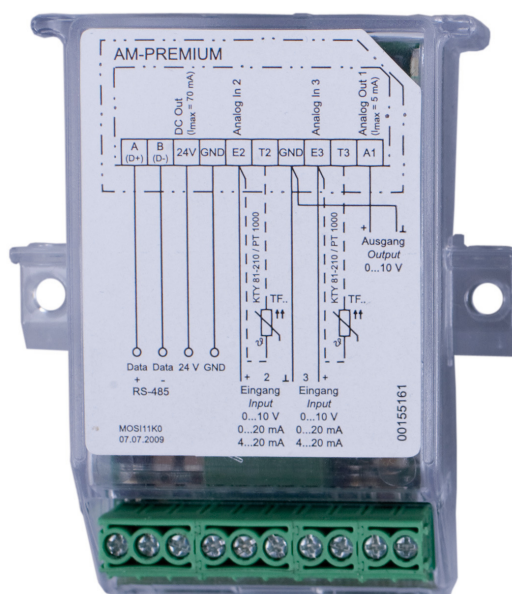# AM-PREMIUM(-W)

Universal control module for ZIEHL-ABEGG ECblue fans and frequency inverters of the Basic series

Operating Instructions

Keep for reference!

Software version: D1727A / D2263A from version 4.00

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Content

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1   General notes

1.1   Structure of the operating instructions

These operating instructions only apply in conjunction with the mounting/operating instructions for the device in which this module is installed. The remarks concerning safety, installation and connection described there must be followed!
Before installation and start-up, read this manual carefully to ensure correct use!

1.2   Exclusion of liability

Concurrence between the contents of these operating instructions and the described hardware and software in the device has been examined. It is still possible that non-compliances exist; no guarantee is assumed for complete conformity. To allow for future developments, construction methods and technical data given are subject to alteration. We do not accept any liability for possible errors or omissions in the information contained in data, illustrations or drawings provided.
ZIEHL-ABEGG SE is not liable for damage due to misuse, incorrect use, improper use or as a consequence of unauthorized repairs or modifications.

1.3   FCC / IC Statements (for AM-PREMIUM-W modules only)

The following specifications are intended for the use of the product in the USA or Canada. In the case of translations of the document, these specifications are also written in the respective national languages.

FCC Compliance (US)
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1) this device may not cause harmful interference, and(2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Warning
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IC Compliance (Canada)
This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

2   Safety instructions

Information
Mounting, electrical connection, and start-up operation may only be carried out by an electrical specialist in accordance with electrotechnical regulations (e.g. EN 50110 or EN 60204)!

Danger due to electric current
- It is generally forbidden to carry out work on electrical live parts. Protection class of the device when open is IP00! It is possible to touch hazardous voltages directly.
- The 5 electrical safety rules must be observed!
- The safe isolation from the supply must be checked using a **two-pole** voltage detector.
- Even after disconnecting the mains voltage, life-threatening charges can appear between the protective ground "PE" and the mains connection.

⚠ DANGER
Risk of electric shock!
Wait 3 minutes after switch off the main supply, before opening the cover.

1.
2.
3.
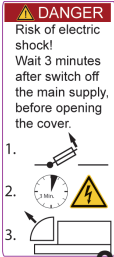
Waiting period at least 3 minutes!
Opening the device in which the module is to be installed (fan, inverter) is only allowed when the mains power is switched off and after waiting at least three minutes.
Through use of capacitors, danger of death exists even after switching off the device through directly touching the energized parts or due to parts that have become energized due to faults.

3   General description

3.1   Operational area

The add-on module can only be used together with compatible ZIEHL-ABEGG devices.

Note: The AM-PREMIUM-W module is intended exclusively for integration and utilisation in host devices (fans and converters) from ZIEHL-ABEGG.

3.2   Function

By plugging on the "AM-PREMIUM" module, the fan / frequency inverter becomes a full universal controller.
The module has two analog inputs (e.g. for sensors), one analog output and a MODBUS interface.
Type"AM-PREMIUM-W" additionally offers radio communication for parameterisation and data scanning by the hand held terminal type A-G-247NW.

Type	Part-No.	Function
AM-PREMIUM	349046	Universal control module
AM-PREMIUM-W	349051	Universal control module
		Communication by radio (wireless) to the hand held terminal A-G-247NW additionally possible.

3.3   Transport

- The device is packed ex factory to suit the transport method previously agreed.
- Always use the original packaging materials when transporting the device.
- Avoid shocks and impacts to the device during the transport.
- During manual handling the human lifting and carrying restrictions must be observed and adhered to.

3.4   Storage

- The device must be stored in its original packaging in a dry and weather-proof room.
- Avoid exposure to extreme heat and cold.
- Avoid over-long storage periods (we recommend a maximum of one year).

3.5   Disposal / recycling

Disposal must be carried out professionally and in an environmentally friendly way in accordance with the respective national legal stipulations.
▷ Separate the materials by type and in an environmentally friendly way.
▷ If necessary, commission a specialist company with the waste disposal.

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4   Mounting the module

Danger due to electric current
- Always read the safety instructions chapter before mounting!
- The terminating device (fan, converter) in which the module is to be installed must be disconnected from the line voltage for at least 3 minutes before opening!

Attention, electrostatic sensitive devices!
- Damage to electronic components by electrostatic charging must be prevented!
- Touch the protective earth connection in the terminal to equalize the potential immediately before removing the module from the packing. This applies regardless of whether the device is already connected to the line.
- Equalize the potential again shortly before installation if the module is not installed immediately after unpacking.
- After unpacking the module, check for possible transport damage and insert it in the slot provided. Do not touch the connection!

▷ ECblue: Mount the module in the housing with the two enclosed screws (permissible tightening torque M_A = 1.3 Nm).
▷ Fcontrol Basic, Icontrol Basic, PMcontrol: Press the module into the retaining clips.
▷ Permissible tightening torque of connection terminals M_A = 0.24 Nm.
▷ When an AM-PREMIUM-**W** module is installed in a fan or converter from ZIEHL-ABEGG, the enclosed FCC/IC label "EM-W" inside must be stuck to the housing of the terminating device.

Example for mounting the add-on module
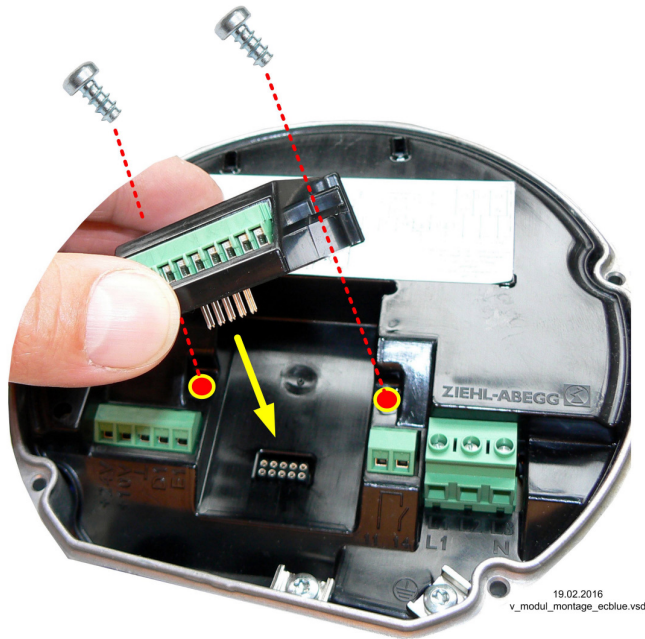
Example: Sticking the FCC/IC label "EM-W" inside onto a fan housing.

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5 Electrical installation

5.1 Safety precautions

Danger due to electric current
- **Work on electric components may only be carried out by trained electricians or by persons instructed in electricity under the supervision of an electrician in accordance with electrical engineering regulations.**
- **It is forbidden to carry out work on electrically live parts.**

5.2 Analog inputs "E2" / "E3"

The unit has two analog inputs: Analog In 2 E2 and Analog In 3 E3
The connection is independent of the programmed operating mode and from the sensor signal employed.
- When connecting **passive** temperature sensorsTF.. (KTY81-210) or PT1000 at terminals "E2 / T2" and/or "E3 / T3" must be paid attention to no polarity.
  For a high interference immunity a capacitor must be connected directly to the sensor (1 nF parallel). With ZIEHL-ABEGG temperature sensors type TF.. (KTY81-210) the capacitor is integrated.
- When connecting **aktive** sensors at the terminals "E2 / GND" and/or "E3 / GND" attention must be paid to correct polarity, a 24 V DC power supply is integrated.
- For sensors in two-wire-technology (4 - 20 mA signal), the connection is made on the "E2 / 24 V" and/or "E3 / 24 V", "GND" terminal is omitted.

Attention!
Never apply line voltage to analog inputs!

5.3 Analog output (0 - 10 V) "A1"

The analogoutputs 0 - 10 V can be allocated with various functions (☞ IO Setup: Analog output "A").
Connection to terminal "A" - "GND" = "Analog Out" (I_{max}☞ technical data / connection diagram).
It is not permissible to connect outputs of several devices to each other!

5.4 Voltage supply 24 V DC

There is an integrated power supply for external devices, e.g. a sensor. Terminal +24 V, output voltage tolerance +/- 20%. Max. load current 70 mA.
In case of overload or short circuit (24 V – GND), the external power supply is shut down (multi-fuse). The device performs a "Reset" and continues operation.
It is not permissible to connect outputs of several devices to each other!

5.5 Connection external terminal type A-G-247NW or AXG-1A(E)

If necessary an external terminal can be connected. This can be e.g. necessary to adapt the pre-setting during start-up. For information about the current operating condition a terminal can be permanent attached.
- The connection is made via a 4-strand line at the terminals (D-, D+ and GND).
- e.g., telephone flex e.g. J-Y (St) Y 2x2x0.6 (or similar), maximum line length ca. 250 m.
- Signal "D+" and "D-" (RS 485)

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- **Type A-G-247NW, Part.-No. 380090, handheld terminal**
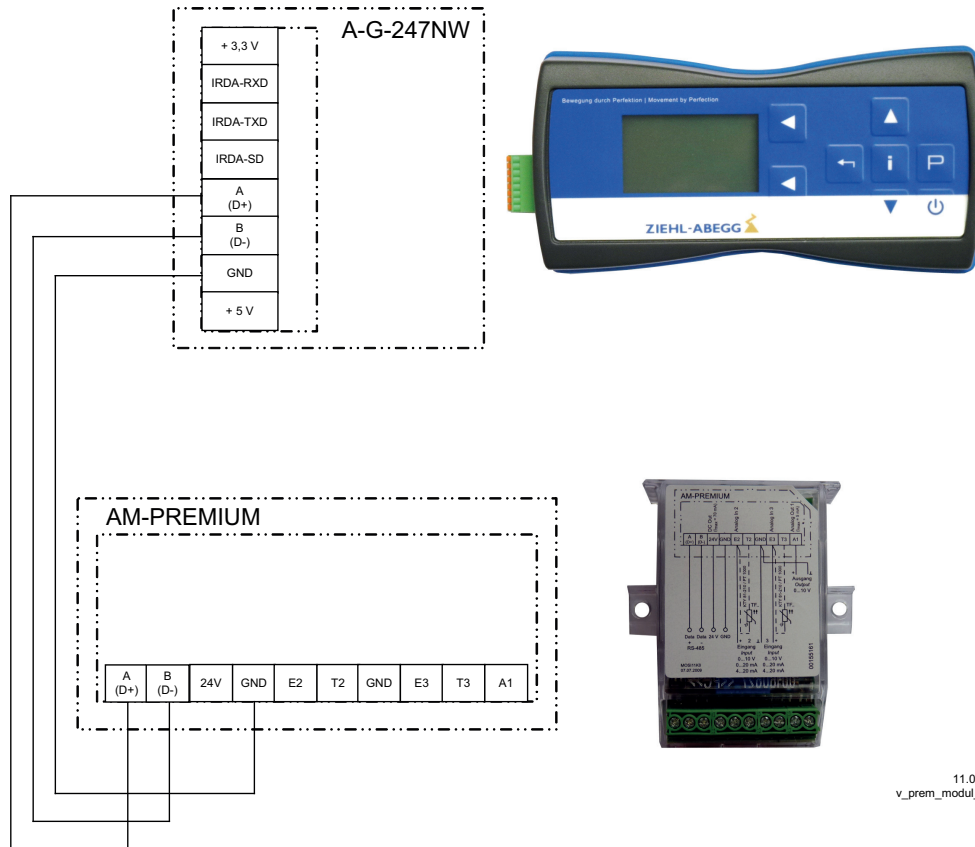
The voltage supply of the terminal is made by the accumulators inserted there or the plug power supply unit.

- **Model AXG-1A, Part-No. 349034 for wall mounting**
- **Model AXG-1AE, Part-No. 349008 for panel mounting**
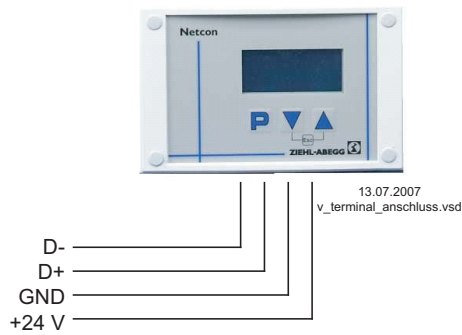
Voltage supply: Terminal "24 V", "GND", (I_{max}, for terminal approx. 50 mA)

5.6   Digital inputs "D1" and "E1 = D2"

In the case of use of the module AM-PREMIUM two digital inputs can be programmed. When inserting the module the analog input "E1" becomes automatically to the second digital input "D2".

D1: contact at Terminals "D1" - "24 V"
D2: contact at Terminals "E1" - "24 V"
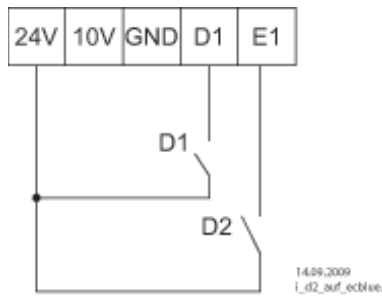
On the printed circuit board of the basic device

Various functions can be allocated to the digital inputs "D1"and "D2" (☞ IO Setup: Functions summary of the digital inputs). Activation via floating contacts (a low voltage of ca. 24 V DC is connected).

Attention!
Never apply line voltage to the digital input!
It is not permissible to connect inputs of several devices to each other!

5.7   Communication

5.7.1   Networking via MODBUS-RTU

The device comes equipped with a RS-485 interface for networking via MODBUS. Conntection at: "A (D+)", "B (D-)" and "GND".
The address must be set in the "IO Setup"menu.

Information
A maximum of 64 members can be directly connected to one another, and another 63 members via a repeater.

5.7.2   RS-485 - network design and interface parameter

Please ensure the correct connection; i.e. "A (D+)" must always be connected to "A (D+)" of the next devices. The same applies to "B (D-)" .
In addition, a "GND" connection must be established, as dissimilar potential (over 10 V!) will lead to the destruction of the RS-485 interface (e.g. lightning).
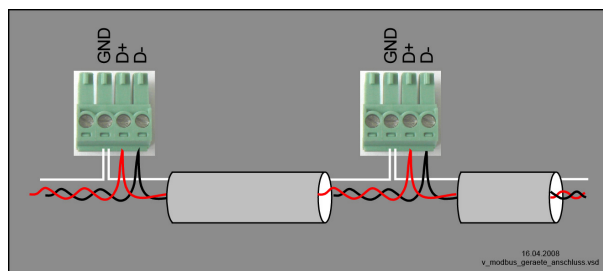
general example for MODBUS device connection

The data line must be connected from one device to the next. No other type of wiring is allowed!
Always use only two wires of one lead (twisted pair) for the connection.
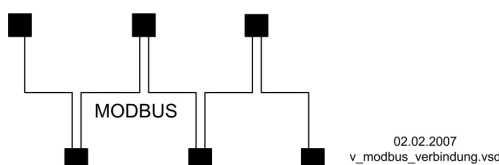
Example for MODBUS connection

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Recommended wire types
1. CAT5 / CAT7 cables
2. J-Y (St) 2x2x0.6 (telephone wire)
3. AWG22 (2x2 twisted pair)

When using telephone flex with four cable cores, we recommend the following allocation:
"A (D+)" = red, "B (D-)" = black, "GND" = white

Information
- Pay attention to sufficient distance from powerlines and motor wires (min. 20 cm).
- Except the data link "A (D+)", "B (D-)" and "GND"- connection may no further cable cores of the data line be used.
- Max allowed wire length 1000 m (CAT5/7 500 m).

Shielding
The use of shielded cables is normally not demanded but offers high protection against electro-magnetic interferences, especially high frequencies. However, the effectiveness of the shield depends on careful installation of the line.

If shielded cables are used, the shield should be placed at "PE" on at least one side (preferably on the master connection). The occurrence of compensating currents may have to be considered if the shield is contacted on both sides.

Shield connection correct   Shield connection incorrect
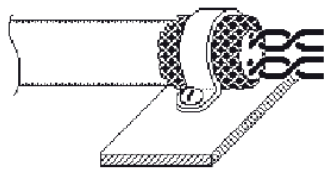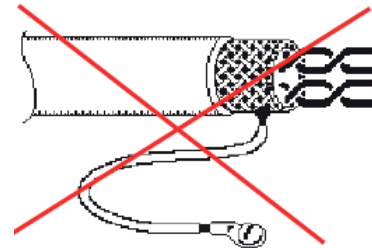
Default interface parameter

Baudrate	=	19200
Bits	=	8
Parity	=	Even (None, exception of devices agriculture)
Stop bits	=	1
Handshake	=	none

Information
If any matters are unclear, please contact our V-STE support department for control systems - ventilation technology. The information sheet "Network structure of MODBUS" R-TIL08_01 contains detailed information about "MODBUS".

5.7.3 AM-PREMIUM-W Wireless Communication
The type A-G-247NW hand-held terminal can communicate wireless with the type **AM-MODBUS-W** communications module (☞ Operating Instuctions A-G-247NW: AM-PREMIUM App's / Configuration Online / Wireless).
In a hard-wired system, wireless communication is primarily designed in order to have a second interface for communicating with the device (e.g., for configuration and diagnostics).
Wireless communication is also used by the MODBUS protocol, so it is necessary to assign an address. **Wireless** and **hard-wired communications use the same address**. The address can be hard-wire assigned via an RS-485.

For pure, wireless communication, it is recommended to assign the address manually.
- Switch on the device you want to re-address and establish a connection with address 247.
- In "IO Setup", change the address and then switch this device off again.
- Apply the same procedure to the next device.

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Radio control key (0 - 9999)

Different from RS-485 communication, wireless communication also has a radio control key (0 - 9999). This radio control key is used to encode the messages and ensures that several networks can be operated in mutually overlapping radio ranges.

For that reason, every wireless MODBUS network should have its own radio control key if there is another wireless MODBUS network in the vicinity.

The factory setting is 9999 .

A radio control key with the value 0 switches off encoding.

The device must be switched off to save the new radio control key.

The radio control key must be assigned in the same manner as the assignment of the MODBUS address.

Radio key (Network key)☞ Menu group "Controller Setup".

Technical data for wireless Communication:

Radio communication standard:	IEEE 802.15.4
Frequency:	2.4 GHz (not licensed wireless band, like WLAN, Bluethooth) 16 wireless channels, default wierless channel 0
Communications range:	Short-distance radio, within buildings max. 8 m typically 3 - 5m, free field to 25 m, generally strongly dependent on interferences
Type of communication:	Bi-directional, half-duplex
Application protocol:	MODBUS-RTU (max. protocol length 125 Bytes and/or 50 register)
Coding:	Proprietary through 4-digit number
Network structure:	Point - to - point or point - to- mulit point - communication

5.8 Potential at control voltage connections

The control voltage connections (< 50 V) relate to the joint GND potential (Exception: Relay contacts are potential free). There is a potential separation between the control voltage connections and the protective earth. It must be ensured that the maximum external voltage at the control voltage connections cannot exceed 50 V (between "GND" terminals and "PE" protective earth). If necessary, a connection to the protective earth potential can be established, install bridge between "GND" terminal and the "PE" connection (terminal for screening).

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6   Operating by terminal

6.1   Menu operation

Display after turning on the voltage supply.
description for menu language English = "GB" (delivery status).
Switch over between "Start" and *Actual value with Escape [Esc] .

Example for mode **1.01** (speed controller).

*actual value depending device type:
- "Speed" / rpm,- "Frequency" / Hz, - "Fanlevel" / %

By pushing the **P** key one reaches the menu item "START".

P↓ ↑ ESC

▲ ▼
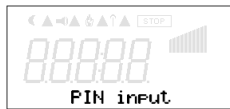
One moves up and down within the menu group using the arrow keys.

In the menu point "Language" display language can be selected.
One returns to the menu group "Start" using the ESC (▼ + ▲) shortcut keys.

6.2   Menu structure

PIN 0010
STOP

← ← ← ← **User**

Service → → → →

Start	▼ ▲	Info	▼ ▲	Setting	▼ ▲	Events	▼ ▲	Base setup
P↓ ↑ ESC		**P↓ ↑ ESC**		**P↓ ↑ ESC**		**P↓ ↑ ESC**		**P↓ ↑ ESC**
PIN input		Frequency		Set Intern1		Motor fault		Mode
▲ ▼		▲ ▼		▲ ▼		▲ ▼		▲ ▼
Language		Set external1		Set Intern2				E1 Analog In

Menu dependent on device type

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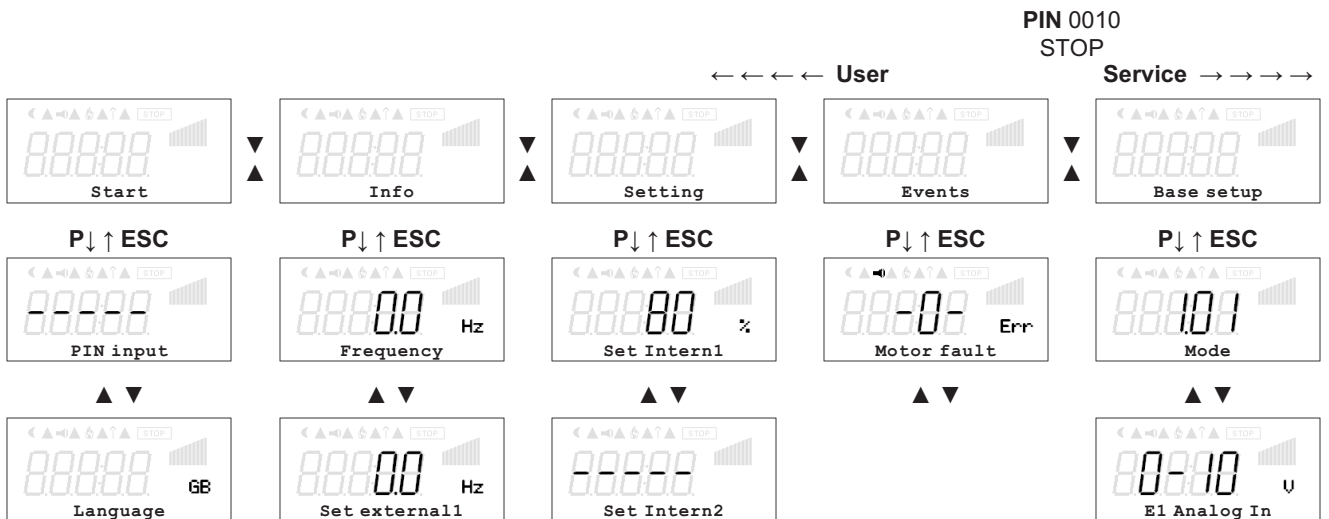
Selection of the menu group (e.g. Base setup) to the right through the ▼-key, to the left through the ▼-key.

