

UNIcon MODBUS Master

CXE/AV(E), CXG-24AV(E)

Universal control module

Operating Instructions



Keep for reference!

Software version: from Version 12.18

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1 General notes

Compliance with the following instructions is mandatory to ensure the functionality and safety of the product. If the following instructions given especially but not limited for general safety, transport, storage, mounting, operating conditions, start-up, maintenance, repair, cleaning and disposal / recycling are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.

Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

1.1 Validity

This document is valid for universal control modules UNIcon MODBUS Master.



Information

In the case of devices with a quality mark (see name plate), please note the related specifications depending on the application location!

1.2 Structure of the operating instructions

Before installation and start-up, read this manual carefully to ensure correct use!

We emphasize that these operating instructions apply to specific units only, and are in no way valid for the complete system!

Use these operating instructions to work safely with and on the device. They contain safety instructions that must be complied with as well as information that is required for failure-free operation of the device.

Keep these operating instructions together with the device. It must be ensured that all persons that are to work on the device can refer to the operating instructions at any time.

Keep the operating instructions for continued use. They must be passed-on to all successive owners, users and final customers.

1.3 Target group

The operating instructions address persons entrusted with planning, installation, start-up, maintenance and servicing, who have the corresponding qualifications and skills for their job.

1.4 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.

1.5 Copyright

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2 Safety instructions

2.1 Intended use

The equipment is to be used solely for the purposes specified and confirmed in the order.

Any other use above and beyond this is considered not for the intended purpose unless agreed otherwise by contract. The manufacturer will not be liable for any damage resulting from this. The individual or company using it bears the sole risk.

Reading these operating instructions and complying with all contained instructions - especially the safety notifications contained therein - are considered part of intended use. To consider is also the manual of attached components. Not the manufacturer, rather the operator of the device is liable for any personal harm or material damage arising from non-intended use!

2.2 Explanations of symbols

Safety instructions are highlighted with warning triangles and are depicted according to the degree of hazard as follows.

	Attention! General hazardous area. Death or severe injury or significant property damage can occur if the corresponding precautions are not taken!
	Danger due to electric current Danger by dangerous, electric voltage! Death or severe injury can occur if the corresponding precautions are not taken!
	Information Important additional information and advice for user.

2.3 Product safety

The device conforms to the state of the art at the time of delivery and is fundamentally considered to be reliable. The device and its accessories must only be used in a flawless condition and installed and operated in compliance with the assembly instructions and/or operating instructions. Operating outside the device's technical specifications (see name plate and attachment / technical data) can lead to a defect in the device and additional damage!



Information

In the case of a malfunction or a failure of the equipment check all functions with alarms in order to prevent injury to persons or property. Note possibility of back-up operation. If used in intensive animal environments, any malfunctions in the air supply must be detected as soon as possible to prevent the development of a life-threatening situation for the animals. The design and installation of the system must comply with local regulations and directives. In Germany these include DIN VDE 0100, the animal protection and the keeping of working animals ordinance and the pig-keeping ordinance etc. Also note the instructions of AEL, DLG, VdS.

2.4 Requirements placed on the personnel / due diligence

Persons entrusted with the planning, installation, commissioning and maintenance and servicing in connection with the frequency inverter must have the corresponding qualifications and skills for these jobs.

In addition, they must be knowledgeable about the safety regulations, EU/EC directives, rules for the prevention of accidents and the corresponding national as well as regional and in-house regulations. Personnel to be trained or instructed and apprentices are only permitted to work on the device under the supervision of an experienced person. This also applies to personnel undergoing general training. Comply with the legal minimum age.

2.5 Start-up and during operation



Attention!

- During commissioning, unexpected and hazardous conditions can arise in the entire installation due to defective adjustments, defective components or incorrect electrical connections. Remove all persons and objects from the hazardous area.
- During operation, the device must be closed or installed in a control cabinet. Fuses may only be replaced by new ones and must not be repaired or bypassed. The data for the maximum line fuse are to be considered absolutely (see Technical data). Use only fuses specified in schematic diagrams.
- Any faults detected in the electric system/modules/operating equipment must be corrected immediately. If these faults are not corrected, the device/system is potentially very dangerous. The device/system must therefore not be operated when it is faulty.
- Pay attention to smooth, low vibration running of the motor/fan, the appropriate instructions in the drive documentation must be observed!

2.6 Work on the device



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 safe isolation from the supply must be checked using a **two-pole** voltage detector.

2.7 Modifications / interventions in the device



Attention!

For reasons of safety, no unauthorized interventions or modifications may be made on the device. All planned modifications must be authorized by the manufacturer in writing.

Use only genuine spare parts / genuine wearing parts / genuine accessories from ZIEHL-ABEGG. These parts were specifically designed for the device. There is no guarantee that parts from non-original sources are designed and manufactured in correspondence with load and safety requirements. Parts and optional equipment not supplied by ZIEHL-ABEGG are not approved by ZIEHL-ABEGG for use.

2.8 Operator's obligation of diligence

- The contractor or owner must also ensure that the electric systems and equipment are operated and maintained in accordance with electro-technical regulations.
- The owner is obliged to ensure that the device is operated in perfect working order only.
- The device may only be used as intended.
- You must periodically examine the safety equipment for their properly functioning condition.
- The assembly instructions and/or operating instructions are always readily available at the location where the device is being used, are complete and are in legible condition.
- These persons are regularly instructed in all applicable questions regarding occupational safety and environmental protection and are knowledgeable regarding the assembly instructions and/or operating instructions and, especially, are familiar with the safety instructions contained therein.
- All safety and warning notices attached to the device are never removed and remain legible.

2.9 Employment of external personnel

Maintenance and service work are frequently carried out by external employees who often do not recognize the specific situations and the thus resulting dangers. These persons must be comprehensively informed about the hazards in their area of activity.

You must monitor their working methods in order to intervene in good time if necessary.

3 Product overview

3.1 Application area

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 is deduced from this.

The device has two separate control circuits and two sensor inputs (0 - 10 V, 4 - 20 mA, KTY 81-210, PT 1000).

Speed controllers for fans or fans with an integrated controller can be activated via the 0 - 10 V signal or the parallel option of the MODBUS Master interface.

3.2 Service work

The device must be checked for soiling and, if necessary, cleaned in periodic intervals.

3.3 Transport

- The device is packed ex factory to suit the transport method previously agreed.
- The device may only be transported in the original packaging.
- 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.

4 Mounting

4.1 General notes



Attention!

The following points must be complied with during the mechanical installation to avoid causing a defect in the device due to assembly errors or environmental influences:

- Before installation remove the device from the packing and check for any possible shipping damage! Start-up is not allowed in the case of transport damage!
- Do not mount equipment on vibrating base!
- When mounted onto lightweight walls, there must be no impermissibly high vibrations or shock loads. Any banging shut of doors that are integrated into these lightweight walls, can result in extremely high shock loads. Therefore, we advise you to decouple the devices from the wall.
- Do not allow drilling chips, screws and other foreign bodies to reach the device interior!
- The device should be installed in a location where it will not be disturbed, but at the same time can be easily accessed!
- Care must be taken to avoid direct radiation from the sun!

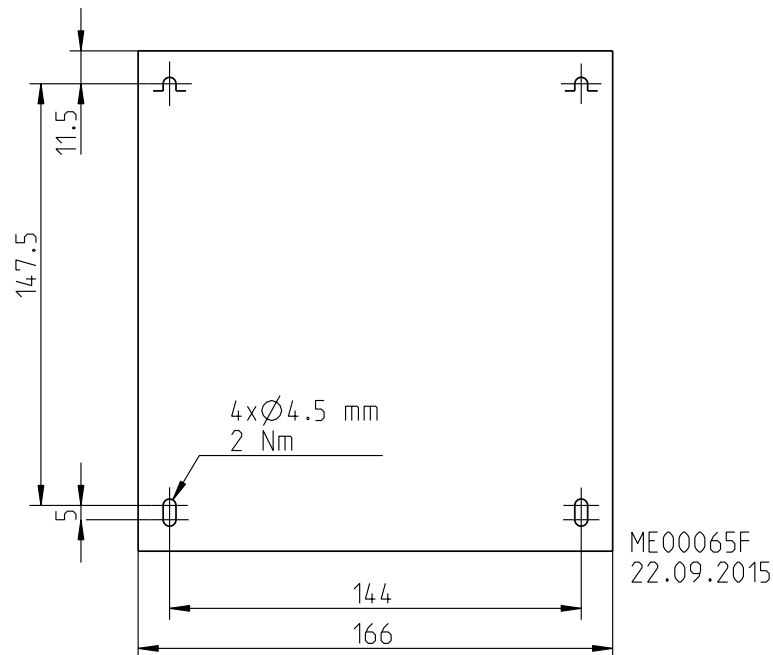
4.2 Prerequisites for mounting

Type CXE/AV & CXG-24AV (version for wall mounting)

- The device is designed for vertical installation (bottom cable inlet). A horizontal or reclined installation is only permissible after technical release of the manufacturer!
- Assemble the device on a clean and stable base. Do not distort during assembly! Use the appropriate mounting devices for proper installation of the unit!

Proceed as follows:

1. Remove the terminal compartment cover.
2. Create mounting holes (dimension sheet see enclosure).



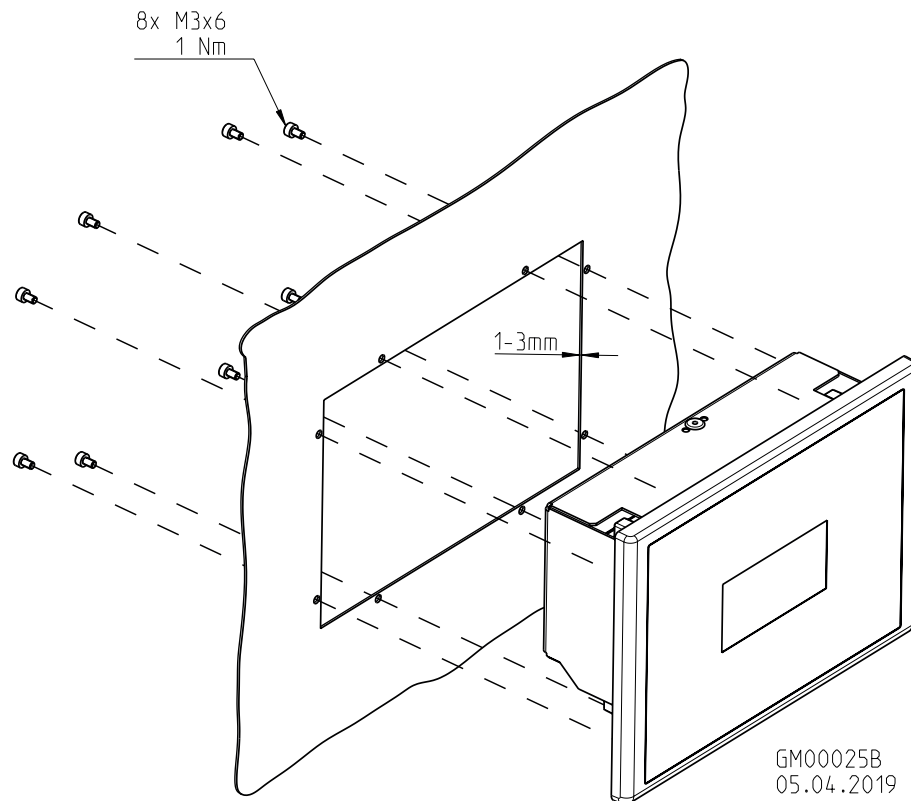
3. Screw in the two upper flad head screws up to a distance of approx. 2 mm and hang on the device.
4. Screw in the two lower flad head screws (tightening torque 2 Nm).
5. Insert cables properly and ensure tightness of the cable inlet.
6. Unused entry points must be sealed!
7. Attach the cover of terminal compartment again carefully after connection (see Electrical Installation).

Type CXE/AVE & CXG-24AVE (version for panel mounting)

- The device is designed for vertical assembly in a panel (display vertical). A horizontal assembly is not allowed!
- Necessary panel cut-out: 162.5 mm x 110.5 mm (Dimension sheet see Enclosure).
- Permissible panel thickness: 1 - 3 mm.

Proceed as follows:

1. Perform the panel cut-out and drill the boreholes for the fastening according to the dimension sheet (see Appendix).
2. Insert the device from the front in the cut opening.
3. Guide the screws provided (8x M3x6) from behind through the boreholes of the panel and tighten evenly (tightening torque 1.0 Nm).



4.3 Outdoor installation

Outdoor installation is possible up to -20 °C when the controller supply is not switched off. Installation must be protected from the effects of weather as much as possible, including protection from direct sunlight!

4.4 Installation location for agriculture

When using for animal keeping, do not install the device directly in the stable but in a separate room with a lower pollutant load. This helps to avoid damages caused by pollutant gases (e.g. ammonia fumes, hydrogen sulphide fumes).

4.5 Temperature influences during commissioning

Avoid condensation in the controller and functional faults attributable to condensation by storing the controller at room temperature!

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.
- The 5 electrical safety rules must be observed!
- It is forbidden to carry out work on electrically live parts.
- Cover neighbouring electrical equipment during installation work.
- Other measures may be necessary to achieve safe electrical isolation.
- A second person must always be present when working on energized parts or lines who disconnects in case of emergency.
- Electrical equipment must be checked regularly: Loose connections are to be re-tightened and damaged cables must be replaced immediately.
- Always keep switch cabinets and all electrical supply facilities locked. Access is only allowed for authorized persons using a key or special tool.
- Operating the device with the housing cover removed is prohibited because energized, exposed parts are present inside the device. Disregarding this regulation can lead to severe personal injury.

- The required protective earth connection is established using screws between the housing parts in metal terminal space covers and housing casings. Commissioning is only permissible after these screws have been properly attached!
- The device owner is responsible for the EMC of the entire plant according to the locally applicable standards.
- Metal screwed-connections are not permitted in plastic housing parts because there is no potential equalization.
- Never clean electrical equipment with water or similar liquids.

**Information**

The respective connections are represented in the enclosure of this Operating Instructions (see connection diagram)!

5.2 EMC-compatible installation of control lines

Pay attention to sufficient distance from powerlines and motor wires to prevent interferences. The control cable may not be longer than 30 m. Screened control cables must be used when the cable length is longer than 20 m. When using a shielded cable connect the shielding to one side only, i.e. only to the control unit with the protective ground (keep cable short and with as little inductance as possible!).

5.3 Mains connection

Here, it must be strictly observed that the mains voltage lies within the allowable tolerance specifications (see Technical data and name plate affixed to the side).

**Danger due to electric current**

The mains voltage must comply with the DIN EN 50160 quality characteristics and the defined standard voltages in IEC 60038!

Type CXE/AV(E)

- Power from the mains is connected to terminals N, L1 and PE.
- Potential separation between the control voltage connections and line connection by internal transformer.

Type CXG-24AV(E)

- Connection for voltage supply to terminals (+) and (-).
- No potential separation between voltage supply and control voltage connections!

**Danger due to electric current**

- Only PELV current sources which ensure safe electrical isolation of the operating voltage in accordance with IEC/DIN EN 60204-1 must be used.

UL note:

- The products shall be supplied by limited energy in accordance to UL/IEC 61010-1 Third Edition, Sub. Clause 9.4 "Limited-energy circuit" or LPS in accordance to UL/IEC60950-1, 2nd edition, or the requirements of NEC Class II or the standard UL1310.

5.4 Signal input or sensor connection (E1, E2)

The unit has two analog inputs: Analog In 1 = "E1" and Analog In 2 = "E2".

The connection is independent of the programmed operating mode and from the sensor signal employed.

- When connecting **passive** temperature sensors TF.. (KTY81-210) or PT1000 at terminals "E1" and "T" or "E2" and "T" 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 temperature sensors type TF.. (KTY81-210) a capacitor is integrated.
- When connecting **active** sensors at the terminals "E1" and "GND" or "E2" and "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 "E1" and "24 V" or "E2" and "24 V", "GND" terminal is omitted.

**Danger due to electric current**

Never apply line voltage to analog inputs!

5.5 Control outputs 0 - 10 V (A1, A2)

The analogue outputs can be used to activate a speed controller with 0 - 10 V input for example. Fans with integrated controller and 0 - 10 V input can be activated directly.

- Analog output 1 (terminals A1 - GND)
 - Controlled 0 - 10 V output for control circuit 1 (factory setting function **[2A]**).
- Analog output 2 (terminals A2 - GND)
 - For operation with one control circuit: constant voltage +10 V e.g. for supply of an external potentiometer (function factory setting **[1A]**).
 - For operation with a second control circuit: controlled 0 - 10 V output for control circuit 2 (function initial setting **[8A]**).

Other functions can be assigned if necessary (see Operating Instructions / IO Setup).

**Danger due to electric current**

It is not permissible to connect outputs of several devices to each other!

5.6 Voltage supply for external devices (+ 24 V, GND)

A voltage supply is integrated for external devices e.g. a sensor (max. current load see technical data).

The tolerance of the output voltage is for 230 V and 400 V version -30 % - +20 %.

For the 24 V DC version directly depending on the supply voltage.

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 voltage outputs of several devices to each other!
- It is not permissible to connect voltage outputs in the device to each other!

5.7 Digital inputs (D1, D2)

Different functions can be assigned to the digital inputs "D1" and "D2" (see IO Setup: Functional overview of digital inputs). Activation via floating contacts, a low voltage of approx. 24 V DC is connected.

**Danger due to electric current**

Never apply line voltage to the digital input!

Note the input resistance (see technical data).

5.8 Relay outputs (K1, K2)

Various functions can be allocated to the relay outputs "K1" and "K2" (see IO Setup: function and inverting relays outputs). Max. contact rating see technical data and connection diagram.

Relays K1

- Connection of the floating contacts of relay "K1" to the terminals 11, 14, 12.
- "K1 Function" factory setting: **[1K]** = **Operating indication**. I.e. energized for operation without fault, for enable "OFF" de-energized.

Relays K2

- Connection of the floating contacts of relay "K2" to the terminals 21, 24, 22.
- "K2 Function" factory setting: **[2K]** = **Fault indication**. I.e. energized for operation without fault and for enable "OFF".

5.9 RS-485 interfaces for MODBUS RTU

The device has two RS-485 interfaces for networking via MODBUS RTU:

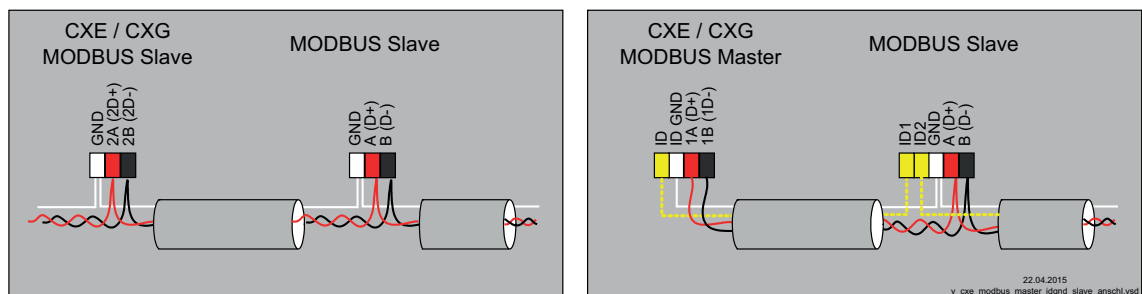
1. Interface “1A (1D+)”, “1B (1D-)” for MODBUS Master applications

- Pre-programmed function is output from control circuit 1: **1. Control signal (2A)**
e.g. for activating speed controllers for fans or fans with integrated controller and MODBUS interface (see member MODBUS Master).
The programmable functions correspond to the functions for the analogue outputs described in the IO Setup.
- Automatic addressing of members via a patented procedure.
It is no longer necessary to address each individual member manually in the network. The “ID” connection is also assigned (for more information see the following chapter).
- Integrated failsafe wiring and 150 Ω termination.
- **The MODBUS Master interface is galvanically isolated!**

2. Interface “2A (2D+)”, “2B (2D-)” for MODBUS Slave applications

- Connection of the device to a superordinate building control system.
- Setting of address and communication parameters see Programming: Menu group MODBUS Slave.

Connection MODBUS Slave and MODBUS Master interface



When using telephone cable with four cable cores, we recommend the following allocation:

- A (D+) = red
- B (D-) = black
- ID - ID1/2 = yellow (for automatic addressing for MODBUS Master)
- GND = white

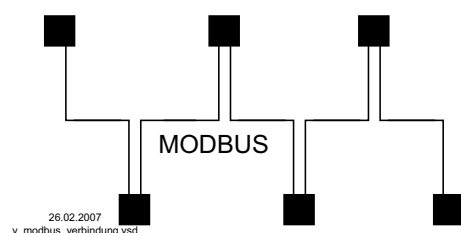


Information

- You must ensure correct connection; i.e. “A (D+)” must also be connected on the following devices to “A (D+)”. 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).
- Except for the data link “A (D+)”, “B (D-)”, the “ID1 - ID2” (automatic addressing for MODBUS Master) and the “GND” connection, no further cable cores of the data line may be used.
- Make sure the distance from powerlines and motor wires is sufficient (min. 20 cm).

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.

MODBUS connection



Recommended wire types

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

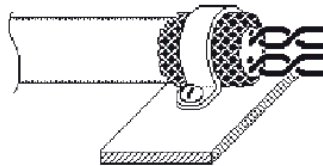
Max. allowed wire length 1000 m (CAT5/7 500 m)

Shielding

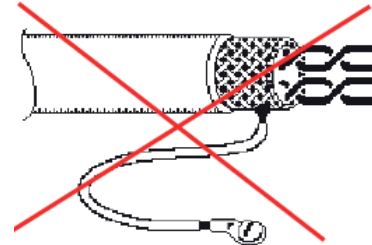
The use of shielded cables is normally not needed but offers high protection against electromagnetic interferences, especially high frequencies. However, the effectiveness of the shield depends on careful installation of the line.

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



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".

5.10 Addressing member MODBUS Master Interface

Up to **32** members can be connected at the MODBUS Master interface.

No other components are required for the patented automatic addressing (activation see menu group MODBUS Master: Auto Addressing). Only the connections "ID1" and "ID2" of the Slave members are connected additionally next to the bus connection and at the "ID" connection of the MODBUS Master for this.

The "ID" connection of the MODBUS Master must be connected to the "ID1" or "ID2" connection of the **first Slave member**. This is recognised as a result and occupied by address **1**.

For the following users the connection "ID1" or "ID2" of a Slave user respectively is connected with connection "ID1" or "ID2" of the next Slave user.

The automatic addressing of other users is initiated by the previous user via this connection.

The individual members can be addressed in advance without this device by an external terminal or a PC.

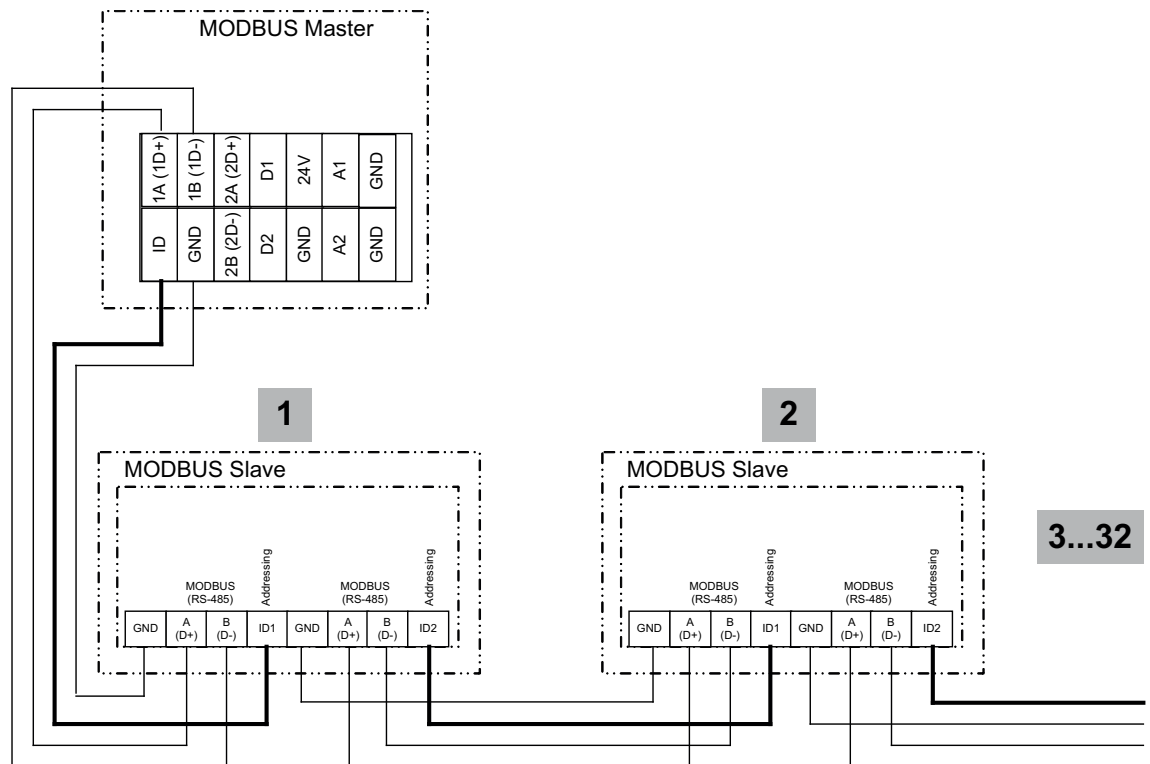
Alternatively, manual addressing with free assignment of the address is possible (see Manual addressing).



Information

- If a repeater is necessary and automatic addressing should be carried out, only the repeater of the Z-G-1NE type can be used, only it can relay the addressing signal.
- Depending on the version, the connections for MODBUS "A (D+)", "B (D-)" are available single or double at the Slave members. These are connected with each other internally electrically.
- The connections for the automatic addressing "ID1" and "ID2" are **not directly** connected electrically with each other. These may not be bridged; any order of connection is possible.
- When using the connection box the cable shield of the CAT5 cable is internally connected to "PE" by an RC element.
- The communication parameters are fixed preset, see programming menu group MODBUS Master.

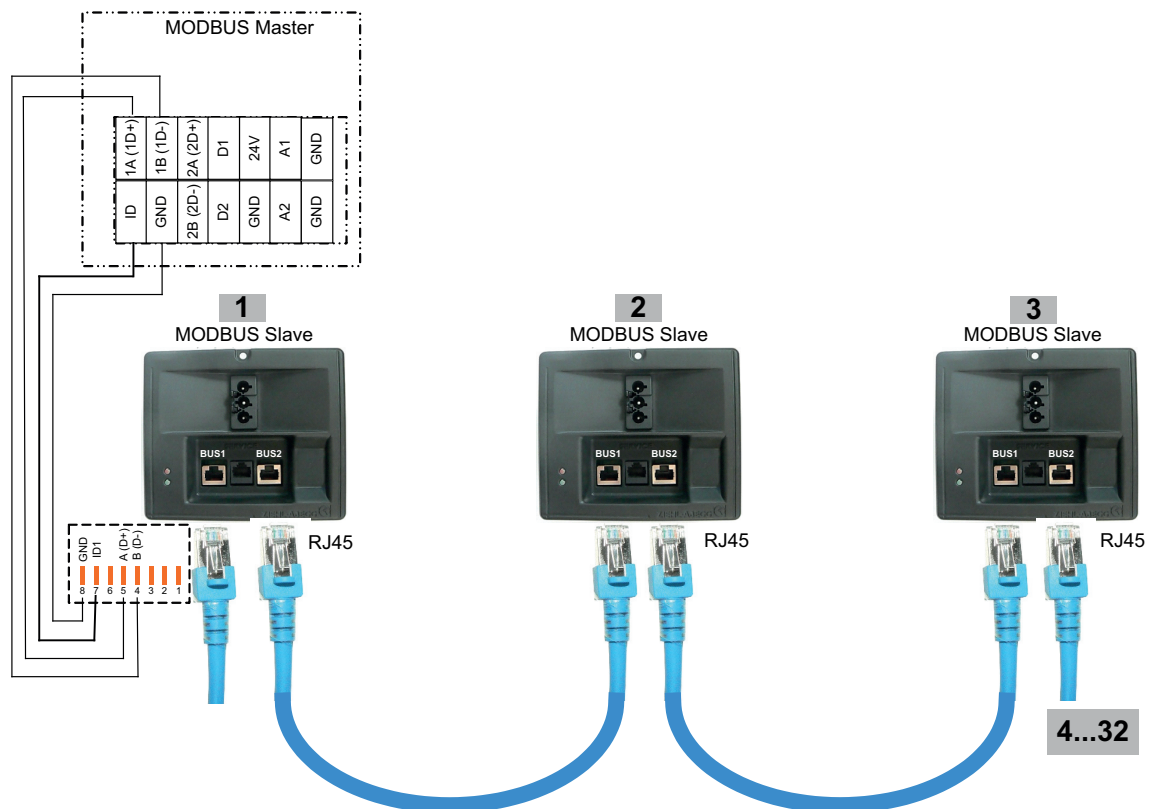
Networking with telephone wire



13.03.2013
v_modbus_master_autodr.vsd

Connection at terminal device via the terminals: 1A (1D+), 1B (1D-), ID and GND
Connection of the Slave members via the terminals: A (D+), B (D-), GND und ID1 / ID2

Networking with RJ45 patch cable by usage connection box for ECblue (part. no. 380085).



13.03.2013
v_modbus_master_autodr_rabox.vsd

Connection to the MODBUS Master at the terminals: 1A (1D+), 1B (1D-), ID and GND
Connection of the Slave members via the two RJ45 connections "BUS1" and "BUS2"

5.11 USB-interface

Over the USB interface if necessary a software update can be made. For this a consultation with our V-STE support department for control systems-ventilation technology is necessary.
For communication with a PC (Virtual COM Port) we make the necessary programs available on request.



Danger due to electric current

Plug the jumper J1 to both PINs only for a software update via USB interface. The device will not switch on if this jumper is plugged to both PINs!

Do not replug the jumper under voltage, observe the safety instructions!

5.12 Potential at control voltage connections

The control voltage connections (< 30 V) relate to the joint GND potential (Exception: relay contacts are potential-free).

CXE/AV(E) 1~ 230 V, 2 ~ 400 V

There is a potential separation between the control voltage connections and the earthed conductor. It must be ensured that the maximum external voltage at the control voltage connections cannot exceed 30 V (between "GND" terminals and "PE" earthed conductor). If necessary, a connection to the earthed conductor potential can be established, install bridge between "GND"- terminal and the "PE" connection.

CXG-24AV(E)

In low voltage versions (24 V DC) there is **no potential separation** between supply voltage and connections of the control voltage.

5.13 Option add-on modules



An additional module can be retrofitted in the slot provided if required (mounting see operating instructions of the additional modules).

The range of additional modules is constantly being extended and adapted to market requirements. The currently available additional modules can be requested from ZIEHL-ABEGG.

