PCA-2 1000D2
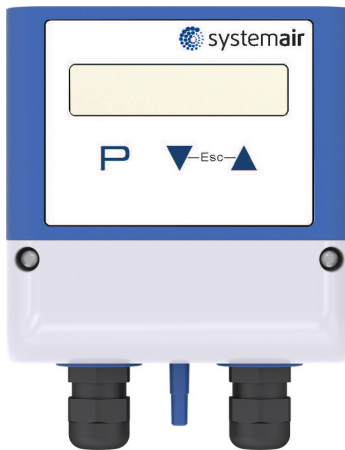
Pressure sensor and pressure controller for measuring and controlling differential pressure and voume flow

Operating Instructions

Keep for reference!

Software version: from Version 1.00

Content

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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 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.

1.2 Exclusion of liability

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.

We accept no liability for damage caused by misuse, incorrect use, improper use or as a consequence of unauthorized repairs or modifications.

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2 Safety instructions

Attention!
- Mounting, electrical connection, and start-up operation may only be carried out by an electrical specialist in accordance with electrotechnical regulations (e.g. DIN EN 50110 or DIN EN 60204)!
- Persons entrusted with the planning, installation, commissioning and maintenance and servicing in connection with the device must have the corresponding qualifications and skills for these jobs. In addition, they must be knowledgeable about the safety regulations, EU directives, rules for the prevention of accidents and the corresponding national as well as regional and in-house regulations.
- It is strictly forbidden for work to be carried out on any components while they are connected to live voltage.
- The safe isolation from the supply must be checked using a two-pole voltage detector.
- The owner is obliged to ensure that the device is operated in perfect working order only.
- Electrical equipment must be checked regularly: Loose connections are to be re-tightened and damaged lines or cables must be replaced immediately.
- Never clean electrical equipment with water or similar liquids.
- A separate fault and performance monitoring-system with an alarm signal function is necessary in order to prevent personal injuries and material damages during malfunctions and in case the device fails. Substitute operation must be taken into consideration!

Intended use
These devices are intended exclusively as sensor and control module for pressure and volume flow (non-aggressive gases only). Their operation is only permitted under observance of the specifications in these operating instructions.

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Any other use above and beyond this will be considered as improper use. The manufacturer will not be liable for any damage resulting from this. The company using it bears the sole risk.

3 Product overview

3.1 Function

Sensor-control module with differential-pressure sensors in proven ceramic-cantilever technology for climate and clean-room application.
The pressure range goes from 0...1000 Pa (0...4.0 in.wg), four measuring ranges are programmable.
Function when the pressure at the "Plus"- connection exceeds the pressure at the "Minus"- connection.

Depending on the programmed Mode the device can be used as sensor or as a control module for pressure or volume flow.

- For operation as pressure sensor the device supplies an output signal (0...10 V) proportional to the measuring range.
- For operation as volume flow sensor the device supplies an output signal (0...10 V) proportional to the air volume measuring range (see INFO / Range qV). Function in combination with centrifugal fans and measuring device in the inlet ring. The controller calculates the volume flow of the fan from the "K-Factor" and pressure differential between the suction side and the inlet duct.
- For operation as control module for pressure or volume flow the purpose of the device is to reach and maintain the target value 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. Controlled output (0...10 V) e.g. for activating a speed controller for fans or an EC-fan directly.

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The extended PCA **-2**1000D2 type version provides the following additional functions:

• Integrated real-time clock with timer function.
• Operating modes with setpoint adjustment based on outdoor temperature and input for outdoor temperature sensor.
• RS-485 interface for MODBUS RTU.
• Signal relay that can be assigned different functions.

3.2 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).

3.3 Disposal / recycling

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

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4 Mounting

- Before installation remove the device from the packing and check for any possible shipping damage!
- 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!
- Use the templates printed on the device packing to mark the fastening bore holes.
- The pressure measuring depends on position, therefore the mounting must be made vertical and as possible on a vibration-free place (cable inlet and pressure connections down).
- The pressure line´s connection should be with plastic-hose (in building), inside diameter 4 / 5 mm. For a firm hold of the hose, its inside diameter must be 1 mm smaller than the outside diameter of the hose nozzle (step spigot 5 / 6 mm).
- Remove the connection cover for mounting, electrical connection and setting of the measuring range. Close the lid again carefully before start-up (tightening torque of the lid screws 1.1 Nm).
- Two lines may only be fed through one cable screw-type gland with the sealing insert for two lines.
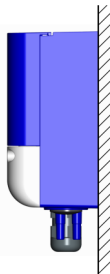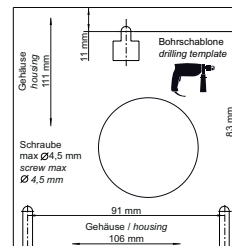
Vertical mounting   Drilling template on packing

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5 Electrical installation

5.1 EMC-compatible installation of control lines

Pay attention to maintain sufficient distance from powerlines and motor wires to prevent interferences.

When using a shielded cable the shield must be connected (as short and with as low an induction as possible!) to the PE conductor on one side at the signal input (of the evaluation unit).

5.2 Connection Voltage supply

Connection Voltage supply at terminals: "+U_S" and "GND". Here, it must be strictly observedt hat the mains voltage lies within the llowable olerance pecifications (see Technical data and nameplate affixed to the side).

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.

There is no potential isolation between supply voltage and output signal.

5.3 Output voltage 0...10 V

Connection to terminals "A" and "GND" (I_{max} see Technical data).

Parallel control of several speed controllers / EC-fans
The maximum possible number of speed controllers / EC fans with 0...10 V input that can be controlled parallel depends on their input resistance and on the maximum admissible load of the 0...10 V output.

Attention!
- It is not permissible to connect outputs of several devices to each other!
- In case of failure of the control module or interruption of the 0...10 V specification signal, all parallel connected EC fans/-

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speed controllers are no longer controlled. This means that all fans stop!

5.4 Digital input (D1)

Different functions can be assigned to the digital input D1(see IO SETUP).
A voltage at terminals "1" and "2" (10...24 V DC) activates the programmed function (note polarity - see connection diagram).

5.5 Relay outputs "K1"

The relay output "K1"can have different functions assigned to it, see IO SETUP. Max. contact rating see technical data and con-nection diagram.

Function fault indication (factory setting) for "K1":
• For operation the relay is energized, connections "13" and "14" are bridged. For fault the relay is de-energized.
• When switching off via enable (see IO SETUP/Digital inputs "DI"), the relay remains energized.

5.6 RS-485 interface for MODBUS

The device comes equipped with a RS-485 interface for network-ing via MODBUS. Conntection at: "A (D+)", "B (D-)" and "GND".
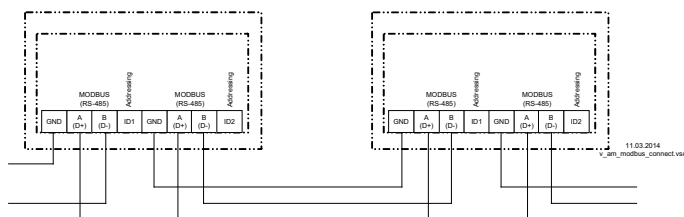
The connections for MODBUS "A (D+)", "B (D-)" are available double on the module and are connected with each other internally.

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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

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dissimilar potential (over 10 V!) will lead to the destruction of the RS-485 interface (e.g. lightning).
- Except the data link "A (D+)", "B (D-)" and "GND" (for automatic addressing additional "ID1" - "ID2" see following chapter) no further cable cores of the data line may be used.
- Pay attention to sufficient distance from powerlines and motor wires (min. 20 cm).
- A maximum of 64 participants can be directly connected to one another, and another 64 participants via a repeater.