You can go to the menu items in the menu groups (e.g. mode of operation) by using the **P** key. Use the arrow keys to move up and down within the menu group.

The menu groups consist of one area for the user (user menu) and one area for installation (service). The service area can be protected against unauthorized access by using a PIN.

In order to simplify the initial start-up operation, the service level is enabled at first (i.e., not protected by the PIN 0010 (☞ see Controller Setup, PIN protection = OFF). If PIN protection is activated (ON), the service menu remains enabled after input of PIN 0010 as long as one is pressing keys. If no keys are pressed for ca. 15 minutes, the PIN is automatically erased, i.e. the service level is blocked.

To make adjustments, press the **P** key after selecting the menu item. If the previously set value starts to flash, it can be adjusted with the ▼ + ▲ keys and then saved with the **P** key. To exit the menu without making any changes, use the "Esc" short-key, i.e., the originally set values remain.

Information

After installation of the device has been carried out, PIN protection should be activated (☞Controller Setup)!

6.3   Example for programming mode `2.01` in "Base setup"
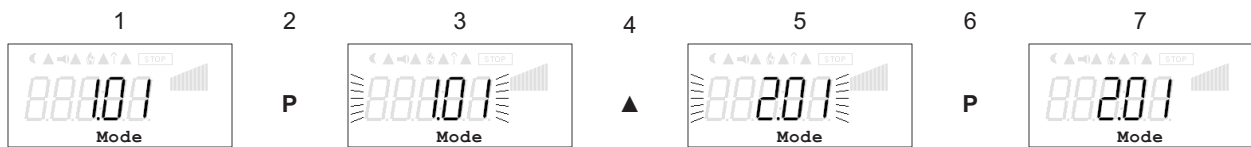
7   Base setup

7.1   Select operation mode

Information
Simple installation is possible through the selection of the preprogrammed mode of operation. This determines the basic function of the device; factory setting `1.01` = speed controller (activation via 0 - 10 V signal). The controller configuration is automatically carried out during selection of the application related mode of operation. The factory presets in accordance with the mode of operation are based on many years of experience, which is suitable for many applications. Under special circumstances, these can be individually adapted (☞ Controller Setup: "Controller Configuration").
The purpose of the device is to reach and maintain the target values set. To accomplish this, the measured actual value (sensor value) is compared with the adjusted target value, and the controlled value (modulation) is deduced from this.

Mode	Signal or Sensor (input)	Function
`1.01`	Signal 0 - 10 V	Speed controller, two step operation (factory setting)
`2.01`	Sensor KTY81-210 / PT1000 (E2)	Temperature control airconditioning and refrigeration. (preset set-point 20.0 °C, P-band 5.0 K)
`2.02`	Sensor KTY81-210 / PT1000 (E3)	Temperature control depending on outdoor temperature (preset set-point 5.0 °C, - P-band 20.0 K)
`2.03`	Sensor KTY81-210 / PT1000 (E2)	Temperature control with additional functions (shutter and heating)
`2.04`	1x Sensor KTY81-210 / PT1000 (E2) 1x Sensor KTY81-210 / PT1000 (E3)	Temperature control with two sensors, comparison or average
`2.05`	1x Sensor KTY81-210 / PT1000 (E2) 1x Sensor KTY81-210 / PT1000 (E3)	Temperature control with two sensors differential temperature
`3.01`	Sensor MBG.. (E2)	Pressure control condensers (refrigeration)
`3.02`	Sensor MBG..(E2)	Pressure control for condensers with input for refrigerant
`3.03`	1x Sensor MBG..(E2) 1x Sensor MBG..(E3)	Pressure control for two circuit condensers
`3.04`	1x Sensor MBG..(E2) 1x Sensor MBG..(E3)	Pressure control for two circuit condensers with input for refrigerant
`4.01`	Sensor DSG.. / MPG.. (E2)	Pressure control for ventilation systems
`4.02`	1x Sensor DSG.. / MPG.. (E2) 1x Sensor KTY81-210 / PT1000 (E3)	Pressure control depending on outdoor temperature
`4.03`	1x Sensor DSG.. / MPG.. (E2) 1x BUS RS 485	Pressure control depending on outdoor temperature, MODBUS for outdoor temperature and remote control by central operating device type AXE-200AX
`5.01`	Sensor DSG.. / MPG.. (E2)	Volume control (constant) for ventilation systems
`5.02`	1x Sensor DSG.. / MPG.. (E2) 1x Sensor KTY81-210 / PT1000 (E3)	Volume control with setpoint depending on outdoor temperature
`6.01`	Sensor MAL..(E2)	Air velocity control e.g. clean room

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Mode and Signal to E1, E3

1.01

0 - 10 V

A1	E2	GND

0-10 V

10 k

2.01 .. 2.03

TF..

E2	T2

KTY81-210
PT 1000

3.01 + 3.02

MBG..-I

24V	E2	GND

1 BN	3 GN

MBG..
(4 - 20 mA)

4.01 + 5.01

DSG 0 - 10 V

24V	E2	GND

BN	YE	WH

DSG.. / MPG..
(0 - 10 V)

6.01

MAL 0 - 10 V

24V	E2	GND

1	3	2

MAL1/10
(0 - 10 V)

2.04 + 2.05

10 V PWM

GND	E2	A1

R_ext

f = 1..10 kHz @ R_{ext} = 1 kohm
f = 1 kHz @ R_{ext} = 10 kohm
= 0...100 %

3.03 + 3.04

TF..

E3	T3

KTY81-210
PT 1000

TF..

3.03 + 3.04

MBG..-I

24V	E3	GND

1 BN	3 GN

MBG..
(4 - 20 mA)

4.02 + 5.02

TF..

E3	T3

KTY81-210
PT 1000

TF..

4.03

GND	D+	D-

Data
RS-485

07.05.2012
v_e2_e3_signal_sensor_pwm.vsd

7.2   External Setpoint / External speed setting in manual operation

External setpoint setting or external manual operation are possible using a 0 - 10 V (0 - 20 mA, 4 - 20 mA) signal at the "E3" and "GND" terminals. Configure "E3" in Base setup. For potentiometers, program Analog Out 1 (terminal "A1") to the function 1A = "+10 V" (as factory setting ☞ IO Setup).
E3 Analog In = factory setting 0 - 10 V

A1	E3	GND

Signal 0-10 V

10 k
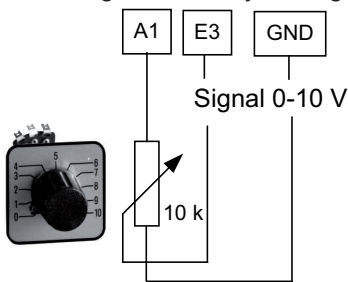
16.01.2012
v_extern_poti_e3.vsd

External Setpoint via external signal instead of "Setpoint 1". The "external Setpoint" function must be activated in base setup 1E for "E3 function". The active external Setpoint value is displayed in the "info" menu group.
External speed setting in manual operation. The "external manual operation" function must be activated in the basic settings 2E for "E3 function". Switchover between settings on the device and external manual operation via the digital input (☞ IO Setup: "Control / manual operation" 7D).

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8 Start-up

8.1 Prerequisites for commissioning

Attention!
1. You must mount and connect the device in accordance with the operating instructions.
2. Double check that all connections are correct.
3. Make sure that no persons or objects are in the fan's hazardous area.

8.2 Procedure for commissioning

Sequence	Setting
1	If necessary, set the menu language in **Menu group "Start"**. (Factory setting Englisch: **"Language GB"**)
2	Set the operating mode in the **Base setup** menu group (factory settings **1.01** = **speed controllers**). **Attention!** When saving the operating mode, the respective preset factory operating-mode setting is loaded. That means, the settings you have made, e.g., in "Motor Setup" are lost. An exception: the menu language setting remains preserved.

8.3 Menu Mode **1.01**

Example for ECblue
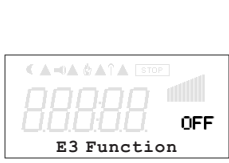
Start	Info	Setting	Events	Base setup	Controller Setup	IO Setup	Limits	Motor Setup	Diagnostic
- - - - PIN input	0 rpm Speed	200 rpm Set Intern1	-0- Factory sett.	**1.01** Mode	OFF PIN Protection	1A A Function	OFF Controller function	20 sec Rampup time	OTC 00012:56:-15
GB Language	0.0 A Motor current	- - - - - Set Intern2	-1- Sensor 1	0 - 10 V E2 Analog In	OFF Set protection	0.0 V A min.	- - - - - Level min	20 sec Rampdown time	OTM 00010:56:-11
OFF Reset	0 rpm Set external1	0 rpm Min. Speed	-3- ext. Fault	OFF E3 Function	OFF Save User Setup	10.0 V A max.	- - - - - Level max.	OFF Suppression1	585 V DC-Voltage
1.01 Mode		1800 rpm Max. Speed		- - - - - E3 Analog In	- - - - - Limit	OFF A Inverting	- - - - - Level Delay	- - - - - Range1 min.	244 V Line voltage
4.00 ECblue Premium		ON Set external1			- - - - - Group 2 ON value	OFF D1 Function	OFF Lmt E2 Function	- - - - - Range1 max.	29.5 °C Heatsink
1.01 Basic Version					- - - - - nmin at Group2	- - - - - - D1 Inverting	- - - - - Lmt E2 min	OFF Suppression1	29.5 °C Capacitor

Menu dependent on device type

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9   Programming

9.1   Speed controller `1.01`

9.1.1   Base setup `1.01`

Base setup	**Base setup**
Mode	**Mode** Factory setting Mode: `1.01`
E2 Analog In	**E2 Analog In** Selection: 0 - 10 V, 0 - 20 mA, 4 - 20 mA, KTY, PT1000 (Inverting ☞ IO Setup) Factory setting: 0 - 10 V
E3 Function	**E3 Function** (only for special applications) • Analog input 2 "E3 function" factory set at "OFF". • For operation with a second signal and switch over via floating contact set function for "E3" to `1E` (☞ IO Setup: function `4D`). • For operation with a second signal and automatic control at the higher level. Set "E3" Function to `4E` . • Measurement value = function `7E` e.g. for limit indication, display in Info menu "E3 Actual".
E3 Analog In	**E3 Analog In** As long as no allocation has been carried out display: `- - - - -` Selection: 0 - 10 V, 0 - 20 mA, 4 - 20 mA, KTY, PT1000 (Inverting ☞ IO Setup) Factory setting: 0 - 10 V

9.1.2   Setting for operation `1.01`

ECblue
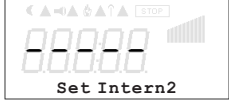
Setting	**Setting**
Set Intern1	**Set Intern1** Setting range manual speed setting: 0 rpm... "Max. Speed" Factory setting: 200 rpm
Set Intern2	**Set Intern2** Setting "Set Intern 2" e.g. reduced value for night operation. Switch over intern 1/2 by external contact (as long as no allocation is carried out: Display: `- - - - -` ☞ IO Setup).
Min. Speed	**Min. Speed** Setting range: 0 rpm... "Max. Speed" Factory setting: 0 rpm
Max. Speed	**Max. Speed** Setting range: Rated speed ...0 rpm (takes priority over setting "Min. Speed") Factory setting: Rated speed
Set external1	**Set external1** "ON" (factory setting) = speed setting by external Signal "OFF" = Setting "Set Intern1"

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Diagram setting signal and output voltage (Idealized principle diagram)

0	1	2	3	4	5	6	7	8	9	10	0 – 10 V
10	9	8	7	6	5	4	3	2	1	0	10 – 0 V
0	2	4	6	8	10	12	14	16	18	20	0 – 20 mA
20	18	16	14	12	10	8	6	4	2	0	20 – 0 mA
4	5,6	7,2	8,8	10,4	12	13,6	15,2	16,8	18,4	20	4 – 20 mA
20	18,4	16,8	15,2	13,6	12	10,4	8,8	7,2	5,6	4	20 – 4 mA
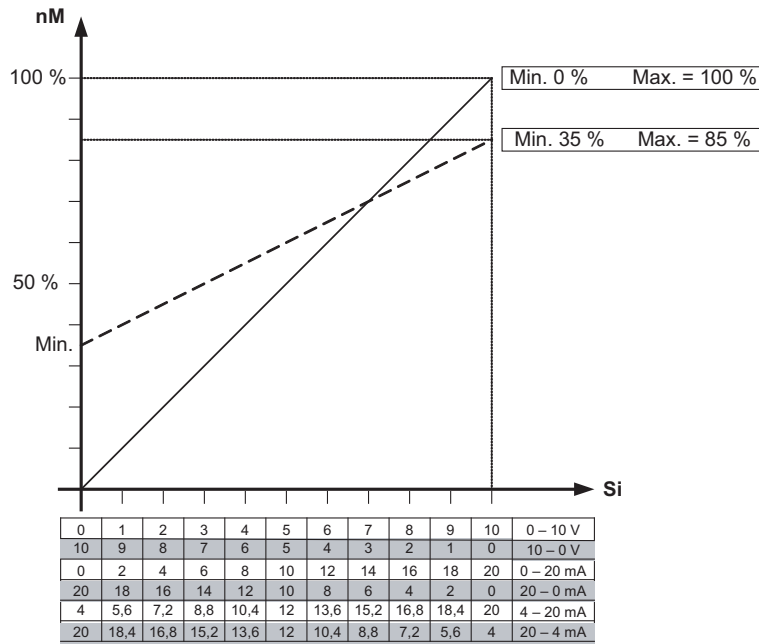
09.05.2007
v_nmotor_101.vsd

100 % = Rated speed
nM   Motor speed
Si   Signal

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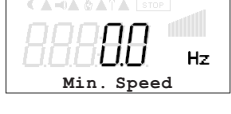
 Setting	**Setting**
 Set Intern1	**Set Intern1** Setting range manual speed setting: "Min. Speed" - "Max. Speed" Factory setting: 50.0 Hz (≙ Setting "Max. Speed")
 Set Intern2	**Set Intern2** Setting "Set Intern2" e.g. reduced value for night operation. Switch over intern 1/2 by external contact (as long as no allocation is carried out: Display: ‐ ‐ ‐ ‐ ☞ IO Setup).
 Min. Speed	**Min. Speed** (basic speed only when needed) Setting range: 0... "Max. Frequency" (☞ Motor Setup). Factory setting: 0.0 Hz Active in every control mode, priority by "Max. speed".
 Max. Speed	**Max. Speed** (speed limitation only when needed) Setting range: "Max. Frequency" (☞ Motor Setup)... "Min. Speed " Factory setting: 50.0 Hz Active in every control mode! Settings by "Max. frequency" are possible but are not made!
 Set external1	**Set external1** "ON" (factory setting) = speed setting by external Signal "OFF" = Setting "Set Intern1"

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Diagram setting signal and output frequency
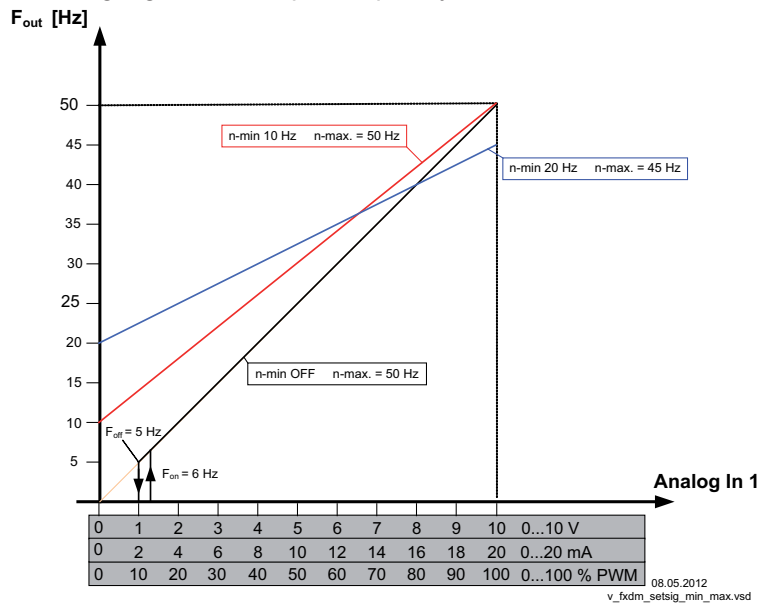
Fout: Output frequency
Analog In: Speed setting signal
n-min: Min. Speed
n-max: Max. Speed
Foff: Shutdown Freq.
Fon: Switch on Freq.

9.2   Temperature control 2.01 ... 2.05

9.2.1   Basic setting 2.01 ... 2.05
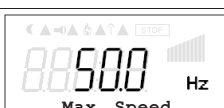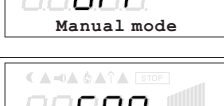
Base setup	**Base setup**
Mode	**Mode** Mode selection e.g. 2.01
KTY **E2 Analog In**	**E2 Analog In** In all group 2 operating modes (2.01, 2.02, 2.03, ...) "E2 Analog In" factory set to "KTY" (sensors type TF..) at terminals "E2" and "T2" (measuring range: -50.0...+140 °C). **Alternative selection sensor** • PT1000 to Terminals "E2" and "T2" (Measuring range -50.0...+140 °C) • MTG-120V active sensor with 0 - 10 V output at terminals "E2" and "GND" (measuring range: -10...+120 °C) Alternative selection signal at terminals "E2" and "GND": 0 - 10 V, 0 - 20 mA, 4 - 20 mA. The sensor measurement range must be entered in order to display the actual value correctly. Example with a 0 - 10 V sensor and 0 - 100 °C measurement range: E2 Analog In = 0 - 10 V, E2 Min. = 0.0 °C, E2 Max. = 100.0 °C, E2 Decimally = 1, E2 Unit = °C
K **E2 Offset**	**E2 Offset** Sensor calibration with calibrated comparison device

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	E3 Function (only for special applications)
E3 Function	• Function ☐1E☐ = External Setpoint e.g. via external signal (0 - 10 V) instead of "Setpoint1"
	– For sensor type "E2 Analog In" = "KTY or PT1000": 0 - 10 V ≙ -50.0...+140 °C.
E3 Analog In	– For sensors with active signal: 0 - 10 V ≙ 0 - 100 % sensor measuring range.
	• Function ☐2E☐ = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (☞ IO Setup: function ☐7D☐).
	• Function ☐7E☐ Measurement value = Measurement value e.g. for limit indication, display in Info menu "E3 Actual".
	Modes with 2 sensors
	The function is automatically jointly programmed in operating modes using 2 sensors. The second analog input is thus allocated and additional function allocations are not possible.
	• **2.04** E3 Function at ☐4E☐ preprogrammed = comparison value with control to higher temperature. Alternative: average of 2 measuring points for this must be reprogrammed on function ☐3E☐ preprogrammed sensor type "KTY".
	• **2.05** E3 Function at ☐5E☐ preprogrammed = regulation on difference temperature between sensor 1 and sensor 2. Preprogrammed sensor type "KTY".

9.2.2   Settings for operation modes **2.01** ... **2.05**

2.01 Temperature control simple

2.02 Temperature control depending on outdoor temperature (Special function: Sensor connection at "E3", display and setting under "E2").

2.03 Temperature control with pre-programmed additional functions (heating, shutter, temperature monitoring).

2.04 Temperature control with 2 sensors
Comparison with control to higher value "E3 Function" set to comparison ☐4E☐ . Display during operation: "Control value "
Alternative: Average calculation of 2 measuring places "E3 Function" set to ☐3E☐ . Display during operation: "Average E2 / E3 "

2.05 Temperature control with 2 sensors, regulation on difference temperature.
Display during operation: "Value of E2 - E3" in K, "E2" = reference temperatur, "E3" causes positiv (E3 < E2) or negative (E3 >E2) difference.

Setting	**Setting**
20.0 °C Setpoint1	**Setpoint1** Setting range: with passive sensor type "KTY", "PT1000" : -50.0...150.0 °C Factory setting: **2.01**, **2.03**, **2.04** : 20.0 °C at **2.02** : 5.0 °C at **2.05** : 0.0 °C Setting range: at active sensor type "MTG-120V": -10.0...+120.0 °C Factory setting: **2.01** - **2.05** : 55.0 °C
Setpoint2	**Setpoint2** Setting "Setpoint 2" e.g. reduced value for night operation. Switch over Setpoint 1/2 by external contact (as long as no allocation is carried out: Display: ☐ - - - - -☐ ☞ IOSetup).

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5.0 K Pband	**Pband** Narrow control range = Short control times Wide control range = Longer control times and more stable control Passive sensor type "KTY", "PT1000" Setting range: 0 - 200.0 K (Kelvin) Factory setting: 5.0 K, (at **2.02**: 20.0 K) active Sensor type "MTG-120V" Setting range: 0.0...+130.0 K Factory setting: 65.0 K

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0 rPM Min. Speed	**Min. Speed** Setting range: 0 rpm... "Max. Speed" Factory setting: 0 rpm
1500 rPM Max. Speed	**Max. Speed** Setting range: Rated speed ...0 rpm (takes priority over setting "Min. Speed") Factory setting: Rated speed
OFF Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
200 rPM Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0 rpm...Rated speed, Factory setting: 200 rpm For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

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0.0 Hz Min. Speed	**Min. Speed** (basic speed only when needed) Setting range: 0... "Max. Frequency" (☞ Motor Setup). Factory setting: 0.0 Hz Active in every control mode, priority by "Max. speed".
50.0 Hz Max. Speed	**Max. Speed** (speed limitation only when needed) Setting range: "Max. Frequency" (☞ Motor Setup)... "Min. Speed " Factory setting: 50.0 Hz Active in every control mode! Settings by "Max. frequency" are possible but are not made!
OFF Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
50.0 Hz Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0... "Max. Frequency" (☞Motor Setup) Factory setting: 50.0 Hz For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

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9.2.3 Functional diagrams temperature control

Example 1: Temperature control in factory setting "Cooling function" (Idealized principle diagram)
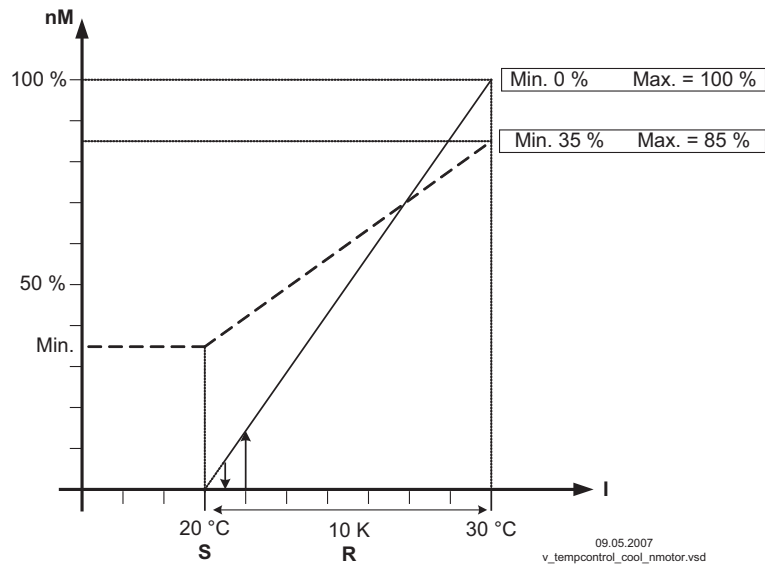
(Controller Setup: "Val > Set = n+" to "ON")
nM   Motor speed
S   Setpoint
R   Pband
I   Actual value

Example 2: Temperature control in "Heating function" (Idealized principle diagram)
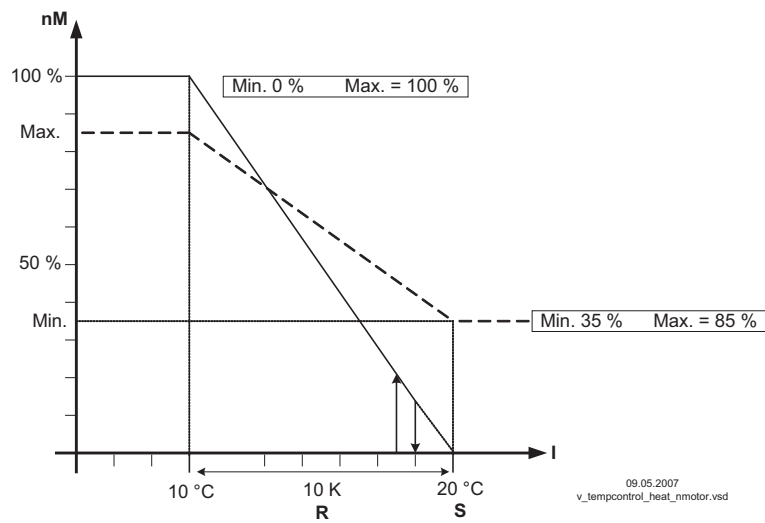
(Controller Setup: "Val > Set = n+" to "OFF")
nM   Motor speed
S   Setpoint
R   Pband
I   Actual value

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9.2.4 Additional for mode ▣2.03▣: Signal output 0 - 10 V
The 0 - 10 V output signal can, e.g., be used for triggering a shutter or heating.