Examples for currently available additional modules for UNIcon MODBUS Master

Type	Part-No.	Function
AM-MODBUS-UB	349085	MODBUS MODUL The AM-MODBUS-UB communication model for UNIcon MODBUS Master universal control module serves as an additional MODBUS and Bluetooth interface. An additional IoT gateway, e.g. type DIG2019-NE Art. no. 380109, can be connected via this interface to achieve a cloud connection to ZABluegalaxy. In addition, all connected MODBUS devices can be accessed centrally via the Bluetooth interface.
AM-BACNET-U	349088	BACNET Modul The AM-BACNET-U communication module for UNIcon MODBUS Master universal control module has the device profile: B-ASC (BACnet Application Specific Controller). This enables the UNIcon MODBUS Master to be integrated into a higher-level controller or in a building control system as a BACnet device.

6 Select operation mode

6.1 Mode and signal input



Information

Simple installation is possible through the selection of the preprogrammed mode of operation (see Start-up)

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 (see Operating Instructions / 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.

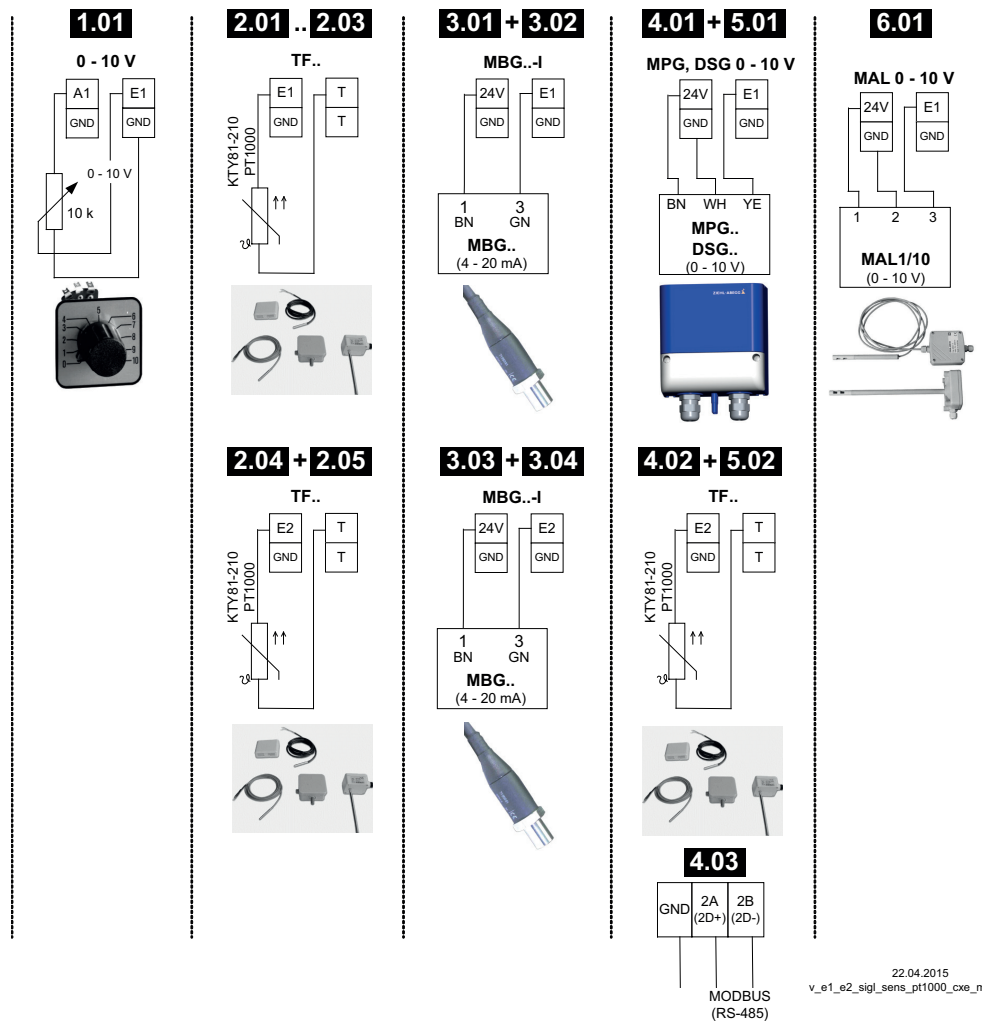
By selection of the mode the function for control circuit 1 is determined, this influences the following outputs (factory setting):

1. Analog output "A1" 0 - 10 V with function **2A** (see Electrical installation).
2. MODBUS Master interface "1A" + "1B" with function **2A** (see Electrical installation).

Mode	Signal or Sensor (input)	Function
1.01	Signal: 0 - 10 V, 0 - 20 mA, 4 - 20 mA (E1)	Speed controller with input for Setting signal, two step operation (Factory setting)
1.02	-	Manual speed controller with direct setting by the keys ▼ ▲ (0 - 100 % or in 1 - 5 steps)
2.01	* Sensor KTY81-210 / PT1000 (E1)	Temperature control airconditioning and refrigeration (preset set-point 20.0 °C, P-band 5.0 K)
2.02	* Sensor KTY81-210 / PT1000 (E1)	Temperature control depending on outdoor temperature (preset set-point 5.0 °C, - P-band 20.0 K)
2.03	Sensor KTY81-210 / PT1000 (E1)	Temperature control with additional functions (shutter and heating)
2.04	* 1x Sensor KTY81-210 / PT1000 (E1) 1x Sensor KTY81-210 / PT1000 (E2)	Temperature control with two sensors, comparison or average
2.05	* 1x Sensor KTY81-210 / PT1000 (E1) 1x Sensor KTY81-210 / PT1000 (E2)	Temperature control with two sensors differential temperature
3.01	* Sensor MBG.. (E1)	Pressure control condensers (refrigeration)
3.02	* Sensor MBG.. (E1)	Pressure control for condensers with input for refrigerant
3.03	* 1x sensor MBG.. (E1) 1x sensor MBG.. (E2)	Pressure control for two circuit condensers
3.04	* 1x sensor MBG.. (E1) 1x sensor MBG.. (E2)	Pressure control for two circuit condensers with input for refrigerant
4.01	* Sensor DSG.. / MPG.. (E1)	Pressure control for ventilation systems
4.02	1x Sensor DSG.. / MPG.. (E1) 1x Sensor KTY81-210 / PT1000 (E2)	Pressure control depending on outdoor temperature
4.03	1x Sensor DSG.. / MPG.. (E1) 1x BUS RS 485	Pressure control with outdoor temperature-dependent setpoint adaptation and activation by MODBUS
5.01	* Sensor DSG.. / MPG.. (E1)	Volume control (constant) for ventilation systems
5.02	1x Sensor DSG.. / MPG.. (E1) 1x Sensor KTY81-210 / PT1000 (E2)	Volume control with setpoint depending on outdoor temperature
6.01	* Sensor MAL.. (E1)	Air velocity control e.g. clean room

* Operation with a second control circuit possible

Mode and signal to E1, E2

**6.2 Operation with a second control circuit**

The function for control circuit 1 is determined by selection of the mode. This influences the output with function **2A**.

A second control circuit with separate actual value measuring and separate output can be activated additionally if required.

Control circuit 2 influences the output with function **8A**.

- Analog output “A2” (factory setting) see IO Setup
- MODBUS Master interface see member menu

Operation with a second control circuit is **not** possible in the following modes:

1.01, 1.02, 2.03, 4.02, 4.03, 5.02

The following modes which are pre-programmed to operation with a second sensor can be reprogrammed to operation with a second control circuit:

2.04, 2.05, 3.03, 3.04

The second control circuit is activated by the “E2 function” for the second analogue input “E2” (see menu group “Base Setup”).

E2 functions for activating control circuit 2:

E2 Function	Description second control circuit	Factory setting	
		E2 Analog In	2.Setpoint 1
Temperature (8E)	Temperature control Presettings and sensor selection see Mode 2.01	TF	20.0 °C
Cold-Pressure (9E)	Pressure control condensers Presettings and sensor selection see Mode 3.01	MBG0-30	15.00 bar
Cold-Temperature (10E)	Pressure control for condensers with input for refrigerant Presettings, sensor selection and input for refrigerant see Mode 3.02	MBG0-30	35.0°C
Air Pressure (11E)	Pressure control Airconditioning Presettings and sensor selection see Mode 4.01	DSG200	100.0 Pa
Air flow (12E)	Air volume control Presettings, sensor selection and K-Factor for inlet ring see Mode 5.01	DSG200	44720 m³h
Air speed (13E)	Air velocity control Presettings and sensor selection see Mode 6.01	MAL1	0.50 m/s

When activating control circuit 2, the “Setting” menu group is extended.

- The additional parameters for control circuit 2 are identified by a prefixed “2.” e. g. “2.Setpoint 1”.
- A prefixed “1.” e. g. “1.Setpoint 1” is added to the parameters for control circuit 1.

Example: Second control circuit Pressure control condensers

E2 function = 9E , Mode 2.01 for temperature control via control circuit 1	
Setting	1.Setpoint 1
20.0 °C 1.Setpoint 1	Setpoint 1 for control circuit 1 Setting range with passive sensor type “TF”, “PT1000” : -50.0...150.0 °C Factory setting: 20.0 °C
Setting	1.Setpoint 2
----- 1.Setpoint 2	Setpoint 2 for control circuit 1 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: ----- see IO Setup).
Setting	1. Pband 1
5.0 K 1. Pband 1	Pband 1 for control circuit 1 Setting range with passive sensor type “TF”, “PT1000” : 0.0...200.0 °C Factory setting: 5.0 K
Setting	1. Min. Speed
0 % 1. Min. Speed	Minimal Speed for control circuit 1 Setting range: 0... “1. Max. Speed” Factory setting: 0 %
Setting	1. Max. Speed
100 % 1. Max. Speed	Maximal Speed for control circuit 1 Setting range: 100 %... “1. Min. Speed” Factory setting: 100 %
Setting	2.Setpoint 1
15.0 bar 2.Setpoint 1	Setpoint 1 for control circuit 2 Setting range: in measuring range of sensor Factory setting: 15.0 bar

Setting	2.Setpoint 2
----- 2.Setpoint 2	Setpoint 2 for control circuit 2 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: ----- see IO Setup).
Setting	2. Pband 1
15.0 bar 2. Pband 1	Pband 1 for control circuit 2 Setting range: in measuring range of sensor Factory setting: 15.0 bar
Setting	2. Min. Speed
0 % 2. Min. Speed	Minimal Speed for control circuit 2 Setting range: 0... "2. Max. Speed" Factory setting: 0 %
Setting	2. Max. Speed
100 % 2. Max. Speed	Maximal Speed for control circuit 2 Setting range: 100 %... "2. Min. Speed" Factory setting: 100 %
Setting	Manual mode
OFF 1. Manual mode	Manual mode for control circuit 1 "OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
Setting	Speed manual
100 % 1. Speed man.	Speed Manual mode for control circuit 1 Setting range: 0... "1. Max. Speed" Factory setting: 100 %

Function extension for digital inputs "D1" and "D2" in operation with second control circuit

D1 / D2 Function	Description *
E1 / E2 (4D)	The output for control circuit 2 is set additionally to "A2" to "A1" (regardless of the programmed function for A1). Control circuit 1 has no output for the duration of the switching.
2. Setpoint 1/2 (9D)	for control circuit 2: Switch over "Setpoint 1" / "Setpoint 2"
2.Setp+Pband1/2 (16D)	for control circuit 2: Switch over Setpoint 1/2 and Pband 1/2 When programming this function, "Setting" additionally lists the parameter: "2.Pband 2 for control circuit 2"

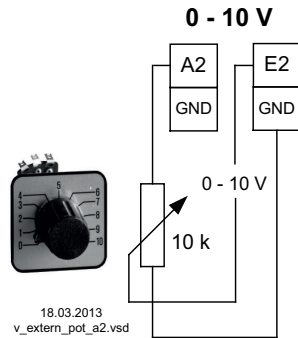
* Detailed description see IO Setup / Digital Inputs "D1" / "D2"

Following restrictions apply for the control circuit 2:

- The "Manual Mode" function in the "Setting" menu group only influences control circuit 1!
- The fuction Limit (see IO Setup 3D and Controller Setup) influences both control circuits simultaneously.
- The "Max. Speed" setting by a digital input (see IO Setup 11D) simultaneously influences both control circuits. I.e. at "1.Max. Speed" and at "2.Max. Speed".
- The controller configurations (KP, KI, KD, TI see Controller Setup) are identical for both control circuits. Fine adjustment is possible for each control circuit by the separate "Pband" setting.

6.3 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 "E2" and "GND" terminals. Configure "E2" in Base setup. For potentiometers, program Analog Out 1 (terminal "A1") to the function [1A] = "+10 V" (as factory setting  IO Setup).
E2 Analog In = factory setting 0 - 10 V



External Setpoint via external signal instead of "Setpoint 1". The "external Setpoint" function must be activated in base setup [1E] for "E2 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]).



Information

Not possible in modes with 2 sensors and operation with a second control circuit because the second analogue input is already occupied by it.

7 Start-up

7.1 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. The mains voltage must match the information on the rating plate.
4. Make sure that no persons or objects are in the fan's hazardous area.

7.2 Procedure for commissioning

Sequence	Setting
1	▷ Check connection and close housing carefully.
2	▷ Turn on mains voltage.  ↔  Display after first turning on the mains voltage
3	 →  Use key [ESC] to switch to the main menu
4	Menu group: Start ▷ Set the menu language if necessary (factory setting English = Language GB). ▷ The display can be switched between SI units (US units = OFF) and imperial (US) units (US units = ON).
5	Menu group: Base setup ▷ Setting the desired operation Mode (factory setting 1.01 = Speed controller see selection Mode). ▷ Further settings depend on the selected mode and the sensor / setting signal used. 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 "IO setup" are lost. An exception: the menu language setting remains preserved.
6	Menu group Setting : ▷ Set the parameters for the control mode.
7	 Press the On/Off key for approx 2 s to give the release (the display [STOP] disappears).

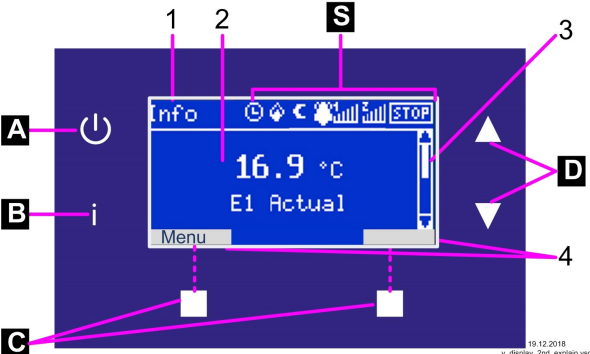


Information

Adjust further settings according to the desired function (see Operating Instructions / Programming).

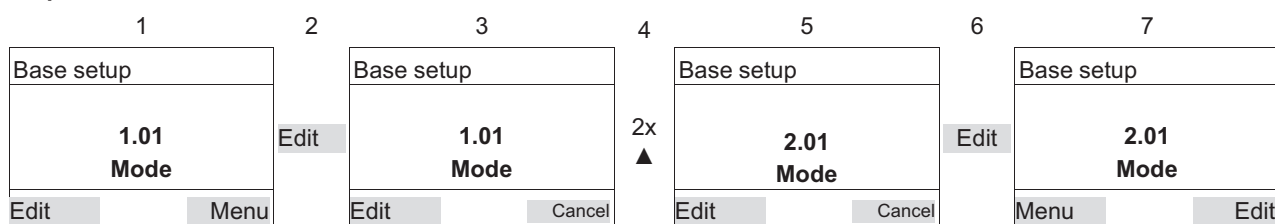
8 Controls and Menu

8.1 Multipurpose LC display and keyboard

		Display		
		1	Display Menu group	
		2	Display window	
		3	Position of the menu in the menu group	
		4	Current softkey function see keys C	
Keys		S	Symbol	
A	ON / OFF By this key the activation of the members (speed setting) by analogue output and MODBUS interface can be switched off, the other signal inputs and outputs stay active. Display STOP for switch OFF. Attention, only electronic disconnection! No disconnection (isolation) when switched off, in accordance with VBG4 §6)!		Modulation control circuit 1	
			Modulation control circuit 2	
		STOP	No controller enable see key A = OFF, IO Setup function 1D	
			Moon symbol for active Setpoint 2 see IO Setup	
			Freeze function active (modulation value is retained) see IO Setup	
B	Help texts (no function yet)		Fire symbol (heating operation) see operation / Mode 2.03	
C	The function of these keys are variable and dependent on the menu where you located (Softkey). The current function is explained in the display above the key.			Timer function active (see Timer)
	Menu	To display Main menu		Log entry which still was not seen
	Info	To menu group Info		Alarm symbol (fault message alternating with actual value display), see Messages & Troubleshooting
	Edit	Open adjustable menu item		Connection/communication error, see Messages & Troubleshooting
	Enter	Open menu group Accept settings (store)		
	Cancel	Cancel setting and exit menu item		
	Back	One step back in the menu		
	Details	Display of details for fault messages in menu group Protocol		
D		Menu selection, increase value		
		Menu selection, reduce value		

8.2 Example for programming mode **2.01** in “Base setup ”

Sequence



8.3 Menu structure

Selection of the menu group (e.g. Base setup) with the arrow keys ▼ + ▲.

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 Operating Instructions / 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.

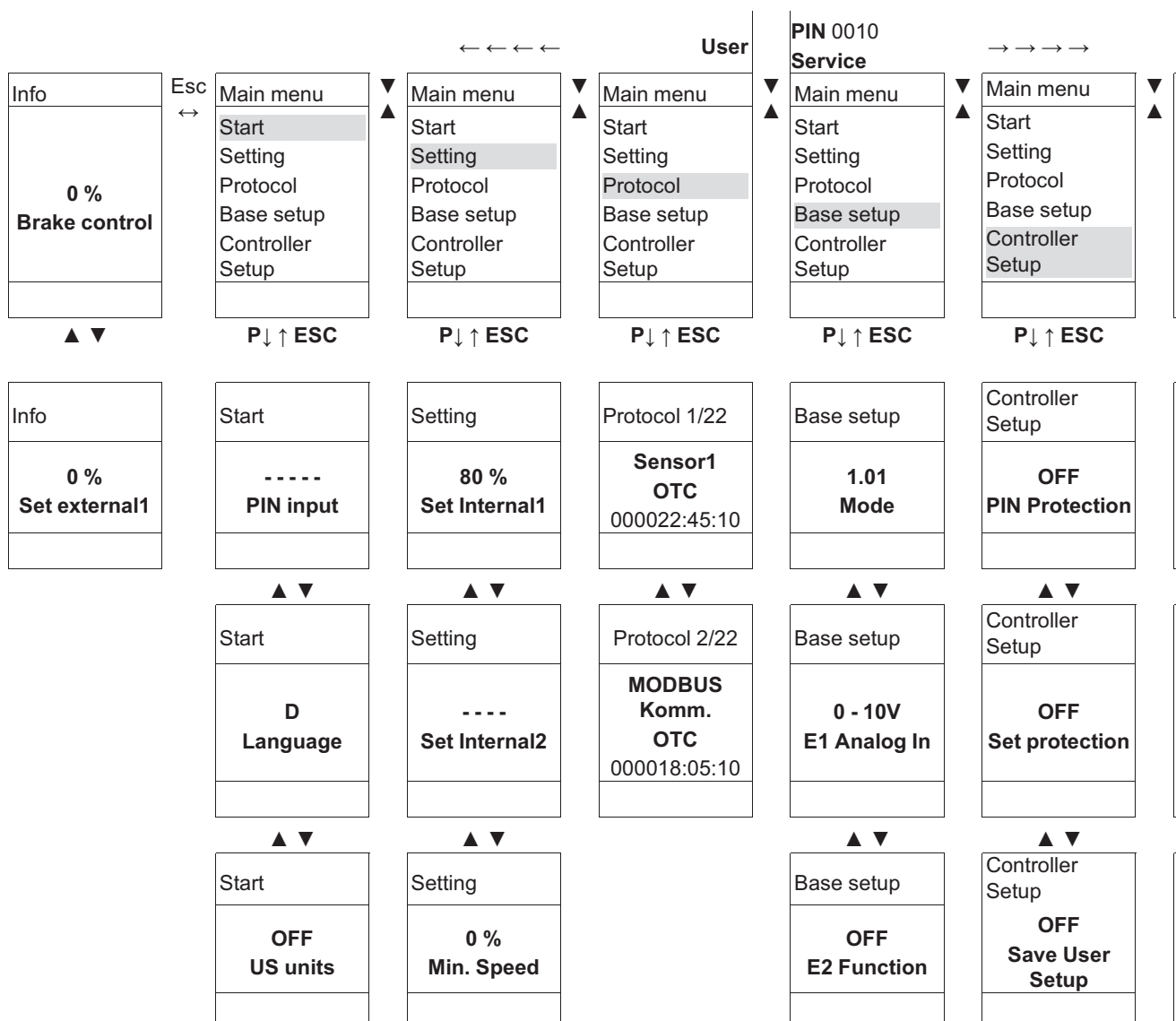
To make adjustments, press the **P** key after selecting the menu item. If the previously set value starts to flash, it can be adjusted with the ▼ + ▲ keys and then saved with the **P** key. To exit the menu without making any changes, use the “Esc” short-key, i.e., the originally set values remain.



Information

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

Example for Mode 1.01



Menu dependent on mode

8.4 Overview menu groups

Main menu	Possible settings
Info	Display measured actual values, selected setpoints, modulation, etc. Settings cannot be made in this menu group.
Start	PIN input for reset to initial settings and to protect settings. Setting the menu language. Display in SI units or Imperial units (US) Complete re-start of the device. Display of the set mode, software version, etc.
Setting	Settings for Operation, Setpoint, Pband, Min. Speed, Max. Speed, etc.
Protocol	Display and query of events / malfunctions.
Base setup	Setting of the desired mode, configuration of signal and sensor inputs. Activation control circuit 2.
Controller Setup	Activate set protection, save user settings. Activate alarm message in the event of a sensor fault. Activate limitation of modulation via digital input or timer of time switch. Configuration of control parameters, group control.
IO Setup	Configuration and function assignment for: analogue outputs, digital inputs, relay outputs.
Limit	Limit messages depending on modulation, setting signal or sensor signal, offset to setpoint.
Timer	Integrated time switch with programmable timer functions. Clock fine adjustment
Diagnostic	Current operating states of the device.
MODBUS Slave	Addressing and configuration of the MODBUS Slave interface.
MODBUS Master	Start automatic addressing of members. alternatively Manual input of number of members.

9 Programming



Display in SI units or Imperial units (US)

The following description is for display in SI units (factory setting). The appropriate conversion factors must be observed when switching over to Imperial units (US) (☞ menu group Start / US Units).

9.1 Speed controller **1.01**, **1.02**

9.1.1 Speed controller with setting by external signal **1.01**

Settings for controller output with function **2A** (by analogue signal see IO Setup, by MODBUS see members menu).

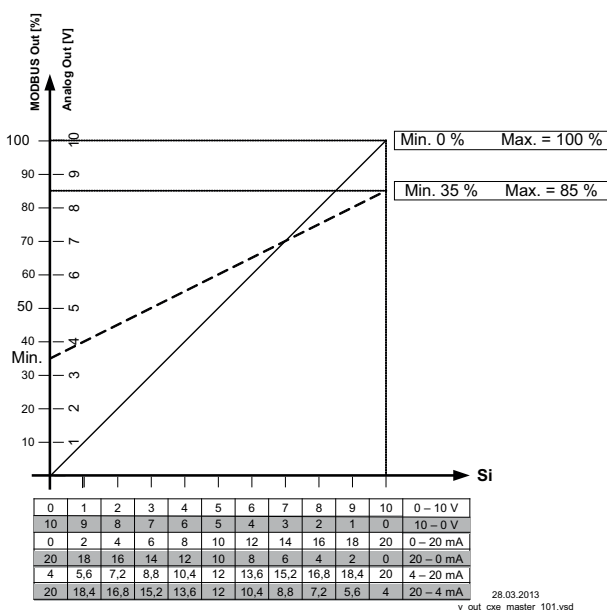
Base setup **1.01**

Main menu	Base setup
Setting	
Protocol	
Base setup	
Controller Setup	
IO Setup	
Base setup	Mode
1.01	Factory setting Mode: 1.01
Mode	
Base setup	E1 Analog In
0 - 10V	Selection: 0 - 10V, 0 - 20 mA, 4 - 20 mA (Inverting, E1 BUS Modus see IO Setup)
E1 Analog In	Factory setting: 0 - 10 V
Base setup	E2 Function (only for special applications)
OFF	Analog input 2 "E2" factory set at "OFF".
E2 Function	For operation with a second setting signal and switch over by potential-free contact: E2 Function = Ext. Setpoint (1E)
	Necessary function for digital input: E1/E2 (4D) see IO Setup
	For operation with a second signal and automatic control at the higher level: E2 Function = comparison E1 (4E).
Base setup	E2 Analog In
-----	Display as long as no function allocated: -----
E2 Analog In	Selection: 0 - 10 V, 0 - 20 mA, 4 - 20 mA (Inverting, E2 BUS Modus see IO Setup)
	Factory setting: 0 - 10 V

Setting for operation 1.01

Main menu	Setting
Setting	
Protocol	
Base setup	
Controller Setup	
IO Setup	
Setting	Set Internal1
80 % Set Internal1	Setting range manual speed setting: 0...100 % $\triangle$ "Min. Speed"... "Max. Speed" Factory setting: 80 %
Setting	Set Internal2
----- Set Internal2	Setting "Set Intern2" e.g. reduced value for night operation. Switch over setpoint 1/2 over external contact (display where no allocation: -----)]see IO Setup).
Setting	Min. Speed
0 % Min. Speed	Setting range: 0... "Max. Speed" Factory setting: 0 %
Setting	Max. Speed
100 % Max. Speed	Setting range: 100 %... "Min. Speed" Factory setting: 100 %
Setting	Set external1
ON Set external1	"ON" (factory setting) = speed setting by external Signal "OFF" = Setting "Set Intern1"

Diagram setting signal and output voltage (Idealized principle diagram)



MODBUS Out: speed setting over MODBUS

Analog Out: speed setting over analog output 0 - 10 V

Si Signal

9.1.2 Speed controller with direct setting by keyboard 1.02**Base setup 1.02**

Main menu	Base setup
Setting	
Protocol	
Base setup	
Controller Setup	
IO Setup	
Base setup	Mode Mode selection: 1.02
1.02 Mode	
Base setup	Number steps Selection: 0, 1, 2, 3, 4, 5 Factory setting: 0 Number steps: 0 In the factory setting "0" (without steps) the output frequency can be set directly with the ▼ + ▲ keys (see setting in operation). Number steps: 1, 2, 3, 4, 5 The modulation value can be assigned to each step. The desired step is set with the ▼ ▲ keys (see setting in operation). The following menus become active depending on the selected step count. (Step not active = [---])
0 Number steps	
Base setup	Step 1 value - 5 Setting range: 0...100 %. Factory setting: - - - - (Number steps 0) Factory setting: 20 %, 40 %, 50 %, 60 %, 100 % (Number steps 1 - 5)
- - - -	
Step 1 value	

Menu group "setting" (only when needed)

Main menu	Setting
Setting	
Protocol	
Base setup	
Controller Setup	
IO Setup	
Setting	Setting direct (at Number steps: 0 see "Base setup") If the setting is to be made during operation directly with the ▼ ▲ keys, no setting is necessary here (see setting in operation 1.02). Setting range: Min. Speed - Max. Speed Factory setting: 80 %
80 % Setting direct	
Setting	Setting step (at Number steps: 1 - 5 see "Base setup") If the setting is to be made during operation directly with the ▼ ▲ keys, no setting is necessary here (see setting in operation 1.02). Setting range: 0 - setting nummmber steps Factory setting: 0
0 Setting Step	

Setting	Min. Speed
0 % Min. Speed	Setting range: 0... "Max. Speed" Factory setting: 0 %
Setting	Max. Speed
100 % Max. Speed	Setting range: 100 % - "Min. Speed" Factory setting: 100 %

Setting in operation 1.02

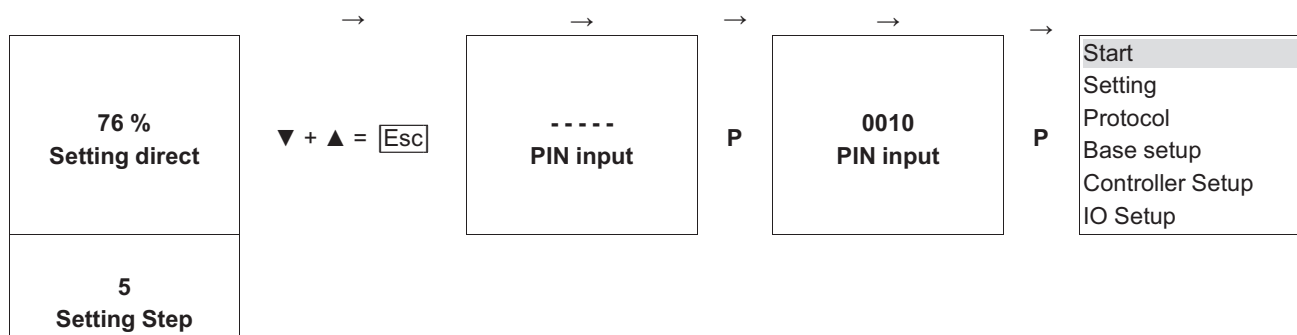
After installation is completed, only the "**Setting direct**" or "**Setting Step**" setting is visible in the "Info" menu group. All other menus are protected by a PIN.

Info	Setting direct (at Number steps: 0 see "Base setup")
76 % Setting direct	Setting range: Min. Speed - Max. Speed Factory setting: 80 %
	The value set by the ▼ ▲ keys is accepted and executed directly (P key without function).
Info	Setting step (at Number steps: 1 - 5 see "Base setup")
5 Setting Step	Setting range: 0 - programmed number steps Factory setting: 0

Switching over to the protected "Info" menu group takes place automatically after approximately 15 minutes if no key is pressed.

Possibilities for early activation of PIN protection:

- Select the "Info" menu group and confirm with the **P** key.
- Press the **[Esc]** key combination several times until the "Setting direct" or "Setting Step" menu is displayed.
- Execute the "Reset" function in the "Start" menu group.
- By switching the mains voltage off and then on again.

