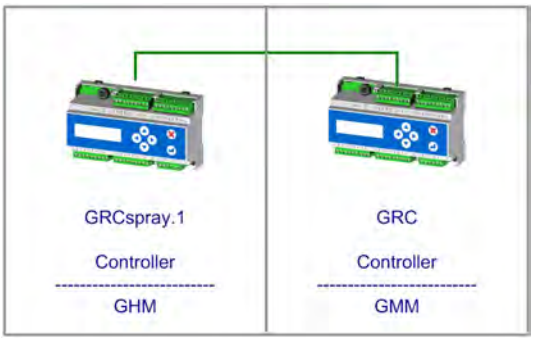


5.1 Remote controllers

5.1.1 Functional description

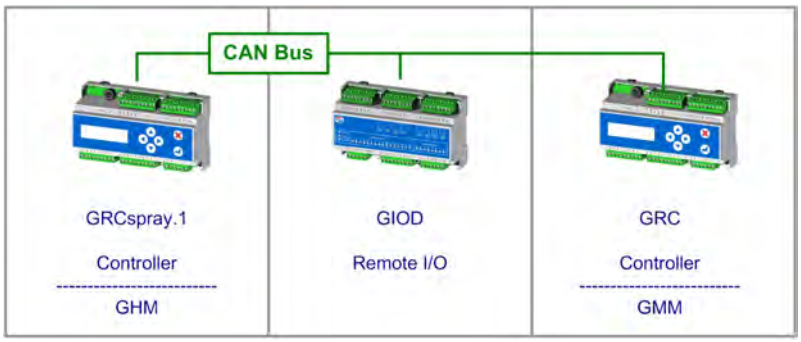
Functional description of GRCspray.1

GRCspray.1 is used to manage spraying together with either a GMM speed controller with bus communication or an external speed controller without bus communication. As a minimal solution, the GRCspray.1 can control one step
(variant GHM spray basic).



Variant GHM spray basic

If you need more steps you will need to combine the GRCspray.1 with the GIOD.1 expansion module, ERP no. 5204183
(variant GHM spray professional).



Variant GHM spray professional

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 time) can be configured either per menu or via an external bus module.
The spraying setpoint can be specified from the internal menu.
The current value is determined via a pressure sensor (4-20mA), a temperature sensor (KTY, GTF210) or via BUS from the GMM speed controller.
The relay outputs controlling the output stages are switched as appropriate for the setpoint and the number of steps. A switch-on threshold can be configured for each step.

The digital inputs are designed as potential-free contacts that must be connected to +24V. Spraying will be enabled only if the external enable (DI1) is connected and the fans are in operation. Fan operation is either conveyed from GMM to GHM via bus communication or by means of an additional enable (D12). This enable (DI2) is valid only if there is no bus communication between GMM and GHM spray.

ADVICE

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

Relay outputs are used to control solenoid valves and activate warning messages. The CAN interface of the GRCspray.1 is an internal interface for communicating with other Güntner units (such as the GIOD.1 expansion module). Communications modules are available for the following external bus connections: Modbus (GCM MOD GHMspray Rail.1, ERP no. 5206138) and Profibus (GCM PROF GHMspray Rail.1, ERP no. 5206140).

Functional description of GIOD.1

The GIOD.1 is controlled via CAN by a Güntner controller. The GIOD.1 possesses 16 digital inputs with a rated voltage of 24V DC and 8 relay outputs. The bus address of the GIOD.1 (node ID) is set up using a rotary encoding switch. The address 0xF may not be used for this.

ADVICE

To operate the GIOD on GHM professional the rotary switch must always be set to address A.

The GIOD reads this address only when first switched on.

To ensure the bus connection between the controller and one or more other units works correctly, bus termination must be activated at the beginning and end of the bus connection by setting the units' DIP switches labelled "Term". They must be placed in the "ON" position to activate the termination. Units that are in the middle of the bus and therefore permitted to transfer the bus signal may not have bus termination activated.

The status of the inputs and outputs is indicated by LEDs on the front of the casing. A lit LED against the digital inputs signifies that the corresponding input is receiving a "high" signal. A lit LED against the relay outputs signifies that the closer contact is closed. A power LED signifies that the internal electronic components are receiving power.
There is also a status display for the bus connection that involves two LEDs.

Bus status LED	Description
On	The GIOD.1 is in operation
Flashing 50:50	The GIOD.1 can be taken into operation
Brief single flash	The GIOD.1 is currently stopped
Three flashes with error LED	The software is attempting to overrun the stack on the GIOD.1
Alternate flashing with error LED	A “layer setting service” is being performed on the GIOD.1
Synchronous fast flashing with error LED	Reset to default has been selected on the rotary coding switch (setting “F”)

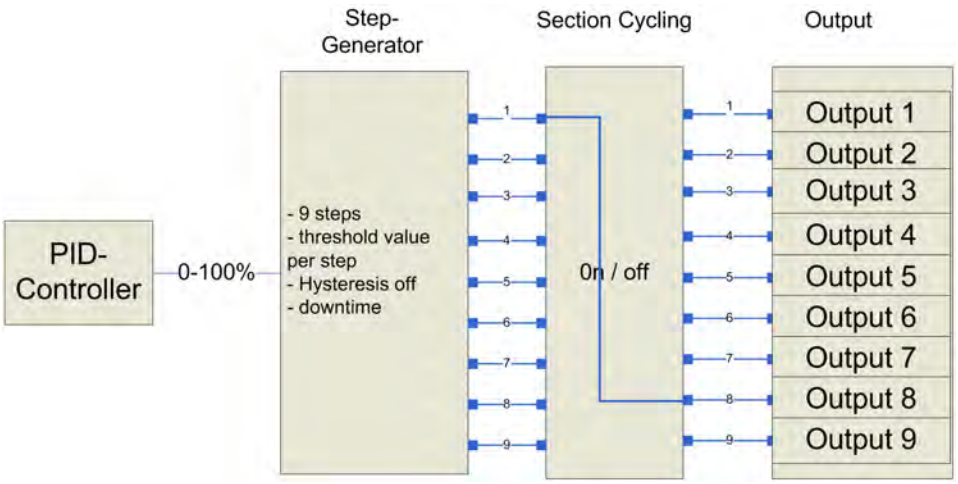
Bus error LED	Description
Off	Unit is operating correctly
On	There is a static fault on the CAN bus
Brief single flash	The warning limit has been reached in the CAN controller
Double flashing	A fault was detected in the lifeguard, nodeguard or heart-beat
Three flashes with the bus status LED	The software is attempting to overrun the stack on the GIOD.1
Alternate flashing with the bus status LED	A “layer setting service” is being performed on the GIOD.1
Synchronous fast flashing with error LED	Reset to default has been selected on the rotary coding switch (setting “F”)

Power LED	Description
On	The internal electronics are receiving power
Off	The unit is not powered or is reverse-poled

Digital input LED	Description
On	The digital input detects a “High” signal
Off	The digital input detects a “Low” signal

Digital output LED	Description
On	The digital output is closed
Off	The digital output is open

5.1.1.1 Configurable step generator



The step generator comprises three main components

1. Step generator
The step generator generates a bit pattern for the outputs that are to be switched depending on the number of steps, their thresholds, their hysteresis and the hold-off time (=default setting).

2. Section cycling
Section cycling ensures even distribution of the running times for the outputs (the sections). To this end it records and evaluates the running times of all the active outputs.

Active section cycling means,

- when a step is switched on, the output with the least running time is activated.
No change is made to any outputs that were already active.

- when a step is switched off, the output with the highest running time is deactivated.

- when no change is made (the number of outputs does not change for a period of one hour) no outputs are switched over.

- An even distribution of running times can be achieved only in association with the installation's general control behaviour on the basis of higher or lower heat exchanger performance.

ADVICE

When section cycling is deactivated, steps and outputs are correlated 1:1. In other words, step 1 switches output 1, step 2 switches output 2, and so on.

When section cycling is active, an active step is assigned to an output depending on its running time.
The current assignments are shown in the Current values menu.

3. Outputs
The outputs are the physical correlations of steps to outputs.
This depends on the type of GHM spray and the number of steps.
See also Configuration table, Page 37

5.1.2 Installation / Operating conditions

Installation / Operating conditions GRCspray.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 GIOD.1

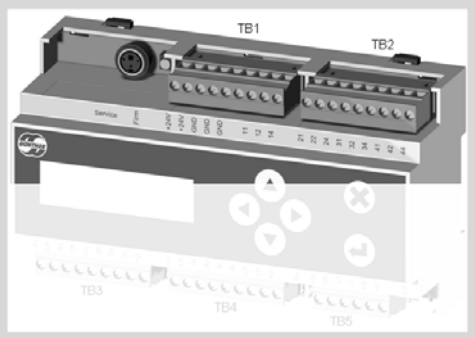
- The module is designed for mounting on a top-hat rail.
- Bus lines that are not wired via the supplied ribbon cable must be shielded.
- The shielding of bus lines must be earthed at one end only.
- Suitable shielding and routing measures must be taken to ensure that mains cables and motor cables do not give rise to any interference in signal and control lines.
- Temperature:

Storage location,	
Transport	-20°C .. +70°C
Operation:	-20°C .. +65°C

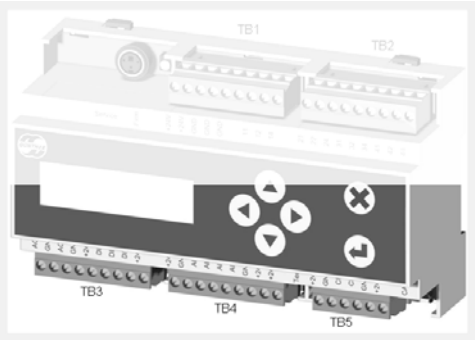
- Protection rating: IP 20

5.1.3 Connections

Connections GRCspray.1



Upper row of connections			
	Name	**Description**	
	Service	Service plug only for use by service personnel	
	Firm	Pushbutton only for use by service personnel	
TB1	+24V	External feed for power supply	
	+24V		
	GND	Contact ground for external power feed	
	GND		
	GND		
		Terminal not connected	
	11		relay DO1
	12		
	14		
TB2	21		relay DO2
	22		
	24		
	31		relay DO3
	32		
	34		
	41		relay DO4
	42		
	44		

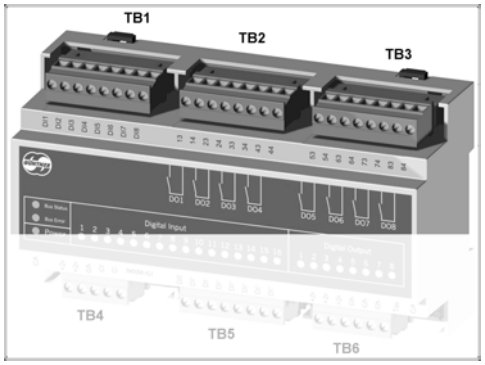


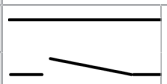
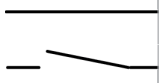
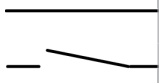
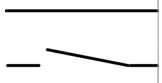
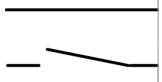
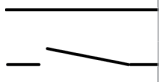
Lower row of connections		
	Name	**Description**
TB3	AO1	Analogue output 1, 0-10V
	GND	Ground
	AO2	Analogue output 2, 0-10V
	GND	Ground
	+24V	Voltage +24V
	DI1	Digital input +24V
	DI2	Digital input +24V
	DI3	Digital input +24V
	+24V	Voltage +24V
TB4	+24V	Voltage +24V
	GND	Ground
	AI1	Analogue output 4-20mA
	AI2	Analogue input 4-20mA or for temperature sensor GTF must be configured in the soft-ware
	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

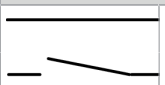
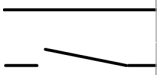
Lower row of connections		
	GND	Ground
	+24V	Voltage +24V
	CAN	CAN bus plug including power supply

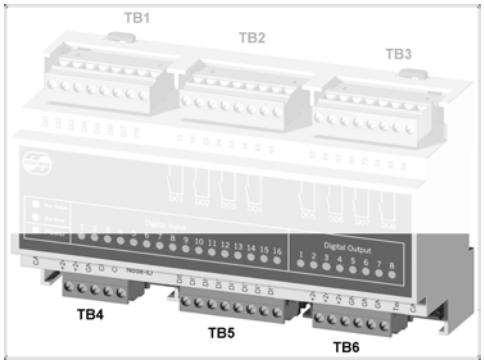
*TB: Terminal block

Connections GIOD.1



	Upper row of connections	
	Name	**Description**
TB1	DI1	Digital input 1
	DI2	Digital input 2
	DI3	Digital input 3
	DI4	Digital input 4
	DI5	Digital input 5
	DI6	Digital input 6
	DI7	Digital input 7
	DI8	Digital input 8
TB2	13	 Relay contact 1 closer
	14	
	23	 Relay contact 2 closer
	24	
	33	 Relay contact 3 closer
	34	
	43	 Relay contact 4 closer
	44	
TB3	53	 Relay contact 5 closer
	54	
	63	 Relay contact 6 closer
	64	

	Upper row of connections		
	Name	Description	
	73		Relay contact 7 closer
	74		
	83		Relay contact 8 closer
	84		