Example for MODBUS connection

MODBUS

26.02.2007
v_modbus_verbindung.vsd
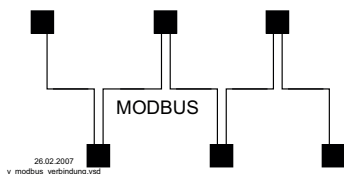
The data line must be conducted from one device to the next. No other type of wiring is allowed!
Always use only two wires of one lead (twisted pair) for the connection.

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.

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Shield connection correct   Shield connection incorrect
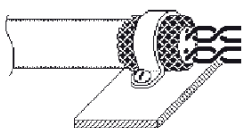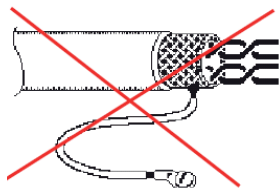
When using telephone cable with four cable cores, we recommend the following allocation:

- A (D+) = red
- B (D-) = black
- ID1 - ID2 = yellow (for automatic addressing)
- GND = white

Default interface parameter

- Baudrate = 19200
- Bits = 8
- Parity = Even
- Stop bits = 1
- Handshake = none

Information

Addressing is performed depending on version by display, an external terminal or a PC with the appropriate software (automatic addressing following chapter).

5.6.1 Automatic addressing

Automatic addressing can be started when the connections "ID1" and "ID2" for "Addressing" are connected with each other additionally next to the bus connection. I. e. it is no longer necessary to address every user manually in the network.

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Information
- Except the data link "A (D+)", "B (D-)" the "ID1 - ID2" and the "GND" connection may no further cable cores of the data line be used.
- The connections for the automatic addressing "ID1" and "ID2" are not directly connected with each other internally. These may not be bridged; any order of connection is possible.
- If a repeater is necessary and automatic addressing is to be carried out, only certain repeaters that relay the addressing signal can be used.

On the first user that is connected directly to a terminal, MODBUS Master or PC, "GND" and "ID1" or "ID2" must be bridged. This is recognised as a result and occupied by address **1**.
For the following users the connection "ID1" or "ID2" of a user respectively is connected with connection "ID1" or "ID2" of the next user.
The automatic addressing of other users is initiated by the previous user via this connection.

5.7 Input for outdoor temperature sensor

For **4.02** and **5.02** operating modes with setpoint adjustment depending on outdoor temperature, the outdoor temperature sensor is connected at the "TF" terminals. You can connect passive temperature sensors TF... (KTY81-210) or PT1000, and the polarity is not relevant.
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.

Danger due to electric current
Never apply line voltage to analog inputs!

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6 Device construction

6.1 Connecting elements
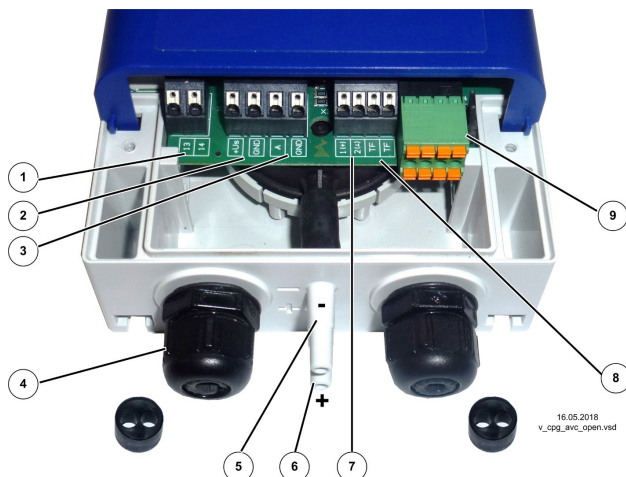
1   *Signal relay (terminals: 13, 14)*
2   *Supply voltage (terminals: U$_S$, GND)*
3   *Output signal 0...10 V (terminals: A, GND)*
4   *Cable gland M16 + seal insert with two holes (5 mm)*
5   *"Minus"- connection in area with lower pressure*
6   *"Plus"- connection in area with higher pressure*
7   *Digital input D1 (terminals: 1, 2)*
8   *Input outdoor temperature sensor (terminals: TF, TF)*
9   *MODBUS interface (terminals: GND, A, B, ID1, ID2 and jumper J1)*

6.2 Multipurpose LC display and keyboard

```
100 Pa
Δp
```
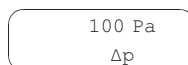
Line 1: 16 figures for actual and desired values
Line 2: 16 figures for menu text

P   Program key and open menu
▼   Menu selection, reduce value
▲   Menu selection, increase value
▼ + ▲   ESC-key combination, Escape = leave menu

Messages on the display

OFF	No enable
!	Exceeding measuring range
☾	Moon symbol = Adjustment for Setpoint 2 active
⧗	Hourerglass symbol = Timer function active
External error	External fault alarm
Limit Uout	Limit: Modulation
Limit Pressure	Limit: Pressure
Limit AirVolume	Limit: volume flow
Limit Temp.	Limit: Temperature
Check Temp Sens	Failure: Check temperature sensor
Check Press Sens	Failure: Check pressure sensor

7 Modes/Start-up

7.1 Select operation mode

i **Information**
Simple installation is possible through the selection of the preprogrammed mode of operation.
This determines the basic function of the device, factory set **4.01**.

Mode	Function
4.00	Pressure sensor: output 0...10 V proportional to measuring range
4.01	Pressure control (PID): output 0...10 V depending on adjusted set-point and measured actual value
4.02	Pressure control (PID) with outdoor temperature compensation: output 0...10 V depending on adjusted setpoint, outdoor temperature and measured actual value.
5.00	Volume flow sensor: Output 0...10 V propotional to measuring range (depending on setting for K-Factor)
5.01	Volume flow control (PID): Output 0...10 V depending on adjusted setpoint and measured actual value

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Mode	Function
5.02	Volume flow control (PID) with outdoor temperature compensation: output 0...10 V depending on adjusted setpoint, outdoor temperature and measured actual value.

7.2 Start-up

Procedure

1. You must mount and connect the device in accordance with the operating instructions.
2. Double check that all connections are correct.
3. The supply voltage must match the information on the rating plate.
4. Set the mode, unit and measuring range and adjust the sensor in the **BASE SETUP**.
5. Set the parameters for control operation for the modes 4.01, 4.02, 5.01, 5.02 unter "SETTING".

7.3 Menu structure

```
 ┌─────────────┐
 │   100 Pa    │   **Display after turning on the voltage supply.**   ┌─────────────┐
 │     Δp      │   Switch over between actual value display and        │    INFO     │
 └─────────────┘   "INFO" with the key shortcut for Escape (Esc       └─────────────┘
                   = ▼ + ▲).
```

Selection of the menu group (e.g. BASE SETUP) to the right through the ▼-key, to the left through the ▲-key.
Youcangotothemenuitemsinthe**menu**groups (e.g. mode) by using the P key. Use the arrow keys to move up and down within the menu group.
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.