(display) **0.0** K Offset AnalogOut	**Offset AnalogOut** The target value for this output is the target value (Setpoint) for the ventilation "offset" setting. Adjustment: range +/- 10 K relative to the active Setpoint. Example for triggering a shutter servomotor: At factory setting "0 K" = synchronous operation. The analog output is factory set to increasing activation during increasing temperature. Reprogramming to "Heating function", i.e., increasing modulation during decreasing temperature is possible (☞IO Setup).
(display) **2.0** K Pband AnalogOut	**Pband AnalogOut** Pband AnalogOut = separately adjustable range of control (P-band) for 0 - 10 V output Setting range: 0...102.0 K Factory setting: 2.0 K
(display) **0** % Min. AnalogOut	**Min. AnalogOut** Min. AnalogOut = Minimal output voltage Setting range: 0...100 % = 0 - 10 V Factory setting: 0 %
(display) **100** % Max. AnalogOut	**Max. AnalogOut** Max. AnalogOut = Maximal output voltage, Setting range: 100...0 % = 10 - 0 V Factory setting: 0.0 K

Example for signal out 0 - 10 V (IO Setup: "A function" = ▢6A▢)
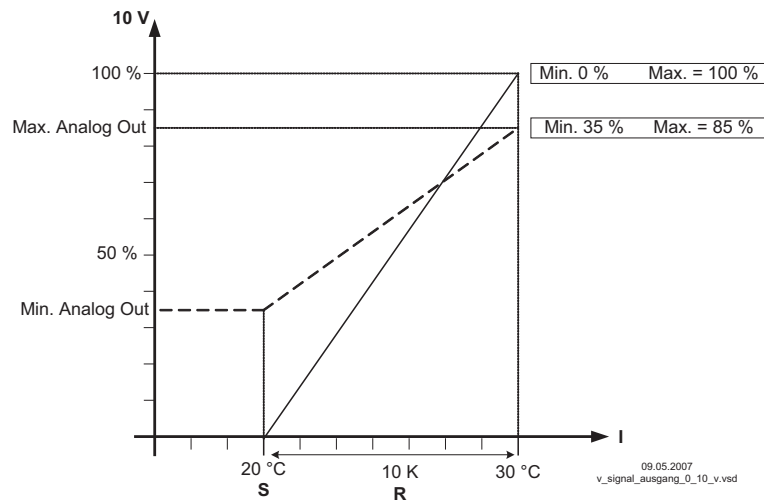
Example: Setpoint ventilation 25.0°C, Offset -5.0 K, Pband 10.0 K
S Setpoint Ventilation +/- Offset
R Pband
I Actual value

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9.2.5   For mode 2.03 : Relay output for Heating or Cooling

OffsetDigitalOut	**OffsetDigitalOut** Offset Digital Out = Offset for relay output ("K1" has to be reprogrammed to function 9K). The relay operating point deviates by the adjusted offset of the Setpoint of the ventilation. Setting range: -10.0...+10.0 K Factory setting: -1.0 K • "0.0 ‚K" set, i. e. heating "ON" when: actual value = Setpoint • During negative offset value heating "ON" when: actual value = Setpoint - offset • During positive offset value heating "ON" when: actual value = Setpoint + offset
Hyst.DigitalOut	**Hyst.DigitalOut** Switching hysteresis of the relay Setting range: 0...10 K, Factory setting: 1.0 K (Kelvin)

Temperature variation with setting 9K for K1 function in IO Setup e. g. for controlling a Heating.
If the ambient temperature is lower than the set operating point, the heating remains switched on. If the ambient temperature exceeds the set operating point of the heating by 2,0 K (Kelvin), the heating is switched off. I. e., the release point is situated at the hysteresis value over the operating point.

Example:
Setpoint 15.0 °C, Offset +5.0 K, Hysteresis 2.0 K
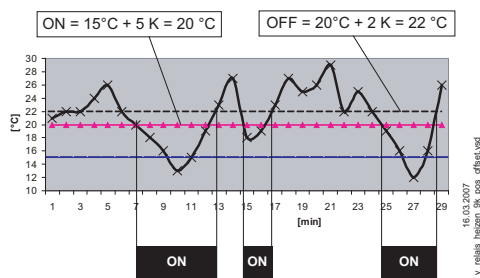
Example:
Setpoint 20.0 °C, Offset -5.0 K, Hysteresis 2.0 K
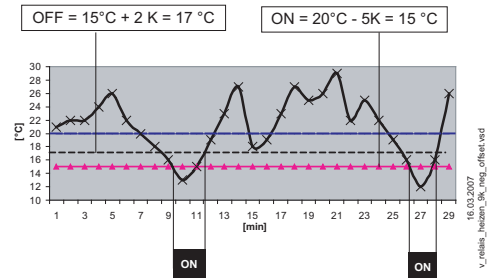
The activated heating is indicated over the fire symbol in the display.

Temperature variation with setting 10K for "K1" function in IO Setup e. g. for activation of the cooling.

Example:
Setpoint 15.0 °C, Offset +5.0 K, Hysteresis 2.0 K
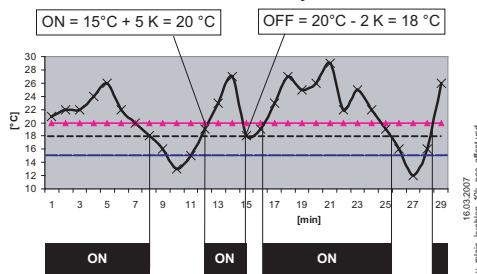
If the ambient temperature is higher than the set operating point, the cooling remains switched on. If the ambient temperature falls below the set operating point of the cooling by 2 K (Kelvin), it is switched off. I. e., the OFF point is situated at the hysteresis value under the ON point.

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9.2.6   For mode `2.03` Relay output for temperature monitoring

If the set value for the "minimum alarm" is not reached or the set value for the "maximum alarm" is exceeded, a message is generated via the alarm symbol in the display. In addition, „Lmt E1 min" is displayed alternately with the actual value for the minimum alarm and Lmt E1 max for the „Maximum alarm". An external message follows via the factory-assigned"K1" relay. (IO Setup: K1 function = `2K`).

Alarm Minimum display `0.0 °C` Alarm Minimum	**Alarm Minimum** Setting range: OFF / -26.9...75.0 °C Factory setting: 0.0 °C
Alarm Maximum display `40.0 °C` Alarm Maximum	**Alarm Maximum** Setting range: OFF / -26.9...75.0 °C Factory setting: 40.0 °C

display `-0-` A1 GW E2 min.	Example for display if falling below setting "Alarm Minimum" alternating to the actual value display. Relay "K1" disengages (if not inverted).
display `-0-` A1 Lmt E2 max.	Example for display if exceeding setting "Alarm Maximum" alternating to the actual value display Relay "K1" disengages (if not inverted).

9.3   Pressure control for condensers refrigeration `3.01`...`3.04`

9.3.1   Base setup `3.01`... `3.04`

display Base setup	**Base setup**
display `3.01` Mode	**Mode** Mode selection e.g. `3.01`
display `0-30` MBG E2 Analog In	**E2 Analog In** For all Modes in Group 3 (`3.01`, `3.02`, `3.03`, ...) "E2 Analog In" factory setting to "MBG-30I". (measuring range 0...30 bar) proportional output 4 - 20 mA Selection sensor: MBG-30I, MBG-50I, MBG-7I, DSF2-25 Alternative selection signal: 0 - 10 V, 4 - 20 mA. The sensor measurement range must be entered in order to display the actual value correctly. Example 0 - 10 V sensor and measuring range 0 - 20 bar: E2 Analog In = 0 - 10 V, E2 Min. = 0.0 bar, E2 Max. = 20.0 bar, E2 Decimals = 1, E2 Unit = bar
display `0.0` bar E2 Offset	**E2 Offset** Sensor calibration with calibrated comparison device

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r503 E2 Refrigerant	**E2 Refrigerant** With **3.02** and **3.04** operating modes with input of the refrigerant, the device automatically calculates the corresponding temperature for the measured pressure. The settings for offset, target value and the controlling range are then carried out in °C or K. Calculation for relative pressure (differential measurement of pressure relative to ambient pressure). No further settings are necessary for pressure sensors model e.g. "MBG-30I" or "MBG-50I" (measurement range 0 - 30 bar or 0 - 50 bar). In the case of sensors with other measurement ranges, the "E2 Min. value" and the "E2 Max. Value". Setting in "bar" although unit display is in "°C"!
OFF E3 Function	**E3 Function** (only for special applications) • External setpoint = Function $\boxed{1E}$ by external signal (0 - 10 V) instead of "Setpoint 1". 0 - 10 V $\triangleq$ 0 - 100 % sensor measuring range. • Function $\boxed{2E}$ = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (☞ IO Setup: function $\boxed{7D}$). • Measurement value = function $\boxed{7E}$ e.g. for limit indication, display in Info menu "E3 Actual". **Modes2 3.03 and 3.04 with two sensors** The function is automatically jointly programmed in operating modes using 2 sensors. The second analog input is thus allocated and additional function allocations are not possible. With **3.03** and **3.04** E3 Function at $\boxed{4E}$ preprogrammed = comparison value with control to higher value (two circuit condensers).

Selection of the refrigerants:								
R12	R13	R13b1	R22	R23	R32	R114	R134a	R142B
R227	R401	R401A	R401B	R402	R402A	R402B	R404A	R407A
R407B	R407C	R410A	R500	R502	R503	R507	R717	

9.3.2 Setting for operation modes 3.01 and 3.02

3.01 Pressure control condensers, setting Setpoint in bar
3.02 Pressure control for condensers with input for refrigerant, Setpoint in °C

Setting	**Setting**
12.00 bar Setpoint1 **35.0 °C** Setpoint1	**Setpoint1** **3.01** Setting range: in measuring range of sensor, factory setting: 12.0 bar **3.02** Setting range: dependent on the selected refrigerant, factory setting: 35.0 °C
Setpoint2	**Setpoint2** Setting "Setpoint 2" e.g. reduced value for night operation. Switch over Setpoint 1/2 by external contact (as long as no allocation is carried out: Display: $\boxed{-----}$ ☞ IOSetup).
5.00 bar Pband **7.0 K** Pband	**Pband** Narrow control range = Short control times Wide control range = Longer control times and more stable control **3.01** Setting range: in measuring range of sensor, factory setting: 5.0 bar **3.02** Setting range: dependent on the selected refrigerant and in measuring range of sensor, factory setting 7.0 K

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`0` rpm Min. Speed	**Min. Speed** Setting range: 0 rpm... "Max. Speed" Factory setting: 0 rpm
`1500` rPM Max. Speed	**Max. Speed** Setting range: Rated speed ...0 rpm (takes priority over setting "Min. Speed") Factory setting: Rated speed
`OFF` Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
`200` rPM Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0 rpm...Rated speed, Factory setting: 200 rpm For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

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`0.0` Hz Min. Speed	**Min. Speed** (basic speed only when needed) Setting range: 0... "Max. Frequency" (☞ Motor Setup). Factory setting: 0.0 Hz Active in every control mode, priority by "Max. speed".
`50.0` Hz Max. Speed	**Max. Speed** (speed limitation only when needed) Setting range: "Max. Frequency" (☞ Motor Setup)... "Min. Speed " Factory setting: 50.0 Hz Active in every control mode! Settings by "Max. frequency" are possible but are not made!
`OFF` Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
`50.0` Hz Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0... "Max. Frequency" (☞Motor Setup) Factory setting: 50.0 Hz For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

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9.3.3   Functional diagrams pressure control condensers
Functional diagram for Mode **3.01** and **3.03** (Idealized principle diagram)
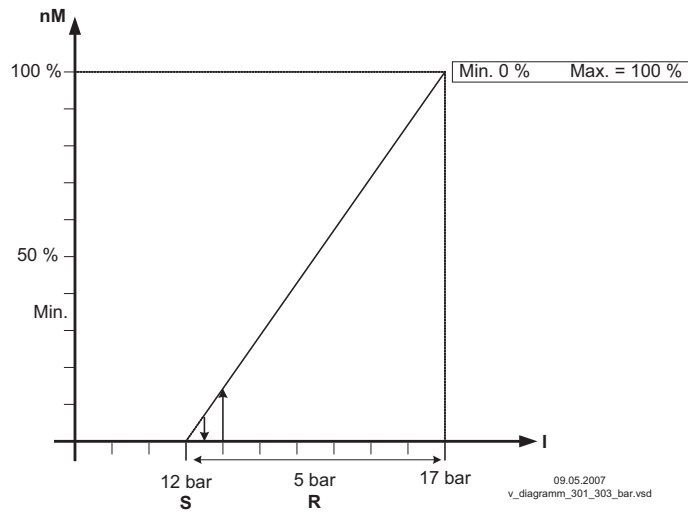
nM   Motor speed
S   Setpoint
R   Pband
I   Actual value

Functional diagram for Mode **3.02** and **3.04** (Idealized principle diagram)
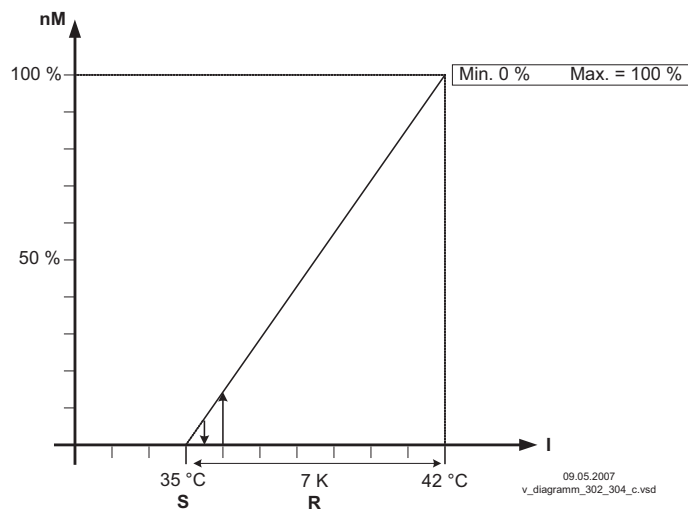
nM   Motor speed
S   Setpoint
R   Pband
I   Actual value

Information
The factory default presets must be adapted to match the system conditions by a competent person.

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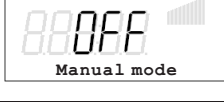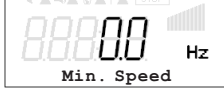
9.4   Pressure control airconditioning 4.01 ... 4.03

9.4.1   Base setup 4.01 ... 4.03

Base setup	**Base setup**
Mode	**Mode** Mode selection e.g. 4.01
200 DSG E2 Analog In	**E2 Analog In** In all group 4 operating modes 4 (4.01 , 4.02 , 4.03 , ...) "E2 Analog In" factory setting "DSG200". Selection sensor type: "DSG 50", "DSG100*", "DSG200", "DSG300"*, "DSG500", "DSG1000", "DSG2000", "DSG4000", "DSG6000 " (* no standard type). With the use of not pre-programmed sensor types further settings are necessary. Example with a 0 - 10 V sensor and 0 - 400 Pa measurement range (proportional output signal): E2 Analog In = 0 - 10 V, E2 Min. = 0.0 Pa, E2 Max. = 400 Pa, E2 Dezimal = 1, E2 Einheit = Pa
0.0 Pa E2 Offset	**E2 Offset** Sensor calibration with calibrated comparison device

OFF
E3 Function
	E3 Function (only for special applications)
	• External setpoint = Function 1E by external signal (0 - 10 V) instead of "Setpoint 1". 0 - 10 V ≙ 0 - 100 % sensor measuring range.
	• Function 2E = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (☞ IO Setup: function 7D).
	• Measurement value = function 7E e.g. for limit indication, display in Info menu "E3 Actual."
	Modes 4.02 and 4.03 with two sensors
	The function is automatically jointly programmed in operating modes using 2 sensors. The second analog input is thus allocated and additional function allocations are not possible.
	For 4.02 E3 Function at 6E preprogrammed = sensor for setpoint lowering. Preprogrammed sensor type "KTY "
	For 4.03 E2 Function at 6E preprogrammed = sensor for setpoint lowering.
	- preprogrammed sensor type "BUS"
	- measuring range -35.0...+65.0 °C
	
	In "IO Setup":
	• E3 Busmode = ON
	• For enable "ON" / "OFF" via Bus:
	  – D1 function = 1D
	  – D1 Busmode = "ON"
	• For switch over setpoint 1 /2 via Bus:
	  – D2 function = 2D
	  – D2 Busmode = "ON"

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9.4.2 Setting for operation modes `4.01`... `4.03`
- `4.01` pressure control, setpoint in Pa
- `4.02` and `4.03` Pressure control for ventilation systems setpoint depending on outdoor temperature

|	
 Setting	**Setting**
 Setpoint1	**Setpoint1** Setting range: in measuring range of sensor Factory setting: 100 Pa
 Setpoint2	**Setpoint2** Setting "Setpoint 2" e.g. reduced value for night operation. Switch over Setpoint 1/2 by external contact (as long as no allocation is carried out: Display: ` - - - - - ` ☞ IOSetup).
 Pband	**Pband** Narrow control range = Short control times Wide control range = Longer control times and more stable control Setting range: in measuring range of sensor Factory setting: 100 Pa
ECblue	
 Min. Speed	**Min. Speed** Setting range: 0 rpm... "Max. Speed" Factory setting: 0 rpm
 Max. Speed	**Max. Speed** Setting range: Rated speed ...0 rpm (takes priority over setting "Min. Speed") Factory setting: Rated speed
 Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
 Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0 rpm...Rated speed, Factory setting: 200 rpm For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.
Icontrol / Fcontrol Basic	
 Min. Speed	**Min. Speed** (basic speed only when needed) Setting range: 0... "Max. Frequency" (☞ Motor Setup). Factory setting: 0.0 Hz Active in every control mode, priority by "Max. speed".
 Max. Speed	**Max. Speed** (speed limitation only when needed) Setting range: "Max. Frequency" (☞ Motor Setup)... "Min. Speed " Factory setting: 50.0 Hz Active in every control mode! Settings by "Max. frequency" are possible but are not made!
 Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"

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	Speed manual
[display: 50.0 Hz — Speed manual]	Manual speed setting without influence by the external signal.
	Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup).
	Setting range: 0... "Max. Frequency" (☞Motor Setup)
	Factory setting: 50.0 Hz
	For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

Additional menu item for mode 4.02 and 4.03 with outside-temperature dependent target-setpoint.

Outside-temperature dependent target-setpoint
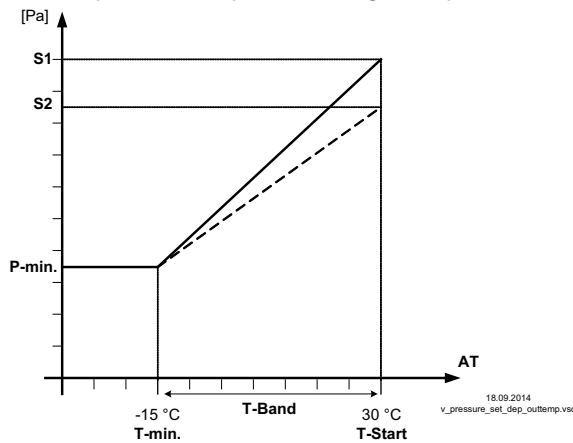
An outside temperature compensation can be activated (sensor connection "E2" = "Analog In 2") when being operated as a pressure regulation device.
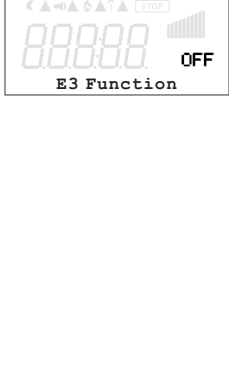
An optimal building climate, e.g., can be achieved through this. Through this function, the set and active "Setpoint1" or "Setpoint2" is automatically changed proportional to the measured outside temperature (☞ Info: "Setpoint control").

S1   Setpoint1
S2   Setpoint2
P-Min SA   Minimum pressure
T-min   Minimum temperature
T-Start   Setpoint reducing will start below this outside temperature
AT   Outdoor temperature

	T-Band SA
[display: 30.0 K — T-Band SA]	Temperature range in which the setpoint change continiously with outside temperature
[display: 15.0 °C — T-Start SA]	**T-Start SA** Setpoint reducing will start below this outside temperature
[display: 70.0 Pa — P-Min SA]	**P-Min SA** Minimum pressure for very low outside temperature

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9.5   Volume control 5.01 ... 5.02

9.5.1   Basic setting 5.01 and 5.02

Setting	**Base setup**
5.01 Base setup	**Mode** Mode selection e.g. 5.01
200 DSG E2 Analog In	**E2 Analog In** In all group operating modes 5 (5.01 and 5.02) "E2 Analog In" factory setting "DSG200. " Selection sensor measuring range: "DSG 50", * "DSG100", "DSG200", * "DSG300", "DSG500", "DSG1000", "DSG2000", "DSG4000", "DSG6000" (* no standard type).
75 K-Factor	**K Factor** Input of the "K factor" dependent on the fan (inlet duct). setting range: 0...7.000 Factory setting: 75
0.0 m3h E2 Offset	**E2 Offset** Sensor calibration with calibrated comparison device
OFF E3 Function	**E3 Function** (only for special applications) • External setpoint = Function $\boxed{1E}$ by external signal (0 - 10 V) instead of "Setpoint 1". 0 - 10 V ≙ 0 - 100 % setting range • Function $\boxed{2E}$ = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (☞ IO Setup: function $\boxed{7D}$). • Measurement value = function $\boxed{7E}$ e.g. for limit indication, display in Info menu "E2 Actual" **Modes 5.02 with two sensors** Modes with two sensors The function is automatically jointly programmed in operating modes using 2 sensors. The second analog input is thus allocated and additional function allocations are not possible. For 5.02 E3 Function at $\boxed{6E}$ preprogrammed = sensor for setpoint lowering. Pre-programmed sensor type "KTY".