Input PIN **[0010] to exit the protected area**

adjust PIN 0010

9.2 Temperature control **2.01...2.05**

9.2.1 Basic setting **2.01... 2.05**

Main menu	Base setup
Setting	
Protocol	
Base setup	
Controller Setup	
IO Setup	
Base setup	Mode
2.01	Mode selection e.g. 2.01
Mode	
Base setup	E1 Analog In
TF	The sensor input is factory set in modes of group 2 to sensors of the "TF" type series (sensor type KTY81-210).
E1 Analog In	Measuring range: -50.0...+150 °C
	Connection terminals: "E1" and "T"
	Other settable sensors: • PT1000 at terminals "E1" and "T", (measuring range -50.0...+150 °C) • MTG-120V (type designation for active sensor with 0 - 10 V output, connection to terminals "E1", "GND" and "24 V", measuring range: -10...+120 °C) • 0 - 10 V, 0 - 20 mA, 4 - 20 mA (for sensors with free measuring range and linear characteristic) The sensor measuring range must be entered for sensors with free measuring range in order to display the actual value correctly. Example with a 0 - 10 V sensor and 0 - 100 °C measurement range: E1 Analog In = 0 - 10 V, E1 Unit = °C, E1 Decimals = 1, E1 Min. = 0,0 °C, E1 Max. = 100,0 °C, When selecting sensors with active signal, the setpoint and the Pband are automatically set to the 1/2 measuring range.
Base setup	E1 Offset
20.0 °C	Sensor calibration with calibrated comparison device.
E1 Offset	The current "E1 Actual" is displayed including the offset set here.
Base setup	E1 Setpoint min (function depending on the software version available)
--50.0 °C	Limitation of the adjustable setpoint (see settings for operation)
E1 Setpoint min	Setting range: in measuring range of sensor
	Factory setting: minimum measurement value
Base setup	E1 Setpoint max (function depending on the software version available)
150.0 °C	Limitation of the adjustable setpoint (see settings for operation)
E1 Setpoint max	Setting range: in measuring range of sensor
	Factory setting: maximum measurement value

Base setup	E2 Function
OFF E2 Function	The second signal input is not activated at the factory for modes with one sensor. In modes with two sensors, the function is automatically programmed. The second analog input is thus assigned and no other function assignments are possible. • 2.04 E2 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 "TF". • 2.05 E2 Function at 5E preprogrammed = regulation on difference temperature between sensor 1 and sensor 2. Preprogrammed sensor type "TF". Adjustable "E2 Function" • 1E = External Setpoint e.g. via external signal (0 - 10 V) instead of "Setpoint 1" – For sensor type "E1 Analog In" = "TF or PT1000": 0 - 10 V $\triangleq$ -50.0...+150 °C. – For sensors with active signal: 0 - 10 V $\triangleq$ 0 - 100 % sensor measuring range. • 2E = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (see IO Setup: function 7D). • 6E = sensor for outdoor temperature-dependent setpoint adaptation (at 2.03 not possible), pre-programmed sensor type "TF..". – additional parameters menu group "Setting": T-Band, T-Start SA, Min. Setpoint. – additional parameters menu group "Info": Setpoint Control – Example see setting for operation 4.01... 4.03 / additional menu items. • 7E = Measurement value = Measurement value e.g. for limit indication, display in Info menu "E2 Actual". • 8E... 13E = sensor input for control circuit 2 (at 2.03 not possible) see Base setup / operation with second control circuit.

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

- 2.01** Temperature control airconditioning and refrigeration
(preset set-point 20.0 °C, P-band 5.0 K)
- 2.02** Temperature control depending on outdoor temperature
(preset set-point 5.0 °C, - P-band 20.0 K)
- 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 "E2 Function" set to comparison **4E**. Display during operation: "Control value"
Alternative: Average calculation of 2 measuring places "E2 Function" set to **3E**. Display during operation: "Average E1 / E2"
- 2.05** Temperature control with 2 sensors, regulation on difference temperature.
Display during operation: "Value of E1 - E2" in K, "E1" = reference temperatur, "E2" causes positiv (E2 < E1) or negative (E2 > E1) difference.

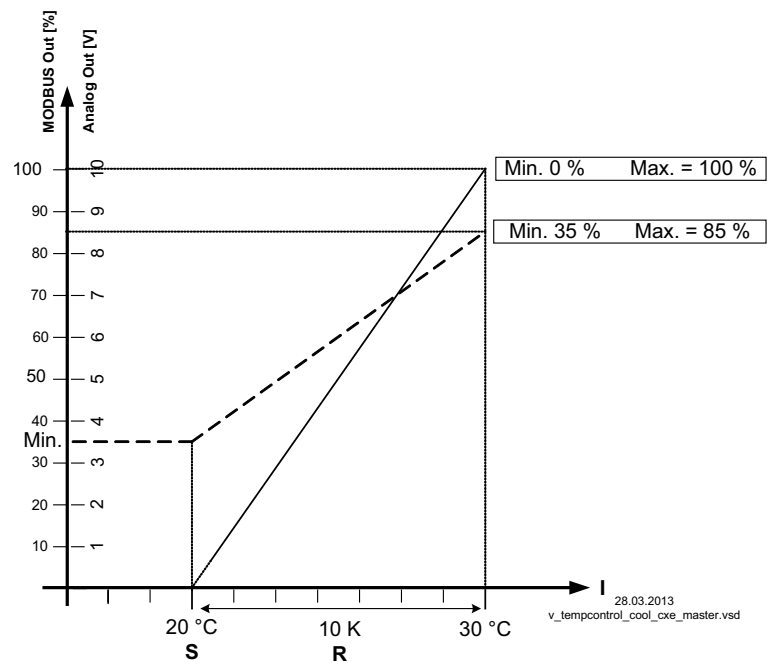
Settings for controller output with function **2A** (by analogue signal see IO Setup, by MODBUS see members menu).

Main menu	Setting
Setting	
Protocol	
Base setup	
Controller Setup	
IO Setup	
Setting	Setpoint 1
20.0 °C Setpoint 1	Setting range with passive sensor type "TF", "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 with active sensor type "MTG-120V": -10.0 °C...+120.0 °C Factory setting 2.01 - 2.05 : 55.0 °C

Setting	Setpoint 2
----- Setpoint 2	Setting "Setpoint 2" e.g. reduced value for night operation. Switch over setpoint 1/2 over external contact (display where no allocation: -----]see IO Setup).
Setting	Pband
5.0 K Pband	Narrow control range = Short control times Wide control range = Longer control times and more stable control
	Passive sensor type "TF", "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: -10.0...+120.0 K Factory setting: 65.0 K
Setting	Min. Speed
0 % Min. Speed	Setting range: 0... "Max. Speed" Factory setting: 0 %
Setting	Max. Speed
100 % Max. Speed	Setting range: 100 %... "Min. Speed" Factory setting: 100 %
Setting	Manual mode
OFF Manual mode	"OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
Setting	Speed manual
100 % Speed manual	Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (see IO Setup). Setting range: 0...100 % $\triangle$ "Min. Speed"... "Max. Speed" Factory setting: 100 %
	For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

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”)

MODBUS Out: speed setting over MODBUS

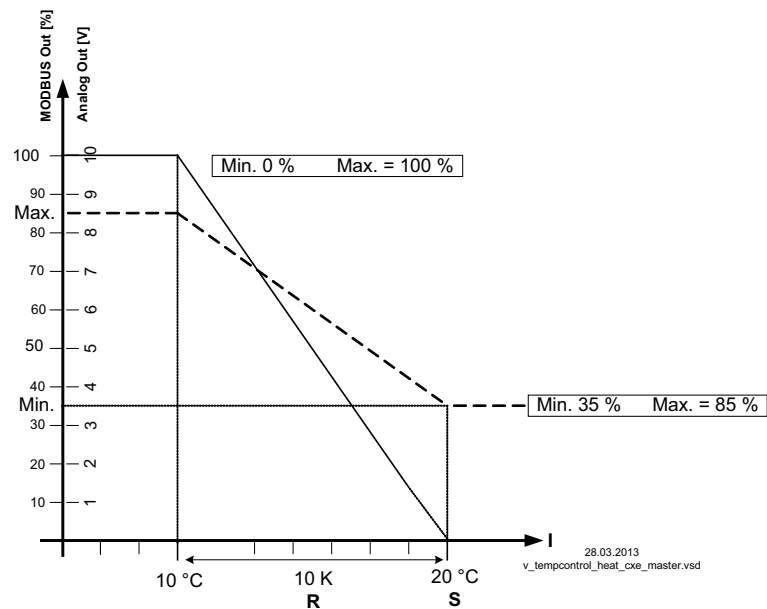
Analog Out: speed setting over analog output 0 - 10 V

S Setpoint

R Pband

I Actual value

Example 2: Temperature control in “Heating function” (Idealized principle diagram)



(Controller Setup: “Val > Set = n+” to “OFF”)

MODBUS Out: speed setting over MODBUS

Analog Out: speed setting over analog output 0 - 10 V

S Setpoint

R Pband

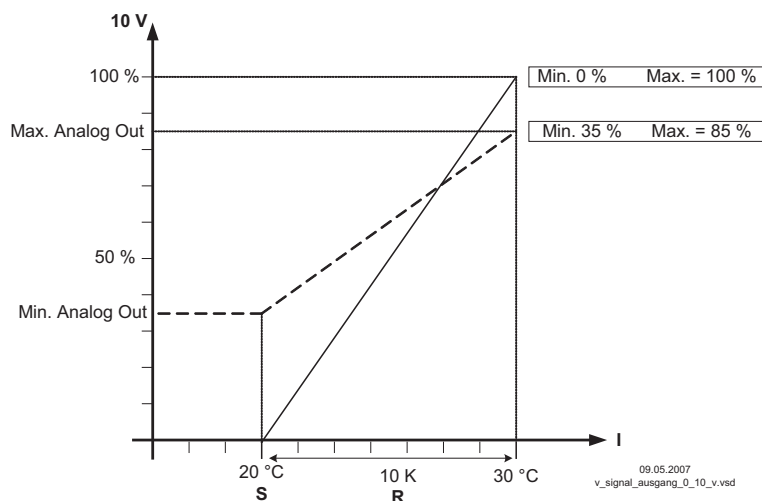
I Actual value

9.2.4 Additionally for 2.03 (controller output 2 with function 6A)

The 0 - 10 V output signal A2 can, e.g., be used for triggering a shutter or heating.

Setting	Offset AnalogOut
0.0 K Offset AnalogOut	The target value for this output is the target value (Setpoint) for the ventilation "offset" setting. Adjustment: range +/- 10,0 K relative to the active Setpoint. Example for triggering a shutter servomotor: At factory setting "0,0 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 (see IO Setup).
Setting	Pband AnalogOut
2.0 K Pband AnalogOut	Pband AnalogOut = separately adjustable range of control (P-band) for 0 - 10 V output Setting range: 0...200.0 K Factory setting: 2.0 K
Setting	Min. AnalogOut
0 % Min. AnalogOut	Min. AnalogOut = Minimal output voltage Setting range: 0...100 % = 0 - 10 V Factory setting: 0 %
Setting	Max. AnalogOut
100 % Max. AnalogOut	Max. AnalogOut = Maximal output voltage Setting range: 100...0 % = 10 - 0 V Factory setting: 100 %

Example for signal out 0 - 10 V (IO Setup: "A2 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

9.2.5 For mode **2.03**: Relay output for Heating or Cooling

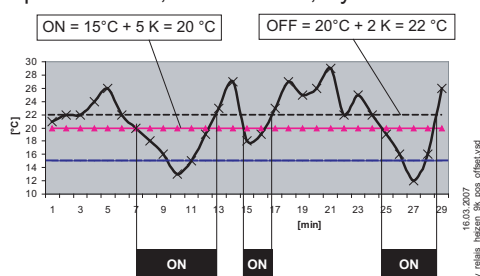
Setting	OffsetDigitalOut
-1.0 K OffsetDigitalOut	Offset Digital Out = Offset for relay output ("K2" is pre-programmed by the factory). The relay operating point deviates by the adjusted offset of the Setpoint of the ventilation (if relay "K2" not inverted, terminal "21"- "24" bridged). Setting range: -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
Setting	Hyst.DigitalOut
1.0 K Hyst.DigitalOut	Switching hysteresis of the relay Setting range: 0...10,0 K, Factory setting: 1.0 K (Kelvin)

Temperature variation with factory setting **[9K]** 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 K (Kelvin), the heating is switched off. I.e., the release point is situated at the hysteresis value over the operating point.

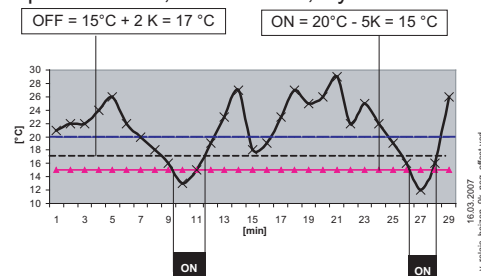
Example:

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

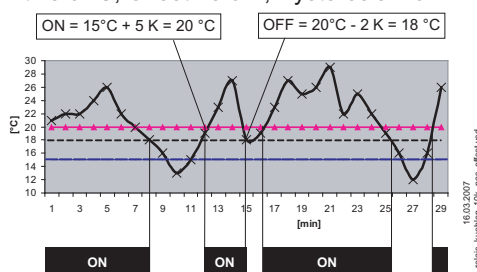


Info	
28.7 °C E1 Actual	The activated heating is indicated over the fire symbol in the display.

Temperature variation with reprogramming to **[10K]** for "K2" 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.

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).

Setting	Alarm Minimum
0.0 °C Alarm Minimum	Setting range: OFF / -49.9...150.0 °C Factory setting: 0.0 °C
Setting	Alarm Maximum
40.0 °C Alarm Maximum	Setting range: OFF / -49.9...150.0 °C Factory setting: 40.0 °C
Info	Example for display if falling below setting “Alarm Minimum” alternating to the actual value display. Relay “K1” disengages (if not inverted).
 Lmt E1 min	
Info	Example for display if exceeding setting “Alarm Maximum” alternating to the actual value display Relay “K1” disengages (if not inverted).
 Lmt E1 max.	

9.3 Pressure control for condensers refrigeration 3.01...3.04**9.3.1 Base setup 3.01... 3.04**

Main menu	Base setup
Start	
Setting	
Protocol	
Base setup	
Controller Setup	
Base setup	Mode
3.01 Mode	Mode selection e.g. 3.01

Base setup	E1 Analog In
MBG0-30 E1 Analog In	The sensor input is factory set for modes of group 3 to sensor type "MBG-30I". Measuring range: 0...30 bar Output signal: 4 - 20 mA Connection terminals: "E1", "24V"
	Other settable sensors: • MBG-50I (measuring range 0...50 bar, output signal 4 - 20 mA) • DSF2-25 (measuring range 2...25 bar, output signal 4 - 20 mA) • 0 - 10 V, 0 - 20 mA, 4 - 20 mA (for sensors with free measuring range and linear characteristic) The sensor measuring range must be entered for sensors with free measuring range in order to display the actual value correctly. Example 0 - 10 V sensor and measuring range 0 - 20 bar: E1 Analog In = 0 - 10 V, E1 Unit = bar, E1 Decimals = 1, E1 Min. = 0,0 bar, E1 Max. = 20,0 bar
Base setup	E1 Refrigerant
R448A E1 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 "E1 Min. value" and the "E1 Max. Value". Setting in "bar" although unit display is in "°C"!
	E1 Offset
0.00 bar E1 Offset	Sensor calibration with calibrated comparison device. The current "E1 Actual" is displayed including the offset set here.
Base setup	E1 Setpoint min (function depending on the software version available)
0.00 bar E1 Setpoint min	Limitation of the adjustable setpoint (see settings for operation) Setting range: in measuring range of sensor Factory setting: minimum measurement value
Base setup	E1 Setpoint max (function depending on the software version available)
30.0 bar E1 Setpoint max	Limitation of the adjustable setpoint (see settings for operation) Setting range: in measuring range of sensor Factory setting: maximum measurement value

Base setup	E2 Function
OFF E2 Function	The second signal input is not activated at the factory for modes with one sensor. 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.
	Modes with two sensors • 3.03 and 3.04 E2 Function at 4E preprogrammed = comparison value with control to higher value (two circuit condensers). Adjustable “E2 Function” • 1E = external setpoint e.g. by external signal (0 - 10 V) instead of setting “Setpoint 1”. 0 - 10 V Δ 0 - 100 % sensor measuring range. • 2E = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (see IO Setup: function 7D). • 3E = Sensor average to E1 • 5E = Sensor difference to E1 • 6E = sensor for outdoor temperature-dependent setpoint adaptation, pre-programmed sensor type “TF..”. – Menu group “Setting” additional parameter: T-Band, T-Start SA, Min. Setpoint. – Menu group “Info” additional parameter: Setpoint control – Example see setting for operation 4.01... 4.03 / additional menu items. • 7E = Measurement value = Measurement value e.g. for limit indication, display in Info menu “E2 Actual”. • 8E... 13E = sensor input for control circuit 2, see base setup / operation with second control circuit.

Selection of the refrigerants*:								
R12	R13	R13b1	R22	R23	R32	R114	R1234YF	R1234ZE
R134a	R142B	R227	R401	R401A	R401B	R402	R402A	R402B
R404A	R407A	R407B	R407C	R410A	R448A	R449A	R455A	R500
R502	R503	R507	R717					

* Number of refrigerants depending on software version

9.3.2 Setting for operation modes **3.01**... **3.04**

- 3.01** Pressure control condensers, setting Setpoint in bar
- 3.02** Pressure control for condensers with input for refrigerant, Setpoint in °C
- 3.03** Two sensors for dual circuit condenser. Automatic regulation to the highest pressure (selection amplifier integrated) operation display: “Control value”, Setpoint in bar
- 3.04** Two sensors for dual circuit condenser with input for refrigerant automatic regulation to the highest pressure (selection amplifier). Setpoint in °C , also for different refrigerants suitably there comparison of the temperatures. Display during operation: “Control value ”

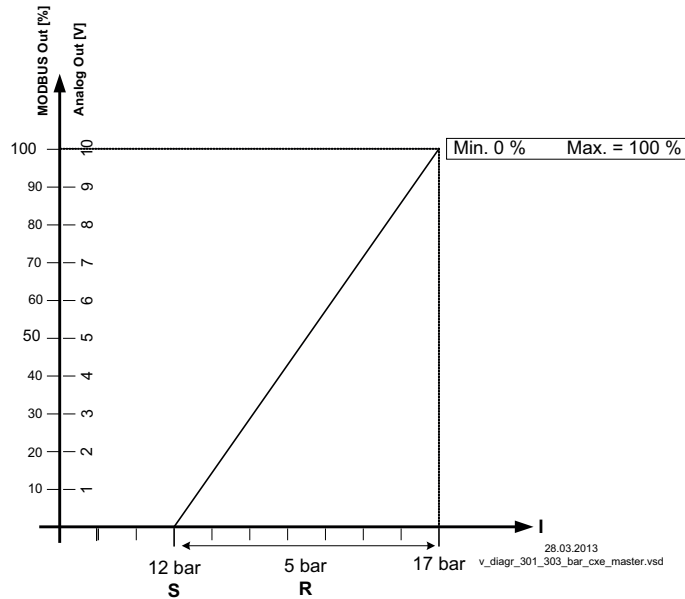
Settings for controller output with function **2A** (by analogue signal see IO Setup, by MODBUS see members menu).

Main menu	Setting
Start	
Setting	
Protocol	
Base setup	
Controller Setup	

Setting	Setpoint 1
12.0 bar Setpoint 1	3.01 and 3.03 Setting range: in measuring range of sensor Factory setting: 12.0 bar
	3.02 and 3.04 Setting range: dependent on the selected refrigerant Factory setting: 35.0 °C
Setting	Setpoint 2
----- Setpoint 2	Setting "Setpoint 2" e.g. reduced value for night operation. Switch over setpoint 1/2 over external contact (display where no allocation: -----]see IO Setup).
Setting	Pband
5.00 bar Pband	Narrow control range = Short control times Wide control range = Longer control times and more stable control 3.01 and 3.03 Setting range: in measuring range of sensor Factory setting: 5.0 bar
	3.02 and 3.04 Setting range: dependent on the selected refrigerant Factory setting: 7.0 K
Setting	Min. Speed
0 % Min. Speed	Setting range: 0... "Max. Speed" Factory setting: 0 %
Setting	Max. Speed
100 % Max. Speed	Setting range: 100 %... "Min. Speed" Factory setting: 100 %
Setting	Manual mode
OFF Manual mode	"OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
Setting	Speed manual
100 % Speed manual	Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (see IO Setup). Setting range: 0...100 % siehe "Min. Speed"... "Max. Speed" Factory setting: 100 %
	For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

9.3.3 Functional diagrams pressure control condensers

Functional diagram for Mode **3.01** and **3.03** (Idealized principle diagram)



MODBUS Out: speed setting over MODBUS

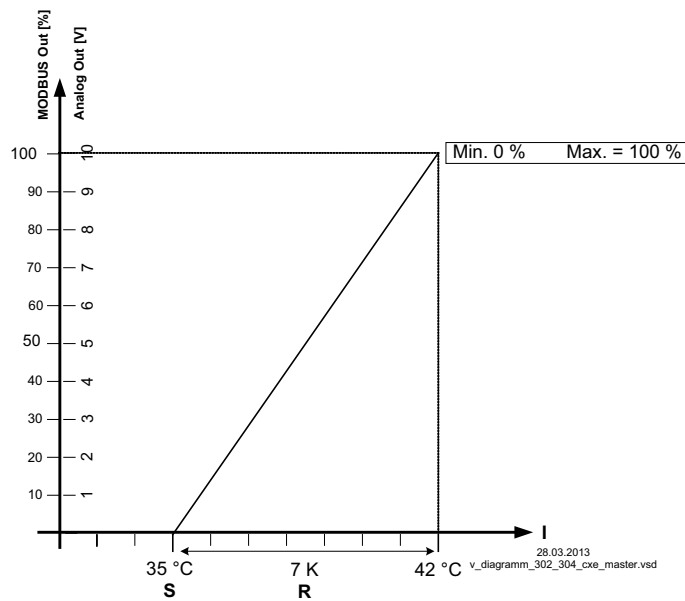
Analog Out: speed setting over analog output 0 - 10 V

S Setpoint

R Pband

I Actual value

Functional diagram for Mode **3.02** and **3.04** (Idealized principle diagram)



MODBUS Out: speed setting over MODBUS

Analog Out: speed setting over analog output 0 - 10 V

S Setpoint

R Pband

I Actual value



Information

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

9.4 Pressure control airconditioning 4.01... 4.03

9.4.1 Base setup 4.01... 4.03

Main menu	Base setup
Start	
Setting	
Protocol	
Base setup	
Controller Setup	
Base setup	Mode
4.01	Mode selection e.g. 4.01
Mode	
Base setup	E1 Analog In
DSG200	The sensor input is factory set for modes of group 4 to sensor type "DSG200".
E1 Analog In	Measuring range: 0...200 Pa Output signal: 0 - 10 V Connection terminals: "E1", "GND", "24V"
	Other settable sensors / measuring ranges:
	"DSG 50", "DSG100", "DSG200", "DSG300", "DSG500", "DSG1000", "DSG2000", "DSG4000", "DSG6000", INT300, INT500 (numerical data $\triangle$ measuring range [Pa], output signal 0 - 10 V). Type designation DSG... $\triangle$ pressure sensor with new type designation MPG.. 0 - 10 V, 0 - 20 mA, 4 - 20 mA (for sensors with free measuring range and linear characteristic)
	The sensor measuring range must be entered for sensors with free measuring range in order to display the actual value correctly. Example with a 0 - 10 V sensor and 0 - 400 Pa measurement range: E1 Analog In = 0 - 10 V, E1 Unit = Pa, E1 Decimals = 1, E1 Min. = 0,0 Pa, E1 Max. = 400 Pa
Base setup	E1 Offset
0.0 Pa	Sensor calibration with calibrated comparison device.
E1 Offset	The current "E1 Actual" is displayed including the offset set here.
Base setup	E1 Setpoint min (function depending on the software version available)
0.0 Pa	Limitation of the adjustable setpoint (see settings for operation)
E1 Setpoint min	Setting range: in measuring range of sensor Factory setting: minimum measurement value
Base setup	E1 Setpoint max (function depending on the software version available)
200.0 Pa	Limitation of the adjustable setpoint (see settings for operation)
E1 Setpoint max	Setting range: in measuring range of sensor Factory setting: maximum measurement value

Base setup	E2 Function
OFF E2 Function	The second signal input is not activated at the factory for modes with one sensor. In modes with two sensors, the function is automatically programmed. The second analog input is thus assigned and no other function assignments are possible.
	Modes with two sensors
	- For 4.02 E2 Function at 6E preprogrammed = sensor for setpoint lowering. Preprogrammed sensor type "TF.." - For 4.03 E2 Function at 6E preprogrammed = sensor for setpoint lowering. - Preprogrammed sensor: type "0 - 10 V" (measuring range -35.0...+65.0 °C) Pre-programmed in the IO setup: - To read out the sensor value via bus: E2 (AI2) signal = MB.h9001 - For enabling via bus: D1 Function = 1D, D1 (DI1) signal = MB.c0 - For switch over setpoint 1 /2 via Bus: D2 Function = 5D, D2 (DI2) signal = MB.c1 Adjustable "E2 Function" for Modes with one sensor 1E = external setpoint e.g. by external signal (0 - 10 V) instead of setting "Setpoint 1". 0 - 10 V $\triangleq$ 0 - 100 % sensor measuring range. 2E = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (see IO Setup: function 7D). 3E = Sensor average to E1 4E = Sensor comparison to E1 5E = Sensor difference to E1 7E = Measurement value = Measurement value e.g. for limit indication, display in Info menu "E2 Actual". 8E ... 13E = sensor input for control circuit 2 see Base setup / operation with second control circuit.

9.4.2 Setting for operation modes **4.01**... **4.03**

4.01	Pressure control, Setting Setpoint in Pa
4.02	Pressure control setpoint depending on outdoor temperature
4.03	Pressure control with outdoor temperature-dependent setpoint adaptation and activation by MODBUS

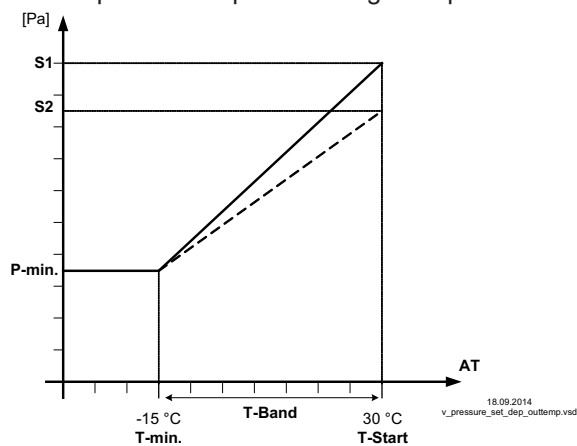
Settings for controller output with function **2A** (by analogue signal see IO Setup, by MODBUS see members menu).

Main menu	Setting
Start	
Setting	
Protocol	
Base setup	
Controller Setup	
Setting	Setpoint 1
100 Pa Setpoint 1	Setting range: in measuring range of sensor Factory setting: 100 Pa
Setting	Setpoint 2
..... Setpoint 2	Setting "Setpoint 2" e.g. reduced value for night operation. Switch over setpoint 1/2 over external contact (display where no allocation: -----] see IO Setup).

Setting	Pband
100 Pa	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
Setting	Min. Speed
0 %	Setting range: 0... "Max. Speed" Factory setting: 0 %
Setting	Max. Speed
100 %	Setting range: 100 %... "Min. Speed" Factory setting: 100 %
Setting	Manual mode
OFF	"OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
Setting	Speed manual
100 %	Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (see IO Setup). Setting range: 0...100 % $\triangle$ "Min. Speed"... "Max. Speed" Factory setting: 100 %
	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



S1 Setpoint 1
S2 Setpoint 2
P-min. Min. Setpoint
T-min. Min. temperature
T-Start Setpoint reducing will start below this outside temperature
T-band Temperature range
AT Outdoor temperature

An outside temperature compensation can be activated (sensor connection "E2" = "Analog In 2") when being operated as a pressure regulation device.

Through this function, the set and active "Setpoint 1" or "Setpoint 2" is automatically changed proportional to the measured outside temperature (see Info: "Setpoint control").

Setting	T-Band SA
30 K	Temperature range in which the setpoint change continuously with outside temperature Setting range: 0.0..100.0 K Factory setting: 30.0 K
T-Band SA	

Setting	T-Start SA
15 °C T-Start SA	Setpoint reducing will start below this outside temperature Setting range: -10.0...40.0 °C Factory setting: 15.0 °C
Setting	Min. Setpoint
70.0 Pa Min. Setpoint	Minimum pressure for very low outside temperature Setting range: in measuring range of sensor Factory setting: 70 Pa

9.5 Volume control **5.01** and **5.02**

9.5.1 Basic setting **5.01** and **5.02**

Main menu	Base setup
Start	
Setting	
Protocol	
Base setup	
Controller Setup	
Base setup	Mode
5.01 Mode	Mode selection e.g. 5.01
Base setup	E1 Analog In
DSG200 E1 Analog In	The sensor input is factory set for modes of group 5 to sensor type "DSG200". Measuring range: 0...200 Pa Output signal: 0 - 10 V Connection terminals: "E1", "GND", "24V"
	Other settable sensors / measuring ranges: "DSG 50", "DSG100", "DSG200", "DSG300", "DSG500", "DSG1000", "DSG2000", "DSG4000", "DSG6000", INT300, INT500 (numerical data Δ measuring range [Pa], output signal 0 - 10 V). Type designation DSG... Δ pressure sensor with new type designation MPG.. 0 - 10 V, 0 - 20 mA, 4 - 20 mA (for sensors with free measuring range and linear characteristic) The sensor measuring range must be entered for sensors with free measuring range in order to display the actual value correctly. Example with a 0 - 10 V sensor and 0 - 400 Pa measurement range: E1 Analog In = 0 - 10 V, E1 Min. = 0,0 Pa, E1 Max. = 400 Pa
Base setup	K Factor
75 E1 K-Factor	Input of the "K factor" dependent on the fan (inlet duct). setting range: 0...5000 Factory setting: 75
	The K-factors (Nozzle coefficients) of ZIEHL-ABEGG fans can be found in the following table. Please contact the manufacturer for K-factors of unlisted fans.
Base setup	E1 Offset
0.0 Pa E1 Offset	Sensor calibration with calibrated comparison device.

Base setup	E1 Setpoint min (function depending on the software version available)
0 m³/h E1 Setpoint min	Limitation of the adjustable setpoint (see settings for operation) Setting range: in measuring range of sensor Factory setting: minimum measurement value
Base setup	E1 Setpoint max (function depending on the software version available)
1060 m³/h E1 Setpoint max	Limitation of the adjustable setpoint (see settings for operation) Setting range: in measuring range of sensor Factory setting: maximum measurement value
Base setup	E2 Function
OFF E2 Function	The second signal input is not activated at the factory for modes with one sensor. In modes with two sensors, the function is automatically programmed. The second analog input is thus assigned and no other function assignments are possible.
	Modes with two sensors
	For 5.02 E2 Function at [6E] preprogrammed = sensor for setpoint lowering. Preprogrammed sensor type "TF.."
	Adjustable "E2 Function" for Modes with one sensor
	[1E] = external setpoint e.g. by external signal (0 - 10 V) instead of setting "Setpoint 1". 0 - 10 V Δ 0 - 100 % setting range. [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]). [3E] = Sensor average to E1 [4E] = Sensor comparison to E1 [5E] = Sensor difference to E1 [7E] = Measurement value = Measurement value e.g. for limit indication, display in Info menu "E2 Actual". [8E] ... [13E] = sensor input for control circuit 2 see Base setup / operation with second control circuit.