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Example for Mode `4.01` (Factory setting)

INFO	▼▲	SETTING	▼▲	BASE SETUP
P↓ ↑ Esc		**P↓ ↑ Esc**		**P↓ ↑ Esc**
100 Pa / Δp		100 Pa / Setpoint 1		4.01 / Mode
▲ ▼		▲ ▼		▲ ▼
100 Pa / Setpoint 1		100 Pa / Setpoint 2		1: metric / Units
▲ ▼		▲ ▼		▲ ▼
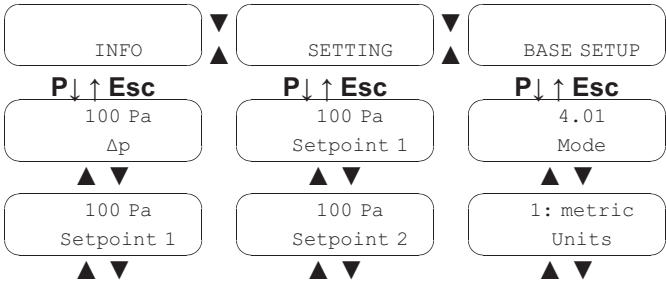
Reprogramming Mode `4.01` to `5.00` in "BASE SETUP"

1	2	3	4	5	6	7
4.01 / Mode	**P**	«4.01» / Mode	▲	«5.00» / Mode	**P**	5.00 / Mode
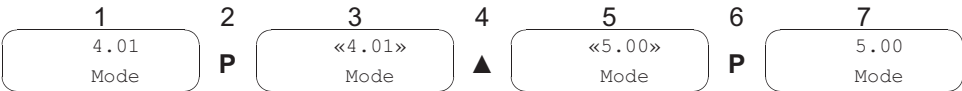
8 Programming

8.1 Pressure sensor `4.00` and pressure control `4.01` + `4.02`

8.1.1 Base setup `4.00`... `4.02`

BASE SETUP

`4.01` Mode	`4.00`: Pressure sensor `4.01`: Pressure control (factory setting) `4.02`: Pressure control with outdoor temperature compensation
metric Units	Display in SI units "metric" (factory setting) or Imperial units (US) "inch". Conversion factors: Pressure: 1.0 in.wg = 254 Pa Temperature (`4.02`) t / °F = 1.8 x t °C + 32 Settings for temperature differences (with SI units in K) are also made for Imperial units (US) in °F (Δ 1.8 °F ≜ Δ 1 K).

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KTY81-210 Temp. Sensor	Temperature sensor for recording the outdoor temperature in **4.02** operating mode. Sensor type: KTY 81-210 (factory fitted) or PT 1000.	
0...1000 Pa Measuring range	**1: 0...1000 Pa** *(0...4.0 in.wg)* 2: 0...500 Pa *(0...2.0 in.wg)* 3: 0...300 Pa *(0...1.2 in.wg)* 4: 0...200 Pa *(0...0.8 in.wg)*	Adjustable measuring range
OFF Autozero	If the actual value is not "0 Pa Δp" in pressureless state a zero-point adjustment is possible with fuction "Autozero". This may be necessary, for example, in case of heavy thermal fluctuations in the sensor environment or non-vertical mounting.	
0 Pa *(0.000 in.wg)* Offset	**Proceed as follows:** 1. Pull off the pressurised hoses. 2. Switch function "Autozero" to "ON". 3. The display switches to the actual value display and the value "0" is displayed after zero point calibration has taken place. 4. The necessary difference up to "0" is displayed in the BASE SETUP under "Offset". Alternatively to the automatic zero point calibration, the offset value can also be set manually. Setting range: +/ - 1000 Pa *(+/- 4.000 in.wg)*	
0.0 K *(0.0 °F)* Offset	Offset temperature sensor for mode **4.02**. Setting range: -20.0...20.0 °C *(-36.0...36.0 °F)* Factory setting: 0.0 K *(0.0 °F)*	
OFF Factory Setting	**Attention!** ON => restore factory setting = delivery status	

(xxx)   *Values for Imperial units (US)*

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8.1.2 Settings for operation `4.01` + `4.02`

SETTING

500 Pa *(22.0 in.wg)* Setpoint 1	**Setpoint1** Setting range: in measuring range of sensor Factory setting: 50 % of selected measuring range
500 Pa *(2.0 in.wg)* Setpoint 1	**Set Internal2** Setting range: in measuring range of sensor Factory setting: 50 % of selected measuring range
500 Pa *(2.0 in.wg)* Pband	**Pband** Narrow control range = Short control times Wide control range = Longer control times and more stable control Setting range: in measuring range of sensor Factory setting: 50 % of selected measuring range
0.0 V Min. Uout	**Minimal output voltage** Setting range: 0...10 V (priority over "Max. Uout") Factory setting: 0 V
10.0 V Max. Uout	**Maximal output voltage** Setting range: 10...0 V Factory setting: 10 V

Additional menu item for mode `4.02` with outside-temperature dependent target-setpoint

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Outside-temperature dependent target-setpoint
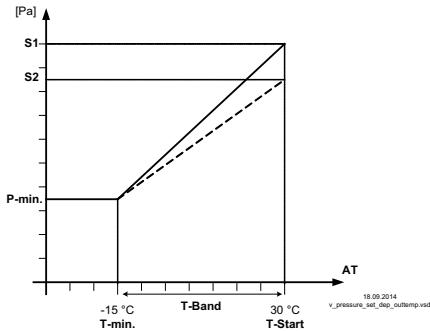
An outside temperature compensation can be activated (sensor connection terminals "TF"-"TF") when being operated as a pressure control device.
This function automatically changes the set and active "Setpoint 1" or "Setpoint 2" proportional to the measured outdoor temperature (see INFO: SETPOINT CONTROL).

S1   Setpoint1
S2   Set Internal2
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

30.0 K *(54.0 °F)* T-Band SA	**Temperature range setpoint lowering** Temperature range in which the setpoint change continiously with outdoor temperature. Setting range: 0.0...100.0 K *(0.0...180.0 °F)* Factory setting: 30.0 K *(54.0 °F)*
15.0 °C *(59.0°F)* T-Start SA	**Start temperature for setpoint lowering** Setpoint reducing will start below this outside temperature. Setting range: -10.0...40.0 °C *(14.0...104.0 °F)* Factory setting: 15.0 °C *(59.0 °F)*
500 Pa Min. Setpoint *(2.0 in.wg)*	**Minimum setpoint** Minimum pressure for very low outside temperature. Setting range: in measuring range of sensor Factory setting: 500 Pa (2.0 in.wg)

(xxx)   *Values for Imperial units (US)*

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8.2 Volume sensor 5.00 and volume control 5.01 + 5.02

8.2.1 Base setup 5.00 ... 5.02

BASE SETUP

5.01 Mode	**5.00**: Volume flow sensor **5.01**: Volume flow control **5.02**: Volume flow control with outdoor temperature compensation
metric Units	Display in SI units "metric" (factory setting) or Imperial units (US) "inch". Conversion factors: Pressure: 1.0 in.wg = 254 Pa Volume flow: 1.0 cfm = 0.5885 m^3/h (inlet ring: K-Faktor US = 9.3 x K-Factor SI) Temperature (**4.02**) t / °F = 1.8 x t °C + 32 Settings for temperature differences (with SI units in K) are also made for Imperial units (US) in °F (Δ 1.8 °F ≙ Δ 1 K).
KTY81-210 Temp. Sensor	Temperature sensor for recording the outdoor temperature in **5.02** operating mode. Sensor type: KTY 81-210 (factory fitted) or PT 1000.
0...1000 Pa Measuring range	**1: 0...1000 Pa** *(0...4.0 in.wg)* 2: 0...500 Pa *(0...2.0 in.wg)* 3: 0...300 Pa *(0...1.2 in.wg)* 4: 0...200 Pa *(0...0.8 in.wg)*	Adjustable measuring range
75 K-Factor *(697 US)* *K-Factor US*	Nozzle coefficient (K-Factor) ☞ following table	