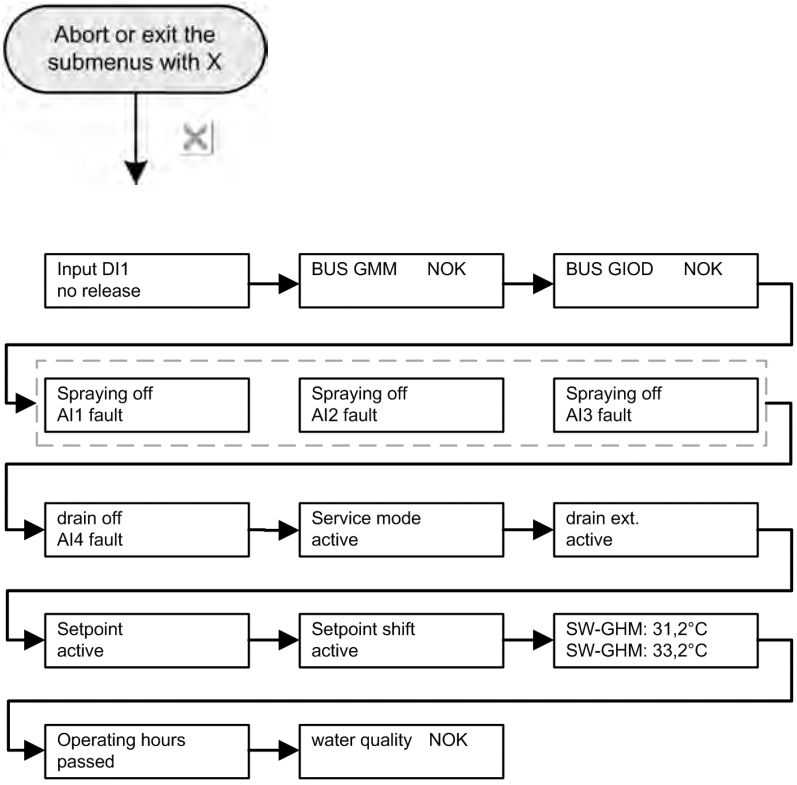
	Lower row of connections	
	Name	**Description**
	CAN	CAN bus plug including power supply
TB4	+24V	External feed for power supply
	+24V	
	GND	Contact ground for external power feed
	CH	CAN high signal
	CL	CAN low signal
	Node ID	Rotary switch for setting the bus node address 0: Address 0 1: Address 1 - - E: Address 14 F: Reset CANopen parameters to their default values
TB5	DI9	Digital input 9
	DI10	Digital input 10
	DI11	Digital input 11
	DI12	Digital input 12
	DI13	Digital input 13
	DI14	Digital input 14
	DI15	Digital input 15
	DI16	Digital input 16
TB6	+24V	Voltage +24V
	+24V	
	+24V	
	GND	Ground
	GND	

	Lower row of connections	
	Name	**Description**
	GND	
	Term	DIP switch for CAN bus termination (120Ω)
	CAN	CAN bus plug including power supply

6 Display and operation

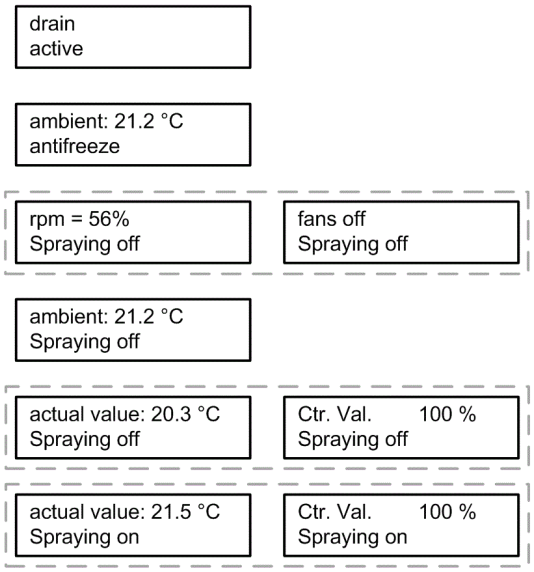
Information and error messages are shown on a two-line display. The controller is operated via a membrane keyboard.

6.1 Info menu



The Info menu shows the current status messages and, if available, the incident reports for the controller.

If a number of incidents have occurred, these will be shown alternately on the display.



The display depends on the device variant selected.

6.2 Operation

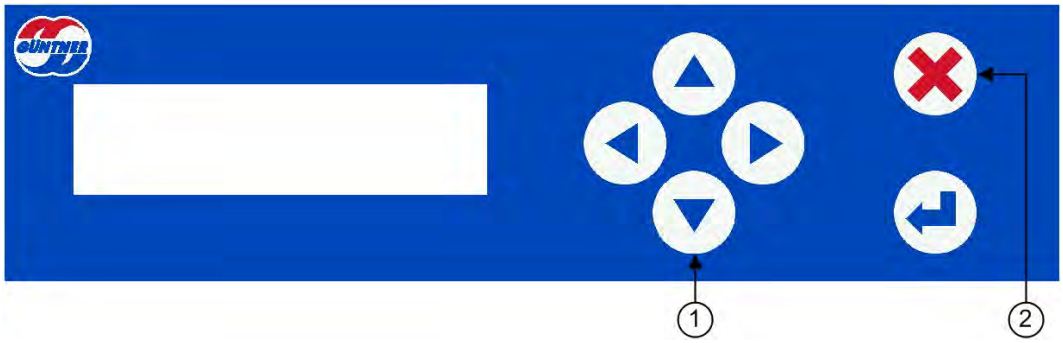
Cancel and return to INFO menu

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.

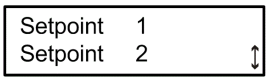


1. Use this key to move from the **INFO** menu to the **Operating menu**.
2. Use this key to return to the **INFO** menu at any time.

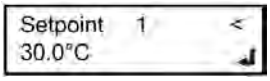
6.3 Edit mode

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

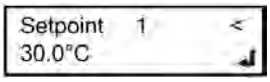
Select menu option you want (top line)

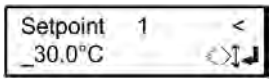


Change to menu option

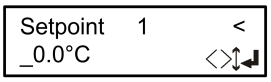


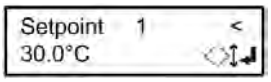
Change to writing mode (cursor flashes)



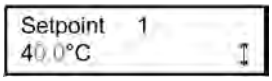


Decimal point selection (cursor flashes)

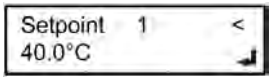




Change value



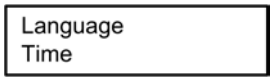
New value acceptance



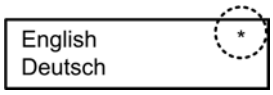
6.4 Selection mode

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

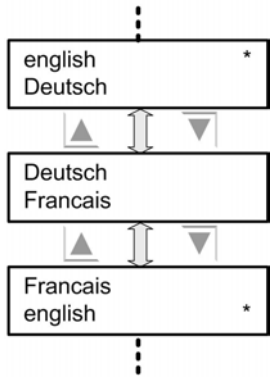
Select menu option you want ("Language", for example, top line)



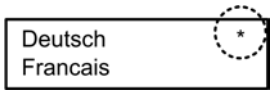
Change to the menu option
→ The function/language currently set is marked with an *asterisk*.



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



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



6.5 Configuration

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

6.5.1 Configuration table

GRCspray.1 **with** GMM:

			Condenser		Drycooler	
	I/O	**Signal**	**GRCspray.1 basic**	**GRCspray.1 professional**	**GRCspray.1 basic**	**GRCspray.1 professional**
GRCspray.1	DI1	24V	External enabling			
	DI2	24V	Starting drain from externally			
	DI3	24V	Switching to 2nd setpoint			
	AI1	4..20mA	Control value (Slave) / Setpoint (Auto external) / Free			
	AI2	4..20mA/KTY	Free	Conductivity sensor	Free	Conductivity sensor
	AI3	KTY	Free			
	AI4	0..10V	Ambient temperature / Control value (Slave)			
	AO1	0..10V	Control value / Control value from master unit			
	AO2	0..10V	Fault report: <5V = Fault, >5V = No fault			
	DO1	Relay	Solenoid valve inlet installed on site (NC) / Solenoid valve drain installed on site (NO)			
			Solenoid drain valve in the system (NO)	–	Solenoid drain valve in the system (NO)	–
	DO2	Relay	Drain signal for slave units	Drain valves in the system	Drain signal for slave units	Drain valves in the system
	DO3	Relay	Spraying solenoid valve	Solenoid valve water supply (NO) / (drain signal for slave units)	Spraying solenoid valve	Solenoid valve water supply (NO) / (drain signal for slave units)
	DO4	Relay	Fault report	Section 9 or fault report	Fault report	Section 9 or fault report
CAN BUS			Data from GMM: Pressure or return temperature/release via control value/setpoint/heat exchanger type/refrigerant/units system			
GIOD.1	DO1	Relay	-	Section 1	-	Section 1
	DO2	Relay	-	Section 2	-	Section 2
	DO3	Relay	-	Section 3	-	Section 3

Table: Configuration table GRCspray.1 **with** GMM

			Condenser		Drycooler	
	I/O	Signal	GRCspray.1 basic	GRCspray.1 professional	GRCspray.1 basic	GRCspray.1 professional
	DO4	Relay	-	Section 4	-	Section 4
	DO5	Relay	-	Section 5	-	Section 5
	DO6	Relay	-	Section 6	-	Section 6
	DO7	Relay	-	Section 7	-	Section 7
	DO8	Relay	-	Section 8	-	Section 8

Table: Configuration table GRCspray.1 **with** GMM

The GRCspray.1 professional variant requires additional hardware (GIOD.1, BAAN no. 5204183).

GRCspray.1 **None** GMM:

			Condenser		Drycooler	
	I/O	**Signal**	**GRCspray.1 basic**	**GRCspray.1 professional**	**GRCspray.1 basic**	**GRCspray.1 professional**
GRCspray.1	DI1	24V	External enabling			
	DI2	24V	Enabled: Fans ON (e.g. operating message from fan speed controller) / Starting drain from externally			
	DI3	24V	Switching to 2nd setpoint			
	AI1	4..20mA	Pressure sensor / Control value (Slave) / Setpoint (Auto external) / Free		Control value (Slave) / Setpoint (Auto external) / free	
	AI2	4..20mA/KTY	Free	Conductivity sensor	Free	Conductivity sensor
	AI3	KTY	Free		Return temperature	
	AI4	0..10V	Ambient temperature / Control value (Slave)			
	AO1	0..10V	Control value / Control value from master unit			
	AO2	0..10V	Fault report: <5V = Fault, >5V = No fault			
	DO1	Relay	Solenoid valve inlet installed on site (NC) / Solenoid valve drain installed on site (NO)			
			Solenoid drain valve in the system (NO)	-	Solenoid drain valve in the system (NO)	-
	DO2	Relay	Drain signal for slave units	Drain valves in the system	Drain signal for slave units	Drain valves in the system
	DO3	Relay	Spraying solenoid valve	Solenoid valve water supply (NO) / (drain for slave units)	Spraying solenoid valve	Solenoid valve water supply (NO) / (drain for slave units)
	DO4	Relay	Fault report	Section 9 or fault report	Fault report	Section 9 or fault report
CAN BUS			-			
GIOD.1	DO1	Relay	-	Section 1	-	Section 1
	DO2	Relay	-	Section 2	-	Section 2
	DO3	Relay	-	Section 3	-	Section 3
	DO4	Relay	-	Section 4	-	Section 4
	DO5	Relay	-	Section 5	-	Section 5
	DO6	Relay	-	Section 6	-	Section 6

Table: Configuration table GRCspray.1 **None** GMM

			Condenser		Drycooler	
	I/O	Signal	GRCspray.1 basic	GRCspray.1 professional	GRCspray.1 basic	GRCspray.1 professional
	DO7	Relay	-	Section 7	-	Section 7
	DO8	Relay	-	Section 8	-	Section 8

Table: Configuration table GRCspray.1 **None** GMM

The GRCspray.1 professional variant requires additional hardware (GIOD.1, BAAN no. 5204183).

6.5.2 Control outputs on the GRCspray.1

Digital output (DO1):
Digital output DO1 is used to control the on-site solenoid valves. An NC solenoid valve (normally closed) is to be provided to feed the system and an NO solenoid valve (normally open) for on-site draining. The valves are powered when contact 11/14 is closed.
The drain valve in the system is connected additionally to DO1 in the case of the "basic" system.

Digital output (DO2):
Digital output DO2 is used to control two solenoid drain valves in the system in the case of the professional system. The valves are powered when contact 21/24 is closed.
Digital output DO2 is not occupied in the case of the "basic" system or is intended as a drain signal for additional slave systems.

Digital output (DO3):
Digital output DO3 is used to control the solenoid valve on the unit's water inlet. The valve is powered when contact 31/34 is closed. If several units are operated in master-slave mode, the drain command is sent to the slave unit via this output signal in the case of the professional system.
The solenoid valve is connected to DO3 for spraying in the case of a GHM basic controller.

Digital output (DO4):
Digital output DO4 is used for the fault report. If a fault is pending, contact 41/44 is activated. The exception here is a device with 9 sections. Output DO4 is used in this case to activate the 9th step. The fault report is picked up in this case on AO2. (See I/O configuration, Page 77)

6.6 Control inputs

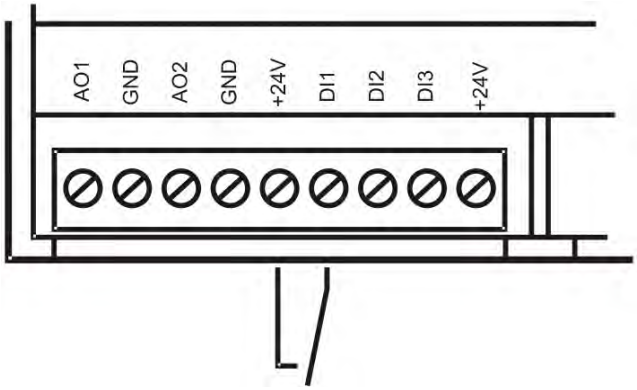
The control inputs are designed as a **low-voltage connection** and are connected via a potential-free contact (relay, contactor contact, switch etc.). The potential-free contact must be switched between the terminals **+24V** and the **DI1** or **DI2** or **DI3** control input. The function is activated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

6.6.1 Enabling of GHM spray

Spraying is enabled via terminal **DI1** (enable). If this enable is not switched, spraying will be disabled.