K-Factors for ZIEHL-ABEGG fans

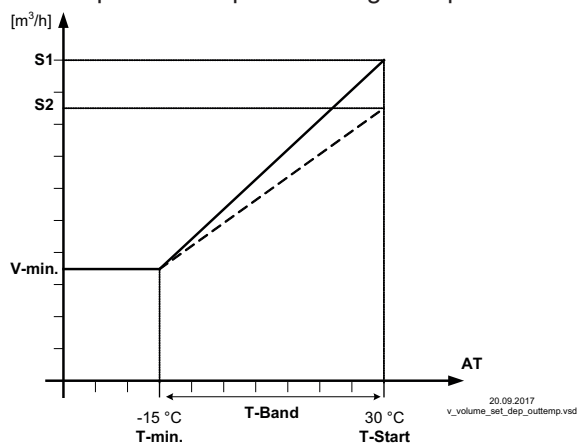
Size	ZABluefin	C-series Cpro-series	Vpro-series	M-series	ZAvblue
Impeller diameter [mm]		K-Factor	K-Factor	K-Factor	K-Factor
225		47		57	
250		60		68	
280		75	86	86	95
315		95	112	96	120
355		121	144	142	150
400		154	180	172	200
450		197	220	217	240
500		252	291	274	320
560		308	360		400
630		381	445		480
710	530	490			
800	670	620			
900	850	789			
1000	1050	999			
1120	1250				

Subject to technical changes!

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

Settings for controller output with function **2A** (by analogue signal see IO Setup, by MODBUS see members menu).

Main menu	Setting
Start	
Setting	
Protocol	
Base setup	
Controller Setup	
Setting	Setpoint 1
530 m³/h Setpoint 1	Setting Setpoint in m ³ /h Setting range: depending on measuring range of sensor and "K factor" Factory setting: 530 m ³ /h
Setting	Setpoint 2
----- Setpoint 2	Setting "Setpoint 2" e.g. reduced value for night operation. Switch over setpoint 1/2 over external contact (display where no allocation: -----] see IO Setup).
Setting	Pband
530 m³/h 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
Setting	Min. Speed
0 % Min. Speed	Setting range: 0... "Max. Speed" Factory setting: 0 %
Setting	Maximal Speed
100 % Max. Speed	Setting range: 100 %... "Min. Speed" Factory setting: 100 %
Setting	Manual mode
OFF Manual mode	"OFF" = automatic control as function of the set parameters (Factory setting) "ON" = automatic control without function, speed setting in menu "Speed manual"
Setting	Speed manual
100 % Speed manual	Manual speed setting without influence by the external signal. Activation by menu "Manual mode" or external contact at digital input (see IO Setup). Setting range: 0...100 % $\triangle$ "Min. Speed"... "Max. Speed" Factory setting: 100 %
	For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

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.

Through this function, the set and active Setpoint 1/2 is automatically changed proportional to the measured outside temperature (see Info: "Setpoint control").

S1 Setpoint 1
S2 Setpoint 2
V-Min SA Minimum air volume
T-min Minimum temperature
T-Start Setpoint reducing will start below this outside temperature
AT Outdoor temperature

Setting	T-Band SA
30.0 K T-Band SA	Temperature range in which the setpoint change continously with outside temperature Setting range: 0.0..100.0 K Factory setting: 30.0 K
Setting	T-Start SA
15.0 °C T-Start SA	Setpoint reducing will start below this outside temperature Setting range: -10.0...40.0 °C Factory setting: 15.0 °C
Setting	Min. Setpoint
700 m³/h Min. Setpoint	Minimum pressure for very low outside temperature Setting range: depending on measuring range of sensor and "K factor" Factory setting: 700 m³/h

9.6 Air velocity control 6.01**9.6.1 Base setup 6.01**

Main menu	Base setup
Start	
Setting	
Protocol	
Base setup	
Controller Setup	
Base setup	Mode
6.01 Mode	Mode selection 6.01

Base setup	E1 Analog In
MAL1 E1 Analog In	The sensor input is factory set for mode 6.01 to sensor type "MAL1". Measuring range: 0...1 m/s Output signal: 0 - 10 V Connection terminals: "E1", "GND", "24V"
	Other settable sensors / measuring ranges: • MAL10 (0...10 m/s, output signal 0 - 10 V) • MAL15 * (0...15 m/s, output signal 0 - 10 V) • MAL20 * (0...20 m/s, output signal 0 - 10 V) • 0 - 10 V, 0 - 20 mA, 4 - 20 mA (for sensors with free measuring range and linear characteristic) The sensor measuring range must be entered for sensors with free measuring range in order to display the actual value correctly. Example 0 - 10 V sensor and measuring range 0 - 5 M/s: E1 Analog In = 0 - 10 V, E1 Unit = m/s, E1 Decimals = 1, E1 Min. = 0,0 m/s, E1 Max. = 5 m/s * Alternative measuring ranges which can be selected by jumpers for sensor type MAL10.
Base setup	E1 Offset
0.00 m/s E1 Offset	Sensor calibration with calibrated comparison device. The current "E1 Actual" is displayed including the offset set here.
Base setup	E1 Setpoint min (function depending on the software version available)
0.00 m/s E1 Setpoint min	Limitation of the adjustable setpoint (see settings for operation) Setting range: in measuring range of sensor Factory setting: minimum measurement value
Base setup	E1 Setpoint max (function depending on the software version available)
1.00 m/s E1 Setpoint max	Limitation of the adjustable setpoint (see settings for operation) Setting range: in measuring range of sensor Factory setting: maximum measurement value
Base setup	Adjustable "E2 Function"
OFF E2 Function	• [1E] = external setpoint e.g. by external signal (0 - 10 V) instead of setting "Setpoint 1". 0 - 10 V $\triangleq$ 0 - 100 % sensor measuring range. • [2E] = External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input (see IO Setup: function [7D]). • [3E] = Sensor average to E1 • [4E] = Sensor comparison to E1 • [5E] = Sensor difference to E1 • [6E] = sensor for outdoor temperature-dependent setpoint adaptation, pre-programmed sensor type "TF..". – Menu group "Setting" additional parameter: T-Band, T-Start SA, Min. Setpoint. – Menu group "Info" additional parameter: Setpoint control – Example see setting for operation 4.01... 4.03 / additional menu items. • [7E] = Measurement value = Measurement value e.g. for limit indication, display in Info menu "E2 Actual". • [8E]... [13E] = sensor input for control circuit 2 see Base setup / operation with second control circuit.

9.6.2 Settings for operation modes 6.01**6.01** Air velocity control, Setpoint in m/s

Settings for controller output with function **2A** (by analogue signal see IO Setup, by MODBUS see members menu).

Main menu	Setting
Start	
Setting	
Protocol	
Base setup	
Controller Setup	
Base setup	Setpoint 1
0.50 m/s	Setting range: in measuring range of sensor
Setpoint 1	Factory setting: 0.50 m/s
Base setup	Setpoint 2
-----	Setting "Setpoint 2" e.g. reduced value for night operation.
Setpoint 2	Switch over setpoint 1/2 over external contact (display where no allocation: -----] see IO Setup).
Base setup	Pband
0.50 m/s	Narrow control range = Short control times
Pband	Wide control range = Longer control times and more stable control
	Setting range: in measuring range of sensor
	Factory setting: 0.50 m/s
Base setup	Min. Speed
0 %	Setting range: 0... "Max. Speed"
Min. Speed	Factory setting: 0 %
Base setup	Max. Speed
100 %	Setting range: 100 %... "Min. Speed"
Max. Speed	Factory setting: 100 %
Base setup	Manual mode
OFF	"OFF" = automatic control as function of the set parameters (Factory setting)
Manual mode	"ON" = automatic control without function, speed setting in menu "Speed manual"
Base setup	Speed manual
100 %	Manual speed setting without influence by the external signal.
Speed manual	Activation by menu "Manual mode" or external contact at digital input (see IO Setup).
	Setting range: 0...100 % $\triangle$ "Min. Speed"... "Max. Speed"
	Factory setting: 100 %
	For information about deactivated regulation the adjusted value for manual speed is indicated alternating with the actual value.

9.7 Menu group Start

Main menu	Start
Start	
Settings	
Protocol	
Base setup	
Controller Setup	
Start	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.
	PIN 1234 Freischalten Menu group "Setting". If "Set protection" = "ON" (see Controller Setup)
	PIN 9090 Restore user setting.
	PIN 9091 Save user setting (corresponds function "Save user setup" = "ON" see Controller Setup)
	PIN 9095 Restore factory setting = delivery status Exception: The stored events in the "Protocol" menu are retained after resetting to factory setting!
Start	Language
GB Language	Menu language by the factory set to English. In this menu different national languages can be selected (GB = English, D = German ...).
	US Einheiten
OFF US Einheiten	The display can be switched between SI units and imperial (US) units => US units ON. SI units (factory setting): °C, bar, Pa, m ³ /h, K-Faktor, m/s Imperial (US) units: °F, psi, in.wg, cfm, K-Faktor US, ft/s Settings for temperature differences (with SI units in K) are also made for Imperial units (US) in °F ($\Delta 1.8\text{ °F} \triangleq \Delta 1\text{ K}$). Conversion factors: - Temperature: $t / \text{°F} = 1,8 \times t \text{ °C} + 32$. - Pressure: 1,0 psi = 0,069 bar, 1,0 in.wg = 254 Pa - Air flow: 1,0 cfm = 0.5885 m³/h, inlet ring: K-Faktor US = 9,3 x K-Faktor SI - Speed: 1.0 ft/s = 0.3048 m/s In order to refresh the display, the desired mode must be confirmed again after switching over the units (see Base setup)!
Start	Reset
OFF Reset	Complete re-start of the device
Start	Mode
1.01 Mode	Query of the operating mode (e.g. 1.01 for speed controller)
Start	Device name
12.00 xxx	Display of device name and software version

Start	Individual unit number
SN: 154036311039	

9.8 Menu group Info

The first menu item in the Info menu group is displayed (display dependent on selected mode) after switching on the line voltage or after exiting the setting menu with the Esc key combination. Settings cannot be made in this menu group!	
Info for mode speed controller 1.01	
Info	Level modulation control output.
0 % Brake control	The percentage modulation factor is displayed in addition to the bar chart.
Info	Display of the currently active default signal.
0 % Set external1	The percentage corresponds to the internal actuation of the power component under consideration of the settings "Min. Speed" and "Max. Speed". 0 - 100 % $\triangleq$ 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 "E1" / "GND"
"Set external2"	Signal to "E2" / "GND"
"Set Internal1"	Menu "Set Intern1"
"Set Internal2"	Menu "Set Intern2"
Info for mode controller 2.01... 6.01	
Info	Only for mode 2.05
0 °C E1-E2 actual	Current actual value difference sensor 1 - sensor 2 (unit depending on the programming).
Info	Only for mode 2.04, 3.03, 3.04 (E2 function = 4E)
0 °C Control value	The highest value determined automatically from two sensor measuring values which is used as the actual value for the control (unit depending on programming).
Info	Only for mode 2.04 programmed for averaging (E2 function = 3E).
49.9 °C Average E1/E2	
Info	Current actual value measured at sensor 1 (unit depending on programming).
0 °C E1 Actual	
Info	Display for "actual value 2" for operation with two sensors. Display if function not active: -----
0 °C E2 Actual	

Info	Display of the active target value at which the device operates.
0 °C Setpoint 1	"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. Display for operation with two control circuits: "1.Setpoint 1" or "1.Setpoint 2" for control circuit 1 "2.Setpoint 1" or "2.Setpoint 2" for control circuit 2
Info	Only for mode 4.02 , 4.03 , 5.02 with setpoint depending on outdoor temperature (E2 function = [6E]).
100.0 Pa Setpoint control	
Info	Level modulation control output.
0 % Brake control	In addition to the bar chart, the level of the output voltage is indicated.
	The modulation for each control circuit is displayed in operation with two control circuits: "1. Modulation" for control circuit 1 "2. Modulation" for control circuit 2
Info	Minimum switch-off state
OFF Min. switch off	"ON" = switch off, if Setpoint (+/- "Min. cut off" value) is reached. "OFF" = no switch-off, i.e. operation at minimum rate.
	Display for operation with two control circuits: "1.Minimum switch-off" for control circuit 1 "2.Minimum switch-off" for control circuit 2

9.9 Controller Setup

9.9.1 PIN protection activate, PIN0010

Controller Setup	The adjustments for the installation in the service level can be protected against unintentional modifications. To do this, activate the "PIN protection" = "ON".
OFF PIN Protection	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 .

Available menu groups with activated PIN-protection

Main menu	
Start	
Setting	
Protocol	

If PIN-protection is switched on, it automatically becomes active after about 15 minutes without keys being pressed.

Possibilities for early activation of PIN protection:

- Execute the "Reset" function in the "Start" menu group.
- By switching the mains voltage off and then on again.



Information

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

9.9.2 Set protection activate, PIN 1234

Controller Setup	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").
OFF Set protection	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!

Available menu groups with activated PIN-protection + setting protection

Menu	
Start	
Protocol	

9.9.3 Save user settings restore with PIN 9090

Controller Setup	The individually made device configurations (User Setting) can be saved here (corresponds to PIN 9091).
OFF Save User Setup	By entering PIN 9090 the individually made device configurations can be reestablished (9090 Start - PIN Input).
	A file (userconf.csv) is generated and saved on the main drive (root directory) when saving the user setting. The data can be accessed via the ZAsset program.

**Information**

By entering the "PIN 9095" in the "PIN" menu of the "Start" menu group the device is reset to the as-delivered state (except for the saved events in the "Protocol" menu).
Any changes that have been made to the settings are thus lost.

9.9.4 Sensor Alarm ON / OFF

The sensors at the analog inputs "E1 Analog In" and "E2 Analog In" (if sensor 2 is activated) are monitored.

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.

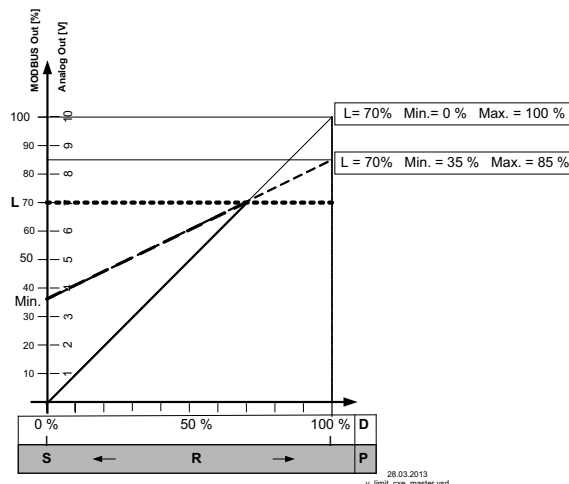
Function only in controller mode (from **2.01**)!

Controller Setup	With "Alarm Sensors" = "ON" (factory setting). Indicated sensor disturbances are displayed as "Alarm" alternating to the actual value and stored in the menu of "Protocol".	 Sensor 1
ON Alarm sensors	A programmed alarm relay (factory setting relay K2) indicates the sensor failure.	
Controller Setup	With "AlarmSensors" = "OFF" are indicated sensor disturbances as "Message" alternating to the actual value and stored in the menu of "Protocol".	 Sensor 1
OFF Alarm sensors		

9.9.5 Limit

Controller Setup	After allocation of a digital input (see IO Setup) an adjustable limitation of the modulation can be activated via a digital input ("D1", "D2", ..).
----- Limit	Display as long as no allocation has been carried out in "IO Setup": ---- The limitation influences both outputs in operation with two control circuits.

"Limit value" = max. possible modulation (e.g. speed reduction during night operation by time switch).
 Setting range: "Limit" = "Min. Speed" to "Max. Speed".
 Factory setting: 100 % $\triangleq$ max. modulation, i. e. no limit.
 Setting depending on device type in: % or rpm.



Limit (idealized principle diagram)
 MODBUS Out: speed setting over MODBUS
 Analog Out: speed setting over analog output 0 - 10 V
 L Limit
 S Setpoint
 R Pband
 D Speed controller: setting signal
 P P-controller: control deviation

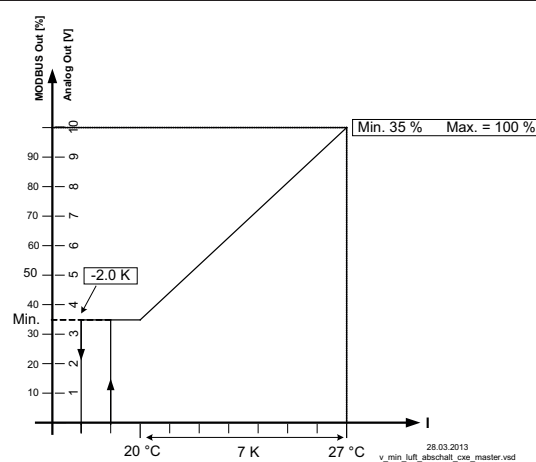
9.9.6 Min. switch off

Controller Setup	This function is primarily significant for installation of the device as a pure P Controller in refrigeration and air-conditioning technology.
OFF Min. switch off	For operation mode speed controller 1.01 without function!
	Display for operation with two control circuits: "1. Minimum switch-off" for control circuit 1 "2. Minimum switch-off" for control circuit 2

Minimum switch-off = 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").

Minimum switch-off, 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 cut off (idealized principle diagram)
 MODBUS Out: speed setting over MODBUS
 Analog Out: speed setting over analog output 0 - 10 V
 S Setpoint
 R Pband
 I Actual value

9.9.7 Reverse action of the control function

Controller Setup	For the effect of the regulation there are two functions: • ON for “Val>Set=n+” Δ increasing Fanlevel for increasing actual value over Setpoint. • OFF for “Val>Set=n+” Δ increasing Fanlevel for decreasing actual value below Setpoint. Display for operation with two control circuits: “1. Actual>Set=n” for control circuit 1 “2. Actual>Set=n” for control circuit 2 For special applications an external switch over of the control function is possible (see IO Setup).
ON Val>Set=n+	

Factory setting depending on selected mode	Example for temperature control (Idealized principle diagram)														
<table border="1"> <thead> <tr> <th>Mode</th><th>Controller function</th></tr> </thead> <tbody> <tr> <td>1.01</td><td>non</td></tr> <tr> <td>2.01...</td><td>ON</td></tr> <tr> <td>3.01...</td><td>ON</td></tr> <tr> <td>4.01...</td><td>OFF</td></tr> <tr> <td>5.01...</td><td>OFF</td></tr> <tr> <td>6.01...</td><td>OFF</td></tr> </tbody> </table>	Mode	Controller function	1.01	non	2.01...	ON	3.01...	ON	4.01...	OFF	5.01...	OFF	6.01...	OFF	MODBUS Out: speed setting over MODBUS Analog Out: speed setting over analog output 0 - 10 V R Pband S Setpoint I Actual value OFF for Val>Set=n+ = heating function ON for Val>Set=n+ = cooling function
Mode	Controller function														
1.01	non														
2.01...	ON														
3.01...	ON														
4.01...	OFF														
5.01...	OFF														
6.01...	OFF														

9.9.8 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 (see menu group “setting”).

Controller Setup	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) Display for operation with two control circuits: “1.Controller type” for control circuit 1 “2.Controller type” for control circuit 2
P Type of control	

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.

The control configuration (KP, KI, KD, TI) is identical for both control circuits in operation with two control circuits. Fine adjustment is possible for each control circuit by the separate “Pband” setting.

Controller Setup	P-component = reaction time
50 % KP	Setting range: 0 - 200 % smaller = more slowly bigger = faster
Controller Setup	I-component = accuracy, correction time
50 % KI	Setting range: 0 - 200 % bigger = faster smaller = more slowly
Controller Setup	D-component
50 % KD	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"
Controller Setup	Integration time = correction time
0 % TI	Setting range: 0 - 200 % smaller = faster bigger = more slowly

9.9.9 Group control

Fan groups can be activated by the analogue outputs "A1" and "A2", the relay outputs "K1" and "K2" or by the RS-485 interface for MODBUS RTU.

Controller Setup	Following group versions are available:
OFF Group version	• OFF: no group control (factory setting) • 1: Two controlled groups • 2: One controlled group and up to three switched groups

Group control via analogue outputs and relays

- The groups must be connected at the appropriate programmed output when activating by the analogue outputs and relays.
- The assignment of the analogue outputs and the relays for the group control takes place in the IO Setup.
- The number of possible groups depends on the available hardware outputs in the MODBUS Master (maximum of 4 groups possible).

Group control im MODBUS Master Operation

- If controlling via MODBUS, an individual function can be programmed for each group device.
- The virtual outputs are assigned after the menu group "MODBUS Master" for the respective component "fan 1" .. "fan xx".
- The number of possible groups does **not depend** on the available hardware outputs in the MODBUS Master (maximum of 4 groups possible).

Group functions (see IO Setup)

Analog output A1, A2
MODBUS A1, A2

2A = Group 1
5A = Group 2
11A = Group 3
12A = Group 4

Relay output K1, K2

8K = Group 2
12K = Group 3
13K = Group 4

**Information**

- Group activation by analogue output, relay and MODBUS can also be combined.
- Ensure an ascending and complete sequence when assigning the groups. This means that if, for example, the function for a fourth group was assigned for an output, there must already be an assignment for groups 2 and 3 (see IO Setup).
- The group control only becomes active once a group function is allocated to an output (analogue, relay, MODBUS).

9.9.9.1 Version “1”: Two controlled groups

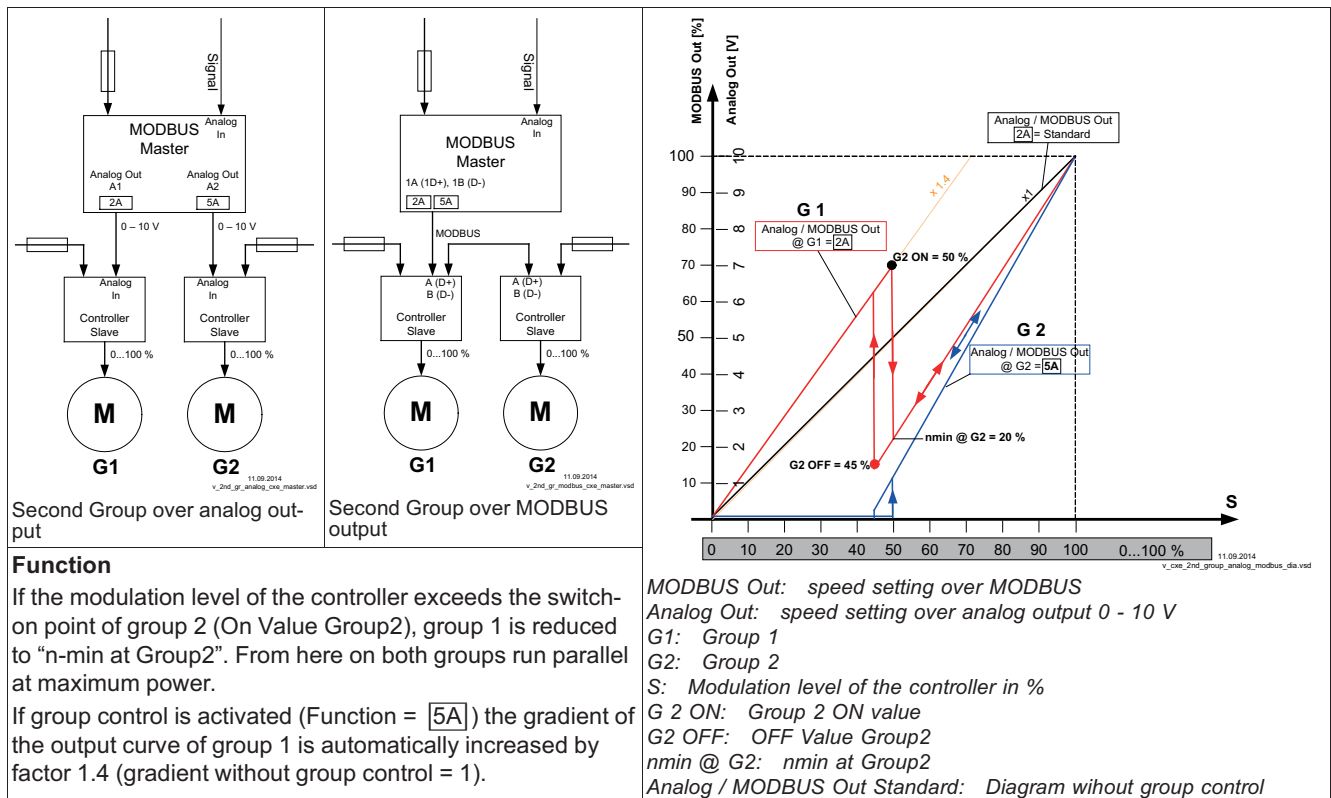
The programming described below applies equally for group control by the analogue outputs “A1” / “A2” and by the MODBUS interface.

Required allocation: Function **2A** for activation of Group1, function **5A** for Group2.

Controller Setup	Group 2 ON value
50 % Group 2 ON value	Switch-on value for Group2 Setting range: 0 - 100 % Factory setting: 50 % *
Controller Setup	OFF Value Group2
45 % OFF Value Group2	Switch-off value for group2 Setting range: 0 - 100 % Factory setting: 45 % *
Controller Setup	nmin at Group2
20 % nmin at Group2	Minimum Value for Group2 Setting range: 0 - 100 % Factory setting: 20 % *

* Display as long as no group assignment via analogue output, relay, MODBUS: **----**

Example version “1”: Two controlled groups



9.9.9.2 Variant “2”: One controlled group and up to three switched groups

The programming described below applies equally for group control by analogue outputs, relay outputs and MODBUS.

For group control by the analogue outputs “A1” / “A2” and the relay outputs “K1” and “K2”, the available outputs must be observed in the selection of the version (combinations are possible).

Example: Required assignment for a controlled and a switched group

- For activation by analogue output (see IO Setup) or MODBUS (see MODBUS Master)
 - Function **2A** for group 1 (0 - 100 % controlled)
 - Function **5A** for group 2 (0 / 100 % switched)
- For activation of Group 2 by relay (see IO Setup)
 - Function **2A** for group 1 (0 - 100 % controlled)
 - Function **8K** for group 2 (ON / OFF switched)

The function **11A** must be allocated additionally to Group 3 for one controlled and two switched groups.

The function **12A** must be allocated additionally to Group 4 for one controlled and three switched groups.

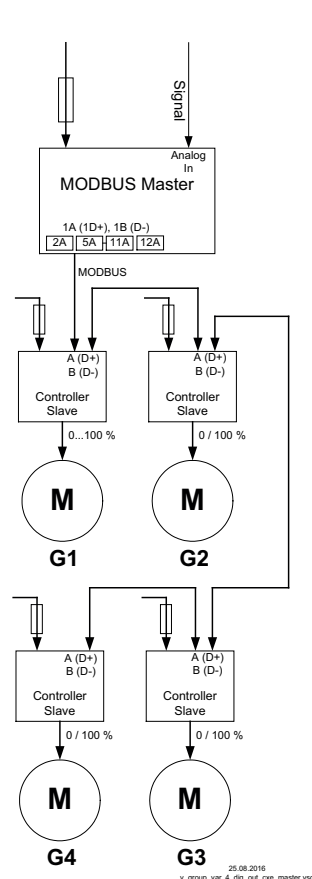
Controller Setup	Group 2 ON value Switch-on value for Group2 Setting range: 0 - 100 % Factory setting: 50 % *
50 % Group 2 ON value	
Controller Setup	OFF Value Group2 Switch-off value for group2 Setting range: 0 - 100 % Factory setting: 45 % *
45 % OFF Value Group2	

Controller Setup	nmin at Group2
20 % nmin at Group2	Minimum Value for Group2 Setting range: 0 - 100 % Factory setting: 20 % *
Controller Setup	Group 3 ON value
70 % Group 3 ON value	Switch-on value for Group3 Setting range: 0 - 100 % Factory setting: 70 % *
Controller Setup	OFF Value Group3
65 % OFF Value Group3	Switch-off value for group3 Setting range: 0 - 100 % Factory setting: 65 % *
Controller Setup	nmin at Group3
30 % nmin at Group3	Minimum Value for Group3 Setting range: 0 - 100 % Factory setting: 30 % *
Controller Setup	Group 4 ON value
85 % Group 4 ON value	Switch-on value for Group4 Setting range: 0 - 100 % Factory setting: 85 % *
Controller Setup	OFF Value Group4
80 % OFF Value Group4	Switch-off value for group4 Setting range: 0 - 100 % Factory setting: 80 % *
Controller Setup	nmin at Group4
40 % nmin at Group4	Minimum Value for Group4 Setting range: 0 - 100 % Factory setting: 40 % *

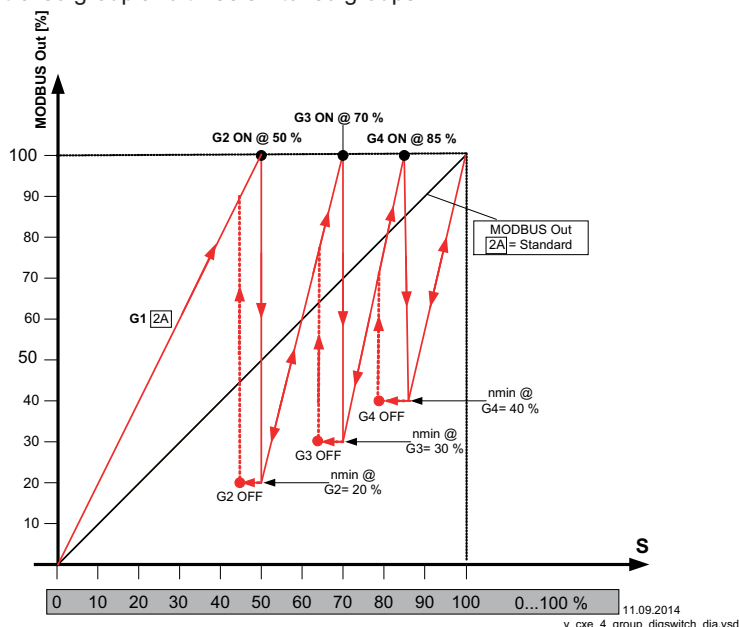
* Display as long as no group assignment via analogue output, relay, MODBUS: ----

Higher settings must be selected for following groups and the switch-off value of the group must be below the switch-on value.

Example version "2" via MODBUS



On controlled group and three switched groups



MODBUS Out: speed setting over MODBUS

S: Modulation level of the controller in %

G1: Group 1

G2: Group 2

G3: Group 3

G4: Group 4

G2, G3, G4 ON: ON Value Group2, 3, 4

G2, G3, G4, OFF: OFF Value Group2, 3, 4

nmin@G 2, 3, 4: nmin at Group2, 3, 4

MODBUS Out Standard: Diagram without group control

Function

Group 1 is continuously controlled (0 - 100 %), the other groups are switched on and off depending on the degree of modulation (0 / 100%).

If the modulation level exceeds the switch-on point "ON Value Group2", the MODBUS Master switches on the second group and the speed of the first group is reduced to an adjustable minimal value "nmin at Group2".