9.5.2   Setting for operation modes 5.01 ... 5.02
- 5.01 Volume control, Setpoint in m³/h
- 5.02 Volume control for ventilation systems setpoint depending on outdoor temperature.

Setting	**Setting**
530 m3h Setpoint1	**Setpoint1** Setpoint in m³/h (m³/s) Setting range: depending on measuring range of sensor and "K factor" Factory setting: 530 m³/h
Setpoint2	**Setpoint2** Setting "Setpoint 2" e.g. reduced value for night operation. Switch over Setpoint 1/2 by external contact (as long as no allocation is carried out: Display: $\boxed{-----}$ ☞ IOSetup).

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`530` m3h Pband	**Pband** Narrow control range = Short control times Wide control range = Longer control times and more stable control Setting range: depending on measuring range of sensor and "K factor" Factory setting: 530 m^3/h

ECblue

`0` rPM Min. Speed	**Min. Speed** Setting range: 0 rpm... "Max. Speed" Factory setting: 0 rpm
`1500` rPM Max. Speed	**Max. Speed** Setting range: Rated speed ...0 rpm (takes priority over setting "Min. Speed") Factory setting: Rated speed
`OFF` Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
`200` rPM Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0 rpm...Rated speed, Factory setting: 200 rpm For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

Icontrol / Fcontrol Basic

`0.0` Hz Min. Speed	**Min. Speed** (basic speed only when needed) Setting range: 0... "Max. Frequency" (☞ Motor Setup). Factory setting: 0.0 Hz Active in every control mode, priority by "Max. speed".
`50.0` Hz Max. Speed	**Max. Speed** (speed limitation only when needed) Setting range: "Max. Frequency" (☞ Motor Setup)... "Min. Speed " Factory setting: 50.0 Hz Active in every control mode! Settings by "Max. frequency" are possible but are not made!
`OFF` Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
`50.0` Hz Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0... "Max. Frequency" (☞Motor Setup) Factory setting: 50.0 Hz For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

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Additional menu item for mode 5.02 with outside-temperature dependent target-setpoint

Outside-temperature dependent target-setpoint
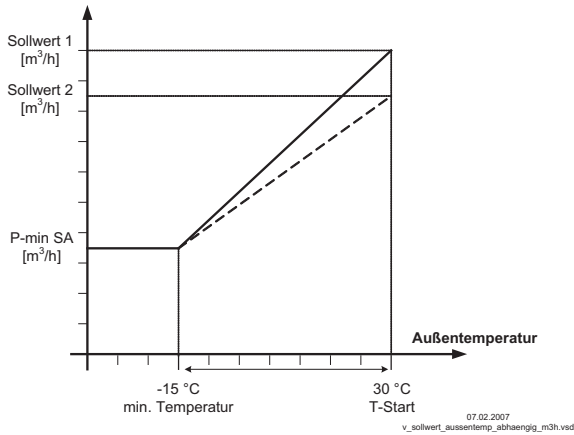
An outside temperature compensation can be activated (sensor connection "E2" to "Analog In 2") when being operated as a air volume regulation device.
An optimal building climate, e.g., can be achieved through this. Through this function, the set and active Setpoint 1/2 is automatically changed proportional to the measured outside temperature (☞ Info: "Setpoint control").
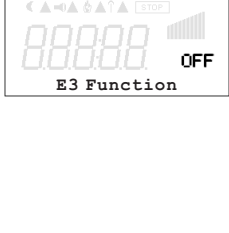
S1   Setpoint1
S2   Setpoint2
P-Min SA   Minimum air volume
T-min   Minimum temperature
T-Start   Setpoint reducing will start below this outside temperature
AT   Outdoor temperature
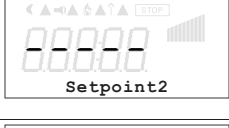
	T-Band SA Temperature range in which the setpoint change continiously with outside temperature
	T-Start SA Setpoint reducing will start below this outside temperature
	P-Min SA Minimum pressure for very low outside temperature

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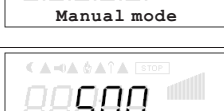
9.6   Air velocity control 6.01

9.6.1   Base setup 6.01

Base setup	**Base setup**
6.01 Mode	**Mode** Mode selection 6.01
0-1 MAL E2 Analog In	**E2 Analog In** For mode 6.01 "E2 Analog In" factory setting to "MAL1" Selection sensor measuring range: MAL1, MAL10 Alternative selection signal: 0 - 10 V, 0 - 20 mA, 4 - 20 mA. The sensor measurement range must be entered in order to display the actual value correctly. Example with a 0 - 10 V sensor and 0 - 5 m/s measurement range (proportional output signal). E2 Analog In = 0 - 10 V, E2 Min. = 0.0 m/s, E2 Max. = 5.0 m/s, E2 Decimals = 1, E2 Unit = m/s
0.0 m/s E2 Offset	Sensor calibration with calibrated comparison device
OFF E3 Function	**E3 Function** (only for special applications) • External setpoint = Function 1E by external signal (0 - 10 V) instead of "Setpoint 1". 0 - 10 V ≙ 0 - 100 % setting range • Function 2E = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (☞ IO Setup: function 7D). • Measurement value = function 7E e.g. for limit indication, display in Info menu "E3 Actual."

9.6.2   Settings for operation modes 6.01

Setting	**Setting**
0.50 m/s Setpoint1	**Setpoint1** Setting range: in measuring range of sensor Factory setting: 0.50 m/s
Setpoint2	**Setpoint2** Setting "Setpoint 2" e.g. reduced value for night operation. Switch over Setpoint 1/2 by external contact (as long as no allocation is carried out: Display: - - - - - ☞ IOSetup).
0.50 m/s Pband	**Pband** Narrow control range = Short control times Wide control range = Longer control times and more stable control Setting range: in measuring range of sensor Factory setting: 0.50 m/s
ECblue	
0 rpm Min. Speed	**Min. Speed** Setting range: 0 rpm... "Max. Speed" Factory setting: 0 rpm
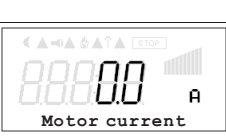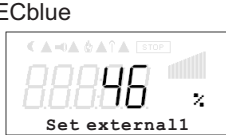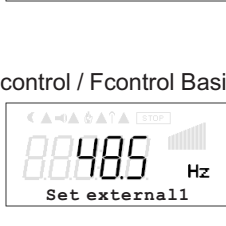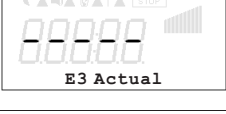
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1500 rpm Max. Speed	**Max. Speed** Setting range: Rated speed ...0 rpm (takes priority over setting "Min. Speed") Factory setting: Rated speed
OFF Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
1500 rpm Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0...100 %, Factory setting: 100 % For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

Icontrol / Fcontrol Basic

0.0 Hz Min. Speed	**Min. Speed** (basic speed only when needed) Setting range: 0... "Max. Frequency" (☞ Motor Setup). Factory setting: 0.0 Hz Active in every control mode, priority by "Max. speed".
50.0 Hz Max. Speed	**Max. Speed** (speed limitation only when needed) Setting range: "Max. Frequency" (☞ Motor Setup)... "Min. Speed " Factory setting: 50.0 Hz Active in every control mode! Settings by "Max. frequency" are possible but are not made!
OFF Manual mode	**Manual mode** "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
50.0 Hz Speed manual	**Speed manual** Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (☞ IO Setup). Setting range: 0... "Max. Frequency" (☞Motor Setup) Factory setting: 50.0 Hz For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

9.7   Menu group Start

88888 Start	**Start**
0010 PIN input	**PIN input** The service menu for the installation can be protected against unintentional changes by a pin code. With further pin codes putting back to pre-setting is possible.
	PIN 0010 Opening "service menu", if PIN-protection activated Menu (☞menu structure).
	PIN 1234 Opening "setting". if "set protection" = "ON" (☞ Controller Setup).
	PIN 9090 Restore user setting.
	PIN 9091 Save"user"setting"(corresponds"function☞Save user setup = ON Controller Setup).

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	PIN 9095 Restore factory setting = delivery status. Exception in ECblue Basic The following parameters are not set back: Min. Speed, Max. Speed, all settings in Motor Setup.
GB Language	**Language** Menu language by the factory set to English. In this menu different national languages can be selected (GB = English, D = German ...).
OFF Reset	**Reset** Complete re-start of the device.
1.01 Mode	**Mode** Query of the operating mode (e.g. **1.01** for speed controller).
4.00 ECblue Premium	**ECblue Premium** Software version Modul.
8.02 Basic Version	**Basic Version** software version motorcontroller.
SN: 09303459d336	Individual unit number.

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9.8 Menu group Info

 Info	**Menu group Info**

Info for mode speed controller 1.01	
 Speed	ECblue Speed
 Frequency	Icontrol / Fcontrol Basic Inverter output frequency.
 Motor current	Display of motor current, different from the input current (metering precision approx. +/-10 %)

ECblue Set external1	Display of the currently active default signal. The percentage corresponds to the internal actuation of the power component under consideration of the settings "Min. speed" and "Max. speed". 0 - 100 % ≙ 0 - 10 V, 10 - 0 V, 0 - 20 mA, 20 - 0 mA, 4 - 20 mA, 20 - 4 mA	
	Display:	The device operates at:
	Set "external1"	Signal to "E2" / "GND"
Icontrol / Fcontrol Basic Set external1	Set "External2"	Signal to "E3" / "GND"
	Set "Intern1"	Menu "Set Intern1"
	Set "Intern2"	Menu "Set Intern2"

 E2 Actual	If E2 is in IO Setup on Busmode, the value of the analog input E2 is displayed. If function not active, display - - - - -
 E3 Actual	If E3 is in IO Setup on Busmode, the value of the analog input E3 is displayed. If E3 Function = 7E the value of the analog input E3 is displayed. If function not active, display - - - - -

Info for mode controller 2.01 ... 6.01	
 E2 Actual	Current actual value measured on the sensor 1. Depending sensor-type in: mbar, m^3/s, m/s, Pa, %, bar, m^3/h, °C, V, mA, etc.
 E3 Actual	For operation with two sensors display for "2 actual". If function not active, display - - - - -
 Setpoint1	Display of the active target value at which the device operates. "Setpoint1" Menu "Setting" "Setpoint2" Menu "Setting" "Ext. Setpoint" = setting by external signal 0 - 10 V. With activated manual mode the display constantly changes between actual value and value for manual mode.

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Speed	ECblue Speed
Frequency	Icontrol / Fcontrol Basic Inverter output frequency.
Motor current	Motor current (deviating to input current)
Min. speed cut off	Momentarily status for minimum speed cut off "ON" = switch off, if Setpoint (+/- "Min. speed cut off") is reached. "OFF" = no switch off that means operation with minimum rate of air.

9.9   Controller Setup

Controller Setup	**Controller Setup**

9.9.1   PIN protection activate, PIN0010

PIN Protection	The adjustments for the installation in the service level can be protected against unintentional modifications. To do this, activate the "PIN protection" = "ON". In order to simplify the initial start-up operation, the service level in the factory setting is free = "OFF" i.e. accessible without **PIN 0010**.

> **Information**
> After installation of the device has been carried out, "PIN-Protection" should be activated = "ON"

9.9.2   Set protection activate, PIN 1234

Set protection	The "Settings" menu for the user's basic settings (Setpoint, default value, min, max ..) are freely accessible when using the factory settings (i.e. without "PIN"). If necessary, these can also be protected against unauthorized modifications by using a **"PIN 1234"** . For this, the settings protection must be programmed to "ON". The settings menu is then no longer visible without inputting a PIN!
	Function only in combination with activated PIN-Protection!

9.9.3   Save user settings restore with PIN 9090

Save User Setup	The individually made device configurations (User Setting) can be saved here (corresponds to PIN 9091). By entering **PIN 9090** the individually made device configurations can be reestablished (☞ Start - PIN Input).

> **Information**
> By entering "PIN 9095" in the "PIN" menu in the "start" menu-group, the device is entirely reset to the pre-delivery condition.
> Any changes that have been made to the settings are thus lost!

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9.9.4 Sensor Alarm ON / OFF

Function only in controller mode (**2.01**)!

For "E2 Analog In" and if activated for sensor 2 "E3 Analog In".
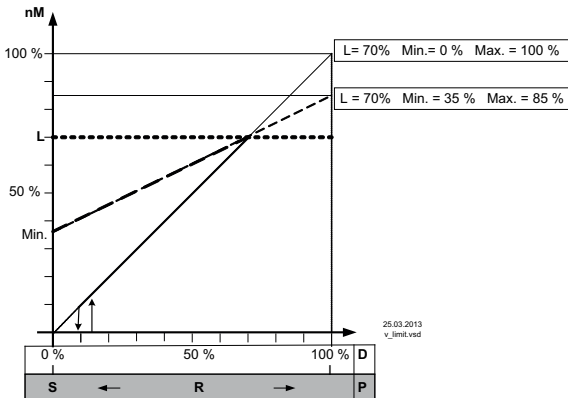
In case of an interruption or short-circuit in the sensor conductor, or in case of measured values that lie outside of the device's measurement range, a time-delayed fault indication takes place.

OFF Alarm sensors	With "Alarm Sensors" = "OFF" (factory setting). Indicated sensor disturbances are displayed as "Message" alternating to the actual value and stored in the menu of "Events".	-0- MSG Sensor 1
ON Alarm sensors	With "AlarmSensors" = "ON" areindicated sensor disturbances as "Alarm" alternating to the actual value and stored in the menu of "Events". Indication via relays is possible (☞IO Setup / function relay outputs).	-0- AL Sensor 1

9.9.5 Limit

100 % Limit	After allocation of a digital input (☞ IO Setup) an adjustable limitation of the modulation can be activated via a digital input ("D1", "D2", ..). As long as no allocation has been carried out "IO Setup". Display: ⸢ - - - - ⸥

"Limit value" = max. possible modulation (e.g. speed reduction during night operation by time switch).
Setting range: "Limit" = "n-max" up to "n-min".
Factory setting: 100 % ≙ max. modulation, i. e. no limit.
Setting depending on device tye in: % or rpm.

Limit (idealized principle diagram)
nM   Motor speed
L   Limit
S   Setpoint
R   Pband
D   Speed controller: setting signal
P   P-controller: control deviation

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9.9.6   Minimum speed cut off

OFF Min. speed cut off	This function is primarily significant for installation of the device as a pure P Controller in refrigeration and air-conditioning technology. For operation mode speed controller **1.01** without function!

Msco = OFF (factory setting)
If no "Min. speed" is adjusted, the fan stops with reaching the desired value.
If "Min. speed" is adjusted (e.g. 20%), then no disconnection of the fan takes place. I.e., always a minimum ventilation is ensured (fan does not go under setting "Min. speed").

Msco. e.g. -2.0 K
It takes place a disconnection from setting "Min. speed"to "0", if the given difference is reached related to the desired value.
At a plus value (+) before reaching the desired value
At a minus value (-) after falling below the desired value.
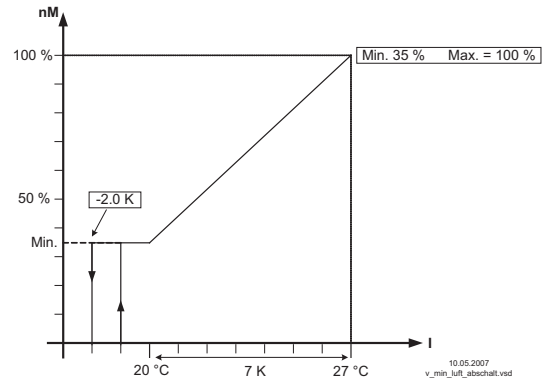
Minimum speed cut off (idealized principle diagram)
nM   Motor speed
S   Setpoint
R   Pband
I   Actual value

9.9.7   Second Group
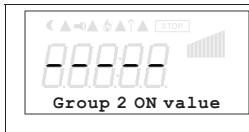
Group 2 ON value	**Second group "indirectly controlled" (picture A)** Analog output "AnalogOut 1" in IO Setup function 5 A = group control is programmed. This output is employed as the default signal for a speed controller. If the default signal or the regulation deviation exceeds the group 2 switch-on point, group 1 is reduced to "n-min group 2". Starting here, both groups run parallel at maximum power.
nmin at Group2	**Second group "100 % energized" (picture B)** Relay output (K1 or K2) in IO Setup function 8K = group control is programmed. A contactor is triggered via this relay contact, which directly switches the fans of the second group to mains voltage. If the default signal or the regulation deviation exceeds the "Group 2 ON value" switch-on point, the relay for the second group switches on and the speed of the first group is lowered to an adjustable minimum value. After that, the speed of the first group increases back up to maximum.
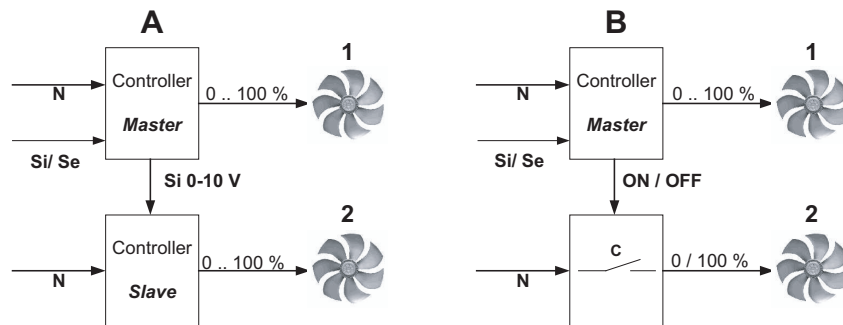
N   Line
Si   Signal
Se   Sensor
C   Contactor

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9.9.8   Reverse action of the control function

 Val>Set=n+	**For the effect of the regulation there are two functions:** • **ON** for "Val > Set = n+" ≙ increasing Fanlevel for increasing actual value over Setpoint. • **OFF** for "Val > Set = n+" ≙ increasing Fanlevel for decreasing actual value below Setpoint. For special applications an external switch over of the control function is possible (☞ IO Setup).

Factory setting depending on selected mode		Example for temperature control (Idealized principle diagram)
Mode	**Controller function**	
1.01	non	
2.01...	ON	
3.01...	ON	
4.01...	OFF	
5.01...	OFF	
6.01...	OFF	

nM   Motor speed
R   Pband
S   Setpoint
I   Actual value
OFF   for Val > Set = n+ = heating function
ON   for Val > Set = n+ = cooling function

9.9.9   Controller configuration

The "controller configuration" is automatically carried out during selection of the application related mode of operation (Base setup). The factory presets in accordance with the mode of operation are based on many years of experience, which is suitable for many applications. Under special circumstances, these can be individually adapted (☞ Menu group "setting").

 Type of control	The type of control determines the method with which the controlled value behaves in case of a difference between the target and current values. For this, the control technology has standard algorithms, which consist of a combination of three methods: **Selection P, PID:** • **P** control (Proportional component, proportion of the absolute deviation) • **I** control (Integral component, proportion of the sum of all deviations) • **D** control (Differential component, proportion of the last difference)
	With pure P controllers (controller type **P**), the following described settings do not have any function. If needed, the most suitable combination for the respective control system can be determined from these proportions.
 KP	**P-component = reaction time** Setting range: 0 - 200 % smaller = more slowly bigger = faster
 KI	**I-component = accuracy, correction time** Setting range: 0 - 200 % bigger = faster smaller = more slowly
 KD	**D-component** More "D-component" causes more stability by a clean actual value signal with shorter correction times By a actual value signal with a superposition should be done to attitude without "D-component" → 0 % Setting range: 0 - 200 % value smaller = less "D-component" value higher = more "D-component"

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 888888 % TI	**Integration time = correction time** Setting range: 0 - 200 % smaller = faster bigger = more slowly

9.9.10   Data on the total control deviation
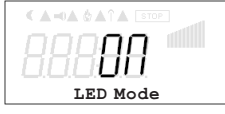
The total control deviation is comprised of the sum of the control deviations for performance quantities and work quantities combined and refers to the specified areas.

In direct reference to the acquired input and controlled variables, the maximum deviation to the target value is < ± 5 %. By activating the menu-assisted adjustment, the total control deviation can be reduced to a value of < ± 1 %.

For indirect reference of the acquired input value to the controlled variable, i.e., two physical variables still need to be converted, the deviation can be reduced to < ± 5 % through adjustment.

In the case of an internal default value through the integrated or external terminal, the control deviation remains at < ±0.5%.

9.9.11   LED Mode

 888On LED Mode	For motor sizes "D" and "G" there is a status LED in the cover of the controller housing.	
	ON	Status LED in ECblue active i.e. operating conditions are indicated by flash code (factory setting).
	OFF	Status LED not active, i.e. always OFF.

9.9.12   MODBUS communication watchdog

The MODBUS communication watchdog defines the behaviour in case of a communication fault.

 888888 Watchdog Mode	**Watchdog Mode** Watchdog Mode: 0: no function (Default) = OFF 1: Fault (K1 Function, h58) 2: Watchdog speed (ECblue) / Watchdog frequency (Icontrol / Fcontrol Basic) 3: Fault + constant speed 1 * in case of communication fault (WDT)
 888888 sec Watchdog Time	**Watchdog Time** If the device receives no message in the time window, a definable function is executed. Watchdog time in seconds. Setting range: 0 - 255 sec. Factory setting: 0 sec. = off
 8850.0 Hz Watchdog Speed	**Watchdog Speed** ECblue: Setting Watchdog Speed Icontrol / Fcontrol Basic: Setting Watchdog Frequency

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9.10   IO Setup

IO Setup	**IO Setup**

9.10.1   Analog-Output "A"

1A A Function	The analog outputs 0 - 10 V can be allocated with various functions. Terminals "A" - "GND" = Analog Out (I_{max} 10 mA)
0.0 V A min. 10.0 V A max.	With the attitudes "A min" and "A max" the characteristic of the output voltage can be adapted. Setting range: "A min." = 0 - 5 V, "A max." = 10 - 5 V Factory setting: "A min." = 0 V, "A max." = 10 V
OFF A Inverting	With the attitudes "A Inverting" the output voltage can inverted. Factory setting: "A Inverting" = "OFF"

Function	Description
OFF	no function
1A	Constant voltage +10 V (factory setting)
2A	Proportional the internal control of modulation with consideration "Min. speed" and "Max. speed" setting. • for enable "OFF" it goes back to 0 V • for motor fault the output signal remains for a slave controller ("Master-Slave" combination).
3A	proportional input "E2"
4A	proportional input "E3"
5A	Group control (☞ Controller Setup - second group)
6A	Control output 2 increasing modulation at actual value > Set = cooling (only mode **2.03** temperature controller with additional functions).
7A	Control output 2 incresing modulation at actual value < Set (Heating) only mode **2.03** temperature controller with additional functions).
9A	ECblue = speed output ratio: actual speed / rated speed (for 10 V actual speed = rated speed) Icontrol / Fcontrol Basic Proportional to the output frequency
10A	Operating indicator **ECblue:** • Output 0 V @ Speed < 50 rpm • Output 10 V @ Speed > 70 rpm **Icontrol / Fcontrol Basic** • Output 0 V @ Speed < 5 Hz • Output 10 V @ Speed > 7 Hz

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A1 Function "A min." and "A max."   A1 Function 3A / 4A

16.03.2007
v_a1_funktion_amin_amax.vsd

0	1	2	3	4	5	6	7	8	9	10	0 – 10 V
10	9	8	7	6	5	4	3	2	1	0	10 – 0 V
0	2	4	6	8	10	12	14	16	18	20	0 – 20 mA
20	18	16	14	12	10	8	6	4	2	0	20 – 0 mA
4	5,6	7,2	8,8	10,4	12	13,6	15,2	16,8	18,4	20	4 – 20 mA
20	18,4	16,8	15,2	13,6	12	10,4	8,8	7,2	5,6	4	20 – 4 mA
-27	-16,8	-6.6	3.6	13.8	24	34,2	44.4	54.6	64.8	+75	TF.. (KTY)

16.03.2007
v_a1_funktion_3a_4a.vsd

9.10.2   Digital inputs "D1" / "D2" (E1)

9.10.2.1   Menu overview

 D1 Function	The digital inputs Digital In 1 (D1) and Digital In 2 (D2) can be allocated with various functions. Activation via floating contacts (a low voltage of approx. 24 V DC is connected).
 D1 Inverting	Inverting "D1" and "D2" possible
 D1 Busmode	With networking the digital inputs can be replaced by control over bus. With mode of operation **4.03** pre-setting of "D1" and "D2" is ON .