*If it is 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

ADVICE

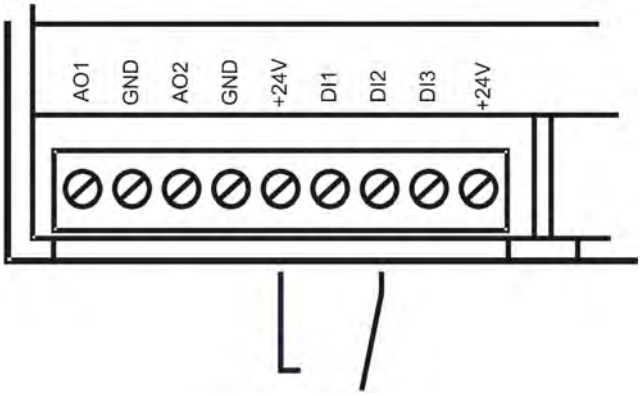
Under no circumstances may the controller be disabled by interrupting the supply voltage! Continuously switching the supply voltage can damage the controller and such damage is not covered by the warranty!

Enable is not required in "Manual" mode.
See *Manual mode, Page 65*

6.6.2 Enabling the fan

(only if there is no active bus communication to a GMM)

If the GHM is not operated with a Güntner speed controller (bus communication between GMM and GHM), a further enable via digital input DI2 is required. This enable serves to ensure that the fans are in operation.



Connection for enabling the fan +24V - DI2

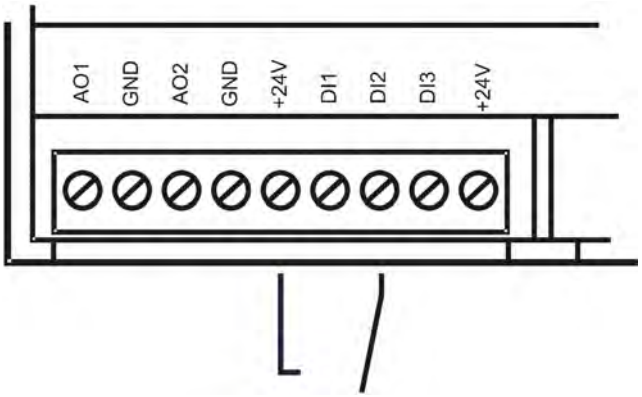
ADVICE

Under no circumstances may you disable the controller by disconnecting its power supply! Continual switching of the power supply may damage the controller, and such damage is not covered by the warranty!

Enable is not required in "Manual" mode.
See Manual mode, Page 65.

6.6.3 Starting drain from externally

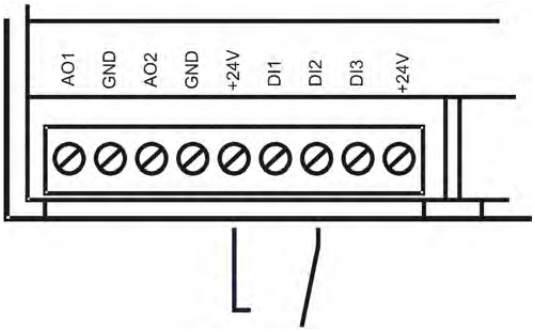
The drain can be started from externally via input DI2.



Connection for starting the drain from externally +24V - DI2

6.6.4 Setpoint switchover

The setpoint switchover can be activated via digital input DI3. The second setpoint has to be configured in the menu.



6.7 Analogue inputs

The GHM 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.

6.7.1 Connecting a pressure sensor to AI1

Operating mode: Auto internal

Depending on the operating mode, the current input at AI1 can be configured differently (see I/O configuration, Page 77).
If there is no bus communication to a GMM, then condensers have a two-wire sensor connected to AI1. If both a GHM and a GMM are present, the pressure signal from the GMM is passed via the bus to the GHM and the pressure connection is then not required.

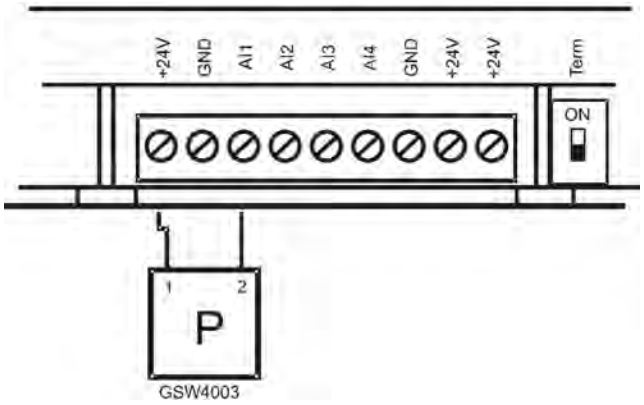
+24V = Common supply voltage (GSW4003.1: brown(1), GSW4003:brown(1))

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

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



Pressure transmitter connection

6.7.2 External power signal connection to AI1

The AI1 input 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 the corresponding steps switched on the basis of the thresholds set.

Furthermore, the setpoint can be specified externally via the AI1 input.

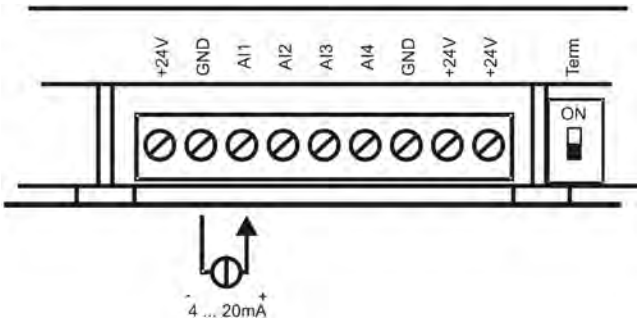
One power signal (4-20mA) can be connected to the AI1 analogue input.

GND = Reference point (**–**).

AI1 = 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.

6.7.3 Connecting the conductivity sensor on AI2

(only for the professional system)

A conductivity sensor for recording the water quality is connected on AI2.

6.7.4 Connecting a medium temperature sensor on AI3

Drycoolers (with no bus communication to a GMM) have a return temperature sensor connected to AI3.

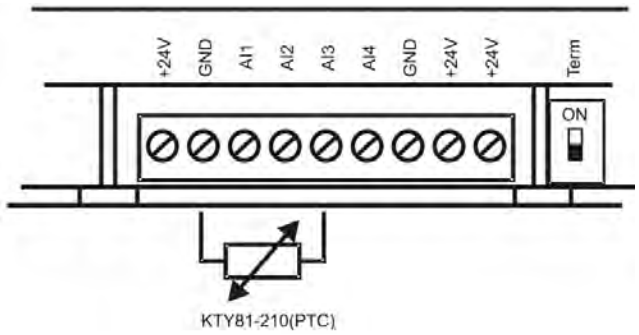
A temperature sensor is connected on the terminals

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 kΩ (-50°C) and 3.27kΩ (+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
1040Ω	-50°C	2075Ω	30°C
1095Ω	-45°C	2152Ω	35°C
1150Ω	-40°C	2230Ω	40°C
1207Ω	-35°C	2309Ω	45°C
1266Ω	-30°C	2390Ω	50°C
1325Ω	-25°C	2472Ω	55°C
1387Ω	-20°C	2555Ω	60°C
1449Ω	-15°C	2640Ω	65°C
1513Ω	-10°C	2727Ω	70°C
1579Ω	-5°C	2814Ω	75°C

Table: Temperature / Impedance

Impedance	Temperature	Impedance	Temperature
1645Ω	0°C	2903Ω	80°C
1713Ω	5°C	2994Ω	85°C
1783Ω	10°C	3086Ω	90°C
1854Ω	15°C	3179Ω	95°C
1926Ω	20°C	3274Ω	100°C
2000Ω	25°C	3370Ω	105°C

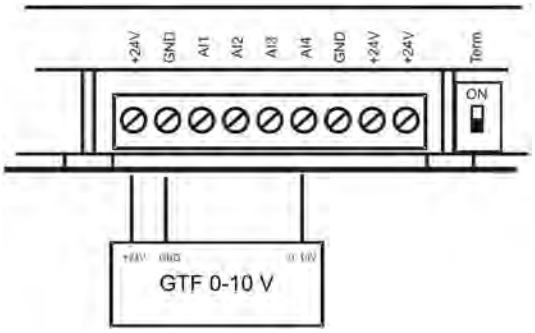
Table: Temperature / Impedance

6.7.5 Connecting a temperature sensor on AI4

A temperature sensor for recording the ambient temperature is connected to AI4.
A standard signal (0-10V) is connected on the terminals

GND = Earth (negative)

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



0-10V standard signal connection

6.7.6 Connecting an external voltage sensor on AI4

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

GND = Earth (negative)

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

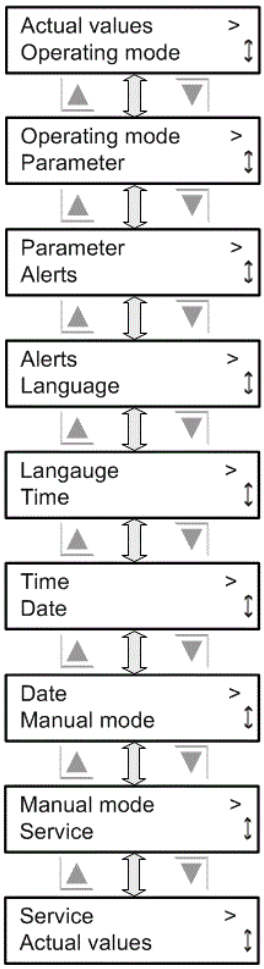
ADVICE

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 or Auto external mode. To do this, this input must be defined as a slave or setpoint input in the I/O configuration. The 0-10V input signal is scaled 0-100% in a control signal and passed on to the spraying controller.

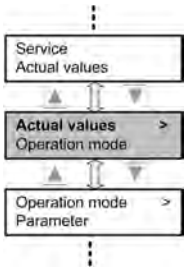
6.8 Operating menu

Structure of basic menu



6.8.1 Actual values

The actual input signals and control values are shown here.



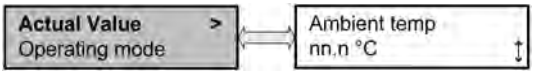
6.8.1.1 Input current values

You can have a number of quantities displayed by calling up the menu item *Current values*. The measured temperature or pressure is displayed first. Which value is displayed depends on the type of cooler (condenser or drycooler).

Condenser	No refrigerant	CDS press nn.n bar
Condenser	Refrigerant selected	CDS temp nn.n °C
Drycooler		Outlet temp nn.n °C

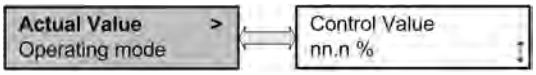
6.8.1.2 Ambient temperature

The current ambient temperature is shown.



6.8.1.3 Control value

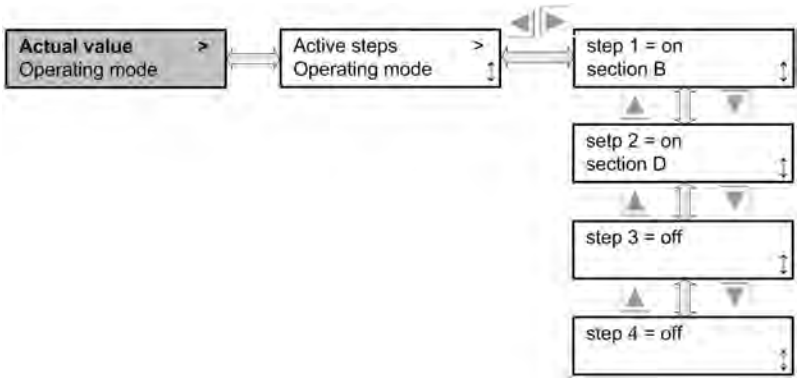
The control value of the controller that is used to generate the steps is displayed in percent.



6.8.1.4 Steps

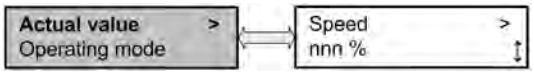
Here the system displays the current status of the switching step and the corresponding spray section.

The length of the list depends on the number of configured steps.



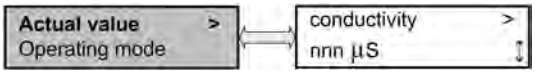
6.8.1.5 Speed

When the GHM is combined with a GMM (Güntner Motor Management) this displays the fan speed. This display will not appear if there is no bus communication to a GMM.



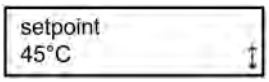
6.8.1.6 Conductivity

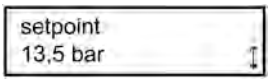
The spraying water's conductivity is displayed here.

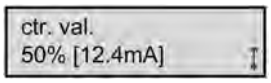


6.8.1.7 Setpoint

The control value of the master is displayed here for a master-slave controller.





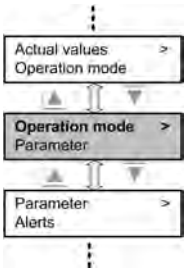


ADVICE

Based on the control concept, the GHM controller's setpoint must always be at least 2 Kelvin higher than the setpoint on the speed controller.

6.8.2 Status

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



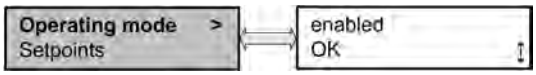
6.8.2.1 Operating modes

The current operating mode is displayed here.