Then the speed of the first group increases to maximum within the remaining range.

If a third group is programmed up to switch-on point "ON Value Group3" etc.

Switch-off point "OFF Value Group2" at diminishing speed requirement.

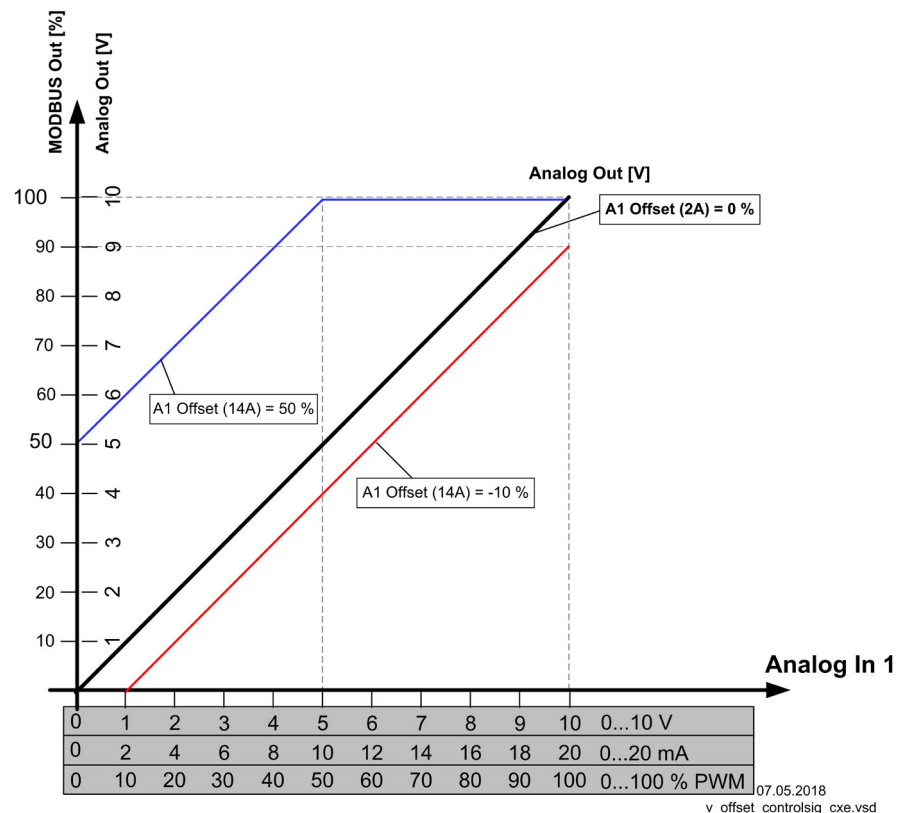
9.9.10 Display text for external message

Controller Setup	Alternatively to the "External Error" display when an external message occurs (see IO Setup / Digital Inputs "D1" / "D2" the following error texts can be programmed:
External error External message	• EC Motors • Filter • Frost protection • Adiabatic • Firealarm • Pressure switch • Gas alarm • Water alarm • RCD • Exhaust air

RCD Residual-current-operated protective device

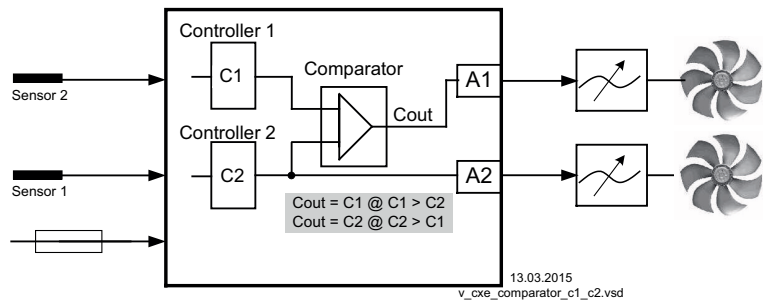
9.9.11 Offset control signal

Controller Setup	Offset control sig. 1
0 %	If required, the characteristic of the control signal for control circuit 1 can be adjusted. To activate this function, re-program the output with function 2A to function 14A , see IO Setup.
Offset control sig. 1	Setting range: -50...+50 % Factory setting: 0 % (characteristic curve unchanged)



9.9.12 Selection amplifier (comparator) control circuit 1 or 2 at output A1

Controller Setup	If using two control circuits, the control circuit with the higher modulation can be selected to affect the power component of the device.
OFF	This function can be used for refrigeration systems with combined refrigerant circuit and floating brine pressure control circuits, for example.
Selection amplifier	Example: - Control circuit 1 is used for the refrigerant circuit. A pressure sensor is connected to determine the actual value. The setpoint and control range are set in bar. - Control circuit 2 is used for the brine pressurised circuit. A temperature sensor is connected to determine the actual value. The setpoint and control range are set in °C / K. - Depending on which control circuit produces the higher modulation (depending on the measured and set values), the pressure control or temperature control is used as a specification for the power component. Selection amplifier = OFF (factory setting) No comparison of the two control circuits. Selection amplifier = ON Comparison of the modulation of control circuit 1 and control circuit 2 with automatic control active at the highest value.



9.9.13 **COM2 Function**

IO Setup	Possible settings:
MODBUS Slave COM2 Function	• MODBUS Slave (factory setting): In the main menu the “Diagnostic” menu group is followed by the “MODBUS Slave” menu group. The communication parameters can be set in this. • OFF: The “MODBUS Slave” or “MODEM SMS” menu group is not displayed in the main menu. • MODEM SMS: In the main menu the “IO Setup” menu group is followed by the “MODEM SMS” menu group. Input SIM PIN for MODEM SMS interface (no function at present).

9.9.14 **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 $< \pm 5 \%$. By activating the menu-assisted adjustment, the total control deviation can be reduced to a value of $< \pm 1 \%$.

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 $< \pm 5 \%$ through adjustment.

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

9.10 **IO Setup**

9.10.1 **overview Menu group IO Setup**

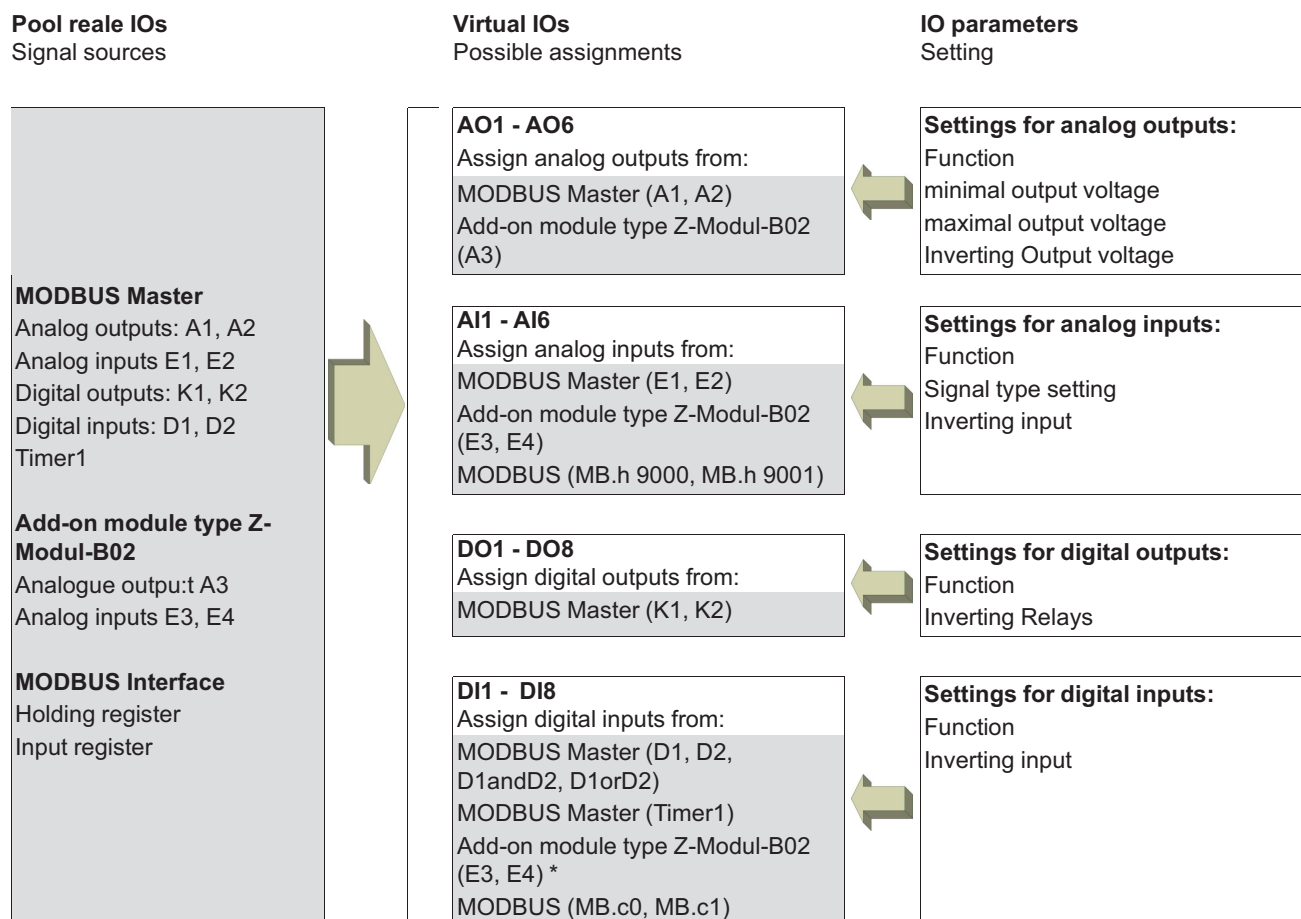
Main menu	IO Setup
Settings	
Protocol	
Base setup	
Controller Setup	
IO Setup	
IO Setup	The IO setup consists of 4 areas:
Analog Out	Analog outputs
Analog In	Analog inputs
Digital Out	Digital outputs
Digital In	Digital inputs

9.10.2 Allocation: virtual IOs / real IOs

A distinction is made between virtual IOs and actual IOs.

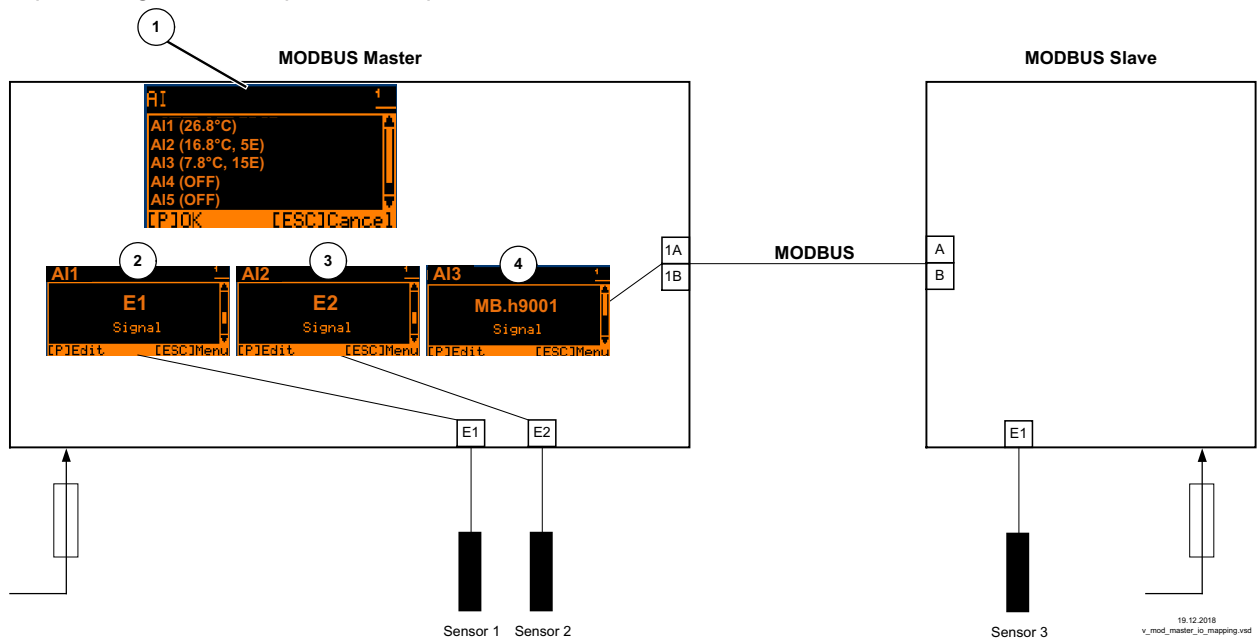
- Actual IOs are physical inputs, physical outputs and timer functions on the MODBUS master, on add-on modules and on devices connected via the MODBUS interface.
- Virtual IOs are the inputs and outputs used to make the settings on the MODBUS master.

The actual inputs and outputs that the virtual inputs and outputs affect can be freely assigned. This enables the “pool” of available actual IOs (signal sources) to be used as effectively as possible. The possible selection of signal sources that can be assigned to the virtual IOs depends on the available actual IOs.

Example of possible assignments from actual to virtual IOs

* When assigning the analog inputs of the auxiliary module, they are used as digital inputs

Example: Assignment of inputs for temperature sensors



- 1 Overview display of virtual inputs "AI1-AI6" with display of actual values and programmed functions
- 2 Assignment of actual input "E1" on MODBUS master to virtual input "AI1"
- 3 Assignment of actual input "E2" on MODBUS master to virtual input "AI2"
- 4 Assignment MODBUS holding register 9001 to virtual input "AI3"

Assignment of IOs and display of designations

With the factory default assignment, the designations of the inputs and outputs in the display correspond to the connection designations (see circuit board and connection diagram imprint).

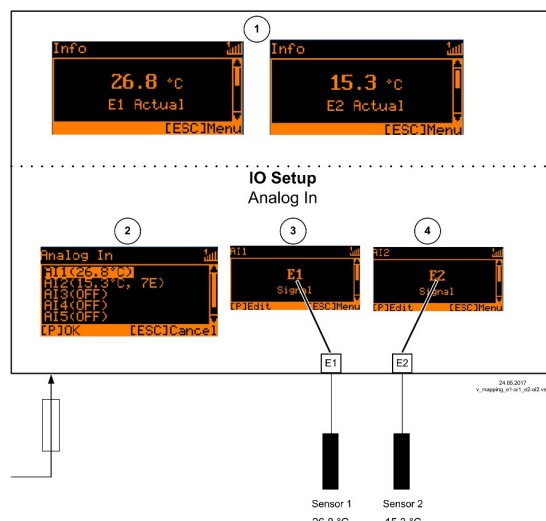
If you make a different assignment, e.g. assigning the input "E2" instead of the previous hardware input "E1" under "AI1" (analog input 1), the display and setting is still under "E1". In other words, the designation of the connection and the designation in the display no longer match.

Example of possible assignment for analog input AI1 and AI2

Factory assignment

The actual input "E1" is assigned to the virtual input "AI1".

The actual input "E2" is assigned to the virtual input "AI2".

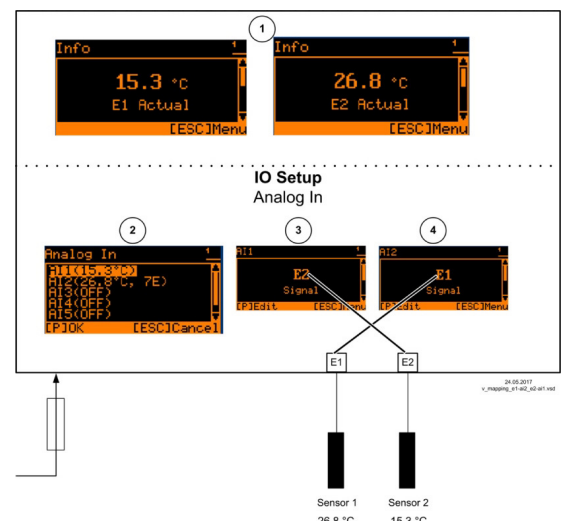


- 1 Actual value display for "E1" and "E2" in Info menu group
- 2 Overview display of virtual inputs "AI1-AI6" with display of actual values and programmed functions
- 3 Assignment of signal at "E1" to analog input "AI1"
- 4 Assignment of signal at "E2" to analog input "AI2"

Exchanged assignment

The actual input "E2" is assigned to the virtual input "AI1".

The actual input "E1" is assigned to the virtual input "AI2".



- 1 Actual value display for "E1" and "E2" in Info menu group
- 2 Overview display of virtual inputs "AI1-AI6" with display of actual values and programmed functions
- 3 Assignment of signal at "E2" to analog input "AI1"
- 4 Assignment of signal at "E1" to analog input "AI2"

9.10.3 Analog outputs “AO”

Menu structure

Analog Out	
AO1 (0.00V, 2A)	
AO2 (10.00V, 1A)	
AO3 (OFF)	
AO4 (OFF)	
AO5 (OFF)	

P↓↑ESC

▲ ▼ Overview of possible analog outputs

AO1	
1. Control signal (2A)	
Function	

▲ ▼

P
▲ ▼ Setting of the desired function

AO1	
A1	
Signal	

▲ ▼

P
▲ ▼ Assignment: virtual input / actual input

AO1	
0.0 V	
Min.	

▲ ▼

P
▲ ▼ Setting minimal output voltage

AO1	
10.0 V	
Max.	

▲ ▼

P
▲ ▼ Setting maximal output voltage

AO1	
OFF	
Invertierung	

▲ ▼

P
▲ ▼ Inverting output

Overview of possible analog outputs

Analog Out	Example to explain the display
AO1 (0.00V, 2A)	0.00V = Current output voltage at “AO1” 2 A = Programmed function (1st control signal) for “AO1”
AO2 (10.00V, 1A)	10.00V = Current output voltage at “AO2”. 1A = Programmed function (fixed voltage 10V) for “AO2”
AO3 (OFF)	OFF = No function assigned
AO4 (OFF)	OFF = No function assigned
AO5 (OFF)	OFF = No function assigned
AO6 (OFF)	OFF = No function assigned

Setting of the desired function

Function	Designation
OFF	no function
Constant voltage 10 V (1A)	Constant voltage +10 V Factory setting for "A2" at operation with one control circuit.
1. Control signal (2A)	Controlled 0 - 10 V output for control circuit 1 (factory setting for "A1")
E1 (3A)	proportional input "E1"
E2 (4A)	proportional input "E2"
Group2 (5A)	Group control (see controller setup group 2)
2.Cooling (6A)	Only for mode 2.03 temperature controller with additional functions. Controller output 2 with rising activation at Actual>Nominal = Cool .
2.Heating (7A)	Only for mode 2.03 temperature controller with additional functions. Controller output 2 with rising activation at Actual<Nominal = Heat .
2. control signal (8A)	Controlled 0 - 10 V output for control circuit 2 (factory setting for "A2" at operation with second control circuit). Control circuit 2 can be activated by programming the E2 function if required (see Base setup / Operation with second control circuit).
Brake control (9A)	proportionally 1.Control signal
Group3 (11A)	Group control (see controller setup group 3)
Group4 (12A)	Group control (see controller setup group 4)
Offset control sig. 1 (14A)	Offset control signal 1 Offset setting (see controller setup)

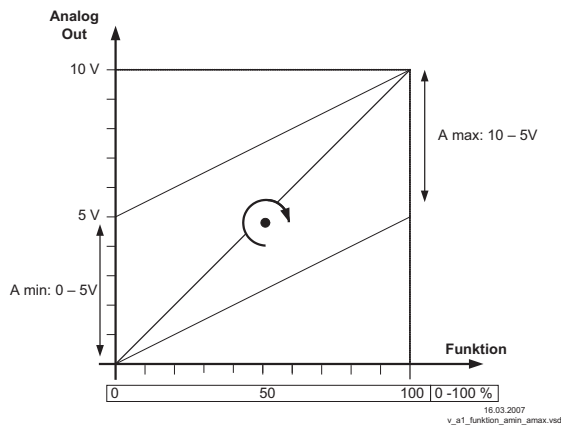
Factory assignments: Virtual outputs / actual outputs

Virtual output	Actual output	Explanation
AO1	A1 Signal	A1 MODBUS Master
AO2	A2 Signal	A2 MODBUS Master
AO3	n.a.	not available (no output assigned)
AO4	n.a.	not available (no output assigned)
AO5	n.a.	not available (no output assigned)
AO6	n.a.	not available (no output assigned)

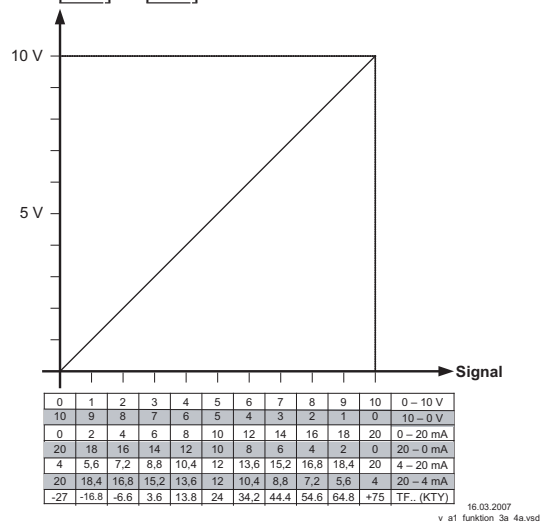
Signal settings

With the attitudes "min" / "max" the characteristic of the output voltage can be adapted.	
AO1	Min. Setting range: 0 - 10 V Factory setting: 0 V
0.0 V Min.	The setting for "min." must be below "max".
AO1	Max. Setting range: 10 - 0 V Factory setting: 10 V
10.0 V Max.	
AO1	Inverting With the attitudes "Inverting" the output voltage can inverted. Factory setting: Inverting = "OFF"
OFF Inverting	

"Min." / "Min."



Function 3A / 4A



9.10.4 Analog inputs “AI”**Menu structure for “AI1” and “AI2”**

Analog In
AI1 (0.00V)
AI2 (OFF)
AI3 (OFF)
AI4 (OFF)
AI5 (OFF)

P ↓ ↑ ESC

▲ Overview of possible analog inputs
▼

AI1
E1
Signal

▲ ▼

P Allocation: virtuell input / real input
▲ ▼

AI1
OFF
Invertierung

P Inverting input
▲ ▼

The function and signal type settings for the analog inputs “AI1” and “AI2” are made in the base setup.

Menu overview for “AI3” and “AI6”

Analog In
AI1 (0.00V, 2A)
AI2 (10.00V, 1A)
AI3 (OFF)
AI4 (OFF)
AI5 (OFF)

P ↓ ↑ ESC

▲ Overview of possible analog inputs
▼

AI3
OFF
Function

▲ ▼

P Setting of the desired function
▲ ▼

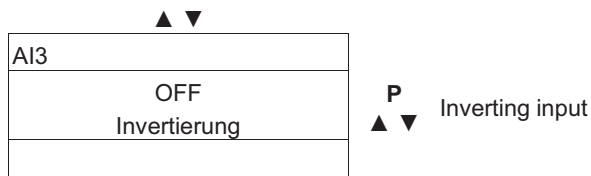
AI3
0-10V
Analog In

▲ ▼

P Signal type setting: 0-10V, 0-20mA, 4-20mA, TF, PT1000
▲ ▼

AI3
n.a.
Signal

P Assignment: virtual input / actual input
▲ ▼



Overview of possible analog inputs

Analog In	Example to explain the display
AI1 (32.7 °C)	32.7 °C = Current temperature measured at "AI1"
AI2 (16.8 °C, 5E)	16.8 °C = Current temperature measured at "AI2" 5E = Programmed function (E1 difference) for "AI2"
AI3 (OFF)	OFF = No function assigned
AI4 (OFF)	OFF = No function assigned
AI5 (OFF)	OFF = No function assigned
AI6 (OFF)	OFF = No function assigned

Setting for desired function (AI3-AI6)

Function	Description Function
OFF	No function
For mode speed controller 1.01	
1E	Operation with a second setting signal (switch over "E1" <-> "E2" via floating contact)
4E	Operation with a second setting signal and automatic control at the higher level ("E1" <-> "E2")
For modes as controller higher 2.01	
Ext. Setpoint (1E)	1E = External Setpoint e.g. via external signal (0 - 10 V) instead of "Setpoint 1"
Ext. Manual mode (2E)	External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input.
Measurement (7E)	Measurement value e.g. Measurement value e.g. for limit indication, display in Info menu "E2 Actual".
Outdoor temperature (15E)	no function!

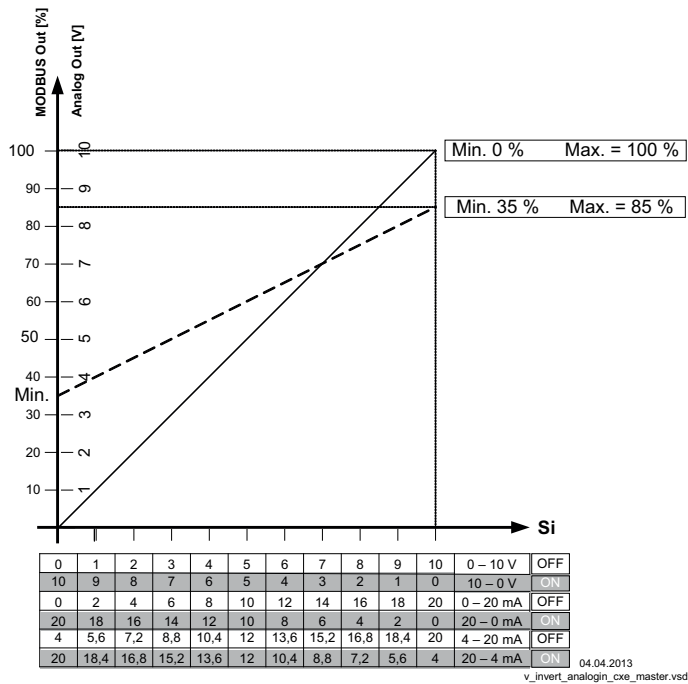
Factory assignments: Virtual inputs / actual inputs

Virtual input	Real input	Explanation
AI1	E1 Signal	E1 MODBUS Master
AI2	E2 Signal	E2 MODBUS Master
AI3	n.a.	not available (no input assigned)
AI4	n.a.	not available (no input assigned)
AI5	n.a.	not available (no input assigned)
AI6	n.a.	not available (no input assigned)

Signal settings

AI1	After programming the signal or sensor type, an inversion of the inputs can be carried out.
OFF 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).

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



MODBUS Out: speed setting over MODBUS
Analog Out: speed setting over analog output 0 - 10 V
 S_i Signal
OFF Inverting = OFF
ON Inverting = ON

9.10.5 Digital outputs “DO”

Menu structure

Digital Out	
DO1 (0, 1K)	
DO2 (1, 2K)	
DO3 (OFF)	
DO4 (OFF)	
DO5 (OFF)	

P ↓ ↑ ESC

▲ Overview of possible digital outputs
▼

DO1	
Operating indication (1K)	
Function	

▲ ▼

P Setting of the desired function
▲ ▼

DO1	
K1	
Signal	

▲ ▼

P Assignment: virtual input / actual input
▲ ▼

DO1	
OFF	
Invertierung	

▲ ▼

P Inverting output
▲ ▼

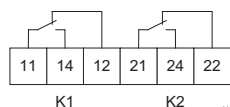
Overview of possible digital outputs

Digital Out	Example to explain the display
DO1 (0, 1K)	0 = Relays D01 de-energized 1K = Programmed function (operating indication) for “DO1”
DO2 (1, 2K)	1 = Relay D02 energised 2K = Programmed function (fault indication) for “DO2”
DO3 (OFF)	OFF = No function assigned
DO4 (OFF)	OFF = No function assigned
DO5 (OFF)	OFF = No function assigned
DO6 (OFF)	OFF = No function assigned

Setting of the desired function

Various functions can be allocated to the relay outputs "K1" and "K2". In case of the same function allocation for "K1" and "K2", these work parallel.

Function	Designation
OFF	No function Relays remain always de-energized.
Operating indication (1K)	Operating indication (factory setting for "K1", non inverting). Operation without fault, reports enable "OFF"
Fault indication (2K)	Fault indication (factory setting for "K2", non inverting). Pulled up in operation without fault, with release "OFF" not dropped out. Drops out in case of line and device fault and external fault at the digital input. Depending on programming in event of sensor failure. When networked via the MODBUS Master interface, fault indication in case of faulty MODBUS connection and fault on a member.
External error (3K)	External fault separate with message at digital input (factory setting if terminals bridged).
Limit modulation (4K)	Limit modulation Exceeding or undercutting the limits for modulation
Limit E1 (5K)	Limit "E1" Whenever or falling below limits for input signal "E1".
Limit E2 (6K)	Limit "E2" Whenever or falling below limits for input signal "E2".
Setpoint Offset (7K)	Only in controller modes (from 2.01) Limit: Setpoint offset (only for active Setpoint control circuit 1). Deviation between actual value and setpoint to high.
Group2 (8K)	Group control (Group 2) Switching on fans depending on modulation
Group3 (12K)	Group control (Group 3) Switching on fans depending on modulation
Group4 (13K)	Group control (Group 4) Switching on fans depending on modulation
(14K) to (18K)	no function
For modes as temperature controller with additional functions 2.03	
2.Heating (9K)	Heating function Switch ON point: temperature = Setpoint +/- Offset Switch OFF point: Temperature around hysteresis over switch ON point
2.Cooling (10K)	Cooling function Switch ON point: temperature = Setpoint +/- Offset Switch OFF point: Temperature around hysteresis below switch ON point



K1 1 = energized, terminals 11-14 bridged
0 = de-energized, terminals 11-12 bridged

K2 1 = energized, terminals 21-24 bridged
0 = de-energized, terminals 21-22 bridged

Function	Controller status	K1/ K2 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	External Fault at digital input for external fault	1	0
4K	Exceeding or falling below modulation	1	0
5K	over or falling below limits for input signal "E1"	1	0
6K	over or falling below limits for input signal "E2"	1	0
7K	setpoint deviation to high	1	0

Factory assignments: Virtual outputs / actual outputs

Virtual output	Actual output	Explanation
DO1	K1 Signal	K1 MODBUS Master
DO2	K2 Signal	K2 MODBUS Master
DO3	n.a.	not available (no output assigned)
DO4	n.a.	not available (no output assigned)
DO5	n.a.	not available (no output assigned)
DO6	n.a.	not available (no output assigned)

Inverting

DO1	Inverting
OFF	The inversion of the relays "K1" and "K2" is set at the factory to "OFF" (when a function is programmed). 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!
Inverting	

9.10.6 Digital inputs “DI”**Menu overview**

Digital In	
DI1 (OFF)	
DI2 (OFF)	
DI3 (OFF)	
DI4 (OFF)	
DI5 (OFF)	

P ↓ ↑ ESC

DI1	
OFF	
Function	

▲ ▼

DI1	
D1	
Signal	

▲ ▼

DI1	
OFF	
Invertierung	

▲ Overview of possible digital inputs
▼

P
▲ ▼ Setting of the desired function

P
▲ ▼ Assignment: virtual input / actual input

P
▲ ▼ Inverting input

Overview of possible digital inputs

Digital In	Example to explain the display
DI1 (0, 1D)	0 = Input DI1 not active 1D = Programmed function (enable) for “DI1”
DI2 (1, 3D)	1 = input DI2 active 3D = Programmed function (limit) for “DI1”
DI3 (OFF)	OFF = No function assigned
DI4 (OFF)	OFF = No function assigned
DI5 (OFF)	OFF = No function assigned
DI6 (OFF)	OFF = No function assigned

Linking the physical inputs D1 and D2

If necessary, you can allocate the two physical digital inputs (D1 and D2) to a virtual input DI... as the signal source. You can determine the type of link (AND/OR) of D1 and D2 by selecting the corresponding parameter.