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OFF Autozero	If the actual value is not "0 Pa Δp" in pressureless state a zero-point adjustment is possible with fuction "Autozero". This may be necessary, for example, in case of heavy thermal fluctuations in the sensor environment or non-vertical mounting.
0 Pa *(0.000 in.wg)* Offset	**Proceed as follows:** 1. Pull off the pressurised hoses. 2. Switch function "Autozero" to "ON". 3. The display switches to the actual value display and the value "0" is displayed after zero point calibration has taken place. 4. The necessary difference up to "0" is displayed in the BASE SETUP under "Offset". Alternatively to the automatic zero point calibration, the offset value can also be set manually. Setting range: +/ - 1000 Pa *(+/- 4.000 in.wg)*
0.0 K *(0.0 °F)* Offset	Offset temperature sensor for mode **5.02**. Setting range: -20.0...20.0 °C *(-36.0...36.0 °F)* Factory setting: 0.0 K *(0.0 °F)*
OFF Factory Setting	**Attention!** ON => restore factory setting = delivery status

(xxx)   *Values for Imperial units (US)*

8.2.2 Nozzle coefficient (K-Factor)

Maximum K-Factor depending on the measuring range of the pressure sensor				
Range [Pa] Range *[in.wg]*	200 *0.8*	300 *1.2*	500 *2.0*	1000 *4.0*
Max. K-Factor Max.*US*	4596 *32767*	3752 *32767*	2906 *32767*	2055 *32500*

Air volume measuring range [m^3/h], [cfm] depends on selected measuring range of pressure senosr [Pa], [in.wg] and selected "K-Factor (US)". In menu "INFO" display for "Range qV". Maximum measuring range at input of each possible maximum "K-Factor (US)".

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Air flow measuring range: max. 65000 m^3/h (*38257 cfm*) depending on setting of measuring range and K-Factor.

8.2.3 Setting for operation `5.01` and `5.02`

SETTING

1185 m^3/h *(697 cfm)* Setpoint 1	**Setpoint1** Setting range: depending on measuring range of sensor and "K factor" Factory setting: 1185 m^3/h
1185 m^3/h *(697 cfm)* Setpoint 1	**Set Internal2** Setting range: depending on measuring range of sensor and "K factor" Factory setting: 1185 m^3/h
1185 m^3/h *(697 cfm)* Pband	**Pband** Narrow control range = Short control times Wide control range = Longer control times and more stable control Setting range: in measuring range of sensor Factory setting: 1185 m^3/h
0.0 V Min. Uout	**Minimal output voltage** Setting range: 0...10 V (priority over "Max. Uout") Factory setting: 0 V
10.0 V Max. Uout	**Maximal output voltage** Setting range: 10...0 V Factory setting: 10 V

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

Outside-temperature dependent target-setpoint
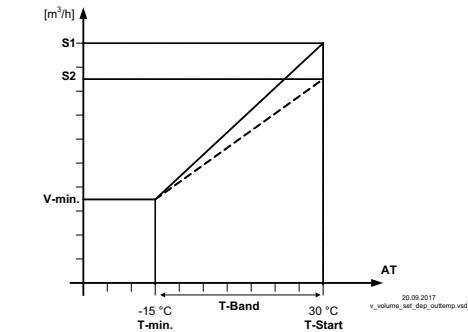
An outside temperature compensation can be activated (sensor connection terminals "TF"-"TF") when being operated as a volume flow control device.
This function automatically changes the set and active "Setpoint 1" or "Setpoint 2" proportional to the measured outdoor temperature (see INFO: SETPOINT CONTROL).

S1   Setpoint1
S2   Set Internal2
V-min.   Min. Setpoint
T-min   Min. temperature
T-Start   Setpoint reducing will start below this outside
           temperature
T-band   Temperature range
AT   Outdoor temperature

30.0 K (54.0 °F) T-Band SA	**Temperature range setpoint lowering** Temperature range in which the setpoint change continiously with outdoor temperature. Setting range: 0.0...100.0 K *(0.0...180.0 °F)* Factory setting: 30.0 K *(54.0 °F)*
15.0 °C (59.0°F) T-Start SA	**Start temperature for setpoint lowering** Setpoint reducing will start below this outside temperature. Setting range: -10.0...40.0 °C *(14.0...104.0 °F)* Factory setting: 15.0 °C *(59.0 °F)*
1185 m^3/h (697 cfm) Min. Setpoint	**Minimum setpoint** Minimum volume flow for very low outdoor temperature. Setting range: depending on measuring range of sensor and "K factor" Factory setting: 1185 m^3/h *(697 cfm)*

(xxx)   *Values for Imperial units (US)*

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8.3 Menu group "INFO"

The number of menus depends on the selected operating mode. Settings cannot be made in this menu group!

INFO

Display	Mode					
	4.00	4.01	4.02	5.00	5.01	5.02
Actual value after turning on the voltage or after exiting the setting menu using the Esc key combination.						
Δp	0 Pa *(0.000 in.wg)*	0 Pa *(0.000 in.wg)*	0 Pa *(0.000 in.wg)*	-	-	-
qV	-	-	-	0 m^3/h *(0 cfm)*	0 m^3/h *(0 cfm)*	0 m^3/h *(0 cfm)*
Display outdoor temperature						
Outdoortemp.	-	-	15.0 °C *(59.0°F)*	-	-	15.0 °C *(59.0°F)*
Active setpoint display (Setpoint 1 or Setpoint 2 depending on activation via digital input or timer).						
Setpoint 1	-	500 Pa *(2.000 in.wg)*	500 Pa *(2.000 in.wg)*	-	1185m^3/h *(697 cfm)*	1185m^3/h *(697 cfm)*
Setpoint control in operating modes with outdoor temperature compensation. This function automatically changes the set and active Setpoint 1/2 proportional to the measured outdoor temperature.						
Setpoint Control	-	-	254 Pa *(1.000 in.wg)*	-	-	593 m^3/h *(349 cfm)*
Air volume measuring range depending on sensor measuring range and K-Factor						
Range qV	-	-	-	2371m^3/h *(1394 cfm)*	2371m^3/h *(1394 cfm)*	2371m^3/h *(1394 cfm)*

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	Mode					
Display	`4.00`	`4.01`	`4.02`	`5.00`	`5.01`	`5.02`
Magnitude of the output voltage 0...10 V						
Uout	0.0 V	9.9 V	9.9 V	0.0 V	9.9 V	9.9 V
Display actual value for volume measurement						
Δp	-	-	-	0 Pa *(0.000 in.wg)*	0 Pa *(0.000 in.wg)*	0 Pa *(0.000 in.wg)*
Time						
Time	-	8:54	8:54	-	8:54	8:54
Software version						
XXX	1.00	1.00	1.00	1.00	1.00	1.00

8.4 Menu group "IO SETUP"

8.4.1 Allocation: virtual IOs/real IOs

A distinction is made between virtual inputs/outputs (IOs) and actual inputs/outputs (IOs).

- Actual IOs are physical inputs, physical outputs and timer functions.
- Virtual IOs are the inputs and outputs used to make the settings.

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Virtual IOs	Pool real IOs (signal sources)
AO1 Analog output	• Analog output A1 (terminals: A, GND)
DO1 Digital output	• Relay output K1 (terminals: 13, 14)
DI1 - DI3 Digital inputs (for **4.00** and **5.00** not available)	• Digital input D1 (terminals: 1, 2) • Timer from time switch • MODBUS interface (terminals: A, B)

If only one signal source is available, no further assignment is possible (n.a. = no assignment).