Auto internal Setpoint 1	Shows the current setpoint for spraying
Auto internal Setpoint 2	If a second setpoint was configured, it will be displayed here
Slave external AI1	Shows the control value pre-set via AI1 for slave operation
Slave external Bus	Shows the control value pre-set via a bus signal for slave operation
Auto external AI1	Shows the setpoint pre-set via AI1
Auto external Bus	Shows the setpoint pre-set via a bus signal

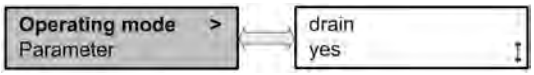
6.8.2.2 External release - Status

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



6.8.2.3 Drained

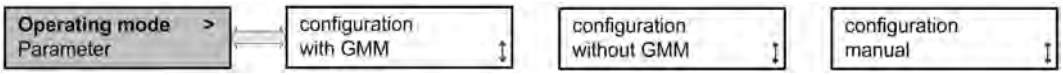
Indicates that the spraying system is empty as far as the on-site solenoid valves.



6.8.2.4 Configuration

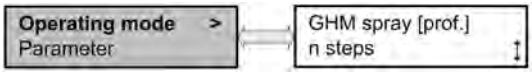
The current configuration is displayed here.

With GMM	This shows that the GHM is operating with a GMM (Güntner Motor Management).
Without GMM	This shows that the GHM is operating as an independent controller.
Manual	This shows that the GHM is operating in manual mode.



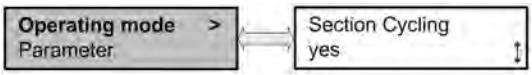
6.8.2.5 GHM spray basic/prof.

This shows whether the controller is a GHM spray professional or a GHM spray basic. The display also shows how many spraying steps are configured in the controller.



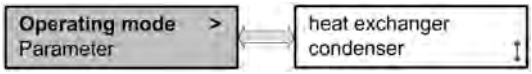
6.8.2.6 Section cycling

This shows whether the Section cycling function is activated. This function is present only in GHM spray professional.



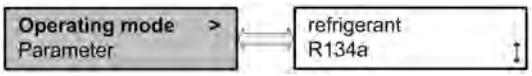
6.8.2.7 Heat exchanger

The heat exchanger type is displayed here.



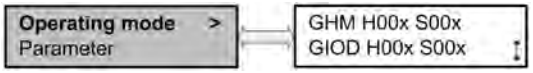
6.8.2.8 Refrigerant

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



6.8.2.9 Hardware and software versions

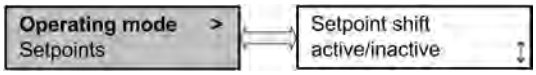
This shows information about the current hardware and software versions of the GHM.



GHM	= Güntner Hydro Management
GIOD	= Güntner Input Output Device
H	= Hardware version
S	= Software version

6.8.2.10 Setpoint displacement active/inactive

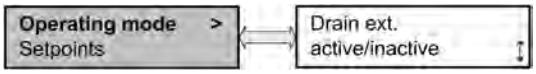
It is shown here whether the current setpoint is displaced.



This is possible if a GHM controller is operating in combination with a GMM controller. If the setpoint is displaced in the case of the GMM controller, the GHM setpoint may also be displaced automatically, thus ensuring that the GHM setpoint is always higher than the GMM setpoint.

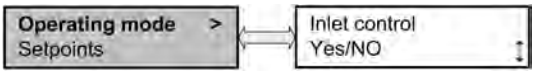
6.8.2.11 External drain

If DI2 is configured as an external drain, the status will be shown here.



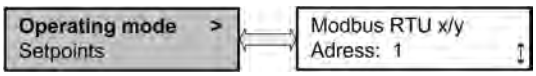
6.8.2.12 Inlet control

It is shown here whether the unit has been configured such that the common on-site feed valve is activated with master-slave control.



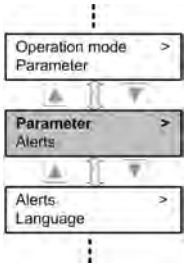
6.8.2.13 Bus module

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



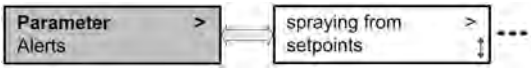
6.8.3 Parameters

The parameters are configured in this menu.



6.8.3.1 Parameter – Spraying from

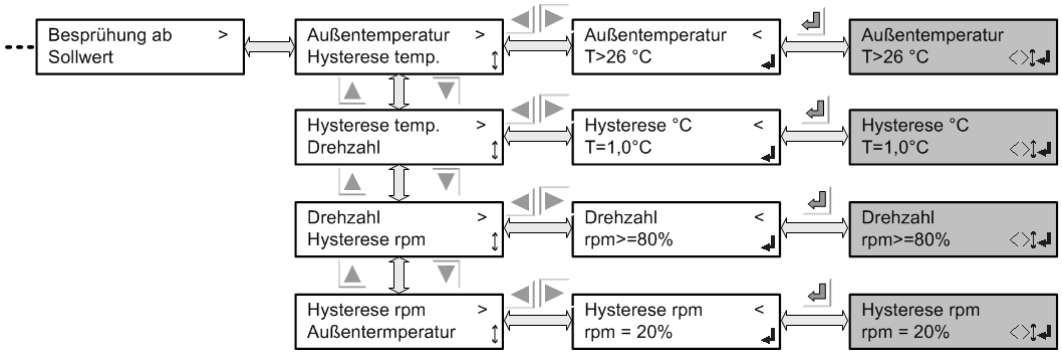
Here you set up the conditions that activate spraying.



6.8.3.1.1 Outdoor temperature

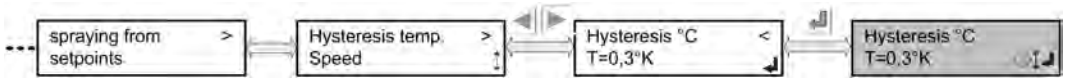
Here you set up the ambient temperature at which spraying is enabled.

Note: Spraying will not begin until the setpoint (parameter → Spraying from → setpoint) is reached or exceeded.



6.8.3.1.2 Hysteresis temp.

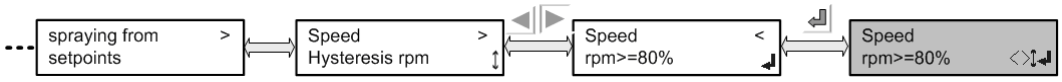
Here you set up hysteresis values for the outdoor temperature. For example, if the starting temperature for spraying is set to 30° with a hysteresis of 3K, spraying will not switch off until the ambient temperature drops below 27°C.



6.8.3.1.3 Speed

(only if there is active bus communication to a GMM)

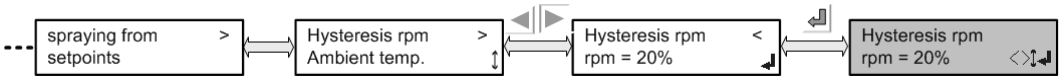
Here you set up the fan speed from which spraying is enabled. This function is available only for a GHM in combination with a GMM. If there is currently no bus communication to a GMM, the GHM can be enabled additionally by means of digital input contact DI2, assuming this has been defined in the IO configuration.



6.8.3.1.4 Hysteresis rpm

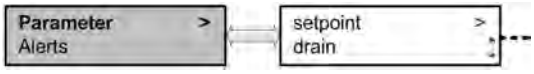
(only if there is active bus communication to a GMM)

Here you set up the hysteresis that is responsible for enabling spraying according to the fan speed. For example, if the starting speed for spraying is set up as 90% with a hysteresis of 10%, spraying will not be switched off until the speed drops below 80%.



6.8.3.2 Setpoint

Here you set up the setpoint for spraying.



The following table shows the value to which the setpoint refers, depending on the heat exchanger configuration.

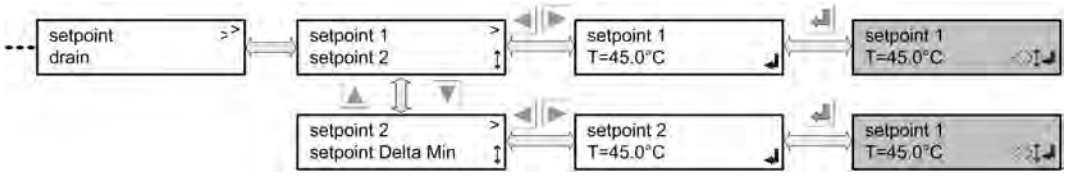
Condenser	Refrigerant configured in the controller. Temperature regulation!	Setpoint depends on the condensation temperature
	Refrigerant **not** configured in the controller. Pressure regulation!	Setpoint depends on the condenser pressure
Dry cooler	Temperature regulation!	Setpoint depends on the return temperature of the refrigerant medium

ADVICE

Based on the control concept, the GHM controller's setpoint must always be at least 2 Kelvin higher than the setpoint on the speed controller.

6.8.3.2.1 Setpoint 1 and Setpoint 2

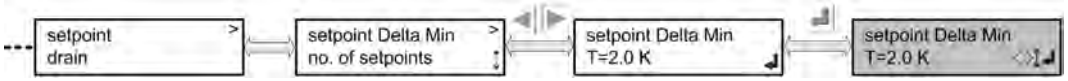
The setpoints that govern spraying are defined here.



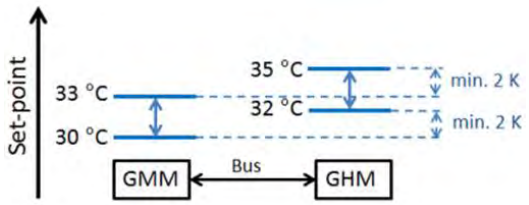
If a second setpoint is required, it has to be activated under the "No. of setpoints" menu option.

6.8.3.2.2 Setpoint delta min.

The minimum interval between the GHM and GMM setpoint is displayed here.

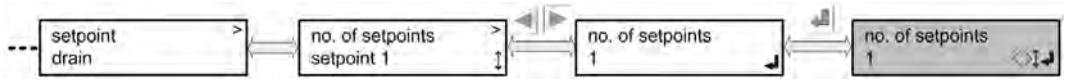


The GHM setpoint must always be higher than the GMM setpoint. If the GMM setpoint is displaced, this parameter ensures that the GHM setpoint is higher than the GMM setpoint by the specified interval.



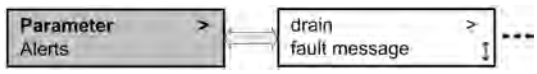
6.8.3.2.3 Number of setpoints

A second setpoint can be activated here.



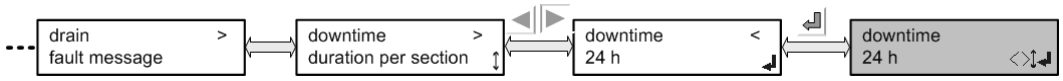
6.8.3.3 Draining

Here you set up the parameters that govern draining.



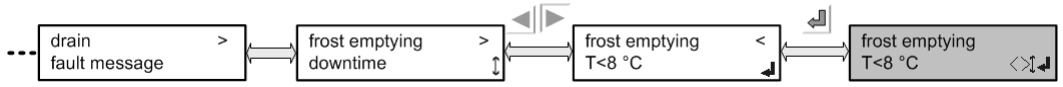
6.8.3.3.1 Downtime

Here you set the amount of downtime (during which spraying is inactive) after which the pipes of the spraying system will be drained. It is necessary to empty the system periodically to prevent the build-up of Legionella in the water



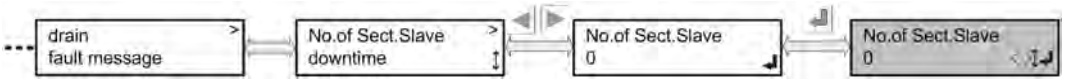
6.8.3.3.2 Frost draining

If the ambient temperature is lower than the specified frost temperature, the system is drained automatically.



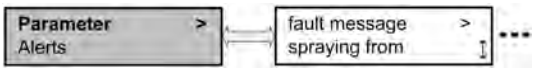
6.8.3.3.3 Number of slave sections

The number of spraying steps of the largest slave unit is displayed here for master-slave control.



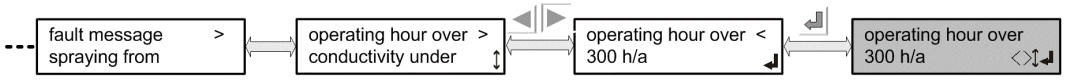
6.8.3.4 Fault report

Here you set up the parameters that govern fault reports.



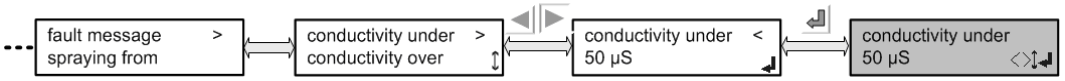
6.8.3.4.1 Hours high

An alarm message is generated if the number of hours of spraying per year exceeds the specified value.



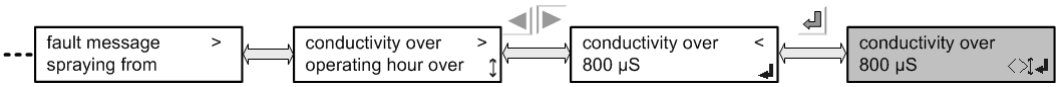
6.8.3.4.2 Conductivity low

An alarm message is generated if the conductivity of the water drops below the specified value.



6.8.3.4.3 Conductivity high

An alarm message is generated if the conductivity of the water exceeds the specified value.