DI1	
D1andD2 Signal	D1andD2 = AND relation The function becomes active when both digital inputs (D1 and D2) are activated.

DI2	
D1orD2 Signal	D1orD2 = OR relation The function becomes active when one digital input (D1 or D2) is activated.

**Information**

If you allocate identical functions for multiple (virtual) digital inputs (e.g. for DI1 and DI2 the function 1D for enable ON/OFF), it is automatically an OR link.

This also applies if you select different signal sources for the allocation (e.g. DI1 = signal D1 and DI2 = Timer1). In the example cited, this means that the digital input D1 **or** or the integrated timer is used for the enable.

Setting of the desired function

Function	Designation
OFF	no function (factory setting)
Enable (1D)	Enable (remote control) "ON" / "OFF"
External error (2D)	External fault alarm
Limit (3D)	"Limit" ON / OFF Influences control circuit 1 and control circuit 2 in operation with two control circuits
E1 / E2 (4D)	Switch over input "E1" / "E2" (for operation with one control circuit)
Reset (10D)	no function
Max. Speed (11D)	Setting Max. Speed "ON" / "OFF" Influences the respectively set value "1. Max. Speed" and "2. Max. Speed" in operation with two control circuits.
Motorheating (12D)	no function
Reverse rotation di- rection (13D)	no function
Freeze function (14D)	"Freeze function" = maintain momentary modulation value
Override Time (21D)	Override timer function (in operation with timer) The timer output is overwritten for a settable time with a selectable status (ON / OFF).
(22D) to (33D)	no function
For Mode Speed controller 1.01	
Setpoint1/2 (5D)	Switch over "Set Intern1" / "Set Intern2" "Setting External 1" must be at "OFF".
Setpoint int./ext. (6D)	Switch over "Intern" / "Extern"
For modes as controller (from 2.01)	
Setpoint1/2 (5D)	Switch over "Setpoint 1" / "Setpoint 2" for control circuit1
Setpoint int./ext. (6D)	Switch over "Intern" / "Extern" Possible only for operation with one control circuit!
Control/Manual (7D)	Switch over "automatic control" / "Speed manual" Possible only for operation with one control circuit!

Heating/Cooling (8D)	Switch over control function (e.g. "heating" / "cooling")
Only active in operation with a second control circuit	
E1 / E2 (4D)	The output for control circuit 2 is set additionally to "A2" to "A1" (regardless of the programmed function for "A1"). Control circuit 1 has no output for the duration of the switching. The switch over input "E1" / "E2" as in operation with one control circuit is no longer possible.
2. Setpoint 1/2 (9D)	for control circuit 2: Switch over "2. Setpoint 1" / "2. Setpoint 2"
1.Setp+Pband1/2 (15D)	for control circuit 1: Switch over Setpoint 1/2 and Pband 1/1 When programming this function, "Setting" additionally lists the parameter: "1.Pband 1. for control circuit 1"
2.Setp+Pband1/2 (16D)	for control circuit 2: Switch over Setpoint 1/2 and Pband 1/2 When programming this function, "Setting" additionally lists the parameter: "2.Pband 2 for control circuit 2"

Factory assignments: Virtual inputs / actual inputs

Virtual input	Real input	Explanation
DI1	D1 Signal	D1 MODBUS Master
DI2	D2 Signal	D2 MODBUS Master
DI3	n.a.	not available (no input assigned)
DI4	n.a.	not available (no input assigned)
DI5	n.a.	not available (no input assigned)
DI6	n.a.	not available (no input assigned)

Inverting

DI1	Inverting
OFF Inverting	The inverting of digital inputs is factory set to "OFF" (if a function is programmed). To invert the function, switch to "ON" (display ---- as long as no function is allocated for DI1).

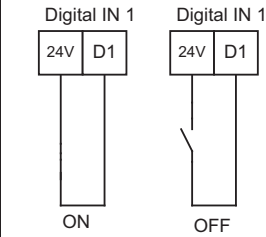
9.10.6.1 Enable ON/OFF function 1D

Remote ON/OFF by potential-free contact.

Activation of the members (speed setting) by analogue output and MODBUS interface is switched off, the other signal inputs and outputs stay active.

The device can still be operated in the switched-off state after pressing the "Esc" key combination.

- A programmed operating indicator relay (factory set "K1 function" = 1K) reports the switch-off.
- A programmed alarm relay (factory set "K2 function" = 2K) does not report the switch-off.

Info	STOP	Display STOP for switch OFF	
OFF		- Controller "OFF" with opened contact - Controller "ON" for closed contact (factory setting).	
Display for switch-off alternately with actual value display		At "D1 Inverting" = "ON" reversed function, i.e. device "OFF" when contact closed.	25.06.2007 v_1d_24v_freigabe.vsd Contact at digital input e.g. "Digital In 1"

**Attention!**

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

9.10.6.2 External message, 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 K2) (see IO Setup function K1, K2).

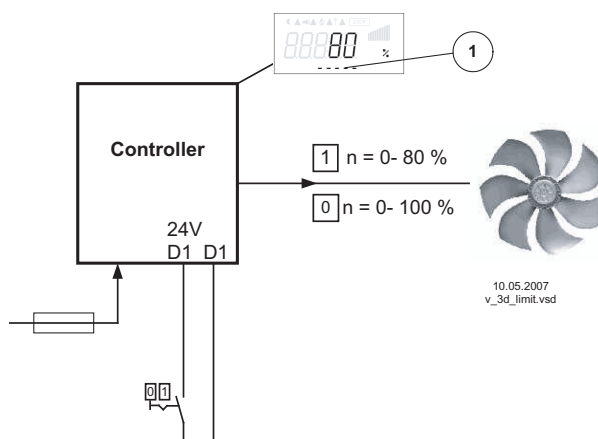
Info		- Indication during closed contact (factory setting): "D1 Inverting" = "OFF" - Indication during opened contact: "D1 Inverting" = "ON"
		Alternative display texts for error message see Controller Setup / display text for external message.
External error		
Display alternating with actual value display		

9.10.6.3 Limit ON / OFF, Function [3D]

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

The limitation influences both outputs in operation with two control circuits.

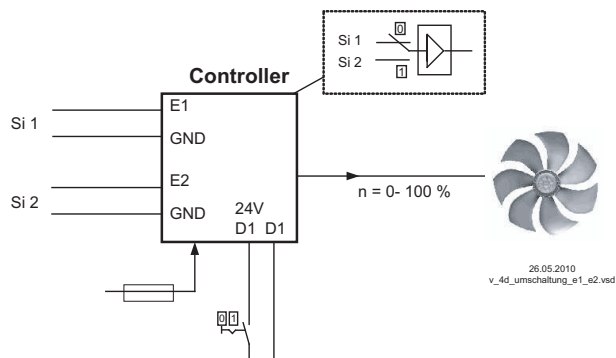


1 Setting "Limit" (depending on device type in: %, Hz, rpm)

9.10.6.4 Switch over input "E1" / "E2", function [4D] (operation with one control circuit)

Switch over between Input signal 1 (Analog In 1 terminal "E1") and input signal 2 (Analog In 2 terminal "E2").

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



Si 1 Signal 1

Si 2 Signal 2

For mode speed controller (**1.01**) Base setup for "E2 Analog In": **1E** necessary.

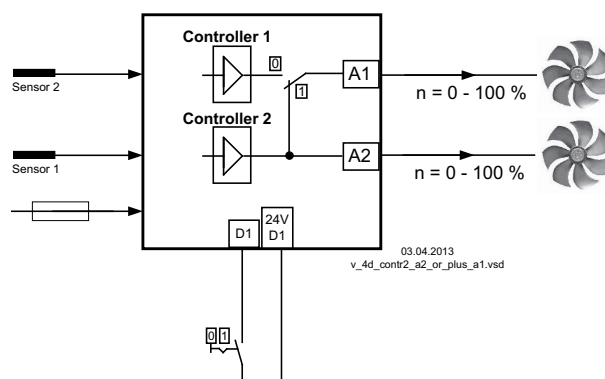
For modes controller (higher **2.01** ..) Base setup for "E2 Analog In": **7E** necessary (as far as otherwise does not occupy).

9.10.6.5 Output control circuit 2 additional to "A2" on "A1", function **4D**

The output for control circuit 2 is set additionally to "A2" to "A1" (regardless of the programmed function for **A1**). Control circuit 1 has no output for the duration of the switching.

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

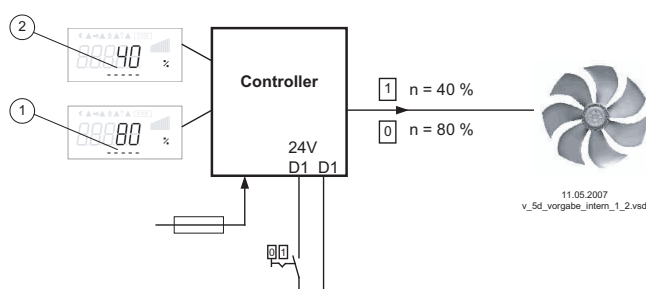
At "D1" Inverting "OFF" the output of control circuit 2 also influences output "A1" when the contact is closed.



9.10.6.6 Set 1/2 or Setpoint 1/2, Function **5D**

For Mode Speed controller 1.01: Switch over "Set Intern1" / "Set Intern2"

Contact e.g. at digital 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)

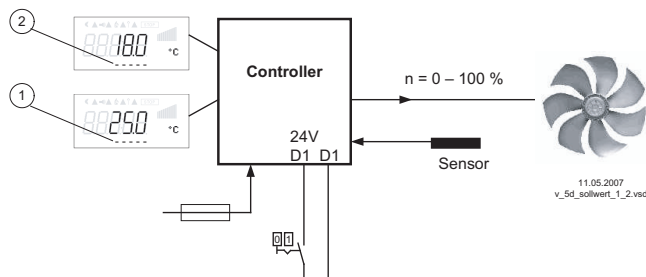
2 Setting "Set Intern2" (depending on device type in: %, Hz, rpm)

Info	 Operation with "Set Intern2" is signaled by the moon symbol for reduced operation. "Set extern1" under "settings" must be programmed to "OFF".
50 % Brake control	

For operation as controller (starting from 2.01): switch over “Setpoint 1” / “Setpoint 2”

For operation with second control circuit: switch over “1.Setpoint 1” / “1.Setpoint 2”

Contact e.g. at digital 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 “Setpoint 1” or “1.Setpoint 1” (display in operation with two control circuits for Setpoint 1 of control circuit 1)
- 2 Setting “Setpoint 2” or “1.Setpoint 2” (display in operation with two control circuits for Setpoint 2 of control circuit 1)

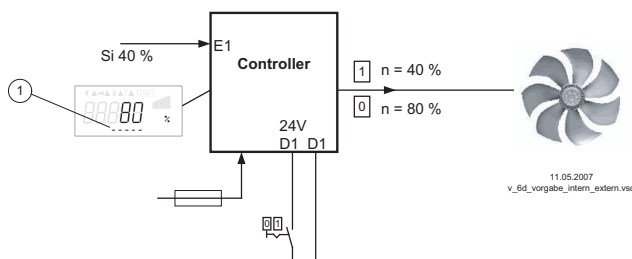
Info	Operation with “Setpoint2” is signalized by the moon symbol for reduced operation.
28.7 °C E1 Actual	

9.10.6.7 Intern / Extern Function [6D]

For Mode Speed controller 1.01: Switch over “Set Intern” / “Set external”

“Set extern1” under settings must be programmed to “OFF”.

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



Si Signal

- 1 Setting “Set Intern1” (depending on device type in: %, Hz, rpm)

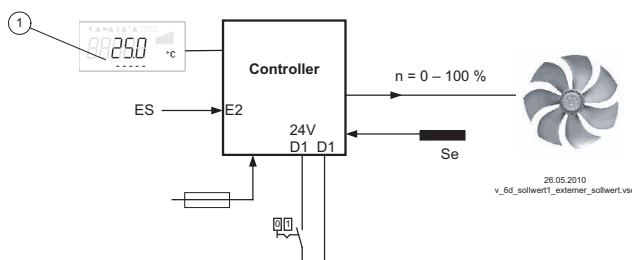
- “D1 Inverting” = “OFF”: “Set Intern1” at opened contact / “Setting Extern” at closed contact.
- “D1 Inverting” = “ON”: “Set Intern1” at closed contact / “Set Extern” at opened contact.

For operation as controller (starting from 2.01): switch over “Setpoint 1” / “external Setpoint ”

Possible only for operation with one control circuit!

Under Base setup “E2 function” programmed to function [1E] for “external setpoint”.

Contact at digital input e.g. “Digital In 1” = “D1” - “D1”



- 1 Setting “Setpoint1”
- ES External Setpoint e.g. 5 V Δ 23.8°C
Se Sensor

- “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

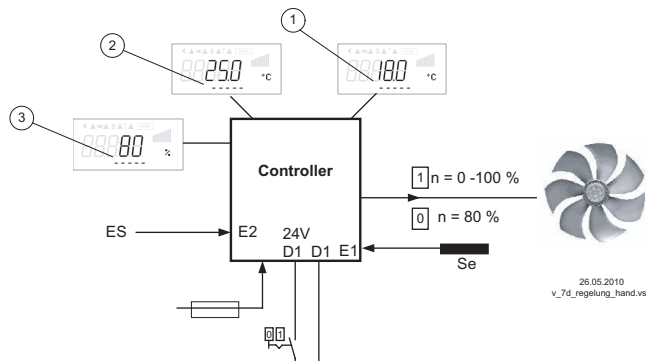
9.10.6.8 Automatic control / speed manual Function [7D] (mode [2.01])

Possible only for operation with one control circuit!

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 "E2 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"



- 1 Setting "Setpoint1"
- 2 Setting "Setpoint2"
- 3 Setting "Speed manual" (depending on device type in: %, Hz, rpm)
- EH Signal for Manual mode extern, E2 Function = [2E]
- Se Sensor

- "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.

9.10.6.9 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 (see 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.

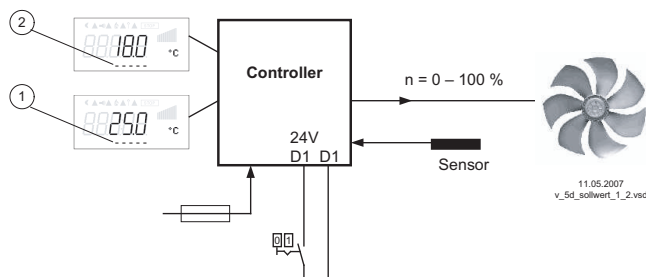
The inversion of the control function influences both circuits in operation with two control circuits.

Controller Setup	Settings in Controller Setup
ON Val>Set=n+	Display for operation with two control circuits: "1. Actual>Set=n" for control circuit 1 "2. Actual>Set=n" for control circuit 2

9.10.6.10 Switch over Setpoint 1/2 for control circuit 2 [9D]

Switch over between "2.Setpoint 1" and "2.Setpoint 2" (for operation with two control circuits)

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



- 1 Setting "2.Setpoint 1" = Setpoint 1 of control circuit 2
- 2 Setting "2.Setpoint 2" = Setpoint 2 control circuit 2

- "D1 Inverting" = "OFF": "2. Setpoint 1" = 18 °C at opened contact / "2. Setpoint 2" = 25 °C at closed contact.
- "D1 Inverting" = "ON": "2. Setpoint 1" = 18 °C at closed contact / "2. Setpoint 2" = 25 °C at opened contact.

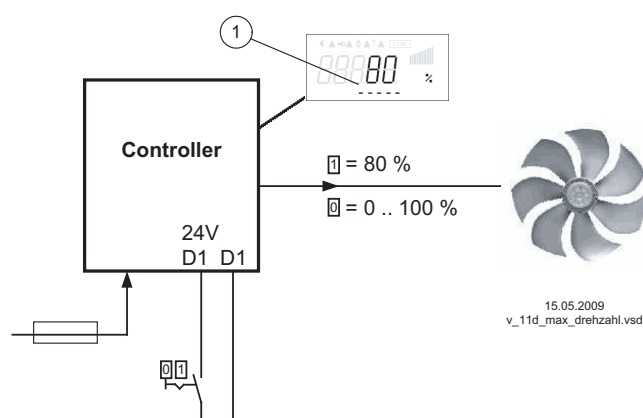
Info		Operation with "2. Setpoint2" is signalized by the moon symbol for reduced operation. If Setpoint 2 was activated additionally for control circuit 1 "1.Setpoint 2" by a digital input with function [5D] , the moon symbol is already switched on.
28.7 °C E2 Actual		

9.10.6.11 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 digital input "Digital In 1" (depending on device type at terminals "D1" - "D1" or "D1" - "24 V").

This function influences both circuits in operation with two control circuits.



- "D1 Inverting" = "OFF": "Max. Speed" active at closed contact
- "D1 Inverting" = "ON": "Max. Speed" active at opened contact

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

1 Setting "Max. Speed" or "1.Max. Speed" and "2.Max. Speed" for operation with two control circuits

9.10.6.12 "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.

Info		
28.7 °C E1 Actual		The active "Freeze function" is indicated by a symbol in the display.

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

9.10.6.13 Switch over Setpoint 1/2 and Pband 1/ 2 for control circuit 1 **[15D]**

Switching between "1st setpoint 1" / "1st setpoint 2" and "1st Pband 1" / "1st Pband 2" (from **2.01**, not for **2.03**).

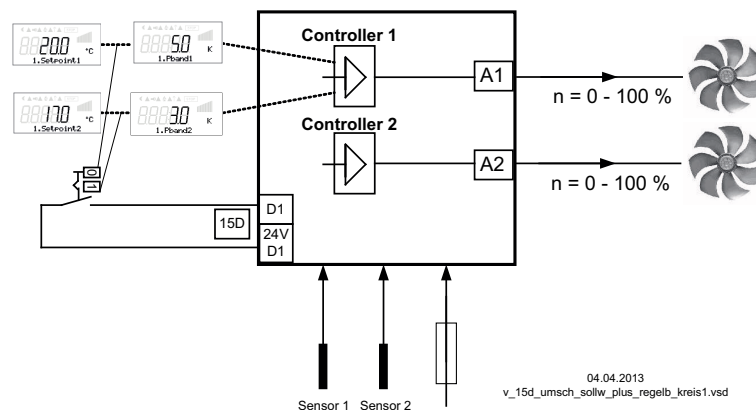
Function basically the same as **[5D]**, it is additionally switched over to Pband 2.

When programming this function, "Setting" additionally lists the parameter: "1.Pband 1. for control circuit 1"

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

Example for "D1 Inverting" = "OFF":

- With open contact: "1.Setpoint 1" = 20 °C + "1.Pband 1" = 5 K
- With closed contact: "1.Setpoint 2" = 17 °C + "1.Pband 2" = 3 K



1.Setpoint1 Setting "1.Setpoint 1" = Setpoint 1 of control circuit 1

1.Pband1 Setting "1.Pband 1" = Pband 1 von control circuit 1

1.Setpoint2 Setting "1.Setpoint 2" = Setpoint 2 of control circuit 1

1.Pband2 Setting "1.Pband 2" = Pband 1 von control circuit 1

Info	 Operation with "1.Setpoint2" and "1.Pband2" is signalized by the moon symbol for reduced operation.
28.7 °C E1 Actual	If Setpoint 2 was activated additionally for control circuit 1 or control circuit 2 by a digital input with function [5D] / [9D] the moon symbol is already switched on.
	If Setpoint 2 and Pband 2 were activated additionally for control circuit 2 by a digital input with function [16D] , the moon symbol is already switched on.

9.10.6.14 Switch over Setpoint 1/2 and Pband 1/2 for control circuit 2 **[16D]**

Switch over between "2.Setpoint 1" / "2.Setpoint 2" and "2.Pband 1" / "2.Pband 2" (only for operation with second control circuit possible).

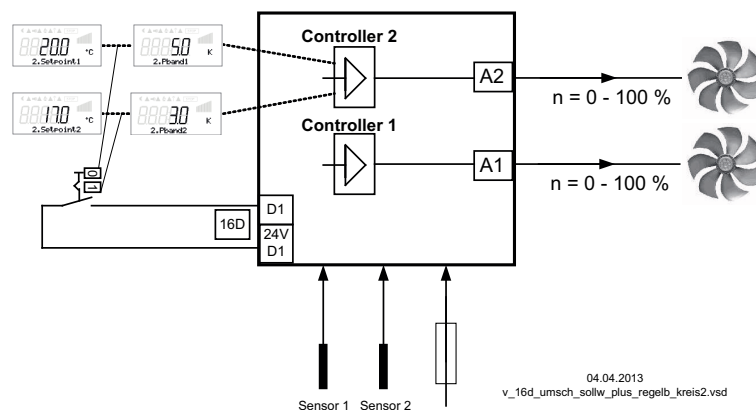
Function basically the same as **[5D]** and **[9D]**, it is additionally switched over to Pband 2.

When programming this function, "Setting" additionally lists the parameter: "2.Pband 2 for control circuit 2"

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

Example for "D1 Inverting" = "OFF":

- With open contact: "2.Setpoint 1" = 20 °C + "2.Pband 1" = 5 K
- With closed contact: "2.Setpoint 2" = 17 °C + "2.Pband 2" = 3 K



2.Setpoint1 Setting "2.Setpoint 1" = Setpoint 1 of control circuit 2

2.Pband1 Setting "2.Pband 2" = Pband 1 von control circuit 2

2.Setpoint2 Setting "2.Setpoint 2" = Setpoint 2 control circuit 2

2.Pband2 Setting "2.Pband 2" = Pband 2 von control circuit 2

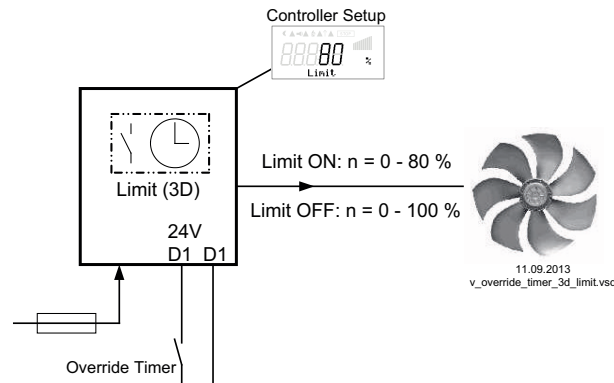
Info	 Operation with "2.Setpoint2" and "2.Pband2" is signalized by the moon symbol for reduced operation.
28.7 °C E2 Actual	If Setpoint 2 was activated additionally for control circuit 1 or control circuit 2 by a digital input with function [5D] / [9D] the moon symbol is already switched on.
	If Setpoint 2 and Pband 2 was activated additionally for control circuit 1 by a digital input with function [15D] , the moon symbol is already switched on.

9.10.6.15 Timer function overwrite [21D]

The timer output can be overwritten for a settable time with a selectable status if required (see timer). To overwrite the timer function by pressing keys until the next timing change => "Override Time" = 0 min.

The override time is activated by pressing a key at a digital input (example for D1 not inverted). The bypass time can be ended prematurely by pressing another key.

If the contact remains closed, the override time also run out, then a short interruption is required to reactivate.



Contact depending on device type at terminals "D1" - "D1" or "D1" - "24 V"

Example: speed limitation over Timer (Function [3D])

The timer limits the maximum speed for a certain period of time (e.g. timer ON from 6:00 - 10:00 am). With the "Override Timer" contact the limitation (from 6:00 - 10:00 am) activated by the timer can be cancelled for an adjustable period "Override Time" (see timer / timer function overwritten: Override Status = OFF)

To activate the limitation outside the programmed time (10:01 - 5:59 am) => "Override Status" = ON

9.11 Limits

9.11.1 Limit indication depending on modulation

only for Modulation control circuit 1!

Display for operation with two control circuits: 1.Modul. function, 1.Modulation min., 1.Modulation max., 1.Modul. Delay

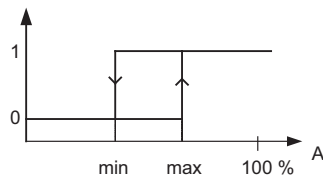
Limit	Following functions can be allocated to the limit indication	
OFF Controller function	OFF	no function (factory setting)
	Fault (1L)	Limit alarm alternating with actual value display is listed in the protocol as an alarm. Indication with the centralized fault of a programmed relay (IO allocation Function 2K).
	Message (2L)	Is listed in the protocol as a message. There is no alternating message on the actual value display and no message via alarm relay.
	Filter error (3L)	Like function 1L with fault message "Filter"
	Filter Message (4L)	Like function 2L with fault message "Filter"
In the IO setup, a separate relay can be allocated independent of these settings.		
Limit	If the modulation exceeds the set "Modulation max" value, this is reported until the set value "Modulation min" has been undercut.	
30 % Level min.	The indication is delayed by the time set in "Display delay". Setting range: 0 - 100 % Factory setting: 30 % / 40 % *	
Limit		
40 % Level max.		
Limit	Time delay exceeding "Modulation max." up to indication by relay and alarm symbol.	
2 sec Level Delay	Setting range: 0 - 120 sec. Factory setting: 2 sec. *	

* Display **----** as long as function = OFF

Example indication by relay “K1”:**not inverted**

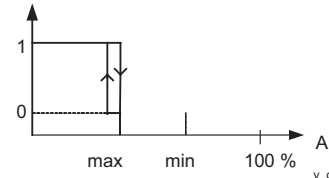
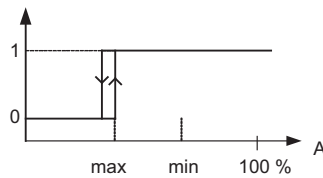
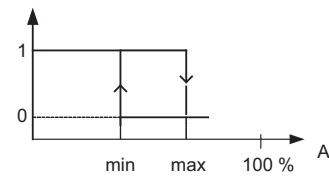
IO Setup: K1 Function = 4K

IO Setup: K1 Inverting = OFF

**Inverting**

IO Setup: K1 Function = 4K

IO Setup: K1 Inverting = OFF



A Brake control

If “Level min.” is higher than “Level max.”, the “Level max.” switching point is without hysteresis.

9.11.2 Limit indication depending on setting or sensor signal**Same procedure for analogue inputs “E1” and “E2”.**

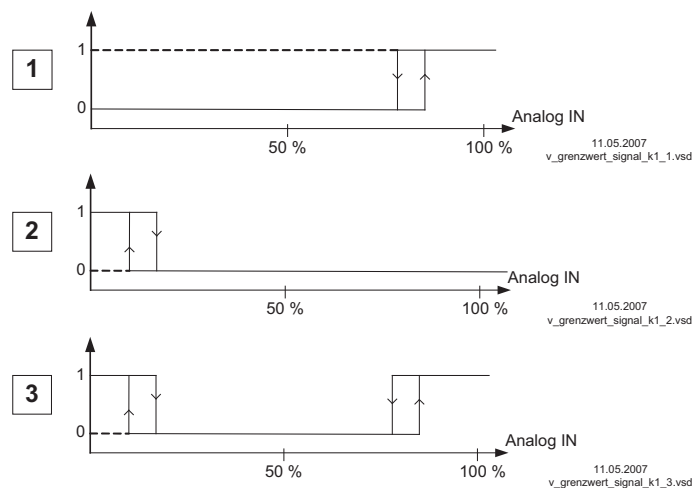
Limit	Following functions can be allocated to the limit indication	
OFF Lmt E1 Function	OFF	no function (factory setting)
	Fault (1L)	Limit alarm alternating with actual value display is listed in the protocol as an alarm. Indication with the centralized fault of a programmed relay (IO allocation Function [2K]).
	Message (2L)	Is listed in the protocol as a message. There is no alternating message on the actual value display and no message via alarm relay.
	Filter error (3L)	Like function [1L] with fault message “Filter”
	Filter Message (4L)	Like function [2L] with fault message “Filter”
In the IO setup, a separate relay can be allocated independent of these settings.		
Limit	Both values for E1 (“E1 min” and “E1 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. The same setting applies to “E2 Min.” and “E2 Max.”, described below for “E1”. Undercutting the signal (“E1 Min”).	
----- Lmt E1 min		
Limit	If the signal undercuts the set value “E1 min”, this is reported until the set value (plus adjustable hysteresis) has been exceeded once again. Exceeding the signal (“E1 max”).	
----- Lmt E1 max.	If the signal exceeds the set value “E1 max”, this is reported until the set value (minus hysteresis) has been undercut once again.	
Limit	E1 Hysteresis Hysteresis adjustment in the unit of measure of the programmed input signal.	
----- Lmt E1 Hyst.		

Limit	E1 Delay
----- Lmt E1Del.	Time delay until indication through relay and alarm symbol. Setting range: 0 - 120 sec. Factory setting: 2 sec.

**Information**

Always adjust the value for the maximum input signal higher than the value for the minimum input signal!

E1 Max. > E1 Min.

Example for a limit indication of default signal or sensor signal to “Analog In 1”**Settings**

- E1 Max.: 80 %
- E1 Min.: OFF
- switching hysteresis 5 % (from 100 %)

Settings

- E1 Min.: 20 %
- E1 Max.: OFF
- switching hysteresis 5 % (from 100 %)

Settings

- E1 Min.: 20 %
- E1 Max.: 80 %
- switching hysteresis 5 % (from 100 %)

Terminal “E1” 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 (starting from **2.01**), two limit indicators can be carried out based on the set target value (Setpoint) and measured actual value (on E1).

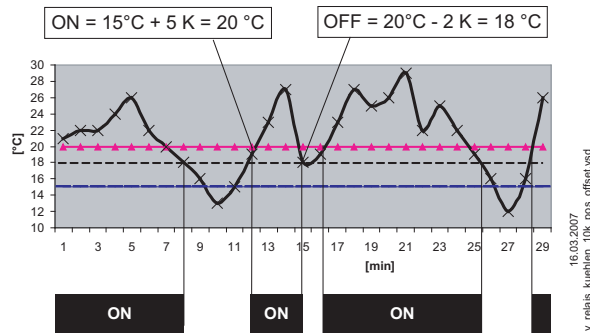
Only for active Setpoint of control circuit 1!