⚠ **Attention!**
Never apply line voltage to the digital input!
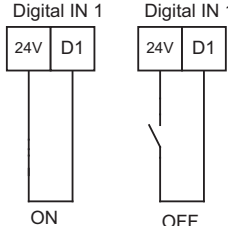
Function	Description
OFF	no function
1D	Enable (remote control) "ON" / "OFF"
2D	External error
3D	"Limit" ON / OFF
4D	Switch over "E1" / "E3"
	For mode speed controller 1.01
5D	Switch over "Set Intern1" / "Set Intern2"
6D	Switch over "Intern" / "Extern"
	For modes as controller higher 2.01
5D	Switch over "Setpoint1" / "Setpoint2"
6D	Switch over "Intern" / "Extern"
7D	Switch over "automatic control" / "Speed manual"
8D	Switch over control function (e.g. "heating" / "cooling")
10D	"Reset"

11D	Setting Max. Speed "ON" / "OFF"
13D	Switch over direction of rotation "right" / " left"
14D	"Freeze function" = maintain momentary modulation value
16D	Busmode / analog input Switch over for E2

9.10.2.2   Enable ON/OFF function 1D

Remote ON/OFF (electronic disconnection) and Reset after a motor malfunction via floating contact. The power section is electronically disconnected. Operation of the device is still possible after pressing the "ESC" hotkey combination in switched-off condition. Signal- in and outputs remain active.
- A programmed alarm relay (factory set "K1 function" = 2K) does not report the switch-off.
- A programmed operation indicator relay (1K) reports the switch-off.

Display		
88**OFF** STOP	**Display STOP for switch OFF** • Controller "ON" for closed contact (factory setting). • Controller "OFF" with opened contact When inverting in reverse i.e. equipment "OFF" with closed contact.	Digital IN 1 Digital IN 1 24V D1 24V D1 25.06.2007 v_1d_24v_freigabe.vsd ON OFF

⚠️ **Attention!**
No disconnection (isolation) when turned off, in accordance with VBG4 §6)!

9.10.2.3   External fault Function 2D

Connecting an external alarm indication (via floating contact). The device continues to work unchanged during an external indication to the digital input; the alarm symbol appears in the display. This indication can be issued via the relay contacts (K1) (☞IO Setup function K1).
- Indication during closed contact (factory setting): "D1 Inverting" = "OFF "
- Indication during opened contact: "D1 Inverting" = "ON"

Display	
88**20.0** °C Actual value	Alarm symbol for indication "External fault"

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9.10.2.4 Limit ON / OFF, Function 3D

The value for "Limit" adjusted in the Controller Setup, is activated over a digital input.

Contact e.g. at ditgital input "Digital In 1" (depending on device type at terminals "D1" - "D1"or "D1" - "24 V").

For "D1" Inverting"OFF", limitation active at closed contact.
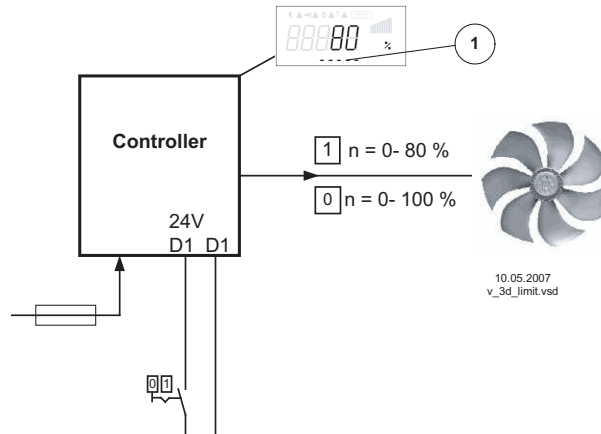
1   Setting "Limit" (depending on device type in: %, Hz, rpm)

9.10.2.5 Switch over Input signal "E2" / "E3", Function 4D

Switch over between Input signal 1 (Analog In 1 terminal "E2") and input signal 2 (Analog In 3 terminal "E3").

Contact at digital input e.g. "Digital In 1"= terminals "D1" - "24 V"
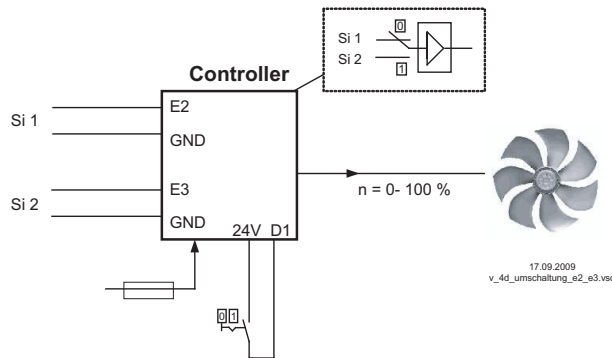
Si 1   Signal 1
Si 2   Signal 2

For mode speed controller (**1.01**) Base setup for "E3 Analog In": 1E necessary.

For modes controller (higher **2.01** ..) Base setup for "E3 Analog In": 7E necessary (as far as otherwise does not occupy).

9.10.2.6 Set 1/2 or Setpoint 1/2, Function 5D

Switch over between "Set Intern1" and "Set Intern2" (for speed controller **1.01**)

Contact e.g. at ditgital input "Digital In 1" (depending on device type at terminals "D1" - "D1"or "D1" - "24 V").
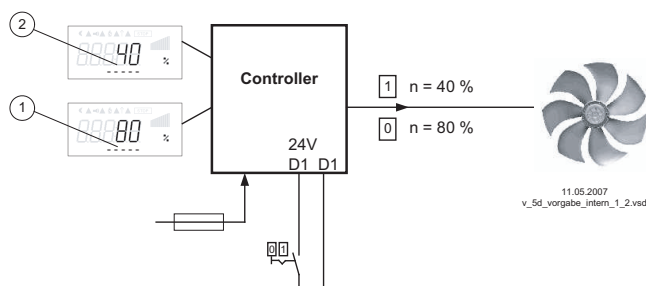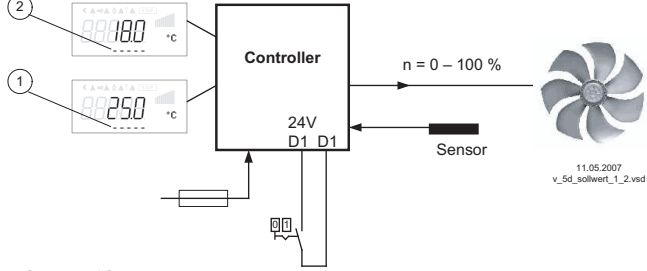
- "D1 Inverting" = "OFF": "Set Intern1" at opened contact / "Set Intern2" at closed contact.
- "D1 Inverting" = "ON": "Set Intern1" at closed contact / "Set Intern2" at opened contact.

1   Setting "Set Intern1" (depending on device type in: %, Hz, rpm)
2   Setting "Set Intern2" (depending on device type in: %, Hz, rpm)

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| | Operation with "Set Intern2" is signalized by the moon symbol for reduced operation. "Set extern1" under "settings" must be programmed to "OFF". |

Switch over between "Setpoint1" and "Setpoint2" (for modes as controller higher **2.01**)
Contact e.g. at ditgital input "Digital In 1" (depending on device type at terminals "D1" - "D1"or "D1" - "24 V").
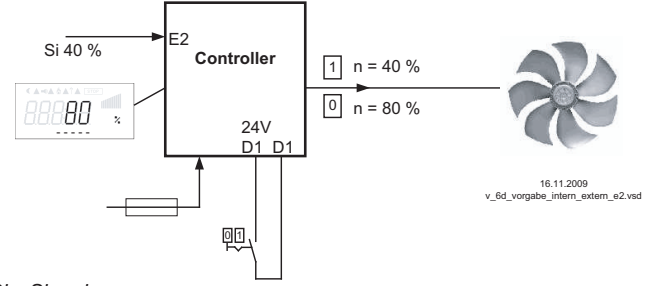
- "D1 Inverting" = "OFF": "Setpoint1" = 18 °C at opened contact / "Setpoint2" = 25 °C at closed contact.
- "D1 Inverting" = "ON": "Setpoint1" = 18 °C at closed contact / "Setpoint2" = 25 °C at opened contact.

1   Setting "Setpoint1"
2   Setting "Setpoint2"

| | Operation with "Setpoint2" is signalized by the moon symbol for reduced operation. |

9.10.2.7   Intern / Extern Function 6D
Switch over between Set Intern and Set Extern (for mode speed controller **1.01**). "Set extern1" under settings must be programmed to "OFF".
Contact e.g. at ditgital input "Digital In 1" (depending on device type at terminals "D1" - "D1"or "D1" - "24 V").

- "D1 Inverting" = "OFF": "Set Intern1" at opened contact / "Setting Extern" at closed contact.
- "D1 Inverting" = "ON": "Set Intern1" at closed contact / "Set Extern" at opened contact.
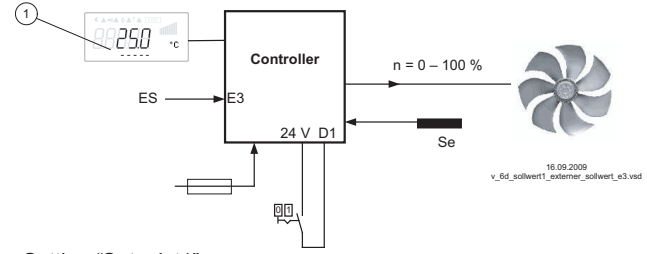
Si   Signal
1   Setting "Set Intern1" (depending on device type in: %, Hz, rpm)

"Setpoint1" / "external Setpoint" (modes **2.01**)
Under Base setup "E3 function" programmed to function 1E for "external setpoint" .
Contact at digital input e. g. "Digital In 1" = "D1" - "24 V"

- "D1 Inverting" = "ON": Setting at the unit at opened contact / Signal Extern at closed contact
- "D1 Inverting" = "OFF": Setting at the unit at closed contact / Signal Extern at opened contact

1   Setting "Setpoint1"
ES   External Setpoint e.g. 5 V ≙ 23.8 °C
Se   Sensor

9.10.2.8   Automatic control / speed manual Function ⌐7D¬ (mode ▪2.01▪)

Switch over between automatic control to set target value (depending on the activation: "Setpoint1", "Setpoint2") and the default for "manual operation" set at the device.

If for Analog In 2 "E3 function" is programmed to ⌐2E¬ switch over between "Setpoint1" or "Setpoint2" and external manual operation. With activated manual mode the display constantly changes between "actual value" and value for "manual mode".

Contact at digital input e.g. "Digital In 1"

- "D1 Inverting" = "OFF" Automatic control at opened contact / manual operation at closed contact.
- "D1 Inverting" = "ON": Automatic control at closed contact / manual operation at opened contact.
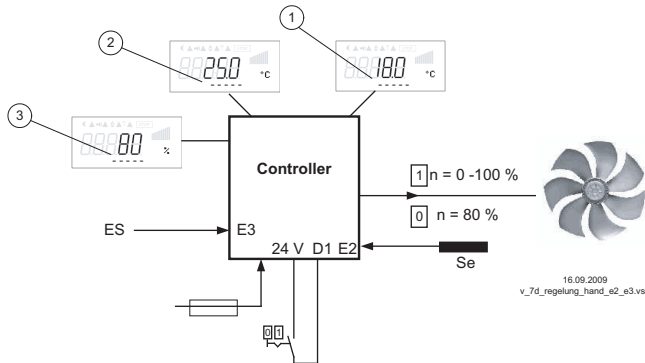
1   Setting "Setpoint1"
2   Setting "Setpoint2"
3   Setting "Speed manual" (depending on device type in: %, Hz, rpm)
EH   Signal for Manual mode extern, E3 Function = ⌐2E¬
Se   Sensor

9.10.2.9   Reverse action of control function (▪2.01▪), Function ⌐8D¬

Switchover between: Increasing modulation during increasing actual-value and increasing modulation during sinking actual-value.

The factory presets for the "Control function" are dependent on the selected Mode of operation (☞ Controller Setup - reverse operation of the control function).

When switching over via a digital input, the device works with the opposite function as set there.

	Settings in Controller Setup
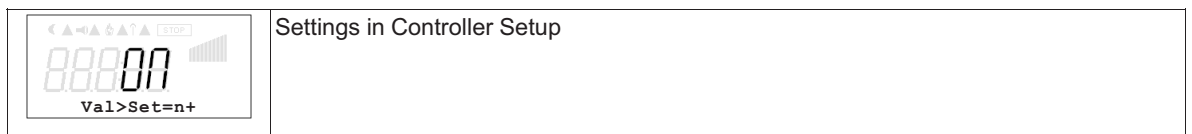
9.10.2.10   Reset, Function ⌐10D¬

Complete re-start of the device.
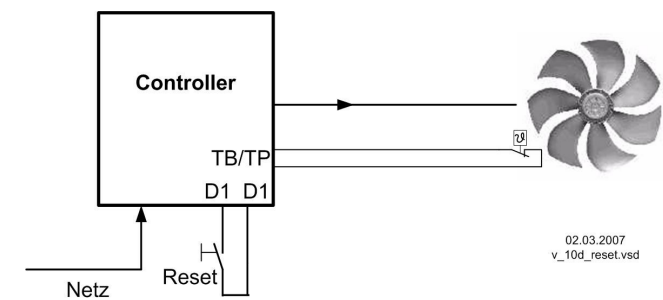
- For "D1 Inverting" = "OFF" both terminals "D1"- "24 V" in normal operation interrupted. Reset after fault by short close.(For"Inverting" = "ON" reverse function).

Contact at digital input e.g. "Digital In 1"

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9.10.2.11   Setting Max. Speed ON / OFF function 11D

The value for "Max Speed" adjusted in menu "Settings", is activated over a digital input. I.e. the unit works independently of the controller function firm with this value.
Contact e.g. at ditgital input "Digital In 1" (depending on device type at terminals "D1" - "D1"or "D1" - "24 V").
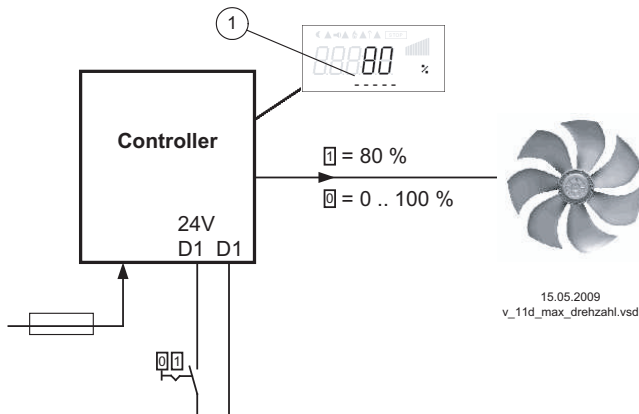
- "D1 Inverting" = "OFF": "Max. Speed" active at closed contact
- "D1 Inverting" = "ON": "Max. Speed" active at opened contact

1   Setting "Max. Speed" (depending on device type in: %, Hz, rpm)

9.10.2.12   Direction of rotation, Function 13D

Switch over "clockwise" rotation and "counterclockwise" rotation. When switching over via a digital input, the device works with the opposite function than the one set in motorsetup.

> **Information**
> If the rotary direction is reversed with an available modulation, it is initially reduced to "0" (disconnected) and subsequently increased back to the default value.

Contact e.g. by digital input "Digital In 1" for factory setting " clockwise rotation."
- "D1 Invertierung" = "OFF": "Clockwise" at opened contact / "Counterclockwise" at closed contact.
- "D1 Invertierung" = "ON ": "Counterclockwise" at opened contact / "Clockwise" at closed contact.

9.10.2.13   "Freeze function" = maintain momentary modulation value, Function 14D

The device continues to work so long independently of the control function with the momentary value of the modulation and/or speed as activated over the digital input.

	Message indicated alternating with the active value "Freeze Function"

Contact at digital input e.g. "Digital In 1"
"D1 Inverting" = "OFF": "Freeze function" at closed contact activ
"D1 Inverting" = "ON": "Freeze function" at opened contact activ

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9.10.3   Configuration of analog inputs "E1"and "E3"

9.10.3.1   Signal adaption E2 and E3
If required, an adaptation of the specification signal / speed characteristic curve is possible

Information
These settings are mostly practical for the operating mode **1.01** with rotational speed specification over an external signal. In operating modes (as of 2.01) this setting is not suited for influencing the regulation process.

E2 Mode	**E2 Mode** ⎡0⎤ = E2 min. / E2 max. without function (factory setting) ⎡1⎤ = Offset / turn ⎡2⎤ = signal range
E2 min.	**E2 min.** Setting range: 0 - 100 % Factory setting: 0 %
E2 max.	**E2 max.** Setting range: 0 - 100 % Factory setting: 100 %
E2 Mode	**E3 Mode** ⎡0⎤ = E2 min. / E2 max. without function (factory setting) ⎡1⎤ = Offset / turn ⎡2⎤ = signal range
E2 min.	**E3 min.** Setting range: 0 - 100 % Factory setting: 0 %
E2 max.	**E3 max.** Setting range: 0 - 100 % Factory setting: 100 %

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ECblue: Example for Mode 1.01 with speed setting signal 0 - 10 V
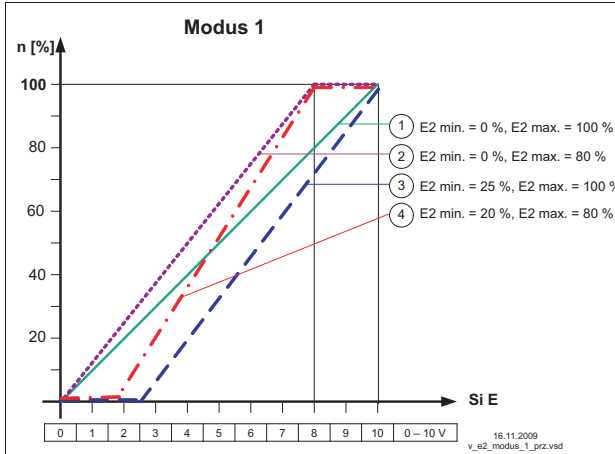
Modus 1
Example: "E2 min." = 20 %
The controller begins only at approx. 20 % higher signal with minimal speed.

Example: "E2 max." = 80 %
Speed rises linear to 100 % speed with 80 % setting signal.
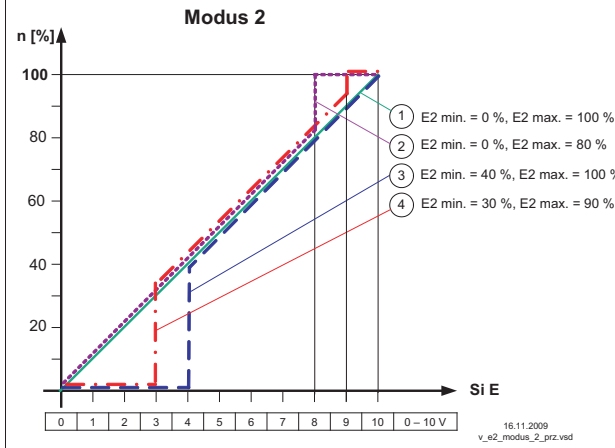
Modus 2
Example: "E2 min." = 30 %
Only with approx. 30 % setting signal the controller begins with approx. 30 % speed.

Example: "E2 max." = 80 %
Over 80 % setting signal the speed is switched to 100 %.

n = speed of motor, Si E = setting signal input

Idealized principle diagrams for setting:
"Min. Speed" = 0 % and "Max. Speed" = 100 %

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Icontrol / Fcontrol Basic: Example for Mode **1.01** with Setting signal 0 - 10 V
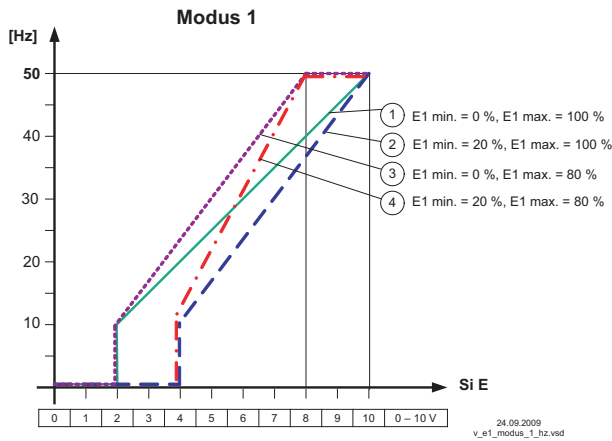
Modus 1

Modus 1
Example: "E1 min." = 20 %
The controller begins only at approx. 20 % higher signal with minimal modulation.

Example: "E1 max." = 80 %
The modulation rises linear to 100 % modulation with 80 % setting signal.
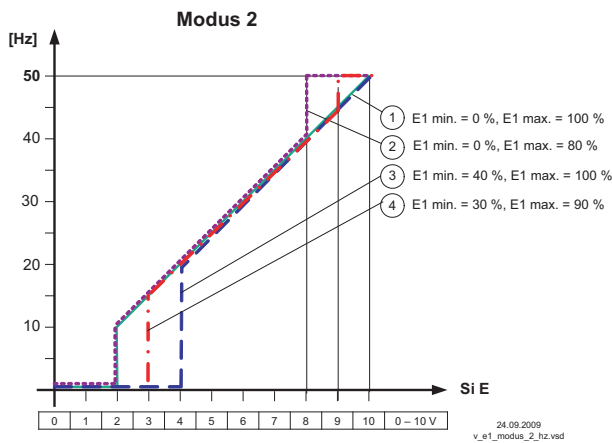
Modus 2

Modus 2
Example: "E1 min." = 30 %
Only with approx. 30 % setting signal the controller begins with approx. 30 % modulation.

Example: "E1 max." = 80 %
Over 80 % setting signal the modulation is switched to 100 % modulation.

Idealized principle diagrams for setting:
"Min. Speed" = 0.0 Hz and "Max. Speed" = 50.0 Hz

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9.10.3.2   Inverting analog inputs "E2" / "E3"

After programming the signal or sensor type, an inversion of the inputs can be carried out.