6.8.4 Alerts

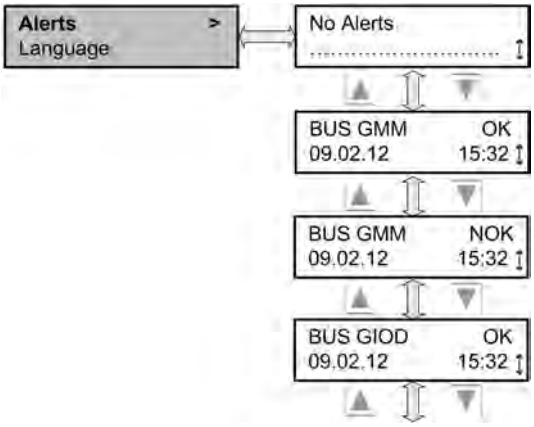
The last 85 alerts can be called up here.

6.8.4.1 Alert memory

The GHM 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 , Page 94.

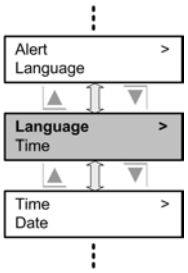
When the alert memory is selected, the display shows the last fault that occurred.

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



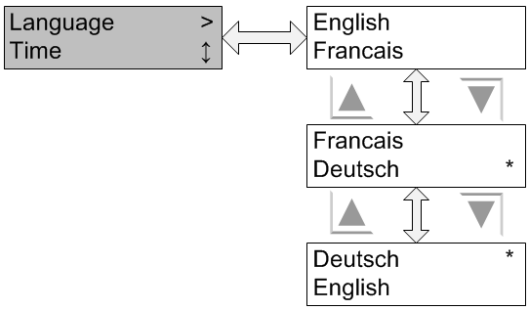
6.8.5 Language

The menu language can be selected here.



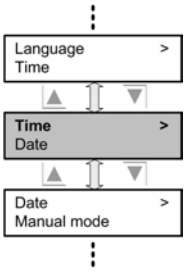
6.8.5.1 Language selection

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



6.8.6 Time

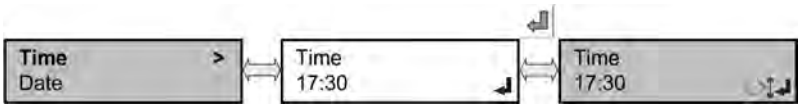
The time can be selected here.



6.8.6.1 Time setting

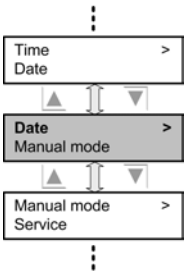
The set time is displayed and changed where required in the 24-hour clock.

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



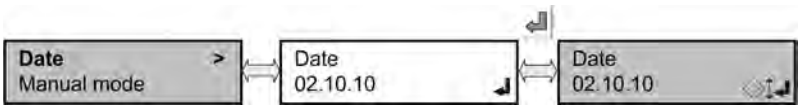
6.8.7 Date

The date can be set here.



6.8.7.1 Set date

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



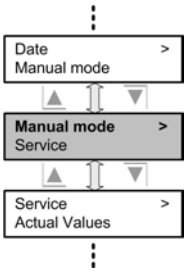
6.8.8 Manual mode

Manual mode is used to manually activate spraying of the heat exchanger, draining or to operate individual valves.

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.



6.8.8.1 Manual mode

In order to set manual mode you first need to select the desired type of manual operation from the “Mode” menu.

Manual mode off:
Manual mode is inactive.

Manual mode draining:
Manual mode has been activated, draining can be carried out by hand.

Manual mode valve switching
Manual mode “valve switching” enables you to manually power the solenoids of the inlet and drain valves.

(only for the basic system)

Manual mode spraying:
The heat exchanger can be sprayed manually in manual spraying mode.

(only for the professional system)

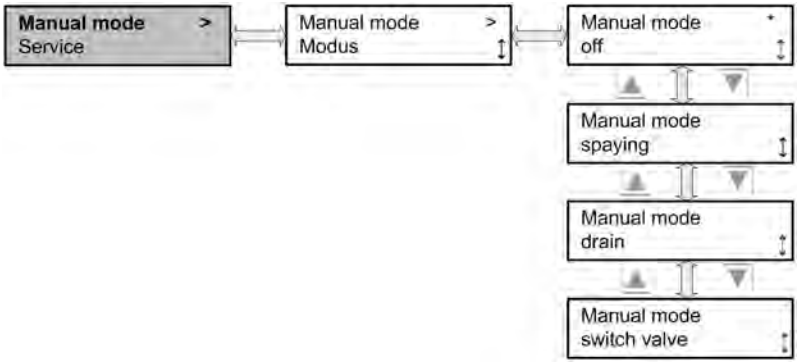
Manual mode control value:
Manual mode has been activated, the control value for switching the spraying steps is prescribed by a parameter.

Manual mode section:
Manual mode has been activated, the spraying of each section can be specifically switched on or off.

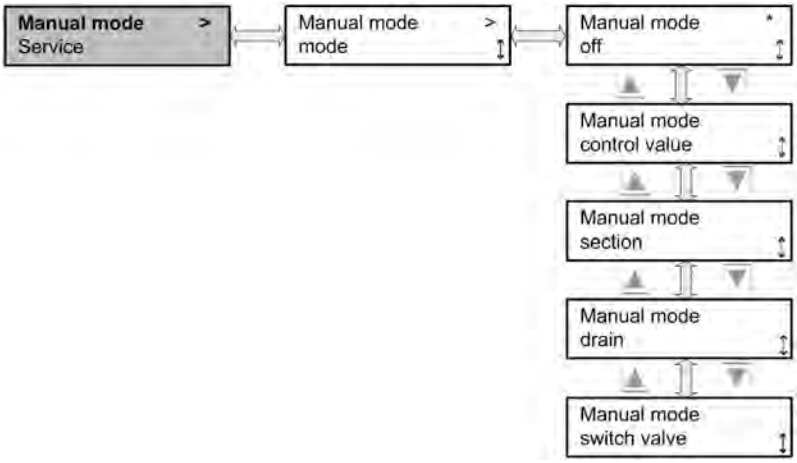
ADVICE

The settings for manual mode are fail-safe. After switching the GHM spray off and back on, the most recently specified manual mode is reactivated and again has higher priority than all other control types.

Manual mode GHM basic



Manual mode GHM professional



6.8.8.2 Manual mode settings

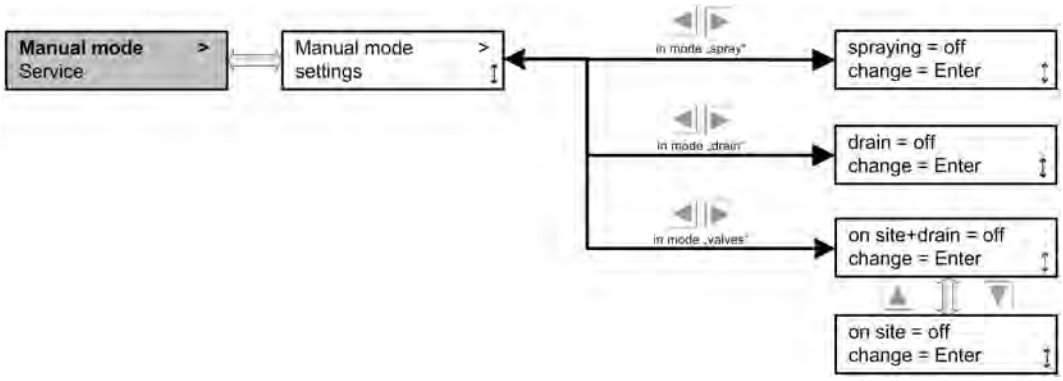
The relevant settings for the modes selected under "Manual mode" can be defined in manual settings mode.

Manual mode settings:
When manual mode is active, this enables you to modify either the manual control value or the state of the relevant output.

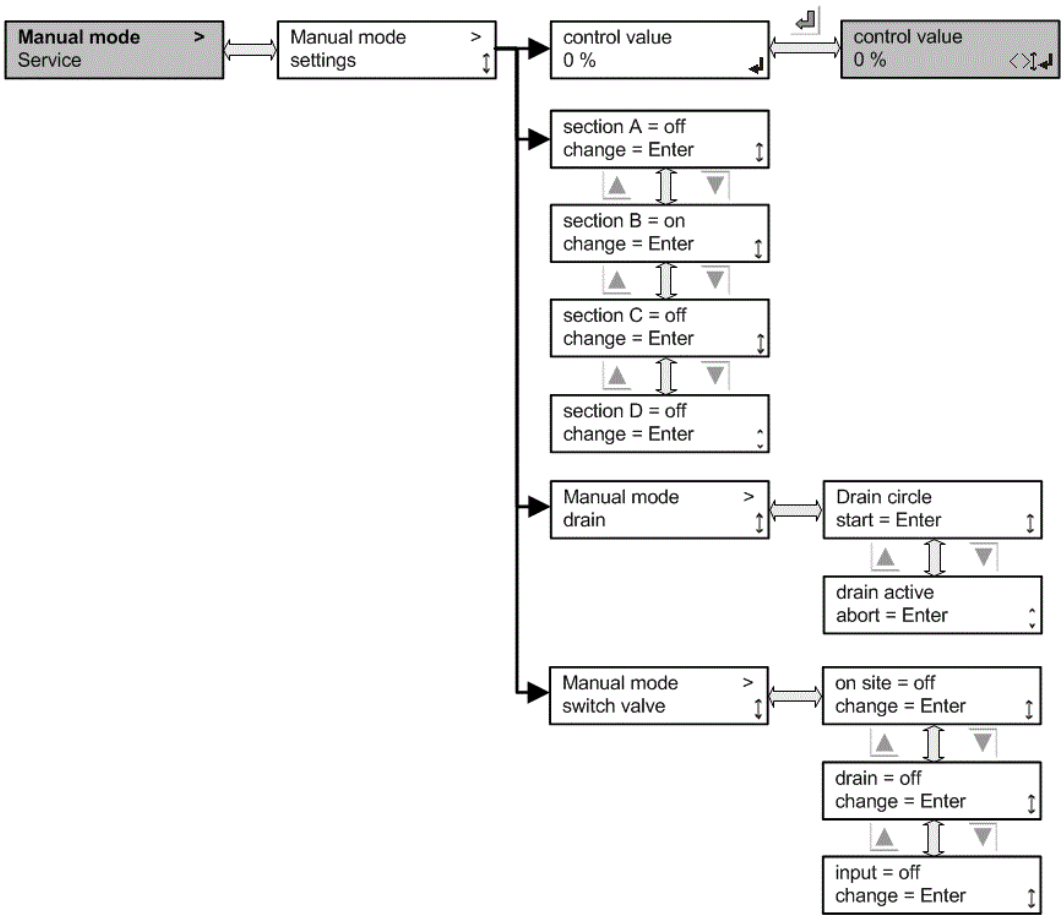
ADVICE

The settings for manual mode are fail-safe. After switching the GHM spray off and back on, the most recently specified manual mode is reactivated and again has higher priority than all other control types.

Manual mode GHM basic settings



Manual mode GHM professional settings



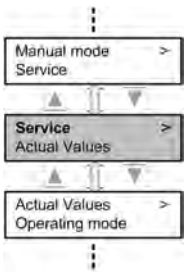
6.9 Service

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

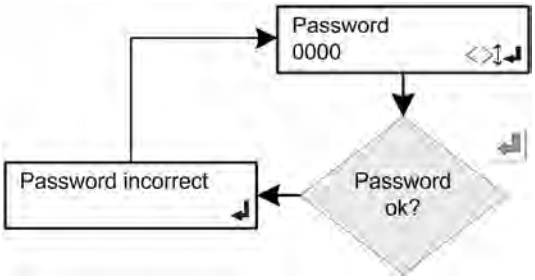
The password is **3795**.

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

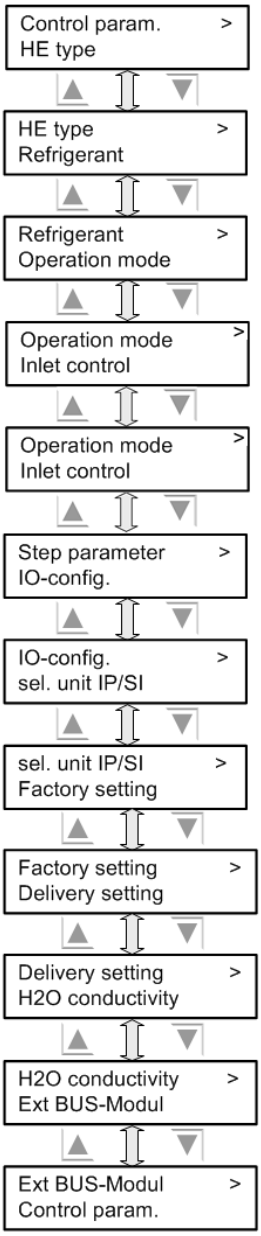
The password is valid for 15 minutes and will not be requested again during this time.



Password prompt

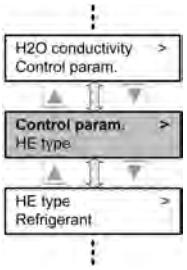


Service menu set-up

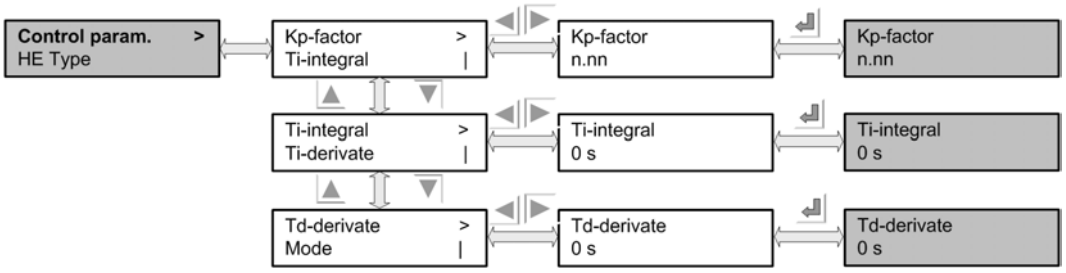


6.9.1 Control parameters

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



6.9.1.1 Control parameters Kp, Ti and Td



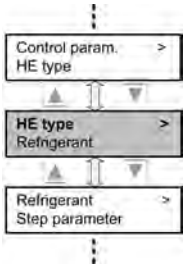
The Kp factor can be entered in a range from 0.1 to 10.0 to one decimal place. The Kp factor specifies the control amplification. It is the proportion of the control path following the input signal.