Display for operation with two control circuits: 1.Offset function, 1.Offset 1, 1.Offset 2, 1.Offset hyst., 1.Offset Delay

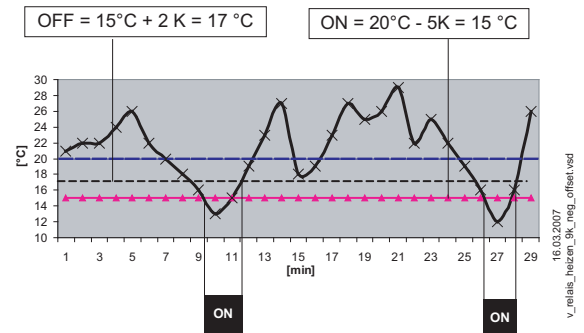
Limit	Following functions can be allocated to the limit indication. Identical setting for both analogue inputs "E1" and "E2".	
OFF Offset Function	OFF	no function (factory setting)
	Fault (1L)	Limit alarm alternating with actual value display is listed in the protocol as an alarm. Indication with the centralized fault of a programmed relay (IO allocation Function 2K).
	Message (2L)	Is listed in the protocol as a message. There is no alternating message on the actual value display and no message via alarm relay.
	Filter error (3L)	Like function 1L with fault message "Filter"
	Filter Message (4L)	Like function 2L with fault message "Filter"
In the IO setup, a separate relay can be allocated independent of these settings.		
Limit	Offset 1, Offset 2	
----- Offset 1	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.	
Limit		
----- Offset 2	"Offset 1" for alarm in case of an exceeding of the max. deviation between actual and target. Switch ON point: actual value = Setpoint +/- offset Switch OFF point: Actual value by hysteresis under the switch-on point	
Limit		
	"Offset 2" for alarm in case of an undercutting of the max. deviation between actual and target Switch ON point: actual value = Setpoint +/- offset Switch OFF point: Actual value by hysteresis over the switch-on point	
Limit	Offset Hysteresis	
----- Offset Hyst.	Hysteresis switch-on point: In temperature regulation + / - 10 K, otherwise sensors 10 % of measurement range	
Limit		
----- Offset Delay	Offset Delay Time delay until indication through relay and alarm symbol. Setting range: 0 - 120 sec. Factory setting: 2 sec.	
Limit		

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

Offset 1 for alarm during exceeding



Offset 2 for alarm during undercutting



9.12 Timer

9.12.1 Timer Function

The device has a real time clock. The clock is backed up (Gold Cap) and has a reserve of 2 or 3 days after sufficient operation on a voltage supply.

The time and date must be set during start-up operation and when using the real-time clock. The device calculates the weekday based on the date.

In principle, the timer function acts like a digital switch input (timer "On" Δ closed contact at inverting OFF). The same functions can be assigned to the timer switch as the digital inputs (see IO Setup/Digital inputs "DI").

Inverting of the timer function

The timer function can be inverted by inverting the digital input to which the timer function is assigned (see IO Setup/Digital inputs "DI").

With inversion "DI" = "OFF" (factory setting) the programmed function is activated at the switch on time (clock symbol in display) and deactivated again at the switch off time.

With the setting "DI" = "ON" the programmed function is deactivated at the switch on time and reactivated at the switch off time (clock symbol in display).

Function	Description *	Timer ON = (@ Timer Invert. = OFF) 
OFF	no function (factory setting)	
Enable (1D)	Enable (remote control) "ON" / "OFF"	Device ON
External error (2D)	External fault alarm	Fault
Limit (3D)	"Limit" ON / OFF Influences control circuit 1 and control circuit 2 in operation with two control circuits	Limit ON
E1 / E2 (4D)	Switch over input "E1" / "E2" (for operation with one control circuit)	Signal at E2
Reset (10D)	no function	Reset
Max. Speed (11D)	Setting Max. Speed "ON" / "OFF" Influences the respectively set value "1. Max. Speed" and "2. Max. Speed" in operation with two control circuits.	Max. Speed ON
Override Time (21D)	Do not use function for timer (only for digital input).	-
For mode speed controller 1.01		
Setpoint1/2 (5D)	Switch over "Set Intern1" / "Set Intern2" "Setting External 1" must be at "OFF".	Set Internal2

Function	Description *	Timer ON = (@ Timer Invert. = OFF) 
Setpoint int./ext. (6D)	Switch over "Intern" / "Extern"	Set external
For modes as controller (from 2.01.)		
Setpoint1/2 (5D)	Switch over "Setpoint 1" / "Setpoint 2" for control circuit1	Setpoint 2
Setpoint int./ext. (6D)	Switch over "Intern" / "Extern" Possible only for operation with one control circuit!	Setpoint External
Control/Manual (7D)	Switch over "automatic control" / "Speed manual" Possible only for operation with one control circuit!	Manual mode
Heating/Cooling (8D)	Switch over control function (e.g. "heating" / "cooling")	Reversal standard
1.Setp+Pband1/2 (15D)	for control circuit 1: Switch over Setpoint 1/2 and Pband 1/1 When programming this function, "Setting" additionally lists the parameter: "1.Pband 1. for control circuit 1"	First control circuit Setpoint 2 + Pband 2
Only active in operation with a second control circuit		
E1 / E2 (4D)	The output for control circuit 2 is additionally set to "A2" to "A1" (regardless of the programmed function for "A1"). The first control circuit has no output for the duration of the switch over. The switch over input "E1" / "E2" as in operation with one control circuit is no longer possible.	Second control circuit to A1 + A2
2. Setpoint 1/2 (9D)	for control circuit 2: Switch over "2. Setpoint 1" / "2. Setpoint 2"	Second control circuit Setpoint 2
2.Setp+Pband1/2 (16D)	for control circuit 2: Switch over Setpoint 1/2 and Pband 1/2 When programming this function, "Setting" additionally lists the parameter: "2.Pband 2 for control circuit 2"	Second control circuit Setpoint 2 + Pband 2

* For a detailed function description, see IO Setup

9.12.2 Setting of time and date

Main menu	Menu group timer
Controller Setup	
IO Setup	
Limit	
Timer	
Autoaddressing	
Timer	Press the P-key and set the hours with the UP / DOWN keys, press the P-key to save.
13:05 Time	Now the minutes flash and can be set with the UP / DOWN keys, press the P-key to save.
Timer	To set the date follow the same method as for "Time". The date setting consists of day, month and year
09.04.13 Date	Example for: 9. April 2013

9.12.3 Automatic summer time

The summertime automatic is factory set to "OFF", i.e. switched off. When the summertime automatic is activated the device automatically switches between daylight saving time and wintertime.

"North" = for countries in the Northern Hemisphere.

"South" = for countries in the Southern Hemisphere.

		for Northern Hemisphere		for Southern Hemisphere
Timer		Timer		Timer
OFF Summertime Auto.	→	North Summertime Auto.		South Summertime Auto.

**Information**

If the summer time automatic is used, the switch over date and the switch over time are identical and unchangeable for both settings.

The time is put forward from 2:00 am to 3:00 am respectively on the last Sunday in March (South put back from 3:00 am to 2:00 am) and put back from 3:00 am to 2:00 am (South put forward from 2:00 am to 3:00 am) on the last Sunday in October.

If other dates for the switch over between summer time and winter time are required, the clock must be changed by hand (manually) on the respective date.

9.12.4 Enter switching times

Two switching times can be entered for the same function (e.g. **[3D]** = Limit) for each weekday. The menu items are repeated for each weekday with two on- and off-times each. Switching times are not preprogrammed at the factory.

In order to make configuration easier, the same switching times can be made for several days in a block. To prevent unwanted switching times from arising, all should be deleted before programming. To do this, select the block **[Mo - Su]** and deactivate all 4 switching times.

Be sure to delete all switching times before carrying out complete new settings.

Sequence						
1	2	3	4	5	6	7
Timer		Timer		Timer		Timer
Mon	P 9 x ▲	Mon-Sun	P	----- Mon-Sun ON1	3 x P	----- Mon-Sun OFF1
[P] [ESC]		[P] [ESC]		[P] [ESC]		[P] [ESC]
Factory setting first weekday *		All weekdays selected		First switch-on time for all weekdays. Display: [---] = no switching times programmed yet.		The first switching times for all weekdays are now deleted. Then the first switch-off time for all weekdays is displayed. Now delete all other switching times in the same way.

* If switching times are already programmed for all weekdays "Mon-Sun", press the P key and increase the hours with the ▲-key until the deactivation appears after "23", display: **[---]**. Then press the P key twice to confirm and delete the switching times.

All programmed switching times are deleted after loading the factory setting or resetting the mode.

Factory setting without preprogrammed switching times

Mon-Sun													
Mon-Fri										Sat-Sun			
Mon		Tue		Wed		Thr		Fri		Sat		Sun	
ON1	-- :-	ON1	-- :-	ON1	-- :-	ON1	-- :-	ON1	-- :-	ON1	-- :-	ON1	-- :-
OFF1	-- :-	OFF1	-- :-	OFF1	-- :-	OFF1	-- :-	OFF1	-- :-	OFF1	-- :-	OFF1	-- :-
ON2	-- :-	ON2	-- :-	ON2	-- :-	ON2	-- :-	ON2	-- :-	ON2	-- :-	ON2	-- :-
OFF2	-- :-	OFF2	-- :-	OFF2	-- :-	OFF2	-- :-	OFF2	-- :-	OFF2	-- :-	OFF2	-- :-

Example 1: Every day at 8 am ON and at 6 pm OFF

Mon-Sun													
ON1	08:00	ON1	08:00	ON1	08:00	ON1	08:00	ON1	08:00	ON1	08:00	ON1	08:00
OFF1	18:00	OFF1	18:00	OFF1	18:00	OFF1	18:00	OFF1	18:00	OFF1	18:00	OFF1	18:00
ON2	--:--	ON2	--:--	ON2	--:--	ON2	--:--	ON2	--:--	ON2	--:--	ON2	--:--
OFF2	--:--	OFF2	--:--	OFF2	--:--	OFF2	--:--	OFF2	--:--	OFF2	--:--	OFF2	--:--

Example 2: Monday to Friday at 6 am ON at 8 am OFF and at 5 pm ON at 10 pm OFF

Mon-Fri										Sat-Sun			
ON1	06:00	ON1	06:00	ON1	06:00	ON1	06:00	ON1	06:00	ON1	--:--	ON1	--:--
OFF1	08:00	OFF1	08:00	OFF1	08:00	OFF1	08:00	OFF1	08:00	OFF1	--:--	OFF1	--:--
ON2	17:00	ON2	17:00	ON2	17:00	ON2	17:00	ON2	17:00	ON2	--:--	ON2	--:--
OFF2	22:00	OFF2	22:00	OFF2	22:00	OFF2	22:00	OFF2	22:00	OFF2	--:--	OFF2	--:--

Example 3: Wednesday 6 pm ON and Thursday at 8 am OFF

Mon	Tue	Wed	Thr	Fri	Sat	Sun							
ON1	--:--	ON1	--:--	ON1	18:00	ON1	--:--	ON1	--:--	ON1	--:--	ON1	--:--
OFF1	--:--	OFF1	--:--	OFF1	--:--	OFF1	08:00	OFF1	--:--	OFF1	--:--	OFF1	--:--
ON2	--:--	ON2	--:--	ON2	--:--	ON2	--:--	ON2	--:--	ON2	--:--	ON2	--:--
OFF2	--:--	OFF2	--:--	OFF2	--:--	OFF2	--:--	OFF2	--:--	OFF2	--:--	OFF2	--:--

Free tables for entering individual timer settings

Mon	Tue	Wed	Thr	Fri	Sat	Sun							
ON1		ON1		ON1		ON1		ON1		ON1		ON1	
OFF1		OFF1		OFF1		OFF1		OFF1		OFF1		OFF1	
ON2		ON2		ON2		ON2		ON2		ON2		ON2	
OFF2		OFF2		OFF2		OFF2		OFF2		OFF2		OFF2	

9.12.5 Overwrite timer function

The timer output can be overwritten for a settable time with a selectable status if required. Activation is by a digital input (☞ IO Setup function **21D**)

Application: Exceptions from the normal timing operation, e.g. for manual or automatic presence switch, party mode, etc.

Timer	Override Time
120 min Override Time	Settable time for overwriting the timer function Setting range: 0...65535 min. Factory setting: 120 min
	In the "0 min." setting, the timer function is overwritten with the selected status until the next timing change.
Timer	Override Status
OFF Override Status	Settable status when overwriting the timer function: ON = function as for timer ON ☞ timer function OFF = function as for timer OFF (factory setting)

9.12.6 Adjustment of the real time clock

Timer	Fine adjustment of the real time clock is possible if required.
60 RTC Adjust	The greater the value, the slower the clock runs. If the value is increased by one point, this corresponds to a slowing of the clock by approx. 2 to 3 s per month. Setting range: 0 - 127 Factory setting: 60

9.13 MODBUS Slave

Addressing and configuration of the MODBUS Slave interface.

Via this interface the device can be networked with a master building control system, the device then operates as a pure Slave and uses the MODBUS-RTU protocol.

The connection is made to the terminals "2A (2D+)", "2B (2D-)" of the MODBUS Slave interface (☞ installation / RS-485 interfaces for MODBUS RTU).

**Information**

- In the IO Setup the "COM function must be set" to "MODBUS Slave" so that this menu group is displayed (factory setting).
- MODBUS settings (baud rate, parity) are saved after a reset (☞ menu group "Start" -> "Reset" or interrupt voltage supply).

MODBUS Slave	Bus Address
247 Bus Address	The device address is factory set to the highest available MODBUS address: 247. Setting range MODBUS Address: 1 - 247.
MODBUS Slave	Addressing
OFF Addressing	Switch addressing to "ON" before setting "address".
MODBUS Slave	UART Baudrate
19200 UART Baudrate	Setting transfer rate Valid values: 4800, 9600, 19200, 38400, 115200 Factory setting: 19200

MODBUS Slave	UART Mode
8E1	Setting transfer format
UART Mode	Valid values: 8O1, 8N1, 8E1
	Factory setting: 8E1
MODBUS communication watchdog	
The MODBUS communication watchdog defines the behaviour in the event of a communication fault in the slave interface.	
MODBUS Slave	Watchdog Mode
0	0: no function (default) = OFF
Watchdog Mode	1: Watchdog error: If the communication fault persists for longer than the "Watchdog time", the "Watchdog Timeout" error appears on the MODBUS Master display.
	2: Watchdog speed: If the communication fault persists for longer than the "Watchdog time", the modulation of the MODBUS Master becomes the " Watchdog speed".
	3: Watchdog error and speed: If the communication fault persists for longer than the "Watchdog time", the modulation of the MODBUS Master becomes the "Watchdog speed" and the "Watchdog Timeout" error appears on the MODBUS Master display.
MODBUS Slave	Watchdog Time
0 sec	If the device does not receive any messages in the time window, the function that can be defined under "Watchdog Mode" is executed.
Watchdog Zeit	Watchdog time in seconds.
	Setting range: 0 - 255 sec.
	Factory setting: 0 sec. = off
MODBUS Slave	Watchdog Speed
100 %	Watchdog speed setting on the slave that corresponds to modulation of the UNicon MODBUS Master in the event of a communication fault.
Watchdog Drehzahl	Setting range: 0 - 100 %
	Factory setting: 100 %

9.14 MODBUS Master

Addressing of the members that are activated via the MODBUS Master interface.

Addressing can be done automatically by a patented method. It is then no longer necessary to address every single member manually in the network.

Alternatively, manual addressing with free assignment of the address is possible (see Manual addressing).



Information

- A **maximum of 32 devices** can be connected. The communication settings are pre-set to 19.2kbd, 8E1 and cannot be changed.
- To ensure activation, the function of the digital input "D1" of the members is automatically set to "OFF" by the MODBUS Master. I.e. any programmed enable function for switching off the member (by a potential-free contact) is no longer active.

Main menu	MODBUS Master
MODBUS Master	After addressing (manual or automatic), the devices are subsequently listed to the "MODBUS Master" menu group (see "Members MODBUS Master").
Fan 1 (2A)	
Fan 2 (2A)	
Fan 3 (2A)	
[P] Enter	[ESC] Info

9.14.1 Automatic addressing

- The first member (MODBUS address **1**) must be connected to the terminals 1A(1D+) and 1B (1D-), additionally the "ID" connections must be connected (see Installation / Communication / Addressing members MODBUS Master interface).
- The members are automatically addressed consecutively according to the installation.
- In order to do the automatic addressing successfully, all the bus members to be addressed must be connected with each other, applied to voltage and switched on.

**Information**

The automatic addressing can only be done with compatible devices!

Main menu	MODBUS Master 1. Press the P-key to open the "MODBUS Master".
Limit	
Timer	
Diagnostic	
MODBUS Master	
[P] Enter [ESC] Info	
MODBUS Master	1. Press the P-key to select automatic addressing. 2. Press the P-key to start automatic addressing.
Auto Address	
[P] Enter [ESC] Menu	
MODBUS Master	Display while the automatic addressing is in progress.
Addressing Found: 0 In progress	
[P] Repeat [ESC] Cancel	
MODBUS Master	The found members count is displayed at the end of automatic addressing. Press the P-key again to repeat the addressing. Exit the menu with [ESC].
Addressing Found: 5 Done	
[P] Repeat [ESC] Cancel	

9.14.2 Manual addressing

- The members are connected to the device by the terminals 1A(1D+) and 1B (1D-) (see Installation / RS-485 interfaces for MODBUS RTU).
- All bus members to be addressed must be connected with one other in order for manual addressing to be successful.
- Only connect the bus members currently to be addressed to the voltage and switch on, not all the other members during the addressing operation.

Main menu	MODBUS Master	
Limit	▷ Press the P-key to open the “MODBUS Master”.	
Timer		
Diagnostic		
MODBUS Master		
[P] Enter [ESC] Info		
MODBUS Master		
Auto Address		
[P] Enter [ESC] Menu		
MODBUS Master	▷ Press the ▼ key to select the “ManualAddressing” menu.	
	▷ Press the P-key to open the menu.	
Manual address		
[P] Edit [ESC] Menu		
MODBUS Master		
4 Select address	▷ Set the lowest desired address using the ▼+▲ keys and confirm with the P key .	
[P] Start [ESC] Menu		
Manual address		
ZA ECblue Select type	▷ Select the type with the ▼+▲ keys and confirm with the P key . ZA ECblueZA B-G-028NE	
[P] OK [ESC] Cancel		
Manual address		
Switch on device 4	▷ Connect device to voltage and switch on	
	▷ Press the P key to perform addressing.	
[P] OK [ESC] Cancel		
Manual address		
5 Select address	▷ Set the desired address with the ▼+▲ keys (higher than addresses already assigned).	
	▷ Press the P key to perform addressing of more members.	
[P] Next		
Manual address		
Addressing Error	Error message for unsuccessful addressing.	
[P] Next		

9.15 Member MODBUS Master

After addressing, (manual or automatic) the members are then listed to the “MODBUS Master” menu group.

Main menu	The function for activation by MODBUS is displayed after the address of the member. The same function is programmed initially for all members after addressing. [1. Control Signal (2A)] . I.e. every member is activated by the output of control circuit 1.
MODBUS Master	
Fan 1 (2A)	
Fan 2 (2A)	
Fan 3 (2A)	
[P] Enter [ESC] Info	

After selection with the ▼ ▲ keys, press the **P-key** to open the State menu of the member (menu content depends on the type of member).

State menu member

Example: ECblue fan

Fan 1 (2A)	← Device type and firmware version ← Operating state of the member ← Speed Actual value (1/min) ← Current consumption ← Power consumption and modulation of the device
ECblue V13.05	
Fan OK!	
Speed [rpm 570]	
Motorcurrent [A] 2.60	
P=0W Level=0%	
[P] Edit [ESC] Menu	

To set the MODBUS function for the member, press the **P-key**.

Fan 1 (2A)	Press the P-key to open the menu.
1. Control signal	Select the desired MODBUS function with the ▼ ▲ keys and save with the P-key . Pre-programmed function [1. Control Signal (2A)] = output of control circuit 1. For example, to activate speed controllers for fans or fans with integrated controller and MODBUS interface.
(2A)	
MB Function	The programmable functions correspond to the functions for the analogue outputs (☞ IO Setup). - For members activated by control circuit 2, function: [2. Control Signal (8A)] - For members activated in groups (function: [5A], [11A], [12A]), the “Group Version” setting must be observed, at factory setting “OFF” there is no activation (☞ Controller Setup)!
[P] Edit [ESC] Menu	

Exit the menu with the Esc key combination ▼ + ▲.

10 Menu tables

10.1 Menues of operating modes

Mode	1.01	2.01			3.01	3.03	4.01	5.01		User Setting
	1.02	2.03	2.02	2.05	3.02	3.04	4.02	5.02	6.01	
	2.04						4.03			
Parameter	Factory setting									
Info										
Setting direct	1.02 = 80 %									
Setting step ¹	1.02 = 0									
E1-E2 actual				-2.4 °C						
Control value		2.04 = 30.0 °C				12.0 bar 22.6 °C				
E1 Actual		30.0 °C	30.0 °C	30.0 °C	10.0 bar -88.7 °C	10.0 bar -88.7 °C	88.7 Pa	712 m³h	0.45 m/s	
E2 Actual		----- 2.04 = 30.0 °C	-----	30.0 °C	-----	10.0 bar -88.7 °C	----- 4.02, 4.03 = 21.0 °C	----- 5.02 = 21.0 °C	-----	
Setpoint 1 1.Setpoint 1 ²		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	
2.Setpoint 1 ³										
Setpoint control							4.02, 4.03 = 100 Pa	5.02 = 530 m³h		
Brake control 1. Control ²	1.01 = 0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
1. Control ³		0 %	0 %		0 %	0 %	0 %	0 %	0 %	
Set external1	1.01 = 0 %									
Min. switch off 1.Minimum switch off. ²		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
2.Minimum switch off. ³										
Start										
PIN input	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Language	GB	GB	GB	GB	GB	GB	GB	GB	GB	
US units	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Reset	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Mode	1.01 1.02	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	
UNIcon	12.18	12.18	12.18	12.18	12.18	12.18	12.18	12.18	12.18	
SN:	000005-E45536	000005-E45536	000005-E45536	000005-E45536	000005-E45536	000005-E45536	000005-E45536	000005-E45536	000005-E45536	
Setting										
Set Internal1	1.01 = 80%									
Set Internal2	1.01 = -- --									
Setting direct	1.02 = 80%									

Mode	1.01 1.02	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									
Setting step ¹	1.02 = 0									
Setpoint 1 1.Setpoint 1 ²		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 2 1.Setpoint 2 ²		-----	-----	-----	-----	-----	----- 4.03 = 100 Pa	-----	-----	
Pband 1. Pband ²		5.0 K	20.0 K	5.0 K	5.0 bar 7.0 K	5.0 bar 7.0 K	100 Pa	530 m³h	0.50 m/s	
1. Pband 2 ⁴		5.0 K	20.0 K	5.0 K	5.0 bar 7.0 K	5.0 bar 7.0 K	100 Pa	530 m³h	0.50 m/s	
Min. Speed 1.Min. Speed ²	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Max. Speed 1. Max. Speed ²	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	
2.Setpoint 1 ³										
2.Setpoint 2 ³										
2. Pband ³										
2. Pband 2 ⁵										
2. Min. Speed ³	0%	0%	0%		0%		0%	0%	0%	
2. Max. Speed ³	100 %	0%	100 %		100 %		100 %	100 %	100 %	
Set external1	1.01 = ON									
Manual mode 1. Manual mode ²		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Speed manual 1. Speed man. ²		100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	
Offset AnalogOut		2.03 = 0.0 K								
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		
Min Setpoint							4.02 + 4.03 = 70.0 Pa	5.02 = 700 m³h		
Protocol										

Mode	1.01 1.02	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									
Base setup										
Mode	1.01 1.02	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	
E1 Analog In	1.01 = 0 - 10 V	TF	TF	TF	0-30 MBG	0-30 MBG	DSG200	4.01 = DSG200 4.02 + 4.03 = DSG50	0-1 MAL	
Number steps	1.02 = 0									
Step 1 value	1.02 = -- -- (20%)									
Step 2 value	1.02 = -- -- (40%)									
Step 3 value	1.02 = -- -- (50%)									
Step 4 value	1.02 = -- -- (60%)									
Step 5 value	1.02 = -- -- (100%)									
E1 Refrigerant					3.02 = R448A	3.04 = R448A				
E1 K-Factor								75		
E1 Unit		-----	-----	-----	-----	-----	-----	-----	-----	
E1 Decimals		-----	-----	-----	-----	-----	-----	-----	-----	
E1 Min.		-----	-----	-----	-----	-----	-----	-----	-----	
E1 max		-----	-----	-----	-----	-----	-----	-----	-----	
E1 Offset		149.9 °C	149.9 °C	149.9 °C	0.00 bar 149.9 °C	0.00 bar 149.9 °C	0.0 Pa	0 m³h	0.0 m/s	
E1 Setpoint min		-50 °C	-50 °C	-50 °C	0.0 bar -122.3°C	0.0 bar -122.3°C	0.0 Pa	0 m³h	0.0 m/s	
E1 Setpoint max		150 °C	150 °C	150 °C	30.0 bar 96.4 °C	30.0 bar 96.4 °C	200.0 Pa	1060m³h	1.0 m/s	
E2 Function	OFF	OFF 2.04 = 4E	OFF	5E	OFF	4E	OFF 4.02 + 4.03 = 6E	OFF 5.02 = 6E	OFF	
E2 Analog In	-----	----- 2.04 = TF	-----	TF	-----	0-30 MBG	----- 4.02 = TF 4.03 = Bus	----- 5.02 = TF	-----	
E2 Refrigerant						3.04 = R448A				
E2 K-Factor²								-----		
E2 Unit		-----	-----	-----	-----	-----	----- 4.03 = °C	-----	-----	
E2 Decimals		-----	-----	-----	-----	-----	----- 4.03 = 1	-----	-----	
E2 Min.		-----	-----	-----	-----	-----	----- 4.03 = - 35.0 °C	-----	-----	

Mode	1.01 1.02	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 Max.		-----	-----	-----	-----	-----	----- 4.03 = 65.0 °C	-----	-----	
E2 Offset		----- 2.04 = 149.9 °C	-----	149.9 °C	-----	0.00 bar 149.9 °C	----- 4.02 + 4.03 = 149.9 °C	----- 5.02 = 149.9 °C	-----	
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		ON	ON	ON	ON	ON	ON	ON	ON	
Limit	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Min. switch off 1.Minimum switch off. ²		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
2.Minimum switch off. ³										
Val>Set=n+ 1. Val>Set=n+ ²		ON	ON	ON	ON	ON	OFF	OFF	OFF	
2. Val>Set=n+ ³										
Type of control 1.Controller type ²		P	P	P	P	P	Pid	Pid	Pid	
2.Controller type ³										
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 %	
Group version	0	0	0	0	0	0	0	0	0	
Group 2 ON value	-----	-----	-----	-----	-----	-----	-----	-----	-----	
OFF Value Group2	-----	-----	-----	-----	-----	-----	-----	-----	-----	
nmin at Group2	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Group 3 ON value	-----	-----	-----	-----	-----	-----	-----	-----	-----	
OFF Value Group3	-----	-----	-----	-----	-----	-----	-----	-----	-----	
nmin at Group3	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Group 4 ON value	-----	-----	-----	-----	-----	-----	-----	-----	-----	
OFF Value Group4	-----	-----	-----	-----	-----	-----	-----	-----	-----	
nmin at Group4	-----	-----	-----	-----	-----	-----	-----	-----	-----	
External message	External error									
Offset control sig. 1	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
Selection amplifier		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
COM2 Function	MODBUS SLAVE									
IO Setup										
	Analog Out									
	AO1									
Function	2A	2A	2A	2A	2A	2A	2A	2A	2A	
Signal	A1	A1	A1	A1	A1	A1	A1	A1	A1	

Mode	1.01 1.02	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.	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	
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	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AO2									
Function	1A	1A	1A	1A	1A	1A	1A	1A	1A	
Signal	A2	A2	A2	A2	A2	A2	A2	A2	A2	
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	
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	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AO3									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.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	
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	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AO4									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.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	
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	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AO5									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.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	
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	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AO6									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.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	
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	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	Analog In									
	AI1									
Signal	E1	E1	E1	E1	E1	E1	E1	E1	E1	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AI2									
Signal	E2	E2	E2	E2	E2	E2	E2	E2	E2	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AI3									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Analog In	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AI4									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Analog In	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	

Mode	1.01 1.02	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									
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AI5									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Analog In	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	AI6									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Analog In	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	Digital Out									
	DO1									
Function	1K	1K	1K	1K	1K	1K	1K	1K	1K	
Signal	K1	K1	K1	K1	K1	K1	K1	K1	K1	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DO2									
Function	2K	2K	2K	2K	2K	2K	2K	2K	2K	
Signal	K2	K2	K2	K2	K2	K2	K2	K2	K2	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DO3									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DO4									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DO5									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DO6									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DO7									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DO8									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	Digital In									
	DI1									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	D1	D1	D1	D1	D1	D1	D1	D1	D1	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	

Mode	1.01 1.02	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									
	DI2									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	D2	D2	D2	D2	D2	D2	D2	D2	D2	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DI3									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DI4									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DI5									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DI6									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DI7									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
	DI8									
Function	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Signal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Inverting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Limit										
Level Function 1. Level. Function ²	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Level min. 1. Level min. ²	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Level max. 1. Level max. ²	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Level Delay 1. Level Delay ²	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Lmt E1 Function	OFF	OFF 2.03 = 1L	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Lmt E1 min	-----	----- 2.03 = 0.0 °C	-----	-----	-----	-----	-----	-----	-----	
Lmt E1 max.	-----	----- 2.03 = 40.0 °C	-----	-----	-----	-----	-----	-----	-----	
Lmt E1 Hyst.	-----	----- 2.03 = 1.0 K	-----	-----	-----	-----	-----	-----	-----	

Mode	1.01 1.02	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									
Lmt E1 Del.	-----	----- 2.03 = 2 sec.	-----	-----	-----	-----	-----	-----	-----	
Lmt E2 Function	-----	----- 2.04 = OFF	-----	OFF	-----	OFF	----- 4.02,03 = OFF	----- 5.02 = OFF	-----	
Lmt E2 min.	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Lmt E2 max.	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Lmt E2 Hyst.	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Lmt E2 Delay	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Offset Function 1. Offset Function ²		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Offset 1 1.Offset 1 ²		-----	-----	-----	-----	-----	-----	-----	-----	
Offset 2 1.Offset 2 ²		-----	-----	-----	-----	-----	-----	-----	-----	
Offset Hyst. 1. Offset Hyst. ²		-----	-----	-----	-----	-----	-----	-----	-----	
Offset Delay 1. Offset Del. ²		-----	-----	-----	-----	-----	-----	-----	-----	
Timer										
Time	14:24	14:24	14:24	14:24	14:24	14:24	14:24	14:24	14:24	
Date	19.04.13	19.04.13	19.04.13	19.04.13	19.04.13	19.04.13	19.04.13	19.04.13	19.04.13	
Summertime Auto.	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Mon										
Mon ON1	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	
Mon OFF1	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	
Mon ON2	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	
Mon OFF2	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	--:--	
Override Time	120 min	120 min	120 min	120 min	120 min	120 min	120 min	120 min	120 min	
Override Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
RTC Adjust	60	60	60	60	60	60	60	60	60	
Diagnostic										
Runtime Controller	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	
Runtime Motor	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	
E1 - 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	
E1-Current	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	
E1 - Voltage	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	
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	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	0.00 mA	
E2 - Voltage	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	0.00 V	
Operating h group1	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	
Operating h group2	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	
Operating h group3	005617:10:55	005617:10:55	005617:10:55	005617:10:55	005617:10:55	005617:10:55	005617:10:55	005617:10:55	005617:10:55	
Operating h group4	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	000007:40:35	
MODBUS Slave										
Bus Address	247	247	247	247	247	247	247	247	247	
Addressing	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	

Mode	1.01 1.02	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									
UART Baudrate	19200	19200	19200	19200	19200	19200	19200	19200	19200	
UART Mode	8E1	8E1	8E1	8E1	8E1	8E1	8E1	8E1	8E1	
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	
MODBUS Master										
Auto Address										
Manual address										

- 1 For adjustment "Setting Sep" > 0 (see Base setup)
- 2 For control circuit 1 in operation with a second control circuit (see Base Setup / Function E2)
- 3 For control circuit 2 in operation with a second control circuit (presetting depending on programmed function)
- 4 In operation with control circuit 2 and programmed function 15 D for digital input (see IO Setup)
- 5 In operation with control circuit 2 and programmed function 16 D for digital input (see IO Setup)

10.2 Possible allocation of the IOs, PINs

Units for analogue inputs AI

The following units can be set for programmed sensors with free measuring range (0 - 10 V, 0 - 20 mA, 4 - 20 mA).	
E1 Analog In *	°C, m ³ /h, bar, %, Pa, m/s, m ³ /s, Ohm, mbr, °F, ft/s, cfm, in.wg, psi, ppm
E2 Analog In	

* for Modes **5.01** and **5.02** display in m³/h, other units are not possible

AO = analog outputs

Function	Designation
OFF	no function
Constant voltage 10 V (1A)	Constant voltage +10 V Factory setting for "A2" at operation with one control circuit.
1. Control signal (2A)	Controlled 0 - 10 V output for control circuit 1 (factory setting for "A1")
E1 (3A)	proportional input "E1"
E2 (4A)	proportional input "E2"
Group2 (5A)	Group control (see controller setup group 2)
2.Cooling (6A)	Only for mode 2.03 temperature controller with additional functions. Controller output 2 with rising activation at Actual>Nominal = Cool .
2.Heating (7A)	Only for mode 2.03 temperature controller with additional functions. Controller output 2 with rising activation at Actual<Nominal = Heat .