8.4.2 Analog output "AO"

Menu overview

Function	Designation
Control sign. 2A AO1 Function	Setting of the desired function (see following table).
A1 AO1 Signal	Analog output A1 (terminals: A, GND) No further assignment possible, n.a. (no assignment) = No signal assigned.
OFF AO1 Inverting	Inverting output

Setting of the desired function

Function	Designation
OFF	No function
Control sig. 2A	Control signal (factory setting)
MODBUS sig. 17A	Setting via MODBUS register

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8.4.3 Digital output "DO"

Menu overview

Function	Designation
Fault indic. 2K DO1 Function	Setting of the desired function (see following table).
K1 DO1 Signal	Relay output K1 (terminals: 13, 14) No further assignment possible, n.a. (no assignment) = No signal assigned.
OFF DO1 Inverting	Inverting output

Setting of the desired function

Function K1	Designation
OFF	No function Relays remain always de-energized.
Operation indic. 1K	Operating indication Reports a failure and switch-off using the enable function (see digital inputs "DI").
Fault indic. 2K	Fault indication (factory setting) Reports a failure, switch-off using the enable function (see digital inputs "DI") is not reported.
Extern. Error. 3K	Report of an external failure triggered by digital output (no function in **4.00** and **5.00**).
Limit modu. 4K	Limit message modulation
Limit act val 5K	Limit message actual value
Limit temp 6K	Limit message outdoor temperature (only for **4.02** and **5.02**).
MODBUS sig. 17K	Setting via MODBUS Register H01 Bit 14.

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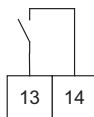
10.11.2008
v_relais_k1_13_14.vsd
K1

K1
1 = energized, terminals 13 - 14 bridged
0 = de-energized, terminals 13 - 14 not bridged

Function	State controller	K1 1 = energized 0 = de-energized	
		Inverting	
K1		**OFF**	ON
1K	Operation without fault	**1**	0
	Switch off via digital input "DI" (no enable, display = "OFF")	**0**	1
	Fault	**0**	1*
2K	Operation without fault	**1**	0
	Switch off via digital input "DI" (no enable, display = "OFF")	**1**	0
	Failure, external fault indication at "DI", Limit message	**0**	1*
3K	External fault indication via digital input "DI" (Display = "External Error")	**1**	0
4K	Exceeding or undercutting the limits for modulation	**1**	0
5K	Exceeding or undercutting the limits for actual value	**1**	0
6K	Exceeding or undercutting the limits for outdoor temperature	**1**	0
17K	MODBS register H01, if Bit 14 is set	**1**	0
* In case of a failure, the relay can only be energised if the supply voltage is connected and the device is functioning.			

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8.4.4 Digital inputs "DI"

The device has three virtual digital inputs: DI1, DI2 and DI3 (not available in **4.00** and **5.00**).

8.4.4.1 Menu overview

Example for DI1

Function	Designation
OFF DI1 Function	Setting of the desired function (see following table).
n.a. DI1 Signal	Allocation: virtuell input <=> real input • n.a. (no asignement) = no signal assigned (factory setting) • Digital input D1 (terminals: 1, 2) • Timer from time switch • MODBUS interface (terminals: A, B)
OFF DI Inverting	Inverting input
OR DI - DI Relation	If the digital inputs have the **same** function allocation (also applies for timer function) you can choose between an AND and OR operation. **OR** operation (factory setting). The function becomes active **when one** of the digital inputs or the timer is activated. **AND** operation. The function becomes only active **when all** digital inputs or also the timer are activated.

Setting of the desired function

Function	Designation
OFF	no function (factory setting)
Enable 1D	Enable (remote control) "ON" / "OFF"
Extern Error 2D	External fault alarm
Setpoint 1/2 5D	Switch over "Setpoint1" / "Setpoint2"

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8.4.4.2   Enable ON/OFF, function `1D`

Remote ON/OFF (electronic disconnection). The device can still be operated in the switched-off state after pressing the "Esc" key combination.

A programmed alarm relay (factory set "K1 function" = `2K`) does not report the switch-off.

Enable ON

100 Pa Δp

Display for switch-off alternately with actual value display

Enable OFF

OFF Δp

Possible controls

Real input	Inverting DI	State input	State device
Digital input D1 (terminals: 1, 2)	OFF	Voltage ON	ON
		Voltage OFF	OFF
	ON	Voltage ON	OFF
		Voltage OFF	ON
Timer from time switch	OFF	Timer active	ON
		Timer not active	OFF
	ON	Timer active	OFF
		Timer not active	ON
MODBUS interface (terminals: A, B)	OFF	Register H01 Bit 15 not set	OFF
		Register H01 Bit 15 set	ON
	ON	Register H01 Bit 15 not set	ON
		Register H01 Bit 15 set	OFF

8.4.4.3   External message, function `2D`

Connection of an external fault indication - the device continues operating with no changes after a message and "External Error" appears in the display. Message via relay "K1" depending on programmed function (see digital output "DO").

A programmed alarm relay (factory set "K1 function" = `2K`) does not report the switch-off.

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100 Pa Δp	External message display alternating with the actual value display	External Error Δp
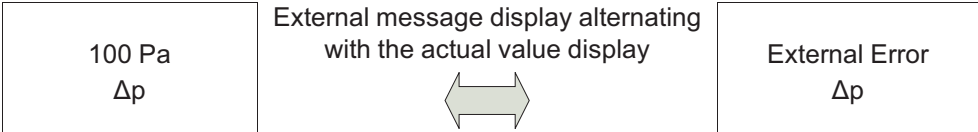
Possible controls

Real input	Inverting DI	State input	External Error
Digital input D1 (terminals: 1, 2)	OFF	Voltage ON	YES
		Voltage OFF	NO
	ON	Voltage ON	NO
		Voltage OFF	YES
Timer from time switch	OFF	Timer active	YES
		Timer not active	NO
	ON	Timer active	NO
		Timer not active	YES
MODBUS interface (terminals: A, B)	OFF	Register H01 Bit 15 not set	NO
		Register H01 Bit 15 set	YES
	ON	Register H01 Bit 15 not set	YES
		Register H01 Bit 15 set	NO

8.4.4.4   Setpoint 1/2, function 5D
Switching between control with Setpoint 1 and Setpoint 2.

Setpoint 1active

100 Pa Δp	The active Setpoint is indicated in the menu INFO, an active "Setpoint 2" is signalized by the moon symbol.

Setpoint 2 active

80 Pa   ☾ Δp

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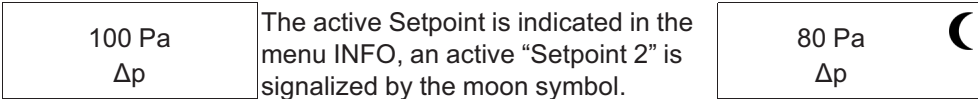
Possible controls

Real input	Inverting DI	State input	active
Digital input D1 (terminals: 1, 2)	OFF	Voltage ON	Setpoint 2
		Voltage OFF	Setpoint 1
	ON	Voltage ON	Setpoint 1
		Voltage OFF	Setpoint 2
Timer from time switch	OFF	Timer active	Setpoint 2
		Timer not active	Setpoint 1
	ON	Timer active	Setpoint 1
		Timer not active	Setpoint 2
MODBUS interface (terminals: A, B)	OFF	Register H01 Bit 15 not set	Setpoint 1
		Register H01 Bit 15 set	Setpoint 2
	ON	Register H01 Bit 15 not set	Setpoint 2
		Register H01 Bit 15 set	Setpoint 1

8.5 Menu group "LIMITS"

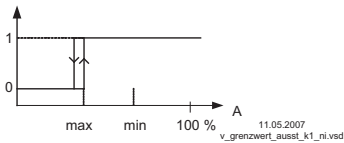## 8.5.1 Limit message modulation

Menu overview

Function	Designation
OFF Level Fuction	OFF: no function ON: limit message active The "Limit Uout" message appears in the display if the set limit value for modulation is exceeded. The message via the relay depends on the programmed function (see IO Setup), with the factory setting (K1 function = $\boxed{2K}$, not inverted) the relay is de-energised (terminals 13 - 14 disconnected).
0.0 V Level min. 10.0 V Level max.	If the modulation exceeds the set "Level max." value, this is reported until the set value "Level min." has been undercut. Setting range "Level min.": 0...10 V Setting range "Level max.": 10...0 V
2 s Level delay	The indication is delayed by the time set. Setting range: 0 - 120 sec. Factory setting: 2 sec.