The Ti reset time changes the control value in the set time by the value specified by the proportional factor.
Example: With an unchanged control deviation (X_s) of 1K and X_p = 10 the control signal in Ti = 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.

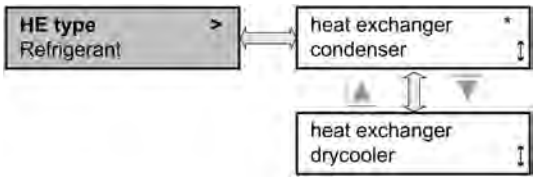
6.9.2 Heat exchanger

The heat exchanger type is selected here.



6.9.2.1 Heat exchanger type

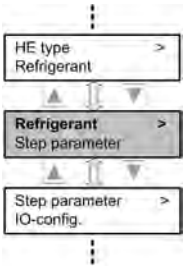
The heat exchanger type is selected here.
The selected type is displayed with a *.



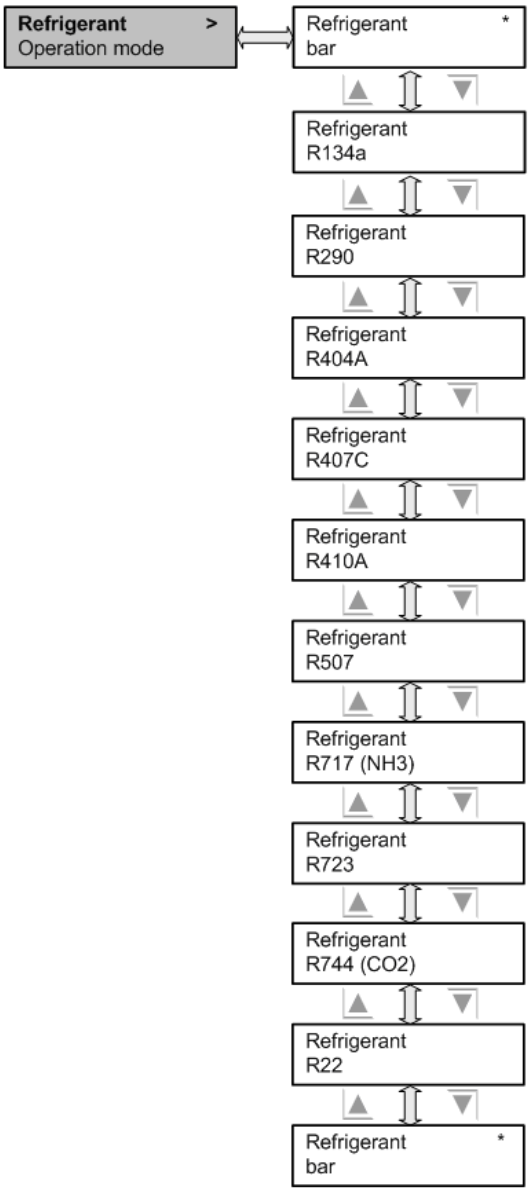
→ Select with ENTER.

6.9.3 Refrigerant

A refrigerant is selected here.



6.9.3.1 Refrigerant selection

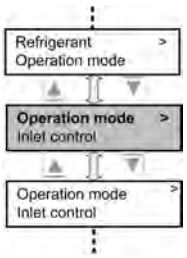


In this menu option you can select whether a refrigerant has been defined and whether the display of reference and current values with temperature should be converted accordingly, or whether no refrigerant has been defined (bar) and the setpoints and current values should be displayed as pressure.

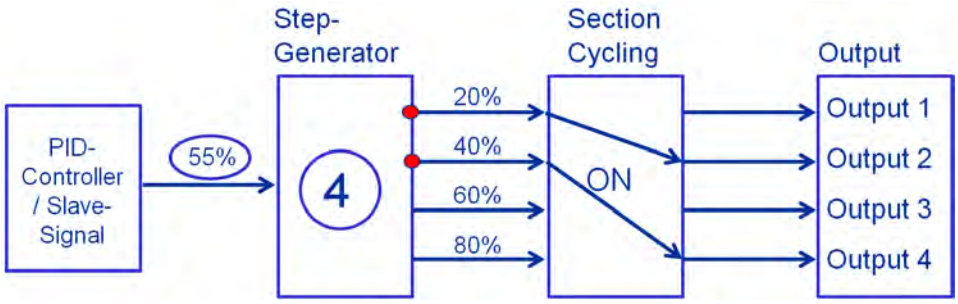
The selected option is displayed with a *.

6.9.4 Operating mode

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

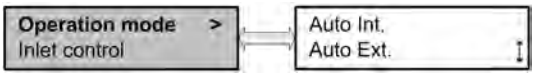


The individual spraying steps are activated in accordance with the control value. This control value is generated automatically by the internal PI controlled in Auto internal and Auto external modes. The control value is pre-set externally in Slave external mode. The control principle is illustrated in the next diagram using the example of a system with four steps.



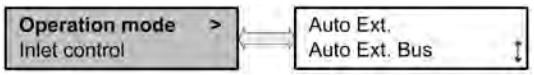
6.9.4.1 Auto internal

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



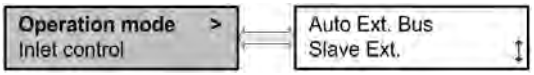
6.9.4.2 Auto external

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.



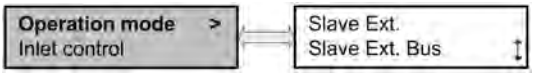
6.9.4.3 Auto external BUS

In this mode the setpoint is specified via BUS.
A Güntner Communication Module (GCM module) is required for this operating mode.



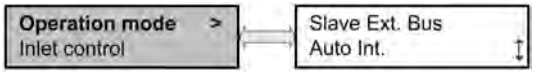
6.9.4.4 Slave external

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



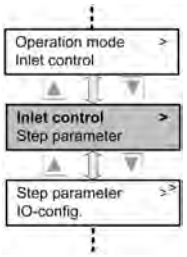
6.9.4.5 Slave external BUS

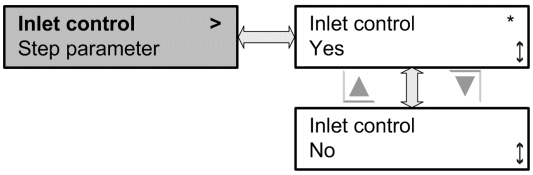
In this mode the control value is specified via BUS.
A Güntner Communication Module (GCM module) is required for this operating mode.



6.9.5 Inlet control

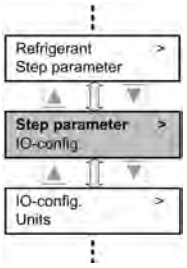
A number of units can share the use of on-site inlet and drain valves in the case of master-slave control. The master unit has to be configured here such that this unit assumes control of the on-site valves.





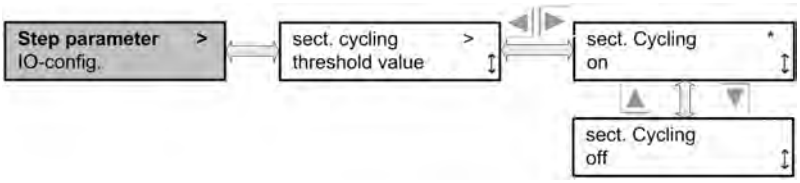
6.9.6 Step parameters

Here you can modify the parameters of the step generator.



6.9.6.1 Section cycling

When section cycling is active the running times of the individual spraying sections are balanced. This ensures that, on average, all the sections are subjected to the same load.

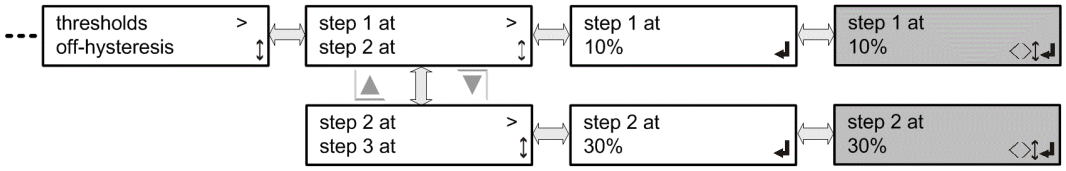


ADVICE

With active section cycling there is NO 1:1 correlation between active steps and spray sections.

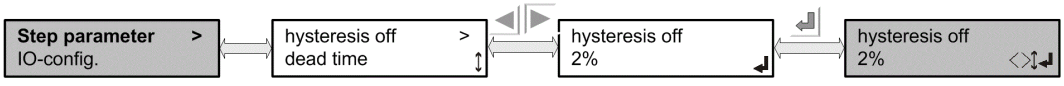
6.9.6.2 Threshold value

Here you can specify a threshold value for each step.
The step will then be switched active when the control value of the internal PID controller reaches this threshold.



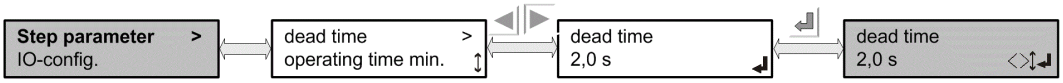
6.9.6.3 Off hysteresis

A hysteresis is defined to prevent a given step from being switched on and off too frequently. This means that each stage switches off only when it reaches the corresponding threshold value minus the hysteresis.



6.9.6.4 Dead time

This is the time until the next higher step is switched in.
This prevents a number of steps from being switched in simultaneously.



ADVICE

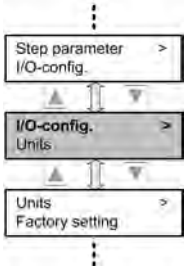
Switching the steps back down is carried out with no hold-off time.

6.9.6.5 Minimum switch time

The minimum switch time is the shortest possible time for a section to be sprayed.

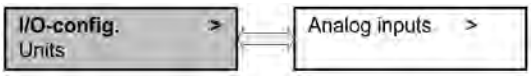
6.9.7 I/O configuration

This menu item is used to configure the analogue inputs.
At the same time you can assign them selected functions.

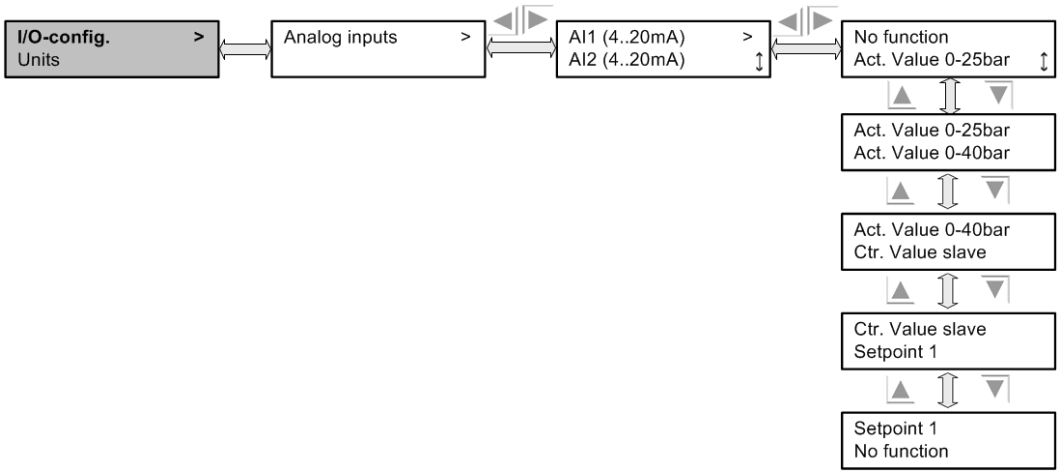


6.9.7.1 Analogue inputs

The analogue inputs are configured by default, depending on the type of heat exchanger (condenser or dry cooler) and on whether or not the GHM has bus communication to a GMM (Güntner Motor Management). Input AI1 is a 4-20 mA current input. Input AI3 is a current input. Input AI2 can be configured as a current input as well as a KTY resistance input. Input AI4 is a 0-10V DC input.
See Configuration table, Page 37.



6.9.7.1.1 Current input AI1



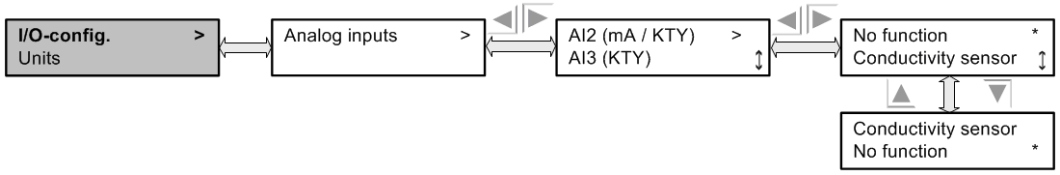
No function is selected if this input is to be inactive.

Actual value 0-25bar or **Actual value 0-40bar** means that a pressure sensor is connected for recording the actual value. This sensor is only required if the GHM is operated without GMM.

Slave control value means that the control value for spraying is pre-set externally on AI1.