`OFF` **E2 Inverting**	Factory setting for Inverting inputs = "OFF" (if input activated) (signal: 0 - 10 V, 0 - 20 mA, 4 - 20 mA). For activation using inverted default signals or sensors with inverted output signals proportional to the measurement range, switch inverting to "ON" (Signal: 10 - 0 V, 20 - 0 mA, 20 - 4 mA).
`OFF` **E3 Inverting**	

Example: mode **1.01** speed controller, setting by external signal

0	1	2	3	4	5	6	7	8	9	10	0 – 10 V	OFF
10	9	8	7	6	5	4	3	2	1	0	10 – 0 V	ON
0	2	4	6	8	10	12	14	16	18	20	0 – 20 mA	OFF
20	18	16	14	12	10	8	6	4	2	0	20 – 0 mA	ON
4	5,6	7,2	8,8	10,4	12	13,6	15,2	16,8	18,4	20	4 – 20 mA	OFF
20	18,4	16,8	15,2	13,6	12	10,4	8,8	7,2	5,6	4	20 – 4 mA	ON
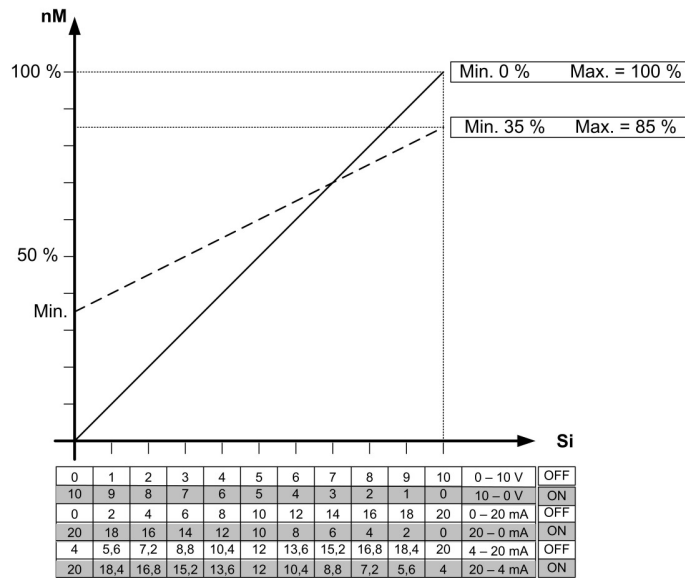
11.05.2007
v_invertierung_anlaog_eingaenge.vsd

nM   Motor speed
Si   Signal
OFF   Inverting = OFF
ON   Inverting = ON

9.10.3.3   "E2" / "E3" Bus mode
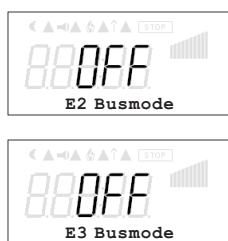
`OFF` **E2 Busmode**	The bus mode of the inputs is set to "OFF" at the factory. When selecting the mode **4.03** (pressure control with outdoor temperature-dependent setpoint compensation and activation by MODBUS) the bus mode for "E2" becomes active, i. e. switched automatically to "ON".
`OFF` **E3 Busmode**	

9.10.4   Function and inverting for relay outputs "K1"

`     1K` **K1 Function**	Various functions can be allocated to the relay outputs "K1". This is preset at the factory for fault indication.
`OFF` **K1 Inverting**	The relay inversion "K1" is set at the factory to "OFF" (when a function is programming). For switching inversion to "ON" (switching behaviour dependent on assigned function). The relays can only pull up basically when the voltage supply of the electronics is working. Three-phase current devices must have at least 2 line phases!

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Function	Description
OFF	No function Relays remain always de-energized
1K	Operating indication. Operation without fault, reports enable "OFF"
2K	Fault indication (factory setting for "K1", non inverting). Energized for operation without fault, for enable "OFF" not energized. De-energized at line, motor and controller fault, Sensor fault dependent on programming, external fault at digital input.
3K	External fault separate with message at digital input (factory setting if terminals bridged)
4K	Limit modulation Over or falling below modulation
5K	Limit "E2" When over or falling below limits for input signal "E2"
6K	Limit "E3" When over or falling below limits for input signal "E3"
For modes as controller higher 2.01	
7K	Setpoint Offset Deviation between actual value and setpoint to high
8K	Activation of second group
For modes as temperature controller with additional functions 2.03	
9K	Heating function Switch ON point: temperature = Setpoint +/- Offset Switch OFF point: Temperature around hysteresis over switch ON point
10K	Cooling function Switch ON point: temperature = Setpoint +/- Offset Switch OFF point: Temperature around hysteresis below switch ON point

ECblue

11 14

K1

17.09.2009
v_relais_k1_11_14.vsd
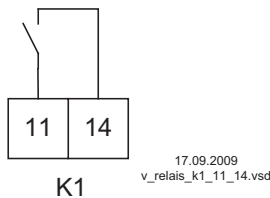
K1
1 = energized, terminals 11 - 14 bridged
0 = de-energized 11 - 14 not bridged

Icontrol / Fcontrol Basic

13 14

K1

10.11.2008
v_relais_k1_13_14.vsd
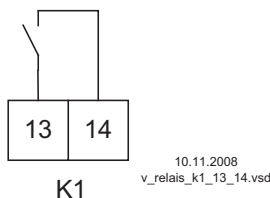
K1
1 = energized, terminals 13 - 14 bridged
0 = de-energized 13-14 not bridged

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Function	Status Controller	K1 1 = energized 0 = de-energized	
		Inverting	
		OFF	ON
1K	Operation without fault, line supply okay	**1**	0
2K	Fault with indication by relay	**0**	1
3K	Ext. Fault at digital input for external fault	**1**	0
4K	Over or falling below modulation	**1**	0
5K	over or falling below limits for input signal "E2"	**1**	0
6K	over or falling below limits for input signal "E3"	**1**	0
7K	setpoint deviation to high	**1**	0

9.10.5   Networking via MODBUS

It is possible to network several devices with each other. The device uses the MODBUS-RTU as the protocol for the RS-485 interface.

247 Bus Address	**Bus Address** The device address (Device-ID) is factory set to the highest available MODBUS address: 247 Thisaddressis reserved for operation with an external terminal and should not be occupied with anything else.
OFF Addressing	**Addressing** Switch addressing to "ON" before setting "address".

Reading and writing parameters

The device supports reading and writing processes for MODBUS Holding Registers. The start address is **0**; the number of registers depends on the device. If the allowable start address or number is exceeded, the device answers with an exception code. The description of the register is device dependent and can be requested from service for the device/version concerned.

9.11   Limits

88888 Limits	**Menu group Limits**

9.11.1   Limit indication depending on modulation

OFF Controller function	Following functions can be allocated to the limit indication	
	OFF	no function
	1L	Indication with the centralized fault of a programmed relay (IO allocation Function 2K). Warning symbol in display, "AL" code in events memory.
	2L	Is merely displayed in the events menu as message "msg".
	In the IO setup, a separate relay can be allocated independent of these settings.	
OFF Level min.	If the modulation exceeds the set "Modulation max" value, this is reported until the set value "Modulation min" has been undercut. Setting range "Modulation min.": "Min. Speed" - "Modulation max." Setting range "Modulation max.": "Modulation min." - "Max. Speed"	
OFF Level max.	The indication is delayed by the time set in "Display delay".	

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◀ ▲•◀▲ ↕▲↑▲ STOP 88888 〜 OFF **Level Delay**	Time delay exceeding "Modulation max." up to indication by relay and alarm symbol. Setting range: 0 - 120 sec. Factory setting: 2 sec.

Example indication by relay "K1":

not inverted
IO Setup: K1 Function = 4K
IO Setup: K1 Inverting = OFF
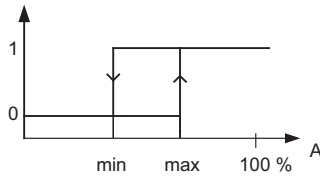
Inverting
IO Setup: K1 Function = 4K
IO Setup: K1 Inverting = OFF

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v_grenzwert_ausst_k1_ni.vsd

A   Modulation

11.05.2007
v_grenzwert_ausst_k1_i.vsd
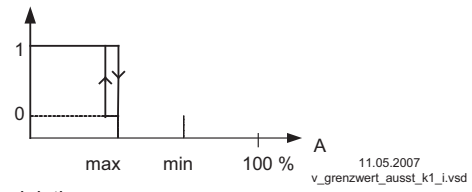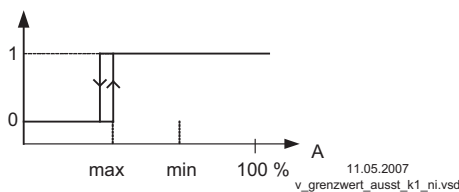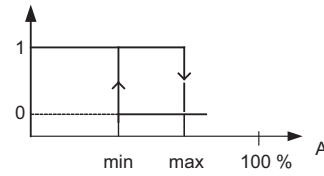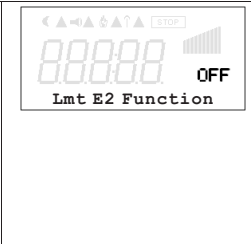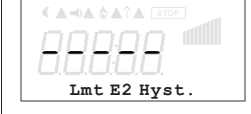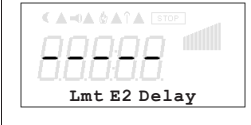
A   Modulation

If "Level min." is higher than "Level max.", the "Level max." switching point is without hysteresi.

9.11.2   Limit indication depending on setting or sensor signal

◀ ▲•◀▲ ↕▲↑▲ STOP 88888 〜 OFF **Lmt E2 Function**	Following functions can be allocated to the limit indication	
	OFF	no function
	1L	Indication with the centralized fault of a programmed relay (IO allocation Function 2K). Warning symbol in display, "AL" code in events memory.
	2L	Is merely displayed in the events menu as message "msg".
	In the IO setup, a separate relay can be allocated independent of these settings.	
◀ ▲•◀▲ ↕▲↑▲ STOP 8888 〜 **GW E2 min.**	Both values for E2 ("E2 min" and "E2 max") can be set independent of each other and act on a relay together if correspondingly programmed. If a function is activated or if a relay is allocated, both settings ("min" and "max") are initially at "OFF". Work can be carried out with one as well as with both limit indicators.	
◀ ▲•◀▲ ↕▲↑▲ STOP 8888 〜 **Lmt E2 max**	The same setting applies to "E3 Min." and "E3 Max.", described below for "E2".	
	Undercutting the signal ("E2 Min").	
	If the signal undercuts the set value "E2 min", this is reported until the set value (plus adjustable hysteresis) has been exceeded once again.	
	Exceeding the signal ("E2 Max.").	
	If the signal exceeds the set value "E2 max", this is reported until the set value (minus hysteresis) has been undercut once again.	
◀ ▲•◀▲ ↕▲↑▲ STOP 8888 〜 **Lmt E2 Hyst.**	**E2 Hysteresis** Hysteresis adjustment in the unit of measure of the programmed input signal.	
◀ ▲•◀▲ ↕▲↑▲ STOP 8888 〜 **Lmt E2 Delay**	**E2 Delay** Time delay exceeding "Modulation max." up to indication by relay and alarm symbol. Setting range: 0 - 120 sec. Factory setting: 2 sec.	

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> **Information**
> Always adjust the value for the maximum input signal higher than the value for the minimum input signal!
> E2 Max. > E2 Min.

Example for a limit indication of default signal or sensor signal to "Analog In 1"
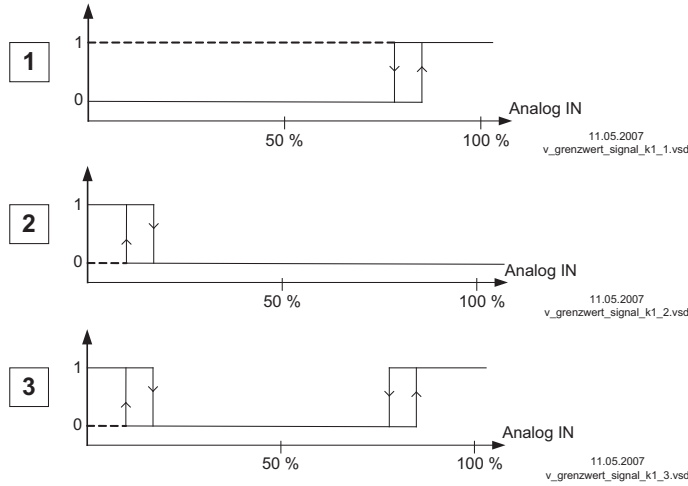
Settings:
- E2 Max.: 80 %
- E2 Min.: OFF
- switching hysteresis 5 % (from 100 %)

Settings:
- E2 Min.: 20 %
- E2 Max.: OFF
- switching hysteresis 5 % (from 100 %)

Settings:
- E2 Min.: 20 %
- E2 Max.: 80 %
- switching hysteresis 5 % (from 100 %)

Terminal "E2" and "GND" alarm via relay "K1" (non-inverted) IO Setup → K1 function: 5 K = limit indicators

9.11.3   Limit indication depending on (offset) to Setpoint

In operating modes as a controller (via **2.01**), two limit indicators can be carried out based on the set target value (Setpoint) and measured actual value (on E2).

Offset Function	Following functions can be allocated to the limit indication	
	OFF	no function
	1L	Indication with the centralized fault of a programmed relay (IO allocation function 2K) warning symbol in display, "AL" code in events memory.
	2L	Is merely displayed in the events menu as message "msg".
	In the IO setup, a separate relay can be allocated independent of these settings.	
Offset 1 / Offset 2	**Offset 1, Offset 2**	
	Both values for Offset 1 and Offset 2 can be set independent of each other and act on a relay together if correspondingly programmed. If a function is activated or if a relay is allocated both settings (Offset 1 and Offset 2) are initially at "OFF".	
	Work can be carried out with one as well as with both limit indicators.	
	"Offset 1" for alarm in case of an exceeding of the max. deviation between actual and target.	
	Switch ON point: actual value = Setpoint +/- offset	
	Swtich OFF point: Actual value by hysteresis under the switch-on point	
	"Offset 2" for alarm in case of an undercutting of the max. deviation between actual and target	
	Switch ON point: actual value = Setpoint +/- offset	
	Swtich OFF point: Actual value by hysteresis over the switch-on point	
Offset Hyst.	**Offset Hysteresis**	
	Hysteresis switch-on point: In temperature regulation + / - 10 K, otherwise sensors 10 % of measurement range	
Offset Delay	**Offset Delay**	
	Time delay until indication through relay and alarm symbol.	
	Setting range: 0 - 120 sec.	
	Factory setting: 2 sec.	

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Example for temperature regulation; for other modes of operation settings in corresponding sensor unit.

Offset 1 for alarm during exceeding

ON = 15°C + 5 K = 20 °C　　　　　　OFF = 20°C - 2 K = 18 °C
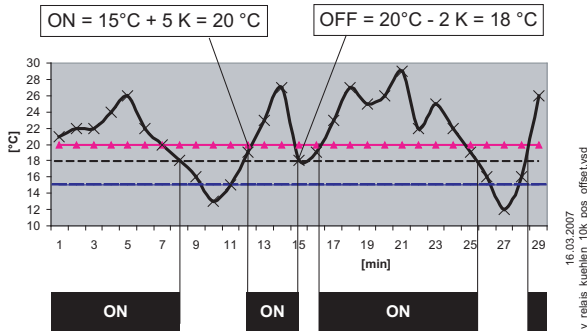
Example: Setpoint 15.0 °C, Offset +5.0 K, Hysteresis 2.0 K

Offset 2 for alarm during undercutting

OFF = 15°C + 2 K = 17 °C　　　　　　ON = 20°C - 5K = 15 °C
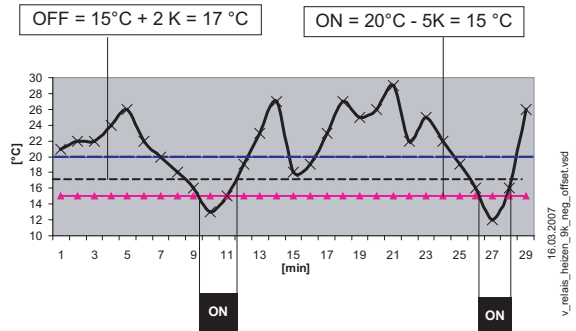
Example: Setpoint 15.0 °C, Offset -5.0 K, Hysteresis 2.0 K

9.12　Motor Setup for AM-PREMIUM in ECblue

	Menu group Motor Setup

9.12.1　Setting for Rampup time and Rampdown time

By separate menus for Rampup time and Rampdown time an adjustment is possible to individual system conditions.
This function is switched behind the actual controller function.

	Rampup time Time setting in which the automatic controller output from 0 % to 100 % rises. Setting range: 0...250 sec. Factory setting: 10 / 20 / 30 / 40 sec. (depending on device type)
	Rampdown time Time setting in which the automatic controller output from 100 % to 0 % reduces. Setting range: 0...250 sec. Factory setting: 10 / 20 / 30 / 40 sec. (depending on device type)

1　*external Signal*
2　*Setting*
3　*Rampup time*
4　*Rampdown time*

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9.12.2 Suppression of speeds
Suppression of up to three speed ranges.
Under certain circumstances, it is possible to prevent disturbing noises that can arise at certain speeds due to resonances.

Example for suppression of 2 ranges (Idealized principle diagram)

Setting depending on device type in: %, Hz, rpm

A   Modulation
S   Setpoint
R   Pband
D   Speed controller: setting signal
P   P-controller: control deviation

 Suppression1	→	Factory setting no suppression active = "OFF"	→	 **Suppression1**
 Range1 min.	→	Setting for "Range1 min." Setting range: "Shutdown Freq." - "Range 1 max."	→	 **Range1 min.**
 Range1 max.	→	Setting for "Range1 max." Setting range: "Range 1 max." - "Max. Frequency"	→	 **Range1 max.**
 Suppression2	→	Identical procedures for Suppression2 and Suppression3, as far as desired	→	etc.

9.13   Motor Setup for AM-PREMIUM in Fcontrol Basic

 Motor Setup	**Menu group Motor Setup**

> ⚠ **Attention!**
> **Settings for U/f characteristic may only be made when no motor modulation is present!**

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9.13.1   Setting motor rated current

◁▲◁▲◁▲↻▲↻▲ ⬛STOP⬛ **0.0** A MotorRatedCurr.	**MotorRatedCurr.** Possible setting for the motor rated current. The setting for the "DC brake level" (☞ setting brake behaviour) refers to this setting. Setting range: 0.0...device rated current / A Factory setting: device rated current

9.13.2   Setting motor rated voltage

◁▲◁▲◁▲↻▲↻▲ ⬛STOP⬛ **400** V MotorRatedVolt.	**MotorRatedVolt.** **When commissioning, you must set the motor to the rated voltage stated on the rating plate.** An adaptation can be made if the motor rated-voltage as the applied mains voltage is lower (e.g. 3 ~ 230 V motor on 3 ~ 400 V mains). Verify the output voltage using suitable measuring instruments. Setting range: 0...500 V Factory setting: 400 V

9.13.3   Adjustment of the U/f curve

ℹ️ | **Information**
The device comes supplied with a preprogrammed square characteristic curve for the operation of fans.
In the case of voltage-controllable motors and square load torque-moments (e.g. fans and pump operation), an optimal speed control is generally achieved through this.
In systems in which high dynamics are required, switchover to a linear characteristic must take place. Generally speaking, if the load characteristic is not known as a definite value, the linear characteristic should be set. In the case of linear characteristic curves, the motor achieves full torque throughout the entire speed range. For this, a thermal overload of the motor must be prevented through suitable measures (complete motor protection through using thermocontact or PTC thermistor-monitoring).

◁▲◁▲◁▲↻▲↻▲ ⬛STOP⬛ **48.5** Hz Edgefrequency	**Edgefrequency** The maximum output voltage is attained during break edge frequency. Adjustment range: 1.0 - 120.0 Hz Factory setting: 48.5 Hz
	In the case of special settings with "Edge frequency" > "Max. frequency", due to higher power losses it is possible that automatic power reduction occurs (☞ Messages and trouble shooting "Temp. Manager").
◁▲◁▲◁▲↻▲↻▲ ⬛STOP⬛ **50.0** Hz Max. Frequency	**Max. Frequency** Above the Edgefrequency, the frequency is merely increased up to the Maximum frequency. Adjustment range: 1.0 - 120 Hz Factory setting: 50.0 Hz
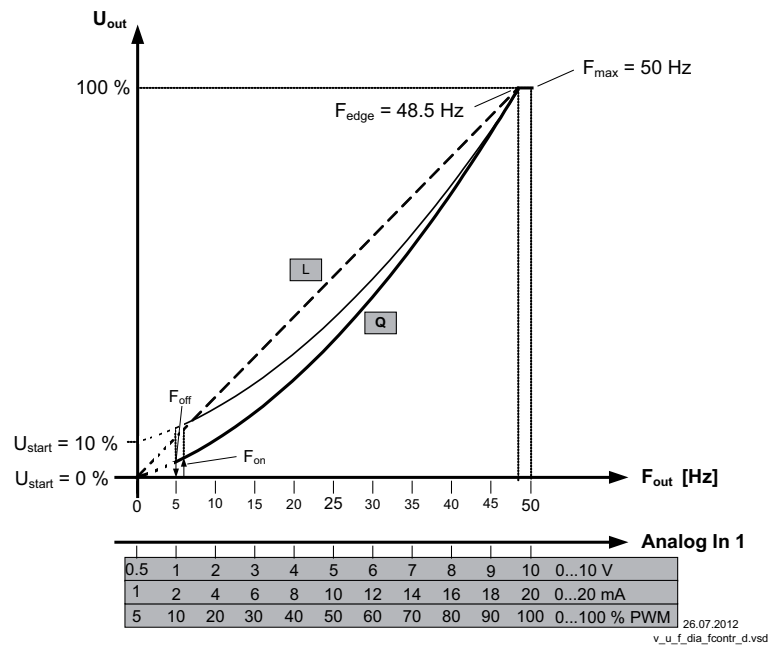
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Uout   Output voltage
Fout: Output frequency
Analog In   Speed setting signal (0 - 10 V, 0...20 mA, 0...100 % PWM)
Ustart   Startvoltage
Foff   Shutdown Freq.
Fon: Switch on Freq.
Fedge   Edgefrequency
Fmax   Max. Frequency
L   linear
Q   Square (factory setting)

Due to technical reasons the output voltage amounts to approx. max. 95 % of the applied mains voltage.
In order to still be able to achieve the maximum airflow of the connected fans, an increase of the maximum frequency is possible for our motors. For this, a current increase must be included in the calculation. It is necessary to optimize monitoring of motor current, output voltage, and speed using suitable measuring instruments.
The factory set values are for voltage controllable external rotor motors with 400 V / 50 Hz.
After verification of the motor specifications, adjustments are to be adapted, if applicable.

Motor rated voltage (see Rating plate)	Setting "Edgefrequency"	Setting "Max. Frequency"
3 ~ 400 V, 50 Hz	48.5 Hz	50 Hz
3 ~ 400 V, 50/60 Hz	48.5 Hz	60 Hz
3 ~ 400 V, 60 Hz	57 Hz	60 Hz

Startvoltage	**Startvoltage** The start voltage is used to apply enough torque to the motors to insure they will run at low speed. Attention! In order to prevent over current and unnecessarily high thermal load of the motor, do not select to high a setting. Adjustment range: 0 - 15 % (percentage of the maximum output voltage) Factory setting: 0 %
VF quadratic	**VF quadratic** U/f curve linear or square Factory preprogrammed square characteristic curve "UF square" = "ON" for the operation of voltage controllable fans. For operation with linear curve "UF quadratic" = "OFF"

9.13.4   Setting for Rampup time and Rampdown time

By separate menus for Rampup time and Rampdown time an adjustment is possible to individual system conditions.
This function is switched behind the actual controller function.