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Example message by relay "K1":

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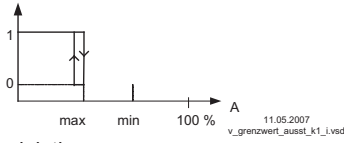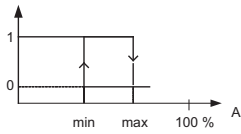
A   Modulation

A   Modulation

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

8.5.2 Limit message actual value

Menu overview

Function	Designation
OFF Actual Value Fnc	OFF: no function ON: limit message active The values "Value min." and "Value max." can be set independently of one another. The unit depends on the selected operating mode (**4..** / **5..**) and unit (metric / inch). Depending on the operating mode, the message "Limit Pressure" / "Limit AirVolume" appears in the display if the set limits for the actual value are exceeded or not reached. The message via the relay depends on the programmed function (see IO Setup), with the factory setting (K1 function = 2K , not inverted), the relay is de-energised in case of a message (terminals 13 - 14 disconnected).

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0 Pa / 0 m³/h *(in.wg / cfm)* Value min.	Work can be carried out with one as well as with both limit indicators. If the actual value undercuts the set value "Value min.", this is reported until the set value (plus 5 % hysteresis) has been exceeded once again.
0 Pa / 0 m³/h *(in.wg / cfm)* Value max.	If the actual value exceeds the set value "Value max.", this is reported until the set value (minus 5 % hysteresis) has been undercut once again.
2 s Value delay	The indication is delayed by the time set. Setting range: 0 - 120 sec. Factory setting: 2 sec.

i **Information**
Always set the value for "Value max." higher than the value for "Value min.".

Example for limit message actual value
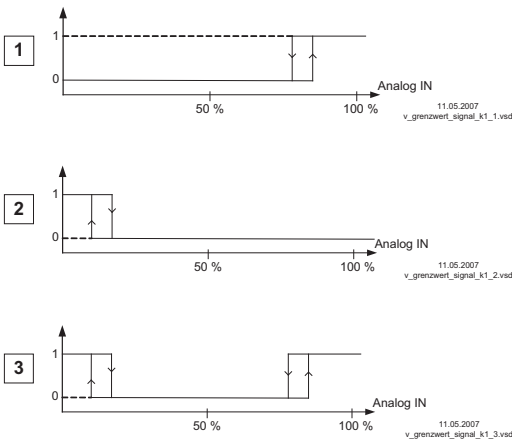
Settings
- Value Max.: 800 Pa
- Value Min.: OFF
- switching hysteresis 5 % (from 100 %)

Settings
- Value Min.: 200 Pa
- Value Max.: OFF
- switching hysteresis 5 % (from 100 %)

Settings
- Value Min.: 200 Pa
- Value Max.: 800 Pa
- switching hysteresis 5 % (from 100 %)

Message via relay "K1" (not inverted) IO Setup → K1 function: limit act val 5K

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8.5.3 Limit message outdoor temperature

Function is only available in operating modes **4.02** and **5.02**.

Menu overview

| Function	Designation
OFF Actual Temp Fnc	OFF: no function ON: limit message active The values "Temp min." and "Temp max" can be set independent of each other. The "Limit Temp." message appears in the display if the set limits for the outdoor temperature are exceeded or not reached. The message via the relay depends on the programmed function (see IO Setup), with the factory setting (K1 function = $\boxed{2K}$, not inverted), the relay is de-energised in case of a message (terminals 13 - 14 disconnected).
-50.0 °C *(-58.0°F)* Temp min. 150.0 °C *(302.0°F)* Temp max.	Work can be carried out with one as well as with both limit indicators. If the actual value undercuts the set value "Temp min.", this is reported until the set value (plus 5 % hysteresis) has been exceeded once again. If the actual value exceeds the set value "Temp max.", this is reported until the set value (minus 5 % hysteresis) has been undercut once again.
2 s Temp delay	The indication is delayed by the time set. Setting range: 0 - 120 sec. Factory setting: 2 sec.

i **Information**

Always set the value for "Temp max." higher than the value for "Temp min.".

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Examples for limit messages outdoor temperature
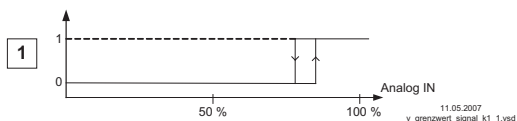
Settings
- Temp. Max.: 80 °C
- Temp. Min.: OFF
- switching hysteresis 5 % (from 100 %)
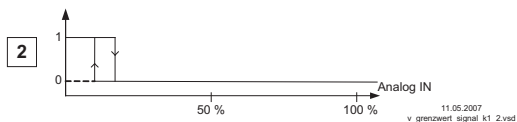
Settings
- Temp. Min.: 20 °C
- Temp. Max.: OFF
- switching hysteresis 5 % (from 100 %)
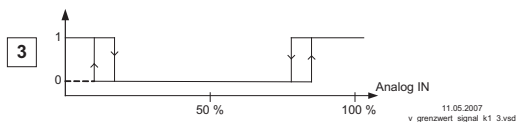
Settings
- Temp. Min.: 20 °C
- Temp Max.: 80 °C
- switching hysteresis 5 % (from 100 %)

Message via relay "K1" (not inverted) IO Setup → K1 function: Limit Temp 6K

8.6 Time switch

The device has a real time clock (not active in sensor operating modes). The clock is backed up (Gold Cap) and has a reserve of 2 or 3 days after sufficient operation on a voltage supply.
In principle, the timer function acts like a digital switch input (timer "On" ≙ 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").
The switch-on and switch-off times apply for every day of the week. If you set the timer switch-on time before the current time, the assigned function is executed immediately and continues until the switch-off time.

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").

Menu overview

Parameter	Designation
15:05 Time	**Time** **Press the P-key** and set the hours with the UP / DOWN keys, press the **P-key** to save. Now the minutes flash and can be set with the UP / DOWN keys, press the **P-key** to save.
25.09.17 Date	**Date** To set the date follow the same method as for "Time". The date setting consists of day,month and year. Example for: 25. September 2017 Entering the date is only required if automatic summer time adjustment is used.
OFF Summertime Auto	**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.
23:00 ON	**Turn-on time**
05:00 OFF	**Turn-off time**

i	**Information** Automatic daylight saving time only applies to countries in the Northern hemisphere. The time is put forward from 2:00 am to 3:00 am on the last Sunday in March and put back from 3:00 am to 2:00 am on the last Sunday in October. If other dates for the switch over between daylight saving time and winter time are required, the clock must be changed by hand (manually) on the respective date.