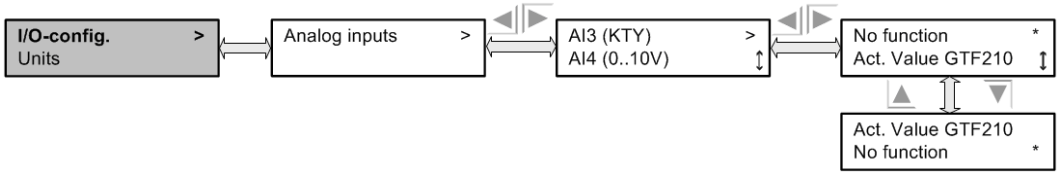
Setpoint 1 means that the setpoint for spraying is pre-set externally on AI1.

6.9.7.1.2 Current input AI2



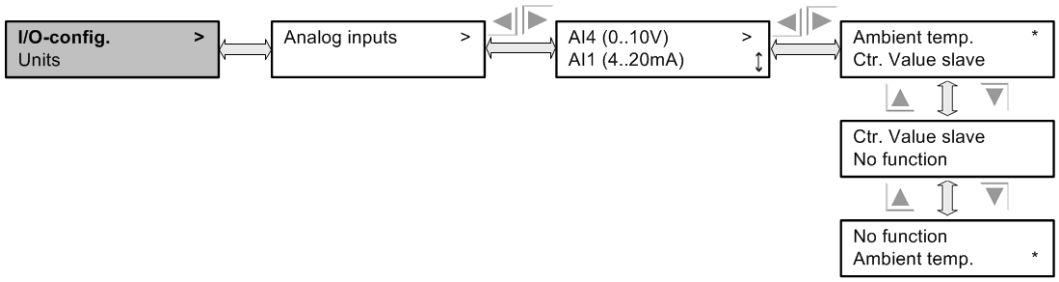
Conductivity sensor means that a sensor for recording the water conductivity is configured on AI2.

6.9.7.1.3 Switchable input AI3 (current/KTY)



Actual value GTF210 means that a temperature sensor for recording the fluid temperature is configured on AI3. The temperature sensor is only required if a GHM is operated without GMM.

6.9.7.1.4 Voltage input AI4



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

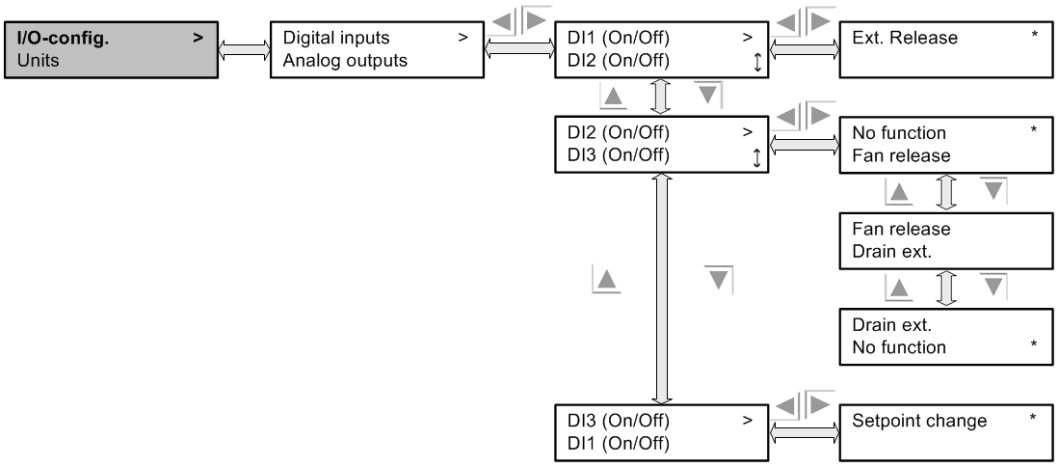
Ambient temperature means that a sensor for recording the ambient temperature is configured on AI4.

Slave control value means that the control value for spraying is pre-set externally on AI4.

6.9.7.2 Digital inputs

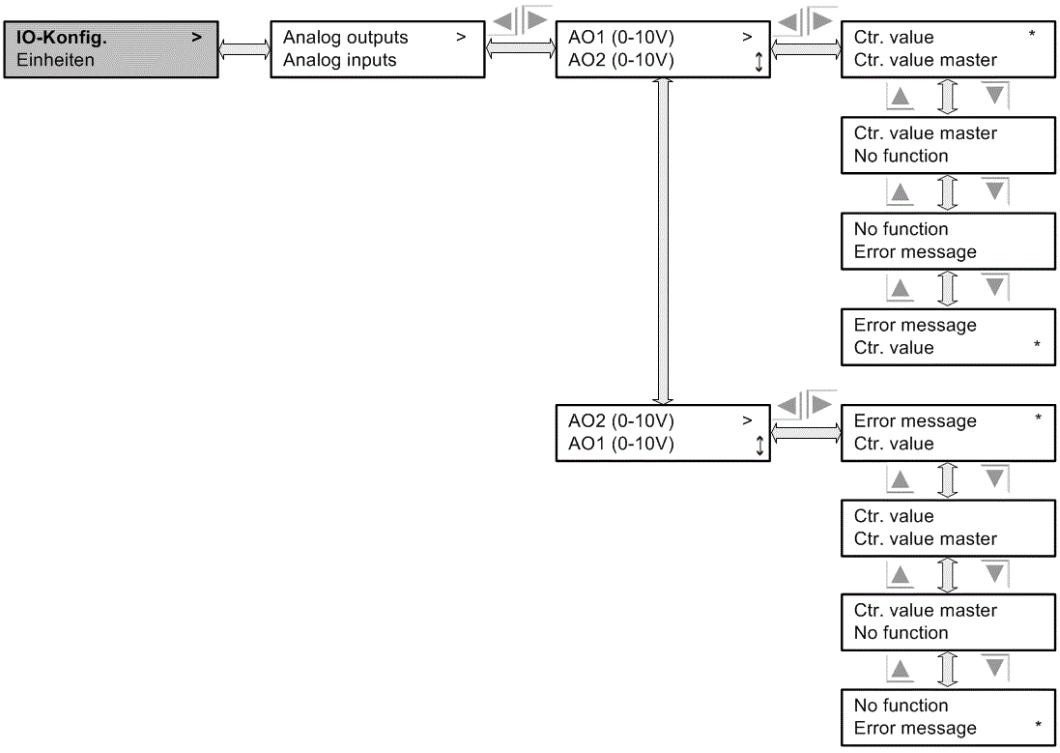
The digital inputs on terminals **DI1**, **DI2** and **DI3** are control inputs.

In the case of a GHM without GMM, a choice can be made here as to whether the input is to be used for enabling spraying via the fans or whether it can be used to initiate external draining. If the input is required for external draining, the enabling by the fans can also be performed in series with the general enable on **DI1** . Digital input **DI3** is used for switchover between the defined setpoints.



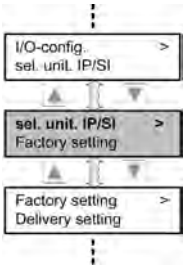
6.9.7.3 Analogue outputs

A choice is made here as to whether the control value for the unit will be output via **AO1** or **AO2** or whether the control value for the master will be output for master-slave control on a slave unit on **AO1**/**AO2** . If the control value is used for activating additional slave units, the control value of the master unit should always be forwarded to the other slave units.
Likewise, **AO1** and **AO2** can be configured as a fault report. If the output signal exceeds 5V, there is no fault, while a fault exists in case of a signal less than 5V.



6.9.8 SI/IP selection

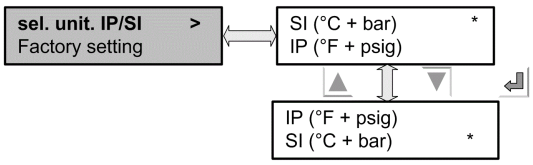
The units system can be selected here.



6.9.8.1 SI/IP units system

Unit selection for pressure and temperature.

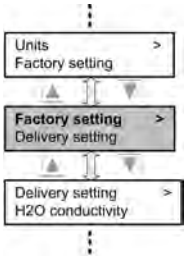
International units →	**SI** (**S**ystème **i**nternational d´ unités)
Anglo-American units →	**IP** (**Imp**erial System)



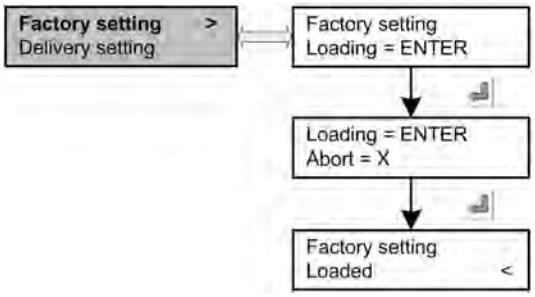
The selected unit of measurement is marked with a *****.

6.9.9 Factory setting

The control can be reset to factory settings here.



6.9.9.1 Control reset (factory setting)



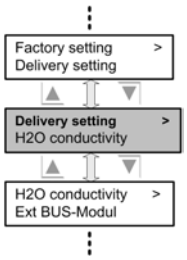
ADVICE

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

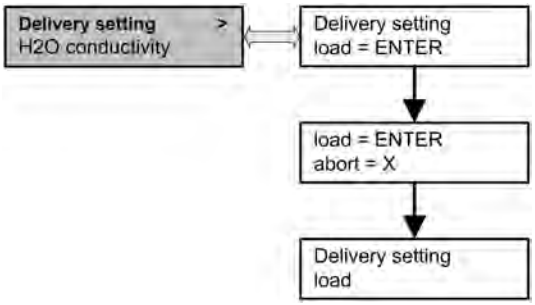
See Factory setting, Page 93

6.9.10 Delivery condition

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



6.9.10.1 Control reset (delivery condition)

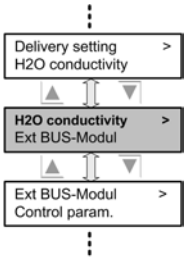


ADVICE

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

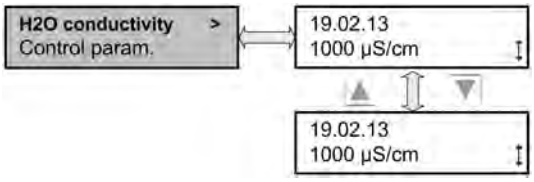
6.9.11 H2O conductivity

The measured H2O conductivity is displayed here.



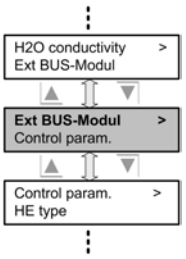
6.9.11.1 Storage of H2O conductivity values

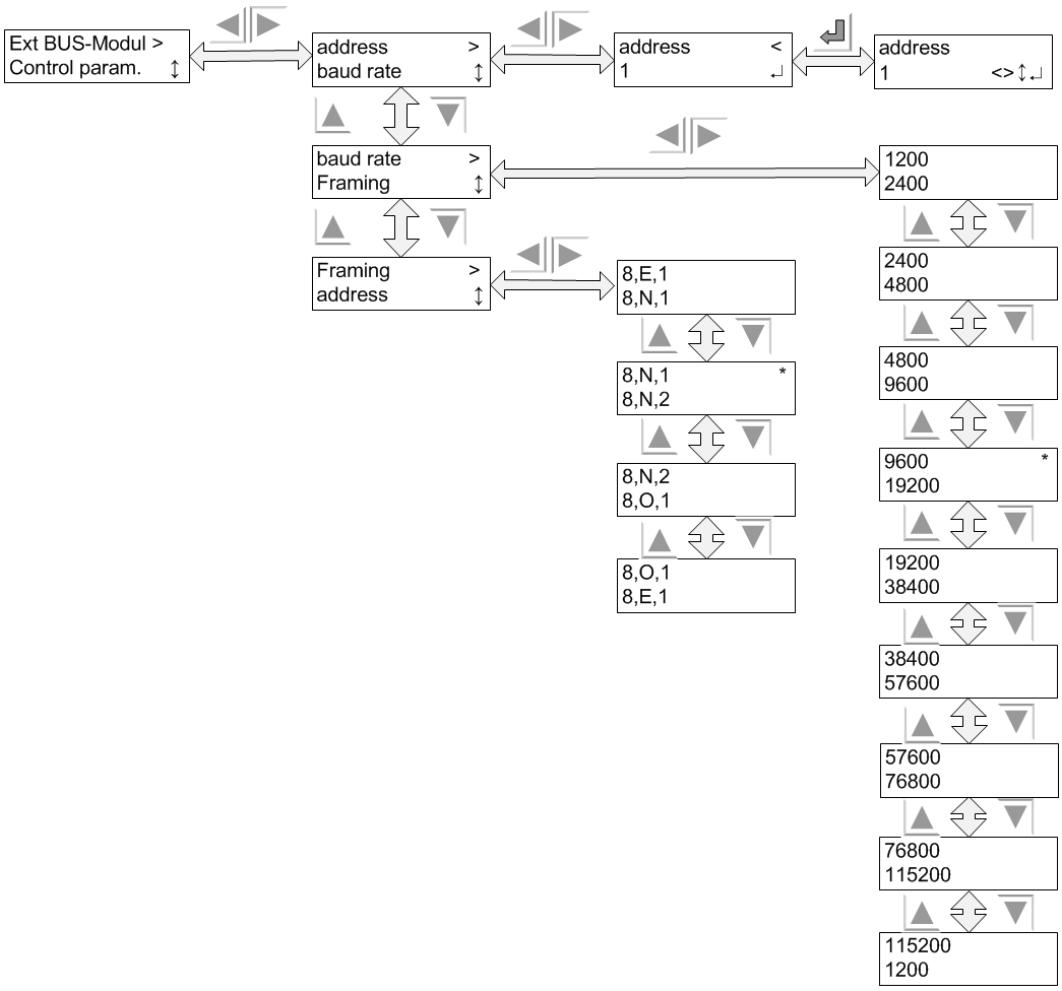
The conductivity of the water is measured at regular intervals. These values are stored.