40 sec Rampup time	**Rampup time** Time setting in which the automatic controller output from 0 % to 100 % rises. Setting range: 0...250 sec. Factory setting: 10 / 20 / 30 / 40 sec. (depending on device type)
40 sec Rampdown time	**Rampdown time** Time setting in which the automatic controller output from 100 % to 0 % reduces. Setting range: 0...250 sec. Factory setting: 10 / 20 / 30 / 40 sec. (depending on device type)

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1   *external Signal*
2   *Setting*
3   *Rampup time*
4   *Rampdown time*

9.13.5   Setting Rolling direct.

Attention!
It is essential to check the direction of rotation of the fan during the initial commissioning. To do this, note the direction of the arrow on the fan housing. We will not be responsible under any circumstances for warrantee for damage caused because the direction of rotation is wrong!
When connected in accordance with the connection diagram, the standard rotary direction "RIGHT" = CW results under factory settings. A change of direction is feasible by exchanging the phase sequence in the motor connection or through reprogramming.

CW Rotat. Direction	By selection of the parameter "Direction of rotation" and following pressing the **P** key, the direction of rotation can changed to CCW for anti-"clockwise" = CCW direction of rotation. Pressing the **P** key causes the value that has been set to be accepted.	CCW Rotat. Direction

If the rotary direction is reversed with an available modulation, it is initially reduced to "0" (disconnected) and subsequently increased back to the default value.

9.13.6   Setting Current limit

120 % Current limit	As an additional safety function the device has a current limit, this can be adapted if necessary. The setting refers to the motor rated current of the device (100 % = setting: MotorRatedCurr.). On exceeding the percentage value set here, the modulation is reduced until the set current is set again. This prevents overloading of the motor. Setting range: 100...130 % Factory setting: 120 %
28.8 °C E1 Actual	Active current limit is signaled by a bright triangle in the display

9.13.7   Setting brake function

DC brake mode	**DC brake mode** Setting function of DC-brake for frequency inverters. For units that come with a factory engaged DC brake mode (if extant, ☞ DC brake mode setting), simultaneously activating the "DC brake mode " only makes sense in exceptional cases. **0** = no brake function (factory setting). **1** = brakes before start (before modulation is returnd) If, under certain circumstances, the modulation switches back on while the motor is still rotating fast, this can result in a re-supply of the inverter's "overcurrent disconnection". The brake function can be activated to prevent this. This is then always active for an adjustable period before triggering starts. I.e., the brake function is always initiated before modulation after has it returned to "0". The suitable adjustments depend on the centrifugal force of the motor and the conditions in the installation. **2** = Special function, brakes before stop (as soon as modulation "0"). The motor does not run out up to stop. The motor is braked actively, as soon as no modulation is present (Setpoint = "0" or Enable = "OFF") . Test required. The "min. speed" adjustment must be set to "0". Attention! With the frequently one behind the other following DC bracings it can come to strong heating up of the motor. To prevent any overheating, motor protection in the form of a temperature limiter installed in the motor is required (☞ motor protection).
DC brake time	**DC brake time** Maximal length of DC-brake for frequency inverters. If the braking is activated, the d.c. brake torque is active for this time. Setting range: 0...250 sec. factory setting: 5 / 10 sec. (depending on device type)
DC brake level	**DC brake level** Direct-current level, generated for braking. The higher this value, the greater the braking effect. The setting "DC brake level" refers in % to the value set in "MotorRated Curr.". Setting range: 25, 50, 75, 100 % Factory setting: 25 % The setting is dependent on the size of the fan/motor. Attention! Too high values can lead to a considerable braking effect. Same"setting"affects also the function Motorheating.

9.13.8   Motorheating
In order to avoid a sticking or a freezing of standing fans in cold environment, the "motor heating system" can be switched on.

Motorheating	The motor heating function corresponds to the braking function in which a direct current puts the motor into standstill. The height of the "brake level" is set in "Motor Setup". A current is impressed here, which does not permit any rotation of the fans. The value required to prevent any freezing depends on the ambient conditions and the connected motor's technical data. The setting effected is to be checked under real conditions. The higher the setting, the greater the heating output generated in the motor (heat dissipation). The motor heating or stationary heating can only become active, where there is no given modulation as a result of regulation. To prevent any overheating, motor protection in the form of thermal protection installed in the motor is required (☞ motor protection). The heating function is switched off when the motor protection function of the regulating unit responds. **OFF** = motor heating switched off (at the factory) **ON** = The motor heating becomes active automatically when there is no device modulation.

9.13.9   Suppression of speeds
Suppression of up to three speed ranges.
Under certain circumstances, it is possible to prevent disturbing noises that can arise at certain speeds due to resonances.

Example for suppression of 2 ranges (Idealized principle diagram)

Setting depending on device type
in: %, Hz, rpm

A   Modulation
S   Setpoint
R   Pband
D   Speed controller: setting signal
P   P-controller: control deviation

OFF **Suppression1**	→	Factory setting no suppression active = "OFF"	→	ON **Suppression1**
0.0.0.0.0. **Range1 min.**	→	Setting for "Range1 min." Setting range: "Shutdown Freq." - "Range 1 max."	→	15 % **Range1 min.**
0.0.0.0.0. **Range1 max.**	→	Setting for "Range1 max." Setting range: "Range 1 max." - "Max. Frequency"	→	35 % **Range1 max.**
OFF **Suppression2**	→	Identical procedures for Suppression2 and Suppression3, as far as desired	→	etc.

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9.14   Motor Setup for AM-PREMIUM in Icontrol Basic

Motor Setup	**Menu group Motor Setup**
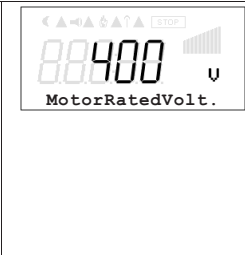
⚠️ **Attention!**
Settings for U/f characteristic may only be made when no motor modulation is present!

9.14.1   Setting motor rated current

MotorRatedCurr.	**MotorRatedCurr.** **When commissioning, you must set the motor to the rated current stated on the rating plate.** The setting for the "DC brake level" (☞ setting brake behaviour) refers to this setting. Setting range: 0.0...device rated current / A Factory setting: device rated current
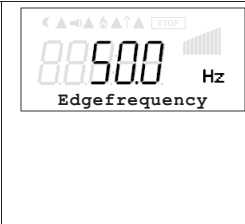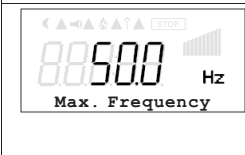
9.14.2   Setting motor rated voltage

MotorRatedVolt.	**MotorRatedVolt.** **When commissioning, you must set the motor to the rated voltage stated on the rating plate.** An adaptation can be made if the motor rated-voltage as the applied mains voltage is lower (e.g. 3 ~ 230 V motor on 3 ~ 400 V mains). Verify the output voltage using suitable measuring instruments. Setting range: 0...500 V Factory setting: 400 V

9.14.3   Adjustment of the U/f curve

⚠️ **Attention!**
Settings for U/f characteristic may only be made when no motor modulation is present!

Edgefrequency	**Edgefrequency** The maximum output voltage is attained during break edge frequency. Adjustment range: 1.0 - 120.0 Hz Factory setting: 50.0 Hz In the case of special settings with "Edge frequency" > "Max. frequency", due to higher power losses it is possible that automatic power reduction occurs (☞ Messages and trouble shooting "Temp. Manager").
Max. Frequency	**Max. Frequency** Above the Edgefrequency, the frequency is merely increased up to the Maximum frequency. Adjustment range: 1.0 - 120.0 Hz Factory setting: 50.0 Hz

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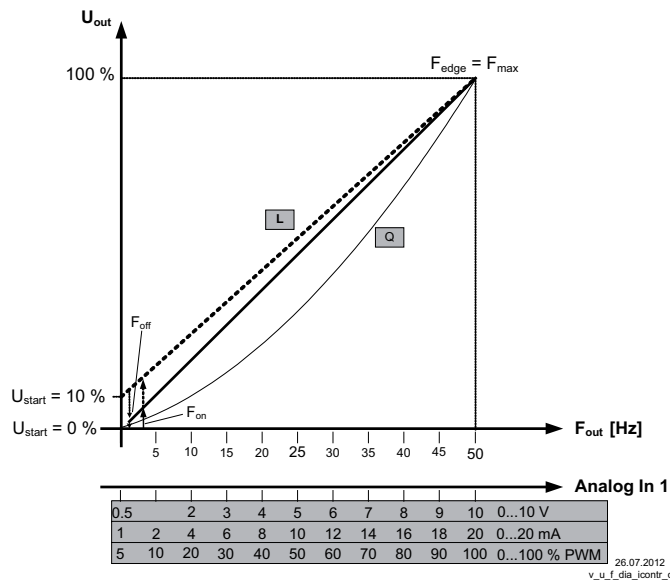
Uout   Output voltage
Fout: Output frequency
Analog In   Speed setting signal (0 - 10 V, 0...20 mA, 0...100 % PWM)
Ustart   Startvoltage
Foff   Shutdown Freq.
Fon: Switch on Freq.
Fedge   Edgefrequency
Fmax   Max. Frequency
L   Linear (factory setting)
Q   Square

Startvoltage	**Startvoltage** The start voltage is used to apply enough torque to the motors to insure they will run at low speed. Attention! In order to prevent over current and unnecessarily high thermal load of the motor, do not select to high a setting. Adjustment range: 0 - 25 % (percentage of the maximum output voltage) Factory setting: 0 %
VF quadratic	**VF quadratic** U/f curve linear or square Factory setting"UF quadratic" = "OFF" i.e linear curve pre-programmed. **In the case of linear characteristic curves, the motor achieves full torque throughout the entire speed range. For fans operation a optimal speed control is generally achieved through this.** Switching over to square characteristic curve (only permissible in fans and pumps with square torque moment) might make sense in order to reduce the electromagnetic motor noises. "UF square"= "ON"

9.14.4   Setting for Rampup time and Rampdown time

By separate menus for Rampup time and Rampdown time an adjustment is possible to individual system conditions.
This function is switched behind the actual controller function.

Rampup time	**Rampup time** Time setting in which the automatic controller output from 0 % to 100 % rises. Setting range: 0...250 sec. Factory setting: 10 / 20 / 30 / 40 sec. (depending on device type)
Rampdown time	**Rampdown time** Time setting in which the automatic controller output from 100 % to 0 % reduces. Setting range: 0...250 sec. Factory setting: 10 / 20 / 30 / 40 sec. (depending on device type)

1   external Signal
2   Setting
3   Rampup time
4   Rampdown time

9.14.5   Setting switching Frequency

	Switching frequency Possible motor noises can be reduced by adjusting the clock frequency (16 kHz = upper limit of the human acoustic range). Setting range: 6 (only FSDM32 - 62) / 8.0 / 10.0 / 16.0 kHz Setting range: FSDM2.6 - 25 = 8.0 kHz / FSDM32 - 62: = 6.0 kHz

Information
- This fixed switching frequency setting is only effective if the automatic switching frequency changeover is not activated (see "Auto. Switchfreq").
- **Increasing of clock frequency only possible by reducing maximal load**. (☞Maximum load depending on clock frequency and ambient temperature).

9.14.6   Setting Rolling direct.

Attention!
It is essential to check the direction of rotation of the fan during the initial commissioning. To do this, note the direction of the arrow on the fan housing. We will not be responsible under any circumstances for warrantee for damage caused because the direction of rotation is wrong!
When connected in accordance with the connection diagram, the standard rotary direction "RIGHT" = CW results under factory settings. A change of direction is feasible by exchanging the phase sequence in the motor connection or through reprogramming.

	By selection of the parameter "Direction of rotation" and following pressing the **P** key, the direction of rotation can changed to CCW for anti-"clockwise" = CCW direction of rotation. Pressing the **P** key causes the value that has been set to be accepted.	

If the rotary direction is reversed with an available modulation, it is initially reduced to "0" (disconnected) and subsequently increased back to the default value.

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9.14.7   Setting Current limit

120 % Current limit	As an additional safety function the device has a current limit, this can be adapted if necessary. The setting refers to the motor rated current of the device (100 % = setting: MotorRatedCurr.). On exceeding the percentage value set here, the modulation is reduced until the set current is set again. This prevents overloading of the motor. Setting range: 100...130 % Factory setting: 120 %
28.8 °C E1 Actual	Active current limit is signaled by a bright triangle in the display

9.14.8   Setting brake function

0 DC brake mode	**DC brake mode** Setting function of DC-brake for frequency inverters. For units that come with a factory engaged DC brake mode (if extant, ☞ DC brake mode setting), simultaneously activating the "DC brake mode " only makes sense in exceptional cases. **0** = no brake function (factory setting). **1** = brakes before start (before modulation is returnd) If, under certain circumstances, the modulation switches back on while the motor is still rotating fast, this can result in a re-supply of the inverter's "overcurrent disconnection". The brake function can be activated to prevent this. This is then always active for an adjustable period before triggering starts. I.e., the brake function is always initiated before modulation after has it returned to "0". The suitable adjustments depend on the centrifugal force of the motor and the conditions in the installation. **2** = Special function, brakes before stop (as soon as modulation "0"). The motor does not run out up to stop. The motor is braked actively, as soon as no modulation is present (Setpoint = "0" or Enable = "OFF") . Test required. The "min. speed" adjustment must be set to "0". Attention! With the frequently one behind the other following DC bracings it can come to strong heating up of the motor. To prevent any overheating, motor protection in the form of a temperature limiter installed in the motor is required (☞ motor protection).
5 sec DC brake time	**DC brake time** Maximal length of DC-brake for frequency inverters. If the braking is activated, the d.c. brake torque is active for this time. Setting range: 0...250 sec. factory setting: 5 / 10 sec. (depending on device type)
25 % DC brake level	**DC brake level** Direct-current level, generated for braking. The higher this value, the greater the braking effect. The setting "DC brake level" refers in % to the value set in "MotorRated Curr.". Setting range: 25, 50, 75, 100 % Factory setting: 25 % The setting is dependent on the size of the fan/motor. Attention! Too high values can lead to a considerable braking effect. Same"setting"affects also the function Motorheating.

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9.14.9 Setting Quench mode

If, under certain circumstances, the modulation switches back on while the motor is still rotating fast, this can result in a re-supply of the inverter's "overcurrent disconnection".

The quench modus is available to prevent this from happening ("quench" = synchronizing the rotating magnetic field generated by the frequency inverter with the momentary speed of the triggered motor). If this function is activated, the frequency inverter's rotating magnetic-field speed is synchronized with the motor's field at the start of every triggering (nominal value and modulation must have been „0" beforehand). Switchover into "normal mode" is automatic after the synchronization is completed.

Attention!

Due to the transient motor triggering with maximum frequency at reduced output voltage necessary for the quench mode, short-term start-up can occur in a stationary motor with low centrifugal force.

The quench function can be combined with motor braking (DC brake mode). However, running both functions successively increases the time span until the motor is reaccelerated. For normal use, it is recommended to use only the quench mode.

	Selection of function for Quench mode **ON** = Ouench mode ON (factory setting) **OFF** = Ouench mode OFF

9.14.10 Setting Overmodulation

In the as-delivered state the maximum output voltage for operation without overmodulation is approx. 95 % of the applied mains voltage.

In operation with overmodulation the maximum output voltage can reach about the level of the applied mains voltage. Since resonance vibrations can occur in operation with overmodulation, the appropriate instructions in the motor or fan documentation must be observed!

	OFF = Overmodulation switched off (factory setting) **ON** = Overmodulation switched on

Attention!

- **In operation with overmodulation, you must make sure that resonance vibrations cannot increase. Speed ranges (frequencies) can be faded out in the following settings.**
- **The notes on mechanical vibrations and operation with overmodulation in the assembly and operating manual of the drive must be observed!**

9.14.11 Motorheating

In order to avoid a sticking or a freezing of standing fans in cold environment, the "motor heating system" can be switched on.

	The motor heating function corresponds to the braking function in which a direct current puts the motor into standstill. The height of the "brake level" is set in "Motor Setup".
	A current is impressed here, which does not permit any rotation of the fans. The value required to prevent any freezing depends on the ambient conditions and the connected motor's technical data.
	The setting effected is to be checked under real conditions. The higher the setting, the greater the heating output generated in the motor (heat dissipation). The motor heating or stationary heating can only become active, where there is no given modulation as a result of regulation.
	To prevent any overheating, motor protection in the form of thermal protection installed in the motor is required (☞ motor protection). The heating function is switched off when the motor protection function of the regulating unit responds.
	OFF = motor heating switched off (at the factory)
	ON = The motor heating becomes active automatically when there is no device modulation.

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9.14.12   Suppression of speeds
Suppression of up to three speed ranges.
Under certain circumstances, it is possible to prevent disturbing noises that can arise at certain speeds due to resonances.

Example for suppression of 2 ranges (Idealized principle diagram)

Setting depending on device type
in: %, Hz, rpm

A   Modulation
S   Setpoint
R   Pband
D   Speed controller: setting signal
P   P-controller: control deviation

OFF Suppression1	→	Factory setting no suppression active = "OFF"	→	**ON** Suppression1
0.0.0.0.0 Range1 min.	→	Setting for "Range1 min." Setting range: "Shutdown Freq." - "Range 1 max."	→	**15** % Range1 min.
0.0.0.0.0 Range1 max.	→	Setting for "Range1 max." Setting range: "Range 1 max." - "Max. Frequency"	→	**35** % Range1 max.
OFF Suppression2	→	Identical procedures for Suppression2 and Suppression3, as far as desired	→	etc.

10 Menu tables

10.1 Menu table for AM-PREMIUM in ECblue Basic

Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
Parameter					**Factory setting**					
					Start					
PIN input	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Language	GB	GB	GB	GB	GB	GB	GB	GB	GB	
Reset	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	
ECblue Premium	8.13	8.13	8.13	8.13	8.13	8.13	8.13	8.13	8.13	
Basic Version	13.27	13.27	13.27	13.27	13.27	13.27	13.27	13.27	13.27	
SN:	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	
					Info					
Actual value E2-E3				-2.4 °C						
Control value (only 2.04, 3.03, 3.04)		30.0 °C				12.0 bar 22.6 °C				
E2 Actual	- - - - -	30.0 °C	30.0 °C	30.0 °C	10.0 bar 9.5 °C	10.0 bar 9.5 °C	88.7 Pa	712 m³h	0.45 m/s	
E3 Actual	- - - - -	30.0 °C	- - - - -	30.0 °C	- - - - -	10.0 bar 9.5 °C	21.0 °C	21.0 °C	- - - - -	
Setpoint1		20.0 °C	5.0 °C	0.0 °C	12.0 bar 35.0°C	12.0 bar 35.0°C	100 Pa	530 m³h	0.50 m/s	
Setpoint control (only 4.02, 4.03, 5.02)							100 Pa	530 m³h		
Speed	0 rpm	0 rpm	0 rpm	0 rpm	0 rpm	0 rpm	0 rpm	0 rpm	0 rpm	
Motor current	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	
Set external1	0 rpm									
Msco		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
					Setting					
Set Intern1	200 rpm									
Set Intern2	- - - - --									
Setpoint1		20.0 °C	5.0 °C	0.0 °C	12.0 bar 35.0°C	12.0 bar 35.0°C	100 Pa	530 m³h	0.50 m/s	
Setpoint2		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Pband		5.0 K	20.0 K	5.0 K	5.0 bar 7.0 °C	5.0 bar 7.0 °C	100 Pa	530 m³h	0.50 m/s	
Min. Speed *	0 rpm	0 rpm	0 rpm	0 rpm	0 %	0 %	0 rpm	0 rpm	0 rpm	
Max. Speed *	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	
Set external1	ON									
Manual mode		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Speed manual		200 rpm	200 rpm	200 rpm	200 rpm	200 rpm	200 rpm	200 rpm	200 rpm	
Offset AnalogOut		2.03 = 0.0 K								

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Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
Parameter						**Factory setting**				
Pband AnalogOut		2.03 = 2.0 K								
Min. AnalogOut		2.03 = 0 %								
Max. AnalogOut		2.03 = 100 %								
OffsetDigitalOut		2.03 = -1.0 K								
Hyst.DigitalOut		2.03 = 1.0 K								
Alarm Minimum		2.03 = 0.0 °C								
Alarm Maximum		2.03 = 40.0 °C								
T-Band SA							4.02 + 4.03 = 30.0 K	5.02 = 30.0 K		
T-Start SA							4.02 + 4.03 = 15.0 °C	5.02 = 15.0 °C		
P-Min SA							4.02 + 4.03 = 70.0 Pa	5.02 = 70.0 m³h		
					Events					
					Base setup					
Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	
E2 Analog In	0 - 10 V	KTY	KTY	KTY	0-30 MBG	0-30 MBG	DSG200	DSG200	0-1 MAL	
E2 Refrigerant (only 3.02 and 3.04)					R503	R503				
E2 K-Factor								75		
E2 Min.		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
E2 Max.		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
E2 Decimals		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
E2 Unit		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
E2 Offset		0.0 K	0.0 K	0.0 K	0.0 bar 0.0 K	0.0 bar 0.0 K	0.0 Pa	0.0 Pa	0.0 m/s	
E3 Function	OFF	OFF 2.04 = 4E	OFF	5E	OFF	4E	4.02 + 4.03 = 6E	5.02 = 6E	OFF	
E3 Analog In	- - - - -	- - - - -			- - - - -	0-30 MBG	4.02 = TF 4.03 = Bus	5.02 = TF	OFF	
E3 Refrigerant (only 3.04)		- - - - -				R503				
E3 K-Factor								75		
E3 Min.		- - - - -			- - - - -	- - - - -	4.03 = - 35.0 °C	- - - - -	- - - - -	

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Mode Parameter	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
					Factory setting					
E3 Max.		- - - - -			- - - - -	- - - - -	4.03 = 65.0 °C	- - - - -	- - - - -	
E3 Decimals		- - - - -			- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
E3 Unit		- - - - -			- - - - -	- - - - -	4.03 = °C	- - - - -	- - - - -	
E3 Offset		- - - - -			- - - - -	0.0 bar 0.0 K	4.02 + 4.03 = 0.0 K	5.02 = 0.0 K	- - - - -	
					Controller Setup					
PIN Protection	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Set protection	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Save User Setup	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Alarm sensors		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Limit	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Min. speed cut off		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Group 2 ON value	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
nmin at Group2	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Val > Set=n+		ON	ON	ON	ON	ON	OFF	OFF	OFF	
Type of control		P	P	P	P	P	Pid	Pid	Pid	
KP		50 %	50 %	50 %	50 %	50 %	50 %	50 %	50 %	
KI		50 %	50 %	50 %	50 %	50 %	50 %	50 %	50 %	
KD		50 %	50 %	50 %	50 %	50 %	50 %	50 %	50 %	
TI		0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
LED Mode	ON	ON	ON	ON	ON	ON	ON	ON	ON	
Watchdog Mode	0	0	0	0	0	0	0	0	0	
Watchdog Time	0 sec	0 sec	0 sec	0 sec	0 sec	0 sec	0 sec	0 sec	0 sec	
Watchdog Speed	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	1800 rpm	
					IO Setup					
A Function	1A	1A (2.03 = 6A)	1A	1A	1A	1A	1A	1A	1A	
A min.	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	
A max.	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	
A Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
D1 Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF 4.03 = 1D	OFF	OFF	
D1 Inverting	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - 4.03 = OFF	- - - - -	- - - - -	
D1 Busmode	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - 4.03 = ON	- - - - -	- - - - -	
D2 Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF 4.03 = 5D	OFF	OFF	
D2 Inverting	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - 4.03 = OFF	- - - - -	- - - - -	

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Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
Parameter					**Factory setting**					
D2 Busmode	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - 4.03 = ON	- - - - -	- - - - -	
E2 Mode	0	0	0	0	0	0	0	0	0	
E2 min.	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
E2 max.	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	
E2 Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
E2 Busmode	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
E3 Mode	0	0	0	0	0	0	0	0	0	
E3 min.	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
E3 max.	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	
E3 Inverting	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
E3 Busmode	OFF	OFF	OFF	OFF	OFF	OFF	OFF 4.03 = ON	OFF	OFF	
K1 Function	1K	1K (2.03 = 2K)	1K	1K	1K	1K	1K	1K	1K	
K1 Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Bus Address	247	247	247	247	247	247	247	247	247	
Addressing	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
UART Baudrate	19200	19200	19200	19200	19200	19200	19200	19200	19200	
UART Mode	8E1	8E1	8E1	8E1	8E1	8E1	8E1	8E1	8E1	
					Limits					
Level Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Level min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Level max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Level Delay	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E2 Function	OFF	OFF (2.03 = 1L)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Lmt E2 min.	- - - - -	- - - - - 2.03 = 0.0 °C	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E2 max.	- - - - -	- - - - - 2.03 = 40.0 °C	- - - - -	- - - - -	- - - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E2 Hyst.	- - - - -	- - - - - 2.03 = 1.0 K	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E2 Delay	- - - - -	- - - - - 2.03 = 2 sec.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E3 Function	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E3 min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E3 max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
GW E3 Hysteresis	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E3 Del.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Offset Function		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Offset 1		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Offset 2		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	

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Mode Parameter	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
					Factory setting					
Offset Hyst.		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Offset Delay		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
					Motor Setup					
Rampup time*	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	
Rampdown time*	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	
Suppression1 *	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range1 min. *	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Range1 max. *	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Suppression2 *	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range2 min. *	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Range2 max. *	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Suppression3 *	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range3 min. *	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Range3 max. *	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
					Diagnostic					
OTC	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	
OTM	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	
DC-Voltage	415 V	415 V	415 V	415 V	415 V	415 V	415 V	415 V	415 V	
Line voltage	240 V	240 V	240 V	240 V	240 V	240 V	240 V	240 V	240 V	
Heatsink	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	
Capacitor	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	
E2-KTY	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	
E2-Current	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	
E2-Voltage	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	
E3-KTY	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	
E3-Current	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	
E3-Voltage	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	
D1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
D2	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
K1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
* Factory setting depending on motor, changed settings are not put back on activation of factory setting!										