2. control signal (8A)	Controlled 0 - 10 V output vor control circuit 2. Factory setting for "A2" at operation with second control circuit. A second control circuit can be activated if required by programming the E2 function (see Base Setup E2 functions 8E - 13E and second control circuit)
Brake control (9A)	proportionally 1.Control signal
Group3 (11A)	Group control (see controller setup group 3)
Group4 (12A)	Group control (see controller setup group 4)
Offset control sig. 1 (14A)	Offset control signal 1 Offset setting (see Controller setup)

Analog input E2 under basic setting

Function	Description Function E2
OFF	no function (factory setting)
For mode speed controller 1.01	
1E	Operation with a second setting signal (switch over "E1" <-> "E2" via floating contact)
4E	Operation with a second setting signal and automatic control at the higher level ("E1" <-> "E2")
For modes as controller higher 2.01	
Ext. Setpoint (1E)	[1E] = External Setpoint e.g. via external signal (0 - 10 V) instead of "Setpoint 1"
Ext. Manual mode (2E)	External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input.
Average E1 (3E)	Sensor average with E1 (see mode 2.04)
Comparison E1 (4E)	Sensor comparison with E1 (see Mode 2.04)
Difference E1 (5E)	Sensor difference to E1 (see Mode 2.05)
Setpoint derating (6E)	Sensor for setpoint outdoor temperature controlled (see Mode 4.02, 5.02).
Measurement (7E)	Measurement value e.g. Measurement value e.g. for limit indication, display in Info menu "E2 Actual".
For activation of a second control circuit (only possible in certain Modes (see operation with second control circuit))	
Temperature (8E)	Temperature control, pre-settings and sensor selection correspond to mode 2.01
Cold-Pressure (9E)	Pressure control condensers, pre-settings and sensor selection correspond to mode 3.01
Cold-Temperature (10E)	Pressure control condensers with input for refrigerant, pre-settings, sensor selection and input for refrigerant corresponding to mode 3.02
Air Pressure (11E)	Pressure control air conditioning, pre-settings and sensor selection correspond to mode 4.01
Air flow (12E)	Volume control, pre-settings, sensor selection and K-factor for inlet ring correspond to mode 5.01
Air speed (13E)	Air velocity control, pre-settings correspond to mode 6.01
Outdoor temperature (15E)	no function!

AI3 ... AI6 = analogue inputs in the IO Setup

Function	Description Function
OFF	no function (factory setting)
For operating modes 1.10+1.11	
Ext. Setpoint 1E	Operation with a second setting signal (switch over "E1" <-> "E2" via floating contact)
Ext. Manual mode (2E)	External manual operation via external signal (0 - 10 V). Switch over between settings on the device and external manual operation via digital input.
Measurement (7E)	Measurement value e.g. Measurement value e.g. for limit indication, display in Info menu "E2 Actual".
Outdoor temperature (15E)	no function!

DO = digital outputs

Function	Designation
OFF	No function Relays remain always de-energized
Operating indication (1K)	Operating indication (factory setting for "K1", non inverting). Operation without fault, reports enable "OFF"
Fault indication (2K)	Fault indication (factory setting for "K2", non inverting). Pulled up in operation without fault, with release "OFF" not dropped out. Drops out in case of line and device fault and external fault at the digital input. Depending on programming in event of sensor failure.
External error (3K)	External fault separate with message at digital input (factory setting if terminals bridged)
Limit modulation (4K)	Limit modulation Exceeding or undercutting the limits for modulation
Limit E1 (5K)	Limit "E1" When over or falling below limits for input signal "E1"
Limit E2 (6K)	Limit "E2" When over or falling below limits for input signal "E2"
(14K) to (18K)	no function
For modes as controller higher 2.01	
Setpoint Offset (7K)	Setpoint Offset Deviation between actual value and setpoint to high
Group2 (8K)	Group control (Group 2) Switching on fans depending on modulation
Group3 (12K)	Group control (Group 3) Switching on fans depending on modulation
Group4 (13K)	Group control (Group 4) Switching on fans depending on modulation
For modes as temperature controller with additional functions 2.03	
2.Heating (9K)	Heating function Switch ON point: temperature = Setpoint +/- Offset Switch OFF point: Temperature around hysteresis over switch ON point
2.Cooling (10K)	Cooling function Switch ON point: temperature = Setpoint +/- Offset Switch OFF point: Temperature around hysteresis below switch ON point

DI = Digital inputs D1 and D2

Function	Designation
OFF	no function (factory setting)
Enable (1D)	Enable (remote control) "ON" / "OFF"
External error (2D)	External fault alarm
Limit (3D)	"Limit" ON / OFF Influences control circuit 1 and control circuit 2
E1 / E2 (4D)	Switch over input "E1" / "E2" (for operation with one control circuit)
Reset (10D)	Complete re-start of the device
Max. Speed (11D)	Setting Max. Speed "ON" / "OFF" Influences the respectively set value "1. Max. Speed" and "2. Max. Speed" in operation with two control circuits.
Override Time (21D)	Overwrite timer function (in operation with timer)
For Mode Speed controller 1.01	
Setpoint1/2 (5D)	Switch over "Set Intern1" / "Set Intern2" "Setting External 1" must be at "OFF".
Setpoint int./ext. (6D)	Switch over "Intern" / "Extern"
For modes as controller higher 2.01	
Setpoint1/2 (5D)	Switch over "Setpoint 1" / "Setpoint 2" for control circuit1
Setpoint int./ext. (6D)	Switch over "Intern" / "Extern" Possible only for operation with one control circuit!
Control/Manual (7D)	Switch over "automatic control" / "Speed manual" Possible only for operation with one control circuit!
Heating/Cooling (8D)	Switch over control function (e.g. "heating" / "cooling")
1.Setp+Pband1/2 (15D)	for control circuit 1: Switch over Setpoint 1/2 and Pband 1/1 When programming this function, "Setting" additionally lists the parameter: "1.Pband 1. for control circuit 1"
Only active in operation with a second control circuit	
E1 / E2 (4D)	The output for control circuit 2 is set additionally to "A2" to "A1" (regardless of the programmed function for A1). The first control circuit has no output for the duration of the switch over. The switch over input "E1" / "E2" as in operation with one control circuit is no longer possible.
2. Setpoint 1/2 (9D)	for control circuit 2: Switch over "Setpoint 1" / "Setpoint 2"
2.Setp+Pband1/2 (16D)	for control circuit 2: Switch over Setpoint 1/2 and Pband 1/2 When programming this function, "Setting" additionally lists the parameter: "2.Pband 2 for control circuit 2"

Functions 12D, 13D and 22D to 29 D without function!

Limits GW E1 and GW E2

Function	Description function GW E1, GW E2
OFF	no function
Fault (1L)	Indication with the centralized fault of a programmed relay (IO allocation Function 2K). Warning symbol in display, "AL" code in events memory.
Message (2L)	Is merely displayed in the events menu as message "msg".
Filter error (3L)	Like function 1L with fault message "Filter"
Filter Message (4L)	Like function 2L with fault message "Filter"

PINs

PIN	Function
PIN 0010	Opening service menu, if PIN-protection activated
PIN 1234	Freischalten Menu group "Setting". If "Set protection" = "ON" (see Controller Setup)
PIN 9090	Restore user setting
PIN 9091	Save user setting (corresponds function "Save user setup" = "ON" see Controller Setup)
PIN 9095	Restore factory setting = delivery status

11 Diagnostics menu

Main menu	The diagnostics menu supplies information about the momentary operating condition of the device.
IO Setup	
Limit	
Timer	
Auto Address	
Diagnostic	
Diagnostic	Operating hours on the line
000419:27:28 Runtime Controller	The time counter (h:m:s) runs as soon as line voltage is applied to the device and the device is switched on (without failure). If events occur (e.g. sensor failure, MODBUS communication etc.), the operating time at this time is also saved (☞ Protocol).
Diagnostic	Operating hours with modulation
000146:23:54 Runtime Motor	The time counting (h:m:s) runs only when a modulation of the controller is present
Diagnostic	Signal height at analog input E1 (Analog In 1)
20.0 °C E1 - KTY	
Diagnostic	
9.0 mA E1-Current	
Diagnostic	
4.0 V E1 - Voltage	
Diagnostic	Signal height at analog input E2 (Analog In 2)
20.0 °C E2 - KTY	
Diagnostic	
9.0 mA E2-Current	
Diagnostic	
4.0 V E2 - Voltage	
Diagnostic	Operating h group1
065535:28:50 Operating h group1	Display of operating hours for group 1

Diagnostic	Operating h group2
048535:28:50 Operating h group2	Display of operating hours for group 2
Diagnostic	Operating h group3
078535:48:50 Operating h group3	Display of operating hours for group 3
Diagnostic	Operating h group4
012335:45:50 Operating h group4	Display of operating hours for group 4

12 Protocol

12.1 Display and query of events and malfunctions

Main menu	Events during operation can lead to a malfunctioning of the device.
Start	The last 100 events are saved in the "Protocol" menu group.
Setting	Position 1 = latest event, display: Protocol 1/100
Protocol	Position 100 = last saved event, display: Protocol 100/100
Base setup	
Controller Setup	The saved events are retained even after resetting to factory setting (☞ menu group Start / PIN input)!

The device distinguishes between several event types which are identified by different symbols.

Examples

Protocol 1/100		Attention symbol = message
Brake control Runtime Controller 000493:04:59		The message is only listed in the protocol. There is no message alternately with the actual value display and no message via alarm relay. Exception In case of sensor failure there is always a message in the display (☞ Controller Setup / Alarm Sensors) .
Protocol 2/100		Bell symbol = Alarm
Error MODBUS Com Runtime Controller 000193:04:59		The alarm message is listed in the protocol and appears alternately with the actual value display. Message by alarm relay depending on the type of failure and programming.
Protocol 2/100		Cross symbol = previous messages
Line Fault Runtime Controller 000493:04:59		Cause of the message no longer exists.

Example: Previous line failure on a member

Protocol 2/100		
Line Fault Runtime Controller 000493:04:59		Previous line failure on a member connected via the MODBUS interface. When the failure was cleared (line voltage available again), the device was on the line for 493 hours, 4 minutes and 59 seconds.
[P] Details	[ESC]Menu	

Press the P-key to show further details.

Protocol 2/100		
Line Fault Date 15.04.13 Time 10:24		Date and time when the failure was cleared (time setting  timer)
[P] Details	[ESC]Menu	

Press the P-key to show further details.

Protocol 2/100		
Line Fault Place Fan 1		Member on which the failure occurred.
[P] Details	[ESC]Menu	

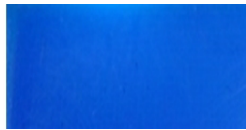
Press the P-key to show further details.

Protocol 2/100		
Line Fault Brake control 0 %		Modulation of the member at the time of the message.
[P] Details	[ESC]Menu	

Exit the menu with the Esc key combination ▼ + ▲.

12.2 Messages and trouble shooting

A momentary pending alarm or error message is indicated by a blinking display and appears alternately with the actual value display.

Display	Relais switches *		Cause	Reaction of Controller
	Operation	Fault		Adjustment
no display	-	-	No line voltage	Line voltage available? Unit switches OFF and automatically ON when the voltage has been re-stored. Check line fuse.
 	-	-	Jumper J1 for USB interface plugged. The device is in programming mode.	The device cannot be operated in this mode (display "xLCD .." or "Blue screen"). Disconnect the device from the mains and check jumper J1. If both pins are connected, pull out the jumper and plug into only one PIN. Close the housing and then switch on the mains voltage again.
OFF	X	-	No enable	Switch OFF by external contact (function 1D = enable programmed for Digital In).
 Factory setting	-	-	fault in Eprom	Works with defaults.
 EEP error	-	X	fault EEP damaged	Works with defaults.
 EEP Corruption	X	X	EEP data incorrectly	controller runs with the read settings.
 Sensor 1	-	X	Sensor 1 Interruption / short circuit in the sensor leads or sensor values measured are outside measuring range	The device works with minimal or maximum modulation depending on whether there is a short-circuit or an interruption, and on the programmed mode of operation. Check sensor
 Sensor2	-	X	Sensor2 Interruption / short circuit in the sensor leads or sensor values measured are outside measuring range	The device works with minimal or maximum modulation depending on whether there is a short-circuit or an interruption, and on the programmed mode of operation. Check sensor
 External error * EC Motors Filter Frost protection Adiabatic Firealarm Pressure switch Gas alarm Water alarm RCD	-	X	Alarm from external contact	The device continues working unchanged. check contacts.

Display	Relais switches *		Cause	Reaction of Controller
	Operation	Fault		Adjustment
Messages for programmed limits				
 Brake control Filter **	-	X	Limit message modulation	The device continues working unchanged. ☞ Limit indication depending on modulation. .
 Lmt E1 min Filter **	-	X	Limit indication minimum Signal actual value at “E1” below setting	The device continues working unchanged. ☞ Limit indication depending on setting or sensor signal.
 Lmt E1 max. Filter **	-	X	Limit indication maximum Signal actual value at “E1” above setting	The device continues working unchanged. ☞ Limit indication depending on setting or sensor signal.
 Lmt E2 min. Filter **	-	X	Limit indication minimum Signal actual value at “E2” above setting	The device continues working unchanged. ☞ Limit indication depending on setting or sensor signal.
 Lmt E2 max. Filter **	-	X	Limit indication maximum Signal actual value above setting	The device continues working unchanged. ☞ Limit indication depending on setting or sensor signal.
 Offset 1 Filter **	-	X	Limit alarm deviation from Offset 1 too high	The device continues working unchanged. ☞ Limits depending on the deviation from the setpoint.
 Offset 2 Filter **	-	X	Limit alarm deviation from Offset 2 too high	The device continues working unchanged. ☞ Limits depending on the deviation from the setpoint.
For operation as MODBUS Master				
When networking via the MODBUS Master interface, the individual error messages of the members are displayed. These depend on the type of member (☞ operating instructions of the respective device). Example:				
 Error MODBUS Com Fan: 8	-	X	Connection to the MODBUS Master interface interrupted Entered member count too high	The device continues working unchanged. Check member count Check MODBUS connection.
 Motor fault Fan: 3	-	X	Example for motor fault at member with address 3	The control module continues running unchanged. Reset required on the member (☞ operating instructions of the device concerned).
 Line Fault Fan: 6	-	X	Example for line failure at member with address 6	The control module continues running unchanged. Check line supply of member.

* Alternative display texts for error message via external contact ☞ Controller Setup / display text for external message.

** Alternative display texts for limit alarms ☞ limits function [3L]

13 Enclosure

13.1 Technical data

Versions with UL approval

For devices with the corresponding quality mark (see name plate)			
Authorization:		PROCESS CONTROL EQUIPMENT FILE No. E342692	
TRANSIENT OVERVOLTAGES - OVERVOLTAGE CATEGORY II			
Enclosure Type 1			

Type	Part-No.	Line voltage	Weight
CXE/AV	320066	1 ~ 100...240 V (-10 % to +10 %), 50/60 Hz	0.61 kg
CXE/AVE	320067		0.53 kg
CXG-24AV	320068	24 V DC +/- 20 %	0.58 kg
CXG-24AVE	320069	Current consumption max. 0.2 A *	0.5 kg

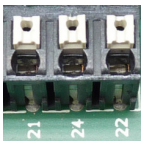
* at maximum load of the 24 V voltage supply for external components e.g. for sensors

Version without UL approval

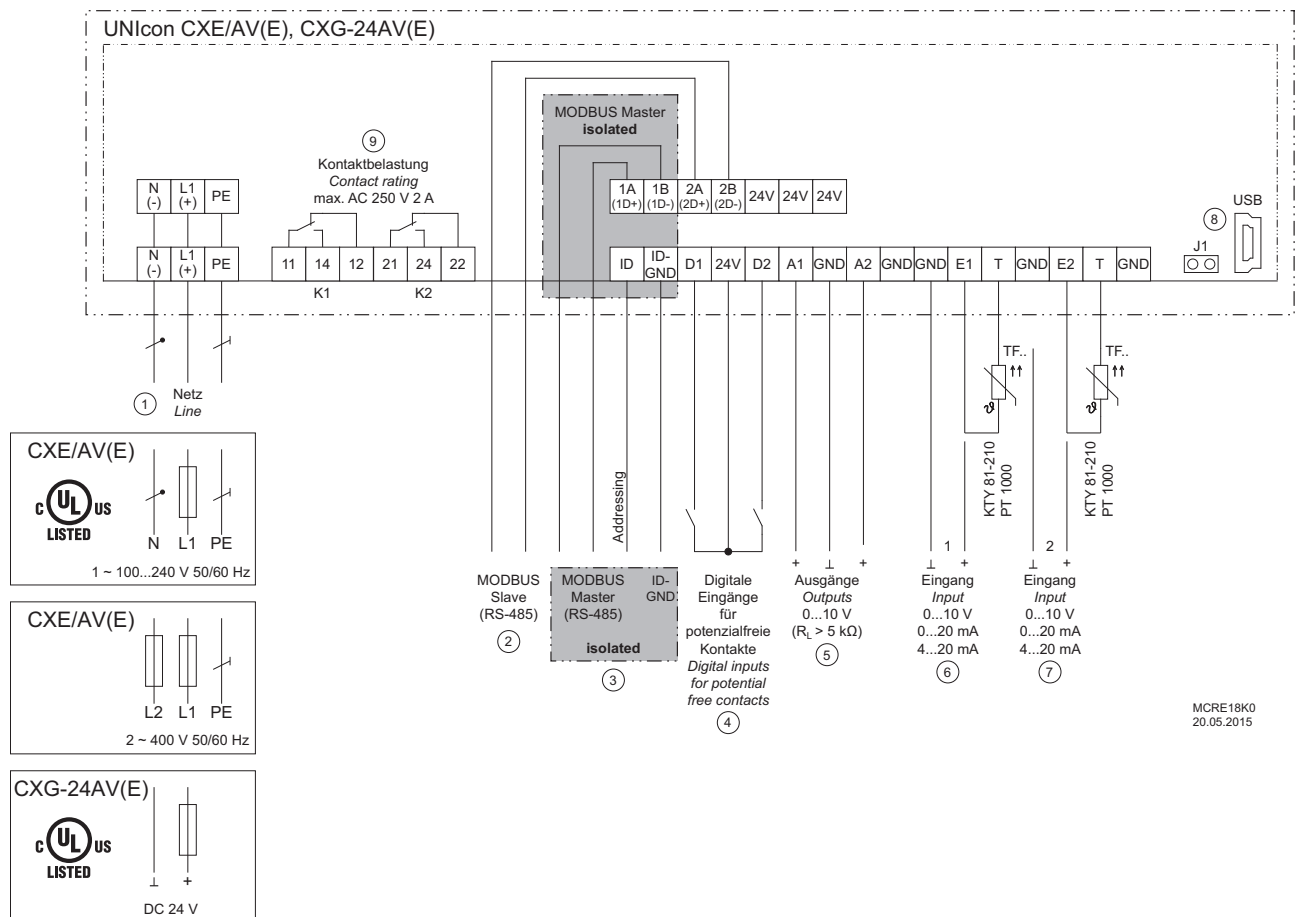
Type	Part-No.	Line voltage	Weight
CXE/AV	320070	2 ~ 400 V (-10 %...+10 %), 50 / 60 Hz	0.72 kg

Input resistance for sensor or signal set for the rotational speed (E1, E2)	for input 0 - 10 V: $R_i > 900 \text{ k}\Omega$ for input 4 - 20 mA: $R_i = 250 \text{ }\Omega$ (max. load $500 \text{ }\Omega$)	
Voltage supply e.g. for sensors	+24 V (-30...+20 %), $I_{\max} 70 \text{ mA}$ (for version 24 V DC this depends directly on supply voltage)	
Analog output (A1, A2 0 - 10 V)	Load resistance (load) $> 5 \text{ k}\Omega$ Short-circuit proof, short-circuit current = 24 mA	
Digital inputs (D1, D2)	R_i approx. $7.8 \text{ k}\Omega$ Input current typ. 2.5 mA Voltage range high level: 7.1...19 V DC Voltage range low level: 0...2.7 V DC	
Max. heat dissipation	approx. 10 W	
Max. line fuse	10 A	
Max. permissible ambient temperature for operation	55 °C	UL: 40 °C
Min. permissible ambient temperature for operation	0 °C (if mains voltage is not switched off up to -20 °C)	
Permissible temperature range for storage and transport	-30...+80 °C	
Permissible installation height	0...4000 m amsl $\leq 2000 \text{ m}$: no limitation $> 2000 \text{ m}$: max. permissible line voltage = max. voltage indication name plate minus 1.29 % / 100 m	
Permissible rel. humidity	85 % no condensation	
Electromagnetic compatibility for the standard voltage 230 / 400 V according to DIN IEC 60038	Interference emission EN 61000-6-3 (domestic household applications)	
	Interference immunity EN 61000-6-2 (industrial applications)	
Housing	PC (polycarbonate) Fire protection classification UL94V0	
Housing protection	IP54 For type CXE/AV E & CXG-24AV E (version for panel mounting) only front in built in condition.	

Connectable conductors (information for all terminals)

Push-In Terminals 		Cross section minimal	Cross section maximum
	Terminal range, rated connection	0.13 mm ²	1.5 mm ²
	Wire connection cross section AWG	AWG 24	AWG 16
	Solid H05(07) V-U	0.2 mm ²	1.5 mm ²
	Flexible H05(07) V-K	0.2 mm ²	1.5 mm ²
	With wire end ferrule DIN 46 228/1	0.25 mm ²	1.5 mm ²
	Wire plastic collar ferrule DIN 46 228/4	0.25 mm ²	0.75 mm ²
	Rigid conductors and conductors with wire end ferrules can be plugged into the terminal without tools. Use the flexible conductor for connection and the push button for release. Stripping length: 8 mm The data refer to the connection possibilities of the terminals. The necessary conductor cross section must be dimensioned according to the respective prevailing conditions.		

13.2 Connection diagram



MCRE18K0
20.05.2015

- 1 Line
- 2 MODBUS Slave interface
- 3 MODBUS Master interface, galvanically isolated
- 4 Digital inputs for potential-free contacts
- 5 Outputs ($I_{max} = 2 \text{ mA}$): A1 pre-programmed control output e.g. for controlling a speed controller. Fans with integrated controller and input 0 - 10 V can be activated directly. A2 pre-programmed for constant voltage +10 V
- 6 Input E1: 0...10 V, 0...20 mA, 4...20 mA, TF.. (KTY, Pt1000)
- 7 Input E2: 0...10 V, 0...20 mA, 4...20 mA, TF.. (KTY, Pt1000)
- 8 Jumper J1 for USB interface (Bootloader)
- 9 Contact rating max. AC 250 V 2 A (ohmic load)

Plug jumper J1 into both PINs only for software updates via USB interface!

If this jumper is plugged into both PINs, the device is in programming mode.

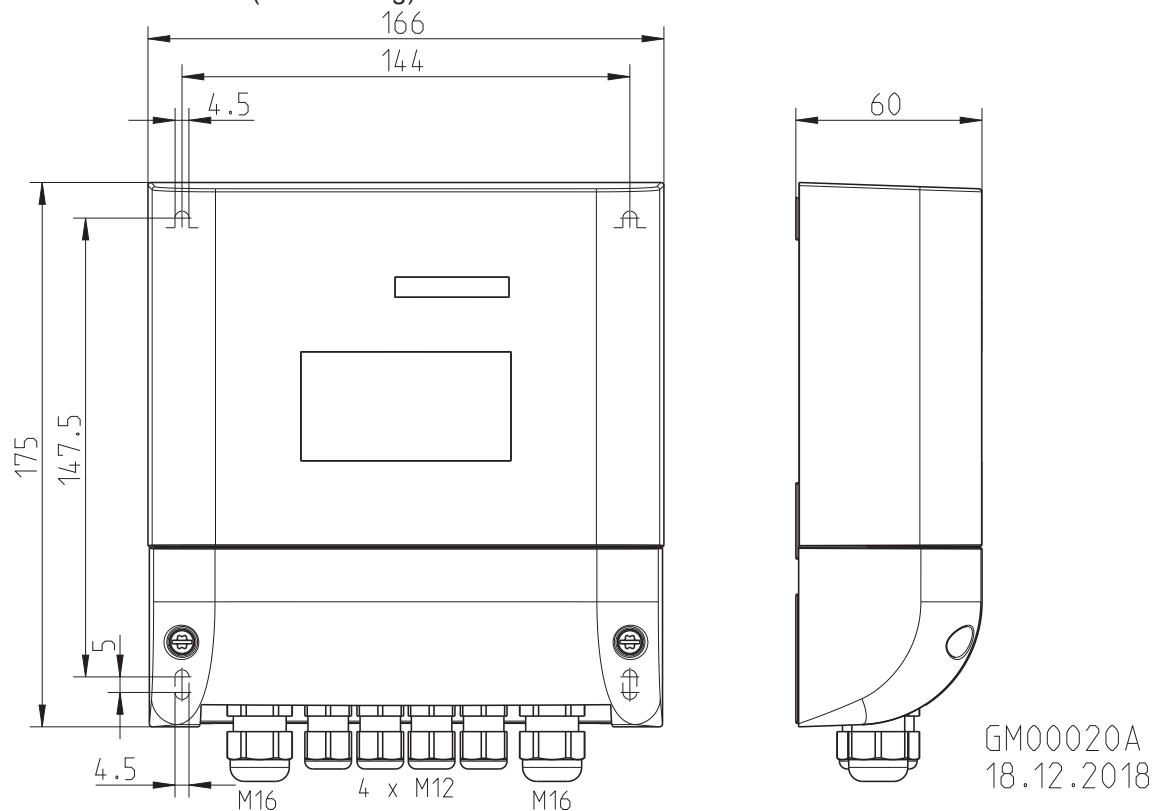
The device cannot be operated in this mode (display "xLCD .." or "Blue screen").

Attention!

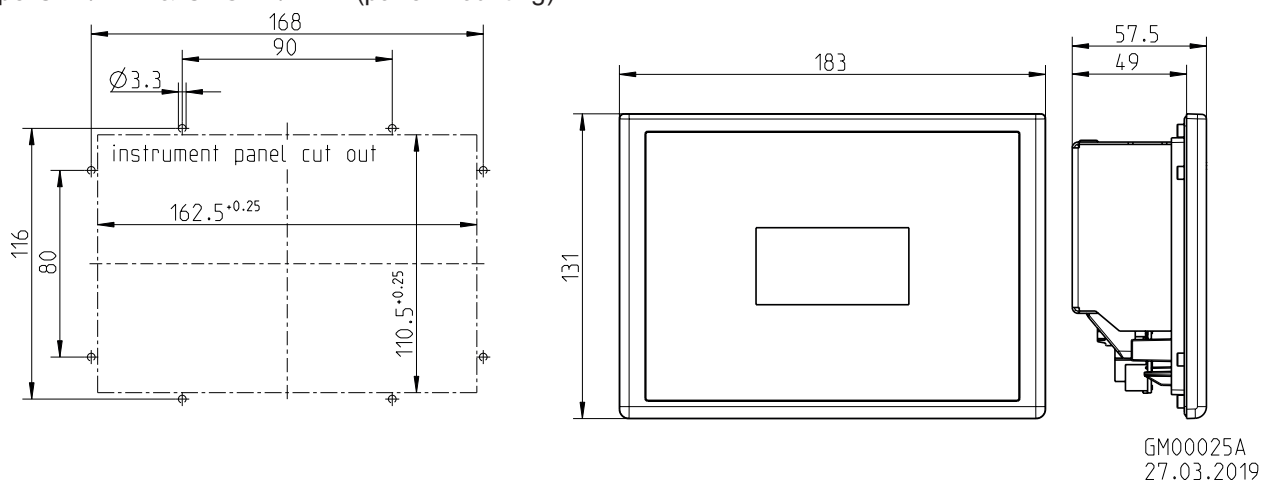
Do not replug the jumper under voltage, observe the safety instructions!

13.3 Dimensions [mm]

Type CXE/AV & CXG-24AV (wall housing)



Type CXE/AVE & CXG-24/ AVE (panel mounting)



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13.5 Manufacturer reference

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:

ZIEHL-ABEGG SE
Heinz-Ziehl-Straße
74653 Künzelsau
phone: +49 (0) 7940 16-0
info@ziehl-abegg.de
http://www.ziehl-abegg.com

13.6 Service information

If you have any technical questions while commissioning or regarding malfunctions, please contact our technical support for control systems - ventilation technology.

phone: +49 (0) 7940 16-800

Email: fan-controls-service@ziehl-abegg.de

Our worldwide contacts are available in our subsidiaries for deliveries outside of Germany, see www.ziehl-abegg.com.