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8.7 MODBUS SLAVE

8.7.1 Address and interface parameters

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 "A (D+)", "B (D-)" of the MODBUS Slave interface (see installation / RS-485 interfaces for MODBUS RTU).

Menu overview

Function	Designation
247 Bus Address	**Bus Address** The device address is factory set to the highest available MODBUS address: 247. Setting range MODBUS Address: 1 - 247.
19200 UART Baudrate	**UART Baudrate** Setting transfer rate Valid values: 4800, 9600, 19200, 38400, 115200 Factory setting: 19200
8E1 UART Mode.	**UART Mode** Setting transfer format Valid values: 8N1, 8O1, 8E1, 8N2 Factory setting: 8E1

i **Information**
The MODBUS settings for baud rate and UART mode are only applied after a restart - to do this disconnect the voltage supply.

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8.7.2 MODBUS Register

8.7.2.1   Holding register

HR	Mode 4.			Mode 5.			Function/Setting
	00	01	02	00	01	02	
H00	x	x	x	x	x	x	0 = OFF 1 = Restore factory setting (delivery status)
H01		x	x		x	x	Input MODBUS, digital control bit wise* Digital inputs DI1-3 @ Bit 15, relay K1 @ Bit 14
H02	x	x	x	x	x	x	On register H23 Value 2 = Function 17A: Preset output voltage from analog output "AO" with assignment "A1": 0...100 ≙ 0...10 V
H03	x	x	x	x	x	x	Bus address: 1...247 @ Bit 8...15* UART baud rate: 4800, 9600, 19200, 38400, 115200 @ Bit 4...7* UART Mode: 8N1, 8O1, 8E1, 8N2 @ Bit 0...2*
H04	x	x	x	x	x	x	Mode: 0...5 ≙ **4.00** ... **5.02**
H05		x	x		x	x	Setpoint 1: 0...max. measuring range (Pa, in.wg, m^3/h, cfm)
H06		x	x		x	x	Setpoint 2: 0...max. measuring range (Pa, in.wg, m^3/h, cfm)
H07		x	x	x	x		Minimal output voltage: 0...100 ≙ 0...10 V
H08		x	x	x	x		Maximum output voltage: 0...100 ≙ 0...10 V
H10		x	x		x	x	Inverting IOs: AO1 @ Bit 6, DO1 @ Bit 7, DI1 @ Bit 13, DI2 @ Bit 14, DI3 @ Bit 15*
H13	x	x	x	x	x	x	DO1 function: 0 = OFF, 1 = 1K, 2 = 2K, 3 = 3K, 4 = 4K, 5 = 5K, 6 = 6K, 8 = 17K
H14	x	x	x	x	x	x	DO1 Signal: 0 = n.a. (no asignement), 1 = K1
H15		x	x		x	x	DI1 function: 0 = OFF, 1 = 1D, 2 = 2D, 3 = 5D
H16		x	x		x	x	DI1 Signal: 0 = n.a. (no asignement), 1 = D1, 1 = MODBUS, 3 = Timer
H17	x	x	x	x	x	x	MODBUS Watchdog*: Bit 7 activation = message via the relay in the event of a communication fault (factory setting "0" not activated) Bit 8...15 = time delay until message, setting range 03...64 ≙ 3...100 s (factory set 000A = 10 s)

HR	Mode 4.			Mode 5.			Function/Setting
	00	01	02	00	01	02	
H18		x	x		x	x	DI2 function: 0 = OFF, 1 = 2D, 2 = 2D, 3 = 5D
H19		x	x		x	x	DI2 Signal: 0 = n.a. (no asignement), 1 = D1, 2 = MODBUS, 3 = Timer
H20		x	x		x	x	DI3 function: 0 = OFF, 1 = 1D, 2 = 3D, 3 = 5D
H21		x	x		x	x	DI3 Signal: 0 = n.a. (no asignement), 1 = D1, 3 = MODBUS, 3 = Timer
H22		x	x		x	x	DI-DI Relation: 0 = AND, 1 = OR
H23	x	x	x	x	x	x	AO1 function: 0 = OFF, 1 = 2A, 2 = 17A
H24	x	x	x	x	x	x	AO1 signal: 0 = n.a. (no asignement), 1 = A1
H26	x	x	x	x	x	x	Limit message actual value: 0 = OFF, 1 = ON
H27	x	x	x	x	x	x	Minimum actual value: 0 ...max. measuring range (Pa, in.wg, m^3/h, cfm)
H28	x	x	x	x	x	x	Maximum actual value: 0 ...max. measuring range (Pa, in.wg, m^3/h, cfm)
H29	x	x	x	x	x	x	Time delay limit message actual value: 0...120 (s)
H30			x			x	Limit message outdoor temperature: 0 = OFF, 1 = ON
H31			x			x	Minimum temperature: -500 = OFF, -500...1500 ≙ -50.0...150.0 °C (-580 = OFF, -580...3020 ≙ -58.0...302.0 °F)
H32			x			x	Maximum temperature: 1500 = OFF, -500...1500 ≙ -50.0...150.0 °C (-580 = OFF, -580...3020 ≙ -58.0...302.0 °F)
H33			x			x	Time delay limit message actual value: 0...120 (s)
H34	x	x	x	x	x	x	Limit message output voltage: 0 = OFF, 1 = ON
H35	x	x	x	x	x	x	Minimal output voltage: 0 = OFF, 0...100 ≙ 0...10 V
H36	x	x	x	x	x	x	Maximum output voltage: 100 = OFF, 0...100 ≙ 0...10 V
H37	x	x	x	x	x	x	Time delay limit message output voltage: 0...120 (s)
H39			x	x	x	x	Nozzle coefficient (K-Factor): 1...max. value
H40	x	x		x	x		Control range: 0...max. measuring range (Pa, in.wg, m^3/h, cfm)
H41			x			x	Temperature range setpoint lowering: 0...1000 ≙ 0.0...100.0 °C (0...1800 ≙ 0.0...180.0 °F)

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HR	Mode 4. 00	Mode 4. 01	Mode 4. 02	Mode 5. 00	Mode 5. 01	Mode 5. 02	Function/Setting
H42			x		x		Start temperature setpoint lowering: -100...400 ≙ -10.0...40.0 °C (-140...1040 ≙ 14.0...104.0 °F)
H43			x		x		Minimum Setpoint: 0...max. measuring range (Pa, in.wg, m^3/h, cfm)
H44	x	x	x	x	x	x	Units of the display: 0 = SI units "metric", 1 = Imperial units (US) "inch"
H45	x	x	x	x	x	x	Measuring range: 0/1/2/3 ≙: 200/300/500/1000 Pa (0.8/1.2/2.0/4.0 in.wg)
H46			x		x		Temperature sensor type: 0 = KTY 81-210, 1 = PT 1000
H47	x	x	x	x	x	x	Automatic zero point adjustment pressure sensor: 0 = OFF, 1 = AutoZero
H48	x	x	x	x	x	x	Manual offset pressure sensor: +/-1000 (Pa), (+/- 4.000 (in.wg))
H49			x		x		Offset temperature sensor: -200...200 ≙ -20.0...20.0 °C (-360...360 ≙ -36.0...36.0 °F)
H51		x	x		x	x	Time: HIGHBYTE = hours, LOWBYTE = minutes
H52		x	x		x	x	Date: HIGHBYTE = month, LOWBYTE = day
H53		x	x		x	x	Year: 0...99 ≙ 2000...2099
H54		x	x		x	x	Automatic summer time: 0 = OFF, 1 = ON
H56		x	x		x	x	Turn-on time: HIGHBYTE = hours, LOWBYTE = minutes
H57		x	x		x	x	Turn-off time: HIGHBYTE = hours, LOWBYTE = minutes

*   *For bit-by-bit activation: Bit 15 = lowest value bit, Bit 0 = highest value bit*

Information

The registers HR00, HR01, HR02, HR47, HR51, HR52 and HR53 can be written as often as needed. For all other registers, write processes are limited to 10,000 (i.e. only use them for configuration purposes).