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10.2 Menu table for AM-PREMIUM in Icontrol / Fcontrol Basic

Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
Parameter					Factory setting *					
Start										
PIN input	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Language	GB	GB	GB	GB	GB	GB	GB	GB	GB	
Reset	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	
AM-PREMIUM	8.13	8.13	8.13	8.13	8.13	8.13	8.13	8.13	8.13	
Basic Version	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	
SN:	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	1727393-6FF33	
Info										
Actual value E2-E3				-2.4 °C						
Control value (only 2.04, 3.03, 3.04)		30.0 °C				12.0 bar 22.6 °C				
E2 Actual	- - - - -	30.0 °C	30.0 °C	30.0 °C	10.0 bar 9.5 °C	10.0 bar 9.5 °C	88.7 Pa	712 m^{3}h	0.45 m/s	
E3 Actual	- - - - -	30.0 °C	- - - - -	30.0 °C	- - - - -	10.0 bar 9.5 °C	21.0 °C	21.0 °C	- - - - -	
Setpoint1		20.0 °C	5.0 °C	0.0 °C	12.0 bar 35.0 °C	12.0 bar 35.0 °C	100 Pa	530 m^{3}h	0.50 m/s	
Setpoint control (only 4.02, 4.03, 5.02)							100 Pa	530 m^{3}h		
Frequency	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	
Motor current	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	0.0 A	
Set external1	0.0 Hz									
Msco		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Setting										
Set Intern1	50.0 Hz									
Set Intern2	- - - - - -									
Setpoint1		20.0 °C	5.0 °C	0.0 °C	12.0 bar 35.0 °C	12.0 bar 35.0 °C	100 Pa	530 m^{3}h	0.50 m/s	
Setpoint2		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Pband		5.0 K	20.0 K	5.0 K	5.0 bar 7.0 °C	5.0 bar 7.0 °C	100 Pa	530 m^{3}h	0.50 m/s	
Min. Speed	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	
Max. Speed	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	
Set external1	ON									
Manual mode		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Speed manual		50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	
Offset AnalogOut		2.03 = 0.0 K								
Pband AnalogOut		2.03 = 2.0 K								

ZIEHL-ABEGG

Mode	`1.01`	`2.01` `2.03` `2.04`	`2.02`	`2.05`	`3.01` `3.02`	`3.03` `3.04`	`4.01` `4.02` `4.03`	`5.01` `5.02`	`6.01`	User Setting
Parameter					Factory setting *					
Min. AnalogOut		2.03 = 0 %								
Max. AnalogOut		2.03 = 100 %								
OffsetDigitalOut		2.03 = -1.0 K								
Hyst.DigitalOut		2.03 = 1.0 K								
Alarm Minimum		2.03 = 0.0 °C								
Alarm Maximum		2.03 = 40.0 °C								
T-Band SA							4.02 + 4.03 = 30.0 K	5.02 = 30.0 K		
T-Start SA							4.02 + 4.03 = 15.0 °C	5.02 = 15.0 °C		
P-Min SA							4.02 + 4.03 = 70.0 Pa	5.02 = 70.0 m³h		
					Events					
					Base setup					
Mode	`1.01`	`2.01` `2.03` `2.04`	`2.02`	`2.05`	`3.01` `3.02`	`3.03` `3.04`	`4.01` `4.02` `4.03`	`5.01` `5.02`	`6.01`	
E2 Analog In	0 - 10 V	KTY	KTY	KTY	0-30 MBG	0-30 MBG	DSG200	DSG200	0-1 MAL	
E2 Refrigerant (only 3.02 and 3.04)					R503	R503				
E2 K-Factor								75		
E2 Min.		-----	-----	-----	-----	-----	-----	-----	-----	
E2 Max.		-----	-----	-----	-----	-----	-----	-----	-----	
E2 Decimals		-----	-----	-----	-----	-----	-----	-----	-----	
E2 Unit		-----	-----	-----	-----	-----	-----	-----	-----	
E2 Offset		0.0 K	0.0 K	0.0 K	0.0 bar 0.0 K	0.0 bar 0.0 K	0.0 Pa	0.0 Pa	0.0 m/s	
E3 Function	OFF	OFF 2.04 = 4E	OFF	5E	OFF	4E	4.02 + 4.03 = 6E	5.02 = 6E	OFF	
E3 Analog In	-----	-----			-----	0-30 MBG	4.02 = TF 4.03 = Bus	5.02 = TF	OFF	
E3 Refrigerant (only 3.04)		-----				R503				
E3 K-Factor								75		
E3 Min.		-----			-----	-----	4.03 = -35.0 °C	-----	-----	
E3 Max.		-----			-----	-----	4.03 = 65.0 °C	-----	-----	

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Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
Parameter	Factory setting *									
E3 Decimals		- - - - -			- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
E3 Unit		- - - - -			- - - - -	- - - - -	4.03 = °C	- - - - -	- - - - -	
E3 Offset		- - - - -			- - - - -	0.0 bar 0.0 K	4.02 + 4.03 = 0.0 K	5.02 = 0.0 K	- - - - -	
Controller Setup										
PIN Protection	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Set protection	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Save User Setup	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Alarm sensors		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Limit	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Min. speed cut off		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Group 2 ON value	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
nmin at Group2	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Val > Set=n+		ON	ON	ON	ON	ON	OFF	OFF	OFF	
Type of control		P	P	P	P	P	Pid	Pid	Pid	
KP		50 %	50 %	50 %	50 %	50 %	50 %	50 %	50 %	
KI		50 %	50 %	50 %	50 %	50 %	50 %	50 %	50 %	
KD		50 %	50 %	50 %	50 %	50 %	50 %	50 %	50 %	
TI		0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
LED Mode	ON	ON	ON	ON	ON	ON	ON	ON	ON	
Watchdog Mode	0	0	0	0	0	0	0	0	0	
Watchdog Time	0 sec	0 sec	0 sec	0 sec	0 sec	0 sec	0 sec	0 sec	0 sec	
Watchdog Speed	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	
IO Setup										
A Function	1A	1A (2.03 = 6A)	1A	1A	1A	1A	1A	1A	1A	
A min.	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	0.0 V	
A max.	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	10.0 V	
A Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
D1 Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF 4.03 = 1D	OFF	OFF	
D1 Inverting	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - 4.03 = OFF	- - - - -	- - - - -	
D1 Busmode	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - 4.03 = ON	- - - - -	- - - - -	
D2 Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF 4.03 = 5D	OFF	OFF	
D2 Inverting	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - 4.03 = OFF	- - - - -	- - - - -	
D2 Busmode	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - 4.03 = ON	- - - - -	- - - - -	

Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
Parameter	Factory setting *									
E2 Mode	0	0	0	0	0	0	0	0	0	
E2 min.	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
E2 max.	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	
E2 Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
E2 Busmode	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
E3 Mode	0	0	0	0	0	0	0	0	0	
E3 min.	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
E3 max.	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	
E3 Inverting	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
E3 Busmode	OFF	OFF	OFF	OFF	OFF	OFF	OFF 4.03 = ON	OFF	OFF	
K1 Function	1K	1K (2.03 = 2K)	1K	1K	1K	1K	1K	1K	1K	
K1 Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Bus Address	247	247	247	247	247	247	247	247	247	
Addressing	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
UART Baudrate	19200	19200	19200	19200	19200	19200	19200	19200	19200	
UART Mode	8E1	8E1	8E1	8E1	8E1	8E1	8E1	8E1	8E1	
Limits										
Level Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Ausst. min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Level max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Level Delay	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E2 Function	OFF	OFF (2.03 = 1L)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
GW E2 min.	- - - - -	- - - - - 2.03 = 0.0 °C	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E2 max.	- - - - -	- - - - - 2.03 = 40.0 °C	- - - - -	- - - - -	- - - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E2 Hyst.	- - - - -	- - - - - 2.03 = 1.0 K	- - - - -	- - - - -	- - - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E2 Delay	- - - - -	- - - - - 2.03 = 2 sec.	- - - - -	- - - - -	- - - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E3 Function	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
GW E3 min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E3 max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
GW E3 Hysteresis	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Lmt E3 Del.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Offset Function		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Offset 1		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Offset 2		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Offset Hyst.		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Offset Delay		- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	

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Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
Parameter	Factory setting *									

Fcontrol Basic

Motor Setup

	1.01	2.01/2.03/2.04	2.02	2.05	3.01/3.02	3.03/3.04	4.01/4.02/4.03	5.01/5.02	6.01	User Setting
MotorRatedCurr.	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	
MotorRatedVolt.	400 V	400 V	400 V	400 V	400 V	400 V	400 V	400 V	400 V	
Edgefrequency	48.5 Hz	48.5 Hz	48.5 Hz	48.5 Hz	48.5 Hz	48.5 Hz	48.5 Hz	48.5 Hz	48.5 Hz	
Max. Frequency	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	
Startvoltage	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
VF quadratic	ON	ON	ON	ON	ON	ON	ON	ON	ON	
Rampup time	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	
Rampdown time	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	
Rotat. Direction	CW	CW	CW	CW	CW	CW	CW	CW	CW	
Current limit	120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %	
DC brake mode	0	0	0	0	0	0	0	0	0	
DC brake time	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	
DC brake level	25 %	25 %	25 %	25 %	25 %	25 %	25 %	25 %	25 %	
Motorheating	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Suppression1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range1 min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Range1 max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Suppression2	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range2 min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Range2 max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Suppression3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range3 min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Range3 max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	

Icontrol Basic

Motor Setup

	1.01	2.01/2.03/2.04	2.02	2.05	3.01/3.02	3.03/3.04	4.01/4.02/4.03	5.01/5.02	6.01	User Setting
MotorRatedCurr.	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	5.0 A	
MotorRatedVolt.	400 V	400 V	400 V	400 V	400 V	400 V	400 V	400 V	400 V	
Edgefrequency	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	
Max. Frequency	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	50.0 Hz	
Startvoltage	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
VF quadratic	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Rampup time	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	
Rampdown time	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	20 sec	
Switching frequency	8 kHz	8 kHz	8 kHz	8 kHz	8 kHz	8 kHz	8 kHz	8 kHz	8 kHz	
Rotat. Direction	CW	CW	CW	CW	CW	CW	CW	CW	CW	
Current limit	120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %	
DC brake mode	0	0	0	0	0	0	0	0	0	
DC brake time	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec	
DC brake level	25 %	25 %	25 %	25 %	25 %	25 %	25 %	25 %	25 %	
Quench mode	ON	ON	ON	ON	ON	ON	ON	ON	ON	
Overmodulation	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Motorheating	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Suppression1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range1 min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	

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Mode	1.01	2.01 2.03 2.04	2.02	2.05	3.01 3.02	3.03 3.04	4.01 4.02 4.03	5.01 5.02	6.01	User Setting
Parameter					Factory setting *					
Range1 max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Suppression2	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range2 min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Range2 max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Suppression3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Range3 min.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
Range3 max.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	
					Diagnostic					
OTC	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	
OTM	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	000056:-46:13	
DC-Voltage	415 V	415 V	415 V	415 V	415 V	415 V	415 V	415 V	415 V	
Line voltage	240 V	240 V	240 V	240 V	240 V	240 V	240 V	240 V	240 V	
Heatsink	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	28.8 °C	
Capacitor	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	
E2-KTY	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	
E2-Current	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	
E2-Voltage	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	
E3-KTY	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	20.0 °C	
E3-Current	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	9.0 mA	
E3-Voltage	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	4.0 V	
D1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
D2	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
K1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	

*   *Specifications not binding, these values can differe depending on the software version and customer-specific pre-setting.*

10.3   Possible allocation of the IOs, PINs

Units for analog inputs E2 and E3

The following units can be set for programmed sensors with free measuring range (0 - 10 V, 0 - 20 mA, 4 - 20 mA).	
E2 Analog In E3 Analog In	mA, V, Hz, kHz, A, rpm, °C, m^3/h, bar, %, Pa, m/s, m^3/s, Ohm, mbr, ppm

Analog output A

Function	Description Function A
OFF	no function
1A	Constant voltage +10 V
2A	proportional level control
3A	proportional input E2
4A	proportional input E3
5A	Group control
6A	only 2.03 Cooling function
7A	only 2.03 Heating function

ZIEHL-ABEGG

Function	Description Function A
9A	ECblue = speed output ratio: actual speed / rated speed (for 10 V actual speed = rated speed) Icontrol / Fcontrol Basic Proportional to the output frequency
10A	Operating indicator **ECblue:** • Output 0 V @ Speed < 50 rpm • Output 10 V @ Speed > 70 rpm **Icontrol / Fcontrol Basic** • output 0 V @ Speed < 4 Hz • Output 10 V @ Speed > 7 Hz

Digital inputs D1 + D2

Function	Description Function D1 + D2
OFF	no function
1D	Enable (remote control) "ON" / "OFF"
2D	External error
3D	"Limit" ON / OFF
4D	Switch over "E1" / "E3"
	For mode speed controller `1.01`
5D	Switch over "Set Intern1" / "Set Intern2"
6D	Switch over "Intern" / "Extern"
	For modes as controller from `2.01`
5D	Switch over "Setpoint1" / "Setpoint2"
6D	Switch over "Intern" / "Extern"
7D	Switch over "automatic control" / "Speed manual"
8D	Switch over control function (e.g. "heating" / "cooling")
10D	"Reset"
11D	Setting Max. Speed "ON" / "OFF"
13D	Switch over direction of rotation "right" / " left"
14D	"Freeze function" = maintain momentary modulation value
16D	Busmode / analog input Switch over for E2

Analog input E2 / E3 (IO Setup)

Mode	Description E2 Modus
0	E2 min. / E2 max. without function (factory setting)
1	Offset / turn
2	Signal range

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Analog input E3 (Base setup)

Function	Description Function E3
OFF	no function
1E	external Setpoint
2E	external Manual mode (from **2.01**)
3E	Sensor average to E2 (from **2.01**)
4E	Sensor comparison to E2
5E	Sensor difference to E2 (from **2.01**)
6E	Sensor for Setpoint (from **2.01**)
7E	Measurement

Digital output K1

Function	Description Function K1 (not inverted)
OFF	no function Relays remain always de-energized
1K	Operating indication Operation without fault, reports enable "OFF"
2K	Fault indication Energized for operation without fault, for enable "OFF" not energized. De-energized at line, motor and controller fault, Sensor fault dependent on programming, external fault at digital input.
3K	External fault separate with message at digital input (factory setting if terminals bridged)
4K	Limit modulation Over or falling below modulation
5K	Limit "E2" When over or falling below limits for input signal "E2"
6K	Limit "E3" When over or falling below limits for input signal "E3"
	For modes as controller from 2.01
7K	Setpoint Offset Deviation between actual value and setpoint to high
8K	Group control Switching on fans depending on modulation
	For modes as temperature controller with additional functions 2.03
9K	Heating function Switch ON point: temperature = Setpoint +/- Offset Switch OFF point: Temperature around hysteresis over switch ON point
10K	Cooling function Switch ON point: temperature = Setpoint +/- Offset Switch OFF point: Temperature around hysteresis below switch ON point
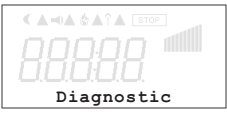
Limits GW E2, GW E3
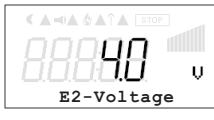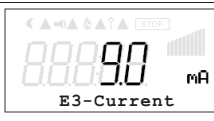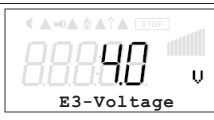
Function	Description Function GW E2, GW E3
OFF	no function
1L	Indication with the centralized fault of a programmed relay (IO allocation Function 2K). Warning symbol in display, "AL" code in events memory.
2L	Is merely displayed in the events menu as message "msg".

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PINs

| PIN	Function
PIN 0010	Opening service menu, if PIN-protection activated
PIN 1234	Opening "setting". if "set protection" = "ON" (☞ Controller Setup)
PIN 9090	Restore user setting
PIN 9091	Save user setting (corresponds function "Save user setup" = "ON"☞ Controller Setup)
PIN 9095	Restore factory setting = delivery status
	Exception in ECblue Basic
	The following parameters are not set back: Min. Speed, Max. Speed, all settings in Motor Setup.

11   Diagnostics menu

Diagnostic	The diagnostics menu supplies information about the momentary operating condition of the device.
OTC 00056:46:13	**O** = Operation, **T** = Time, **C** = Controller The time counting runs, as soon as mains voltage is connected (without fault). If events step on (Motor fault, External Error, etc.), the period of operation is stored at this time (☞ Events).
OTM 00056:46:13	**O** = Operation, **T** = Time, **M** = Motor The time counting runs as soon as a modulation of the controller is present
408 V DC-Voltage	**For 1 ~ types** ZK voltage constant at approx. 400 V The PFC (Power Factor Controller) makes it mostly independent of the mains voltage.
585 V DC-Voltage	**For 3 ~ types** The intermediate circuit voltage without load is the peak value of the input voltage. In a three-phase supply network with 400 V, an intermediate circuit voltage of ca. 565 V results. This voltage sinks slightly under load.
230 V Line voltage	Line voltage
32.0 °C Heatsink	Display of DC-Choke or Capacitor temperature. In case of temperature increase above predetermined threshold value (from 90 °C) the output power will be automatic reduced.
32.0 °C Capacitor	Display of DCLink Elco temperature. During impermissibly high levels (from 75 °C on), the output power is automatically reduced. At 90 °C switch off.
20.0 °C E2-KTY	Signal height at analog input E2 (Analog In 2)
9.0 mA E2-Current	

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4.0 V E2-Voltage	
20.0 °C E3-KTY	Signal height at analog input E3 (Analog In 3)
9.0 mA E3-Current	
4.0 V E3-Voltage	
OFF D1	Status digital input 1 (Digital In 1) OFF = terminals D1 - 24 V bridged ↔ ON = terminals D1 - 24 V not bridged
OFF D2	Status digital input 2 (Digital In 2) OFF = terminals E1 - 24 V bridged ↔ ON = terminals D2 (E2) - 24 V not bridged
OFF K1	OFF = relay K1 de-energized: terminals 11 - 14 not bridged ON = relay K1 energized: terminals 11 - 14 bridged

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12 Enclosure

12.1 Connection diagram
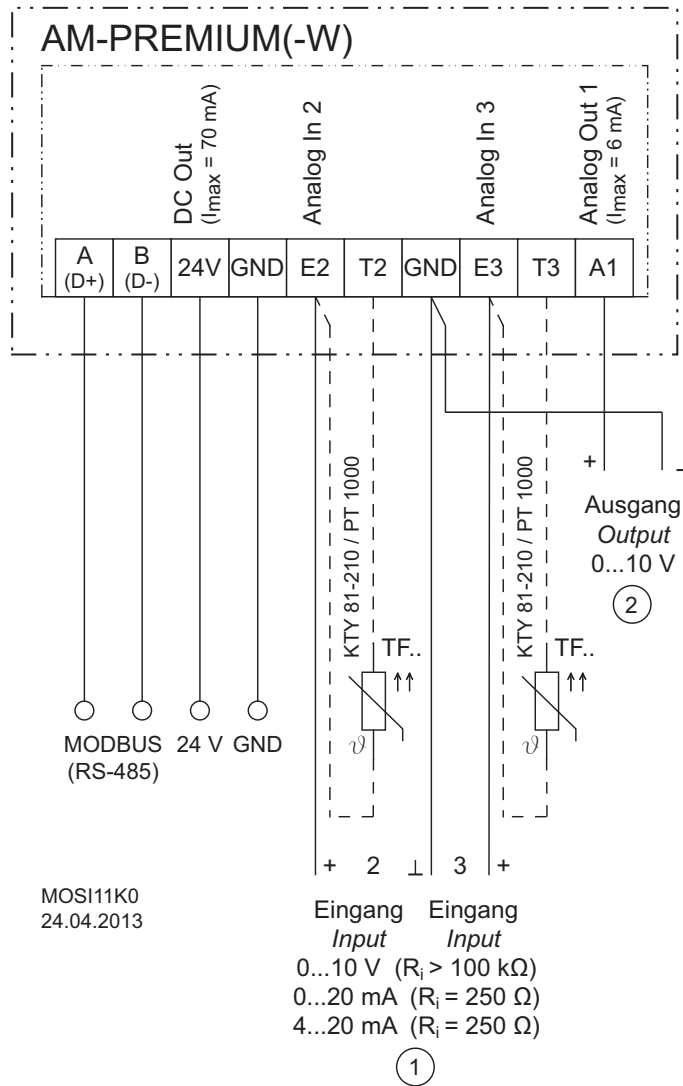
Information
The full connection diagram for the terminating device is a combination of the connection diagram of the module plus the connection diagram of the device in which the module is installed (☞ appropriate operating instructions).

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12.3   Manufacturer reference $C\,\varepsilon$

Our products are manufactured in accordance with the relevant international regulations. If you have any questions concerning the use of our products or plan special uses, please contact:

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12.4   Service information

If you have any technical questions while commissioning or regarding malfunctions, please contact our technical support for control systems - ventilation technology.
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Our worldwide contacts are available in our subsidiaries for deliveries outside of Germany. ☞ www.ziehl-abegg.com.
If you make returns for inspections or repairs we need certain information in order to facilitate focused trouble shooting and fast repair. Please use our repair ticket for this. It is provided to you after you have consulted our support department.
In addition, you can download it from our homepage. Download - Ventilation Technology - Topic: Control Engineering - Document type: General documents.

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