6.9.12 External bus module

If an external bus module is connected, the communication parameters for the module in question can be set in this menu. In addition to the fieldbus address, the baud rate and framing can also be pre-set additionally in the case of a Modbus module.





ADVICE

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

7 Faults and troubleshooting

7.1 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.**

• For other error messages see Table Error messages and warnings , Page 94

TEST POINT 2:

Mains connection:

• Are all phases present?

Sensor connection:

• Is the sensor connected correctly? Cf "Sensor connection" section

• Sensor OK? (Measure! Pressure: 4-20mA, Temp.: 1.2-2.7kΩ, default signal: 0-10V)

• Are the sensor cables laid in the immediate vicinity of the mains or motor cable? Consider increasing the distance!

• Are the sensor cables shielded? If not – swap for shielded cables!

• Is the shielding applied unidirectionally on the controller?

Fuses:

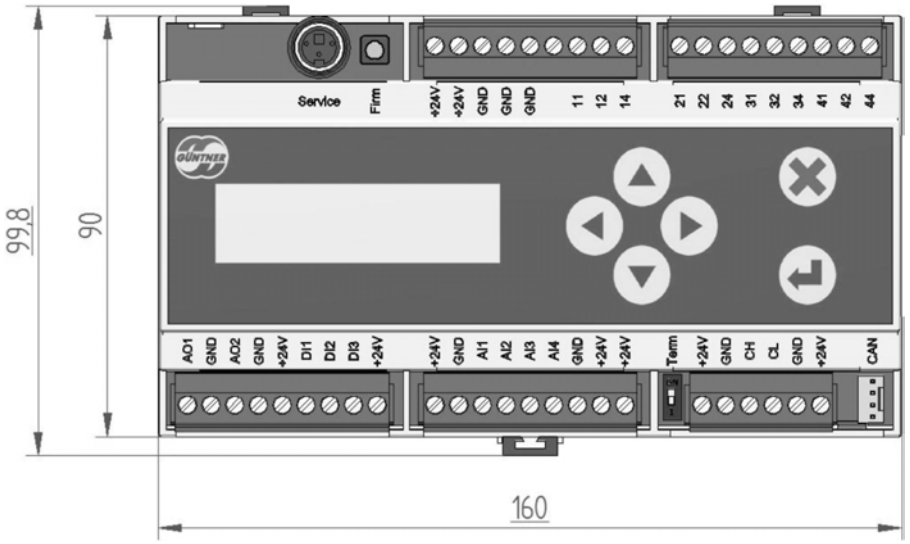
• Is the fuse on the controller supply OK?

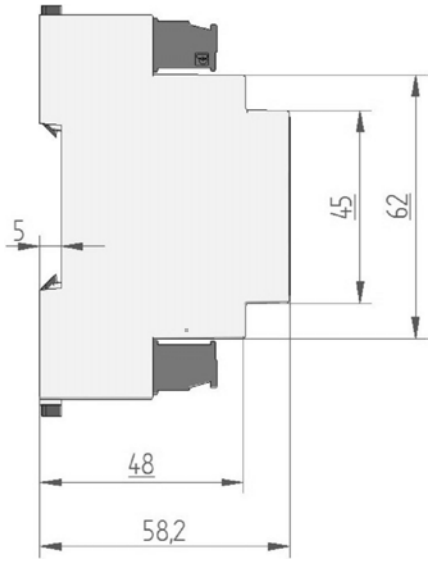
8 Technical data

8.1 Component dimensions - Dimensions / Weight

Dimensions of GRCspray.1

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



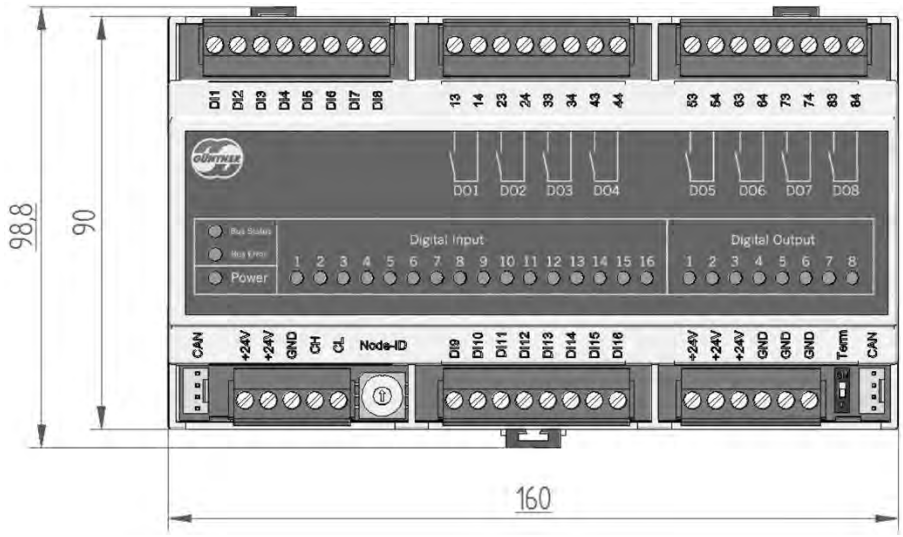


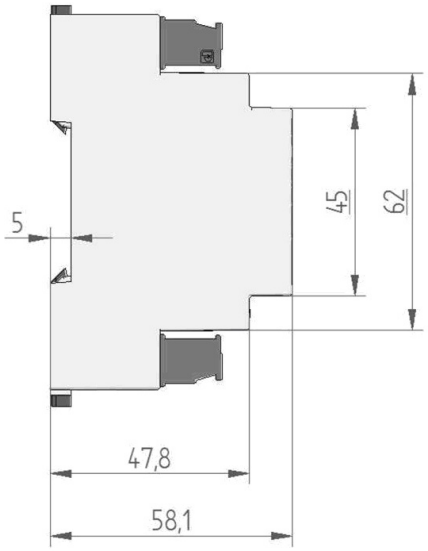
Casing dimensions of GRCspray.1

Weight:
ca. 340g

Dimensions of GIOD.1

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





Dimensions of casing of GIOD.1

Weight:
ca. 340g

9 Electrical properties of the components

Electrical properties of GRCspray.1				
	Min	**Type**	**Max**	**Unit**
Voltage supply	21	24	30	V
Current consumption		80	250[1]	mA
Digital inputs				
High level	15	24	30	V
Low level	-3	0	5	V
Relay outputs				
Voltage DC		24	30	V
Voltage AC			250	V
Current resistive load 24V DC/250V AC			1	A
Current inductive load 24V DC/250V AC			1	A
Switch cycles, mechanical	$1*10^6$			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

Table: Electrical properties of GRCspray.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			

Table: Electrical properties of GRCspray.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 GIOD.1				
	Min	**Type**	**Max**	**Unit**
Power supply DC	21	24	30	V
Current consumption		100	250	mA
Digital inputs				
High level	15	24	30	V
Low level	-3	0	5	V
Relay outputs				
Power supply 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

Table: Electrical properties of GIOD.1

10 Factory setting

	Drycooler		Condenser with refrigerant		Condenser without refrigerant	
Units	**SI**	**IP**	**SI**	**IP**	**SI**	**IP**
Language	English					
Kp	5 (Temp) / 20 (Pressure bar) / 2 (Pressure psig)					
Ti	45 s (Temp) / 40 s (Pressure)					
Td	0 sec.					
Setpoint	Depending on unit design (GPC), not saved with reset to factory settings					
Manual mode	Off					
Manual mode control value	0%					
Section cycling	On					
Thresholds of steps	Defaults (depending on the number of steps)					
Hold-off time	1 sec.					
Control value hysteresis	Depending on the number of steps					
Start spraying dep. ext. temp.	26°C					
Start spraying (only if there is active bus communication to a GMM)	90%					
Hysteresis rpm	30%					
Outdoor temperature Hysteresis	0.3 K					
Min. start-up time	15 sec.					
Draining after waiting time	24 hours					
Draining, duration per section	30 sec.					

Table: Factory setting

11 Error messages and warnings

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

Messages / warnings on the display	**Alarm output PRIO 2** on the GMM (only for GHM with GMM)	
Display dark, GMM spray OFF	X	**Displayed where?** - **Explanation:** GMM has no supply voltage **Possible cause:** Main switch off, power pack has no power supply, power pack defective, display defective **Measure:** Check the power supply and the fuses
Contact DI1	-	**Displayed where?** Info menu **Explanation:** DI1 (enable) not switched (open or 0 V) **Possible cause:** Enable input DI1 on the GRCspray.1 is not switched; no enable from a higher-level controller; jumper between +24V and DI1 not in place **Measure:** Check the wiring; if appropriate check the signal from a higher-level control unit or controller
Sensor fault 1	X	**Displayed where?** Info menu + alarm memory **Explanation:** The sensor on input AI1 is defective or the signal is out of range (4 ... 20 mA). **Possible cause:** Cable break, sensor not connected or defective **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
Sensor fault 3	X	**Displayed where?** Info menu + alarm memory **Explanation:** The sensor on input AI3 is defective or the signal is out of range (KTY). **Possible cause:** Cable break, sensor not connected or defective **Measure:** Check the I/O configuration; check the connections and wiring; replace the sensors

Table: Error messages / warnings on the display

Messages / warnings on the display	Alarm output PRIO 2 on the GMM (only for GHM with GMM)	
Sensor fault 4	X	**Displayed where?** Info menu + alarm memory **Explanation:** The signal is out of range (0...10 V) **Possible cause:** Voltage is higher than 12V **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.
GIOD NOK	X	**Displayed where?** Info menu + alarm memory **Explanation:** The GIOD expansion module has a fault status. **Possible cause:** No communication to GIOD, CAN connection down (cable not OK or not plugged in, GIOD without power or defective, the rotary code switch on the GIOD is not set to address 1 **Measure:** Check that the GIOD is receiving power; check the CAN connection between the controller, GRCspray.1 and the GIOD, it may be missing or plugged incorrectly; check the cable connection; set the rotary note ID switch on the GIOD to address 1 and switch GHM spray off and back on
GIOD OK	-	**Displayed where?** Alarm memory **Explanation:** The GIOD expansion module has started operation correctly. **Possible cause:** OK message after switching on the power supply to GMM step or after GIOD has successfully logged itself on afresh **Measure:** None required
GIOD PRE_OPERA	-	**Displayed where?** Alarm memory **Explanation:** The GIOD expansion module has taken on CANopen status PRE_OPERATIONAL. **Possible cause:** This is a CANopen-specific reaction from the GIOD caused by incorrect or missing communication **Measure:** Usually no measures are necessary. If this message occurs frequently you may have a serious disruption of the CAN connection.

Table: Error messages / warnings on the display

Messages / warnings on the display	Alarm output PRIO 2 on the GMM (only for GHM with GMM)	
GIOD REBOOT	-	**Displayed where?** Alarm memory **Explanation:** Because of a reboot, the GIOD expansion module has taken on CANopen status PRE_OPERATIONAL. **Possible cause:** This is a CANopen-specific reaction from the GIOD caused by powering on or a CAN error. The GIOD goes operational automatically. **Measure:** Usually no measures are necessary. If this message occurs frequently you may have a serious disruption of the CAN connection.
GIOD STOPPED	-	**Displayed where?** Alarm memory **Explanation:** The GIOD expansion module has taken on CANopen status STOPPED. **Possible cause:** This is a CANopen-specific status that occurs only by specific command of the CAN master. It does not generally occur on the GHM spray. **Measure:** Usually no measures are necessary. If this message occurs frequently you may have a serious disruption of the CAN connection.
Contact DI2	-	**Displayed where?** Info menu **Explanation:** DI2 (enable via fans) not switched (open or 0 V) Possible cause: Fans are not in operation Enable input DI2 on the GRC-spray.1 is not switched; no enable from a higher-level controller; jumper between +24V and DI2 not in place. **Measure:** Check whether the fans are working. If necessary, check the wiring or the signal from a higher-level control unit or controller
Emptying active	-	**Displayed where?** Info menu **Explanation:** The draining cycle is active. The process may take several minutes. **Measure:** None required

Table: Error messages / warnings on the display

Messages / warnings on the display	Alarm output PRIO 2 on the GMM (only for GHM with GMM)	
Oper. hours over	-	**Displayed where?** Info menu **Explanation:** The permitted number of spraying hours has been exceeded. **Measure:** Check the start temperature and setpoint for spraying. The values may be set too low.
Fans OFF System OFF	-	**Displayed where?** Info menu **Explanation:** The unit's fans are not running and therefore spraying is not enabled. **Measure:** Check the speed controller or the higher-level controller.
Outside: 21.2°C System OFF	-	**Displayed where?** Info menu **Explanation:** The ambient temperature is lower than the starting temperature for spraying. **Measure:** None required
H2O Quality NOK		**Displayed where?** Info menu **Explanation:** The conductivity of the water is out of range. **Measure:** Check the water treatment plant
Manual mode active		**Displayed where?** Info menu **Explanation:** Manual mode is active. Manual mode has top priority and switches all other controller functions off. **Measure:** None required, or switch manual mode off.
Act val: 20.3°C System OFF	-	**Displayed where?** Info menu **Explanation:** The medium temperature or condenser temperature is lower than the setpoint. **Measure:** None required

Table: Error messages / warnings on the display

Messages / warnings on the display	Alarm output PRIO 2 on the GMM (only for GHM with GMM)	
Act val: 22.3°C System ON	-	**Displayed where?** Info menu **Explanation:** The medium temperature or condenser temperature is higher than the setpoint. Spraying is active. **Measure:** None required

Table: Error messages / warnings on the display

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

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