Value of the bits

			MSB										LSB		
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
0x8000	0x4000	0x2000	0x1000	0x0800	0x0400	0x0200	0x0100	0x0080	0x0040	0x0020	0x0010	0x0008	0x0004	0x0002	0x0001

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8.7.2.2   Input register

IR	Mode 4. 00	01	02	Mode 5. 00	01	02	Information
I00	x	x	x	x	x	x	Software version: 100 = 1.00
I01	x	x	x	x	x	x	Product code: 0h0508
I03	x	x	x	x	x	x	Unique device Signature 0...5
I04	x	x	x	x	x	x	Unique device Signature 0...5
I05	x	x	x	x	x	x	Unique device Signature 0...5
I06	x	x	x	x	x	x	Unique device Signature 0...5
I10		x	x		x	x	Operation status bit wise* for DI1-DI3, relay and timer: b15 = Timer, b14 = relay K1, b7 = DI1, b6 = DI2, b5 = DI3
I12	x	x	x	x	x	x	Device status decimal: 0 = no Error 1 = Enable 2 = Limit output voltage 3 = Limit actual value pressure 4 = Limit actual value volume flow 5 = Limit actual value temperature 6 = temperature sensor defect 7 = Pressure sensor defect
I23	x	x	x	x	x	x	Actual value temperature: -500...1500 ≜ -50.0...150.0 °C (-400...3020 ≜ -40.0...302.0 °F)
I26	x	x	x				Actual value pressure: 0... max measuring range (Pa, in.wg)
I26				x	x	x	Actual value volume flow: 0... max measuring range (m^3/h, cfm)
I27	x	x	x	x	x	x	Actual value output voltage: 0...100 ≜ 0...10 V
I28		x	x		x	x	Current Setpoint

For bit-by-bit evaluation: Bit 15 = lowest value bit, Bit 0 = highest value bit

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9 Enclosure

9.1 Technical data

Type	**PCA-2 1000D2**
Part-No.	93347 (320076-42)
Voltage supply	10...24 V DC (+20 %) Protected against reverse polarity

|	@ U_S 10 V DC	@ U_S 13...24 V DC
Max. load output 0...10 V (short-circuit-proof)	0.3 mA	10 mA
Max. current consumption ca.	28 mA	28 mA

Pressure connections "+, -"	Hose connectors d = 5 / 6 mm *(0.20 / 0.24 inch)*
Housing	PC (polycarbonate) Fire protection classification UL94V0
Use position	vertical (measuring depends on position)
Protection class	IP54 according EN 60529
Weight	approx. 250 g *(0.55 lb)*
Permissible ambient temperature	-10...60 °C *(14...140 °F)*
Permissible medium temperature	-10...70 °C *(14...158 °F)*
Permissible temperature range for storage and transport	-30...70 °C *(-22...158 °F)*
Permissible rel. humidity	85 % no condensation
One-sided permissible overload	0.1 bar *(80 in.wg)*
Burst prssure	at room temperature: 0.2 bar *(80 in.wg)*
	at 70 °C (158 °F): 0.15 bar *(60 in.wg)*
Maximum cross section of terminals	1.5 mm^2 / AWG16
Interference emission	according EN 61000-6-3 (domestic household applications)
Interference immunity	according EN 61000-6-2 (industrial applications)

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| Accuracy and measuring ranges		
Pressure measuring range max.		0...1000 Pa *(0...4.0 in.wg)*
Tolerance zero point max.*)	%	+/- 0.9
Tolerance full scale max.	%	+/- 1.3
Resolution	%	0.1
Total of linearity, hysteresis and repeatability max.	%	0.6
Long term stability according to DIN EN 60770	%	+/- 1.0
Temperature coefficient typical	% / 10K	+/- 0.2
Temperature coefficient max.	% / 10K	+/- 0.4
Temperature coefficient sensitivity typical	% / 10K	+/- 0.2
Temperature coefficient sensitivity max.	% / 10K	+/- 0.4
The accuracy data are percentages and refer to the maximum possible measuring range of the respective type. Test conditions: 25 °C, 45 % RH, voltage supply 12 VDC		

*)   *Calibration is possible to reduce the zero point error* ☞*zero point calibration*

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9.2 Connection diagram
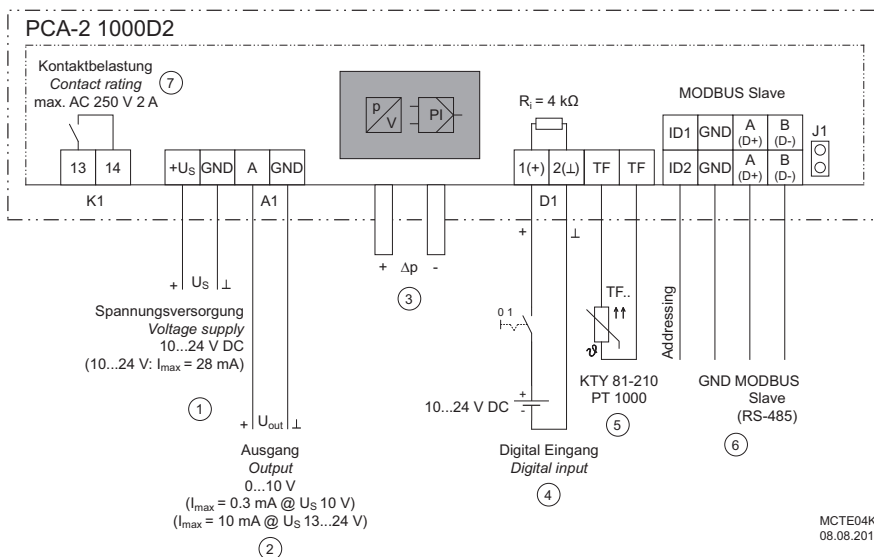
1 Voltage supply 10...24 V DC
2 Output 0...10 V
3 Pressure connections
4 digital input (voltage ON/OFF)
5 Outdoor temperature sensor KTY81-210 or PT 1000
6 MODBUS Slave interface RS-485 (J1 plugged = Bus terminating resistor 150 Ω active)
7 Contact rating max. AC 250 V 2 A

9.3 Dimensions [mm]

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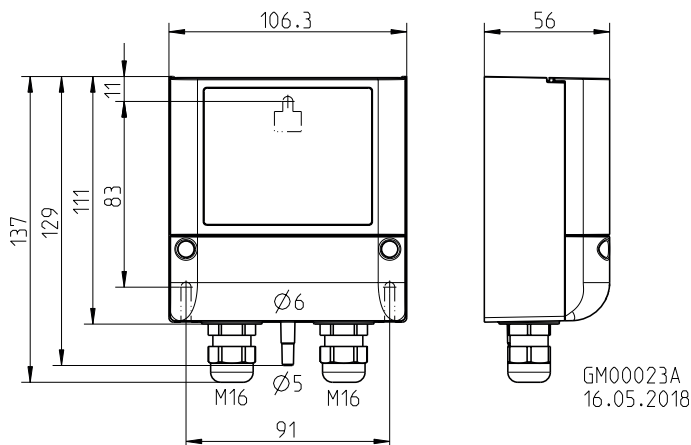
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9.4 Manufacturer reference C E

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

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